

# Service Manual



## 2715 Spectrum Analyzer Volume 1

**070-9096-06**

This document supports firmware version 12.01.95 and above.

**Warning**

The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries prior to performing service.

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# General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

*Only qualified personnel should perform service procedures.*

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

## To Avoid Fire or Personal Injury

**Use Proper Power Cord.** Use only the power cord specified for this product and certified for the country of use.

**Connect and Disconnect Properly.** Do not connect or disconnect probes or test leads while they are connected to a voltage source.

**Ground the Product.** This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

**Observe All Terminal Ratings.** To avoid fire or shock hazard, observe all ratings and marking on the product. Consult the product manual for further ratings information before making connections to the product.

The common terminal is at ground potential. Do not connect the common terminal to elevated voltages.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

**Do Not Operate Without Covers.** Do not operate this product with covers or panels removed.

**Use Proper Fuse.** Use only the fuse type and rating specified for this product.

**Avoid Exposed Circuitry.** Do not touch exposed connections and components when power is present.

**Wear Eye Protection.** Wear eye protection if exposure to high-intensity rays or laser radiation exists.

**Do Not Operate With Suspected Failures.** If you suspect there is damage to this product, have it inspected by qualified service personnel.

**Do Not Operate in Wet/Damp Conditions.**

**Do Not Operate in an Explosive Atmosphere.**

**Keep Product Surfaces Clean and Dry.**

**Provide Proper Ventilation.** Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

**Symbols and Terms**

**Terms in this Manual.** These terms may appear in this manual:



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**WARNING.** *Warning statements identify conditions or practices that could result in injury or loss of life.*

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**CAUTION.** *Caution statements identify conditions or practices that could result in damage to this product or other property.*

---

**Terms on the Product.** These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

**Symbols on the Product.** The following symbols may appear on the product:



WARNING  
High Voltage



Protective Ground  
(Earth) Terminal



CAUTION  
Refer to Manual



Double  
Insulated

# Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

**Do Not Service Alone.** Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

**Disconnect Power.** To avoid electric shock, switch off the instrument power, then disconnect the power cord from the mains power.

**Use Caution When Servicing the CRT.** To avoid electric shock or injury, use extreme caution when handling the CRT. Only qualified personnel familiar with CRT servicing procedures and precautions should remove or install the CRT.

CRTs retain hazardous voltages for long periods of time after power is turned off. Before attempting any servicing, discharge the CRT by shorting the anode to chassis ground. When discharging the CRT, connect the discharge path to ground and then the anode. Rough handling may cause the CRT to implode. Do not nick or scratch the glass or subject it to undue pressure when removing or installing it. When handling the CRT, wear safety goggles and heavy gloves for protection.

**Use Care When Servicing With Power On.** Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

**X-Radiation.** To avoid x-radiation exposure, do not modify or otherwise alter the high-voltage circuitry or the CRT enclosure. X-ray emissions generated within this product have been sufficiently shielded.





# Preface

This manual contains service information for the 2715 Spectrum Analyzer. The service information is located in two volumes. Volume 1 contains the maintenance procedures and parts lists. Volume 2 contains the component locators and schematic diagrams.

This manual is divided into the following sections.

- *Section 1: Specifications*, contains characteristic tables detailing *Electrical Characteristics*, *Mechanical Characteristics*, and *Environmental Characteristics*.
- *Section 2: Operating Information*, contains information on how to install and operate the product.
- *Section 3: Theory of Operation*, contains both a general and detailed circuit description of the various modules that make up the instrument.
- *Section 4: Performance Verification*, is a procedure to ensure, when passed, that the product operates properly and meets its advertised performance levels.
- *Section 5: Adjustment Procedures*, is a procedure to ensure that, when performed, the product can meet the performance levels for characteristics listed in *Section 1, Specifications*.
- *Section 6: Maintenance*, contains instructions for removal and replacement of internal modules or components.
- *Section 7: Options*, describes all options available for this instrument.
- *Section 8: Replaceable Electrical Parts*, is a list of replaceable assemblies and electrical components.
- *Section 9: Diagrams*, Refer to the 2715 Spectrum Analyzer Service Manual Volume 2.
- *Section 10: Replaceable Mechanical Parts*, is a list of replaceable assemblies and mechanical components. Exploded-view illustrations are included to relate assemblies to the parts list.

The following manuals are also available for the 2715 Spectrum Analyzer.

- *2715 User Manual* provides information necessary to operate the 2715 Spectrum Analyzer.
- *2714 & 2715 Programmer Manual* includes all GPIB commands, queries, and responses for the instrument.
- The *Cable TV RF Measurement Software Manual* describes how to use the Cable TR RF Measurements Software, a test system that measures cable TV parameters.

## Contacting Tektronix

<b>Phone</b>	1-800-833-9200*
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<b>Web site</b>	<a href="http://www.tektronix.com">www.tektronix.com</a>
<b>Sales support</b>	1-800-833-9200, select option 1*
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<b>Technical support</b>	Email: <a href="mailto:techsupport@tektronix.com">techsupport@tektronix.com</a> 1-800-833-9200, select option 3* 6:00 a.m. - 5:00 p.m. Pacific time

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\* **This phone number is toll free in North America. After office hours, please leave a voice mail message. Outside North America, contact a Tektronix sales office or distributor; see the Tektronix web site for a list of offices.**

# Specifications

This section lists the electrical, physical, and environmental characteristics of the spectrum analyzer, specifies the performance requirements for those characteristics, and provides supplementary information.

## Electrical Characteristics

Unless otherwise stated, the following tables of electrical characteristics and features apply to the spectrum analyzer after a 15 minute warm-up period (within the environmental limits) and after all normalization procedures have been carried out.

Information in the Performance Requirement column of Tables 1-2 through 1-8 is guaranteed and verifiable unless otherwise noted. Supplemental Information is intended to further explain a characteristic, its performance requirement, or to describe characteristic performance that is impractical to verify. Supplemental Information is not guaranteed and may not be supported by a performance check procedure.

Changes to a characteristic because of the addition of an option are included in Table 1-7.

**Table 1- 1: CATV Characteristics**

Characteristic	Description
Input Configuration	
All except Option 50	75 Ω Female F connector
Option 50	50 Ω Type N connector
Channel Selection	The visual and aural carriers are displayed when the channel number is entered, or either [ ▲ ] or [ ▼ ] next to [CHAN/FREQ] is pressed
Tune Configuration	STD (73.603), HRC (73.605), IRC (73.612), and Custom <sup>1</sup>
Channel Range	0 to 999 <sup>1</sup>
Frequency Range (except Opt 50 and Opt 75)	1 MHz to 1.8 GHz <sup>2</sup> , Preamp limited to 600 MHz
Frequency Range (Opt 50 and Opt 75)	1 MHz to 2.15 GHz <sup>2</sup> , Preamp limited to 600 MHz
Visual Carrier Frequency Measurement	Accuracy is dependent on the accuracy of the spectrum analyzer — see Frequency Accuracy in Table 1-2.
Method	Internal Counter
Resolution	1 Hz
Accuracy	5 × 10 <sup>-7</sup> × Carrier Frequency ±10 Hz, ±1 Least Significant Digit @ 55.25 MHz (Ch 2) worst case is ±38 Hz @ 325.25 MHz (Ch 41) worst case is ±173 Hz @ 643.25 MHz (Ch 94) worst case is ±332 Hz
Visual-to-Aural Carrier Frequency Measurement	Aural carrier measured relative to the visual carrier
Method	Internal Counter
Difference Range	1 MHz to 10 MHz <sup>3</sup> for an amplitude difference of ≤30 dB and aural C/N ≥15 dB (300 kHz RBW)
Resolution	1 Hz
Accuracy	±15 Hz for visual-to-aural carrier difference ≤8 MHz
Visual Carrier Peak Level Measurement	Absolute peak amplitude of visual carrier measured with PREAMP OFF
Accurate Frequency and Amplitude	Visual carrier frequency measurement Visual-to-aural carrier frequency measurement Visual carrier peak level measurement Visual-to-aural carrier level difference measurement
Accurate Amplitude Only	Visual carrier peak level measurement Visual-to-aural carrier level difference measurement
Fast Amplitude Only	Carrier amplitudes are measured using marker values in 10 dB/div vertical scale
Amplitude Range	-18 dBmV to +58.8 dBmV <sup>4</sup> for visual C/N ≥30 dB (300 kHz RBW)

<sup>1</sup> Configured using Cable TV RF Measurements Software.

<sup>2</sup> Dependent on selected channel table. Frequencies above 1.8 GHz are not supported by the Cable TV RF Measurements Software.

<sup>3</sup> Dependent on selected channel table.

<sup>4</sup> Total input power (all signals included) cannot exceed +70 dBmV.

Table 1-1: CATV Characteristics (Cont.)

Characteristic	Description
Frequency Range	15 to 1015 MHz
Resolution	0.1 dB
Absolute Accuracy	$\pm 2.5$ dB for visual C/N $\geq 30$ dB (300 kHz RBW) and for FM signal C/N $\geq 33$ dB (100 kHz RBW) assumes flatness corrections are present
Relative Accuracy	$\pm 0.5$ dB relative to adjacent channel $\pm 1.2$ dB relative to all other channels
Visual-to-Aural Carrier Level Difference Measurement	Aural carrier level measured relative to the visual carrier
Difference Range	0 to 30 dB for aural C/N $\geq 15$ dB (300 kHz RBW)
Resolution	0.1 dB
Accuracy	$\pm 0.75$ dB for aural C/N $\geq 15$ dB (300 kHz RBW)
Averaged Power (Typical)	Averaged amplitude measured with preamp off
Accuracy	$\pm 2.5$ dB for input levels above -30 dBmV, up to +37 dBmV (multichannel) or +52 dBmV (preselector in use)
Resolution	0.1 dB
Modulation Depth Measurement (Typical)	Percent AM measured from sync tip to lowest white level found in 10 sweeps (the VITS line is used if it is defined in the channel table)
AM Range	50% to 95%
Resolution	0.1%
Accuracy	$\pm 2\%$ for visual C/N $\geq 40$ dB (300 kHz RBW)
HUM/LFD Measurement (Typical)	Power line frequency is measured on an unmodulated visual carrier, and low frequency disturbance (LFD) is measured on the modulated carrier
AM Range	1% to 10% peak-to-peak
Resolution	0.1%
Accuracy	$\pm 1\%$ for Hum $\leq 5\%$ and visual C/N $\geq 25$ dB (300 kHz RBW) $\pm 2\%$ for Hum $< 10\%$ and visual C/N $\geq 25$ dB (300 kHz RBW)
Carrier-to-Noise (C/N) Measurement (Typical)	Default noise floor is a normalized 4 MHz bandwidth measured relative to the visual carrier peak
Optimum Input Range	See Figure 1-1 on page 1-7
Maximum Range	See Figure 1-1 on page 1-7
Resolution	0.3 dB
Accuracy	See Figure 1-1 on page 1-7
In-Service C/N (typical)	Noise density is measured at 2 MHz offset (by default) from visual carrier during quiet lines in the vertical interval, then normalized to 4 MHz BW and expressed as dBc
Optimum Input Range	See Figure 1-1 on page 1-7
Maximum Range	See Figure 1-1 on page 1-7
Resolution	0.3 dB

**Table 1-1: CATV Characteristics (Cont.)**

Characteristic	Description
Accuracy	See Figure 1-1 on page 1-7
Desired-to-Undesired Ratio (Typical)	Channel averaged power is divided by total noise plus distortion in the channel
Resolution	0.1 dB
Accuracy	±2 dB within the limits shown in Figure 1-6 on page 1-9
CTB Measurement (Typical)	Composite triple beat (CTB) is measured relative to the visual carrier peak according to the NCTA recommended spectrum analyzer settings — SINGLE-SWEEP mode does not use all the NCTA recommended settings
Maximum Range	See Figure 1-2 on page 1-7
Resolution	0.3 dB
Accuracy	See Figure 1-2 on page 1-7
Digital Channel CTB (Typical)	Measured relative to the averaged power of the test channel
Resolution	0.3 dB
Accuracy	±2 dB within the limits shown in Figure 1-8 on page 1-10
CSO Measurement (Typical)	Composite second order (CSO) is measured relative to the visual carrier peak according to the NCTA recommended spectrum analyzer settings — SINGLE-SWEEP and CONTINUOUS modes do not use all the NCTA recommended settings
Optimum Input Range	See Figure 1-3 on page 1-8
Maximum Range	See Figure 1-3 on page 1-8
Resolution	0.3 dB
Accuracy	See Figure 1-3 on page 1-8
In-Service CSO (Typical)	CSO products are measured per NCTA recommendations during quiet lines in the vertical interval, then expressed as dBc
Optimum Input Range	See Figure 1-4 on page 1-8
Maximum Range	See Figure 1-4 on page 1-8
Resolution	0.3 dB
Accuracy	See Figure 1-4 on page 1-8
Digital Channel CSO (Typical)	Measured relative to the averaged power of the test channel
Resolution	0.3 dB
Accuracy	±2.0 dB within the limits shown in Figure 1-7 on page 1-10
Frequency Response Measurement (Typical)	For fixed-amplitude scrambling or no scrambling, system amplitude variations (flatness) are measured relative to a reference trace (stored during the frequency response reference setup)
Reference Trace Storage (Nonvolatile)	Up to 10 traces with spectrum analyzer states
Range	5 dB/div, fixed
Resolution	0.2 dB
Trace Flatness Accuracy	±0.75 dB

Table 1-1: CATV Characteristics (Cont.)

Characteristic	Description
Carrier Survey	Absolute peak amplitude of each visual carrier measured and each associated aural carrier level measured relative to the measured visual carrier for the selected channels — characteristics are identical to the frequency (visual and aural) and level measurements (frequency is counted only if ACCURATE FREQUENCY AND AMPL is on)
Accurate Frequency and Amplitude	Visual carrier frequency measurement Visual-to-aural carrier frequency measurement Visual carrier peak level measurement Visual-to-aural carrier level difference measurement
Accurate Amplitude Only	Visual carrier peak level measurement Visual-to-aural carrier level difference measurement
Fast Amplitude Only	Carrier amplitudes are measured using marker values in 10 dB/div vertical scale
Visual Carrier	
Amplitude Range	-18 dBmV to +58.8 dBmV <sup>5</sup> for C/N ≤30 dB (300 kHz RBW)
Frequency Range	15 MHz to 1015 MHz
Resolution	0.3 dB
Absolute Accuracy	±2.7 dB for visual C/N ≥30 dB (300 kHz RBW) and for FM signal C/N ≥33 dB (100 kHz RBW) assumes flatness corrections are present
Relative Accuracy	±0.8 dB relative to adjacent channel ±1.5 dB relative to all other channels
Aural Carrier	
Difference Range	0 to 30 dB for C/N ≥15 dB (300 kHz RBW)
Resolution	0.3 dB
Accuracy	±1.1 dB for C/N ≥15 dB (300 kHz RBW)
Aural <FM> Deviation (Typical)	Peak FM deviation measured for the selected channel
Range	10 kHz to 50 kHz, usable to 80 kHz
Accuracy	±4 kHz
Cross Modulation (Typical)	The third order distortion at the horizontal sync frequency (AM) measured on the unmodulated visual carrier, as corrected to the NCTA recommended synchronous square wave modulation procedure
Range	48 dB
Resolution	0.1 dB
Accuracy	±2 dB for cross modulation < 36 dB ±3 dB for cross modulation < 48 dB
Listen (Typical)	The aural carrier for the selected channel is demodulated
Output	Speaker or headphones with volume control
Demodulation Type	FM
Sweep	Displays instantaneous peak FM deviation

<sup>5</sup> Total input power (all signals included) cannot exceed +70 dBmV.

**Table 1-1: CATV Characteristics (Cont.)**

<b>Characteristic</b>	<b>Description</b>
View Picture (Typical)	The visual carrier, NTSC or PAL format depending on the selected channel, is demodulated
View Modulation (Field) (Typical)	One video field of the selected channel video is displayed
View Modulation (Line) (Typical)	The VITS line is displayed — if no VITS line is specified in the channel table, line 17 is displayed
TV Line Selection	Selectable using the FREQ/MKRS knob during View Line Modulation function
Line Format	NTSC or PAL
Line Range	1 to 525 (NTSC), 1 to 625 (PAL)
Sweep Time	10 $\mu$ s/div
In-Channel Response	
Range	$\pm 3$ dB (the auto test is run in 1 dB/div)
Resolution	0.1 dB
Accuracy	$\pm 0.5$ dB, Auto mode $\pm 0.8$ dB, Interactive mode
Adjacent Channel Leakage (Typical)	Averaged power in adjacent channel(s) is divided by averaged power for the test channel
Resolution	0.1 dB
Accuracy	$\pm 2.0$ dB within limits shown in Figure 1-5 on page 1-9
In-Service In-Channel Response (Typical)	Standard vertical interval test signal (line sweep, ghost-canceller, multiburst) is measured within gate which excludes active video; result is expressed as dB P-P
Resolution	0.2 dB
Accuracy	$\pm 0.5$ dB assuming test signal is flat at head end



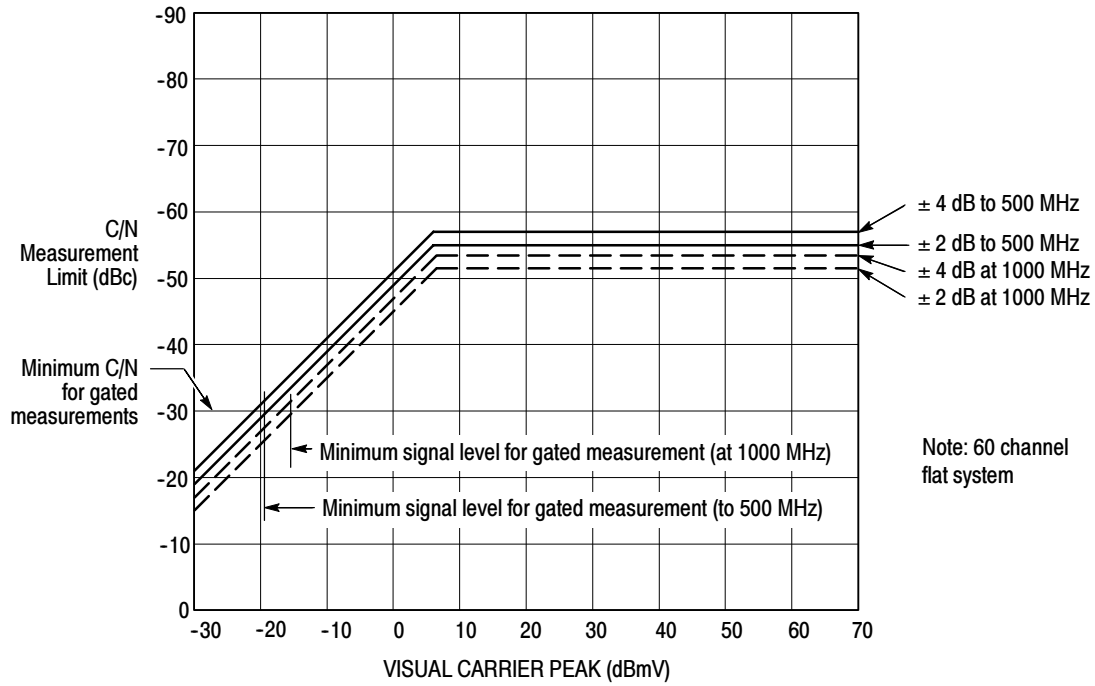


Figure 1-1: Typical Accuracy Limits for Carrier-to-Noise Measurement

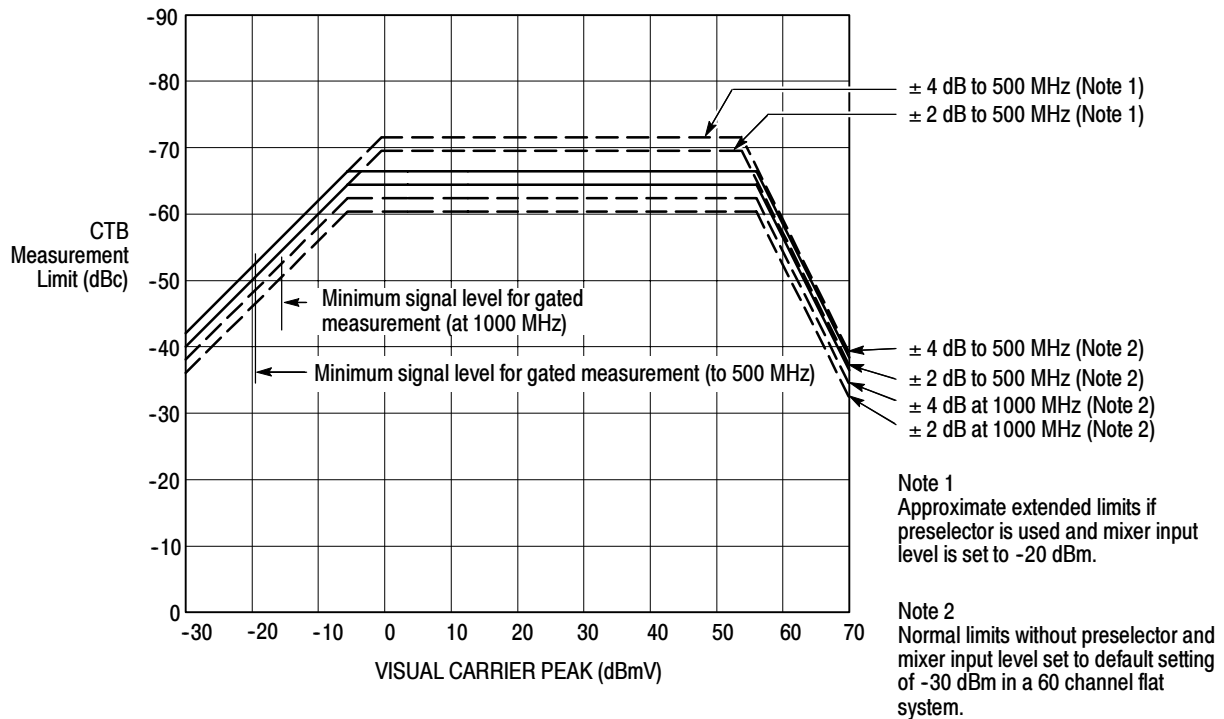


Figure 1-2: Typical Accuracy Limits for CTB Measurement

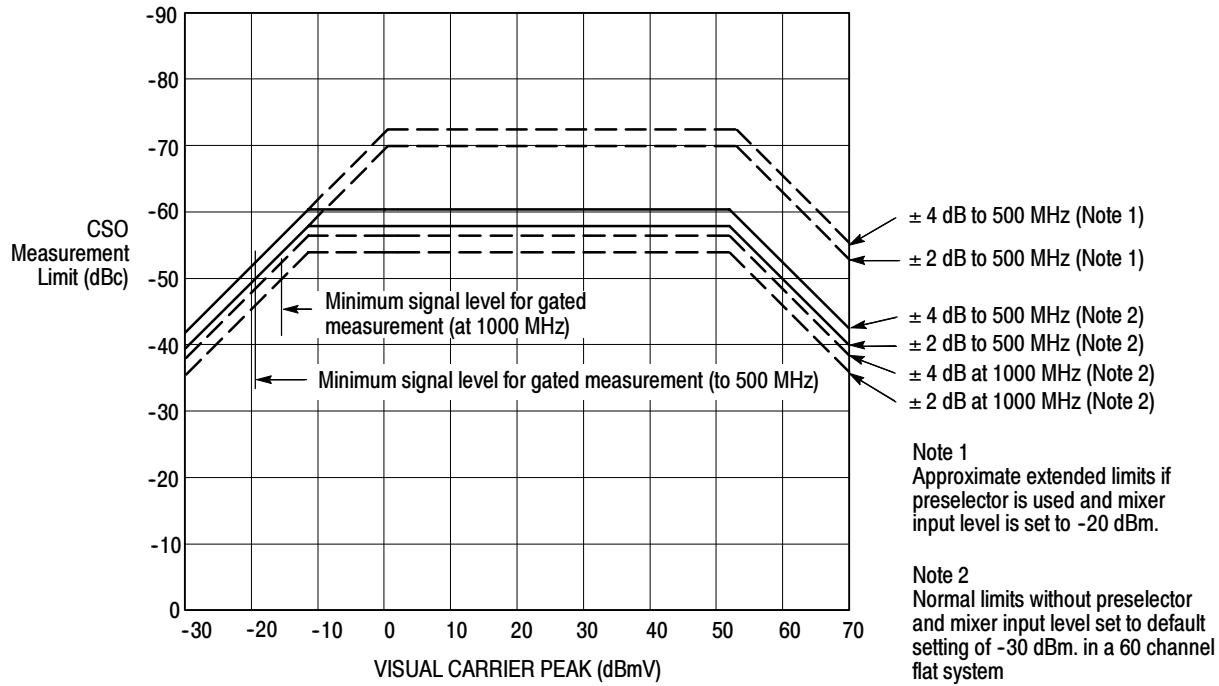


Figure 1-3: Typical Accuracy Limits for Nongated CSO Measurement

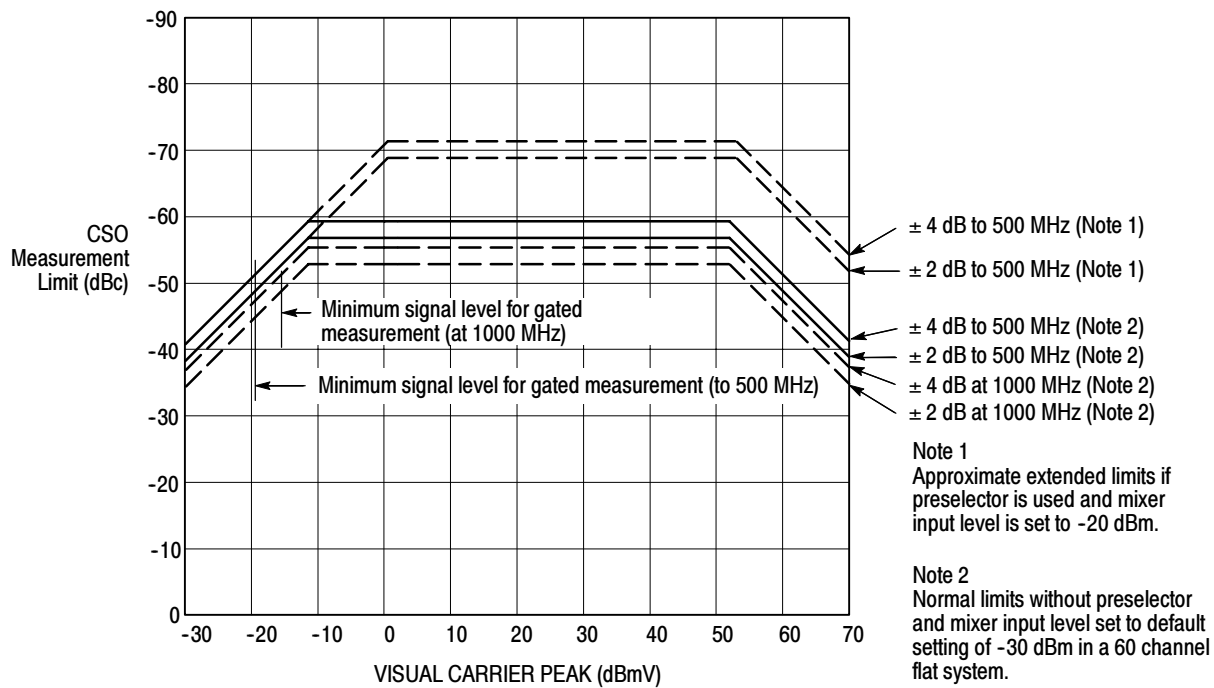


Figure 1-4: Typical Accuracy Limits for Gated CSO Measurement

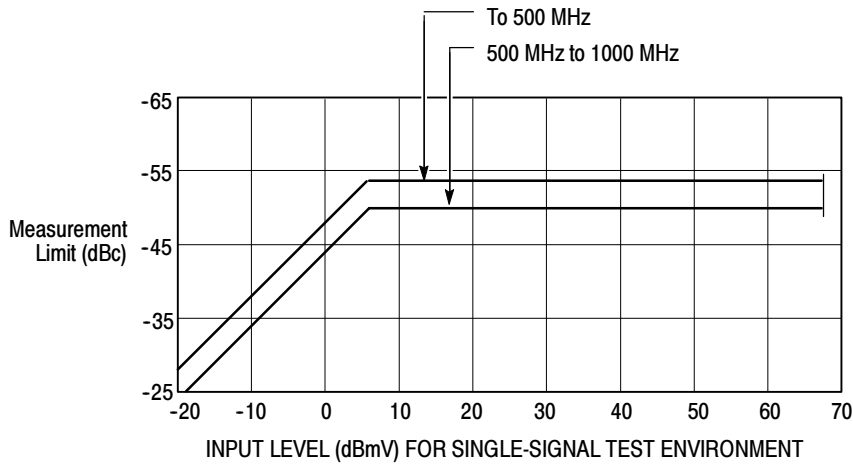


Figure 1-5: Typical ACL Measurement Limits for 2 dB Accuracy

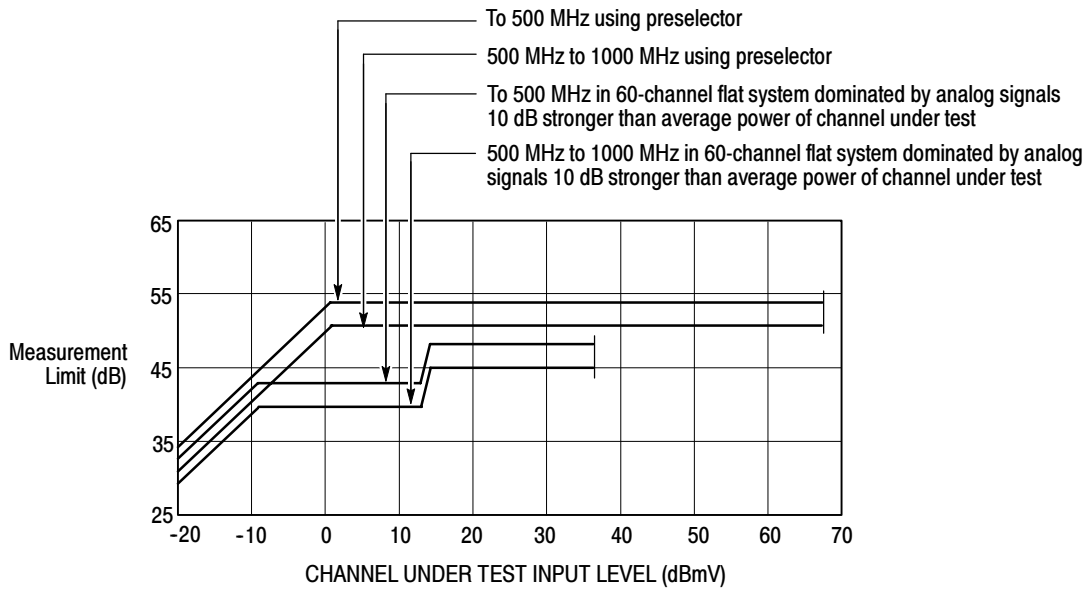


Figure 1-6: Typical D/U Measurement Range Limits for 2 dB Accuracy

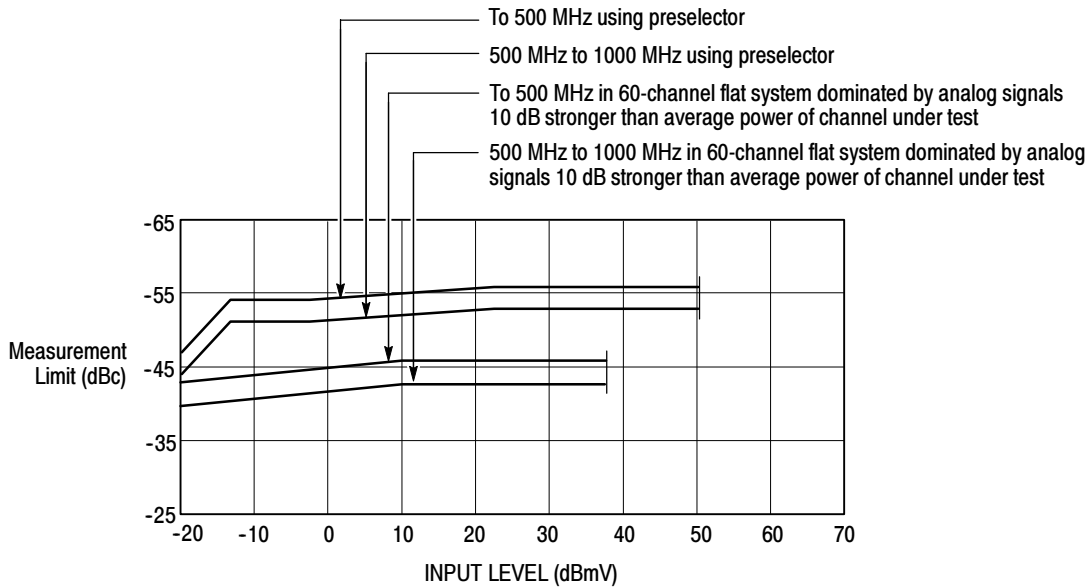


Figure 1-7: Typical Digital Signal CSO Measurement Range Limit for 2 dB Accuracy

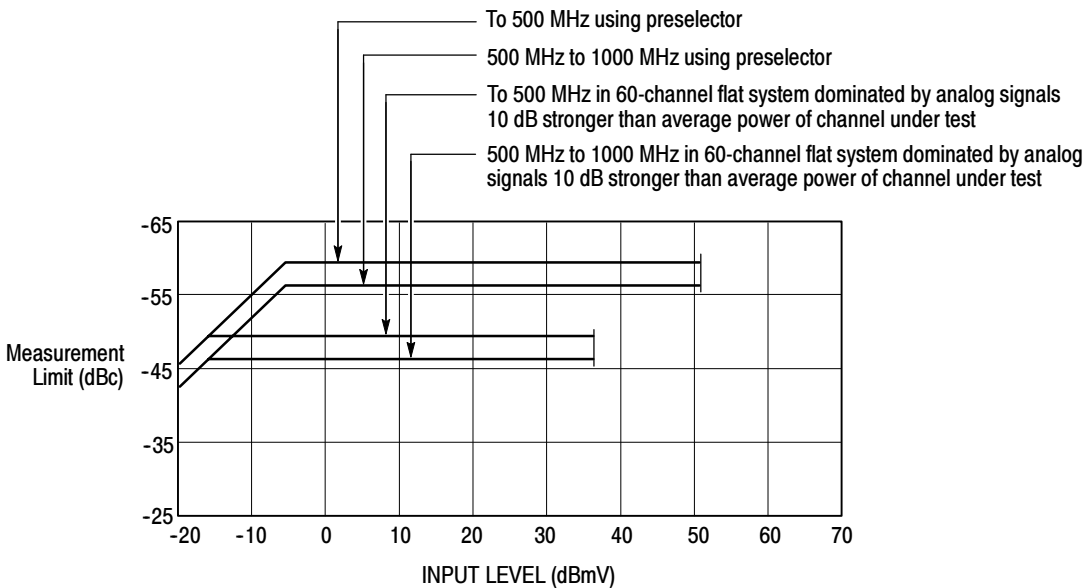


Figure 1-8: Typical Digital Signal CTB Measurement Range Limit for 2 dB Accuracy

Table 1-2: Frequency-Related Characteristics

Characteristic	Performance Requirement	Supplemental Information
Channel		Tuned with keypad, <b>[CHAN/FREQ]</b> [▲], or <b>[CHAN/FREQ]</b> [▼], according to the selected channel table
Frequency Range	All except Option 50 and Option 75: 9 kHz to 1.8 GHz Option 50 and Option 75: 9 kHz to 2.15 GHz	Tuned with keypad, <b>[CHAN/FREQ]</b> [▲], <b>[CHAN/FREQ]</b> [▼], FREQ/MARKERS knob, UTIL menu, or MKR/FREQ menu
Accuracy	$5 \times 10^{-7}$ of center frequency $\pm 10$ Hz $\pm 1$ least significant digit	Assumes zero drift since last normalization procedure
Drift Long Term (One Year)		$\pm 2$ PPM/year
Short Term (SPAN/DIV $\leq 20$ kHz)	All except Option 50 and Option 75: $\leq 400$ Hz up to 1.8 GHz Option 50 and Option 75: 500 Hz above 1.8 GHz	With frequency corrections enabled
Readout Resolution		1 kHz or 1 Hz (counter readout), menu selectable
Frequency Span/Div Range		Using <b>[SPAN/DIV]</b> [▲] and <b>[SPAN/DIV]</b> [▼] buttons, selections in a 1-2-5 sequence Using the keypad or UTIL menu, select any value from 100 MHz/div to 1 kHz/div. In MAXSPAN, 180 MHz/div (All except Option 50 and Option 75) or 215 MHz/div (Option 50 and Option 75) In ZERO SPAN, 0 Hz/div
Accuracy/Linearity	Within 3%	Measured over the center 8 divisions
Flatness (Relative to the Reference Level at 100 MHz)	All instruments: $\pm 2$ dB 9 KHz to 1.8 GHz Option 50 and Option 75: $\pm 3$ dB above 1.8 GHz	Measured with 10 dB of RF Attenuation and PREAMP off Flatness is affected by: <ul style="list-style-type: none"> <li>■ Input voltage standing-wave ratio (VSWR)</li> <li>■ Gain variation</li> <li>■ Mixer conversion</li> </ul>

**Table 1-2: Frequency-Related Characteristics (Cont.)**

Characteristic	Performance Requirement	Supplemental Information
Residual FM With SPAN/DIV $\leq 20$ kHz	All except Option 50 and Option 75: $\leq 100$ Hz peak-to-peak total excursion in 20 ms up to 1.8 GHz Option 50 and Option 75: $\leq 120$ Hz peak-to-peak total excursion in 20 ms (above 1.8 GHz)	Short term, after 1 hr warm-up, and with PHASELOCK in AUTO mode
With SPAN/DIV $> 20$ kHz	All except Option 50 and Option 75: $\leq 2$ kHz peak-to-peak total excursion in 20 ms up to 1.8 GHz Option 50 and Option 75: $\leq 2.4$ KHz peak-to-peak total excursion in 20 ms above 1.8 GHz	
Resolution Bandwidth (6 dB down)		Resolution bandwidth selections are: 5 MHz, 1 MHz, 300 kHz, 100 kHz, 30 kHz, 10 kHz, 3 kHz, 1 kHz, and 300 Hz for the spectrum analyzer
Shape Factor (60 dB/6 dB)	7:1 or less for all resolution bandwidths $\leq 1$ MHz	
Noise Sidebands	All except Option 50 and Option 75: $\leq -70$ dBc at 30X Resolution Bandwidth for all resolution bandwidths $\leq 100$ kHz Option 50 and Option 75: $\leq -69$ dBc at 30X Resolution Bandwidth for all resolution bandwidths $\leq 100$ kHz	
Video Filter		Reduces video bandwidth to about 1% of the selected resolution bandwidth; or one of 12 video filters (3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, or WIDE) can be selected from the UTIL menu

Table 1-2: Frequency-Related Characteristics (Cont.)

Characteristic	Performance Requirement	Supplemental Information
Resolution Bandwidth (6 dB down)		Resolution bandwidth selections are: 5 MHz, 1 MHz, 300 kHz, 100 kHz, 30 kHz, 10 kHz, 3 kHz, 1 kHz, and 300 Hz for the spectrum analyzer
Shape Factor (60 dB/6 dB)	7:1 or less for all resolution bandwidths $\leq 1$ MHz	
Noise Sidebands	$\leq -70$ dBc at 30X Resolution Bandwidth for all resolution bandwidths $\leq 100$ kHz	
Video Filter		Reduces video bandwidth to about 1% of the selected resolution bandwidth; or one of 12 video filters (3 Hz, 10 Hz, 30 Hz, 100 Hz, 300 Hz, 1 kHz, 3 kHz, 10 kHz, 30 kHz, 100 kHz, 300 kHz, or WIDE) can be selected from the UTIL menu

Table 1-3: Frequency/Amplitude Related Characteristics

Characteristic	Performance Requirement	Supplemental Information
Marker		The frequency and amplitude values of the marker position are displayed and are preceded by the letter <b>M</b>  [MKR] [ $\blacktriangleright$ ] and [MKR] [ $\blacktriangleleft$ ] position the marker to the next right or left signal peak, respectively
Accuracy		
Frequency		Same as SPAN/DIV
Amplitude		A function of the reference level, vertical scale factor, and normalizations (see <i>Display Dynamic Range</i> on page 1-15)  Also, flatness corrections while in CATV mode for range of 15 MHz to 1.105 GHz
Delta Marker	When activated, a second marker is displayed at the same frequency as the first marker. This is the "Reference Marker"	The FREQ/MARKERS control may be used to position the first marker; the frequency and amplitude differences between markers are readouts preceded by the letter <b>D</b>
Accuracy		
Frequency	1 PPM $\pm 10$ Hz of the higher marker frequency	With both signals counted
Amplitude		Same as Marker

**Table 1-3: Frequency/Amplitude Related Characteristics (Cont.)**

Characteristic	Performance Requirement	Supplemental Information
Center Measure		When activated, the signal nearest center screen (or nearest marker if marker is on) and above a preset threshold level, is moved to center screen  The frequency and amplitude values are preceded by the letter C
Readout Resolution	1 kHz or 1 Hz	Readout resolution is selectable
Signal Tracking		When activated, the centered signal is held at center screen  Signal tracking requires a signal strength greater than the threshold level  If the strength of a signal being tracked decreases below the threshold level, the instrument displays the message NO SIGNAL FOUND ABOVE THRESHOLD

**Table 1-4: Amplitude-Related Characteristics**

Characteristic	Performance Requirement	Supplemental Information
Vertical Display Mode		10 dB/div, 5 dB/div, 1 dB/div, and Linear
Reference Level		
Range		Top of graticule
Log Mode		-21.2 dBmV to +68.8 dBmV (-41.2 dBmV to +48.8 dBmV with the PREAMP enabled)
Linear Mode		10.83 $\mu$ V/div to 342.33 mV/div (1.08 nV div to 34.23 mV/div with the PREAMP enabled)
Steps		
Log Mode		1 dB or 10 dB
Linear Mode		1-2-5 sequence: 10.83 $\mu$ V/div to 342.33 mV/div
FINE REF LVL STEP Activated		$\geq 0.2$ division per increment
Accuracy		Dependent on: <ul style="list-style-type: none"> <li>■ Normalizations</li> <li>■ Calibrator accuracy</li> <li>■ Frequency response</li> </ul>



Table 1-4: Amplitude-Related Characteristics (Cont.)

Characteristic	Performance Requirement	Supplemental Information																				
Display Dynamic Range	All except Option 50 and Option 75: 80 dB maximum (Log) 8 divisions (Linear)	Log Mode Display Dynamic Range is dependent upon the selected Resolution Bandwidth.  The accuracy specifications apply for amplitude measurements done with the marker only, since marker measurements are corrected for logging errors.  Option 50 and Option 75: Baseline will rise to indicated value, typically 10 dB to 20 dB below signal level applied near frequency of 2.11 GHz. Display Dynamic Range is reduced if there is signal energy at or near 2.11 GHz.																				
Accuracy 10 dB/div Mode	$\pm 1.0$ dB/10 dB to a maximum cumulative error of $\pm 2.0$ dB over the 70 dB range and a maximum cumulative error of $\pm 4.0$ dB over the 80 dB range	10 dB/div accuracy and range is affected by the signal-to-noise ratio of the selected Resolution Bandwidth filter. See following table for maximum specified range.																				
		<table border="1"> <thead> <tr> <th>Resolution Bandwidth</th> <th>dB Down</th> </tr> </thead> <tbody> <tr> <td>5 MHz</td> <td>40</td> </tr> <tr> <td>1 MHz</td> <td>40</td> </tr> <tr> <td>300 kHz</td> <td>50</td> </tr> <tr> <td>100 kHz</td> <td>50</td> </tr> <tr> <td>30 kHz</td> <td>60</td> </tr> <tr> <td>10 kHz</td> <td>60</td> </tr> <tr> <td>3 kHz</td> <td>80</td> </tr> <tr> <td>1 kHz</td> <td>80</td> </tr> <tr> <td>300 Hz</td> <td>80</td> </tr> </tbody> </table>	Resolution Bandwidth	dB Down	5 MHz	40	1 MHz	40	300 kHz	50	100 kHz	50	30 kHz	60	10 kHz	60	3 kHz	80	1 kHz	80	300 Hz	80
Resolution Bandwidth	dB Down																					
5 MHz	40																					
1 MHz	40																					
300 kHz	50																					
100 kHz	50																					
30 kHz	60																					
10 kHz	60																					
3 kHz	80																					
1 kHz	80																					
300 Hz	80																					
5 dB/div Mode	$\pm 1.0$ dB/10 dB to a maximum cumulative error of $\pm 2.0$ dB over the 40 dB range																					
1 dB/div Mode	$\pm 1$ dB maximum error over the 8 dB range																					
Linear Mode	$\pm 5\%$ of full scale																					
RF Attenuator Range		0 to 50 dB in 2 dB steps																				

**Table 1-4: Amplitude-Related Characteristics (Cont.)**

Characteristic	Performance Requirement			Supplemental Information
Sensitivity without Preamp				Equivalent maximum input noise for each resolution bandwidth.
Resolution Bandwidth	@110 MHz	@ 1.8 GHz	@ 2.15 GHz*	
5 MHz	-36 dBmV (-85 dBm)	-28 dBmV (-77 dBm)	-26 dBmV (-75 dBm)	*Performance measurements above 1.8 GHz refer to the Option 50 and Option 75 instruments only.
1 MHz	-43 dBmV (-92 dBm)	-35 dBmV (-84 dBm)	-33 dBmV (-82 dBm)	
300 kHz	-48 dBmV (-97 dBm)	-40 dBmV (-89 dBm)	-38 dBmV (-87 dBm)	Sensitivity decreases linearly approximately 8 dB from 9 KHz to 1.8 GHz. Above 1.8 GHz sensitivity decreases linearly approximately 10 dB.
100 kHz	-53 dBmV (-102 dBm)	-45 dBmV (-94 dBm)	-43 dBmV (-92 dBm)	
30 kHz	-58 dBmV (-107 dBm)	-50 dBmV (-99 dBm)	-48 dBmV (-97 dBm)	<b>NOTE:</b> Sensitivity degrades as the FREQUENCY setting is decreased from approximately 10 MHz to 9 kHz. Maximum loss in sensitivity is approximately 20 dB.
10 kHz	-63 dBmV (-112 dBm)	-55 dBmV (-104 dBm)	-53 dBmV (-102 dBm)	
3 kHz	-68 dBmV (-117 dBm)	-60 dBmV (-109 dBm)	-58 dBmV (-107 dBm)	
1 kHz	-73 dBmV (-122 dBm)	-65 dBmV (-114 dBm)	-63 dBmV (-112 dBm)	
300 Hz	-78 dBmV (-127 dBm)	-70 dBmV (-119 dBm)	-68 dBmV (-117 dBm)	
Sensitivity with Preamp				<b>NOTE.</b> Sensitivity with the Preamp enabled is not specified above 600 MHz.
Resolution Bandwidth	@110 MHz	@ 1.8 GHz and 2.15 GHz		
5 MHz	-48 dBmV (-95 dBm)	Not Specified		
1 MHz	-55 dBmV (-104 dBm)	Not Specified		
300 kHz	-60 dBmV (-109 dBm)	Not Specified		
100 kHz	-65 dBmV (-114 dBm)	Not Specified		
30 kHz	-70 dBmV (-119 dBm)	Not Specified		
10 kHz	-75 dBmV (-124 dBm)	Not Specified		
3 kHz	-80 dBmV (-129 dBm)	Not Specified		
1 kHz	-85 dBmV (-134 dBm)	Not Specified		
300 Hz	-90 dBmV (-139 dBm)	Not Specified		

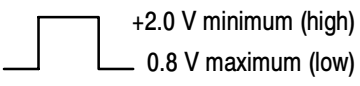
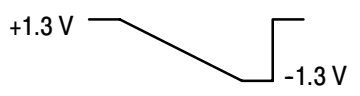
Table 1-4: Amplitude-Related Characteristics (Cont.)

Characteristic	Performance Requirement	Supplemental Information
Spurious Responses Residual (no input signal)	All except Option 50 and Option 75: ≤ -51 dBmV (≤ -100 dBm) except at 1780 MHz where the spurious response is ≤ -41 dBmV (≤ -90 dBm). Option 50 and Option 75: ≤ -26 dBmV (≤ -75 dBm) at 2.0 GHz.	With 0 dB RF attenuation
3 <sup>rd</sup> Order IM (Intermodulation) Products	All except Option 50 and Option 75: ≤ -70 dBc up to 1.8 GHz	From any two on-screen signals within any frequency span Option 50 and Option 75: Typically ≤ -65 dBc at 2.15 GHz
Zero Frequency Spur	≤ +39 dBmV (≤ -10 dBm)	Referenced to input with 0 dB RF attenuation
2 <sup>nd</sup> Harmonic Distortion	≤ -66 dBc	Measured with 1 <sup>st</sup> mixer input level of ≤ +9 dBmV
LO (Local Oscillator) Emission	All except Option 50 and Option 75: ≤ -70 ≤ -21 dBmV (≤ -70 dBm)	With 0 dB RF attenuation and preamp off. Option 50 and Option 75: When frequency is below 90 MHz: Typically < +29 dBmV (-20 dBm) When frequency is above 350 MHz: Typically ≤ -21 dBmV (≤ -70 dBm)

Table 1-5: Input/Output Signal Characteristics

Characteristic	Performance Requirement	Supplemental Information
RF Input		Type F male connector or type N female connector
VSWR with RF Attenuation ≥ 10 dB	1.5:1 maximum	Checked to 1 GHz
VSWR with 0 dB RF Attenuation	All except Option 50 and Option 75: 2:1 maximum up to 1 GHz 3.5:1 maximum up to 1.8 GHz Option 50 and Option 75: 4:1 maximum up to 2.15 GHz	
Maximum Safe Input		+70 dBmV (0.1 W or 2.2 V) continuous peak 100 VDC blocking capacitor <b>Caution:</b> Do not apply more than 100 VDC or 100V peak AC to the RF Input
1 dB Compression Point (minimum)	+34 dBmV (-15 dBm)	With no RF Attenuation and 1 <sup>st</sup> mixer at +19 dBmV (-30 dBm)

**Table 1-5: Input/Output Signal Characteristics (Cont.)**

Characteristic	Performance Requirement	Supplemental Information
Ext Trig (J102)		BNC connector, 10 k $\Omega$ , DC coupled for external trigger signals
Voltage Range		
Minimum		Typically at least 100 mV <sub>peak</sub> , 15 Hz to 1 MHz
Maximum		50 V (DC + peak AC)
Pulse Width		0.1 $\mu$ s minimum
Accessory Connector (J103)		DB-15 female connector
Pin 1: External Video Input		Typically 100 ohm, DC coupled, 0 - 50 kHz, 0 - 1.6 V (200 mV/div) signal input for vertical deflection of the CRT beam. The signal is processed through the video filters and the 1 dB, 5 dB, and 10 dB scale factor circuits on the Log board. Display storage may be by-passed.
Pin 2: Sweep Gate		TTL-compatible signal that goes to a logic high level while the CRT beam is sweeping.
Pin 3: Chassis and Signal Ground		
Pin 4: Sweep Output		Provides a nominal +1.3 V to -1.3 V negative-going ramp, proportional to the horizontal sweep (output impedance $\leq$ 50 $\Omega$ ).
Pin 5: Log Video Output		Provides 0 V to +1.6 V of video signal, inversely proportional to the vertical display amplitude. 0 V is the top of the screen. Impedance is 1 k $\Omega$ .
Pin 6: CLK0 Output		Clock output to Option 05 (External Tracking Generator). CMOS logic levels typically +3.5 V high, +1.5 V low.
Pin 7: Data I Input		Data input from Option 05 (External Tracking Generator). Typically +5 V high, +0.1 V low.
Pin 8: Data O Output		Data output to Option 05 (External Tracking Generator). CMOS logic levels, typically +3.5 V high, +1.5 V low.
Pin 9: $\sim$ EXTGLATCH		Logic output to Option 05 (External Tracking Generator). CMOS logic levels, typically +3.5 V high, +1.5 V low.
Pin 10: 26.38 MHz Input		Input from Option 05 (External Tracking Generator); typically a 0.5 V <sub>p-p</sub> sine wave centered at +3.7 VDC.

**Table 1-5: Input/Output Signal Characteristics (Cont.)**

Characteristic	Performance Requirement	Supplemental Information
Pin 11: VLVL Output		DC output to Option 05 (External Tracking Generator); typically $\pm 9.5$ V with TG level set to ON.
Pin 12: SWPSLOPE Output		Negative going ramp output to Option 05 (External Tracking Generator); typically $\pm 5$ V with analyzer set to max span.
Pins 13 through 15		Not used
Digital Communications Port (J104)		RS-232 or GPIB connector

**Table 1-6: Power Requirements**

Characteristic	Performance Requirement	Supplemental Information
Input Voltage		
Line Voltage Range	90 VAC to 250 VAC	
Line Frequency Range	48 Hz to 63 Hz	
Line Voltage Range	90 VAC to 132 VAC	
Line Frequency Range	48 Hz to 440 Hz	
Line Fuse	2 A Slow-Blow	
Input Power	90 W (1.2 A) for standard instrument 105 W (1.4 A) maximum with options (115 W maximum at 90 V and 440 Hz)	At 115 V and 60 Hz
Leakage Current		3.5 mA <sub>RMS</sub> maximum or 5 mA <sub>peak</sub> maximum

**Table 1-7: Supplementary Characteristics Due to Options**

Characteristic	Performance Requirement	Supplemental Information
Option 03		Provides a GPIB interface port at J104 to replace RS-232
Option 08		Provides a RS-232 serial interface port at J104 to replace GPIB
Option 15		Add a 1 <sup>st</sup> LO output
1 <sup>st</sup> LO Output Level	$\geq +48.8$ dBmV ( $\geq 0.0$ dBm)	At spectrum analyzer frequencies $\geq 100$ kHz

**Table 1-8: General Characteristics**

Characteristic	Performance Requirement	Supplemental Information
Sweep		Normal, Single Sweep, and Manual Scan
Sweep Rate	1 $\mu$ s/div to 2 s/div in a 1-2-5 sequence	
Accuracy	$\pm 10\%$ over the center 8 divisions	
Triggering		Free Run, Internal, External, Line, TV Line, and TV Field
Internal Trigger Level	1 division or more of signal	
External Trigger Level		See EXT TRIG in Table 1-5
Nonvolatile Memory (Battery-Backed Up)		Instrument settings, waveforms, and normalization results are stored in NVRAM
Battery Life (Lithium)		
At +55° C Ambient Temperature		1 to 2 years
At +25° C Ambient Temperature		At least 5 years
Temperature Range for Retaining Data		-10° C to +75° C
Internal Calibrator		Provides 100 MHz marker for amplitude calibration and comb of 100 MHz markers for frequency and span calibration
Amplitude and Accuracy	+18.8 dBmV (-30 dBm), $\pm 0.3$ dB, at 100 MHz, $\pm 2$ kHz	
Drift	$\pm 2$ PPM/year	
IF Gate Rise and Fall Times		7 $\mu$ s nominal
Off Isolation		> 60 dB

**Table 1-9: Environmental Characteristics**

Characteristic	Description
<i>The Description column describes how most characteristics were derived and a description of the characteristic. This instrument meets MIL-T-28800E, Type III, Class 5, Style C Specifications.</i>	
Electromagnetic Interference (EMI)	
Emissions: EN50081-1	Radiated Emissions, 30 MHz-1 GHz EN55022 Class B (CISPR 22B)  Conducted Emissions, 150 kHz-30 MHz EN55022 Class B (CISPR 22B)  Conducted Emissions, Power Line Harmonics, 0-2 kHz IEC 555-2/3
Immunity: EN50082-1	Electrostatic Discharge, 8 kV IEC 801-2  Radiated Immunity, 27 MHz-500 MHz IEC 801-3 Performance Requirement: No responses above -90 dBm in a 3 V/meter field  Fast Transients, Capacitive Clamp, 1 kV Power Leads, 500 V Control Leads IEC 801-4  Power Line Surge, 1 kV Differential Mode, 2 kV common mode IEC 801-5
Temperature	
Operating	0° C to +50° C
Nonoperating <sup>1</sup>	-55° C to +75° C <sup>2</sup>
Humidity	
Operating	95% RH ± 5% + 30° C and below 75% RH ± 5% + 31° C through + 40° C 45% RH ± 5% + 41° C through + 50° C
Nonoperating	Five cycles (120 hours) in accordance with MIL-STD-28800E, class 5
Altitude	
Operating	15,000 ft (4.57 km)
Nonoperating	50,000 ft (15.24 km)

<sup>1</sup> After storage at temperatures below -15° C, the instrument may not reset when power is first turned on. If this happens, allow the instrument to warm up for at least 15 minutes, then turn power off for 5 seconds and back on.

<sup>2</sup> NVRAM is lost below -10° C.

**Table 1-9: Environmental Characteristics (Cont.)**

Characteristic	Description
Vibration Operating (Instrument secured to a vibration platform during test)	MIL-T-28800E, Method 514 Procedure X (modified) 15 minutes along each of 3 major axes at a total displacement of 0.015 in (0.38 mm) peak-to-peak (2.4 g at 55 Hz), with frequency varied from 10 Hz to 55 Hz in 1-minute sweeps  Hold for 10 minutes at 55 Hz  All major resonances must be above 55 Hz (resonance is defined as an excursion greater than 2X the input displacement)
Shock (Operating and Nonoperating)	Three guillotine-type shocks of 30 g, one-half sine, 11 ms duration each direction along each major axis, total of 18 shocks; no drops allowed on the front surface and front corners
Transit Drop (Free Fall)	8 in (203.2 mm), one per each of 5 faces and 4 corners (instrument is tested and meets drop height of 12 in (304.8 mm))

**Table 1-10: Physical Characteristics**

Characteristic	Performance Requirement
Weight	
With Standard Accessories	25 lbs (11.34 kg)
Without Standard Accessories	22.5 lbs (10.21 kg)
Dimensions	
Height with Feet and Handle	5.4 in (137.16 mm)
Width	
With Handle	14.2 in (360.68 mm)
Without Handle	12.9 in (327.66 mm)
Depth	
With Front Panel Cover	17.5 in (444.50 mm)
Without Front Panel Cover	16.85 in (427.99 mm)
With Handle Extended	20.1 in (510.54 mm)



**Table 1- 11: Certifications and Compliances**

Category	Description												
EC Declaration of Conformity - EMC	<p>Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:</p> <p>EN 50081-1 Emissions:</p> <table data-bbox="613 533 1240 594"> <tr> <td>EN 55022</td> <td>Class B Radiated and Conducted Emissions</td> </tr> <tr> <td>EN 60555-2</td> <td>AC Power Line Harmonic Emissions</td> </tr> </table> <p>EN 50082-1 Immunity:</p> <table data-bbox="613 638 1198 753"> <tr> <td>IEC 801-2</td> <td>Electrostatic Discharge Immunity</td> </tr> <tr> <td>IEC 801-3</td> <td>RF Electromagnetic Field Immunity</td> </tr> <tr> <td>IEC 801-4</td> <td>Electrical Fast Transient/Burst Immunity</td> </tr> <tr> <td>IEC 801-5</td> <td>Power Line Surge Immunity</td> </tr> </table>	EN 55022	Class B Radiated and Conducted Emissions	EN 60555-2	AC Power Line Harmonic Emissions	IEC 801-2	Electrostatic Discharge Immunity	IEC 801-3	RF Electromagnetic Field Immunity	IEC 801-4	Electrical Fast Transient/Burst Immunity	IEC 801-5	Power Line Surge Immunity
EN 55022	Class B Radiated and Conducted Emissions												
EN 60555-2	AC Power Line Harmonic Emissions												
IEC 801-2	Electrostatic Discharge Immunity												
IEC 801-3	RF Electromagnetic Field Immunity												
IEC 801-4	Electrical Fast Transient/Burst Immunity												
IEC 801-5	Power Line Surge Immunity												
EC Declaration of Conformity - Low Voltage	<p>Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities:</p> <p>Low Voltage Directive 73/23/EEC</p> <table data-bbox="516 905 1419 963"> <tr> <td>EN 61010-1:1993</td> <td>Safety requirements for electrical equipment for measurement, control, and laboratory use</td> </tr> </table>	EN 61010-1:1993	Safety requirements for electrical equipment for measurement, control, and laboratory use										
EN 61010-1:1993	Safety requirements for electrical equipment for measurement, control, and laboratory use												
Approvals	<p>UL1244 - Standard for Electrical and Electronic Measuring and Testing Equipment</p> <p>CAN/CSA C22.2 No. 231 – Safety Requirements for Electrical and Electronic Measuring and Testing Equipment</p>												
Installation Category Descriptions	<p>Terminals on this product may have different installation category designations. The installation categories are:</p> <table data-bbox="516 1167 1455 1346"> <tr> <td>CAT III</td> <td>Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location</td> </tr> <tr> <td>CAT II</td> <td>Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected</td> </tr> <tr> <td>CAT I</td> <td>Secondary (signal level) or battery operated circuits of electronic equipment</td> </tr> </table>	CAT III	Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location	CAT II	Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected	CAT I	Secondary (signal level) or battery operated circuits of electronic equipment						
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CAT I	Secondary (signal level) or battery operated circuits of electronic equipment												

**Table 1-12: Safety Certification Compliance**

Category	Description
Temperature (operating)	+5° C to +50° C
Altitude (maximum operating)	2000 meters (6562 ft.)
Relative Humidity (maximum operating)	80% for temperatures up to 31° C, decreasing linearly to 50% at 40° C
Equipment Type	Test and Measuring
Safety Class	Class I (as defined in IEC 1010-1, Annex H)—grounded product
Overvoltage Category	Overvoltage Category II (as defined in IEC 1010-1, Annex J)
Pollution Degree	Pollution Degree 2 (as defined in IEC 1010-1) Note: Rated for indoor use only.

**Table 1-13: Safety Standards**

Category	Standards
U.S. Nationally Recognized Testing Laboratory Listing	UL1244 - Standard for Electrical and Electronic Measuring and Testing Equipment
Canadian Certification	CAN/CSA C22.2 No. 231 – Safety Requirements for Electrical and Electronic Measuring and Test Equipment
European Union Compliance	Low Voltage Directive 73/23/EEC, as Amended by 93/68/EEC EN61010-1/A1 – Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use
Additional Compliance	UL3111-1 – Standard for Electrical Measuring and Test Equipment IEC1010-1 – Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use

# Operating Information

This section contains the following:

- Instrument description
- Conformance to industry standards
- Product service information
- Instrument construction
- Installation and preparation for use
- Power cord
- Fuse replacement
- Assembly and circuit numbering
- Accessories
- Menus

## Instrument Description

This instrument is a compact and portable Spectrum Analyzer for the 9 kHz to 1.8 GHz frequency range (up to 2.15 GHz with Option 50 or Option 75 installed). Microprocessor control of most functions simplifies and enhances operation.

The Spectrum Analyzer's main features are:

- **Precision Measurements** Menu selectable routines provide directions for normalizing the internal reference (calibrator signal) to external frequency and amplitude references. After the internal reference is normalized, other menu selections provide for normalizing any instrument measurement parameter.
- **Menu Operation** Menu-selectable routines provide diagnostics, normalization, adjustments, and setup of basic parameters such as center frequency, frequency span, reference level, vertical scale factor, resolution bandwidth, etc. These menus are described in *Section 6: Spectrum Analyzers Menus of the 2715 Spectrum Analyzer Users Manual*.

- **Single and  $\Delta$  Markers** A single marker can be enabled to show the frequency and amplitude of a specific point on the display. Delta ( $\Delta$ ) markers show the difference frequency and amplitude between any selected two points on the displayed waveform.
- **Tracking** Signal tracking holds a drifting signal to center screen.
- **Center Measure** When this function is activated, the instrument completes the sweep and centers the signal nearest center screen or, with markers activated, the signal nearest the marker. A readout of center frequency and amplitude is displayed.
- **Display** In the Spectral mode, the numerical values of signals and setup parameters are displayed. In the Menu mode, a menu with its selections and prompts is displayed. Any error, warning, or information messages are displayed in both modes.

## Conformance to Industry Standards

This Spectrum Analyzer conforms with the following industry safety standards and regulatory requirements.

CAN/CSA C22.2, No. 231

UL 1244 (3rd Edition) Measuring Testing Equipment

## Product Service

To ensure adequate product service and maintenance for our instruments, Tektronix has established Field Offices and Service Centers at strategic points throughout the United States and in countries where our products are sold. Several types of maintenance or repair agreements are available.

For example, for a fixed fee, a maintenance agreement program provides maintenance and recalibration on a regular basis. Tektronix will remind you when a product is due for recalibration and perform the service within a specified time.

Contact your local Tektronix Service Center, representative, or sales engineer for details regarding product service.

## Instrument Construction

Modular construction provides ready access to the major circuits. Each circuit board containing RF sensitive circuits is mounted in a casting, with feed through connectors through the compartment walls. Most boards and assemblies plug onto a common interconnect board. Most adjustments and test points are accessible while the instrument is operational and without need of a circuit board extender.

Circuit board extenders are available in an optional Service Kit (see *Maintenance* section under *Fixtures and Tools for Maintenance* on page 6-3). Most of the modules or boards can be removed without affecting the structural or functional integrity of other modules. The extender board allows any of the six circuit board assemblies in the card cage to be positioned for service or adjustment. The Sweep and Power Supply circuit boards are accessed by removing the instrument's cabinet (and the Variable Resolution assembly in the case of the Power Supply).

All other circuit boards are accessible by removing the instrument's cabinet and the shielding associated with each assembly.

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**NOTE.** *Disassembly of some modules may require special tools and procedures. These procedures and a list of tools are located in the Maintenance section.*

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Most RF circuits are isolated in shielded compartments to obtain and maintain the frequency stability, sensitivity, and EMI characteristics. While shielding helps ensure a spurious free response, the closeness of the circuits reduces losses and interactions with other functions. Interconnections between compartments are made by feed through terminals rather than cables. If the compartments are opened, be sure that the shields are properly reinstalled before operating.

## Installation and Preparation for Use

Refer to *Section 2: Getting Started* of the *2715 Spectrum Analyzer User Manual* for unpacking, storage, repackaging for shipment, and installation information.

## Power Cord

The power cord that is supplied with the instrument depends on the available power source (see *Section 1: Specifications*). Power cord options are described in *Section F: Options*.

## Replacing the Fuse

Replace the line fuse with a 2 A Slow Blow fuse.

## Selected Components

Some components are specifically selected to meet Tektronix specifications. These components are shown in the parts list.

Selected value components are identified in the parts list as a SEL value. The component description lists either the nominal value or a range of values.

## Assembly and Circuit Numbering

Each assembly and subassembly is assigned an assembly number. Generally, each component is assigned a circuit number according to its geographic location within an assembly. The Replaceable Electrical Parts list prefixes these circuit numbers with the corresponding assembly and subassembly numbers.

Example: R260 on assembly A14 becomes A14R260.

Example: U140 on subassembly A1 of assembly A19 is found in the electrical parts list as A19A1U140.

## Accessories

The *Replaceable Mechanical Parts* section contains part numbers, descriptions, and ordering information for all standard and optional accessories offered for this Spectrum Analyzer.

Refer to *Appendix F: Accessories & Options* in the *2715 Spectrum Analyzer User Manual* for listings of standard and optional accessories.

Refer to *Section 7: Options* in this manual for information on accessories associated with options.

The *Accessories* at the end of the *Replaceable Mechanical Parts* in this manual contains information on all standard accessories currently available with this Spectrum Analyzer.

## Menus

There are eight menus of selections that are used to invoke most of the setups, operational modes, and applications.

A menu of selections may be displayed by pressing its front panel push button. Menu push buttons are grouped together under the MENU block. See Figure 2-1 and the Menu Structure beginning on the following page.

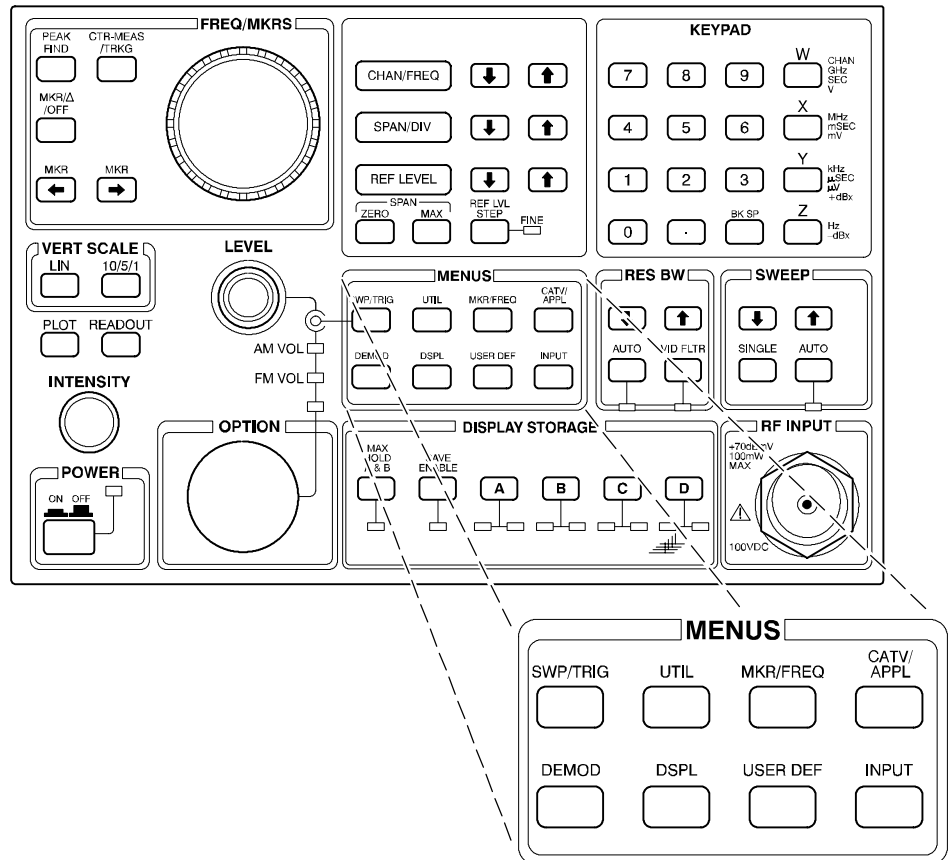
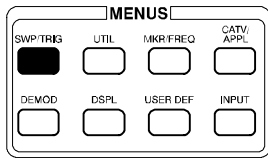


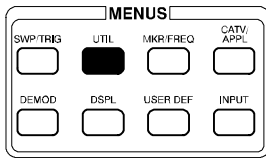
Figure 2-1: 2715 Front Panel Keys



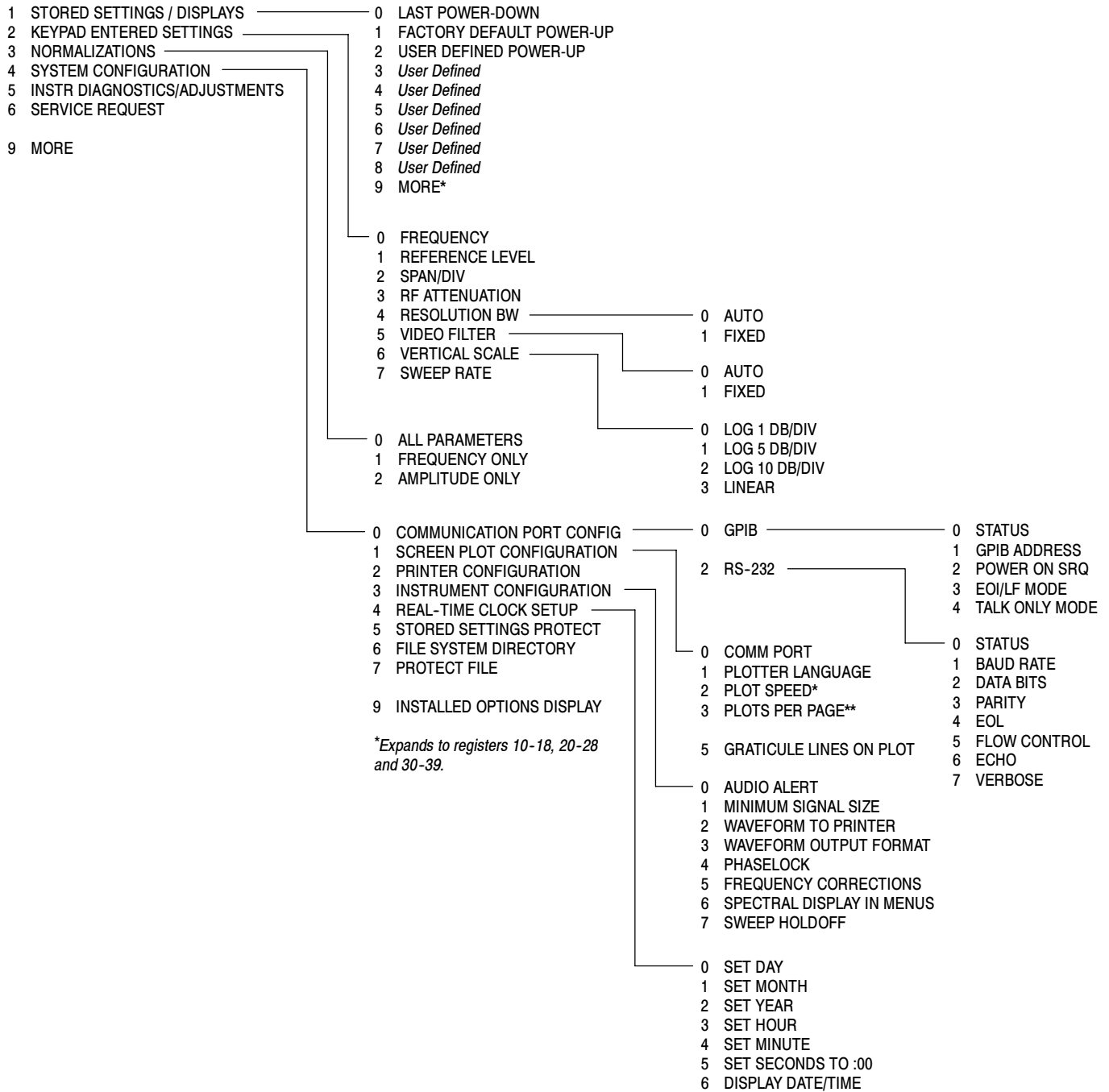
## SWP/TRG Menu Structure

- 0 FREE RUN
- 1 INTERNAL
- 2 EXTERNAL
- 3 LINE
- 4 TV LINE
- 5 TV FIELD
- SWEEP MENU
- 6 SWEEP RATE
- 7 MANUAL SCAN
- 8 SYNC POLARITY
- 9 SETUP TABLE ————— HORIZONTAL LINE TRIGGERING
  - 0 CONTINUOUS
  - 1 KNOB SELECTABLE
  - 2 KEYPAD ENTERED LINE
  - 3 KEYPAD ENTRY
  - 4 TV LINE STANDARD



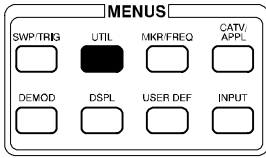


## UTIL Menu Structure (1 of 2)

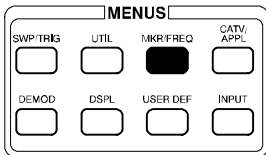
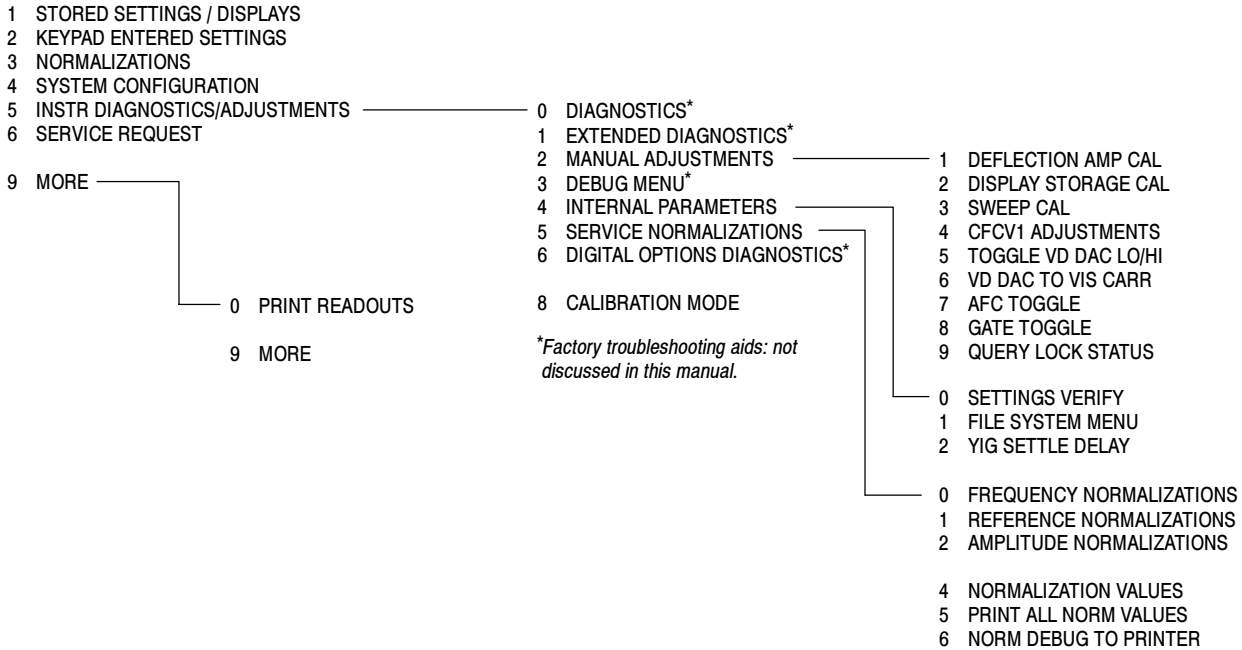


\*Expands to registers 10-18, 20-28 and 30-39.

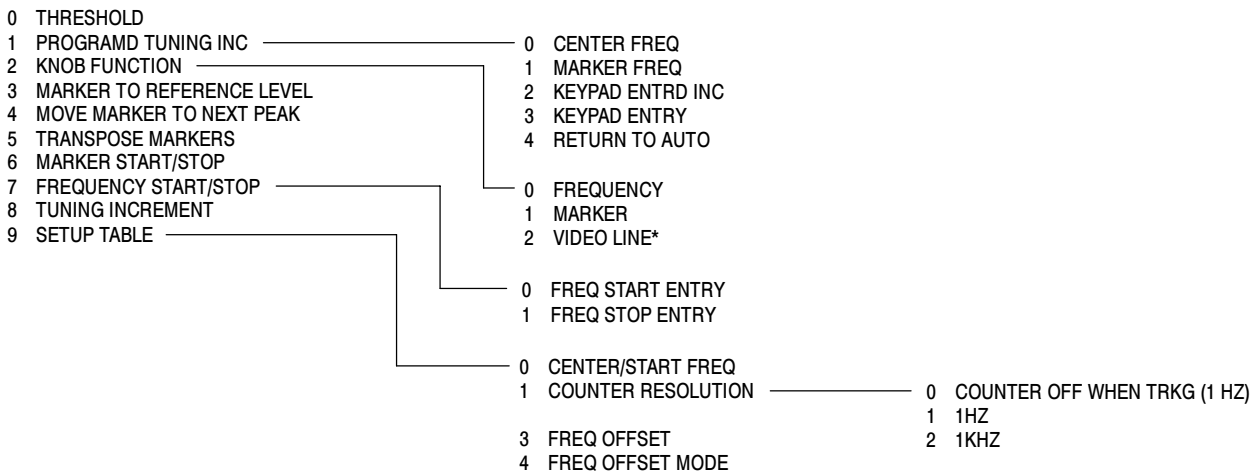
\*\*Displayed when selected plotter language is HPGL.



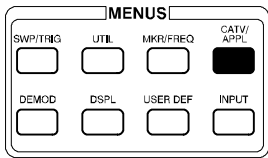
## UTIL Menu Structure (2 of 2)



## MRK/FREQ Menu Structure



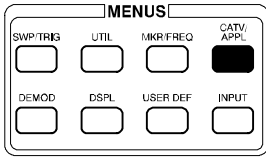
*\*Displayed only if KNOB SELECTABLE is selected in the SWEEP MENU SETUP TABLE.*



## CATV/APPL CATV Measurements Page 1 Menu Structure (1 of 3)



\*RS-232 only.



## CATV/APPL CATV Measurements Page 1 Menu Structure (2 of 3)

- 0 RECENTER CHANNEL xx
- 1 CARRIER LEVEL -- AVG POWER
- 2 CARRIER SURVEY
- 3 MODULATION DEPTH
- 4 AURAL (FM) DEVIATION
- 5 CARRIER/NOISE -- DESIRED/UNDESIRED
- 6 HUM/LFD
- 7 FREQUENCY RESPONSE
- 8 CATV MEASUREMENTS SETUP
- 9 MORE

- 0 RUN C/N -- D/U
- 1 STORE CURRENT RESULTS
- 2 DISPLAY RESULTS
- 3 PRINT CURRENT RESULTS
- 4 PRINT STORED RESULTS

- 5 SET UP CARRIER/NOISE
  - TEST MODES
  - 0 INTERACTIVE
  - 1 AUTO
  - 2 AUTO (PAUSE FOR CARRIED OFF)
- 7 IN-SERVICE
- 9 LEAVE C/N -- D/U

- 5 NOISE NORM'D BW

- 0 RUN HUM/LFD
- 1 STORE CURRENT RESULTS
- 2 DISPLAY RESULTS
- 3 PRINT CURRENT RESULTS\*
- 4 PRINT STORED RESULTS\*
- 5 POWER LINE FREQ

- 9 LEAVE HUM/LFD

- 0 RUN FREQ RESP

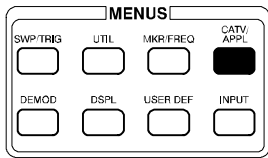
CURRENT REFERENCE

- 5 SET UP FREQ RESP
- 9 LEAVE FREQUENCY RESPONSE

\*RS-232 only.

- TEST MODES
- 0 \*NO REF
- 1 WITH REF
- SWEEP RANGE
- 2 START FREQUENCY
- 3 STOP FREQUENCY
- 4 USE DEFAULT START/STOP

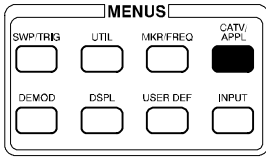
- TEST MODES
- 0 NO REF
- 1 \*WITH REF
- REFERENCE ACQUISITION
- 2 START FREQUENCY
- 3 STOP FREQUENCY
- 4 USE DEFAULT START/STOP
- 5 ACQUIRE NEW REFERENCE
- 6 STORED REFERENCE MENU
- 7 EDIT CURRENT REFERENCE NAME



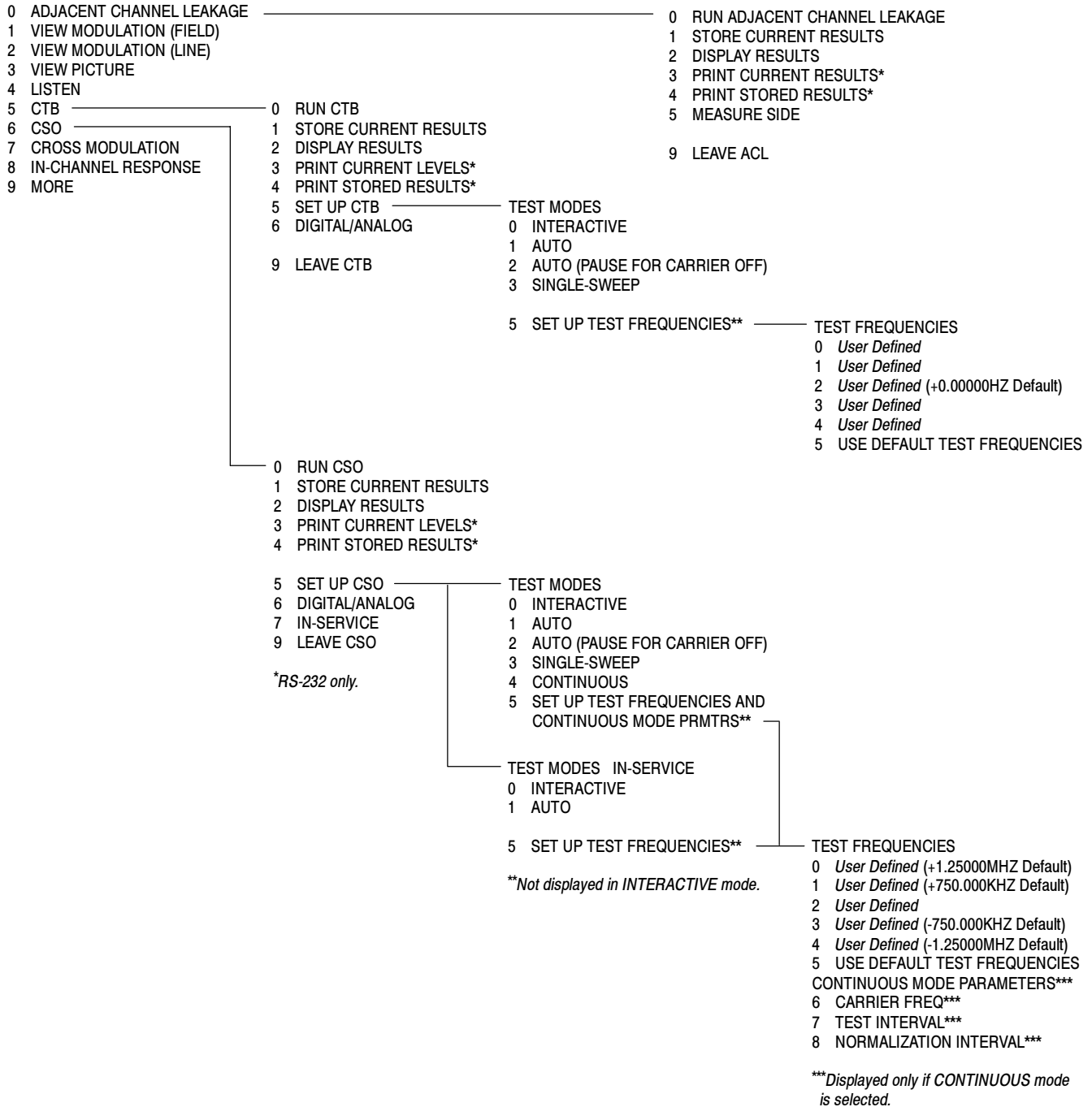
## CATV/APPL CATV Measurements Page 1 Menu Structure (3 of 3)

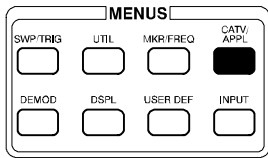
- |   |                                    |   |                                 |
|---|------------------------------------|---|---------------------------------|
| 0 | RECENTER CHANNEL <i>xx</i>         |   |                                 |
| 1 | CARRIER LEVEL -- AVG POWER         |   |                                 |
| 2 | CARRIER SURVEY                     |   |                                 |
| 3 | MODULATION DEPTH                   |   |                                 |
| 4 | AURAL (FM) DEVIATION               |   |                                 |
| 5 | CARRIER/NOISE -- DESIRED/UNDESIRED |   |                                 |
| 6 | HUM/LFD                            |   |                                 |
| 7 | FREQUENCY RESPONSE                 |   |                                 |
| 8 | CATV MEASUREMENTS SETUP            | 0 | EXIT CATV MEASUREMENT MODE      |
| 9 | MORE                               | 1 | CHANNEL TABLE                   |
|   |                                    | 2 | SKIP CHANNEL                    |
|   |                                    | 3 | ALL CHANNELS                    |
|   |                                    | 4 | SITE                            |
|   |                                    | 5 | OPERATOR                        |
|   |                                    | 6 | REF LEVEL UNIT                  |
|   |                                    | 7 | EDIT CHANNEL TABLE <sup>1</sup> |
|   |                                    | 8 | REMOVE ALL STORED RESULTS       |
|   |                                    | 9 | LEAVE CATV MEASUREMENTS SETUP   |
|   |                                    | 0 | STD                             |
|   |                                    | 1 | HRC                             |
|   |                                    | 2 | IRC                             |
|   |                                    | 3 | <i>User Defined</i>             |
|   |                                    | 4 | <i>User Defined</i>             |
|   |                                    | 5 | <i>User Defined</i>             |
|   |                                    | 6 | <i>User Defined</i>             |
|   |                                    | 7 | <i>User Defined</i>             |
|   |                                    | 8 | <i>User Defined</i>             |
|   |                                    | 9 | <i>User Defined</i>             |
- To CATV/APPL  
CATV Measurements Page 2

<sup>1</sup> Option 50 and Option 75 only



## CATV/APPL CATV Measurements Page 2 Menu Structure (1 of 2)





## CATV/APPL CATV Measurements Page 2 Menu Structure (2 of 2)

- 0 ADJACENT CHANNEL LEAKAGE
- 1 VIEW MODULATION (FIELD)
- 2 VIEW MODULATION (LINE)
- 3 VIEW PICTURE
- 4 LISTEN
- 5 CTB
- 6 CSO
- 7 CROSS MODULATION
- 8 IN-CHANNEL RESPONSE
- 9 MORE

To CATV/APPL  
CATV Measurements Page 1

- 0 RUN CROSS MODULATION
- 1 STORE CURRENT RESULTS
- 2 DISPLAY RESULTS
- 3 PRINT CURRENT RESULTS\*
- 4 PRINT STORED RESULTS\*
- 9 LEAVE CROSS MODULATION

- 0 RUN IN-CHAN RESP
- 1 STORE CURRENT RESULTS
- 2 DISPLAY RESULTS
- 3 PRINT CURRENT RESULTS\*
- 4 PRINT STORED RESULTS\*
- 5 SET UP IN-CHAN RESP
- 6 TEST SIGNAL LINE NUMBER\*\*
- 7 IN-SERVICE
- 9 LEAVE IN-CHAN RESP

\*RS-232 only.

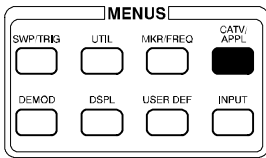
\*\*Displayed only when IN-SERVICE is On.

### TEST MODES

- 0 INTERACTIVE
- 1 AUTO (PAUSE FOR SIGNAL ON)
- TEST FREQUENCIES
- 2 *User Defined* (-500.000KHZ Default)
- 3 *User Defined* (+500.000KHZ Default)
- 4 *User Defined* (+1.25000MHZ Default)
- 5 *User Defined* (+2.00000MHZ Default)
- 6 *User Defined* (+3.00000MHZ Default)
- 7 *User Defined* (+3.75000MHZ Default)
- 8 USE DEFAULT TEST FREQUENCIES

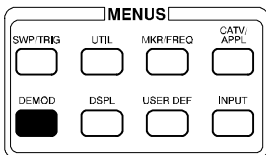
### TEST MODES IN-SERVICE

- 0 INTERACTIVE
- 1 AUTO
- TEST FREQUENCIES
- 2 *User Defined* (-500.000KHZ Default)
- 3 *User Defined* (+500.000KHZ Default)
- 4 *User Defined* (+1.25000MHZ Default)
- 5 *User Defined* (+2.00000MHZ Default)
- 6 *User Defined* (+3.00000MHZ Default)
- 7 *User Defined* (+3.75000MHZ Default)
- 8 USE DEFAULT TEST FREQUENCIES



## CATV/APPL Applications Menu Structure

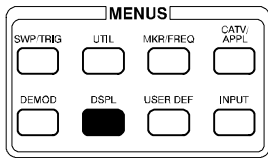
- 0 BANDWIDTH MODE
- 1 CARRIER TO NOISE
- 2 NOISE NORM'D
- 3 SIGNAL SEARCH MENU
- 4 OCCUPIED BW
- 7 FM DEVIATION MODE
- 8 CATV MEASUREMENT MODE
- 9 SETUP TABLE
  - 0 DB DOWN FOR BW MODE
  - 1 NORM BW FOR C/N
  - 2 NOISE NORM'D BW
  - 3 PERCENT OCCUPIED BW



## DEMOD Menu Structure

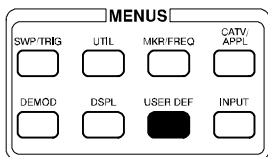
- 0 OFF
- 1 AM DEMODULATOR
- 2 FM DEMODULATOR
- 3 BROADCAST (AM) VIDEO
- 9 VIDEO MONITOR SETUP
  - 0 VIDEO DETECT MODE
  - 1 SYNC POLARITY
  - 2 VIDEO POLARITY





## DSPL Menu Structure

- |                          |       |                           |
|--------------------------|-------|---------------------------|
| 0 DIGITAL/ANALOG         |       | 1 INITIATE AVERAGING      |
| 1 ENSEMBLE AVERAGING     | ————— | 2 TERMINATE AVERAGING     |
| 2 B, C MINUS A           |       | 3 MAX                     |
| 3 B, C MINUS A OFFSET TO |       | 4 MEAN                    |
| 4 ACQUISITION MODE       |       | 5 MIN                     |
| 5 TITLE MODE             | ————— | 6 MAX/MIN                 |
| 6 GRATICULE ILLUMINATION | ————— | 7 NUMBER OF AVERAGES      |
| 7 DISPLAY SOURCE (AM)    |       | 8 SAVE RESULTS IN DISPLAY |
| 8 DISPLAY LINE           | ————— |                           |
| 9 MIN HOLD               | ————— |                           |
- 
- |  |  |                      |
|--|--|----------------------|
|  |  | 1 TITLE MODE         |
|  |  | 2 TITLE MODE EDIT    |
|  |  | 3 PLOT LABELING      |
|  |  | 4 PLOT LABELING EDIT |
- 
- |  |  |                          |
|--|--|--------------------------|
|  |  | 1 ON/OFF                 |
|  |  | 2 VALUE ENTRY            |
|  |  | 3 DISPLAY LINE TO MARKER |
|  |  | 4 LIMIT DETECTOR         |



## USER DEF Menu Structure

- |                              |       |  |
|------------------------------|-------|--|
| 0 <i>User Defined</i>        |       |  |
| 1 <i>User Defined</i>        |       |  |
| 2 <i>User Defined</i>        |       |  |
| 3 <i>User Defined</i>        |       |  |
| 4 <i>User Defined</i>        |       |  |
| 5 <i>User Defined</i>        |       |  |
| 6 <i>User Defined</i>        |       |  |
| 7 <i>User Defined</i>        |       |  |
| 8 <i>User Defined</i>        |       |  |
| 9 USER DEF PROGRAM UTILITIES | ————— |  |
- 
- |  |  |                            |
|--|--|----------------------------|
|  |  | 0 ACQUIRE KEY STROKES      |
|  |  | 1 TITLE EDIT               |
|  |  | 2 WAIT FOR END OF SWEEP    |
|  |  | 3 DISPLAY MESSAGE          |
|  |  | 4 PAUSE FOR "USER DEF" KEY |
|  |  | 5 CONTINUOUS EXECUTION     |
|  |  | 6 STORE                    |
|  |  | 7 DELETE                   |
|  |  | 8 PROTECT                  |
|  |  | 9 TIME DELAY SETUP         |
- 
- |  |       |                   |
|--|-------|-------------------|
|  | ————— | 0 SET DAY         |
|  |       | 1 SET HOUR        |
|  |       | 2 SET MINUTE      |
|  |       | 3 REPEAT INTERVAL |
|  |       | 4 RUN N TIMES     |
|  |       | 5 CLEAR TIME      |



# Theory of Operation

This section describes the 2715 circuitry. The section begins with a functional description of the major circuit blocks. This is followed by more detailed descriptions of the circuitry within each block. While reading these descriptions, refer to the corresponding diagrams in *Section 9: Diagrams*.

## Block Diagram Description

The Spectrum Analyzer block diagram contains the following major blocks:

- Attenuator and Low Pass Filter
- 1st Converter
- 2nd Converter
- RF Mother Board (3rd Converter)
- VR (Variable Resolution Module)
- Log Amplifier
- Display Storage board
- Center Frequency Control
- 1st LO Buffer
- Microprocessor
- Sweep
- Power Supply (Deflection)

This is a block diagram description of the Spectrum Analyzer. While reading this description, refer to Figure 3-1.

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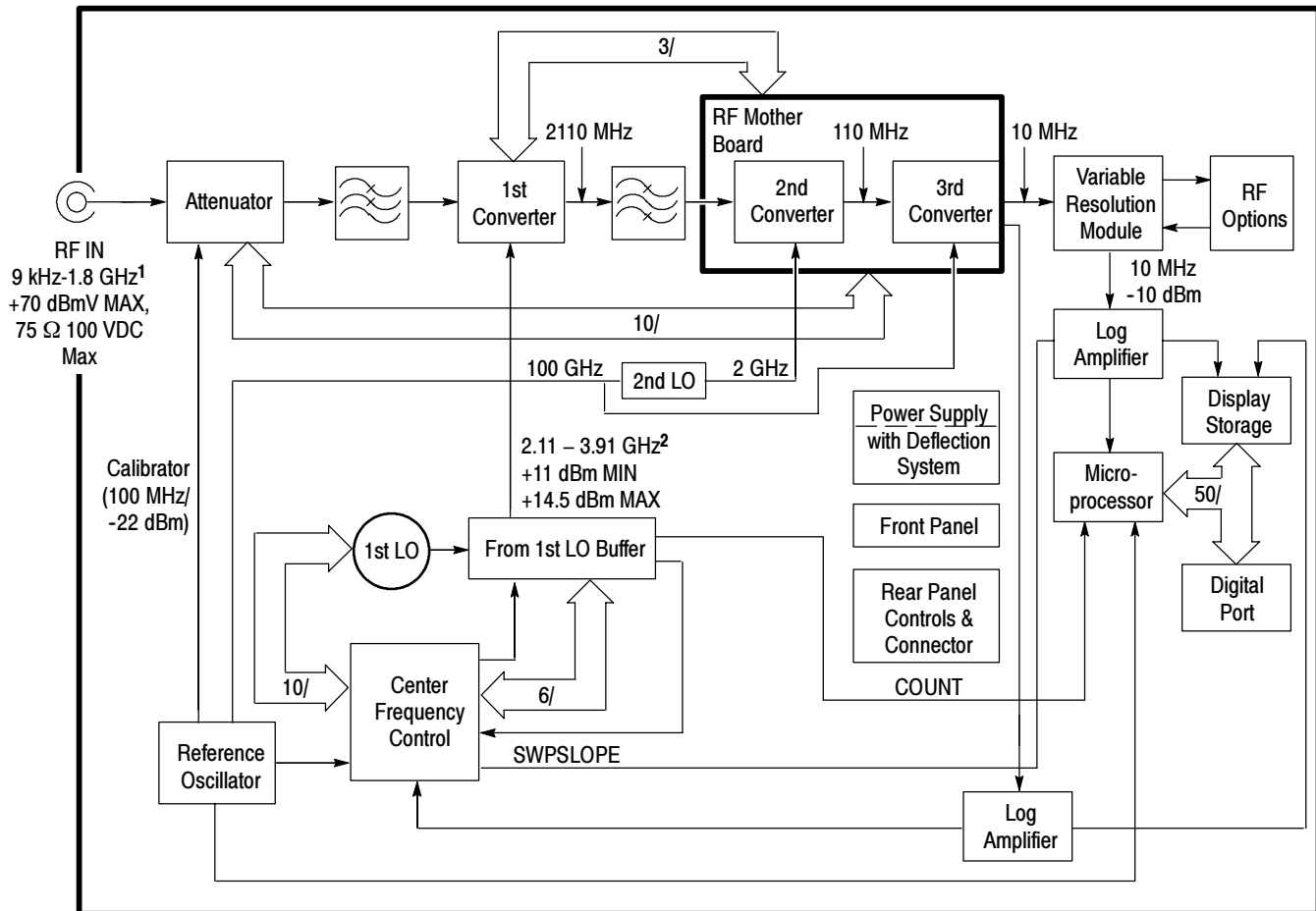
**NOTE.** *The power levels noted in the block diagram between the input and the Log Amplifier assume a -30 dBm (+18.8 dBmV) input level.*

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The block diagram shows how the major sections in the instrument relate. It also shows the paths of most major signals. Not explicitly shown are the interconnections between the Power Supply and the circuit blocks, interconnections between the Sweep board and other major circuit blocks, and interconnections between the Deflection System and other circuit blocks. (The Deflection System is located on the Power Supply board.)

A 25 Ω resistor within the RF INPUT connector assembly is placed in series with the signal path. This transforms the connector to a 75 Ω impedance for external signal connections. All RF signal connections within the 2715 (SMA and SMB connectors) have a 50 Ω impedance. RF type signal connections between modules are made using double shielded coaxial cables, while DC type signal connections are made using either multipin jacks on the Power Supply board (Power Supply, Log Amplifier, Display Storage, Microprocessor, and Center Frequency Control boards) or small ribbon cables.

The Main Interconnect Diagram at the front of the *Diagrams* section provides a chart of the interconnect system in addition to what is shown in Figure 3-1. Block diagrams showing more detail of these main sections appear before the appropriate schematics together with another description. Circuit schematic diagrams follow the Main Interconnect Diagram.



<sup>1</sup> 9 KHz – 2.15 GHz for Option 50 and Option 75  
<sup>2</sup> 2.11 – 4.26 GHz for Option 50 and Option 75

Figure 3- 1: Main Block Diagram

<b>What It Does</b>	<p>The Spectrum Analyzer accepts an electrical signal as its input and displays the signal's frequency components on a CRT. Signals are applied directly to the RF INPUT.</p> <p>The display of the input signal appears on the CRT as a graph where the horizontal axis is frequency and the vertical axis is amplitude.</p>
<b>How It Works</b>	<p>The Spectrum Analyzer operates as a variable bandwidth receiver. The CRT beam moves horizontally as a range of frequencies is scanned. When a frequency component of an input signal is detected, the beam is deflected vertically as a function of input power at that frequency.</p>
<b>Attenuator and Low Pass Filter</b>	<p>There are two selections for inputs to the Spectrum Analyzer: the RF INPUT at the front panel and the internal calibrator signal.</p> <p>The Attenuator adds attenuation to the input signal such that the level at the input of the 1st mixer (1st Converter) is limited to no more than <math>-30</math> dBm. This would represent a full screen signal. Also, an amplifier can be inserted in the signal path to improve sensitivity when small signals are applied to the RF INPUT by invoking the Preamp mode. The Microprocessor sets the amount of attenuation, depending on the user selected reference level, to maintain the proper signal level.</p> <p>The signal is then routed to the 1st Converter through a Low Pass Filter. The Low Pass Filter attenuates out-of-band signals and helps minimize 1st Local Oscillator (LO) emission at the RF INPUT. When the Preamp mode is invoked, the Microprocessor sets the appropriate amount of attenuation, or it sets the gain of an internal amplifier (Variable Resolution) to maintain a calibrated display.</p>
<b>1<sup>st</sup> Converter and Bandpass Filter</b>	<p>The input signal is converted to an intermediate frequency (IF) signal of 2110 MHz. This is accomplished by mixing the input signal with an LO signal that varies over a range of 2.11 GHz to 3.91 GHz (4.26 GHz for Option 50 and Option 75). The LO range corresponds to a range of 0 Hz to 1.8 GHz (2.15 GHz for Option 50 and Option 75) at the RF INPUT. The output of the mixer is then amplified to compensate for the conversion loss, and it is filtered to allow only the difference frequency to pass. All other mixer products are attenuated.</p>
<b>2<sup>nd</sup> Converter</b>	<p>The 2nd Converter down converts the 2110 MHz IF signal to 110 MHz, then routes this 2nd IF to the RF Mother board.</p>

**RF Mother Board Assembly**

The RF Mother board assembly contains a 2 GHz 2nd LO, a 2nd Converter, several gain stages, a 5 MHz resolution bandwidth filter, and a 3rd Converter. The 2nd Converter down converts the 2110 MHz 1st IF to 110 MHz. The 3rd Converter down converts the 110 MHz 2nd IF to a 10 MHz 3rd IF. This signal is routed to the Variable Resolution module.

**Variable Resolution Module**

The Variable Resolution contains several selectable gain stages prior to the filters and a compensation amplifier. One of the nine filters is selected. Each filter has an attenuator pad associated with it to compensate for losses in the filter. The system selects the appropriate amplification factor as each filter is selected.

The 10 MHz IF signal is processed through one of several Bandpass filters, amplified once more, and then routed to the Log Amplifier board.

**Log Amplifier**

The Log Amplifier performs the logarithmic conversion, linear detection and logarithmic detection of the incoming signal, and amplitude calibration. The log display has scale factors of 10 dB/div, 5 dB/div, and 1 dB/div. The module also contains an FM detector, an audio amplifier, an amplitude limited output for the period counter, and an out-of-band signal clamp.

The detector produces a voltage that corresponds to the input signal strength in decibels. The detector output is then vertically scaled and sent to the Display Storage and Sweep boards.

The control processor uses three 8 bit shift registers to control the Log Amplifier.

**Display Storage**

The Display Storage board contains the circuitry for putting text and waveforms onto the CRT display.

This board contains the following programmable functions:

- Waveform Storage — four 512 point waveforms
- Dot Markers — up to two intensified markers
- Text Storage — four 32 character by 16 lines of text
- Accumulator data — direct access to the output of the A to D converter
- Nonvolatile memory — 32 Kbytes total; 2 Kbytes used for waveforms; 2 Kbytes used for text; the rest is available for general use

When enabling the analog display, waveforms A, B, C, and D are turned on, but not displayed. This results in a chopped blanking effect between the readout and the analog display. The scanning alternates between the readout and the analog display.

The Display Storage board is capable of storing four waveforms of 512 bytes each, four pages of text of 512 bytes each, and up to two markers. Any combination of waveforms and text may be displayed on the CRT. If any waveforms are being displayed, the text portion of the display is limited to approximately 100 characters in order to avoid flicker.

Only one page of text may be displayed at any one time. The readout page is limited to approximately 100 characters.

The waveforms and text displays are accessed through memory reads and writes. When (DISPLAY) A, B, C, or D is selected, the stored waveforms in those registers are displayed. When A, B, C, and D are deselected, the display reverts to the real time (nondigitized) video waveform, and the readout is updated during the readout cycle.

## Center Frequency Control

The Center Frequency Control system provides 1st Local Oscillator (1st LO) signal to the 1st Converter at the center frequency and span selected by the user. In general, this is accomplished by a combination of setting, counting, and resetting (as required) of the frequencies of various oscillators.

The system is expected to control the frequency within a few Hz out of a total operating range of approximately 2 GHz.

The principal elements of the frequency control system are as follows:

- 1<sup>st</sup> LO** This is a YIG tuned oscillator that covers the range of 2.11 to 3.91 GHz or 2.11 to 4.26 GHz for Option 50 and Option 75 (YIG = Yttrium Iron Garnet.) Ideally, its operating frequency is exactly proportional to the strength of an internal DC magnetic field. This field is the combined field of two coils, one large (Main) and one small (FM). In practice, the frequency is uncertain by up to a few MHz due to problems such as temperature drift, slight nonlinearity, and magnetic hysteresis. Also, the oscillator has some residual FM and phase noise sidebands due to internal causes and external noise and drift from the driver circuit. The remainder of the frequency control system maintains the oscillator (abbreviated YIG) at the right frequency. Usually, it is sufficient to set the YIG, then periodically check its frequency and make small adjustments as required. However, in very narrow spans the YIG must be phase locked to a stable source in order to maintain sufficient stability.

The 1st LO Interface provides drive signals for the main coil and FM coil, a control signal for the main coil, and power for the gain stage.

**100 MHz Reference Oscillator**

This is a precision, temperature controlled, quartz crystal oscillator that provides the reference around which all instrument frequency related performance revolves. It is designed for maximal frequency stability over temperature and time, with absolute frequency accuracy being secondary. The instrument firmware accounts for any frequency inaccuracy, producing a virtually perfect reference.

**Phase Gate**

The phase gate is a high speed sampling switch that takes a very brief sample of the 1st LO waveform once during each cycle of the strobe frequency. (The strobe is a control signal supplied to the phase gate from an external source.) These samples are later averaged by a low pass filter to eliminate ripple at the strobe frequency, and also to eliminate other undesirable components.

When the 1st LO is phase locked to any integer multiple of the strobe frequency, the resulting output is a phase dependent DC voltage that is used as the error voltage in a feedback loop to maintain phase lock.

When the 1st LO is not phase locked, the resulting output is a beat note occurring at the difference frequency between the 1st LO frequency and the nearest integer multiple of the strobe frequency. (Actually, many beat frequencies are present at once, but the low pass filter eliminates all but the one of lowest frequency.)

**Phase Lock Center Frequency Control (PLCFC)**

This element is the focal point of the frequency control system hardware. It accepts commands from the instrument microprocessor and then puts out appropriate drive signals to the 1st LO as well as a suitable strobe signal to the Phase Gate. The PLCFC module also uses the Phase Gate output. It also provides counter signals and status information to the microprocessor. It requires the 100 MHz reference signal in order to function.

**Firmware**

Because of the variety of tasks that the Spectrum Analyzer is called upon to do, it is essential to have an intelligent controller. This is especially true in the frequency control context, because the required degree of control could not be economically obtained with unassisted analog hardware.

Instrument firmware has the task (among many others) of commanding the frequency control hardware, taking feedback from it, and making readjustments as required to obtain the desired result.

The interface between the microprocessor system and the PLCFC module is through a pair of serial data lines, some latch lines, and some clock signals.



## 1<sup>st</sup> LO Buffer

The 1st LO Buffer consists of a Leveled Amplifier and a Phase Gate Detector. The Leveled Amplifier provides the LO input drive for the 1st Mixer. The Phase Gate Detector logs 1st LO drift. That information is then used for frequency corrections.

## Sweep

The Sweep board contains a microprocessor interface, horizontal sweep generator, trigger circuitry, vertical sweep (raster scan) circuitry, video processing, video line triggering, and graticule illumination.

This board receives messages from the microprocessor regarding its operation, but cannot send messages directly to the microprocessor.

Various combinations of resistors and capacitors yield the sweep speed selections.

The available trigger modes are Free Run, Internal, Line, External, TV Field, and TV Line. When the video monitor mode is selected, the readout, display storage, and video filter are turned off. In addition, the resolution bandwidth is set to 5 MHz, the Vertical display mode defaults to Lin, the span setting defaults to Zero Span, and the sweep rate defaults to 5  $\mu$ s. The video monitor mode is turned off from the trigger menu or by selecting another trigger mode.

TV Line Trigger mode causes the Spectrum Analyzer to trigger on the selected video line. The selected line, and part of the next line, are displayed.

## Display System

The Display System consists of the Vertical Display circuit, Horizontal Display circuit, and Z Axis circuit. See Figure 3-2.

The Display System has three possible display modes. The active spectrum display mode displays the incoming signal. The static spectrum display mode displays stored signals from memory. The video monitor mode displays live video signals.

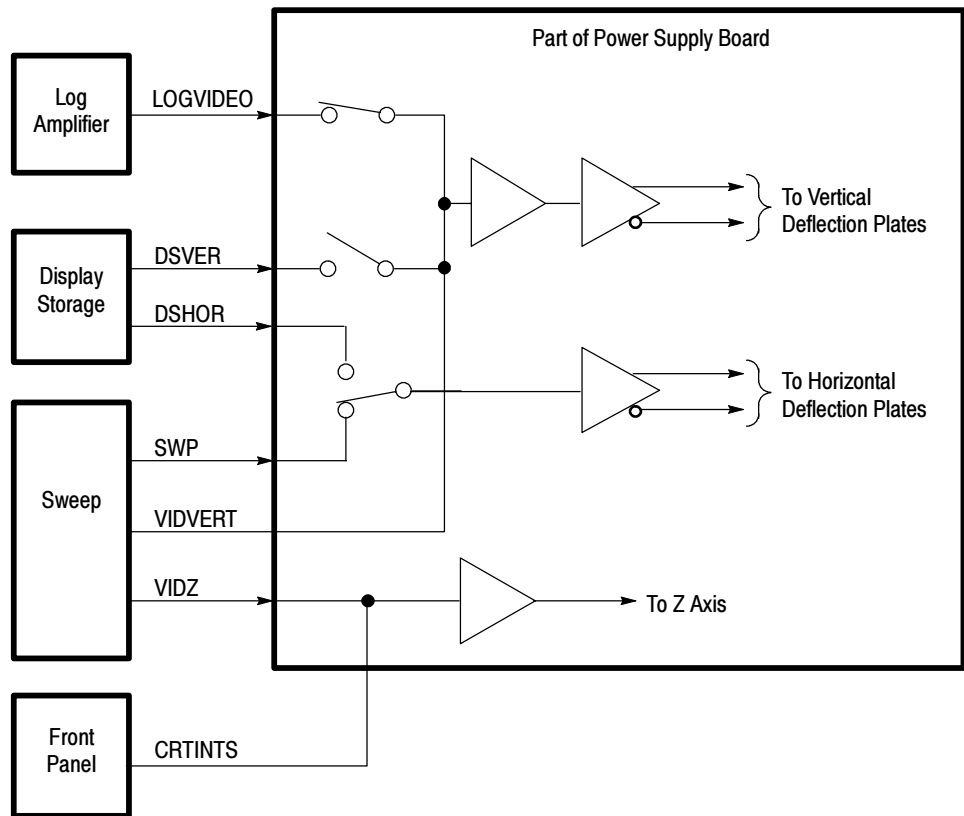


Figure 3-2: Display System Diagram

## Circuit Description

The following sections provide detailed circuit descriptions and is arranged to follow the input signal flow. While reading these descriptions, refer to the corresponding diagrams in *Section 9: Diagrams*.

### Attenuator and 1<sup>st</sup> Converter

The Attenuator and 1st Converter signal path consists of the following parts:

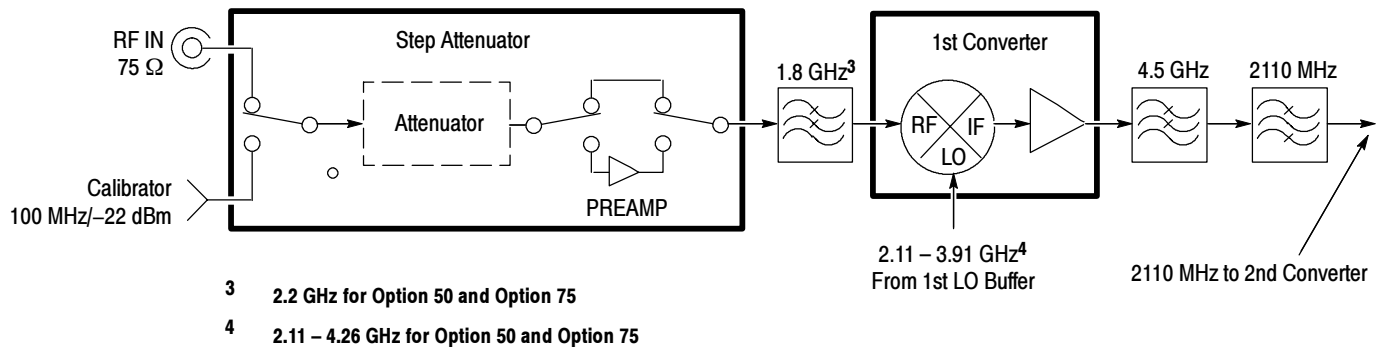
- Step Attenuator
- 1.8 GHz Low Pass Filter (2.2 GHz Low Pass Filter for Option 50 and Option 75)
- Mixer
- 4.5 GHz Low Pass Filter
- 2110 MHz Bandpass Filter

#### Step Attenuator

The Spectrum Analyzer input frequency range is 9 kHz to 1.8 GHz (2.15 GHz for Option 50 and Option 75). The low end of the frequency range is determined by a capacitor on the Attenuator board, the narrowest resolution filter in the Variable Resolution assembly, and FM characteristics of the 1st LO (YIG Oscillator).

The signal comes in at the front panel RF INPUT connector. The 75  $\Omega$  RF INPUT connector is connected to a 0 to 50 dB step attenuator, capable of stepping from 0 to 50 dB in 2 dB steps. The Attenuator consists of relay controlled pads of 2, 4, 8, 16, and 20 dB. The instrument firmware controls the relays to provide the necessary attenuation to maintain a calibrated reference level.

A relay switch at the input of the Step Attenuator selects the RF input signal or the internal calibrator signal. See Figure 3-3. Since the calibrator signal comes into the Step Attenuator assembly ahead of the attenuators, it can be used to verify the accuracy of the Step Attenuator and other parameters. Selection is made through the INPUT MENU.



**Figure 3-3: Attenuator and 1st Converter Diagram**

Also, an amplifier with 18 to 20 dB of gain may be inserted in the signal path at the output of the Step Attenuator. This is the Preamp mode, selectable through the INPUT MENU. It is used to enhance sensitivity, when small signals are applied to the input, by maintaining the same signal to noise ratio from the input to the 2nd Converter. When a small signal is applied to the RF INPUT, and the Preamp mode is activated, both the signal and the noise level are amplified an equal amount. Any attenuation less than the gain of the preamp will then attenuate both the signal and the noise. Thus, signal to noise ratio remains nearly constant. In the meantime, the instrument makes corrections in the IF to maintain a calibrated reference level.

### Low Pass Filter

The Low Pass Filter attenuates all out-of-band frequencies. It rejects all frequencies above 1.8 GHz (above 2.2 GHz for Option 50 and Option 75), preventing them from reaching the mixer input and creating unwanted images. It also reduces emissions from internally generated frequencies above 1.8 GHz (above 2.2 GHz for Option 50 and Option 75).

**1<sup>st</sup> Converter**

The 1<sup>st</sup> Converter converts the incoming RF signals to the 1<sup>st</sup> IF. Input signals are applied through the Step Attenuator and Low Pass Filter and through the 1<sup>st</sup> LO Buffer Amplifier.

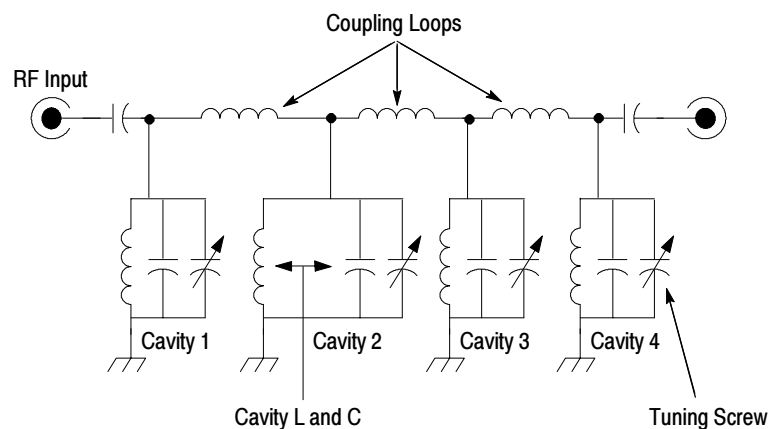
The 1<sup>st</sup> Converter receives the RF signal through the Low Pass Filter and a 1<sup>st</sup> LO signal from the 1<sup>st</sup> LO Buffer Amplifier. These signals combine to produce mixing products that are filtered to yield the 2110 MHz IF signal.

The mixer output is coupled to the input of a balanced amplifier where the signal is split into two paths. The signals in the two paths are 90 degrees out of phase. The signals are recombined at the output, yielding a gain of approximately 10 dB. Any reflections to the input are dissipated in a 50  $\Omega$  termination. The output is also terminated in 50  $\Omega$  to assure a match at the output port.

**Bandpass Filter**

The Bandpass Filter (a four cavity filter) is a low loss, narrow band filter that only passes the 2110 MHz IF signal to the 2<sup>nd</sup> Converter. Any other frequencies are reflected back to the 1<sup>st</sup> Converter and dissipated in the termination. In addition, the filter prevents the 2<sup>nd</sup> Converter LO and mixer products from feeding back into the 1<sup>st</sup> Converter.

Each end resonator is capacitively coupled to external circuits through a coupling hat plugged into a 3 mm connector. Inter cavity coupling is provided by coupling loops that protrude from the machined filter top. The resonant frequency of each cavity is determined primarily by the depth of a gap in the underside of the filter top and is fine tuned with a tuning screw on the side of each cavity. When properly tuned, the filter return loss is >25 dB from either end (in a 50  $\Omega$  system). Figure 3-4 shows the equivalent electrical circuit.



**Figure 3-4: Equivalent Circuit for the Bandpass (4 Cavity) Filter**

## RF Mother Board and Phase Locked 2nd LO

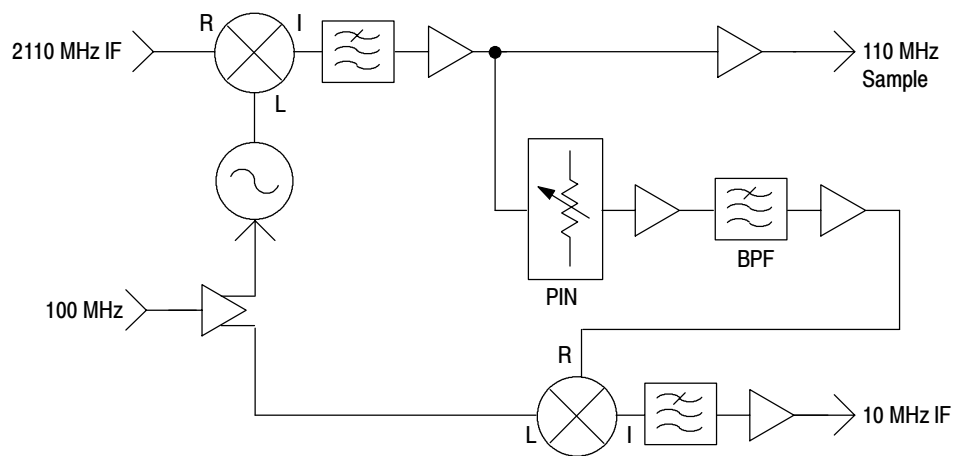
This section contains a detailed description of the RF Mother board and Phase Locked 2nd Local Oscillator.

### Overview

The RF Mother board converts the 1st IF frequency to 10 MHz in two frequency conversions. The first conversion (2nd mixer) mixes the 2.11 GHz 1st IF with the 2 GHz 2nd LO to create a 110 MHz second IF. The 2 GHz LO is generated on the board and is phase locked to the 100 MHz crystal reference. The 110 MHz 2nd IF is amplified (with variable gain) and filtered by a 5 MHz bandpass filter. A portion of the 2nd IF signal is sent to the sweep board for use by the satellite demodulator. The 3rd conversion mixes the 2nd IF with the 100 MHz reference to produce the 3rd IF frequency of 10 MHz. This signal is amplified and sent to the variable resolution module.

### RF Mother Board Block Diagram

This section provides a block diagram description of the RF Mother board as illustrated in Figure 3-5.



**Figure 3-5: Block Diagram of RF Mother Board**

The RF Mother board converts the 1st IF frequency (2.11 GHz) down to 110 MHz by mixing it with a 2 GHz LO. This LO is created by phase locking a VCO to the 100MHz reference frequency. This reference is provided by the Reference Oscillator module.

The 110 MHz 2nd IF is amplified and divided along two paths. One path is through a buffer amplifier to the sweep board where the signal is available to the satellite demodulator. The second path is through a PIN attenuator which sets the gain of the module. The signal then passes through a second amplifier stage then a 110 MHz Bandpass filter. This filter has a 3 dB bandwidth of 5 MHz which sets the widest resolution bandwidth of the instrument. After the 5 MHz filter, the signal is again amplified and applied to the 3rd converter.

The 3rd IF is created by mixing the 2nd IF with the 100 MHz reference to create the 3rd IF frequency of 10 MHz. The mixer output is filtered to reduce the 2nd harmonic level, and then amplified before being applied to the VR module.

### Detailed Circuit Descriptions

This section describes specific elements of the RF Mother board.

**2 GHz Phase locked LO.** The 2nd local oscillator is formed by Q112 and C204. In this configuration, the VCO oscillates into a 50  $\Omega$  load. The resonator ensures that this frequency will be close to 2 GHz. The VCO is tuned by varying the emitter base voltage, which causes that junction to act as a varactor.

A sample of the 2 GHz signal is divided by 4 (U424) and sent to a mixer/phase detector (U511). The mixer is driven by the 100 MHz reference, so the DC mixer output is created by the divide-by-4 sample and the 5th harmonic of the 100 MHz reference. This signal is integrated (U444) and connected to the Q112 emitter, closing the loop.

U230A provides a clean -8 V bias to Q223. If the loop is unlocked U230B causes the control loop to oscillate, sweeping over its full range until lock occurs. C323 (10 $\mu$ F) and related circuitry insures start up by pulling the control voltage high at turn on.

**2nd Mixer.** This single balanced mixer is formed by CR223. The 2 GHz 2nd LO is applied to the diodes through amplifier (Q322), and the 2.11 GHz input and 110 MHz 2nd IF are separated by a filter.

**110 MHz Amplifiers.** These IF amplifiers consist of common emitter transistors (Q130, Q140, and Q150) with both series and parallel feedback. The 1:1 transformers (T130, T140, and T150) provide lower output impedance for better intermodulation distortion performance.

**PIN Attenuator.** CR369 and CR367 are PIN diodes and are used to adjust the gain of the module. PIN diodes behave like resistors at RF frequencies, with the value being dependent on current flowing in the diode. (High current, low resistance; low current, high resistance). Current through CR369 decreases attenuation and current through CR367 increases attenuation. R200 adjusts the current through the PIN diodes and has a range of approximately 15dB attenuation.

**110 MHz Bandpass Filter.** This filter is a 5th order, shunt resonator Butterworth filter.

**3rd Mixer.** U665 and its associated circuitry make up the 3rd mixer.

**Output Amplifier.** This IF amplifier consists of a common emitter transistor (Q670) with both series and parallel feedback. The 1:1 transformer (T670) provides lower output impedance for better intermodulation distortion performance. The resistive attenuator at the output is used to match the load to the variable resolution. It also provides some high frequency roll off.

## 1<sup>st</sup> LO Interface, 1<sup>st</sup> LO, and 1<sup>st</sup> LO Buffer Amplifier

This section contains a detailed description of the 1st LO Interface, 1st LO and 1st Buffer Amplifier.

### 1<sup>st</sup> LO Interface and 1<sup>st</sup> LO

The 1st LO has a tuning range of 2.11 to 3.91 GHz (2.11 to 4.26 GHz for Option 50 and 75). The oscillator assembly includes the interface circuit board that couples operating and tuning voltages from the Center Frequency Control board.

Two Zener diodes on the Interface board clamp transient voltages from the main coil. See Figure 3-6.

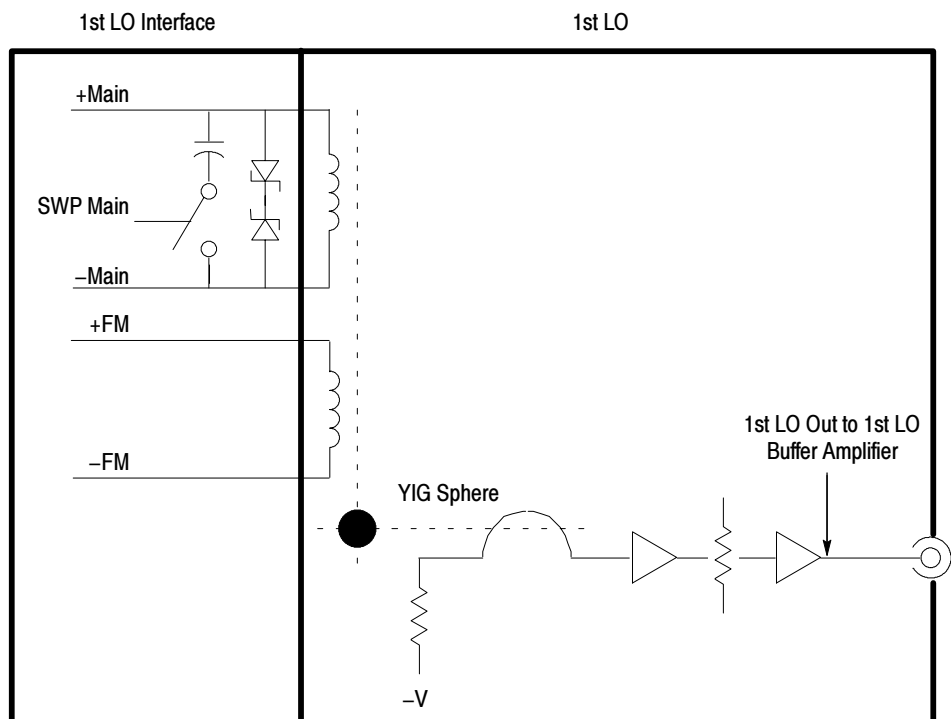


Figure 3-6: 1st LO Interface and 1st LO Diagram



When the FM coil is used to sweep the oscillator, the relay on the Interface board closes and couples a large capacitor (two capacitors in parallel) across the main coil. The capacitors lower the noise bandwidth of the main coil driving circuit while the FM coil is in operation. The heater provides temperature stability. The rest of the circuitry on the Interface board provides operating voltages for the two amplifiers in the 1st LO assembly.

The output of the 1st LO drives the 1st LO Buffer Amplifier.

### 1st LO Buffer Amplifier

The 1st LO Buffer Amplifier consists of the following:

- Automatic Level Controlled (ALC) Amplifier
- Strobe Driver
- Sampling Gate

**ALC Amplifier.** The ALC Amplifier is composed of a wide band amplifier with impedance matching transmission lines at the input and output, a directional coupler, a detector, a level comparator, and active bias. See Figure 3-7.

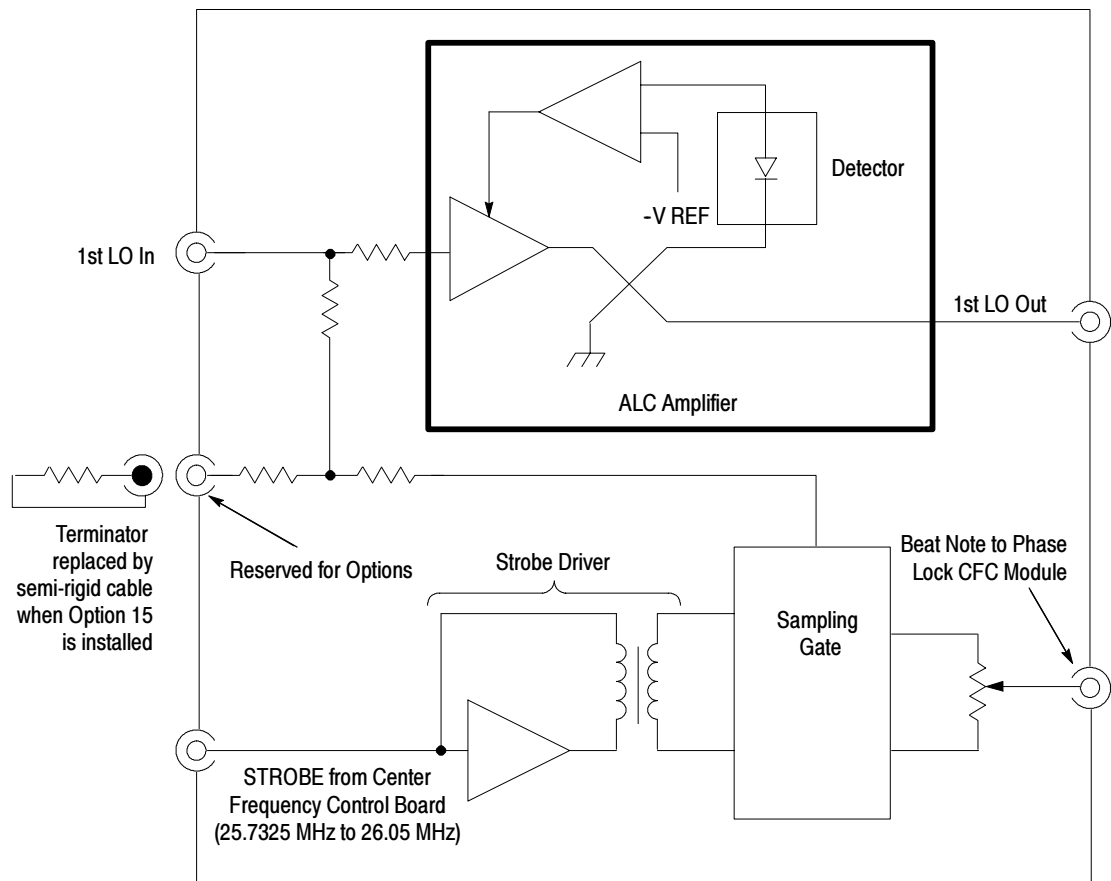


Figure 3-7: 1st LO Buffer Amplifier Diagram

The directional coupler couples approximately -15 dBm of the amplified LO signal to the detector. The coupled signal is then amplitude detected, and the resultant DC level fed to the noninverting input of a comparator, where it is compared to a reference DC level. (The reference DC level is connected to the inverting input.) The output of the comparator then controls the active bias tending to hold the amplifier's output at a constant level.

**Strobe Driver.** A Strobe signal from the Center Frequency Control assembly is coupled to the Strobe Driver. The Strobe Driver is a transformer coupled gain stage. The Strobe Driver's output is coupled to the Sampling Gate.

**Sampling Gate.** A power divider at the input of the amplifier routes 50% of the 1st LO's output to another power divider. One port of the second divider is reserved for Option 15 and is terminated in 50  $\Omega$ . The other port is coupled to the Sampling Gate.

If the output frequency of the 1st LO were stable, LO sampling would occur at the same level since the rate at which the LO output is sampled is constant. However, the LO output has a tendency to drift slightly under certain conditions, such as unstable ambient temperature. Consequently, sampling occurs at different levels, resulting in a beat note. Thus, the BEAT NOTE signal is a measure of the 1st LO's drift.

The output of the Sampling Gate is routed to the Phase Lock Center Frequency Control (PLCFC) module.

## Reference Oscillator

The Reference Oscillator board provides a 100 MHz frequency reference and amplitude reference for the Spectrum Analyzer. The frequency reference enables the high counter accuracy.

Firmware based routines use the Amplitude Calibrator output as a reference for calibrating internal gain settings.

The Reference Oscillator consists of the following blocks of circuitry:

- Power Supply Regulation
- Heater
- Oscillator
- Distribution
- Amplitude Calibrator
- Microprocessor Interface

Figure 3-8 is a block diagram of the Reference Oscillator section.

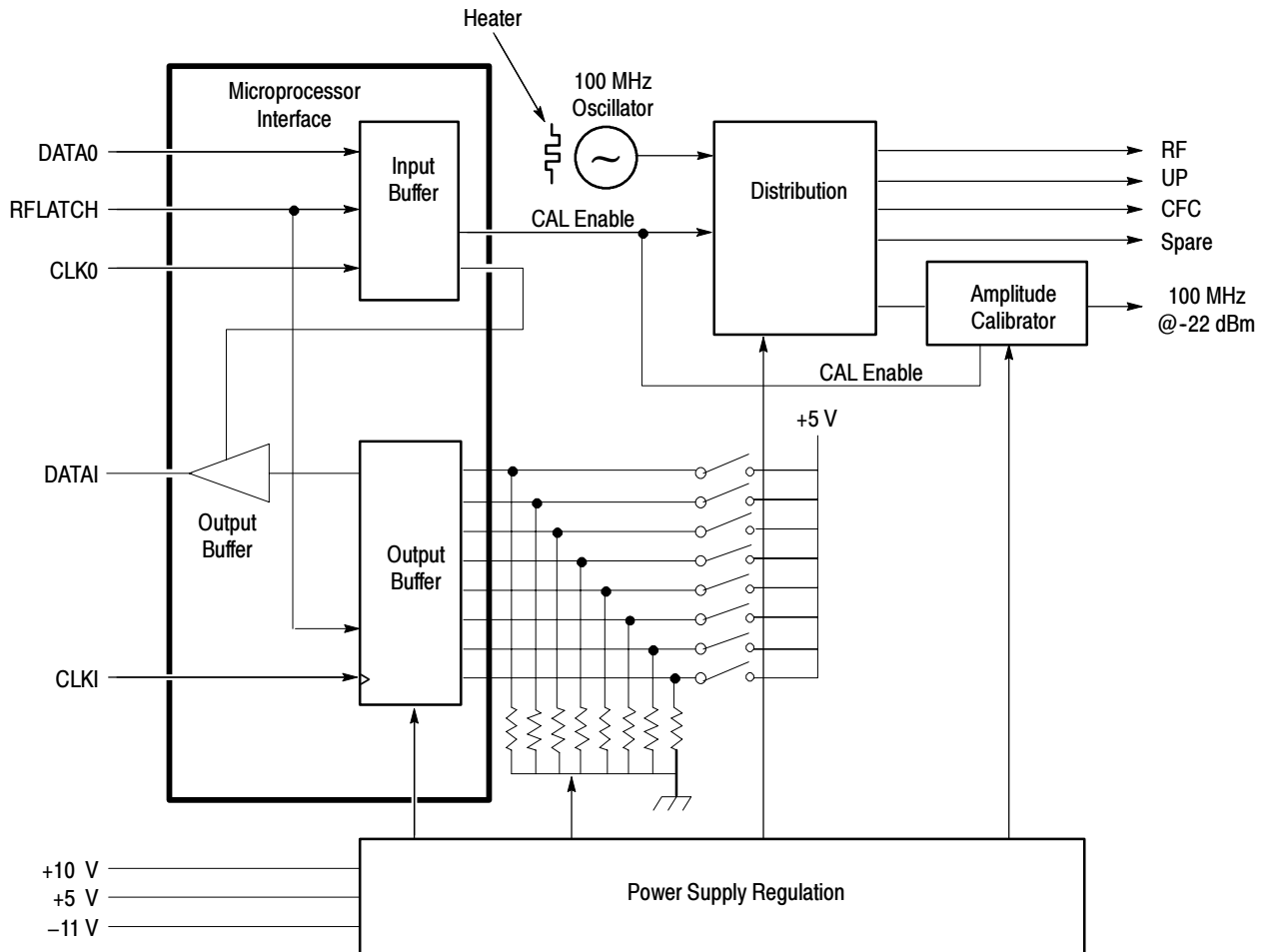
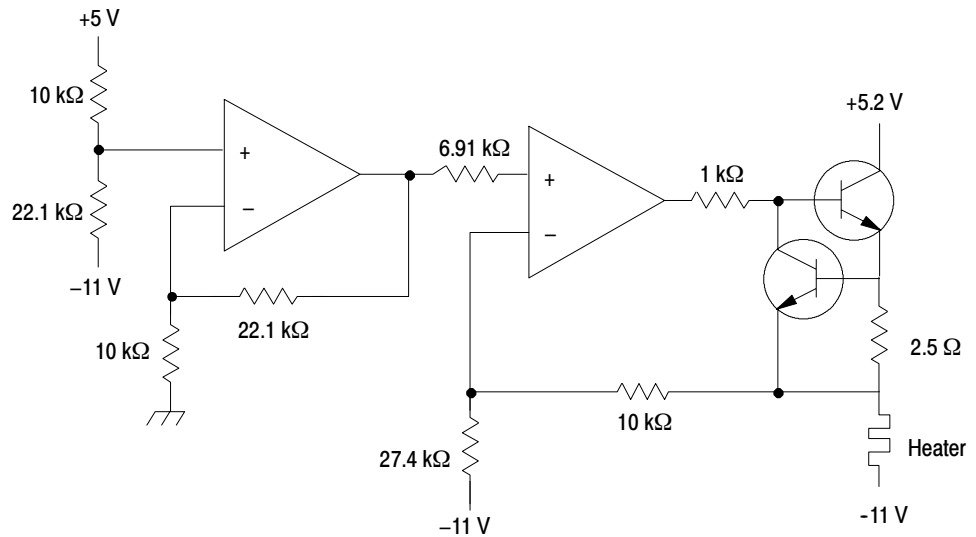


Figure 3-8: Reference Oscillator Diagram

**Power Supply Regulation.** The Oscillator and the Amplitude Calibrator are furnished with stringent, on board, power supply regulation to minimize power supply ripple. Otherwise, both the Oscillator and the Amplitude Calibrator would produce FM sidebands proportional to power supply ripple amplitude and frequency.

**Crystal Heater.** The Crystal Heater maintains the oscillator crystal's case temperature within a  $3^\circ$  window of the crystal's operating temperature (near  $70^\circ$  C) over the instrument's operating temperature range. The crystal leads sink heat such that the crystal inside the case operates at temperatures below the case temperature.

The heater circuit maintains a constant 15 V potential across the heater element regardless of power supply ripple. The circuit is shown in Figure 3-9.

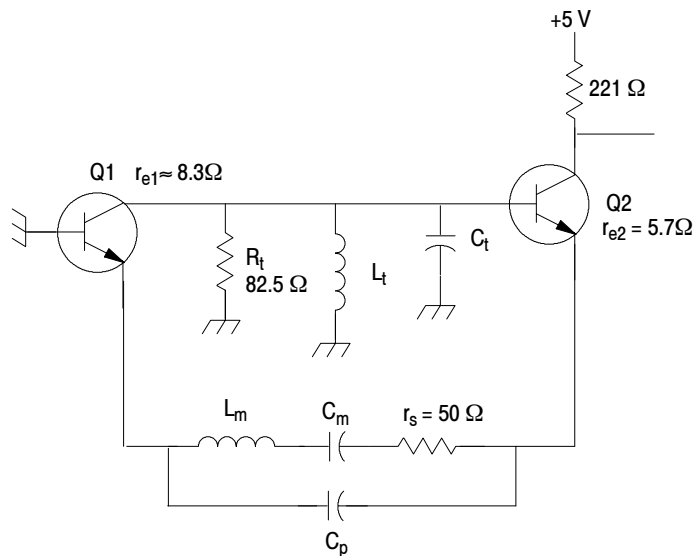


**Figure 3-9: Crystal Heater and 15 V Regulation Circuit**

**Oscillator.** The oscillator generates the 100 MHz reference frequency that is used by the instrument firmware to enhance frequency accuracy. Figure 3-10 shows the AC equivalent for the oscillator. At resonance, the tank inductor and capacitor  $L_t$  and  $C_t$  exhibit an open circuit condition, and the LC equivalent of the crystal ( $L_m$  and  $C_m$ ) exhibit a short circuit condition. Thus, at resonance, the open loop gain is calculated as:

$$A = \frac{R_t}{(r_{e1} + r_{e2} + r_s)}$$

This gain must be greater than unity to ensure oscillation.

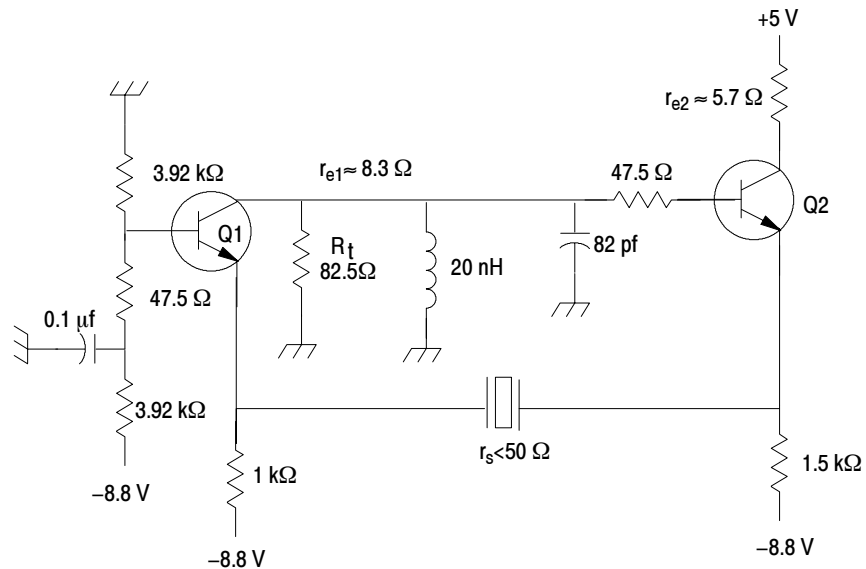


**Figure 3-10: Oscillator AC Equivalent**

At oscillation, the loop gain is unity and the phase  $0^\circ$ . If the phase delay of Q1, Q2, or the tank changes, the operating frequency must also change to maintain a  $0^\circ$  loop phase shift. Because of this phase/frequency shift dependency, the Q of the parallel tank circuit is made as low as possible to minimize the tank phase change as the values of  $L_t$  and  $C_t$  drift.

The component values of the tank circuit are determined by the voltage swing at the collector of Q2 (Figure 3-11). The collector of Q2 drives an ECL line receiver. Therefore, the collector voltage should swing 1 V peak to peak about 3.8 VDC (3.8 V being the ECL  $V_{bb}$  bias voltage). The gain of Q2 is calculated as:

$$A = \frac{R_t}{(r_{e1} + r_{e2} + r_s)} = 3$$



**Figure 3-11: Oscillator DC Equivalent**

The voltage swing required across the tank circuit must be at least equal to the ratio of 1 V to the calculated gain, which is 0.3 V. If the bias current available in Q1 is 3.6 mA, then the tank resistance required is calculated to be:

$$\frac{0.3 \text{ V}}{3.6 \text{ mA}} = 83 \Omega$$

**Distribution.** The distribution circuit represents an ECL line receiver. This circuit receives the 100 MHz signal from the Oscillator and steers it to the following circuits at -4 dBm.

- RF Mother Board (2nd and 3rd LOs)
- Microprocessor (Counter Section)
- CFC Board (1st LO Phase Lock)
- Port reserved for future option
- Amplitude Calibrator on the Reference Oscillator board

**Amplitude Calibrator.** The Amplitude Calibrator receives a 100 MHz signal from the distribution circuit. The level of the 100 MHz signal is adjusted, and the resultant calibrator signal is then routed to a switch on the Step Attenuator board.

When enabled by the Microprocessor, a differential pair of transistors switch a carefully controlled current on and off across a 56.2 Ω resistor. The resulting signal, with a -22 dBm level, is routed to the calibrator port through an 8 dB pad.

**Microprocessor Interface.** The Microprocessor Interface is used by the Microprocessor board to communicate with the Reference Oscillator board. An 8 bit input shift register controls the operation of the board, and an 8 bit output shift register contains frequency correction bits for indicating the Oscillator frequency. The microprocessor clocks (CLKO) eight bits of serial data (DATAO) into the input serial register, and it then latches the serial contents (RFLATCH-) to the parallel outputs. The microprocessor clocks data out of the output register by setting bit 7 of the input register low to enable the Buffer (see Figure 3-8 on page 3-17) and using CLKI- to clock serial DATAI out. Refer to Table 3-1 for the bit mapping of the registers.

Bit 0 of the input register is the last bit to leave the microprocessor, and bit 0 of the output register is the last bit to reach the microprocessor.

Bit 0 of the input register enables the calibrator signal when high and disables it when low. Bit 7 of the input register allows the microprocessor to read the contents of the output register when set low, and it tristates the output buffer when set high.

**Table 3-1: Input and Output Bit Definition**

Input Register		Output Register		
Bit	Function	Bit	Function	
0	Cal Enable	0	CB0	1
1	None	1	CB1	2
2	None	2	CB2	4
3	None	3	CB3	8
4	None	4	CB4	16
5	None	5	CB5	32
6	None	6	CB6	64
7	Output Enable	7	CB7	128

The output register has 8 bits available to represent the Oscillator frequency. The microprocessor can then read the Oscillator frequency through these bits to within 10 Hz. The possible values are 1 through 254. The microprocessor interprets a value of 128 as a frequency of 100 MHz, 127 as 99,999,990 Hz, 129 as 100,000,010 Hz, and so forth.

Values 0 (all bits low) and 255 (all bits high) are used to send a hardware failure message to the microprocessor.

## Phase Lock Assembly (Center Frequency Control System)

There are three major operating areas of the frequency control system:

In wide spans (5.1 MHz/div or greater), the center frequency is set coarsely by setting a suitable bias current in the main coil. Fine increments of the center frequency are set by appropriate currents to the FM coil. In this mode, sweeping over the span is accomplished by summing a suitably scaled analog sweep signal with the drive to the main coil. The strobe signal is not even turned on except briefly when needed to assist in verifying the exact 1st LO frequency by counting the beat frequency.

In moderate spans (50 kHz/div through 5 MHz/div), sweeping is done by summing the scaled sweep signal with the drive to the FM coil. Additionally, a noise suppressing low pass filter is inserted into the main coil circuit to reduce residual FM and phase noise due to noise from the main coil driver. Otherwise, the setup is the same as for wide spans. In this mode, the strobe is unused except when counting the 1st LO frequency.

When operating in narrow spans (20 kHz/div and less), the 1st LO is phase locked to a harmonic of the strobe frequency. Coarse control of the center frequency is effected by choosing which harmonic of the strobe frequency is used (by setting an appropriate main coil current before commanding the hardware to lock). Sweeping and fine control of center frequency are done by controlling the strobe frequency. When phase locked, the FM coil is used by the loop to adjust the 1st LO to zero phase error.

**PLCFC Module Functional Blocks.** The Phase Lock Center Frequency Control (PLCFC) module circuitry can be grouped into the following functional areas:

- Power Supply Regulation
- 1st LO Coil Drivers for the Current Source
- Strobe Frequency Generator (VCO Module)
- 1st Phase Lock Loop and Beat Note Processor
- Signal Path and Switching Summary
- Digital to Analog Conversion
- Digital Interface

### Power Supply Regulation

There are six regulated supplies on the PLCFC circuit board and two additional regulators in the VCO module.

**-5 V Reference Supply (-5 VREF).** This is a precision reference supply for those circuit applications where a critical frequency is directly dependent on a voltage or current.



This supply consists of VR160, U166, U174, Q170, Q674, and associated components. VR160 is a temperature compensated reference diode that defines the output voltage. U166 and Q170 constitute a buffered scaling amplifier to provide the desired -5 V output at sufficient current. C660 makes the closed loop bandwidth very low to minimize noise from the reference diode on the output. U174 and Q674 convert -5 V to +10 V to provide stable low noise current to the reference diode through R171. The +8.5 V path through CR175 is used to guarantee start up of the supply. CR175 disconnects the potentially noisy start up source once the emitter of Q674 goes sufficiently positive.

**-5 V Supply.** This supply is not to be confused with the -5 V Reference Supply.

This supply is regulated by U470 and serves solely as a reference for the remaining four supplies on the board. U470 is a programmable shunt regulator whose output voltage is defined by an internal reference and by R472 and R473.

**+8.5 V Supply.** U282A and Q781 constitute a buffered operational amplifier used in the inverting configuration to provide +8.5 V from an input of -5 V. (Note that Q781 provides a phase inversion, so the polarities of the operational amplifier IC input pins have to be reversed from the usual practice.)

**+15 V Supply.** U380B and Q880 operate in the same fashion as the corresponding parts in the +8.5 V regulator.

**-8.5 V Supply.** U282B and Q780 serve as a buffered operational amplifier in the non inverting configuration to provide -8.5 V.

**+5 V Supply.** U380A and Q881 serve as a buffered operational amplifier used in an inverting configuration to provide +5 V. (Note that Q881 is used in noninverting fashion, so that the normal polarities of the operational amplifier IC terminals apply here.)

The regulators in the VCO module will be discussed later in this section on page 3-25.

### **1<sup>st</sup> LO Coil Drivers Current Source**

It is desirable to drive the 1st LO coils from high impedance sources so that temperature dependent changes in winding resistance have negligible effect on stability.

**Main Coil Driver.** U921 and Q521 constitute a buffered operational amplifier used in an inverting configuration. Inputs to the summing junction are from a number of sources and all pass through Q920. R900 (a current sense resistor in the return lead of the main coil) develops a voltage proportional to main coil current.

This voltage across R926 defines the feedback current to the summing junction of the operational amplifier. This circuit forces 1st LO main coil current to be proportional to the sum of the currents from the various control sources, which is described later. The normal operating current range of the main coil is from approximately 135 mA to 255 mA.

Q920 is a switch that is normally conducting and consequently has no significant impact on circuit operation as described. However, it is sometimes necessary to momentarily set the main coil current to zero in order to standardize frequency errors due to hysteresis in the 1st LO magnetic structure. When this is desired, the microprocessor asserts the DEGAUSS line HIGH (by way of the digital interface circuits), which causes Q931 and Q930 to pull the gate of Q920 to -8.5 V. This opens the switch, disconnecting the normal input and feedback paths of the circuit. R929 provides a slight negative feedback in this situation, ensuring that the main coil current goes to zero instead of to some undefined value.

The main coil current is the sum of at least two items. First, there is a large fixed bias current stemming from the reference supply and R923 (trimmed by R931 and U920) to set the 1st LO at 3.01 GHz in the absence of other inputs. Second, there is a current induced by DAC U950A (and subsequent circuits), which is used to steer the 1st LO over the range from 2.11 to 3.91 GHz (2.11 to 4.26 GHz for Option 50 and Option 75). This current is normally a steady state value selected by the microprocessor to coarsely set the center frequency. Third, if the instrument is set to a span greater than 5 MHz/div, there is a sawtooth sweep waveform summed into the main coil current through switch U830A. This corresponds to the wide span operating mode discussed earlier in the Block Diagram description.

**FM Coil Driver.** U811 and U810 together form a buffered operational amplifier used in the inverting configuration. Input currents to the summing junction come from a variety of sources, to be described later. R905 is the current sense resistor for the FM coil. The voltage developed across it results in the current fed back to the summing junction through R815. Thus, this circuit forces a current through the FM coil proportional to the sum of the various control currents put into the summing junction. The normal current range for the FM coil is from approximately -120 mA to +120 mA.

Q910 and Q911 serve as a low resistance switch. When closed (gates held several volts positive), the FM coil driver operates as described above. When open (gates held several volts negative), the driver is disconnected and the FM coil gets its current from R714, which is the situation when the instrument is phase locked. Control of the switch state is through Q703 and Q800 from the signal PLLCON-. This signal is LOW when the instrument is phase locked. Several other switches are also controlled by the same command. R812 keeps U811 out of saturation when the switch is open.

When the FM coil driver is in use (instrument not phase locked) there are two potential signal sources summed into the driver circuit. One that is always present is induced by DAC U850A and subsequent circuits. It is steered into U821 by switch U757A, and serves to finely set the center frequency. The other is selected only in moderate spans. It is the sawtooth sweep waveform used to sweep the 1st LO over spans ranging from 50 kHz/div through 5 MHz/div.

### **Strobe Frequency Generator (VCO Module)**

Functionally, this module is a voltage controlled frequency source. It has an output frequency range from 25.73 MHz through 26.05 MHz in response to a tuning voltage range of approximately 4 V to 12.5 V. There is also a switch to select which of two signals is counted by the microprocessor, and there are means to turn off the output.

The strobe frequency comes from a VCO that ranges from 102.9 MHz through 104.2 MHz and whose output frequency is divided by four to yield the desired strobe frequency. Its frequency is controlled by phase locking it (with a 100 MHz offset) to 1/4 the frequency of a free running VCO (the LFVCO) that operates over a frequency range of 11.68 MHz through 16.84 MHz. It is this LFVCO that is actually tuned by the incoming tuning voltage referred to earlier, and this phase locked loop within the VCO module is called the inner loop. The strobe signal is generated in this manner in order to control close in phase noise and to provide a countable signal (the LFVCO output) whose frequency is not condensed into a very narrow range that would require long times to count to adequate resolution.

The LFVCO consists of Q426, T430, varactors CR532 and CR540, and associated components. Output (from the collector of Q422) is made available for external counting through selector switch U240. The LFVCO output frequency is also divided by four through U410, and the result is the reference frequency for the inner loop. U512 and U510 serve as a phase/frequency detector for the inner loop. The differential output of the phase detector is passed through error amplifier U435 and becomes the tuning voltage for the HFVCO.

The HFVCO consists of Q522, L610, varactor CR511, trim capacitor C611, and associated parts. Output is taken from a tap on L610, then split through a pair of isolation amplifiers (Q400 and Q410 plus Q316). Output from Q400 is divided by four in U300, providing the useful strobe frequency output of the module. HFVCO output from Q316 is applied to one input of mixer U320, whose other input is supplied with 100 MHz energy from the Reference Oscillator. The useful output of the mixer is the difference frequency between the HFVCO (for example, 103 MHz) and the 100 MHz reference, or 3 MHz. This signal is amplified (by Q310, Q312, and so forth.) and applied to the remaining input of the phase/frequency detector, thus closing the inner loop.

U240 serves two functions; both controlled by the logic signals CNTSELA and CNTSELB. First, it allows turning the HFVCO on or off by means of Q425. When the oscillator is turned off, Q101 is turned on at the same time to shut

down the strobe driver amplifier in the 1st LO BUFFER module.

Also, U240 serves as a count selector switch. It selects either the LFVCO signal or the 1st LO beat signal (from the PLCFC board) for counting by the microprocessor. R241 is part of a TTL to ECL level shifter, the remainder of which is located on the microprocessor board.

U510B provides a lock status indicator for the inner loop so that a lock failure can interrupt the microprocessor through circuitry on the PLCFC board.

The HFVCO receives supplementary power supply regulation by means of U122.

The LFVCO receives supplementary power supply regulation by means of U123, Q223, and associated parts.

### **1<sup>st</sup> LO Phase Lock Loop (Outer Loop) and Beat Note Processor**

The output of the phase gate in the 1st LO Buffer module may either be a beat note (when loop is unlocked) or a phase error voltage for maintenance of lock. Thus, the output of the phase gate is split into two paths.

Beat signals in the range of approximately 3 kHz through 11 MHz are passed through a chain including U614, a low pass filter, U723, and U720. They drive a Schmitt trigger circuit (Q630 through Q633), which produces a clean rectangular wave at TTL levels. The desired beat note, noise, and one or more weak, extraneous beat notes arising from 1st LO harmonics mixing with other harmonics of the strobe frequency, will normally be within the pass band of the low pass filter. The level control, R620, sets the overall signal level so that only the desired beat note is strong enough to overcome the hysteresis designed into the Schmitt trigger. The Schmitt trigger output may be routed to the microprocessor through a selector switch on the VCO module.

Phase error information from DC through a few hundred kHz is passed through U606 and switch U700D (when phase lock is invoked) to error amplifier U713. The output of U713 is applied to the FM coil through R714. When phase lock is invoked by setting PLLCON to high, U700D is closed and U700C is opened, closing the outer loop. Nominally, the loop bandwidth is set to 20 kHz. It may vary considerably from this value due to frequency dependent variations in the output level and slope of the phase gate. R709 provides for a known drift direction of the 1st LO tuning when the loop is first closed, but the initial frequency is away from lock. The instrument firmware purposely sets up a significant frequency offset in the direction that allows the loop to drift into lock, as a way of dealing with uncertainties in starting conditions.

The outer loop has a holding range of approximately  $\pm 2.5$  MHz before U713 saturates. U650A and U650B form a window comparator that generates logic signals (either INCR MAIN or DCR MAIN) when the loop approaches a range limit so that the microprocessor can take corrective action (for example, changing the main coil current in the appropriate direction to recenter the loop).

This allows for 1st LO drift or user changes to the center frequency setting without having to drop and reacquire lock for every change.

If Q652 is turned on by the signal UNLKIND (signifying that the inner loop is unlocked), both INCR MAIN and DCR MAIN are turned on simultaneously. This is a unique condition that the microprocessor interprets as a hardware failure in the VCO module.

**Summary of Outer Loop Lock Acquisition.** When the instrument is placed into a situation calling for phase lock operation, several things are done by the firmware to arrange for a lock at the correct frequency.

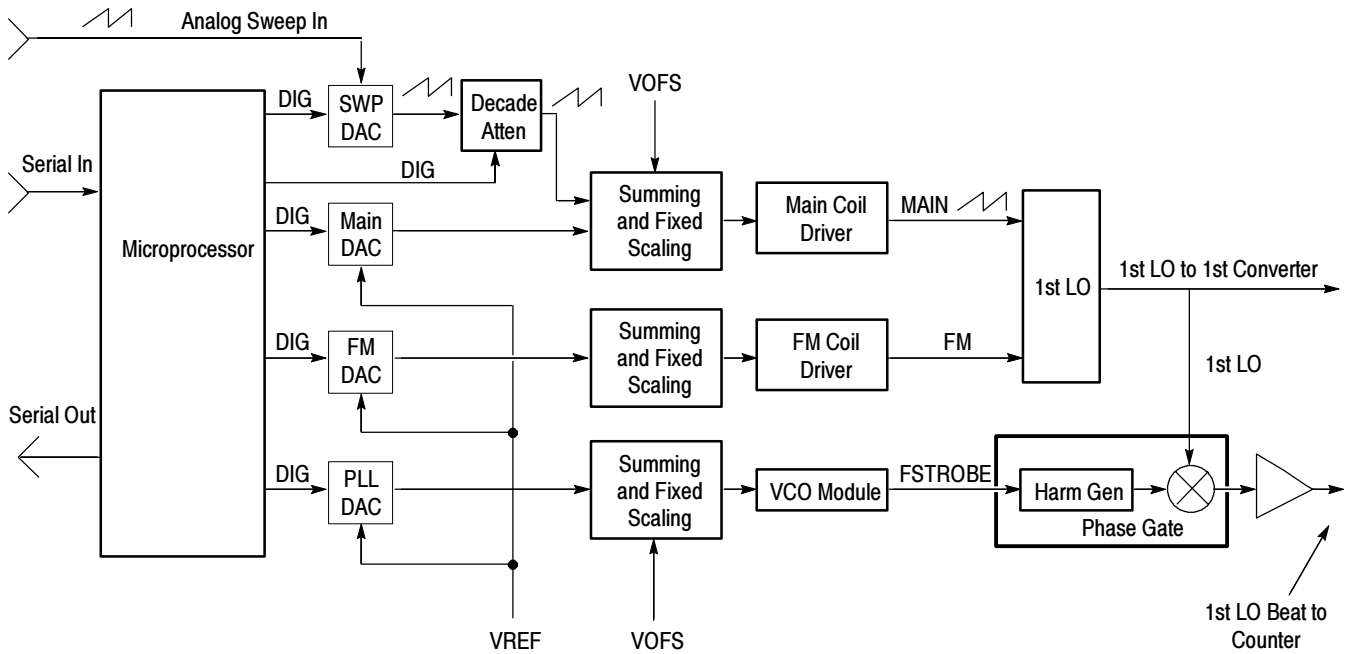
The N number (that is, the harmonic order of the strobe to which the 1st LO will lock) is calculated, and the strobe and corresponding VCO frequencies needed are calculated. The sweep is disconnected, the FM coil DAC is set to mid range (FM coil current to nominal zero), and the main coil DAC is set to the value that will place the 1st LO as close as possible to the desired 1st LO frequency (it can be several hundred kHz off because of the coarseness of the main coil DAC steps). Now the VCO is tuned by trial and error so that the strobe line, at a frequency of  $N \times F_{\text{strobe}}$ , is approximately 100 kHz above the actual 1st LO frequency (that is, the measured beat frequency is 100 kHz on the correct side of zero beat). Then, lock is invoked by setting PLLCON high. Due to the intentional offset provided by R709, the 1st LO drifts rapidly into lock. After a suitable delay, acquisition of lock is verified by checking the states of both lock limit comparators and by checking that the beat frequency is zero.

At this point the loop is locked, but in the wrong spot. Now the microprocessor proceeds to tune the VCO (and consequently, the strobe and 1st LO) to the correct frequency by repeatedly tuning and counting the VCO. The sweep is then switched into the VCO tuning voltage, and the instrument is now scanning the desired spectrum range.

### Signal Path and Switching Summary

**Wide Span Operation (5.1 MHz/div and Higher Spans).** The Main coil is driven by a fixed bias summed with DAC U950A output and a sweep signal (routed through U830A).

The FM coil is driven with VCFC FM arising from DAC U850A only (routed through U757A). Current is routed through Q910 and Q911 to the FM coil. See Figure 3-12.

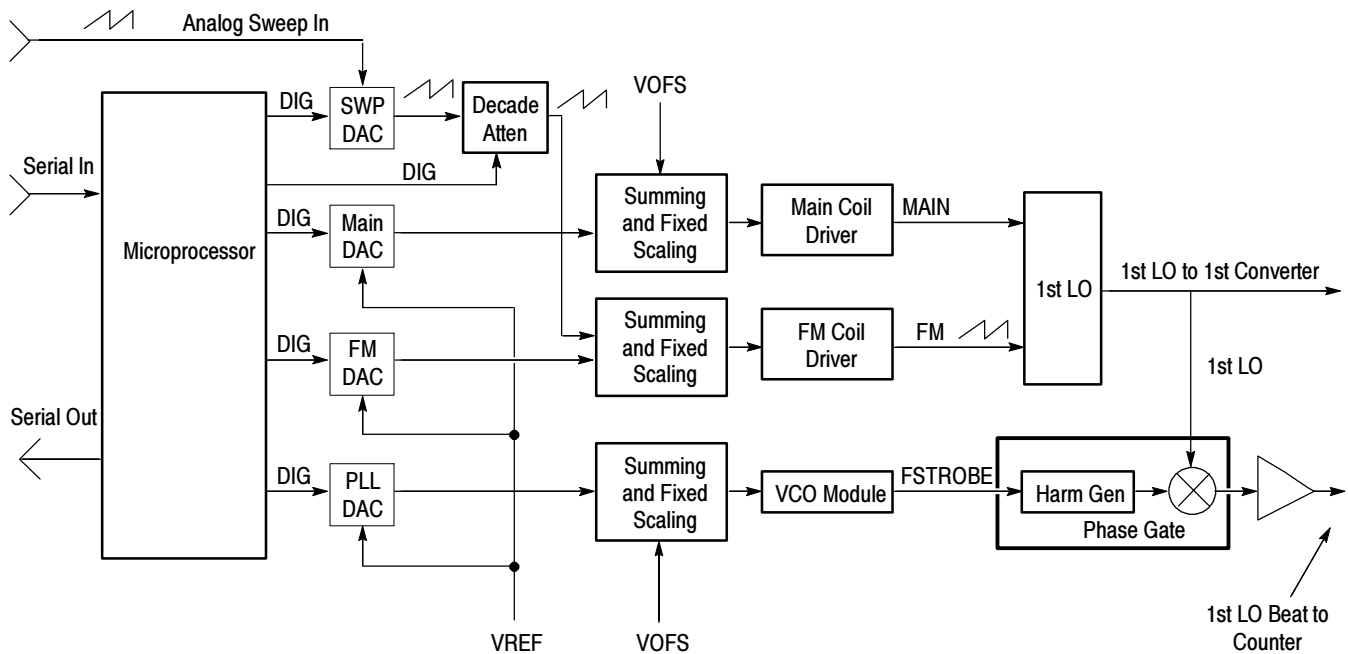


**Figure 3- 12: Phase Lock Center Frequency Control Configuration for Wide Spans (Unlocked, Sweep Main Coil)**

The VCO is not used except intermittently for frequency corrections, and it is tuned by a fixed bias summed with VCFCU arising from DAC U950B.

**Moderate Span Operation (50 kHz/div through 5 MHz/div Span).** The Main coil is driven by a fixed bias plus a DAC output (U950A).

The FM coil is driven with VCFC FM arising from DAC U850A (routed through U757A) summed with the sweep signal (routed through U830B). Total current is routed through Q910 and Q911 to FM coil. See Figure 3-13.

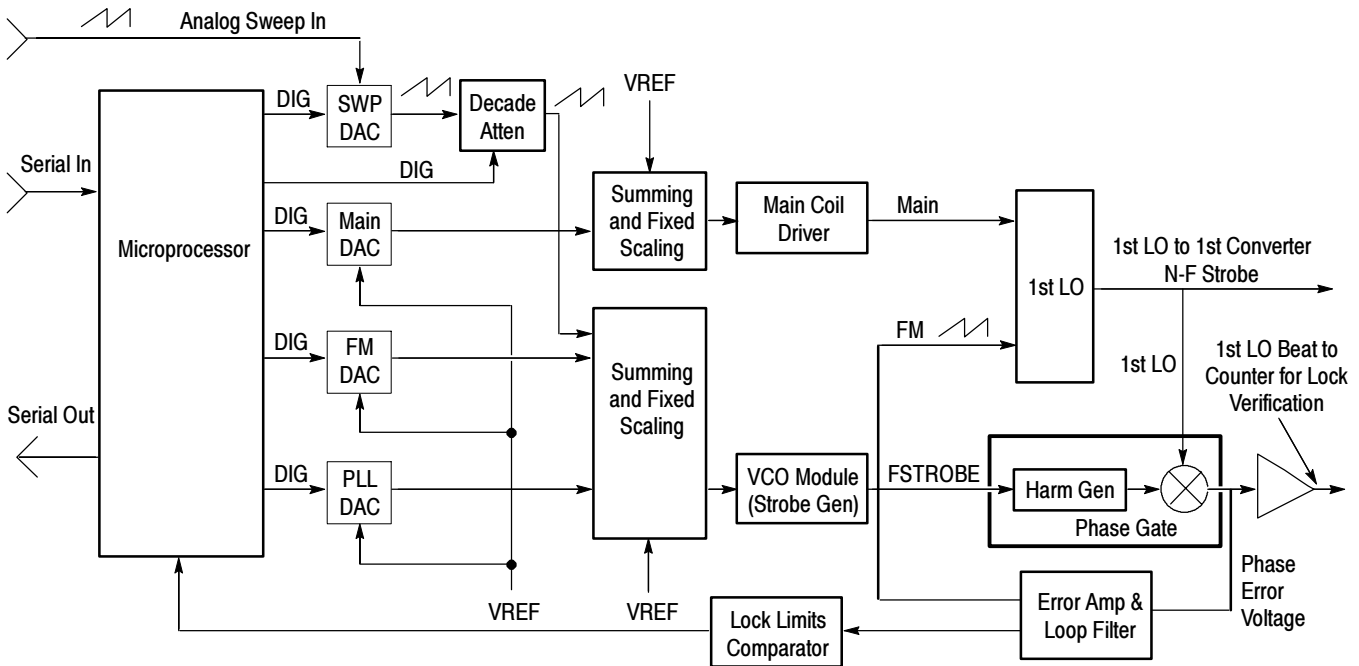


**Figure 3-13: Phase Lock Center Frequency Control Configuration for Moderate Spans (Unlocked, Sweep FM Coil)**

The VCO is not used except intermittently for frequency corrections and is tuned by a fixed bias summed with VCFCU arising from DAC U950B.

**Narrow Span Operation (20 kHz/div and Smaller Spans).** The instrument is phase locked.

The Main coil is driven with a fixed bias summed with DAC U950A output. See Figure 3-14.



**Figure 3-14: Phase Lock Center Frequency Control Configuration for Narrow Spans (Locked, Sweep VCO)**

The FM coil is driven with the output of the phase lock error amplifier, U713, only.

The VCO is active continuously and is tuned by a fixed bias summed with VCFCU from DAC U950B, VCFC L from DAC U850A (routed through U757D), and sweep voltage VSWP PLL (routed through U757B).

### Digital to Analog Conversion

The PLCFC board has four 12 bit DACs in two IC packages, U850 and U950.

On the digital side, each package has four data lines, three address lines, and two control lines. The DACs contain internal registers for the 12 bit words associated with each analog output and, therefore, the microprocessor must write multiple 4 bit words to a package in order to set up a new output.

These are multiplying DACs. Each delivers an output current that is the product of an analog voltage (called the reference) and the 12 bit digital word. These units can correctly deal with either polarity of reference voltage. Three of them (U850A, U950A, and U950B) are supplied fixed reference voltages and serve simply as computer controlled DC sources.

DAC U850A is called the FM DAC but serves two roles. In non phase locked spans, its output ultimately ends up fine tuning the 1st LO center frequency through the FM coil.



In phase locked spans, its output is used to fine tune the VCO frequency. In either case its output passes through U852, which has an output range of 0 to +5 V. U845 sums that with an offset and provides gain so that the output of U845 ranges from -5 V to +5 V. This signal is called VCFC (L/FM) and is routed to the appropriate destination by U757A and U757D.

Main Coil DAC U950A output passes through U952 and U940. U940 provides gain such that the output of U845 ranges from -5 V to +5 V, and the result is summed with the other components of the main coil current. Its function is coarse tuning of the 1st LO center frequency, in steps of approximately 400 kHz.

U950B is the PLL DAC. Its function is coarse tuning of the VCO frequency. Its output is converted to the -5 V to +5 V range by U954 and U941 before being summed with the other components of the VCO tune voltage.

Unlike the other DACs, U850B's reference input is supplied with the analog sweep waveform SWP (from the Sweep board through U565) and serves as a microprocessor controlled gain control to determine span/div. Its output passes through U854 to a decade attenuator composed of U831 and associated components. The output of the decade attenuator is then routed to the desired destination by switches U830A, U830B, and U757B. In wide spans, this signal sweeps the 1st LO main coil. In moderate spans, it sweeps the 1st LO FM coil. In phase locked spans, it is used to sweep the VCO frequency.

## Digital Interface

This circuitry links the phase lock hardware with the microprocessor. The link is bidirectional. Commands and DAC setting data are sent to the PLCFC module, and lock status information is sent back to the microprocessor. In addition, there is provision to loop input data back to the microprocessor to verify integrity of the interface circuitry.

The path into the PLCFC module is through a 24 bit shift register composed of U361, U460, and U560. Serial data on the DATAO line is shifted into the register by the clock signal CLKO. When all 24 bits have been shifted in, CFLATCH- is used to latch data simultaneously from all shift register stages to parallel output registers. The resulting 24 bit parallel word is used to control switches, set DACs, and do a number of other things on the module. A listing of the 24 lines and their functions appears later in Table 3-22 on page 3-71.

CFCLATCH- also triggers U372 causing a delayed pulse on the WR- line, latching data into internal registers of the DACs.

U370 is an 8 bit shift register used for transferring data from the module back to the microprocessor. Serial data is shifted out on the DATAI line by the clock CLKI-, which is gated into the clock input of the register by U270C as controlled by CFCACK-. Data may be serially loaded into this register through the EXAM line coming from the tail end of the 24 bit input register. In this situation the data is clocked into the register by a derivative of CLKO, which is gated by LOADEXM through U270D.

This is the loop back path referred to earlier for checking the interface. This register may also be loaded with up to eight bits of parallel data for subsequent serial transfer to the microprocessor. Only three bits are used. Bits 7 and 8 are the signals (INCR MAIN and DCR MAIN) from the lock limits comparator, and bit 5 is wired to logic 1 as a board identity.

The gating of CLKI- and CLKO into the output shift register (by CFCACK- and LOADEXM, respectively) is partly a matter of source selection and is also necessary because both clock signals are used by other boards in the system at some times.

Any transition on either INCR MAIN or DCR MAIN (or both) will load the new states of those lines into the output shift register. (The various sections of U360 serve as edge detectors to generate the load command to the shift register.) Further, if LKINTEN is high at the time, U471B will end up SET, interrupting the microprocessor by way of CFCREQ-. The line READEXM provides a direct method of setting the interrupt, if desired. Any transition on LKINTEN will also cause the shift register to be loaded, providing a forced means for checking the status of the lock lines at any time. The microprocessor uses CFCACK- to clear U471 of the interrupt (in addition to the gating function mentioned above).

**Summary of Digital  
Control Lines on Phase  
Lock Center Frequency  
Control Module**

READEXM. Low to high transition forces CFC interrupt.

LOADEXM. High level gates CLKO into output shift register clock input.

DEGAUSS. High level forces 1st LO main coil current to zero.

CNTSELA and CNTSELB. These signals are decoded to set state of selector switch in VCO module. Both high is strobe OFF. CNTSELA high and CNTSELB low is count VCO. CNTSELA low and CNTSELB high is count beat frequency. Both low is strobe ON but no count selected.

PLLCON. High level commands phase lock configuration.

LKINTEN. High level enables interrupt on transition of either lock limit comparator line.

CAPCON. High level connects noise reduction capacitor across 1st LO main coil.

SWDECA. A and B are decoded to select setting of sweep decade attenuator. Both low is straight through. A high and B low is divide by 10. A low and B high is divide by 100. Both high is disconnect sweep.

SWSELA. A and B are decoded in U274 to operate switches that direct sweep waveform to proper destination.

SWSELB. Both low is sweep main coil. A high and B low is sweep FM coil. A low and B high is sweep VCO. Both high is no sweep.

A0, A1, and A2. Address lines for DAC internal register selection and control.

UPD. Used for simultaneous transfer to DAC output registers.

DB0', dB1', dB2', and dB3'. Data lines for DAC U950 (A and B).

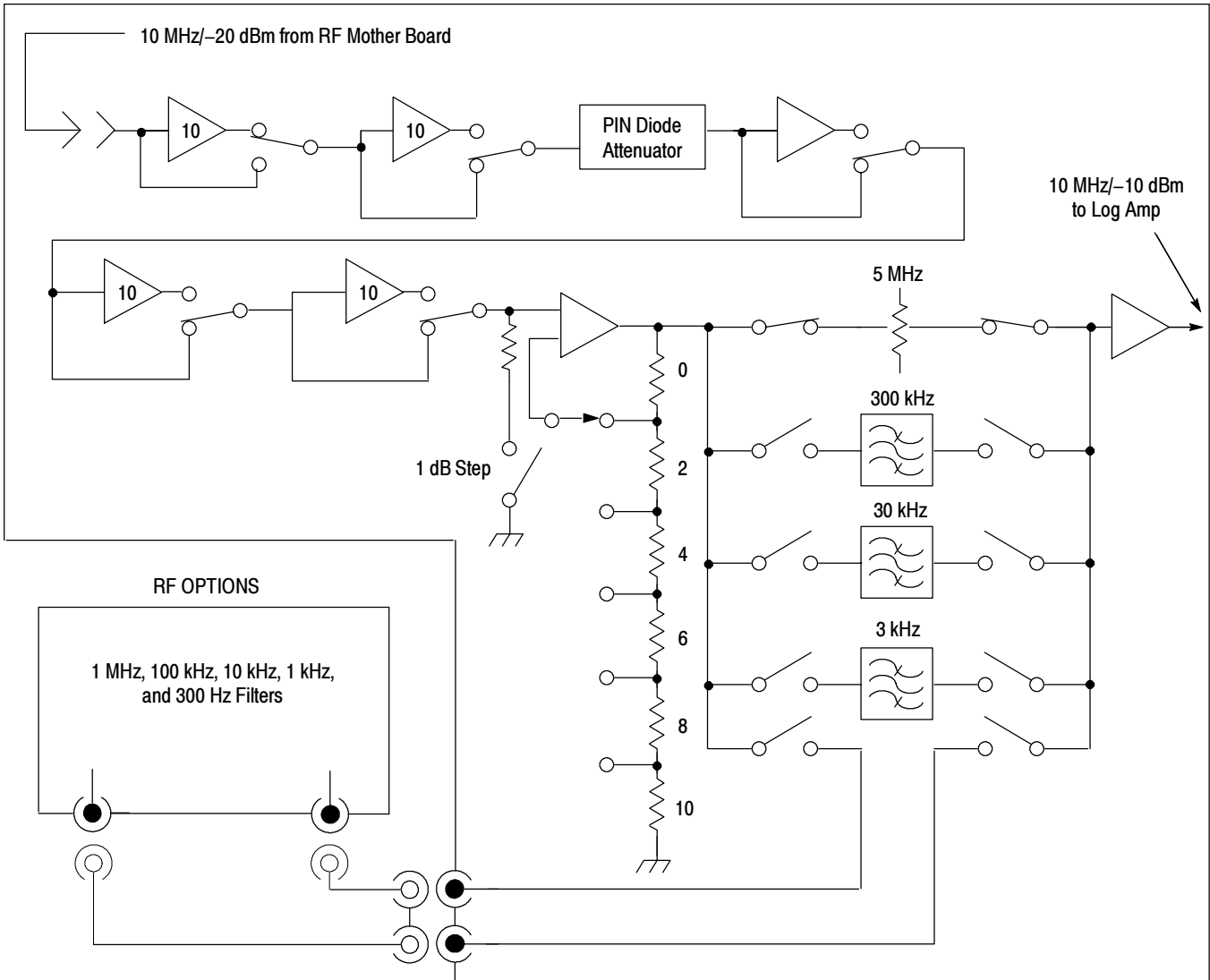
DB0, dB1, dB2, and dB3. Data lines for DAC U850 (A and B).

## Variable Resolution Module

This section contains a detailed description of the Variable Resolution module.

### **Input Amplifier**

The input amplifier used is a transformer feedback stage that provides approximately 12 dB of gain with 10 dB of reverse isolation. See Figure 3-15. The match at each port with the other terminated is better than 15 dB at 10 MHz. The noise figure is less than 3 dB and, with 12 mA flowing in the device, the output intercept is approximately +30 dBm. The match at each port is highly sensitive to a proper termination being presented to the other port.



**Figure 3- 15: Variable Resolution Module Diagram**

**PIN Attenuator**

The PIN attenuator design is based upon a pair of matched pin diodes used in a tee configuration. This configuration maintains the impedance match at each end, providing the product of the PIN diode resistances is equal to the square of the end terminations. This can be approximated if the sum of the currents in the PIN diodes is equal to a constant. The DAC has complementary current outputs whose total is set by an adjustment. The attenuation range is approximately 12 dB with a 1 dB minimum loss. The worst case return loss at the end points is 15 dB. The step size for an 8 bit DAC is 0.04 dB steps in the center of its range.

**10 dB Gain Step Amplifier**

The 10 dB gain step stages incorporate a transformer feedback amplifier. These stages have approximately 0.5 dB of loss or 9.5 dB of gain, for a net difference of 10 dB. When the gain step is selected, the signal is routed through the amplifier for a gain of approximately 11.5 dB. A pad of approximately 1.5 dB is added to trim the gain down to 10 dB. The signal is then routed through a switch that has approximately 0.5 dB of loss. When the amplifier is deselected, the signal is routed around the amplifier, thus preserving noise figure and intercept point. A total of five step gain stages are used.

**1 dB Gain Step Amplifier**

The 1 dB gain step amplifier is the last amplifier before the filter switching tree. The amplifier is composed of a class AB, three stage, feedback amplifier. The gain is adjusted in 2 dB steps for a total of 10 dB. The 1 dB steps are done by shunting part of the signal to ground. This is controlled by Q246, located at the input of this amplifier. This configuration allows the entire 10 dB gain sequence to be contained within one step gain stage.

**Routing Switches**

The routing switches are used to route RF signals to various areas. They are composed of a transistor in heavy saturation that has relatively large charge storage characteristics. The topology used is a shunt series configuration. These switches are used on both the input and output of each filter including the external filter connection.

**RF Options**

The RF Options is a system of additional resolution bandwidth filters that enhance the measurement capability of the instrument. See Figure 3-16.

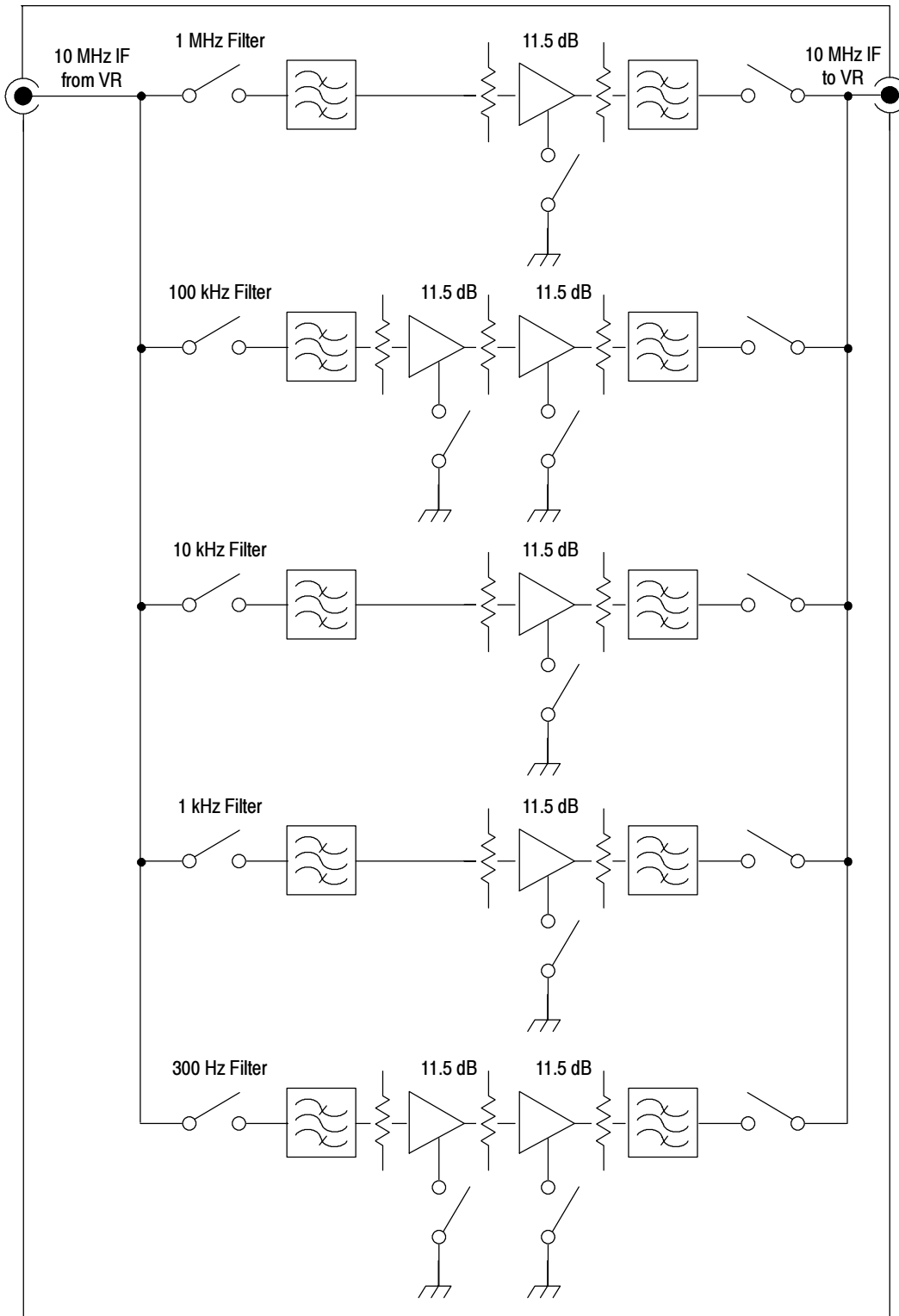


Figure 3-16: RF Options Diagram

The board provides the resolution bandwidths used to fill in between filter values installed within the Variable Resolution module. The bandwidth range is 1 MHz to 1 kHz in decade steps, and 300 Hz. Each filter path consists of a switchable amplifier and bandpass filter combination.

**Control System Interface**

The control of the RF Options by the microprocessor is through one 8 bit shift register. Data is shifted serially in one 8 bit word.

**Bandwidth Control**

The variable bandwidth section consists of a switching tree to select one of five filters. Available bandwidth filters, in addition to those already in place in the Variable Resolution module, are 1 MHz, 100 kHz, 10 kHz, 1 kHz, and 300 Hz.

**Identification Bit**

A resistor is installed between either pin 12 (d6) or pin 13 (d5) of shift register U390 and the base of Q396 to complete a path for an identification bit for the Microprocessor. This allows the Microprocessor to determine that the 300 Hz filter is installed on the RF Options board.

**Gain Stage**

The gain stage used is a transformer feedback stage that provides approximately 11.5 dB of gain. In the case of the 100 kHz and 300 Hz filters, two gain stages are used. The impedance match at one port of the Gain Stage is highly sensitive to a proper termination being presented to the other port.

**Routing Switches**

The routing switches are used to route RF signals to the selected bandwidth filter. They are composed of a transistor in heavy saturation that has relatively large charge storage characteristics. The topology used is a shunt series configuration. These switches are used on both the input and output of each filter. That is, the filters are switched in and out at both the input and the output so that when a filter is not being used it is effectively out of the circuit.

Each bandwidth filter is composed of a double tuned circuit (a two pole Butterworth filter section), an amplifier to provide gain correction and isolation, and another double tuned circuit. The intermodulation performance of the amplifier is less critical because the amplifier is placed after the filter. The noise power generated by the stage is reduced by placing a filter of equal bandwidth after the gain stage.

**Diagnostics**

The identification bit can provide useful information on the proper configuration of the instrument.

## Log Amplifier

The Log Amplifier system is a high performance, intermediate amplifier system that provides display laws of linear detection and logarithmic detection of the incoming signal. The log display has scale factors of 10 dB/div, 5 dB/div, and 1 dB/div. The linear mode has the ability to magnify the top portion of the waveform to enhance the measurement capability. The module also contains an FM detector, which, when used with the built in audio amplifier, can be used to monitor the modulated input signal for enhanced signal identification. The audio amplifier can also be used to monitor the output of the displayed waveform regardless of the video source. There is an alternate audio input for the push button clicks generated by the system controller. This audio signal is also used for the vertical amplitude reference, to check the sweep speed, and for internal triggers. An amplitude limited output is available for the period counter for determining the actual frequency of the signal present in the IF system. External video inputs are provided for the use of external detectors and the rear panel. A provision is made for clamping the display when the 1st LO is tuned out-of-band. Frequency dependent amplitude (flatness) correction is also performed on this board.

### Hardware

The Log Amplifier system is configured by using a 4.5 by 8.75 circuit board mounted in the card cage. The Microprocessor interface is through three 8 bit shift registers.

### Flatness Error Correction

The signal level at the Log Amplifier board (J190) for full screen deflection is -10 dBm. The first stage of the Log Amplifier is an amplifier that provides gain between 18 dB and 24 dB, depending on the frequency of the 1st LO. The amplifier is adjusted such that the gain is 18 dB at low frequencies and is up to 24 dB at the high end of the frequency range, because the frequency dependent amplitude error is always greater at the higher frequencies. The feedback is adjusted by changing the amount of current flowing through PIN diodes CR290 or CR291. The correction voltage, SWPSLOPE, reflects the frequency of the 1st LO. Provision for a second correction voltage from a future Digital Signal Processing module is included. This second correction voltage, which provides an interpolated voltage, will be derived from a flatness table. At present, only SWPSLOPE is used.

### Noise Filter

The output of the first stage, a gain slope amplifier, is then fed to a two pole noise filter to limit the noise to 5 MHz and to provide two more poles of 5 MHz bandwidth resolution filtering. The output of this filter is then sent to the log stages through a set of jumpers so the signal can be broken for calibration purposes and buffer amplifier Q170 (in a common base configuration) to form an auxiliary IF output.



**Logarithmic Amplifier Stages**

The core of the logging stage is a pair of AD640s. The AD640 uses five cascaded limiting amplifiers to approximate a logarithmic response to an input signal of wide dynamic range and wide bandwidth. The two AD640s are used in a parallel/summing operation. The input signal to one AD640 is amplified by 25 dB with the CLC501. This is a current feedback operational amplifier that has a clamping circuit used to limit the output to a value set by an external voltage divider. The other AD640 is fed through a 25 dB attenuator. The difference in input amplitude for small signals is then 50 dB. There is not enough gain in the 75 dB path to cause the AD640 to limit on the input noise of the CLC501. Thus, the full dynamic range of both parts is realized. This topology eliminates the need for a narrow bandwidth noise filter.

**Synchronous Detector**

In Lin mode, the signal envelope is extracted from the RF carrier by the use of a synchronous detector. This detector is basically a multiplier. Detection is accomplished by feeding a limited signal into one input and a sample of the RF signal into the other. Since the limited input is always considered equal to plus or minus one unit, only the polarity is important. The sample RF is then multiplied by plus or minus one. Since the RF is always in phase with the limited input, the product is always positive. Thus, demodulation is achieved.

**Ripple Filter**

The ripple filter is a six pole elliptic filter with a finite transmission zero at the 10 MHz IF frequency and another at approximately 19 MHz. The purpose is to remove any of the remaining 10 MHz component that may still exist. Because of the full wave rectification provided by the synchronous detector and the log cells, the 10 MHz component is attenuated by approximately 30 dB. This greatly reduces the requirements of the ripple filter. However, the signal is not always at 10 MHz. The widest bandwidth is 5 MHz, so there is still a significant requirement for ripple reduction as low as 5 MHz.

**Video Filter/Scale Factor**

After the Ripple Filter, the signal is offset before being amplified to bring the equivalent of a full screen signal in log mode or linear mode to correspond to 0 V output. The out-of-band clamp is also done at this time to deflect the CRT beam into the bottom of the screen when the display is outside the frequency limits of the Spectrum Analyzer. Next, the video filter selector is chosen. The bandwidth of the vertical chain is approximately 5 MHz. Therefore, when a video filter path is chosen, the maximum bandwidth drops to approximately 1 MHz. This switching tree also multiplexes in the external signals from the rear panel or the FM Detector.

Immediately following the Video Filters is the Scale Factor amplifier. The gain of the Scale Factor amplifier can be set to 1.1, 2.2, 5.5, or 11 corresponding to 10 dB/div, 5 dB/div, 2 dB/div, or 1 dB/div. The linear function is done with the gain set to 1.1.

**FM Detector** The AD834 (U350) is a four quadrant multiplier that is used as a quadrature detector for demodulation of FM signals. The audio output is sent to the audio amplifier selector and to the video input selector.

**Period Counter Signal** The limited output of one of the log cells is used to drive an isolation buffer (U630A). This signal is used to drive the period counter on the Microprocessor board for frequency measurements.

**Audio Amplifier** The TDA1013A is used as the audio amplifier for monitoring purposes, and as a means of providing feedback to the user from the microprocessor.

**Video Amplitude Calibrator** Microprocessor audio appearing at pin 22 of J7 is used to provide feedback to the operator for push button clicks and out of range or uncalibrated conditions. This signal is also used to provide a signal for calibrating the video amplifier and display storage. The sweep triggers are also tested by this signal.

**System Reset** At power on, the system reset line SYSRST- on pin 4 of J7 goes low until the Microprocessor resets it. During this time, the control latch's output enable line is held false and the outputs are in a high impedance state. This is used only by the mute bit. The pull up resistor will force a mute condition during this time, thus disallowing any extraneous noise from the speaker.

## Display Storage

The Display Storage board digitizes both vertical (LOGVID) and horizontal (SWP) signals and places this digitized information in nonvolatile RAM (NVRAM). Various state machines on the board then take this digitized data from the NVRAM and generate the horizontal and vertical signals which are sent to the deflection circuitry on the Power Supply board. In addition to displaying the digitized data, the Display Storage board also is used to display the readouts and place markers on the CRT.

The major features of the Display Storage board are:

- Digitize the LOGVID signal from the Log Board (8 bits)
- Digitally track the SWP signal from the Sweep Board (9 bits)
- Acquire and store up to four waveforms in RAM

- Provides for the ability to place up to two markers on a displayed waveform
- Implement and display a B,C-Save A waveform
- Display readout information on the screen
- Provide up to 28 Kbytes of nonvolatile storage area
- Provide two different waveform acquisition modes: Max Peak and Min/Max
- Provide a Max Hold function

## Control System Interface

The following sections show the bit maps for each of the control registers on the Display Storage board.

**Mode Control Register 1.** Mode Control Register 1 is located in I/O space, at location 0x0FA00. Mode Control Register 1 is a read/write register. Table 3-2 describes the Mode Control Register.

**Table 3-2: Mode Control Register 1**

Bit Number	Mnemonic	Activity Level	Description
7	DSON_L	Low	Display Storage On
6	DISP-A_L	Low	Enables B,C-Save A Display
5	MAXHLD_L	Low	Enables max hold function
4	PEAKDIS_L	Low	Enables max peak function
3	HLF/FLL_L	High	Selects location of B,C-Save A display
2	ACQ_ON	High	Enables the acquisition system
1	RDZEN	High	Not used
0	DS_PROTECT	High	Not used

DSON\_L. Enables the Display Storage board to display the digitized waveforms when low. When this signal is high, the analog trace is drawn on the CRT.

DISP-A\_L. Invokes the B,C-Save A display on the CRT when low.

MAXHLD\_L. Invokes the Max Hold algorithm for A and B waveforms when low. In this mode a given bin will only be updated when the new vertical data is greater than the stored vertical data.

PEAKDIS\_L. In the Normal Mode this bit selects one of the two acquisition modes. Either the Max Peak, when low, or the Min/Max algorithm when high. In the Enhance Mode this bit is used in conjunction with the ACQM0 bit of Mode Control Register 2 to invoke Sample and Min Peak algorithms. See Table 3-3 below.

HLF/FLL\_L. In the Normal Mode this bit selects one of two positions on the CRT screen to normalize the B,C-Save A display. When this bit is low, the B,C-Save A display will be normalized to the top of the CRT screen. When this bit is high, the B,C-Save A display will be normalized to the middle of the screen. In the Enhanced Mode this bit is used in addition to the POS1 bit in Mode Control Register 2. See *Mode Control Register 2* below for more details.

ACQ\_ON. This bit asynchronously enables/disables the storing of vertical data into the waveform memory. When this bit is high, the vertical data will be stored in waveform memory. When this bit is low, the vertical data will not be stored in waveform memory. It is important to understand that the A/D converter is still running and the vertical data processing sections are still running. All that this bit does is control the ability to store the vertical data after being processed.

RDZEN. This bit is not used in the Display Storage board.

DS\_PROTECT. This bit is not used in the Display Storage board.

**Mode Control Register 2.** Mode Control Register 2 is located in I/O space, at location 0x0FA04. Mode Control Register 2 is a read/write register.

In order to write to this register, it must first be enabled by setting the MCREG2 bit (bit 7) of the Scroll Register high. If at any time the MCREG2 bit is cleared (set low) Mode Control Register 2 will be cleared and disabled.

**Table 3-3: Mode Control Register 2**

Bit Number	Mnemonic	Activity Level	Description
7			Not used
6			Not used
5			Not used
4			Not used
3			Not used
2	ENB2715	High	Enables features available in 2715 instrument
1	POS1	High	MSB of B,C-Save A waveform position
0	ACQM0	High	LSB of acquisition mode control

ENB2715. This bit, when high, enables the Enhanced Mode of the board.

POS1. This bit, along with the HLF/FLL\_L bit (called POS0 on the schematics) in Mode Control Register 1, determines the position on the CRT for the B,C-Save A display. The Normal Mode does not use this bit. Table 3-4 gives the positions on the screen that are available when using the HLF/FLL\_L and POS1 bits.

**Table 3-4: Truth Table for the B,C- Save A Display Screen Offset**

POS1	POS0 (HLF/FLL_L)	Normal Mode	Enhanced Mode
0	0	TOP (vertical position 245)	TOP (vertical position 245)
0	1	MIDDLE (vertical position 125)	MIDDLE (vertical position 125)
1	0	TOP (vertical position 245)	BOTTOM (vertical position 5)
1	1	MIDDLE (vertical position 125)	BOTTOM (vertical position 0)

ACQM0. This bit, along with the PEAKDIS\_L bit (called ACQM1 on the schematics) in Mode Control Register 1, determines the acquisition mode currently being used to update the waveform memory. The Normal Mode does not use this bit. Table 3-5 gives the acquisition modes that are available when using the PEAKDIS\_L and ACQM0 bits.

**Table 3-5: Truth Table for the Acquisition Modes**

ACQM1 (PEAKDIS_L)	ACQM0	Normal Mode	Enhanced Mode
0	0	Max Peak Acquisition	Max Peak Acquisition
0	1	Max Peak Acquisition	Minimum Peak Acquisition
1	0	Min/Max Peak Acquisition	Min/Max Acquisition
1	1	Min/Max Peak Acquisition	Sample Acquisition

**Marker/Save Register.** The Marker/Save Register is located in I/O space, at location 0x0FA01. The Marker/Save Register is a read/write register.

**Table 3-6: Mode Control Register 2**

Bit Number	Mnemonic	Activity Level	Description
7	MKRWFM3	Low	Markers on Display D
6	MKRWFM2	Low	Markers on Display C
5	MKRWFM1	Low	Markers on Display B

**Table 3-6: Mode Control Register 2 (Cont.)**

Bit Number	Mnemonic	Activity Level	Description
4	MKRWFM0	Low	Markers on Display A
3	UPDATED_L	Low	Display D updating, not in save mode
2	UPDATEC_L	Low	Display C updating, not in save mode
1	UPDATEB_L	Low	Display B updating, not in save mode
0	UPDATEA_L	Low	Display A updating, not in save mode

MKRWFM3. This bit, when low and the board is in the Normal Mode, enables both markers to be displayed on the D waveform. When the board is in the Enhanced Mode, this bit, when combined with the MKRWFM2 bit determines on which waveform Marker 3 will be placed, as shown in Table 3-7.

MKRWFM2. This bit, when low and the board is in the Normal Mode, enables both markers to be displayed on the C waveform. When the board is in the Enhanced Mode, this bit, when combined with the MKRWFM3 bit determines on which waveform Marker 2 will be placed, as shown in Table 3-7.

**Table 3-7: Enhanced Mode MKRWFM[3..2] Bit Assignment**

MKRWFM3	MKRWFM2	Marker 2 on Waveform...
0	0	Waveform A
0	1	Waveform B
1	0	Waveform C
1	1	Waveform D

MKRWFM1. This bit, when low and the board is in the Normal Mode, enables both markers to be displayed on the B waveform. When the board is in the Enhanced Mode, this bit, when combined with the MKRWFM0 bit determines on which waveform Marker 1 will be placed, as shown in Table 3-8.

MKRWFM0. This bit, when low and the board is in the Normal Mode, enables both markers to be displayed on the A waveform. When the board is in the Enhanced Mode, this bit, when combined with the MKRWFM1 bit determines on which waveform Marker 0 will be placed, as shown in Table 3-8.

**Table 3-8: Enhanced Mode MKRWFM[1..0] Bit Assignment**

MKRWF3	MKRWF2	Marker 2 on Waveform...
0	0	Waveform A
0	1	Waveform B
1	0	Waveform C
1	1	Waveform D

UPDATED\_L. This bit, when low, allows the vertical data to be stored in Waveform D. When the bit is high, the write strobe for Waveform D is disabled.

UPDATEC\_L. This bit, when low, allows the vertical data to be stored in Waveform C. When the bit is high, the write strobe for Waveform C is disabled.

UPDATEB\_L. This bit, when low, allows the vertical data to be stored in Waveform B. When the bit is high, the write strobe for Waveform B is disabled.

UPDATEA\_L. This bit, when low, allows the vertical data to be stored in Waveform A. When the bit is high, the write strobe for Waveform A is disabled.

**Display Control Register.** The Display Control Register is located at I/O memory location 0x0FA02. The Display Control Register is a read/write register.

**Table 3-9: Display Control Register**

Bit Number	Mnemonic	Activity Level	Description
7	TEXT4	High	Display Text Page 4 on the CRT
6	TEXT3	High	Display Text Page 3 on the CRT
5	TEXT2	High	Display Text Page 2 on the CRT
4	TEXT1	High	Display Text Page 1 (readouts) on the CRT
3	DISPD	High	Display Waveform D on the CRT
2	DISPC	High	Display Waveform C on the CRT
1	DISPB	High	Display Waveform B on the CRT
0	DISPA	High	Display Waveform A on the CRT

TEXT4. This bit, when high, places page four of the four possible readout pages on the CRT. Any number of text pages may be displayed on the CRT however, the resulting display may not be readable, and will flicker severely.

TEXT3. This bit, when high, places page three of the four possible readout pages on the CRT. Any number of text pages may be displayed on the CRT, however the resulting display may not be readable, and will flicker severely.

TEXT2. This bit, when high, places page two of the four possible readout pages on the CRT. Any number of text pages may be displayed on the CRT, however the resulting display may not be readable, and will flicker severely.

TEXT1. This bit, when high, places page one (readouts) of the four possible readout pages on the CRT. Any number of text pages may be displayed on the CRT, however the resulting display may not be readable, and will flicker severely.

DISPD. This bit, when high, enables the display of Waveform D on the CRT.

DISPC. This bit, when high, enables the display of Waveform C on the CRT.

DISPB. This bit, when high, enables the display of Waveform B on the CRT.

DISPA. This bit, when high, enables the display of Waveform A on the CRT.

**Scroll Register.** The Scroll Register is located at I/O memory location 0x0FA03. The Scroll Register is write only register. Reading from this register will return the vertical data currently stored in the Maximum Storage register. This value may be either a maximum peak, if the acquisition mode is Max Peak, or sample, if the acquisition mode is Sample. After reading this register, it is cleared.

**Table 3-10: Scroll Register**

Bit Number	Mnemonic	Activity Level	Description
7	MCREG2	High	Enables Mode Control Register 2
6	Not used	—	
5	Not used	—	
4	Not used	—	
3	SCRL3	High	Readout Scroll bit 3
2	SCRL2	High	Readout Scroll bit 3
1	SCRL1	High	Readout Scroll bit 3
0	SCRL0	High	Readout Scroll bit 3

MCREG2. This bit, when low, holds Mode Control Register 2 in the cleared (disabled) state. Setting the MCREG2 bit high will allow successful writes to Mode Control Register 2.

SCRL[0..3]. These four bits determine how far up the screen the bottom row of text should be displayed, anywhere from 0 to 15 lines.



**Marker Position Registers.** There are two Marker Position Registers. One register for Marker 1 and a second register for Marker 2. Marker Position Register 1 uses I/O port locations 0x0FC00 through 0x0FDFF. Marker Position Register 2 uses I/O port locations 0x0FE00 through 0x0FFFF. Each port location corresponds to a horizontal position on the screen. By writing any data to one of the I/O ports inside the above range, the corresponding marker will be placed at the horizontal position, on the CRT, represented by the lower nine bits of the port address.

For example, writing 0x55 to I/O address 0x0FCE3 will place Marker 1 at horizontal screen position 0x0E3 (227), while writing 0xA1 to I/O address 0x0FFF9 will place Marker 2 at horizontal screen position 0x1F9 (505).

## Circuit Description

The Display Storage board is best described by breaking it up into several sections. These sections include Address Buffering and Decoding, the Control Registers, the Horizontal Input and Tracking A/D, the Vertical Input, the Vertical Data Processor and NVRAM, the Readouts and Waveform Drawing, the Horizontal Output, the Vertical Output, and the Miscellaneous Decoupling. The following sections will describe each one of these in detail.

**Address Buffering and Decoding.** The Address Buffering and Decoding section consists of a 74HCT245 bidirectional bus transceiver (U22), and a GAL20V8 PAL (U29). The purpose of this section is to decode the incoming address lines into the various enable signals required by the Display Storage board, buffer the data lines from the CPU Board, and buffer the BCLK signal for distribution around the board.

U22, the bus transceiver, is used to allow data on or off the Display Storage board. This bus transceiver can only be enabled after the RAM arbitrator grants access to a request from the Microprocessor.

The PAL, U29, decodes the address lines BA19 through BA9, to generate the request signal UPREQ, and the enable signals PORTVEC, MKR1\_LT, and MKR2\_LT. In addition the signals RDEN and WREN are generated on read or writes to or from the board. The memory map (Table 3-11) shows which signals are generated from which address ranges. A description of each signal from U29 is given below.

**UPREQ.** This signal becomes active (high) any time the board is accessed by the CPU. The UPREQ signal is fed into the RAM arbitrator to request access to the board.

**PORTVEC.** This signal becomes active (high) at any access to the Control registers (I/O port addresses 0xFA00 through 0xFBFF). This signal also causes the UPREQ signal to become active.

**MKR1\_LT.** This signal becomes active (high) at any access to the Marker 1 port addresses (I/O port addresses 0xFC00 through 0xFDFF). This signal also causes the UPREQ signal to become active.

MKR2\_LT. This signal becomes active (high) at any access to the Marker 2 port addresses (I/O port addresses 0xFE00 through 0xFFFF). This signal also causes the UPREQ signal to become active.

Table 3-11 is the memory map for the Display Storage board.

**Table 3-11: Memory Map for the Display Storage Board**

Name	Total Number of Bytes	Address Range Decoded	Signal Name	Memory Type
Control Registers	(512 bytes)	0x0FA000x0FBFF	PORTVEC	I/O Port
Marker 1 Position	(512 bytes)	0x0FC000x0FDFF	MKR1_LT	I/O Port
Marker 2 Position	(512 bytes)	0x0FE000x0FFFF	MKR2_LT	I/O Port
Nonvolatile Waveform Storage	(28,672 bytes)	0x380000x3EFFF	UPREQ	Memory
Storage - Waveform A	(512 bytes)	0x3F0000x31FFF	UPREQ	Memory
Storage - Waveform B	(512 bytes)	0x3F2000x3F3FF	UPREQ	Memory
Storage - Waveform C	(512 bytes)	0x3F4000x3F5FF	UPREQ	Memory
Storage - Waveform D	(512 bytes)	0x3F6000x3F7FF	UPREQ	Memory
Storage - Text Page 1 (Readouts)	(512 bytes)	0x3F8000x3F9FF	UPREQ	Memory
Storage - Text Page 2	(512 bytes)	0x3FA000x3FBFF	UPREQ	Memory
Storage - Text Page 3	(512 bytes)	0x3FC000x3FDFF	UPREQ	Memory
Storage - Text Page 4	(512 bytes)	0x3FE000x3FFFF	UPREQ	Memory

The following paragraph describes a typical CPU read or write of the Display Storage board.

The CPU begins by presenting the read or write address to the Display Storage board on the BA<19..0> lines. The upper eleven address lines (BA<19..9>) are fed into the address decoder PAL, U29. If the address is inside the range for the Display Storage board the UPREQ signal becomes high, and the appropriate enable signal becomes active (PORTVEC, MKR1\_LT, or MKR2\_LT). The UPREQ signal is a request for access to the Display Storage board, and it feeds the RAM arbitrator. As soon as the UPREQ signal becomes active, the CPU BWAIT\_L signal is pulled low, forcing the CPU into a wait state. The CPU will remain in this wait state until the RAM arbitrator allows the CPU to access the board. The RAM arbitrator will bring the UPGRNT\_L signal low, when it is ready to allow the CPU to access the Display Storage board. When UPGRNT\_L goes low, the data bus transceiver, U22, is enabled as well as the RDEN and WREN signals to the rest of the Display Storage board.

**Control Registers.** There are five control registers on the Display Storage board which are used to set the various operating modes for the board. All of the control registers are read/write registers, with the exception of the Scroll Register. The Control Register section consists several 74HCT273 latches and 74HCT541 tristate buffers, and two 74F138 decoders.

Each control register is made up of a 74HCT273 latch and a 74HCT541 tristate buffer. During power up each control register is cleared to all zeros, allowing the board to start at a known state. Table 3-12 gives the reference designators for both the latch and tristate buffer used for each control register. The two 74F138 decoders are used to decode the BA2, BA1, and BA0 address lines to select the appropriate register. There is one decoder for writing to the control registers, U16, and one for reading from the control registers, U17. Both decoders are enabled by the PORTVEC signal from the Address Decoder Section and either the WREN or RDEN signal (depending on whether the microprocessor is reading or writing the Control Registers).

**Table 3-12: Control Register Latch and Tristate Buffer Reference Designators and Microprocessor I/O Port Address Location**

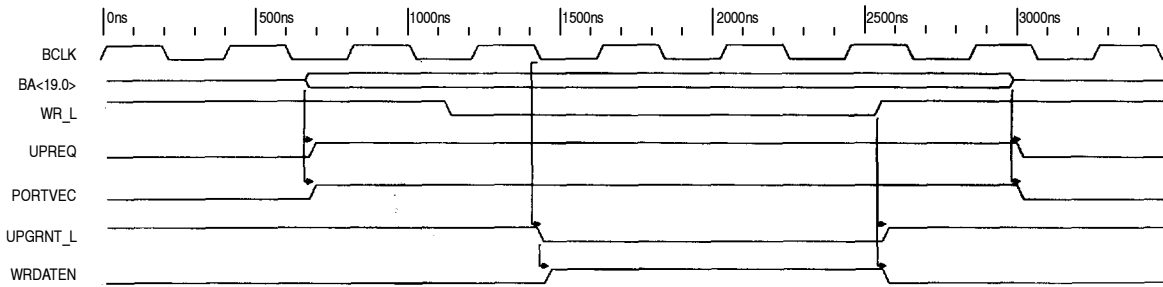
Control Register Name	Latch Ref. Designator	Tristate Ref. Designator	Port Read/Write Address
Mode Control Register 1	U18	U20	0x0FA00
Marker Save Register	U23	U26	0x0FA01
Display Control Register	U21	U25	0x0FA02
Scroll Register	U19	N/A	0x0FA03
Mode Control Register 2	U24	U27	0x0FA04

As mentioned earlier the Scroll Register can't be read by the microprocessor. This is to allow the ability to read the contents of the Maximum Accumulator in the Vertical Waveform Processing Section.

The Display Storage board also provides an additional control register, Mode Control Register 2 to protect against accidental writes. This protection is an enable bit (MCREG2) located in the MSB of the Scroll Register. While the MCREG2 bit is low, Mode Control Register 2 is held in the cleared state. When MCREG2 bit is high, Mode Control Register 2 can be written. If at any time MCREG2 goes low, Mode Control Register 2 will be cleared.

There are also two 74HCT541 tristate buffers (U32 and U33) which are used to buffer the address lines on to the internal (Display Storage board's) address bus. U32 and U33 are enabled by the UPGRNT\_L signal from the RAM Arbitrator.

A typical write to the control registers is described in the following paragraph.



**Figure 3- 17: Timing Diagram for a Typical Write to the Control Register**

The CPU starts a write cycle to the Display Storage board, presenting the appropriate address for the desired port. The PORTVEC signal becomes active, enabling one of the enable inputs on both of the decoders, U16 and U17. As soon as the RAM arbitrator allows access to the Display Storage board, the WREN signal becomes high, completing the enabling of the decoder, U16. The lower three bits of the address (BA<2..0>) are then decoded to select the desired register. The desired output of the decoder will then go low and stay low until the WREN signal goes high. This rising edge of the WREN signal brings the desired decoder output high, latching the data present at the data inputs of the desired control register. The steps are identical for a read, except that the tristate buffer is enabled, placing the contents of the latch on the RAMD<7..0> data bus.

**Horizontal Input and Tracking A/D.** The Display Storage board uses a tracking A/D converter to follow the SWP signal. A tracking A/D guarantees that the digital output is monotonic. A tracking A/D operates by taking the input voltage and summing it with the output of a D/A converter. A summing node, the output of the D/A converter, is then fed into the inputs of two comparators. One comparator determines if the summing node is less than a reference point, and another comparator determines if the summing node is greater than a reference point. The difference between the two reference points is called the comparator window. The outputs of the comparators are then fed into a digital state machine, which is used to either increment or decrement a counter, depending on the state of the comparator outputs. The output of this counter is fed into the D/A converter.

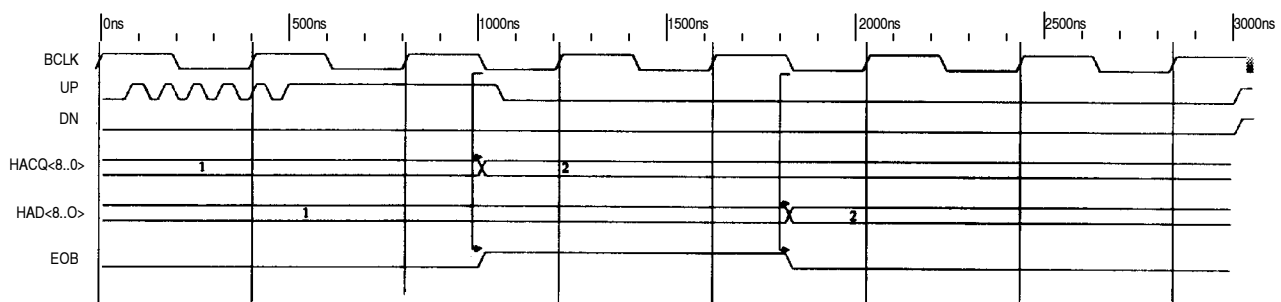
On the Display Storage board, the SWP signal is fed through an MC34001 operational amplifier, U36, running at a voltage gain of about -2. The output of this operational amplifier is fed through a summing resistor, which consists of R38 and R40. These two resistors sum the voltage output of the operational amplifier with the current from a DAC312, U11. R40 (HIG) can be adjusted to determine the gain of the tracking A/D. The offset for the tracking A/D is adjusted using the resistors R37 and R39 (HIO). The offset works by adding more current to the summing node.

The comparators are contained in an LM319, U9. The top (UP) comparator determines if the summing node is greater than the 49.5 mV reference point. The bottom (DN) comparator determines if the summing node is less than the 0.0 V reference. The outputs of these two comparators, UP and DN, are fed into the Horizontal LCA. Inside the Horizontal LCA the UP and DN signals are debounced to prevent false changes in the internal counter. Also inside the Horizontal LCA is a small state machine which decodes the debounced UP and DN signals, the SWPGATE signal, and the internal counter, to determine whether to increment or decrement the internal counter.

A typical sequence of events for the tracking A/D converter are described in the following paragraph.

First assume that the summing node starts at a stable point and a valid sweep is running. The SWP signal begins to increase. Once the output of U36 has increased enough to force the summing node above the positive reference point of 49.5 mV, the output of the top comparator, UP signal, goes high. This signals the state machine inside the Horizontal LCA to increment its internal counter. The outputs of this internal counter are fed back to the U11, increasing its sink current, bring the summing node back inside the comparator window. At the transition of the internal counter to a new value, the signal EOB (End Of Bin) goes high until all data has been written into waveform memory. The reverse procedure occurs for a SWP signal that is decreasing.

The timing diagram shown in Figure 3-18 depicts a section of a typical sweep for the Horizontal Tracking A/D Converter.



**Figure 3-18: Timing Diagram of a Typical Sweep for the Horizontal Tracking A/D Converter**

**Vertical Input.** The purpose of the Vertical Input section is to provide gain and offset to the incoming LOGVID signal prior to a flash A/D Converter (ADC).

The LOGVID signal is amplified by operational amplifier U2, an NE5534. U2 is configured as an inverting amplifier with a gain of about -3.5. Input signal gain is adjusted using R24 (VIG), while input offset is adjusted using R20 (VIO). The output of U2 is then passed through a resistive divider, which reduces the output

voltage by about one third. The signal is then passed through a diode, CR2 and an emitter follower, Q3, and then into U1, an MC10319 Flash ADC running at 2.4576 MHz. Transistor, Q3, provides the low input resistance required by the ADC. Eight bits of vertical data are output by U1 at each falling edge of the clock. An 74HCT04 inverter attached to the OVRNG (over range, pin 3) pin of U1 drives an LED which illuminates when the voltage at the input exceeds the reference voltage (VRT, pin 28). Test point TP1 can be used to probe the OVRNG pin if necessary.

In order to protect the analog input and reference voltage inputs of the ADC, the input amplifier section is required to clamp the incoming LOGVID signal between  $\pm 2.3$  V. The input amplifier clamps in the negative direction at  $-0.7$  V, due to diode CR2. The diode in the output of U2 prevents the operational amplifier from going below ground, which in turn limits the voltage at the emitter of Q3 to about  $-0.7$  V. Clamping in the positive direction occurs when the operational amplifier reaches its positive rail, the signal is attenuated by the resistive divider, R29 and R31, and then shifted down by two diode drops. This prevents the signal from exceeding the positive input voltage specification of U1.

There are also three reference supply circuits on this section. The main reference supply is +VR, at +5 V. It is generated using a TL431 precision Zener reference, buffered through U5, one half of an MC34002 operational amplifier and then driven by Q1, a BCX68 npn transistor. Power dissipation on the output transistor for +VR requires an SOT-89 style package. A negative reference supply is generated from +VR. This negative reference is -VR, at  $-5$  V. The other half of U5 is used to buffer this supply. -VR is driven by Q7, a BT3906 pnp transistor. The final reference supply is the +2 V reference for the ADC. This supply is also generated from the +VR supply. It is buffered by another MC34002, U4. The output transistor for this reference supply is Q2, a BT3904 npn transistor.

**Vertical Data Processor and NVRAM.** The Vertical Data Processor and NVRAM section performs all of the waveform data processing, storing, and nonvolatile RAM (NVRAM) arbitration. It consists of an XC3042 LCA (U15), a single XC1736 serial configuration PROM (U14), two TC55257 32K by 8 SRAMs (U13 and U30), and two DS1210 Nonvolatile Controller ICs (U6 and U28).

At power up U15, the Vertical LCA, will wait until the BDRST\_L signal becomes high and then begin configuring itself from the contents of U14, the serial configuration PROM.

During normal operation U15 receives data, at the falling edge of BCLK, directly from the A/D Converter via the VAD<7..0> bus. This data is manipulated inside U15, depending on the acquisition mode, and then written to the NVRAM. If the acquisition mode is Max Peak, the incoming data is compared against the data already stored in the Max Accumulator (a register internal to U15). If the incoming data is greater than the Max Accumulator then the incoming data becomes the new value stored in the Max Accumulator.

At the end of a horizontal bin the contents of the Max Accumulator will be written to waveform memory.

If the acquisition mode is Min Peak the same comparisons occur as in Max Peak acquisition mode, except that the Min Accumulator is used. At the end of a horizontal bin the contents of the Min Accumulator will be written to waveform memory.

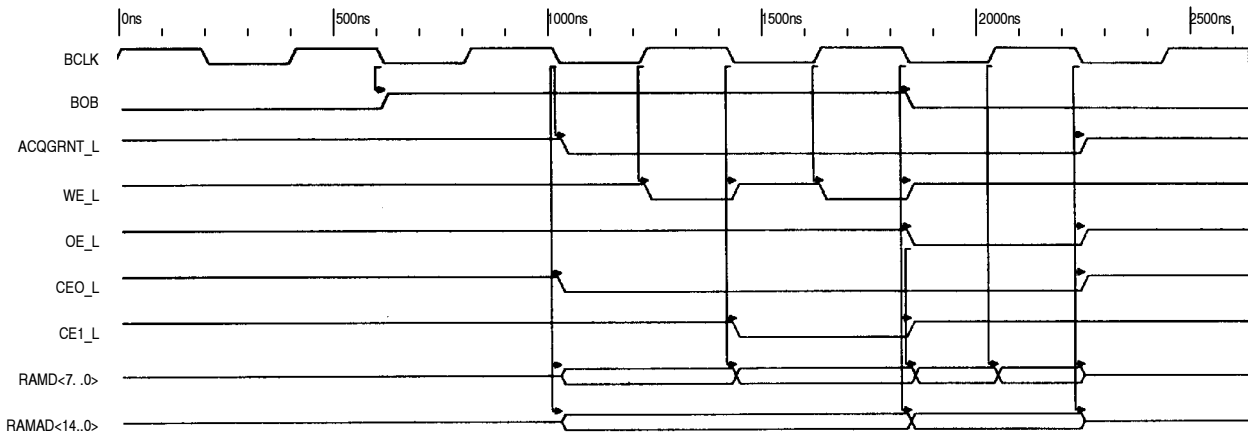
If the acquisition mode is Min/Max then the same comparison occur as in Max Peak acquisition mode, except that both the Min and Max Accumulators are used. At the end of a horizontal bin the contents of either the Max or Min Accumulators will be written into waveform memory, depending on whether the horizontal bin was even or odd and whether noise was detected or not. Noise is defined as both the Min and Max Accumulator being written with a new value sometime during the horizontal bin. Table 3-13 shows the algorithm used to write data to the waveform memory at the end of a horizontal bin.

**Table 3-13: Input Conditions Required to Write Either the Max or Min Accumulators to Waveform Memory**

Horizontal Bin	Signal Type	Waveform Written From
Odd	Noise	Max Accumulator
Odd	Signal	Max Accumulator
Even	Noise	Max Accumulator
Even	Signal	Max Accumulator

If the acquisition mode is Sample the incoming data is automatically placed in the Max Accumulator, regardless of its value. At the end of the horizontal bin, the contents of the Max Accumulator are written to waveform memory. This effectively places the last acquisition, from the ADC, into waveform memory.

The timing diagram in Figure 3-19 shows the sequence of events required when writing data to the waveform memory.



**Figure 3-19: Sequence of Events When Writing Data to the Waveform Memory**

The two DS1210's, U6 and U28, are used to provide battery backup power to the RAM devices while the instrument is in the off state.

**Readouts and Waveform Drawing.** The Readouts and Waveform Drawing section places all readouts and waveforms on the CRT screen. It does this using an XC3042 LCA (U46), a CY7C291 PROM (U48), two 22V10 PALs (U39 and U40), a 74HCT541 buffer (U47), and three 74HCT257 quad 2-1 multiplexers (U50, U51, and U52).

The easiest way to view the display section of this board is to look at it as if each waveform or screen of text were a page. There are eight pages, four pages of waveforms (waveforms A through D) and four pages of text (one for readouts and 3 more for menus). U39 and U40 form a state machine called the Readout State Machine which is used to turn the CRT beam on and off, load data for display from RAM, and determine which pages should be displayed. The Readout State Machine begins by determining which page needs to be displayed, starting with page 0. By taking the contents of the Display Control Register (U21 and U25) and comparing it to a 3 bit counter (Page Counter, internal to U46) it can be determined which pages need to be displayed. For example if DISPA is high and the page counter is at zero, then Waveform A should be displayed. This comparison is performed in U40. Once U40 determines that a page should be displayed, the Readout State Machine will then load the appropriate data and display the page. Depending on whether the page to be displayed is text or waveform, the Readout State Machine takes one of two paths.

Table 3-14 illustrates the relation between the page counter, page number and the waveform or text page.

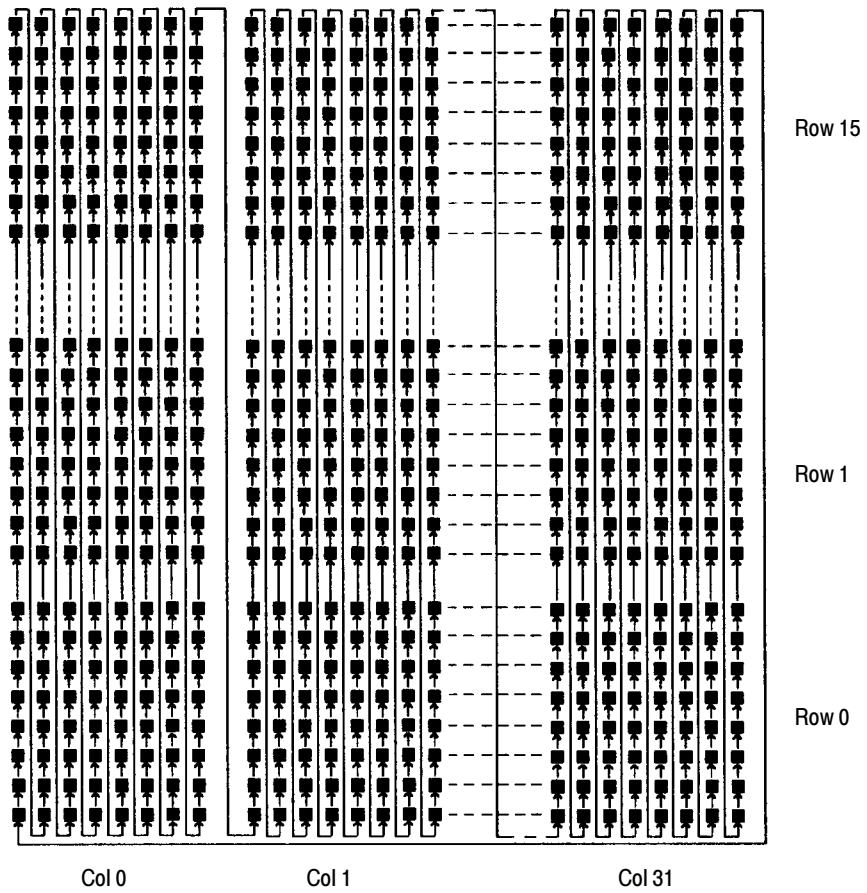


**Table 3-14: Page Number/Waveform Relation**

Page Number	Refers to
0	Waveform A
1	Waveform B
2	Waveform C
3	Waveform D
4	Text Page 1 (Readouts)
5	Text Page 2
6	Text Page 3
7	Text Page 4

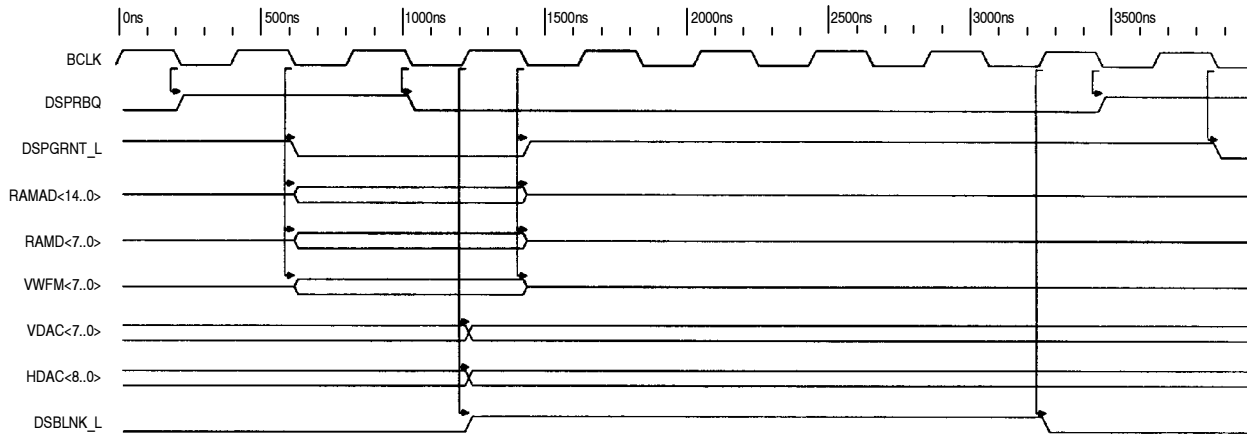
If the page to be displayed is a waveform then the address for the waveform data is determined by the lower two bits of the Page Counter and the position of the waveform is determined by the Horizontal Counter (inside U46). This combination of bits is placed on the board's address bus using U50, U51, and U52, the three 2-1 multiplexers. The waveform data is then read through a tristate buffer, U47, into the LCA, U46, and latched. The CRT beam is then turned on and the waveform data is presented to the Vertical Output DAC, drawing a vector on the CRT.

If the page to be displayed is text then the address for the text data is determined by the lower two bits of the Page Counter, the upper four bits of the Character Row Counter (inside U46), and the upper eight bits of the Character Column Counter (inside U46). This combination of bits is placed on the board's address bus using U50, U51, and U52. The text data is then placed at the inputs of the Character ROM, U48. The character ROM outputs then provide one column of bit information for the character to be displayed. The character bit information is then latched inside U46 and fed out serially and used to control the CRT beam. If a one (high) is encountered in the character bits, the CRT beam is turned on for five clock cycles (2.44 uS), displaying a dot on the CRT. The text continues to be placed on the CRT using a vertical scan method. A vertical scan is used to decrease the time required to wait for the beam to move from the top back down to the bottom of the CRT. Figure 3-20 shows how a vertical scan is performed.



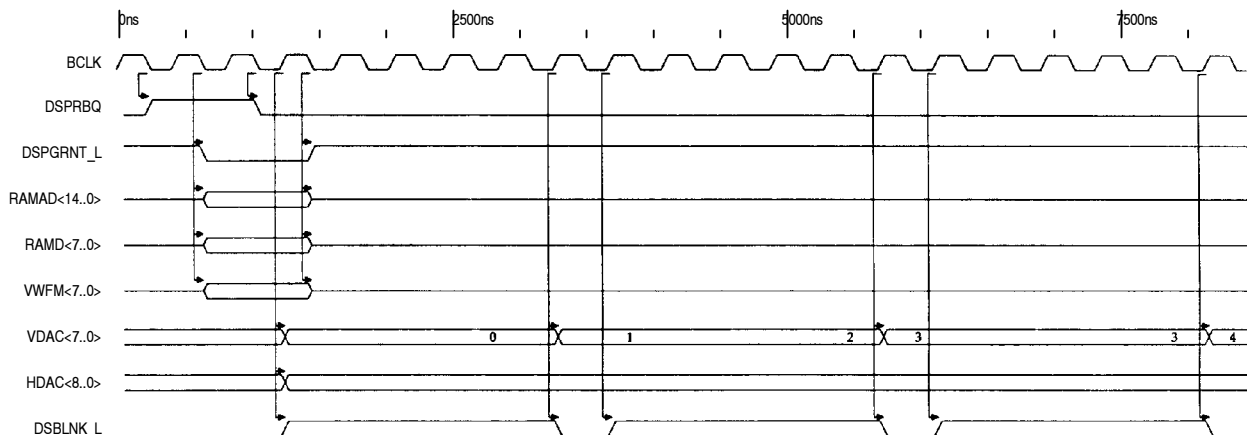
**Figure 3-20: How a Vertical Scan is Performed**

Figure 3-21 shows the display of a single vector of a waveform.



**Figure 3-21: The Display of a Single Vector of a Waveform**

Figure 3-22 shows the display of a single column of character dots.



**Figure 3-22: A Single Column of Character Dots**

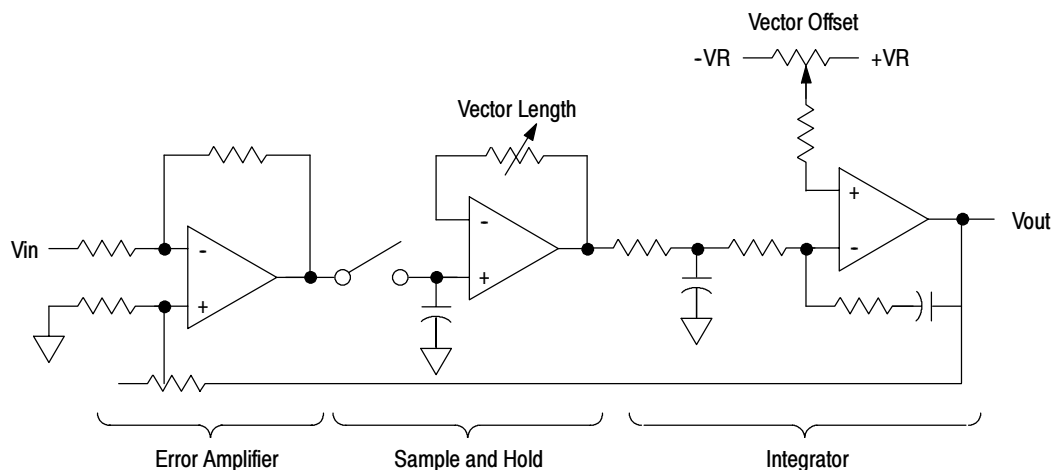
**Horizontal Output.** The Horizontal Output section uses a DAC312 (U41), an operational amplifier (U45), and DG444 analog switches (U43 and U34), to generate the DSHOR signal, which is in turned used to deflect the CRT beam on the Power Supply board. The DAC312 is a twelve bit DAC, has had its lower three bits tied to ground to turn it into a nine bit DAC. The DAC receives data from the Readout LCA (U46), and converts it into a horizontal position on the screen. The output of the DAC is then converted to a voltage via R95 and R97. This voltage is then amplified by an MC34001 operational amplifier (U45). Added to the DAC output is a 3300 pF capacitor, C96. This capacitor is required to remove the glitch current on the DAC output at major code transitions. Adjustments for Horizontal Output Gain (HOG), R107, and Horizontal Output

Offset, (HOO) R98, are provided. In addition part of U34, an analog switch, and another resistor are added in parallel to the feedback resistor of the operational amplifier to allow gain reduction while the readouts are being drawn. This will allow the waveform to extend beyond the edge of the graticule and still allow the readouts to be visible.

There are also two analog switches which are used to multiplex between the digitized information (HORIZ signal) and the analog trace (SWP signal) during real time displays.

**Vertical Output.** The Vertical Output Section converts the vertical data from the Readout LCA (U46), into the DSVER signal, which is then used to deflect the CRT beam by the Power Supply. There are two paths through the Vertical Output Section. A high bandwidth path for the readouts and an integrator path for drawing the waveform vectors. Both the waveform and readout paths will be described in the following paragraphs.

The waveform path of the Vertical Output Section uses an integrator to draw the vectors between each point in a waveform. A block diagram of the integrator is shown in Figure 3-23. The integrator consists of an Error Amplifier, a Sample and Hold, and the Integrator.



**Figure 3-23: Vertical Output Integrator**

**The Display Storage.** The Error Amplifier consists of an LM318 (U53), a BT3904 transistor (Q4), and a BT3906 transistor (Q5). The Sample and Hold consists of part of a DC641 (U34), capacitor C94, and half of a TL072 (U57). The integrator consists of one half of a TL072 (U57) and capacitor C93.

Digital data is fed into an eight bit DAC-08 from the Readout LCA. The current output of the DAC is converted to a voltage ranging from 0.170 V to 1.30 V. This is then fed into a unity gain buffer to drive the Error Amplifier of the Integrator circuit.

The Error Amplifier compares the current state of the Integrator Circuitry output and the current input voltage from the DAC and generates an error voltage. This error voltage is then fed into a high current buffer made up of Q4, Q5, and CR7. CR7 and R179 are used to insure that transistor Q4 is properly biased. The high current buffer is required to ensure that the capacitor in the Sample and Hold section is charged quickly. The Sample and Hold circuit basically samples the error voltage by closing the analog switch, U34, for 400 ns, charging capacitor C94. When the switch opens the value of the error voltage should be across the capacitor. The operational amplifier U57 then buffers and amplifies the error voltage such that when it is applied to the Integrator section ramp the correct slope is produced. The potentiometer, R181, Vector Length, is used to adjust the slope of the output ramp to match the waveform data drawing rate. The input of the Integrator section consists of two resistors with a capacitor to ground between them. This RC network, along with the resistor in series with the integrating capacitor, C93, form a network that prevents an early step when integrating over a long distance. The step is caused by the rapid change in error voltage coupling straight through the integrating capacitor. The resistors R112 and R183 along with capacitor C93 and operational amplifier U57 form the Integration Section of the Integrator. The output of the Integrator is then fed through a DC641 analog switch and into the output buffer, U35, of the Vertical Output Section. Finally a potentiometer, R174, Vector Offset, is provided to compensate for the injection charge of the DC641 into the hold capacitor, C94.

The signal for drawing the Readouts is taken directly off U4, the DAC current to voltage buffer, and fed through an analog switch into the output buffer. The gain variations between the waveform and readout is accomplished by slightly increasing the gain of the Integrator, such that the Readouts will always remain inside the graticule. In order to ensure that the Readouts will always appear centered inside the graticule, the waveform is forced slightly lower by adjusting the Vertical Offset to +40 mV. Then when the waveform display is centered on the screen using the Vertical Output Offset potentiometer everything aligns correctly.

The final buffer in the Vertical Output Section provides both gain and offset adjustments, Vertical Output Gain (VOG), R42, and Vertical Output Offset (VOO), R63. The two analog switches which drive the DSVR signal are used to switch between the LOGVID signal, for real time analog display, and the VERT signal for digitized display (readouts).

**Miscellaneous Decoupling.** Contained on the Miscellaneous Decoupling page of the schematics are all of the decoupling capacitors. There is one 0.1  $\mu\text{F}$  capacitor for each digital integrated circuit on the board. Also shown on this page are several 221  $\Omega$  resistors. These resistors are required to restore the power dissipation to a minimum level to ensure that the power supply can maintain its supply voltages well centered.

**Power Up Reset.** The power up reset circuit is included to ensure that a valid reset signal is generated when the instrument is turned on.

The Power up reset circuit consists of a TL7705 Power Supervisor IC. This IC monitors the +5 V supply and generates a reset signal on power up. The capacitor, C101, is used to delay the rising edge of BDRST\_L for about 50 ms. This ensures that if the +5 V supply falls below 4.5 V, the BDRST\_L signal will remain low for a minimum of 50 ms, and that the LCA will go through a valid reset cycle and reprogram correctly.

## Microprocessor

The Microprocessor board is the central processing section of the instrument. It is used to control all instrument functions including frequency control, implementation of the human interface, and external port communication through the GPIB or RS-232C board. The Microprocessor contains the following circuit blocks (Figure 3-24):

- Microprocessor (CPU)
- Clock Generator
- Interrupt Controller
- Input/Output (I/O) Subsystem Interface
- Memory (RAM and ROM)
- Software Option Jumpers
- Programmable Interval Timer
- Counter System (Figure 3-25)

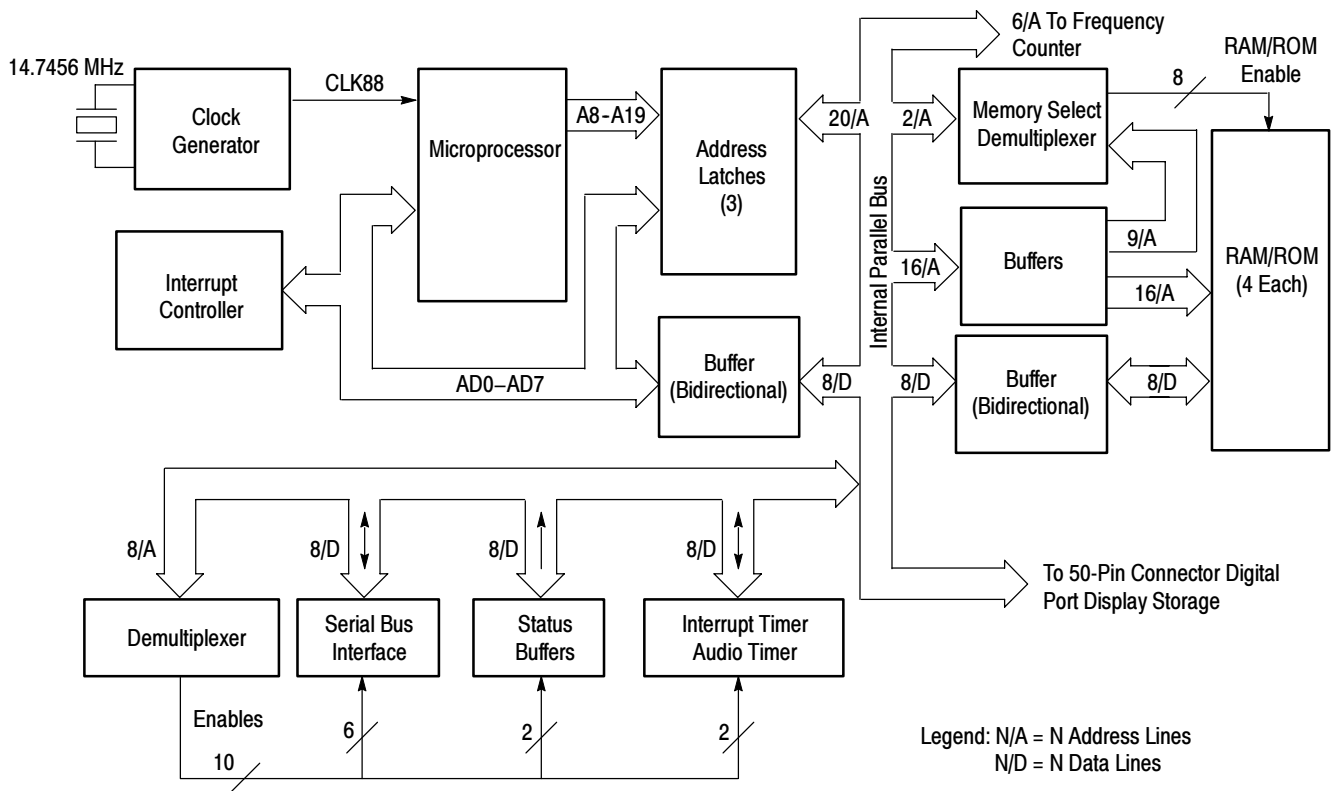
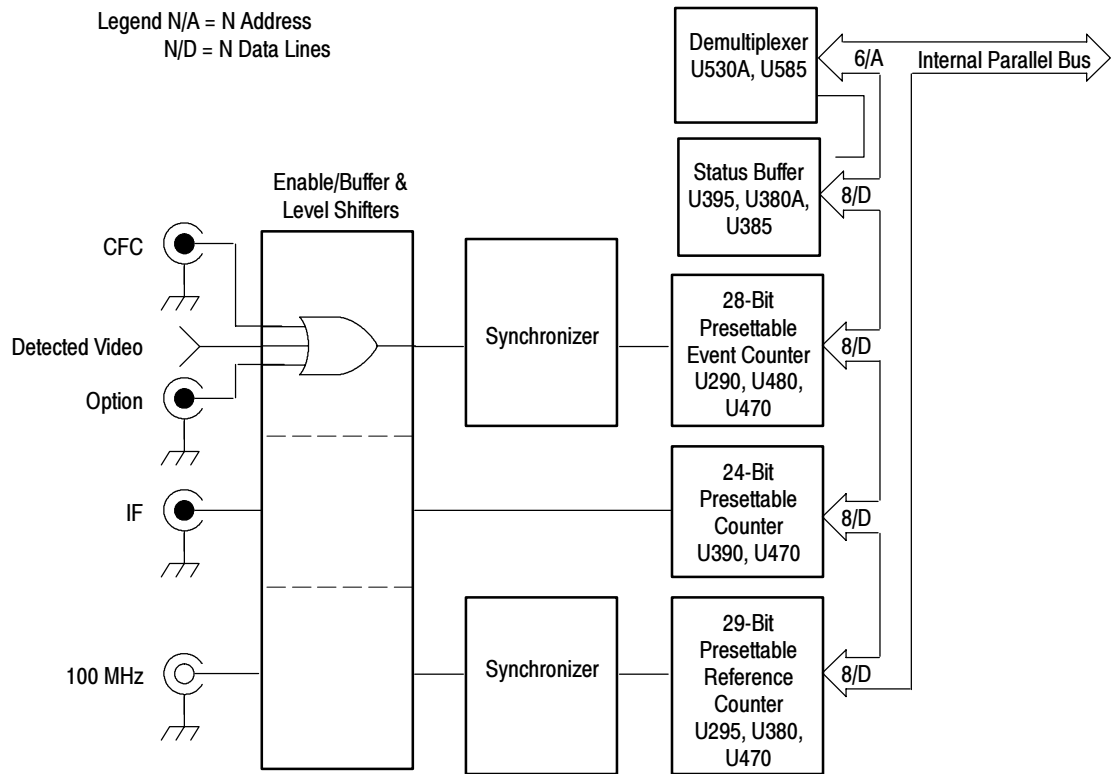


Figure 3-24: Microprocessor Block Diagram



**Figure 3-25: Microprocessor Counter System (CPU)**

### Microprocessor (CPU)

The Microprocessor (CPU) is based on an 8 MHz NEC  $\mu$ PD70108 (V20).

The V20 is configured in the minimum mode (pin 36 connected to  $V_{cc}$ ) using a demultiplexed bus. In the demultiplexed bus configuration, the address bits (AD0 through AD7 and A8 through A19) are presented to the address latches (U440, U450, U465), and the falling edge of ALE (pin 28 of U250) latches the address lines. Approximately one clock cycle later, the data lines (AD0 through AD7) become active for either a read or write operation. (Notice that the AD0 through AD7 lines provide both the low order eight bits of address and the eight bits of data.) The DIR signal (pin 30 of U250) determines the direction of data flow on the data lines. This signal is used to set the direction of the bidirectional data buffer (U460).

Once the address lines have been latched, they are decoded using the Programmable Logic Devices (PLDs) U515 and U530, and the 4 to 16 line decoder, U585. The outputs of these PLDs are used to enable the various peripheral sections of the board.



**Clock Generator**

The Clock Generator chip (U360) is an NEC  $\mu$ PD71011. The purpose of this IC is to generate the clock for the Microprocessor board and synchronize the insertion of wait states into the CPU.

The Clock Generator part of the IC uses a 14.7456 MHz crystal (parallel resonant) to generate the 7.3728 MHz CPU clock ( $14.7456 \text{ MHz} \div 2$ ). In addition to the CPU clock output, there is an oscillator clock output that is divided by six ( $\div 6$ ) using three flip flops (U240). The output of this  $\div 6$  (2.4576 MHz) is used to drive the Display Storage and GPIB or RS-232C board state machines.

The wait state synchronization part of U360 is not used but is replaced by a flip flop (U260A). Timing errors between a wait state generator on the GPIB or RS-232 board and the CPU are eliminated by synchronizing the RDY signal (pin 25 of U250). Since the CPU allows the RDY line to go low asynchronously, relative to the CLK88 signal, U260A is cleared as soon as the BWAIT- signal goes low. After the BWAIT- signal goes high, the RDY signal is synchronized, through U260A, using the CLK88 signal. This prevents any timing problems regarding the generation of wait states.

**Interrupt Controller**

The Interrupt Controller (U340) is based on the NEC  $\mu$ PD71059 (Intel 82C59). The purpose of the Interrupt Controller is to synchronize and set up priority for up to eight system interrupts. A high level on any of the IR0 through IR7 inputs of the Interrupt Controller causes the INT output (pin 17 of U340) to become high. After the CPU recognizes the interrupt on the INTR input (pin 20 of U250), it pulls the INTA output (pin 27 of U250) low, telling the Interrupt Controller that the CPU is ready to accept the interrupt data. The Interrupt Controller then disables the data buffer outputs (U460), through XDEN- on pin 20 of U530, and presents the interrupt data on the data bus during the second low pulse on the INTA signal from the CPU.

The interrupt inputs to the Interrupt Controller are configured as shown in Table 3-15. The priority is determined by both the settings of the internal registers of the Interrupt Controller and the interrupt input number (IR0 has highest priority by default).

**Table 3-15: Interrupt Controller Input Connections**

Interrupt Number	System Connection
IR0	Programmable Interval Timer 0
IR1	I/O Subsystem Interrupt
IR2	End of Sweep Interrupt
IR3	Frequency Counter Done Interrupt
IR4	Digital Options Board

**Table 3- 15: Interrupt Controller Input Connections (Cont.)**

Interrupt Number	System Connection
IR5	Digital Options Board
IR6	Digital Options Board
IR7	Programmable Interval Timer 1

See the NEC  $\mu$ PD71059 (or Intel 82C59) data sheets for more detailed information on the operation and programming of the Interrupt Controller.

### I/O Subsystem Interface

The I/O Subsystem performs the serial communication between the CPU and other modules in the instrument, controls the Interval Timers, and triggers single sweeps.

The signal SSTRIG (pin 5 of U495) is used to trigger the single sweep mode of the instrument. This signal is selected by writing a one to the second LSB of the I/O Subsystem Control Register.

The I/O Subsystem Control Register is also used to control some parts of the Interval Timer (U580). The signal, GATE\_0 (pin 6 of U495), is used to enable Timer 0 of the Interval Timer depending on how the counter is set up.

The signal AUDEN is used to enable Timer 2 of the Interval Timer. This timer's output is a square wave, UPAUD, which is used by the Log board to generate the audio feedback tones that are heard on the speaker.

The serial bus is used by the CPU to communicate with several of the modules in the instrument. The serial bus is based on either a three wire or seven wire system. The three wire system is used for modules that only listen (are written to), while the seven wire system is used for modules that must talk and listen.

Writing to a module begins by latching one bit of data into the Q0 register of U495 and generating a strobe on the XCLKO- signal. The strobe is generated by writing the correct address to U585. The XCLKO- output (pin 16 of U585) then goes low for two clock cycles of the CPU (the length of the WR- pulse). This strobe is used as a shifting clock to load a single bit into a shift register on all modules (connected to the DATAO signal).

After all of the data for the intended module has been sent, a 4 bit address, ADO0 through ADO3, is latched into U495 registers Q4 through Q7. This 4 bit address is decoded by U590 on the Power Supply Secondaries and becomes the latch pulse for the intended module latches. The latch pulse is generated by the LOAD signal (pin 13 of U585) and is two CPU clock cycles long. All modules must have a pull up resistor on the incoming latch signal in order to guarantee correct logic levels.

Reading from a module begins with the module requesting service through its active low request signal (FPREQ- for the front panel, ...). This signal goes into a priority encoder (U780) on the Power Supply Secondaries, then pulls the Microprocessor board Interrupt Handler, IRQ1, high. The outputs of the priority encoder are then used to acknowledge the request for service that activates the output buffers on the module requesting service. At the same time, the outputs of the priority encoder, ADI0 through ADI2, are fed into the I/O Subsystem status register, U595. This status register is then read, due to the interrupt, and the address of the module requesting service is determined from the ADI0 through ADI2 lines. Now the process of reading in the data from the module requesting service can begin.

The lowest bit of the I/O Subsystem status register contains the data from the module to be read. After each CLKI- signal, the status register is read and the data is linked together in a series until all data has been received. The CLKI- signal is generated the same way as the CLKO- signal described earlier.

## Memory

The memory on the Microprocessor board consists of two sections, 128 kilobytes (16 × 8 kilobytes) of Random Access Memory (RAM), and up to 524 kilobytes (64 × 8 kilobytes) of Read Only Memory (ROM). The RAM is used for CPU processing and data space, while the ROM contains all of the system firmware.

Access to the RAM, for either reading or writing, consists of sending out the address for the byte to be accessed. This address is decoded by U515, and the appropriate enable line pulled low to select the memory device that is to be accessed.

Access to the ROM (read only) is performed in the same way as the RAM.

Jumpers (and wires for a more permanent method) are provided on the Microprocessor board for selecting the size of EPROM and RAM memory chips used. Table 3-16 shows the configuration of jumpers/wires for various size memory ICs.

**Table 3-16: Configuration of Jumpers/Wires for Various Memory IC Sizes**

Memory Size	Jumpers/Wires to Install		
27256	W525A	W518B	
27512	W525A	W518A	W522
27010	W525A	W518A	
27020	W525B	W518A	
43256	W526A		
4364	W526B		

Allowances have been made for on board programming of the EPROM devices. On board programming is done by removing J528 (and/or W528) and then supplying the appropriate timing and voltage signals to program the EPROMs through connector J550.

**Software Option Jumpers**

There are two jumpers (1 kΩ resistors) on the I/O Subsystem Status Register that can be used by the CPU to set various software options. These jumpers select the options shown in Table 3-17.

When SW0 is set to 1 (+5 V), all the debug messages will be printed on the screen. This greatly increases the amount of time needed to complete the power up sequences.

**Table 3-17: Definition of Software Jumpers**

Jumper Status	Definition
SW0 = 0	Do not print debug messages
SW0 = 1	Print debug messages
SW1 = 0	Old Counter Amplifier
SW1 = 1	New Counter Amplifier

**Programmable Interval Timer**

The programmable interval timer (U580) is an NEC μPD71054 (Intel 82C54). It contains three programmable timers that are used for various functions by the CPU. The signal GATE\_0, from the I/O Subsystem Control Register, is used to enable (GATE\_0 = 1) or disable (GATE\_0 = 0) timers zero and one. The signal AUDEN is used to enable (AUDEN = 1) or disable (AUDEN = 0) timer two. The signal CLK88 (7.3728 MHz) is fed into timer one. The output of timer 1 is then fed into timers zero and two. The output of timer zero is then fed into IR0 of the Interrupt Controller. The output of timer two goes to the Log Board to generate the audio tones.

For programming details, see the NEC μPD71054 or Intel 82C54 data sheets.

**Frequency Counter System**

The Frequency Counter System consists of buffer amplifiers and three counters. The three counters are an event counter (28 bits long), the reference/period counter (29 bits long), and the IF counter (24 bits long).

The event counter consists of devices U290, U480, and counter zero in U470. The event counter is fed from one of three ports: CFC, DETVID, or OPTION. These inputs range in frequency from 1 Hz to 40 MHz. The input is selected by writing the appropriate bits in the Frequency Control Register.

The reference/period counter consists of devices U295, U380, and counter one of U470. The reference counter is fed from the 100 MHz Reference Oscillator.

The IF counter consists of devices U370 and counter two of U470. The IF counter is fed from the IF input and ranges in frequency from 5 MHz to 15 MHz.

The Frequency Counter Control Register (U385) contains all of the signals necessary to run and control the Frequency Counters. The following are descriptions for each of the signals:

- The TMRGATE signal (bit zero) is used to enable all of the counters in U470. This signal is active (1) when counting is being performed.
- The CTR100MH signal is used to enable the 100 MHz buffer amplifier in the Frequency Counter Buffer Amplifier section.
- The CLOAD- signal is used to load counters U370, U380, and U480, with the data present at the data inputs. This allows the counters to be set to any starting point.
- The RESET signal is used to set the counting flip flops (U195) to a known value.
- The VID\_EN, IF\_EN, CFC\_EN, and OPT\_EN enable the detect video, IF, CFC, and optional input buffer amplifiers, respectively.

The Buffer Amplifier section consists of an ECL differential line receiver for each input. The noninverting input of each receiver is connected to the signal input, while the inverting input is connected to a control signal. The control signals from the Frequency Counter Control Register are fed into pnp transistors that act as saturated switches. These switches are then used to enable or disable the associated receiver. Immediately following the first receiver is a second receiver to help buffer the signal. The output of the second receiver is fed into a level shifting transistor that sets the output TTL levels.

On the 100 MHz input, prior to ECL to TTL translation, an ECL flip flop (U195) is used to synchronize and divide the signal frequency by two.

**Hardware Interface**

The Microprocessor requires several signals. A brief description of these signals, by connector, is given in Table 3-18, Table 3-19, and Table 3-20.

**Table 3-18: Power Supply and Serial Bus Connector (J10) Signal Names and Definitions**

Signal Name	Description	Source Module
DETVID	Detected Video: The demodulated AM or FM signal from the Log Board	Log Board
SWPGATE	Sweep Gate (TTL): Signal that is active during the sweep	Display Storage
POK	Power OK: Tells CPU that the +5 V supply is OK	Power Supply Secondaries
REQUI-	Request Interrupt (TTL): I/O Subsystem request for service	Power Supply Secondaries
UPAUD	Microprocessor Audio: Square wave output at frequency of the audio tone	Microprocessor
CLKI-	Clock In (TTL): Microprocessor Serial bus input clock	Microprocessor
CLKO	Clock Out (TTL): Serial bus output clock	Microprocessor
DATAI	Data In (TTL): Serial bus data in	Rear Connector, RF Options, Front Panel, PLCFC
DATAO	Data Out (TTL): Microprocessor Serial bus data out	Microprocessor
ACKI-	Acknowledge Interrupt (TTL): Enables priority encoder on Power Supply Secondaries	Microprocessor
LOAD-	Load (TTL): Latches data into receiving module on serial bus	Microprocessor
ADI0 through ADI2	Address In (TTL): Address of module on serial bus requesting service	Power Supply Secondaries
ADO0 through ADO2	Address Out (TTL): Address of receiving module on serial bus	Microprocessor
SSTRIG	Single Sweep Trigger (TTL): Triggers a single sweep on the Sweep board	Microprocessor
+5 V	+5 V: +5 V digital supply	Power Supply

**Table 3-19: Microprocessor Interface Connector (J550) Signal Names and Definitions**

Signal Name	Description	Source Module
BUSDIS	Bus Disable (TTL): Disables microprocessor address bus and control signals	Display Storage Digital Options
ALE	Address Latch Enable (TTL): Signal used to latch the address lines into the address registers.	Microprocessor
BCLK	Buffered Clock (TTL): Microprocessor crystal oscillator divided by six, 92.4576 MHz	Microprocessor
BRD-	Buffered Read (TTL): Microprocessor signal signifying a read cycle	Microprocessor
BWR-	Buffered Write (TTL): Microprocessor signal signifying a write cycle	Microprocessor
BIO/M	Buffered I/O or Memory (TTL): Microprocessor signal used to determine if the read or write cycle is for an I/O device or memory	Microprocessor
BRST-	Buffered Reset (TTL): Microprocessor reset line	Microprocessor
BWAIT-	Buffered Wait (TTL): Line to Microprocessor used to insert wait states	Display Storage Digital Options
BD0 through BD7	Buffered Data (TTL): Microprocessor bidirectional data lines	Microprocessor, Display Storage, and Digital Option
BA0 through BA19	Buffered Address (TTL): Microprocessor address lines	Microprocessor
BMT-	Boot Memory Test (TTL): Maps an optional ROM on the GPIB or RS-232 board to high address space for diagnostics	Digital Options
IR4	Interrupt 4 (TTL): Interrupt line to the interrupt handler on the Microprocessor board	Digital Options
IR5	Interrupt 5 (TTL): Interrupt line to the interrupt handler on the Microprocessor board	Digital Options
VPROG	Voltage Program: Programming voltage for EPROMs on the Microprocessor board	External Programmer
ROMVCC	ROM Power Supply: Power Supply that is selectable for either programming voltage levels or operating voltage levels	Microprocessor External Programmer
+5 V	+5 V Supply: +5 V supply from Microprocessor (power supply module) to modules connected to J550	Power Supply

**Table 3-20: Microprocessor Counter Section Connector Signal Names and Definitions**

Signal Name	Description	Source Module
CFC	Center Frequency (J180): Signal from the CFC board to be counted	Center Frequency Control
OPTION	Optional Input (J185): Signal from an installed option to be counted	Installed Option
IF	IF Input (J190): IF Signal from the Log board to be counted	Log Board
100MHZ	100MHZ Calibrator (J195): Reference Signal from the Reference Oscillator to be counted	Reference Oscillator

**Connector Pinouts**

Tables 3-21 through 3-24 give the pinout for each connector on the Microprocessor board.

**Frequency Counter Connectors.** There are four SMB connectors that provide the required signals to the Frequency Counter section of the Microprocessor board. These four connectors are listed in Figure 3-21 with the associated input name.

**Table 3-21: Connectors and Signal Names for the Frequency Counter Section**

Connector	Signal Name
J180	CFC
J185	OPTION
J190	IF
J195	100MHZ

**Power Supply Interface.** The Microprocessor board requires only the +5 V supply.

A single 0.1  $\mu$ F capacitor is placed near the power supply pins for each digital integrated circuit on the board to reduce the noise. In addition there are several 220  $\mu$ F electrolytic capacitors placed near sections of the board that require extra filtering.



**Table 3-22: Pinout for the 24-Pin DIN Connector (J10) Between the Microprocessor Board, Power Supply Interconnect, and Serial I/O**

Pin No.	Pin Name
1	DETVID
2	—KEY—
3	SWPGATE
4	POK
5	REQUI-
6	UPAUD
7	CLKI-
8	CLKO
9	DATAI
10	DATAO
11	ACKI-
12	LOAD
13	+5 V
14	+5 V
15	GND
16	GND
17	ADI0
18	ADO0
19	ADI1
20	ADO1
21	ADI2
22	ADO2
23	SSTRIG
24	ADO3

**Table 3-23: Pinout for the Microprocessor Board Test Connector (J150)**

Pin No.	Pin Name
1	+5 V
2	A15
3	A16
4	A17

**Table 3-23: Pinout for the Microprocessor Board Test Connector (J150) (Cont.)**

Pin No.	Pin Name
5	A18
6	A19
7	GND
8	GND
9	RD-
10	HOLD-
11	HOLDA
12	WR-
13	IO/M-
14	DIR
15	DEN-
16	GND
17	INTA-
18	GND
19	RDY
20	RST
1B	GND
2B	A14
3B	A13
4B	A12
5B	A11
6B	A10
7B	A9
8B	A8
9B	AD7
10B	AD6
11B	AD5
12B	AD4
13B	AD3
14B	AD2
15B	AD1
16B	AD0
17B	GND
18B	INT

**Table 3-23: Pinout for the Microprocessor Board Test Connector (J150) (Cont.)**

Pin No.	Pin Name
19B	ALE
20B	GND

**Table 3-24: Pinout for the 50 Pin Connector (J550) Between the Microprocessor, Display Storage, and Digital Options Boards**

Pin No.	Pin Name	Pin No.	Pin Name
1	GND	26	BA12
2	BPCLK	27	BMT-
3	GND	28	BA11
4	BRD-	29	BUSDIS-
5	+5 V	30	BA10
6	BWR-	31	ALE
7	+5 V	32	BA9
8	BIO/M-	33	IR4
9	BRST-	34	BA8
10	BWAIT-	35	IR5
11	BD7	36	BA7
12	BA19	37	IR6
13	BD6	38	BA6
14	BA18	39	VPROG
15	BD5	40	BA5
16	BA17	41	ROMVCC
17	BD4	42	BA4
18	BA16	43	+5 V
19	BD3	44	BA3
20	BA15	45	+5 V
21	BD2	46	BA2
22	BA14	47	GND
23	BD1	48	BA1
24	BA13	49	GND
25	BD0	50	BA0

## **GPIB, RS-232, Real Time Clock, NVRAM, and Gated Measurement Functions**

The Digital Options module provides both the RS-232 and GPIB interface and gated sweep capability. The features are:

- Gated measurement functions to provide in service measurement capability
- A standard IEEE 488.1 GPIB interface
- Two RS-232 interfaces which includes:
  - A full 7 wire interface (RXD, TXD, DTR, DSR, RTS, CTS, CD)
  - A simple 3 wire (RXD, TXD, DTR) interface
- A real time clock with battery back up
- NVRAM for storing waveforms and instrument settings

### **Gated Measurement Function**

In-service CATV measurements require the ability to look for very weak noise or distortion components. For example, the C/N measurement will commonly have a noise floor 50 to 65 dB below the visual carrier (in a 300 kHz resolution bandwidth), and the CSO measurement will have similar amplitudes but in a 30 kHz resolution bandwidth. Unfortunately, the sidebands resulting from video modulation of the carrier are generally much stronger than this.

To overcome this measurement difficulty, the analyzer's data acquisition is shut off except during quiet scan lines. These quiet scan lines occur during vertical retrace. The temporary absence of video modulation during these lines means that sidebands are not present (provided that the resolution filter being used has a settling time shorter than the horizontal line time). This function is performed by the acquisition control facility on the Display Storage board.

In practical application the settling time of the resolution filter is not entirely predictable. The abrupt edges that occur during the horizontal sync pulse immediately preceding a given quiet line shocks the resolution filter into ringing even if it is tuned some distance away from the visual carrier. To overcome this, the sharp edges associated with the sync pulse are replaced by soft edges having rise and fall times of a few microseconds. The shock excitation of the filter is negligible even if the filter is tuned as close as 500 kHz from the visual carrier. The IF Gate performs this edge softening function, by blocking the IF path during the sync pulse time.

### **Instrument Bus Interface**

The Address Buffering and Decoding section consists of three 74HCT541 bus receivers (U24, U25, and U26) to receive 20 bits of address and 4 control signals (BRD\_L, BWR\_L, BIO/W\_L and BCLK), a GAL26V12 (U7) for address decoding and a 74HCT245 bus transceiver (U1) to buffer the 8 bit data bus. Part of U10 is also used to generate the bus wait signal BWAIT\_L required for TTY write cycles.

**Real Time Clock**

The Real Time Clock (RTC) is an Oki Semiconductor MSM62X42BRS clock/calendar (U23). This IC uses an internal 32,768 Hz clock which is divided down to 1 Hz. This one hertz clock is then used to drive the time registers. Each time register consists of some multiple of ten of the current time (i.e. 1 sec, 10 seconds, 1 minute, 10 minutes, ..., 10 years). The time registers are also writeable allowing easy time setting. The data bus for this part is only 4 bits wide and connected to bits 0 to 3 of the microprocessor data bus. The real time clock circuitry has a battery backup. Table 3-25 shows the Real Time Clock functions.

**Table 3-25: Real Time Clock Functions**

Register Name	Address	Access Type
Seconds	0x00300	R/W
Seconds x 10	0x00301	R/W
Minutes	0x00302	R/W
Minutes x 10	0x00303	R/W
Hours	0x00304	R/W
Hours x 10	0x00305	R/W
Days	0x00306	R/W
Days x 10	0x00307	R/W
Months	0x00308	R/W
Months x 10	0x00309	R/W
Years	0x0030a	R/W
Years x 10	0x0030b	R/W
Day of week	0x0030c	R/W
Control Register D	0x0030d	R/W
Control Register E	0x0030e	R/W
Control Register F	0x0030f	R/W

**EPROM**

The EPROM consists of a single 32 pin socketed 27C200 (U5).

**NVRAM**

The nonvolatile RAM allows the storage of waveforms and instrument settings. It consists of a single 128k by 8 CMOS SRAM (U8). Only 96 K of this device is addressable due to display storage allocations. The battery backup circuit provides the nonvolatility of this RAM.

### **Battery Backup Circuit**

The battery backup circuits consist of a 2.8 V lithium battery (BT1), and two DS1210 (U16 and U17) power monitor chips. U17 supplies backup power for the RAM (U8), likewise U16 supplies the real time clock (U23). The DS1210 chips supply power from the power supply while its voltage is above 4.75 V and switches to the 3 V battery backup supply when the power supply voltage falls below 4.75 V. The chip select outputs of the DS1210 chips go high when switched to battery backup power. This guarantees that the SRAM and RTC will not be written to during the power down sequence.

### **RS-232 Serial Port**

The RS-232 ports are implemented by a Z85C30 SCC chip (U22) and an LT1130A transceiver chip (U9). To read or write to one of the internal registers of the SCC one must first write to WR0. The data written to WR0 will contain, in the lower six bits (bits D0 through D5), a pointer to the desired register. The next read or write cycle then either reads or writes the register that is pointed to by WR0. At the end of the second read or write cycle the pointer value in WR0 is reset to zero (next write defaults to WR0). Wait states are inserted during writes due to the timing requirements of the TTY\_WR\_L signal and the access recovery time requirements of the Z85C30.

### **GPIB Interface Port**

The GPIB section is composed of the 9914A, GPIB Controller IC (U18), a 75160 GPIB octal bus transceiver (U19), and a 75162 GPIB eight channel transceiver (U20). In addition there is circuitry included to drive two LEDs. These two LEDs display the status of the Not Ready For Data (NRFD) and Not Data Accepted (NDAC) handshaking lines.

The 9914A, as well as the 75160 and 75162, meet the IEEE-488.1 standards. Access to the 9914A is through the microprocessor address and data buses, where the lower three bits of the address bus (A0 through A2) determine which of the thirteen internal registers are to be accessed (6 readable, and 7 writeable). For GPIB programming information, refer to the *2714 and 2715 Programmer Manual*.

### **Input Vector Register**

The entire address space of 0x0e800 to 0x0efff is occupied by this read only register. In addition to three interrupt status lines, this register also contains other miscellaneous status. The GPIB\_DIR\_L status bit indicates the direction of GPIB data flow. The DONE\_PG bit is an output from the Xilinx part which goes high when self programming is complete. The software must check this bit before attempting to write to any of the registers on the Xilinx part. If the DONE\_PG does not go high within 500 ms of power up the software should attempt to reset the system by forcing the BRST\_L line low. If DONE\_PG still does not go high within 100 ms, a diagnostic message should be displayed indicating a hardware failure.

**Video Gating Control Register**

There are ten video gating control registers on the Digital Option module. All of these control registers are write only registers, with the exception of misc. gating control register (address 0x210). The other nine registers contain line count and pixel count information used to control the IF gate and Display Storage acquisition.

**IF Gate System**

This system performs gating of the IF signal path at a point immediately before the VR filter. It is composed of two components, the IF Gate itself and a control signal conditioner.

**IF Gate Proper**

This section performs the actual gating of 10 MHz IF signals. The desired action is not to produce abrupt ON/OFF transitions like a switch, however, but rather to perform controlled, rapid “fades” between ON and OFF. The intent is to minimize the frequency domain sidelobes arising from the gating of any signals present in the wide passband preceding the resolution filters. In the CATV test environment the dominant signal present would most commonly be the visual carrier of the channel under test, and we want to prevent the gating sidebands from spoiling our ability to see weak distortion components near the visual carrier frequency. The gate’s characteristics combined with those of the control signal conditioner (see *Control Signal Conditioner*, next) define the transition times and shapes.

In operation, 10 MHz IF signals entering J2 are converted to differential currents at the collectors of Q3 and Q4. Note that the asymmetric arrangement of the network in the emitters of Q3 and Q4 allows use of resistors instead of current sources with little degradation of balance, taking advantage of the fact that the base of Q4 is not driven with signal. The overall differential topology of the IF gate is chosen to minimize even order distortion.

If IF\_GATE\_EN is held HIGH, Q7A and Q7D steer virtually all the differential current from Q3 and Q4 through to the emitters of Q2 and Q13. Q2 and Q13 serve as common base stages to keep the large voltage swings at the input of the transformer T1 off the collectors of Q7A and Q7D, which have large, nonlinear, capacitances. This is to reduce distortion (particularly odd order terms) and to improve the output circuit bandwidth.

If IF\_GATE\_EN is held LOW, the differential signal current is steered into Q1 and Q14 via Q7B and Q7C. The outputs of Q1 and Q14 are damped into resistors R1 and R2.

During transitions, which are governed by the linear ramp waveform applied to the bases of Q7B and Q7C, the differential signal current steered to the output is modulated according to the transfer function of a bipolar transistor differential amplifier having no emitter degeneration. The resulting soft envelope rise and fall shapes provide a rapid fall off of sidebands with frequency offset from the visual carrier.

## Control Signal Conditioner

This circuit takes in HCMOS logic levels and produces shaped and risetime controlled control signal(s) having the characteristics required by the IF gate circuit. The IF\_GATE\_EN signal is first passed through CMOS inverter U6 powered from a locally regulated +5 V source to produce output voltage levels which are well defined, stable, and noise free. The circuit comprising Q5, Q6, Q8, Q11, and Q12 is a crude operational amplifier with a well defined, intentionally low slew rate. Its purpose is to convert the abrupt logic level transitions into linear ramps having controlled rise and fall times. R27, R33, R37, and R44 provide scaling and offset to this signal to provide the correct drive waveform to the steering circuit that makes up the IF gate proper.

## Video Demodulator

The primary purpose of the video demodulator is to produce TV sync pulses derived from video modulation on the 110 MHz IF signal. These pulses are used by other circuitry to control the timing of the IF gate and so forth. It is necessary that the sync pulses be available whenever the spectrum analyzer is tuned anywhere within the selected TV channel. A secondary function of this module is to pass on a slightly amplified sample of the 110 MHz IF signal to the FM (satellite) TV demodulator located on the sweep board.

Operation of the video demodulator board is described as follows:

### 110 MHz to 45.7 MHz Downconverter

Input IF signals near 110 MHz are amplified by about 13 dB in U3, then applied to a splitter, one output of which relays most of the signal to the satellite TV demodulator. The signal from the other output is loosely bandpass filtered by L2, C5, and C8, then sent through a 2nd gain stage (U5) (whose function is primarily to provide reverse isolation) to a highpass filter with a cut-on frequency of about 104 MHz. Output from this filter is then applied to a downconverter (U4) which converts the signal to 45.7 MHz (visual carrier) without further frequency inversion (the 110 MHz IF signal is already frequency inverted from the spectrum analyzer input). The 45.7 MHz signal then passes through a SAW (surface acoustic wave) filter which imposes final bandpass limiting and provides the Nyquist slope for correct detection of vestigial sideband TV signals by the subsequent detector IC.

Local oscillator for the downconverter is generated by an internal VCO whose frequency is maintained in part by an AFC loop whose error signal comes from the video detector IC. This AFC loop is used to keep the mixer output frequency at 45.7 MHz while the input frequency ranges from 108.5 to 114.5 MHz as a function of the spectrum analyzer's center frequency setting. The VCO is tuned by a dual varactor (CR2) which resonates with L5. One part of this varactor receives a programmed tuning voltage from a DAC (U6) which is set by the instrument's firmware according to the frequency difference between the visual carrier and the instrument's center frequency setting. The other part receives the AFC error voltage if AFC is ON; otherwise, it receives a fixed midrange voltage.



The tuning voltage path from the DAC to its varactor includes a temperature correction from sensor (U9).

### **Video Detector**

The 45.7 MHz signal from the SAW filter is presented to the MC44301 demodulator (U16). This device passes the signal through an AGC controlled IF amplifier, then to a synchronous detector. The reference signal for the detector comes from an internal PLL. Note that the oscillator for the PLL actually runs at half frequency, and its output is frequency doubled on-chip for use by both the PLL's phase detector and the synchronous video detector. This reduces stray coupling between the oscillator's external resonator (C41, C42, and L11) and the IF input to the chip. The AFC error signal is a current from pin 5, and the video output is a voltage (offset several volts positive) at pin 2. The video output is passed through a single pole RC lowpass filter to strip off most of the color burst signal, then through an emitter follower (Q10) on to the sync separator (U15). The emitter follower is used because the input pin of the sync separator uses an active diode clamp DC restorer which prefers being driven from a low impedance source. The lowpass filter also includes a video attenuator to properly match the video amplitude to the sync slice level of the sync separator. A video test pad is provided at the output terminal of the demodulator IC.

The control line SECAM\_EN is provided to reconfigure the demodulator for positive modulated signals. When SECAM\_EN is taken high, two actions occur. First, Q9 turns on, which changes the operating mode of the demodulator IC. Secondly, part of U8 selects AGC sense gate timing control from the back porch output of the sync separator because the sync tip is not a viable place to sample the video for AGC with positive modulation.

### **Sync Separator**

This section uses an LM1881 IC (U15) to produce composite sync, vertical sync, and Even/Odd field flag signals (all at 5 V logic levels) from the demodulated video. A non-retriggerable one-shot multivibrator (U12) in the horizontal sync path serves to strip out the unwanted equalizing pulses during the vertical retrace interval so that the resulting horizontal sync signal is a simple periodic pulse train at the horizontal rate. This one-shot is set up for a time interval of about 3/4 of the horizontal sweep period, and the feedback path from the "Q" output to the "A" input serves to block triggering until timeout occurs, thus preventing triggering by the equalizing pulses. If this process starts up out of sync, correct sync is automatically re-established within one scan line of when the equalizing pulses end. The horizontal sync, vertical sync, and Even/Odd flag signals are buffered by U2 and sent to the Digital Options board as H\_SYNC, V\_SYNC, and E/O\_L respectively to drive the instrument's gate timing circuits.

### **AFC Lock Control Circuitry**

The lock control circuitry is used to switch the AFC loop (mentioned in the downconverter description) ON or OFF as required in the course of getting the video demodulator locked onto a new TV channel. The AFC loop needs to be reset by the instrument firmware on certain occasions (such as instrument re-tuning) to assure that the demodulator is locked to the correct channel.

The locking procedure, carried out by the instrument's firmware, is to first tune the spectrum analyzer to the desired center frequency. Then, the microprocessor applies a nominally correct tuning voltage to one half of CR2 by sending an appropriate setting to the DAC. At this point the demodulator may still be locked to the wrong thing (if so, usually the adjacent channel's sound carrier), so the final step in the procedure is to momentarily disable the AFC by switching the AFC tuning line to a midrange value (done by part of U8). When this is done, the demodulator IC will re-lock to the correct video carrier, although the IF frequency will still be off by as much as a few hundred kHz due to drift and tolerances. After a brief delay the microprocessor re-enables the AFC, which restores the frequency offset to virtually zero. At this point, valid sync pulses are available from the video demodulator system.

The tuning DAC setting used is calculated from:  $dac\_val = 165 - 20.44 * freq\_diff$ . The  $dac\_val$  ranges from 0 through 255, and the  $freq\_diff$  is the difference in MHz between the instrument's frequency setting and that channel's visual carrier frequency. For example, if the instrument is to measure the CSO component at 1.25 MHz above the visual carrier, the correct  $dac\_val$  is 139.

### **Sweep**

A Miller integrator, U270, is the core of the sweep generator. With a logic low at pin 16 of the analog switch U260B, the switch is closed. All of the timing current from pin 3 of U170 then flows through the switch, and the voltage across the switch is nearly 0 V. Thus, the sweep voltage is approximately the same as the voltage at pin 3 of U270 ( $\approx +1.3$  V). When the sweep logic circuit, U460, receives the proper signal, pin 19 goes to a high state and the switch (U260B) opens. All of the timing current is then steered to the timing capacitors, and they begin to charge. Operational amplifier U270 maintains a 0 V difference between its input pins 2 and 3 by changing its output voltage to provide the displacement current to the timing capacitors. Since the capacitor charges linearly, the resultant output at pin 6 of U270 appears to decrease linearly. Thus, the sweep is generated.

The sweep continues to decrease until the voltage at pin 9 of U470B is less than the voltage at pin 10 (of U470B). At that time, the output of U470B goes to a low state and clears the sweep gate flip flop inside U460, and a retrace cycle is initiated. The sweep logic circuit, U460, sets pin 16 of U260B low, closing the analog switch. The timing current is diverted from the timing capacitors, and the capacitors begin to discharge. The resultant sweep voltage starts to rise. When sweep voltage discharges to within 28 mV of its final value, the output of U540B goes to a high state. This releases holdoff capacitors C253 and C252. One of these begins to charge.

When this voltage reaches approximately 1 V, an RS flip flop inside U460 resets and the holdoff cycle is finished. The sweep gate logic circuit is then enabled to accept another trigger and, if in the free run mode, another sweep is then started.

Transistor Q574 is used to abort the sweep and initiate another holdoff.

Transistor Q255 is used to choose a long or short holdoff time. A logic 1 at pin 13 of U312 turns on the transistor, diverting the available current to charge C252. This has the effect of making the holdoff capacitor look larger.

Multiplexer U170 is used to determine the timing current to be used while U160 chooses the timing capacitor.

The trigger signal is selected by multiplexer U452. The output on pin 3 (TRIG) goes to the input of comparator U470A. This is wired as a Schmitt trigger with the threshold set by the voltage appearing at pin 4 of U470A. This threshold voltage is always positive regardless of the value of TLVL. The circuit composed of CR373 and U374B provides an absolute value generator. When the value of TLVL is negative, operational amplifier U374B is in equilibrium and the output is positive. When the value of TLVL is positive, the output of U374B goes as far negative as possible, effectively turning off CR373 (the operational amplifier is open loop). With CR373 off, the value of TLVL appears at pin 4 of U470A. When U374B is open loop, Q351 is turned on and pin 3 of U460 goes to a logic 0. This is the slope input that is EXCLUSIVE ORed with the trigger input at pin 2. Thus, the opposite slope is selected.

When TLVL is not being used to set the trigger level of the sweep, it can be used for the manual scan as these two functions are entirely mutually exclusive. During a manual scan, pin 7 of sweep logic IC U460 is set low. This sets the sweep gate flip flop in U460. Also, multiplexer U160 is set to select R162, the 100 k $\Omega$  resistor. Multiplexer U170 is set to select current input from R175 that ultimately originates at TLVL. Miller integrator U270 is then used as an amplifier and the output voltage is then proportional to the value of TLVL.

The source for the continuous TV line trigger and TV field trigger is from the sync separator, U320. This chip provides a vertical interval and composite sync. The composite sync contains the elements of the equalization pulses that occur during the vertical interval. This composite sync is fed to the two monostable multivibrators that are used to strip off the double pulses that occur during the vertical interval. One of the timers, U225A, is set for a pulse width of 3/4 of a horizontal scan. This output is used to inhibit another trigger from occurring on either monostable multivibrator until it has timed out. The other timer, U225B, provides an approximately 10  $\mu$ s pulse that is used as a general horizontal blanking pulse (HCLK).

Composite video source for the sync separator is from the output of operational amplifiers U244 ( for positive sync) or U343 (for negative sync). U244 also forms the source of the internal trigger.

The video monitor mode is generated by using the vertical sync outputs of the sync separator and HCLK to control an auxiliary sweep generator formed by U560B and its associated components. This ramp generator (U560B) provides the vertical sweep while the normal sweep circuit forms the horizontal sweep. When the video monitor mode is selected, Q522 is turned off, which lowers the sweep current, and slows the normal 5  $\mu\text{s}/\text{div}$  sweep to approximately 6.3  $\mu\text{s}/\text{div}$ . This has the effect of stretching out the TV picture over the entire length of the screen. When a vertical scan is nearly complete, the output of comparator U540A goes high, and on the next HCLK the signal at pin 14 of U670 goes high. At this time, Q664 turns on Q663 and the vertical sweep capacitors C564 and C563 are discharged. This resets the vertical sweep to 0 V, which corresponds to the top of the screen. The signal VLVL is used to speed up or slow down the vertical sweep to allow the vertical interval to be observed in detail and to allow for various vertical scan rates. When the video monitor is enabled, the Z axis signal is selected through analog switches U443A or U443D, depending on the desired polarity.

The video monitor mode has two input sources. First, in the AM mode, the input source is from the video amplifiers located on the Log board. Second, in the FM (satellite) mode, the video source is from the FM demodulator (U770 on the Sweep board). The input of the FM demodulator is from amplifier U760, which provides approximately 16 dB of gain. The input to the board (to U760) is picked off just prior to the 110 MHz bandpass filter, located on the RF Mother board. The output of the FM demodulator is then fed to operational amplifier U690, which inverts the signal and adds an offset. Analog switches U260A and U260C are used to select between broadcast (AM) video and satellite (FM) video.

The selective line trigger is selected by programming a line number in the counter made up of U510, U620, and U630. This counter is then decremented by HCLK. When the counter is at a minimum count (0), the signal at pin 15 of U630 goes to a low state. This signal is then delayed for one HCLK to remove any glitches that would produce a false trigger. The delayed terminal count appears at pin 17 (HTRIG) of U670. This signal is used to trigger the sweep. The line trigger counter is preset during field one by the signal at pin 7 of U670. This preset signal is generated in U670 by sensing whether timer U225A has timed out at the beginning of the vertical interval. The vertical output of U320 always starts at the beginning of the major serration during the vertical interval. This serration starts just prior to an HCLK during one field. During the next field, the serration starts on an equalization pulse halfway between HCLK. This difference is used to determine the odd/even field. When the odd/even field flip flop inside U670 switches to the high state, a positive edge transition detector generates the preset enable signal for the line counter. The proper number to preset the counter with is determined by adding an offset of 6 for NTSC and 3 for PAL.

The graticule lights are controlled by switching Q707 on, which then turns on Q706.

All of the control information is shifted in through four shift registers U211, U312, U610, and U520.

## Front Panel

The Front Panel acts as an interface between the user and the instrument. These circuits translate operator actions on front panel controls into data for the microprocessor to read and execute. The Microprocessor outputs data showing current operating modes to the user through LEDs (light emitting diodes) and CRT readout.

The Front Panel consists of five sections. These sections are the Input Shift Registers, the Switch Matrix, the Debounce circuitry, the Gray Code Knob, and the Service Request/Acknowledge circuitry. See Figure 3-26.

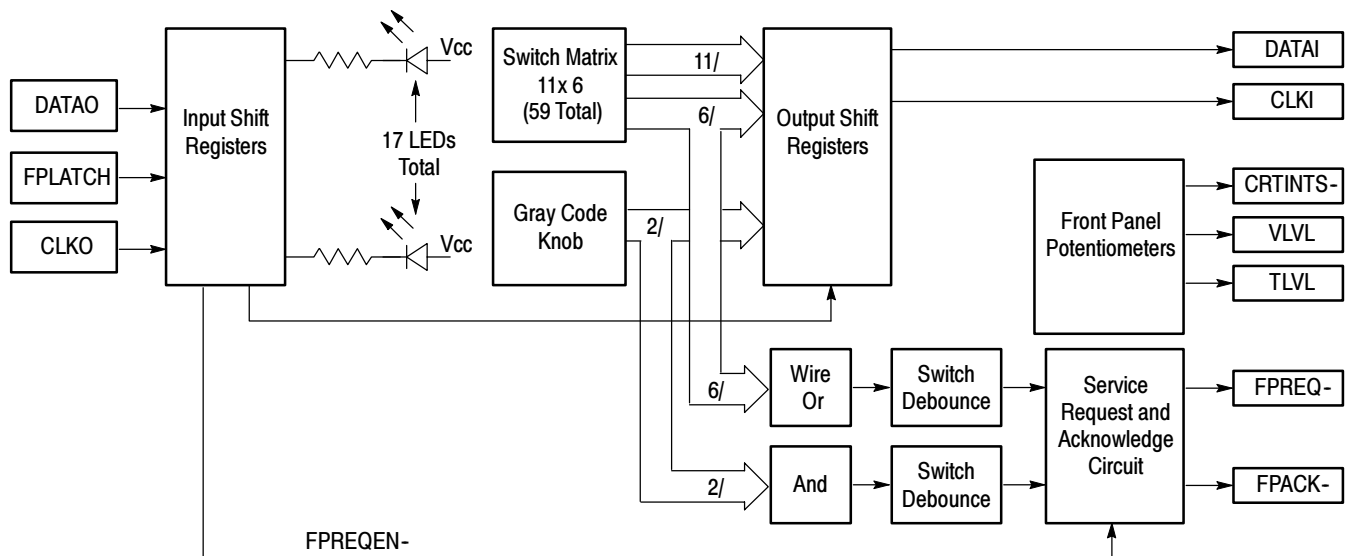


Figure 3-26: Front Panel Block Diagram

### Input Shift Registers

The Input Shift Registers consist of three serial input, parallel output shift registers cascaded together. The outputs of the shift registers drive the front panel LEDs and provide two control signals. The LEDs are connected from the +5 V supply to the shift register output through a 274  $\Omega$  resistor. The nominal LED current is 10 mA. This current is high enough to provide adequate light for the LED to be seen in direct sunlight. A low (zero) is required on the output of the shift register to light the LED.

Two control signals are provided on the shift register outputs. They are the front panel request enable (FPREQEN-) and the clock in enable (CLKIEN-). Both of these signals are active low.

The FPREQEN- signal is used to enable the front panel request output buffer. If FPREQEN- is in the inactive state, the front panel service request line to the microprocessor will always be active (always requesting service).

The CLKIEN- signal is reserved for future use.

### Switch Matrix

The Switch Matrix consists of 59 normally open single pole, single throw switches. These switches are configured in a  $6 \times 11$  matrix (possibility of 66 switches total). By using this matrix, it is possible to determine the location of a closed switch by looking at the rows and columns of the matrix.

Each column in the matrix is held low by a  $100\text{ k}\Omega$  resistor to ground, while the rows are connected to the  $+5\text{ V}$  supply through a  $22.1\text{ k}\Omega$  resistor and to the base of an open collector transistor. When all the switches are open, the transistor is in the off state, thus the row line is low (ground). When a switch is closed, the base of the transistor is pulled down to approximately  $4.3\text{ V}$  and the transistor turns on, thus pulling the row line to the  $+5\text{ V}$  supply. At the same time, the column line is pulled high due to the resistor divider on the base of the transistor.

The row and column lines are fed to inputs of three parallel to serial shift registers. In addition to the shift registers, the row lines are wired to form a phantom OR gate whose output triggers a debounce circuit.

**Switch Matrix Debounce Circuit.** The debounce circuitry for the switch matrix consists of three retriggerable single shots. Two of these single shots are used to establish the minimum time between key presses. The third single shot is used to debounce the switch being pressed.

The two single shots used to establish the minimum time between key presses operate as follows:

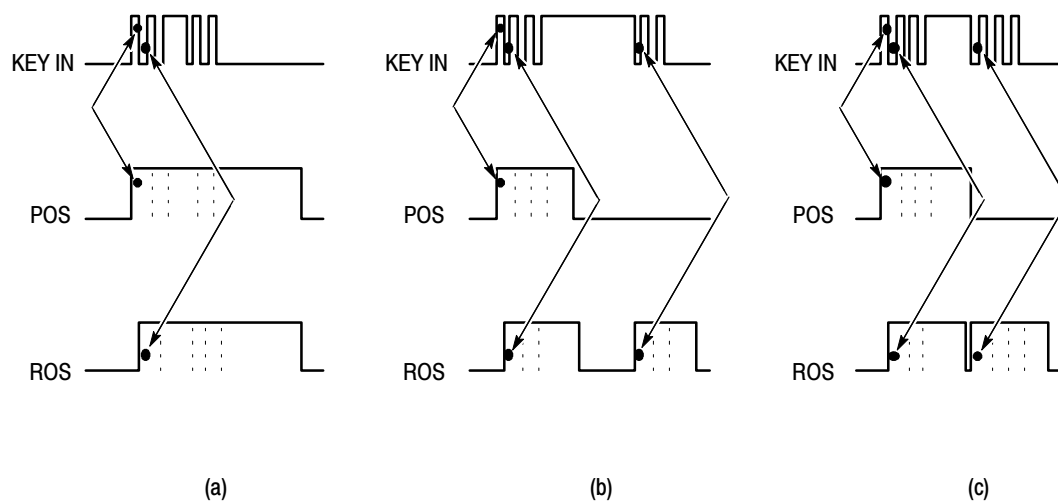
The row lines of the switch matrix are wired to form a phantom OR gate whose output drives the trigger inputs of both single shots. Each single shot triggers on the opposite edge of the other. The rising edge triggered single shot is called the Press One Shot (POS), while the falling edge triggered single shot is called the Release One Shot (ROS).

For a typical key press, the one shots will operate as follows:

1. The key is pressed and a rising edge is presented to both the POS and the ROS.
2. The POS is triggered and its output goes active.
3. Due to the bouncing of the switch, a negative edge is presented to both the POS and ROS.
4. The ROS is triggered by this edge and its output becomes active.

5. Steps 2 and 4 are repeated, retriggering either the POS or ROS, until the switch has stabilized in the closed position.
6. Each single shot then times out approximately 50 ms after the last valid trigger.
7. Now the switch is released and a negative edge is presented to both the POS and the ROS.
8. This edge triggers the ROS and its output becomes active.
9. With the ROS output active and POS output inactive, the POS is held in the reset state by a NAND gate.
10. The ROS is retriggered, by each falling edge of the bouncing switch, until the switch has stabilized in the open state.
11. After approximately 50 ms, the ROS times out and its output becomes inactive.
12. The POS and the ROS are ready for another key press.

Figure 3-27 shows the three possible scenarios of key presses and how the debounce circuit reacts to each one.



NOTE: The dotted lines denote retrigger points relative to the KEY IN pulse transitions.

**Figure 3-27: How the Debounce Circuit Reacts to Key Closure**

The three conditions illustrated in Figure 3-27 are as follows:

1. Switch pressed and released inside the 50 ms time of POS.
2. Switch pressed and released well after both the POS and ROS have timed out.
3. Switch pressed and released with the POS becoming inactive during the release.

The debounce single shot is triggered by the rising edge of the POS and has a 1 ms pulse width. At the end of the 1 ms pulse, the following two conditions occur:

- The status of the switch matrix is stored in the output shift registers (U130, U140, and U319).
- The service request circuit on the Front Panel board is activated.

### **Gray Code Knob**

The gray code knob is a rotary knob that outputs a two bit gray coded pulse train. The direction of the knob is decoded by monitoring the two output lines of the knob. The two knob outputs drive a NAND gate whose output is used to trigger a single shot. The single shot is positive edge triggered. Triggering the single shot in this method gives a pulse to the Service Request/Acknowledge circuit as the knob leaves the position of both bits high. The direction of the knob can be determined by loading the status of the knob just after the both bits high position.

Two open collector transistors on the knob outputs are used to set the correct TTL levels. In addition, two Schmitt trigger inverters are used to buffer the transistor outputs and speed up the edge transitions.

### **Service Request/Acknowledge Circuit**

The Service Request/Acknowledge circuitry consists of two flip flops (request for service flip flop) that request service from the firmware. A description of a typical request for service and firmware acknowledgment follows:

1. A key is pressed on the front panel and the output of the Press One Shot goes high.
2. The rising edge on the Press One Shot output triggers the debounce single shot. The falling edge of this pulse loads the switch matrix status and clocks the first flip flop.
3. The output of the first flip flop then sets the request for service flip flop, making the FPREQ signal low (active).
4. The output of the request for service flip flop is then used to reset the load flip flop, thus completing a load pulse for the shift registers.



5. After the firmware recognizes the request for service, the FPACK- line is set low, which enables the DATAI and CLKI tristate buffers.
6. The data is then clocked out of the switch matrix shift registers.
7. After the data has been clocked out, the FPACK- line is set high, disabling the DATAI and CLKI tristate buffers.
8. The rising edge of FPACK- is also used to reset the request for service flip flop.
9. The board is now ready for another key press.

### **Diagnostics and Testability**

There are two diagnostic tools available for the front panel, the key test and the LED test. These diagnostic tools reside in instrument firmware. They are used during initial board turn on and when the front panel needs repair. Descriptions for these diagnostic tools follow.

**Key Test.** The key test is located in the extended diagnostics menu of the instrument and consists of text prompting the technician on which key to press. If the correct key is pressed, its location in the switch matrix and the next switch to be pressed are displayed. If the incorrect key is pressed, the speaker beeps, and the same key press is prompted again. Up to four incorrect key presses are allowed before the firmware continues on to the next key.

**LED Test.** The LED test is also located in the extended diagnostics menu of the instrument and uses the knob to light each LED one at a time, in a known sequence. By rotating the knob, each LED is lit. The test runs until the backspace key is pressed.

## **Power Supply (Primary and Secondary)**

The Power Supply operates with a line input voltage from 90 VAC to 250 VAC without range switching. This is done by regulating the rectified AC input (125 V to 350 V) to 60 VDC.

An inverter drives a transformer having numerous secondaries, including a high voltage winding (1400 V peak) for the CRT supplies. The secondary voltages are rectified to provide operating power for the instrument.

The high current secondary output, +5 V, is regulated by feedback to the primary pulse width modulator. The other secondary outputs track +5 V fairly closely, except for the high voltage supplies, which have secondary regulation.

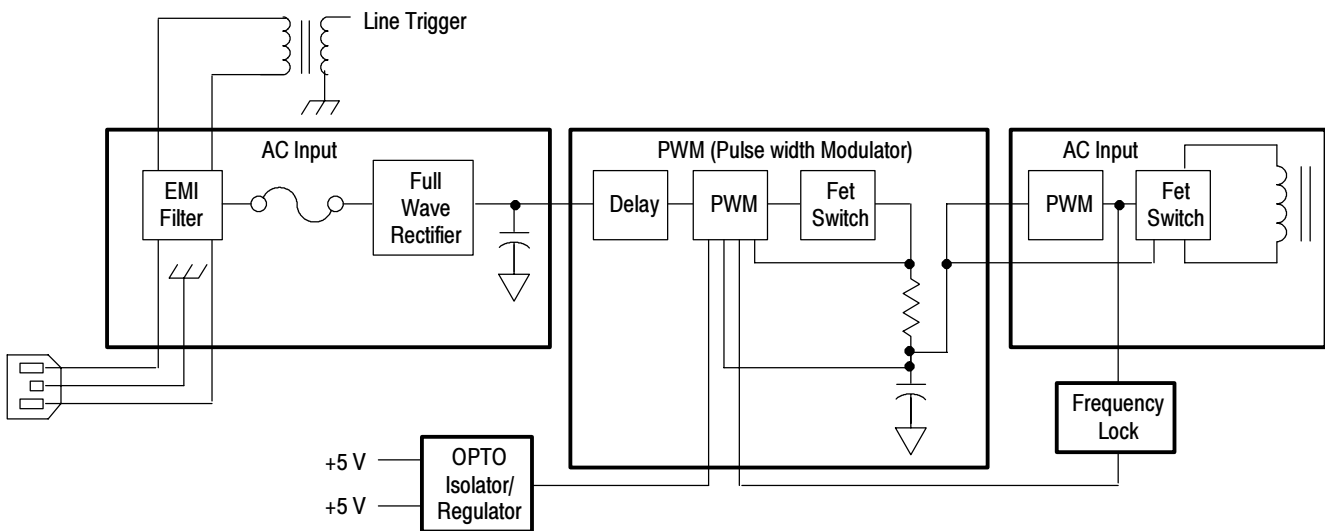
The Power Supply circuits are divided into the primary circuits and the secondary circuits.

**Primary** The Power Supply primary circuits consist of the AC Input circuit, a Pulse Width Modulator (PWM), an Inverter, and a Frequency Lock circuit. See Figure 3-28.

**AC Input.** Input power is applied through an EMI line filter, a line fuse, an on/off switch, additional EMI filtering, and a full wave rectifier and storage capacitor. The line filter prevents power line interference from entering the Power Supply and also attenuates internally generated signals radiating out the power cord. The additional EMI filtering attenuates harmonic noise generated in the PWM and conducted out the power cord. Additional EMI filtering consists of a common mode choke, line to line capacitors, and line to ground capacitors.

A thermistor, having a negative temperature coefficient, limits current surge at power up. The surge current drops within several cycles of line input as the storage capacitor charges. When power is applied, the thermistor limits the line current until it has had time to warm up. As the line input current heats the thermistor, the increase in temperature decreases the resistance value of the thermistor, reducing power loss across the thermistor.

The AC line signal is coupled to the secondary through T110 and is also used in the trigger circuits as a line trigger source.



**Figure 3-28: Power Supply Primary Block Diagram**

PWM Integrated circuit U280, a multifunction PWM IC, is used to drive a MOSFET switch. The PWM, operating in a single ended mode, sets frequency, regulates voltage using its internal +5 V reference, allows current limiting, and provides a slow start up.

At power up, there is a delay until R185 charges C290 to approximately 20 V, at which time Q690 and Q691 turn on to supply power to the PWM IC. The capacitor provides drive current until the PWM output (TP293) reaches 60 V relative to special ground (TP190).

Initial pulses to the MOSFET switch are narrow, but they gradually widen as C691 (between pins 4 and 14 of the PWM IC) charges. If current through R260 at the source terminal of the MOSFET switch exceeds 1.9 A, the pulse width is limited until C163 at the primary center tap of the power transformer charges up to the desired voltage. The PWM operates in a voltage control mode set by the string R693, R682, R685, and R686, where the output voltage across C163 is compared to the PWM's internal +5 V reference. The negative end of the +5 V reference is connected to TP293 (60 V above special ground). Frequency is set by C690 and R694 in parallel with R681 and R680. Pin 10 of the PWM conducts through CR680 and R672 to Q270 (a MOSFET switch) for fast positive transitions. Transistor Q680 turns on for fast negative transitions. Series RC damping networks R696/C692 and R684/C681 compensate the PWM transient response.

The MOSFET duty factor is approximately  $E_o/E_{in}$ . This will be approximately 16% (2.2  $\mu$ s) at 250 V line input. The PWM IC has a maximum duty factor of 95%, which means that voltage  $E_{in}$  across storage capacitor C171 can drop to approximately 70 V before loss of regulation occurs.

Three components carry high current. These are MOSFET Q270, commutating diode CR270, and coupled winding energy storage inductor (transformer) T190. Capacitor C280 between the storage inductor windings compensates for leakage inductance. The transformer has two auxiliary windings. One winding, pins 6 and 7, has a positive peak of 20 V and provides current for the PWM through 6.2 V Zener diode VR690 and CR290. The other winding, pins 9 and 10, drives out of phase current through a small capacitor connected to the chassis. This reduces line conducted EMI by cancelling current flowing through stray capacitance to chassis from the drain of Q270 and other parts connected to the same node.

Current into C163 at the center tap of the power transformer is continuous, as in a Buck regulator. The current in the storage inductor ramps up when Q270 is on and ramps down when CR270 conducts. Since there is current and stored charge in the diode when Q270 turns on, L170 is included in the loop to limit current and reduce power losses. Energy stored in L170 is recovered with three diodes and a capacitor and transferred to the output.

**Inverter.** The inverter consists primarily of a PWM IC, a pair of MOSFETs, and the power transformer. The MOSFETs are driven in push pull mode by U260, the PWM IC. There is no regulation to modulate the pulse width of the drive signals. Current flows through the power transformer from the center tap to the closed MOSFET switch. The operating frequency is approximately 26 kHz as set by R664 and C661. Supply current for U260 is through R261 clamped to 12.4 V by VR660 and VR661.

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**NOTE.** For instruments with serial numbers B030000 or above, a dead time control (DTC) R669 has been added which will be used to set the maximum high voltage measured at the  $-2.75\text{KV}$  test point by varying the voltage at pin 1 of U260. New values for C262 and R652 have been chosen to lower the effect of the leakage current from pin 4 of U260. Any pin 4 leakage current through R652 will reduce Power Supply performance. Supply regulation for U260 has been improved by lowering the resistance of R261.

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The low impedance, fast switching of the MOSFETs is slowed down by series inductors L241 and L250. As each MOSFET turns on, the drain inductor, transformer leakage inductance, and transformer reflected capacitance resonate. This is damped by CR740, CR640, and R240. Also, when each MOSFET turns on, CR250, CR260, C151, and R152 limit the peak voltage excursion to approximately 120 V. The series resistor capacitor (RC) networks across the inductors absorb some energy in both conditions.

**Frequency Lock.** The inverter frequency is approximately 26 kHz and the pre-regulator operates at 3 times this rate. The D flip flop U670A is clocked at 78 kHz with the D input driven at 26 kHz through clamp diode CR661. The Q output is RC filtered and modulates pin 6 of the PWM IC to maintain the 3:1 frequency ratio. When R680 is adjusted for lock, one sample of the D input is low, the second is high, and the third is at the edge of the 26 kHz waveform. When the third sample is high, the filtered output to the PWM will reduce its frequency, and increase the frequency when low. This lock prevents low frequency IM between the two frequencies that could be audible. The lock can occur at various ratios with 3:1 chosen so the predominant harmonic of the inverter coincides with the PWM fundamental.

## Secondary

The +5 V potentiometer, R937, is used to adjust +5 V<sub>1</sub>, the reference voltage. This reference voltage is compared with the +5 V supply by U630B, and an error voltage is generated. Feedback through the optoisolator U281 controls the pulse width of U280 on the primary side. The center tap voltage on the primary side of the power transformer is adjusted this way to correct small changes in +5 V. Other secondary DC voltages are determined by transformer winding ratios and degree of loading. Three secondary windings (5 V, 10 V, and 50 V) have series RC damping networks to circulate energy stored in the power transformer leakage inductances. Choke/capacitor (lc) filter networks at the output of each rectifier reduce ripple to acceptable levels for instrument power.

Most of the available power flows to the +5 V, +10 V, and -11 V supplies. The +20 V supply is lightly loaded and generated by voltage doubling. The fan supply is -11 V. The +50 V and +115 V supplies are used for Z axis control, CRT adjustments, and deflection amplifiers. The -5 V<sub>1</sub> is a stable supply generated by a three terminal regulator for use in the deflection amplifiers. Secondary regulation is provided for the high voltage supplies. U630A and Q130 control the peak to peak amplitude of the high voltage AC voltage seen by both cathode and anode rectifiers. Constant output and post deflection anode ratio is maintained as internal loading varies. This keeps the display fixed in size.

## Power Supply (Display)

The Display system consists of the following:

- CRT Bias
- Vertical Display circuit
- Horizontal Display circuit
- Z Axis circuit

Figure 3-29 is a block diagram of the Display Amplifier.

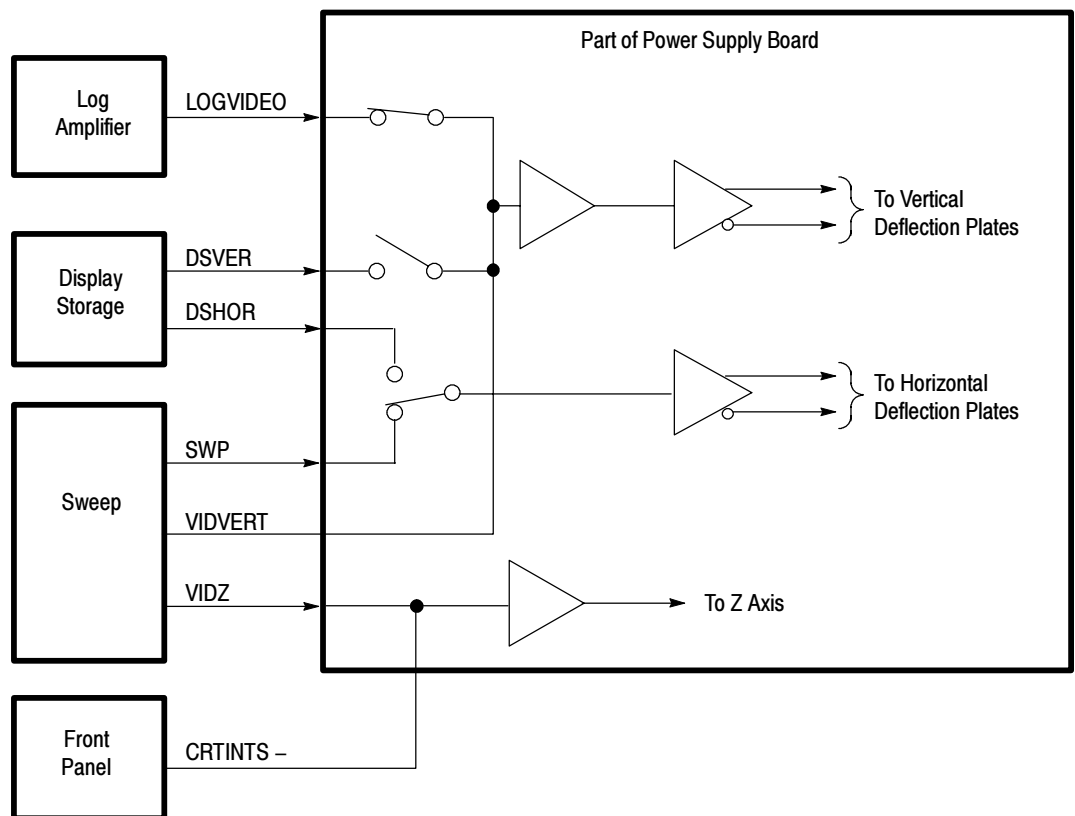


Figure 3-29: Display Amplifiers Block Diagram

The CRT is biased as follows:

Cathode	-2750 VDC
Heater	-2750 VDC, 6.2 V <sub>RMS</sub>
Grid	-2880 VCO
Accelerator	24 VDC
Focus	-2200 to -1925 VDC
Astigmatism	115 to 0 VDC
D3, D4 ave	24 VDC
D1, D2	45 VDC
Geo mesh	115 to 0 VDC
Anode	11000 VDC
TRACE ROT	+30 mA to -30 mA

The voltage multiplier is encapsulated in high insulation material. Both cathode and anode multipliers are AC coupled within the multiplier and have multiplication factors of -2 and +8, respectively.

The high voltage regulator circuit takes a sample voltage from the cathode and controls the impedance of Q130 for a steady cathode voltage. The parallel combination of C130 and Q130 (with R637) is switched into the high voltage current loop when the voltage at pin 23 of T230 goes negative (CR531 turns off and CR530 turns on). The positive DC voltage on C130 is added to the negative excursion on the high voltage winding. Therefore, the total peak to peak voltage seen at the input of the high voltage multiplier is the peak to peak voltage at the transformer secondary minus the DC charge on C130. The high voltage outputs are changed by varying the impedance of Q130, which discharges C130. VR530 and VR630 provide a 300 V clamp that protects C130, Q130, CR530, and CR531 from overvoltage. The cathode has almost 300 V of regulation range.

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**NOTE.** In instruments with serial numbers B030000 or above, C130, CR530, CR531, Q130, VR530, and VR630 were changed to extend the cathode regulation range to nearly 400V. Voltage regulators VR530 and VR630 provide a 460 V clamp.

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### Vertical Display

The Vertical Display circuit is a video amplifier (preamplifier and a paraphase amplifier). Gain and DC offset (Vertical Position) are set so the signal at the input of the paraphase amplifier swings from -0.7 V to +0.7 V for a full screen signal. The output of the paraphase amplifier then drives the vertical deflection plates.

Three signals may be applied to the Vertical Display circuitry:

- LOGVID (Detected video from the Log board)
- DSVER (from the Display Storage board)
- VIDVERT (Vertical Scan signal from the Sweep board)

## Horizontal Display

The Horizontal Display circuit is a paraphase amplifier. Gain and DC offset (Horizontal Position) are set so the signal at the input of the paraphase amplifier swings from -1 V to +1 V. The output of the paraphase amplifier then drives the horizontal deflection plates.

Two signals may be applied to the Horizontal Display circuitry:

- SWP (Sweep from the Sweep board)
- DSHOR (from the Display Storage board)

When an active signal is displayed in normal mode, the horizontal drive signal is the sweep (SWP), and the vertical drive signal is the detected video (LOGVID); when a stored signal is displayed, the horizontal drive signal becomes DSHOR from the Display Storage board, and the vertical drive signal becomes DSVER from the Display Storage board.

When the video monitor mode is enabled, the vertical signal is a vertical scan signal (VIDVERT) and LOGVID and DSVER are switched out. At the same time DSHOR is also switched out, and the sweep signal (SWP) is set to a TV line rate. A third signal, VIDZ (live video), is routed to the Z Axis circuit.

## Z Axis

The Z Axis circuits receive signals from the Display Storage and Sweep boards and accept control levels from the front panel INTENSITY control. These signals are then used to control the CRT beam brightness by modifying the CRT control grid voltage.

VIDZ from the sweep board and /CRTINTS from the Front Panel are summed into the Z Axis drive amplifier. Two gates also drive the amplifier: /DSBLANK during readout display periods and SWPGATE during sweep display periods.

The Z Axis clipper circuit consists of two series diodes, plus associated components. The voltage that passes the clipper circuit is coupled through a capacitor to the Z Axis rectifier.

The clipped Z Axis drive signal is rectified by a pair of diodes. The rectified voltage is then fed to the grid of the CRT. A capacitor couples fast changes of the drive voltage to the grid to speed up the response of the grid circuit. The CRT grid is protected from high voltage arcs by a spark gap (E110). Also, a 4.75 k $\Omega$  resistor at the junction of the clipper diodes protects the rectifier diodes from high voltage surges in case the CRT arcs. Clamp diodes CR200 and CR201 protect the Z Axis amplifier from high voltage transients.





# Performance Verification

This section contains procedures for verifying that the instrument performs according to the characteristics stated in the *Performance Requirement* columns in *Section 1: Specifications*.

If a failure is found, it is recommended that only those circuits that do not meet performance criteria be adjusted. If adjustment fails to return the circuit to specified performance, refer to *Section 6: Maintenance* for repair procedures.

A procedure that is unique to instrument options is described as a subpart of the step, where practical, or at the end of this section.

## Incoming Inspection Test

The User manual contains a system checkout (power up check) of the Spectrum Analyzer. This check is recommended for incoming inspections because it requires no external equipment or special experience and is a reliable indication that the instrument is performing properly.

## Verification of Tolerance Values

Tests shall be performed only after the normalizations have occurred. If a test should fail, normalize the instrument by pressing **UTIL 3 0**. The normalization will correct for any changes in the operating environment due to time or temperature.

Measurement tolerance of test equipment should be negligible in comparison to the specification being tested. If not, the error of the measuring apparatus must be added to the specification tolerance.

## History Information

Corrections or additional information is included when revisions are made to the manual. If modifications require changes in the procedures, information applicable to earlier instruments will be included within a step or as a subpart to a step.

## Equipment Required

Table 4-1 lists the test equipment recommended for the Performance Verification. The characteristics specified are the minimum. If equipment is substituted, it must meet or exceed these specifications.

**Table 4-1: Equipment Required**

Test Equipment	Characteristic	Recommended
Frequency Standard	100 MHz	Oscillator with an accuracy of $1 \times 10^{-9}$ (WWV Receiver in the USA)
Test Oscilloscope	Deflection factor: 2 mV/div to 5 V/div, Bandwidth: DC to 100 MHz, X-Y display capability	Tektronix TAS485 Oscilloscope with P6138 probes
Spectrum Analyzer	Frequency range at least 2 GHz to 4 GHz	Tektronix 2797
Tracking Generator	Frequency Range: 100 kHz to at least 1.8 GHz	Tektronix TR 503
Sweep Oscillator	Output: 0 dBm to +13 dBm, Spectral Purity: >25 dBc, Flatness: $\pm 0.33$ dB	HP 8350B with 83522A Plug in
Signal Generator (2)	Frequency range of 10 MHz to at least 100 MHz	Marconi 2022C or D
CATV Modulator	0 dBmV visual carrier peak output (at sync tip) on a TV channel assignment accessible to the 2715 under test, modulated (negative modulation polarity) with video conforming to NTSC or PAL format. Sound carrier output not essential.	Standard Communications Model TVM450 CATV Modulator
PAL/NTSC Signal Generator		Tektronix TSG 95 Generator
VSWR Bridge (50 $\Omega$ )	10 MHz to 1 GHz	Wiltron VSWR Bridge 60NF50
VSWR Bridge (75 $\Omega$ )	10 MHz to 1 GHz	Wiltron VSWR Bridge 62B75
10 dB and 1 dB Step Attenuators	Range: 132 dB in combined 10 dB and 1 dB steps, Accuracy: +0.1 dB, Frequency Range: 0 to at 1 GHz	HP 355C and 355D, calibrated using precision standard attenuators such as Weinchel Model AS-6
SMA male to BNC female Adapters for the Combiner (3)		Tektronix Part No. 015-0554-00
Power Meter with Power Sensor	-30 dBm to +20 dBm full scale 100 kHz to 4.2 GHz	HP Model 436A with 8482A and 8484A Sensors
Combiner	0.125 to 0.25 GHz, 20 dB minimum directivity	Mini Circuits Model ZFSC-2-1
Time Mark Generator	1 $\mu$ s markers accuracy 0.001%	Tektronix TG 501A
Bandpass Filter	Centered near 100 MHz with 2nd harmonic rejection better than 90 dB	Tektronix 119-1025-00 (110 MHz)
2 each 20 dB/50 $\Omega$ Attenuators		Tektronix Part No. 011-0059-01
Precision 20 dB Attenuator	10 kHz to 1.8 GHz +0.4 dB	Weinchel Model 1

Table 4-1: Equipment Required (Cont.)

Test Equipment	Characteristic	Recommended
BNC T Adapter		Tektronix Part No. 103-0030-00
Adapter, N Male to BNC Female	50 $\Omega$	Tektronix Part No. 103-0045-00
Adapter, Female-to-Female F	75 $\Omega$	Tektronix Part No. 103-0301-00
Adapter, 75 $\Omega$ Female-to-Female F	75 $\Omega$	Tektronix Part No. 103-0310-00
BNC Female to Female Adapter		Tektronix Part No. 103-0028-00
Min loss attenuator (2)	50 - 75 $\Omega$	Tektronix Part No. 011-0057-01
Two 50 $\Omega$ Coaxial Cables		Tektronix Part No. 012-0057-01
FM Antenna		Any commercially available FM antenna
Two Function Generators	0.002 Hz to 20 MHz 20 mV to 20 V	Tektronix FG 5010 with TM 5000 Series Power module
Mainframe	For TM 500 and TM 5000 series Plug ins	Tektronix TM5006A

## Power-Up Procedure

1. Connect the Spectrum Analyzer power cord to an appropriate power source.
2. Push the front panel power switch ON.
3. The instrument will initialize itself according to the configuration stored in the USER DEFINED POWER-UP register. If this register is empty, the instrument will initialize according to the configuration stored in the FACTORY DEFAULT POWER-UP register.
4. Allow the instrument to warm up for at least 30 minutes before continuing this procedure.
5. The instrument must be normalized before any measurements can be made. Invoke normalizations by pressing **UTIL 3 0**. The instrument will begin normalizations and print progress messages on the CRT.
6. After the instrument has completed normalization, press **UTIL 5 5 0** and verify that all frequency related normalizations have passed.
7. Press **BKSP 2** and verify that all amplitude related normalizations have passed.
8. Press any menu button to exit the menu.
9. Set instrument to CALIBRATION MODE as follows:
  - a. Press the **CATV/APPL** key then, **8** (CATV MEASUREMENT SETUP) and **0** (EXIT CATV MEASUREMENT MODE).
  - b. Next press the **UTIL** key then, **5** (INSTR DIAGNOSTIC/ADJUSTMENTS) and **8** (CALIBRATION MODE).

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**NOTE.** Step 9 above exits the CATV mode and places the Spectrum Analyzer in a Calibration Mode. This mode must be used for all steps in this section.

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## Front Panel Operation

Refer to the *2715 Spectrum Analyzer User Manual* for an explanation of front panel functions.

## Performance Check Procedure

Use the following procedure to verify the proper operation of the 2715.

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**NOTE.** For all instruments except Option 50 use only 75Ω connectors or the min-loss pad on all applied signals to avoid damaging the 75Ω input connector of the 2715.

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### Frequency Accuracy

Performance requirement is  $5 \times 10^{-7} \times \text{Center Frequency} \pm 10 \text{ Hz} \pm 1 \text{ Least Significant Digit}$ .

- Test equipment required:

100 MHz Frequency Standard

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-20 dBm
SPAN/DIV	100 kHz
RESOLUTION BW	AUTO
3. Set the counter resolution to 1 Hz by pressing **MKR/FREQ 9 1 1**.
4. Connect a verified 100 MHz signal (such as the output of a generator locked to WWV) to the RF INPUT.
5. If necessary, reset the REFERENCE LEVEL for a full screen signal.
6. Center the signal by pressing **CTR-MEAS/TRKG**.
7. Check that the readout displays the frequency of the signal within  $\pm 60 \text{ Hz}$ .
8. Disconnect the signal from the RF INPUT.

## Resolution Bandwidth Shape Factor

Performance requirement is 7:1 or less for Bandwidths  $\leq 1$  MHz.

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	100 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	1 MHz
RESOLUTION BW	1 MHz
VID FLTR	On
VERTICAL SCALE	10 dB/div
SWEEP	AUTO
3. Enable the calibrator by pressing **INPUT 9**.
4. Enable MAX/MIN ACQUISITION MODE by pressing **DSPL 4**.
5. Press **APPL 9 0** and enter -6 dBc. Press **BKSP** and **0** to activate bandwidth mode (exits the menu).
6. The marker readout displays the bandwidth of the filter 6 dB down from peak amplitude. Make a note of this value.
7. Check that the ratio of the 60 dB bandwidth to the 6 dB bandwidth is 7:1 or less.
8. Using Table 4-2, verify that the -60 dBc readings for the other resolution bandwidth filters are no more than 7X the -6 dBc reading.
9. Exit bandwidth mode by pressing **MKR/ $\Delta$ /OFF**.

**Table 4-2: Settings for Shape Factor Check**

Span/Div	Resolution Bandwidth
1 MHz	1 MHz
200 kHz	300 kHz
100 kHz	100 kHz
10 kHz	30 kHz
10 kHz	10 kHz
5 kHz	3 kHz
1 kHz	1 kHz
1 kHz	300 Hz

**Short Term Drift**

Performance requirement is  $\leq 400$  Hz between frequency corrections.

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	1 kHz
RESOLUTION BW	300 Hz
VID FLTR	Off
VERTICAL SCALE	10 dB/DIV
SWEEP	AUTO

3. Enable the calibrator by pressing **INPUT 9**.
4. Press **CTR-MEAS/TRKG** to center the signal.
5. Check that the signal does not move more than  $\pm 2$  minor divisions from center screen.

**Noise Sidebands**

Performance requirement is  $\geq 70$  dBc at 30 X Resolution Bandwidth for Bandwidths  $\leq 100$  kHz.

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Enable the calibrator by pressing **INPUT 9**.
3. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	1 MHz
RESOLUTION BW	100 kHz
VID FLTR	On
VERTICAL SCALE	10 dB/
SWEEP	AUTO

4. Enable peak detection mode by pressing **DSPL 4**.
5. Check that the noise sidebands are at least 70 dB down from peak amplitude at  $\geq 9$  MHz away from center frequency (30 times the selected bandwidth).
6. Reset RESOLUTION BW and SPAN/DIV settings according to Table 4-3 to check the remaining filters.

**Table 4-3: Settings for the Noise Sidebands Check**

Span/Div	Resolution Bandwidth	30 X Resolution Bandwidth
1 MHz	100 kHz	3 MHz
500 kHz	30 kHz	900 kHz
100 kHz	10 kHz	300 kHz
5 kHz	300 Hz	9 kHz

### Frequency Span/Div Accuracy

Performance requirement is within 3% over the center 8 divisions.

- Test equipment required:

Time Mark Generator

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Connect a Time Mark Generator to the RF INPUT and select 10 ns marks.
3. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	500 MHz
REFERENCE LEVEL	Set for Visible Marks
SPAN/DIV	100 MHz
RESOLUTION BW	300 kHz
VID FLTR	Off
4. Enable peak detection mode by DSPL MENU 4.
5. Press **MKR/Δ/OFF** to enable the marker system and tune the marker to the time mark signal at the 2nd graticule line from the left.
6. Press **MKR/Δ/OFF** again to enable the delta marker and tune the second marker to the time mark signal at the 10th graticule line.
7. The delta frequency readout should read between 776 MHz and 824 MHz. Disable markers by pressing **MKR/Δ/OFF**.
8. Use Table 4-4 and repeat steps 5 and 6 to check the rest of the remaining frequency spans.
9. Disconnect the Time Mark Generator from the RF INPUT.

**Table 4-4: Front Panel Span Accuracy Settings**

Time Markers	Center Frequency	Span/Div	Resolution Bandwidth	Specification Range
10 ns	500 MHz	100 MHz	300 kHz	776-824 MHz
20 ns	250 MHz	50 MHz	300 kHz	388-412 MHz
50 ns	100 MHz	20 MHz	300 kHz	155.2-164.8 MHz
0.1 $\mu$ s	50 MHz	10 MHz	30 kHz	77.6-82.4 MHz
0.2 $\mu$ s	25 MHz	5 MHz	30 kHz	38.8-41.2 MHz
0.5 $\mu$ s	10 MHz	2 MHz	30 kHz	15.52-16.48 MHz
1 $\mu$ s	5 MHz	1 MHz	30 kHz	7.76-8.24 MHz
2 $\mu$ s	2.5 MHz	500 kHz	30 kHz	3.88-4.12 MHz
5 $\mu$ s	1 MHz	200 kHz	3 kHz	1.552-1.648 MHz
10 $\mu$ s	500 kHz	100 kHz	3 kHz	776-824 kHz
20 $\mu$ s	250 kHz	50 kHz	3 kHz	388-412 kHz
50 $\mu$ s	125 kHz	20 kHz	3 kHz	155.2-164.8 kHz
0.1 ms	62.5 kHz	10 kHz	3 kHz	77.6-82.4 kHz
0.2 ms	25 kHz	5 kHz	300 Hz	38.8-41.2 kHz
0.5 ms	25 kHz	2 kHz	300 Hz	15.52-16.48 kHz
1.0 ms	25 kHz	1 kHz	300 Hz	7.76-8.24 kHz

**Flatness**

Performance requirement is  $\pm 2.0$  dB with 10 dB of RF ATTENUATION referenced to 100 MHz.

1. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-20 dBm
SPAN/DIV	MAX
VERTICAL SCALE	1 dB/

2. Connect the output of the sweep oscillator as follows:

- Option 50 instruments - Connect the output to the input of the spectrum analyzer.
- All instruments except Option 50 - Connect the output through the precision min-loss pad to the input of the spectrum analyzer.

3. Set the frequency of the sweep oscillator to 100 MHz, adjust the amplitude for 5 divisions of signal. The sweep rate should be on its slowest setting.
4. Press **A** to enable the Display A register. Start the sweep on the sweep oscillator and press **MAX HOLD A B** on the 2715.



5. When the sweep oscillator has finished its sweep, press **MKR/Δ/OFF** to activate the marker.
6. Press **MKR/Δ/OFF** again to activate the delta marker and tune it to the highest and lowest points on the response curve. Note the amplitude at both markers.
7. Check the delta marker amplitudes as follows:
  - All instruments except Option 50 and Option 75 - not to exceed  $\pm 2$  dB.
  - Option 50 and Option 75 instruments - not to exceed  $\pm 2$  dB from 9 KHz to 1.8 GHz, not to exceed  $\pm 3$  dB from 1.8 GHz to 2.15 GHz.

### Marker Operation

Verify proper marker operation with the following procedure:

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	500 MHz
REFERENCE LEVEL	-10 dBm
SPAN/DIV	100 MHz
RESOLUTION BW	300 kHz
VID FLTR	On
VERTICAL SCALE	10 dB/
3. Enable the calibrator by pressing **INPUT 9**. The instrument should display a series of 100 MHz marks of varying amplitudes.
4. Press **PEAK FIND**. The marker should go to the highest signal, and the readout should display that signal's frequency and amplitude. Frequency and amplitude readouts are preceded by the letter M.
5. Press **MKR [▶]** and note that the marker moves to the next signal to the right and the readouts are updated. Continue pressing **MKR** and observe the marker position and readouts. The marker will only recognize those signals whose amplitude is above a preset or default threshold level, and will not recognize apparent signals  $\leq 0$  Hz. The threshold level is set via **MKR/FREQ 0**.
6. Repeat step 5 using the **MKR [◀]** button.
7. Press **MKR/Δ/OFF** once. The readouts should now be preceded by the letter D and should read 0.
8. Tune the **FREQ/MKRS** control and note that a second marker appears. The marker readout should now display frequency and amplitude differences between the two markers.

9. Use the following procedure to check Center Measure/Counter Resolution Counter Resolution selectable. Performance requirement is 1 Hz or 1 kHz

a. Recall default power up settings by pressing **UTIL 1 1**. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-20 dBm
SPAN/DIV	100 kHz
RESOLUTION BW	AUTO
VID FLTR	Off
VERTICAL SCALE	5 dB/

b. Enable the calibrator by pressing **INPUT 9**.

c. Tune the signal approximately three divisions to one side of the center of the screen.

d. Select a counter resolution of 1 Hz by pressing **MKR/FREQ 9 1 1**. Press **CTR-MEAS/TRKG**.

e. Check that the signal is moved to center screen, frequency and amplitude readouts are preceded by the letter C, and the frequency readout is displayed to six decimal places.

f. Select a readout resolution of 1 kHz, and press **CTR-MEAS/TRKG**.

g. Check that the signal frequency readout is displayed to three decimal places.

### Display Dynamic Range Accuracy

Performance requirements are:

10 dB/:  $\pm 1.0$  dB/10 dB to a maximum cumulative error of  $\pm 2.0$  dB over the 70 dB range and a maximum cumulative error of  $\pm 4.0$  dB over the 80 dB range

5 dB/:  $\pm 1.0$  dB/10 dB to a maximum cumulative error of  $\pm 2.0$  dB over the 40 dB range

1 dB/: +1 dB maximum error over the 8 dB range

Linear:  $\pm 5\%$  of full scale

■ Test equipment required:

Signal Generator  
10 dB and 1 dB Step Attenuators

1. Recall default power up settings by pressing **UTIL 1 1**. Select the following settings on the Spectrum Analyzer:

FREQUENCY	110 MHz
REFERENCE LEVEL	-20 dBm
SPAN/DIV	1 kHz
RESOLUTION BW	AUTO
VID FLTR	On
VERTICAL SCALE	1 dB/
MARKER	On

2. Connect a 110 MHz signal to the RF INPUT through the 10 dB and 1 dB step attenuators.
3. Set the attenuators for 0 dB attenuation, set the amplitude of the input signal for full screen deflection, and press **PEAK FIND**.
4. Change the Vertical Scale to 10dB/ and increase the attenuation to 10 dB. Check that the Marker readout changes by 10 dB  $\pm$ 1 dB.
5. Continue to increase the attenuation in 10 dB steps to a total attenuation of 80 dB (See *Note* below) while checking that the Marker readout changes 10 dB  $\pm$ 1 dB for each 10 dB change in attenuation.

Check also that the cumulative error does not exceed  $\pm$ 2 dB over the 70 dB range and the total error (80 dB) does not exceed  $\pm$ 4 dB.

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**NOTE.** In 10 dB/Div the noise floor limits the signal range that can be resolved. As the Resolution Bandwidth is decreased, higher resolution is possible. Table 4-5 indicates this limit for each RES BW setting. Refer to step 14 on page 4-12

When making this check, press **PEAK FIND** as necessary, to keep the marker at the top of the signal.

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**Table 4-5: Maximum Range in 10 dB/Div**

RES BW	dB Down From Top of Screen
5 MHz	40 dB
1 MHz	40 dB
300 kHz	50 dB
100 kHz	50 dB
30 kHz	60 dB
10 kHz	60 dB
3 kHz	80 dB
1 kHz	80 dB
300 Hz	80 dB

6. Set the Vertical Scale to 5 dB/.
7. Set the attenuators for 0 dB and adjust the signal generator amplitude for full screen display.
8. Increase the attenuation 5 dB and check that the Marker readout changes 5 dB  $\pm$ 1 dB.
9. Continue to increase the attenuation in 5 dB steps to a total attenuation of 40 dB while checking the Marker readout for a change of 5 dB  $\pm$ 1 dB.  
  
Check that the Marker readout change for each 10 dB change does not exceed  $\pm$ 1 dB or that the cumulative error does not exceed  $\pm$ 2 dB over the 40 dB range.
10. Set the Vertical Scale to 1 dB/.
11. Set the attenuators for 0 dB and adjust the signal generator amplitude for full screen display.
12. Increase the attenuation 1 dB and check that the Marker readout changes 1 dB  $\pm$ 1 dB.
13. Continue to increase the attenuation in 1 dB steps to a total attenuation of 8 dB while checking the Marker readout for a change of 1 dB  $\pm$ 1 dB at each step. The specification is  $\pm$ 1 dB per step over the 8 dB range.
14. Set the Resolution Bandwidth and Span/Div as indicated in Table 4-6 and repeat steps 3 through 13 for each Resolution Bandwidth filter.

**Table 4-6: Resolution Bandwidth Filter Display Dynamic Range Settings**

RES BW	SPAN/DIV
300 Hz	1 kHz
1 kHz	5 kHz
3 kHz	10 kHz
10 kHz	50 kHz
30 kHz	100 kHz
100 kHz	500 kHz
300 kHz	1 MHz
1 MHz	10 MHz
5 MHz	20 MHz

15. After completing the above procedure, disconnect the signal generator from the RF INPUT.

**Sensitivity** Check Sensitivity as specified in Table 4-7.

1. Recall default power up settings by pressing **UTIL 1 1**. Select the following settings on the Spectrum Analyzer:

FREQUENCY	110 MHz
REFERENCE LEVEL	-50 dBm
SPAN/DIV	5 MHz
RESOLUTION BW	5 MHz
VERTICAL SCALE	10 dB/

2. Set the VIDEO FILTER to 10 Hz by pressing **UTIL 2 5 1**.
3. Enable peak detection mode by pressing **DSPL 4**.
4. Connect a 110 MHz, -85 dBm signal to the RF INPUT.
5. After one sweep, press **MKR/Δ/OFF** to enable the marker. Tune the marker away from the signal and onto the noise. Press **MKR/Δ/OFF** to enable a second marker (the delta marker) and position the delta marker on the signal peak. It may be necessary to reposition the delta marker if the signal is drifting.
6. Check that the indicated delta amplitude is  $\geq 2.1$  dB.

**Table 4-7: Sensitivity Settings at 110 MHz**

Span	Res BW	Ref Level	RF INPUT Level, Preamp OFF	RF INPUT Level, Preamp ON
5 MHz	5 MHz	-50 dBm	-85 dBm	-97 dBm
1 MHz	1 MHz	-50 dBm	-92 dBm	-104 dBm
200 kHz	300 kHz	-50 dBm	-97 dBm	-109 dBm
100 kHz	100 kHz	-60 dBm	-102 dBm	-114 dBm
50 kHz	30 kHz	-70 dBm	-107 dBm	-119 dBm
20 kHz	10 kHz	-70 dBm	-112 dBm	-124 dBm
10 kHz	3 kHz	-70 dBm	-117 dBm	-129 dBm
10 kHz	1 kHz	-70 dBm	-122 dBm	-134 dBm
1 kHz	300 Hz	-70 dBm	-127 dBm	-139 dBm

7. Enable the preamplifier by pressing **INPUT MENU 1 (PREAMP)**, and reset the input signal amplitude to -97 dBm.
8. Check that the readout shows the difference amplitude to be  $\geq 2.1$  dB.

9. Using Table 4-7, check the rest of the filters with and without the preamp enabled. If necessary, use an external attenuator to reach a -139 dBm setting.

**Sensitivity at 1.8 GHz**

Check with Preamp OFF as specified in Table 4-8.

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:

FREQUENCY	1800 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	ZERO SPAN
RESOLUTION BW	5 MHz
VERTICAL SCALE	10 dB/

3. Set the VIDEO FILTER to 10 Hz by pressing **UTIL 2 5 1**.
4. Make sure that the preamplifier is disabled (INPUT 1).
5. Check that the noise floor is  $\leq -77$  dBm.
6. Check sensitivity as specified in Table 4-8 for the remaining bandpass filters.

**Table 4-8: Sensitivity Settings at 1800 MHz**

Res BW	Ref Level	Sensitivity
5 MHz	-30 dBm	-77 dBm
1 MHz	-30 dBm	-84 dBm
300 kHz	-30 dBm	-89 dBm
100 kHz	-40 dBm	-94 dBm
30 kHz	-50 dBm	-99 dBm
10 kHz	-50 dBm	-104 dBm
3 kHz	-60 dBm	-109 dBm
1 kHz	-60 dBm	-114 dBm
300 Hz	-70 dBm	-119 dBm

**Sensitivity at 2.15 GHz  
(Option 50 and Option 75)**

Check with Preamp OFF as specified in Table 4-9.

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:

FREQUENCY	2.15 GHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	ZERO SPAN
RESOLUTION BW	5 MHz
VERTICAL SCALE	10 dB/

3. Set the VIDEO FILTER to 10 Hz by pressing **UTIL 2 5 1**.
4. Make sure that the preamplifier is disabled (INPUT 1).
5. Check that the noise floor is  $\leq -77$  dBm.
6. Check sensitivity as specified in Table 4-9 for the remaining bandpass filters.

**Table 4-9: Sensitivity Settings at 2.15 GHz**

Res BW	Ref Level	Sensitivity
5 MHz	-30 dBm	-75 dBm
1 MHz	-30 dBm	-82 dBm
300 kHz	-30 dBm	-87 dBm
100 kHz	-40 dBm	-92 dBm
30 kHz	-50 dBm	-97 dBm
10 kHz	-50 dBm	-102 dBm
3 kHz	-60 dBm	-107 dBm
1 kHz	-60 dBm	-112 dBm
300 Hz	-70 dBm	-117 dBm

**Spurious Responses**

Performance requirement is  $\leq -100$  dBm (except at 1780 MHz where the specification is  $\leq -90$  dBm).

1. Recall default power up settings by pressing **UTIL 1 1**.

2. Select the following settings on the Spectrum Analyzer:

REFERENCE LEVEL	-40 dBm
SPAN/DIV	1 MHz
RESOLUTION BW	30 kHz
VIDEO FILTER	On
VERTICAL SCALE	10 dB/
ACQUISITION MODE	PEAK

3. Set the threshold level at -105 dBm by pressing **MKR/FREQ 0** and entering -105 dBm.
4. Select the CRT as the output device by pressing **UTIL 4 2 0**. Press any menu button to exit the menu.
5. Start the spur search routine as follows:
  - Option 50 and Option 75 instruments - press **APPL 3, 1**  
Set the stop freq to 2.15 Ghz
  - All instruments except Option 50 and Option 75 - press **APPL 3 2**.
6. When the spur search routine is done, display the results by pressing **APPL 3 3**. Make a note of the listed spur frequencies.
7. Manually check that the amplitude of any listed spur is as follows (Disregard the response at 0 Hz):
  - All instruments except Option 50 and Option 75 -  $\leq -100$  dBm (except at 1780 MHz where the specification is  $\leq -90$  dBm).
  - Option 50 and Option 75 instruments -  $\leq -75$  dBm at 2.0 GHz.



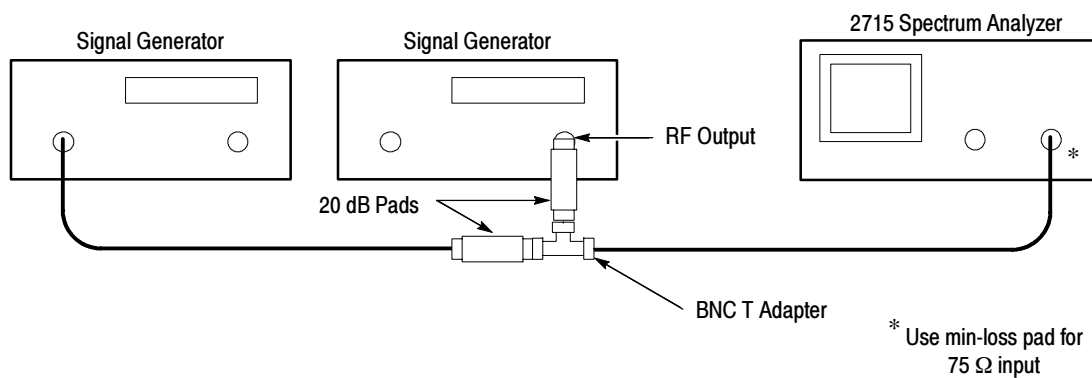
**Intermodulation Products (IM)**

3rd Order IM performance requirement is  $\leq 70$  dBc.

■ Test equipment required:

Signal Generators (2)  
20 dB Pads (2)  
BNC T Adapter

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Connect the test equipment as shown in Figure 4-1.



**Figure 4-1: 3rd Order IM Test Setup (25 MHz Separation)**

3. Select the following settings on the Spectrum Analyzer:

FREQUENCY	200 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	10 MHz
RESOLUTION BW	30 kHz
VERTICAL SCALE	1 dB/

4. Set the VIDEO FILTER to 3 kHz by pressing **UTIL 2 5 1**.
5. Set the first generator for a 200 MHz, full screen signal.
6. Set the second generator for a 225 MHz, full screen signal.
7. Reset the VERTICAL SCALE to 10 dB.
8. Check that the 3rd Order IM product is  $\leq -70$  dBc.
9. Reset the VERTICAL SCALE to 1 dB and FREQ SPAN/DIV to 500 kHz.
10. Reset the second generator output frequency for a 201 MHz, full screen signal.

11. Reset the VERTICAL SCALE to 10 dB/.
12. Check that the 3rd Order IM products are  $\leq -70$  dBc.
13. Disconnect the test equipment from the RF INPUT.

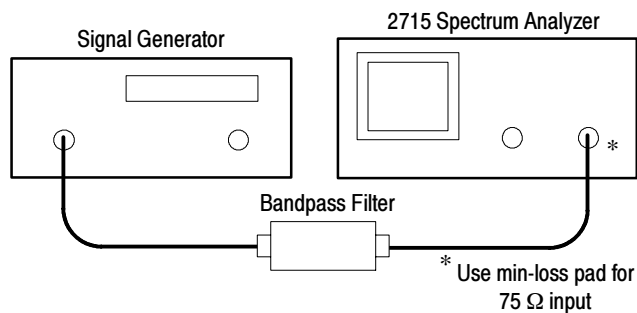
### Harmonic Distortion

2nd harmonic distortion performance requirement is  $\leq -66$  dBc.

- Test equipment required:

Signal Generator  
Bandpass Filter

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Connect the test equipment as shown in Figure 4-2.



**Figure 4-2: Harmonic Distortion Test Equipment Setup**

3. Select the following settings on the Spectrum Analyzer:

REFERENCE LEVEL	-40 dBm
SPAN/DIV	100 kHz
RESOLUTION BW	AUTO
VID FLTR	On
VERTICAL SCALE	10 dB/

4. Set the signal generator output frequency and the Spectrum Analyzer center frequency to the frequency of the bandpass filter.
5. Set the signal generator output amplitude for a full screen signal.
6. Reset the Spectrum Analyzer center frequency to twice the input frequency.
7. Check that the 2nd harmonic is  $\leq -66$  dBc.
8. Disconnect the test equipment from the RF INPUT.

**0 Hz Response Amplitude**

Performance requirement is  $\leq -10$  dBm.

- Test equipment required:

Signal Generator

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	200 kHz
RESOLUTION BW	300 kHz
VID FLTR	On

3. Connect a 100 MHz, -10 dBm signal to the RF INPUT.
4. Press **SAVE ENABLE A** to store the reference signal in the A DISPLAY STORAGE register, then enable the A display by pressing **A**.
5. Reset the FREQUENCY to 0 Hz.
6. Check that the 0 Hz spur skirts are equal to or narrower than those of the stored signal.
7. Disconnect the test equipment from the RF INPUT.

**Local Oscillator (LO)  
Emission**

Performance requirement is  $\leq -70$  dBm.

- Test equipment required:

Test Spectrum Analyzer

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:

REFERENCE LEVEL	-30 dBm
SPAN/DIV	MAX

3. Enable manual scan by pressing **SWP/TRIG 7**.
4. Monitor the RF INPUT with the test spectrum analyzer. Set the test spectrum analyzer controls to monitor the 2 GHz to 4 GHz frequency range.
5. Tune the manual scan control from full counterclockwise to fully clockwise while viewing the display.
6. Check that any signal that appears on the test spectrum analyzer as the manual scan control is tuned is  $\leq -70$  dBm.
7. Disconnect the Spectrum Analyzer from the RF INPUT.

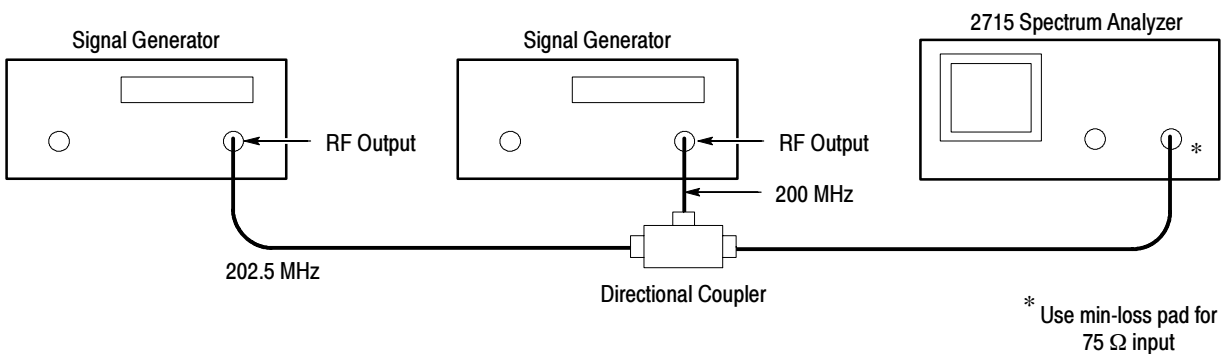
**1 dB Compression Point**

Performance requirement is  $\geq -15$  dBm.

■ Test equipment required:

- 2 Signal Generators
- Combiner
- 3 SMA Male to BNC Female Adapters for Combiner

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Connect the test equipment as shown in Figure 4-3.



**Figure 4-3: 1 dB Compression Point Test Setup**

3. Select the following settings on the Spectrum Analyzer:

FREQUENCY	200 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	10 kHz
RESOLUTION BW	30 kHz
VID FLTR	On
VERTICAL SCALE	1 dB/

4. Enable PEAK ACQUISITION mode by pressing **DSPL 4**.
5. Set one signal generator's controls for a full screen, 200 MHz signal.
6. Set the second signal generator's controls for a full screen, 202.5 MHz signal.
7. Increase the output amplitude of the second signal generator until the 200 MHz signal on the CRT drops 1 dB.
8. Check that the second signal generator output is  $\geq -15$  dBm.
9. Disconnect the test equipment from the RF INPUT.

**J103 Accessory  
Connector**

Performance requirements are:

Pin 5: Video Out, Pin 2: Sweep Gate, Pin 4: Sweep Output

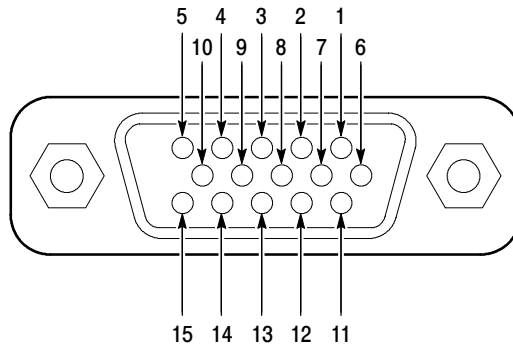
- Test equipment required:

Test Oscilloscope

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	1 MHz
RESOLUTION BW	AUTO
VID FLTR	Off
VERTICAL SCALE	10 dB/
DISPLAY STORAGE	OFF

3. Enable the calibrator by pressing **INPUT 9**.
4. Disable frequency corrections by pressing **UTIL 4 3 5**.
5. Monitor Pin 5 of J103 (Figure 4-4) with the test oscilloscope. Set the test oscilloscope sweep rate to 10 ms/div and Volts/div to 0.5.



**Figure 4-4: Accessory Connector (J103)**

Pin	Signal
1	External Video Input
2	Sweep Gate
3	Chassis/Signal Ground
4	Sweep Ramp
5	Video Out
6	CLK0 Input
7	DATAI Output
8	DATAO Input
9	$\sim$ DOLATCH Input
10	26.38 MHz Output
11	VLVL Input
12	SWPSLOPE Input
13	Not Used
14	Not Used
15	Not Used

6. Check for a 0 V to 1.6 V inverted version of the Spectrum Analyzer display.
7. Monitor pin 2 of J103 (Figure 4-4) with the test oscilloscope. Set the test oscilloscope sweep rate to 1 ms/div and Volts/div to 2.
8. Press **ZERO SPAN**, then press **SWEEP** ↓ until the readout reads 1MS/.
9. Check for an  $\approx$ 5 V square wave (Sweep Gate).
10. Monitor pin 4 of J103 (Figure 4-4) with the test oscilloscope. Set the test oscilloscope Volts/div to 0.5.
11. Check for a negative going ramp approximately +1.3 V to -1.3 V.
12. Recall default power up settings by pressing **UTIL 1 1**.
13. Connect a 15 Hz, 2 Vp-p, and 0 VDC square wave to pin 1 of J103.
14. Check that the noise on the display is clamped to the bottom of the screen approximately every half a division. The display will not be triggered.
15. Disconnect the test oscilloscope from J103.

**Sweep Rate and Accuracy**

Performance requirement is 10% over the center eight divisions.

- Test equipment required:

Time Mark Generator

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Connect the Time Mark Generator to the RF INPUT.
3. Connect the Time Mark Generator Trigger Output to J102, (EXT TRIG) on the rear panel of the Spectrum Analyzer.
4. Enable external triggering by pressing **SWP/TRIG 2**.
5. Set the Time Mark Generator controls for 50 ms time marks, and turn off the Spectrum Analyzer video filter.
6. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	10 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	ZERO
RESOLUTION BW	300 kHz
7. It may be necessary to set the Horizontal position potentiometer on the rear panel to align the marks with the graticule. Be sure to return the potentiometer to its original position when done.
8. Check the accuracy of the 2 s to 1 ms sweep timing range by applying appropriate markers for each sweep setting. The error should not exceed  $\pm 4$  minor divisions measured over the center 8 divisions.
9. Turn off the DISPLAY STORAGE for the 50  $\mu$ s and faster sweep settings and reset RESOLUTION BW to 5 MHz.
10. Disconnect the Time Mark Generator from the RF INPUT.

**Triggering**

Performance requirements are:

Internal: 1 division or more of signal

External: 1.0 V peak minimum.

- Test equipment required:

Function Generator

1. Recall default power up settings by pressing **UTIL 1 1**.

2. Select the following settings on the Spectrum Analyzer:

VERTICAL SCALE	10 dB/
DISPLAY STORAGE	Off
SWEEP RATE	1 ms/DIV

3. Enable external video by pressing **DSPL 7**. The Spectrum Analyzer automatically selects ZERO SPAN.
4. Connect a 100 kHz square wave signal to Pin 1 of J103 on the rear panel of the Spectrum Analyzer. See Figure 4-4.
5. Set the Function Generator output for 1 division or less of signal at the top of the screen. Use an external attenuator if necessary.
6. Enable internal triggering by pressing **SWP/TRIG 1**.
7. Check that the trigger LEVEL control can be set for a triggered display.
8. Using another cable and T Adapter, connect the same square wave source to the EXT TRIG input (J102) on the Spectrum Analyzer rear panel.
9. Set the generator controls for a 15 Hz, 2 Vp-p signal.
10. Enable external triggering by pressing **SWP/TRIG 2**.
11. Press **SWEEP ↑** until the readout reads 10MS/.
12. Check that the trigger LEVEL control can be set for a triggered display.
13. Remove the cable from the EXT TRIG input.
14. Enable line triggering by pressing **SWP/TRIG 3**.
15. Check that the trigger LEVEL control can be set for a visible display. The display will not be stable.
16. Disconnect the Function Generator from the RF INPUT.

### Internal Calibrator

Performance requirement is  $-30 \text{ dBm} \pm 0.3 \text{ dB}$  at  $100 \text{ MHz} \pm 2 \text{ kHz}$ .

- Test equipment required:

- Min loss attenuator, 50 - 75  $\Omega$
- Signal Generator
- Frequency Counter
- Power Meter with High Sensitivity Sensor

1. Recall default power up settings by pressing **UTIL 1 1**.



2. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-29 dBm
SPAN/DIV	1 kHz
RESOLUTION BW	AUTO
VID FLTR	On
VERTICAL SCALE	1 dB/div

3. Enable the internal calibrator signal by pressing **INPUT 9**.
4. Enable PEAK ACQUISITION MODE by pressing **DSPL 4**.
5. Press **SAVE ENABLE A** to store the internal signal.
6. Disable the internal calibrator signal by pressing **INPUT 9**.
7. All instruments except Option 50:
  - a. Connect the power meter (with high sensitivity sensor) through a 50 - 75  $\Omega$  min loss pad to the output of the signal generator.
  - b. Set the generator to 100 MHz and set the amplitude to -30.2 dBm on the power meter.
  - c. Connect the 100 MHz -30.2 dBm external signal to the RF INPUT of the 2715. Do not remove the min loss pad.
8. Option 50 instruments:
  - a. Connect the power meter (with high sensitivity sensor) to the output of the signal generator.
  - b. Set the generator to 100 MHz and set the amplitude to -30.0 dBm on the power meter.
  - c. Connect the 100 MHz -30.0 dBm external signal to the RF INPUT of the 2715.
9. Press **A** to display the saved internal signal and compare it to the active external signal.
10. Check that the signals are within  $\pm 2$  divisions of each other in frequency and  $\pm 1.5$  minor divisions in amplitude.
11. Discard the stored signal by pressing **SAVE ENABLE A**, and disconnect the Signal Generator from the RF INPUT.

### **AM and FM Audio Detectors**

Verify the proper operation of the AM and FM Audio Detectors with the following procedure.

■ Test equipment required:

Antenna  
Headphones

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Connect the Antenna to the RF INPUT.
3. Select the following settings on the Spectrum Analyzer:

SPAN/DIV	2 MHz
RESOLUTION BW	AUTO
4. Tune the Spectrum Analyzer FREQUENCY to a local FM station.
5. Set the REFERENCE LEVEL for a full screen signal.
6. Push ZERO SPAN.
7. Select the FM DEMODULATOR by pressing **DEMOD 2**.
8. Set the LEVEL control for a comfortable listening volume.
9. Plug the headphones into the external speaker jack on the right front side of the Spectrum Analyzer.
10. Check that the speaker shuts off and audio is redirected to the headphones.
11. Tune the Spectrum Analyzer FREQUENCY to an AM station.
12. Select the AM DEMODULATOR by pressing **DEMOD 1**.
13. Check that the LEVEL control does in fact control the AM audio level.
14. Disconnect the antenna from the RF INPUT and the headphones from the external speaker jack.

### **Residual FM**

Performance requirements are:

$\leq 2$  kHz total excursion in 20 ms not phase locked  
 $\leq 100$  Hz total excursion in 20 ms phase locked

This check requires a one hour warm up period.

1. Recall default power up settings by pressing **UTIL 1 1**.

2. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	10 kHz
RESOLUTION B	3 kHz
VID FILTR	Off
VERTICAL SCALE	10 dB/div
SWEEP	AUTO

3. Enable the calibrator by pressing **INPUT 9**.
4. Disable phase lock by pressing **UTIL 4 3 4**.
5. Enable **SINGLE SWEEP**.
6. Enable a marker by pressing **MKR/Δ/OFF**, and tune the marker one division down from the top of the screen on the falling slope of the calibrator signal.
7. Enable a second marker (Delta Marker) by pressing **MKR/Δ/OFF**, and tune the marker three divisions down from the top of the screen on the falling slope of the calibrator signal.
8. Divide the Delta Frequency readout (upper right readout) by 2. The ratio of the frequency delta to 2 divisions then is the vertical scale factor for this measurement in **ZERO SPAN**.
9. Disable the markers by pressing **MKR/Δ/OFF**, then press **AUTO SWEEP**.
10. Tune the center frequency control to position the trace 2 divisions down from the top of the screen.
11. Activate **ZERO SPAN**, and reset Time/div to 2 ms by pressing **SWEEP ↓** until the readout indicates 2MS/.
12. Check that the signal does not move more than  $\pm 2$  kHz according to the vertical scale factor established in step 8.
13. Enable phase lock by pressing **UTIL 4 3 4**.
14. Reset the following parameters:

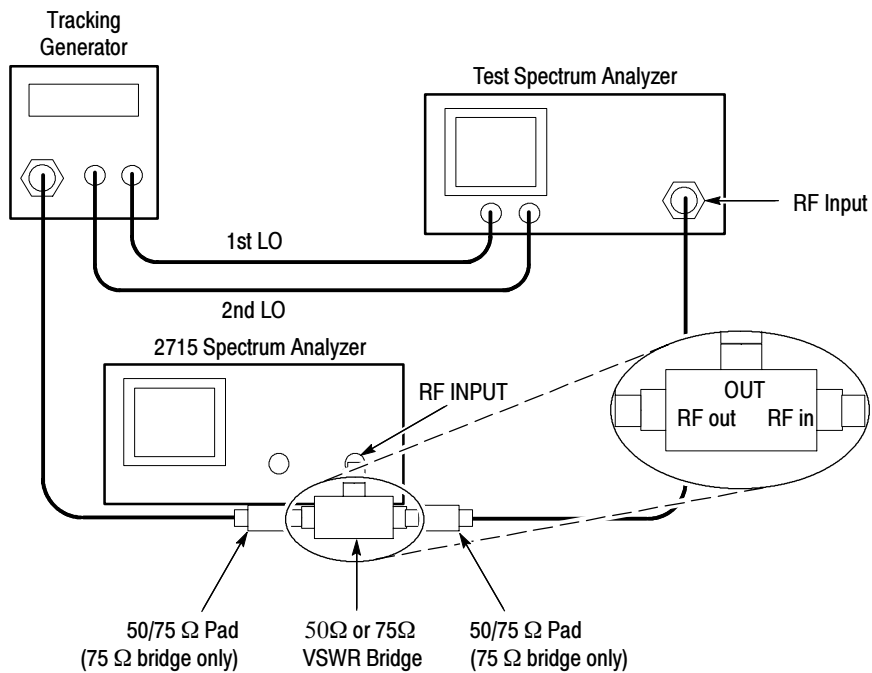
SPAN/DIV	1 kHz
RESOLUTION BW	300 Hz
15. Repeat steps 6 through 12.
16. Check that the signal does not move more than  $\pm 100$  Hz according to the vertical scale factor established in step 8.

**VSWR** Performance requirement is 1.5:1 or better.

Test equipment required:

- All instruments except Option 50 - 75  $\Omega$  VSWR Bridge with 50 - 75  $\Omega$  matching pad on RF in and RF out Test Spectrum Analyzer with Tracking Generator
- Option 50 instruments - 50  $\Omega$  VSWR Bridge. No matching pad on RF in and RF out Test Spectrum Analyzer with Tracking Generator

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Connect the test equipment as shown in Figure 4-5. Do not connect the VSWR Bridge to the Spectrum Analyzer.



**Figure 4-5: Test Equipment Setup for Checking Return Loss**

3. Select the following settings on the test spectrum analyzer:

Reference Level	0 dBm
Span/div	Max Span
Vertical Scale	10 dB/div

4. Set the Tracking Generator output level at 0 dBm.

5. Press **B-Save A** on the test spectrum analyzer. A straight line will be at midscreen. This is the reference trace.
6. Connect the VSWR Bridge to the RF INPUT and set the REFERENCE LEVEL to -20 dBm.
7. A frequency response waveform will be displayed on the Test Spectrum Analyzer.
8. Check that this waveform is  $\geq 1.5$  divisions down from the reference trace across the entire band.

**Signal Track**

Use the following procedure to verify operation of the Signal Track feature.

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHZ
REFERENCE LEVEL	-20 dBm
SPAN/DIV	100 kHz
RESOLUTION BW	AUTO
VID FLTR	Off
VERTICAL SCALE	5 dB/
3. Enable the calibrator by pressing **INPUT 9**.
4. Press **CTR-MEAS/TRKG** twice.
5. Check that the letters TRKG appear at center screen.
6. Tune the signal away from the center of the screen.
7. Check that the signal returns to the center of the screen.

**GPIB Operation  
(Option 03)**

If applicable to your 2715, use the following procedure to verify operation of the GPIB port.

■ Test equipment required:

IBM PC/AT or Compatible, Hard Disk highly recommended  
DOS Operating System  
Microsoft QuickBASIC Programming Language  
Tek GURU II GPIB Interface Package, Tektronix PN S3FG100  
GPIB Interconnect Cable, Tektronix PN 012-0991-01  
*2714 & 2715 Spectrum Analyzer Programmer Manual*, Tektronix PN 070-8533-XX

Refer to *Section 1: Introduction to Programming* of the *2714 & 2715 Spectrum Analyzer Programmer Manual* for all instructions for verifying the operation of the GPIB Interface. Included in the manual are several program listings that can be used to exercise the instrument.

**RS-232 Port  
(Option 08)**

If applicable to your 2715, use the following procedure to verify operation of the RS-232 port.

■ Test equipment required:

IBM PC/AT or Compatible  
GPIB Interconnect Cable, Tektronix PN 012-0991-01

1. Connect the computer to J104 on the Spectrum Analyzer rear panel and run the terminal program.
2. Enable the RS-232 Communications Port by pressing **UTIL 4 0 2 0**.
3. Enable the MAIN PORT INPUT TEST by pressing **BKSP** three times then **5 6 2 4**.
4. Any character typed on the keyboard will show up next to the RX: readout on the Spectrum Analyzer screen.
5. Press **5** and the Spectrum Analyzer will print out a message on the computer screen of what is displayed on the screen.

**Video Monitor Mode and TV Line Trigger**

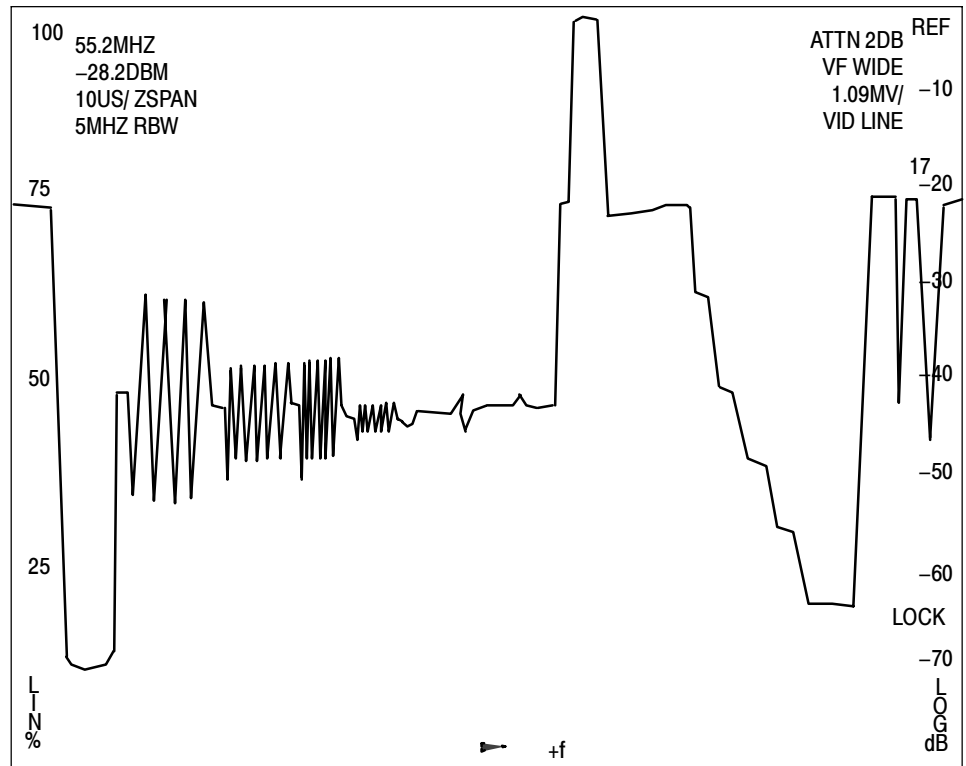
Use the following procedure to verify operation of the Video Monitor and TV Line Trigger features.

1. Recall default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	1038.4 MHz
REFERENCE LEVEL	-60 dBm
SPAN/DIV	2 MHz
RESOLUTION BW	AUTO
3. Enable the preamp by pressing **INPUT 1**.
4. Connect a satellite feed to the RF INPUT.
5. Enable SATELLITE VIDEO DETECT MODE by pressing **DEMOD 9 0**.
6. Enable SATELLITE VIDEO by pressing **BKSP 3**.
7. Check that the front panel LEVEL control can be set for a full screen picture.
8. Disconnect the satellite feed from the RF INPUT, and connect a broadcast antenna feed in its place.
9. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	Visual Carrier
REFERENCE LEVEL	-30 dBm
SPAN/DIV	100 kHz
RESOLUTION BW	5 MHz
VID FLTR	Off
VERTICAL SCALE	LIN
10. Turn off SATELLITE VIDEO by pressing **DEMOD 3**.
11. Enable BROADCAST VIDEO DETECT MODE by pressing **DEMOD 9 0**.
12. Enable BROADCAST VIDEO by pressing **BKSP 3**.
13. Set the front panel LEVEL control for a full screen picture.
14. Turn off BROADCAST VIDEO by pressing **DEMOD 3**.
15. Set the FREQ/MKRS knob function to video line selector by pressing **SWP/TRIG 9 1**. Press any menu button to exit the menu.
16. Enable ZERO SPAN and turn off DISPLAY STORAGE.

17. Use the FREQ/MKRS knob to select video line 17 (VID LINE readout indicates VID LINE 17).
18. Check that the Spectrum Analyzer displays the test waveform shown in Figure 4-6. The test signal amplitude may be different.



**Figure 4-6: Test Signal on Video Line 17**



## Video Demodulator and Gating Verification

This procedure assures the proper operation of the Video Demodulator and the gated measurement circuitry. Since this is not a Performance Requirement, typical values are used throughout the procedure.

- Test equipment required:

- PAL/NTSC Signal Generator (TSG 95)
  - CATV Modulator (TVM450)

1. Connect the TSG 95 Video Output to the TVM450 Video Input.
2. Connect the TVM450 -20 dB RF TEST Output to the 2715 RF INPUT.
3. Set the TSG 95 to produce 5-Step Grayscale and set it to the desired video format (NTSC or PAL).
4. Set the TVM450 output to Channel 4 and the RF level control full counterclockwise.

---

**NOTE.** Be sure the Offset switch on the rear panel of the TVM450 is set to OFF.

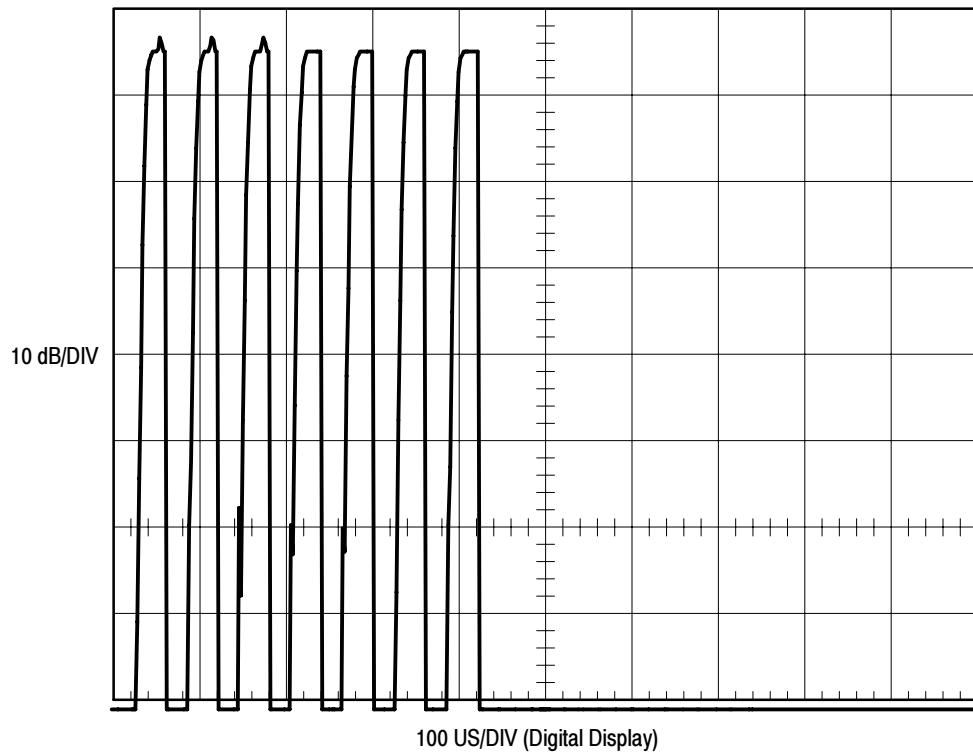
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5. Check that the VIDEO MODULATION and VIDEO/AUDIO RATIO controls on the TVM450 are both set to midrange (detent) and that the AUDIO DEVIATION control is set full counterclockwise.
6. Select the following settings on the 2715:
 

FREQUENCY	67.25 MHz
RESOLUTION BW	300 kHz
VID FLTR	OFF
DISPLAY STORAGE	D (only)
REFERENCE LEVEL	+30 dBmV
7. Press **PEAK FIND**, **CTR-MEAS/TRKG** and manually reset the center frequency to the actual counted visual carrier frequency.
8. Press **ZERO** (SPAN) and set Sweep Speed to 100  $\mu$ s/div.
9. Press **UTIL 5 2 6** to tune the video demodulator to the visual carrier.
10. Press **7** to activate the AFC. If it indicates ON, press **7** twice more to toggle it OFF then back ON.
11. Press **8** to select GATING. If it already indicates GATING, press **8** twice more to toggle it through NOR back to GATING.
12. Press any MENU key to exit the menus, and turn off the readouts. Check that the display is similar to that illustrated in Figure 4-7.

Check for the presence of the tiny pips at the top of the first peaks (first three for NTSC or first two for PAL).

Check for the absence of noise (flat baseline) between and after the peaks. (The baseline should be below the bottom graticule line.)



**Figure 4-7: Video Gating Check Waveform (NTSC Illustrated)**

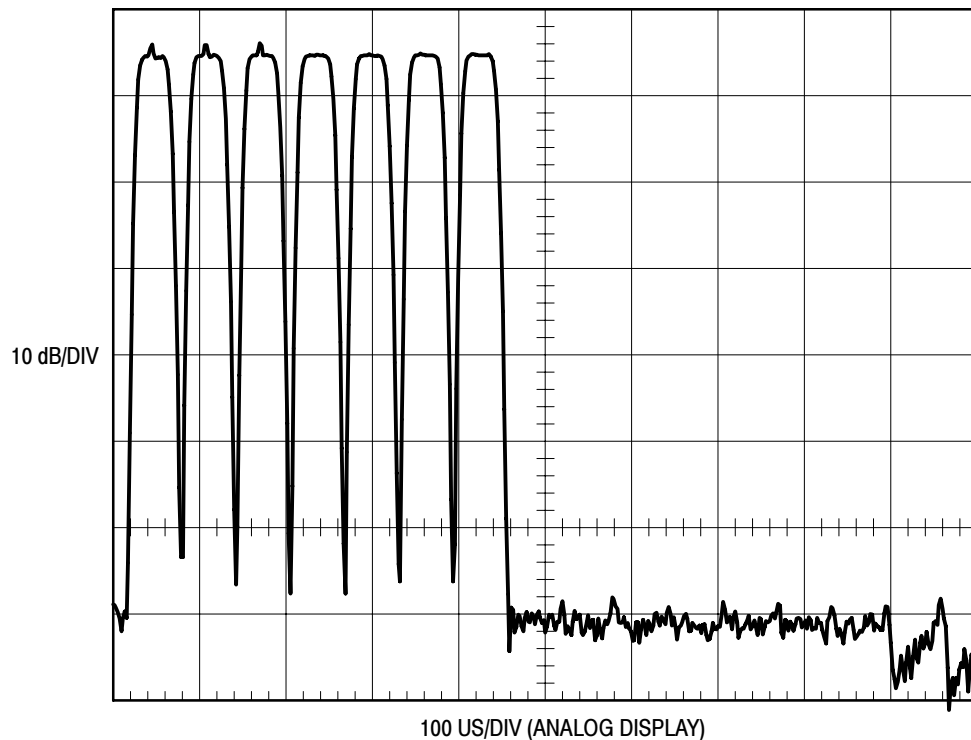
13. Turn off DISPLAY STORAGE (D).

14. Check that the display is similar to that illustrated in Figure 4-8.

Check for the presence of the tiny pips at the top of the first peaks (first three for NTSC or first two for PAL).

Check for the presence of a noisy baseline before and after the peaks.

Check that that the correct number of peaks are displayed (seven) and that they are stable (not flickering or changing location).



**Figure 4-8: IF Gating Check Waveform (NTSC Illustrated)**

15. Press **UTIL 5 2 8** to turn off gating.

### 1st LO Output Level (Option 15)

Performance requirement is  $\geq 0$  dBm.

**NOTE.** This check applies only to Spectrum Analyzers equipped with Option 15.

■ Test equipment required:

Power Meter

1. Remove the 50  $\Omega$  terminator from J101 at the Spectrum Analyzer rear panel.
2. Monitor J101 with the Power Meter.
3. Select the following settings on the Spectrum Analyzer:
 

SPAN/DIV	MAX SPAN
RESOLUTION BW	AUTO
4. Enable MANUAL SCAN by pressing **SWP/TRIG 7**.

5. Manually sweep the Spectrum Analyzer/Tracking Generator system slowly from 100 kHz to 1.8 GHz.
6. Check that the Power Meter indicates a power level of at least 0 dBm over the full span.
7. Disconnect the Power Meter from J101, and replace the 50  $\Omega$  terminator.

# Adjustment Procedures

If the instrument performance is not within tolerance for a particular characteristic, determine the cause, repair if necessary, then use the appropriate adjustment procedure to return the instrument operation to performance specification. After any adjustment, verify performance by repeating the applicable part of the *Performance Verification* procedure.

Allow the instrument to warm up for at least 15 minutes, in an ambient temperature of 20° C to 30° C before making any adjustments. Waveform illustrations in the adjustment procedure are typical and may differ from one instrument to another. These waveforms should not be construed as being representative of specification tolerances.

## Static Discharge Precautions

Static discharge can damage many semiconductor components used in this instrument.

Many semiconductor components, especially MOS types, can be damaged by static discharge. Damage may not be catastrophic and, therefore, not immediately apparent. It usually appears as a degradation of the semiconductor characteristics. Devices that are particularly susceptible are: MOS, CMOS, JFETs, and high impedance operational amplifiers (FET input stages.) The damaged parts may operate within acceptable limits over a short period, but their reliability will have been severely impaired. Damage can be significantly reduced by observing the following precautions.

- Handle static sensitive components or circuit assemblies at or on a staticfree surface. Work station areas should contain a staticfree bench cover or work plane such as conductive polyethylene sheeting and a grounding wrist strap. The work plane should be connected to earth ground.
- All test equipment, accessories, and soldering tools should be connected to earth ground.
- Minimize handling by keeping the components in their original containers until ready for use. Minimize the removal and installation of semiconductors from their circuit boards.
- Hold the IC devices by the body rather than the terminals.
- Use containers made of conductive material or filled with conductive material for storage and transportation. Avoid using ordinary plastic containers. Any static sensitive part or assembly (circuit board) that is to be returned to Tektronix, Inc. should be packaged in its original container or one with antistatic packaging material.

## Recommended Test Equipment

Table 5-1 lists test equipment and test fixtures recommended for the adjustment procedure. The characteristics specified are the minimum required for the checks. Substitute equipment must meet or exceed these characteristics.

**Table 5-1: Test Equipment**

Test Equipment	Characteristics	Recommended
High Voltage Test Probe	Voltage Range: 1 kV to 40 kV Input Resistance: 1000 M $\Omega$ Division Ratio: 1000:1	Fluke Model 80K-40 H.V. Probe
Signal Generator	10 MHz to 1 GHz frequency range -40 dBm to 10 dBm output power range; with at least 0.1 dB amplitude setting resolution	Marconi 2022C or 2022D
Signal Generator	Frequency range of 500 kHz to at least 100 MHz (CW), and capable of 80 kHz peak deviation FM at 100 MHz	HP 8642A
Sweep/Signal Generator	Output: 0 dBm to +13 dBm, Spectral Purity: 25 dB or more below the fundamental	HP 8350B with Plug in 83522A
Time Mark Generator	1 $\mu$ s markers; accuracy 0.001%	Tektronix TG 501 with TM 500 Series Power module
Test Oscilloscope	Deflection Factor: 2 mV/Div to 5 V/Div- Bandwidth: DC to 100 MHz, and X-Y display capability	Tektronix TAS485 Oscilloscope and P6138 X10 Probes
Test Spectrum Analyzer	Range 35 MHz to 150 MHz, Frequency error <10 kHz. Resolution Bandwidth 100 kHz. Compatible with tracking genera- tor.	Tektronix 2712 (or Option 04 combination)
Tracking Generator	Compatible with test spectrum analyzer	Tektronix 2707 (or 2712 Option 04 com- bination)
CATV Modulator	25 dBmV visual carrier peak output (at sync tip) on a TV channel assignment accessible to the 2715 under test.	Standard Communications Model TVM450 CATV Modulator (required for the Video Demod Adjustment Procedure)
PAL/NTSC Signal Generator		Tektronix TSG 95 Generator (required for the Video Demod Adjustment Procedure)
Digital Multimeter (DMM)	100 mV to 350 VDC	Tektronix DM 504A with TM 500 Series Power module
Power Meter	10 MHz to 1 GHz frequency range	HP 438A. HP 437B or HP 436A and HP 11708A 50 MHz 30 dB Reference Attenua- tor
50 $\Omega$ Power Sensor	10 MHz to 1 GHz frequency range -70 dBm to -20 dBm input power range	HP 8484A or HP 8481D
50 $\Omega$ Power Sensor	100 KHz to 4.2 GHz frequency range -30 dBm to +20 dBm input power range	HP 8482A

**Table 5-1: Test Equipment (Cont.)**

<b>Test Equipment</b>	<b>Characteristics</b>	<b>Recommended</b>
75 $\Omega$ Power Sensor	10 MHz to 1 GHz frequency range -30 dBm to +20 dBm input power range	HP 8483A
Single Channel Power Meter	50 $\Omega$ N male termination	Wiltron 26N50 or equivalent
10 dB and 1 dB Step Attenuators	Range : 110 dB in combination 10 dB and 1 dB steps. Accuracy: $\pm 0.1$ dB frequency range: 0 to 1.8 GHz	HP 355C and 355D, calibrated using precision standard attenuators such as Weinschel Model AS-6
Attenuator	20 dB N	Weinschel Model 2-20
Attenuator	6 dB N	Weinschel Model 2-6
Min. Loss Attenuator	50 - 75 $\Omega$	Tektronix Part No. 011-0057-01
BNC Male to SMB Female Coaxial Cable		Tektronix Part No. 012-0532-00
50 $\Omega$ BNC Male to Square Pin Female Cable		Tektronix Part No. 175-2140-00
GPIB Interface Cable(s)	2 meters long	Three GPIB Interconnecting cables, Tektronix Part No. 012-0630-01
Two Attenuators with BNC Connectors	6 dB (2X); DC to 2 GHz; 50 $\Omega$	Tektronix Part No. 011-0069-02
Terminators	75 $\Omega$ BNC female termination	Tektronix Part No. 011-0102-00
50 - 75 $\Omega$ Min Loss Pad	DC-1 GHz frequency range	Trilithic ZM-57 N female - BNC male Weinschel Model 1506A
Power Divider	DC-1 GHz frequency range	
SMA Female to Female Adapter		Tektronix Part No. 015-1012-00
Connector Adapters	75 $\Omega$ N female to BNC male	HP 1250-1534
Connector Adapter	75 $\Omega$ BNC female to BNC female	HP 1250-1287
Coaxial Cable	50 $\Omega$ N Type, 6 ft.	Tektronix Part No. 012-0114-00
Frequency Standard	100 MHz	Oscillator with an accuracy of $1 \times 10^{-9}$ (WWV Receiver in the USA)
Isolation Transformer	At least 500 VA	Stancor GIS21000
Personal Computer		Minimum of 80286 based PC (IBM PC AT or greater, or equivalent), EGA or VGA graphics card and monitor, Interface card with serial (RS-232) port, MS-DOS 3.1 or later, and a National PCIIA GPIB interface board, or compatible.
Performance Check Software		271X Flatness Tests software included with this manual

## Preparation

Remove the cabinet as follows:

1. Turn the power OFF and remove the power cord.
2. Set the instrument on its face with the front cover installed.
3. Remove the rear cover (two T15 Torx-drive screws), two (front) top and bottom feet (four T15 screws), three pan head screws from the bottom rear, and two pan head screws from the top rear of the instrument.
4. Pull the cover up and off.
5. Remove the plastic safety cover from over the Power Supply board.

After power has been applied, set instrument to CALIBRATION MODE as follows:

6. Press **CATV/APPL 8** (CATV MEASUREMENT SETUP) and **0** (EXIT CATV MEASUREMENT MODE).
7. Next press **UTIL 5** (INSTR DIAGNOSTIC/ADJUSTMENTS) and **8** (CALIBRATION MODE).

---

**NOTE.** Step 7 exits the CATV mode and places the Spectrum Analyzer in a calibration mode. Calibration mode must be used for all steps in this section.

---



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**CAUTION.** Do not attach 50  $\Omega$  connectors to the 2715 input unless you have Option 50. Using 50  $\Omega$  connectors will damage the 2715 input connector. Use the 50 - 75  $\Omega$  min loss pad (for non-Option 50 instruments) unless otherwise specified.

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## Adjustments Requiring Flatness Correction

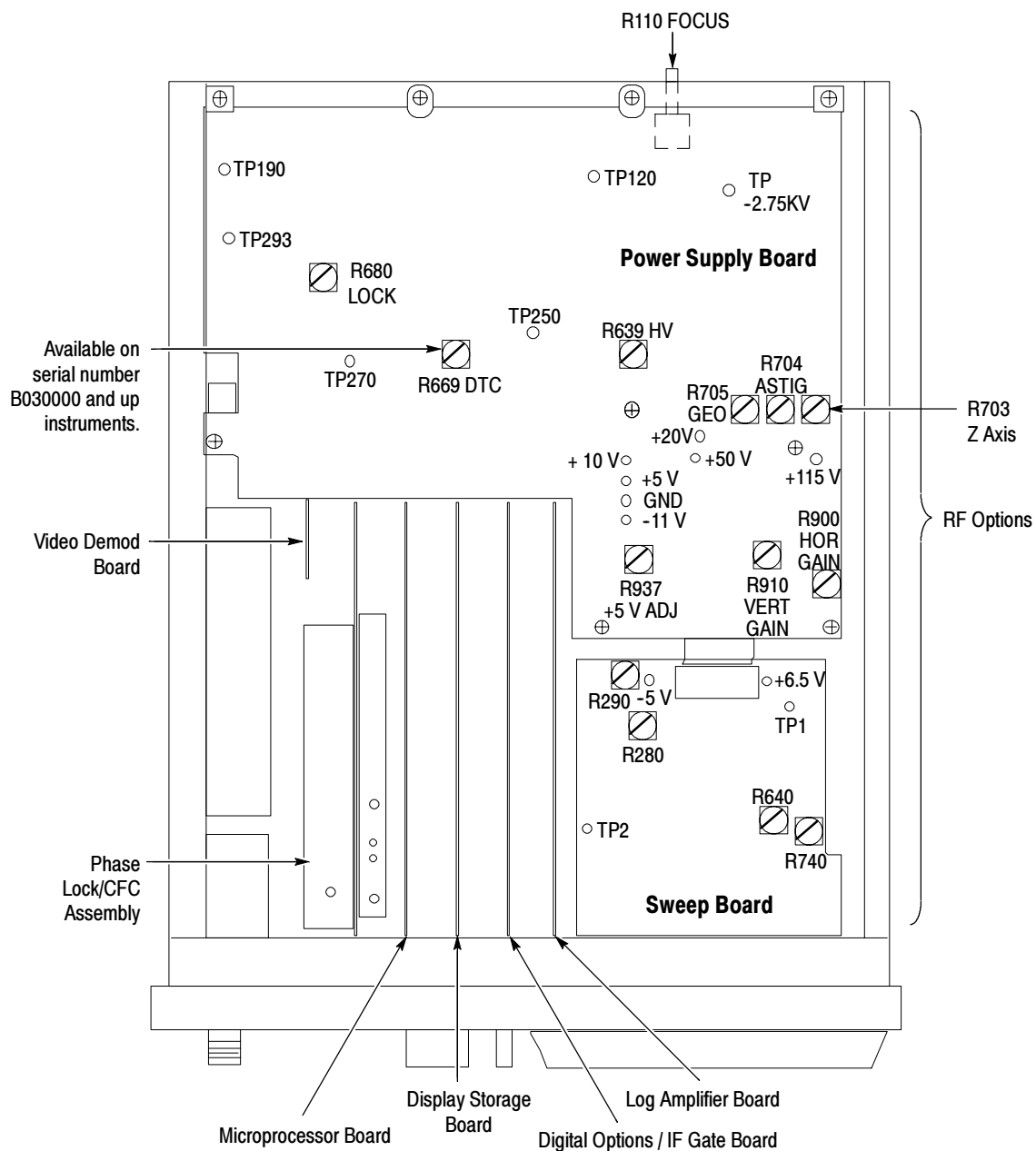
Note that changes to any of the following adjustments require completing the *Amplitude Flatness Adjustment Procedure* on Page 5-52.

- R160 or R172 on the Log Amplifier Board (A7)
- R288 on the YIG Buffer Amplifier Board (A17)



## Instrument Bottom View

The following figure calls out many of the circuit board locations. Adjustment and test point locations are shown for the power supply module and sweep board. This figure will be referred to in following adjustment sections.



**Figure 5-1: Instrument Bottom View**

## Adjustments

Use the following procedures to bring the 2715 operating parameters within the tolerances specified in *Section 1: Specifications*.

### Power Supply and Deflection

Two procedures are provided for adjusting the Power Supply and Deflection circuits. Check the serial number of your instrument then perform one of the two procedures given below.

**Instrument with serial number below B030000.** Adjust R639, R680, R703, R704, R705, R900, and R930 on the Power Supply board and R6, R7, and R110 on the rear panel.

■ Test equipment required:

Voltage Variable Isolation Transformer  
Test Oscilloscope with Probes  
Multimeter (DMM)  
High Voltage Probe (X1000)



---

**WARNING.** Use an *isolation transformer* when working on the Power Supply. The transformer must have a three wire input and output connector with ground through the input and output. Stancor GIS21000 is an example of a suitable transformer.

*Hazardous line potential exists on the Power Supply board at all times the instrument power cord is connected. If it becomes necessary to remove the shield on the bottom of the Power Supply board, use extreme caution when handling the instrument.*

---

Refer to Figure 5-1 for the location of most adjustments and test points.

1. Connect an Isolation Transformer in line with the Spectrum Analyzer power input and the AC line voltage source of 90 to 250 VAC.
2. Apply power to the Spectrum Analyzer and turn on the graticule lights (DSPL 6).
3. Adjust R937 (+5 V ADJ) on the Power Supply board for +5.0 VDC at the +5 V test point.

4. Set the test oscilloscope controls as follows:

Channel 1	
Coupling	AC
Deflection Factor	20 mV/div
Trigger	Channel 1, positive edge
Time Base	5 $\mu$ s/div

5. Place the Channel 2 probe near R680 on the Power Supply board. The test oscilloscope should display approximately four periods of the waveform at TP250.
6. Adjust R680 (LOCK) so that the waveform on TP270 is locked to the waveform on TP250. An unlocked waveform exhibits a noticeable amount of jitter. When the waveform locks, a sudden shift of the waveform occurs and the jitter goes away. Continue adjusting R680 counterclockwise until lock is lost or the potentiometer is fully counterclockwise. Make a note of the range through which the signal stays locked. Center R680 in the noted range.

---

**NOTE.** *The waveform at TP270 has phase jitter due to pulse width modulation.*

---

7. Vary the line voltage from 90 VAC to 240 VAC while checking for no loss of lock. Readjust R680 if lock is lost. Reset the line voltage to nominal line voltage.
8. Enable the checkerboard pattern by pressing **UTIL 5 2 2** and set INTENSITY fully clockwise.
9. Set R703 (Z AXIS) on the Power Supply board fully counterclockwise.
10. Check the power supplies as per Table 5-2.

**Table 5-2: Power Supply Tolerances**

Power Supply	Voltage Range
-11 V	-10.2 V to -11 V
+5 V	Adjusted with R937
+10 V	+10.0 V to +10.8 V
+20 V	+21 V to +24 V
+50 V	+47 V to +51 V
+115 V	+109 V to +117 V

11. Monitor TP120 with the Multimeter and the 2.75KV test point with the High Voltage Probe.

12. Adjust R639 (HV) on the Power Supply board for  $-2750\text{ V} \pm 5\text{ V}$  at the 2.75KV test point. The DC level at TP120 should lie between 50 V and 250 V.

---

**NOTE.** *The signal at TP120 is a 20 V triangle waveform with a DC component. The DC component should lie between 50 V and 250 V after R639 is adjusted.*

---

13. Press **UTIL** five times to return the display to the spectral display mode. Set INTENSITY fully counterclockwise.
14. Adjust R703 (Z AXIS) on the Power Supply board until the display just disappears (no beam current).
15. Set R110 (FOCUS) on the Power Supply board fully clockwise.
16. Adjust R704 (ASTIG) on the Power Supply board for as round a dot as possible.
17. Adjust R110 on the Power Supply board for the sharpest display.
18. Enable the DEFLECTION AMP CAL signal by pressing **UTIL 5 2 1**. Press any menu button to exit the menu.
19. Disable DISPLAY STORAGE and READOUT, and enable ZERO SPAN.
20. Press **SWEEP** ↓ six times.
21. Adjust VERT POS (R6) at the rear panel to position the top of the square wave to the top edge of the screen.
22. Adjust TRACE ROT (R7) at the rear panel for a level trace.
23. Adjust R705 (GEO) on the Power Supply board and VERT POS (R6) at the rear panel for the straightest trace possible at the top edge of the screen.
24. Adjust R910 (VERT GAIN) on the Power Supply board to place the bottom of the trace at the bottom graticule line.
25. Disable the DEFLECTION AMP CAL signal by pressing **UTIL 5 2 1** and enable SWEEP CAL by pressing **3**. Press any menu button to exit the menu.
26. Adjust HORIZ POS (R5) on the rear panel to position the CRT beam to the center vertical graticule line.
27. Move the beam at the right edge of the graticule by pressing **SWEEP** ↑ three times.
28. Adjust R900 (HOR GAIN) on the Power Supply board to place the beam at the right edge of the graticule.

**Instrument with serial number B030000 or above.** Adjust R639, R669, R680, R703, R704, R705, R900, and R930 on the Power Supply board and R6, R7, and R110 on the rear panel.

■ Test equipment required:

Voltage Variable Isolation Transformer  
 Test Oscilloscope with Probes  
 Multimeter (DMM)  
 High Voltage Probe (X1000)



**WARNING.** Use an *isolation transformer* when working on the Power Supply. The transformer must have a three wire input and output connector with ground through the input and output. Stancor GIS21000 is an example of a suitable transformer.

*Hazardous line potential exists on the Power Supply board at all times the instrument power cord is connected. If it becomes necessary to remove the shield on the bottom of the Power Supply board, use extreme caution when handling the instrument.*

Refer to Figure 5-1 for the location of most adjustments and test points.

1. Connect an Isolation Transformer in line with the Spectrum Analyzer power input and the AC line voltage source of 90 to 250 VAC.
2. Set R669 (DTC) on the Power Supply board to midrange position.
3. Apply power to the Spectrum Analyzer and turn on the graticule lights (DSPL 6).
4. Adjust R937 (+5 V ADJ) on the Power Supply board for +5.0 VDC at the +5 V test point.
5. Set the test oscilloscope controls as follows:

Channel 1	
Coupling	AC
Deflection Factor	20 mV/div
Trigger	Channel 1, positive edge
Time Base	5 $\mu$ s/div

6. Place the Channel 2 probe near R680 on the Power Supply board. The test oscilloscope should display approximately four periods of the waveform at TP250.

7. Adjust R680 (LOCK) so that the waveform on TP270 is locked to the waveform on TP250. An unlocked waveform exhibits a noticeable amount of jitter. When the waveform locks, a sudden shift of the waveform occurs and the jitter goes away. Continue adjusting R680 counterclockwise until lock is lost or the potentiometer is fully counterclockwise. Make a note of the range through which the signal stays locked. Center R680 in the noted range.

---

**NOTE.** *The waveform at TP270 has phase jitter due to pulse width modulation.*

---

8. Vary the line voltage from 90 VAC to 240 VAC while checking for no loss of lock. Readjust R680 if lock is lost. Reset the line voltage to nominal line voltage.
9. Check the power supplies as per Table 5-3.

**Table 5-3: Power Supply Tolerances**

Power Supply	Voltage Range
-11 V	-10.2 V to -11 V
+5 V	Adjusted with R937
+10 V	+10.0 V to +10.8 V
+20 V	+21 V to +24 V
+50 V	+47 V to +51 V
+115 V	+109 V to +117 V

10. Turn off the graticule lights (DSPL 6).
11. Enable the checkerboard pattern by pressing **UTIL 5 2 2** and set INTENSITY fully clockwise.
12. Set R703 (Z AXIS) on the Power Supply board to midrange position.
13. Monitor TP120 with the Multimeter and the -2.75 KV test point with the High Voltage Probe.
14. Adjust R669 (DTC) on the Power Supply board for -2835 V at the -2.75 KV test point. A tolerance of +40 V and -30 V applies to the -2835 V when R669 reaches either endstop.

- 
15. Adjust R639 (HV) on the Power Supply board for  $-2750\text{ V} \pm 5\text{ V}$ .  
The DC level at TP120 should lie between 50 V and 250 V.

---

**NOTE.** The signal at TP120 is a 20 V triangle waveform with a DC component. The DC component should lie between 50 V and 250 V after R639 is adjusted.

---

16. Press **UTIL** five times to return the display to the spectral display mode. Set **INTENSITY** fully counterclockwise.
17. Adjust R703 (Z AXIS) on the Power Supply board until the display just disappears (no beam current).

---

**NOTE.** Steps 18 through 21 only apply to instruments with serial numbers B04XXXX or above. For instruments with serial numbers B03XXXX or below, skip to step 22.

---

18. With a multimeter measuring the DC voltage at pin 1 of J1, adjust R705 (GEO) for a voltage measurement of **45 Vdc  $\pm 1\text{ V}$** .
19. Adjust R110 (FOCUS) on the Power Supply board for best overall focus.
20. Adjust R704 (ASTIG) on the Power Supply board to improve the overall focus.
21. Readjust R110 on the Power Supply board for the sharpest overall display.

---

**NOTE.** Steps 22 through 24 only apply to instruments with serial numbers B03XXXX or below. For instruments with serial numbers B04XXXX or above, skip to step 25.

---

22. Set R110 (FOCUS) on the Power Supply board fully clockwise.
23. Adjust R704 (ASTIG) on the Power Supply board for as round a dot as possible.
24. Adjust R110 on the Power Supply board for the sharpest display.
25. Enable the DEFLECTION AMP CAL signal by pressing **UTIL 5 2 1**. Press any menu button to exit the menu.
26. Disable **DISPLAY STORAGE** and **READOUT**, and enable **ZERO SPAN**.
27. Press **SWEEP** ↓ six times.
28. Adjust **VERT POS** (R6) at the rear panel to position the top of the square wave to the top edge of the screen.
29. Adjust **TRACE ROT** (R7) at the rear panel for a level trace.

30. Adjust R705 (GEO) on the Power Supply board and VERT POS (R6) at the rear panel for the straightest trace possible at the top edge of the screen.
31. Adjust R910 (VERT GAIN) on the Power Supply board to place the bottom of the trace at the bottom graticule line.
32. Disable the DEFLECTION AMP CAL signal by pressing **UTIL 5 2 1** and enable SWEEP CAL by pressing **3**. Press any menu button to exit the menu.
33. Adjust HORIZ POS (R5) on the rear panel to position the CRT beam to the center vertical graticule line.
34. Move the beam at the right edge of the graticule by pressing **SWEEP ↑** three times.
35. Adjust R900 (HOR GAIN) on the Power Supply board to place the beam at the right edge of the graticule.

### **Sweep and Horizontal Deflection Amplifier**

Use this procedure to adjust R290 and R280 on the Sweep board. HORIZ POS (R5) on the rear panel. R901 on the Power Supply board.

- Test equipment required:

Multimeter (DMM)

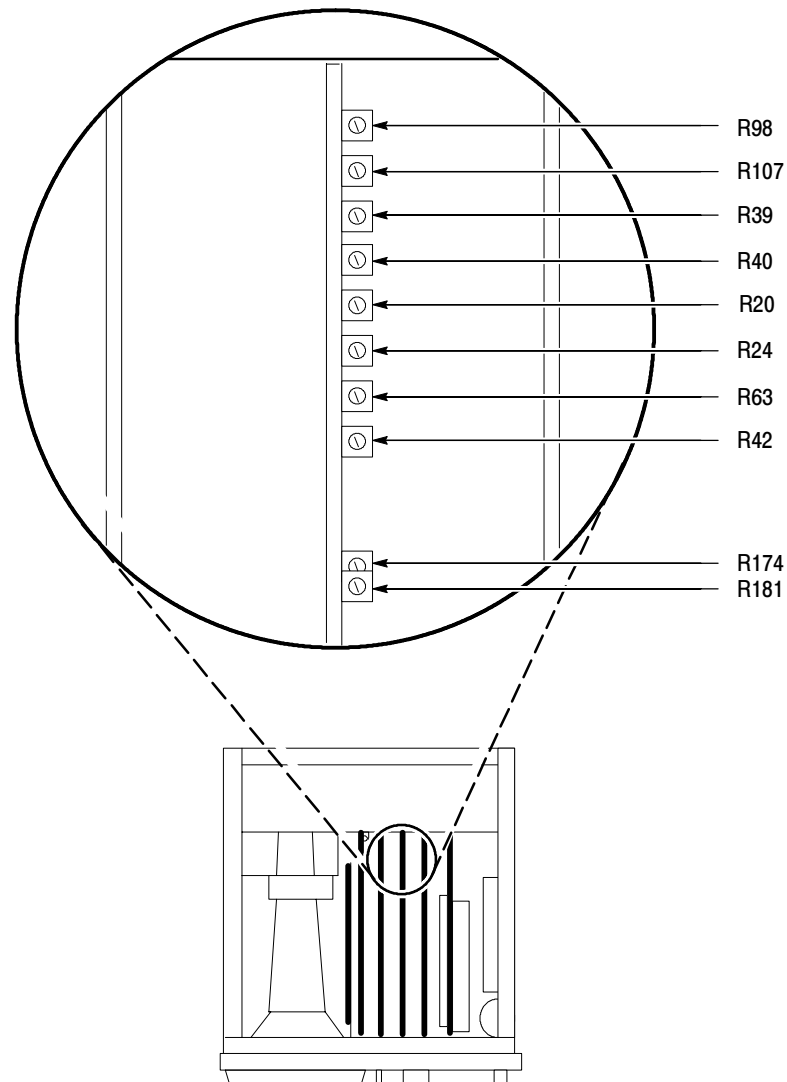
1. Recall default power up settings by pressing **UTIL 1 1**.
2. Disable the DISPLAY STORAGE, and center the beam by pressing **UTIL 5 2 3**. Press any menu button to exit the menu.
3. Monitor TP2 with the Multimeter. See Figure 5-1 for the location of TP2.
4. Adjust R290 on the Sweep board (Figure 5-1) for 0.0 V  $\pm$ 2 mV at TP2.
5. Adjust HORIZ POS (R5) on the rear panel to position the CRT beam to the center vertical graticule line.
6. Move the beam at the right edge of the graticule by pressing **SWEEP ↑** three times.
7. Adjust R280 on the Sweep board (Figure 5-1) for -1.190 V at TP2.
8. Adjust R901 on the Power Supply board (Figure 5-1) to place the beam at the right edge of the graticule.
9. Disable the Sweep Cal signal by pressing **UTIL 5 2 3**. Exit the menu by pressing any menu button. Press **SWEEP AUTO** to enable the sweep.



**Display Storage**

Use this procedure to adjust R174, R98, R107, R42, and R63 on the Display Storage board.

Refer to Figure 5-2 for the locations referred to in this procedure.

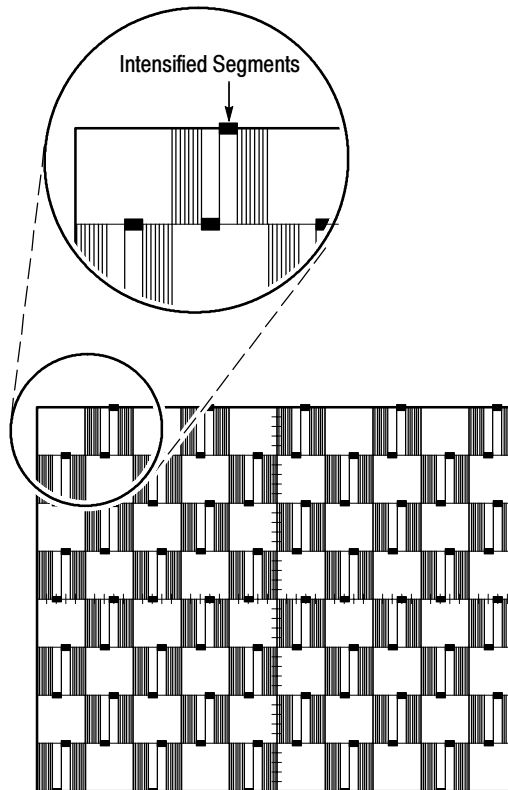


**Figure 5-2: Display Storage Board Adjustment Locations**

**Gain and Offset Adjustment.**

1. Recall factory default power up settings by pressing **UTIL 1 1**.
2. Enable the checkerboard pattern by pressing **UTIL 5 2 2**.
3. Refer to Figure 5-2 and adjust R98 (HOO) to position the center of the checkerboard pattern at center screen.

4. Adjust R107 (HOG) for optimum one checkerboard square per division (edges of intensified squares positioned to left and right vertical graticule lines).
5. Repeat steps 3 and 4 to eliminate interaction. The checkerboard pattern will be centered when properly adjusted.
6. Set R174 (Vector Offset) to midrange.
7. Adjust R63 (VOO) and R42 (VOG) for proper spacing of the pattern at the top and bottom of the screen, respectively.
8. Adjust R63 (VOO) to center the top intensified horizontal checkerboard line on the top graticule line. Refer to Figure 5-3.



**Figure 5-3: Properly Adjusted Checkerboard Pattern**

9. Adjust R42 (VOG) to center the bottom intensified horizontal line on the bottom graticule line.
10. Press **BKSP** (once).

- 11.** Adjust R63 (VOO) to center the readout between the top and bottom graticule lines.
- 12.** Enable the checkerboard by pressing **UTIL 5 2 2**.
- 13.** Adjust R174 (Vector Offset) to align the top intensified line of the checkerboard with the top graticule line.
- 14.** Press any **MENUS** key five times to return to the spectral display.
- 15.** Initialize instrument settings by pressing **UTIL 0**.

**Locked 2<sup>nd</sup> LO Preset**

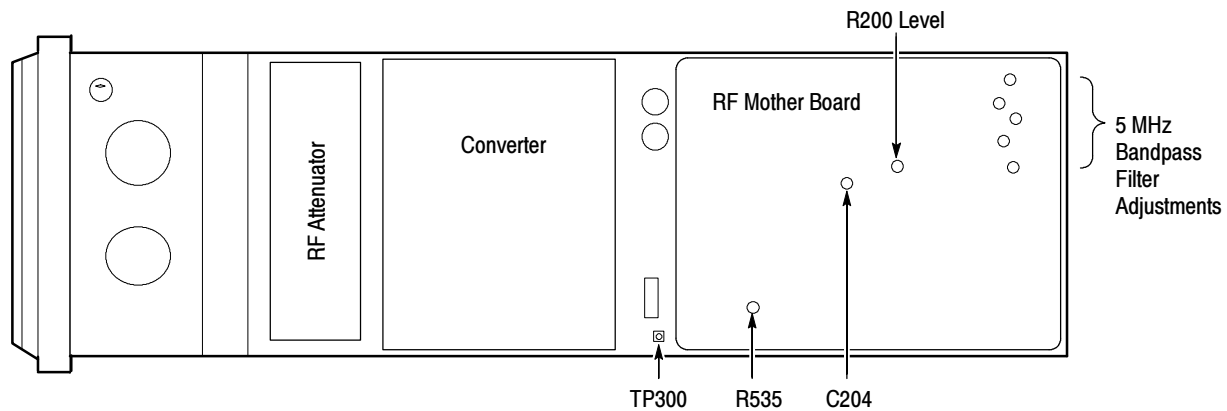
Use this procedure to adjust C204 and R535 on the RF Mother board.

See Figure 5-4 for the location of adjustments on the 2nd LO board.

1. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	5 MHz
RES BW	5 MHz
VIDEO FILTER	On
VERT SCALE	10 dB/DIV

2. Enable the calibrator signal by pressing **INPUT 9**.
3. Set R535 to mid range. See Figure 5-4.



**Figure 5-4: Locked 2nd LO and 5 MHz Bandpass Filter Adjustments**

4. Monitor TP300 (Figure 5-4) on the RF Mother board with the Multimeter.
5. Adjust C204 (Figure 5-4) until the oscillator locks. (The calibrator signal should appear on-screen at this time.)

---

**NOTE.** C204 is a loop of wire on later versions of the RF mother board and is adjusted using a nonmetallic tool. Move the loop up or down to vary the tune voltage.

---

6. Note the voltage reading on the meter and adjust C204 for a tune voltage of 8.5 to 9.5 V.

### Phase Lock CFC Assembly

Use this procedure to adjust R931, R918, R920, R746, R827, R620, and C611 on the Phase Lock assembly.

- Test equipment required: Time Mark Generator

Refer to Figure 5-5 for adjustment and test point locations excluding TP168 on the Sweep board.

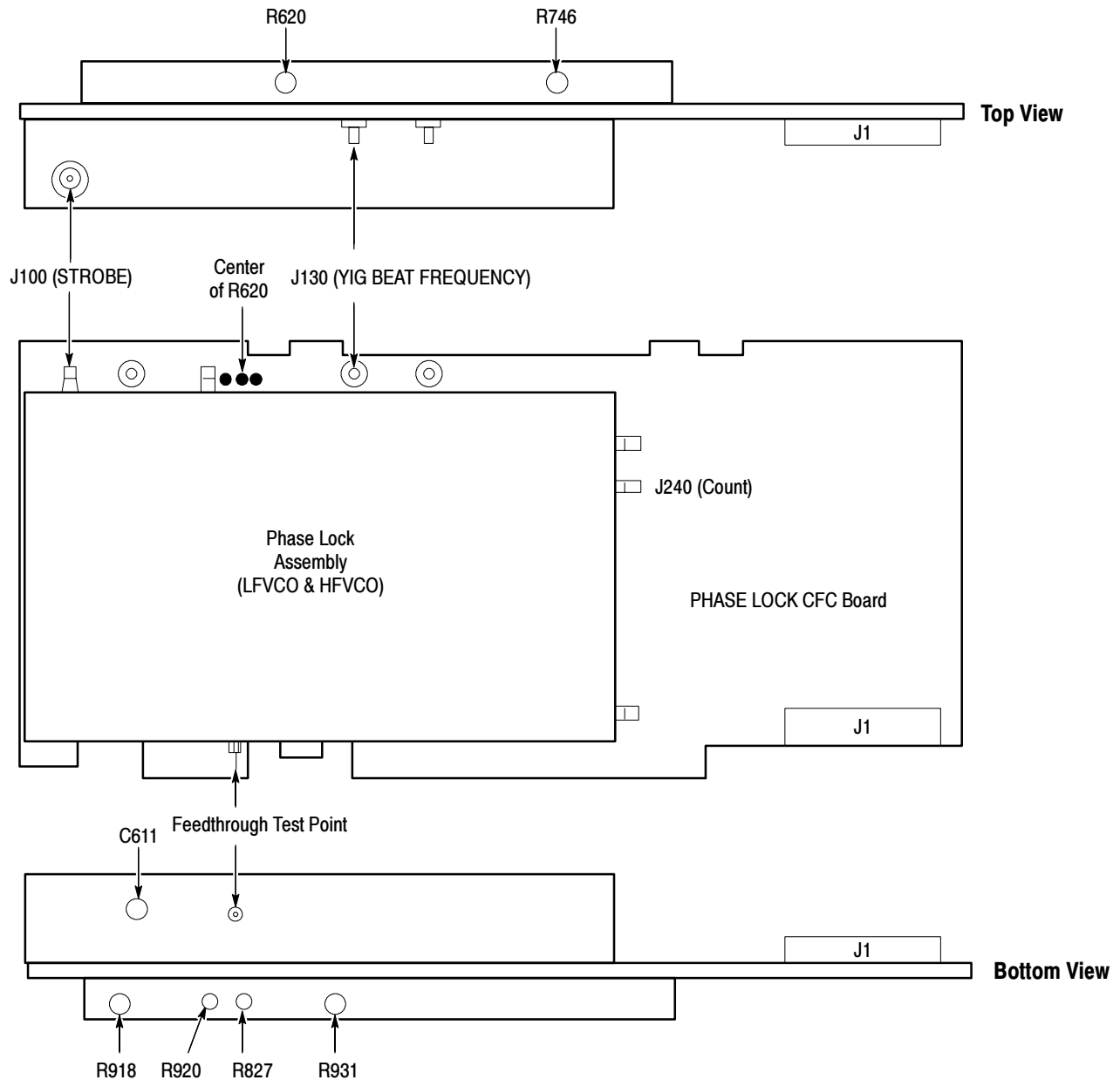


Figure 5-5: Phase Lock CFC Module Adjustment and Test Point Locations

1. Initialize instrument settings by pressing **UTIL 0**.
2. Disable frequency corrections by pressing **UTIL 4 3 5**. Press any menu button to exit the menu.
3. Recall default frequency normalization values by pressing **UTIL 5 5 0 8 Y**. Press any menu button to exit the menu. Set **FREQUENCY** at 0 Hz.
4. Adjust R931 (Main Coil Offset) on the Phase Lock CFC board to center the 0 Hz signal. Use the **SPAN/DIV ↓** to reduce the span/div to 1 MHz while keeping the signal centered with R931.
5. Press **MAX SPAN** twice and check that the 0 Hz signal is within 2 minor divisions of center screen. If necessary, readjust R931 on the Phase Lock CFC board to center the 0 Hz signal.
6. Repeat step 5 until the 0 Hz signal remains within 2 minor divisions of center screen.
7. Select the following settings on the Spectrum Analyzer:

<b>FREQUENCY</b>	500 MHz
<b>REF LEVEL</b>	-30 dBm
<b>SPAN/DIV</b>	100 MHz
<b>RES BW</b>	300 kHz
<b>VID FLTR</b>	OFF
<b>VERT SCALE</b>	10 dB/div
8. Enable the calibrator signal by pressing **INPUT 9**.
9. Disable **DISPLAY STORAGE** (analog display mode on) and the **READOUT**.
10. Set the **FREQ/MKRS** knob such that a mark (harmonic of the calibrator signal) is at center screen.
11. Adjust R918 (Main SWP Gain) on the Phase Lock CFC board for one mark per division.
12. Enable **DISPLAY STORAGE D**.
13. Disable the calibrator signal by pressing **INPUT 9**.
14. Apply 0.2  $\mu$ s time marks to the RF INPUT.
15. Reset **FREQUENCY** to 25 MHz and **SPAN/DIV** to 5 MHz. Use the **FREQ/MKRS** knob to position a mark at center screen.
16. Adjust R920 (FM SWP Gain) on the Phase Lock CFC board for one mark per division.

**17.** Adjust the Low Frequency VCO and High Frequency VCO as follows:

- a. Enable the LFVCO adjustment procedure by pressing **UTIL 5 2 4 0**; then follow screen prompts up to the adjustment of R746.
- b. After adjusting R746, press the **BKSP** once to return to CFCV1 ADJUSTMENTS menu; then press **1** for the HFVCO adjustment and follow screen prompts.

---

**NOTE.** Capacitor C611 is adjusted for 8.5 V at the second peak as C611 is adjusted from fully clockwise.

---

- c. After adjusting C611, press **BKSP** to return to CFCV1 ADJUSTMENTS menu; then press **3** for the FM DAC sensitivity adjustment and follow screen prompts.

**18.** Adjust the Counter Level as follows:

- a. Recall factory default power up settings by pressing **UTIL 1 1**.
- b. Disable frequency corrections by pressing **UTIL 4 3 5**. Press any menu button to exit the menu.
- c. Enable continuous strobos by pressing **UTIL 5 1 6 6**. Press any menu button to exit the menu.
- d. Set SPAN/DIV to MAX SPAN and press **SWEEP ↓** twice.
- e. Use a X10 probe to connect the Channel 1 input (X channel input for an X-Y display) of the test oscilloscope to TP2 on the Sweep board (See Figure 5-1). Ground the test oscilloscope at the Spectrum Analyzer chassis.
- f. Use a X1 probe to connect the Y channel of the test oscilloscope to the center of R620 (CNT LVL) on the Phase Lock CFC assembly.
- g. Set the X input deflection factor at 0.2 V/div and the Y input deflection factor at 10 mV, AC coupled. Set the test oscilloscope Time/Div control to X-Y.
- h. Adjust R620 (CNT LVL) on the Phase Lock CFC assembly for an envelope waveform amplitude of 80 mVp-p. Check that the ratio of the peak-to-peak to valley-to-valley amplitude is less than 2:1.
- i. Recall factory default power up settings by pressing **UTIL 1 1**.
- j. Remove the probes from the instrument.
- k. Perform frequency normalizations by pressing **UTIL 3 1 W**.

- l. When normalizations are complete, select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REF LEVEL	-20 dBm
SPAN/DIV	100 kHz

- m. Connect a 100,000,000.0 Hz signal to the RF INPUT. Set the controls for a full screen display.
- n. Initiate reference frequency normalizations by pressing **UTIL 5 5 1 1 2 W**.
- o. After normalizations are completed, press any menu button to return to the spectral display.

### 5 MHz Resolution Bandwidth Adjustment

Use this procedure to adjust the 110 MHz Bandpass Filter on the RF Mother board.

1. Recall factory default power up settings by pressing **UTIL1 1**.
2. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-30 dBm
SPAN/DIV	2 MHz
VERT SCALE	10 dB/div

3. Connect a 100 MHz/-30 dBm signal to the RF INPUT. Center the display by pressing **CTR-MEAS TRKG**.
4. Enable bandwidth mode by pressing **APPL 9 0**, entering -6 dB, and pressing **BKSP 0**.
5. Change the resolution bandwidth to 5 MHz. (The bandwidth readout will continuously update as the adjustments are made.)
6. Starting with the capacitor towards the top of the instrument, adjust the five capacitors for highest amplitude, best filter shape of the 5 MHz pass band (4 to 6 MHz), and centering. See Figure 5-4 on Page 5-16 for the locations of the five capacitors on the RF Mother board (FILTER ADJUSTMENTS). If necessary, adjust C280 and C392 (See Figure 5-6 on Page 5-21) on the Log board for amplitude and filter shape.
7. Decrease the reference level by one step and check that the filter shape is not severely distorted.



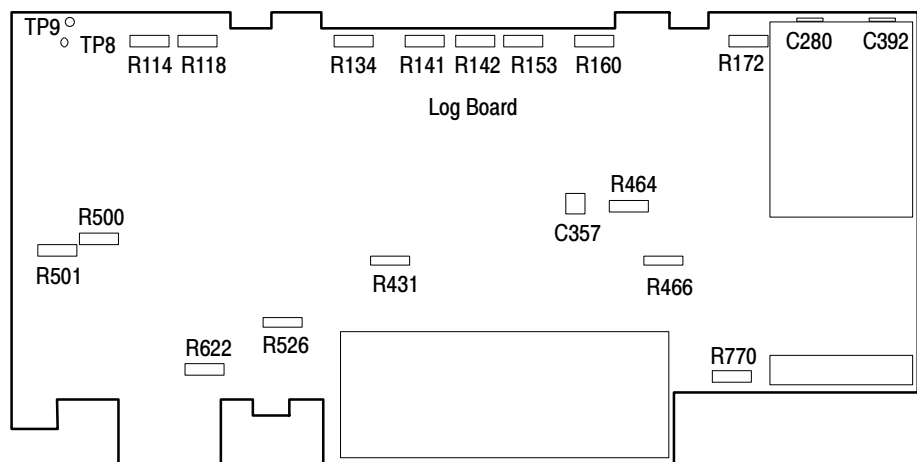
**Log Board Adjustment**

Use the following procedure to adjust the Log Board.

■ Test equipment required:

Signal Generator (Marconi 2022)  
 10 dB and 1 dB Step Attenuators  
 Multimeter (DMM)  
 RF Cable, BNC to SMB

Refer to Figure 5-6 for all adjustment locations on the Log board.



**Figure 5-6: Log Board Adjustment and Test Point Locations**

1. Adjust 10 dB/div, 5 dB/div, and 1 dB/div Log Match (R622 on the Log board)
  - a. Recall factory default power up settings by pressing **UTIL 1 1**. Recall default amplitude normalizations by pressing **UTIL 5 5 2 9 Y**. Press any menu button to exit the menu.
  - b. Set R160 and R172 on the Log board fully counterclockwise.

---

**NOTE.** Changing the adjustment of either R160 or R172 requires that you complete the Amplitude Flatness Adjustment Procedure on Page 5-52.

---

- c. Disconnect P190 from the Log board, and use the BNC to SMB cable to connect a 10 MHz/-10 dBm signal to J190 through the 10 dB and 1 dB Step Attenuators. Set the attenuators for 0 dB attenuation.

- d. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
SPAN/DIV	ZERO SPAN
RES BW	3 kHz
VERT SCALE	1 dB/div
VIDEO FILTER	ON

- e. Disable DISPLAY STORAGE by pressing **D**, and press **SWEEP** ↓ twice.
- f. Adjust R622 (LOG GAIN) on the Log board for trace shift as the VERT SCALE is cycled through 10 dB/div, 5 dB/div, and 1 dB/div. If necessary, set VERT POS (R6) to bring the trace into the viewing area.
- g. Set the VERTICAL SCALE to 10 dB/div.
- h. Adjust VERT POS (R6) on the rear panel to position the trace at the top graticule line.
2. Adjust Level (R63, R42, R20, R24, R98, R107, R39, and R40 on the Display Storage board, as follows (See Figure 5-2 on Page 5-13):
- a. Enable the checkerboard pattern (Display Storage adjustment pattern) by pressing **UTIL 5 2 2**.
- b. Adjust R63 (VOO) to align the top intensified edge of the checkerboard pattern with the top graticule line.
- c. Adjust R42 (VOG) to align the bottom intensified edge of the checkerboard pattern with bottom graticule line.
- d. Adjust R98 (HOO) to position the center of the checkerboard pattern at the center of the screen.
- e. Adjust R107 (HOG) for optimum one checkerboard square per division (edges of the intensified squares position to left and right vertical graticule lines).
- f. Repeat steps d and e to optimize horizontal adjustment due to small interaction between these adjustments.
- g. Press **BKSP** (once) and adjust R63 (VOO) to center the readouts between the top and bottom graticule lines.
- h. Enable the checkerboard by pressing **UTIL 5 2 2**.
- i. Adjust R174 (Vector Offset) to align the top intensified line of the checkerboard with the top graticule line.
- j. Press any menu button five times to exit the checkerboard pattern.

- k. Disconnect P190 and reconnect the 10 MHz signal to P190 as was done in step 1, c on Page 5-21.
- l. Press LIN and add proper external attenuation to the input signal to place the nonstored trace at the bottom graticule line.
- m. Adjust R20 (VIO) to match the position of the stored display to the nonstored display at the bottom graticule line. (Pressing D repeatedly alternates the display between a nonstored and stored trace.)
- n. Press LIN and remove external attenuation to place the nonstored trace at the top graticule line.
- o. Adjust R24 (VIG) to match the position of the stored display to the nonstored display at the bottom graticule line.
- p. Repeat steps l through o to compensate for interaction between the adjustment of R20 and R24.
- q. Disconnect the 10 MHz signal connected to P190 (step 1, c on Page 5-21) and reconnect P190.
- r. Set the **FREQ/SPAN** to 100 MHz, **FREQUENCY** to 500 MHz, **REF LEVEL** -30 dBm, **RBW** 300 kHz, and enable the calibrator by pressing **INPUT 9**. Turn display storage off by pressing **DISPLAY STORAGE D** and press **VID FLTR** to turn the video filter off.
- s. Turn the readout off and position the center mark at center screen.
- t. Adjust R39 (HIO) to align the stored display to the nonstored display at center screen. (Pressing **DISPLAY STORAGE D** repeatedly alternates the display between stored and nonstored trace).
- u. Adjust R40 (HIG) to align the stored display to the nonstored display. one division from the left and right edges, at center screen vertically.
- v. Enable **DISPLAY STORAGE D**.
- w. Enable **REF LEVEL FINE** and using the **REF LEVEL**  $\uparrow\downarrow$  keys, move one of the signals to the first major division down from the top of the screen.
- x. Adjust R181 (Vector Length) while repeatedly pressing **DISPLAY D** until the peak of the digitized signal matches the peak of the analog signal.
- y. Set **FREQ/SPAN** to **ZERO SPAN**, **FREQUENCY** to 100 MHz, **RES BW** to 3 kHz, **VIDEO FILTER** on, and **CALIBRATOR** Off.
- z. Insert 30 dB of attenuation in the input signal path using the external attenuators.



- d. Adjust R431 on the Log board for a DC level of 20 mV  $\pm$ 2 mV at TP9.
  - e. Adjust R500 on the Log board to position the trace at the bottom graticule line.
  - f. Reconnect the 10 MHz/-10 dBm signal to J190 on the Log board through the 10 dB and 1 dB Step Attenuators. Set the attenuators for 0 dB attenuation (no external attenuation).
  - g. Adjust R526 on the Log board to position the trace at the top graticule line.
  - h. Repeat parts (3) through (7) until both top of screen and bottom of screen alignment are satisfied.
  - i. Add 6 dB of attenuation to the input signal.
  - j. Check that the trace is within 2 minor divisions of the fourth graticule line from top of screen.
  - k. Add another 6 dB of attenuation to the input signal.
  - l. Check that the trace is within 2 minor divisions of the sixth graticule line from top of screen.
  - m. Add another 6 dB of attenuation to the input signal.
  - n. Check that the trace is within 2 minor divisions of the seventh graticule line from top of screen.
5. Adjust RF Gain (R200 on the RF Mother board, R170 on the Reference Oscillator board) as follows:
- a. Recall factory default power up settings by pressing **UTIL 1 1**.
  - b. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	100 MHz
SPAN/DIV	2 MHz
REFERENCE LEVEL	-30 dBm
RESOLUTION BW	5 MHz
VIDEO FILTER	On
VERT SCALE	LIN
  - c. Connect a 100 MHz signal to the RF INPUT as follows:
    - All instruments except Option 50 - Connect a 50 - 75  $\Omega$  min loss pad to the Power Meter power head. Connect the min loss pad to the Signal Generator input. Set the amplitude of a 100 MHz signal from the Signal Generator and cable combination to -30.2 dBm, then connect the 100 MHz signal to the RF INPUT.

- Option 50 instruments - Connect a 50  $\Omega$  coaxial cable to the signal generator output. Connect the Power meter head to the other end of the 50  $\Omega$  coaxial cable. Set the generator to a 100 MHz signal. Adjust the signal amplitude to -30.0 dBm, then connect the 100 MHz signal to the RF INPUT.
- d. Adjust R200 on the RF Mother board (see Figure 5-4 on page 5-16) to position the signal peak at the top graticule line.
- e. Turn off the input signal (Carrier Off), and enable the internal calibrator by pressing **INPUT 9**.
- f. Adjust R170 on the Reference Oscillator board (see Figure 5-7) to position the calibrator signal peak at the top graticule line.



**Figure 5-7: CAL Level Adjustment on Reference Oscillator Board**

6. Adjust the FM Detector (C357 and R153 on the Log board) as follows:
  - a. Disable the internal calibrator by pressing **INPUT 9**.
  - b. Apply a 100 MHz/-30 dBm signal with 80 kHz FM deviation at a 1 kHz rate to the RF INPUT.
  - c. Reset the VERT SCALE to 10 dB/div and center the display by pressing **CTR-MEAS/TRKG**. Enable ZERO SPAN; select the internal trigger by pressing **SWP/TRIG 1**; enable FM Deviation Mode by pressing **APPL 7**; then set the sweep speed to 200  $\mu$ s by pressing **SWEEP** ↓ repeatedly until 200  $\mu$ s is displayed.
  - d. Set the inner LEVEL control for a triggered display.
  - e. Set R153 on the Log board to set the signal peak approximately one division from the bottom of the screen.
  - f. Adjust C357 on the Log board for maximum signal size.
  - g. Adjust R153 on the Log board to place the bottom of the signal at the bottom graticule line.
  - h. Reduce the amount of deviation in 10 kHz increments until the bottom peaks of the signal are at one division below top of screen.

- i. Check that the peaks fall within 2 minor divisions of each graticule line.
- j. Press **CTR-MEAS/TRKG**.
- k. Check that the right hand readout indicates approximately C1.000KHZ.

### **Variable Resolution and RF Option Filter Adjustments**

Use the following procedure to adjust the Variable Resolution and RF Option Filters.

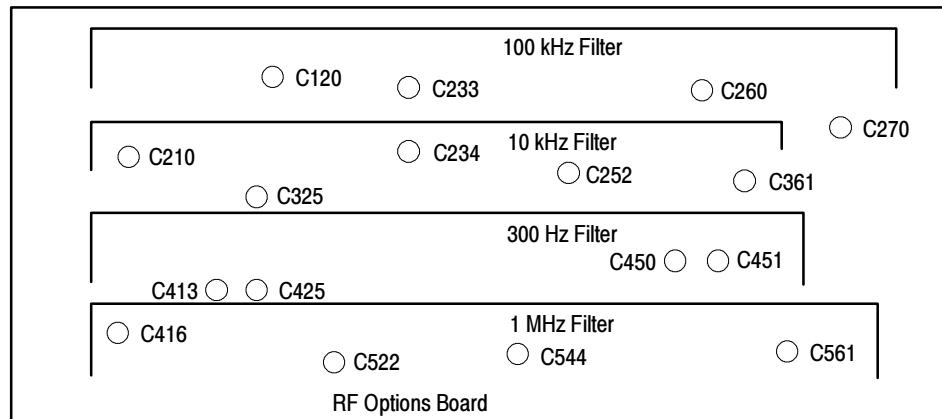
- Test equipment required:

100 MHz Signal Generator

1. Adjust **1 MHz Resolution** Bandwidth (C561, C544, C522, and C416 on the RF Options board) as follows:
  - a. Recall factory default power up settings by pressing **UTIL 1 1**.
  - b. Connect a 100 MHz signal to the RF INPUT.
  - c. Recall default amplitude normalizations by pressing **UTIL 5 5 2 9 Y**. Press any menu button to exit the menu.
  - d. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	100 MHz
REFERENCE LEVEL	-20 dBm
SPAN/DIV	1 MHz
RESOLUTION BW	30 kHz
VIDEO FILTER	Off
VERTICAL SCALE	10dB/Div
  - e. Save the display in one of the DISPLAY STORAGE registers.
  - f. Change the resolution bandwidth to 1 MHz.

- g. Adjust C561, C544, C522, and C416 on the RF Options board (Figure 5-8) for highest amplitude, best filter shape, and centering about the stored 30 kHz filter.



**Figure 5-8: RF Option Adjustment Locations**

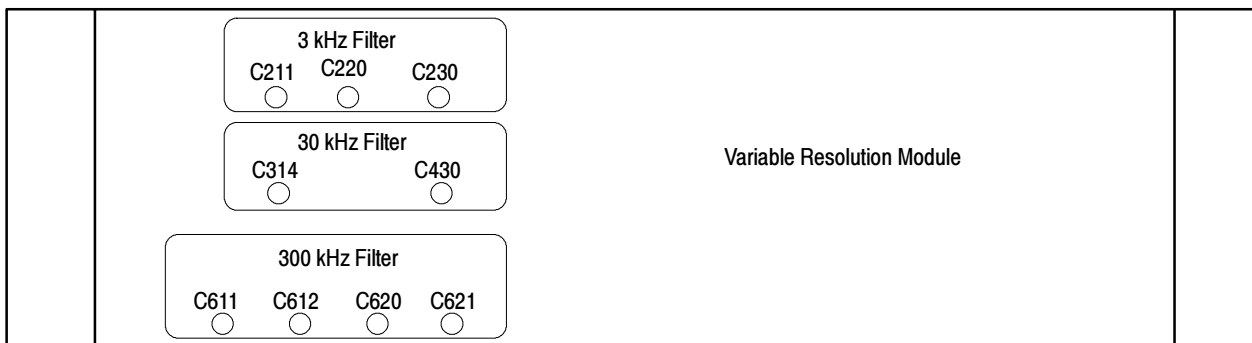
- h. Set the reference level for a full screen display, and enable the VID FLTR.
- i. Enable bandwidth mode by pressing **APPL 9 0** and entering  $-6$  dB, then pressing **BKSP 0**.
- j. Check bandwidth shape factor. The bandwidth at the 60 dB down point must not exceed 7X the bandwidth at the 6 dB down point.
- k. Check that the filter amplitude is  $-20$  dBm,  $\pm 4$  dB.
- l. Disconnect the signal from the RF INPUT.
2. Adjust **300 kHz Resolution** Bandwidth Filter (C611, C612, C620, and C621 on the VR Filter board) as follows:
- Recall factory default power up settings by pressing **UTIL 1 1**.
  - Connect a 100 MHz/ $-30$  dBm signal to the RF INPUT.
  - Recall default amplitude normalizations by pressing **UTIL 5 5 2 9 Y**. Press any menu button to exit the menu.



- d. Select the following settings on the spectrum analyzer:

FREQUENCY	100 MHz
REF LEVEL	-20 dBm
SPAN/DIV	200 kHz
RES BW	30 kHz
VID FLTR	Off
VERT SCALE	10 dB/Div

- e. Save the display in one of the DISPLAY STORAGE registers.  
 f. Reset the RES BW to 300 kHz.  
 g. Adjust C611, C612, C620, and C621 on the VR Filter Select board (Figure5-9) for highest amplitude, best filter shape, and centering.



**Figure 5-9: Variable Resolution Module Adjustment Locations**

- h. Set the reference level for a full screen display, and enable the VID FLTR.  
 i. Enable bandwidth mode by pressing **APPL 9 0** and entering -6 dB, then pressing **BKSP 0**.  
 j. Check bandwidth shape factor. The bandwidth at the 60 dB down point must not exceed 7X the bandwidth at the 6 dB down point.  
 k. Check that the filter amplitude is -20 dBm,  $\pm 4$  dB.  
 l. Disconnect the signal from the RF INPUT.
3. Adjust **100 kHz Resolution** Bandwidth (C270, C260, C233, and C120 on the RF Options board) as follows:
- Recall factory default power up settings by pressing **UTIL 1 1**.
  - Connect a 100 MHz/-30 dBm signal to the RF INPUT.

- c. Recall default amplitude normalizations by pressing **UTIL 5 5 2 9 Y**. Press any menu button to exit the menu.
  - d. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	100 MHz
REFERENCE LEVEL	-20 dBm
SPAN/DIV	100 kHz
RESOLUTION BW	30 kHz
VIDEO FILTER	Off
VERTICAL SCALE	10dB/Div
  - e. Save the display in one of the DISPLAY STORAGE registers.
  - f. Adjust C270, C260, C233, and C120 on the RF Options board (Figure 5-8) for highest amplitude, best filter shape, and centering about the stored 30 kHz filter.
  - g. Set the reference level for a full screen display, and enable the VID FLTR.
  - h. Enable bandwidth mode by pressing **APPL 9 0** and entering -6 dB, then pressing **BKSP 0**.
  - i. Check bandwidth shape factor. The bandwidth at the 60 dB down point must not exceed 7X the bandwidth at the 6 dB down point.
  - j. Check that the filter amplitude is -20 dBm,  $\pm 4$  dB.
  - k. Disconnect the signal from the RF INPUT.
4. Adjust **30 kHz Resolution** Bandwidth Filter (C314 and C430 on the VR board) as follows:
- a. Recall factory default power up settings by pressing **UTIL 1 1**.
  - b. Connect a 100 MHz/-30 dBm signal to the RF INPUT.
  - c. Recall default amplitude normalizations by pressing **UTIL 5 5 2 9 Y**. Press any menu button to exit the menu.
  - d. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	100 MHz
REF LEVEL	-20 dBm
SPAN/DIV	10 kHz
RES BW	30 kHz
VID FLTR	Off
VERT SCALE	10 dB/Div
  - e. Adjust C314 and C430 on the VR board (Figure 5-9 on page 5-29) for highest amplitude and best filter shape.

- f. Set the reference level for a full screen display, and enable the VID FLTR.
  - g. Enable bandwidth mode by pressing **APPL 9 0** and entering -6 dB, then pressing **BKSP 0**.
  - h. Check bandwidth shape factor. The bandwidth at the 60 dB down point must not exceed 7X the bandwidth at the 6 dB down point.
  - i. Check that the filter amplitude is -20 dBm,  $\pm 4$  dB.
  - j. Disconnect the signal from the RF INPUT.
5. Adjust **3 kHz Resolution** Bandwidth Filter (C211, C220, and C230 on the VR Filter board) as follows:
- a. Recall factory default power up settings by pressing **UTIL 1 1**.
  - b. Connect a 100 MHz/-30 dBm signal to the RF INPUT.
  - c. Recall default amplitude normalizations by pressing **UTIL 5 5 2 9 Y**. Press any menu button to exit the menu.
  - d. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	100 MHz
REF LEVEL	-30 dBm
SPAN/DIV	2 kHz
RES BW	3 kHz
VID FILTER	Off
VERT SCALE	10 dB/Div
  - e. Adjust C211, C220, and C230 on the VR Filter board (Figure 5-9 on page 5-29) for highest amplitude and best filter shape.
  - f. Set the reference level for a full screen display, and enable the VID FLTR.
  - g. Enable bandwidth mode by pressing **APPL 9 0** and entering -6 dB, then pressing **BKSP 0**.
  - h. Check bandwidth shape factor. The bandwidth at the 60 dB down point must not exceed 7X the bandwidth at the 6 dB down point.
  - i. Check that the filter amplitude is -20 dBm,  $\pm 4$  dB.
  - j. Disconnect the signal from the RF INPUT.
6. Adjust **10 kHz Resolution** Bandwidth (C361, C325, C252, C234, and C210 on the RF Options board) as follows:
- a. Recall factory default power up settings by pressing **UTIL 1 1**.

- b. Connect a 100 MHz/-30 dBm signal to the RF INPUT.
  - c. Recall default amplitude normalizations by pressing **UTIL 5 5 2 9 Y**. Press any menu button to exit the menu.
  - d. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REFERENCE LEVEL	-20 dBm
SPAN/DIV	10 kHz
RESOLUTION BW	10 kHz
VIDEO FILTER	Off
VERTICAL SCALE	10 dB/Div
  - e. Adjust C361, C325, C252, C234, and C210 on the RF Options board (Figure 5-8 on page 5-28) for highest amplitude and best filter shape.
  - f. Set the reference level for a full screen display, and enable the VID FLTR.
  - g. Enable bandwidth mode by pressing **APPL 9 0** and entering -6 dB, then pressing **BKSP 0**.
  - h. Check bandwidth shape factor. The bandwidth at the 60 dB down point must not exceed 7X the bandwidth at the 6 dB down point.
  - i. Check that the filter amplitude is -20 dBm,  $\pm 4$  dB.
  - j. Disconnect the signal from the RF INPUT.
7. Adjust **300 Hz Resolution** Bandwidth Filter (C413, C425, C450, and C451 on the RF Options board) as follows:
- a. Recall factory default power up settings by pressing **UTIL 1 1**.
  - b. Disconnect W47 from J180 on the RF Options assembly (at the front connector on the RF Options assembly) and connect a 10.00000 MHz, -15 dBm signal to J180.
  - c. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REF LEVEL	-30 dBm
SPAN/DIV	1 kHz
RES BW	AUTO
VID FLTR	Off
VERT SCALE 1	0 dB/Div
  - d. Press **SWEEP**  $\uparrow$  twice. The display should be a straight line.
  - e. Adjust C413, C425, C450, and C451 on the RF Options board (Figure 5-8) for maximum amplitude.

- f. Reset the VERT SCALE to 1 dB/div, and readjust the capacitors for maximum amplitude.
- g. Disconnect the signal generator from J180 and reconnect P180.

### Locked 2<sup>nd</sup> LO Adjustment

Use this procedure to adjust C204 and R535 on the 2nd LO board.

- Test equipment required:

Multimeter (DMM)

1. Recall factory default power up settings by pressing **UTIL 1 1**.
2. Select the following settings on the Spectrum Analyzer:
 

FREQUENCY	100 MHz
REF LEVEL	-30 dBm
SPAN/DIV	5 kHz
RES BW	300 Hz
3. Enable the calibrator signal by pressing **INPUT 9**.
4. Set R535 (Figure 5-4 on page 5-16) to midrange.
5. Monitor TP300 (Figure 5-4 on page 5-16) on the RF Mother board with the Multimeter.
6. Adjust C204 (Figure 5-4 on page 5-16) for an indication of +8.6 V on the Multimeter.

---

**NOTE.** C204 is a loop of wire on later versions of the RF mother board and is adjusted using a nonmetallic tool. Move the loop up and down to vary the voltage.

---

7. Check that a signal is present on screen (oscillator locked).
8. Cycle the POWER switch and return to the CAL MODE (press **UTIL 5 8**).
9. Check that the 2<sup>nd</sup> LO is still locked (+8.6V is present at TP300).
10. Adjust R535 for a downward slope to the noise about the on screen signal (phase noise).

---

**NOTE.** When R535 is full counterclockwise, lock cannot be achieved.

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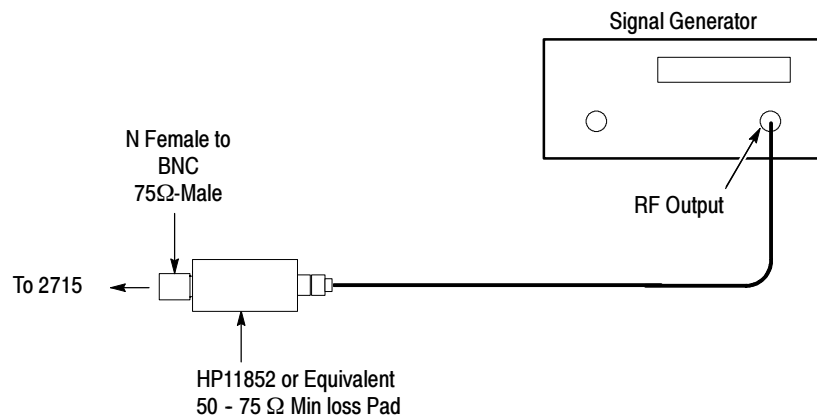
**Flatness Adjustment**

Use the following procedure to adjust R160 and R172 on the Log board.

- Test equipment required:

Sweep Generator  
 N male to N male coaxial cable  
 HP11852 or equivalent 50 – 75Ω min loss pad

1. Recall factory default power up settings by pressing **UTIL 1 1**.
2. Connect the Sweep Generator output to the RF INPUT as follows:
  - Option 50 instruments - Connect the Sweep Generator to the RF INPUT.
  - All instruments except Option 50 - Connect the Sweep Generator to the RF INPUT using the HP11852 or equivalent 50 - 75 Ω min loss pad. Refer to Figure 5-10.

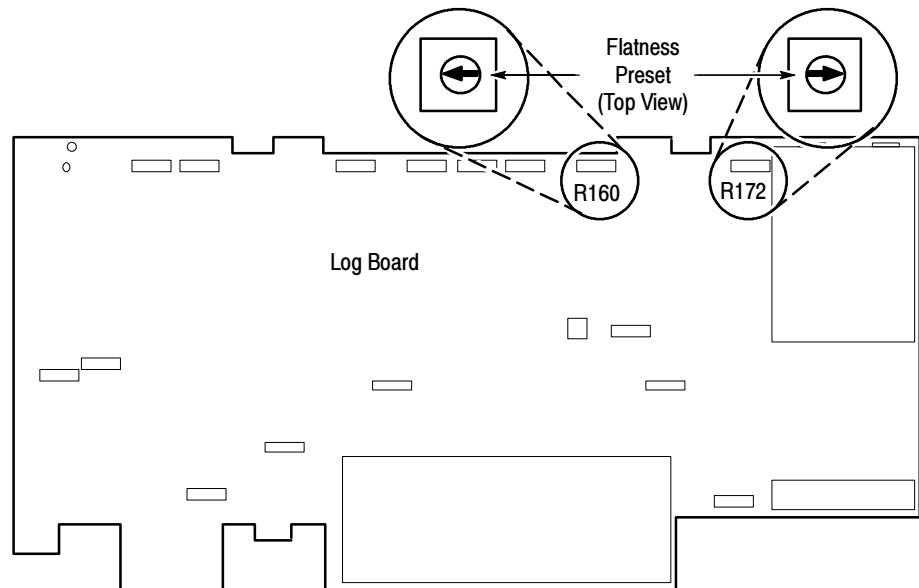


**Figure 5- 10: Flatness adjustment test setup (all instruments except Option 50)**

3. Select the following settings on the Spectrum Analyzer:

FREQUENCY	100 MHz
REF LEVEL	-20 dBm

4. Press **SWEEP** ↑ three times. Check that R160 and R172 on the Log board (Figure 5-11) are set fully counterclockwise.
5. Preset R160 and R172 on the Log board as shown in Figure 5-11.



**Figure 5-11: Presetting the Flatness Adjustments on the Log Board**

6. Set the Sweep Generator Time to 0.1, variable fully clockwise, and power level to 4. If the generator signal is too low or high, use the power level potentiometer on the Sweep Generator to bring the signal level to mid screen.
7. Allow the Spectrum Analyzer to sweep one full sweep.
8. Press **MKR** ↑ to place a marker on the peak to the left of 100 MHz.
9. Press **DSPL 8 3** to enable a display line through the marker.
10. Enable automatic sweep speed by pressing **SWEEP AUTO**.
11. Adjust R160 (Slope) and R172 (Slope Offset) on the Log board for flatness ( $\pm 1.5$  dB) while keeping the marked peak (peak that has a marker on it) at the display line. See Figure 5-11 for adjustment locations.  
Option 50/75 instruments -  $\pm 1.5$  dB from 9 kHz to 1.8 GHz,  $\pm 3$  dB from 1.8 GHz to 2.15 GHz.
12. Press **SWEEP** ↑ three times.
13. Check that the marked peak is still at the display line. If necessary, repeat the adjustments until flatness is within specification with the marked peak at the display line.
14. Disconnect the Sweep Generator from the RF INPUT.

**Service Normalization**

Use the following procedure to perform the Service Normalization.

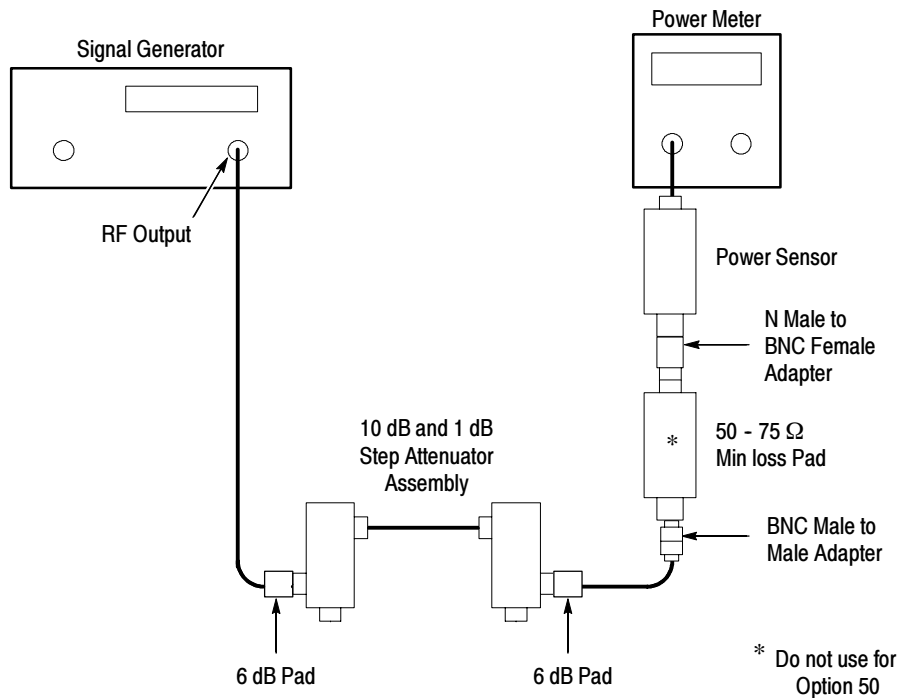
- Test equipment required:

Signal Generator  
 Power Meter  
 10 dB and 1 dB Step Attenuator Assembly  
 Two 6 dB Attenuators  
 Min Loss Pad

**GAIN STEP REFERENCE**

Use the following procedure to normalize the gain step reference:

1. Connect the test equipment as shown in Figure 5-12.



**Figure 5-12: Gain Step Reference Test Setup**

2. Set the step attenuators to 0 dB, and set the generator for a 100 MHz output and a power meter reading of -0.2 dBm for all instruments except Option 50 (0.0 dBm for Option 50 instruments).
3. Set the step attenuators to 10 dB (add 10 dB of attenuation to the 100 MHz signal) and make a note of the Power Meter reading. This is the actual attenuation of the 10 dB step.



4. Reset the step attenuator to 0 dB. Disconnect the cable from the Power Meter sensor and connect it to the RF INPUT.
5. Perform frequency normalizations (if not previously done) by pressing **UTIL 3 1**.
6. Start the first gain step measurement by pressing **UTIL 5 5 1 0 1 W**. The instrument will make a measurement and return to GAIN STEP REF menu.
7. Start the second measurement by pressing **2 1** and entering the actual value of the 10 dB step attenuator determined in part (3).
8. Finish the gain step normalization by adding 10 dB of attenuation in the signal path and pressing **2 W**.
9. Press **BKSP** to return to the REFERENCE NORMALIZATIONS menu.

#### **INTERNAL REF FREQ**

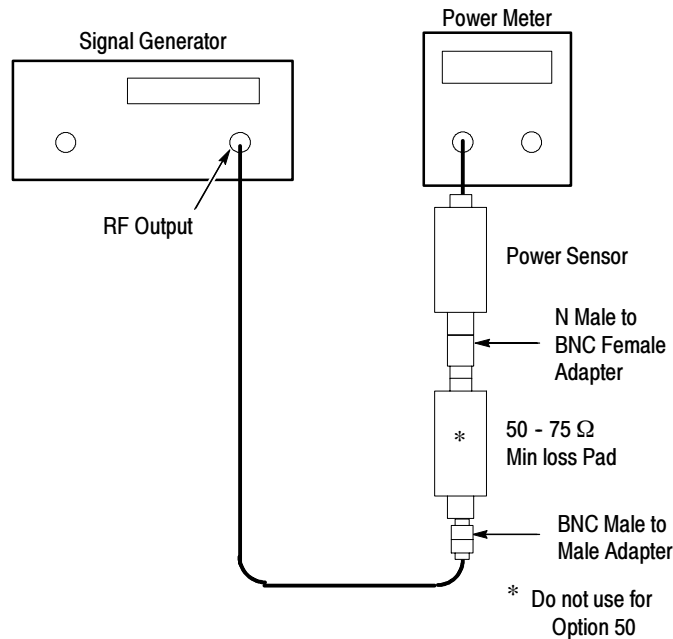
Use the following procedure to set the Internal Reference Frequency:

1. Connect a 100,000,000.0 Hz signal to the RF INPUT. Set the controls for a full screen display.
2. Center the signal by pressing **CTR-MEAS/TRKG**.
3. Initiate reference frequency normalization by pressing **UTIL 5 5 1 1**, and follow screen prompts.

### INTERNAL REF AMPLTD

Use the following procedure to set the Internal Reference Amplitude:

1. Connect the test equipment as shown in Figure 5-13.



**Figure 5-13: Internal Ref Ampltd Test Setup**

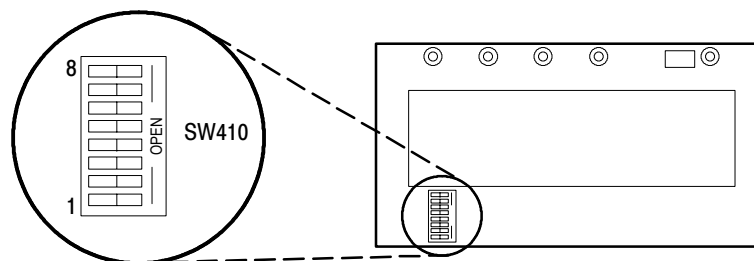
1. Set the Signal Generator for an output of  $-30.2$  dBm for all instruments except Option 50 ( $-30.0$  dBm for Option 50 instruments). Use the power meter to set the output level.
2. Initiate reference amplitude normalization by pressing **UTIL 5 5 1 2** and following screen prompts.

Perform Amplitude Normalizations by pressing **UTIL 3 2** to invoke amplitude normalizations.

## Setting of Reference Frequency Correction Bits

Use the following procedure to adjust SW410 on the Reference Oscillator board:

- Test equipment required: 100 MHz Frequency Standard
1. Perform Internal Reference Frequency normalizations as detailed on page 5-37.
  2. When normalizations are complete, display reference normalization values by pressing **BKSP 4 6**. Make a note of the CALIBRATOR FREQ value. Press any menu button to return to the spectral display.
  3. Start the Reference Frequency correction bit entry routine by pressing **UTIL 5 2 4 2**. Where the screen prompt calls for a new value, enter the value noted in step 2, and follow the screen prompts. See Table 5-4 for the correction bit values for SW410. See Figure 5-14 for the location of SW410 on the Reference Oscillator board.



**Figure 5-14: SW410 on the Reference Oscillator Board**

4. Turn power off and back on. Recall last power down settings by pressing **UTIL 1 0**. Display reference normalization values by pressing **UTIL 5 5 4 6**.
5. Check that the CALIBRATOR FREQ value is 100 MHz,  $\pm 1.2$  kHz.
6. Again, perform the Internal Reference Frequency normalization, as detailed on page 5-37.

**Table 5-4: Correction Bit Values**

Switch No.	Value
7	20 Hz
6	40 Hz
5	80 Hz
4	160 Hz
3	320 Hz
2	640 Hz
1	1280 Hz

**Video Monitor Adjustment**

Use the following procedure to adjust R640 and R740 on the Sweep board.

■ Test equipment required:

TV Visual Carrier Source  
Oscilloscope with Probes  
Multimeter (DMM)

1. Press **UTIL 0** to initialize instrument settings. Set SPAN/DIV to 2 MHz and RESOLUTION BW to 5 MHz.
2. Connect an RF visual carrier (such as from a TV antenna) to the RF INPUT.
3. Tune the Spectrum Analyzer to a TV visual carrier via UTIL 2 0. See Table 5-5 for visual carrier frequencies.

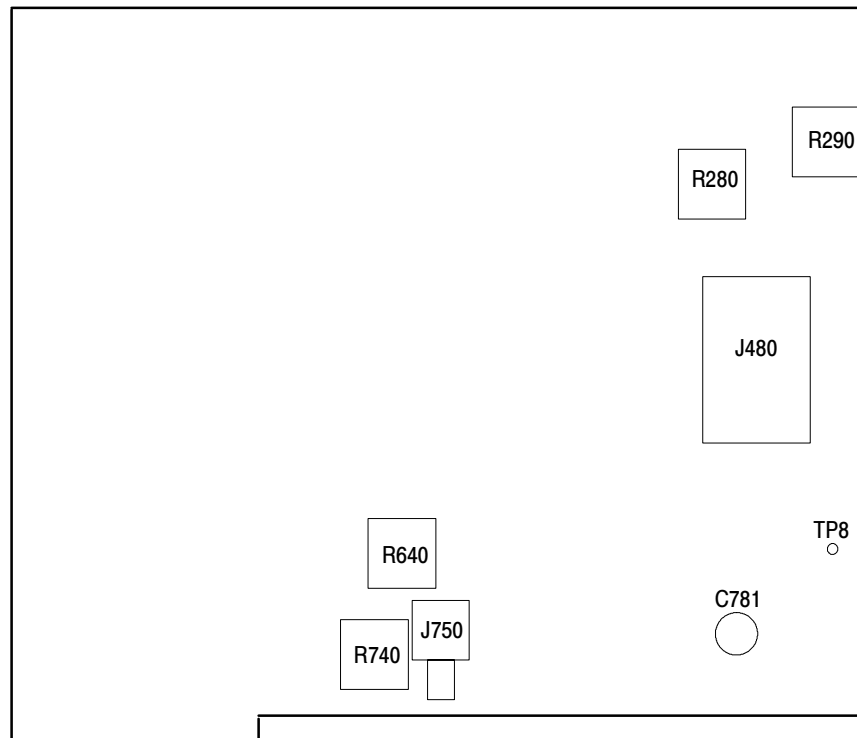
**Table 5-5: Television Channels**

Channel	Video Carrier
2	55.25 MHz
3	61.25 MHz
4	67.25 MHz
5	77.25 MHz
6	83.25 MHz
7	175.25 MHz
8	181.25 MHz
9	187.25 MHz
10	193.25 MHz
11	199.25 MHz
12	205.25 MHz
13	211.25 MHz

**NOTE.** The aural carrier is 4.5 MHz away from the visual carrier. Carrier frequencies for Channels A through W and 14 through 83 are omitted from this table.

4. Set video signal parameters by pressing **DEMOD 9** and selecting BROADCAST VIDEO DETECT MODE, POSITIVE SYNC POLARITY, and NEGATIVE VIDEO POLARITY. Press any menu button to exit the menu.
5. Set the peak carrier level at the top graticule line (REF LEVEL ↑ or ↓).
6. Enable the broadcast (AM) video mode by pressing **DEMOD 3**, and set the LEVEL control for minimum flicker in the displayed picture.

7. Adjust R640 on the Sweep board (Figure 5-15) to move the bottom of the scan to the bottom graticule line.



**Figure 5-15: Adjustment and Test Point Locations on the Sweep Board**

8. Adjust the FM detector as follows:
  - a. Select the following settings on the test Spectrum Analyzer:

FREQUENCY	100 MHz
REF LEVEL	-30 dBm
SPAN/DIV	10 MHz
  - b. Enable the calibrator by pressing **INPUT 9**.
  - c. Center the signal by pressing **CTR MEAS/TRKG**.
  - d. Disconnect the 110 MHz IF cable from J750 on the Sweep board.
  - e. Monitor TP8 with a Multimeter and adjust R740 (FM Video Offset) on the Sweep board (Figure 5-15) for 0.7 VDC.
  - f. Reconnect the 110 MHz IF cable to J750 on the Sweep board.
  - g. Set the oscilloscope to 0.5 V/Div and 1 ms/Div sweep.

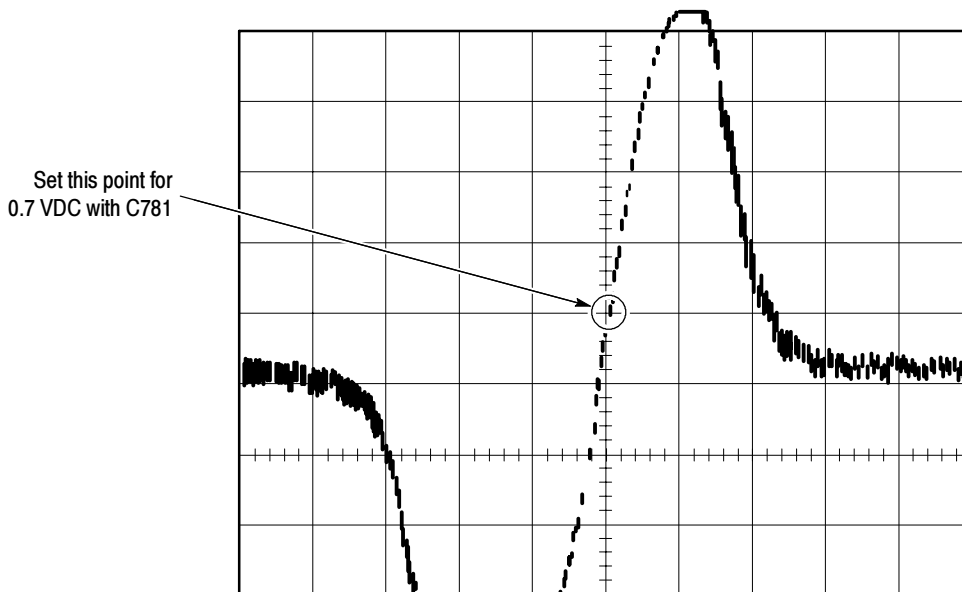
- h. Connect the oscilloscope test probe to TP8 on the Sweep board.
- i. Press **Util 5 2 3 Util** to stop the sweep at center screen.

---

**NOTE.** Refer to Figure 5-16. This is a representation of what the waveform at TP8 would look like if the analyzer was sweeping. The scope will be indicating a DC level. The point indicated in Figure 5-16 will need to be adjusted to 0.7 VDC by adjusting C781.

---

- j. Adjust C781 through its range to locate the midpoint of the waveform between its extremes. When it has been determined that C781 is adjusted to this point, set C781 for 0.7 VDC. Change the oscilloscope to 0.1 V/Div to increase the accuracy of the adjustment.



**Figure 5-16: Typical FM Adjustment Waveform**

- k. Remove the probe from TP8 and press **AUTO SWEEP** twice to restart the sweep.
- l. Connect a FM video signal to the RF IN.
- m. Tune the Spectrum Analyzer to an FM visual carrier.
- n. Set FM (Satellite) video signal parameters by pressing **DEMODO 9** and selecting **SATELLITE VIDEO DETECT MODE**, **NEGATIVE SYNC POLARITY**, and **POSITIVE VIDEO POLARITY**. Press any menu button to exit the menu.

- o.** Set the peak carrier level at the top graticule line.
- p.** Enable the FM video mode by pressing **DEMODO 3**, and set the LEVEL control for minimum flicker in the displayed picture.
- q.** Adjust R740 on the Sweep board for best contrast in the picture.
- r.** Initialize instrument settings by pressing **UTIL 1 1**. If user defined power up settings exist, the instrument will recall those settings. If no user defined power up settings exist, the instrument will recall factory default power up settings.

**Video Demod  
Adjustment Procedure**

Use the following procedure to adjust C21, C22, C23, C24, R63, R59, and L11 on the Video Demod board:

**Test Setup.** Connect instruments as follows:

- Test equipment required:

PAL/NTSC Signal Generator  
CATV Modulator  
Test Spectrum Analyzer  
Tracking Generator

- Select the following settings on the test instruments:

Test Spectrum Analyzer

Center Frequency	100 MHz
Span/div	5 MHz
Reference Level	-20 dBm
Vertical Scale	10 dB/div
Resolution	5 to 1 MHz

Test Tracking Generator

Output Level	-20dBm
--------------	--------

- Mount video demod board on extender board.
- Remove the connectors to the video demod board 110MHz OUT and 110MHz IN.
- Connect the output of the tracking generator to the RF Input of the test spectrum analyzer using two cables connected together with an SMB connector. These cables will later be connected to the Video Demodulator board (next step).

The test spectrum analyzer display should be a nearly flat line near the top of the screen (reference level). Adjust the output level (fine) of the tracking generator to position the trace at the test spectrum analyzer reference level (top of screen) over the frequency range of 105 MHz to 115 MHz.

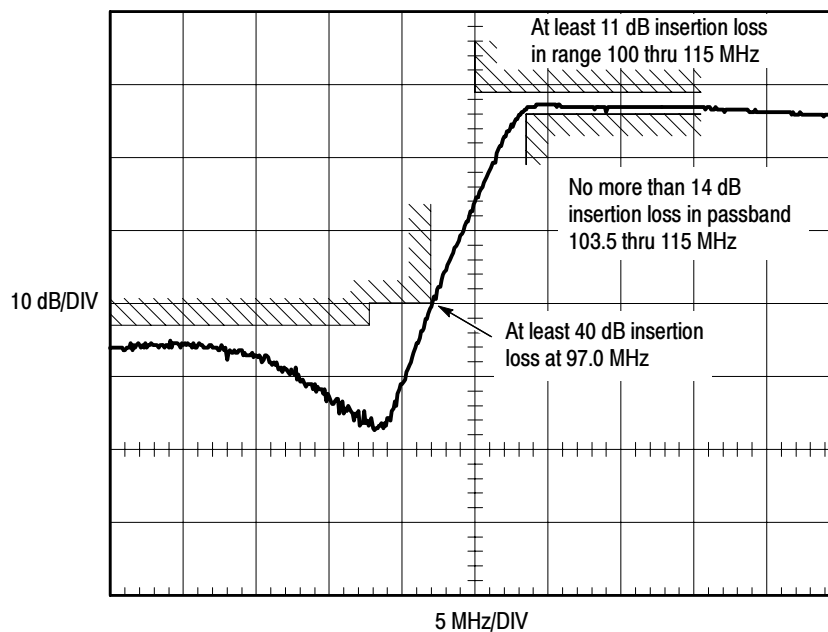
- Connect the output of the tracking generator to the Video Demod board 110M IN connector. (This connector is an SMB connector and will require an adapter cable.)
- Connect the TP110M (SMB connector) from the Video Demod board to the test spectrum analyzer's RF input.



**Adjust High Pass Filter.** Adjust C21, C22, C23, and C24 as follows:

1. Adjust C21, C22, C23 and C24 on the video demod board so the response of the High Pass filter closely resembles the curve shown in Figure 5-17 and conforms to the limits indicated in the figure.

**NOTE.** C21 and C22 primarily tune the notch seen at about 93 MHz; C23 and C24 primarily affect the area around the knee seen near 103 MHz. However, there is appreciable interaction between the adjustments.



**Figure 5-17: HPF Tuning Criteria (at TP110M)**

2. Disconnect the tracking generator output cable from the Video Demod board.

**Adjust Downconverter Local Oscillator.** Adjust R59 and R63 as follows:

1. Reconnect the 110 MHz input signal (from the RF Mother board) to the Video Demod board 110M IN connector.
2. Move the input cable of the test spectrum analyzer from TP110M (on the Video Demod board) to TP45M.
3. Set the test spectrum analyzer as follows:

Center Frequency	45 MHz
Reference Level	-30 dBm
Span/Div	1 MHz

4. Initialize the 2715 setting by pressing **UTIL 1 1**.
5. Select the following settings on the 2715:

CENTER FREQUENCY	100 MHz
REFERENCE LEVEL	18.8 dBmV
RESOLUTION BANDWIDTH	1 MHz
SPAN	ZERO
Calibrator Signal	ON
Markers	OFF

6. Activate the TOGGLE VD DAC LO/HI function by pressing **UTIL 5 2 5**.

---

**NOTE.** When performing steps 7 through 10 you will be adjusting the operating frequency and tuning range of the Downconverter Local Oscillator. While making the adjusts, use menu item 5 (TOGGLE VD DAC LO/HI) to toggle the frequency between the two values (41 and 47 MHz as indicated by the “41 SET” or “47 SET” at the end of the menu line).

*The object of the procedure is to set R63 and R59 so that the frequencies produced in both states are each within 100 kHz of the nominal value.*

---

7. Adjust the video demod BIAS (R63) so that the signal peaks, in both states (41 SET and 47 SET), are visible on the test spectrum analyzer’s screen. If necessary adjust RANGE (R59) toward the counterclockwise end of its rotation.
8. Adjust RANGE (R59) so that the two signal peak locations are 6.0 MHz apart.
9. Adjust BIAS (R63) so that the lower frequency signal is located at 41 MHz  $\pm$ 100 kHz.
10. Alternately adjust R59 and R63 to eliminate interaction until the lower frequency peak is at 41 MHz  $\pm$ 100 kHz and the upper peak is at 47.0 MHz  $\pm$ 100 kHz.

**Adjust Video Detector.** Adjust L11 as follows:

1. Connect the TSG 95 Video Output to the TVM450 Video Input. Connect the TVM450's -20 dB RF TEST Output to the 2715 RF INPUT.
2. Set the TSG 95 to produce a 5-Step Grayscale and set it to the desired video format (NTSC or PAL).
3. Set the TVM450 output to Channel 4 and the RF level control full counterclockwise.

---

**NOTE.** Be sure the *OFFSET* switch on the rear panel of the TVM450 is set to *OFF*.

---

4. Check that the VIDEO MODULATION and VIDEO/AUDIO RATIO controls on the TVM450 are both set to mid range (detent) and that the AUDIO DEVIATION control is set full counterclockwise.
5. Select the following settings on the 2715:
 

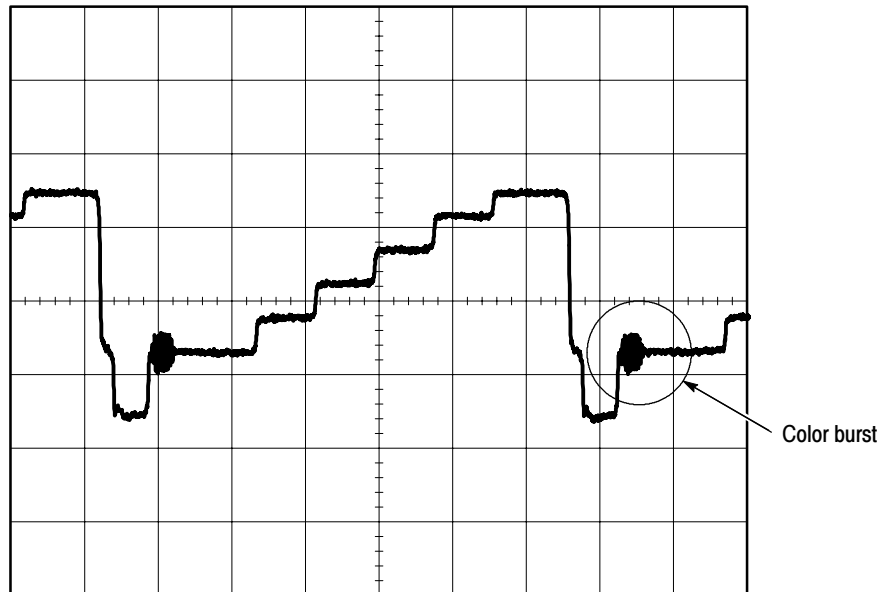
CENTER FREQUENCY	67.25 MHz
SPAN/DIV	2 MHz
Calibrator Signal	OFF
6. Set the signal (visual carrier) to the top graticule with the REF LEVEL ↑ and ↓ controls.
7. Set SPAN to ZERO.
8. Activate the VD DAC TO VIS CARR function by pressing **UTIL 5 2 6**.
9. Select the following settings on the test oscilloscope:
 

Vertical Mode	CH 1
CH 1 Volts/Div.	500 mV
CH 1 Coupling	DC
Time/Div.	10 μs
Trigger Mode	Auto
Trigger Source	CH 1
Trigger Coupling	DC
10. Connect the oscilloscope channel 1 probe to the Video Demod VIDEO TP.
11. Tune L11 until the test oscilloscope displays a video signal as illustrated in Figure 5-18.

---

**NOTE.** It will probably be necessary to adjust the test oscilloscope trigger level control to obtain a stable display.

---



**Figure 5-18: Typical Video Waveform**

12. Adjust the Video Demod L11 slug so the amplitude of the color burst remains constant as the AFC is toggled ON and OFF by pressing 7. Refer to Figure 5-18.
13. Toggle the AFC to the ON position.
14. Set the test spectrum analyzer as follows:
 

Center Frequency	45.7 MHz
Span/Div	200 kHz
Resolution	100 kHz
15. Adjust L11 to position the visual carrier signal seen on the test spectrum analyzer to center screen (45.7 MHz  $\pm$ 50 kHz).
16. Toggle the AFC (off - on) and verify that the frequency shift of the signal seen on the test spectrum analyzer is <150 kHz.
17. Remove the cable to the 2715 RF INPUT.
18. Activate the 2715 QUERY LOCK STATUS by pressing 9.
19. Verify that line 9 status indicates UNLOCKED.

**Horizontal Sync Output Check.** Verify the Horizontal Sync Output as follows:

1. Set the test oscilloscope as follows:

Vertical Mode	CH1 & CH2
CH1 Volts/div	500 mV
CH1 Coupling	DC
CH2 Volts/div	5V
CH2 Coupling	DC
Time/div	10 $\mu$ s
Trigger Source	CH2
Trigger Mode	Auto
Trigger Coupling	DC

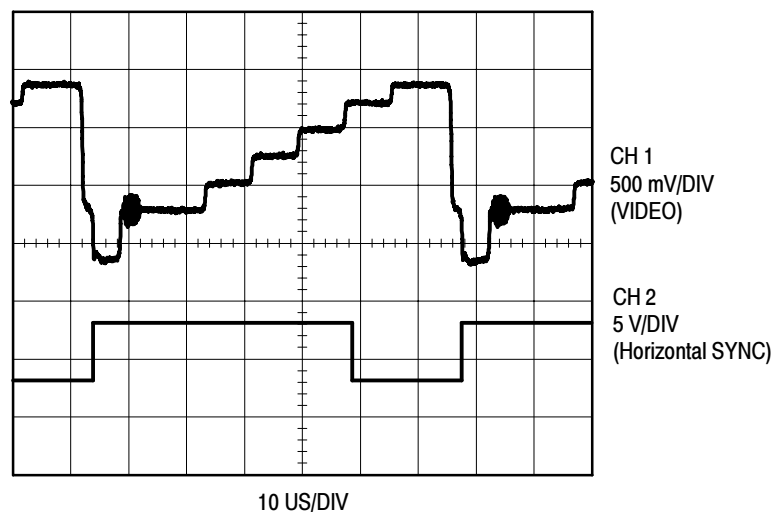
2. Connect test oscilloscope channel 2 probe to pin 24 of demod/300Hz extender board.

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**NOTE.** Channel 1 oscilloscope probe is still connected to Video Demodulator boards video test point.

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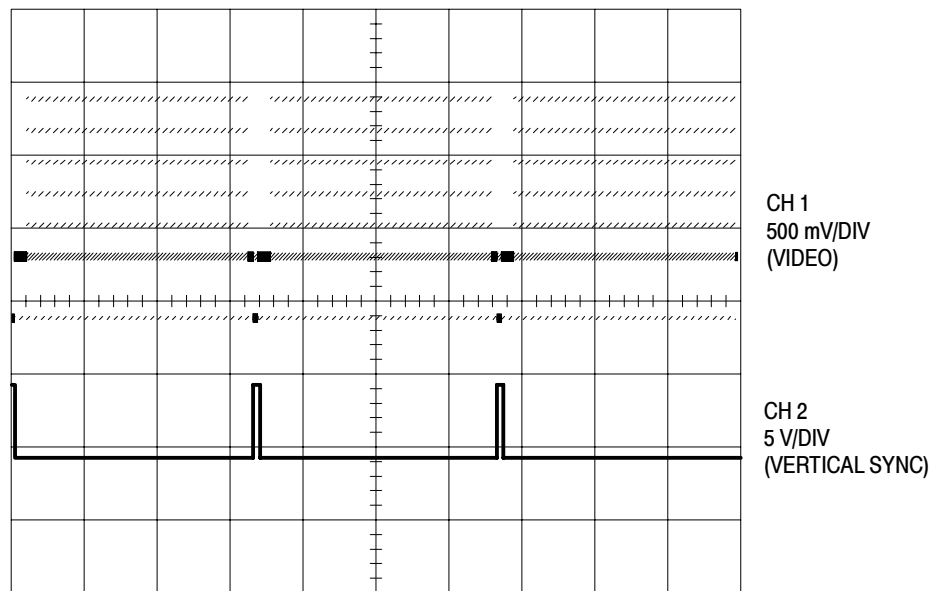
3. Check that during one cycle of videos waveform (test oscilloscope CH 1), the following occurs:
  - a. Horizontal output waveform (test oscilloscopes CH 2) changes to high state (+5 V) when video's 1st horizontal sync pulse begins. Refer to Figure 5-19.
  - b. After a period of 40  $\mu$ s to 57  $\mu$ s the horizontal output waveform changes to a low state (0 V).
  - c. At end of videos cycle (beginning of 2nd horizontal sync pulse), the waveform changes back to a high state.



**Figure 5-19: Horizontal Sync Output**

**Vertical Sync Output Check.** Use this procedure to check the Vertical Sync Output.

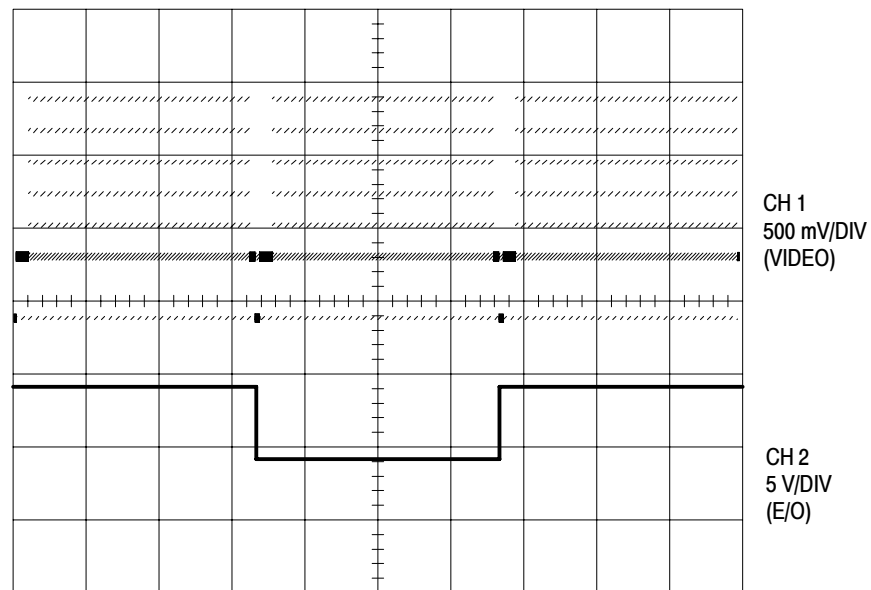
1. Change test oscilloscope time/div to 5ms.
2. Move the test oscilloscope channel 2 probe to pin 22 of the extender board.
3. During one cycle of video waveform (test oscilloscope CH 1), verify the following:
  - a. The vertical output waveform (test oscilloscope CH 2) appears as a narrow pulse of 0 to +5 V. Refer to Figure 5-20.
  - b. The vertical output pulse width is approximately the same as video vertical sync pulse width.
  - c. Vertical output's pulse appears at the same place on screen as video vertical sync pulse.



**Figure 5-20: Vertical Sync Output Waveform**

**E/O Output Check.** Use this procedure to check the E/O Output.

1. Move the test oscilloscope channel 2 probe to pin 23 of the extender.
2. Looking at the test oscilloscope screen, verify the following:
  - a. E/O Output waveform (test oscilloscope CH 2) resembles a 0 to + 5 V square wave. Refer to Figure 5-21.
  - b. E/O Output changes state with each video vertical sync pulse (CH 1).
  - c. E/O Output is locked to video vertical sync pulse. (No erratic behavior occurs.)



**Figure 5-21: E/O Output Waveform**

3. Turn the 2715 POWER off. Reconnect the cables to the Video Demod board and reinstall it without the extender board.

### **Amplitude Flatness Adjustment**

The following procedure measures the instrument's response over the input frequency range (15 MHz to 1000 MHz) to a known amplitude input. Once this data is available, it is transferred to the instrument operating system. The operating system uses the data to correct certain CATV measurements.

The following steps describe the Amplitude Flatness Adjustment process.

- Set up computer
- Measure flatness response
- Transfer data to instrument operating system
- Check flatness corrections

**Preliminary Adjustment Procedure and Environment Requirements.** Before performing this step, reinstall the cabinet (removed at the start of this procedure) and allow the instrument to warm up for at least one hour. After a stable temperature is reached, run the instrument normalization routine as described in *Perform Service Normalizations* on page 5-36.

For proper flatness adjustment, the ambient temperature for the instrument should be within  $\pm 5^{\circ}$  C of the temperature where normalization was performed. The ambient temperature during factory normalization is  $25^{\circ}$  C.



**Computer Setup and Software Installation**

For this adjustment the 2715 is controlled by a personal computer using the RS-232 or GPIB interface. The test equipment is controlled by GPIB. If necessary, refer to the documentation provided with the GPIB interface card for installation instructions.

The following steps describe the installation process.

- Install the test software
- Run the system configuration program (CONFIG)
- Connect the personal computer to control the test instrument
- Run the test equipment characterization program (CHAR)

---

**NOTE.** *These steps are required for initial installation only. After the initial installation, it is not necessary to run CONFIG or CHAR as long as the system remains intact.*

---

**Install the Flatness Test Software.** The Flatness Test software is contained on a set of floppy disks (*271X Flatness Tests*) supplied with this manual. Use the following procedure to install the software onto the personal computer:

1. Install disk 1 in drive A of the personal computer.
2. Set the default drive to A by typing:  
A:<Return>
3. Type the following command to install the flatness software on your hard disk:  
Install<Return>  
A prompt will instruct you when to switch disks (for 5.25 disks only).
4. Reboot your PC to incorporate the changes to the autoexec.bat file.

---

**NOTE.** *INSTALL.BAT is a batch file that creates a directory on your hard disk (called TEKCATS) and several subdirectories. It then copies the Flatness Test software into these directories.*

---

**Configure the Test System (CONFIG).** The CONFIG program generates a table that describes the test equipment being used and its respective GPIB addresses. The program also creates a file for the power sensors, containing the calibration factors to be used at each frequency. It also provides a means to customize the software to work with a signal generator not supported by the software.

To start the program to configure the test system type:

```
CONFIG<Return>
```

The main menu will be displayed with the following selections.

```
Create a New System Configuration
List the New System Configuration
Exit to DOS
```

Select Create a New System Configuration and you will be asked to specify the following:

- Signal source. (If you select User Defined Signal Generator, you will be prompted to describe the generator frequency range, amplitude range, and so forth. Refer to the next topic *User Defined Signal Generator*).
- Power Meter used.
- Identification code for Power Sensors. (This is an arbitrary code of your choice. Three power sensors are used; select HP8482A for your first sensor, select HP8484A or HP8481D for the second sensor, and select HP8483A for the third sensor.)
- Power Sensor calibration factors (in %) from the data printed on the power sensor.

---

**NOTE.** When entering the data, you are asked to enter the 50 MHz Reference Calibration Factor (RCF) first. Then enter the remaining data, starting with the lowest frequency and increasing to highest, including the 50 MHz data if available.

When entering data (for example 50 MHz), type 50e6 or 50000000.

---

If you wish to examine the configuration you have just created, select List a New System Configuration. This will display the system configuration.

---

**NOTE.** When using the HP 438A power meter, connect the 50  $\Omega$  sensor (HP8484A or HP8481D) to Channel A, and the 75  $\Omega$  sensor (HP8483A for 75  $\Omega$  system) or 50  $\Omega$  sensor (HP8482A for 50  $\Omega$  system) to Channel B.

---

**User Defined Signal Generator.** If this item is selected during the above configuration procedure, you will be prompted to enter the following information that will tell the software how to drive the signal generator you specify. The correct entries for the Wiltron 6769A Swept Synthesizer will be used in this example.

1. Manufacturer's Name. 15 characters maximum. For Wiltron 6769A: *Wiltron*
2. Model Name. 10 characters maximum. For Wiltron 6769A: *6769A*
3. GPIB command to initialize the signal generator (80 characters maximum). Enter the string of characters to reset to the following conditions:
  - CW Mode selected (if signal generator is a sweeper)
  - All other miscellaneous functions, like Modulation, turned offFor Wiltron 6769A: *RST*
4. GPIB command that will turn the RF Output on. Enter the string of characters that will turn the RF Output on. For Wiltron 6769A: *RF1*
5. GPIB command that will turn the RF Output off. Enter the string of characters that will turn the RF Output off. For Wiltron 6769A: *RF0*
6. Minimum RF Output Amplitude. Enter the minimum amplitude that the signal generator can produce (in dBm) over the frequency range 10 MHz to 1000 MHz. For Wiltron 6769A: *-92*
7. Maximum RF Output. Enter the maximum amplitude the signal generator can produce (in dBm) over the frequency range 10 MHz to 1000 MHz. For Wiltron 6769A: *+10*
8. Enter the command to set the RF Output Amplitude. Enter the string of characters that comprise the RF output amplitude command. The actual level and units will be appended to this command by the software. For Wiltron 6769A: *L1*
9. Enter units to append to the RF output amplitude for dBm - Enter the string that will be appended to the numeric part of the RF Output Amplitude command that will designate that the number is in dBm. If no units are required, enter <Return>. For Wiltron 6769A: *DM*
10. Enter the finest resolution available for the RF Output Amplitude (in dB). For Wiltron 6769A: *.01*

Using the above example for the Wiltron 6769A, the software will send the following to set the 6769A to maximum output amplitude: *L1 10.00 DM*

11. Enter Minimum Output Frequency in Hz. Be sure to enter a number in decimal or scientific notation. For Wiltron 6769A: *10000000* or *10e6* (not 10 MHz)

12. Enter Maximum Output Frequency in Hz. For Wiltron 6769A: *40e9*
13. Enter the GPIB command that sets frequency. Enter the string of characters that comprise the CW frequency command. The actual frequency and units will be appended to this command by the software. For Wiltron 6769A: *CFI*
14. Enter the maximum number of digits that can be sent in a GPIB frequency command. If there is a limitation on the number of frequency digits the signal generator will accept (not including sign or decimal point or units), enter that limit. Most signal generators have no such limit, so enter 0. For Wiltron 6769A: *0*
15. Enter units to append Frequency number that denotes Hz (<Return> if not required). Enter the string that will be appended to the numeric part of a frequency command that will designate Hz. If no Hz units are available, enter *\*NONE\**. For Wiltron 6769A: *\*NONE\**
16. If no Hz units are available, or if an insufficient number of digits can be sent to the signal generator to set it to its maximum frequency in Hz, then you will be prompted to enter the units for kHz. As with Hz, enter the string of characters that will cause the signal generator to interpret the frequency number to be kHz. If no kHz units are available, enter *\*NONE\**. For Wiltron 6769A: *KH*
17. If no Hz or kHz units are available, or if an insufficient number of digits has been sent to the signal generator to set it to its maximum frequency in kHz, then you will be prompted to enter the units for MHz. As with kHz, enter the string of characters that will cause the signal generator to interpret the frequency number to be MHz. If no MHz units are available, enter *\*NONE\**. For Wiltron 6769A: not applicable

**Changing System Configuration.** If you wish to change system configuration (different generator or power meter) you must again run CONFIG and reenter the test equipment being used. If the power sensor is not to be changed, when prompted for power sensor calibration factors, type <RETURN> at the frequency prompt, and the existing file of data will be used. If the user defined signal generator is not to be changed, select User Defined Signal Generator at the Signal Generator selection menu, then answer N to the next prompt.

**Personal Computer  
Connections to Test  
Instrument**

Use the following procedure to connect the PC to the instrument.

1. Connect the signal generator and power meter to the computer through GPIB cables. Connect the instrument to be tested to the computer through a GPIB or RS-232 cable. See the *2714 & 2715 Programmer Manual* for a description of the RS-232 cable requirements.
2. Apply power to the instrument and test equipment, then allow a warmup of at least one hour.
3. If applicable, set the GPIB address of the 2715 to 1.

**Running the Test Equipment Characterization Program (CHAR).** The flatness test uses a power divider and power meter to compensate for flatness variations in the generator, and for losses in the test system cabling. The flatness test performs this correction by measuring the signal amplitude at one power divider output (refer to Figure 5-22), then calculating the amplitude present at the instrument's RF Input at the other power divider output. The error in displayed flatness is then corrected according to the calculated power available at the RF Input.

The CHAR program is designed to measure and record the difference in amplitude between the power meter and the instrument's RF Input.<sup>1</sup>

If a dual channel meter is used, then both outputs are characterized at the same time using the setup in Figure 5-22. If a single channel power meter is used, test setups for characterizing the power divider output ports are shown in Figures 5-23 and 5-24. The power meter output of the power divider is characterized by measuring its output amplitude, with a power meter, across the frequency range while the DUT output, with min loss pad, is terminated with the 75  $\Omega$  termination as in Figure 5-23. The power meter and termination connections are then made as in Figure 5-24 to determine the response of the DUT output with the power meter output terminated. The amplitude difference between the power meter and DUT outputs is then stored in a data file for later use by the flatness test.

To maintain a traceable calibration standard, this characterization must be performed whenever the power divider or any pads are replaced. We recommended dedicating these components to this test system to minimize characterization requirements.

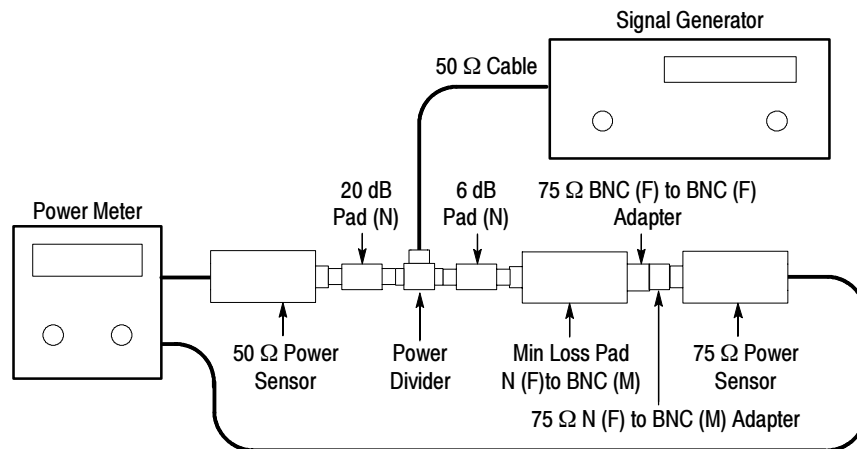
<sup>1</sup> **Output of the min loss pad connected to power divider device under test (DUT) output.**

To characterize the test setup, enter the following at the prompt on the PC:

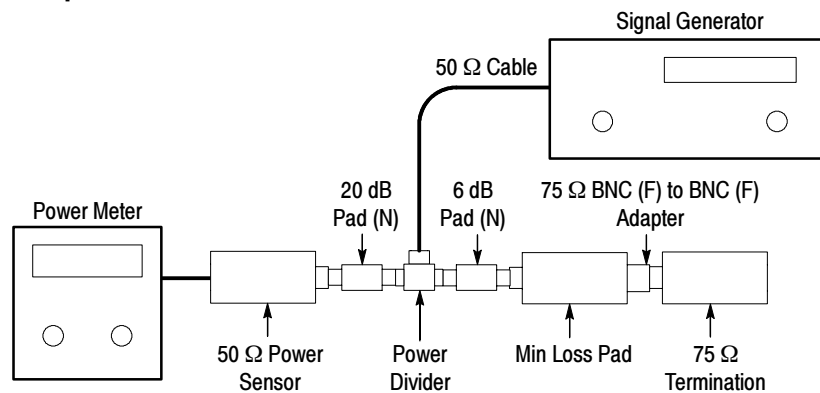
CHAR<Return>

Select device under test (DUT). **Both selections need to be run, select 1 or 2 and return key?**

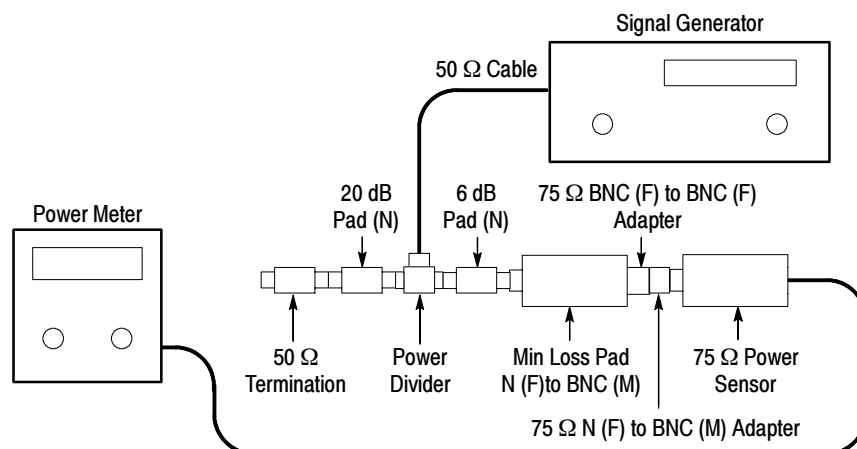
- For split75 select 1 then press <Return>:  
Follow the on-screen instructions. You will be prompted to make the connections shown in Figure 5-22 (if you are using a dual channel power meter) or Figures 5-23 (if you are using a single channel power meter). If you are using a single channel power meter, midway through the test you will be prompted to make the connections shown in Figure 5-24. The test will then run to completion.
- For split50 select 2 then press <Return>:  
Follow the on-screen instructions. You will be prompted to make the connections shown in Figure 5-25 (if you are using a dual channel power meter) or Figures 5-26 (if you are using a single channel power meter). If you are using a single channel power meter, midway through the test you will be prompted to make the connections shown in Figure 5-27. The test will then run to completion.



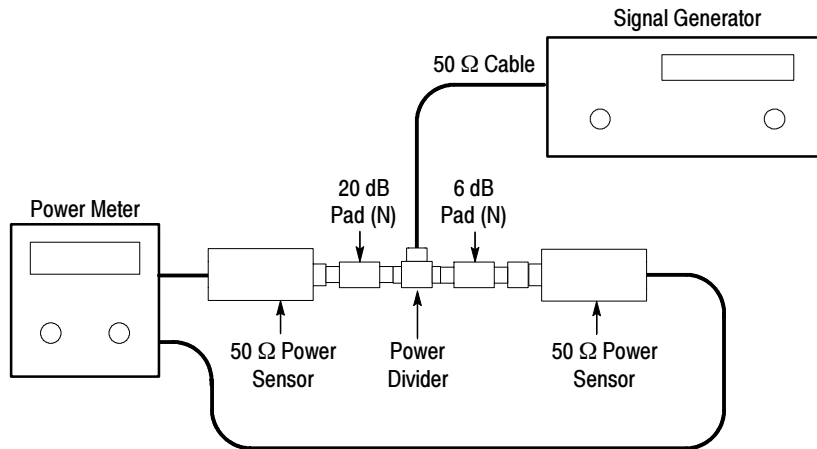
**Figure 5-22: Test Equipment Characterization Using a Dual Channel Power Meter for split75**



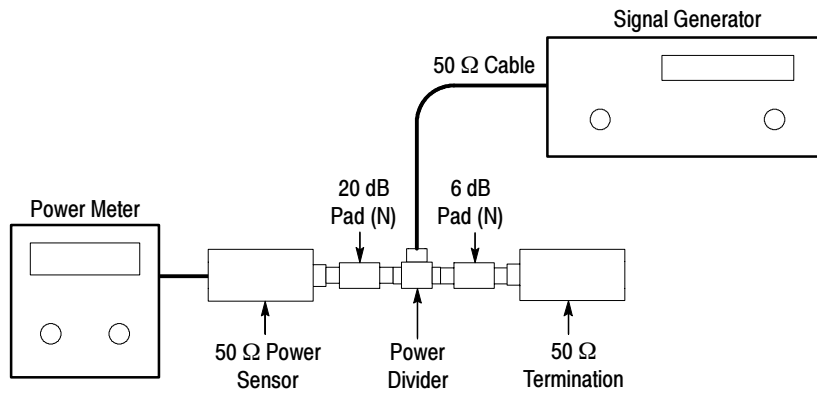
**Figure 5-23: Test Equipment Characterization Using a Single Channel Power Meter to Characterize the Power Meter Output for split75**



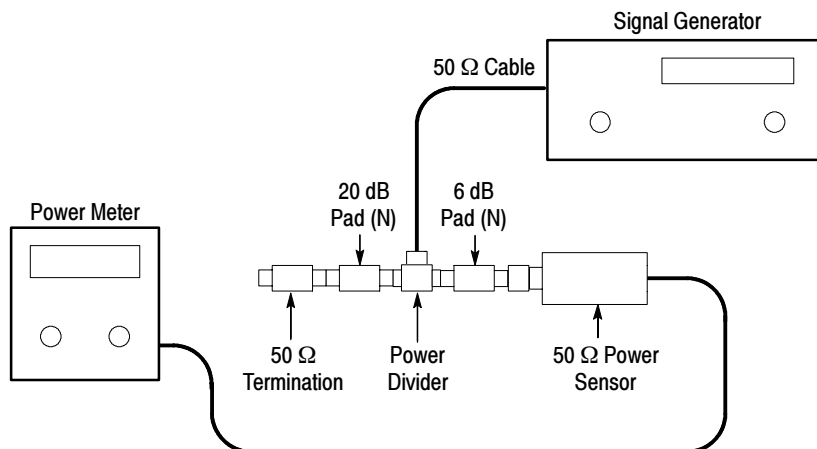
**Figure 5-24: Test Equipment Characterization Using a Single Channel Power Meter to Characterize the DUT Output for split75**



**Figure 5-25: Test Equipment Characterization Using a Dual Channel Power Meter for split50**



**Figure 5-26: Test Equipment Characterization Using a Single Channel Power Meter to Characterize the Power Meter Output for split50**



**Figure 5-27: Test Equipment Characterization Using a Single Channel Power Meter to Characterize the DUT Output for split50**



**Flatness Measurement**

This section measures the instrument's flatness response over the input frequency range and downloads that response to the instrument. This data is used by certain CATV measurements to correct for frequency related amplitude errors.

Allow the instrument to warm up for at least one hour before performing this procedure.

---

**NOTE.** Do not press the help or interrupt keys during the test. Once a test is interrupted, it cannot be resumed at the point of interruption; it must be restarted.

---

**Run the Flatness Program.** Type the following on the personal computer to begin the flatness program.

271X<Return>

The 271X program is menu driven and requires entry of test conditions. You will be prompted to enter the following during the test sequence.

1. Enter your name or your calibration lab's name.
2. Verify the date and time.
3. Select the CAL sequence from the Select Sequence menu.
4. Select the type of communication interface used by the 2715 (RS-232 or GPIB).
5. Select "y" if the 2715 has Option 15 installed (EXT LO output on the rear panel).
6. Enter the 2715 serial number and press <Return>. You will be asked to verify the serial number.

**Flatness Measurement.** Complete the following steps to perform the flatness measurement.

1. Select Flatness Test.

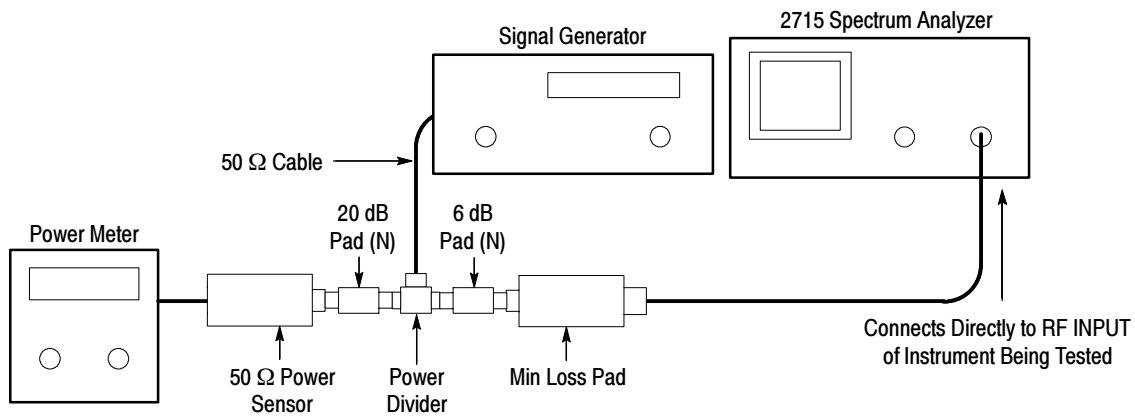
After the flatness test is initiated, the 2715 normalization routine will be performed. Normalization requires approximately 15 minutes to complete.

2. You will be prompted to make the connections shown in Figure 5-28 (75  $\Omega$ ) or Figure 5-29 (50  $\Omega$ ).

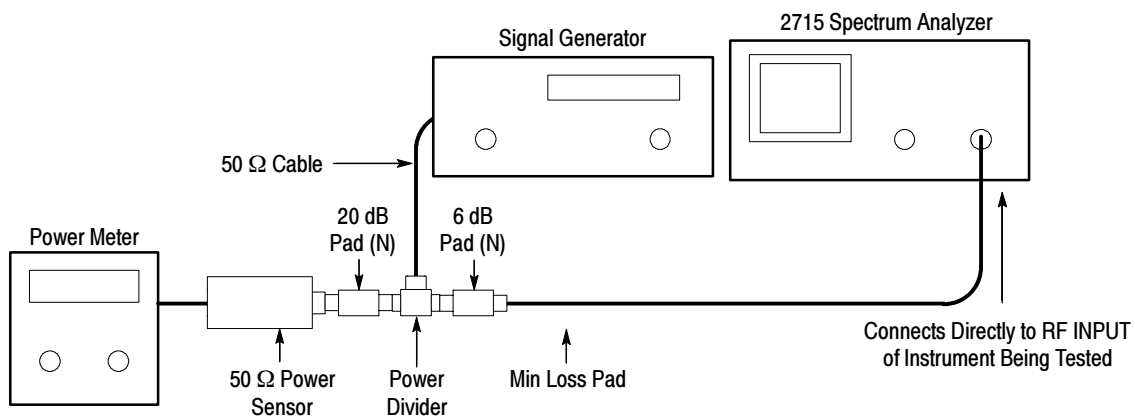


**CAUTION.** Provide adequate support for the power divider and related equipment. The RF INPUT connector of the 2715 can be damaged if adequate support is not provided.

The test will require about 2 3/4 hours to complete. At the completion of the test, the measurement data will be downloaded to the 2715. Data will not be downloaded if the test failed.



**Figure 5-28: Flatness Test Setup (75 Ω)**



**Figure 5-29: Flatness Test Setup (50 Ω)**

**Run the Flatness Verification Program.** This section checks the flatness correction of the 2715 generated in the previous step.

Type the following on the personal computer to run the 271X program.

271X<Return>

The 271X program is a menu driven program which requires entry of test conditions and test selections. Complete the following steps to run the flatness test (PERFORMANCE VERIFICATION) sequence:

1. Enter your name or your calibration lab's name.
2. Verify the date and time.
3. Select the PV sequence from the Select Sequence menu.
4. Select the type of communication interface used by the 2715 (RS-232 or GPIB).
5. Select "y" if the 2715 has Option 15 installed (EXT LO output on the rear panel).
6. Enter the 2715 serial number and press **<Return>**. You will be asked to verify the serial number.
7. Select the flatness test and you will be prompted to make the connections shown in Figure 5-28.




---

**CAUTION.** Provide adequate support for the power divider and related equipment. The RF INPUT connector of the 2715 can be damaged if adequate support is not provided.

---

The test requires approximately  $\frac{3}{4}$  hour to complete and will record the flatness as corrected by the data down loaded in the CAL measurement.

**Evaluating the Flatness Verification Test.** The Report Generator (RPT) program generates a printout of the test results from the 2715 tests. For example, to run RPT for a 2715 SN B010100 enter the following at the DOS prompt:

```
rpt 2715 B010100 PV<Return>
```

The full syntax for RPT is as follows: (Optional parameters are in [ ])

```
rpt [-pfs] dut_type serial_number sequence
```

-p: print only those tests that passed (optional)

-f: print only those tests that failed (optional)

-S: print to the screen (optional)

dut\_type: 2715 (required)

serial\_number: DUT serial number, for example B010100 (required)

sequence: PV or CAL (required) Use CAL for the adjustment test.

**RPT Results.** The following is a description of the results of running RPT.

If units are dBRef (CAL,TS) compute maximum error relative to the reference.

Example:

if absolute (maxError + minError) > absolute (minError - RefError)

error = maxError - RefError

else

error = minError - RefError

If units are dBm (PV,TS) compute the difference between the median of the measured values and 0.0.

Example: 
$$\text{error} = \frac{\text{maxError} + \text{minError}}{2.0}$$

If units are dB P-P (PV,TS) compute the P-P error.

Example: 
$$\text{error} = \text{maxError} - \text{minError}$$

**Troubleshooting Flatness Problems.** Included with the software is a utility that allows you to run the flatness over a restricted frequency or attenuator range as a means of troubleshooting a problem. This utility can also be used to download flatness data from a previous flatness calibration run into the 2715.

To enter this troubleshooting (TS) sequence, after the Cal Lab Name, and Data Prompts, select TS sequence.

After selecting the flatness test to run, you will be prompted to either Run Flatness, or Download Existing Data. Choose the former if you wish to run the flatness test, and the latter if you wish to download data from a previous Flatness CAL run.

If you choose Download Existing Data, the software will download the data from the previous run for this serial number into the 2715. The data it uses is in the file \tekcats\flatness\2715\<sn>.unc (where <sn> is the serial number of the 2715).

If you choose Run Flatness, you are asked for a start frequency, a stop frequency, a frequency step size, a start attenuator, and stop attenuator. Note that the test will always run every attenuator between start attenuator and stop attenuator (2 dB increments). Also note that the numbers entered above must fit within the normal range of values. The normal ranges are: 15 MHz to 995 MHz and 0 dB to 40 dB. If you select values outside these ranges, the test will return and not run.

Next you are prompted to choose between Calibrate Flatness, and Verify Flatness Calibration. Choose the former to generate a table of flatness corrections to be downloaded to the 2715. The data will not be automatically downloaded to the 2715, as with the CAL sequence. If you wish to do this, you will need to copy the file \tekcats\flatness\2715\<sn>.ts to \tekcats\flatness\2715\<sn>.unc Be aware that if you download a file that does not cover the full frequency or attenuator range of the CAL sequence tests, the 2715 will not be calibrated for CATV measurements at some frequency/attenuators.

Choose Verify Flatness Calibration to check the flatness of the 2715 as corrected by a CAL flatness run.



# Maintenance

This section describes procedures for preventive maintenance, troubleshooting methods, corrective maintenance, and procedures for recalibrating those assemblies that normally do not require routine calibration.

## Static Sensitive Components

This instrument contains electrical components that can be damaged by static discharge. See Table 6-1 for the relative susceptibility of various classes of semiconductors. Static voltages of 1 kV to 30 kV can occur in unprotected environments.

Observe the following precautions to avoid damage:

- Minimize handling of static sensitive components.
- Transport and store static sensitive components or assemblies in their original containers, on metallized or conductive foam. Label packages that contain static sensitive assemblies or components.
- Discharge body static voltage by wearing a grounded wrist strap while handling these components. Static sensitive assemblies or components should be handled and serviced only at static free work stations by qualified service personnel.
- Nothing capable of generating or holding a static charge should be allowed on the work station surface.
- Keep the component leads shorted together whenever possible.
- Pick up components by the body, never by the leads.
- Do not slide the components over any surface.
- Avoid handling components in areas that have a floor or work surface covering capable of generating a static charge.
- Use a soldering iron that is connected to earth ground.
- Use only antistatic suction or wick type desoldering tools.

**Table 6- 1: Relative Susceptibility to Static Discharge Damage**

Semiconductor Classes	Relative Susceptibility Levels <sup>1</sup>
MOS or CMOS microcircuits or discretes, or linear microcircuits with MOS inputs (most sensitive)	100 to 500 V
ECL	200 to 500 V
Schottky signal diodes	250 V
Schottky TTL	500 V
High frequency bipolar transistors	400 to 600 V
JFET devices	600 to 800 V
Linear microcircuits	400 to 1000 V
Low power Schottky TTL	900 V
TTL (Least Sensitive)	1200 V

## Preventive Maintenance

Preventive maintenance consists of cleaning, visual inspection, performance check, and recalibration. The preventive maintenance schedule that is established for the instrument should be based on the environment in which the instrument is operated and the amount of use. A preventive maintenance check should be performed every 2000 hours of instrument operation.

### Cleaning

Clean the instrument often enough to prevent dust or dirt from accumulating in or on it. Accumulation of dirt and grease acts as a thermal insulating blanket, prevents efficient heat dissipation, and provides high resistance leakage paths between conductors or components in a humid environment.

Do not use any cleaning method that would subject the internal components to moisture (wet wash).

**Exterior.** Clean the dust from the outside of the instrument by wiping or brushing the surface with a soft cloth or small brush. The brush will remove dust from around the front panel selector buttons. Hardened dirt can be removed with a cloth dampened in water that contains a mild detergent. Abrasive cleaners should not be used.

**Interior.** Clean the interior by loosening accumulated dust with a dry soft brush, then remove the loosened dirt with low pressure air to blow the dust clear. (High velocity air can damage some components.) Hardened dirt or grease may be removed with a cotton tipped applicator dampened with a solution of 75% isopropyl alcohol and rinsed with deionized water. When cleaning front panel buttons use only

<sup>1</sup> Voltage discharged from a 100 pF capacitor through a resistance of 100  $\Omega$ .



deionized water. Abrasive cleaners should not be used. If the circuit board assemblies need cleaning, remove the circuit board by referring to the instructions under *Corrective Maintenance* on Page 6-13.

After cleaning, allow the interior to dry thoroughly before applying power to the instrument.

---

**NOTE.** Do not allow water to get inside any enclosed assembly or components such as the hybrid assemblies, RF Attenuator assembly, potentiometers, etc. Instructions for removing these assemblies are provided in the *Corrective Maintenance on Page 6-13 part of this section*. Do not clean any plastic materials with organic cleaning solvents such as benzene, toluene, xylene, acetone, or similar compounds because they may damage the plastic.

---

### Fixtures and Tools for Maintenance

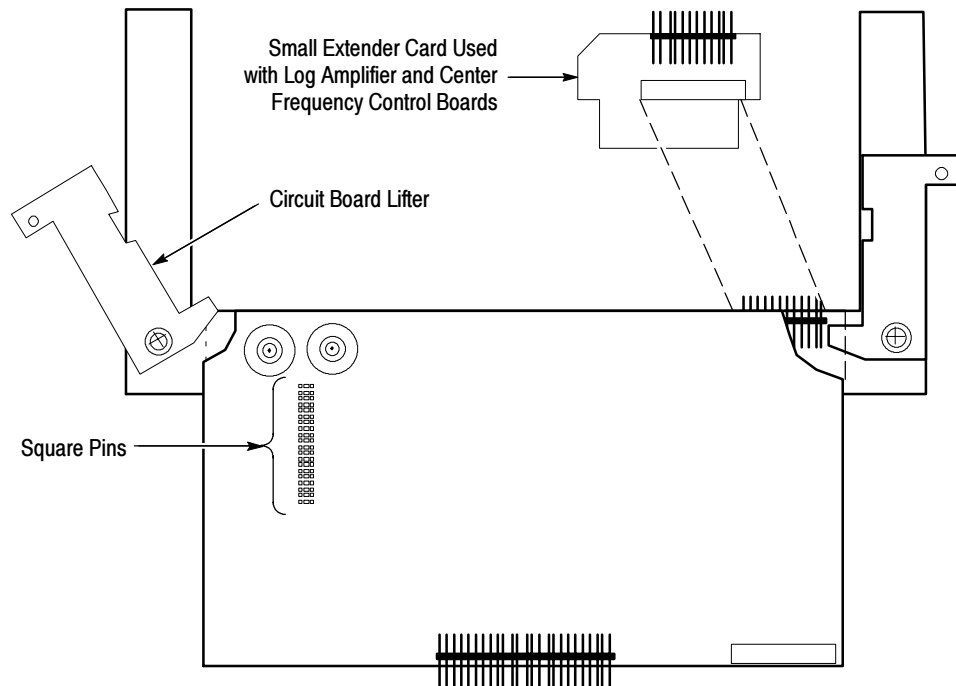
The following is a list of tools and fixtures that are needed to service the Spectrum Analyzer:

- Screwdriver, flat, with 1/4 to 3/8 inch bit
- Screwdriver, Posidriv 440-2
- Screwdrivers, Torx T15 and T20
- Wrench, 5/16 inch open end
- Hex drive wrenches, 3/32, 5/64, 7/64 inch
- Torque Wrench Kit

An optional service kit (the Extender Kit) is available to aid in servicing the Spectrum Analyzer. The Extender Kit consists of the following:

- Main Extender Board
- Small Extender Board
- Extender Board for the 300 Hz Bandpass Filter board
- Three SMB male to female cables
- Two SMA male to male cables
- Two SMA female to female adapters
- Female BNC to female SMB cable
- Male BNC to square pin cable
- Data sheet

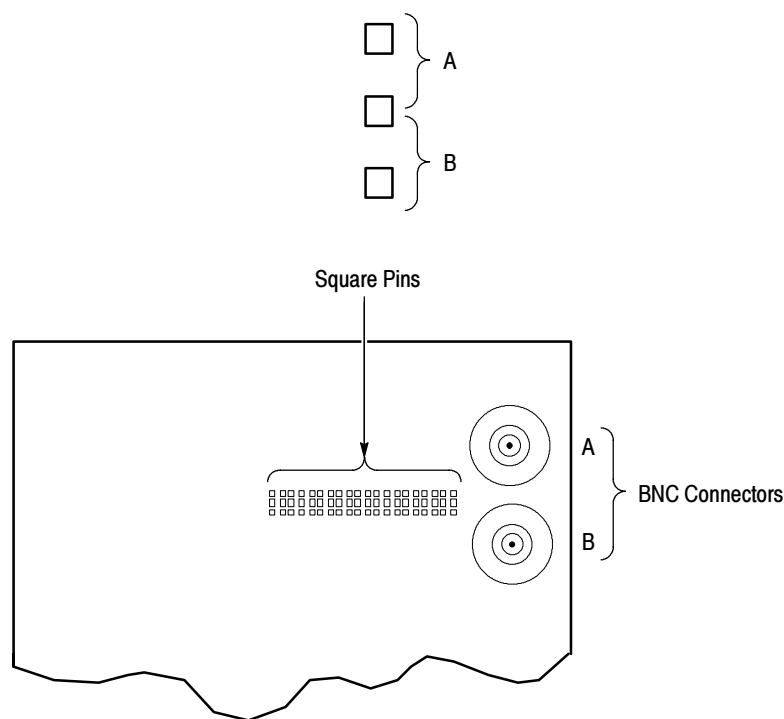
The Main Extender is to be used with all circuit boards that use the 50 conductor microprocessor bus cable. The Secondary Extender card is added to the Main Extender for use with the Log and Phase Lock CFC boards. See Figure 6-1.



**Figure 6-1: Main Extender and Secondary Extender**

On the Main Extender, signal lines and power supply lines from the bottom edge connector to the pins at the top edge of the Extender are completed by a set of two pin jumpers (excluding two ground lines and the 50 conductor microprocessor bus cable). Thus, except for the two ground lines, all signal and power supply lines are interruptible via these two pin jumpers.

Signal lines are brought to square pins where they can be steered to one of two BNC connectors on the Main Extender. See Figure 6-2. There are 20 rows of 3 pin sets numbered 1 through 12 and 17 through 24. The numbers correspond to pin numbers of the interconnect system on the Power Supply board. Placing a jumper at position A in Figure 6-2 steers the selected signal to BNC connector A, and a jumper at position B steers the signal to connector B. Consequently, a maximum of two signals may be steered to the BNC connectors at any one time.



**Figure 6-2: Signal Steering Square Pins**

Conversely, an external signal may be injected on any one of these signal lines by removing the proper jumper on the signal line, selecting a BNC connector, and applying the external signal to the selected connector.

The double shielded coaxial cables with SMB connectors and the coaxial cable with square pin connectors are for interboard connections when needed.

**Visual Inspection.** After cleaning, carefully check the instrument for such defects as defective connections and damaged parts. The remedy for most visible defects is obvious. If heat damaged parts are discovered, try to determine the cause of overheating before the damaged part is replaced; otherwise, the damage may be repeated.

**Transistor and Integrated Circuit Checks.** All transistors and integrated circuits are soldered on the boards to prevent pin contact problems. Periodic checks of the transistors and integrated circuits is not recommended. The best measure of performance is the actual operation of the component in the circuit. In most cases any degradation in performance will be detected by the microprocessor during power up. Performance of these components is also checked during NORMALIZATION; any substandard transistors or integrated circuits will usually be detected at that time.

**Performance Checks and Recalibration.** The instrument performance should be checked after each 2000 hours of operation or every 12 months, if the instrument is used intermittently, to ensure maximum performance and assist in locating defects that may not be apparent during regular operation. Instructions for conducting a performance check are provided in *Section 4: Performance Verification* of this manual.

**Stored Data in Nonvolatile Memory.** Data stored in nonvolatile memory will be lost if backup battery power to the memory is interrupted, such as when changing the battery.

## Troubleshooting

The Spectrum Analyzer contains firmware that will troubleshoot the frequency control system. After a defective assembly or component is located, refer to *Removing and Replacing Assemblies and Subassemblies* on Page 6-17 for removal and replacement instructions.

### Troubleshooting Aids

The following aids are provided to assist in troubleshooting:

**Diagrams.** Functional block and circuit diagrams, on foldout pages in the *Diagrams* section, contain significant waveforms, voltages, and logic data information. Conditions for getting the data are provided on the diagram or adjacent to it. Refer to the *Replaceable Electrical Parts* list for a description of all assemblies and components.

**Replaceable Electrical Parts.** This list indicates changes to components with serial numbers showing the first serial number when usage of the part occurred and the last serial number when usage of the part stopped. Absence of serial numbers indicates the parts were in use since the first instrument shipped. When a major modification is made to an assembly or board and it is no longer compatible with earlier instruments, a new part number is assigned and a separate schematic with associated illustrations is added. All diagrams indicate the new part number and the instrument serial number break. If the assembly is compatible with earlier instruments and the change is significant enough to require a separate schematic, this will also be identified.

**Circuit Board Illustrations and Component Locator Charts.** Electrical components, connectors, and test points are identified on circuit board illustrations that are located on the inside fold of the corresponding circuit diagram or the back of the preceding diagram. A grid on the circuit board illustration and the circuit schematic, plus a look up table, provide the means to quickly locate components on either the diagram or the circuit board.

In most cases, circuit numbers are assigned according to the physical location of the component on the board or assembly. The first digit designates the row of a grid and the second a column.

**General Troubleshooting Techniques.** Before using test equipment to measure across static sensitive components or assemblies, be certain that voltages and currents supplied by the test equipment do not exceed the limits of the components to be tested.

Try to isolate the problem to a component through signal analysis. Determine that circuit voltages will not damage the replacement.

**Semiconductor Checks.** Semiconductor failures account for the majority of electronic equipment failures. All semiconductors are soldered to the boards to reduce pin contact problems. Follow these guidelines when substituting any of these semiconductors.

- Always turn the power off before removing an assembly or circuit board.
- Use a hot air repair terminal to remove surface mounted components, and a 15 W or less soldering iron to remove components with leads.
- Use only good components for substitution. Be sure the new component is inserted into the board properly before soldering. Refer to the manufacturer's data sheet for integrated circuit and transistor lead configuration.

**Diode Checks.** Most diodes can be checked in the circuit by taking measurements across the diode and comparing these with voltages listed on the diagram. Forward to back resistance ratios can usually be taken by referring to the schematic and pulling appropriate transistors and pin connectors to remove low resistance loops around the diode.

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**NOTE.** *Do not use an ohmmeter scale with a high external current to check diode junctions. Do not check the forward to back resistance ratios of mixer diodes.*

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**Diagnostic Firmware.** The firmware in the Spectrum Analyzer provides diagnostic routines that can be used to troubleshoot the Frequency Control system.

## Troubleshooting Steps

The following are some general suggestions that may help isolate a problem when troubleshooting.

1. Ensure that the problem exists in the Spectrum Analyzer by checking the operation of associated test equipment.
2. Try to isolate the problem to a circuit or at least to the board level by evaluating operational symptoms; for example, absence of the frequency dot could be caused by a malfunction in the marker generator or switching circuits.
3. Visually inspect the area or assembly for such defects as broken or loose connections, improperly connected components, overheated or burned components, chafed insulation, and so forth. Repair or replace all obvious defects. In the case of overheated components, try to determine the cause of the overheated condition and correct it before applying power.
4. Use successive electrical checks to try to locate the problem. An oscilloscope is a valuable test item for evaluating circuit performance. If applicable, check the calibration adjustments; however, before changing an adjustment, note its position so it can be returned to its original setting. This will facilitate recalibration after the trouble has been located and repaired.
5. Determine the extent of the repair needed; if complex, we recommend contacting your local Tektronix Field Office or representative. If minor, such as a component replacement, see the Replaceable Parts list for replacement information. Removal and replacement procedure of the assemblies and subassemblies are described under Corrective Maintenance later in this section.

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**NOTE.** *When measuring voltages and waveforms, use extreme care with the placement of test probes. Because some circuit boards have a high component density, access to points in some circuits is limited. A test probe could accidentally short a circuit and generate transient voltages that can destroy many static sensitive components.*

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## Cal Debug Flags

From time to time, certain screen messages are displayed when normalizations are performed with the CAL DEBUG FLAGS turned on (UTIL MENU 5 3 4). The following is a list of all possible messages the normalizations can produce.

**Table 6-2: Cal Debug Messages and Meanings**

<b>Message</b>	<b>Meaning</b>
“ERROR in REF GAIN STEP OFF: Cannot set external signal near full screen”	The signal could not be placed at or above full screen by reducing RF attenuation.
“ERROR in REF GAIN STEP OFF: Cannot set signal to below 0.75 division from full screen”	The signal could not be placed exactly 0.75 division full screen by using only the VR fine gain DAC.
“ERROR in REF GAIN STEP ON: External signal at incorrect level”	The signal did not drop at least 70 storage locations when the operator reduced the signal by 10 dB (lin mode).
“ERROR in REF GAIN STEP ON: Cannot measure lin mode sensitivity”	The calculations for lin mode sensitivity were outside reasonable limits.
“ERROR in REF GAIN STEP ON: Result out of range”	The calculated result for this test was outside reasonable limits.
“ERROR in REF FREQUENCY: Cannot count reference signal”	The user applied reference signal could not be counted using the center measure function.
“ERROR in REF FREQUENCY: Result out of range”	The calculated result for this test was outside reasonable limits.
“ERROR in REF AMPLITUDE: Cannot span down on external signal (1)”	The externally applied signal could not be set to zero span, 5 MHz filter. Probably due to frequency instability in the signal or the instrument.
“ERROR in REF AMPLITUDE: Cannot set calibrator to full screen”	The user applied reference signal could not be set a half a division from full screen using VR gain steps, RF attenuators, and the VR fine gain DAC.
“ERROR in REF AMPLITUDE: No amplitude change when 10 dB step changes”	The 10 dB reference step was removed to calculate the lin mode sensitivity. The amplitude did not change.
“ERROR in REF AMPLITUDE: Lin mode sensitivity of range”	The calculations for lin mode sensitivity were outside reasonable limits.
“ERROR in REF AMPLITUDE: Cannot span down on calibrator”	The internal calibrator signal could not be set to zero span, 5 MHz filter. Probably due to frequency instability in the signal or the instrument.
“ERROR in REF AMPLITUDE: Result out of range”	The calculated result for this test was outside reasonable limits.
“ERROR in VCO UPPER SENS: Cannot count phase lock VCO”	The LF VCO could not be counted at some point on the upper VCO DAC.
“ERROR in VCO UPPER SENS: Result out of range”	The calculated result for this test was outside reasonable limits.
“ERROR in VCO UPPER SENS: Cannot calculate polynomial”	The coefficients for the curve fitting algorithm could not be calculated. One of the 20 sample points taken along the VCO curve were probably in error.
“ERROR in VCO LOWER SENS: Cannot count phase VCO (1)”	The LF VCO could not be counted when the upper VCO lock DAC was set for a VCO frequency of approximately 13.4 MHz and the lower VCO DAC was at center (2047).
“ERROR in VCO LOWER SENS: Cannot count phase VCO (2)”	The LF VCO could not be counted when the upper VCO lock DAC was set for a VCO frequency of approximately 13.4 MHz and the lower VCO DAC was at its upper limit (4095).
“ERROR in VCO LOWER SENS: Result out of range”	The calculated result for this test was outside reasonable limits.

**Table 6-2: Cal Debug Messages and Meanings (Cont.)**

<b>Message</b>	<b>Meaning</b>
"ERROR in VCO SENS @ 13 MHz: Cannot calculate result"	The LF VCO DAC calculator failed to find a proper VCO sensitivity when given a frequency of 13 MHz. This should never happen if the Upper VCO normalization worked properly.
"ERROR in VCO SENS @ 13 MHz: Result out of range"	The calculated result for this test was outside reasonable limits.
"ERROR in MAIN DAC OFFSET: Cannot center start spur"	Beginning at 10 MHz/div span, the start spur was located and centered, then span was reduced. In 1 MHz/div span, the signal could not be centered within 30 horizontal storage bits.
"ERROR in MAIN DAC OFFSET: Cannot count beat frequency (1)"	The beat frequency was connected to the counter, but an attempt at counting was unsuccessful. This attempt occurred when the start spur was within 300 kHz of center screen, producing a beat frequency of approximately 5 MHz.
"ERROR in MAIN DAC OFFSET: Cannot set main DAC low enough"	To actually center the start spur, a DAC value <1 was requested.
"ERROR in MAIN DAC OFFSET: Cannot count beat frequency (2)"	The beat frequency was connected to the counter, but an attempt at counting was unsuccessful. This attempt occurred when the start spur was within 300 kHz of center screen, producing a beat frequency of approximately 5 MHz.
"ERROR in MAIN DAC OFFSET: Result out of range"	The calculated result for this test was outside reasonable limits.
"ERROR in MAIN DAC SENS: Cannot count beat frequency (3)"	The beat frequency should have been around 10 MHz, but was not countable. This count was done at approximately 900 MHz CF.
"ERROR in MAIN DAC SENS: YIG cannot be counted at 100% of CF range"	The 1st LO frequency could not be determined after a series of LF VCO and beat frequency counts. This was tried at approximately 0 MHz (2110 MHz 1st LO frequency).
"ERROR in MAIN DAC SENS: YIG cannot be counted at 80% of CF range"	The 1st LO frequency could not be determined after a series of LF VCO and beat frequency counts. This was tried at approximately 1440 MHz (3550 MHz 1st LO frequency).
"ERROR in MAIN DAC SENS: Result out of range (1)"	The intermediate result predicted a main DAC value greater than 4095 at 1800 MHz.
"ERROR in MAIN DAC SENS: YIG cannot be counted at 100%"	The 1st LO frequency could not be determined after a series of LF VCO and beat frequency counts. This was tried at approximately 1800 MHz (3910 MHz 1st LO frequency).
"ERROR in MAIN DAC SENS: Result out of range (2)"	The final value calculated is outside reasonable limits.
"ERROR in MAIN DAC SENS: YIG cannot be counted at 50% of CF range"	The 1st LO frequency could not be determined at 900 MHz CF.
"ERROR in FM DAC SENS: Cannot set strobe to required frequency"	The strobe frequency could not be set to a known frequency.
"ERROR in FM DAC SENS: Cannot count beat frequency (1)"	Failed to count the beat frequency while trying to set the 1st LO to a specific position (5 MHz).
"ERROR in FM DAC SENS: Cannot set beat frequency DAC"	Five attempts have failed to set the beat frequency to the main with proper location.
"ERROR in FM DAC SENS: Cannot count beat frequency (2)"	The beat frequency could not be counted when the FM DAC was set to 1.



**Table 6-2: Cal Debug Messages and Meanings (Cont.)**

<b>Message</b>	<b>Meaning</b>
“ERROR in FM DAC SENS: Cannot count beat frequency (3)”	The beat frequency could not be counted when the FM DAC was set to 4095.
“ERROR in FM DAC SENS: Result out of range”	The calculated result for this test was outside reasonable limits.
“ERROR in FREQUENCY ACCY: Cannot count YIG (1)”	The 1st LO frequency could not be determined.
“ERROR in FREQUENCY ACCY: Out of range (1)”	The result was outside of acceptable limits.
“ERROR in FREQUENCY ACCY: Out of range (2)”	The result was outside of acceptable limits.
“SPANS: range X”	This is an indicator to show which span range is being tested. This is not an error message.
“ERROR in SPANS: Cannot count at center screen, DAC low”	For this span range, the effective screen frequency could not be determined when the span DAC was set to 30 and the sweep was parked at center screen.
“ERROR in SPANS: Cannot count at center screen, DAC high”	For this span range, the effective screen frequency could not be determined when the span DAC was set to 4095 and the sweep was parked at center screen.
“ERROR in SPANS: Cannot count at right screen, DAC low”	For this span range, the effective screen frequency could not be determined when the span DAC was set to 30 and the sweep was parked at right screen.
“ERROR in SPANS: Cannot count at right screen, DAC high”	For this span range, the effective screen frequency could not be determined when the span DAC was set to 4095 and the sweep was parked at right screen.
“ERROR in SPANS: Span out of range”	The calculated result for this test was outside reasonable limits.
“ERROR in GAIN AND ATTEN: Cannot span down on (1)”	On the first attempt, the calibrator could not be centered sufficiently to go to zero span without losing the signal.
“ERROR in GAIN AND ATTEN: Cannot span down on calibrator (2)”	On the second attempt, the calibrator could not be centered sufficiently to go to zero span without losing the signal.
“ERROR in GAIN AND ATTEN: Cannot calculate lin sensitivity”	Lin mode sensitivity figures were outside reasonable mode limits.
“ERROR in GAIN AND ATTEN: Attenuation result out of range”	One of the attenuator steps measured outside reasonable limits.
“ERROR in GAIN AND ATTEN: Gain step result out of range”	One of the gain steps measured outside reasonable limits.
“ERROR in VR FINE GAIN: Cannot span down on calibrator”	On the second attempt, the calibrator could not be centered sufficiently to go to zero span without losing the signal.
“ERROR in VR FINE GAIN: Cannot calculate lin mode sensitivity”	Lin mode sensitivity figures were outside reasonable limits.
“ERROR in VR FINE GAIN: Result out of range”	The calculated result for this test was outside reasonable limits.
“ERROR in VR FILTER AMPLTD: Cannot measure lin mode sensitivity”	Lin mode sensitivity figures were outside reasonable limits.
“ERROR in VR FILTER AMPLTD: Cannot set filter to full screen”	The RF attenuators could not reduce the signal below full screen.
“ERROR in VR FILTER AMPLTD: Result out of range”	The calculated result for this test was outside reasonable limits.
“ERROR in VR LOG FLTR AMPLTD: Cannot set filter to full screen”	The RF attenuation, VR gain, and VR fine gain together could not set the filter being tested to full screen.
“ERROR in VR LOG FLTR AMPLTD: Result out of range”	The calculated result for this test was outside reasonable limits.

**Table 6-2: Cal Debug Messages and Meanings (Cont.)**

<b>Message</b>	<b>Meaning</b>
“ERROR in VERTICAL OFFSET: Cannot span down on calibrator”	Could not keep calibrator signal on screen when spanning down to 1 MHz span, 5 MHz filter.
“ERROR in VERTICAL OFFSET: Cannot set calibrator to full screen, scale X”, where X is one of:  1 dB/div 5 dB/div 10 dB/div LIN	The signal could not be set to full screen with the RF attenuators, VR gain steps, and VR fine gain in the specified scale factor.
“ERROR in VERTICAL OFFSET: Out of range, scale X”, where X is one of:  1 dB/div 5 dB/div 10 dB/div LIN	The calculated result for this test was outside reasonable limits.
“ERROR in PREAMP GAIN: Cannot span down on calibrator”	On the second attempt, the calibrator could not be centered sufficiently to go to zero span without losing the signal.
“ERROR in PREAMP GAIN: Cannot calculate lin mode sensitivity”	Lin mode sensitivity figures were outside reasonable limits.
“ERROR in PREAMP GAIN: Cannot bring signal on with attenuators”	Once the preamp was turned on, the signal could not be brought down below full screen with the RF attenuators.
“ERROR in PREAMP GAIN: Result out of range”	The calculated result for this test was outside reasonable limits.
“ERROR in LOGGING ERROR: Lost signal while spanning down”	On the second attempt, the calibrator could not be centered sufficiently to go to zero span without losing the signal.
“ERROR in LOGGING ERROR: Cannot set signal to full screen (1)”	Initially, the calibrator signal could not be set to full screen with the RF attenuators, VR gain steps, or VR fine gain DAC.
“ERROR in LOGGING ERROR: Cannot set signal to full screen (2)”	The calibrator could not be set to full screen for one of the three log mode scale factors.
“ERROR in LOGGING ERROR: Out of range”	The calculated result for this test was outside reasonable limits.
“ERROR in SENSITIVITY: Result out of range (1)”	The peak of the unfiltered noise floor minus the peak of the filtered noise floor was outside reasonable limits.
“ERROR in SENSITIVITY: Result out of range (2)”	The peak sensitivity with preamp on was out of range.
“ERROR in SENSITIVITY: Result out of range (3)”	The peak sensitivity with preamp off was out of range.

## Corrective Maintenance

Corrective maintenance consists of component replacement and instrument repair. Special techniques and procedures that may be required to remove and replace assemblies or components in this instrument are described here.

**Handling Static Sensitive Components.** Most semiconductor types, both separately and in assemblies, are susceptible to damage to static charge, see Table 6-1 on Page 6-2 for voltage levels. We recommend static sensitive procedures be followed for all operations involving semiconductor handling.

**Obtaining Replacement Parts.** All electrical and mechanical parts are available through your local Tektronix Field Office or representative. The *Replaceable Parts* list contains replacement parts ordering information.

Parts orientation and lead dress should be duplicated, because some components are oriented to reduce interaction between circuits or control circuit characteristics.

Where applicable, an improved part will be substituted when a replacement is ordered. If the change is complex, your local Field Office or representative will contact you concerning the change. After repair, the circuits may need recalibration.

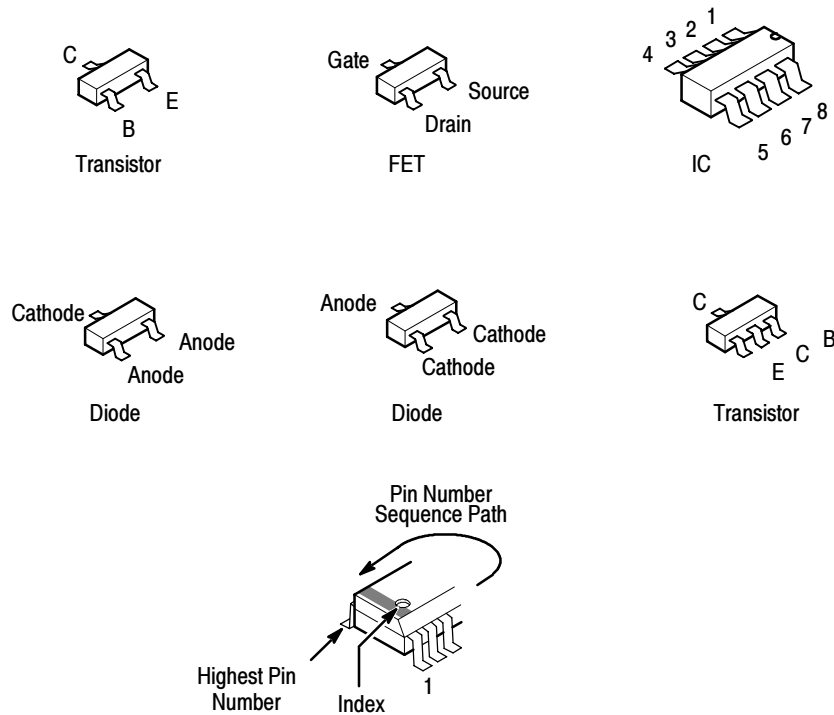
**Parts Repair and Return Program.** Assemblies containing hybrid circuits or substrates in a semisealed module, and complex assemblies, such as the 1st LO, can be returned to Tektronix for repair under the repair and return program.

Tektronix repair centers provide replacement or repair service on major assemblies as well as the unit. Return the instrument or assembly to your local Field Office for this service, or contact your local Field Office for repair and exchange information.

**Selected Components.** A few components are selected to meet certain parameters such as temperature compensation, or to center the range of some adjustable components. The selected components are identified as selectable in the *Replaceable Electrical Parts* list. The replaceable parts list description for the component gives a nominal value. The procedure for selection is explained in the *Maintenance Adjustments*.

**Replacing Firmware EPROM Devices.** Firmware for the microcomputer is contained in a set of ROMs on the Microprocessor and either GPIB or RS-232 boards. Refer to the *Replaceable Electrical Parts* list for the versions and part numbers. Refer to Replacing Transistor and Integrated Circuit for procedure.

**Surface Mounted Components.** Surface mounted components are used in this instrument. These components are mounted on pads on the circuit board, rather than through holes in the board. (In some rare instances, components may be mounted on pads around through holes.) Lead configurations of these components are shown in Figure 6-3.



**Figure 6-3: Surface Mounted Components Lead Configuration**

The positive end of an electrolytic capacitor is identified by a band. Other capacitors and resistors have no visible identification.

Surface mounted semiconductor devices are sensitive to static electricity discharges and should be treated as outlined in the beginning of this section.

**Replacing Surface Mounted Components**

A hot air machine, such as Hart Model 200A manufactured by Nu-Concept Systems Incorporated of Colmar, Pennsylvania, is recommended for unsoldering and soldering surface mounted components.

Table 6-3 lists tools that are suitable for servicing circuit boards with surface mounted components.

Do not apply too much heat or pull hard on the components, as the pads on which the device is soldered may be lifted from the circuit board.

1. Unsolder the component. Use a solder wick to remove access solder.
2. Clean the board with isopropyl alcohol.
3. Solder in the replacement. Surface mounted components are pretinned, and therefore require little solder.



**CAUTION.** *If you use a soldering iron, use one with a small tip. After applying the solder paste, touch the corner of the pad with the iron to fasten the component. Avoid touching the component with the hot soldering iron. Thermal shock causes hairline cracks that are not visible to the eye.*

**Table 6-3: Servicing Tools for Boards With Surface Mounted Components**

Description	Model Type	Tektronix Part No.
Hot Air Repair Terminal	Nu-Concepts Systems HART200A	N/A
Tempilaq	Nu-Concepts Systems	N/A
Tempilaq Thinner	Nu-Concepts Systems TLTH	N/A
Flux Dispenser	Nu-Concepts Systems FD2	N/A
Soldering Iron	Hexacon Model SMD10	003-1401-00
Soldering Iron SMD Tips		
Semi-Chisel, 1/16"	Hexacon Model Z780X	003-1402-00
Conical, 1/32"	Hexacon Model Z783X	003-1403-00
Sharp Conical	Hexacon Model Z784X	003-1404-00
Bevel, 1/32"	Hexacon Model Z786X	003-1405-00
Chisel, 1/16"	Hexacon Model Z787X	003-1406-00
Bevel, 1/16"	Hexacon Model Z788X	003-1407-00
Slot 0.062"	Hexacon Model S303	003-1408-00
Slot 0.195"	Hexacon Model S308	003-1409-00
Slot 0.195"	Hexacon Model S314	003-1410-00
Slot 0.195"	Hexacon Model S316	003-1411-00
Slot 0.195"	Hexacon Model S302	003-1412-00
Stainless Steel, Nonmagnetic Tweezers		
Straight Tip		003-0464-00
Curved Tip		003-0465-00
Silver Solder		251-0514-00

## Soldering Techniques

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**NOTE.** *Disconnect the instrument from its power source before replacing or soldering components.*

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Extreme caution must be used when removing or replacing components, because the instrument contains several multi layer circuit boards. Excess heat from the soldering iron and bent component leads may pull the plating out of the hole.

Some circuit boards do contain leaded components. To remove the component leads, use a 15 W (or less) pencil type soldering iron. Straighten the leads on the back side of the board; when the solder melts, gently pull the soldered lead through the hole. A desoldering tool should be used to remove the old solder. Use a desoldering tool that has a low build up of static charge, such as Silverstat Soldapullt desoldering tool, when unsoldering integrated circuits or transistors.

**Transistor and Integrated Circuit Configurations.** Lead identification for transistors and integrated circuits is readily available from manufacturer's data books. Integrated circuit pin outs for Vcc and ground are shown with a box on the schematic diagram.

**Diode Color Code.** The cathode of each glass encased diode is indicated by a stripe, a series of stripes, or a dot. Some diodes have a diode symbol printed on one side.

**Resistor Values.** Surface mounted resistors have no visible identification. However, the value can be measured with a meter. Other types of resistors (such as composition, metal film, tapped, thick film resistor network package, and plate) are also used. The value is either color coded in accordance with the EIA color code or printed on the body of the component.

**Capacitor Marking.** Surface mounted capacitors (chip capacitors) have no visible markings. The capacitance value, voltage rating, and polarity of electrolytic capacitors are marked on the side of the component body. The ceramic tubular capacitors and feed through capacitors are color coded in picofarads.

**Multiple Terminal (Harmonica) Connectors.** Some intercircuit connections are made through square pin connectors that are mounted in a harmonica type holder. If one of the pins must be replaced, all the pins at that location must be replaced as a set. Most ribbon cable connectors are keyed. Exceptions are: two pin connectors, the three pin connector at the back of the Log board, and the 50 pin connector between the Microprocessor, Display Storage, and Digital Options boards. The key location on the circuit board is identified by a missing pin.

## Assembly Replacement Requiring Flatness Correction

Replacement of any of the following assemblies will require completion of the *Amplitude Flatness Adjustment Procedure* on Page 5-52.

- RF Attenuator (A18)
- 1st Converter (A16)
- YIG Oscillator (A19)
- YIG Buffer Amplifier (A17)
- 1845 MHz Lo Pass Filter (FL16)
- 4.5 GHz Lo Pass Filter (FL18)
- Log Amplifier (A7)
- Display Storage (A9) - File Restore (NVRAM)
- RS-232 (A11) or GPIB (A15) Interface - File Restore (NVRAM)
- 2110 MHz Bandpass Filter (FL17)

## Removing and Replacing Assemblies and Subassemblies

Most assemblies or subassemblies in this instrument are easily removed and replaced. The following describes procedures for replacing those assemblies that require special attention. Top and bottom views are shown in Figure 6-4 and Figure 6-5, respectively. These illustrations show the locations of most assemblies.

The Microprocessor, Display Storage, Digital Options, and Video Demod boards must be placed on an extender to access test points or adjustments. A second extender card is added to the main extender for use with the Center Frequency, Log, and RF Options boards.

Turn the power off before removing an assembly.

### Removing the Instrument from its Cabinet

Use the following procedure to remove the instrument from the cabinet.

1. Remove the power cord.
2. Set the instrument on its face with the front cover installed.
3. Remove the rear cover (two T15 Torx-drive screws), two (front) top and bottom feet (four T15 screws), three pan head screws from the bottom rear, and two pan head screws from the top rear of the instrument.

4. Pull the cover up and off.

Replace the instrument in its cabinet by reversing the removal procedure.

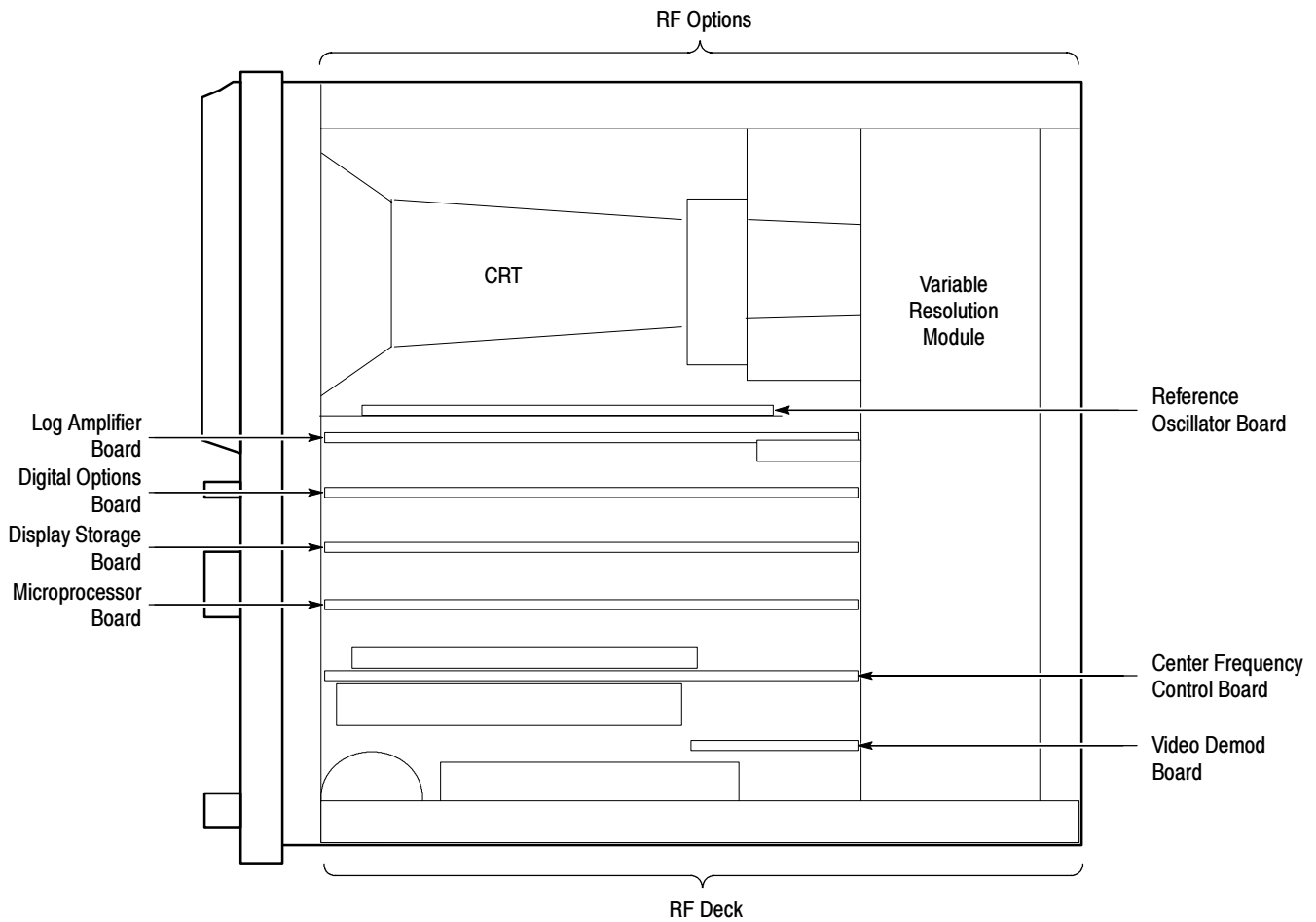
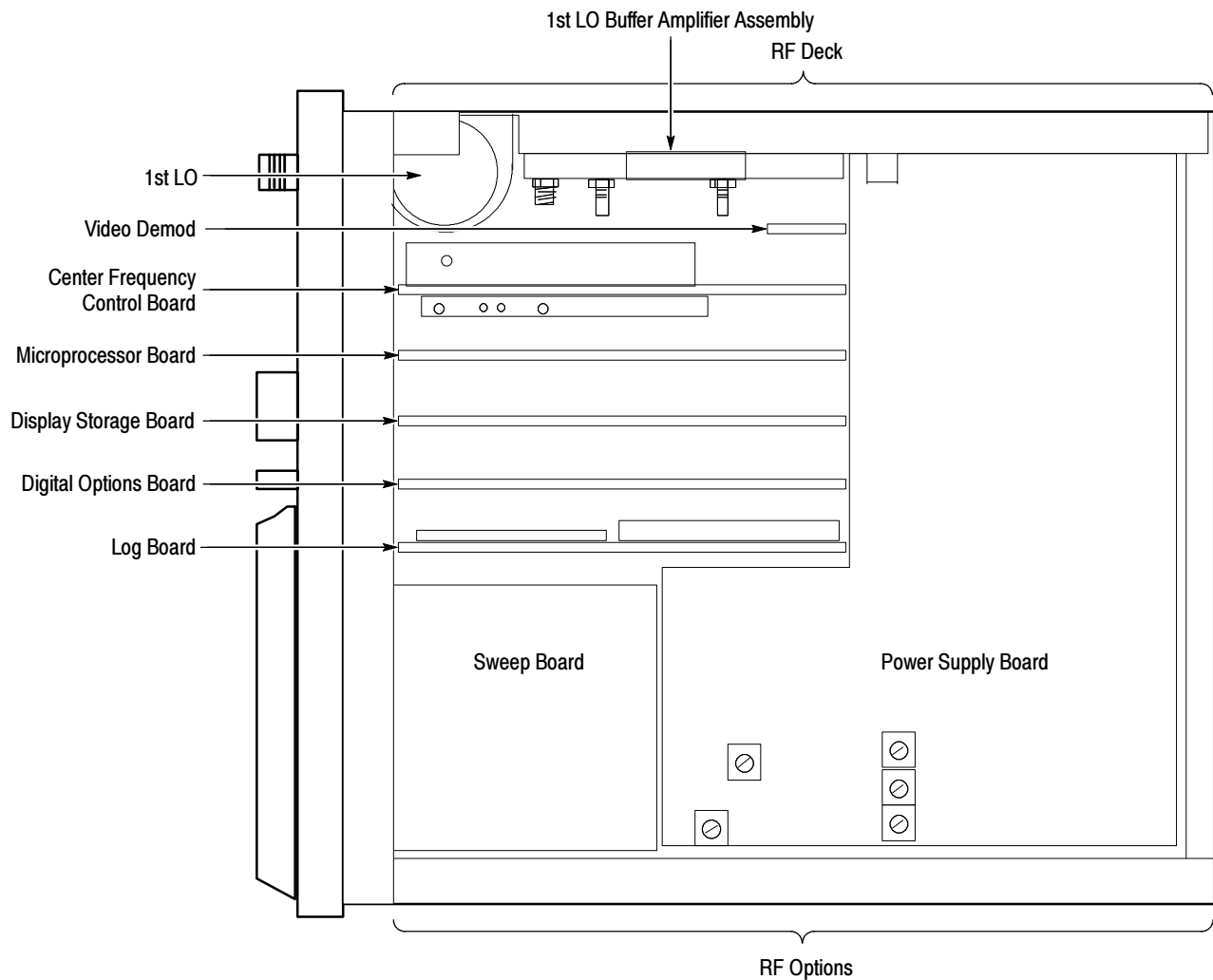


Figure 6-4: Top View of Assemblies and RF Deck





**Figure 6-5: Assemblies Seen from the Bottom of the Spectrum Analyzer**

### Replacing the CRT

Use the following procedure to replace the CRT.



**WARNING.** Breaking the CRT may result in an implosion. Protective clothing and safety glasses should be worn. Avoid hitting the CRT against any object that may cause the CRT to crack. Place the CRT in a protective carton or place it face down on a smooth surface in a protected location with a soft mat under the face plate.

1. Remove the instrument from its cabinet (see *Removing the Instrument from its Cabinet* on page 6-17).
2. Remove the circuit board retainer.

3. Disconnect the CRT anode lead and discharge it to the main chassis.



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**WARNING.** *The CRT anode lead retains a high voltage charge after the instrument is turned off. To avoid electrical shock, ground the anode lead to the main chassis immediately after disconnecting.*

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4. Disconnect the two pin connector (Trace Rotation) from J930 on the Power Supply board.
5. Use a T15 Torx driver to remove the two CRT bezel screws, and remove the bezel.
6. Remove the CRT rear cover and plastic shield.
7. Disconnect the CRT socket.
8. Slide the CRT out through the front panel.

Replace the CRT by reversing the removal procedure.

### **Replacing the CRT Trace Rotation Coil**

The trace rotation coil is part of the CRT assembly. If the coil is damaged beyond repair, the CRT with the damaged coil must be replaced.

If the finish (red) lead is broken, remove the tape and unwind one or two turns so it can be replaced and soldered to the lead wire. Rewind and retape.

If the start (black) lead is broken and the lead is too short to resplice, attempt to fish out the broken end so one or two turns can be unwound, resplice and solder to the lead; then rewind and retape.

In all three instances, the CRT must be removed from the instrument.

### **Replacing Semirigid Coaxial Cables**

Performance of the instrument is easily degraded if coaxial connectors are loose, dirty, or damaged. The following procedure will help ensure that the connection is good enough to maintain proper performance.

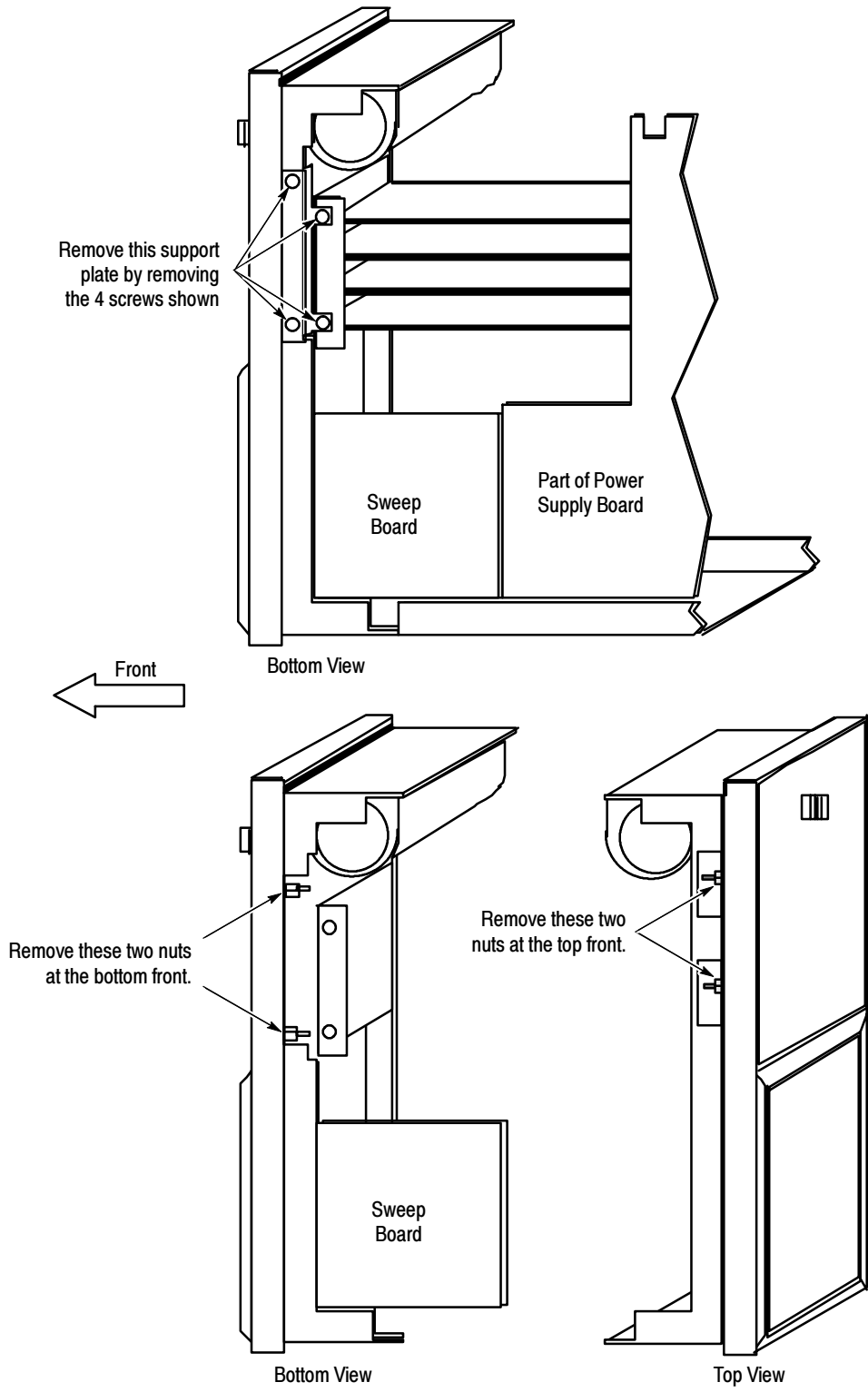
1. Use a 5/16 inch open end wrench to loosen or tighten the connectors. It is good practice to use a second wrench to hold the rigid (receptacle) portion of the connector to prevent bending or twisting the cable.
2. Ensure that the plug and receptacle are clean and free of any foreign matter.
3. Insert the plug connector fully into the receptacle before screwing the nut on. Tighten the connection to 8 in-lb to ensure that the connection is tight. Do not overtighten, because this can damage the connector.

**Replacing the Front Panel Assembly**

Use the following procedure to replace the Front Panel assembly:

1. Remove the instrument from its cabinet (see *Removing the Instrument from its Cabinet* on Page 6-17).
2. Remove the nut and washer from the RF INPUT connector (and from the Tracking Generator output connector if Option 04 is installed).
3. Remove four screws from the bottom front of the instrument as shown in Figure 6-6 to gain access to the two bottom retaining nuts.
4. Remove the bottom two Front Panel retaining nuts (Figure 6-6).
5. Remove the top two Front Panel retaining nuts (Figure 6-6).
6. Gently pull the front panel assembly out of the instrument to gain access to a ribbon cable (P6) attached to the back of the Front Panel. Disconnect P6 from the Front Panel board.
7. Remove the Front Panel assembly.

Replace the Front Panel by reversing the removal procedure.



**Figure 6- 6: Removing the Front Panel**

**Replacing the RF Deck**

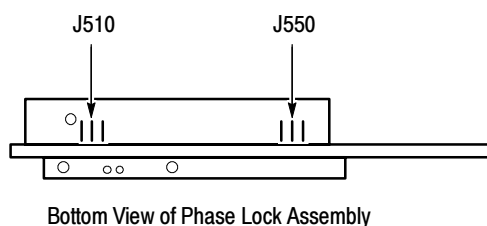
Use the following procedure to replace the RF Deck assembly:

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**NOTE.** Replacement of this assembly requires completion of the .Amplitude Flatness Adjustment Procedure on Page 5-52.

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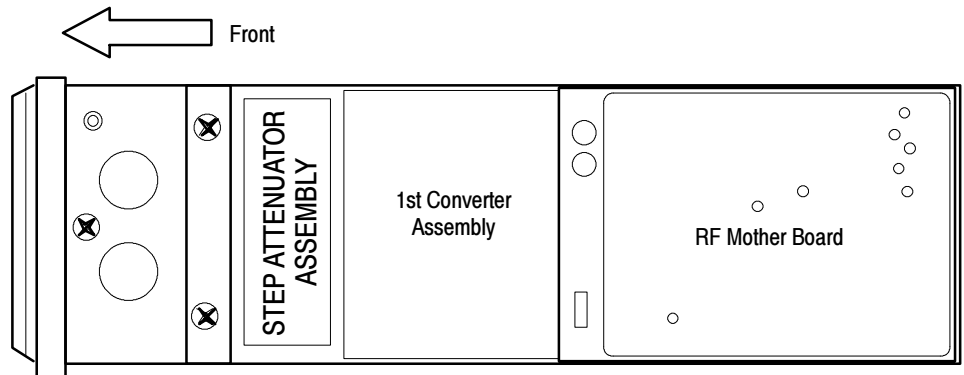
1. Remove the instrument from its cabinet (see *Removing the Instrument from its Cabinet* on Page 6-17).
2. Remove the Front Panel assembly (see *Replacing the Front Panel Assembly* on Page 6-21).
3. Remove the circuit board retainer.
4. Remove the Variable Resolution module.
5. Disconnect P510 and P550 (Figure 6-7) from the Phase Lock assembly.



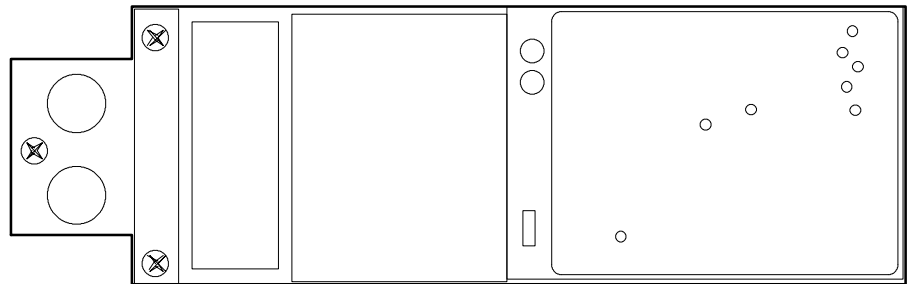
**Figure 6-7: Locations of J510 and J550 on the Phase Lock Assembly**

6. Disconnect P100 and P200 (Figure 6-8) from the Attenuator assembly.
7. Disconnect P400, P410, P565, P670 (Figure 6-8) from the RF Mother board assembly.
8. Disconnect P430 and P460 (and P300 if Option 04 or Option 15 is installed) from the 1st LO Buffer Amp assembly (Figure 6-8).
9. Remove the seven screws and two nuts shown in Figure 6-9.
10. Loosen the two nuts shown in Figure 6-9.
11. With the instrument facing you, carefully raise the rear part of the RF deck and swing it to the left while pulling it backwards.

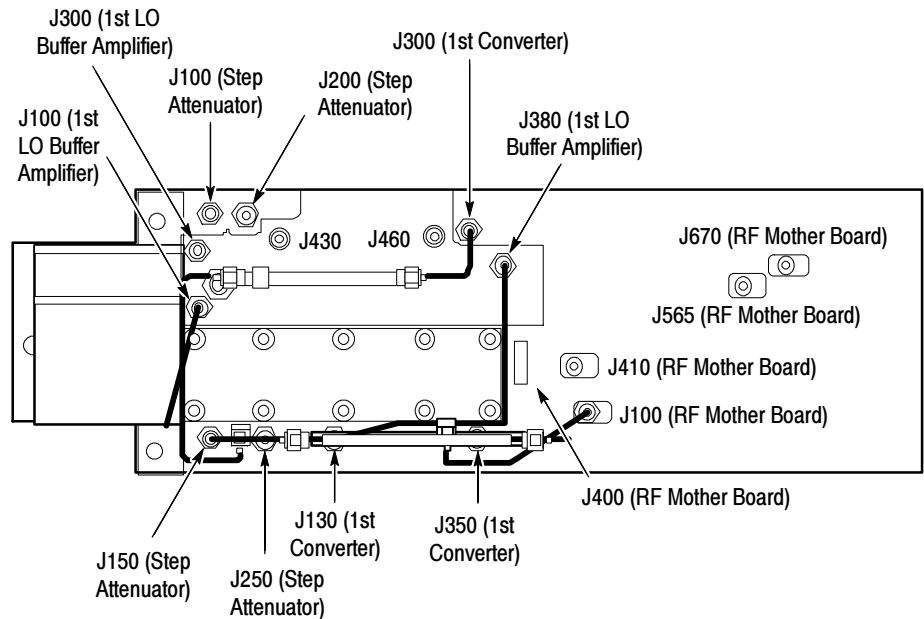
Replace the RF deck by reversing the removal procedure.



A. Right side of instrument



B. RF Deck after removal from instrument



C. Connectors on the RF Deck (inside)

**Figure 6-8: Connector Locations on the RF Deck**

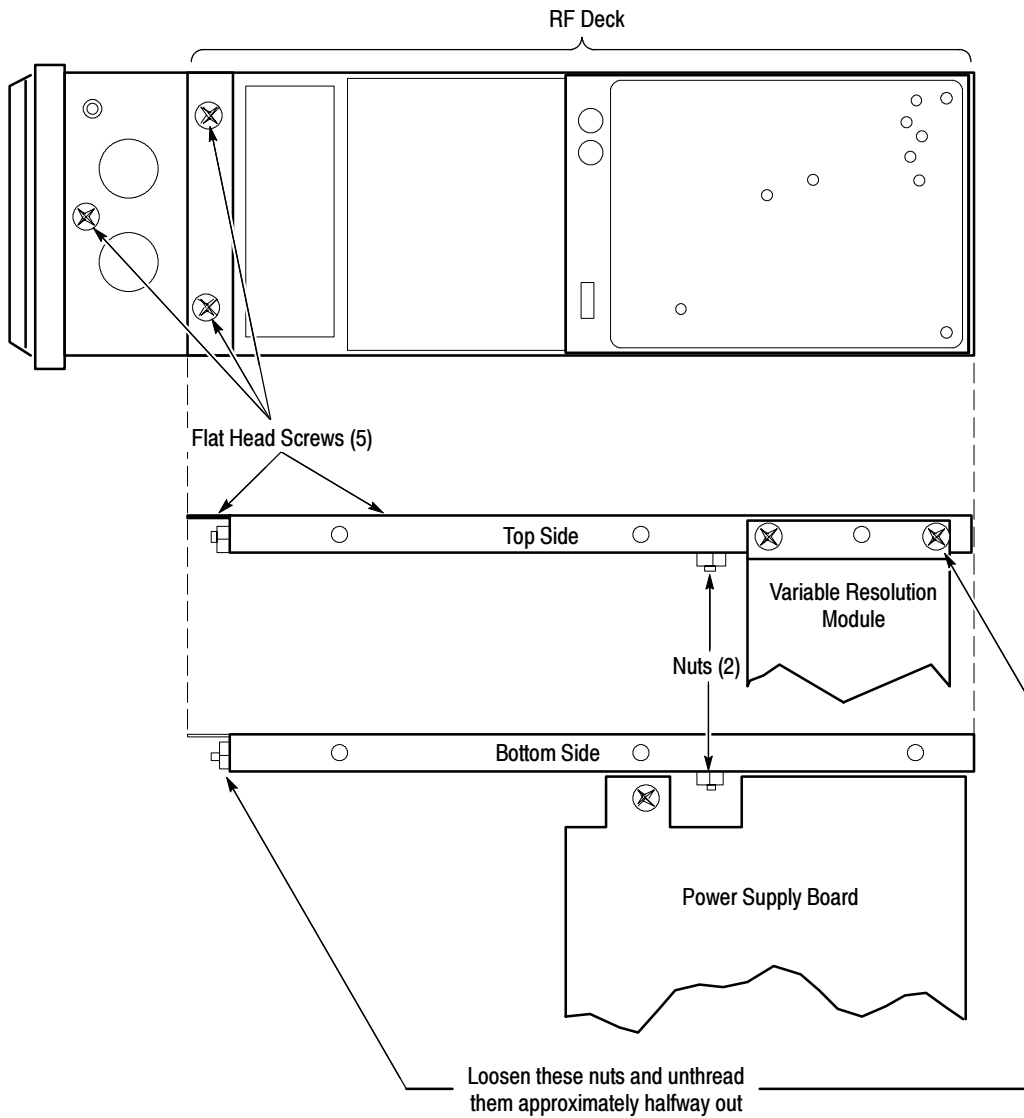


Figure 6-9: RF Deck Screws and Nuts

### Replacing the 1<sup>st</sup> LO Assembly

Use the following procedure to replace the 1st LO Assembly:

---

**NOTE.** Replacement of this assembly requires completion of the Amplitude Flatness Adjustment Procedure on Page 5-52.

---

1. Remove the instrument from its cabinet (see *Removing the Instrument from its Cabinet* on Page 6-17).
2. Remove the RF Deck from the Spectrum Analyzer (see *Replacing the RF Deck* on Page 6-23).
3. Disconnect P100 from the 1st LO Buffer Amplifier (semi rigid cable from the 1st LO assembly to the 1st LO Buffer Amplifier).
4. Remove the 1st LO assembly from the RF deck.

Replace the 1st LO assembly by reversing the removal procedure.

### Replacing the Step Attenuator

Use the following procedure to replace the Step Attenuator:

---

**NOTE.** Replacement of this assembly requires completion of the Amplitude Flatness Adjustment Procedure on Page 5-52.

---

1. Remove the instrument from its cabinet (see *Removing the Instrument from its Cabinet* on Page 6-17).
2. Disconnect P210 from the Step Attenuator. This is a multipin plug on the top side of the RF Deck.
3. Disconnect P100, P200, and P150 (Figure 6-8 on Page 6-24) from the Step Attenuator.
4. Remove the nuts and washers from J100, J150, J200, and J250 on the Step Attenuator.
5. Remove the Step Attenuator.

Replace the Step Attenuator by reversing the removal procedure.



### Replacing the 1<sup>st</sup> LO Buffer Amplifier

Use the following procedure to replace the 1st LO Buffer Amplifier:

---

**NOTE.** Replacement of this assembly requires completion of the Amplitude Flatness Adjustment Procedure on Page 5-52.

---

1. Remove the instrument from its cabinet (see *Removing the Instrument from its Cabinet* on Page 6-17).
2. Remove the RF Deck from the Spectrum Analyzer (see *Replacing the RF Deck* on Page 6-23).
3. Disconnect P100 and P380 from the 1st LO Buffer Amplifier assembly.
4. Remove the Step Attenuator (see the previous step *Replacing the Step Attenuator*).
5. Remove two 1/4" nuts and a screw holding the 1st LO Buffer Amplifier in place. The screw is located in the corner of the 1st Converter assembly.
6. Remove the 1st LO Buffer Amplifier assembly from the RF deck.

Replace the assembly by reversing the removal procedure.

### Replacing the Fan Assembly

Refer to Figure 6-10 for the following removal procedure for the fan:

1. Remove the instrument from its cabinet (see *Removing the Instrument from its Cabinet* on Page 6-17).
2. Position the instrument with the rear of the instrument facing the installer.
3. Remove the fan shroud by removing the two 4-40 nuts.
4. Remove the fan connector.
5. Remove the fan and mounting springs by removing the four 4-40 Pozidriv screws. The fan becomes free with the mounting springs still attached.
6. Remove the two 6-32 mounting screws (and nuts) to separate the mounting springs from the fan.

Refer to Figure 6-10 for the following assembly procedure for the fan:

1. Install the mounting springs onto the replacement fan using two 6-32 Pozidriv screws (and nuts). Hand tighten only.

---

**NOTE.** *Observe the position of fan cable to mounting springs and screw locations to chassis.*

---

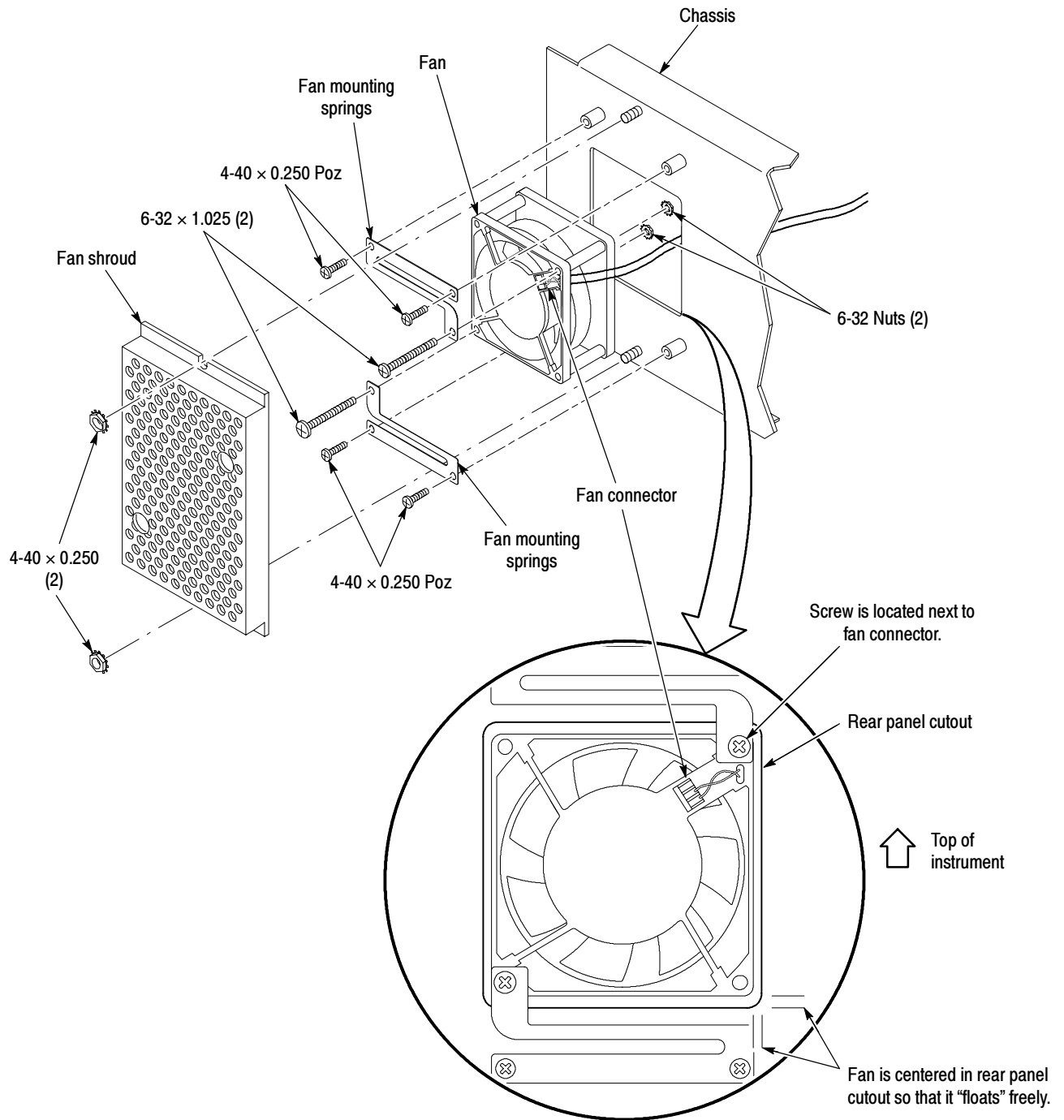
2. Reconnect the fan connector.
3. Install the fan and mounting springs into the rear chassis using the four 4-40 Pozidriv screws. Tighten each screw to 4 to 5 inch-lbs torque.
4. Apply 8 inch-lbs torque to the two 6-32 mounting screws.

---

**NOTE.** *Make sure that the fan floats freely inside the rear chassis fan cutout. If the fan housing touches any edge of the rear chassis, loosen the four (4) 4-40 mounting screws, recenter the fan, and tighten each screw with 4 to 5 inch-lbs torque.*

---

5. Install the fan shroud to the rear chassis using the two 4-40 nuts.
6. Reinstall the cabinet.



**Figure 6-10: Fan and Fan Mounting Springs Detail**

### **Replacing the RF Mother Board**

Use the following procedure to replace the RF Mother Board:

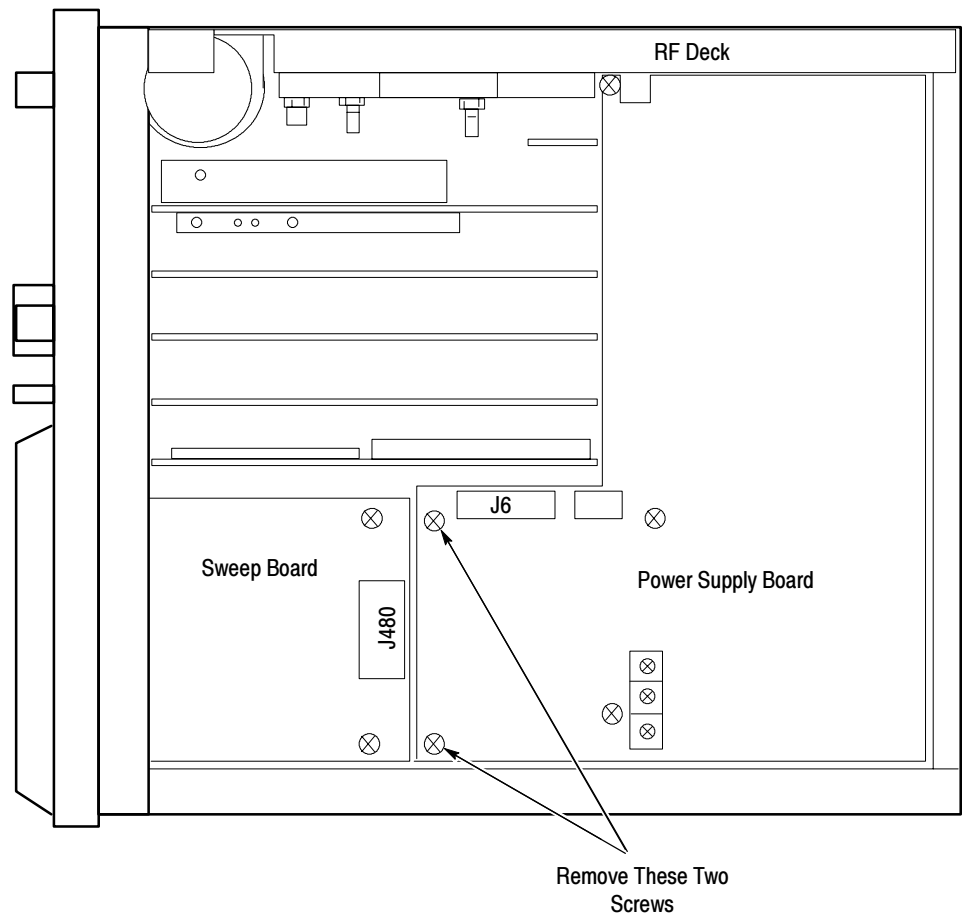
1. Remove the instrument from its cabinet.
2. Disconnect P100, P410, P400, P565, and P670 from the RF Mother board (Figure 6-8 on Page 6-24).
3. Remove the nut and washer from J100 on the RF Mother board.
4. Remove the four screws from the four corners of the RF Mother board.
5. Remove the RF Mother board assembly.

Replace the assembly by reversing the removal procedure.

### **Replacing the Power Supply Assembly**

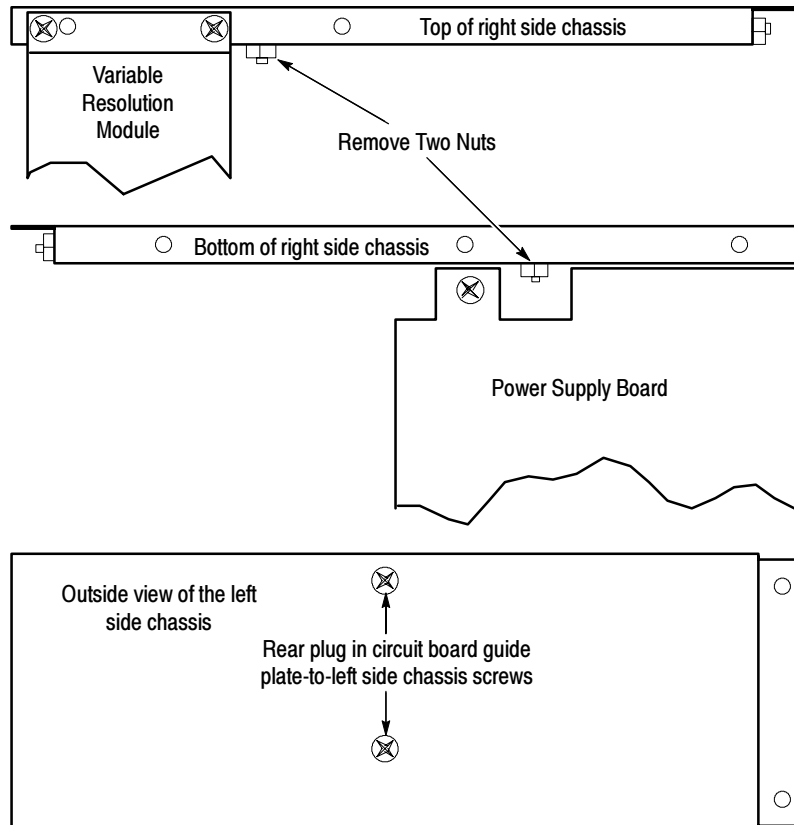
Use the following procedure to replace the Power Supply Assembly:

1. Remove the instrument from its cabinet.
2. Remove the plugin circuit board retainer.
3. Remove all the plugin circuit boards.
4. Remove the Variable Resolution module.
5. Remove the connector from J480 on the Sweep board.
6. Disconnect P400 from the RF Mother board (Figure 6-8 on Page 6-24).
7. Remove the CRT (see *Replacing the CRT* on Page 6-19).
8. Remove the connector from J6 on the Power Supply board.
9. Remove four screws at the corners of the rear subpanel.
10. Remove two screws as shown in Figure 6-11.



**Figure 6-11: Power Supply Assembly Removal (Bottom View)**

11. Remove the two nuts that fasten the rear plug-in circuit board guide to the RF Deck (Figure 6-12).



**Figure 6- 12: Removing Power Supply Attaching Nuts**

12. Remove the two nuts that fasten the front plug-in circuit board guide to the rear plug in circuit board guide.
13. Undo the cables threaded through the rear plug-in circuit board guide.
14. Remove the Power Supply assembly.

Replace the Power Supply assembly by reversing the removal procedure.

## Replacing the Batteries

Use the following procedure to replace the battery on the Display Storage and GPIB or RS-232 boards.

The Spectrum Analyzer uses two lithium batteries for nonvolatile memory. One battery is located on the Display Storage board, and the other on the GPIB or RS-232 board.

---

**NOTE.** Replacement of this assembly requires completion of the Amplitude Flatness Adjustment Procedure on Page 5-52.

---

Large quantities of spent batteries may need to be sent by surface carrier to a hazardous waste disposal facility. Check with your local, state and Federal regulations.



---

**WARNING.** To avoid personal injury, observe proper procedures for handling of lithium batteries. Improper handling can cause fire, explosion, or severe burns. Do not recharge, crush, disassemble, heat the battery above 100 °C, incinerate, or expose the contents to water.

---

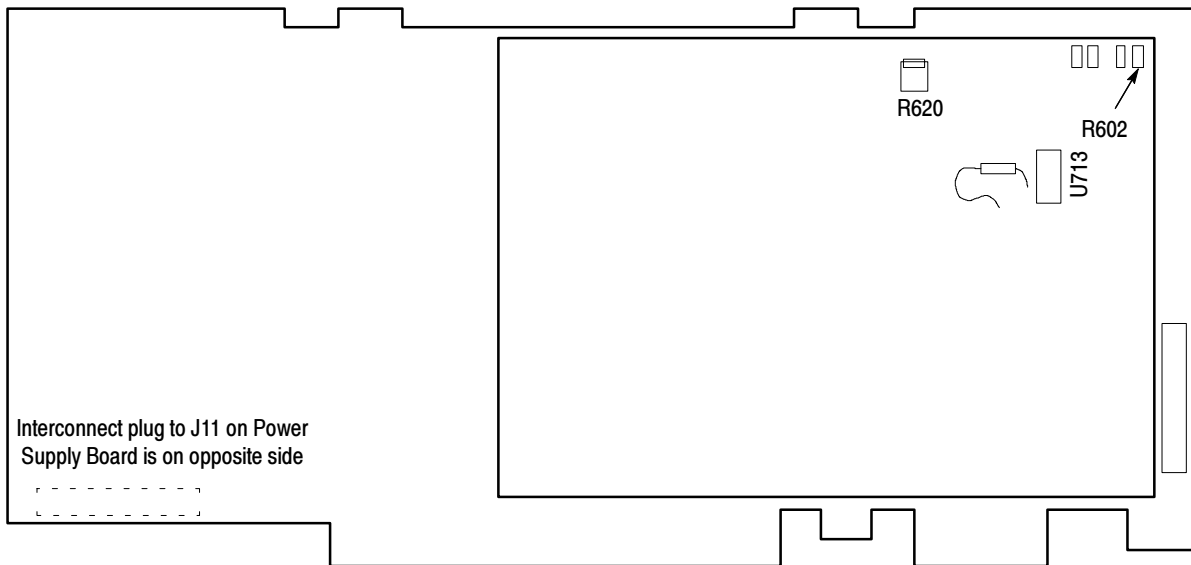
## Maintenance Adjustments

Maintenance procedures are those required when an assembly is replaced. Normal adjustment does not require completion of this procedure.

### Beat Note Level Adjustment

After replacing the Phase Lock CFC Board, use this procedure to select R602 on the Phase Lock CFC board.

1. Remove the small shield over part of the Phase Lock CFC board.
2. Disable frequency corrections by pressing UTIL 4 3 5. Press any menu button to exit the menu, then enable continuous strobes by pressing UTIL 5 1 6 6.
3. Monitor J240 on the LFVCO assembly (Phase Lock module) with the test oscilloscope. Set the test oscilloscope deflection factor to 1 V/div and sweep rate to 20  $\mu$ s/div.
4. Set the FREQ SPAN/DIV to 200 kHz. There should be a square wave present. Tune the FREQ/MARKERS control to get the lowest frequency possible. Reset the test oscilloscope time/div as needed.
5. Measure the beat note amplitude at the bottom of R602 (Figure 6-13) on the Phase Lock CFC board.



**Figure 6-13: Location of R602 on the Phase Lock CFC Board**

---

**NOTE.** *If the beat note frequency is above 50 kHz, it will not be visible.*

---

6. If the amplitude is greater than 60 mV, pick a lower value for R602. If the amplitude is lower than 40 mV, pick a higher value. See Figure 6-13 for the location of R602. The following formula helps in picking a resistor value:

$$R602 = 5620 \frac{60 \text{ mV}}{V_{p-p}} \Omega$$

7. Replace the shield on the Phase Lock CFC board.
8. Enable frequency normalizations by pressing UTIL 3 1.
9. After frequency normalizations are complete, set the FREQUENCY to 100 MHz and enable the calibrator signal (INPUT 9). There should be a 100 MHz signal at center screen.



# Options

This section describes the options available for the 2715 Spectrum Analyzer.

## **Options A1 Through A5 (Power Cord Options)**

There are five international power cord options offered for the 2715 Spectrum Analyzer. The physical descriptions of the power cord plugs follows. For replacement purposes, refer to the Replaceable Mechanical parts List.

**Option A1.** Universal Euro, 220 V/50 Hz at 16 A

**Option A2.** United Kingdom, 240 V/50 Hz at 13 A

**Option A3.** Australian, 240 V/50 Hz at 10 A

**Option A4.** North American, 240 V/60 Hz at 12 A

**Option A5.** Swiss, 220 V/50 Hz at 6A

## **Options B1 and B2**

**Option B1.** This option adds a service manual for the Spectrum Analyzer.

**Option B2.** This option adds a reference manual, a user manual, a programmer manual, and a service manual for the Spectrum Analyzer.

## **Options M1 Through M3 (Extended Service and Warranty Options):**

There are three extended service and warranty options offered for the Spectrum Analyzer that go beyond the basic one year coverage. Contact your local Tektronix Field Office or representative for additional information about your specific requirements.

**Option M1.** Two routine calibrations to published specifications; one each in years two and three of warranty coverage, plus two year remedial service.

**Option M2.** Four year remedial service.

**Option M3.** Four routine calibrations to published specifications; one each in years two, three, four, and five of product ownership, plus four years of remedial service.

**Option 03** This is a no cost option that adds the IEEE Standard 488 General Purpose Interface Bus (GPIB). The pertinent circuits are located on the Digital Option board. The GPIB port consists of three compartments. They are the general purpose interface bus controller, an octal bus transceiver, and an eight channel transceiver. In addition, there is circuitry included to drive two LEDs to display the status of the Not Ready For Data (NRFD) and Not Data Accepted (NDAC) handshake lines.

The general purpose interface bus controller, octal bus transceiver, and eight channel transceiver meet the IEEE-488 1975/78 standards along with the IEEE-488A1980 supplement.

For programming, see the *2714 & 2715 Programmer Manual*.

The rear panel connection provides full GPIB printer compatibility.

If this option is specified, Option 08 is not available.

**Option 05** This option adds the 2707 External Tracking Generator (Option 01). In addition, Option 15 (1st LO output) is included to provide the drive signal for the 2707.

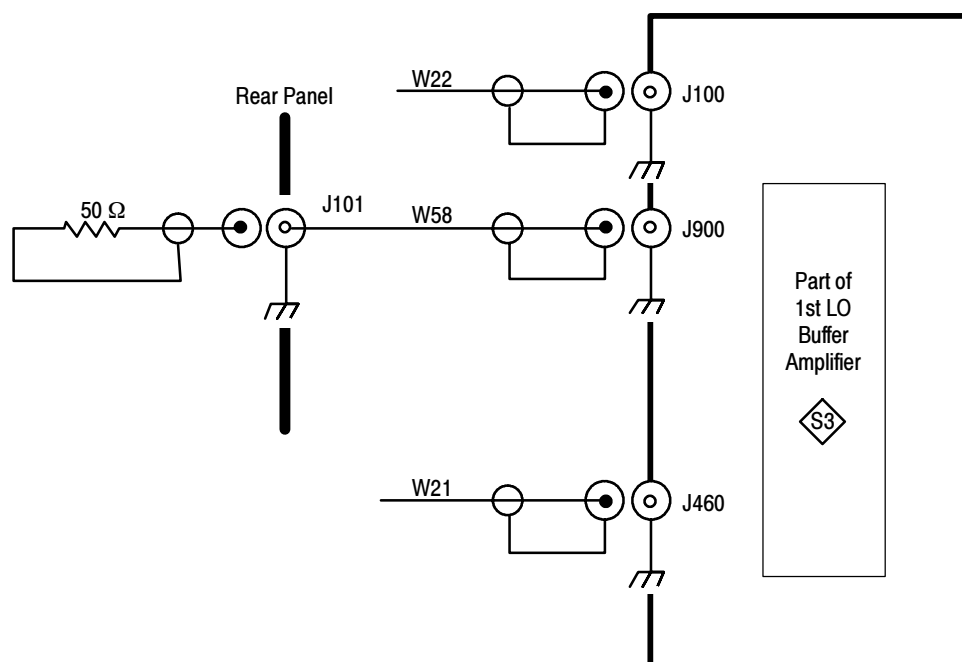
**Option 07** This option comprises the Tektronix 2704 DC Inverter and 2705 Battery Pack. The Inverter and Battery Pack are designed to allow operation of the Spectrum Analyzer in locations where AC power is not available.

The Inverter and Battery Pack combination is capable of operating the Spectrum Analyzer for a minimum of one hour. Moreover, the Inverter contains a charger and an 18 VDC output to power external devices such as Low Noise Block (LNB) Down Converters used in satellite down link applications. The Inverter also includes an additional 12 V input to allow use of external batteries without power interruption to the Spectrum Analyzer. The Inverter and Battery Pack form a matching unit and attach together to the Spectrum Analyzer. At least one Battery Pack is needed with each inverter for normal operation and to add stability when mounted to the Spectrum Analyzer.

Refer to the *2074 Inverter and 2705 Battery Pack Instruction Manual* for specifications, installation instructions and other pertinent information.

**Option 08** This option adds the RS-232 Interface port, a no cost option. The pertinent circuits are located on the RS-232 board. If this option is specified, Option 03 is not available.

**Option 15** This option provides an interface for the 1405 TV Sideband Analyzer and the Option 05 External Tracking Generator. The 1st LO is routed from J300 on the 1st LO Buffer Amplifier assembly to J101 at the rear panel and terminated in 50  $\Omega$ . See Figure 7-1.



**Figure 7-1: Option 15 Installation**

- Option 30** This option enables mounting of the Spectrum Analyzer in a standard 19 inch (483 mm) rack. The Spectrum Analyzer is guaranteed to meet all electrical and environmental characteristics, published in both the User and Service Manuals, when it is mounted according to the procedures given in the instruction sheet.
- Option 33** This option provides a Travel Line package including a rain cover, accessory pouch, gray CRT filter, and carrying strap.
- Option 34** This option provides a rack mount adapter that enables mounting of the Spectrum Analyzer in a standard 19 inch (483 mm) rack. The adapter consists of a 19 inch × 6.97 inch cradle (shelf) with slide-out assemblies and a mask to fit over the regular instrument panel.
- Option 50** This option provides a 50Ω input, frequency range of 9 KHz to 2.15 GHz, and channel table editing from the front panel of the 2715.
- Option 75** This option provides a 75Ω input, frequency range of 9 KHz to 2.15 GHz, and channel table editing from the front panel of the 2715.



# Replaceable Electrical Parts

This section contains a list of the electrical components for the 2715. Use this list to identify and order replacement parts.

## Parts Ordering Information

Replacement parts are available through your local Tektronix field office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest circuit improvements. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix field office or representative will contact you concerning any change in part number.

## Using the Replaceable Electrical Parts List

The tabular information in the Replaceable Electrical Parts List is arranged for quick retrieval. Understanding the structure and features of the list will help you find all of the information you need for ordering replacement parts. The following table describes each column of the electrical parts list.

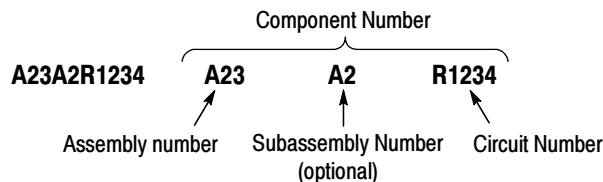
**Parts List Column Descriptions**

Column	Column Name	Description
1	Component Number	<p>The component number appears on diagrams and circuit board illustrations, located in the diagrams section. Assembly numbers are clearly marked on each diagram and circuit board illustration in the <i>Diagrams</i> section, and on the mechanical exploded views in the <i>Replaceable Mechanical Parts</i> list section. The component number is obtained by adding the assembly number prefix to the circuit number (see Component Number illustration following this table).</p> <p>The electrical parts list is arranged by assemblies in numerical sequence (A1, with its subassemblies and parts, precedes A2, with its subassemblies and parts).</p> <p>Chassis-mounted parts have no assembly number prefix, and they are located at the end of the electrical parts list.</p>
2	Tektronix Part Number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial Number	Column three indicates the serial number at which the part was first effective. Column four indicates the serial number at which the part was discontinued. No entry indicates the part is good for all serial numbers.
5	Name & Description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.
6	Mfr. Code	This indicates the code number of the actual manufacturer of the part.
7	Mfr. Part Number	This indicates the actual manufacturer's or vendor's part number.

**Abbreviations**

Abbreviations conform to American National Standard ANSI Y1.1-1972.

**Component Number**



**Read: Resistor 1234 (of Subassembly 2) of Assembly 23**

**List of Assemblies**

A list of assemblies is located at the beginning of the electrical parts list. The assemblies are listed in numerical order. When a part's complete component number is known, this list will identify the assembly in which the part is located.

**Chassis Parts**

Chassis-mounted parts and cable assemblies are located at the end of the Replaceable Electrical Parts List.

**Mfr. Code to Manufacturer Cross Index**

The table titled Manufacturers Cross Index shows codes, names, and addresses of manufacturers or vendors of components listed in the parts list.

## Manufacturers Cross Index

<b>Mfr. Code</b>	<b>Manufacturer</b>	<b>Address</b>	<b>City, State, Zip Code</b>
D5243	ROEDERSTEIN ERNST GMBH	LUDMILLA STRASSE 23	8300 LANDSHUT GERMANY
S3774	OSHINO ELECTRIC LAMP WORKS LTD	5 2 MINAMI SHINAGAWA 2 CHORE SHINAGAWA KU	TOKYO JAPAN
S4091	SANYO ELECTRIC CO LTD		OSAKA JAPAN
TK0032	POWELL ELECTRONICS	411 FAIRCHILD DR	MT VIEW CA 94040
TK0198	AVNET INC	AVNET ELECTRONICS MKTG, AMERICA 15580 SW JAY STREET	BEAVERTON, OR 97006
TK0515	EVOX-RIFA INC	100 TRI-STATE INTERNATIONAL SUITE 290	LINCOLNSHIRE IL 60015
TK0875	MATSUO ELECTRONICS INC	831 S DOUBLAS ST	EL SEGUNDO CA 92641
TK0891	MICONICS	1 FAIRCHILD AVE	PLAINVIEW NY 11803
TK1146	MITSUBISHI ELECTRONICS	1050 E ARQUES AVENUE	SUNNYVALE CA 94086
TK1727	PHILIPS NEDERLAND BV AFD ELONCO	POSTBUS 90050	5600 PB EINDHOVEN THE NETHERLANDS
TK1869	ALPS	100 N CNTR E AVE	ROCKVILLE CENTRE NY 11570
TK1913	WIMA THE INTER-TECHNICAL GROUP IND	2269 SAW MILL RIVER ROAD PO BOX 127	ELMSFORD NY 10523
TK1978	ELEKTRISOLA	3156 NE LA PALMA AVE	ANAHEIM CA 92806
TK2058	TDK CORPORATION OF AMERICA	1600 FEEHANVILLE DRIVE	MOUNT PROSPECT, IL 60056
TK2073	TOKYO AMERICA INC	565 W GULF ROAD	ARLINGTON HEIGHTS IL 60005
TK2096	KELVIN ASSOCIATES	14724 VENTURA BLVD SUITE 1003	SHERMAN OAKS CA 91403-3501
TK2319	COLLMER	14368 PROTON RD	DALLAS TX 75244
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK WAY SUITE #2	VANCOUVER WA 98601
TK2540	SONY ELECTRONICS INC BUSINESS & PROFESSIONAL GROUP	10833 VALLEY VIEW STREET	CYPRESS, CA 90630-0016
TK2611	STACKPOLE CORPORATION	PO BOX 14466	RALEIGH, NC 27610
0B0A9	DALLAS SEMICONDUCTOR CORP	4350 BELTWOOD PKWY SOUTH	DALLAS TX 75244
0C8T6	CITEL AMERICA INC	1111 PARK CENTRE BLVD SUITE 474	MIAMI, FL 33169
0GZV8	HUBER AND SUHNER INC	ONE ALLEN MARTIN DRIVE	EXXEX VT 05451
0H1N5	TOSHIBA MARCON ELECTRONICS AMERICA CORPORATION	998 FIRST EDGE DRIVE	VERNON HILLS IL 60061
0JR03	ZMAN MAGNETICS INC	7633 S 180th	KENT WA 98032
0JR04	TOSHIBA AMERICA INC ELECTRONICS COMPONENTS DIV	9775 TOLEDO WAY	IRVINE CA 92718
0J7N9	MCX INC	30608 SAN ANTONIO ST	HAYWARD CA 94544
0LUA3	PHILIPS COMPONENTS	100 PROVIDENCE PIKE	SLATERSVILLE, RI 02876
0N2P9	OKI SEMICONDUCTOR INC	785 MARY AVENUE	SUNNYVALE CA 94086-2909
00213	MSD INC	700 ORANGE ST	DARLINGTON, SC 29532
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPY PO BOX 655303	DALLAS TX 75262-5303
02113	COILCRAFT INC	1102 SILVER LAKE RD	CARY IL 60013-1658
02114	PHILIPS COMPONENTS AMPEREX ELECTRONICS CORP FERROXCUBE DIV	5083 KINGS HWY	SAUGERTIES, NY 12477

**Manufacturers Cross Index (Cont.)**

<b>Mfr. Code</b>	<b>Manufacturer</b>	<b>Address</b>	<b>City, State, Zip Code</b>
02289	HI-G CO INC SUB OF NYTRONICS INC	101 LOCUST ST	HARTFORD CT 06114-1504
04222	AVX/KYOCERA DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR	5005 E MCDOWELL RD	PHOENIX AZ 85008-4229
07716	IRC, INC	2850 MT PLEASANT AVE	BURLINGTON, IA 52601
09969	DALE ELECTRONICS INC	EAST HIGHWAY 50 P O BOX 180	YANKTON SD 57078
1CH66	PHILIPS SEMICONDUCTORS	811 E ARQUES AVENUE PO BOX 3409	SUNNYVALE CA 94088-3409
1ES66	MAXIM INTEGRATED PRODUCTS INC	120 SAN GABRIEL DRIVE	SUNNYVALE CA 94086
12020	OVENAIRE DIV OF ELECTRONIC TECHNOLOGIES INC	706 FORREST ST PO BOX 1528	CHARLOTTESVILLE VA 22901-4224
12697	CLAROSTAT MFG CO INC	12055 ROJAS DRIVE SUITE K	EL PASO, TX 79936
14482	WATKINS-JOHNSON COMPANY	RELCOM DEPT 3333 HILLVIEW AVENUE	PALO ALTO, CA 94304
14552	MICROSEMI CORP	2830 S FAIRVIEW ST	SANTA ANA CA 92704-5948
15454	KETEMA RODAN DIVISION	2900 BLUE STAR STREET	ANAHEIM CA 92806-2591
15542	MINI-CIRCUITS LABORATORY	2625 E 14TH ST	BROOKLYN NY 11235-3915
17540	ALPHA INDUSTRIES INC HQ/SEMICONDUCTOR DIV	20 SYLVAN RD PO BOX 1044	WOBURN MA 01801-1854
17554	AVX/KYOCERA CORP.	69 LANDRY ST AIRPORT INDUSTRIAL PARK	BIDDEFORD ME 04005-4319
17856	SILICONIX INC	2201 LAURELWOOD RD	SANTA CLARA CA 95054-1516
18612	VISHAY INTERTECHNOLOGY INC VISHAY RESISTOR PRODUCTS GROUP	63 LINCOLN HWY	MALVERN PA 19355-2120
18796	MURATA ELECTRONICS NORTH AMERICA INC. STATE COLLEGE OPERATIONS	1900 W COLLEGE AVE	STATE COLLEGE PA 16801-2723
19701	PHILIPS COMPONENTS DISCRETE PROD- UCTS DIV RESISTIVE PRODUCTS FACILITY AIRPORT ROAD	PO BOX 760	MINERAL WELLS TX 76067-0760
2N936	VISHAY ELECTRONIC COMPONENTS	1122 23RD STREET	COLUMBUS, NE 68601
22526	BERG ELECTRONICS INC (DUPONT)	857 OLD TRAIL RD	ETTERS PA 17319
24355	ANALOG DEVICES INC	1 TECHNOLOGY DRIVE	NORWOOD MA 02062
24546	DALE ELECTRONICS A VISHAY INTERTECHNOLOGY INC CO	550 HIGH ST	BRADFORD PA 16701-3737
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
25088	SIEMENS CORP	186 WOOD AVE S	ISELIN NJ 08830-2704
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051-0606
31918	ITT SCHADOW INC	8081 WALLACE RD	EDEN PRAIRIE MN 55344-2224
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507-2114
33095	SPECTRUM CONTROL INC	8061 AVONIA ROAD	FAIRVIEW, PA 16415
33096	COLORADO CRYSTAL CORP	2303 W 8TH ST	LOVELAND CO 80537-5268



## Manufacturers Cross Index (Cont.)

Mfr. Code	Manufacturer	Address	City, State, Zip Code
34371	HARRIS SEMICONDUCTOR SEMICONDUCTOR SECTOR	MS 58-71 PO BOX 883	MELBOURNE, FL 32902-0883
4T165	NEC ELECTRONICS USA INC ELECTRON DIV	475 ELLIS ST PO BOX 7241	MOUNTAIN VIEW CA 94039
4U402	ROEDERSTEIN ELECTRONICS INC 2100 W FRONT ST		STATESVILLE NC 28677-3651
5W664	NDK AMERICA INC	828 MAIN STREET SUITE 1906, PO BOX 884	LYNCHBURG VA 24505
50101	FREQUENCY SOURCES INC SEMICONDUCTOR DIV SUB OF LORAL CORP	16 MAPLE RD	CHELMSFORD MA 01824-3737
50139	ALLEN-BRADLEY COMPANY INC	ELECTRONIC COMPONENTS DIVISION 1414 ALLEN BRADLEY DRIVE	EL PASO, TX 79936
50140	K & L MICROWAVE INC	SUB OF DOVER CORP 408 COLES CIRCLE	SALISBURY, MD 21801-3214
50434	HEWLETT-PACKARD CO OPTOELECTRONICS DIV	370 W TRIMBLE RD	SAN JOSE CA 95131-1008
50579	SIEMENS COMPONENTS INC OPTOELECTRONICS DIV	19000 HOMESTEAD RD	CUPERTINO CA 95014-0712
51406	MURATA ELECTRONICS NORTH AMERICA INC HEADQUARTERS AND GEORGIA OPERATIONS	2200 LAKE PARK DR	SMYRNA GA 30080
51993	INTERNATIONAL RECTIFIER	233 KANSAS STREET	EL SEGUNDO, CA 90245
52769	SPRAGUE-GOODMAN ELECTRONICS INC	1700 SHAMES DRIVE	WESTBURY, NY 11590
53469	GEC PLESSEY SEMICONDUCTORS INC	1500 GREEN HILLS RD PO BOX 660017	SCOTTS VALLEY, CA 95067-0017
54893	HEWLETT PACKARD MICROWAVE SEMICONDUCTOR DIVISION	350 TRIMBLE	SAN JOSE CA 95131-1008
54937	DEYOUNG MANUFACTURING INC	12920 NE 125TH WAY	KIRKLAND WA 98034-7716
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195-4526
56708	ZILOG INC	1315 DELL AVE	CAMPBELL CA 95008-6609
57027	INTERNATIONAL RESISTIVE PRODUCTS INC	4222 S STAPLES	CORPUS CHRISTI TX 78411-2702
57668	ROHM CORPORATION	15375 BARRANCA PARKWAY SUITE B207	IRVINE CA 92718
58050	TEKA PRODUCTS INC	45 SALEM ST	PROVIDENCE RI 02907
59124	KOA SPEER ELECTRONICS INC	BOLIVAR DRIVE PO BOX 547	BRADFORD PA 16701
59492	QUARTZTEK INC	20 S 48TH AVE	PHOENIX AZ 85043-3820
59660	TUSONIX INC	7741 N BUSINESS PARK DR PO BOX 37144	TUCSON AZ 85740-7144
61058	MATSUSHITA ELECTRIC CORP OF AMERICA PANASONIC INDUSTRIAL CO DIV	TWO PANASONIC WAY	SECAUCUS NJ 07094
61374	BUEHLER PRODUCTS INC	PS BOX 33400	RALEIGH NC 27606
61441	SARONIX	4010 TRANSPORT ST	PALO ALTO CA 94303-4913
62104	CALIFORNIA EASTERN LABORATORIES INC	4590 PATRICK HENRY DR	SANTA CLARA CA 95054-3309
62643	UNITED CHEMICON INC	9801 W HIGGINS ST SUITE 430	ROSEMONT, IL 60018-4771
62839	COMLINEAR CORP	4800 WHEATON DR PO BOX 20600	FT COLLINS CO 80525
63681	CROUZET CORPORATION	3237 COMMANDER DRIVE	CARROLLTON, TX 75006-2503
64155	LINEAR TECHNOLOGY CORP	1630 MCCARTHY BLVD	MILPITAS CA 95035-7417
64537	KDI/TRIANGLE ELECTRONICS	60 S JEFFERSON ROAD	WHIPPANY, NJ 07981

**Manufacturers Cross Index (Cont.)**

<b>Mfr. Code</b>	<b>Manufacturer</b>	<b>Address</b>	<b>City, State, Zip Code</b>
68994	XILINX INC	2100 LOGIC DRIVE	SAN JOSE CA 95124
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
73138	BI TECHNOLOGIES CORPORATION	4141 PALM ST	FULLERTON CA 92635
75378	CTS KNIGHTS INC	400 REIMANN AVE	SANDWICH IL 60548-1846
75498	MULTICOMP INC	3005 SW 154TH TERRACE #3	BEAVERTON OR 97006
8X345	NORTHWEST SPRING & MFG CO	5858 SW WILLOW LANE	LAKE OSWEGO OR 97035
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
81073	GRAYHILL INC	561 HILLGROVE AVE PO BOX 10373	LA GRANGE IL 60525-5914
82389	SWITCHCRAFT INC SUB OF RAYTHEON CO	5555 N ELSTRON AVE	CHICAGO IL 60630-1314
84411	AMERICAN SHIZUKI CORP OGALLALA OPERATIONS	301 WEST O ST	OGALLALA NE 69153-1844
91293	JOHANSON MFG CO	400 ROCKWAY VALLEY RD	BOONTON NJ 07005
91637	DALE ELECTRONICS INC	2064 12TH AVE PO BOX 609	COLUMBUS NE 68601-3632

**Replaceable Electrical Parts List**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A5	671-0974-04		B040924	CKT BD ASSY:SWEEP	80009	671-0974-04
A5	671-0974-05	B040925		CKT BD ASSY:SWEEP	80009	671-0974-05
A6	671-1923-01			CIRCUIT BD ASSY:FRONT PANEL;	80009	671-1923-01
A7	671-1674-04			CKT BD ASSY:LOG AMP	80009	671-1674-04
A9	671-2918-02			CKT BD ASSY:DISPLAY STORAGE	80009	671-2918-02
A9	671-2918-04		B010324	CIRCUIT BD ASSY:DISPLAY STORAGE	80009	671-2918-04
A9	671-2918-05	B010325	B020495	CIRCUIT BD ASSY:DISPLAY STORAGE	80009	671-2918-06
A9	671-2918-06	B020496		CIRCUIT BD ASSY:DISPLAY STORAGE	80009	671-2918-06
A10	671-0653-14			CIRCUIT BD ASSY:MICROPROCESSOR	80009	671-0653-14
A10	672-1543-00	B010100	B041844	CIRCUIT BD ASSY:MICROPROCESSOR, W/163-1271-00, 163-1272-00,163-1273-00,163-1274-00, OPT 50 AND OPT 75 ONLY	80009	672-1543-00
A10	672-1543-01	B041845		CIRCUIT BD ASSY; MICROPROCESSOR, 671-0653-14, W/163-1271-01, 163-1272-01, 163-1273-01, 163-1274-01;2715 OPT 50, 2715 OPT 75	80009	672-1543-01
A11	671-3275-00			CKT BD ASSY:DIGITAL OPTIONS/IF GATE	80009	671-3275-00
A11	672-1544-00	B010100	B041844	CIRCUIT BD ASSY:DIGITAL OPT IF GATE, W/163-1276-00, 2715 OPT 50	80009	672-1544-00
A11	672-1544-01	B041845		CIRCUIT BD ASSY; DIGITAL OPT IF GATE, 671-3275-01, W/163-1276-01;2715 OPT 50, 2715 OPT 75	80009	672-1544-01
A11	672-1545-00			CIRCUIT BD ASSY:DIGITAL OPT IF GATE, W/163-1299-00, 2715 OPT 75	80009	672-1545-00
A12	672-1284-05		B010166	CIRCUIT BD ASSY:PHASELOCK CFC MODULE	80009	672-1284-05
A12	672-1284-06	B010167	B010181	CKT BD ASSY PHASELOCK CFC MODULE	80009	672-1284-06
A12	672-1284-07	B010182		CKT BD ASSY PHASELOCK CFC MODULE	80009	672-1284-07
A12	672-1284-10			CIRCUIT BD ASSY:PHASELOCK CFC MODULE,670-9472-05 & 670-9473-03 & 671-0583-03, OPT 50 & OPT 75 ONLY	80009	672-1284-10
A12A1	-----			(PART OF A12) PHASELOCK CF CONTROL		
A12A2	-----			(PART OF A12) HIGH FREQ VCO		
A12A3	-----			(PART OF A12) LOW FREQUENCY		
A13	119-3445-04			VR ASSEMBLY	80009	119344504
A13A1	670-9475-06			CIRCUIT BD ASSY:VARIABLE RESOLUTION	80009	670947506
A14	672-1308-03			CKT BD ASSY:RF MOM/2ND LO	80009	672130803
A14	672-1308-04		B030838	CIRCUIT BD ASSY:RF MOM/2ND LO	80009	672-1308-04
A14	672-1308-05	B030839	B041227	CIRCUIT BD ASSY:RF MOM/2ND LO BD ASSY	80009	672-1308-05
A14	672-1308-06	B041228		CIRCUIT BD ASSY:RF MOM/2ND LO BD ASSY	80009	672-1308-06
A14A1	-----			CKT BD ASSY:RF MON/2ND LO (PART OF A14)	80009	671174301
A15	621-0083-09		B010180	POWER SUPPLY:CIRCUIT BOARD W/CHASSIS	80009	621008309
A15	621-0083-10	B010181	B020569	POWER SUPPLY:CIRCUIT BOARD W/CHASSIS	80009	621008310
A15	621-0083-11	B020570	B020605	POWER SUPPLY:CIRCUIT BOARD W/CHASSIS	80009	621008311
A15	621-0083-12	B020606	B030799	POWER SUPPLY:CIRCUIT BOARD W/CHASSIS	80009	621008312
A15	621-0083-13	B030800	B040924	POWER SUPPLY:CIRCUIT BOARD W/CHASSIS	80009	621008313

## Replaceable Electrical Parts

### Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A15	621-0083-14	B0 40925		POWER SUPPLY:CIRCUIT BOARD W/CHASSIS	80009	621008314
A15A1				(PART OF A15)		
A16	119-2568-04			1ST CONVERTER A	80009	119256804
A16A1	-----			CIRCUIT BD ASSY:1ST CONVERTER (PART OF A16)		
A16A2	-----			CIRCUIT BD ASSY: 1ST MIXER INPUT (PART OF A16)		
A17	119-2301-06			YIG BUFFER ASSY	80009	119230106
A17A1	-----			(PART OF A17)		
A18	672-1297-01			CIRCUIT BD ASSY:RF ATTN	80009	672129701
A18A1	-----			(PART OF A18) DIGITAL CONTROL		
A18A2	-----			(PART OF A18) RF		
A19	119-2206-00			OSCILLATOR,RF:1.9 TO 4.0 GHZ ALL EXCEPT OPTION 50/75	80009	119220600
A19	119-5101-00			OSCILLATOR,RF:YIG,1.9 TO 4.4 GHZ,2712FE OPTION 50/75	14482	2712FE
A19A1	-----			CIRCUIT BD ASSY:YIG INTERFACE (PART OF A19)		
A21	670-9470-02		B040924	CIRCUIT BD ASSY:REF OSCILLATOR	80009	670947002
A21	670-9470-03	B040925		CIRCUIT BD ASSY:REF OSCILLATOR	80009	670947002

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A23	671-1740-03		B010400	CIRCUIT BD ASSY:RF OPTION	80009	671174003
A23	671-1740-04	B010401	B030924	CIRCUIT BD ASSY:RF OPTION	80009	671174004
A23	671-1740-05	B040925		CIRCUIT BD ASSY:RF OPTION BD,388-9676-01 WIRED,2712	80009	671-1740-05
A28	671-3276-00			CKT BD ASSY:VIDEO DEMODULATOR	80009	671327600
A5	671-0974-04		B030924	CKT BD ASSY:SWEEP	80009	671097404
A5	671-0974-05	B040925		CKT BD ASSY:SWEEP	80009	671097405
A5C130	290-0944-00			CAP,FXD,ELCTLT:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A5C150	283-0645-00			CAP,FXD,MICA DI:790PF,1%,300V	TK0891	RDM15FC791F03
A5C160	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C161	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C165	283-0672-00			CAP,FXD,MICA DI:200PF,1%,500V	TK0891	RDM15FD201F03
A5C176	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C210	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C220	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A5C230	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A5C231	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C252	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A5C253	290-5039-00			CAP,FXD,ALUM:10UF,20%,50V,6.3MM;SMD,16MM T&R	62643	MVK50VC10RMF60T
A5C262	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C310	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C311	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C322	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C383	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C384	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C391	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C410	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C420	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C421	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A5C430	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C431	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C475	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A5C531	290-0944-00			CAP,FXD,ELCTLT:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A5C553	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C563	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C564	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C582	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C583	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C585	283-5188-00			CAP,FXD,CERAMIC:MLC;100PF,5%,100V,NPO,1206	04222	12061A101JAT1A

**Replaceable Electrical Parts List (Cont.)**

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A5C586	283-5188-00			CAP,FXD,CERAMIC:MLC;100PF,5%,100V,NPO,1206	04222	12061A101JAT1A
A5C592	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C611	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C621	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C631	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C662	290-5039-00			CAP,FXD,ALUM:10UF,20%,50V,6.3MM;SMD,16MM T&R	62643	MVK50VC10RMF60T
A5C691	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C720	290-0944-00			CAP,FXD,ELCTLT:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A5C751	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A5C761	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C762	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A5C773	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C774	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A5C775	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A5C781	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A5C782	283-5008-00			CAP,FXD,CERAMIC:MLC;12PF,5%,50V,NPO,1206	TK2058	C3216C0G1H120J
A5C790	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C840	295-0199-00		B030924	CAP SET,MATCHED:(1) 10UF,1.5%,25V, (1) 0.1UF,1.5%,100V,MATCHED (MATCHED SET WITH A5C845)	75498	295-0199-00
A5C840	295-0199-01	B040925		CAP SET MATCHED:(1)10UF,1.5% 25V,(1)0.1UF,1.5%,100V CAPACITOR SET	84411	TEK-392ST
A5C841	283-5004-00		B030924	CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C841	295-0199-01	B040925		CAP SET MATCHED:(1)10UF,1.5% 25V,(1)0.1UF,1.5%,100V CAPACITOR SET	84411	TEK-392ST
A5C842	283-5004-00		B030924	CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C842	295-0199-01	B040925		CAP SET MATCHED:(1)10UF,1.5% 25V,(1)0.1UF,1.5%,100V CAPACITOR SET	84411	TEK-392ST
A5C843	283-5004-00		B030924	CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C843	295-0199-01	B040925		CAP SET MATCHED:(1)10UF,1.5% 25V,(1)0.1UF,1.5%,100V CAPACITOR SET	84411	TEK-392ST
A5C844	283-5004-00		B030924	CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C844	295-0199-01	B040925		CAP SET MATCHED:(1)10UF,1.5% 25V,(1)0.1UF,1.5%,100V CAPACITOR SET	84411	TEK-392ST
A5C845	295-0199-00		B030924	CAP SET,MATCHED:(1) 10UF,1.5%,25V, (1) 0.1UF,1.5%,100V,MATCHED	75498	295-0199-00
A5C845	295-0199-01	B040925		CAP SET MATCHED:(1)10UF,1.5% 25V,(1)0.1UF,1.5%,100V CAPACITOR SET	84411	TEK-392ST
A5C860	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C870	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C871	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A5C872	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C880	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C940	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C941	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C960	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C961	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C970	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5C971	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A5CR212	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A5CR361	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A5CR373	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A5CR461	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A5CR462	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A5DS200	150-0097-00			LAMP,INCAND:6.3V,0.2A,#7381,WIRE LEADS SAFETY CONTROLLED	S3774	0L381BP
A5DS500	150-0097-00			LAMP,INCAND:6.3V,0.2A,#7381,WIRE LEADS SAFETY CONTROLLED	S3774	0L381BP
A5DS700	150-0097-00			LAMP,INCAND:6.3V,0.2A,#7381,WIRE LEADS SAFETY CONTROLLED	S3774	0L381BP
A5J480	131-2514-00			CONN,HDR:;PCB;;MALE,RTANG,2 X 10,0.1CTR,0.318 MLG X 0.110 TAIL,0.238 H,30 GOLD,SHRD BETWEEN REAR TAILS	00779	86479-1
A5J750	131-0265-00			CONN,RF JACK:SMB;PCB,MALE,RTANG,50 OHM,0.381 H X 0.15 TAIL,0.043 DIA CTR COND,0.040 S Q TAIL	0GZV8	85SMB-50-0-1
A5L783	108-5001-00			INDUCTOR,FXD:SIGNAL;70NH,5%,IDC<860 MA,RDC<0.55 OHM,Q>35,SRF>900 MHZ	02113	1008CT-700XJB(A
A5L890	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A,RDC<0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A5Q255	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0LUA3	PMBT3904TRL
A5Q351	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0LUA3	PMBT3904TRL
A5Q574	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0LUA3	PMBT3904TRL
A5Q663	151-5002-00			TRANSISTOR,SIG:JFET,N-CH;5V,75MA,60 OHM,SWITCH	04713	MMBF4392LT1
A5Q664	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL
A5Q685	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0LUA3	PMBT3904TRL
A5Q706	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0LUA3	PMBT3904TRL
A5Q707	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A5R100	321-5028-00			RES,FXD:THICK FILM;6.81K OHM,1%,0.125W,TC=100 PPM	50139	BCK6811FT
A5R101	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R140	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W,TC=100 PPM	50139	BCK8250FT
A5R141	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R142	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R150	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R171	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA1M
A5R172	321-5041-00			RES,FXD:THICK FILM;82.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK8252FT
A5R173	321-5035-00			RES,FXD:THICK FILM;27.4K OHM,1%,0.125W,TC=100 PPM	50139	BCK2742FT
A5R174	321-5041-00			RES,FXD:THICK FILM;82.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK8252FT
A5R175	321-5041-00			RES,FXD:THICK FILM;82.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK8252FT
A5R177	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R180	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R181	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R182	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R183	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R184	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R185	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R186	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA332K
A5R190	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA332K
A5R200	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R201	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R213	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R221	321-5037-00			RES,FXD:THICK FILM;39.2K OHM,1%,0.125W,TC=100 PPM	50139	BCK3922FT
A5R222	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK4752FT
A5R232	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK1211FT
A5R233	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK2211FT
A5R240	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R251	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R270	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W,TC=100 PPM	50139	BCK3921FT
A5R272	321-5005-00			RES,FXD:THICK FILM;27.4 OHM,1%,0.125W,TC=100 PPM	57668	MCR18EZHFW 27E4
A5R280	311-1225-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3386F-1-102
A5R281	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA1M
A5R282	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA1M
A5R283	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R284	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R286	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W,TC=100 PPM	50139	BCK3921FT
A5R290	311-1466-00			RES,VAR,NONWW:TRMR,2K OHM,0.5W	32997	3386F-1-202



**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A5R293	321-5031-00			RES,FXD:THICK FILM;12.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK1212FT
A5R300	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R301	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R340	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R341	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R342	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R343	321-5028-00			RES,FXD:THICK FILM;6.81K OHM,1%,0.125W,TC=100 PPM	50139	BCK6811FT
A5R344	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A5R350	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R352	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R353	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R360	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R361	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R370	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R371	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R372	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R374	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W,TC=100 PPM	50139	BCK8250FT
A5R380	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R381	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R382	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R430	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA332K
A5R431	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA332K
A5R441	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R450	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R451	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A5R463	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R471	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R472	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA1M
A5R473	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R474	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA1M
A5R481	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W,TC=100 PPM	50139	BCK8250FT
A5R482	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R483	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W,TC=100 PPM	50139	BCK3921FT
A5R541	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R542	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R543	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK2211FT
A5R544	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A5R552	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1502FT
A5R561	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R562	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R570	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R571	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA1M
A5R572	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R573	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R580	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R581	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R585	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK1211FT
A5R586	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A5R591	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W,TC=100 PPM	50139	BCK1820FT
A5R630	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R631	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R640	311-1225-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3386F-1-102
A5R650	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT
A5R651	321-5033-00			RES,FXD:THICK FILM;18.2K OHM,1%,0.125W,TC=100 PPM	50139	BCK1822FT
A5R652	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R653	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W,TC=100 PPM	50139	BCK5621FT
A5R654	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W,TC=100 PPM	50139	BCK3321FT
A5R660	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK4752FT
A5R661	321-5040-00			RES,FXD:THICK FILM;68.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK6812FT
A5R680	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A5R681	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R682	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R683	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R684	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R692	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R693	321-5029-00			RES,FXD:THICK FILM;8.25K OHM,1%,0.125W,TC=100 PPM	50139	BCK8251FT
A5R701	301-0560-00			RES,FXD,FILM:56 OHM,5%,0.5W	TK2611	RC1/2 0560J
A5R702	301-0560-00			RES,FXD,FILM:56 OHM,5%,0.5W	TK2611	RC1/2 0560J
A5R703	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R704	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A5R705	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A5R710	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A5R733	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A5R740	311-1227-00			RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3386F-1-502
A5R763	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A5R764	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W,TC=100 PPM	50139	BCD56R2FT
A5R771	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A5R780	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W,TC=100 PPM	50139	BCK1820FT
A5R990	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A5R991	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A5R992	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A5U150	156-5097-00			IC,MISC:CMOS,ANALOG MUX;8 CHANNEL	04713	MC14051BD
A5U160	156-5298-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE, 5V,100MA,5%	01295	UA78L05ACD
A5U170	156-5097-00			IC,MISC:CMOS,ANALOG MUX;8 CHANNEL	04713	MC14051BD
A5U211	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTDT
A5U244	156-5095-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW NOISE,HIGH OUTPUT DRIVE	01295	NE5534DR
A5U260	156-5274-01			IC,MISC:CMOS,ANALOG SWITCH;QUAD	17856	DG211DY-T1
A5U270	156-5352-00			IC,LINEAR:BIFET,OP-AMP;LOW OFFSET	64155	LT1056S8
A5U312	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTDT
A5U320	156-5265-00			IC,DIGITAL:CMOS,MULTIVIBRATOR;DUAL PRECISION RETRIG/RESETTABLE MONOSTABLE	1CH66	HEF4538BTD
A5U343	156-5095-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW NOISE,HIGH OUTPUT DRIVE	01295	NE5534DR
A5U374	156-5018-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLE SUPPLY	01295	LM358D
A5U390	156-5299-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIVE, -5V,100MA,5%	01295	MC79L05ACD
A5U420	156-5694-00			MICROCKT,LINEAR:BIPOLAR,VIDEO SYNC SEPARATOR	27014	LM1881M
A5U443	156-5274-01			IC,MISC:CMOS,ANALOG SWITCH;QUAD	17856	DG211DY-T1
A5U452	156-5097-00			IC,MISC:CMOS,ANALOG MUX;8 CHANNEL	04713	MC14051BD
A5U460	160-5714-00			IC,DIGITAL:STTL,PLD;FPLA,PLS153,30NS,155MA	TK0198	160-5714-00
A5U470	156-5119-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR, 80NS	1CH66	LM319D
A5U510	156-5110-00			IC,DIGITAL:LSTTL,COUNTER;SYNCH 4-BIT UP/DOWN BINARY	01295	SN74LS169BD
A5U530	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTDT
A5U540	156-5119-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR, 80NS	1CH66	LM319D
A5U560	156-5018-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLE SUPPLY	01295	LM358D
A5U590	156-5298-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE, 5V,100MA,5%	01295	UA78L05ACD
A5U610	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTDT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A5U620	156-5110-00			IC,DIGITAL:LSTTL,COUNTER;SYNCH 4-BIT UP/DOWN BINARY	01295	SN74LS169BD
A5U630	156-5110-00			IC,DIGITAL:LSTTL,COUNTER;SYNCH 4-BIT UP/DOWN BINARY	01295	SN74LS169BD
A5U670	160-5715-00			IC,DIGITAL:STTL,PLD;FPLS,16 X 45 X 12	TK0198	160-5715-00
A5U690	156-5095-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW NOISE,HIGH OUTPUT DRIVE	01295	NE5534DR
A5U730	156-5081-01			IC,DIGITAL:HCTCMOS,GATE;HEX INVERTER	0JR04	TC74HCT04AFN
A5U760	156-5280-00			IC,LINEAR:BIPOLAR,AMPLIFIER;RF AMP,20DB GAIN,600MHZ	1CH66	NE5205AD
A5U770	156-3620-00			IC,LINEAR:BIPOLAR,DETECTOR;FM,WIDEBAND	53469	SL1454/DP
A6	671-1923-01			CIRCUIT BD ASSY:FRONT PANEL;	80009	671192301
A6C130	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C131	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C140	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C141	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C180	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A6C181	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A6C190	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C220	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C240	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C250	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C280	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A6C310	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C330	283-0330-00			CAP,FXD,CER DI:100PF,5%,50V	18796	RPE121151C0G101
A6C340	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C341	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C350	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C351	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C352	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C360	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C380	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A6C390	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C440	283-0330-00			CAP,FXD,CER DI:100PF,5%,50V	18796	RPE121151C0G101
A6C460	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C520	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C540	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6C560	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A6CR100	152-5000-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A6CR300	152-5000-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A6CR400	152-5000-00			DIODE,SIG:,ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A6DS800	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS820	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS821	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS830	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS860	150-5004-00			DIODE,OPTO:.,LED;HI EFFIC RED,635NM,1.0 MCD AT 10MA, YOKE LEAD BEND	50434	HLMP-6300-021
A6DS910	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS920	150-5008-00			DIODE,OPTO:.,LED;GRN,569NM,4.2MCD AT 10MA	50434	HLMP-6505-021
A6DS921	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS922	150-5008-00			DIODE,OPTO:.,LED;GRN,569NM,4.2MCD AT 10MA	50434	HLMP-6505-021
A6DS930	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS931	150-5008-00			DIODE,OPTO:.,LED;GRN,569NM,4.2MCD AT 10MA	50434	HLMP-6505-021
A6DS940	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS941	150-5008-00			DIODE,OPTO:.,LED;GRN,569NM,4.2MCD AT 10MA	50434	HLMP-6505-021
A6DS950	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS951	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS960	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS961	150-5009-00			DIODE,OPTO:.,LED;HI-EFFIC RED,626NM,3.4MCD AT IF=10MA	50434	HLMP-6305-021
A6DS980	150-5008-00			DIODE,OPTO:.,LED;GRN,569NM,4.2MCD AT 10MA	50434	HLMP-6505-021
A6J360	131-1857-00			CONN,HDR:PCB,;MALE,STR,1 X 36,0.1 CTR,0.230	58050	082-3644-SS10
A6J380	131-1857-00			CONN,HDR:PCB,;MALE,STR,1 X 36,0.1 CTR,0.230	58050	082-3644-SS10
A6J480	131-1857-00			CONN,HDR:PCB,;MALE,STR,1 X 36,0.1 CTR,0.230	58050	082-3644-SS10
A6J550	131-2514-00			CONN,HDR:PCB,;MALE,RTANG,2 X 10,0.1CTR,0.318 MLG X 0.110 TAIL,0.238 H,30 GOLD,SHRD BETWEEN REAR TAILS	00779	86479-1
A6Q100	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	0LUA3	PMBT3906TRL
A6Q200	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	0LUA3	PMBT3906TRL
A6Q201	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	0LUA3	PMBT3906TRL
A6Q280	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	0LUA3	PMBT3904TRL

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A6Q300	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL
A6Q380	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0LUA3	PMBT3904TRL
A6Q400	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL
A6Q510	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL
A6R100	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A6R110	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A6R130	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A6R140	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A6R150	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R180	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W,TC=100 PPM	50139	BCK8250FT
A6R200	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R201	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A6R210	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A6R211	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R212	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R220	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R230	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R240	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R250	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R280	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R281	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A6R300	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A6R301	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A6R302	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A6R310	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A6R340	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA1M
A6R341	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA1M
A6R350	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA1M
A6R351	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W,TC=100 PPM	57668	MCR18FXEA1M
A6R352	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R380	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R381	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A6R390	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R400	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A6R401	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A6R441	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W,TC=100 PPM	50139	BCK3321FT
A6R442	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A6R443	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A6R450	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A6R451	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A6R460	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A6R461	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A6R480	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A6R481	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R482	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R483	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R490	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R491	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R492	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R493	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R500	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A6R510	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A6R511	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A6R620	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100	50139	BCK2740FT
A6R621	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R622	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R623	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R630	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R631	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R632	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R633	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R634	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R635	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R636	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R637	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R640	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R641	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R642	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R643	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6R680	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A6SW260	311-2320-00			ENCODER,DIGITAL:INCREMENTAL,50PPR,50 DETENT,QUAD OUTPUT,LOC LUG AT 9 O'CLOCK	TK1869	EC24B50000FB
A6U130	156-5080-00			IC,DIGITAL:CMOS,REGISTER;8-STAGE STATIC SHIFT REGISTER	1CH66	HEF4021BTD

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A6U135	156-5265-00			IC,DIGITAL:CMOS,MULTIVIBRATOR;DUAL PRECISION RETRIG/RESETTABLE MONOSTABLE	1CH66	HEF4538BTD
A6U140	156-5080-00			IC,DIGITAL:CMOS,REGISTER;8-STAGE STATIC SHIFT REGISTER	1CH66	HEF4021BTD
A6U190	156-5037-00			IC,DIGITAL:LSTTL,SCHMITT TRIG;HEX INV	01295	SN74LS14D
A6U250	156-5098-00			IC,DIGITAL:HCTCMOS,GATE;QUAD 2-INPUT NAND	01295	SN74HCT00D
A6U310	156-5080-00			IC,DIGITAL:CMOS,REGISTER;8-STAGE STATIC SHIFT REGISTER	1CH66	HEF4021BTD
A6U320	156-5145-00			IC,DIGITAL:HCTCMOS,FLIP FLOP;DUAL D-TYPE	01295	SN74HCT74D
A6U340	156-5145-00			IC,DIGITAL:HCTCMOS,FLIP FLOP;DUAL D-TYPE	01295	SN74HCT74D
A6U350	156-5265-00			IC,DIGITAL:CMOS,MULTIVIBRATOR;DUAL PRECISION RETRIG/RESETTABLE MONOSTABLE	1CH66	HEF4538BTD
A6U450	156-5079-00			IC,DIGITAL:LSTTL,BUFFER;QUAD BUS, 3-STATE	01295	SN74LS125AD
A6U490	156-5254-00			IC,DIGITAL:HCTCMOS,REGISTER;8-STAGE SHIFT AND STORE BUS REGISTER	1CH66	74HCT4094D
A6U620	156-5254-00			IC,DIGITAL:HCTCMOS,REGISTER;8-STAGE SHIFT AND STORE BUS REGISTER	1CH66	74HCT4094D
A6U640	156-5254-00			IC,DIGITAL:HCTCMOS,REGISTER;8-STAGE SHIFT AND STORE BUS REGISTER	1CH66	74HCT4094D
A7	671-1674-04		B0	CKT BD ASSY:LOG AMP	80009	671167404
A7	671-1674-05	B0		CKT BD ASSY:LOG AMP	80009	671-1674-05
A7C152	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C170	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C171	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C190	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C191	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C230	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C232	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C233	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C240	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C241	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A7C242	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A7C243	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A7C250	283-5025-00			CAP,FXD,CERAMIC:MLC;220PF,5%,50V,NPO,1206	TK2058	C3216COG1H221J
A7C251	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C252	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C253	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C254	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C260	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C270	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K



Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A7C280	281-0298-00			CAP,VAR,CER DI:6-50PF	51406	TZ03Z500YR169
A7C281	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C282	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C283	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C290	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C291	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C320	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C321	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C322	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C330	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C340	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C350	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C353	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J-
A7C354	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A7C355	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A7C356	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A7C357	281-0298-00			CAP,VAR,CER DI:6-50PF	51406	TZ03Z500YR169
A7C360	290-0943-00			CAP,FXD,ALUM:;47UF,+50-20%,25V,6 X 11MM	0H1N5	CEUSM1E470-Q
A7C361	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C362	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C363	290-0944-00			CAP,FXD,ELCTL:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A7C370	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C380	283-5025-00			CAP,FXD,CERAMIC:MLC;220PF,5%,50V,NPO,1206	TK2058	C3216COG1H221J
A7C381	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A7C382	283-5027-00			CAP,FXD,CERAMIC:MLC;470PF,5%,50V,NPO,1206	TK2058	C3216C0G1H471J
A7C383	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J-
A7C384	283-5049-00			CAP,FXD,CERAMIC:MLC;180PF,5%,50V,NPO,1206	TK2058	C3216C0G1H181J-
A7C385	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A7C386	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C387	283-5025-00			CAP,FXD,CERAMIC:MLC;220PF,5%,50V,NPO,1206	TK2058	C3216COG1H221J
A7C390	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C391	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C392	281-0298-00			CAP,VAR,CER DI:6-50PF	51406	TZ03Z500YR169
A7C440	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C441	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C442	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C450	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C462	290-0944-00			CAP,FXD,ELCTL:220UF,+50-20%,10V	0H1N5	CEUSM1A221

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A7C470	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C473	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C480	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C481	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C490	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C491	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C500	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C501	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C502	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C510	283-5016-00			CAP,FXD,CERAMIC:MLC;1UF,10%,50V,X7R	04222	22255C105KAT1A
A7C511	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A7C512	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J-
A7C513	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A7C520	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C521	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C530	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C531	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C540	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C560	290-0804-00			CAP,FXD,ELCTLT:10UF,+50-20%,25V	0H1N5	CEUSM1E100
A7C570	290-0804-00			CAP,FXD,ELCTLT:10UF,+50-20%,25V	0H1N5	CEUSM1E100
A7C572	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A7C573	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C580	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C581	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C582	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C590	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C591	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C600	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C610	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A7C611	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A7C612	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A7C613	283-5009-00			CAP,FXD,CERAMIC:MLC;15PF,5%,50V,NPO	TK2058	C3216C0G1H150J-
A7C614	283-5025-00			CAP,FXD,CERAMIC:MLC;220PF,5%,50V,NPO,1206	TK2058	C3216COG1H221J
A7C615	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A7C640	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C641	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C642	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A7C650	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C660	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A7C661	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A7C662	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C665	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C666	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C670	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C671	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C680	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C681	290-0944-00			CAP,FXD,ELCTLT:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A7C690	290-0944-00			CAP,FXD,ELCTLT:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A7C691	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C692	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C710	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C720	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C730	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C740	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C741	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C742	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C750	283-5027-00			CAP,FXD,CERAMIC:MLC;470PF,5%,50V,NPO,1206	TK2058	C3216C0G1H471J
A7C751	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C752	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C760	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A7C761	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C762	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A7C950	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C951	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C952	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C960	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C961	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A7C962	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A7C970	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A7CR291	152-5043-00			SEMICON DVC,DI:PIN,SI,100V,2.5 OHM,0.35PF,0.35PF,SOT-23,HSMP-3802TAPE & REEL	50434	HSMP-3802-T31
A7CR420	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A7CR520	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A7CR580	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A7CR620	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A7CR720	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A7J160	131-0391-01			CONN,RF JACK:SMB,;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA CTR COND TAIL, FLUSH PCB SLDR MT,0.25 DIA BODY	24931	32JR141-1
A7J190	131-0391-01			CONN,RF JACK:SMB,;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA CTR COND TAIL, FLUSH PCB SLDR MT,0.25 DIA BODY	24931	32JR141-1
A7J260	131-0391-01			CONN,RF JACK:SMB,;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA CTR COND TAIL, FLUSH PCB SLDR MT,0.25 DIA BODY	24931	32JR141-1
A7J360	131-1425-00			CONN,HDR:PCB,;MALE,RTANG,1 X 36,0.1CTR,0.230 MLG X 0.090 TAIL,30 GOLD,STACKABLE	22526	65521-136
A7J570	131-1857-00			CONN,HDR:PCB,;MALE,STR,1 X 36,0.1 CTR,0.230	58050	082-3644-SS10
A7L140	108-5069-00			INDUCTOR,FXD:POWER;120UH,5%,I<0.11A,RDC<8.0	TK2058	NL453232T-121J
A7L350	108-5037-00			INDUCTOR,FXD:POWER;22UH,5%,I<0.18 A,RDC<3.2	TK2058	NL453232T-220J
A7L351	108-5093-00			INDUCTOR,FXD:SIGNAL;2.2UH,10%,IDC<380 MA, RDC<0.7 OHM,Q>50,SRF>55 MHZ	02113	1812LS-222XKB(A
A7L380	108-5046-00			INDUCTOR,FXD:POWER;1.2UH,5%,I<0.43A, RDC<0.55 OHM,Q>50,SRF>130MHZ	80009	108504600
A7L381	108-5046-00			INDUCTOR,FXD:POWER;1.2UH,5%,I<0.43A, RDC<0.55 OHM,Q>50,SRF>130MHZ	80009	108504600
A7L440	108-5037-00			INDUCTOR,FXD:POWER;22UH,5%,I<0.18 A,RDC<3.2	TK2058	NL453232T-220J
A7L441	108-5037-00			INDUCTOR,FXD:POWER;22UH,5%,I<0.18 A,RDC<3.2	TK2058	NL453232T-220J
A7L610	108-5018-00			INDUCTOR,FXD:POWER;4.7UH,20%,I<0.315 A, RDC<1 OHM,Q>50,SRF>45 MHZ	TK2058	NL453232T-4R7M
A7L611	108-5051-00			INDUCTOR,FXD:SIGNAL;10UH,10%,I<0.25A, RDC<1.6 OHM,Q>50,SRF>20MHZ	TK2058	NL453232T-100K
A7L612	108-5010-00			INDUCTOR,FXD:SIGNAL;3.3UH,10%,IDC<350 MA, RDC<3.4 OHM,Q>20,SRF>90 MHZ	02113	1008CS-332XKB(A
A7L680	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A, RDC<0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A7L690	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A, RDC<0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A7L760	108-5049-00			INDUCTOR,FXD:SIGNAL;820NH,5%,IDC<500 MA, RDC<1.61 OHM,Q>33,SRF>325 MHZ	02113	1008CS-821XJB(A
A7P7	131-3556-00			CONN,BOX:PCB,;FEMALE,RTANG,2 X 12,0.1 CTR, 0.24 H X 0.115 TAIL,W/GUIDES,SIDE ENTRY,30 GOLD, 0.1 X 0.310 PCB	22526	66527-012
A7P110	131-3199-00			CONN,SHUNT:SHUNT,;FEMALE,STR,1 X 2,0.1 CTR, 0.2 H,LOW PROFILE,JUMPER	22526	68786-202
A7P570	131-3199-00			CONN,SHUNT:SHUNT,;FEMALE,STR,1 X 2,0.1 CTR, 0.2 H,LOW PROFILE,JUMPER	22526	68786-202
A7Q170	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	0LUA3	PMBT3904TRL
A7Q310	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	0LUA3	PMBT3906TRL
A7Q311	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	0LUA3	PMBT3906TRL

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A7Q312	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL
A7Q313	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL
A7Q330	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL
A7Q340	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0LUA3	PMBT3904TRL
A7Q420	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0LUA3	PMBT3904TRL
A7Q421	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL
A7Q460	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0LUA3	PMBT3904TRL
A7Q600	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL
A7Q601	151-5001-00		B0	TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0LUA3	PMBT3904TRL
A7Q680	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	0LUA3	PMBT3904TRL
A7Q960	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL
A7Q970	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	0LUA3	PMBT3906TRL
A7R113	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R150	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W,TC=100 PPM	50139	BCK5620FT
A7R151	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R153	311-1239-00			RES,VAR,TRMR:CERMET;2.5K OHM,10%,0.5W,0.375	32997	3386X-1-252
A7R160	311-1245-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3386X-DY6-103
A7R170	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R171	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R172	311-1245-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3386X-DY6-103
A7R180	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R181	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A7R182	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A7R183	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A7R240	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R241	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A7R243	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A7R250	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W,TC=100 PPM	50139	BCK3920FT
A7R251	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R252	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W,TC=100 PPM	50139	BCK5620FT
A7R253	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A7R254	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A7R255	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A7R256	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R260	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R270	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK2211FT
A7R271	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R272	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R280	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A7R281	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R282	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT
A7R283	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R284	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A7R285	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A7R290	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A7R294	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R311	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R312	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A7R313	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R314	321-5033-00			RES,FXD:THICK FILM;18.2K OHM,1%,0.125W,TC=100 PPM	50139	BCK1822FT
A7R315	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT
A7R316	321-5033-00			RES,FXD:THICK FILM;18.2K OHM,1%,0.125W,TC=100 PPM	50139	BCK1822FT
A7R317	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK2211FT
A7R318	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK2211FT
A7R319	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK2211FT
A7R322	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R323	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R324	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R326	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R327	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R329	322-3066-00			RES,FXD:METAL FILM;47.5 OHM,1%,0.2W,TC=100 PPM	09969	CCF502G47R50F
A7R330	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R331	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A7R332	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R333	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R334	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R335	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A7R340	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A7R341	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R342	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R343	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R351	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A7R354	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R360	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A7R361	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R370	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A7R390	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A7R391	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R392	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A7R393	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R394	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R395	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R402	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R410	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT
A7R411	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1502FT
A7R412	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1502FT
A7R413	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A7R414	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1502FT
A7R415	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A7R416	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT
A7R417	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK4752FT
A7R420	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W,TC=100 PPM	50139	BCK8250FT
A7R421	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W,TC=100 PPM	50139	BCK1210FT
A7R422	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R430	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R431	311-1936-00			RES,VAR,NONWWW:TRMR,50 OHM,20%,0.5W	32997	3386X-1-500
A7R432	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R433	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R434	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W,TC=100 PPM	50139	BCK3920FT
A7R435	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R436	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A7R437	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R438	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W,TC=100 PPM	50139	BCK5620FT
A7R439	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W,TC=100 PPM	50139	BCK5620FT
A7R440	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R441	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A7R442	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R443	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R450	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R451	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R452	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R453	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A7R460	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A7R461	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A7R462	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R463	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R466	311-1245-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3386X-DY6-103
A7R470	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A7R471	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A7R472	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R473	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R480	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1502FT
A7R481	321-5040-00			RES,FXD:THICK FILM;68.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK6812FT
A7R482	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R483	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R490	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A7R500	311-1237-00			RES,VAR,NONWW:1K OHM,10%,0.50W	32997	3386X-DY6-102
A7R501	311-1236-00			RES,VAR,NONWW:TRMR,250 OHM,0.5W	32997	3386X-1-251
A7R503	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R504	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R510	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R520	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R521	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R523	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R525	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R526	311-1244-00			RES,VAR,NONWW:TRMR,100 OHM,0.5W	32997	3386X-1-101
A7R527	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W,TC=100 PPM	50139	BCK6810FT
A7R530	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A7R531	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A7R532	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT
A7R533	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R540	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A7R541	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1



Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A7R542	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT
A7R543	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A7R570	321-5029-00			RES,FXD:THICK FILM;8.25K OHM,1%,0.125W,TC=100 PPM	50139	BCK8251FT
A7R571	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A7R572	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A7R580	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R581	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A7R582	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R583	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R584	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R585	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R586	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R590	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A7R591	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R592	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R593	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK4752FT
A7R594	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A7R595	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R600	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R601	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A7R602	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A7R603	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R604	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R605	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R606	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A7R607	321-5026-00		B0	RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A7R607	321-5051-00	B0		RES,FXD:THICK FILM;0 OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCD0JUMPERT
A7R608	321-5026-00		B0	RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A7R610	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A7R611	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A7R612	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W,TC=100 PPM	50139	BCK8250FT
A7R620	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R621	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W,TC=100 PPM	50139	BCK1820FT
A7R622	311-1244-00			RES,VAR,NONWWW:TRMR,100 OHM,0.5W	32997	3386X-1-101
A7R630	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W,TC=100 PPM	50139	BCD56R2FT
A7R632	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R640	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A7R641	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R642	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R643	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R644	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W,TC=100 PPM	50139	BCD68R1FT
A7R645	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R646	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W,TC=100 PPM	50139	BCD56R2FT
A7R647	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W,TC=100 PPM	50139	BCK1820FT
A7R648	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A7R652	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A7R653	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A7R654	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A7R655	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W,TC=100 PPM	50139	BCD56R2FT
A7R661	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A7R662	321-5029-00			RES,FXD:THICK FILM;8.25K OHM,1%,0.125W,TC=100 PPM	50139	BCK8251FT
A7R663	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W,TC=100 PPM	09969	CRCW1206 JUMPER
A7R670	321-5046-00			RES,FXD:THICK FILM;82.5 OHM,1%,0.125W,TC=100 PPM	50139	BCK82R5FT
A7R671	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R672	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W,TC=100 PPM	50139	BCK3920FT
A7R673	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W,TC=100 PPM	50139	BCK3920FT
A7R690	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R710	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A7R720	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R721	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R722	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R730	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A7R740	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R741	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A7R742	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W,TC=100 PPM	50139	BCD68R1FT
A7R750	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W,TC=100 PPM	50139	BCD68R1FT
A7R751	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R752	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R753	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W,TC=100 PPM	50139	BCK1820FT
A7R754	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R755	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R760	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R761	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R762	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A7R763	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A7R764	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT
A7R765	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A7R770	311-1936-00			RES,VAR,NONWW:TRMR,50 OHM,20%,0.5W	32997	3386X-1-500
A7R771	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A7R772	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W,TC=100 PPM	50139	BCK8250FT
A7R940	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA33E2
A7R941	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A7R950	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R951	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R960	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R961	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A7R962	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK2211FT
A7R963	321-5031-00			RES,FXD:THICK FILM;12.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK1212FT
A7R964	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W,TC=100 PPM	50139	BCK8250FT
A7R965	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK2211FT
A7R970	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W,TC=100 PPM	50139	BCK5621FT
A7T180	120-1721-00			TRANSFORMER,RF:AUTO,6:6:6 RATIO	QJR03	120-1721-00
A7T660	120-1721-00			TRANSFORMER,RF:AUTO,6:6:6 RATIO	QJR03	120-1721-00
A7U170	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	0LUA3	PMBT3904TRL
A7U211	156-5018-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLE SUPPLY	01295	LM358D
A7U231	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTDT
A7U240	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTDT
A7U250	156-5467-00			IC,LINEAR:BIPOLAR,OP-AMP;1.0GHZ GBW	1CH66	NE5539D
A7U280	156-6074-00			IC,LINEAR:BIPOLAR,OP-AMP;CURRENT FEEDBACK,60MHZ, 8 TO 64 GAIN RANGE,OUTPUT CLAMPING	62839	CLC501AJE
A7U320	156-5138-00			IC,LINEAR:BIFET,OP-AMP;DUAL	01295	TL072CD
A7U321	156-6073-00			IC,LINEAR:BIPOLAR,OP-AMP;CURRENT FEED- BACK,200MHZ, 1 TO 8 GAIN RANGE	62839	CLC400AJE
A7U330	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTDT
A7U350	156-6141-00			IC,MISC:BIPOLAR,MULTIPLIER;FOUR QUADRANT,500MHZ	24355	AD834JR
A7U370	156-2884-00			IC,LINEAR:BIPOLAR,AMPLIFIER;4.0W AUDIO POWER AMPLIFIER W/DC VOLUME CONTROL	1CH66	TDA1013BU
A7U390	156-5018-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLE SUPPLY	01295	LM358D
A7U410	156-5097-00			IC,MISC:CMOS,ANALOG MUX;8 CHANNEL	04713	MC14051BD
A7U420	156-5073-00			IC,MISC:HCMOS,ANALOG MUX;TRIPLE 2-CHANNEL	1CH66	74HC4053D
A7U421	156-5120-00			IC,MISC:CMOS,ANALOG MUX;DUAL 4-CHANNEL	1CH66	74HC4052D

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A7U440	156-6141-00			IC,MISC:BIPOLAR,MULTIPLIER;FOUR QUADRANT,500MHZ	24355	AD834JR
A7U480	156-5018-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358D
A7U490	156-5714-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE, ADJUSTABLE,100MA,4%	27014	LM317LM
A7U510	156-5120-00			IC,MISC:CMOS,ANALOG MUX;DUAL 4-CHANNEL	1CH66	74HC4052D
A7U520	156-5352-00			IC,LINEAR:BIFET,OP-AMP;LOW OFFSET	64155	LT1056S8
A7U530	156-6073-00			IC,LINEAR:BIPOLAR,OP-AMP;CURRENT FEEDBACK, 200MHZ,1 TO 8 GAIN RANGE	62839	CLC400AJE
A7U550	156-5130-00			IC,DIGITAL:HCTCMOS,GATE;TRIPLE 3-INPUT NAND	1CH66	74HCT10D
A7U560	156-5130-00			IC,DIGITAL:HCTCMOS,GATE;TRIPLE 3-INPUT NAND	1CH66	74HCT10D
A7U580	156-5119-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR,80NS	1CH66	LM319D
A7U590	156-5217-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIVE, ADJUSTABLE,100MA,4%	27014	LM337LM
A7U600	156-6073-00			IC,LINEAR:BIPOLAR,OP-AMP;CURRENT FEEDBACK, 200MHZ,1 TO 8 GAIN RANGE	62839	CLC400AJE
A7U620	156-5073-00			IC,MISC:HCMOS,ANALOG MUX;TRIPLE 2-CHANNEL	1CH66	74HC4053D
A7U630	156-5269-00			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE	04713	MC10H116FN
A7U650	156-6250-00			IC,MISC:CMOS,ANALOG MUX;8 CHANNEL,RF/VIDEO	1ES66	MAX310CWN-2/C30
A7U651	156-6073-00			IC,LINEAR:BIPOLAR,OP-AMP;CURRENT FEEDBACK, 200MHZ,1 TO 8 GAIN RANGE	62839	CLC400AJE
A7U660	156-6090-00			IC,LINEAR:BIPOLAR,AMPLIFIER;LOGARITHMIC,DC COUPLED,350 MHZ	24355	AD640BP
A7U670	156-5119-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR,80NS	1CH66	LM319D
A7U710	156-6073-00			IC,LINEAR:BIPOLAR,OP-AMP;CURRENT FEEDBACK, 200MHZ,1 TO 8 GAIN RANGE	62839	CLC400AJE
A7U740	156-6090-00			IC,LINEAR:BIPOLAR,AMPLIFIER;LOGARITHMIC,DC COUPLED,350 MHZ	24355	AD640BP
A7U750	156-6073-00			IC,LINEAR:BIPOLAR,OP-AMP;CURRENT FEEDBACK, 200MHZ,1 TO 8 GAIN RANGE	62839	CLC400AJE
A7U760	156-6074-00			IC,LINEAR:BIPOLAR,OP-AMP;CURRENT FEEDBACK,60MHZ, 8 TO 64 GAIN RANGE,OUTPUT CLAMPING	62839	CLC501AJE
A7U990	156-0277-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE, 5.0V,1.0A,4%	01295	UA7805CKC
A7U991	156-0846-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIVE, -5.0V,1.0A,4.0%	27014	LM320T-5.0
A9	671-2918-02			CKT BD ASSY:DISPLAY STORAGE	80009	671291802
A9BT1	146-0103-00			BATTERY,DRY:3V;560MAH AT 0.2MA,BUTTON CELL	S4091	CR-2450-FT2-1
A9C1	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C2	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C3	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C4	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A9C5	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C6	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C7	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C8	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C9	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C10	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C11	290-5034-01			CAP,FXD,ALUM::;33UF,20%,10V,5.7MM(0.224)	62643	MVK10VC33RME60T
A9C12	290-5037-01			CAP,FXD,ALUM::;10UF,20%,35V,5.7 H X 5 DIA MM	62643	MVK35VC10RME60T
A9C13	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C14	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C15	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C16	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C17	290-5037-01			CAP,FXD,ALUM::;10UF,20%,35V,5.7 H X 5 DIA MM	62643	MVK35VC10RME60T
A9C18	290-5037-01			CAP,FXD,ALUM::;10UF,20%,35V,5.7 H X 5 DIA MM	62643	MVK35VC10RME60T
A9C19	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C20	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C21	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C22	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C23	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C24	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C25	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C26	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C27	290-5034-01			CAP,FXD,ALUM::;33UF,20%,10V,5.7MM(0.224)	62643	MVK10VC33RME60T
A9C28	290-5036-01			CAP,FXD,ALUM::;22UF,20%,16V,5.7MM(0.224)	62643	MVK16VC22RME60T
A9C29	290-5036-01			CAP,FXD,ALUM::;22UF,20%,16V,5.7MM(0.224)	62643	MVK16VC22RME60T
A9C30	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C31	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C32	283-5187-00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A9C33	283-5195-00			CAP,FXD,CERAMIC:MLC;10PF,5%,100V ,NPO,1206	04222	12061A100JAT1A
A9C34	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C35	283-5246-00			CAP,FXD,CERAMIC:MLC;6800PF,5%,50V,X7R,1206	04222	12065C682JAT1A
A9C36	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C37	283-5201-00			CAP,FXD,CERAMIC:MLC;33PF,5%,100V,NPO,1206	04222	12061A330JAT1A
A9C38	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C39	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C40	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A9C41	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C42	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A9C43	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A9C44	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C45	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C46	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C47	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C48	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C49	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C50	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C51	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C52	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C53	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A9C54	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C55	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C56	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C57	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C58	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C59	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C60	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C61	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C62	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C63	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C64	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C65	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C66	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C67	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C68	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C69	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C70	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C71	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C72	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C73	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C74	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C75	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C76	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C77	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C78	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C79	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A9C80	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C81	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C82	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C83	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C84	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C85	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C86	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C87	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C88	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C89	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C90	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C91	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C92	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A9C93	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A
A9C94	285-1344-00			CAP,FXD,PLASTIC:1000PF,100V,5%	TK1913	FKP2 1000 PF 5
A9C95	283-5189-00			CAP,FXD,CERAMIC:MLC;220PF,5%,100V,NPO,1206	04222	12061A221JAT1A

**Replaceable Electrical Parts List (Cont.)**

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A9C96	283-5265-00	B010100	B020495	CAP,FXD,CERAMIC:MLC;0.0033UF,5%,50V,NPO,1206	04222	12065A332JAT1A
A9C96	283-5068-00	B020496		CAP,FXD,CERAMIC:MLC,2200PF,10%,50V,X7R,1206,SMD,8M M T&R	04222	12065C222KAT1A
A9C97	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C98	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C99	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A9C100	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A9C101	290-5035-01			CAP,FXD,ALUM;:3.3UF,20%,50V,5.7MM(0.224)	62643	MVK50VC3R3MD60T
A9C102	283-5188-00			CAP,FXD,CERAMIC:MLC;100PF,5%,100V,NPO,1206	04222	12061A101JAT1A
A9C103	290-5027-00			CAP,FXD,TANT:2.2UF,20%,20V	04222	TAJBZ25M020
A9C104	290-5027-00			CAP,FXD,TANT:2.2UF,20%,20V	04222	TAJBZ25M020
A9C500	283-0204-00			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR155E103MAA
A9C501	283-0024-00			CAP,FXD,CERAMIC:MLC;0.1UF,20%,50V,X7R	04222	SR215C104MAA
A9C502	283-0024-00			CAP,FXD,CERAMIC:MLC;0.1UF,20%,50V,X7R	04222	SR215C104MAA
A9CR1	150-5000-00			DIODE,OPTO;:LED;RED,628NM	50579	LS-S260-DOE7502
A9CR2	152-5000-00			DIODE,SIG;:ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A9CR3	152-5018-00			DIODE,SIG;:ULTRA FAST;100V,0.74VF,4NS,2.0PF,SER-PAIR	27014	MMBD1203
A9CR4	152-5000-00			DIODE,SIG;:ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A9CR5	152-5000-00			DIODE,SIG;:ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A9CR6	152-5062-00			DIODE,SIG;:ULTRA FAST;100V,0.74VF,4NS,2.0PF,COM-ANODE	27014	MMBD1205
A9CR7	152-5018-00			DIODE,SIG;:ULTRA FAST;100V,0.74VF,4NS,2.0PF,SER-PAIR	27014	MMBD1203
A9L1	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A, RDC<0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A9L2	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A, RDC<0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A9L3	108-5132-00			INDUCTOR,FXD:SIGNAL;68UH,5%,IDC<50 MA,RDC<9	TK2058	NL322522T-680J
A9L4	108-5130-00			INDUCTOR,FXD:SIGNAL;22UH,5%,IDC<110 MA, RDC<3.7 OHM,Q>30,SRF>25 MHZ	TK2058	NL322522T-220J
A9L5	108-5131-00			INDUCTOR,FXD:SIGNAL;33UH,5%,IDC<70 MA, RDC<5.6 OHM,Q>30,SRF>17 MHZ	TK2058	NL322522T-330J
A9Q1	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A9Q2	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	0LUA3	PMBT3904TRL
A9Q3	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	0LUA3	PMBT3904TRL
A9Q4	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	0LUA3	PMBT3904TRL
A9Q5	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	0LUA3	PMBT3906TRL
A9Q7	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	0LUA3	PMBT3906TRL



**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A9R1	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W,TC=100 PPM	50139	BCK3921FT
A9R2	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A9R3	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK2211FT
A9R4	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W,TC=100 PPM	50139	BCK5621FT
A9R5	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A9R6	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W,TC=100 PPM	50139	BCK5621FT
A9R7	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W,TC=100 PPM	09969	CRCW1206 JUMPER
A9R8	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R9	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R10	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R11	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W,TC=100 PPM	50139	BCK1500FT
A9R12	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R13	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R14	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT
A9R15	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R16	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A9R17	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R18	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R19	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W,TC=100 PPM	50139	BCK3921FT
A9R20	311-5052-00			RES,VAR:10K OHM,20%,0.25W,SIDE ADJ,SMD,16MM,T&R	TK2073	G4S103M
A9R21	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A9R22	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R23	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W,TC=100 PPM	50139	BCK5621FT
A9R24	311-5042-00			RES,VAR:2K OHM,20%,0.25W,SIDE ADJ,SMD,16MM,T&R	32997	3314S-1-202G
A9R25	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A9R26	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R27	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A9R28	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A9R29	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A9R30	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R31	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT
A9R32	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A9R33	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A9R34	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A9R35	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R36	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A9R37	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK2211FT
A9R38	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A9R39	311-5051-00			RES,VAR:500 OHM,20%,0.25W,SIDE ADJ,SMD,16MM,T&R	TK2073	G4S501M
A9R40	311-5051-00			RES,VAR:500 OHM,20%,0.25W,SIDE ADJ,SMD,16MM,T&R	TK2073	G4S501M
A9R41	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W,TC=100 PPM	50139	BCK5621FT
A9R42	311-5042-00			RES,VAR:2K OHM,20%,0.25W,SIDE ADJ,SMD,16MM,T&R	32997	3314S-1-202G
A9R43	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK1211FT
A9R44	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W,TC=100 PPM	50139	BCK1003FT
A9R45	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R46	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W,TC=100 PPM	50139	BCK6810FT
A9R47	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A9R48	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM	50139	BCK1501FT
A9R49	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R50	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R51	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W,TC=100 PPM	50139	BCK8250FT
A9R52	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A9R53	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A9R54	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A9R55	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A9R56	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R57	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R58	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R59	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R60	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R61	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A9R62	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W,TC=100 PPM	50139	BCK3920FT
A9R63	311-5052-00			RES,VAR:10K OHM,20%,0.25W,SIDE ADJ,SMD,16MM,T&R	TK2073	G4S103M
A9R64	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R65	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R66	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A9R67	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A9R68	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R69	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A9R70	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R71	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A9R72	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A9R73	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R74	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R75	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A9R76	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK1211FT
A9R77	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R78	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R79	32-00			RES,FXD:THICK FILM;1.82K OHM,1%,0.125W,TC=100 PPM	50139	BCK1821FT
A9R80	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R81	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK1211FT
A9R83	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R84	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA33E2
A9R85	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R86	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R87	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R88	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R89	321-5023-00	B010100	B020495	RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A9R89	321-5029-00	B020496		RES,FXD:THICK FILM;8.25K OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK8251FT
A9R90	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R91	321-5026-00	B010100	B020495	RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R91	321-5030-00	B020496		RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK1002FT
A9R92	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W,TC=100 PPM	50139	BCK8250FT
A9R93	321-5023-00	B010100	B020495	RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A9R93	321-5020-00	B020496		RES,FXD:THICK FILM;1.5K OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK1501FT
A9R94	321-5021-00			RES,FXD:THICK FILM;1.82K OHM,1%,0.125W,TC=100 PPM	50139	BCK1821FT
A9R95	321-5014-00	B010100	B020495	RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A9R95	321-5017-00	B020496		RES,FXD:THICK FILM;825 OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK8250FT
A9R96	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A9R97	321-5023-00	B010100	B020495	RES,FXD:THICK FILM;2.74K OHM,1%,0.125W,TC=100 PPM	50139	BCK2741FT
A9R97	321-5026-00	B020496		RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK4751FT
A9R98	311-5052-00			RES,VAR:10K OHM,20%,0.25W,SIDE ADJ,SMD,16MM,T&R	TK2073	G4S103M
A9R99	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A9R100	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A9R101	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R102	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R103	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R104	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R105	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A9R106	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A9R107	311-5047-00			RES,VAR:1K OHM,20%,0.25W,SIDE ADJ,SMD,16MM,T&R	TK2073	G4S102M
A9R108	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R109	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R110	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R111	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R112	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W,TC=100 PPM	50139	BCK3321FT
A9R113	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R114	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R115	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R116	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R117	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R118	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R119	321-5033-00			RES,FXD:THICK FILM;18.2K OHM,1%,0.125W,TC=100 PPM	50139	BCK1822FT
A9R120	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R121	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R122	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R123	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R124	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R125	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R126	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R127	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R128	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R129	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R130	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W,TC=100 PPM	50139	BCK3920FT
A9R131	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R132	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R133	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R134	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R135	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R136	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R137	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R138	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R139	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R140	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R141	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R142	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R143	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A9R144	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R145	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R146	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R147	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R148	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R149	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R150	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R151	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R152	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R153	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R154	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R155	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R156	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R157	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R158	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R159	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R160	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R161	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R162	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R163	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R164	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R165	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R166	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R167	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R168	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R169	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R170	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R171	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W,TC=100 PPM	50139	BCK3320FT
A9R172	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R173	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R174	321-5052-00			RES,FXD,FILM:1.5K OHM,1%,0.125W	50139	BCK1501FT
A9R175	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R176	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R177	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W,TC=100 PPM	50139	BCK221FT
A9R178	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A9R179	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R180	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5

**Replaceable Electrical Parts List (Cont.)**

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A9R181	311-5051-00			RES,VAR:500 OHM,20%,0.25W,SIDE ADJ,SMD,16MM,T&R	TK2073	G4S501M
A9R182	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W,TC=100 PPM	59124	RK73H2B10R0FT
A9R183	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W,TC=100 PPM	50139	BCK3321FT
A9R184	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W,TC=100 PPM	50139	BCK1211FT
A9R185	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R186	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R187	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A9R188	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W,TC=100 PPM	09969	CRCW1206 JUMPER
A9U1	156-5589-00			IC,CONVERTER:TTL,A/D;8-BIT,25MSPS,FLASH	04713	MC10319DW
A9U2	156-5095-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW NOISE,HIGH OUTPUT DRIVE	01295	NE5534DR
A9U3	156-5297-01			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR, ADJUST-ABLE,SHUNT,100MA,2%,TL431CD,SO8.150,12MM,T&R	01295	TL431CDR
A9U4	156-5138-01			IC,LINEAR:BIFET,OP-AMP;DUAL	01295	TL072CDR
A9U5	156-5138-01			IC,LINEAR:BIFET,OP-AMP;DUAL	01295	TL072CDR
A9U6	156-6344-00			IC,MISC:CMOS,PWR SUPPLY SUPERVISOR;NONVOLATILE CMOS RAM BATTERY BACKUP CONTROLLER	0B0A9	DS1210S
A9U7	156-5146-01			IC,DIGITAL:HCTCMOS,GATE;QUAD 2-INPUT AND	01295	SN74HCT08DR
A9U8	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A9U9	156-5119-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR,80NS	1CH66	LM319D
A9U10	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A9U11	156-5157-01			IC,CONVERTER:BIPOLAR,D/A;12 BIT,300NS,MULTIPLYING	1CH66	AM6012DT (D/C88
A9U12	156-5081-01			IC,DIGITAL:HCTCMOS,GATE;HEX INVERTER	0JR04	TC74HCT04AFN(EL
A9U13	156-5940-00			IC,MEMORY:CMOS,SRAM;32K X 8,120NS,20UA	4T165	UPD43256BGU-85L
A9U14	160-9849-01			IC,MEMORY:CMOS,36288 X 1 SERIAL CONFIGURATION, PROM	80009	160984901
A9U15	156-6194-00	B010100	FDIF-714	IC,DIGITAL:CMOS,PLD;FPGA,XC3000 FAMILY,3042, 144 CLBS,96 IOBS,74 I/O,70 MHZ	68994	XC3042-70PC84C
A9U15	156-7198-00	FDIF-714		CMOS,PLD;FPGA,XC3000 FAMILY,3042,144 CLBS,96 IOBS,74 I/O,70 MHZ;3042-70,PLCC84,TUBE,AT&T (LUCENT)		
A9U16	156-5190-01			IC,DIGITAL:FTTL,DEMUX/DECODER;1-OF-8 DECODER	01295	SN74F138DR
A9U17	156-5190-01			IC,DIGITAL:FTTL,DEMUX/DECODER;1-OF-8 DECODER	01295	SN74F138DR
A9U18	156-5147-01			IC,DIGITAL:HCTCMOS,FLIP FLOP;OCTAL D-TYPE, CLEAR	01295	SN74HCT273DWR
A9U19	156-5147-01			IC,DIGITAL:HCTCMOS,FLIP FLOP;OCTAL D-TYPE, CLEAR	01295	SN74HCT273DWR
A9U20	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A9U21	156-5147-01			IC,DIGITAL:HCTCMOS,FLIP FLOP;OCTAL D-TYPE, CLEAR	01295	SN74HCT273DWR

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A9U22	156-5071-01			IC,DIGITAL:HCTCMOS,TRANSCEIVER;OCTAL,3-STATE	0JR04	TC74HCT245AFW(E
A9U23	156-5147-01			IC,DIGITAL:HCTCMOS,FLIP FLOP;OCTAL D-TYPE, CLEAR	01295	SN74HCT273DWR
A9U24	156-5147-01			IC,DIGITAL:HCTCMOS,FLIP FLOP;OCTAL D-TYPE, CLEAR	01295	SN74HCT273DWR
A9U25	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A9U26	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A9U27	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A9U28	156-6344-00			IC,MISC:CMOS,PWR SUPPLY SUPERVISOR;NONVOLATILE CMOS RAM BATTERY BACKUP CONTROLLER	0B0A9	DS1210S
A9U29	160-9851-00			IC,DIGITAL:CMOS,PLD;EEPLD,20V8,15NS,115MA,P RGM 156-5547-00	80009	160-9851-00
A9U30	156-5940-00			IC,MEMORY:CMOS,SRAM;32K X 8,120NS,20UA	4T165	UPD43256BGU-85L
A9U31	156-5043-01			IC,CONVERTER:BIPOLAR,D/A;8 BIT,CURRENT OUT, MULTIPLYING	1CH66	DAC08EDT
A9U32	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A9U33	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A9U34	156-6620-00			IC,MISC:D/CMOS,ANALOG SWITCH;QUAD SPST,20 OHM, VIDEO	17856	DG641DY
A9U35	156-5257-00			IC,LINEAR:BIPOLAR,OP-AMP;HIGH SLEW RATE	01295	LM318D
A9U36	156-5023-01			IC,LINEAR:BIFET,OP-AMP;	01295	TL071ACDR
A9U37	156-5489-01			IC,MISC:BIPOLAR,PWR SUPPLY SUPERVISOR;MPU RESET GENERATOR,5V SUPPLY SENSING	01295	TL7705ACDR
A9U38	156-5023-01			IC,LINEAR:BIFET,OP-AMP;	01295	TL071ACDR
A9U39	160-9852-01			IC,DIGITAL:CMOS,PLD,EEPLD,22V10,25NS,130MA, PRGM 156-5924-00;22V10-25,PLCC28-1,TUBE	80009	160-9852-01
A9U40	160-9853-01			IC,DIGITAL:CMOS,PLD;EEPLD,22V10,25NS,55MA, PRGM 156-5924-00,22V10-25,PLCC28-1,TUBE	80009	163-9853-01
A9U41	156-5157-01			IC,CONVERTER:BIPOLAR,D/A;12 BIT,300NS, MULTIPLYING	1CH66	AM6012DT (D/C88
A9U43	156-6059-01			IC,MISC:CMOS,ANALOG SWITCH;QUAD	1ES66	DG444DY-T
A9U44	160-9850-02	B010100	B010324	IC,MEMORY:CMOS,PROM,64K X 1,SERIAL CONFIGURATION	80009	160985002
A9U44	160-9850-03	B010325		IC,MEMORY:CMOS,PROM,64K X 1,SERIAL CONFIGURATION,PRGM 156-4088-00,DIP08.3	TK0198	160985003
A9U45	156-5023-01			IC,LINEAR:BIFET,OP-AMP	01295	TL071ACDR
A9U46	156-6194-00	B010100	FDIF-714	IC,DIGITAL:CMOS,PLD;FPGA,XC3000 FAMILY, 3042,144 CLBS,96 IOBS,74 I/O,70 MHZ	68994	XC3042-70PC84C
A9U46	156-7198-00	FDIF-714		CMOS,PLD;FPGA,XC3000 FAMILY,3042,144 CLBS,96 IOBS,74 I/O,70 MHZ;3042-70,PLCC84,TUBE,AT&T (LUCENT)		
A9U47	156-5452-01			IC,DIGITAL:FTTL,BUFFER/DRIVER;NONINV OCTAL	01295	SN74F541DWR

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A9U48	160-9848-00			IC,DIGITAL:CMOS,2048 X 8 PROM,50NS,OTP,7C291	80009	160984800
A9U49	156-5502-01			IC,DIGITAL:FTTL,BUFFER/DRIVER;QUAD, IND /OE, 3-STATE	01295	SN74F125DR
A9U50	156-5387-00			IC,DIGITAL:FTTL,MUX/ENCODER;QUAD 2-TO-1 DATA SELECTOR, NONINV	04713	MC74F257AD
A9U51	156-5387-00			IC,DIGITAL:FTTL,MUX/ENCODER;QUAD 2-TO-1 DATA SELECTOR, NONINV	04713	MC74F257AD
A9U52	156-5387-00			IC,DIGITAL:FTTL,MUX/ENCODER;QUAD 2-TO-1 DATA SELECTOR, NONINV	04713	MC74F257AD
A9U53	156-5257-00			IC,LINEAR:BIPOLAR,OP-AMP;HIGH SLEW RATE	01295	LM318D
A9U54	156-6147-00			IC,DIGITAL:CMOS,PLD;FPGA,XC3000 FAMILY,3030, 100 CLBS,80 IOBS,74 I/O,70 MHZ	68994	XC3030-70PC84C
A9U55	156-5304-01			IC,DIGITAL:HCTCMOS,BUFFER;QUAD BUFFER, /OE	01295	SN74HCT125DR
A9U57	156-5138-01			IC,LINEAR:BIFET,OP-AMP;DUAL	01295	TL072CDR
A10	671-0653-14			CIRCUIT BD ASSY:MICROPROCESSOR	80009	671065314
A10	672-1543-00	B010100	B041844	CIRCUIT BD ASSY:MICROPROCESSOR, W/163-1271-00, 163-1272-00, 163-1273-00,163-1274-00,271 OPT 50 AND OPT 75 ONLY	80009	672-1543-00
A10	672-1543-01	B041845		CIRCUIT BD ASSY; MICROPROCESSOR, 671-0653-14, W/163-1271-01, 163-1272-01, 163-1273-01, 163-1274-01;2715 OPT 50, 2715 OPT 75	80009	672-1543-01
A10C110	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C128	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C174	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C175	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C183	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C184	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C210	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C228	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C261	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A10C275	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C280	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C295	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C310	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C328	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C361	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A10C362	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A10C365	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C370	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C380	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C385	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C395	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C410	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K



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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A10C428	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C450	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C460	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C465	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C470	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C480	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C485	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C510	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C527	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A10C528	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C529	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C540	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C550	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C565	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C570	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C580	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C595	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C715	290-0944-00			CAP,FXD,ELCTL:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A10C760	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C830	290-0944-00			CAP,FXD,ELCTL:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A10C880	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C885	290-0944-00			CAP,FXD,ELCTL:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A10C890	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C895	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C960	290-0944-00			CAP,FXD,ELCTL:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A10C961	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C975	290-0944-00			CAP,FXD,ELCTL:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A10C978	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A10C982	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C987	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C990	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A10C995	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A10J180	131-0391-01			CONN,RF JACK:SMB,;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA CTR COND TAIL, FLUSH PCB SLDR MT,0.25 DIA BODY	24931	32JR141-1
A10J185	131-0391-01			CONN,RF JACK:SMB,;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA CTR COND TAIL, FLUSH PCB SLDR MT,0.25 DIA BODY	24931	32JR141-1

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A10J190	131-0391-01			CONN,RF JACK:SMB,;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA CTR COND TAIL, FLUSH PCB SLDR MT,0.25 DIA BODY	24931	32JR141-1
A10J195	131-0391-01			CONN,RF JACK:SMB,;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA CTR COND TAIL, FLUSH PCB SLDR MT,0.25 DIA BODY	24931	32JR141-1
A10J528	131-1857-00			CONN,HDR:PCB,;MALE,STR,1 X 36,0.1 CTR	58050	082-3644-SS10
A10J550	131-2221-00			CONN,HDR:PCB,;MALE,RTANG,2 X 25,0.1CTR,0.318 MLG X 0.110 TAIL,30 GOLD	22526	65626-150
A10L350	108-5023-00			INDUCTOR,FXD:POWER;5.6UH,20%,I<0.3A,RDC<1.1	TK2058	NL453232T-5R6M
A10P10	131-3556-00			CONN,BOX:PCB,;FEMALE,RTANG,2 X 12,0.1 CTR, 0.24 H X 0.115 TAIL,W/GUIDES,SIDE ENTRY,30 GOLD, 0.1 X 0.310 PCB	22526	66527-012
A10Q175	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	0LUA3	PMBT3904TRL
A10Q194	151-5016-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,30MA,600MHZ, AMPLIFIER	04713	MMBTH81LT1
A10Q195	151-5016-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,30MA,600MHZ, AMPLIFIER	04713	MMBTH81LT1
A10Q196	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	0LUA3	PMBT3904TRL
A10Q197	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	0LUA3	PMBT3906TRL
A10Q522	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	0LUA3	PMBT3904TRL
A10Q970	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	0LUA3	PMBT3906TRL
A10Q973	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	0LUA3	PMBT3906TRL
A10Q975	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	0LUA3	PMBT3906TRL
A10Q985	151-5016-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,30MA,600MHZ, AMPLIFIER	04713	MMBTH81LT1
A10Q986	151-5016-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,30MA,600MHZ, AMPLIFIER	04713	MMBTH81LT1
A10R172	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R174	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R175	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R176	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W,TC=100 PPM	50139	BCK5620FT
A10R177	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R180	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A10R184	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R185	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R186	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R190	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R191	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A10R192	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A10R194	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA33E2
A10R196	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A10R197	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W,TC=100 PPM	50139	BCD56R2FT
A10R198	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W,TC=100 PPM	50139	BCD56R2FT
A10R199	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R242	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R250	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W,TC=100 PPM	50139	BCK4750FT
A10R260	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R261	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A10R266	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R267	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R280	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R281	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A10R290	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A10R291	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A10R292	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R340	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R342	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R344	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R345	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R350	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W,TC=100 PPM	50139	BCK1000FT
A10R365	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R370	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R375	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R380	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R420	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R520	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R524	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R526	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A10R527	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1002FT
A10R535	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R574	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W,TC=100 PPM	50139	BCK2212FT
A10R696	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R886	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A10R887	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R890	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A10R895	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R970	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W,TC=100 PPM	50139	BCK1210FT
A10R971	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R972	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R973	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R974	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R975	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R976	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W,TC=100 PPM	50139	BCK3320FT
A10R977	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R978	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W,TC=100 PPM	50139	BCD56R2FT
A10R979	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R980	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W,TC=100 PPM	50139	BCK4751FT
A10R981	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W,TC=100 PPM	50139	BCD56R2FT
A10R982	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W,TC=100 PPM	50139	BCK5620FT
A10R984	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA22E1
A10R985	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A10R986	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W,TC=100 PPM	50139	BCK2740FT
A10R987	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R990	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R991	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R992	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W,TC=100 PPM	50139	BCK5620FT
A10R993	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10R994	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W,TC=100 PPM	50139	BCD56R2FT
A10R995	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W,TC=100 PPM	50139	BCK1001FT
A10U120	160-8928-03	B010100	B019999	IC,DIGITAL:CMOS,EPROM,131072 X 8	80009	160-8928-03
A10U120	163-0390-01	B020000		IC,DIGITAL:CMOS,EPROM,131072 X 8	80009	163-0390-01
A10U120	163-1271-00	B010100	B041844	IC,MEMORY:PRGM 156-3644-00,CMOS,EPROM,128K X 8,150NS,27C010,DIP32.6 OPT 50 AND OPT 75 ONLY	TK0198	163-1271-00
A10U120	163-1271-01	B041845		IC,MEMORY; PRGM 156-3644-00,CMOS,EPROM,128K X 8,150NS;27C010,DIP32.6 (V12.03.99)	TK0198	163-1271-01
A10U130	156-5286-00			IC,MEMORY:CMOS,SRAM;32K X 8,120NS,50UA,OE	TK2540	CXK58257M-12L
A10U170	156-5269-00			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE	04713	MC10H116FN
A10U175	156-5269-00			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE	04713	MC10H116FN
A10U185	156-5269-00			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE	04713	MC10H116FN
A10U195	156-5221-00			IC,DIGITAL:ECL,FLIP FLOP;DUAL D-TYPE	04713	MC10H131FN
A10U220	160-8927-03	B010100	B019999	IC,DIGITAL:CMOS,EPROM,131072 X 8	80009	160-8927-03
A10U220	163-0391-01	B020000		IC,DIGITAL:CMOS,EPROM,131072 X 8	80009	163-0391-01
A10U220	163-1272-00	B010100	B041844	IC,MEMORY:PRGM 156-3644-00,CMOS,EPROM,128K X 8,150NS,27C010,DIP32.6	TK0198	163-1272-00

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Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A10U220	163-1272-01	B041845		IC, MEMORY; PRGM 156-3644-00, CMOS, EPROM, 128K X 8, 150NS;27C010, DIP32.6 (V12.03.99)	TK0198	163-1272-01
A10U230	156-5286-00			IC, MEMORY: CMOS, SRAM; 32K X 8, 120NS, 50UA, OE	TK2540	CXK58257M-12L
A10U240	156-5144-00			IC, DIGITAL: HCTCMOS, FLIP FLOP; QUAD D-TYPE, CLEAR	1CH66	74HCT175D
A10U245	156-5146-00			IC, DIGITAL: HCTCMOS, GATE; QUAD 2-INPUT AND	01295	SN74HCT08D
A10U250	156-5301-00			IC, PROCESSOR: CMOS, MICROPROCESSOR; 16-BIT, 8 MHZ	4T165	UPD70108L8
A10U260	156-5145-00			IC, DIGITAL: HCTCMOS, FLIP FLOP; DUAL D-TYPE	01295	SN74HCT74D
A10U270	156-5239-00			IC, DIGITAL: HCTCMOS, BUFFER; OCTAL INV, BUFFER /DRIVER, 3-STATE	04713	MC74HCT240ADW
A10U280	156-5070-00			IC, DIGITAL: HCTCMOS, BUFFER; OCTAL BUFFER/DRIVER, 3-STATE	01295	SN74HCT244DW
A10U290	156-5285-00			IC, DIGITAL: FTTL, COUNTER; SYNCH 4-BIT UP/DOWN	1CH66	N74F193D
A10U294	156-5268-00			IC, DIGITAL: FTTL, SCHMITT TRIG; HEX INV	04713	MC74F14D
A10U295	156-5285-00			IC, DIGITAL: FTTL, COUNTER; SYNCH 4-BIT UP/DOWN	1CH66	N74F193D
A10U320	160-8926-03	B010100	B019999	IC, DIGITAL: CMOS, EPROM, 131072 X 8, 250NS, DIP 32.6	80009	160-8926-03
A10U320	163-0392-01	B020000		IC, DIGITAL: CMOS, EPROM, 131072 X 8	80009	163-0392-01
A10U320	163-1273-00	B010100	B041844	IC, MEMORY: PRGM 156-3644-00, CMOS, EPROM, 128K C 8, 150NS, 27C010, DIP32.6 OPT 50 AND OPT 75 ONLY	TK0198	163-1273-00
A10U320	163-1273-01	B041845		IC, MEMORY; PRGM 156-3644-00, CMOS, EPROM; 128K C 8, 150NS; 27C010, DIP32.6 (V12.03.99)	TK0198	163-1273-01
A10U330	156-5286-00			IC, MEMORY: CMOS, SRAM; 32K X 8, 120NS, 50UA, OE	TK2540	CXK58257M-12L
A10U340	156-5093-00			IC, PROCESSOR: CMOS, PERIPHERAL; PROGRAMMABLE INTERRUPT CONTROLLER, 5MHZ	34371	CS82C59A-5
A10U360	156-5302-00			IC, PROCESSOR: CMOS, MISC; CLOCK GENERATOR/DRIVER, 8MHZ	80009	156530200
A10U365	156-5085-00			IC, DIGITAL: HCTCMOS, GATE; QUAD 2-INPUT OR	04713	MC74HCT32AD
A10U370	156-5284-00			IC, DIGITAL: LSTTL, COUNTER; 8-BIT BINARY	01295	SN74LS593DW
A10U380	156-5284-00			IC, DIGITAL: LSTTL, COUNTER; 8-BIT BINARY	01295	SN74LS593DW
A10U385	156-5101-01			IC, DIGITAL: HCTCMOS, LATCH; OCTAL D-TYPE, 3-STATE	04713	MC74HCT373ADWR2
A10U395	156-5220-01			IC, DIGITAL: HCTCMOS, BUFFER; OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A10U420	160-8925-03	B010100	B019999	IC, DIGITAL: CMOS, EPROM, 131072 X 8, 250NS, DIP 32.6	80009	160-8925-03
A10U420	163-0393-01	B020000		IC, DIGITAL: CMOS, EPROM, 131072 X 8	80009	163-0393-01
A10U420	163-1274-00	B010100	B041844	IC, MEMORY: PRGM 156-3644-00, CMOS, EPROM, 128K X 8, 150NS, 27C010, DIP32.6 OPT 50 AND OPT 75 ONLY	TK0198	163-1274-00
A10U420	163-1274-01	B041845		IC, MEMORY; PRGM 156-3644-00, CMOS, EPROM; 128K X 8, 150NS; 27C010, DIP32.6 (V12.03.99)	TK0198	163-1274-01
A10U430	156-5286-00			IC, MEMORY: CMOS, SRAM; 32K X 8, 120NS, 50UA, OE	TK2540	CXK58257M-12L
A10U440	156-5101-01			IC, DIGITAL: HCTCMOS, LATCH; OCTAL D-TYPE, 3-STATE	04713	MC74HCT373ADWR2
A10U450	156-5101-01			IC, DIGITAL: HCTCMOS, LATCH; OCTAL D-TYPE, 3-STATE	04713	MC74HCT373ADWR2
A10U460	156-5071-00			IC, DIGITAL: HCTCMOS, TRANSCEIVER; OCTAL, 3-STATE	04713	MC74HCT245ADW

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A10U465	156-5101-01			IC,DIGITAL:HCTCMOS,LATCH;OCTAL D-TYPE, 3-STATE	04713	MC74HCT373ADWR2
A10U470	156-5092-00			IC,PROCESSOR:CMOS,PERIPHERAL;PROGRAMMABLE INTERVAL TIMER, 8MHZ	4T165	UPD71054L
A10U480	156-5284-00			IC,DIGITAL:LSTTL,COUNTER;8-BIT BINARY	01295	SN74LS593DW
A10U485	156-5070-00			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	01295	SN74HCT244DW
A10U495	156-5101-01			IC,DIGITAL:HCTCMOS,LATCH;OCTAL D-TYPE, 3-STATE	04713	MC74HCT373ADWR2
A10U515	160-5430-00			IC,DIGITAL:STTL,PLD;FPLA,PLS173,170MA,30NS	TK0198	160-5430-00
A10U530	160-5431-00			IC,DIGITAL:STTL,PLD;FPLA,PLS173,170MA,30NS	TK0198	160-5431-00
A10U540	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A10U550	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A10U560	156-5071-00			IC,DIGITAL:HCTCMOS,TRANSCEIVER;OCTAL,3-STATE	04713	MC74HCT245ADW
A10U565	156-5070-00			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	01295	SN74HCT244DW
A10U570	156-5071-00			IC,DIGITAL:HCTCMOS,TRANSCEIVER;OCTAL,3-STATE	04713	MC74HCT245ADW
A10U580	156-5092-00			IC,PROCESSOR:CMOS,PERIPHERAL;PROGRAMMABLE INTERVAL TIMER, 8MHZ	4T165	UPD71054L
A10U585	156-5123-00			IC,DIGITAL:HCTCMOS,DEMUX/DECODER;4-TO-16 DECODER	1CH66	74HCT154D
A10U595	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E
A10W518	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A10W525	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A10W526	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A10W577	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A10W578	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A10Y350	158-0390-00			XTAL UNIT,QTZ:14.745600 MHZ,+/-0.005%,PARALLEL, CL=20 PF, ESR=25 OHMSHC-18/U PKG	61441	NMP147-20
A11	671-3275-00			CKT BD ASSY:DIGITAL OPTIONS/IF GATE	80009	671327500
A11	672-1544-00	B010100	B041844	CIRCUIT BD ASSY:DIGITAL OPT IF GATE, W/163-1276-00, 2715 OPT 50 AND OPT 75	80009	672-1544-00
A11	672-1544-01	B041845		IC, MEMORY; PRGM 156-4025-00, CMOS;EPROM, 256K X 8, 200NS;27C020, DIP32.6 (V12.03.99)	80009	672-1544-01
A11BT1	146-0103-00			BATTERY,DRY:3V;560MAH AT 0.2MA,BUTTON CELL	S4091	CR-2450-FT2-1
A11C1	290-5037-01			CAP,FXD,ALUM::;10UF,20%,35V,5.7 H X 5 DIA MM	62643	MVK35VC10RME60T
A11C2	290-5037-01			CAP,FXD,ALUM::;10UF,20%,35V,5.7 H X 5 DIA MM	62643	MVK35VC10RME60T
A11C3	290-5037-01			CAP,FXD,ALUM::;10UF,20%,35V,5.7 H X 5 DIA MM	62643	MVK35VC10RME60T
A11C4	290-5037-01			CAP,FXD,ALUM::;10UF,20%,35V,5.7 H X 5 DIA MM	62643	MVK35VC10RME60T
A11C5	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C6	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K

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Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A11C7	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C8	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C9	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C10	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C11	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C12	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C13	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C14	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C15	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C16	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C17	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C18	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C19	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C20	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C21	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C22	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C23	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C24	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C25	283-5109-00			CAP,FXD,CERAMIC:MLC;680PF,5%,100V,NPO,1206	04222	12061A681JAT1A
A11C26	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A11C27	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A11C28	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A11C29	283-5109-00			CAP,FXD,CERAMIC:MLC;680PF,5%,100V,NPO,1206	04222	12061A681JAT1A
A11C30	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A11C31	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C32	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A11C33	283-5267-00			CAP,FXD,CERAMIC:MLC;1UF,+80%-20%,25V,Y5V,1206	04222	12063G105ZAT1A
A11C34	283-5265-00			CAP,FXD,CERAMIC:MLC;0.0033UF,5%,50V,NPO,1206	04222	12065A332JAT1A
A11C35	283-5108-00			CAP,FXD,CERAMIC:MLC;68PF,5%,100V,NPO,1206	04222	12061A680JAT1A
A11C36	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C37	283-5201-00			CAP,FXD,CERAMIC:MLC;33PF,5%,100V,NPO,1206	04222	12061A330JAT1A
A11C38	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A11C39	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A11C40	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C41	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A11C42	283-5267-00			CAP,FXD,CERAMIC:MLC;1UF,+80%-20%,25V,Y5V,1206	04222	12063G105ZAT1A
A11C43	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A11C44	283-5267-00			CAP,FXD,CERAMIC:MLC;1UF,+80%-20%,25V,Y5V,1206	04222	12063G105ZAT1A

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A11C45	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C46	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A11C47	290-5037-01			CAP,FXD,ALUM;;10UF,20%,35V,5.7 H X 5 DIA MM	62643	MVK35VC10RME60T
A11C48	290-5037-01			CAP,FXD,ALUM;;10UF,20%,35V,5.7 H X 5 DIA MM	62643	MVK35VC10RME60T
A11C49	290-5037-01			CAP,FXD,ALUM;;10UF,20%,35V,5.7 H X 5 DIA MM	62643	MVK35VC10RME60T
A11C50	290-5037-01			CAP,FXD,ALUM;;10UF,20%,35V,5.7 H X 5 DIA MM	62643	MVK35VC10RME60T
A11C51	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A11C52	283-5109-00			CAP,FXD,CERAMIC:MLC;680PF,5%,100V,NPO,1206	04222	12061A681JAT1A
A11J1	131-0391-01			CONN,RF JACK:SMB;;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA	24931	32JR141-1
A11J2	131-0391-01			CONN,RF JACK:SMB;;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA	24931	32JR141-1
A11J3	131-2221-00			CONN,HDR:PCB;;MALE,RTANG,2 X 25,0.1CTR,0.318 MLG X 0.110 TAIL,30 GOLD	22526	65626-150
A11J8	131-3556-00			CONN,BOX:PCB;;FEMALE,RTANG,2 X 12,0.1 CTR,0 .24 H X 0.115 TAIL	22526	66527-012
A11J140	131-2920-00			CONN,HDR:PCB;;MALE,RTANG,2 X 5,0.1 CTR,0.318 MLG X 0.110 TAIL,0.238 H,30 GOLD	00779	86479-3
A11J550	131-2221-00			CONN,HDR:PCB;;MALE,RTANG,2 X 25,0.1CTR,0.318 MLG X 0.110 TAIL,30 GOLD	22526	65626-150
A11Q1	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A11Q2	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A11Q3	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A11Q4	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A11Q5	151-5066-00			TRANSISTOR,SIG:MOS,N-CH;60V,0.115A,7.5OHM	04713	2N7002LT1
A11Q6	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A11Q7	156-6140-00			IC,LINEAR:BIPOLAR,TRANSISTOR ARRAY;QUAD,NPN, INDEPENDENT,MATCHED	24355	MAT04FS
A11Q8	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A11Q10	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A11Q11	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A11Q12	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A11Q13	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1



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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A11Q14	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A11R1	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A11R2	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A11R3	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R4	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R5	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R6	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R7	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R8	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A11R9	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R12	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R13	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R14	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R15	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A11R16	321-5005-00			RES,FXD:THICK FILM;27.4 OHM,1%,0.125W	57668	MCR18EZHFV 27E4
A11R17	321-5039-00			RES,FXD:THICK FILM;56.2K OHM,1%,0.125W	50139	BCK5622FT
A11R18	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A11R19	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A11R20	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A11R21	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A11R22	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A11R23	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A11R24	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A11R25	321-5021-00			RES,FXD:THICK FILM;1.82K OHM,1%,0.125W	50139	BCK1821FT
A11R26	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A11R27	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A11R28	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A11R29	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A11R30	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A11R31	321-5281-00			RES,FXD:THICK FILM;2K OHM,1%,0.125W	91637	CRCW1206-2001FT
A11R32	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A11R33	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A11R34	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A11R35	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A11R36	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A11R37	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A11R38	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A11R39	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A11R40	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A11R41	321-5021-00			RES,FXD:THICK FILM;1.82K OHM,1%,0.125W	50139	BCK1821FT
A11R42	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A11R43	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A11R44	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A11R45	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A11R46	321-5005-00			RES,FXD:THICK FILM;27.4 OHM,1%,0.125W	57668	MCR18EZHFW 27E4
A11R47	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R48	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A11R49	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A11R50	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A11R51	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W	50139	BCK4752FT
A11R52	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R53	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R54	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A11R55	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A11R56	321-5035-00			RES,FXD:THICK FILM;27.4K OHM,1%,0.125W	50139	BCK2742FT
A11R57	321-5035-00			RES,FXD:THICK FILM;27.4K OHM,1%,0.125W	50139	BCK2742FT
A11T1	120-1627-00			TRANSFORMER,SIG:IF GATE OUTPUT;PRI 34T CT,SEC 6T	54937	500-6018
A11U1	156-5820-00			IC,DIGITAL:ACTCMOS,TRANSCEIVER;OCTAL,3-STATE	04713	MC74ACT245DW
A11U2	156-5464-00			IC,DIGITAL:ACTCMOS,GATE;QUAD 2-INPUT NAND	04713	MC74ACT00D
A11U3	156-5686-00			MICROCKT,LINEAR:CMOS,HIGH SPEED PHASE LOCKED LOOP	1CH66	74HCT4046AD
A11U4	156-5131-00			IC,DIGITAL:HCTCMOS,GATE;HEX INV SCHMITT TRIG	04713	MC74HCT14AD
A11U5	163-0239-00		B019999	IC,MEMORY:CMOS,EPROM,PRGM	80009	163023900
A11U5	163-0239-01	B020000		IC,MEMORY:CMOS,EPROM,PRGM	80009	163023901
A11U5	163-1276-00	B010100	B041844	IC,MEMORY:CMOS,EPROM,256K X 8,200NS,27C020,DIP32.6 OPT 50 AND OPT 75 ONLY	TK0198	163-1276-00
A11U5	163-1276-01	B041845		IC, MEMORY; PRGM 156-4025-00, CMOS;EPROM, 256K X 8, 200NS;27C020, DIP32.6	TK0198	163-1276-01
A11U6	156-5081-01			IC,DIGITAL:HCTCMOS,GATE;HEX INVERTER	0JR04	TC74HCT04AFN(EL
A11U7	163-0020-00			IC,DIGITAL:CMOS,PLD;EEPLD,26V12,20NS,105MA, PRGM 156-6650-00	80009	163-0020-00
A11U8	156-6151-01			IC,MEMORY:CMOS,SRAM;128K X 8,100NS,15UA,OE	TK1146	M5M51008AFP-10L
A11U9	156-6895-00			IC,MISC:CMOS,INTERFACE;RS-232,5 DRIVERS,5 RECEIVERS,+5V VCC,EXTERNAL CAPS REQUIRED	64155	LT1130ACS
A11U10	156-6312-00			IC,DIGITAL:CMOS,PLD;FPGA,XC3000 FAMILY,3030, 100 CLBS,80 IOBS,58 I/O,70 MHZ	68994	XC3030-70PC68C

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A11U11	156-5217-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIVE, ADJUSTABLE,100MA,4%	27014	LM337LM
A11U12	156-5298-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE,5V,100MA,5%	01295	UA78L05ACD
A11U13	163-0019-00			IC,MEMORY:CMOS,PROM;36288 X 1 SERIAL CONFIGURATION,PRGM 156-3808-00	80009	163001900
A11U15	156-5489-01			IC,MISC:BIPOLAR,PWR SUPPLY SUPERVISOR;MPU RESET GENERATOR,5V SUPPLY SENSING	01295	TL7705ACDR
A11U16	156-6344-00			IC,MISC:CMOS,PWR SUPPLY SUPERVISOR;NONVOLATILE CMOS RAM BATTERY BACKUP CONTROLLER	0B0A9	DS1210S
A11U17	156-6344-00			IC,MISC:CMOS,PWR SUPPLY SUPERVISOR;NONVOLATILE CMOS RAM BATTERY BACKUP CONTROLLER	0B0A9	DS1210S
A11U18	156-6223-00			IC,PROCESSOR:NMOS,PERIPHERAL;GPIB CONTROLLER, TEXAS INSTR PINOUT	80009	156622300
A11U19	156-5580-01			IC,DIGITAL:TTL,OCTAL GPIB TRANSCEIVER,DATA BUS,75160,SO20.300,24MM T&R	01295	SN75160BDWR
A11U20	156-6677-00			IC,MISC:LSTTL,INTERFACE;OCTAL IEEE-488 GPIB	01295	SN75162BDW
A11U21	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E)
A11U22	156-5527-00			IC,PROCESSOR:CMOS,PERIPHERAL;SCC, SERIAL COMMUNICATION CONTROLLER,8MHZ	56708	Z85C3008VSC
A11U23	156-3629-00			IC,PROCESSOR:CMOS,PERIPHERAL;RTC,CLOCKCALENDAR	0N2P9	MSM62X42BRS-B
A11U24	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E)
A11U25	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E)
A11U26	156-5220-01			IC,DIGITAL:HCTCMOS,BUFFER;OCTAL BUFFER/DRIVER, 3-STATE	0JR04	TC74HCT541AFW(E)
A12	672-1284-05			CIRCUIT BD ASSY:PHASELOCK CFC MODULE	80009	672128405
A12	672-1284-10			CIRCUIT BD ASSY:PHASELOCK CFC MODULE,670-9472-05 & 670-9473-03 & 671-0583-03, OPT 50 & OPT 75 ONLY	80009	672-1284-10
A12C1	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A12C2	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A12C3	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A12C4	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A12C5	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A12C6	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A12C7	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A12C8	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A12C9	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A12C10	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A12C11	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12J100	131-1170-00			CONN,RF JACK:SMB,;50 OHM,MALE,STR,SLDR CUP/ FRONT PNL,0.236 MLG X 0.375 TAIL	24931	32JR124-2
A12J130	131-1170-00			CONN,RF JACK:SMB,;50 OHM,MALE,STR,SLDR CUP/ FRONT PNL,0.236 MLG X 0.375 TAIL	24931	32JR124-2
A12J140	131-1170-00			CONN,RF JACK:SMB,;50 OHM,MALE,STR,SLDR CUP/ FRONT PNL,0.236 MLG X 0.375 TAIL	24931	32JR124-2
A12J240	131-1170-00			CONN,RF JACK:SMB,;50 OHM,MALE,STR,SLDR CUP/ FRONT PNL,0.236 MLG X 0.375 TAIL	24931	32JR124-2
A12J540	131-1170-00			CONN,RF JACK:SMB,;50 OHM,MALE,STR,SLDR CUP/ FRONT PNL,0.236 MLG X 0.375 TAIL	24931	32JR124-2
A12R1	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W PPM	91637	CCF501G10000F
A12R2	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W PPM	91637	CCF501G10000F
A12R3	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125W	TK1727	SFR16 2322-180
A12A1	-----			(PART OF A12) PHASELOCK CF CONTROL		
A12A1C100	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C101	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C112	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C120	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C141	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C150	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C163	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C167	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C200	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C201	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C205	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C211	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C213	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C214	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C220	283-5025-00			CAP,FXD,CERAMIC:MLC;220PF,5%,50V,NPO,1206	TK2058	C3216COG1H221J
A12A1C221	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C230	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C231	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A1C235	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C240	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C245	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C251	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C252	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C255	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C262	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A12A1C280	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C281	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C282	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C290	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A12A1C292	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A12A1C300	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C310	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C312	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C314	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C321	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C322	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C333	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C334	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C337	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C338	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C340	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C341	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C342	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C343	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C352	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C374	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A12A1C388	290-0536-00			CAP,FXD,ELCTLT:10UF,20%,25V TANTALUM	D5243	ETP-3F 10UF 25V

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A1C389	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C390	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C392	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A12A1C395	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A12A1C410	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C411	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C420	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C421	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C422	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C442	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C443	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C445	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C452	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C480	290-0944-00			CAP,FXD,ELCTL:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A12A1C483	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C520	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C540	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C562	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A12A1C567	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A12A1C605	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C611	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A12A1C612	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C616	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C623	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C625	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C630	283-5008-00			CAP,FXD,CERAMIC:MLC;12PF,5%,50V,NPO,1206	TK2058	C3216C0G1H120J
A12A1C635	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C660	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C671	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A12A1C672	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C710	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C711	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C712	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C714	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A12A1C715	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A12A1C716	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C721	283-5042-00			CAP,FXD,CERAMIC:MLC;27PF,5%,50V,NPO,1206	TK2058	C3216C0G1H270J
A12A1C722	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A12A1C724	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C726	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C728	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C729	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C731	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A12A1C733	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A12A1C735	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A12A1C737	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C738	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C741	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C742	283-5004-00		B010181	CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C742	283-0339-00	B010182		CAP,FXD,CERAMICMLC;0.22UF,10%,50V,X7R,0.30 X 0.30,0.20 LS,RADIAL	17554	SR305C224KAA
A12A1C744	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C747	283-5004-00		B010181	CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C760	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C761	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C770	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C771	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C773	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C812	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C824	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C825	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C826	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C840	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C851	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C853	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C860	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C862	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A1C864	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C874	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C914	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C919	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A12A1C920	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C929	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C930	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C940	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C941	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C942	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C943	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C951	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C953	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A1C960	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C961	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C962	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C963	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A1C971	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A12A1C973	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C974	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A12A1C975	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A1C976	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A12A1C980	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A12A1C990	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A12A1J110	131-0391-01			CONN,RF JACK:SMB,;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA	24931	32JR141-1
A12A1J130	131-0391-01			CONN,RF JACK:SMB,;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA	24931	32JR141-1
A12A1J140	131-0391-01			CONN,RF JACK:SMB,;50 OHM,MALE,STR,PCB,GOLD/ GOLD,0.293 H X 0.155 L 0.038 DIA	24931	32JR141-1
A12A1J190	131-1425-00			CONN,HDR:PCB,;MALE,RTANG,1 X 36,0.1CTR,0.23 0 MLG X 0.090 TAIL,30 GOLD,STACKABLE (REPLACE AS SET WITH 131-1426-00)	22526	65521-136
A12A1J190	131-1426-00			CONN,HDR:PCB,;MALE,RTANG,1 X 36,0.1CTR,0.23 (REPLACE AS SET WITH 131-1425-00)	22526	65524-136
A12A1J510	131-3774-00			CONN,HDR:PCB,;MALE,STR,2 X 36,0.1 CTR,0.230	22526	67996-172
A12A1J550	131-1857-00			CONN,HDR:PCB,;MALE,STR,1 X 36,0.1 CTR,0.230	58050	082-3644-SS10
A12A1L351	108-5009-00			INDUCTOR,FXD:POWER;82UH,10%,I<0.12A,RDC<7.0	TK2058	NL453232T-820K
A12A1L451	108-5009-00			INDUCTOR,FXD:POWER;82UH,10%,I<0.12A,RDC<7.0	TK2058	NL453232T-820K



**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A1L481	108-1420-00			INDUCTOR,FXD:POWER;300UH,20%,IDC<0.75 A,RDC <0.17 OHM,Q>100 (20KHZ),POT CORE	54937	500-4326
A12A1L490	108-1420-00			INDUCTOR,FXD:POWER;300UH,20%,IDC<0.75 A,RDC <0.17 OHM,Q>100 (20KHZ),POT CORE	54937	500-4326
A12A1L621	108-5021-00			INDUCTOR,FXD:POWER;1.5UH,20%,I<0.41A,RDC <0.6 OHM,Q>50,SRF>110MHZ	TK2058	NL453232T-1R5M
A12A1L631	108-5023-00			INDUCTOR,FXD:POWER;5.6UH,20%,I<0.3A,RDC<1.1	TK2058	NL453232T-5R6M
A12A1L720	108-5000-00			INDUCTOR,FXD:POWER;1.0UH,5%,I<0.45A,RDC<0.5	TK2058	NL453232T-1R0J
A12A1L732	108-5093-00			INDUCTOR,FXD:SIGNAL;2.2UH,10%,IDC<380 MA,RDC <0.7 OHM,Q>50,SRF>55 MHZ	02113	1812LS-222 XKBA
A12A1L802	108-5009-00			INDUCTOR,FXD:POWER;82UH,10%,I<0.12A,RDC<7.0	TK2058	NL453232T-820K
A12A1L814	108-5009-00			INDUCTOR,FXD:POWER;82UH,10%,I<0.12A,RDC<7.0	TK2058	NL453232T-820K
A12A1L917	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A,RDC <0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A12A1P11	131-3556-00			CONN,BOX:PCB,;FEMALE,RTANG,2 X 12,0.1 CTR, 0.24 H X 0.115 TAIL	22526	66527-012
A12A1Q170	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A12A1Q521	151-1127-00			TRANSISTOR,PWR:MOS,N-CH;60V,4.0A,0.6 OHM	34371	IRF510R
A12A1Q630	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A12A1Q631	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A12A1Q632	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A12A1Q633	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A12A1Q652	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A12A1Q674	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A12A1Q703	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A12A1Q780	151-1127-00			TRANSISTOR,PWR:MOS,N-CH;60V,4.0A,0.6 OHM	34371	IRF510R
A12A1Q781	151-1128-00			TRANSISTOR,PWR:MOS,P-CH;60V,6.0A,0.6 OHM	17856	IRF9520
A12A1Q800	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A12A1Q880	151-1128-00			TRANSISTOR,PWR:MOS,P-CH;60V,6.0A,0.6 OHM	17856	IRF9520
A12A1Q881	151-1127-00			TRANSISTOR,PWR:MOS,N-CH;60V,4.0A,0.6 OHM	34371	IRF510R
A12A1Q910	151-1063-00			TRANSISTOR,PWR:MOS,N-CH;60V,0.8A,0.8 OHM	04713	IRFD113
A12A1Q911	151-1063-00			TRANSISTOR,PWR:MOS,N-CH;60V,0.8A,0.8 OHM	04713	IRFD113
A12A1Q920	151-1121-00			TRANSISTOR,PWR:MOS,N-CH;60V,0.5A,3.0 OHM	17856	VN0606L
A12A1Q930	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A1Q931	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A12A1R111	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A12A1R161	325-0315-00			RES,FXD,FILM:20K OHM,0.05%,0.3W,TC=3.1 PPM/DEG C	TK2096	K747 20.00 KOHM
A12A1R162	325-0411-00			RES,FXD,FILM:15.6K OHM,1%,0.3W,TC=3.1PPM	18612	S102C 15K600-1%
A12A1R164	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A12A1R171	321-0161-00			RES,FXD,FILM:464 OHM,1%,0.125W,TC=T0	91637	CMF55116G464R0F
A12A1R172	321-0816-07			RES,FXD,FILM:5K OHM,0.1%,0.125W,TC=T9MI	TK1727	MPR24-2322-141
A12A1R173	321-0289-07			RES,FXD,FILM:10.0K OHM,0.1%,0.125W,TC=T9	19701	5033RE10K00B
A12A1R191	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R202	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A12A1R203	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A12A1R204	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A12A1R210	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A12A1R212	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A12A1R232	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R233	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R234	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R236	321-0239-07			RES,FXD,FILM:3.01K OHM,0.1%,0.125W,TC=T9MI	19701	5033RE3K010B
A12A1R237	321-0272-07			RES,FXD,FILM:6.65K OHM,0.1%,0.125W,TC=T9	19701	5033RD6K650B
A12A1R238	321-0228-09			RES,FXD,FILM:2.32K OHM,1%,0.125W,TC=T9MI	19701	5033RE2K320F
A12A1R239	321-0753-06			RES,FXD,FILM:9K OHM,0.25%,0.125W,TC=T9MI	19701	5033RE9K000C
A12A1R241	325-0410-00			RES,FXD,FILM:14.3K OHM,1%,0.3W,TC=3.1PPM	18612	S102C 14K300-1%
A12A1R242	325-0410-00			RES,FXD,FILM:14.3K OHM,1%,0.3W,TC=3.1PPM	18612	S102C 14K300-1%
A12A1R243	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R244	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R250	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A12A1R253	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A12A1R254	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A12A1R261	321-5035-00			RES,FXD:THICK FILM;27.4K OHM,1%,0.125W	50139	BCK2742FT
A12A1R271	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R272	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R273	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R281	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R283	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R284	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A12A1R285	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A12A1R286	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R287	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A12A1R288	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A12A1R289	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R291	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R311	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R313	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R320	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R323	321-0924-07			RES,FXD,FILM:40K OHM,0.1%,0.125W,TC=T9MI	TK1727	MPR24-2322-141
A12A1R324	321-0306-09			RES,FXD,FILM:15.0K OHM,1%,0.125W,TC=T9MI	19701	5033RE15K00F
A12A1R330	321-0193-07			RES,FXD,FILM:1K OHM,0.1%,0.125W,TC=T9MI	19701	5033RE1K000B
A12A1R331	321-1722-07			RES,FXD,FILM:3.39K OHM,0.1%,0.125W,TC=T9	19701	5033RE3K390B
A12A1R332	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R335	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R336	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R339	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R350	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A12A1R362	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R371	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R373	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R375	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R380	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R381	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R382	321-5029-00			RES,FXD:THICK FILM;8.25K OHM,1%,0.125W	50139	BCK8251FT
A12A1R383	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A12A1R384	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R385	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R386	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R387	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R430	321-0222-09			RES,FXD,FILM:2.00K OHM,1,0.125W,TC=T9MI	19701	5033RE2K000F
A12A1R431	321-0222-09			RES,FXD,FILM:2.00K OHM,1,0.125W,TC=T9MI	19701	5033RE2K000F
A12A1R440	321-0289-07			RES,FXD,FILM:10.0K OHM,0.1%,0.125W,TC=T9	19701	5033RE10K00B
A12A1R441	321-0289-07			RES,FXD,FILM:10.0K OHM,0.1%,0.125W,TC=T9	19701	5033RE10K00B
A12A1R444	321-0193-07			RES,FXD,FILM:1K OHM,0.1%,0.125W,TC=T9MI	19701	5033RE1K000B
A12A1R446	321-5042-00			RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	57668	MCR18FWEA39E2
A12A1R450	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A12A1R453	321-5042-00			RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	57668	MCR18FWEA39E2
A12A1R472	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R473	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R474	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A12A1R475	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A1R476	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R477	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R478	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R482	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R484	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A12A1R485	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A12A1R486	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A12A1R487	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A12A1R491	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A12A1R530	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W	57668	MCR18FXEA332K
A12A1R541	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A12A1R541	321-5026-00			RES,FXD:THICK FILM,4.75K OHM,1%,0.125W,TC=100 PPM,1206,T&R OPT 50 & OPT 75 ONLY	50139	BCK4751FT
A12A1R542	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R543	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A12A1R545	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W	50139	BCK1502FT
A12A1R545	321-5274-00			RES,FXD,FILM:THIN FILM, 24.9K OHM,0.1%,0.125W,TC=25PPM,1206,T&R OPT 50 & OPT 75 ONLY	91637	TNPW1206-2492B-R7 5
A12A1R546	321-5041-00			RES,FXD:THICK FILM;82.5K OHM,1%,0.125W	50139	BCK8252FT
A12A1R546				NOT USED FOR OPT 50 & OPT 75		
A12A1R547	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A12A1R547	321-5030-00			RES,FXD:THICK FILM,10.0K OHM,1%,0.125W,TC=100 PPM,1206,T&R OPT 50 & OPT 75 ONLY	50139	BCK1002FT
A12A1R551	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A12A1R552	321-5042-00			RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	57668	MCR18FWEA39E2
A12A1R561	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A12A1R563	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W	50139	BCK1502FT
A12A1R564	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A12A1R566	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W	50139	BCK1502FT
A12A1R568	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R569	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R571	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R572	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R573	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R574	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R575	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A12A1R576	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A1R600	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R601	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R602	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A12A1R603	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A12A1R604	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A12A1R610	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A12A1R613	321-5003-00			RES,FXD:THICK FILM;18.2 OHM,1%,0.125W	91637	CRCW120618R2FT
A12A1R615	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A12A1R617	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A12A1R620	311-2275-00			RES,VAR,NONWW:TRMR,200 OHM,20%,0.5WLINEAR,MI	TK2073	GF06VT2 201 M L
A12A1R622	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A12A1R624	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A12A1R632	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A12A1R633	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A12A1R634	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A12A1R636	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A12A1R637	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A12A1R638	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A12A1R640	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R641	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R642	321-5021-00			RES,FXD:THICK FILM;1.82K OHM,1%,0.125W	50139	BCK1821FT
A12A1R643	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A12A1R644	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A12A1R645	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W	50139	BCK4752FT
A12A1R651	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A12A1R653	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W	50139	BCK4752FT
A12A1R654	321-5021-00			RES,FXD:THICK FILM;1.82K OHM,1%,0.125W	50139	BCK1821FT
A12A1R655	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A12A1R656	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R657	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R670	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A12A1R673	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R701	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W	50139	BCK4752FT
A12A1R702	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W	50139	BCK1502FT
A12A1R709	321-1542-00			RES,FXD,FILM:4.37M OHM,1.0%,0.125W	64537	PME60 4.37 M OH
A12A1R710	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A12A1R711	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A12A1R712	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A1R713	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R714	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A12A1R716	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R718	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A12A1R719	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A12A1R725	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A12A1R727	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A12A1R730	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A12A1R734	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R736	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A12A1R745	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R746	311-2168-00			RES,VAR,NONWW:10K OHM,10%,0.5W,20 TURN TRIMMER,METAL FOIL	18612	1280G 10 K OHM
A12A1R750	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R751	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R752	321-5031-00			RES,FXD:THICK FILM;12.1K OHM,1%,0.125W	50139	BCK1212FT
A12A1R753	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R754	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R755	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A12A1R756	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R772	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R801	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R812	321-5037-00			RES,FXD:THICK FILM;39.2K OHM,1%,0.125W	50139	BCK3922FT
A12A1R813	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R815	321-0822-06			RES,FXD,FILM:1.76K OHM,0.25%,0.125W	19701	5033RE1K760C
A12A1R816	321-1228-07			RES,FXD,FILM:2.34K OHM,0.1%,0.125W	19701	5033RE2K34BB298
A12A1R820	321-0361-06			RES,FXD,FILM:56.2K OHM,0.25%,0.125W	19701	5033RE56K20C
A12A1R821	321-0641-07			RES,FXD,FILM:1.8K OHM,0.1%,0.125W	19701	5033RE1K800B
A12A1R822	321-0926-07			RES,FXD,FILM:4K OHM,0.1%,0.125W	TK1727	MPR24-2322-141
A12A1R823	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R827	311-1245-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3386X-DY6-103
A12A1R828	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A12A1R832	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R833	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R840	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A12A1R841	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A12A1R842	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A12A1R843	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A12A1R844	321-5042-00			RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	57668	MCR18FWEA39E2
A12A1R845	321-5042-00			RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	57668	MCR18FWEA39E2

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A12A1R846	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R847	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R848	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A12A1R861	321-5035-00			RES,FXD:THICK FILM;27.4K OHM,1%,0.125W	50139	BCK2742FT
A12A1R863	321-5035-00			RES,FXD:THICK FILM;27.4K OHM,1%,0.125W	50139	BCK2742FT
A12A1R870	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A12A1R871	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A12A1R872	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R873	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R875	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R898	321-1145-08			RES,FXD,FILM:320 OHM,1%,0.125W,TC=T2	07716	CEA 320R
A12A1R899	321-0088-00			RES,FXD,FILM:80.6 OHM,1%,0.125W,150PPM OPT 50 & OPT 75 ONLY	50139	NOT AVAILABLE
A12A1R900	325-0413-00			RES,FXD,FILM:13 OHM,1%,2W,TC=3.1PPM	18612	S106D 13R000-1%
A12A1R901	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R903	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R904	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R905	308-0142-00			RES,FXD,WW:30 OHM,5%,3W	TK2096	KM300 30 OHM 1
A12A1R912	321-0926-07			RES,FXD,FILM:4K OHM,0.1%,0.125W	TK1727	MPR24-2322-141
A12A1R913	321-0222-09			RES,FXD,FILM:2.00K OHM,1,0.125W	19701	5033RE2K000F
A12A1R915	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R916	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R917	321-0481-00			RES,FXD,FILM:1M OHM,1%,0.125W	TK1727	2322-151-1M
A12A1R918	311-1245-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3386X-DY6-103
A12A1R920	311-1245-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3386X-DY6-103
A12A1R921	321-0926-07			RES,FXD,FILM:4K OHM,0.1%,0.125W	TK1727	MPR24-2322-141
A12A1R922	325-0410-00			RES,FXD,FILM:14.3K OHM,1%,0.3W	18612	S102C 14K300-1%
A12A1R923	325-0414-00			RES,FXD,FILM:3.2K OHM,1%,0.3W	18612	S102C 3K200-1%
A12A1R923	321-0248-00			RES,FXD,FILM:3.74K OHM,1%,0.125W,TC=T0 MI OPT 50 & OPT 75 ONLY	50139	NOT AVAILABLE
A12A1R924	321-0926-07			RES,FXD,FILM:4K OHM,0.1%,0.,W/GUIDES,SIDE ENTRY, 30 GOLD,0.1 X 0.310 PCB	TK1727	MPR24-2322-141
A12R924	321-0748-06			RES,FXD,FILM:4.95K OHM,0.25%,0.125W,TC=T9 MI OPT 50 & OPT 75 ONLY	07716	CEAE49500C
A12A1R925	321-0278-07			RES,FXD,FILM:7.68K OHM,0.1%,0.125W	57027	RC55-D-7K68-B-R
A12A1R926	325-0412-00			RES,FXD,FILM:1.5K OHM,1%,0.3W,	18612	S102C 1K500-1%
A12A1R927	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A1R928	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A1R929	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W	57668	MCR18FXEA332K
A12A1R930	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R931	311-2168-00			RES,VAR,NONWW:10K OHM,10%,0.5W,20 TURN TRIMMER,METAL FOIL	18612	1280G 10 K OHM
A12A1R932	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A12A1R933	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A12A1R934	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A12A1R935	321-5002-00			RES,FXD:THICK FILM;15 OHM,1%,0.125W	91637	CRCW120615R0FT
A12A1R936	321-5035-00			RES,FXD:THICK FILM;27.4K OHM,1%,0.125W	50139	BCK2742FT
A12A1R937	321-5037-00			RES,FXD:THICK FILM;39.2K OHM,1%,0.125W	50139	BCK3922FT
A12A1R938	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W	50139	BCK4752FT
A12A1R939	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A12A1R940	321-0816-07			RES,FXD,FILM:5K OHM,0.1%,0.125W,TC=T9MI	TK1727	MPR24-2322-141
A12A1R941	321-5042-00			RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	57668	MCR18FWEA39E2
A12A1R942	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R943	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A1R944	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1R945	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W	57668	MCR18FXEA1M
A12A1R946	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A12A1R947	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A12A1R948	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A12A1R970	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R972	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R977	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A1R995	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A1R996	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A12A1U166	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U174	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U260	156-5155-00			IC,DIGITAL:HCMOS,GATE;HEX INV	01295	SN74HC04D
A12A1U270	156-5154-00			IC,DIGITAL:HCMOS,GATE;QUAD 2-INPUT NAND, OD	04713	MC74HC03AD
A12A1U274	156-5142-00			IC,DIGITAL:HCTCMOS,DEMUX/DECODER;DUAL2-TO-4	01295	SN74HCT139D
A12A1U282	156-5018-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358D
A12A1U360	156-5615-00			IC,DIGITAL:HCMOS,GATE;QUAD 2-INPUT XNOR	04713	MC74HC266D
A12A1U361	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTD
A12A1U370	156-5080-00			IC,DIGITAL:CMOS,REGISTER;8-STAGE STATIC SHIFT REGISTER	1CH66	HEF4021BTD
A12A1U372	156-5227-00			IC,DIGITAL:HCMOS,MULTIVIBRATOR;DUAL RETRIGMONOSTABLE, WITH RESET	1CH66	74HC123D
A12A1U380	156-5018-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358D



**Replaceable Electrical Parts List (Cont.)**

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A12A1U460	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTD
A12A1U470	156-5297-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;ADJUSTABLE,SHUNT,100MA,2%	01295	TL431CD
A12A1U471	156-5074-00			IC,DIGITAL:HCMOS,FLIP FLOP;DUAL D-TYPE	01295	SN74HC74D
A12A1U544	156-5017-01			IC,LINEAR:BIPOLAR,OP-AMP;DUAL	01295	MC1458DR
A12A1U560	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTD
A12A1U565	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U570	156-5278-00			IC,DIGITAL:HCCMOS,BUFFER/DRIVER;QUAD,LINEDRIVER, 3-STATE	04713	MC74HC125AD
A12A1U606	156-5690-00			IC,LINEAR:BIPOLAR,OP-AMP;LOW NOISE	24355	OP27GS
A12A1U614	156-5467-00			IC,LINEAR:BIPOLAR,OP-AMP;1.0GHZ GBW	1CH66	NE5539D
A12A1U650	156-5119-00			IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR,80NS	1CH66	LM319D
A12A1U700	156-5274-01			IC,MISC:CMOS,ANALOG SWITCH;QUAD	17856	DG211DY-T1
A12A1U713	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U720	156-5280-00			IC,LINEAR:BIPOLAR,AMPLIFIER;RF AMP,20DB GAIN,600MHZ	1CH66	NE5205AD
A12A1U723	156-5280-00			IC,LINEAR:BIPOLAR,AMPLIFIER;RF AMP,20DB GAIN,600MHZ	1CH66	NE5205AD
A12A1U740	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U743	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U757	156-5274-01			IC,MISC:CMOS,ANALOG SWITCH;QUAD	17856	DG211DY-T1
A12A1U810	156-2848-00			IC,LINEAR:BIPOLAR,AMPLIFIER;BUFFER,1300V/US	34371	HA7-5002-5
A12A1U811	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U820	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U821	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U830	156-5571-00			IC,MISC:CMOS,ANALOG MUX;TRIPLE,2 CHAN	04713	MC14053BD
A12A1U831	156-5570-00			IC,MISC:CMOS,ANALOG MUX;DUAL 4-CHANNEL	04713	MC14052BD
A12A1U845	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U850	156-5300-00			IC,CONVERTER:CMOS,D/A;12 BIT,DUAL,CURRENT OUT,1.5US,4-BIT DATA INPUT,MPU COMPATIBLE, MULTIPLYING	24355	AD7549JP
A12A1U852	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U854	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U910	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U920	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U921	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U940	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U941	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A1U950	156-5300-00			IC, CONVERTER:CMOS,D/A;12 BIT,DUAL,CURRENT OUT,1.5US,4-BIT DATA INPUT,MPU COMPATIBLE, MULTIPLYING	24355	AD7549JP
A12A1U952	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1U954	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A1CR165	152-5004-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A12A1CR175	152-5000-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A12A1CR639	152-0842-00			DIODE,SIG:SCHTKY.;COM-ANODE,20V,410MV,1.3PF	50434	HSMS-2813-T31
A12A1CR840	152-5004-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A12A1CR841	152-5004-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A12A1VR160	152-0526-00			DIODE,ZENER:.;6.35V,1%,0.4W	14552	DT840615A
A12A1VR803	152-5007-00			DIODE,ZENER:.;9.1V,5%,.225MW	0LUA3	BZX84C9V1-TRL
A12A1VR902	152-5007-00			DIODE,ZENER:.;9.1V,5%,.225MW	0LUA3	BZX84C9V1-TRL
A12A2	-----			(PART OF A12) HIGH FREQ VCO		
A12A2C103	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C110	290-5003-00			CAP,FXD,TANT:47UF,20%,10V,0.287 X 0.169;7343,SMD,13MM,T&R	TK0875	267M1002-476-MR
A12A2C111	290-5003-00			CAP,FXD,TANT:47UF,20%,10V,0.287 X 0.169;7343,SMD,13MM,T&R	TK0875	267M1002-476-MR
A12A2C120	290-5003-00			CAP,FXD,TANT:47UF,20%,10V,0.287 X 0.169;7343,SMD,13MM,T&R	TK0875	267M1002-476-MR
A12A2C133	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A12A2C200	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A12A2C204	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A12A2C212	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C222	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C224	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C231	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A12A2C233	283-5009-00			CAP,FXD,CERAMIC:MLC;15PF,5%,50V,NPO,0.126 X	TK2058	C3216C0G1H150J
A12A2C234	283-5025-00			CAP,FXD,CERAMIC:MLC;220PF,5%,50V,NPO,1206	TK2058	C3216COG1H221J
A12A2C302	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C310	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C321	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C331	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A12A2C332	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A2C333	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A2C404	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C407	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C412	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C413	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K

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Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A12A2C414	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A12A2C422	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C431	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A12A2C500	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C510	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C512	283-5006-00			CAP,FXD,CERAMIC:MLC;5PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H050C
A12A2C520	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A2C521	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A12A2C523	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A12A2C532	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A12A2C533	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A2C611	281-0165-00			CAP,VAR,AIR DI:0.8-10PF,250V	91293	5201/3469
A12A2C630	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A2C631	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A2L230	108-5030-00			INDUCTOR,FXD:SIGNAL;100NH,10%,IDC<800 MA,RDC <0.56 OHM,Q>25,SRF>950MHZ	02113	1008CS-101XKBA
A12A2L232	108-5004-00			INDUCTOR,FXD:SIGNAL;1.8UH,10%,IDC<400 MA,RDC <2.4 OHM,Q>20,SRF>150 MHZ	02113	1008CS-182XKBA
A12A2L415	108-5000-00			INDUCTOR,FXD:POWER;1.0UH,5%,I<0.45A,RDC<0.5	TK2058	NL453232T-1R0J
A12A2L610	108-1325-00			COIL,RF:100NH,6.75 TURNS,#16 WIRE,0.5 IN LONG, ONE LEAD BENT 90 DEGREES	8X345	108-1325-00
A12A2Q101	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A12A2Q213	151-5011-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,50MA,900MHZ, AMPLIFIER	0LUA3	BFS17
A12A2Q316	151-5011-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,50MA,900MHZ, AMPLIFIER	0LUA3	BFS17
A12A2Q400	151-5011-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,50MA,900MHZ, AMPLIFIER	0LUA3	BFS17
A12A2Q410	151-5011-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,50MA,900MHZ, AMPLIFIER	0LUA3	BFS17
A12A2Q425	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A12A2Q522	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A12A2R3	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125W	TK1727	SFR16 2322-180
A12A2R102	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A2R121	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A12A2R123	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A12A2R130	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A2R131	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A12A2R132	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A2R201	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A12A2R202	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A12A2R203	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A12A2R210	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A12A2R211	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A12A2R220	321-5042-00			RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	57668	MCR18FWEA39E2
A12A2R221	321-5002-00			RES,FXD:THICK FILM;15 OHM,1%,0.125W	91637	CRCW120615R0FT
A12A2R223	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A2R301	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A12A2R311	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A12A2R312	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A12A2R313	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A12A2R314	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A2R315	321-5042-00			RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	57668	MCR18FWEA39E2
A12A2R322	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A12A2R330	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A12A2R401	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A12A2R402	321-5028-00			RES,FXD:THICK FILM;6.81K OHM,1%,0.125W	50139	BCK6811FT
A12A2R403	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A12A2R405	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A12A2R406	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A12A2R411	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A2R416	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A12A2R420	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A12A2R421	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A12A2R423	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A12A2R424	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A12A2R430	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A12A2R432	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A12A2R433	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A2R434	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A2R524	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A12A2R530	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A12A2R531	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A12A2R630	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125W	TK1727	SFR16 2322-180
A12A2T200	120-0318-00			TRANSFORMER,SIG:BIFILAR,TOROID CORE	QJR03	120-0318-00
A12A2U122	156-1161-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE, ADJUSTABLE,1.5A,4%	04713	LM317T
A12A2U300	156-5221-00			IC,DIGITAL:ECL,FLIP FLOP;DUAL D-TYPE	04713	MC10H131FN

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A2U320	119-5001-00			MIXER,RING:+7DBM LO,SMD	15542	RMS-1-10
A12A2U435	156-5095-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW NOISE,HIGH OUTPUT DRIVE	01295	NE5534DR
A12A2CR511	152-5010-00			DIODE,SIG:;VVC;30V,29PF,C3/25=5.75	0LUA3	BBY40TRL
A12A3	-----			(PART OF A12) LOW FREQUENCY		
A12A3C100	290-5003-00			CAP,FXD,TANT:47UF,20%,10V,0.287 X 0.169;7343,SMD,13MM,T&R	TK0875	267M1002-476-MR
A12A3C110	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A12A3C122	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C124	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C130	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C211	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C220	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C224	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C300	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A12A3C303	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A12A3C304	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C311	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C316	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C400	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A3C412	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C420	290-5003-00			CAP,FXD,TANT:47UF,20%,10V,0.287 X 0.169;7343,SMD,13MM,T&R	TK0875	267M1002-476-MR
A12A3C421	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C431	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C500	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A3C513	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C515	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C520	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C521	290-5003-00			CAP,FXD,TANT:47UF,20%,10V,0.287 X 0.169;7343,SMD,13MM,T&R	TK0875	267M1002-476-MR
A12A3C522	290-5003-00			CAP,FXD,TANT:47UF,20%,10V,0.287 X 0.169;7343,SMD,13MM,T&R	TK0875	267M1002-476-MR
A12A3C523	290-5003-00			CAP,FXD,TANT:47UF,20%,10V,0.287 X 0.169;7343,SMD,13MM,T&R	TK0875	267M1002-476-MR
A12A3C530	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C531	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A12A3C533	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A12A3C542	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A12A3E411	276-0532-00			CORE,EM:TOROID;FERRITE,UO=1500 20% (1KHZ)	02114	5659065-4A6
A12A3E511	276-0532-00			CORE,EM:TOROID;FERRITE,UO=1500 20% (1KHZ)	02114	5659065-4A6
A12A3E514	276-0532-00			CORE,EM:TOROID;FERRITE,UO=1500 20% (1KHZ)	02114	5659065-4A6
A12A3L200	108-5018-00			INDUCTOR,FXD:POWER;4.7UH,20%,I<0.315 A,RDC <1 OHM,Q>50,SRF>45 MHZ	TK2058	NL453232T-4R7M
A12A3L534	108-1042-00			INDUCTOR,FXD:SIGNAL;4.7UH,8%,IDC<1 A,TOROID	QJR03	108-1042-00
A12A3Q213	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A12A3Q215	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A12A3Q223	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A12A3Q310	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A12A3Q312	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A12A3Q422	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A12A3Q426	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A12A3R111	321-0932-03			RES,FXD,FILM:2.5K OHM,0.25%,0.125W	19701	5033RC2K500C
A12A3R121	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A12A3R125	321-0168-02			RES,FXD,FILM:549 OHM,0.5%,0.125W	19701	5033RC549R0D
A12A3R126	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A12A3R201	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A12A3R210	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A12A3R212	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A12A3R214	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A12A3R221	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A12A3R222	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A12A3R230	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A12A3R241	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A12A3R301	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A12A3R302	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A12A3R313	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A3R315	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A3R423	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A12A3R424	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A12A3R425	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A12A3R501	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A3R502	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A12A3R516	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A12A3R517	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A12A3R541	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A12A3R543	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A12A3T430	120-1790-00			TRANSFORMER,SIG::24:1:1,PRI L=2.3UH 5%,TOROID CORE 276-0700-00,W/HOLDER	0JR03	120-1790-00
A12A3U123	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A12A3U240	156-5038-00			IC,DIGITAL:LSTTL,MUX;DUAL 4-T0-1 DATASELECTOR	01295	SN74LS153D
A12A3U410	156-5074-00			IC,DIGITAL:HCMOS,FLIP FLOP;DUAL D-TYPE	01295	SN74HC74D
A12A3U510	156-5098-00			IC,DIGITAL:HCTCMOS,GATE;QUAD 2-INPUT NAND	01295	SN74HCT00D
A12A3U512	156-5074-00			IC,DIGITAL:HCMOS,FLIP FLOP;DUAL D-TYPE	01295	SN74HC74D
A12A3CR216	152-0842-00			DIODE,SIG:SCHTKY,;COM-ANODE,20V,410MV,1.3PF	50434	HSMS-2813-T31
A12A3CR413	152-0842-00			DIODE,SIG:SCHTKY,;COM-ANODE,20V,410MV,1.3PF	50434	HSMS-2813-T31
A12A3CR532	152-0578-00			SEMICON DVC,DI:VVC,SI,22-155PF,DO-7V34-4202	50101	V34-4202
A12A3CR540	152-0578-00			SEMICON DVC,DI:VVC,SI,22-155PF,DO-7V34-4202	50101	V34-4202
A13	119-3445-04			VR ASSEMBLY:670-9475-XX W/HARDWARE	80009	119344504
A13A1	670-9475-06			CIRCUIT BD ASSY:VARIABLE RESOLUTION;	80009	670947506
A13A1C103	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C104	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C105	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C106	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C110	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C133	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C135	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C141	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C147	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C153	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C154	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C164	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C165	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C166	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C170	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C171	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C172	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C173	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A13A1C182	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C183	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C187	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A13A1C191	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C201	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A13A1C205	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C206	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C210	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C211	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A13A1C212	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A13A1C214	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A13A1C220	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A13A1C221	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A13A1C230	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A13A1C231	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A13A1C232	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C234	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A13A1C236	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C240	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C241	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C242	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C254	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C255	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C261	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C262	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C263	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C270	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C271	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C272	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C280	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C281	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C282	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C283	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C290	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C291	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C292	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C293	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C294	283-5025-00			CAP,FXD,CERAMIC:MLC;220PF,5%,50V,NPO,1206	TK2058	C3216COG1H221J
A13A1C296	283-5025-00			CAP,FXD,CERAMIC:MLC;220PF,5%,50V,NPO,1206	TK2058	C3216COG1H221J
A13A1C302	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C311	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K



Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A13A1C314	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A13A1C315	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A13A1C317	283-5009-00			CAP,FXD,CERAMIC:MLC;15PF,5%,50V,NPO,0.126	TK2058	C3216C0G1H150J
A13A1C319	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C322	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C325	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C329	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C333	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C334	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C342	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C343	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C344	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C345	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C350	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C351	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C352	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C353	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C354	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C360	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C361	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C362	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C370	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C371	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C372	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C373	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C380	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C381	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C382	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C390	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C392	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C399	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C401	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C402	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C412	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A13A1C413	283-5042-00			CAP,FXD,CERAMIC:MLC;27PF,5%,50V,NPO,1206	TK2058	C3216C0G1H270J
A13A1C430	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A13A1C431	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A13A1C433	283-5042-00			CAP,FXD,CERAMIC:MLC;27PF,5%,50V,NPO,1206	TK2058	C3216C0G1H270J
A13A1C434	283-5009-00			CAP,FXD,CERAMIC:MLC;15PF,5%,50V,NPO,0.126	TK2058	C3216C0G1H150J

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A13A1C435	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A13A1C446	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C447	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C450	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A13A1C451	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C452	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C453	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C462	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C463	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C477	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C480	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C481	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C482	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C483	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C495	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C497	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C500	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C513	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C514	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A13A1C515	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C516	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A13A1C517	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A13A1C518	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A13A1C520	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A13A1C521	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A13A1C522	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A13A1C523	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A13A1C524	283-5041-00			CAP,FXD,CERAMIC:MLC;7PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H070D-
A13A1C525	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A13A1C526	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A13A1C527	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A13A1C528	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A13A1C529	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A13A1C532	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C533	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A13A1C534	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C535	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C542	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A13A1C546	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C549	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C564	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C565	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C566	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C576	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C588	290-0944-00			CAP,FXD,ELCTLT:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A13A1C590	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C591	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C600	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C602	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C607	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C610	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A13A1C611	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A13A1C612	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A13A1C613	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A13A1C614	283-5041-00			CAP,FXD,CERAMIC:MLC;7PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H070D-
A13A1C615	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A13A1C620	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A13A1C621	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A13A1C631	290-0944-00			CAP,FXD,ELCTLT:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A13A1C642	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C645	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C648	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C661	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C673	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C682	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C683	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A13A1C684	290-5039-00			CAP,FXD,ALUM:10UF,20%,50V,6.3MM;SMD,16MM	62643	MVK50VC10RMF60T
A13A1C689	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A13A1J100	131-0951-00			CONN,RF JACK:SMB,MALE,STR,PCB,REAR PNL 10-32 THD,0.313 HEX,0.688 H3/0.125 0.028 SQ SLDR TAIL	0GZV8	VPN 82SMB-50-0
A13A1J150	131-0951-00			CONN,RF JACK:SMB,MALE,STR,PCB,REAR PNL 10-3 2 THD,0.313 HEX,0.688 H3/0.125 0.028 SQ SLDR TAIL	0GZV8	VPN 82SMB-50-0
A13A1J190	131-0951-00			CONN,RF JACK:SMB,MALE,STR,PCB,REAR PNL 10-3 2 THD,0.313 HEX,0.688 H3/0.125 0.028 SQ SLDR TAIL	0GZV8	VPN 82SMB-50-0
A13A1J620	131-0951-00			CONN,RF JACK:SMB,MALE,STR,PCB,REAR PNL 10-3 2 THD,0.313 HEX,0.688 H3/0.125 0.028 SQ SLDR TAIL	0GZV8	VPN 82SMB-50-0

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A13A1J690	131-2920-00			CONN,HDR:PCB,;MALE,RTANG,2 X 5,0.1 CTR,0.318 MLG X 0.110 TAIL,0.238 H,30 GOLD	00779	86479-3
A13A1L295	108-5005-00			INDUCTOR,FXD:SIGNAL;560NH,10%,IDC<580 MA,RDC <1.33 OHM,Q>30,SRF>415 MHZ	02113	1008CS-561XKBA
A13A1L454	108-5003-00			INDUCTOR,FXD:POWER;12UH,10%,I<0.225A,RDC <2.0 OHM,Q>50,SRF>25MHZ	TK2058	NL453232T-120K
A13A1L465	108-5003-00			INDUCTOR,FXD:POWER;12UH,10%,I<0.225A,RDC <2.0 OHM,Q>50,SRF>25MHZ	TK2058	NL453232T-120K
A13A1L470	108-5003-00			INDUCTOR,FXD:POWER;12UH,10%,I<0.225A,RDC <2.0 OHM,Q>50,SRF>25MHZ	TK2058	NL453232T-120K
A13A1L484	108-5003-00			INDUCTOR,FXD:POWER;12UH,10%,I<0.225A,RDC <2.0 OHM,Q>50,SRF>25MHZ	TK2058	NL453232T-120K
A13A1L516	108-5027-00			INDUCTOR,FXD:POWER;47UH,10%,I<0.14A,RDC<5.0	TK2058	NL453232T-470K
A13A1L549	108-5027-00			INDUCTOR,FXD:POWER;47UH,10%,I<0.14A,RDC<5.0	TK2058	NL453232T-470K
A13A1L577	108-5003-00			INDUCTOR,FXD:POWER;12UH,10%,I<0.225A,RDC <2.0 OHM,Q>50,SRF>25MHZ	TK2058	NL453232T-120K
A13A1L587	108-5003-00			INDUCTOR,FXD:POWER;12UH,10%,I<0.225A,RDC <2.0 OHM,Q>50,SRF>25MHZ	TK2058	NL453232T-120K
A13A1L592	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A,RDC <0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A13A1L593	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A,RDC <0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A13A1L687	108-5003-00			INDUCTOR,FXD:POWER;12UH,10%,I<0.225A,RDC <2.0 OHM,Q>50,SRF>25MHZ	TK2058	NL453232T-120K
A13A1L710	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A13A1L730	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A13A1L810	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A13A1L830	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A13A1L910	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A13A1L911	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A13A1L920	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A13A1L921	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A13A1Q116	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A13A1Q136	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q144	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q145	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869

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Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A13A1Q202	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A13A1Q215	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q233	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A13A1Q246	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q260	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A13A1Q264	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A13A1Q275	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A13A1Q285	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A13A1Q298	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A13A1Q310	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A13A1Q312	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A13A1Q328	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q331	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q332	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A13A1Q340	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q341	151-5016-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,30MA,600MHZ,AMPLIFIER	04713	MMBTH81LT1
A13A1Q350	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A13A1Q351	151-5016-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,30MA,600MHZ,AMPLIFIER	04713	MMBTH81LT1
A13A1Q352	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q360	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q370	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q385	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q411	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A13A1Q414	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q440	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A13A1Q441	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A13A1Q442	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A13A1Q460	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q461	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q476	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q486	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A13A1Q490	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q491	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q504	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A13A1Q511	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q536	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q537	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A13A1Q543	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A13A1Q547	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A13A1Q586	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A13A1Q603	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A13A1Q604	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A13A1Q643	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A13A1Q649	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A13A1R100	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A13A1R101	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A13A1R102	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R107	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R113	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R130	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A13A1R131	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A13A1R132	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A13A1R134	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R140	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R142	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R143	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R145	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R146	321-5001-00			RES,FXD:THICK FILM;12.1 OHM,1%,0.125W	91637	CRCW120612R1FT
A13A1R148	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A13A1R149	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A13A1R150	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A13A1R151	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A13A1R152	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A13A1R160	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A13A1R161	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R162	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R163	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A13A1R167	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A13A1R174	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R175	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A13A1R176	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R177	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A13A1R178	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A13A1R180	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R181	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R184	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A13A1R185	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R186	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R188	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A13A1R200	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R203	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R204	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R207	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A13A1R213	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R235	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R237	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R243	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R244	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R245	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R247	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R250	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A13A1R251	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A13A1R253	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R265	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R266	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R273	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R274	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R284	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R285	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R286	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R294	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A13A1R295	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A13A1R296	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A13A1R297	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R299	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A13A1R301	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R304	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R313	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R316	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R318	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R320	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R323	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A13A1R324	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A13A1R335	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A13A1R336	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R340	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R345	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R346	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R347	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R348	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R349	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A13A1R350	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A13A1R351	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R352	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R353	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A13A1R354	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R355	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R360	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A13A1R361	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A13A1R362	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R363	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R364	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R365	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A13A1R366	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R367	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A13A1R368	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R369	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R370	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A13A1R371	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT



**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A13A1R372	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R373	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A13A1R374	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A13A1R375	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R376	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A13A1R377	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R378	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R380	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R381	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R382	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A13A1R383	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R384	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A13A1R385	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A13A1R386	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R387	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R388	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R391	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A13A1R392	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R393	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R394	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A13A1R395	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R398	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R403	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A13A1R404	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R410	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R423	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A13A1R434	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R438	321-5003-00			RES,FXD:THICK FILM;18.2 OHM,1%,0.125W	91637	CRCW120618R2FT
A13A1R439	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A13A1R440	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A13A1R441	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A13A1R442	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A13A1R444	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A13A1R445	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A13A1R448	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R451	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A13A1R452	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R453	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A13A1R454	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R455	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R456	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A13A1R471	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R484	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A13A1R492	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R493	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R494	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R498	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R501	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A13A1R502	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R503	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A13A1R530	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A13A1R531	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R532	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A13A1R538	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R540	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R541	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A13A1R544	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A13A1R545	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A13A1R548	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R550	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R551	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R552	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R553	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R554	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R561	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A13A1R562	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R563	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A13A1R571	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R572	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R573	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R574	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R575	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R580	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A13A1R581	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A13A1R582	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A13A1R583	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A13A1R605	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R606	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R608	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R640	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A13A1R641	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A13A1R644	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A13A1R646	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A13A1R647	321-5031-00			RES,FXD:THICK FILM;12.1K OHM,1%,0.125W	50139	BCK1212FT
A13A1R648	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A13A1R650	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R651	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R652	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A13A1R653	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A13A1R662	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A13A1R671	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A13A1R672	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A13A1R685	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A13A1R686	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A13A1T256	120-1721-00			TRANSFORMER,RF:AUTO,6:6:6 RATIO	0JR03	120-1721-00
A13A1T700	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A13A1T750	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A13A1T760	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A13A1T770	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A13A1T780	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A13A1T790	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A13A1U190	156-5081-01			IC,DIGITAL:HCTCMOS,GATE;HEX INVERTER	0JR04	TC74HCT04AFN(EL
A13A1U300	156-5088-00			IC,DIGITAL:HCTCMOS,DEMUX/DECODER;3-TO-8 DECODER	01295	SN74HCT138D
A13A1U400	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTDT
A13A1U560	156-5081-01			IC,DIGITAL:HCTCMOS,GATE;HEX INVERTER	0JR04	TC74HCT04AFN(EL
A13A1U570	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTDT
A13A1U650	156-5088-00			IC,DIGITAL:HCTCMOS,DEMUX/DECODER;3-TO-8 DECODER	01295	SN74HCT138D
A13A1U660	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTDT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A13A1U670	156-5043-01			IC, CONVERTER: BIPOLAR, D/A; 8 BIT, CURRENT OUT, MULTIPLYING	1CH66	DAC08EDT
A13A1U680	156-5018-00			IC, LINEAR: BIPOLAR, OP-AMP; DUAL, SINGLE SUPPLY	01295	LM358D
A13A1U681	156-5298-00			IC, LINEAR: BIPOLAR, VOLTAGE REGULATOR; POSITIVE, 5V, 100MA, 5%	01295	UA78L05ACD
A13A1Y711	158-0323-00			XTAL UNIT, QTZ: 4 POLE, 10MHZ	5W664	158-0323-00
A13A1Y720	158-0323-00			XTAL UNIT, QTZ: 4 POLE, 10MHZ	5W664	158-0323-00
A13A1Y811	158-0324-00			XTAL UNIT, QTZ: SET OF 3 : 3 POLE MONOLITHIC CRYSTAL FILTERS, CENTERFREQ 10.0 MHZ, PASSBAND 30KHZ BETWEEN 6 DB FREQ	5W664	158-0324-00
A13A1Y820	158-0324-00			XTAL UNIT, QTZ: SET OF 3 : 3 POLE MONOLITHIC CRYSTAL FILTERS, CENTERFREQ 10.0 MHZ, PASSBAND 30KHZ BETWEEN 6 DB FREQ	5W664	158-0324-00
A13A1Y821	158-0324-00			XTAL UNIT, QTZ: SET OF 3 : 3 POLE MONOLITHIC CRYSTAL FILTERS, CENTERFREQ 10.0 MHZ, PASSBAND 30KHZ BETWEEN 6 DB FREQ	5W664	158-0324-00
A13A1CR450	152-5004-00			DIODE, SIG.; ULTRA FAST; 70V, 0.15A, 6NS, SER-PAIR	0LUA3	BAV99TRL
A13A1CR485	152-5043-00			SEMICON DVC, DI: PIN, SI, 100V, 2.5 OHM, 0.35PF, 0.35PF, SOT-23	50434	HSMP-3802-T31
A13A1CR584	152-5043-00			SEMICON DVC, DI: PIN, SI, 100V, 2.5 OHM, 0.35PF, 0.35PF, SOT-23	50434	HSMP-3802-T31
A13A1CR585	152-5043-00			SEMICON DVC, DI: PIN, SI, 100V, 2.5 OHM, 0.35PF, 0.35PF, SOT-23	50434	HSMP-3802-T31

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A14	672-1308-03			CKT BD ASSY:RF MOM/2ND LO	80009	672130803
A14	672-1308-04		B030838	CIRCUIT BD ASSY:RF MOM/2ND LO	80009	672-1308-04
A14	672-1308-05	B030839	B041227	CIRCUIT BD ASSY:RF MOM/2ND LO BD ASSY	80009	672-1308-05
A14	672-1308-06	B041228		CIRCUIT BD ASSY:RF MOM/2ND LO BD ASSY	80009	672-1308-06
A14A1				CKT BD ASSY:RF MON/2ND LO (PART OF A14)	80009	671174301
A14A1C100	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A14A1C101	283-5042-00			CAP,FXD,CERAMIC:MLC;27PF,5%,50V,NPO,1206	TK2058	C3216C0G1H270J
A14A1C121	283-5008-00			CAP,FXD,CERAMIC:MLC;12PF,5%,50V,NPO,1206	TK2058	C3216C0G1H120J
A14A1C130	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C131	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A14A1C132	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A14A1C133	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A14A1C134	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C140	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C141	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A14A1C142	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A14A1C143	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A14A1C144	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C150	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C151	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A14A1C152	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A14A1C153	283-5015-00			CAP,FXD,CERAMIC:MLC;3300PF,10%,50V,X7R,1206	TK2058	C3216X7R1H332K
A14A1C154	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C155	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A14A1C165	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C200	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C201	290-5039-00			CAP,FXD,ALUM:10UF,20%,50V,6.3MM;SMD	62643	MVK50VC10RMF60T
A14A1C202	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C204	176-0010-00			WIRE,ELECTRICAL:27 AWG,RED,POLYURETHANEHEAVY FILM INSULATION	TK1978	ORDER BY DESC
A14A1C210	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C211	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A14A1C212	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A14A1C220	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A14A1C221	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A14A1C222	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C223	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C225	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A14A1C240	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C242	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C261	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A14A1C274	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A14A1C276	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C278	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C280	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A14A1C281	283-5007-00			CAP,FXD,CERAMIC:MLC;8PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H080D
A14A1C282	283-5007-00			CAP,FXD,CERAMIC:MLC;8PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H080D
A14A1C283	283-5007-00			CAP,FXD,CERAMIC:MLC;8PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H080D
A14A1C284	283-5006-00			CAP,FXD,CERAMIC:MLC;5PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H050C
A14A1C285	283-5041-00			CAP,FXD,CERAMIC:MLC;7PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H070D
A14A1C286	283-5006-00			CAP,FXD,CERAMIC:MLC;5PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H050C
A14A1C287	283-5006-00			CAP,FXD,CERAMIC:MLC;5PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H050C
A14A1C288	283-5041-00			CAP,FXD,CERAMIC:MLC;7PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H070D
A14A1C289	283-5006-00			CAP,FXD,CERAMIC:MLC;5PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H050C
A14A1C290	283-5007-00			CAP,FXD,CERAMIC:MLC;8PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H080D
A14A1C291	283-5007-00			CAP,FXD,CERAMIC:MLC;8PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H080D
A14A1C292	283-5007-00			CAP,FXD,CERAMIC:MLC;8PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H080D
A14A1C300	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C320	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A14A1C321	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A14A1C323	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A14A1C330	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A14A1C340	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A14A1C341	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C342	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A14A1C350	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C351	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C362	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C366	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C370	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A14A1C374	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C380	281-5014-00			CAP,VAR:CERAMIC,SINGLE-TRN TRIMMER;6.5-25PF,250V,-1100PPM,TOPADJ,SMD,T&R	91293	2320-4R1
A14A1C381	281-5014-00			CAP,VAR:CERAMIC,SINGLE-TRN TRIMMER;6.5-25PF,250V,-1100PPM,TOPADJ,SMD,T&R	91293	2320-4R1

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A14A1C382	281-5014-00			CAP,VAR:CERAMIC,SINGLE-TRN TRIMMER;6.5-25PF,250V,-1100PPM,TOPADJ,SMD,T&R	91293	2320-4R1
A14A1C383	281-5014-00			CAP,VAR:CERAMIC,SINGLE-TRN TRIMMER;6.5-25PF,250V,-1100PPM,TOPADJ	91293	2320-4R1
A14A1C384	281-5014-00			CAP,VAR:CERAMIC,SINGLE-TRN TRIMMER;6.5-25PF,250V,-1100PPM,TOPADJ	91293	2320-4R1
A14A1C390	283-5042-00			CAP,FXD,CERAMIC:MLC;27PF,5%,50V,NPO,1206	TK2058	C3216C0G1H270J
A14A1C391	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A14A1C392	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A14A1C393	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A14A1C394	283-5042-00			CAP,FXD,CERAMIC:MLC;27PF,5%,50V,NPO,1206	TK2058	C3216C0G1H270J
A14A1C420	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A14A1C421	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A14A1C422	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C423	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C430	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A14A1C432	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C433	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C444	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C445	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C500	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C501	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A14A1C502	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C503	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C504	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C510	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C520	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A14A1C523	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A14A1C524	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A14A1C532	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C533	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A14A1C534	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C542	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C550	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C551	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A14A1C562	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A14A1C564	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C567	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A14A1C600	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A14A1C612	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C619	290-5039-00			CAP,FXD,ALUM:10UF,20%,50V,6.3MM;SMD,16MM	62643	MVK50VC10RMF60T
A14A1C621	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A14A1C630	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A14A1C631	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A14A1C632	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C640	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C643	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A14A1C650	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A14A1C651	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A14A1C652	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A14A1C653	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A14A1C654	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A14A1C662	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C670	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C671	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C672	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C673	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C674	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C701	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A14A1C702	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A14A1C711	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C712	290-5039-00			CAP,FXD,ALUM:10UF,20%,50V,6.3MM;SMD,16MM	62643	MVK50VC10RMF60T
A14A1C721	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A14A1C736	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A14A1C763	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A14A1C780	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A14A1CR223	152-0843-00			DIODE,SIG:SCHTKY,;SER-PAIR,20V,410MV,1.3PF	50434	HSMS-2812-T31
A14A1CR334	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A14A1CR335	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A14A1CR336	152-5000-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A14A1CR367	152-5043-00			SEMICONV DVC,DI:PIN,SI,100V,2.5 OHM,0.35PF,0.35PF,SOT-23,HSMP-3802	50434	HSMP-3802-T31
A14A1CR369	152-5043-00			SEMICONV DVC,DI:PIN,SI,100V,2.5 OHM,0.35PF,0.35PF,SOT-23,HSMP-3802	50434	HSMP-3802-T31
A14A1CR442	152-5000-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A14A1L122	108-5128-00			INDUCTOR,FXD:SIGNAL,AIR CORE;35.5NH,5%,Q>112@150MHZ,SRF>1.8 GHZ	02113	B09T



**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A14A1L222	108-5128-00			INDUCTOR,FXD:SIGNAL,AIR CORE;35.5NH,5%, Q>112@150MHZ,SRF>1.8 GHZ	02113	B09T
A14A1L280	108-5128-00			INDUCTOR,FXD:SIGNAL,AIR CORE;35.5NH,5%, Q>112@150MHZ,SRF>1.8 GHZ	02113	B09T
A14A1L281	108-5128-00			INDUCTOR,FXD:SIGNAL,AIR CORE;35.5NH,5%, Q>112@150MHZ,SRF>1.8 GHZ	02113	B09T
A14A1L282	108-5128-00			INDUCTOR,FXD:SIGNAL,AIR CORE;35.5NH,5%, Q>112@150MHZ,SRF>1.8 GHZ	02113	B09T
A14A1L283	108-5128-00			INDUCTOR,FXD:SIGNAL,AIR CORE;35.5NH,5%, Q>112@150MHZ,SRF>1.8 GHZ	02113	B09T
A14A1L284	108-5128-00			INDUCTOR,FXD:SIGNAL,AIR CORE;35.5NH,5%, Q>112@150MHZ,SRF>1.8 GHZ	02113	B09T
A14A1L364	108-5005-00			INDUCTOR,FXD:SIGNAL;560NH,10%,IDC<580 MA, RDC<1.33 OHM,Q>30,SRF>415 MHZ	02113	1008CS-561XKBA
A14A1L375	108-5005-00			INDUCTOR,FXD:SIGNAL;560NH,10%,IDC<580 MA, RDC<1.33 OHM,Q>30,SRF>415 MHZ	02113	1008CS-561XKBA
A14A1L402	108-5093-00			INDUCTOR,FXD:SIGNAL;2.2UH,10%,IDC<380 MA, RDC<0.7 OHM,Q>50,SRF>55 MHZ	02113	1812LS-222 XKBA
A14A1L403	108-5093-00			INDUCTOR,FXD:SIGNAL;2.2UH,10%,IDC<380 MA, RDC<0.7 OHM,Q>50,SRF>55 MHZ	02113	1812LS-222 XKBA
A14A1L511	108-5000-00			INDUCTOR,FXD:POWER;1.0UH,5%,I<0.45A,RDC<0.5	TK2058	NL453232T-1R0J
A14A1L525	108-5001-00			INDUCTOR,FXD:SIGNAL;70NH,5%,IDC<860 MA,RDC <0.55 OHM,Q>35,SRF>900 MHZ	02113	1008CT-700XJBA
A14A1L622	108-5001-00			INDUCTOR,FXD:SIGNAL;70NH,5%,IDC<860 MA,RDC <0.55 OHM,Q>35,SRF>900 MHZ	02113	1008CT-700XJBA
A14A1L652	108-5000-00			INDUCTOR,FXD:POWER;1.0UH,5%,I<0.45A,RDC<0.5	TK2058	NL453232T-1R0J
A14A1L655	108-5000-00			INDUCTOR,FXD:POWER;1.0UH,5%,I<0.45A,RDC<0.5	TK2058	NL453232T-1R0J
A14A1Q112	151-5010-00		B030838	TRANSISTOR,SIG:BIPOLAR,NPN;12V,200MA,6.5GHZ, AMPLIFIER	62104	NE85634-T2(D)
A14A1Q112	151-5010-01	B030839		TRANSISTOR,SIG:BIPOLAR,NPN,12V,200MA,6.5GHZ,AMPLIFI ER,RE GAIN GROUP(125~250),NE85634-T1(D) (RE)	62104	NE85634-T1(D)(RE)
A14A1Q130	151-5010-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,200MA,6.5GHZ, AMPLIFIER	62104	NE85634-T2(D)
A14A1Q140	151-5010-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,200MA,6.5GHZ, AMPLIFIER	62104	NE85634-T2(D)
A14A1Q150	151-5010-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,200MA,6.5GHZ, AMPLIFIER	62104	NE85634-T2(D)
A14A1Q223	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A14A1Q280	151-5010-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,200MA,6.5GHZ, AMPLIFIER	62104	NE85634-T2(D)
A14A1Q443	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A14A1Q446	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A14A1Q530	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A14A1Q540	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A14A1Q541	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A14A1Q670	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A14A1Q740	151-5010-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,200MA,6.5GHZ,AMPLIFIER	62104	NE85634-T2(D)
A14A1Q741	151-5010-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,200MA,6.5GHZ,AMPLIFIER	62104	NE85634-T2(D)
A14A1R110	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A14A1R111	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A14A1R130	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R131	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A14A1R132	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R133	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A14A1R134	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A14A1R135	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A14A1R140	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R141	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A14A1R142	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R143	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A14A1R144	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A14A1R145	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A14A1R150	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R151	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A14A1R152	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R153	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A14A1R154	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A14A1R155	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A14A1R200	311-5011-00			RES,VAR,NONWW:5K OHM,20%,0.2W	32997	3335W-1-502E
A14A1R202	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A14A1R203	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A14A1R213	321-5008-00		B041227	RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A14A1R213	321-5045-00	B041228		RES,FXD:THICK FILM;68.1 OHM,1%,0.125W,	50139	BCD68R1FT
A14A1R214	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A14A1R215	321-5040-00			RES,FXD:THICK FILM;68.1K OHM,1%,0.125W	50139	BCK6812FT

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A14A1R216	321-5029-00			RES,FXD:THICK FILM;8.25K OHM,1%,0.125W	50139	BCK8251FT
A14A1R222	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A14A1R224	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A14A1R231	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A14A1R232	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A14A1R241	321-5037-00			RES,FXD:THICK FILM;39.2K OHM,1%,0.125W	50139	BCK3922FT
A14A1R270	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R272	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A14A1R280	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A14A1R282	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A14A1R284	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A14A1R286	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A14A1R310	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A14A1R320	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A14A1R321	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A14A1R322	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W	57668	MCR18FXEA332K
A14A1R330	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A14A1R331	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A14A1R332	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A14A1R333	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A14A1R341	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A14A1R342	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A14A1R343	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A14A1R365	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A14A1R368	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A14A1R373	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A14A1R400	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A14A1R401	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A14A1R410	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A14A1R421	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A14A1R423	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R425	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A14A1R430	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A14A1R431	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A14A1R433	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A14A1R440	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A14A1R441	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A14A1R442	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A14A1R443	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A14A1R444	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A14A1R445	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A14A1R521	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A14A1R522	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A14A1R523	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A14A1R524	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A14A1R530	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A14A1R531	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A14A1R532	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A14A1R533	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A14A1R535	311-5011-00			RES,VAR,NONWW:5K OHM,20%,0.2W	32997	3335W-1-502E
A14A1R543	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A14A1R544	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A14A1R545	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A14A1R552	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A14A1R570	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A14A1R601	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A14A1R602	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A14A1R633	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A14A1R634	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A14A1R635	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A14A1R641	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A14A1R642	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R672	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R673	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A14A1R680	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R681	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A14A1R682	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A14A1R683	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A14A1R684	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A14A1R685	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A14A1R700	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A14A1R730	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A14A1R731	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A14A1R732	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A14A1R733	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A14A1R734	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A14A1R735	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A14A1R764	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A14A1R772	311-5011-00			RES,VAR,NONWW:5K OHM,20%,0.2W	32997	3335W-1-502E
A14A1R773	321-5028-00			RES,FXD:THICK FILM;6.81K OHM,1%,0.125W	50139	BCK6811FT
A14A1R774	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A14A1T100	120-5011-00			TRANSFORMER,SIG:WIDEBAND;1:1,BW=11-480MHZ, IDC=0.7 A,RDC<0.3 OHM,SRF PRI=435 MHZ,ISO=50	02113	1812WBT-4
A14A1T101	120-5011-00			TRANSFORMER,SIG:WIDEBAND;1:1,BW=11-480MHZ, IDC=0.7 A,RDC<0.3 OHM,SRF PRI=435 MHZ,ISO=50	02113	1812WBT-4
A14A1T102	120-5011-00			TRANSFORMER,SIG:WIDEBAND;1:1,BW=11-480MHZ, IDC=0.7 A,RDC<0.3 OHM,SRF PRI=435 MHZ,ISO=50	02113	1812WBT-4
A14A1T103	120-5011-00			TRANSFORMER,SIG:WIDEBAND;1:1,BW=11-480MHZ, IDC=0.7 A,RDC<0.3 OHM,SRF PRI=435 MHZ,ISO=50	02113	1812WBT-4
A14A1T104	120-5011-00			TRANSFORMER,SIG:WIDEBAND;1:1,BW=11-480MHZ, IDC=0.7 A,RDC<0.3 OHM,SRF PRI=435 MHZ,ISO=50	02113	1812WBT-4
A14A1T105	120-5012-00			TRANSFORMER,SIG:WIDEBAND;1:1,BW=0.68-82MHZ, IDC=0.4 A,RDC<1.8 OHM,SRF PRI=90 MHZ,ISO=50	02113	1812WBT-2
A14A1T130	120-5011-00			TRANSFORMER,SIG:WIDEBAND;1:1,BW=11-480MHZ, IDC=0.7 A,RDC<0.3 OHM,SRF PRI=435 MHZ,ISO=50	02113	1812WBT-4
A14A1T140	120-5011-00			TRANSFORMER,SIG:WIDEBAND;1:1,BW=11-480MHZ, IDC=0.7 A,RDC<0.3 OHM,SRF PRI=435 MHZ,ISO=50	02113	1812WBT-4
A14A1T150	120-5011-00			TRANSFORMER,SIG:WIDEBAND;1:1,BW=11-480MHZ, IDC=0.7 A,RDC<0.3 OHM,SRF PRI=435 MHZ,ISO=50	02113	1812WBT-4
A14A1T670	120-5012-00			TRANSFORMER,SIG:WIDEBAND;1:1,BW=0.68-82MHZ, IDC=0.4 A,RDC<1.8 OHM,SRF PRI=90 MHZ,ISO=50	02113	1812WBT-2
A14A1U230	156-5018-00		B041227	IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358D
A14A1U230	156-5018-01	B041228		IC,LINEAR:BIPOLAR,OP-AMP,DUAL,SINGLE SUPPLY	01295	LM358DR
A14A1U424	156-5838-00			IC,LINEAR:BIPOLAR,PRESALER;DIVIDE BY 4,2.5GHZ	62104	UPB585G
A14A1U444	156-5690-00		B041227	IC,LINEAR:BIPOLAR,OP-AMP;LOW NOISE	24355	OP27GS
A14A1U444	156-5690-01	B041228		IC,LINEAR:BIPOLAR,OP-AMP,LOW NOISE	24355	OP27GS-REEL
A14A1U450	156-5298-00		B041227	IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE,5V,100MA,5%	01295	UA78L05ACD
A14A1U450	156-5298-01	B041228		IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR,POSITIVE,5V,100MA,5%	01295	UA78L05ACDR
A14A1U451	156-5298-00		B041227	IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE,5V,100MA,5%	01295	UA78L05ACD
A14A1U451	156-5298-01	B041228		IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR,POSITIVE,5V,100MA,5%	01295	UA78L05ACDR
A14A1U511	119-5001-00			MIXER,RING:+7DBM LO,SMD	15542	RMS-1-10
A14A1U546	156-5018-00		B041227	IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358D
A14A1U546	156-5018-01	B041228		IC,LINEAR:BIPOLAR,OP-AMP,DUAL,SINGLE SUPPLY	01295	LM358DR

**Replaceable Electrical Parts List (Cont.)**

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A14A1U610	156-5269-00		B041227	IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE	04713	MC10H116FN
A14A1U610	156-5269-01	B041228		IC,DIGITAL:ECL,RECEIVER,TRIPLE LINE,10H116,PLCC20	04713	MC10H116FNR2
A14A1U665	156-5282-00			IC,MISC:D.MOS,ANALOG SWITCH;QUAD FETS	17856	SD5400CY
A15	621-0083-14	B040925		PWR SUPPLY ASSY:CIRCUIT BOARD W/CHASSIS	80009	621-0083-14
A15B15	119-0830-07		B010180	FAN,TUBEAXIAL:12VDC,2.4W,6500 RPM,31 CFM BRUSHLESS DC MOTOR,	61374	69.11.52 WITH 6
A15B15	119-5081-00	B010181		FAN,TUBEAXIAL:12VDC, 60mm X 60MM X 25.5MM,17.65CFM, 42DBA,3.24W,0.27A,SAFETYCONTROLLED	61058	FBA06A12U1A
A15F15	159-0023-00			FUSE,CARTRIDGE:3AG,2A,250V,SLOW BLOW,	71400	MDX2
A15Q250	151-1137-00			TRANSISTOR,PWR:MOS,N-CH;200V,9.0A,0.4 OHM	51993	IRF630 W/FORMED
A15Q251	151-1137-00			TRANSISTOR,PWR:MOS,N-CH;200V,9.0A,0.4 OHM	51993	IRF630 W/FORMED
A15Q270	151-1204-00			TRANSISTOR,PWR:MOS,N-CH;500V,8.8A,0.85 OHM	34371	IRFP440R
A15U120	152-1160-00			MODULE,HV:;,3KVAC INPUT,12KVDC ANODEOUT, -3KVDC CATHODE OUT	75498	149-0011-ED
A15W3	174-2826-00			CABLE ASSY,RF:SHLD CMPD,;CPD,12,28 AWG,12.0 IGH DENSITY DSUB,THD INSERT	80009	174282600
A15CR270	152-0839-00			DIODE,RECT,FAST RCVRY;500V,8A,50NS	04713	MUR850
A15A1	-----			(PART OF A15)		
A15A1C100	285-1255-00			CAP,FXD,PLASTIC:0.01UF,20%,3KV,	84411	TEK266 .01 20 3
A15A1C101	285-1255-00			CAP,FXD,PLASTIC:0.01UF,20%,3KV,	84411	TEK266 .01 20 3
A15A1C102	285-1255-00			CAP,FXD,PLASTIC:0.01UF,20%,3KV,	84411	TEK266 .01 20 3
A15A1C103	290-0947-00			CAP,FXD,ELCTLT:33UF,+50-10%,160V	0H1N5	CEUSM2C330-Q
A15A1C105	285-1255-00			CAP,FXD,PLASTIC:0.01UF,20%,3KV,	84411	TEK266 .01 20 3
A15A1C110	283-0279-00			CAP,FXD,CER DI:0.001UF,20%,3000V	18796	DHR12Y5S102M3KV
A15A1C111	283-0279-00			CAP,FXD,CER DI:0.001UF,20%,3000V	18796	DHR12Y5S102M3KV
A15A1C130	283-0079-00		B030799	CAP,FXD,CER DI:0.01UF,20%,250V	04222	SR50VC103MAA
A15A1C130	283-0267-00	B030800		CAP,FXD,CER DI:0.01UF,20%,500V	59660	0841-546-Y550-0103
A15A1C131	285-1192-00			CAP,FXD,PPR DI:0.0022 UF,20%,250VAC,	TK0515	PME271Y422M
A15A1C145	285-1192-00			CAP,FXD,PPR DI:0.0022 UF,20%,250VAC,	TK0515	PME271Y422M
A15A1C150	285-1252-00			CAP,FXD,PLASTIC:0.15UF,10%,250VAC,	D5243	F1772-415-2000
A15A1C151	283-0057-00			CAP,FXD,CER DI:0.1UF,+80-20%,200V	04222	SR302E104ZAA
A15A1C152	283-0029-00			CAP,FXD,CER DI:0.005UF,5%,500V	59660	821-000B502J
A15A1C153	285-1252-00			CAP,FXD,PLASTIC:0.15UF,10%,250VAC,	D5243	F1772-415-2000
A15A1C163	290-1247-00			CAP,FXD,ALUM:;1000UF,20%,100V,ESR=0.13 OHM (120HZ,20C),18 X 40MM	55680	UPR2A102MRH
A15A1C170	285-1252-00			CAP,FXD,PLASTIC:0.15UF,10%,250VAC,	D5243	F1772-415-2000
A15A1C171	290-1249-00			CAP,FXD:ALUM;120UF,20%,400V	62643	82D121M400JD2
A15A1C172	285-1381-00			CAP,FXD,MTLZD:1500PF,10%,250V	TK0515	PME271Y415K
A15A1C173	285-1381-00			CAP,FXD,MTLZD:1500PF,10%,250V	TK0515	PME271Y415K
A15A1C174	285-1381-00			CAP,FXD,MTLZD:1500PF,10%,250V	TK0515	PME271Y415K

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A15A1C175	285-1381-00			CAP,FXD,MTLZD:1500PF,10%,250V	TK0515	PME271Y415K
A15A1C176	285-1252-00			CAP,FXD,PLASTIC:0.15UF,10%,250VAC,	D5243	F1772-415-2000
A15A1C185	285-1463-00			CAP,FXD,PLASTIC:METALIZED FILM CLASS X 2;1UF,20%,250VAC,POLYESTER,0.70 X 1.24	4U402	F1773-510-2000
A15A1C190	283-0481-00			CAP,FXD,CER DI:220PF,10%,250VAC,	18796	DE7090B221KVA1-
A15A1C200	290-0947-00			CAP,FXD,ELCTLT:33UF,+50-10%,160V	0H1N5	CEUSM2C330-Q
A15A1C201	290-1248-00			CAP,FXD:ALUM:220UF,20%,63V	2N936	517D227M063CG6A
A15A1C202	290-1248-00			CAP,FXD:ALUM:220UF,20%,63V	2N936	517D227M063CG6A
A15A1C203	290-0963-00			CAP,FXD,ALUM:;220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A15A1C204	290-0963-00			CAP,FXD,ALUM:;220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A15A1C205	283-0057-00			CAP,FXD,CER DI:0.1UF,+80-20%,200V	04222	SR302E104ZAA
A15A1C212	290-0963-00			CAP,FXD,ALUM:;220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A15A1C213	290-0963-00			CAP,FXD,ALUM:;220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A15A1C214	290-0963-00			CAP,FXD,ALUM:;220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A15A1C220	283-0079-00			CAP,FXD,CER DI:0.01UF,20%,250V	04222	SR50VC103MAA
A15A1C239	283-0486-00			CAP,FXD,CER DI:1.0UF,10%,50V	04222	SR305C105KAA
A15A1C250	283-0029-00			CAP,FXD,CER DI:0.005UF,5%,500V	59660	821-000B502J

**Replaceable Electrical Parts List (Cont.)**

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A15A1C262	283-0486-00		B030799	CAP,FXD,CER DI:1.0UF,10%,50V	04222	SR305C105KAA
A15A1C262	290-0536-00	B030800		CAP,FXD,ELCTLT:10UF,20%,25V TANTALUM	2N936	199D106X0025CA1
A15A1C270	283-0058-00			CAP,FXD,CER DI:0.027UF,10%,100V	04222	SR591C273KAA
A15A1C280	285-1463-00			CAP,FXD,PLASTIC:METALIZED FILM CLASS X 2;1UF,20%,250VAC,POLYESTER,0.70 X 1.24	4U402	F1773-510-2000
A15A1C290	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A15A1C300	283-0057-00			CAP,FXD,CER DI:0.1UF,+80-20%,200V	04222	SR302E104ZAA
A15A1C301	283-0057-00			CAP,FXD,CER DI:0.1UF,+80-20%,200V	04222	SR302E104ZAA
A15A1C302	283-0057-00			CAP,FXD,CER DI:0.1UF,+80-20%,200V	04222	SR302E104ZAA
A15A1C303	283-0057-00			CAP,FXD,CER DI:0.1UF,+80-20%,200V	04222	SR302E104ZAA
A15A1C310	283-0212-00			CAP,FXD,CER DI:2UF,20%,50V	04222	SR405E205MAA
A15A1C311	283-0212-00			CAP,FXD,CER DI:2UF,20%,50V	04222	SR405E205MAA
A15A1C312	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A15A1C320	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A15A1C321	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A15A1C322	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A15A1C323	290-0963-00			CAP,FXD,ALUM::220UF,+50-20%,25WVDC,10 X12MM	55680	UVX1V221MPA
A15A1C400	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C401	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C424	283-0486-00			CAP,FXD,CER DI:1.0UF,10%,50V	04222	SR305C105KAA
A15A1C425	283-0486-00			CAP,FXD,CER DI:1.0UF,10%,50V	04222	SR305C105KAA
A15A1C610	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C620	283-5070-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,200V,X7R,1210	04222	12102C103KAT1A
A15A1C621	283-5070-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,200V,X7R,1210	04222	12102C103KAT1A
A15A1C630	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A
A15A1C631	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A
A15A1C632	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C633	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A
A15A1C634	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A
A15A1C635	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C636	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A15A1C638	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A
A15A1C660	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C661	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A
A15A1C670	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C671	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C681	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A15A1C682	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C690	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A



Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A15A1C691	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C692	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A15A1C710	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C720	283-5070-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,200V,X7R,1210	04222	12102C103KAT1A
A15A1C732	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C750	290-0920-00			CAP,FXD,ALUM::;33UF,20%,50V,6 X 11MM,0.1SP	55680	UVX1H330MEA
A15A1C760	283-5070-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,200V,X7R,1210	04222	12102C103KAT1A
A15A1C780	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C781	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A
A15A1C782	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A
A15A1C783	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A15A1C800	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C810	283-5018-00			CAP,FXD,CERAMIC:MLC;0.033UF,10%,50V,X7R,1206	TK2058	C3216X7R1H333K
A15A1C811	283-5018-00			CAP,FXD,CERAMIC:MLC;0.033UF,10%,50V,X7R,1206	TK2058	C3216X7R1H333K
A15A1C812	283-5018-00			CAP,FXD,CERAMIC:MLC;0.033UF,10%,50V,X7R,1206	TK2058	C3216X7R1H333K
A15A1C813	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A
A15A1C814	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C815	283-5185-00			CAP,FXD,CERAMIC:MLC;1000PF,5%,50V,NPO,1206	04222	12065A102JAT1A
A15A1C820	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C822	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C830	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C834	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C840	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C850	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C860	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C861	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C870	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C900	283-5009-00			CAP,FXD,CERAMIC:MLC;15PF,5%,50V,NPO,0.126	TK2058	C3216C0G1H150J
A15A1C901	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C902	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C903	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C904	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C905	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C910	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C911	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C912	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C913	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C914	283-5009-00			CAP,FXD,CERAMIC:MLC;15PF,5%,50V,NPO,0.126	TK2058	C3216C0G1H150J
A15A1C915	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A15A1C916	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A15A1C920	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1C930	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A15A1CR180	152-0848-00			SEMICON DVC,DI:RECT BRDG,600V,2A,FAST RCVY	TK2319	RKBU806
A15A1CR200	152-0808-00			DIODE,RECT.;ULTRA FAST;400V,1.5A,50NS	0LUA3	BYD73G
A15A1CR201	152-0808-00			DIODE,RECT.;ULTRA FAST;400V,1.5A,50NS	0LUA3	BYD73G
A15A1CR220	152-0600-00			DIODE,RECT:SCHTKY,;35V,15A,150A IFSM,0.57VF	04713	MBR1535CT
A15A1CR221	152-0884-00			DIODE,RECT.;SCHTKY;35V,16A,150A IFSM,630MVF	04713	MBR1635
A15A1CR222	152-0600-00			DIODE,RECT:SCHTKY,;35V,15A,150A IFSM,0.57VF	04713	MBR1535CT
A15A1CR223	152-0884-00			DIODE,RECT.;SCHTKY;35V,16A,150A IFSM,630MVF	04713	MBR1635
A15A1CR250	152-0808-00			DIODE,RECT.;ULTRA FAST;400V,1.5A,50NS	0LUA3	BYD73G
A15A1CR260	152-0808-00			DIODE,RECT.;ULTRA FAST;400V,1.5A,50NS	0LUA3	BYD73G
A15A1CR271	152-0808-00			DIODE,RECT.;ULTRA FAST;400V,1.5A,50NS	0LUA3	BYD73G
A15A1CR272	152-0808-00			DIODE,RECT.;ULTRA FAST;400V,1.5A,50NS	0LUA3	BYD73G
A15A1CR273	152-0808-00			DIODE,RECT.;ULTRA FAST;400V,1.5A,50NS	0LUA3	BYD73G
A15A1CR290	152-0808-00			DIODE,RECT.;ULTRA FAST;400V,1.5A,50NS	0LUA3	BYD73G
A15A1CR400	152-5004-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A15A1CR520	152-5008-00			DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR521	152-5008-00			DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR530	152-5008-00		B030799	DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR530	152-5086-00	B030800		DIODE,RECTDIODE,RECT:ULTRA FAST,600V,1A,50NS	04713	MURS160T3
A15A1CR531	152-5008-00		B030799	DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR531	152-5086-00	B030800		DIODE,RECTDIODE,RECT:ULTRA FAST,600V,1A,50NS	04713	MURS160T3
A15A1CR602	152-5008-00			DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR610	152-5008-00			DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR611	152-5008-00			DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR620	152-5008-00			DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR621	152-5008-00			DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR622	152-5008-00			DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR623	152-5008-00			DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR640	152-0808-00			DIODE,RECT.;ULTRA FAST;400V,1.5A,50NS	0LUA3	BYD73G
A15A1CR660	152-5000-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A15A1CR661	152-5000-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A15A1CR680	152-5005-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,COM-ANODE	04713	BAW56LT1
A15A1CR700	152-5000-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A15A1CR710	152-5000-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,COM-CATH	0LUA3	BAV70TRL
A15A1CR731	152-5008-00			DIODE,RECT.;;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR740	152-0808-00			DIODE,RECT.;ULTRA FAST;400V,1.5A,50NS	0LUA3	BYD73G

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A15A1CR750	152-5005-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,COM-ANODE	04713	BAW56LT1
A15A1CR780	152-5005-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,COM-ANODE	04713	BAW56LT1
A15A1CR810	152-5008-00			DIODE,RECT:;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR811	152-5008-00			DIODE,RECT:;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR812	152-5005-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,COM-ANODE	04713	BAW56LT1
A15A1CR820	152-5008-00			DIODE,RECT:;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1CR821	152-5008-00			DIODE,RECT:;400V,1A,MONOLITHIC COM-CATH	25088	BAW79D-E6327
A15A1E110	119-018100			ARSR,ELEC SURGE:230V, +/-15%; GAS DISCHARGE	25088	B1-A230T
A15A1J3	131-3774-00			CONN,HDR:PCB;;MALE,STR,2 X 36,0.1 CTR,0.230	22526	67996-172
A15A1J6	131-3774-00			CONN,HDR:PCB;;MALE,STR,2 X 36,0.1 CTR,0.230	22526	67996-172
A15A1J7	131-3557-00			CONN,HDR:;PCB;;MALE,STR,2 X 12,0.1 CTR,0.555 H X 0.177 TAIL,SHRD/4 SIDES,W/CARD SLOT &	22526	67273-012
A15A1J8	131-3557-00			CONN,HDR:;PCB;;MALE,STR,2 X 12,0.1 CTR,0.555 H X 0.177 TAIL,SHRD/4 SIDES,W/CARD SLOT &	22526	67273-012
A15A1J9	131-3557-00			CONN,HDR:;PCB;;MALE,STR,2 X 12,0.1 CTR,0.555 H X 0.177 TAIL,SHRD/4 SIDES,W/CARD SLOT &	22526	67273-012
A15A1J10	131-3557-00			CONN,HDR:;PCB;;MALE,STR,2 X 12,0.1 CTR,0.555 H X 0.177 TAIL,SHRD/4 SIDES,W/CARD SLOT &	22526	67273-012
A15A1J11	131-3557-00			CONN,HDR:;PCB;;MALE,STR,2 X 12,0.1 CTR,0.555 H X 0.177 TAIL,SHRD/4 SIDES,W/CARD SLOT &	22526	67273-012
A15A1J12	131-3557-00			CONN,HDR:;PCB;;MALE,STR,2 X 12,0.1 CTR,0.555 H X 0.177 TAIL,SHRD/4 SIDES,W/CARD SLOT &	22526	67273-012
A15A1J930	131-1425-00			CONN,HDR:PCB;;MALE,RTANG,1 X 36,0.1CTR,0.230 MLG X 0.090 TAIL,30 GOLD,STACKABLE	22526	65521-136
A15A1L100	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A,RDC<0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A15A1L170	108-1441-00			COIL,RF:8.8UH,20%	OJR03	108-1441-00
A15A1L200	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A,RDC <0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A15A1L201	108-0958-00			INDUCTOR,FXD:CUSTOM,POWER;50UH,10%,IDC<3 A, RDC<0.027 OHM,BOBBIN 276-0240-00,30.5T W/20	OJR03	108-0958-00
A15A1L202	108-0958-00			INDUCTOR,FXD:CUSTOM,POWER;50UH,10%,IDC<3 A, RDC<0.027 OHM,BOBBIN 276-0240-00,30.5T W/20	OJR03	108-0958-00
A15A1L210	108-1263-00			INDUCTOR,FXD:POWER;10UH,10%,I<2.1A,RDC <0.043 OHM,Q>20,SRF>19MHZ,BOBBIN	TK2058	TSL0707-100K1R9
A15A1L211	108-1263-00			INDUCTOR,FXD:POWER;10UH,10%,I<2.1A,RDC <0.043 OHM,Q>20,SRF>19MHZ,BOBBIN	TK2058	TSL0707-100K1R9
A15A1L212	108-0554-00			INDUCTOR,FXD:CUSTOM,POWER;5UH,20%,I<10 A,RDC <0.01 OHM,ROD CORE 276-0147-00	OJR03	108-0554-00
A15A1L213	108-0554-00			INDUCTOR,FXD:CUSTOM,POWER;5UH,20%,I<10 A,RDC <0.01 OHM,ROD CORE 276-0147-00	OJR03	108-0554-00
A15A1L214	108-0958-00			INDUCTOR,FXD:CUSTOM,POWER;50UH,10%,IDC<3 A, RDC<0.027 OHM,BOBBIN 276-0240-00,30.5T W/20	OJR03	108-0958-00

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A15A1L215	108-1263-00			INDUCTOR,FXD:POWER;10UH,10%,I<2.1A,RDC<0.043 OHM,Q>20,SRF>19MHZ,BOBBIN	TK2058	TSL0707-100K1R9
A15A1L216	108-1442-00			INDUCTOR,FXD:SIGNAL;10UH,20%,TOROID COR	0JR03	108-1442-00
A15A1L217	108-1442-00			INDUCTOR,FXD:SIGNAL;10UH,20%,TOROID CORE	0JR03	108-1442-00
A15A1L241	108-0828-00			INDUCTOR,FXD:CUSTOM,POWER;56.4UH,IDC<3.2 A,RDC<0.017 OHM,TOROID CORE 276-0603-00,TD-565	0JR03	108-0828-00
A15A1L250	108-0828-00			INDUCTOR,FXD:CUSTOM,POWER;56.4UH,IDC<3.2 A,RDC<0.017 OHM,TOROID CORE 276-0603-00,TD-565	0JR03	108-0828-00
A15A1L310	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A,RDC<0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A15A1L320	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A,RDC<0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A15A1L330	108-1442-00			INDUCTOR,FXD:SIGNAL;10UH,20%,TOROID CORE	0JR03	108-1442-00
A15A1Q130	151-0678-00		B030799	TRANSISTOR,PWR:BIPOLAR,NPN;400V,4.0A,SWITCHING	04713	MJE13005
A15A1Q130	151-1088-00	B030800		TRANSISTOR,PWR:MOS,N-CH;600V,1.0A,12 OHM		
A15A1Q250	151-1137-00			TRANSISTOR,PWR:MOS,N-CH,200V,9.0A,0.4 OHM,IRF630,TO-220 W/FORMED LEADS	04713	STP4064LFCF
A15A1Q251	151-1137-00			TRANSISTOR,PWR:MOS,N-CH,200V,9.0A,0.4 OHM,IRF630,TO-220 W/FORMED LEADS	04713	STP4064LFCF
A15A1Q250						
A15A1Q251						
A15A1Q400	151-0619-00			TRANSISTOR,SIG:BIPOLAR,NPN;35V,20MA,SUPERMATCHED DUAL	27014	LM394H
A15A1Q410	151-0619-00			TRANSISTOR,SIG:BIPOLAR,NPN;35V,20MA,SUPERMATCHED DUAL	27014	LM394H
A15A1Q610	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A15A1Q611	151-5006-00			TRANSISTOR,SIG:BIPOLAR,NPN;300V,50MA,50MHZ,AMPLIFIER	0LUA3	BF620
A15A1Q680	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A15A1Q690	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A15A1Q691	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A15A1Q700	151-5006-00			TRANSISTOR,SIG:BIPOLAR,NPN;300V,50MA,50MHZ,AMPLIFIER	0LUA3	BF620
A15A1Q720	151-5006-00			TRANSISTOR,SIG:BIPOLAR,NPN;300V,50MA,50MHZ,AMPLIFIER	0LUA3	BF620
A15A1Q751	151-5002-00			TRANSISTOR,SIG:JFET,N-CH;5V,75MA,60 OHM,SWITCH	04713	MMBF4392LT1
A15A1Q752	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A15A1Q753	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A15A1Q800	151-5006-00			TRANSISTOR,SIG:BIPOLAR,NPN;300V,50MA,50MHZ,AMPLIFIER	0LUA3	BF620
A15A1Q801	151-5006-00			TRANSISTOR,SIG:BIPOLAR,NPN;300V,50MA,50MHZ,AMPLIFIER	0LUA3	BF620
A15A1Q811	151-5006-00			TRANSISTOR,SIG:BIPOLAR,NPN;300V,50MA,50MHZ,AMPLIFIER	0LUA3	BF620
A15A1Q812	151-5006-00			TRANSISTOR,SIG:BIPOLAR,NPN;300V,50MA,50MHZ,AMPLIFIER	0LUA3	BF620
A15A1Q820	151-5006-00			TRANSISTOR,SIG:BIPOLAR,NPN;300V,50MA,50MHZ,AMPLIFIER	0LUA3	BF620
A15A1Q900	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A15A1Q901	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A15A1Q922	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A15A1Q923	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A15A1Q924	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A15A1Q925	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A15A1Q930	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A15A1R110	311-1968-00			RES,VAR,NONWW:PNL,5M OHM,20%,0.5W	12697	72M4N048S505M
A15A1R120	315-0625-00			RES,FXD,FILM:6.2M OHM,5%,0.25W	TK1727	SFR25 2322-181
A15A1R151	308-0236-00			RES,FXD,WW:85 OHM,5%,3W	00213	1240S-85 OHM 5
A15A1R152	301-0273-00			RES,FXD,FILM:27K OHM,5%,0.5W	TK1727	SFR30 2322-182
A15A1R170	301-0474-00			RES,FXD,FILM:470K OHM,5%,0.5W	TK1727	SFR30 2322-182
A15A1R185	303-0154-00			RES,FXD,CMPSN:150K OHM,5%,1W	24546	FP1 150 K OHM 5
A15A1R240	308-0399-01			RES,FXD,WW:10 OHM,5%,5W	91637	CW5-10ROJ-BULK
A15A1R250	308-0236-00			RES,FXD,WW:85 OHM,5%,3W	00213	1240S-85 OHM 5
A15A1R260	308-0643-00			RES,FXD,WW:0.10 OHM,3%,3W	TK2096	KM300 0.1 OHM +
A15A1R261	308-0292-00		B030799	RES,FXD,WW:2.2K OHM,5%,3W	91637	CW-2B 2.2K 5 PE
A15A1R261	308-0281-00	B030800		RES,FXD,WW:1.8K OHM,5%,3W	09969	FP69 1.8K 5%
A15A1R400	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W	57668	MCR18FXEA332K
A15A1R401	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R402	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R403	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R404	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R405	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A15A1R406	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R407	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R408	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R409	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R410	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R411	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R412	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R413	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R414	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R415	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R416	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W	57668	MCR18FXEA332K
A15A1R417	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W	57668	MCR18FXEA332K
A15A1R418	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R419	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R420	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R421	321-5169-00			RES,FXD:THICK FILM;475K OHM,1%,0.125W	91637	CRCW1206-47502F
A15A1R425	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R426	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R427	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R428	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R429	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R430	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R431	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A15A1R510	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A15A1R511	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A15A1R520	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A15A1R521	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A15A1R522	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A15A1R531	321-5041-00			RES,FXD:THICK FILM;82.5K OHM,1%,0.125W	50139	BCK8252FT
A15A1R532	321-5041-00			RES,FXD:THICK FILM;82.5K OHM,1%,0.125W	50139	BCK8252FT
A15A1R534	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R535	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A15A1R536	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A15A1R537	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A15A1R550	321-5000-00		B020569	RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R550A	321-5487-00	B020570	B030799	RES,FXD:THICK FILM,22.6 OHM, 1%,0.250W, TC=100PPM,1210,T&R,SMD	09969	CRCW1210-22R6FRT 2
A15A1R550B	321-5487-00	B020570	B030799	RES,FXD:THICK FILM,22.6 OHM, 1%,0.250W, TC=100PPM,1210,T&R,SMD	09969	CRCW1210-22R6FRT 2
A15A1R550	321-5523-00	B030800		RES,FXD,FILM:THICK FILM,22 OHM,5%,800MW,200V	56845	RCWP2010-6

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A15A1R551	321-5000-00		B020569	RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R551A	321-5487-00	B020570	B030799	RES,FXD:THICK FILM,22.6 OHM, 1%,0.250W, TC=100PPM,1210,T&R,SMD	09969	CRCW1210-22R6FRT 2
A15A1R551B	321-5487-00	B020570	B030799	RES,FXD:THICK FILM,22.6 OHM, 1%,0.250W, TC=100PPM,1210,T&R,SMD	09969	CRCW1210-22R6FRT 2
A15A1R551	321-5523-00	B030800		RES,FXD,FILM:THICK FILM,22 OHM,5%,800MW,200V	56845	RCWP2010-6
A15A1R552	321-5523-00	B030800		RES,FXD,FILM:THICK FILM,22 OHM,5%,800MW,200V	56845	RCWP2010-6
A15A1R553	321-5523-00	B030800		RES,FXD,FILM:THICK FILM,22 OHM,5%,800MW,200V	56845	RCWP2010-6
A15A1R570	321-5000-00		B020569	RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R570A	321-5487-00	B020570	B030799	RES,FXD:THICK FILM,22.6 OHM, 1%,0.250W, TC=100PPM,1210,T&R,SMD	09969	CRCW1210-22R6FRT 2
A15A1R570B	321-5487-00	B020570	B030799	RES,FXD:THICK FILM,22.6 OHM, 1%,0.250W, TC=100PPM,1210,T&R,SMD	09969	CRCW1210-22R6FRT 2
A15A1R570	321-5523-00	B030800		RES,FXD,FILM:THICK FILM,22 OHM,5%,800MW,200V	56845	RCWP2010-6
A15A1R571	321-5000-00		B030799	RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R571	321-5523-00	B030800		RES,FXD,FILM:THICK FILM,22 OHM,5%,800MW,200V	56845	RCWP2010-6
A15A1R600	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A15A1R601	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A15A1R602	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A15A1R603	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A15A1R604	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A15A1R605	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A15A1R606	321-5022-00		B030924	RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A15A1R606	321-5018-00	B040925		RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R610	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A15A1R611	321-5022-00		B030924	RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A15A1R611	321-5025-00	B040925		RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A15A1R612	321-5022-00		B030924	RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A15A1R612	321-5025-00	B040925		RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A15A1R613	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A15A1R614	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A15A1R615	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A15A1R616	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R617	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A15A1R618	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A15A1R620	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A15A1R630	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A15A1R631	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R632	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5

## Replaceable Electrical Parts

### Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A15A1R633	321-5040-00			RES,FXD:THICK FILM;68.1K OHM,1%,0.125W	50139	BCK6812FT
A15A1R634	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R635	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W	57668	MCR18FXEA1M
A15A1R636	321-5036-00			RES,FXD:THICK FILM;33.2K OHM,1%,0.125W	50139	BCK3322FT
A15A1R637	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A15A1R638	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A15A1R639	311-2234-00			RES,VAR,TRMR:CERMET;5K OHM,20%,0.5W,0.197	TK2073	GF06UT2 502 M L
A15A1R650	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A15A1R651	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A15A1R652	321-5047-00		B030799	RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A15A1R652	321-5030-00	B030800		RES,FXD:THICK FILM,10.0K OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK1002FT
A15A1R660	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R661	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R663	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R664	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A15A1R666	321-5037-00		B020605	RES,FXD:THICK FILM;39.2K OHM,1%,0.125W	50139	BCK3922FT
A15A1R666	321-5031-00	B020606	B030799	RES,FXD:THICK FILM;12.1K OHM,1%,0.125W	50139	BCK3922FT
A15A1R666	321-5034-00	B030800		RES,FXD:THICK FILM,22.1K OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK2212FT
A15A1R667	321-5028-00			RES,FXD:THICK FILM;6.81K OHM,1%,0.125W	50139	BCK6811FT
A15A1R668	321-5017-00	B030800		RES,FXD:THICK FILM,825 OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK8250FT
A15A1R669	311-2231-00	B030800		RES,VAR,TRMR:CERMET,1K OHM,20%,0.5W,0.197 SQ,TOP ADJUST	TK2073	GF06UT2 102 M L20
A15A1R670	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R671	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A15A1R672	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R680	311-2236-00			RES,VAR,TRMR:CERMET;20K OHM,20%,0.5W,0.197	TK2073	GF06UT2 203 M L
A15A1R681	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A15A1R682	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A15A1R683	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R684	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A15A1R686	321-5031-00			RES,FXD:THICK FILM;12.1K OHM,1%,0.125W	50139	BCK1212FT
A15A1R687	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A15A1R688	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A15A1R689	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R690	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A15A1R691	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT



Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A15A1R693	321-5027-00		B020605	RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A15A1R693	321-5145-00	B020606	B030799	RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK5621FT
A15A1R693	321-5030-00	B030800		RES,FXD:THICK FILM;10.0K OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK1002FT
A15A1R694	321-5037-00			RES,FXD:THICK FILM;39.2K OHM,1%,0.125W	50139	BCK3922FT
A15A1R695	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A15A1R696	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A15A1R697	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A15A1R698	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A15A1R699	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A15A1R700	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A15A1R701	321-5034-00		B030924	RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A15A1R701	321-5031-00	B040925		RES,FXD:THICK FILM;12.1K OHM,1%,0.125W	50139	BCK1212FT
A15A1R702	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A15A1R703	311-1235-00			RES,VAR,NONWW:100K OHM,0.5W	32997	3386F-1-104
A15A1R704	311-1235-00			RES,VAR,NONWW:100K OHM,0.5W	32997	3386F-1-104
A15A1R705	311-1235-00			RES,VAR,NONWW:100K OHM,0.5W	32997	3386F-1-104
A15A1R706	321-5037-00		B030924	RES,FXD:THICK FILM;39.2K OHM,1%,0.125W	50139	BCK3922FT
A15A1R706	321-5035-00	B040925		RES,FXD:THICK FILM;27.4K OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK2742FT
A15A1R707	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R709	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A15A1R710	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A15A1R711	321-5028-00			RES,FXD:THICK FILM;6.81K OHM,1%,0.125W	50139	BCK6811FT
A15A1R712	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A15A1R713	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A15A1R714	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R720	321-5041-00			RES,FXD:THICK FILM;82.5K OHM,1%,0.125W	50139	BCK8252FT
A15A1R721	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A15A1R722	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R723	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R730	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W	50139	BCK1502FT
A15A1R731	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W	50139	BCK1502FT
A15A1R732	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R733	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R741	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R750	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A15A1R752	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R754	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A15A1R761	321-5030-00		B020605	RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R761	321-5024-00	B020606	B030799	RES,FXD:THICK FILM,3.32K OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK4751FT
A15A1R761	321-5026-00	B030800		RES,FXD:THICK FILM,4.75K OHM,1%,0.125W,TC=100 PPM,1206,T&R	50139	BCK4751FT
A15A1R762	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R763	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A15A1R770	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R771	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R772	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R780	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W	50139	BCK1502FT
A15A1R781	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R782	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A15A1R790	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A15A1R791	321-5028-00			RES,FXD:THICK FILM;6.81K OHM,1%,0.125W	50139	BCK6811FT
A15A1R800	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A15A1R801	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A15A1R802	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R803	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R804	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R805	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R806	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R807	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A15A1R808	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A15A1R809	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A15A1R810	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A15A1R811	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A15A1R812	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R813	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R814	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R815	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R816	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R817	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A15A1R818	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A15A1R819	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A15A1R820	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W	50139	BCK4752FT
A15A1R821	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A15A1R822	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A15A1R823	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W	50139	BCK4752FT
A15A1R824	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A15A1R825	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A15A1R826	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A15A1R828	321-5051-00	B030800	B030924	RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A15A1R828	321-5048-00	B040925		RES,FXD:THICK FILM;332K OHM,1%,0.125W	50139	BCK3323FT
A15A1R830	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A15A1R831	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A15A1R832	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A15A1R833	321-5038-00			RES,FXD:THICK FILM;47.5K OHM,1%,0.125W	50139	BCK4752FT
A15A1R834	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A15A1R835	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A15A1R836	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A15A1R837	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A15A1R838	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A15A1R839	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A15A1R870	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R871	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R872	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A15A1R873	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R874	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R875	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R880	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R881	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R884	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A15A1R900	311-1225-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3386F-1-102
A15A1R901	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A15A1R902	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A15A1R903	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A15A1R904	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A15A1R905	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R906	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R907	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A15A1R908	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A15A1R909	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A15A1R910	311-1225-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3386F-1-102
A15A1R911	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R911	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A15A1R912	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A15A1R912	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A15A1R913	321-5035-00		B030924	RES,FXD:THICK FILM;27.4K OHM,1%,0.125W	50139	BCK2742FT
A15A1R913	321-5033-00	B040925		RES,FXD:THICK FILM,18.2K OHM,1%,0.125W	50139	BCK1822FT
A15A1R914	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R915	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A15A1R916	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A15A1R917	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A15A1R918	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A15A1R919	321-5033-00			RES,FXD:THICK FILM;18.2K OHM,1%,0.125W	50139	BCK1822FT
A15A1R920	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A15A1R921	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A15A1R922	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A15A1R923	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A15A1R924	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A15A1R925	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A15A1R926	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A15A1R927	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A15A1R933	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A15A1R934	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W	50139	BCK1502FT
A15A1R937	311-1223-00			RES,VAR,NONWW:TRMR,250 OHM,0.5W	32997	3386F-1-251
A15A1R938	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A15A1R939	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A15A1R940	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A15A1R941	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A15A1R942	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A15A1R943	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A15A1R944	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A15A1R945	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R946	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A15A1R947	321-5010-00	B040925		RES,FXD:THICK FILM,221 OHM,1%,0.125W	50139	BCK221FT
A15A1RT130	307-0863-00			RES,THERMAL:10 OHM,10%,NTC	15454	SG13-S
A15A1SW140	260-1849-00			SWITCH,PWR:DPDT;PUSH PUSH ALT ACT,PC PINS,6A 250VAC/1A 100VDC,36A AC SURGE,RIGHT ANG MNT	31918	130222 (NE18-00)
A15A1T110	120-1401-00			TRANSFORMER,PWR:LINE TRIGGER;1:1,PRI L>0.6H,SEC	54937	DMI 500-2044
A15A1T160	120-1880-00			TRANSFORMER,RF:COMMON MODE,10MH,DCR 0.18 OHM, I MAX 3A AC,VERTICAL MOUNT,1.26 X 0.91 X1.4 HIGH,UL	TK2058	TF3233S-103Y3R0
A15A1T190	120-1776-00			TRANSFORMER,RF:ENERGY STORAGE POT CORE2710 SAFETY CONTROLLED	75498	128-7050-00
A15A1T230	120-1890-00			TRANSFORMER,PWR:SWITCHING,24-28KHZ,IN 120V, OUT 3KV .3MA,12KV 10UA,115V.1A,50V .1A,20V.25A,10V 3.2A, 10.5 2.2A	75498	129-0135-00

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A15A1U260	156-1627-00		B020605	IC,LINEAR:BIPOLAR,SW-REGULATOR CONTROLLER	01295	TL594CN
A15A1U260	156-4661-00	B020606		IC,LINEAR:BIPOLAR,SW-REGULATOR CONTROLLER;PWM,PUSH-PULL OUTPUTS	04713	TL594CN

**Replaceable Electrical Parts List (Cont.)**

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A15A1U280	156-1627-00		B020605	IC,LINER:BIPOLAR,SW-REGULATOR CONTROLLER;PWM,PUSH-PULL OUTPUTS	01295	TL594CN
A15A1U280	156-4661-00	B020606		IC,LINER:BIPOLAR,SW-REGULATOR CONTROLLER;PWM,PUSH-PULL OUTPUTS	04713	TL594CN
A15A1U281	156-0885-00			CPLR,OPTOELECTR:LED,5KV ISOLATION	80009	156088500
A15A1U400	156-5257-00			IC,LINER:BIPOLAR,OP-AMP;HIGH SLEW RATE	01295	LM318D
A15A1U630	156-5018-00			IC,LINER:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358D
A15A1U670	156-5074-00			IC,DIGITAL:HC MOS,FLIP FLOP;DUAL D-TYPE	01295	SN74HC74D
A15A1U730	156-5032-00			IC,DIGITAL:LSTTL,GATES;QUAD 2-INPUT NOR	01295	SN74LS02D
A15A1U780	156-5123-00			IC,DIGITAL:HCTCMOS,DEMUX/DECODER;4-TO-16 DECODER	1CH66	74HCT154D
A15A1U810	156-5018-00			IC,LINER:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358D
A15A1U830	156-5714-00			IC,LINER:BIPOLAR,VOLTAGE REGULATOR;POSITIVE, ADJUSTABLE,100MA,4%	27014	LM317LM
A15A1U840	156-5081-01			IC,DIGITAL:HCTCMOS,GATE;HEX INVERTER	0JR04	TC74HCT04AFN(EL)
A15A1U850	156-5088-00			IC,DIGITAL:HCTCMOS,DEMUX/DECODER;3-TO-8 DECODER	01295	SN74HCT138D
A15A1U860	156-5001-00			IC,DIGITAL:LSTTL,GATES;QUAD 2-INPUT NAND	01295	SN74LS00D
A15A1U861	156-5144-00			IC,DIGITAL:HCTCMOS,FLIP FLOP;QUAD D-TYPE, CLEAR	1CH66	74HCT175D
A15A1U870	156-5121-00			IC,DIGITAL:LSTTL,MUX/ENCODER;8-TO-3 PRIORITY ENCODER	01295	SN74LS148D
A15A1U900	156-5001-00			IC,DIGITAL:LSTTL,GATES;QUAD 2-INPUT NAND	01295	SN74LS00D
A15A1U901	156-5257-00			IC,LINER:BIPOLAR,OP-AMP;HIGH SLEW RATE	01295	LM318D
A15A1U910	156-5257-00			IC,LINER:BIPOLAR,OP-AMP;HIGH SLEW RATE	01295	LM318D
A15A1U920	156-5299-00			IC,LINER:BIPOLAR,VOLTAGE REGULATOR;NEGATIVE,-5V,100MA,5%	01295	MC79L05ACD
A15A1U930	156-5070-01	B030800		IC,DIGITAL:HCTCMOS,BUFFER,OCTAL,3-STATE	01295	SN74HCT244DWR
A15A1VR150	307-0456-00			RES,V SENSITIVE:MOV; 250VRMS, 330VDC,72J, 4500A, VAR 429V, CLAMP 650V,500PF	34371	V250LA20A
A15A1VR530	152-0247-00		B030799	SEMICON DVC,DI:ZEN,SI,150V,5%,0.4W,DO-71N989B,MI	04713	SZG275K1RL
A15A1VR530	152-0470-00	B030800		DIODE,ZENER:200V,5%,0.4W,1N992B,DO-7	04713	1N992BRL
A15A1VR630	152-0247-00		B030799	SEMICON DVC,DI:ZEN,SI,150V,5%,0.4W,DO-71N989B,MI	04713	SZG275K1RL
A15A1VR630	152-0470-00	B030800		DIODE,ZENER:200V,5%,0.4W,1N992B,DO-7	04713	1N992BRL
A15A1VR660	152-5011-00			DIODE,ZENER:;6.2V,5%,225MW	04713	MMBZ5234BLT1
A15A1VR661	152-5011-00			DIODE,ZENER:;6.2V,5%,225MW	04713	MMBZ5234BLT1
A15A1VR690	152-5011-00			DIODE,ZENER:;6.2V,5%,225MW	04713	MMBZ5234BLT1
A15A1VR691	152-5011-00			DIODE,ZENER:;6.2V,5%,225MW	04713	MMBZ5234BLT1
A15A1W1	174-2551-00			CA ASSY,SP,ELEC:RIBBON W/CRT SOCKET	80009	174255100
A15A1W2	174-0188-02			CABEL ASSY,RF:50 OHM COAX,9.0 L,W/O TAG	TK2469	174-0188-02
A15A1W5	175-4464-00			CA ASSY,SP,ELEC:RIBBON,;JDC,20,28 AWG,2.5 L ,2X10,0.1 CTR,RCPT X PCB,2ROW	TK0032	ORDER BY DESC
A15A1W13	174-0198-02			CA ASSY,SP,ELEC:10,28 AWG,5.5 L,RIBBON	TK2469	174-0198-02
A15A1W14	174-0191-01			CA ASSY,SP,ELEC:10,28 AWG,5.4 L,RIBBON	80009	174019101
A15A1W730	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A15A1W790	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A15A1W830	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A15A1W831	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A15A1W832	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A15A1W840	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A16	119-2568-04			1ST CONVERTER A	80009	119256804
A16C101	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A16C102	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A16C103	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A16C105	290-0512-00			CAP,FXD,ELCTLT:22UF,20%,15V	2N936	199D226X0015DA1
A16C106	290-0536-00			CAP,FXD,ELCTLT:10UF,20%,25V TANTALUM	D5243	ETP-3F 10UF 25V
A16R107	313-1820-00			RES,FXD,FILM:82 OHM,5%,0.2W	91637	CCF50-2-82R00J
A16R108	313-1470-00			RES,FXD,FILM:47 OHM,5%,0.2W	91637	CCF50-2-47R00J
A16A1	-----			CIRCUIT BD ASSY:1ST CONVERTER (PART OF A16)		
A16A1C105	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A1C106	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A16A1C108	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A16A1C112	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A16A1C113	283-5017-00			CAP,FXD,CERAMIC:MLC;1PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H010C
A16A1C114	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A16A1C120	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A1C202	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A16A1C204	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A16A1C214	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A16A1C220	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A1C222	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A16A1C300	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A1C304	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A16A1C312	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A16A1C322	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A16A1C324	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A16A1C326	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A1C328	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A1C330	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A16A1J130	131-1803-02			CONN,RCPT,ELEC:SMA,FEMALE,50OHM	0GZV8	22SMA-50-0-30/1
A16A1J300	131-4203-00			CONN,RF JACK:SMA,;50 OHM,FEMALE,	24931	39JR226-1

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A16A1Q204	151-0608-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,65MA,8.5GHZ,AMPLIFIER	62104	NE64535(D)
A16A1Q212	151-0608-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,65MA,8.5GHZ,AMPLIFIER	62104	NE64535(D)
A16A1Q324	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ	04713	MMBT3906LT1
A16A1Q326	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ	04713	MMBT3906LT1
A16A1Q335	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ	04713	MMBT3906LT1
A16A1Q338	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A16A1R102	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A16A1R104	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A16A1R106	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A16A1R113	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A16A1R114	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A16A1R204	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A16A1R214	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A16A1R224	321-5033-00			RES,FXD:THICK FILM;18.2K OHM,1%,0.125W	50139	BCK1822FT
A16A1R234	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A16A1R236	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A16A1R314	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A16A1R315	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A16A1R322	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A16A1R324	321-5040-00			RES,FXD:THICK FILM;68.1K OHM,1%,0.125W	50139	BCK6812FT
A16A1R325	321-5040-00			RES,FXD:THICK FILM;68.1K OHM,1%,0.125W	50139	BCK6812FT
A16A1R326	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A16A1R328	321-5033-00			RES,FXD:THICK FILM;18.2K OHM,1%,0.125W	50139	BCK1822FT
A16A1R330	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A16A1R332	321-5028-00			RES,FXD:THICK FILM;6.81K OHM,1%,0.125W	50139	BCK6811FT
A16A1R334	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A16A1R335	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A16A1R336	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A16A1R338	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A16A1U230	156-5017-01			IC,LINEAR:BIPOLAR,OP-AMP;DUAL	01295	MC1458DR
A16A1CR130	152-1063-00			DIODE,SIG:SCHTKY,;STAR QUAD,450MVF,0.15PF	17540	DME3256-99
A16A2	-----			CIRCUIT BD ASSY: 1ST MIXER INPUT (PART OF A16)		
A16A2C151	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A2C201	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A16A2C202	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A16A2C240	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A2C241	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K



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Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A16A2C242	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A2C258	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A2C259	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A2C344	283-5042-00			CAP,FXD,CERAMIC:MLC;27PF,5%,50V,NPO,1206	TK2058	C3216C0G1H270J
A16A2C345	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A2C346	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A2C351	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A2C352	290-0524-00			CAP,FXD,ELCTLT:4.7UF,20%,10V	D5243	ETP-1B 4.7UF 10
A16A2C353	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A16A2J350	131-1803-02			CONN,RCPT,ELEC:SMA,FEMALE,50 OHM	0GZV8	22SMA-50-0-30/1
A16A2Q243	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A16A2Q244	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A16A2R150	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A16A2R245	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A16A2R246	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A16A2R247	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A16A2R250	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A16A2R251	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A16A2R252	321-5002-00			RES,FXD:THICK FILM;15 OHM,1%,0.125W	91637	CRCW120615R0FT
A16A2R253	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A16A2R254	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A16A2R340	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A16A2R341	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W	50139	BCK1502FT
A16A2R342	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A16A2R343	321-5032-00			RES,FXD:THICK FILM;15.0K OHM,1%,0.125W	50139	BCK1502FT
A16A2R349	311-5031-00			RES,VAR,NONWW:10K,20%,0.2W	32997	3335W-1-103E
A16A2R355	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A16A2R356	321-5046-00			RES,FXD:THICK FILM;82.5 OHM,1%,0.125W	50139	BCK82R5FT
A16A2R357	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A16A2U348	156-5095-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW NOISE,HIGH OUTPUT DRIVE	01295	NE5534DR
A16A2CR255	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A16A2CR256	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A16A2CR257	152-5004-00			DIODE,SIG:;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A16A2VR347	152-5011-00			DIODE,ZENER:;6.2V,5%,225MW	04713	MMBZ5234BLT1
A16A2VR354	152-5011-00			DIODE,ZENER:;6.2V,5%,225MW	04713	MMBZ5234BLT1
A17	119-2301-06			YIG BUFFER ASSY	80009	119230106

**Replaceable Electrical Parts List (Cont.)**

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A17C172	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A17C192	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A17C568	281-0825-00			CAP,FXD,CER DI:0.005UF,+100-0%,100VFEEDTHROUGH	33095	51-726-008
A17J100	131-1803-02			CONN,RCPT,ELEC:SMA,FEMALE,50 OHM	0GZV8	22SMA-50-0-30/1
A17J300	131-1803-02			CONN,RCPT,ELEC:SMA,FEMALE,50 OHM	0GZV8	22SMA-50-0-30/1
A17J380	131-1803-02			CONN,RCPT,ELEC:SMA,FEMALE,50 OHM	0GZV8	22SMA-50-0-30/1
A17J430	131-0938-00			CONN,RF JACK::SMB/PNL,;MALE,STR,50 OHM,0.25	24931	32JR125-1
A17J460	131-0938-00			CONN,RF JACK::SMB/PNL,;MALE,STR,50 OHM,0.25	24931	32JR125-1
A17P1	015-1022-00			TERMN,COAXIAL:50 OHM,0.5W,SMA	64537	T198CS
A17W27	174-0383-01			CA ASSY,SP,ELEC:6,26 AWG,10.5 L,RIBBON	TK2469	174-0383-01
A17A1	-----			(PART OF A17)		
A17A1C130	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A17A1C140	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A17A1C150	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A17A1C160	283-5018-00			CAP,FXD,CERAMIC:MLC;0.033UF,10%,50V,X7R,1206	TK2058	C3216X7R1H333K
A17A1C180	290-5039-00			CAP,FXD,ALUM:10UF,20%,50V,6.3MM;SMD	62643	MVK50VC10RMF60T
A17A1C182	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A17A1C190	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A17A1C194	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A17A1C266	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A17A1C267	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A17A1C280	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A17A1C282	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A17A1C290	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A17A1C292	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A17A1C296	283-5042-00			CAP,FXD,CERAMIC:MLC;27PF,5%,50V,NPO,1206	TK2058	C3216C0G1H270J
A17A1C298	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A17A1C340	283-5005-00			CAP,FXD,CERAMIC:MLC;4PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H040C
A17A1C392	290-5039-00			CAP,FXD,ALUM:10UF,20%,50V,6.3MM;SMD	62643	MVK50VC10RMF60T
A17A1C442	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A17A1C444	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A17A1C466	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A17A1C468	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A17A1C550	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A17A1C560	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A17A1Q150	151-1221-00			TRANSISTOR,SIG:MESFET,N-CH;GAAS,20MS,3DB@4GHZ	62104	NE72084(D)
A17A1Q158	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A17A1Q164	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A17A1Q190	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A17A1Q460	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A17A1R128	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A17A1R130	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A17A1R132	321-5002-00			RES,FXD:THICK FILM;15 OHM,1%,0.125W	91637	CRCW120615R0FT
A17A1R142	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A17A1R144	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A17A1R158	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A17A1R160	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A17A1R161	321-5023-00			RES,FXD:THICK FILM;2.74K OHM,1%,0.125W	50139	BCK2741FT
A17A1R164	321-5005-00			RES,FXD:THICK FILM;27.4 OHM,1%,0.125W	57668	MCR18EZHF27E4
A17A1R166	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A17A1R168	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A17A1R178	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A17A1R179	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A17A1R184	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A17A1R186	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W	57668	MCR18FXEA332K
A17A1R192	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A17A1R194	321-5005-00			RES,FXD:THICK FILM;27.4 OHM,1%,0.125W	57668	MCR18EZHF27E4
A17A1R224	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A17A1R230	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A17A1R232	321-5016-00			RES,FXD:THICK FILM;681 OHM,1%,0.125W	50139	BCK6810FT
A17A1R264	321-5024-00			RES,FXD:THICK FILM;3.32K OHM,1%,0.125W	50139	BCK3321FT
A17A1R266	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A17A1R278	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A17A1R280	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A17A1R281	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A17A1R282	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A17A1R284	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A17A1R286	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A17A1R288	311-2227-00			RES,VAR,TRMR:CERMET;100 OHM,20%,0.5W,0.197 SQ,TOP ADJUST	TK2073	GF06UT2 101 M L
A17A1R294	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W	57668	MCR18FXEA332K
A17A1R296	321-5048-00			RES,FXD:THICK FILM;332K OHM,1%,0.125W	57668	MCR18FXEA332K
A17A1R310	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A17A1R322	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A17A1R324	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A17A1R326	321-5042-00			RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	57668	MCR18FWEA39E2

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A17A1R332	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A17A1R334	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A17A1R394	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A17A1R438	311-0607-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	73138	82PR10K-25D
A17A1R450	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A17A1R464	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A17A1R466	321-5046-00			RES,FXD:THICK FILM;82.5 OHM,1%,0.125W	50139	BCK82R5FT
A17A1R540	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A17A1R542	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A17A1R550	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A17A1R552	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A17A1R560	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A17A1R562	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A17A1R563	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A17A1R564	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A17A1T450	120-1737-00			TRANSFORMER,RF:BALUN,5:2 RATIO,#34 WIRE	0JR03	120-1737-00
A17A1U290	156-5095-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW NOISE,HIGH OUTPUT DRIVE	01295	NE5534DR
A17A1CR178	152-0962-00			SEMICONV DVC,DI:SCHOTTKY,SI,CER STRIPLINE CASE	50434	HSCH-6312-F01
A17A1CR290	152-0843-00			DIODE,SIG:SCHTKY,;SER-PAIR,20V,410MV,1.3PF	50434	HSMS-2812-T31
A17A1HY450	155-0338-00			MICROCKT,LINEAR:0 GATE	80009	155033800
A17A1VR190	152-5015-00			DIODE,ZENER,;7.5V,5%,.225MW	04713	MMBZ5236BLT1
A17A1VR284	152-5011-00			DIODE,ZENER,;6.2V,5%,.225MW	04713	MMBZ5234BLT1
A18	672-1297-01			CIRCUIT BD ASSY:RF ATTN	80009	672129701
A18J210	131-4203-00			CONN,RF JACK:SMA,;50 OHM	24931	39JR226-1
A18A1	-----			(PART OF A18) DIGITAL CONTROL		
A18A1C311	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A18A1C330	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A18A1C412	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A18A1Q300	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A18A1Q421	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A18A1Q430	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A18A1Q432	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1

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Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A18A1Q434	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ ,AMPLIFIER	04713	MMBT3906LT1
A18A1Q441	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A18A1Q443	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A18A1Q445	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A18A1R301	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A18A1R312	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A18A1R321	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A18A1R400	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A18A1R401	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A18A1R410	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A18A1R411	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A18A1R413	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A18A1R420	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A18A1R422	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A18A1R431	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A18A1R433	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A18A1R440	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A18A1R442	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A18A1R444	321-5026-00			RES,FXD:THICK FILM;4.75K OHM,1%,0.125W	50139	BCK4751FT
A18A1U414	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTD
A18A2				(PART OF A18) RF		
A18A2C110	283-0253-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	15051C103KATBC
A18A2C111	283-5016-00			CAP,FXD,CERAMIC:MLC;1UF,10%,50V,X7R,0.225	04222	22255C105KAT1A
A18A2C112	283-5016-00			CAP,FXD,CERAMIC:MLC;1UF,10%,50V,X7R,0.225	04222	22255C105KAT1A
A18A2C123	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A18A2C138	281-0720-00			CAP,FXD,CER DI:1750PF,+80-20%,250V	33095	51-707-002
A18A2C143	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A18A2C144	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A18A2C145	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A18A2C151	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A18A2C210	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A18A2C220	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A18A2C222	281-0720-00			CAP,FXD,CER DI:1750PF,+80-20%,250V	33095	51-707-002
A18A2C225	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A18A2C228	281-0720-00			CAP,FXD,CER DI:1750PF,+80-20%,250V	33095	51-707-002

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<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A18A2C230	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A18A2C232	281-0720-00			CAP,FXD,CER DI:1750PF,+80-20%,250V	33095	51-707-002
A18A2C233	281-0224-00			CAP,VAR,CER DI:0.5-2.0PF,250VDC	91293	9401-2
A18A2C238	281-0720-00			CAP,FXD,CER DI:1750PF,+80-20%,250V	33095	51-707-002
A18A2C239	281-0221-00			CAP,VAR,CER DI:2-10PF,100V	59660	513-016 A 2.0-1
A18A2C240	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A18A2C242	281-0720-00			CAP,FXD,CER DI:1750PF,+80-20%,250V	33095	51-707-002
A18A2C244	281-0720-00			CAP,FXD,CER DI:1750PF,+80-20%,250V	33095	51-707-002
A18A2C245	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A18A2C248	281-0720-00			CAP,FXD,CER DI:1750PF,+80-20%,250V	33095	51-707-002
A18A2J100	131-4203-00			CONN,RF JACK:SMA,50 OHM	24931	39JR226-1
A18A2J150	131-4203-00			CONN,RF JACK:SMA,50 OHM	24931	39JR226-1
A18A2J200	131-4203-00			CONN,RF JACK:SMA,50 OHM	24931	39JR226-1
A18A2J250	131-4203-00			CONN,RF JACK:SMA,;50 OHM	24931	39JR226-1
A18A2K110	148-0198-00			RELAY,ARMATURE:2 FORM C,COIL 6VDC, 98 OHM, CONTACT 1A@28 VDC,PKG TO-5	02289	CAW-6
A18A2K120	148-0198-00			RELAY,ARMATURE:2 FORM C,COIL 6VDC, 98 OHM, CONTACT 1A@28 VDC,PKG TO-5	02289	CAW-6
A18A2K125	148-0198-00			RELAY,ARMATURE:2 FORM C,COIL 6VDC, 98 OHM, CONTACT 1A@28 VDC,PKG TO-5	02289	CAW-6
A18A2K130	148-0198-00			RELAY,ARMATURE:2 FORM C,COIL 6VDC, 98 OHM, CONTACT 1A@28 VDC,PKG TO-5	02289	CAW-6
A18A2K135	148-0198-00			RELAY,ARMATURE:2 FORM C,COIL 6VDC, 98 OHM, CONTACT 1A@28 VDC,PKG TO-5	02289	CAW-6
A18A2K140	148-0198-00			RELAY,ARMATURE:2 FORM C,COIL 6VDC, 98 OHM, CONTACT 1A@28 VDC,PKG TO-5	02289	CAW-6
A18A2K145	148-0198-00			RELAY,ARMATURE:2 FORM C,COIL 6VDC, 98 OHM, CONTACT 1A@28 VDC,PKG TO-5	02289	CAW-6
A18A2R100	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A18A2R101	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A18A2R102	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A18A2R112	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A18A2R113	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A18A2R114	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A18A2R115	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A18A2R120	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A18A2R121	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A18A2R122	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A18A2R123	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A18A2R130	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A18A2R131	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A18A2R132	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A18A2R133	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A18A2R134	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A18A2R135	321-5001-00			RES,FXD:THICK FILM;12.1 OHM,1%,0.125W	91637	CRCW120612R1FT
A18A2R140	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A18A2R141	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A18A2R142	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A18A2R150	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A18A2R250	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A18A2R251	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A18A2U155	156-2691-00			IC,LINEAR:BIPOLAR,AMPLIFIER;MICROWAVE,17DB GAIN,950MHZ	62104	UPC1654A
A19	119-2206-00			OSCILLATOR,RF:1.9 TO 4.0 GHZ	80009	119220600
A19A1	-----			CIRCUIT BD ASSY:YIG INTERFACE (PART OF A19)		
A19A1C120	290-0326-02			CAP,FXD,ELCTL:820UF,10%,6V	2N936	109D827X9006F2
A19A1C240	290-0726-00			CAP,FXD,ELCTL:220UF,20%,10V	2N936	199D227X0010FE3
A19A1C260	290-0804-00			CAP,FXD,ELCTL:10UF,+50-20%,25V	0H1N5	CEUSM1E100
A19A1C320	290-0326-02			CAP,FXD,ELCTL:820UF,10%,6V	2N936	109D827X9006F2
A19A1C430	290-0726-00			CAP,FXD,ELCTL:220UF,20%,10V	2N936	199D227X0010FE3
A19A1J230	131-3774-00			CONN,HDR:PCB,;MALE,STR,2 X 36,0.1 CTR,0.230	22526	67996-172
A19A1K220	148-5000-00			RELAY,REED:1 FORM C; 30VDC, 0.5A,3W, COIL 5V, 150 OHM	63681	SMG1C05
A19A1Q120	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A19A1Q140	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A19A1Q318	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A19A1Q320	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A19A1Q328	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ, AMPLIFIER	04713	MMBT3906LT1
A19A1R118	321-0097-00			RES,FXD,FILM:100 OHM,1%,0.125W,TC=T0MI	TK1727	MR25 2322-151-9
A19A1R130	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A19A1R131	311-2230-00			RES,VAR,TRMR:CERMET;500 OHM,20%,0.5W,0.197 SQ, TOP ADJUST	TK2073	GF06UT2 501 M L
A19A1R136	321-0306-00			RES,FXD,FILM:15.0K OHM,1%,0.125W,TC=T0MI	19701	5043ED15K00F
A19A1R212	321-0122-00			RES,FXD,FILM:182 OHM,1%,0.125W,TC=T0	91637	CMF55116G182ROF
A19A1R214	321-0202-00			RES,FXD,FILM:1.24K OHM,1%,0.125W,TC=T0MI	TK1727	MR25 2322-151-1
A19A1R216	321-0139-00			RES,FXD,FILM:274 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322-151-2
A19A1R218	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A19A1R219	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A19A1R230	321-0289-07			RES,FXD,FILM:10.0K OHM,0.1%,0.125W,TC=T9	19701	5033RE10K00B
A19A1R232	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A19A1R234	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A19A1R236	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A19A1R240	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A19A1R318	321-0289-07			RES,FXD,FILM:10.0K OHM,0.1%,0.125W,TC=T9	19701	5033RE10K00B
A19A1R320	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A19A1R322	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A19A1R324	321-0816-07			RES,FXD,FILM:5K OHM,0.1%,0.125W,TC=T9MI	TK1727	MPR24-2322-141
A19A1R326	321-5022-00			RES,FXD:THICK FILM;2.21K OHM,1%,0.125W	50139	BCK2211FT
A19A1R327	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A19A1R328	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A19A1R330	311-2230-00			RES,VAR,TRMR:CERMET;500 OHM,20%,0.5W,0.197 SQ, TOP ADJUST	TK2073	GF06UT2 501 M L
A19A1R340	311-2230-00			RES,VAR,TRMR:CERMET;500 OHM,20%,0.5W,0.197 SQ, TOP ADJUST	TK2073	GF06UT2 501 M L
A19A1R360	321-0289-07			RES,FXD,FILM:10.0K OHM,0.1%,0.125W,TC=T9	19701	5033RE10K00B
A19A1R362	321-0289-07			RES,FXD,FILM:10.0K OHM,0.1%,0.125W,TC=T9	19701	5033RE10K00B
A19A1R364	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A19A1U120	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A19A1U320	156-5082-01			IC,LINEAR:BIPOLAR,OP-AMP;LOW OFFSET	01295	OP07CDR
A19A1U350	156-5297-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;ADJUSTABLE,SHUNT,100MA,2%	01295	TL431CD
A19A1CR320	152-5005-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,COM-ANODE	04713	BAW56LT1
A19A1VR120	152-0304-00			DIODE,ZENER:;20V,5%,0.4W	04713	1N968BRL
A19A1VR218	152-0304-00			DIODE,ZENER:;20V,5%,0.4W	04713	1N968BRL
A21	670-9470-02			CIRCUIT BD ASSY:REFERENCE OSCILLATOR	80009	670947002
A21C112	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C140	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A21C141	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A21C151	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A21C200	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C232	281-0957-00			CAP,FXD,CER DI:82PF,5%,50OV	59660	308-000-S2H0-82
A21C250	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A21C255	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C256	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C261	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C272	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J



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Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A21C280	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A21C287	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C331	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C353	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C360	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A21C363	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C371	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C374	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C383	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C431	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C441	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C460	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C471	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C480	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C562	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A21C583	290-5002-00			CAP,FXD,TANT:DRY;10UF,20%,20V,TANT OXIDE,0.287 X 0.170,7343,SMD,T&R	0H1N5	20MC106MDTER
A21H310	119-2265-00			OVEN,CRYSTAL:5W,5VDC	12020	TO5P-15-70
A21J110	131-0938-00			CONN,RF JACK::SMB/PNL;;MALE,STR,50 OHM,0.25	24931	32JR125-1
A21J130	131-0938-00			CONN,RF JACK::SMB/PNL;;MALE,STR,50 OHM,0.25	24931	32JR125-1
A21J140	131-0938-00			CONN,RF JACK::SMB/PNL;;MALE,STR,50 OHM,0.25	24931	32JR125-1
A21J180	131-0938-00			CONN,RF JACK::SMB/PNL;;MALE,STR,50 OHM,0.25	24931	32JR125-1
A21J290	131-2221-00			CONN,HDR:PCB;,MALE,RTANG,2 X 25,0.1CTR,0.318 MLG X 0.110 TAIL,30 GOLD	22526	65626-150
A21L230	108-5031-00			INDUCTOR,FXD:SIGNAL;20NH,5%,IDC<900 MA,RDC <0.33 OHM,Q>40,SRF>900 MHZ	02113	1008CT-200XJBA
A21Q213	151-5011-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,50MA,900MHZ,AMPLIFIER	0LUA3	BFS17
A21Q276	151-5011-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,50MA,900MHZ,AMPLIFIER	0LUA3	BFS17
A21Q277	151-5011-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,50MA,900MHZ,AMPLIFIER	0LUA3	BFS17
A21Q286	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ ,AMPLIFIER	04713	MMBT3906LT1
A21Q320	151-5011-00			TRANSISTOR,SIG:BIPOLAR,NPN;12V,50MA,900MHZ,AMPLIFIER	0LUA3	BFS17
A21Q362	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A21Q450	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A21Q451	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A21Q552	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPLIFIER	04713	MMBT3906LT1
A21Q570	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A21Q580	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A21R111	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A21R142	321-5051-00			RES,FXD:THICK FILM;0 OHM,1%,0.125W	09969	CRCW1206 JUMPER
A21R170	311-1237-00			RES,VAR,NONWW:1K OHM,10%,0.50W	32997	3386X-DY6-102
A21R210	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A21R211	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A21R212	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A21R221	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A21R223	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A21R240	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A21R241	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A21R242	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A21R243	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A21R251	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A21R252	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A21R253	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A21R254	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A21R260	321-5025-00			RES,FXD:THICK FILM;3.92K OHM,1%,0.125W	50139	BCK3921FT
A21R262	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A21R270	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A21R271	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A21R273	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A21R274	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A21R275	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A21R278	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A21R279	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A21R281	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A21R282	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A21R283	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A21R285	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A21R288	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A21R321	321-5020-00			RES,FXD:THICK FILM;1.5K OHM,1%,0.125W	50139	BCK1501FT
A21R330	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A21R332	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A21R350	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A21R351	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A21R352	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A21R364	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A21R365	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A21R372	321-5033-00			RES,FXD:THICK FILM;18.2K OHM,1%,0.125W	50139	BCK1822FT
A21R373	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A21R381	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A21R382	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A21R420	307-5016-00			RES NTKW,FXD,FI:10K OHM,2%,0.125W	91637	SOMC-1601-103G
A21R452	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A21R453	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A21R461	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A21R472	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A21R473	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A21R481	321-5042-00			RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	57668	MCR18FWEA39E2
A21R482	321-5042-00			RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	57668	MCR18FWEA39E2
A21R530	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A21R540	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A21R541	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A21R542	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A21R543	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A21R544	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A21R545	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A21R550	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A21R551	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A21R561	321-5028-00			RES,FXD:THICK FILM;6.81K OHM,1%,0.125W	50139	BCK6811FT
A21R563	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A21R564	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A21R565	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A21R566	321-5034-00			RES,FXD:THICK FILM;22.1K OHM,1%,0.125W	50139	BCK2212FT
A21R571	321-5035-00			RES,FXD:THICK FILM;27.4K OHM,1%,0.125W	50139	BCK2742FT
A21R572	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A21R573	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A21R574	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A21R581	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A21R582	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A21U340	156-5279-00			IC,DIGITAL:ECL,GATE;QUAD 2-INPUT AND	80009	156527900

**Replaceable Electrical Parts List (Cont.)**

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A21U380	156-5018-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358D
A21U430	156-5080-00			IC,DIGITAL:CMOS,REGISTER;8-STAGE STATIC SHIFT REGISTER	1CH66	HEF4021BTD
A21U440	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTD
A21U470	156-5298-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE,5V,100MA,5%	01295	UA78L05ACD
A21U560	156-5018-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,SINGLESUPPLY	01295	LM358D
A21Y310	158-0340-00			XTAL UNIT,QTZ:100.000MHZ,0.0005%	33096	CCAT505288
A21CR284	152-5004-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A21CR363	152-5004-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A21CR364	152-5004-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A21CR370	152-5004-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A21CR490	152-5004-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A21CR491	152-5004-00			DIODE,SIG.;ULTRA FAST;70V,0.15A,6NS,SER-PAIR	0LUA3	BAV99TRL
A21SW410	260-1721-00			SWITCH,ROCKER:8,SPST,125MA,30VDC,	81073	76SB08S
A23	671-1740-03		B010400	CIRCUIT BD ASSY:RF OPTION	80009	671174003
A23	671-1740-04	B010401		CIRCUIT BD ASSY:RF OPTION	80009	671174004
A23C100	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C111	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C120	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C142	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C150	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C180	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C191	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C205	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C206	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C207	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C208	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C209	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A23C210	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C211	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C220	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C221	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C222	283-5008-00			CAP,FXD,CERAMIC:MLC;12PF,5%,50V,NPO,1206	TK2058	C3216C0G1H120J
A23C223	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A23C230	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A23C231	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A23C232	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A23C233	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A23C234	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C240	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A23C241	283-5008-00			CAP,FXD,CERAMIC:MLC;12PF,5%,50V,NPO,1206	TK2058	C3216C0G1H120J
A23C242	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C243	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C244	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C248	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C249	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C250	283-5008-00			CAP,FXD,CERAMIC:MLC;12PF,5%,50V,NPO,1206	TK2058	C3216C0G1H120J
A23C251	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A23C252	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C260	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C261	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A23C262	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A23C263	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A23C270	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C271	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A23C272	283-5008-00			CAP,FXD,CERAMIC:MLC;12PF,5%,50V,NPO,1206	TK2058	C3216C0G1H120J
A23C273	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C274	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C283	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C290	290-0944-00			CAP,FXD,ELCTLT:220UF,+50-20%,10V	0H1N5	CEUSM1A221
A23C292	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C305	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C306	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C307	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C312	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C320	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A23C321	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A23C322	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C323	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C324	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C325	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C326	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C333	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C334	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A23C335	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C343	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A23C344	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C350	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C352	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C353	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A23C361	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C362	283-5000-00			CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J
A23C363	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C371	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C372	283-5042-00			CAP,FXD,CERAMIC:MLC;27PF,5%,50V,NPO,1206	TK2058	C3216C0G1H270J
A23C374	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C375	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C384	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C385	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C395	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C406	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C407	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C408	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C412	283-5027-00			CAP,FXD,CERAMIC:MLC;470PF,5%,50V,NPO,1206	TK2058	C3216C0G1H471J
A23C413	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C414	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A23C415	283-5009-00			CAP,FXD,CERAMIC:MLC;15PF,5%,50V,NPO	TK2058	C3216C0G1H150J
A23C416	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C420	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C421	283-5049-00			CAP,FXD,CERAMIC:MLC;180PF,5%,50V,NPO,1206	TK2058	C3216C0G1H181J
A23C422	283-5027-00			CAP,FXD,CERAMIC:MLC;470PF,5%,50V,NPO,1206	TK2058	C3216C0G1H471J
A23C423	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A23C424	283-5009-00			CAP,FXD,CERAMIC:MLC;15PF,5%,50V,NPO	TK2058	C3216C0G1H150J
A23C425	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C431	283-5027-00			CAP,FXD,CERAMIC:MLC;470PF,5%,50V,NPO,1206	TK2058	C3216C0G1H471J
A23C432	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C433	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C434	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C435	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C436	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C438	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C441	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C445	283-5027-00			CAP,FXD,CERAMIC:MLC;470PF,5%,50V,NPO,1206	TK2058	C3216C0G1H471J
A23C450	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A23C451	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C452	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A23C453	283-5009-00			CAP,FXD,CERAMIC:MLC;15PF,5%,50V,NPO	TK2058	C3216C0G1H150J
A23C454	283-5049-00			CAP,FXD,CERAMIC:MLC;180PF,5%,50V,NPO,1206	TK2058	C3216C0G1H181J
A23C455	283-5027-00			CAP,FXD,CERAMIC:MLC;470PF,5%,50V,NPO,1206	TK2058	C3216C0G1H471J
A23C456	283-5001-00			CAP,FXD,CERAMIC:MLC;100PF,5%,50V,NPO,1206	TK2058	C3216C0G1H101J
A23C457	283-5009-00			CAP,FXD,CERAMIC:MLC;15PF,5%,50V,NPO	TK2058	C3216C0G1H150J
A23C463	283-5027-00			CAP,FXD,CERAMIC:MLC;470PF,5%,50V,NPO,1206	TK2058	C3216C0G1H471J
A23C464	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C465	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C466	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C472	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C473	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C491	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C503	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C504	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C505	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C506	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C507	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C510	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C511	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A23C512	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A23C520	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A23C521	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A23C522	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C530	283-5006-00			CAP,FXD,CERAMIC:MLC;5PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H050C
A23C531	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A23C532	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C533	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C537	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C540	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C541	283-5006-00			CAP,FXD,CERAMIC:MLC;5PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H050C
A23C542	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A23C543	283-5022-00			CAP,FXD,CER DI:47PF,5%,50V	TK2058	C3216C0G1H470J
A23C544	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C551	283-5002-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,50V,NPO,1206	TK2058	C3216COG1H102K
A23C552	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J
A23C553	283-5014-00			CAP,FXD,CERAMIC:MLC;330PF,5%,50V,NPO,1206	TK2058	C3216C0G1H331J

**Replaceable Electrical Parts List (Cont.)**

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A23C561	281-0267-00			CAP,VAR,CERAMIC:6-50PF,50V	51406	TZ03Z500ER169
A23C562	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C563	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C564	283-5011-00			CAP,FXD,CERAMIC:MLC;33PF,5%,50V,NPO,1206	TK2058	C3216C0G1H330J
A23C565	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C570	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23C571	283-5004-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K
A23J110	131-0951-00			CONN,RF JACK:SMB,MALE	0GZV8	VPN 82SMB-50-0
A23J180	131-0951-00		B030924	CONN,RF JACK:SMB,MALE	0GZV8	VPN 82SMB-50-0
A23J180	131-6278-00	B040925		CONN,RF PLUG:SMB,50 OHM,MALE,STR,PCB,0.293 H X 0.155 TAIL,3(0.028 SQ,0.038 DIA CTR COND,GOLD	24931	32JR183-1
A23L110	108-5027-00			INDUCTOR,FXD:POWER;47UH,10%,I<0.14A,RDC<5.0	TK2058	NL453232T-470K
A23L215	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A23L236	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A23L354	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A23L370	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A23L386	108-5027-00			INDUCTOR,FXD:POWER;47UH,10%,I<0.14A,RDC<5.0	TK2058	NL453232T-470K
A23L513	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A23L523	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A23L550	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A23L560	108-1326-00			INDUCTOR,FXD:CUSTOM,POWER;2.1UH,10%,IDC <0.7W/27AWG	0JR03	108-1326-00
A23L630	108-1402-00			INDUCTOR,FXD:SIGNAL;2.4UH,5%,TOROID CORE,23	0JR03	108-1402-00
A23L640	108-1402-00			INDUCTOR,FXD:SIGNAL;2.4UH,5%,TOROID CORE,23	0JR03	108-1402-00
A23L650	108-1402-00			INDUCTOR,FXD:SIGNAL;2.4UH,5%,TOROID CORE,23	0JR03	108-1402-00
A23L660	108-1402-00			INDUCTOR,FXD:SIGNAL;2.4UH,5%,TOROID CORE,23	0JR03	108-1402-00
A23L790	108-1262-00			INDUCTOR,FXD:POWER;100UH,10%,I<0.75A,RDC <0.23 OHM,Q>15,SRF>5.4MHZ,BOBBIN CORE	TK2058	TSL0807-101KR75
A23P790	131-2920-00			CONN,HDR:PCB,;MALE	00779	86479-3
A23Q112	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A23Q113	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A23Q143	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ, AMPLIFIER	0LUA3	BFQ17
A23Q200	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A23Q201	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868



Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A23Q245	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A23Q249	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A23Q276	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A23Q280	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A23Q300	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A23Q301	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A23Q320	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A23Q339	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A23Q377	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A23Q378	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A23Q379	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A23Q380	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A23Q396	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A23Q400	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A23Q401	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A23Q405	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A23Q406	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A23Q430	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A23Q460	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A23Q461	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A23Q470	151-5004-00			TRANSISTOR,SIG:BIPOLAR,NPN;20V,1.0A,65MHZ,AMPLIFIER	0LUA3	BC868
A23Q471	151-5005-00			TRANSISTOR,SIG:BIPOLAR,PNP;20V,1.0A,60MHZ,AMPLIFIER	0LUA3	BC869
A23Q539	151-5009-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,300MA,1.2GHZ,AMPLIFIER	0LUA3	BFQ17
A23R101	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R140	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A23R141	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A23R151	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A23R152	321-5001-00			RES,FXD:THICK FILM;12.1 OHM,1%,0.125W	91637	CRCW120612R1FT
A23R153	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A23R202	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R203	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R204	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R212	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R213	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A23R214	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R235	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A23R240	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A23R241	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A23R242	321-5003-00			RES,FXD:THICK FILM;18.2 OHM,1%,0.125W	91637	CRCW120618R2FT
A23R243	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A23R244	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A23R245	321-5001-00			RES,FXD:THICK FILM;12.1 OHM,1%,0.125W	91637	CRCW120612R1FT
A23R246	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A23R247	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A23R248	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A23R249	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A23R253	321-5013-00			RES,FXD:THICK FILM;392 OHM,1%,0.125W	50139	BCK3920FT
A23R255	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A23R275	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R281	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R282	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R290	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R291	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A23R302	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R303	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R304	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R313	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A23R314	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A23R315	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A23R325	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A23R326	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A23R327	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A23R328	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A23R329	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A23R330	321-5002-00			RES,FXD:THICK FILM;15 OHM,1%,0.125W	91637	CRCW120615R0FT
A23R330	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A23R331	321-5002-00			RES,FXD:THICK FILM;15 OHM,1%,0.125W	91637	CRCW120615R0FT
A23R332	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A23R338	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A23R339	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A23R340	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A23R341	321-5002-00			RES,FXD:THICK FILM;15 OHM,1%,0.125W	91637	CRCW120615R0FT
A23R342	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W	50139	BCK3320FT
A23R376	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R381	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R382	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R383	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R390	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R391	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A23R392	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A23R393	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A23R394	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A23R397	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A23R398	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A23R399	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R402	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R403	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R404	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R430	321-5010-00		B010400	RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A23R430	321-5008-00	B010401		RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A23R431	321-5010-00		B010400	RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A23R431	321-5008-00	B010401		RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A23R432	321-5004-00		B010400	RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A23R432	321-5042-00	B010401		RES,FXD:THICK FILM;39.2 OHM,1%,0.125W	50139	BCD39R2FT
A23R433	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A23R434	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A23R435	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A23R436	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A23R437	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A23R438	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A23R439	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A23R440	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A23R442	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A23R443	321-5006-00			RES,FXD:THICK FILM;100 OHM,1%,0.125W	50139	BCK1000FT
A23R467	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R468	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R469	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R474	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R475	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R476	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R500	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A23R501	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R502	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R534	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A23R535	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A23R536	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A23R537	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A23R538	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A23R545	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A23R546	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A23R547	321-5050-00			RES,FXD:THICK FILM;33.2 OHM,1%,0.125W	57668	MCR18FWEA33E2
A23R548	321-5009-00			RES,FXD:THICK FILM;182 OHM,1%,0.125W	50139	BCK1820FT
A23R572	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R573	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23R574	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A23T144	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A23T245	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A23T310	120-0902-00			TRANSFORMER,SIG:BIFILAR;8.8UH,32%,TOROID CORE 276-0581-00,5 TURNS WITH 27 AWG WIRE 176-0010-(00 & 15)	0JR03	120-0902-00
A23T320	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A23T336	120-0902-00			TRANSFORMER,SIG:BIFILAR;8.8UH,32%,TOROID CORE 276-0581-00,5 TURNS WITH 27 AWG WIRE 176-0010-(00 & 15)	0JR03	120-0902-00
A23T345	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A23T430	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A23T530	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A23T535	120-1720-00			TRANSFORMER,RF:BALUN,1:11 RATIO,TAPPED AT 4 TURNS,W/HOLDER,CORE 276-0712-00	0JR03	120-1720-00
A23U190	156-5298-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE,5V,100MA,5%	01295	UA78L05ACD
A23U390	156-5021-01			IC,DIGITAL:CMOS,REGISTER;8-STAGE SHIFT/STORAGE, 3-STATE	1CH66	HEF4094BTD
A23U490	156-5088-00			IC,DIGITAL:HCTCMOS,DEMUX/DECODER;3-TO-8 DECODER	01295	SN74HCT138D
A23U590	156-5081-01			IC,DIGITAL:HCTCMOS,GATE;HEX INVERTER	0JR04	TC74HCT04AFN(EL
A23Y224	158-0372-00			XTAL UNIT,QTZ:SET OF 3 : 2 POLE MONOLITHIC CRYSTAL FILTER,CENTER FREQ 10 MHZ,PASSBAND (MATCHED SET WITH A23Y225)	50140	158-0372-00

Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A23Y225	158-0372-00			XTAL UNIT,QTZ:SET OF 3 : 2 POLE MONOLITHIC CRYSTAL FILTER,CENTER FREQ 10 MHZ,PASSBAND (MATCHED SET WITH A23Y224)	50140	158-0372-00
A23Y311	158-0337-00			XTAL UNIT,QTZ:IMPED 360 OHM,USED IN CRYSTAL OF 2 (MATCHED SET WITH A23Y337)	59492	001-56460
A23Y337	158-0337-00			XTAL UNIT,QTZ:IMPED 360 OHM,USED IN CRYSTAL OF 2 (MATCHED SET WITH A23Y311)	59492	001-56460
A23Y360	158-0372-00			XTAL UNIT,QTZ:SET OF 3 : 2 POLE MONOLITHIC CRYSTAL FILTER,CENTER FREQ 10 MHZ,PASSBAND	50140	158-0372-00
A23Y417	158-0356-00		B010400	XTAL UNIT,QTZ:10.000MHZ,+/-0.001 %,PARALLEL,CL 32PF	75378	020-1371-0
A23Y417	158-0477-00	B010401		XTAL UNIT,QTZ:10.000MHZ,+/-15PPM,SERIES,CL 32PF	80009	158-0477-00
A23Y426	158-0356-00		B010400	XTAL UNIT,QTZ:10.000MHZ,+/-0.001 %,PARALLEL,CL 32PF	75378	020-1371-0
A23Y426	158-0477-00	B010401		XTAL UNIT,QTZ:10.000MHZ,+/-15PPM,SERIES,CL 32PF	80009	158-0477-00
A23Y446	158-0356-00		B010400	XTAL UNIT,QTZ:10.000MHZ,+/-0.001 %,PARALLEL,CL 32PF	75378	020-1371-0
A23Y446	158-0477-00	B010401		XTAL UNIT,QTZ:10.000MHZ,+/-15PPM,SERIES,CL 32PF	80009	158-0477-00
A23Y458	158-0356-00		B010400	XTAL UNIT,QTZ:10.000MHZ,+/-0.001 %,PARALLEL,CL 32PF	75378	020-1371-0
A23Y458	158-0477-00	B010401		XTAL UNIT,QTZ:10.000MHZ,+/-15PPM,SERIES,CL 32PF	80009	158-0477-00
A28	671-3276-00			CKT BD ASSY:VIDEO DEMODULATOR	80009	671327600
A28C1	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C2	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C3	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C4	283-5201-00			CAP,FXD,CERAMIC:MLC;33PF,5%,100V,NPO,1206	04222	12061A330JAT1A
A28C5	283-5196-00			CAP,FXD,CERAMIC:MLC;47PF,5%,100V,NPO,1206	04222	12061A470JAT1A
A28C6	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C7	283-5007-00			CAP,FXD,CERAMIC:MLC;8PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H080D
A28C8	283-5187-00			CAP,FXD,CERAMIC:MLC;15PF,5%,100V,NPO,1206	04222	12061A150JAT1A
A28C9	283-5007-00			CAP,FXD,CERAMIC:MLC;8PF,+/-0.5PF,50V,NPO,1206	TK2058	C3216C0G1H080D
A28C10	283-5203-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,100V,X7R,1206	04222	12061C102KAT1A
A28C12	283-5203-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,100V,X7R,1206	04222	12061C102KAT1A
A28C13	283-5203-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,100V,X7R,1206	04222	12061C102KAT1A
A28C14	283-5019-00			CAP,FXD,CERAMIC:MLC;2PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H020C
A28C15	283-5201-00			CAP,FXD,CERAMIC:MLC;33PF,5%,100V,NPO,1206	04222	12061A330JAT1A
A28C16	283-5203-00			CAP,FXD,CERAMIC:MLC;1000PF,10%,100V,X7R,1206	04222	12061C102KAT1A
A28C17	283-5019-00			CAP,FXD,CERAMIC:MLC;2PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H020C
A28C18	283-5108-00			CAP,FXD,CERAMIC:MLC;68PF,5%,100V,NPO,1206	04222	12061A680JAT1A
A28C19	283-5108-00			CAP,FXD,CERAMIC:MLC;68PF,5%,100V,NPO,1206	04222	12061A680JAT1A
A28C20	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A28C21	281-5013-00			CAP,VAR,CERAMIC:MONOLITHIC;4 PF TO 25 PF,50V,NPO,.177X.157	51406	TZBX4Z250BA110T
A28C22	281-5013-00			CAP,VAR,CERAMIC:MONOLITHIC;4 PF TO 25 PF,50V,NPO,.177X.157	51406	TZBX4Z250BA110T

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A28C23	281-5004-00			CAP,VAR,CERAMIC;;2-6PF,100V,NPO+/-200PPM/C, 4 X 4.5 X 2.7MM	52769	GKG6R066-25
A28C24	281-5004-00			CAP,VAR,CERAMIC;;2-6PF,100V,NPO+/-200PPM/C, 4 X 4.5 X 2.7MM	52769	GKG6R066-25
A28C25	283-5188-00			CAP,FXD,CERAMIC:MLC;100PF,5%,100V,NPO,1206	04222	12061A101JAT1A
A28C26	283-5108-00			CAP,FXD,CERAMIC:MLC;68PF,5%,100V,NPO,1206	04222	12061A680JAT1A
A28C27	283-5267-00			CAP,FXD,CERAMIC:MLC;1UF,+80%-20%,25V,Y5V,1206	04222	12063G105ZAT1A
A28C28	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A28C29	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C30	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C31	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C32	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C33	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C34	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C35	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C36	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A28C37	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C38	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C39	283-5267-00			CAP,FXD,CERAMIC:MLC;1UF,+80%-20%,25V,Y5V,1206	04222	12063G105ZAT1A
A28C40	283-5265-00			CAP,FXD,CERAMIC:MLC;0.0033UF,5%,50V,NPO,1206	04222	12065A332JAT1A
A28C41	283-5019-00			CAP,FXD,CERAMIC:MLC;2PF,+/-0.25PF,50V,NPO,1206	TK2058	C3216C0G1H020C
A28C42	283-5346-00			CAP,FXD,CERAMIC:MLC;10PF,+/-0.5PF,50V,U2J,1206	18796	GRM42-CU2J100C0
A28C43	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C44	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C45	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C46	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C47	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C48	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C49	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C50	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C51	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A28C52	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A
A28C53	283-5098-00			CAP,FXD,CERAMIC:MLC;0.1UF,+80%-20%,50V,Z5U,1206	04222	12065E104ZAT3A
A28C54	283-5267-00			CAP,FXD,CERAMIC:MLC;1UF,+80%-20%,25V,Y5V,1206	04222	12063G105ZAT1A
A28C55	290-5021-00			CAP,FXD,TANT:3.3UF,20%,16V,0.138 X 0.110;3528,SMD	17554	TAJB335K016R
A28C56	290-5019-00			CAP,FXD,TANT;4.7UF,20%,10V,3.5MM X 2.8MM	2N936	293D475X0010B2T
A28C57	290-5021-00			CAP,FXD,TANT:3.3UF,20%,16V,0.138 X 0.110;3528,	17554	TAJB335K016R
A28C58	283-5267-00			CAP,FXD,CERAMIC:MLC;1UF,+80%-20%,25V,Y5V,1206	04222	12063G105ZAT1A
A28C59	290-5021-00			CAP,FXD,TANT:3.3UF,20%,16V,0.138 X 0.110;35 28,SMD,T&R	17554	TAJB335K016R

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Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A28C60	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A28C61	283-5109-00			CAP,FXD,CERAMIC:MLC;680PF,5%,100V,NPO,1206	04222	12061A681JAT1A
A28C62	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A28C63	283-5114-00			CAP,FXD,CERAMIC:MLC;0.1UF,10%,50V,X7R,1206	04222	12065C104KAT(1A)
A28C64	283-5267-00			CAP,FXD,CERAMIC:MLC;1UF,+80%-20%,25V,Y5V,1206	04222	12063G105ZAT1A
A28C65	290-5021-00			CAP,FXD,TANT:3.3UF,20%,16V,0.138 X 0.110;3528	17554	TAJB335K016R
A28C66	290-5021-00			CAP,FXD,TANT:3.3UF,20%,16V,0.138 X 0.110;3528	17554	TAJB335K016R
A28C67	290-5019-00			CAP,FXD,TANT;:4.7UF,20%,10V,3.5MM X 2.8MM	2N936	293D475X0010B2T
A28C68	283-5003-00			CAP,FXD,CERAMIC:MLC;0.01UF,10%,50V,X7R,1206	TK2058	C3216X7R1H103K
A28CR2	152-5012-00			SEMICON DVC,DI:ZENER,6.2V,5%	80009	152501200
A28CR3	152-5018-00			DIODE,SIG;:ULTRA FAST;100V,0.74VF,4NS,2.0PF,SER-PAIR	27014	MMBD1203
A28J1	131-0391-01			CONN,RF JACK:SMB;50 OHM	24931	32JR141-1
A28J2	131-0391-01			CONN,RF JACK:SMB;50 OHM	24931	32JR141-1
A28J3	131-0391-01			CONN,RF JACK:SMB;50 OHM	24931	32JR141-1
A28J4	131-0391-01			CONN,RF JACK:SMB;50 OHM	24931	32JR141-1
A28J5	131-3556-00			CONN,BOX:PCB;FEMALE	22526	66527-012
A28L1	108-5119-00			INDUCTOR,FXD:SIGNAL,MAG SHIELDED;1.5UH,10%, IDC<360 MA,RDC<0.59 OHM,Q>60,SRF>130 MHZ	TK2058	ACL3225S-1R5K-T
A28L2	108-5095-00			INDUCTOR,FXD:SIGNAL;27NH,20%,IDC<450 MA,RDC <0.22 OHM,Q>23,SRF>1.5 GHZ	TK2058	NL322522T-027K
A28L3	108-5139-00			INDUCTOR,FXD:SIGNAL,AIR CORE;43NH,5%,Q>106@ 150MHZ,SRF>1.5 GHZ	02113	B10T
A28L4	108-5119-00			INDUCTOR,FXD:SIGNAL,MAG SHIELDED;1.5UH,10%, IDC<360 MA,RDC<0.59 OHM,Q>60,SRF>130 MHZ	TK2058	ACL3225S-1R5K-T
A28L5	108-5032-00			INDUCTOR,FXD:SIGNAL;150NH,5%,IDC<450 MA,RDC <0.25 OHM,Q>30,SRF>450 MHZ	TK2058	NL322522T-R15J-
A28L6	108-5139-00			INDUCTOR,FXD:SIGNAL,AIR CORE;43NH,5%,Q>106@ 150MHZ,SRF>1.5 GHZ	02113	B10T
A28L7	108-5139-00			INDUCTOR,FXD:SIGNAL,AIR CORE;43NH,5%,Q>106@ 150MHZ,SRF>1.5 GHZ	02113	B10T
A28L8	108-5139-00			INDUCTOR,FXD:SIGNAL,AIR CORE;43NH,5%,Q>106@ 150MHZ,SRF>1.5 GHZ	02113	B10T
A28L9	108-5139-00			INDUCTOR,FXD:SIGNAL,AIR CORE;43NH,5%,Q>106@ 150MHZ,SRF>1.5 GHZ	02113	B10T
A28L10	108-5121-00			INDUCTOR,FXD:SIGNAL,SHIELDED;560NH,IDC<440MA, RDC<0.51 OHM,Q>50,SRF>180 MHZ	TK2058	ACL3225S-R56KT
A28L11	120-1926-00			INDUCTOR,VAR;:1.37-2.63UH,Q>42@L=1.9UH(7.9MHZ)	02113	M1300-A
A28Q1	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1
A28Q2	151-5066-00			TRANSISTOR,SIG:MOS,N-CH;60V,0.115A,7.5 OHM	04713	2N7002LT1
A28Q3	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ, AMPLIFIER	04713	MMBT3904LT1

**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A28Q4	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A28Q6	151-5001-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER	04713	MMBT3904LT1
A28Q8	151-5075-00			TRANSISTOR,SIG:MOS,P-CH;60V,0.12A,10 OHM	17856	TP0610T-T1
A28Q9	151-5066-00			TRANSISTOR,SIG:MOS,N-CH;60V,0.115A,7.5 OHM	04713	2N7002LT1
A28Q10	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMP	04713	MMBT3906LT1
A28Q11	151-5000-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMP	04713	MMBT3906LT1
A28R1	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A28R2	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A28R3	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A28R4	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A28R5	321-5055-00			RES,FXD:THICK FILM;681K OHM,1%,0.125W	91637	CRCW120668102FT
A28R6	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A28R7	321-5055-00			RES,FXD:THICK FILM;681K OHM,1%,0.125W	91637	CRCW120668102FT
A28R8	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A28R9	321-5031-00			RES,FXD:THICK FILM;12.1K OHM,1%,0.125W	50139	BCK1212FT
A28R10	321-5055-00			RES,FXD:THICK FILM;681K OHM,1%,0.125W	91637	CRCW120668102FT
A28R11	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A28R12	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W	57668	MCR18FWEA47E5
A28R13	321-5055-00			RES,FXD:THICK FILM;681K OHM,1%,0.125W	91637	CRCW120668102FT
A28R14	321-5031-00			RES,FXD:THICK FILM;12.1K OHM,1%,0.125W	50139	BCK1212FT
A28R15	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A28R16	321-5031-00			RES,FXD:THICK FILM;12.1K OHM,1%,0.125W	50139	BCK1212FT
A28R17	321-5004-00			RES,FXD:THICK FILM;22.1 OHM,1%,0.125W	57668	MCR18FWEA22E1
A28R18	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A28R19	321-5007-00			RES,FXD:THICK FILM;121 OHM,1%,0.125W	50139	BCK1210FT
A28R20	321-5044-00			RES,FXD:THICK FILM;56.2 OHM,1%,0.125W	50139	BCD56R2FT
A28R21	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A28R22	321-5003-00			RES,FXD:THICK FILM;18.2 OHM,1%,0.125W	91637	CRCW120618R2FT
A28R23	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A28R24	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A28R25	321-5031-00			RES,FXD:THICK FILM;12.1K OHM,1%,0.125W	50139	BCK1212FT
A28R26	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A28R27	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A28R28	321-5031-00			RES,FXD:THICK FILM;12.1K OHM,1%,0.125W	50139	BCK1212FT
A28R29	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A28R30	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT



**Replaceable Electrical Parts List (Cont.)**

<b>Component Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
A28R31	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A28R32	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A28R33	321-5029-00			RES,FXD:THICK FILM;8.25K OHM,1%,0.125W	50139	BCK8251FT
A28R34	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A28R37	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A28R38	321-5011-00			RES,FXD:THICK FILM;274 OHM,1%,0.125W	50139	BCK2740FT
A28R39	321-5019-00			RES,FXD:THICK FILM;1.21K OHM,1%,0.125W	50139	BCK1211FT
A28R40	321-5047-00			RES,FXD:THICK FILM;100K OHM,1%,0.125W	50139	BCK1003FT
A28R41	321-5031-00			RES,FXD:THICK FILM;12.1K OHM,1%,0.125W	50139	BCK1212FT
A28R42	321-5055-00			RES,FXD:THICK FILM;681K OHM,1%,0.125W	91637	CRCW120668102FT
A28R43	321-5030-00			RES,FXD:THICK FILM;10.0K OHM,1%,0.125W	50139	BCK1002FT
A28R44	321-5015-00			RES,FXD:THICK FILM;562 OHM,1%,0.125W	50139	BCK5620FT
A28R45	321-5010-00			RES,FXD:THICK FILM;221 OHM,1%,0.125W	50139	BCK221FT
A28R46	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A28R47	321-5036-00			RES,FXD:THICK FILM;33.2K OHM,1%,0.125W	50139	BCK3322FT
A28R48	321-5045-00			RES,FXD:THICK FILM;68.1 OHM,1%,0.125W	50139	BCD68R1FT
A28R49	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A28R50	321-5017-00			RES,FXD:THICK FILM;825 OHM,1%,0.125W	50139	BCK8250FT
A28R51	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A28R52	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A28R53	321-5029-00			RES,FXD:THICK FILM;8.25K OHM,1%,0.125W	50139	BCK8251FT
A28R54	321-5266-00			RES,FXD:THICK FILM;11K OHM,1%,0.125W	91637	CRCW1206-1102FT
A28R55	321-5000-00			RES,FXD:THICK FILM;10 OHM,1%,0.125W	91637	CRCW120610R0FT
A28R56	321-5008-00			RES,FXD:THICK FILM;150 OHM,1%,0.125W	50139	BCK1500FT
A28R57	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A28R58	321-5049-00			RES,FXD:THICK FILM;1M OHM,1%,0.125W	57668	MCR18FXEA1M
A28R59	311-5042-00			RES,VAR:2K OHM,20%,0.25W,SIDE ADJ	32997	3314S-1-202G
A28R60	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A28R61	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A28R62	321-5027-00			RES,FXD:THICK FILM;5.62K OHM,1%,0.125W	50139	BCK5621FT
A28R63	311-5052-00			RES,VAR:10K OHM,20%,0.25W,SIDE ADJ	TK2073	G4S103M
A28R64	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A28R65	321-5021-00			RES,FXD:THICK FILM;1.82K OHM,1%,0.125W	50139	BCK1821FT
A28R66	321-5018-00			RES,FXD:THICK FILM;1.0K OHM,1%,0.125W	50139	BCK1001FT
A28R67	321-5055-00			RES,FXD:THICK FILM;681K OHM,1%,0.125W	91637	CRCW120668102FT
A28R68	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A28R69	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT
A28R70	321-5014-00			RES,FXD:THICK FILM;475 OHM,1%,0.125W	50139	BCK4750FT

**Replaceable Electrical Parts List (Cont.)**

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
A28R71	321-5046-00			RES,FXD:THICK FILM;82.5 OHM,1%,0.125W	50139	BCK82R5FT
A28R72	321-5046-00			RES,FXD:THICK FILM;82.5 OHM,1%,0.125W	50139	BCK82R5FT
A28R73	321-5002-00			RES,FXD:THICK FILM;15 OHM,1%,0.125W	91637	CRCW120615R0FT
A28R74	321-5002-00			RES,FXD:THICK FILM;15 OHM,1%,0.125W	91637	CRCW120615R0FT
A28R75	321-5171-00			RES,FXD:THICK FILM;562K OHM,1%,0.125W	91637	CRCW1206-5623FT
A28T1	120-5001-00			TRANSFORMER,RF:1.9UH,+/-25%,2 WINDINGS,4 TURNS,BIFILAR,6 PIN SMTHEADER	0JR03	120-5001-00
A28TP5	131-1857-00			CONN,HDR:PCB,;MALE,STR,1 X 36,0.1 CTR,0.230	58050	082-3644-SS10
A28TP7	131-1857-00			CONN,HDR:PCB,;MALE,STR,1 X 36,0.1 CTR,0.230	58050	082-3644-SS10
A28U1	156-5254-00			IC,DIGITAL:HCTCMOS,REGISTER;8-STAGE SHIFT AND STORE BUS REGISTER	1CH66	74HCT4094D
A28U2	156-5081-01			IC,DIGITAL:HCTCMOS,GATE;HEX INVERTER	0JR04	TC74HCT04AFN(EL
A28U3	156-6564-01			IC,LINEAR:BIPOLAR,AMPLIFIER;MICROWAVE,12 DB	54893	MSA-0711-TR1
A28U4	156-4525-00			IC,LINEAR:BIPOLAR,AMPLIFIER;VHF LOCAL OSCILLATOR/MIXER,UHF IF AMP,SAW FILTER IF AMP	1CH66	TDA5030AN
A28U5	156-6564-01			IC,LINEAR:BIPOLAR,AMPLIFIER;MICROWAVE,12 DB	54893	MSA-0711-TR1
A28U6	156-5435-01			IC,CONVERTER:CMOS,D/A;DUAL,8 BIT,200NS,CURRENT OUT MPU COMPATIBLE,MULTIPLYING	24355	AD7528JP-REEL
A28U7	156-5254-00			IC,DIGITAL:HCTCMOS,REGISTER;8-STAGE SHIFT AND STORE BUS REGISTER	1CH66	74HCT4094D
A28U8	156-5073-01			IC,MISC:HCMOS,ANALOG MUX;TRIPLE SPDT	1CH66	74HC4053DT
A28U9	156-2461-00			IC,MISC:BIPOLAR,TEMPERATURE SENSOR;CURRENT OUTPUT	24355	AD592AN
A28U10	119-4824-00			SAW FILTER:TV IF FILTER, QUASI/SPLIT SOUND;	25088	B39458-M3352-K1
A28U11	156-5677-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE,12V,500MA,5%	04713	MC78M12CDT
A28U12	156-5479-01			IC,DIGITAL:HCMOS,MULTIVIBRATOR;DUAL RETRIG PRECISION MONOSTABLE	1CH66	74HC4538DT
A28U13	156-6183-01			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE ADJUSTABLE,500MA,4%	04713	LM317MDTRK
A28U14	156-5138-01			IC,LINEAR:BIFET,OP-AMP;DUAL	01295	TL072CDR
A28U15	156-5694-01			IC,MISC:BIPOLAR,VIDEO SUBSYSTEM;SYNC SEPARATOR	27014	LM1881MX
A28U16	156-4255-00			IC,MISC:BIPOLAR,VIDEO SUBSYSTEM;TVIF W/PLL DETECTOR,VIDEO & SOUND OUTPUT	04713	MC44301P
J102	136-0094-00			JACK,TELEPHONE:MINIATURE,SHUNT TYPE	82389	42A
R360	311-0679-00			RES,VAR,NONWW:PNL,2X10K OHM,0.5W	12697	D381-CM39687
R480	311-2052-01			RES,VAR,NONWW:PNL,20K OHM,20%,0.5W LINEAR	12697	CM46583
V1	154-0913-00		B030924	ELECTRON TUBE:CRT,FINISHED	80009	154091300
V1	154-1000-00	B040925		ELECTRON TUBE:CRT,FINISHED,	80009	154-1000-00
W1	174-3740-00	B040925		CA ASSY,SP:RIBBON,IDC,10,28AWG,6.0 L,2X5,0.1CTR,PCB X 4X5,0.1CTR,PCB,	TK2469	174-3740-00
W6	174-1228-00			CA ASSY,SP,ELEC:20,26 AWG,14.75 L,RIBBON	TK2469	174-1228-00
W7	174-0195-00			CA ASSY,SP,ELEC:SEMI-RIGID	TK2469	174-0195-00

## Replaceable Electrical Parts List (Cont.)

Component Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Name & Description	Mfr. Code	Mfr. Part Number
W8	174-0196-00			CA ASSY,RF:SEMI-RIGID;;SDI,50 OHM,0.086 DIA ,3.34 CUT L,FORMED,SMA,MALE,STR,BOTH ENDS,W/FERRITE BEAD ONE END	TK2469	174-0196-00
W10	174-0194-00			CA ASSY,RF:SEMI-RIGID;;SDI,50 OHM,0.086 DIA ,3.26 CUT L,FORMED,SMA,MALE,STR,BOTH ENDS	TK2469	174-0194-00
W11	174-0818-00			CABLE ASSY,RF:50 OHM COAX,5.25 L	TK2469	174-0818-00
W12	174-0817-00			CABLE ASSY,RF:50 OHM COAX,7.25 L	TK2469	174-0817-00
W16	174-0819-00			CABLE ASSY,RF:50 OHM COAX,8.25 L	TK2469	174-0819-00
W22	174-0200-00			CA ASSY,SP,ELEC:SEMI-RIGID	TK2469	174-0200-00
W24	174-0192-01			CA ASSY,SP,ELEC:SEMI-RIGID	TK2469	174-0192-01
W25	174-0251-00			CA ASSY,SP,ELEC:4,26 AWG,3.0 L,RIBBON	80009	174025100
W26	174-0534-00			CA ASSY,SP,ELEC:50,28 AWG,5.0 L RIBBON	TK2469	174-0534-00
W28	174-0265-01			CA ASSY,SP,ELEC:10,26 AWG,7.25 L	80009	174026501
W29	174-0406-01			CA ASSY,SP,ELEC:3,26 AWG,6.5 L	TK2469	174-0406-01
W30	174-1138-00			CA ASSY,RF:SEMI-RIGID;;SDI,50 OHM,0.086 DIA ,2.44 CUT L,FORMED,SMA,MALE,STR,BOTH ENDS	TK2469	174-1138-00
W31	174-1143-00			CA ASSY,RF:SEMI-RIGID;;SDI,50 OHM,0.086 DIA ,4.795 CUT L,FORMED,SMA,MALE,STR,BOTH ENDS	TK2469	174-1143-00
W35	174-1263-01			CA ASSY,RF:50 OHM COAX,14.0 L	TK2469	174-1263-01
W36	174-0817-00			CABLE ASSY,RF:50 OHM COAX,7.25 L	TK2469	174-0817-00
W37	174-0817-00			CABLE ASSY,RF:50 OHM COAX,7.25 L	TK2469	174-0817-00
W38	174-0817-00			CABLE ASSY,RF:50 OHM COAX,7.25 L	TK2469	174-0817-00
W41	174-0820-00			CABLE ASSY,RF:50 OHM COAX,11.5 L	TK2469	174-0820-00
W42	174-1237-00			CABLE ASSY,RF:50 OHM COAX,12.5 L	TK2469	174-1237-00
W43	174-1237-00			CABLE ASSY,RF:50 OHM COAX,12.5 L	TK2469	174-1237-00
W44	174-0819-00			CABLE ASSY,RF:50 OHM COAX,8.25 L	TK2469	174-0819-00
W45	174-0819-00			CABLE ASSY,RF:50 OHM COAX,8.25 L	TK2469	174-0819-00
W46	174-1227-01			CA ASSY,SP,ELEC:8 COND,5,26 AWG,RIBBON	TK2469	174-1227-01
W47	174-1238-00			CABLE ASSY,RF:50 OHM COAX,16.5 L	TK2469	174-1238-00
W48	174-1237-00			CABLE ASSY,RF:50 OHM COAX,12.5 L	TK2469	174-1237-00
W54	174-1617-00			CA ASSY,SP,ELEC:10,28 AWG,9.5 L,RIBBON	TK2469	174-1617-00
W56	174-2395-01			CA ASSY,SP,ELEC:10,28 AWG,14.750 L (OPTION 08 ONLY)	OJ7N9	174-2395-01
W57	174-1822-00			CA ASSY,SP,ELEC24,24 AWG,16.0 L,RIBBON (OPTION 03 ONLY)	OJ7N9	174-1822-00
W58	174-0966-00			CABLE ASSY,RF:50 OHM,14.525 L,SEMI RIGID (OPTION 15 ONLY)	TK2469	174-0966-00
W59	174-1237-00			CABLE ASSY,RF:50 OHM COAX,12.5 L	TK2469	174-1237-00
W60	174-1237-00			CABLE ASSY,RF:50 OHM COAX,12.5 L	TK2469	174-1237-00
W61	174-1237-00			CABLE ASSY,RF:50 OHM COAX,12.5 L	TK2469	174-1237-00
W62	174-1533-00			CABLE ASSY,RF:50 OHM	TK2469	174-1533-00
FL16	119-0294-01			FILTER,LOW PASS:DC TO 1.8GHZ	TK0769	F-4730
FL16	119-6060-00			FILTER,RFI:LOW PASS,2715FE,DC TO 2.2 GHZ,50 OHM IMPEDANCE,SMA CONNECTOR; (OPT 50 AND OPT 75 ONLY)	50140	119-6060-00
FL17	119-2205-00			1ST IF FILTER:TUNED CAVITY 2110	80009	119220500
FL18	015-1027-00			FILTER,LOW PASS:	80009	015102700
LS103	119-0962-00			LOUDSPEAKER,PM:8 OHM,3W,2.047 DIA	61058	EAS-5PH04SC



# Diagrams

Refer to the 2715 Spectrum Analyzer Service Manual Volume 2 for block diagram, schematic diagrams, and parts placement illustrations for the 2715 Spectrum Analyzer.

Diagrams in Volume 2 are in the following order:

INTERCONNECT DIAGRAM

A18 ATTENUATOR

A16A1 1ST CONVERTER

A16A2 RF INPUT

A17 1ST LO BUFFER AMP

A19A1 1ST LO INTERFACE S3

A12A1 PHASE LOCK CENTER FREQUENCY CONTROL (CFC)

A12A2 HF VCO

A12A3 LF VCO

A14 RF MOTHER BOARD and 2ND LO

A28 VIDEO DEMOD

A11 DIGITAL OPTIONS

A13 VARIABLE RESOLUTION

A23 RF OPTIONS

A7 LOG AMPLIFIER

A21 REFERENCE OSCILLATOR

A10 MICROPROCESSOR

A9 DISPLAY STORAGE

A6 FRONT PANEL

A5 SWEEP

A15A1 POWER SUPPLY



# Replaceable Mechanical Parts

This section contains a list of the replaceable mechanical components for the 2715. Use this list to identify and order replacement parts.

## Parts Ordering Information

Replacement parts are available through your local Tektronix field office or representative.

Changes to Tektronix products are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest improvements. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If you order a part that has been replaced with a different or improved part, your local Tektronix field office or representative will contact you concerning any change in part number.

## Using the Replaceable Mechanical Parts List

The tabular information in the Replaceable Mechanical Parts List is arranged for quick retrieval. Understanding the structure and features of the list will help you find all of the information you need for ordering replacement parts. The following table describes the content of each column in the parts list.

**Parts List Column Descriptions**

Column	Column Name	Description
1	Figure & Index Number	Items in this section are referenced by figure and index numbers to the exploded view illustrations that follow.
2	Tektronix Part Number	Use this part number when ordering replacement parts from Tektronix.
3 and 4	Serial Number	Column three indicates the serial number at which the part was first effective. Column four indicates the serial number at which the part was discontinued. No entries indicates the part is good for all serial numbers.
5	Qty	This indicates the quantity of parts used.
6	Name & Description	An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.
7	Mfr. Code	This indicates the code of the actual manufacturer of the part.
8	Mfr. Part Number	This indicates the actual manufacturer's or vendor's part number.

**Abbreviations**      Abbreviations conform to American National Standard ANSI Y1.1-1972.

**Chassis Parts**      Chassis-mounted parts and cable assemblies are located at the end of the *Replaceable Electrical Parts* list.

**Mfr. Code to Manufacturer Cross Index**      The table titled Manufacturers Cross Index shows codes, names, and addresses of manufacturers or vendors of components listed in the parts list.



## Manufacturers Cross Index

<b>Mfr. Code</b>	<b>Manufacturer</b>	<b>Address</b>	<b>City, State, Zip Code</b>
K1072	GREENPAR CONNECTORS LTD	PO BOX 15	HARLOW ESSEX, CM20 2ER UK
S3109	FELLER U.S. CORPORATION	72 Veronica Ave Unit 4	Summerset NJ 08873
TK0428	DLB INDUSTRIES		FRESNO CA
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609-3320
TK0860	LABEL GRAPHICS	6700 SW BRADBURY CT	PORTLAND OR 97224
TK1181	SEA-TAC INDUSTRIES INC	1217 FOURTH AVE N	KENT WA 98031
TK1287	ENOCH MFG CO	14242 SE 82ND DR PO BOX 98	CLACKAMAS OR 97015
TK1326	NORTHWEST FOURSLIDE INC	18224 SW 100TH CT	TUALATIN OR 97062
TK1373	PATELEC-CEM	10156 TORINO	VAICENTALLO 62/45S ITALY
TK1499	AMLAN INC	97 THORNWOOD RD	STAMFORD CT 06903-2617
TK1564	GONSELS MACHINE SHOP	8710 G STREET	OAKLAND CA 94621
TK1623	STARKOR MFG	3454 NE HWY 101	LINCOLN CITY OR 97367
TK1643	PETERS-DELAET INC	7911 NE 33RD DR SUITE 170	PORTLAND OR 97211
TK1828	LITE SPECIALTY METAL WORKS	20460 SW AVERY CT	TUALATIN OR 97062
TK1869	ALPS	100 N CNTRE AVE	ROCKVILLE CENTRE NY 11570
TK1918	SHIN-ETSU POLYMER AMERICA INC	1181 NORTH 4TH ST	SAN JOSE CA 95112
TK1935	ACCRA-FAB INC	11007 NE 37TH CIRCLE	VANCOUVER WA 98682
TK2174	TETON MACHINE CO	1600 VALLEY RD	PAYETTE ID 83661
TK2379	FIBERBILT CASES INC	601 W 26TH STREET	NEW YORK NY 10001-1199
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK WAY SUITE #2	VANCOUVER WA 98601
TK2548	XEROX BUSINESS SERVICES DIV OF XEROX CORPORATION	14181 SW MILLIKAN WAY	BEAVERTON OR 97077
TK2562	MOLDING SPECIALITIES INC	3000 LEWIS & CLARK HWY	VANCOUVER, WA 98661-2999
TK2565	VISION PLASTICS INC	26000 SW PARKWAY CENTER DRIVE	WILSONVILLE, OR 97070
TK2582	TC CORPORATION	814 N HAYDEN MEADOWS DRIVE	PORTLAND, OR 97217
TK2606	VISPRO	PO BOX 6239	BEAVERTON, OR 97007
0B445	ELECTRI-CORD MFG CO INC	312 EAST MAIN ST	WESTFIELD PA 16950
0GV52	SCHAFFNER EMC INC	9-B FADEM ROAD	SPRINGFIELD, NJ 07081
0JR05	TRIQUEST CORP	3000 LEWIS AND CLARK HWY	VANCOUVER WA 98661-2999
0J260	COMTEK MANUFACTURING OF OREGON (METALS)	PO BOX 4200	BEAVERTON OR 97076-4200
0J7N4	ARCHER PRECISION SHEET METAL INC	10950 SW 5TH ST	BEAVERTON OR 97005
0J7N9	MCX INC	30608 SAN ANTONIO ST	HAYWARD CA 94544
0J848	CRYSTAL LITE MANUFACTURING CO	11971 SW HERMAN RD	TUALATIN OR 97062-7062
0J9P4	DELTA ENGINEERING	19500 SW TETON	TUALATIN OR 97062
0J9P9	GEROME MFG CO INC	PO BOX 737 403 NORTH MAIN	NEWBERG OR 97132

**Manufacturers Cross Index (Cont.)**

<b>Mfr. Code</b>	<b>Manufacturer</b>	<b>Address</b>	<b>City, State, Zip Code</b>
0KBZ5	MORELLIS Q & D PLASTICS	1812 16TH AVE PO BOX 487	FOREST GROVE OR 97116-0487
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
0KB05	NORTH STAR NAMEPLATE	5750 NE MOORE COURT	HILLSBORO OR 97124-6474
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPY PO BOX 655303	DALLAS TX 75262-5303
02768	ILLINOIS TOOL WORKS INC FASTEX DIVISION	195 ALGONQUIN ROAD	DES PLAINES IL 60016-6103
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR	5005 E MCDOWELL RD	PHOENIX AZ 85008-4229
04963	MINNESOTA MINING AND MFG CO ADHESIVES COATINGS AND SEALERS DIV	3M CENTER	ST PAUL MN 55101-1428
06383	PANDUIT CORP	17301 RIDGELAND	TINLEY PARK IL 60477-3048
06915	RICHCO PLASTIC CO	5825 N TRIPP AVE	CHICAGO IL 60646-6013
07416	NELSON NAME PLATE CO	3191 CASITAS	LOS ANGELES CA 90039-2410
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125-4632
12360	ALBANY FASTENERS PAWTUCKET FASTERNER DIV	327 PINE ST PO BOX 879	PAWTUCKET RI 02862
12697	CLAROSTAT MFG CO INC	12055 ROJAS DRIVE SUITE K	EL PASO, TX 79936
13103	THERMALLOY CO INC	2021 W VALLEY VIEW LN PO BOX 810839	DALLAS TX 75381
18565	CHOMERICS INC	77 DRAGON COURT	WOBURN MA 01801-1039
2K262	BOYD CORP	6136 NE 87th AVE PO BOX 20038	PORTLAND OR 97220
2W733	BELDEN WIRE & CABLE COMPANY	2200 US HIGHWAY 27 SOUTH PO BOX 1980	RICHMOND, IN 47374
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051-0606
28681	HUTCHINSON MFG AND SALES INC	HIGHWAY 22 NORTHWEST	HUTCHINSON MN 55350
3L462	QUALITY PLASTICS DIV. OF MOLL PLASTICRAFTERS L.P.	2101 CRESTVIEW DRIVE	NEWBERG, OR 97132-9518
5Y400	TRIAx METAL PRODUCTS INC DIV OF BEAVERTON PARTS MFG CO	1800 NW 216TH AVE	HILLSBORO OR 97124-6629
52750	ALAN INDUSTRIES INC	745 GREENWARY DR PO BOX 1203	COLUMBUS IN 47202-2210
53421	TYTON CORPORATION	7930 N FAULKNER ROAD PO BOX 23005	MILWAUKEE WI 53223
57003	CHOMERICS INC	23839 S BANNING BLVD	CARSON CA 90745-6225
61058	MATSUSHITA ELECTRIC CORP OF AMERICA PANASONIC INDUSTRIAL CO DIV	TWO PANASONIC WAY	SECAUCUS NJ 07094

**Manufacturers Cross Index (Cont.)**

<b>Mfr. Code</b>	<b>Manufacturer</b>	<b>Address</b>	<b>City, State, Zip Code</b>
61374	BUEHLER PRODUCTS INC	PS BOX 33400	RALEIGH NC 27606
61935	SCHURTER INC	1016 CLEGG COURT	PETALUMA CA 94952-1152
72653	GC ELECTRONICS CO SUB OF HOUSEHOLD INTERNATIONAL CORP	1801 MARGAN ST PO BOX 1209	ROCKFORD IL 61105-1209
73743	FISCHER SPECIAL MFG CO	111 INDUSTRIAL RD	COLD SPRING KY 41076-9749
75498	MULTICOMP INC	3005 SW 154TH TERRACE #3	BEAVERTON OR 97006
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIV	ST CHARLES ROAD	ELGIN IL 60120
8X345	NORTHWEST SPRING & MFG CO	5858 SW WILLOW LANE	LAKE OSWEGO OR 97035
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
82389	SWITCHCRAFT INC SUB OF RAYTHEON CO	5555 N ELSTRON AVE	CHICAGO IL 60630-1314
85480	BRADY W H CO CORP H Q INDUSTRIAL PRODUCTS DIV	2221 W CAMDEN RD PO BOX 2131	MILWAUKEE WI 53209
86928	SEASTROM MFG CO INC	456 SEASTROM STREET	TWIN FALLS, ID 83301

**Replaceable Mechanical Parts List**

<b>Fig. &amp; Index Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Qty</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
1-1	390-1118-00	B010100	B010145	1	CAB., WRAPAROUND:ALUMINUM, CABINET:WRAPAROUND ASSY (INCLUDES FIG & INDEX 1-7,1-8 & 1-11)	TK1935	390-1118-00
	390-1118-01	B010146		1		80009	390111801
-2	211-0121-00			2	SCR,ASSEM WSHR:4-40 X 0.438,PNH,BRS,NP,POZ	TK0435	ORDER BY DESC
-3	200-3265-00			1	COVER,REAR:POLYCARBONATE	3L462	200-3265-00
-4	334-6639-01			1	OVERLAY,REAR PA:POLYCARBONATE,BACKED WITH ACRYLIC ADHESIVE	0KB05	334-6639-01
-5	348-0990-00			2	FOOT,CABINET:REAR,MOLDED BLACK POLYURETHENE	0JR05	348-0990-00
-6	211-0730-00			4	SCR,ASSEM WSHR:6-32 X 0.375,PNH,STL,CDPL,T-15,TORX DR,MACHINE,	0KB01	ORDER BY DESC
-7	367-0289-02	B010100	B010145	1	HANDLE,CARRING:13.855,DTT	80009	367028902
	367-0356-01	B010146		1	HANDLE,CARRYING:POLYCARBONATE LEXAN 500R,SMOKE TAN,CTS710	80009	367035601
-8	212-0144-00			2	SCREW,TPG,TC:8-16 X 0.562 L,PLASTITE,SPCL HD,TORX	0KB01	ORDER BY DESC
-9	348-0991-00			4	FOOT,CABINET:FRONT,MOLDED BLACK POLYURETHENE	80009	348-0991-00
-10	211-0691-00			4	SCR,ASSEM WSHR:6-32 X 0.625,PNH,STL,CDPL,T-15 TORX DR,MACHINE	0KB01	ORDER BY DESC
-11	348-0659-00			2	FOOT,CABINET:BLACK POLYURETHANE	0JR05	ORDER BY DESC
-12	334-8302-00	B010100	B010145	1	MARKER,IDENT:MKD TEKTRONIX,CABLE TV SPECTRUM ANALYZER	0KB05	ORDER BY DESC

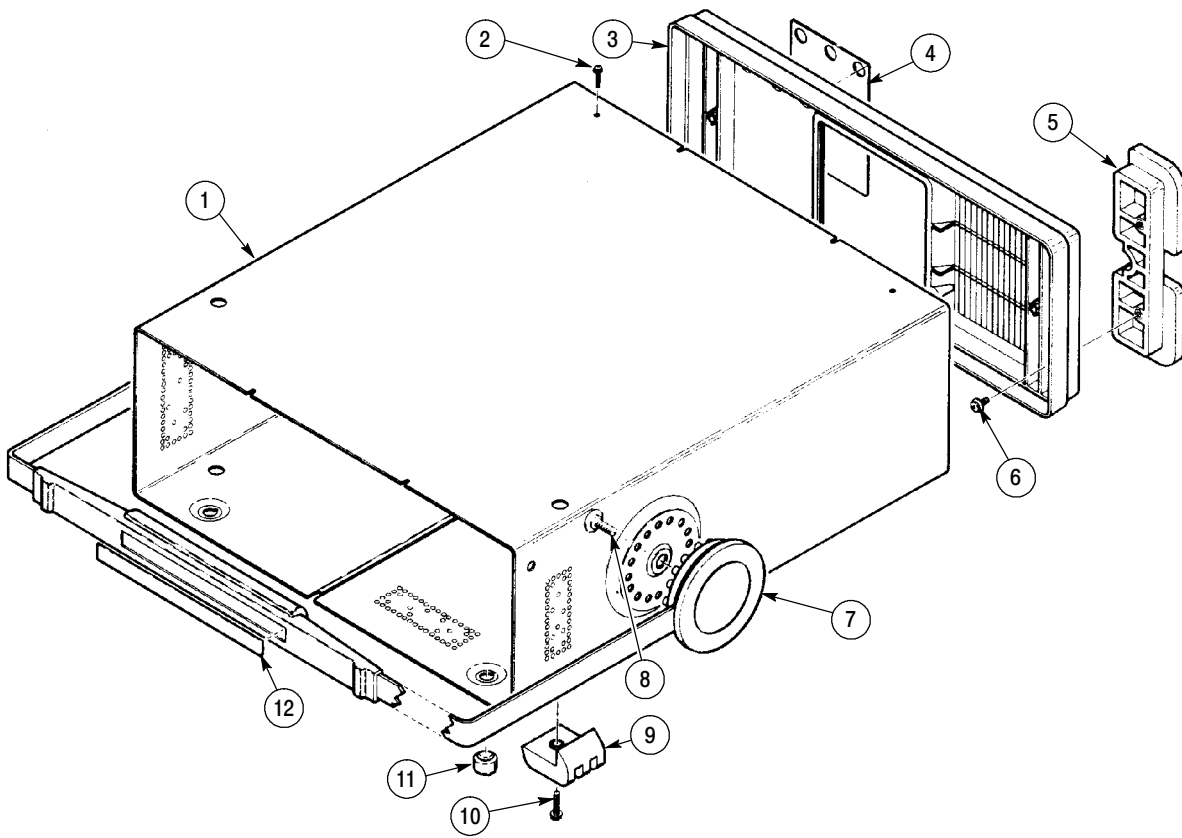


Figure 10- 1: Cabinet

**Replaceable Mechanical Parts List**

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
2-1	348-0660-00			4	CUSHION,CRT:POLYURETHANE	80009	348066000
-2	386-6198-00			1	SUBPANEL,FRONT:POLYCARBONATE	80009	386619800
-3	348-0276-00			0	SHLD GSKT,ELEK:MESH TYPE,0.080 OD,BULK SAFETY CONTROLLED	57003	01-0404-3719
-4	441-1986-00			1	CHASSIS,FRONT:ALUMINUM,2712	5Y400	ORDER BY DESC
-5	213-0882-00			1	SCREW,TPG,TR:6-32 X 0.437,PNH,STL,CDPL, TYPE TT,T-15 TORX DR	0KB01	ORDER BY DESC
-6	386-4443-00		B030924	1	SUPPORT,SHIELD:CRT,FRONT,PLASTIC	80009	386444300
-6	386-6911-00	B040925		4	SUPPORT, SHIELD:CRT SHIELD SUPPORT,PLASTIC,1740A	7X318	1365
-7	337-3487-00		B030924	1	SHIELD,ELEC:CRT,STL	0J9P9	337-3487-00
-7	337-4114-00	B040925		1	SHIELD,ELEC:CRT SHIELD,ELEC,0.014 STEEL,MOLY PERMALLOY,271X,	80009	337-4114-00
-8	334-1951-00			1	MARKER,IDENT:MKD WARNING,CRT VOLTAGES	TK0860	ORDER BY DESC
-9	334-1379-00			1	MARKER,IDENT:MKD HI VACUUM	07416	ORDER BY DESC
-10	441-1863-01		B030924	1	CHASSIS,REF:CARD CAGE	5Y400	ORDER BY DESC
-10	441-2120-00	B040925		1	CHASSIS,REF:CARD CAGE REFERENCE OSCILLATOR CHASSIS	80009	441-2120-00
-11	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
-12	407-3723-00			1	BRACKET,MTG:ALUMINUM	TK1935	407-3723-00
-13	337-3497-00			1	SHIELD,ELEC:2710,100MHZ	80009	337-3497-00
-14	211-0711-00			2	SCR,ASSEM WSHR:6-32 X 0.250,PNH,STL,CDPL, T-15 TORX DR,MACHINE	0KB01	ORDER BY DESC
-15	342-0855-00			1	INSULATOR,OVEN:NEOPENE LATEX FOAM,0.75 DIA, 0.075 THK	2K262	342-0855-00
-16	342-0856-00			1	INSULATOR,PLATE:NEOPRENE LATEX FOAM, W/ADHESIVE,1.4 X 1.5 X 0.125 THK	80009	342085600
-17	211-0097-00			1	SCREW,MACHINE:4-40 X 0.312,PNH,STL	TK0435	ORDER BY DESC
-18	-----			1	CIRCUIT BD ASSY:REF OSCILLATOR (SEE A21 REPL)		
-19	337-3496-00			1	SHIELD,ELEC:BACK,100MHZ,BRASS	80009	337-3496-00
-20	211-0541-00			3	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESC
-21	351-0303-00			5	GUIDE,CKT BOARD:T4002A,POLYCARBONATE, SILVER GRAY	80009	351030300
-22	211-0711-00			2	SCR,ASSEM WSHR:6-32 X 0.250,PNH,STL,CDPL, T-15 TORX DR,MACHINE	0KB01	ORDER BY DESC
-23	-----			1	CKT BD ASSY:SWEEP,389-0269-02 WIRED,2711 (SEE A5 REPL)		
-24	211-0711-00			2	SCR,ASSEM WSHR:6-32 X 0.250,PNH,STL,CDPL, T-15 TORX DR,MACHINE	0KB01	ORDER BY DESC
-25	385-0080-00			2	SPACER,POST:0.437 L W/6-32 THD THRU,AL 0.25 HEX	TK2174	385-0080-00

## Replaceable Mechanical Parts List (Cont.)

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
-26	-----			1	CA ASSY,SP,ELEC:4,26 AWG,3.0 L,RIBBON (SEE W25 REPL)		
-27	210-0457-00			1	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	TK0435	ORDER BY DESC
-28	211-0541-00			2	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESC
-29	211-0711-00			2	SCR,ASSEM WSHR:6-32 X 0.250,PNH,STL,CDPL, T-15 TORX DR,MACHINE	0KB01	ORDER BY DESC
-30	407-4058-00			1	BRACKET,MTG:ALUMINUM,FRONT	5Y400	ORDER BY DESC
-31	211-0512-00			1	SCREW,MACHINE:6-32 X 0.5,FLH,100 DEG, STL CD PL POZ	TK0435	ORDER BY DESC
-32	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.250,PNH,STL,CDPL, T-15 TORX DR,MACHINE	0KB01	ORDER BY DESC
-33	210-0993-00			1	WASHER,FLAT:0.143 ID X 0.75 OD X 0.051,BRS	86928	ORDER BY DESC
-34	361-1588-01			2	SPACER,CONN:0.080 THICK X 1.0 OD,W/2 DFLAT @ 0.54 WIDE W/2(0.320RAD)0.080 THK AL	80009	361158801
-35	174-2673-00			1	CABLE ASSY,RF:50 OHM COAX,SEMIRIGID,4.504 L ALL EXCEPT OPT 50	TK2469	174-2673-00
	174-0199-01			1	CA ASSY,SP,ELEC:SEMI-RIGID OPTION 50 ONLY	060D9	174-0199-01
-36	015-0638-00			1	TERMN FEEDTHRU:MALE F TO FEMALE SMA, W/25 OHM SERIES RES,75 OHM INPUT,50 OHM OUT,STR,FN L/D1/FLAT,0.625-2J,1.765 L	52750	255-1544
-37	210-1365-00			2	WASHER,FLAT:0.141 ID X 0.266 OD X 0.5,AL	0KB01	ORDER BY DESC
-38	-----			1	LOUDSPEAKER,PM:8 OHM,3W,2.047 DIA (SEE LS103 REPL)		
-39	211-0622-00			2	SCREW,MACHINE:6-32 X 0.188,TRH,SST	TK0435	MACHINE SCREW:
-40	-----			1	JACK,TELEPHONE:MINIATURE,SHUNT TYPE (SEE J102 REPL)		
-41	129-0285-00			4	SPACER,POST:0.281 L,4-40 THRU,BRS,CU SN ZN PL,0.188 HEX	80009	129028500
-42	210-1365-00			4	WASHER,FLAT:0.141 ID X 0.266 OD X 0.5,AL	0KB01	ORDER BY DESC
-43	211-0541-00			8	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESC
-44	-----			1	RES,VAR,NONWW:PNL,20K OHM,20%,0.5W LINEAR (SEE R480 REPL)		
-45	-----			1	RES,VAR,NONWW:PNL,2X10K OHM,0.5W (SEE R360 REPL)		
-46	-----			1	ENCODER,DIGITAL:INCREMENTAL,50PPR, 50 DETENT ,QUAD OUTPUT,LOC LUG AT 9 O'CLOCK (SEE A6SW260 REPL)		
-47	-----			1	CIRCUIT BD ASSY:FRONT PANEL (SEE A6 REPL)		
-48	260-2546-00			1	SWITCH ASSEMBLY:KEYPAD,2712,ELASTOMER	TK1918	ORDER BY DESC
-49	366-0748-00			1	PUSH BUTTON ASSEMBLY:2714	80009	366074800
-50	344-0423-00			9	CLIP,RETAINING:2712 FRONT PANEL/KYBD ASSY	0KBZ5	334-0423-00

**Replaceable Mechanical Parts List (Cont.)**

<b>Fig. &amp; Index Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Qty</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
-51	333-4003-00			1	PANEL FRONT:2714	0KB05	ORDER BY DESC
-52	200-3416-00			1	COVER,TG PORT:PLASTIC	3L462	200-3416-00
-53	210-0046-00			1	WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL	78189	1214-05-00-0541
-54	210-0583-00			1	NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL	73743	2X-20319-402
-55	366-1326-01			1	KNOB:GRAY,0.127 ID X 0.588 OD X0.6 H	80009	366-1326-01
-56	366-1696-01			1	KNOB:GRAY,0.82 ID X 0.588 OD X 0.6 H	80009	366-1696-01
-57	366-1708-03			1	KNOB:SIL GY,0.127 ID X 0.5 OD X0.531 H	0JR05	ORDER BY DESC
-58	210-0590-00			1	NUT,PLAIN,HEX:0.375-32 X 0.438 BRS CD PL	73743	28269-402
-59	210-0046-00			1	WASHER,LOCK:0.261 ID,INTL,0.018 THK,STL	78189	1214-05-00-0541
-60	211-0690-01			2	SCREW,MACHINE:6-32 X 0.875 PNH,SST	0KB01	ORDER BY DESC
-61	334-8810-00			1	MARKER,IDENT:BEZEL LABEL,2715	0KB05	334-8810-00
-62	426-1765-02			1	FRAME,CRT:POLYCARBONATE,GRAY	0JR05	ORDER BY DESC
-63	337-2775-00			1	SHLD,IMPLOSION:FILTER,BLUE 2211/2213/2215SA FETY CONTROLLED	0JR05	ORDER BY DESC
-64	366-1782-02			1	SHELL,KNOB:MOLDED PLASTIC	80009	366-1782-02
-65	210-0590-00			1	NUT,PLAIN,HEX:0.375-32 X 0.438 BRS CD PL	73743	28269-402
-66	210-0994-00			1	WASHER,FLAT:0.125 ID X 0.25 OD X 0.022,STL	12327	ORDER BY DESC



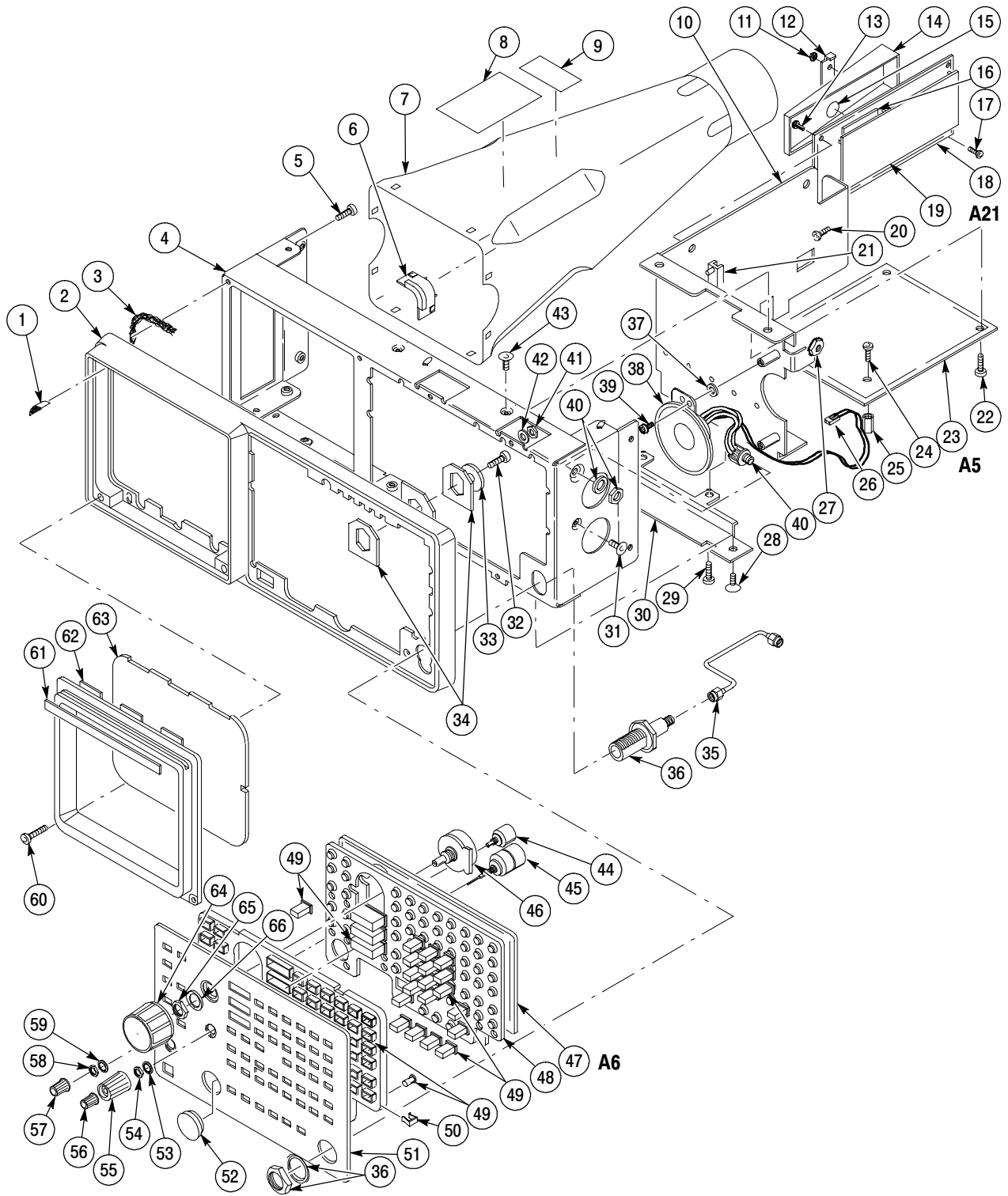


Figure 10-2: Front Panel

**Replaceable Mechanical Parts List**

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
3-1	-----			1	CABEL ASSY,RF:50 OHM COAX,9.0 L,W/O TAG (SEE A15A1W2 REPL)		
-2	348-0090-00	B040925		1	PAD,CUSHIONING 2.03 X 0.69 X 0.312 SI RBR , CUT TO 1/3 LENGTH FOR THIS USE		348-0090-00
-3	174-2551-00		B030924	1	CA ASSY,SP,ELEC:RIBBON W/CRT SOCKET (W1 ON INTERCONNECT DIAGRAM)	80009	174255100
-3	131-6014-00	B040925		1	CA ASSY,CRT:DISCRETE,ANODE LEAD,CRT,1,22 AWG,30KV,UL3239,58MM DIA A NODE X 1.9 L,0.125 LEAD	20093	131-6014-00
-4	200-1388-03			1	COVER,FUSE LEAD:POLYURETHANE	0JR05	ORDER BY DESC
-5	-----				(PART OF FIGURE AND INDEX 3-19)		
-6	-----			1	MODULE,HV:,3KVAC INPUT,12KVDC ANODE OUT, -3KVDC CATHODE OUT (SEE A15U120 REPL)		
-7	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
-8	343-1502-00		B010180	1	CLAMP,CABLE:0.188 ID X 0.25 W,0.141 MOUNTING HOLE,BLACK NYLON	53421	NX1
	343-1502-00			3	CLAMP,CABLE:0.188 ID X 0.25 W,0.141 MOUNTING HOLE,BLACK NYLON	53421	NX1
-9	211-0711-00			4	SCR,ASSEM WSHR:6-32 X 0.250,PNH,STL,CDPL,T-15 TORX DR,MACHINE	0KB01	ORDER BY DESC
-10	210-0011-00			2	WASHER,LOCK:0.25 ID,INTL,0.025 THK,STL CD PL	78189	1214-00-00-0541
-11	358-0251-00			2	BUSHING,VAR RES:0.25-32 X 0.424 L,BRS NP	80009	358025100
-12	-----			1	CABLE ASSY,RF:SHLD CMPD,;CPD,12,28 AWG,12.0L (SEE A15W3 REPL)		
-13	200-3506-00			1	COVER,CRT:REAR	0J9P9	ORDER BY DESC
-14	358-0251-00			1	BUSHING,VAR RES:0.25-32 X 0.424 L,BRS NP	80009	358025100
-15	210-0586-00			1	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
-16	131-0890-00			2	CONN,HARDWARE:DSUB,JACK SCREW;4-40 X 0.312 L HEX HD,STL CD PL,W/2 FLAT WASHERS,1 LOCK WASHER,4-40 NUT,2 JACKSCREW/ASSY	0KB01	131-0890-00
-17	334-8164-01			1	MARKER,IDENT:MKD UL DCSA CE CERTIFICATION	0KB05	334-8164-01
-18	211-0541-00			2	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESC
-19	204-0833-00			1	BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES	61935	031 1653 (MODEL
-20	200-2264-00			1	CAP,FUSEHOLDER:3AG FUSES	61935	FEK 031 1666
-21	214-2871-00			2	HARDWARE KIT:STANDOFF ,STUD MOUNT W/NUT & LOCKWASHER	00779	552633-3
-22	174-1822-00			1	CA ASSY,SP,ELEC:24,24 AWG,16.0 L,RIBBON,PNL MT X 2 X 12 RCPT	0J7N9	174-1822-00
-23	210-0586-00	B010181		2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
-24	337-3805-01	B010181		1	SHIELD,FAN:EMI,SHIELD .030 ALUMINUM WITH CHROMATE CONVERSION COATING	80009	337380501

**Replaceable Mechanical Parts List (Cont.)**

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
-25	211-0661-00			4	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL,CD PL,POZ, MACHINE	TK0435	ORDER BY DESC
-26	134-0026-00			1	BUTTON,PLUG:U/W 0.375 HOLE	72653	11-352
-27	119-3299-00			1	FILTER:POWER LINE,RTANG	0GV52	FX326-3/07
-28	211-0529-00	B010181		2	SCREW,MACHINE:6-32 X 1.250,PNH,STL	TK0435	ORDER BY DESC
-29	211-0661-00	B010181		4	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL,CD PL,POZ, MACHINE	TK0435	ORDER BY DESC
-30	214-4704-00	B010181		2	SPRING:0.020 BERYLLIUM COPPER W/ELECTROLESS NICKEL PLATE,SPRING FAN MOUNT	80009	214470400
-31	441-1931-01	B010181		1	CHASSIS,REAR:REAR CHASSIS .050 ALUMINUM5052	80009	441193101
-32	131-0955-00			1	CONN,RF JACK:BNC,;50 OHM,FEMALE,STR,SLDR CUP/FRONT PNL,GOLD,0.520 MLG X 0.490 TAIL	K1072	G35152BN
-33	174-1822-00			1	CA ASSY,SP,ELEC:24,24 AWG,16.0 L,RIBBON,PNL MT X 2 X 12 RCPT	OJ7N9	174-1822-00
-34	386-6132-00			1	PLATE,MOUNTING:GPIB,AL (OPTION 03 ONLY)	5Y400	386-6132-00
	386-6209-01			1	PLATE,MOUNTING:ALUMINUM (OPTION 08 ONLY)	5Y400	380-3209-01
-35	210-0204-00			1	TERMINAL,LUG:0.142 ID,LOCKING,BRZ TINNED	86928	A373-175
-36	210-0586-00			1	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
-37	-----	B010181		1	FAN,DC:TUBEAXIAL;12V,60MM X 60MM X 25.5MM,17.65CFM,42DBA,3.24W,0.27A (SEE A15B15 REPL)		
-38	210-0457-00	B010181		2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	TK0435	ORDER BY DESC
-39	214-4129-01			1	BRACKET,HEAT SK:ALUMINUM	OJ260	214-4129-01
-40	343-0007-00			1	CLAMP,LOOP:0.625 ID,PLASTIC	06915	N10B
-41	210-0863-00			1	WSHR,LOOP CLAMP:0.091 ID U/W 0.5 W CLP,STLCD PL	85480	C191
-42	211-0602-00			1	SCR,ASSEM WSHR:6-32 X 0.438,PNH,BRS NP,POZ	TK0435	ORDER BY DESC
-43	211-0014-00			1	SCREW,MACHINE:4-40 X 0.5,PNH,STL	TK0435	ORDER BY DESC
-44	342-0536-00			1	INSULATOR,XSTR:TO-220,POLYENELENE	TK2562	342-0536-00
-45	342-0420-00			1	INSULATOR,PLATE:TRANSISTOR PORCELAIN	TK2606	342-0420-00
-46	210-0586-00	B010100	B010180	2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
-47	407-4115-00			1	BRKT,HEAT SINK:ALUMINUM	OJ9P9	ORDER BY DESC
-48	343-1397-00			1	RETAINER,TRANS:NATURAL	80009	343139700
-49	210-1001-00			1	WASHER,FLAT:0.119 ID X 0.375 OD X 0.021,BRS	12360	ORDER BY DESC
-50	211-0302-00			1	SCR,ASSEM WSHR:4-40 X 0.750,PNH,STL,CDPL,T-10 TORX DR,MACHINE	OKB01	ORDER BY DESC
-51	344-0445-00			2	CLIP,SPRING:TENSION,PHOSPHOR BRONZECU-SN-ZN	8X345	344-0445-00
-52	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
-53	384-1136-00			1	EXTENSION SHAFT:0.95 INCH LONG	OJR05	ORDER BY DESC

**Replaceable Mechanical Parts List (Cont.)**

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
-54	441-1708-02		B030924	1	CHASSIS,REAR:INTERCONNECT,ALUMINUM	0J9P9	441-1708-02
-54	441-2121-00	B040925		1	CASSIS,REAR:REAR INTERCONNECT CHASSIS,0.050 ALUM,W/GROMMET & 9 STANDOFFS	80009	441-2121-00
-55	-----			1	CIRCUIT BD ASSY:POWER SUPPLY (SEE A15 A1 REPL)		
-56	211-0711-00			2	SCR,ASSEM WSHR:6-32 X 0.250,PNH,STL,CDPL,T-15 TORX DR,MACHINE	0KB01	ORDER BY DESC
-57	337-3772-02			1	SHIELD,ELEC:POWER SUPPLY	80009	337377202
-58	210-0910-00			2	WASHER,FLAT:0.19 OD X 0.281 OD X 0.046 TEFLON	02107	S-47-11
-59	214-3012-00			2	FSTNR,SNAP-IN:0.437 L X 0.3 DIA,ROUND HD	02768	254-090601-01
-60	211-0711-00			5	SCR,ASSEM WSHR:6-32 X 0.250,PNH,STL,CDPL,T-15 TORX DR,MACHINE	0KB01	ORDER BY DESC
-61	211-0121-00			1	SCR,ASSEM WSHR:4-40 X 0.438,PNH,BRS,NP,POZ	TK0435	ORDER BY DESC
-62	210-1178-00			1	WASHER,SHLDR:U/W TO-220 TRANSISTOR	13103	7721-7PPS
	211-0116-00			1	SCR,ASSEM WSHR:4-40 X 0.312,PNH,BRS,NP,POZ	TK0435	ORDER BY DESC
-63	-----			1	TRANSISTOR,PWR:BIPOLAR,NPN;400V,4.0A,SWITCHING (SEE A15A1Q130 REPL)		
-64	334-4251-00			1	MARKER,IDENT:MKD CAUTION	07416	ORDER BY DESC
-65	211-0121-00			2	SCR,ASSEM WSHR:4-40 X 0.438,PNH,BRS,NP,POZ	TK0435	ORDER BY DESC
-66	342-0563-00			1	INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINFORCED SILICON RUBBER	18565	69-11-8805-1674
-67	214-4467-00			1	HEAT SINK,XSTR:MACHINED ALUMINUM	TK1828	ORDER BY DESC
-68	348-0502-00			1	FOOT,CABINET:GRAY RUBBER	04963	SJ-5023 GRAY
-69	211-0711-00			3	SCR,ASSEM WSHR:6-32 X 0.250,PNH,STL,CDPL,T-15 TORX DR,MACHINE	0KB01	ORDER BY DESC
-70	384-1058-00			1	EXTENSION SHAFT:8.157 L	0JR05	ORDER BY DESC
-71	384-1061-00			1	EXTENSION SHAFT:4.357 L	0JR05	ORDER BY DESC
-72	366-1480-03			1	PUSH BUTTON:BLACK,OFF	0JR05	ORDER BY DESC
-73	351-0303-00			6	GUIDE,CKT BOARD:T4002A,POLYCARBONATE,SILVERGRAY	80009	351030300
-74	348-0145-00			2	GROMMET,PLASTIC:GRAY,U SHAPE,0.48 ID	0JR05	ORDER BY DESC
-75	255-0581-00			AR	PLASTIC CHANNEL:0.156 X 0.156,POLYETHYLENE	TK1643	ORDER BY DESC
-76	342-0563-00			4	INSULATOR,PLATE:TRANSISTOR,FIBERGLASS RINFORCED SILICON RUBBER	18565	69-11-8805-1674
-77	210-1178-00			4	WASHER,SHLDR:U/W TO-220 TRANSISTOR	13103	7721-7PPS
-78	211-0116-00			4	SCR,ASSEM WSHR:4-40 X 0.312,PNH,BRS,NP,POZ	TK0435	ORDER BY DESC

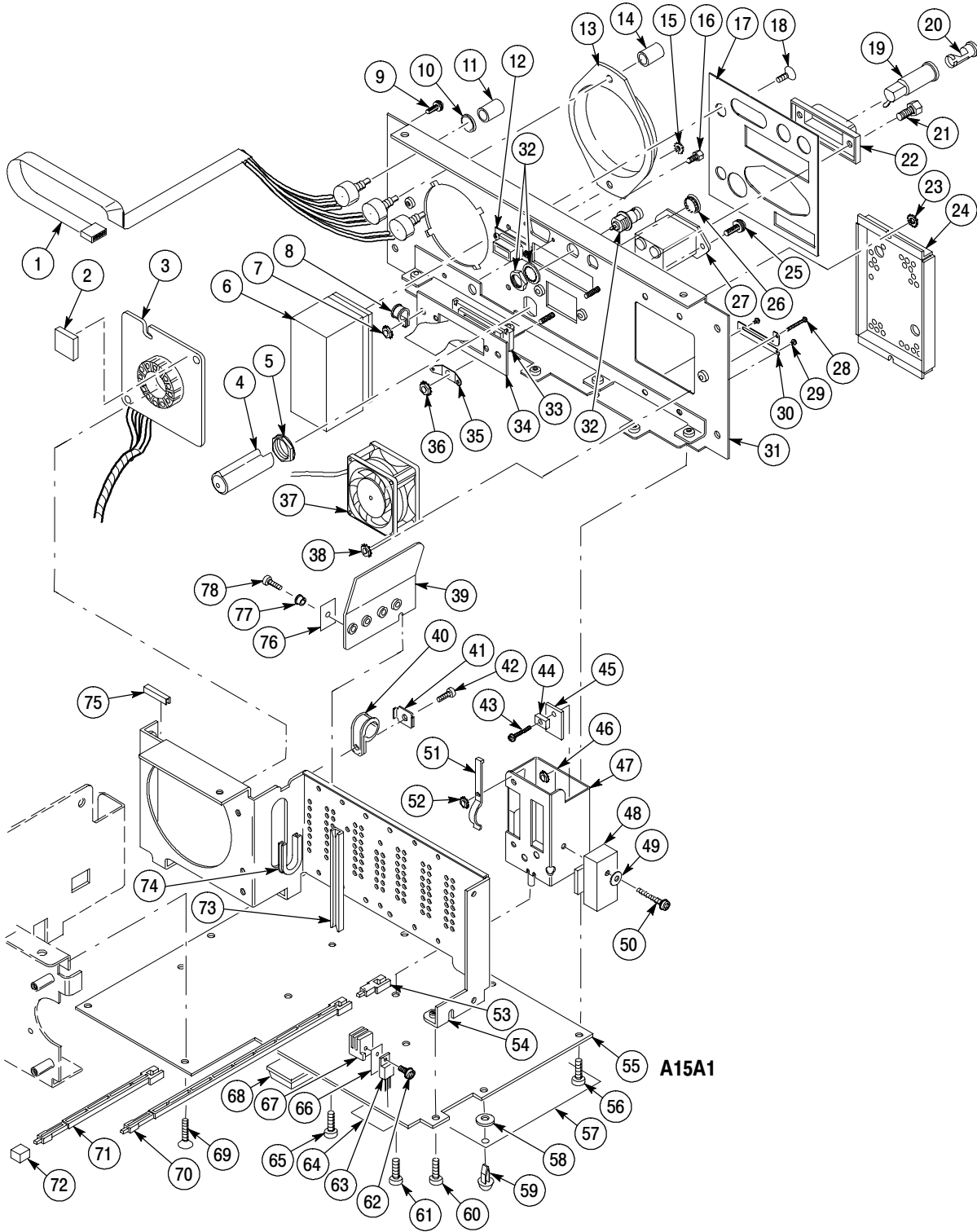


Figure 10-3: Power Supply

**Replaceable Mechanical Parts List**

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
4-1	-----			1	FILTER,LOW PASS:DC TO 1.8GHZ (SEE FL16 REPL)		
-2	352-0482-00			1	HOLDER,CA TIE:0.75 SQ,STICKY BACK,PLASTIC	06383	ABMM-AT-D
-3	210-0206-00			1	TERMINAL,LUG:0.2 ID,LOCKING,BRZ TINNED	0KB01	OBD
-4	-----			1	YIG BUFFER ASSY:2712 (SEE A17 REPL)		
-5	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
-6	210-0994-00			2	WASHER,FLAT:0.125 ID X 0.25 OD X 0.022,STL	12327	ORDER BY DESC
-7	210-0940-00			1	WASHER,FLAT:0.25 ID X 0.375 OD X 0.02,STL	12327	ORDER BY DESC
-8	211-0246-00			2	SCR,ASSEM WSHR:4-40 X 0.625,PNH,STL,CD PL, POZ,MACHINE	TK0435	ORDER BY DESC
-9	441-1710-01			1	CHASSIS,RF,;	80009	441171001
-10	211-0343-00			15	SCREW,MACHINE:4-40 X 0.250,TRUSS,STL,CDPL, T-9 TORX DR	0KB01	ORDER BY DESC
-11	-----			1	CKT BD ASSY:RF MON/2ND LO, (SEE A14A1 REPL)		
-12	380-1082-00			1	HOUSING,RF:RF MOM,MACHINED,ALLOY	80009	380108200
-13	211-0246-00			2	SCR,ASSEM WSHR:4-40 X 0.625,PNH,STL,CD PL, POZ,MACHINE	TK0435	ORDER BY DESC
-14	211-0503-00			3	SCREW,MACHINE:6-32 X 0.188,PNH,STL	TK0435	ORDER BY DESC
-15	200-3514-02			1	COVER,RF:ALUMINUM	0J7N4	200-3514-02
-16	211-0622-00			3	SCREW,MACHINE:6-32 X 0.188,TRH,SST	TK0435	MACHINE SCREW:
-17	-----			1	1ST CONVERTER A:2710 (SEE A16 REPL)		
-18	211-0031-00			4	SCREW,MACHINE:4-40 X 1.0,FLH,100 DEG, STL CDPL,PHILLIPS	73893	ORDER BY DESC
-19	-----			1	CIRCUIT BD ASSY:RF ATTN (SEE A18 REPL)		
-20	337-3437-00			1	SHIELD,ELEC:YIG,BOTTOM	0J9P9	337-3437-00
-21	352-0797-00			1	HOLDER,YIG:SST	0J9P4	352-0797-00
-22	211-0512-00			1	SCREW,MACHINE:6-32 X 0.5,FLH,100 DEG, STL CDPL POZ	TK0435	ORDER BY DESC
-23	211-0512-00			2	SCREW,MACHINE:6-32 X 0.5,FLH,100 DEG, STL CDPL POZ	TK0435	ORDER BY DESC
-24	386-5665-00			1	NUT PLATE:ALUMINUM	0J848	386-5665-00
-25	210-0457-00			4	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	TK0435	ORDER BY DESC
-26	343-1260-00			1	CLAMP,YIG:SST	0J9P4	343-1260-00
-27	337-3436-00			1	SHIELD,ELEC:YIG,TOP	80009	337343600
-28	211-0541-00			8	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESC
-29	361-1496-00			4	SPACER,SLEEVE:0.120 L X 0.250 ID,ALUMINUM	0J260	361-1496-00
-30	211-0541-00			4	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESC

**Replaceable Mechanical Parts List (Cont.)**

<b>Fig. &amp; Index Number</b>	<b>Tektronix Part Number</b>	<b>Serial No. Effective</b>	<b>Serial No. Discont'd</b>	<b>Qty</b>	<b>Name &amp; Description</b>	<b>Mfr. Code</b>	<b>Mfr. Part Number</b>
-31	210-0940-00			4	WASHER,FLAT:0.25 ID X 0.375 OD X 0.02,STL	12327	ORDER BY DESC
-32	220-0531-02			5	NUT,PLAIN,HEX:0.25-36 X 0.312 HEX,BRS NP	80009	220053102
-33	-----			1	1ST IF FILTER:TUNED CAVITY (SEE FL17 REPL)		
-34	343-0549-00			1	STRAP,TIEDOWN,E:0.098 W X 4.0 L,ZYTEL	TK1499	HW-047
-35	-----			1	FILTER,LOW PASS (SEE FL18 REPL)		

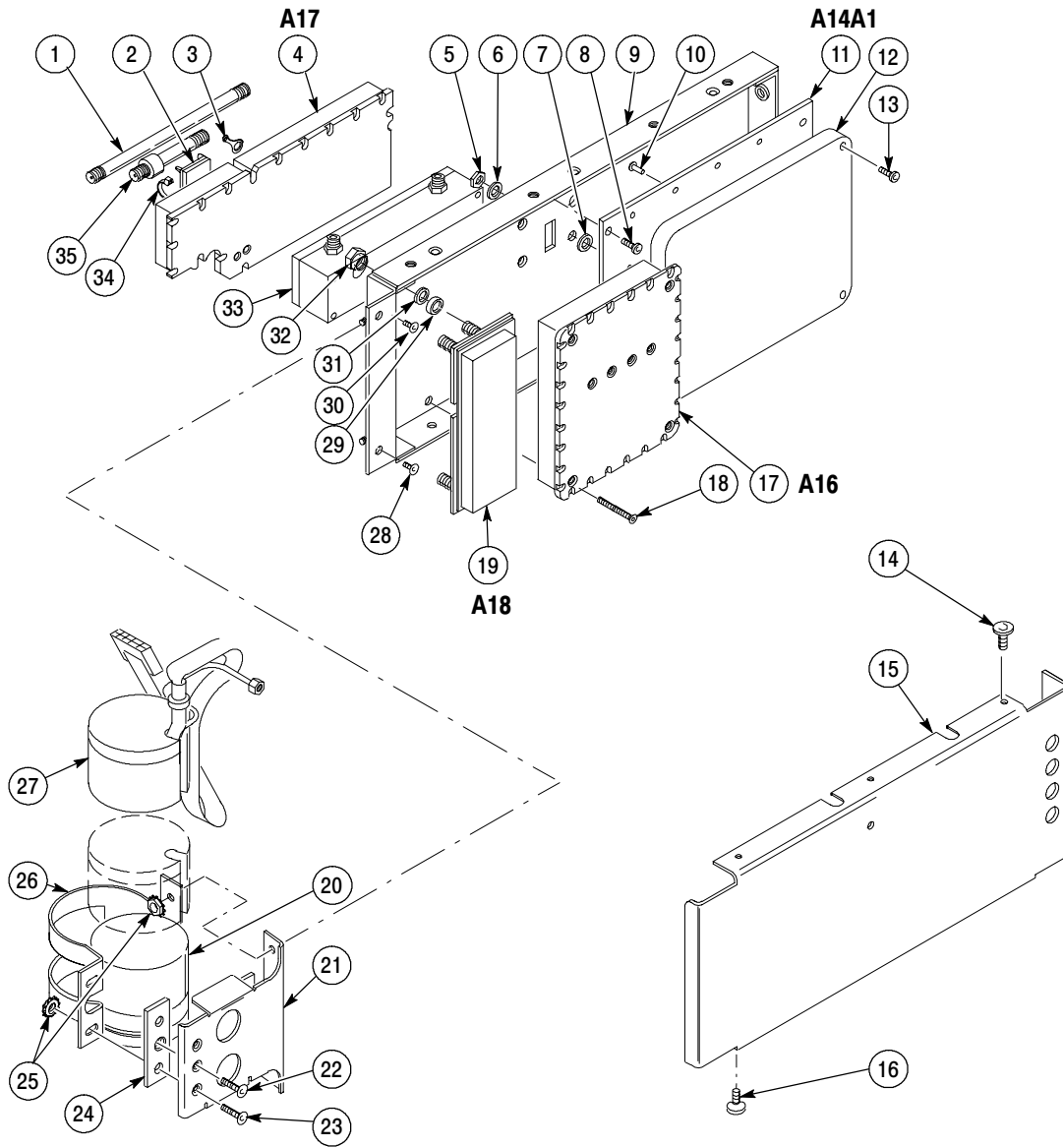


Figure 10-4: Chassis #1



**Replaceable Mechanical Parts List**

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
5-1	211-0711-00			4	SCR,ASSEM WSHR:6-32 X 0.250,PNH,STL,CDPL, T-15 TORX DR,MACHINE	OKB01	ORDER BY DESC
-2	211-0541-00			4	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESC
-3	200-3158-03			1	COVER,VR:ALUMINUM	OJ7N4	200-3158-03
-4	211-0661-00			3	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL,CD PL, POZ,MACHINE	TK0435	ORDER BY DESC
-5	-----			1	CIRCUIT BD ASSY:VARIABLE RESOLUTION (SEE A13A1 REPL)		
-6	441-1711-01			1	CHASSIS,VR:ALUMINUM	OJ260	441-1711-01
-7	-----			1	CIRCUIT BD ASSY:RF OPTION (SEE A23 REPL)		
-8	441-1911-00		B030924	1	CHASSIS,RF:ALUMINUM	OJ260	441-1911-00
-8	441-2123-00	B040925		1	CHASSIS,RF:SIDE CHASSIS,0.050 ALUM,W/8 STANDOFFS,3 PRESSMOUNT HOLES,271X	80009	441-2123-00
-9	407-4480-00	B040925		1	CRT MOUNT:CRT MOUNT,0.048 1018 CRS,EG,W/2 6-32 PEM NUTS,271X,	80009	407-4480-00
-10	426-1766-00			1	MOUNT,RESILIENT:CRT,REAR	80009	426176600
-11	214-1061-05			1	SPRING,GROUND:PLATED	TK1326	ORDER BY DESC
-12	211-0541-00			2	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESC
-13	343-1224-00		B030924	1	RETAINER,CKT BD:ALUMINUM	OJ9P4	343-1224-00
-13	343-1599-00	B040925		1	RETAINER:PCB RETAINER,0.063 ALUM,271X	80009	343-1599-00
-14	-----			1	CIRCUIT BD ASSY:PHASELOCK CFC (SEE A12A1 REPL)		
-15	361-1487-00			1	SPACER:ALUMINUM	80009	361148700
-16	210-0202-00			1	TERMINAL,LUG:0.146 ID,LOCKING,BRZ TIN PL	TK1181	ORDER BY DESC
-17	211-0162-00			12	SCREW,MACHINE:2-56 X 0.188,SCH,SST	TK0428	ORDER BY DESC
-18	-----			1	CIRCUIT BD ASSY:LOW FREQUENCY (SEE A12A3 REPL)		
-19	337-3493-00			1	SHIELD,XFMR:SILVER PLATED	OJ9P9	337-3493-00
-20	200-3606-00			1	COVER,HOUSING:ALUMINUM	OJ260	200-3606-00
-21	337-3494-00			1	SHIELD,COVER	80009	337-3494-00
-22	129-1254-00			1	SPACER,POST:6-32,0.312 HEX,ALUMINUM	TK2174	129-1254-00
-23	211-0162-00			11	SCREW,MACHINE:2-56 X 0.188,SCH,SST	TK0428	ORDER BY DESC
-24	211-0016-00			1	SCREW,MACHINE:4-40 X 0.625,PNH,STL	TK0435	ORDER BY DESC
-25	210-1178-00			1	WASHER,SHLDR:U/W TO-220 TRANSISTOR	13103	7721-7PPS
-26	342-0563-00			1	INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINFORCED SILICON RUBBER	18565	69-11-8805-1674
-27	337-3509-00			1	SHIELD,ELEC:COIL,BRASS (SEE A12A2 REPL)	80009	337-3509-00
-28	-----			1	CIRCUIT BD ASSY:HIGH FREQ VCO (SEE A12A2 REPL)		

**Replaceable Mechanical Parts List (Cont.)**

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
-29	211-0162-00			9	SCREW,MACHINE:2-56 X 0.188,SCH,SST	TK0428	ORDER BY DESC
-30	337-3494-00			1	SHIELD,COVER	80009	337-3494-00
	380-0901-00			1	HOUSING,LOCK:ALUMINUM	TK1564	ORDER BY DESC
-31	210-0586-00	B010100	B010166	4	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
	210-0551-00	B010167		4	NUT,4-40	TK0435	ORDER BY DESC
	210-0054-00	B010167		4	LOCK WASHER	TK0435	ORDER BY DESC
-32	211-0343-00			10	SCREW,MACHINE:4-40 X 0.250,TRUSS,STL,CDPL, T-9 TORX DR	0KB01	ORDER BY DESC
-33	129-1200-00			4	SPCR,SHLDR SCR:5.75 L,W 4-40 INT ONE END, 4-40 EXT INE END,0.188 HEXAL	TK1287	129-1200-00
-34	337-3500-01			1	SHIELD,ELEC:BACK BRASS	80009	337-3500-01
-35	210-0004-00			4	WASHER,LOCK:#4 INTL,0.015 THK,STL	78189	1204-00-00-0541
-36	211-0343-00			4	SCREW,MACHINE:4-40 X 0.250,TRUSS,STL,CDPL, T-9 TORX DR	0KB01	ORDER BY DESC
-37	-----			1	CIRCUIT BD ASSY:MICROPROCESSOR (SEE A10 REPL)		
-38	-----			1	CKT BD ASSY:DISPLAY STORAGE (SEE A9 REPL)		
-39	174-0534-00			1	CA ASSY,SP,ELEC:50,28 AWG,5.0 L RIBBON	TK2469	174-0534-00
-40	-----			1	CKT BD ASSY:DIGITAL OPTIONS/IF GATE (SEE A11 REPL)		
-41	337-3434-00			1	SHIELD,ELEC:CIRCUIT BOARD	28681	337-3434-00
-42	-----			1	CKT BD ASSY:LOG AMP (SEE A11 REPL)		
-43	214-4421-01			1	HT SK,CKT BD:ALUMINUM,W/SHIM	5Y400	ORDER BY DESC
-44	342-0563-00			2	INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINFORCED SILICON RUBBER	18565	69-11-8805-1674
-45	-----			1	IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR; POSITIVE,5.0V,1.0A,4% (SEE A7U990 REPL)		
	-----			1	IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR; NEGATIVE,-5.0V,1.0A,4.0% (SEE A7U991 REPL)		
-46	210-0994-00			2	WASHER,FLAT:0.125 ID X 0.25 OD X 0.022,STL	12327	ORDER BY DESC
-47	210-0054-00			2	WASHER,LOCK:#4 SPLIT,0.025 THK STL	86928	ORDER BY DESC
-48	210-0406-00			2	NUT,PLAIN,HEX:4-40 X 0.188,BRS CD PL	73743	12161-50
-49	210-1178-00			2	WASHER,SHLDR:U/W TO-220 TRANSISTOR	13103	7721-7PPS
-50	337-3433-00			1	SHIELD,ELEC:CIRCUIT BOARD	28681	337-3433-00
-51	211-0409-00			1	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,CDPL, T-10 TORX DR	0KB01	211-0409-00
-52	255-0581-00			1	PLASTIC CHANNEL:0.156 X 0.156,POLYETHYLENE	TK1643	ORDER BY DESC

## Replaceable Mechanical Parts List (Cont.)

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
-53	211-0711-00			4	SCR,ASSEM WSHR:6-32 X 0.250,PNH,STL,CDPL, T-15 TORX DR,MACHINE	0KB01	ORDER BY DESC
-54	214-4138-00			1	HT SK,CKT BD:ALUMINUM	OJ260	214-4138-00
-55	211-0116-00			4	SCR,ASSEM WSHR:4-40 X 0.312,PNH,BRS,NP,POZ	TK0435	ORDER BY DESC
-56	210-1178-00			4	WASHER,SHLDR:U/W TO-220 TRANSISTOR	13103	7721-7PPS
-57	342-0563-00			4	INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINFORCED SILICON RUBBER	18565	69-11-8805-1674
-58	211-0541-00			2	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESC
-59	211-0661-00			2	SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL,CD PL, POZ,MACHINE	TK0435	ORDER BY DESC
-60	337-3575-01			1	SHIELD,ELEC:RF OPTIONS	80009	ORDER BY DESC
-61	211-0005-00			8	SCREW,MACHINE:4-40 X 0.125,PNH,STL CD PL,POZ	0KB01	ORDER BY DESCRIPTION
-62	129-1321-00			6	SPACER,POST:4-40 X 0.47 L,HEX,ALUMINUM	TK2174	129-1321-00
-63	211-0541-00	B040925		2	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	TK0435	ORDER BY DESC

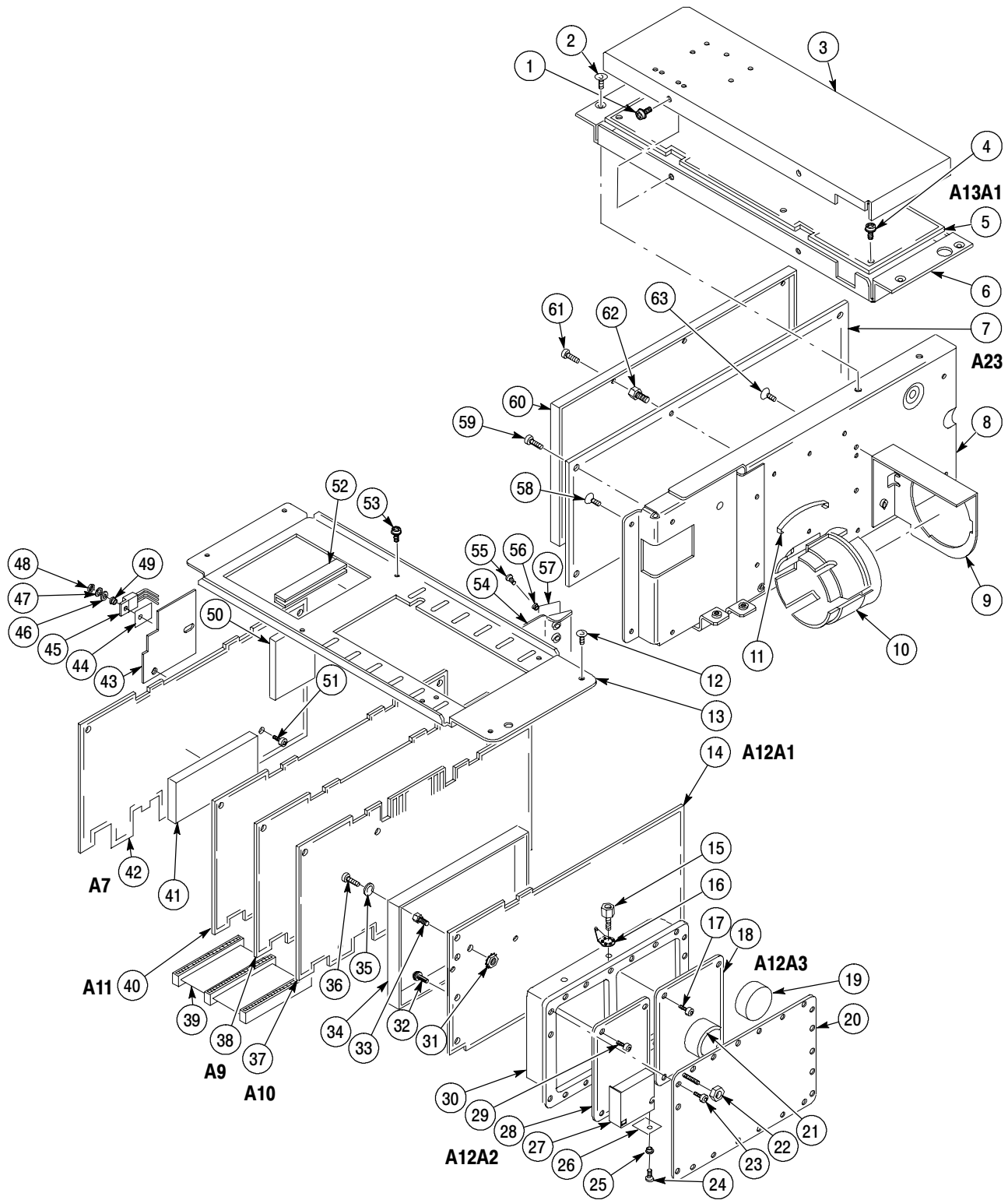


Figure 10-5: Chassis #2

## Replaceable Mechanical Parts List

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
6-1	161-0104-00			1	CA ASSY,PWR:3,18 AWG,98 L,250V/10AMP,98 INCH,RTANG,IEC320,RCPT X STR,NEMA 15-5P,W/CORD GRIP,US,SAFTEY CONTROLLED	0B445	MC6 -3 CG86
-2	161-0104-06			1	CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER, RTANG,IEC320,RCPT,EUROPEAN,SAFTEY CONTROLLED (EUROPEAN OPTION A1 ONLY)	S3109	198-010
-3	161-0104-07			1	CA ASSY,PWR:3,1.0MM SQ,240V/10A,2.5 METER, RTANG,IEC320,RCPT X 13A,FUSED,UK PLUG,(13A F USE),UNITED KINGDOM,SAFTEY CONTROL (UNITED KINGDOM OPTION A2 ONLY)	S3109	209010
-4	161-0104-05			1	CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER, RTANG,IEC320,RCPT,AUSTRALIA,SAFTEY CONTROLLED (AUSTRALIAN OPTION A3 ONLY)	S3109	198-010
-5	161-0134-00			1	CABLE ASSY,PWR:,3,18 AWG,240V,120.0 L NORTH AMERICAN (NORTH AMERICAN OPTION A4 ONLY)	2W733	ORDER BY DESC
-6	161-0167-00			1	CA ASSY,PWR:3,0.75MM SQ,250V/10A,2.5 METER, RTANG,IEC320,RCPT,SWISS,SAFTEY CONTROLLED (SWISS OPTION A5 ONLY)	S3109	ORDER BY DESC

**Replaceable Mechanical Parts List (Cont.)**

Fig. & Index Number	Tektronix Part Number	Serial No. Effective	Serial No. Discont'd	Qty	Name & Description	Mfr. Code	Mfr. Part Number
-7	103-0301-00			1	ADAPTER,CONN:F SERIES,FEMALE TO FEMALE	24931	33A116-2
	103-0310-00			1	ADAPTER CONN:BNC JACK TO F SERIES JACK,1.0 L	24931	29JJ189-1
-8	200-2520-00			1	COVER,SCOPE:FRONT,ABS	0JR05	ORDER BY DESC
	070-8533-XX			1	MANUAL,TECH:PROGRAMMERS,2714 & 2715 SPECTRUM ANALYZER,DM	TK2548	070-8533-XX
	070-8535-XX			1	MANUAL,TECH:REFERENCE,2714 & 2715 SPECTRUM ANALYZER,DM	TK2548	070-8535-XX
	070-9611-XX			1	MANUAL,TECH:CABLE TV RF MEASUREMENT SOFTWARE	TK2548	070-9611-XX
	070-9115-XX			1	MANUAL,TECH:USERS MANUAL,2715	TK2548	070-9115-XX
					OPTIONAL ACCESSORIES		
					CAMERA,SCOPE:C9		
					K212:CART PORTABLE INSTRUMENT		
	012-0057-01			1	CA ASSY,RF:COAXIAL,;RFD,50 OHM,43 L,BNC, MALE,STR,BOTH ENDS,W/STRAIN RELIEF BOOT BOTH ENDS	TK2469	012-0057-01
	012-0074-00			1	CA ASSY,RF:COAXIAL,;RFD,75 OHM,42 L,BNC, MALE,STR,BOTH ENDS,W/STRAIN RELIEF BOOT BOTH ENDS	TK2469	012-0074-00
	012-0076-00			1	CA ASSY,RF:COAXIAL,;RFD,50 OHM,20 L,BNC, MALE,STR,BOTH ENDS,W/STRAIN RELIEF BOOT BOTH ENDS	TK2469	012-0076-00
	016-0359-02			1	HOOD,CRT:PORTABLE SERIES	TK2565	016-0359-02
	016-0566-00			1	VISOR,CRT:465	0JR05	ORDER BY DESC
	016-0677-02			1	POUCH,ACCESSORY:W/PLATE	TK2582	016-0677-02
	016-0792-02			1	CASE,CARRYING:27 X 20.5 X 12.5,PLASTIC,SILVER	TK2379	23988
	016-0848-00			1	COVER,PROT:WATERPROOF VINYL	TK2582	ORDER BY DESC
	016-1158-01			1	CARRYING CASE:SOFTSIDED,	80009	016-1158-01
	070-9096-XX			1	MANUAL,TECH:SERVICE,2715	TK2548	070-9096-XX
	131-4199-00			1	CONN,RCPT,ELEC:75 TO 50 OHM,N STYLE	52750	50Z75-1050
	337-2775-01			1	SHLD,IMPLOSION:2215 MOD WN	0JR05	ORDER BY DESC
	337-2775-02			1	SHLD,IMPLOSION:2215 MOD PV	80009	337-2775-02
	346-0199-00			1	STRAP,CARRYING:MKD TEKTRONIX	TK1623	ORDER BY DESC
	606-0110-02			1	TEST KIT:SERVICE CABLES & EXTENDER BOARD	80009	606-0110-02

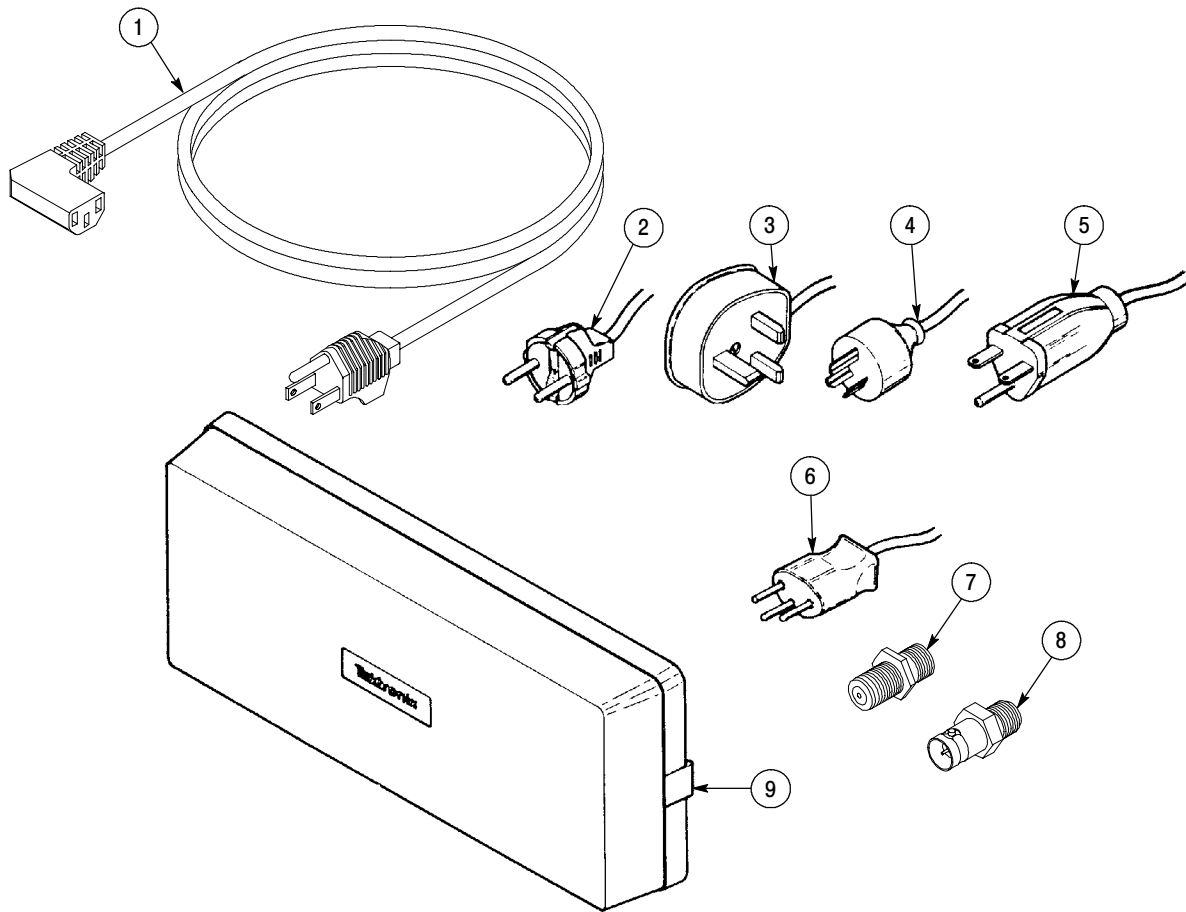


Figure 10-6: Accessories





# Service Manual



## 2715 Spectrum Analyzer Volume 2

**070-9096-06**

This document supports firmware version 12.01.95 and above.

**Warning**

The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries prior to performing service.

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## WARRANTY

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; or c) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

**THIS WARRANTY IS GIVEN BY TEKTRONIX WITH RESPECT TO THIS PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.**



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# General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

*Only qualified personnel should perform service procedures.*

While using this product, you may need to access other parts of the system. Read the *General Safety Summary* in other system manuals for warnings and cautions related to operating the system.

## To Avoid Fire or Personal Injury

**Use Proper Power Cord.** Use only the power cord specified for this product and certified for the country of use.

**Connect and Disconnect Properly.** Do not connect or disconnect probes or test leads while they are connected to a voltage source.

**Ground the Product.** This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

**Observe All Terminal Ratings.** To avoid fire or shock hazard, observe all ratings and marking on the product. Consult the product manual for further ratings information before making connections to the product.

The common terminal is at ground potential. Do not connect the common terminal to elevated voltages.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

**Do Not Operate Without Covers.** Do not operate this product with covers or panels removed.

**Use Proper Fuse.** Use only the fuse type and rating specified for this product.

**Avoid Exposed Circuitry.** Do not touch exposed connections and components when power is present.

**Wear Eye Protection.** Wear eye protection if exposure to high-intensity rays or laser radiation exists.

**Do Not Operate With Suspected Failures.** If you suspect there is damage to this product, have it inspected by qualified service personnel.

**Do Not Operate in Wet/Damp Conditions.**

**Do Not Operate in an Explosive Atmosphere.**

**Keep Product Surfaces Clean and Dry.**

**Provide Proper Ventilation.** Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

**Symbols and Terms**

**Terms in this Manual.** These terms may appear in this manual:



---

**WARNING.** *Warning statements identify conditions or practices that could result in injury or loss of life.*

---



---

**CAUTION.** *Caution statements identify conditions or practices that could result in damage to this product or other property.*

---

**Terms on the Product.** These terms may appear on the product:

DANGER indicates an injury hazard immediately accessible as you read the marking.

WARNING indicates an injury hazard not immediately accessible as you read the marking.

CAUTION indicates a hazard to property including the product.

**Symbols on the Product.** The following symbols may appear on the product:



WARNING  
High Voltage



Protective Ground  
(Earth) Terminal



CAUTION  
Refer to Manual



Double  
Insulated



# Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

**Do Not Service Alone.** Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

**Disconnect Power.** To avoid electric shock, switch off the instrument power, then disconnect the power cord from the mains power.

**Use Caution When Servicing the CRT.** To avoid electric shock or injury, use extreme caution when handling the CRT. Only qualified personnel familiar with CRT servicing procedures and precautions should remove or install the CRT.

CRTs retain hazardous voltages for long periods of time after power is turned off. Before attempting any servicing, discharge the CRT by shorting the anode to chassis ground. When discharging the CRT, connect the discharge path to ground and then the anode. Rough handling may cause the CRT to implode. Do not nick or scratch the glass or subject it to undue pressure when removing or installing it. When handling the CRT, wear safety goggles and heavy gloves for protection.

**Use Care When Servicing With Power On.** Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

**X-Radiation.** To avoid x-radiation exposure, do not modify or otherwise alter the high-voltage circuitry or the CRT enclosure. X-ray emissions generated within this product have been sufficiently shielded.



# Preface

This manual contains service information for the 2715 Spectrum Analyzer. The service information is located in two volumes. Volume 1 contains the maintenance procedures and parts lists. Volume 2 contains the component locators and schematic diagrams.

The following manuals are also available for the 2715 Spectrum Analyzer.

- *2715 User Manual* provides information necessary to operate the 2715 Spectrum Analyzer.
- *2714 & 2715 Programmer Manual* includes all GPIB commands, queries, and responses for the instrument.
- The *Cable TV RF Measurement Software Manual* describes how to use the Cable TV RF Measurements Software, a test system that measures cable TV parameters.
- *2714 & 2715 Reference Manual* provides front panel control and connector information.

## Contacting Tektronix

<b>Phone</b>	1-800-833-9200*
<b>Address</b>	Tektronix, Inc. Department or name (if known) 14200 SW Karl Braun Drive P.O. Box 500 Beaverton, OR 97077 USA
<b>Web site</b>	<a href="http://www.tektronix.com">www.tektronix.com</a>
<b>Sales support</b>	1-800-833-9200, select option 1*
<b>Service support</b>	1-800-833-9200, select option 2*
<b>Technical support</b>	Email: <a href="mailto:techsupport@tektronix.com">techsupport@tektronix.com</a> 1-800-833-9200, select option 3* 6:00 a.m. - 5:00 p.m. Pacific time

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\* **This phone number is toll free in North America. After office hours, please leave a voice mail message. Outside North America, contact a Tektronix sales office or distributor; see the Tektronix web site for a list of offices.**

# Diagrams and Circuit Board Illustrations

This section contains the troubleshooting procedures, block diagrams, circuit board illustrations, component locator tables, waveform illustrations, and schematic diagrams.

## Symbols

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975. Abbreviations are based on ANSI Y1.1-1972.

Logic symbology is based on ANSI/IEEE Standard 91-1984 in terms of positive logic. Logic symbols depict the logic function performed and can differ from the manufacturer's data.

The tilde (~) preceding a signal name indicates that the signal performs its intended function when in the low state.

Other standards used in the preparation of diagrams by Tektronix, Inc., include the following:

- Tektronix Standard 062-2476 Symbols and Practices for Schematic Drafting
- ANSI Y14.159-1971 Interconnection Diagrams
- ANSI Y32.16-1975 Reference Designations for Electronic Equipment
- MIL-HDBK-63038-1A Military Standard Technical Manual Writing Handbook

## Component Values

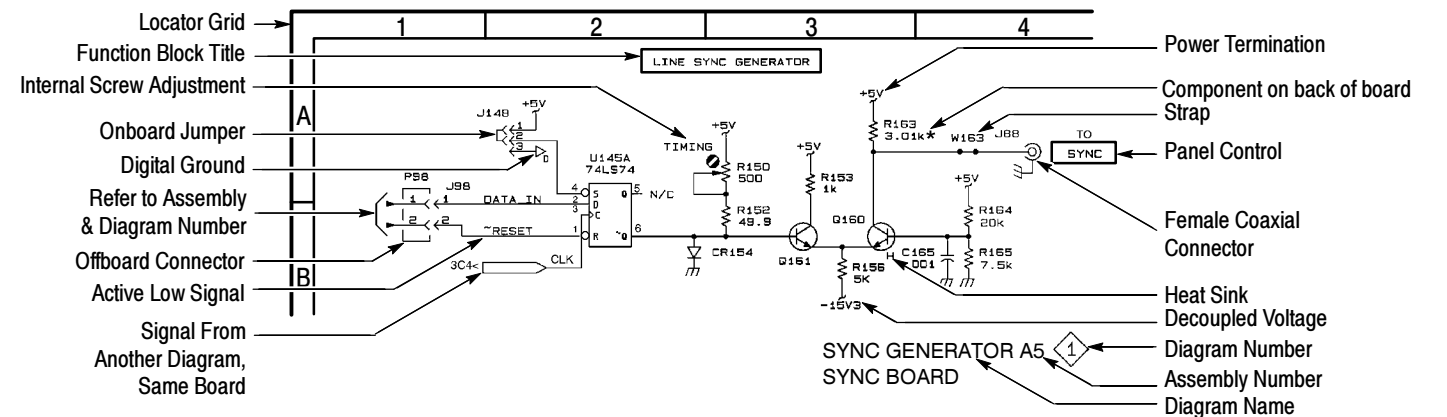
Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors: Values one or greater are in picofarads (pF).  
Values less than one are in microfarads (μF).

Resistors: Values are in Ohms (Ω).

## Graphic Items and Special Symbols Used in This Manual

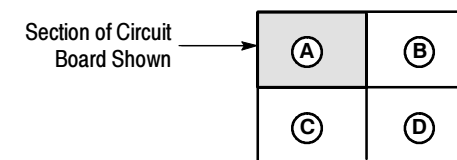
Each assembly in the instrument is assigned an assembly number (for example A5). The assembly number appears in the title on the diagram, in the lookup table for the schematic diagram, and corresponding component locator illustration. The Replaceable Electrical Parts list is arranged by assembly in numerical sequence; the components are listed by component number.



## Component Locator Diagrams

The schematic diagram and circuit board component location illustrations have grids marked on them. The component lookup tables refer to these grids to help you locate a component. The circuit board illustration appears only once; its lookup table lists the diagram number of all diagrams on which the circuitry appears.

Some of the circuit board component location illustrations are expanded and divided into several parts to make it easier for you to locate small components. To determine which part of the whole locator diagram you are looking at, refer to the small locator key shown below. The gray block, within the larger circuit board outline, shows where that part fits in the whole locator diagram. Each part in the key is labeled with an identifying letter that appears in the figure titles under component locator diagrams.



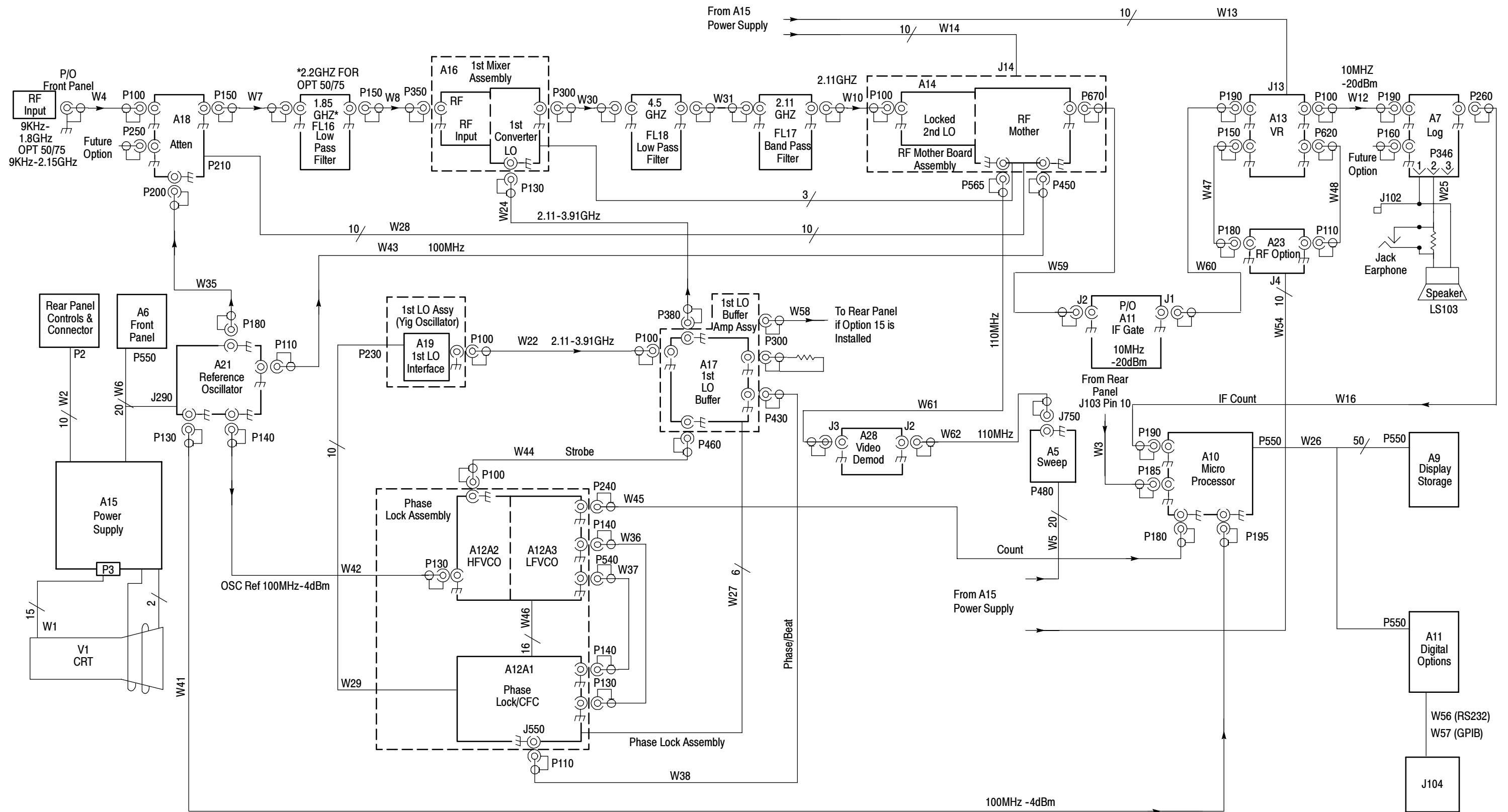


Figure 1-1: Interconnect Diagram, Part 1

Pin #	A15 J1 to CRT SKT	A15 J2 to RPANL Pots	A15 J3 to Rear Con	A23 RF OPT J4	A5 J5 SWEEP	A6 J6 FRONT PANEL	A7 J7 LOG	A11 J8 RS232/GPIB	A9 J9 DISP STOR	A10 J10 uPROC	A12 J11 PL/CFC	A28 J12 VIDEO DEMOD	A13 J13 VR	A14 J14 RF MOTHER
1	CRT-12	EXTSYNC	EXTVID	DATAI	SWPGND	CRTINTS-TLVL	SWSLOPE	FRAME_TRIG	SWP	DETVID	SWSLOPE	SWSLOPE	SYSRST-DATAI	SYSRST--KEYED--
2	CRT-11	TR +10V	SWPGATE	VLVL	SWP	TLVL	LOGVID	ACQ_EN	LOGVID	--KEYED--	+20V	+20V	DATAI	--KEYED--
3	CRT-10	TR Center	GND	+20V	VIDMON-	DATAI	-----	-----	SWPGATE	SWPGATE	SWPGND	SWPGND	--KEYED--	+20V
4	CRT-9	TR -11V	SMP	CLKO	VIDZ	FPACK-	SYSRST	SYSRST	SYSRST-	POK	SWP	SWP	CLKO	CLKO
5	CRT-8	VP -5V1	LOGVID	DATAO	VIDVERT	KEYED	FLAT	-----	POK	REQUI-	-----	-----	DATAO	DATAO
6	CRT-7	VP Center	JP832	+10V	TLVL	CLKI-	RFOPTVID	DOAUD	ROEN-	UPAUD	SWPGATE	SWPGATE	+10V	+10V
7	CRT-6	VP GND	DATAI	JP840 A15	SWPGATE	VLVL	-----	-----	ACQ_EN	CLKI-	CLKI-	CLKI-	-----	+5V
8	CRT-5	HP +5V1	JP831 A15	GND	CLKO	REFLATCH-	CLKO	CLKO	CLKO	CLKO	CLKO	CLKO	GND	GND
9	-----	HP Center	JP830 A15	-11V	FRAME_TRIG	-----	DATAI	DATAI	VIDMON-	DATAI	DATAI	DATAI	-11V	-11V
10	-----	HP -5V1	--KEYED--	TGLATCH-	DATAO	-----	DATAO	DATAO	DATAO	DATAO	DATAO	DATAO	VRLATCH-	RFLATCH-
11			VLVL		+10V	-----	+10V	+10V	+10V	ACKI-	+10V	+10V		
12			JP840 A15		VLVL	-11V	+10V	+10V	+10V	LOAD-	+10V	+10V		
13					+5V	+10V	+5V	+5V	+5V	+5V	+5V	+5V		
14					SSTRIG	+5V	+5V	+5V	+5V	+5V	+5V	+5V		
15					GND	GND	GND	GND	GND	GND	GND	GND		
16					LINETRIG	GND	GND	GND	GND	GND	GND	GND		
17					-11V	CLKO	-11V	-11V	-11V	AD10	-11V	-11V		
18					EXTRIG	DATAO	-11V	-11V	-11V	AD00	-11V	-11V		
19					SWLATCH-	FPLATCH-	LGLATCH-	DOLATCH-	-----	AD11	CFCLATCH-	JP790 A15		
20					LOGVID	FPREQ-	QPAUD	-----	DSBLANK-	AD01	CFCACK-	CFCACK-		
21							EXTVID	-----	DSSEL-	AD12	CFCREQ-	CFCREQ-		
22							AUDIO	VSYNC	-----	AD02	-----	VSYNC		
23							DETVID	E/O_L	DSVER	SSTRIG	-----	E/O_L		
24							VLVL	HSYNC	DSHOR	AD03	-----	HSYNC		
25								-----			-----			

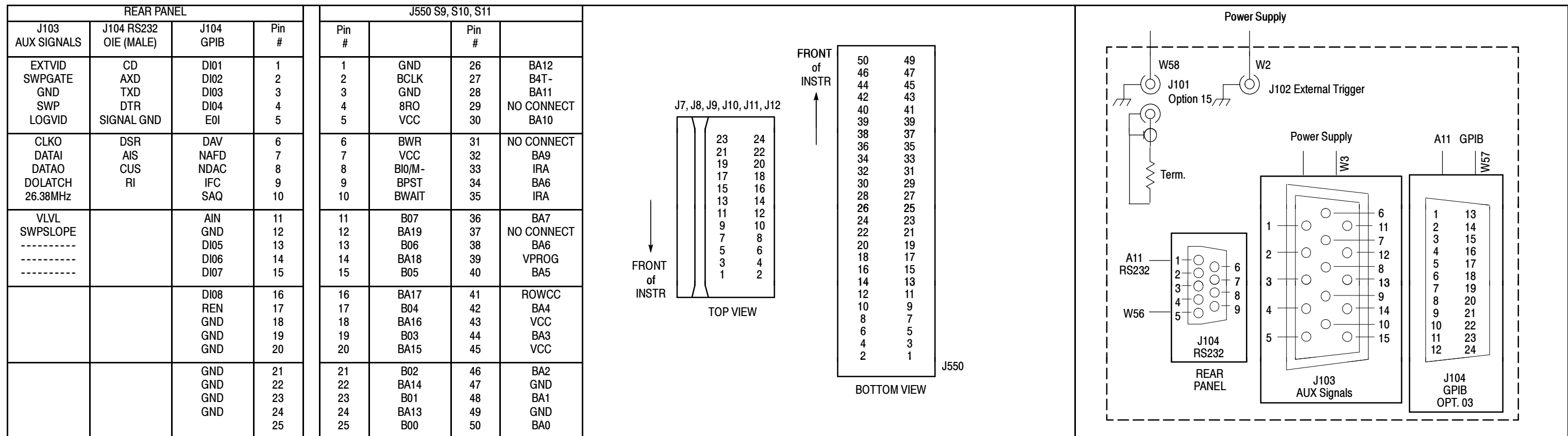
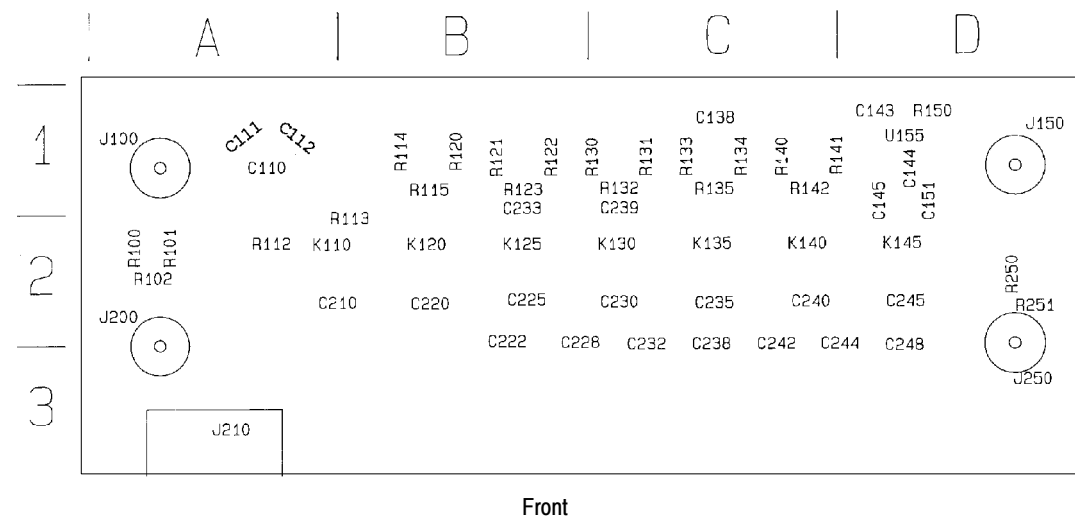
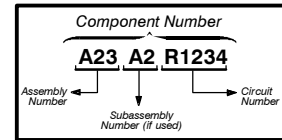


Figure 1-2: Interconnect Diagram, Part 2



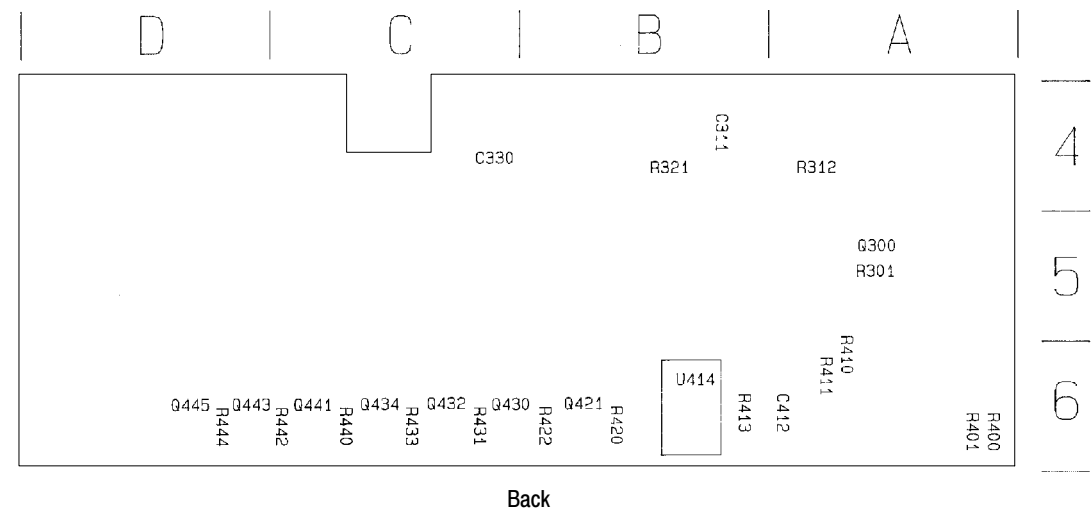
**COMPONENT NUMBER EXAMPLE**



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.



**STATIC SENSITIVE DEVICES**

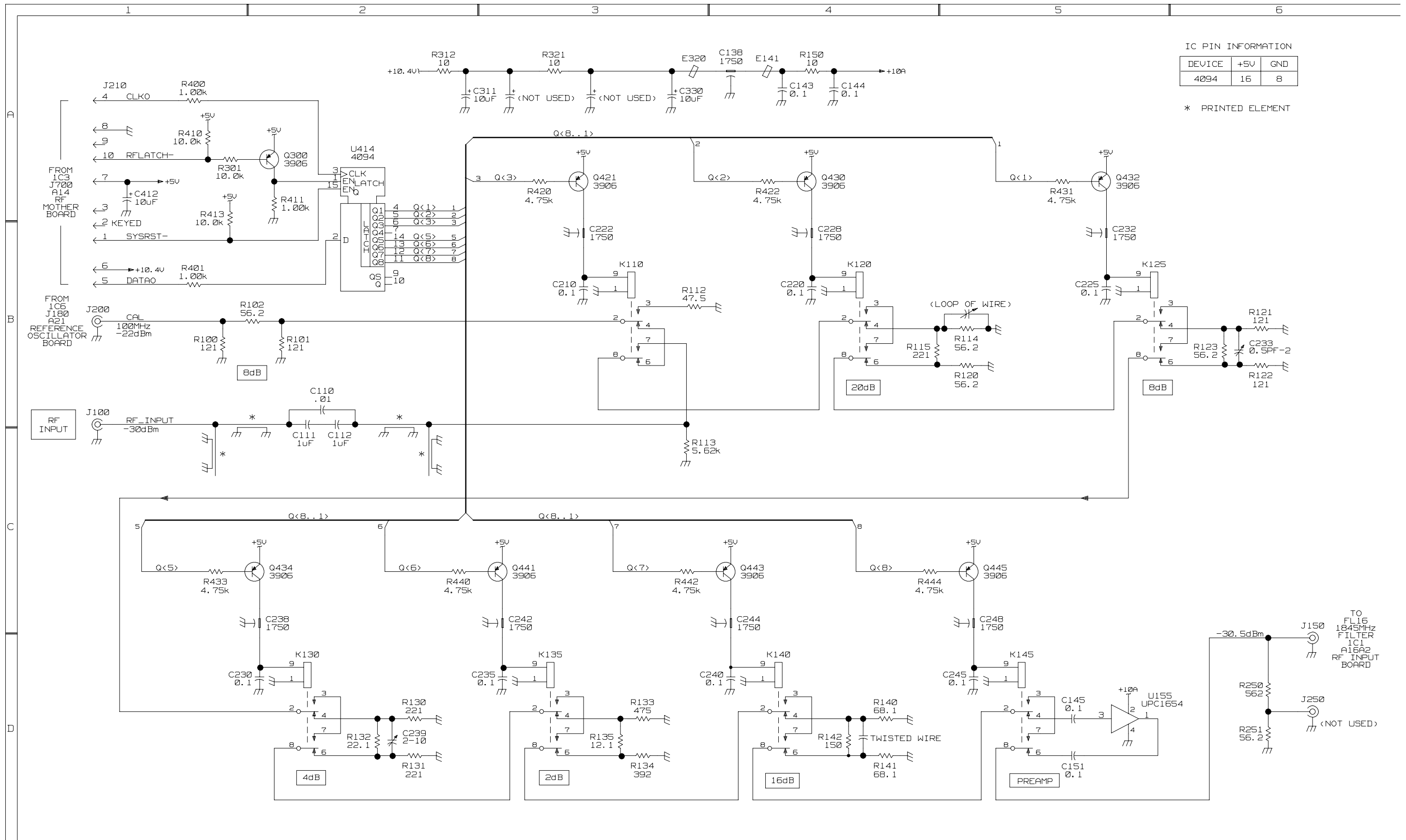


**A18 RF Attenuator Component Locator**

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C110	A-1	1B2	C228	B-3	1B4	C248	D-3	1C5	K120	B-2	1B4	Q441	C-6	1C3	R121	B-1	1B6	R142	C-1	1D4	R413	B-6	1A1
C111	A-1	1C2	C230	C-2	1D2	C311	B-4	1A2	K125	B-2	1B5	Q443	D-6	1C4	R122	B-1	1B6	R150	D-1	1A4	R420	B-6	1A3
C112	A-1	1C2	C232	C-3	1B5	C330	C-4	1A3	K130	C-2	1D2	Q445	D-6	1C5	R123	B-1	1B6	R250	D-2	1D6	R422	B-6	1A4
C138	C-1	1A4	C233	B-1	1B6	C412	A-6	1A1	K135	C-2	1D3	R100	A-2	1B1	R130	C-1	1D2	R251	D-2	1D6	R431	C-6	1A5
C143	D-1	1A4	C235	C-2	1D3	J100	A-1	1B1	K140	C-2	1D4	R101	A-2	1B2	R131	C-1	1D2	R301	A-5	1A1	R433	C-6	1C1
C144	D-1	1A4	C238	C-3	1C2	J150	D-1	1D6	K145	D-2	1D5	R102	A-2	1B2	R132	C-1	1D2	R312	A-4	1A2	R440	C-6	1C2
C145	D-1	1D5	C239	C-1	1D2	J200	A-2	1B1	Q300	A-5	1A2	R112	A-2	1B3	R133	C-1	1D3	R321	B-4	1A3	R442	D-6	1C3
C151	D-1	1D5	C240	C-2	1D4	J210	A-3	1A1	Q421	B-6	1A3	R113	B-2	1C3	R134	C-1	1D3	R400	A-6	1A1	R444	D-6	1C4
C210	B-2	1B3	C242	C-3	1C3	J240	A-3	1B1	Q430	C-6	1A4	R114	B-1	1B5	R135	C-1	1D3	R401	A-6	1B1	U155	D-1	1D5
C220	B-2	1B4	C244	D-3	1C4	J250	D-3	1D6	Q432	C-6	1A5	R115	B-1	1B4	R140	C-1	1D4	R410	A-6	1A1	U414	B-6	1A2
C222	B-3	1B3	C245	D-2	1D5	K110	A-2	1B3	Q434	C-6	1C2	R120	B-1	1B5	R141	C-1	1D4	R411	A-6	1A2			
C225	B-2	1B5																					

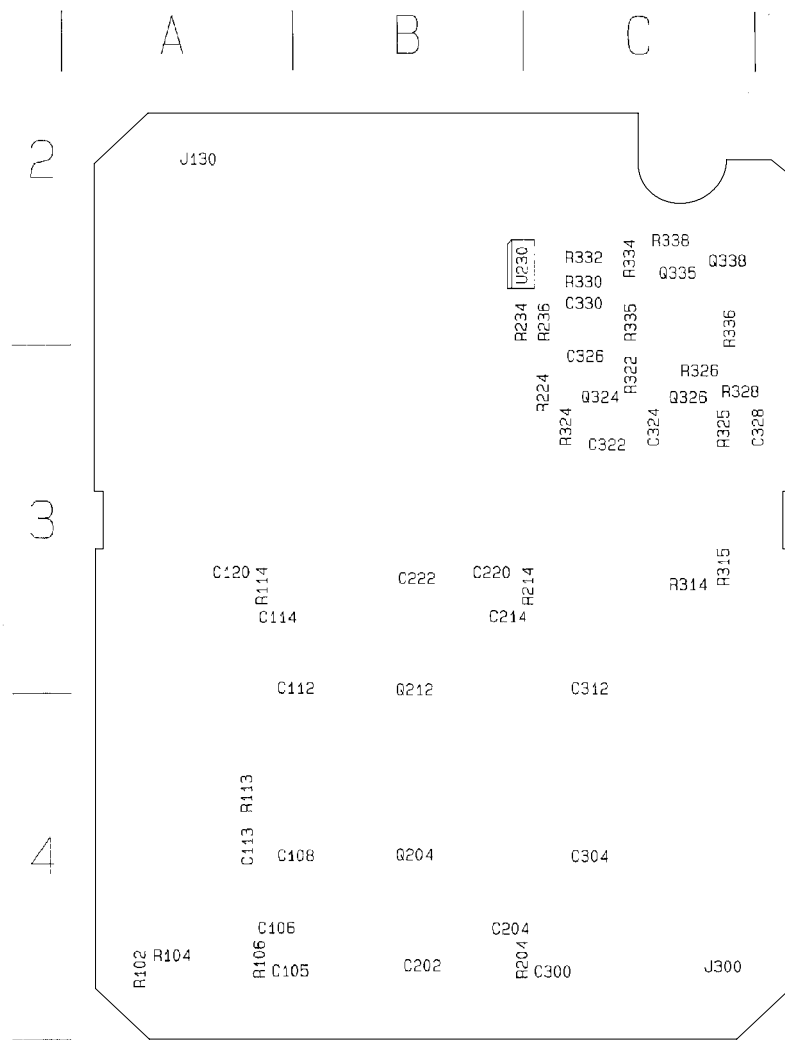
Figure 1-3: A18 Step Attenuator



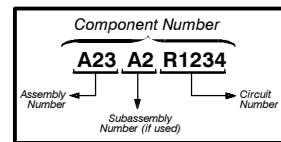


2715

RF ATTENUATOR A18 1



**COMPONENT NUMBER EXAMPLE**



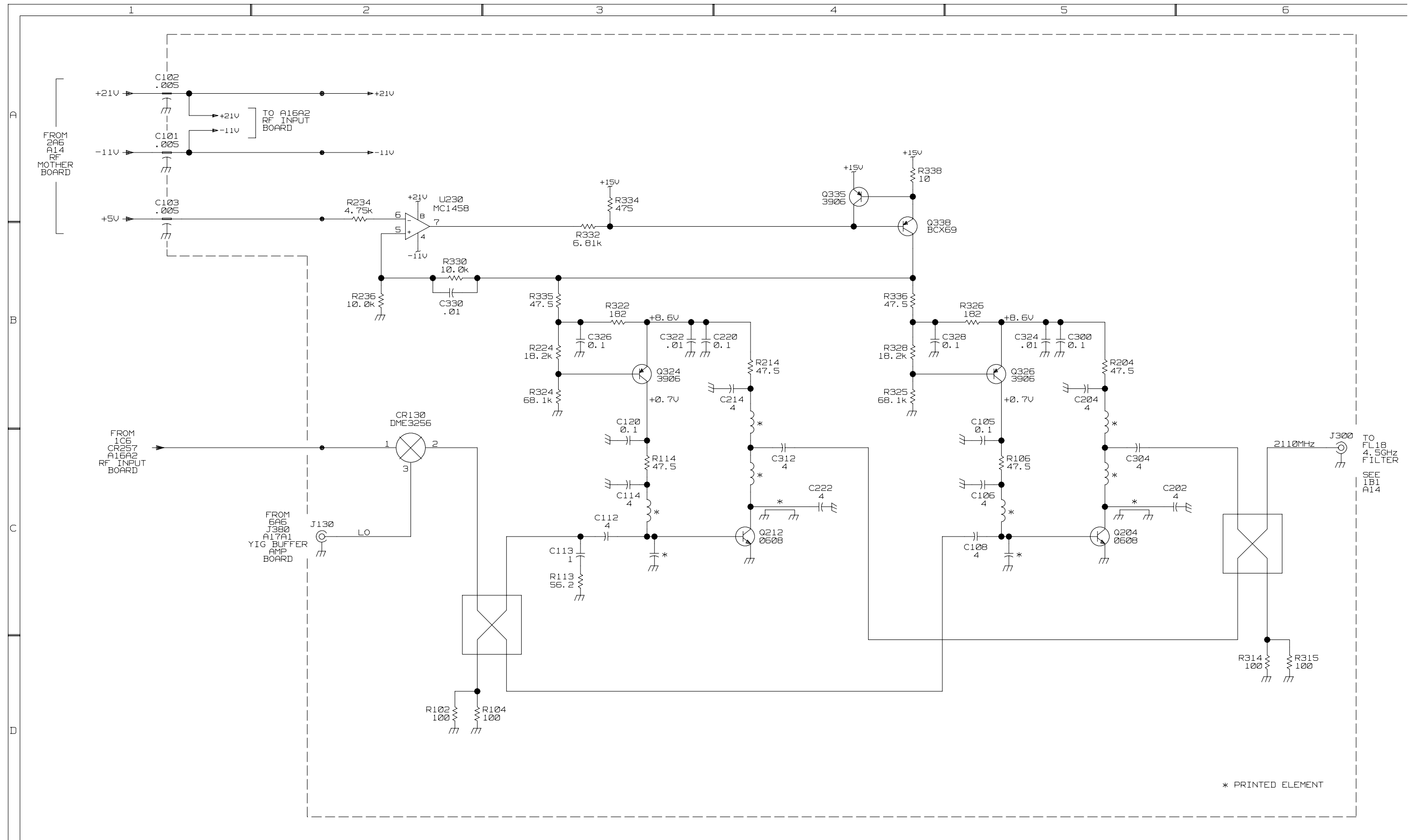
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**STATIC SENSITIVE DEVICES**

**A16A1 1ST Converter Component Locator**

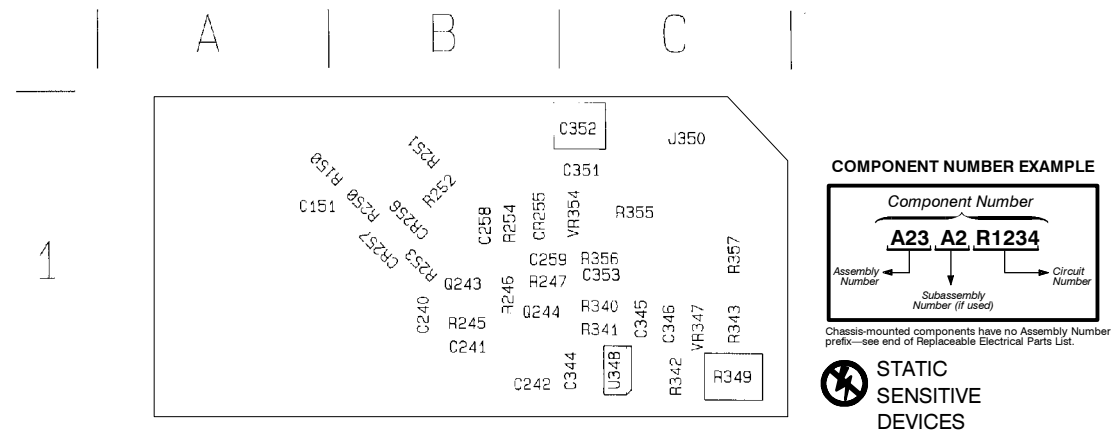
CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C105	A-4	1B5	C202	B-4	1C6	C312	C-3	1C4	J300	C-4	1C6	R102	A-4	1D2	R214	B-3	1B4	R322	C-3	1B3	R332	C-2	1B3
C106	A-4	1C5	C204	B-4	1B5	C322	C-3	1B3	Q204	B-4	1C5	R104	A-4	1D3	R224	B-3	1B3	R324	C-3	1B3	R334	C-2	1A3
C108	A-4	1C5	C214	B-3	1B4	C324	C-3	1B5	Q212	B-3	1C4	R106	A-4	1C5	R234	B-2	1A2	R325	C-3	1B4	R335	C-2	1B3
C112	A-3	1C3	C220	B-3	1B3	C326	C-3	1B3	Q324	C-3	1B3	R113	A-4	1C3	R236	B-2	1B2	R326	C-3	1B5	R336	C-2	1B4
C113	A-4	1C3	C222	B-3	1C4	C328	C-3	1B4	Q326	C-3	1B5	R114	A-3	1C3	R314	C-3	1D6	R328	C-3	1B4	R338	C-2	1A4
C114	A-3	1C3	C300	B-4	1B5	C330	C-2	1B2	Q335	C-2	1A4	R204	B-4	1B5	R315	C-3	1D6	R330	C-2	1B2	U230	B-2	1A2
C120	A-3	1B3	C304	C-4	1C5	J130	A-2	1C2	Q338	C-2	1B4												

Figure 1-4: A16A1 1st Converter



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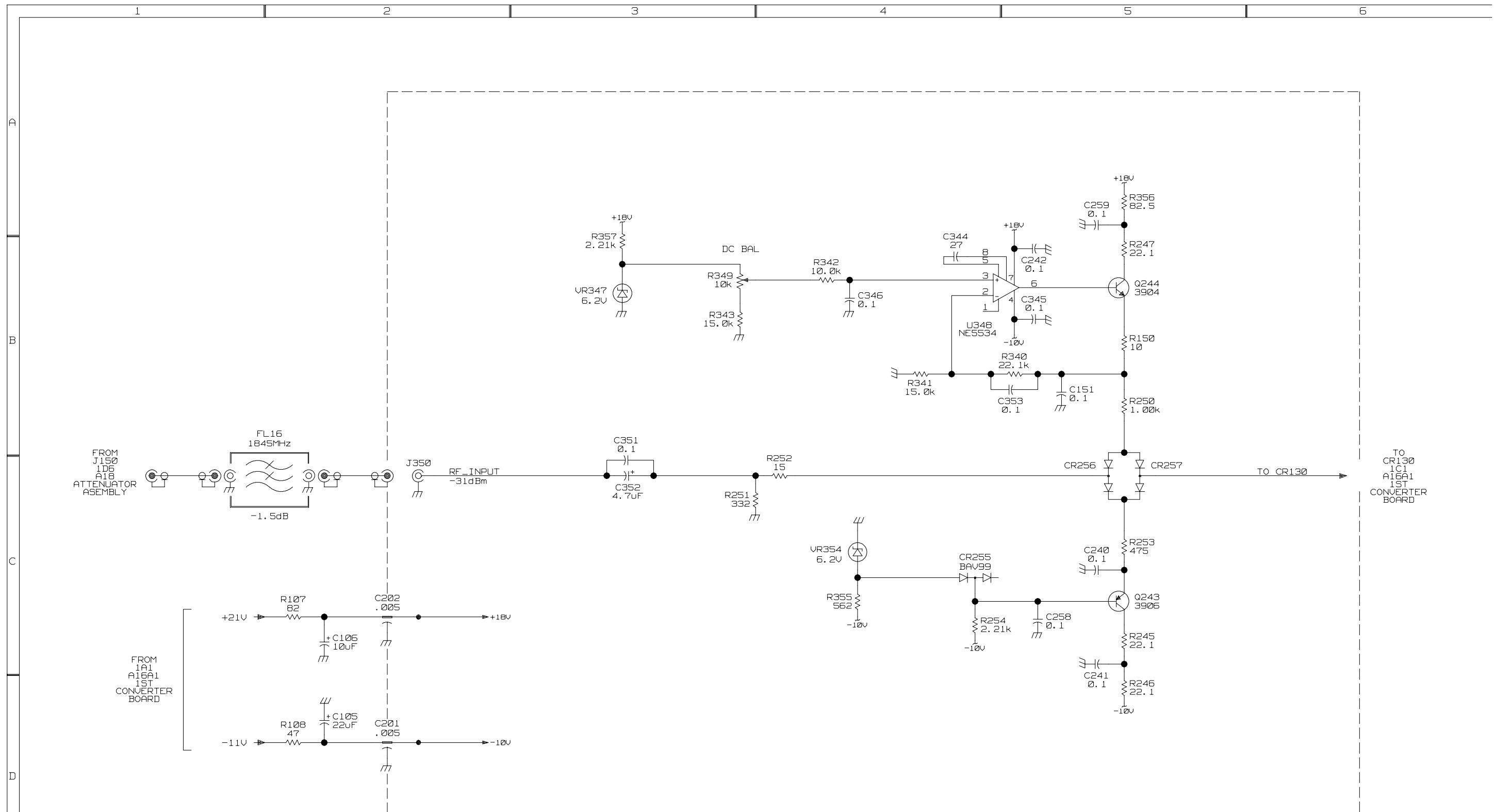
1ST CONVERTER A16A1 1



### A16A2 RF Input Component Locator

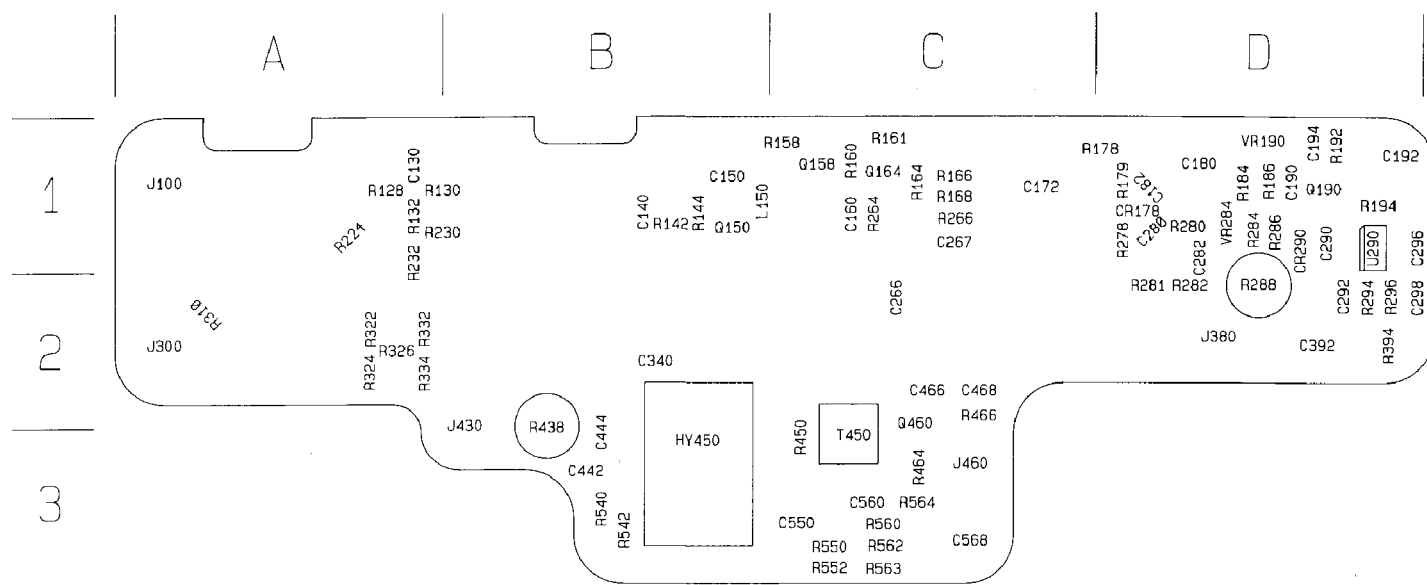
CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C151	A-1	1B5	C258	B-1	1C5	C351	C-1	1B3	J350	C-1	1C2	R341	C-1	1B4	R247	B-1	1B5	R254	B-1	1C4	U348	C-1	1B4
C240	B-1	1C5	C259	B-1	1A5	C353	C-1	1B5	Q243	B-1	1C5	R342	C-1	1B4	R250	B-1	1B5	R349	C-1	1B3	VR354	C-1	1C4
C241	B-1	1D5	C345	C-1	1B5	CR255	B-1	1C4	Q244	B-1	1B5	R343	C-1	1B3	R251	B-1	1C3	R355	C-1	1C4	VR347	C-1	1B3
C242	B-1	1B5	C346	C-1	1B4	CR256	B-1	1C5	R150	A-1	1B5	R245	B-1	1C5	R252	B-1	1C4	R356	C-1	1A5			
C344	C-1	1B4	C352	C-1	1C3	CR257	B-1	1C5	R340	C-1	1B5	R246	B-1	1D5	R253	B-1	1C5	R357	C-1	1B3			

Figure 1-5: A16A2 RF Input



2715

RF INPUT A16A2 1



**COMPONENT NUMBER EXAMPLE**

Component Number  
**A23 A2 R1234**

Assembly Number ← Subassembly Number (if used) → Circuit Number

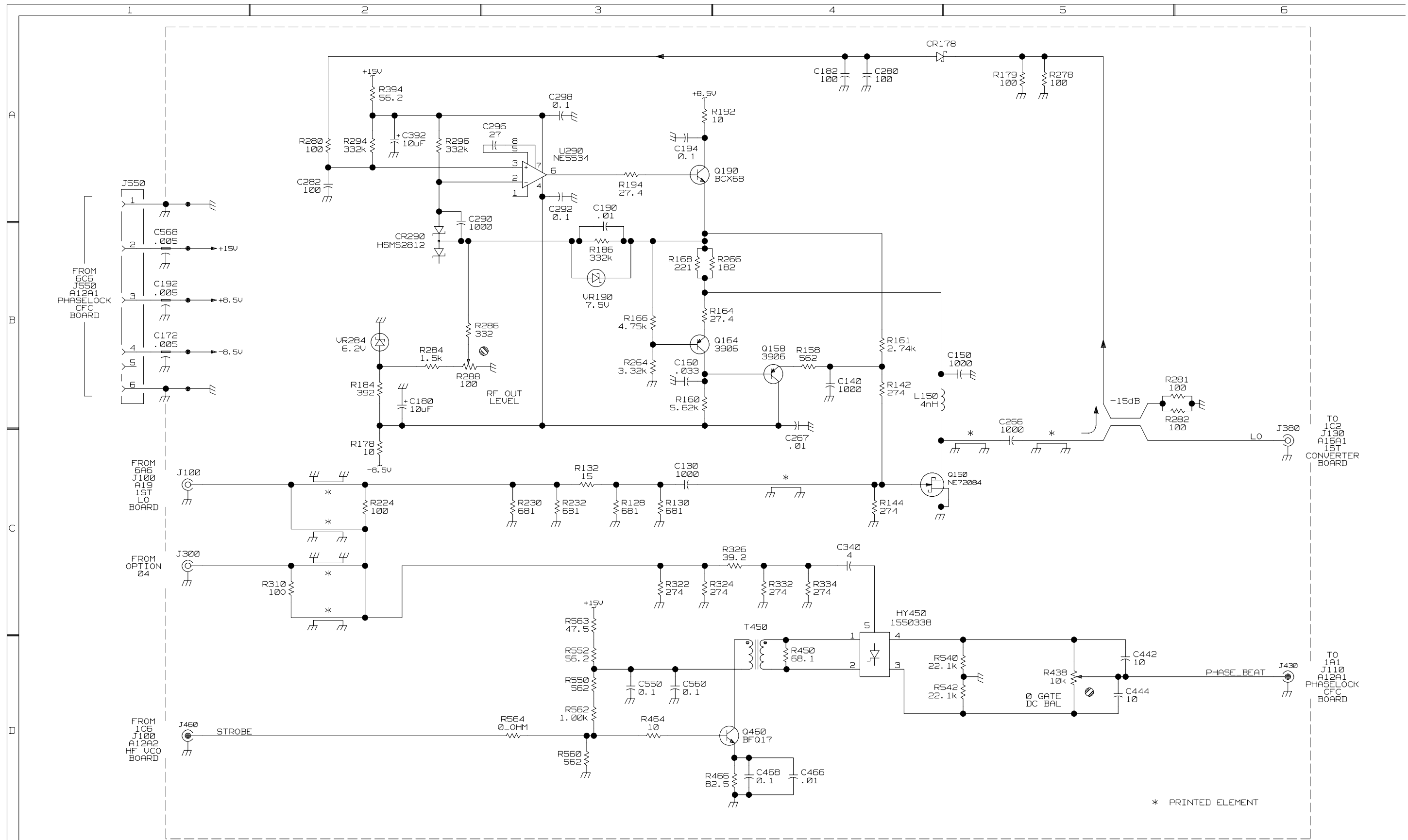
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**⚡ STATIC SENSITIVE DEVICES**

**A17 YIG Buffer Amplifier Component Locator**

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION			
C130	A-1	1C3	C282	D-1	1A2	C560	C-3	1D3	Q158	C-1	1B4	R164	C-1	1B3	R264	C-1	1B3	R322	A-2	1C3	R542	B-3	1D5			
C140	B-1	1B4	C290	D-1	1B2	C568	C-3	1B1	Q164	C-1	1B3	R166	C-1	1B3	R266	C-1	1B4	R324	A-2	1C3	R550	C-3	1D3			
C150	B-1	1B5	C292	D-2	1A3	CR178	D-1	1A4	Q190	D-1	1A3	R168	C-1	1B3	R278	D-1	1A5	R326	A-2	1C4	R552	C-3	1D3			
C160	C-1	1B3	C296	D-1	1A3	CR290	D-1	1B2	Q460	C-3	1D4	R178	C-1	1C2	R280	D-1	1A2	R332	A-2	1C4	R560	C-3	1D3			
C172	C-1	1B1	C298	D-2	1A3	HY450	B-3	1C4	R128	A-1	1C3	R179	D-1	1A5	R281	D-2	1B6	R334	A-2	1C4	R562	C-3	1D3			
C180	D-1	1B2	C340	B-2	1C4	J100	A-1	1C1	R130	A-1	1C3	R184	D-1	1B2	R282	D-2	1B6	R394	D-2	1A2	R563	C-3	1C3			
C182	D-1	1A4	C392	D-2	1A2	J300	A-2	1C1	R132	A-1	1C3	R186	D-1	1B3	R284	D-1	1B2	R438	B-2	1D5	R564	C-3	1D3			
C190	D-1	1A3	C442	B-3	1D5	J380	D-2	1C6	R142	B-1	1B4	R192	D-1	1A3	R286	D-1	1B2	R450	C-3	1D4	T450	C-3	1C4			
C194	D-1	1A3	C444	B-3	1D5	J430	A-3	1D6	R144	B-1	1C4	R194	D-1	1A3	R288	D-2	1B2	R464	C-3	1D3	U290	D-1	1A3			
C266	C-2	1B5	C466	C-2	1D4	J460	C-3	1D1	R158	C-1	1B4	R224	A-1	1C2	R294	D-2	1A2	R466	C-3	1D4	VR190	D-1	1B3			
C267	C-1	1C4	C468	C-2	1D4	L150	B-1	1B4	R160	C-1	1B3	R230	A-1	1C3	R296	D-2	1A2	R540	B-3	1D5	VR284	D-1	1B2			
C280	D-1	1A4	C550	C-3	1D3	Q150	B-1	1C5	R161	C-1	1B4	R232	A-1	1C3	R310	A-2	1C2									

Figure 1-6: A17 1st LO Buffer Amp

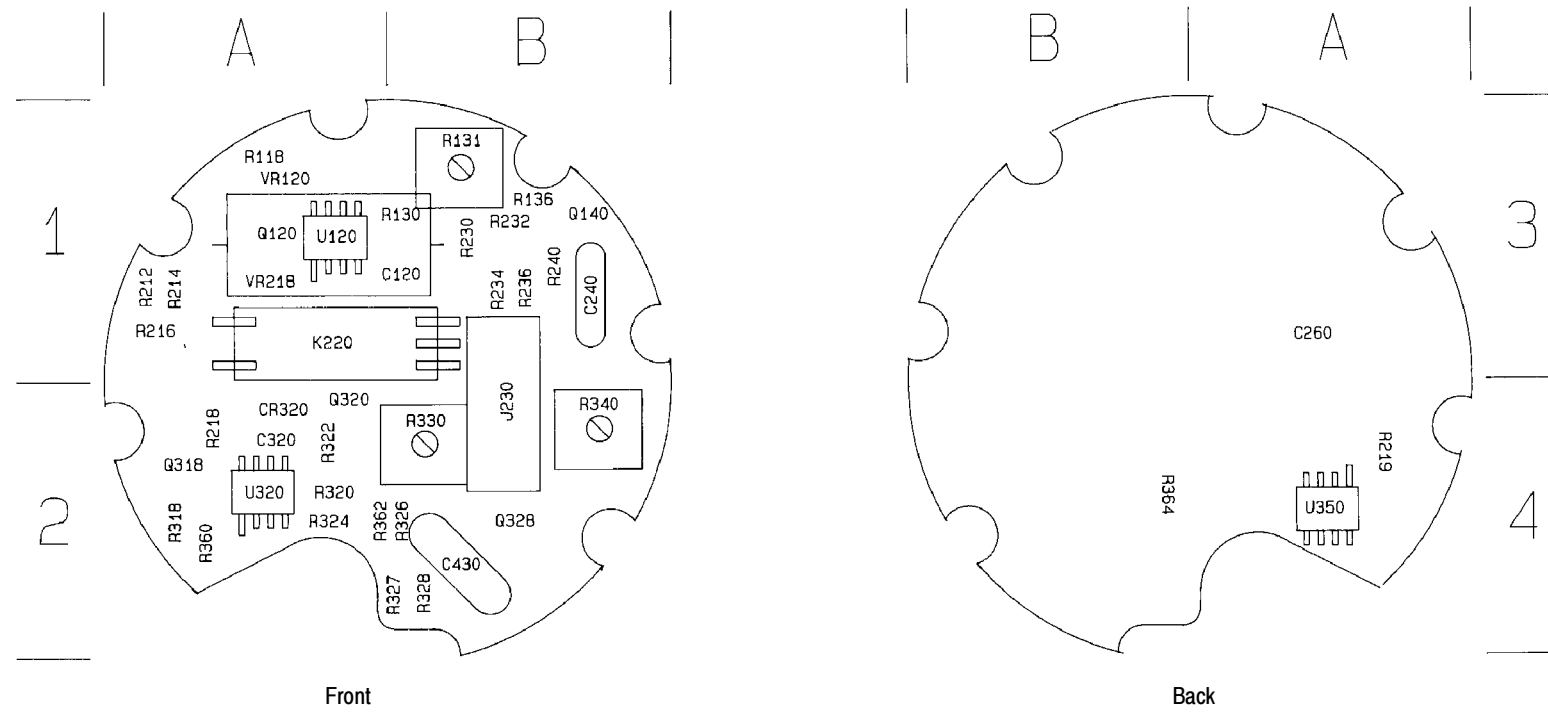


2715

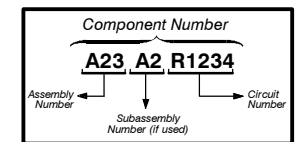
YIG BUFFER AMPLIFIER

A17

1



**COMPONENT NUMBER EXAMPLE**



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

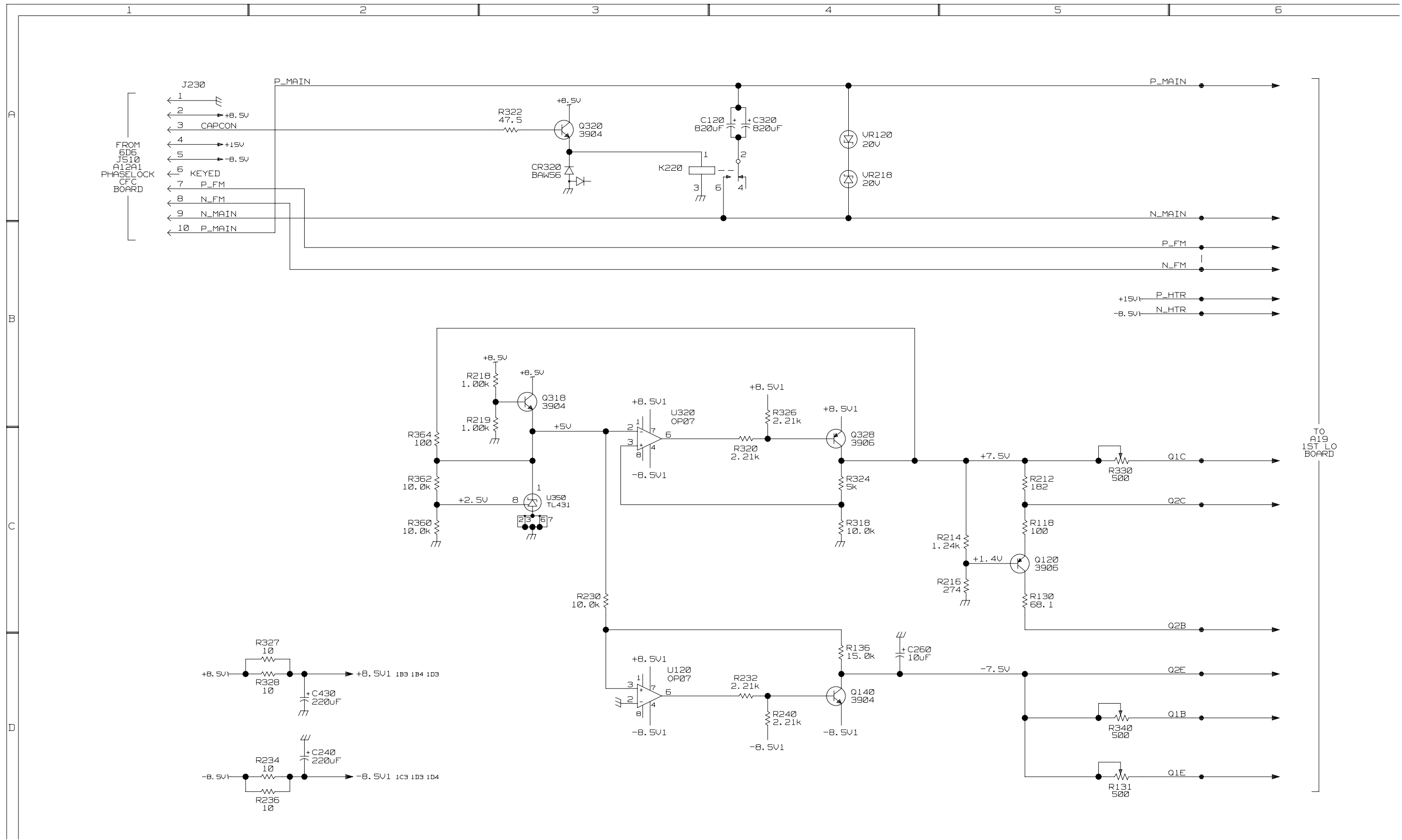
**STATIC SENSITIVE DEVICES**

**A19A1 1st LO Component Locator**

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C120	B-1	1A4	K220	A-1	1A3	Q328	B-2	1C4	R214	A-1	1C5	R234	B-1	1D2	R322	A-2	1A3	R330	B-2	1C5	U120	A-1	1D3
C240	B-1	1D2	J230	B-1	1A1	R118	A-1	1C5	R216	A-1	1C5	R236	B-1	1D2	R324	A-2	1C4	R340	B-2	1D5	U320	A-2	1B3
C260	A-3	1D4	Q120	A-1	1C5	R130	B-1	1C5	R218	A-2	1B3	R240	B-1	1D4	R326	B-2	1B4	R360	A-2	1C2	U350	A-4	1C3
C320	A-2	1A4	Q140	B-1	1D4	R131	B-1	1D5	R219	A-4	1B3	R318	A-2	1C4	R327	B-2	1D2	R362	A-2	1C2	VR120	A-1	1A4
C430	B-2	1D2	Q318	A-2	1B3	R136	B-1	1D4	R230	B-1	1C3	R320	A-2	1C4	R328	B-2	1D2	R364	A-4	1C2	VR218	A-1	1A4
CR320	A-2	1A3	Q320	A-2	1A3	R212	A-1	1C5	R232	B-1	1D4												

Figure 1-7: A19A1 1st LO Interface



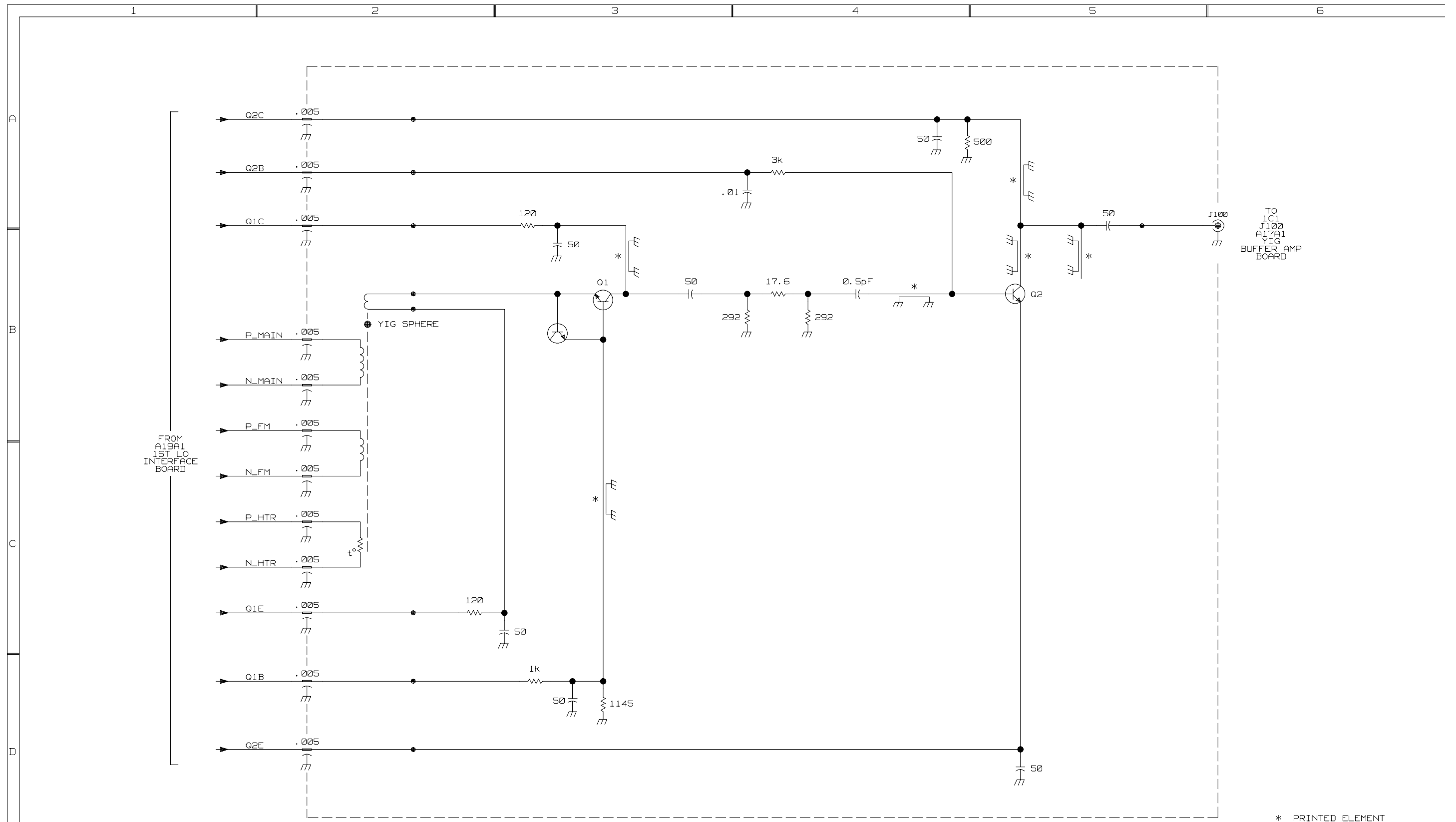


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1ST LO INTERFACE

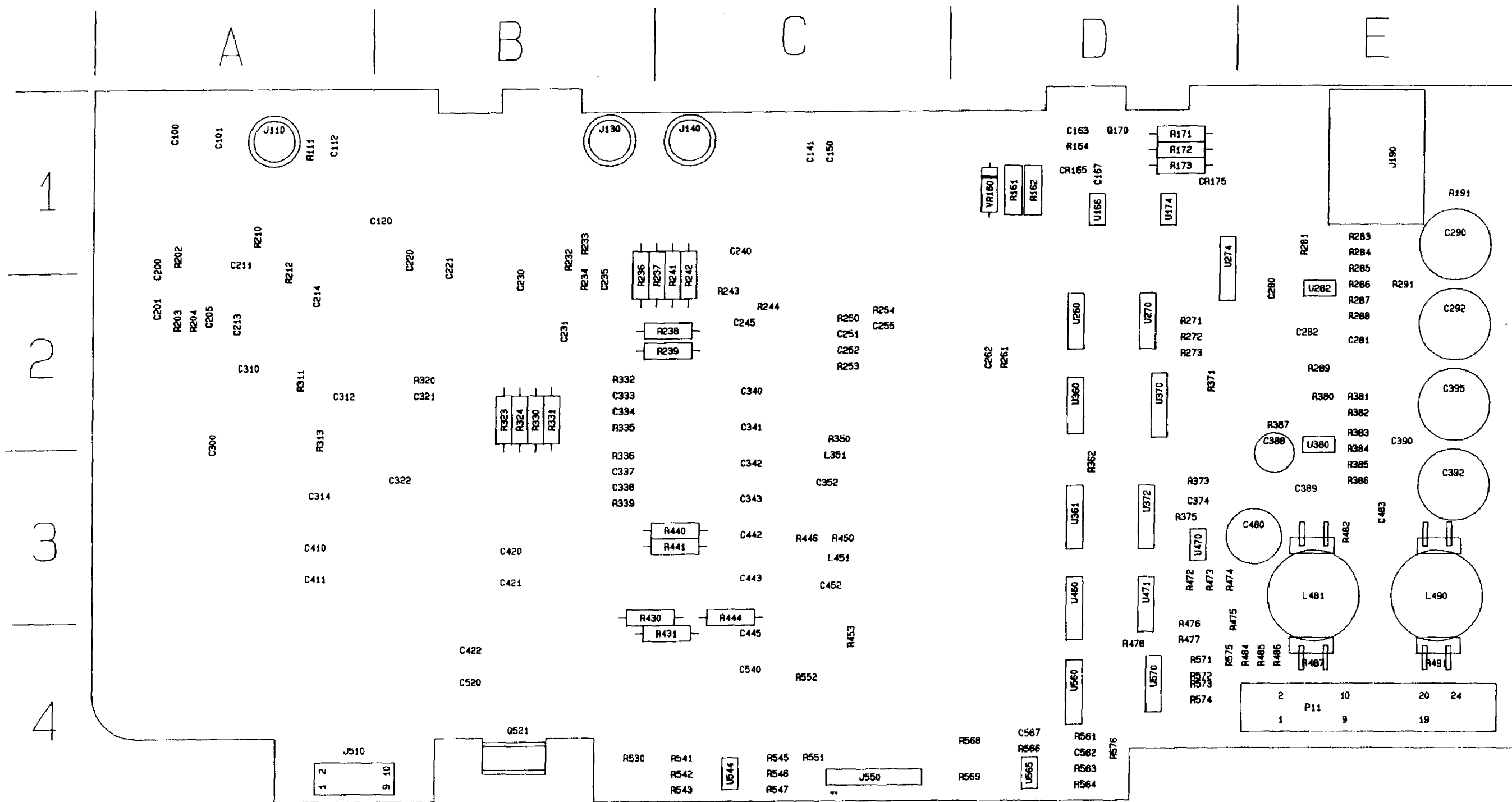
A19A1 1





TO  
J100  
A17A1  
YIG  
BUFFER AMP  
BOARD

\* PRINTED ELEMENT



**COMPONENT NUMBER EXAMPLE**

Component Number  
**A23 A2 R1234**

Assembly Number      Subassembly Number (if used)      Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**⚡** STATIC SENSITIVE DEVICES

2	10	20	24
P11			
1	9	19	

Figure 1-8: A12A1 Phaselock CFC (front)

E | D | C | B | A

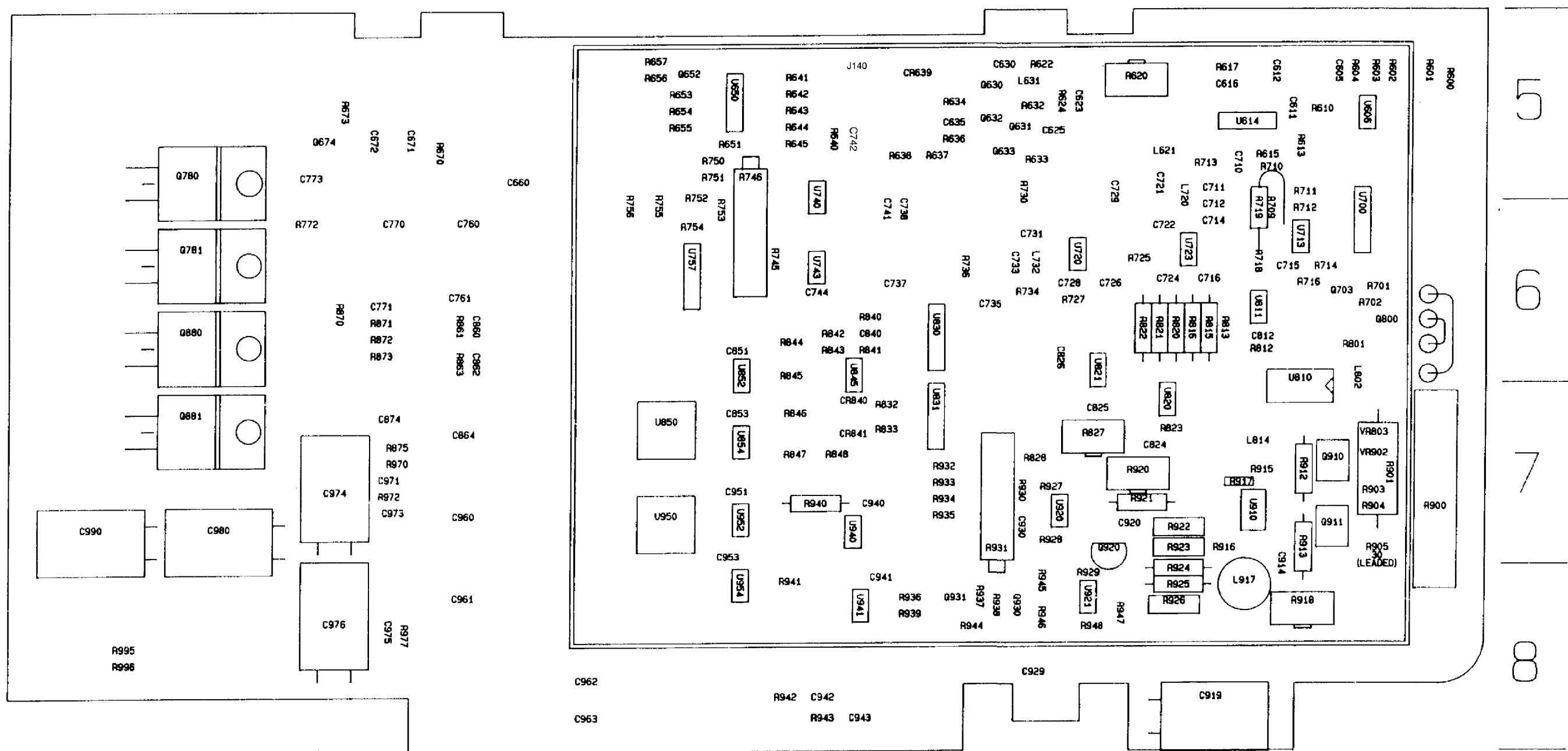


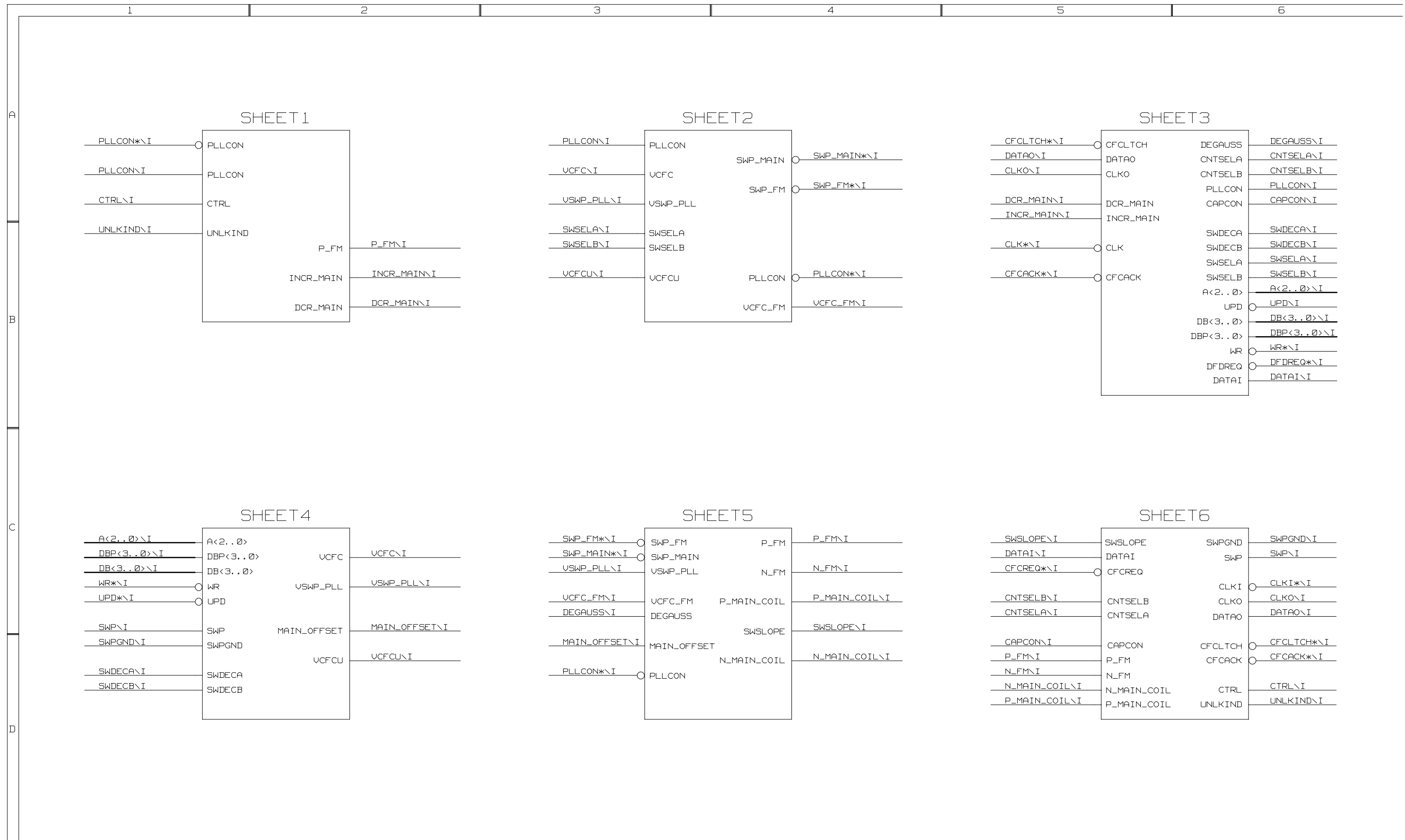
Figure 1-9: A12A1 Phaselock CFC (back)

### A12A1 Phaselock CFC Component Locator

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C100	A-1	1C2	C960*	D-7	6B1	R610*	A-5	1C1	U260	D-2	3A2	C390	E-2	6A2	Q674*	D-5	6B4	R482	E-3	6A5	R918*	A-8	5B5
C101	A-1	1C2	C961*	D-8	6B2	R613*	A-5	1A2	U260	D-2	3B3	C392	E-3	6A6	Q703*	A-6	5A4	R484	E-4	6C2	R920*	B-7	5A2
C112	A-1	1B2	C971*	D-7	3B5	R615*	A-5	1A2	U260	D-2	3C2	C395	E-2	6A2	Q780*	E-5	6D4	R485	E-4	6C2	R921*	B-7	4C5
C120	B-1	1A2	C973*	D-7	6B2	R617	A-5	1B2	U260	D-2	3D2	C410	A-3	5B5	Q781*	E-6	6A4	R486	E-4	6C2	R922*	B-7	5D2
C141	C-1	6A4	C975*	D-8	6B2	R620*	B-5	1B4	U260	D-2	3D3	C411	A-3	5B5	Q800*	A-6	5A4	R487	E-4	6C2	R923*	B-7	5D2
C150	C-1	6D5	CR639*	B-5	1C6	R622*	B-5	1C6	U270	D-2	3B2	C420	B-3	5D2	Q880*	A-6	6A2	R491	E-4	6D2	R924*	B-8	4C5
C200	A-2	1C2	J110	A-1	1A1	R624*	B-5	1C6	U270	D-2	3C3	C421	B-3	5D2	Q881*	E-7	6A6	R530	B-4	5C5	R925*	B-8	5B5
C201	A-2	1C2	J130	B-1	1C6	R632*	B-5	1C5	U270	D-2	3D2	C422	B-4	5C3	Q910*	A-7	5A5	R541	C-4	5C4	R926*	B-8	5D3
C205	A-2	1C2	J140	C-1	2B6	R633*	B-5	1C5	U274	D-1	2D2	C442	C-3	4C4	Q911*	A-7	5A5	R542	C-4	5D3	R927*	B-7	5D2
C211	A-1	1C3	J190	E-1	6B6	R634*	B-5	1C6	U360	D-2	3C2	C443	C-3	4C4	Q920*	B-7	5C3	R543	C-4	5D5	R928*	B-7	5D2
C213	A-2	1C3	L621*	B-5	1B3	R636*	B-5	1C5	U360	D-2	3C3	C445	C-4	4D3	Q930*	B-8	5C2	R545	C-4	5C5	R929*	B-8	5D3
C214	A-2	1A2	L631*	B-5	1C6	R637*	B-5	1C5	U360	D-2	3D2	C452	C-3	4D2	Q931*	B-8	5C2	R546	C-4	5D4	R930*	B-7	5D2
C220	B-1	1B2	L720*	B-5	1B3	R638*	C-5	1B5	U361	D-3	3A3	C480	E-3	6C3	R161	D-1	6C4	R547	C-4	5D4	R931*	B-7	5D1
C221	B-1	1A4	L732*	B-6	1B5	R640*	C-5	1D4	U370	D-2	3C4	C483	E-3	6A6	R162	D-1	6B4	R551	C-4	5D5	R932*	B-7	4B4
C230	B-2	1B5	P11	E-4	6C1	R641*	C-5	1C4	U460	D-3	3A4	C520	B-4	5C3	R164	D-1	6C4	R552	C-4	4D3	R933*	B-7	4B4
C231	B-2	1D5	P11	E-4	6D1	R642*	C-5	1D3	U471	D-3	3C4	C540	C-4	4D3	R171	D-1	6C3	R561	D-4	4B2	R934*	B-7	4B4
C235	B-2	1B5	Q630*	B-5	1C5	R643*	C-5	1D3	U471	D-3	3C5	C562	D-4	4B2	R172	D-1	6B5	R563	D-4	4B2	R935*	B-7	4C4
C240	C-1	2B4	Q631*	B-5	1C5	R644*	C-5	1D3	U560	D-4	3A5	C567	D-4	4B3	R173	D-1	6B5	R564	D-4	4B2	R936*	B-8	5C2
C245	C-2	2B4	Q632*	B-5	1C5	R645*	C-5	1D4	U570	D-4	3A2	C660*	D-5	6B4	R191	D-1	6D4	R566	D-4	4B3	R937*	B-8	5C2
C251	C-2	2B3	Q633*	B-5	1C5	R651*	C-5	1C3	U570	D-4	3C3	C671*	D-5	6C4	R281	E-1	6A3	R568	D-4	4B3	R938*	B-8	5C2
C252	C-2	2B2	Q652*	C-5	1D3	R653*	C-5	1C3	U570	D-4	3D5	C672*	D-5	6C4	R283	E-1	6D4	R569	D-4	4B3	R939*	B-8	5C1
C255	C-2	2B3	R111	A-1	1B1	R654*	C-5	1C3	U606*	A-5	1C2	C812*	A-6	5A3	R284	E-1	6D4	R575	E-4	6C2	R940*	C-7	4C4
C262	D-2	3C2	R202	A-1	1B2	R655*	C-5	1C3	U614*	A-5	1B2	C824*	B-7	5A2	R285	E-2	6D4	R576	D-4	4B2	R941*	C-8	4D3
C374	D-3	3B4	R203	A-2	1B2	R656*	C-5	1D2	U650*	C-5	1C3	C825*	B-7	5B2	R286	E-2	6A3	R670*	D-5	6C4	R942*	C-8	5C4
C605*	A-5	1B1	R204	A-2	1C2	R657*	C-5	1D2	U650*	C-5	1D4	C826*	B-6	5C2	R287	E-2	6B4	R673*	D-5	6C4	R943*	C-8	5D4
C611*	A-5	1A1	R210	A-1	1C3	R709*	A-6	1C2	U700*	A-5	1C2	C840*	C-6	4A4	R288	E-2	6A4	R701*	A-6	5A4	R944*	B-8	5C2
C612*	A-5	1A1	R212	A-2	1C3	R710*	A-5	1A2	U700*	A-5	1D3	C851*	C-6	4A3	R289	E-2	6A3	R702*	A-6	5A4	R945*	B-8	5C2
C616*	A-5	1B2	R232	B-1	1C5	R711*	A-5	1C2	U700*	A-5	2A2	C853*	C-7	4B3	R291	E-2	6A3	R716*	A-6	5A4	R946*	B-8	5C3
C623*	B-5	1D5	R233	B-1	1C5	R712*	A-6	1D2	U700*	A-5	2C5	C914*	A-8	5B5	R311	A-2	5A3	R801*	A-6	5A4	R947*	B-8	5C4
C625*	B-5	1B5	R234	B-2	1C5	R713*	A-5	1B2	U713*	A-6	1C3	C919*	A-8	6D6	R313	A-2	5B3	R812*	A-6	5A3	R948*	B-8	5C3
C630*	B-5	1C6	R236	B-2	4D5	R714*	A-6	1B3	U720*	B-6	1A4	C920*	B-7	4C5	R320	B-2	5A2	R813*	A-6	5B3	U166	D-1	6C4
C635*	A-5	1C6	R237	C-2	2C4	R718*	A-6	1B3	U723*	B-6	1A3	C929*	B-8	5C4	R323	B-2	5C2	R815*	A-6	5C5	U174	D-1	6B5
C710*	A-5	1A2	R238	C-2	2C4	R719*	A-6	1A2	U740*	C-5	2B5	C930*	B-7	5D2	R324	B-2	5C2	R816*	B-6	5A3	U282	E-2	6A3
C711*	A-5	1A3	R239	C-2	2C3	R725*	B-6	1A4	U743*	C-6	2C3	C940*	C-7	4C5	R330	B-2	5B3	R820*	B-6	5C3	U282	E-2	6D4
C712*	A-6	1B3	R241	C-2	4D5	R727*	B-6	1A4	U757*	C-6	2B2	C941*	C-8	4C4	R331	B-2	5B3	R821*	B-6	5A3	U380	E-3	6A1
C714*	A-6	1B3	R242	C-2	2A4	R730*	B-5	1C4	U757*	C-6	2B3	C942*	C-8	5C4	R332	B-2	5B1	R822*	B-6	5A3	U380	E-3	6A5
C715*	A-6	1B3	R243	C-2	2B4	R734*	B-6	1B5	U757*	C-6	2D3	C943*	C-8	5D4	R335	B-2	5B1	R823*	B-7	5B2	U470	D-3	6C2
C716*	A-6	1B4	R244	C-2	2B4	R736*	B-6	1D5	C163	C-7	1C6	C951*	C-7	4C4	R336	B-3	4B5	R827*	B-7	5B2	U544A	C-4	5C4
C721*	B-5	1A3	R250	C-2	2B2	R745*	C-6	2C3	C167	D-1	6C4	C953*	C-7	4D3	R339	B-3	4C5	R828*	B-7	6C6	U544B	C-4	5D5
C722*	B-6	1B3	R253	C-2	2B2	R746*	C-5	2C3	C280	E-2	6A3	C962*	D-8	4B3	R350	C-2	4B2	R832*	C-7	6B3	U565	D-4	4B3
C724*	B-6	1A4	R254	C-2	2B2	R750*	C-5	2B4	C281	E-2	6A4	C963*	D-8	4B3	R380	E-2	6A2	R833*	C-7	6B3	U810	A-7	5A4
C726*	B-6	1B4	R261	D-2	3C2	R751*	C-5	2D4	C282	E-2	6A3	C974*	D-7	6D2	R381	E-2	6A2	R840*	C-6	4A4	U811*	A-6	5A3
C728*	B-6	1A4	R271	D-2	3D2	R752*	C-5	2D4	C290	E-1	6D5	C976*	D-8	6C2	R382	E-2	6A2	R841*	C-6	4A4	U820*	B-7	5B2
C729*	B-5	1B4	R272	D-2	3D2	R753*	C-6	2D4	C292	E-2	6A4	C980*	E-7	6D2	R383	E-2	6B2	R842*	C-6	4A4	U821*	B-6	5C2
C731*	B-6	1B5	R273	D-2	3D2	R754*	C-6	2D3	C300	A-2	5A4	C990*	E-7	6D2	R384	E-3	6A5	R843*	C-6	4A4	U831*	B-7	4B5
C733*	B-6	1B5	R362	D-3	3C4	R755*	C-6	2B4	C310	A-2	5A3	CR165	D-1	6C4	R385	E-3	6B6	R844*	C-6	4A4	U845*	C-6	4A5
C735*	B-6	1B5	R371	D-2	3C3	R756*	C-6	2B4	C312	A-2	5B3	CR175	D-1	6B3	R386	E-3	6A6	R845*	C-6	4B4	U850*	C-7	4A2
C737*	C-6	2C4	R373	D-3	3B4	R772*	D-6	2D2	C314	A-3	5B4	CR840	C-7	6B2	R387	E-2	6A5	R846*	C-7	4B4	U852*	C-6	4A4
C738*	C-6	4D5	R375	D-3	3B4	R861*	D-6	3D2	C321	B-2	5A2	CR841	C-7	6B2	R430	C-3	4D3	R847*	C-7	4B4	U854*	C-7	4B4
C741*	C-6	4D5	R476	D-4	3C5	R863*	D-6	3C2	C322	B-3	5B2	J140	C-1	2A6	R431	C-4	4D4	R848*	C-7	4B4	U910*	A-7	5B5
C742*	C-6	2A4	R477	D-4	3C5	R870*	D-6	3B2	C333	B-2	5B2	J510	A-4	6C6	R440	C-3	4C5	R900*	A-7	5D3	U920*	B-7	5D2
C744*	C-6	2C3	R478	D-4	3C5	R871*	D-6	3B2	C334	B-2	5B2	J550	C-4	6C6	R441	C-3	4C5	R901*	A-7	5A5	U921*	B-8	5C3
C747*	C-6	2A4	R571	D-4	3B2	R872*	D-6	3D5	C337	B-3	4B5	L351	C-3	4B2	R444	C-3	4D3	R903*	A-7	5A5	U940*	C-7	4C5
C760*	D-6	6B1	R572	D-4	3A2	R873*	D-6	3D5	C338	B-3	4C5	L451	C-3	4C2	R446	C-3	4C4	R904*	A-7	5A5	U941*	C-8	4D4
C761*	D-6	6B1	R573	D-4	3A2	R875*	D-7	3B4	C340	C-2	4A4	L481	E-3	6D2	R450	C-3	4D2	R905*	A-7	5C5	U950*	C-7	4C2
C770*	D-6	6B2	R574	D-4	3A2	R970*	D-7	3B5	C341	C-2	4B4	L490	E-3	6D2	R453	C-4	4D4	R912*	A-7	5B5	U952*	C-7	4C4
C773*	D-5	6B2	R600*	A-5	1C1	R972*	D-7	3B5	C342	C-3	4B4	L802*	A-6	5A4	R472	D-4	6C2	R913*	A-7	5B5	U954*	C-8	4D3
C860*	D-6	3D2	R601*	A-5	1C1	R977*	D-8	3C3	C343	C-3	4B4	L814*	A-7	5B4	R473	D-3	6C2	R915*	A-7	5B5	VR160*	D-1	6C3
C862*	D-6	3C2	R602*	A-5	1B2	R995*	E-8	3A2	C352	C-3	4B2	L917*	A-8	6D6	R474	D-3	6D2	R916*	A-7	5C5	VR803*	A-7	5A5
C864*	D-7	6B2	R603*	A-5	1C1	R996*	E-8	3A2	C388	E-2	6A5	Q170	D-1	6C5	R475	E-4	6D2	R917*	A-7	5B5	VR902*	A-7	5A5
C874*	D-7	6B1	R604*	A-5	1B1	U260	D-2	2A3	C389	E-3	6A5	Q521	B-4	5C4									

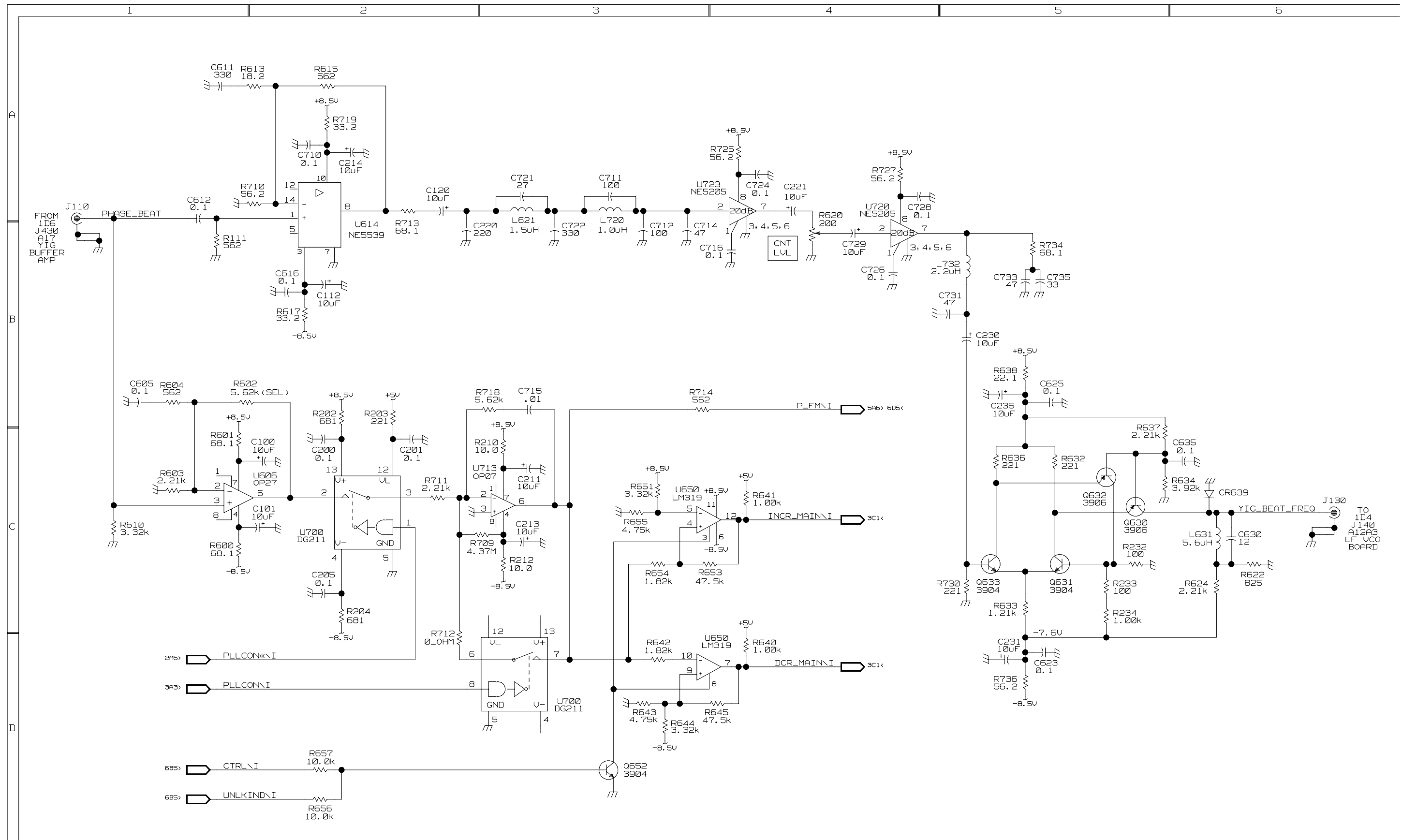
\*Asterisks indicate components located on the back of the board.

Figure 1-10: A12A1 Phaselock CFC Component Locator





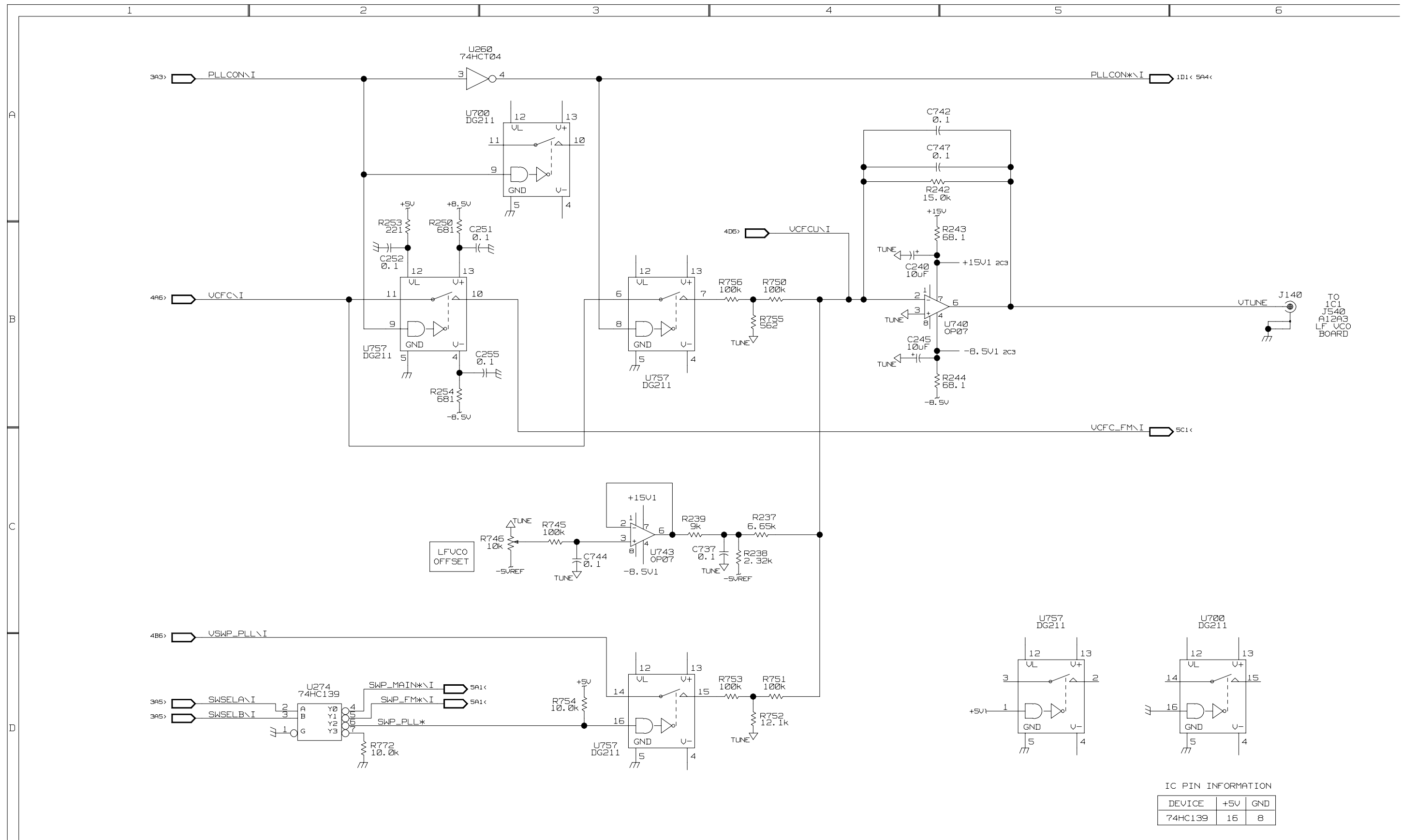




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PHASELOCK CFC A12A1 1



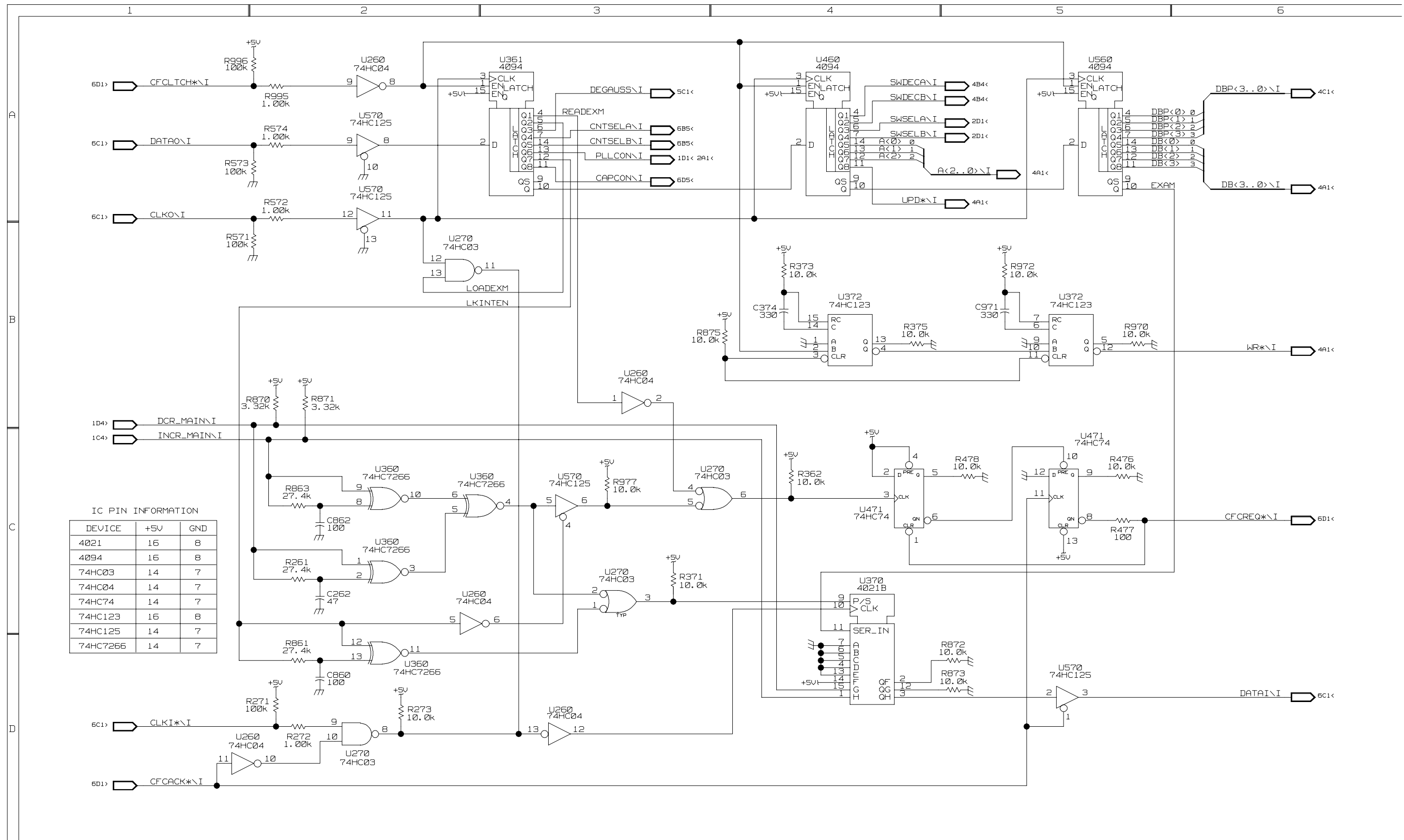


TO  
IC1  
J540  
A12A3  
LF VCO  
BOARD

IC PIN INFORMATION

DEVICE	+5V	GND
74HC139	16	8

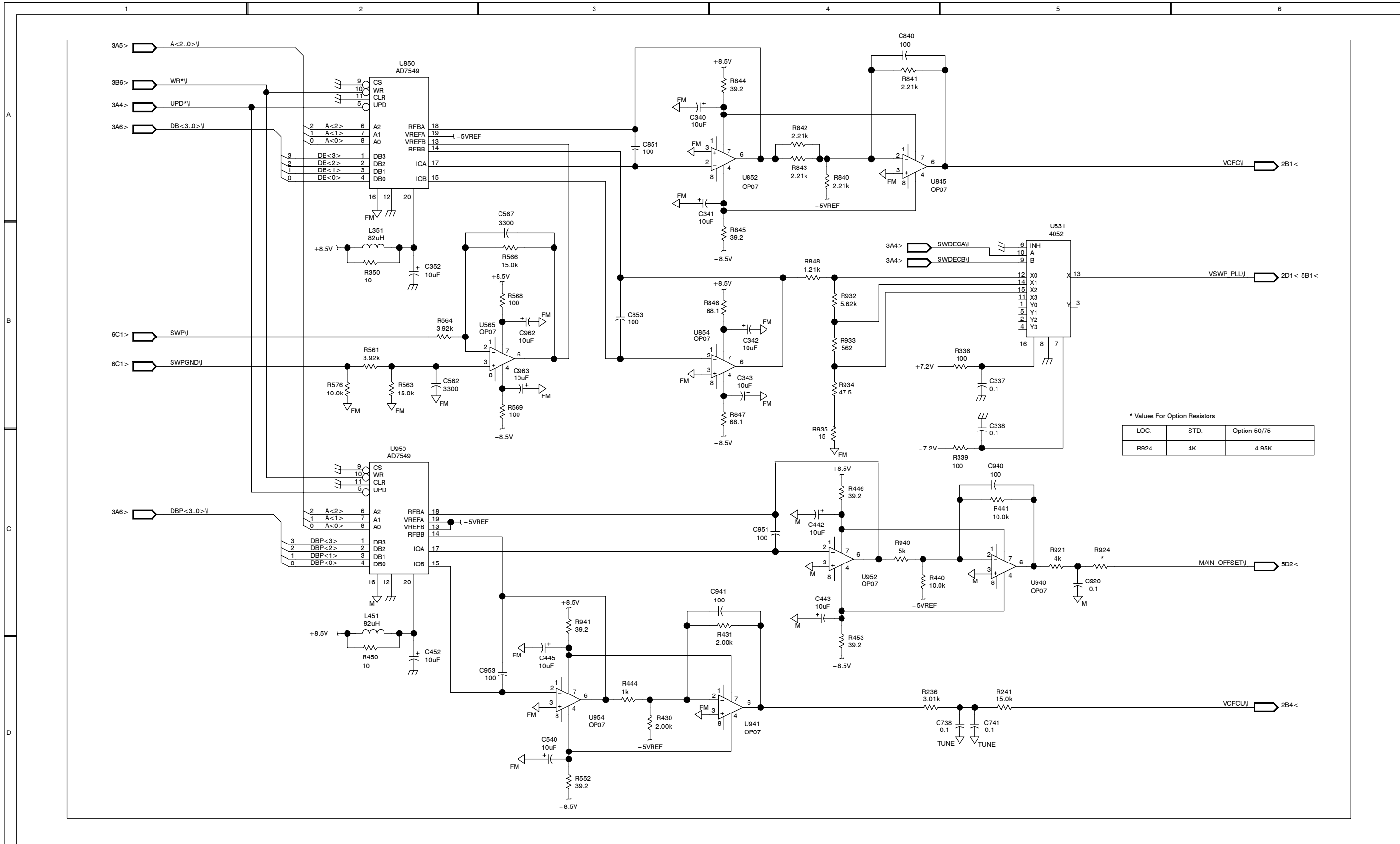




IC PIN INFORMATION

DEVICE	+5V	GND
4021	16	8
4094	16	8
74HC03	14	7
74HC04	14	7
74HC74	14	7
74HC123	16	8
74HC125	14	7
74HC7266	14	7



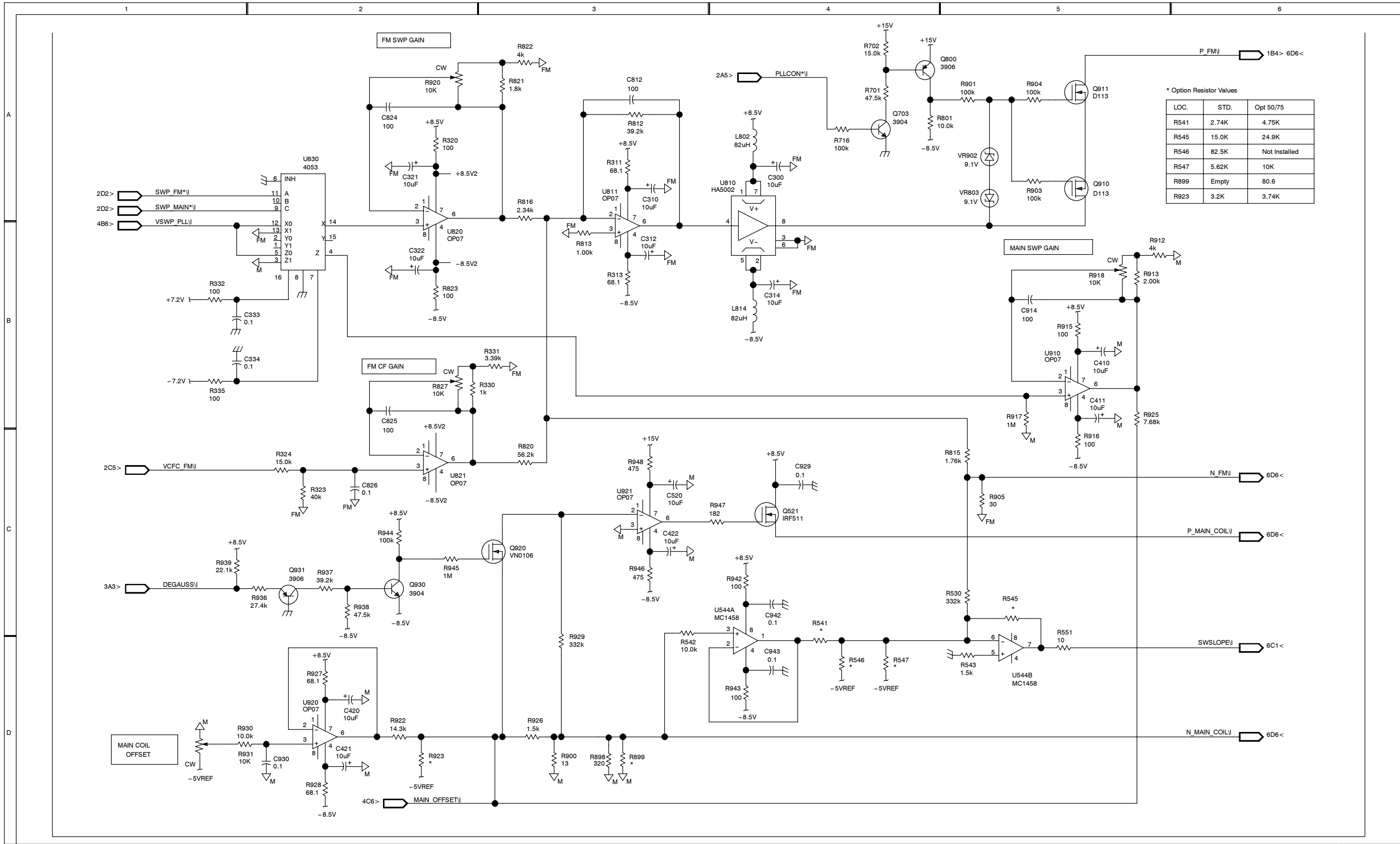


\* Values For Option Resistors

LOC.	STD.	Option 50/75
R924	4K	4.95K



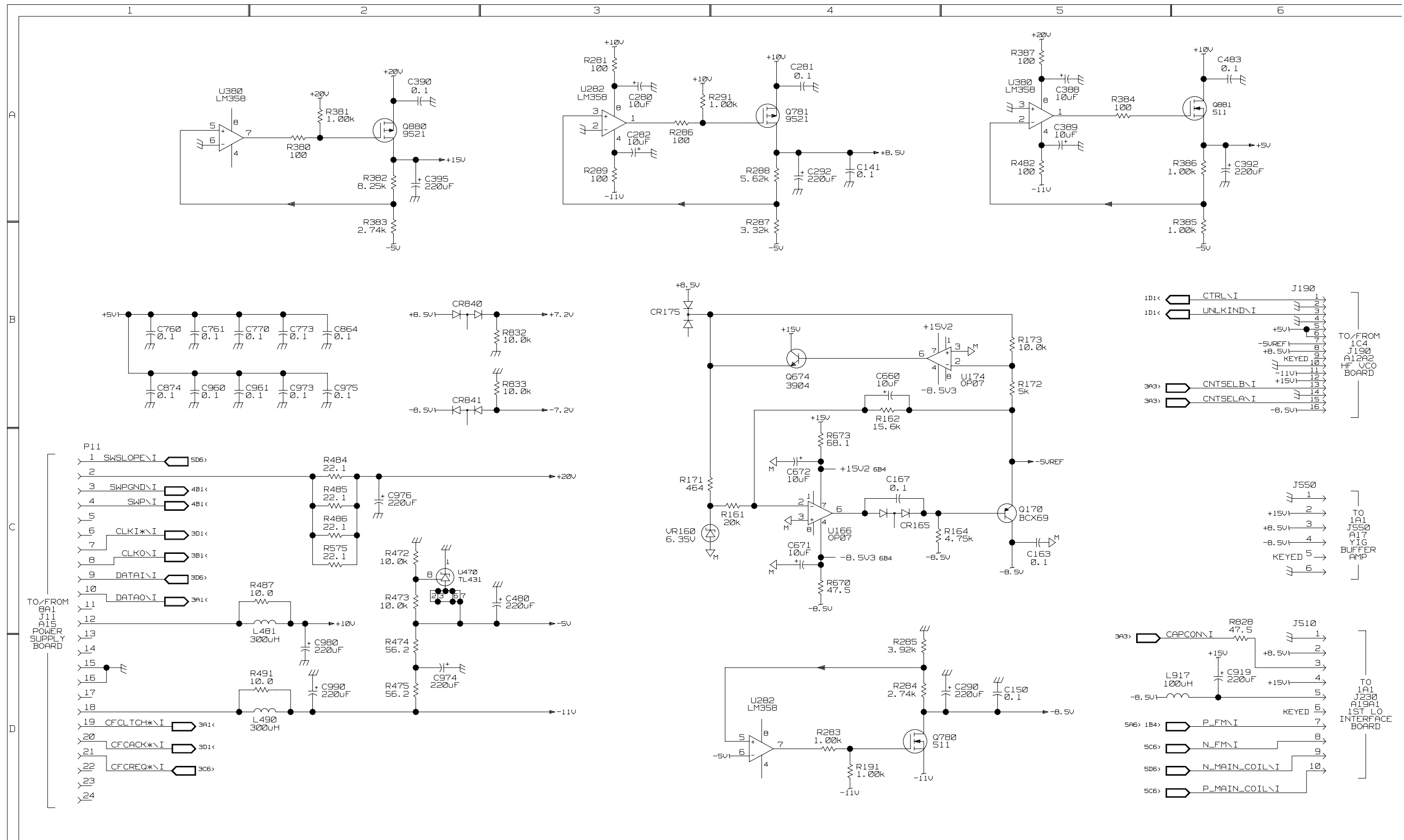




\* Option Resistor Values

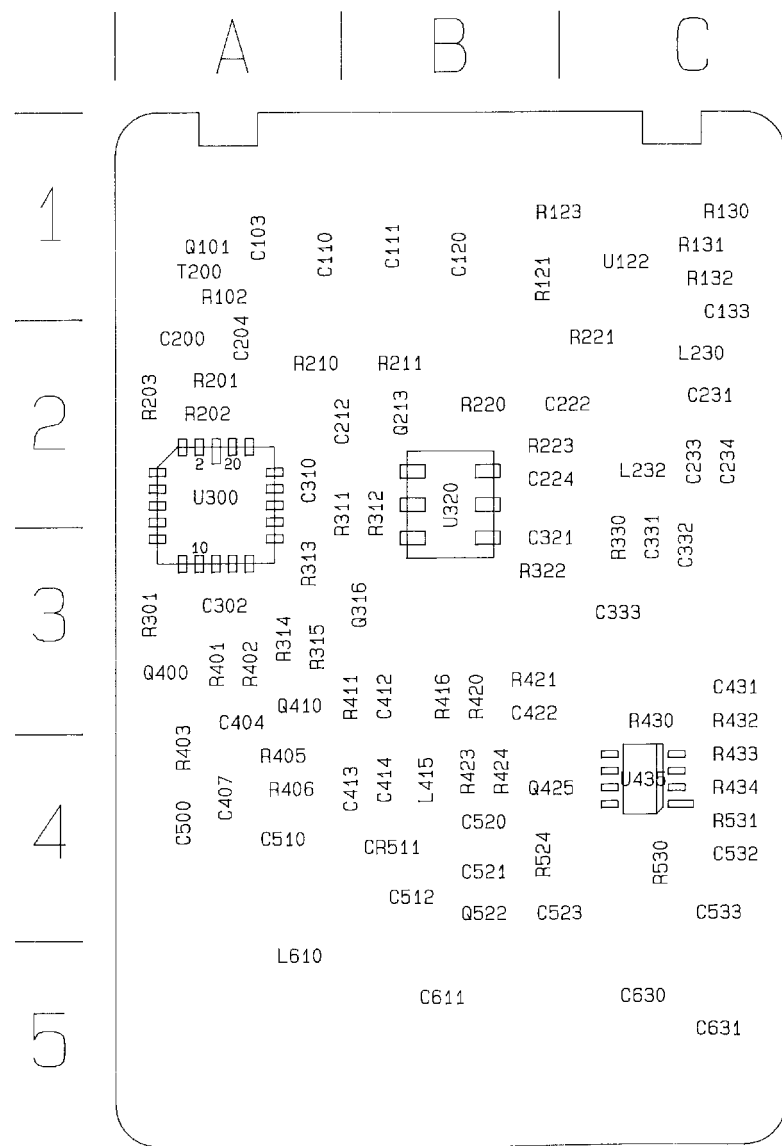
LOC.	STD.	Opt 50/75
R541	2.74K	4.75K
R545	15.0K	24.9K
R546	82.5K	Not Installed
R547	5.62K	10K
R899	Empty	80.6
R923	3.2K	3.74K



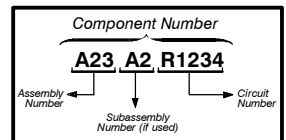


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PHASELOCK CFC POWER SUPPLY A12A1 6



**COMPONENT NUMBER EXAMPLE**



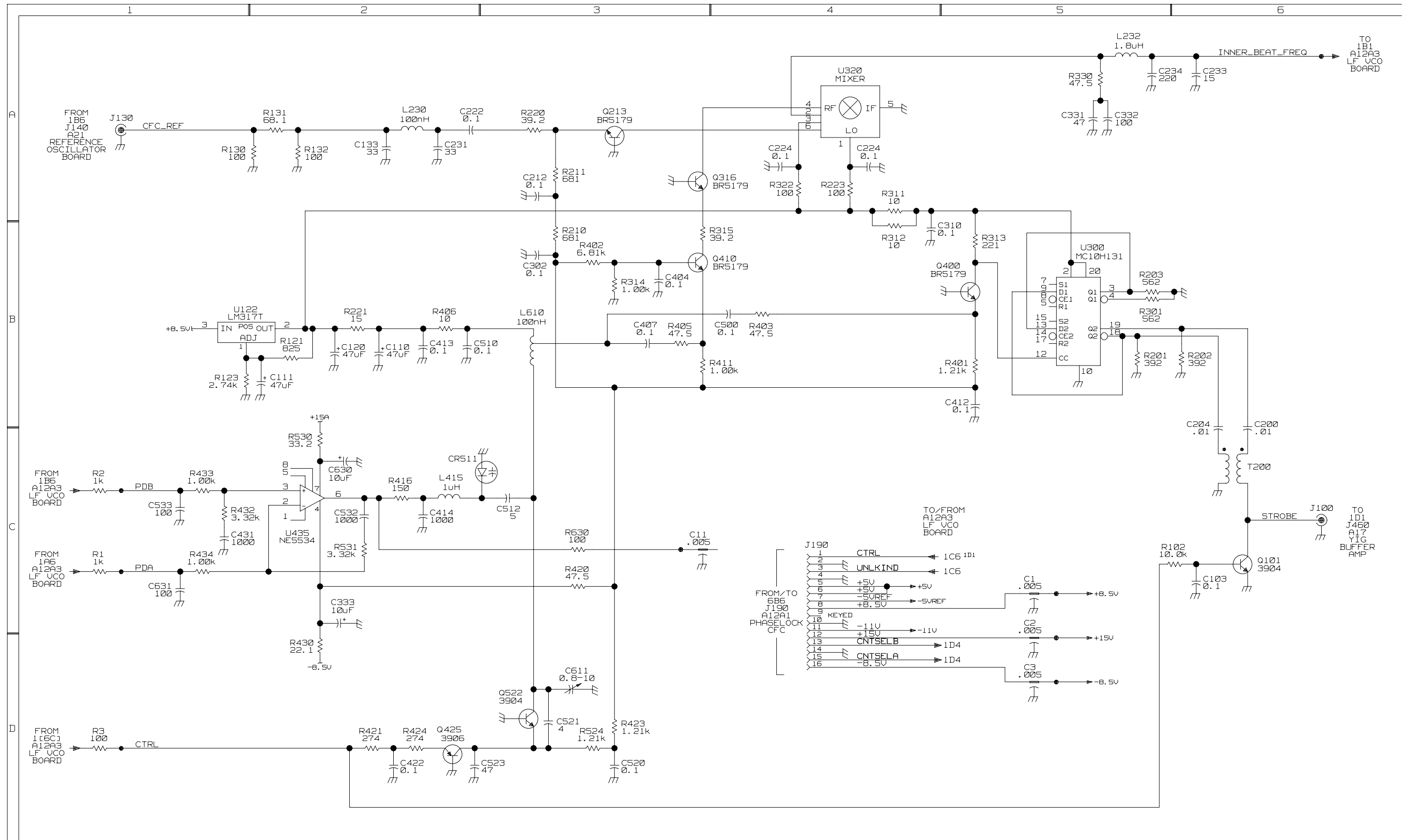
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**STATIC SENSITIVE DEVICES**

**A12A2 HF VCO Component Locator**

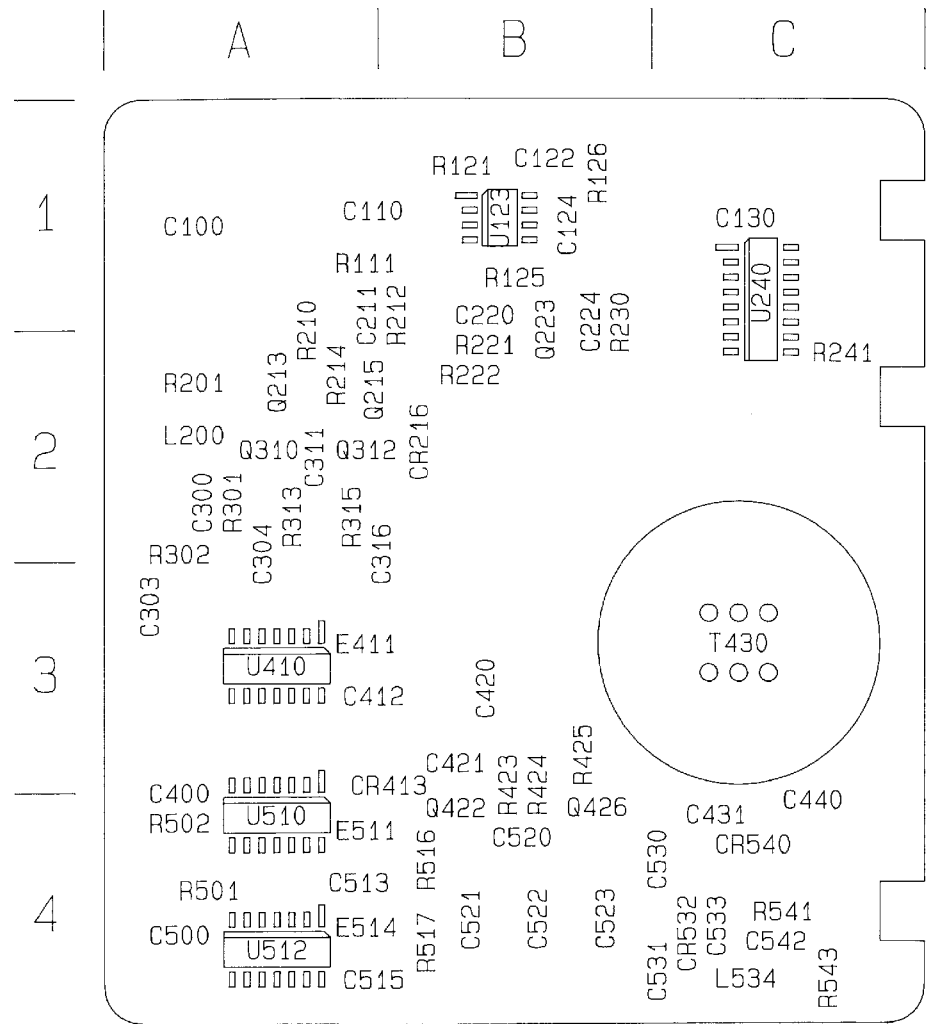
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C103	A-1	1C6	C234	C-2	1A5	C431	C-3	1C1	CR511	B-4	1C2	R102	A-1	1C6	R221	C-2	1B2	R402	A-3	1B3	R432	C-4	1C1
C110	A-1	1B2	C302	A-3	1B3	C500	A-4	1B4	L230	C-2	1A2	R121	B-1	1B2	R223	B-2	1A4	R403	A-4	1B4	R433	C-4	1C1
C111	B-1	1B2	C310	A-2	1A4	C510	A-4	1B3	L232	C-2	1A5	R123	B-1	1B1	R301	A-3	1B5	R405	A-4	1B3	R434	C-4	1C1
C120	B-1	1B2	C331	C-3	1A5	C512	B-3	1C3	L415	B-4	1C2	R130	C-1	1A2	R311	B-3	1A4	R406	A-4	1B2	R524	B-4	1D3
C133	C-1	1A2	C332	C-3	1A5	C520	B-4	1D3	L610	A-5	1B3	R131	C-1	1A2	R312	B-3	1A4	R411	B-3	1B3	R530	C-4	1C2
C200	A-2	1B6	C333	C-3	1C2	C521	B-4	1D3	Q101	A-1	1C5	R132	C-1	1A2	R313	A-3	1B5	R416	B-3	1C2	R531	C-4	1C2
C204	A-2	1B6	C404	A-3	1B3	C523	B-4	1D2	Q213	B-2	1A3	R201	A-2	1B5	R314	A-3	1B3	R420	B-3	1C3	T200	A-1	1C6
C212	A-2	1A3	C407	A-4	1B3	C532	C-4	1C2	Q400	A-3	1B5	R202	A-2	1B6	R315	A-3	1B3	R421	B-3	1D2	U122	C-1	1B2
C222	B-2	1A2	C412	B-4	1B5	C533	C-4	1C1	Q316	B-3	1A4	R203	A-2	1B5	R322	B-3	1A4	R423	B-4	1D3	U300	A-2	1B5
C231	C-2	1A2	C413	B-4	1B2	C611	B-5	1D3	Q410	A-3	1B3	R210	A-2	1B3	R330	C-3	1A5	R424	B-4	1D2	U320	B-2	1B4
C224	B-2	1A4	C414	B-4	1C2	C630	C-5	1C2	Q425	C-4	1D2	R211	B-2	1A3	R401	A-3	1B5	R430	C-4	1D2	U435	C-4	1C2
C233	C-2	1A5	C422	B-4	1D2	C631	C-5	1C1	Q522	B-4	1D3	R220	B-2	1A3									

Figure 1-11: A12A2 HF VCO

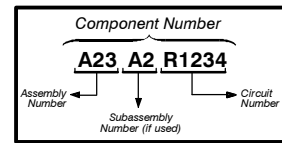


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HF VCO A12A2 1



**COMPONENT NUMBER EXAMPLE**



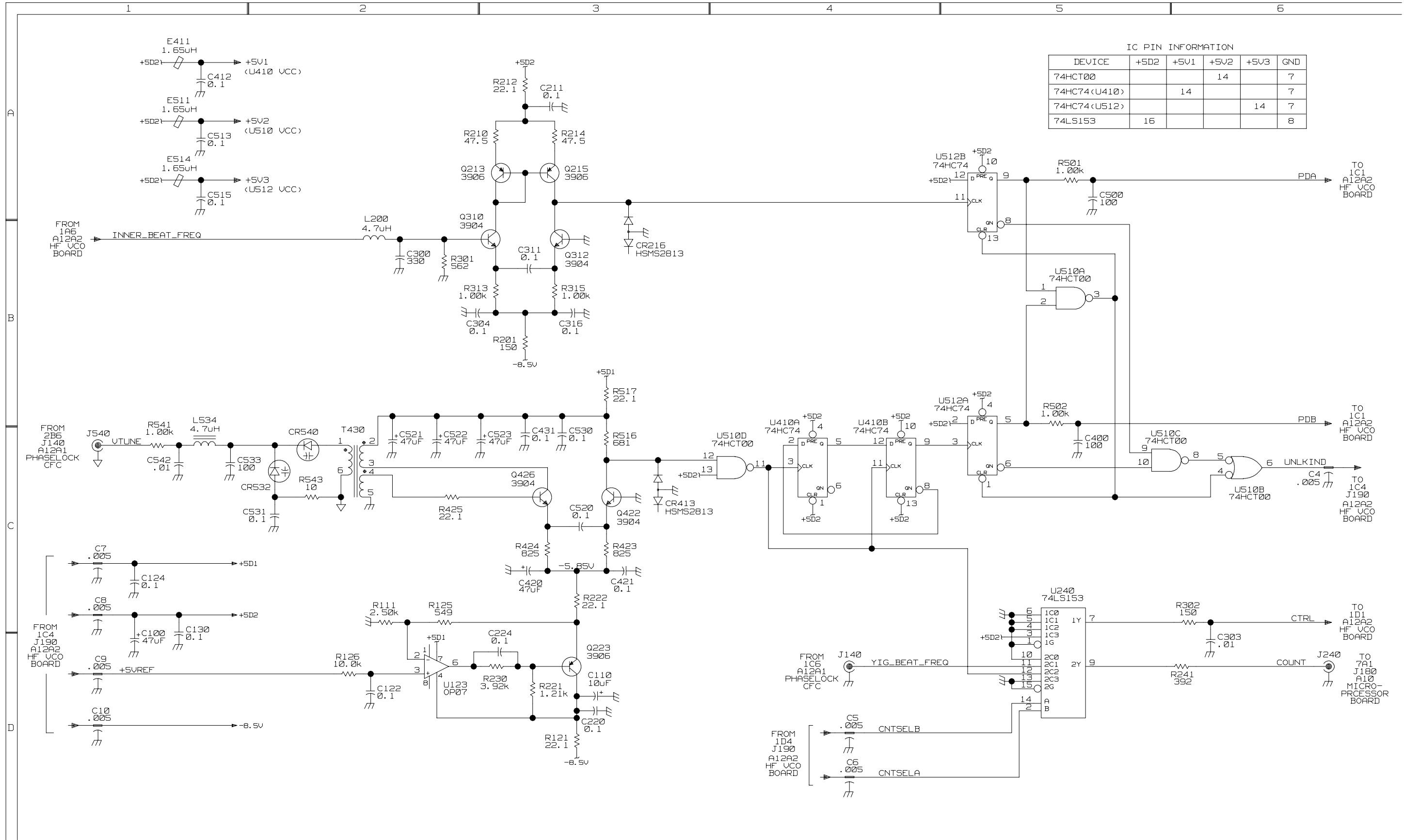
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**⚡** STATIC SENSITIVE DEVICES

**A12A3 LF VCO Component Locator**

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C100	A-1	1D1	C311	A-2	1B3	C521	B-4	1C2	CR540	C-4	1C2	Q312	A-2	1B3	R214	B-2	1A3	R424	B-4	1C3	U240	C-1	1C5
C110	A-1	1D3	C316	A-2	1B3	C522	B-4	1C2	E411	A-3	1A1	Q422	B-4	1C3	R221	B-2	1D3	R425	B-3	1C2	U410A	A-3	1C4
C122	B-1	1D2	C400	A-3	1C5	C523	B-4	1C3	E511	A-4	1A1	Q426	B-4	1C3	R222	B-2	1C3	R501	A-4	1A5	U410B	A-3	1C4
C124	B-1	1C1	C412	A-3	1A1	C530	C-4	1C3	E514	A-4	1A1	R111	A-1	1C2	R230	B-1	1D3	R502	A-4	1B5	U510A	A-4	1B5
C130	C-1	1D1	C420	B-3	1C3	C531	C-4	1C2	L200	A-2	1B2	R121	B-1	1D3	R241	C-2	1D6	R516	B-4	1C3	U510B	A-4	1C6
C211	A-1	1A3	C421	B-3	1C3	C533	C-4	1C1	L534	C-4	1C1	R125	B-1	1C2	R301	A-2	1B2	R517	B-4	1B3	U510C	A-4	1C5
C220	B-1	1D3	C431	C-4	1C3	C542	C-4	1C1	Q213	A-2	1A3	R126	B-1	1D2	R302	A-2	1C6	R541	C-4	1C1	U510D	A-4	1C4
C224	B-1	1D3	C500	A-4	1A5	CR216	B-2	1B3	Q215	A-2	1A3	R201	A-2	1B3	R313	A-2	1B3	R543	C-4	1C2	U512A	A-4	1B5
C300	A-2	1B2	C513	A-4	1A1	CR413	A-3	1C3	Q223	B-2	1D3	R210	A-2	1A3	R315	A-2	1B3	T430	C-3	1C2	U512B	A-4	1A5
C303	A-3	1D6	C515	A-4	1A1	CR532	C-4	1C1	Q310	A-2	1B2	R212	B-1	1A3	R423	B-4	1C3	U123	B-1	1D2			
C304	A-2	1B2	C520	B-4	1C3																		

Figure 1-12: A12A3 LF VCO

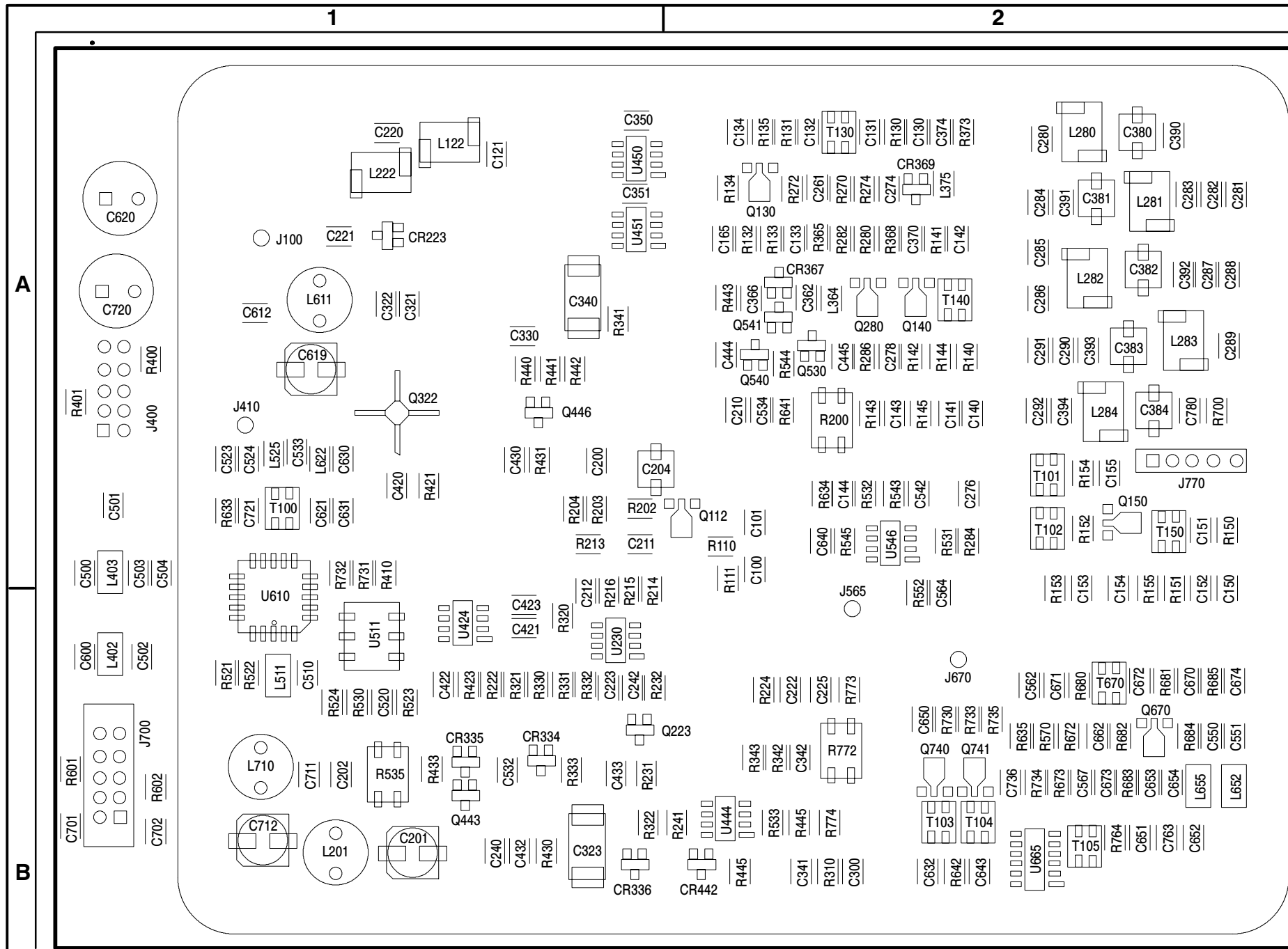


IC PIN INFORMATION

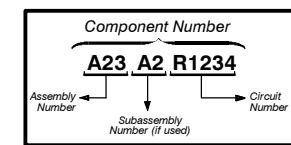
DEVICE	+5D2	+5V1	+5V2	+5V3	GND
74HCT00			14		7
74HC74 (U410)		14			7
74HC74 (U512)				14	7
74LS153	16				8

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LF VCO A12A3 1



**COMPONENT NUMBER EXAMPLE**



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**STATIC SENSITIVE DEVICES**

**Figure 1-13: A14 RF Mother**

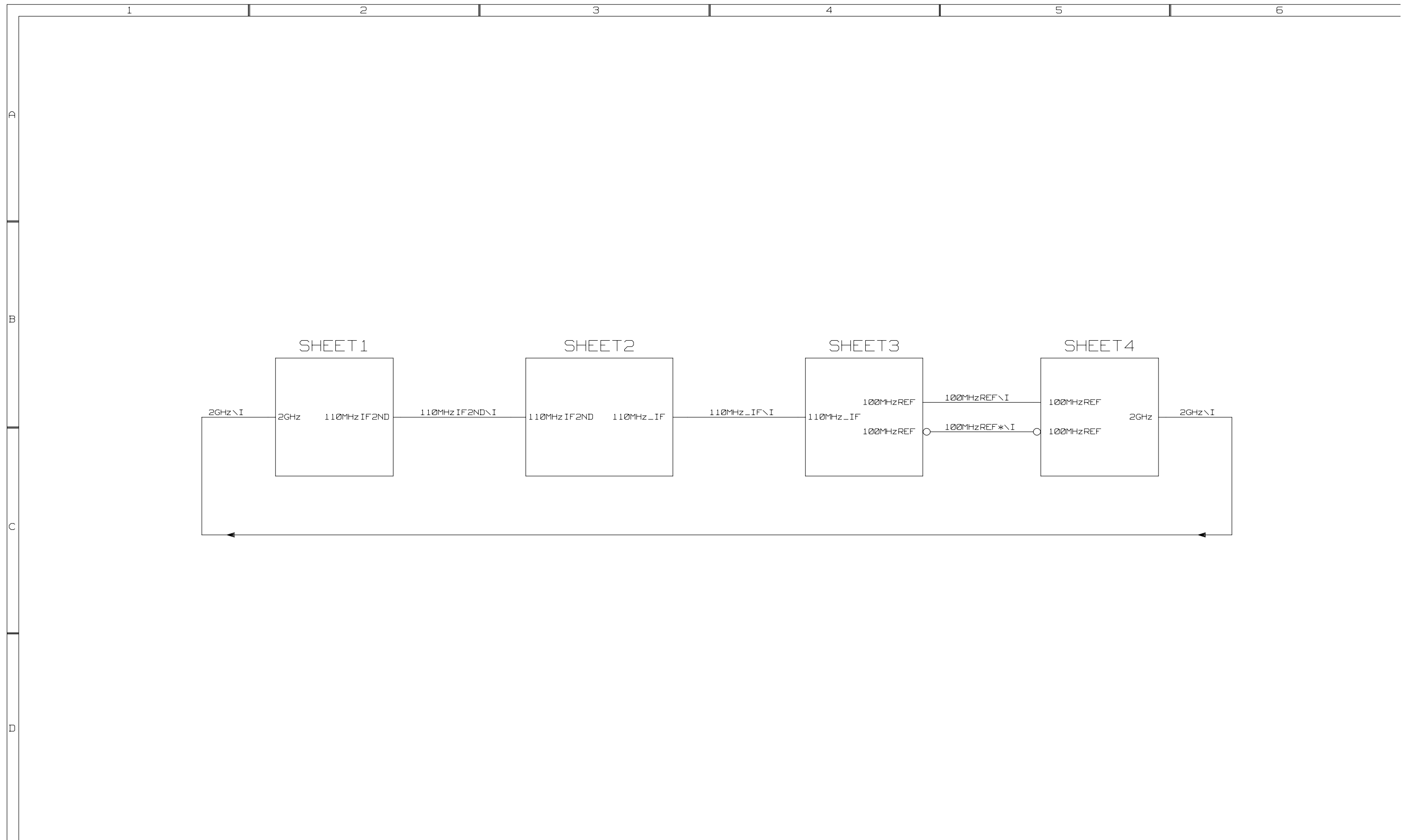


## A14 RF Mother Component Locator

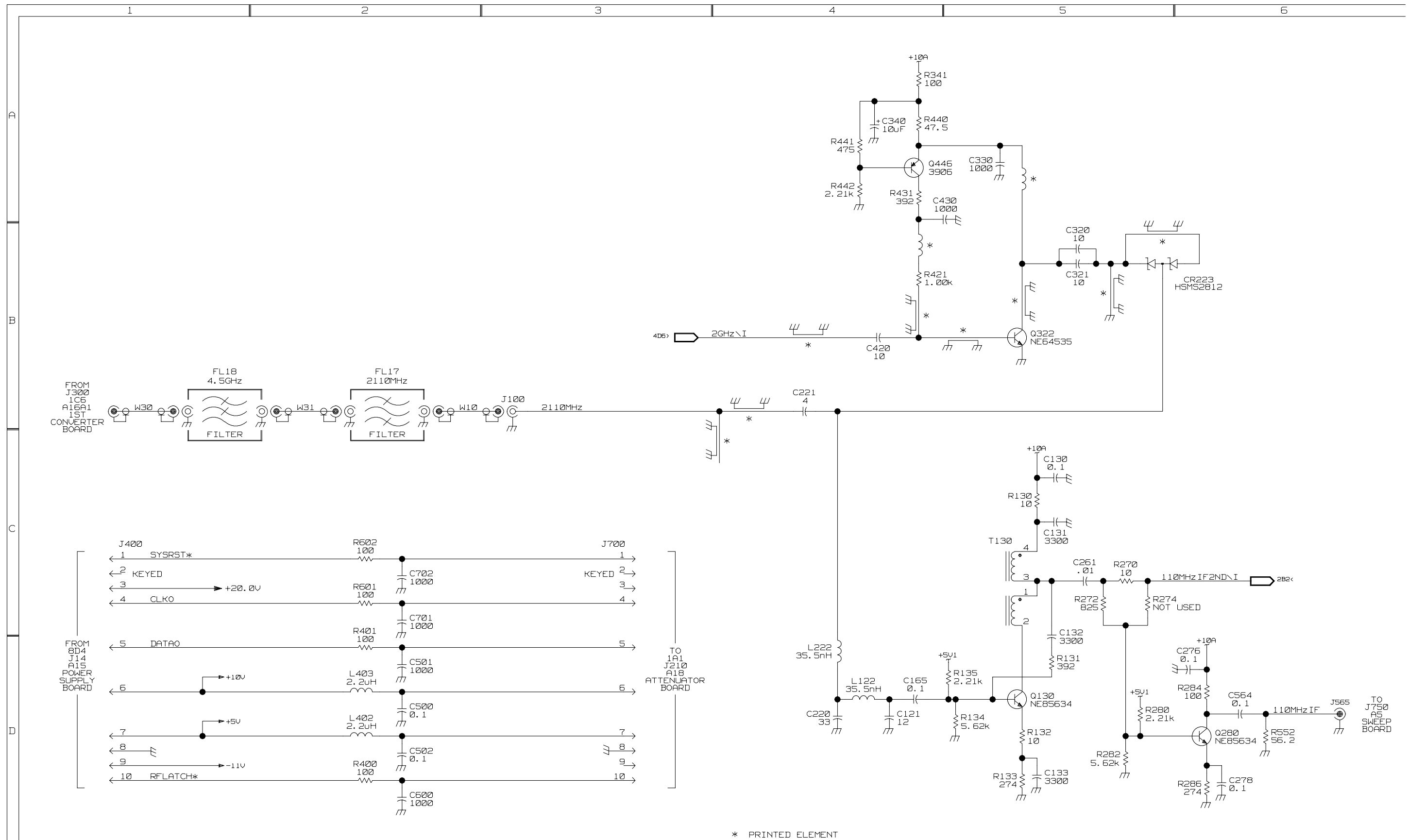
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C100	A-2	4C3	C281	A-2	3A2	C423	B-1	4D5	C670	B-2	3C5	L364	A-2	2C3	R150	A-2	3B6	R373	A-2	2A3	R681	B-2	3D5
C101	A-2	4C3	C282	A-2	3A3	C430	A-1	1A4	C671	B-2	3C5	L375	A-2	2B3	R151	A-2	3B6	R400	A-1	1D2	R682	B-2	3D5
C121	A-1	1D4	C283	A-2	3A3	C432	B-1	4B5	C672	B-2	3D5	L402	A-1	1D2	R152	A-2	3C6	R401	A-1	1D2	R683	B-2	3D5
C130	A-2	1C5	C284	A-2	3A3	C433	B-1	4B4	C673	B-2	3D5	L403	B-1	1D2	R153	A-2	3C6	R410	A-1	4D4	R684	B-2	3D5
C131	A-2	1C5	C285	A-2	3A3	C444	A-2	2C3	C674	B-2	2C6	L511	B-1	2D6	R154	A-2	3C6	R421	A-1	1B4	R685	B-2	3D4
C132	A-2	1D5	C286	A-2	3A3	C445	A-2	2C3	C701	B-1	1C2	L525	A-1	3A2	R155	A-2	3B6	R423	B-1	2C6	R700	A-2	3A6
C133	A-2	1D5	C287	A-2	3A4	C500	A-1	1D2	C702	B-1	1C2	L611	A-1	2C5	R200	A-2	2D1	R425	B-2	4B4	R730	B-2	3C1
C134	A-2	2C5	C288	A-2	3A4	C501	A-1	1D2	C711	B-1	2D6	L622	A-1	3A2	R204	A-1	4D4	R430	B-1	4B5	R731	A-1	3A4
C140	A-2	2A4	C289	A-2	3A4	C502	B-1	1D2	C712	B-1	2D5	L652	B-2	3D4	R202	A-1	4C3	R431	A-1	1A4	R732	A-1	3A4
C141	A-2	2A4	C291	A-2	3A5	C503	A-1	2D5	C720	A-1	2D5	L655	B-2	3D4	R203	A-1	4C3	R433	B-1	4B3	R733	B-2	3C2
C142	A-2	2B4	C290	A-2	3A5	C504	A-1	2D6	C721	A-1	3B3	Q112	A-2	4C3	R213	A-1	4C4	R440	A-1	1A4	R734	B-2	3D2
C143	A-2	2B4	C292	A-2	3A5	C520	B-1	4B2	C736	B-2	3C2	Q130	A-2	1D5	R216	B-1	4C2	R442	A-1	1A4	R735	B-2	3C2
C144	A-2	2C5	C300	B-2	4B6	C523	A-1	3A1	C763	B-2	3D3	Q140	A-2	2B4	R215	B-1	4C2	R441	A-1	1A4	R764	B-2	3D3
C150	A-2	3A6	C320	A-1	1B5	C524	A-1	3A2	C780	A-2	3A6	Q150	A-2	3C6	R214	B-1	4C2	R443	A-2	2C2	R772	B-2	3B2
C150	A-2	3B6	C321	A-1	1B5	C532	B-1	4B4	CR223	A-1	1B6	Q322	A-1	1B5	R222	B-1	4A4	R444	B-2	4B2	R773	B-2	3B2
C152	A-2	3B6	C323	B-1	4B4	C533	A-1	3A2	CR336	B-1	4B4	Q223	B-1	4D2	R224	B-2	4D2	R445	B-2	4B3	R774	B-2	3B2
C153	A-2	3C6	C330	A-1	1A5	C534	A-2	2D1	CR334	B-1	4B3	Q280	A-2	1D6	R231	B-1	4D2	R521	B-1	3C2	T100	A-1	3A3
C154	A-2	2C6	C340	A-1	1A4	C542	A-2	2D3	CR335	B-1	4B5	Q443	B-1	4B5	R232	B-1	4D2	R522	B-1	3C1	T101	A-2	3C2
C155	A-2	3B6	C341	B-2	4B5	C550	B-2	3D4	CR367	A-2	2C3	Q446	A-1	1A4	R241	B-2	4B4	R523	B-1	4C2	T102	A-2	3D2
C165	A-2	1D4	C342	B-2	4B3	C551	B-2	3D4	CR369	A-2	2B3	Q670	B-2	3D5	R270	A-2	1C5	R530	B-1	4B2	T103	B-2	3C1
C200	A-1	4D3	C350	A-1	2C6	C562	B-2	3C6	CR442	B-2	4B4	Q530	A-2	2C3	R272	A-2	1C5	R531	A-2	2D3	T104	B-2	3C2
C201	B-1	2C5	C351	A-1	2D5	C564	A-2	1D6	J100	A-1	1B3	Q540	A-2	2C2	R274	A-2	1C5	R532	A-2	2D2	T105	B-2	3C3
C202	B-1	2C5	C362	A-2	2B3	C567	B-2	3C5	J400	A-1	1C1	Q541	A-2	2C3	R280	A-2	1D5	R533	B-2	4B3	T130	A-2	1C5
C204	A-1	4D3	C366	A-2	2C3	C600	B-1	1D2	J400	A-1	1D1	Q740	B-2	3C1	R282	A-2	1D5	R535	B-1	4B3	T140	A-2	2A4
C210	A-2	2D1	C370	A-2	2B4	C612	A-1	2C6	J410	A-1	3A1	Q741	B-2	3C2	R284	A-2	1D6	R543	A-2	2D2	T150	A-2	3B6
C211	A-1	4C4	C374	A-2	2B3	C619	A-1	2C5	J565	A-2	1D6	R110	A-2	4C4	R286	A-2	1D6	R544	B-2	2D3	T670	B-2	3C5
C212	B-1	4C2	C380	A-2	3A2	C620	A-1	2C5	J670	B-2	3C6	R111	A-2	4C4	R310	B-2	4B5	R545	A-2	2D2	U230	B-1	4A3
C220	A-1	1D4	C381	A-2	3A3	C621	A-1	3A3	J700	B-1	1C3	R130	A-2	1C5	R320	B-1	4C5	R552	A-2	1D6	U230	B-1	4C2
C221	A-1	1B4	C382	A-2	3A4	C630	A-1	3A2	J700	B-1	1D3	R131	A-2	1D5	R321	B-1	4A4	R570	B-2	3C6	U424	B-1	4C5
C222	B-2	4D2	C383	A-2	3A5	C631	A-1	3A2	L710	B-1	2D5	R132	A-2	1D5	R322	B-1	4A4	R601	B-1	1C2	U444	B-2	4B3
C223	B-1	4D3	C384	A-2	3A5	C632	B-2	3B1	J770	A-2	3A6	R133	A-2	1D5	R330	B-1	4A4	R602	B-1	1C2	U450	A-1	2C5
C225	B-2	4D2	C390	A-2	3A2	C640	A-2	2D3	L122	A-1	1D4	R135	A-2	1D5	R331	B-1	4A3	R634	A-2	2D2	U451	A-1	2D5
C240	B-1	4C2	C391	A-2	3A3	C643	B-2	3C2	L201	B-1	2B5	R134	A-1	1D5	R332	B-1	4A3	R641	A-2	2D1	U511	B-1	4B2
C242	B-1	4C2	C392	A-2	3A4	C650	B-2	3B2	L222	A-1	1D2	R140	A-2	2A4	R333	B-1	4B3	R633	A-1	3A3	U546	A-2	2D2
C261	A-2	1C5	C393	A-2	3A5	C651	B-2	3D4	L280	A-2	3A2	R141	A-2	2B4	R341	A-1	1A4	R635	A-1	3A3	U610	B-1	3A4
C274	A-2	2B3	C394	A-2	3A5	C652	B-2	3D4	L281	A-2	3A3	R142	A-2	2B4	R342	B-2	4B5	R642	B-2	3C1	U610	B-1	3B3
C276	A-2	1D6	C420	A-1	1B4	C653	B-2	3D4	L283	A-2	3A4	R143	A-2	2B4	R343	B-2	4B5	R672	B-2	3C5	U665	B-2	3C3
C278	A-2	1D6	C421	B-1	4C5	C654	B-2	3D4	L282	A-2	3A3	R144	A-2	2B4	R344	A-2	2B3	R673	B-2	3C5	U665	B-2	3D3
C280	A-2	3A2	C422	B-1	2D6	C662	B-2	3C5	L284	A-2	3A5	R145	A-2	2B4	R368	A-2	2B3	R680	B-2	3C5			

Figure 1-14: A14 RF Mother Component Locator







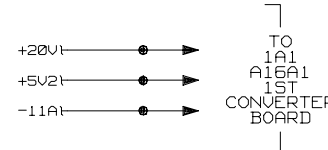
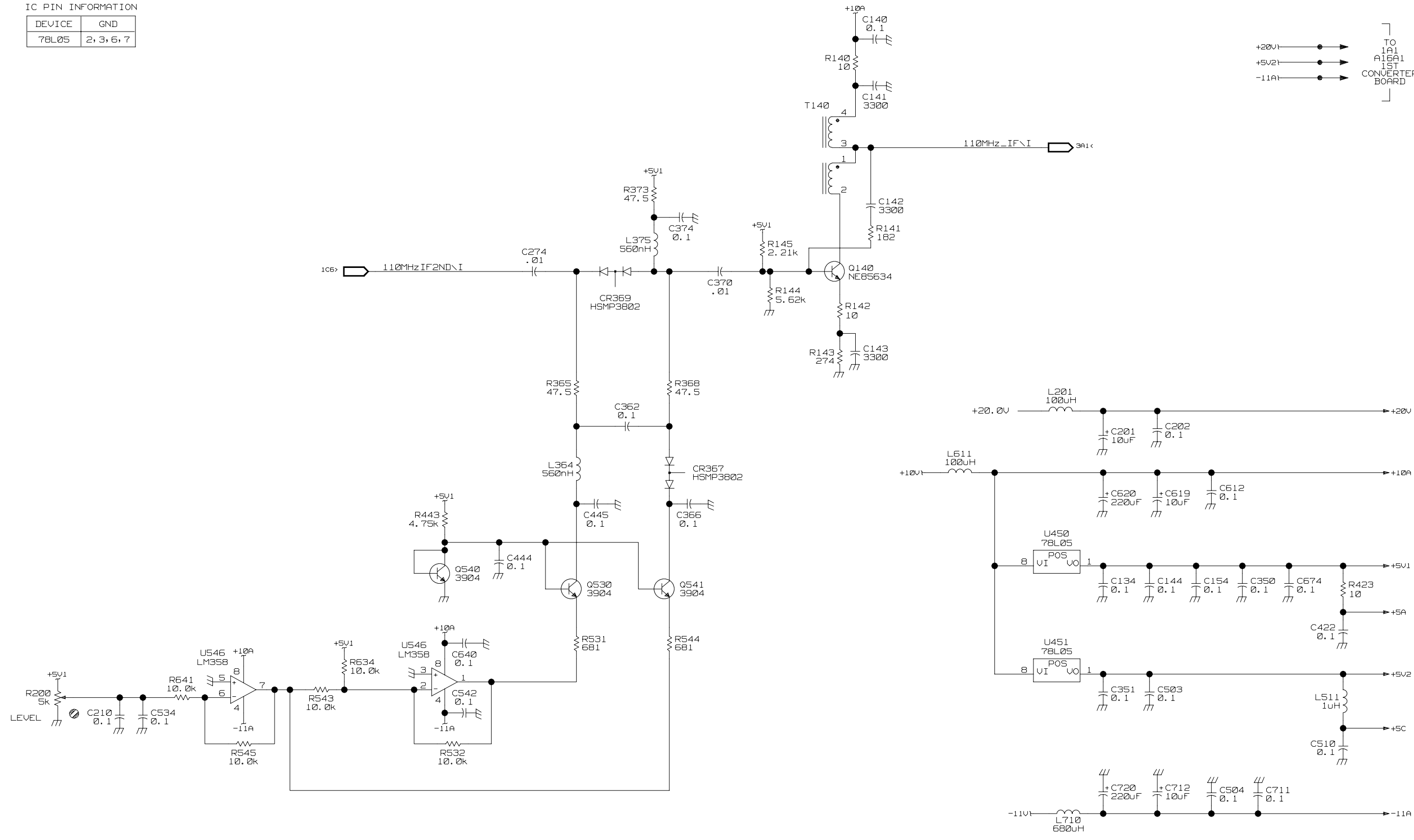


\* PRINTED ELEMENT



IC PIN INFORMATION

DEVICE	GND
78L05	2, 3, 6, 7

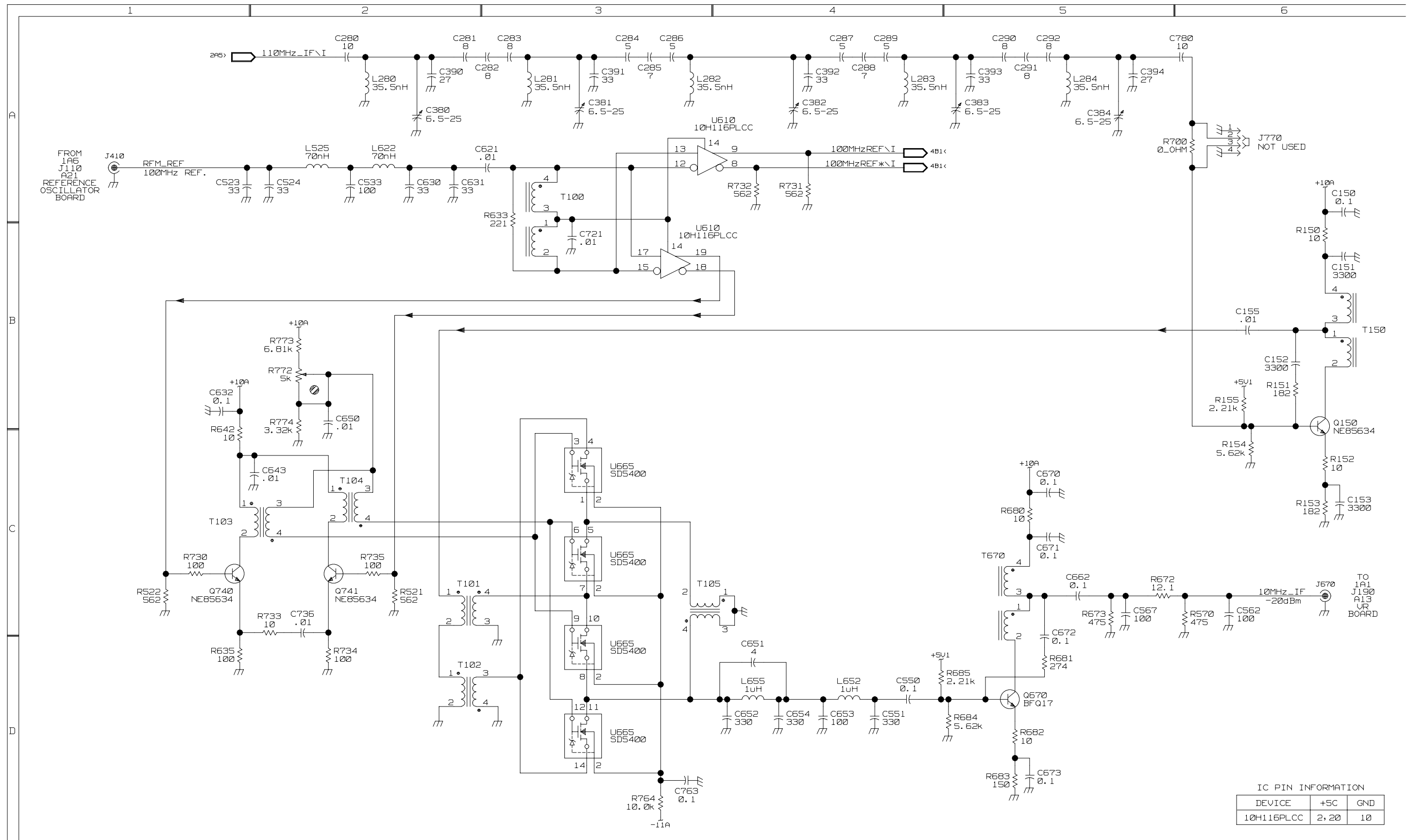


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RF MOTHER A14 2







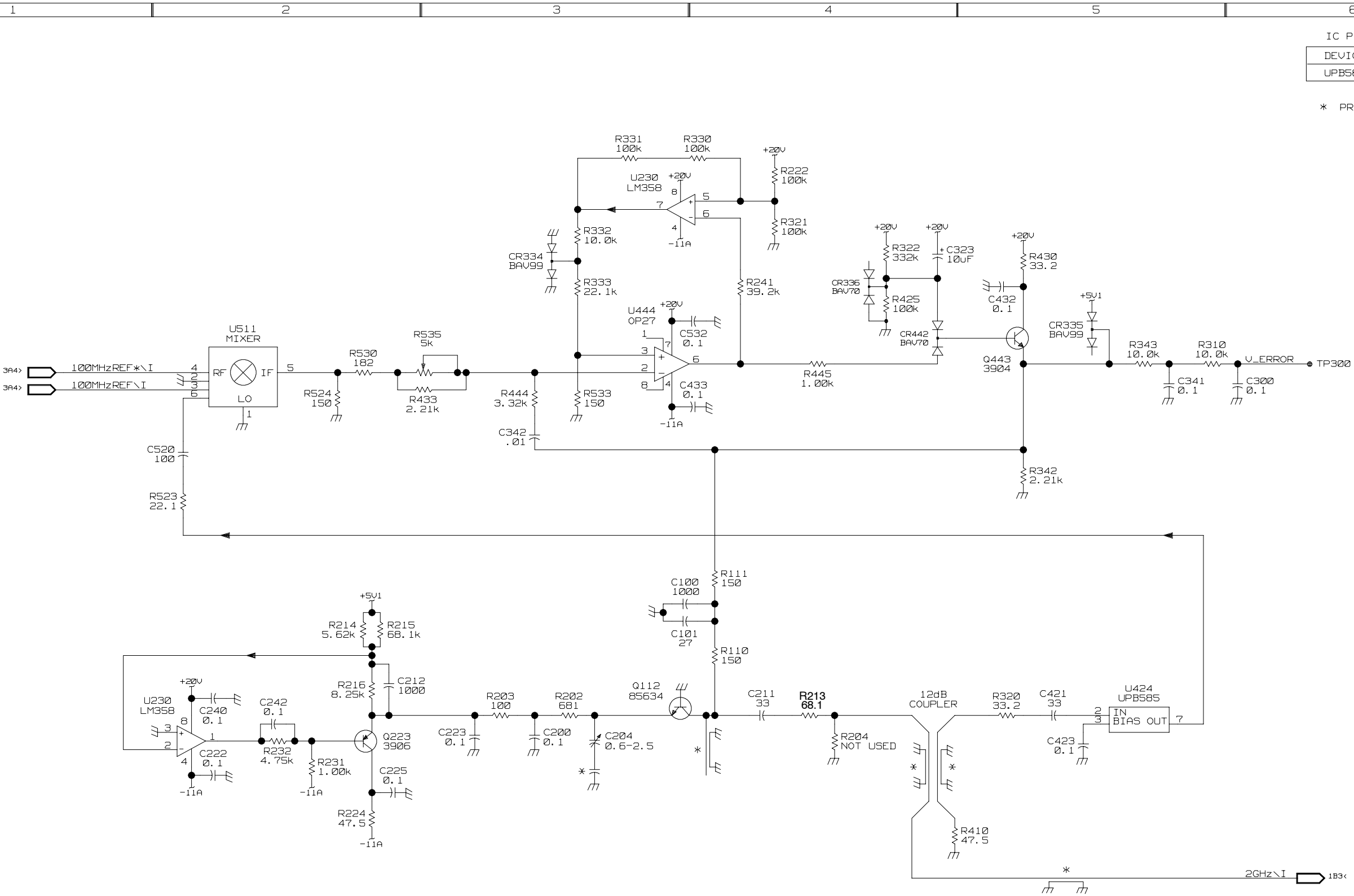
IC PIN INFORMATION

DEVICE	+5C	GND
10H116PLCC	2, 20	10

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RF MOTHER A14 3

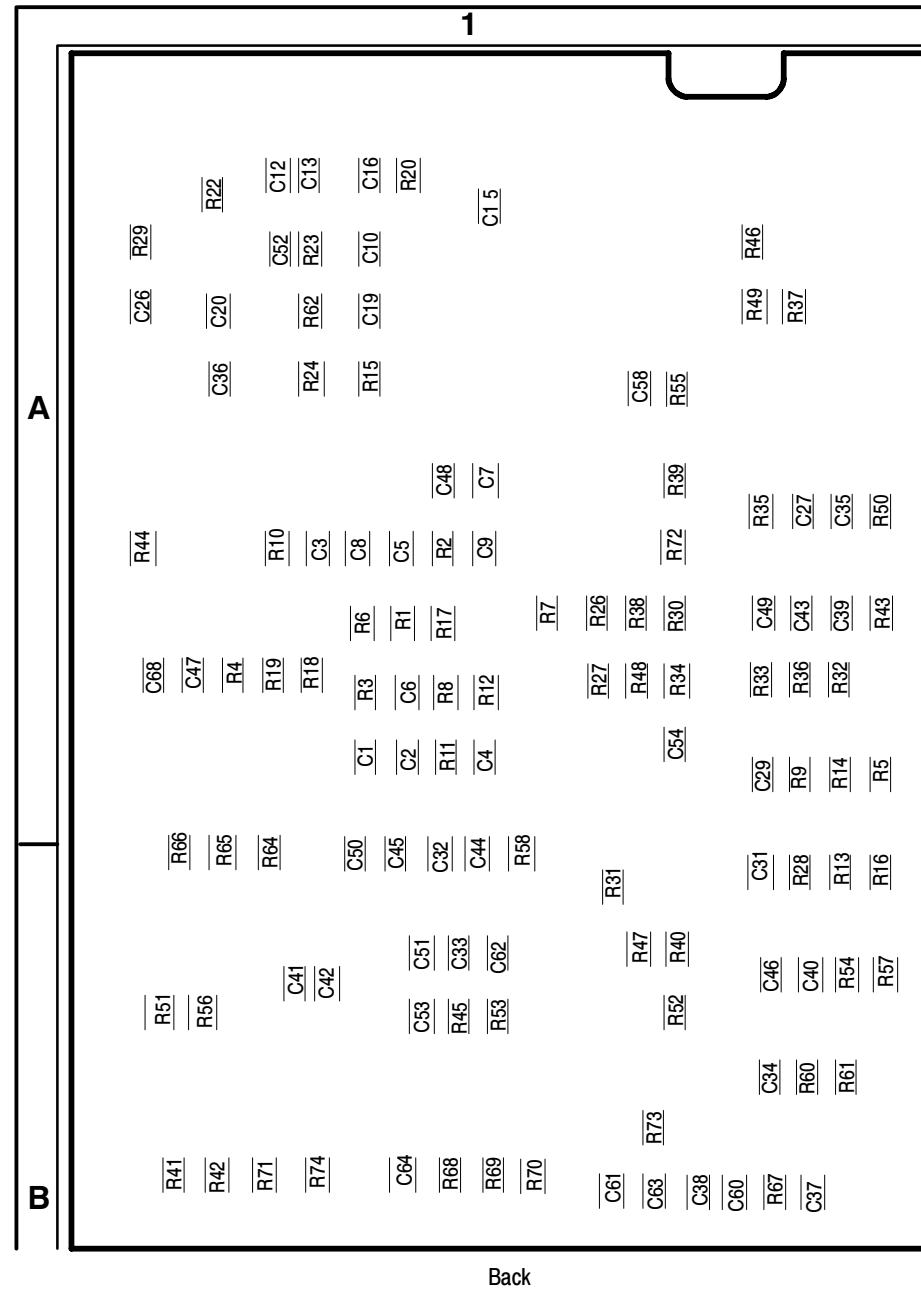
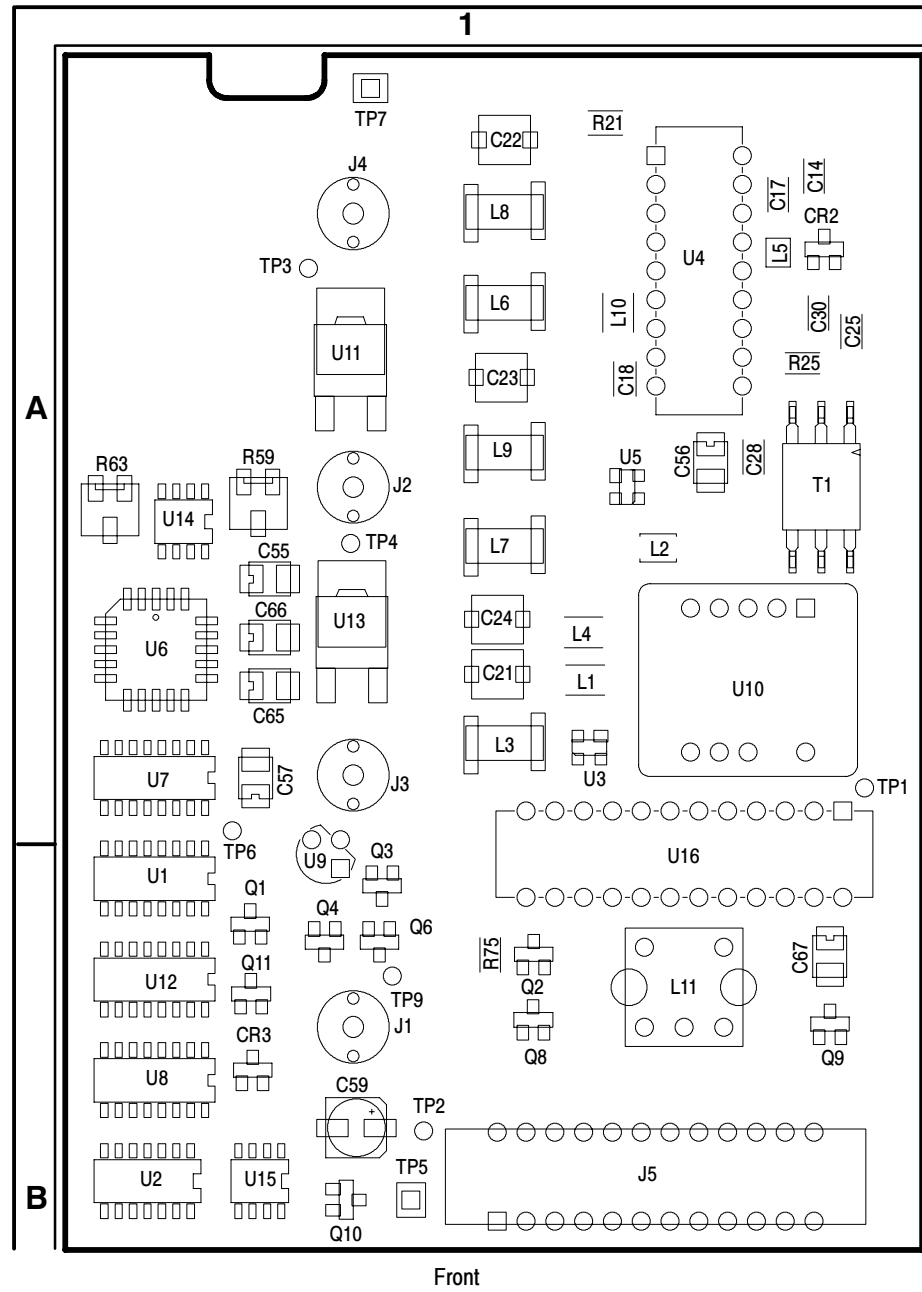




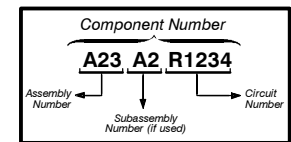
IC PIN INFORMATION

DEVICE	+5A	GND
UPB585	1	4, 5

\* PRINTED ELEMENT



**COMPONENT NUMBER EXAMPLE**



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**⚡** STATIC SENSITIVE DEVICES

Figure 1-15: A28 Video Demod

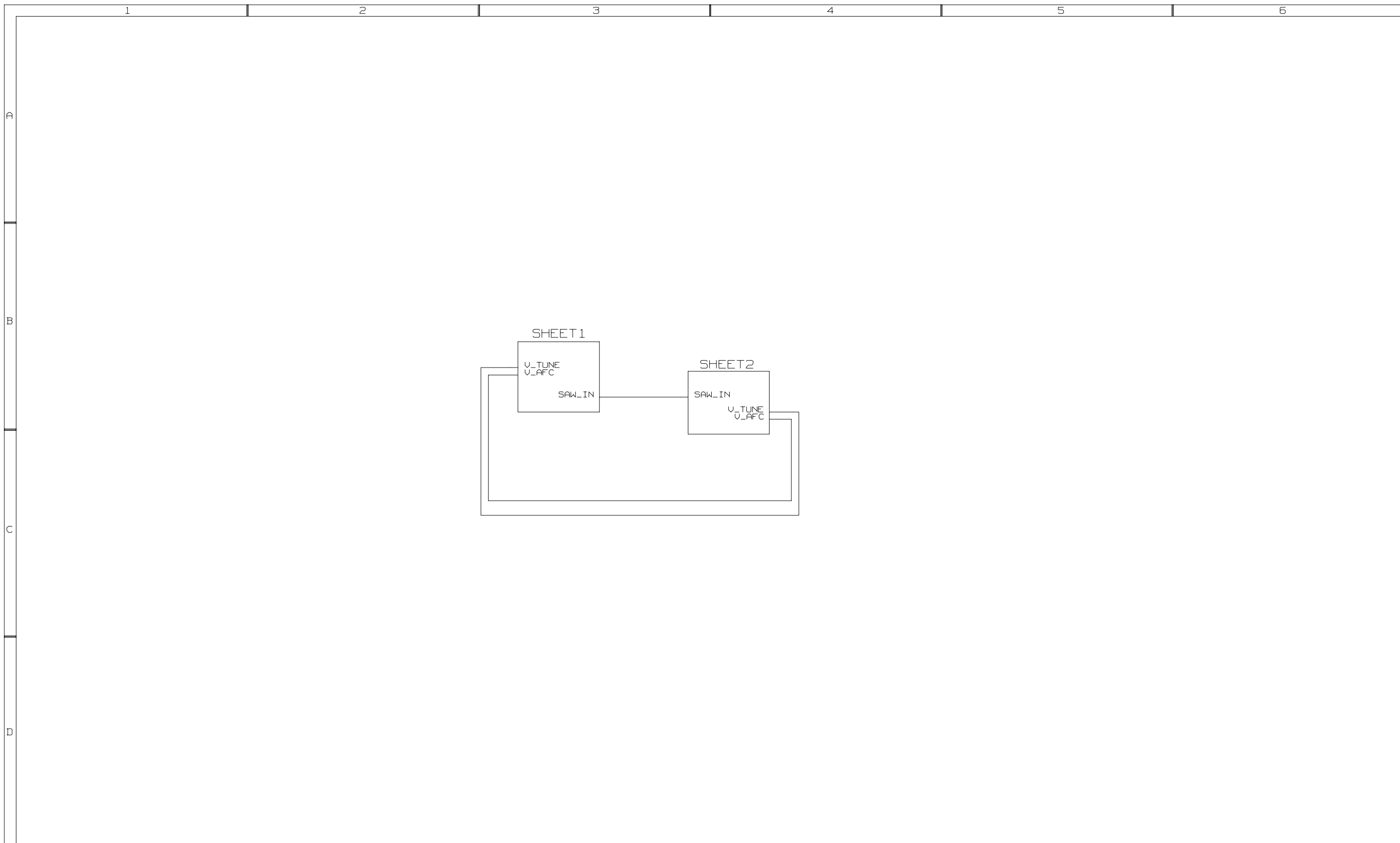
## A28 Video Demod Component Locator

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C1*	A1	1B2	C33*	B1	2D4	C56	A1	1C5	L10	A1	1B6	R15*	A1	1B5	R38*	A1	1D3	R60*	B1	2B3	TP6	A1	2B5
C10*	A1	1B5	C34*	B1	1D2	C57	A1	1D4	L11	B1	2C5	R16*	A1	2C2	R39*	A1	2A1	R61*	B1	2B3	TP7	A1	1D6
C12*	A1	1B5	C35*	A1	2A2	C58*	A1	1D4	L2	A1	1B2	R17*	A1	1B2	R4*	A1	1A3	R62*	A1	1C5	TP9	B1	2D3
C13*	A1	1B5	C36*	A1	1B6	C59	B1	2C6	L3	A1	1B4	R18*	A1	1A3	R40*	B1	2D3	R63	A1	2A2	U1	A1	2C1
C14	A1	1B6	C37*	B1	1D2	C6*	A1	1B3	L4	A1	1B3	R19*	A1	1A3	R41*	B1	2A1	R64*	A1	2C5	U10	A1	2C3
C15*	A1	1B4	C38*	B1	1C2	C60*	B1	2C5	L5	A1	1C6	R2*	A1	1A2	R42*	B1	2B1	R65*	A1	2C5	U11	A1	1D4
C16*	A1	1B5	C39*	A1	2B2	C61*	B1	2C6	L6	A1	1B4	R20*	A1	1B5	R43*	A1	2A2	R66*	A1	2C5	U12	B1	2A1
C17	A1	1B6	C4*	A1	1B4	C62*	B1	2D5	L7	A1	1B4	R21	A1	1B5	R44*	A1	2C3	R67*	B1	2C5	U12	B1	2B4
C18	A1	1C6	C40*	B1	2B4	C63*	B1	2C6	L8	A1	1B4	R22*	A1	1B6	R45*	B1	2D4	R68*	B1	2C6	U13	A1	1C3
C19*	A1	1B5	C41*	B1	2D5	C64*	B1	2B6	L9	A1	1B4	R23*	A1	1D6	R46*	A1	1C4	R69*	B1	2C6	U14	A1	2A2
C2*	A1	1B1	C42*	B1	2D5	C65	A1	2A4	Q1	B1	2D3	R24*	A1	1C5	R47*	B1	2C2	R7*	A1	1B2	U14	A1	2B2
C20*	A1	1C6	C43*	A1	1D2	C66	A1	2A5	Q10	B1	2D6	R25	A1	1D6	R48*	A1	1C2	R70*	B1	2C6	U15	B1	2B5
C21	A1	1B4	C44*	A1	2D4	C67	B1	2D5	Q11	B1	2D3	R26*	A1	1D3	R49*	A1	1C4	R71*	B1	2A4	U16	A1	2C4
C22	A1	1B4	C45*	A1	2C5	C68*	A1	2C5	Q2	B1	2B3	R27*	A1	1C3	R5*	A1	2D1	R72*	A1	2A5	U2	B1	2A5
C23	A1	1B4	C46*	B1	1C1	C7*	A1	1B4	Q3	A1	2C2	R28*	A1	2C2	R50*	A1	2B2	R73*	B1	2B5	U2	B1	2B1
C24	A1	1B4	C47*	A1	1A3	C8*	A1	1B2	Q4	B1	2C2	R29*	A1	1C6	R51*	A1	2D3	R74*	B1	2B6	U2	B1	2B5
C25	A1	1C6	C48*	A1	1A2	C9*	A1	1B4	Q6	B1	2C2	R3*	A1	1A2	R52*	B1	2D3	R75	B1	2C4	U2	B1	2B5
C26*	A1	1C6	C49*	A1	1C1	CR2	A1	1C6	Q8	B1	2C4	R30*	A1	1C3	R53*	B1	2C4	R8*	A1	1B3	U2	B1	2D2
C27*	A1	2B2	C5*	A1	1B2	CR3	B1	2C3	Q9	B1	2B3	R31*	A1	2D2	R54*	B1	2B4	R9*	A1	2D1	U3	A1	1B1
C28	A1	1B6	C50*	A1	2D4	J1	B1	2C3	R1*	A1	1A2	R32*	A1	2B2	R55*	A1	1C4	T1	A1	1A6	U4	A1	1B5
C29*	A1	1D1	C51*	B1	2D4	J2	A1	1B2	R10*	A1	1B2	R33*	A1	2B2	R56*	B1	2D4	TP1	A1	2C5	U5	A1	1B3
C3*	A1	1B2	C52*	A1	1C2	J3	A1	1B1	R11*	A1	1B3	R34*	A1	1C3	R57*	B1	2A4	TP2	B1	2B5	U6	A1	2B2
C30	A1	1C5	C53*	B1	2D5	J4	A1	1A5	R12*	A1	1B3	R35*	A1	2B1	R58*	A1	2D4	TP3	A1	1C4	U7	A1	2B1
C31*	A1	1D1	C54*	A1	1D3	J5	B1	2A6	R13*	A1	2D1	R36*	A1	2B2	R59	A1	2A2	TP4	A1	1C3	U8	B1	2B3
C32*	A1	2D4	C55	A1	1D4	L1	A1	1B2	R14*	A1	2D1	R37*	A1	1C4	R6*	A1	1B2	TP5	B1	1D5	U9	A1	2A2

\*Asterisks indicate components located on the back of the board.

Figure 1-16: A28 Video Demod Component Locator





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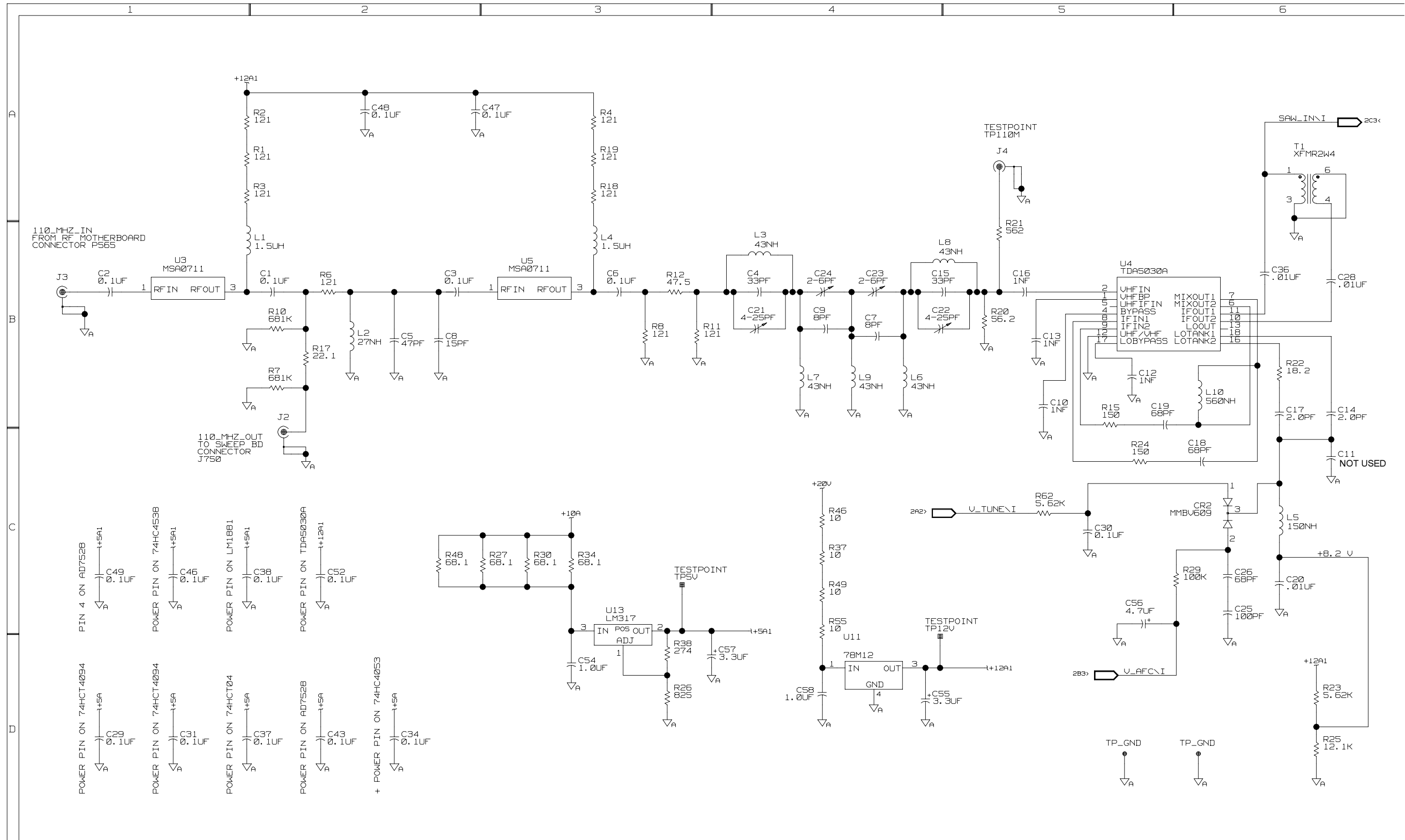
SIGNAL INTERCONNECT  
VIDEO DEMOD BOARD

A28





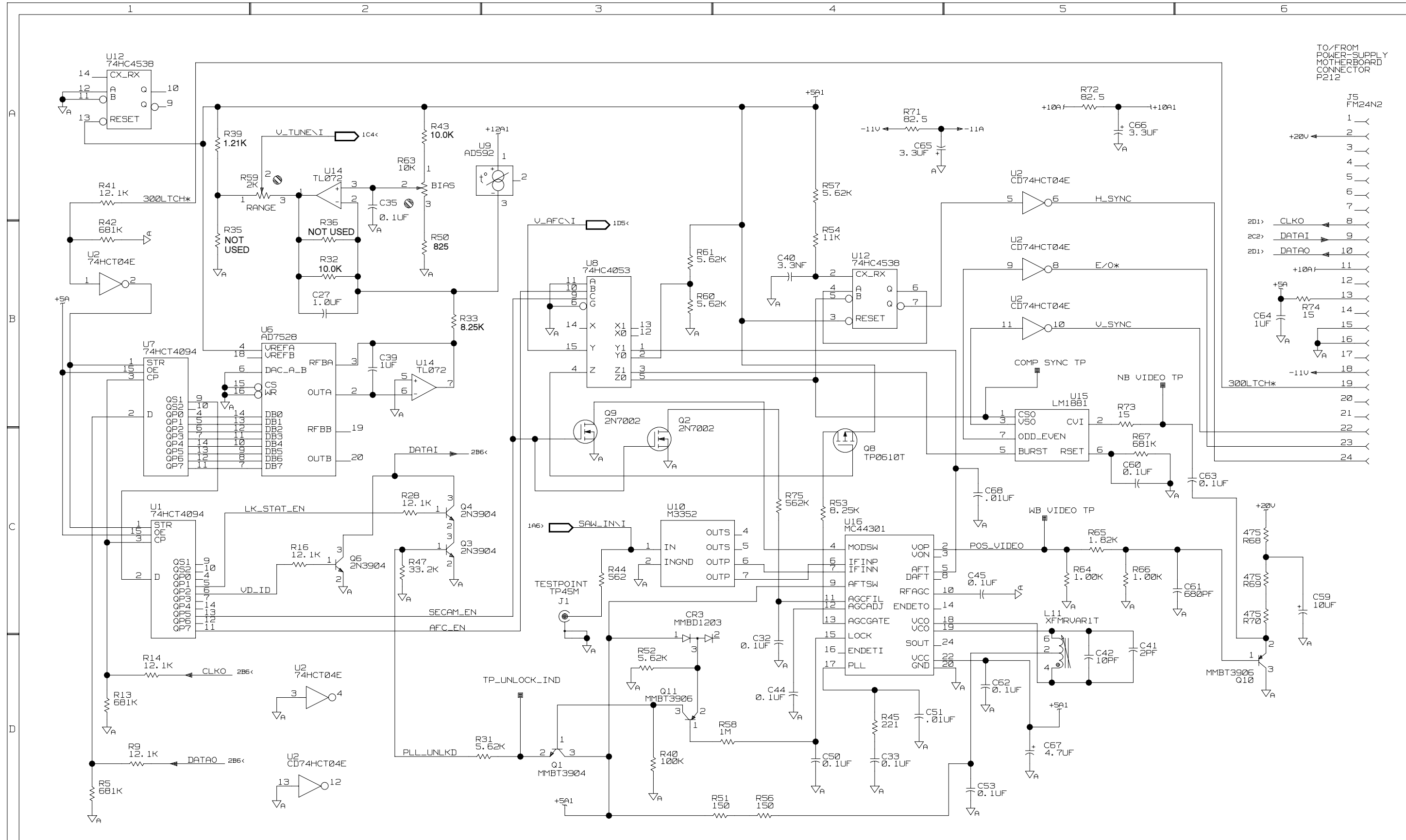




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DEMOD 1 VIDEO DEMOD BOARD A28 1





2715

DEMOD 2 VIDEO DEMOD BOARD A28 2

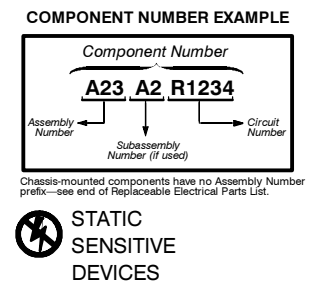
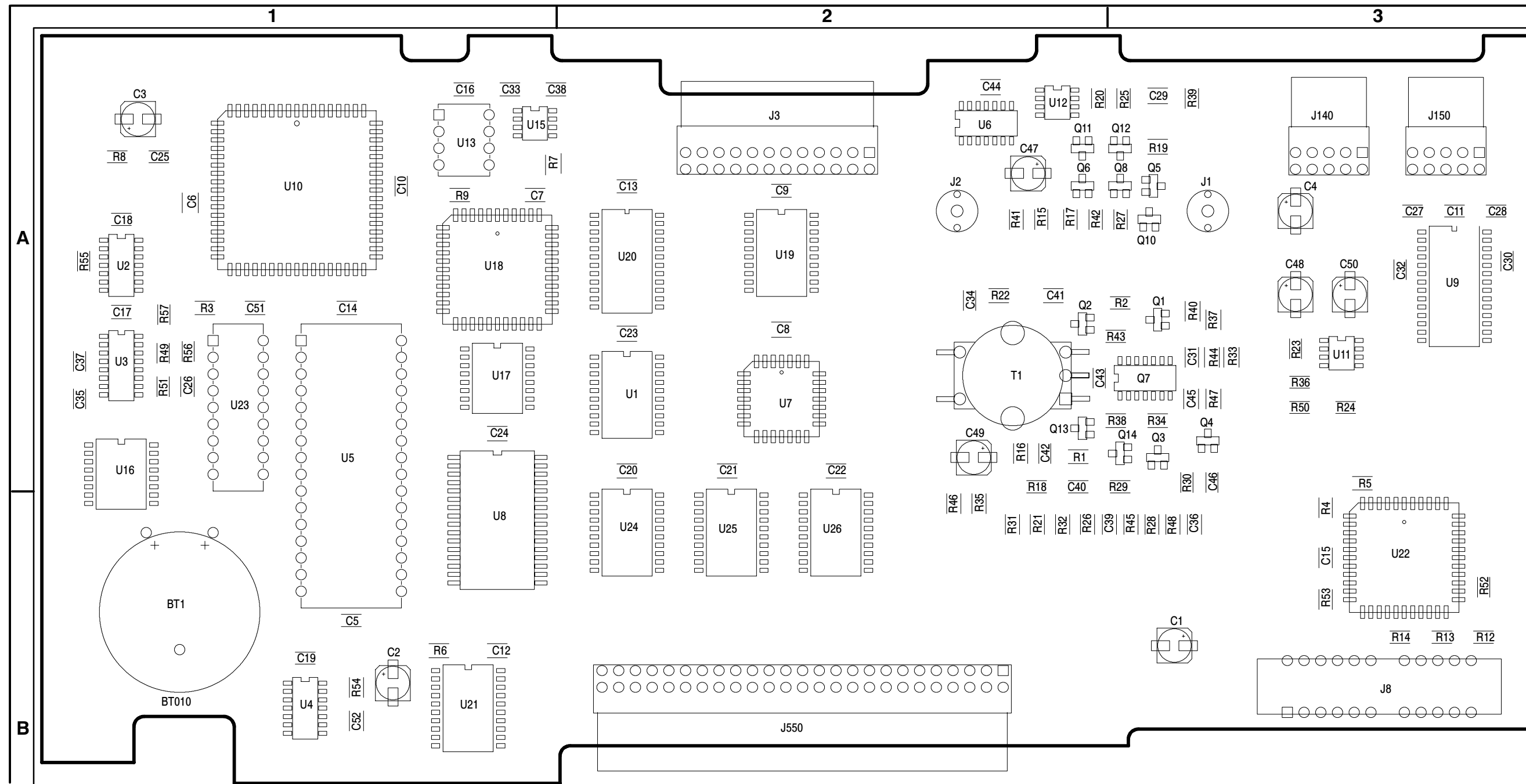


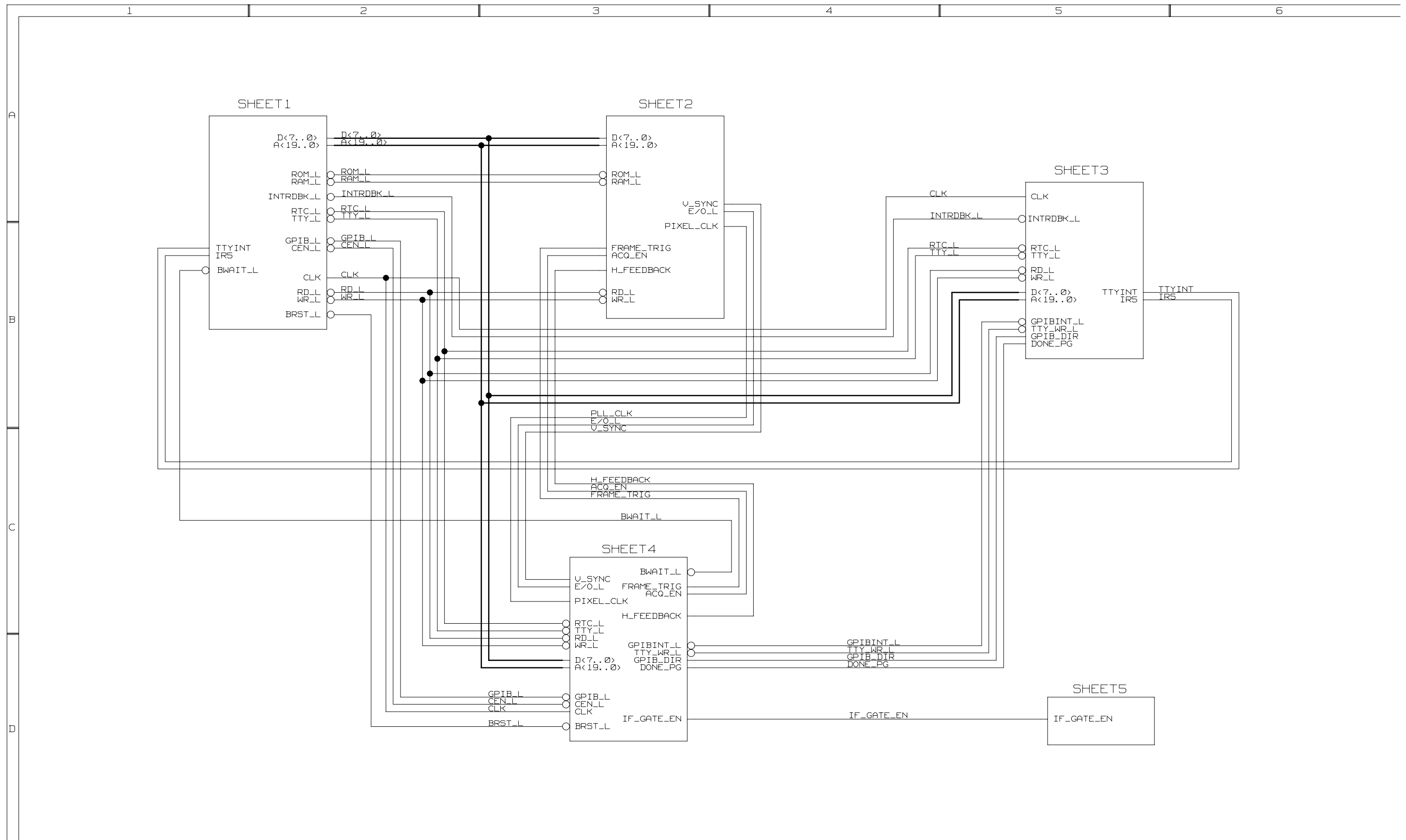
Figure 1-17: A11 Digital Options

### A11 Digital Options Component Locator

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
BT1	B1	2A3	C28	A3	3A5	C47	A2	5A2	J8	B3	2B1	R17	A2	5C2	R36	A3	5D2	R55	A1	3D3	U2	A1	4C6
C1	B3	1D4	C29	A3	5B2	C48	A3	5C2	Q1	A3	5B5	R18	A2	5D2	R37	A3	5C3	R56	A1	2D1	U20	A2	4B6
C10	A1	1D6	C3	A1	1D5	C49	A2	5B6	Q10	A3	5B3	R19	A3	5B2	R38	A2	5B4	R57	A1	2D1	U21	B1	3C4
C11	A3	1D6	C30	A3	3B5	C5	B1	1D5	Q11	A2	5B2	R2	A2	5B5	R39	A3	5B3	R6	B1	3C3	U22	B3	3B4
C12	B1	1D4	C31	A3	5C4	C50	A3	5C1	Q12	A2	5B2	R20	A2	5B2	R4	A3	3A3	R7	A1	4C2	U23	A1	3A2
C13	A2	1D4	C32	A3	3B5	C51	A1	3A2	Q13	A2	5B4	R21	B2	5D5	R40	A3	5B5	R8	A1	4C4	U24	B2	1A3
C14	A1	1D5	C33	A1	4D1	C52	B1	1C5	Q14	A2	5B4	R22	A2	5B6	R41	A2	5A3	R9	A1	4A4	U25	B2	1B3
C15	B3	1D5	C34	A2	5B6	C6	A1	1D5	Q2	A2	5B5	R23	A3	5C2	R42	A2	5C2	T1	A2	5A5	U26	B2	1C3
C16	A1	1D5	C35	A1	2C1	C7	A1	1D5	Q3	A3	5C4	R24	A3	5C1	R43	A2	5B5	U1	A2	1B2	U3	A1	2C2
C17	A1	1D5	C36	B3	5C5	C8	A2	1D6	Q4	A3	5C5	R25	A2	5B2	R44	A3	5C4	U10	A1	4B3	U4	B1	1C5
C18	A1	1D5	C37	A1	2C1	J1	A3	5C6	Q5	A3	5B3	R26	B2	5D5	R45	B2	5D4	U11	A3	5C1	U4	B1	3A5
C19	B1	1D5	C38	A1	4D1	J140	A3	3B6	Q6	A2	5B2	R27	A2	5C3	R46	A2	5B5	U12	A2	5A2	U4	B1	4B3
C2	B1	1D4	C39	B2	5D4	J150	A3	3C6	Q7	A3	5B4	R28	B3	5D4	R47	A3	5D6	U13	A1	4D2	U4	B1	4C3
C20	A2	1D6	C4	A3	1D5	J2	A2	5D1	Q7	A3	5C5	R29	A2	5D3	R48	B3	5D4	U15	A1	4D1	U4	B1	4C4
C21	A2	1D6	C40	A2	5D2	J3	A2	4A6	Q8	A2	5B2	R3	A1	3A3	R49	A1	2C2	U16	A1	3A1	U5	A1	2B4
C22	A2	1D6	C41	A2	5B5	J3	A2	4B6	R1	A2	5A4	R30	A3	5C4	R5	A3	3A4	U17	A1	2A4	U6	A2	5A1
C23	A2	1D6	C42	A2	5B3	J550	B2	1A1	R12	B3	2C2	R31	B2	5D3	R50	A3	5D2	U18	A1	4A4	U6	A2	5B1
C24	A1	2B4	C43	A2	5A5	J550	B2	1B1	R13	B3	2B2	R32	B2	5D3	R51	A1	2C3	U19	A2	4A5	U7	A2	1A5
C25	A1	4D4	C44	A2	5A3	J550	B2	1C1	R14	B3	2B2	R33	A3	5C3	R52	B3	3B3	U2	A1	3D4	U8	B1	2C5
C26	A1	2C3	C45	A3	5D6	J550	B2	1D1	R15	A2	5A2	R34	A3	5B4	R53	B3	3B4	U2	A1	4C5	U9	A3	3B5
C27	A3	3A5	C46	A3	5C4	J8	B3	2A1	R16	A2	5B5	R35	A2	5A3	R54	B1	1C5						

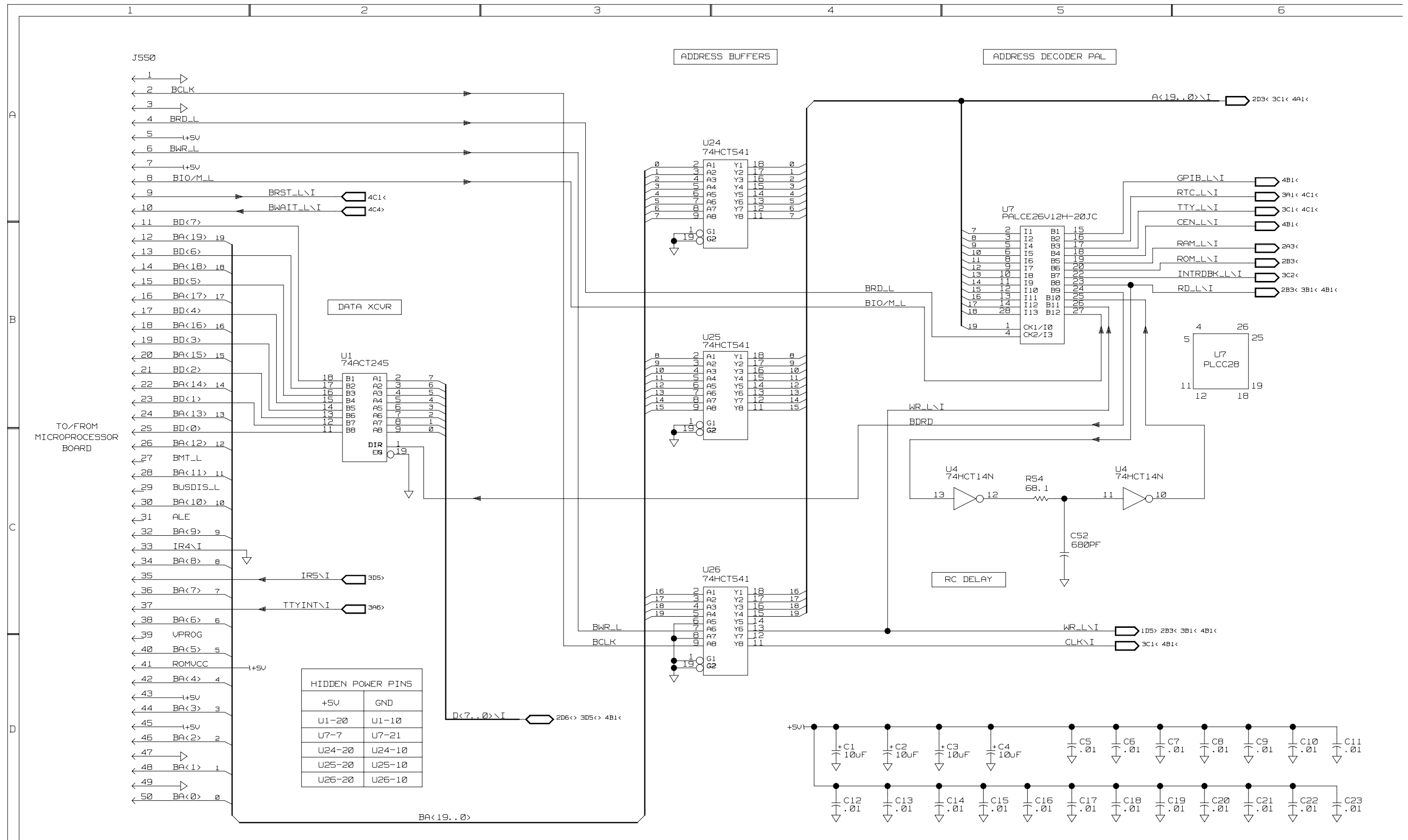
Figure 1-18: A11 Digital Options Component Locator







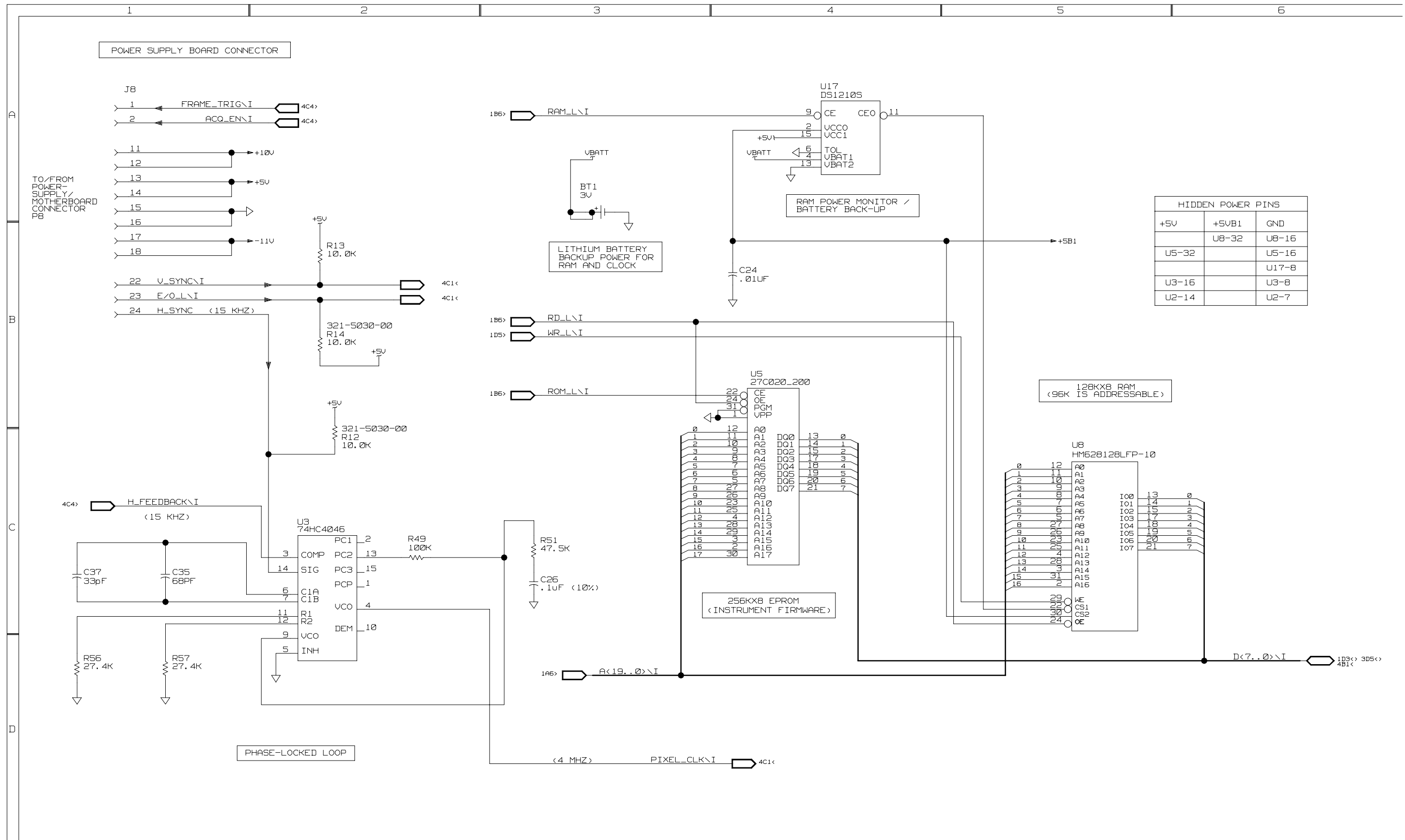




2715

MICROPROCESSOR BUS INTERFACE A11 1  
DIGITAL OPTIONS BOARD



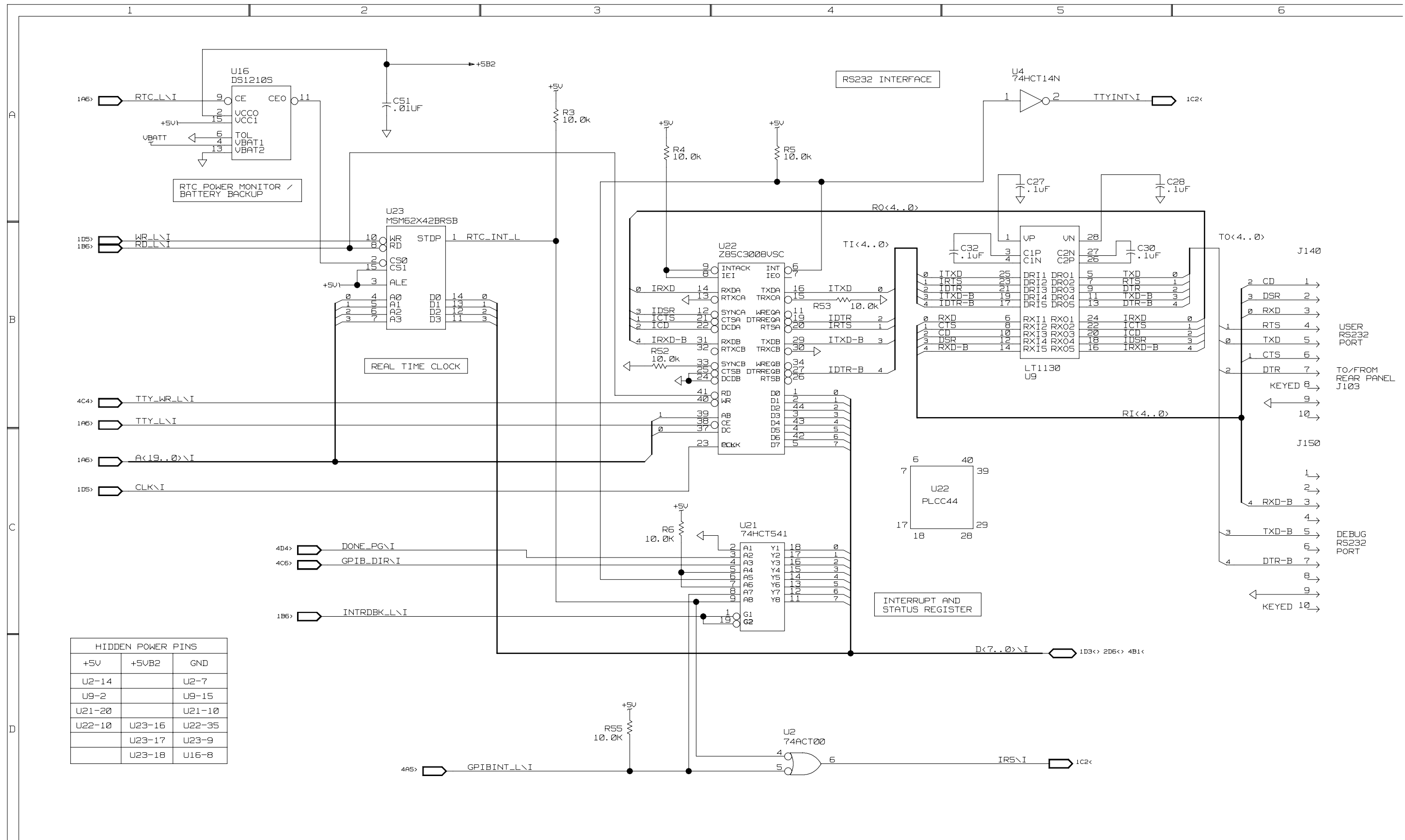


2715

PHASE LOCKED LOOP, EPROM AND NVRAM  
DIGITAL OPTIONS BOARD

A11 2



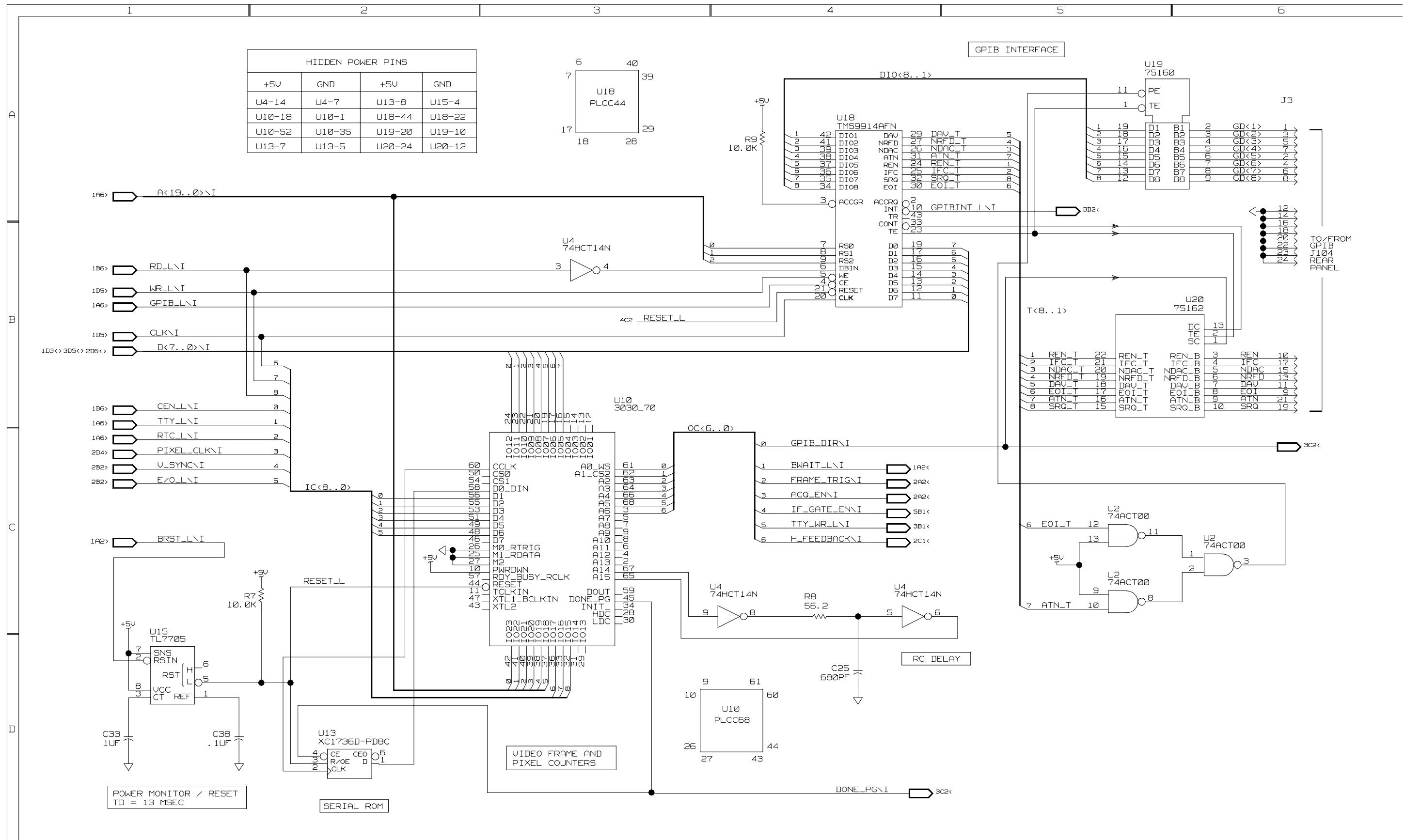


2715

REAL-TIME CLOCK AND RS232 INTERFACE  
DIGITAL OPTIONS BOARD

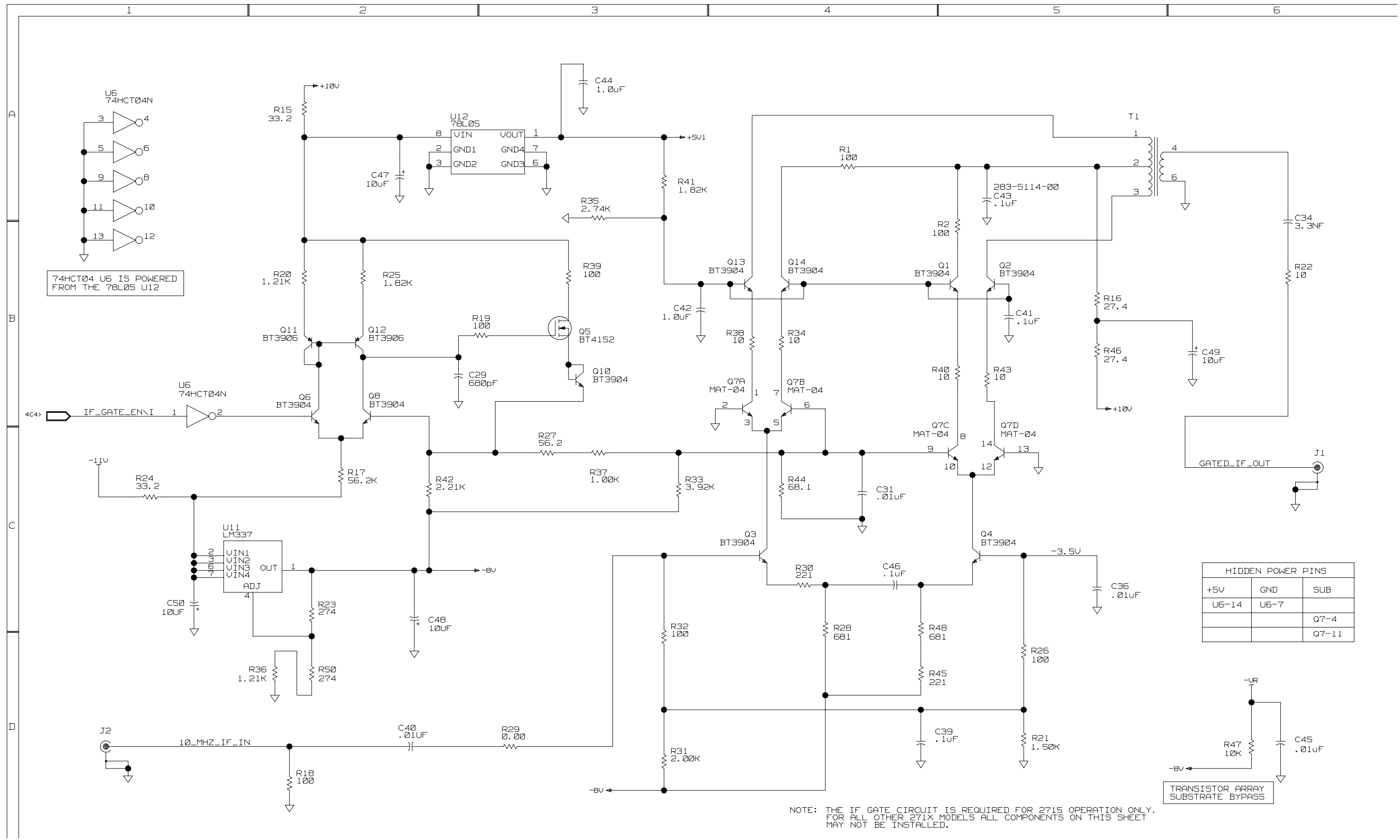
A11 3





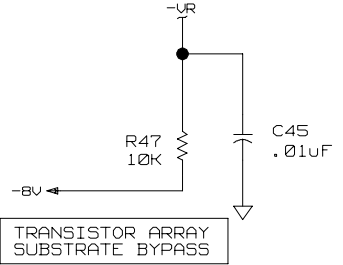




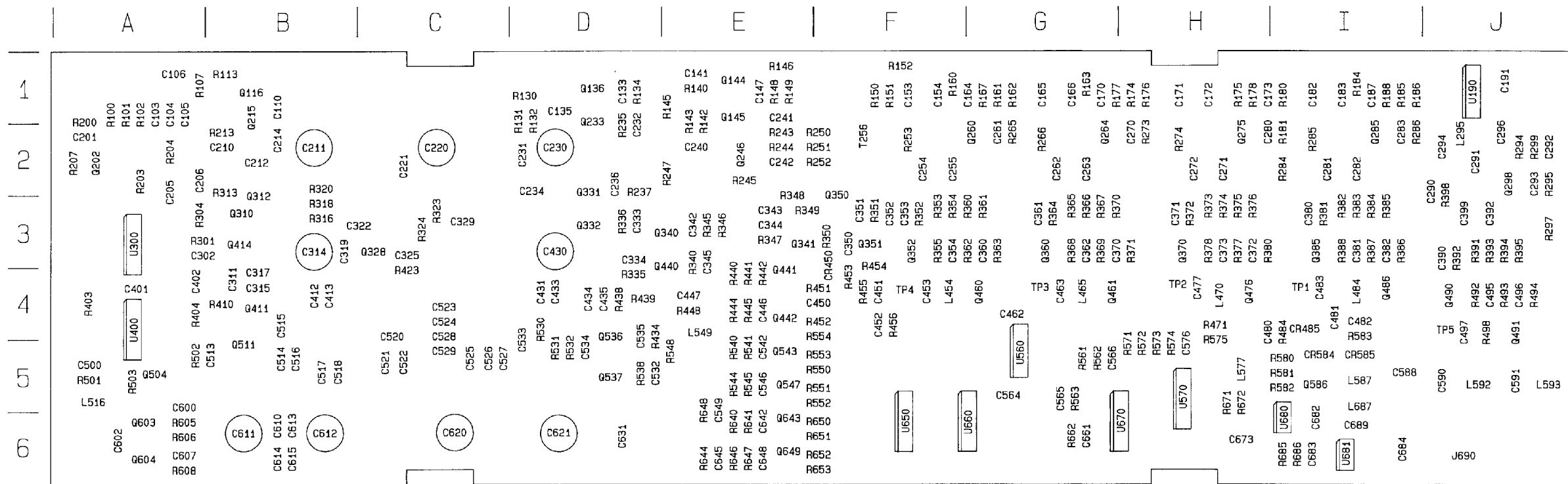


74HCT04 U5 IS POWERED FROM THE 78L05 U12

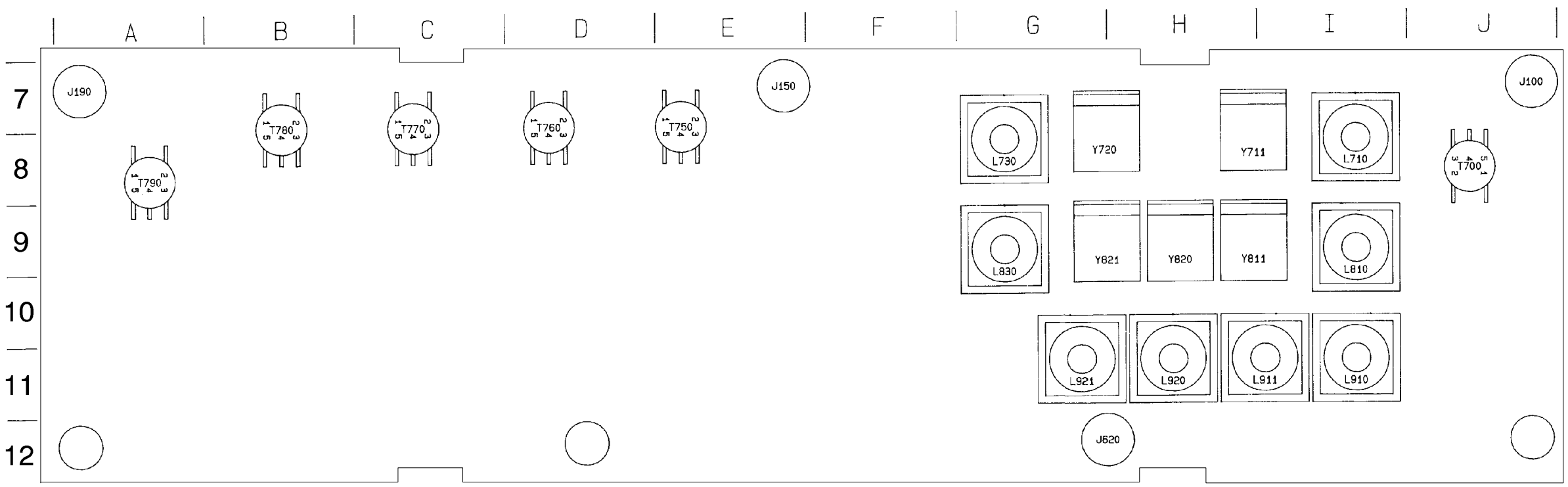
HIDDEN POWER PINS		
+5V	GND	SUB
U6-14	U6-7	
		Q7-4
		Q7-11



NOTE: THE IF GATE CIRCUIT IS REQUIRED FOR 2715 OPERATION ONLY. FOR ALL OTHER 271X MODELS ALL COMPONENTS ON THIS SHEET MAY NOT BE INSTALLED.

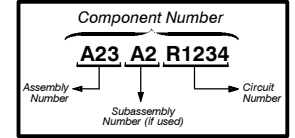


Front



Back

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.



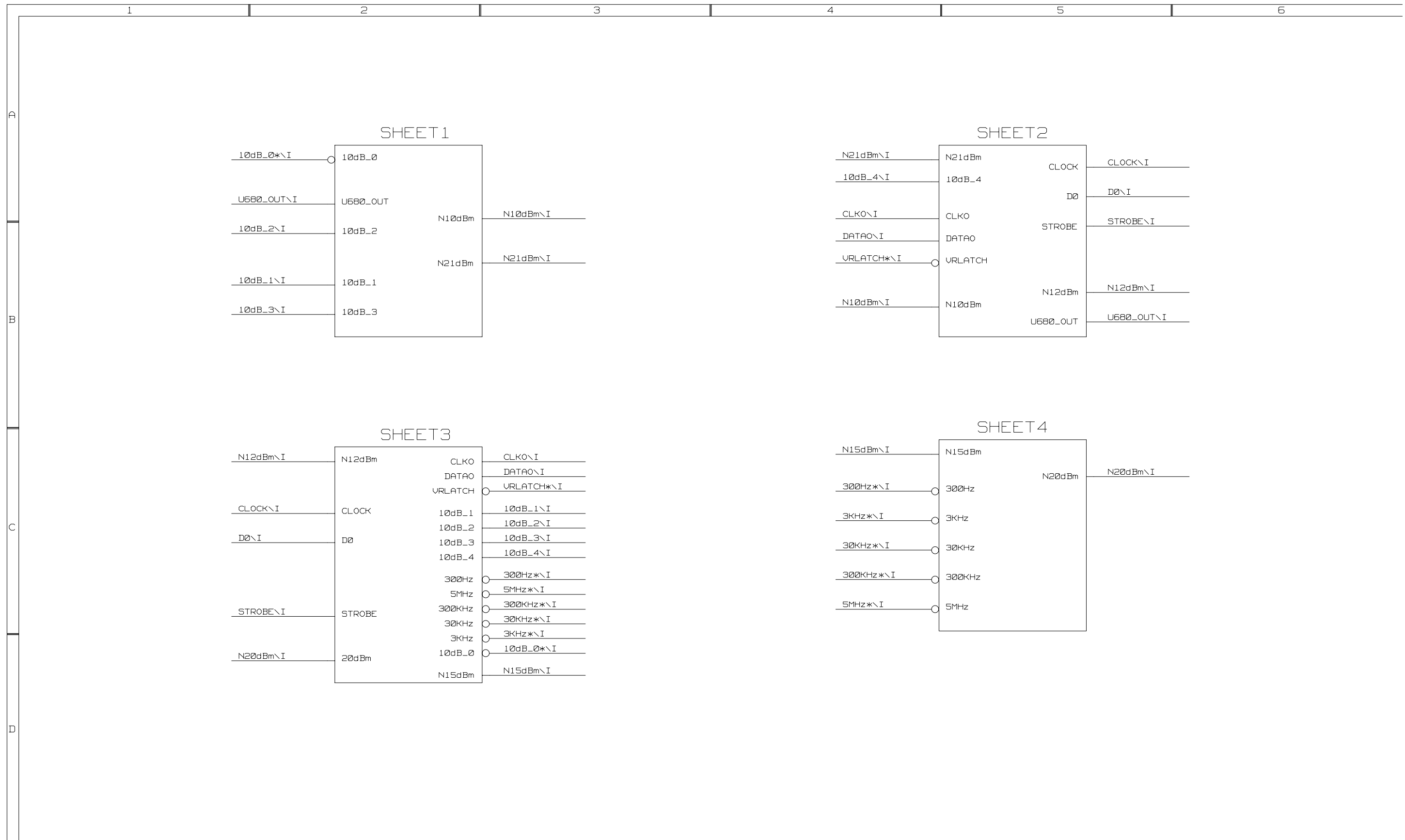
Figure 1-19: A13 Variable Resolution

### A13 Variable Resolution Component Locator

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C103	A-1	3C6	C311	B-3	4C5	C500	A-5	3D6	J150	E-7	4A3	Q476	H-4	1D3	R247	E-2	4D1	R376	H-3	1C3	R552	F-5	3C4
C104	A-1	3B6	C314	B-3	4C4	C513	B-5	4D5	J190	A-7	1A1	Q486	I-4	1B6	R243	E-2	3A3	R377	H-3	1C2	R553	F-5	3C3
C105	A-1	3D5	C315	B-3	4C5	C514	B-5	4C5	J620	H-12	4A4	Q490	J-4	1A2	R244	E-2	3A3	R378	H-3	1C2	R554	F-4	3C4
C106	A-1	4B5	C317	B-3	4C5	C515	B-5	4C5	J690	J-6	3A1	Q491	J-4	1B3	R245	E-2	3A2	R380	H-3	1C3	R561	G-5	2C3
C110	B-1	4B5	C319	B-3	4D5	C516	B-5	4D5	L295	J-2	1A1	Q504	A-5	3D2	R250	F-2	3A3	R381	I-3	1A5	R562	G-5	2D1
C133	D-1	4B1	C322	B-3	4D5	C517	B-5	4D4	L454	F-4	2B4	Q511	B-5	4C6	R251	F-2	3A3	R382	I-3	1A6	R563	G-5	2C3
C135	D-1	4B2	C325	C-3	4D5	C518	B-5	4C4	L465	G-4	1D5	Q536	D-4	4C2	R252	F-2	3A3	R383	I-3	1A6	R571	H-4	2B2
C141	E-1	4B1	C329	C-3	4D2	C520	C-4	4D4	L470	H-4	1D2	Q537	D-5	4C2	R253	F-2	2A4	R384	I-3	1A6	R572	H-4	2B1
C147	E-1	4A2	C333	D-3	4D1	C521	C-5	4D4	L484	I-4	1B5	Q543	E-5	3C4	R265	G-2	2B3	R385	I-3	1A6	R573	H-4	2C1
C153	F-1	3D6	C334	D-4	4C2	C522	C-5	4C4	L516	A-5	4A6	Q547	E-5	3C4	R266	G-2	1C6	R386	I-3	1A6	R574	H-4	2C2
C154	F-1	2A4	C342	E-3	4C1	C523	C-4	4C3	L549	E-4	4A2	Q586	I-5	2D3	R273	H-2	1D5	R387	I-3	1A5	R575	H-4	2C1
C164	G-1	2B3	C343	E-3	3A4	C524	C-4	4D3	L577	H-5	2C5	Q603	A-6	4A6	R274	H-2	1C3	R388	I-3	1A5	R580	I-5	2D2
C165	G-1	3D6	C344	E-3	3A5	C525	C-5	4C3	L587	I-5	2D5	Q604	A-6	4B6	R284	I-2	1D2	R391	J-3	1A3	R581	I-5	2D2
C166	G-1	1C5	C345	E-3	4C1	C526	C-5	4C3	L592	J-5	3A1	Q643	E-6	3C4	R285	I-2	1A6	R392	J-3	1A2	R582	I-5	2D3
C170	G-1	1D5	C350	F-3	3B5	C527	C-5	4D3	L593	J-5	3C5	Q649	E-6	3D4	R286	I-2	1B5	R393	J-3	1A3	R583	I-4	2D5
C171	H-1	3D6	C351	F-3	3B5	C528	C-4	4D3	L687	I-5	2D5	R100	A-1	3C6	R295	J-2	1B3	R394	J-3	1A3	R605	A-6	4A5
C172	H-1	1C2	C352	F-3	3A2	C529	C-5	4C3	L710	I-8	4B5	R101	A-1	3C6	R295	J-2	1B2	R395	J-3	1A3	R606	A-6	4A6
C173	H-1	1D2	C353	F-3	2A3	C532	D-5	4C1	L730	G-8	4B3	R102	A-1	3C6	R297	J-3	1B2	R398	J-2	1A3	R608	A-6	4A5
C182	I-1	3D5	C354	F-3	2A3	C533	D-5	4C2	L810	I-9	4C5	R107	A-1	4B5	R299	J-2	1B2	R403	A-4	3C2	R640	E-6	3D4
C183	I-1	1A5	C360	G-3	2A5	C534	D-5	4C2	L830	G-9	4C3	R113	B-1	4B6	R301	A-3	4C5	R404	A-4	4C5	R641	E-6	3D4
C187	I-1	1B5	C361	G-3	1C5	C535	D-4	4D1	L910	I-11	4D5	R130	D-1	4B2	R304	A-3	4B5	R410	B-4	4C6	R644	E-6	3D4
C191	J-1	3D6	C362	G-3	1C5	C542	E-4	3C4	L911	I-11	4C4	R131	D-1	4B2	R313	B-3	4B6	R423	C-4	4D4	R646	E-6	3D4
C201	A-2	3C5	C370	G-3	1C6	C546	E-5	3C4	L920	H-11	4C3	R132	D-1	4B2	R316	B-3	4D5	R434	D-4	4C1	R647	E-6	3D4
C205	A-2	3C5	C371	H-3	1C2	C549	E-5	3B4	L921	G-11	4D2	R134	D-1	4B1	R318	B-3	4D5	R438	D-4	4C2	R648	E-6	3B4
C206	A-2	4C5	C372	H-3	1C3	C564	G-5	3D6	Q116	B-1	4B6	R140	E-1	4A1	R320	B-2	4D6	R439	D-4	4C2	R650	F-6	3C3
C210	B-2	4B5	C373	H-3	1C2	C565	G-5	2D1	Q136	D-1	4B2	R142	E-1	4A1	R323	C-3	4D3	R440	E-4	3B5	R651	F-6	3D4
C211	B-2	4B4	C380	I-3	1A5	C566	G-5	2D1	Q144	E-1	4B2	R143	E-1	4A1	R324	C-3	4D4	R441	E-4	3B4	R652	F-6	3D3
C212	B-2	4B4	C381	I-3	1B5	C576	H-4	3D6	Q145	E-1	4A2	R145	E-1	4B1	R335	D-4	4C2	R442	E-4	3B4	R653	F-6	3D4
C214	B-2	4B5	C382	I-3	1A6	C588	I-5	3D5	Q202	A-2	3C6	R146	E-1	4A2	R336	D-3	4D1	R444	E-4	3C4	R662	G-6	2D1
C220	C-2	4B4	C390	J-3	1A2	C590	J-5	3A1	Q215	B-2	4B6	R148	E-1	4A2	R340	E-3	4B1	R445	E-4	3C4	R671	H-5	2D3
C221	C-2	4B4	C392	J-3	1A3	C591	J-5	3D6	Q233	D-2	4B2	R149	E-1	4A2	R345	E-3	4C1	R448	E-4	4A2	R672	H-5	2D3
C230	D-2	4B3	C399	J-3	1A3	C600	A-5	4A5	Q246	E-2	3A3	R150	F-1	3B3	R346	E-3	4B1	R451	F-4	3A4	R685	I-6	2D4
C231	D-2	4B3	C401	A-4	3D6	C602	A-6	4A5	Q260	G-2	2B4	R151	F-1	3B3	R347	E-3	3A4	R452	F-4	3B3	R686	I-6	2D4
C232	D-2	4B1	C402	A-4	4C5	C607	A-6	4B5	Q264	G-2	1D6	R152	F-1	3B3	R348	E-2	3A5	R453	F-4	3B5	T256	F-2	3B4
C234	D-2	4B3	C412	B-4	4C4	C610	B-6	4C4	Q275	H-2	1D3	R160	F-1	2B4	R349	E-3	3A5	R454	F-3	3B5	T700	J-8	3C5
C236	D-2	4D1	C413	B-4	4C4	C611	B-6	4C5	Q285	I-2	1B6	R161	G-1	2B3	R350	F-3	3A5	R455	F-4	3B5	T750	E-7	2A4
C240	E-2	4A1	C430	D-3	4C3	C612	B-6	4C4	Q298	J-2	1B3	R162	G-1	2B3	R351	F-3	3B5	R456	F-4	3B6	T760	D-7	1C5
C241	E-1	3A3	C431	D-4	4C3	C613	B-6	4C4	Q310	B-3	4B6	R163	G-1	1D6	R352	F-3	2A4	R471	H-4	2C1	T770	C-7	1C3
C242	E-2	3A3	C433	D-4	4C3	C614	B-6	4C4	Q312	B-3	4D6	R167	G-1	2B3	R353	F-3	2A4	R484	I-4	2D6	T780	B-7	1A5
C254	F-2	2A4	C434	D-4	4C2	C615	B-6	4D4	Q328	C-3	4D6	R174	H-1	1D5	R354	F-3	2A4	R492	J-4	1A2	T790	A-8	1A3
C255	F-2	2A4	C435	D-4	4C2	C620	C-6	4C3	Q331	D-2	4D2	R175	H-1	1D3	R355	F-3	2A3	R493	J-4	1A2	TP1	I-4	1B6
C261	G-2	2B3	C446	E-4	3B4	C621	D-6	4C2	Q332	D-3	4D2	R176	H-1	1D5	R360	G-3	2A4	R494	J-4	1A3	TP2	H-4	1D3
C262	G-2	1C6	C447	E-4	3D6	C631	D-6	3A1	Q340	E-3	4C2	R177	G-1	1D5	R361	G-3	2A5	R498	J-4	1B2	TP3	G-4	1D6
C263	G-2	1C6	C450	F-4	3B4	C642	E-6	3C4	Q341	E-3	3A5	R178	H-1	1D2	R362	G-3	2A3	R501	A-5	4A6	TP4	F-4	2B5
C270	H-2	1D5	C451	F-4	3B5	C645	E-6	3D4	Q350	F-2	3A5	R180	I-1	1D2	R363	G-3	2A5	R502	A-5	4C5	TP5	J-4	1B3
C271	H-2	1C3	C452	F-4	3A5	C648	E-6	3D4	Q351	F-3	3B5	R181	I-2	1D2	R364	G-3	1C5	R503	A-5	3D2	U300	A-3	3C2
C272	H-2	1C3	C453	F-4	2B5	C661	G-6	2C3	Q352	F-3	2A4	R184	I-1	1B6	R365	G-3	1C6	R530	D-4	4C2	U400	A-4	3C2
C280	H-2	1D2	C462	G-4	3D6	C689	I-6	2D5	Q360	G-3	1C5	R185	I-1	1B5	R366	G-3	1C6	R531	D-5	4C2	U570	H-5	2B2
C281	I-2	1A6	C463	G-4	1D6	C673	H-5	3A2	Q370	H-3	1C2	R186	I-1	1B5	R367	G-3	1C6	R532	D-5	4D2	U650	F-6	3B3
C282	I-2	1A6	C477	H-4	1D3	C682	I-6	3D6	Q385	I-3	1A5	R188	I-1	1B5	R368	G-3	1C5	R538	D-5	4C1	U660	G-6	3B2
C283	I-2	1B5	C480	H-4	2D6	C683	I-6	3D6	Q411	B-4	4C6	R200	A-1	3C5	R369	G-3	1C5	R540	E-5	3C4	U670	H-6	2C4
C290	J-2	3D5	C481	I-4	2D5	C684	I-6	3D5	Q414	B-4	4C6	R203	A-2	3C6	R370	G-3	1C6	R541	E-5	3C4	U681	I-6	3D5
C291	J-2	1A2	C482	I-4	2D5	CR450	F-3	3B5	Q440	E-3	4B2	R204	A-2	3B5	R371	H-3	1C6	R544	E-5	3C4	Y811	H-9	4C4
C292	J-2	1B2	C483	I-4	1B6	CR485	I-4	2D5	Q441	E-4	3B4	R207	A-2	3C5	R372	H-3	1C2	R545	E-5	3C4	Y711	H-8	4B4
C293	J-2	1B2	C495	J-4	1B2	CR584	I-5	2D2	Q442	E-4	3B4	R213	B-2	4B5	R373	H-3	1C3	R548	E-5	4C1	Y720	G-8	4B3
C294	J-2	1A1	C496	J-4	1A3	CR585	I-5	2D5	Q460	G-4	2B5	R235	D-2	4B1	R374	H-3	1C3	R550	F-5	3C4	Y820	H-9	4C4
C296	J-2	1A1	C497	J-4	1B3	J100	J-7	3C6	Q461	G-4	1D6	R237	D-2	4D1	R375	H-3	1C3	R551	F-5	3C3	Y821	G-9	4C3
C302	A-3	4C5																					

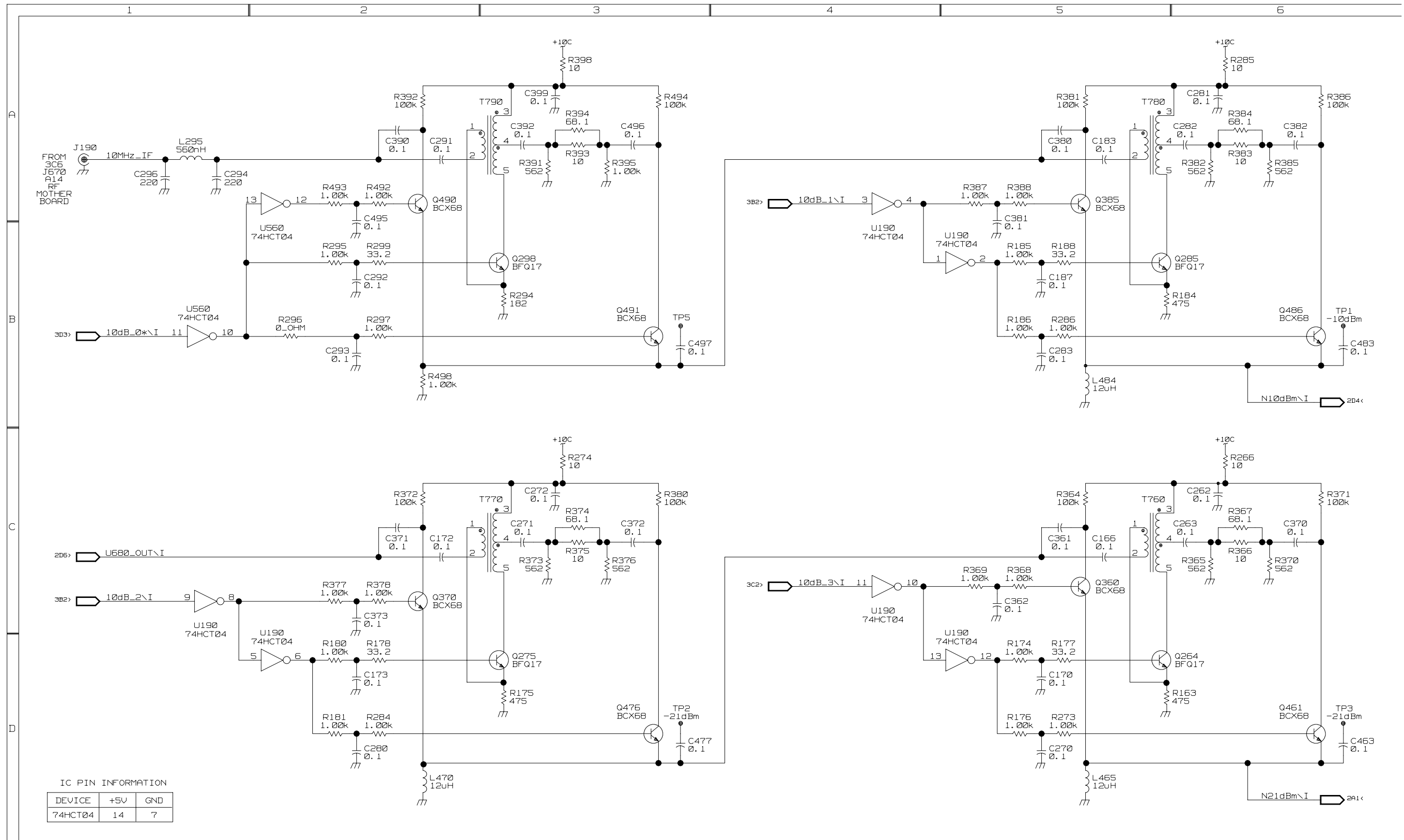
Figure 1-20: A13 Variable Resolution Component Locator





2715



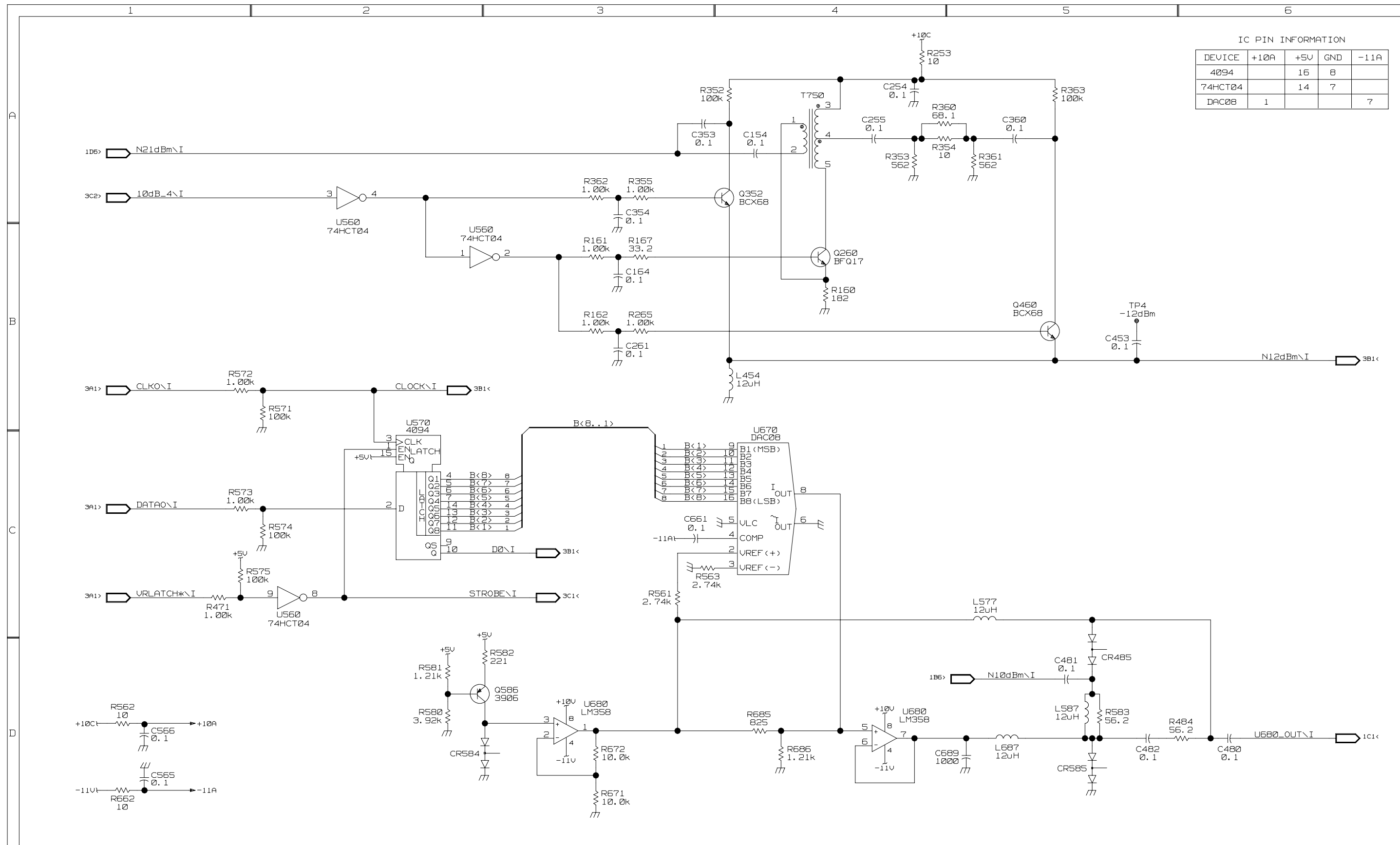


2715

VARIABLE RESOLUTION A13 1







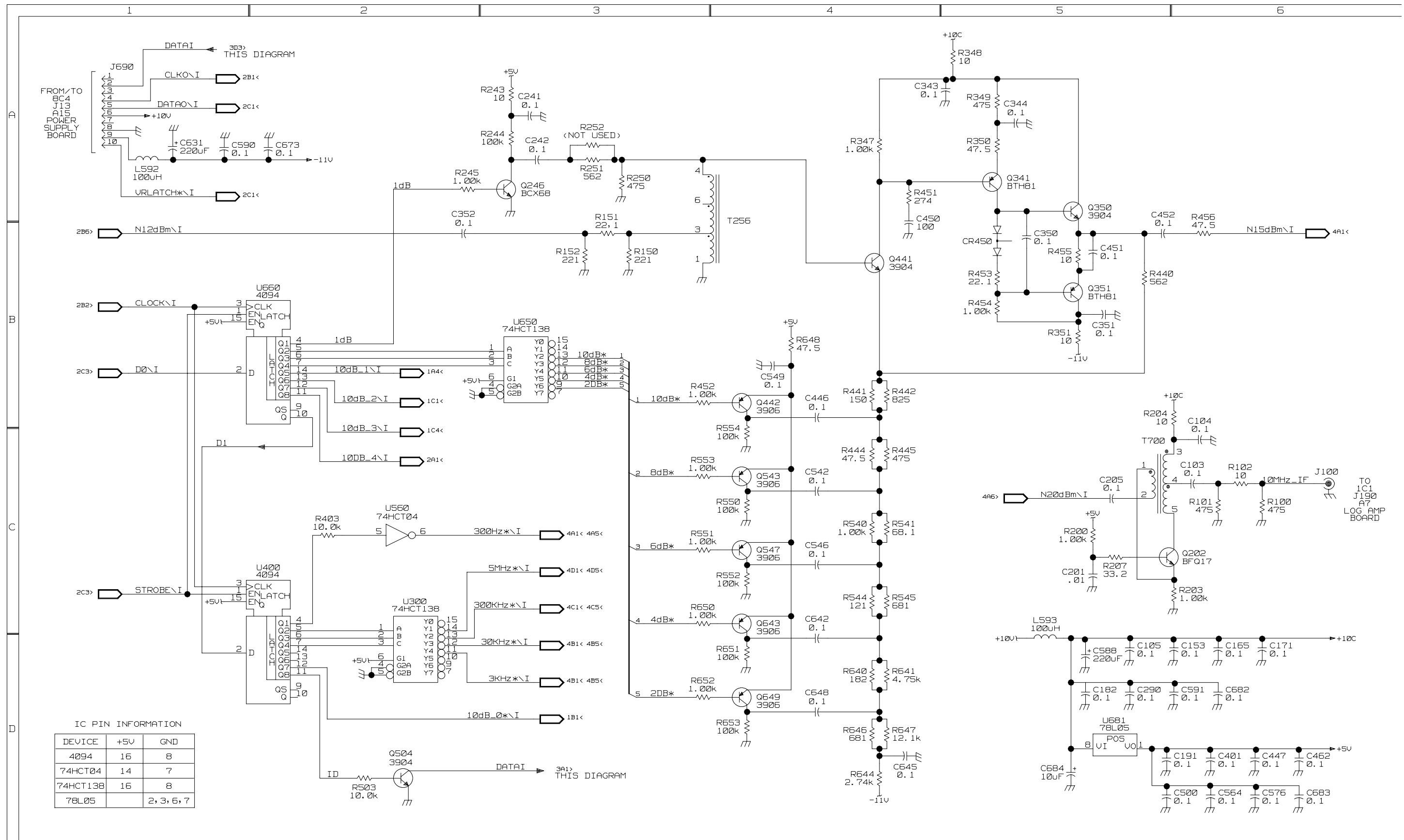
IC PIN INFORMATION

DEVICE	+10A	+5V	GND	-11A
4094		16	8	
74HCT04		14	7	
DAC08	1			7

2715

VARIABLE RESOLUTION A13 2

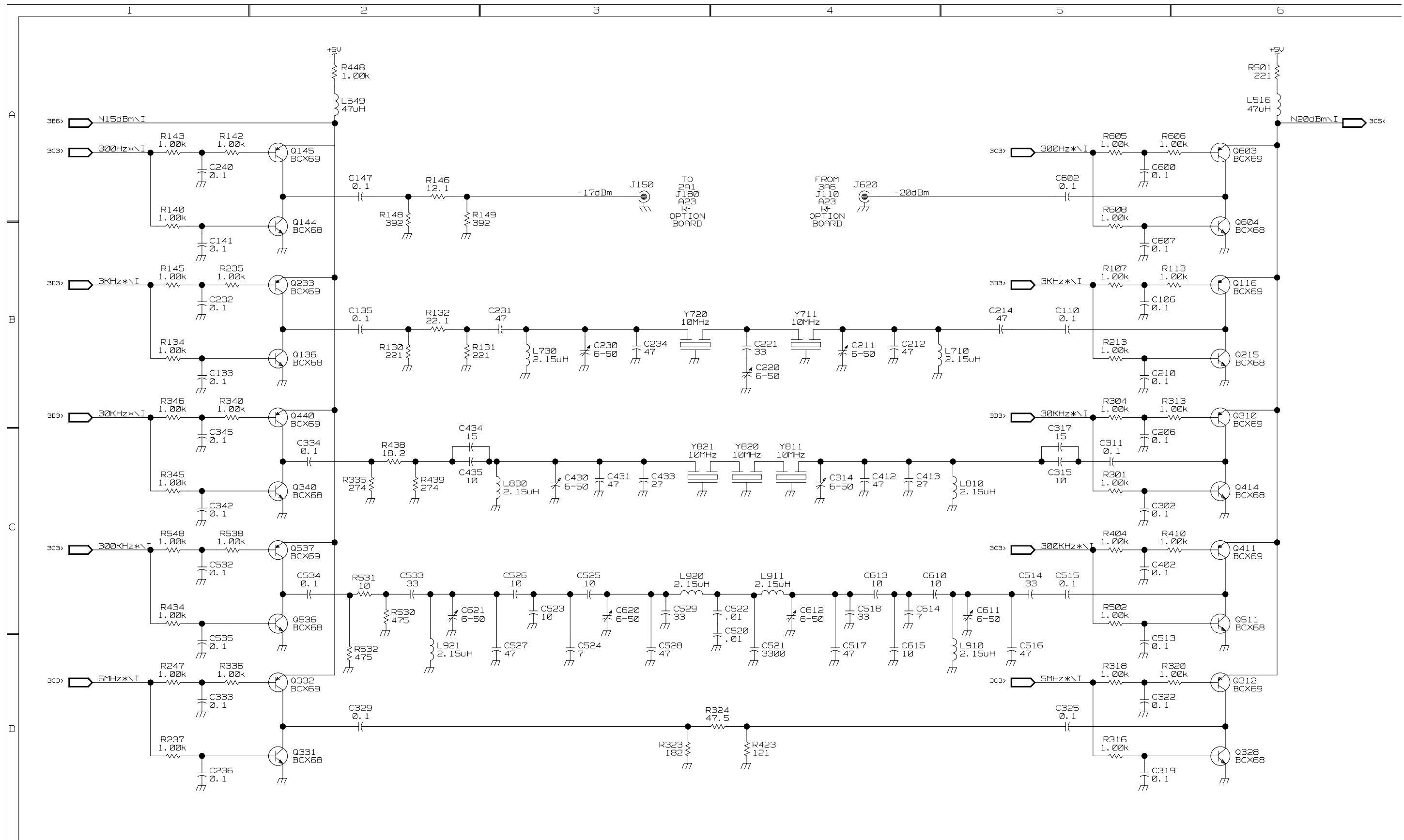




2715

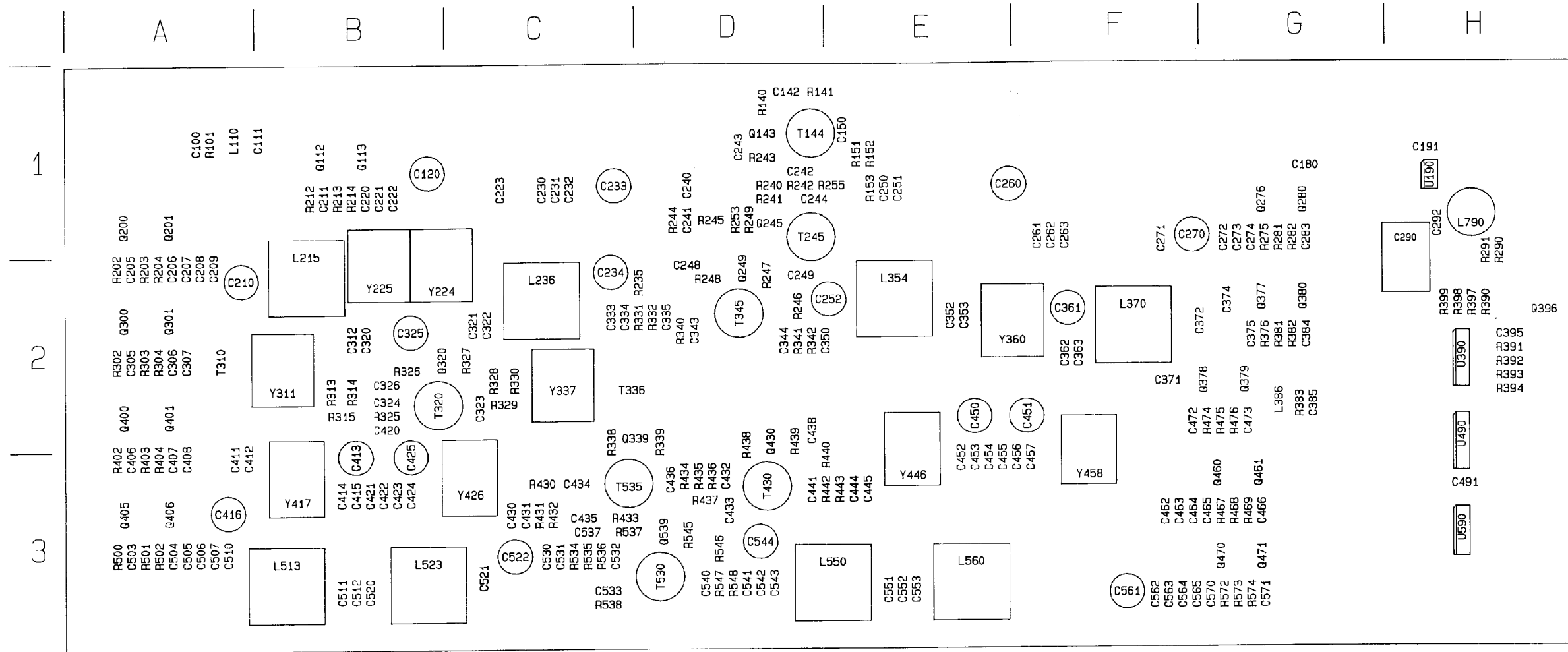
VARIABLE RESOLUTION A13 3





2715

VARIABLE RESOLUTION A13 4



**COMPONENT NUMBER EXAMPLE**

Component Number		
A23 A2 R1234		
Assembly Number	Subassembly Number (if used)	Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**⚡** STATIC SENSITIVE DEVICES

Figure 1-21: A23 RF Options

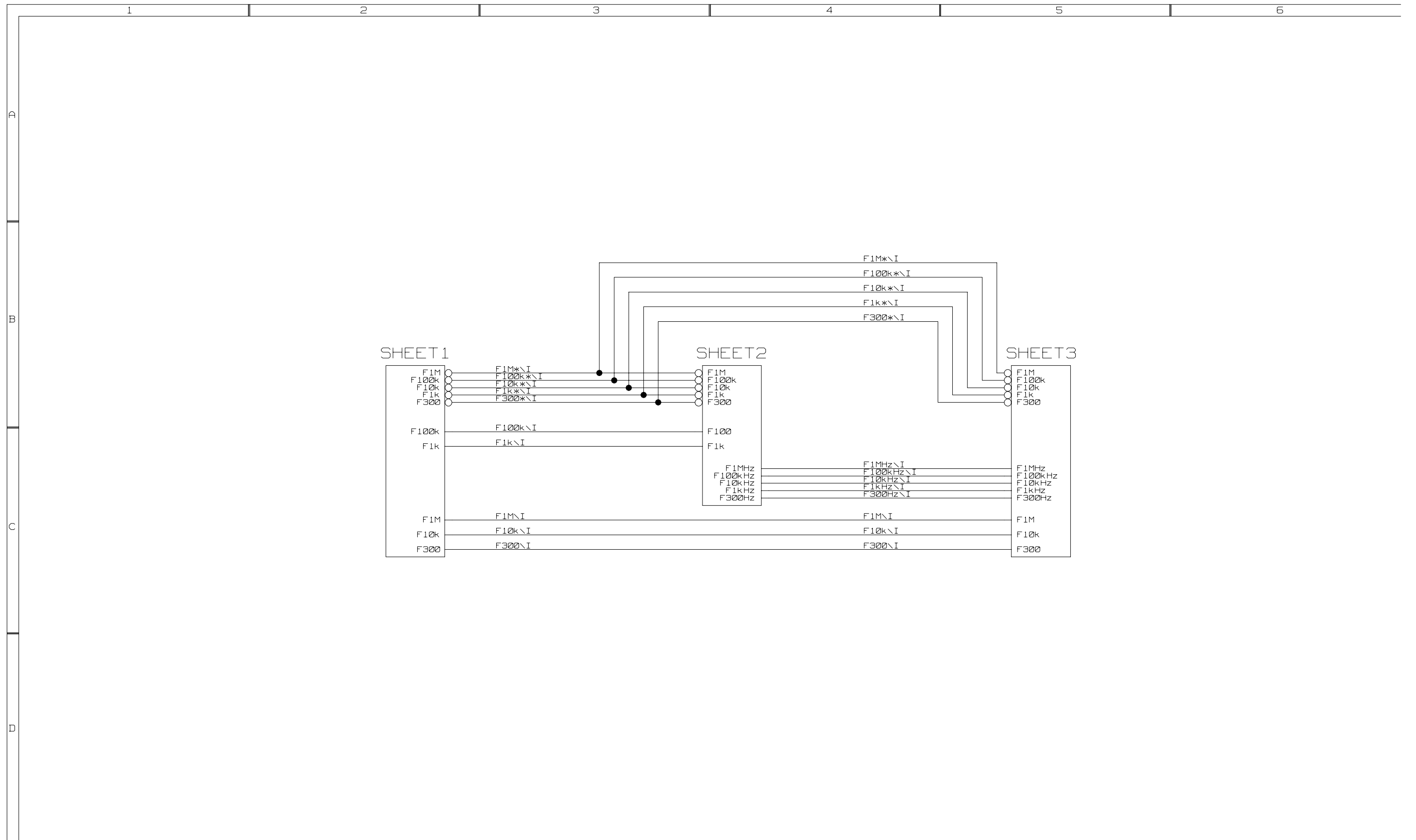
## A23 RF Option Component Locator

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C100	A-1	1D3	C273	G-1	2B2	C414	B-3	3D4	C507	A-3	3A5	L640	D-4	3B4	R202	A-2	3B5	R339	D-2	3D3	R501	A-3	3A5
C111	B-1	3A6	C274	G-1	2B2	C415	B-3	3D4	C510	A-3	3A4	L650	E-4	2B4	R203	A-2	3B5	R340	D-2	3B2	R502	A-3	3A5
C120	B-1	3B4	C283	G-1	2B2	C416	A-3	3A4	C511	B-3	3A4	L660	F-4	2B3	R204	A-2	3C5	R341	D-2	2C5	R503	A-3	3A2
C142	D-1	2B5	C290	H-1	1C3	C420	B-2	2C5	C512	B-3	3A4	L790	H-4	1C2	R212	B-1	3B5	R342	D-2	2C5	R535	C-3	3A3
C150	E-1	2B5	C292	H-1	1C3	C421	B-3	3D4	C520	B-3	3A3	P790	H-4	1C1	R213	B-1	3B5	R376	G-2	2C2	R536	C-3	3A2
C180	G-1	2A1	C305	A-2	3C5	C422	B-3	3D4	C521	C-3	3A3	Q112	B-1	3B6	R214	B-1	3B5	R381	G-2	2B2	R537	C-3	3B2
C191	H-1	1D3	C306	A-2	3D5	C423	B-3	3D4	C522	C-3	3A3	Q113	B-1	3B6	R235	D-2	3C2	R382	G-2	2B2	R538	C-3	3A2
C205	A-2	3C5	C307	A-2	3C5	C424	B-3	3D4	C530	C-3	3A3	Q143	D-1	2B5	R240	D-1	2B5	R383	G-2	2A2	R545	D-3	3B2
C206	A-2	3C5	C312	B-2	3C4	C425	B-3	3D4	C531	C-3	3A3	Q200	A-1	3B6	R241	D-1	2B6	R390	H-2	1A2	R546	D-3	2A5
C207	A-2	3C5	C320	B-2	3C4	C430	C-3	3D3	C532	C-3	3A2	Q201	A-1	3C6	R242	D-1	2B5	R391	H-2	1B3	R547	D-3	2A5
C208	A-2	3C5	C321	C-2	3C3	C431	C-3	3D3	C533	C-3	3A2	Q245	D-1	2B6	R243	D-1	2B5	R392	H-2	1B3	R548	D-3	2A4
C209	A-2	3C5	C322	C-2	3C3	C432	D-3	3D2	C537	C-3	3B1	Q249	D-2	3C2	R244	D-1	3B3	R393	H-2	1B3	R572	G-3	2A2
C210	A-1	3C4	C323	C-2	2C4	C433	D-3	3C2	C540	D-3	2A5	Q276	G-1	2B2	R245	D-1	3B3	R394	H-2	1B3	R573	G-3	2A2
C211	B-1	3B5	C324	B-2	3C4	C434	C-3	3D3	C541	D-3	2A4	Q280	G-1	2B2	R246	D-2	2C5	R397	H-2	1A2	R574	G-3	2A2
C220	B-1	3B5	C325	B-2	3C4	C435	C-3	3D3	C542	D-3	2A4	Q300	A-2	3C6	R247	D-2	3C2	R398	H-2	1B2	T144	D-1	2B5
C221	B-1	3B5	C326	B-2	2D5	C436	D-3	3D2	C543	D-3	2A4	Q301	A-2	3C6	R248	D-2	3C2	R399	H-2	1B2	T245	D-1	2B6
C222	B-1	3B5	C333	C-2	3C2	C438	D-2	3D1	C544	D-3	2A4	Q320	B-2	2D5	R249	D-1	2B5	R402	A-3	3D5	T310	A-2	3C4
C223	C-1	3B4	C334	C-2	3C2	C441	D-3	2D5	C551	E-3	2A4	Q339	C-2	3D3	R253	D-1	3B3	R403	A-3	3D5	T320	B-2	2C5
C230	C-1	3B4	C335	D-2	3C2	C444	E-3	2D4	C552	E-3	2A3	Q377	G-2	2C2	R255	E-1	2B5	R404	A-3	3D5	T336	C-2	2C3
C231	C-1	3B4	C343	D-2	3B2	C445	E-3	2D4	C553	E-3	2A3	Q378	G-2	2D2	R275	G-1	2B2	R430	C-3	3D3	T345	D-2	3B2
C232	C-1	3B4	C344	D-2	2C5	C450	E-2	2D4	C561	F-3	2A3	Q379	G-2	2C2	R281	G-1	2B2	R431	C-3	3D3	T430	D-3	3D2
C233	C-1	3B3	C350	E-2	2C4	C451	F-2	2D3	C562	F-3	2A3	Q380	G-2	2C2	R282	G-1	2B2	R432	C-3	3D3	T530	D-3	3A2
C234	C-2	3C3	C352	E-2	2C4	C452	E-3	2D4	C563	F-3	2A3	Q396	H-2	1B4	R290	H-2	1B2	R433	C-3	3C3	T535	C-3	3C2
C240	D-1	3B4	C353	E-2	2C4	C453	E-3	2D4	C564	F-3	2A3	Q400	A-2	3D6	R291	H-2	1B2	R434	D-3	3D2	U190	H-1	1C2
C241	D-1	3B3	C361	F-2	2C3	C454	E-3	2D4	C565	F-3	2A2	Q401	A-2	3D6	R302	A-2	3C5	R435	D-3	3D2	U390	H-2	1B3
C242	D-1	2B5	C362	F-2	2C3	C455	E-3	2D3	C570	G-3	2B2	Q405	A-3	3A6	R303	A-2	3C5	R436	D-3	3D2	U490	H-2	1B4
C243	D-1	2B5	C363	F-2	2C3	C456	F-3	2D3	C571	G-3	2A2	Q406	A-3	3B6	R304	A-2	3C5	R437	D-3	3C2	U590	H-3	1B3
C244	D-1	2B5	C371	F-2	2C2	C457	F-3	2D3	J110	NA	3A6	Q430	D-2	3D2	R313	B-2	3C4	R438	D-2	3D2	U590	H-3	1C5
C248	D-2	3C1	C372	F-2	2C3	C462	F-3	2D3	J180	NA	2A1	Q460	G-3	2D2	R314	B-2	3C4	R439	D-2	3D2	U590	H-3	1D5
C249	D-2	3B3	C374	G-2	2C2	C463	F-3	2D3	L110	A-1	3A6	Q461	G-3	2D2	R315	B-2	3C4	R440	E-3	2D5	Y224	B-2	3C3
C250	E-1	2B4	C375	G-2	2C2	C464	F-3	2D2	L215	B-1	3C4	Q470	G-3	2A2	R325	B-2	2C5	R442	E-3	2D5	Y225	B-2	3C4
C251	E-1	2B4	C384	G-2	2C2	C465	G-3	2D2	L236	C-2	3C3	Q471	G-3	2A2	R326	B-2	2D5	R443	E-3	2D5	Y311	B-2	3C4
C252	E-2	2C4	C385	G-2	1D3	C466	G-3	2D2	L354	E-2	2C4	Q539	D-3	3B2	R327	C-2	2D5	R467	G-3	2D2	Y337	C-2	2C3
C260	E-1	2B4	C395	H-2	1D3	C472	F-2	2D2	L370	F-2	2C3	R101	A-1	3A6	R328	C-2	2C4	R468	G-3	2D2	Y360	E-2	2C4
C261	F-1	2B4	C406	A-3	3D5	C473	G-2	2C2	L386	G-2	2A2	R140	D-1	2B5	R329	C-2	2C4	R469	G-3	2D2	Y417	B-3	3D5
C262	F-1	2B3	C407	A-3	3D5	C491	H-3	1D3	L513	B-3	3A4	R141	D-1	2B5	R330	C-2	2C3	R474	G-2	2C2	Y426	C-3	3D3
C263	F-1	2B3	C408	A-3	3D5	C503	A-3	3A5	L523	B-3	3A3	R151	E-1	2B4	R331	D-2	3C2	R475	G-2	2C2	Y446	E-3	2D4
C270	F-1	2B3	C411	A-3	3D5	C504	A-3	3B5	L550	E-3	2A4	R152	E-1	2B4	R332	D-2	3C2	R476	G-2	2C2	Y458	F-3	2D3
C271	F-1	2B3	C412	A-3	3D5	C505	A-3	3A5	L560	E-3	2A3	R153	E-1	2B4	R338	C-2	3D2	R500	A-3	3A5			
C272	G-1	2B3	C413	B-3	3D4	C506	A-3	3A5	L630	C-4	3B5												

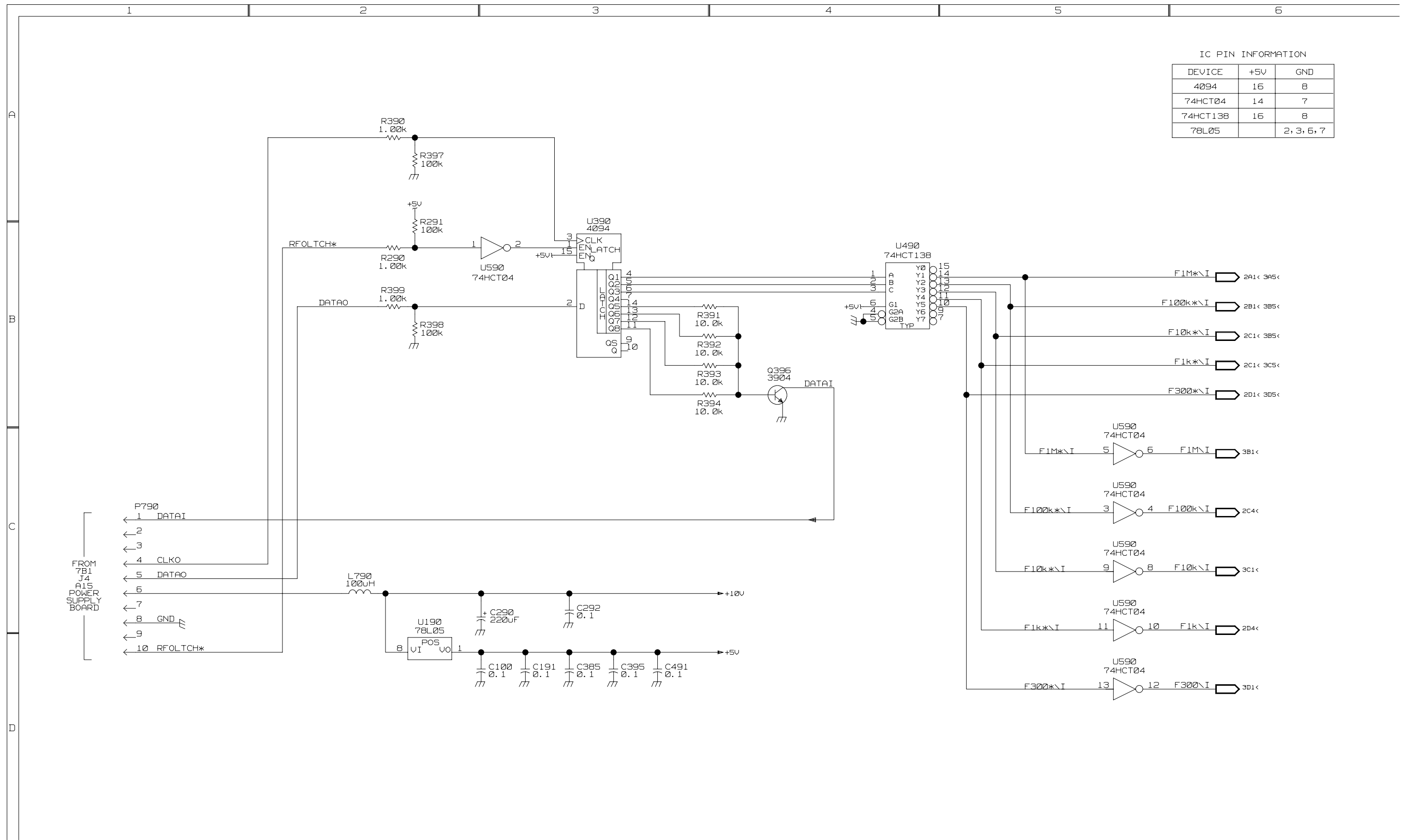
Figure 1-22: A23 RF Option Component Locator











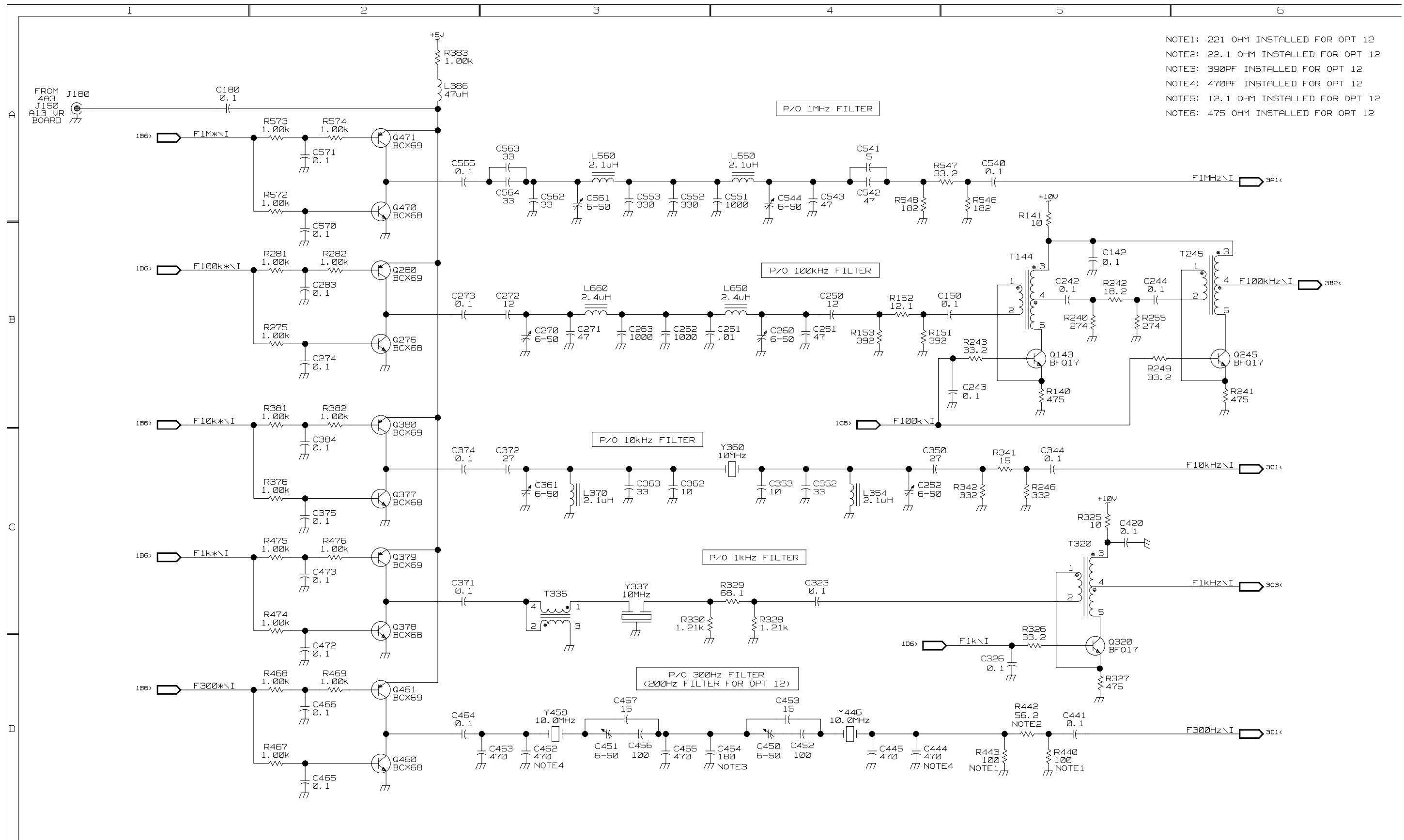
IC PIN INFORMATION

DEVICE	+5V	GND
4094	16	8
74HCT04	14	7
74HCT138	16	8
78L05		2, 3, 6, 7

2715

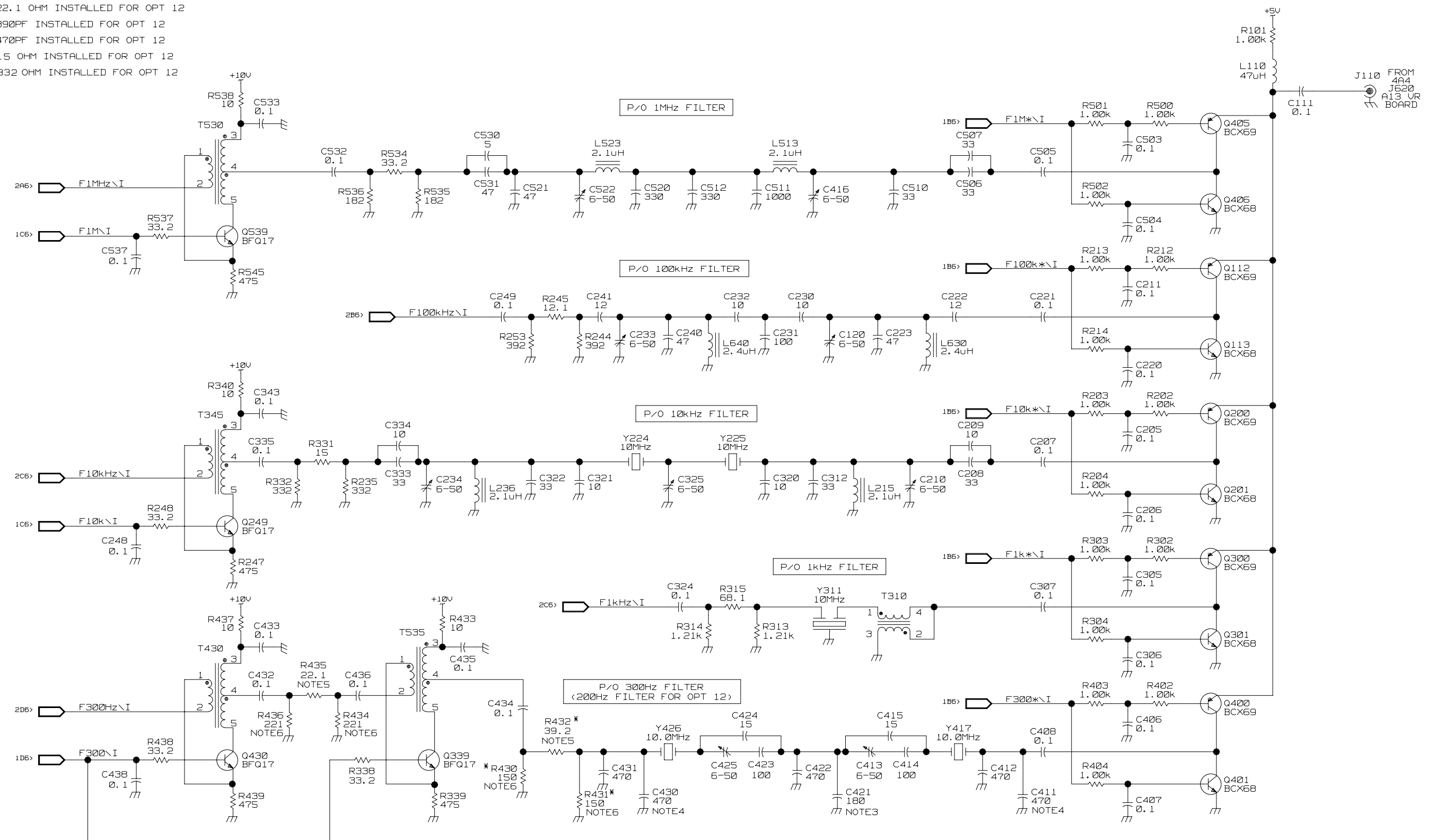
RF OPTION A23 1



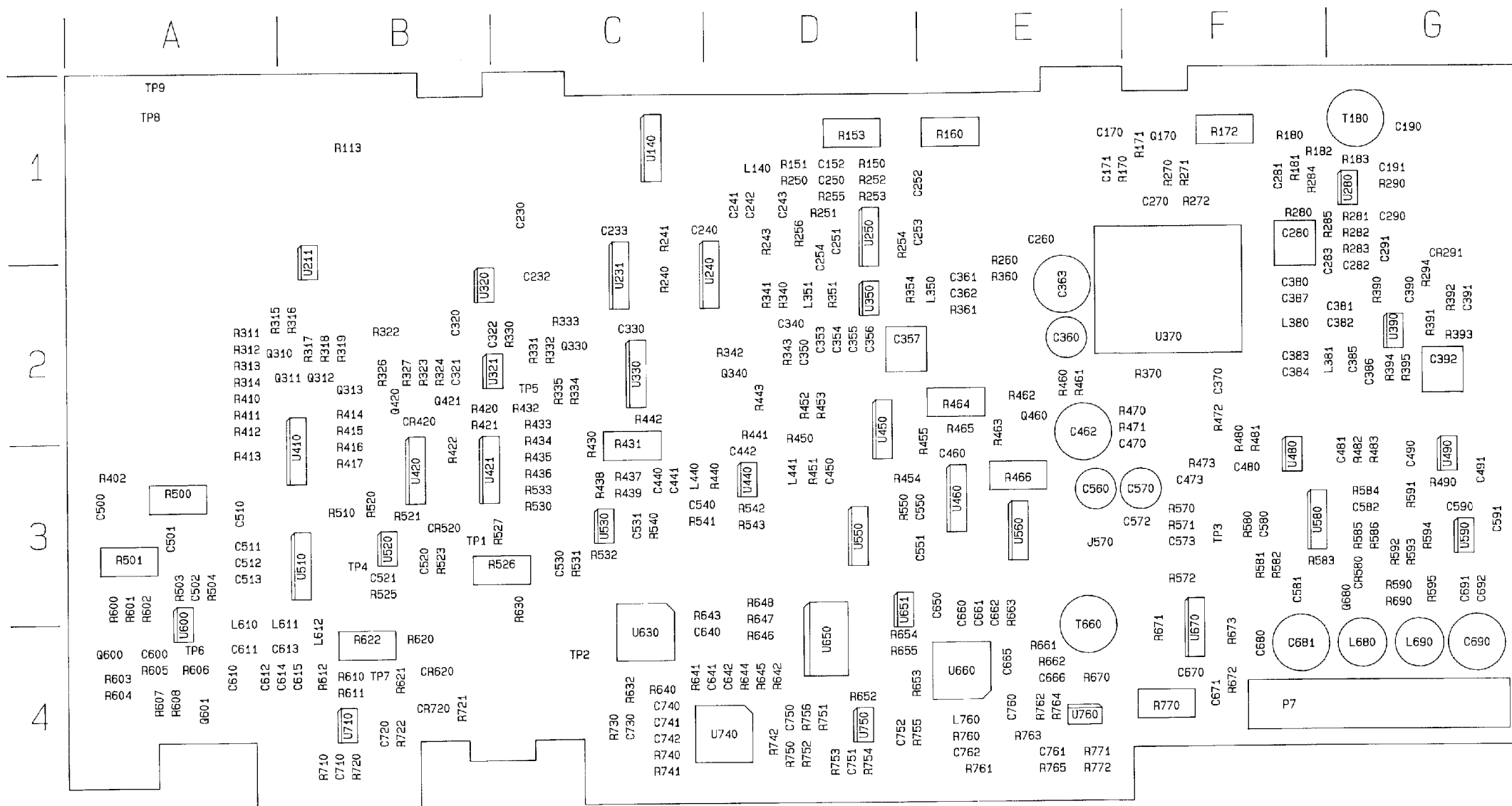




NOTE1: 221 OHM INSTALLED FOR OPT 12  
 NOTE2: 22.1 OHM INSTALLED FOR OPT 12  
 NOTE3: 390PF INSTALLED FOR OPT 12  
 NOTE4: 470PF INSTALLED FOR OPT 12  
 NOTE5: 15 OHM INSTALLED FOR OPT 12  
 NOTE6: 332 OHM INSTALLED FOR OPT 12



\* SEE PARTS LIST FOR EARLIER VALUES.



**COMPONENT NUMBER EXAMPLE**

Component Number		
A23 A2 R1234		
Assembly Number	Subassembly Number (if used)	Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**STATIC SENSITIVE DEVICES**

Figure 1-23: A7 Log Amp (front)



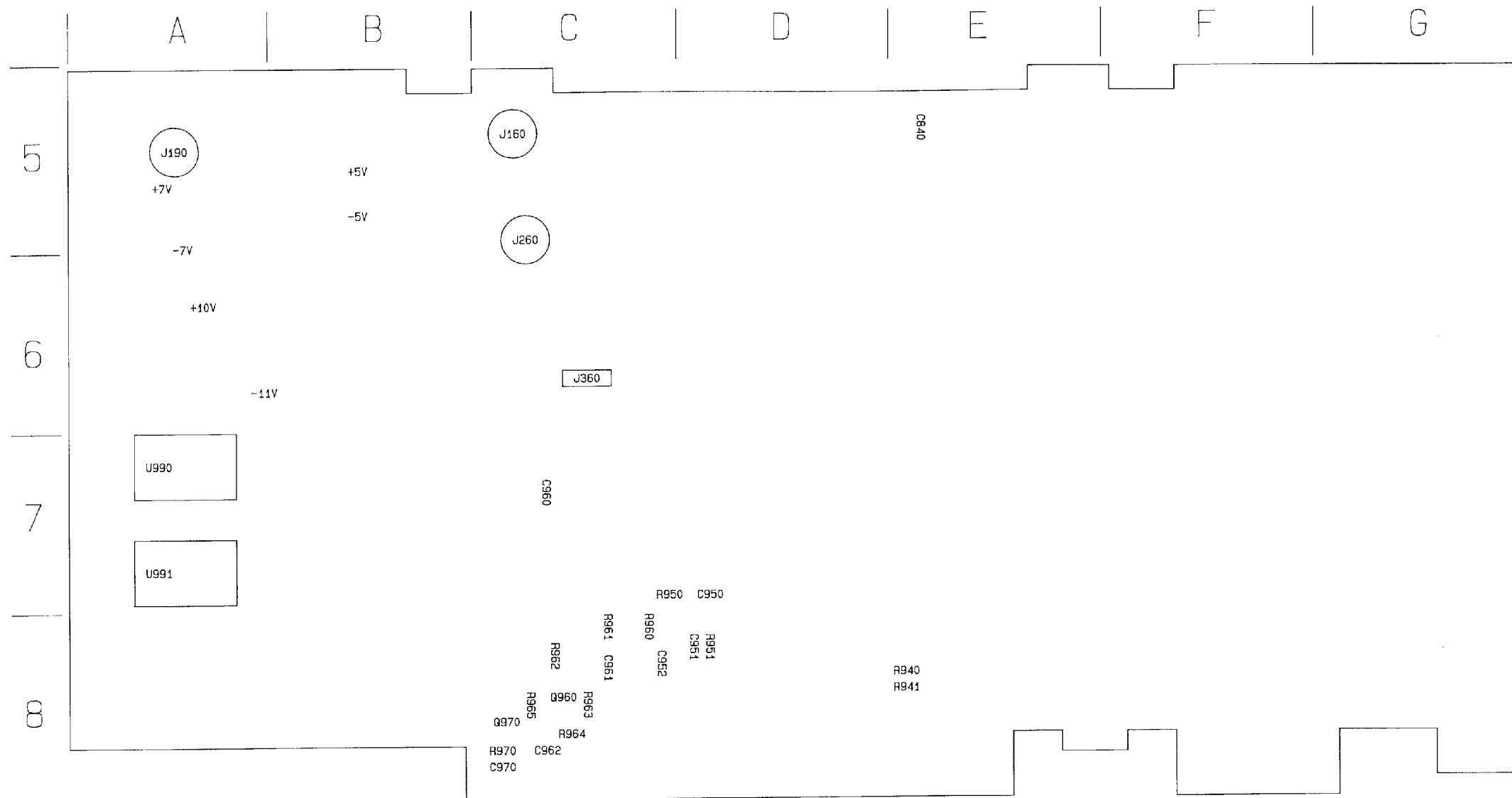
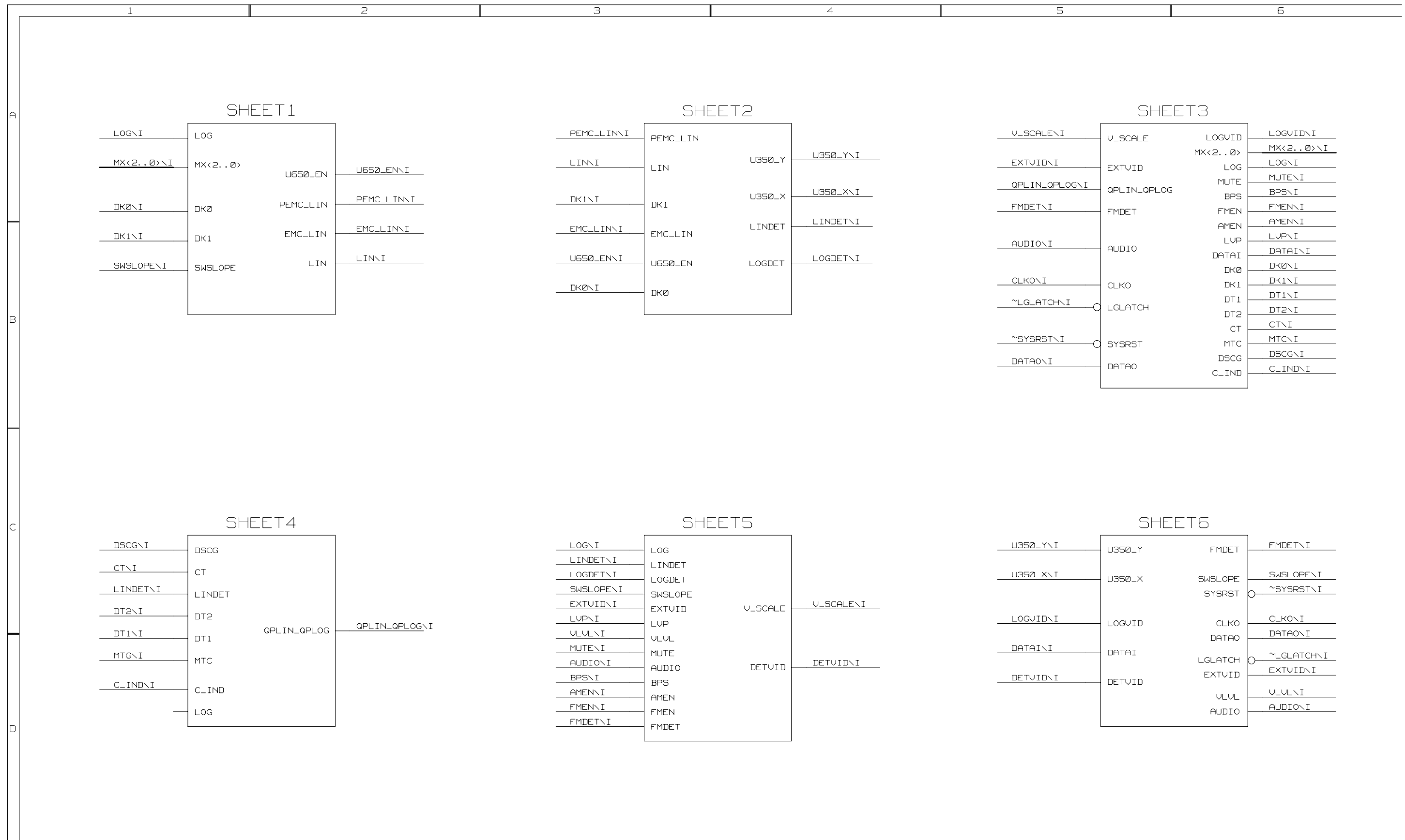


Figure 1-24: A7 Log Amp (back)

## A7 Log Amp Component Locator

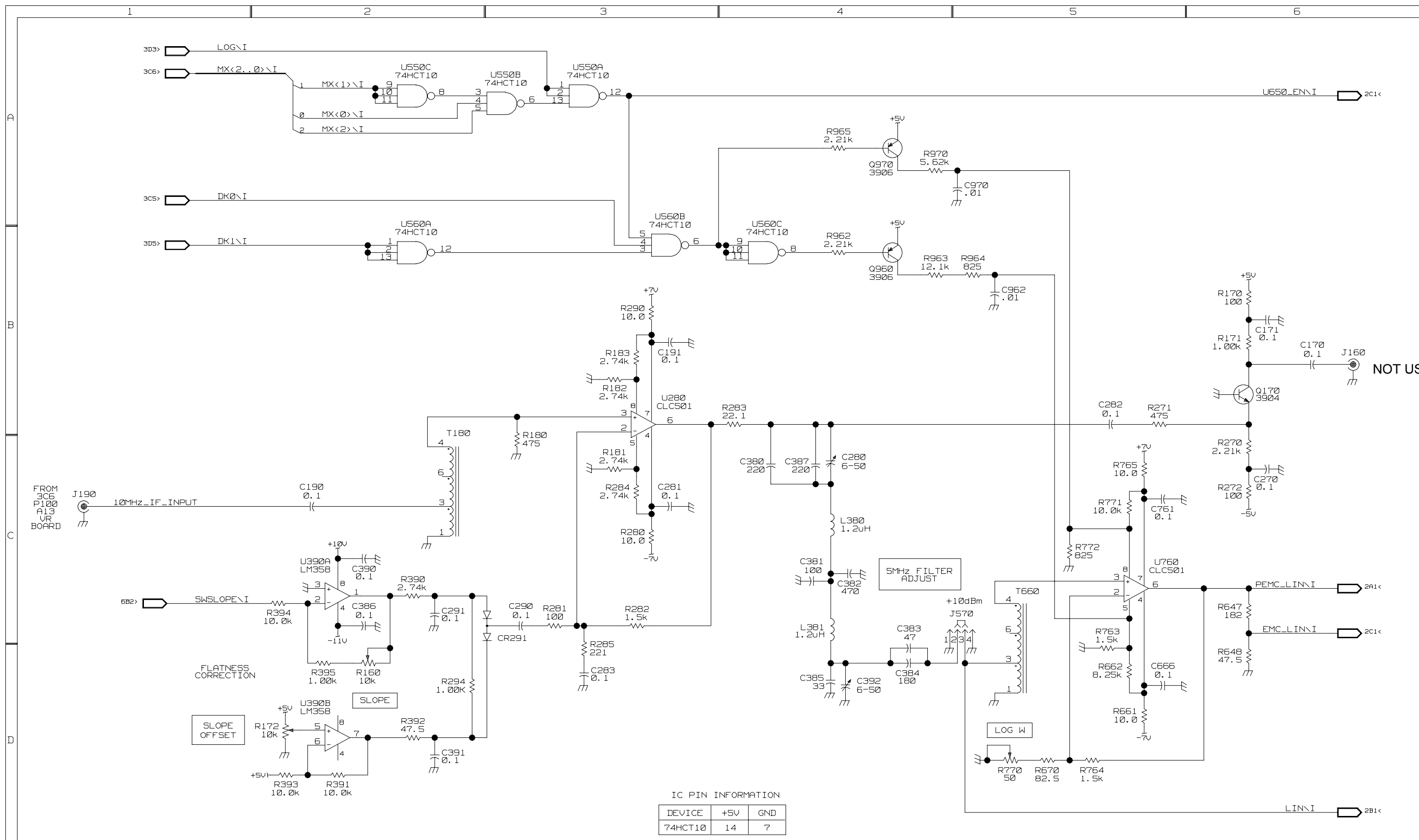
CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C152	D-1	6A5	C473	F-3	5C5	C752	D-4	2D4	R151	D-1	6A5	R360	E-2	2A5	R501	A-3	5A4	R646	D-4	2C1	TP7	B-4	5A3
C170	E-1	1B6	C480	F-3	5C3	C760	E-4	2A1	R153	D-1	6A3	R361	E-2	6A3	R503	A-3	5A5	R647	D-3	1C6	TP8	A-1	4C3
C171	E-1	1B6	C481	G-3	5C3	C761	E-4	1C5	R160	E-1	1D2	R370	F-2	5C4	R504	A-3	5A4	R648	D-3	1D6	TP9	A-1	4A3
C190	G-1	1C2	C490	G-3	6B4	C762	E-4	2A2	R170	F-1	1B6	R390	G-2	1C2	R510	B-3	5D2	R652	D-4	2D4	U140	C-1	3C6
C191	G-1	1B3	C491	G-3	6B4	C849	E-5	6C5	R171	F-1	1B6	R391	G-2	1D2	R520	B-3	5D2	R653	D-4	2B3	U211A	B-1	4D4
C230	C-1	4B5	C500	A-3	5C4	C950	D-7	2C4	R172	F-1	1D2	R392	G-2	1D2	R521	B-3	5D2	R654	D-4	2C4	U211B	B-1	4D5
C232	C-2	4A4	C501	A-3	5B4	C951	D-8	2C4	R180	F-1	1C3	R393	G-2	1D2	R523	B-3	3B4	R655	D-4	2C3	U231	C-2	3C4
C233	C-1	6C4	C502	A-3	5A4	C952	C-8	2A2	R181	F-1	1C3	R394	G-2	1C2	R525	B-3	3B4	R661	E-4	1D5	U240	D-2	3C5
C240	C-1	6C4	C510	A-3	3B3	C960	C-7	6C5	R182	F-1	1B3	R395	G-2	1D2	R526	C-3	5A2	R662	E-4	1D5	U250	D-1	6A4
C241	D-1	6A5	C511	A-3	3B3	C961	C-8	2A2	R183	G-1	1B3	R402	A-3	5C3	R527	C-3	5A1	R663	E-3	2A3	U280	G-1	1B3
C242	D-1	6A5	C512	A-3	3B3	C962	C-8	1B5	R240	C-2	3C1	R410	A-2	3C2	R530	C-3	3B6	R670	E-4	1D5	U320B	B-2	3A2
C243	D-1	6A5	C513	A-3	3B3	C970	C-8	1A5	R241	C-1	3C1	R411	A-2	3A3	R531	C-3	2C6	R671	F-4	5C6	U321	C-2	3B5
C250	D-1	6A4	C520	B-3	3B4	CR291	G-1	1D3	R243	D-1	3D2	R412	A-2	3B3	R533	C-3	3B6	R672	F-4	5B6	U330	C-2	3C2
C251	D-1	6C4	C521	B-3	3B4	CR420	B-2	5B5	R250	D-1	6A5	R413	A-3	3A3	R532	C-3	2B6	R673	F-4	5B6	U350	D-2	6A3
C252	E-1	6C4	C530	C-3	2C6	CR520	B-3	5D2	R251	D-1	6A4	R414	B-2	3A3	R540	C-3	2B6	R690	G-3	5C2	U370	F-2	5C5
C253	E-1	6C4	C531	C-3	2B6	CR580	G-3	5C2	R252	D-1	6A4	R415	B-2	3A3	R541	C-3	2C5	R710	B-4	5A2	U390A	G-2	1C2
C254	D-2	6A3	C540	C-3	2C5	CR620	B-4	5A5	R253	D-1	6B4	R416	B-3	3A3	R542	D-3	2C5	R720	B-4	5A2	U390B	G-2	1D2
C260	E-1	2B5	C550	E-3	2D2	CR720	B-4	6D2	R254	D-1	6B4	R417	B-3	3A3	R543	D-3	2B5	R721	B-4	6D2	U410	B-3	3A3
C270	F-1	1C6	C551	E-3	2D6	J160	C-5	1B6	R255	D-1	6A4	R420	B-2	3B5	R550	D-3	2D6	R722	B-4	5A2	U420A	B-3	5A6
C280	F-1	1C4	C560	E-3	5C6	J190	A-5	1C1	R256	D-1	6A3	R421	B-2	3B6	R570	F-3	5C5	R730	C-4	2A4	U420B	B-3	5D3
C281	F-1	1C3	C570	F-3	5C5	J260	C-5	2B6	R260	E-2	2A4	R422	B-3	5B5	R571	F-3	5C4	R740	C-4	2B2	U420C	B-3	3B5
C282	G-2	1B5	C572	F-3	5C4	J360	C-6	5C6	R270	F-1	1C6	R430	C-3	2B5	R572	F-3	5C6	R741	C-4	2B3	U421	B-3	3A5
C283	G-2	1D3	C573	F-3	5C4	J570	E-3	1C5	R271	F-1	1B5	R431	C-3	2B5	R580	F-3	5C2	R742	D-4	2B2	U440	D-3	2B5
C290	G-1	1C3	C580	F-3	5C2	L140	D-1	6A5	R272	F-1	1C6	R432	C-2	3A6	R581	F-3	5C2	R750	D-4	2B2	U450A	D-2	2D2
C291	G-1	1C2	C582	G-3	5C2	L350	E-2	6A3	R280	F-1	1C3	R433	C-2	3A6	R582	F-3	5C2	R751	D-4	2A3	U450B	D-2	2D2
C320	B-2	4A4	C581	F-3	6C5	L351	D-2	6A2	R281	G-1	1C3	R434	C-2	3A6	R583	F-3	5C1	R752	D-4	2B3	U460	E-3	2D3
C321	B-2	3B5	C590	G-3	6D4	L380	F-2	1C4	R282	G-1	1C3	R435	C-3	3A6	R584	G-3	5B2	R753	D-4	2D3	U490	G-3	6B3
C322	C-2	3B5	C591	G-3	6D5	L381	G-2	1C4	R283	G-1	1B4	R436	C-3	3A6	R585	G-3	5B2	R754	D-4	2D4	U480A	F-3	5C3
C360	E-2	5D4	C600	A-4	5A4	L440	C-3	2C4	R284	F-1	1C3	R437	C-3	2B5	R586	G-3	5C1	R755	D-4	2C4	U480B	F-3	5D4
C363	E-2	6B4	C610	A-4	5A4	L441	D-3	2C4	R285	D-3	1D3	R438	C-3	2B5	R590	G-3	5C2	R756	D-4	2D3	U510	B-3	3B3
C370	F-2	5C5	C611	A-4	5A4	L610	A-3	5A4	R290	G-1	1B3	R439	C-3	2B5	R591	G-3	6C4	R760	E-4	2A2	U520	B-3	3B4
C330	C-2	6C4	C612	A-4	5A3	L611	B-3	5A3	R294	G-2	1D2	R440	D-3	2B4	R592	G-3	6D4	R761	E-4	2A2	U530	C-3	2B6
C340	D-2	6A2	C613	B-4	5A3	L612	B-4	5A3	R311	A-2	3B1	R441	D-2	2C4	R593	G-3	6D4	R762	E-4	2A1	U550A	D-3	1A3
C350	D-2	6A3	C614	A-4	5A3	L680	G-4	6C3	R312	A-2	3B1	R442	C-2	2B5	R594	G-3	6D4	R763	E-4	1C5	U550B	D-3	1A3
C353	D-2	2A5	C615	B-4	5A3	L690	G-4	6C3	R313	a-2	3B1	R443	D-2	3D4	R595	G-3	3A2	R764	E-4	1D5	U550C	D-3	1A2
C354	D-2	6A2	C640	D-4	6C5	L760	E-4	2A2	R314	A-2	3C2	R450	D-2	2C4	R600	A-3	5C4	R765	E-4	1C5	U560A	E-3	1B2
C355	D-2	6A3	C641	D-4	2C2	P7	F-4	6B1	R315	A-2	3B2	R451	D-3	2C4	R601	A-3	5B4	R770	F-4	1D5	U560B	E-3	1A3
C356	D-2	6A2	C642	D-4	2B3	P7	F-4	6B1	R316	B-2	3B2	R452	D-2	2A4	R602	A-3	5A4	R771	E-4	1C5	U560C	E-3	1B4
C357	D-2	6A2	C650	E-3	2C4	P7	F-4	6C1	R317	B-2	3B2	R453	D-2	2A5	R603	A-4	5B3	R772	E-4	1C5	U590	G-3	6D3
C361	E-2	2A5	C660	E-3	2A3	P7	F-4	6C1	R318	B-2	3B2	R454	D-3	2D2	R604	A-4	5B2	R940	E-8	2B5	U580A	F-3	5C2
C362	E-2	6A3	C661	E-3	2A3	P7	F-4	6D1	R319	B-2	3B2	R460	E-2	5C6	R605	A-4	5A4	R941	E-8	2B5	U580B	F-3	5B2
C380	F-2	1C4	C662	E-3	2A3	Q170	F-1	1B6	R322	B-2	5D2	R461	E-2	5D6	R606	A-4	5A4	R950	C-7	2B4	U600	A-3	5A4
C381	G-2	1C4	C665	E-4	2A3	Q310	B-2	3B2	R323	B-2	5D2	R462	E-2	5C3	R607	A-4	5B3	R951	D-8	2C4	U620A	B-4	5A2
C382	G-2	1C4	C666	E-4	1D5	Q311	B-2	3B2	R324	B-2	3B5	R463	E-2	5C4	R608	A-4	5B3	R960	C-8	2A2	U620C	B-4	5A6
C383	F-2	1C4	C680	F-4	6B5	Q312	B-2	3B2	R326	B-2	5D3	R455	E-3	2C6	R610	B-4	5A3	R961	C-8	2B2	U670A	F-4	5B5
C384	F-2	1D4	C681	F-4	6B4	Q313	B-2	3B2	R327	B-2	5D3	R464	E-2	2D2	R611	B-4	5B2	R962	C-8	1B4	U630A	C-4	2A4
C385	G-2	1D4	C690	G-4	6D5	Q330	C-2	3C2	R330	C-2	3B5	R465	E-2	2D2	R612	B-4	5A1	R963	C-8	1B4	U630B	C-4	2A4
C386	G-2	1C2	C691	G-3	6C4	Q340	D-2	3D4	R331	C-2	3C2	R466	E-3	5C4	R620	B-4	5A5	R964	C-8	1B5	U630C	C-4	2A4
C387	F-2	1C4	C692	G-3	6D5	Q420	B-2	5D3	R332	C-2	3C1	R470	F-2	5D5	R621	B-4	5A2	R965	C-8	1A4	U650	D-4	2C2
C390	G-2	1C2	C670	F-4	5C5	Q421	B-2	5D3	R333	C-2	3D2	R471	F-2	5D5	R622	B-4	5A2	R970	C-8	1A4	U651	D-3	2C3
C391	G-2	1D2	C671	F-4	5B5	Q460	E-2	5C4	R334	C-2	3D1	R472	F-2	5B5	R630	C-3	5A2	T180	G-1	1C2	U660	E-4	2A2
C392	G-2	1D4	C710	B-4	5A3	Q600	A-4	5B3	R335	C-2	3D2	R473	F-3	5C5	R632	C-4	2A4	T660	E-4	1C5	U710	B-4	5A2
C440	C-3	6C5	C720	B-4	5A3	Q601	A-4	5B3	R340	D-2	6A2	R480	F-3	5C3	R640	C-4	2A4	TP1	B-3	2C6	U740	D-4	2B2
C441	C-3	2B4	C730	C-4	2A4	Q680	G-3	5C2	R341	D-2	3D1	R481	F-3	5C3	R641	C-4	2C2	TP2	C-4	2D4	U750	D-4	2D4
C442	D-3	2B5	C740	C-4	2B3	Q960	C-8	1B4	R342	D-2	3D4	R482	G-3	5D4	R642	D-4	2B2	TP3	F-3	5B5	U760	E-4	1C5
C450	D-3	2C4	C741	C-4	2B3	Q970	C-8	1A4	R343	D-2	6B3	R483	G-3	5D4	R643	D-3	2B4	TP4	B-3	3B4	U990	A-7	6C3
C460	E-3	2D6	C742	C-4	2B2	R113	B-1	5D2	R351	D-2	6A2	R490	G-3	6C4	R644	D-4	2B1	TP5	C-2	3B5	U991	A-7	6C3
C462	E-2	6D4	C750	D-4	2B2	R150	D-1	6A4	R354	D-2	6A2	R500	A-3	5B3	R645	D-4	2C1	TP6	A-4	5A5			
C470	F-3	5D5	C751	D-4	2D4																		

Figure 1-25: A7 Log Amp Component Locator



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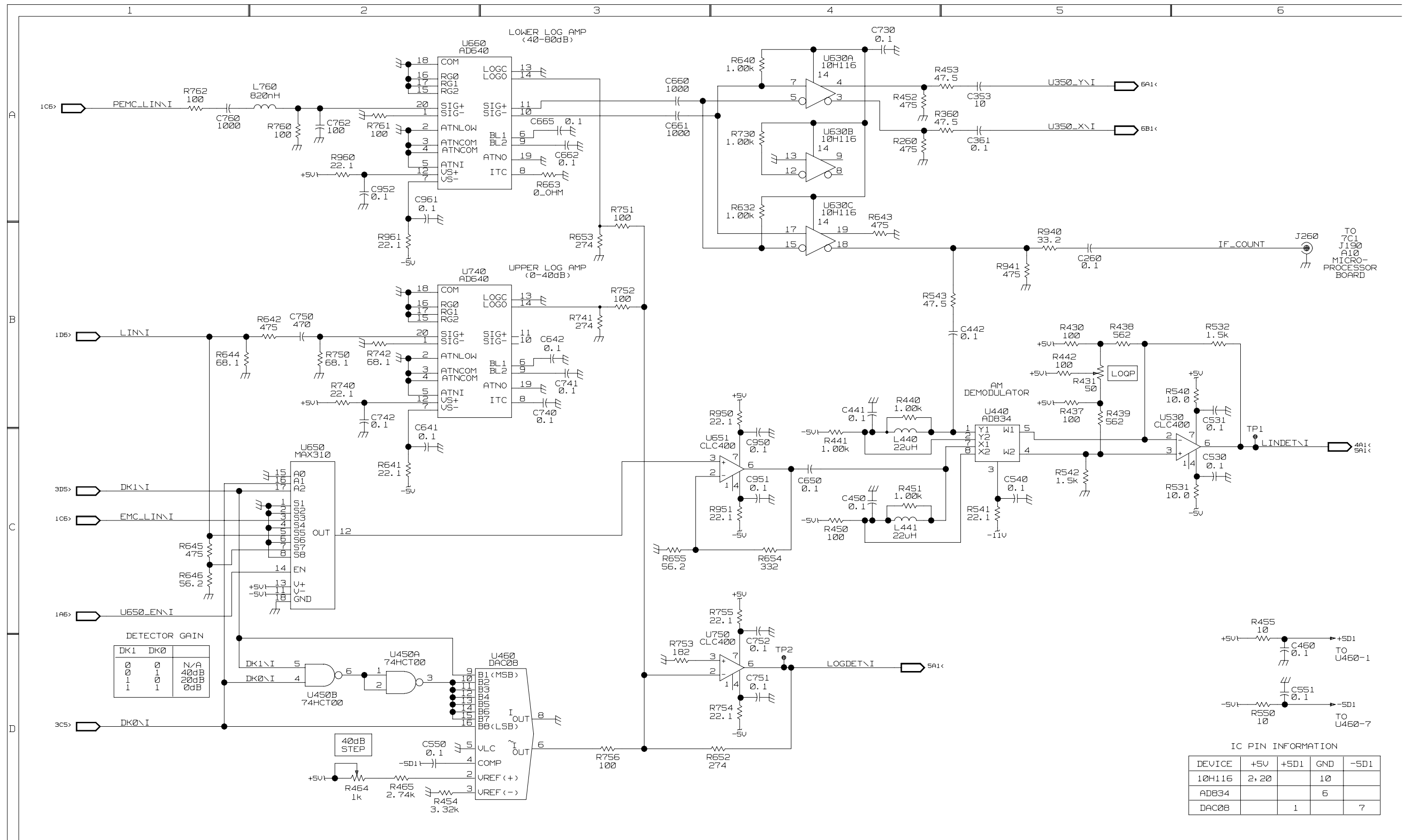


NOT USED

IC PIN INFORMATION

DEVICE	+5V	GND
74HCT10	14	7



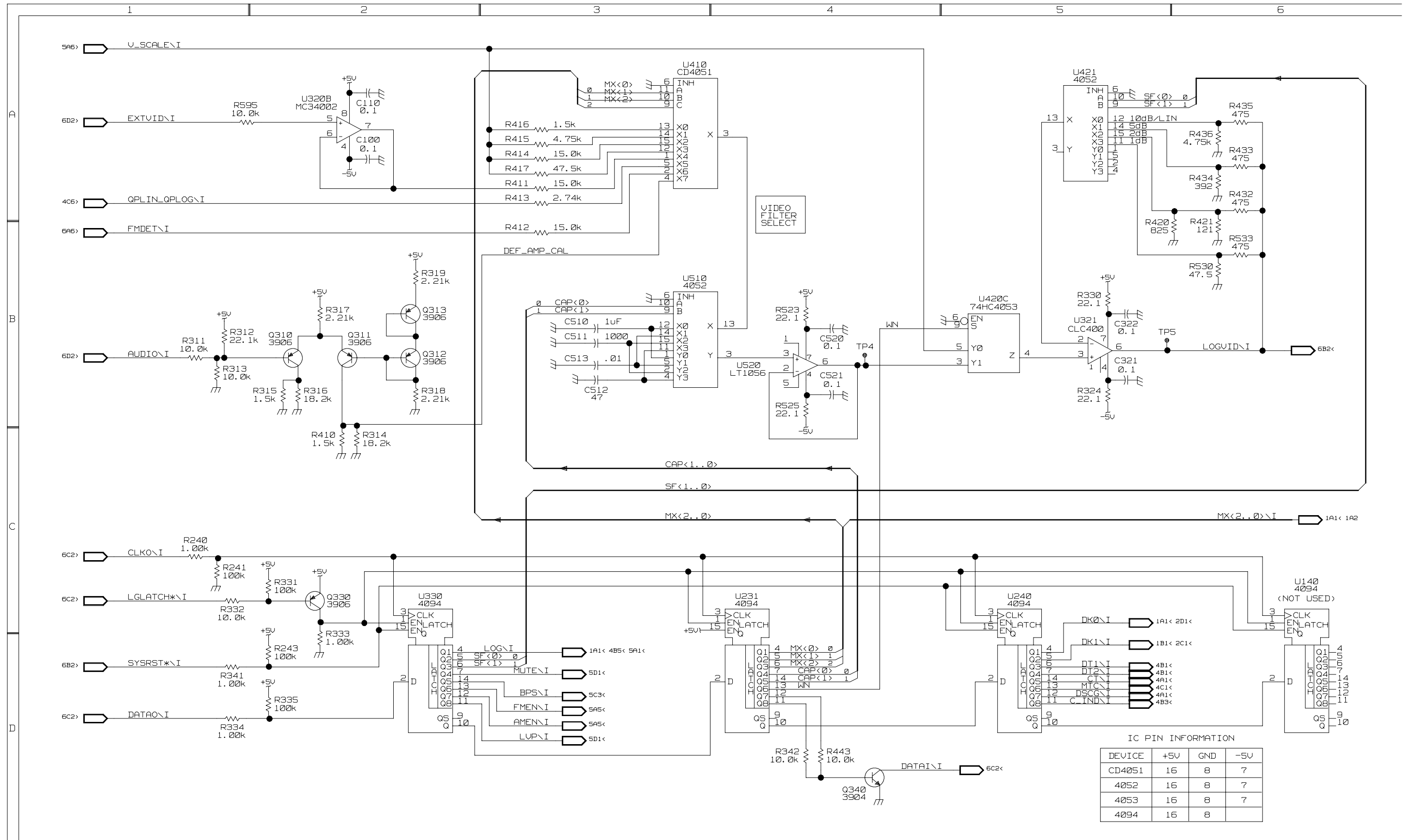


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LOG AMP BOARD A7



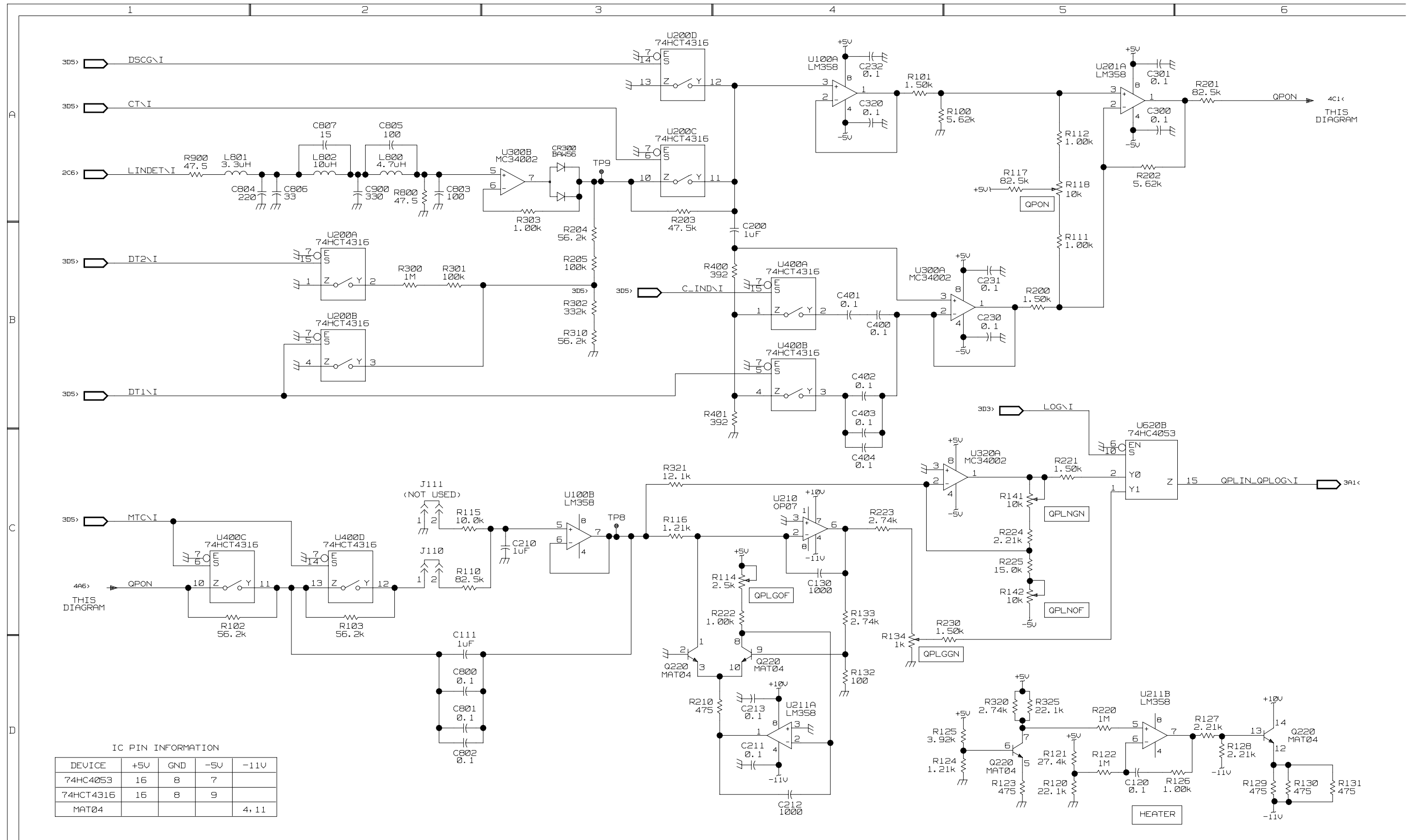




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LOG AMP BOARD A7 3

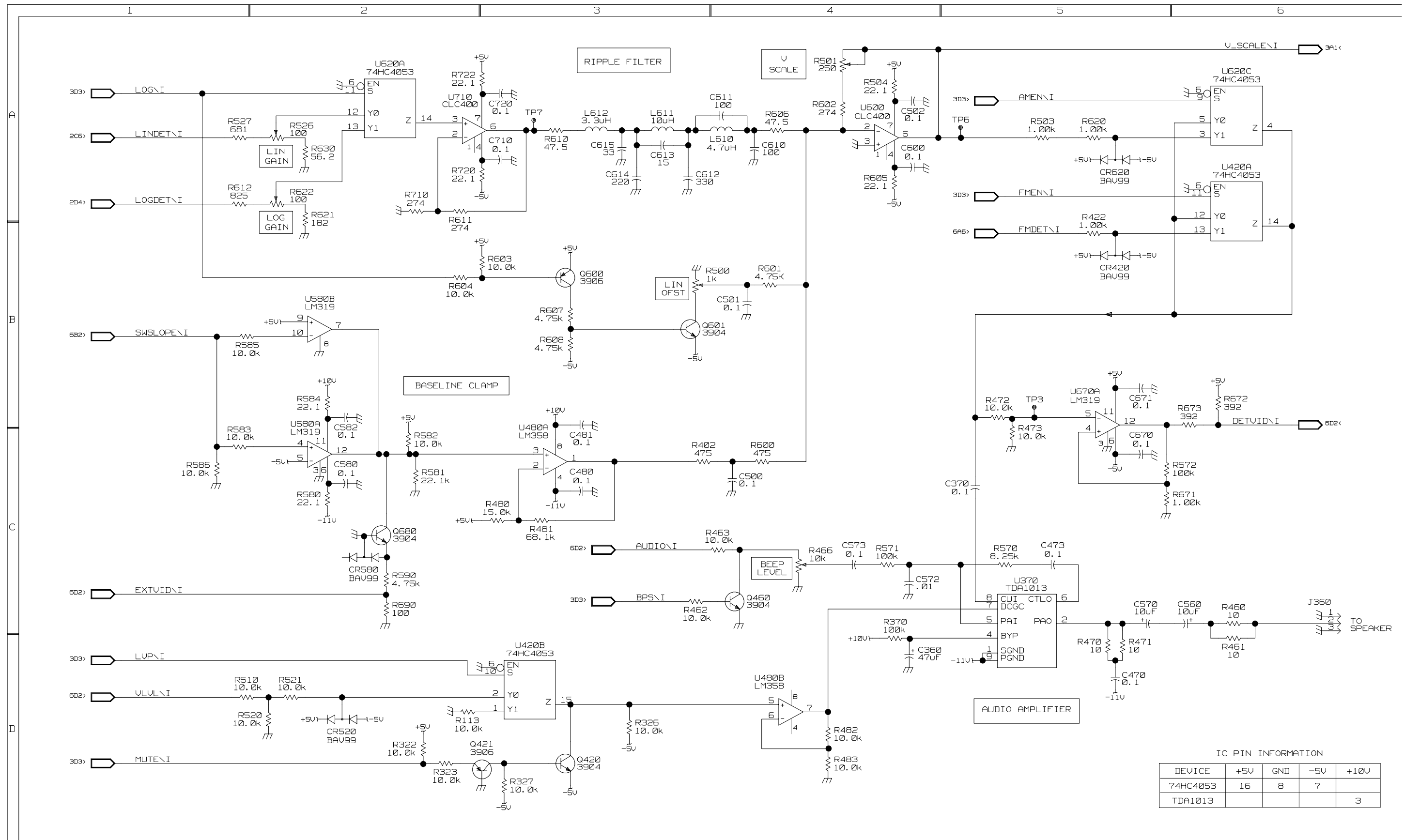




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LOG AMP BOARD A7 4





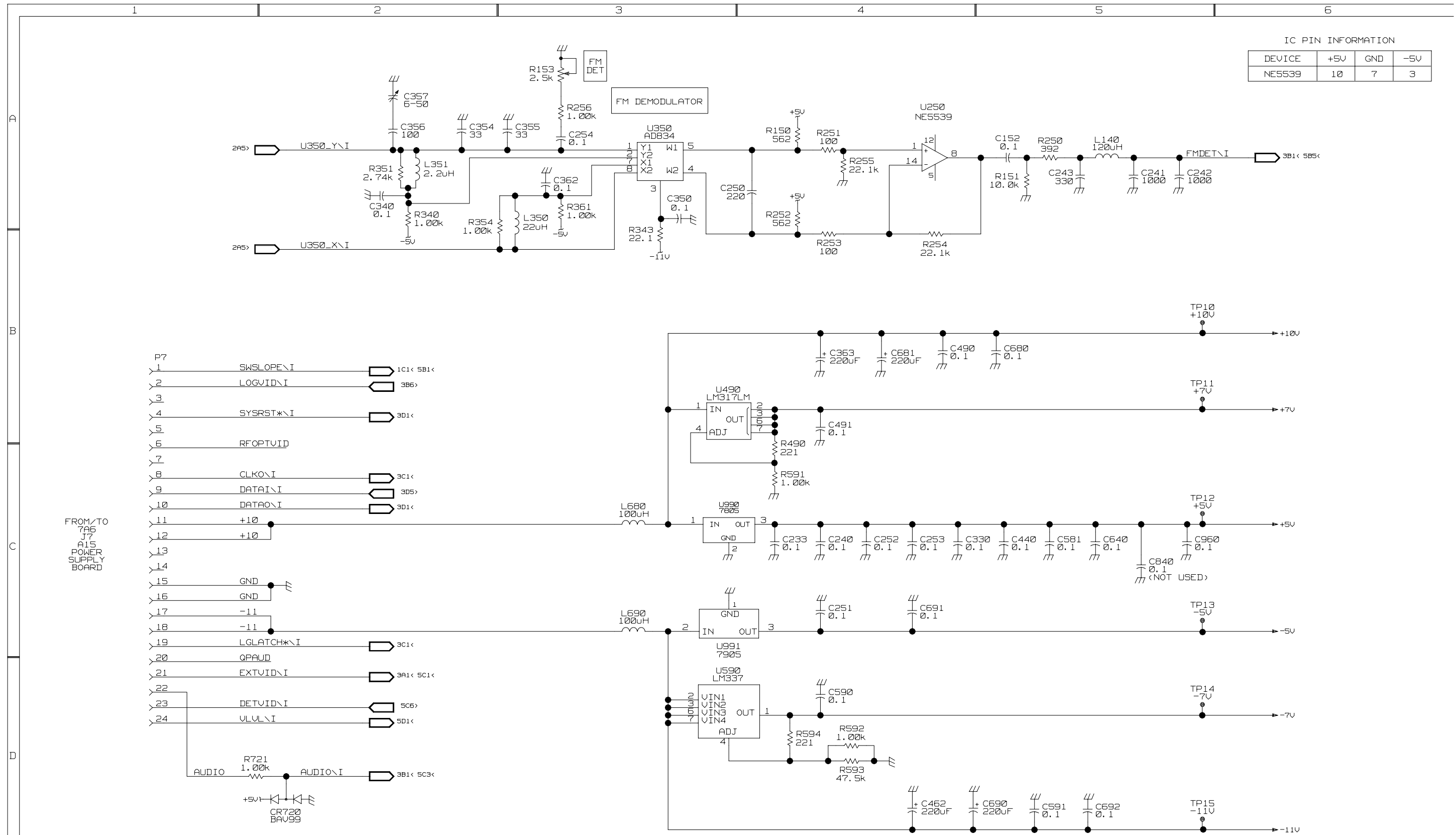
IC PIN INFORMATION

DEVICE	+5V	GND	-5V	+10V
74HC4053	16	8	7	
TDA1013				3

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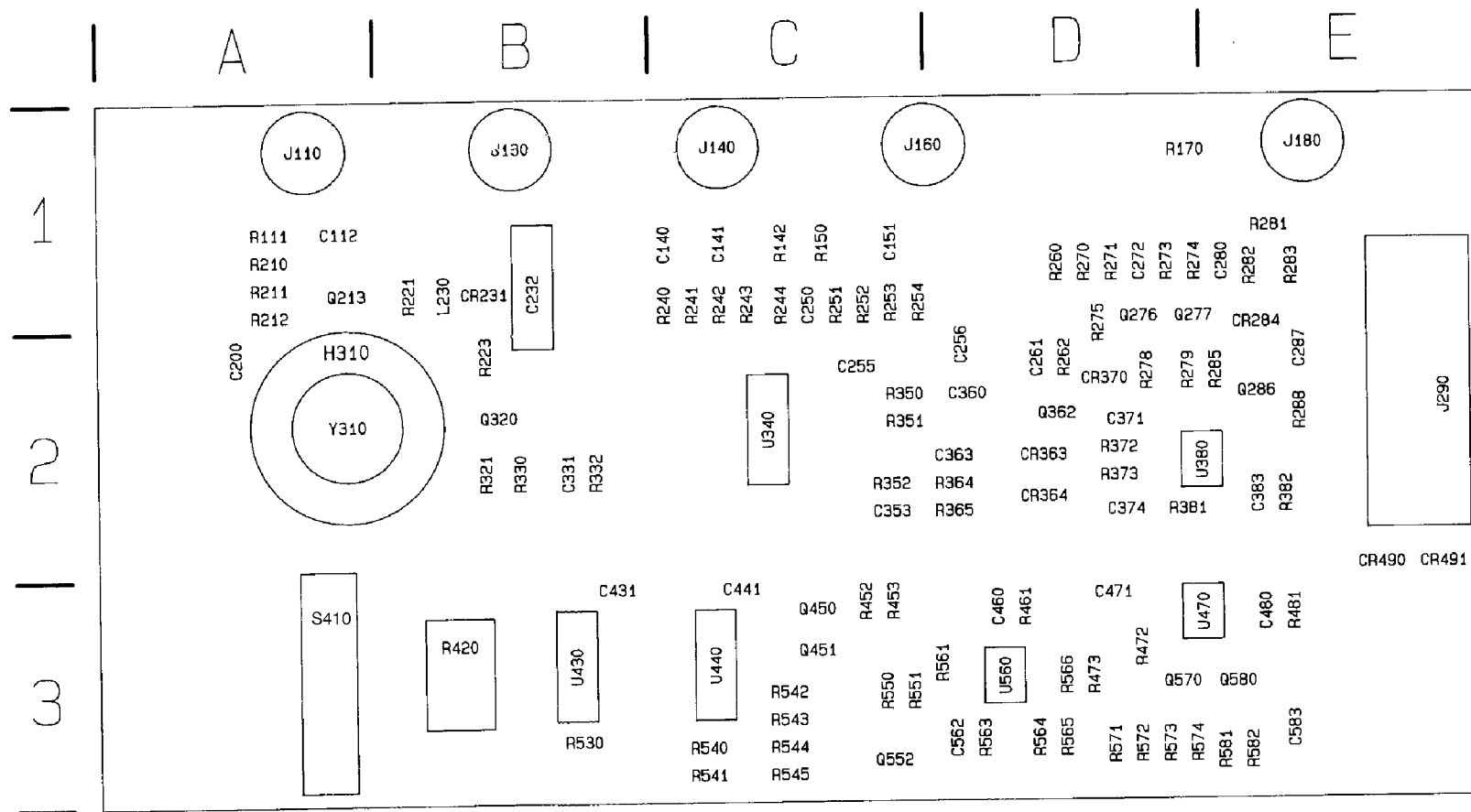
LOG AMP BOARD A7 5



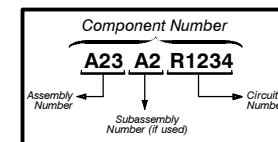


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LOG AMP BOARD A7 6



**COMPONENT NUMBER EXAMPLE**



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

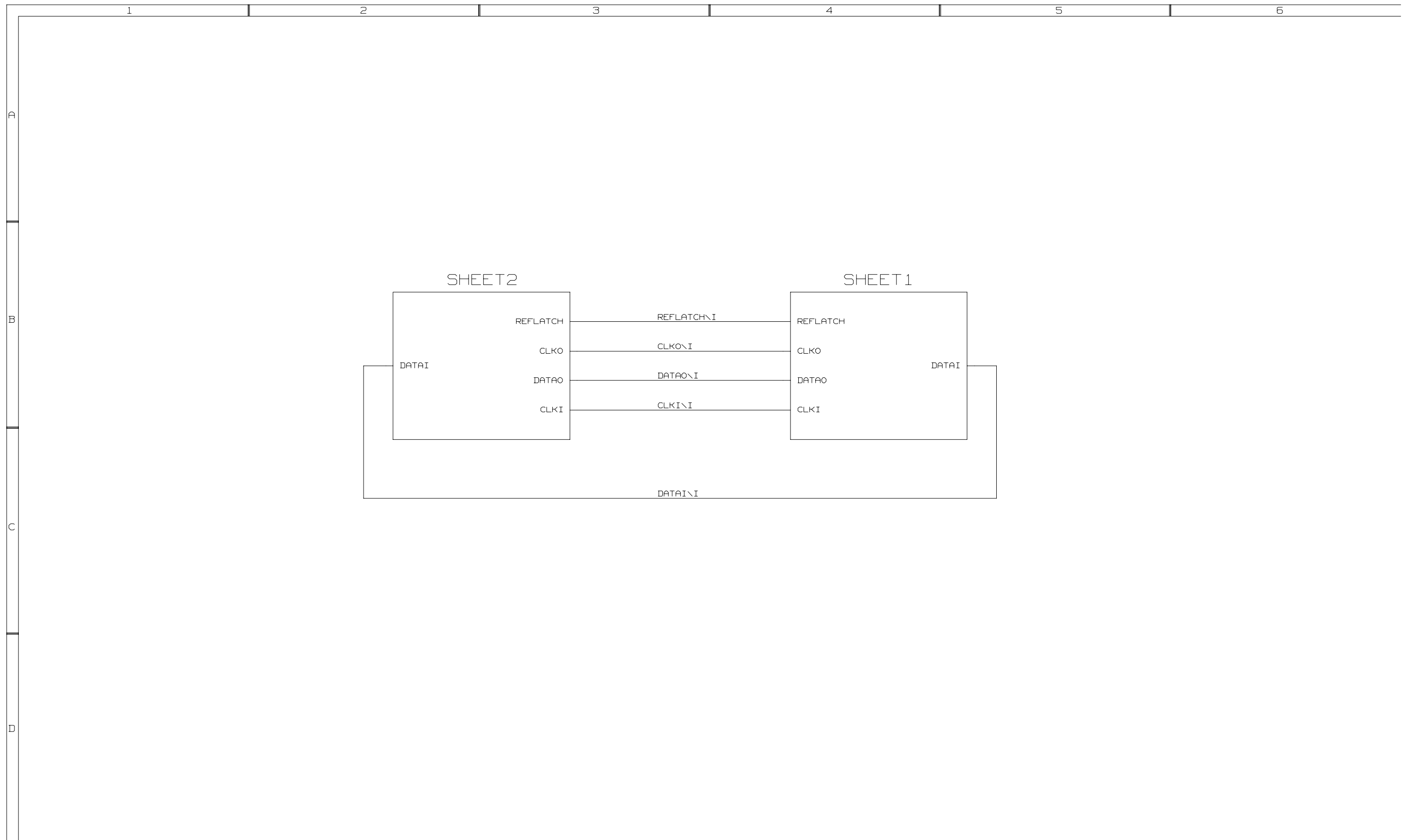
**STATIC SENSITIVE DEVICES**

**A21 Reference Oscillator Component Locator**

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C112	A-1	1A1	C374	D-2	1C1	J110	A-1	1A6	Q451	C-3	1D4	R244	C-1	1B5	R285	E-2	1C5	R461	D-3	2A4	R566	D-3	2B3
C140	C-1	1A5	C383	E-2	1B1	J130	B-1	1A6	Q552	C-3	1B3	R251	C-1	1B5	R288	E-2	1D5	R472	D-3	2A4	R571	D-3	2B3
C141	C-1	1A5	C431	B-3	2D4	J140	C-1	1B6	Q570	D-3	2B4	R252	C-1	1B4	R321	B-2	1A2	R473	D-3	2B3	R572	D-3	2B4
C151	C-1	1A5	C441	C-3	2D4	J160	D-1	1A6	Q580	E-3	2A5	R253	C-1	1A5	R330	B-2	1A2	R481	E-3	2C3	R573	D-3	2B4
C200	A-2	1B2	C460	D-3	2A4	J180	E-1	1C6	R111	A-1	1A1	R254	C-1	1B4	R332	B-2	1B2	R530	B-3	1B3	R574	D-3	2B5
C232	B-1	1A1	C471	D-3	2D5	J290	E-2	2B1	R142	C-1	1B5	R260	D-1	1D4	R350	C-2	1B5	R540	C-3	1C3	R581	E-3	2B5
C250	C-1	1B5	C480	E-3	2D3	J290	E-1	2B1	R150	C-1	1B5	R262	D-2	1C2	R351	C-2	1B4	R541	C-3	1C3	R582	E-3	2B5
C255	C-2	2D4	C562	D-3	2B4	J290	E-1	2C1	R170	D-1	1C4	R270	D-1	1C4	R352	C-2	1C2	R542	C-3	1C3	S410	A-3	1D2
C256	D-2	1C4	C583	E-3	2D4	J290	E-1	2C1	R210	A-1	1A1	R271	D-1	1B5	R364	D-2	1B2	R543	C-3	1C3	U340	C-2	1A4
C261	D-2	1C2	CR231	B-1	1A1	L230	B-1	1A1	R211	A-1	1A1	R273	D-1	1C5	R365	D-2	1C2	R544	C-3	1B3	U380A	E-2	1C1
C272	D-1	1B4	CR284	E-1	1C5	Q213	A-1	1A1	R212	A-1	1A1	R274	D-1	1C5	R372	D-2	1B2	R545	C-3	1B3	U380B	E-2	1C4
C280	E-1	1C5	CR363	D-2	1C1	Q276	D-1	1C5	R221	B-1	1A2	R275	D-2	1B4	R373	D-2	1B1	R550	C-3	1B3	U430	B-3	1C3
C287	E-2	1C5	CR364	D-2	1C1	Q277	D-1	1C5	R223	B-2	1A2	R278	D-2	1C5	R381	D-2	1C1	R551	C-3	1B3	U440	C-3	1B3
C331	B-2	1B2	CR370	D-2	1B4	Q286	E-2	1C5	R240	C-1	1A5	R279	D-2	1C5	R382	E-2	1B1	R561	D-3	2A3	U470	E-3	2C3
C353	C-2	1C2	CR490	E-3	1B1	Q320	B-2	1A2	R241	C-1	1A4	R281	E-1	1C6	R420	B-3	1C3	R563	D-3	2B4	U560A	D-3	2A3
C360	D-2	1C5	CR491	E-3	1B1	Q362	D-2	1B2	R242	C-1	1A5	R282	E-1	1C6	R452	C-3	1D4	R564	D-3	2A3	Y310	A-2	1A2
C363	D-2	1C2	H310	A-2	2B4	Q450	C-3	1D4	R243	C-1	1A4	R283	E-1	1C6	R453	C-3	1D4	R565	D-3	2A3			
C371	D-2	1B2																					

Figure 1-26: A21 Reference Oscillator

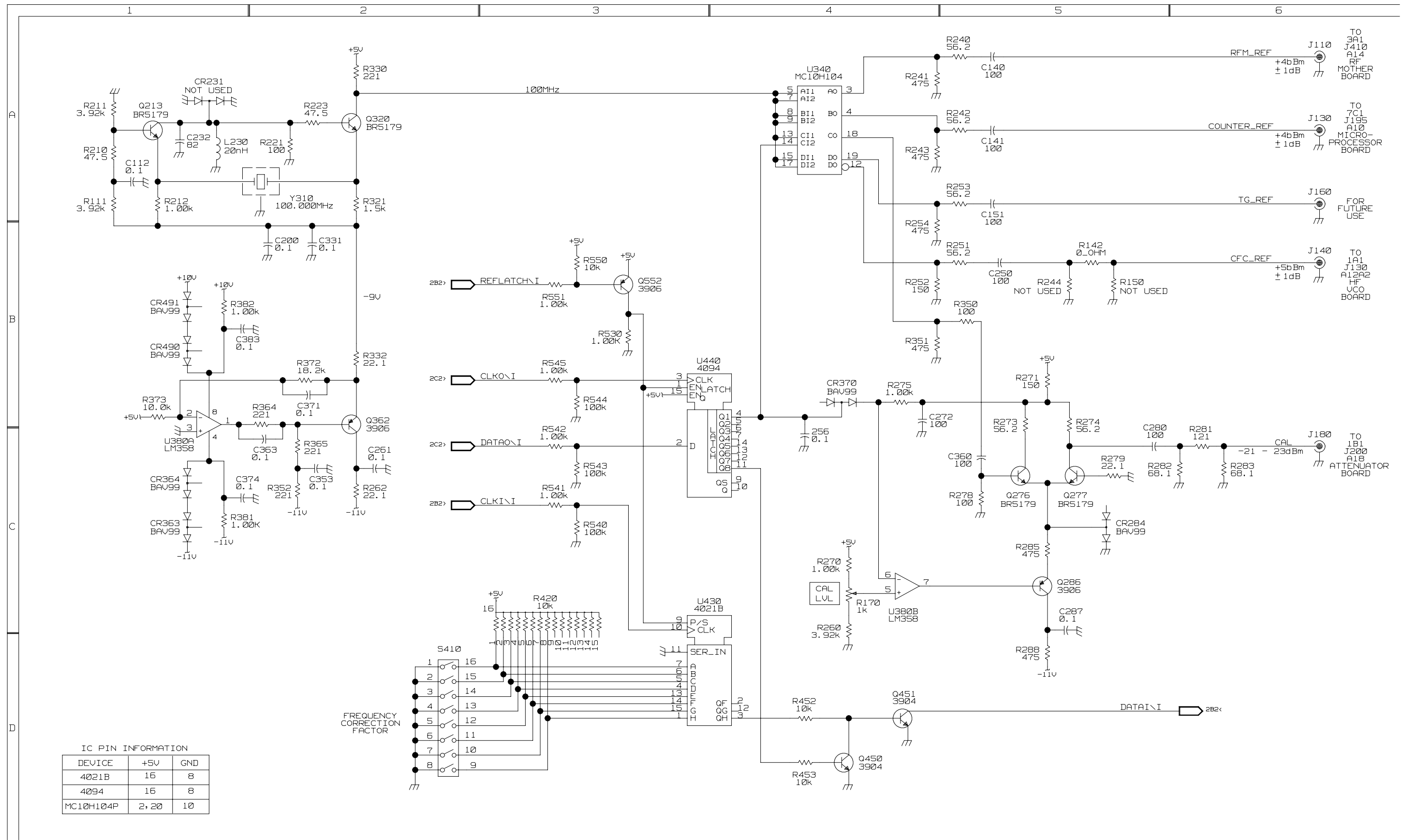




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SIGNAL INTERCONNECT REFERENCE OSCILLATOR BOARD A21 0



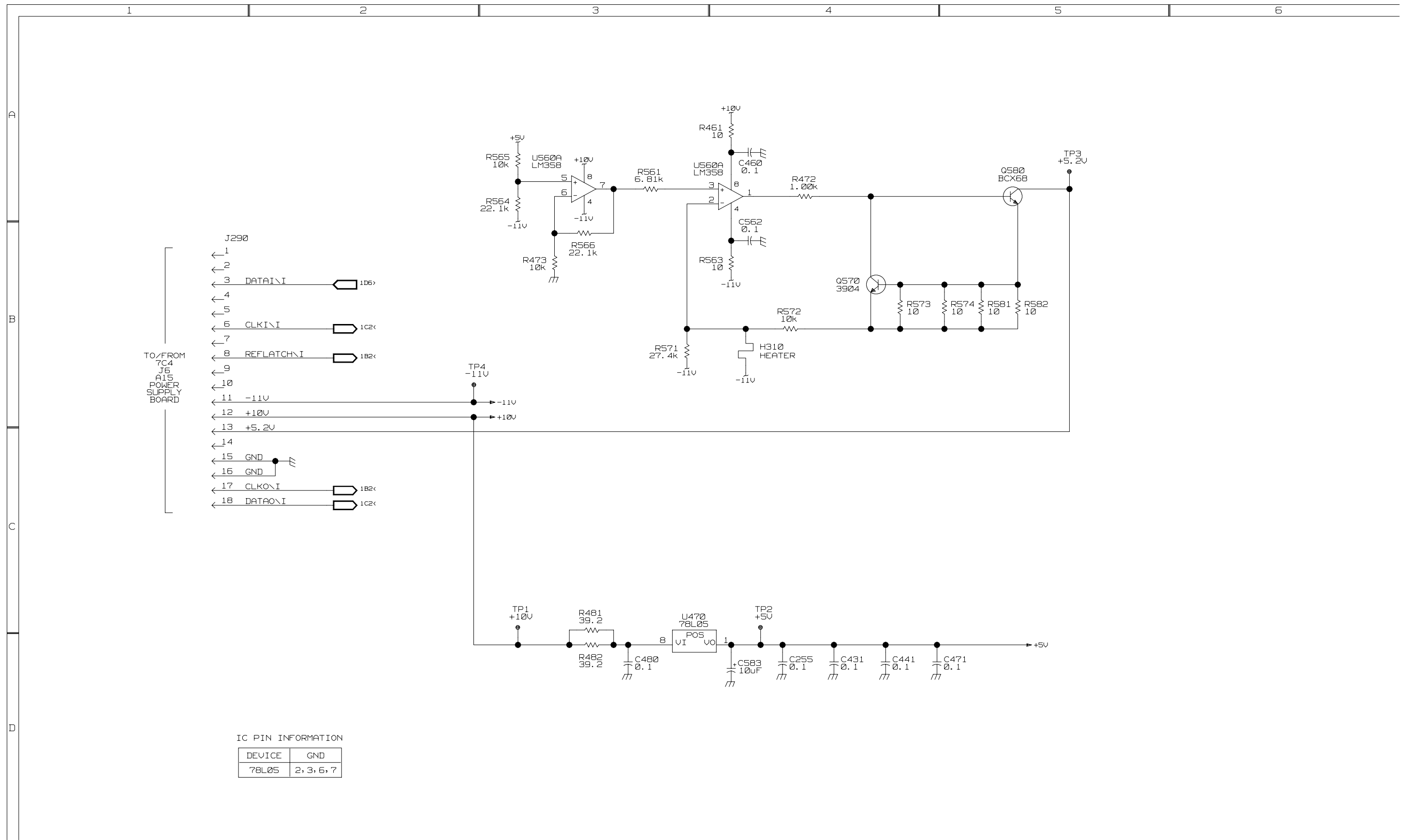


IC PIN INFORMATION

DEVICE	+5V	GND
4021B	16	8
4094	16	8
MC10H104P	2, 20	10

FREQUENCY CORRECTION FACTOR

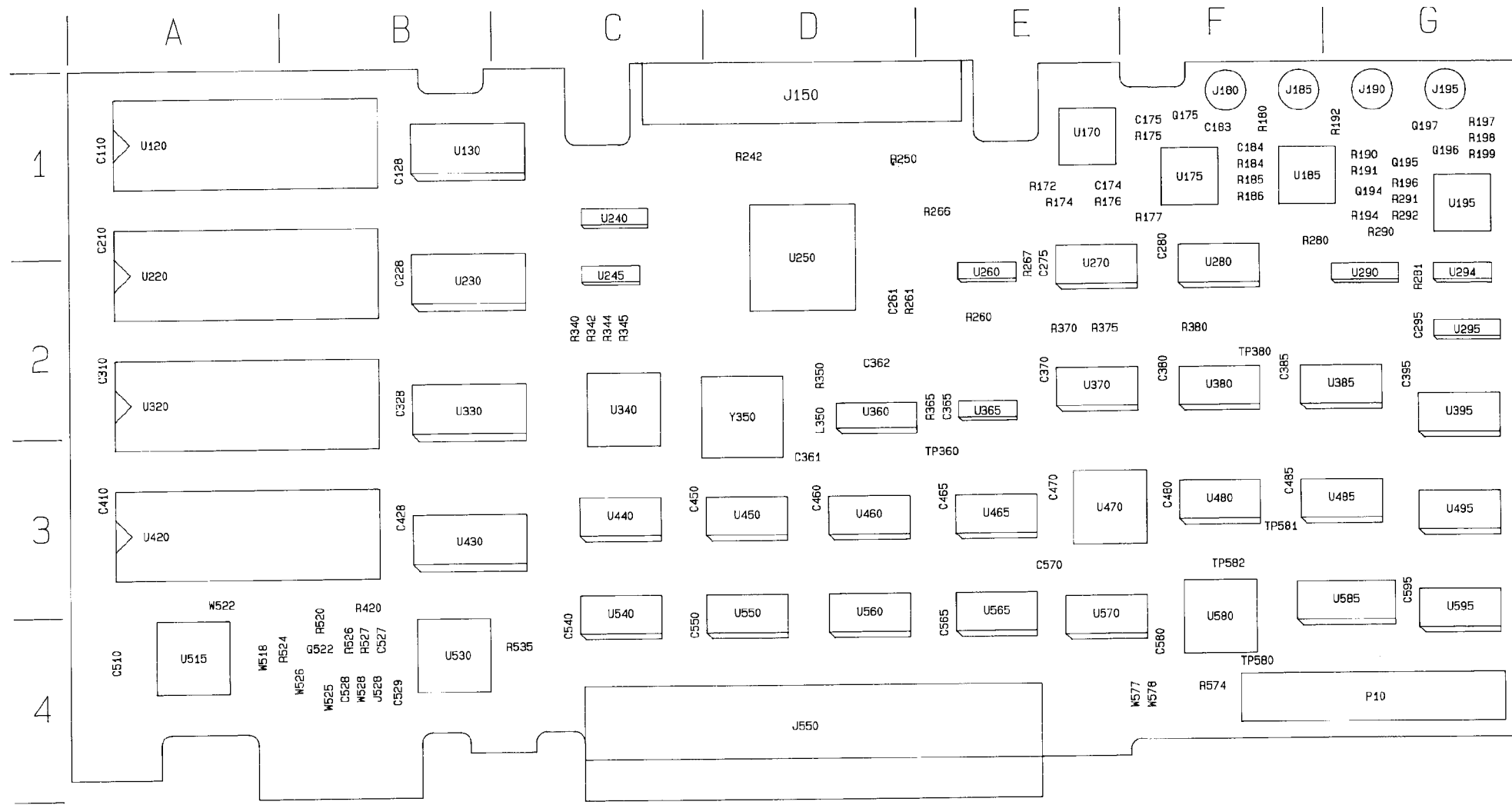




2715

REFERENCE OSCILLATOR

A21 2



**COMPONENT NUMBER EXAMPLE**

Component Number		
A23 A2 R1234		
Assembly Number	Subassembly Number (if used)	Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**⚡** STATIC SENSITIVE DEVICES

Figure 1-27: A10 Microprocessor (front)

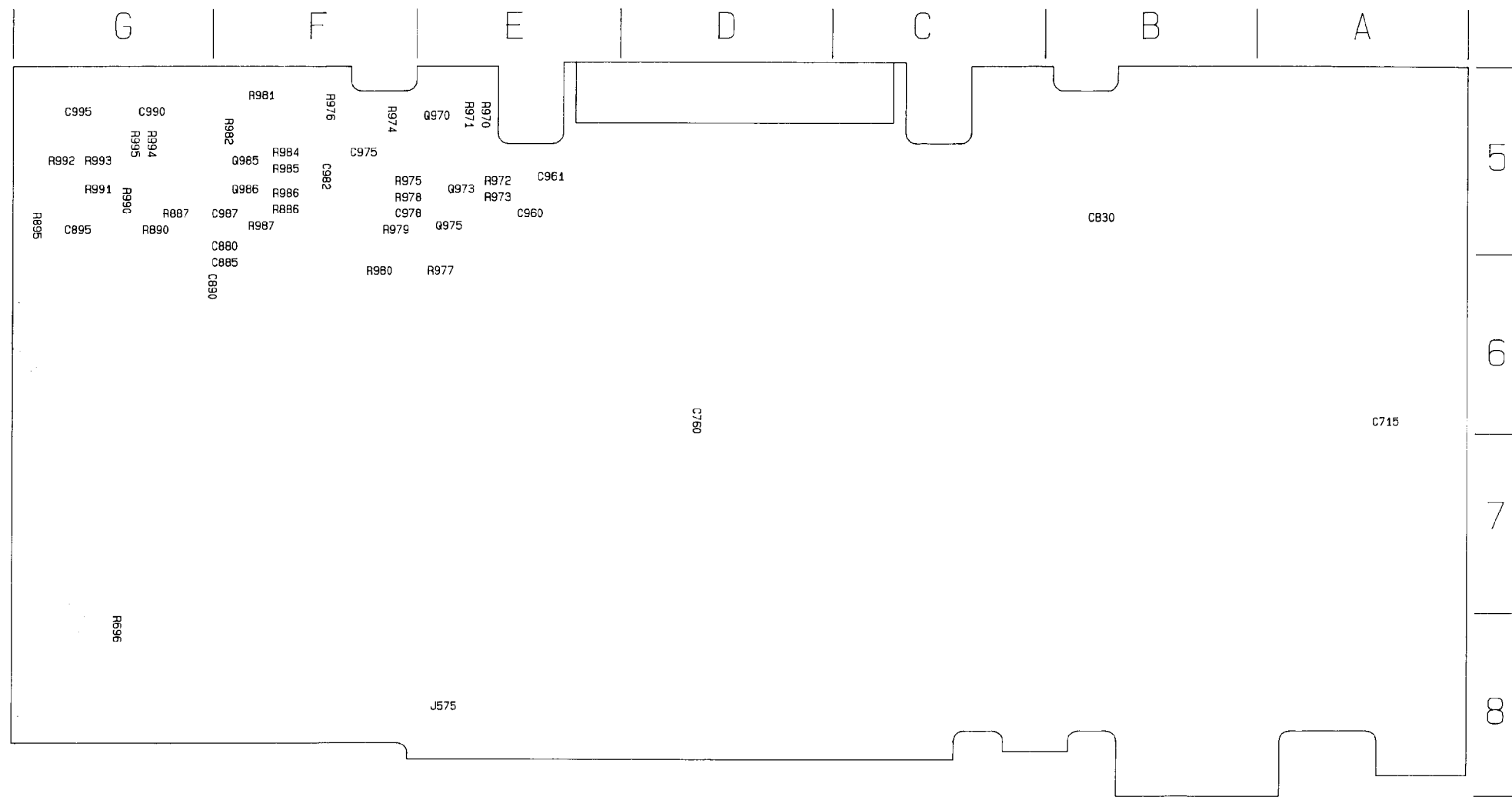


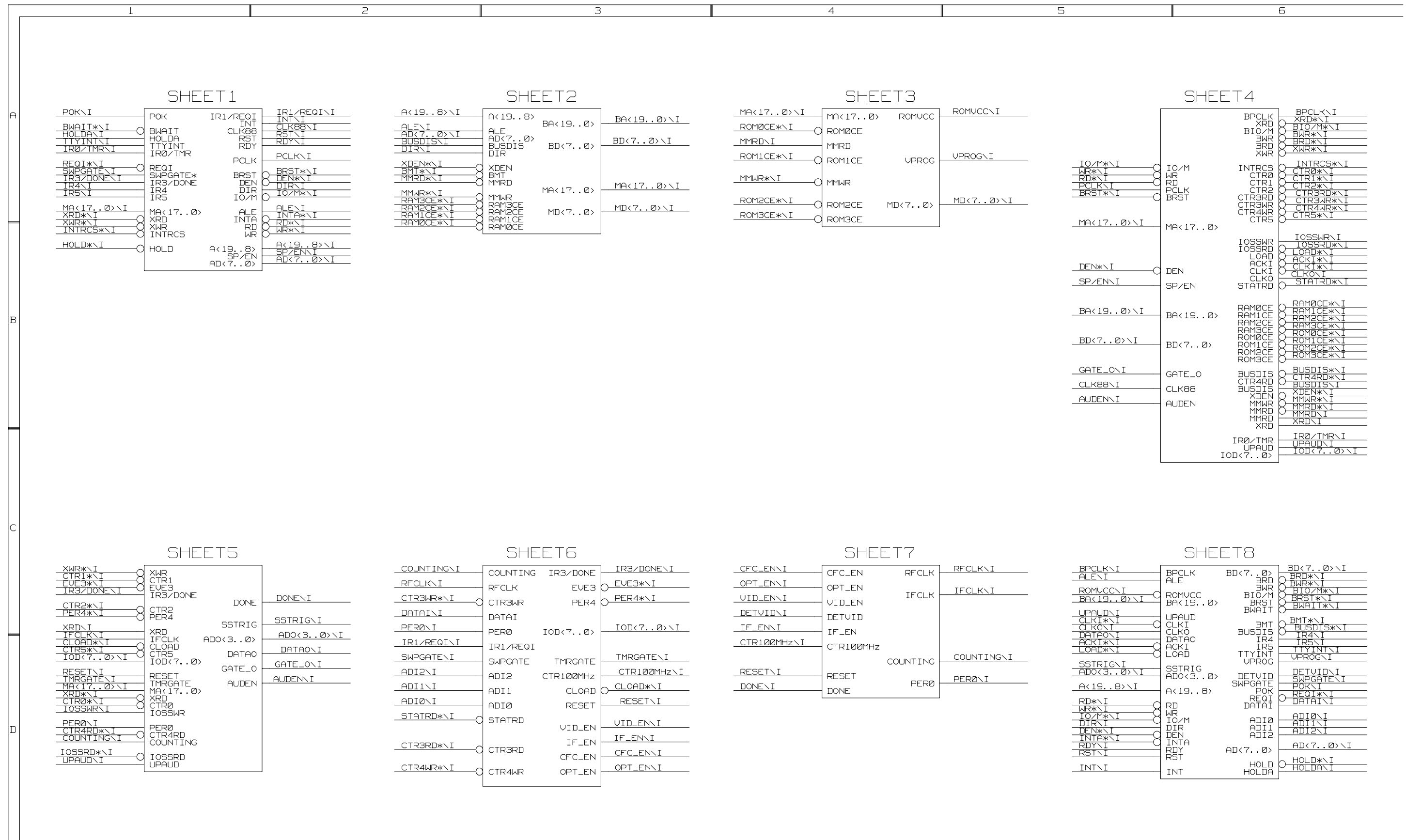
Figure 1-28: A10 Microprocessor (back)

## A10 Microprocessor Component Locator

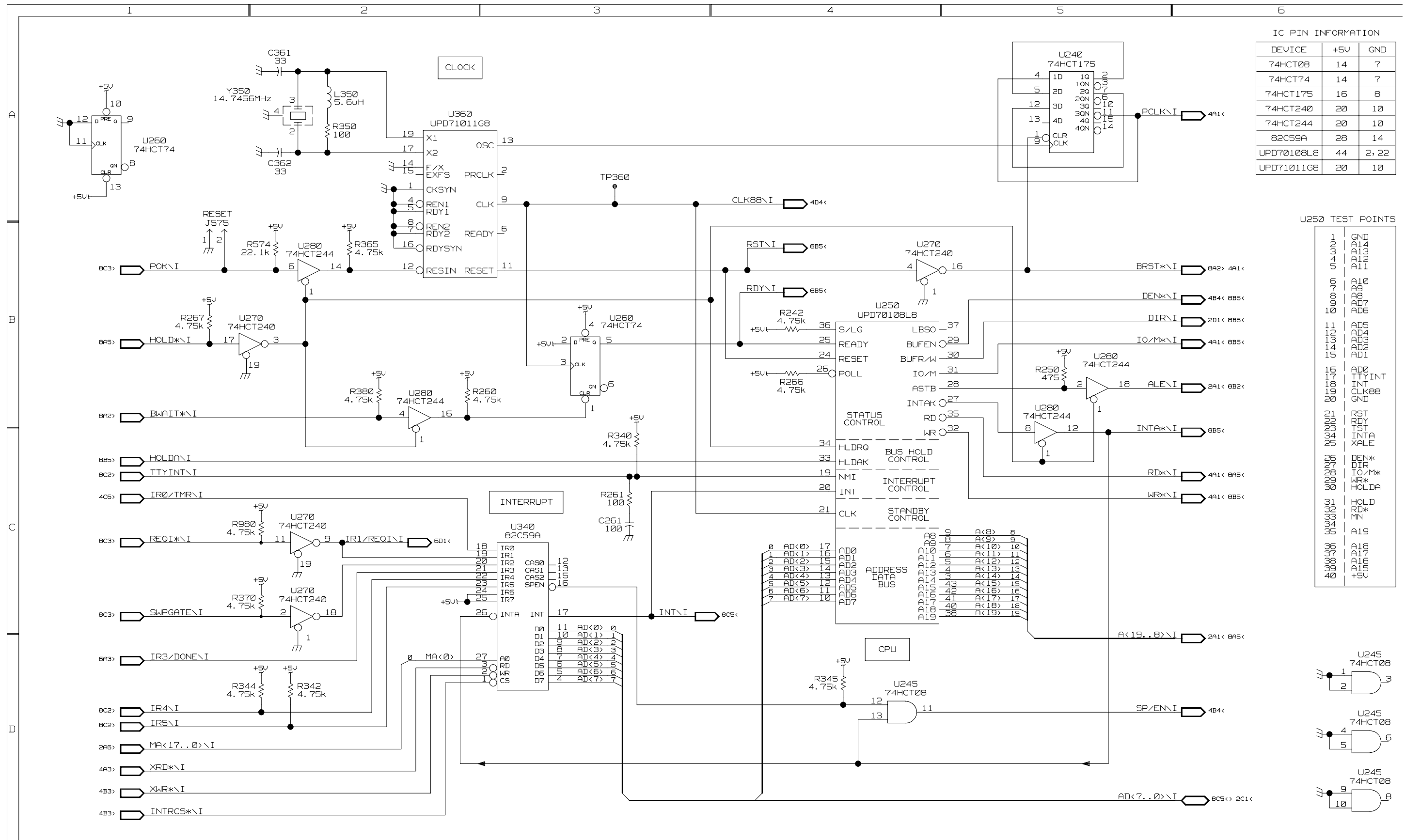
CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C110	A-1	8D2	C485	F-3	8A4	J185	F-1	7B1	R184	F-1	7C3	R370	E-2	1C2	R985	F-5	7B4	U270	E-2	6D4	U460	D-3	2C2
C128	B-1	8A4	C510	A-4	8B4	J190	G-1	7C1	R185	F-1	7C3	R375	E-2	2D3	R986	F-5	7C4	U320	A-2	3C3	U465	E-3	2A2
C174	E-1	7D6	C527	B-4	3B2	J195	G-1	7C1	R186	F-1	7C3	R380	F-2	1B2	R987	F-5	7A4	U280	F-2	1B2	U470	E-3	5A4
C175	F-1	7C3	C528	B-4	8D2	J528	B-4	3A6	R190	G-1	7D3	R420	B-3	3B1	R990	G-5	7D5	U280	F-2	1B5	U480	F-3	5A3
C183	F-1	7B3	C529	B-4	8A4	J550	D-4	8A1	R191	G-1	7D3	R520	B-4	3B2	R991	G-5	7A5	U280	F-2	5A6	U485	G-3	2C3
C184	F-1	7D3	C540	C-4	8A4	J550	D-4	8B1	R192	G-1	7C2	R524	B-4	3A6	R992	G-5	7A4	U280	F-2	5B6	U485	G-3	4D2
C210	A-1	8D2	C550	C-4	8A4	J550	D-4	8C1	R194	G-1	7D5	R526	B-4	3C1	R993	G-5	7A4	U290	G-2	6A3	U485	G-3	5C6
C228	B-2	8B4	C565	E-4	8A4	J550	D-4	8D1	R196	G-1	7A5	R527	B-4	3B1	R994	G-5	7C2	U294	G-2	6A4	U485	G-3	5D6
C261	D-2	1C3	C570	E-3	8B4	J575	E-8	1B1	R197	G-1	7D2	R574	F-4	1B2	R995	G-5	7C2	U294	G-2	6B4	U495	G-3	5C4
C275	E-2	8B4	C580	F-4	8B3	L350	D-2	1A2	R198	G-1	7D2	R696	G-8	6C2	TP360	E-3	1A3	U294	G-2	7A6	U515	A-4	4A5
C280	F-2	8B4	C595	G-3	8B4	P10	G-4	8B4	R199	G-1	7D2	R886	F-5	7C3	TP380	F-2	5A3	U294	G-2	7B4	U540	C-4	2A3
C295	G-2	8A4	C715	A-6	8A3	Q175	F-1	7B3	R242	D-1	1B4	R887	G-5	7D3	TP580	F-4	4C5	U294	G-2	7C4	U550	D-4	2B3
C310	A-2	8D2	C760	D-6	8B3	Q194	G-1	7D5	R250	D-1	1B5	R890	G-5	7C2	TP581	F-3	4D5	U294	G-2	7D6	U560	D-4	2C3
C328	B-2	8A4	C830	B-5	8A3	Q195	G-1	7A5	R260	E-2	1B2	R895	G-5	7D5	TP582	F-3	4C5	U295	G-2	6B3	U565	E-4	4A2
C361	D-3	1A2	C880	F-5	7D6	Q196	G-1	7D2	R261	D-2	1C3	R970	E-5	7A2	U120	A-1	3C5	U330	B-2	2C5	U570	E-4	4C5
C362	D-2	1A2	C885	F-6	7D5	Q197	G-1	7C2	R266	E-1	1B4	R971	E-5	7A2	U130	B-1	2A5	U340	C-2	1C3	U580	F-4	4C5
C365	E-2	8A4	C895	G-5	7D6	Q522	B-4	3B2	R267	E-2	1B1	R972	E-5	7A2	U220	A-2	3B5	U360	D-2	1A2	U585	G-3	4C2
C370	E-2	8A4	C890	G-6	8B4	Q970	E-5	7A2	R280	F-1	7D3	R973	E-5	7B2	U230	B-2	2B5	U365	E-2	5A5	U595	G-4	6C3
C380	F-2	8B4	C960	E-5	7C2	Q973	E-5	7B2	R281	G-2	5A6	R974	F-5	7B2	U240	C-1	1A5	U365	E-2	5B5	W518	A-4	3A2
C385	F-2	8A3	C961	E-5	7C2	Q975	E-5	7B2	R290	G-1	7D5	R975	F-5	7A2	U250	D-2	1B4	U365	E-2	6B2	W522	A-3	3B2
C395	G-2	8B4	C975	F-5	7C3	Q985	F-5	7B4	R291	G-1	7A5	R976	F-5	7A2	U260	E-2	1A1	U370	E-2	5C3	W525	B-4	3A5
C410	A-3	8D2	C978	F-5	7C2	Q986	F-5	7C4	R292	G-1	7C5	R977	E-6	7B2	U260	E-2	1B3	U380	F-2	5B3	W526	B-4	2A4
C428	B-3	8B3	C982	F-5	7D6	R172	E-1	7C2	R340	C-2	1C3	R978	F-5	7C2	U270	E-2	1B2	U385	G-2	6C5	W528	B-4	3A6
C450	C-3	8B3	C987	F-5	7D6	R174	E-1	7A2	R342	C-2	1D2	R979	F-5	7C2	U270	E-2	1B4	U395	G-2	6A5	W577	F-4	6C2
C460	D-3	8A3	C990	G-5	7C2	R175	F-1	7C3	R344	C-2	1D2	R980	F-6	1C2	U270	E-2	1C2	U420	A-3	3B3	W578	F-4	6C2
C465	E-3	8B3	C995	G-5	7C2	R176	E-1	7A3	R345	C-2	1D4	R981	F-5	7B2	U270	E-2	2D3	U430	B-3	2C5	Y350	D-2	1A2
C470	E-3	8A3	J150	D-1	8A6	R177	F-1	7A3	R350	D-2	1A2	R982	F-5	7A3	U270	E-2	4C2	U440	C-3	2C2			
C480	F-3	8B4	J180	F-1	7A1	R180	F-1	7C2	R365	E-2	1B2	R984	F-5	7B3	U270	E-2	6A2	U450	D-3	2B2			

Figure 1-29: A10 Microprocessor Component Locator







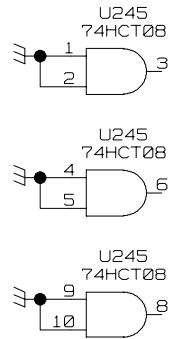


IC PIN INFORMATION

DEVICE	+5V	GND
74HCT08	14	7
74HCT74	14	7
74HCT175	16	8
74HCT240	20	10
74HCT244	20	10
82C59A	28	14
UPD70108L8	44	2, 22
UPD71011G8	20	10

U250 TEST POINTS

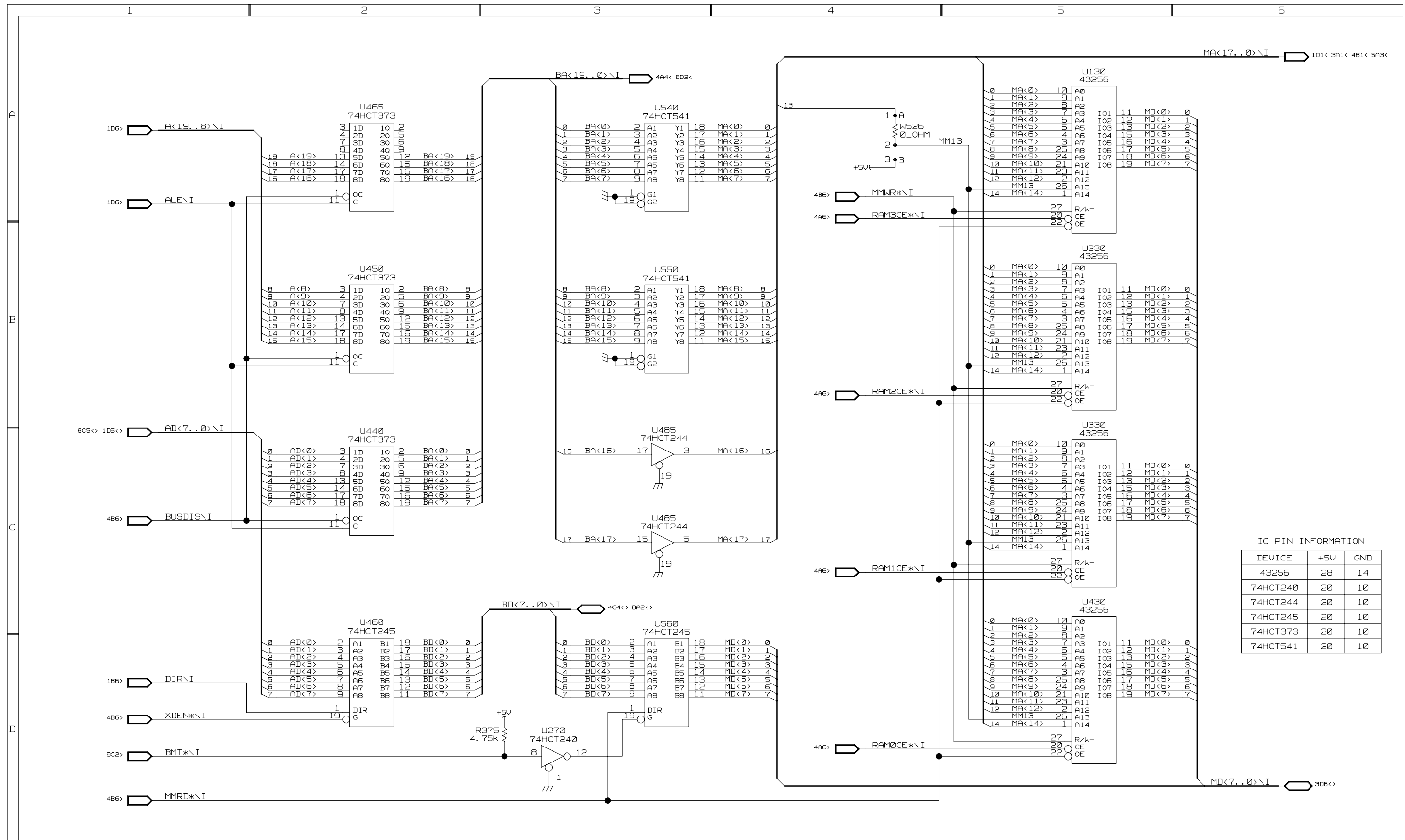
1	GND
2	A14
3	A13
4	A12
5	A11
6	A10
7	A9
8	A8
9	A7
10	A6
11	AD5
12	AD4
13	AD3
14	AD2
15	AD1
16	AD0
17	TTYINT
18	INT
19	CLK88
20	GND
21	RST
22	RDY
23	TST
24	INTA
25	XALE
26	DEN*
27	DIR
28	IO/M*
29	WR*
30	HOLDA
31	HOLD
32	RD*
33	MN
34	A19
35	A19
36	A18
37	A17
38	A16
39	A15
40	+5V



2715

CLOCK, CPU, AND INTERRUPT CONTROLLER A10 1  
MICROPROCESSOR BOARD

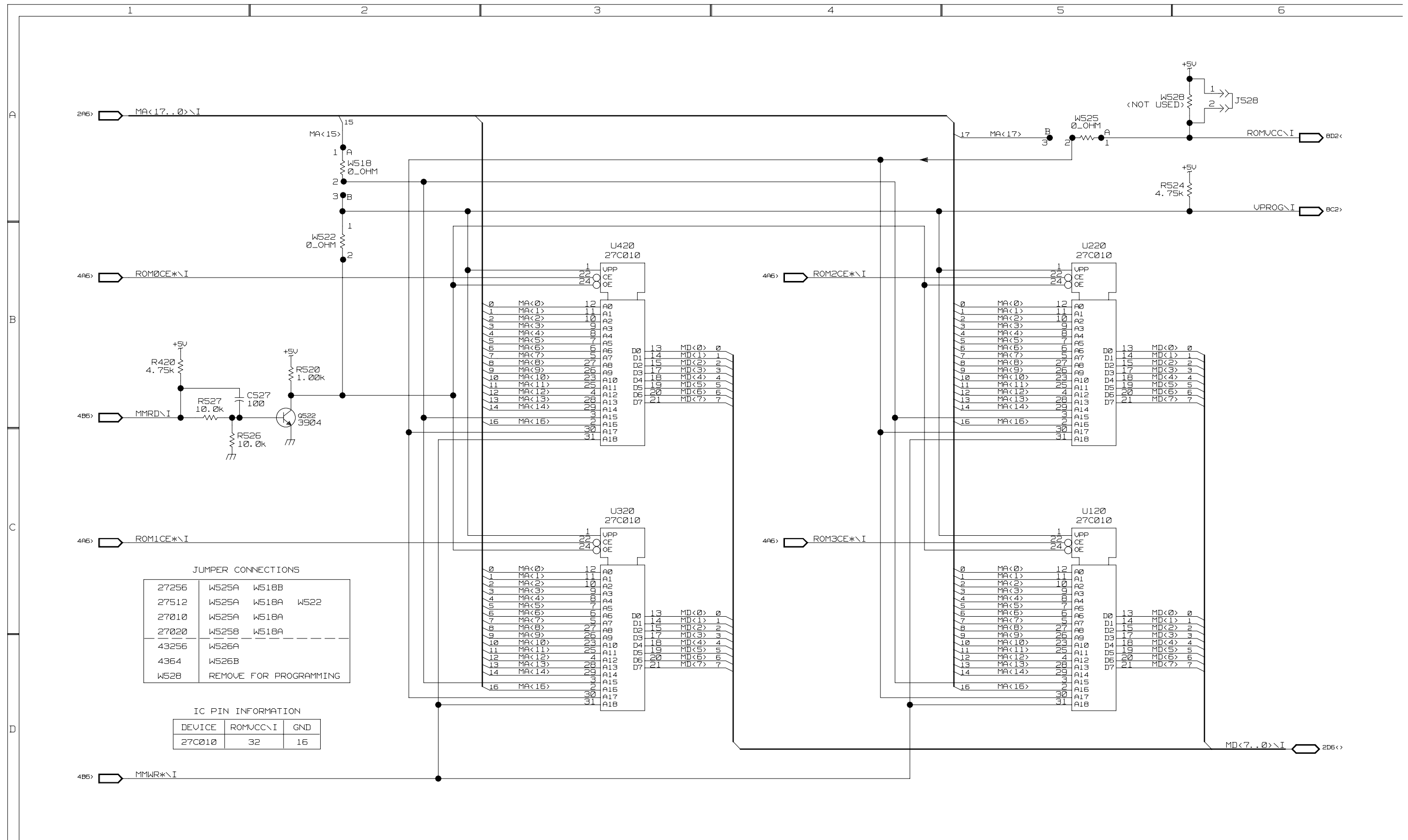




IC PIN INFORMATION

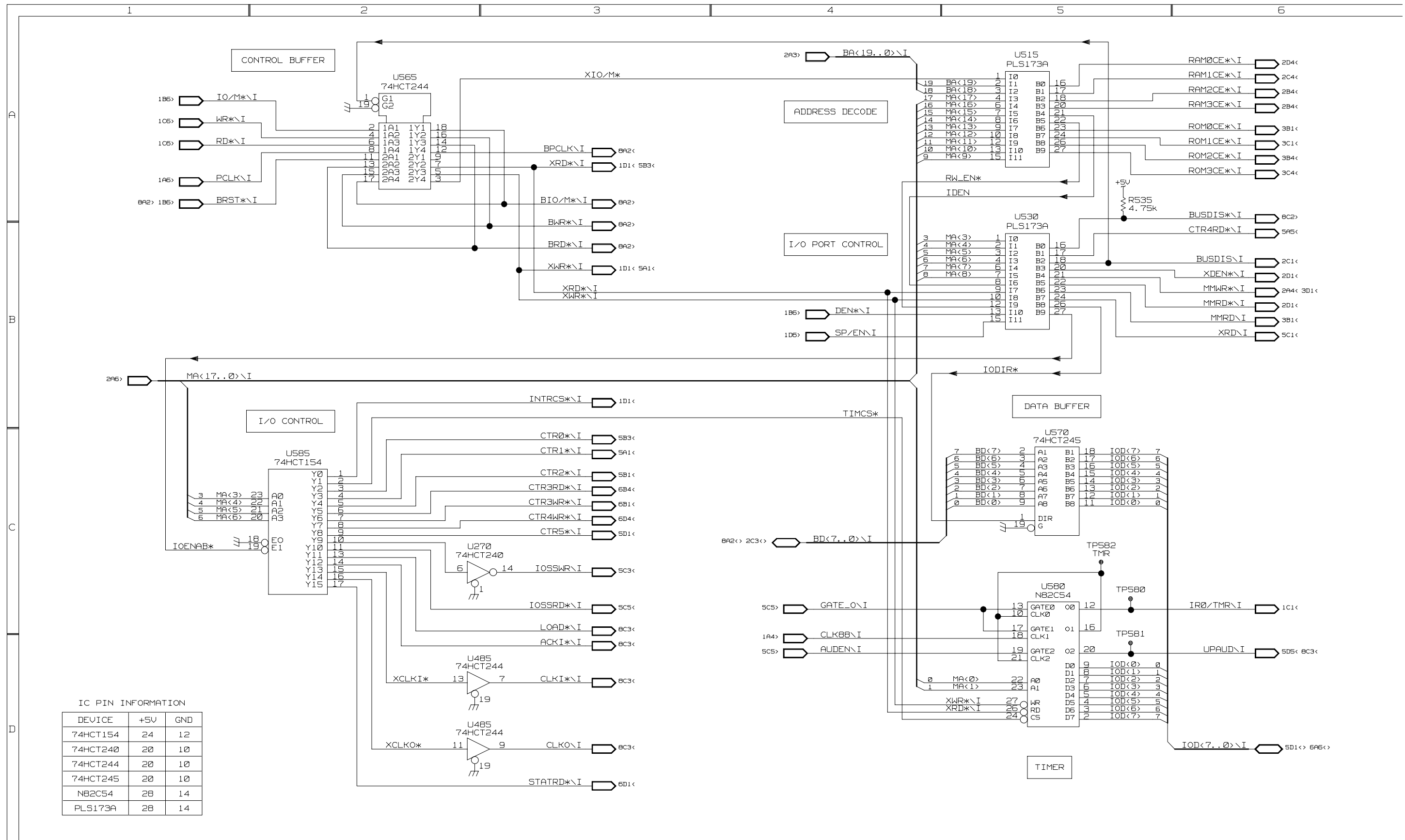
DEVICE	+5V	GND
43255	28	14
74HCT240	20	10
74HCT244	20	10
74HCT245	20	10
74HCT373	20	10
74HCT541	20	10





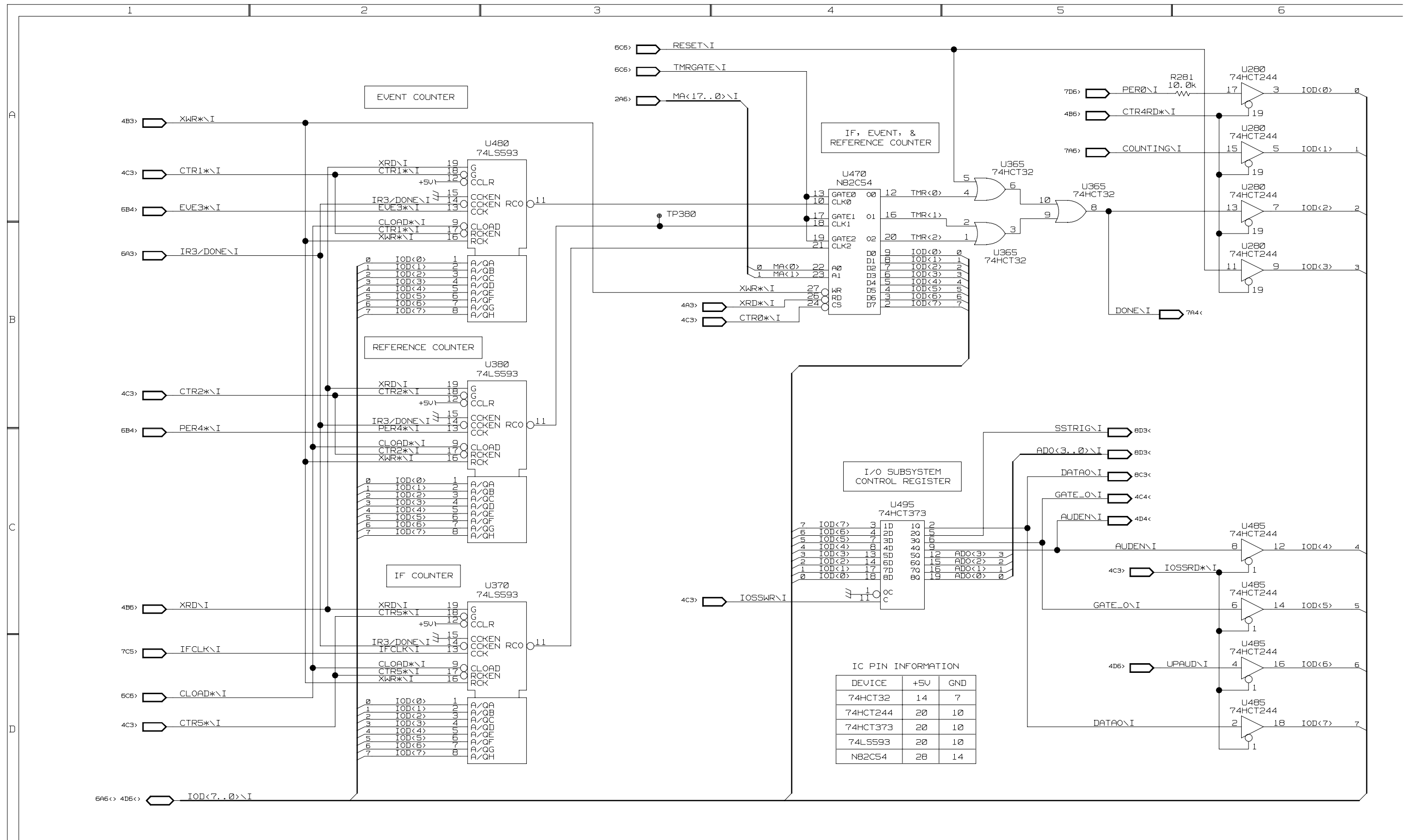




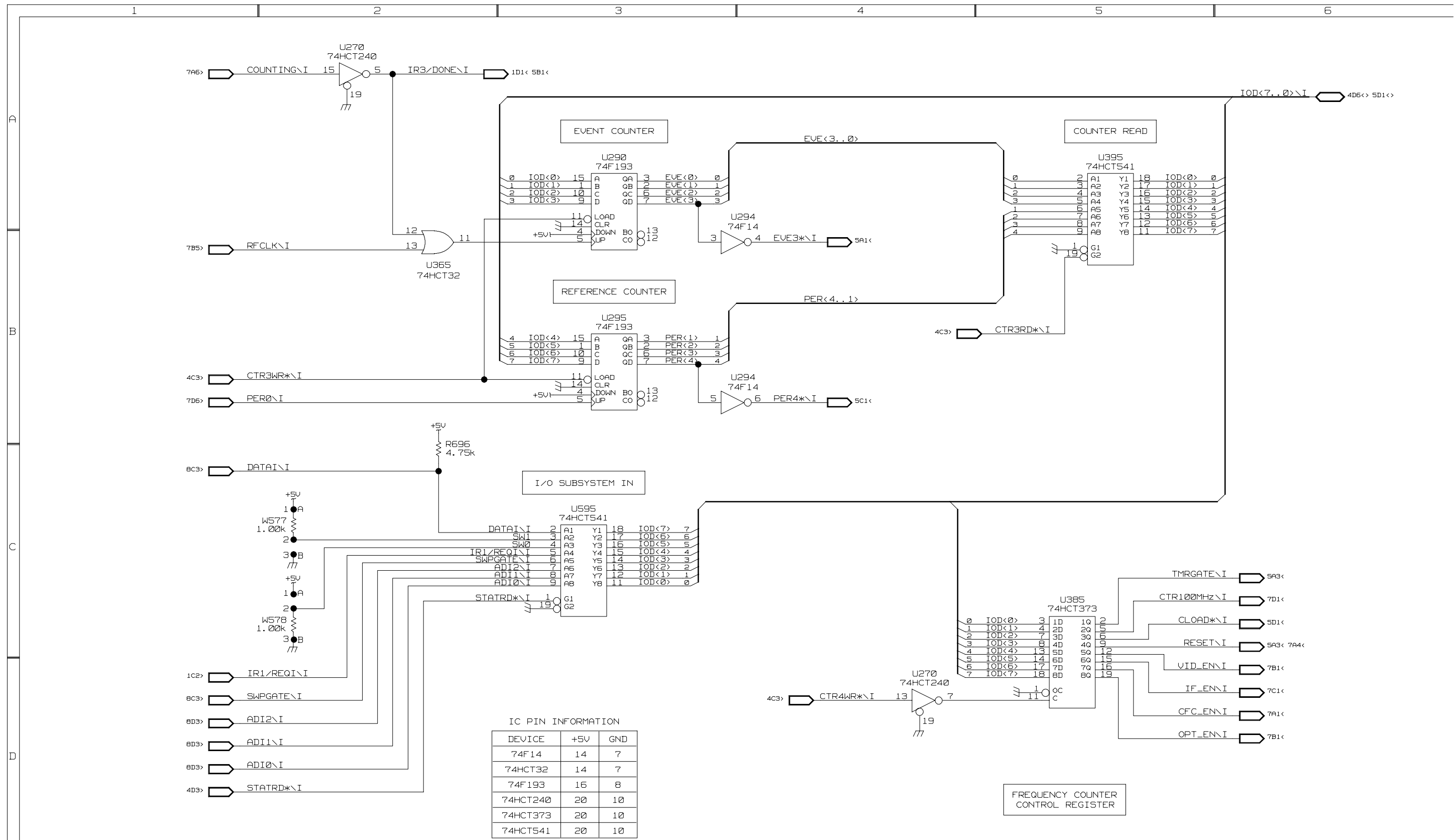


2715

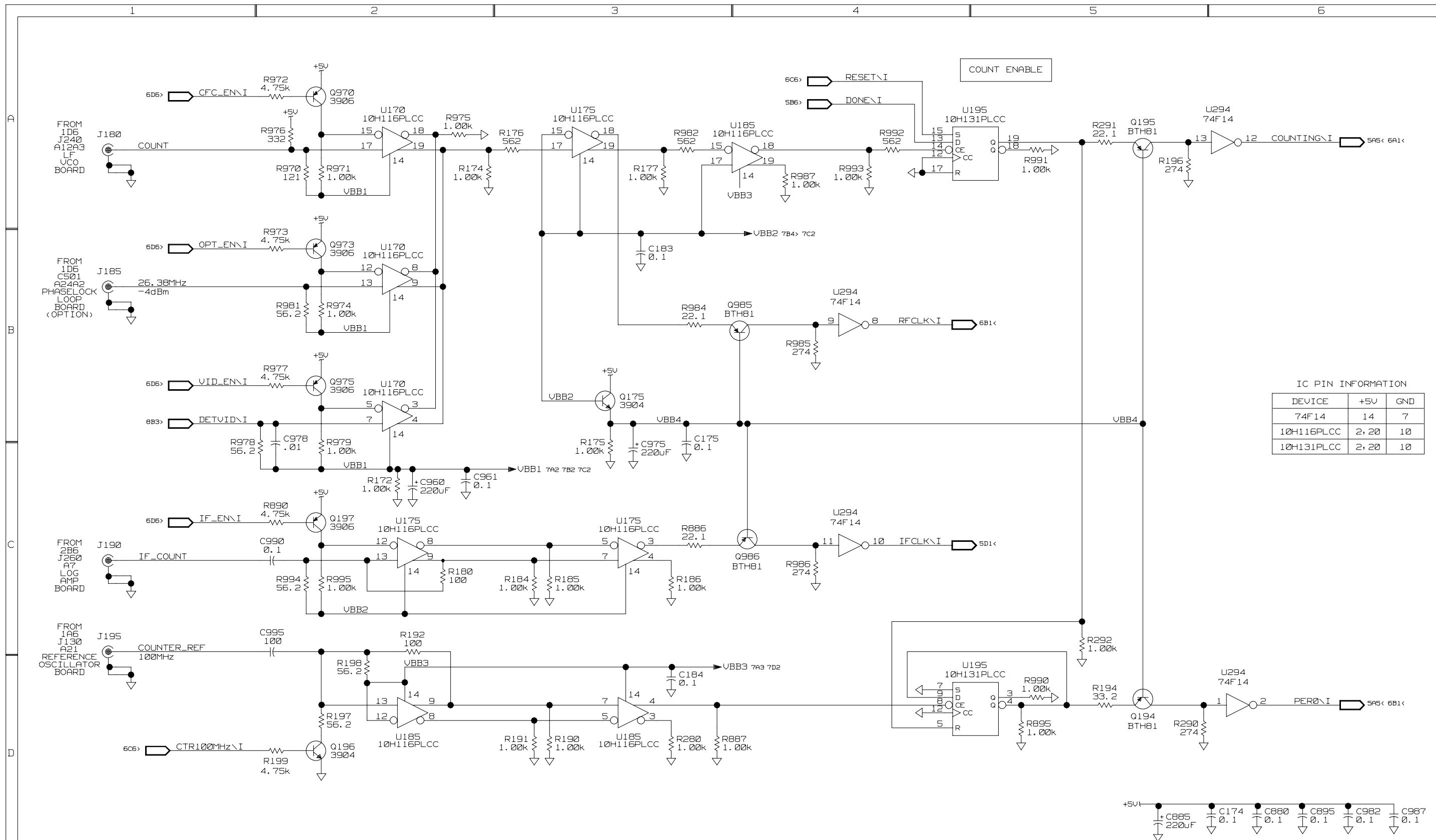










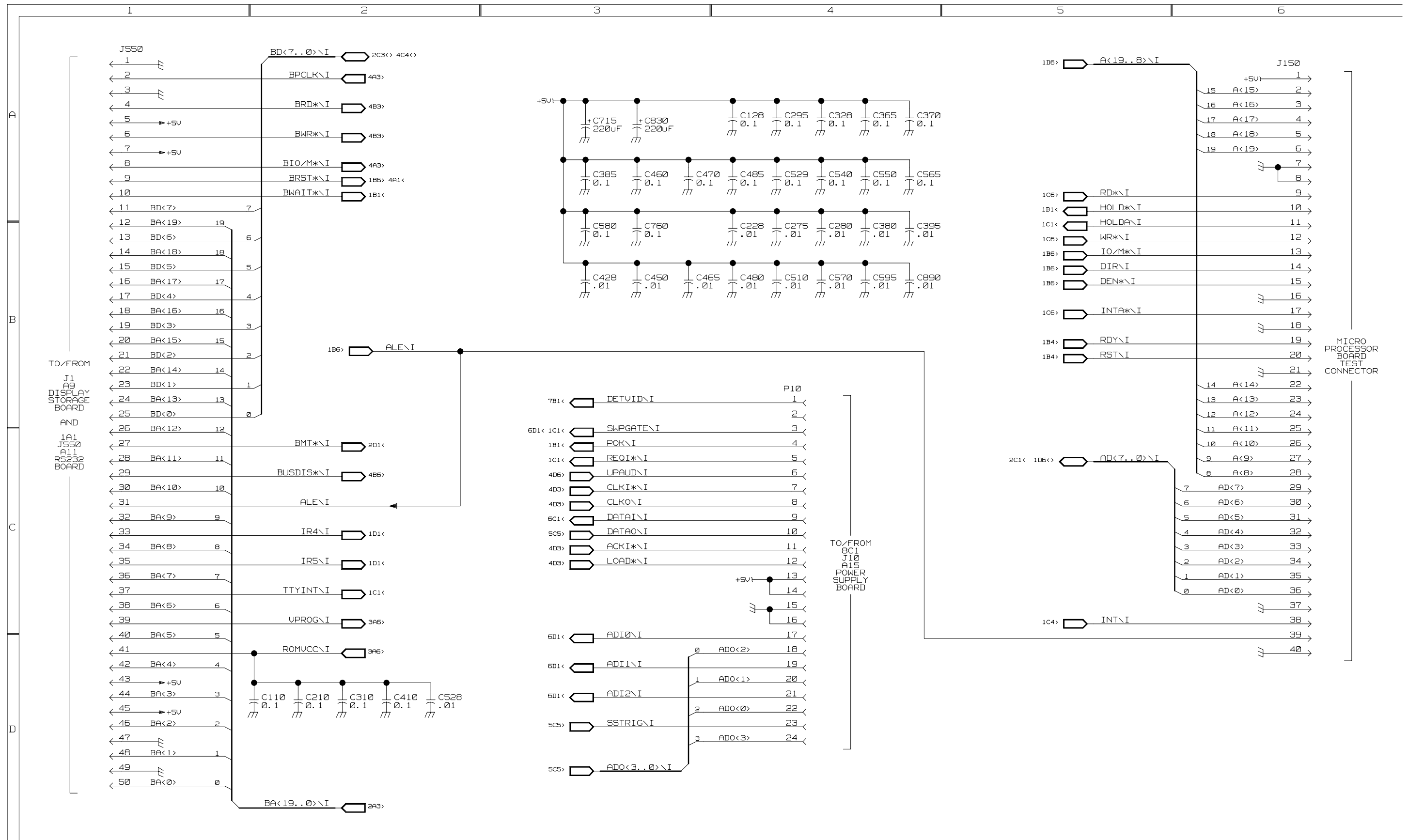


IC PIN INFORMATION

DEVICE	+5V	GND
74F14	14	7
10H116PLCC	2, 20	10
10H131PLCC	2, 20	10

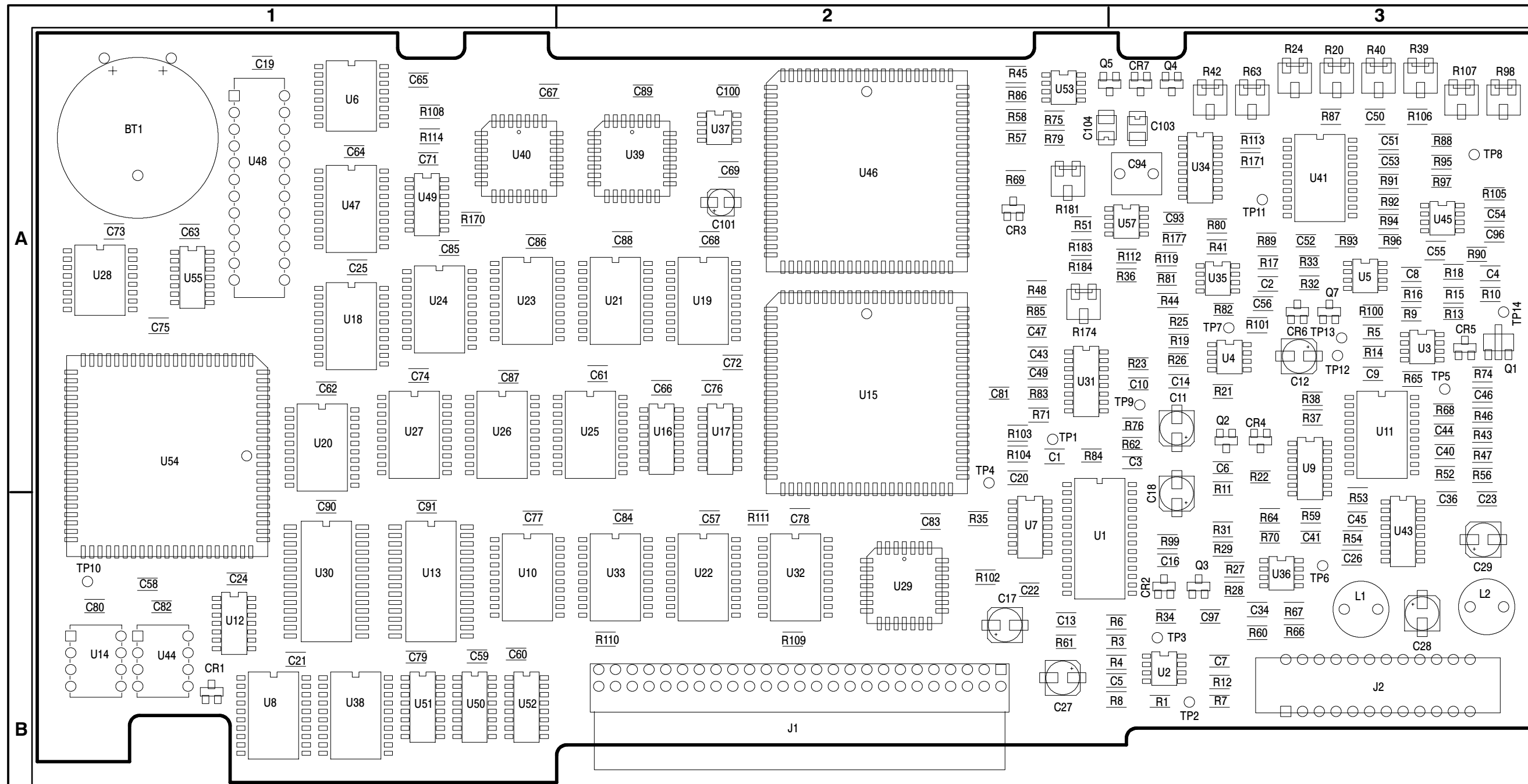






2715

CONNECTORS AND DECOUPLING  
MICROPROCESSOR BOARD



**COMPONENT NUMBER EXAMPLE**

Component Number		
A23 A2 R1234		
Assembly Number	Subassembly Number (if used)	Circuit Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**STATIC SENSITIVE DEVICES**

Figure 1-30: A9 Display Storage Front

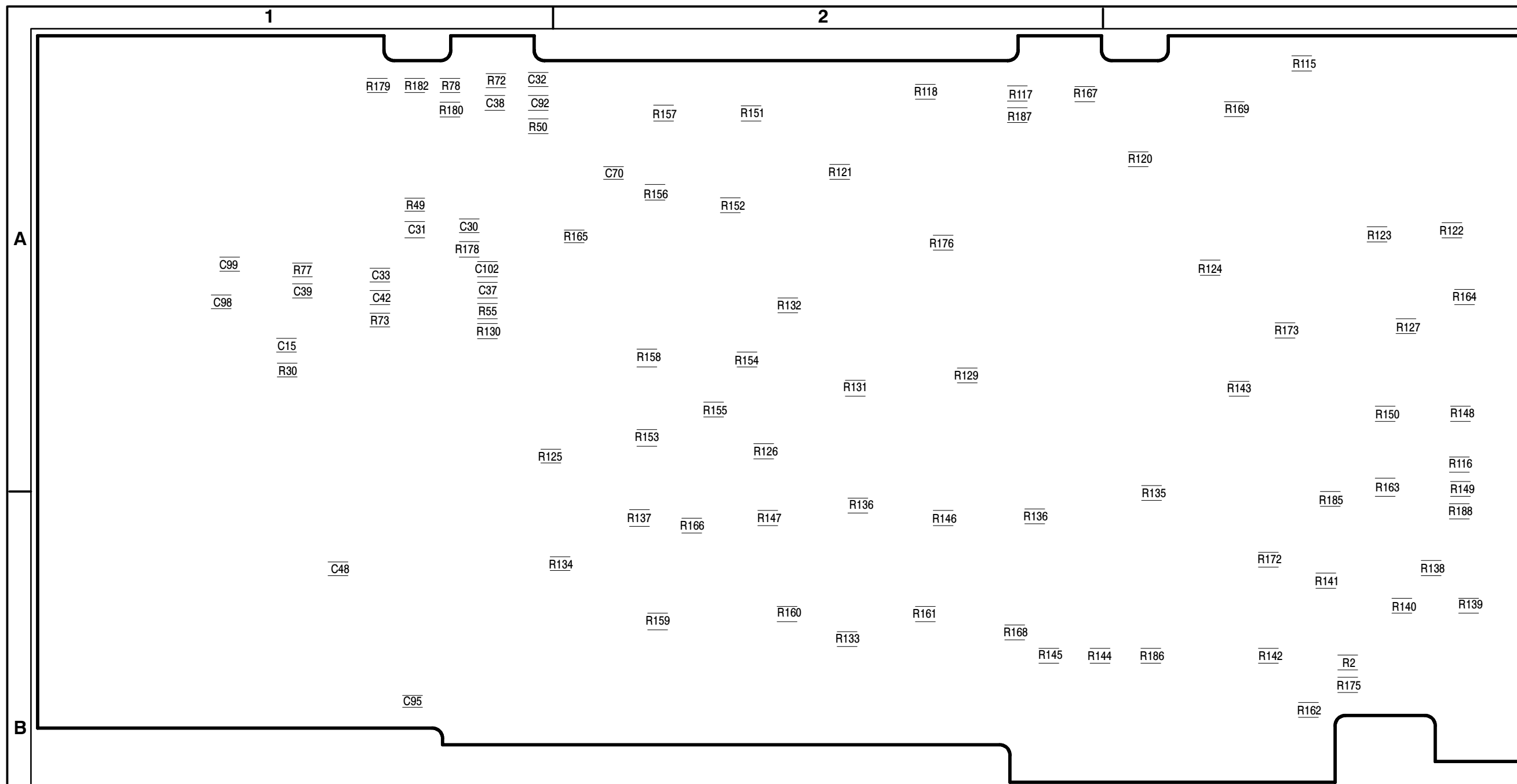


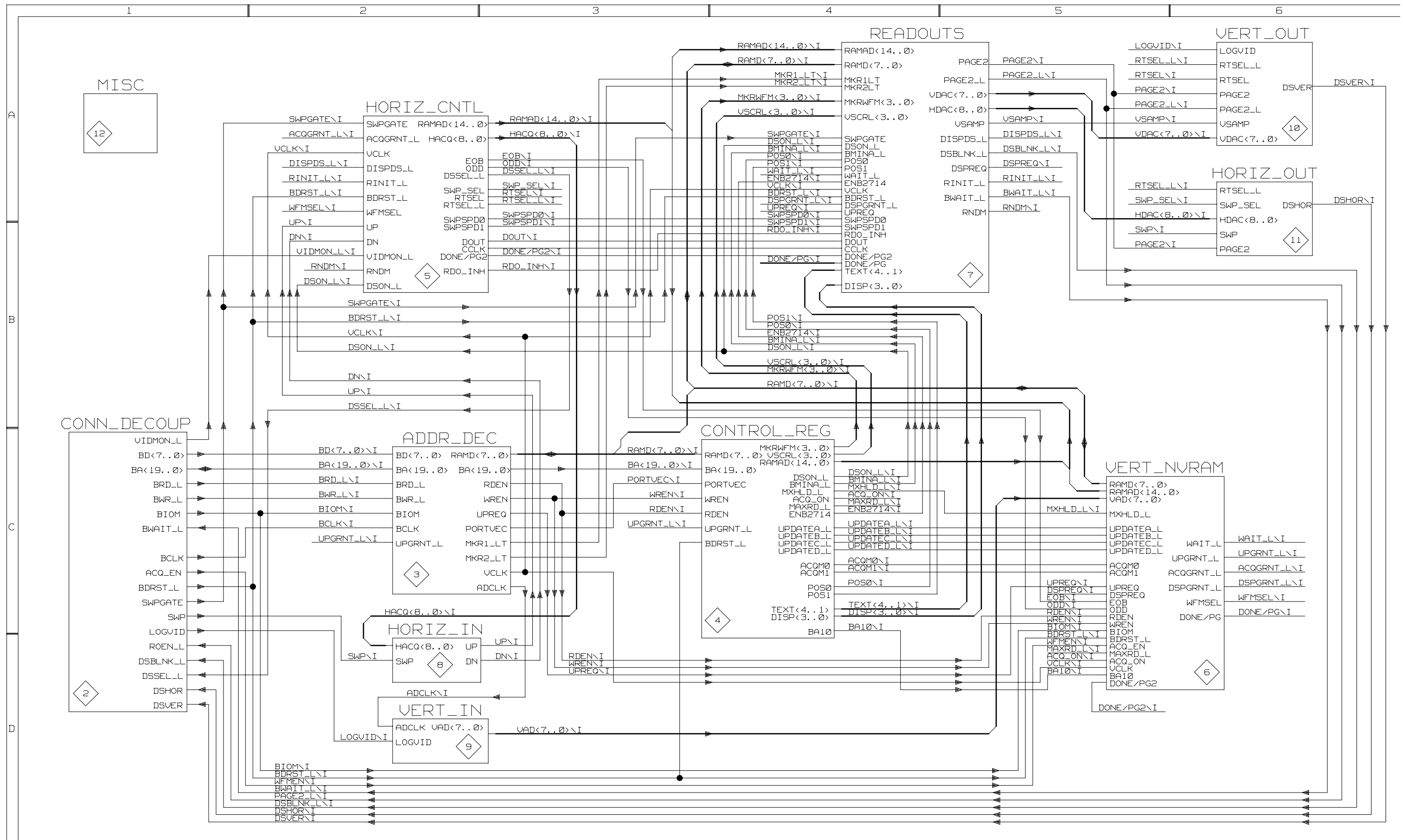
Figure 1-31: A9 Display Storage Back

### A9 Display Storage Component Locator

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	
BT1	A1	6B6	C50	A3	10A2	C96	A3	10B3	R125*	A1	12B1	R170	A1	7D4	R46	A3	8B3	R90	A3	10B3	U28	A1	6B6	
C1	A2	9B4	C51	A3	10B2	C97	B3	9B2	R126*	A2	12B1	R171	A3	11A5	R47	A3	8B3	R91	A3	10B2	U29	B2	3B3	
C10	A2	9C2	C52	A3	10B2	C98*	A1	9D5	R127*	A3	12B2	R172*	B3	12A1	R48	A2	11D1	R92	A3	10A4	U3	A3	9C4	
C100	A2	2B5	C53	A3	10B2	C99*	A1	9D5	R128*	A3	12A2	R173*	A3	12A2	R49*	A1	11B4	R93	A3	10B2	U30	B1	6B4	
C101	A2	2B5	C54	A3	10B4	CR1	B1	9A5	R129*	A2	12A2	R174	A2	11B4	R5	A3	9C4	R94	A3	10A3	U31	A2	11D2	
C102*	A1	11B3	C55	A3	10B4	CR2	B3	9B3	R13	A3	9C5	R175*	B3	12A2	R50*	A1	11C2	R95	A3	10B3	U32	B2	4C2	
C103	A2	11B2	C56	A3	9D5	CR3	A2	11C4	R130*	A1	11D1	R176*	A2	12A2	R51	A2	11B3	R96	A3	10A3	U33	B2	4C2	
C104	A2	11C2	C57	A2	12C3	CR4	A3	9C2	R131*	A2	12A1	R177	A3	11C4	R52	A3	8B2	R97	A3	10B3	U34	A3	10A4	
C11	A3	9B3	C58	B1	12C4	CR5	A3	9C5	R132*	A2	12B1	R178*	A1	11B4	R53	A3	8B4	R98	A3	10A4	U34	A3	11B3	
C12	A3	9C4	C59	B1	12C4	CR6	A3	9D5	R133*	B2	12B1	R179*	A1	11B2	R54	B3	8B4	R99	B3	9B3	U34	A3	11B4	
C13	B2	9C4	C6	A3		CR7	A2	11B2	R134*	B1	12B2	R18	A3	9C5	R55*	A1	11D1	TP1	A2	9A4	U34	A3	11C4	
C14	A3	9D2	C60	B1	12C2	J1	B2	2A1	R135*	A2	12A2	R180*	A1	11B2	R56	A3	8B1	TP10	B1	5B1	U35	A3	11B5	
C15*	A1	9C2	C61	A2	12C2	J2	B3	2C1	R136*	B2	12A2	R181	A2	11B3	R57	A2	11C2	TP11	A3	11C5	U36	B3	8C2	
C16	B3	9B4	C62	A1	12C3	L1	B3	12C1	R137*	B2	12B2	R182*	A1	11B2	R58	A2	11C1	TP12	A3	9D6	U37	A2	2B5	
C17	B2	9C3	C63	A1	12C3	L2	B3	12C1	R138*	B3	12B2	R183	A2	11B3	R59	A3	8B4	TP13	A3	9D6	U38	B1	6B5	
C18	A3	9B3	C64	A1	12C3	Q1	A3	9C5	R139*	B3	12A1	R184	A2	11B3	R6	B2	9B2	TP14	A3	9C6	U39	A2	7B5	
C19	A1	12C2	C65	A1	12C3	Q2	A3	9C3	R14	A3	9C4	R185*	A3	5B4	R60	B3	8D2	TP2	B3	9B1	U4	A3	9C2	
C2	A3	9C5	C66	A2	12C4	Q3	B3	9A3	R140*	B3	12A1	R186*	B3	7B5	R61	B2	9C3	TP3	B3	9A3	U4	A3	11D3	
C20	A2	12C2	C67	A1	12C4	Q4	A3	11B2	R141*	B3	12A1	R187*	A2	7B4	R62	A2	11D2	TP4	A2	6B1	U40	A1	7A5	
C21	B1	12C3	C68	A2	12C4	Q5	A2	11B2	R142*	B3	12B1	R188*	A3	7C1	R63	A3	11A5	TP5	A3	8B2	U41	A3	10B2	
C22	B2	12C1	C69	A2	12C4	Q7	A3	9D5	R143*	A3	12B2	R19	A3	9C2	R64	A3	8B4	TP6	B3	8C2	U43	B3	10B5	
C23	A3	12D1	C7	B3	9A2	R1	B3	9B2	R144*	B2	12B2	R2*	B3	9B5	R65	A3	8B2	TP7	A3	11B5	U43	B3	11B6	
C24	B1	12C3	C70*	A2	12C4	R10	A3	9C5	R145*	B2	12B1	R20	A3	9B1	R66	B3	8C2	TP8	A3	10B4	U44	B1	5B2	
C25	A1	12C3	C71	A1	12C5	R100	A3	9D5	R146*	A2	12A3	R21	A3	9D2	R67	B3	8D2	TP9	A2	11D2	U45	A3	10B4	
C26	B3	12C1	C72	A2	12C5	R101	A3	9D5	R147*	B2	12B2	R22	A3	9C2	R68	A3	8B1	U1	B2	9A4	U46	A2	7A2	
C27	B2	12C1	C73	A1	12C5	R102	B2	6A1	R148*	A3	12A3	R23	A2	9C2	R69	A2	11C2	U10	B1	5C5	U47	A1	7C2	
C28	B3	12C1	C74	A1	12C5	R103	A2	6A3	R149*	A3	12A4	R24	A3	9B2	R7	B3	9B1	U11	A3	8B2	U48	A1	7D2	
C29	B3	12D1	C75	A1	12C6	R104	A2	6A3	R15	A3	9C5	R25	A3	9C2	R70	B3	8C2	U12	B1	4B1	U49	A1	5B1	
C3	A2	9B3	C76	A2	12C4	R105	A3	10A4	R150*	A3	12A3	R26	A3	9D2	R71	A2	11D2	U12	B1	6B1	U49	A1	7A6	
C30*	A1	11B4	C77	A1	12C4	R106	A3	10B3	R151*	A2	12A4	R27	B3	9A3	R72*	A1	11B2	U12	B1	7C3	U49	A1	7D4	
C31*	A1	11B4	C78	B2	12C4	R107	A3	10A4	R152*	A2	12A4	R28	B3	9B3	R73*	A1	11C5	U12	B1	7C5	U49	A1	7D4	
C32*	A1	11B2	C79	B1	12C5	R108	A1	7D3	R153*	A2	12A3	R29	B3	9B2	R74	A3	8A1	U12	B1	7D1	U5	A3	9C5	
C33*	A1	11B5	C8	A3	9C5	R109	B2	7D5	R154*	A2	12A4	R3	B2	9B1	R75	A2	11B2	U12	B1	9A4	U5	A3	9D4	
C34	B3	8D2	C80	B1	12C5	R11	A3	9C3	R155*	A2	12A3	R30*	A1	9C2	R76	A2	11D2	U13	B1	6A5	U50	B1	7B5	
C36	A3	8B1	C81	A2	12C5	R110	B2	7D5	R156*	A2	12B3	R31	B3	9B3	R77*	A1	11B5	U14	B1	6B2	U51	B1	7D5	
C37*	A1	11B4	C82	B1	12C5	R111	B2	7D4	R157*	A2	12A3	R32	A3	9D4	R78*	A1	11B2	U15	A2	6B2	U52	B1	7C5	
C38*	A1	11B2	C83	B2	12C6	R112	A2	11B4	R158*	A2	12A4	R33	A3	9D5	R79	A2	11B3	U16	A2	4A2	U53	A2	11B2	
C39*	A1	11B5	C84	A2	12C3	R113	A3	10A4	R159*	B2	12A4	R34	B3	9B2	R8	B2	9B2	U17	A2	4B2	U54	A1	5B3	
C4	A3	9C6	C85	A1	12C3	R114	A1	7D4	R16	A3	9C5	R35	B2	2B6	R80	A3	11B5	U18	A1	4A3	U55	A1	7B1	
C40	A3	8B2	C86	A1	12C4	R115*	A3	12B1	R160*	B2	12A4	R36	A2	11B4	R81	A3	11B5	U19	A2	4D3	U55	A1	7C4	
C41	B3	8C2	C87	A1	12C4	R116*	A3	2C2	R161*	B2	12A1	R37	A3	8C3	R82	A3	11B5	U2	B3	9B2	U55	A1	7C5	
C42*	A1	11B5	C88	A2	12C4	R117*	A2	12B2	R162*	B3	12A2	R38	A3	8C3	R83	A2	11C2	U20	A1	4A4	U57	A2	11B3	
C43	A2	11D1	C89	A2	12C4	R118*	A2	12B1	R163*	A3	12A3	R39	A3	8C4	R84	A2	11D2	U21	A2	4C3	U57	A2	11B4	
C44	A3	8B1	C9	A3	9C4	R119	A3	11B4	R164*	A3	12A3	R4	B2	9B2	R85	A2	11C2	U22	B2	3A2	U6	A1	6A6	
C45	A3	8B3	C90	A1	12C4	R12	B3	9A2	R165*	A1	12A4	R40	A3	8C3	R86	A2	11B1	U23	A1	4B3	U7	B2	3D3	
C46	A3	8B1	C91	A1	12C5	R120*	A2	12A1	R166*	B2	12A1	R41	A3	11A5	R87	A3	10A1	U24	A1	4B3	U7	B2	5C2	
C47	A2	11C2	C92*	A1	11C2	R121*	A2	12B2	R167*	A2	12A4	R42	A3	11A5	R88	A3	10B1	U25	A2	4C4	U7	B2	7D4	
C48*	B1	9A3	C93	A3	11C4	R122*	A3	12B2	R168*	B2	12A4	R43	A3	8B3	R89	A3	10B2	U26	A1	4B4	U8	B1	5D5	
C49	A2	11D2	C94	A2	11B3	R123*	A3	12A2	R169*	A3	12A2	R44	A3	11A5	R9	A3	9C5	U27	A1	4B4	U9	A3	8B4	
C5	B2	9B2	C95*	B1	9A2	R124*	A3	12B3	R17	A3	9C5	R45	A2	11B2										

\*Asterisks indicate components located on the back of the board.

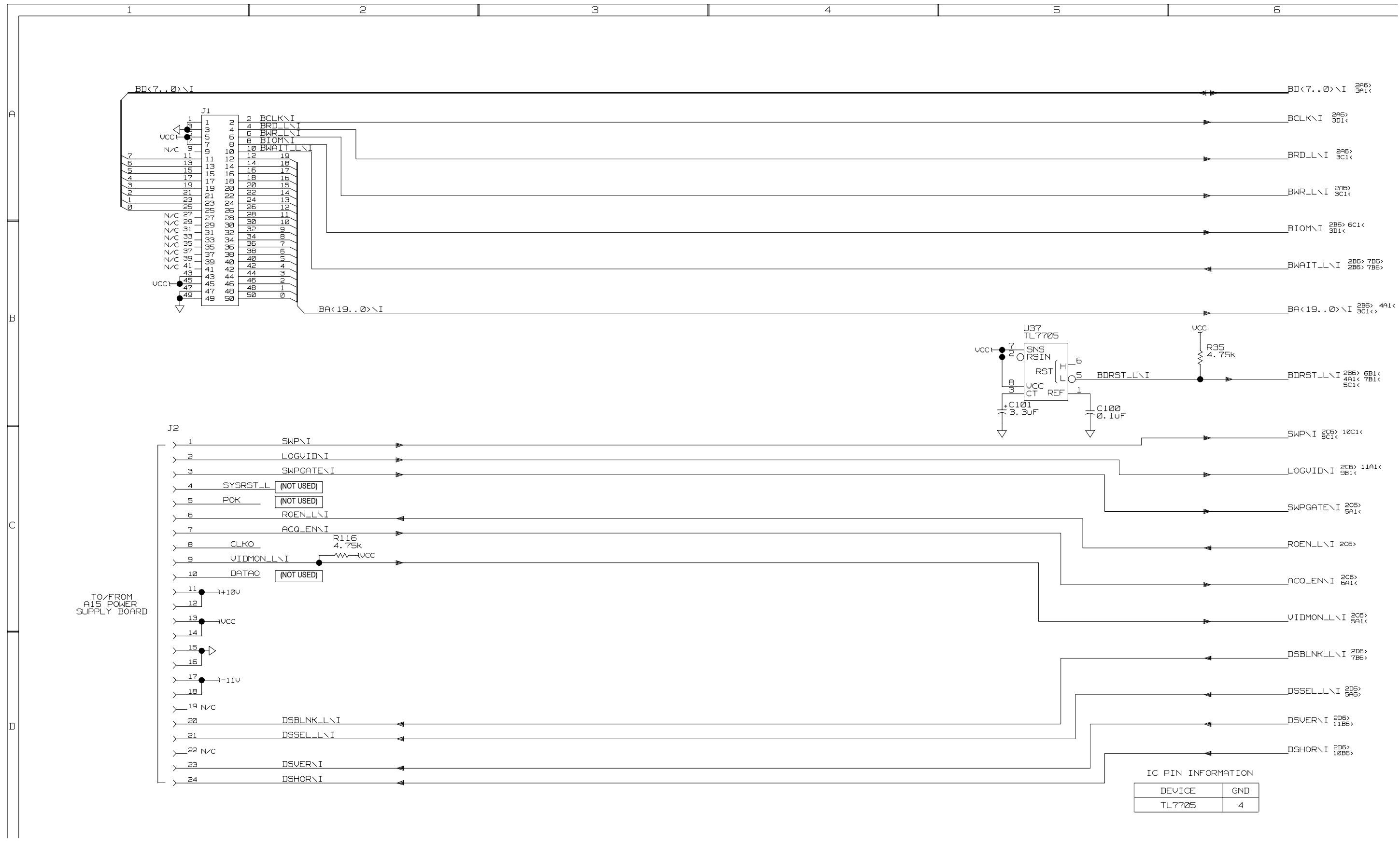
Figure 1-32: A9 Display Storage Component Locator



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SIGNAL INTERCONNECT A9 1  
 DISPLAY STORAGE BOARD





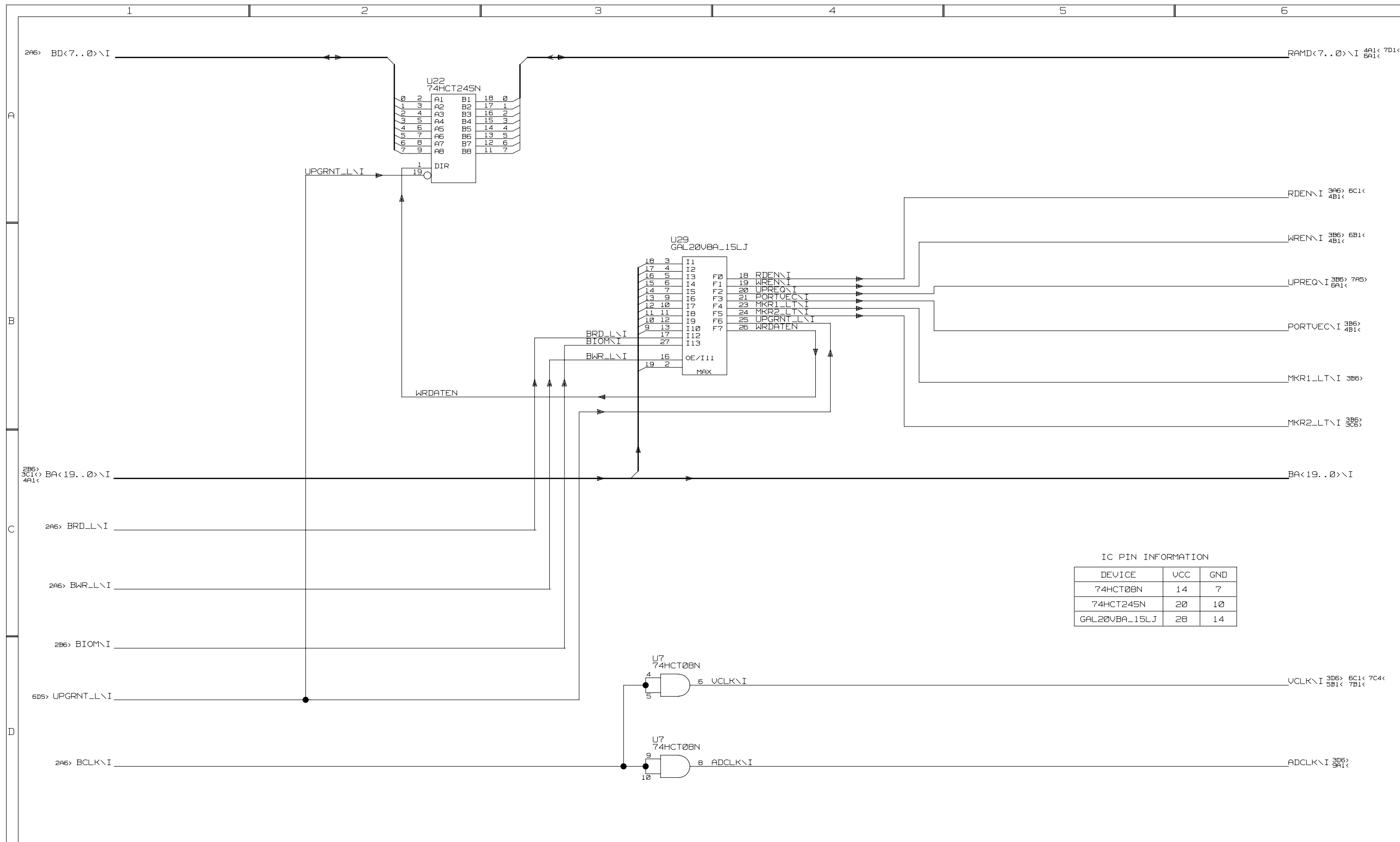
2715

CONNECTORS A9  
DISPLAY STORAGE BOARD

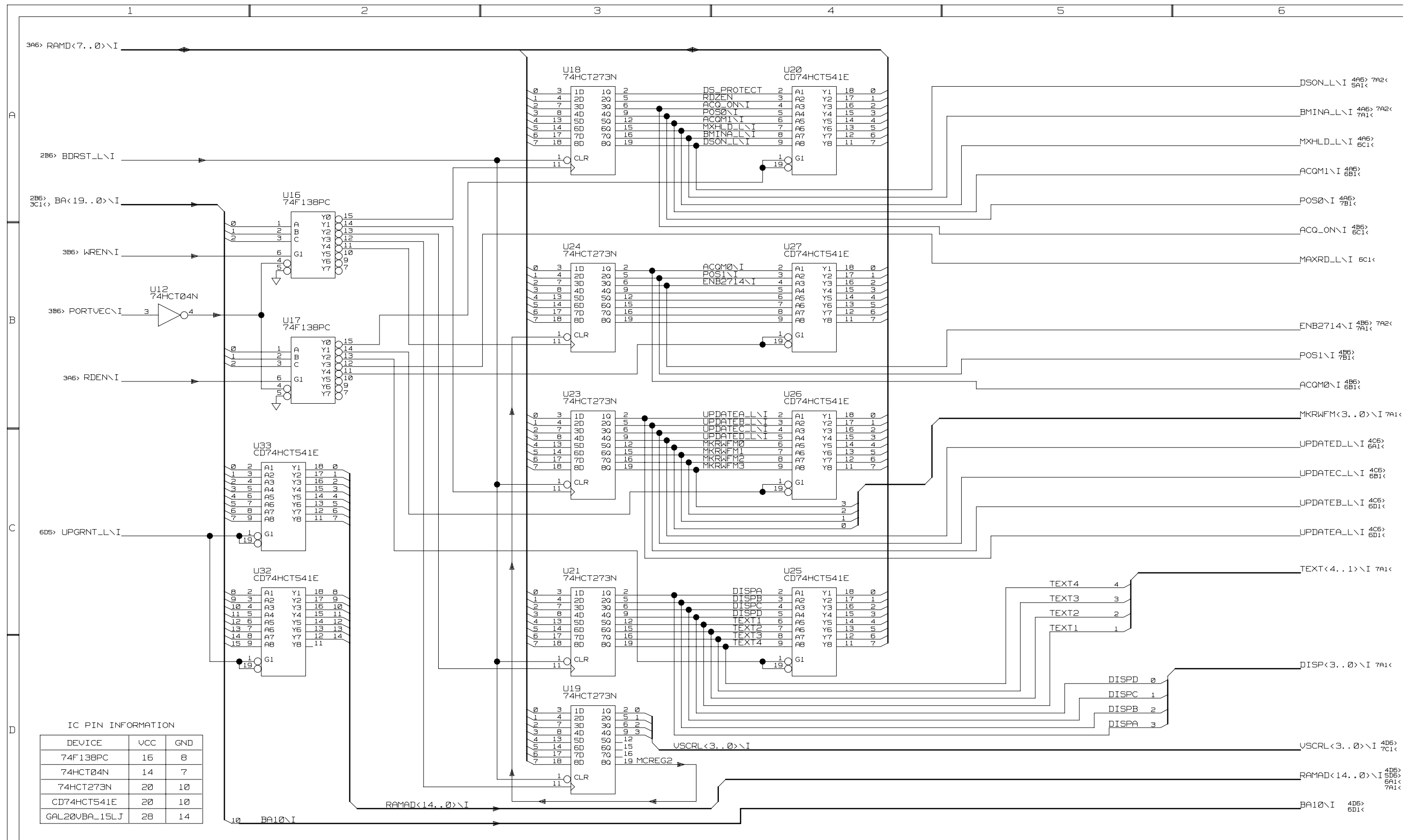
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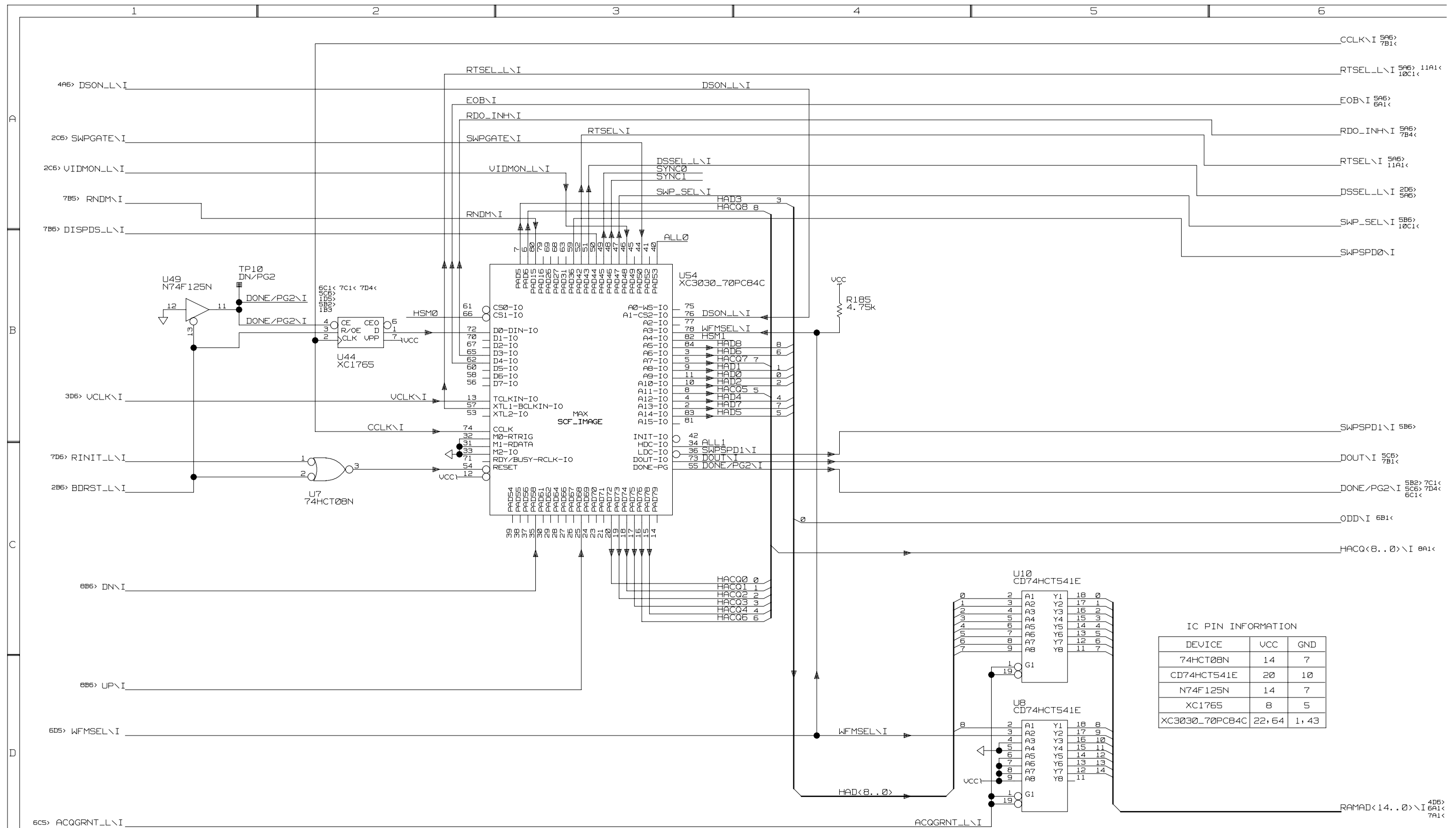




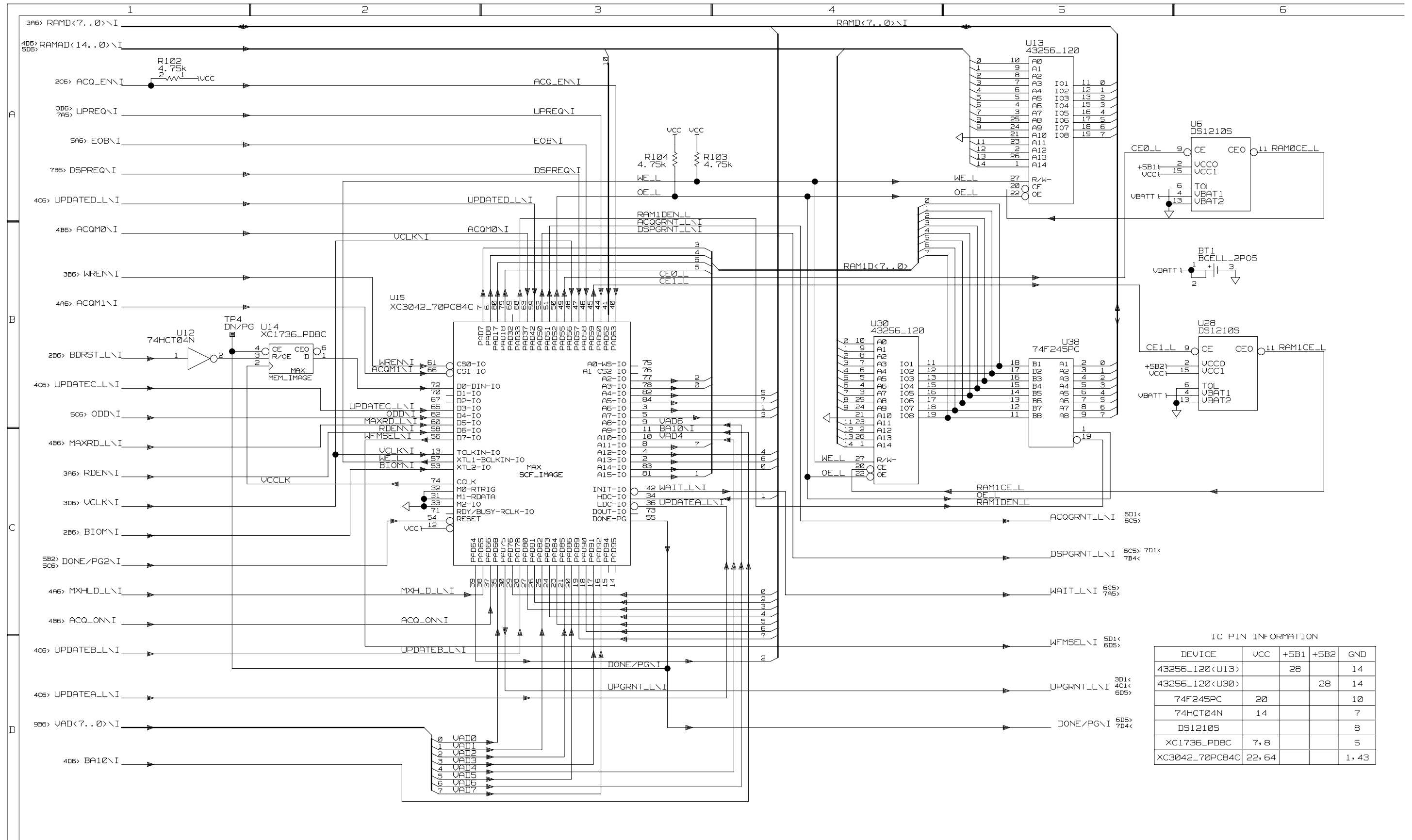
IC PIN INFORMATION

DEVICE	VCC	GND
74F138PC	16	8
74HCT04N	14	7
74HCT273N	20	10
CD74HCT541E	20	10
GAL20VBA_15LJ	28	14







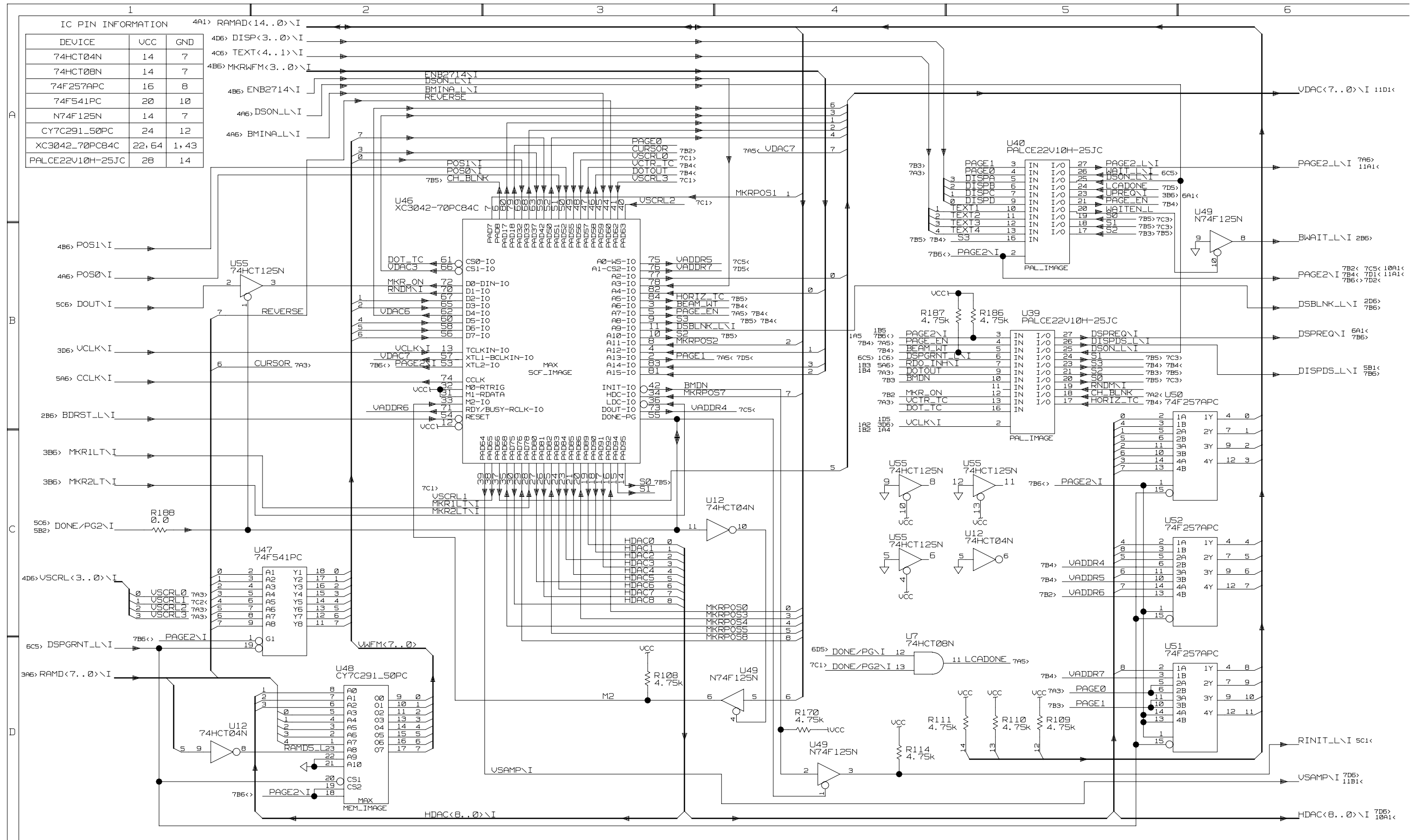


IC PIN INFORMATION

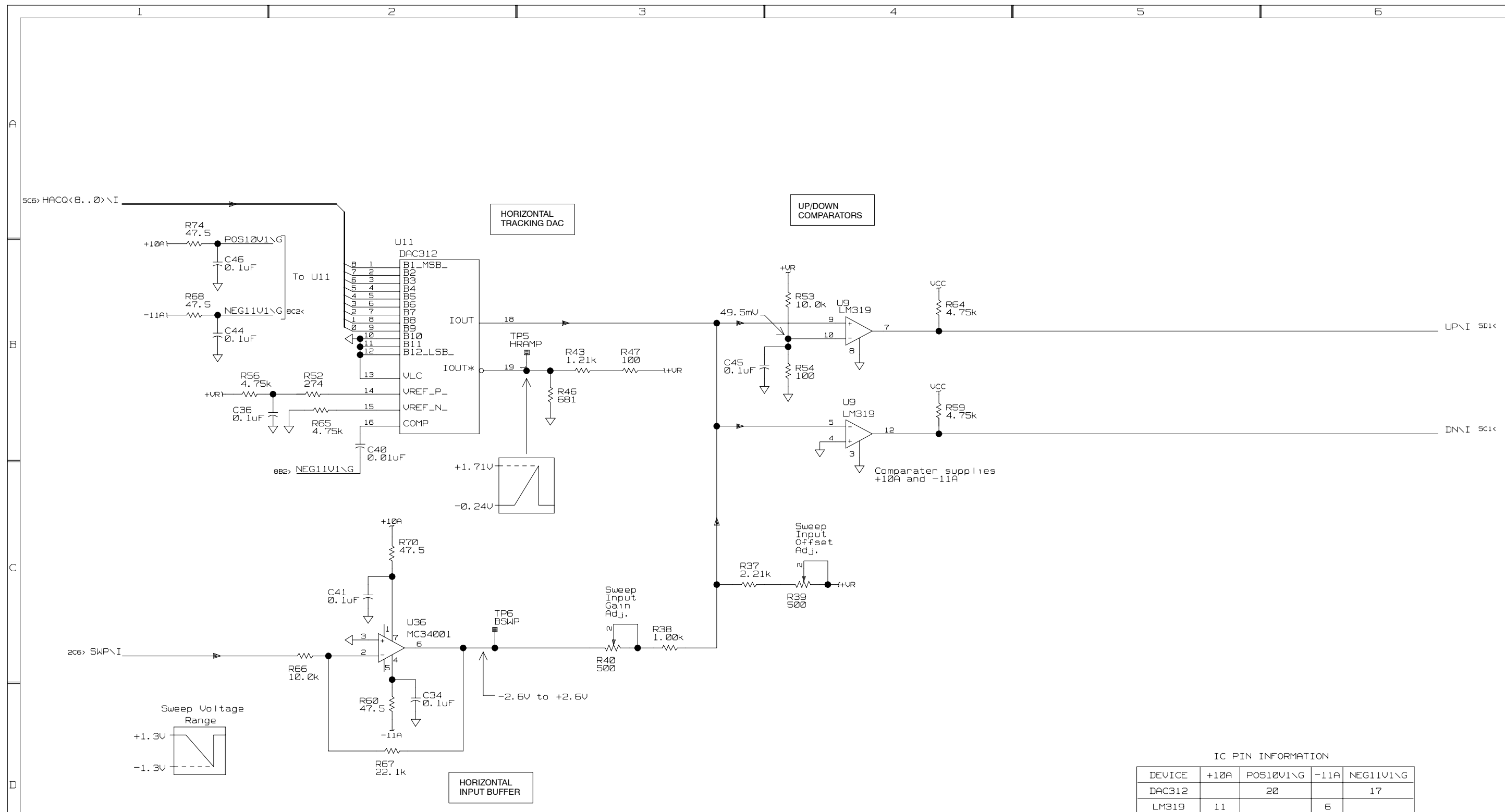
DEVICE	VCC	+5B1	+5B2	GND
43256_120(U13)		28	14	
43256_120(U30)			28	14
74F245PC	20			10
74HCT04N	14			7
DS1210S				8
XC1736_PD8C	7, 8			5
XC3042_70PC84C	22, 64			1, 43







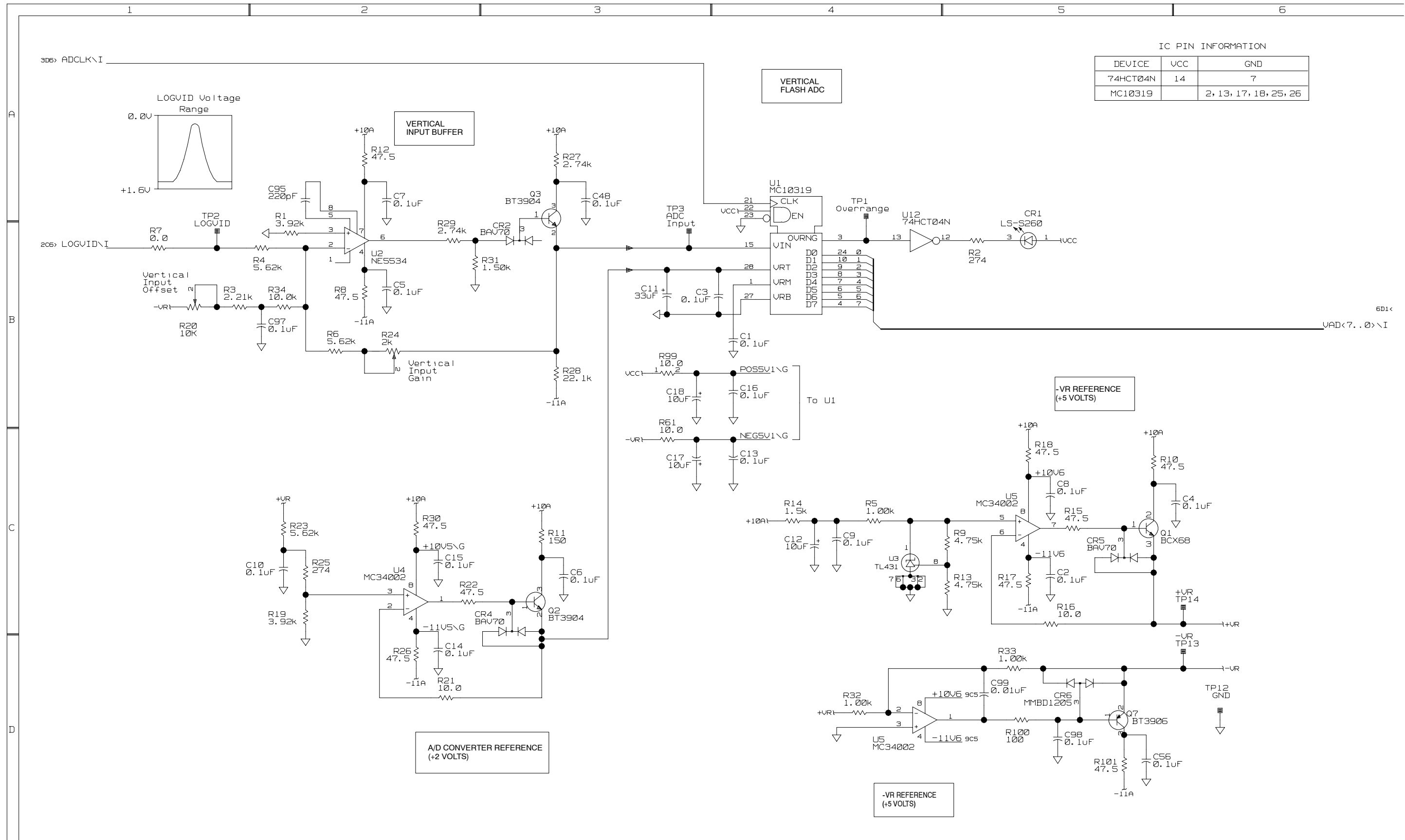




IC PIN INFORMATION

DEVICE	+10A	POS10V1\G	-11A	NEG11V1\G
DAC312		20		17
LM319	11		6	

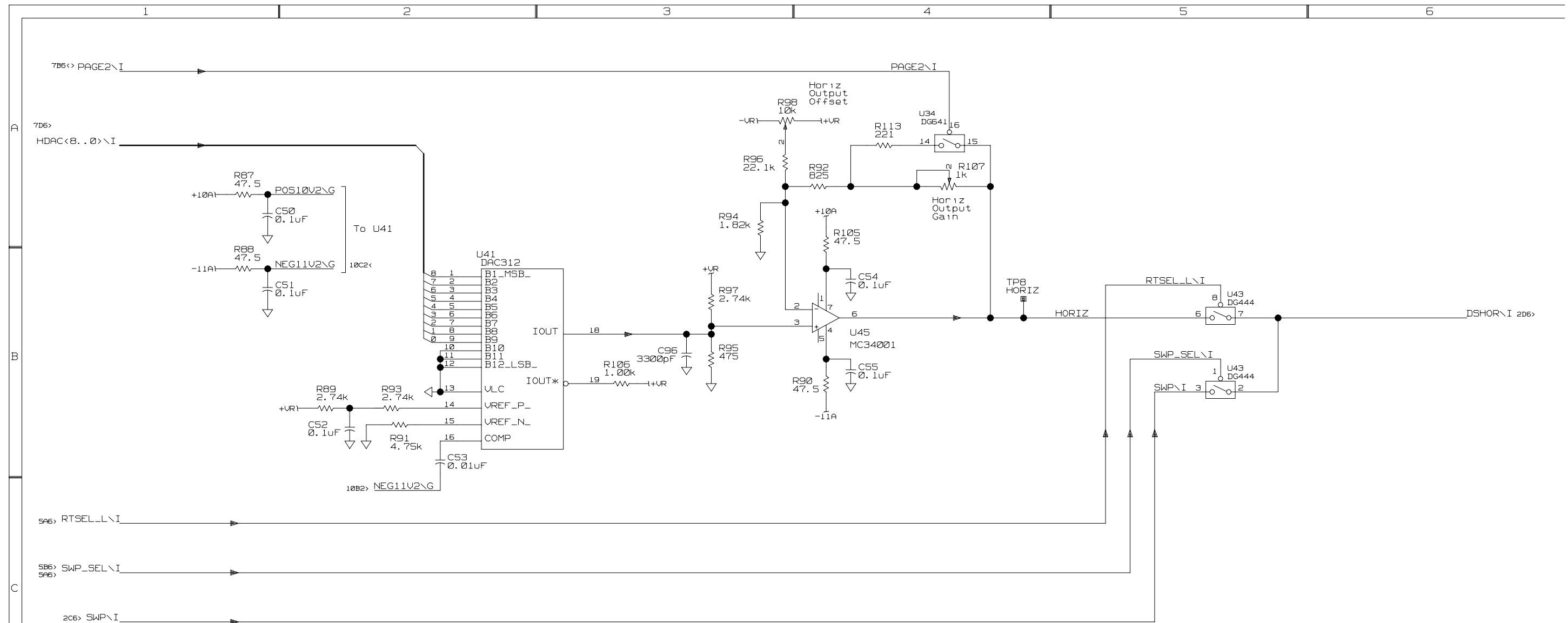




IC PIN INFORMATION

DEVICE	VCC	GND
74HCT04N	14	7
MC10319		2, 13, 17, 18, 25, 26



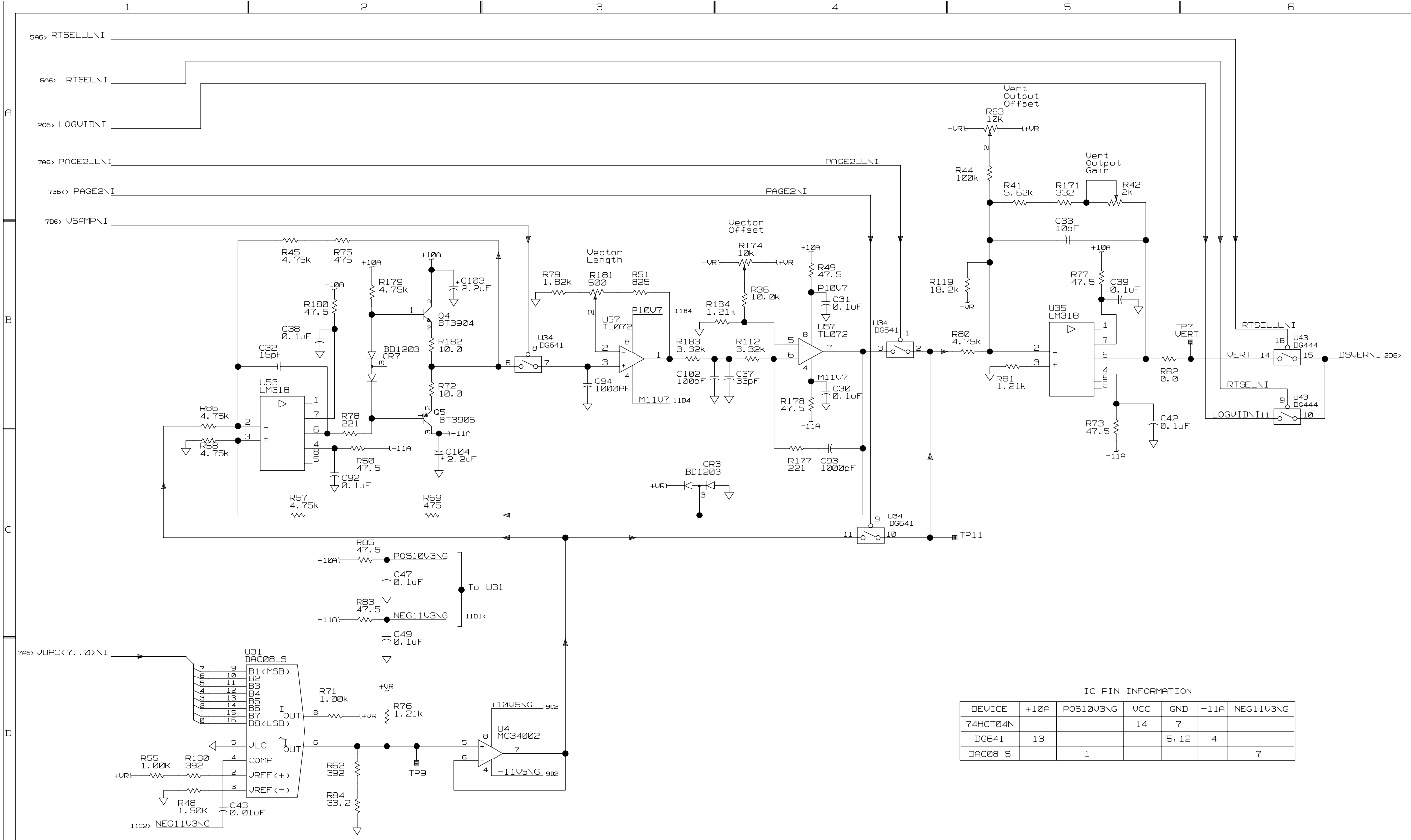


IC PIN INFORMATION

DEVICE	+10A	POS10V2\G	UCC	GND	-11A	NEG11V2\G
DG444	13		12	5	4	
DG541	13			5, 12	4	
DAC312		20				17





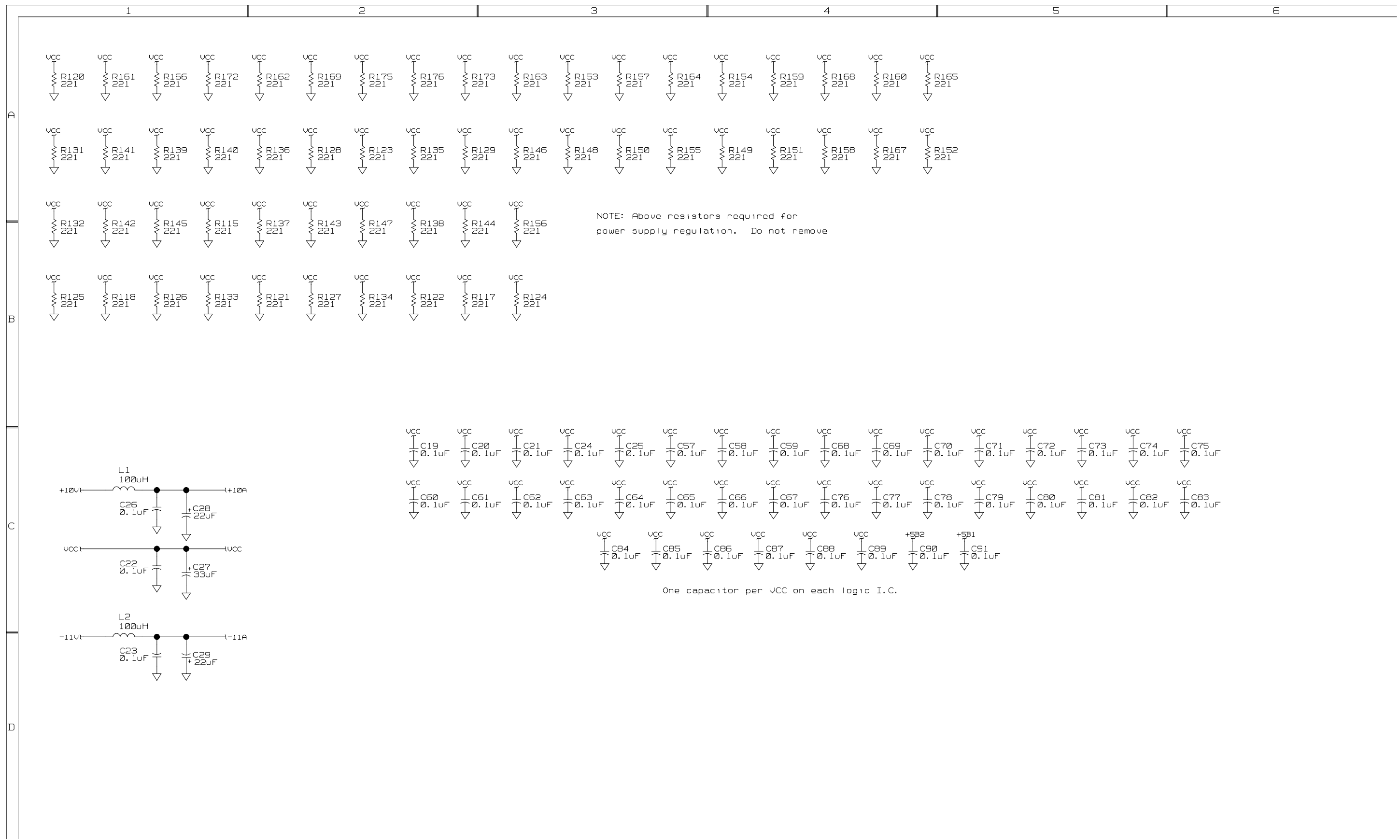


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IC PIN INFORMATION

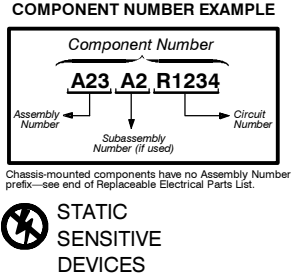
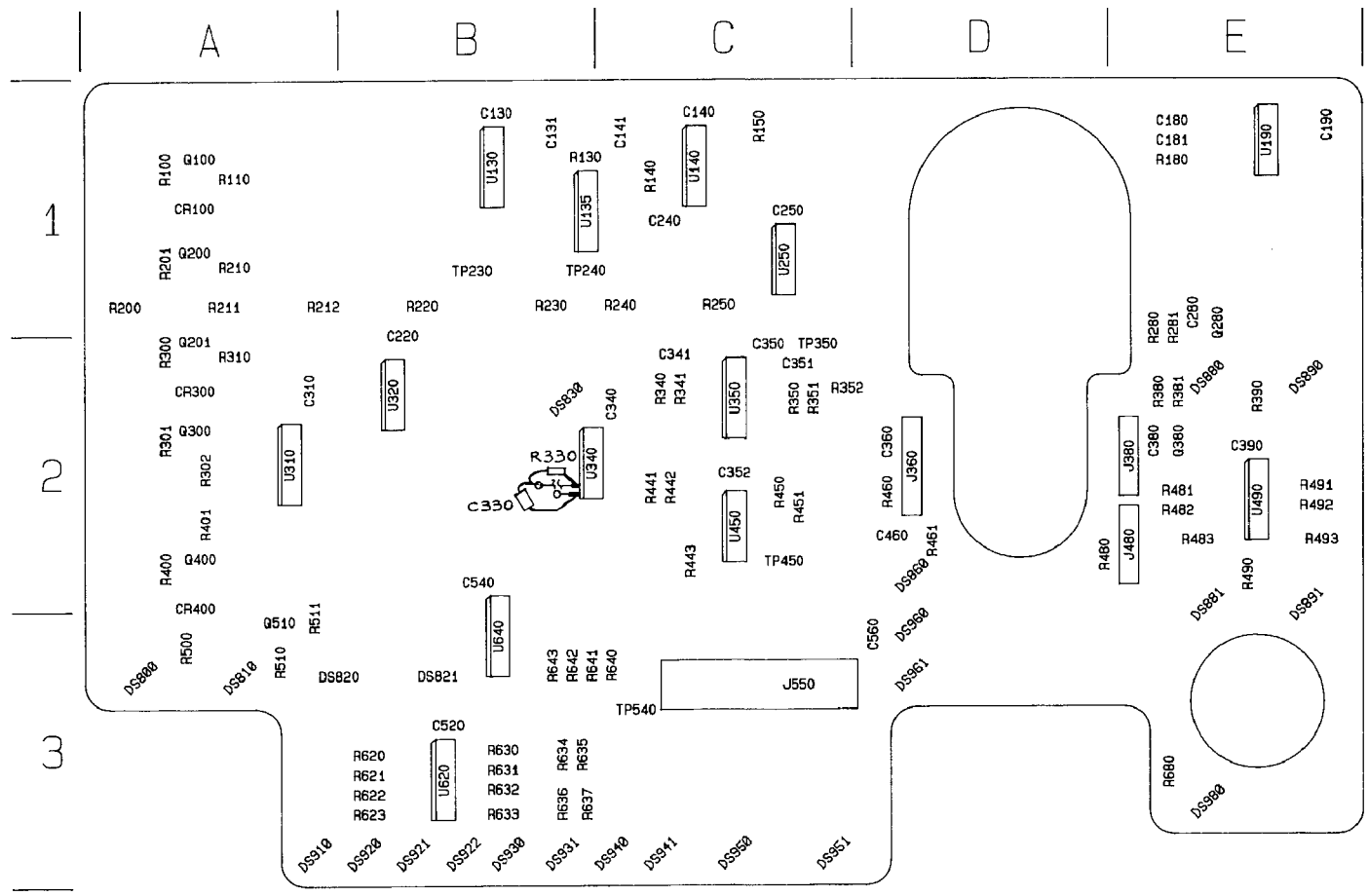
DEVICE	+10A	POS10V3\G	UCC	GND	-11A	NEG11V3\G
74HCT04N			14	7		
DG641	13			5, 12	4	
DAC08 S		1				7





NOTE: Above resistors required for power supply regulation. Do not remove

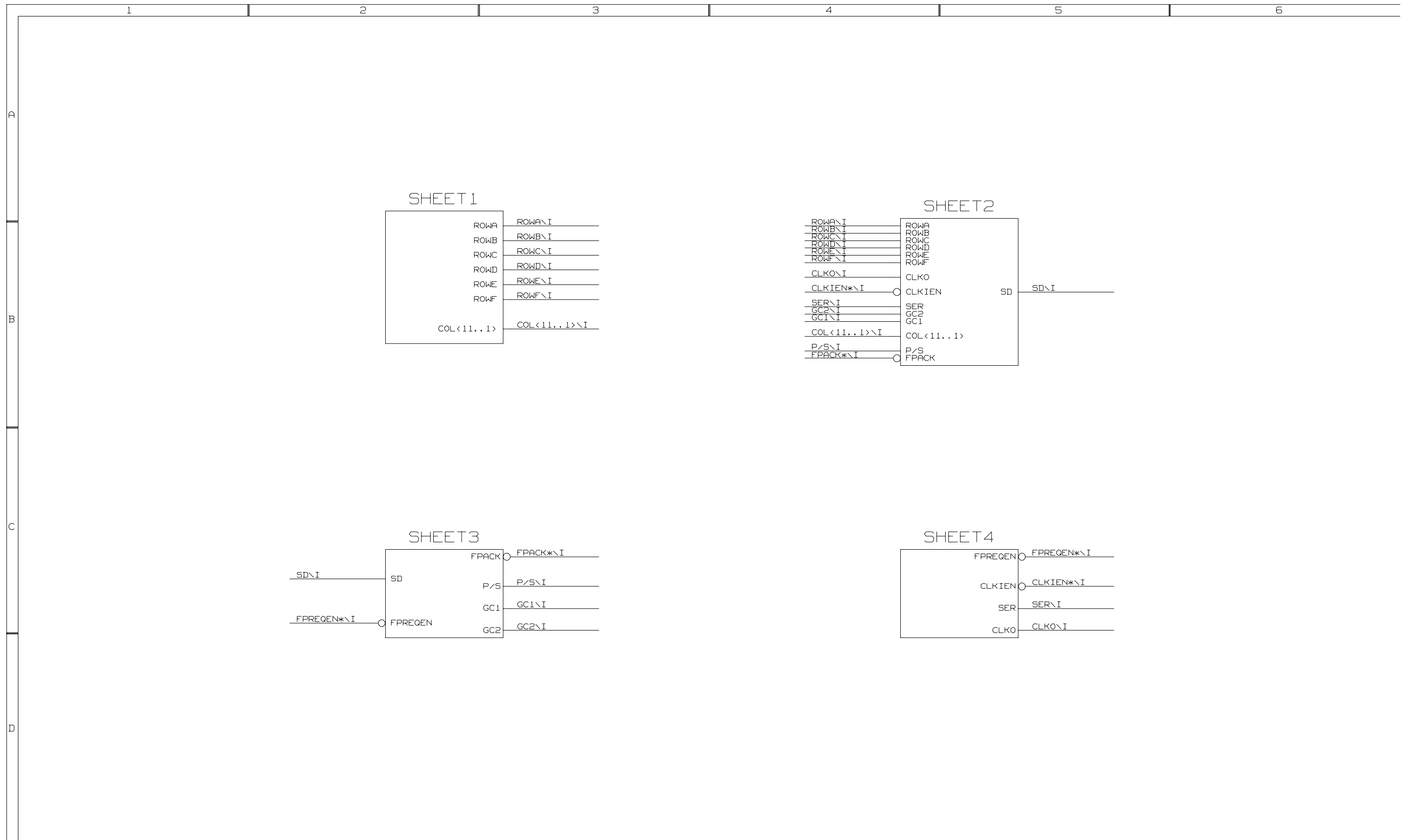
One capacitor per VCC on each logic I.C.



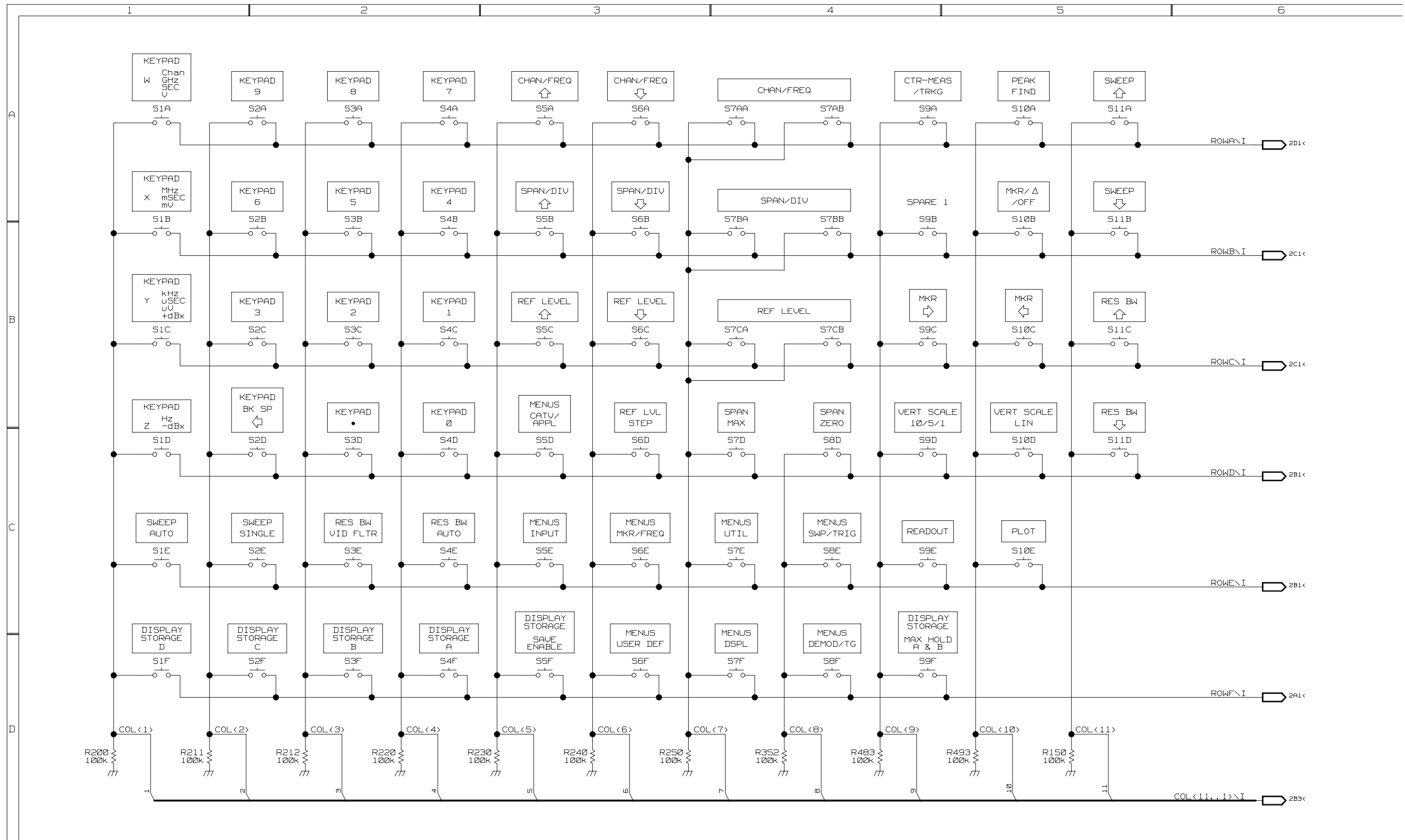
**A6 Front Panel Component Locator**

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C130	B-1	2D4	CR300	A-2	2B2	J360	D-2	2B5	R180	E-1	4A2	R401	A-2	2B2	R633	B-3	4D6	U250	C-1	3B3	U135	B-1	3A5
C131	B-1	3B3	CR400	A-2	2A2	J380	E-2	3C1	R200	A-1	1D1	R441	C-2	3C3	R634	B-3	4C3	U310	A-2	2A4	U135	B-1	3B3
C140	C-1	2D4	DS800	A-3	4C3	J380	E-2	3D1	R201	A-1	2C1	R442	C-2	3C3	R635	B-3	4C3	U320	B-2	3C4	U140	C-1	2B4
C141	C-1	2D4	DS810	A-3	4C3	J480	E-2	2B5	R210	A-1	2C2	R443	C-2	2A3	R636	B-3	4C4	U320	B-2	3D4	U190	E-1	3B6
C180	E-1	4A2	DS820	A-3	4C5	J550	C-3	2A6	R211	A-1	1D1	R450	C-2	4A3	R637	B-3	4C4	U340	B-2	3A5	U190	E-1	3C2
C181	E-1	4A2	DS821	B-3	4C5	J550	C-3	2B3	R212	A-1	1D2	R451	C-2	3B5	R640	C-3	4C5	U340	B-2	3B5	U190	E-1	3D2
C190	E-1	2D4	DS830	B-2	4C6	J550	C-3	2B6	R220	B-1	1D2	R460	D-2	2B6	R641	B-3	4C5	U350	C-2	3A2	U190	E-1	3D5
C220	B-1	2D5	DS860	D-2	4A4	J550	C-3	2C6	R230	B-1	1D3	R461	D-2	2A6	R642	B-3	4C6	U350	C-2	3A4	U190	E-1	4A1
C240	C-1	3A4	DS880	E-2	4A5	J550	C-3	3B1	R240	C-1	1D3	R480	D-2	2B5	R643	B-3	4C6	U450	C-2	2A3	U250	C-1	3A3
C250	C-1	2D5	DS881	E-2	4A5	J550	C-3	3C1	R250	C-1	1D3	R481	E-2	4A4	R680	E-3	4C1	U450	C-2	2B3	U250	C-1	3A4
C280	E-1	3D2	DS890	E-2	4A6	J550	C-3	3C6	R280	E-1	3D2	R482	E-2	4A4	TP230	B-1	3B3	U450	C-2	2C4	U250	C-1	3B3
C310	A-2	2D5	DS891	E-2	4A6	J550	C-3	4A1	R281	E-1	3D2	R483	E-2	1D4	TP240	B-1	3A5	U450	C-2	3B5	U310	A-2	2A4
C330	B-2	3B5	DS910	A-3	4C4	J550	C-3	4D1	R300	A-2	2C1	R490	E-2	4A5	TP350	C-2	3B4	U490	E-2	4A2	U320	B-2	3C4
C340	C-2	2D4	DS920	B-3	4C4	Q100	A-1	2D2	R301	A-2	2B1	R491	E-2	4A6	TP450	C-2	2C5	U620	B-3	4C2	U320	B-2	3D4
C341	C-2	3A3	DS921	B-3	4B3	Q200	A-1	2C2	R302	A-2	2B2	R492	E-2	4A6	TP540	C-3	3B6	U640	B-3	4B2	U340	B-2	3A5
C350	C-2	2D4	DS922	B-3	4B3	Q201	A-2	2C2	R310	A-2	2C2	R493	E-2	1D5	U130	B-1	2C4	R640	C-3	4C5	U340	B-2	3B5
C351	C-2	3A2	DS930	B-3	4B4	Q280	E-1	3D2	R330	B-2	3B5	R500	A-3	2D2	U135	B-1	3A5	R641	B-3	4C5	U350	C-2	3A2
C352	C-2	2D4	DS931	B-3	4B4	Q300	A-2	2B2	R340	C-2	3A3	R510	A-3	2A2	U135	B-1	3B3	R642	B-3	4C6	U350	C-2	3A4
C360	D-2	3B1	DS940	C-3	4B6	Q380	E-2	3C2	R341	C-2	3A3	R511	A-3	2A1	U140	C-1	2B4	R643	B-3	4C6	U450	C-2	2A3
C380	E-2	3C2	DS941	C-3	4B6	Q400	A-2	2A2	R350	C-2	3A2	R620	B-3	4D3	U190	E-1	3B6	R680	E-3	4C1	U450	C-2	2B3
C390	E-2	2D4	DS950	C-3	4B5	Q510	A-3	2A2	R351	C-2	3A2	R621	B-3	4D3	U190	E-1	3C2	TP230	B-1	3B3	U450	C-2	2C4
C460	D-2	3B1	DS951	C-3	4B5	R100	A-1	2D1	R352	C-2	1D4	R622	B-3	4D4	U190	E-1	3D2	TP240	B-1	3A5	U450	C-2	3B5
C520	B-3	2D5	DS960	D-3	4A4	R110	A-1	2D2	R380	E-2	3C2	R623	B-3	4D4	U190	E-1	3D5	TP350	C-2	3B4	U490	E-2	4A2
C540	B-2	2D5	DS961	D-3	4C6	R130	B-1	3B3	R381	E-2	3C2	R630	B-3	4D5	U190	E-1	4A1	TP450	C-2	2C5	U620	B-3	4C2
C560	D-3	2B6	DS980	E-3	4B1	R140	C-1	3A4	R390	E-2	4A5	R631	B-3	4D5	U250	C-1	3A3	TP540	C-3	3B6	U640	B-3	4B2
CR100	A-1	2D2	J360	D-2	2A5	R150	C-1	1D5	R400	A-2	2A1	R632	B-3	4D6	U250	C-1	3A4	U130	B-1	2C4			

Figure 1-33: A6 Front Panel





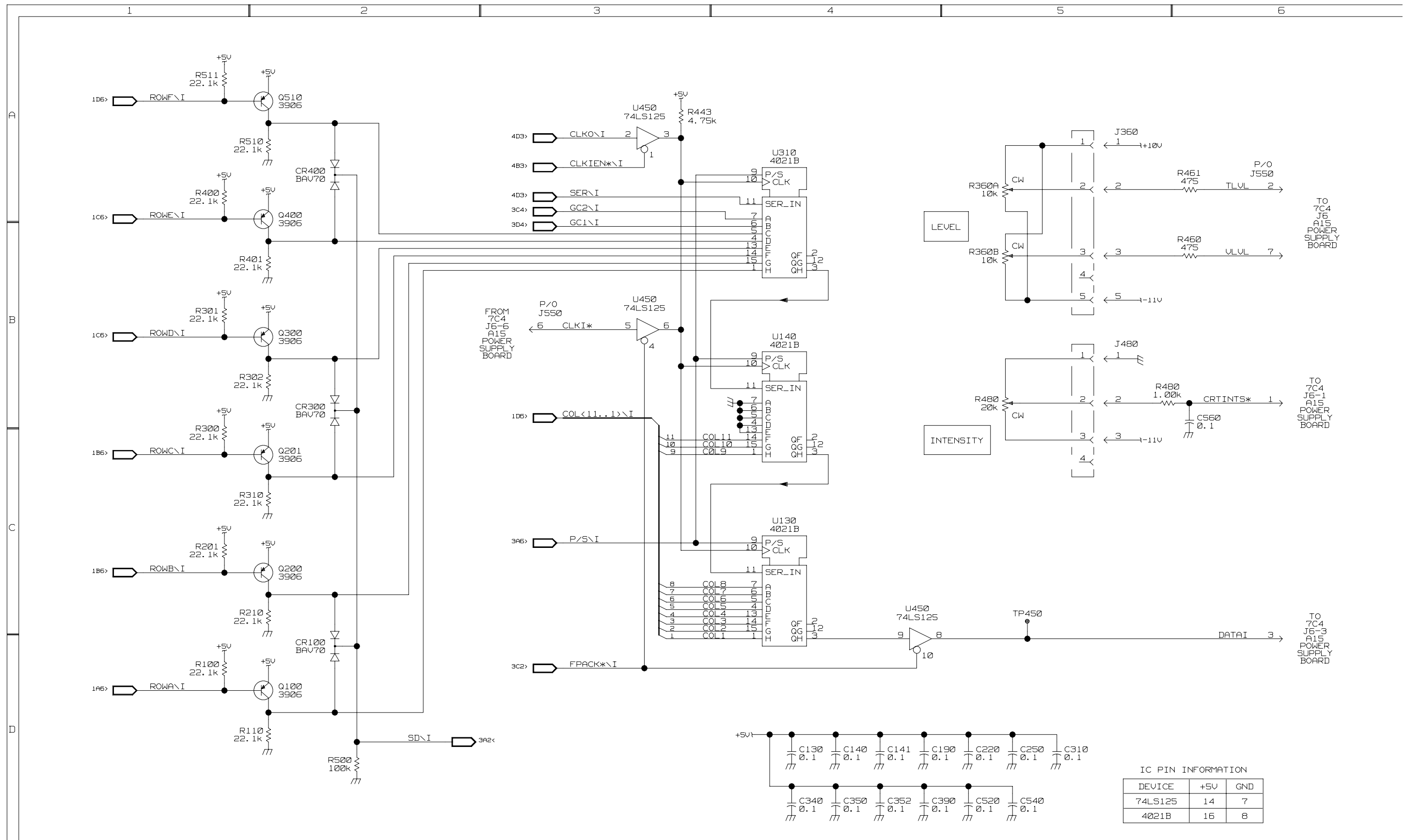


2715

SWITCH MATRIX A6 1  
FRONT PANEL BOARD







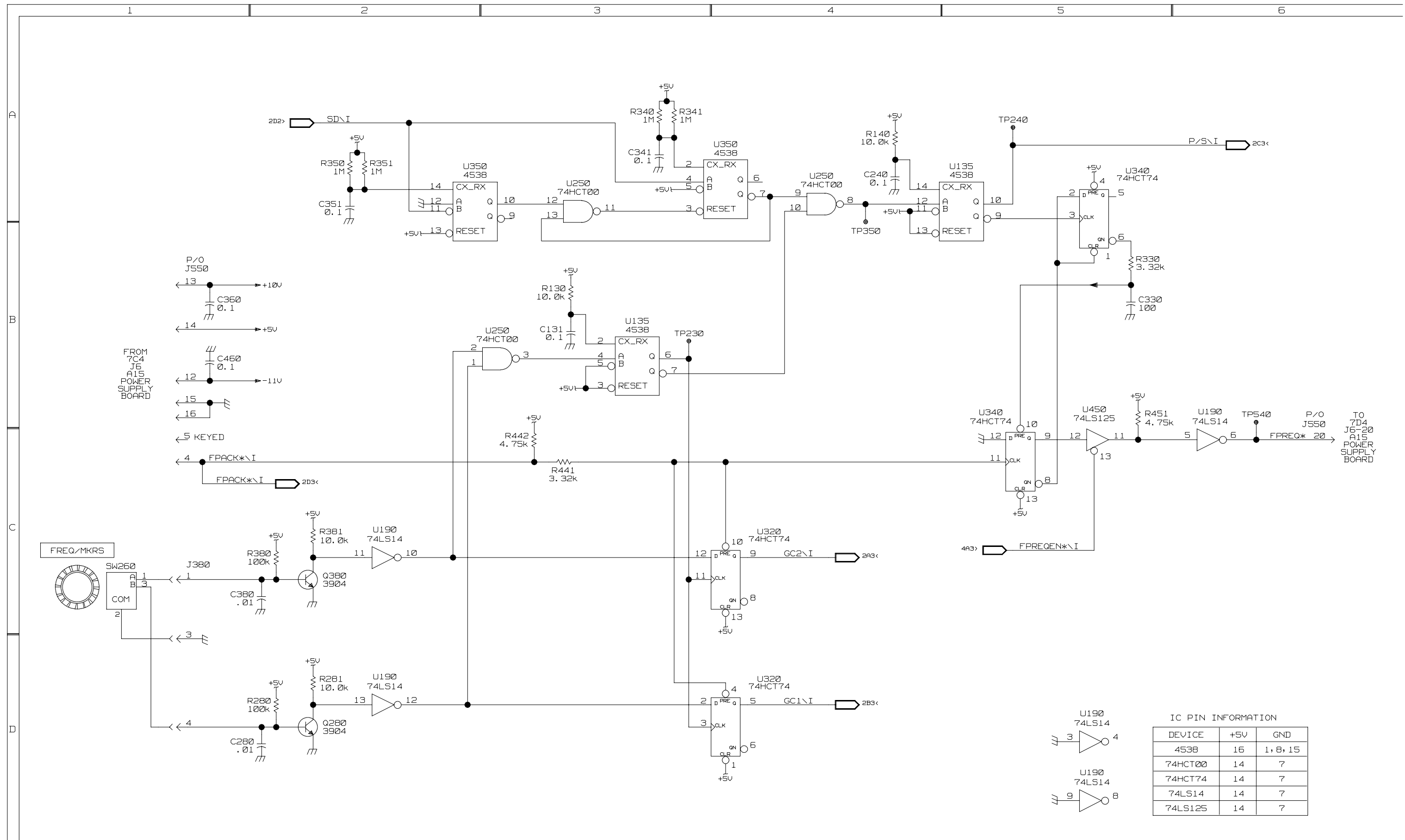
2715

OUTPUT SHIFT REGISTERS AND POTS A6 2

IC PIN INFORMATION

DEVICE	+5V	GND
74LS125	14	7
4021B	16	8





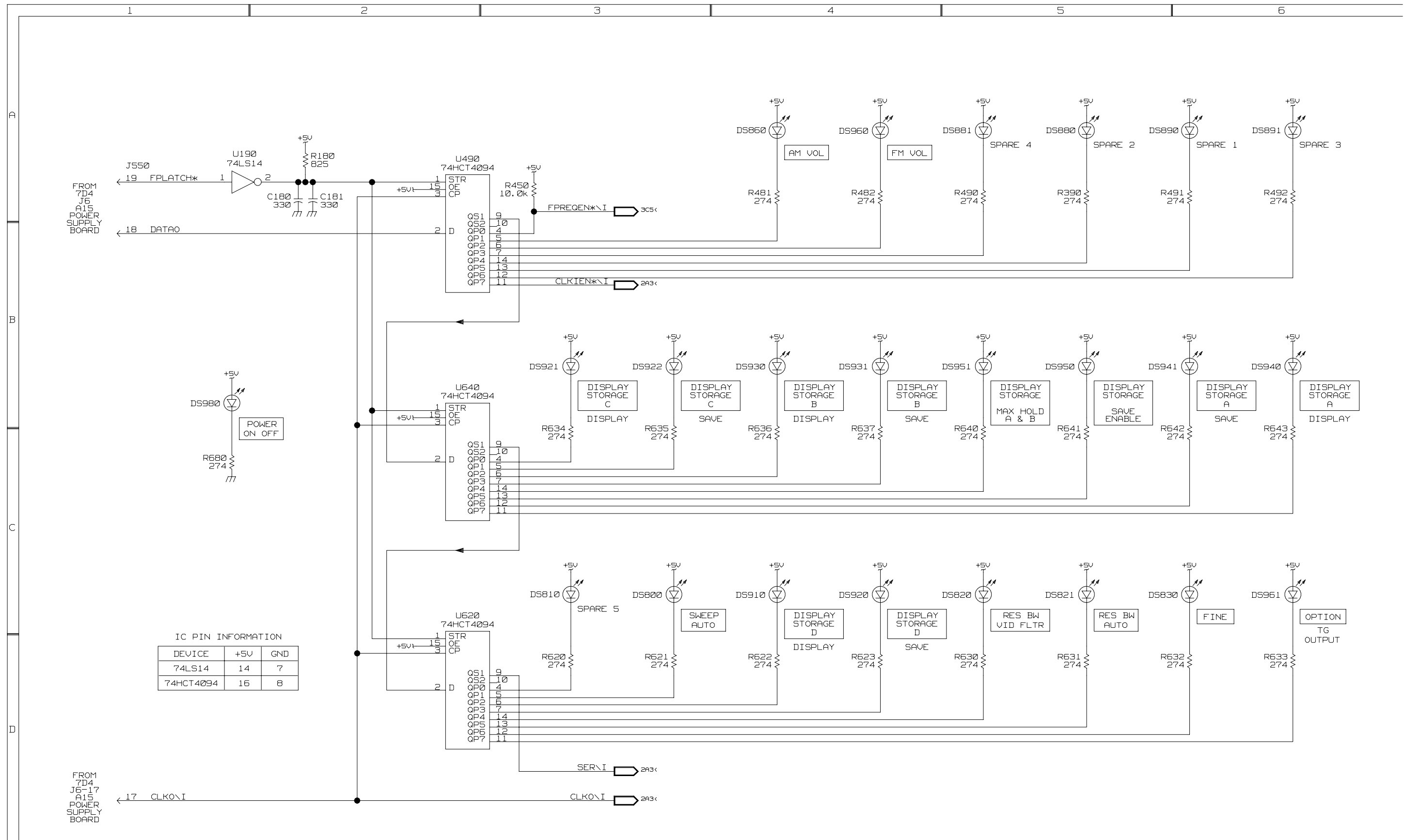
IC PIN INFORMATION

DEVICE	+5V	GND
4538	16	1, 8, 15
74HCT00	14	7
74HCT74	14	7
74LS14	14	7
74LS125	14	7

2715

GRAY CODE AND SERVICE REQUEST/ACKNOWLEDGE FRONT PANEL BOARD





2715

INPUT SHIFT REGISTERS AND LEDS  
FRONT PANEL BOARD

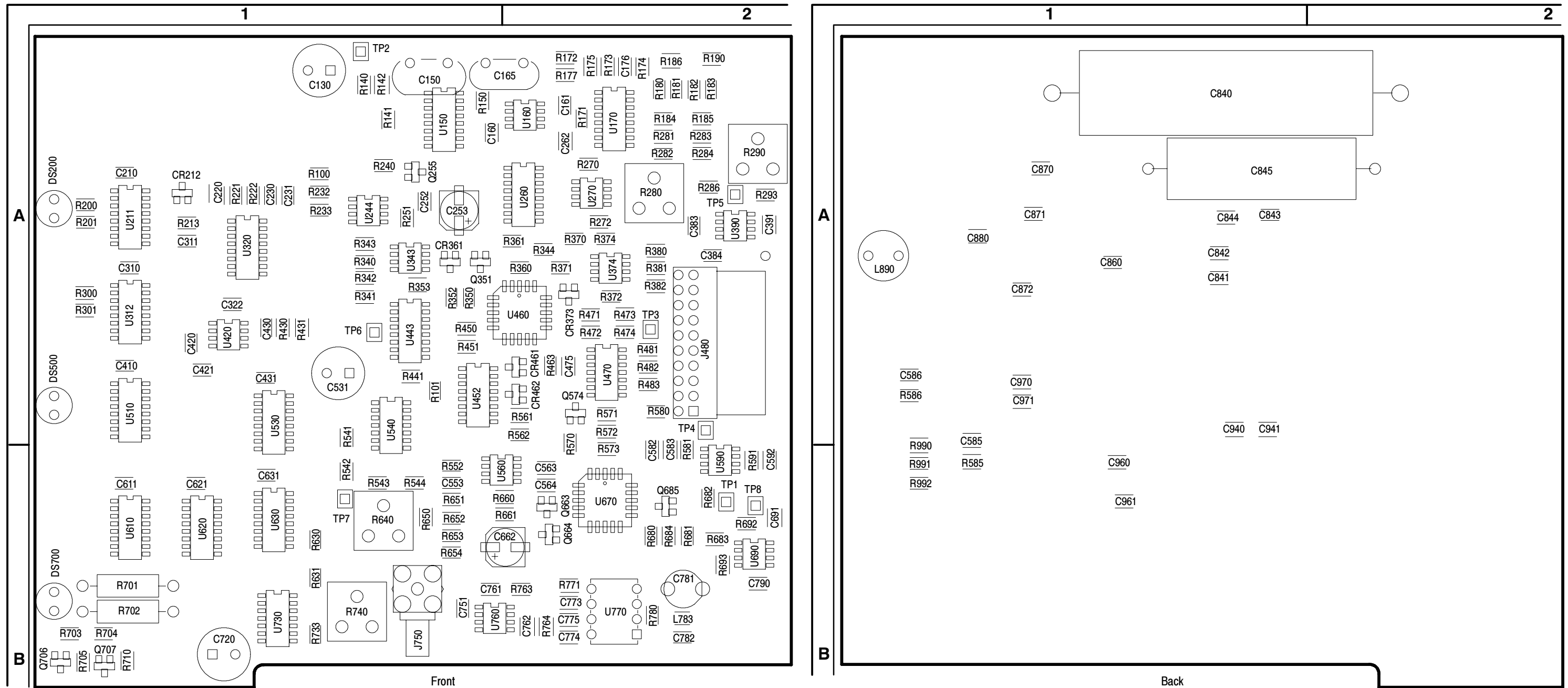
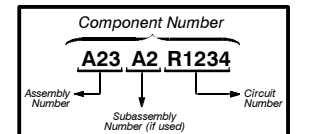


Figure 1-34: A5 Sweep

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**⚡** STATIC SENSITIVE DEVICES

## A5 Sweep Component Locator

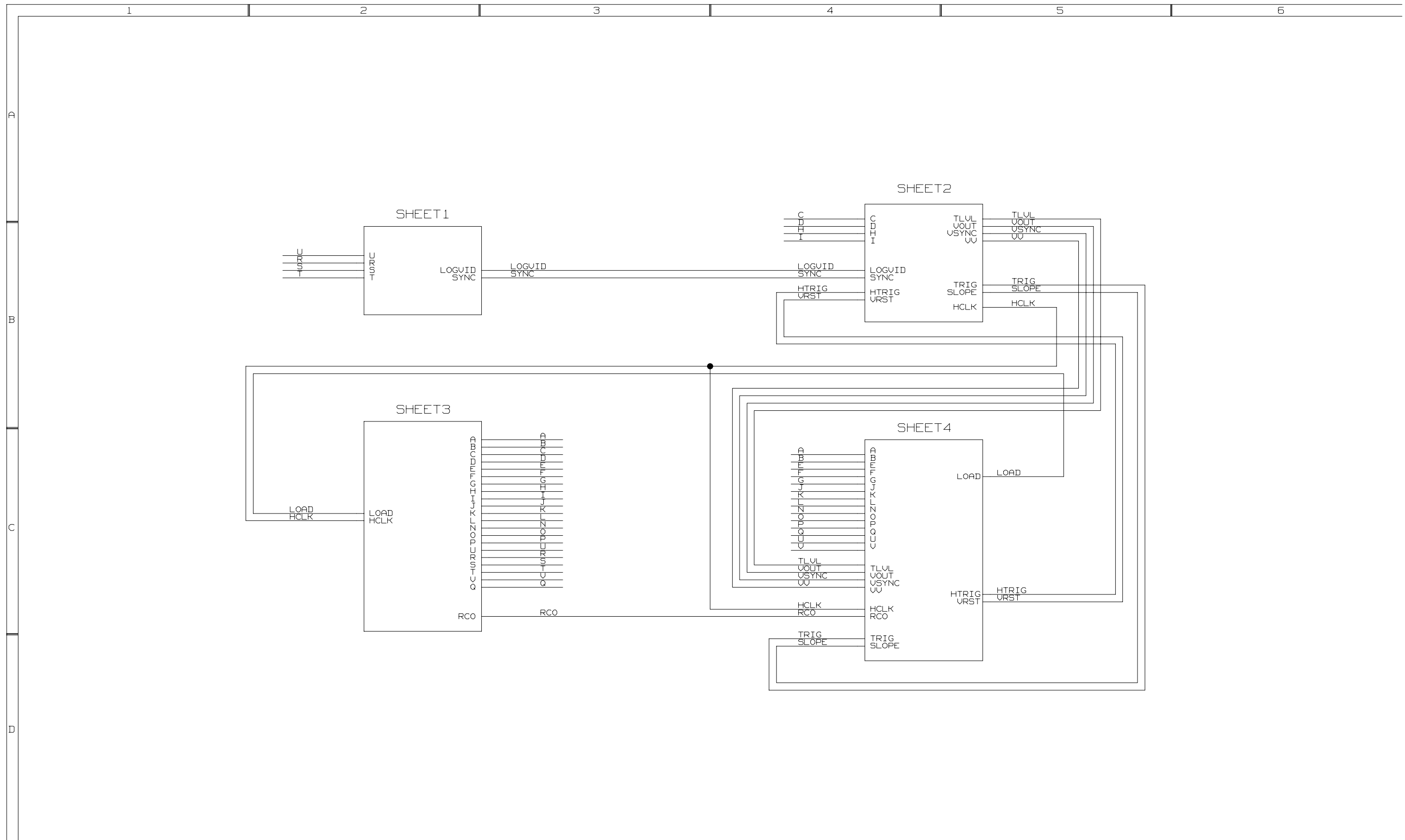
CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C130	A1	1C2	C631	A1	1D3	CR461	A1	2D2	R141	A1	4A3	R286	A2	4A2	R482	A2	4C4	R701	B1	3A5	U312	A1	3A3
C150	A1	4A5	C662	B1	2A5	CR462	A1	2C2	R142	A1	4A2	R290	A2	4A2	R483	A2	4C4	R702	B1	3A6	U320	A1	2B3
C160	A1	1C2	C691	B2	1A3	DS200	A1	3A6	R150	A1	4A4	R293	A2	4A2	R541	A1	4C1	R703	B1	3B5	U343	A1	1C4
C161	A2	4A1	C720	B1	1D2	DS500	A1	3A6	R171	A2	4C3	R300	A1	3A2	R542	A1	2A6	R704	B1	3A5	U374	A2	2C4
C165	A1	4A5	C751	B1	1A1	DS700	B1	3A6	R172	A2	4C3	R301	A1	3A2	R543	B1	4D1	R705	B1	3A5	U374	A2	4A2
C176	A2	4C3	C761	B1	1A2	J480	A2	1B1	R173	A2	4C3	R340	A1	1C4	R544	B1	4D2	R710	B1	3A5	U390	A2	1D2
C210	A1	1D2	C762	B1	1A2	J480	A2	1C1	R174	A2	4C2	R341	A1	1B5	R552	A1	2A4	R733	B1	3C2	U420	A1	2B2
C220	A1	2B2	C773	B2	1A3	J480	A2	1C6	R175	A2	4C3	R342	A1	1C4	R561	A1	2C1	R740	B1	1A3	U443	A1	1B5
C230	A1	2B2	C774	B2	1A2	J480	A2	1D1	R177	A2	4A4	R343	A1	1C4	R562	A1	2D1	R763	B1	1A2	U443	A1	1C5
C231	A1	1D2	C775	B2	1A2	J480	A2	2A3	R180	A2	4B2	R344	A2	1B2	R570	A2	4C5	R764	B2	1A2	U443	A1	1D5
C252	A1	4B5	C781	B2	1B2	J480	A2	2A6	R181	A2	4B2	R350	A1	4D4	R571	A2	4C4	R771	B2	1A3	U452	A1	2D3
C253	A1	4B5	C782	B2	1B2	J480	A2	2C1	R182	A2	4B2	R352	A1	1D5	R572	A2	4C5	R780	B2	1B2	U460	A1	4C5
C262	A2	4B1	C790	B2	1A3	J480	A2	2D1	R183	A2	4B2	R353	A1	1D5	R573	A2	2D5	R990*	A1	1C2	U470	A2	2D5
C310	A1	1D2	C840*	A1	4A5	J480	A2	3A1	R184	A2	4B2	R360	A1	2C5	R580	A2	4C4	R991*	A1	1C2	U470	A2	4C4
C311	A1	3C2	C841*	A1	1C4	J480	A2	3C1	R185	A2	4B2	R361	A1	2C3	R581	A2	1C2	R992*	B1	1C2	U510	A1	3B5
C322	A1	1D3	C842*	A1	1C4	J480	A2	3D4	R186	A2	4A3	R370	A2	4A2	R591	A2	1C2	TP1	B2	4D6	U530	A1	3C3
C383	A2	1D2	C843*	A1	1B3	J480	A2	4A6	R190	A2	4A3	R371	A2	2C5	R630	B1	3C3	TP2	A1	4A6	U540	A1	4B4
C384	A2	1D3	C844*	A1	1B3	J480	A2	4B6	R200	A1	3A2	R372	A2	2C4	R631	B1	3C3	TP3	A2	2D5	U540	A1	4D2
C391	A2	1D1	C845*	A1	4A5	J480	A2	4D4	R201	A1	3A2	R374	A2	4B4	R640	B1	4D1	TP4	A2	1C2	U560	A1	2A4
C410	A1	1D3	C860*	A1	1D3	J750	B1	1A1	R213	A1	3B2	R380	A2	2C4	R650	B1	4D1	TP5	A2	1D2	U560	A1	2A5
C420	A1	1D6	C870*	A1	4A4	L783	B2	1B2	R221	A1	2B2	R381	A2	2C4	R651	B1	2A3	TP6	A1	1C6	U590	A2	1C2
C421	A1	1D5	C871*	A1	4B4	L890*	A1	1C1	R222	A2	2B2	R382	A2	2C4	R652	B1	2A4	TP7	B1	2A6	U610	B1	3B3
C430	A1	2B1	C872*	A1	2C5	Q255	A1	4C5	R232	A1	1B3	R430	A1	2B1	R653	B1	2A4	TP8	B2	1A4	U620	B1	3C5
C431	A1	1D2	C880*	A1	2C5	Q351	A1	2C5	R233	A1	1C3	R431	A1	2B1	R654	B1	2A5	U150	A1	4A5	U630	B1	3C5
C475	A2	4D6	C940*	A1	1C3	Q574	A2	4C5	R240	A1	4B5	R441	A1	1B5	R660	B1	2B5	U160	A1	4A1	U670	B2	4D3
C531	A1	1D2	C941*	A1	1D3	Q663	B2	2B5	R251	A1	4B5	R450	A1	4D5	R661	B1	2A5	U170	A2	4B3	U690	B2	1A3
C553	B1	2A4	C960*	A1	2A4	Q664	B2	2B5	R270	A2	4A2	R451	A1	4D5	R680	B2	2B5	U211	A1	3A3	U730	B1	1B2
C563	A2	2A5	C961*	B1	2A4	Q685	B2	4D5	R272	A2	4B4	R463	A2	4D5	R681	B2	3C2	U244	A1	1B3	U730	B1	1D4
C564	B2	2A5	C970*	A1	1C3	Q706	B1	3A6	R280	A2	4C4	R471	A2	2D4	R682	B2	4D5	U260	A1	1A4	U730	B1	2C3
C582	A2	1D2	C971*	A1	1D3	Q707	B1	3A5	R281	A2	4B2	R472	A2	2D4	R683	B2	1A3	U260	A1	1B3	U730	B1	3C2
C583	A2	1C3	CR212	A1	3C2	R100	A1	1B3	R282	A2	4C2	R473	A2	2D4	R684	B2	4D5	U260	A1	2C4	U730	B1	3D3
C592	A2	1C1	CR361	A1	2C5	R101	A1	2D4	R283	A2	4B2	R474	A2	2D4	R692	B2	1A3	U260	A1	4B6	U760	B1	1A2
C611	B1	1D2	CR373	A2	2C5	R140	A1	2C3	R284	A2	4B2	R481	A2	4C4	R693	B2	1A3	U270	A2	4A4	U770	B2	1A3
C621	B1	1D3																					

\*Asterisks indicate components located on the back of the board.

Figure 1-35: A5 Sweep Component Locator



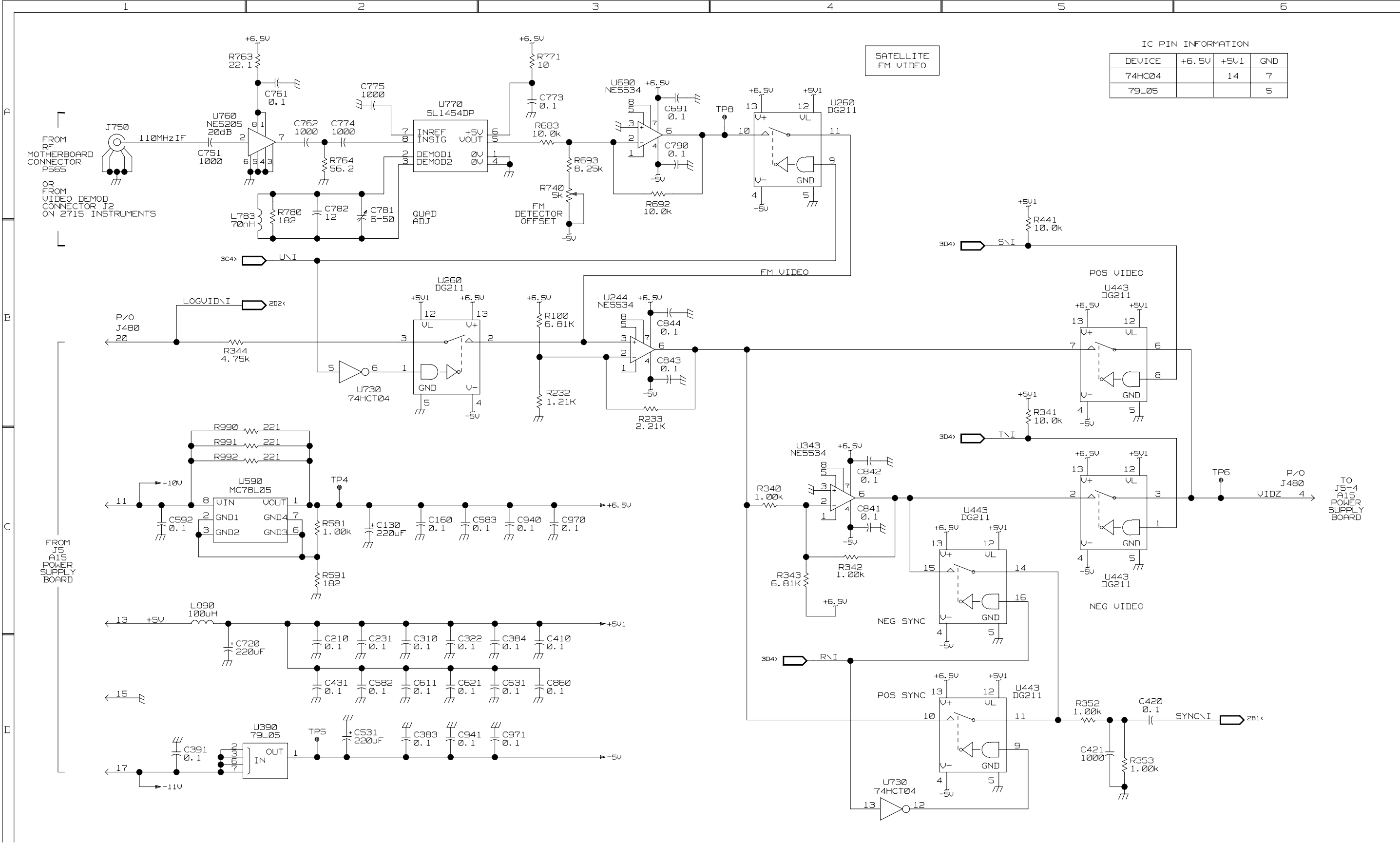




2715

SIGNAL INTERCONNECT A5 0  
SWEEP BOARD





IC PIN INFORMATION

DEVICE	+6.5V	+5V1	GND
74HC04		14	7
79L05			5

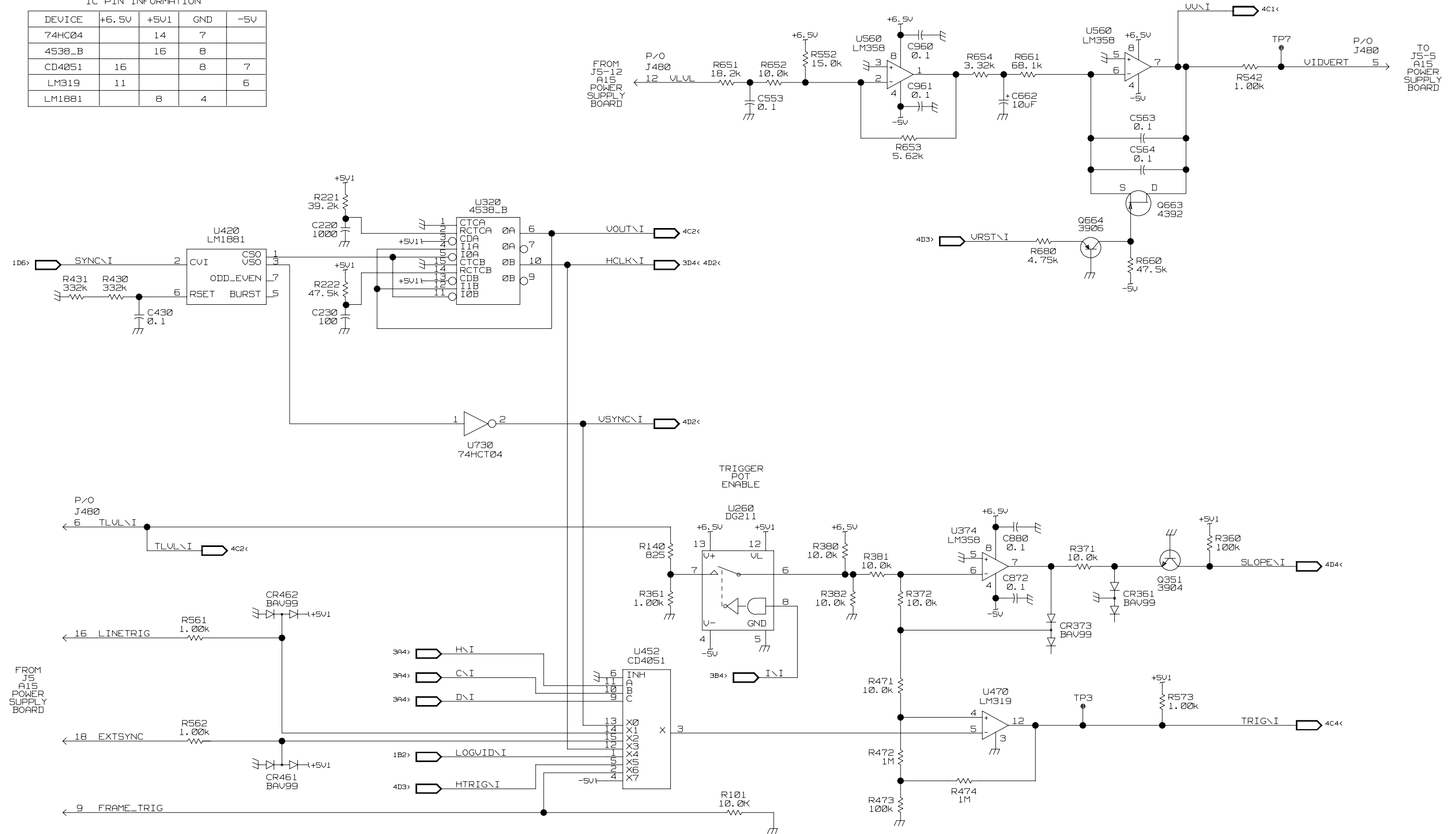
2715

VIDEO BUFFERING A5 1  
SWEEP BOARD



IC PIN INFORMATION

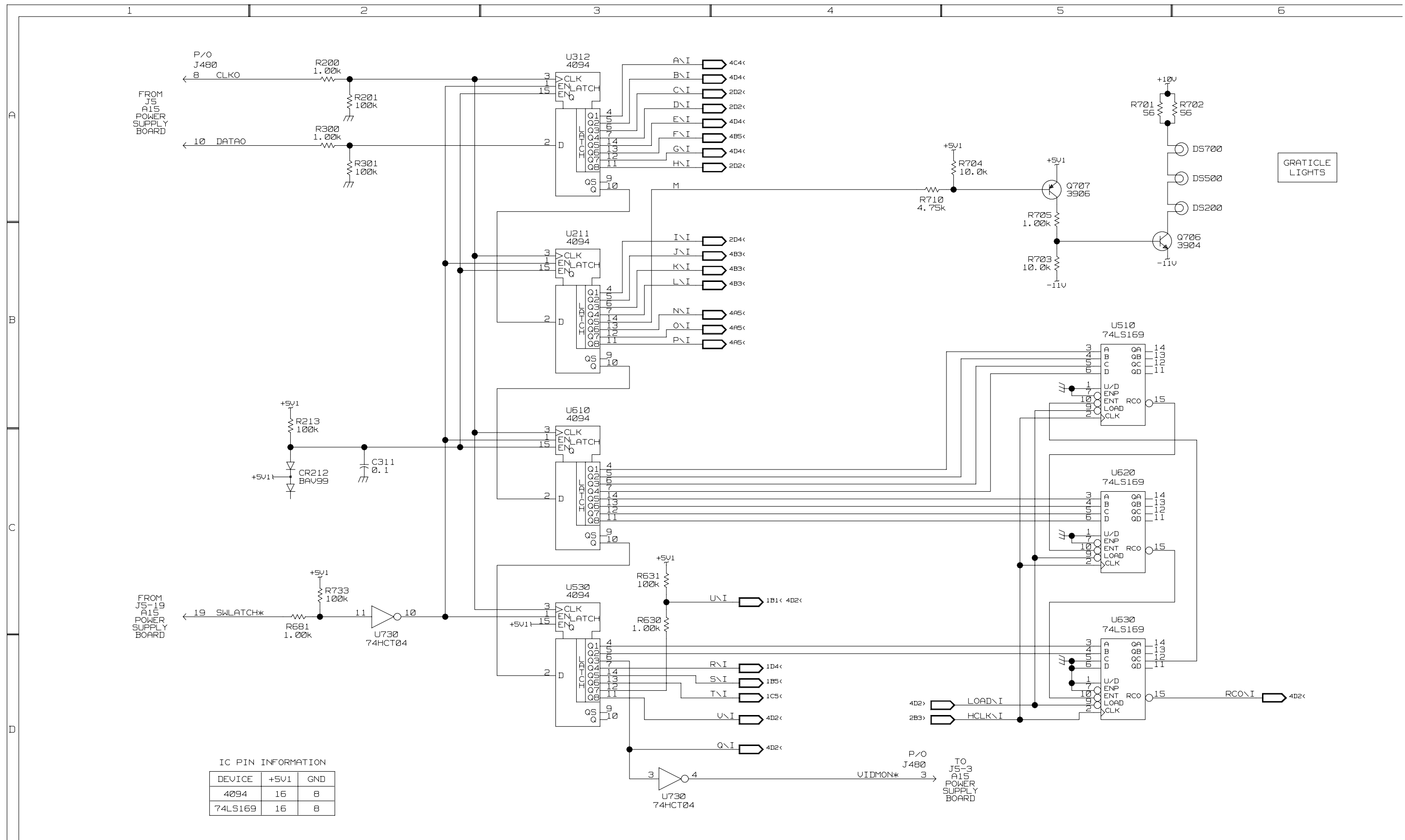
DEVICE	+6.5V	+5V1	GND	-5V
74HC04		14	7	
4538_B		16	8	
CD4051	16		8	7
LM319	11			6
LM1881		8	4	



2715

VIDEO TRIGGER SWEEP BOARD A5 2



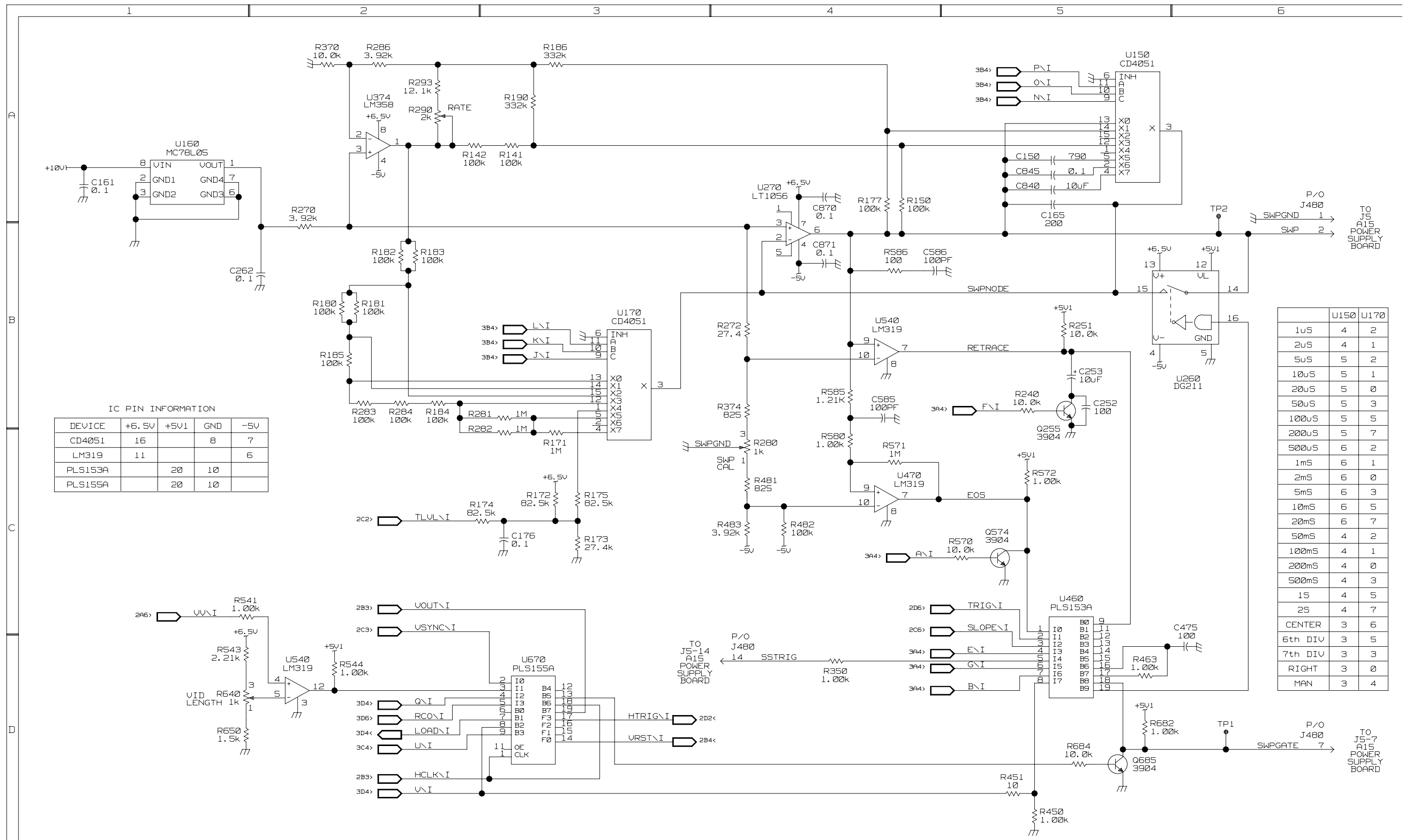


2715

SERIAL CONTROL REGISTER A5 3  
SWEEP BOARD







IC PIN INFORMATION

DEVICE	+6.5V	+5V1	GND	-5V
CD4051	16		8	7
LM319	11			6
PLS153A		20	10	
PLS155A		20	10	

	U150	U170
1uS	4	2
2uS	4	1
5uS	5	2
10uS	5	1
20uS	5	0
50uS	5	3
100uS	5	5
200uS	5	7
500uS	6	2
1mS	6	1
2mS	6	0
5mS	6	3
10mS	6	5
20mS	6	7
50mS	4	2
100mS	4	1
200mS	4	0
500mS	4	3
1S	4	5
2S	4	7
CENTER	3	6
6th DIV	3	5
7th DIV	3	3
RIGHT	3	0
MAN	3	4

2715

SWEEP RAMP GENERATOR SWEEP BOARD A5 4

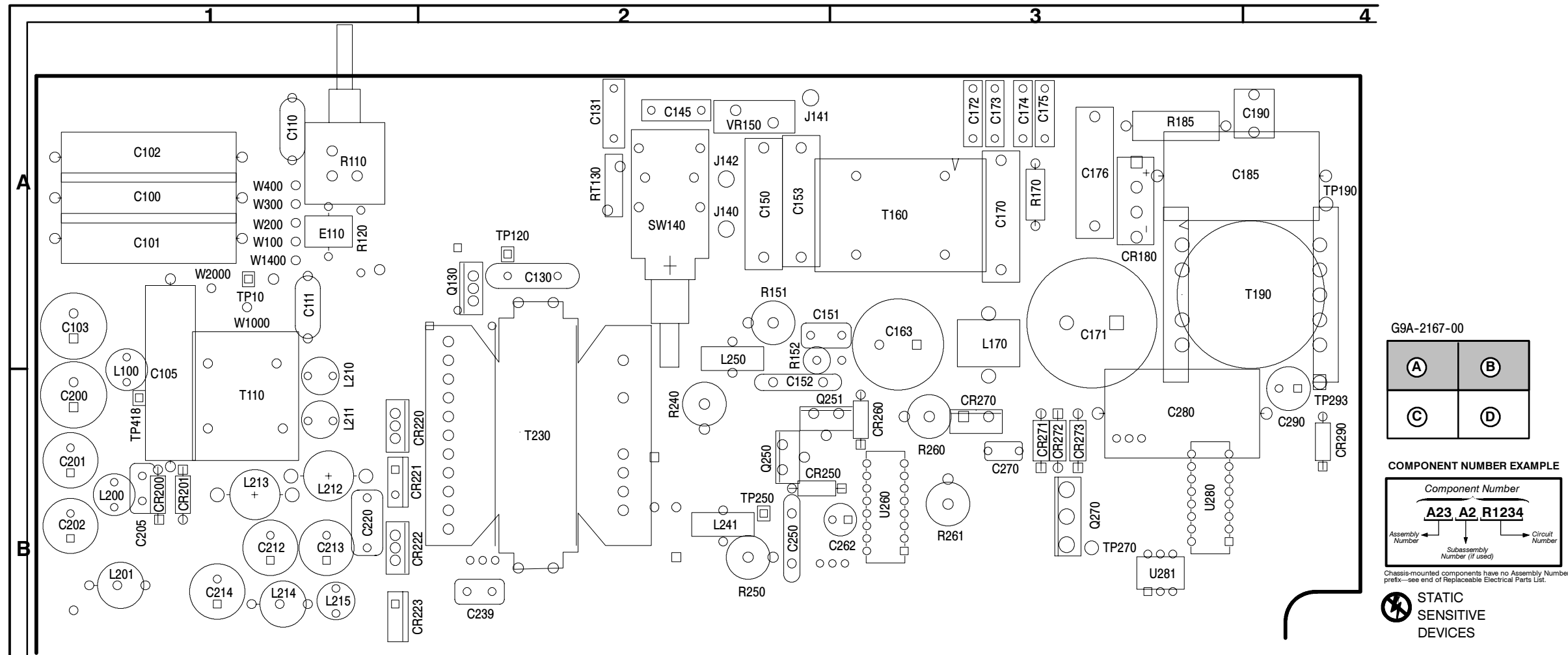


Figure 1-36: A15A1 Power Supply board front (sections A, B)

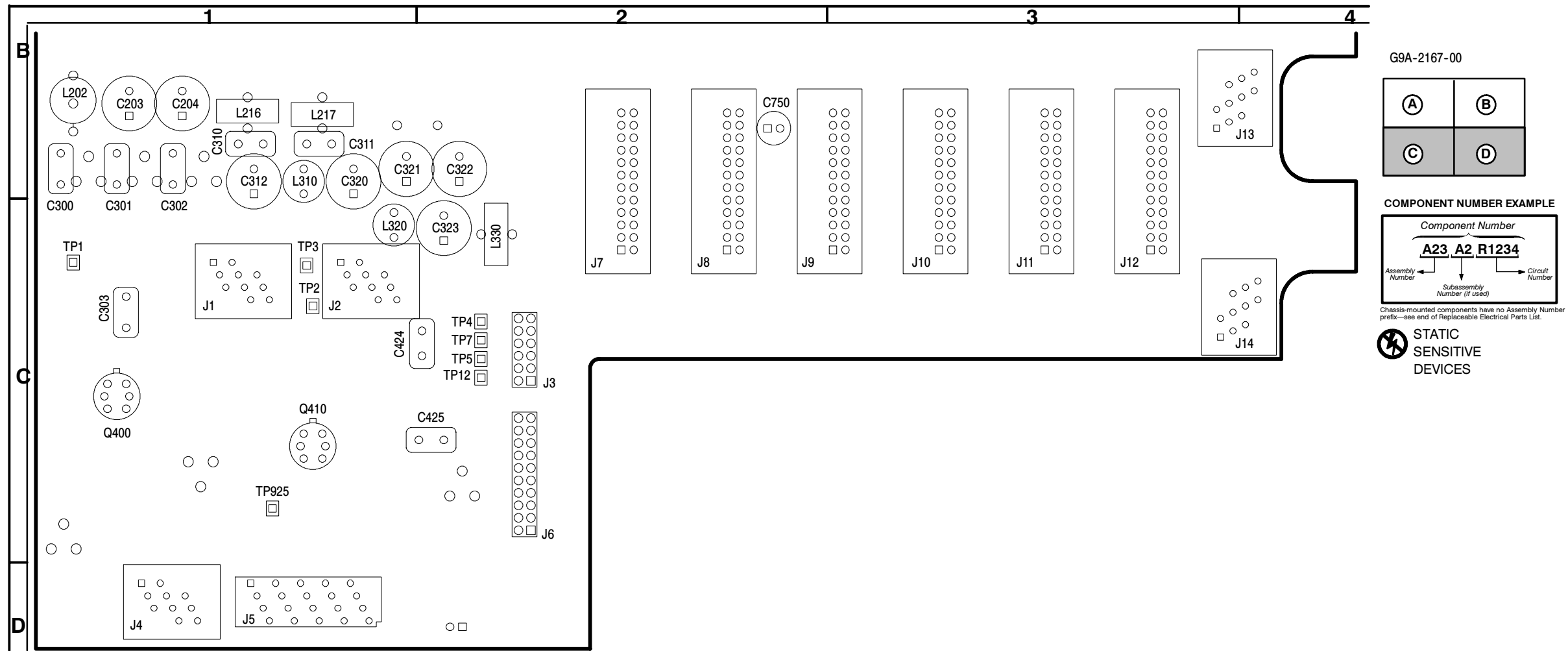
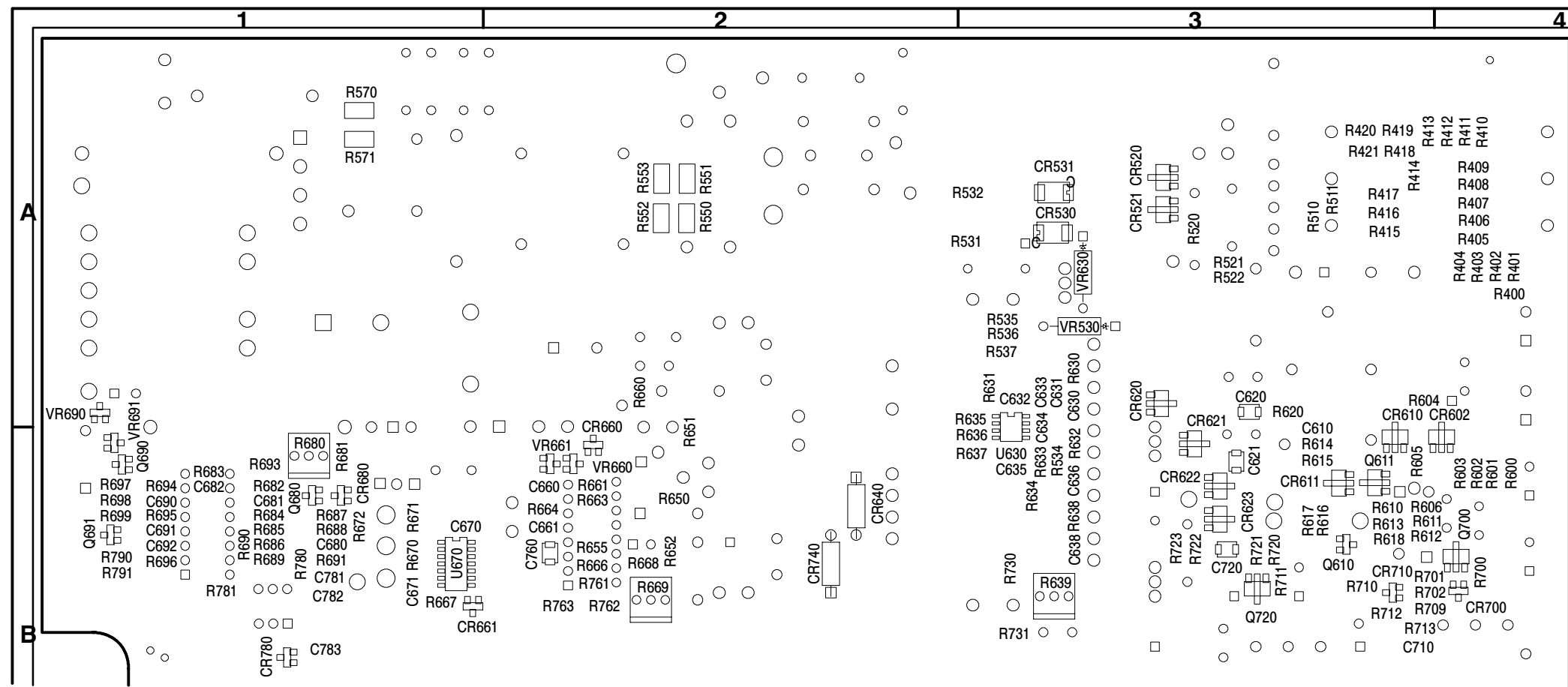
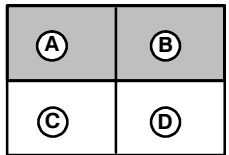


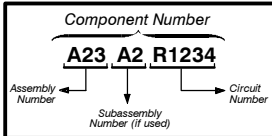
Figure 1-37: A15A1 Power Supply board front (sections C, D)



G9A-2167-00



COMPONENT NUMBER EXAMPLE

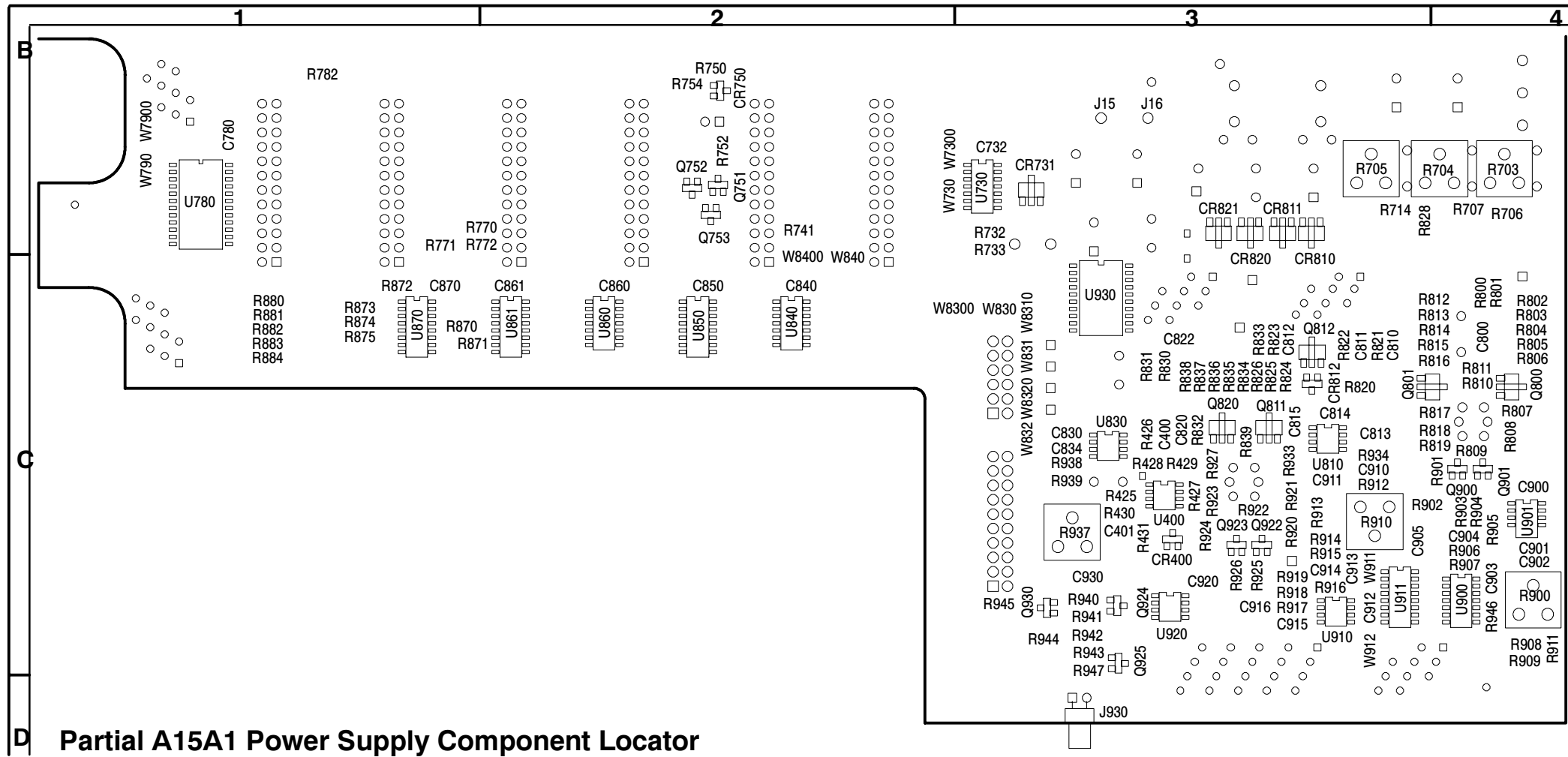


Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

STATIC SENSITIVE DEVICES

Figure 1-38: A15A1 Power Supply board back (sections A, B)

D



G9A-2167-00

(A)	(B)
(C)	(D)

**COMPONENT NUMBER EXAMPLE**

Component Number			
A23	A2	R	1234
↓	↓	↓	↓
Assembly Number	Subassembly Number (if used)	Circuit Number	

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**STATIC SENSITIVE DEVICES**

**Partial A15A1 Power Supply Component Locator**

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
C100	A1	5D3	C176	A3	1A5	C302	B1	5B4	C635*	B3	5A3	C783*	B1	1C5	C903*	C4	2D6	CR260	A2	2C2	CR661*	B1	2A2
C101	A1	5D2	C185	A3	1A6	C303	C1	4B5	C636*	B3	2D4	C800*	C4	4C5	C904*	C3	4D5	CR270	A3	1D6	CR680*	B1	1C4
C102	A1	5D3	C190	A3	1B6	C310	B1	2B5	C638*	B3	2C4	C810*	C3	5B3	C905*	C3	3C3	CR271	B3	1D6	CR700*	B3	4B4
C103	A1	2A5	C200	A1	2A5	C311	B1	2B5	C660*	B2	2C1	C811*	C3	5C3	C910*	C3	3C4	CR272	A3	1C6	CR710*	B3	4B3
C105	A1	5C4	C201	B1	2B5	C312	B1	2B5	C661*	B2	2C1	C812*	C3	5B2	C911*	C3	3C4	CR273	B3	1C6	CR731*	B3	2B5
C110	A1	5C3	C202	B1	2B5	C320	B1	2B6	C670*	B1	2A2	C813*	C3	4D4	C912*	C3	3D3	CR290	B4	1B6	CR740*	B2	2B3
C111	A1	5D4	C203	B1	2C5	C321	B1	2C5	C671*	B1	2A3	C814*	C3	3B4	C913*	C3	2C5	CR400*	C3	6D2	CR750*	B2	2C4
C130	A2	5A3	C204	B1	2C6	C322	B2	2B6	C680*	B1	1D2	C815*	C3	3C4	C914*	C3	3B3	CR520*	A3	5D4	CR780*	B1	1C4
C131	A2	1A3	C205	B1	4A5	C323	B1	2B6	C681*	B1	1D1	C820*	C3	3B5	C915*	C3	2C6	CR521*	A3	5D4	CR810*	B3	2B5
C145	A2	1B3	C212	B1	2D4	C400*	C3	6D2	C682*	B1	1C2	C822*	C3	3B2	C916*	C3	3B2	CR530*	A3	5A3	CR811*	B3	2B5
C150	A2	1A3	C213	B1	2D5	C401*	C3	6D2	C690*	B1	1C2	C830*	C3	2D2	C920*	C3	3C5	CR531*	A3	5A2	CR812*	C3	5B2
C151	A2	2B2	C214	B1	2C5	C424	C1	3A5	C691*	B1	1D2	C834*	C3	2D3	C930*	C3	5A4	CR602*	A3	5C3	CR820*	B3	2B5
C152	A2	2C3	C220	B1	5D2	C425	C1	2D3	C692*	B1	1C2	C840*	C2	2D5	CR180	A3	1A5	CR610*	A3	5C3	CR821*	B3	2B5
C153	A2	1A4	C239	B2	1B4	C610*	A3	1A4	C710*	B3	4B3	C850*	C2	2D6	CR200	B1	5D4	CR611*	B3	4A5	E110	A1	5D5
C163	A3	2B3	C250	B2	2B3	C620*	A3	5C2	C720*	B3	5D2	C860*	C2	2D5	CR201	B1	5C4	CR620*	A3	2A4	J1	C1	5A5
C170	A3	1A4	C262	B2	2D1	C621*	B3	5C1	C732*	B2	2D6	C861*	C1	2D6	CR220	A1	2D4	CR621*	A3	2B4	J1	C1	5B5
C171	A3	1A6	C270	B3	1C6	C630*	A3	2B4	C750	B2	2D5	C870*	C1	2D5	CR221	B1	2C4	CR622*	B3	5C2	J1	C1	5B5
C172	A3	1A5	C280	A3	1C5	C631*	A3	2B4	C760*	B2	2B2	C900*	C4	4C3	CR222	B1	2C5	CR623*	B3	5D1	J1	C1	5C5
C173	A3	1A4	C290	A4	1B1	C632*	A3	5A3	C780*	B1	2D5	C901*	C4	4D3	CR223	B1	2C4	CR640*	B2	2C3	J10	B3	8C1
C174	A3	1B5	C300	B1	5D3	C633*	A3	1B4	C781*	B1	1D4	C902*	C4	4D3	CR250	B2	2B2	CR660*	A2	2C2	J10	B3	8C1
C175	A3	1B4	C301	B1	5B4	C634*	A3	1B4	C782*	B1	1D4												

\*Asterisks indicate components located on the back of the board.

Figure 1-39: A15A1 Power Supply board back (sections C, D) and partial component locator

### A15A1 Power Supply Component Locator (cont.)

CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION	CIRCUIT NUMBER	BOARD LOCATION	SCHEM LOCATION
J2	C1	3B1	L213	B1	2D4	R404*	A3	5A1	R614*	A3	1A4	R703*	B4	5C3	R818*	C3	4D6	R921*	C3	3B4	U780*	B1	6A1
J2	C1	4C6	L214	B1	2C4	R405*	A4	5B1	R615*	B3	1A4	R704*	B3	5B3	R819*	C3	4D5	R922*	C3	3B5	U810*	C3	3B4
J2	C1	4D6	L215	B1	2C5	R406*	A4	5B1	R616*	B3	4A3	R705*	B3	5B4	R820*	C3	5B3	R923*	C3	3B5	U810*	C3	4D4
J2	C1	5A4	L216	B1	2B4	R407*	A4	5B1	R617*	B3	4A3	R706*	B4	5C3	R821*	C3	5B3	R924*	C3	3C4	U830*	C3	2D2
J3	C2	7A1	L217	B1	2B4	R408*	A4	5B1	R618*	B3	4A4	R707*	B3	5B4	R822*	C3	5B3	R925*	C3	3C5	U840*	C2	6C2
J4	C1	7B1	L241	B2	2B3	R409*	A4	5B1	R620*	A3	5C2	R709*	B3	4A3	R823*	C3	5B2	R926*	C3	3C5	U840*	C2	6C3
J4	C1	7C1	L250	A2	2C3	R410*	A4	5B1	R630*	A3	2B4	R710*	B3	4A3	R824*	C3	3A4	R927*	C3	3B5	U840*	C2	6C4
J5	C1	7C1	L310	B1	2B6	R411*	A3	5B2	R631*	A2	5A3	R711*	B3	5D2	R825*	C3	3A4	R933*	C3	3B4	U840*	C2	6D5
J5	C1	7D1	L320	B1	2B6	R412*	A3	5B2	R632*	A3	2D4	R712*	B3	4B4	R826*	C3	3A4	R934*	C3	3C3	U850*	C2	6D6
J6	C2	7C4	L330	B2	2B5	R413*	A3	5B2	R633*	B3	1B4	R713*	B3	4B3	R828*	B3	5B3	R937*	C3	2D2	U860*	C2	6A3
J6	C2	7C4	Q130	A2	5A3	R414*	A3	5B2	R634*	B3	1B4	R714*	B3	5B4	R830*	C3	3A5	R938*	C3	2D2	U861*	C1	6C5
J6	C2	7C4	Q250	B2	2B2	R415*	A3	5C2	R635*	A2	5A3	R720*	B3	5D2	R831*	C3	3A4	R939*	C3	2D2	U870*	C1	6C3
J6	C2	7D4	Q251	A2	2C2	R416*	A3	5C2	R636*	A2	5B2	R721*	B3	5D2	R832*	C3	3B5	R940*	C3	5A4	U900*	C3	3D4
J6	C2	7D4	Q270	B3	1C5	R417*	A3	5C2	R637*	B2	5B3	R722*	B3	5D2	R833*	C3	5B2	R941*	C3	5A4	U900*	C3	4C2
J6	C2	7D4	Q400	C1	4D4	R418*	A3	5C2	R638*	B3	2C4	R723*	B3	5D2	R834*	C3	3A4	R942*	C3	5A4	U900*	C3	6D3
J7	B2	7A6	Q400	C1	4D5	R419*	A3	5C2	R639*	B3	5A2	R730*	B3	5A2	R835*	C3	3A5	R943*	C3	5A5	U901*	C4	4D3
J7	B2	7A6	Q410	C1	3B5	R420*	A3	5D2	R650*	B2	2B2	R731*	B3	5A2	R836*	C3	3A5	R944*	C3	4A3	U910*	C3	3B3
J7	B2	7B6	Q610*	B3	4A3	R421*	A3	5D2	R651*	A2	2C2	R732*	B3	4A2	R837*	C3	3A5	R945*	C3	4B2	U911*	C3	3C2
J7	B2	7B6	Q611*	B3	4A5	R425*	C3	6D1	R652*	B2	2D1	R733*	B3	4A2	R838*	C3	3A5	R946*	C4	6D3	U911*	C3	3D3
J8	B2	7C6	Q680*	B1	1C4	R426*	C3	6D1	R655*	B2	2D1	R741*	B2	7C6	R839*	C3	3B5	R947*	C3	5A5	U911*	C3	4C2
J8	B2	7C6	Q690*	B1	1B2	R427*	C3	6D1	R660*	A2	2B2	R750*	B2	2D4	R870*	C1	6B3	RT130	A2	1A3	U911*	C3	4D1
J8	B2	7C6	Q691*	B1	1B3	R428*	C3	6D1	R661*	B2	2C2	R752*	B2	2D5	R871*	C1	6B3	SW140	A2	1A2	U920*	C3	2D3
J8	B2	7D6	Q700*	B3	4A4	R429*	C3	6D2	R663*	B2	2C2	R754*	B2	2D5	R872*	C1	6C3	TP1	B1	2A5	U930*	C3	7B4
J8	B2	7D6	Q720*	B3	5D3	R430*	C3	6D2	R664*	B2	2C1	R761*	B2	2D1	R873*	C1	6C3	TP2	C1	2A5	VR150	A2	1A3
J9	B2	8A1	Q751*	B2	2D6	R431*	C3	6D2	R666*	B2	2D1	R762*	B2	2A2	R874*	C1	6C3	TP3	C1	2B6	VR530*	A3	5A2
J9	B2	8A1	Q752*	B2	2C6	R510*	A3	5D2	R667*	B2	2A2	R763*	B2	2B2	R875*	C1	6B3	TP4	C2	2C5	VR630*	A3	5A2
J9	B2	8B1	Q753*	B2	2C6	R511*	A3	5D2	R668*	B2	2D1	R770*	B1	8C1	R880*	C1	6C2	TP5	C2	2C6	VR660*	B2	2C2
J10	B3	8D1	Q800*	C4	4C4	R520*	A3	5D4	R669*	B2	2D1	R771*	B1	2D6	R881*	C1	6C2	TP7	C2	2D5	VR661*	B2	2C2
J10	B3	8D1	Q801*	C3	4C5	R521*	A3	5D6	R670*	B1	2A2	R772*	B1	2D6	R882*	C1	6B2	TP10	A1	5D3	VR690*	A1	1B6
J11	B3	8A6	Q811*	C3	3B4	R522*	A3	5D6	R671*	B1	2A3	R780*	B1	1D3	R883*	C1	6B2	TP12	C2	2C6	VR691*	A1	1B2
J11	B3	8A6	Q812*	C3	5B3	R531*	A2	1A3	R672*	B1	1C5	R781*	B1	1D4	R884*	C1	6B2	T110	A1	1A4	W100	A1	5C6
J11	B3	8B6	Q820*	C3	3B5	R532*	A2	1A3	R680*	B1	1D2	R782*	B1	1C5	R900*	C4	4C3	T160	A3	1A4	W200	A1	5C5
J11	B3	8B6	Q900*	C3	4D4	R534*	B3	1B4	R681*	B1	1D2	R790*	B1	1B2	R901*	C3	4D4	T190	A3	1B6	W300	A1	5C5
J12	B3	8C6	Q901*	C4	4D5	R535*	A3	5A2	R682*	B1	1C1	R791*	B1	1B2	R902*	C3	4D4	T230	B2	2B3	W400	A1	5C5
J12	B3	8C6	Q922*	C3	3C5	R536*	A3	5A1	R683*	B1	1C3	R800*	C4	4B5	R903*	C4	4D4	TP120	A2	5A3	W730*	B2	4A2
J12	B3	8D6	Q923*	C3	3C5	R537*	A3	5A1	R684*	B1	1C1	R801*	C4	4B4	R904*	C4	4D5	TP190	A4	1A5	W790*	B1	8D5
J12	B3	8D6	Q924*	C3	5A5	R550*	A2	1A4	R685*	B1	1C1	R802*	C4	4B4	R905*	C4	4D2	TP250	B2	2B2	W830*	C3	7B3
J13	B3	8C4	Q925*	C3	5A5	R551*	A2	1A4	R686*	B1	1C1	R803*	C4	4B4	R906*	C3	3D4	TP270	B3	1C5	W831*	C3	7B3
J14	C3	8D4	Q930*	C3	4B3	R552*	A2	1A4	R687*	B1	1C4	R804*	C4	4C4	R907*	C3	3D3	TP293	A4	2A2	W832*	C3	7A3
J15*	B3	2C6	R110	A1	5C2	R553*	A2	1A4	R688*	B1	1D2	R805*	C4	4C4	R908*	C4	4B2	TP418	A1	5C3	W840*	B2	7C3
J16*	B3	2C6	R120	A1	5D5	R570*	A1	1A5	R689*	B1	1C1	R806*	C4	4C4	R909*	C4	4D2	TP925	C1	3B4	W911*	C3	3C2
J140	A2	1A2	R151	A2	2C3	R571*	A1	1A5	R690*	B1	1D1	R807*	C4	4C4	R910*	C3	3C3	U260	B3	2C1	W912*	C3	4B2
J141	A2	1A2	R152	A2	2B2	R600*	B4	4B5	R691*	B1	1D2	R808*	C4	4D4	R911*	C4	4C3	U280	B3	1C2	W1000	A1	2A6
J142	A2	1B2	R170	A3	1A5	R601*	B4	4B5	R693*	B1	1C1	R809*	C4	4D5	R912*	C3	3C3	U281	B3	1D5	W1400	A1	5C6
J930*	D3	5A5	R185	A3	1B5	R602*	B4	4A5	R694*	B1	1C2	R810*	C4	4C5	R913*	C3	3B2	U400*	C3	6D1	W2000	A1	5D1
L100	A1	2A5	R240	A2	2B3	R603*	B3	4A5	R695*	B1	1D2	R811*	C4	4C5	R914*	C3	3B3	U630*	A3	1B4	W7300*	B2	4A2
L170	A3	1C6	R250	B2	2B3	R604*	A3	5D3	R696*	B1	1C2	R812*	C3	4B5	R915*	C3	3C3	U630*	A3	5A3	W7900*	B1	8D5
L200	B1	2B5	R260	A3	1D5	R605*	B3	5C4	R697*	B1	1B2	R813*	C3	4B5	R916*	C3	3B3	U670*	B1	2A2	W8300*	C2	7B3
L201	B1	2C5	R261	B3	2B1	R606*	B3	4A4	R698*	B1	1B2	R814*	C3	4C5	R917*	C3	3B3	U670*	B1	2A3	W8310*	C3	7A3
L202	B1	2C5	R400*	A4	5A2	R610*	B3	4A5	R699*	B1	1B2	R815*	C3	4C5	R918*	C3	3B3	U730*	B2	4A2	W8320*	C3	7A3
L210	A1	2A5	R401*	A4	5A2	R611*	B3	4A4	R700*	B4	4B4	R816*	C3	4C5	R919*	C3	3B2	U730*	B2	4A2	W8400*	B2	7B3
L211	A1	2B4	R402*	A4	5A2	R612*	B3	4A4	R701*	B3	4A4	R817*	C3	4C5	R920*	C3	3C4	U730*	B2	4A3			
L212	B1	2D4	R403*	A4	5A2	R613*	B3	4A5	R702*	B3	4A4												

\*Asterisks indicate components located on the back of the board.

Figure 1-40: A15A1 Power Supply component locator (cont.)

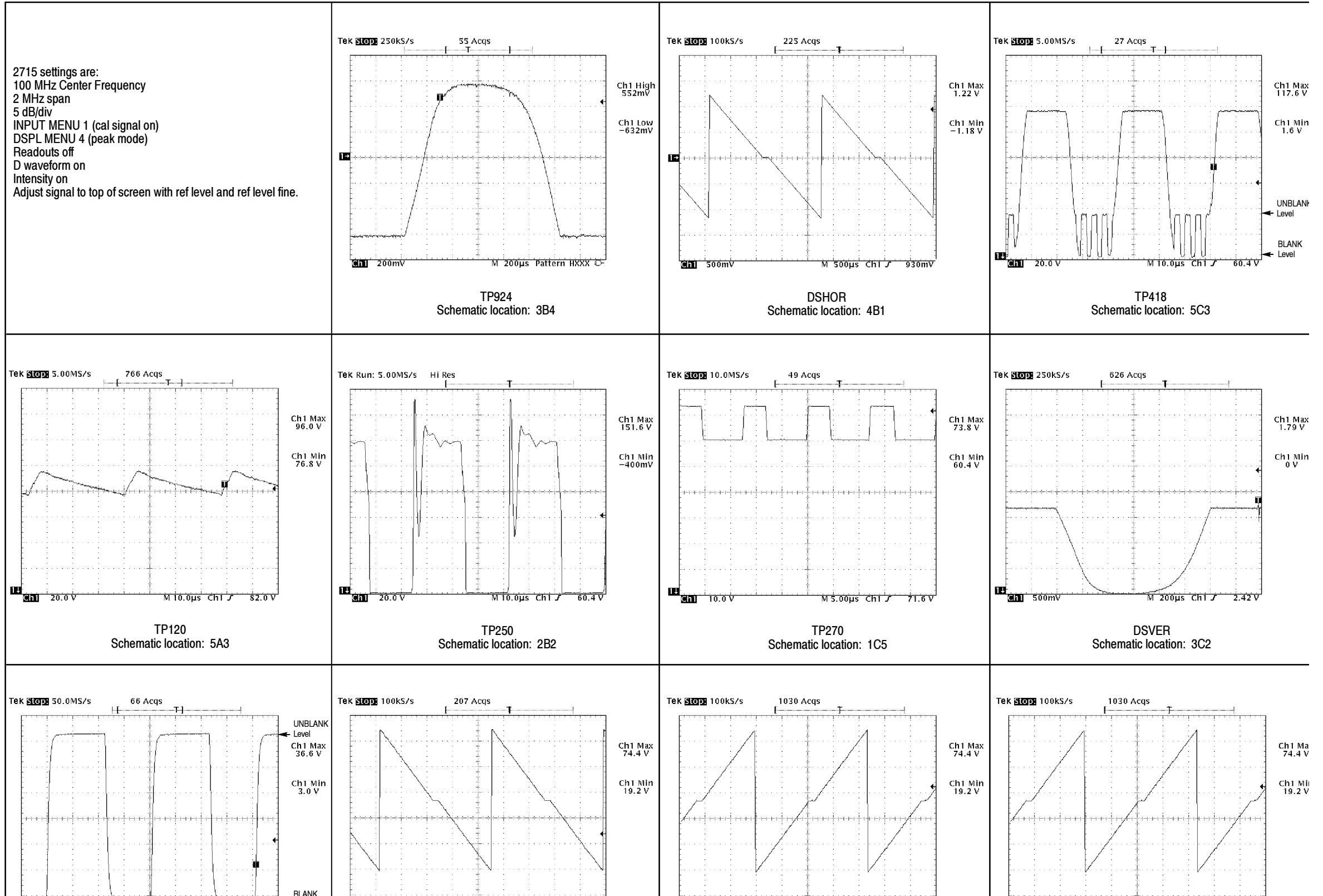
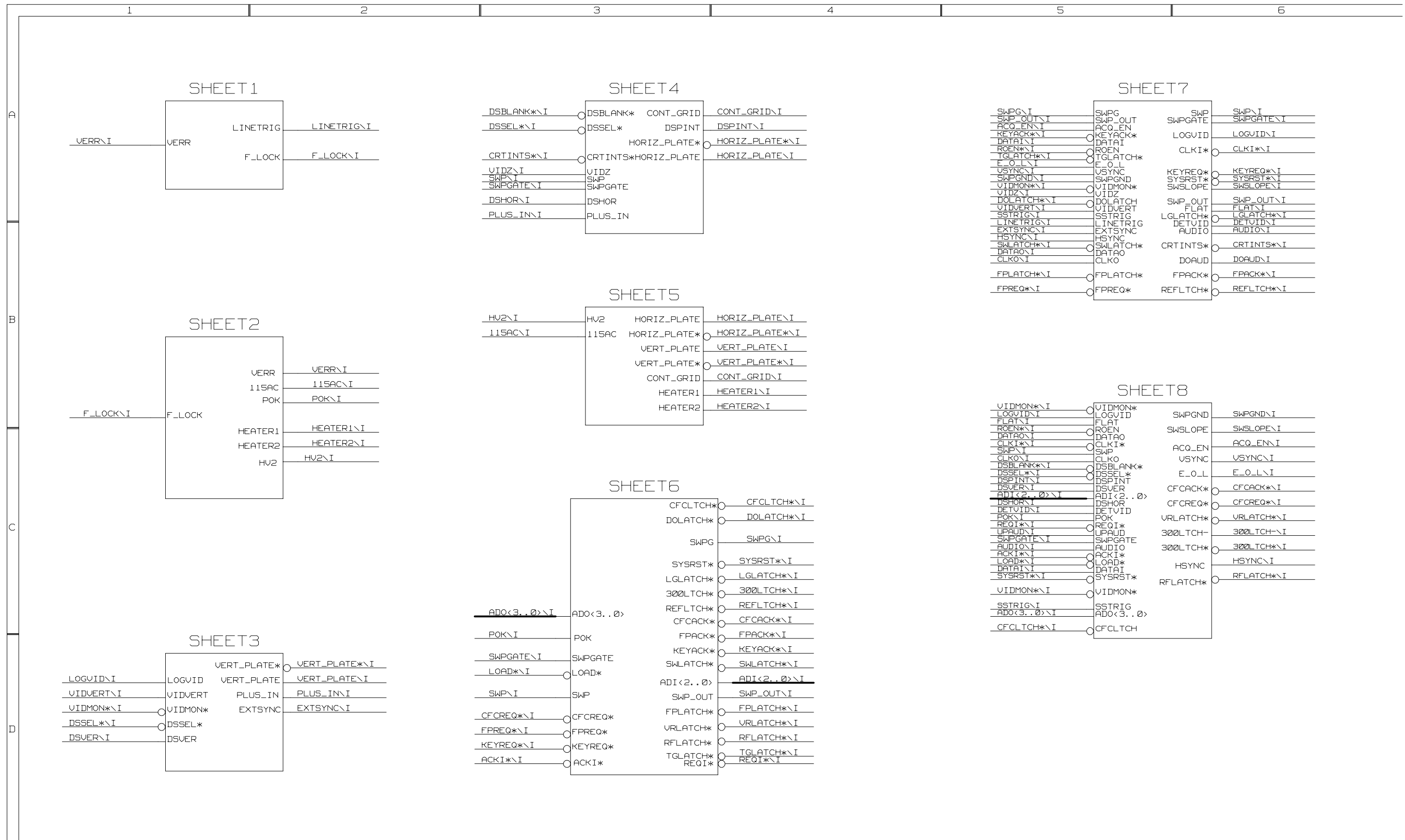


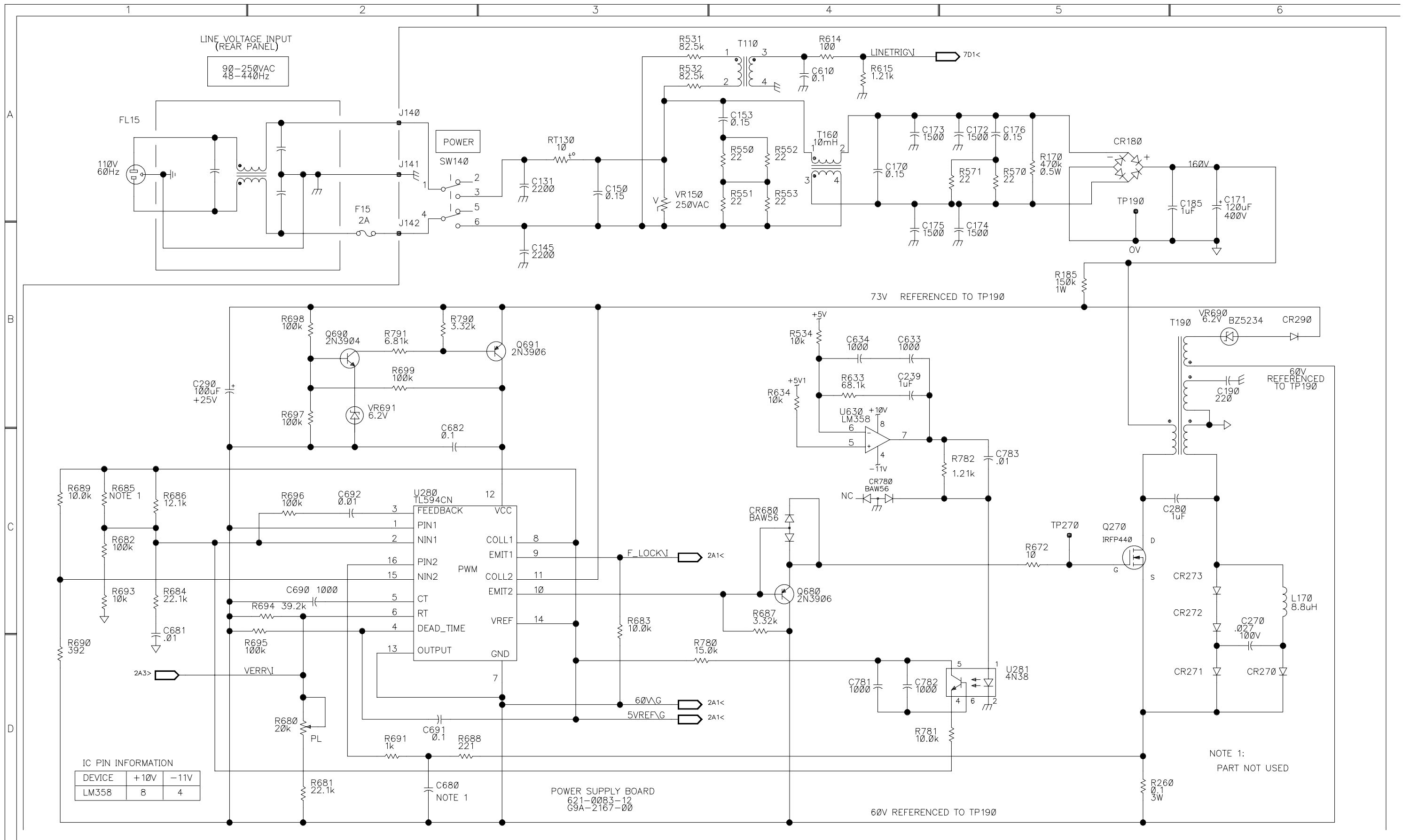
Figure 1-41: A15A1 Power Supply Waveforms







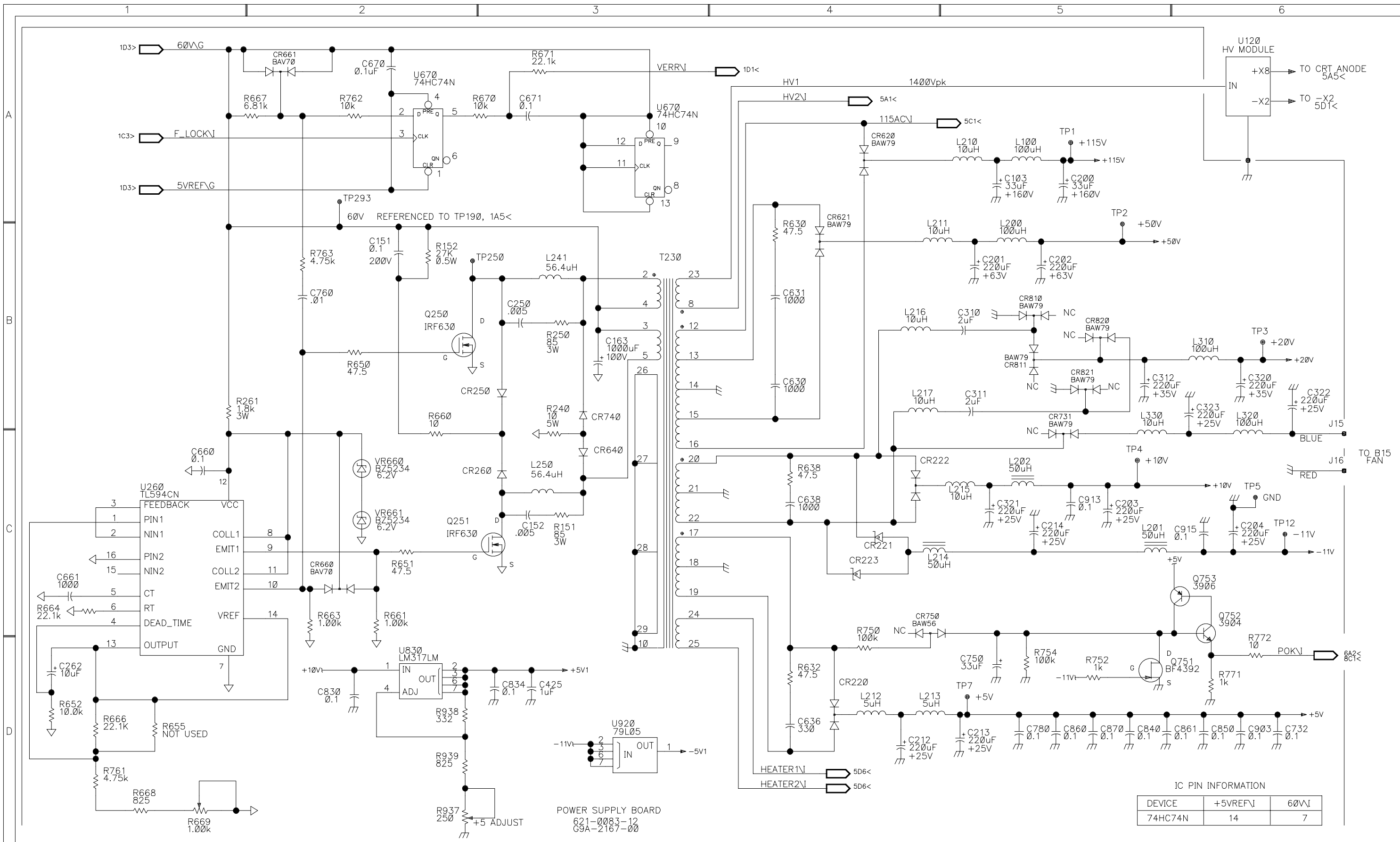




IC PIN INFORMATION

DEVICE	+10V	-11V
LM358	8	4

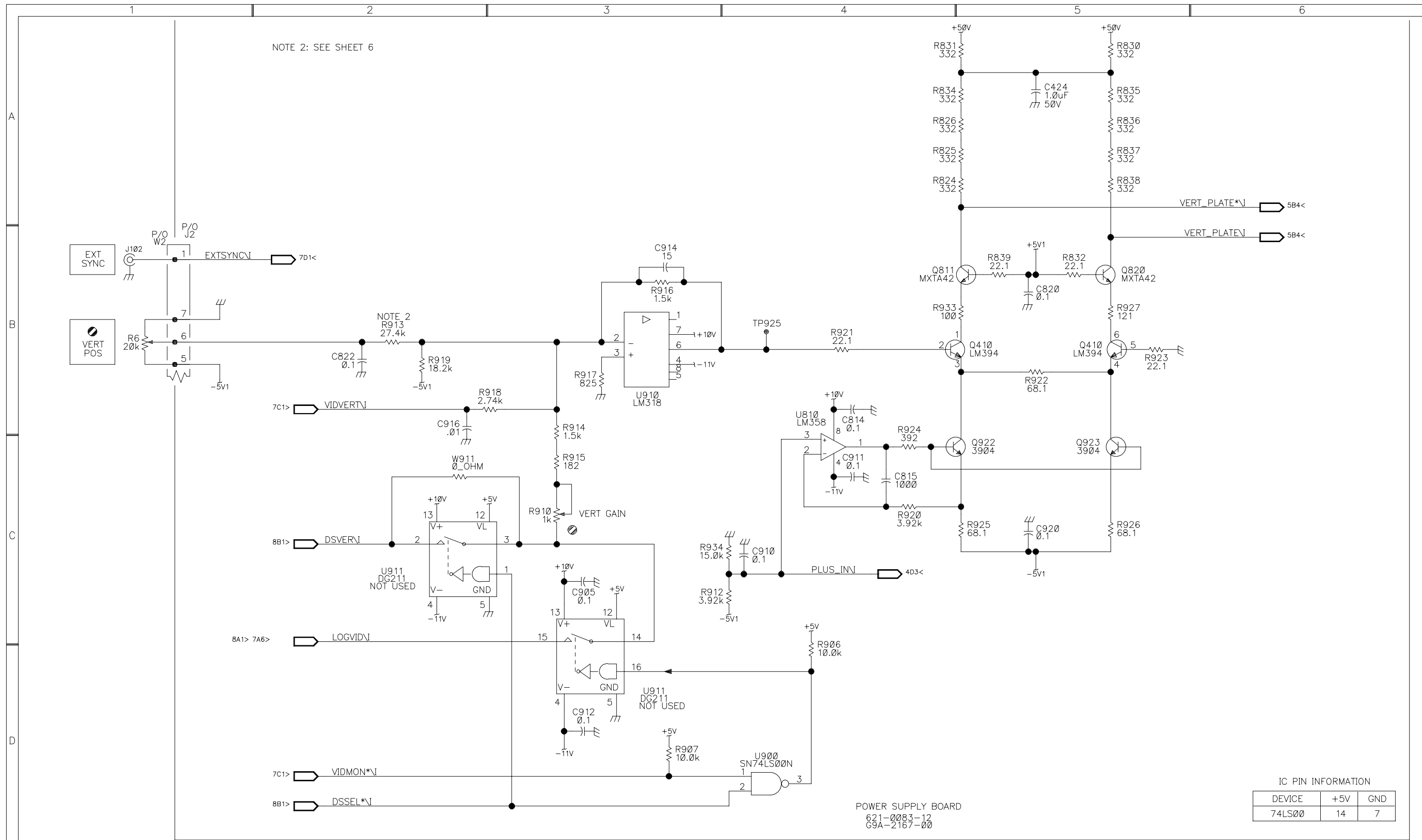




IC PIN INFORMATION

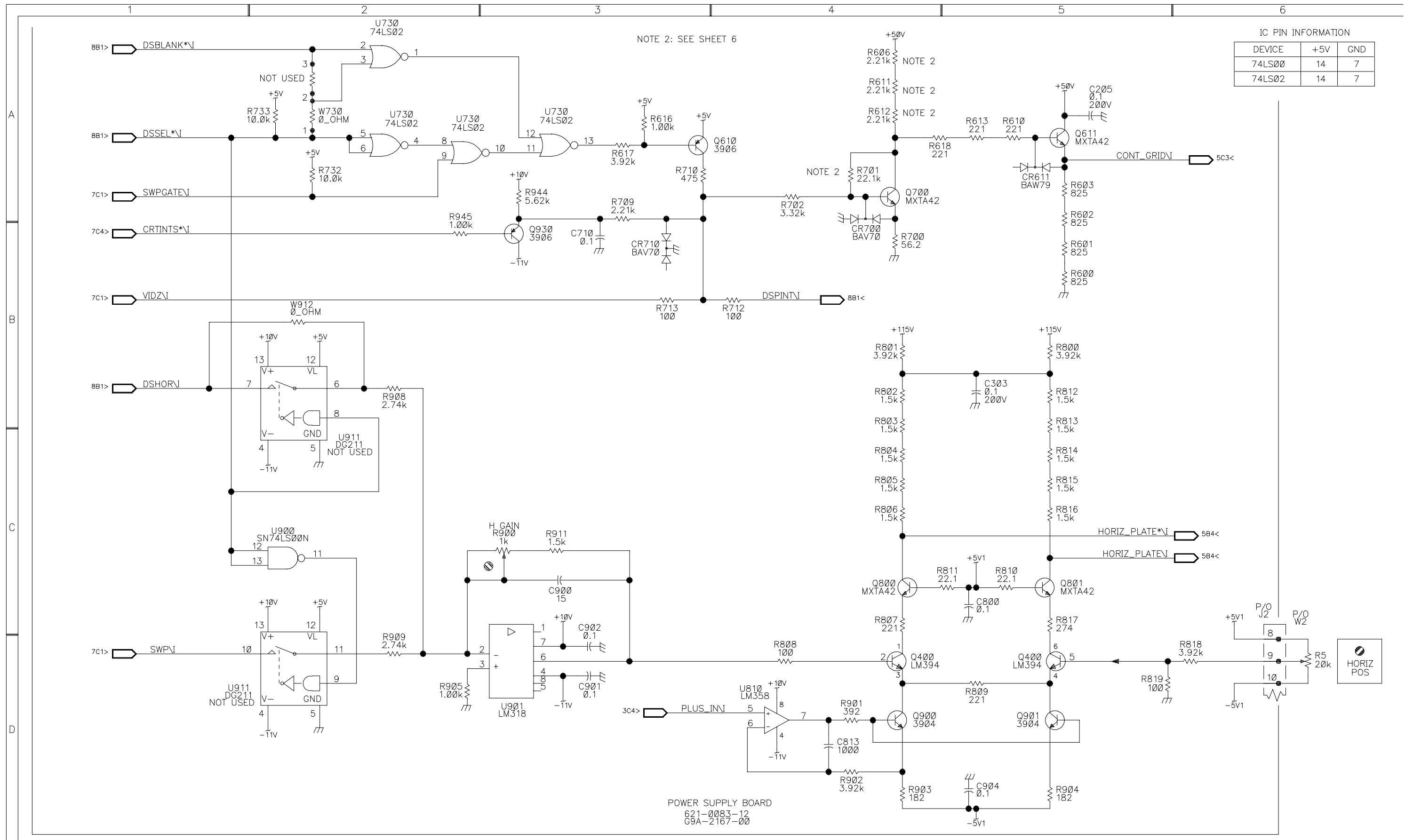
DEVICE	+5VREFV <sub>I</sub>	60V <sub>V<sub>I</sub></sub>
74HC74N	14	7







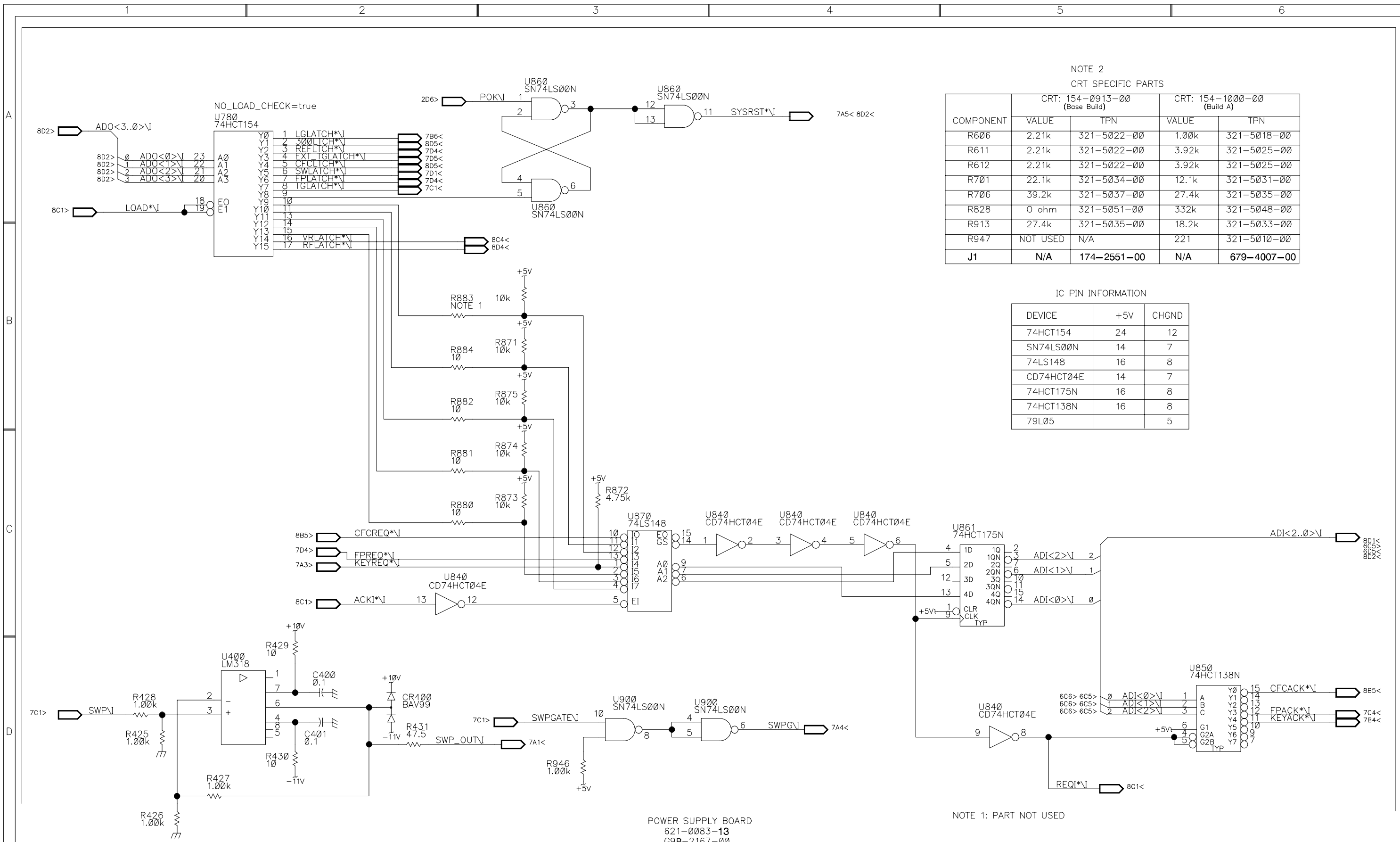












NOTE 2  
CRT SPECIFIC PARTS

COMPONENT	CRT: 154-0913-00 (Base Build)		CRT: 154-1000-00 (Build A)	
	VALUE	TPN	VALUE	TPN
R606	2.21k	321-5022-00	1.00k	321-5018-00
R611	2.21k	321-5022-00	3.92k	321-5025-00
R612	2.21k	321-5022-00	3.92k	321-5025-00
R701	22.1k	321-5034-00	12.1k	321-5031-00
R706	39.2k	321-5037-00	27.4k	321-5035-00
R828	0 ohm	321-5051-00	332k	321-5048-00
R913	27.4k	321-5035-00	18.2k	321-5033-00
R947	NOT USED	N/A	221	321-5010-00
J1	N/A	174-2551-00	N/A	679-4007-00

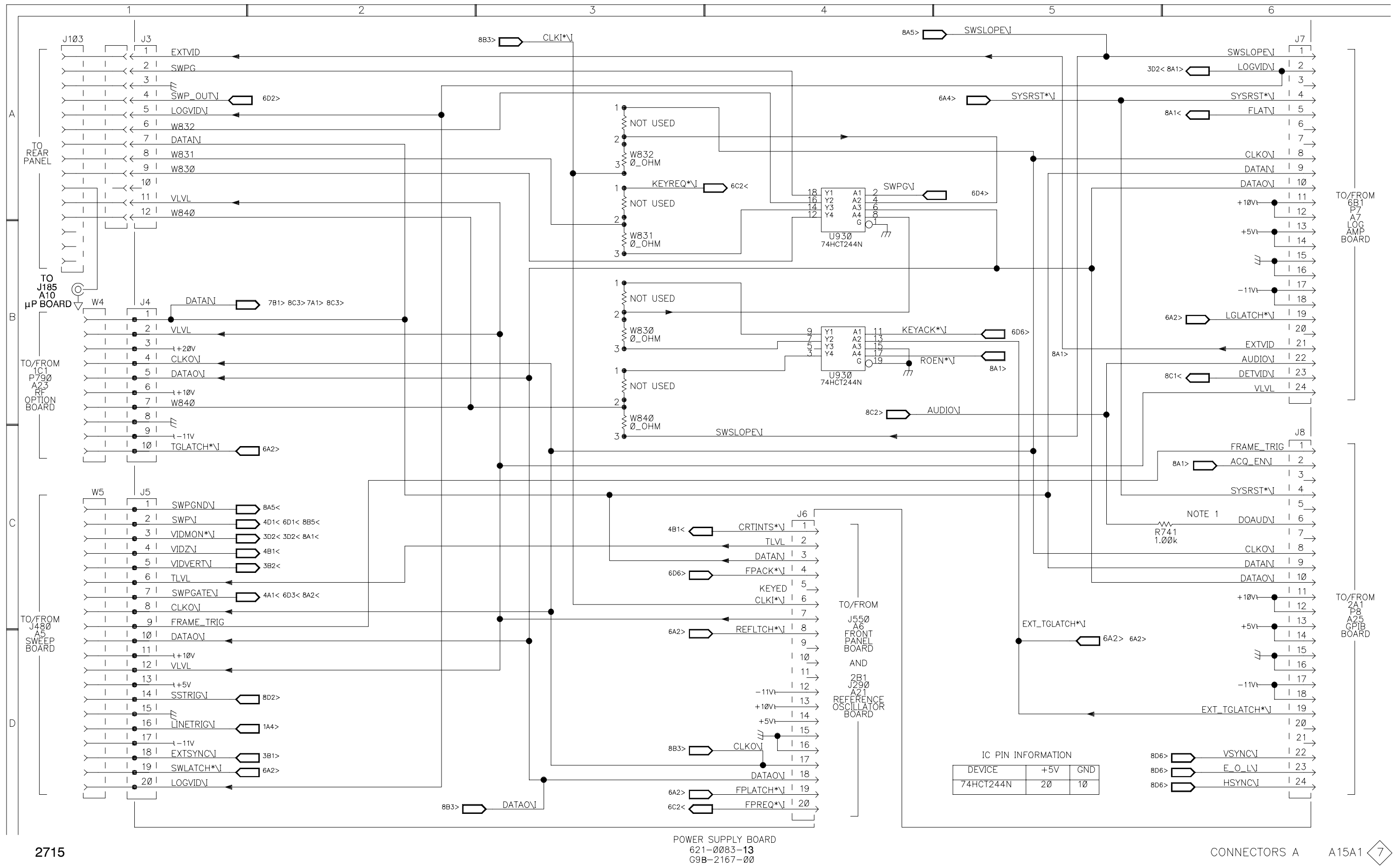
IC PIN INFORMATION

DEVICE	+5V	CHGND
74HCT154	24	12
SN74LS00N	14	7
74LS148	16	8
CD74HCT04E	14	7
74HCT175N	16	8
74HCT138N	16	8
79L05		5

POWER SUPPLY BOARD  
621-0083-13  
G9B-2167-00

NOTE 1: PART NOT USED





2715

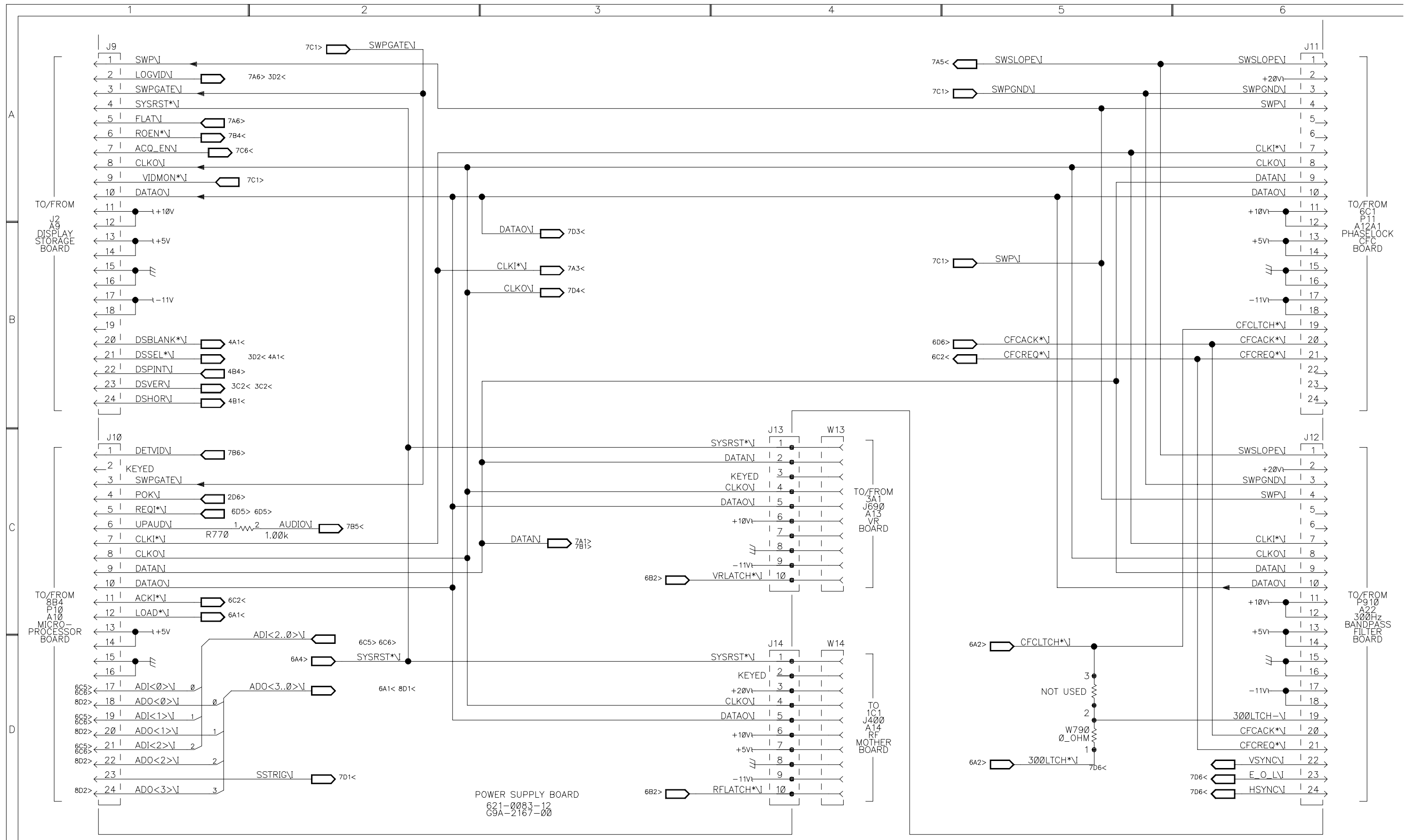
POWER SUPPLY BOARD  
621-0083-13  
G9B-2167-00

CONNECTORS A

A15A1 7  
OF:9







2715

CONNECTORS B

A15A1 8

