Service Manual

Tektronix

DSA 600 Series
Digitizing Signal Analyzers

070-8184-00

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 the Safety Summary prior to performing service.

Please check for change information at the rear of this manual.

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Instrument Serial Numbers

Each instrument manufactured by Tektronix has a serial number on a panel insert or tag, or stamped on the chassis. The first letter in the serial number designates the country of manufacture. The last five digits of the serial number are assigned sequentially and are unique to each instrument. Those manufactured in the United States have six unique digits. The country of manufacture is identified as follows:

B010000	Tektronix, Inc., Beaverton, Oregon, USA
E200000	Tektronix United Kingdom, Ltd., London
J300000	Sony/Tektronix, Japan
H700000	Tektronix Holland, NV, Heerenveen, The Netherlands

Instruments manufactured for Tektronix by external vendors outside the United States are assigned a two digit alpha code to identify the country of manufacture (e.g., JP for Japan, HK for Hong Kong, IL for Israel, etc.).

Tektronix, Inc., P.O. Box 500, Beaverton, OR 97077

Printed in U.S.A.

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.

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General Information

This *DSA 600 Series Service Reference* is designed for use by qualified service personnel. It contains information necessary to check, troubleshoot, and maintain the following DSA 600 Series Digitizing Signal Analyzers:

- DSA 601
- DSA 602
- DSA 601A
- DSA 602A

For the different DSA versions, 601 indicates a maximum sampling rate of one gigasample per second, 602 indicates a maximum of two gigasamples per second. An "A" indicates that the DSA is equipped with a disk drive. In this manual, DSA 600 refers to the DSA 601 and DSA 602. DSA 600A refers to DSA 601A and DSA 602A. Discussions of the DSA 601 and DSA 602 also include the "A" version unless indicated otherwise.

Troubleshooting the DSA is primarily based upon internal power-on diagnostics. These diagnostics isolate problems to the field replaceable unit (FRU) level. Defective FRUs not detected by diagnostics are isolated using other troubleshooting methods. Once the faulty FRU is identified, use the instructions provided in this manual to remove and replace it. Removing and immediately replacing the faulty FRU will minimize downtime. The Replaceable Parts section at the end of this manual provides a complete list of FRUs in the DSA.

First-time users are encouraged to read *The DSA 601A and DSA 602A Tutorial*. This tutorial will familiarize you with the basic functions of the DSA.

This section contains information about safety, installing and removing a plug-in amplifier, applying power, proper environmental conditions, shipping the DSA, and instrument options.

The major sections in this manual are:

- General Information – discusses information that is helpful prior to servicing.
- Checks and Adjustments – contains procedures for preparing the DSA for specified performance.
- Maintenance – provides the information necessary to maintain, troubleshoot, and repair DSA600 Series instruments to the board level.
- Theory of Operation – provides a high level overview of signal acquisition plus detailed circuit discriptions for every board.
- Replaceable Parts – lists the Field Replaceable Units (FRUs) and mechanical parts.

Safety Summary

This general safety information is directed to operators and service personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

Terms in Manuals

CAUTION statements in manuals identify conditions or practices that could result in damage to the equipment or other property.

WARNING statements in manuals identify conditions or practices that could result in personal injury or loss of life.

Terms on Equipment

CAUTION on equipment identifies a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

DANGER on equipment identifies a personal injury hazard immediately accessible as one reads the marking.

Symbols in Manuals

Static Sensitive Devices

Symbols on Equipment

DANGER
High Voltage

Protective ground (earth) terminal

ATTENTION
Refer to manual

Power Source

This product is intended to operate from a power source that will not apply more than 250 V rms between the supply conductors or between either supply conductor and ground. A protective ground connection, by way of the grounding conductor in the power cord, is essential for safe operation.

Grounding the Product

The DSA is grounded through the grounding conductor in the power cord. To avoid electric shock, plug the power cord into a properly wired receptacle before making connections to the DSA input or output terminals. A protective-ground connection, by way of the grounding conductor in the power cord, is essential for safe operation.

Danger Arising from Loss of Ground

Upon loss of the protective-ground connection, all accessible conductive parts (including knobs and controls that may appear to be insulating) can render an electrical shock.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate the DSA in an atmosphere of explosive gasses.

Do Not Service Alone

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

Use Care When Servicing with Power On

Dangerous voltages exist at several points in the DSA. To avoid personal injury, do not touch exposed connections and components while the PRINCIPAL POWER switch is ON.

Disconnect the power before removing protective panels, soldering, or replacing components.

CRT Handling

Use care when handling a CRT. Breakage of the CRT causes a high-velocity scattering of glass fragments (implosion). Protective clothing and safety glasses should be worn. Avoid striking the CRT on any object which might cause it to crack or implode. When storing a CRT, place it in a protective carton or place it face down in a protected location on a smooth surface with a soft mat under the faceplate.

Use the Proper Fuse

To avoid fire hazard, use only a fuse which is identical in type, voltage rating, and current rating to the fuse specified in the Replaceable Parts section.

Plug-in Unit Installation and Removal

To install a plug-in unit in a DSA:

1. Set the ON/STANDBY switch to STANDBY to prevent damage to the DSA.
2. Align the grooves in the top and bottom of the plug-in amplifier with the guides in the plug-in compartment of the DSA (see Figure 1-1).
3. Slide the plug-in unit into the DSA until the front panel of the plug-in unit is flush with the front panel of the DSA.

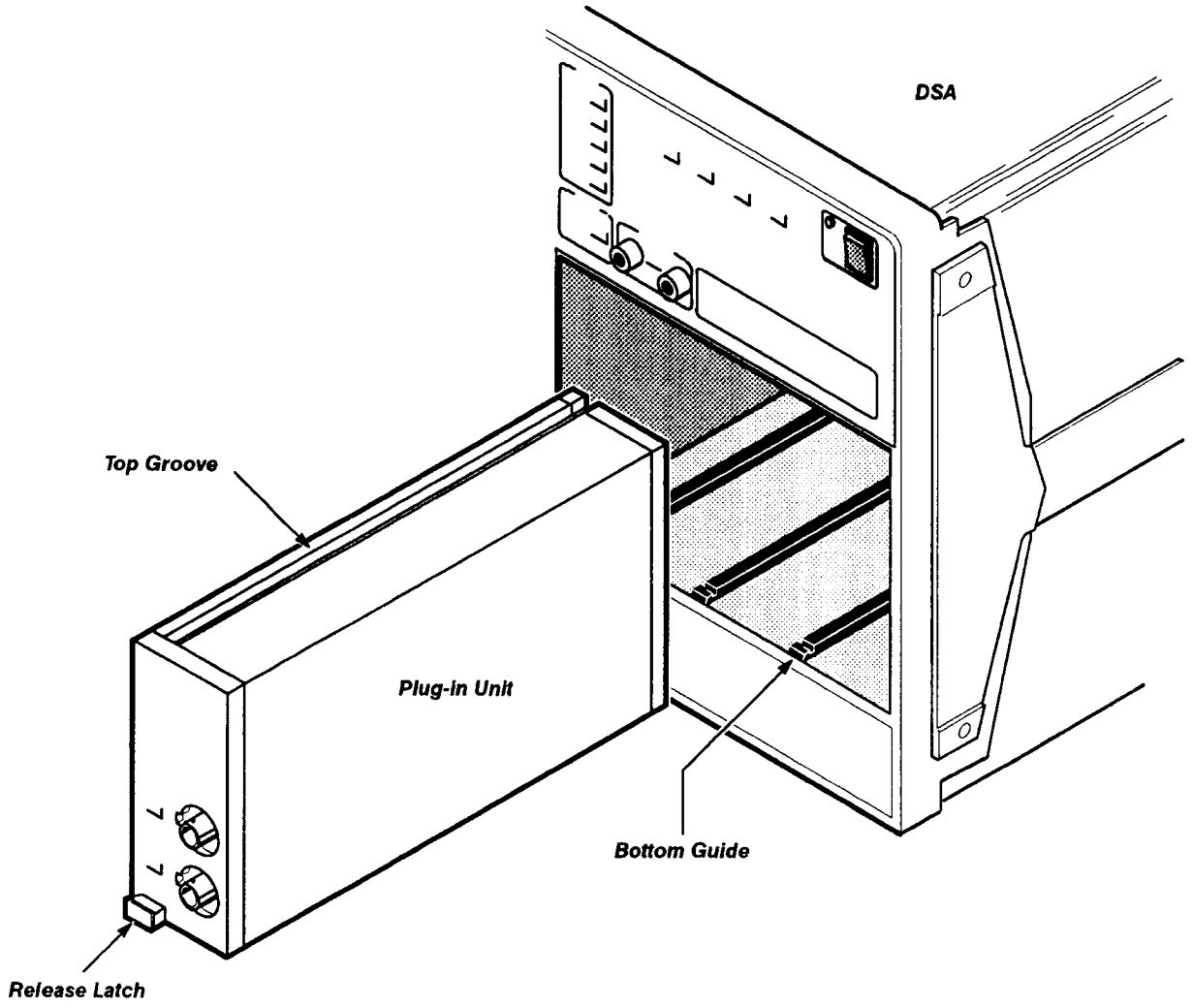


Figure 1-1 *— Plug-in Compartments in the DSA 600 Series*

CAUTION

Never install or remove a plug-in unit when the ON/STANDBY switch is ON.

To remove the plug-in unit from the DSA:

1. Set the ON/STANDBY switch to STANDBY to prevent damage to the DSA.
2. Pull the release latch to disengage the plug-in unit from the DSA (see Figure 1-1).
3. Remove the plug-in unit from the plug-in compartment.

New Configuration

When a plug-in unit is first installed in a DSA or moved to a different compartment, the DSA is in new configuration mode. After running the Self-Test diagnostics the DSA performs a partial Enhanced Accuracy cycle and displays the message **New configuration partial enhanced accuracy occurring**. If this operation is successful, the DSA enters normal operating mode.

Power Information

The rear panel LINE VOLTAGE SELECTOR allows you to select either a 115 V or 230 V (48 to 72 Hz) nominal supply source. Both the 115 V and 230 V operation use the 12 A, 250 V line fuse.

WARNING

AC POWER SOURCE AND CONNECTION. *The DSA operates from a single-phase power source. It has a three-wire power cord and two-pole, three-terminal grounding type plug. The voltage to ground (earth) from either pole of the power source must not exceed the maximum rated operating voltage, 250 V.*

Before connecting the power source, ensure that the LINE VOLTAGE SELECTOR is set to match the voltage of the power source, and that the power cord has a suitable two-pole, three-terminal grounding plug.

GROUNDING. *The DSA is safety Class 1 equipment (IEC designation). All accessible conductive parts are directly connected through the grounding conductor of the power cord to the grounded (earthing) contact of the power plug.*

Only insert the power-input plug in a mating receptacle with a grounding contact where earth ground has been verified by a qualified service person. Do not defeat the grounding connection. Any interruption of the grounding connection can create an electrical shock hazard.

For electric shock protection, connect the power source to ground before connecting the power source to the DSA input or output terminals.

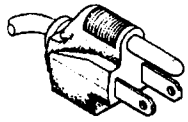
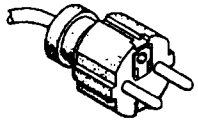
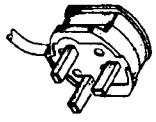
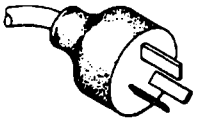
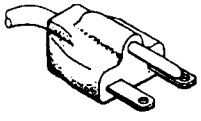
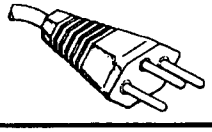
Power Cord Information

A power cord with appropriate plug configuration is supplied with each DSA. Table 1-1, Power Cord Conductor Identification, gives the color-coding of the conductors in the power cord. If you require a power cord other than the one supplied, refer to Table 1-2, Power Cord and Plug Identification.

Table 1-1 *– Power Cord Conductor Identification*

Conductor	Color	Alternate Color
Ungrounded (Line)	Brown	Black
Grounded (Neutral)	Light Blue	White
Grounded (Earthing)	Green/Yellow	Green

***Table 1-2** — Power Cord and Plug Identification*

Plug Configuration	Usage (Max Rating)	Reference Standards & Certification	Option #
	North America 125 V/6 A	[1]ANSI C73.11 [2]NEMA 5-15-P [3]IEC 83 [10]UL [11]CSA	Standard
	Europe 220 V/16 A	[3]ICE 83 [4]CEE (7), II, IV, VII [8]VDE [9]SEMKO	A1
	United Kingdom 240 V/13 A	[3]IEC 83 [5]BSI 1363	A2
	Australia 240 V/10 A	[6]AS C112 [12]ETSA	A3
	North America 240 V/15 A	[1]ANSI C73.20 [2]NEMA 6-15-P [3]IEC 83 [10]UL [11]CSA	A4
	Switzerland 220 V/10 A	[7]SEV	A5

[1]ANSI—American National Standards Institute
[2]NEMA—National Electrical Manufacturers' Association
[3]IEC—International Electrotechnical Commission
[4]CEE—International Commission on Rules for the Approval of Electrical Equipment
[5]BSI—British Standards Institute
[6]AS—Standards Association of Australia
[7]SEV—Schweizevischer Elektrotechischer Verein
[8]VDE—Verband Deutscher Elektrotechniker
[9]SEMKO—Swedish Institute for Testing and Approval of Electrical Equipment
[10]UL—Underwriters Laboratories
[11]CSA—Canadian Standards Association
[12]ETSA—Electricity Trust of South Australia

Memory Backup Power

Two self-contained power sources within the DSA maintain volatile memory when AC power is lost. These self-contained power sources provide memory backup power for the following purposes:

- To retain front panel settings.
- To retain stored settings.
- To continue recording the number of DSA on-time and power-on sequences.
- To retain **Time & Date** parameters.

The self-contained power sources have a nominal shelf life of approximately five years.

Operating Environment

The following environmental requirements are provided so that you can ensure proper functioning and extend the operating life of your DSA.

Operating Temperature

You should operate the DSA between ambient air temperatures of 0° and +45°C, and store the instrument between −40° and +75°C. Make sure the temperature is within the operating limits before applying power.

Ventilation Requirements

The fans circulate cooling air through the DSA. To ensure proper ventilation, allow at least two inches clearance on both sides and at the rear of the DSA. The top and bottom of the DSA do not require ventilation clearance.

CAUTION

If air flow is restricted, the DSA's power supply may temporarily shut down. (If installed in a rack, refer to rackmount instructions for maximizing fan speed.)

Packaging for Shipment

If you are shipping the DSA long distances by commercial transportation, use the original packaging. (The original carton and packaging material should be saved for this purpose.)

Also, if you are shipping the DSA to a Tektronix service center for service or repair, attach a tag to the DSA showing the following:

- Owner of the DSA (including address).
- Name of person to contact at your firm.
- Complete DSA type and serial number.
- If possible, furnish complete system firmware versions as displayed in the **IDENT** pop-up menu selected from the UTILITY major menu.
- A description of the problem found and service required.

If the original packaging is unfit for use or not available, then package the DSA as follows:

☐ Step 1: Obtain a corrugated cardboard shipping carton with a 375-pound test strength and having inside dimensions at least six inches greater than the DSA dimensions, to allow for cushioning.

☐ Step 2: Wrap the DSA with polyethylene sheeting or equivalent material to protect the finish.

☐ Step 3: To cushion the DSA on all sides, tightly pack dunnage or urethane foam between the carton and the DSA, allowing three inches on each side.

☐ Step 4: Seal the carton with shipping tape or with an industrial stapler.

☐ Step 5: Mark the address of your local Tektronix service center and your return address on the carton in one or more prominent locations.

Instrument Options

Your DSA may be equipped with one or more instrument options. A brief description of each available option is given in the following discussion. Option information is incorporated into the appropriate sections of the manual. Refer to the Contents for the location of option information. For further information and prices of instrument options, see your *Tektronix Products Catalog* or contact your local Tektronix service center.

Option 1C – adds eight BNC connectors to the front and rear panels so that you can route signals to the front or rear of the DSA. This option can be added at any time.

Option 3C (Not available for DSA 600A) – replaces the standard A8 Waveform Processor board with the A8 Signal Processor board. The A8 Signal Processor board provides less waveform processing capability and none of the Tristar features such as FFT, Act on Delta, and Dejitter. Option 3C also includes a rear-panel connection for external battery power to back up the acquisition memory for single-shot acquisition.

Option 4C – adds non-volatile memory for internal storage of 468,288 waveform points. This option can be added at any time.

Option 1P – adds an HC100 Four-color Plotter.

Option 2P – adds a 4697 ColorQuick Ink-Jet Printer.

Option 3P – adds a 4693DX Color Image Printer.

Option 1R – adds slide rail and rackmounting hardware to convert the standard bench DSA to a flush or protruding rackmount configuration.

Option A1 – replaces the standard power cord with the Universal European 220 V-type power cord.

Option A2 – replaces the standard power cord with the United Kingdom 240 V-type power cord.

Option A3 – replaces the standard power cord with the Australian 240 V-type power cord.

Option A4 – replaces the standard power cord with the North American 240 V-type power cord.

Option A5 – replaces the standard power cord with the Switzerland 220 V-type power cord.

Checks and Adjustments

This section contains procedures to examine measurement limits, check electrical specifications, and set all internal adjustments listed in Table 2-1, Measurement Limits, Specifications, and Adjustments. These procedures provide a logical sequence of checks and adjustments intended to prepare the DSA for operation following shipment or repair. These procedures also function as part of a routine maintenance program. To functionally test the DSA, perform the procedures which have a "yes" indication in the Functional Test column of Table 2-1.

The Checks and Adjustment procedure contains manual and automated tests. The automated procedures use the Checks and Adjustments Software operating on an IBM-compatible personal computer (PC) to control the DSA. The PC controls the DSA under test through the GPIB port.

At the beginning of each procedure the specifications or measurement limits are given. The setup for each procedure provides information on test equipment and interconnections, along with any necessary prerequisite steps. Refer to Table 2-2 for more information concerning the test equipment used.

Refer to the *DSA 600 Series User Reference* for more information about specifications and DSA operation.

All measurements are specified after a 20 minute warmup.

***Table 2-1** — Measurement Limits, Specifications, Adjustments, and Functional Tests*

Procedure and Description	**Measurement Limits *(Examine)***	**Specifications *(Check)***	**Adjustments *(Adjust)***	**Functional Test**
Procedure 1 Power-On Diagnostics	none	none	none	yes
Procedure 2 Extended Diagnostics	none	none	none	yes
Procedure 3 Power Supply				no
Voltage Supply	+4.85 to +5.25 V	none	none	
Voltage Reference	+5.15 to +5.25 V	none	R835 +5.2 V Ref for +5.20 V	
Regulator Reference	+9.95 to +10.05 V	none	R321 +10 V Ref for +10.00 V	

Table 2-1 — Measurement Limits, Specifications, Adjustments, and Functional Tests (Cont.)

Procedure and Description	Measurement Limits *(Examine)*	Specifications *(Check)*	Adjustments *(Adjust)*	Functional Test
Procedure 4 Display	Voltage difference from TP760 to TP761 must be between 23.5 V and 24.5 V	none	Vert Size, R700, for 24.25 V between TP760 and TP761 Grid, R113, until the raster lines just disappear Horiz Hold, R962, for a stable, synchronized display	no
	Vertical size so that grid aligns with the tic marks within .050 inches Horizontal size and linearity so that grid aligns with the tic marks within .050 inches and the grid boxes are uniform in length	none	Vert Hold, R760, and Vert Size, L750, to align the grid with the tic marks Horiz Lin, R961, Horiz Size, R867, Horiz Pos, R866, for optimum linearity and position Horiz Tilt, R800, for a level center-horizontal line	
	Interactive adjustments produce optimum grid geometry	none	Pin Cushion, R500, for straight horizontal lines Right Ampl, R400, for straight horizontal lines on the right side of the display Left Ampl, R200, for straight horizontal lines on the left side of the display Apex Point, R300, for linearity between the left and right side adjustments	
	Convergence of colors in grid pattern within one line width at the extreme edges of the display Make adjustment only	none	Convergence, R102, for optimum vertical convergence. Horizontal Convergence for optimum horizontal convergence Red, R100, Green, R110, Blue, R111, adjustments for a grey background color	

Table 2-1 — Measurement Limits, Specifications, Adjustments, and Functional Tests (Cont.)

Procedure and Description	Measurement Limits *(Examine)*	Specifications *(Check)*	Adjustments *(Adjust)*	Functional Test
Procedure 4 Display (cont.)	none	none	Red Gain, R200 Green Gain, R210 Blue Gain, R220 HV Reg, R865, for minimum movement of white border pattern Focus, R111, for minimum vertical line width	no
Procedure 5 Low Frequency Square Wave	Frequency = 1 kHz ±1%	Amplitude = 500 mV ±15 mV into a 50 Ω load	none	yes
Procedure 6 Calibrator DC Level Accuracy	none	Cal_Ref High into 1 MΩ load must yield -9.995 V ±10 mV Cal_Ref Low into 1 MΩ load must yield -10.000 V ±10 mV Cal_Ref High into 50 Ω load must yield -1.000 V + (+6 mV or -7 mV) Cal_Ref Low into 50 Ω load must yield -1.000 V ±6 mV	Gain, R238, and Offset, R237, adjustments for 9.9995 ±1 mV and -10.000 V ±1 mV	no
Procedure 7 Input/Output	Temperature Sensor Voltage Reference 6.5000 V ±5 mV	none	Temp Sensor Voltage Ref, R112, for +6.5000 V	no
Procedure 8 ACVS Gain	The difference between TP400 high and TP400 low must be 2.715 V ±500 μV	none	ACVS Gain, R723, for $V_2 - V_5 = 2.715$ V ±500 μV	no
Procedure 9 Field Calibration	none	none	optomizes performance through acquisition channels and trigger circuits	no
Procedure 10 Enhanced Accuracy	Successful operation	none	none	yes

Table 2-1 — Measurement Limits, Specifications, Adjustments, and Functional Tests (Cont.)

Procedure and Description	Measurement Limits *(Examine)*	Specifications *(Check)*	Adjustments *(Adjust)*	Functional Test
Procedure 11 Probe Calibration	Successful operation	none	none	yes
Procedure 12 Vertical Gain Accuracy	Vertical gain accuracy within ±1% for all pipe paths	none	none	no
Procedure 13 Time Base Accuracy	none	Time base accuracy must be within 0.005% of the measurement interval	none	no
Procedure 14 Window Record Accuracy	none	±0.005% of the reading ±150 ps ±(100 ps/$\sqrt{n}$), for n averages	none	no
Procedure 15 Trigger Level Accuracy	none	Trigger level accuracy must be within 2% of full scale	none	yes
Procedure 16 Trigger Sensitivity	none	The display will trigger at: DC coupled — 0.4 div from DC to 10 MHz, increasing to 1 div at 1 GHz. DC Noise Reject Coupled — 1.2 div from DC to 10 MHz, increasing to 3 div at 1 GHz AC Coupled — 0.4 div from 60 Hz to 10 MHz, increasing to 1 div at 1 GHz AC HF Reject Coupled — 0.5 div from 60 Hz to 30 kHz AC LF Reject Coupled — 0.5 div from 80 kHz to 10 MHz, increasing to 1 div at 1 GHz	none	no

Table 2-1 — Measurement Limits, Specifications, Adjustments, and Functional Tests (Cont.)

Procedure and Description	Measurement Limits *(Examine)*	Specifications *(Check)*	Adjustments *(Adjust)*	Functional Test
Procedure 17 Cable Characterization	Propagation delay of 1.7 ns to 2.0 ns		none	no
Procedure 18 Boolean Trigger Minimum True Width	none	The display will trigger if the Boolean trigger minimum true time is 2.0 ns	none	no
Procedure 19 Boolean Trigger Minimum False Time	none	The display will trigger if the Boolean trigger minimum false time is 2.0 ns	none	no
Procedure 20 Edge Qualified Trigger	none	Enable to Edge — the display must trigger if the Enable trigger source is true at least 2 ns before the Edge trigger source Edge to Enable — the display must trigger if the Enable trigger is true at least 2 ns after the Edge trigger source Setup and Hold time, Edge to itself — the display must trigger if the Edge trigger source is true at least 2 ns immediately before and after the selected transition.	none	no
Procedure 21 Maximum Event Frequency	none	Maximum event frequency is 400 MHz at 50% duty cycle	none	no
Procedure 22 Disk Check	none	none	none	no

Minimizing the Power-Off Time

During the procedure you will be asked to install and remove plug-in units. These tasks require a power-off with the ON/STANDBY switch. You should try to keep the power-off time to a minimum in order to reduce the internal temperature change. The DSA accuracy is adversely affected by internal changes in temperature. In normal operation, Enhanced Accuracy is available only after a 20-minute warmup period. In order to preserve the Enhanced Accuracy state, minimize the power-off time as much as possible.

When moving plug-in amplifiers, a quick transfer (i.e., about 15 seconds) and power-up will essentially preserve the internal temperature and the Enhanced Accuracy state. Disconnect any cables or probes before beginning to move a plug-in amplifier. An excessive delay in powering on (beyond 30 seconds) will mean a warm-up period is necessary.

Whenever possible, place plug-in amplifiers in unoccupied plug-in compartments of the DSA to maintain their internal temperature. This configuration is not always shown in the setup, but it will not affect any of the tests.

Test Equipment

Table 2-2 contains suggested test equipment used in this manual. The Functional Test column of Table 2-2 indicates, with a check mark (✓), the test equipment that is recommended if you are only performing a functional test. Procedure steps are based on the test equipment examples given, but other equipment with similar specifications may be substituted. Test results, Setup information, and related connectors and adapters may be altered by the use of different equipment.

***Table 2-2** — Test Equipment*

Description	Minimum Specification	Examples of Applicable Test Equipment	Functional Test
PC Controller	IBM PC-compatible; with two disk drives, floating point co-processor, GPIB port, 640 kbytes RAM memory, and MS DOS 2.1 or greater	Compaq	
Function Generator	60 Hz to 250 kHz, Variable offset, Amplitude variable from 0 to 10 V, sine wave output	TEKTRONIX FG 5010 Function Generator with a TM 500-Series Power Module	✓
Medium Frequency Sine Wave Generator	250 kHz to 250 MHz, variable amplitude, 50 kHz reference	TEKTRONIX SG 503 Leveled Sine Wave Generator with a TM 500-Series Power Module	
Time Mark Generator	200 MHz, accuracy within ±0.001%	TEKTRONIX TG 501A Time Mark Generator with a TM 500-Series Power Module	
High Frequency Sine Wave Generator	250 MHz to 1000 MHz, Variable amplitude, 6 MHz reference	TEKTRONIX SG 504 Leveled Sine Wave Generator with a TM 500-Series Power Module with SG 504 Output Head	

Table 2-2 — Test Equipment (Cont.)

Description	Minimum Specification	Examples of Applicable Test Equipment	Functional Test
Calibration Generator	Fast Rise Output, 1.0 ns risetime; square wave output	TEKTRONIX PG 506 Calibration Generator with a TM 500-Series Power Module	
Power Supplies Troubleshooting Fixture	none	TEKTRONIX 067-1264-00 Extended Diagnostics 11000-Series Power Supplies Troubleshooting Fixture	
Gray Scale Test Card (recommended)	18% gray	Kodak Neutral Gray test card	
Photometer (optional)	Calibrated with probe by standard calibration: 3100°K Tungsten white light.	TEKTRONIX J17 Photometer/ Radiometer	
Illuminance Probe (optional)	Accuracy within 5% of NBS standards ±1 digit (least significant)	TEKTRONIX J1803 Illuminance Probe	
Digital Multimeter (w/test leads)	Accuracy ≤0.01%	Fluke 8842A Digital Multimeter	
Signal Standardizer (3 required)	Tektronix Calibration Fixture with interface connector modified for 11000-series use	TEKTRONIX 067-0587-10 Signal Standardizer	
Plug-in Amplifier (3 required)	0 to 1 GHz bandwidth	TEKTRONIX 11A72 Two-Channel Amplifier	✓ (1 required)
Coaxial Cable, 2 ns (5 required)	50 Ω, 18-inch, male BNC connectors	Tektronix Part 012-0076-00	✓ (1 required)
Adapters	BNC female-to-SMA male (3 required)	Tektronix Part 015-1018-00	
	SMA female-to-SMA female (3 required)	Tektronix Part 015-1012-00	
	BNC female-to-BNC female (2 required)	Tektronix Part 103-0028-00	
	BNC male-to-BNC male (2 required)	Tektronix Part 103-0029-00	
Precision 50 Ω Termination	Impedance, 50 Ω; accuracy, within 0.5%; connectors, BNC	Tektronix Part 011-0129-00	

Table 2-2 — Test Equipment (Cont.)

Description	Minimum Specification	Examples of Applicable Test Equipment	Functional Test
Power Divider, 50 Ω	6 dB load isolation, 50 Ω, SMA connectors	Tektronix Part 015-1014-00	
$5^1/_4$" diskette	Formatted, double-sided, double-density	Maxell MD 2-DD	
$3^1/_2$" diskette (600A only)	Formatted, double-sided, high-density	Maxell MF 2-HD	
Adapter, Probe-Tip to Ground	Used on Probe Bayonet Ground assembly	Tektronix Part 013-0085-00	
Term Conn Link	Shorting strap	Tektronix Part 131-0993-00	
External Loopback Connector	RS-232-C connector	Tektronix Part 013-0198-00	
Alignment Tool (plastic hex)	Plastic hex	Tektronix Part 003-0301-00	
Alignment Tool (insulated slot)	Insulated slot	Tektronix Part 003-0675-01	
Alignment Tool (square-tip ceramic)	Square-Tip (ceramic)	Tektronix Part 003-1400-00	
Magnetic Screwdriver	Holder for Torx tips	Tektronix Part 003-0293-00	
Torx Screwdriver Tips	#10 tip	Tektronix Part 003-0814-00	
	#15 tip	Tektronix Part 003-0966-00	
	#20 tip	Tektronix Part 003-0866-00	
Shorting Strap	Two alligator clips on a short length conductor		
Integrated Circuit Extracting Tool	IC Insertion-Extraction Pliers 28-pin type	General Tool P/N U505BG or equivalent	
Board Removal Tools	Straight-slot screwdriver, large		
	Torx screwdriver. Torx screwdriver tips: T-7, T-8, T-10, T-15, T-20, T-25		
	Allen (Hex) Wrench, $^1/_{16}$-inch		
	Nutdrivers, $^3/_{16}$", $^1/_4$", $^7/_{16}$"		
	Needle-nose pliers		
	Open-ended wrench, $^1/_4$"		

GPIB and RS-232-C Cable Requirements

The GPIB cable and connectors are standard.

If an RS-232-C cable connects the PC COM1 port with the DSA under test it should be a standard controller-to-modem (DCE-DTE) type cable. The type of RS-232-C connector your PC has will determine the type of connectors your cable must have. The two most common connectors are the 25-pin D type and the 9-pin D type. The 25-pin to 25-pin cable should at least have pins 2-2, 3-3, 4-4, 5-5, 7-7, 8-8, and 20-20 connected. The 9-pin to 25-pin RS-232-C cable should be wired as follows:

9-Pin Connector	25-Pin Connector
1 (DCD)	8 (DCD)
2 (RD)	2 (RD)
3 (TD)	3 (TD)
4 (DTR)	6 (DSR)
5 (Sig GND)	7 (Sig GND)
6 (DSR)	20 (DTR)
7 (RTS)	5 (CTS)
8 (CTS)	4 (RTS)
9 (NC)	22 (RI)

Using These Procedures

Most procedures begin with a setup illustration that shows the test equipment required and the interconnections of this equipment. Refer to Table 2-2, Test Equipment, on the preceding pages for an example of the test equipment appropriate for each procedure.

Conventions in this Manual

In these procedures, the following conventions are used:

- CAPITAL letters within the body of text identify front panel controls, indicators, and connectors on the DSA (for example, MEASURE) and plug-in amplifiers.
- **Bold** letters identify menu labels and display messages.
- Initial Capital letters identify connectors, controls, and indicators (for example, On) on associated test equipment.
- In some steps, the first word is italicized to identify a step that contains a performance verification or an adjustment instruction. For example, if *Check* is the first word in the title of a step, an electrical specification is checked. If *Adjust* appears in the title, the step involves an electrical adjustment. If *Examine* is the first word in the title, the step concerns measurement limits that indicate whether the DSA is operating properly; these limits are not to be interpreted as electrical specifications.

Menu Selections and Measurement Techniques

All menu, knob, and button selections in this section refer to selections on the DSA unless otherwise specified. Comprehensive descriptions of menus and DSA features are located in the appropriate DSA 600 Series User Reference. If you are new to the DSA, read the DSA 600 Series Tutorial for your mainframe as an introduction to DSA operation.

To **Initialize** the DSA settings:

☐ Step 1: Push the UTILITY button.

☐ Step 2: Touch **Initialize** in the UTILITY major menu.

☐ Step 3: Touch **Initialize** in the **Verify Selection** pop-up menu.

Warm-up Time

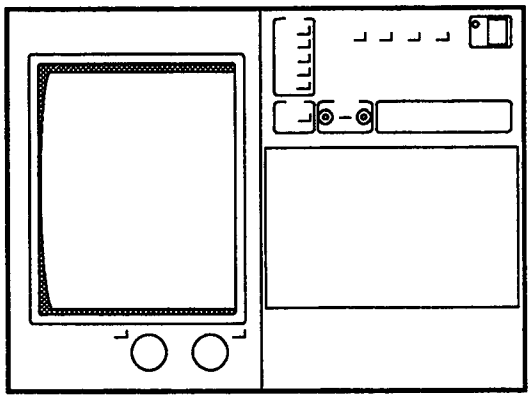
Allow the DSA to warm up for approximately twenty minutes prior to attempting any measurement or adjustment procedure.

Procedure 1 Power-On Diagnostics

Power-On Diagnostics execute automatically whenever you power on the DSA. Do not power on the DSA on if its environment is outside of the ambient temperature range of 0°C to 45°C. To ensure nominal accuracy for the procedures that follow, do not attempt any adjustments if room temperature is outside the range of +18°C to +28°C. The steps in this procedure prepare the DSA for following procedures.

Setup to Perform Power-On Diagnostics

DSA



Prerequisite Steps: None.

Procedure to Perform Power-On Diagnostics

Ensure that power is off first.

☐ Step 1: Remove the top and bottom covers from the DSA. Use a coin to turn the four clasps on the top and bottom covers. Lift up the front of each cover to remove.

☐ Step 2: With the rear-panel PRINCIPAL POWER switch set to OFF, connect the DSA to a suitable power source.

☐ Step 3: Set the rear-panel PRINCIPAL POWER switch to ON and then set the front-panel ON/STANDBY switch to ON.

When the DSA is first installed, the PRINCIPAL POWER switch should be set to the ON position and remain in this position. Thereafter, use the ON/STANDBY switch as an on/off switch.

☐ Step 4: Allow test equipment to warm up for approximately twenty minutes to alleviate measurement errors due to thermal drift. (A complete list of test equipment is shown in Table 2-2):

- Digital multimeter
- Function generator
- Calibration generator

- Frequency counter
- Medium frequency sine wave generator
- High frequency sine wave generator
- Time Mark Generator

Kernel and Self-Test Diagnostics

Each time the ON/STANDBY switch is set to ON, the DSA performs Kernel diagnostics on its microprocessor subsystems and Self-Test diagnostics on all of its major circuits. (See Diagnostic Troubleshooting for further information.)

CAUTION

Avoid turning the DSA power off during Probe Calibration, Enhanced Accuracy, or Extended Diagnostics. This will result in some of the internal data being corrupted. If corruption occurs, run Enhanced Accuracy to restore necessary calibration constants.

Self-Test diagnostics verify the following circuits:

- Executive Control
- Front Panel
- Internal I/O
- External I/O
- Subsystem Communication
- Options
- Display Control
- Video Generator
- Digitizer Control/Calibration
- Signal Processing
- Acquisition
- All plug-in amplifiers

Completion of Power-On Diagnostics

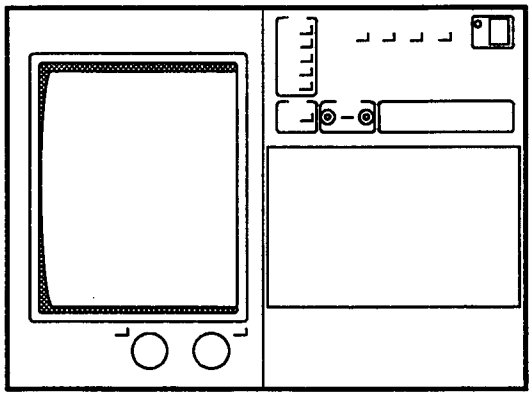
When the DSA has passed power-on diagnostics, it displays the graticule and front panel settings that are in effect.

Procedure 2 Extended Diagnostics

The Extended Diagnostics perform more extensive testing than the Self-Test diagnostics. Extended Diagnostics are designed as a troubleshooting aid for service personnel.

Setup to Invoke Extended Diagnostics

DSA



The DSA should have entered the normal operating mode without any diagnostic failures.

Prerequisite Steps: None.

Procedure to Invoke Extended Diagnostics

Perform the following steps to enter the **EXTENDED DIAGNOSTICS** menu structure and execute the indicated tests. No inputs or I/O cables should be attached to the DSA for these tests.

☐ Step 1: Perform the following settings in the order listed:

DSA

ON/STANDBY switch ..... ON

☐ Step 2: Press the UTILITY button, and then touch **Page to Utility 2**.

☐ Step 3: Touch **Extended Diagnostics**.

☐ Step 4: Touch **Extended Diagnostic** in the **Verify Selection** pop-up menu.

☐ Step 5: Touch **All** and then **Run** to start the tests.

☐ Step 6: *Check* that all tests have executed and have a **Pass** status.

☐ Step 7: Touch the following selectors in order:

External I/O

Area

GPIB

Routine

☐ Step 8: Touch **Run** to start the **Intrpt Reset** test.

☐ Step 9: Touch **Reset Status** and then touch **Run** to start the test.

☐ Step 10: Touch **Data Lines** and then touch **Run** to start the test.

☐ Step 11: Touch **Interrupt** and then touch **Run** to start the test.

☐ Step 12: *Check* that all four tests executed and passed.

☐ Step 13: Touch **Exit** to leave Extended Diagnostics.

Procedure 3 Power Supply

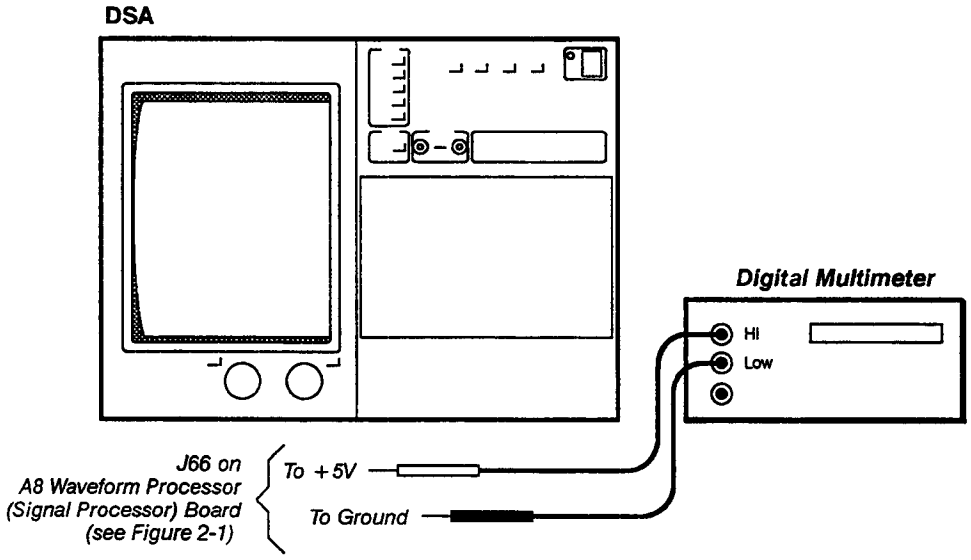
This procedure shows the setup and lists the steps to check the measured voltage supply, the voltage reference, and the regulator reference (see Figures 2-1, 2-2, and 2-3).

Measurement Limits

The measurement limits for this procedure are as follows:

- the measured voltage supply must be within the limits of +4.85 V and +5.25 V
- the voltage reference must be within +5.15 V and +5.25 V
- the regulator reference must be within +9.95 V and +10.05 V

Setup to Examine Voltage Supply



Prerequisite Steps: None.

Procedure to Examine Voltage Supply

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

DSA ..... no settings required
Digital multimeter
Mode ..... DC Voltage

☐ Step 2: *Examine* that the digital multimeter reads within the limits of +4.85 V and +5.25 V.

STOP

DO NOT attempt to optimize the following adjustment settings if the reading is within the stated limits. Proceed to Procedure 4, Display.

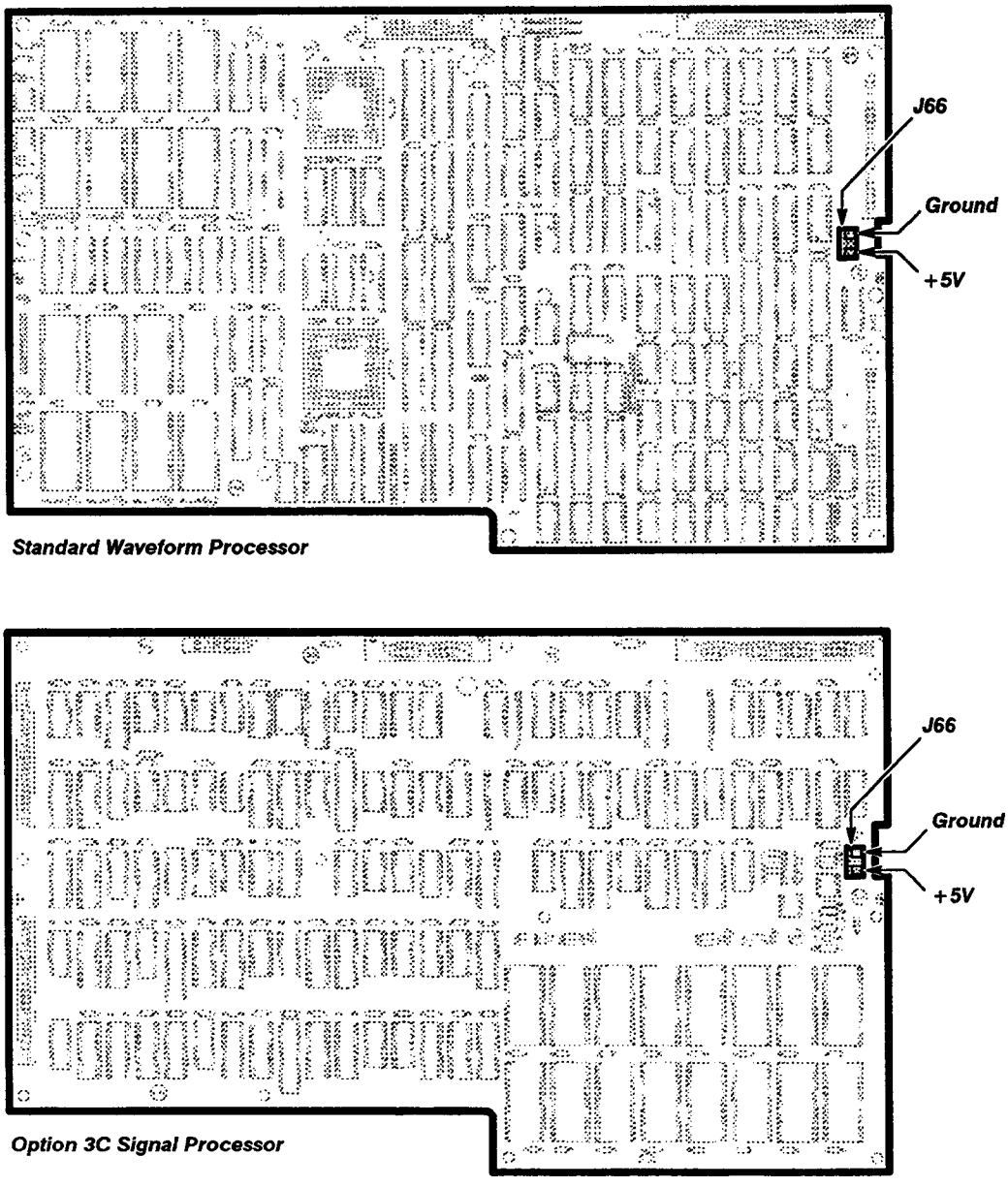
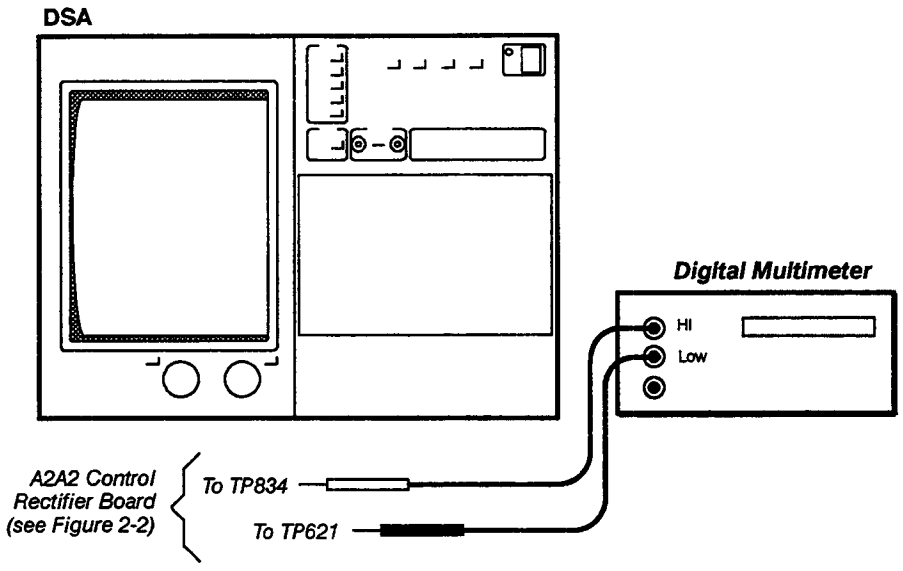


***Figure 2-1** — A8 Waveform Processor (Signal Processor) Board Test Point Locations*

Setup to Examine and Adjust Voltage Reference



Prerequisite Steps: None.

Procedure to Examine and Adjust Voltage Reference

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

DSA:

a. Set the front panel ON/STANDBY switch to STANDBY and the rear panel PRINCIPAL POWER switch to OFF. Disconnect the DSA from the power source.

b. Remove the Power Supply module, following the instructions under Power Supply Module Removal in Section 3, Maintenance.

c. Create a short between test points TP631 and TP632 on the A2A2 Control Rectifier board using a shorting strap.

d. Connect the DSA Power Supply module to a suitable line power source.

e. Set the rear panel PRINCIPAL POWER switch to ON.

Digital multimeter

Mode ..... DC Voltage

WARNING

You must use extreme caution when performing the following adjustment.

☐ Step 2: *Examine* that the digital multimeter reads +5.20 V, within the limits of +5.15 and +5.25 V.

STOP

DO NOT attempt to optimize the the following adjustment if the reading is within the stated limits. Proceed to Step 4.

☐ Step 3: *Adjust* the +5.2 V Ref adjustment R835 on the A2A2 Control Rectifier board for +5.20 V.

☐ Step 4: Set the PRINCIPAL POWER switch to OFF.

☐ Step 5: Remove the digital multimeter leads from the test points.

☐ Step 6: Disconnect the DSA from the power source.

☐ Step 7: Remove all test leads and the shorting strap.

☐ Step 8: Replace the Power Supply module following the instructions in Section 3, Maintenance.

☐ Step 9: Set the PRINCIPAL POWER switch to ON, and the ON/STANDBY switch to ON. Proceed to the Adjust Regulator Reference procedure.

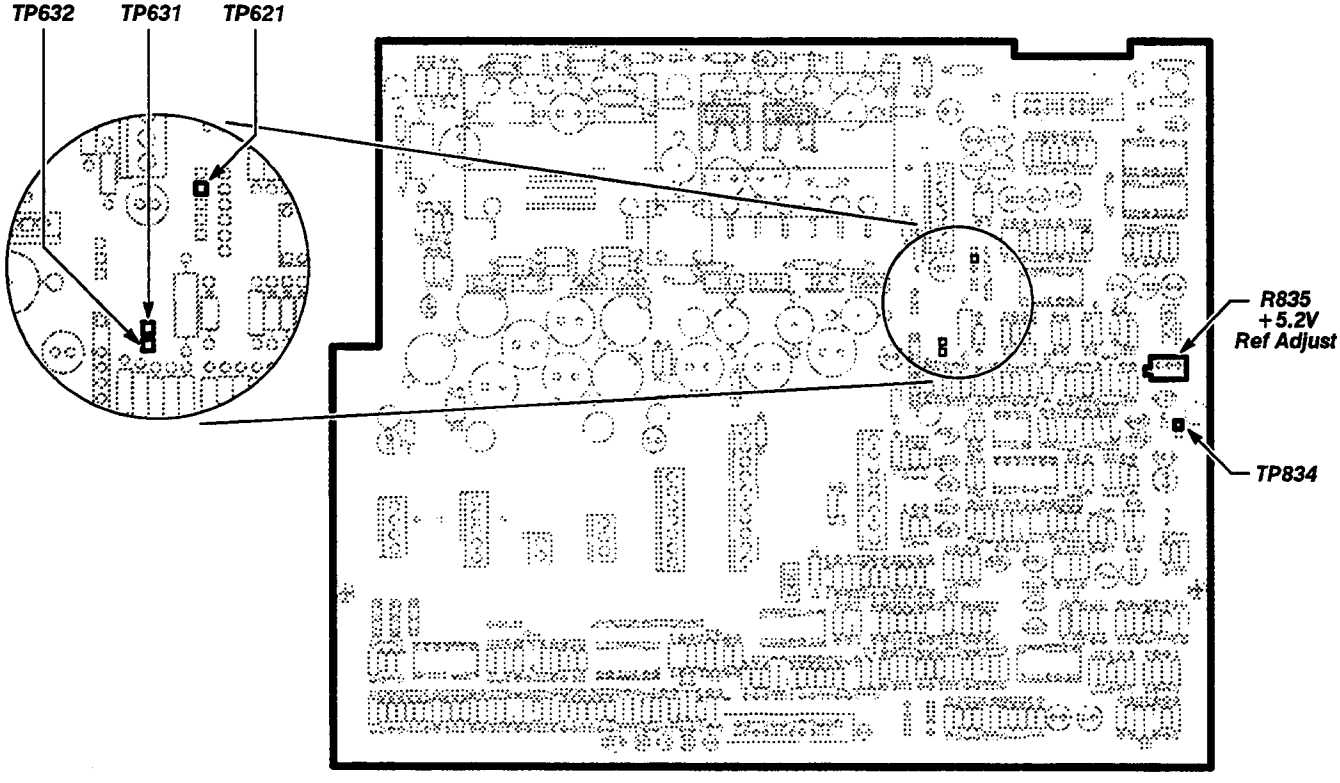
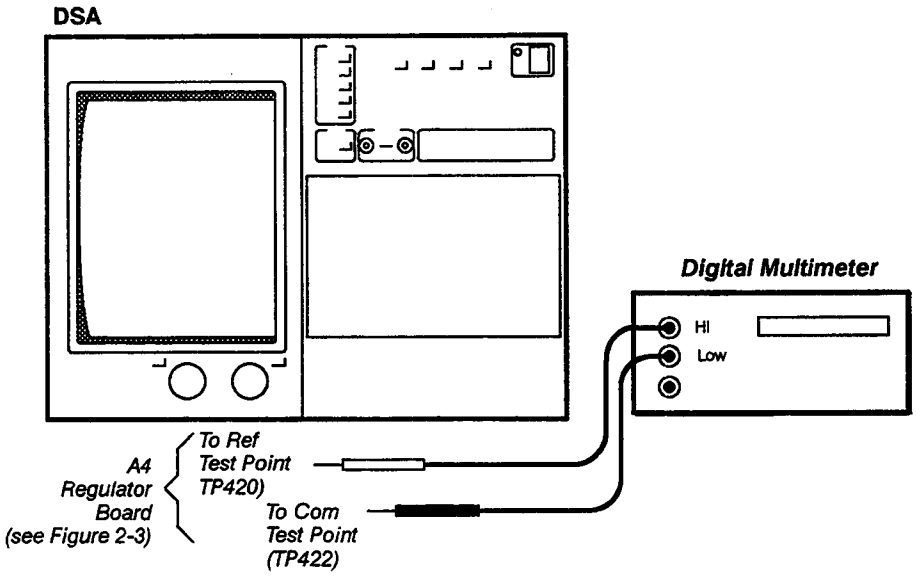


Figure 2-2 — A2A2 Control Rectifier Board Test Point and Adjustment Locations

Setup to Examine and Adjust Regulator Reference



Prerequisite Steps: None.

Procedure to Examine and Adjust Regulator Reference

☐ Step 1: Perform the following settings in the order listed:

DSA ..... no settings required
Digital multimeter
Mode ..... DC Voltage

WARNING *You must use extreme caution when performing the following adjustment.*

☐ Step 2: *Examine* that the digital multimeter reads +10.00 V, within the limits of +9.95 V and +10.05 V.

STOP *DO NOT attempt to optimize the adjustment if the reading is within the stated limits. Proceed to Step 4.*

☐ Step 3: *Adjust* +10 V Ref adjustment R321 on the A4 Regulator board for +10.00 V.

☐ Step 4: Remove the test leads.

☐ Step 5: Repeat Procedure 1, Power-On Diagnostics.

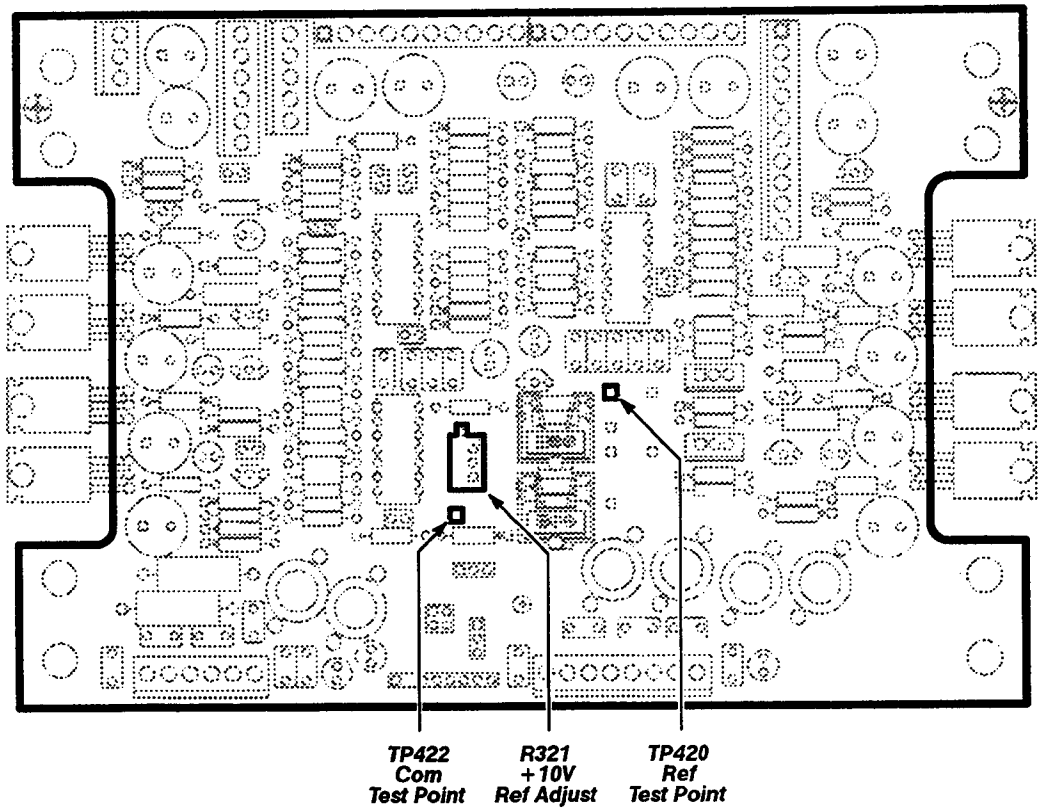


Figure 2-3 *— A4 Regulator Board Test Point and Adjustment Locations*

Procedure 4 Display

This procedure shows the setup and list the steps to Examine/Adjust the A24 CRT Driver board (see Figures 2-4, 2-5, 2-6 and 3-12).

The adjustments in this procedure only affect the visual aspects of the CRT display. The adjustments in this procedure do not affect DSA accuracy since all measurements are made on the acquired data, not the displayed data. Unless alignment or brightness difficulties are apparent, proceed to Procedure 5, Low Frequency Square Wave Level.

If you have replaced the CRT or A24 CRT Driver board, and visual problems are apparent, then you may have to perform all of the adjustments in this procedure. If you have replaced the A26 Geometry board or A27 CRT Socket board, then you may have to perform only the adjustments that are located on that board.

Measurement Limits

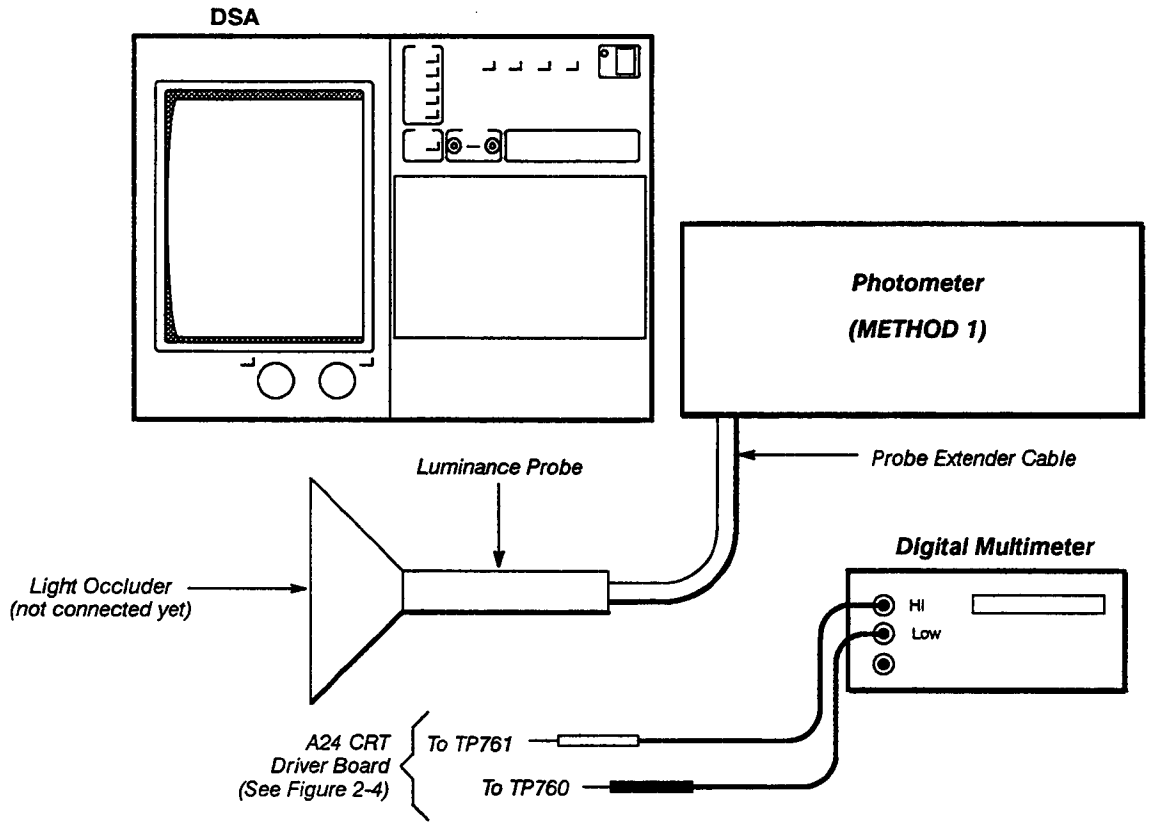
The measurement limits are set on the CRT as follows:

- A voltage difference of 24.0 V ±0.5 V between TP761 and TP760.
- Vertical size must be within ±0.050 inch of tic marks on the edges of the front panel bezel.
- Horizontal size and linearity must be: within ±0.050 inch of the tic marks on the top and bottom edges of the front panel bezel, and the grid boxes must be uniform in length.
- Horizontal tilt, pin cushion, right amplitude, left amplitude, and apex point adjustments are adjusted for optimum grid geometry.
- Convergence of red, green, and blue colors within one line width at the edges of the display.
- Red, Green, and Blue background adjustments must be adjusted for a proper color balance (gray background). Use either a photometer (method 1), or a Kodak Neutral-Density Test Card (method 2).

  Method 1:
  Red gain is adjusted to 16.2 ±0.5 foot lamberts.
  Green gain is adjusted to 43.3 ±1.3 foot lamberts.
  Blue gain is adjusted to 6.9 ±0.2 foot lamberts.

  Method 2:
  The Kodak Neutral Density Test Card should blend with the gray scale on the CRT. An exact match to any one shade is not required.

Setup to Examine and Adjust the Display



WARNING *You must use extreme caution when performing the following adjustments.*

Prerequisite Steps: None.

Procedure to Examine and Adjust the Display

☐ Step 1: Perform the following settings in the order listed:

DSA
ON/STANDBY switch ..... STANDBY
Digital multimeter
Mode ..... DC Voltage
Photometer ..... no settings required

☐ Step 2: Set the DSA so that the left side is facing upwards.

☐ Step 3: Remove the left side decorative trim covers, left side frame section, and the five Torx drive screws that secure the trap door located beneath the A24 CRT Driver board (refer to Section 3, Corrective Maintenance, Steps 2

through 5 under A24 CRT Driver Board for specific instructions on removing the preceeding items).

☐ Step 4: Carefully set the DSA in the upright position and place a hard cover book (or similar object) under the right, front of the DSA. This will prop up the front of the DSA so that you can access the A24 CRT Driver board.

☐ Step 5: Remove the eight screws securing the platform, and then raise the platform on its hinges.

☐ Step 6: Secure the platform with the support rod.

☐ Step 7: Remove the ten screws in the CRT protector shield, and then remove the shield.

☐ Step 8: Connect the digital multimeter (DMM) to TP760 and TP761 on the A24 CRT Driver board.

CAUTION

Do not short together the test points TP760 and TP761 when connecting the digital multimeter to these test points. Shorting the test points together will blow fuse F660 on the A24 CRT Driver board.

☐ Step 9: Set the ON/STANDBY switch to ON.

☐ Step 10: *Examine* that the DMM reading is between 23.5 V and 24.5 V.

STOP

Do not attempt to optimize the adjustment if the reading is within the stated limits. Proceed to Step 13.

☐ Step 11: *Adjust* the Vert Size adjustment R700 on the A26 Geometry board so that the DMM reads approximately 24.00 V.

☐ Step 12: *Adjust* the Grid adjustment R113 on the A27 CRT Socket board clockwise until the raster appears, then turn the adjustment counterclockwise until the raster lines just disappear.

☐ Step 13: Press the UTILITY button.

☐ Step 14: Touch **Page to Utility 2** in the UTILITY major menu.

☐ Step 15: Touch **Extended Diagnostics** in the UTILITY major menu, and then **Extended Diagnostic** in the **Verify Selection** pop-up menu.

☐ Step 16: Touch **Front Panel** in the **Extended Diagnostics** pop-up menu.

☐ Step 17: Touch **Area** and then **Test Pattern**.

☐ Step 18: Touch **Routine** and then **Green Grid**.

☐ Step 19: Touch **Run** (a grid pattern will fill the display area).

☐ Step 20: *Adjust* Horiz Hold adjustment R962 on the A24 CRT Driver board if the display is unsynchronized. Adjust R962 counter-clockwise until the display stabilizes, and then turn the adjustment another one-quarter turn counter-clockwise.

☐ Step 21: Set the following adjustments before performing the rest of this procedure:

- Set Left Ampl R200, Apex Point R300, and Right Ampl R400 on the A26 Geometry board to their midrange settings.
- Set the Pin Cushion R500 adjustment on the A26 Geometry board so that the green grid has a flat top line.
- Set the HV Reg R865 adjustment on the A24 CRT Driver board one quarter turn clockwise past its midrange setting.

☐ Step 22: *Examine* that the grid is aligned with the tic marks along the inside vertical edge of the front panel bezel. There are two indexes along each side; one at the top and one at the bottom of the front panel bezel. To eliminate any parallax error, look directly at the center of the CRT and then move your eyes (do not move your head) to align the top of the grid with the top tic mark, and the bottom of the grid with the bottom tic mark. The grid may be .050 inches larger than tic marks at the top and bottom of the front panel bezel.

DO NOT attempt to optimize the adjustments if the grid is aligned within the stated limits. Proceed to Step 24.

☐ Step 23: *Adjust* Vert Hold adjustment R760 and Vert Size adjustment L750 on the A24 CRT Driver board to align the grid with the index bumps along the inside vertical edge of the front panel bezel; within ±0.05 inches.

☐ Step 24: *Examine* that the grid is aligned with the horizontal tic marks at the top and bottom of the front panel bezel, and the grid boxes are of uniform length. The grid may be .050 inches larger than the tic marks at the left and right of the front panel bezel.

DO NOT attempt to optimize the adjustments if the grid is aligned within the stated limits. Proceed to Step 32.

☐ Step 25: *Adjust* Horiz Lin adjustment R961, Horiz Size adjustment R867, and Horiz Pos adjustment R866 on the A24 CRT Driver board for optimum overall linearity and position. Use the horizontal indexes along the top and bottom of the front panel bezel to align the grid within 0.05 inches of the tic marks by the same method used in Step 22. These adjustments interact and it may be necessary to repeat this step until R961, R867, and R866 are adjusted properly.

☐ Step 26: *Adjust* the Horiz Tilt adjustment R800 on the A26 Geometry board so that the center, horizontal line is level. Use the index bumps along the two sides of the CRT to perform the adjustment.

☐ Step 27: *Adjust* the Pin Cushion adjustment R500 on the A26 Geometry board so that the horizontal lines are as straight as the adjustment allows.

☐ Step 28: *Adjust* the Right Ampl adjustment R400 on the A26 Geometry board to straighten out the horizontal lines on the right side of the display.

☐ Step 29: *Adjust* the Left Ampl adjustment R200 on the A26 Geometry board to straighten out the horizontal lines on the left side of the display.

☐ Step 30: *Adjust* the Apex Point adjustment R300 on the A26 Geometry board to correct for any non-linearity between the left and right side adjustments.

☐ Step 31: *Examine* that all of the interactive adjustments performed in Steps 23 through 31 produce a grid with optimum geometry. If any of the measurements or adjustments performed in steps 23 through 31 are not within the stated limits, then perform Steps 23 through 31 again.

☐ Step 32: Touch **Exit** to remove the pattern from the screen.

☐ Step 33: Touch **White Grid** in the **Routine** menu.

☐ Step 34: Touch **Run** at the bottom of the screen.

☐ Step 35: *Examine* that any separation of colors from the main grid pattern is less than one line width at the edges of the display.

DO NOT attempt to optimize the following adjustment if the display is within the stated limits. Proceed to Step 40.

☐ Step 36: *Adjust* the Convergence adjustment R102 on the A27 CRT Socket board for the best convergence of colors over the entire display area.

Note: Convergence adjustment R102 adjusts the vertical convergence; if the horizontal convergence is not set properly then adjust the Horizontal Convergence adjustment located on the left side of the CRT yoke (see Figure 3-12).

☐ Step 37: *Adjust* Grid adjustment R113 clockwise on the A27 CRT Socket board until the raster lines just appear.

☐ Step 38: *Adjust* the Red, Green, and Blue Background adjustments; R100, R110, and R111 respectively, on the A24 CRT Driver board fully counter-clockwise.

☐ Step 39: *Examine* that the background color is gray. If the background color is not grey, note which color(s) (red, green, or blue) appear more prominent.

☐ Step 40: *Adjust* the Red, Green, or Blue Background adjustment; R100, R110, and R111 respectively, on the A24 CRT Driver board so that the background color is grey. Only adjust the background colors that appear not to be prominent. That is, if the background color appears to be red, then adjust the Green and Blue Background adjustments.

☐ Step 41: *Adjust* the Grid adjustment R113 until the raster lines just disappear and the black background appears.

☐ Step 42: Touch **Exit** once to remove the grid pattern.

Note: *To examine the color balance, choose using a photometer (Method 1) by going to Step 43, or choose using the Gray-Scale (Method 2) by going to Step 48.*

☐ Step 43: Touch **Red Display** in the **Routine** menu (refer to Table 2-3, Illuminance Levels, for the correct selector in the **Routine** menu for successive tests).

Table 2-3 *— Illuminance Levels*

Routine menu selector (step 43)	Examine limits (step 45)	Adjustment indicator (step 46)	Adjust limit (step 46)
Red Display	16.2 ±1.62 Foot Lamberts	Red Gain (R200)	16.2 Foot Lamberts
Green Display	43.3 ±4.33 Foot Lamberts	Green Gain (R210)	43.3 Foot Lamberts
Blue Display	6.9 ±0.69 Foot Lamberts	Blue Gain (R220)	6.9 Foot Lamberts

☐ Step 44: Touch **Run** at the bottom of the screen.

☐ Step 45: Place the light occluder on the face plate of the CRT. Verify that the photometer reads within the stated limits for each display listed in Table 2-3.

DO NOT attempt to optimize the following adjustments if the reading is within the stated limits. Proceed to Step 47.

☐ Step 46: *Adjust* the appropriate color adjustment (from Table 2-3) on the A24 CRT Driver board to its respective limit. (See Figure 2-4.)

☐ Step 47: Touch **Exit** and repeat Steps 43 through 46 for the remaining **Routine** menu selectors listed in Table 2-3.

Note: *If you are using Method 1, proceed to Step 53.*

☐ Step 48: Touch **Gray-Scale** in the **Routine** menu.

☐ Step 49: Touch **Run** at the bottom of the screen.

☐ Step 50: Hold the Kodak Neutral-Density Test Card up to the display, and check that the card blends with the gray-scale on the CRT. An exact match to any one shade is not required.

DO NOT attempt to optimize the following adjustments if the gray-scale shading matches the shading on the card.

☐ Step 51: Adjust R200, R210, and R220 as needed to match the test card to the gray-scale display. (See Figure 2-4.)

☐ Step 52: Touch **Exit**.

- ☐ Step 53: Touch **HV Reg Dsply** in the **Routine** menu.
- ☐ Step 54: Touch **Run** at the bottom of the display.
- ☐ Step 55: *Adjust* the HV Reg adjustment R865 on the A24 CRT Driver board for the minimum movement of the top right corner of the border pattern.
- ☐ Step 56: Touch **Exit** to remove the pattern from the screen.
- ☐ Step 57: Touch **Green Grid** in the **Routine** menu.
- ☐ Step 58: Touch **Run** at the bottom of the display.
- ☐ Step 59: *Examine* that the vertical size, vertical position, horizontal size and horizontal linearity of the green grid pattern are still within the previously stated limits. If they are not within the stated limits then repeat Steps 23 through 26.
- ☐ Step 60: *Adjust* the Focus adjustment R111 on the A27 CRT Socket board for the minimum vertical line width.
- ☐ Step 61: Reinstall the trap door, the left-side frame section, the left-side decorative trim covers, and the CRT cover.

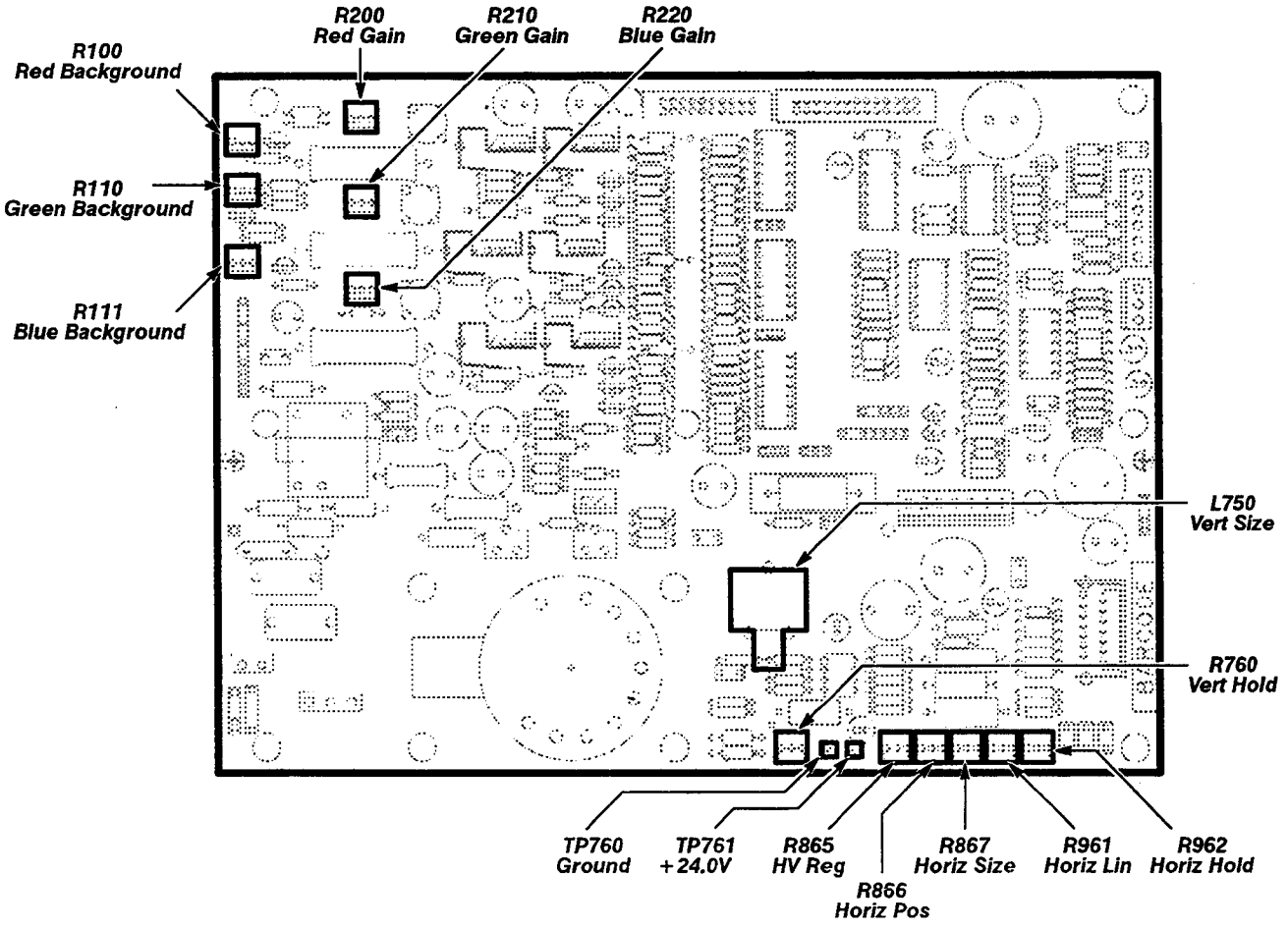


Figure 2-4 — *A24 CRT Driver Board Test Point and Adjustment Locations*

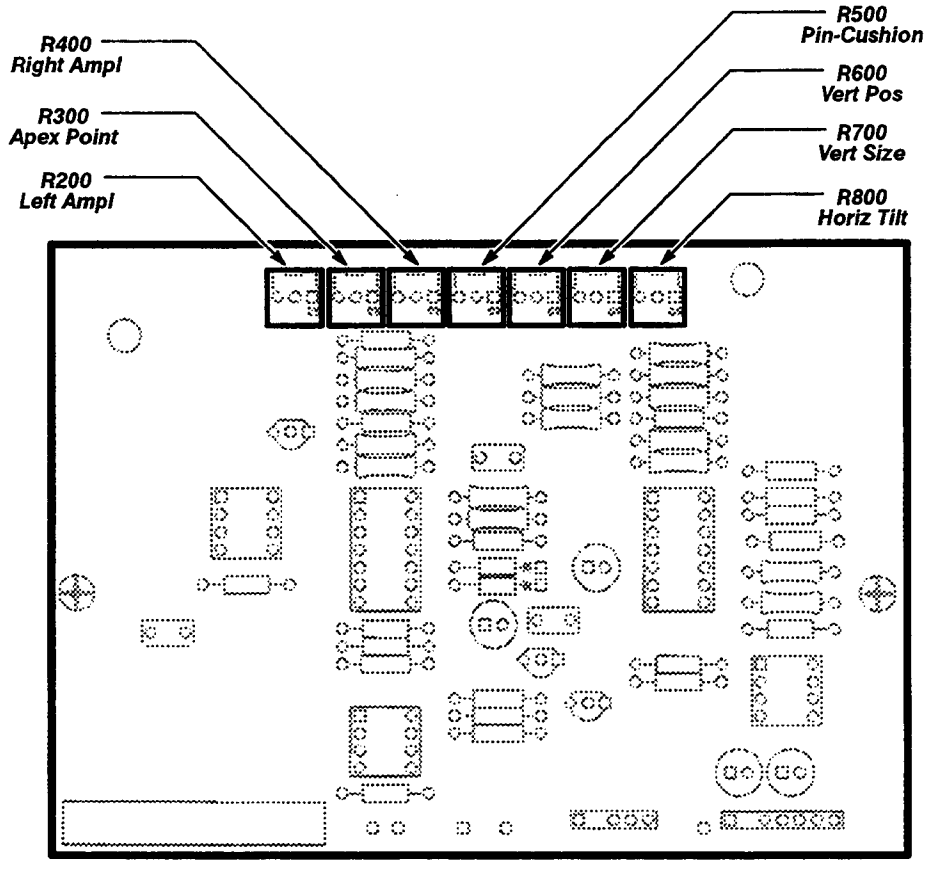


Figure 2-5 — A26 Geometry Board Adjustment Locations

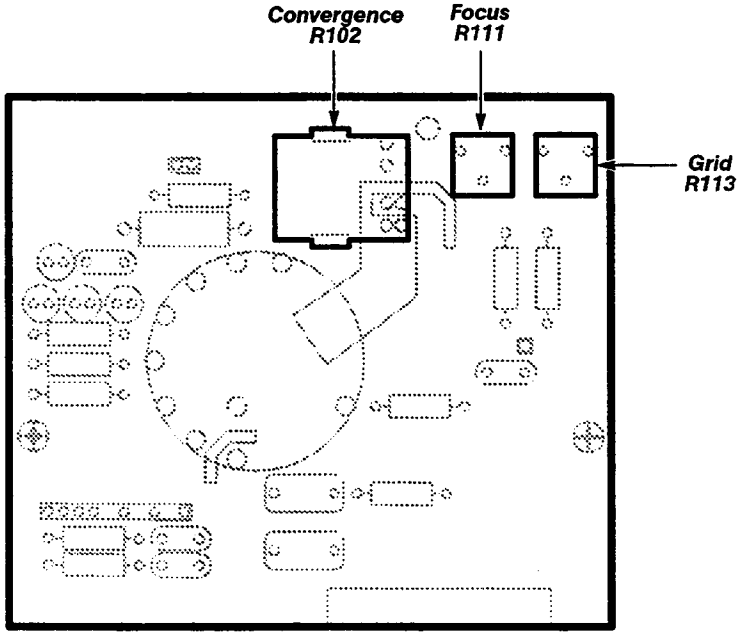


Figure 2-6 — A27 CRT Socket Board Adjustment Locations

Procedure 5 Low Frequency Square Wave

This procedure shows the setup and lists the steps to check the low frequency square wave level.

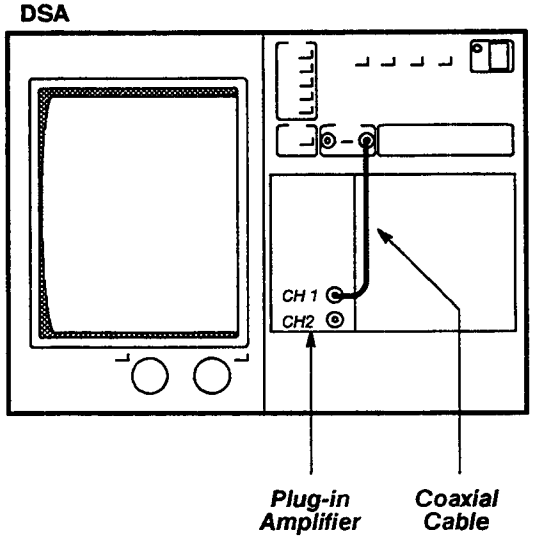
Specification

The low frequency square wave level must be 500 mV ± 15 mV into a 50 Ω load.

Measurement Limit

The frequency of the low frequency square wave must be approximately 1 kHz.

Setup to Check and Examine Low Frequency Square Wave



Prerequisite Steps: None.

Procedure to Check and Examine Low Frequency Square Wave

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Left plug-in amplifier
- CH1 display on/off ..... on

DSA
- **Vert Size: L1** ..... 100 mV/div
- **Vert Offset: L1** ..... 300 mV
- **Main Size** ..... 200 µs/div
- UTILITY button ..... press
  - **Calibrator Output** ..... touch
    - **Frequency** ..... 1 kHz

TRIGGER button ..... press
Level ..... 200 mV
WAVEFORM button ..... press
Acquire Desc ..... touch
Average N ..... **On**
MEASURE button ..... press
Measurements ..... **Peak-Peak**
..... **Frequency**

☐ Step 2: *Check* that the **Peak-Peak** reading is 500 mV ±15 mV.

☐ Step 3: *Examine* that the **Frequency** reading is 1 kHz ±1%.

Procedure 6 Calibrator DC Level Accuracy

This procedure shows the setup and lists the steps to examine and adjust the calibrator DC level accuracy (see Figure 2-7).

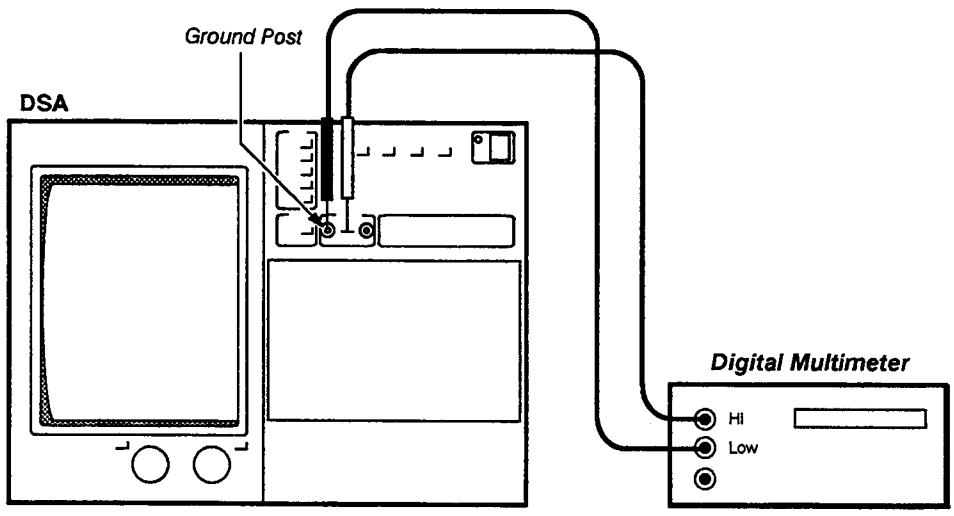
This procedure is necessary only if the A5 Calibrator board has been replaced. If the A5 board has not been replaced, go to Procedure 7.

Measurement Limits

The measurement limits for this procedure are as follows:

- The Extended Diagnostics **Cal_Ref High** routine into a 1 MΩ load must yield a calibrator output of 9.995 V ±10 mV.
- The Extended Diagnostics **Cal_Ref Low** routine into a 1 MΩ load must yield a calibrator output of -10.000 V ±10 mV.
- The Extended Diagnostics **Cal_Ref High** routine into a 50 Ω load must yield a calibrator output of 1.000 V + (+6 mV or -7 mV).
- The Extended Diagnostics **Cal_Ref Low** routine into a 50 Ω load must yield a calibrator output of -1.000 V ±6 mV.

Setup to Examine and Adjust Calibrator DC Level Accuracy



Prerequisite Steps: None.

Procedure to Examine and Adjust Calibrator DC Level Accuracy

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

DSA
UTILITY button ..... press
Page to Utility 2 ..... touch
Extended Diagnostics ..... touch
Verify Selection ..... **Extended Diagnostics**
Block ..... **Dig Cntl/Cal**
Area ..... **Refs Adjust**
Routine ..... **Cal_Ref High**
Run ..... touch
Digital multimeter
set to measure ..... 10 V DC

☐ Step 2: *Examine* that the digital multimeter (DMM) reads between 9.985 V and 10.005 V.

☐ Step 3: Touch **Exit** to return to Extended Diagnostics.

☐ Step 4: Touch **Cal_Ref Low** in the **Routine** menu and then **Run** at the bottom of the screen.

☐ Step 5: *Examine* that the DMM reads between -9.990 V and -10.010 V.

☐ Step 6: Touch **Exit** to return to Extended Diagnostics.

DO NOT adjust if the readings are within the stated limits. Proceed to Step 8.

☐ Step 7: *Adjust* the Gain and Offset adjustments, R238 and R237 respectively, on the A5 Calibrator board so that the values measured in Steps 4 and 6 are 9.995 V ± 0.001 V and -10.000 V 0 ± .001 V respectively (see Figure 2-7).

☐ Step 8: Connect the precision 50 Ω termination to the Calibrator BNC output connector on the DSA.

☐ Step 9: Connect the DMM lead to the center conductor of the 50 Ω termination.

☐ Step 10: Touch **Cal_Ref High** in the **Routine** menu and then touch **Run** at the bottom of the screen.

☐ Step 11: *Examine* that the DMM reads between 0.993 V and 1.006 V.

☐ Step 12: Touch **Exit** to return to Extended Diagnostics.

☐ Step 13: Touch **Cal_Ref Low** in the **Routine** menu and then touch **Run** at the bottom of the screen.

☐ Step 14: *Examine* that the DMM reads between −0.994 V and −1.006 V.

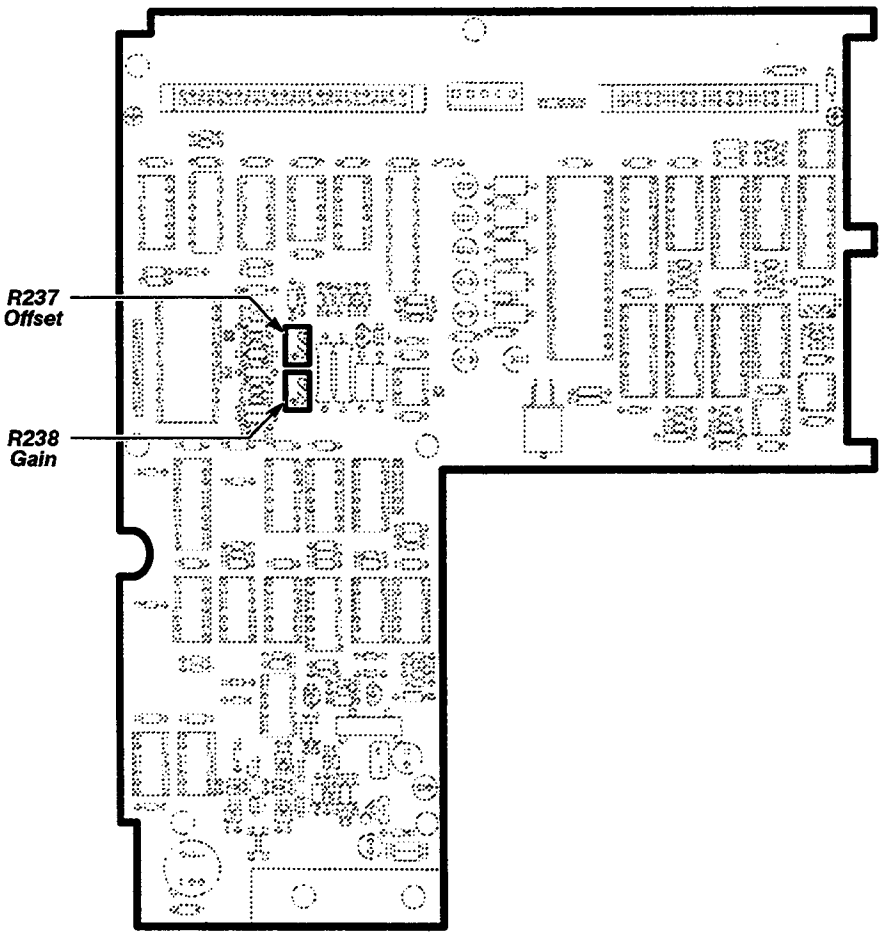


***Figure 2-7** — A5 Calibrator Board Adjustment Locations*

Procedure 7 Input/Output

In this procedure, you will measure the temperature sensor voltage and voltage reference with a digital multimeter (see Figures 2-8 and 3-13).

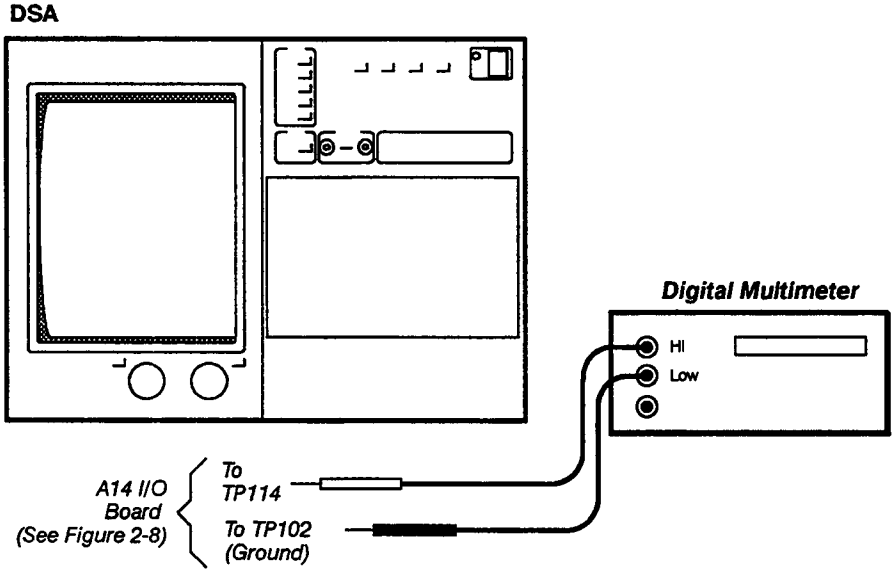
STOP

The adjustments in this procedure are necessary only if the A14 I/O board has been replaced. If the A14 I/O board has not been replaced, go to Procedure 8.

Measurement Limits

Temperature sensor voltage reference +6.500 V ±5 mV.

Setup to Examine and Adjust Temperature Sensor Voltage Reference



Prerequisite Steps: None.

Procedure to Examine and Adjust Temperature Sensor Voltage Reference

☐ Step 1: Perform the following in the order listed:

DSA

a. Set the front panel ON/STANDBY switch to STANDBY.

b. Remove the eight Torx drive screws that secure the platform to the chassis (see Figure 3-13).

c. Raise the platform on its hinges, and then secure the platform with the kickstand.

d. Remove both plastic retaining strips from top of card cage.

e. Connect the digital multimeter to test points TP114 and TP102 on the A14 I/O board.

Note: *If you cannot access the test points due to interference from the ribbon cables, disconnect the ribbon cables, connect the 10X Probe to the test points, and then reconnect the ribbon cables. The ribbon cables must be properly connected to perform the remainder of this procedure.*

f. Set the front-panel ON/STANDBY switch to ON.

Digital multimeter

Mode ..... DC voltage

☐ Step 2: *Examine* that the digital multimeter reads within the limits +6.505 V and +6.495 V.

DO NOT attempt to optimize following adjustment setting if the digital voltmeter reading is within the stated limits. Proceed to Step 4.

☐ Step 3: *Adjust* the Temp Sensor Voltage Ref adjustment R112 for +6.500 V.

☐ Step 4: Set the front panel ON/STANDBY switch to STANDBY.

☐ Step 5: Replace the plastic retaining strips.

☐ Step 6: Lower the platform, and secure with the eight Torx drive screws.

☐ Step 7: Set the ON/STANDBY to ON.

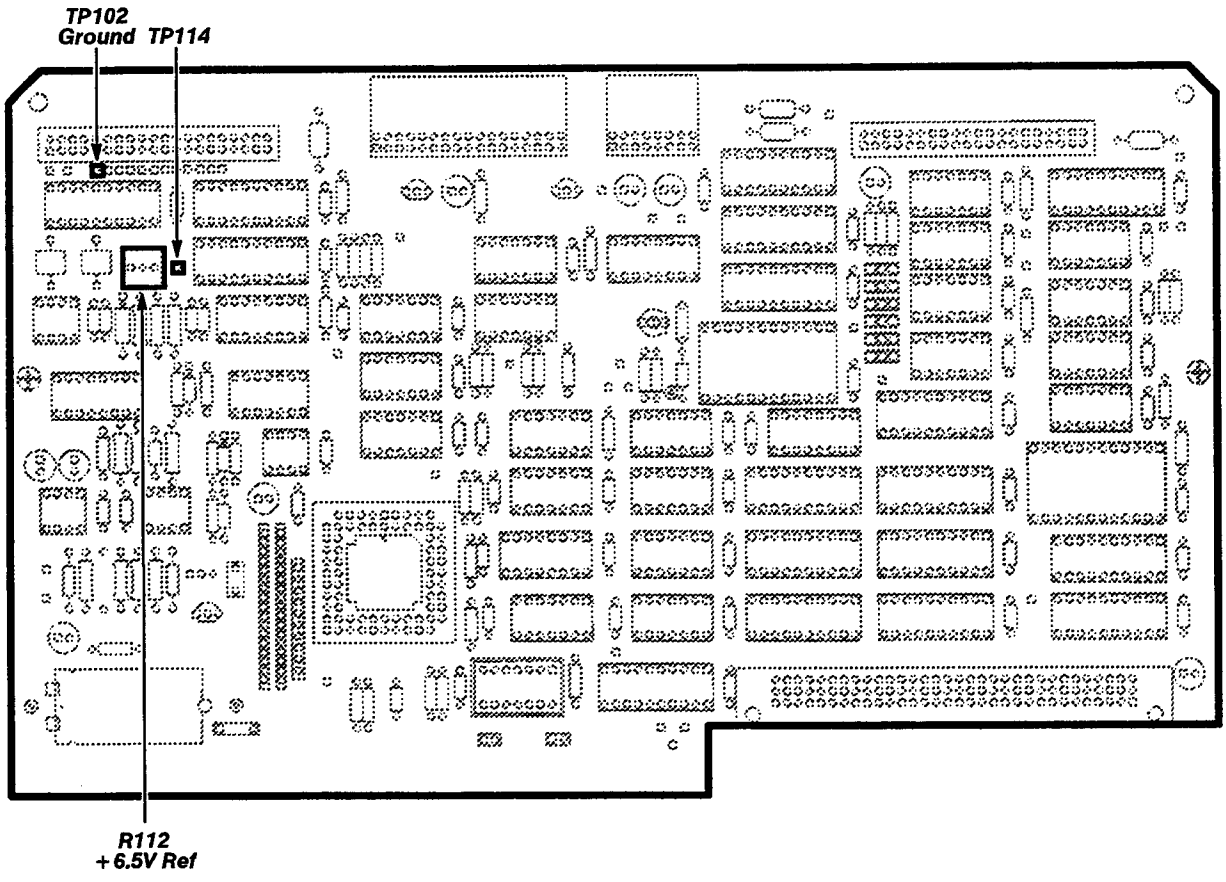


Figure 2-8 — A14 I/O Board (Temperature Sensor) Test Point and Adjustment Locations

Procedure 8 ACVS Gain

This procedure shows the setup and lists the steps to examine and adjust the ACVS gain (see Figures 2-9 and 2-10).

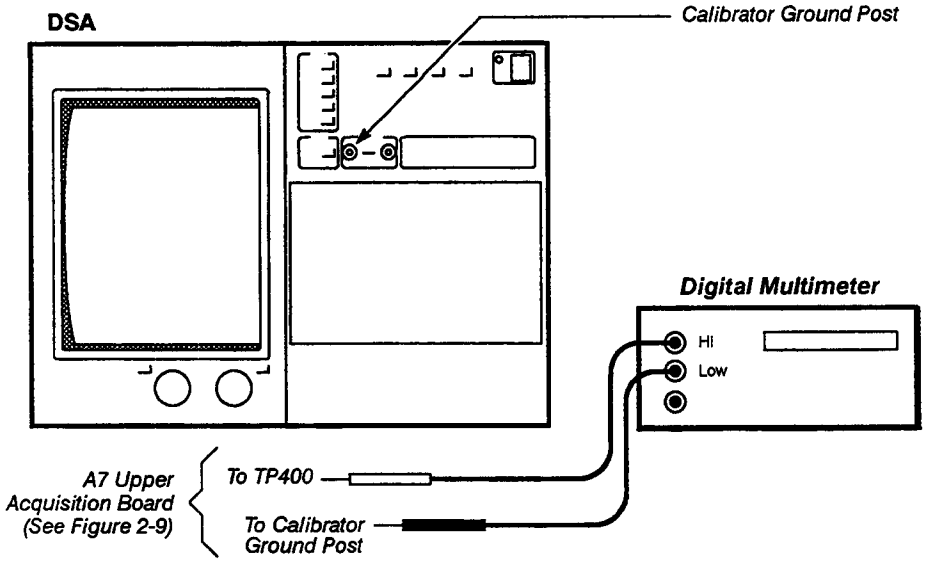
STOP

This procedure is necessary only if the A5 calibrator board has been replaced.

Measurement Limit

The voltage difference between TP400 in its high state and TP400 in its low state must be 2.715 V ±500 μV.

Setup to Examine and Adjust ACVS Gain



Prerequisite Steps: None.

Procedure to Examine and Adjust ACVS Gain

☐ Step 1: Perform the following settings in the order listed:

DSA

UTILITY button ..... press
Page to Utility 2 ..... touch
Extended Diagnostics ..... touch
Verify Selection ..... **Extended Diagnostic**
Block ..... **Dig Cntl/Cal**
Area ..... **Refs Adjust**
Routine **TP400H, 401L**
Run ..... touch

☐ Step 2: Read and record the digital multimeter reading as V_1 for later use.

☐ Step 3: Touch **Exit** to return to the **EXTENDED DIAGNOSTICS** menu structure.

☐ Step 4: Touch **TP400L, 401H** in the **Routine** menu, and then touch **Run**.

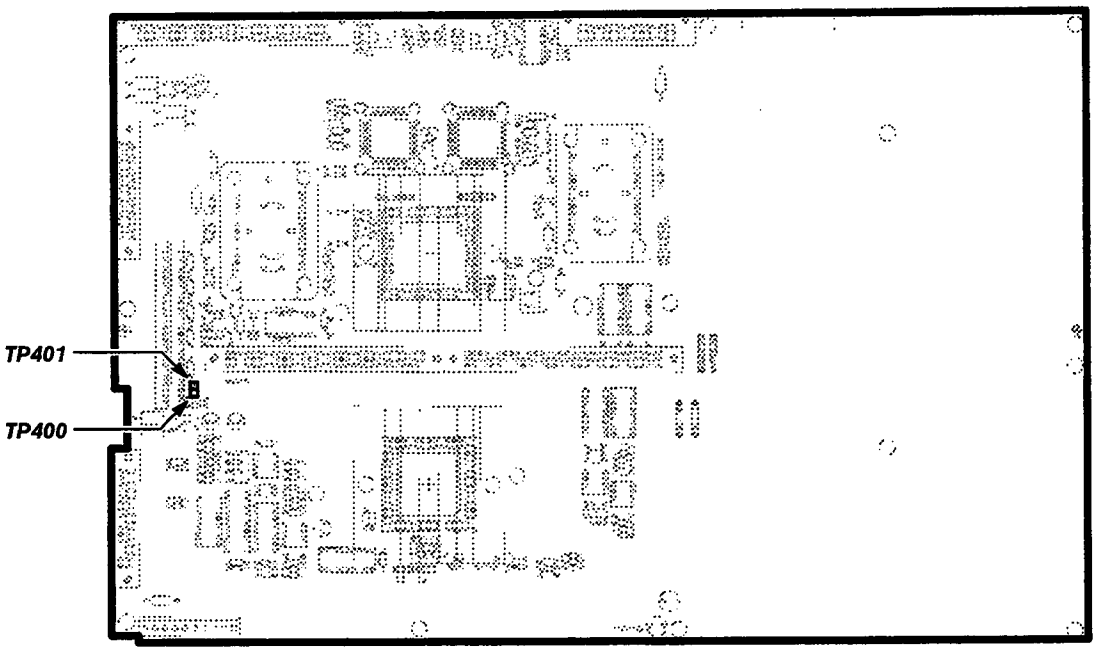
☐ Step 5: Read and record the digital multimeter reading as V_2 for later use.

☐ Step 6: *Examine* that $V_1 - V_2$ is 2.715 V ±500 µV.

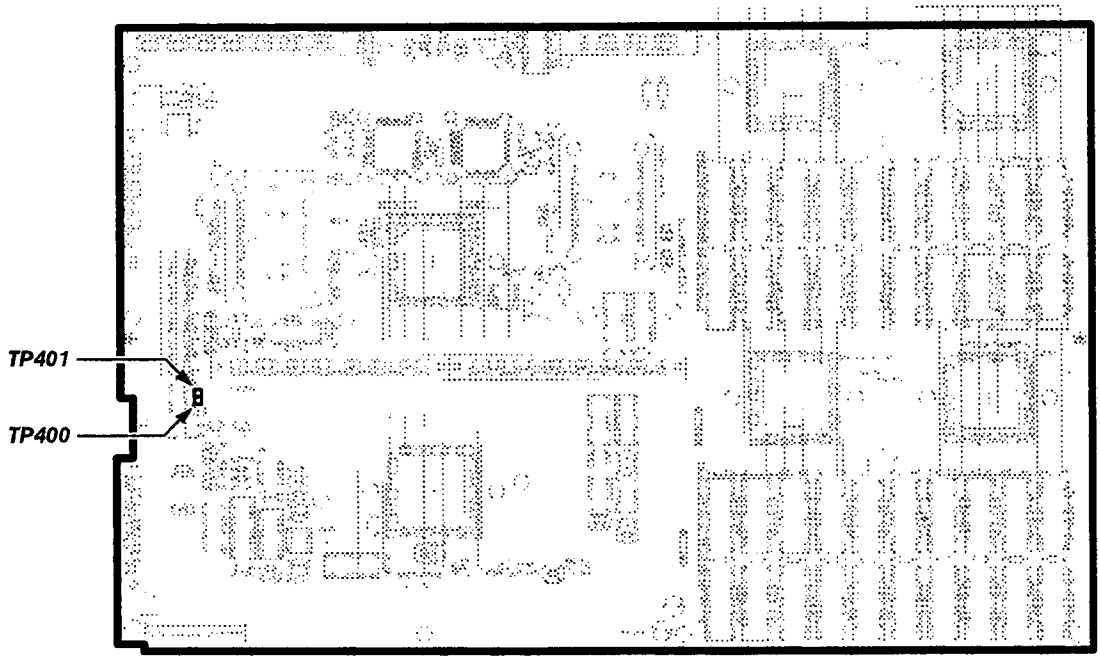
DO NOT attempt to optimize the following adjustment if the measurement is within the stated limits. Proceed to Step 8.

☐ Step 7: *Adjust* the ACVS Gain adjustment R723 on the A5 Calibrator board so that $V_1 - V_2$ is 2.715 V ±500 µV.

☐ Step 8: Touch **Exit**, then touch **Exit** twice to leave the **EXTENDED DIAGNOSTICS** menu structure.



DSA 601



DSA 602

Figure 2-9 — *A7 Upper Acquisition Board Test Point Locations*

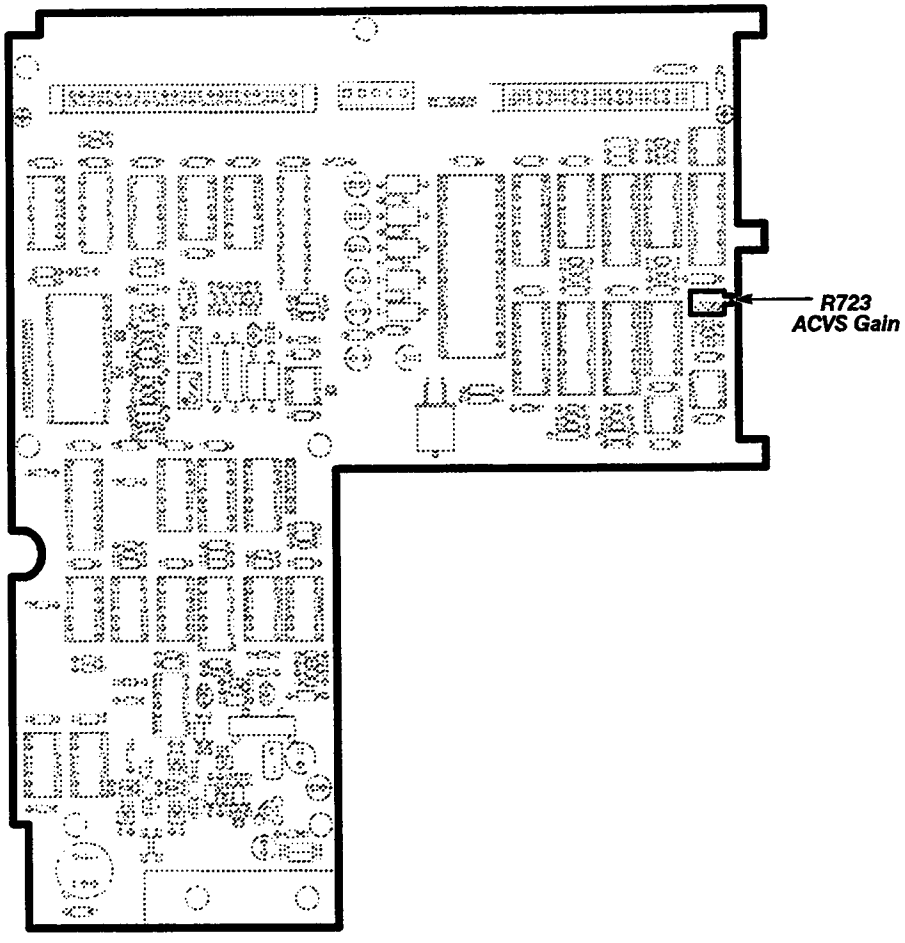


Figure 2-10 — A5 Calibrator Board Adjustment Location

Procedure 9 Field Calibration

This procedure provides information to operate the Checks and Adjustments Software. A PC configured with a GPIB controller board is required.

Note: *This procedure is only necessary if the A1 Plug-In Interface board, A5 Calibrator board, A6 Lower Acquisition board, A7 Upper Acquisition board, A17 MPU board, A19 Digitizer board, or any Field Replaceable Units (FRUs) on the Acquisition boards have been replaced. If an error is generated in running Procedure 16 Trigger Sensitivity, running Field Calibration might correct it.*

Overview

The DSA Checks and Adjustments Software verifies and optimizes calibration constants in the DSA EEROM. The *Checks* sequence of the software examines the performance of the DSA and the associated calibration constants. The *Adjust* sequence of the software tailors the calibration constants for optimum DSA performance.

When the Checks and Adjustments Software is run through the full sequence, it performs the following operations in order:

1. Prompts you to install initial plug-in units.
2. Waits 15 minutes for the instruments warm up then runs Enhanced Accuracy and Probe calibration.
3. Checks the performance of each of the acquisition pipes against a 6 MHz reference signal. This is the end of the checks portion of the procedure.

This is the end of the checks portion of the procedure. The following adjustments are made in the order listed.

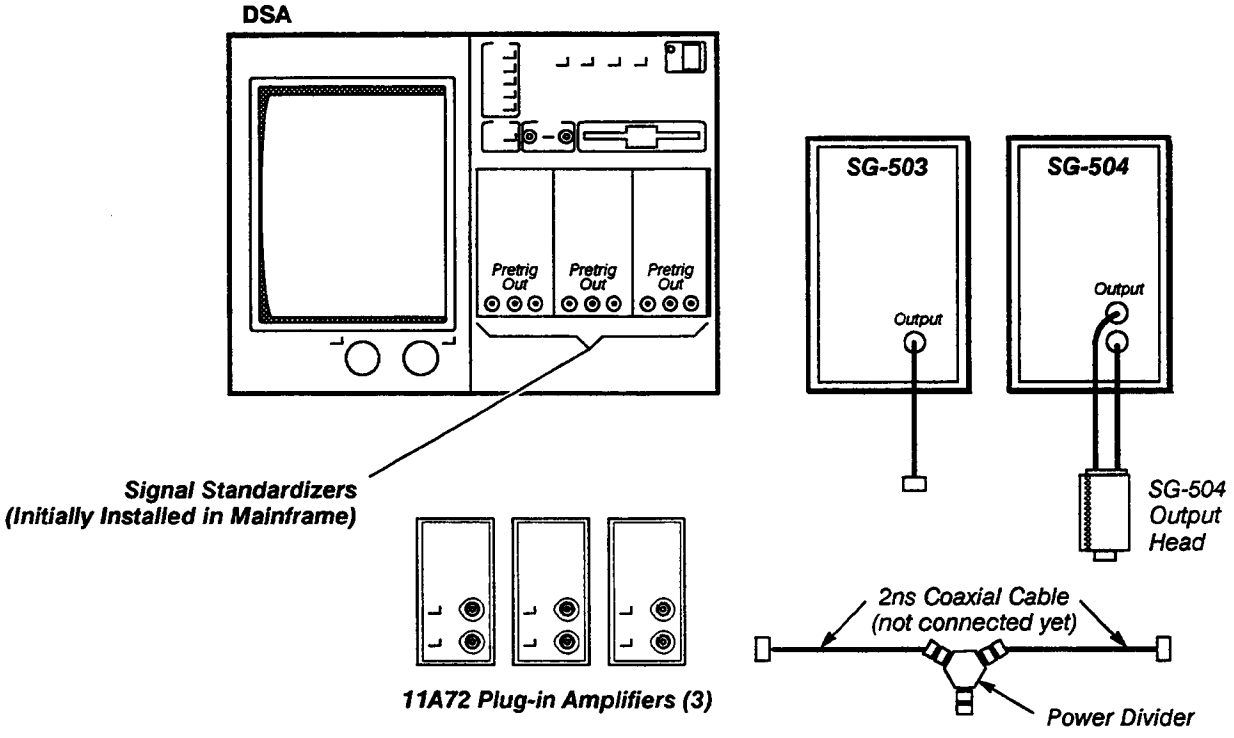
4. Optimizes the high-frequency bandwidth for pipes 2, 3, 1, and 4 for the 602/602A and pipes 1 and 3 for the 601/601A.
5. Adjusts the anti-aliasing filter.

You are prompted to install the three 11A72 amplifiers. After a 15 minute warm up, Enhanced Accuracy and Probe calibration are automatically run.

6. Adjust the bandwidth limit skewing effects.
7. Adjust main trigger sensitivity
8. Adjust window trigger sensitivity
9. Adjust the main trigger DC Noise Reject sensitivity
10. Adjust the window trigger DC Noise Reject sensitivity
11. Optimize effective bits at 500 Msample/sec rate.
12. Optimize effective bits at 1 Gsample/sec rate (DSA 602 and 602A only).
13. Optimize effective bits at the maximum real-time sample rate.

The Checks and Adjustments Software is on the 5¼-inch floppy disk(s) located in the front of this manual. Make a working copy of the disk(s) and save the original as a back up. Use an IBM compatible PC as a controller with MS-DOS system disk version 2.1 or later to boot up the Checks and Adjustments Software. The PC must have a GPIB interface board to run the Checks and Adjustments Software. GPIB configuration is discussed later in this procedure.

Setup to Perform Field Calibration



Prerequisite Steps: Enhanced Accuracy, Probe Calibration (Executed automatically by the software).

Procedure to Perform Field Calibration

The following steps describe how to configure the DSA and the PC, and start the Checks and Adjustments Software.

☐ Step 1: **Remove the Instrument Covers**—set the DSA ON/STANDBY switch to STANDBY. Remove the top and bottom covers from the DSA. (Use a coin to turn the four clasps on the top and bottom covers. Lift the front of each cover to remove.)

☐ Step 2: **Install the Jumper for Testing**—locate the CAL jumper J200 on the A19 Digitizer CPU board (see Figure 2-14). Install a black short-circuit jumper over the jumper pins.

☐ Step 3: **Install the Instrument Covers**—install the covers before starting the software.

☐ Step 4: **Set the GPIB**—set up your installed GPIB control card as described below. The main configuration parameters are:

- Base I/O address set to 22E1*hex*
- Card 1 configuration instead of the card 0 default
- Interrupts are not used
- DMA feature is not used

The following configuration illustrations show how to configure three popular GPIB control cards. The PCII/IIA configuration is shown in Figure 2-11, the PC2A configuration is shown in Figure 2-12, and the PC2 configuration is shown in Figure 2-13. For additional hardware configuration information, refer to your GPIB card manual.

After completing the device configuration, set the software configuration parameter by entering the appropriate one of the following DOS commands:

- `SET GPIB1=PCII/IIA 0 0 1`
- `SET GPIB1=PC2A 0 0 1`
- `SET GPIB1=PC2 0 0 87`

This command will alter the PC configuration only until you power down the PC. To set this software configuration at boot up, put this command into the autoexec.bat file and reboot the PC.

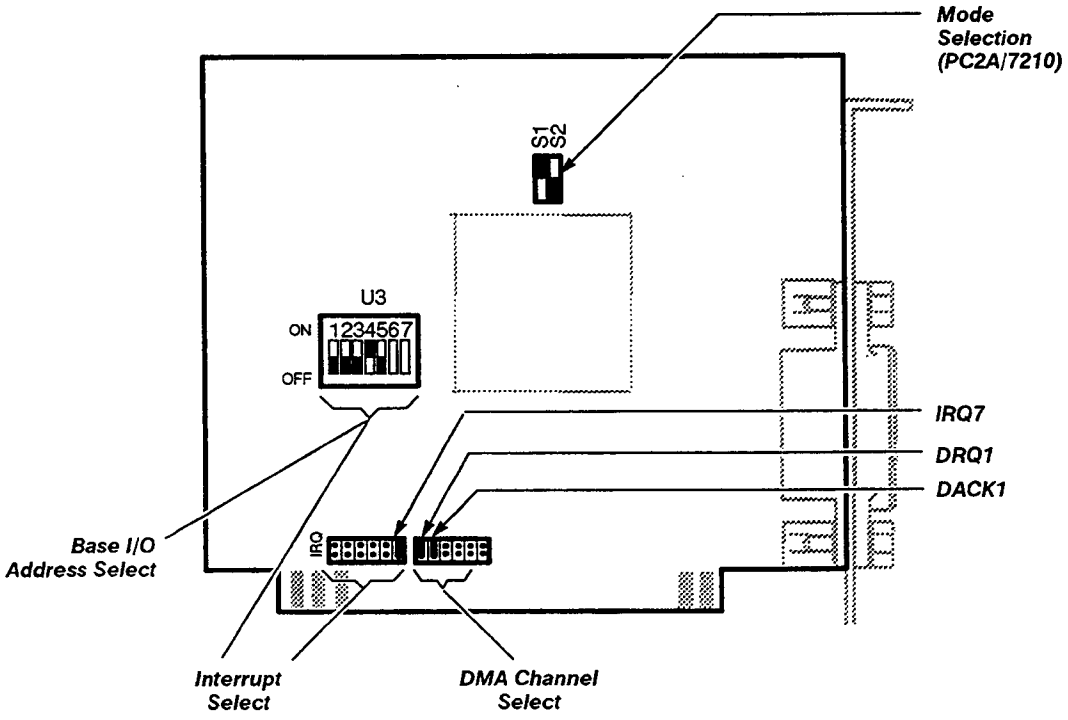


Figure 2-11 — GPIB PCII/IIACard Configuration

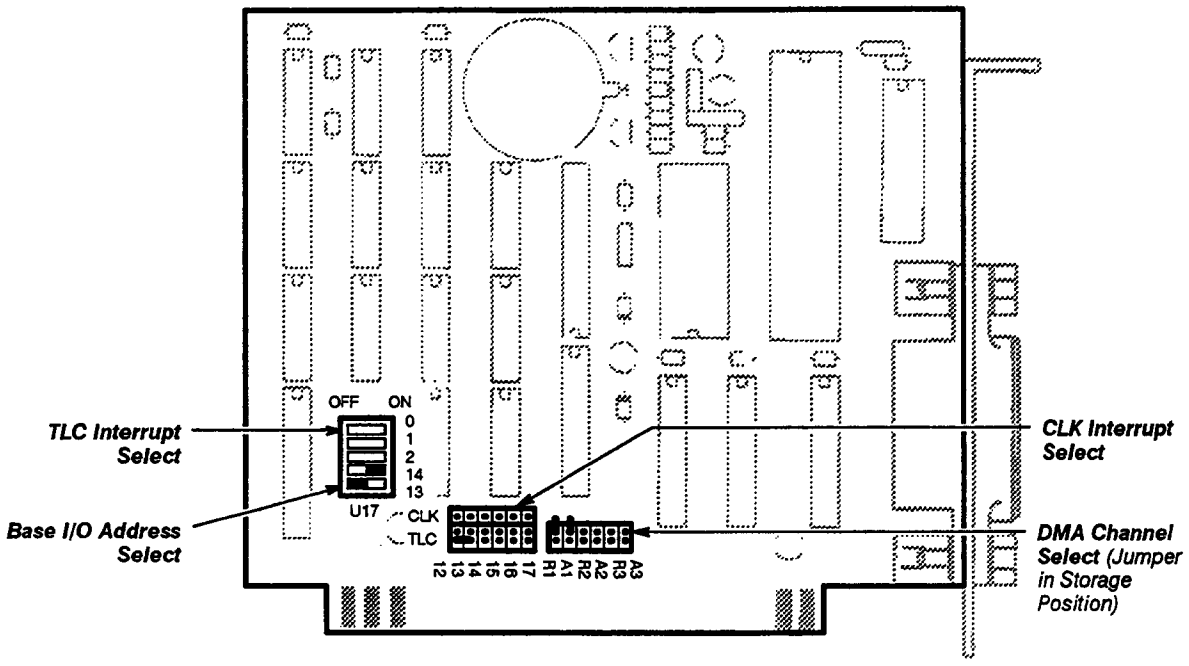


Figure 2-12 — GPIB PC2A Card Configuration

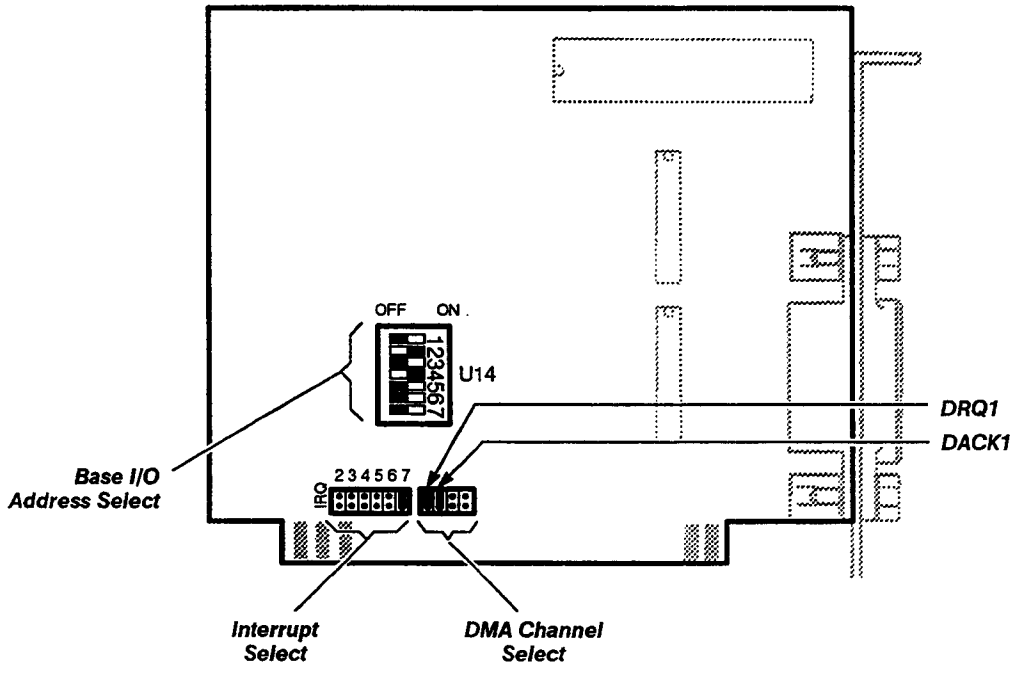


Figure 2-13 — GPIB PC2 Card Configuration

☐ Step 5: **Install DSA Checks and Adjustments Software**–

For a system equipped with a hard drive:
Make a \TEKCATS directory on the main drive. Copy all files and directories from the disk to the \TEKCATS directory using the *xcopy* command. (For example, *xcopy a: c: /e/s/v*, where a: holds the master and c: is the hard drive.)

For a system equipped with a floppy drive:
Copy the original disk onto a high density 1.2 Mbyte floppy disk. Use this copy of the disk on the PC main drive. The Field Calibration procedure writes information on this disk during execution.

☐ Step 6: **Start the Checks and Adjustments Software**–with the DSA powered on and the Checks and Adjustments Software working disk installed, change directories into the \TEKCATS directory. Start the Checks and Adjustments Software by entering the command:

DSACAL

☐ Step 7: **Perform the Field Calibration**–once the software is executing, you will be prompted to do the following:

- Enter your name
- Verify or set the current date and time
- Select the device under test (DSA 60X or DSA 60XA)
- Power-on the DSA and check the GPIB cable connection
- Verify the DSA GPIB parameters
- Verify that the serial number read from the DSA internal EEROM is correct (matches the front panel serial number)

Note: *The software will not accept Alpha characters. For example, when entering the serial number for instrument "B010100" you should enter "010100" instead.*

This information is recorded in the data log file and does not affect the execution of the procedure. The PC will initialize the powered-on DSA. The Checks and Adjustments Software will display the Sequence menu first, then the test list menu.

Selecting menu items–the software presents menus with instructions first, selections or prompt messages next, and data entry last. Each selection has a number that must be entered to select the item.

The software tries to anticipate the usual selection and highlights it as the default. Simply pressing the Enter key will select the highlighted item. If a different selection is desired, enter its corresponding number.

Example:

```
PLEASE SELECT SEQUENCE TO EXECUTE
        1. ADJUST
        2. CHECK
ENTER SELECTION NUMBER:
```

After selecting the Sequence, you can select the Full Sequence, Partial Sequence, or Select Test. We recommend that you run the Full Sequence which provides the best calibration in most cases.

Exiting from the Checks and Adjustments Software and Other Interrupt Key Options—once executing, the software can be exited by pressing the interrupt key, then entering a 4 to leave the program. Pressing the interrupt key also offers other options that include the following:

- Return to (Restart) previous test or menu. This allows you to restart a test after exiting it.
- Back up one menu level. When exiting from a Checks and Adjustments Software tests, this returns you to the test list menu.
- Return to the top menu (i.e., DSA 60X or DSA 60XA selection).
- Leave the Checks and Adjustments Software for the MSDOS environment. This terminates the Checks and Adjustments Software and closes the log file.
- Redraw the PC screen.
- Display Checks and Adjustments Software environment information, including the Checks and Adjustments Software CATSOS version number and the application (APPL) version number. These version numbers are necessary when reporting a problem with the software.

Test Data Logging—the data log file is written to a directory that has the same name as the DUT. The instrument serial number is written to the data file as is the date and the time of testing. The data log file is named with the instrument serial number, followed by a .DLF suffix (e.g., B010000.DLF). This ensures a unique log file for each DSA checked.

To remove old log files enter the DOS command:

ERASE *drive:filename*.dlf.

SRQ Messages—when appropriate, the DSA sends Service Requests (SRQs) to the PC. Usually the SRQ indicates completion of the last command sent by the PC. If the SRQ is not a response to a command and is unexpected by the PC, then it is a spurious SRQ. The spurious SRQ may indicate an error condition in the DSA, an incorrect plug-in amplifier for the current test, or many other possibilities. For a complete list of SRQ messages, refer to the ASCII interface discussion in the *Programmer's Reference*.

When a spurious SRQ occurs, the Checks and Adjustments Software displays a status window as a troubleshooting aid for the operator. The window gives the SRQ status byte, the event number, and a description of the unexpected event.

To remove the SRQ message press the carriage return. If the PC continues to display an SRQ message, check the settings, connections, and the on/off state of all test equipment and the DSA. After these items have been checked, press the interrupt key and select **Return to previous test**. This will restart the failed test.

Clearing a Continuous SRQ Condition—in unusual circumstances, the DSA may continually generate SRQs, or it may not respond to PC controller keyboard input. If either of these conditions occur, press the interrupt key, and select number 4 to exit the Checks and Adjustments Software. When the MS-DOS prompt appears, restart the Checks and Adjustments Software. The Checks and Adjustments Software has a buffer in which it stores SRQ messages from the DSA. Quitting the Checks and Adjustments Software clears this buffer.

If the SRQ message reappears, it means that the PC-to-DSA communication interface is not synchronized. To correct this condition, exit the Checks and Adjustments Software, **Initialize** the DSA, then turn the DSA ON/STANDBY switch to STANDBY and then back to ON to reset the interface. Turning off the PC is not necessary. When the DSA is powered on, restart the Checks and Adjustments Software.

Error Messages—the PC generates error messages when the Checks and Adjustments Software is unable to execute properly, or when a test fails. The error message display briefly describes the problem. If the failure follows an adjustment attempt, refer to the Troubleshooting section of this manual.

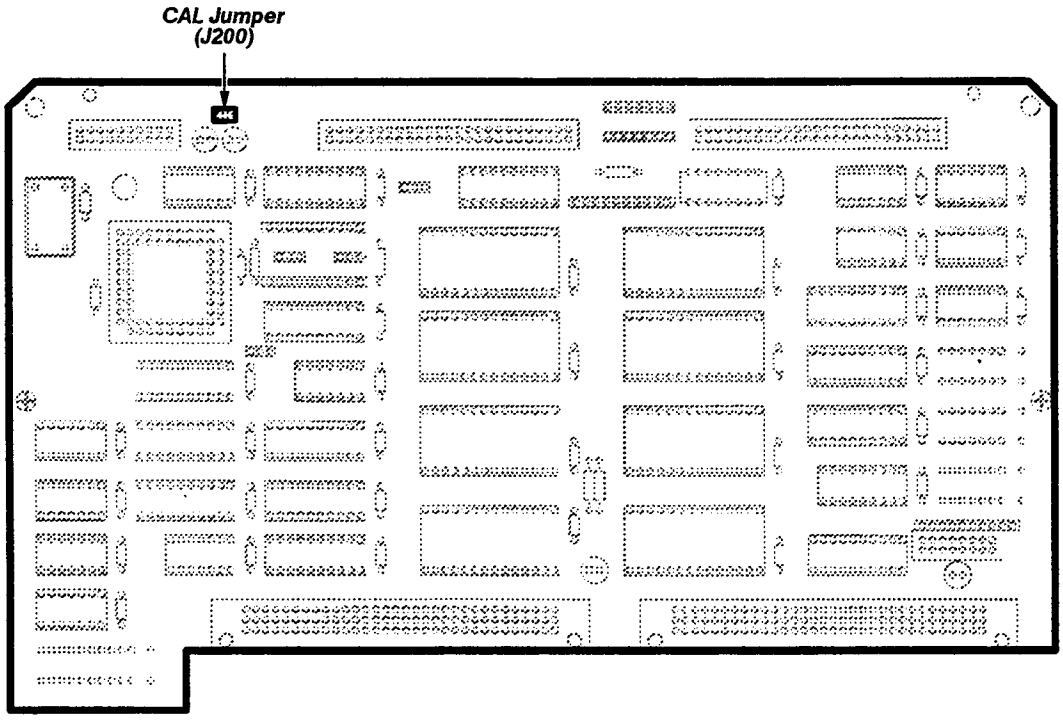


Figure 2-14 — Location of the CAL Jumper on the A19 Digitizer CPU

Procedure 10 Enhanced Accuracy

The setup is determined by the procedure that is to be performed. All 11000-Series plug-in amplifiers that are used in the procedure must be installed in their appropriate slots and allowed to warm up for twenty minutes (if they were installed cool).

If you have previously performed the Enhanced Accuracy procedure while operating the Checks and Adjustments Software, skip this procedure.

To avoid instrument damage, set the DSA ON/STANDBY switch to STANDBY before installing or removing plug-ins.Turning the instrument power off during Probe Calibration, Enhanced Accuracy, or Extended Diagnostics can result in some internal data being corrupted.

Procedure to Perform Enhanced Accuracy

☐ Step 1: After the twenty minute warm-up, press the ENHANCED ACCURACY button. The prompt, **Press ENHANCED ACCURACY again to confirm request,** will appear at the top of the display. Press the ENHANCED ACCURACY button again. Enhanced accuracy will take approximately six to ten minutes to complete.

☐ Step 2: *Examine* for the message **Enhanced Accuracy in Progress, Please Leave Instrument on Until Complete** indicating that the DSA is performing enhanced accuracy.

☐ Step 3: *Examine* for the message **Enhanced Accuracy completed and passed** indicating a successful operation. The EA indicator will appear below the Vertical Scale Factor on the left side of the display when the DSA has entered the enhanced accuracy mode.

When displayed, the Enhanced Accuracy symbol (EA) indicates that the DSA is at its highest accuracy state. The DSA records the time and ambient temperature for use in maintaining the Enhanced Accuracy state.

In order to preserve the ENHANCED ACCURACY state, remove and install plug-in amplifiers as quickly as possible. (Again, first set the ON/STANDBY switch to STANDBY, then remove and install the plug-in, and then set the ON/STANDBY switch to ON.) If either the DSA or plug-in(s) are allowed to cool, the ENHANCED ACCURACY state will be lost.

Procedure 11
Probe Calibration

This procedure shows the setup and lists the steps to perform a probe calibration.

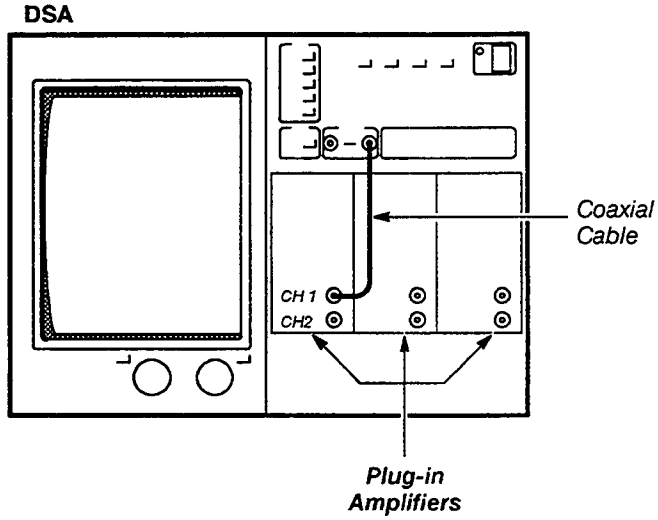
If the DSA or plug-in amplifier is allowed to cool, then Procedure 10, Enhanced Accuracy, must be performed prior to this procedure.

If you have previously performed a Probe Calibration while operating the Checks and Adjustments Software, skip this procedure.

NOTE:

SKIP STEP 2 IF THERE IS NO "INTERLEAVE" IN POP-UP MENU

Setup to Perform Probe Calibration



Prerequisite Steps: Enhanced Accuracy.

Procedure to Perform Probe Calibration

☐ Step 1: Press the WAVEFORM button, and then touch **Horizontal Desc**.

☐ Step 2: Touch **Interleave Enable** in the **Horizontal Description** pop-up menu to enable the Digitizer interleave.

☐ Step 3: Press the UTILITY button, and then touch **Probes**.

☐ Step 4: Touch **L1** in the **Probes** pop-up menu.

Note: *The message* **Probe Cal/Deskew/Compensation in Progress** *should appear in the center of the screen. This message and various screen displays appear while this calibration is performed.*

☐ Step 5: *Examine* that the message **Probe calibration passed. Perform probe compensation procedure then select menu entry to continue** is displayed to ensure that the probe calibration has passed.

☐ Step 6: Touch **Exit Comp** in the **Probe Compensation** pop-up menu.

Procedure 12 Vertical Gain Accuracy

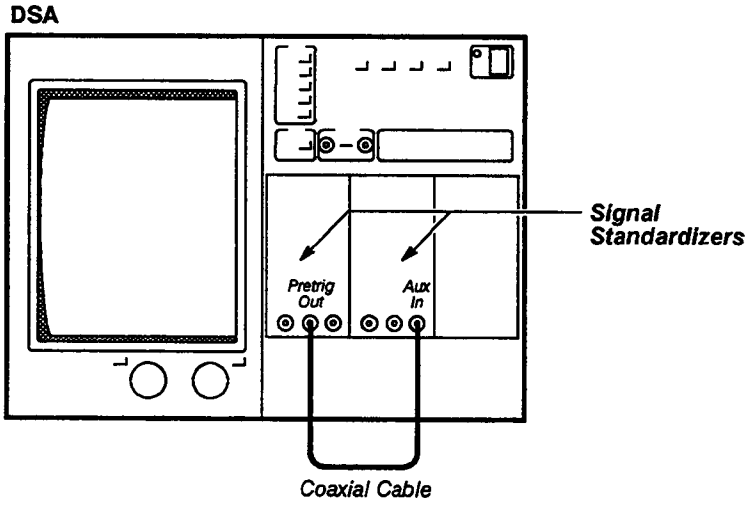
This procedure shows the setup and lists the steps to examine the vertical gain accuracy. All signal standardizers used in this procedure should have their clock outputs in the 10X position before they are installed. The clock output is controlled by a switch located on the circuit board inside the signal standardizer. Set the switch so that it is towards the front of the signal standardizer.

Measurement Limit

The vertical gain accuracy for all pipe paths must be within 1%.

Setup to Examine Pipe 3 Left Path

NOTE: DON'T WORRY ABOUT TRIGGERING WAVEFORM



Prerequisite Steps: Enhanced Accuracy.

Procedure to Examine Pipe 3 Left Path

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Left signal standardizer
- Test ..... Vert Gain
- Rep Rate ..... 10 kHz

Center signal standardizer
- Test ..... Trigger Freq Resp
- Amplitude ..... Midrange
- Rep Rate ..... 10 kHz

DSA
- **Main Size** ..... 200 µs/div
- **Def Wfm** ..... touch
  - **L** ..... touch
  - **Enter Desc** ..... touch

TRIGGER button ..... press
Source Desc ..... touch
C ..... touch
Enter Desc ..... touch
WAVEFORM button ..... press
Acquire Desc ..... touch
Average N ..... **On**
Acquire Desc ..... touch

☐ Step 2: Center the waveform with the Position knob on the left-most signal standardizer.

☐ Step 3: Touch the **Cursors** icon on the top of the screen, and then **Cursor Type**.

☐ Step 4: Touch **Horizontal Bars** in the **Cursor Type** pop-up menu.

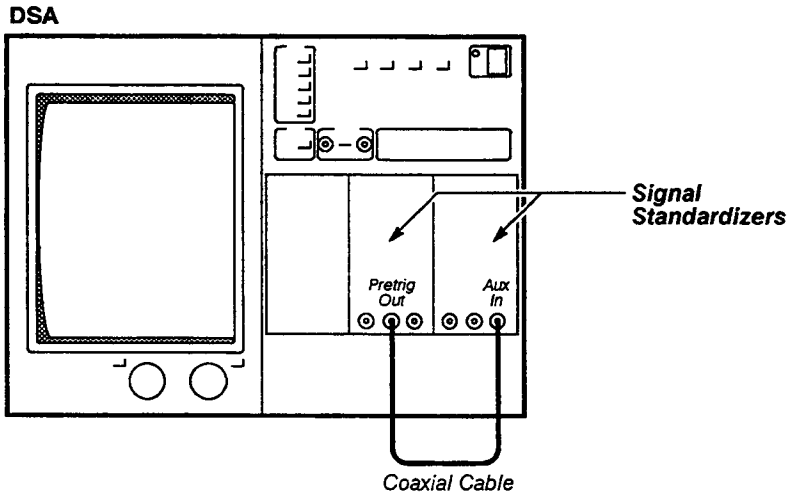
☐ Step 5: Press the two FINE buttons next to the two control knobs.

☐ Step 6: Position **Cursor 2** on the waveform step that is four divisions above the horizontal centerline.

☐ Step 7: Position **Cursor 1** on the waveform step that is four divisions below the horizontal centerline.

☐ Step 8: *Examine* the **ΔV** readout is 8 U ± .08 U (1%).

Setup to Examine Pipe 1 Center Path



Prerequisite Steps: None.

Procedure to Examine Pipe 1 Center Path

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Center signal standardizer
- Test ..... Vert Gain
- Rep Rate ..... 10 kHz

Right signal standardizer
- Test ..... Trigger Freq Resp
- Amplitude ..... Midrange
- Rep Rate ..... 10 kHz

DSA
- **Main Size** ..... 200 µs/div
- **Def Wfm** ..... touch
  - **C** ..... touch
  - **Enter Desc** ..... touch
- TRIGGER button ..... press
  - **Source Desc** ..... touch
    - **R** ..... touch
    - **Enter Desc** ..... touch
- WAVEFORM button ..... press
  - **Acquire Desc** ..... touch
    - **Average N** ..... **On**
  - **Acquire Desc** ..... touch

☐ Step 2: Center the waveform with the Position knob on the center signal standardizer.

☐ Step 3: Touch the **Cursors** icon on the top of the screen and then **Cursor Type**.

☐ Step 4: Touch **Horizontal Bars** in the **Cursor Type** pop-up menu.

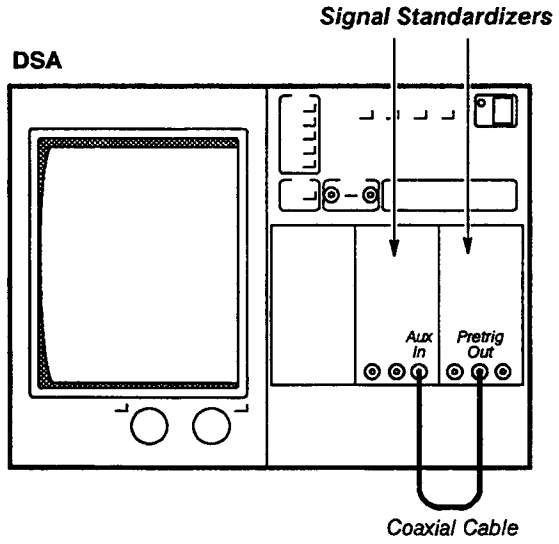
☐ Step 5: Press the two FINE button next to the two control knobs.

☐ Step 6: Position **Cursor 2** on the waveform step that is four divisions above the horizontal centerline.

☐ Step 7: Position **Cursor 1** on the waveform step that is four divisions below the horizontal centerline.

☐ Step 8: *Examine* the **ΔV** readout is 8 U ±.08 U (1%).

Setup to Examine Pipe 3 Right Path



Prerequisite Steps: None.

Procedure to Examine Pipe 3 Right Path

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Right signal standardizer
- Test ..... Vert Gain
- Rep Rate ..... 10 kHz

Center signal standardizer
- Test ..... Trigger Freq Resp
- Amplitude ..... Midrange
- Rep Rate ..... 10 kHz

DSA
- **Main Size** ..... 200 µs/div
- **Def Wfm** ..... touch
  - **R** ..... touch
  - **Enter Desc** ..... touch
- TRIGGER button ..... press
  - **Source Desc** ..... touch
    - **C** ..... touch
    - **Enter Desc** ..... touch
- WAVEFORM button ..... press
  - **Acquire Desc** ..... touch
    - **Average N** ..... **On**
  - **Acquire Desc** ..... touch

☐ Step 2: Center the waveform with the Position knob on the right-most signal standardizer.

☐ Step 3: Touch the **Cursors** icon on the top of the screen, and then **Cursor Type**.

☐ Step 4: Touch **Horizontal Bars** in the **Cursor Type** pop-up menu.

☐ Step 5: Press the two FINE buttons next to the two control knobs.

☐ Step 6: Position **Cursor 2** on the waveform step that is four divisions above the horizontal centerline.

☐ Step 7: Position **Cursor 1** on the waveform step that is four divisions below the horizontal centerline.

☐ Step 8: *Examine* the **ΔV** readout is 8 U ±.08 U (1%).

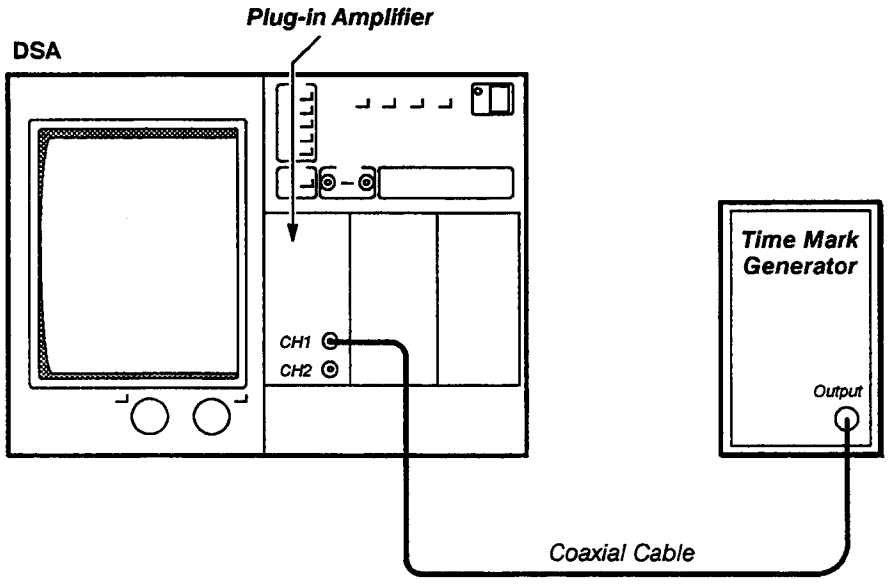
Procedure 13 Time Base Accuracy

This procedure shows the setup and lists the steps to check the time base accuracy.

Specification

Time Base accuracy must be within ±0.005% of measurement interval.

Setup to Check Time Base Accuracy



Prerequisite Steps: Enhanced Accuracy.

Procedure to Check Time Base Accuracy

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Plug-in amplifier
CH1 display on/off ..... on
DSA
Main Size ..... 1 ns/div
Vert Size ..... 200 mV/div
Impedance ..... 50 Ω
Time mark generator
Marker (sec) ..... 5 ns

☐ Step 2: Press the TRIGGER button, and then touch **Level**.

☐ Step 3: *Adjust* the **Trig Level** and **Main Time Holdoff** for a stable display.

☐ Step 4: Press the WAVEFORM button, and then touch **Acquire Desc**.

☐ Step 5: Set **Average N** to **On** in the **Acquire Description** pop-up menu.

☐ Step 6: Touch the horizontal icon, and then set **Main Size** to 2 µs/division. Set **Main Pos** to 0 s. (Ignore the main waveform in the following steps, since it will appear to be unstable.)

☐ Step 7: Touch **Window 1**.

☐ Step 8: Set the **Window1 Pos** to 0 s.

☐ Step 9: Touch a portion of the main waveform.

☐ Step 10: Touch **Window 2**.

☐ Step 11: Set the **Window2 Pos** to 20 µs.

☐ Step 12: Set the **Window Size** to 1 ns/div.

☐ Step 13: Touch **Cursors** at the top of the lower graticule.

☐ Step 14: Touch **Cursor Type** and the **Vertical Bars** in the **Cursor Type** pop-up menu.

☐ Step 15: Set the **Cursor 1** and **Cursor 2** on corresponding peaks of the Window 1 and Window 2 waveforms.

☐ Step 16: Check that Δt reads 0 ± 1 ns (0.005% of the 20 µs Main measurement interval).

Procedure 14 Window Record Accuracy

This procedure shows the setup and lists the steps to check the window record accuracy.

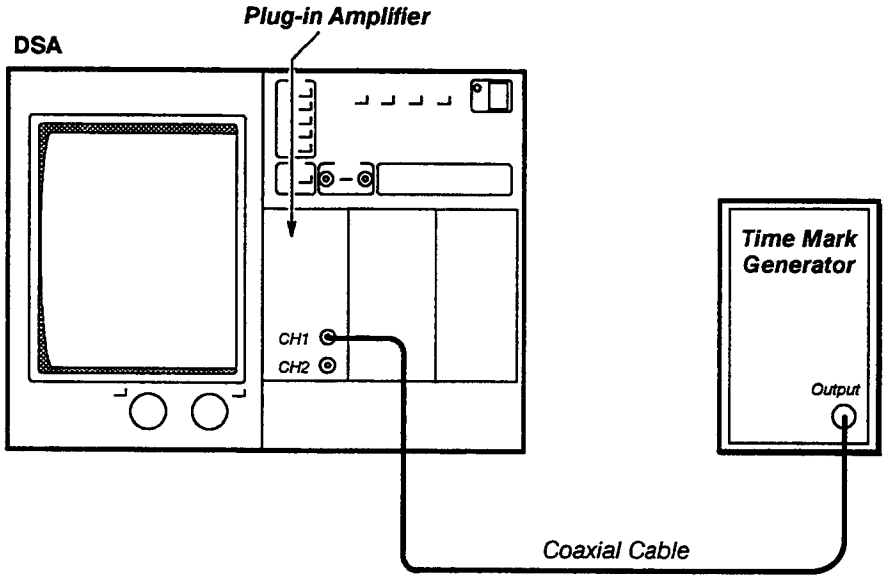
Specification

Window record accuracy must be within

$$\pm 0.005\% \text{ of the reading } + 150\ ps + \left(\frac{100\ ps}{\sqrt{N}}\right)$$

where N is the number of averages.

Setup to Check Window Record Accuracy



Prerequisite Steps: Enhanced Accuracy, Probe Calibration.

Procedure to Check Window Record Accuracy

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Time mark generator
- Marker (sec) ..... 5 ns

Plug-in amplifier
- CH 1 display on/off ..... on

DSA
- **Input Parameters** ..... 50 Ω
- **Main Size** ..... 200 ns/div
- **Vert Size: L1** ..... 50 mV/div
- **Vert Offset: L1** ..... set for a centered display

☐ Step 2: Touch **Window 1**.

☐ Step 3: Press the TRIGGER button, and then set **Trigger Select** to **Window**.

☐ Step 4: Touch **Source Desc** in the TRIGGER major menu, and then set the **Window Trigger Mode** to **Window Holdoff By Events**.

☐ Step 5: Touch **Events Holdoff** in the TRIGGER major menu, and then set the **Wdw Event Holdoff** to 200.

☐ Step 6: Press the MEASURE button.

☐ Step 7: Touch **Measurements** in the MEASURE major menu, and then **Main → Win Trig Time**.

☐ Step 8: *Check* that the **Main → Win Trig Time** reading is 1 μs ±300 ps (±0.005% of 1 μs +150 ps +100 ps).

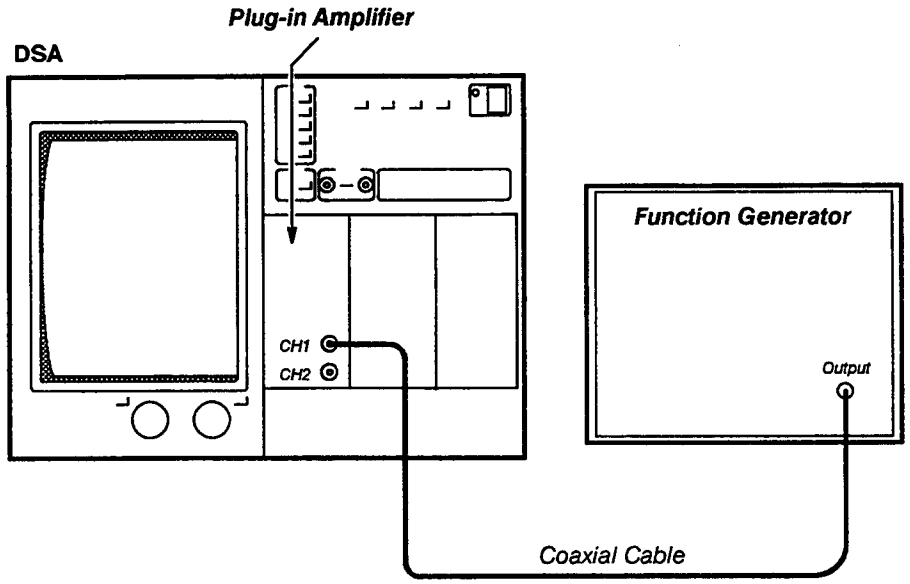
Procedure 15 Trigger Level Accuracy

This procedure shows the setup and lists the steps to check the trigger level accuracy.

Specification

The trigger level accuracy must be within 0.2 divisions (2% of full scale).

Setup to Check Trigger Level Accuracy



Prerequisite Steps: Enhanced Accuracy.

Procedure to Check Trigger Level Accuracy

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Plug-in amplifier
- CH 1 display on/off ..... on

DSA
- **Vert Size: L1** ..... 200 mV/div
- **Main Size** ..... 1 µs/div
- **Main Pos** 0
- **Acquire Desc** ..... touch
- **Average N** ..... On

Function generator
- Function ..... Sine
- Ampl ..... set for 3 V p-p display
- Freq ..... 1 kHz

☐ Step 2: Touch the cursors icon at the top of the screen.

☐ Step 3: Set **Cursor 1** so that **t1** = 0.00.

☐ Step 4: Touch the **trig'd** icon, and then set the **Main Trig Level** to various settings between +1 V and -1 V.

☐ Step 5: *Check* that for each **Main Trig Level** setting, **v1** - **Main Trig Level** setting is within ±40 mV (0.2 divisions).

Procedure 16 Trigger Sensitivity

This procedure shows the setup and lists the steps to check and examine the trigger sensitivity.

Specifications

The specifications for this procedure are that the display will trigger for the following:

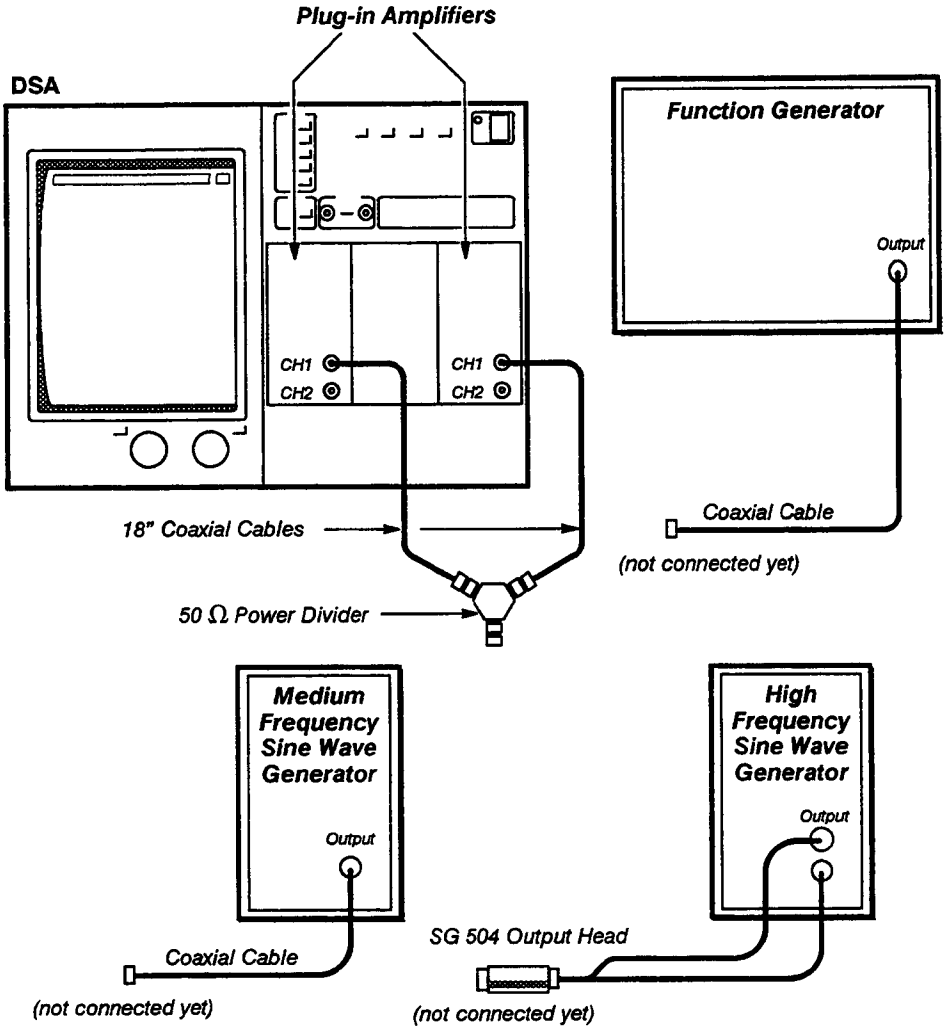
- DC Coupled—0.4 div from DC to 10 MHz, increasing to 1 div at 1 GHz
- DC Noise Reject Coupled—1.2 div from DC to 10 MHz, increasing to 3 div at 1 GHz
- AC Coupled—0.4 div from 60 Hz to 10 MHz, increasing to 1 div at 1 GHz
- AC HF Reject Coupled—0.5 div from 60 Hz to 30 kHz
- AC LF Reject Coupled—0.5 div from 80 kHz to 10 MHz, increasing to 1 div at 1 GHz

Measurement Limits

The measurement limits for this procedure are that the display will not trigger for the following:

- DC Coupled—0.05 div up to 1 GHz
- DC Noise Reject Coupled—0.5 div up to 1 GHz
- AC Coupled—0.05 div up to 1 GHz
- AC HF Reject Coupled—0.05 div up to 30 kHz
- AC LF Reject Coupled—0.05 div up to 1 GHz

Setup to Check and Examine Trigger Sensitivity



Prerequisite Steps: Enhanced Accuracy.

Procedure to Check and Examine Trigger Sensitivity

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Left plug-in amplifier

CH 1 vertical size ..... 500 mV/div

Right plug-in amplifier

CH 1 display on/off ..... on

DSA
- TRIGGER button ..... press
  - **Source Desc** ..... touch
    - **L1** ..... touch
    - **Enter Desc** ..... touch

Function generator
- Function ..... Sine

Medium frequency sine wave generator ..... no settings required

High frequency sine wave generator ..... no settings required

☐ Step 2: Set **Coupling** in the TRIGGER major menu to the setting listed in Table 2-4 for the particular test you are performing (begin with Test 1).

☐ Step 3: Set the **Main Size** to the setting listed in Table 2-4 for the particular test you are performing.

☐ Step 4: Set the **Vert Size: R1** to the setting listed in Table 2-4 for the particular test you are performing.

☐ Step 5: Connect the generator, listed in Table 2-5 for the particular test you are performing, to the unconnected end of the power divider.

☐ Step 6: Set the generator Frequency to the setting listed in Table 2-5 for the particular test you are performing.

☐ Step 7: Set the generator Amplitude so that the screen displays a sine wave of amplitude equal to the Low Amplitude Limit listed in Table 2-5 for the particular test you are performing.

☐ Step 8: *Examine* that the waveform is not triggered for display amplitudes $\leq$ to Low Amplitude Limit. The waveform is not triggered when the **!not!** icon above the **trig'd** icon is intermittently or continuously visible. (Vary the **Main Trig Level** to ensure that the waveform will not trigger.)

Note: *To derive the number of divisions of signal referred to under the Specifications and Measurement Limits, use the following formula:*

$$\text{divisions} = \frac{\textbf{High or Low Amplitude Limit} \times \textbf{Vert Size : R1}}{\textbf{Vert Size : L1} \text{ (500 mV/div)}}$$

☐ Step 9: Set the generator Amplitude so that the screen displays a sine wave of amplitude equal to the High Amplitude Limit listed in Table 2-5 for the particular test you are performing.

☐ Step 10: *Check* that the waveform will trigger. The waveform is triggered when the **!not!** icon is not visible. (The **Main Trig Level** may have to be set to achieve a triggered display.)

☐ Step 11: Disconnect the generator from the power divider.

☐ Step 12: Repeat Steps 2 through 10 for each Test listed in Tables 2-4 and 2-5.

Table 2-4 — Trigger Sensitivity DSA Settings

Test	Trigger Coupling	Main Size	Vert Size: R1
Test 1	DC	500 µs/div	50 mV/div
Test 2	DC	50 ns/div	50 mV/div
Test 3	DC	500 ps/div	50 mV/div
Test 4	DC Noise Reject	500 µs/div	100 mV/div
Test 5	DC Noise Reject	50 ns/div	100 mV/div
Test 6	DC Noise Reject	500 ps/div	200 mV/div
Test 7	AC	10 ms/div	50 mV/div
Test 8	AC	50 ns/div	50 mV/div
Test 9	AC	500 ps/div	50 mV/div
Test 10	AC High Freq Rej	10 ms/div	50 mV/div
Test 11	AC High Freq Rej	20 µs/div	50 mV/div
Test 12	AC Low Freq Rej	5 µs/div	50 mV/div
Test 13	AC Low Freq Rej	50 ns/div	50 mV/div
Test 14	AC Low Freq Rej	500 ps/div	50 mV/div

Note: *If any of the Trigger Sensitivity tests fail, perform Procedure 9 then check the failed test again.*

Table 2-5 — *Trigger Sensitivity Generator Settings*

Test	Generator	Frequency	Amplitude Limits	
			Low	High
Test 1	Function	1 kHz*	0.5 div	4.0 div
Test 2	Medium Frequency Sine Wave	10 MHz	0.5 div	4.0 div
Test 3	High Frequency Sine Wave	1 GHz	0.5 div	10.0 div
Test 4	Function	1 kHz*	2.5 div	6.0 div
Test 5	Medium Frequency Sine Wave	10 MHz	2.5 div	6.0 div
Test 6	High Frequency Sine Wave	1 GHz	1.2 div	7.5 div
Test 7	Function	60 Hz	0.5 div	4.0 div
Test 8	Medium Frequency Sine Wave	10 MHz	0.5 div	4.0 div
Test 9	High Frequency Sine Wave	1 GHz	0.5 div	10.0 div
Test 10	Function	60 Hz	0.5 div	5.0 div
Test 11	Function	30 kHz	0.5 div	5.0 div
Test 12	Function	80 kHz	0.5 div	5.0 div
Test 13	Medium Frequency Sine Wave	10 MHz	0.5 div	5.0 div
Test 14	High Frequency Sine Wave	1 GHz	0.5 div	10.0 div

**The difference in response between a DC signal and a 1 kHz sine wave is negligible. Therefore, a 1 kHz sine wave is substituted for the DC signal so that the test will be simpler to perform.*

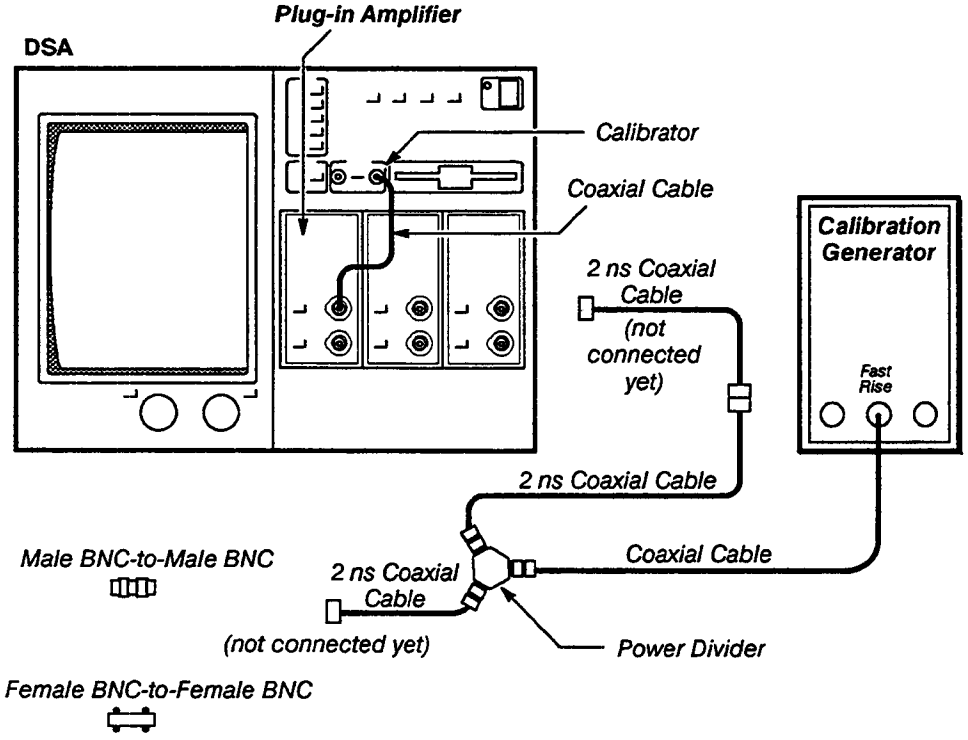
Procedure 17 Cable Characterization

This procedure shows the setup and lists the steps to examine/set the cable characterization that will be used in Procedures 18, 19, and 20.

Measurement Limit

The propagation delay difference must be within 1.7 ns and 2.0 ns.

Setup to Examine and Set the Cable Characterization



Prerequisite Steps: Enhanced Accuracy, Probe Calibration.

Procedure to Examine and Set the Cable Characterization

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Calibration generator
- Pulse Amplitude ..... Max
- Period ..... 1 µs
- Mode ..... Fast Rise

Left plug-in amplifier
- CH 1 display on/off ..... on

Center plug-in amplifier
- CH 1 display on/off ..... on

DSA

Vert Size: C1 ..... 200 mV/div
Vert Size: L1 ..... 200 mV/div
TRIGGER button ..... press
Level ..... -250 mV
Main Size ..... 500 ps/div

☐ Step 2: Press the UTILITY button.

☐ Step 3: Touch **Probes** and then **L1** in the **Probes** pop-up menu.

Note: The probe calibration process will last about one minute. The message ***Probe calibration passed. Perform probe compensation procedure then select menu entry to continue*** should appear when the probe calibration is completed.

☐ Step 4: Disconnect the coaxial cable from the left CH 1 input and connect it to the center CH 1 input.

☐ Step 5: Touch **Select Next Chan** and the **C1** in the **Probes** pop-up menu.

☐ Step 6: After the probe calibration is completed, disconnect the coaxial cable from the center CH 1 input.

☐ Step 7: Connect the single coaxial cable from the power divider to the left CH 1 input and the two connected coaxial cables from the power divider to the center CH 1 input.

☐ Step 8: Set the **Main Pos** so that the rising edges of both waveforms are approximately centered.

☐ Step 9: Press the WAVEFORM button, and then touch **Acquire Desc**.

☐ Step 10: Set **Average N** to **On** in the **Acquire Description** pop-up menu.

☐ Step 11: Touch the left CH1 waveform on the screen (should be the left-most step) to select that waveform.

☐ Step 12: Touch **Acquire Desc** in the WAVEFORM major menu, and then set **Average N** to **On** in the **Acquire Description** pop-up menu.

☐ Step 13: Press the MEASURE button, and then touch **Measurements**.

☐ Step 14: Touch **Prop Delay** in the **Measurements** pop-up menu.

☐ Step 15: *Examine* that the **Prop Delay** readout is between 1.7 ns and 2.0 ns.

DO NOT attempt to set the propagation delay between the CH1 and CH2 signals if the reading is within the stated limits. Proceed to Procedure 18, Boolean Trigger Minimum True Width.

☐ Step 16: If the **Prop Delay** readout is less than 1.7 ns, insert a male BNC-to-male BNC adapter and a female BNC-to-female BNC adapter in the left CH 2 signal path. If the **Prop Delay** readout is greater than 2.0 ns, insert a male BNC-to-male BNC adapter and a female BNC-to-female BNC adapter in the left CH 1 signal path. Repeat Steps 15 and 16 until the reading is within the stated limit.

Note: *If you have the equipment available to cut the cables, it may be easier for you to cut the cables for the specified propagation delay than to insert the adapters in the signal path.*

Once the proper propagation delay is achieved, note the configuration of the cables for use in Procedures 18, 19 and 20.

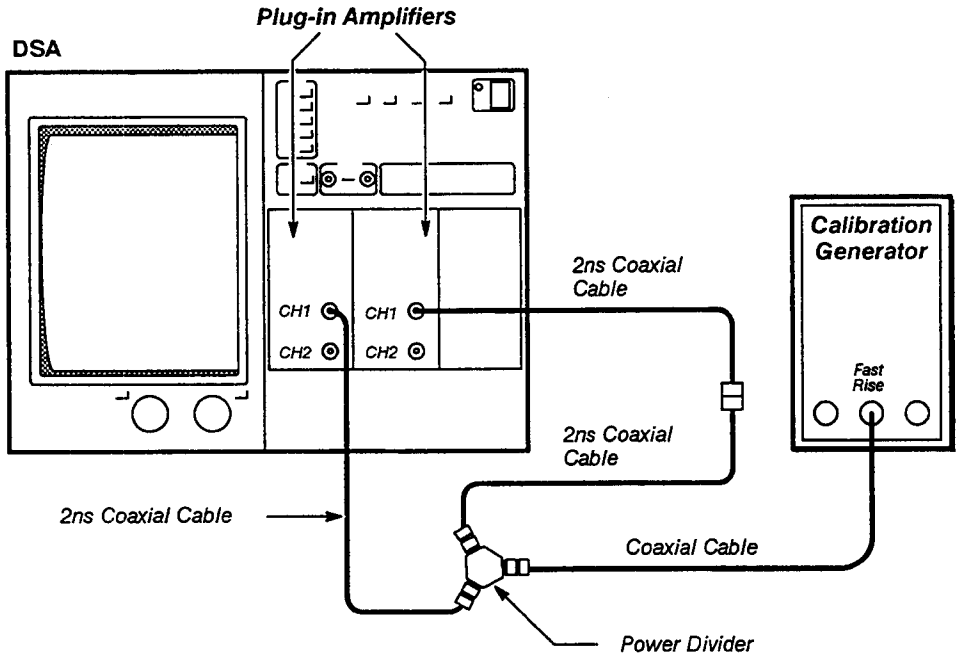
Procedure 18 Boolean Trigger Minimum True Width

This procedure shows the setup and lists the steps to check the Boolean trigger true minimum width. To achieve the proper propagation delay (from 1.7 ns to 2.0 ns) between the two input signals from the calibration generator, use the cable configuration found in Procedure 17, Cable Characterization.

Specification

The display must trigger if the Boolean trigger function is true for a minimum of 2.0 ns. An individual Boolean operand (in this case the signal L1, C1, R1, NOT L1, NOT C1, or NOT R1) is true if its amplitude is greater than its trigger level.

Setup to Check Boolean Trigger with Left AND Center



Prerequisite Steps: Cable Characterization.

Procedure to Check Boolean Trigger with Left AND Center

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Calibration generator
- Pulse Amplitude ..... Max
- Period ..... 1 µs
- Mode ..... Fast Rise

Left plug-in amplifier ..... no settings required
Center plug-in amplifier ..... no settings required

DSA

Def Wfm ..... touch
L1 ..... touch
Enter Desc ..... touch
Vert Size: L1 ..... 100 mV/div
Vert Offset: L1 ..... -250 mV
Def Wfm ..... touch
C1 ..... touch
Enter Desc ..... touch
Vert Size: C1 ..... 100 mV/div
Vert Offset: C1 ..... -250 mV
TRIGGER button ..... press
Source Desc ..... touch
L1 ..... touch
AND ..... touch
NOT ..... touch
C1 ..... touch
Enter Desc ..... touch
LevelA ..... -250 mV
Level B ..... -250 mV
Main Size ..... 2 ns/div
Main Pos ..... center the rising edges

☐ Step 2: *Check* that the rising edge of both waveforms is displayed, and that both waveforms are triggered.

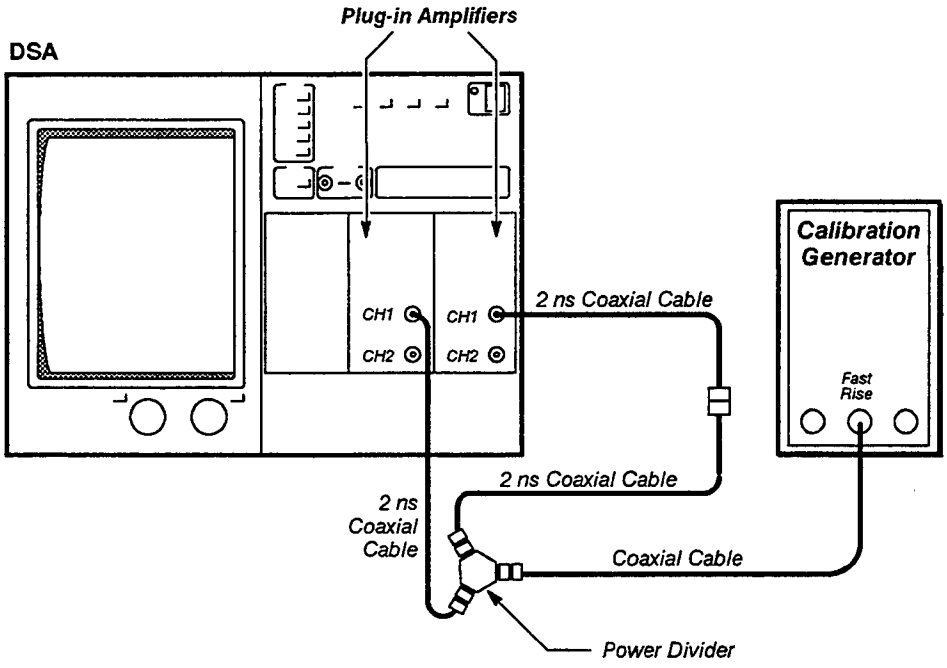
☐ Step 3: Disconnect the cables from the plug-in amplifiers and then connect the short cable to the center CH 1 input connector and the long cable to the left CH 1 input connector.

☐ Step 4: Touch **Source Desc** in the **Trigger** major menu, and then the following selectors in the **Main Trigger Source Description** pop-up menu:

C1 ..... touch
AND ..... touch
NOT ..... touch
L1 ..... touch
Enter Desc ..... touch

☐ Step 5: *Check* that the rising edge of both waveforms is displayed, and that both waveforms are triggered.

Setup to Check Boolean Trigger with Center AND Right



Prerequisite Steps: Cable Characterization.

Procedure to Check Boolean Trigger with Center AND Right

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Calibration generator
- Pulse Amplitude ..... Max
- Period ..... 1 µs
- Mode ..... Fast Rise

Center plug-in amplifier ..... no settings required

Right plug-in amplifier ..... no settings required

DSA
- **Def Wfm** ..... touch
  - **C1** ..... touch
  - **Enter Desc** ..... touch
- **Vert Size: C1** ..... 100 mV/div
- **Vert Offset: C1** ..... -250 mV
- **Def Wfm** ..... touch
  - **R1** ..... touch
  - **Enter Desc** ..... touch
- **Vert Size: R1** ..... 100 mV/div
- **Vert Offset: R1** ..... -250 mV

TRIGGER button ..... press
Source Desc ..... touch
C1 ..... touch
AND ..... touch
NOT ..... touch
R1 ..... touch
Enter Desc ..... touch
LevelA ..... -250 mV
Level B ..... -250 mV
Main Size ..... 2 ns/div
Main Pos ..... center the rising edges

☐ Step 2: *Check* that the rising edge of both waveforms is displayed, and that both waveforms are triggered.

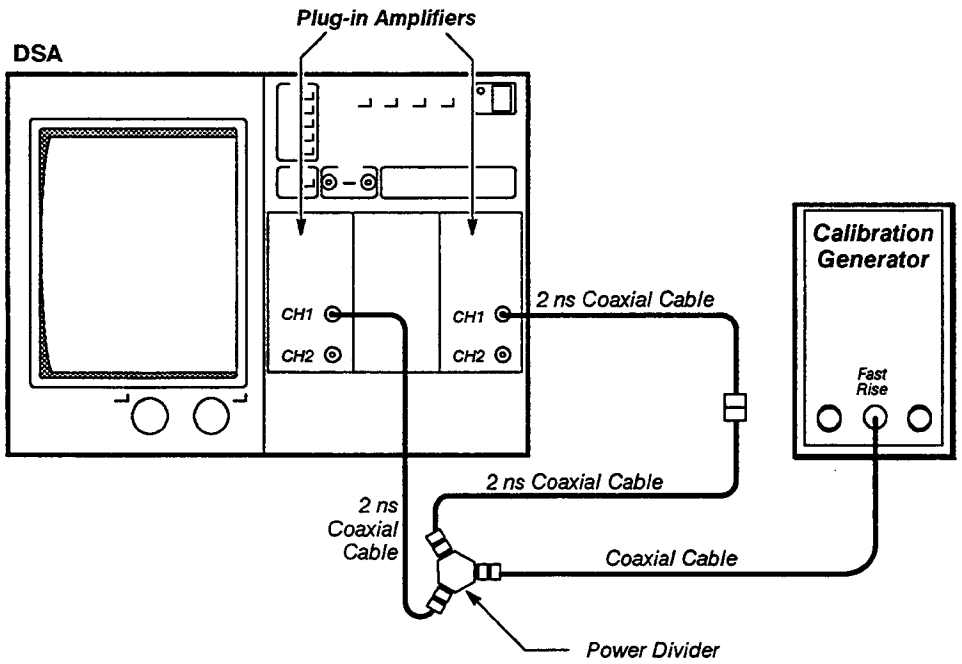
☐ Step 3: Disconnect the cables from the plug-in amplifiers and then connect the short cable to the right CH 1 input connector and the long cable to the center CH 1 input connector.

☐ Step 4: Touch **Source Desc** in the TRIGGER major menu, and then the following selectors in the **Main Trigger Source Description** pop-up menu:

R1 ..... touch
AND ..... touch
NOT ..... touch
C1 ..... touch
Enter Desc ..... touch

☐ Step 5: *Check* that the rising edges of both waveforms are displayed, and that both waveforms are triggered.

Setup to Check Boolean Trigger with Left AND Right



Prerequisite Steps: Cable Characterization.

Procedure to Check Boolean Trigger with Left AND Right

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Calibration generator
- Pulse Amplitude ..... Max
- Period ..... 1 µs
- Mode ..... Fast Rise

Left plug-in amplifier ..... no settings required

Right plug-in amplifier ..... no settings required

DSA
- **Def Wfm** ..... touch
  - **L1** ..... touch
  - **Enter Desc** ..... touch
- **Vert Size: L1** ..... 100 mV/div
- **Vert Offset: L1** ..... -250 mV
- **Def Wfm** ..... touch
  - **R1** ..... touch
  - **Enter Desc** ..... touch
- **Vert Size: R1** ..... 100 mV/div
- **Vert Offset: R1** ..... -250 mV

TRIGGER button ..... press
Source Desc ..... touch
L1 ..... touch
AND ..... touch
NOT ..... touch
R1 ..... touch
Enter Desc ..... touch
Level A ..... –250 mV
Level B ..... –250 mV
Main Size ..... 2 ns/div
Main Pos ..... center the rising edges

☐ Step 2: *Check* that the rising edges of both waveforms are displayed, and that both waveforms are triggered.

☐ Step 3: Disconnect the cables from the plug-in amplifiers and then connect the short cable to the right CH 1 input connector and the long cable to the left CH 1 input connector.

☐ Step 4: Touch **Source Desc** in the TRIGGER major menu, and then the following selectors in the **Main Trigger Source Description** pop-up menu:

R1 ..... touch
AND ..... touch
NOT ..... touch
L1 ..... touch
Enter Desc ..... touch

☐ Step 5: *Check* that the rising edges of both waveforms are displayed, and that both waveforms are triggered.

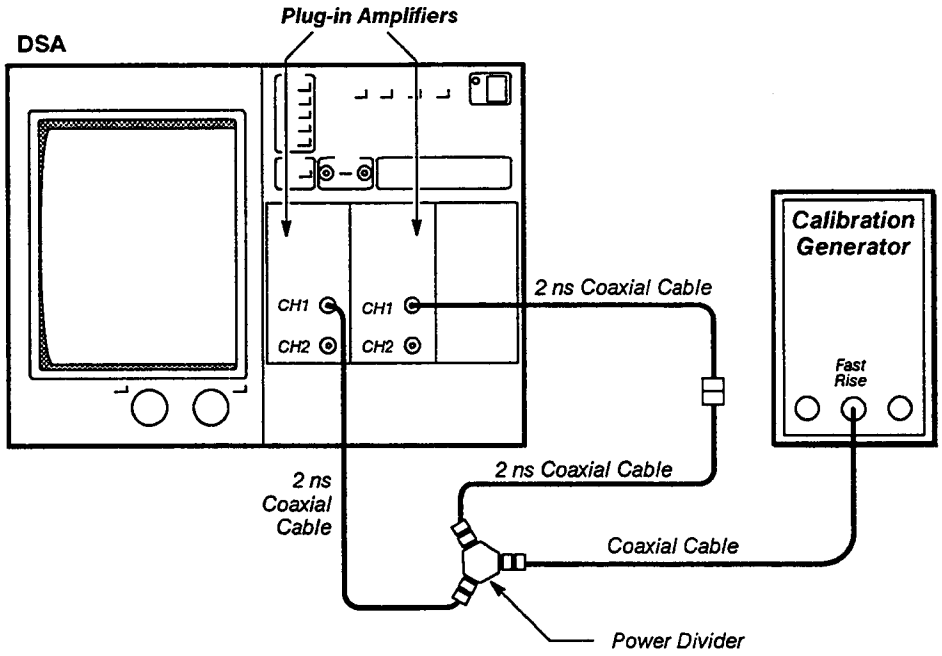
Procedure 19 Boolean Trigger Minimum False Time

This procedure shows the setup and lists the steps to check the Boolean trigger minimum false time. To achieve the proper propagation delay (1.7 ns to 2.0 ns) between the two input signals, use the cable configuration found in Procedure 17, Cable Characterization.

Specification

The display must trigger if the Boolean trigger function is false for a minimum of 2.0 ns. An individual Boolean operand (in this case the signal L1, C1, R1, NOT L1, NOT C1, or NOT R1) is false if its amplitude is less than its trigger level.

Setup to Check Boolean Trigger with Left OR Center



Prerequisite Steps: Cable Characterization.

Procedure to Check Boolean Trigger with Left OR Center

☐ Step 1: **Initialize** the DSA settings, then perform the following setting in the order listed:

Calibration generator
- Pulse Amplitude ..... Max
- Period ..... 1 µs
- Mode ..... Fast Rise

Left plug-in amplifier ..... no settings required

Center plug-in amplifier ..... no settings required

DSA

Def Wfm ..... touch
L1 ..... touch
Enter Desc ..... touch
Vert Size: L1 ..... 100 mV/div
Vert Offset: L1 ..... -250 mV
Def Wfm ..... touch
C1 ..... touch
Enter Desc ..... touch
Vert Size: C1 ..... 100 mV/div
Vert Offset: C1 ..... -250 mV
TRIGGER button ..... press
Source Desc ..... touch
NOT ..... touch
L1 ..... touch
OR ..... touch
C1 ..... touch
Enter Desc ..... touch
Level A ..... -250 mV
Level B ..... -250 mV
Main Size ..... 2 ns/div
Main Pos ..... center the rising edges

☐ Step 2: *Check* that the rising edges of both waveforms are displayed, and that both waveforms are triggered.

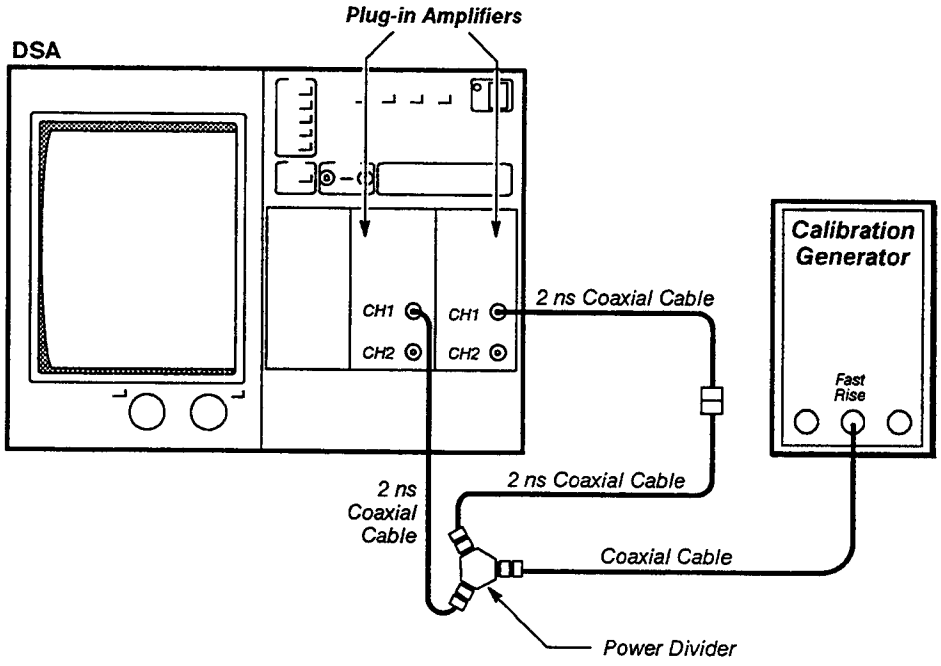
☐ Step 3: Disconnect the cables from the plug-in amplifiers, and then connect the short cable to the center CH 1 input connector and the long cable to the left CH 1 input connector.

☐ Step 4: Touch **Source Desc** in the TRIGGER major menu, and then the following selectors in the **Main Trigger Source Description** pop-up menu:

NOT ..... touch
C1 ..... touch
OR ..... touch
L1 ..... touch
Enter Desc ..... touch

☐ Step 5: *Check* that the rising edges of both waveforms are displayed, and that both waveforms are triggered.

Setup to Check Boolean Trigger with Center OR Right



Prerequisite Steps: Cable Characterization.

Procedure to Check Boolean Trigger with Center OR Right

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Calibration generator
- Pulse Amplitude ..... Max
- Period ..... 1 µs
- Mode ..... Fast Rise

Center plug-in amplifier ..... no settings required
Right plug-in amplifier ..... no settings required
DSA
- **Def Wfm** ..... touch
  - **C1** ..... touch
  - **Enter Desc** ..... touch
- **Vert Size: C1** ..... 100 mV/div
- **Vert Offset: C1** ..... -250 mV
- **Def Wfm** ..... touch
  - **R1** ..... touch
  - **Enter Desc** ..... touch
- **Vert Size: R1** ..... 100 mV/div
- **Vert Offset: R1** ..... -250 mV

TRIGGER button ..... press
Source Desc ..... touch
NOT ..... touch
C1 ..... touch
OR ..... touch
R1 ..... touch
Enter Desc ..... touch
Level A ..... −250 mV
Level B ..... −250 mV
Main Size ..... 2 ns/div
Main Pos ..... center the rising edges

☐ Step 2: *Check* that the rising edges of both waveforms are displayed, and that both waveforms are triggered.

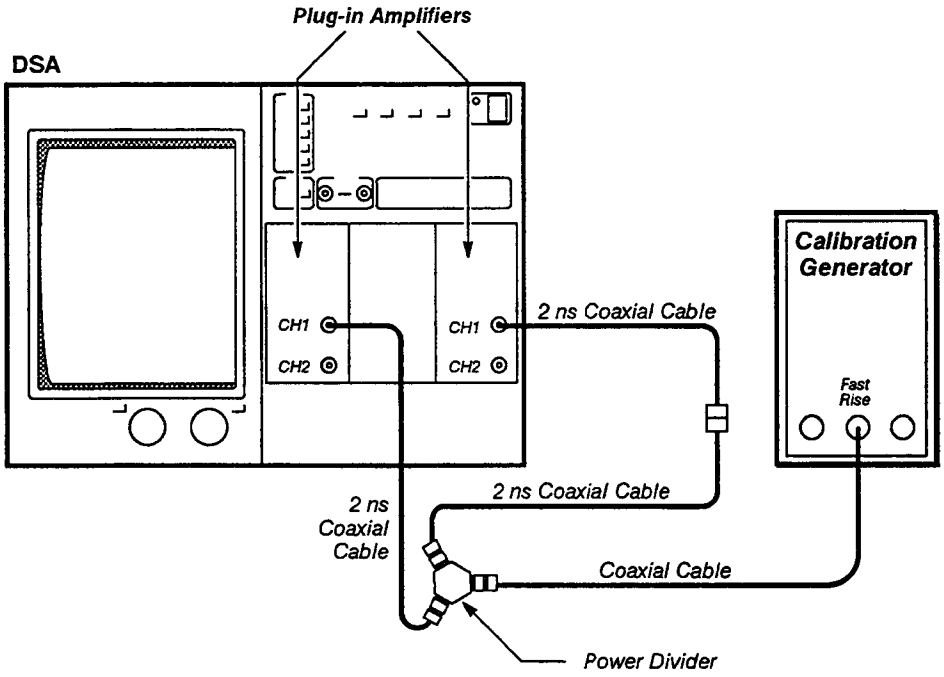
☐ Step 3: Disconnect the cables from the plug-in amplifiers, and then connect the short cable to the right CH 1 input connector and the long cable to the center CH 1 input connector.

☐ Step 4: Touch **Source Desc** in the TRIGGER major menu, and then the following selectors in the **Main Trigger Source Description** pop-up menu:

NOT ..... touch
R1 ..... touch
OR ..... touch
C1 ..... touch
Enter Desc ..... touch

☐ Step 5: *Check* that the rising edges of both waveforms are displayed and that both waveforms are triggered.

Setup to Check Boolean Trigger with Left OR Right



Prerequisite Steps: Cable Characterization.

Procedure to Check Boolean Trigger with Left OR Right

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Calibration generator
- Pulse Amplitude ..... Max
- Period ..... 1 µs
- Mode ..... Fast Rise

Left plug-in amplifier ..... no settings required
Right plug-in amplifier ..... no settings required
DSA
- **Def Wfm** ..... touch
  - **L1** ..... touch
  - **Enter Desc** ..... touch
- **Vert Size: L1** ..... 100 mV/div
- **Vert Offset: L1** ..... -250 mV
- **Def Wfm** ..... touch
  - **R1** ..... touch
  - **Enter Desc** ..... touch
- **Vert Size: R1** ..... 100 mV/div
- **Vert Offset: R1** ..... -250 mV

TRIGGER button ..... press
Source Desc ..... touch
NOT ..... touch
L1 ..... touch
OR ..... touch
R1 ..... touch
Enter Desc ..... touch
Level A ..... –250 mV
Level B ..... –250 mV
Main Size ..... 2 ns/div
Main Pos ..... center the rising edges

☐ Step 2: *Check* that the rising edges of both waveforms are displayed, and that both waveforms are triggered.

☐ Step 3: Disconnect the cables from the plug-in amplifiers, and then connect the short cable to the right CH 1 input connector and the long cable to the left CH 1 input connector.

☐ Step 4: Touch **Source Desc** in the TRIGGER major menu, and then the following selectors in the **Main Trigger Source Description** pop-up menu.

NOT ..... touch
R1 ..... touch
OR ..... touch
L1 ..... touch
Enter Desc ..... touch

☐ Step 5: *Check* that the rising edges of both waveforms are displayed, and that both waveforms are triggered.

Procedure 20 Edge Qualified Trigger

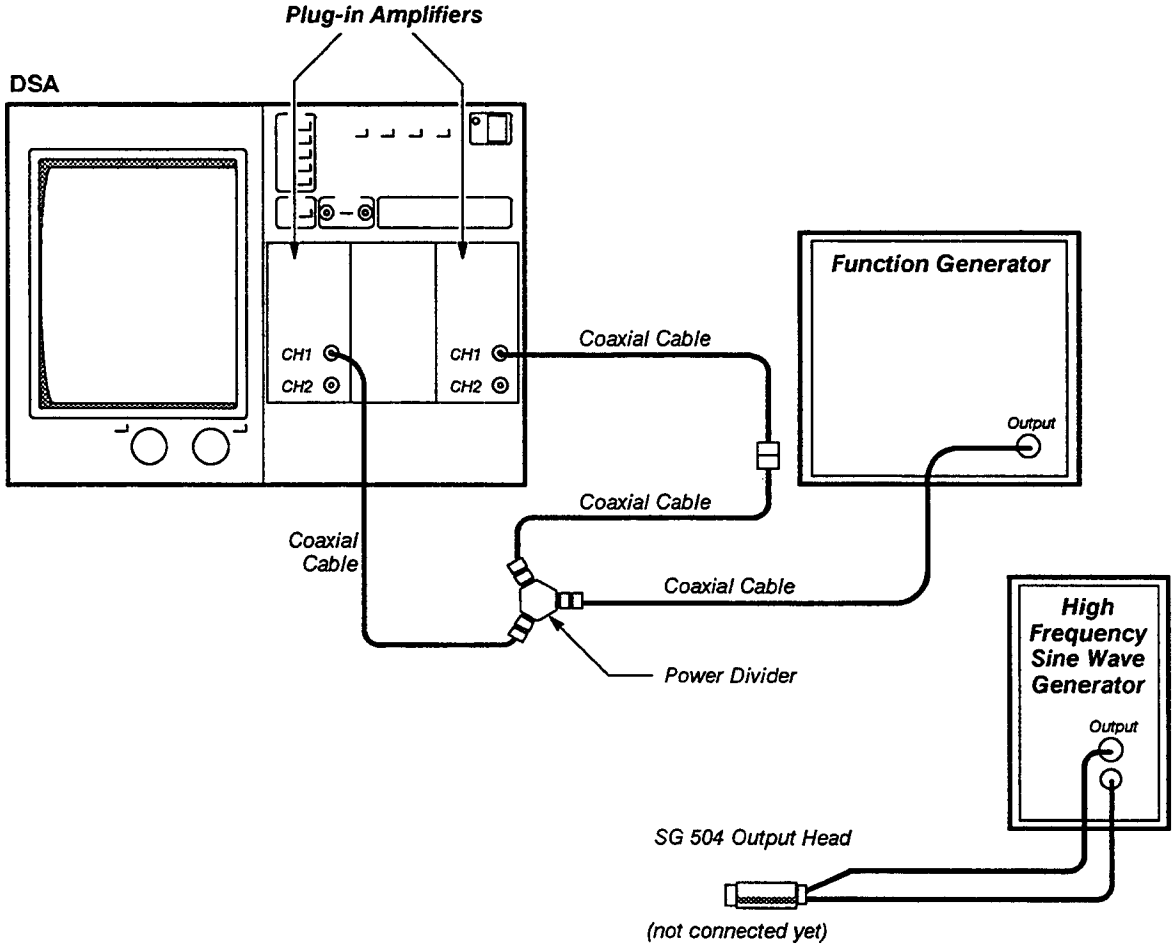
This procedure shows the setup and lists the steps to check the edge qualified trigger.

Specifications

The specifications for this procedure are as follows:

- Enable to Edge—the display must trigger if the Enable trigger source is true at least 2 ns before the Edge trigger source. The Enable trigger source is true if its amplitude is greater than its trigger level after the Boolean function is realized.
- Setup and Hold time (Edge to itself)—the display must trigger if the Edge trigger source is true at least 2 ns immediately before and after the selected transition. The Edge trigger source is true if its amplitude is greater than its trigger level after the Boolean function is realized.

Setup to Check Edge Qualified Trigger



Prerequisite Steps: Cable Characterization.

Procedure to Check Edge Qualified Trigger

☐ Step 1: **Initialize** the DSA settings, then perform the following settings in the order listed:

Left plug-in amplifier
CH 1 display on/off ..... on
DSA
Vert Size: L1 ..... 100 mV/div
Right plug-in amplifier
CH 1 display on/off ..... on
DSA
Vert Size: R1 ..... 100 mV/div
Main Size ..... 200 ns/div
TRIGGER button ..... press
Mode ..... **Normal**
Function generator
Function ..... Square
Frequency ..... 1 MHz
Amplitude ..... 1 V p-p
Medium frequency sine wave generator
Function ..... 250 MHz
Amplitude ..... 0.5 V p-p

☐ Step 2: Touch **Source Desc** in the TRIGGER major menu.

☐ Step 3: Touch the following selectors in the **Main Trigger Source** pop-up menu in the order listed:

R1 (Edge trigger source) ..... touch
WHILE ..... touch
L1 (Enable trigger source) ..... touch
Enter Desc ..... touch

☐ Step 4: Set the **Main Pos** so that the two waveforms are approximately centered on the screen.

☐ Step 5: *Check* that the display is triggered.

☐ Step 6: Touch **Source Desc** in the TRIGGER major menu.

☐ Step 7: Touch the following selectors in the **Main Trigger Source** pop-up menu in the order listed.

L1 (Edge trigger source) ..... touch
WHILE ..... touch
NOT ..... touch
R1 (Enable trigger source) ..... touch
Enter Desc ..... touch

☐ Step 8: *Check* that the display is triggered.

☐ Step 9: Reverse the cable connections to the left CH 1 input and the right CH 1 input (that is, connect the short cable to the right CH 1 input and the long cable to the left CH 1 input).

☐ Step 10: Touch **Source Desc** in the TRIGGER major menu.

☐ Step 11: Touch the following selectors in the **Main Trigger Source** pop-up menu in the order listed:

L1 (Edge trigger source) ..... touch
WHILE ..... touch
R1 (Enable trigger source) ..... touch
Enter Desc ..... touch

☐ Step 12: *Check* that the display is triggered.

☐ Step 13: Touch **Source Desc** in the TRIGGER major menu.

☐ Step 14: Touch the following selectors in the **Main Trigger Source** pop-up menu.

R1 (Edge trigger source) ..... touch
WHILE ..... touch
NOT ..... touch
L1 (Enable trigger source) ..... touch
Enter Desc ..... touch

☐ Step 15: *Check* that the display is triggered.

☐ Step 16: Disconnect the cables from the left CH 1 input and the right CH 1 input.

☐ Step 17: Connect the high frequency sine wave generator to the left CH 1 input connector.

☐ Step 18: Touch **Source Desc** in the TRIGGER major menu.

☐ Step 19: Touch the following selectors in the order listed:

L (Edge trigger source) ..... touch
WHILE ..... touch
R (Enable trigger source) ..... touch
Enter Desc ..... touch

☐ Step 20: Set the **Main Size** to 1 ns/div.

☐ Step 21: Touch **Level A Level B** in the TRIGGER major menu.

☐ Step 22: Set **Level B** (right knob) to -300 mV.

☐ Step 23: *Check* that display is triggered.

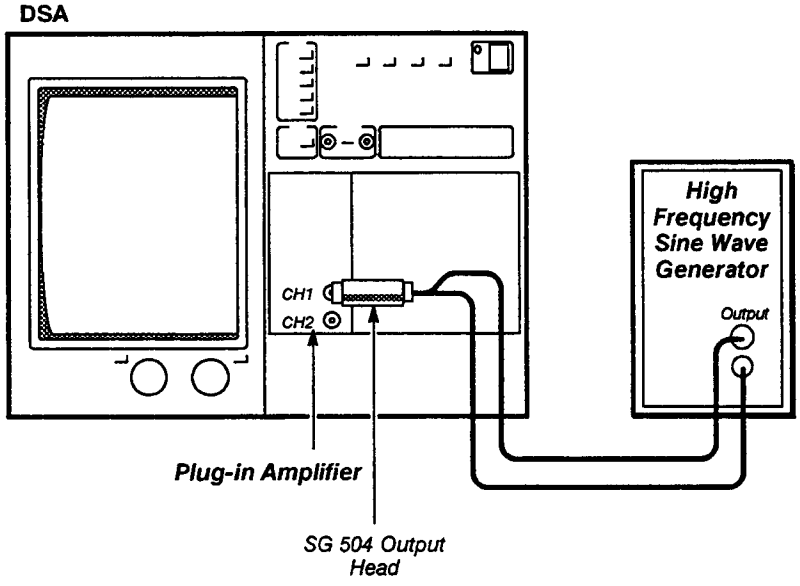
Procedure 21 Maximum Event Frequency

This procedure shows the setup and lists the steps to check the maximum event frequency.

Specification

The maximum event frequency is 400 MHz at 50% duty cycle.

Setup to Check Maximum Event Frequency



Prerequisite Steps: Enhanced Accuracy, Probe Calibration.

Procedure to Check Maximum Event Frequency

☐ Step 1: **Initialize** the DSA settings, then perform the following setting in the order listed:

Plug-in amplifier
CH 1 display on/off ..... on
DSA
Main Size ..... 10 ns/div
High frequency sine wave generator
Frequency ..... 400 MHz
Amplitude ..... 4 V p-p

☐ Step 2: Touch the **Window 1** icon at the top of the screen.

☐ Step 3: Set the **Window Size** to 1 ns/div.

☐ Step 4: Press the TRIGGER button, and then set **Trigger Select** to **Window**.

☐ Step 5: Touch **Source Desc** and then **Window Holdoff By Events**.

☐ Step 6: Touch **Events Holdoff** and then set **Events Holdoff** to 15.

☐ Step 7: Press the MEASURE button.

☐ Step 8: Touch **Measurements** and then **Main** → **Win Trig Time** in the **Measurements** pop-up menu.

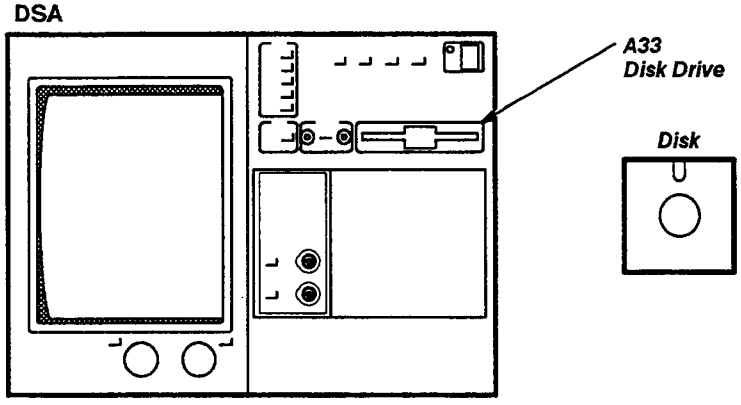
☐ Step 9: *Check* that the **Main** → **Win Trig Time** is between 38 ns and 42 ns.

Procedure 22 Disk Check

This procedure formats a standard disk and examines the A33 Disk Drive.

The required equipment is a 3½ inch, double-sided, high-density disk (1.44 M or 720 kilobytes).

Setup to Check Floppy Disk Drive



Prerequisite Steps: None.

Procedure to Format Disk

If the disk is formatted, skip this procedure and go directly to the Check Disk Drive procedure.

☐ Step 1: **Initialize** the DSA settings, then insert the disk.

☐ Step 2: Perform the following settings in the order listed.

DSA
UTILITY button ..... press
Page to Utility 2 ..... touch
Page to Utility 3 ..... touch
Disk ops ..... touch
format ..... touch
A: ..... touch
Enter ..... touch

Note: *The formatting procedure takes approximately 1.5 minutes to complete.*

☐ Step 3: When formatting is complete, touch **EXIT**.

Procedure to Check Disk Drive

☐ Step 1: Insert formatted disk into disk drive (refer to **Procedure to Format Disk**, if necessary).

☐ Step 2: **Initialize** the DSA, then select the following settings by touching the selectors in the order listed:

Store Setting On Disk

STORE/RECALL ..... press
Store setting ..... touch
Trigger (main) ..... touch
Store Present Front Panel Setting To:
Disk ..... touch
Store Next FPS ..... touch

Recall Setting From Disk

STORE/RECALL ..... press
Recall Setting ..... touch
Last Stored Setting appears in the pop-up menu (see Figure 2-15):
FPSX.FPB ..... touch

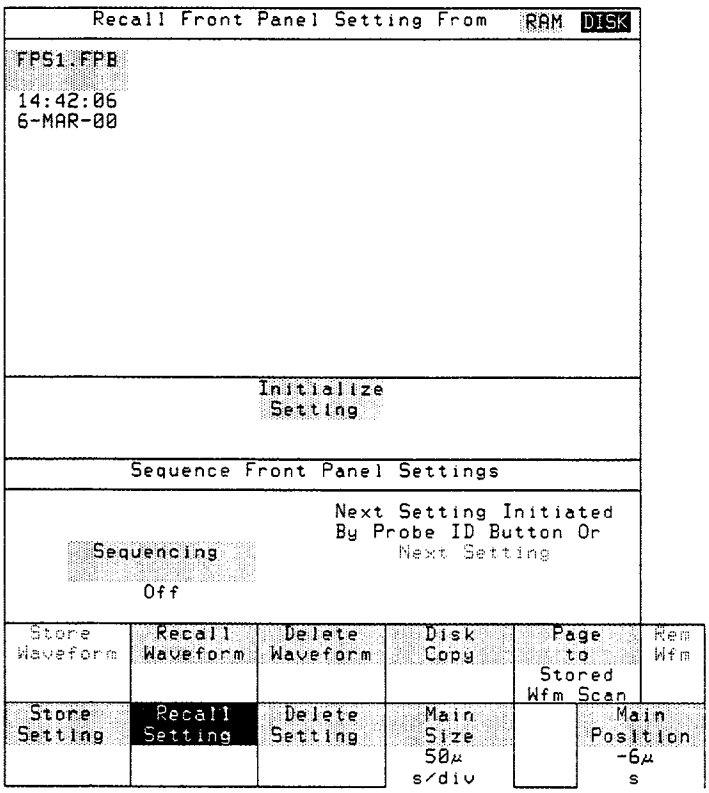


***Figure 2-15** — Recall Front Panel Setting Pop-Up Menu*

Check that the Trigger menu is selected. The appearance of this menu verifies disk functionality. If failure occurs, try another disk. Then if failure persists, troubleshoot the disk drive and controller board from the EXTENDED DIAGNOSTICS menu (refer to the *Maintenance* section of this manual).

Restore to proper defaults status

STORE/RECALL ..... press
Delete Setting ..... touch
Last Stored Setting appears in pop-up menu (see Figure 2-16):
FPSX.FPB ..... touch
Delete Selected Settings ..... touch
Recall Setting ..... touch
Recall Present Front Panel Setting From:
RAM ..... touch
Initialize Setting ..... touch
Initialize ..... touch

The DSA should return to the waveform menu.

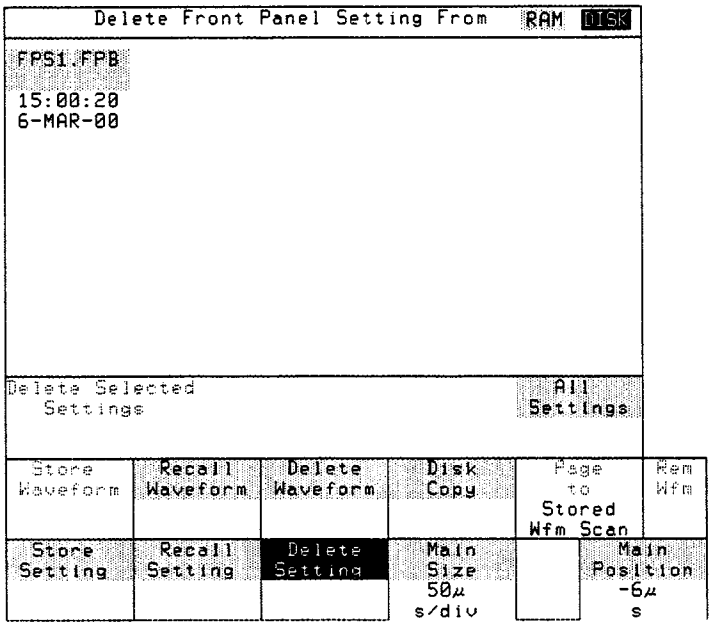


***Figure 2-16** — Delete Front Panel Setting Pop-Up Menu*

Maintenance

Preventive Maintenance

Performing a regular maintenance program can prevent the DSA from malfunctioning and may improve the reliability of the DSA. The environment in which the DSA operates will determine the frequency of this maintenance. A convenient time for doing preventive maintenance is prior to performing an electrical adjustment.

The Cabinet Panel

The top and bottom cabinet covers (or panels) protect you from operating potentials present within the DSA. In addition, the covers reduce radiation of electromagnetic interference from the DSA and protect the interior from dust. If you must remove the covers, then loosen the fasteners and lift the covers off; otherwise operate the DSA with the covers in place.

WARNING

Dangerous potentials exist at several points throughout the DSA. If you operate the DSA with the covers removed, do not touch exposed connections or components.

Some transistors have voltages present on their cases. Therefore, disconnect the power before cleaning the DSA or replacing any parts.

Cleaning the DSA

The DSA should be cleaned as often as operating conditions require. Dirt present in the DSA can cause overheating and component breakdown. If dirt accumulates on components, it will act as an insulating blanket and prevent efficient heat dissipation. Dirt also provides an electrical conduction path which may cause the DSA to fail.

When cleaning the DSA, the side panels reduce the amount of dust that reaches the interior of the DSA. Therefore, keep the side panels in place for safety and cooling.

When cleaning the DSA, avoid using chemical cleaning agents which might damage the plastics in this DSA.

Exterior—dust on the outside of the DSA can be removed with a soft cloth or small brush. A brush is particularly useful for dislodging dirt in and around the front-panel controls. Remove any remaining dirt with a soft cloth dampened in a mild detergent and water solution. Do not use abrasive cleaners.

CRT—you should clean the CRT faceplate with a soft, lint-free cloth dampened with denatured alcohol.

Interior—cleaning the interior of the DSA is seldom required. However, cleaning may be necessary if the interior of the DSA accumulates dust or dirt. To clean the interior, blow off the dust with dry, low-velocity air (approximately 5 lb/psi^2), and remove any dirt that remains with a soft brush or a cloth dampened with a mild detergent and water solution. Then use a washcloth dampened with water to remove any residue from areas you cleaned with the solution. You can use a cotton-tipped applicator to clean in narrow spaces or to clean more delicate components.

CAUTION

To prevent damage from electrical shorts, the boards and components must be dry before applying power.

You should, in particular, examine the high-voltage circuits. Excessive dirt in these circuit areas may cause high-voltage arcing and result in improper DSA operation.

Visual Inspection

The DSA should be inspected occasionally for defects such as broken connectors, improperly seated semiconductors, damaged or improperly installed boards, and heat-damaged parts. The corrective procedure for most visible defects is obvious; however, particular care must be taken if heat-damaged parts are found, since overheating usually indicates other trouble in the DSA. Correcting the cause of overheating is important to prevent the damage from recurring.

Periodic Electrical Adjustment

To ensure accurate measurements, check the electrical adjustment of the DSA after each 2,000 hours of operation, or every 24 months if you use the DSA infrequently.

Troubleshooting

This section provides the information necessary to trace a DSA fault to the most likely Field Replaceable unit (FRU). In most cases, the FRU is a circuit board. Exceptions are the Cathode Ray Tube (CRT)/CRT Driver board, the Power Supply Module, and several acquisition IC's. After the faulty FRU is replaced, some recalibration of the DSA is normally required (this is discussed further below).

Conventional troubleshooting techniques described in the last part of this section help identify a faulty Power Supply module, A4 Regulator board, CRT, A24 CRT Driver board, A27 CRT Socket board, and A26 Geometry board, A13 Mother board, or fuses.

Diagnostic Troubleshooting

The primary method for troubleshooting the DSA is to cross-reference the error index codes generated by internal diagnostics to the suspected FRU boards listed in the FRU Guide.

Diagnostics Overview

Three stages of diagnostics are employed in the DSA. The first stage, Kernel diagnostics, is automatically implemented when the DSA is turned on. The second stage is the Kernel communication test referred to as Communications and Subsystem Configuration; this follows automatically if all tests are passed in the first stage. If there are no faults detected in the second stage, the diagnostics enters the third stage and begins the Self-Test. The Self-Test stage performs a set of diagnostic tests automatically. These same tests, plus some additional tests, are available for manual execution using the **EXTENDED DIAGNOSTICS** menu structure. The **EXTENDED DIAGNOSTICS** menu structure is used to display error codes generated during the third stage of diagnostics.

Kernel Diagnostics

When you turn on the DSA, each of the three major subsystem processors, Executive, Display, and Digitizer executes a set of Kernel diagnostics. The status indicator of the Kernel tests are two LEDs residing on the corresponding processor board. The LEDs light up at power-on to verify their operation, then one of the LEDs turn off as Kernel tests begin. If the LEDs "flip" (dark LED goes on, light LED goes off), a Kernel fault is indicated in that subsystem. If both LEDs go off, Kernel tests for that processor have passed and communication tests have begun.

When a Kernel fault is detected, the DSA emits a single hi-low beep and illuminates some of the major menu buttons. Using the top LED (next to the **WAVEFORM** button) as the least significant bit and the bottom LED (next to the **UTILITY** button) as the most significant bit, interpret this as a binary representation of a hexadecimal code. The value will range from 03 to 1F. The error codes can also be derived by removing the DSA covers and measuring hi-low voltages at the appropriate test points.

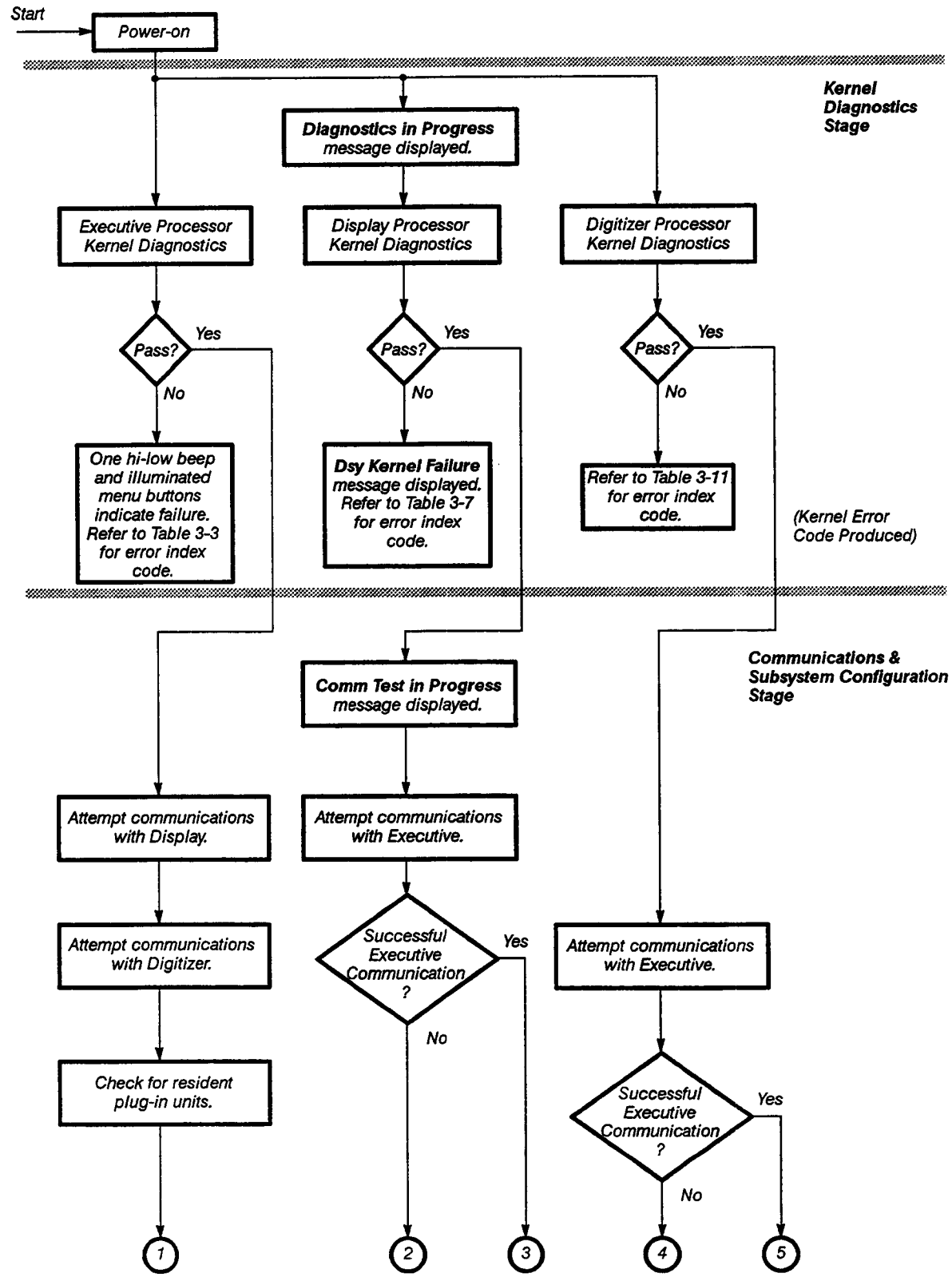


Figure 3-1 — Diagnostics Flowchart

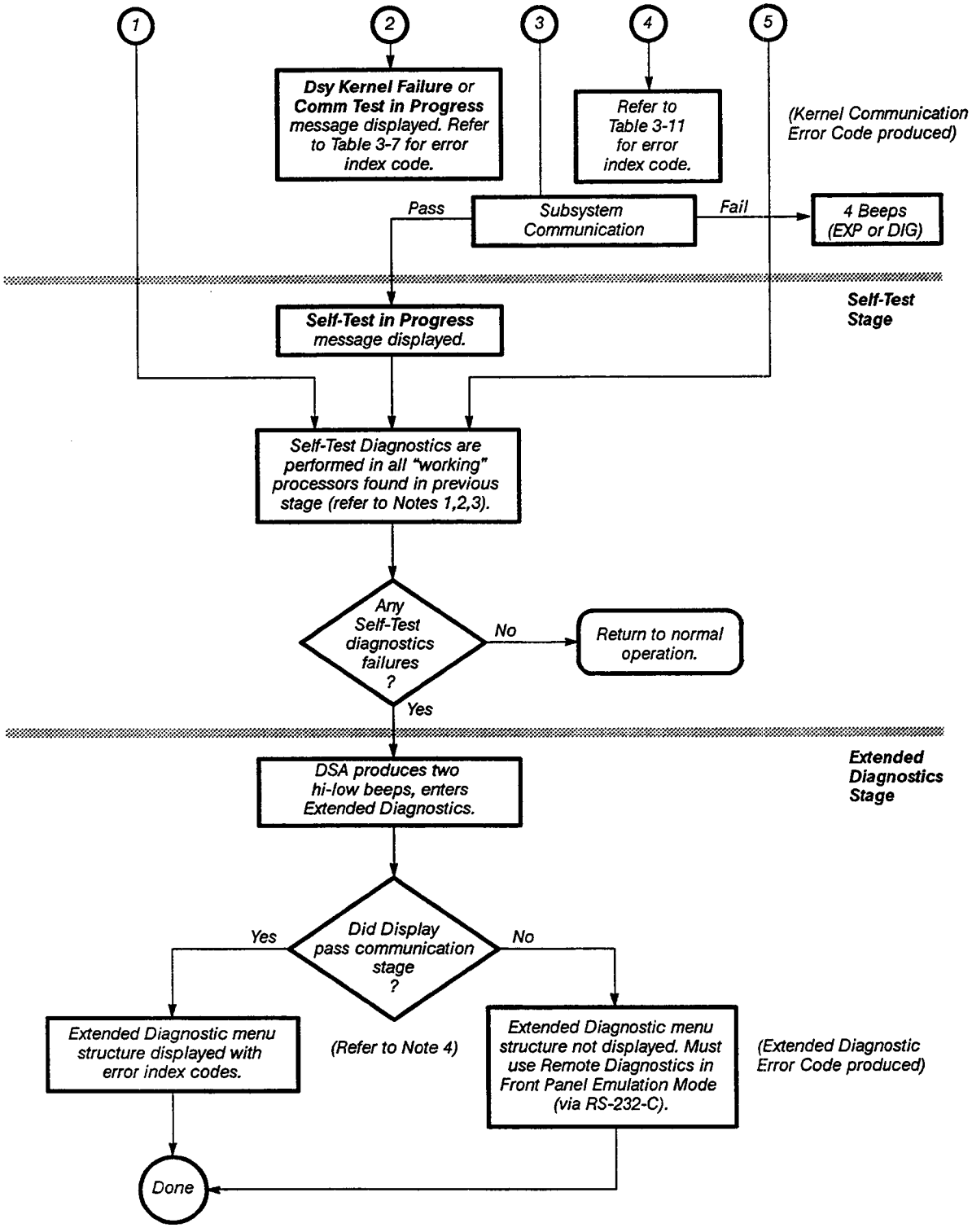


Figure 3-1 — *Diagnostics Flowchart (Cont.)*

Notes:

1. *If the Executive Processor has a kernel failure, no other processors can enter Self-Test diagnostics.*
2. *If the Display Processor does not successfully communicate with the Executive Processor, the Digitizer or plug-in amplifiers can not enter Self-Test.*
3. *If the Digitizer Processor does not successfully communicate with the Executive Processor, the plug-in amplifier(s) cannot enter Self-Test diagnostics.*
4. *Normal Operation cannot be entered from Extended Diagnostics unless both the Display and Digitizer Processors have successfully communicated with the Executive Processor.*

Communications and Subsystem Configuration

When the second stage of diagnostics is entered, the message **Comm Test in Progress** is displayed. The Executive Processor (EXP) communicates with the Digitizer (DIG) and Display (DSY) subsystems. If the EXP fails to communicate with a target subsystem, it will sound a single hi-low beep indicating a diagnostic failure.

After successful completion of the Kernel communication test the EXP sends additional messages to the subsystems. A fault detected at this point results in four beeps signaling the occurrence of a major communication problem. This usually means that one of the subsystems is no longer able to respond to messages properly. Something in one of the subsystems has caused the associated processor to hang up preventing further successful EXP messages.

If no faults are detected, the diagnostics will reach the Self-Test stage.

Self Test

Self Test is the third stage of diagnostics and is indicated by display of the message **Self-Test in Progress**. This message also indicates that Kernel and Communications tests were successful. After all the Self-Test diagnostics are executed, any faults will cause the DSA to sound two hi-low beeps and enter Extended Diagnostics. The Extended Diagnostics mode displays the error index codes in the **EXTENDED DIAGNOSTICS** menu structure. If there are no faults detected anywhere, the DSA enters normal operating mode and never enters Extended Diagnostics. When the Self-Test completes, results appear on the CRT.

Front panel controls are active during the Self-Test diagnostics sequence, and any disturbance may cause a test failure. If a failure occurs, then the DSA automatically executes the Extended Diagnostics displaying the **EXTENDED DIAGNOSTICS** menu structure. Touching **Exit** removes the menu and resumes normal operation. However, if a fatal fault is detected in the Digitizer processor then exiting to normal operation is inhibited.

Self-Test diagnostics verify the following circuits:

- Executive Control
- Front Panel

- Internal I/O
- External I/O
- Subsystem Communication
- Options
- Display Control
- Video Generator
- Digitizer Control/Calibration
- Signal Processor
- Acquisition
- Left Amplifier
- Center Amplifier
- Right Amplifier

Extended Diagnostics Menu Structure

The format of the error index codes is based on the Extended Diagnostics menu structure, which is a three-level hierarchy structure with the **Block** pop-up menu at the highest level. Each circuit block name in the **Block** pop-up menu is individually selectable and testable. A selected circuit block is divided into a number of parts or circuit areas in the **Area** pop-up menu, the second level. Touching **Area** in the **EXTENDED DIAGNOSTIC** menu structure, displays the **Area** pop-up menu for the selected block. Each circuit area has a **Routine** pop-up menu which has one or more selectable routines. Routines are the smallest test units that are selectable and executable. These **Block**, **Area**, and **Routine** pop-up menus generate the error index codes.

Some of the tests that can indicate faulty FRUs are not executed automatically during the Self-Test diagnostics. They are only generated by manually selected tests in the Extended Diagnostics menu, or by performing Enhanced Accuracy or Probe Compensation.

Error Index Decoding

Extended Diagnostics error index codes are five-character codes. The first character indicates the subsystem tested. The last four digits are hexadecimal (hex) numbers that indicate the **Block**, **Area**, **Routine**, and the failure identity. For example, E2321 is decoded as follows:

E Subsystem—Executive

2 Block name—Front Panel

3 Area name—Soft Keys (Selectors)

2 Routine name—Column Open

1 Failure Identity—specific failure mode

The subsystem character of an error index code is one of the following:

E Executive

D Display

G Digitizer

L Left Amplifier

C Center Amplifier

R Right Amplifier

Using the Self-Test/Extended Diagnostics

After Self-Test and after any Extended Diagnostics have executed, resultant error index codes appear on the display next to the associated circuit block names in the **EXTENDED DIAGNOSTICS** menu structure. Each circuit block that experiences a failure reports the first error encountered and the number of failures in the block. To obtain a more complete list of the error index codes in a block, select the label of the failed block, then select **Area**. Select **Routine** to display the lowest level test routines in the selected **Area**. The currently selected **Block**, **Area**, and **Routine** are displayed below their labels at the bottom of the display along with these selections:-

- **Exit**—Extended Diagnostics is terminated and the DSA enters the normal operating mode.
- **Loop**—Toggles **On** and **Off**. When **On**, the selected test or tests execute continuously. The number of execution iterations is displayed.
- **Terse**—Toggles **On** and **Off**. When **On**, tests in the loop mode execute at the fastest rate, but the iteration readout is not updated until the test is stopped. To manually stop the test, touch the screen or a button.
- **All**—Toggles **On** and **Off**. When **On**, all tests in the current menu are selected to execute when started.
- **Stop on Err**—Toggles **On** and **Off**. When **On**, testing stops after the first failed test completes.
- **Run/Quit**—Starts or stops the currently selected tests.

Note: *Touching any place on the screen (or pressing any front panel button) while a test is executing will stop the test when the current routine is completed.*

Battery Testing

The DSA contains two (three with Option 4C) lithium batteries to provide power when the ON/STANDBY switch is set to OFF. Battery BT130 powers the real time clock on the A14 I/O board. Battery BT160 provides power to the nonvolatile RAM (NVRAM) on the A17 Main Processor board. (Battery BT150 provides power to the optional NVRAM on the A18 BB Memory board.)

The real time clock typically has an operating life of five years. If the clock begins to lose time rapidly when the DSA is turned off, or if the diagnostics report that the real time clock has failed, the most likely source of the problem is the battery (BT130). If the battery drops below 2.7 V (at 20°C), then follow the instructions for replacement under Battery Disposal and First Aid (page 3-42).

Batteries BT150 and BT160 for the NVRAM, also typically have an operational life of five years. If the diagnostics consistently report a problem with the battery for the NVRAM, then the battery should be tested. If the battery measures less than 2.45 V (at 20°C), then follow the instructions for replacement, under Battery Disposal and First Aid (page 3-42).

Note: *If the diagnostics report an NVRAM battery failure, then exit the diagnostics. This will rewrite the confidence words into the NVRAM. Turn the DSA OFF for at least one hour. Now, switch the PRINCIPAL POWER switch on. If the diagnostics still indicate an NVRAM battery failure, then the battery should be tested.*

Turning the PRINCIPAL POWER switch or the ON/STANDBY switch off while the Extended Diagnostics is executing the NVRAM Memory Test usually causes a single failure of the NVRAM battery test. Errors are also caused if these switches are turned off during the Enhanced Accuracy or Probe Calibration. These errors will not necessarily be displayed, but may downgrade performance. Turning off these switches should be avoided during tests. If one of these switches is turned off, performing the Enhanced Accuracy and Probe Calibration will restore the DSA to proper status.

Field Replaceable Unit (FRU) Guide

This section correlates error index codes resulting from diagnostic tests with the hybrid/integrated circuit (IC) and the board FRUs suspected of causing each error. The FRUs in the board FRU category are listed in most-to-least probable cause order (assuming only one error is indicated). If any diagnostic errors occur, inspect the suspect FRU for loose connections and components, and repeat the diagnostic test. If any diagnostic error is repeated, then replace the suspect FRU with a known good FRU. Ensure that the new FRU is configured exactly the same as the original FRU, and that any installed firmware matches the version in the original FRU. In addition, refer to Table 3-22 at the rear of this section, for any necessary adjustments and precautions.

The error index codes and tests are divided into three groups based on the three main subsystems: Executive, Display, and Digitizer. The prefix letters on the error index codes, E, D, G refer to these processors, respectively. The error index codes for the Left, Center, and Right plug-in compartments are reported by the DSA. They are denoted with L, C, and R respectively. Each subsystem group has a table of Kernel diagnostic error index codes and a table of Self-Test/Extended Diagnostic error index codes. The Executive processor and Display processor also have a table of manual diagnostic test error index codes.

Kernel error index codes for the Digitizer and Display are read as TTL logic levels on board pins. Refer to appropriate circuit board discussion for the location and significance of the kernel-diagnostic board pins.

Abbreviations of FRU Names—Table 3-1 lists FRU boards/assemblies, abbreviations, full names, and board numbers.

Table 3-1 — Board FRUs/Assemblies

FRU	Board/Assembly	Board No.
CRT	Cathode Ray Tube	
PIINT	Plug-in Interface board	(A1)
REG	Regulator board	(A4)
CAL	Calibrator board	(A5)
LOWACQ	Lower Acquisition board	(A6)
UPACQ	Upper Acquisition board	(A7)
WAVPROC	Waveform Processor board	(A8)
SIGPROC[1]	Signal Processor board	(A8)
TOUCH	Touch Panel board	(A9)
FPCTRL	Front Panel Control board	(A10)
FPBUT	Front Panel Button board	(A11)
REAR	Rear Panel board	(A12)
MOTHER	Mother board	(A13)
IO	Input/Output board	(A14)
MMU	Memory Management Unit board	(A15)
DSY	Display Controller board	(A16)
MPU	Main Processor board	(A17)
MEM	Memory board	(A18)
DIGCPU	Digitizer CPU board	(A19)
DIGIO	Digitizer I/O board	(A20)
MINMOTH	Mini Mother board	(A21)
CRTDR	CRT Driver board	(A24)
DGAUSS	Degauss board	(A25)
GEOM	Geometry board	(A26)
CRTSKT	CRT Socket board	(A27)
DISKCTRL	Disk Controller board	(A32)
DDRIVE	Disk Drive	(A33)
LMAIN	Left Plug-in	
CMAIN	Center Plug-in	
RMAIN	Right Plug-in	

[1]*The A8 Signal Processor board replaces the A8 Waveform Processor board if your DSA is equipped with Option 3C.*

Abbreviations of Component and Module Names—Table 3-2 lists the FRU components and modules and their abbreviation.

Table 3-2 — FRU Components and Modules

FRU	Component/Module
FW	Executive Processor Firmware
FW	Display Processor Firmware
FW	Digitizer Processor Firmware
CALPROC	Calibrator Processor and Firmware IC
SDI	Serial Data Interface IC
DMUX	Demux IC
UTLY	Utility IC
TRIG	Trigger IC
SWP	Sweep Controller IC
CLKDR	Clock Driver IC
SHF	S/H and Flash IC
TIME	Time Interpolator IC
PS	Power Supply Module

The Executive, Display, and Digitizer processor firmware are not separate components. These three components are packaged in a firmware (FW) kit (refer to Firmware ICs on page 3-118)

Executive Subsystem Error Index Codes

Table 3-3 lists the Executive processor Kernel error index codes and their suspect faulty FRUs.

Table 3-3 — Executive Processor Kernel Error Index Codes

Error Index$_{hex}$	Hybrid/IC FRUs	Suspect Board FRUs
1F - 1C	none	MEM, MPU
1B - 18	FW	MPU
17 - 14	FW	MEM, MPU
13 - 11	none	IO, MPU
10	none	MPU
0F	none	MPU, MEM

Table 3-3 — Executive Processor Kernel Error Index Codes (Cont.)

Error Index$_{hex}$	Hybrid/IC FRUs	Suspect Board FRUs
0E	none	FPCTRL, IO, MPU, TOUCH PANEL
0D	none	IO, MPU
0C	none	IO, MPU
0B - 09	none	REAR, IO, MPU
08 - 06	none	MMU, MPU
05 - 04	none	MPU, MEM
03	none	REAR, IO, MPU

Bit patterns for the above hexadecimal error index codes are displayed with the front panel MENUS LEDs in bottom-to-top bit order. That is, the UTILITY label represents the MSB (most significant bit) and the WAVEFORM label represents the LSB (least significant bit). When lit, the LEDs represent a one.

For example: Error index code 12$_{hex}$ causes the UTILITY and TRIGGER LEDs to light.

Reading the Executive processor subsystem error bits from the A17 Main Processor Board test points TP201 (MSB) to TP205 (LSB) is also possible (see Figure 3-2 for the location of these status pins). The bits are high (+5 V) true.

The Status LEDs (DS306 and DS307) light up momentarily when the unit is powered on. Only one LED is on (the one located closest to the rear) while the Kernel Diagnostic tests are executing. If a kernel failure is detected, the unlit LED latches on and the lit LED latches off. If no failure is detected, both LEDs latch off when the tests are completed. Table 3-4 lists the various LED configurations and the status they indicate.

Table 3-4 — Executive Processor Status LED Configuration

DS307	DS306	Status
ON	ON	Power-On
ON	OFF	Kernel Tests Executing
OFF	ON	Kernel Tests Failed
OFF	OFF	Kernel Tests Finished

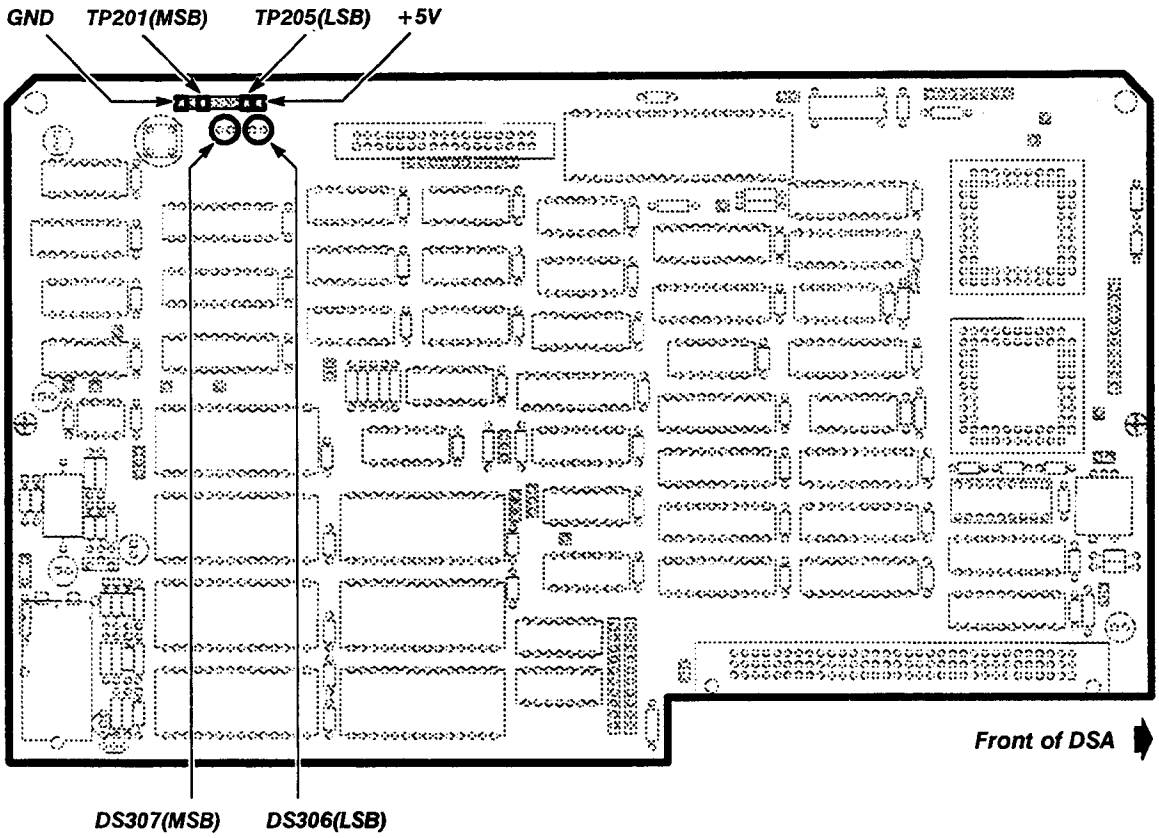


Figure 3-2 — A17 Main Processor Board Status Pins

Table 3-5 lists the Executive processor Self-Test/Extended Diagnostics error index codes and their suspect faulty FRUs.

Table 3-5 – Executive Processor Self-Test/Extended Diagnostics Error Index Codes

Description	Error Index	Suspect Hybrid/ IC FRUs	Suspect Board FRUs
ROM Location	E111X – E112X	FW	MPU
ROM Location	E113X – E11AX	FW	MEM, MPU
ROM Checksum	E121X – E122X	FW	MPU
ROM Checksum	E123X – E12AX	FW	MEM, MPU
System RAM	E13XX	none	MEM, MPU
NVRAM	E14XX	none	MPU
Interrupt Control	E15XX	none	MPU
Timers	E16XX	none	IO, MPU
Timer Interrupts	E17XX	none	IO, MPU
MPU Waits	E18XX	none	MPU, IO
ROM Waits	E19XX	none	MEM, IO, MPU
Math Co-processor	E1AXX	none	MPU
DMAs	E1BXX	none	MPU, MEM
Control	E21XX	none	FPCTRL, IO, MPU
Hard Keys	E22XX	none	FPBUT, TOUCH, FPCTRL, IO, MPU
Soft Keys	E23XX	none	TOUCH, FPCTRL, IO, MPU
Knobs	E24XX	none	IO, FPCTRL, MPU
Temp Sensor	E31XX	none	IO, MPU
Real Time Clock	E32XX	none	IO, MPU
Printer	E41XX	none	REAR, IO, MPU
RS232	E42XX	none	REAR, IO, MPU
GPIB	E43XX	none	REAR, IO, MPU
Disk	E44XX	none	DISKCTRL, DDRIVE, MPU
MMU Control	E51XX	none	MMU, MPU
Waveform RAM	E52XX	none	MMU, MPU
Display Comm	E531X	none	DSY, MMU
Digitizer Comm	E532X	none	DIGCPU, DIGIO, MMU, MPU

Table 3-5 — Executive Processor Self-Test/Extended Diagnostics Error Index Codes (Cont.)

Description	Error Index	Suspect Hybrid/ IC FRUs	Suspect Board FRUs
SDI	E54XX	SDI	IO, MPU
Left Plug-in Comm	E551X	none	LMAIN, IO, PIINT, MPU
Center Plug-in Comm	E552X	none	CMAIN, IO, PIINT, MPU
Right Plug-in Comm	E553X	none	RMAIN, IO, PIINT, MPU
WFM NVRAM	E6XX	none	MEM, MPU

Manual Diagnostic Tests—Table 3-6 lists the Executive processor manual tests, the verification procedures, and the suspect board FRUs. If the conditions specified in the verification procedure listed are not met, then the listed board FRUs are suspect.

These tests are performed manually and display no error index codes. These tests are included to help you locate faulty boards that possibly the Kernel diagnostics or Self-Test diagnostics did not locate. Interconnections such as the A13 Mother board, cable, and the Power Supply module interconnections are not listed, but are considered as possible problem sources.

Table 3-6 — Executive Processor Manual Tests

Test	Verification Procedure	Verification Procedure Failure: Suspect Board FRUs
Front Panel		
Verify		
Hard Keys	This test allows you to interactively press the hard keys to verify their operation, with both visual and audio feedback. This test requires you to interact, and is only executable in the **Routine** menu with the **All** and **Loop** modes set to **Off**. Once this test is invoked, you can press any of the hard keys in the DSA and verify that the corresponding image of the key on the screen is highlighted, that the associated LED is turned on, and that an audio click is generated.	FPBUT, TOUCH, FPCTRL, IO, MPU

Table 3-6 — Executive Processor Manual Tests (Cont.)

Test	Verification Procedure	Verification Procedure Failure: Suspect Board FRUs
Front Panel (cont) Verify (cont)		
Soft Keys	This test allows you to interactively touch any of the soft keys (on the touch-pad screen) and verify their operation, with both visual and audio feedback. This test requires you to interact, and is only executable in the **Routine** menu with the **All** and **Loop** modes set to **Off**. Once this test is invoked, you can touch any of the soft keys on the display screen and verify that a touch box is drawn around the soft key on the screen and that an audio click is generated.	TOUCH, FPCTRL, IO, MPU
Knobs	This test allows you to verify the operation of the knobs by displaying visual feedback for knob movement. This test requires you to interact, and is only executable in the **Routine** menu with the **All** and **Loop** modes set to **Off**. Once this test is invoked, you can turn either of the knobs on the DSA and verify that the corresponding knob pointer on the screen rotates and that its associated counter value changes.	IO, FPCTRL, MPU

Table 3-6 — Executive Processor Manual Tests (Cont.)

Test	Verification Procedure	Verification Procedure Failure: Suspect Board FRUs
Internal I/O		
Tone Gen		
Ramp Tone	This test verifies the capability of the DSA to generate tones through its internal speaker. This test requires you to interact, and is only executable in the **Routine** menu with the **Loop** mode set to **On** and **All** mode set to **Off**. After invoking this test, you should verify that a high speed clicking sound occurs.	IO, FPCTRL, MPU
Real Time Clk		
Calibrate	This test allows you to check and adjust the real time clock period. This test requires you to interact, and is only executable in the **Routine** menu with the **All** and **Loop** modes set to **Off**. Once this test is invoked, you can examine/adjust the Real Time Clock period following the procedure outlined in the Section 2, Checks and Adjustments.	IO, MPU

Table 3-6 — Executive Processor Manual Tests (Cont.)

Test	Verification Procedure	Verification Procedure Failure: Suspect Board FRUs
External I/O		
Printer		
Pattern	This test prints a set of patterns (all printable ASCII characters) to help you verify the external printer interface. This test requires you to interact, and is only executable in the **Routine** pop-up menu with the **All** mode set to **Off**. Before executing this test, connect a Centronics-compatible printer to the printer connector on the rear panel of the DSA.	REAR, IO, MPU
RS-232		
Extern Loop	This test verifies parts of the external RS-232-C interface. This test requires you to interact, and is only executable in the **Routine** pop-up menu with the **All** mode set to **Off**. Before executing this test, connect an external loopback connector to the RS-232-C connector on the rear panel of the DSA.	REAR, IO, MPU
GPIB		
Intrpt Reset Reset Status Data Lines Interrupt	These tests verify the Executive processor interface to the internal GPIB circuitry. The major external GPIB functions are not tested. This test requires you to interact, and is only executable in the **Routine** pop-up menu with the **All** mode set to **Off**. Before executing this test, disconnect the DSA from the GPIB bus.	REAR, IO, MPU

Table 3-6 — Executive Processor Manual Tests

Test	Verification Procedure	Verification Procedure Failure: Suspect Board FRUs
Disk Drive		
Chip Reset Interrupt Step Seq Read/Write	This test helps you verify the disk interface and operation. The Read/Write test checks the read and write capability of the floppy disk. The previous tests (Chip Reset, Interrupt, and Step Seq) check the floppy disk controller IC and the interface to it then a step sequence drives the floppy disk without a disk inserted. The data channel is only checked by the manual Read/ Write test. This test requires you to interact, and is only executable in the **Routine** pop-up menu with the **All** mode set to **Off**. Before executing this test, insert a high-density formatted disk. **NOTE**: *Contents of the disk will be overwirtten.*	Disk Controller, Disk, MPU

Display Subsystem Error Index Codes

Table 3-7 lists the Display processor Kernel error index codes and their suspect faulty FRUs.

Table 3-7 — Display Processor Kernel Error Index Codes

Error Index	Suspect Hybrid/ IC FRUs	Suspect Board FRUs
7	none	DSY
1 – 4	FW	DSY
5	none	DSY
6	none	DSY

The name of the first Display Kernel test that fails is displayed on the screen. The Display processor error index code is read from the A16 Display Controller board test points TP100(MSB) to TP102(LSB) (see Figure 3-3 for the location of these status pins). The test points are high (+5 V) true.

The status LEDs (DS100 and DS200) light up momentarily when the unit is powered on. Only one LED is on (the one located closest to the front) while the Kernel Diagnostic tests are executing. If a kernel failure is detected, the unlit LED latches on and the lit LED latches off. If no failure is detected, both LEDs latch off when the tests are completed. Table 3-8 lists the various LED configurations and the status they indicate.

***Table 3-8** — Display Processor Status LED Configuration*

DS100	DS200	Status
ON	ON	Power-On
OFF	ON	Kernel Tests Executing
ON	OFF	Kernel Tests Failed
OFF	OFF	Kernel Tests Finished

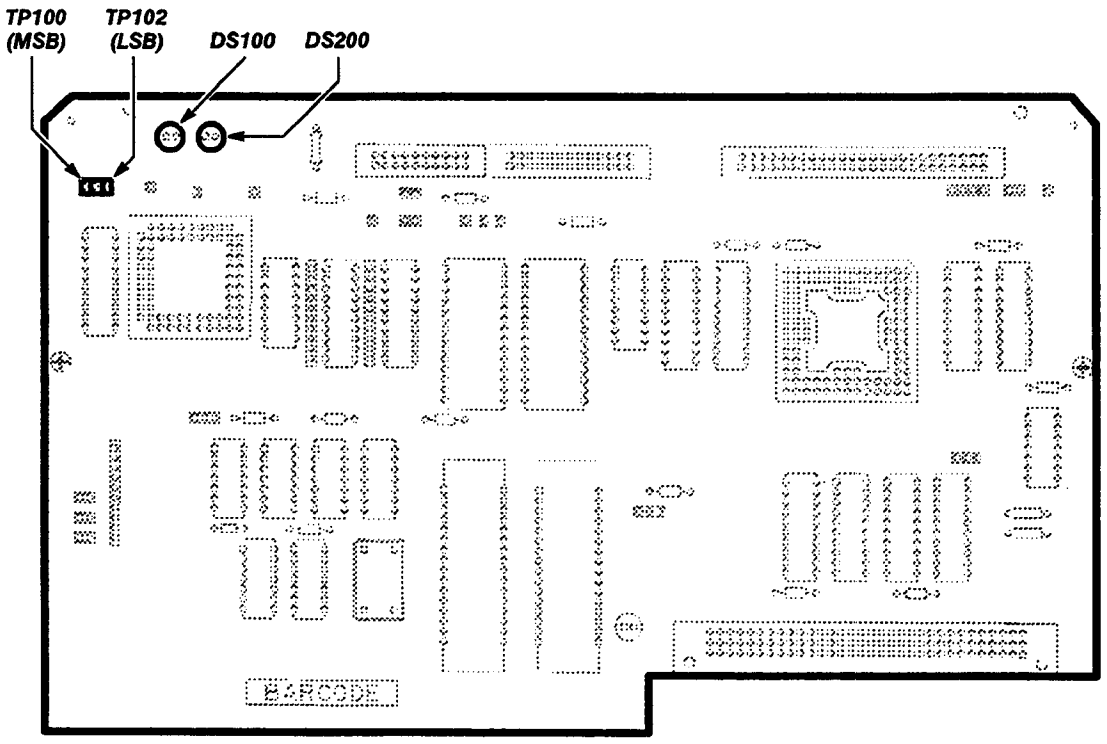


***Figure 3-3** — A16 Display Controller Board Status Pins*

Table 3-9 lists the Display processor Self-Test/Extended Diagnostics error index codes and their suspect faulty FRUs.

Table 3-9 *— Display Processor Self-Test/Extended Diagnostics Error Index Codes*

Area	Error Index	Suspect Hybrid/ IC FRUs	Suspect Board FRUs
ROM Location	D11XX	FW	DSY
ROM Checksum	D12XX	FW	DSY
Static RAM	D13XX	none	DSY
Timer	D14XX	none	DSY
DMAs	D15XX	none	DSY
Exec Intrfce	D16XX	none	DSY, MMU, MPU
Wfm Compress	D17XX	none	DSY
Timing	D21XX	none	DSY
Address Mux	D22XX	none	DSY
Display Mem	D23XX	none	DSY
Pixel Check	D24XX	none	DSY
Wfm Display	D25XX	none	DSY
BPALU	D26XX	none	DSY

Manual Diagnostic Tests—Table 3-10 lists the Display processor manual test, the verification procedure, and the suspect board FRUs. If the condition specified in the listed verification procedure is not met, then the listed board FRUs listed are suspect.

These tests are performed manually and produce no error index code displays. They are included to help you locate faulty boards that possibly the Kernel diagnostics or Self-Test diagnostics did not locate. Interconnections, such as A13 Mother board, cables, and the Power Supply module interconnections, are not listed, but are considered possible problem sources.

Table 3-10 — Display Processor Manual Test

Test	Verification Procedure	Verification Procedure Failure: Suspect Board FRUs
Video Gen		
CRT Driver		
Stimulus	This test verifies the capability of the A24 CRT Driver board to change the intensity of the CRT display screen. This test requires you to interact, and is only executable in the **Routine** menu with the **All** mode set to **Off**. Once this test is invoked, you are required to verify that the intensity of the display CRT screen changes through four different intensity levels.	CRTDR, DSY, CRT

Digitizer Subsystem Error Index Codes

Table 3-11 lists the Digitizer processor Kernel diagnostic error index codes and their suspect faulty FRUs.

Table 3-11 — Digitizer Processor Kernel Diagnostic Tests Error Index Codes

Error Index	Suspect Hybrid/ IC FRUs	Suspect Board FRUs
1F - 1E	none	DIGCPU
1D - 12	FW	DIGCPU
11	none	DIGIO, DIGCPU, MINMOTH
10	none	CAL, DIGCPU
0F	none	WAVPROC (SIGPROC), DIGCPU
0E	none	MMU, MPU, DIGIO, DIGCPU, MINMOTH

The error index code bits of the first Digitizer Kernel test that fails are read from the A19 Digitizer CPU board test connector J500, pins 2 (MSB) to 6 (LSB) (see Figure 3-4 for the location of these status pins). The pins are high (+5 V) true.

The status LEDs (DS200 and DS205) light up momentarily when the unit is powered on. Only one LED is on (the one located closest to the rear) while the Kernel Diagnostic tests are executing. If a kernel failure is detected, the unlit LED latches on and the lit LED latches off. If no failure is detected, both LEDs latch off when the tests are completed. Table 3-12 lists the various LED configurations and the status they indicate.

Table 3-12 — *Digitizer Processor Status LED Configuration*

DS200	DS205	Status
ON	ON	Power-On
ON	OFF	Kernel Tests Executing
OFF	ON	Kernel Tests Failed
OFF	OFF	Kernel Tests Finished

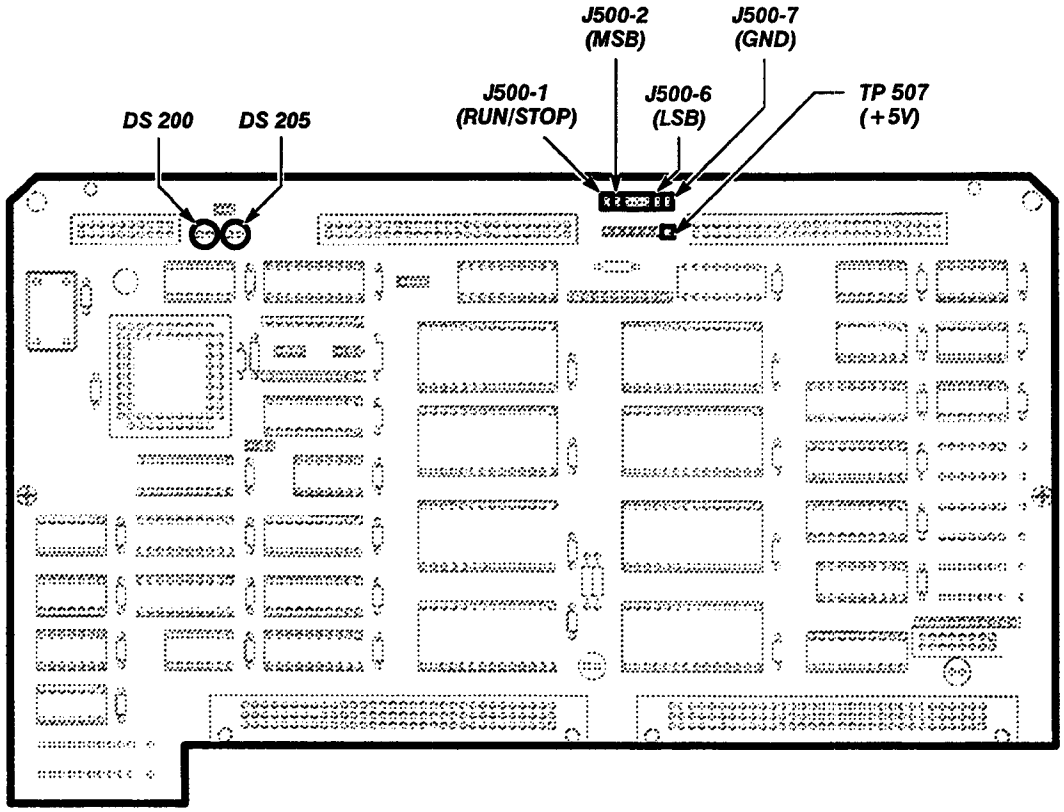


Figure 3-4 — *A19 Digitizer CPU Board Status Pins*

Table 3-13 lists the Digitizer Processor Self-Test/Extended Diagnostics error index codes and their suspect faulty FRUs.

Table 3-13 *— Digitizer Processor Self-Test/Extended Diagnostics Error Index Codes*

Area	Error Index	Suspect Hybrid/ IC FRUs	Suspect Board FRUs
ROM Location	G11XX	FW	DIGCPU
ROM Checksum	G12XX	FW	DIGCPU
Digitizer RAM	G1311	none	DIGCPU
Digitizer RAM	G1321	none	DIGCPU
Digitizer RAM	G1322	none	WAVPROC (SIGPROC)
Digitizer RAM	G1331	none	DIGCPU
Cal Board Diag	G1411	CALPROC	CAL, LOWACQ, UPACQ
Cal Board Diag	G1412 - G1442	CALPROC	CAL
Cal Board Diag	G1451	none	CAL, LOWACQ, UPACQ
Cal Board Diag	G1452 - G1482	CALPROC	CAL
Communication	G1511	CALPROC	CAL, DIGCPU
Tristar Bank Switch	G2111	none	WAVPROC (SIGPROC)
SH/Flash Reg	G2121	none	WAVPROC (SIGPROC), UPACQ
Trigger Reg	G2131	none	WAVPROC (SIGPROC), UPACQ
Ext. RAM Power	G214X	none	WAVPROC (SIGPROC)
SPM 1-64K	G22XX	none	WAVPROC (SIGPROC)
SPM 2-64K	G23XX	none	WAVPROC (SIGPROC)
Program RAM 1	G24XX	none	WAVPROC
Program RAM 2	G25XX	none	WAVPROC
Tristar	G26XX	none	WAVPROC
HSDMA	G27XX	none	SIGPROC
SL Utility 1	G3111	UTLY (U850)	LOWACQ, WAVPROC (SIGPROC)
SL DMX 1 Master	G3121	DMUX (U1140), UTLY (U850), CLKDR (U570)	LOWACQ, WAVPROC (SIGPROC), UPACQ
SL DMX 1 Slave	G3131	DMUX (U1340), CLKDR (U570), DMUX (U1140)	LOWACQ, WAVPROC (SIGPROC), UPACQ
SL DMX 3 Slave	G3141	DMUX (U1300), DMUX (U1340)	LOWACQ, WAVPROC (SIGPROC), UPACQ

Table 3-13 — Digitizer Processor Self-Test/Extended Diagnostics Error Index Codes (Cont.)

Area	Error Index	Suspect Hybrid/ IC FRUs	Suspect Board FRUs
SL DMX 3 Master	G3151	DMUX (U1100), DMUX (U1300), CLKDR (U570)	LOWACQ, WAVPROC (SIGPROC), UPACQ
SL Utility 3	G3161	UTLY (U810), DMUX (U1100), CLKDR (U570)	LOWACQ, WAVPROC (SIGPROC)
SL Utility 4	G3171	UTLY (U110), DMUX (U810)	LOWACQ, WAVPROC (SIGPROC)
SL Utility 2	G3181	UTLY (U150), UTLY (U110)	LOWACQ, WAVPROC (SIGPROC)
SL DMX 2 Master	G3191	DMUX (U1000), UTLY (U150), CLKDR (U570)	UPACQ, WAVPROC (SIGPROC)
SL DMX 2 Slave	G31A1	DMUX (U1400), DMUX (U1000), CLKDR (U570)	UPACQ, WAVPROC (SIGPROC)
SL DMX 4 Slave	G31B1	DMUX (U1450), DMUX (U1400), CLKDR (U570)	UPACQ, WAVPROC (SIGPROC)
SL DMX 4 Master	G31C1	DMUX (U1050), DMUX (U1450), CLKDR (U570)	UPACQ, WAVPROC (SIGPROC)
Sweep Tests	G32XX	SWP	UPACQ, WAVPROC (SIGPROC)
Utility 1 IC	G3311	UTLY (U850)	LOWACQ
Utility 2 IC	G3321	UTLY (U150)	LOWACQ
Utility 3 IC	G3331	UTLY (U810)	LOWACQ
Utility 4 IC	G3341	UTLY (U110)	LOWACQ
Demux 1 Master	G341X	DMUX (U1140)	LOWACQ, UPACQ
Demux 1 Slave	G342X	DMUX (U1340)	LOWACQ, UPACQ
Demux 2 Master	G343X	DMUX (U1000)	UPACQ
Demux 2 Slave	G344X	DMUX (U1400)	UPACQ
Demux 3 Master	G345X	DMUX (U1100)	LOWACQ, UPACQ
Demux 3 Slave	G346X	DMUX (U1300)	LOWACQ, UPACQ
Demux 4 Master	G347X	DMUX (U1050)	UPACQ
Demux 4 Slave	G348X	DMUX (U1450)	UPACQ
Flash 1 > Utility	G3511	SHF (U650), UTLY (U850)	LOWACQ, CAL

Table 3-13 — Digitizer Processor Self-Test/Extended Diagnostics Error Index Codes (Cont.)

Area	Error Index	Suspect Hybrid/ IC FRUs	Suspect Board FRUs
Flash 2 > Utility	G3521	SHF (U350), UTLY (U150)	LOWACQ, CAL
Flash 3 > Utility	G3531	SHF (U610), UTILY (U810)	LOWACQ, CAL
Flash 4 > Utility	G3541	SHF (U310), UTLY (U110)	LOWACQ, CAL
Utility 1 to DMX	G3611	UTLY (U850), DMUX (U1140)	LOWACQ
Utility 1 to DMX	G3612	UTLY (U850), DMUX (U1340)	LOWACQ
Utility 2 to DMX	G3621	UTLY (U150), DMUX (U1000)	LOWACQ, UPACQ
Utility 2 to DMX	G3622	UTLY (U150), DMUX (U1400)	LOWACQ, UPACQ
Utility 3 to DMX	G3631	UTLY (U810), DMUX (U1100)	LOWACQ
Utility 3 to DMX	G3632	UTLY (U810), DMUX (U1300)	LOWACQ
Utility 4 to DMX	G3641	UTLY (U110), DMUX (U1050)	LOWACQ, UPACQ
Utility 4 to DMX	G3642	UTLY (U110), DMUX (U1450)	LOWACQ, UPACQ
DmxRAM Pipe1	G37XX	DMUX (U1140, U1340)	LOWACQ, UPACQ, WAVPROC (SIGPROC)
DmxRAM Pipe2	G38XX	DMUX (U1000, U1400)	UPACQ, WAVPROC (SIGPROC)
DmxRAM Pipe3	G39XX	DMUX (U1100, U1300)	LOWACQ, UPACQ, WAVPROC (SIGPROC)
DmxRAM Pipe4	G3AXX	DMUX (U1050, U1450)	UPACQ, WAVPROC (SIGPROC)
Trigger A Test	G3B1X	TRIG (U160)	UPACQ, WAVPROC (SIGPROC)
Trigger B Test	G3B2X	TRIG (U140)	UPACQ, WAVPROC (SIGPROC)

Enhanced Accuracy Troubleshooting

Table 3-14 lists the error messages that are possible in the Enhanced Accuracy state and the respective suspect FRUs and FRU ICs. The suspect FRUs and FRU ICs are listed in the most-to-least likely cause of the error message. Enhanced Accuracy is available after the system has a 20-minute warmup period.

Table 3-14 — Enhanced Accuracy State Error Messages and Troubleshooting

Error Message	Suspect FRU and FRU ICs
Vertical System Out of Specification	Plug-ins, SHF(U650), SHF(U350), SHF(U610), SHF(U310), LOWACQ, CAL, PIINT
A/D Pipe 1	SHF(U650), LOWACQ, CAL
A/D Pipe 2	SHF(U350), LOWACQ, CAL
A/D Pipe 3	SHF(U610), LOWACQ, CAL
A/D Pipe 4	SHF(U310), LOWACQ, CAL
Main Time Interpolator	TIME(U820), TRIG(U610), SWP, UPACQ, CAL
Window Time Interpolator	TIME(U330), TRIG(U410), SWP, UPACQ, CAL
Main Fine Holdoff	SWP, UPACQ, CAL
Window Fine Holdoff	SWP, UPACQ, CAL
Main Trigger Level	Plug-ins, TRIG(U610), SWP, UPACQ, CAL, LOWACQ, PIINT, SHF(U650)
Window Trigger Level	Plug-ins, TRIG(U410), SWP, UPACQ, CAL, LOWACQ, PIINT, SHF(U650)
Main Pulsewidth	SWP, UPACQ, CAL
Window Pulsewidth	SWP, UPACQ, CAL
EErom Store	DIGCPU
Main Time Interpolator Histogram	TIME(U820), TRIG(U610), UPACQ, CAL
Window Time Interpolator Histogram	TIME(U330), TRIG(U410), UPACQ, CAL
Interleave Alignment	CLKDR, SHF(U650), SHF(U350), SHF(U610), SHF(U310), UPACQ, LOWACQ, CAL

Table 3-14 – Enhanced Accuracy State Error Messages and Troubleshooting (Cont.)

Error Message	Suspect FRU and FRU ICs
High Frequency Compensation	SHF(U650), SHF(U350), SHF(U610), SHF(U310), LOWACQ, CAL, CLKDR, UPACQ
Slow Risetime, HF Compensation	SHF(U650), SHF(U350), SHF(U610), SHF(U310), LOWACQ, CAL, UPACQ

Note: *In Table 3-14, A/D denotes an analog-to-digital converter.*

Probe Calibration Troubleshooting

Table 3-15 lists the error messages that are possible when performing Probe Calibration, and the respective suspect faulty FRUs and FRU ICs. The suspect FRUs and FRU ICs are listed in order of the most-to-least likely cause of the error message.

Table 3-15 – Probe Compensation Error Messages and Troubleshooting

Error Message	Suspect FRU and FRU ICs
Probe gain/offset calibration error	Probe, Plug-in
DIG high frequency compensation failed	Left Plug-in, SHF(U650), SHF(U350), SHF(U610), SHF(U310), LOWACQ, CAL, CLKDR, UPACQ
DIG risetime too slow for high frequency compensation	Probe, Left Plug-in, SHF(U650), SHF(U350), SHF(U610), SHF(U310), LOWACQ, CAL, CLKDR, UPACQ
DIG interleave alignment calibration failed	Left Plug-in, CLKDR, SHF(U650), SHF(U350), SHF(U610), SHF(U310), UPACQ, LOWACQ, CAL
DIG trigger IC internal path skew failed	TRIG(U610), TRIG(U410), SWP, UPACQ, LOWACQ, CAL

Conventional Troubleshooting

The following procedures are for troubleshooting a faulty Power Supply module, A4 Regulator board, CRT, A24 CRT Driver board, A25 Degauss board, A26 Geometry board, A27 CRT Socket board, and A13 Mother board.

Power Supply Module

This procedure requires an Extended Diagnostics 11000-Series Power Supplies Troubleshooting Fixture. Refer to Table 2-2, Test Equipment, for a complete description of the equipment required.

If any Power Supply module problems are present, they appear when the ON/STANDBY switch is set to ON. If the green light beside the ON label fails to light then check the following:

- ☐ Step 1: Ensure that the PRINCIPAL POWER switch located on the rear panel is in the ON position.
- ☐ Step 2: Ensure that the line cord is connected to a functional power source with the same output voltage as the setting of the LINE VOLTAGE SELECTOR on the rear panel.
- ☐ Step 3: Ensure that the fuse is good. If the fuse is blown, then replace the fuse as described.
- ☐ Step 4: Ensure that the fan exhausts air from the DSA when the ON/STANDBY switch is ON. A defective fan causes an over-temperature shutdown in the power supply.

If these steps fail to correct the problem, then connect the Extended Diagnostics 11000-Series Power Supplies Troubleshooting Fixture to the Power Supply module (refer to the documentation accompanying the test fixture for troubleshooting techniques).

The test fixture indicates which power supply voltage source is at fault. To help isolate the source of the problem, set the ON/STANDBY switch to STANDBY, and disconnect the suspected faulty power supply voltage source from the Power Supply module. Set the ON/STANDBY switch to ON. If the test fixture does not record a fault, then you have verified the suspected faulty power source. This procedure is only effective for externally shorted power supplies. Once again, refer to documentation accompanying the test fixture for more troubleshooting tips.

A4 Regulator Board

This board is implicitly verified; that is, if all the other FRUs pass diagnostic testing, you can assume that the A4 Regulator board is operating correctly. However, if the power supply is regulating slightly off its intended DC voltage, this can cause spurious REGVF faults making the A4 Regulator board suspect.

Display CRT Subsystem

This procedure checks the CRT, A16 Display Controller Board, A24 CRT Driver Board, A25 Degauss Board, A26 Geometry Board, and A27 CRT Socket Board. It requires a test terminal and a compatible RS-232-C serial interface cable. Refer to Table 2-2 for a complete description of the equipment required. See page 2-9for connection information.

Module Troubleshooting—If the DSA powers-on (the ON/STANDBY light is on), but the display gives scrambled information or none at all, then the CRT, A24 CRT Driver board, A26 Geometry board, A27 CRT Socket board, or the A16 Display Controller board are suspect. Two different procedures are described here to help you determine which of these boards is at fault.

☐ Step 1: With the power off (ON/STANDBY switch to STANDBY), remove the top cover, then turn the power on. Observe the two LEDs on the A16 Display Controller board and those on the A17 Main Processor board in the card cage. One LED is lit on each board while the diagnostic tests are running. When the tests are completed, all LEDs turn off. A fault detected on either board is flagged by the residing LED pair switching states. If all LEDs turn off, then the CRT or A24 CRT Driver board is suspect.

☐ Step 2: With the power off, connect a test terminal (ANSI 3.64-compatible) with an RS-232-C cable. Touch the screen through the full power-on cycle to force a diagnostic error so the DSA enters Extended Diagnostics.

☐ Step 3: On the test terminal, type **T** to display the **EXTENDED DIAGNOSTICS** menu structure on the terminal display. If the displayed errors are only for the front panel touch screen, then the CRT or the A24 CRT Driver board is at fault. Note any other errors, and use the Table 3-9, Display Processor Self-Test/Extended Diagnostic Error Index Codes, to identify a suspect board. To further troubleshoot the CRT, A24 CRT Driver board, A25 Degauss board, A26 Geometry board, and A27 CRT Socket board, use the following list of symptoms to identify a faulty FRU.

CRT—The following is a list of symptoms that may indicate a faulty CRT. The symptoms are listed in the order of most-to-least likely to occur if the CRT is faulty.

1. When the DSA is powered on (ON/STANDBY switch is set to ON), the display screen remains completely blank.
2. There are areas on the display that are void or have burn marks visible.
3. Electrical arcing occurs on the CRT when the DSA is powered on.
4. The display appears dim and/or you cannot adjust the display for the proper color brightness or balance among the red, blue, and green colors.

A24 CRT Driver board—The following is a list of symptoms that may indicate a faulty A24 CRT Driver board. The symptoms are listed in the order of most-to-least likely to occur if the A24 CRT Driver board is faulty.

1. The power supply attempts to warn you of a current limiting condition in the following ways:
   - LEDs DS370, DS372, DS374, and DS376 on the A2A2 Control Rectifier board are flashing (see Figure 3-5).
   - the front panel major menu LEDs are flashing.
   - the power supply outputs repetitive high pitched warning sounds.

   If any of these symptoms appear, then set the ON/STANDBY switch to STANDBY. Disconnect connectors J76 and J94 from the A24 CRT Driver board, then set the ON/STANDBY switch to ON. If the symptom(s) disappear, then the A24 CRT Driver board is suspect.

CAUTION

When opening the hatch below the CRT Driver board, check cable connectors J30, J53, and J54 to make sure that they are properly seated. If J30 comes off, the degaussing circuit is disabled. If J53 or J54 are pulled partway out of their sockets, information is displayed diagonally on the screen.

2. With the DSA powered-on, a bright line appears down the middle of the display screen.
3. One or more colors are not visible on the display. To verify that all of the colors are visible, perform the following steps.
   - ☐ Step 1: Press the UTILITY button, and then touch **Color Selection**.
   - ☐ Step 2: Touch **Graticule** in the **Color Selection** pop-up menu.
   - ☐ Step 3: Set the **Lightness** to 20% and the **Saturation** to 100%.
   - ☐ Step 4: Adjust the **Hue** setting and verify that red is visible at 120°, green is visible at 240°, and blue is visible at 0° (360°).
4. The display appears dim and/or you cannot adjust the display for the proper color brightness or balance among the red, blue, and green colors.

A25 Degauss board—If there are obvious color impurities on the display, and this condition is not corrected when you power off and then power on the DSA with the ON/STANDBY switch, then the A25 Degauss board is suspect.

A26 Geometry board—The following is a list of symptoms that may indicate a faulty A26 Geometry board. The symptoms are listed in the order of most likely to least likely.

1. Distortion at the top and bottom of the display image that cannot be corrected with the adjustments on the A26 Geometry board.
2. When the DSA is powered on (ON/STANDBY switch is set to ON), the display screen remains completely blank, and when the ON/STANDBY switch is set to STANDBY, the customary flash on the screen does not appear.
3. The display shows nothing but faint vertical lines.

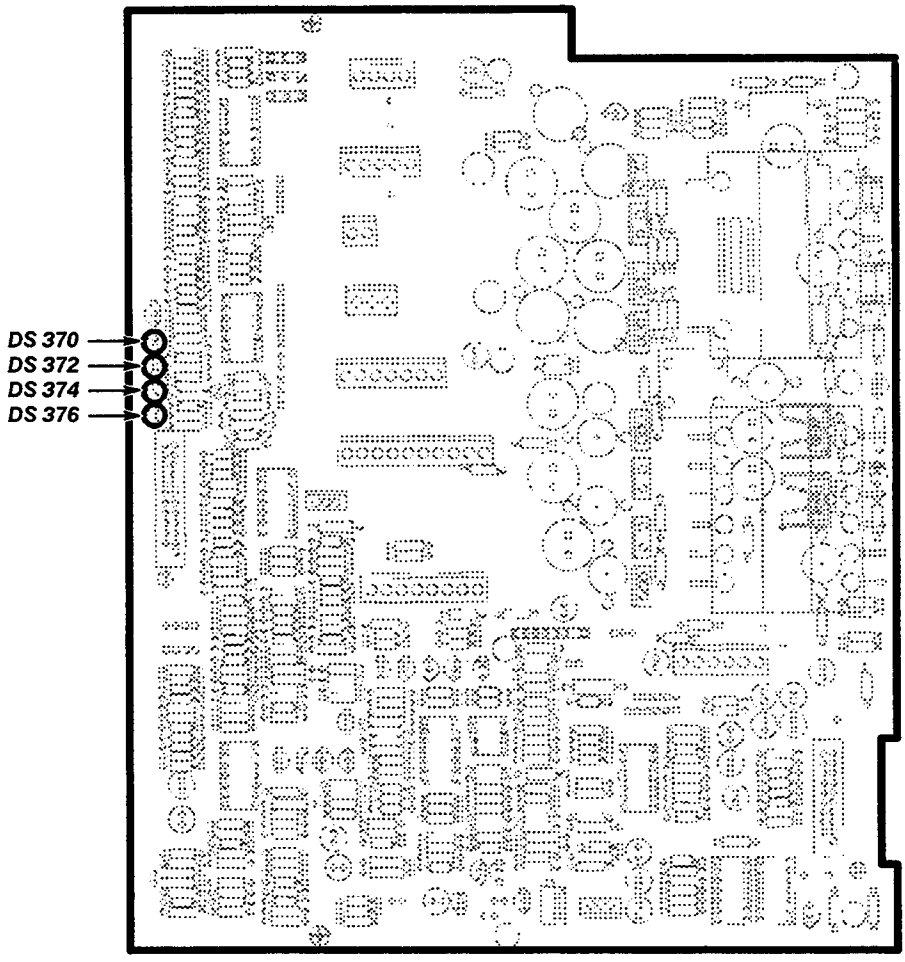


Figure 3-5 *— A2A2 Control Rectifier Board LEDs*

A27 CRT Socket board—The following is a list of symptoms that may indicate a faulty A27 CRT Socket board. The symptoms are listed in the order of most likely to least likely.

1. Poor convergence of the red, green, and blue colors that form the graticules. And, this condition cannot be corrected with the Convergence adjustment on the A27 CRT Socket board.
2. One or more colors are not visible on the display. To verify that all of the colors are visible, perform the following steps.

   ☐ Step 1: Press the UTILITY button, and then touch **Color Selection**.

   ☐ Step 2: Touch **Graticule** in the **Color Selection** pop-up menu.

   ☐ Step 3: Set the **Lightness** to 20% and the **Saturation** to 100%.

   ☐ Step 4: Adjust the **Hue** setting and verify that red is visible at 120°, green is visible at 240°, and blue is visible at 0° (360°).
3. An unusually bright screen that cannot be corrected using the manual adjustments.
4. The display screen remains completely blank when the DSA is powered on (ON/STANDBY switch is set to ON); and when the ON/STANDBY switch is set to STANDBY, the customary flash on the screen does not appear.

A13 Mother Board

This board is implicitly verified; that is, if all the other FRUs pass diagnostic testing, then you can assume that the A13 Mother board is operating correctly as well.

Fuse Testing

Fuse troubleshooting is described here for the boards with resident fuses.

The A14 I/O board has four fuses (see Figure 3-6).

- F200 supplies +5 V to the A12 Rear Panel board. If diagnostics report failure of all three panel ports (RS-232-C, GPIB, and PRINTER), then this fuse is suspect, assuming that the ribbon cable to the A12 Rear Panel board is powered on. (When tested with a multimeter, this fuse should measure less than 1.5 Ω.)

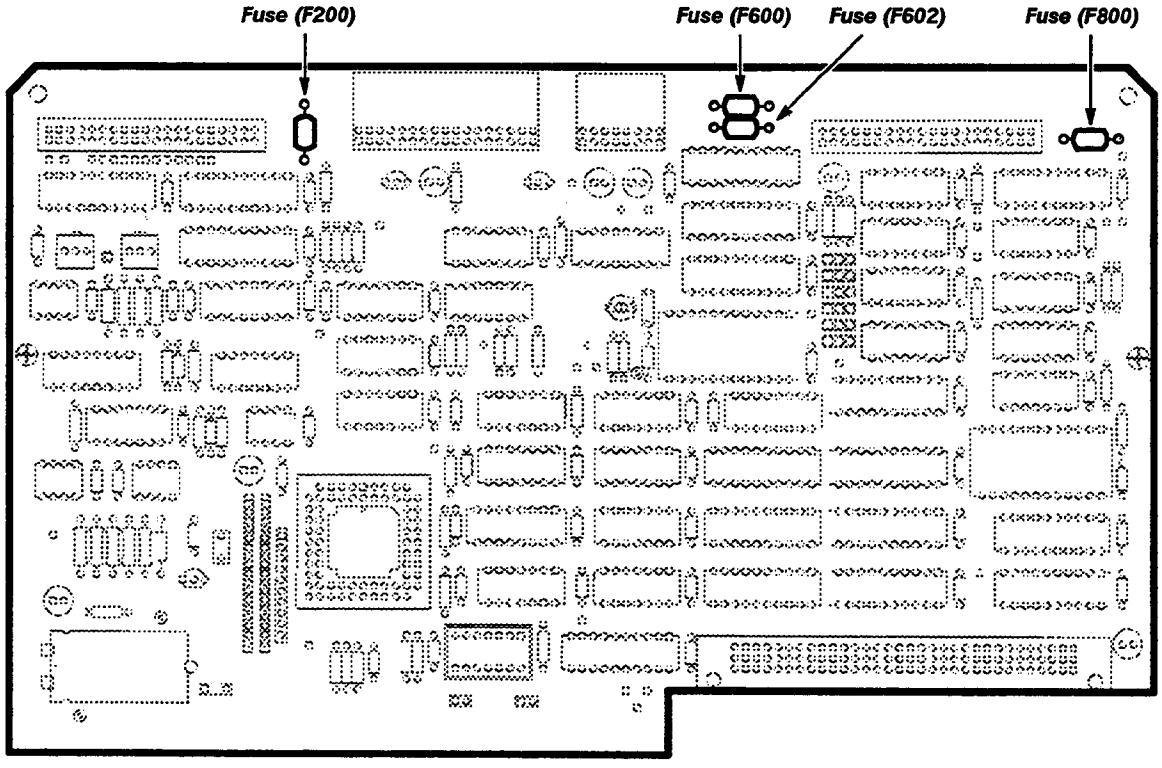


Figure 3-6 — A14 I/O Board Fuse Locator Diagram

- F800 supplies +5 V to the A10 Front Panel Control board and the A11 Front Panel board. If the diagnostics report both an A9 Touch Panel board failure and knob failures, then this fuse is one possible source of this problem. (This fuse should measure less than 1 Ω.)

- F600 supplies +15 V to the A14 I/O board temperature sensor and tone generator, the lights of the A11 Front Panel Button board, the A9 Touch Panel board, the A12 Rear Panel board's RS-232 output line drivers, the card cage, and the A17 Main Processor board's NV RAM. If the NV RAM battery test and the RS-232 External Loop Back test fail, but the Internal Loop Back test passes, and the A11 Front Panel Button board's lights, temperature sensor, and tone generator are all off, then this fuse is suspect. (This fuse should measure less than 1 Ω.)
- F602 supplies −15 V to the A14 I/O board temperature sensor and tone generator, A12 Rear Panel board's RS-232 output line drivers, the A9 Touch Panel board, and the card cage. If the temperature sensor, tone generator, and RS-232 External Loop Back test fail, but the Internal Loop Back test passes, then this fuse is the probable suspect. (This fuse should measure less than 1 Ω.)

The A16 Display Controller board has one fuse (see Figure 3-7):

- F300 supplies +5 V to the A24 CRT Driver board. If there is no display, this fuse is suspect. (This fuse should measure less than 1 Ω.)

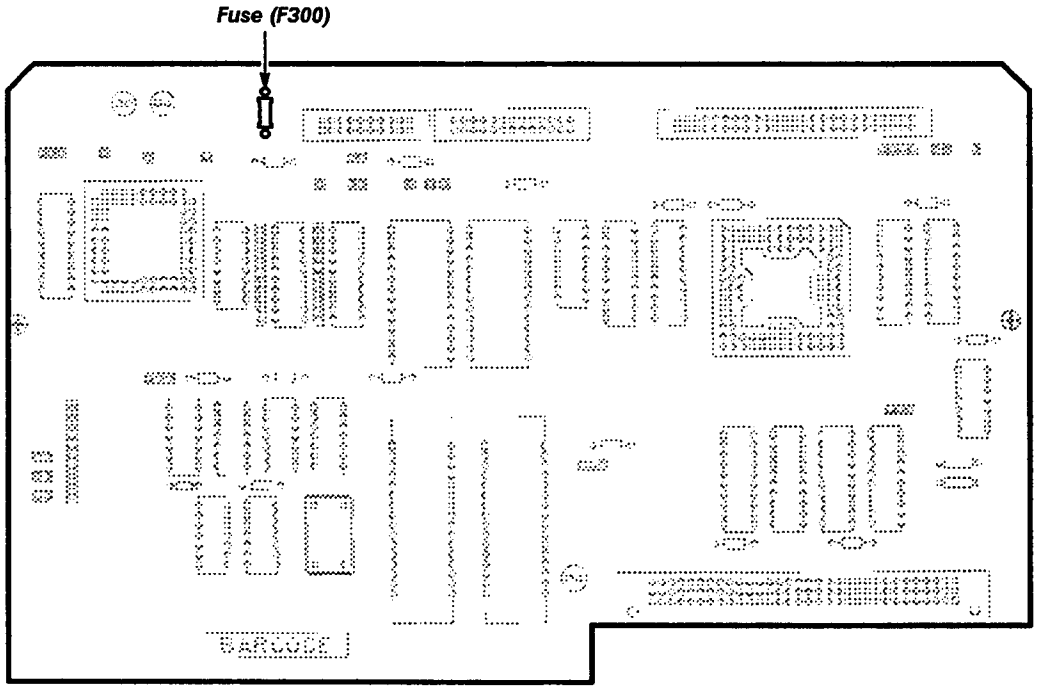


***Figure 3-7** — A16 Display Controller Board Fuse Locator Diagram*

The A20 Digitizer I/O board has one fuse (see Figure 3-8):

- F900 supplies +5 V to the A5 Calibrator board. If there is a Digitizer kernel error 10 and no +5 V on TTL components on the A5 Calibrator board, this fuse is suspect. (This fuse should measure less than 1 Ω.)

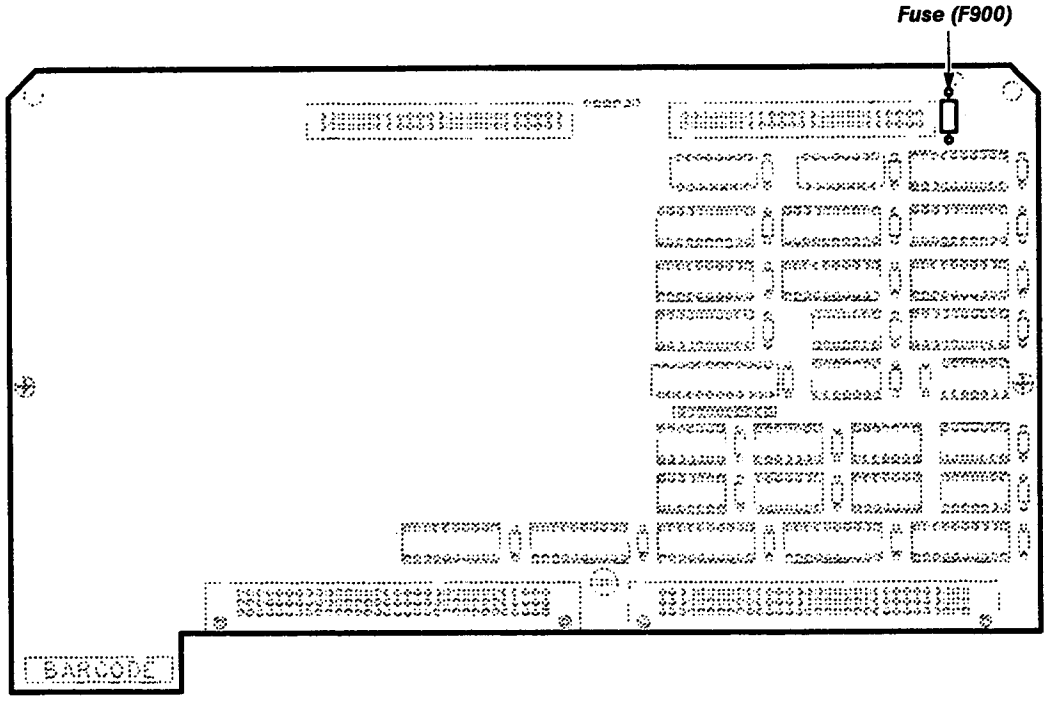


Figure 3-8 — A20 Digitizer I/O Board Fuse Locator Diagram

The A14 I/O board uses the +15 V and -15 V supplies on board to operate the temperature sensor and the tone generator. Of the other card cage boards, the A17 Main Processor board uses the +15 V supply to operate the NV RAM circuitry. The information above and Table 3-16 will help you to identify a failure of one of these fuses. If a test fails, then check the fuses.

CAUTION *Using a replacement fuse with an incorrect current rating may cause ribbon cables to melt and create fire danger during a component fault.*

The DSA line fuse (F99) is located on the rear panel of the DSA. Replace the line fuse (F99) with a fuse of the proper type and rating.

Note: *Line fuse (F99) is used for both 115 V and 230 V operation.*

See Figures 3-6 and 3-16 for the location of the the A14 I/O board fuses and the line fuse, respectively.

When a fuse must be replaced, unsolder the fuse from the board. Be careful not to damage the solder pads on the board. (It may be helpful to straighten the fuse leads on the rear of the board before removing the leads from their holes in the circuit board.) Refer to *Replaceable Parts* for the correct value and part number of each fuse.

Table 3-16 *— A14 I/O Board Fuse Failures*

Fuse	Kernel Test Failure J715 - J710	Test Failure J715 - J710
F200 open	OB*hex* (GPIB Interrupt)	
F800 open	OB*hex* (Front Panel Inter) **Note:** *Front panel lights are not lit. The code must be read from the Error Status test points (TP200–TP205) on the A17 Main Processor board.*	
F600 open	Passes the Kernel diagnostic tests, but the front panel lights are not lit.	Exec Control E1511 2 NV RAM E1411 2 Battery E1411 1 Data Lines E1421 1 Addr/Data* E1431 1 Internal I/O E3111 1 Temp Sensor E3111 1 Comparator E3111 1 Tone Gen* — Ramp Tone (works)* **Note:** *The front panel lights, soft keys, and hard keys will not operate.*
F602 open	OE*hex* (Front Panel Inter) *Note: The tone generator has a very different tone.*	

**Indicates a Manual Test forced by the operator and not automatically executed by Self-Test diagnostics.*

Plug-in Amplifiers

Some reported plug-in errors may be due to the mainframe.

Example: plug-in amplifier fails gainon or gainoff test.

To isolate problems to the plug-in, test the plug-in amplifier in all three compartments or another mainframe. If the error is consistent in all compartments, the plug-in amplifier is faulty or suffers from a plug-in hardware problem. The plug-in constants may be corrupted by a hardware problem in the mainframe. Refer to the plug-in amplifier's manual or contact a service representative for information on restoring constants.

If the problem is not isolated to the plug-in, it may be in the mainframe firmware, (Version 1.3 and under), the SHF IC associated with the failing plug-in path, or a damaged or loose signal path cable.

Front Panel Problems

Before replacing the touch panel assembly to correct front panel errors or improper operation of the touch screen, it is recommended that you check the following items:

- ☐ Step 1: No foreign material is in the touch screen area.
- ☐ Step 2: None of the hard keys are stuck, or stick intermittently.
- ☐ Step 3: The copper EMI gaskets (on the back of the touch panel assembly) are installed properly and not shorting the touch panel circuitry.
- ☐ Step 4: The slack in the CRT wire dress is pulled into the plug-in compartment and away from knobs and plug-in area. This may alleviate CRT driver noise getting into touch panel scan circuitry.

Intermittent Shutdowns/Power Cycling

The DSA may shut itself off when the power supply senses over-current, over-voltage, or excessive temperature. These types of failures are very difficult to isolate, or even to duplicate.

Some causes have been identified as follows:

- CRT or CRT Driver arcing.
- Poor interconnection at J95 (power supply regulator to plug-in interface).
- Thermal shutdown due to inoperable fan or restricted airflow.
- Thermal shutdown due to defective thermal sense resistor (on lower acquisition board) or defective thermal sense circuitry (on power supply).
- Over-current due to defective IC on the upper or lower acquisition board.

The frequency of shutdowns may be observed by monitoring the number of power-ups (under the Utility major menu/time-date selection). This helps to detect a power-up cycle if the instrument cannot be monitored visually.

Displayed Noise

An instrument can pass Diagnostics, Enhanced Accuracy, and Probe Calibration and still have display noise. Noise can generally be tracked to an acquisition path (pipe). In a DSA 601 and DSA 601A, noise in the center compartment is in pipe 1, noise in the right compartment is in pipe 3. In a DSA 602 and DSA 602A, noise in the center compartment is pipe 1 or pipe 2, noise in the right compartment is pipe 3 or pipe 4. In the left compartment (for all DSAs), noise with a single channel selected is pipe 3 and with two channels selected is probably pipe 1.

Noise may be the result of defective DEMUX, UTLY, or SHF ICs, or may be in the RAM circuitry. Due to the DSA pipe symmetry, the socketed ICs may be swapped with those of another pipe to further isolate the noise. If after swapping ICs the problem remains in the same pipe, replace the Lower Acquisition board if pipe 1 or pipe 3 fails, or replace the Upper Acquisition board if pipe 2 or pipe 4 fails.

Restoring Nonvolatile Memory (NVRAM)

CAUTION

Resetting the NVRAM will erase waveforms and settings stored in RAM. Waveforms and settings stored on floppy disk will not be affected.

To restore the mainframe to operating status, the NVRAM might have to be restored to default conditions. To do this, momentarily depress the Waveform and Trigger major menu buttons while turning the ON/STANDBY switch to ON. (If the major menu buttons are held too long, the NVRAM is restored, but a front panel hard key error may occur. To verify hard keys, run Extended Diagnostics).

In DSA600 Series mainframes with Executive firmware version 2.0 or above, you can restore default settings with the Teksecure Erase Mem feature. To reset NVRAM, which also deletes all settings and waveforms, select the Utility 2 major menu and then touch **Teksecure Erase Mem**. In the **Verify Selection** pop-up menu, touch **Teksecure Erase Mem**.

Corrective Maintenance

This section contains repair procedures. These repairs pertain to the Field Replaceable Units (FRUs). The procedures describe locating, removing, and replacing modules, boards, and several FRU ICs.

Preliminaries

Read the following information before attempting any repairs to the DSA.

Power Supply Voltage Hazard—Use caution if you are working near any metal-faced components in the Power supply module.

WARNING

All metal components, including any metal-faced components, in the Power Supply module should be considered hazardous; since the voltage to these components is supplied by and therefore equivalent to the AC line voltage potential.

Always remove the line power cord before attempting any disassembly procedures.

An electric-shock hazard exists when the DSA is not grounded. Do not remove the ground wire (green-yellow wire) that connects the Power Supply module chassis to the DSA.

Ordering Parts—When ordering replacement parts from Tektronix, Inc., include the following information:

- DSA type
- DSA serial number
- description of the part
- Tektronix part number

ATTENTION

If an FRU (field replaceable unit) being replaced contains firmware, the ***firmware must be removed from the old FRU and installed on the new FRU****. The replacement assemblies (FRUs) will not have firmware installed from the factory or Module Repair station.*

Static-Sensitive Device Classification—This DSA contains electrical components that are susceptible to damage from static discharge. Refer to Table 3-17, Relative Susceptibility to Damage from Static Discharge, for the relative susceptibility of various classes of semiconductors. Static voltages of 1 kV to 30 kV are common in unprotected environments.

CAUTION

Static discharge can damage any semiconductor component in the DSA.

Observe the following precautions to avoid damage to components:

- Minimize handling of static-sensitive components.

- Transport and store static-sensitive components or assemblies in their original containers, anti-static tube rail, or conductive foam.
- Label any package that contains static-sensitive assemblies or components.
- Wear a wrist strap while handling these components to discharge the static voltage from your body. Perform servicing of these static-sensitive assemblies or components at a static-free work station (only qualified service personnel should service these components). We recommend using the static control mat. Refer to Table 2-2 for the part numbers of the wrist strap and static control mat.
- Clear the work station surface of anything capable of generating or holding a static charge.
- Whenever possible, store the component leads in conductive foam or rails to keep these leads shorted together.
- 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 that can generate a static charge.

Table 3-17 *— Relative Susceptibility to Damage from Static Discharge*

Semiconductor Classes	Relative Susceptibility Levels[1]
MOS or CMOS microcircuits, and discrete 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
JFETs	600 to 800 V
Linear microcircuits	400 to 1000 V
Low-power Schottky TTL	900 V
TTL (least sensitive)	1200 V

[1]Voltage discharged from a 100 pF capacitor through a resistance of 100 Ω.

Battery Disposal and First Aid

The DSA contains the following batteries on the following named boards:

- one battery (BT130) on the A14 I/O board
- one battery (BT160) on the A17 Main Processor board
- one battery (BT150) on the A18 BB Memory board (Option 4C only)

See Figures 3-33, 3-36, and 3-37 for the location of these batteries.

WARNING

To avoid personal injury, observe the proper procedures for the handling of lithium batteries. ***Improper handling can cause fire, explosion, or severe burns.*** *Do not recharge, crush, disassemble, heat above 100°C (212°F), incinerate, or expose the batteries to water.*

Dispose of the Battery—according to local, state and federal regulations.

> **Note:** *Typically, you can safely dispose small quantities (less than 20) of batteries along with ordinary garbage in a sanitary landfill.*
>
> *You must send larger quantities by surface transport to a hazardous waste disposal facility. The batteries should be individually packaged to prevent shorting. Then, pack them in a sturdy container that is clearly labeled,* ***Lithium Batteries — DO NOT OPEN.***

Emergency and first aid information—for lithium batteries.

- **Manufacturer:** Panasonic
- **Battery Type:** Lithium Poly-Carbon monofluoride, BR 2/3 A
- **Solvent** (electrolyte): Gama Butyrlactone is of low toxicity. It can cause some eye and respiratory irritation. According to the manufacturer, the solvent potentially could be released during venting. (Venting is an out gassing of battery material.) Short circuiting (for more than a few seconds) or overheating usually causes venting.
- **Solute:** LIBF4

Table 3-18, Emergency Procedures, lists the procedures to perform if you come in contact with battery solvent.

Table 3-18 — Emergency Procedures

Contact	Do This
Skin	Wash promptly with plenty of water.
Eyes	Flush immediately with plenty of water, and use an emergency eye wash, if available. Report to a medical professional for treatment.
Inhalation	Leave the area, and get fresh air. Report to a medical professional for treatment.
Ingestion	Non-toxic according to laboratory testing. However, report to a medical professional for advice.

In case of venting, clear the immediate area. Usually, venting will only last a few seconds.

Electrical Lock-On of the Front Panel ON/STANDBY Power Switch

Some applications of the DSA may require that the power remain on. To electrically lock the power on, use the following procedure:

- ☐ Step 1: Switch the rear panel PRINCIPAL POWER switch to OFF.
- ☐ Step 2: Remove the AC power cable.
- ☐ Step 3: Position the DSA on its left (handle) side.
- ☐ Step 4: Remove the bottom cover.
- ☐ Step 5: Locate the A4 Regulator board.
- ☐ Step 6: Locate the J820 jumper on the A4 Regulator board (see Figure 3-21).
- ☐ Step 7: Without dropping the jumper, reposition the J820 jumper from its two rear pins to its two front pins.
- ☐ Step 8: Replace the bottom cover.
- ☐ Step 9: Turn the DSA in the upright position.
- ☐ Step 10: Reconnect the AC power cable, and switch the PRINCIPAL POWER switch to ON.

  The power will now remain on regardless of the setting of the ON/STANDBY power switch.
- ☐ Step 11: To turn the power off while the ON/STANDBY power switch is disabled, use the PRINCIPAL POWER switch.

To return the ON/STANDBY power switch to normal operation, perform steps 1 through 6. Then position the J820 jumper from the two front pins to the two rear pins. Finally, proceed through Steps 8, 9, and 10.

Unit Removal and Replacement

The following table provides a convenient reference for finding connector and screw locations when removing and replacing field replaceable units (FRUs). The first column in the table lists the FRU to be removed or replaced, and the second column lists the figures that you should reference for the location of connector and screw locations discussed in the procedure to remove/replace this FRU.

Table 3-19 — FRU Removal/Replacement Figure Cross Reference

FRU to be Removed/ Replaced	Figures to Reference During Removal		Page
Batteries	Figure 3-33	Removing/Replacing the A14 I/O Board	3-85
	Figure 3-36	Removing/Replacing the A17 Main Processor Board	3-91
	Figure 3-37	Removing/Replacing the A18 BB Memory Board	3-93
Cathode Ray Tube (CRT) (page 3-51)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-10	Removing/Replacing the CRT Shield	3-52
	Figure 3-11	Removing/Replacing the CRT Faceplate Torx Drive Screws	3-53
	Figure 3-12	Removing/Replacing the CRT	3-54
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-14	Removing/Replacing the Degauss Coils	3-57
	Figure 3-27	Removing/Replacing the A9 Touch Panel Assembly Torx Drive Screws	3-76
	Figure 3-28	Removing/Replacing the A9 Touch Panel Assembly	3-77
	Figure 3-42	Removing/Replacing the A24 CRT Driver Board	3-99
	Figure 3-43	Removing/Replacing the A25 Degauss Board	3-100
	Figure 3-52	Multi-Pin Connector Orientation	3-123
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A1 Plug-in Interface Board (page 3-63)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
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Table 3-19 — FRU Removal/Replacement Figure Cross Reference (Cont.)

FRU to be Removed/ Replaced	Figures to Reference During Removal		Page
A4 Regulator Board (page 3-67)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-21	Removing/Replacing the A4 Regulator Board	3-67
	Figure 3-52	Multi-Pin Connector Orientation	3-123
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A11 Front Panel Button Board (page 3-79)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-10	Removing/Replacing the CRT Shield	3-52
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	Figure 3-52	Multi-Pin Connector Orientation	3-123

Table 3-19 — FRU Removal/Replacement Figure Cross Reference (Cont.)

FRU to be Removed/ Replaced	Figures to Reference During Removal		Page
A12 Rear Panel Assembly (page 3-81)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
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	Figure 3-31	Removing/Replacing the A12 Rear Panel Assembly	3-82
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A13 Mother Board (page 3-82)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-18	Top View of the Card Cage	3-62
	Figure 3-32	Removing/Replacing the A13 Mother Board	3-83
	Figure 3-33	Removing/Replacing the A14 I/O Board	3-85
	Figure 3-34	Removing/Replacing the A15 MMU Board	3-87
	Figure 3-35	Removing/Replacing the A16 Display Controller Board	3-89
	Figure 3-36	Removing/Replacing the A17 Main Processor Board	3-91
	Figure 3-37	Removing/Replacing the A18 BB Memory Board	3-93
	Figure 3-38	Removing/Replacing the A19 Digitizer CPU Board	3-94
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A14 Input/Output (I/O) Board (page 3-84)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-18	Top View of the Card Cage	3-62
	Figure 3-33	Removing/Replacing the A14 I/O Board	3-85
	Figure 3-38	Removing/Replacing the A19 Digitizer CPU Board	3-94
	Figure 3-39	Removing/Replacing the A20 Digitizer I/O Board	3-96
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A15 Memory Management Unit (MMU) Board (page 3-86)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
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	Figure 3-33	Removing/Replacing the A14 I/O Board	3-85
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	Figure 3-52	Multi-Pin Connector Orientation	3-123
A16 Display Controller Board (page 3-87)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-18	Top View of the Card Cage	3-62
	Figure 3-33	Removing/Replacing the A14 I/O Board	3-85
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Table 3-19 — FRU Removal/Replacement Figure Cross Reference (Cont.)

FRU to be Removed/ Replaced	Figures to Reference During Removal		Page
A17 Main Processor Board (page 3-89)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
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	Figure 3-18	Top View of the Card Cage	3-62
	Figure 3-33	Removing/Replacing the A14 I/O Board	3-85
	Figure 3-36	Removing/Replacing the A17 Main Processor Board	3-91
	Figure 3-38	Removing/Replacing the A19 Digitizer CPU Board	3-94
	Figure 3-39	Removing/Replacing the A20 Digitizer I/O Board	3-96
	Figure 3-52	Multi-Pin Connector Orientation	3-123
A18 BB Memory Board (page 3-91)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-18	Top View of the Card Cage	3-62
	Figure 3-33	Removing/Replacing the A14 I/O Board	3-85
	Figure 3-37	Removing/Replacing the A18 BB Memory Board	3-93
	Figure 3-38	Removing/Replacing the A19 Digitizer CPU Board	3-94
	Figure 3-39	Removing/Replacing the A20 Digitizer I/O Board	3-96
	Figure 3-52	Multi-Pin Connector Orientation	3-123
A19 Digitizer CPU Board (page 3-93)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
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	Figure 3-18	Top View of the Card Cage	3-62
	Figure 3-38	Removing/Replacing the A19 Digitizer CPU Board	3-94
	Figure 3-52	Multi-Pin Connector Orientation	3-123
A20 Digitizer I/O Board (page 3-95)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-18	Top View of the Card Cage	3-62
	Figure 3-38	Removing/Replacing the A19 Digitizer CPU Board	3-94
	Figure 3-39	Removing/Replacing the A20 Digitizer I/O Board	3-96
	Figure 3-52	Multi-Pin Connector Orientation	3-123
A21 Mini Mother Board (page 3-97)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-18	Top View of the Card Cage	3-62
	Figure 3-33	Removing/Replacing the A14 I/O Board	3-85
	Figure 3-38	Removing/Replacing the A19 Digitizer CPU Board	3-94
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	Figure 3-52	Multi-Pin Connector Orientation	3-123

Table 3-19 — FRU Removal/Replacement Figure Cross Reference (Cont.)

FRU to be Removed/ Replaced	Figures to Reference During Removal		Page
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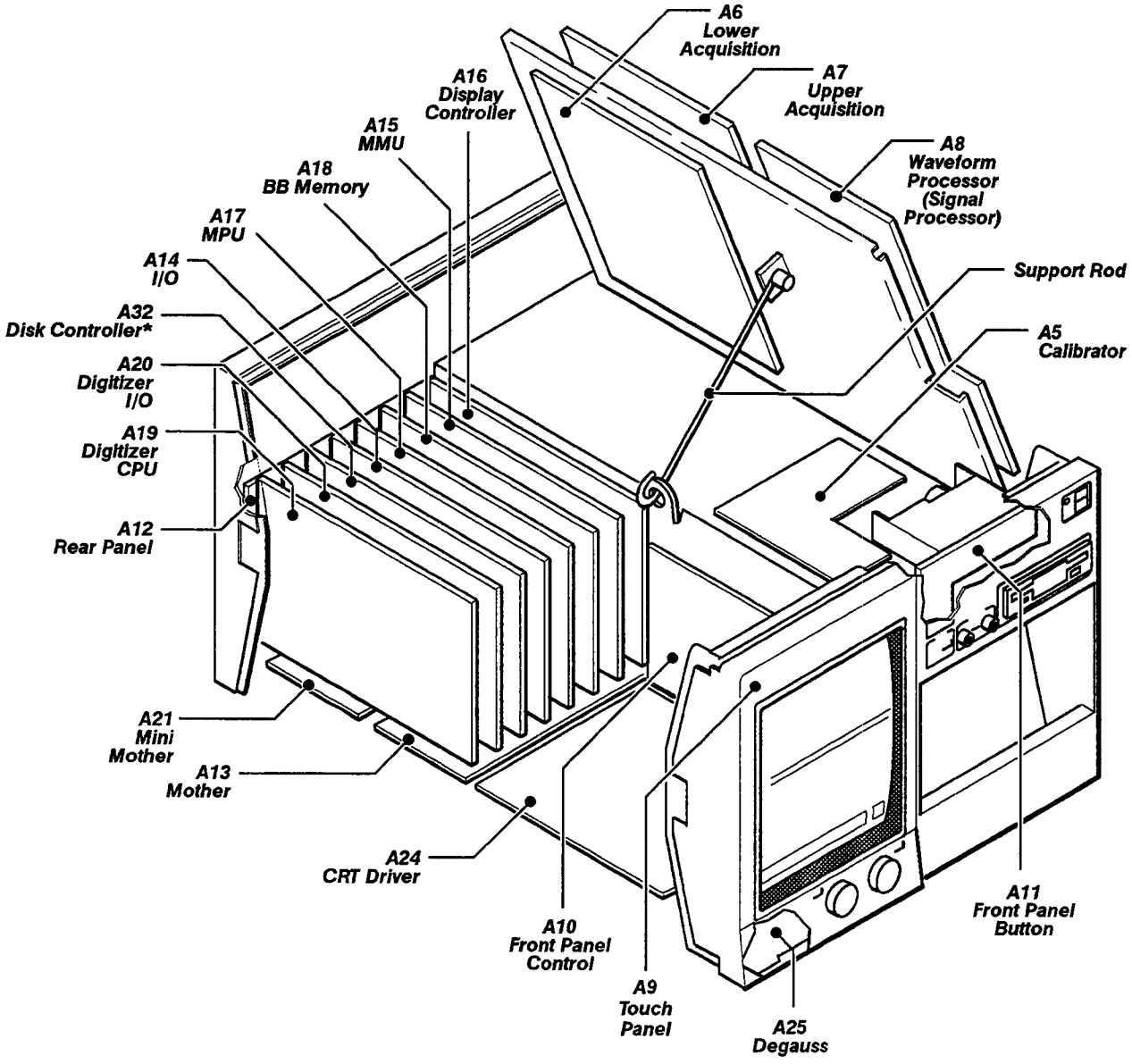
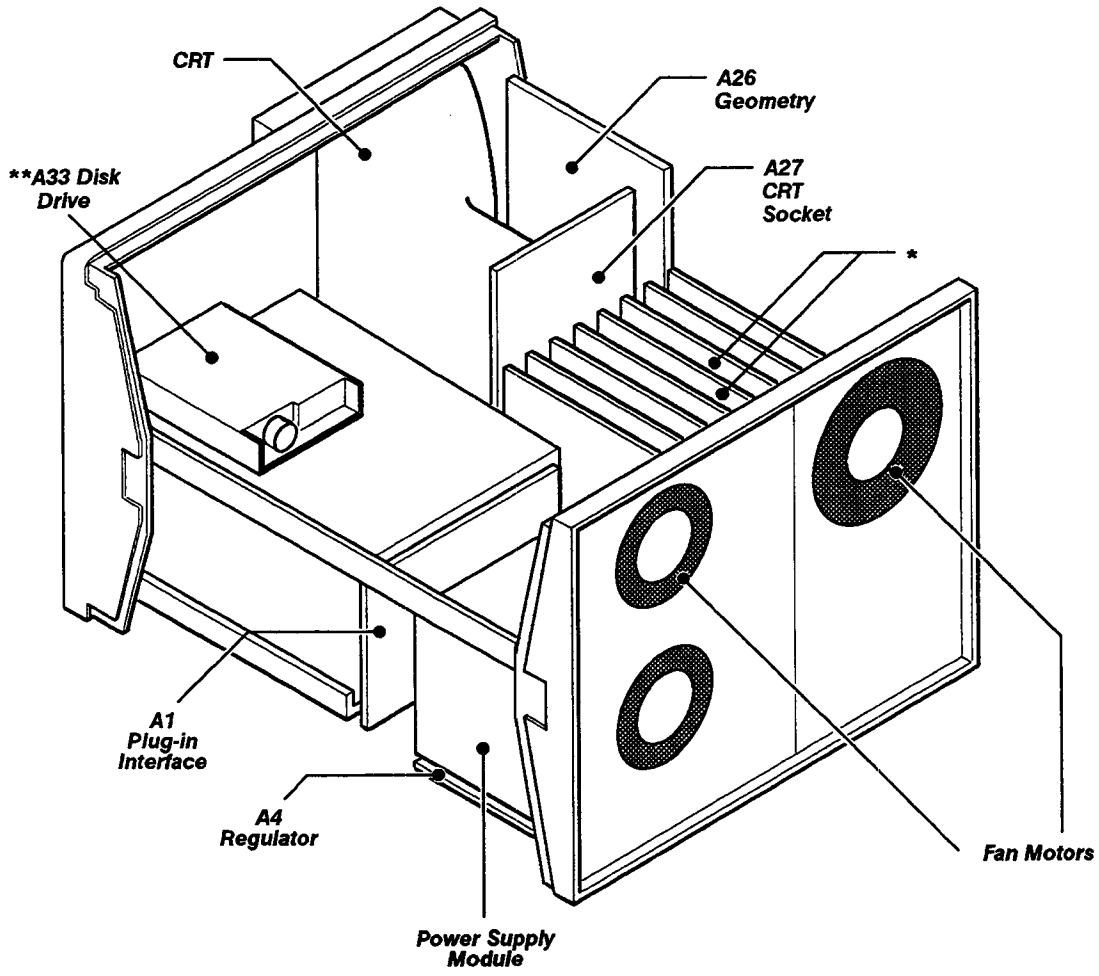
	Figure 3-12	Removing/Replacing the CRT	3-54
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-41	Removing/Replacing the CRT Driver Board Trap Door Torx Drive Screws	3-99
	Figure 3-42	Removing/Replacing the A24 CRT Driver Board	3-99
	Figure 3-52	Multi-Pin Connector Orientation	3-123
A25 Degauss Board (page 3-100)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-27	Removing/Replacing the A9 Touch Panel Assembly Torx Drive Screws	3-76
	Figure 3-28	Removing/Replacing the A9 Touch Panel Assembly	3-77
	Figure 3-43	Removing/Replacing the A25 Degauss Board	3-100
	Figure 3-52	Multi-Pin Connector Orientation	3-123
A26 Geometry Board (page 3-101)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-10	Removing/Replacing the CRT Shield	3-52
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-44	Removing/Replacing the A26 Geometry Board	3-102
	Figure 3-52	Multi-Pin Connector Orientation	3-123
A27 CRT Socket Board (page 3-103)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-10	Removing/Replacing the CRT Shield	3-52
	Figure 3-11	Removing/Replacing the CRT Faceplate Torx Drive Screws	3-53
	Figure 3-12	Removing/Replacing the CRT	3-54
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-27	Removing/Replacing the A9 Touch Panel Assembly Torx Drive Screws	3-76
	Figure 3-28	Removing/Replacing the A9 Touch Panel Assembly	3-77
	Figure 3-42	Removing/Replacing the A24 CRT Driver Board	3-99
	Figure 3-43	Removing/Replacing the A25 Degauss Board	3-100
	Figure 3-45	Removing/Replacing the A27 CRT Socket Board	3-103
	Figure 3-52	Multi-Pin Connector Orientation	3-123
A32 Disk Controller Board (page 3-104)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-18	Top View of the Card Cage	3-62
	Figure 3-38	Removing/Replacing the A19 Digitizer CPU Board	3-94
	Figure 3-39	Removing/Replacing the A20 Digitizer I/O Board	3-96
	Figure 3-46	Removing/Replacing the A32 Disk Controller Board	3-105
A33 Disk Drive (page 3-105)	Figure 3-9	Field Replaceable Units (FRU) Locator	3-49
	Figure 3-13	Removing/Replacing the Left Side Frame Section and Raising the Platform	3-56
	Figure 3-47	Removing/Replacing A33 Disk Drive	3-106

Field Replaceable Unit (FRU) Locator—Figure 3-9 below and on the following page, shows the location of all the Field Replaceable Units in the mainframe.



**The A32 Disk Controller board applies only to the DSA 600A Series. The DSA 600 Series may locate the A14 I/O board either in this slot or the slot shown in the illustration. The DSA 600 Series card cage has one empty slot.*

***Figure 3-9** — Field Replaceable Units (FRU) Locator (Continued on next page)*



*The DSA 600 Series has one less board in either of these two locations.
**Applies only to the DSA 600A Series.

Figure 3-9 – *Field Replaceable Units (FRU) Locator (Cont.)*

Cathode Ray Tube (CRT)

WARNING

The cathode ray tube (CRT) may retain a dangerous electrical charge (21 kV). Before removing the CRT, you must fully discharge the anode. Short the anode from the CRT to the chassis. Wait approximately ten minutes, and again firmly short the anode to the chassis. Then, remove the CRT.

Use extreme care when handling the CRT. If the CRT breaks, the glass fragments scatter at a high velocity (implosion). Therefore, you should wear protective clothing and safety glasses. Avoid striking the CRT on any object which might cause it to crack or implode. When storing a CRT, place the CRT in a protective carton; or, set the CRT face down in a protected location with a smooth surface and with the CRT faceplate on a soft mat.

Remove and Replace the CRT as follows:

- ☐ Step 1: Remove the A9 Touch Panel Assembly (page 3-76).
- ☐ Step 2: Fold the J73 connector into the left plug-in compartment. This ensures that the connector will be accessible when reinstalling the A9 Touch Panel Assembly. The colored edge of the ribbon cable indicates pin 1.
- ☐ Step 3: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 4: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 5: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform).

  Note: *Always support the platform with the support rod when the platform is in the raised position (Figure 3-9).*

- ☐ Step 6: Remove the ten Torx drive screws that secure the CRT shield to the chassis (Figure 3-10).
- ☐ Step 7: Push the CRT shield towards the rear of the DSA, and then lift the CRT shield out of the chassis (Figure 3-11).
- ☐ Step 8: Remove the two J32 connectors from the A25 Degauss board (Figure 3-14).
- ☐ Step 9: Remove the front and rear decorative trim covers from the left side of the DSA (as viewed from the front of the DSA) (Figure 3-13).

CAUTION

Do not lift the trim covers to remove them; doing so will break the trim covers. There is a clip on the inside of the trim cover which slides over the end of the frame section. To remove the trim covers properly, and prevent breakage of these covers, move each cover towards the end of the DSA. (The front cover moves forward and the rear cover moves towards the rear of the DSA.) Move the cover about $^1/_8$-inch to release the cover, and then, remove the cover from the DSA.

☐ Step 10: Remove the four Torx drive screws that secure the left frame section, and then remove the left frame section (Figure 3-13).

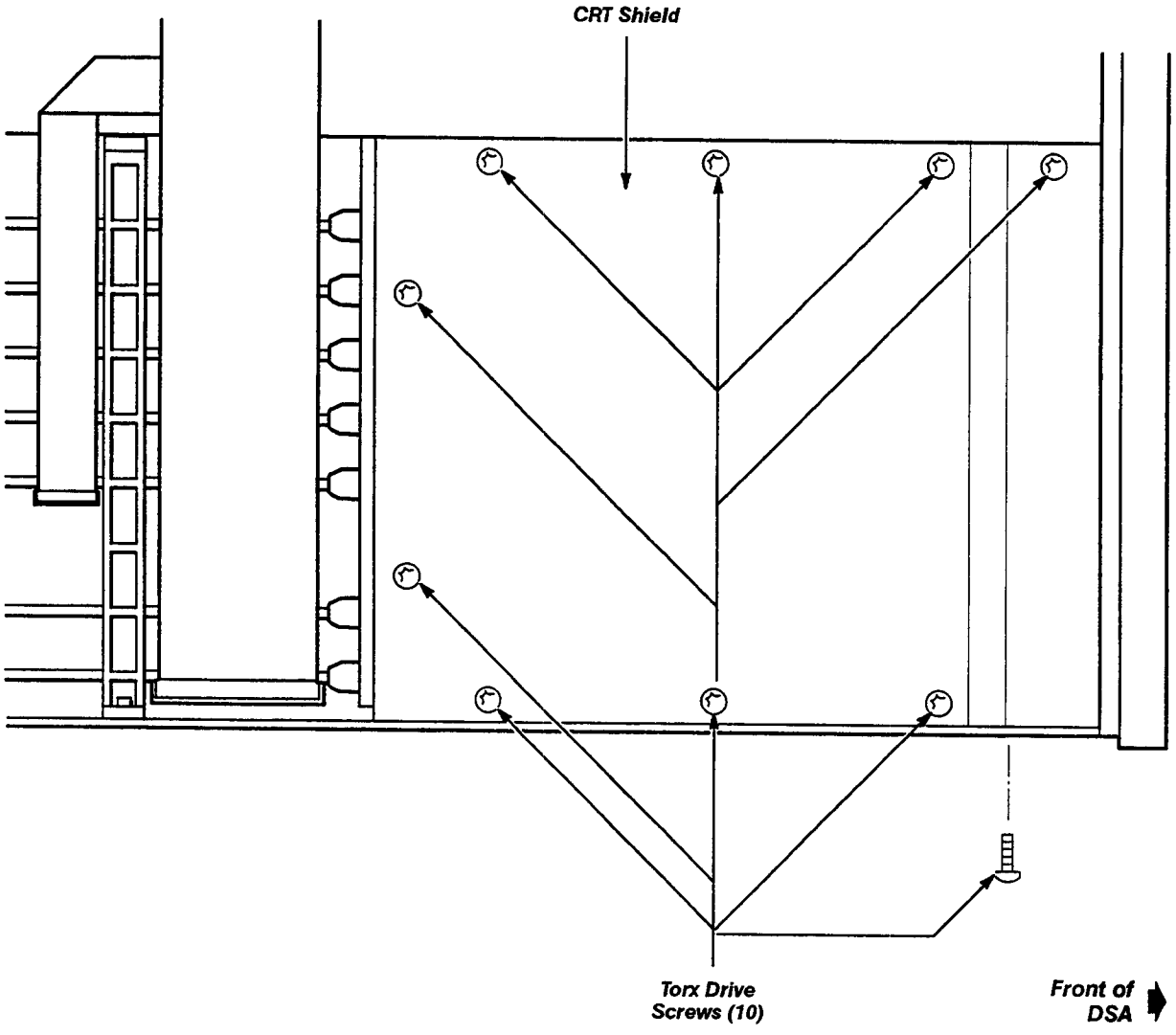


Figure 3-10 *— Removing/Replacing the CRT Shield*

☐ Step 11: Use a non-conducting tool to pry up the anode lead cap. The anode lead cap is accessed through the circular opening in the left side of the chassis. Release the spring clip inside the cap to remove the anode lead.

WARNING

A stored charge can accumulate in the CRT after the anode lead is removed. To eliminate this stored charge, insert one blade of a needle-nose pliers in the small hole referred to in Step 11 and ground the other blade to the DSA chassis.

☐ Step 12: Remove the four Torx drive screws at each corner of the CRT faceplate (Figure 3-11).

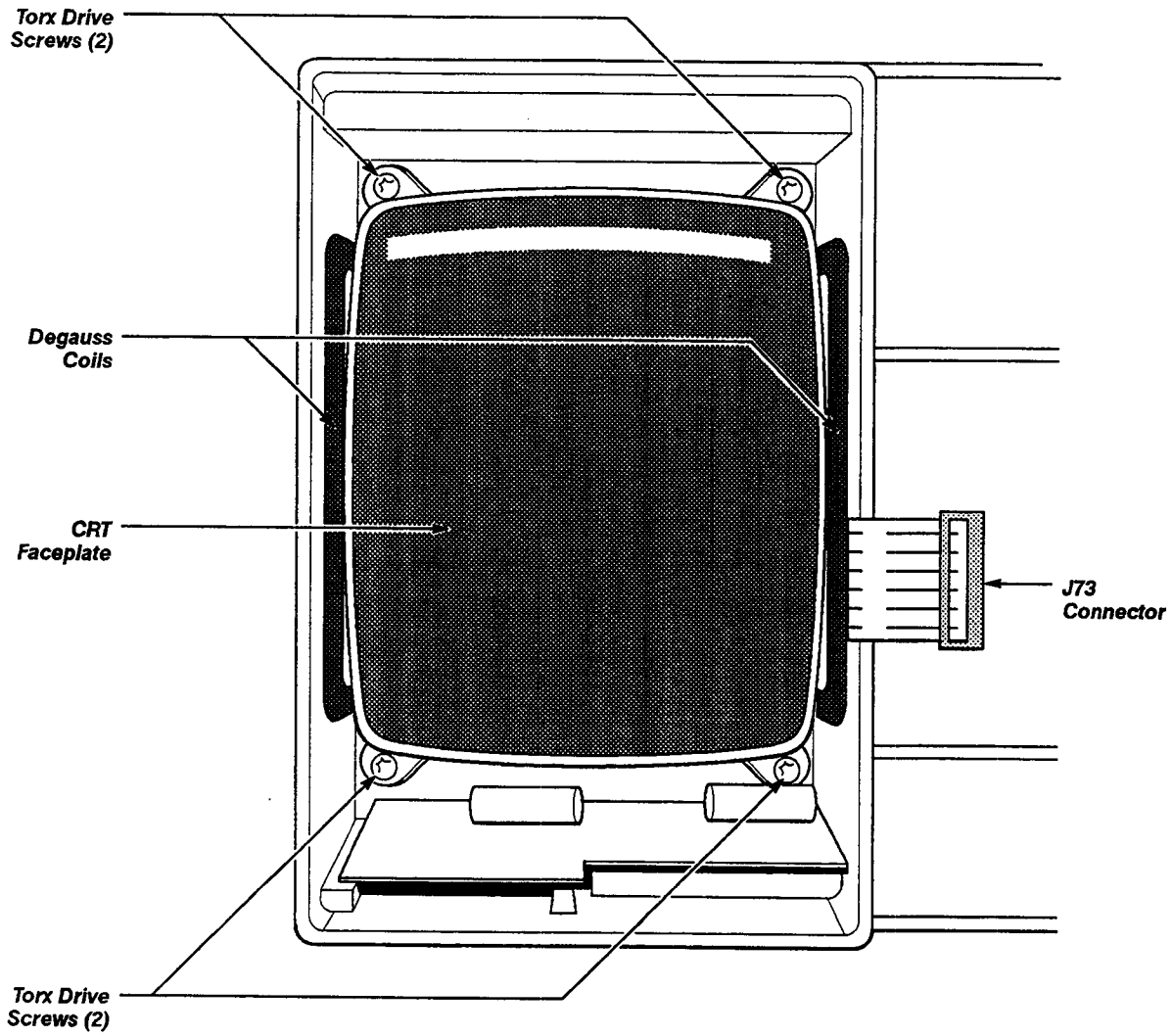


Figure 3-11 — *Removing/Replacing the CRT Faceplate Torx Drive Screws*

CAUTION *Support the front of the CRT when removing the final screws. Handle the CRT with extreme care when performing the following steps.*

☐ Step 13: Pull the CRT partially out of the chassis. While firmly supporting the front of the CRT, carefully unplug the rear of the CRT from the A27 CRT Socket board.

Note: *The CRT is now loose in the chassis. Take care to ensure that you support the CRT for the remaining steps.*

☐ Step 14: Disconnect the J40 connector from the A24 CRT Driver board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figure 3-12).

☐ Step 15: Carefully remove the CRT and the attached Degauss coils.

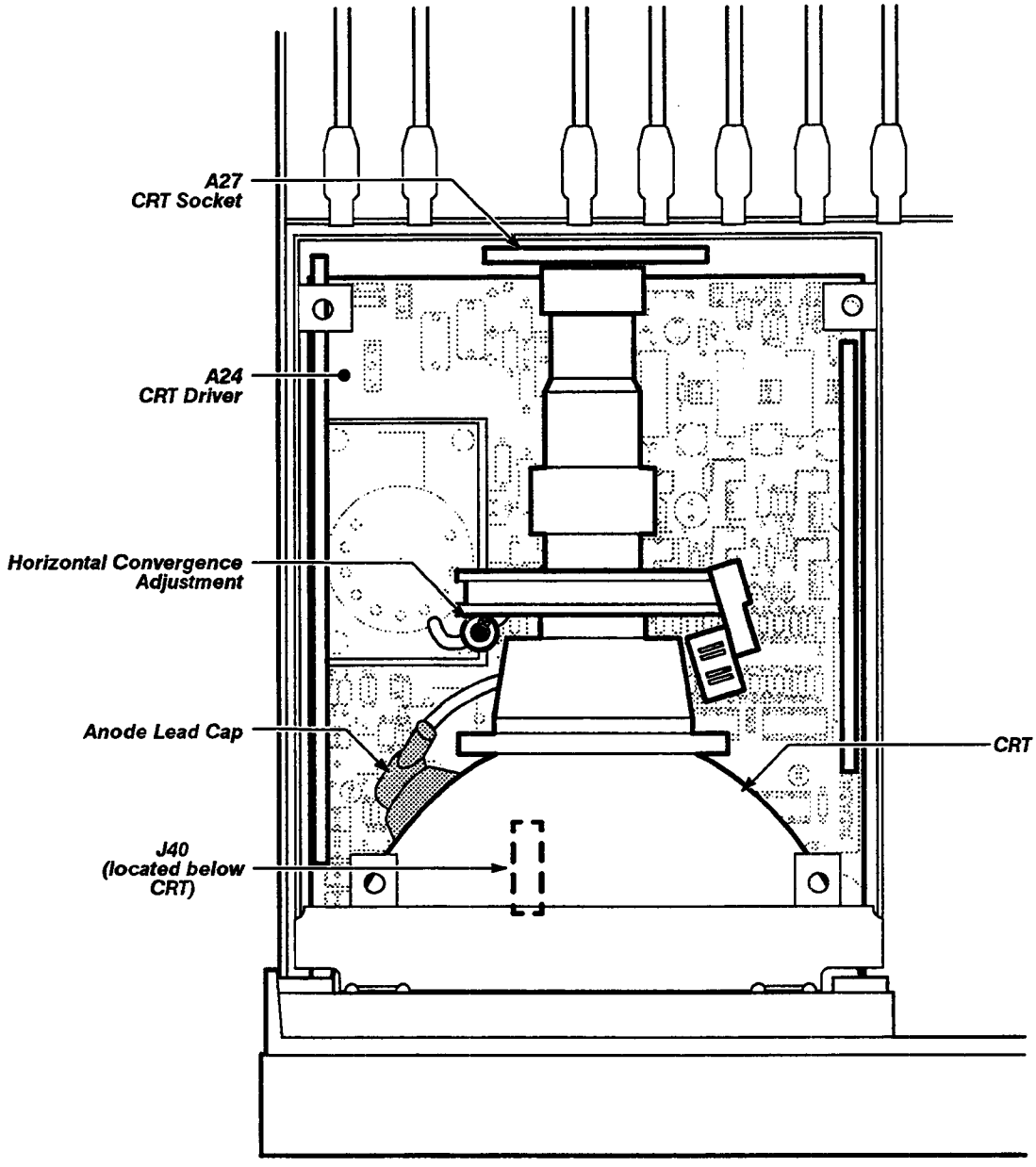


Figure 3-12 — *Removing/Replacing the CRT*

☐ Step 16: Carefully note how the Degauss coils are attached to the sides of the CRT (Figure 3-11).

☐ Step 17: Cut the four cable ties that secure the Degauss coils to the sides of the CRT, then remove the Degauss coils.

Note: *When you replace the Degauss coils, position the cable clamps as noted in step 16. Then, tighten the clamps so that you can rotate the clamps around the Degauss coils. This ensures that you can position the clamps when you replace the CRT.*

To replace the CRT, perform the previous steps in the reverse order.

Note: *Before inserting the CRT into the chassis, ensure that all wires and wire harnesses are behind the metal ground clips and, that all of the ground clips are connected to the CRT.*

After you replace the CRT, you must readjust the CRT. Refer to Checks After FRU Replacement for more information on this readjustment.

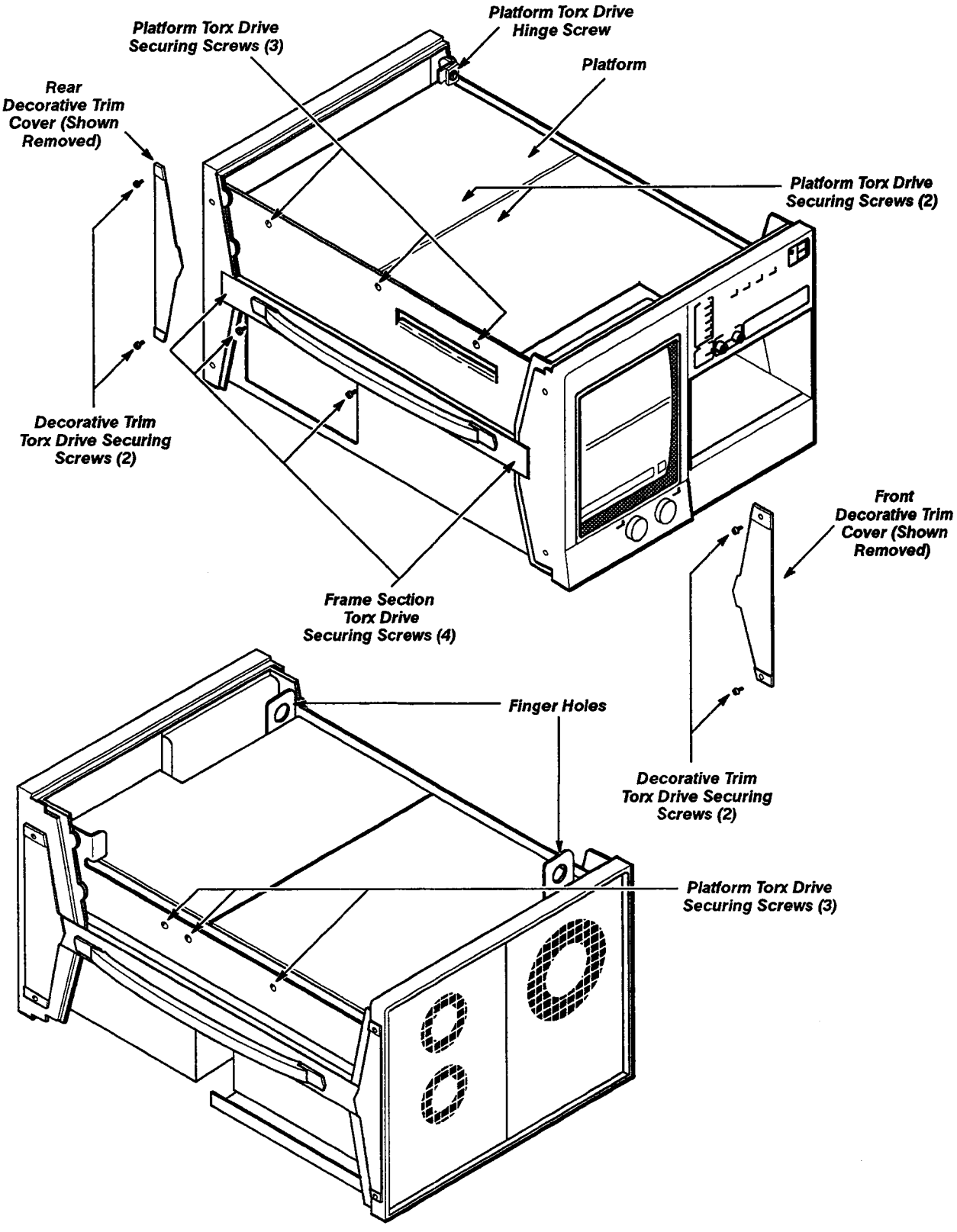


Figure 3-13 — *Removing/Replacing the Left Side Frame Section and Raising the Platform*

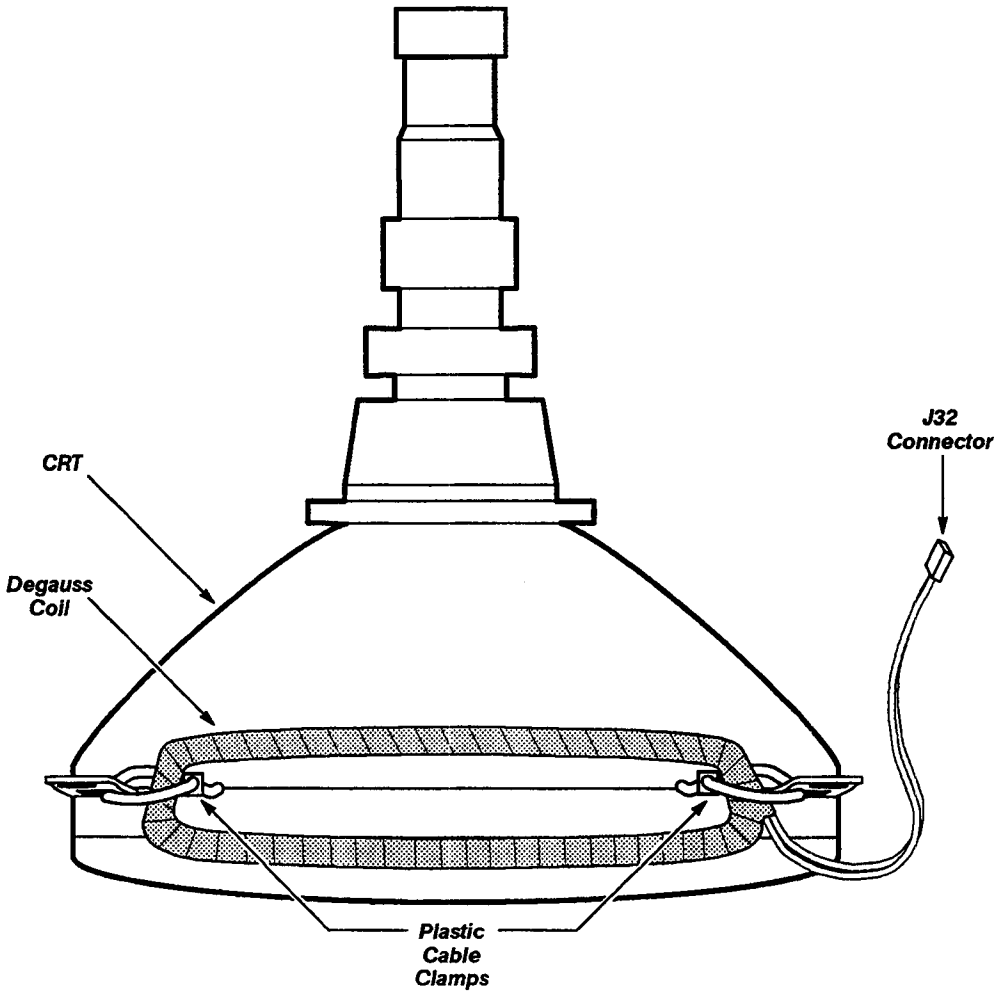


Figure 3-14 — Removing/Replacing the Degauss Coils

Fan Motor

The DSA has two chassis-mounted fan motors. The removal and replacement procedure for both fan motors are identical.

Remove and replace the fan motors as follows:

- ☐ Step 1: Before removing the fan motor, note the orientation of the motor to ensure that you can later correctly replace the motor (Figure 3-15).
- ☐ Step 2: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 3: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 4: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform).

  Note: *Always support the platform with the support rod when the platform is in the raised position.*

- ☐ Step 5: Remove the hex nuts (three on the small fan motor and four on the large fan motor) that secure the fan motor that you are removing to the chassis (Figure 3-15).
- ☐ Step 6: Disconnect the two spade terminal connectors from the fan motor. Note that the red wire connects to the (+) connector, and the brown wire connects to the (–) connector.
- ☐ Step 7: Remove the fan motor.

To replace the fan motor, perform the previous steps in the reverse order.

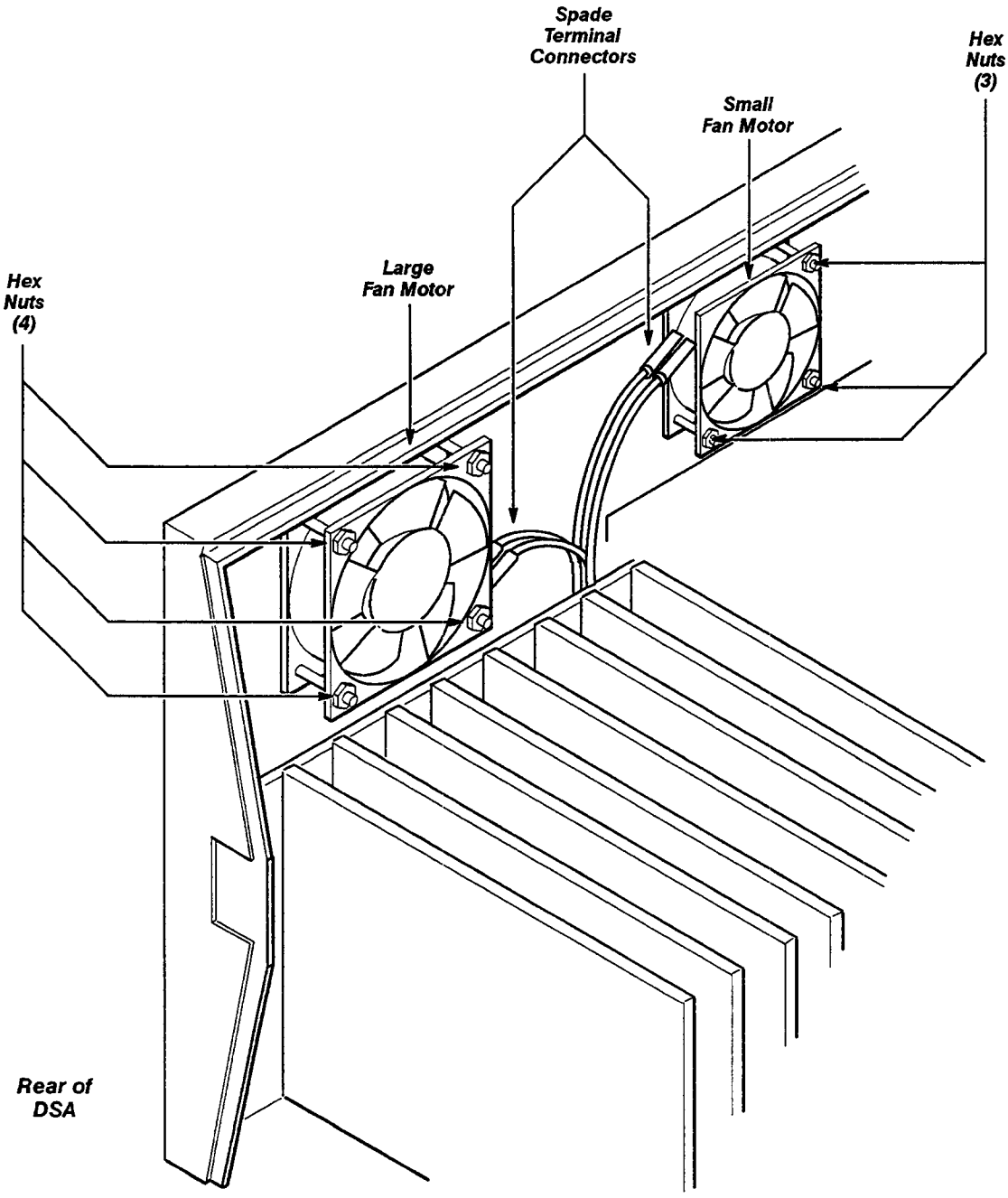


Figure 3-15 — *Removing/Replacing the Fan Motors*

Power Supply Module

The Power Supply module slides out of the rear of the DSA for maintenance and troubleshooting. It may also be removed to gain better access to the A1 Plug-in Interface board.

Remove and replace the Power Supply module as follows:

☐ Step 1: Turn the DSA on its left side (as viewed facing the rear panel). The Power Supply module will now be at the bottom of the DSA.

☐ Step 2: Remove the fourteen Torx drive screws that secure the power supply rear plate (Figure 3-16).

☐ Step 3: Remove the power supply rear plate.

☐ Step 4: Carefully pull the Power Supply module partially out of the DSA. (Stop short of stretching taut or binding the wires that are connected to the A2A2 Control Rectifier board connectors.)

CAUTION *Pulling the Power Supply module any further than partially out of the DSA may damage connector pins.*

☐ Step 5: Remove the wire connectors (J61–J69 and J81–J83) from the A2A2 Control Rectifier board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-17 and 3-52).

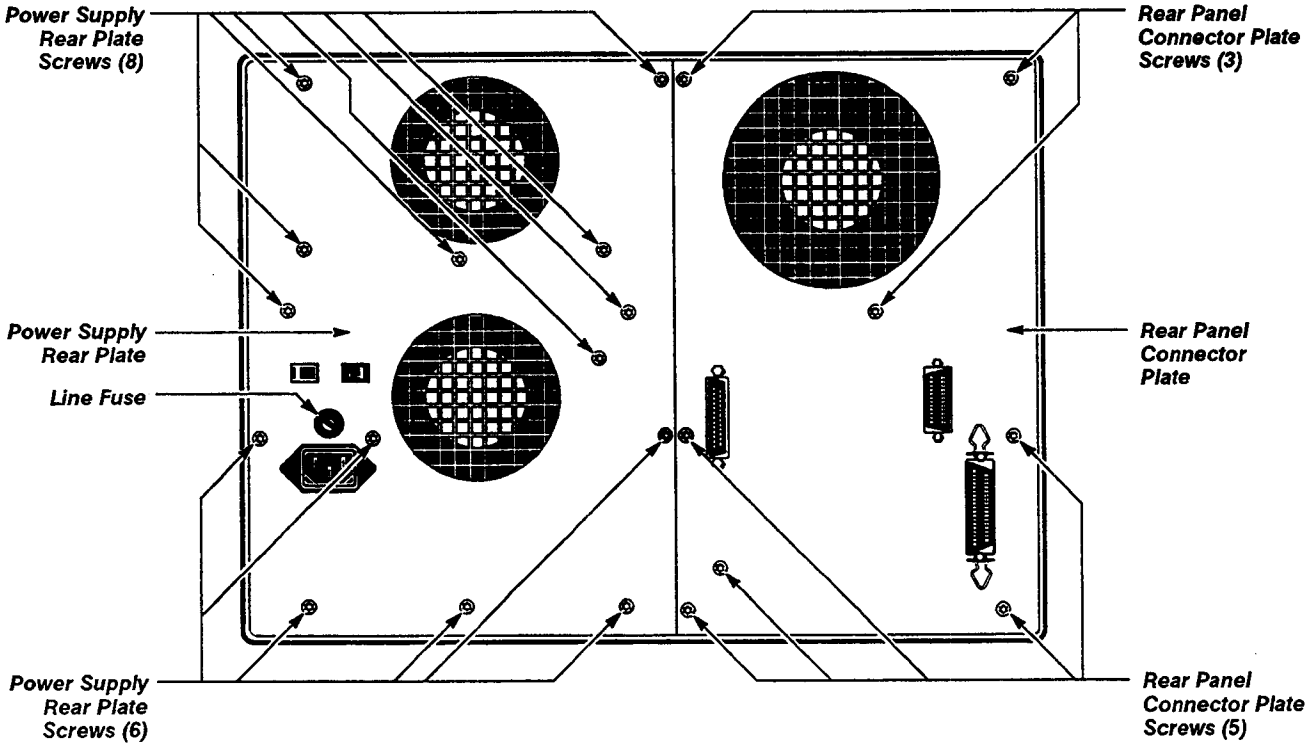


Figure 3-16 — Removing/Replacing the Power Supply Module

☐ Step 6: Remove the chassis ground (green-yellow) wire that is connected from the chassis of the DSA to the Power Supply module.

☐ Step 7: Remove the Power Supply module.

To replace the Power Supply module, perform the previous steps in the reverse order.

Note: *Align the metal guides on the top of the Power Supply module with the grooves inside the upper portion of the opening in the DSA.*

Be careful not to pinch any wires or interconnecting cables while installing the Power Supply module.

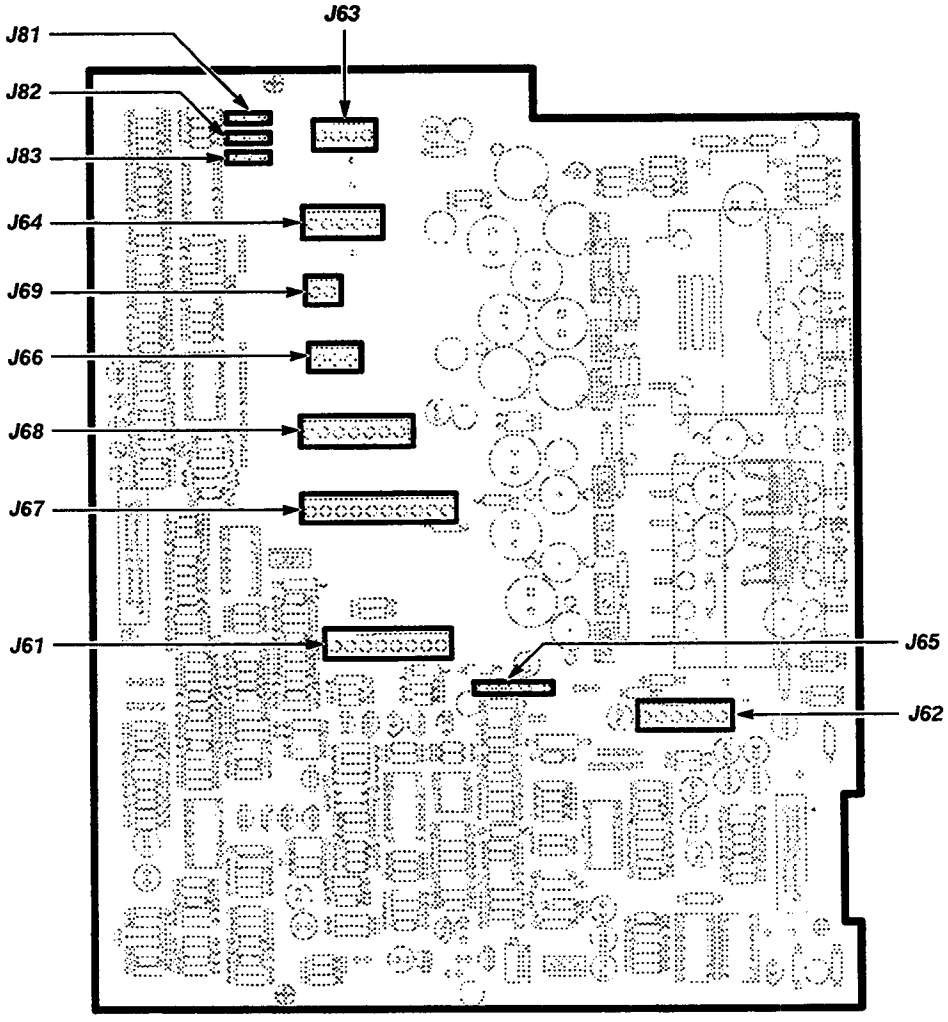
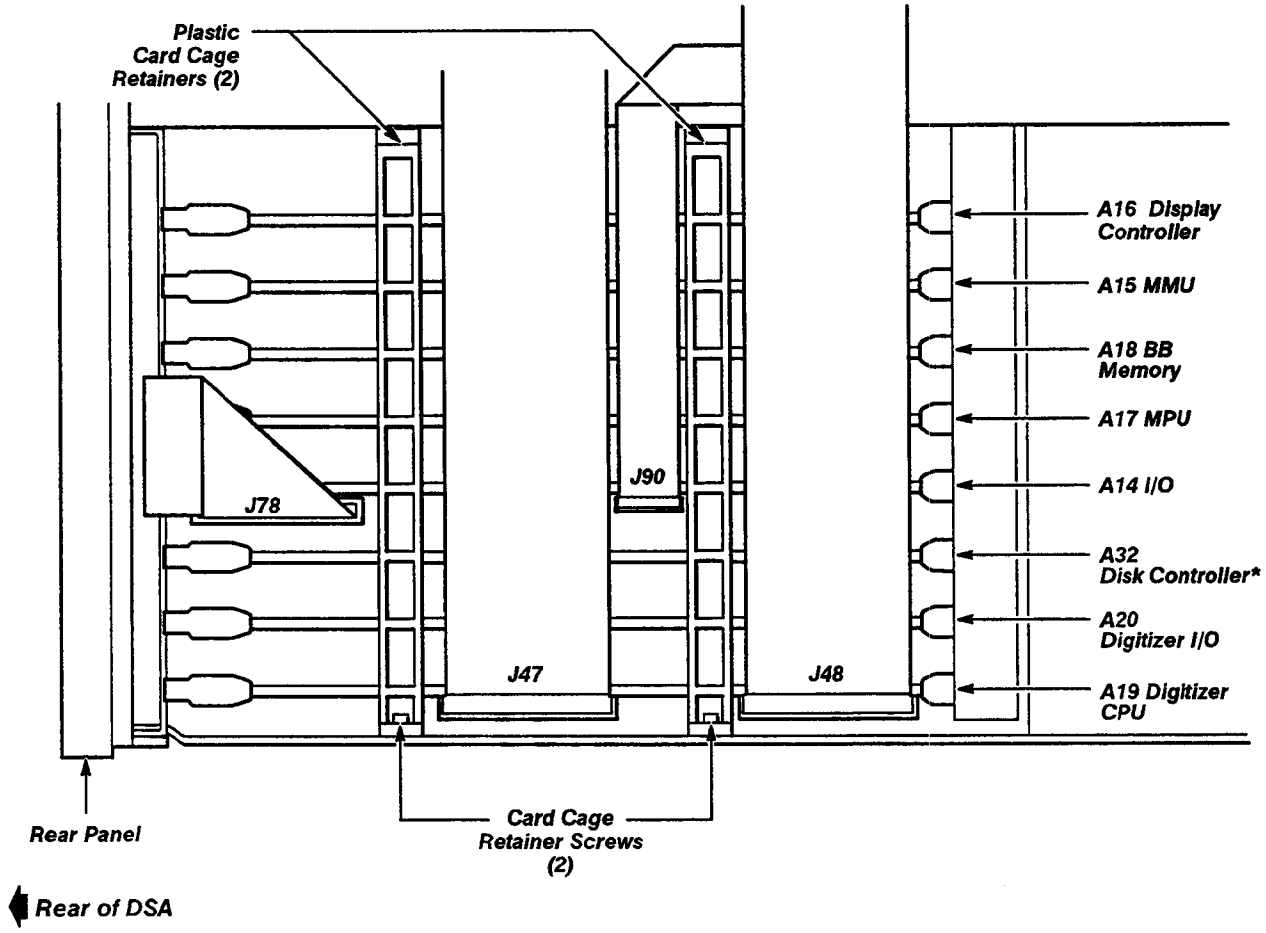


Figure 3-17 *— A2A2 Control Rectifier Board Connector Locations*

Card Cage FRU Boards and Assembly

Pin connectors are used for electrical interconnection with chassis mounted components and other boards. Most boards/assemblies in the DSA are mounted on the chassis. The following boards plug on to the top of the A13 Mother board (see Figure 3-18 for the location of these boards in the card cage):

- A14 Input/Output (I/O)
- A15 Memory Management Unit (MMU)
- A16 Display Controller
- A17 Main Processor
- A18 BB Memory
- A19 Digitizer CPU
- A20 Digitizer I/O
- A32 Disk Controller (DSA 600A only)



A32 Disk Controller board applies only to the DSA 600A Series. (Refer to FRU Locator on page 3-49.)

Figure 3-18 — Top View of the Card Cage

Feed-through connectors join the plug-on boards to the A13 Mother board.

The following two boards plug on to the top of the A21 Mini Mother board (in addition to plugging on to the top of the A13 Mother board).

- A19 Digitizer CPU
- A20 Digitizer I/O

CAUTION *After removing a board from the DSA, place the board on a grounded antistatic surface. This will minimize the chance of static charge damage to the integrated circuits and/or related circuitry.*

Note: *Some components mounted on a board must be retained for use with the new assembly. These components would include firmware, interconnecting plugs, support posts, and some wiring.*

A1 Plug-in Interface Board

Removal and replacement steps are listed below.

Remove and replace the A1 Plug-in Interface board as follows:

☐ Step 1: Remove the A4 Regulator board (page 3-67).

Note: *After removing the A4 Regulator board, place the DSA in the upright position.*

☐ Step 2: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).

☐ Step 3: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).

☐ Step 4: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).

☐ Step 5: Disconnect connector J91 and J92 from the A1 Plug-in Interface board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figure 3-20).

☐ Step 6: Disconnect J90 from the A14 I/O board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-33 and 3-52).

Note: *Always support the platform with the support rod when the platform is in the raised position* (Figure 3-9).

☐ Step 7: Disconnect multi-pin connectors J29, J68, J96 and Peltola connectors J1, J2, J3, J4, J5, J6, J9 and J10 from the A6 Lower Acquisition board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors. Tag all Peltola connectors with their correct J number to ensure that you can correctly replace these connectors (Figure 3-24).

☐ Step 8: Remove connectors J47 and J48 from the A19 Digitizer CPU board (Figure 3-38).

☐ Step 9: Remove the J66 wires from the plastic cable clamp located on the bottom of the platform. The J66 wires connect the A8 Waveform Processor or A8 Signal Processor board to the Power Supply module. (The A8 Signal Processor board replaces the standard A8 Waveform Processor board if your DSA is equipped with Option 3C.)

☐ Step 10: Disconnect the support rod from the platform, and then lower the platform.

☐ Step 11: Remove multi-pin connectors J67, J91 and Peltola connectors J7, J8, J9 and J10 from the A7 Upper Acquisition board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors. Tag all Peltola connectors with their correct J number so that you can correctly replace these connectors (Figure 3-25).

☐ Step 12: Disconnect connector J66 from the A8 Waveform Processor (Signal Processor) board. (Connector J99 will also have to be removed if your DSA is equipped with Option 3C.) Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-26 and 3-52).

☐ Step 13: Remove the platform hinge screw located at the rear of the platform.

☐ Step 14: Lift the platform by the two finger holes on the left side of the DSA, and then remove the platform from the DSA.

☐ Step 15: Remove the nine Torx drive screws that fasten the three interface connector receptacles to the chassis (Figure 3-19).

☐ Step 16: Remove the A1 Plug-in Interface board.

To replace the A1 Plug-in Interface board, perform the previous steps in the reverse order.

Note: *To replace the nine Torx drive screws into the A1 Plug-in Interface board's connector receptacles, start all of the nine screws after you have reinstalled the board into the chassis. Then tighten all nine Torx drive screws into the connector receptacles.*

When securing the platform to the DSA, ensure that there are not any cables covering the two hex spacer nuts below the platform. Before replacing the two Torx drive screws on the top of the platform, ensure that the screw holes are clear.

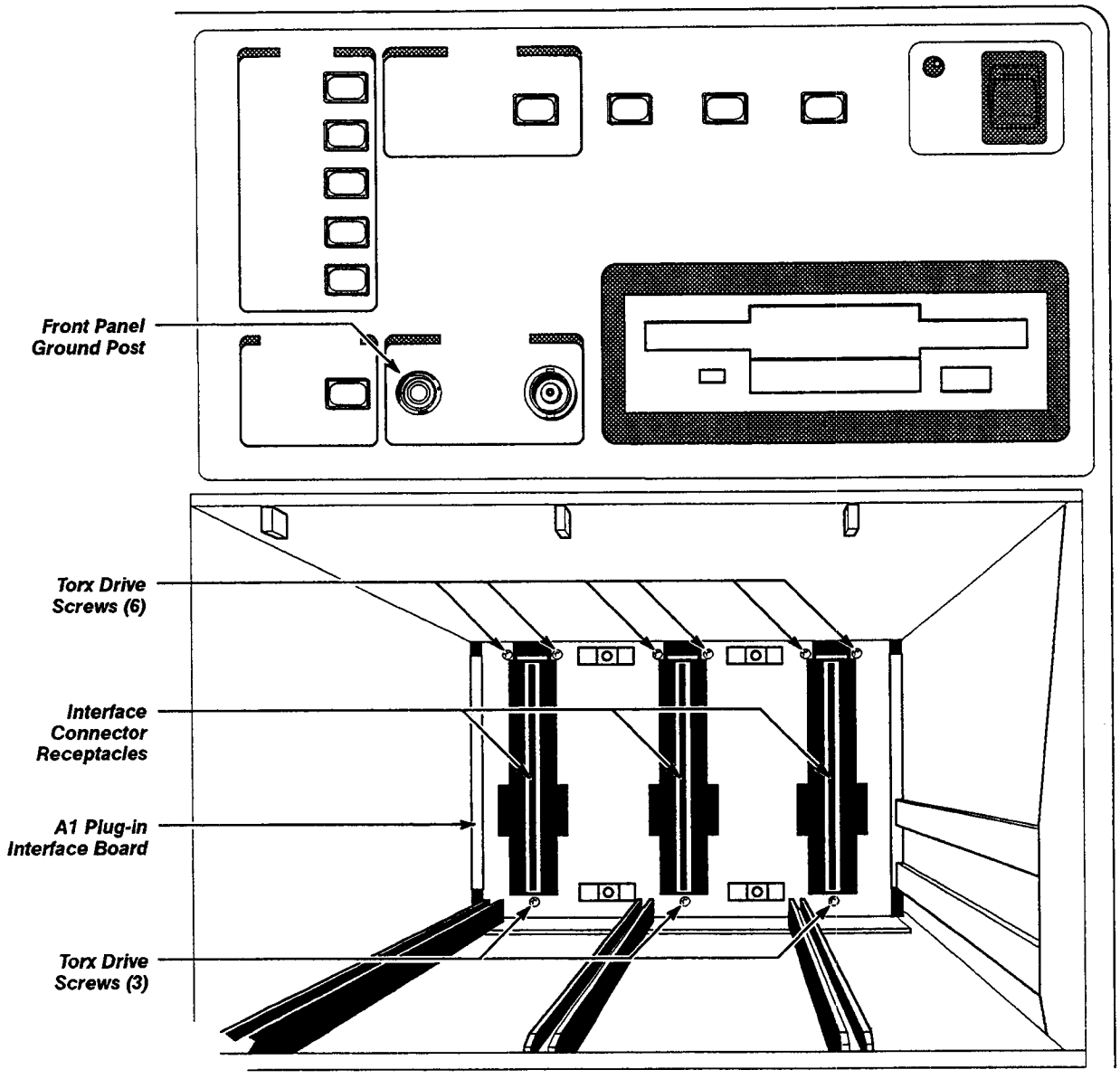


Figure 3-19 — Plug-in Interface Connector Receptacles Torx Drive Screw Locations

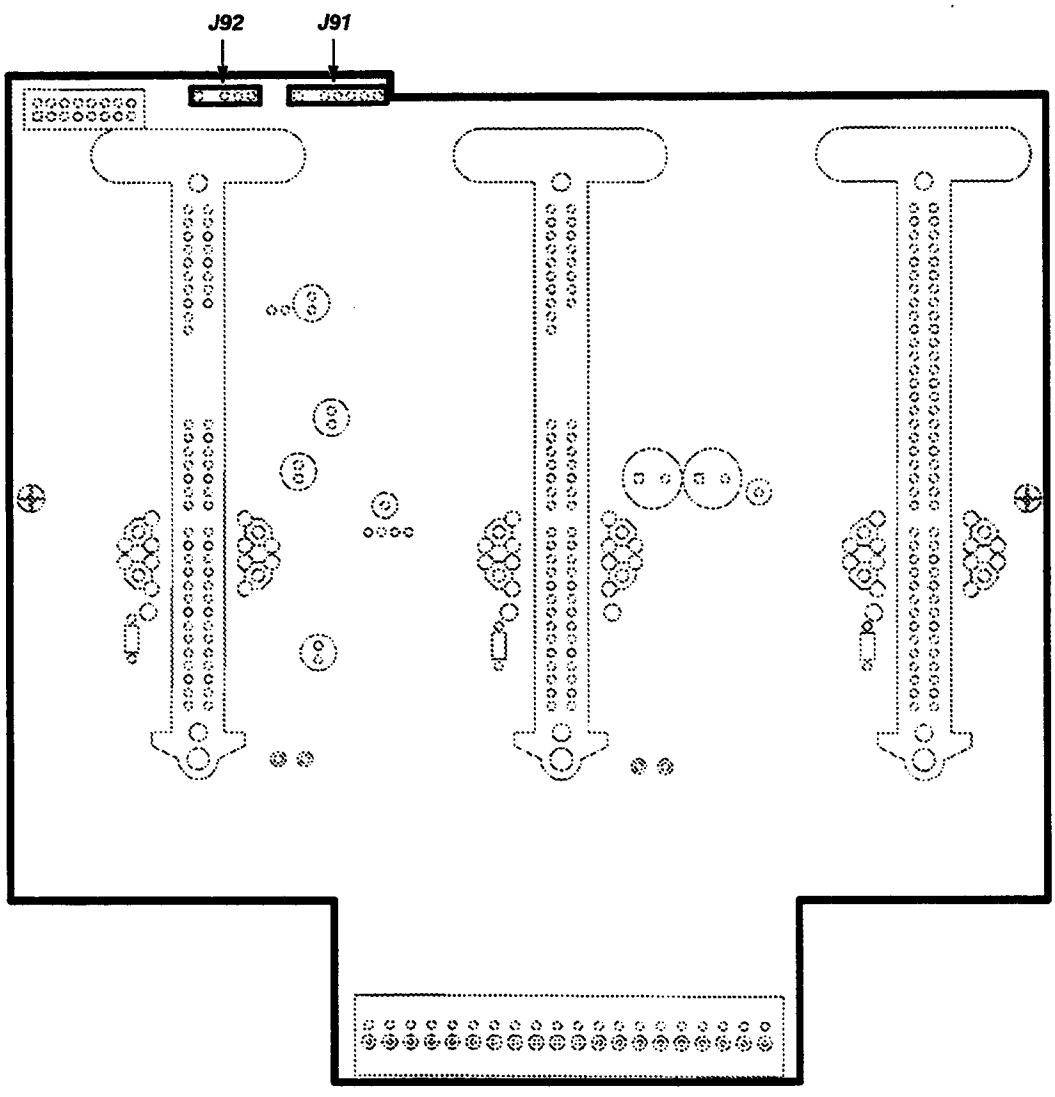


***Figure 3-20** — Removing/Replacing the A1 Plug-in Interface Board*

A4 Regulator Board

Removal and replacement steps are listed below.

☐ Step 1: Position the DSA so that it's right side is facing upwards.

☐ Step 2: Disconnect connectors J61, J62, J65, J76, J93, J94, J96, and J99. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figure 3-21).

☐ Step 3: Remove the four Torx drive screws that secure the A4 Regulator board to the chassis of the DSA (Figure 3-21).

Note: *The A4 Regulator board is now unfastened from the chassis. However, this board remains secured to the A1 Plug-in Interface board through interconnecting pins.*

☐ Step 4: Pull the A4 Regulator board to the rear of the DSA to disconnect the A4 Regulator board from the J95 connector pins.

To replace the A4 Regulator board, perform the previous steps in the reverse order.

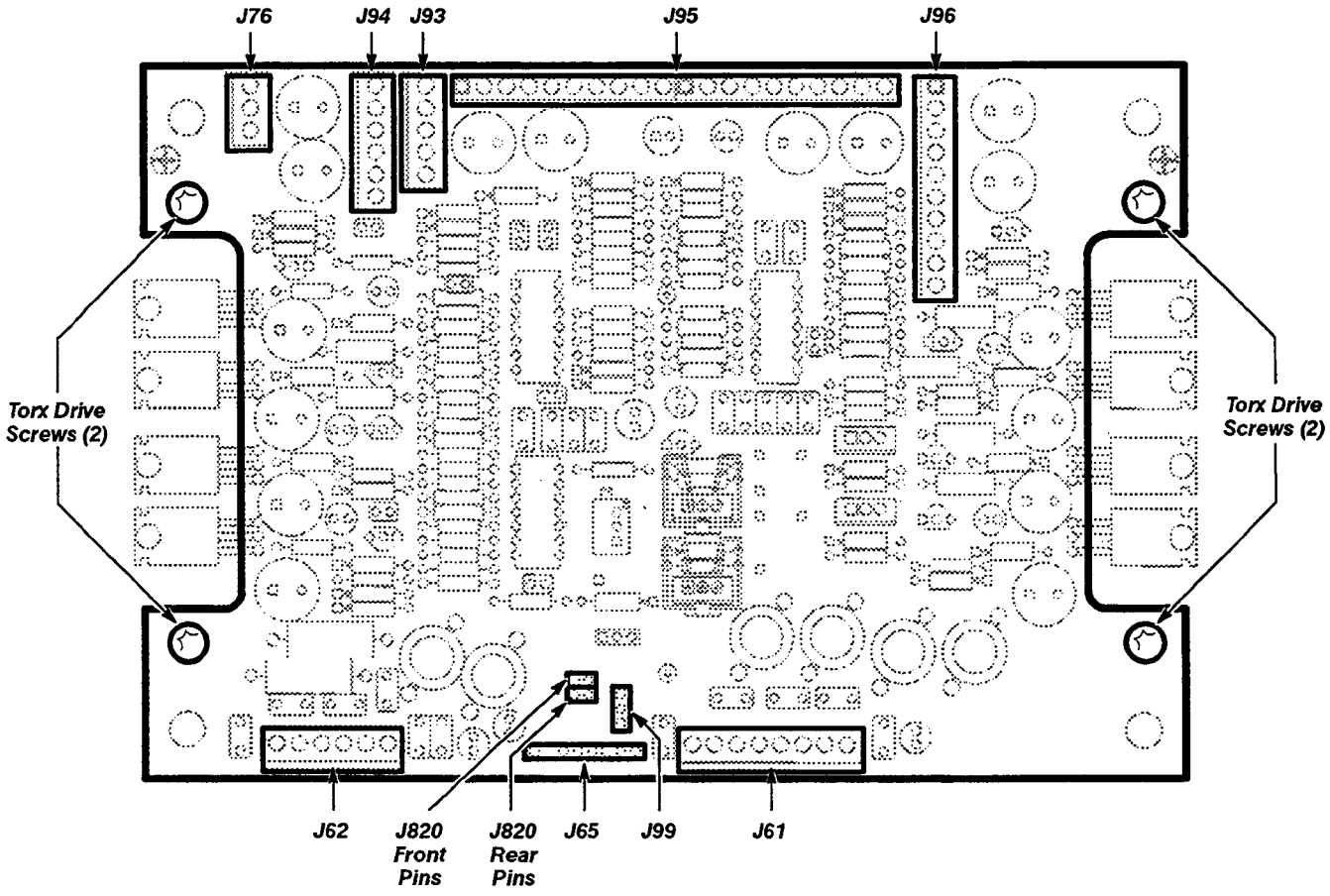


***Figure 3-21** — Removing/Replacing the A4 Regulator Board*

A5 Calibrator Board

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the connector nut from the front panel ground post (Figure 3-19).
- ☐ Step 2: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 3: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 4: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).

  Note: *Always support the platform with the support rod when the platform is in the raised position.*

- ☐ Step 5: Remove the two ¼-inch nuts that secure the front panel calibrator connectors to the chassis (Figure 3-22).
- ☐ Step 6: Remove connectors J28, J29, J92 and J93 from the A5 Calibrator board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figure 3-23).

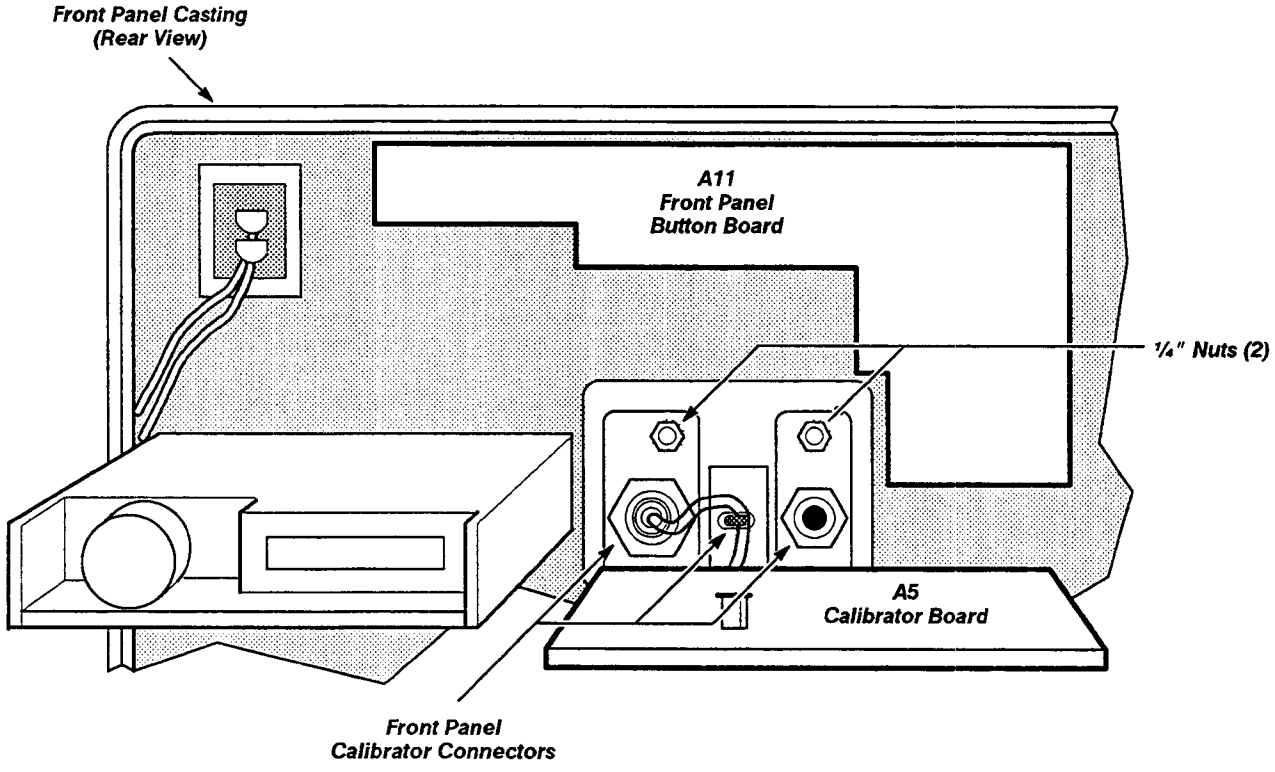


Figure 3-22 — *Removing/Replacing the Front Panel Calibrator's ¼-Inch Nuts*

☐ Step 7: Remove the six Torx drive screws that secure the A5 Calibrator board to the chassis (Figure 3-23).

☐ Step 8: Remove the A5 Calibrator board.

Note: *To remove the A5 Calibrator board, slide the board towards the rear of the DSA until the tabs on the side of the chassis are loose. Then, carefully maneuver the board out of the chassis.*

To replace the A5 Calibrator board, perform the previous steps in the reverse order.

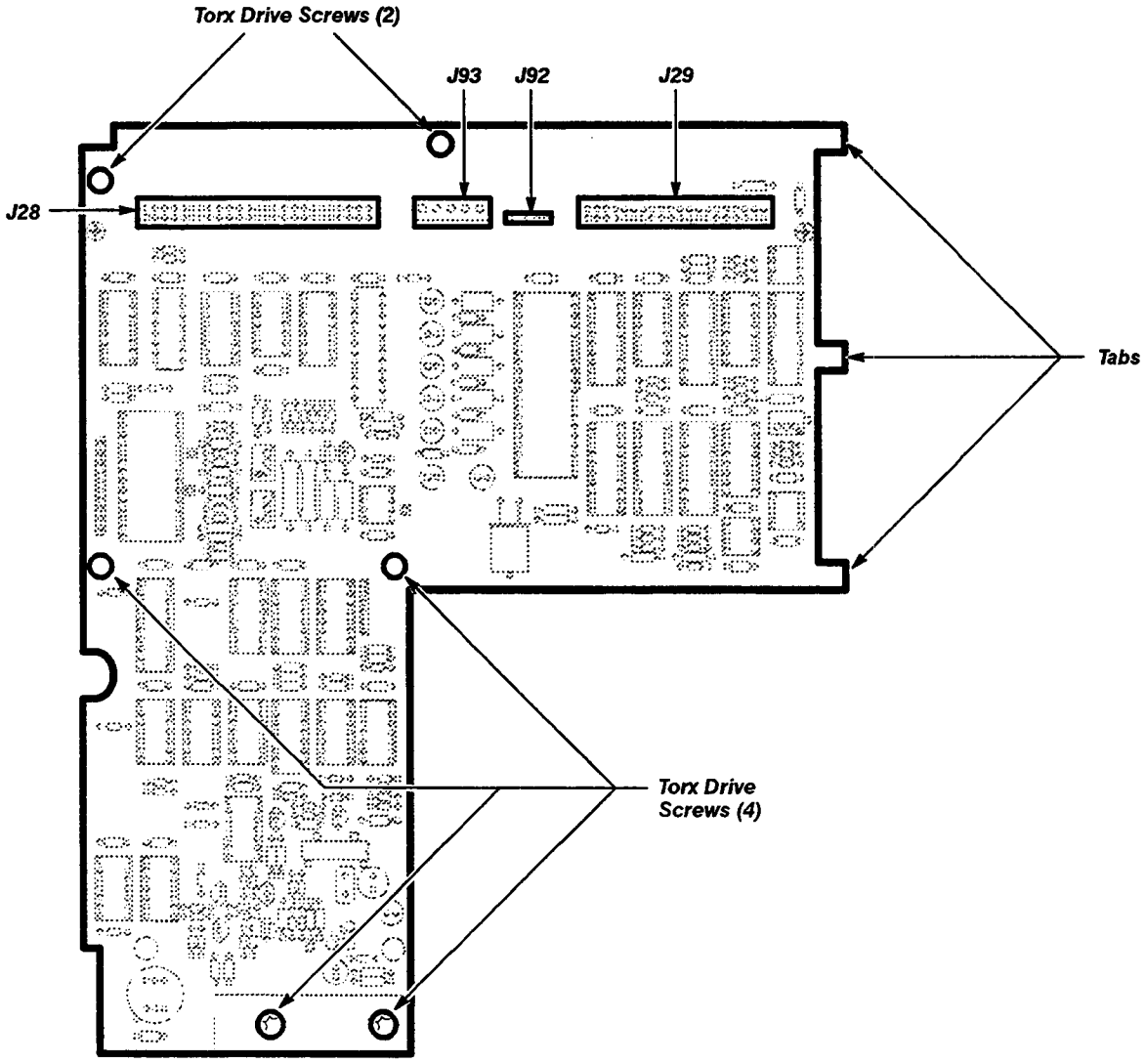


Figure 3-23 — *Removing/Replacing the A5 Calibrator Board*

A6 Lower Acquisition Board

Removal and replacement steps are listed below.

☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).

☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).

☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).

Note: *Always support the platform with the support rod when the platform is in the raised position.*

☐ Step 4: Disconnect connectors J29, J68, and J96 from the A6 Lower Acquisition board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-24 and 3-52).

☐ Step 5: Disconnect Peltola connectors J1, J2, J3, J4, J5, J6, J9, and J10 from the A6 Lower Acquisition board. Tag all Peltola connectors with their correct J number so they can be correctly replaced (Figure 3-24).

☐ Step 6: Remove the eighteen Torx drive screws that secure the A6 Lower Acquisition board (Figure 3-24).

Note: *The A6 Lower Acquisition board is now unfastened from the chassis. However, it remains secured to the A7 Upper Acquisition board through interconnecting pins.*

☐ Step 7: Grasp the A6 Lower Acquisition board near the interconnecting pins P43 and P44 (at the bottom of the platform). Gently lift the board away from the platform to disconnect the P43 and P44 connectors (Figure 3-24).

☐ Step 8: Grasp the A6 Lower Acquisition board near the P41 and P42 interconnecting pins. Ensure that you have a firm grip on the board when disconnecting the interconnecting pins. Gently lift the board away from the platform to disconnect the P41 and P42 connectors (Figure 3-24).

CAUTION *Once the P41 and P42 interconnecting pins are loose, the A6 Lower Acquisition board is completely detached from the DSA.*

☐ Step 9: Remove the A6 Lower Acquisition board.

To replace the A6 Lower Acquisition board, perform the previous steps in the reverse order.

Note: *To reconnect the P41, P42, P43, and P44 interconnecting pins on the A6 Lower Acquisition board, align all of the interconnecting pins with their respective connectors, and then press the pins and their connectors together.*

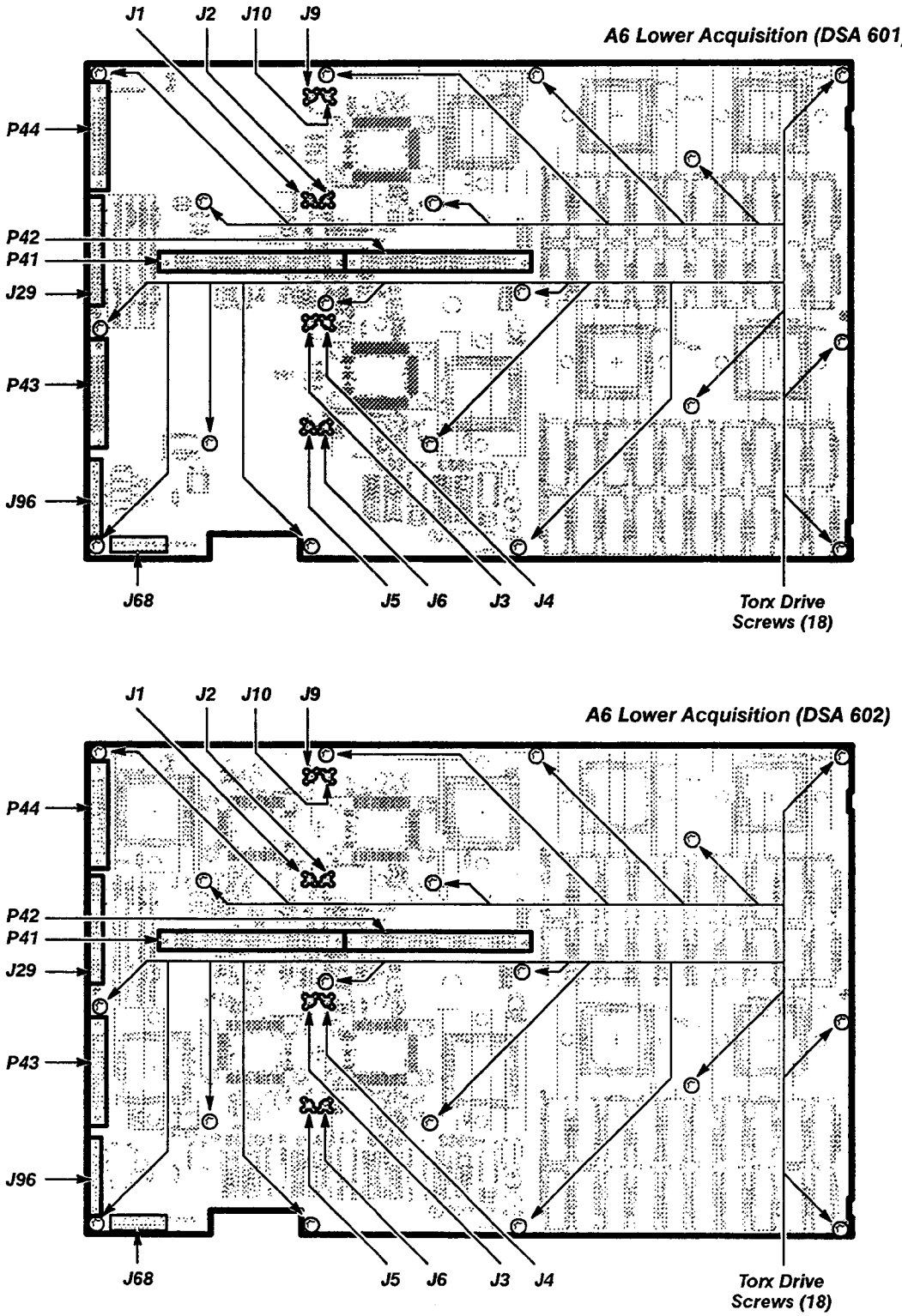


Figure 3-24 — *Removing/Replacing the A6 Lower Acquisition Board*

A7 Upper Acquisition Board

Removal and replacement steps are listed below.

☐ Step 1: Disconnect connectors J67 and J91 from the A7 Upper Acquisition board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figure 3-25).

☐ Step 2: Disconnect Peltola connectors J7, J8, J11 and J12 from the A7 Upper Acquisition board. Tag all Peltola connectors with their correct J numbers so they can be correctly replaced (Figure 3-25).

☐ Step 3: Remove the sixteen Torx drive screws that secure the A7 Upper Acquisition board to the platform (Figure 3-25).

☐ Step 4: Remove the four Torx drive screws that secure the Trigger ICs to the heat sink below the A7 Upper Acquisition board (Figure 3-25).

Note: *The A7 Upper Acquisition board is now unfastened from the platform. However, it remains secured to the A6 Lower Acquisition board and the A8 Waveform Processor (Signal Processor) board through interconnecting pins.*

☐ Step 5: Gently lift the A7 Upper Acquisition board away from the platform to disconnect the J41, J42, J43, and J44 connectors which hold the upper and lower Acquisition boards together.

☐ Step 6: Once the J41, J42, J43, and J44 connectors are disconnected, pull the A7 Upper Acquisition board toward the rear of the DSA to disconnect the J45 and J46 connectors (Figure 3-26).

☐ Step 7: Remove the A7 Upper Acquisition board.

To replace the A7 Upper Acquisition board, perform the previous steps in the reverse order.

Note: *When replacing the A7 Upper Acquisition board, do not over tighten the four screws that secure the heat sink to the A7 Upper Acquisition board.*

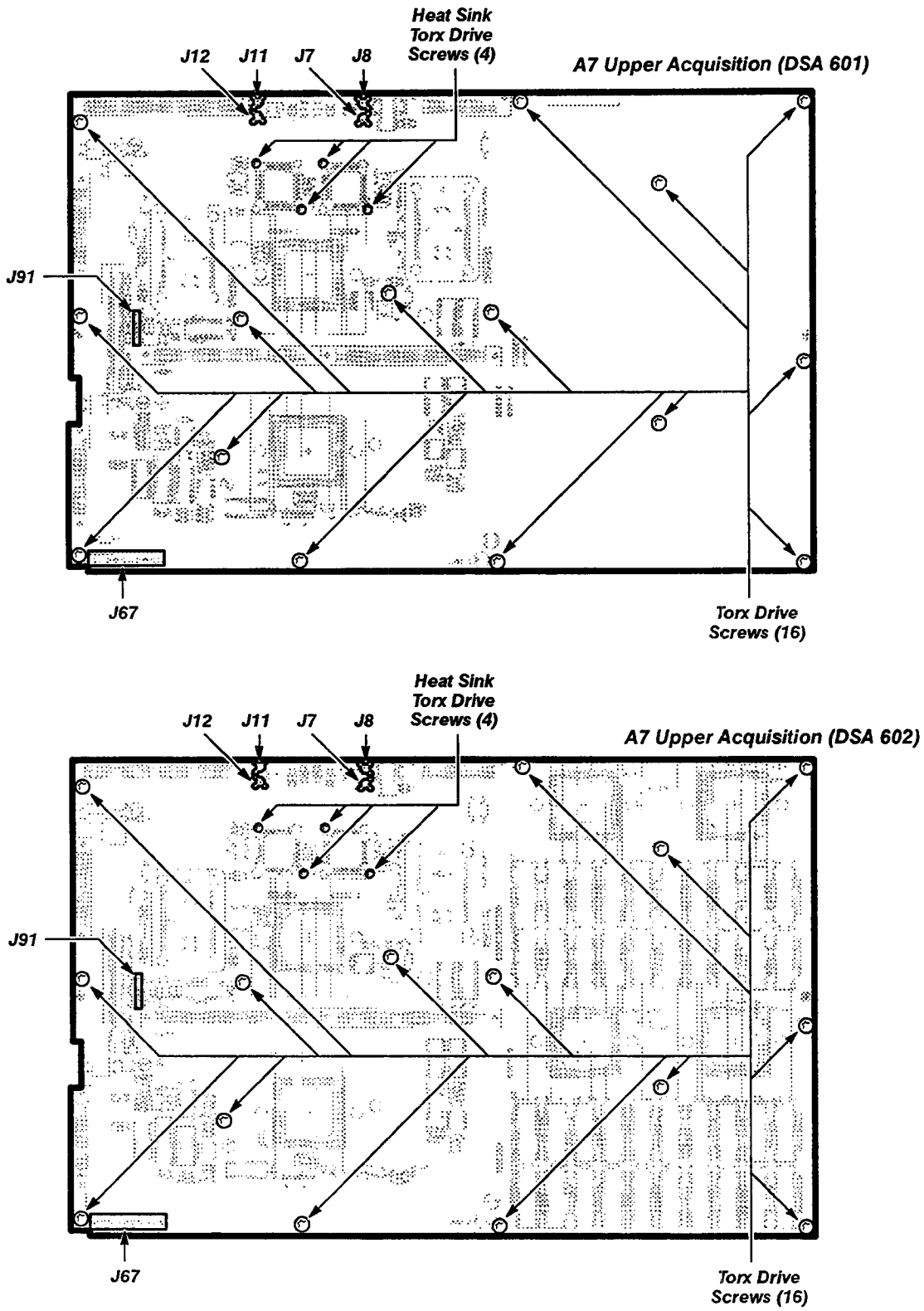


Figure 3-25 — *Removing/Replacing the A7 Upper Acquisition Board*

A8 Waveform Processor or A8 Signal Processor Board

Removal and replacement steps are listed below. The A8 Signal Processor board replaces the standard A8 Waveform Processor board if your DSA is equipped with Option 3C.

☐ Step 1: Disconnect connectors J47, J48, and J66 from the A8 Waveform Processor (Signal Processor) board. If your DSA is equipped with Option 3C, you will also have to disconnect connector 49. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-26 and 3-52).

☐ Step 2: Remove the eleven Torx drive screws that fasten the A8 Waveform Processor (Signal Processor) board to the platform (Figure 3-26).

☐ Step 3: Pull the A8 Waveform Processor (Signal Processor) board towards the front of the DSA to disconnect the P45 and P46 interconnecting pins.

☐ Step 4: Remove the A8 Waveform Processor (Signal Processor) board.

To replace the A8 Waveform Processor (Signal Process) board, perform the previous steps in the reverse order.

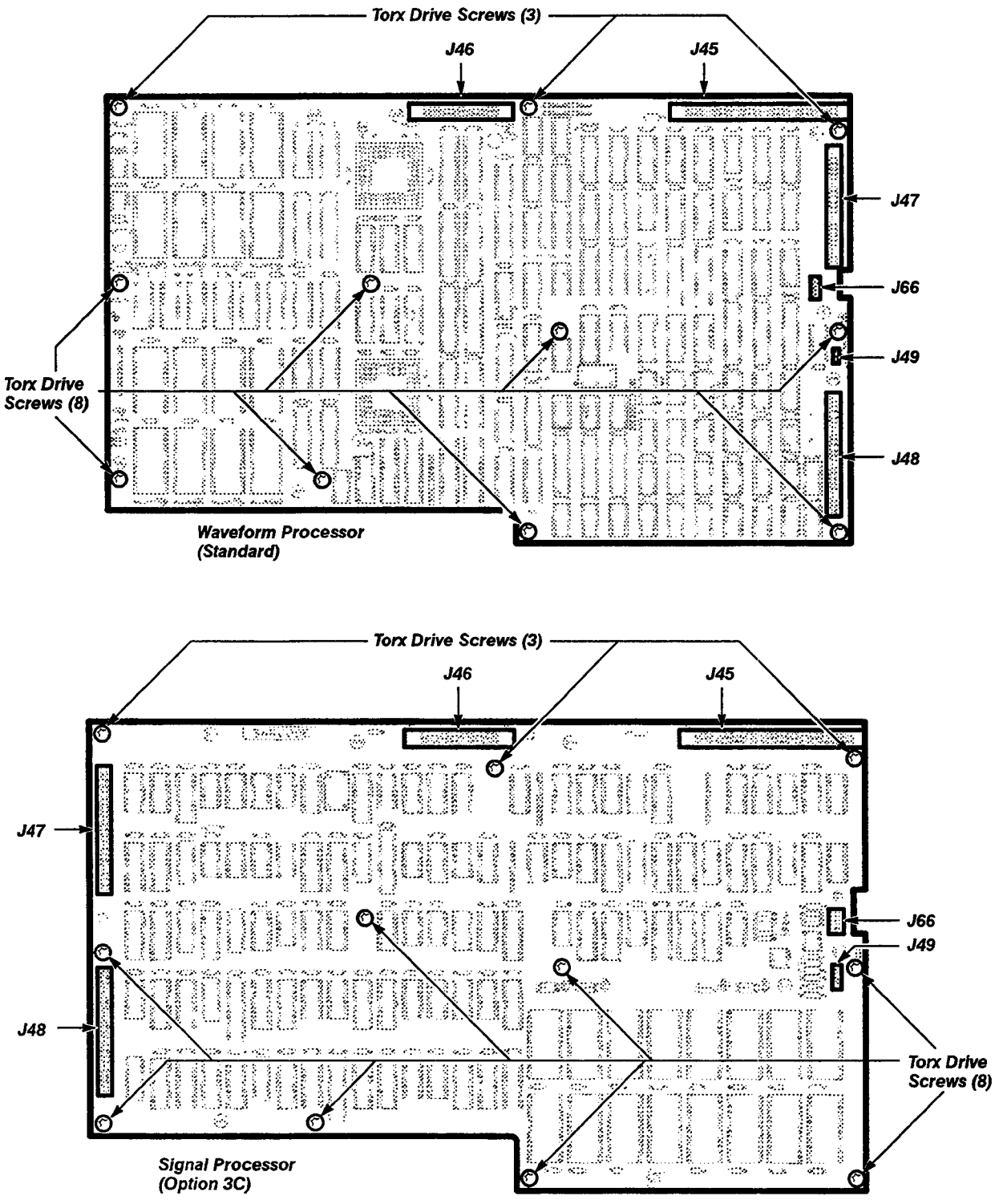


Figure 3-26 — *Removing/Replacing the A8 Waveform Processor (Signal Processor) Board*

A9 Touch Panel Assembly

Removal and replacement steps are listed below.

- ☐ Step 1: Set the DSA on its right side.
- ☐ Step 2: Remove the two screws that secure the A9 Touch Panel Assembly to the bottom of the front casting (Figure 3-27).
- ☐ Step 3: Remove the two Torx drive screws that secure the A9 Touch Panel Assembly to the top of the front casting (Figure 3-27).
- ☐ Step 4: Slowly pull the A9 Touch Panel Assembly away from the DSA until you have access to the J73 connector (Figure 3-28).

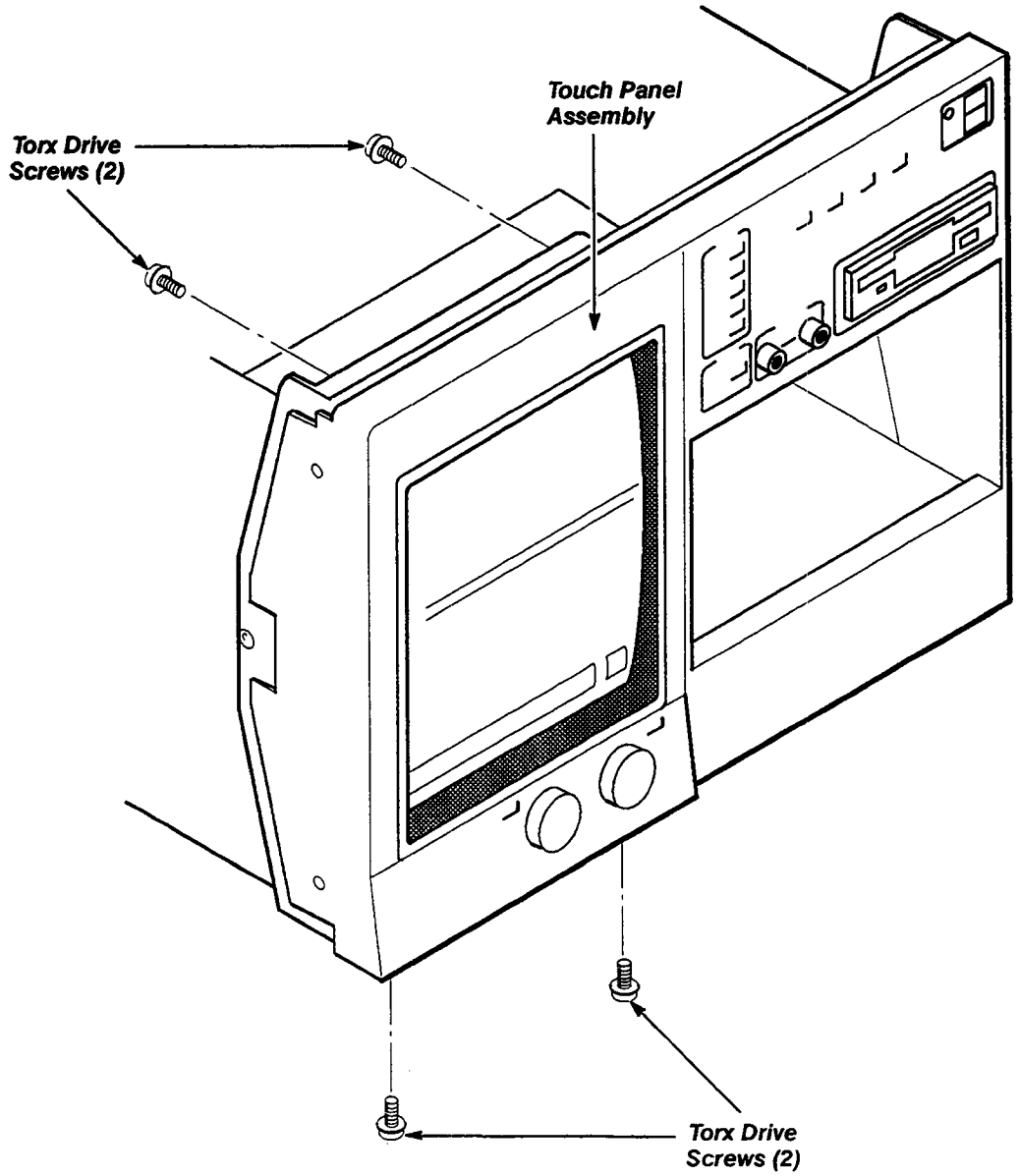


Figure 3-27 — Removing/Replacing the A9 Touch Panel Assembly Torx Drive Screws

☐ Step 5: Disconnect connector J73 from the A9 Touch Panel Assembly. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-28 and 3-52).

☐ Step 6: Remove the A9 Touch Panel Assembly

To replace the A9 Touch Panel Assembly, perform the previous steps in the reverse order.

Note: *Ensure that the Degauss coils are positioned forward and against the CRT, so that the A9 Touch Panel Assembly can be easily replaced.*

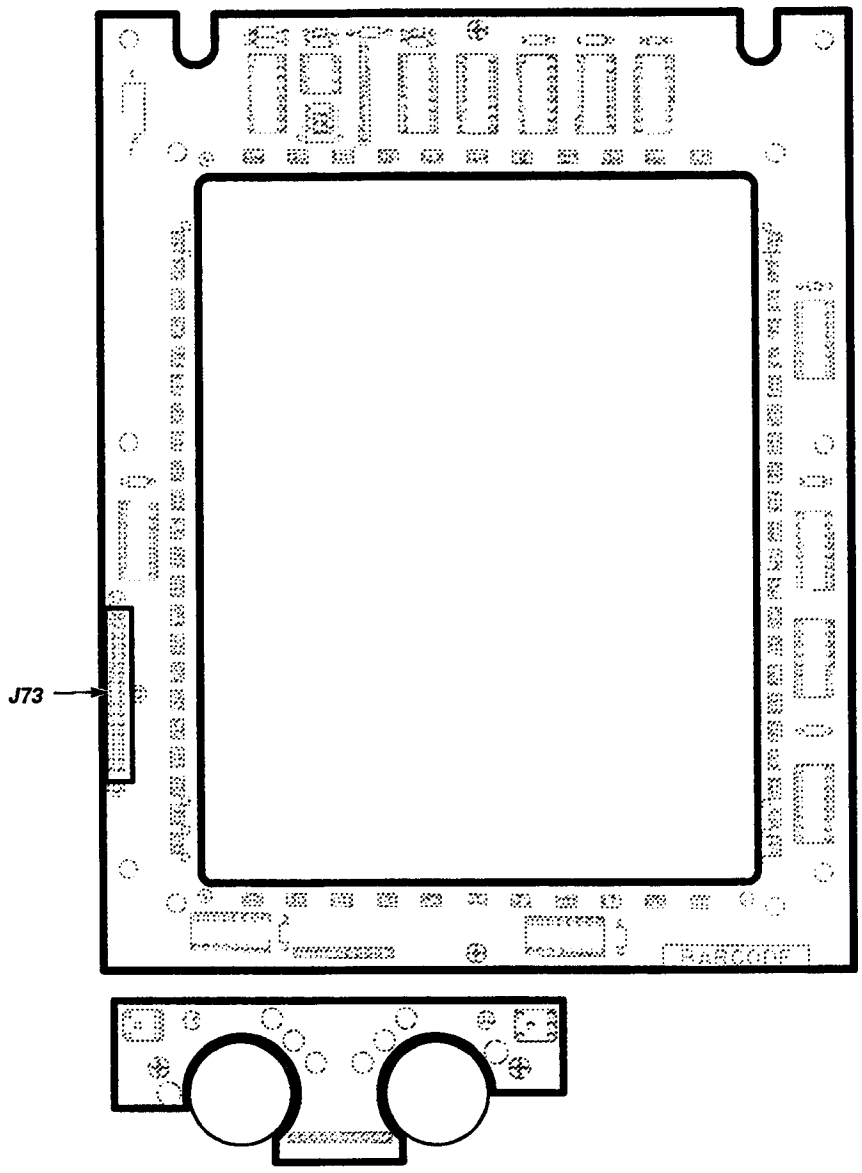


***Figure 3-28** — Removing/Replacing the A9 Touch Panel Assembly*

A10 Front Panel Control Board

Removal and replacement steps are listed below.

☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).

☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).

☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).

Note: *Always support the platform with the support rod when the platform is in the raised position.*

☐ Step 4: Remove the ten Torx drive screws that secure the CRT shield to the chassis (Figure 3-10).

Note: *When replacing the A10 Front Panel Control board, replace the rear-most Torx drive screw first, and then the front-most Torx drive screw.*

☐ Step 5: Push the CRT shield towards the rear of the DSA, and then lift the CRT shield out of the chassis (Figure 3-11).

☐ Step 6: Remove the two Torx drive screws that secure the A10 Front Panel Control board to the chassis (Figure 3-29).

Note: *To remove the two Torx drive screws, use a T10 Torx screwdriver tip with a ¼-inch wrench. Take care not to drop the Torx tip down in the bottom of the chassis.*

☐ Step 7: While holding the A10 Front Panel Control board, disconnect connectors J72, J75, and J73. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figure 3-29).

Note: *Connector J73 may be difficult to disconnect. Do not use a metal tool to disconnect connector J73, and take care not to damage the CRT when you disconnect the connector.*

☐ Step 8: Lift the A10 Front Panel Control board out of the plastic guides at the bottom of the board.

☐ Step 9: Remove the A10 Front Panel Control board.

To replace the A10 Front Panel Control board, perform the previous steps in the reverse order.

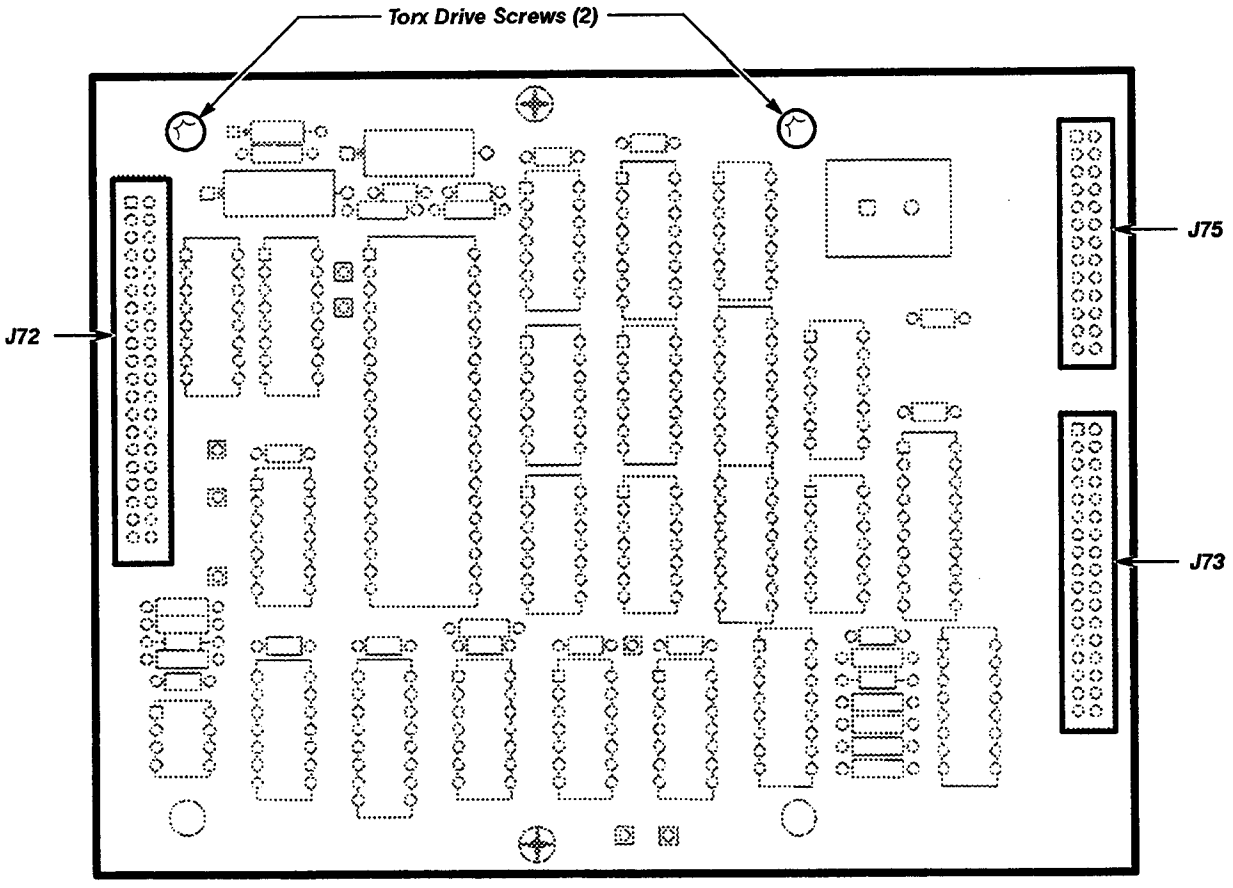


Figure 3-29 — Removing/Replacing the A10 Front Panel Control Board

A11 Front Panel Button Board

Removal and replacement steps are listed below.

☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).

☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).

☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).

Note: *Always support the platform with the support rod when the platform is in the raised position.*

☐ Step 4: Remove the ten Torx drive screws that secure the CRT shield to the chassis (Figure 3-10).

☐ Step 5: Push the CRT shield toward the rear of the DSA, and then lift the CRT shield out of the chassis.

☐ Step 6: Disconnect the dual-pin connector J71 from the A11 Front Panel Button board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-30 and 3-52).

☐ Step 7: Disconnect connector J75 from the A10 Front Panel Control board, and then feed the connector through the CRT chassis. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-29 and 3-52).

☐ Step 8: Remove the seven Torx drive screws that secure the A11 Front Panel Button board to the chassis (Figure 3-30).

☐ Step 9: Remove the A11 Front Panel Button board.

To replace the A11 Front Panel Button board, perform the previous steps in the reverse order.

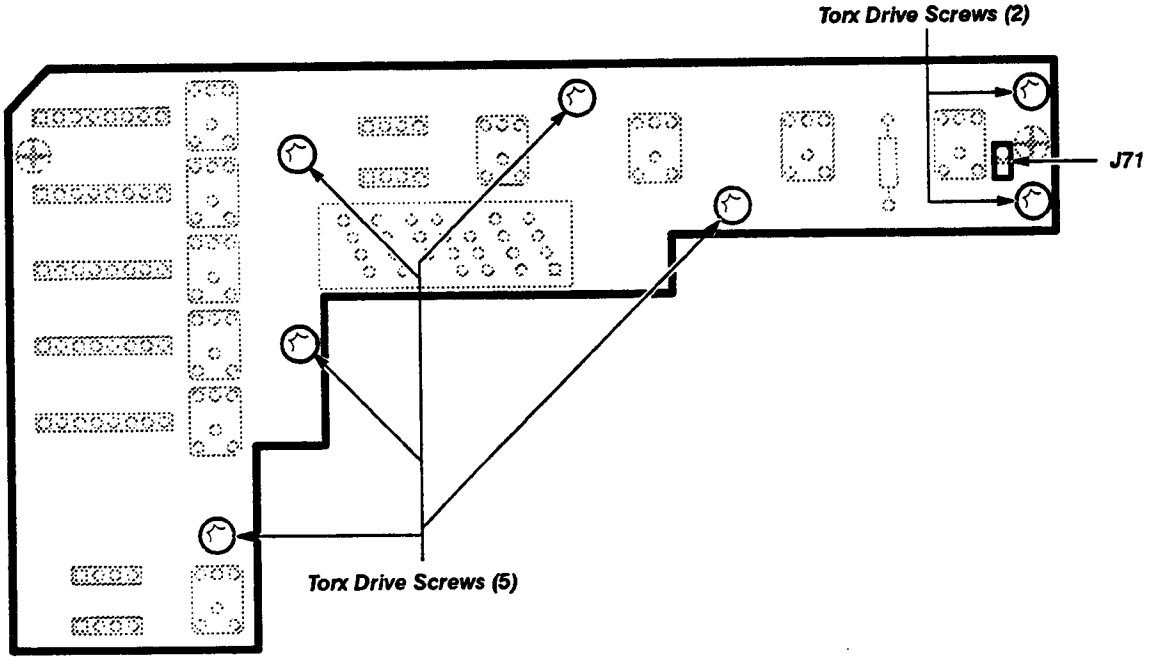


Figure 3-30 — Removing/Replacing the A11 Front Panel Button Board

A12 Rear Panel Assembly

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the connectors from the RS-232-C, the GPIB, and the PRINTER connector holders (Figure 3-31).
- ☐ Step 2: Remove the eight Torx drive screws from the outer edges of the rear panel connector plate (Figure 3-16).
- ☐ Step 3: Tilt the rear panel connector plate away from the DSA.
- ☐ Step 4: Remove connector J78 from the top of the A12 Rear Panel assembly. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-31 and 3-52).
- ☐ Step 5: Pull out the rear panel connector plate and the attached A12 Rear Panel Assembly.
- ☐ Step 6: Remove the black ground wire screw from the bottom of card cage chassis.

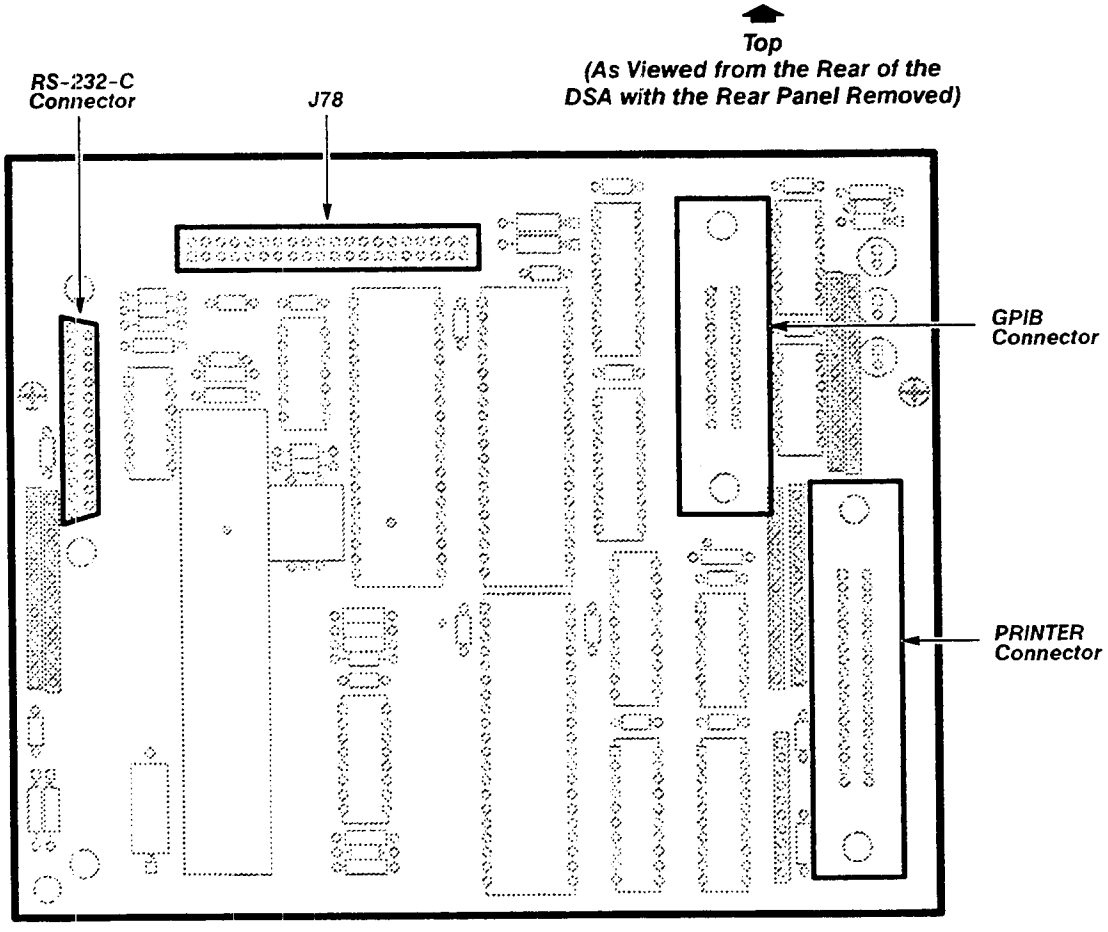


Figure 3-31 — Removing/Replacing the A12 Rear Panel Assembly

☐ Step 7: Remove and save the following items from the rear panel connector plate for replacing the A12 Rear Panel Assembly:

- two bail brackets, screws, and washers from the PRINTER connector
- two posts from the GPIB connector
- posts, lock washers, and flat washers from the RS-232-C connector(s)
- Torx drive screw and washer (at lower left, if present)

☐ Step 8: Remove the A12 Rear Panel Assembly from the rear panel connector plate.

CAUTION

The metal covers on the PRINTER and the GPIB connectors are loose. If the board is inverted, these covers will drop off.

To replace the A12 Rear Panel assembly, perform the previous steps in the reverse order.

Note: *Replacement of connector J78 will be easier if you replace the connector before reinstalling the rear panel connector plate on the rear of the chassis.*

A13 Mother Board

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).
- ☐ Step 4: Remove the two card cage screws located on the left side of the DSA to remove the two plastic card cage retainers from the top of the card cage (Figure 3-18).
- ☐ Step 5: Remove the A14 I/O, A15 MMU, A16 Display Controller, A17 Main Processor, A18 BB Memory, A19 Digitizer CPU and A20 Digitizer I/O boards (pages 3-84, 3-86, 3-88, 3-90, 3-92, 3-94, and 3-96, respectively).
  Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figure 3-52).

  Note: *Tag the interconnecting plugs and mark the board locations to ensure that the plugs can be correctly replaced as well.*

- ☐ Step 6: Remove connector J63B from the A13 Mother board (Figure 3-32).

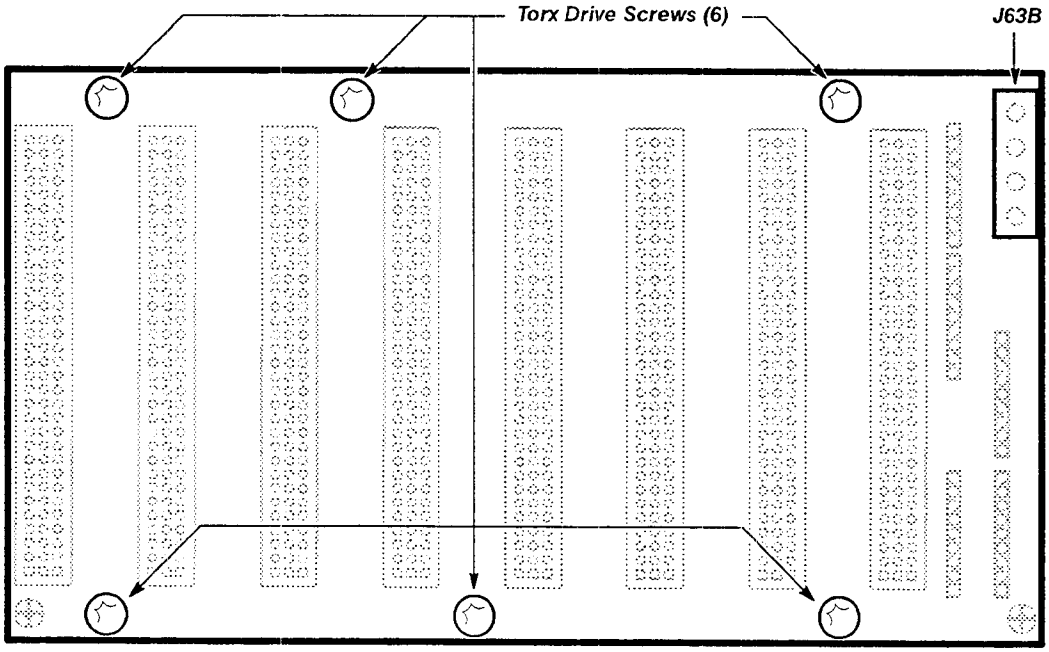


Figure 3-32 *— Removing/Replacing the A13 Mother Board*

☐ Step 7: Remove the six Torx drive screws that secure the A13 Mother board to the chassis (Figure 3-32).

☐ Step 8: Remove the A13 Mother board.

To replace the A13 Mother board, perform the previous steps in the reverse order.

CAUTION

Take care not to pinch the wires along the inside edge of the card cage while replacing this board.

A14 Input/Output (I/O) Board

Removal and replacement steps are listed below.

☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).

☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).

☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).

☐ Step 4: Remove the two card cage retainer screws located on the left side of the DSA to remove the two plastic card cage retainers from the top of the card cage (Figure 3-18).

☐ Step 5: Disconnect connectors J47 and J48 from the A19 Digitizer CPU board (Figure 3-38).

Note: *Note the position of all multi-pin connector's index triangles on the connectors you remove to ensure that you can correctly replace these connectors.*

☐ Step 6: Disconnect connectors J28 and J83 from the A29 Digitizer I/O board (Figure 3-39).

☐ Step 7: Disconnect connectors J72, J77, J78, and J90 from the A14 I/O board (Figure 3-33).

☐ Step 8: Lift the white, hinged tab at the upper, front edge of the board. Pull the tab upward until the A14 I/O board separates from the A13 Mother board.

☐ Step 9: Remove the A14 I/O board.

WARNING

A lithium battery (BT130) is mounted on the A14 I/O board. ***This battery requires special handling for disposal.*** *Refer to the instructions on Lithium Battery Disposal and First Aid on page 3-42. Care is required when placing the A14 I/O board on metal surfaces. If some IC or battery leads are shorted the battery may discharge or overheat and vent. (Plastic standoffs are used to prevent shorts.)*

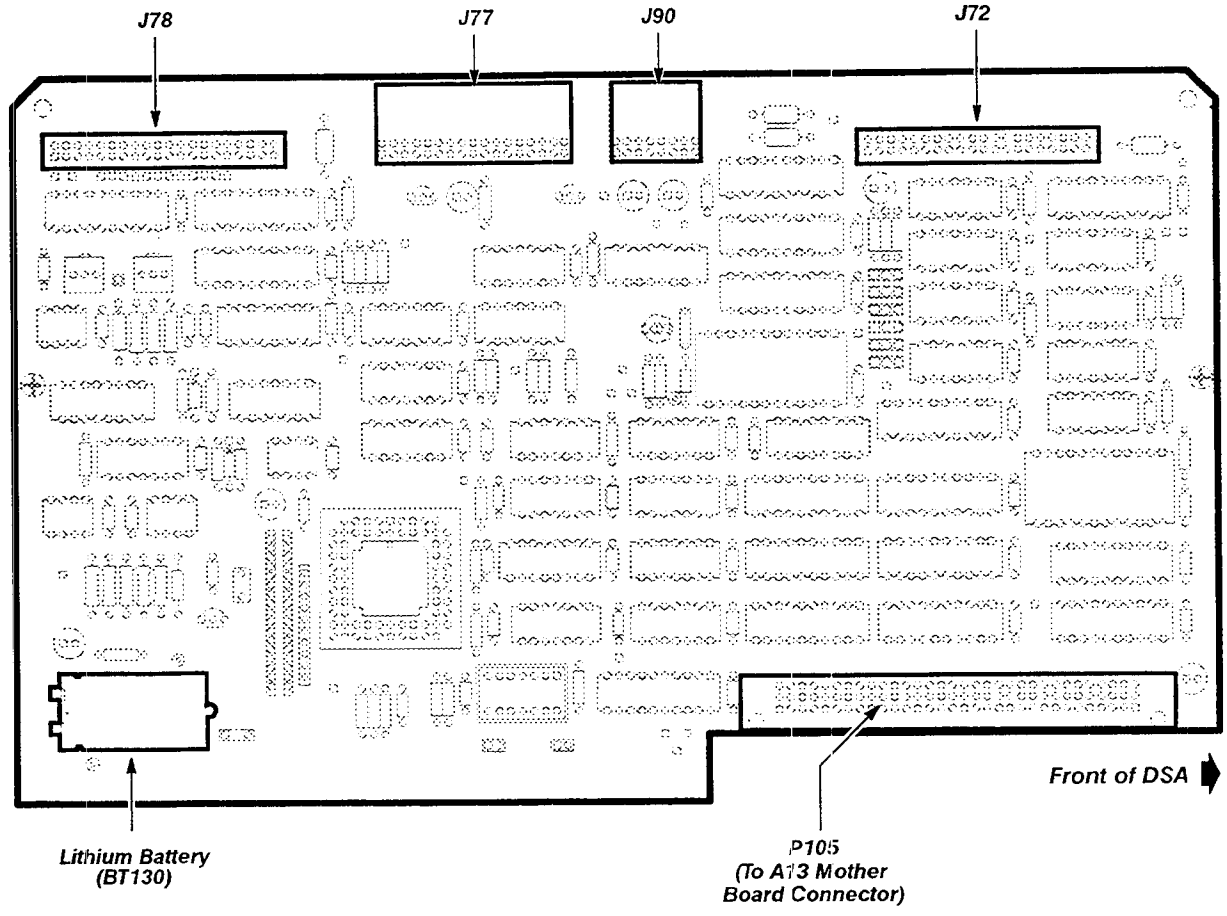


Figure 3-33 -- Removing/Replacing the A14 I/O Board

To replace the A14 I/O board, perform the previous steps in the reverse order.

Note: *Insert the board edges into the plastic guides at each end of the card cage. Lower the board into position.*

Ensure that connector P105 on the A14 I/O board is seated on the A13 Mother board connector. Push down firmly on the A14 I/O board to connect this connector to the A13 Mother board.

A15 Memory Manager Unit (MMU) Board

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).
- ☐ Step 4: Remove the two card cage retainer screws located on the left side of the DSA to remove the two plastic card cage retainers from the top of the card cage (Figure 3-18).
- ☐ Step 5: Disconnect connectors J47 and J48 from the A19 Digitizer CPU board (Figure 3-38).

  Note: *Note the position of all multi-pin connector's index triangles on the connectors you remove to ensure that you can later correctly replace these connectors.*

- ☐ Step 6: Disconnect connector J28 from the A20 Digitizer I/O board (Figure 3-39).
- ☐ Step 7: Disconnect connectors J79 and J83 from the A15 MMU board (Figure 3-34).
- ☐ Step 8: Disconnect connectors J72 and J90 from the A14 I/O board (Figure 3-33).
- ☐ Step 9: Lift the white, hinged tabs at the front and rear edges of the A15 MMU board. Pull the tabs upward until the A15 MMU board separates from the A13 Mother board.
- ☐ Step 10: Remove the A15 MMU board.

To replace the A15 MMU board, perform the previous steps in the reverse order.

Note: *Insert the board edges into the plastic guides at each end of the card cage. Lower the board into position.*

Ensure that connector P101 on the A15 MMU board is seated onto the A13 Mother board connector. Push down firmly on the A15 MMU board to connect this connector to the A13 Mother board.

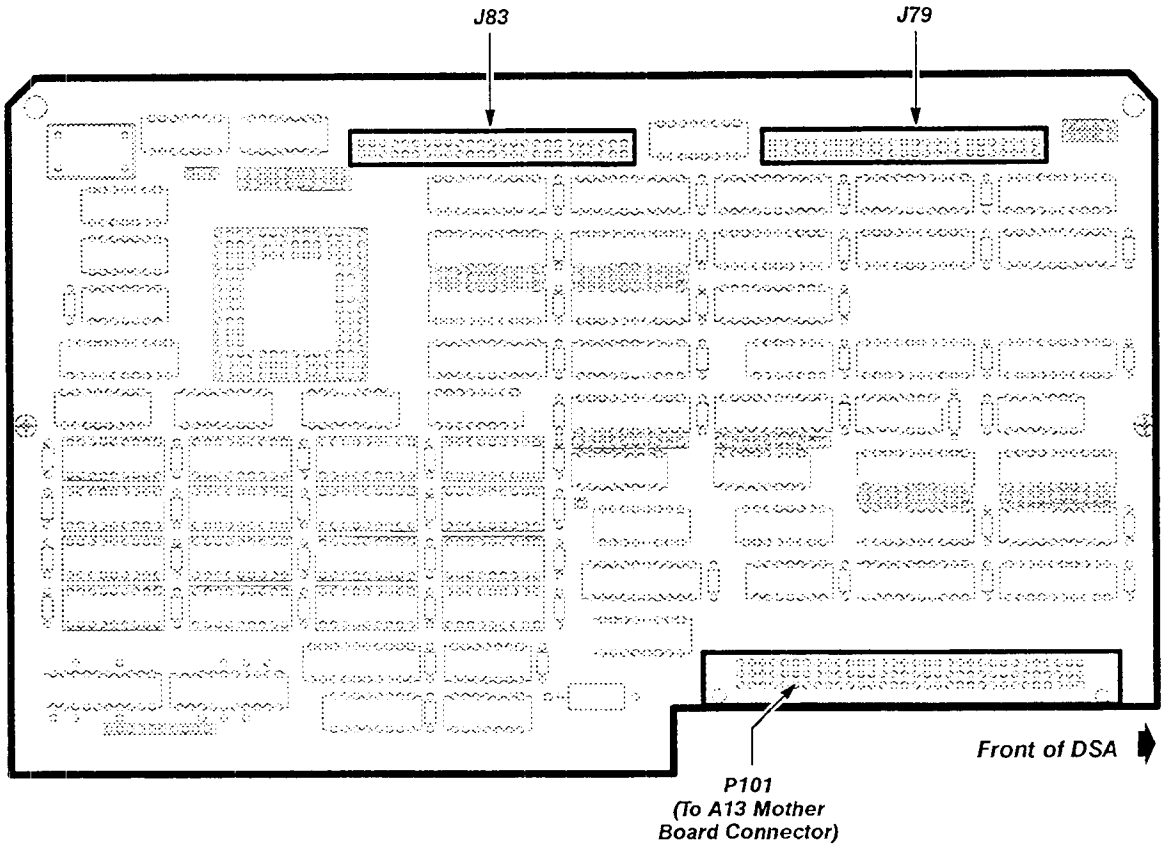


Figure 3-34 -- *Removing/Replacing the A15 MMU Board*

A16 Display Controller Board

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).
- ☐ Step 4: Remove the two card cage retainer screws located on the left side of the DSA to remove the two plastic card cage retainers from the top of the card cage (Figure 3-18).
- ☐ Step 5: Disconnect connectors J47 and J48 from the A19 Digitizer CPU board (Figure 3-38).

  Note: *Note the position of all multi-pin connector's index triangles on the connectors you remove to ensure that you can later correctly replace these connectors.*

- ☐ Step 6: Disconnect connector J28 from the A20 Digitizer I/O board (Figure 3-39).
- ☐ Step 7: Disconnect connectors J53, J54, and J79 from the A16 Display Controller board (Figure 3-35).
- ☐ Step 8: Disconnect connectors J72 and J90 from the A14 I/O board (Figure 3-33).
- ☐ Step 9: Lift the white, hinged tabs at the front and rear edges of the board. Pull the tabs upward until the A16 Display Controller board separates from the A13 Mother board.
- ☐ Step 10: Remove the A16 Display Controller board.

ATTENTION

If an FRU (field replaceable unit) being replaced contains firmware, the ***firmware must be removed from the old FRU and installed on the new FRU****. The replacement assemblies (FRUs) will not have any firmware installed from the factory or Module Repair station.*

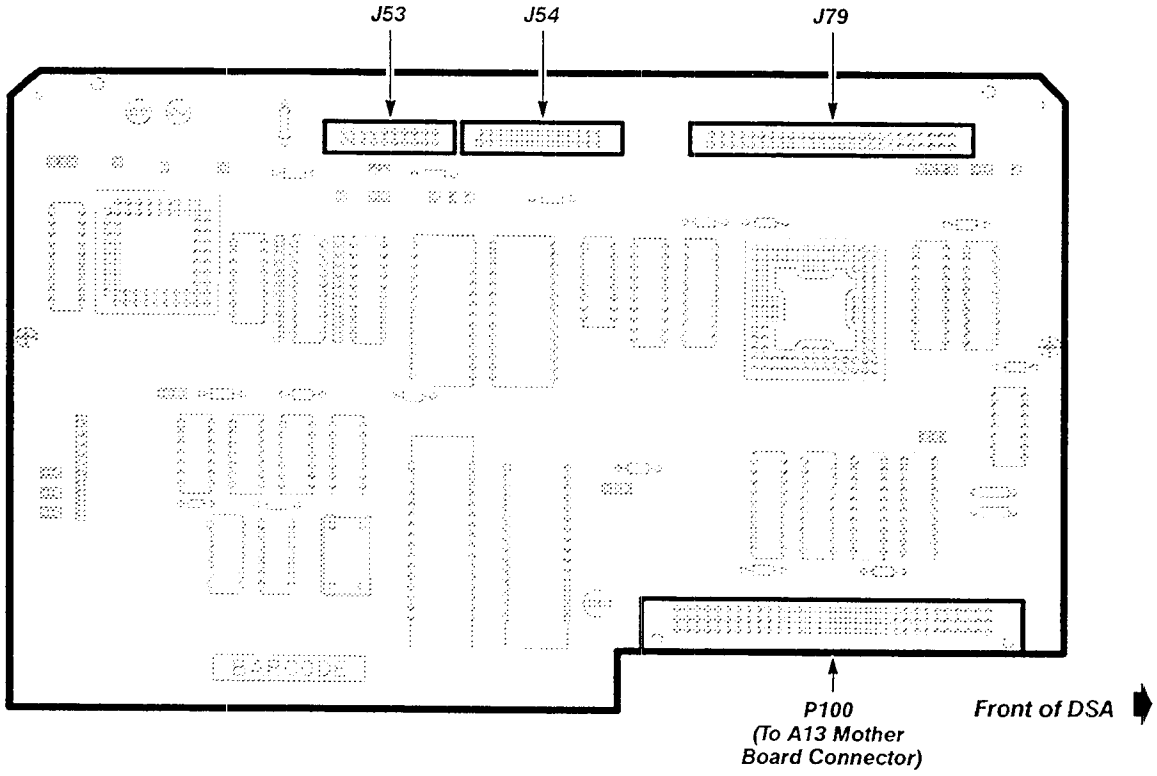


Figure 3-35 — Removing/Replacing the A16 Display Controller Board

To replace the A16 Display Controller board, perform the previous steps in the reverse order.

Note: *Insert the board edges into the plastic guides at each end of the card cage. Lower the board into position.*

Ensure that connector P100 on the A16 Display Controller board is seated onto the A13 Mother board connector. Push down firmly on the A16 Display Controller board to connect this connector to the A13 Mother board.

A17 Main Processor Board

Removal and replacement steps are listed below. If the board is being replaced, the firmware must be removed from the old board and the unit identification must be reprogrammed. A procedure to reprogram the unit identification follows the replacement procedure.

- ☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).
- ☐ Step 4: Remove the two card cage retainer screws located on the left side of the DSA to remove the two plastic card cage retainers from the top of the card cage (Figure 3-18).
- ☐ Step 5: Disconnect connectors J47 and J48 from the A19 Digitizer CPU board (Figure 3-38).

Note: *Note the position of all multi-pin connector's index triangles on the connectors you remove to ensure that you can later correctly replace these connectors.*

- ☐ Step 6: Disconnect connectors J28 and J83 from the A20 Digitizer I/O board (Figure 3-39).
- ☐ Step 7: Disconnect connectors J72, J78 and J90 from the A14 I/O board (Figure 3-33).
- ☐ Step 8: Disconnect connector J77 from the A17 Main Processor board (Figure 3-36).
- ☐ Step 9: Lift the white, hinged tabs at the front and rear edges of the board. Pull the tabs upward until the A17 Main Processor board separates from the A13 Mother board.
- ☐ Step 10: Remove the A17 Main Processor board.

WARNING

A lithium battery (BT160) is mounted on the A17 Main Processor board. ***The battery requires special handling for disposal.*** *Refer to the instructions on Lithium Battery Disposal and First Aid on page 3-42. Care is required when placing the A17 Main Processor board on metal surfaces. If some IC or battery leads are shorted, the battery may discharge or overheat and vent. (Plastic standoffs are used to prevent shorts.)*

ATTENTION *If an FRU (field replaceable unit) being replaced contains firmware, the* ***firmware must be removed from the old FRU and installed on the new FRU****. The replacement assemblies (FRUs) will not have any firmware installed from the factory or Module Repair station. The unit identification number is lost whenever the A17 MPU board is removed. To reset this number, refer to* ***Setting and Verifying the DSA unit identification number*** *on page 3-120.*

To replace the A17 Main Processor board, perform the previous steps in the reverse order.

Note: *Insert the board edges into the plastic guides at each end of the card cage. Lower the board into position.*

Ensure that connector P104 on the A17 Main Processor board is seated on the A13 Mother board connector. Push down firmly on the A17 Main Processor board to connect this connector to the A13 Mother board.

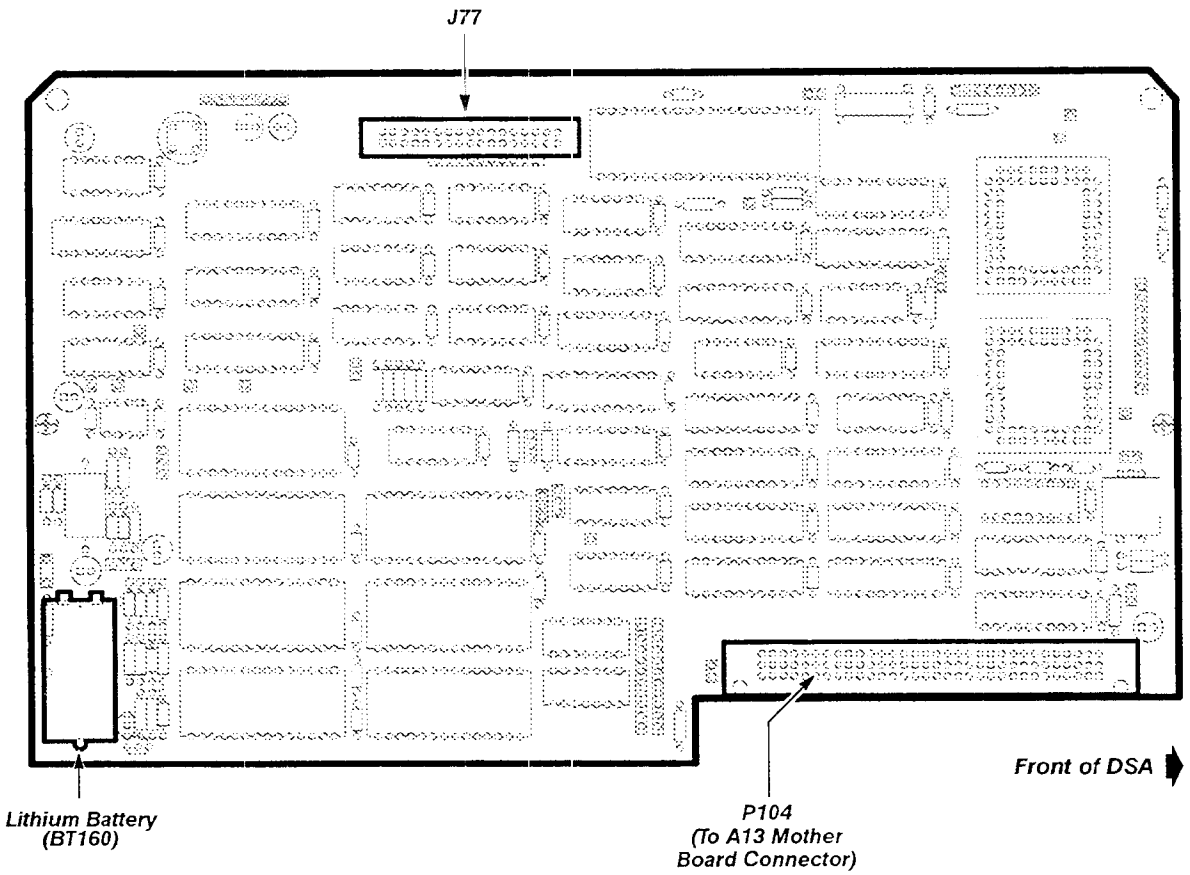


Figure 3-36 — *Removing/Replacing the A17 Main Processor Board*

A18 (Battery Back-up) BB Memory Board

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).
- ☐ Step 4: Remove the two card cage retainer screws located on the left side of the DSA to remove the two plastic card cage retainers from the top of the card cage (Figure 3-18).
- ☐ Step 5: Disconnect connectors J47 and J48 from the A19 Digitizer CPU board (Figure 3-38).

  Note: *Note the position of all multi-pin connector's index triangles on the connectors you remove to ensure that you can later correctly replace these connectors.*

- ☐ Step 6: Disconnect connectors J28 and J83 from the A20 Digitizer I/O board (Figure 3-39).
- ☐ Step 7: Disconnect connectors J72 and J90 from the A14 I/O board (Figure 3-33).
- ☐ Step 8: Lift the white, hinged tabs at the front and rear edges of the board. Pull the tabs upward until the A18 BB Memory board separates from the A13 Mother board.
- ☐ Step 9: Remove the A18 BB Memory board.

ATTENTION

If an FRU (field replaceable unit) being replaced contains firmware, the ***firmware must be removed from the old FRU and installed on the new FRU****. The replacement assemblies (FRUs) will not have any firmware installed from the factory or Module Repair station.*

To replace the A18 BB Memory board, perform the previous steps in the reverse order.

Note: *Insert the edges of the board into the plastic guides at each end of the card cage. Lower the board into position.*

Ensure that connector P106 on the A18 BB Memory board is seated on the A13 Mother board connector. Push down firmly on the A18 BB Memory board to connect this connector to the A13 Mother board.

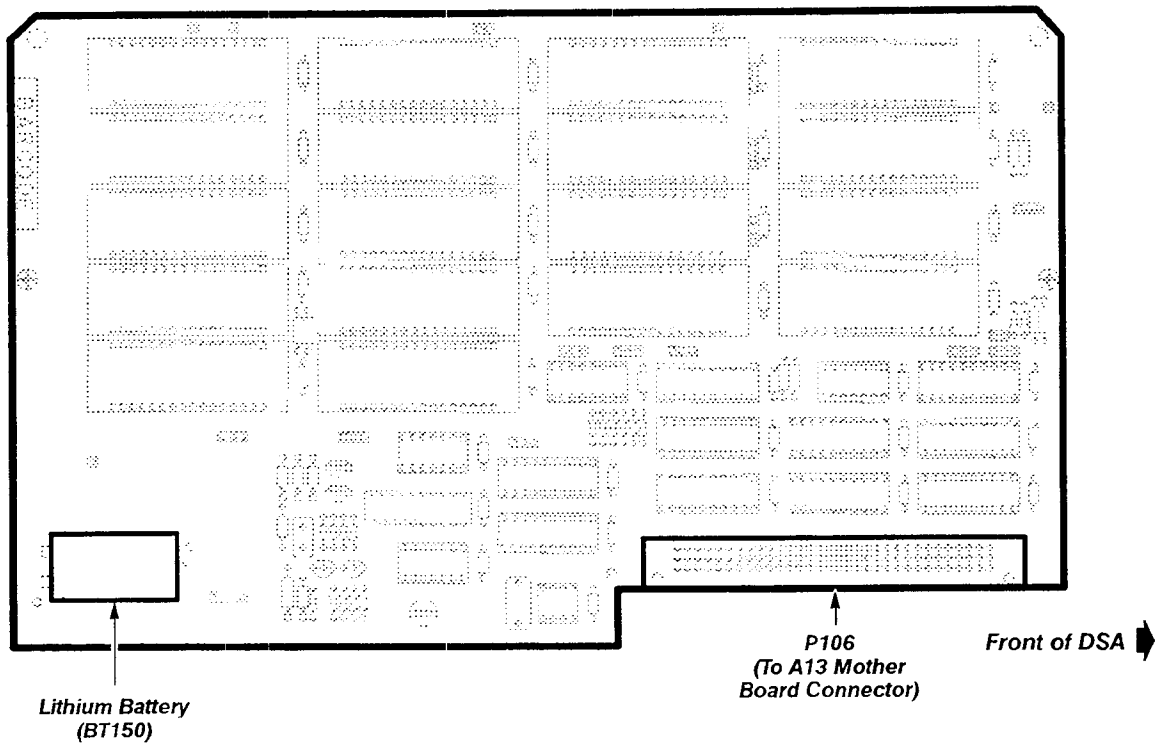


Figure 3-37 -- *Removing/Replacing the A18 BB Memory Board*

WARNING

If your DSA is equipped with Option 4C, then a lithium battery (BT150) is mounted on the A18 BB Memory board. ***The battery requires special handling for disposal****. Refer to the instructions on Lithium Battery Disposal and First Aid (page 3-42). Care is required when placing the A18 BB Memory board on metal surfaces. If some IC or battery leads are shorted, the battery may discharge or overheat and vent. (Plastic standoffs are used to prevent shorts.)*

A19 Digitizer CPU Board

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).
- ☐ Step 4: Remove the two card cage retainer screws located on the left side of the DSA to remove the two plastic card cage retainers from the top of the card cage (Figure 3-18).
- ☐ Step 5: Disconnect connectors J47 and J48 from the A19 Digitizer CPU board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-38 and 3-52).
- ☐ Step 6: Lift the white, hinged tabs at the front and rear edges of the board. Pull the tabs upward until the A19 Digitizer CPU board separates from the A13 Mother board and A21 Mini Mother board.
- ☐ Step 7: Remove the A19 Digitizer CPU board.

ATTENTION

If an FRU (field replaceable unit) being replaced contains firmware, the ***firmware must be removed from the old FRU and installed on the new FRU****. The replacement assemblies (FRUs) will not have any firmware installed from the factory or Module Repair station.*

To replace the A19 Digitizer CPU board, perform the previous steps in the reverse order.

Note: *Insert the edges of the board into the plastic guides at each end of the card cage. Lower the board into position.*

Ensure that connectors P117 and P118 on the A19 Digitizer CPU board are seated on the A13 Mother board and the A21 Mini Mother board connectors, respectively. Push down firmly on the A19 Digitizer CPU board to connect these connectors.

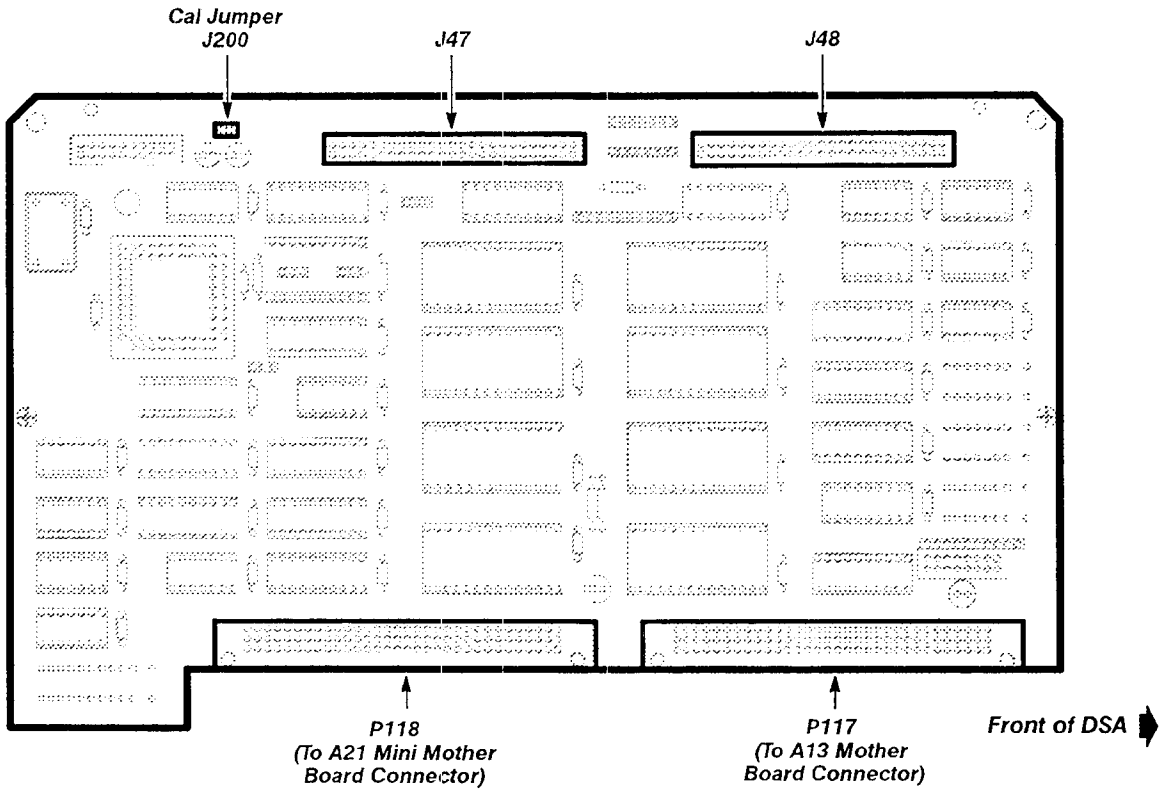


Figure 3-38 — Removing/Replacing the A19 Digitizer CPU Board

A20 Digitizer (Input/Output) I/O Board

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).
- ☐ Step 4: Remove the two card cage retainer screws located on the left side of the DSA to remove the two plastic card cage retainers from the top of the card cage.
- ☐ Step 5: Disconnect connectors J47 and J48 from the A19 Digitizer CPU board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-38 and 3-52).
- ☐ Step 6: Disconnect connectors J28 and J83 from the A20 Digitizer I/O board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-39 and 3-52).
- ☐ Step 7: Lift the white, hinged tabs at the front and rear edges of the board. Pull the tabs upward until the A20 Digitizer I/O board separates from the A13 Mother board.
- ☐ Step 8: Remove the A20 Digitizer I/O board.

To replace the A20 Digitizer I/O board, perform the previous steps in the reverse order.

Note: *Insert the edges of the board into the plastic guides at each end of the card cage. Lower the board into position.*

Ensure that connector P116 and P119 on the A20 Digitizer I/O board are seated on the A13 Mother board and A21 Mini Mother board connectors, respectively. Push down firmly on the A20 Digitizer I/O board to connect these connectors.

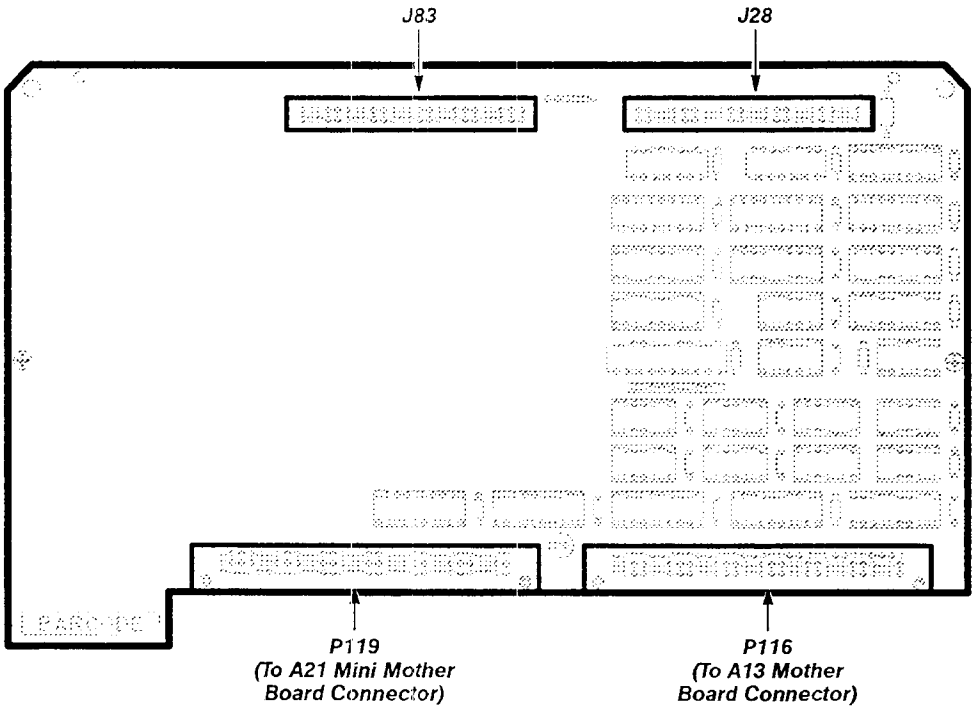


Figure 3-39 — *Removing/Replacing the A20 Digitizer I/O Board*

A21 Mini Mother Board

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).
- ☐ Step 4: Remove the two card cage retainer screws located on the left side of the DSA to remove the two plastic card cage retainers from the top of the card cage (Figure 3-18).
- ☐ Step 5: Remove the A19 Digitizer CPU board, the A20 Digitizer I/O board, and the A14 I/O board (Figure 3-33, 3-38, and 3-39).
- ☐ Step 6: Remove the three Torx drive screws that fasten the A21 Mini Mother board to the chassis (Figure 3-40).
- ☐ Step 7: Remove the A21 Mini Mother board.

To replace the A21 Mini Mother board, perform the previous steps in the reverse order.

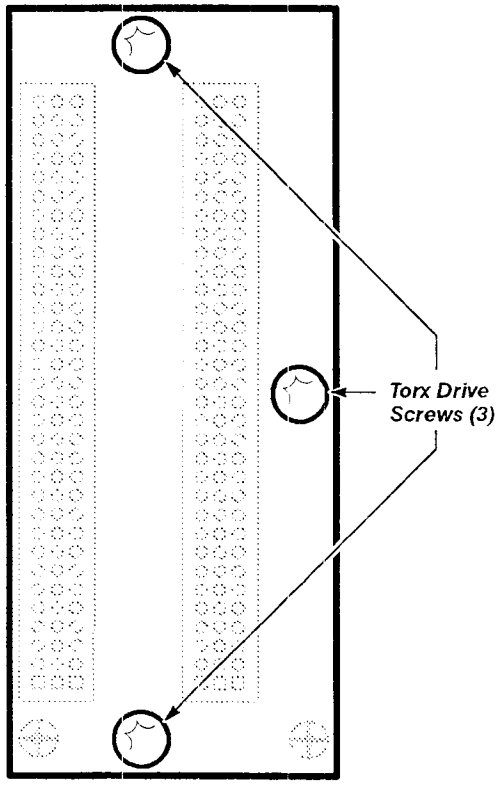


Figure 3-40 — Removing/Replacing the A21 Mini Mother Board

A24 CRT Driver Board

Removal and replacement steps are listed below.

- ☐ Step 1: Set the DSA so that it's left side faces up.
- ☐ Step 2: Remove the front and rear decorative trim covers on the left side of the DSA (Figure 3-13).
- ☐ Step 3: Remove the four Torx drive screws that secure the left frame section, and then remove the frame section (Figure 3-13).
- ☐ Step 4: Remove the three Torx drive screws at the front of the trap door located beneath the A24 CRT Driver board (Figure 3-41).

CAUTION

Do not remove the three Torx drive screws at the rear of the trap door. See Figure 3-41 to ensure that you are removing the appropriate Torx drive screws on the trap door.

- ☐ Step 5: Remove the two Torx drive screws that secure the A24 CRT Driver board on the left side of the DSA (Figure 3-41).

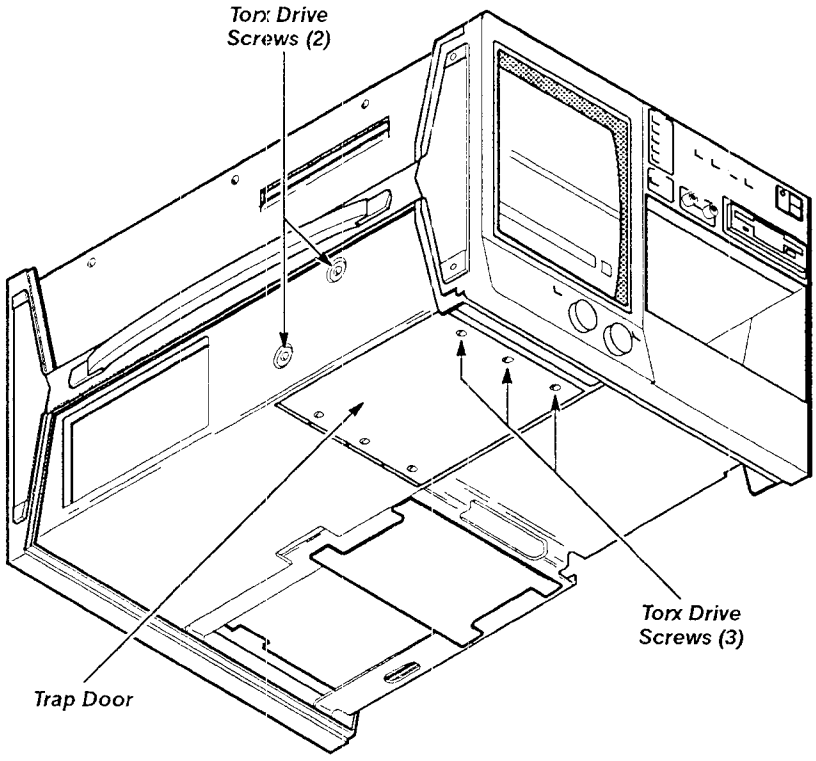


Figure 3-41 -- *Removing/Replacing the Trap Door Torx Drive Screws*

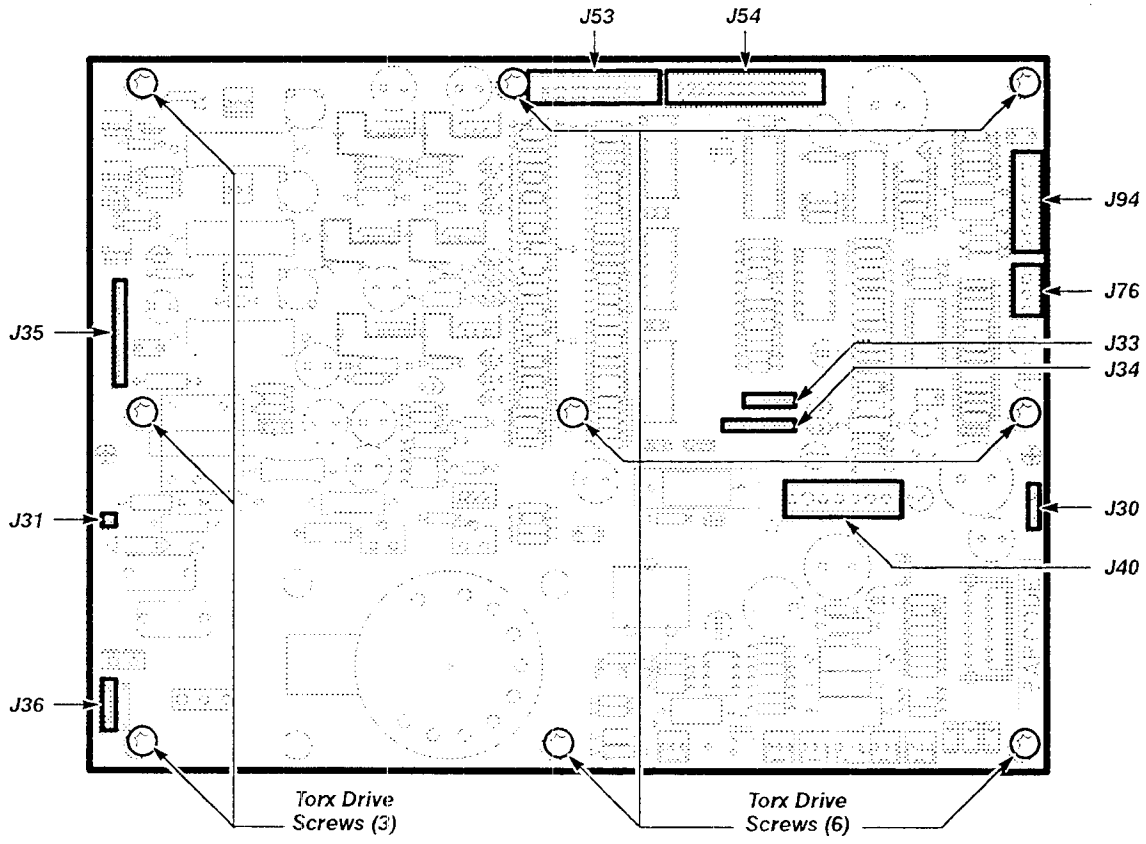


Figure 3-42 — Removing/Replacing the A24 CRT Driver Board

☐ Step 6: Partially open the trap door located beneath the A24 CRT Driver board and disconnect connectors J30, J40, J76 and J94 from the A24 CRT Driver board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figure 3-42).

☐ Step 7: Open the trap door slightly further, than in Step 6 and disconnect connectors J33, J34, J53 and J54 from the A24 CRT Driver board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figure 3-42).

☐ Step 8: Use a non-conducting tool to pry up the anode lead cap on the CRT. (The anode lead cap is accessed through the small hole in the left side of the chassis.) Release the spring clip inside the cap to remove the anode lead (Figure 3-12).

WARNING

A stored charge can accumulate in the CRT after the anode lead is removed. After removing the anode lead and before replacing the anode lead, ground the CRT to the chassis. Insert one blade of a needle-nose pliers in the small hole referred to in Step 8, and the other blade to the DSA chassis.

☐ Step 9: Open the trap door slightly further than in Step 7, and disconnect connectors J31, J35, and J36 from the A24 CRT Driver board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figure 3-42).

☐ Step 10: Remove the nine Torx drive screws that secure the A24 CRT Driver board to the CRT Driver trap door (Figure 3-42).

☐ Step 11: Remove the A24 CRT Driver board.

To replace the A24 CRT Driver board, perform the previous step in the reverse order.

A25 Degauss Board

Removal and replacement steps are listed below.

☐ Step 1: Remove the A9 Touch Panel Assembly (page 3-76).

☐ Step 2: Disconnect the two J32 connectors from the A25 Degauss board (Figure 3-43).

☐ Step 3: Remove the five Torx drive screws that secure the A25 Degauss board to the chassis (Figure 3-43).

☐ Step 4: Remove the A25 Degauss board.

To replace the A25 Degauss board, perform the previous steps in the reverse order.

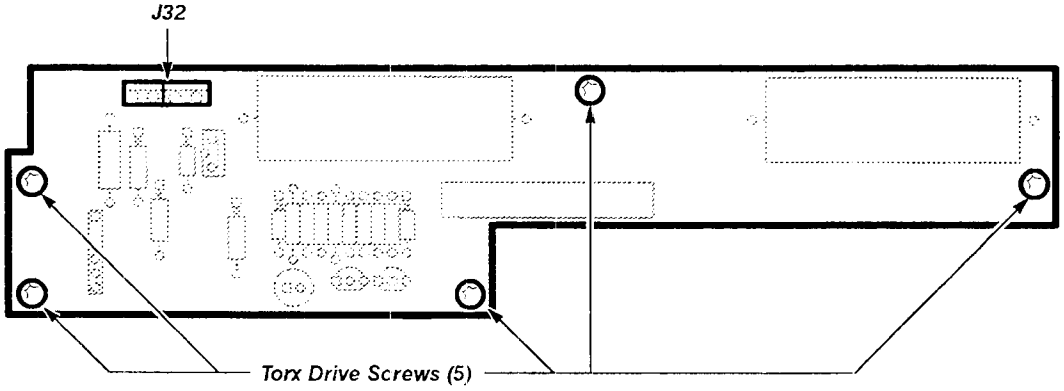


Figure 3-43 — *Removing/Replacing the A25 Degauss Board*

A26 Geometry Board

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).
- ☐ Step 4: Remove the ten Torx drive screws that secure the CRT shield to the chassis (Figure 3-10).
- ☐ Step 5: Push the CRT shield toward the rear of the DSA, and then lift the CRT shield out of the chassis.
- ☐ Step 6: Disconnect connectors J33 and J34 from the A26 Geometry Board (Figure 3-44).
- ☐ Step 7: Remove the two Torx drive screws that secure the A26 Geometry Board to the chassis (Figure 3-44).

  Note: *To remove the two screws, use either a short Torx screwdriver or a Torx tip with a ¼-inch wrench.*

- ☐ Step 8: Lift the A26 Geometry board out of the plastic board guides located at the bottom of the board.
- ☐ Step 9: Remove the A26 Geometry board.

To replace the A26 Geometry board, perform the previous steps in the reverse order.

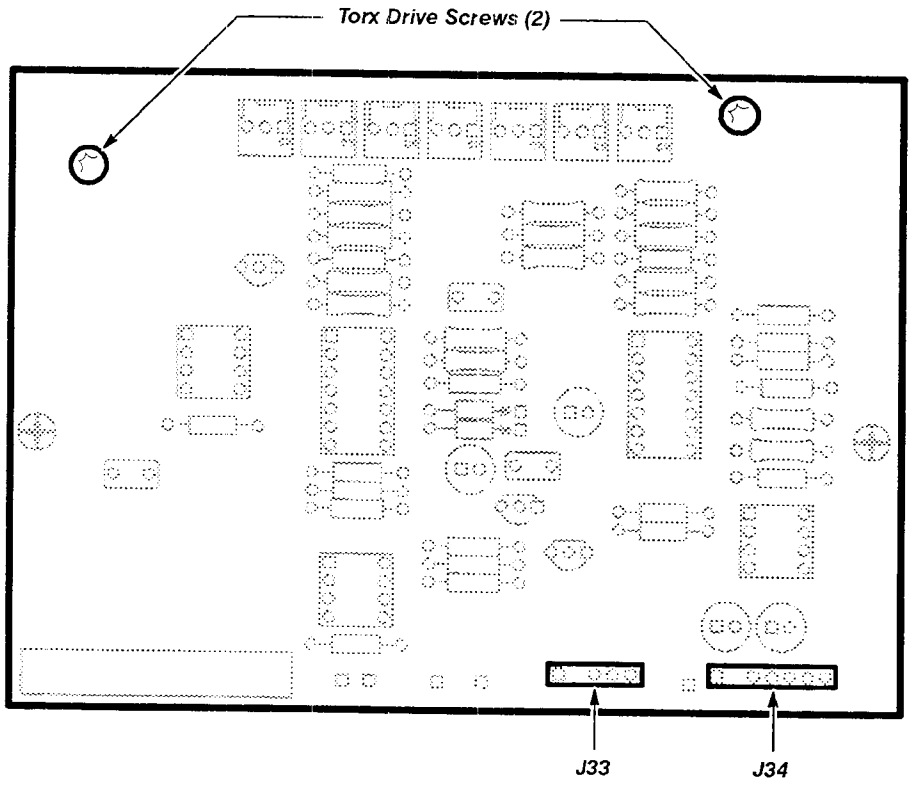


Figure 3-44 — *Removing/Replacing the A26 Geometry Board*

A27 CRT Socket Board

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the CRT (page 3-51).
- ☐ Step 2: Disconnect connectors J35, J36A, and J36B from the A27 CRT Socket board. Note the position of the multi-pin connector's index triangles to ensure that you can correctly replace these connectors (Figures 3-45 and 3-52).
- ☐ Step 3: Unscrew the Torx drive screw that secures the green ground wire from the A27 CRT Socket board to the chassis (Figure 3-9).
- ☐ Step 4: Remove the A27 CRT Socket board.

To replace the A27 CRT Socket board, perform the previous steps in the reverse order.

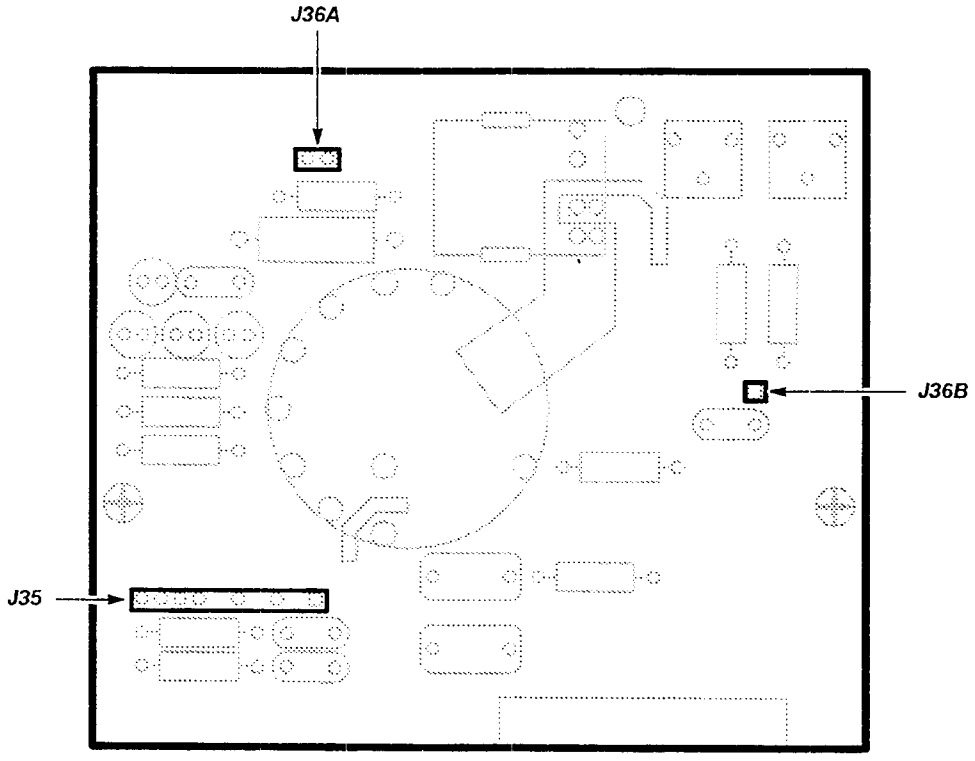


Figure 3-45 — *Removing/Replacing the A27 CRT Socket Board*

A32 Disk Controller Board

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).
- ☐ Step 4: Remove the two card cage retainer screws located on the left side of the DSA to remove the two plastic card cage retainers from the top of the card cage (Figure 3-18).

  Note: *Note the position of all multi-pin connector's index triangles on the connectors you remove to ensure that you can correctly replace these connectors.*

- ☐ Step 5: Disconnect connectors J47 and J48 on the A19 Digitizer CPU board (Figure 3-38).
- ☐ Step 6: Disconnect connectors J28 and J83 on the A20 Digitizer I/O board (Figure 3-39).
- ☐ Step 7: Disconnect connector J2 (Figure 3-46) from the A32 Disk Controller board.
- ☐ Step 8: Lift the white hinged tab at the upper front edge of the board. Pull the tab upward until the A32 board separates from the A13 Mother board.
- ☐ Step 9: Remove the A32 board.

To replace the A32 Disk Controller board, perform the previous steps in the reverse order.

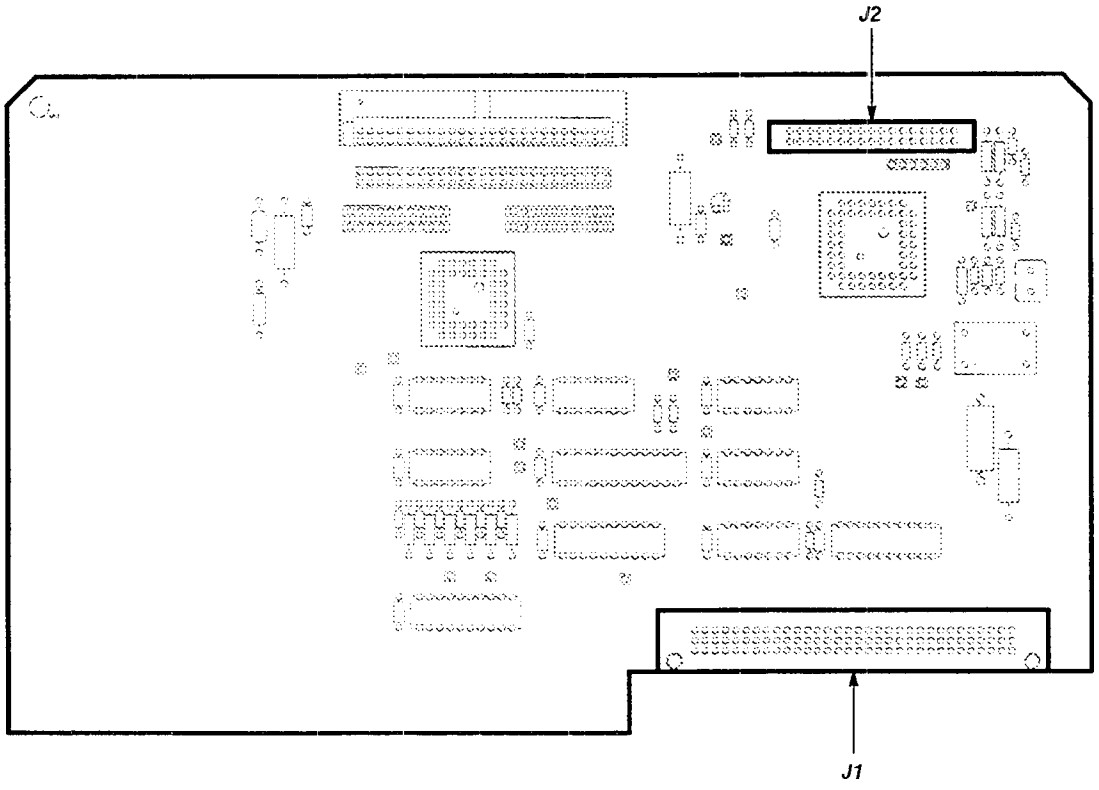


Figure 3-46 — *Removing/Replacing the A32 Disk Controller Board*

A33 Disk Drive

Removal and replacement steps are listed below.

- ☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).
- ☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).
- ☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (refer to the instructions on the bottom of the platform) (Figure 3-9).
- ☐ Step 4: Disconnect connector J201 (Figure 3-47).

  Note: *Note the position of all multi-pin connector's index triangles on the connectors you remove to ensure that you can correctly replace these connectors.*

- ☐ Step 5: Disconnect connector J202 (Figure 3-47).
- ☐ Step 6: Remove the two Torx drive screws that secure the A33 Disk Drive unit to the mainframe cage (Figure 3-47).
- ☐ Step 7: Lift the rear of the disk drive unit and pull it out of the DSA.

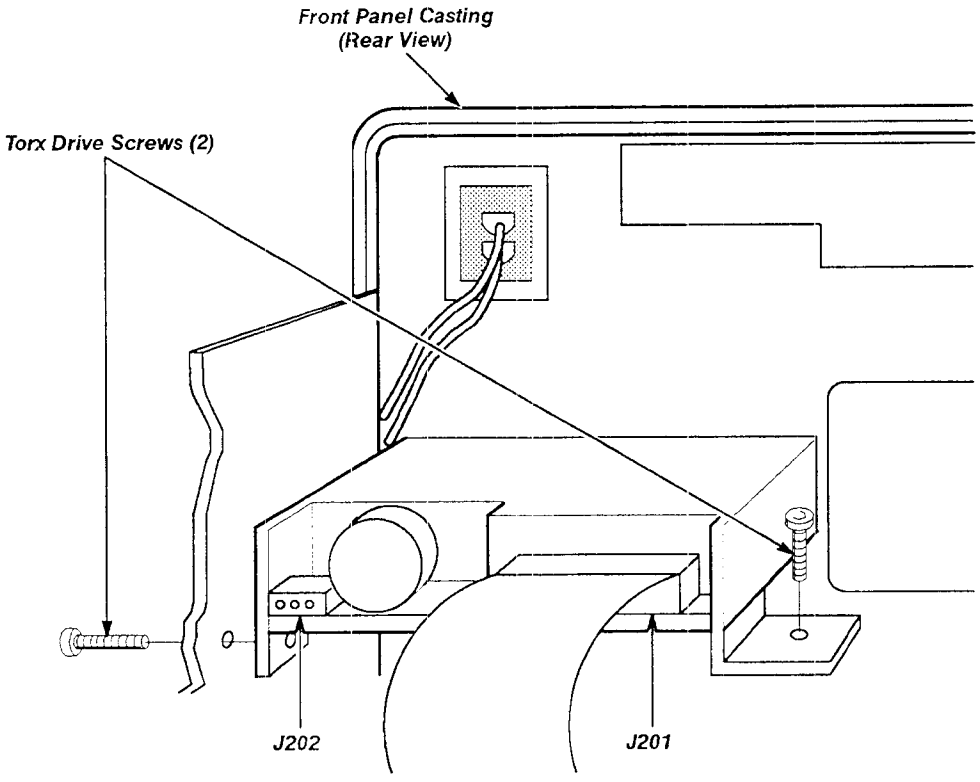


Figure 3-47 – Removing/Replacing the A33 Disk Drive

To replace the A33 Disk Drive, perform the previous steps in the reverse order.

Note: *If replacing the Disk Drive, remove the four Torx drive screws that secure the bracket beneath the unit. Install this bracket on the replacement unit.*

FRU IC Removal/Replacement

The replaceable FRU ICs are shown in Figure 3-48 which spans two pages. The ICs are located on the indicated circuit boards. The following procedures guide you through removal/replacement for each type of IC. Figure 3-49 provides indexing information for each type of IC.

CAUTION *Observe all the special precautions mentioned under Static-Sensitive Classification earlier in this section (page 3-40).*

Serial Data Interface IC—The Serial Data Interface IC (U330) is a "Slam-Pack" IC mounted on the A14 I/O board. The IC has a raised, ridged, heat-sink cover. The IC is oriented to its socket by a beveled corner. The other corners are notched to fit the edges of the socket. The beveled corner aligns with a spring (small metal tab) at one corner of the socket (Figures 3-48 and 3-49).

To remove the Serial Data Interface IC, proceed as follows:

☐ Step 1: Remove the A14 I/O board (page 3-84).

☐ Step 2: Hold the heat sink cover in place and unfasten the retaining clip by moving the retaining clip across the tabs, while pushing down slightly on the cover (Figure 3-49).

CAUTION *Observe all the special precautions mentioned under Static-Sensitive Classification earlier in this section (page 3-40).*

☐ Step 3: Remove the cover slowly to prevent the IC from dropping out. Note the position of the index on the IC so that you can later correctly replace the IC (Figure 3-49).

☐ Step 4: Remove the IC with tweezers.

CAUTION *Avoid touching the IC or its socket contacts with your fingers. Finger oils can degrade reliability.*

Replace the Serial Data Interface IC as follows:

☐ Step 5: Using tweezers, place the beveled corner of the replacement IC against the index spring (the original positioning of this index was noted in Step 3) (Figure 3-49).

CAUTION *Do not damage the spring with the beveled corner. (Shorting of the two corner contacts could result.)*

☐ Step 6: Arrange the other corners, using the tweezers, to fit flush in the edges of the socket.

☐ Step 7: Set the cover flat on the IC; with the cover's end tabs properly aligned with, but not in, the mating recesses in the socket.

☐ Step 8: Push down on the cover, keeping it flat on the IC, and slide the cover end tabs into place. Hold the cover there while moving the retaining clip over the tabs at the other end of the cover.

☐ Step 9: Slightly pull on the cover to ensure that the cover is secure.

☐ Step 10: Replace the A14 I/O board (page 3-84).

Demux ICs, Utility ICs, Sweep Controller IC, and Clock Driver IC—These ICs are located on the A6 Lower Acquisition board and A7 Upper Acquisition board. Table 3-20 lists these ICs, what FRU board they are located on, and which instrument (DSA 601/601A and/or DSA 602/602A) the ICs are in.

Table 3-20 — *Demux, Utility, Sweep Controller, and Clock Driver IC Locator*

IC	IC #	FRU Board	DSA 601	DSA 602
Demux	U1000	A7 Upper Acquisition		✓
	U1050	A7 Upper Acquisition		✓
	U1100	A6 Lower Acquisition	✓	✓
	U1140	A6 Lower Acquisition	✓	✓
	U1300	A6 Lower Acquisition	✓	✓
	U1340	A6 Lower Acquisition	✓	✓
	U1400	A7 Upper Acquisition		✓
	U1450	A7 Upper Acquisition		✓
Utility	U110	A6 Lower Acquisition		✓
	U150	A6 Lower Acquisition		✓
	U810	A6 Lower Acquisition	✓	✓
	U850	A6 Lower Acquisition	✓	✓
Sweep Controller	U530	A7 Upper Acquisition	✓	✓
Clock Driver	U570	A7 Upper Acquisition	✓	✓

To remove a Demux IC, Utility IC, Sweep Controller IC, or Clock Driver IC, proceed as follows:

☐ Step 1: Locate the IC to be removed on either the A6 Lower Acquisition board or A7 Upper Acquisition board (Figure 3-48).

Note: *If you are removing an IC on the A6 Lower Acquisition board, then raise the platform, and secure the platform with the support rod (Figure 3-9).*

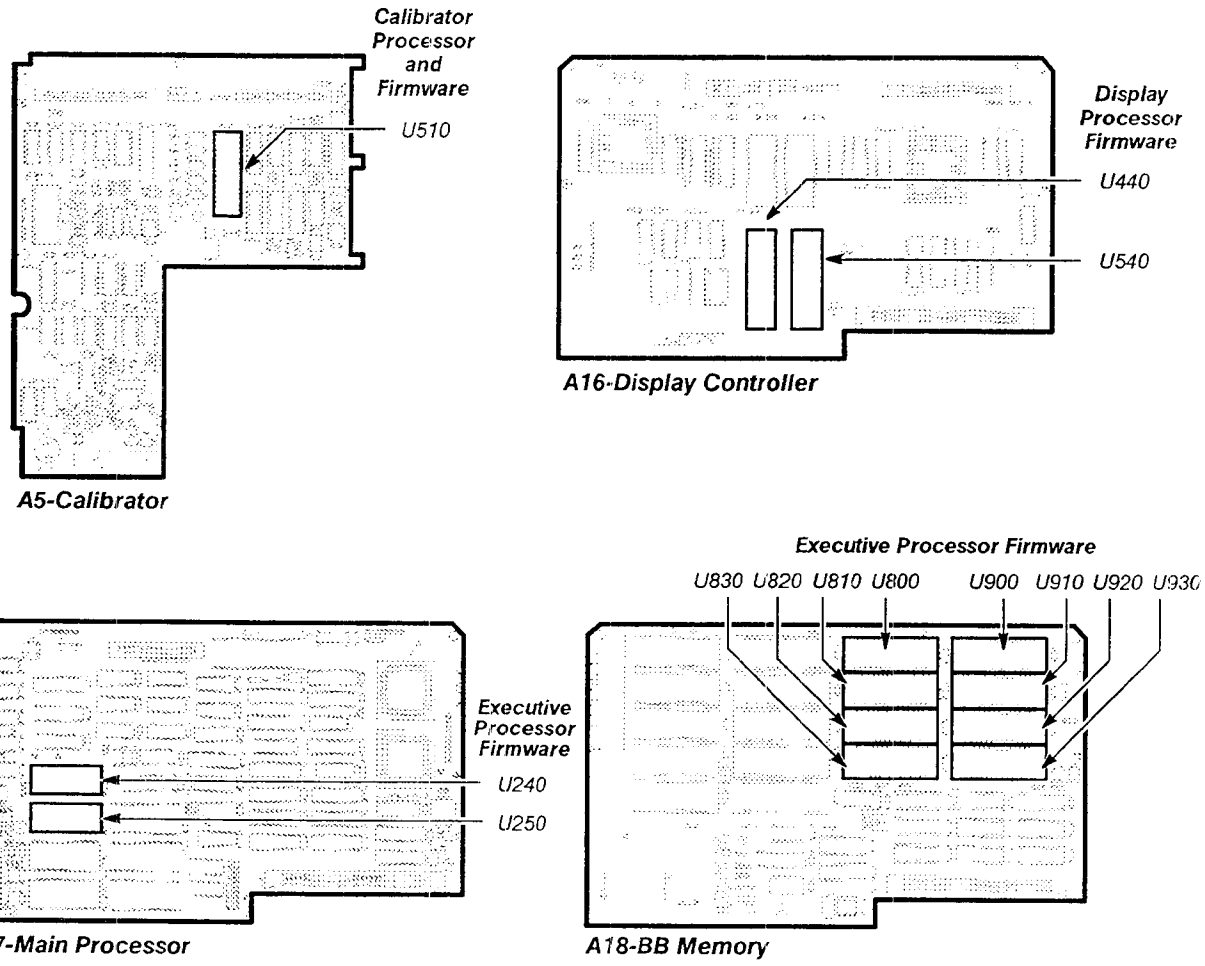


Figure 3-48 — FRU IC Detail

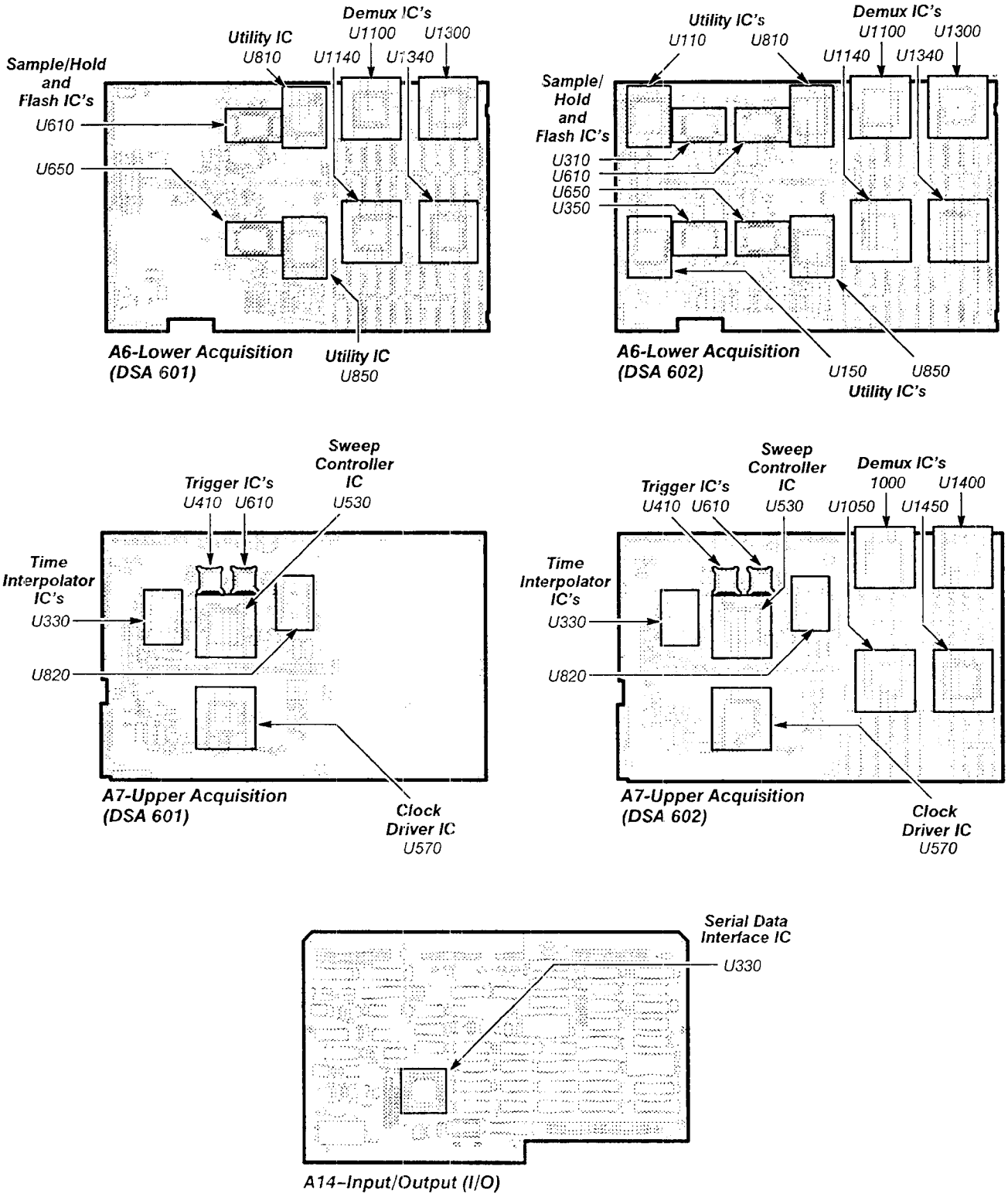


Figure 3-48 – FRU IC Detail (Cont.)

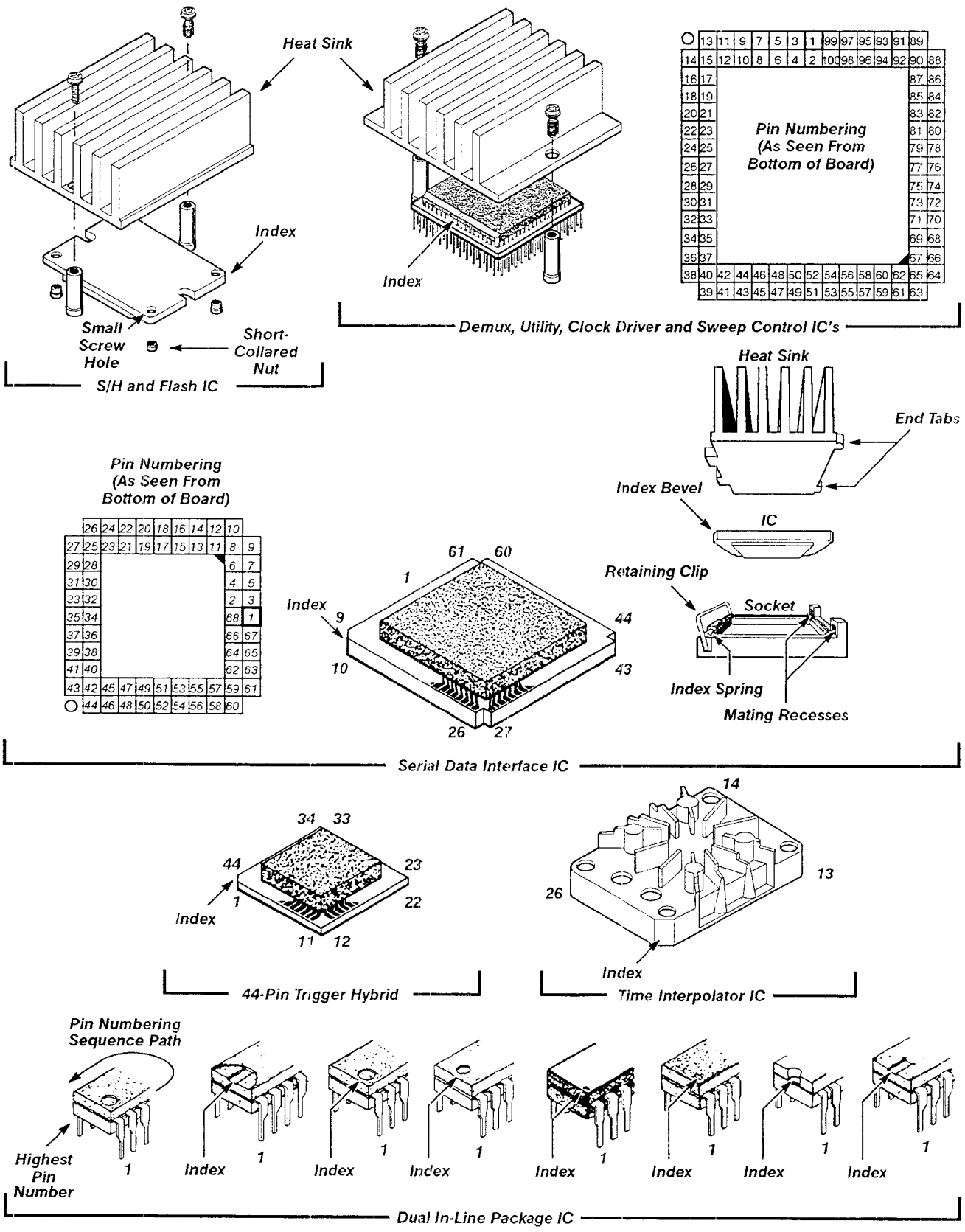


Figure 3-49 — Semiconductor Indexing Diagram

- ☐ Step 2: Remove the two screws that secure the heat sink to the IC (Figure 3-49).
- ☐ Step 3: Remove the heat sink (Figure 3-49).
- ☐ Step 4: Use a tool with a sharp pointed end to pry up the beveled corner of the IC from the socket (Figure 3-49).
- ☐ Step 5: Use the same tool to pry an adjacent corner from the socket.
- ☐ Step 6: Carefully remove the IC.

CAUTION

Avoid touching the IC pins or the socket contacts with your fingers. Finger oils can lessen contact reliability.

To replace a Demux IC, Utility IC, Sweep Controller IC, or Clock Driver IC, proceed as follows:

- ☐ Step 1: Align the small dot on one side of the IC (the index) with the small dot on the board (Figure 3-49).
- ☐ Step 2: Ensure that the beveled corner of the IC also aligns with outer beveled corner of the socket (Figure 3-49).
- ☐ Step 3: Ensure that all IC pins align correctly with their respective socket contacts.
- ☐ Step 4: Push down carefully on the IC to seat the IC in its socket.
- ☐ Step 5: Replace the heat sink.

Processor and Firmware IC (U510) – is located on the A5 Calibrator board.

To remove the Processor and Firmware IC, proceed as follows:

- ☐ Step 1: Grasp the IC with the insertion-extraction pliers shown in Figure 3-50. Refer to Table 2-2 for the part number of these pliers.
- ☐ Step 2: Position the pliers around the outside of the IC, squeeze the handles of the pliers to grasp the IC, and slowly pull the IC from the socket.

CAUTION

Avoid touching the IC pins or the socket contacts with your fingers. Skin oils can lessen contact reliability.

To replace a Processor and Firmware IC, proceed as follows:

- ☐ Step 1: Grasp the replacement IC with the insertion-extraction pliers; ensuring that all the IC pins are straight and evenly spaced.
- ☐ Step 2: Align the index slot on the IC with the corresponding index on its socket (Figure 3-49).
- ☐ Step 3: Align the IC pins with their respective socket contacts, and push down slowly and evenly to seat the IC.

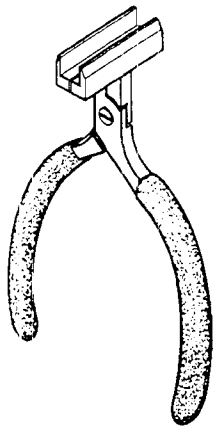


Figure 3-50 — IC Insertion-Extraction Pliers

Sample/Hold and Flash ICs – are located on the A6 Lower Acquisition board. Table 3-21 provides a list of these ICs and which instrument (the DSA 601 or DSA 602) the ICs are in.

Table 3-21 — Sample/Hold and Flash IC Locator

IC	IC #	DSA 601	DSA 602
Sample/Hold anc Flash	U310		✓
	U350		✓
	U610	✓	✓
	U650	✓	✓

To remove a Sample/Hold and Flash IC, proceed as follows:

☐ Step 1: Remove the eight Torx drive screws that secure the platform, and then raise the platform on its hinges (Figures 3-9 and 3-13).

☐ Step 2: Secure the platform with the support rod (Figure 3-9).

☐ Step 3: Remove the two screws that secure the heat sink to the IC (Figure 3-49).

☐ Step 4: Remove the heat sink (Figure 3-49).

☐ Step 5: Remove the four Torx drive screws that secure the IC to the board.

☐ Step 6: Remove the Sample/Hold and Flash IC.

To replace a Sample/Hold and Flash IC, proceed as follows:

☐ Step 1: Orient the IC so that the beveled corner of the IC (the index) aligns with the arrow on the board and so that the small screw hole fits over the short collared nut (Figure 3-49).

☐ Step 2: Replace the four Torx drive screws that secure the IC.

☐ Step 3: Replace the heat sink (Figure 3-49).

Time Interpolator ICs (U330 and U820) – are located on the A7 Upper Acquisition board.

To remove a Time Interpolator IC, proceed as follows:

☐ Step 1: Notice the orientation of the beveled corner of the heat sink on the board (Figures 3-48 and 3-49).

☐ Step 2: Remove the four nuts that secure the heat sink to the board.

☐ Step 3: Remove the heat sink from the board (Figure 3-49).

Note: *The IC is located inside the heat sink and should not be removed from the heat sink. When replacing the Time Interpolator IC, the heat sink and IC are replaced as a unit.*

To replace a Time Interpolator IC, proceed as follows:

☐ Step 1: Align the beveled corner of the heat sink (the index) to the index marker on the board (Figure 3-49).

☐ Step 2: Place the heat sink on the board so that all four screws protrude through the holes in the heat sink.

Note: *Ensure that the IC is properly seated in its socket. Securing the heat sink to the board when the IC is not properly seated will cause the IC break.*

☐ Step 3: Replace the four nuts on the heat sink.

Trigger ICs (U410 and U610) – are located on the A7 Upper Acquisition board.

To remove a Trigger IC, proceed as follows:

☐ Step 1: Notice the index on the plastic frame (pointed tab) and its orientation on the board (Figures 3-48, 3-49, and 3-51).

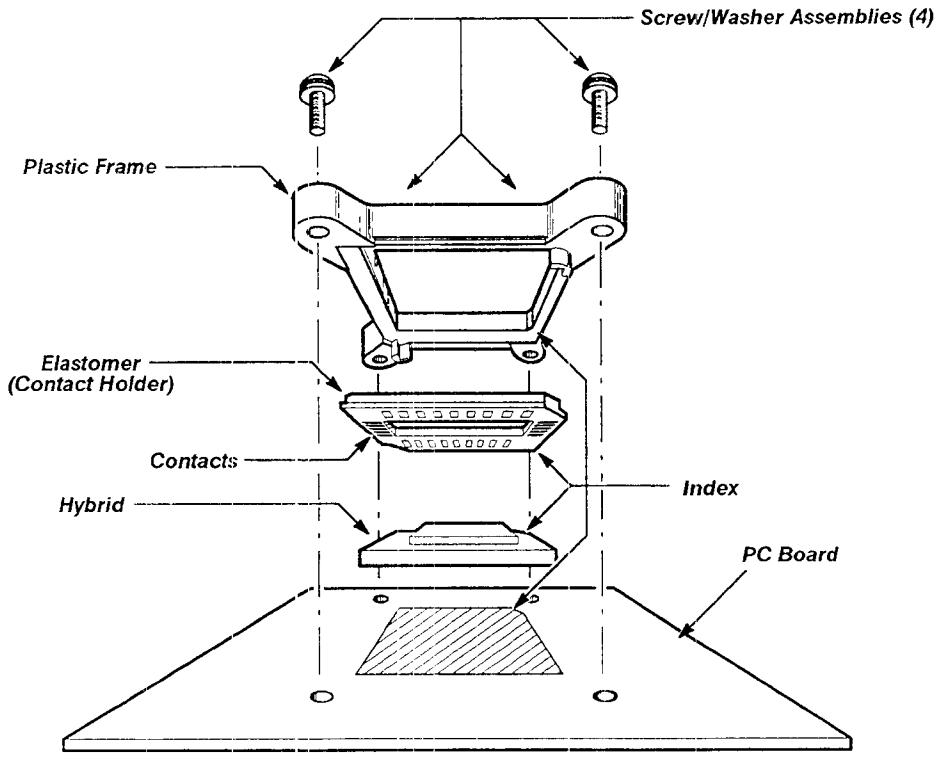
☐ Step 2: Unscrew and remove the four screw/washer assemblies that secure the plastic frame to the board (Figure 3-51).

☐ Step 3: Lift the plastic frame from the board (Figure 3-51).

☐ Step 4: Notice the index location of the hybrid and remove from the hybrid board with the tweezers (Figure 3-51).

Note: *Step 5 describes the removal of the elastomer from the plastic frame. This step is unnecessary when replacing only the hybrid.*

Exploded View of Hypcon Connector



Cross Section View of Hypcon Connector

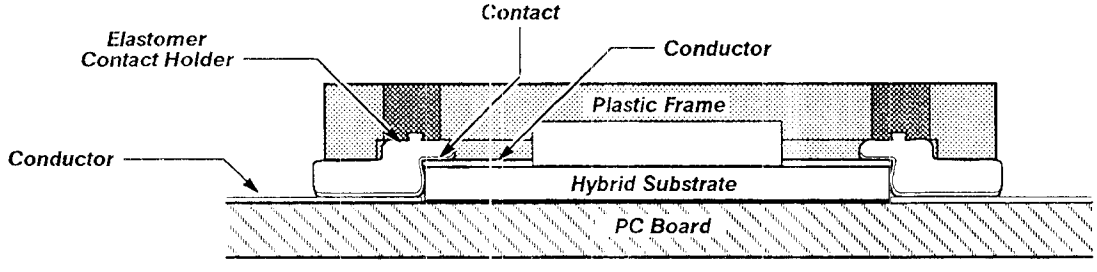


Figure 3-51 *— Trigger IC Assembly*

☐ Step 5: Notice the index location of the elastomer contact holder. Grasp and lift the corner of the contact holder with the tweezers to remove the holder from the plastic frame. Do not touch the gold-plated contacts with your fingers (Figure 3-51).

To replace a Trigger IC, proceed as follows:

☐ Step 1: Grasp a corner of the elastomer with the tweezers and place the elastomer into the plastic frame. Align the beveled corner of the elastomer with the beveled corner of the plastic frame. Tap the elastomer into the plastic frame uniformly (Figure 3-51).

Note: *Keeping the elastomer clean is very important. Small hairs and elastomer flash under the contacts, which are almost invisible to the naked eye, prevent good electrical contact. Do not touch the gold-plated contacts with your fingers.*

☐ Step 2: Place the hybrid into the plastic frame. Align the beveled corner of the hybrid with the beveled corner of the elastomer (Figures 3-49 and 3-51).

☐ Step 3: Place the plastic frame, with the hybrid installed, so that the key (pointed tab) is oriented the same way as when you remove the Trigger IC.

Note: *It is impossible to orient the plastic frame incorrectly on the board since the screw holes will only align if the frame is oriented correctly.*

☐ Step 4: Insert the mounting hardware, and apply two inch-pounds of torque, (2.3 cm-kg) to secure the connector assembly. Do not over tighten the assembly. Over tightening the assembly will strip the microcircuit stiffener/heat sink mounting threads.

Firmware (FW) ICs ("Dual In-Line Package" ICs) – are located on four separate boards.

The boards and their respective firmware (FW) are as follows:

- **A16 Display Controller board** – Display Processor FW (U540 and U440)
- **A17 Main Processor board** – Executive Processor FW (U240 and U250)
- **A18 BB Memory board** – Executive Processor FW (U800, U810, U820, U830, U900, U910, U920 and U930)
- **A19 Digitizer CPU board** – Digitizer Processor FW (U410, U420, U460, U510, U520, and U560)

All of the ICs listed above are ordered with a single Tektronix part number, as a single firmware kit. *Each IC cannot be ordered separately.* For the DSA 601, the firmware kit number is 020-1775-00 and the firmware kit number for the DSA 602 is 020-1776-00.

Note: *All stored settings and stored waveforms are lost when the DSA firmware is upgraded.*

WARNING

You may be exposed to dangerous shock hazards when you remove the DSA covers. Before proceeding, ensure that the PRINCIPAL POWER switch is in the OFF position. Then, disconnect the DSA from the power source. Disassembly should only be attempted by qualified service personnel.

CAUTION

Observe all the special precautions mentioned under Static-Sensitive Classification earlier in this section.

Preparing the DSA for a Firmware Upgrade—requires the following steps:

☐ Step 1: Set the PRINCIPAL POWER switch to OFF, and remove the power cord.

☐ Step 2: Leave the DSA upright up to provide access to boards where you are upgrading the firmware.

Note: *Use the IC insertion-extraction pliers shown in Figure 3-50 for removing and replacing the Firmware ICs. (Refer to Table 2-2 for the part number of these pliers.)*

Do not use the label on the IC as an index since it can be applied bidirectionally. (See Figure 3-49, for the correct location of the index on the IC.)

Accessing Boards Within The Card Cage—requires the following steps:

☐ Step 1: Remove the six Torx drive screws that secure the platform to the sides of the DSA (Figure 3-13).

☐ Step 2: Remove the two Torx drive screws that are located on the top of the platform (Figure 3-13).

☐ Step 3: Raise the platform on its hinges, and then secure the platform with the support rod (Figure 3-9).

☐ Step 4: Remove the screws that secure the card cage retainers (Figure 3-18).

☐ Step 5: Remove the plastic circuit board retainers from the top of the card cage (Figure 3-18).

Upgrading The A16 Display Controller Board Firmware—requires the following steps:

☐ Step 1: Remove the A16 Display Controller board from the card cage. The A16 Display Controller board is the right-most board in the card cage (page 3-88).

☐ Step 2: On the A16 Display Controller board, replace ICs U440 and U540 (Figure 3-48).

In each case, the last two-digit portion of the part number on the replacement IC should be the same as, or higher than, that on the removed IC. Again, ensure that pin 1 is oriented correctly (Figure 3-49).

☐ Step 3: Return the A16 Display Controller board to its original location in the card cage (Figure 3-9).

Upgrading The A17 Main Processor Board Firmware—requires the following steps:

☐ Step 1: Remove the A17 Main Processor board (page 3-90).

☐ Step 2: On the A17 Main Processor board, replace U240 and U250 (see Figure 3-45). The last two-digit portion of the part number on the replacement IC should be the same as, or higher than, that on the removed IC. Again, ensure that pin 1 is oriented correctly when inserting the new parts (Figure 3-49).

Upgrading The A18 BB Memory Board Firmware—requires the following steps:

☐ Step 1: Remove the A18 BB Memory board from the card cage (page 3-92).

☐ Step 2: On the A18 BB Memory board, replace the following ICs (Figure 3-45).

U800	U820	U900	U920
U810	U830	U912	U930

In each case, the last two-digit portion of the part number on the replacement IC should be the same as, or higher than, that on the removed IC. Again, ensure that pin 1 is oriented correctly (Figure 3-49).

☐ Step 3: Return the A18 BB Memory board to its original location in the card cage (Figure 3-9).

Upgrading The A19 Digitizer CPU Board Firmware—requires the following steps:

☐ Step 1: Remove the A19 Digitizer CPU board from the card cage (page 3-94).

☐ Step 2: On the A19 Digitizer CPU board, replace the following ICs:

U410	U460	U520
U420	U510	U560

For each IC, the last two-digit portion of the part number on the replacement IC should be the same as, or higher than, that on the removed IC. Again, ensure that pin 1 is oriented correctly (Figure 3-49).

☐ Step 3: Return the A19 Digitizer CPU board to its original location in the card cage (Figure 3-9).

Replacing The Card Cage And Circuit Board Retainers

Replacement requires the following steps:

☐ Step 1: Replace the card cage retainers using the screws removed earlier.

☐ Step 2: Reconnect all cables to their respective connectors.

Setting And Verifying The DSA Unit Identification Number

Use the following procedure:

Note: *The unit identification number only needs to be set if the A17 MPU board has been removed.*

The DSA unit identification number can be set to match the DSA serial number. To set the identification number, perform the following steps:

☐ Step 1: Verify that the proper identification number is now displayed in the **IDENT** pop-up menu.

☐ Step 2: Locate CAL jumper J200 on the A19 Digitizer CPU board (see Figure 3-38 for the jumper location). Install a black plastic short-circuit jumper on the J200 jumper pins.

☐ Step 3: Connect the DSA to a suitable power source.

☐ Step 4: Connect a terminal or controller to the DSA RS-232-C port at the rear of the DSA. Refer to the mainframe *Programmer Reference* manual for detailed connection information.

☐ Step 5: Set the PRINCIPAL POWER switch to ON and the ON/STANDBY SWITCH to ON.

☐ Step 6: Set the necessary communication parameters between the terminal or controller and the DSA (for example, baud rate). You can set the DSA parameters in the **RS-232-C Parameters** pop-up menu. Press the UTILITY button, touch **Page to Utility 2** and then **RS232C Parameters** to access this pop-up menu.

☐ Step 7: Enter the following commands to establish communication from the terminal or controller:

e <CR>
v <CR>

where <CR> is the return or enter key.

☐ Step 8: Next, enter the command:

Uid main: "BXXXXXX" <CR>

where XXXXXX is the DSA identification number.

☐ Step 9: Verify that the proper identification number is now displayed in the **IDENT** pop-up menu.

Removing the Procedure Setup—requires the following steps:

☐ Step 1: Set the PRINCIPAL POWER switch to OFF.

☐ Step 2: Remove the short-circuit jumper from jumper J200 on the A19 Digitizer CPU board.

☐ Step 3: Replace the top cover of the DSA.

Cables and Connectors

Figure 4-2 shows the interconnecting cables between the various boards, modules, and assemblies. Use this diagram as a reference when you are removing or replacing cables between these units.

Interconnecting Pins

Two methods of interconnecting are used to electrically connect boards with other boards and components. When the interconnection is made with a coaxial cable, a special end-lead connector plugs into a socket on the board. Other interconnections are made with a pin soldered into the board.

These interconnecting pins use two types of connectors. If the connector is mounted on a plug-on board, a special socket is soldered into the board. If the connector is on the end of a lead, an end-lead pin connector is used which mates with the interconnecting pin. The following information provides the removal and replacement procedure for the various types of interconnecting methods.

Coaxial-type End Lead Connectors (Peltolas & SMB)—use color coding of wires, which may be helpful when connecting a Peltola connector to its socket on a board. The wire insulation's color, or its colored stripe, is the same as the color represented by the last digit of the JXX component number. (EXAMPLE: a green wire would connect to a J05 socket.) Other Peltola connectors may have labels which designate their JXX component number.

Multi-Pin Connectors—are arranged so that the pin connectors, connecting the wires to the interconnecting pins, are clamped to the ends of the associated leads (Figure 3-52).

Some of the pin connectors are grouped together and mounted in a plastic holder; these connectors are installed and removed as a multi-pin connector.

Pin 1 on multi-pin connectors is designated with a triangle (or arrowhead) and by the colored edge of the cable. A triangle, dot, or square printed on boards denotes pin 1. When a connection is made to a board, the position or orientation of the triangle on the multi-pin holder is determined by the index (triangle, dot or square) printed on the board. Most board-mounted connectors have a square pad for pin 1.

Note: *Some multi-pin connectors are keyed by a gap between the pin 1 and 3 positions in the holder. (A small plastic plug covers the pin 2 position on the end of the holder.) There is a corresponding gap between pins 1 and 3 on the board.*

Note: *Align the plug in the multi-pin connector with the gap between the connector pins. The connector is then ready to be installed.*

Many of the larger, multi-pin, ribbon connectors have a red, blue, or other contrasting color line along one side of their attached wire cables. This line indicates the location of pins 1 and 2 and also the location of the corresponding triangle index mark on the connector.

Some of the gray-colored ribbon cables may have the number of connectors stamped directly on the cable.

The ribbon connectors have the following two functions:

- to provide a strain relief for the wire connections. The wire ribbon is wrapped around a bar in between the wire connections and the top of the connector. Strain is then present between the wires and the top of the connector. This releases most of the strain which would otherwise be present on the wire connections.
- to provide a pull-tab to ease disconnection. The pull-tab is attached inside the connector. When the tab is pulled, even pressure is applied across the connector. The connector then separates easily from its holder.

  Note: *To remove these ribbon connectors, grasp the pull-tab (fastened into the connector) and pull it loose from the holder.*

  If there is not a pull-tab present on the connector, grasp the ends of the connector instead. Pull the connector straight out from the connector socket.

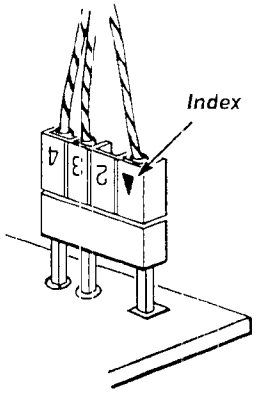


Figure 3-52 *— Multi-Pin Connector Orientation*

Checks After FRU Replacement

After any FRU has been replaced, that particular FRU should be checked. Table 3-22 lists the required checks (and the respective procedure containing this check) to perform.

Table 3-22 — Checks Required After FRU Replacement

FRU Replaced	Checks Required
Cathode Ray Tube (CRT)	Procedure 4 Display
Power Supply Module	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 3 Power Supply
A1 Plug-in Interface Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A4 Regulator Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A5 Calibrator Board	Procedure 1 through Procedure 21
A6 Lower Acquisition Board	Procedure 1 through Procedure 21
A7 Upper Acquisition Board	Procedure 1 through Procedure 21
A8 Waveform Processor (Signal Processor) Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A9 Touch Panel Assembly	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A10 Front Panel Control Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A11 Front Panel Button Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A12 Rear Panel Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration

Table 3-22 — Checks Required After FRU Replacement (Cont.)

FRU Replaced	Checks Required
A13 Mother Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A14 I/O Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 7 Input/Output Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A15 MMU Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A16 Display Controller Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A17 Main Processor Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A18 BB Memory Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A19 Digitizer CPU Board	Procedure 1 through Procedure 21
A20 Digitizer I/O Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A21 Mini-Mother Boards	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A24 CRT Driver Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 4 Display Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A25 Degauss Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration

Table 3-22 – Checks Required After FRU Replacement (Cont.)

FRU Replaced	Checks Required
A 26 Geometry Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 4 Display Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A27 CRT Socket Board	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 4 Display Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration
A32 Disk Controller Board	Procedure 22 Disk Check
A33 Disk Drive	Procedure 22 Disk Check
Firmware ICs	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics
Clock Driver, Demux, Sample/Hold and Flash, Sweep Controller, Time Interpolator, Trigger, and Utility ICs	Procedure 1 through Procedure 21
SDI IC	Procedure 1 Power-On Diagnostics Procedure 2 Extended Diagnostics Procedure 10 Enhanced Accuracy Procedure 11 Probe Calibration

Theory of Operation

The DSA 600 Series instruments are high resolution digitizing signal analyzers. The DSA acquires a waveform by sampling input signals at a maximum rate of 1 billion samples per second (1 GSample/s) for the DSA 601 and 2 billion samples per second (2 GSample/s) for the DSA 602. The DSA 601A and DSA 602A are equipped with disk drives for storing data.

Waveform Processing Cycle Overview

The following is a brief overview of how the DSA acquires, processes, and displays a waveform from the input channels.

1. Analog input signals are connected to the channel inputs of the plug-in amplifiers. The plug-in amplifiers amplify the input signals which are then routed through the plug-in interface to the acquisition circuitry of the DSA.
2. The acquisition circuitry samples and digitizes the analog data, stores the digitized data in high-speed RAM, identifies trigger signals from the plug-in amplifiers, and triggers the "sweep."
3. The Digitizer Controller controls the overall acquisition process.
4. The Waveform Processing circuitry performs any applicable processing of the data.
5. The digitized signals are stored in RAM (waveform memory).
6. When instructed by the Executive Processor (EXP), the Display Controller receives the waveform data from waveform memory and converts it to a unique vertical raster-scan display format, based on user-selected settings.

System Functional Overview

This section describes and illustrates the major functional blocks of the DSA (see Figure 4-1).

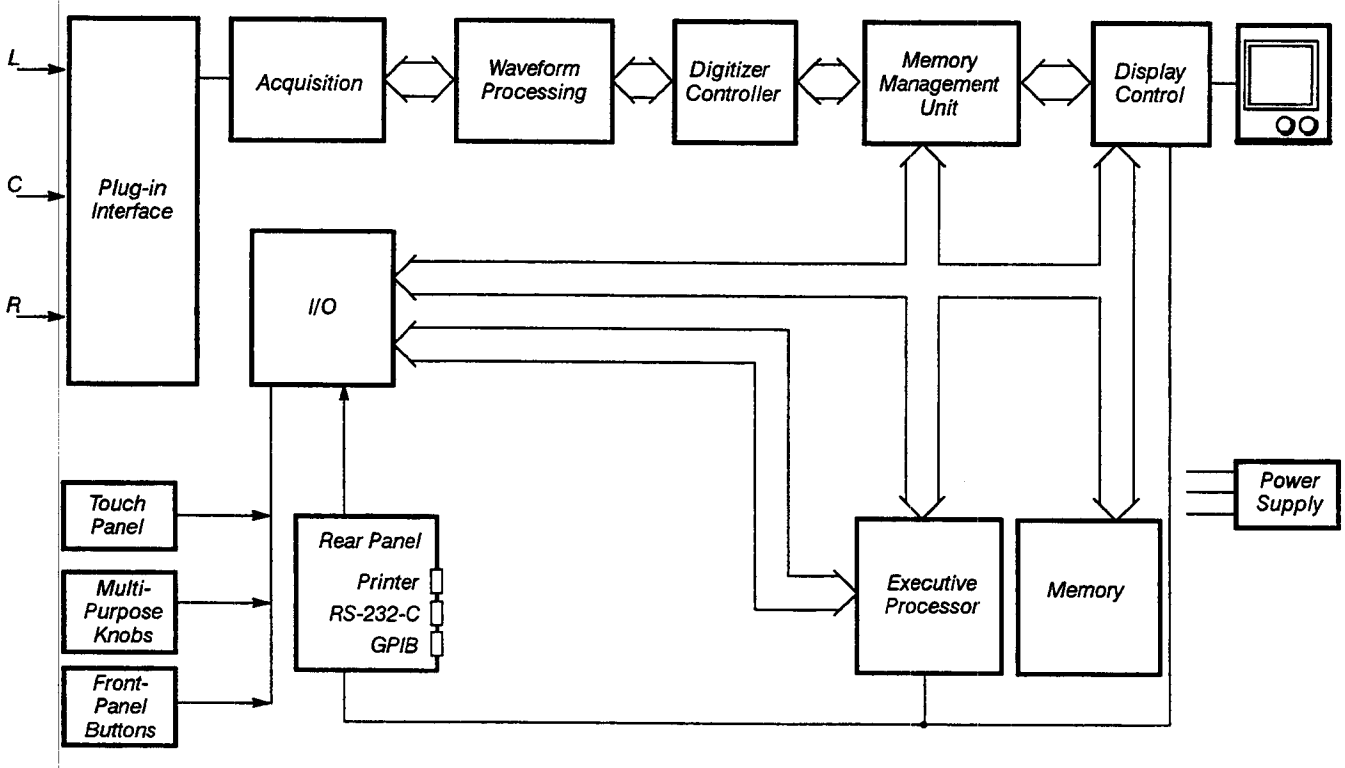


***Figure 4-1** — DSA 600 Series System Functional Block Diagram*

Plug-in Interface Block

The Plug-in Interface block provides a point of connection between the plug-in amplifiers and the Acquisition block of the DSA. This interface allows signal access to the digitizer, allows communication between the DSA mainframe and the plug-in amplifiers, and provides the plug-in amplifiers with power. The Plug-in Interface accommodates a left, center, and right plug-in compartment. Each of the three compartments can support a plug-in amplifier having up to four input channels for a total of twelve active input channels.

Acquisition Block

The Acquisition block digitizes and stores the input signals in high-speed RAM. The selected input signals are converted by a free-running digitizer that acquires signals continuously. Trigger signals for controlling the sweep are processed within this block. When a trigger signal is recognized, the trigger comparator gates a portion of the data through an appropriate channel for processing and display.

Waveform Processing Block

The Waveform Processing block reads the waveform data from the high-speed RAM on the Acquisition board at a rate slower than acquisition, then deposits the waveform data in local RAM for the Digitizer Controller. The Waveform Processing block may also process the data by summing, averaging, calculating an FFT, etc., before sending it to the Digitizer Controller.

Digitizer Controller Block

The Digitizer Controller block sets the parameters for waveform processing and acquisition using commands from the Executive Processor block. These commands are based on the user-selected settings (front panel buttons, control knobs, and touch panel) of the DSA. The Digitizer Controller also moves the data from the local RAM in the Waveform Processing block into waveform memory (part of the Memory block).

Memory Management Unit Block

The Memory Management Unit (MMU) coordinates requests for access to the Memory block from the following three DSA subsystems:

- Display
- Digitizer
- Executive

This arbitration allows all three subsystems transparent access to the Memory block.

Display Control Block

The Display Control block of the DSA provides all of the visual output. Visual output includes data output (such as waveform traces, graticules, axes, and annotation) and displays supporting the human interface (menus, labeling for touch-panel input, and an interactive output to assist in operating the system).

The DSA uses a custom vertical raster-scan display that provides excellent resolution for both waveform display and text. The Display Control block produces a display by:

- receiving waveform data from the MMU.
- compressing the waveform data into 512 horizontal pixels.
- converting the compressed waveform data into a format compatible with the vertical raster-scan display.

I/O Block

The I/O block provides an interface to the Rear Panel block, touch panel, multi-purpose knobs, and front-panel buttons.

Rear Panel Block

The Rear Panel block provides a GPIB port, an RS-232-C port, and a PRINTER port for interfacing various peripheral devices.

Executive Processor Block

After you request an operation (for example, using a front-panel control), a primary function of the Executive processor (EXP) is to direct the DSA to perform the requested operation.

Another primary function of the EXP is to execute Self-Test diagnostics on the DSA when powering-on or upon your request. To control these operations, the EXP controls and monitors the other boards sharing the Executive system bus. Through the Executive bus boards, the EXP also indirectly controls all other DSA boards (and the floppy disk drive on "A" versions). The EXP generates commands and status signals to control on-board devices and I/O devices (such as GPIB and RS-232-C interfaces) which process data and control the rest of the DSA.

Memory Block

The Memory block provides the EXP with RAM and EPROM for waveform storage, setting storage, and program instructions. The EXP initiates all accesses to RAM and ROM. Also, support circuitry for these memories, diagnostic circuitry for troubleshooting, and an option for nonvolatile waveform storage is housed in the Memory block.

Front-Panel Controls

You control the DSA using:

- the front-panel (major-menu) buttons
- the touch panel
- the multi-purpose knobs

The multi-purpose knobs control the function of the particular item that is selected. The major menu buttons are the top-level menu selections for the DSA. Touching an icon, menu item, or waveform selects that particular icon, menu item, or waveform, respectively.

Power Supply

The DSA operates from either a 110 V or 220 V nominal line voltage source at a line frequency between 48 and 72 Hz. The LINE VOLTAGE SELECTOR switch on the rear panel of the DSA allows selection of AC line inputs of 90 to 132 V rms (110 V) or 180 to 250 V rms (220 V).

To apply power to the DSA:

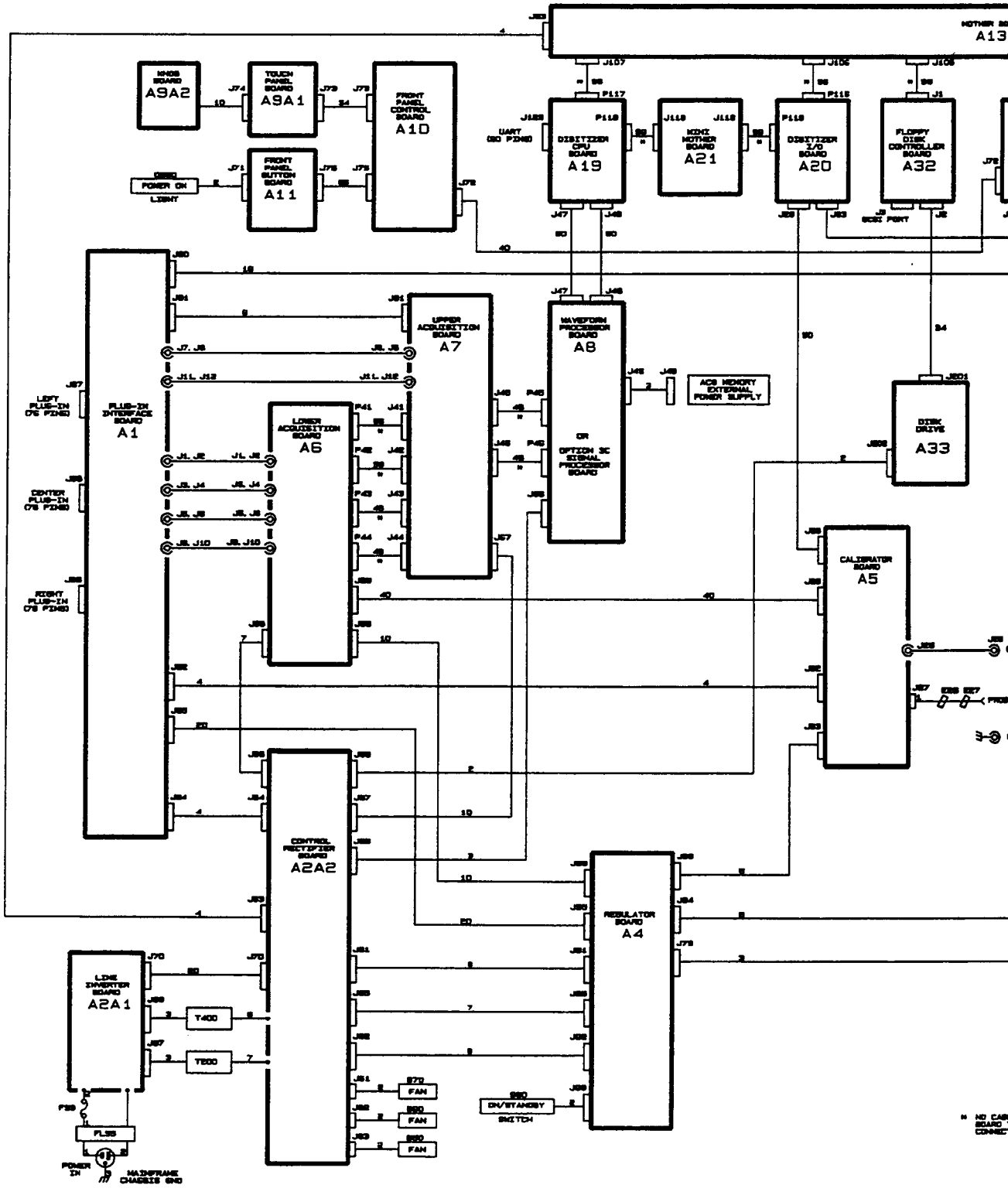
☐ Step 1: Turn the rear panel PRINCIPAL POWER switch to ON.

☐ Step 2: Turn the front panel ON/STANDBY switch to ON.

The small green indicator lamp next to the ON/STANDBY switch should light to indicate that the power is on.

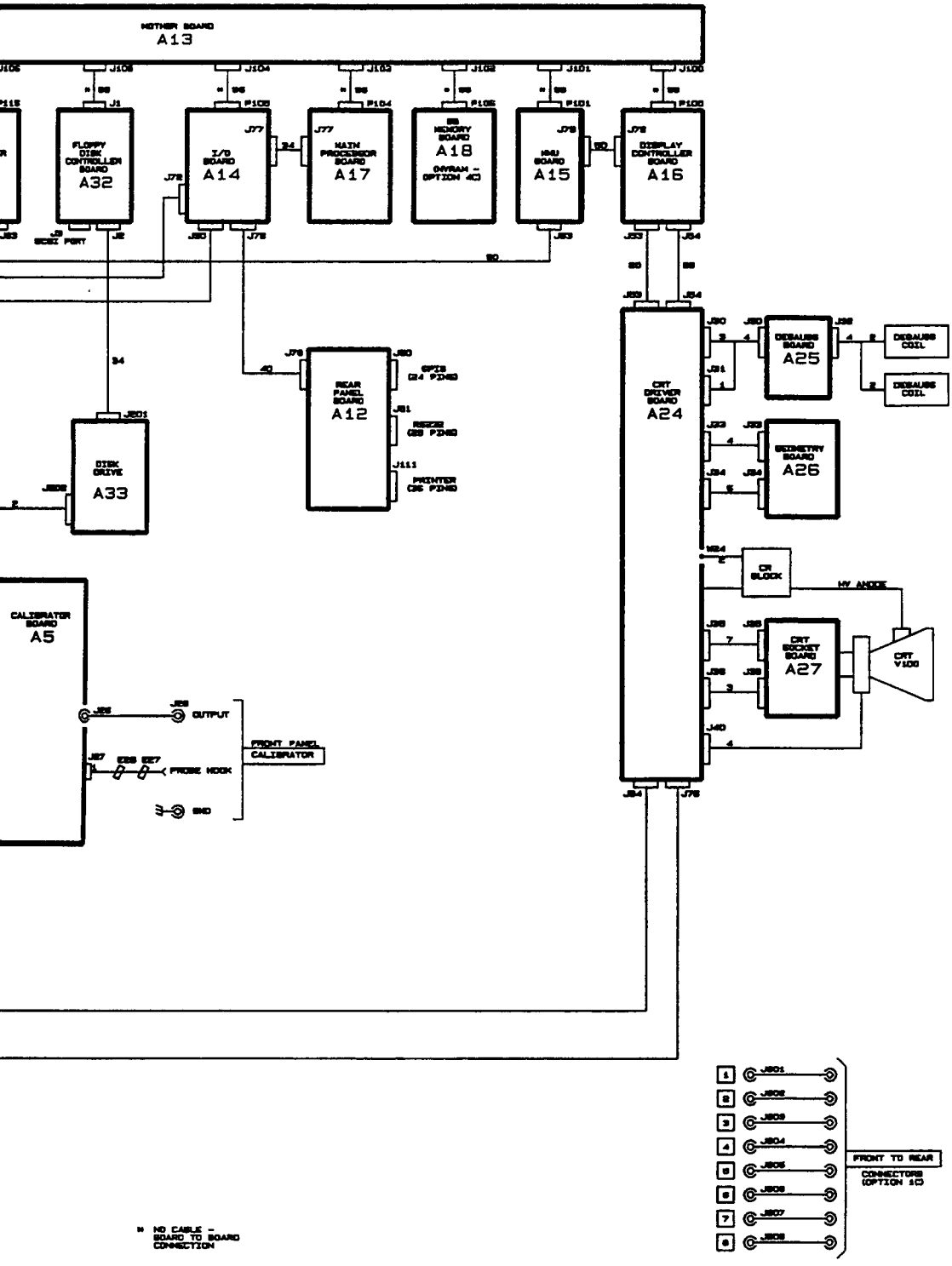
Detailed Block Diagram

This section describes and illustrates the DSA 600 and DSA 600A detailed block (cabling) diagram. (See Figure 4-2).



DSA601A/DSA602A

Figure 4-2 — DSA 600 Series Detailed Bl



CABLING

00 Series Detailed Block (Cabling) Diagram

A1 Plug-in Interface Board

The A1 Plug-in Interface board is the interface between the plug-in units and the other DSA subsystems (Executive, Display, and Digitizer). This board performs the following functions:

- routes signals and voltages within the DSA through the A1 Plug-in Interface board
- busses power supply voltages from the Power Supply module

There are no active components on the A1 Plug-in Interface board.

A4 Regulator Board

The regulators convert semi-regulated voltages into stabilized low-ripple output voltages. The A4 Regulator board consists of the following regulators and the fault-detect circuitry:

- -5 AV
- -5 V
- +5 AV
- +5 V
- -15 V
- +15 V
- -50 V
- +50 V

The regulators use operational amplifiers that require the following supplies:

- a semi-regulated +54 V supply generates +50 V
- a semi-regulated -54 V supply generates -50 V
- a semi-regulated +54 V supply generates +10 V and +20 V
- a semi-regulated -54 supply generates -10 V and -20 V
- a +10.0 V ref is used as a reference voltage

See Figure 4-3 for a block diagram of this board.

The Voltage Fault-Detect Circuitry—consists of two window comparators and associated resistors. This circuitry detects if any regulated supply is over voltage or under voltage. The associated resistors set a hysteresis window that is 5% of the regulator sense line voltages.

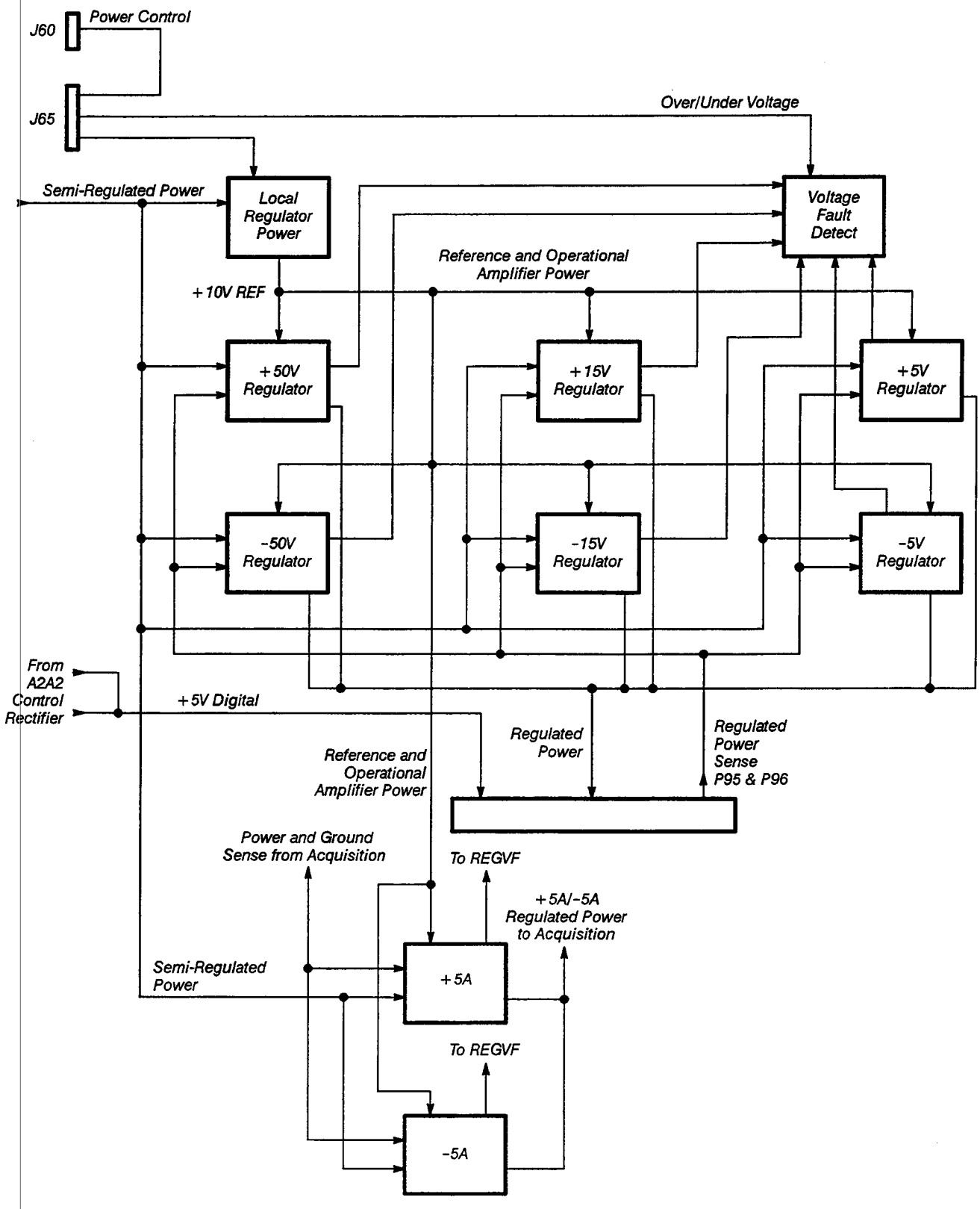


Figure 4-3 — *A4 Regulator Board Block Diagram*

A5 Calibrator Board

The A5 Calibrator board outputs three calibration signals to the front panel calibrator outputs and 48 programmable voltage sources for the analog control voltage system (ACVS). The A5 Calibrator board consists of the following:

- precision DC reference source
- front panel calibrator
- analog control voltage system (ACVS)
- programmable array logic (PAL)
- microprocessor

See Figure 4-4 for a block diagram of this board.

Precision DC reference source—consists of a digital-to-analog converter (DAC), a passive attenuator, multiplexers, buffers, and associated control-logic circuitry. The on-board microprocessor controls the DAC, multiplexers, and control logic. A buffered DC output signal is sent to the front panel calibrator circuitry and the A1 Plug-in Interface board. When a DC signal is applied to the amplifiers, the ground reference of the signal must be the same as the local ground of the amplifiers. To accomplish this, the ground potential in the amplifier is used as a ground reference for the DAC. YCAL, an unbuffered output of the DAC, is sent to the Acquisition system (the A6 Lower Acquisition and A7 Upper Acquisition boards) as a source for the flash analog-to-digital converters (ADCs) CAL inputs during the partial Enhanced Accuracy cycle of the DSA.

Front panel calibrator—provides either a DC, 1 kHz or 1 MHz square wave signal to the front panel BNC connector and probe hook. One collector of the differential pair provides a 1 MHz signal to the front panel, while the opposite collector of a pair provides the same signal to the trigger hybrid on the A6 Lower Acquisition board. These signals are used during the automatic calibration cycle of DSA. A TTL version of the 1 MHz signal is sent to the vertical section of the Acquisition system. This signal is also used during the partial Enhanced Accuracy cycle of the DSA. You can select a front panel output impedance of 50 Ω (1 MHz square wave) or 450 Ω (1 kHz square wave).

Analog control voltage system (ACVS)—is part of the circuitry which provides 48 programmable voltage sources that replace the function of front panel potentiometers and internal adjustments. A 12-bit DAC generates the 48 multiplexed voltages. These voltages are then sent to the Acquisition system. The microprocessor receives request for voltage changes from the Digitizer processor, and controls the DAC inputs.

Programmable array logic (PAL)—is responsible for decoding several control signals which are then sent to the Acquisition system. These control signals must be changed dynamically. The microprocessor cannot perform these functions due to restrictions on throughput.

The PAL also generates a control bit which then either clocks data into the read latch or enables the write latch.

The final function of the PAL is to read back an identifier bit which determines the type of DSA (DSA 60X or DSA 60XA). This data bit is read back on the D0 data line of the Digitizer bus.

Microprocessor—performs three major functions to control the A5 Calibrator board. The first function is to act as a sequencer in providing the 48 control voltage bytes to the ACVS DAC and control logic. The second function is to provide a byte of information for the precision DC reference DAC and the appropriate control logic for the attenuators and latches. The third function is to execute commands sent by the Digitizer processor.

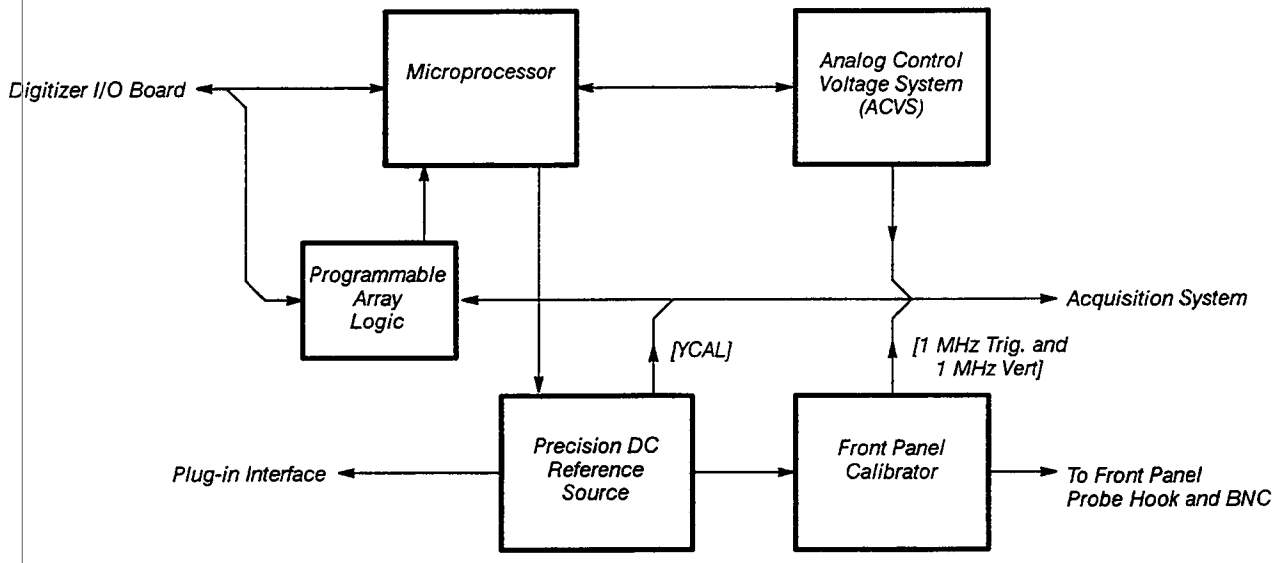


Figure 4-4 *– A5 Calibrator Board Block Diagram*

A6 Lower Acquisition and A7 Upper Acquisition Boards

The Acquisition system of the DSA consists of the A6 Lower Acquisition board and the A7 Upper Acquisition board.

The A6 Lower Acquisition board consists of the following major blocks:

- programmable control voltages
- flash ADCs (two on the DSA 601 and four on the DSA 602)
- utility (two on the DSA 601 and four on the DSA 602)
- demux (two)
- precision DC reference board and fast rise source

The A7 Upper Acquisition board consists of the following major blocks:

- triggers (one main and one window)
- time interpolators (one main and one window)
- programmable control voltage sources
- clock driver circuitry
- demux (two on the DSA 602)
- pseudo random voltage generator
- sweep controller

See Figures 4-5 and 4-6 for block diagrams of these boards.

Triggers—The trigger hybrid receives and processes analog signals from the left, center, and right plug-in compartments, and the line trigger from the power supply. An internal channel switch provides a signal to one input of the trigger comparator (the trigger level you select is applied to the other input). The output of the trigger comparator is applied to the trigger gate latch, which the holdoff signal from the sweep controller resets and enables. The trigger gate latch outputs initialize the time interpolators. The trigger hybrid also provides conditioning of the signal you select (i.e., HF Reject, LF Reject, etc.).

The time interpolator—measures the time between the trigger gate and the sampling clock during each acquisition cycle. This time is then converted to a 10-bit data word which is sent to the sweep controller. This allows for the time placement of an acquisition into the correct location within the waveform record.

Programmable Control Voltages—are required for the Enhanced Accuracy feature of the DSA. The circuitry that provides these control voltages utilizes the multiplexed analog voltages and the select and enable signals generated on the A5 Calibrator board. Various control voltages are then generated by sample/hold circuits, level shifters, gain and attenuator stages, and buffers.

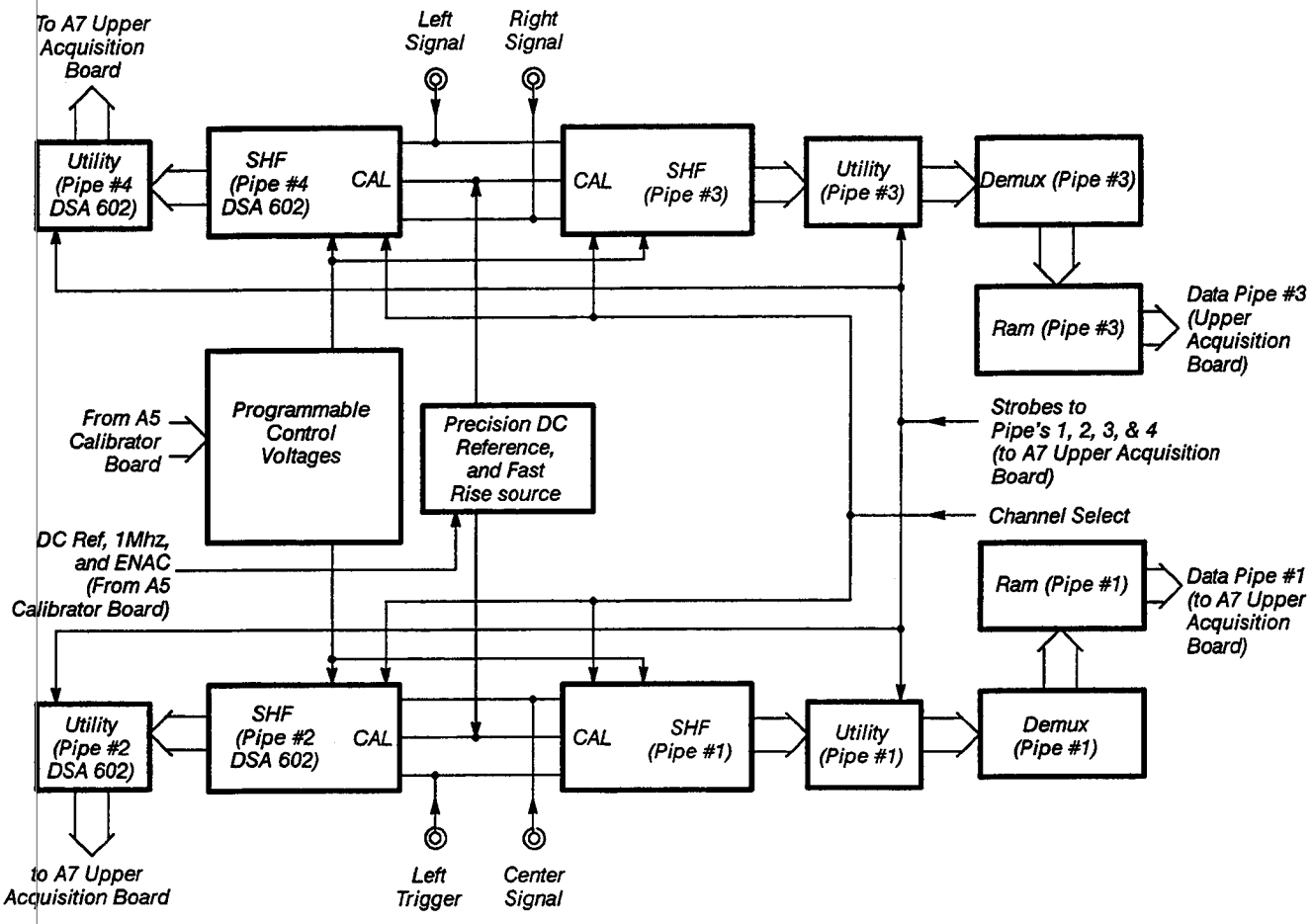


Figure 4-5 — A6 Lower Acquisition Board Block Diagram

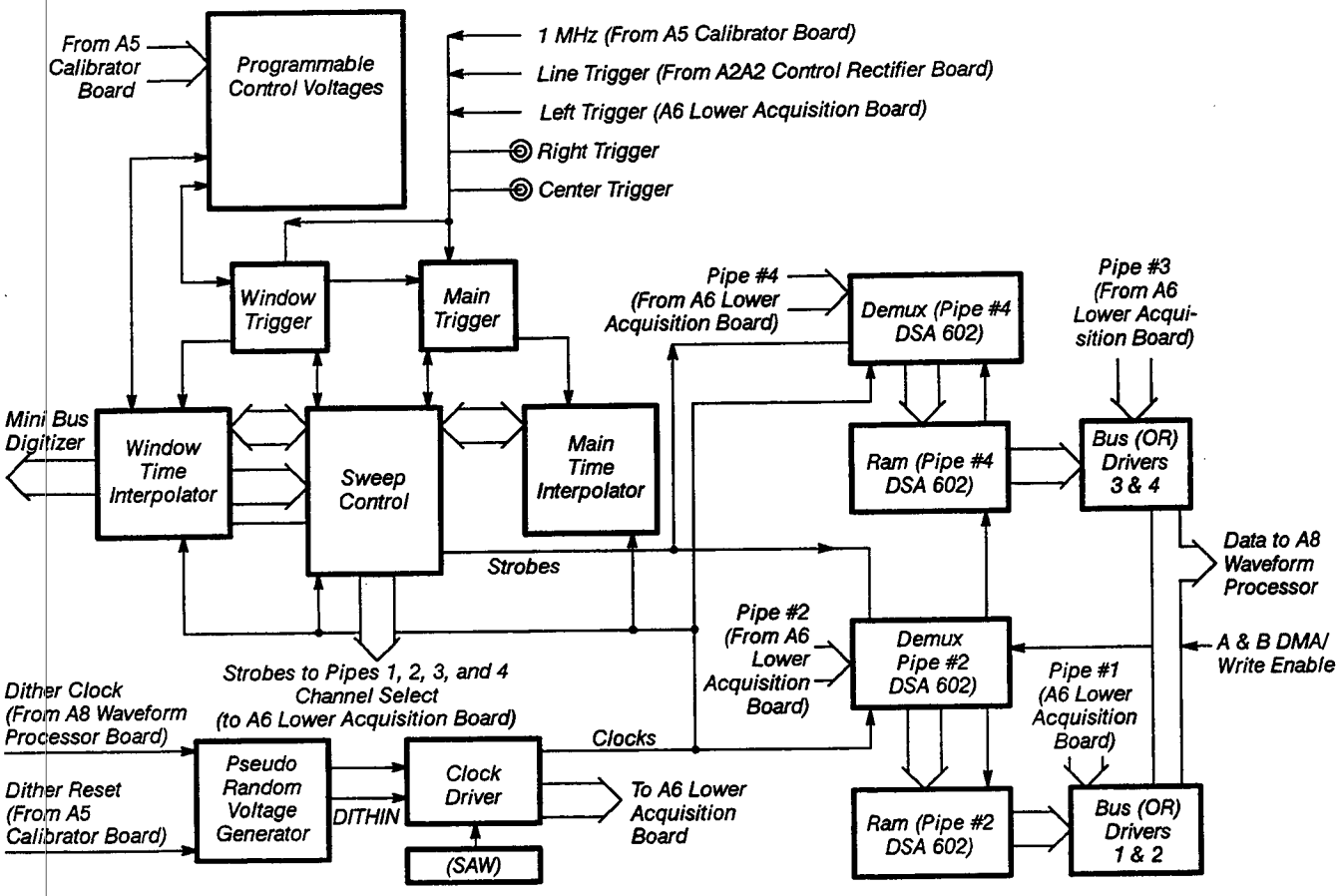


Figure 4-6 — A7 Upper Acquisition Board Block Diagram

The clock driver circuitry—provides all of the system clocks for the SHF, utility, demux, time interpolator, and sweep controller. The clock driver also provides the phase adjustment of the appropriate clocks. This is necessary to obtain the gate interleave alignment of the various acquisition pipes (pipes 1 and 3 for the DSA 601, and pipes 1 through 4 for the DSA 602). DITHIN (an input which drives the pseudo-random voltage generator circuitry) changes the phase of the system clocks. This reduces the probability of your signal synchronizing with the system clock.

Sample/Hold and Flash IC (SHF)—converts two samples of the selected signal to a pair of 8-bit digital values. Each byte of the pair represents data from one of two internal 250 MHz ADCs. A channel switch at the input selects one of three signals: the two signals from the plug-in compartments or the CAL input signal. The selected signal is applied to a pair of track/hold circuits through a buffer. The polarity of one of the 250 MHz strobes driving the track/hold circuits is inverted; consequently shifting the phase of one converter by 180 degrees. When the samples of the pair of track/hold circuits are summed and interleaved, a sample rate of 500 MSamples/s is obtained.

The Utility—phase-aligns the two 8-bit digital signals from the flash ADC to the 500 MHz system clock, interleaving and outputting the pair of 250 Megabyte signals from the SHFs to the demux at a 500 Megabyte rate. The utility also limits the digital signal range of the input data.

The demux—sub-samples the 500 MHz data from the utility, and then demultiplexes it into high speed RAM. The demux sub-samples the data from the utility according to the sample strobes that supply the sweep controller. The demux buffers ten samples of the input data twice and writes those ten samples into the high speed RAM simultaneously. When data is transferred out of the high speed RAM into the signal processing memory, the demux acts as a slave to the controller, controlling address and select lines.

The pseudo-random voltage generator—generates a random DC voltage to the clock driver DITHIN input upon the completion of each acquisition cycle. The purpose of these voltages is to provide phase dithering. A PAL, which is configured as a circular shift register, generates 8-bit random data. This 8-bit data drives an ADC which level-shifts and buffers the output to provide the necessary DC levels.

The precision DC reference and fast-rise source—provides differential precision DC and step signals to the CAL inputs of the four acquisition flash ADCs. During the Enhanced Accuracy state of the DSA, these signals adjust the DC gains, DC offsets, and phase alignments of the acquisition pipes.

Sweep Controller—performs two major functions: sub-sample strobe generation and trigger control. Sub-sample strobes are generated at a rate determined by the Digitizer processor, using an algorithm that takes into account such factors as the user-selected acquisition sample rate, the desired record length(s), and whether or not a window is enabled. The trigger control circuitry performs several functions: generation of hold-off for Main and Window trigger, holdoff by time, delay by events, two-channel Boolean triggering, and pulse-width triggering. The sweep controller operates under the control of the Digitizer processor.

A8 Waveform Processor Board

The A8 Waveform Processor board consists of two Tristar signal processors. These signal processors process data and control the operations of other ICs. Each signal processor is capable of accessing either data memory. The A8 Waveform Processor board consists of the following functional blocks:

- signal processors (two)
- instruction memory (two)
- data memory (two)
- serial loop interface
- demux interface
- sweep controller interface
- trigger controller
- sample/hold control

See Figure 4-7 for a block diagram of this board.

The signal processors—alone can obtain the waveform points from the Acquisition system. After the signal processors complete the transfer of the waveform points to the data memories, the Digitizer processor can then transfer those waveform points to the A15 MMU board. The signal processors may perform processing operations on the waveform points before the Digitizer processor transfers them to the A15 MMU board.

The signal processors, unlike many processors which have a single data bus for both data and instruction, have two independent data busses and an instruction data bus. The two data busses, data bus 1 and data bus 2, are data/address multiplexed. Control signals must latch the address from these data busses at the beginning of the cycle. Each data bus has a set of control signals to direct the flow of the data.

The signal processors on this board appear as slaves to the Digitizer processor. Signal processor 1 has a priority over signal processor 2. Because the Digitizer processor is a master, it has a higher priority than either signal processor. This priority scheme determines which processor is allowed to access the bus during the bus request cycle.

Interrupts—Both signal processors have the capability to interrupt the Digitizer processor. The Digitizer processor is also capable of interrupting either signal processor.

Instruction Memories—consist of six 8 K × 8 System RAMs (SRAMs). The six SRAMs are divided into two sets (or banks) of three SRAMs, allowing the signal processor to access 3 bytes of an instruction at a time. Instructions are 6-byte words, and the processor accesses the SRAMs twice on each processor cycle.

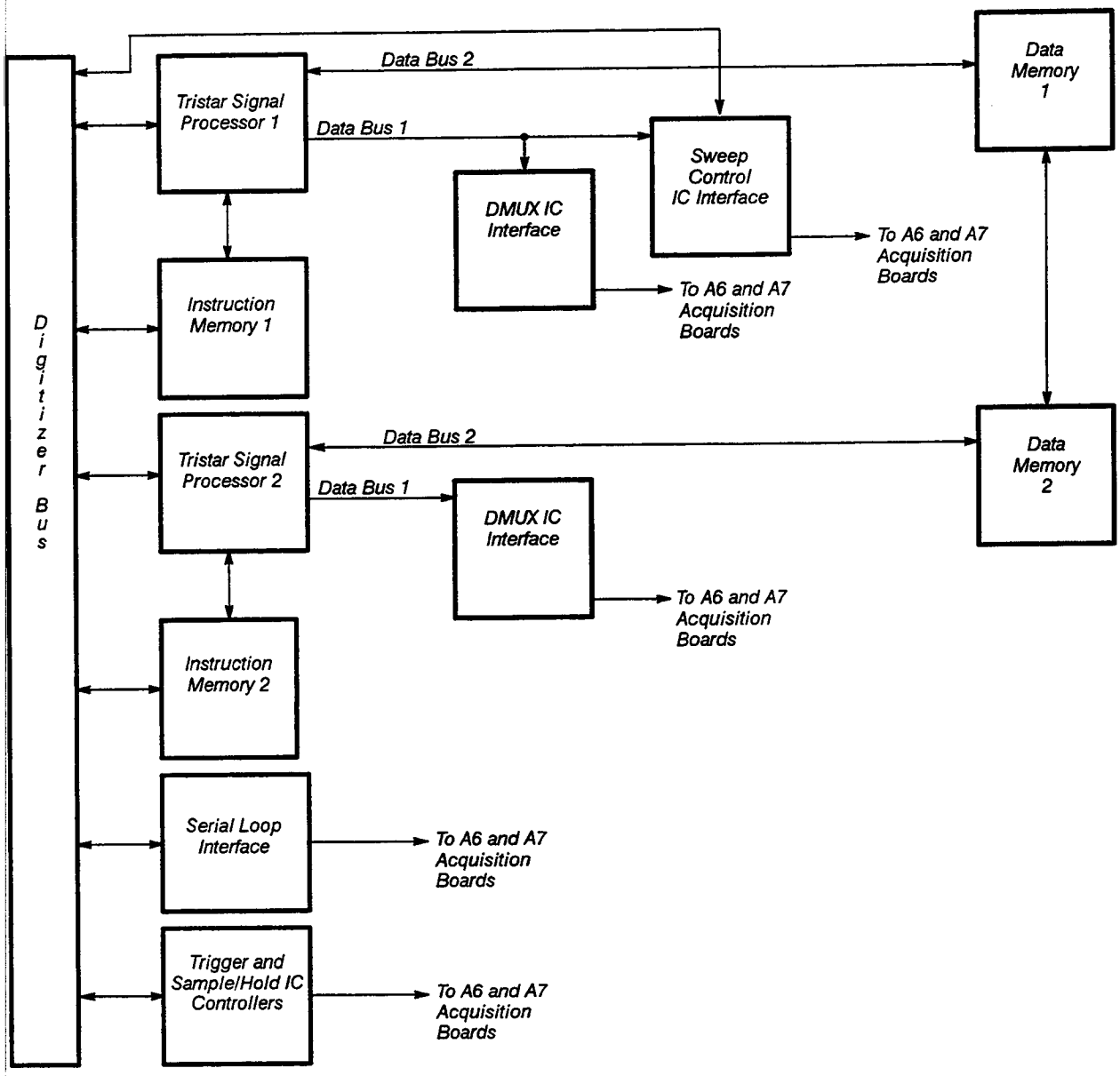


Figure 4-7 *— A8 Waveform Processor Block Diagram*

The Digitizer processor has complete access to the instruction memories. At power-on, the Digitizer processor loads the signal processor instructions to the instruction memories.

Data Memory—is also called the signal processor memory, and is divided into data memory 1 and data memory 2. Each Data Memory consists of four pair of RAMs.

Signal processor 1, signal processor 2, and the Digitizer processor can access this memory. Each signal processor accesses Data Memory through its data bus 2. When the Digitizer processor accesses either Data Memory, the bus request signals are asserted to both signal processors. The Digitizer processor accesses Data Memory when both signal processors acknowledge the requests.

The serial loop interface—to the demux, utility, and sweep controller, is directly controlled by the Digitizer processor. The interface is through a one-bit serial loop data line and a serial loop clock. During the processor write cycle to the serial loop, data is enabled into the serial loop data line and serial loop clock through a TTL to ECL converter. During the Digitizer processor read cycle to the serial loop, the processor reads the data from the ECL to TTL converter, but does not enable the serial loop clock.

The demux interface—links the demux of the Acquisition system to the signal processors. The signal processors read the acquisition data from the Acquisition system by generating DMA strobe(s) to the Demux. The DMA strobe(s) is (are) generated during the signal processor read cycle by decoding the appropriate addresses. Only one of the DMA strobes from each signal processor may be asserted at a time, except during a flush cycle. Data will be corrupted if pipes 1 and 2, or pipes 3 and 4 are asserted simultaneously. Assertion of both the Main and the Window DMA signals simultaneously is not valid.

The sweep controller interface—allows access to the sweep controller from both the Digitizer processor and from signal processor 1. A select signal determines which of the two processors can access the sweep controller. This signal selects the Digitizer processor when low and signal processor 1 when high.

The trigger controller—controls the trigger clocks and the trigger slope select signals to the trigger hybrids. Each time the Digitizer processor writes to the A or the B trigger clock location, a pulse for the respective trigger clock is generated to clock the data to the trigger hybrid. During a read cycle, a signal for the A and B trigger clocks enables the respective trigger data to the Digitizer processor.

The sample/hold control—stores the sample and hold control signals. When the Digitizer processor writes to the sample and hold register, the signal will be asserted to load a new set of control signals into the register.

A8 Signal Processor Board (Not available for DSA 600A.)

The A8 Signal Processor board acquires waveform data from the acquisition system, and then processes this data for the Digitizer processor. The A8 Signal Processor board contains the following:

- high speed DMA circuitry
- DMA control circuitry
- DMUX control circuitry
- signal processor RAM
- serial loop interface
- sweep control IC interface
- trigger, flash, and sample and hold control

See Figure 4-8 for a block diagram of this board.

If your DSA is equipped with Option 3C, the A8 Signal Processor board replaces the A8 Waveform Processor.

High-speed DMA circuitry—acquires the digitizer data from the Acquisition system, and then places this data in the signal processor RAM. The Digitizer processor can access the digitizer data once it is placed in the signal processor RAM.

The high speed DMA consists of the Memory Address Register (MAR), the Word Count Register (WCR), the Address Increment Register (AIR), the Mode Register (MR), and the DMA control circuitry.

- **MAR**—is a set of registers that store the lower 16-bit address, which is sent to the signal processor RAM. The Digitizer processor or the DMA control circuitry can latch data into the MAR during the DMA cycle.
- **WCR**—is a set of counters that store the number of samples or data to be transferred from the Acquisition system to the signal processor RAM. The Digitizer processor writes to the WCR location to load the WCR with the number of transfers.
- **AIR**—is a set of registers that store the number of addresses to be added to the MAR after each DMA transfer. The Digitizer processor asserts the appropriate control signals to access the AIR.
- **MR**—register selects which DMUX strobe(s) is(are) to be asserted during the DMA cycle. The Digitizer processor asserts the appropriate control signals to access the MR.

The DMA Control Circuitry—can either be in program mode or in DMA mode. It is in program mode when the DMODE signal is low and DMA mode when the DMODE signal is high. The Digitizer processor can set the DMA registers when the DMA is in the program mode. After the setup is completed, the Digitizer processor can issue a Start DMA command to change the DMODE signal to the DMA mode and start the DMA transfer.

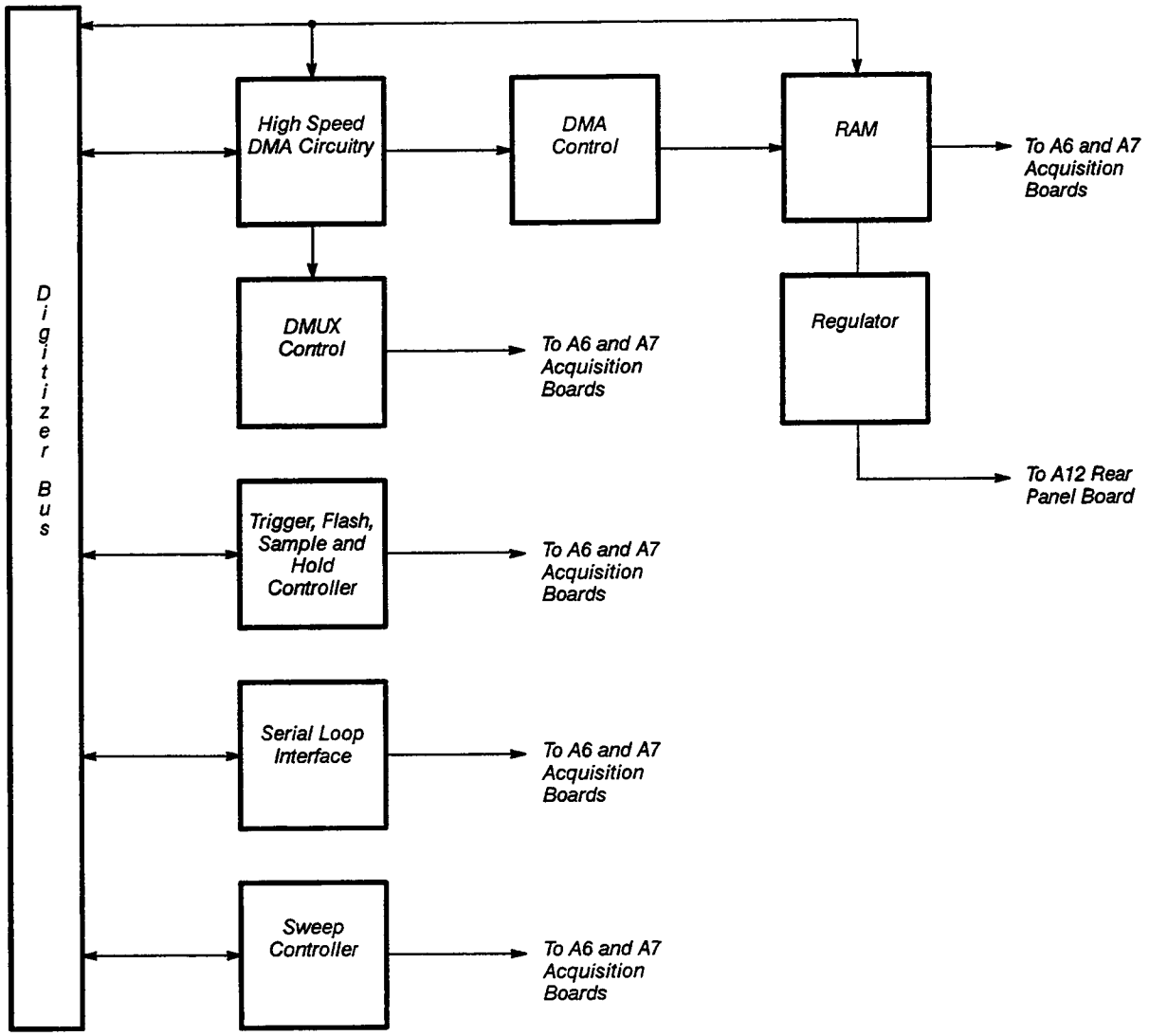


Figure 4-8 *— A8 Signal Processor Board Block Diagram*

The DMA control circuitry acquires the digitized data from the Acquisition system and deposits it in the signal processor RAM during the DMA mode.

The DMA can be set to acquire data from both digitizer channels (that is, the control circuitry can acquire data from the Digitizer pipes 1 and 3, or 2 and 4). The 8-bit digitized data from each digitizer channel is converted to the 16-bit format before being placed into the respective signal processor memories.

Acquiring data from only one of the two digitizer channels is similar to acquiring data from both channels described above, except that in this case only the data from the selected channel is loaded into the signal processor memory.

The Demux Control Circuitry—generates strobe signals to the Acquisition system. The data is then loaded into the signal processor RAM through the high speed DMA control circuitry.

The signal processor RAM—contains 512 kilobytes of RAM that is divided into two 256 kilobytes signal processor memories: one for the digitizer channel 1 (or Digitizer pipes 1 and 2) and the other for the digitizer channel 2 (or Digitizer pipes 3 and 4). This scheme allows the DMA to acquire data from both digitizer channels and deposit the data into the corresponding memories concurrently. The Digitizer processor can access either of the two memories when the DMA is in program mode. In DMA mode, the DMA deposits the digitized data into these two memories.

The serial loop interface—to the demux, utility, and sweep controller, is directly controlled by the Digitizer processor. The interface is through a one-bit serial loop data line and a serial loop clock.

The sweep controller interface—uses the digitizer bus to interface the sweep controller to the Digitizer sub-system. When the Digitizer processor accesses the sweep controller, the chip select is asserted. The chip select controls the data transfer between the Digitizer processor and the sweep controller.

The trigger, flash, and sample/hold controller—contains clocks for the trigger hybrid, sets the trigger slopes, and controls the flash and sample/hold ICs.

The regulator—converts the +5 V to +24 V DC input from the rear panel to back-up voltage. The back-up voltage sustains the contents of the signal processing RAM in the event of a power failure.

A9, A10, and A11 Front Panel Boards

The A9, A10, and A11 Front Panel circuits consist of the following:

- A9 Touch Panel assembly
- A10 Front Panel Control board
- A11 Front Panel Button board

The touch panel, major menu keys (hard keys), and menu status LED all interface to the EXP through a general purpose programmable keyboard and display controller IC on the A10 Front Panel Control board. The keyboard function of this IC handles the touch matrix and hard keys. The display function drives the menu LED light bars.

The A9 Touch Panel assembly—is composed of infrared LEDs that produce a matrix of light beams. When you touch a particular touch zone on the display, the light beams are interrupted by your finger. The touch panel is scanned continuously until such an interruption is detected. When an interruption is detected, or a key is pressed, that scan is complete, and the display controller asserts the respective interrupt line. During this time, the interrupt is active and no new data is written into the sensor RAM from the touch panel or hard keys, even though the hardware continues to scan; therefore, the data will remain stable in the sensor RAM while the microprocessor is in the process of reading this data.

Only one infrared LED is turned on at a time, and only the phototransistor directly opposite is selected to receive light. This prevents any crosstalk between emitter/detector pairs.

The A10 Front Panel Control board—generates the 6-bit address bus that selects an infrared LED and its corresponding phototransistor on the A9 Touch Panel board.

The A11 Front Panel Button board—is composed of the major menu LED light bars, which is driven by the display refresh register output of the keyboard and display controller IC. Internally, the light bars are display RAM organized in an 8-bit by 8-bit matrix. This display RAM is scanned column by column (automatically), lighting the appropriate LED bar(s) when a high bit is encountered. A latch, controlled by the EXP, drives the coarse/fine LEDs. The **coarse/fine** selections are sensed on the A9 Touch Panel board.

A12 Rear Panel Assembly

The A12 Rear Panel assembly links the DSA to other devices. This assembly contains connectors for the following:

- one GPIB port
- one RS-232-C port
- one PRINTER Port (Centronix style)

The A12 Rear Panel assembly is controlled from the A14 Input/Output (I/O) board through a 40-wire cable. This cable contains the following:

- an 8-bit bidirectional data bus
- a four-bit address bus
- four interrupt lines
- a GPIB DMA request and grant lines
- four device control lines
- assorted power supply and ground lines

See Figure 4-9 for a block diagram of this assembly.

The GPIB port—drives the GPIB controller directly. The GPIB controller determines if the microprocessor is attempting a read or write. The interrupt controllers in the A17 Main Processor board monitor this interrupt line and signal the microprocessor to service the GPIB controller if an interrupt occurs. The GPIB controller requires that the:

- receiver section of the GPIB controller has one byte of data from the GPIB bus that the microprocessor must read
- transmitter section register is empty and is ready to receive another byte of data
- microprocessor notification if the status of the GPIB or the GPIB controller has changed

On the other side of the GPIB controller is another bus system. This other bus system includes an 8-bit data bus which accesses a directional GPIB data buffer, and an eight-bit control bus which accesses a GPIB control driver. The GPIB bus is connected to the opposite side of the buffer and control driver. These two devices are specially designed to be TTL signal-level compatible on the bus side of the buffer driver.

The state of three control signals from the GPIB controller are monitored and displayed on the rear panel of the DSA. These LEDs show the state of the GPIB controller, not the state of the GPIB.

Two other significant signals are GPIB REQ and GPIB GR. The DMA controller on the A17 Main Processor board uses these signals to communicate with the GPIB controller (if the DMAC IC is installed). The microprocessor can program the DMA to service either the receiver section or the transmitter section.

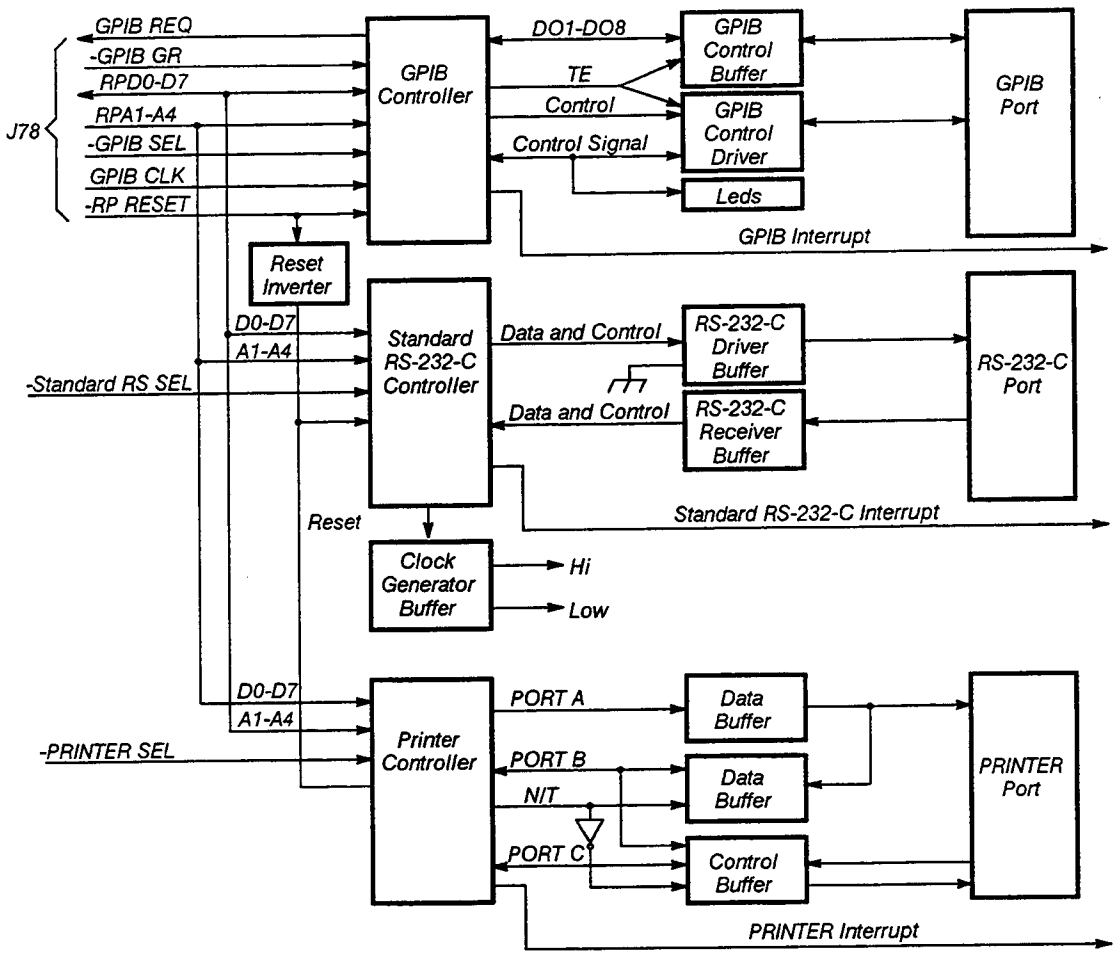


Figure 4-9 — A12 Rear Panel Assembly Block Diagram

The standard RS-232-C controller—is connected to the same data bus and address bus as the GPIB controller. The RPD0-D7 address lines transfer data to and from the microprocessor. The microprocessor uses the RPA1-A4 address lines to select individual registers in the standard RS-232-C controller. The STD RS SEL line becomes low when the microprocessor is attempting to communicate with the RS-232-C controller. (This line also drives the Chip Enable.)

The microprocessor drives the RD and WR signals if the controller is to be read or written into. The standard RS-232-C controller sets the STD RS INTR (interrupt) line low to request service from the microprocessor. The microprocessor writes a byte into the driver buffer of the controller to transmit data on the RS-232-C bus. The microprocessor reads a byte from the receiver buffer to receive data from the RS-232-C bus. The microprocessor can also read the status of the controller. The RS-232-C controller translates the parallel data from the microprocessor to serial data for the RS-232-C bus, and also converts serial data from the RS-232-C bus to parallel data for the microprocessor.

The PRINTER port – is controlled by a programmable peripheral interface IC. This IC has all the control lines for connecting the port to a microprocessor, plus two general purpose 8-bit ports and the control signals to use these two ports. The A12 Rear Panel Assembly Data bus and Address bus connect to the IC and have the same function as described for the GPIB and RS-232-C controllers. The microprocessor sets the PRINTER SEL line low when it is communicating with the interface. The RD and WR lines allow the microprocessor to either read or write to the registers in the programmable peripheral interface IC. The microprocessor must initialize this IC for Port A to be a strobed input port. Port C provides the control signals.

A13 Mother Board

The A13 Mother board provides the interconnection for the microprocessor signals and the +5 V digital power between the following boards:

- A14 I/O board
- A15 MMU board
- A16 Display Controller board
- A17 Main Processor board
- A18 BB Memory board
- A19 Digitizer CPU board
- A20 Digitizer I/O board
- Disk Controller board (DSA 600A only)

A14 Input/Output (I/O) Board

The A14 I/O board consists of the following:

- data buffers
- timer configuration circuitry
- real time clock
- serial data interface (SDI)
- temp/tone readback buffer
- tone generator

The A14 I/O board is an interface between the EXP and the communications ports (for example, RS-232-C), devices on the A9, A10, and A11 Front Panel circuit boards, the A12 Rear Panel assembly, and the plug-ins. The EXP reads and writes to these I/O devices and the communication ports at specific I/O addresses. These I/O addresses are decoded to produce device select signals which enable the addressed device. Each I/O device is located on I/O address boundaries of at least 100_{hex}.

The lower eight bits of the Executive data bus transmit data to and from the various I/O devices and to read their statuses. Note that only one I/O device can be accessed at a time.

When the DMA controller is installed on the A17 Main Processor board, the A14 I/O board alters how it handles GPIB operations.

See Figure 4-10 for a block diagram of this board.

The I/O data buffer—buffers the lower eight bits of the Executive data bus from P105. The output of the I/O data bus drives data to six different on-board devices, including:

- I/O delayed data buffer
- rear panel data buffer
- front panel data buffer
- tone generator
- tone/temp readback buffer
- timer configuration circuitry

The I/O delayed data buffer—interfaces between the I/O data bus and the Write Delayed data bus.

The timer configuration circuitry—is composed of a latch and three two-input data multiplexers built with discrete gates. When the data on the I/O data bus is latched, some of the latched bits individually configure counters 1 and 2; allowing the timer to accept different inputs for different system tasks. The operating system uses Counter 0 as a real-time clock based on the 2 MHz CLK input from the clock generator, which is always on.

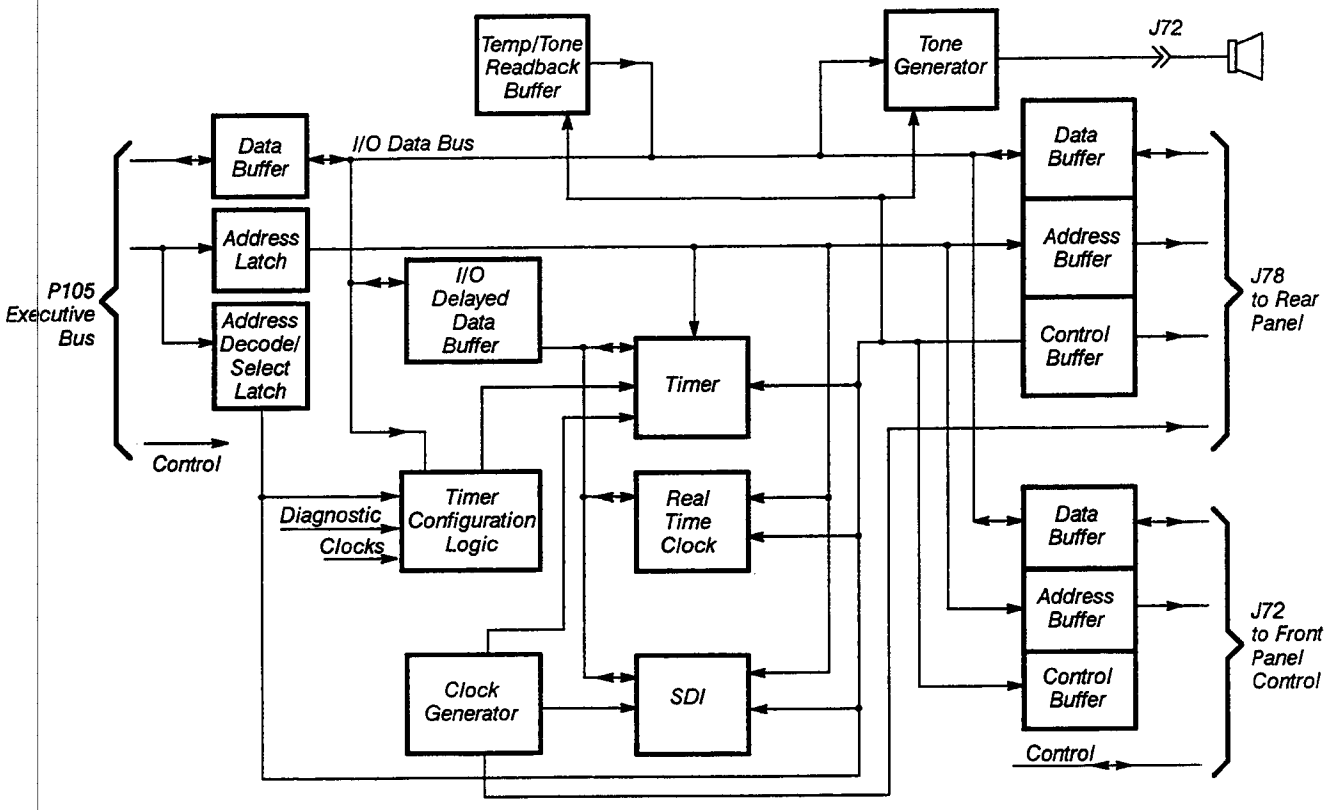


Figure 4-10 — A14 I/O Board Block Diagram

The real time clock—and its oscillator circuitry maintain the current time of day. The EXP sets and reads the real time clock.

The serial data interface (SDI)—is a custom IC that interfaces the EXP with the three plug-in compartments and both front panel knobs. The EXP controls this IC, and this IC interrupts the EXP when a device requires service.

The temp/tone generator—is based on a 555 timer with a special current driver to set the timer's frequency. The timer outputs a square wave. The frequency of the square wave is inversely proportional to the digital value written to the temp/tone DAC. Thus, if a zero value is input into the DAC, the temp/tone generator produces the highest tone.

The temp/tone readback buffer—is an eight-line buffer connected to the I/O data bus, and the EXP uses this buffer to monitor the temp/tone generator.

A15 Memory Management Unit (MMU) Board

The A15 MMU board consists of the following:

- MMU gate array
- status and mode register (SMR)
- display interface
- digitizer interface
- executive processor interface

The A15 MMU board coordinates communications among the following three DSA subsystems:

- Display
- Digitizer
- Executive

The MMU gate array controls each interface with a different set of handshaking and buffer control lines. This board also contains buffers for each interface and two banks of DRAMS for waveform memory, address decode/select circuits, and integrated diagnostic control circuitry. To perform transfers, the EXP sets bits in a control register called the status and mode register (SMR). It must also load addresses and byte count information into either the sequential address generator (SAG) or the random address generator (RAG), which reside within the MMU.

See Figure 4-11 for a block diagram of this board.

The MMU gate array—controls all data transfers to and from waveform memory. The MMU gate array controls high-speed transfers of waveform data and communication messages between waveform memory and the three subsystem interfaces (Display, Digitizer and Executive processors). A set of handshaking lines, designed to the DMA facilities of each particular subsystem, coordinates each subsystem interface.

Through the status and mode register (SMR)—the EXP controls the MMU gate array located at the EXPs I/O address: 1860$_{hex}$. Upon power-on, the EXP must initialize the SMR to enable transfers between waveform memory and the Display subsystem (bits 0 and 1), and the Digitizer subsystem (bits 5 and 6). When set, bit 7 allows the EXP to access the normally inaccessible registers, which are associated with the RAG, SAG and refresh counter.

Through the Display interface—data is transferred to and from the display through the A16 Display Controller board on a 16-bit data bus (Y0-Y15). These data transfers use the SAG to specify the destination or source addresses in waveform memory. Data is buffered with the bi-directional Display data buffers for even and odd bank waveform memory accesses.

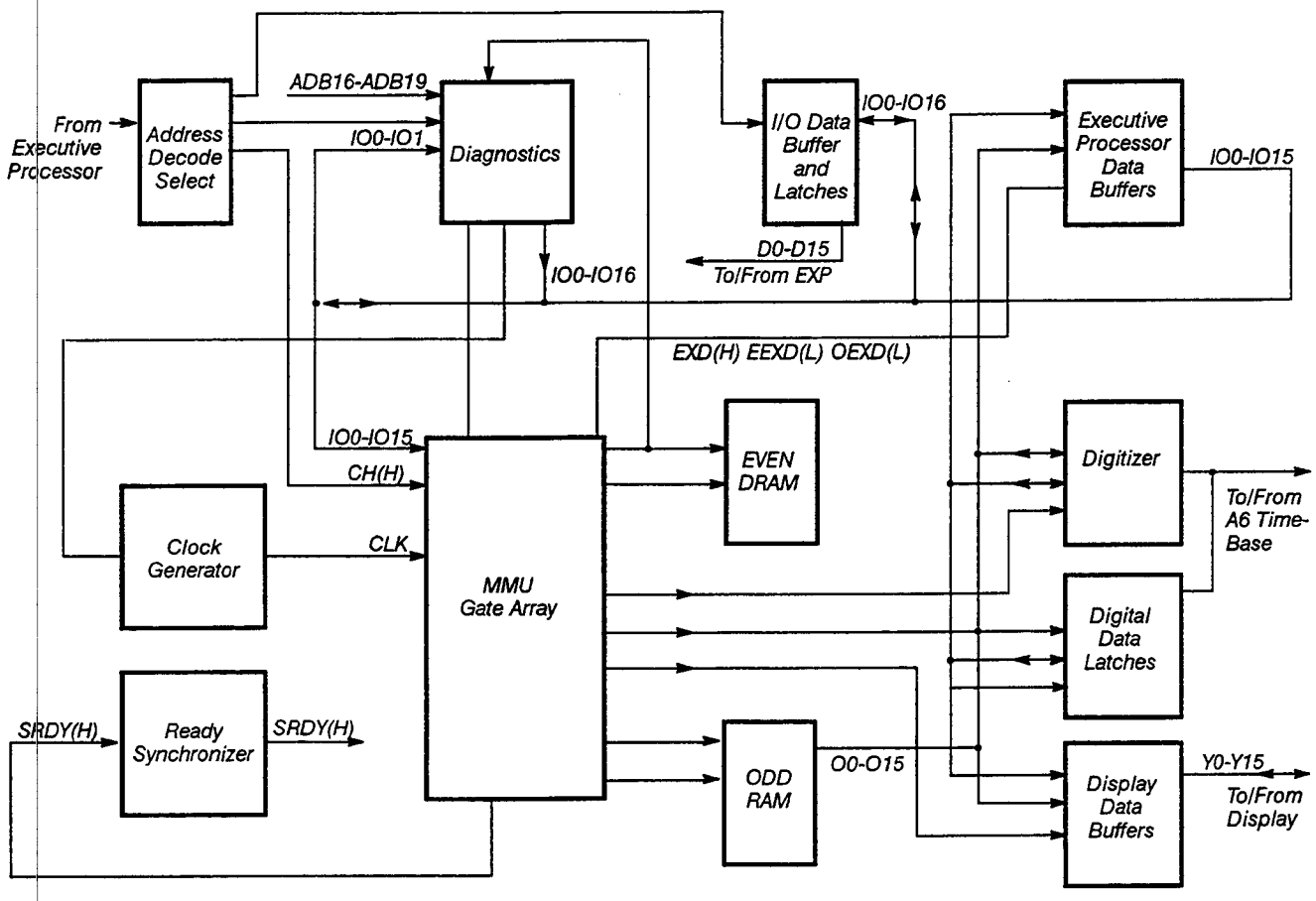


Figure 4-11 – A15 MMU Board Block Diagram

Through the Digitizer interface – data is transferred to and from the Digitizer processor on a 20-line multiplexed address/data bus coordinated by dedicated handshaking lines. For transfers to waveform memory, the Digitizer processor sends a 20-bit address, then a 16-bit data word. During transfers from waveform memory to the Digitizer processor, only 16-bit data words are sent (while the MMU gate array's SAG provides the addressing for waveform memory).

This interface also consists of address, data, and status/control inputs, EXP interrupt outputs, and a data ready output.

The Executive processor interface – performs the following two main functions:

- provides the EXP access to waveform memory for passing subsystem messages and manipulation of waveform record data
- provides access to the status mode register (SMR) and the diagnostic facilities, allowing the EXP to coordinate system operation

A16 Display Controller Board

The A16 Display Controller board is composed of hardware and firmware, which allow the Executive processor to present trace and other displays quickly and accurately. The hardware consists of the following:

- Display IC
- microprocessor
- bit map RAM
- Display RAM

The Display RAM, whose description follows, is the only hardware that configures displays. The firmware places all display elements that are placed into the bit map.

See Figure 4-12 for a block diagram of this board.

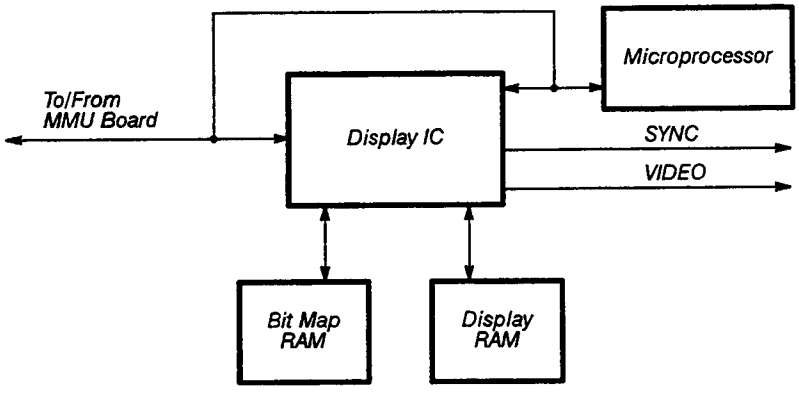


Figure 4-12 *— A16 Display Controller Board Block Diagram*

The Display IC — consists of the following three functional circuits.

- CRT controller
- video memory interface
- compressor circuit

The CRT controller is implemented with a VLSI IC. The basic function of the CRT controller is to produce VIDEO and SYNC signals that indicate to the CRT where to position video information. The controller is virtually automatic in operation and invisible to the firmware programmer, with the exception of several internal registers that must be initialized at power-on.

The video memory interface is where the hardware recognizes and displays specific data structures, while the raster-scan displays the contents of the bit map. During the refresh of the screen, the hardware acquires bit map data and combines it with display data, yielding a final color index.

The compressor circuit provides 512 pairs of data points to the display. The A15 MMU board always provides 512 groups of data points, comprised from a possible 32,768 data points, to the compressor circuit. Hence, the name compressor, since the compressor reduces its groups of input data points to pairs of data points.

The microprocessor—transforms the entire Display subsystem into an intelligent peripheral dedicated to operating the display. The firmware that controls the Display subsystem executes from ROM in the microprocessor's address space. The clock for this microprocessor operates at a frequency of 8 MHz.

The bit map RAM—consists of 196,608 bytes of RAM, divided into three bit planes of 65,536 bytes each. Each bit in a plane represents a single pixel of the display. Setting the representative pixel bit in each of the planes controls the color of the pixel.

The Display RAM—consists of 65,536 bytes. These bytes contain minimum/maximum pairs of values, along with color index information, and overrange/underrange settings.

A17 Main Processor Board

The A17 Main Processor board consists of the:

- Executive processor (EXP)
- numeric co-processor circuitry
- bus controller circuitry
- reset circuitry
- wait state circuitry
- EPROMS
- interrupt controllers
- DMA

See Figure 4-13 for a block diagram of this board.

The Executive processor (EXP)—executes firmware routines stored in EPROMs located on the A17 Main Processor board and the A18 BB Memory board to effectively control the operation of the DSA. When power is first applied to the DSA, the EXP executes local and system diagnostic tests, which are located in the EPROMs on the A18 BB Memory board.

The EXP performs these functions with three main circuits:

- the clock generator generates the timing signals and synchronized reset signals for the microprocessor
- the microprocessor reads and writes data, generates addresses for I/O and memory devices, and also generates status signals for the bus controller

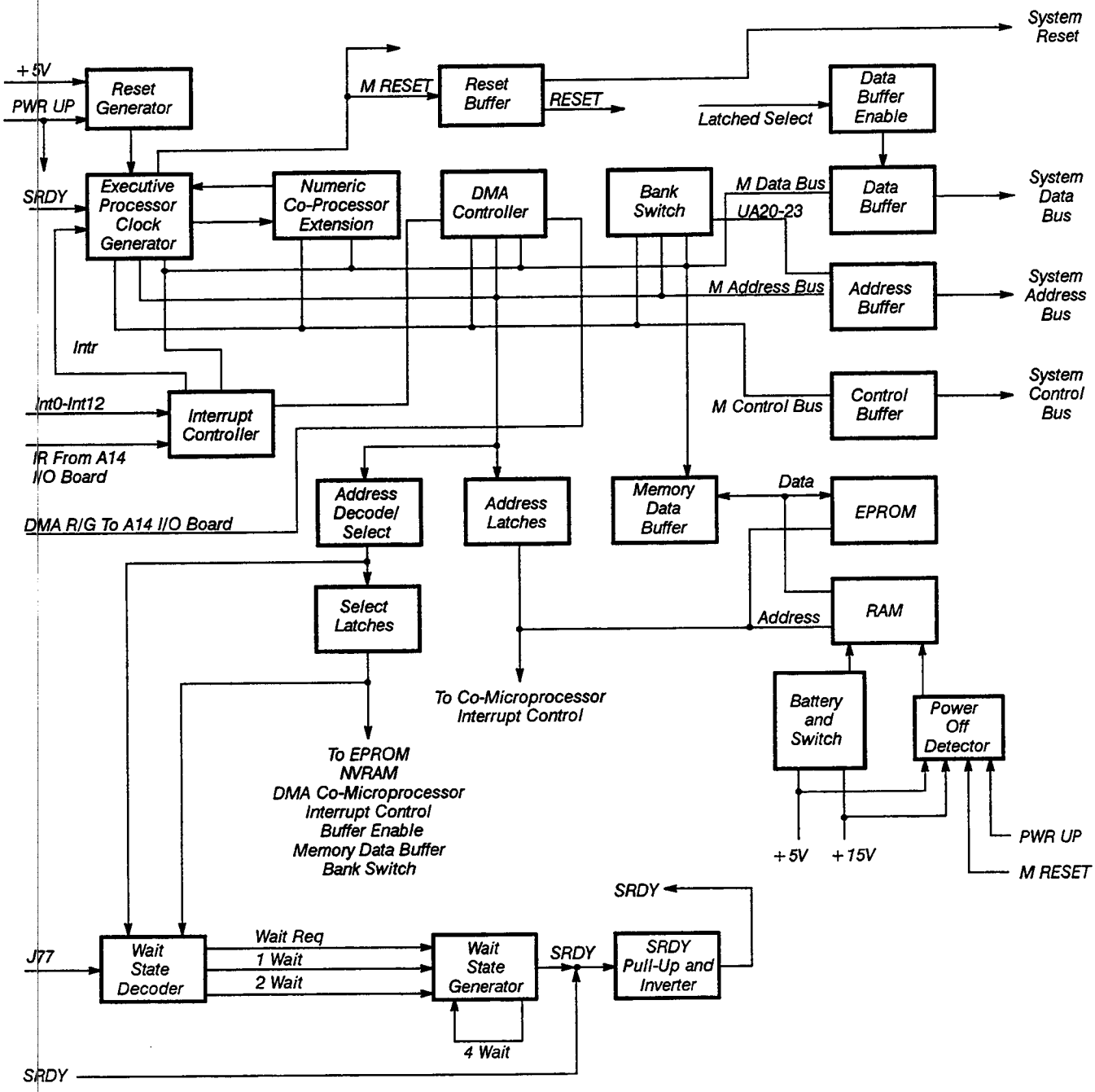


Figure 4-13 *— A17 Main Processor Board Block Diagram*

- the bus controller interprets the microprocessor's status signals and generates the necessary bus control signals for the system bus

The numeric co-processor circuitry—is a high-speed floating-point processor that executes instructions in parallel with the EXP. The EXP programs and controls the numeric co-processor as an I/O device at addresses $0F8_{hex}$ to $0FF_{hex}$.

Address decoders, address latches, and memory data buffers are the support circuits for input/output operations.

The bus controller circuitry—consists of a data buffer, an address buffer, and a control buffer that provide command and control signals for the microprocessor and the three Executive busses. The Executive busses consist of the following:

- **The system data bus**—is a bidirectional bus. It allows the microprocessor to fetch instructions from memory, and also to write data to memory and read data from memory.
- **The system address bus**—contains the address of a device when the microprocessor is requesting access to that device. Once the microprocessor has access, the addressed device can then respond to the microprocessor with data or instructions.
- **The system control bus**—contains control signals sent by the microprocessor. These control signals are sent to the devices that are addressed by the microprocessor, so that the devices respond at the proper moment in the bus cycle.

The reset circuitry—generates the synchronized READY(L) and RESET control signals.

The wait state circuitry—extends the bus cycle so that slower devices have sufficient time to transmit data.

The EPROM—contains the operating system code and also some diagnostics code.

The Interrupt controllers—constantly monitor the EXPs interrupt lines to ensure that the highest priority interrupt gets serviced first. The Interrupt controllers provide the ability to assign priority levels to all the system's interrupt lines, and conversely, to ignore (mask) any of the interrupt lines as well.

The power-down circuitry—consists of the power-down detector and the battery and switch circuit. This circuitry disables the nonvolatile RAM (NVRAM) and provides battery-backup power when it detects the power supplies failing, an active MRESET signal, or PWR UP false. During normal power supply operation, PWR UP is high, MRESET is low, and after a one-second time delay, the NVRAM is enabled.

A18 BB Memory Board

The A18 (Battery Back-up) BB Memory Board provides the EXP with system RAM (SRAM) and EPROM for most operations. Support circuitry for the memories and diagnostic circuitry for troubleshooting are also located on-board. The A17 Main Processor board (specifically the Executive processor or the DMA controller) initiates all accesses to SRAM or EPROMs. See the discussion of the A17 Main Processor board for bus cycle timing information.

The A18 BB Memory board consists of the following:

- address latches
- address decode and memory select circuitry
- EPROM and system ROM
- memory data buffers
- memory configuration readback
- optional waveform storage RAM and battery backup

See Figure 4-14 for a block diagram of this board.

Address latches—buffer and hold the Executive address lines for the EPROMs, SRAMs and other on-board devices.

Address decode and memory select circuitry—programmable array logic (PAL) decode the address lines to produce five RAM select signals (DCS 4-8) and four EPROM select signals, (DCS 0-3). DCS 8 enables the SRAM. Each EPROM select line is latched, along with the four waveform storage RAM select lines. The latch outputs are always enabled. While latch enable EALE is high, the latch outputs are responsive to changes on the inputs.

The EXP on the A17 Main Processor board generates the address line inputs A14-A19. Lines A20-A23 are memory bank-select lines, which are encoded by circuitry on the A17 Main Processor board.

The memory select circuitry provides latched memory select lines and an enable signal for the Memory data buffers.

EPROM and System RAM—contain most of the operating system code and diagnostics code for the EXP. All the memories share the latched address bus. The system RAM (SRAM) stores miscellaneous constants that the operating system code produces and uses. The memories are organized into high and low-byte pairs. The address decode PAL generates latched chip-select signals. A separate latched chip-select signal selects each of these pairs. The data lines to the Executive data bus are buffered by the memory data buffers.

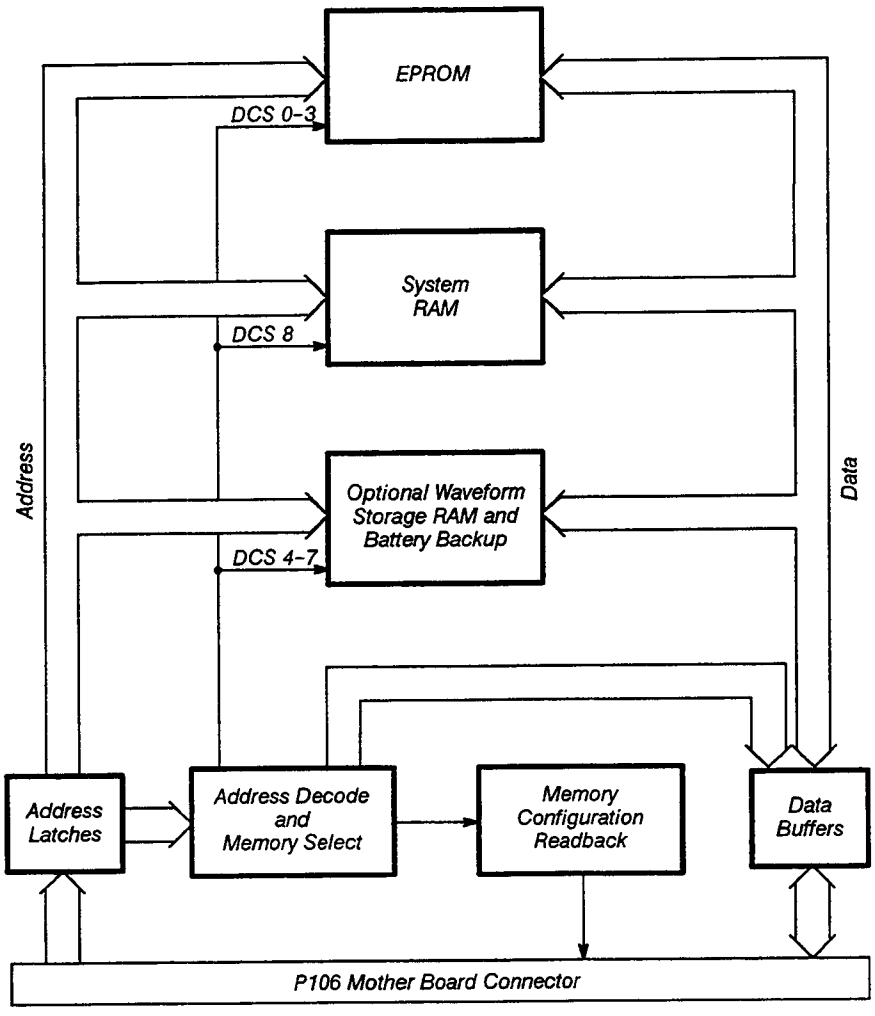


Figure 4-14 — A18 BB Memory Board Block Diagram

Memory data buffers—drive data between the memories and Executive data bus. Both data buffers are enabled when all of its inputs are high.

Memory configuration readback—allows the diagnostics to read the position of the memory configuration straps and the bank address lines. The EXP does an I/O read at address 8040*hex* to read the information on the lower eight data lines.

Optional waveform storage RAM and battery back-up—provides standby power to the waveform storage RAM during any powered-off periods of the DSA.

A19 Digitizer CPU Board

The A19 Digitizer (Central Processing Unit) CPU board, A20 Digitizer I/O board, and A8 Waveform Processor (Signal Processor) board form a system which manages the data acquisition hardware, communicates with the A17 Main Processor board, interprets the front panel settings, and executes diagnostic firmware.

The A19 Digitizer CPU board consists of the following:

- CPU
- system ROM
- system RAM
- selectable RAM/ROM option
- NVRAM
- bus conversion circuitry
- status/option readback

See Figure 4-15 for a block diagram of this board.

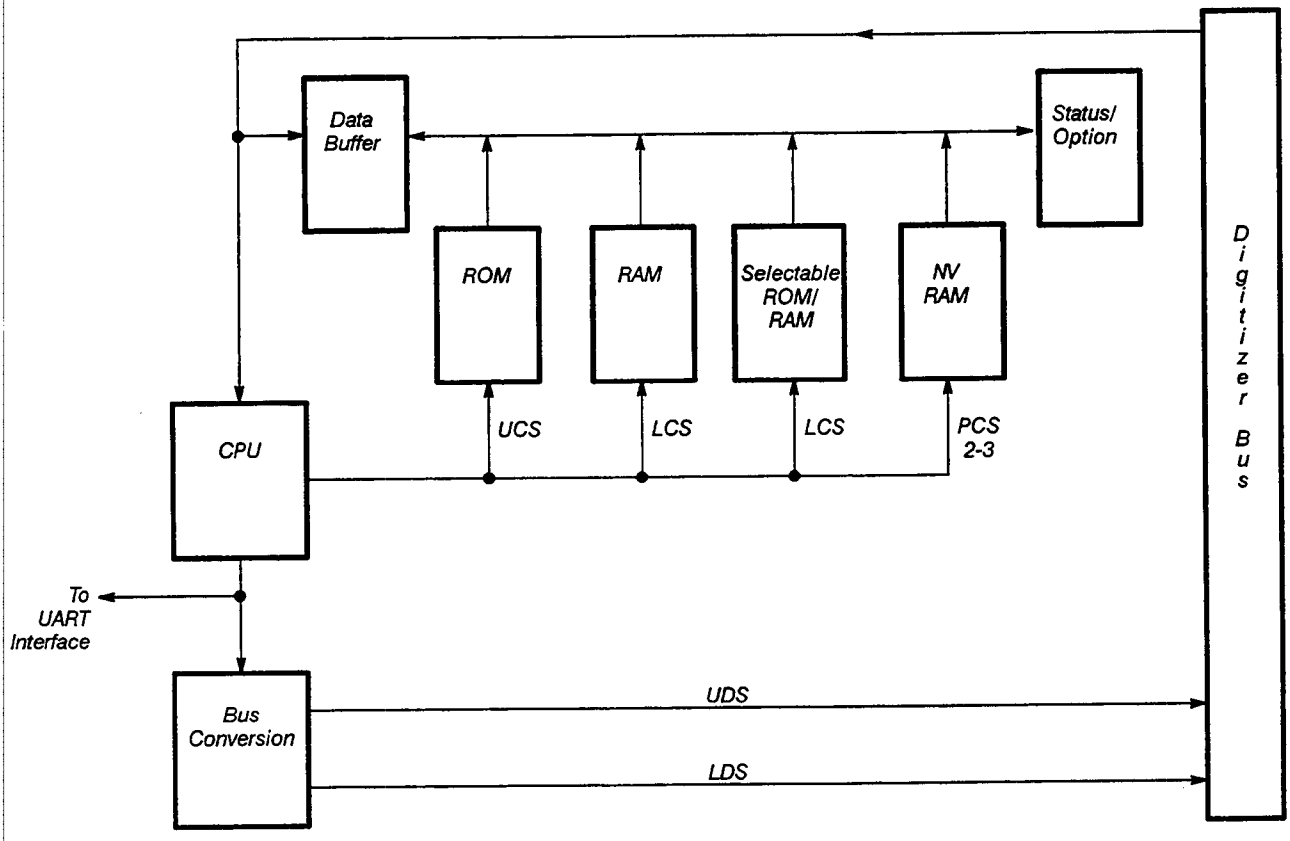


Figure 4-15 — A19 Digitizer CPU Board Block Diagram

CPU – (that is, the Digitizer processor) controls the operations of the A19 Digitizer I/O board, A20 Digitizer CPU board, and the A8 Waveform Processor (Signal Processor) board. The CPU operates at 8 MHz.

System ROM – The instructions are sent to the Digitizer processor through the data buffers during an instruction fetch cycle. The UCS (Upper Chip Select) signal, which is asserted during an instruction fetch cycle, enables the selected ROMs and data buffers.

System RAM – is accessed by the Digitizer processor through the data buffers. The data buffers are enabled when the LCS (Lower Chip Select) signal is asserted. The LCS signal also enables the RAMs.

Selectable ROM/RAM option – is a 64 kilobyte block of memory. The ROM is selected when this block of memory is storing the TriStar signal processor program memory, and the RAM is selected when additional system RAM is needed. Two 0 Ω resistors determine if ROM or RAM is selected. The two resistors are initially set to select the ROMs.

NVRAM – is accessed by the Digitizer processor. The data buffer and the NVRAM are enabled when either PCS2 or PCS3 is asserted.

The NVRAM can store or recall the entire NVRAM internal RAM array to its internal EEPROM array.

BUS Conversion Circuitry – transforms the Digitizer CPU bus interface signals to a new set of bus interface signals called the Digitizer bus. The Digitizer bus interfaces the Digitizer processor to the rest of the Digitizer subsystem.

Both the Lower and the Upper Data Strobes (LDS and UDS, respectively) are asserted during a word access, but only one of the data strobes is asserted during a byte access. When the data strobes are active, data is guaranteed to be valid during the write cycle.

The Digitizer data buffers are enabled when the processor accesses devices not on the A19 Digitizer CPU board. Each data transfer requires that a DTACK signal be asserted from the accessed device.

Status/Option readback – allows the processor to read the status/option jumpers so that a selected section of code can be executed or skipped. Status/Option data is placed on the data bus when the processor performs a read cycle.

A20 Digitizer I/O Board

The A20 Digitizer I/O board links the Digitizer subsystem to the Executive subsystem. The arbitration between these two subsystems is accomplished through the A20 Digitizer I/O board and the A15 MMU board.

The Digitizer I/O board consists of the following:

- Digitizer to MMU interface
- MMU to Digitizer interface
- MMU control

See Figure 4-16 for a block diagram of this board.

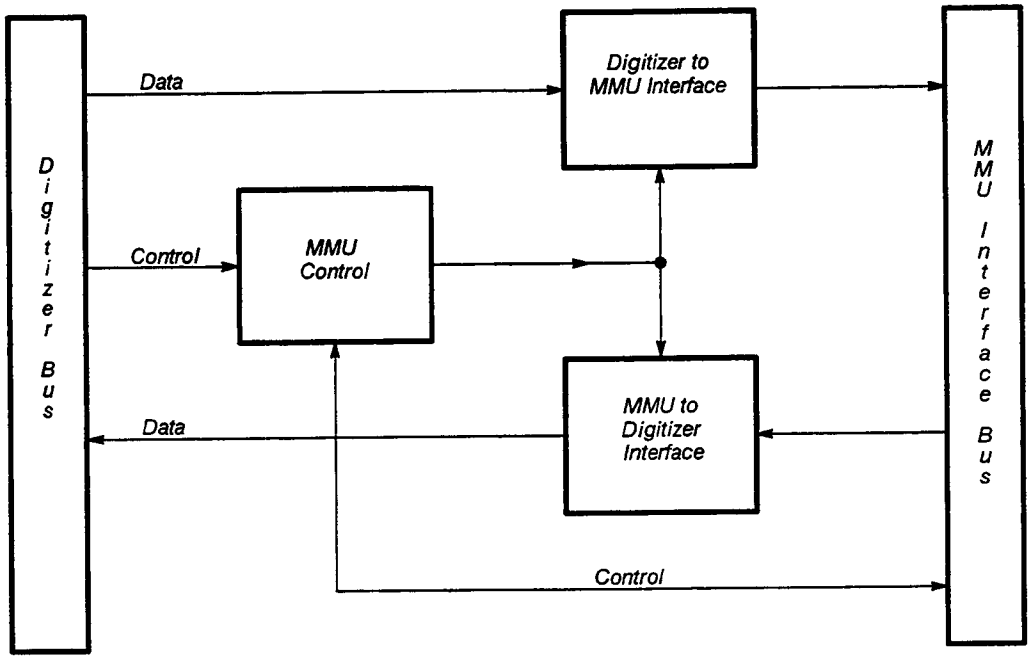


Figure 4-16 *— A20 Digitizer I/O Board Block Diagram*

Digitizer to MMU interface—Data is transferred from the A20 Digitizer I/O board to the A15 MMU board through the Digitizer to MMU interface. The A20 Digitizer I/O board asserts a control signal to the A15 MMU board to request waveform data or a message transfer. This signal remains asserted until the A15 MMU board responds to the MMU control.

This response causes three events to occur. First, the address lines to the A15 MMU board are enabled. Second, the data to the A15 MMU board are latched and enabled to the MMU data bus. Third, the DTACK control signal is asserted to inform the Digitizer processor that the data transfer will be performed.

MMU to Digitizer interface—The A15 MMU board can send messages to the A20 Digitizer I/O board through the MMU to Digitizer Interface. The message from the A15 MMU board is then latched, and at the same time, a DMA request to the

Digitizer processor is asserted to request the Digitizer processor to fetch the message. After the fetching is completed, the MMU to Digitizer interface prepares to accept the next message.

MMU Control—The MMU Control receives and generates signals that control the flow of data from the Digitizer bus to the MMU interface bus, and from the MMU interface bus to the Digitizer bus.

A21 Mini Mother Board

The A21 Mini Mother board provides interconnection between the following boards:

- A19 Digitizer CPU
- A20 Digitizer I/O

A24 CRT Driver Board

The A24 CRT Driver board consists of the following:

- horizontal sweep circuitry
- vertical sweep circuitry
- high and grid voltage generator circuitry
- z-axis amplifier
- intensity circuitry

The A24 CRT Driver board circuitry drives the raster scan CRT. The VIDEO and SYNC signals from the A16 Display Controller board are used in generating the Z-Axis, sweep signals, and grid-bias voltages for the CRT.

See Figure 4-17 for a block diagram of this board.

The horizontal sweep circuitry—generates the sweep current for the horizontal deflection yoke. The horizontal driver includes a voltage-controlled oscillator, a voltage ramp generator, a high-gain amplifier, and a flyback generator. These components provide sweep synchronization, horizontal deflection, and linearity.

The horizontal adjustments: Horiz Size, Horiz Lin, Horiz Hold, and Horiz Pos, are provided so that you can optimize the display appearance.

The vertical sweep circuitry—produces a deflection current that sweeps the video beam from the bottom to the top of the CRT. This circuit also produces a flyback signal to the flyback transformer that is in parallel with the deflection yoke.

The vertical adjustments, Vert Size and Vert Hold, set the vertical size and position of the display.

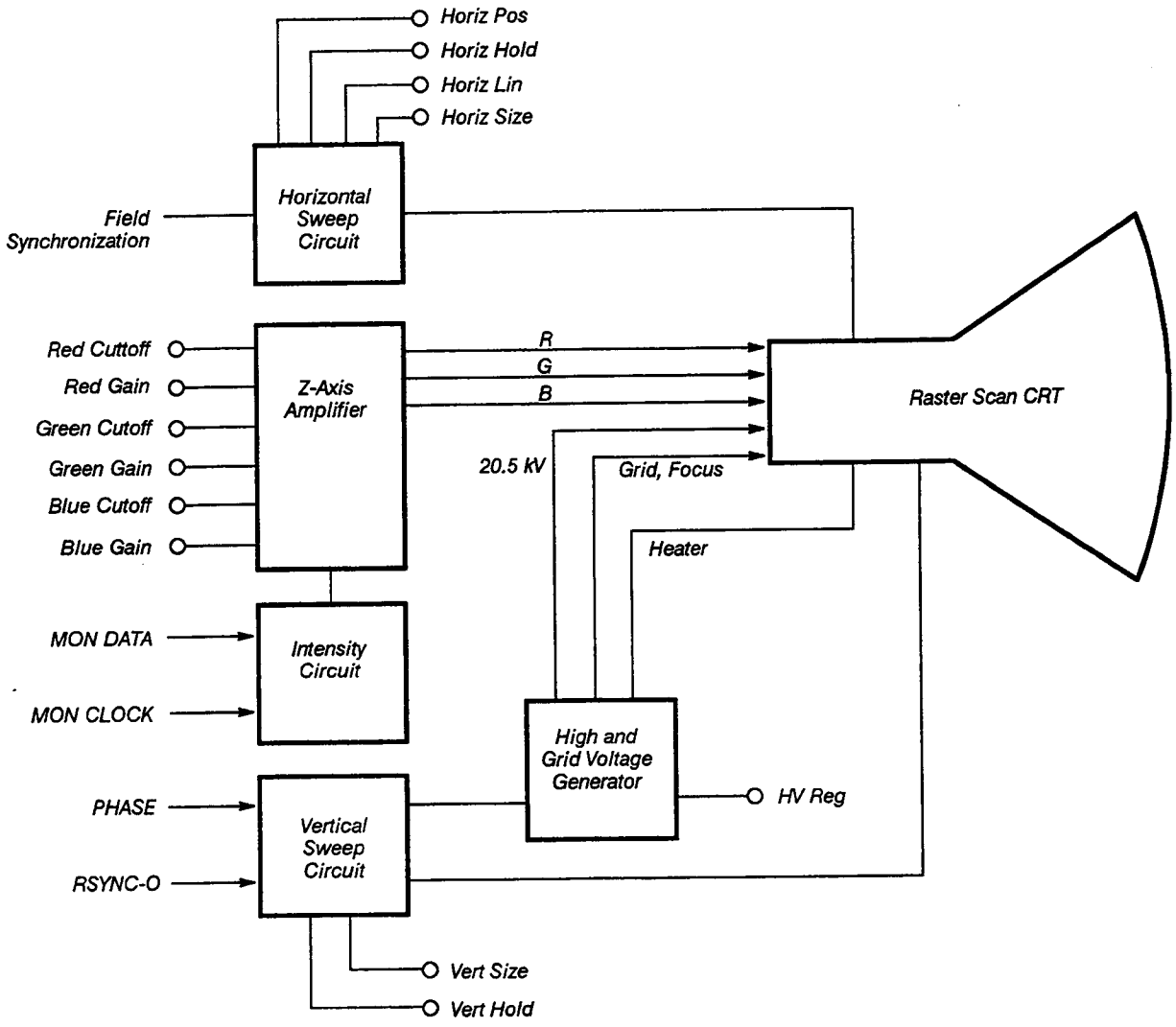


***Figure 4-17** — A24 CRT Driver Board Block Diagram*

The high and grid-voltage generator circuitry—consists of the flyback transformer from the flyback waveform, which generates the 20.5 kV CRT anode potential and other bias voltages. This transformer is in parallel with the yokes and also supplies some of the sweep current for the yoke winding.

The HV Reg adjustment maintains the proper display size throughout the various intensity levels.

The Z-axis amplifier—the three cathodes (R, G, B) of the CRT are driven by three identical high speed video amplifiers. The cut-off point (the point at which a certain color becomes invisible) is controlled by the Red, Green, and Blue Cutoff adjustments. The gain for each amplifier is set by the Red, Green, and Blue Gain adjustments.

Each of the three colors can be programmed to display sixteen different levels. This yields a possible 4096 colors, of which eight can be displayed on the screen at any time.

The intensity circuitry—sets the intensity of the CRT image. The intensity is proportional to the output of a DAC. The serial input MON DATA sets this output, and the MON CLK clocks this output.

A25 Degauss Board

At each power-on, the A25 Degauss board removes magnetic fields (induced by magnetic sources) from the color steel aperture grill.

The A25 Degauss board produces an exponentially-decaying sine wave with a frequency of approximately 5 kHz. This waveform is applied to the degauss coils that are located on both sides of the CRT. The decayed oscillation through the coils causes a magnetic field to be induced in the CRTs steel aperture grill. As the steel is driven around its hysteresis curve this magnetic field saturates the steel and then brings the stored magnetic field down to zero.

A26 Geometry Board

The A26 Geometry board generates signals to drive amplifiers that statistically and dynamically control the CRT beam deflection position and distortion. The A26 Geometry board contains the following:

- field ramp generator
- pin-cushion correction
- phase correction

See Figure 4-18 for a block diagram of this board.

The field ramp generator—generates a ramp waveform that all waveforms on the A26 Geometry board are derived from.

The pin-cushion correction circuitry—creates a parabola waveform (FPARA) that minimizes raster pin-cushion distortion. Pin-cushion distortion is a visual distortion of the display image.

The pin-cushion correction circuitry provides the following manual adjustments for optimizing the display image:

- Parabola Left—corrects the left side of the display amplitude
- Parabola Right—corrects the right side of the display amplitude
- Apex Point—moves the point of correction horizontally across the screen
- Reference Amplitude—controls the vertical size of the display
- Parabola Amplitude—controls the amplitude of the pin-cushion correction parabola

The phase correction circuitry—dynamically and statically controls the start of the raster sweep. The phase correction circuitry also provides the following adjustments for optimizing the display image:

- Phase Magnitude—controls the horizontal tilt of the display
- Phase Offset—controls the fine vertical position of the display

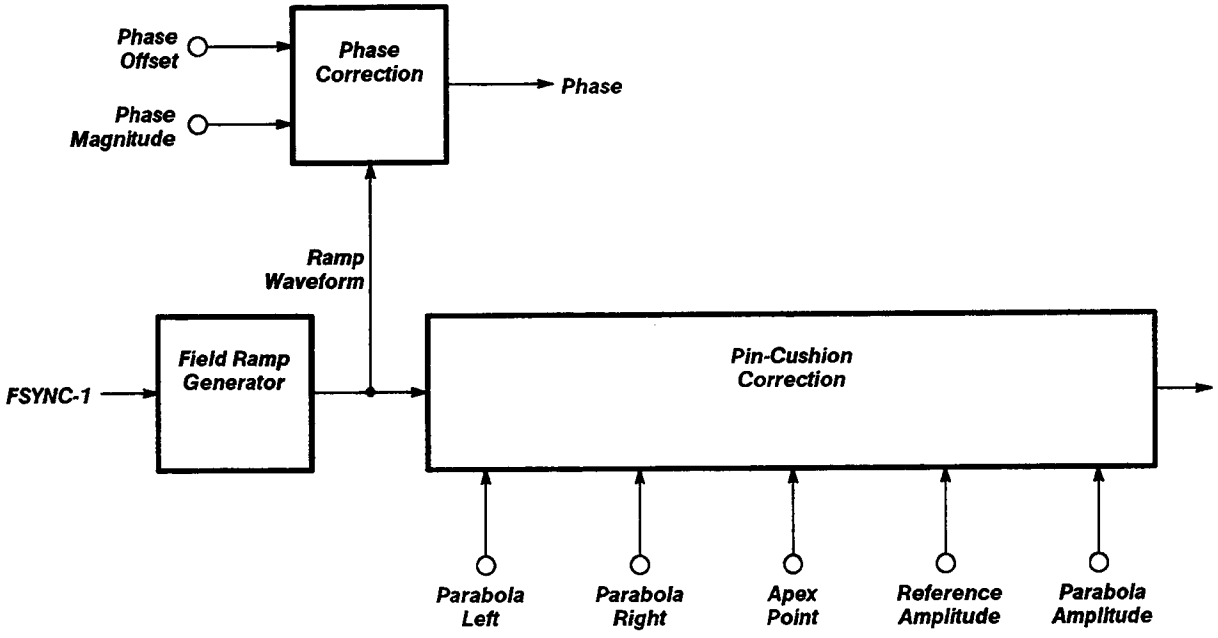


Figure 4-18 — A26 Geometry Board Block Diagram

A27 CRT Socket Board

The A27 CRT Socket board is the interface between the CRT and the A24 CRT Driver board. The A27 CRT Socket board contains the following manual adjustments for optimizing the display image:

- Convergence—controls the vertical convergence of the red, blue, and green grid patterns
- Grid—controls the brightness of the background color
- Focus—controls the focusing of the display

A32 Floppy Disk Controller Board

The A32 Floppy Disk Controller board and the A33 Floppy Disk Drive form a floppy storage system under control of the Executive Processor (A17). Data transfers are done using Direct Memory Access (DMA).

The A32 Floppy Disk Controller Board consists of the following:

- floppy disk control IC
- bus interface/buffers
- wait state generation
- DMA interface
- interrupts

Floppy Disk Control IC—supplies most of the functionality of the floppy interface. All reads and writes to the floppy disk drive go through this device and a control cable. The control IC also includes a phase locked loop (PPL) analog data separator.

Bus Interface/Buffers—provides an interface to the Executive Processor for transfer of data bus, address bus, and control signals. A programmed array logic (PAL) device is used to decode control addresses.

Wait State Generation—SRDY signal is used to hold processor bus until floppy controller circuitry can respond. SRDY is a synchronized signal and is implemented in a PAL, and will generate a set number of wait states.

DMA Interface—uses a request/acknowledge protocol with a terminating count signal as the end of transaction.

Interrupts—floppy interrupts are used for control flow and event signalling. A third interrupt is used as a board detect to determine if the instrument is equipped with a floppy subsystem.

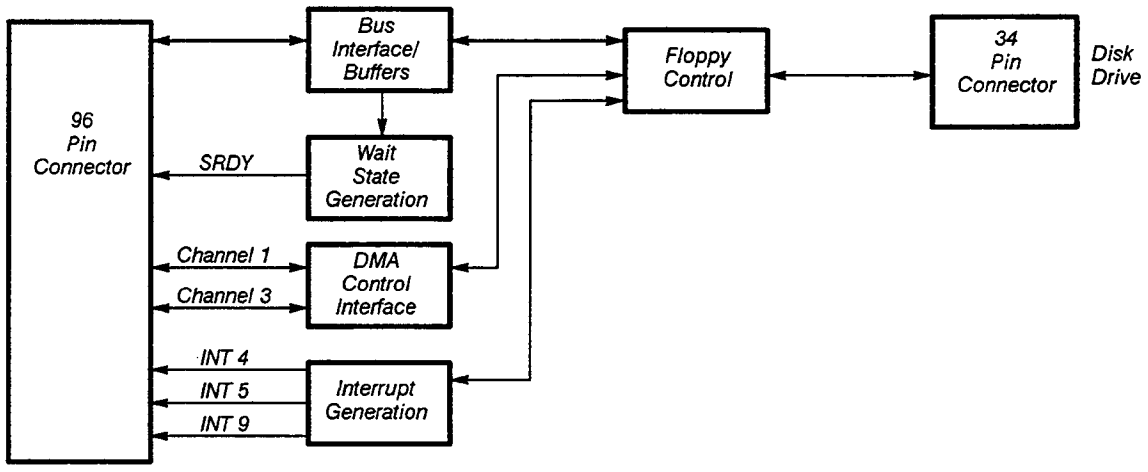


Figure 4-19 — A32 Disk Board Block Diagram

A33 Disk Drive

The A33 Disk Drive and A32 Disk Controller board form a floppy storage system under control of the Executive Processor (A17). A33 is a 3½ inch floppy disk drive that combines electro-mechanical devices and an electrical control board into a single unit.

A high density 3½ inch drive (1.44 Megabyte) is standard, which can also operate at double density (720 kilobyte). The drive supports IBM PC compatible formats. Density is chosen by the floppy drive based on the type of media inserted. Drive select number is one.

Replaceable Parts

This section contains a list of the components that are replaceable for the DSA 600 Series Digitizing Signal Analyzers. As described below, use this list to identify and order replacement parts. There is a separate Replaceable Parts List for each instrument.

Parts Ordering Information

Replacement parts are available from or through your local Tektronix, Inc., service center 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 a part you order has been replaced with a different or improved part, your local Tektronix service center or representative will contact you concerning any change in the part number.

Module Replacement

The DSA 600 Series Digitizing Signal Analyzers are serviced by module replacement; there are three options you should consider:

- **Module Exchange.** In some cases you may exchange your module for a remanufactured module. These modules cost significantly less than new modules and meet the same factory specifications. For more information about the module exchange program, call 1-800-TEKWIDE, ext. BVJ5799.
- **Module Repair.** You may ship your module to us for repair, after which we will return it to you.
- **New Modules.** You may purchase new replacement modules in the same way as other replacement parts.

Using the Replaceable Parts List

The tabular information in the Replaceable Parts List is arranged for quick retrieval. Understanding the structure and features of the list will help you find the all the information you need for ordering replacement parts.

Item Names

In the Replaceable Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, U.S. Federal Cataloging Handbook H6-1 can be used where possible.

Indentation System

This parts list is indented to show the relationship between items. The following example is of the indentation system used in the Description column:

1 2 3 4 5 Name & Description

Assembly and/or Component
Attaching parts for Assembly and/or Component
(END ATTACHING PARTS)
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
(END ATTACHING PARTS)
Parts of Detail Part
Attaching parts for Parts of Detail Part
(END ATTACHING PARTS)

Attaching parts always appear at the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. Attaching parts must be purchased separately, unless otherwise specified.

Abbreviations

Abbreviations conform to American National Standards Institute (ANSI) standard Y1.1

DSA 601A Replaceable Parts

This section contains a list of the components that are replaceable for the DSA 601A Digitizing Signal Analyzer.

Table 5-1 — DSA 601A Board FRUs

FRU	Part Number	Description
A1	670–9815–00	Plug-in Interface Board
A2	620–0033–01	Power Supply:Mainframe
A4	670–9687–01	Regulator Board
A5	670–9823–00	Calibrator Board
A6	671–0014–02	Lower Acquisition Board
A7	671–0015–00	Upper Acquisition Board
A8	670–9831–00	Waveform Processor Board
A9	614–0818–01	Panel,Subassy:Touch Panel
A9A2	671–0036–00	Knob Board
A10	670–9813–00	Front Panel Control Board
A11	670–9830–00	Front Panel Button Board
A12	671–0013–00	Rear Panel Board
A13	670–8851–00	Mother Board
A14	670–8854–01	I/O Board
A15	671–0852–00	MMU Board
A16	671–0879–00	Display Controller Board
A17	671–2116–00	Main Processor Board
A18	671–0385–00	Memory Board
A19	670–9819–00	Digitizer CPU Board
A20	670–9820–00	Digitizer I/O Board
A21	670–9828–00	Mini Mother Board
A24	670–9818–02	CRT Driver Board
A25	670–9829–00	Degauss Board
A26	670–9826–00	Geometry Board

Table 5-1 — DSA 601A Board FRUs

FRU	Part Number	Description
A27	670–9825–00	CRT Socket Board
A32	671–2021–00	Disk Controller Board
A33	118–8526–00	Disk Drive

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
S3109	FELLER	72 VERONICA AVE UNIT 4	SUMMERSET NJ 08873
S3629	SCHURTER AG H C/O PANEL COMPONENTS CORP	2015 SECOND STREET	BERKELEY CA 94170
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK0488	CURRAN COIL SPRING INC	635 NW 16TH	PORTLAND OR 97209–2206
TK0588	UNIVERSAL PRECISION PRODUCTS	1775 NW 216TH	HILLSBORO OR 97123
TK1159	IMPROVED PRODUCTS	3400 OLYMPIC STREET	SPRINGFIELD OR 97477
TK1163	POLYCAST INC	9898 SW TIGARD ST	TIGARD OR 97223
TK1374	TRI–TEC ENGINEERING CORP		
TK1416	SHARP CORP	22–22 NAGAIKE–CHO ABENO–KU	OSAKA JAPAN
TK1465	BEAVERTON PARTS MFG CO	1800 NW 216TH AVE	HILLSBORO OR 97124–6629
TK1547	MOORE ELECTRONICS INC (DIST)	19500 SW 90TH COURT PO BOX 1030	TUALATIN OR 97062
TK1916	SKS DIE CASTING CO	2200 4TH	BERKELEY CA 94710–2215
TK1947	NORTHWEST ETCH TECHNOLOGY	3223 C ST NE UNIT 2	AUBURN WA 98002
TK1967	SYNDETEK	3915 E MAIN	SPOKANE WA 99202
TK2061	SONY CORP	% TOKYO JAPAN BUYERS OFFICE BLDG 78/661	BEAVERTON OR 97077
TK2072	PRECISION DECORATORS INC HAWTHORNE BUSINESS CENTER	5289 NE ELAM YOUNG PARKWAY SUITE G400	HILLSBORO OR 97124
TK2122	INDUSTRIAL GASKET INC	1623 SE 6TH AVE	PORTLAND OR 97214–3502
TK2156	ACACIA/DEANCO	7763 SW CIRRUS RD SUITE 26	BEAVERTON OR 97005–6452
TK2248	WESTERN MICRO TECHNOLOGY	1800 NW 169TH PL SUITE 3300	BEAVERTON OR 97006
TK2338	ACC MATERIALS	ED SNYDER BLDG 38–302	BEAVERTON OR 97077
TK2421	INDEK CORP	2360 QUME DRIVE SUITE A	SAN JOSE, CA 95131
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK WAY SUITE #2	VANCOUVER WA 98601
0B445	ELECTRI–CORD MFG CO INC	312 EAST MAIN ST	WESTFIELD PA 16950
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
0J7N9	MCX INC	30608 SAN ANTONIO ST	HAYWARD CA 94544
0J9P9	GEROME MFG CO INC	PO BOX 737	NEWBURG OR 97132
0KBZ5	MORELLIS Q & D PLASTICS	1812 16TH AVE	FOREST GROVE OR 97116
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
01536	TEXTRON INC CAMCAR DIV SEMS PRODUCTS UNIT	1818 CHRISTINA ST	ROCKFORD IL 61108
06383	PANDUIT CORP	17301 RIDGELAND	TINLEY PARK IL 07094–2917
11897	PLASTIGLIDE MFG CORP	2701 W EL SEGUNDO BLVD	HAWTHORNE CA 90250–3318

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125–4632
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
29681	BEL–TRONICS CORP	344 INTERSTATE RD	ADDISON IL 60101–4516
29870	VICTOR CORP	618 MAIN STREET	WEST WARWICK RI 02893
30010	BICC–VERO ELECTRONICS INC	40 LINDEMAN DR	TRUMBULL CT 06611–4739
46384	PENN ENGINEERING AND MFG CORP	OLD EASTON RD PO BOX 1000	DANBORO PA 18916
5Y400	TRIAX METAL PRODUCTS INC DIV OF BEAVERTON PARTS MFG CO	1800 216TH AVE NW	HILLSBORO OR 97124–6629
52814	TECH–ETCH INC	45 ALDRIN RD	PLYMOUTH MA 02360
53387	MINNESOTA MINING MFG CO	PO BOX 2963	AUSTIN TX 78769–2963
61058	MATSUSHITA ELECTRIC CORP OF AMERICA PANASONIC INDUSTRIAL CO DIV	ONE PANASONIC WAY PO BOX 1502	SECAUCUS NJ 07094–2917
61439	GILLESPIE DECALS INC	27676 PARKWAY AVE SW	WILSONVILLE OR 97070
61857	SAN–0 INDUSTRIAL CORP	85 ORVILLE DR PO BOX 511	BOHEMIA LONG ISLAND NY 11716–2501
7W718	MARQUARDT SWITCHES INC	2711 ROUTH 20 EAST	CAZENOVIA NY 13035–1219
74868	AMPHENOL CORP R F CONNECTORS (OPNS)	1 KENNEDY AVE	DANBURY CT 06810–5803
75915	LITTELFUSE INC SUB TRACOR INC	800 E NORTHWEST HWY	DES PLAINES IL 60016–3049
8X345	NORTHWEST SPRING & MFG CO	5858 WILLOW LANE	LAKE OSWEGO OR 97034–5343
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
83486	ELCO INDUSTRIES INC	1101 SAMUELSON RD	ROCKFORD IL 61101
83553	ASSOCIATED SPRING BARNES GROUP INC	15001 S BROADWAY P O BOX 231	GARDENA CA 90248–1819
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108–5181
96881	THOMSON INDUSTRIES INC	SHORE RD AT CHANNEL DR	PORT WAHSINGTON NY 11050

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1 -1	200-3350-00			1	COVER,CABINET:UPPER,ALUMINUM	80009	ORDER BY DESC
-2	214-0603-02			4	.PIN ASSY,SECRG:W/SPRING WASHER	0J260	ORDER BY DESC
-3	386-1151-00			4	.CLAMP,RIM CLENC:SPG STL CD PL	83553	ORDER BY DESC
-4	386-0227-00			4	.STOP,CLP,RIM CL:ACETAL	0JR05	386-0227-00
-5	348-0875-00			1	FLIPSTAND,CAB.:	TK0488	ORDER BY DESC
-6	200-3351-00			1	COVER,CABINET:LOWER,ALUMINUM	80009	ORDER BY DESC
-7	214-0603-02			4	.PIN ASSY,SECRG:W/SPRING WASHER	0J260	ORDER BY DESC
-8	386-1151-00			4	.CLAMP,RIM CLENC:SPG STL CD PL	83553	ORDER BY DESC
-9	386-0227-00			4	.STOP,CLP,RIM CL:ACETAL	0JR05	386-0227-00
-10	348-0596-00			4	PAD,CAB.FOOT:0.69 X 0.255 X 0.06,PU	TK2122	348-0596-00
-11	348-0879-00			4	FOOT,CABINET:BOTTOM,BLUE,POLYCARB (ATTACHING PARTS)	TK1163	ORDER BY DESC
-12	211-0734-00			4	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	83486	MACHINE SCREW
-13	348-0980-00			4	SHLD GSKT,ELEK:FINGER TYPE,21.0 L	TK1159	ORDER BY DESC
-14	426-2177-00	B010100	B050216	2	FRAME SECT,CAB.:RIGHT/LEFT,ALUMINUM	TK1465	ORDER BY DESC
	426-2177-01	B050217		2	FRAME SECT,CAB.:RIGHT/LEFT,ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-15	212-0681-00			4	SCREW,MACHINE:10-32 X 0.25,PNH,STL	83486	MACHINE SCREW
-16	211-0734-00			3	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	83486	MACHINE SCREW
-17	101-0116-00			2	TRIM,DECORATIVE:FRONT (ATTACHING PARTS)	TK1163	ORDER BY DESC
-18	212-0158-00			4	SCREW,MACHINE:8-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-19	200-2191-00	B010100	B050216	4	CAP,RETAINER:PLASTIC	0JR05	ORDER BY DESC
-20	367-0248-01	B010100	B050216	2	HANDLE,CARRYING:16.341 L,W/CLIP	80009	367024801
-21	101-0117-00			2	TRIM,DECORATIVE:REAR (ATTACHING PARTS)	TK1163	ORDER BY DESC
-22	212-0158-00			4	SCREW,MACHINE:8-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -0	614-0818-01			1	SUBPANEL ASSY:SUBASSY TOUCH PANEL (SEE A9, EXCHANGE ITEM)	80009	614081801
-1	333-3932-00			1	TOUCH PANEL ASSEMBLY INCLUDES: .PANEL,FRONT:	TK2072	ORDER BY DESC
-2	211-0721-00			4	(ATTACHING PARTS) .SCREW,MACHINE:6-32 X 0.375,PNH,STL	0KB01	ORDER BY DESC
-3	129-1165-00			2	(END ATTACHING PARTS) .SPACER,POST:1.9 L,W 6-32 THD BOTH END	TK0588	ORDER BY DESC
-4	386-5499-00			1	.DIFFUSER,LIGHT:PLASTIC,7.055 X 5.472 (ATTACHING PARTS)	TK1163	ORDER BY DESC
-5	211-0372-00			4	.SCREW,MACHINE:4-40 X 0.312,PNH,STL (END ATTACHING PARTS)	93907	B80-00020-003
-6	366-0582-01			2	.KNOB:ENCODER	TK1163	ORDER BY DESC
-7	671-0036-00			1	.CIRCUIT BD ASSY:KNOB (SEE A9A2, EXCHANGE ITEM) (ATTACHING PARTS)	80009	671003600
-8	211-0409-00			2	.SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06888-024
-9	670-9829-00			1	CIRCUIT BD ASSY:DEGAUSS (SEE A25, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982900
-10	211-0408-00			5	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-11	333-3451-01			1	PANEL,FRONT:DSA601,LOWER (ATTACHING PARTS)	TK2072	ORDER BY DESC
-12	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-13	260-2349-00			1	SWITCH,ROCKER:SPST,30MA,12V	7W718	1801.1152
-14	333-3928-00			1	PANEL,FRONT:DSA602A,DISK DRIVE (ATTACHING PARTS)	TK2072	ORDER BY DESC
-15	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-16	348-0878-00			1	SHLD GSKT,ELEK:SOLID TYPE,7.646 L	52814	ORDER BY DESC
-17	348-1075-00			1	SHLD GSKT,ELEK:SOLID TYPE,1.66 L	52814	ORDER BY DESC
-18	348-1076-00			2	SHLD GSKT,ELEK:SOLID TYPE,2.28 L	52814	ORDER BY DESC
-19	344-0438-00			1	CLIP,ELECTRICAL:CRT GROUNDING,2.5 X 4.5	TK1947	ORDER BY DESC
-20	108-1383-00			2	COIL,TUBE DEFL:FXD,DEGAUSS R	29681	87-0912
-21	346-0120-00			4	STRAP,TIEDOWN,E:5.5 L MIN,PLASTIC,WHITE	06383	SST1.5M
-22	154-0914-00			1	ELECTRON TUBE:CRT,P31 (ATTACHING PARTS)	TK2061	SD-192
-23	211-0721-00			4	SCREW,MACHINE:6-32 X 0.375,PNH,STL	0KB01	ORDER BY DESC
-24	210-0949-00			4	WASHER,FLAT:0.141 ID X 0.5 OD X 0.062,BRS (END ATTACHING PARTS)	12327	ORDER BY DESC
-25	386-5495-03			1	SUBPANEL,FRONT:FINISHED (ATTACHING PARTS)	TK1916	ORDER BY DESC
-26	211-0725-00			10	SCREW,MACHINE:6-32 X 0.375,FLH (END ATTACHING PARTS)	01536	ORDER BY DESC
-27	386-5752-00			1	PLATE,ECB MTG:ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-28	211-0408-00			6	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-29	214-1632-01			1	HINGE,BUTT:7.0 X 1.062,AL (ATTACHING PARTS)	80009	214163201
-30	211-0373-00			3	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-31	255-0334-00			2	PLASTIC CHANNEL:12.75 X 0.175 X 0.155,NYLON	11897	122-NN-2500-060
-32	351-0744-00			3	GUIDE,PLUG-IN:POLYAMIDE (ATTACHING PARTS)	TK1163	ORDER BY DESC
-33	211-0711-00			3	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -34	131-0800-03			2	CONTACT,ELEC:PLUG-IN GND,BE NI HT TR (ATTACHING PARTS)	80009	131080003
-35	211-0408-00			4	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-36	131-0799-00			4	CONTACT,ELEC:PLUG-IN GND,BE NI (ATTACHING PARTS)	80009	131079900
-37	211-0408-00			4	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-38	344-0131-00			4	CLIP,SPR TNSN:CKT BOARD MT,ACETAL WHITE (ATTACHING PARTS)	80009	344013100
-39	211-0408-00			4	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STLT10 (END ATTACHING PARTS)	93907	829-06815-024
-40	129-0220-00			1	SPACER,POST:0.281 L,6-32 THRU,ACETAL	TK0588	ORDER BY DESC
-41	150-0121-05			1	LAMP,CARTRIDGE:5V,0.06A,GREEN LENS	TK1967	ORDER BY DESC
-42	670-9830-00			1	CIRCUIT BD ASSY:FRONT PANEL BUTTON (SEE A11, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670983000
-43	211-0408-00			7	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-44	366-0600-00			10	PUSH BUTTON:0.269 X 0.409,ABS	TK1163	ORDER BY DESC
-45	670-9825-00			1	CIRCUIT BD ASSY:CRT SOCKET (SEE A27, EXCHANGE ITEM)	80009	670982500
-46	441-1769-02			1	CHAS,PLATFORM:ALUMINUM (ATTACHING PARTS)	5Y400	ORDER BY DESC
-47	211-0722-00			2	SCREW,MACHINE:6-32 X 0.25,PNH,STL	0KB01	ORDER BY DESC
-48	211-0734-00			6	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	83486	MACHINE SCREW
-49	212-0682-00			1	SCREW,MACHINE:10-32 X 0.5,PNH,STL	0KB01	212-0682-00
-50	358-0717-00			1	BUSHING,SLEEVE:0.2 ID X 0.345 OD X 0.17 THK (END ATTACHING PARTS)	0JR05	ORDER BY DESC
-51	200-3386-01			1	COVER,CRT:ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-52	211-0373-00			10	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-53	129-1168-00			2	SPACER,POST:2.07 L,0.138-32 THD BOTH END	TK0588	ORDER BY DESC
-54	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (ATTACHES SOCKET BD GND WIRE)	0KB01	ORDER BY DESC
-55	351-0765-00			16	GUIDE,CKT BOARD:NYLON	30010	29-0124D
-56	358-0729-00			1	BUSHING,SLEEVE:0.250 X 0.080,NYLON	96881	NYLINER 4L1FF
-57	351-0746-00			1	GUIDE,CKT BOARD:NYLON 6.803 L. (ATTACHING PARTS)	0JR05	ORDER BY DESC
-58	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-59	343-1318-00			2	RTNR,CARD CAGE:CIRCUIT BOARD (ATTACHING PARTS)	0JR05	ORDER BY DESC
-60	211-0722-00			2	SCREW,MACHINE:6-32 X 0.25,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-61	386-5567-00			1	SPRT,PLATFORM:STEEL	TK0488	ORDER BY DESC
-62	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (ATTACHES PWR SPLY GND WIRE)	0KB01	ORDER BY DESC
-63	386-5501-00			1	PLATE,CONNECTOR:STANDARD,ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-64	211-0721-00			8	SCREW,MACHINE:6-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-65	214-2476-01			2	HDW ASSY KIT:BAIL LOCK,ELEC CONN RCPT (ATTACHING PARTS)	53387	3475-4
-66	211-0410-00			2	SCR,ASSEM WSHR:4-40 X 0.437,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-07510-024
-67	671-0013-00			1	CIRCUIT BD ASSY:REAR PANEL (SEE A12, EXCHANGE ITEM) (ATTACHING PARTS)	80009	671001300

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -68	129-0774-00			2	SPACER,POST:0.25 L,4-40 EXT ONE END,BRS	80009	129077400
-69	214-3106-00			2	HARDWARE KIT:JACK SOCKET	53387	3341-1S
-70	211-0410-00			1	SCR,ASSEM WSHR:4-40 X 0.437,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-07510-024
-71	334-7307-00			1	MARKER,IDENT:MARKED CAUTION	61439	ORDER BY DESC
-72	119-2600-01			1	FAN,TUBEAXIAL:12V,3.9W,2500RPM,83CFM (ATTACHING PARTS)	TK2421	DA 121225 HB W
-73	210-0457-00			4	NUT,PL,ASSEM WA:6-32 X 0.312,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-74	378-0311-00			1	SCREEN,FAN:4.8 X 4.8	80009	ORDER BY DESC
-75	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (ATTACHES REAR PNL GND WIRE)	0KB01	ORDER BY DESC
-76	119-2610-02			1	FAN,TUBEAXIAL:12V,3.0W,3300RPM,48CFM,92MM (ATTACHING PARTS)	TK2421	MDA 120925HB
-77	210-0457-00			3	NUT,PL,ASSEM WA:6-32 X 0.312,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-78	378-0310-00			1	SCREEN,FAN:3.65 X 3.65	80009	378031000
-79	386-5496-01			1	SUBPANEL,REAR:DSA600 SERIES FINISHED (ATTACHING PARTS)	TK1916	ORDER BY DESC
-80	211-0725-00			8	SCREW,MACHINE:6-32 X 0.375,FLH (END ATTACHING PARTS)	01536	ORDER BY DESC
-81	386-5503-00			1	PLATE,REAR:POWER SUPPLY,ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-82	211-0721-00			10	SCREW,MACHINE:6-32 X 0.375,PNH,STL	0KB01	ORDER BY DESC
-83	211-0730-00			4	SCR,ASSEM WSHR:6-32 X 0.375,PNH,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-84	351-0791-00			2	GUIDE,PWR SPLY:POLYCARBONATE	TK1163	ORDER BY DESC
-85	610-0754-02			1	CHASSIS ASSY:	0J260	ORDER BY DESC
-86	118-8526-00			1	DISK,FLOPPY:3.5 INCH FLOPPY DRIVE,1.44 MEG (SEE A33, EXCHANGE ITEM) (ATTACHING PARTS)	TK2248	FD235HF
-87	211-0461-00			4	SCREW,MACHINE:M3 X 0.5 X 6MM,PNH,STL (END ATTACHING PARTS)	0KB01	211-0461-00
-88	407-4047-00			1	BRKT,DISK DRIVE:DSA601A/DSA602A (ATTACHING PARTS)	0J9P9	ORDER BY DESC
-89	211-0409-00			2	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06888-024
-90	407-4120-00			1	BRACKET,HLDN:ALUMINUM	0J9P9	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -1	670-9818-01	B010100	B050103	1	CIRCUIT BD ASSY:CRT DRIVER;	80009	670981801
	670-9818-02	B050104		1	CIRCUIT BD ASSY:CRT DRIVER;	80009	670981802
					(SEE A24, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-2	211-0409-00			11	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10	93907	829-06888-024
					(END ATTACHING PARTS)		
					CRT DRIVER BOARD ASSY INCLUDES:		
-3	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-4	670-9687-00	B010100	B050107	1	CIRCUIT BD ASSY:REGULATOR	80009	670968700
	670-9687-01	B050108		1	CIRCUIT BD ASSY:REGULATOR	80009	670968701
					(SEE A4, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-5	211-0720-00			3	SCR,ASSEM WSHR:6-32 X 0.50,PNH,STL,T15	0KB01	ORDER BY DESC
-6	211-0738-00			1	SCREW,MACHINE:6-32 X 0.625,PNH,STL	83486	ORDER BY DESC
					(END ATTACHING PARTS)		
-7	343-0089-00			1	CLAMP,CABLE:0.3 DIA,PLASTIC	80009	343008900
-8	670-9815-00			1	CIRCUIT BD ASSY:PLUG-IN INTERFACE	80009	670981500
					(SEE A1, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-9	211-0409-00			9	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STLT10	93907	829-06888-024
					(END ATTACHING PARTS)		
-10	670-9823-00			1	CIRCUIT BD ASSY:CALIBRATOR	80009	670982300
					(SEE A5, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-11	211-0408-00			6	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STLT10	93907	829-06815-024
-12	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL	TK0435	ORDER BY DESC
					(END ATTACHING PARTS)		
					CALIBRATOR BOARD ASSEMBLY INCLUDES:		
	160-4797-00			1	.MICROCKT,DGTL:MICROCONT,4K BYTES	80009	160479700
					(U510)		
-13	670-9813-00			1	CIRCUIT BD ASSY:FRONT PANEL CONTROL	80009	670981300
					(SEE A10, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-14	211-0408-00			2	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STLT10	93907	829-06815-024
					(END ATTACHING PARTS)		
-15	670-9826-00			1	CIRCUIT BD ASSY:GEOMETRY	80009	670982600
					(SEE A26, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-16	211-0408-00			2	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STLT10	93907	829-06815-024
					(END ATTACHING PARTS)		
-17	670-8851-00			1	CIRCUIT BD ASSY:MOTHER	80009	670885100
					(SEE A13, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-18	211-0711-00			6	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15	0KB01	ORDER BY DESC
					(END ATTACHING PARTS)		
-19	670-9828-00			1	CIRCUIT BD ASSY:MINI MOTHER	80009	670982800
					(SEE A21, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-20	211-0711-00			3	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15	0KB01	ORDER BY DESC
					(END ATTACHING PARTS)		
-21	670-9819-00			1	CIRCUIT BD ASSY:DIGITIZER CPU	80009	670981900
					(SEE A19, EXCHANGE ITEM)		
-22	670-9820-00			1	CIRCUIT BD ASSY:DIGITIZER I/O	80009	670982000
					(SEE A20, EXCHANGE ITEM)		
-23	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FA	75915	R251001T1
				1	CIRCUIT BD ASSY:FLOPPY DISK CONTROLLER	80009	671202100
-23.1	671-2021-00				(SEE A32, EXCHANGE ITEM)		
-24	670-8854-01			1	CIRCUIT BD ASSY:INPUT/OUTPUT	80009	670885401
					(SEE A14, EXCHANGE ITEM)		
-25	159-0245-00			4	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-26	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM	61058	BR-2/3A-E2P

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -27	671-2116-00			1	CIRCUIT BD ASSY:MAIN PROCESSOR; (SEE A17, EXCHANGE ITEM)	80009	671211600
-28	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM	61058	BR-2/3A-E2P
-29	671-0385-00			1	CIRCUIT BD ASSY:BB MEMORY (SEE A18, EXCHANGE ITEM)	80009	671038500
	671-0385-50			1	CIRCUIT BD ASSY:BB MEMORY (SEE A18 OPT 4C, EXCHANGE ITEM)	80009	671038550
-30	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM (OPTION 4C ONLY)	61058	BR-2/3A-E2P
-31	671-0852-00			1	CIRCUIT BD ASSY:MEMORY MGT UNIT (SEE A15, EXCHANGE ITEM)	80009	671085200
-32	671-0879-00			1	CIRCUIT BD ASSY:DISPLAY CONTROLLER (SEE A16, EXCHANGE ITEM)	80009	671087900
-33	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-34	670-9831-00			1	CIRCUIT BD ASSY:WAVEFORM PROCESSOR (SEE A8, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670983100
-35	211-0408-00			11	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
					SIGNAL PROCESSOR BD ASSY INCLUDES:		
-36	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-37	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-38	671-0015-00			1	CIRCUIT BD ASSY:UPPER ACQUISITION (SEE A7, EXCHANGE ITEM) (ATTACHING PARTS)	80009	671001500
-39	211-0408-00			21	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STLT10 (END ATTACHING PARTS)	93907	829-06815-024
					UPPER ACQUISITION BD ASSY INCLUDES:		
-40	159-0203-00			1	.FUSE,CARTRIDGE:2A,125V,FAST,SUBMINIATURE	61857	SPI-2A
-41	165-2078-00			2	.MICROCKT,HYBRID:TIME INTERPOLATOR (ATTACHING PARTS)	80009	165207800
-42	210-0586-00			8	.NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-43	214-3965-00			2	.HEAT SINK,ELEC:DEMUX,ALUMINUM (ATTACHING PARTS)	TK1465	ORDER BY DESC
-44	214-4034-00			4	.SPRING,HLCPS:0.24 OD X 0.44 L (END ATTACHING PARTS)	8X345	ORDER BY DESC
-45	155-0328-01			1	.IC,ASIC:BIPOLAR,DIGITAL,CLOCK DRIVER	80009	155032801
	155-0340-01			1	.IC,ASIC:BIPOLAR,DIGITAL,SWEEP CONT	80009	155034001
-46	119-3690-00			2	.HYPCON ASSY:44 CONTACT,STEP MOUNT (ATTACHING PARTS)	TK2338	ORDER BY DESC
-47	211-0391-00			8	.SCREW,MACHINE:2-56 X 0.437,P4,STL,T-8 (END ATTACHING PARTS)	83486	ORDER BY DESC
-48	214-4188-00			1	.HEAT SINK,ELEC:TRIGGER IC,ALUMINUM	TK1465	ORDER BY DESC
-49	220-0797-00			4	.NUT,CAPTIVE:2-56 X 0.218 DIA,STL	46384	CKF2-256
-50	165-2161-00			2	.MICROCKT,DGTL:TRIGGER,H2161	80009	165216100
-51	159-0204-00			1	.FUSE,WIRE LEAD:3.0A,125V,5 SECONDS	61857	SP7-3A
-52	671-0014-02			1	CIRCUIT BD ASSY:LOWER ACQUISITION (SEE A6, EXCHANGE ITEM) (ATTACHING PARTS)	80009	671001402
-53	211-0408-00			18	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
					LOWER ACQUISITION BD ASSY INCLUDES:		
-54	214-3964-00			4	.HEAT SINK,ELEC:S/H FLASH,ALUMINUM (ATTACHING PARTS)	TK1465	ORDER BY DESC
-55	214-4034-00			8	.SPRING,HLCPS:0.24 OD X 0.44 L,SST (END ATTACHING PARTS)	8X345	ORDER BY DESC
-56	155-0359-00			2	.MICROCKT,LINEAR:A.D PACKAGED HYBRID	80009	155035900
	155-0342-01			2	.IC,ASIC:BIPOLAR,DIGITAL,UTILITY CIRCUIT (ATTACHING PARTS)	80009	155034201

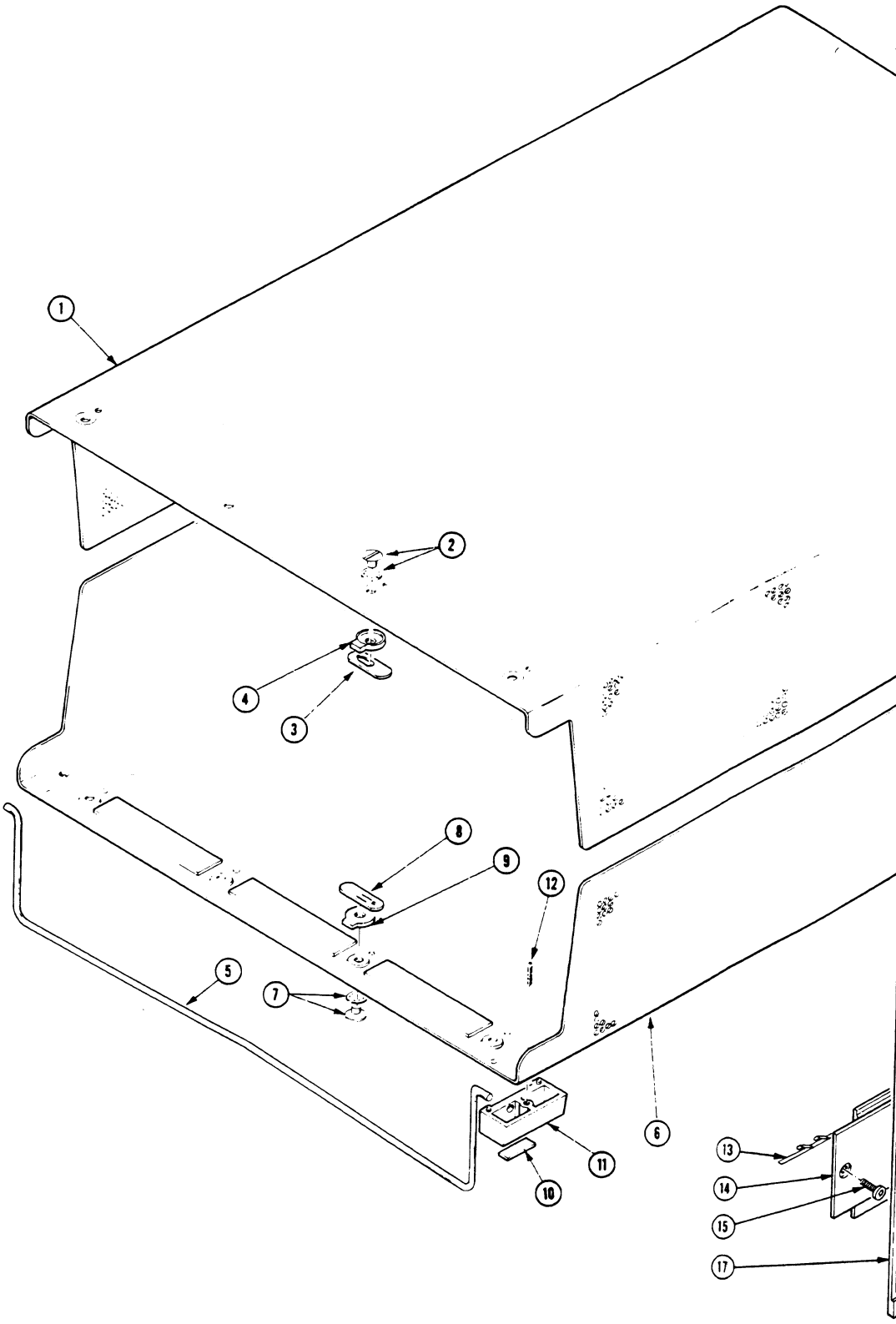
Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -57	211-0411-00			8	.SCR,ASSEM WSHR:4-40 X 0.5,PNH,STL,T10 (END ATTACHING PARTS)	93907	ORDER BY DESC
-58	343-1307-00			2	.RTNR,MICROCKT:2.2 X 1.3 X 0.27,POLYCARB	0KBZ5	ORDER BY DESC
-59	214-3965-00			4	.HEAT SINK,ELEC:DEMUX,ALUMINUM (ATTACHING PARTS)	TK1465	ORDER BY DESC
-60	214-4034-00			8	.SPRING,HLCPS:0.24 OD X 0.44 L,SST (END ATTACHING PARTS)	8X345	ORDER BY DESC
		B010100	B050118				
-61	155-0341-01	B050119		4	.IC,ASIC:BIPOLAR,DIGITAL,DEMULTIPLEXER	80009	155034101
	020-1775-04			1	COMPONENT KIT:DSA601A/DSA602A FIRMWARE	80009	020177504
	020-1775-05			1	COMPONENT KIT:DSA601A/DSA602A VER 2.1	80009	020177505
				1	**WIRE ASSEMBLIES**		
	174-0801-01			1	CABLE ASSY,RF:8,50 OHM COAX,17.0 L (FROM A1J1 TO A6J2),(FROM A1J3 TO A6J4) (FROM A1J5 TO A6J6),(FROM A1J9 TO A6J10)	TK2469	ORDER BY DESC
	174-0802-01				CABLE ASSY,RF:4,50 OHM COAX,33.15 L	TK2469	ORDER BY DESC
		B010100	B050387	1	(FROM A1J7 TO A7J8)		
		B050388		1	(FROM A1J11 TO A7J12)		
	174-0884-00				CA ASSY,SP,ELEC:40,28 AWG,11.5 L,RIBBON	TK1547	ORDER BY DESC
	174-0884-01	B010100	B050387	1	CA ASSY,SP,ELEC:40,28 AWG,11.5 L,RIBBON	TK1547	ORDER BY DESC
		B050388		1	(FROM A5J29 TO A6J29)		
	174-0885-00				CA ASSY,SP,ELEC:50,28 AWG,6.0 L,RIBBON	TK1547	ORDER BY DESC
	174-0885-01			2	CA ASSY,SP,ELEC:50,28 AWG,6.0 L,RIBBON (FROM A15J83 TO A20J83)	TK1547	ORDER BY DESC
	174-0886-00				CA ASSY,SP,ELEC:50,28 AWG,41.5 L,RIBBON	TK1547	ORDER BY DESC
		B010100	B050387	2	(FROM A19J47 TO A8J47, STANDARD ONLY)		
		B050388		2	(FROM A19J48 TO A8J48, STANDARD ONLY)		
	174-1236-00				CA ASSY,SP,ELEC:20,28 AWG,25.0 L,RIBBON	TK1547	ORDER BY DESC
	174-1236-01				CA ASSY,SP,ELEC:20,28 AWG,25.0 L,RIBBON	TK1547	ORDER BY DESC
		B010100	B050387	1	(FROM A19J47 TO A8J47, OPTION 3C ONLY)		
		B050388		1	(FROM A19J48 TO A8J48, OPTION 3C ONLY)		
	174-0888-00				CA ASSY,SP,ELEC:50,28 AWG,15.25 L,RIBBON	TK1547	ORDER BY DESC
	174-0888-01	B010100	B050387	1	CA ASSY,SP,ELEC:50,28 AWG,15.25 L,RIBBON	TK1547	ORDER BY DESC
		B050388		1	(FROM A20J28 TO A5J28)		
	174-0889-00				CA ASSY,SP,ELEC:34,28 AWG,7.5 L,RIBBON	TK1547	ORDER BY DESC
	174-0889-01			1	CA ASSY,SP,ELEC:34,28 AWG,7.5 L,RIBBON (FROM A10J73 TO A9A1J73)	TK1547	ORDER BY DESC
	174-1113-00			1	CA ASSY,SP,ELEC:40,28 AWG,6.0 L,RIBBON (FROM A14J78 TO A12J78)	TK1547	ORDER BY DESC
	174-1126-00			1	CA ASSY,SP,ELEC:4,26 AWG,16.125 L (CRT HARNESS, FROM CRT TO CRT DRIVER BD)	0J7N9	ORDER BY DESC
	174-1132-00			1	CA ASSY,SP,ELEC:26 AWG,8.5 L,RIBBON (FROM A1J92 TO A5J92)	0J7N9	ORDER BY DESC
	174-1134-00			1	CA ASSY,SP,ELEC:18 AWG,17.5 L,RIBBON (FROM A4J94 TO A24J94)	TK1967	ORDER BY DESC
	174-1135-00			1	CA ASSY,SP,ELEC:18 AWG,17.5 L,RIBBON (FROM A4J96 TO A24J96)	0J7N9	ORDER BY DESC
	174-1136-00				CA ASSY,SP,ELEC:26 AWG,8.0 L,RIBBON (FROM A24J35 TO A27J35)	0J7N9	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
					WIRE ASSEMBLIES (CONT)		
	174-1140-02			1	CA ASSY,SP,ELEC:POWER (MAIN POWER HARNESS)	TK1967	ORDER BY DESC
	174-1141-04			1	CA ASSY,SP,ELEC:4,18 AWG,18.0 L (CARD CAGE HARNESS)	TK1967	ORDER BY DESC
	174-1246-00			1	CA ASSY,SP,ELEC:4,26 AWG,14.5 L,RIBBON (FROM A27J36 TO A24J36)	TK1967	ORDER BY DESC
	174-1247-00			1	CA ASSY,SP,ELEC:11,26 AWG,14.5 L,RIBBON (FROM A26J33,J34 TO A24J33,J34)	TK1967	ORDER BY DESC
	174-1393-00			1	CABLE,SP,ELEC:20,28 AWG,9.5 L,STRD/VINYL (FROM A24J53 TO A16J53)	TK1547	ORDER BY DESC
	174-1394-00			1	CABLE,SP,ELEC:26,28 AWG,19.5 L,STRD/VINYL (FROM A24J54 TO A16J54)	TK1547	ORDER BY DESC
	175-9809-00			1	CA ASSY,SP,ELEC:50,3.0 L (FROM A15J79 TO A16J79)	TK1547	ORDER BY DESC
	175-9814-00			1	CA ASSY,SP,ELEC:34,3.0 L (FROM A14J77 TO A17J77)	TK1547	ORDER BY DESC
	175-9854-00	B010100	B050387	1	CA ASSY,SP,ELEC:36,28 AWG,7.0 L	TK1547	ORDER BY DESC
	175-9854-01	B050388		1	CA ASSY,SP,ELEC:36,28 AWG,7.0 L (FROM A14J72 TO A10J72)	TK1547	ORDER BY DESC
	174-2479-00			1	CA ASSY,SP,ELEC:2 COND,23.0 L,RIBBON (FROM A32 TO A33)	80009	174247900
	174-2573-00	B050388		1	CA ASSY,SP,ELEC:50,28 AWG,26.85 L,RIBBON	80009	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
4 -1	620-0033-01			1	POWER SUPPLY:LBT MAINFRAME (SEE A2, EXCHANGE ITEM)	80009	620003301
-2	214-4082-00			2	.PIN,GUIDE:0.850 L,METAL	80009	ORDER BY DESC
-3	200-2264-00			1	.CAP,FUSEHOLDER:3AG FUSES	S3629	FEK 031 1666
	204-0832-00			1	.BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES	S3629	031 1673
-4	159-0088-00			1	.FUSE,CARTRIDGE:3AG,12A,250V,6 SEC,CER	75915	314012
	159-0017-00			1	.FUSE,CARTRIDGE:3AG,4A,250V,FAST BLOW (F520, PART OF LINE INVERTER BOARD)	75915	312 004
	159-0248-00			1	.FUSE,WIRE LEAD:1.5 A,AXIAL LEAD (F130, PART OF LINE INVERTER BOARD)	75915	R25101.5 T1
	159-0220-00			1	.FUSE,WIRE LEAD:3A,125V,FAST (F450, PART OF CONTROL RECTIFIER BOARD)	61857	SP5-3A
					POWER SUPPLY WIRE ASSEMBLIES		
	174-1128-00			1	CA ASSY,SP,ELEC:18 AWG,3.5 L,RIBBON (FROM A2A2J61 TO A4J61)	TK1967	ORDER BY DESC
	174-1129-00			1	CA ASSY,SP,ELEC:18 AWG,4.0 L,RIBBON (FROM A2A2J62 TO A4J62)	TK1967	ORDER BY DESC
	174-1130-00			1	CA ASSY,SP,ELEC:26 AWG,3.5 L,RIBBON (FROM A2A2J65 TO A4J65)	0J7N9	ORDER BY DESC
	175-9933-00			1	CA ASSY,SP,ELEC:20,28 AWG,5.15 L,RIBBON (FROM A2A1J70 TO A2A2J70)	TK1547	ORDER BY DESC
	196-3071-00			1	LEAD,ELECTRICAL:18 AWG,4.0 L,5-4 (GND WIRE, FROM LINE FILTER TO CHASSIS)	TK1967	ORDER BY DESC
	196-3072-00			1	LEAD,ELECTRICAL:18 AWG,2.0 L,9-N (LINE FILTER TO FUSE HOLDER)	TK2469	ORDER BY DESC
	196-3074-00			1	LEAD,ELECTRICAL:18 AWG,12.0 L,5-4 (GND WIRE, FROM PWR SPLY TO CHASSIS)	TK1967	ORDER BY DESC
	196-3075-00			2	LEAD,ELECTRICAL:18 AWG,2.0 L,9-N (FROM A2A1W100 TO FUSE HOLDER) (FROM A2A1W110 TO LINE FILTER)	TK1967	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
5 -0					**OPTION 1C**		
-1	386-5502-00			1	PLATE,CONN MTG:OPTIONAL,ALUMINUM	80009	ORDER BY DESC
-2	333-3415-01			1	PANEL,FRONT:DSA601,LOWER	TK2072	ORDER BY DESC
-3	131-1315-01			16	CONN,RF JACK::BNC/PNL (FRONT AND REAR)	24931	28JR306-1
	012-0208-00			8	CABLE,INTCON:10.0 L	TK2156	ORDER BY DESC
	174-1139-00			2	CABLE ASSY,RF:4,500 OHM,33.0 L	TK2469	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
6 -0					**STANDARD ACCESSORIES**		
-1	161-0066-00			1	CABLE ASSY,PWR,:3,18AWG,115V,98.0 L	0B445	ECM-161-0066-00
-2	161-0066-09			1	CABLE ASSY,PWR,:3,0.75MM SQ,220V,99.0 L (OPTION A1 ONLY)	S3109	86511000
-3	161-0066-10			1	CABLE ASSY,PWR,:THREE 0.75MM SQ,250V,2.5 M (OPTION A2 ONLY)	S3109	BS/13-H05VVF3G0
-4	161-0066-11			1	CABLE ASSY,PWR,:3,0.75MM,240V,96.0 L (OPTION A3 ONLY)	S3109	SAA/3-OD3CCFC3X
-5	161-0066-12			1	CABLE ASSY,PWR,:3,18 AWG,250V,99.0 L (OPTION A4 ONLY)	29870	ORDER BY DESC
-6	161-0154-00			1	CABLE ASSY,PWR,:3,1.00MM SQ,250V,10A,2.5M (OPTION A5 ONLY)	S3109	12-H05VVF3G 00
	013-0195-00			1	ADAPTER,CONN:BNC TO PROBE	24931	28P264-1
	015-0580-00			1	POCKET SIG GEN:TUTORIAL MANUAL AID (OPTION 1R ONLY)	80009	015058000
	070-7529-02			1	MANUAL,TECH:INSTR,DSA600 SERIES RACKMT	80009	070752902
	070-8180-00			1	MANUAL,TECH:TUTORIAL,DSA601A/602A	80009	070818000
	070-8181-00			1	MANUAL,TECH:USER REF,DSA601A/602A	80009	070818100
	070-8182-00			1	MANUAL,TECH:PRGM REF,DSA601A/602A	80009	070818200
	070-8183-00			1	MANUAL,TECH:QUICK REF,DSA601A/602A	80009	070818300
	070-8184-00			1	MANUAL,TECH:SERVICE REF,DSA600 SERIES	80009	070818400
					OPTIONAL ACCESSORIES		
	012-0555-00			1	CABLE,INTCON:CENTRONIX,3 METERS LONG	TK1416	DKIT-0034HCZZ
	012-0630-03			1	CABLE,INTCON:2.0M L	74868	C156327-B
	012-0911-00			1	CABLE,INTCON:MOLDED,RS232;10 FT,15,24 AWG	TK1374	ORDER BY DESC
	016-0829-00			1	PANEL,BLANK:PLUG-IN HOUSING,11K SERIES	80009	016082900
	020-1769-00			1	COMPONENT KIT:QUICKSTART PKG,US,DSA600	80009	020176900
	020-1770-00			1	COMPONENT KIT:QUICKSTART PKG,EURO	80009	020177000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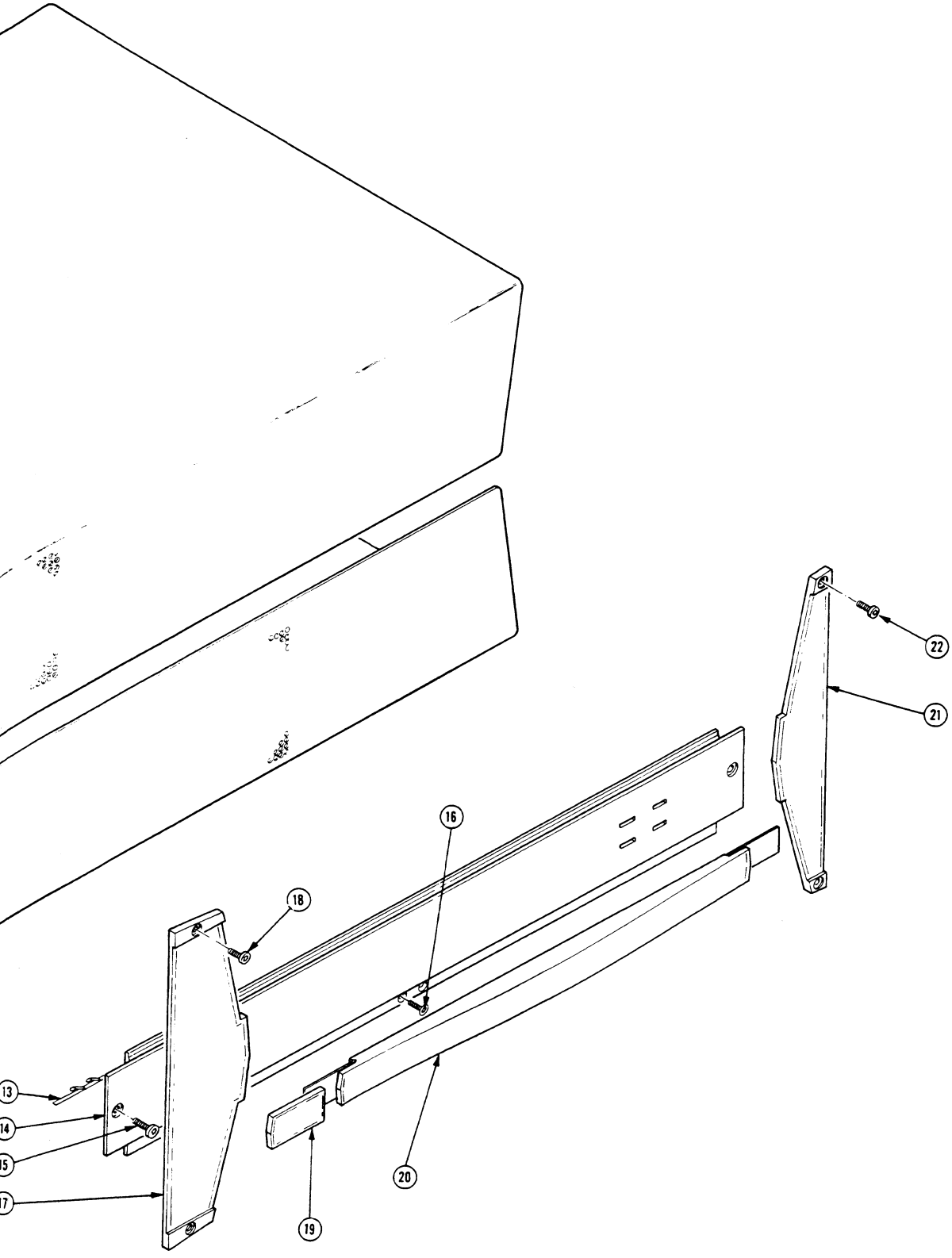
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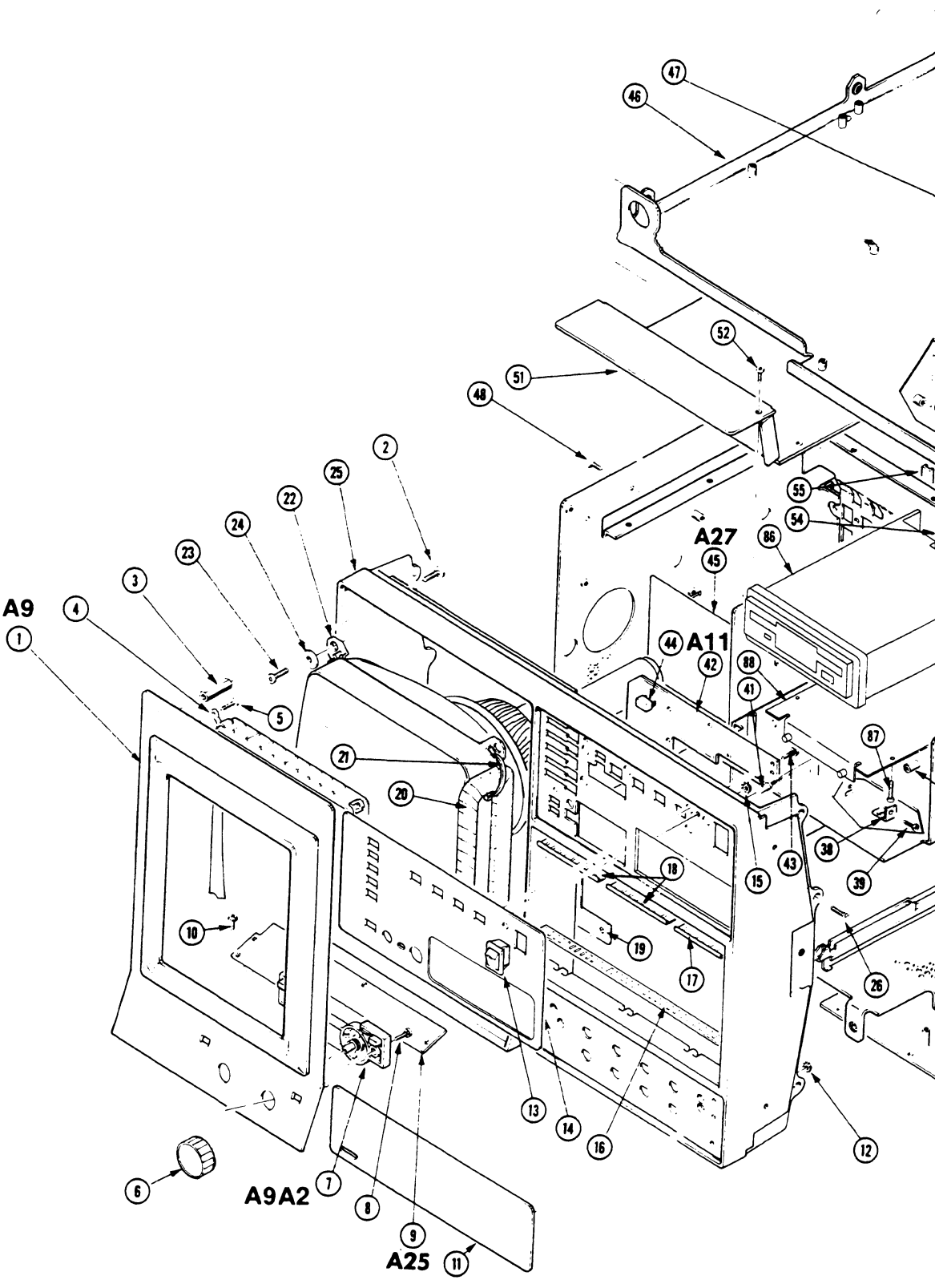
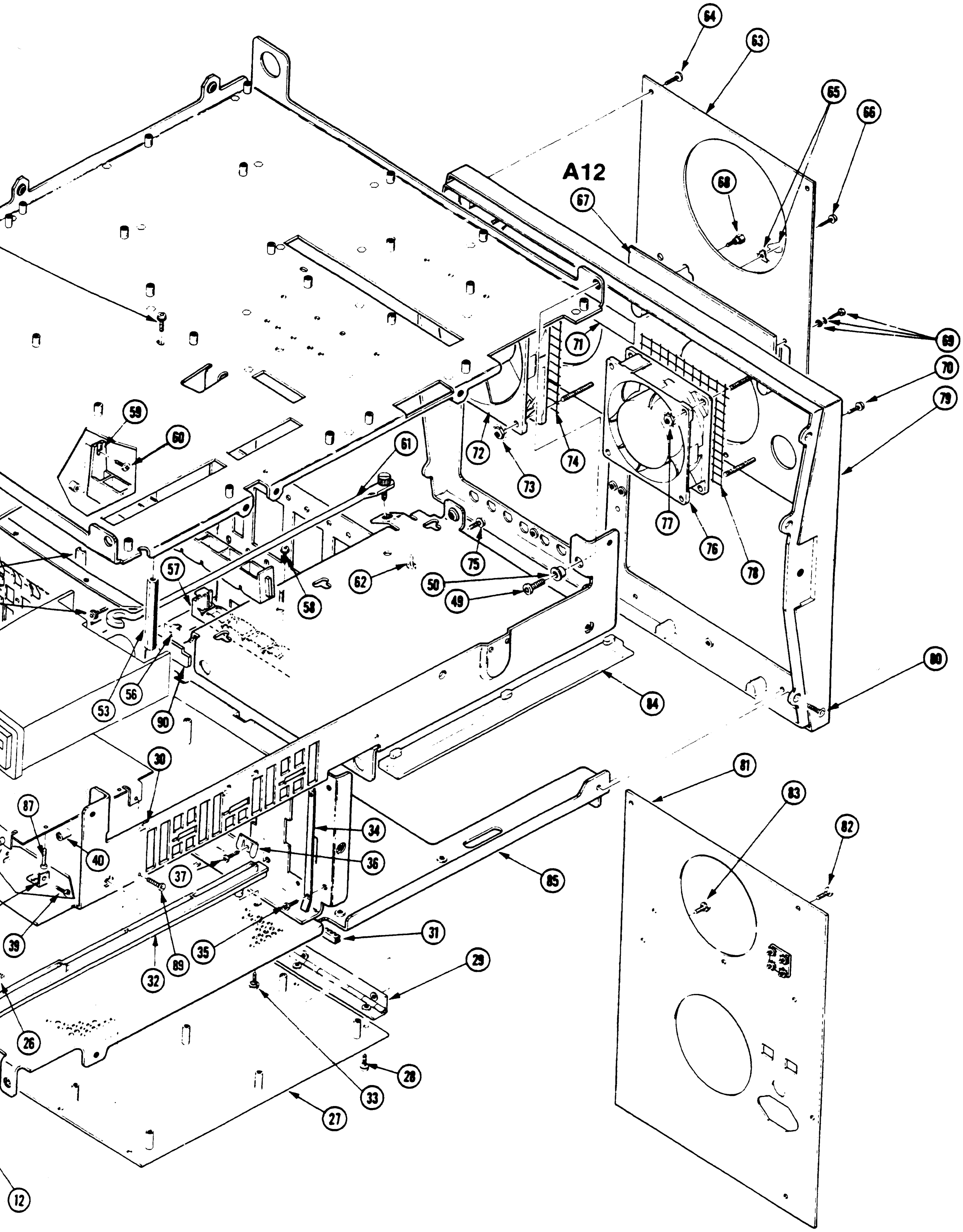
Fig. 2 Front, Chassis, Rear

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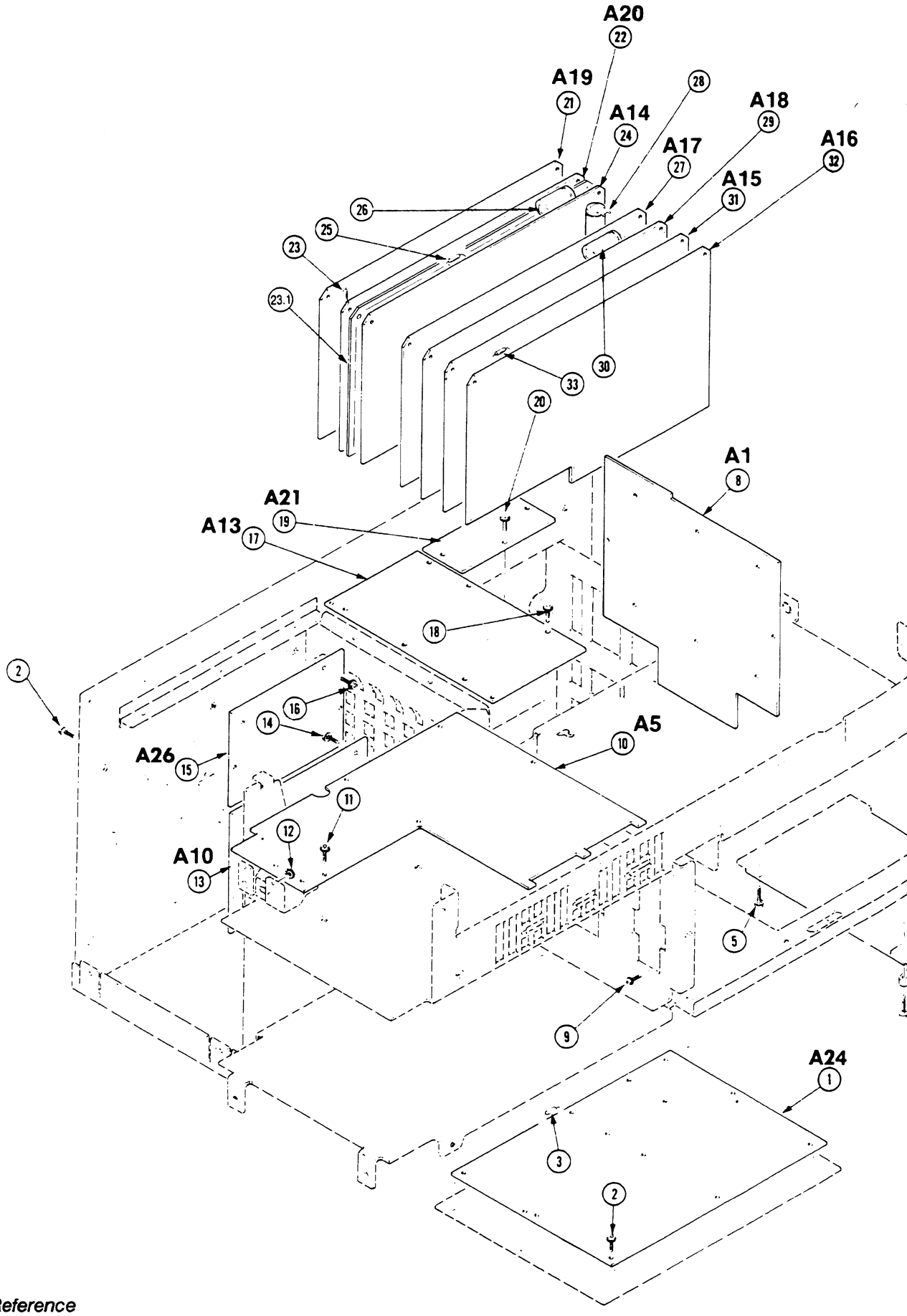
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A21
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A13
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A5
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A26
15
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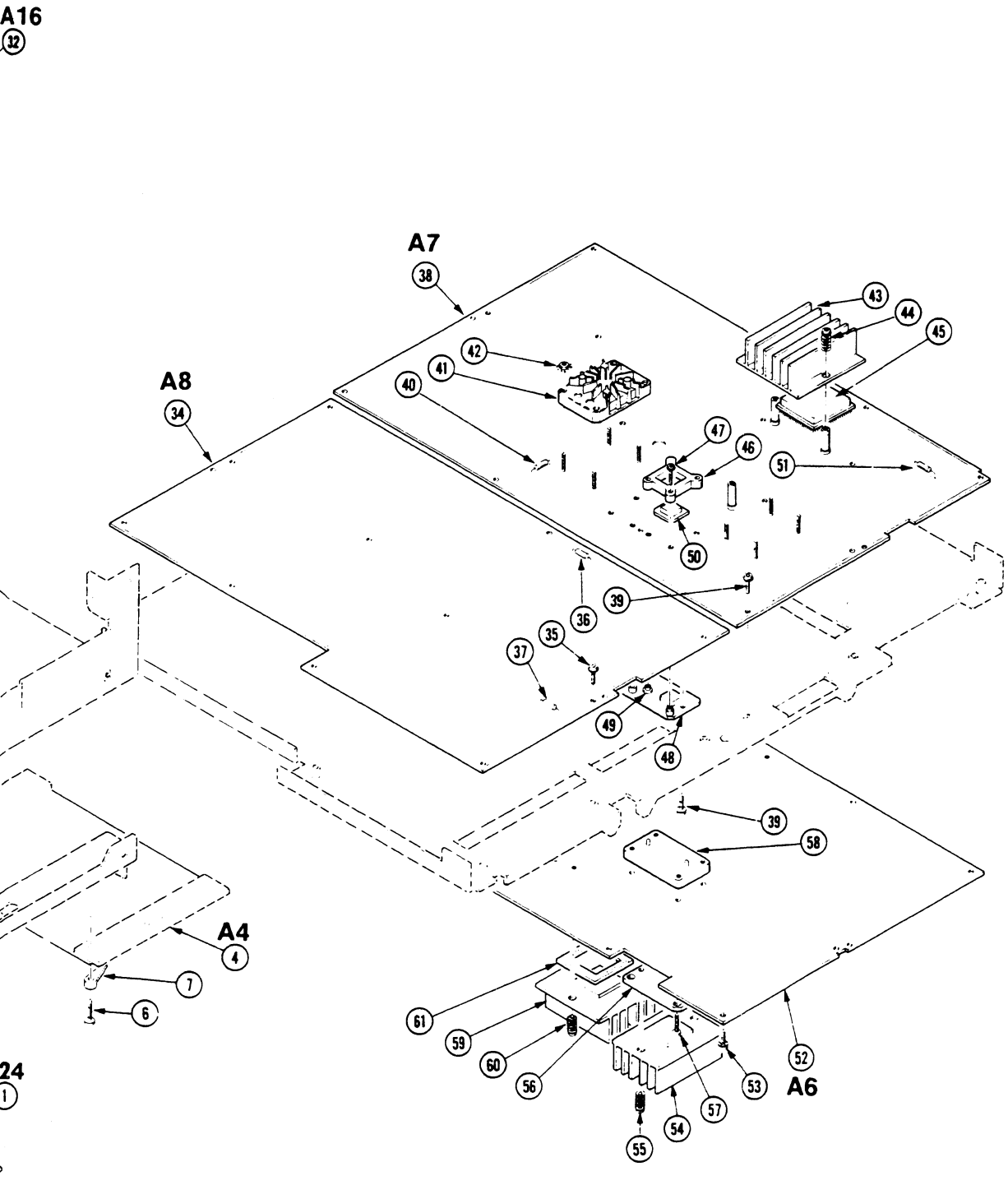
12
A10
13
5
9
A24
1
3
2


A16
32
A7
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A8
34
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45
42
41
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A4
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A6
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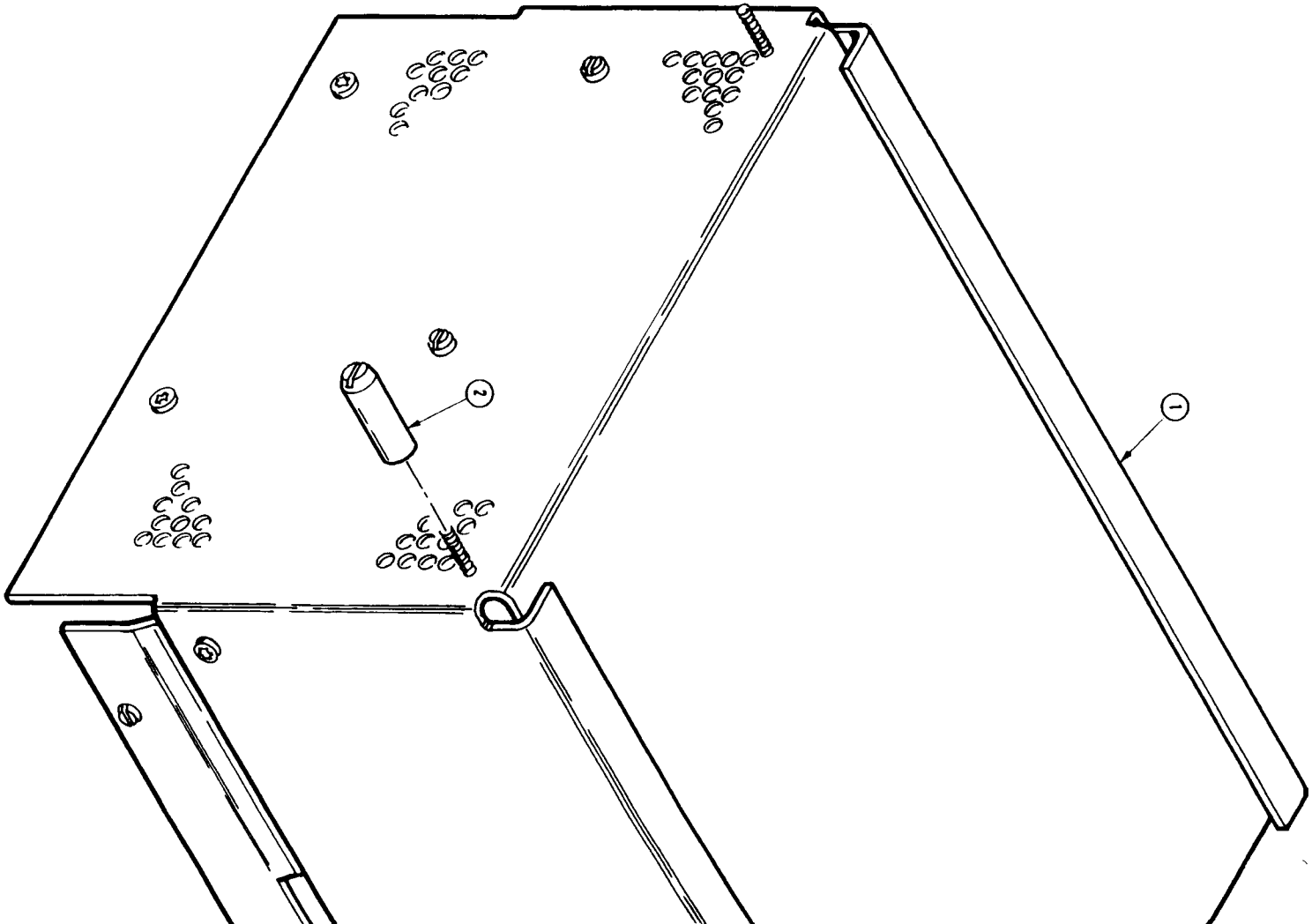
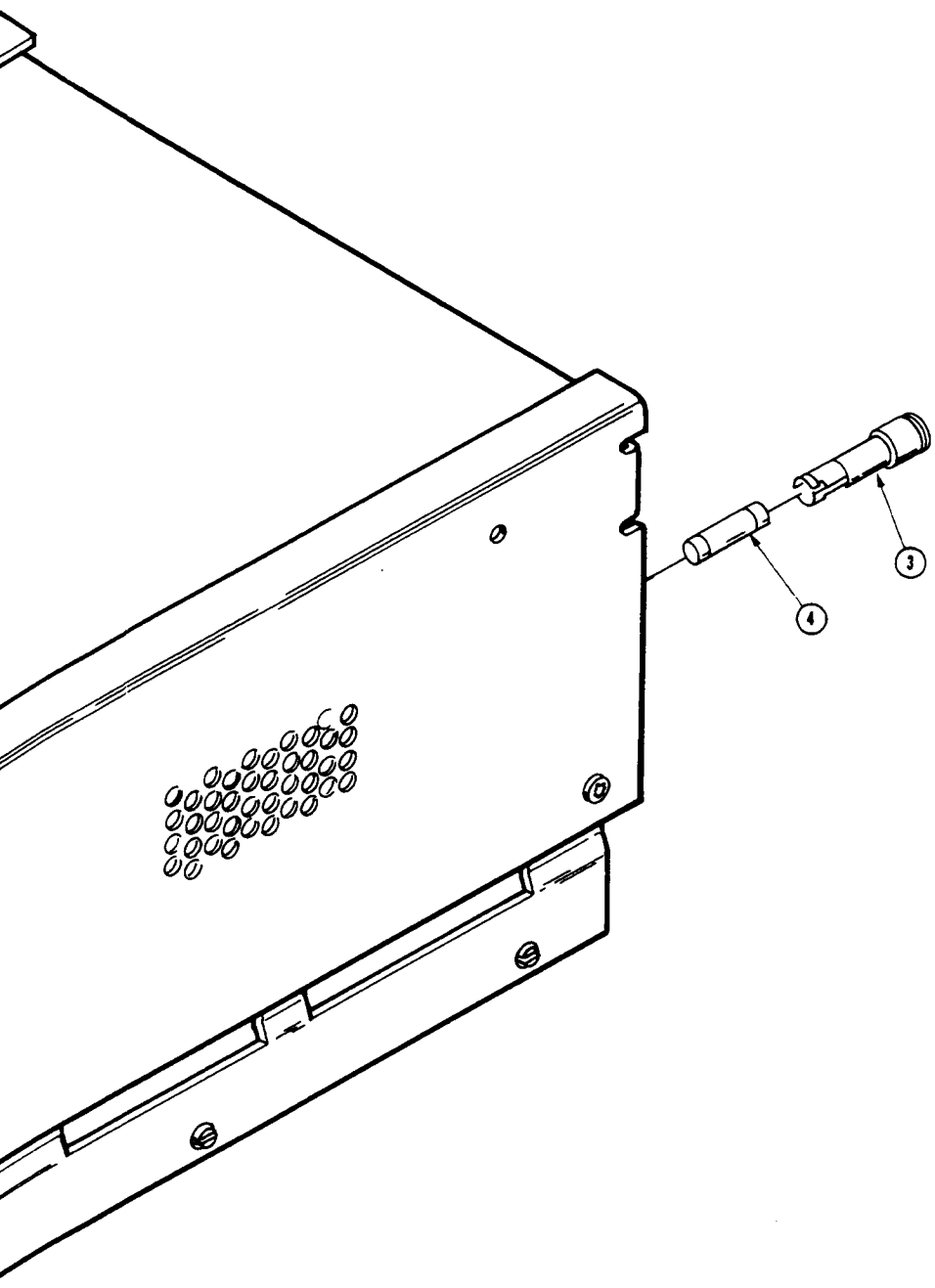
55

Fig. 4 Power Supply

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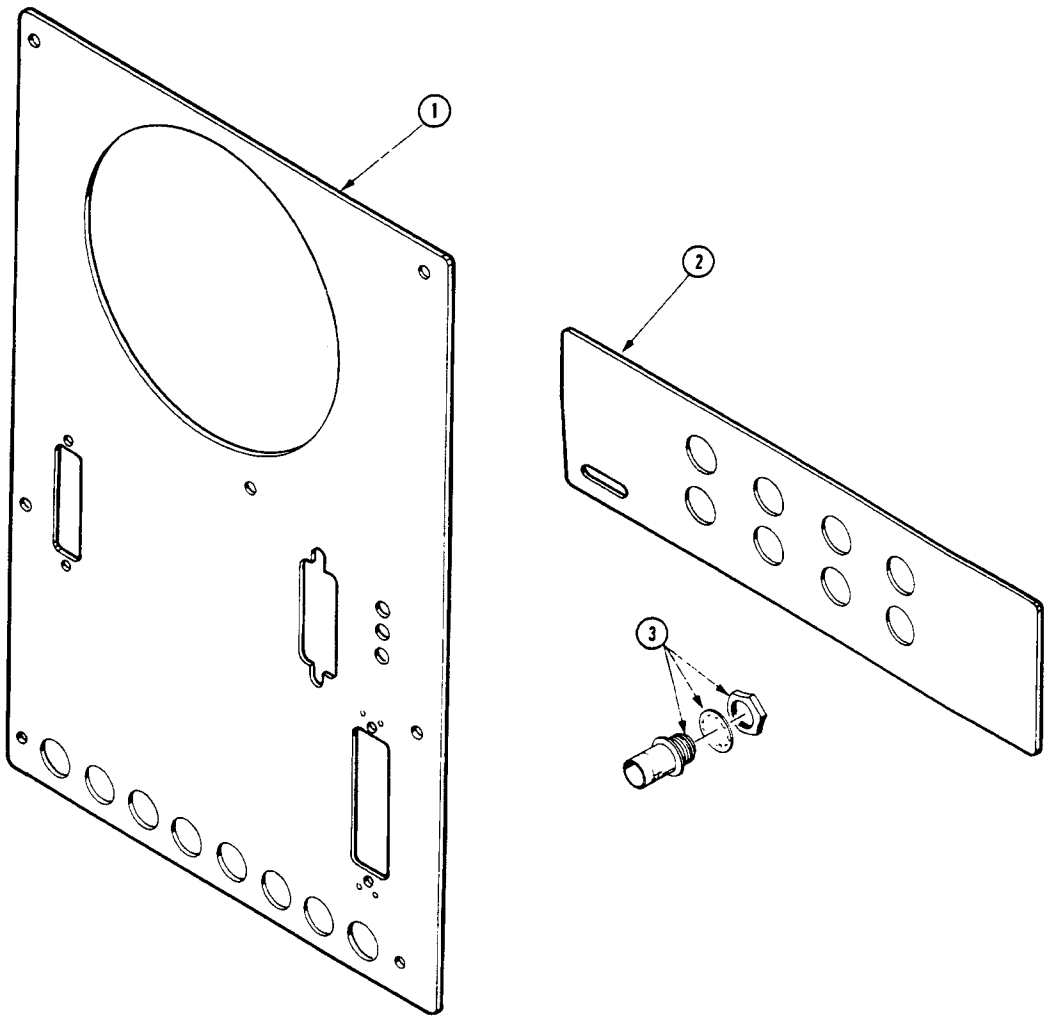
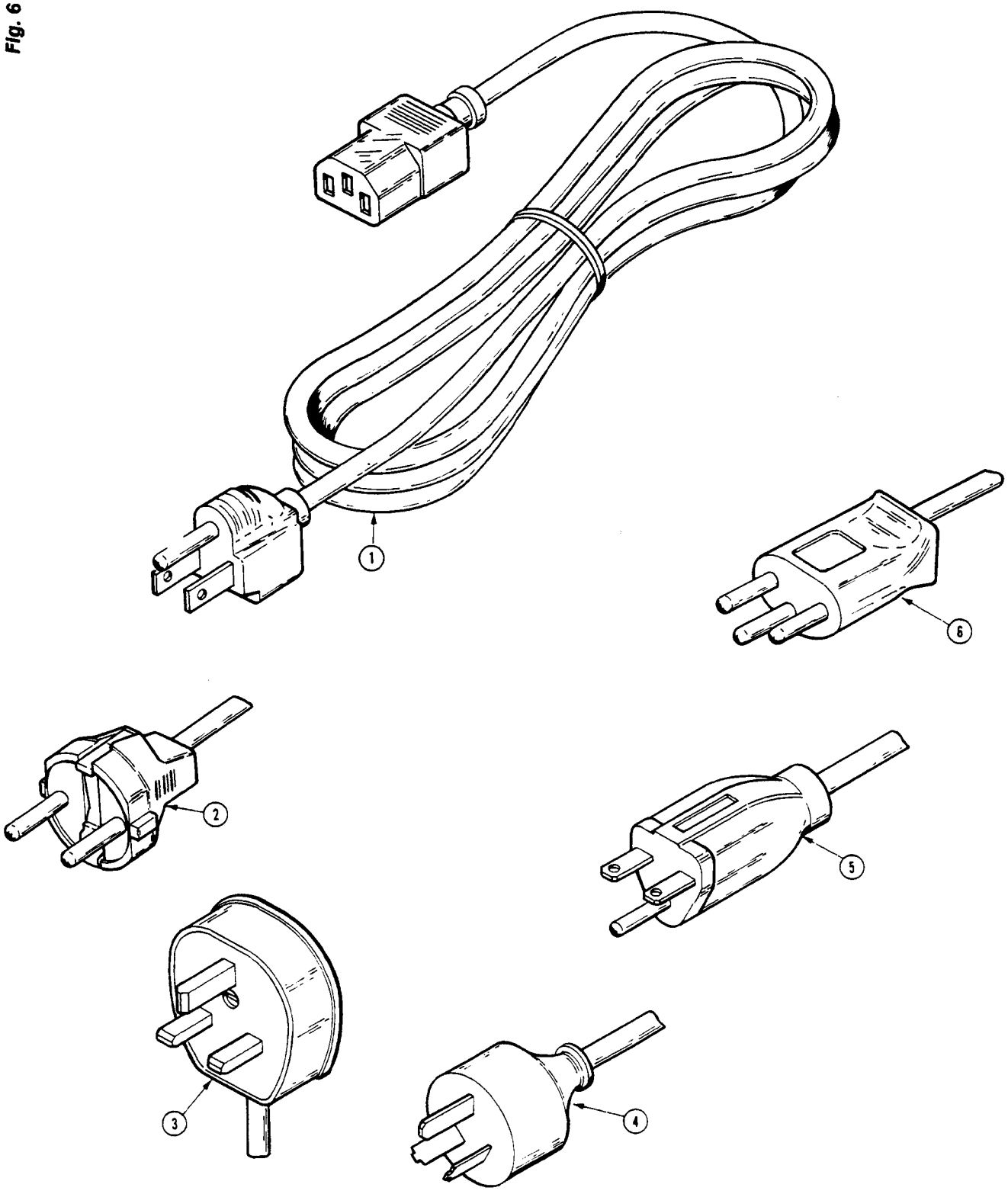


OPTION 1C

Fig. 6 Accessories



DSA 602A Replaceable Parts

This section contains a list of the components that are replaceable for the DSA 602A Digitizing Signal Analyzer.

Table 5-2 — DSA 602A Board FRUs

FRU	Part Number	Description
A1	670–9815–00	Plug-in Interface Board
A2	620–0033–01	Power Supply:Mainframe
A4	670–9687–01	Regulator Board
A5	670–9823–00	Calibrator Board
A6	670–9821–02	Lower Acquisition Board
A7	670–9822–00	Upper Acquisition Board
A8	670–9831–00	Waveform Processor Board
A9	614–0819–01	Panel,Subassy:Touch Panel
A9A2	671–0036–00	Knob Board
A10	670–9813–00	Front Panel Control Board
A11	670–9830–00	Front Panel Button Board
A12	671–0013–00	Rear Panel Board
A13	670–8851–00	Mother Board
A14	670–8854–01	I/O Board
A15	671–0852–00	MMU Board
A16	671–0879–00	Display Controller Board
A17	671–2116–00	Main Processor Board
A18	671–0385–00	Memory Board
A19	670–9819–00	Digitizer CPU Board
A20	670–9820–00	Digitizer I/O Board
A21	670–9828–00	Mini Mother Board
A24	670–9818–02	CRT Driver Board
A25	670–9829–00	Degauss Board
A26	670–9826–00	Geometry Board

Table 5-2 — DSA 602A Board FRUs

FRU	Part Number	Description
A27	670–9825–00	CRT Socket Board
A32	671–2021–00	Disk Controller Board
A33	118–8526–00	Disk Drive

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
S3109	FELLER	72 VERONICA AVE UNIT 4	SUMMERSET NJ 08873
S3629	SCHURTER AG H C/O PANEL COMPONENTS CORP	2015 SECOND STREET	BERKELEY CA 94170
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK0488	CURRAN COIL SPRING INC	635 NW 16TH	PORTLAND OR 97209–2206
TK0588	UNIVERSAL PRECISION PRODUCTS	1775 NW 216TH	HILLSBORO OR 97123
TK1159	IMPROVED PRODUCTS	3400 OLYMPIC STREET	SPRINGFIELD OR 97477
TK1163	POLYCAST INC	9898 SW TIGARD ST	TIGARD OR 97223
TK1374	TRI–TEC ENGINEERING CORP		
TK1416	SHARP CORP	22–22 NAGAIKE–CHO ABENO–KU	OSAKA JAPAN
TK1465	BEAVERTON PARTS MFG CO	1800 NW 216TH AVE	HILLSBORO OR 97124–6629
TK1499	AMLAN INC	97 THORNWOOD RD	STAMFORD CT 06903–2617
TK1547	MOORE ELECTRONICS INC (DIST)	19500 SW 90TH COURT PO BOX 1030	TUALATIN OR 97062
TK1916	SKS DIE CASTING CO	2200 4TH	BERKELEY CA 94710–2215
TK1947	NORTHWEST ETCH TECHNOLOGY	3223 C ST NE UNIT 2	AUBURN WA 98002
TK1967	SYNDETEK	3915 E MAIN	SPOKANE WA 99202
TK2061	SONY CORP	% TOKYO JAPAN BUYERS OFFICE BLDG 78/661	BEAVERTON OR 97077
TK2072	PRECISION DECORATORS INC HAWTHORNE BUSINESS CENTER	5289 NE ELAM YOUNG PARKWAY SUITE G400	HILLSBORO OR 97124
TK2122	INDUSTRIAL GASKET INC	1623 SE 6TH AVE	PORTLAND OR 97214–3502
TK2156	ACACIA/DEANCO	7763 SW CIRRUS RD SUITE 26	BEAVERTON OR 97005–6452
TK2248	WESTERN MICRO TECHNOLOGY	1800 NW 169TH PL SUITE 3300	BEAVERTON OR 97006
TK2338	ACC MATERIALS	ED SNYDER BLDG 38–302	BEAVERTON OR 97077
TK2421	INDEK CORP	2360 QUME DRIVE SUITE A	SAN JOSE, CA 95131
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK WAY SUITE #2	VANCOUVER WA 98601
0B445	ELECTRI–CORD MFG CO INC	312 EAST MAIN ST	WESTFIELD PA 16950
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
0J7N9	MCX INC	30608 SAN ANTONIO ST	HAYWARD CA 94544
0J9P9	GEROME MFG CO INC	PO BOX 737	NEWBURG OR 97132
0KBZ5	MORELLIS Q & D PLASTICS	1812 16TH AVE	FOREST GROVE OR 97116
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
01536	TEXTRON INC CAMCAR DIV SEMS PRODUCTS UNIT	1818 CHRISTINA ST	ROCKFORD IL 61108
06383	PANDUIT CORP	17301 RIDGELAND	TINLEY PARK IL 07094–2917

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
11897	PLASTIGLIDE MFG CORP	2701 W EL SEGUNDO BLVD	HAWTHORNE CA 90250–3318
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125–4632
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
29681	BEL–TRONICS CORP	344 INTERSTATE RD	ADDISON IL 60101–4516
29870	VICTOR CORP	618 MAIN STREET	WEST WARWICK RI 02893
30010	BICC–VERO ELECTRONICS INC	40 LINDEMAN DR	TRUMBULL CT 06611–4739
46384	PENN ENGINEERING AND MFG CORP	OLD EASTON RD PO BOX 1000	DANBORO PA 18916
5Y400	TRIAX METAL PRODUCTS INC DIV OF BEAVERTON PARTS MFG CO	1800 216TH AVE NW	HILLSBORO OR 97124–6629
52814	TECH–ETCH INC	45 ALDRIN RD	PLYMOUTH MA 02360
53387	MINNESOTA MINING MFG CO	PO BOX 2963	AUSTIN TX 78769–2963
61058	MATSUSHITA ELECTRIC CORP OF AMERICA PANASONIC INDUSTRIAL CO DIV	ONE PANASONIC WAY PO BOX 1502	SECAUCUS NJ 07094–2917
61439	GILLESPIE DECALS INC	27676 PARKWAY AVE SW	WILSONVILLE OR 97070
61857	SAN–0 INDUSTRIAL CORP	85 ORVILLE DR PO BOX 511	BOHEMIA LONG ISLAND NY 11716–2501
7W718	MARQUARDT SWITCHES INC	2711 ROUTH 20 EAST	CAZENOVIA NY 13035–1219
74868	AMPHENOL CORP R F CONNECTORS (OPNS)	1 KENNEDY AVE	DANBURY CT 06810–5803
75915	LITTELFUSE INC SUB TRACOR INC	800 E NORTHWEST HWY	DES PLAINES IL 60016–3049
8X345	NORTHWEST SPRING & MFG CO	5858 WILLOW LANE	LAKE OSWEGO OR 97034–5343
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
83486	ELCO INDUSTRIES INC	1101 SAMUELSON RD	ROCKFORD IL 61101
83553	ASSOCIATED SPRING BARNES GROUP INC	15001 S BROADWAY P O BOX 231	GARDENA CA 90248–1819
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108–5181
96881	THOMSON INDUSTRIES INC	SHORE RD AT CHANNEL DR	PORT WAHSINGTON NY 11050

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1 -1	200-3350-00			1	COVER,CABINET:UPPER,ALUMINUM	80009	ORDER BY DESC
-2	214-0603-02			4	.PIN ASSY,SECRG:W/SPRING WASHER	0J260	ORDER BY DESC
-3	386-1151-00			4	.CLAMP,RIM CLENC:SPG STL	83553	ORDER BY DESC
-4	386-0227-00			4	.STOP,CLP,RIM CL:ACETAL	0JR05	386-0227-00
-5	348-0875-00			1	FLIPSTAND,CAB.:	TK0488	ORDER BY DESC
-6	200-3351-00			1	COVER,CABINET:LOWER,ALUMINUM	80009	ORDER BY DESC
-7	214-0603-02			4	.PIN ASSY,SECRG:W/SPRING WASHER	0J260	ORDER BY DESC
-8	386-1151-00			4	.CLAMP,RIM CLENC:SPG STL CD PL	83553	ORDER BY DESC
-9	386-0227-00			4	.STOP,CLP,RIM CL:ACETAL	0JR05	386-0227-00
-10	348-0596-00			4	PAD,CAB.FOOT:0.69 X 0.255 X 0.06,PU	TK2122	348-0596-00
-11	348-0879-00			4	FOOT,CABINET:BOTTOM,BLUE,POLYCARB (ATTACHING PARTS)	TK1163	ORDER BY DESC
-12	211-0734-00			4	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	83486	MACHINE SCREW
-13	348-0980-00			4	SHLD GSKT,ELEK:FINGER TYPE,21.0 L	TK1159	ORDER BY DESC
-14	426-2177-00	B010100	B050661	2	FRAME SECT,CAB.:RIGHT/LEFT,ALUMINUM	TK1465	ORDER BY DESC
	426-2177-01	B050662		2	FRAME SECT,CAB.:RIGHT/LEFT,ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-15	212-0681-00			4	SCREW,MACHINE:10-32 X 0.25,PNH,STL	83486	MACHINE SCREW
-16	211-0734-00			3	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	83486	MACHINE SCREW
-17	101-0116-00			2	TRIM,DECORATIVE:FRONT (ATTACHING PARTS)	TK1163	ORDER BY DESC
-18	212-0158-00			4	SCREW,MACHINE:8-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-19	200-2191-00	B010100	B050661	4	CAP,RETAINER:PLASTIC	0JR05	ORDER BY DESC
-20	367-0248-01	B010100	B050661	2	HANDLE,CARRYING:16.341 L,W/CLIP	80009	367024801
-21	101-0117-00			2	TRIM,DECORATIVE:REAR (ATTACHING PARTS)	TK1163	ORDER BY DESC
-22	212-0158-00			4	SCREW,MACHINE:8-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -0	614-0819-01			1	SUBPANEL ASSY:SUBASSY TOUCH PANEL	80009	614081901
					(SEE A9, EXCHANGE ITEM)		
					TOUCH PANEL ASSEMBLY INCLUDES:	80009	
-1	333-3930-00			1	.PANEL,FRONT:		ORDER BY DESC
					(ATTACHING PARTS)		
-2	211-0721-00			4	.SCREW,MACHINE:6-32 X 0.375,PNH,STL	TK2072	ORDER BY DESC
					(END ATTACHING PARTS)		
-3	129-1165-00			2	.SPACER,POST:1.9 L,W 6-32 THD BOTH END	0KB01	ORDER BY DESC
-4	386-5499-00			1	.DIFFUSER,LIGHT:PLASTIC,7.055 X 5.472		ORDER BY DESC
					(ATTACHING PARTS)	TK0588	
-5	211-0372-00			4	.SCREW,MACHINE:4-40 X 0.312,PNH,STL	TK1163	B80-00020-003
					(END ATTACHING PARTS)		
-6	366-0582-01			2	.KNOB:ENCODER	93907	ORDER BY DESC
-7	671-0036-00			1	.CIRCUIT BD ASSY:KNOB		671003600
					(SEE A9A2, EXCHANGE ITEM)	TK1163	
					(ATTACHING PARTS)	80009	
-8	211-0409-00			2	.SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10		829-06888-024
					(END ATTACHING PARTS)		
-9	670-9829-00			1	CIRCUIT BD ASSY:DEGAUSS	93907	670982900
					(SEE A25, EXCHANGE ITEM)		
					(ATTACHING PARTS)	80009	
-10	211-0408-00			5	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10		829-06815-024
					(END ATTACHING PARTS)		
-11	333-3451-01			1	PANEL,FRONT:DSA601,LOWER	93907	ORDER BY DESC
					(ATTACHING PARTS)		
-12	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL	TK2072	ORDER BY DESC
					(END ATTACHING PARTS)		
-13	260-2349-00			1	SWITCH,ROCKER:SPST,30MA,12V	TK0435	1801.1152
-14	333-3928-00			1	PANEL,FRONT:DSA602A,DISK DRIVE		ORDER BY DESC
					(ATTACHING PARTS)	7W718	
-15	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL	TK2072	ORDER BY DESC
					(END ATTACHING PARTS)		
-16	348-0878-00			1	SHLD GSKT,ELEK:SOLID TYPE,7.646 L	TK0435	ORDER BY DESC
-17	348-1075-00			1	SHLD GSKT,ELEK:SOLID TYPE,1.66 L		ORDER BY DESC
-18	348-1076-00			2	SHLD GSKT,ELEK:SOLID TYPE,2.28 L	52814	ORDER BY DESC
-19	344-0438-00			1	CLIP,ELECTRICAL:CRT GROUNDING,2.5 X 4.5	52814	ORDER BY DESC
-20	108-1383-00			2	COIL,TUBE DEFL:FXD,DEGAUSS R	52814	87-0912
-21	346-0120-00			4	STRAP,TIEDOWN,E:5.5 L MIN,PLASTIC,WHITE	TK1947	SST1.5M
-22	154-0914-00			1	ELECTRON TUBE:CRT,P31	29681	SD-192
					(ATTACHING PARTS)	06383	
-23	211-0721-00			4	SCREW,MACHINE:6-32 X 0.375,PNH,STL	TK2061	ORDER BY DESC
-24	210-0949-00			4	WASHER,FLAT:0.141 ID X 0.5 OD X 0.062,BRS		ORDER BY DESC
					(END ATTACHING PARTS)	0KB01	
-25	386-5495-03			1	SUBPANEL,FRONT:FINISHED	12327	ORDER BY DESC
					(ATTACHING PARTS)		
-26	211-0725-00			10	SCREW,MACHINE:6-32 X 0.375,FLH	TK1916	ORDER BY DESC
					(END ATTACHING PARTS)		
-27	386-5752-00			1	PLATE,ECB MTG:ALUMINUM	01536	ORDER BY DESC
					(ATTACHING PARTS)		
-28	211-0373-00			6	SCREW,MACHINE:4-40 X 0.25,PNH,STL	80009	ORDER BY DESC
					(END ATTACHING PARTS)		
-29	214-1632-01			1	HINGE,BUTT:7.0 X 1.062,AL	83486	214163201
					(ATTACHING PARTS)		
-30	211-0373-00			3	SCREW,MACHINE:4-40 X 0.25,PNH,STL	80009	ORDER BY DESC
					(END ATTACHING PARTS)		
-31	255-0334-00			2	PLASTIC CHANNEL:12.75 X 0.175 X 0.155,NYLON	83486	122-NN-2500-060
-32	351-0744-00			3	GUIDE,PLUG-IN:POLYAMIDE		ORDER BY DESC
					(ATTACHING PARTS)	11897	
-33	211-0711-00			3	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15	TK1163	ORDER BY DESC
					(END ATTACHING PARTS)		

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -34	131-0800-03			2	CONTACT,ELEC:PLUG-IN GND,BE NI HT TR (ATTACHING PARTS)	0KB01	131080003
-35	211-0373-00			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESCRI
-36	131-0799-00			4	CONTACT,ELEC:PLUG-IN GND,BE NI (ATTACHING PARTS)	80009	131079900
-37	211-0373-00			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESCRI
-38	344-0131-00			4	CLIP,SPR TNSN:CKT BOARD MT,ACETAL WHITE (ATTACHING PARTS)	80009	344013100
-39	211-0373-00			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESCRI
-40	129-0220-00			1	SPACER,POST:0.281 L,6-32 THRU,ACETAL	TK0588	ORDER BY DESCRI
-41	150-0121-05			1	LAMP,CARTRIDGE:5V,0.06A,GREEN LENS	TK1967	ORDER BY DESCRI
-42	670-9830-00			1	CIRCUIT BD ASSY:FRONT PANEL BUTTON (SEE A11, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670983000
-43	211-0408-00			7	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-44	366-0600-00			10	PUSH BUTTON:0.269 X 0.409,ABS	TK1163	ORDER BY DESCRI
-45	670-9825-00			1	CIRCUIT BD ASSY:CRT SOCKET (SEE A27, EXCHANGE ITEM)	80009	670982500
-46	441-1769-02			1	CHAS,PLATFORM:ALUMINUM (ATTACHING PARTS)	5Y400	ORDER BY DESCRI
-47	211-0722-00			2	SCREW,MACHINE:6-32 X 0.25,PNH,STL	0KB01	ORDER BY DESCRI
-48	211-0734-00			6	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	83486	MACHINE SCREW:
-49	212-0682-00			1	SCREW,MACHINE:10-32 X 0.5,PNH,STL	0KB01	212-0682-00
-50	358-0717-00			1	BUSHING,SLEEVE:0.2 ID X 0.345 OD X 0.17 THK (END ATTACHING PARTS)	0JR05	ORDER BY DESCRI
-51	200-3386-01			1	COVER,CRT:ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESCRI
-52	211-0373-00			10	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESCRI
-53	129-1168-00			2	SPACER,POST:2.07 L,0.138-32 THD BOTH ENDS	TK0588	ORDER BY DESCRI
-54	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (ATTACHES SOCKET BD GND WIRE)	0KB01	ORDER BY DESCRI
-55	351-0765-00			16	GUIDE,CKT BOARD:NYLON	30010	29-0124D
-56	358-0729-00			1	BUSHING,SLEEVE:0.250 X 0.080,NYLON	96881	NYLINER 4L1FF
-57	351-0746-00			1	GUIDE,CKT BOARD:NYLON 6.803 L (ATTACHING PARTS)	0JR05	ORDER BY DESCRI
-58	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESCRI
-59	343-1318-00			2	RTNR,CARD CAGE:CIRCUIT BOARD (ATTACHING PARTS)	0JR05	ORDER BY DESCRI
-60	211-0722-00			2	SCREW,MACHINE:6-32 X 0.25,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESCRI
-61	386-5567-00			1	SPRT,PLATFORM:STEEL	TK0488	ORDER BY DESCRI
-62	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (ATTACHES PWR SPLY GND WIRE)	0KB01	ORDER BY DESCRI
-63	386-5501-00			1	PLATE,CONNECTOR:STANDARD,ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESCRI
-64	211-0721-00			8	SCREW,MACHINE:6-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESCRI
-65	214-2476-01			2	HDW ASSY KIT:BAIL LOCK,ELEC CONN RCPT (ATTACHING PARTS)	53387	3475-4
-66	211-0410-00			2	SCR,ASSEM WSHR:4-40 X 0.437,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-07510-024
-67	671-0013-00			1	CIRCUIT BD ASSY:REAR PANEL (SEE A12, EXCHANGE ITEM) (ATTACHING PARTS)	80009	671001300

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -68	129-0774-00			2	SPACER,POST:0.25 L,4-40 EXT ONE END,BRS	80009	129077400
-69	214-3106-00			2	HARDWARE KIT:JACK SOCKET	53387	3341-1S
-70	211-0410-00			1	SCR,ASSEM WSHR:4-40 X 0.437,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-07510-024
-71	334-7307-00			1	MARKER,IDENT:MARKED CAUTION	61439	ORDER BY DESC
-72	119-2600-01			1	FAN,TUBEAXIAL:12V,3.9W,2500RPM,83CFM (ATTACHING PARTS)	TK2421	DA 121225
-73	210-0457-00			4	NUT,PL,ASSEM WA:6-32 X 0.312,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-74	378-0311-00			1	SCREEN,FAN:4.8 X 4.8	80009	ORDER BY DESC
-75	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (ATTACHES REAR PNL GND WIRE)	0KB01	ORDER BY DESC
-76	119-2610-02			1	FAN,TUBEAXIAL:12V,3.0W,3300RPM,48CFM,92MM (ATTACHING PARTS)	TK2421	MDA 120925HB
-77	210-0457-00			3	NUT,PL,ASSEM WA:6-32 X 0.312,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-78	378-0310-00			1	SCREEN,FAN:3.65 X 3.65	80009	378031000
-79	386-5496-01			1	SUBPANEL,REAR:FINISHED (ATTACHING PARTS)	TK1916	ORDER BY DESC
-80	211-0725-00			8	SCREW,MACHINE:6-32 X 0.375,FLH (END ATTACHING PARTS)	01536	ORDER BY DESC
-81	386-5503-00			1	PLATE,REAR:POWER SUPPLY,ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-82	211-0721-00			10	SCREW,MACHINE:6-32 X 0.375,PNH,STL	0KB01	ORDER BY DESC
-83	211-0730-00			4	SCR,ASSEM WSHR:6-32 X 0.375,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-84	351-0791-00			2	GUIDE,PWR SPLY:POLYCARBONATE	TK1163	ORDER BY DESC
-85	610-0754-02			1	CHASSIS ASSY:	0J260	ORDER BY DESC
-86	118-8526-00			1	DISK,FLOPPY:3.5 INCH FLOPPY DRIVE,1.44 MEG (SEE A33, EXCHANGE ITEM) (ATTACHING PARTS)	TK2248	FD235HF
-87	211-0461-00			4	SCREW,MACHINE:M3 X 0.5 X 6MM,PNH,STL (END ATTACHING PARTS)	0KB01	211-0461-00
-88	407-4047-00			1	BRKT,DISK DRIVE: (ATTACHING PARTS)	0J9P9	ORDER BY DESC
-89	211-0409-00			2	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06888-024
-90	407-4120-00			1	BRACKET,HLDN:ALUMINUM	0J9P9	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -1	670-9818-01	B010100	B050160	1	CIRCUIT BD ASSY:CRT DRIVER;	80009	670981801
	670-9818-02	B050161		1	CIRCUIT BD ASSY:CRT DRIVER;	80009	670981802
					(SEE A24, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-2	211-0409-00			11	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10	93907	829-06888-024
					(END ATTACHING PARTS)		
					CRT DRIVER BOARD ASSY INCLUDES:		
-3	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-4	670-9687-00	B010100	B050203	1	CIRCUIT BD ASSY:REGULATOR	80009	670968700
	670-9687-01	B050204		1	CIRCUIT BD ASSY:REGULATOR;	80009	670968701
					(SEE A4, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-5	211-0720-00			3	SCR,ASSEM WSHR:6-32 X 0.50,PNH,STL,T15	0KB01	ORDER BY DESC
-6	211-0738-00			1	SCREW,MACHINE:6-32 X 0.625,PNH,STL	83486	ORDER BY DESC
					(END ATTACHING PARTS)		
-7	343-0089-00			1	CLAMP,CABLE:0.3 DIA,PLASTIC	80009	343008900
-8	670-9815-00			1	CIRCUIT BD ASSY:PLUG-IN INTERFACE	80009	670981500
					(SEE A1, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-9	211-0409-00			9	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10	93907	829-06888-024
					(END ATTACHING PARTS)		
-10	670-9823-00			1	CIRCUIT BD ASSY:CALIBRATOR	80009	670982300
					(SEE A5, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-11	211-0408-00			6	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10	93907	829-06815-024
-12	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL	TK0435	ORDER BY DESC
					(END ATTACHING PARTS)		
					CALIBRATOR BOARD ASSEMBLY INCLUDES:		
	160-4797-00			1	.MICROCKT,DGTL:MICROCONT,4K BYTES	80009	160479700
					(U510)		
-13	670-9813-00			1	CIRCUIT BD ASSY:FRONT PANEL CONTROL	80009	670981300
					(SEE A10, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-14	211-0408-00			2	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10	93907	829-06815-024
					(END ATTACHING PARTS)		
-15	670-9826-00			1	CIRCUIT BD ASSY:GEOMETRY	80009	670982600
					(SEE A26, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-16	211-0408-00			2	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10	93907	829-06815-024
					(END ATTACHING PARTS)		
-17	670-8851-00			1	CIRCUIT BD ASSY:MOTHER	80009	670885100
					(SEE A13, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-18	211-0711-00			6	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15	0KB01	ORDER BY DESC
					(END ATTACHING PARTS)		
-19	670-9828-00			1	CIRCUIT BD ASSY:MINI MOTHER	80009	670982800
					(SEE A21, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-20	211-0711-00			3	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15	0KB01	ORDER BY DESC
					(END ATTACHING PARTS)		
-21	670-9819-00			1	CIRCUIT BD ASSY:DIGITIZER CPU	80009	670981900
					(SEE A19, EXCHANGE ITEM)		
-22	670-9820-00			1	CIRCUIT BD ASSY:DIGITIZER I/O	80009	670982000
					(SEE A20, EXCHANGE ITEM)		
-23	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-23.1	671-2021-00			1	CIRCUIT BD ASSY:FLOPPY DISK CONTROLLER;	80009	671202100
					(SEE A32, EXCHANGE ITEM)		
-24	670-8854-01			1	CIRCUIT BD ASSY:INPUT/OUTPUT	80009	670885401
					(SEE A14, EXCHANGE ITEM)		

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -25	159-0245-00			4	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-26	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM	61058	BR-2/3A-E2P
-27	671-2116-00			1	CIRCUIT BD ASSY:MAIN PROCESSOR (SEE A17, EXCHANGE ITEM)	80009	671211600
-28	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM	61058	BR-2/3A-E2P
-29	671-0385-00			1	CIRCUIT BD ASSY:BB MEMORY (SEE A18, EXCHANGE ITEM)	80009	671038500
	671-0385-50			1	CIRCUIT BD ASSY:BB MEMORY (SEE A18 OPT 4C, EXCHANGE ITEM)	80009	671038550
-30	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM (OPTION 4C ONLY)	61058	BR-2/3A-E2P
-31	671-0852-00			1	CIRCUIT BD ASSY:MEMORY MGT UNIT (SEE A15, EXCHANGE ITEM)	80009	671085200
-32	671-0879-00			1	CIRCUIT BD ASSY:DISPLAY CONTROLLER (SEE A16, EXCHANGE ITEM)	80009	671087900
-33	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
				1	CIRCUIT BD ASSY:WAVEFORM PROCESSOR	80009	670983100
-34	670-9831-00				(SEE A8, EXCHANGE ITEM)		
					(ATTACHING PARTS)		
-35	211-0408-00			11	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10	93907	829-06815-024
					(END ATTACHING PARTS)		
					SIGNAL PROCESSOR BD ASSY INCLUDES:		
-36	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-37	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-38	670-9822-00			1	CIRCUIT BD ASSY:UPPER ACQUISITION (SEE A7, EXCHANGE ITEM)	80009	670982200
					(ATTACHING PARTS)		
-39	211-0408-00			21	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10	93907	829-06815-024
					(END ATTACHING PARTS)		
					UPPER ACQUISITION BD ASSY INCLUDES:		
-40	159-0203-00			1	.FUSE,CARTRIDGE:2A,125V,FAST,SUBMINIATUR	61857	SPI-2A
-41	165-2078-00			2	.MICROCKT,HYBRID:TIME INTERPOLATOR	80009	165207800
					(ATTACHING PARTS)		
-42	210-0586-00			8	.NUT,PL,ASSEM WA:4-40 X 0.25,STL	TK0435	ORDER BY DESC
					(END ATTACHING PARTS)		
-43	214-3965-00			6	.HEAT SINK,ELEC:DEMUX,ALUMINUM	TK1465	ORDER BY DESC
					(ATTACHING PARTS)		
-44	214-4034-00			12	.SPRING,HLCPS:0.24 OD X 0.44 L,SST	8X345	ORDER BY DESC
					(END ATTACHING PARTS)		
-45	155-0328-01			1	.IC,ASIC:BIPOLAR,DIGITAL,CLOCK DRIVER	80009	155032801
	155-0340-01			1	.IC,ASIC:BIPOLAR,DIGITAL,SWEEP CONT	80009	155034001
	155-0341-01			4	.IC,ASIC:BIPOLAR,DIGITAL,DEMULTIPLEXER	80009	155034101
-46	119-3690-00			2	.HYPCON ASSY:44 CONTACT,STEP MOUNT	TK2338	ORDER BY DESC
					(ATTACHING PARTS)		
-47	211-0391-00			8	.SCREW,MACHINE:2-56 X 0.437,P4,STL,T-8	83486	ORDER BY DESC
					(END ATTACHING PARTS)		
-48	214-4188-00			1	.HEAT SINK,ELEC:TRIGGER IC,ALUMINUM	TK1465	ORDER BY DESC
-49	220-0797-00			4	.NUT,CAPTIVE:2-56 X 0.218 DIA,STL CD PL	46384	CKF2-256
-50	165-2161-00			2	.MICROCKT,DGTL:TRIGGER,H2161	80009	165216100
-51	159-0203-00			1	.FUSE,CARTRIDGE:2A,125V,FAST,SUBMINIATURE	61857	SPI-2A
-52	670-9821-02			1	CIRCUIT BD ASSY:LOWER ACQUISITION; (SEE A6, EXCHANGE ITEM)	80009	670982102
					(ATTACHING PARTS)		
-53	211-0408-00			18	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10	93907	829-06815-024
					(END ATTACHING PARTS)		
					LOWER ACQUISITION BD ASSY INCLUDES:		
-54	214-3964-00			8	.HEAT SINK,ELEC:S/H FLASH,ALUMINUM	TK1465	ORDER BY DESC
					(ATTACHING PARTS)		
-55	214-4034-00			16	.SPRING,HLCPS:0.24 OD X 0.44 L,SST	8X345	ORDER BY DESC
					(END ATTACHING PARTS)		

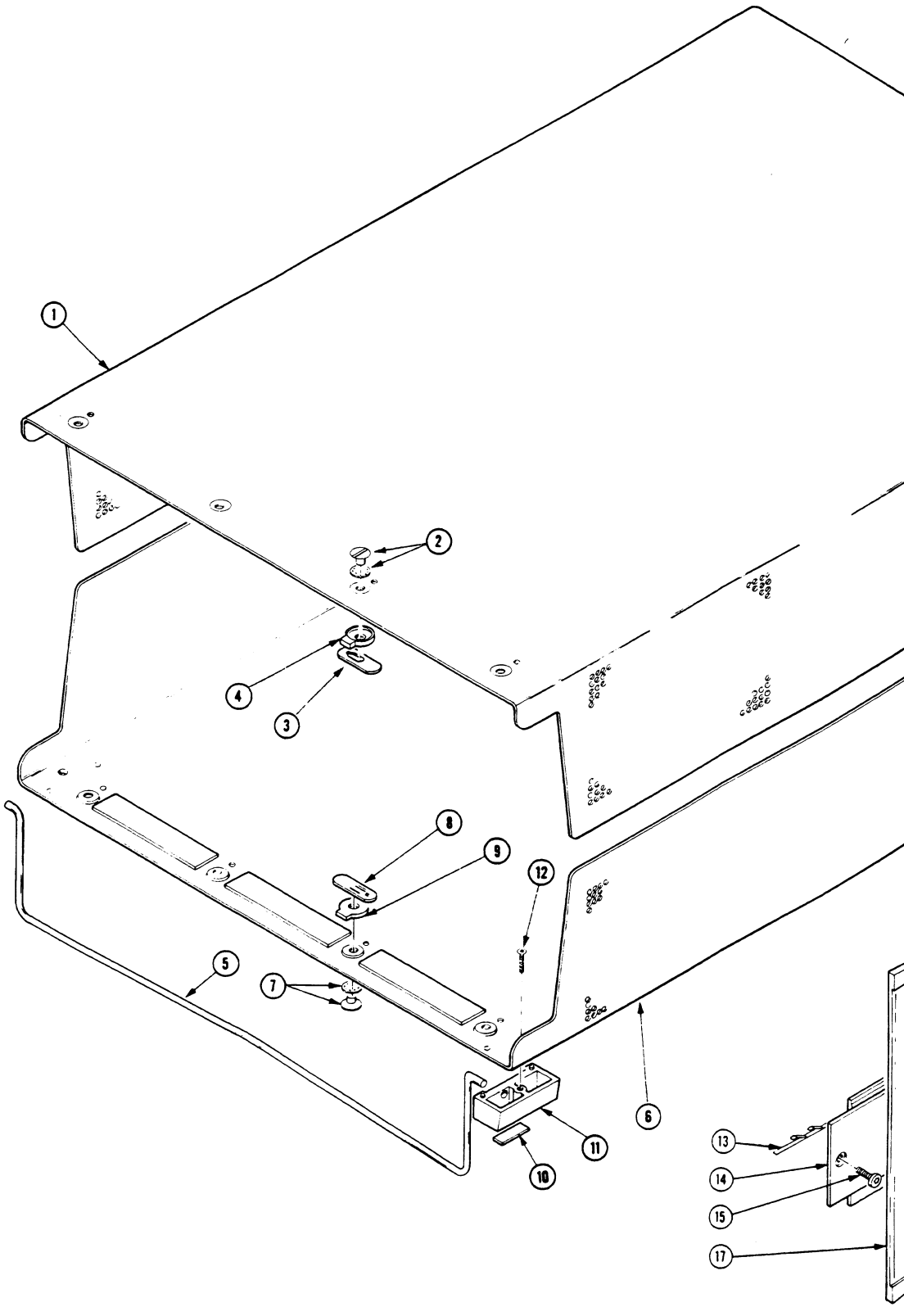
Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -56	155-0359-00			4	.MICROCKT,LINEAR:A.D PACKAGED HYBRID	80009	155035900
	155-0342-01			4	.IC,ASIC:BIPOLAR,DIGITAL,UTILITY CIRCUIT (ATTACHING PARTS)	80009	155034201
-57	211-0411-00			16	.SCR,ASSEM WSHR:4-40 X 0.5,PNH,STL,T10 (END ATTACHING PARTS)	93907	ORDER BY DESC
-58	343-1307-00			4	.RTNR,MICROCKT:2.2 X 1.3 X 0.27,POLYCARB	0KBZ5	ORDER BY DESC
-59	214-3965-00			4	.HEAT SINK,ELEC:DEMUX,ALUMINUM (ATTACHING PARTS)	TK1465	ORDER BY DESC
-60	214-4034-00			8	.SPRING,HLCPS:0.24 OD X 0.44 L,SST (END ATTACHING PARTS)	8X345	ORDER BY DESC
-61	155-0341-01			4	.IC,ASIC:BIPOLAR,DIGITAL,DEMULTIPLEXER	80009	155034101
	020-1775-04	B010100	B050219	1	COMPONENT KIT:DSA601A/DSA602A FIRMWARE	80009	020177504
	020-1775-05	B050220		1	COMPONENT KIT:DSA601A/DSA602A VER 2.1	80009	020177505
					WIRE ASSEMBLIES		
	174-0801-01			1	CABLE ASSY,RF:8,50 OHM COAX,17.0 L (FROM A1J1 TO A6J2),(FROM A1J3 TO A6J4) (FROM A1J5 TO A6J6),(FROM A1J9 TO A6J10)	TK2469	ORDER BY DESC
	174-0802-01			1	CABLE ASSY,RF:4,50 OHM COAX,33.15 L (FROM A1J7 TO A7J8),(FROM A1J11 TO A7J12)	TK2469	ORDER BY DESC
	174-0884-00	B010100	B050329	1	CA ASSY,SP,ELEC:40,28 AWG,11.5 L,RIBBON	TK1547	ORDER BY DESC
	174-0884-01	B050330		1	CA ASSY,SP,ELEC:40,28 AWG,11.5 L,RIBBON (FROM A5J29 TO A6J29)	TK1547	ORDER BY DESC
	174-0885-00	B010100	B050329	1	CA ASSY,SP,ELEC:50,28 AWG,6.0 L,RIBBON	TK1547	ORDER BY DESC
	174-0885-01	B050330		1	CA ASSY,SP,ELEC:50,28 AWG,6.0 L,RIBBON (FROM A15J83 TO A20J83)	TK1547	ORDER BY DESC
	174-0886-00			2	CA ASSY,SP,ELEC:50,28 AWG,41.5 L,RIBBON (FROM A19J47 TO A8J47, STANDARD ONLY) (FROM A19J48 TO A8J48, STANDARD ONLY)	TK1547	ORDER BY DESC
	174-1236-00	B010100	B050329	2	CA ASSY,SP,ELEC:20,28 AWG,25.0 L,RIBBON	TK1547	ORDER BY DESC
	174-1236-01	B050330		2	CA ASSY,SP,ELEC:20,28 AWG,25.0 L,RIBBON (FROM A19J47 TO A8J47, OPTION 3C ONLY) (FROM A19J48 TO A8J48, OPTION 3C ONLY)	TK1547	ORDER BY DESC
	174-0888-00	B010100	B050329	1	CA ASSY,SP,ELEC:50,28 AWG,15.25 L,RIBBON	TK1547	ORDER BY DESC
	174-0888-01	B050330		1	CA ASSY,SP,ELEC:50,28 AWG,15.25 L,RIBBON (FROM A20J28 TO A5J28)	TK1547	ORDER BY DESC
	174-0889-00	B010100	B050329	1	CA ASSY,SP,ELEC:34,28 AWG,7.5 L,RIBBON	TK1547	ORDER BY DESC
	174-0889-01	B050330		1	CA ASSY,SP,ELEC:34,28 AWG,7.5 L,RIBBON (FROM A10J73 TO A9A1J73)	TK1547	ORDER BY DESC
	174-1113-00			1	CA ASSY,SP,ELEC:40,28 AWG,6.0 L,RIBBON (FROM A14J78 TO A12J78)	TK1547	ORDER BY DESC
	174-1126-00			1	CA ASSY,SP,ELEC:4,26 AWG,16.125 L (CRT HARNESS, FROM CRT TO CRT DRVR BD)	0J7N9	ORDER BY DESC
	174-1132-00			1	CA ASSY,SP,ELEC:26 AWG,8.5 L,RIBBON (FROM A1J92 TO A5J92)	0J7N9	ORDER BY DESC
	174-1134-00			1	CA ASSY,SP,ELEC:18 AWG,17.5 L,RIBBON (FROM A4J94 TO A24J94)	TK1967	ORDER BY DESC
	343-0549-00			1	STRAP,TIEDOWN,E:0.098 W X 4.0 L,ZYTEL	TK1499	HW-047
	174-1135-00			1	CA ASSY,SP,ELEC:18 AWG,17.5 L,RIBBON (FROM A4J96 TO A24J96)	0J7N9	ORDER BY DESC
	174-1136-00			1	CA ASSY,SP,ELEC:26 AWG,8.0 L,RIBBON (FROM A24J35 TO A27J35)	0J7N9	ORDER BY DESC
	174-1140-02			1	CA ASSY,SP,ELEC:POWER (MAIN POWER HARNESS)	TK1967	ORDER BY DESC
	343-0549-00			2	STRAP,TIEDOWN,E:0.098 W X 4.0 L,ZYTEL	TK1499	HW-047
	174-1141-04			1	CA ASSY,SP,ELEC:4,18 AWG,18.0 L1 (CARD CAGE HARNESS)	TK1967	ORDER BY DESC
	343-0549-00			1	STRAP,TIEDOWN,E:0.098 W X 4.0 L,ZYTEL	TK1499	HW-047
	174-1246-00			1	CA ASSY,SP,ELEC:4,26 AWG,14.5 L,RIBBON (FROM A27J36 TO A24J36)	TK1967	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
					WIRE ASSEMBLIES (CONT)		
	174-1247-00			1	CA ASSY,SP,ELEC:11,26 AWG,14.5 L,RIBBON	TK1967	ORDER BY DESC
					(FROM A26J33,J34 TO A24J33,J34)		
	174-1393-00			1	CABLE,SP,ELEC:20,28 AWG,9.5 L,STRD/VINYL	TK1547	ORDER BY DESC
	174-1394-00			1	(FROM A24J53 TO A16J53)		
					CABLE,SP,ELEC:26,28 AWG,19.5 L,STRD/VINYL	TK1547	ORDER BY DESC
	175-9809-00			1	(FROM A24J54 TO A16J54)		
					CA ASSY,SP,ELEC:50,3.0 L	TK1547	ORDER BY DESC
	175-9814-00			1	(FROM A15J79 TO A16J79)		
					CA ASSY,SP,ELEC:34,3.0 L	TK1547	ORDER BY DESC
	175-9854-00	B010100	B050329	1	(FROM A14J77 TO A17J77)		
	175-9854-01	B050330		1	CA ASSY,SP,ELEC:36,28 AWG,7.0 L	TK1547	ORDER BY DESC
					CA ASSY,SP,ELEC:36,28 AWG,7.0 L	TK1547	ORDER BY DESC
	174-2479-00			1	(FROM A14J72 TO A10J72)		
					CA ASSY,SP,ELEC:2 COND,23.0 L,RIBBON	80009	174247900
	174-2573-00	B050330		1	(FROM A32 TO A33)		
					CA ASSY,SP,ELEC:50,28 AWG,26.85 L,RIBBON	80009	174257300

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
4 -1	620-0033-01			1	POWER SUPPLY:LBT MAINFRAME (SEE A2, EXCHANGE ITEM)	80009	620003301
-2	214-4082-00			2	.PIN,GUIDE:0.850 L,METAL	80009	ORDER BY DESC
-3	200-2264-00			1	.CAP,FUSEHOLDER:3AG FUSES	S3629	FEK 031 1666
	204-0832-00			1	.BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES	S3629	031 1673
-4	159-0088-00			1	.FUSE,CARTRIDGE:3AG,12A,250V,6 SEC,CER	75915	314012
	159-0017-00			1	.FUSE,CARTRIDGE:3AG,4A,250V,FAST BLOW (F520, PART OF LINE INVERTER BOARD)	75915	312 004
	159-0248-00			1	.FUSE,WIRE LEAD:1.5 A,AXIAL LEAD (F130, PART OF LINE INVERTER BOARD)	75915	R25101.5 T1
	159-0220-00			1	.FUSE,WIRE LEAD:3A,125V,FAST (F450, PART OF CONTROL RECTIFIER BOARD)	61857	SP5-3A
					POWER SUPPLY WIRE ASSEMBLIES		
	174-1128-00			1	CA ASSY,SP,ELEC:18 AWG,3.5 L,RIBBON (FROM A2A2J61 TO A4J61)	TK1967	ORDER BY DESC
	174-1129-00			1	CA ASSY,SP,ELEC:18 AWG,4.0 L,RIBBON (FROM A2A2J62 TO A4J62)	TK1967	ORDER BY DESC
	174-1130-00			1	CA ASSY,SP,ELEC:26 AWG,3.5 L,RIBBON (FROM A2A2J65 TO A4J65)	0J7N9	ORDER BY DESC
	175-9933-00			1	CA ASSY,SP,ELEC:20,28 AWG,5.15 L,RIBBON (FROM A2A1J70 TO A2A2J70)	TK1547	ORDER BY DESC
	196-3071-00			1	LEAD,ELECTRICAL:18 AWG,4.0 L,5-4 (GND WIRE, FROM LINE FILTER TO CHASSIS)	TK1967	ORDER BY DESC
	196-3072-00			1	LEAD,ELECTRICAL:18 AWG,2.0 L,9-N (FROM LINE FILTER TO FUSE HOLDER)	TK2469	ORDER BY DESC
	196-3074-00			1	LEAD,ELECTRICAL:18 AWG,12.0 L,5-4 (GND WIRE, FROM PWR SPLY TO CHASSIS) (FROM A2A1W100 TO FUSE HOLDER)	TK1967	ORDER BY DESC
	196-3075-00			2	LEAD,ELECTRICAL:18 AWG,2.0 L,9-N (FROM A2A1W110 TO LINE FILTER)	TK1967	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	& Description	12345 Name	Mfr. Code	Mfr. Part No.
5 -0					**OPTION 1C**			
-1	386-5502-00			1	PLATE,CONN MTG:OPTIONAL,ALUMINUM		80009	ORDER BY DESC
-2	333-3415-01			1	PANEL,FRONT:DSA601,LOWER		TK2072	ORDER BY DESC
-3	131-1315-01			16	CONN,RF JACK::BNC/PNL,;50 OHM,FEMALE,STR (FRONT AND REAR)		24931	28JR306-1
	012-0208-00			8	CABLE,INTCON:10.0 L		TK2156	ORDER BY DESC
	174-1139-00			2	CABLE ASSY,RF:4,500 OHM,33.0 L		TK2469	ORDER BY DES

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	& Description	12345 Name	Mfr. Code	Mfr. Part No.
6 -0					STANDARD ACCESSORIES			
-1	161-0066-00			1	CABLE ASSY,PWR,:3,18AWG,115V,98.0 L		0B445	ECM-161-0066-00
-2	161-0066-09			1	CABLE ASSY,PWR,:3,0.75MM SQ,220V,99.0 L (OPTION A1 ONLY)		S3109	86511000
-3	161-0066-10			1	CABLE ASSY,PWR,:THREE 0.75MM SQ,250V,2.5 M (OPTION A2 ONLY)		S3109	BS/13-H05VVF3G0
-4	161-0066-11			1	CABLE ASSY,PWR,:3,0.75MM,240V,96.0 L (OPTION A3 ONLY)		S3109	SAA/3-OD3CCFC3X
-5	161-0066-12			1	CABLE ASSY,PWR,:3,18 AWG,250V,99.0 L (OPTION A4 ONLY)		29870	ORDER BY DESC
-6	161-0154-00			1	CABLE ASSY,PWR,:3,1.00MM SQ,250V,10A,2.5M (OPTION A5 ONLY)		S3109	12-H05VVF3G 00-
	013-0195-00			1	ADAPTER,CONN:BNC TO PROBE		24931	28P264-1
	015-0580-00			1	POCKET SIG GEN:TUTORIAL MANUAL AID (OPTION 1R ONLY)		80009	015058000
	070-7529-02			1	MANUAL,TECH:INSTRUCTION,DSA600 RACK		80009	070752902
	070-8180-00			1	MANUAL,TECH:TUTORIAL,DSA601A/602A		80009	070818000
	070-8181-00			1	MANUAL,TECH:USER REF,DSA601A/602A		80009	070818100
	070-8182-00			1	MANUAL,TECH:PRGM REF,DSA601A/602A		80009	070818200
	070-8183-00			1	MANUAL,TECH:QUICK REF,DSA601A/602A		80009	070818300
	070-8184-00			1	MANUAL,TECH:SERVICE REF,DSA600 SERIES		80009	070818400
					OPTIONAL ACCESSORIES			
	012-0555-00			1	CABLE,INTCON:CENTRONIX,3M,36 POS RBN		TK1416	DKIT-0034HCZZ
	012-0630-03			1	CABLE,INTCON:2.0M L		74868	C156327-B
	012-0911-00			1	CABLE,INTCON:MOLDED,RS232;10 FT		TK1374	ORDER BY DESC
	016-0829-00			1	PANEL,BLANK:PLUG-IN HOUSING,11K SERIES		80009	016082900
	020-1769-00			1	COMPONENT KIT:QUICKSTART PKG,US		80009	020176900
	020-1770-00			1	COMPONENT KIT:QUICKSTART PKG,EURO		80009	020177000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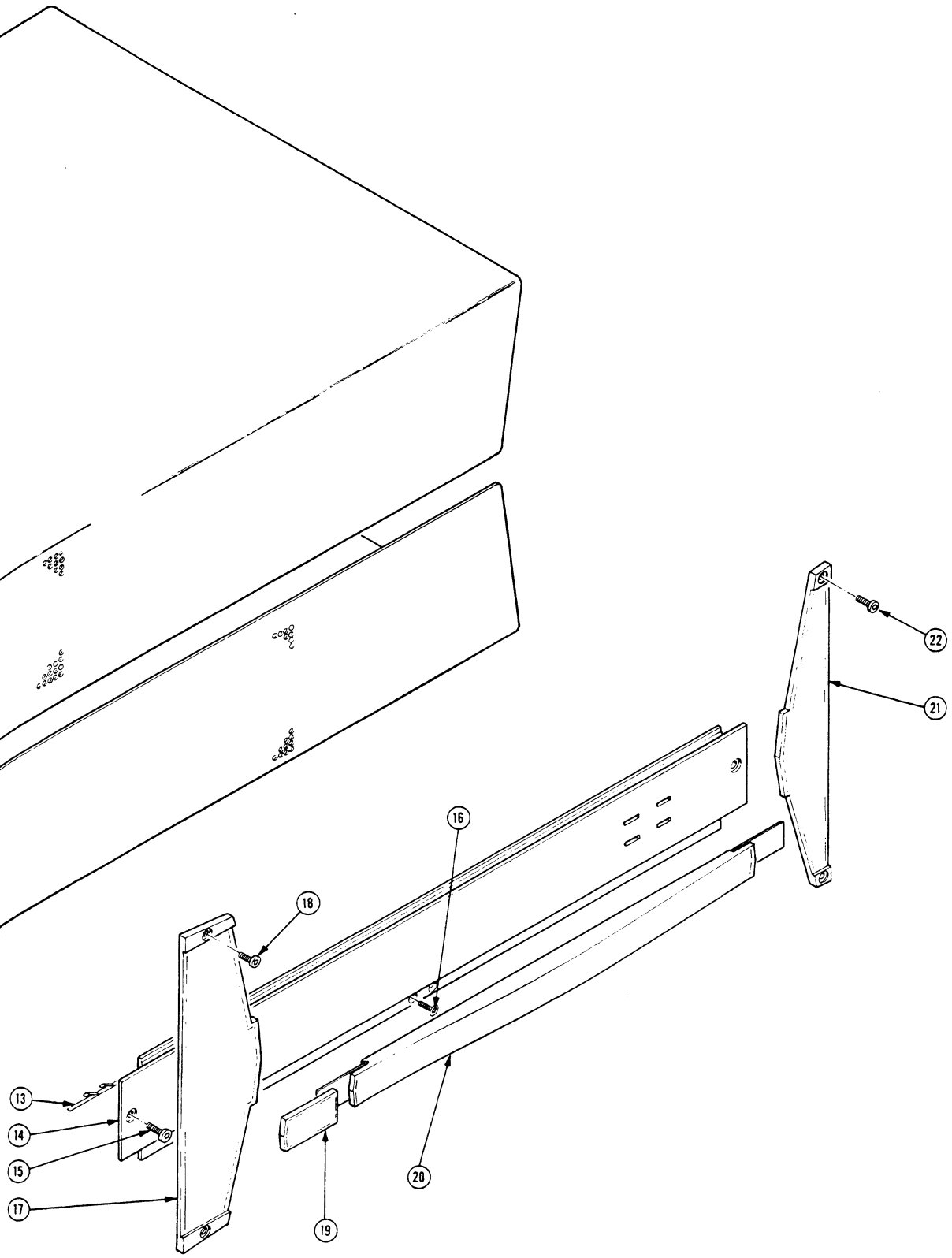
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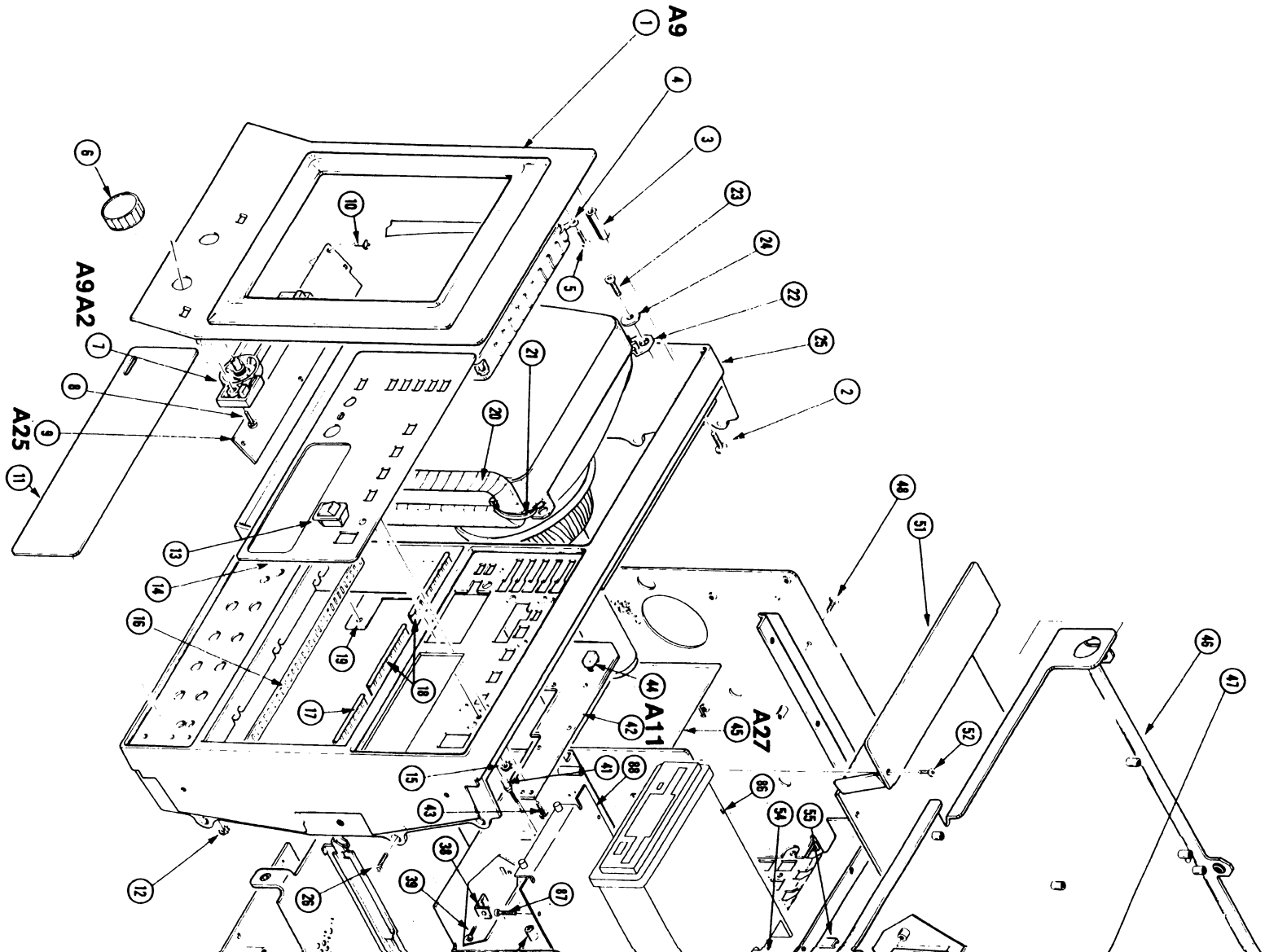
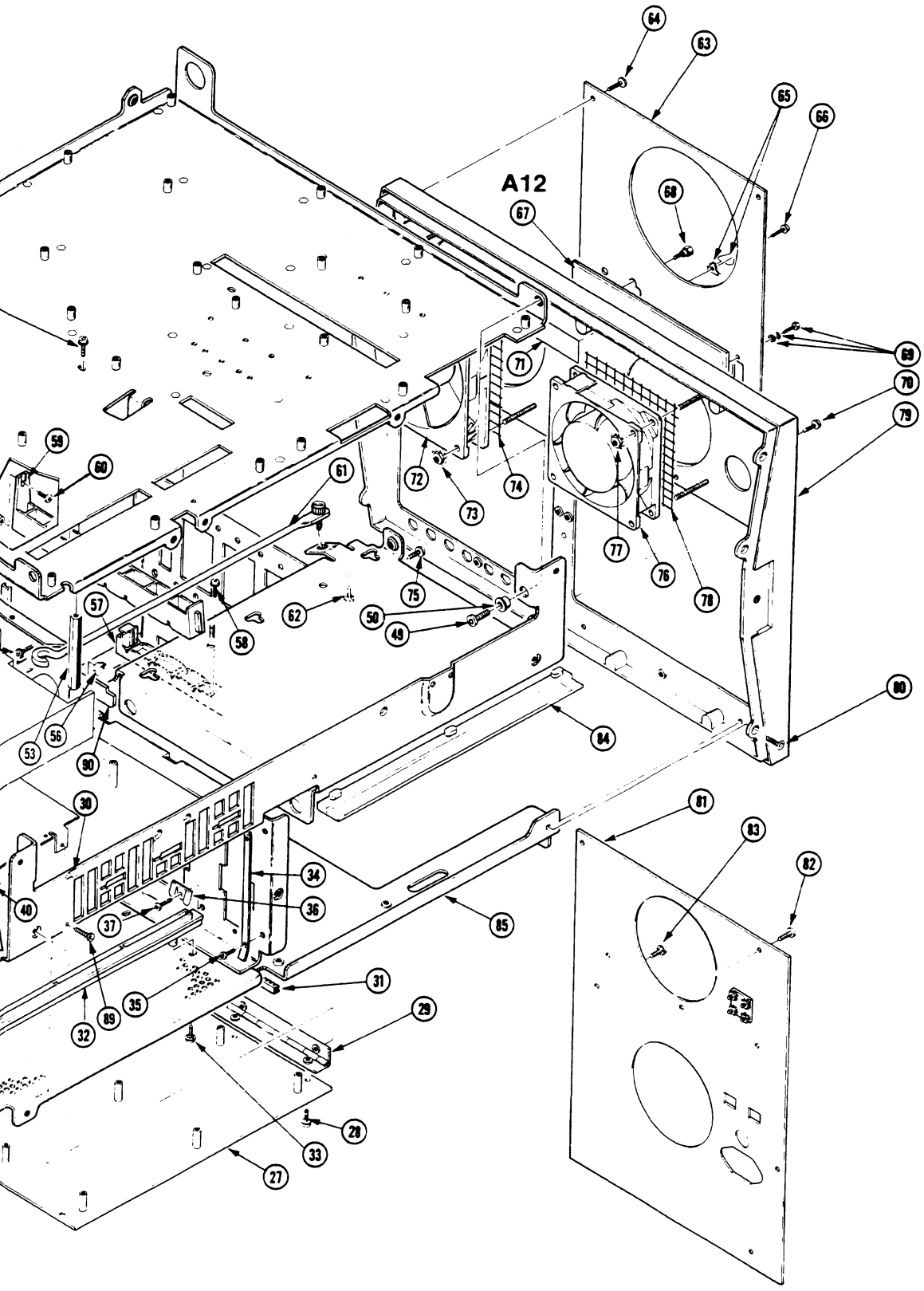
Fig. 2 Front, Chassis, Rear

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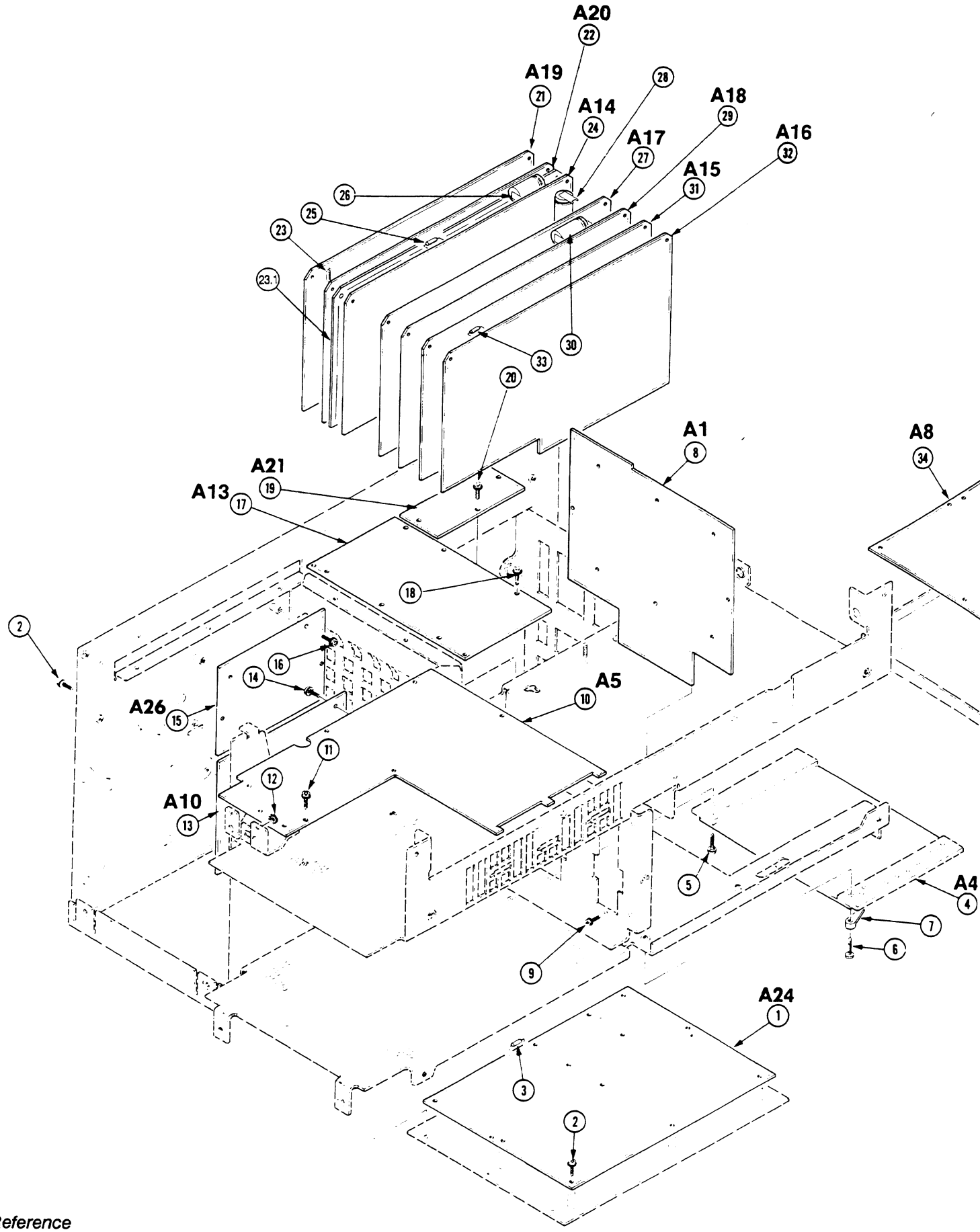
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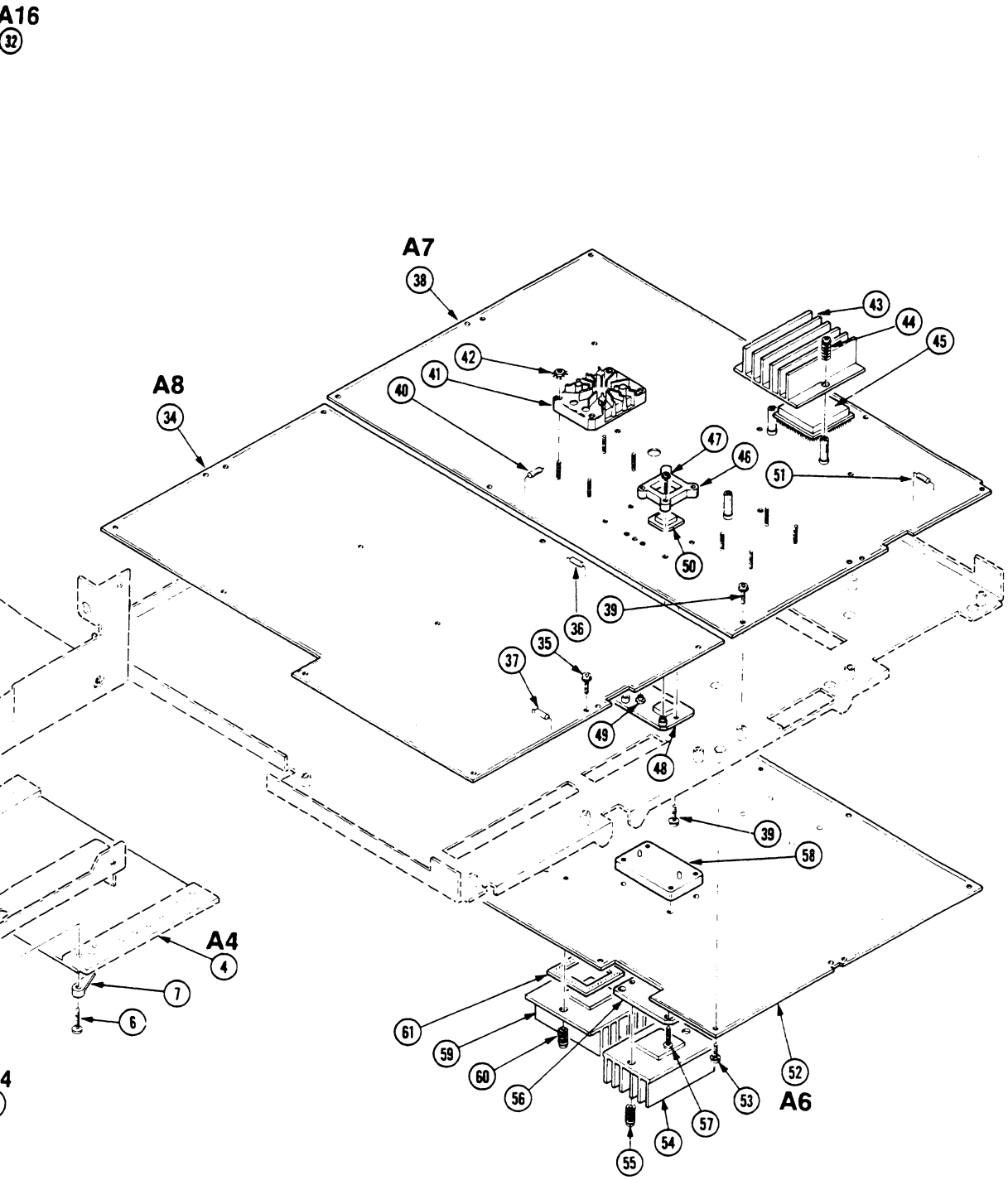
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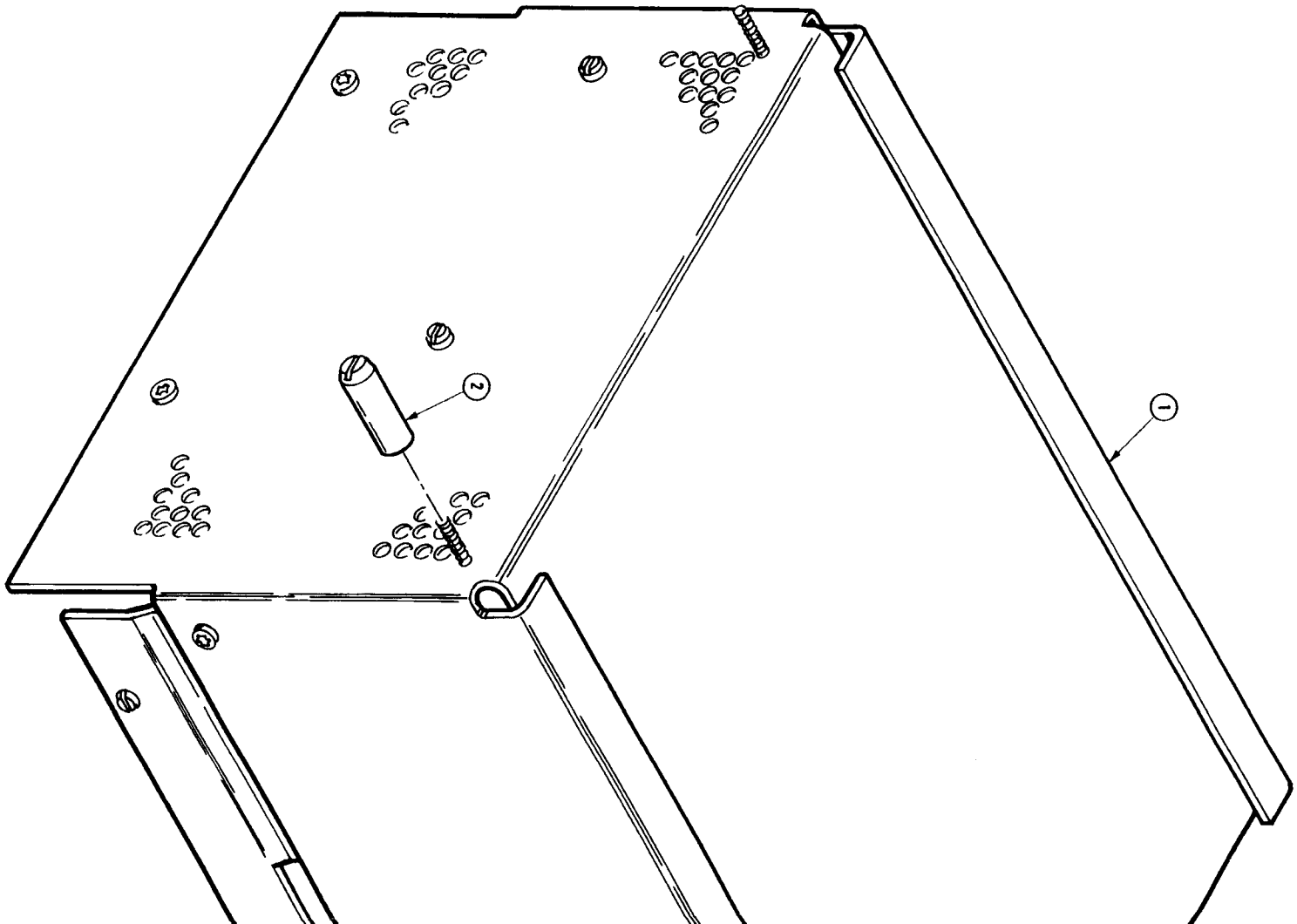
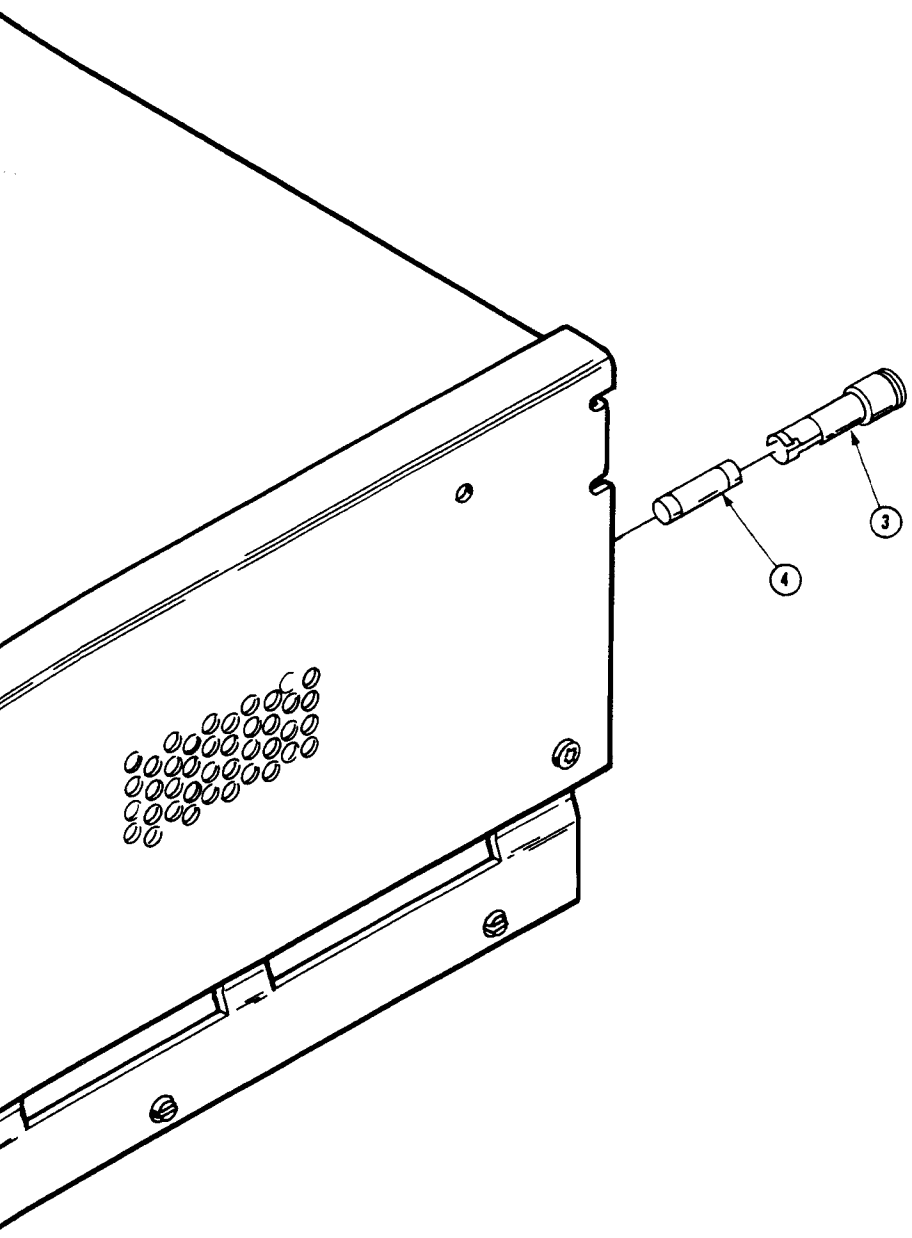
Fig. 4 Power Supply

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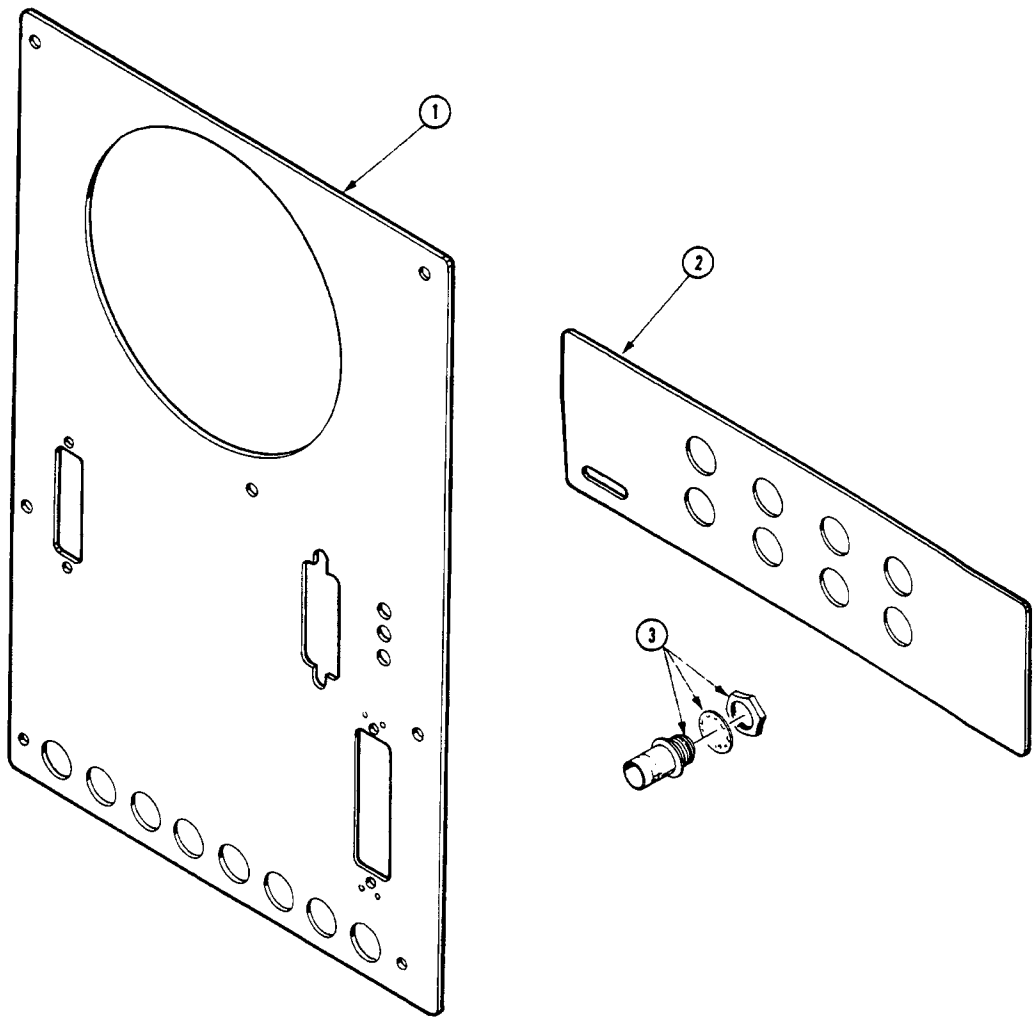
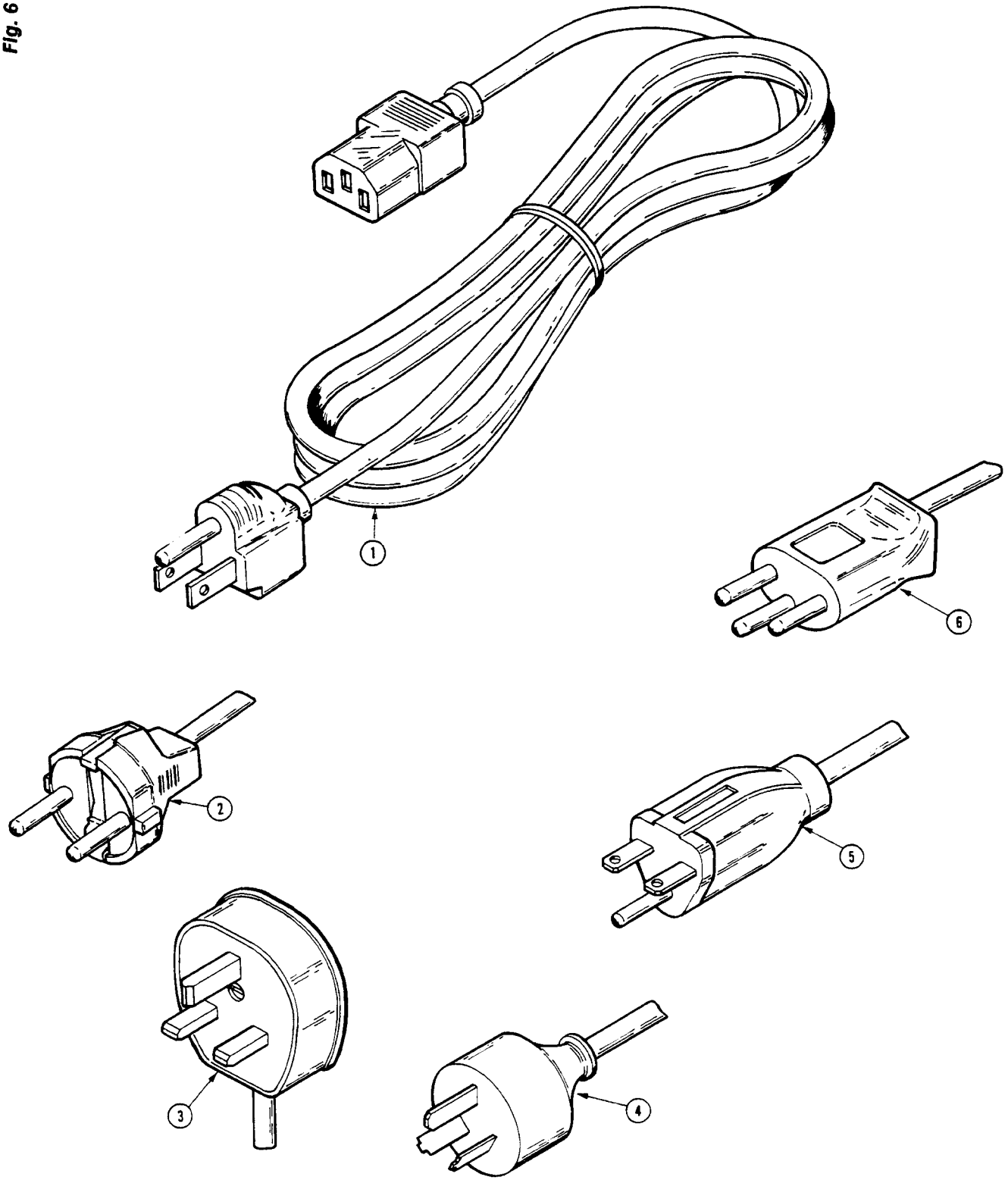


OPTION 1C

Fig. 6 Accessories



DSA 601 Replaceable Parts

This section contains a list of the components that are replaceable for the DSA 601 Digitizing Signal Analyzer.

Table 5-3 — DSA 601 Board FRUs

FRU	Part Number	Description
A1	670–9815–00	Plug-in Interface Board
A2	620–0033–01	Power Supply:Mainframe
A4	670–9687–01	Regulator Board
A5	670–9823–00	Calibrator Board
A6	671–0014–02	Lower Acquisition Board
A7	671–0015–00	Upper Acquisition Board
A8	670–9831–01	Waveform Processor Board
A9	614–0818–01	Panel,Subassy:Touch Panel
A9A2	671–0036–00	Knob Board
A10	670–9813–00	Front Panel Control Board
A11	670–9830–00	Front Panel Button Board
A12	671–0013–00	Rear Panel Board
A13	670–8851–00	Mother Board
A14	670–8854–01	I/O Board
A15	671–0852–00	MMU Board
A16	671–0879–00	Display Controller Board
A17	671–2116–00	Main Processor Board
A18	671–0385–00	Memory Board
A19	670–9819–00	Digitizer CPU Board
A20	670–9820–00	Digitizer I/O Board
A21	670–9828–00	Mini Mother Board
A24	670–9818–02	CRT Driver Board
A25	670–9829–00	Degauss Board
A26	670–9826–00	Geometry Board
A27	670–9825–00	CRT Socket Board

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
S3109	FELLER	72 VERONICA AVE UNIT 4	SUMMERSET NJ 08873
S3629	SCHURTER AG H C/O PANEL COMPONENTS CORP	2015 SECOND STREET	BERKELEY CA 94170
TK0007	AP PRODUCTS INC	72 CORWIN DRIVE POX 110	PAINESVILLE OH 44077
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK0488	CURRAN COIL SPRING INC	635 NW 16TH	PORTLAND OR 97209–2206
TK0588	UNIVERSAL PRECISION PRODUCTS	1775 NW 216TH	HILLSBORO OR 97123
TK1159	IMPROVED PRODUCTS	3400 OLYMPIC STREET	SPRINGFIELD OR 97477
TK1163	POLYCAST INC	9898 SW TIGARD ST	TIGARD OR 97223
TK1374	TRI–TEC ENGINEERING CORP		
TK1416	SHARP CORP	22–22 NAGAIKE–CHO ABENO–KU	OSAKA JAPAN
TK1465	BEAVERTON PARTS MFG CO	1800 NW 216TH AVE	HILLSBORO OR 97124–6629
TK1547	MOORE ELECTRONICS INC (DIST)	19500 SW 90TH COURT PO BOX 1030	TUALATIN OR 97062
TK1916	SKS DIE CASTING CO	2200 4TH	BERKELEY CA 94710–2215
TK1947	NORTHWEST ETCH TECHNOLOGY	3223 C ST NE UNIT 2	AUBURN WA 98002
TK1967	SYNDETEK	3915 E MAIN	SPOKANE WA 99202
TK2061	SONY CORP	% TOKYO JAPAN BUYERS OFFICE BLDG 78/661	BEAVERTON OR 97077
TK2072	PRECISION DECORATORS INC HAWTHORNE BUSINESS CENTER	5289 NE ELAM YOUNG PARKWAY SUITE G400	HILLSBORO OR 97124
TK2122	INDUSTRIAL GASKET INC	1623 SE 6TH AVE	PORTLAND OR 97214–3502
TK2156	ACACIA/DEANCO	7763 SW CIRRUS RD SUITE 26	BEAVERTON OR 97005–6452
TK2338	ACC MATERIALS	ED SNYDER BLDG 38–302	BEAVERTON OR 97077
TK2421	INDEK CORP	2360 QUME DRIVE SUITE A	SAN JOSE, CA 95131
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK WAY SUITE #2	VANCOUVER WA 98601
0B445	ELECTRI–CORD MFG CO INC	312 EAST MAIN ST	WESTFIELD PA 16950
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
0J7N9	MCX INC	30608 SAN ANTONIO ST	HAYWARD CA 94544
0KBZ5	MORELLIS Q & D PLASTICS	1812 16TH AVE	FOREST GROVE OR 97116
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
01536	TEXTRON INC CAMCAR DIV SEMS PRODUCTS UNIT	1818 CHRISTINA ST	ROCKFORD IL 61108
06383	PANDUIT CORP	17301 RIDGELAND	TINLEY PARK IL 07094–2917
06812	TORIN CORP WESTERN DIV	16300 ROSCOE BLVD	VAN NUYS CA 91409
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
11897	PLASTIGLIDE MFG CORP	2701 W EL SEGUNDO BLVD	HAWTHORNE CA 90250–3318
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125–4632
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
29681	BEL–TRONICS CORP	344 INTERSTATE RD	ADDISON IL 60101–4516
29870	VICTOR CORP	618 MAIN STREET	WEST WARWICK RI 02893
30010	BICC–VERO ELECTRONICS INC	40 LINDEMAN DR	TRUMBULL CT 06611–4739
46384	PENN ENGINEERING AND MFG CORP	OLD EASTON RD PO BOX 1000	DANBORO PA 18916
5Y400	TRIAX METAL PRODUCTS INC DIV OF BEAVERTON PARTS MFG CO	1800 216TH AVE NW	HILLSBORO OR 97124–6629
52814	TECH–ETCH INC	45 ALDRIN RD	PLYMOUTH MA 02360
53387	MINNESOTA MINING MFG CO	PO BOX 2963	AUSTIN TX 78769–2963
61058	MATSUSHITA ELECTRIC CORP OF AMERICA PANASONIC INDUSTRIAL CO DIV	ONE PANASONIC WAY PO BOX 1502	SECAUCUS NJ 07094–2917
61439	GILLESPIE DECALS INC	27676 PARKWAY AVE SW	WILSONVILLE OR 97070
61857	SAN–0 INDUSTRIAL CORP	85 ORVILLE DR PO BOX 511	BOHEMIA LONG ISLAND NY 11716–2501
67088	NIDEC–TORN CORP	100 FRANKLIN DR	TORRINGTON CT 06790–6501
7W718	MARQUARDT SWITCHES INC	2711 ROUTH 20 EAST	CAZENOVIA NY 13035–1219
74868	AMPHENOL CORP R F CONNECTORS (OPNS)	1 KENNEDY AVE	DANBURY CT 06810–5803
75915	LITTELFUSE INC SUB TRACOR INC	800 E NORTHWEST HWY	DES PLAINES IL 60016–3049
8X345	NORTHWEST SPRING & MFG CO	5858 WILLOW LANE	LAKE OSWEGO OR 97034–5343
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
83486	ELCO INDUSTRIES INC	1101 SAMUELSON RD	ROCKFORD IL 61101
83553	ASSOCIATED SPRING BARNES GROUP INC	15001 S BROADWAY P O BOX 231	GARDENA CA 90248–1819
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108–5181
96881	THOMSON INDUSTRIES INC	SHORE RD AT CHANNEL DR	PORT WAHSINGTON NY 11050

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1 -1	200-3350-00	B010100	B040212	1	COVER,CABINET:UPPER,ALUMINUM	80009	ORDER BY DESC
	200-3350-01	B040213		1	COVER,CABINET:UPPER LIFT OFF	0J260	200-3350-01
-2	214-0603-02			4	.PIN ASSY,SECRG:W/SPRING WASHER	0J260	ORDER BY DESC
-3	386-1151-00			4	.CLAMP,RIM CLENC:SPG STL	83553	ORDER BY DESC
-4	386-0227-00			4	.STOP,CLP,RIM CL:ACETAL	0JR05	386-0227-00
-5	348-0875-00			1	FLIPSTAND,CAB.:	TK0488	ORDER BY DESC
-6	200-3351-00	B010100	B040212	1	COVER,CABINET:LOWER,ALUMINUM	80009	ORDER BY DESC
	200-3351-01	B040213		1	COVER,CABINET:LOWER LIFT OFF	0J260	200-3351-01
-7	214-0603-02			4	.PIN ASSY,SECRG:W/SPRING WASHER	0J260	ORDER BY DESC
-8	386-1151-00			4	.CLAMP,RIM CLENC:SPG STL	83553	ORDER BY DESC
-9	386-0227-00			4	.STOP,CLP,RIM CL:ACETAL	0JR05	386-0227-00
-10	348-0596-00			4	PAD,CAB.FOOT:0.69 X 0.255 X 0.06,PU	TK2122	348-0596-00
-11	348-0879-00			4	FOOT,CABINET:BOTTOM,BLUE,POLYCARB	TK1163	ORDER BY DESC
					(ATTACHING PARTS)		
-12	211-0734-00			4	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	83486	MACHINE SCREW
					(END ATTACHING PARTS)		
-13	348-0980-00			4	SHLD GSKT,ELEK:FINGER TYPE,21.0 L	TK1159	ORDER BY DESC
-14	426-2177-00	B010100	B040526	2	FRAME SECT,CAB.:RIGHT/LEFT,ALUMINUM	TK1465	ORDER BY DESC
	42602177-01	B040527		2	FRAME SECT,CAB.:RIGHT/LEFT,ALUMINUM	80009	ORDER BY DESC
-15					(ATTACHING PARTS)		
-16	212-0681-00			4	SCREW,MACHINE:10-32 X 0.25,PNH,STL	83486	MACHINE SCREW
	211-0734-00			3	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	83486	MACHINE SCREW
-17					(END ATTACHING PARTS)		
	101-0116-00			2	TRIM,DECORATIVE:FRONT	TK1163	ORDER BY DESC
-18					(ATTACHING PARTS)		
	212-0158-00			4	SCREW,MACHINE:8-32 X 0.375,PNH,STL	0KB01	ORDER BY DESC
-19					(END ATTACHING PARTS)		
-20	200-2191-00	B010100	B040526	4	CAP,RETAINER:PLASTIC	0JR05	ORDER BY DESC
-21	367-0248-01	B010100	B040526	2	HANDLE,CARRYING:16.341 L,W/CLIP	80009	367024801
	101-0117-00			2	TRIM,DECORATIVE:REAR	TK1163	ORDER BY DESC
-22					(ATTACHING PARTS)		
	212-0158-00			4	SCREW,MACHINE:8-32 X 0.375,PNH,STL	0KB01	ORDER BY DESC
					(END ATTACHING PARTS)		

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -0	614-0818-00			1	PANEL SUBASSY:TOUCH PANEL (SEE A9, EXCHANGE ITEM) TOUCH PANEL ASSEMBLY INCLUDES:	80009	614081800
-1	333-3413-01			1	.PANEL ASSY,FR:ALUMINUM (ATTACHING PARTS)	TK2072	ORDER BY DESC
-2	211-0721-00			4	.SCREW,MACHINE:6-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-3	129-1165-00			2	.SPACER,POST:1.9 L,W 6-32 THD BOTH END	TK0588	ORDER BY DESC
-4	386-5499-00			1	.DIFFUSER,LIGHT:PLASTIC,7.055 X 5.472 (ATTACHING PARTS)	TK1163	ORDER BY DESC
-5	211-0372-00			4	.SCREW,MACHINE:4-40 X 0.312,PNH,STL (END ATTACHING PARTS)	93907	B80-00020-003
-6	366-0582-00			2	.KNOB:ENCODER	TK1163	ORDER BY DESC
-7	671-0036-00			1	.CIRCUIT BD ASSY:KNOB (SEE A9A2, EXCHANGE ITEM) (ATTACHING PARTS)	80009	671003600
-8	211-0409-00			2	.SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06888-024
-9	670-9829-00			1	CIRCUIT BD ASSY:DEGAUSS (SEE A25, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982900
-10	211-0408-00			5	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-11	333-3451-01			1	PANEL,FRONT:DSA601,LOWER (ATTACHING PARTS)	TK2072	ORDER BY DESC
-12	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-13	260-2349-00			1	SWITCH,ROCKER:SPST,30MA,12V	7W718	1801.1152
-14	333-3414-00			1	PANEL,FRONT:UPPER,ALUMINUM (ATTACHING PARTS)	TK2072	ORDER BY DESC
-15	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-16	348-0878-00			1	SHLD GSKT,ELEK:SOLID TYPE,7.646 L	52814	ORDER BY DESC
-17	348-1075-00			1	SHLD GSKT,ELEK:SOLID TYPE,1.66 L	52814	ORDER BY DESC
-18	348-1076-00			2	SHLD GSKT,ELEK:SOLID TYPE,2.28 L	52814	ORDER BY DESC
-19	344-0438-00			1	CLIP,ELECTRICAL:CRT GROUNDING,2.5 X 4.5	TK1947	ORDER BY DESC
-20	108-1383-00			2	COIL,TUBE DEFL:FXD,DEGAUSS R	29681	87-0912
-21	346-0120-00			4	STRAP,TIEDOWN,E:5.5 L MIN,PLASTIC,WHITE	06383	SST1.5M
-22	154-0914-00			1	ELECTRON TUBE:CRT,P31 (ATTACHING PARTS)	TK2061	SD-192
-23	211-0721-00			4	SCREW,MACHINE:6-32 X 0.375,PNH,STL	0KB01	ORDER BY DESC
-24	210-0949-00			4	WASHER,FLAT:0.141 ID X 0.5 OD X 0.062,BRS (END ATTACHING PARTS)	12327	ORDER BY DESC
-25	386-5495-01	B010100	B041171	1	SUBPANEL,FRONT:DSA601/DSA602,FINISHED	TK1916	ORDER BY DESC
	386-5495-03	B041172		1	SUBPANEL,FRONT:FINISHED (ATTACHING PARTS)	TK1916	ORDER BY DESC
-26	211-0725-00			10	SCREW,MACHINE:6-32 X 0.375,FLH (END ATTACHING PARTS)	01536	ORDER BY DESC
-27	386-5752-00			1	PLATE,ECB MTG:ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-28	211-0408-00			6	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-29	214-1632-01			1	HINGE,BUTT:7.0 X 1.062,AL (ATTACHING PARTS)	80009	214163201
-30	211-0373-00			3	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-31	255-0334-00			2	PLASTIC CHANNEL:12.75 X 0.175 X 0.155,NYLON	11897	122-NN-2500-060
-32	351-0744-00			3	GUIDE,PLUG-IN:POLYAMIDE (ATTACHING PARTS)	TK1163	ORDER BY DESC
-33	211-0711-00			3	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -34	131-0800-03			2	CONTACT,ELEC:PLUG-IN GND,BE NI HT TR (ATTACHING PARTS)	80009	131080003
-35	211-0408-00			4	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-36	131-0799-00			4	CONTACT,ELEC:PLUG-IN GND,BE NI (ATTACHING PARTS)	80009	131079900
-37	211-0408-00			4	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-38	344-0131-00			4	CLIP,SPR TNSN:CKT BOARD MT,ACETAL WHITE (ATTACHING PARTS)	80009	344013100
-39	211-0408-00			4	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-40	129-0220-00			1	SPACER,POST:0.281 L,6-32 THRU,ACETAL	TK0588	ORDER BY DESC
-41	150-0121-05			1	LAMP,CARTRIDGE:5V,0.06A,GREEN LENS	TK1967	ORDER BY DESC
-42	670-9830-00			1	CIRCUIT BD ASSY:FRONT PANEL BUTTON (SEE A11, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670983000
-43	211-0408-00			7	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-44	366-0600-00			10	PUSH BUTTON:0.269 X 0.409,ABS	TK1163	ORDER BY DESC
-45	670-9825-00			1	CIRCUIT BD ASSY:CRT SOCKET (SEE A27, ECHANGE ITEM)	80009	670982500
-46	441-1769-01	B010100	B041147	1	CHASSIS,PLATE:ALUMINUM	5Y400	ORDER BY DESC
	441-1769-02	B041148		1	CHAS,PLATFORM:ALUMINUM (ATTACHING PARTS)	5Y400	ORDER BY DESC
-47	211-0722-00			2	SCREW,MACHINE:6-32 X 0.25,PNH,STL	0KB01	ORDER BY DESC
-48	211-0734-00			6	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	83486	MACHINE SCREW
-49	212-0682-00			1	SCREW,MACHINE:10-32 X 0.5,PNH,STL	0KB01	212-0682-00
-50	358-0717-00			1	BUSHING,SLEEVE:0.2 ID X 0.345 OD X 0.17 THK (END ATTACHING PARTS)	0JR05	ORDER BY DESC
-51	200-3386-01			1	COVER,CRT:ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-52	211-0373-00			10	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-53	129-1168-00			2	SPACER,POST:2.07 L,0.138-32 THD,AL	TK0588	ORDER BY DESC
-54	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (ATTACHES SOCKET BD GND WIRE)	0KB01	ORDER BY DESC
-55	351-0765-00			16	GUIDE,CKT BOARD:NYLON	30010	29-0124D
-56	358-0729-00			1	BUSHING,SLEEVE:0.250 X 0.080,NYLON	96881	NYLINER 4L1FF
-57	351-0746-00			1	GUIDE,CKT BOARD:NYLON 6.803 L (ATTACHING PARTS)	0JR05	ORDER BY DESC
-58	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-59	343-1318-00			2	RTNR,CARD CAGE:CIRCUIT BOARD (ATTACHING PARTS)	0JR05	ORDER BY DESC
-60	211-0722-00			2	SCREW,MACHINE:6-32 X 0.25,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-61	386-5567-00			1	SPRT,PLATFORM:STEEL	TK0488	ORDER BY DESC
-62	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (ATTACHES PWR SPLY GND WIRE)	0KB01	ORDER BY DESC
-63	386-5501-00			1	PLATE,CONNECTOR:STANDARD,ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-64	211-0721-00			8	SCREW,MACHINE:6-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-65	214-2476-01			2	HDW ASSY KIT:BAIL LOCK,ELEC CONN RCPT (ATTACHING PARTS)	53387	3475-4
-66	211-0410-00			2	SCR,ASSEM WSHR:4-40 X 0.437,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-07510-024

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -67	671-0013-00			1	CIRCUIT BD ASSY:REAR PANEL (SEE A12, EXCHANGE ITEM) (ATTACHING PARTS)	80009	671001300
-68	129-0774-00			2	SPACER,POST:0.25 L,4-40 EXT ONE END,BRS	80009	129077400
-69	214-3106-00			2	HARDWARE KIT:JACK SOCKET	53387	3341-1S
-70	211-0410-00			1	SCR,ASSEM WSHR:4-40 X 0.437,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-07510-024
-71	334-7307-00			1	MARKER,IDENT:MARKED CAUTION	61439	ORDER BY DESC
-72	119-2600-00	B010100	B040175	1	FAN,TUBEAXIAL:12V,5.9W,3000 RPM,78 CFM	06812	A31396-10
	119-2600-01	B040176		1	FAN,TUBEAXIAL:12V,3.9W,2500RPM,83CFM (ATTACHING PARTS)	TK2421	DA 121225 HB
-73	210-0457-00			4	NUT,PL,ASSEM WA:6-32 X 0.312,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-74	378-0311-00			1	SCREEN,FAN:4.8 X 4.8	80009	ORDER BY DESC
-75	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (ATTACHES REAR PNL GND WIRE)	0KB01	ORDER BY DESC
-76	119-2610-00	B010100	B040175	1	FAN,TUBEAXIAL:12VDC,3.5W,3100 RPM,37 CFM	67088	BETA SL A31393
	119-2610-02	B040176		1	FAN,TUBEAXIAL:12V,3.0W,3300RPM,48CFM,92MM (ATTACHING PARTS)	TK2421	MDA 120925HB
-77	210-0457-00			3	NUT,PL,ASSEM WA:6-32 X 0.312,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-78	378-0310-00			1	SCREEN,FAN:3.65 X 3.65	80009	378031000
-79	386-5496-01	B010100	B040428	1	SUBPANEL,REAR:DSA600 SERIES FINISHED	TK1916	ORDER BY DESC
	386-5496-03	B040429		1	SUBPANEL,REAR:FINISHED,DSA601 (ATTACHING PARTS)	TK1916	ORDER BY DESC
-80	211-0725-00			8	SCREW,MACHINE:6-32 X 0.375,FLH (END ATTACHING PARTS)	01536	ORDER BY DESC
-81	386-5503-00			1	PLATE,REAR:POWER SUPPLY,ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-82	211-0721-00			10	SCREW,MACHINE:6-32 X 0.375,PNH,STL	0KB01	ORDER BY DESC
-83	211-0730-00			4	SCR,ASSEM WSHR:6-32 X 0.375,PNH,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-84	351-0791-00			2	GUIDE,PWR SPLY:POLYCARBONATE	TK1163	ORDER BY DESC
-85	610-0754-01	B010100	B041166	1	CHASSIS ASSY:ALUMINUM	80009	610-0754-01
	610-0754-02	B041167		1	CHASSIS ASSY:DSA601A	0J260	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -1	670-9818-00	B010100	B040369	1	CIRCUIT BD ASSY:CRT DRIVER	80009	670981800
	670-9818-01	B040370	B040517	1	CIRCUIT BD ASSY:CRT DRIVER	80009	670981801
	670-9818-02	B040518		1	CIRCUIT BD ASSY:CRT DRIVER (SEE A24, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670981802
-2	211-0409-00			11	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10 (END ATTACHING PARTS) CRT DRIVER BOARD ASSY INCLUDES:	93907	829-06888-024
-3	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-4	670-9687-00	B010100	B040524	1	CIRCUIT BD ASSY:REGULATOR	80009	670968700
	670-9687-01	B040525		1	CIRCUIT BD ASSY:REGULATOR (SEE A4, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670968701
-5	211-0720-00			3	SCR,ASSEM WSHR:6-32 X 0.50,PNH,STL,T15	0KB01	ORDER BY DESCRI
-6	211-0738-00			1	SCREW,MACHINE:6-32 X 0.625,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESCRI
-7	343-0089-00			1	CLAMP,CABLE:0.3 DIA,PLASTIC	80009	343008900
-8	670-9815-00			1	CIRCUIT BD ASSY:PLUG-IN INTERFACE (SEE A1, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670981500
-9	211-0409-00			9	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06888-024
-10	670-9823-00			1	CIRCUIT BD ASSY:CALIBRATOR (SEE A5, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982300
-11	211-0408-00			6	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10	93907	829-06815-024
-12	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS) CALIBRATOR BOARD ASSEMBLY INCLUDES:	TK0435	ORDER BY DESCRI
	160-4797-00			1	.MICROCKT,DGTL:MICROCONT,4K BYTES (U510)	80009	160479700
-13	670-9813-00			1	CIRCUIT BD ASSY:FRONT PANEL CONTROL (SEE A10, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670981300
-14	211-0408-00			2	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-15	670-9826-00			1	CIRCUIT BD ASSY:GEOMETRY (SEE A26, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982600
-16	211-0408-00			2	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-17	670-8851-00			1	CIRCUIT BD ASSY:MOTHER (SEE A13, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670885100
-18	211-0711-00			6	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESCRI
-19	670-9828-00			1	CIRCUIT BD ASSY:MINI MOTHER (SEE A21, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982800
-20	211-0711-00			3	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESCRI
-21	670-9819-00			1	CIRCUIT BD ASSY:DIGITIZER CPU (SEE A19, EXCHANGE ITEM)	80009	670981900
-22	670-9820-00			1	CIRCUIT BD ASSY:DIGITIZER I/O (SEE A20, EXCHANGE ITEM)	80009	670982000
-23	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-24	670-8854-01			1	CIRCUIT BD ASSY:INPUT/OUTPUT (SEE A14, EXCHANGE ITEM)	80009	670885401
-25	159-0245-00			4	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-26	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM	61058	BR-2/3A-E2P

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -27	671-0851-00	B010100	B010129	1	CIRCUIT BD ASSY:MAIN PROCESSOR	80009	671085100
	671-0851-01	B010130	B040216	1	CIRCUIT BD ASSY:MAIN PROCESSOR	80009	671085101
	671-0851-02	B040217	B040466	1	CIRCUIT BD ASSY:MAIN PROCESSOR	80009	671085102
	671-2116-00	B040467		1	CIRCUIT BD ASSY:MAIN PROCESSOR (SEE A17, EXCHANGE ITEM)	80009	671211600
-28	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM	61058	BR-2/3A-E2P
-29	671-0385-00			1	CIRCUIT BD ASSY:BB MEMORY (SEE A18, EXCHANGE ITEM)	80009	671038500
	671-0385-50			1	CIRCUIT BD ASSY:BB MEMORY (SEE A18 OPT 4C, EXCHANGE ITEM)	80009	671038550
-30	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM (OPTION 4C ONLY)	61058	BR-2/3A-E2P
-31	671-0852-00			1	CIRCUIT BD ASSY:MEMORY MGT UNIT (SEE A15, EXCHANGE ITEM)	80009	671085200
-32	671-0879-00			1	CIRCUIT BD ASSY:DISPLAY CONTROLLER (SEE A16, EXCHANGE ITEM)	80009	671087900
-33	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-34	670-9831-00	B010100	B040279	1	CIRCUIT BD ASSY:WAVEFORM PROCESSOR	80009	670983100
	670-9831-01	B040280		1	CIRCUIT BD ASSY:WAVEFORM PROCESSOR (SEE A8, EXCHANGE ITEM)	80009	670983101
	670-9827-00			1	CIRCUIT BD ASSY:SIGNAL PROCESSOR (SEE A8 OPT 3C, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982700
-35	211-0408-00			11	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS) SIGNAL PROCESSOR BD ASSY INCLUDES:	93907	829-06815-024
-36	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-37	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-38	671-0015-00			1	CIRCUIT BD ASSY:UPPER ACQUISITION (SEE A7, EXCHANGE ITEM) (ATTACHING PARTS)	80009	671001500
-39	211-0408-00			21	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS) UPPER ACQUISITION BD ASSY INCLUDES:	93907	829-06815-024
-40	159-0203-00			1	.FUSE,CARTRIDGE:2A,125V,FAST,SUBMINIATURE	61857	SPI-2A
-41	165-2078-00			2	.MICROCKT,HYBRID:TIME INTERPOLATOR (ATTACHING PARTS)	80009	165207800
-42	210-0586-00			8	.NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-43	214-3965-00			2	.HEAT SINK,ELEC:DEMUX,ALUMINUM (ATTACHING PARTS)	TK1465	ORDER BY DESC
-44	214-4034-00			4	.SPRING,HLCPS:0.24 OD X 0.44 L,SST (END ATTACHING PARTS)	8X345	ORDER BY DESC
-45	155-0328-00	B010100	B010150	1	.MICROCKT,DGTL:CLOCK DRIVER	80009	155032800
	155-0328-01	B010151		1	.IC,ASIC:BIPOLAR,DIGITAL,CLOCK DRIVER	80009	155032801
	155-0340-00	B010100	B010150	1	.MICROCKT,DGTL:SWEEP CONTROLLER	80009	155034000
	155-0340-01	B010151		1	.IC,ASIC:BIPOLAR,DIGITAL,SWEEP CONT	80009	155034001
-46	119-3690-00			2	.HYPCON ASSY:44 CONTACT,STEP MOUNT (ATTACHING PARTS)	TK2338	ORDER BY DESC
-47	211-0391-00			8	.SCREW,MACHINE:2-56 X 0.437,P4,STL,T-8 (END ATTACHING PARTS)	83486	ORDER BY DESC
-48	214-4188-00			1	.HEAT SINK,ELEC:TRIGGER IC,ALUMINUM	TK1465	ORDER BY DESC
-49	220-0797-00			4	.NUT,CAPTIVE:2-56 X 0.218 DIA,STL	46384	CKF2-256
-50	165-2161-00			2	.MICROCKT,DGTL:TRIGGER,H2161	80009	165216100
-51	159-0204-00			1	.FUSE,WIRE LEAD:3.0A,125V,5 SECONDS	61857	SP7-3A
-52	671-0014-00	B010100	B030165	1	CIRCUIT BD ASSY:LOWER ACQUISITION	80009	671001400
	671-0014-01	B030166	B040175	1	CIRCUIT BD ASSY:LOWER ACQUISITION	80009	671001401
	671-0014-02	B040176		1	CIRCUIT BD ASSY:LOWER ACQUISITION (SEE A6, EXCHANGE ITEM) (ATTACHING PARTS)	80009	671001402

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -53	211-0408-00			18	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
					LOWER ACQUISITION BD ASSY INCLUDES:		
-54	214-3964-00			4	.HEAT SINK,ELEC:S/H FLASH,ALUMINUM (ATTACHING PARTS)	TK1465	ORDER BY DESC
-55	214-4034-00			8	.SPRING,HLCPS:0.24 OD X 0.44 L,SST (END ATTACHING PARTS)	8X345	ORDER BY DESC
-56	155-0359-00	B010100	B010150	2	.MICROCKT,LINEAR:A.D PACKAGED HYBRID	80009	155035900
	155-0342-00	B010151		2	.MICROCKT,DGTL:UTILITY CIRCUIT IN 100 PIN	80009	155034200
	155-0342-01			2	.IC,ASIC:BIPOLAR,DIGITAL,UTILITY CIRCUIT (ATTACHING PARTS)	80009	155034201
-57	211-0411-00			8	.SCR,ASSEM WSHR:4-40 X 0.5,PNH,STL,T10 (END ATTACHING PARTS)	93907	ORDER BY DESC
-58	343-1307-00			2	.RTNR,MICROCKT:2.2 X 1.3 X 0.27,POLYCARB	0KBZ5	ORDER BY DESC
-59	214-3965-00			4	.HEAT SINK,ELEC:DEMUX,ALUMINUM (ATTACHING PARTS)	TK1465	ORDER BY DESC
-60	214-4034-00			8	.SPRING,HLCPS:0.24 OD X 0.44 L,SST (END ATTACHING PARTS)	8X345	ORDER BY DESC
-61	155-0341-00	B010100	B010150	4	.MICROCKT,DGTL:DEMULTIPLEXER IN 100 PIN	80009	155034100
	155-0341-01	B010151		4	.IC,ASIC:BIPOLAR,DIGITAL,DEMULTIPLEXER	80009	155034101
	020-1775-00	B010100	B020150	1	COMPONENT KIT:DSA601/DSA602 FIRMWARE	80009	020177500
	020-1775-01	B020151	B040175	1	COMPONENT KIT:DSA601/DSA602 VER1.2	80009	020177501
	020-1775-02	B040176	B040296	1	COMPONENT KIT:DSA601/DSA602 VER1.3	80009	020177502
	020-1775-03	B040297		1	COMPONENT KIT:DSA601/DSA602 VER1.3	80009	020177503
					WIRE ASSEMBLIES		
	174-0801-01			1	CABLE ASSY,RF:8,50 OHM COAX,17.0 L (FROM A1J1 TO A6J2),(FROM A1J3 TO A6J4) (FROM A1J5 TO A6J6),(FROM A1J9 TO A6J10)	TK2469	ORDER BY DESC
	174-0802-01			1	CABLE ASSY,RF:4,50 OHM COAX,33.15 L (FROM A1J7 TO A7J8),(FROM A1J11 TO A7J12)	TK2469	ORDER BY DESC
	174-0884-00	B010100	B040521	1	CA ASSY,SP,ELEC:40,28 AWG,11.5 L,RIBBON	TK1547	ORDER BY DESC
	174-884-01	B040522		1	CA ASSY,SP,ELEC:40,28 AWG,11.5 L,RIBBON (FROM A5J29 TO A6J29)	TK1547	ORDER BY DESC
	174-0885-00	B010100	B040521	1	CA ASSY,SP,ELEC:50,28 AWG,6.0 L,RIBBON	TK1547	ORDER BY DESC
	174-0885-01	B040522		1	CA ASSY,SP,ELEC:50,28 AWG,6.0 L,RIBBON (FROM A15J83 TO A20J83)	TK1547	ORDER BY DESC
	174-0886-00			2	CA ASSY,SP,ELEC:50,28 AWG,41.5 L,RIBBON (FROM A19J47 TO A8J47, STANDARD ONLY) (FROM A19J48 TO A8J48, STANDARD ONLY)	TK1547	ORDER BY DESC
	174-1236-00	B010100	B040521	2	CA ASSY,SP,ELEC:20,28 AWG,25.0 L,RIBBON	TK1547	ORDER BY DESC
	174-1236-01	B040522		2	CA ASSY,SP,ELEC:20,28 AWG,25.0 L,RIBBON (FROM A19J47 TO A8J47, OPTION 3C ONLY) (FROM A19J48 TO A8J48, OPTION 3C ONLY)	TK1547	ORDER BY DESC
	174-0888-00	B010100	B040521	1	CA ASSY,SP,ELEC:50,28 AWG,15.25 L,RIBBON	TK1547	ORDER BY DESC
	174-0888-01	B040522		1	CA ASSY,SP,ELEC:50,28 AWG,15.25 L,RIBBON (FROM A20J28 TO A5J28)	TK1547	ORDER BY DESC
	174-0889-00	B010100	B040521	1	CA ASSY,SP,ELEC:34,28 AWG,7.5 L,RIBBON	TK1547	ORDER BY DESC
	174-0889-01	B040522		1	CA ASSY,SP,ELEC:34,28 AWG,7.5 L,RIBBON (FROM A10J73 TO A9A1J73)	TK1547	ORDER BY DESC
	174-1113-00			1	CA ASSY,SP,ELEC:40,28 AWG,6.0 L,RIBBON (FROM A14J78 TO A12J78)	TK1547	ORDER BY DESC
	174-1126-00			1	CA ASSY,SP,ELEC:4,26 AWG,16.125 L (CRT HARNESS, FROM CRT TO CRT DRIVER BD)	0J7N9	ORDER BY DESC
	174-1132-00			1	CA ASSY,SP,ELEC:26 AWG,8.5 L,RIBBON (FROM A1J92 TO A5J92)	0J7N9	ORDER BY DESC
	174-1133-00	B010100	B040464	1	CA ASSY,SP,ELEC:26 AWG,17.0 L,RIBBON (FROM A7J91 TO A1J91)	0J7N9	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
					WIRE ASSEMBLIES (CONT)		
	174-1134-00			1	CA ASSY,SP,ELEC:18 AWG,17.5 L,RIBBON (FROM A4J94 TO A24J94)	TK1967	ORDER BY DESC
	174-1135-00			1	CA ASSY,SP,ELEC:18 AWG,17.5 L,RIBBON (FROM A4J96 TO A24J96)	0J7N9	ORDER BY DESC
	174-1136-00			1	CA ASSY,SP,ELEC:26 AWG,8.0 L,RIBBON (FROM A24J35 TO A27J35)	0J7N9	ORDER BY DESC
	174-1140-00	B010100	B040464	1	CA ASSY,SP,ELEC:POWER HARNESS	TK1967	ORDER BY DESC
	174-1140-02	B040465		1	CA ASSY,SP,ELEC:POWER (MAIN POWER HARNESS)	TK1967	ORDER BY DESC
	174-1141-00	B010100	B040175	1	CA ASSY,SP,ELEC:4,18 AWG,28.5 L	0J7N9	ORDER BY DESC
	174-1141-04	B040176		1	CA ASSY,SP,ELEC:4,18 AWG,18.0 L1 (CARD CAGE HARNESS)	TK1967	ORDER BY DESC
	174-1246-00			1	CA ASSY,SP,ELEC:4,26 AWG,14.5 L,RIBBON (FROM A27J36 TO A24J36)	TK1967	ORDER BY DESC
	174-1247-00			1	CA ASSY,SP,ELEC:11,26 AWG,14.5 L,RIBBON (FROM A26J33,J34 TO A24J33,J34)	TK1967	ORDER BY DESC
	174-1393-00			1	CABLE,SP,ELEC:20,28 AWG,9.5 L,STRD/VINYL (FROM A24J53 TO A16J53)	TK1547	ORDER BY DESC
	174-1394-00			1	CABLE,SP,ELEC:26,28 AWG,19.5 L,STRD/VINYL (FROM A24J54 TO A16J54)	TK1547	ORDER BY DESC
	175-9809-00			1	CA ASSY,SP,ELEC:50,3.0 L (FROM A15J79 TO A16J79)	TK1547	ORDER BY DESC
	175-9814-00			1	CA ASSY,SP,ELEC:34,3.0 L (FROM A14J77 TO A17J77)	TK1547	ORDER BY DESC
	175-9854-00	B010100	B040521	1	CA ASSY,SP,ELEC:36,28 AWG,7.0 L	TK1547	ORDER BY DESC
	175-9854-01	B040522			CA ASSY,SP,ELEC:36,28 AWG,7.0 L (FROM A14J72 TO A10J72)	TK1547	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
4 -1	620-0033-00	B010100	B040175	1	POWER SUPPLY:LBT MAINFRAME	80009	620003300
	620-0033-01	B040176		1	POWER SUPPLY:LBT MAINFRAME (SEE A2, EXCHANGE ITEM)	80009	620003301
-2	214-4082-00			2	.PIN,GUIDE:0.850 L,METAL	80009	ORDER BY DESC
-3	200-2264-00			1	.CAP,FUSEHOLDER:3AG FUSES	S3629	FEK 031 1666
	204-0832-00			1	.BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES	S3629	031 1673 (FEU M
	119-2610-00	B010100	B040175	1	.FAN,TUBEAXIAL:12VDC,3.5W,3100 RPM,37 CFM	67088	BETA SL A31393-
	119-2610-01	B040176		1	.FAN,TUBEAXIAL:12V,3.0W,3300RPM,48CFM	TK2421	MDA 120925HB
-4	159-0088-00			1	.FUSE,CARTRIDGE:3AG,12A,250V,6 SEC,CER	75915	314012
	159-0017-00			1	.FUSE,CARTRIDGE:3AG,4A,250V,FAST BLOW (F520, PART OF LINE INVERTER BOARD)	75915	312 004
	159-0248-00			1	.FUSE,WIRE LEAD:1.5 A,AXIAL LEAD (F130, PART OF LINE INVERTER BOARD)	75915	R25101.5 T1
	159-0220-00			1	.FUSE,WIRE LEAD:3A,125V,FAST (F450, PART OF CONTROL RECTIFIER BOARD)	61857	SP5-3A
					POWER SUPPLY WIRE ASSEMBLIES		
	174-0892-00	B010100	B040175	1	CA ASSY,SP,ELEC:3,22 AWG,10.0 L,RIBBON (FROM A2A2J80,J81,J82 TO FANS)	TK1967	ORDER BY DESC
	174-1128-00			1	CA ASSY,SP,ELEC:18 AWG,3.5 L,RIBBON (FROM A2A2J61 TO A4J61)	TK1967	ORDER BY DESC
	174-1129-00			1	CA ASSY,SP,ELEC:18 AWG,4.0 L,RIBBON (FROM A2A2J62 TO A4J62)	TK1967	ORDER BY DESC
	174-1130-00			1	CA ASSY,SP,ELEC:26 AWG,3.5 L,RIBBON (FROM A2A2J65 TO A4J65)	0J7N9	ORDER BY DESC
	175-9933-00			1	CA ASSY,SP,ELEC:20,28 AWG,5.15 L,RIBBON (FROM A2A1J70 TO A2A2J70)	TK1547	ORDER BY DESC
	196-3071-00			1	LEAD,ELECTRICAL:18 AWG,4.0 L,5-4 (GND WIRE, FROM LINE FILTER TO CHASSIS)	TK1967	ORDER BY DESC
	196-3072-00			1	LEAD,ELECTRICAL:18 AWG,2.0 L,9-N (LINE FILTER TO FUSE HOLDER)	TK2469	ORDER BY DESC
	196-3074-00			1	LEAD,ELECTRICAL:18 AWG,12.0 L,5-4 (GND WIRE, FROM PWR SPLY TO CHASSIS)	TK1967	ORDER BY DESC
	196-3075-00			2	LEAD,ELECTRICAL:18 AWG,2.0 L,9-N (FROM A2A1W100 TO FUSE HOLDER) (FROM A2A1W110 TO LINE FILTER)	TK1967	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Dscont	Qty	& Description	12345 Name	Mfr. Code	Mfr. Part No.
5 -0								
					OPTION 1C			
-1	386-5502-00			1	PLATE,CONN MTG:OPTIONAL,ALUMINUM		80009	ORDER BY DESC
-2	333-3415-01			1	PANEL,FRONT:DSA601,LOWER		TK2072	ORDER BY DESC
-3	131-1315-01			16	CONN,RF JACK::BNC/PNL (FRONT AND REAR)		24931	28JR306-1
	012-0208-00			8	CABLE,INTCON:10.0 L		TK2156	ORDER BY DESC
	174-1139-00			2	CABLE ASSY,RF:4,500 OHM,33.0 L		TK2469	ORDER BY DESC
					OPTION 3C			
-4	386-5503-00			1	PLATE,REAR:POWER SUPPLY,ALUMINUM (SAME AS STD POWER SUPPLY REAR PLATE EXCEPT REMOVE CONN OPENING COVER.)		80009	ORDER BY DESC
-5	174-0895-00			1	CA ASSY,SP,ELEC:2,22 AWG,24.75 L,RIBBON (ATTACHING PARTS)		TK1967	ORDER BY DESC
-6	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)		TK0435	ORDER BY DESC
-7	131-4309-00			1	CONN,PLUG,ELEC:CIRCULAR BAYONET LKG,MALE		09922	BT06-EC-8-2-P
	670-9827-00			1	CIRCUIT BD ASSY:SIGNAL PROCESSOR (REFER TO FIG.3-34, A8)		80009	670982700

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
6 -0					**STANDARD ACCESSORIES**		
-1	161-0066-00			1	CABLE ASSY,PWR,:3,18AWG,115V,98.0 L	0B445	ECM-161-0066-00
-2	161-0066-09			1	CABLE ASSY,PWR,:3,0.75MM SQ,220V,99.0 L (OPTION A1 ONLY)	S3109	86511000
-3	161-0066-10			1	CABLE ASSY,PWR,:THREE 0.75MM SQ,250V,2.5M (OPTION A2 ONLY)	S3109	BS/13-H05VVF3G0
-4	161-0066-11			1	CABLE ASSY,PWR,:3,0.75MM,240V,96.0 L (OPTION A3 ONLY)	S3109	SAA/3-OD3CCFC3X
-5	161-0066-12			1	CABLE ASSY,PWR,:3,18 AWG,250V,99.0 L (OPTION A4 ONLY)	29870	ORDER BY DESC
-6	161-0154-00			1	CABLE ASSY,PWR,:3,1.00MM SQ,250V,10A,2.5M (OPTION A5 ONLY)	S3109	12-H05VVF3G 00-
	070-7737-00			1	MANUAL,TECH:QUICK REF,DSA601/DSA602	80009	070773700
	015-0580-00			1	POCKET SIG GEN:TUTORIAL MANUAL AID	80009	015058000
	070-7249-50			1	MANUAL,TECH:TUTORIAL,DSA601/602	80009	070724950
	070-7250-00			1	MANUAL,TECH:USERS REF,DSA601/602	80009	070725000
	070-7251-00			1	MANUAL,TECH:PRGM REF,DSA601/602	80009	070725100
	070-7252-01			1	MANUAL,TECH:COMMAND REF,DSA601/602	80009	070725201
	070-7529-02			1	MANUAL,TECH:INSTRUCTION,DSA600 RACK	80009	070752902
	070-8184-00			1	MANUAL,TECH:SERVICE REF,DSA600 SERIES	80009	070818400
	013-0195-00	B010100	B040373	1	ADAPTER,CONN:BNC TO PROBE	24931	28P264-1
	013-0266-00	B040374		1	CLIP,TEST:48 PIN FOR DIP (OPTION 1R ONLY)	TK0007	923690-48
					OPTIONAL ACCESSORIES		
	012-0555-00			1	CABLE,INTCON:CENTRONIX,3 METERS LONG	TK1416	DKIT-0034HCZZ
	012-0630-03			1	CABLE,INTCON:2.0M L	74868	C156327-B
	012-0911-00			1	CABLE,INTCON:MOLDED,RS232;10 FT	TK1374	ORDER BY DESC
	016-0829-00			1	PANEL,BLANK:PLUG-IN HOUSING,11K SERIES	80009	016082900
	020-1769-00			1	COMPONENT KIT:QUICKSTART PKG,US	80009	020176900
	020-1770-00			1	COMPONENT KIT:QUICKSTART PKG,EUROPEAN	80009	020177000

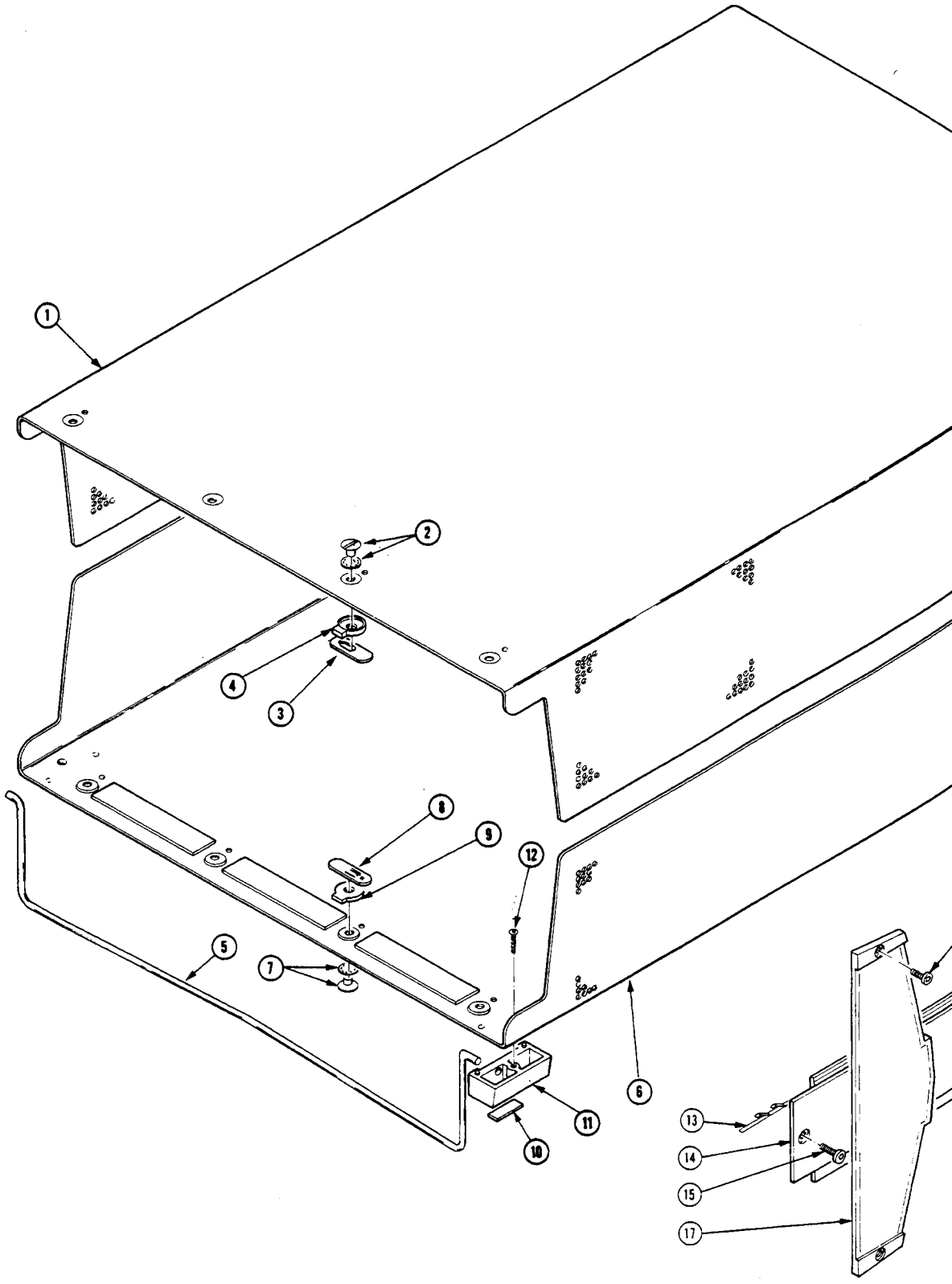

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Fig. 1 Cabinet

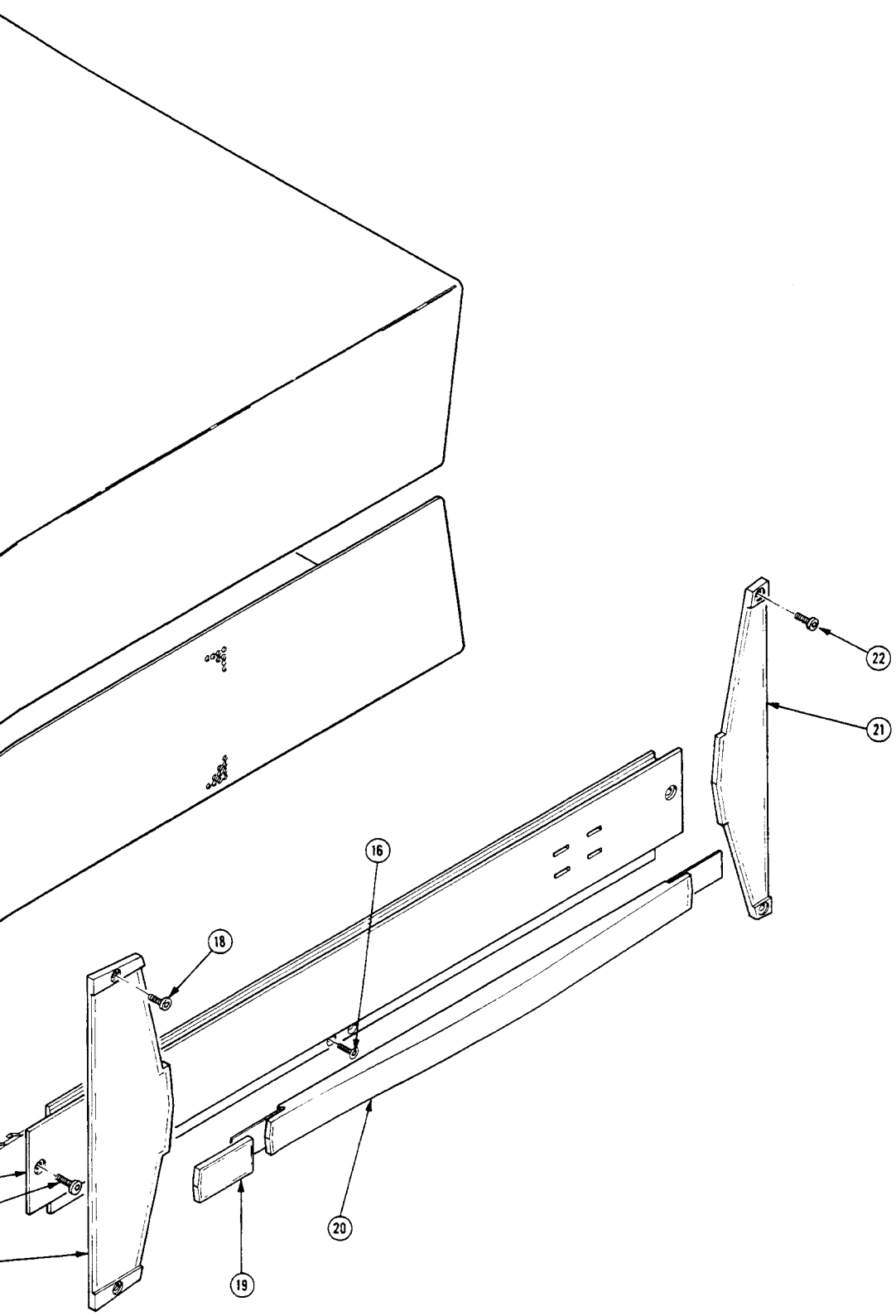
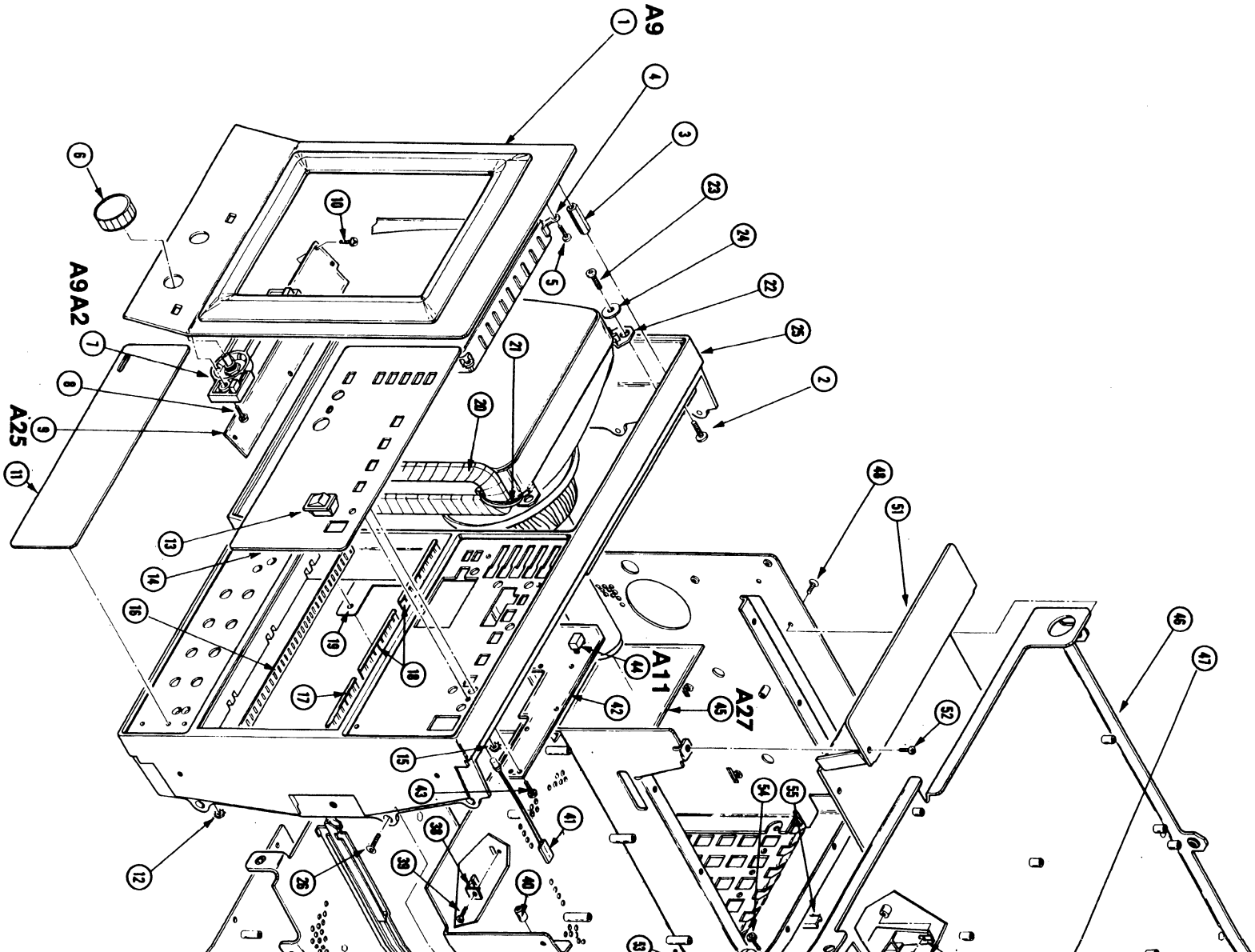
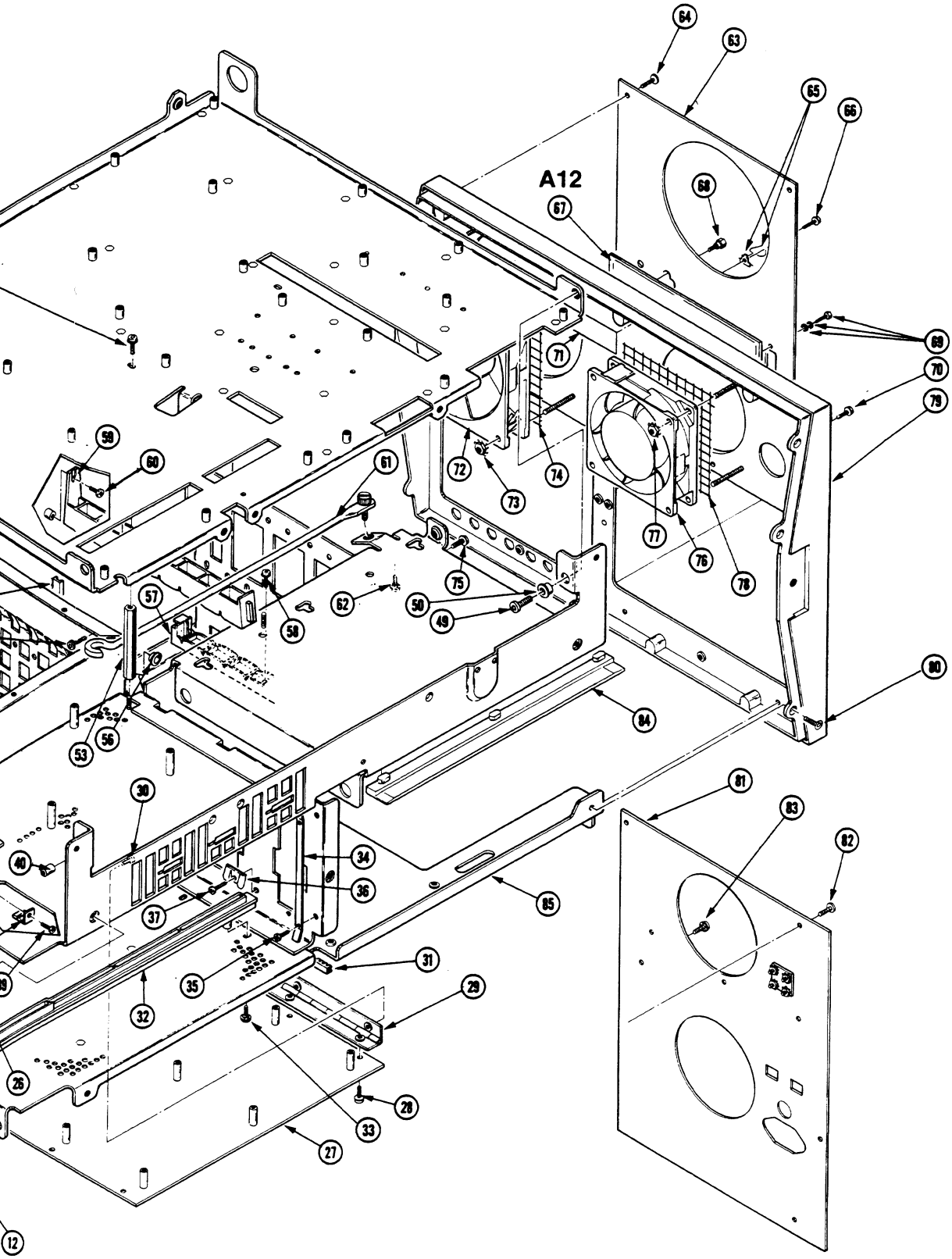


Fig. 2 Front, Chassis, Rear

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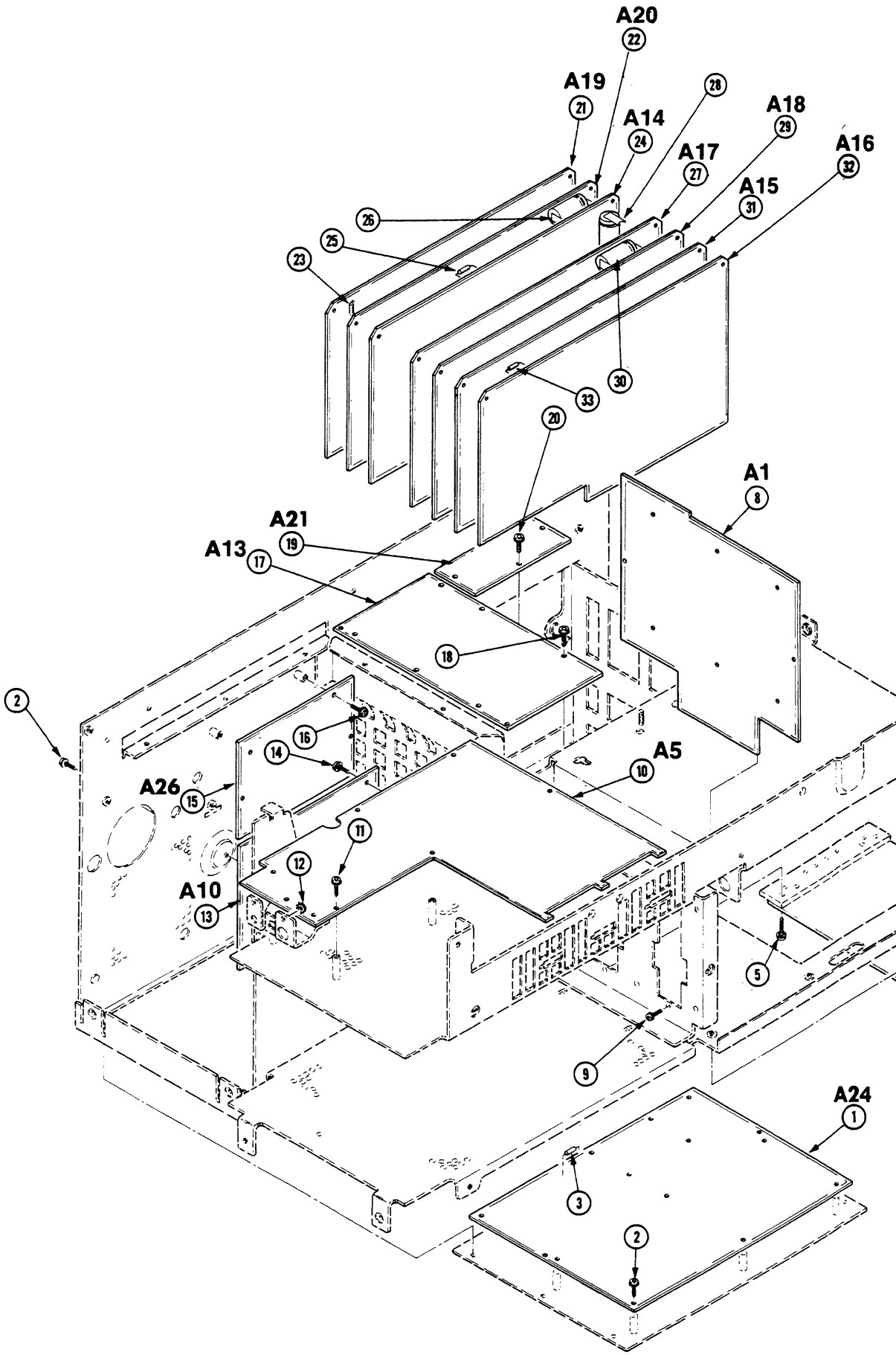
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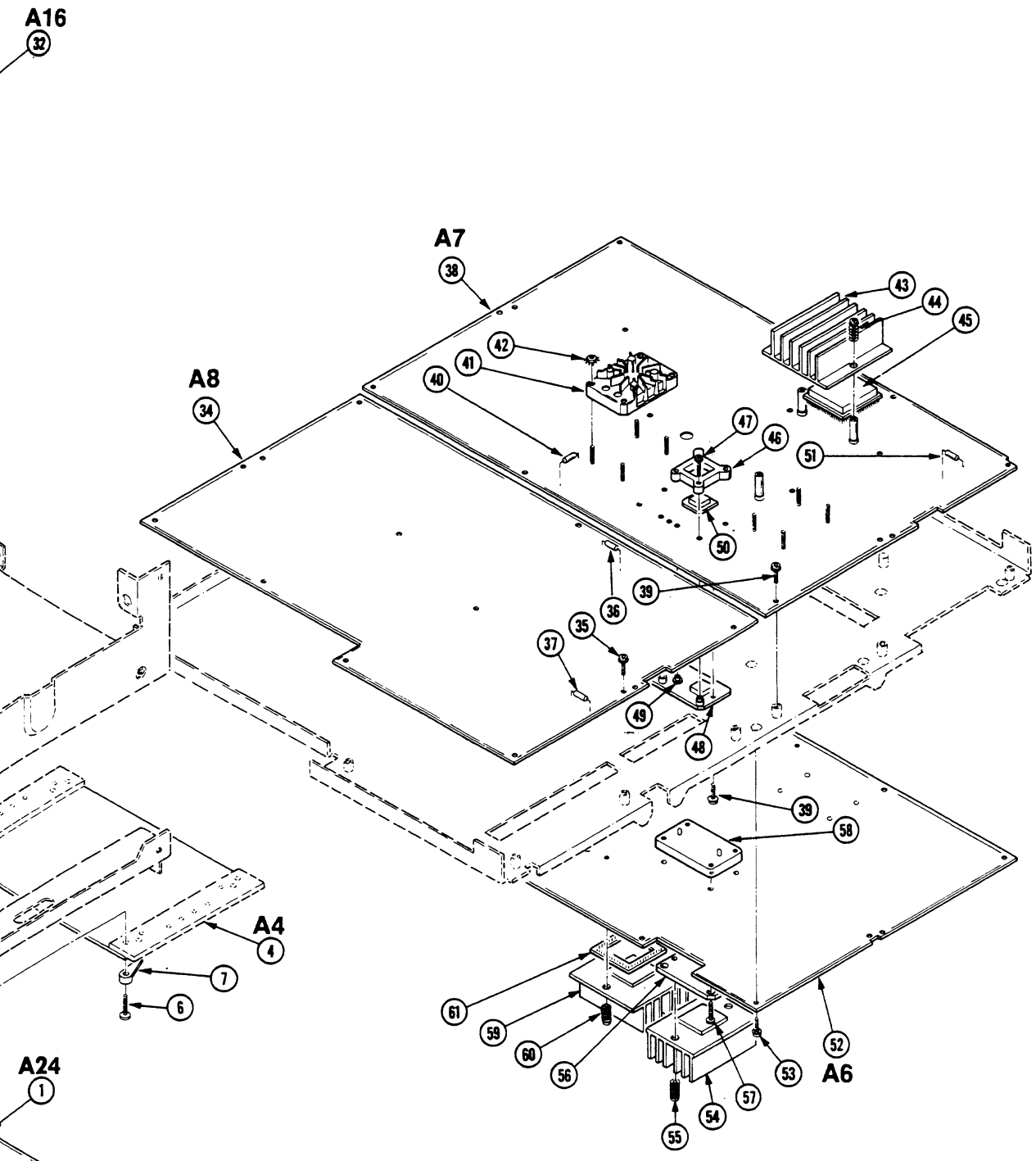
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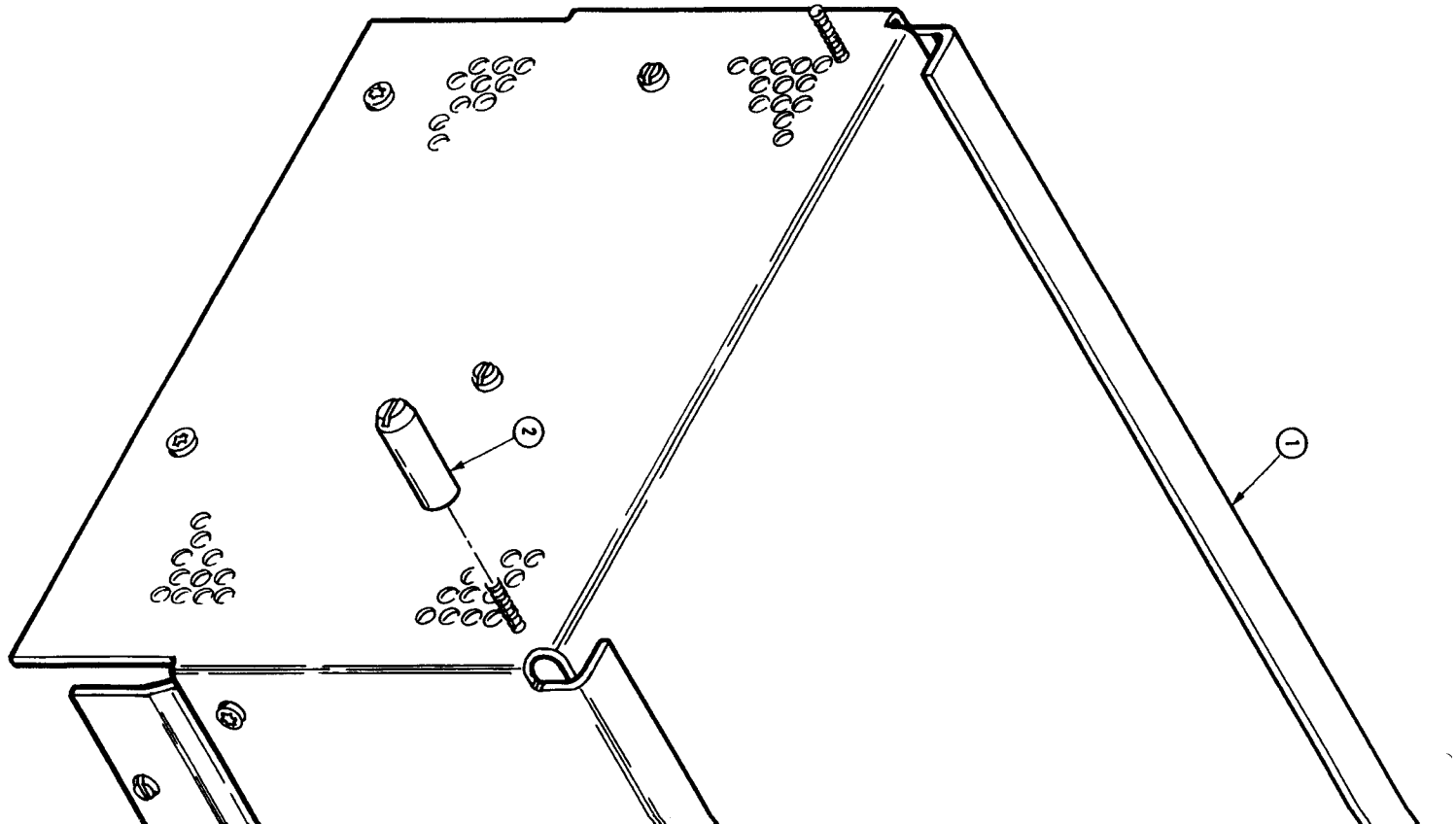
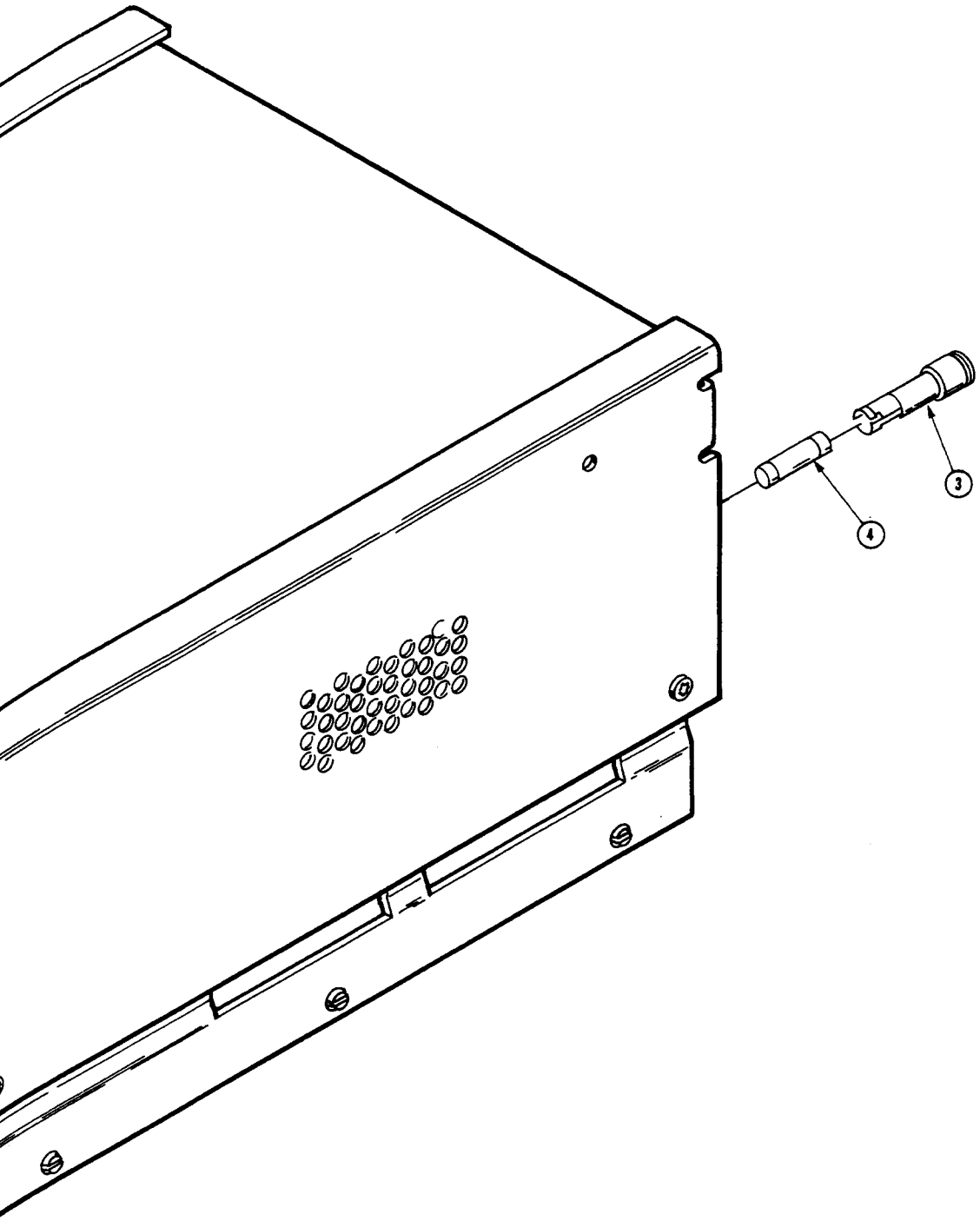
Fig. 4 Power Supply

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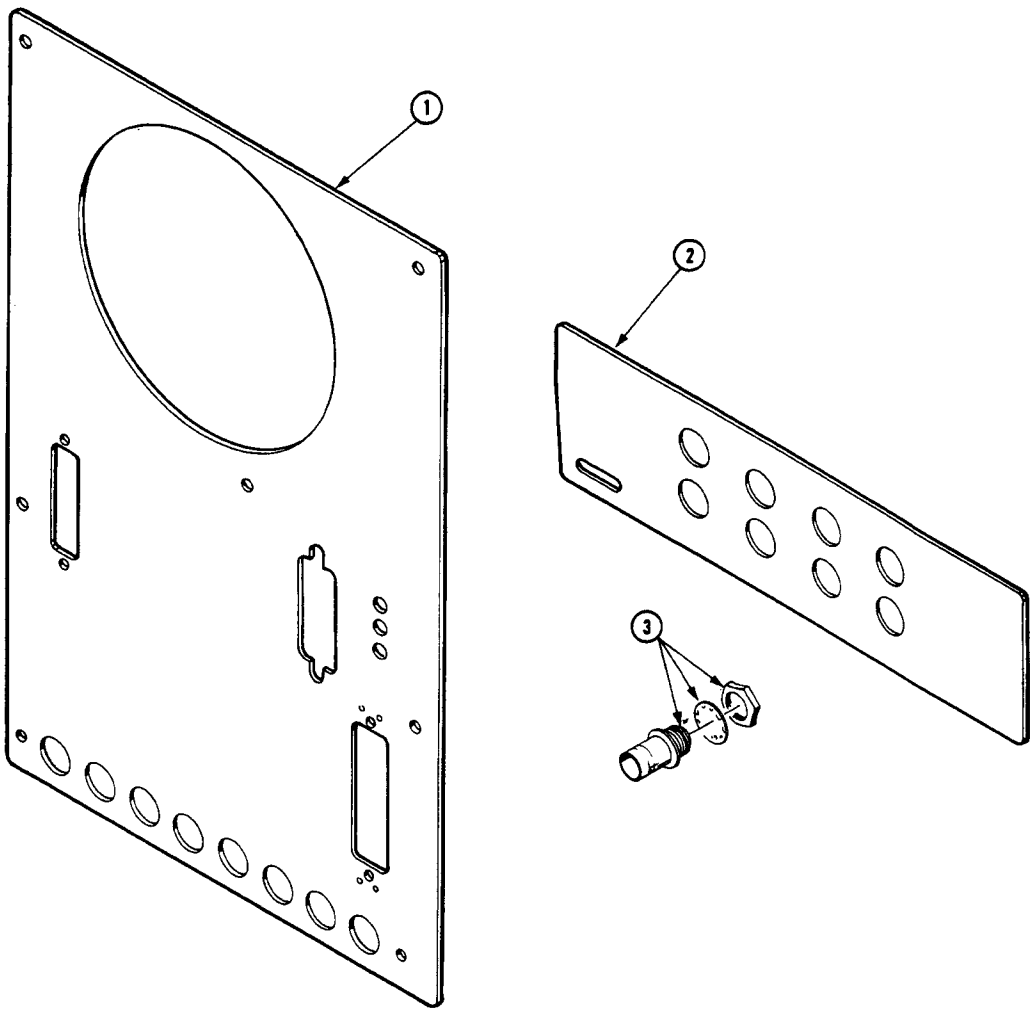
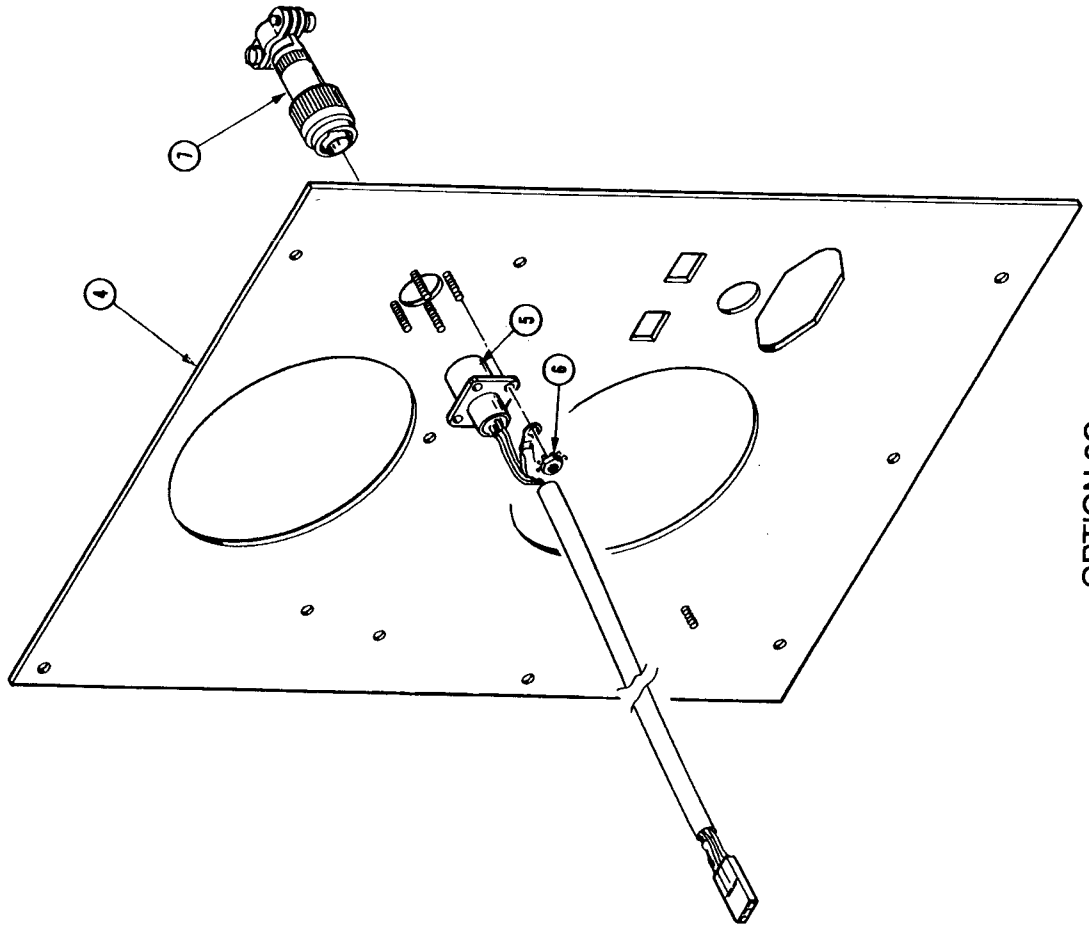


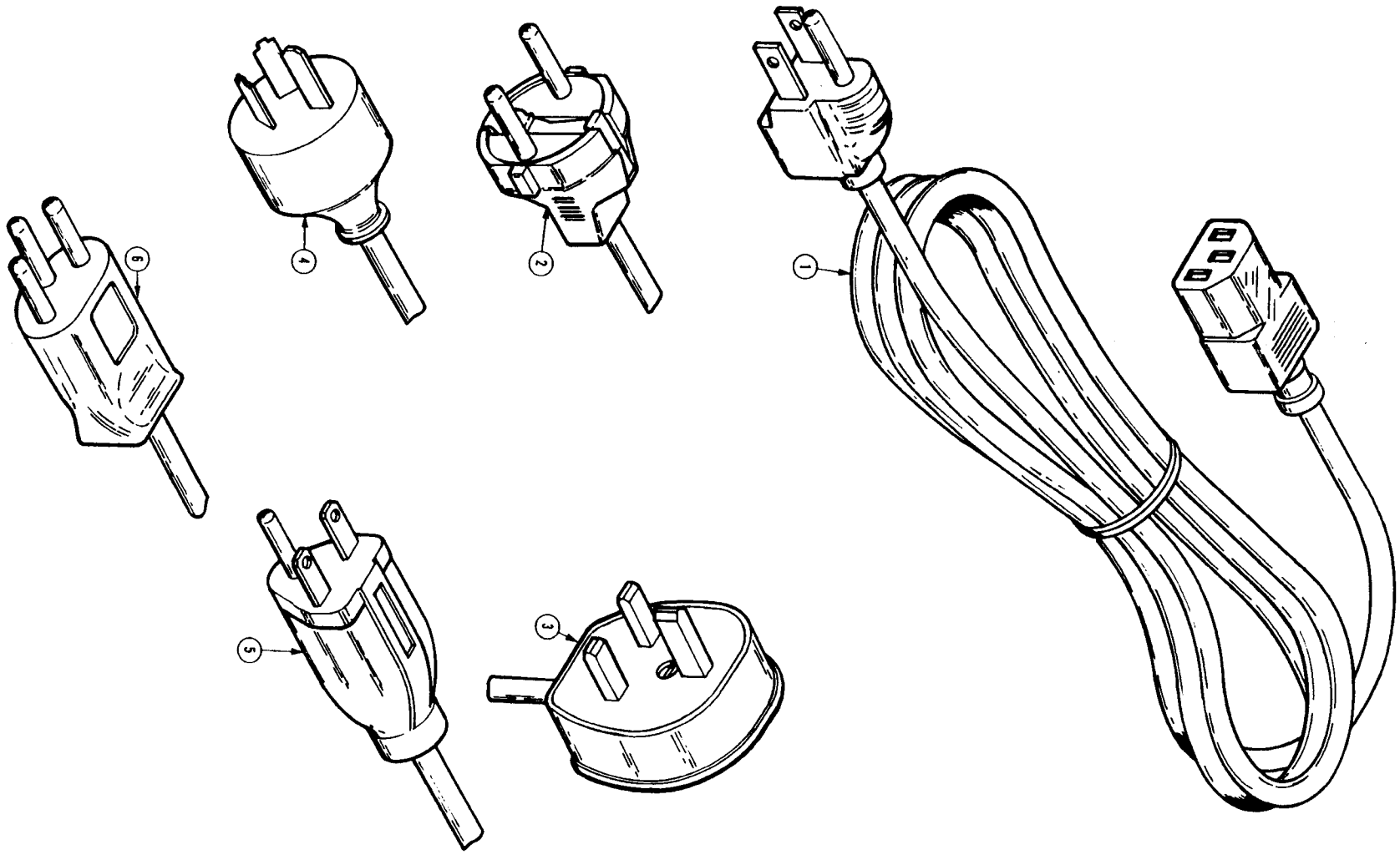
OPTION 1C

Fig. 5 Options



OPTION 3C

Fig. 6 Accessories



DSA 602 Replaceable Parts

This section contains a list of the components that are replaceable for the DSA 602 Digitizing Signal Analyzer.

Table 5-4 — DSA 602 Board FRUs

FRU	Part Number	Description
A1	670–9815–00	Plug-in Interface Board
A2	620–0033–01	Power Supply:Mainframe
A4	670–9687–01	Regulator Board
A5	670–9823–00	Calibrator Board
A6	670–9821–02	Lower Acquisition Board
A7	670–9822–00	Upper Acquisition Board
A8	670–9831–01	Waveform Processor Board
A9	614–0819–01	Panel,Subassy:Touch Panel
A9A2	671–0036–00	Knob Board
A10	670–9813–00	Front Panel Control Board
A11	670–9830–00	Front Panel Button Board
A12	671–0013–00	Rear Panel Board
A13	670–8851–00	Mother Board
A14	670–8854–01	I/O Board
A15	671–0852–00	MMU Board
A16	671–0879–00	Display Controller Board
A17	671–2116–00	Main Processor Board
A18	671–0385–00	Memory Board
A19	670–9819–00	Digitizer CPU Board
A20	670–9820–00	Digitizer I/O Board
A21	670–9828–00	Mini Mother Board
A24	670–9818–02	CRT Driver Board
A25	670–9829–00	Degauss Board
A26	670–9826–00	Geometry Board
A27	670–9825–00	CRT Socket Board

Attaching parts must be purchased separately, unless otherwise specified.

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
S3109	FELLER	72 VERONICA AVE UNIT 4	SUMMERSET NJ 08873
S3629	SCHURTER AG H C/O PANEL COMPONENTS CORP	2015 SECOND STREET	BERKELEY CA 94170
TK0007	AP PRODUCTS INC	72 CORWIN DRIVE POX 110	PAINESVILLE OH 44077
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK0488	CURRAN COIL SPRING INC	635 NW 16TH	PORTLAND OR 97209–2206
TK0588	UNIVERSAL PRECISION PRODUCTS	1775 NW 216TH	HILLSBORO OR 97123
TK1159	IMPROVED PRODUCTS	3400 OLYMPIC STREET	SPRINGFIELD OR 97477
TK1163	POLYCAST INC	9898 SW TIGARD ST	TIGARD OR 97223
TK1374	TRI–TEC ENGINEERING CORP		
TK1416	SHARP CORP	22–22 NAGAIKE–CHO ABENO–KU	OSAKA JAPAN
TK1465	BEAVERTON PARTS MFG CO	1800 NW 216TH AVE	HILLSBORO OR 97124–6629
TK1499	AMLAN INC	97 THORNWOOD RD	STAMFORD CT 06903–2617
TK1547	MOORE ELECTRONICS INC (DIST)	19500 SW 90TH COURT PO BOX 1030	TUALATIN OR 97062
TK1916	SKS DIE CASTING CO	2200 4TH	BERKELEY CA 94710–2215
TK1947	NORTHWEST ETCH TECHNOLOGY	3223 C ST NE UNIT 2	AUBURN WA 98002
TK1967	SYNDETEK	3915 E MAIN	SPOKANE WA 99202
TK2061	SONY CORP	% TOKYO JAPAN BUYERS OFFICE BLDG 78/661	BEAVERTON OR 97077
TK2072	PRECISION DECORATORS INC HAWTHORNE BUSINESS CENTER	5289 NE ELAM YOUNG PARKWAY SUITE G400	HILLSBORO OR 97124
TK2122	INDUSTRIAL GASKET INC	1623 SE 6TH AVE	PORTLAND OR 97214–3502
TK2156	ACACIA/DEANCO	7763 SW CIRRUS RD SUITE 26	BEAVERTON OR 97005–6452
TK2338	ACC MATERIALS	ED SNYDER BLDG 38–302	BEAVERTON OR 97077
TK2421	INDEK CORP	2360 QUME DRIVE SUITE A	SAN JOSE, CA 95131
TK2469	UNITREK CORPORATION	3000 LEWIS & CLARK WAY SUITE #2	VANCOUVER WA 98601
0B445	ELECTRI–CORD MFG CO INC	312 EAST MAIN ST	WESTFIELD PA 16950
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
0J7N9	MCX INC	30608 SAN ANTONIO ST	HAYWARD CA 94544
0KBZ5	MORELLIS Q & D PLASTICS	1812 16TH AVE	FOREST GROVE OR 97116
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
01536	TEXTRON INC CAMCAR DIV SEMS PRODUCTS UNIT	1818 CHRISTINA ST	ROCKFORD IL 61108
06383	PANDUIT CORP	17301 RIDGELAND	TINLEY PARK IL 07094–2917
06812	TORIN CORP WESTERN DIV	16300 ROSCOE BLVD	VAN NUYS CA 91409

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
11897	PLASTIGLIDE MFG CORP	2701 W EL SEGUNDO BLVD	HAWTHORNE CA 90250–3318
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125–4632
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
29681	BEL–TRONICS CORP	344 INTERSTATE RD	ADDISON IL 60101–4516
29870	VICTOR CORP	618 MAIN STREET	WEST WARWICK RI 02893
30010	BICC–VERO ELECTRONICS INC	40 LINDEMAN DR	TRUMBULL CT 06611–4739
46384	PENN ENGINEERING AND MFG CORP	OLD EASTON RD PO BOX 1000	DANBORO PA 18916
5Y400	TRIAX METAL PRODUCTS INC DIV OF BEAVERTON PARTS MFG CO	1800 216TH AVE NW	HILLSBORO OR 97124–6629
52814	TECH–ETCH INC	45 ALDRIN RD	PLYMOUTH MA 02360
53387	MINNESOTA MINING MFG CO	PO BOX 2963	AUSTIN TX 78769–2963
61058	MATSUSHITA ELECTRIC CORP OF AMERICA PANASONIC INDUSTRIAL CO DIV	ONE PANASONIC WAY PO BOX 1502	SECAUCUS NJ 07094–2917
61439	GILLESPIE DECALS INC	27676 PARKWAY AVE SW	WILSONVILLE OR 97070
61857	SAN–0 INDUSTRIAL CORP	85 ORVILLE DR PO BOX 511	BOHEMIA LONG ISLAND NY 11716–2501
67088	NIDEC–TORN CORP	100 FRANKLIN DR	TORRINGTON CT 06790–6501
7W718	MARQUARDT SWITCHES INC	2711 ROUTH 20 EAST	CAZENOVIA NY 13035–1219
74868	AMPHENOL CORP R F CONNECTORS (OPNS)	1 KENNEDY AVE	DANBURY CT 06810–5803
75915	LITTELFUSE INC SUB TRACOR INC	800 E NORTHWEST HWY	DES PLAINES IL 60016–3049
8X345	NORTHWEST SPRING & MFG CO	5858 WILLOW LANE	LAKE OSWEGO OR 97034–5343
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
83486	ELCO INDUSTRIES INC	1101 SAMUELSON RD	ROCKFORD IL 61101
83553	ASSOCIATED SPRING BARNES GROUP INC	15001 S BROADWAY P O BOX 231	GARDENA CA 90248–1819
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108–5181
96881	THOMSON INDUSTRIES INC	SHORE RD AT CHANNEL DR	PORT WAHSINGTON NY 11050

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1 -1	200-3350-00	B010100	B040569	1	COVER,CABINET:UPPER,ALUMINUM	80009	ORDER BY DESC
	200-3350-01	B040570		1	COVER,CABINET:UPPER LIFT OFF	0J260	200-3350-01
-2	214-0603-02			4	.PIN ASSY,SECRG:W/SPRING WASHER	0J260	ORDER BY DESC
-3	386-1151-00			4	.CLAMP,RIM CLENC:SPG STL	83553	ORDER BY DESC
-4	386-0227-00			4	.STOP,CLP,RIM CL:ACETAL	0JR05	386-0227-00
-5	348-0875-00			1	FLIPSTAND,CAB.:	TK0488	ORDER BY DESC
-6	200-3351-00	B010100	B040569	1	COVER,CABINET:LOWER,ALUMINUM	80009	ORDER BY DESC
	200-3351-01	B040570		1	COVER,CABINET:LOWER LIFT OFF	0J260	200-3351-01
-7	214-0603-02			4	.PIN ASSY,SECRG:W/SPRING WASHER	0J260	ORDER BY DESC
-8	386-1151-00			4	.CLAMP,RIM CLENC:SPG STL	83553	ORDER BY DESC
-9	386-0227-00			4	.STOP,CLP,RIM CL:ACETAL	0JR05	386-0227-00
-10	348-0596-00			4	PAD,CAB.FOOT:0.69 X 0.255 X 0.06,PU	TK2122	348-0596-00
-11	348-0879-00			4	FOOT,CABINET:BOTTOM,BLUE,POLYCARB (ATTACHING PARTS)	TK1163	ORDER BY DESC
-12	211-0734-00			4	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	83486	MACHINE SCREW
-13	348-0980-00			4	SHLD GSKT,ELEK:FINGER TYPE,21.0 L	TK1159	ORDER BY DESC
-14	426-2177-00	B010100	B041392	2	FRAME SECT,CAB.:RIGHT/LEFT,ALUMINUM	TK1465	ORDER BY DESC
	426-2177-01	B041293		2	FRAME SECT,CAB.:RIGHT/LEFT,ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-15	212-0681-00			4	SCREW,MACHINE:10-32 X 0.25,PNH,STL	83486	MACHINE SCREW
-16	211-0734-00			3	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL (END ATTACHING PARTS)	83486	MACHINE SCREW
-17	101-0116-00			2	TRIM,DECORATIVE:FRONT (ATTACHING PARTS)	TK1163	ORDER BY DESC
-18	212-0158-00			4	SCREW,MACHINE:8-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-19	200-2191-00	B010100	B041392	4	CAP,RETAINER:PLASTIC	0JR05	ORDER BY DESC
-20	367-0248-01	B010100	B041392	2	HANDLE,CARRYING:16.341 L,W/CLIP	80009	367024801
-21	101-0117-00			2	TRIM,DECORATIVE:REAR (ATTACHING PARTS)	TK1163	ORDER BY DESC
-22	212-0158-00			4	SCREW,MACHINE:8-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -0	614-0819-00			1	PANEL SUBASSY:TOUCH PANEL (SEE A9, EXCHANGE ITEM) TOUCH PANEL ASSEMBLY INCLUDES:	80009	614081900
-1	333-3453-01			1	.PANEL ASSY,FR: (ATTACHING PARTS)	TK2072	ORDER BY DESC
-2	211-0721-00			4	.SCREW,MACHINE:6-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-3	129-1165-00			2	.SPACER,POST:1.9 L,W 6-32 THD ENDS	TK0588	ORDER BY DESC
-4	386-5499-00			1	.DIFFUSER,LIGHT:PLASTIC,7.055 X 5.472 (ATTACHING PARTS)	TK1163	ORDER BY DESC
-5	211-0372-00			4	.SCREW,MACHINE:4-40 X 0.312,PNH,STL (END ATTACHING PARTS)	93907	B80-00020-003
-6	366-0582-00			2	.KNOB:ENCODER	TK1163	ORDER BY DESC
-7	671-0036-00			1	.CIRCUIT BD ASSY:KNOB (SEE A9A2, EXCHANGE ITEM) (ATTACHING PARTS)	80009	671003600
-8	211-0409-00			2	.SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06888-024
-9	670-9829-00			1	CIRCUIT BD ASSY:DEGAUSS (SEE A25, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982900
-10	211-0408-00			5	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-11	333-3451-01			1	PANEL,FRONT:DSA601,LOWER (ATTACHING PARTS)	TK2072	ORDER BY DESC
-12	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-13	260-2349-00			1	SWITCH,ROCKER:SPST,30MA,12V	7W718	1801.1152
-14	333-3414-00			1	PANEL,FRONT:UPPER,ALUMINUM (ATTACHING PARTS)	TK2072	ORDER BY DESC
-15	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-16	348-0878-00			1	SHLD GSKT,ELEK:SOLID TYPE,7.646 L	52814	ORDER BY DESC
-17	348-1075-00			1	SHLD GSKT,ELEK:SOLID TYPE,1.66 L	52814	ORDER BY DESC
-18	348-1076-00			2	SHLD GSKT,ELEK:SOLID TYPE,2.28 L	52814	ORDER BY DESC
-19	344-0438-00			1	CLIP,ELECTRICAL:CRT GROUNDING,2.5 X 4.5	TK1947	ORDER BY DESC
-20	108-1383-00			2	COIL,TUBE DEFL:FXD,DEGAUSS	29681	87-0912
-21	346-0120-00			4	RSTRAP,TIEDOWN,E:5.5 L MIN,PLASTIC,WHITE	06383	SST1.5M
-22	154-0914-00			1	ELECTRON TUBE:CRT,P31 (ATTACHING PARTS)	TK2061	SD-192
-23	211-0721-00			4	SCREW,MACHINE:6-32 X 0.375,PNH,STL	0KB01	ORDER BY DESC
-24	210-0949-00			4	WASHER,FLAT:0.141 ID X 0.5 OD X 0.062,BRS (END ATTACHING PARTS)	12327	ORDER BY DESC
-25	386-5495-01	B010100	B040429	1	SUBPANEL,FRONT:	TK1916	ORDER BY DESC
	386-5495-03	B040430		1	SUBPANEL,FRONT:FINISHED (ATTACHING PARTS)	TK1916	ORDER BY DESC
-26	211-0725-00			10	SCREW,MACHINE:6-32 X 0.375,FLH (END ATTACHING PARTS)	01536	ORDER BY DESC
-27	386-5752-00			1	PLATE,ECB MTG:ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-28	211-0373-00			6	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-29	214-1632-01			1	HINGE,BUTT:7.0 X 1.062,AL (ATTACHING PARTS)	80009	214163201
-30	211-0373-00			3	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-31	255-0334-00			2	PLASTIC CHANNEL:12.75 X 0.175 X 0.155,NYLON	11897	122-NN-2500-060
-32	351-0744-00			3	GUIDE,PLUG-IN:POLYAMIDE (ATTACHING PARTS)	TK1163	ORDER BY DESC
-33	211-0711-00			3	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -34	131-0800-03			2	CONTACT,ELEC:PLUG-IN GND,BE NI HT TR (ATTACHING PARTS)	80009	131080003
-35	211-0373-00			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-36	131-0799-00			4	CONTACT,ELEC:PLUG-IN GND,BE NI (ATTACHING PARTS)	80009	131079900
-37	211-0373-00			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-38	344-0131-00			4	CLIP,SPR TNSN:CKT BOARD MT,ACETAL WHITE (ATTACHING PARTS)	80009	344013100
-39	211-0373-00			4	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-40	129-0220-00			1	SPACER,POST:0.281 L,6-32 THRU,ACETAL	TK0588	ORDER BY DESC
-41	150-0121-05			1	LAMP,CARTRIDGE:5V,0.06A,GREEN LENS	TK1967	ORDER BY DESC
-42	670-9830-00			1	CIRCUIT BD ASSY:FRONT PANEL BUTTON (SEE A11, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670983000
-43	211-0408-00			7	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-44	366-0600-00			10	PUSH BUTTON:0.269 X 0.409,ABS	TK1163	ORDER BY DESC
-45	670-9825-00			1	CIRCUIT BD ASSY:CRT SOCKET (SEE A27, EXCHANGE ITEM)	80009	670982500
-46	441-1769-01	B010100	B040421	1	CHASSIS,PLATE:ALUMINUM	5Y400	ORDER BY DESC
	441-1769-02	B040422		1	CHAS,PLATFORM:ALUMINUM (ATTACHING PARTS)	5Y400	ORDER BY DESC
-47	211-0722-00			2	SCREW,MACHINE:6-32 X 0.25,PNH,STL	0KB01	ORDER BY DESC
-48	211-0734-00			6	SCREW,MACHINE:6-32 X 0.25,FLH,100 DEG,STL	83486	MACHINE SCREW
-49	212-0682-00			1	SCREW,MACHINE:10-32 X 0.5,PNH,STL	0KB01	212-0682-00
-50	358-0717-00			1	BUSHING,SLEEVE:0.2 ID X 0.345 OD X 0.17 THK (END ATTACHING PARTS)	0JR05	ORDER BY DESC
-51	200-3386-01			1	COVER,CRT:ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-52	211-0373-00			10	SCREW,MACHINE:4-40 X 0.25,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-53	129-1168-00			2	SPACER,POST:2.07 L,0.138-32 THD ENDS,AL	TK0588	ORDER BY DESC
-54	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (ATTACHES SOCKET BD GND WIRE)	0KB01	ORDER BY DESC
-55	351-0765-00			16	GUIDE,CKT BOARD:NYLON	30010	29-0124D
-56	358-0729-00			1	BUSHING,SLEEVE:0.250 X 0.080,NYLON	96881	NYLINER 4L1FF
-57	351-0746-00			1	GUIDE,CKT BOARD:NYLON 6.803 L (ATTACHING PARTS)	0JR05	ORDER BY DESC
-58	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-59	343-1318-00			2	RTNR,CARD CAGE:CIRCUIT BOARD (ATTACHING PARTS)	0JR05	ORDER BY DESC
-60	211-0722-00			2	SCREW,MACHINE:6-32 X 0.25,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-61	386-5567-00			1	SPRT,PLATFORM:STEEL	TK0488	ORDER BY DESC
-62	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (ATTACHES PWR SPLY GND WIRE)	0KB01	ORDER BY DESC
-63	386-5501-00			1	PLATE,CONNECTOR:STANDARD,ALUMINUM (ATTACHING PARTS)	80009	ORDER BY DESC
-64	211-0721-00			8	SCREW,MACHINE:6-32 X 0.375,PNH,STL (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-65	214-2476-01			2	HDW ASSY KIT:BAIL LOCK,ELEC CONN RCPT (ATTACHING PARTS)	53387	3475-4
-66	211-0410-00			2	SCR,ASSEM WSHR:4-40 X 0.437,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-07510-024

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2 -67	671-0013-00			1	CIRCUIT BD ASSY:REAR PANEL (SEE A12, EXCHANGE ITEM)	80009	671001300
					(ATTACHING PARTS)		
-68	129-0774-00			2	SPACER,POST:0.25 L,4-40 EXT ONE END,BRS	80009	129077400
-69	214-3106-00			2	HARDWARE KIT:JACK SOCKET	53387	3341-1S
-70	211-0410-00			1	SCR,ASSEM WSHR:4-40 X 0.437,PNH,STL,T10	93907	829-07510-024
					(END ATTACHING PARTS)		
-71	334-7307-00			1	MARKER,IDENT:MARKED CAUTION	61439	ORDER BY DESC
-72	119-2600-00	B010100	B040471	1	FAN,TUBEAXIAL:12V,5.9W,3000 RPM,78 CFM	06812	A31396-10
	119-2600-01	B040472		1	FAN,TUBEAXIAL:12V,3.9W,2500RPM,83CFM	TK2421	DA 121225 HB W
					(ATTACHING PARTS)		
-73	210-0457-00			4	NUT,PL,ASSEM WA:6-32 X 0.312,STL	TK0435	ORDER BY DESC
					(END ATTACHING PARTS)		
-74	378-0311-00			1	SCREEN,FAN:4.8 X 4.8	80009	ORDER BY DESC
-75	211-0711-00			1	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15	0KB01	ORDER BY DESC
					(ATTACHES REAR PNL GND WIRE)		
-76	119-2610-00	B010100	B040471	1	FAN,TUBEAXIAL:12VDC,3.5W,3100 RPM,37 CFM	67088	BETA SL A31393
	119-2610-02	B040472		1	FAN,TUBEAXIAL:12V,3.0W,3300RPM,48CFM,92MM	TK2421	MDA 120925HB
					(ATTACHING PARTS)		
-77	210-0457-00			3	NUT,PL,ASSEM WA:6-32 X 0.312,STL	TK0435	ORDER BY DESC
					(END ATTACHING PARTS)		
-78	378-0310-00			1	SCREEN,FAN:3.65 X 3.65	80009	378031000
-79	386-5496-01	B010100	B041173	1	SUBPANEL,REAR:	TK1916	ORDER BY DESC
	386-5496-03	B041174		1	SUBPANEL,REAR:FINISHED,DSA601	TK1916	ORDER BY DESC
					(ATTACHING PARTS)		
-80	211-0725-00			8	SCREW,MACHINE:6-32 X 0.375,FLH	01536	ORDER BY DESC
					(END ATTACHING PARTS)		
-81	386-5503-00			1	PLATE,REAR:POWER SUPPLY,ALUMINUM	80009	ORDER BY DESC
					(ATTACHING PARTS)		
-82	211-0721-00			10	SCREW,MACHINE:6-32 X 0.375,PNH,STL	0KB01	ORDER BY DESC
-83	211-0730-00			4	SCR,ASSEM WSHR:6-32 X 0.375,PNH,STL,T15	0KB01	ORDER BY DESC
					(END ATTACHING PARTS)		
-84	351-0791-00			2	GUIDE,PWR SPLY:POLYCARBONATE	TK1163	ORDER BY DESC
-85	610-0754-01	B010100	B040427	1	CHASSIS ASSY:ALUMINUM	80009	610-0754-01
	610-0754-02	B040428		1	CHASSIS ASSY:	0J260	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -1	670-9818-00	B010100	B041009	1	CIRCUIT BD ASSY:CRT DRIVER	80009	670981800
	670-9818-01	B041010	B041380	1	CIRCUIT BD ASSY:CRT DRIVER	80009	670981801
	670-9818-02	B041381		1	CIRCUIT BD ASSY:CRT DRIVER (SEE A24, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670981802
-2	211-0409-00			11	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10 (END ATTACHING PARTS) CRT DRIVER BOARD ASSY INCLUDES:	93907	829-06888-024
-3	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-4	670-9687-00	B010100	B040379	1	CIRCUIT BD ASSY:REGULATOR	80009	670968700
	670-9687-01	B040380		1	CIRCUIT BD ASSY:REGULATOR (SEE A4, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670968701
-5	211-0720-00			3	SCR,ASSEM WSHR:6-32 X 0.50,PNH,STL,T15	0KB01	ORDER BY DESC
-6	211-0738-00			1	SCREW,MACHINE:6-32 X 0.625,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESC
-7	343-0089-00			1	CLAMP,CABLE:0.3 DIA,PLASTIC	80009	343008900
-8	670-9815-00			1	CIRCUIT BD ASSY:PLUG-IN INTERFACE (SEE A1, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670981500
-9	211-0409-00			9	SCR,ASSEM WSHR:4-40 X 0.312,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06888-024
-10	670-9823-00			1	CIRCUIT BD ASSY:CALIBRATOR (SEE A5, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982300
-11	211-0408-00			6	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10	93907	829-06815-024
-12	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS) CALIBRATOR BOARD ASSEMBLY INCLUDES:	TK0435	ORDER BY DESC
	160-4797-00			1	.MICROCKT,DGTL:MICROCONT,4K BYTES (U510)	80009	160479700
-13	670-9813-00			1	CIRCUIT BD ASSY:FRONT PANEL CONTROL (SEE A10, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670981300
-14	211-0408-00			2	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-15	670-9826-00			1	CIRCUIT BD ASSY:GEOMETRY (SEE A26, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982600
-16	211-0408-00			2	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
-17	670-8851-00			1	CIRCUIT BD ASSY:MOTHER (SEE A13, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670885100
-18	211-0711-00			6	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-19	670-9828-00			1	CIRCUIT BD ASSY:MINI MOTHER (SEE A21, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982800
-20	211-0711-00			3	SCR,ASSEM WSHR:6-32 X 0.25,PNH,STL,T15 (END ATTACHING PARTS)	0KB01	ORDER BY DESC
-21	670-9819-00			1	CIRCUIT BD ASSY:DIGITIZER CPU (SEE A19, EXCHANGE ITEM)	80009	670981900
-22	670-9820-00			1	CIRCUIT BD ASSY:DIGITIZER I/O (SEE A20, EXCHANGE ITEM)	80009	670982000
-23	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-24	670-8854-01			1	CIRCUIT BD ASSY:INPUT/OUTPUT (SEE A14, EXCHANGE ITEM)	80009	670885401
-25	159-0245-00			4	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-26	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM	61058	BR-2/3A-E2P

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -27	671-0851-00	B010100	B010279	1	CIRCUIT BD ASSY:MAIN PROCESSOR	80009	671085100
	671-0851-01	B010280	B040584	1	CIRCUIT BD ASSY:MAIN PROCESSOR	80009	671085101
-	671-0851-02	B040585	B041270	1	CIRCUIT BD ASSY:MAIN PROCESSOR	80009	671085102
	671-2116-00	B041271		1	CIRCUIT BD ASSY:MAIN PROCESSOR (SEE A17, EXCHANGE ITEM)	80009	671211600
-28	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM	61058	BR-2/3A-E2P
-29	671-0385-00			1	CIRCUIT BD ASSY:BB MEMORY (SEE A18, EXCHANGE ITEM)	80009	671038500
	671-0385-50			1	CIRCUIT BD ASSY:BB MEMORY (SEE A18 OPT 4C, EXCHANGE ITEM)	80009	671038550
-30	146-0055-00			1	.BATTERY,DRY:3.0V,1200 MAH,LITHIUM (OPTION 4C ONLY)	61058	BR-2/3A-E2P
-31	671-0852-00			1	CIRCUIT BD ASSY:MEMORY MGT UNIT (SEE A15, EXCHANGE ITEM)	80009	671085200
-32	671-0879-00			1	CIRCUIT BD ASSY:DISPLAY CONTROLLER (SEE A16, EXCHANGE ITEM)	80009	671087900
-33	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-34	670-9831-00	B010100	B040769	1	CIRCUIT BD ASSY:WAVEFORM PROCESSOR	80009	670983100
	670-9831-01	B040770		1	CIRCUIT BD ASSY:WAVEFORM PROCESSOR; (SEE A8, EXCHANGE ITEM)	80009	670983101
	670-9827-00			1	CIRCUIT BD ASSY:SIGNAL PROCESSOR (SEE A8 OPT 3C, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982700
-35	211-0408-00			11	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
					SIGNAL PROCESSOR BD ASSY INCLUDES:		
-36	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-37	159-0245-00			1	.FUSE,WIRE LEAD:1A,125V,FAST	75915	R251001T1
-38	670-9822-00			1	CIRCUIT BD ASSY:UPPER ACQUISITION (SEE A7, EXCHANGE ITEM) (ATTACHING PARTS)	80009	70982200
-39	211-0408-00			21	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
					UPPER ACQUISITION BD ASSY INCLUDES:		
-40	159-0203-00			1	.FUSE,CARTRIDGE:2A,125V,FAST,SUBMINIATURE	61857	SPI-2A
-41	165-2078-00			2	.MICROCKT,HYBRID:TIME INTERPOLATOR (ATTACHING PARTS)	80009	165207800
-42	210-0586-00			8	.NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-43	214-3965-00			6	.HEAT SINK,ELEC:DEMUX,ALUMINUM (ATTACHING PARTS)	TK1465	ORDER BY DESC
-44	214-4034-00			12	.SPRING,HLCPS:0.24 OD X 0.44 L,SST (END ATTACHING PARTS)	8X345	ORDER BY DESC
-45	155-0328-00	B010100	B010393	1	.MICROCKT,DGTL:CLOCK DRIVER	80009	155032800
	155-0328-01	B010394		1	.IC,ASIC:BIPOLAR,DIGITAL,CLOCK DRIVER	80009	155032801
	155-0340-00	B010100	B010393	1	.MICROCKT,DGTL:SWEEP CONT IN 100 PIN	80009	155034000
	155-0340-00	B010394		1	.MICROCKT,DGTL:SWEEP CONT IN 100 PIN	80009	155034000
	155-0341-00			4	.MICROCKT,DGTL:DEMUX IN 100 PIN QUAD	80009	155034100
-46	119-3690-00			2	.HYPCON ASSY:44 CONTACT,STEP MOUNT (ATTACHING PARTS)	TK2338	ORDER BY DESC
-47	211-0391-00			8	.SCREW,MACHINE:2-56 X 0.437,P4,STL,T-8 (END ATTACHING PARTS)	83486	ORDER BY DESC
-48	214-4188-00			1	.HEAT SINK,ELEC:TRIGGER IC,ALUMINUM	TK1465	ORDER BY DESC
-49	220-0797-00			4	.NUT,CAPTIVE:2-56 X 0.218 DIA,STL	46384	CKF2-256
-50	165-2161-00			2	.MICROCKT,DGTL:TRIGGER,H2161	80009	165216100
-51	159-0203-00			1	.FUSE,CARTRIDGE:2A,125V,FAST,SUBMINIATURE	61857	SPI-2A
-52	670-9821-00	B010100	B030406	1	CIRCUIT BD ASSY:LOWER ACQUISITION	80009	670982100
	670-9821-01	B030407	B040471	1	CIRCUIT BD ASSY:LOWER ACQUISITION	80009	670982101
	670-9821-02	B040472		1	CIRCUIT BD ASSY:LOWER ACQUISITION (SEE A6, EXCHANGE ITEM) (ATTACHING PARTS)	80009	670982102

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
3 -53	211-0408-00			18	SCR,ASSEM WSHR:4-40 X 0.250,PNH,STL,T10 (END ATTACHING PARTS)	93907	829-06815-024
					LOWER ACQUISITION BD ASSY INCLUDES:		
-54	214-3964-00			8	.HEAT SINK,ELEC:S/H FLASH,ALUMINUM (ATTACHING PARTS)	TK1465	ORDER BY DESC
-55	214-4034-00			16	.SPRING,HLCPS:0.24 OD X 0.44 L,SST (END ATTACHING PARTS)	8X345	ORDER BY DESC
-56	155-0359-00	B010100	B010393	4	.MICROCKT,LINEAR:A.D PACKAGED HYBRID	80009	155035900
	155-0342-00	B010394		4	.MICROCKT,DGTL:UTILITY CIRCUIT IN 100 PIN	80009	155034200
	155-0342-01			4	.IC,ASIC:BIPOLAR,DIGITAL,UTILITY CIRCUIT (ATTACHING PARTS)	80009	155034201
-57	211-0411-00			16	.SCR,ASSEM WSHR:4-40 X 0.5,PNH,ST,T10 (END ATTACHING PARTS)	93907	ORDER BY DESC
-58	343-1307-00			4	.RTNR,MICROCKT:2.2 X 1.3 X 0.27,POLYCARB	0KBZ5	ORDER BY DESC
-59	214-3965-00			4	.HEAT SINK,ELEC:DEMUX,ALUMINUM (ATTACHING PARTS)	TK1465	ORDER BY DESC
-60	214-4034-00			8	.SPRING,HLCPS:0.24 OD X 0.44 L,SST (END ATTACHING PARTS)	8X345	ORDER BY DESC
-61	155-0341-00	B010100	B010393	4	.MICROCKT,DGTL:DEMULTIPLEXER IN 100 PIN	80009	155034100
	155-0341-01	B010394		4	.IC,ASIC:BIPOLAR,DIGITAL,DEMULTIPLEXER	80009	155034101
	020-1775-00	B010100	B020395	1	COMPONENT KIT:FIRMWARE	80009	020177500
	020-1775-01	B020396	B040175	1	COMPONENT KIT:FIRMWARE VER1.2	80009	020177501
	020-1775-02	B040176	B040835	1	COMPONENT KIT:FIRMWARE VER1.3	80009	020177502
	020-1775-03	B040836		1	COMPONENT KIT:FIRMWARE VER1.3	80009	020177503
					WIRE ASSEMBLIES		
	174-0801-01			1	CABLE ASSY,RF:8,50 OHM COAX,17.0 L (FROM A1J1 TO A6J2),(FROM A1J3 TO A6J4) (FROM A1J5 TO A6J6),(FROM A1J9 TO A6J10)	TK2469	ORDER BY DESC
	174-0802-01			1	CABLE ASSY,RF:4,50 OHM COAX,33.15 L (FROM A1J7 TO A7J8),(FROM A1J11 TO A7J12)	TK2469	ORDER BY DESC
	174-0884-00	B010100	B041384	1	CA ASSY,SP,ELEC:40,28 AWG,11.5 L,RIBBON	TK1547	ORDER BY DESC
	174-0884-01	B041385		1	CA ASSY,SP,ELEC:40,28 AWG,11.5 L,RIBBON (FROM A5J29 TO A6J29)	TK1547	ORDER BY DESC
	174-0885-00	B010100	B041384	1	CA ASSY,SP,ELEC:50,28 AWG,6.0 L,RIBBON	TK1547	ORDER BY DESC
	174-0885-01	B041385		1	CA ASSY,SP,ELEC:50,28 AWG,6.0 L,RIBBON (FROM A15J83 TO A20J83)	TK1547	ORDER BY DESC
	174-0886-00			2	CA ASSY,SP,ELEC:50,28 AWG,41.5 L,RIBBON (FROM A19J47 TO A8J47, STANDARD ONLY) (FROM A19J48 TO A8J48, STANDARD ONLY)	TK1547	ORDER BY DESC
	174-1236-00	B010100	B041384	2	CA ASSY,SP,ELEC:20,28 AWG,25.0 L,RIBBON	TK1547	ORDER BY DESC
	174-1236-01	B041385		2	CA ASSY,SP,ELEC:20,28 AWG,25.0 L,RIBBON (FROM A19J47 TO A8J47, OPTION 3C ONLY) (FROM A19J48 TO A8J48, OPTION 3C ONLY)	TK1547	ORDER BY DESC
	174-0888-00	B010100	B041384	1	CA ASSY,SP,ELEC:50,28 AWG,15.25 L,RIBBON	TK1547	ORDER BY DESC
	174-0888-01	B041385		1	CA ASSY,SP,ELEC:50,28 AWG,15.25 L,RIBBON (FROM A20J28 TO A5J28)	TK1547	ORDER BY DESC
	174-0889-00	B010100	B041384	1	CA ASSY,SP,ELEC:34,28 AWG,7.5 L,RIBBON	TK1547	ORDER BY DESC
	174-0889-01	B041385		1	CA ASSY,SP,ELEC:34,28 AWG,7.5 L,RIBBON (FROM A10J73 TO A9A1J73)	TK1547	ORDER BY DESC
	174-1113-00			1	CA ASSY,SP,ELEC:40,28 AWG,6.0 L,RIBBON (FROM A14J78 TO A12J78)	TK1547	ORDER BY DESC
	174-1126-00			1	CA ASSY,SP,ELEC:4,26 AWG,16.125 L (CRT HARNESS, FROM CRT TO CRT DRIVER BD)	0J7N9	ORDER BY DESC
	174-1132-00			1	CA ASSY,SP,ELEC:26 AWG,8.5 L,RIBBON (FROM A1J92 TO A5J92)	0J7N9	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
	174-1133-00	B010100	B041263	1	CA ASSY,SP,ELEC:26 AWG,17.0 L,RIBBON (FROM A7J91 TO A1J91)	0J7N9	ORDER BY DESC
	174-1134-00			1	CA ASSY,SP,ELEC:18 AWG,17.5 L,RIBBON (FROM A4J94 TO A24J94)	TK1967	ORDER BY DESC
	343-0549-00			1	STRAP,TIEDOWN,E:0.098 W X 4.0 L,ZYTEL	TK1499	HW-047
	174-1135-00			1	CA ASSY,SP,ELEC:18 AWG,17.5 L,RIBBON (FROM A4J96 TO A24J96)	0J7N9	ORDER BY DESC
	174-1136-00			1	CA ASSY,SP,ELEC:26 AWG,8.0 L,RIBBON (FROM A24J35 TO A27J35)	0J7N9	ORDER BY DESC
	174-1140-00	B010100	B041263	1	CA ASSY,SP,ELEC:POWER HARNESS	TK1967	ORDER BY DESC
	174-1140-02	B041264		1	CA ASSY,SP,ELEC:POWER (MAIN POWER HARNESS)	TK1967	ORDER BY DESC
	343-0549-00			2	STRAP,TIEDOWN,E:0.098 W X 4.0 L,ZYTEL	TK1499	HW-047
	174-1141-00	B010100	B040471	1	CA ASSY,SP,ELEC:4,18 AWG,28.5 L	0J7N9	ORDER BY DESC
	174-1141-04	B040472		1	CA ASSY,SP,ELEC:4,18 AWG,18.0 L1 (CARD CAGE HARNESS)	TK1967	ORDER BY DESC
	343-0549-00			1	STRAP,TIEDOWN,E:0.098 W X 4.0 L,ZYTEL	TK1499	HW-047
	174-1246-00			1	CA ASSY,SP,ELEC:4,26 AWG,14.5 L,RIBBON (FROM A27J36 TO A24J36)	TK1967	ORDER BY DESC
	174-1247-00			1	CA ASSY,SP,ELEC:11,26 AWG,14.5 L,RIBBON (FROM A26J33,J34 TO A24J33,J34)	TK1967	ORDER BY DESC
	174-1393-00			1	CABLE,SP,ELEC:20,28 AWG,9.5 L,STRD/VINYL (FROM A24J53 TO A16J53)	TK1547	ORDER BY DESC
	174-1394-00			1	CABLE,SP,ELEC:26,28 AWG,19.5 L,STRD/VINYL (FROM A24J54 TO A16J54)	TK1547	ORDER BY DESC
	175-9809-00			1	CA ASSY,SP,ELEC:50,3.0 L (FROM A15J79 TO A16J79)	TK1547	ORDER BY DESC
	175-9814-00			1	CA ASSY,SP,ELEC:34,3.0 L (FROM A14J77 TO A17J77)	TK1547	ORDER BY DESC
	175-9854-00	B010100	B041284	1	CA ASSY,SP,ELEC:36,28 AWG,7.0 L	TK1547	ORDER BY DESC
	175-9854-01	B041285		1	CA ASSY,SP,ELEC:36,28 AWG,7.0 L (FROM A14J72 TO A10J72)	TK1547	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
4 -1	620-0033-00	B010100	B040471	1	POWER SUPPLY:LBT MAINFRAME	80009	620003300
	620-0033-01	B040472		1	POWER SUPPLY:LBT MAINFRAME (SEE A2, EXCHANGE ITEM)	80009	620003301
-2	214-4082-00			2	.PIN,GUIDE:0.850 L,METAL	80009	ORDER BY DESC
-3	200-2264-00			1	.CAP,FUSEHOLDER:3AG FUSES	S3629	FEK 031 1666
	204-0832-00			1	.BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES	S3629	031 1673
	119-2610-00	B010100	B040471	1	.FAN,TUBEAXIAL:12VDC,3.5W,3100 RPM,37 CFM	67088	BETA SL A31393
	119-2610-01	B040472		1	.FAN,TUBEAXIAL:12V,3.0W,3300RPM,48CFM	TK2421	MDA 120925HB
-4	159-0088-00			1	.FUSE,CARTRIDGE:3AG,12A,250V,6 SEC,CER	75915	314012
	159-0017-00			1	.FUSE,CARTRIDGE:3AG,4A,250V,FAST BLOW (F520, PART OF LINE INVERTER BOARD)	75915	312 004
	159-0248-00			1	.FUSE,WIRE LEAD:1.5 A,AXIAL LEAD (F130, PART OF LINE INVERTER BOARD)	75915	R25101.5 T1
	159-0220-00			1	.FUSE,WIRE LEAD:3A,125V,FAST (F450, PART OF CONTROL RECTIFIER BOARD)	61857	SP5-3A
					POWER SUPPLY WIRE ASSEMBLIES		
	174-0892-00	B010100	B040471	1	CA ASSY,SP,ELEC:3,22 AWG,10.0 L,RIBBON (FROM A2A2J80,J81,J82 TO FANS)	TK1967	ORDER BY DESC
	174-1128-00			1	CA ASSY,SP,ELEC:18 AWG,3.5 L,RIBBON (FROM A2A2J61 TO A4J61)	TK1967	ORDER BY DESC
	174-1129-00			1	CA ASSY,SP,ELEC:18 AWG,4.0 L,RIBBON (FROM A2A2J62 TO A4J62)	TK1967	ORDER BY DESC
	174-1130-00			1	CA ASSY,SP,ELEC:26 AWG,3.5 L,RIBBON (FROM A2A2J65 TO A4J65)	0J7N9	ORDER BY DESC
	175-9933-00			1	CA ASSY,SP,ELEC:20,28 AWG,5.15 L,RIBBON (FROM A2A1J70 TO A2A2J70)	TK1547	ORDER BY DESC
	196-3071-00			1	LEAD,ELECTRICAL:18 AWG,4.0 L,5-4 (GND WIRE, FROM LINE FILTER TO CHASSIS)	TK1967	ORDER BY DESC
	196-3072-00			1	LEAD,ELECTRICAL:18 AWG,2.0 L,9-N (FROM LINE FILTER TO FUSE HOLDER)	TK2469	ORDER BY DESC
	196-3074-00			1	LEAD,ELECTRICAL:18 AWG,12.0 L,5-4 (GND WIRE, FROM PWR SPLY TO CHASSIS)	TK1967	ORDER BY DESC
	196-3075-00			2	LEAD,ELECTRICAL:18 AWG,2.0 L,9-N (FROM A2A1W100 TO FUSE HOLDER) (FROM A2A1W110 TO LINE FILTER)	TK1967	ORDER BY DESC

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
5 -0							
					OPTION 1C		
-1	386-5502-00			1	PLATE,CONN MTG:OPTIONAL,ALUMINUM	80009	ORDER BY DESC
-2	333-3415-01			1	PANEL,FRONT:DSA601,LOWER	TK2072	ORDER BY DESC
-3	131-1315-01			16	CONN,RF JACK::BNC/PNL,;50 OHM,FEM (FRONT AND REAR)	24931	28JR306-1
	012-0208-00			8	CABLE,INTCON:10.0 L	TK2156	ORDER BY DESC
	174-1139-00			2	CABLE ASSY,RF:4,500 OHM,33.0 L	TK2469	ORDER BY DESC
					OPTION 3C		
-4	386-5503-00			1	PLATE,REAR:POWER SUPPLY,ALUMINUM (SAME AS STANDARD PWR SPLY REAR PLATE EXCEPT REMOVE CONN OPENING COVER.)	80009	ORDER BY DESC
-5	174-0895-00			1	CA ASSY,SP,ELEC:2,22 AWG,24.75 L,RIBBON (ATTACHING PARTS)	TK1967	ORDER BY DESC
-6	210-0586-00			4	NUT,PL,ASSEM WA:4-40 X 0.25,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESC
-7	131-4309-00			1	CONN,PLUG,ELEC:CIRCULAR BAYONET LKG	09922	BT06-EC-8-2-P
	670-9827-00			1	CIRCUIT BD ASSY:SIGNAL PROCESSOR (REFER TO FIG.3-34, A8)	80009	670982700

Fig. & Index No.	Tektronix Part No.	Serial No. Effective	Serial No. Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
6 -0							
					STANDARD ACCESSORIES		
-1	161-0066-00			1	CABLE ASSY,PWR,:3,18AWG,115V,98.0 L	0B445	ECM-161-0066-00
-2	161-0066-09			1	CABLE ASSY,PWR,:3,0.75MM SQ,220V,99.0 L (OPTION A1 ONLY)	S3109	86511000
-3	161-0066-10			1	CABLE ASSY,PWR,:THREE 0.75MM SQ,250V,2.5M (OPTION A2 ONLY)	S3109	BS/13-H05VVF3G0
-4	161-0066-11			1	CABLE ASSY,PWR,:3,0.75MM,240V,96.0 L (OPTION A3 ONLY)	S3109	SAA/3-OD3CCFC3X
-5	161-0066-12			1	CABLE ASSY,PWR,:3,18 AWG,250V,99.0 L (OPTION A4 ONLY)	29870	ORDER BY DESC
-6	161-0154-00			1	CABLE ASSY,PWR,:3,1.00MM SQ,250V,10A,2.5M (OPTION A5 ONLY)	S3109	12-H05VVF3G 00
	070-7737-00			1	MANUAL,TECH:QUICK REF,DSA601/DSA602	80009	070773700
	015-0580-00			1	POCKET SIG GEN:TUTORIAL MANUAL AID	80009	015058000
	070-7249-50			1	MANUAL,TECH:TUTORIAL,DSA601/602	80009	070724950
	070-7250-00			1	MANUAL,TECH:USERS REF,DSA601/602	80009	070725000
	070-7251-00			1	MANUAL,TECH:PRGM REF,DSA601/602	80009	070725100
	070-7252-01			1	MANUAL,TECH:COMMAND REF,DSA601/602	80009	070725201
	070-7529-02			1	MANUAL,TECH:INSTRUCTION,DSA600 RAC	80009	070752902
	070-8184-00			1	MANUAL,TECH:SERVICE REF,DSA600 SERIES	80009	070818400
	013-0195-00	B010100	B041031	1	ADAPTER,CONN:BNC TO PROBE	24931	28P264-1
	013-0266-00	B041032	B041031	1	CLIP,TEST:48 PIN FOR DIP (OPTION 1R ONLY)	TK0007	923690-48
					OPTIONAL ACCESSORIES		
	012-0555-00			1	CABLE,INTCON:CENTRONIX,3 METERS LONG	TK1416	DKIT-0034HCZZ
	012-0630-03			1	CABLE,INTCON:2.0M L	74868	C156327-B
	012-0911-00			1	CABLE,INTCON:MOLDED,RS232;10 FT	TK1374	ORDER BY DESC
	016-0829-00			1	PANEL,BLANK:PLUG-IN HOUSING,11K SERIES	80009	016082900
	020-1769-00			1	COMPONENT KIT:QUICKSTART PKG,US,DSA600	80009	020176900
	020-1770-00			1	COMPONENT KIT:QUICKSTART PKG,EURO	80009	020177000

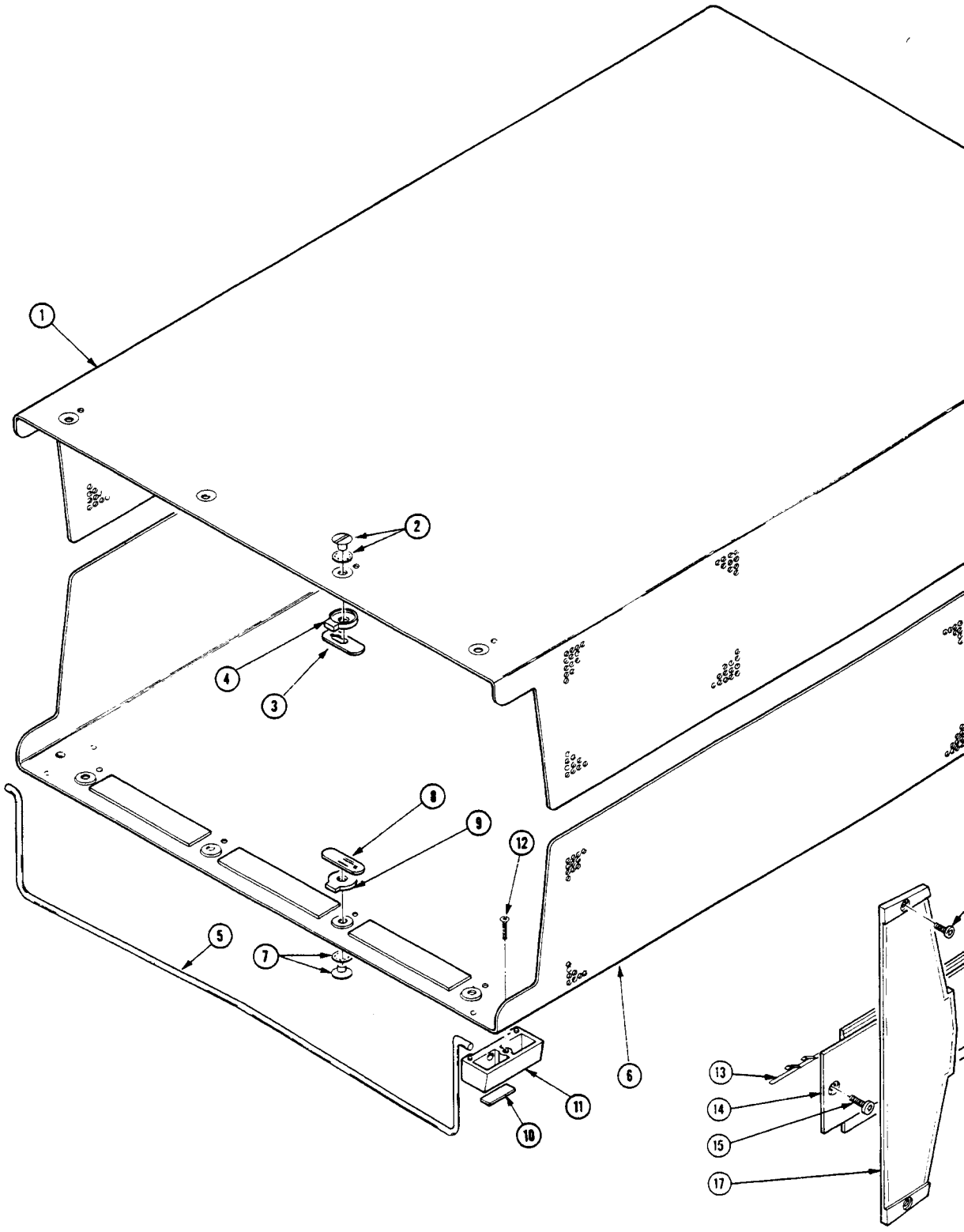

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Fig. 1 Cabinet

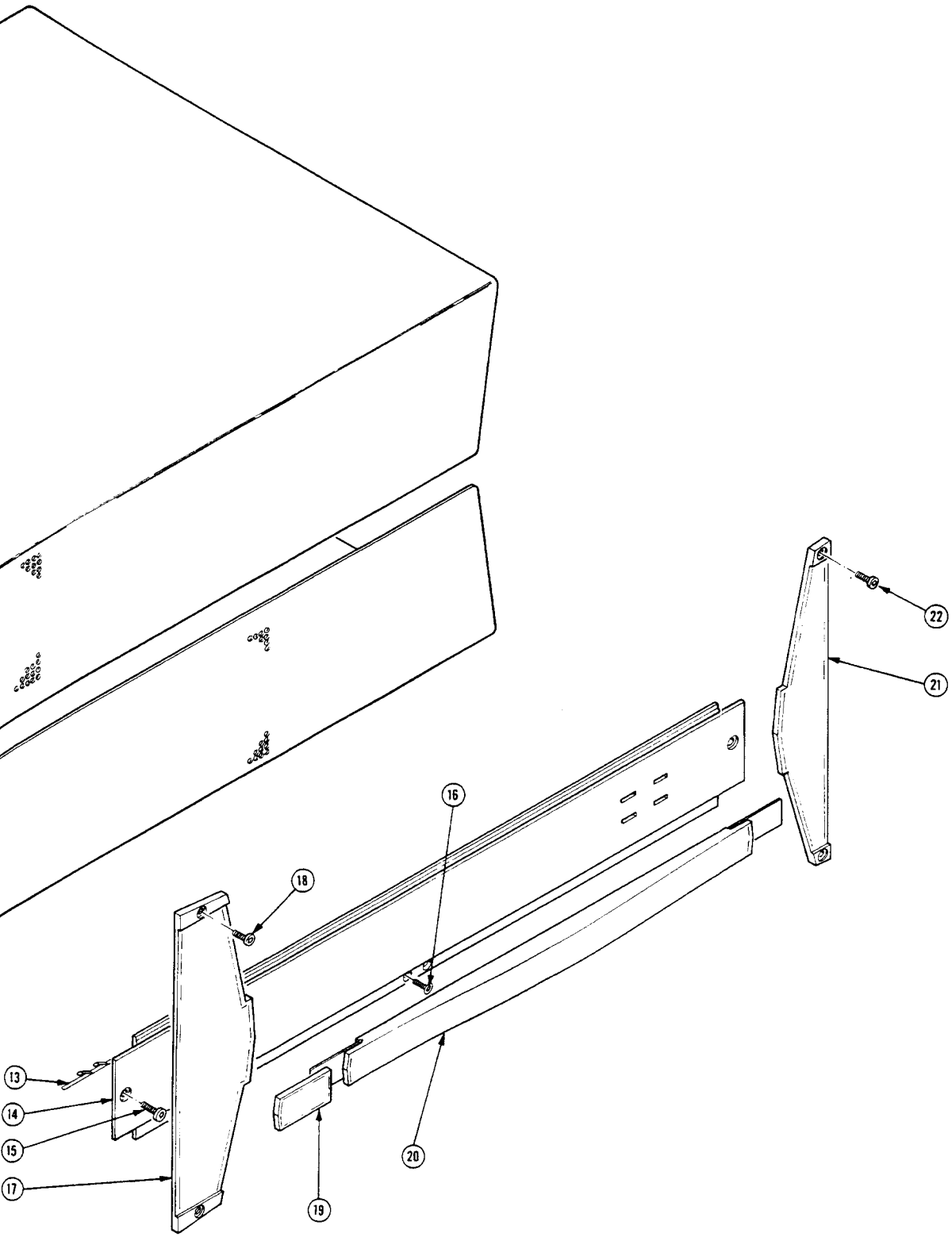
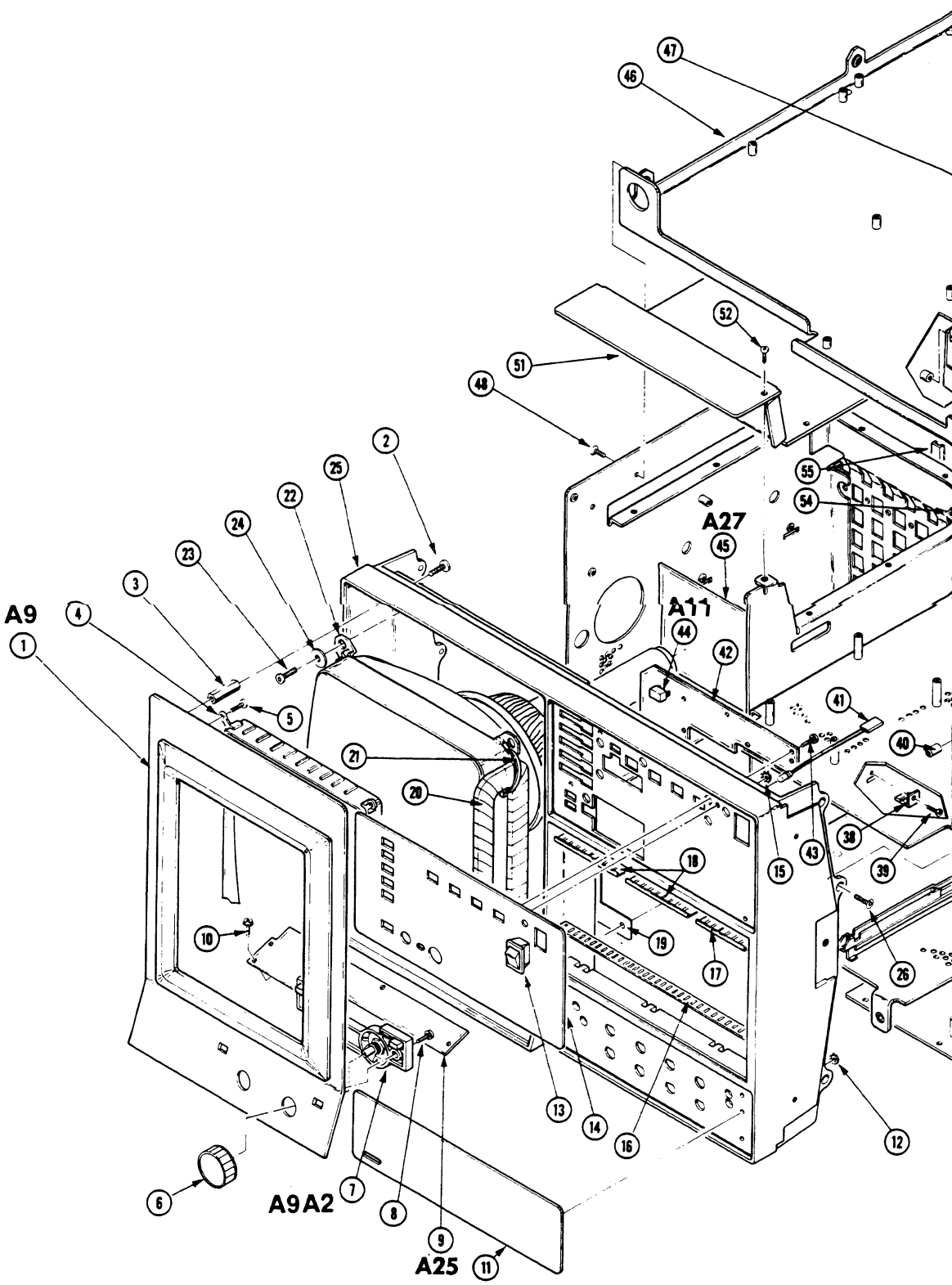
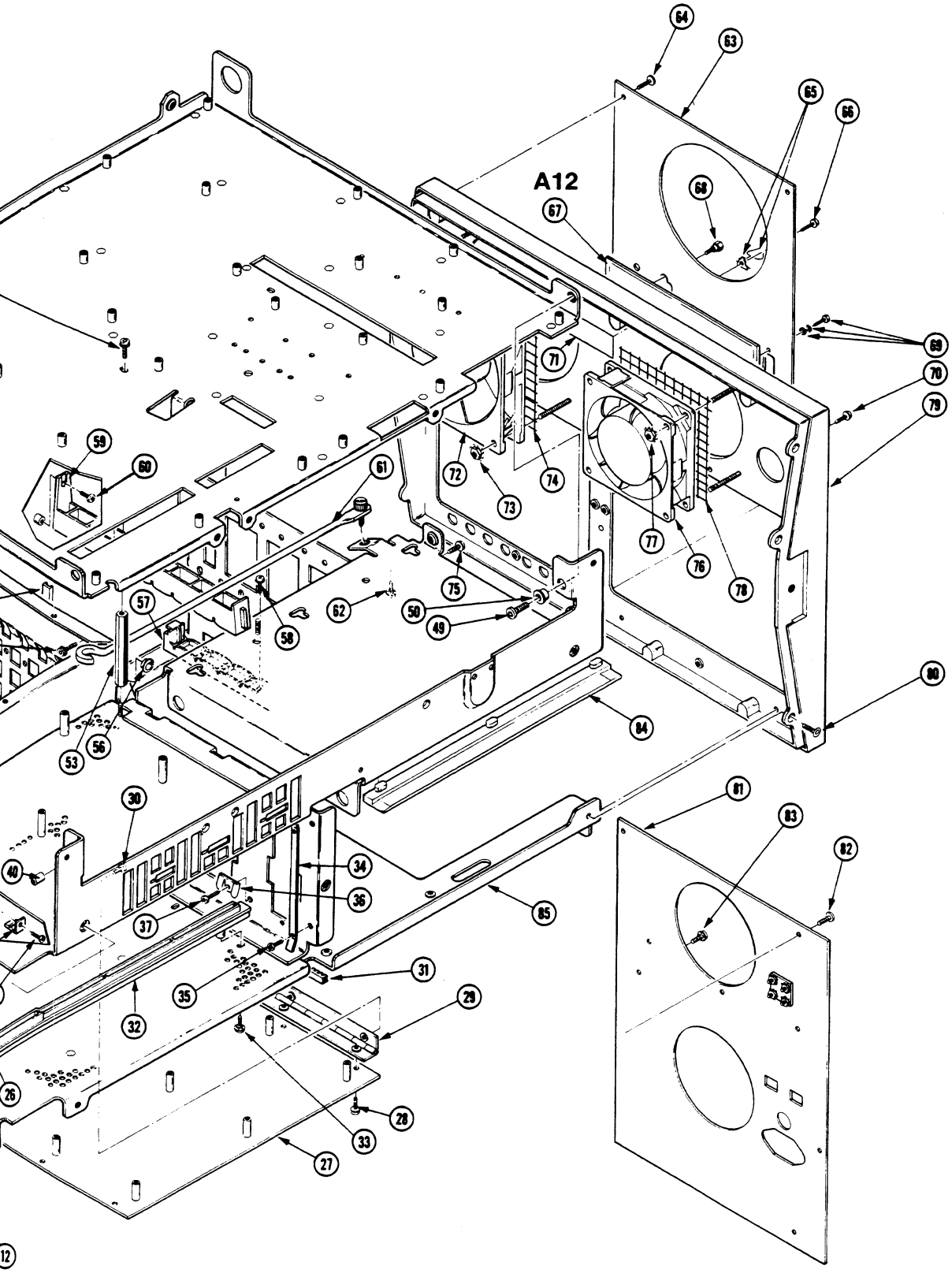


Fig. 2 Front, Chassis, Rear

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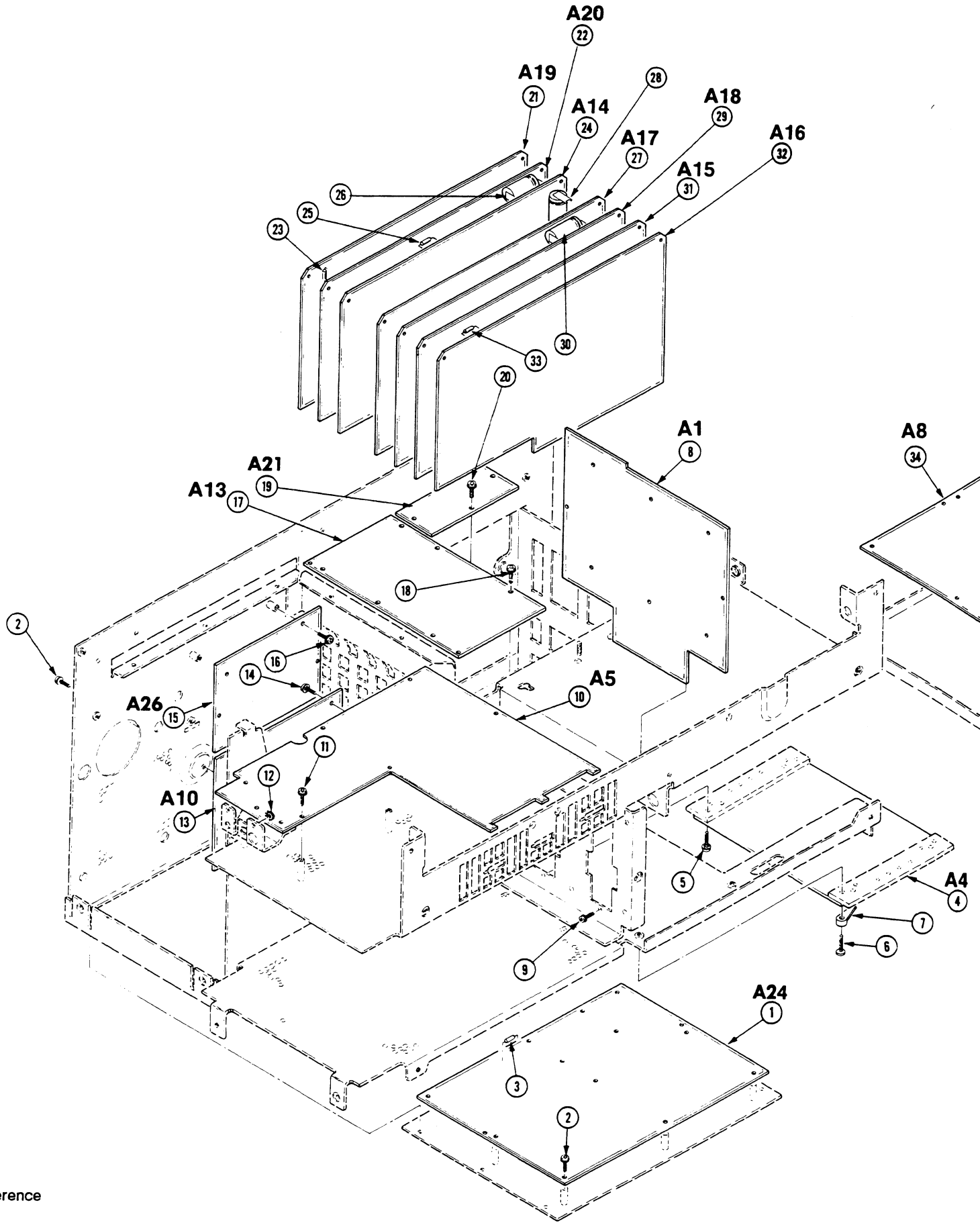
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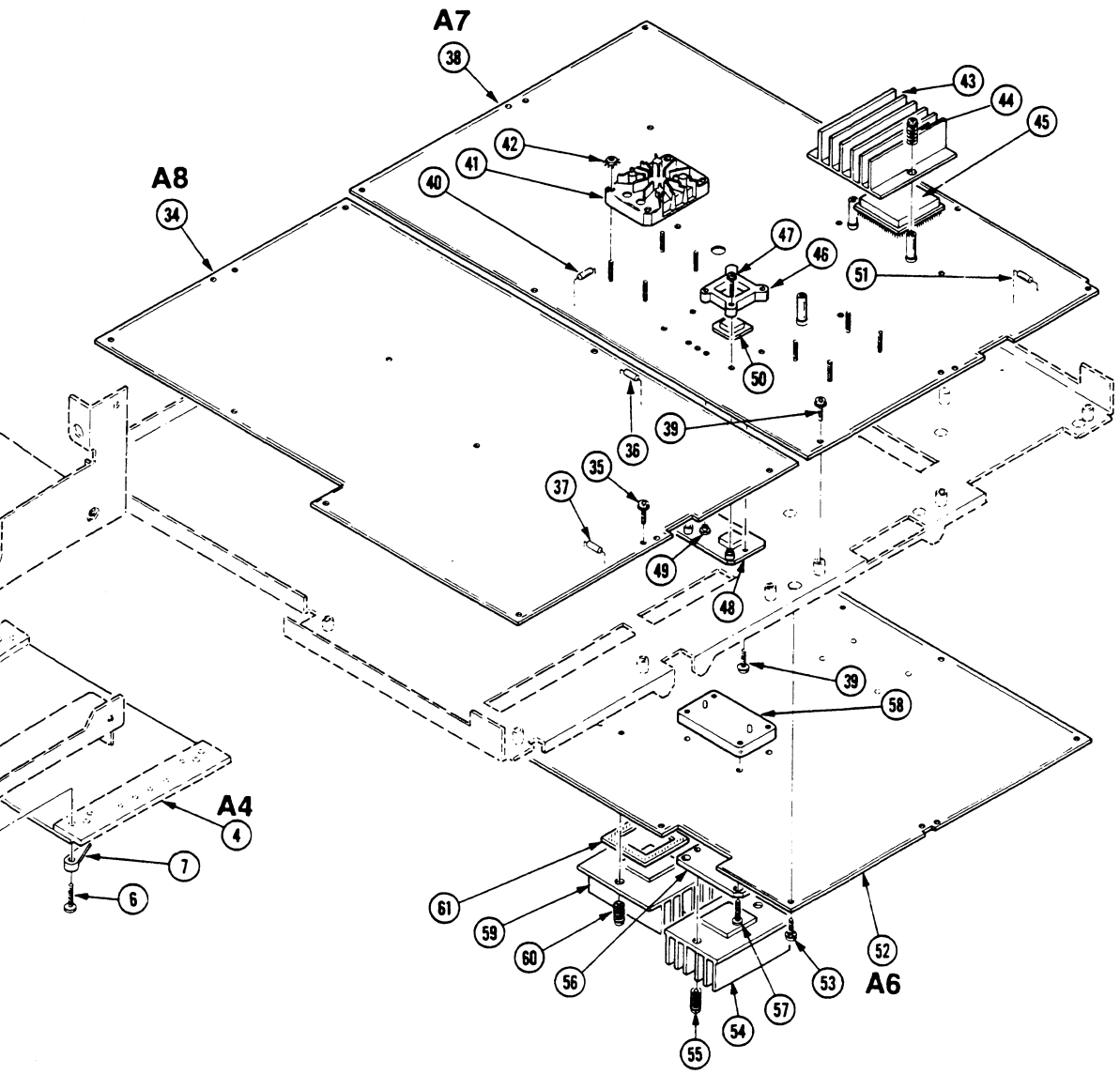
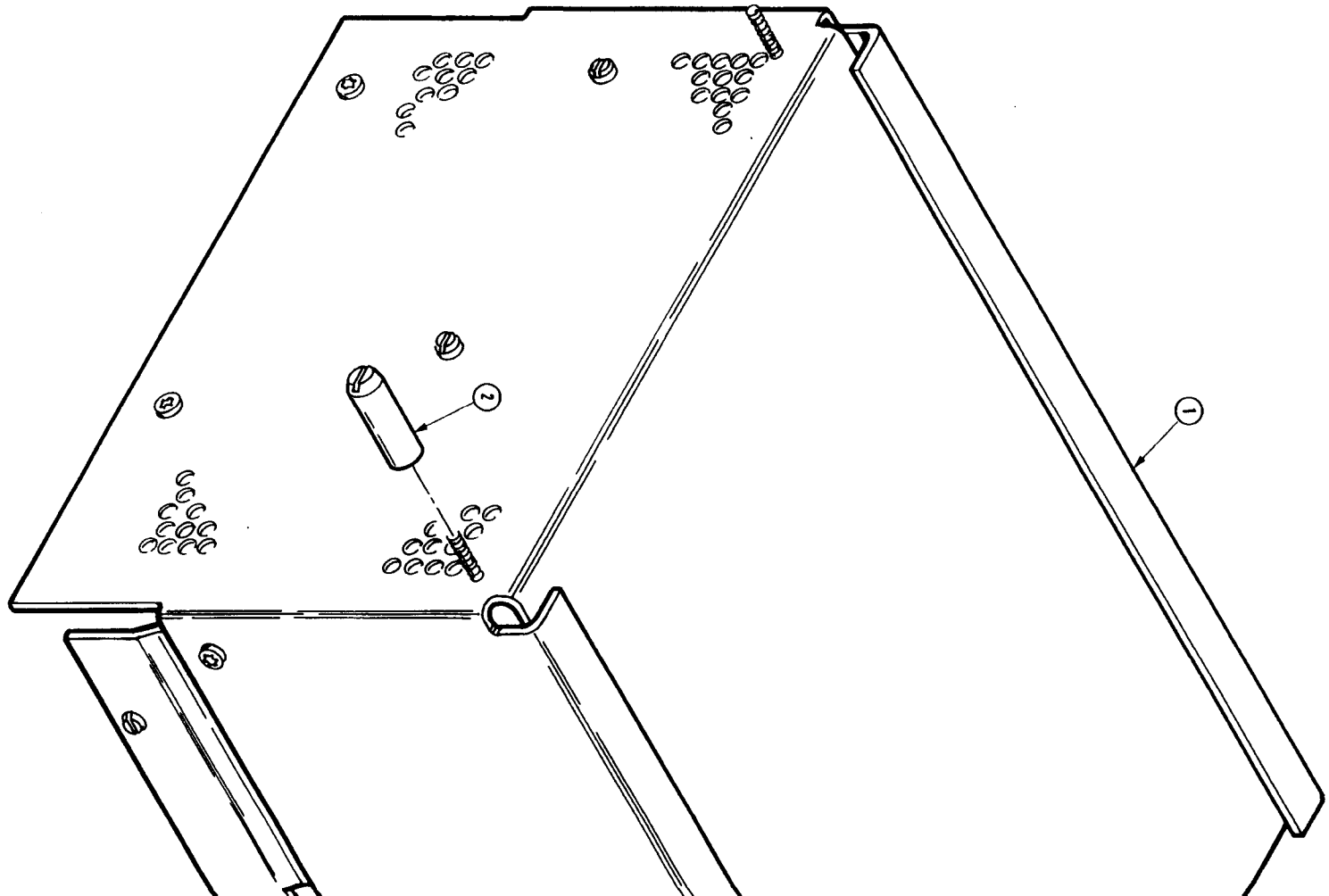
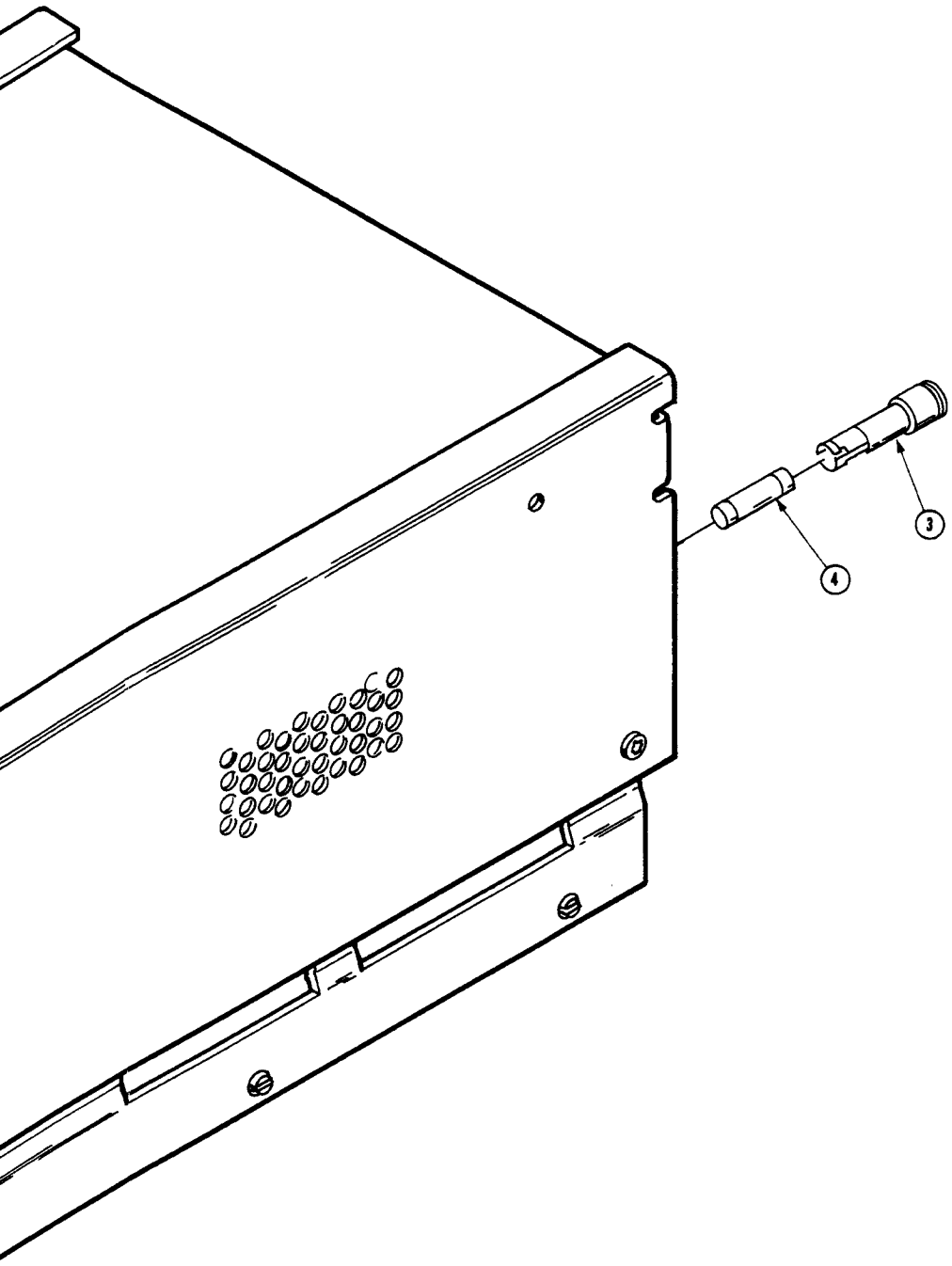


Fig. 3 Circuit Boards

Fig. 4 Power Supply

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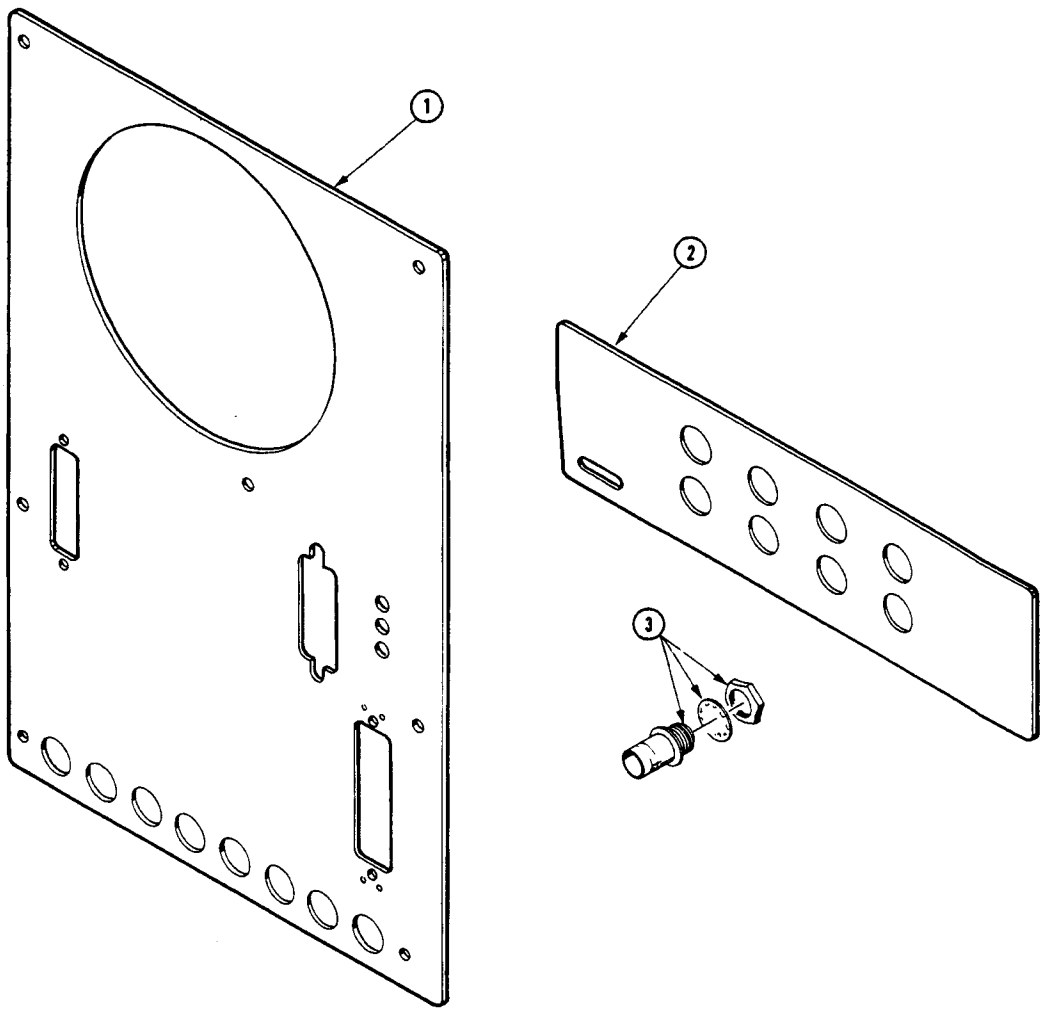
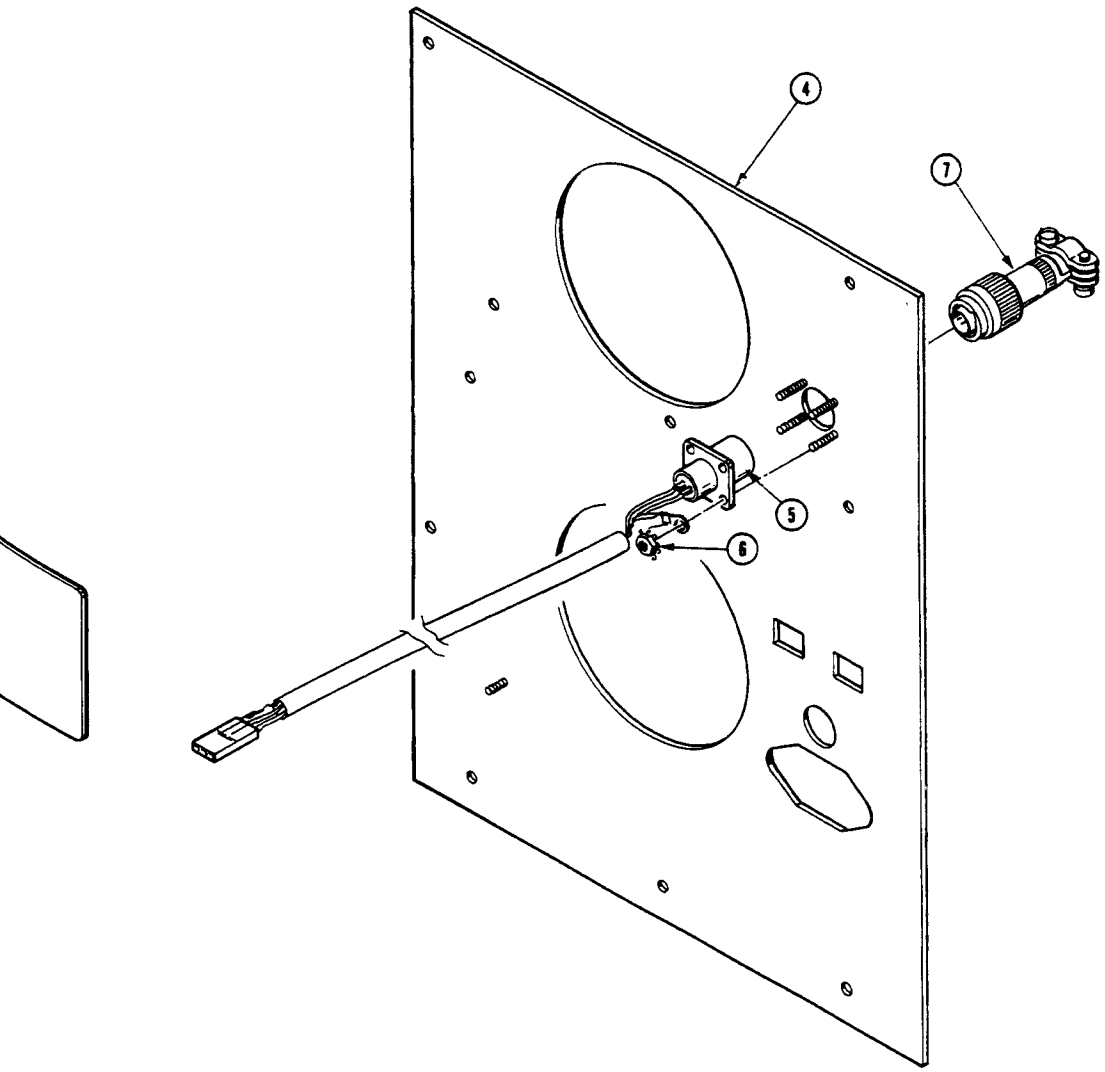


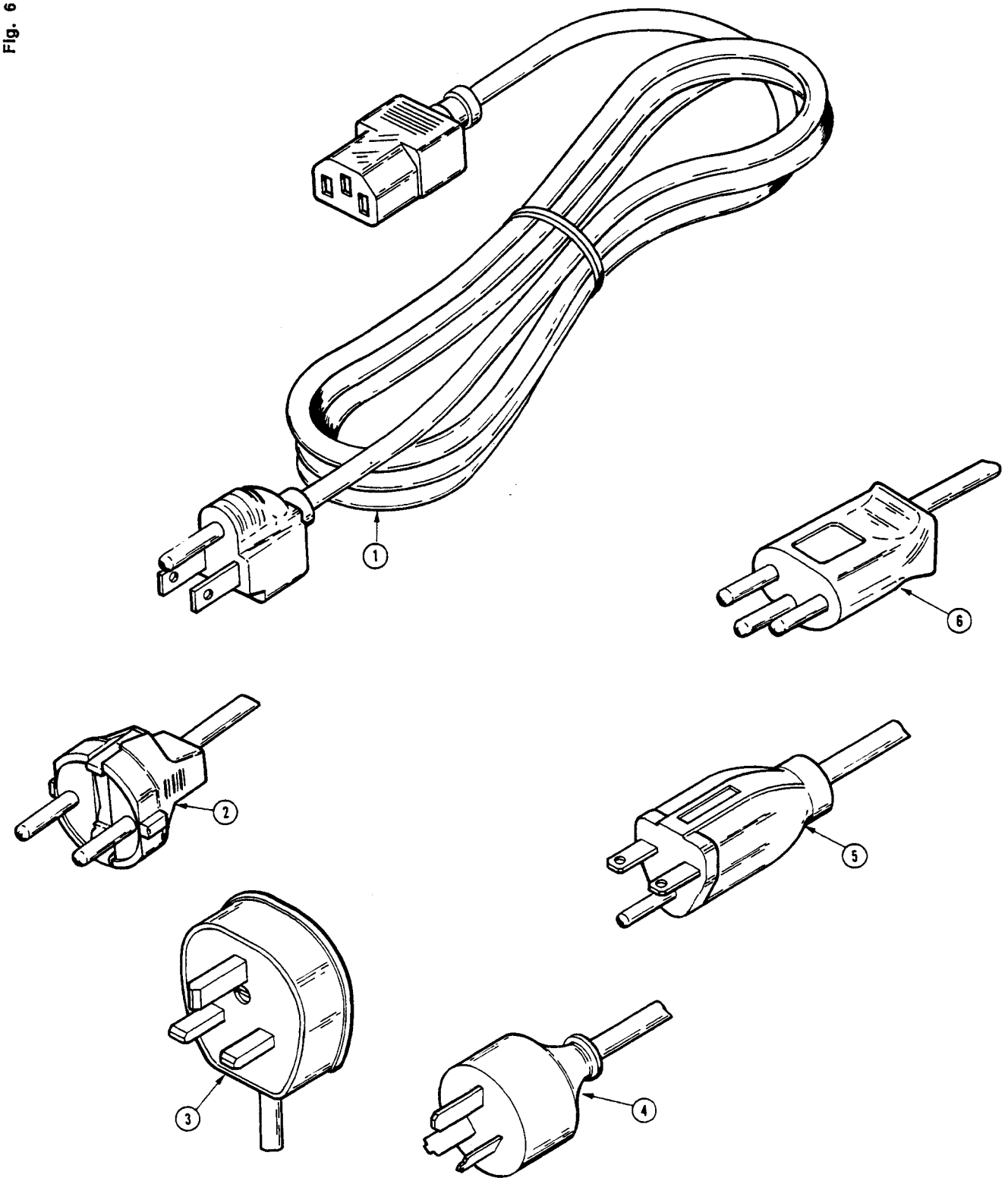
OPTION 1C

Fig. 5 Options



OPTION 3C

Fig. 6 Accessories



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MANUAL CHANGE INFORMATION

Date: 04-NOV-92 Change Reference: C1-1192

Product: DSA 600 SERIES Service Reference Manual Part No.: 070-8184-00

DESCRIPTION Product Group 47

FOR DSA 601 ONLY

The following information should be added to **Checks and Adjustments** section, **Procedure 9 Field Calibration**, page **2-45**, **Step 6: Start the checks and Adjustments Software.**

The Checks and Adjustments software, part number 063-0112-02, contains a bug in one of the files. To correct this problem copy the DSA602.EIS file to the DSA601.EIS file.

Example: `copy A: DSA602.EIS A: DSA601.EIS`

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MANUAL CHANGE INFORMATION

Date: 14-SEP-92 Change Reference: M77477

Product: DSA 600 SERIES Service Reference Manual Part No.: 070-8184-00

DESCRIPTION Product Group 47

EFFECTIVE FOR SERIAL NUMBERS:

DSA 601A: B050262 and above
DSA 602A: B050860 and above

Replaceable Parts List Changes

REMOVE

386-5503-00	PLATE,REAR:POWER SUPPLY,ALUMINUM(ATTACHING PARTS)

ADD

386-5503-01	PLATE,REAR:POWER SUPPLY,ALUMINUM(ATTACHING PARTS)

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