SECTION VI
DIAGRAMS

6-1. INTRODUCTION. This section contains diagrams and associated data for maintaining the instrument. Included are front and rear panel control, connector, and indicator layouts; schematic diagrams with voltages and waveforms, and circuit board layouts with grid chart component locators.

6-2. ARRANGEMENT.

a. Schematic Diagrams. Schematic diagrams are drawn to group circuit functions; therefore, any one diagram may include portions of any number of circuit boards or assemblies. To aid in tracing circuits from one diagram to another, each diagram is identified with a name and a number in a diamond shaped box. Circuits going from one diagram to another identify the destination component and destination diagram number.

b. Symbols and Reference Designators.

(1) Electrical components shown on the diagrams are in the following units unless noted otherwise.

Capacitors	Values one or greater are in picofarads (pF). Values less than one are in microfarads (μF).
Resistors	Ohms (Ω).

(2) Table 6-1 is a partial listing of prefix letters used as reference designators. These are used to identify components or assemblies on the diagrams. A complete listing is contained in MIL STD 16 and also in the ANSI standard.

Table 6-1. Reference Designators

REFERENCE DESIGNATOR	DESCRIPTION	REFERENCE DESIGNATOR	DESCRIPTION
A	Assembly, separable or repairable (circuit board, etc.)	LR	Inductor/resistor combination
AT	Attenuator, fixed or variable	M	Meter
B	Motor	P	Connector, movable portion
BT	Battery	Q	Transistor or silicone-controlled rectifier
C	Capacitor, fixed or variable	R	Resistor, fixed or variable
CB	Circuit breaker	RT	Thermistor
CR	Diode, signal or rectifier	S	Switch or contactor
DL	Delay line	T	Transformer
DS	indicating device (lamp)	TC	Thermocouple
E	Spark Gap, Ferrite bead	TP	Test point
F	Fuse	U	Assembly, inseparable or nonrepairable (integrated circuit, etc.)
FL	Filter	V	Electron tube
H	Heat dissipating device (heat sink, heat radiator, etc.)	VR	Voltage regulator (zener diode, etc.)
		W	Wirestrap or cable
HR	Heater	Y	Crystal
HY	Hybrid circuit	Z	Phase shifter
J	Connector, stationary portion		
K	Relay		
L	Inductor, fixed or variable		

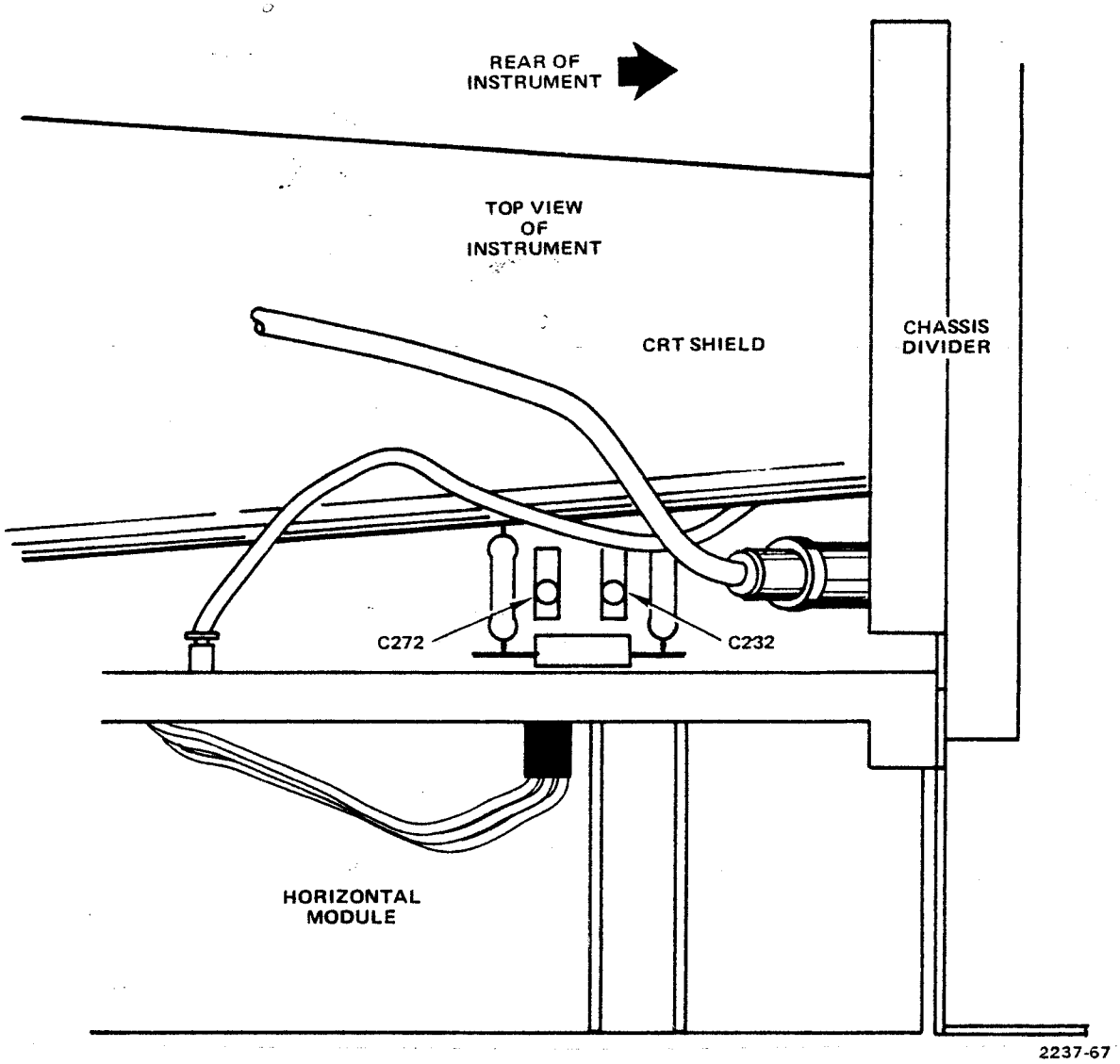


Figure 5-24. 5 nanosecond timing adjustment locations.

(10) Very slightly adjust C2784 so the time marker aligns with the center vertical graticule line.

INTERACTION NOTE

C2784 and C2684 may interact; therefore, repeat this procedure until no further adjustment is needed.

(11) Set DELAY TIME POS to 0.0.

(12) Continue to the next procedure.

t. 5 ns Timing (Figure 5-24).

(1) Set controls as follows:

HORIZ DISPLAY	A
A AND B TIME/DIV	.05 μs
X10 MAG	In (on)

(2) Set time mark generator for 10 nanosecond time markers.

(3) Adjust C232 and C272 for one time marker per two divisions.

INTERACTION NOTE

The adjustment screws for C232 and C272 should be adjusted to about the same height; otherwise horizontal linearity may be degraded.

(4) Check the beginning and end of the .05 microsecond sweep using step 19 in Table 5-1 and excluding the first and last 40 nanoseconds of the sweep. If necessary, slightly readjust C232 and C272 for one time marker per two divisions.

(5) Disconnect the generator.

u. X Gain (Figure 5-22).

(1) Set controls as follows:

CH 1 VOLTS/DIV	5 m
VERT MODE	CH 2
A AND B TIME/DIV	X-Y
X10 MAG	Out (off)

(2) Connect a calibration generator STD AMPL OUTPUT to the CH 1 input through a 50 ohm BNC cable. Set the generator for a 50 millivolt output.

(3) Adjust X GAIN, R2916 for a 10-division (horizontal) display.

(4) Disconnect the generator.

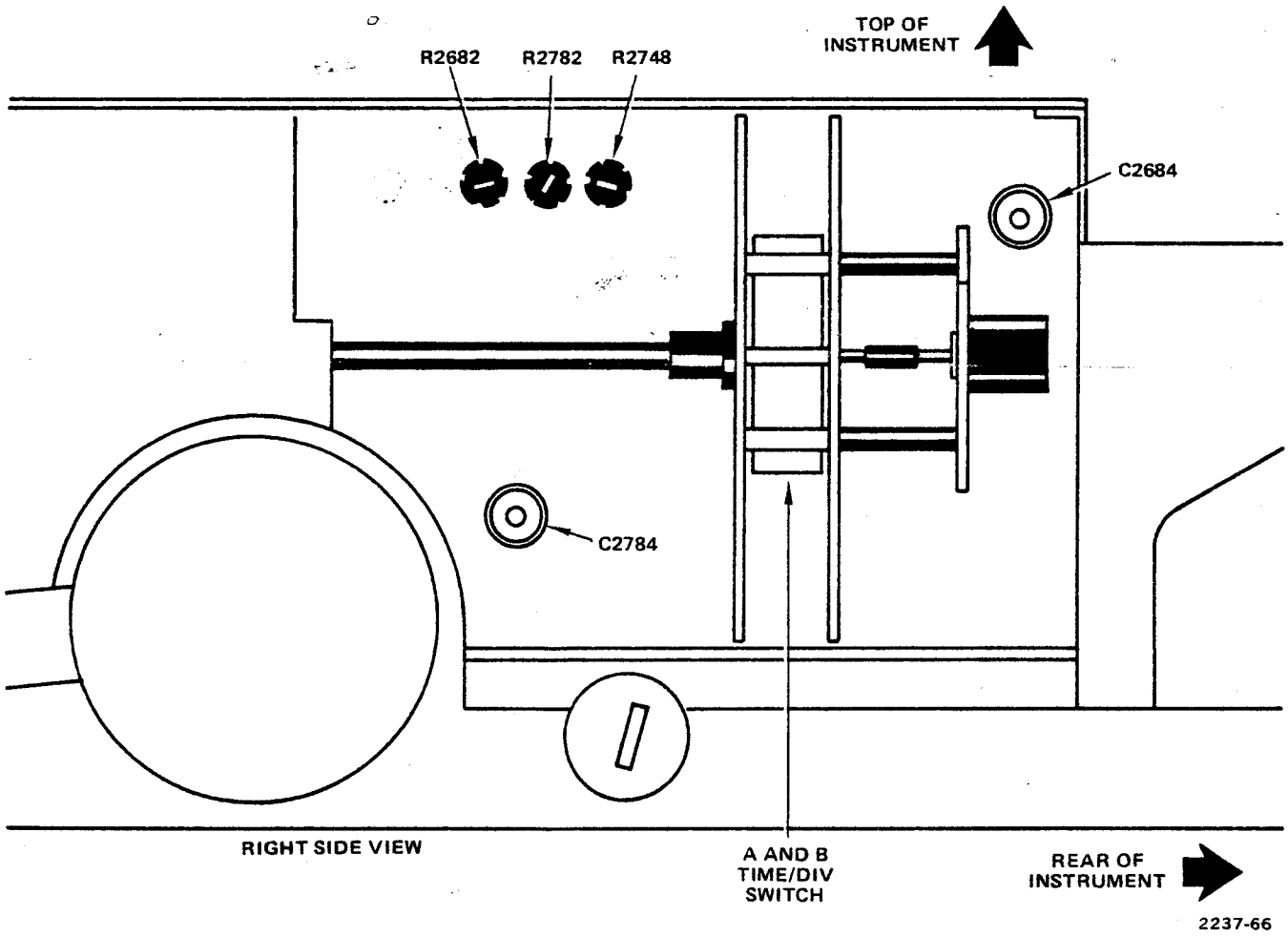


Figure 5-23. Sweep adjustment locations.

(2) Set time mark generator for one millisecond time markers.

(3) Set horizontal POSITION to align the first time marker with the left graticule line.

(4) Adjust R2782 for one time marker per division.

(5) Continue to the next procedure.

s. .5 μs Timing (Figure 5-23).

(1) Set A TIME/DIV to .5 μs and HORIZ DISPLAY to A.

(2) Set time mark generator for 0.5 microsecond time markers.

(3) Adjust C2784 for one time marker per division.

(4) Set HORIZ DISPLAY to B DLY'D.

(5) Set DELAY TIME POS to 1.00, then rotate it toward 0.0 until there is one time marker per division and a time marker is aligned with the left vertical graticule line.

(6) Adjust C2684 for one time marker per division.

(7) Set B TIME/DIV to .05 μs and DELAY TIME POS to 1.00.

(8) Adjust horizontal POSITION and align the time marker with the center vertical graticule line.

(9) Set DELAY TIME POS to 9.00.

INTERACTION NOTE

R2782 and R2748 may interact with each other; therefore, repeat steps (8) through (11) until no further adjustment is needed.

(12) Set DELAY TIME POS to 0.0.

(13) Continue to the next procedure.

p. Horizontal Gain (Figure 5-22).

(1) Set HORIZ DISPLAY to A.

(2) Adjust X1 GAIN, R2923 until the 1st and 11th time markers are exactly aligned with a graticule line. There should be one time marker per division within 0.25 minor divisions.

(3) Set X10 Mag to In (on).

(4) Set time mark generator for .1 ms time markers.

(5) Adjust X10 GAIN, R2925 for one time marker per division.

(6) Continue to the next procedure.

q. Magnifier Registration (Figure 5-22).

(1) Set X10 MAG to In (on).

(2) Adjust horizontal POSITION until the sweep starts at the center vertical graticule line.

(3) Set X10 MAG to Out (off).

(4) Adjust MAG REG, R2932 until the sweep starts at the center vertical graticule line.

INTERACTION NOTE

R2932 and horizontal POSITION may interact; therefore, repeat steps (1) through (4) until no further adjustment of R2932 is needed.

(5) Continue to the next procedure.

r. B Sweep Timing (Figure 5-23).

(1) Set controls as follows:

X10 MAG	Out (off)
A AND B TIME/DIV	1 ms
HORIZ DISPLAY	B DLY'D

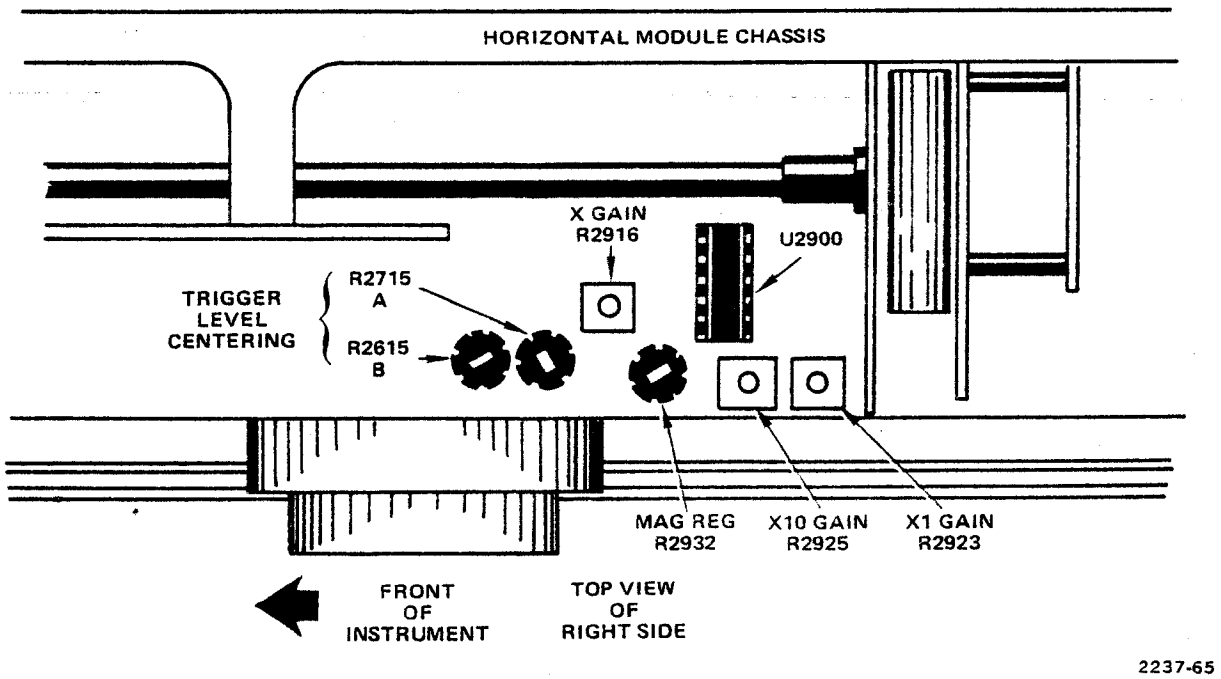


Figure 5-22. Trigger and horizontal adjustment locations.

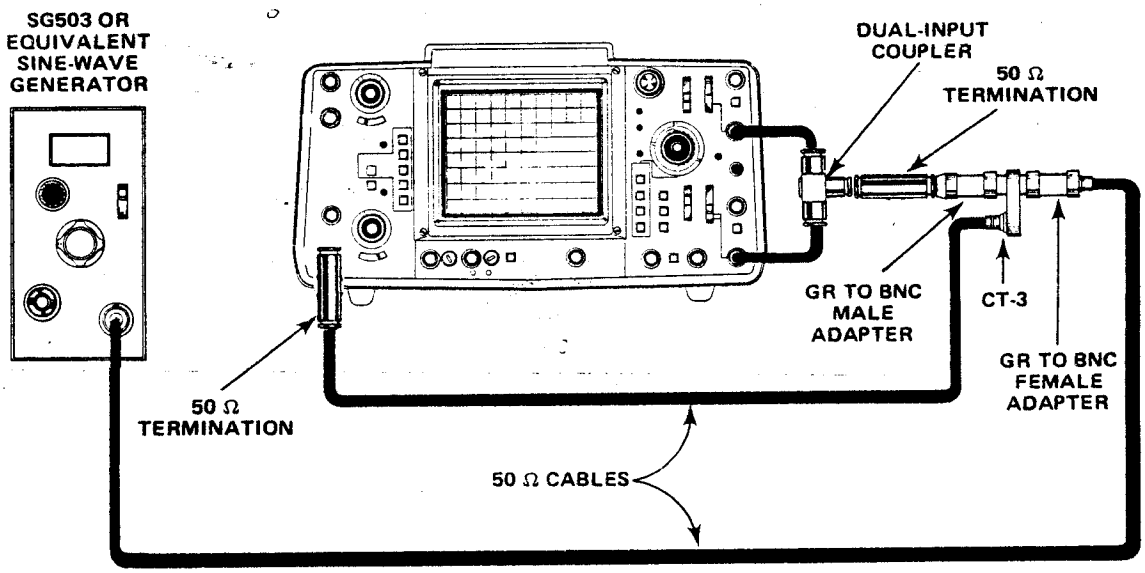


Figure 5-21. External trigger centering setup.

(9) Set B COUPLING to DC.

(10) Adjust B TRIGGER LEVEL CENTERING, R2615 for a stable display.

INTERACTION NOTE

B LEVEL and R2615 may interact with each other; therefore, repeat steps (2) through (5) until no further adjustment of R2615 is needed.

(11) Disconnect the sine wave generator.

o. Sweep Start-Stop (Figure 5-23).

(1) Set controls as follows:

VERT MODE	CH 1
CH 1 VOLTS/DIV	.5
A TIME/DIV	1 ms
B TIME/DIV	5 μs
HORIZ DISPLAY	A INTEN
A SOURCE	NORM
B SOURCE	STARTS AFTER DELAY
COUPLING	AC

(2) Connect a time mark generator to the CH 1 input through a 50 ohm BNC cable and 50 ohm termination. Set the generator for 1 millisecond time markers.

(3) Set DELAY TIME POS to 1.00.

(4) Adjust R2782 so the second time marker is intensified.

(5) Set DELAY TIME POS to 9.00.

(6) Adjust R2748 so the tenth time marker is intensified.

INTERACTION NOTE

R2782 and R2748 may interact with each other; therefore, repeat steps (3) through (6) until no further adjustment is needed.

(7) Set HORIZ DISPLAY to B DLY'D and horizontally position the start of sweep within the graticule area.

(8) Set DELAY TIME POS to 1.00.

(9) Very slightly adjust R2782 until the time marker starts at the beginning of the sweep.

(10) Set DELAY TIME POS to 9.00.

(11) Very slightly adjust R2748 until the time marker starts at the beginning of the sweep.

NOTE

When making the next adjustment, set CH 2 VOLTS/DIV to .1 for a 0.2 division signal and .2 for a 0.1 division signal.

(6) Adjust R2245 and A LEVEL so a stable display is obtained with a 0.2-division display, but not with a 0.1-division display.

NOTE

If R2245 is set too sensitive, double triggering may occur at low frequencies. To desensitize R2245, adjust A LEVEL until the display just double triggers. Then slightly readjust R2245 until the double triggering disappears.

(7) Set CH 2 VOLTS/DIV to 5 m and A AND B TIME/DIV to 5 μs.

(8) Repeat step (4) above.

(9) Set CH 2 VOLTS/DIV to 20 m and adjust A LEVEL for a stable display.

(10) Set controls as follows:

VERT MODE	CH 1
HORIZ MODE	B DLY'D
B SOURCE	CH 1
B LEVEL	0
A AND B TIME/DIV	5 μs

(11) Set R2185 to midrange.

(12) Adjust R2183 so trace starts at the same point when switching B SLOPE between − (in) and + (out).

(13) Set CH 1 VOLTS/DIV to .1, A AND B TIME/DIV to 50 μs, and B SLOPE to + (out).

NOTE

When making the next adjustment, set CH 1 VOLTS/DIV to .1 for a 0.2-division display and .2 for a 0.1-division display.

(14) Adjust R2185 and B LEVEL so a stable display is obtained with a 0.2-division display, but not with a 0.1-division display.

NOTE

If R2185 is set too sensitive, double triggering may occur at low frequencies. To desensitize R2185, adjust B LEVEL until the display just double triggers, then slightly readjust R2185 until the double triggering disappears.

(15) Set CH 1 VOLTS/DIV to 5 m and A AND B TIME/DIV to 5 μs.

(16) Repeat step (12) above.

(17) Disconnect the generator.

n. External Trigger Centering (Figures 5-21 and 5-22).

(1) Set controls as follows:

CH 2 VOLTS/DIV	5 m
VERT MODE	CH 2
HORIZ DISPLAY	A
A AND B TIME/DIV	5 μs
A SOURCE	EXT
B SOURCE	EXT

(2) Set A COUPLING to AC.

(3) Adjust A LEVEL for a stable display.

(4) Set A COUPLING to DC.

(5) Adjust A TRIGGER LEVEL CENTERING, R2715 for a stable display.

INTERACTION NOTE

A LEVEL and R2715 may interact with each other; therefore, repeat steps (2) through (5) until no further adjustment of R2715 is needed.

(6) Set HORIZ DISPLAY to B DLY'D

(7) Set B COUPLING to AC.

(8) Adjust B LEVEL for a stable display.

(20) Move the generator output from CH 2 input to CH 1 input.

(21) Set CH 1 VOLTS/DIV to 5 m and VERT MODE to CH 1.

(22) Adjust CH 1 vertical POSITION so top of waveform is on the center horizontal graticule line.

(23) Adjust C4173, R4173, C4174, and R4174 for the best transient response of the waveform. Total aberrations should not exceed ±3% or 3% peak-to-peak (+0.15 division, −0.15 division, or 0.15 division peak-to-peak).

INTERACTION NOTE

If CH 1 response cannot be adjusted within requirements, very slightly touch up the adjustment in step (12) above. Then recheck the CH 2 response and rise time of both channels.

(24) Set CH 1 VOLTS/DIV to 20 m and TIME/DIV to .1 μs.

(25) Adjust R4167 for the best front corner of the waveform.

(25.1) Set CH 1 VOLTS/DIV to 50 m.

(25.2) Adjust generator for a 5-division display.

(25.3) Adjust R4108 for the best flat top on the front corner of the waveform.

(26) Set CH 1 VOLTS/DIV to .5.

(27) Remove the 10X attenuator from the CH 1 input.

(28) Adjust R4106 for the best front corner of the waveform.

(29) Disconnect the generator.

m. Trigger Hysteresis and Slope Centering (Figure 5-20).

(1) Set controls as follows:

VOLTS/DIV	5 m
A AND B TIME/DIV	5 μs
X10 MAG	Out (off)
VERT MODE	CH 2
A LEVEL	0
A SOURCE	CH 2

(2) Connect a sine wave generator to CH 1 and CH 2 through a 50 ohm BNC cable, 50 ohm termination, and dual input coupler. Set the output for 50 kilohertz and adjust for a 4-division display.

(3) Set R2245 at midrange.

(4) Adjust R2249 so trace starts at the same point when switching A SLOPE between − (in) and + (out).

(5) Set CH 2 VOLTS/DIV to .1, A AND B TIME/DIV to 50 μs, and A SLOPE to + (out).

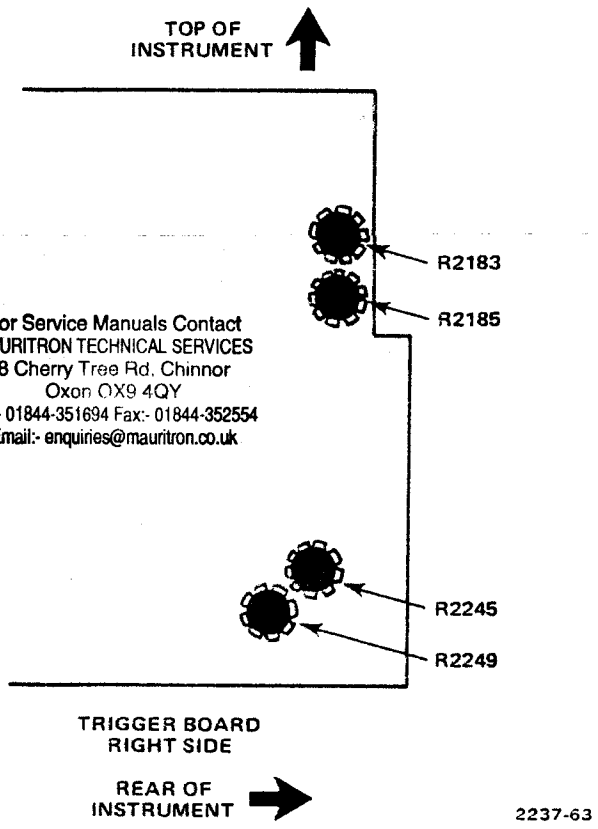


Figure 5-20. Trigger hysteresis and slope centering adjustment locations.

(3) Set the generator output level for a 5-division display. During adjustments, reset the generator output as necessary to maintain a 5-division display.

NOTE

Use a low capacitance tuning tool when making compensation adjustments.

(4) Adjust C4101 for the best flat top waveform.

(5) Set CH 1 VOLTS/DIV to 50 m and readjust the generator for a 5-division display.

(6) Adjust C4108 for the best flat top, and C4107 for the best front corner on the waveform. Alternately readjust both capacitors for the best overall waveform response.

(7) Set CH 1 VOLTS/DIV to .5, remove the 10X attenuator, and readjust the generator for a 5-division display.

(8) Adjust C4105 for the best flat top, and C4104 for the best front corner on the waveform. Alternately readjust both capacitors for the best overall waveform response.

(9) Continue to the next procedure.

I. High-Frequency Conpensation (Figure 5-19).

(1) Move the output of the square wave generator to its positive going, FAST RISE OUTPUT.

(2) Set CH 2 VOLTS/DIV to 5 m and VERT MODE to CH 2.

(3) Disconnect the square wave generator output from the CH 1 input, remove the input RC normalizer, install the 10X attenuator between the BNC cable and termination, and connect the generator output to CH 2. Set the generator output to 1 kilohertz and adjust for a 5-division display. During adjustments, maintain a 5-division display.

(4) Adjust R4406 for the best flat top on the waveform.

(5) Set TIME/DIV to 20 μs.

(6) Set generator to 10 kilohertz and adjust for a 5-division display.

(7) Adjust C4405 for the best flat top on the waveform.

(8) Set TIME/DIV to .1 μs.

(9) Set generator for 100 kilohertz and adjust for a 5-division display.

(10) Push in X10 MAG (on).

(11) Adjust CH 2 vertical POSITION so top of waveform is on the center horizontal graticule line.

(12) Adjust C4271, R4410, C4410, C4342, C4412, C4447, and R4447 for the best front corner of the waveform. Total aberrations should not exceed ±3% or 3% peak-to-peak (+0.15 division, −0.15 division, or 0.15 division peak-to-peak).

(13) Set CH 2 VOLTS/DIV to 20 m.

(14) Adjust generator for a 5-division display.

(15) Adjust R4267 for the best front corner of the waveform.

(15.1) Set CH 2 VOLTS/DIV to 50 m.

(15.2) Adjust generator for a 5-division display.

(15.3) Adjust R4208 for the best flat top on the front corner of the waveform.

(16) Set CH 2 VOLTS/DIV to .5.

(17) Remove the 10X attenautor from the generator input to CH 2.

(18) Adjust R4206 for the best front corner of the waveform.

(19) Reinstall the 10X attenuator in the CH 2 input. Set VOLTS/DIV to 5 m and TIME/DIV to 0.5 μs. Adjust for a 5-division display. Check rise time. If it is greater than 3.5 nanoseconds repeat steps (2) through (18).

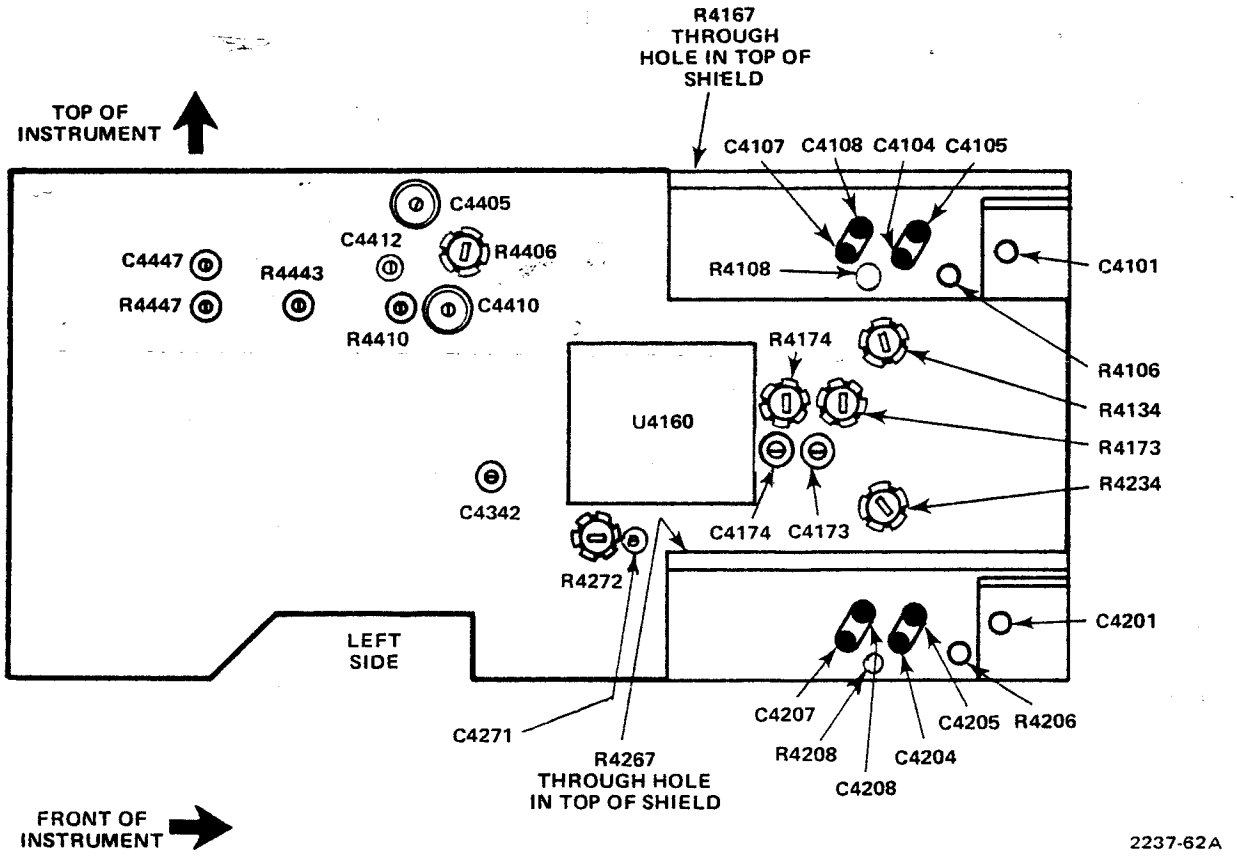


Figure 5-19. Vertical adjustment locations.

j. Channel 2 Low Frequency Compensation (Figure 5-19).

(1) Set square wave generator (same as calibration generator, if using PG 506) for a 1 kilohertz, HIGH AMPL OUTPUT.

(2) Disconnect the square wave generator output from CH 2 and reconnect it to CH 2 through a 10X attenuator, 50 ohm termination, and an input RC normalizer. Set the generator for a 5-division display. During adjustment, set the generator output as necessary to maintain a 5-division display.

NOTE

Use a low capacitance tuning tool when making compensation adjustments.

(3) Adjust C4201 for the best flat top waveform.

(4) Set CH 2 VOLTS/DIV to 50 m and reset the generator output level for a 5-division display.

(5) Adjust C4208 for the best flat top, and C4207 for the best front corner on the waveform. Alternately readjust both capacitors for the best overall waveform response.

(6) Set CH 2 VOLTS/DIV to .5, remove the 10X attenuator, and reset the generator output level for a 5-division display.

(7) Adjust C4205 for the best flat top, and C4204 for the best front corner on the waveform. Alternately readjust both capacitors for the best overall waveform response.

(8) Continue to the next procedure.

k. Channel 1 Low Frequency Compensation (Figure 5-19).

(1) Set VERT MODE to CH 1.

(2) Remove the square wave generator output from CH 2 input and reconnect it to CH 1 through a 50 ohm BNC cable, 10X attenuator, 50 ohm termination, and an input RC normalizer.

(7) Set A AND B TIME/DIV, its associated VAR control, and horizontal POSITION for exactly one time marker per division.

(8) Adjust Y AXIS, R573 to align the center time marker with the center vertical graticule line.

INTERACTION NOTE

This adjustment may affect the TRACE ROTATION adjustment. Position the display baseline to the center horizontal graticule line and recheck display alignment. If TRACE ROTATION needs readjustment, alternate between it and the Y-AXIS adjustment until no further adjustment is needed.

(9) Continue to the next procedure.

f. Geometry (Figure 5-18).

(1) Readjust TIME/DIV VAR and horizontal POSITION for one time marker per division.

(2) Adjust GEOM, R572 for minimum bowing of time markers.

INTERACTION NOTE

This adjustment may affect Y-Axis Alignment and TRACE ROTATION. Repeat Y-Axis Alignment, TRACE ROTATION, and Geometry adjustments for optimum overall alignment.

(3) Reset TIME/DIV VAR fully clockwise in its detent.

(4) Disconnect the time mark generator.

g. Calibrator (Figure 5-18).

(1) Connect a digital voltmeter to the CALIBRATOR output.

(2) Connect a shorting jumper between TP376 and TP386 (a small alligator clip works nicely).

(3) Adjust CAL AMPL, R386 for a 1.00 volt dc reading.

(4) Disconnect the voltmeter.

(5) Remove the shorting jumper from TP376 and TP386.

h. Dc Balance (Figure 5-19).

(1) Set CH 1 and CH 2 VOLTS/DIV to 5 m (1X window) and A AND B TIME/DIV to .2 ms.

(2) Adjust CH 1 vertical POSITION to vertically center the trace.

(3) Adjust R4134 for no trace shift when switching CH 1 VOLTS/DIV between 5 m and 10 m.

(4) Set VERT MODE to CH 2.

(5) Adjust CH 2 vertical POSITION to vertically center the trace.

(6) Adjust R4234 for no trace shift when switching CH 2 VOLTS/DIV between 5 m and 10 m.

i. Vertical Gain (Figure 5-19).

(1) Set CH 1 and CH 2 VOLTS/DIV to 5 m (1X window) and VERT MODE to CH 1.

(2) Connect a calibration generator (select STD OUTPUT) to CH 1 input through an unterminated 50 ohm BNC cable. Set the generator for a 20 millivolt output.

(3) Adjust R4443 for a 4-division display.

(4) Set VERT MODE to CH 2.

(5) Move the calibration generator output from CH 1 input to CH 2 input.

(6) Adjust R4272 for a 4-division display.

(7) Continue to the next procedure.

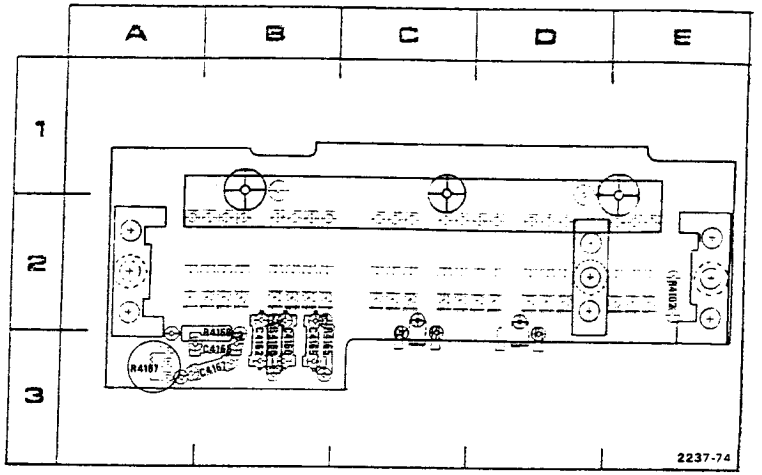


Figure 6-3. A1 Cam Switching board (top) component locations.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C4160	3B	C4165	3B	C4168	3B	R4160	3B	R4167	3A
C4162	3B	C4167	3B	R4102	2E	R4165	3B	R4168	3B

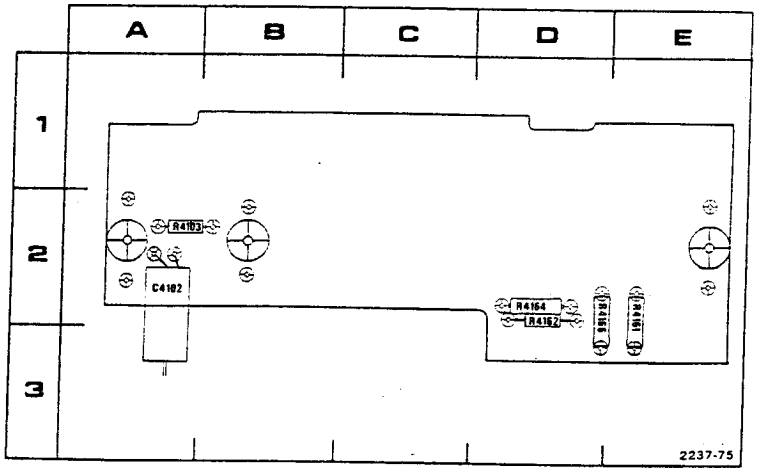


Figure 6-4. A1 Cam Switching board (bottom) component locations.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C4102	2A	R4161	2E	R4164	2D
R4103	2A	R4162	2D	R4166	2D

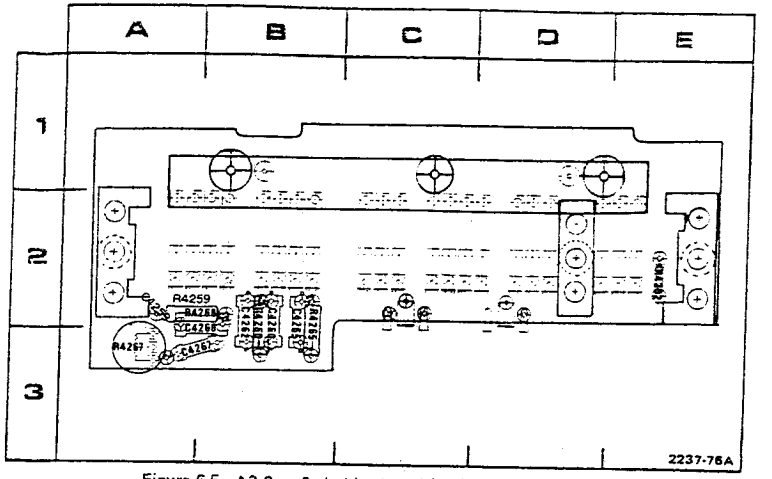


Figure 6-5. A3 Cam Switching board (top) component locations.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C4259	2A	C4265	2B	C4268	2A	R4260	2B	R4267	3A
C4260	2B	C4267	3A	R4202	2E	R4265	2B	R4268	2A
C4262	2B			R4259	2A				

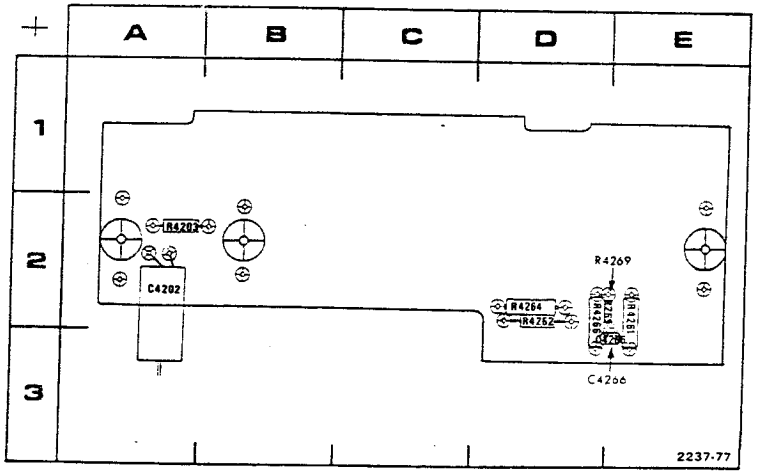
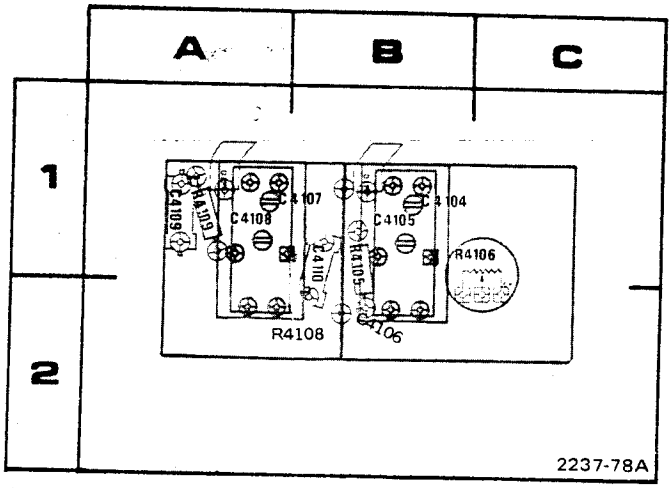


Figure 6-6. A3 Cam Switching board (bottom) component locations.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C4202	2A	R4203	2A	R4262	2D	R4266	2D
C4266	3E	R4261	2E	R4264	2D	R4269	2E

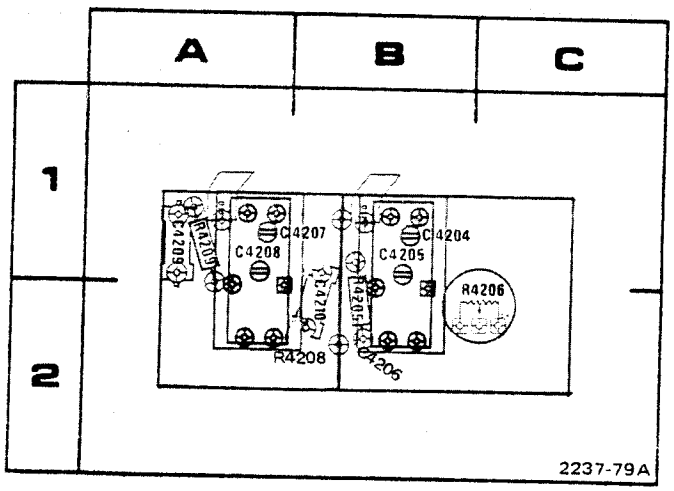
GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
3I	R4324	4B	R4416	2D
3H	R4327	4C	R4418	3E
3I	R4328	4A	R4419	3D
2F	R4332	5B	R4421	1D
4F	R4333	5B	R4423	1D
2I	R4334	5B	R4425	1D
	R4335	5B	R4427	1D
	R4336	5A	R4428	1C
4H	R4337	4C	R4429	1C
4I	R4338	5C	R4431	2D
4H	R4340	2E	R4433	2D
4H	R4341	3F	R4437	2C
4I	R4343	3E	R4441	2C
4H	R4345	3F	R4443	2C
4H	R4349	4E	R4446	1B
4J	R4351	3F	R4447	2B
4H	R4355	3F	R4448	2C
4H	R4356	3F	R4451	2C
4H	R4359	4E	R4453	2C
4H	R4361	4E	R4456	1C
4F	R4362	3E	R4457	1B
5F	R4363	4E	R4458	2C
4G	R4364	4D	R4459	2C
4G	R4365	3D	R4461	1B
4F	R4366	3D	R4463	1A
4F	R4371	3E	R4466	1A
1F	R4372	3E	R4471	2B
4E	R4373	3E	R4473	2B
4F	R4375	3D	R4474	2A
4F	R4376	4E	R4475	2A
4E	R4382	2E	R4476	2A
5E	R4383	2E		
5F	R4384	2E	RT4119	2D
4E	R4385	2F	RT4116	2D
4D	R4386	2F		
4D	R4400†		S4240	3I
5E	R4401	2D	S4330	3K
3E	R4403	2D	S4380	3B
4D	R4404	1D	S4378	3C
4I	R4405	2E		
4A	R4406	1E	U4160	3G
4A	R4408	1E		
4B	R4409	1E		
4C	R4410	2D		
4A	R4411	2E		
4A	R4413	2D		
3A	R4414	2D		



A2 ATTENUATOR BOARD.

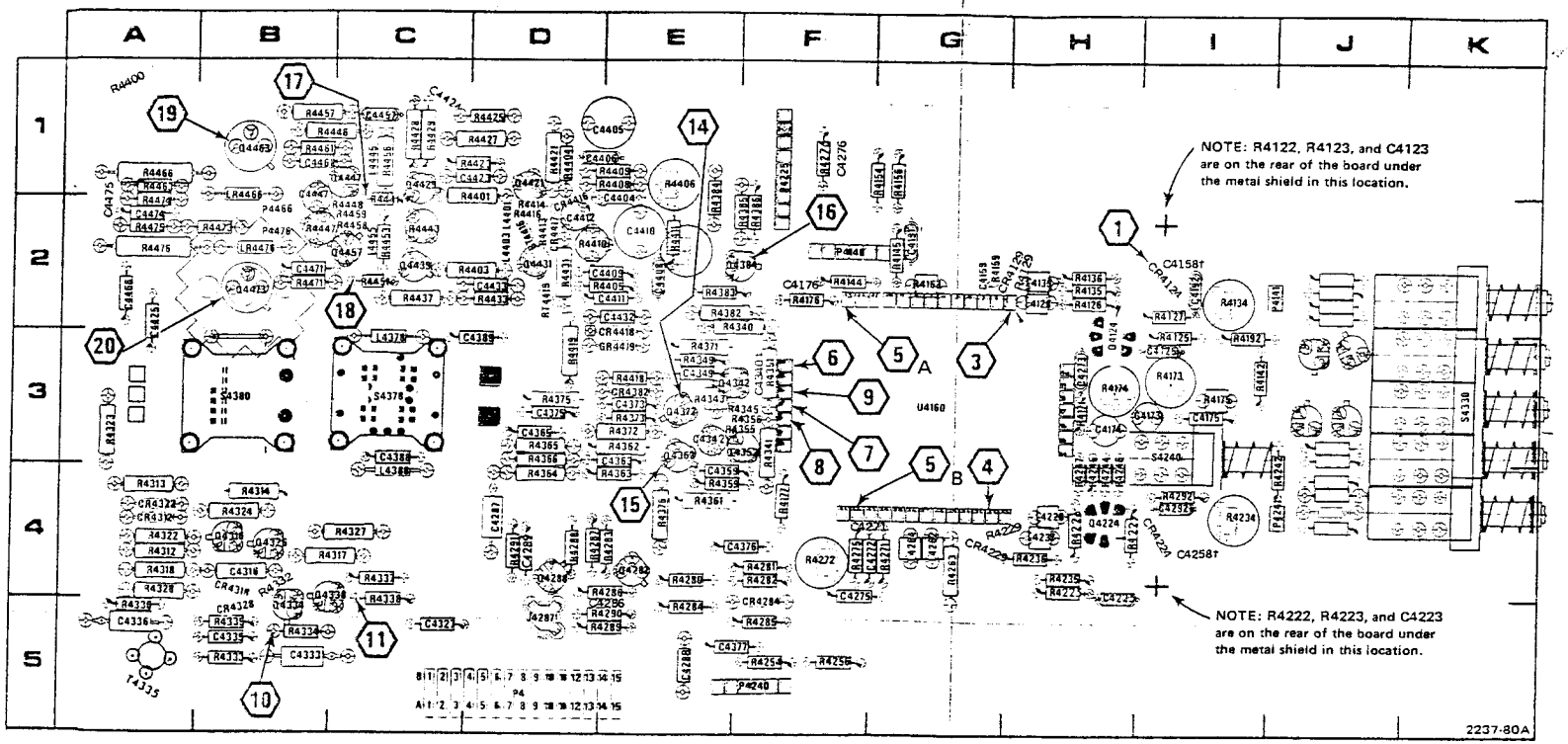
CKT NO	GRID LOC	CKT NO	GRID LOC
C4104	1B	C4110	1B
C4105	1B		
C4106	2B	R4105	1B
C4107	1B	R4106	1B
C4108	1A	R4108	2B
C4109	1A	R4109	1A

FRONT



A4 ATTENUATOR BOARD

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C4204	1B	C4207	1B	C4210	2B	R4206	1C
C4205	1B	C4208	1A			R4208	2B
C4206	2B	C4209	1A	R4205	2B	R4209	1A



A5 VERTICAL BOARD.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	C N
C4123†		C4423	1D	P4	5D	R4173	3I	R
C4125	3I	C4424	1C	P4140	2F	R4174	3H	R
C4158†‡*		C4425	2A	P4141	1J	R4175	3I	R
C4159	2G	C4432	2E	P4225	1F	R4176	2F	R
C4173	3I	C4433	2D	P4240	5F	R4177	4F	R
C4174	3H	C4445§		P4466	2B	R4192	2I	R
C4175	3I	C4447	1B	P4476	2B	R4222†		R
C4176*	2F	C4449	3E			R4223†		R
C4191	2G	C4455§		Q4124	2H	R4225	4H	R
C4192	2I	C4457	1C	Q4224	4H	R4226	4I	R
C4223†		C4461	1B	Q4282	4E	R4227	4H	R
C4225	4H	C4466	2A	Q4288	4D	R4229	4H	R
C4258†‡*		C4471	2B	Q4316	4B	R4234	4I	R
C4271*	4G	C4474	2A	Q4326	4B	R4235	4H	R
C4272	5G	C4475	2A	Q4334	5B	R4236	4H	R
C4273	3H			Q4338	5C	R4242	4J	R
C4275	5F	CR4124	2I	Q4342	3F	R4244	4H	R
C4276*	1F	CR4129	2H	Q4352	3F	R4245	4H	R
C4286*	5E	CR4224	2I	Q4362	3E	R4246	4H	R
C4287	4D	CR4229	4G	Q4372	3E	R4247	4H	R
C4288	5E	CR4284	5F	Q4384	2F	R4254	4F	R
C4289	5E	CR4312	4A	Q4421	1D	R4256	5F	R
C4292	4I	CR4318	4B	Q4429	1C	R4263	4G	R
C4316	4B	CR4322	4A	Q4431	2D	R4271	4G	R
C4327	5C	CR4328	5B	Q4439	2C	R4272	4F	R
C4333	5B	CR4382	3E	Q4447	1C	R4275	4F	R
C4335	5B	CR4416	2D	Q4457	2C	R4276	1F	R
C4336	5A	CR4417	2D	Q4463	1B	R4280	4E	R
C4340†*		CR4418	3E	Q4473	2B	R4281	4F	R
C4342	3E	CR4419	3E			R4282	4F	R
C4359	4E			R4122†		R4283	4E	R
C4363	3E	J4287	5D	R4123†		R4284	5E	R
C4365	3D			R4125	2I	R4285	5F	R
C4373	3E	L4128	2H	R4126	2H	R4286	4E	R
C4375	3D	L4135	2H	R4127	2I	R4287	4D	R
C4376	4F	L4228	4H	R4129	2H	R4288	4D	R
C4377	5F	L4237	4H	R4134	2I	R4289	5E	R
C4388	3C	L4262	4G	R4135	2H	R4290	5E	R
C4389	3D	L4264	4G	R4136	2H	R4291	4D	R
C4404	2E	L4378	3C	R4142	3D	R4292	4I	R
C4405	1E	L4388	4C	R4144	2F	R4312	4A	R
C4406	1D	L4401	2D	R4145	2G	R4313	4A	R
C4408	2E	L4403	2D	R4154	1G	R4314	4B	R
C4409	2E	L4445	1C	R4156	1G	R4317	4C	R
C4410	2E	L4456	1C	R4159	2G	R4318	4A	R
C4411	2E	L4466	1B	R4163	2G	R4322	4A	R
C4412	2D	L4476	2B	R4171	3H	R4323	3A	R

†On back of board

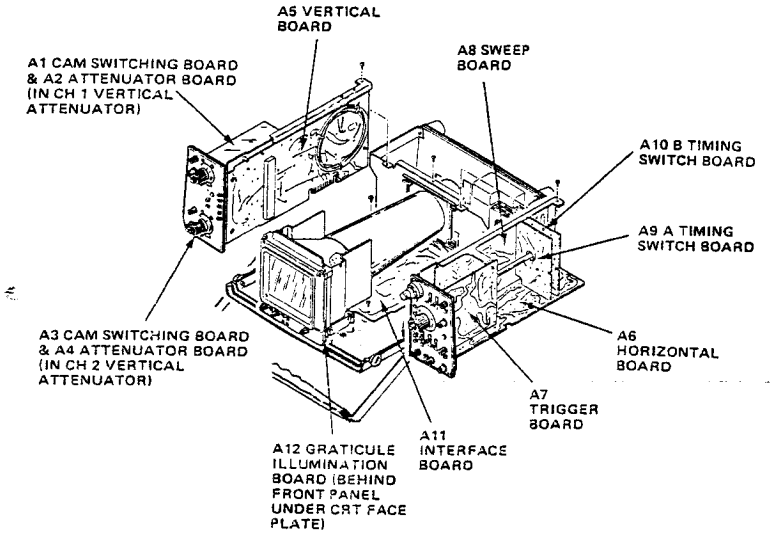
‡Selected: Added as necessary.

*See Parts List for serial number ranges.

§Integral part of etched circuit board.

Figure 6-7. A5 Vertical, A2 Attenuator, & A4 Attenuator board component locations.

VOLTAGE and WAVEFORM CONDITIONS



WAVEFORM AND VOLTAGE TEST CONDITIONS.

a. Waveform Conditions. The following test setup is used for all waveforms, except as noted. This uniform setup simplifies troubleshooting. The test oscilloscope trigger setup allows time comparison (horizontally) between the waveforms. Use an AN/USM-425(V)1, Tektronix 465M, or equivalent for waveforms.

(1) Instrument Setup.

(a) Connect a P6104 Probe (10X) to CH 1 input and the probe tip to the CALIBRATOR.

(b) Set the instrument controls as follows:

VOLTS/DIV (both)	.2
AC-GND-DC (both)	DC
VERT MODE	CH 1
HORIZ DISPLAY	MIXED
SOURCE (both)	CH 1
SLOPE (both)	OUT: +
A TIME/DIV	.2 ms
B TIME/DIV	50 μs
LEVEL (both)	For a stable mixed display

(2) Test Oscilloscope Setup.

(a) Connect a 50 ohm unterminated BNC cable between the A EXT Trigger input of the test oscilloscope and the +A GATE of the oscilloscope under test.

(b) Set the test oscilloscope controls as follows:

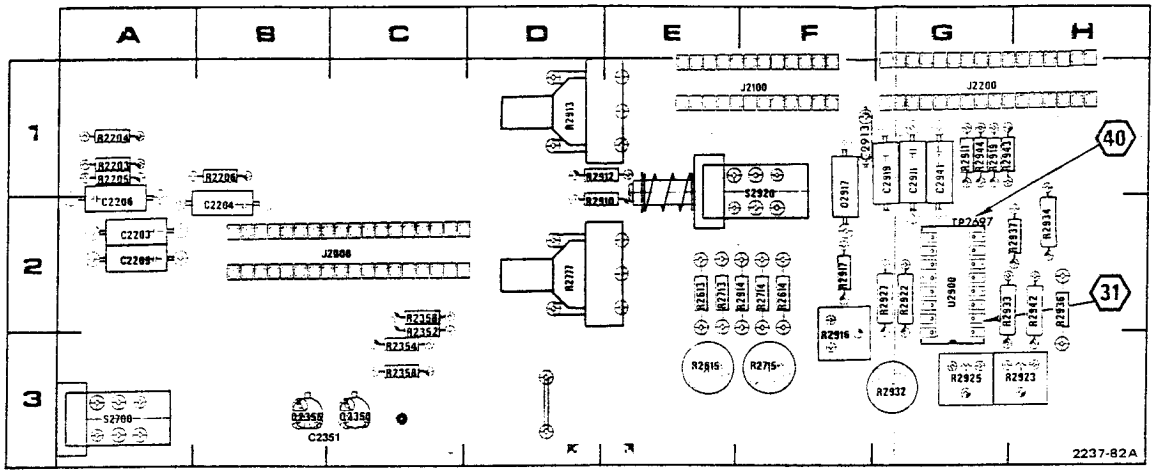
A COUPLING	DC
A SLOPE	OUT: +
A SOURCE	EXT ÷ 10
VERT MODE	CH 1
CH 1 AC-GND-DC	DC
A LEVEL	Adjust so TRIG READY indicator is lit. Push TRIG VIEW to verify triggering on the positive slope.

b. Voltage Conditions. The voltages were taken between the indicated test point and chassis ground using a Tektronix DM 501A digital multimeter. Any change from the following setup may change some of the indicated voltages. Set controls as follows (where controls are duplicated, set both controls the same):

VOLTS/DIV	5 m
AC-GND-DC	GND
POSITION (Vertical)	Midrange
VERT MODE	CH 2
DELAY TIME POS	5.00
HORIZ DISPLAY	A
TIME/DIV	1 ms
POSITION (Horizontal)	Midrange
INTEN	Fully counterclockwise
FOCUS	Fully counterclockwise
SCALE ILLUM	Midrange
TRIG MODE	NORM
COUPLING	AC
SOURCE	CH 1
SLOPE	+
LEVEL	Midrange

NOTE

These settings place the instrument in a quiescent operating state for making dc voltage measurements.



CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C2203	2A	J2000	2C	R2205	1A	R2715	3F	R2922	2G	R2943	1G
C2204	2B	J2100	1F	R2206	1B	R2777	2D	R2923	3H	R2944	1G
C2205	2A	J2200	1G	R2352	3C	R2910	2D	R2925	3G		
C2206	2A			R2356	2C	R2911	1G	R2927	2G	S2700	3A
C2351	3B	Q2350	3C	R2358	3C	R2912	1D	R2932	3G	S2920	1F
C2911	1G	Q2356	3B	R2613	2E	R2913	1D	R2933	2G		
C2913	1F			R2614	2F	R2914	2F	R2934	2H	U2900	2G
C2917	1F	R2201§		R2615	3E	R2916	3F	R2936	2H		
C2919	1G	R2203	1A	R2713	2E	R2917	2F	R2937	2H		
C2941	1G	R2204	1A	R2714	2F	R2919	1G	R2942	2H		

§ Connected from A6 to bnc connector

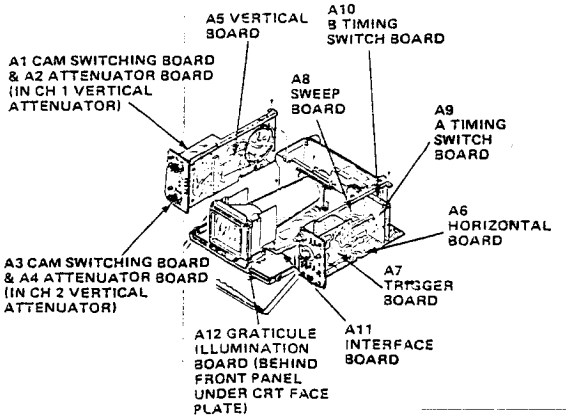
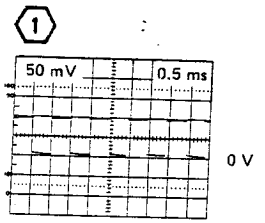
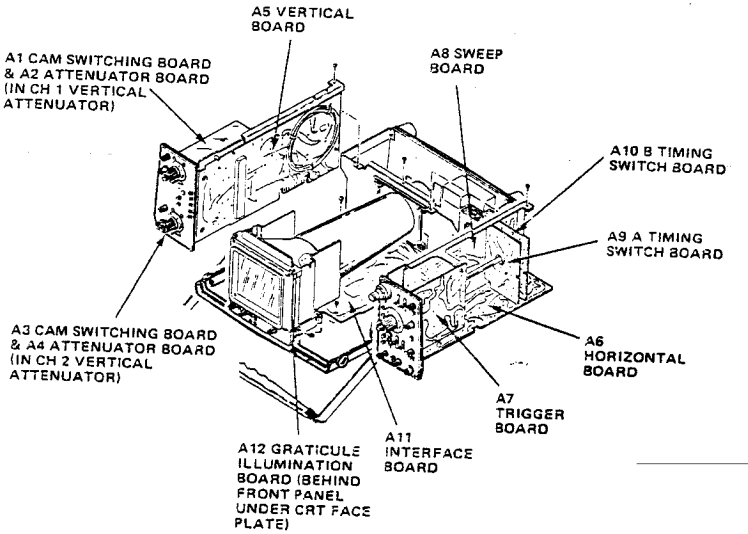
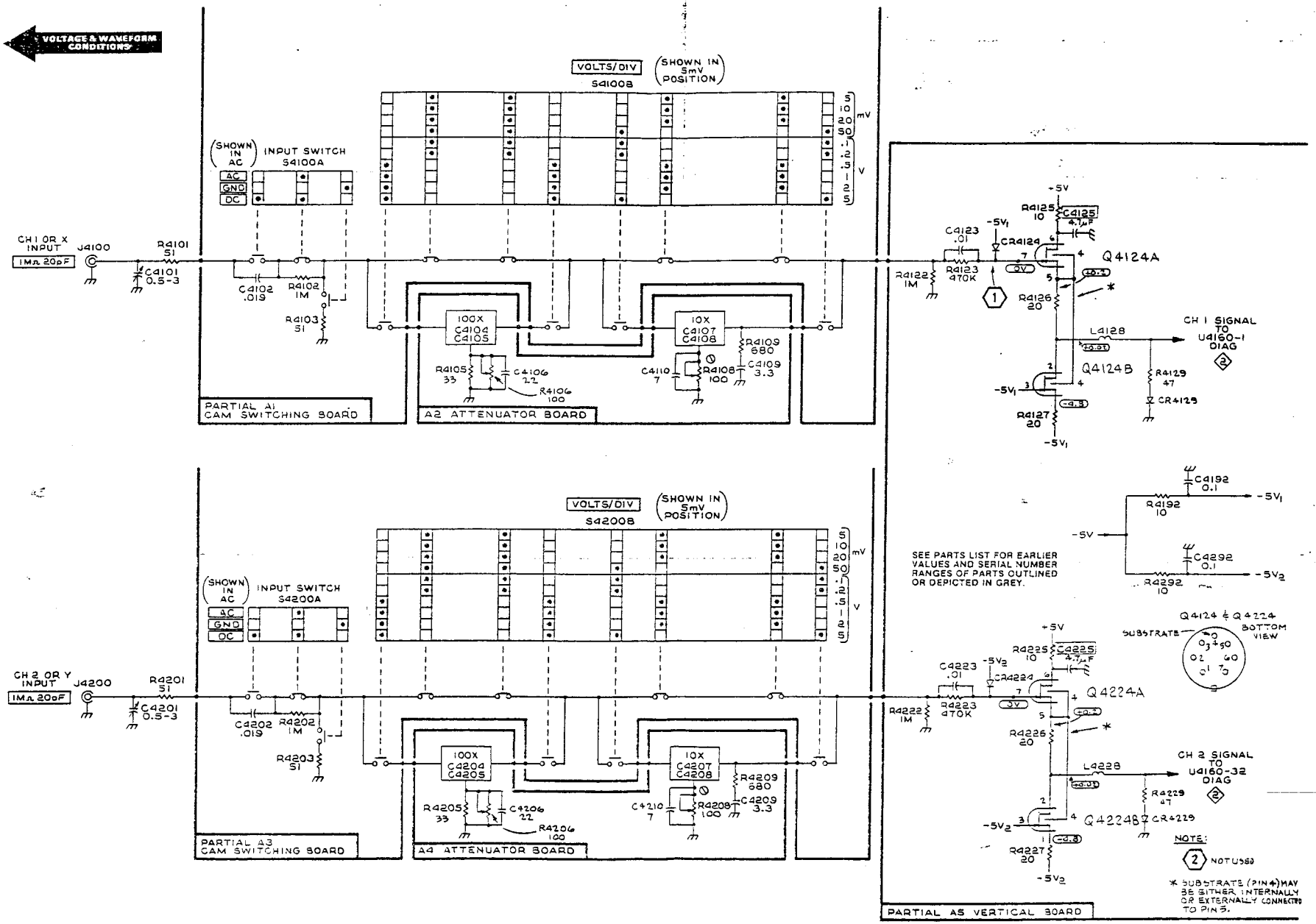


Figure 6-8. A6 Horizontal board component locations.

Refer to Waveform and Voltage Test Conditions.






VOLTAGE & WAVEFORM CONDITIONS
VOLTS/DIV
S4100B
(SHOWN IN 5mV POSITION)
5 10 20 50 mV .1 .2 .5 1 2 5 V
(SHOWN IN AC)
INPUT SWITCH S4100A
AC
GND
DC
CH 1 OR X INPUT
1MΩ 20pF
J4100
R4101 51
C4101 0.5-3
C4102 .019
R4102 1M
R4103 51
100X C4104 C4105
10X C4107 C4108
R4105 33
C4106 22
R4106 100
C4110 7
R4108 100
R4109 680
C4109 3.3
PARTIAL A1 CAM SWITCHING BOARD
A2 ATTENUATOR BOARD
+5V
-5V1
C4123 .01
CR4124
R4125 10
C4125 4.7µF
R4122 1M
R4123 470K
Q4124A
R4126 20
L4128
CH 1 SIGNAL TO U4160-1 DIAG
Q4124B
R4129 47
CR4129
R4127 20
-5V1
C4192 0.1
R4192 10
-5V
C4292 0.1
R4292 10
-5V2
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
Q4124 & Q4224 BOTTOM VIEW
SUBSTRATE
VOLTS/DIV
S4200B
(SHOWN IN 5mV POSITION)
(SHOWN IN AC)
INPUT SWITCH S4200A
AC
GND
DC
CH 2 OR Y INPUT
1MΩ 20pF
J4200
R4201 51
C4201 0.5-3
C4202 .019
R4202 1M
R4203 51
100X C4204 C4205
10X C4207 C4208
R4205 33
C4206 22
R4206 100
C4210 7
R4208 100
R4209 680
C4209 3.3
PARTIAL A3 CAM SWITCHING BOARD
A4 ATTENUATOR BOARD
C4223 .01
CR4224
R4225 10
C4225 4.7µF
R4222 1M
R4223 470K
Q4224A
R4226 20
L4228
CH 2 SIGNAL TO U4160-32 DIAG
Q4224B
R4229 47
CR4229
R4227 20
-5V2
NOTES:
2 NOT USED
* SUBSTRATE (PIN 4) MAY BE EITHER INTERNALLY OR EXTERNALLY CONNECTED TO PIN 5.
PARTIAL A5 VERTICAL BOARD

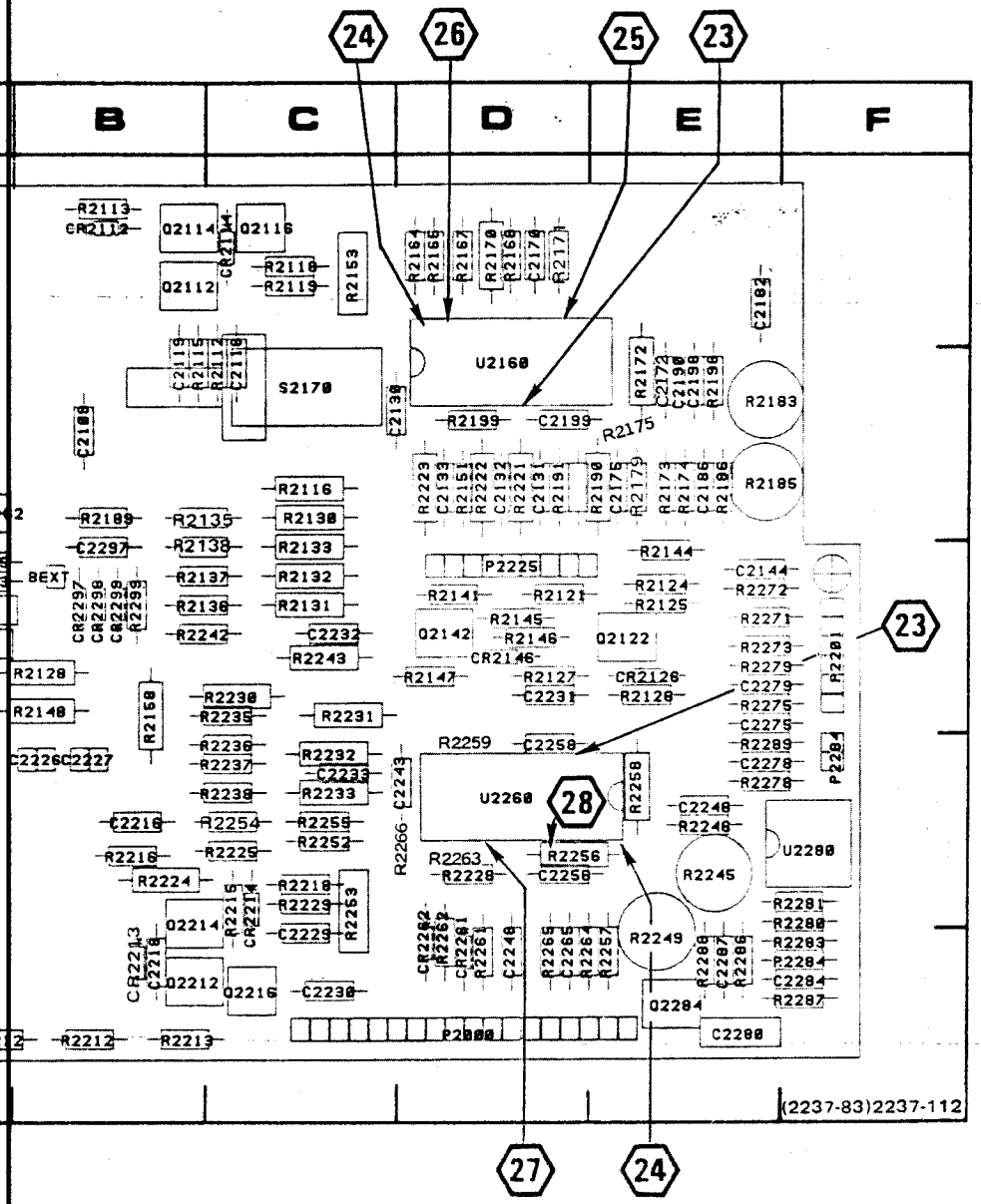
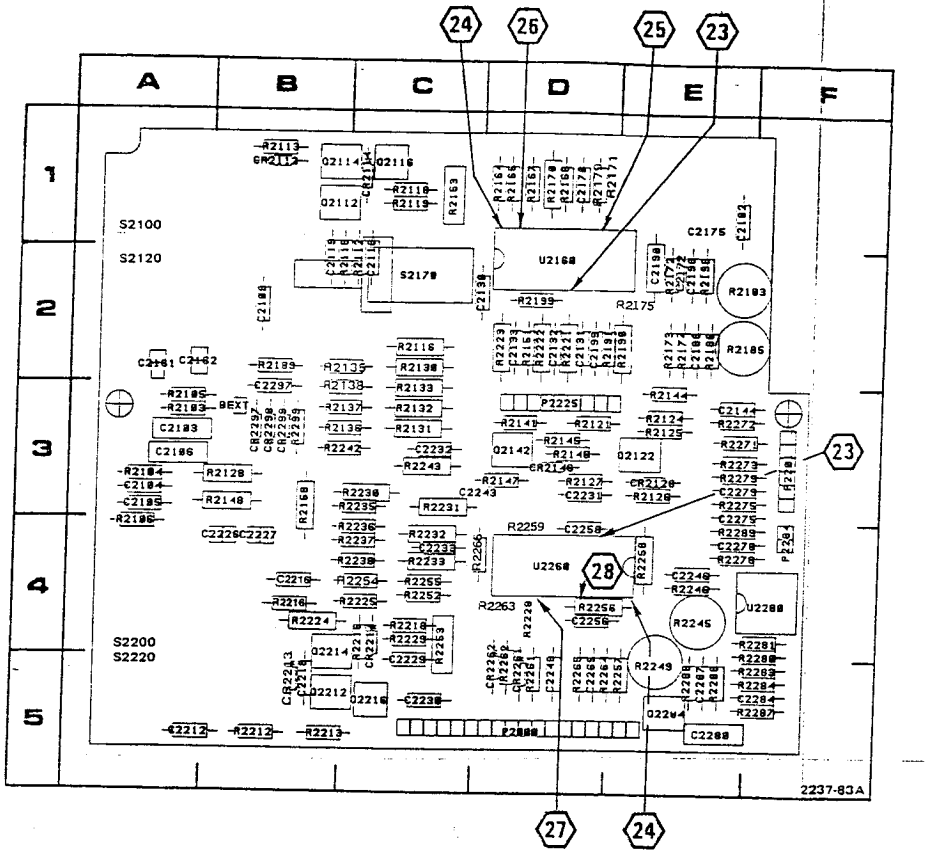
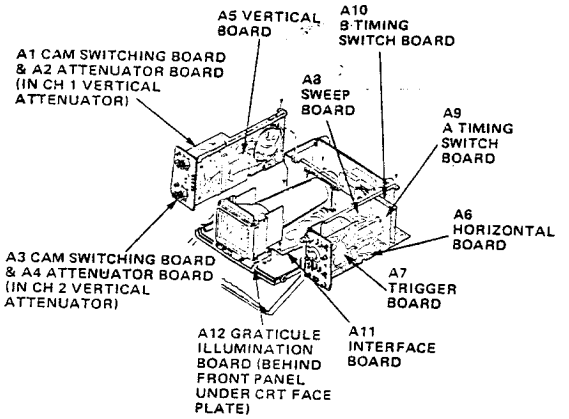


Figure 6-10. A7 Trigger board (below SN B021600) component locations.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
2297	3B	R2101§		R2131	3C	R2167	1D	R2213	5B	R2238	4C	R2265	5D	S2100	1A
2298	3B	R2103	3A	R2132	3C	R2168	1D	R2215	4C	R2242	3B	R2266†		S2120	2A
2299	3B	R2104	3A	R2133	3C	R2170	1D	R2216	4B	R2243	3C	R2271	3E	S2200	4A
		R2105	3A	R2135	2B	R2171	1D	R2218	4C	R2245	4E	R2272	3E	S2220	5A
00	5D	R2106	4A	R2136	3B	R2172	2E	R2221	2D	R2246	4E	R2273	3E	S2170	2C
01	3F	R2112	2C	R2137	3B	R2173	2E	R2222	2D	R2249	5E	R2275	3E		
25	3D	R2113	1B	R2138	3B	R2174	2E	R2223	2D	R2252	4C	R2278	4E	U2160	2D
84	4F	R2115	2B	R2141	3D	R2175	2E	R2224	4B	R2253	4C	R2279	3E	U2260	4D
		R2116	2C	R2144	3E	R2179	2E	R2225	4C	R2254	4C	R2280	4F	U2280	4F
12	1B	R2118	1C	R2145	3D	R2183	2E	R2228	4D	R2255	4C	R2281	4F		
14	1B	R2119	1C	R2146	3D	R2185	2E	R2229	4C	R2256	4D	R2283	5F		
16	1C	R2121	3D	R2147	3D	R2186	2E	R2230	3C	R2257	5E	R2284	5F		
22	3E	R2124	3E	R2148	3B	R2189	2B	R2231	3C	R2258	4E	R2286	5E		
42	3D	R2125	3E	R2151	2D	R2190	2E	R2232	4C	R2259†		R2287	5F		
12	5B	R2126	3E	R2153	1C	R2191	2E	R2233	4C	R2261	5D	R2288	5E		
14	4B	R2127	3D	R2158	3B	R2198	2E	R2235	3C	R2262	5D	R2289	4E		
16	5C	R2128	3B	R2164	1D	R2199	2D	R2236	4C	R2263†		R2299	3B		
84	5E	R2130	2C	R2165	1D	R2212	5B	R2237	4C	R2264	5D				





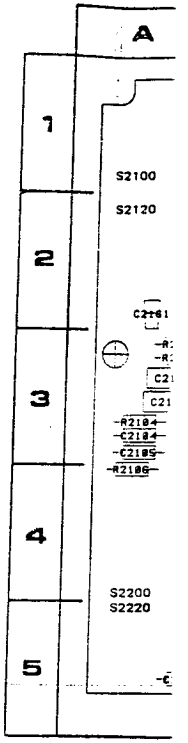


Figure 6-9. A7 Trigger board (SN B021600 & above) component locations.

§ Connected from A7 to bnc connector.

†On back of board.

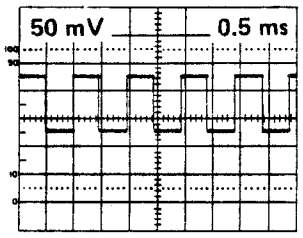
*See Parts List for serial number ranges.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C2103	3A	C2172	2E	C2232	3C	CR2112	1B	P2284	4F	R2105	3A	R2131	3C	R2158	3B	R2189	2B	R2228	4D	R2252	4C	R2272	3E	S2100	1A
C2104	3A	C2175	1E	C2233	4C	CR2114	1C			R2106	4A	R2132	3C	R2164	1D	R2190	2E	R2229	4C	R2253	4C	R2273	3E	S2120	2A
C2105	3A	C2182	1E	C2243	3D	CR2126	3E	Q2112	1B	R2112	2C	R2133	3C	R2165	1D	R2191	2D	R2230	3C	R2254	4C	R2275	3E	S2200	4A
C2106	3A	C2186	3E	C2246	4E	CR2146	3D	Q2114	1B	R2113	1B	R2135	2B	R2167	1D	R2198	2E	R2231	3C	R2255	4C	R2278	4E	S2220	5A
C2109	2B	C2190	2E	C2248	5D	CR2213	5B	Q2116	1C	R2115	2B	R2136	3B	R2168	1D	R2199	2D	R2232	4C	R2256	4D	R2279	3E	S2170	2C
C2118	2C	C2198	2E	C2256	4D	CR2214	4C	Q2122	3E	R2116	2C	R2137	3B	R2170	1D	R2212	5B	R2233	4C	R2257	5E	R2280	4F		
C2119	2B	C2199	2D	C2258	4D	CR2261	5D	Q2142	3D	R2118	1C	R2138	3B	R2171	1D	R2213	5B	R2235	3C	R2258	4E	R2281	4F	U2160	2D
C2130	2C	C2212	5A	C2265	5D	CR2262	5D	Q2212	5B	R2119	1C	R2141	3D	R2172	2E	R2215	4C	R2236	4C	R2259	4D	R2283	5F	U2260	4D
C2131	2D	C2216*	4B	C2275	3E	CR2297	3B	Q2214	4B	R2121	3D	R2144	3E	R2173	2E	R2216*	4B	R2237	4C	R2261	5D	R2284	5F	U2280	4F
C2132	2D	C2218	5B	C2278	4E	CR2298	3B	Q2216	5C	R2124	3E	R2145	3D	R2174	2E	R2218	4C	R2238	4C	R2262	5D	R2286	5E		
C2133	2D	C2226	4B	C2279	3E	CR2299	3B	Q2284	5E	R2125	3E	R2146	3D	R2175	2E	R2221	2D	R2242	3B	R2263	4D	R2287	5F		
C2144	3E	C2227	4B	C2280	5E					R2126	3E	R2147	3D	R2179	1D	R2222	2D	R2243	3C	R2264	5D	R2288	5E		
C2161	2A	C2229	5C	C2284	5F	P2000	5D	R2101§		R2127	3D	R2148	3B	R2183	2E	R2223	2D	R2245	4E	R2265	5D	R2289	4E		
C2162	2A	C2230	5C	C2287	5E	P2201	3F	R2103	3A	R2128	3B	R2151	2D	R2185	2E	R2224	4B	R2246	4E	R2266	4D	R2299	3B		
C2170	1D	C2231	3D	C2297	3B	P2225	3D	R2104	3A	R2130	2C	R2153	1C	R2186	2E	R2225	4C	R2249	5E	R2271	3E				

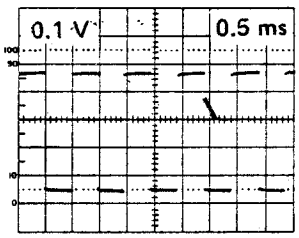
CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CK NO
C2103	3A	C2186	3E	C2258	4D	CF
C2104	3A	C2190	2E	C2265	5D	CF
C2105	3A	C2198	2E	C2275	3E	CF
C2106	3A	C2199	2D	C2278	4E	
C2109	2B	C2212	5A	C2279	3E	P2
C2118	2C	C2216	4B	C2280	5E	P2
C2119	2B	C2218	5B	C2284	5F	P2
C2130	2C	C2226	4B	C2287	5E	P2
C2131	2D	C2227	4B	C2297	3B	
C2132	2D	C2229	5C			Q2
C2133	2D	C2230	5C	CR2112	1B	Q2
C2144	3E	C2231	3D	CR2114	1C	Q2
C2161	2A	C2232	3C	CR2126	3E	Q2
C2162	2A	C2233	4C	CR2146	3D	Q2
C2170	1D	C2243	4D	CR2213	5B	Q2
C2172	2E	C2246	4E	CR2214	4C	Q2
C2175	1E	C2248	5D	CR2261	5D	Q2
C2182	1E	C2256	4D	CR2262	5D	Q2

Refer to Waveform and Voltage Test Conditions.

3 4

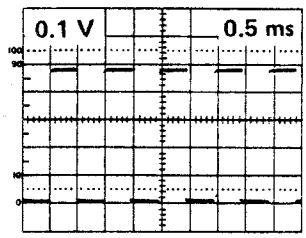


5A 5B



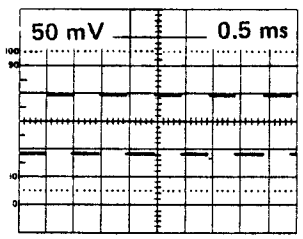
0 volt point depends on setting of instrument vertical POSITION control.

6



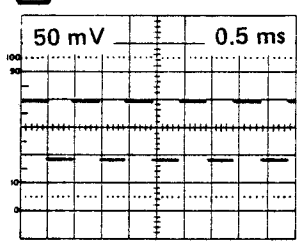
0 volt point depends on setting of instrument vertical POSITION control.

7



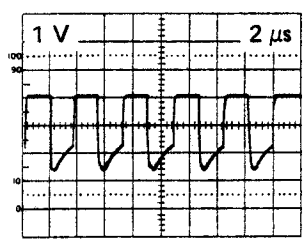
AC Coupled

8



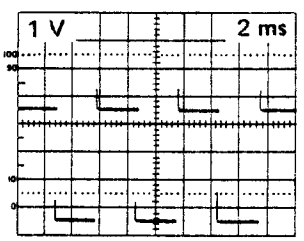
AC Coupled

9A



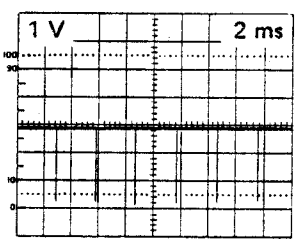
Instrument VERT MODE to CHOP
Test oscilloscope trigger SOURCE to CH 1

9B



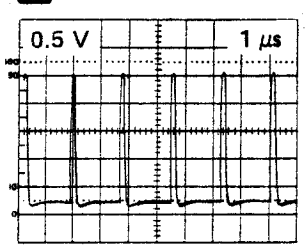
Instrument VERT MODE to ALT

10



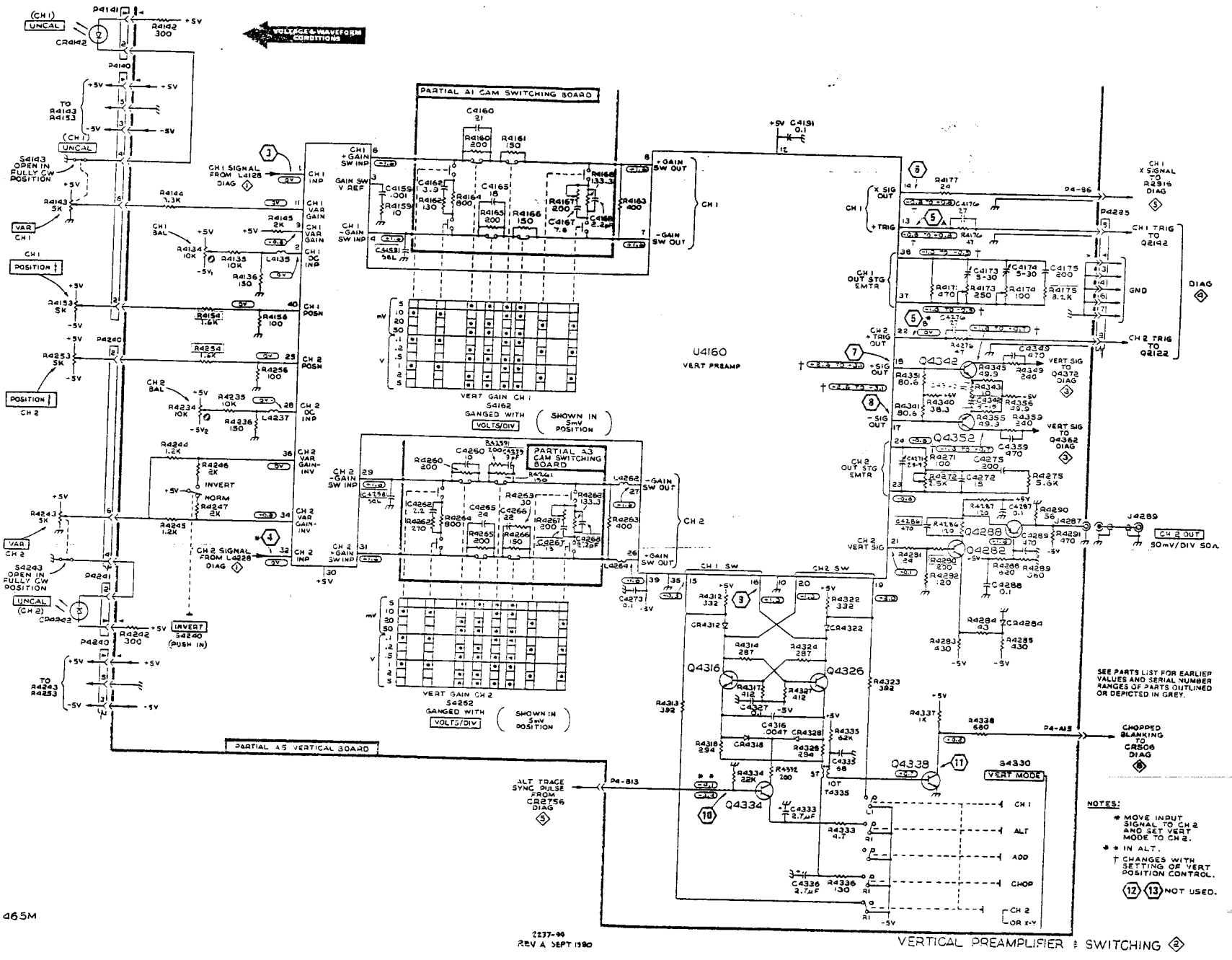
Instrument VERT MODE to ALT

11



Instrument VERT MODE to CHOP
Test oscilloscope trigger SOURCE to CH 1

2237-115



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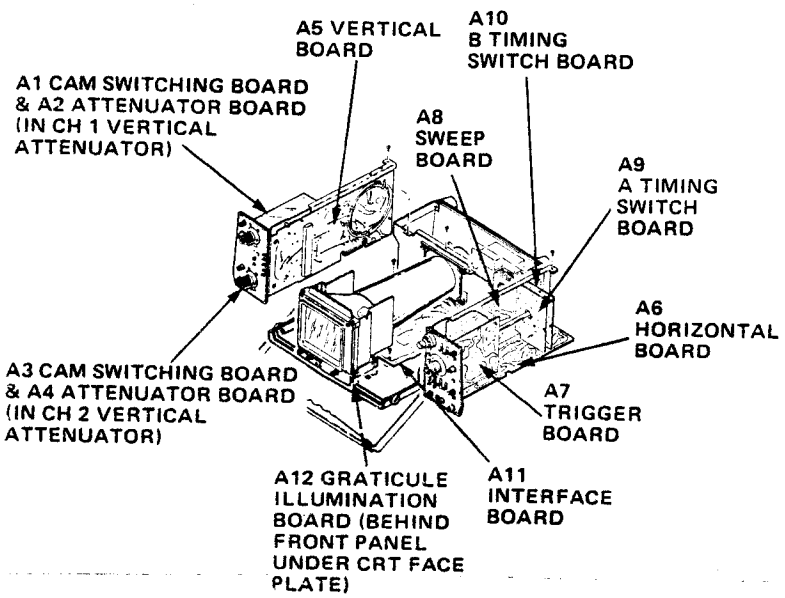
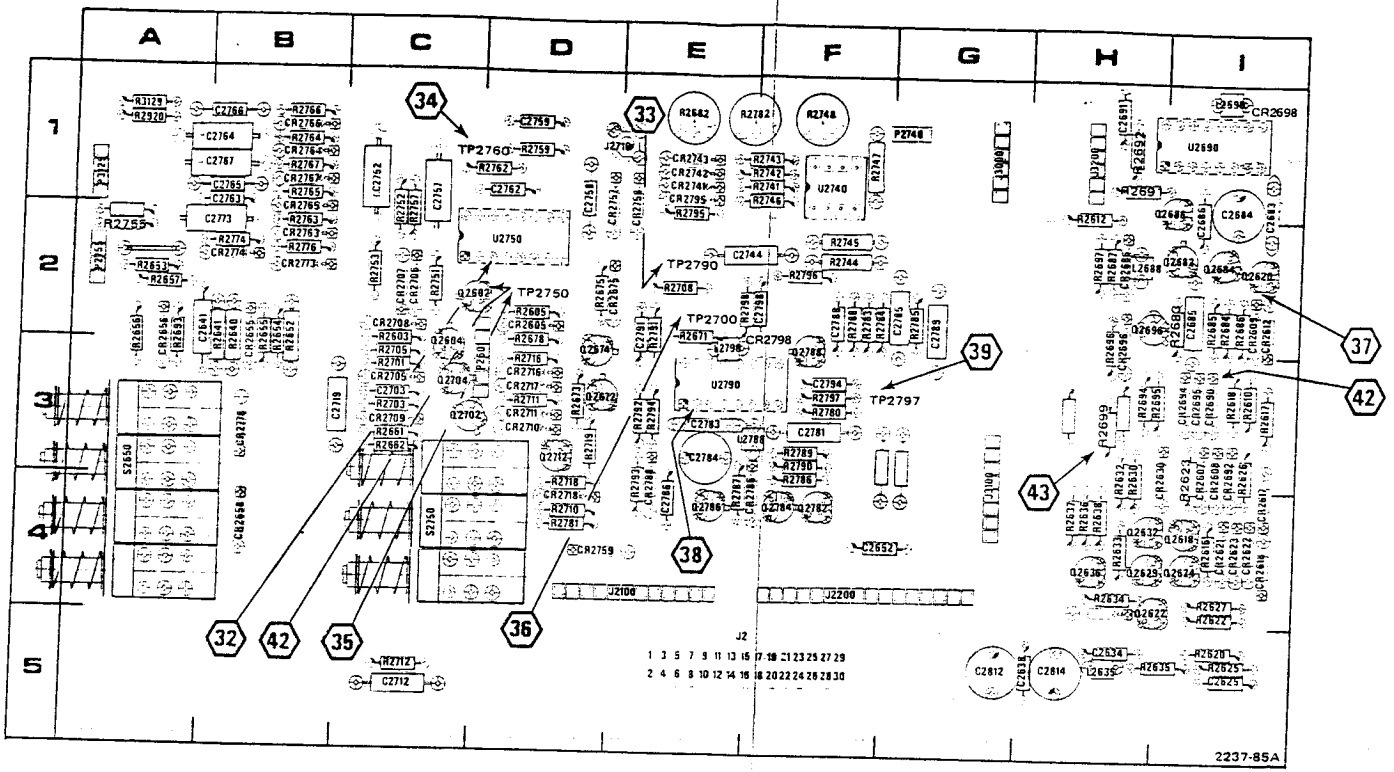




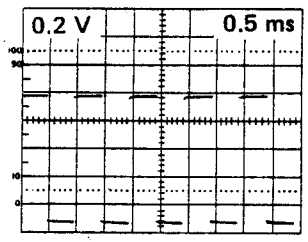
†On back of board.

Figure 6-11. A8 Sweep board component locations.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C2625	5I	C2758	1D	C2791	2E	CR2655	2B	CR2710	3D	CR2773	2B	L2688	2H	Q2629	4H	R2603	2C	R2634	4H	R2673	3D	R2699	3H	R2746	1F	R2776	2B	R2795	2E	U2740	1F
C2634	5H	C2759	1D	C2794	3F	CR2656	2A	CR2711	3D	CR2774	2B	L2698	1I	Q2632	4H	R2605	2D	R2635	5I	R2675	2D	R2701	3C	R2747	1F	R2780	3F	R2796	2F	U2750	2D
C2638	5H	C2762	1D	C2798	2F	CR2658	3B	CR2716	3D	CR2778	3B	L2788	3F	Q2636	4H	R2610	3I	R2636	4H	R2678	2D	R2703	3C	R2748	1F	R2781	4D	R2797	3F	U2790	3E
C2641	2A	C2763	1B	C2812	5G	CR2675	2D	CR2717	3D	CR2786	4F	L2798	3E	Q2672	3D	R2612	1H	R2637	4H	R2682	1E	R2705	3C	R2751	2C	R2782	1E	R2798	1E		
C2652	4F	C2764	1B	C2814	5H	CR2686	2H	CR2718	4D	CR2788	4E			Q2674	3D	R2616	4I	R2638	4H	R2683	2I	R2708	2E	R2752	2C	R2783	2F	R2920	1A		
C2683	1I	C2765	1B	CR2605	2D	CR2690	3A	CR2741	1E	CR2795	1E	P2601	3D	Q2682	2I	R2617	3I	R2640	3B	R2684	2I	R2710	4D	R2753	2C	R2784	2F	R3129	1A		
C2684	1I	C2766	1B	CR2607	3I	CR2692	3I	CR2742	1E	CR2798†		P2740	1G	Q2684	2I	R2618	3I	R2641	3B	R2685	2I	R2711	3D	R2755	2A	R2785	2G				
C2685	2I	C2767	1B	CR2608	3I	CR2694	3I	CR2743	1E	J2	5E	P2755	2A	Q2686	1I	R2620	5I	R2652	2B	R2686	2I	R2712	5C	R2757	2C	R2786	3F	S2650	3A		
C2686	1I	C2773	2B	CR2609	2I	CR2695	3I	CR2756	1E	J2100	4E	P3129	1A	Q2696	2H	R2622	4I	R2653	2A	R2687	2H	R2716	3D	R2759	1D	R2787	4E	S2750	4C		
C2691	1H	C2781	3F	CR2612	2I	CR2696	2H	CR2757	2D	J2200	4F			Q2702	3C	R2623	3I	R2654	2B	R2691	1H	R2718	4D	R2762	1D	R2788	2F				
C2703	3C	C2783	3E	CR2617	4I	CR2698†		CR2759	4D	J2716	1D	Q2602	2C	Q2704	3C	R2625	5I	R2655	2B	R2692	1H	R2719	3D	R2763	2B	R2789	3F	TP2700	2E		
C2712	5C	C2784	3E	CR2618	4I	CR2705	3C	CR2763	2B	J3000	1G	Q2604	3C	Q2712	3D	R2626	3I	R2656	2A	R2693	2A	R2741	1F	R2764	1B	R2790	3F	TP2750	2C		
C2719	3B	C2785	2G	CR2621	4I	CR2706	2C	CR2764	1B	J3100	3G	Q2618	4I	Q2782	4F	R2627	4I	R2657	2A	R2694	3H	R2742	1F	R2765	1B	R2791	2E	TP2760	1C		
C2744	1E	C2786	4E	CR2622	4I	CR2707	2C	CR2765	2B	J3200	1H	Q2620	2I	Q2784	4F	R2630	3H	R2661	3C	R2695	3H	R2743	1F	R2766	1B	R2792	3E	TP2790	2E		
C2752	1C	C2788	2F	CR2623	4I	CR2708	2C	CR2766	1B	L2635	5H	Q2622	4H	Q2786	4E	R2632	3H	R2662	3C	R2696	2H	R2744	2F	R2767	1B	R2793	4E				
C2757	1C	C2789	2G	CR2630	3I	CR2709	3C	CR2767	1B			Q2624	4I	Q2788	3F	R2633	4H	R2671	2E	R2697	2H	R2745	2F	R2774	2B	R2794	3E	U2690	1I		

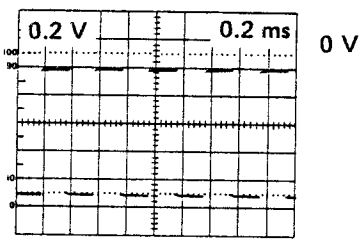
Refer to Waveform and Voltage Test Conditions.

14



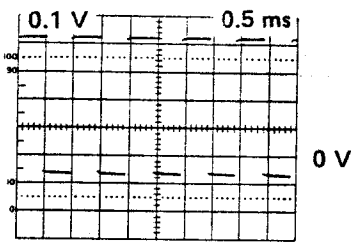
0 volt point depends on setting of instrument vertical POSITION control.

15



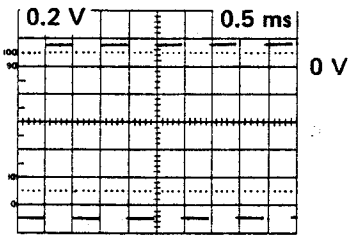
0 volt point depends on setting of instrument vertical POSITION control.

16



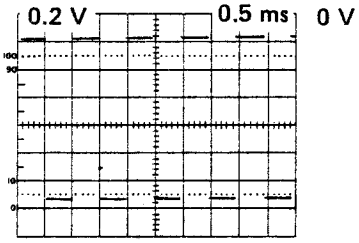
0 volt point depends on setting of instrument vertical POSITION control.

17



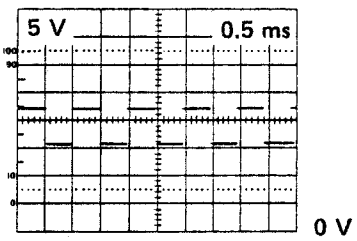
0 volt point depends on setting of instrument vertical POSITION control.

18



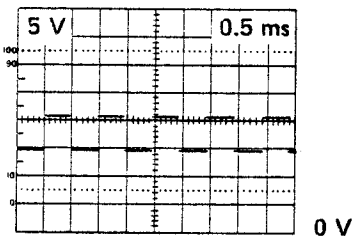
0 volt point depends on setting of instrument vertical POSITION control.

19



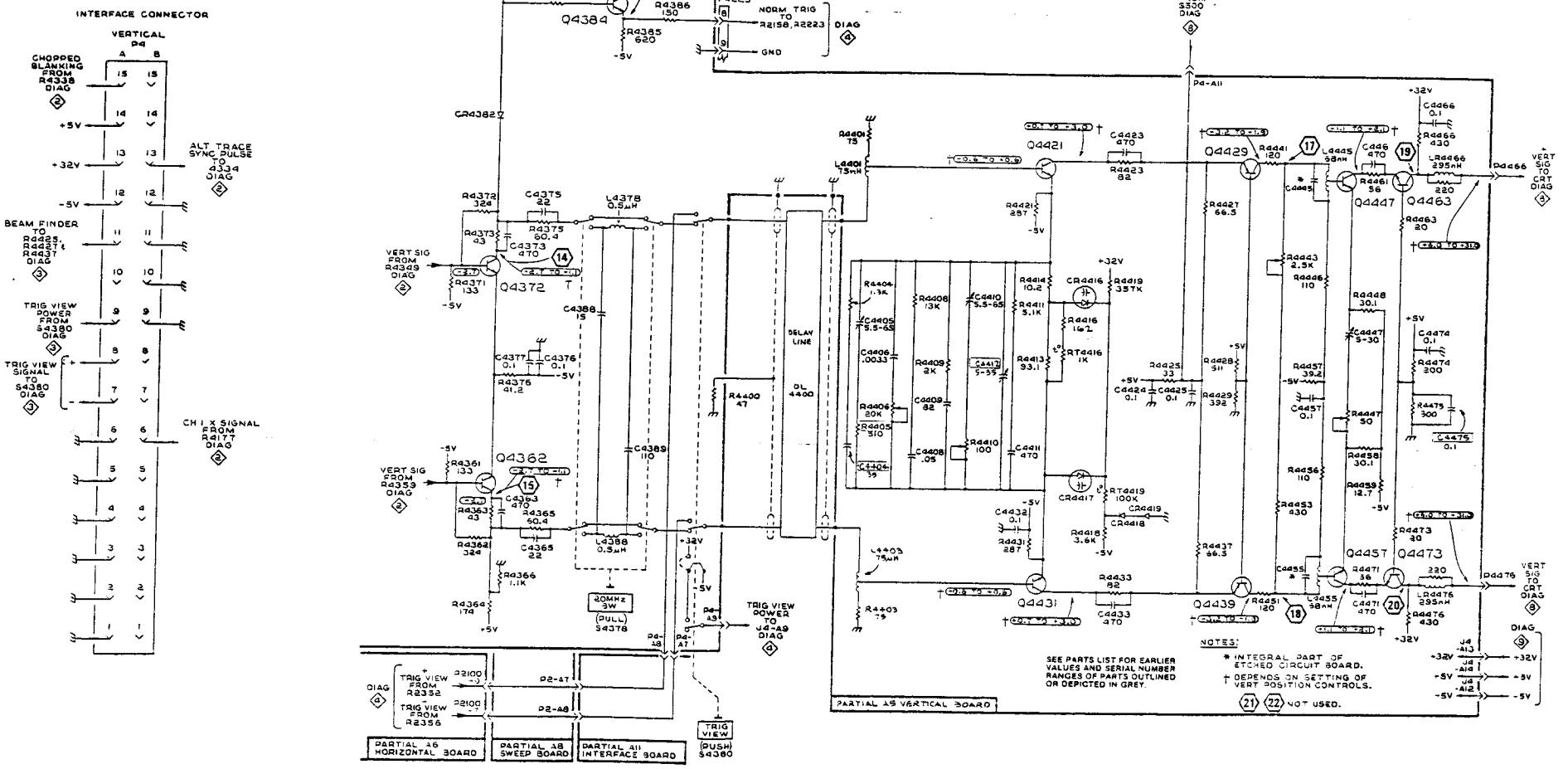
0 volt point depends on setting of instrument vertical POSITION control.

20



0 volt point depends on setting of instrument vertical POSITION control.

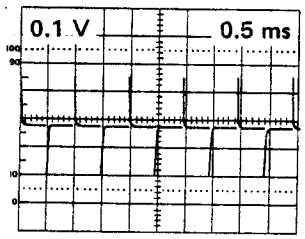
2237-116



DELAY LINE DRIVER, VERTICAL AMPLIFIER 3 & INTERFACE CONNECTOR

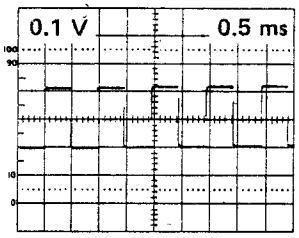
Refer to Waveform and Voltage Test Conditions.

23



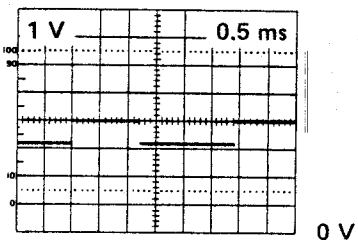
0 volt point depends on setting of instrument vertical POSITION control.

24



0 volt reference depends on setting of instrument LEVEL control. No signal with instrument coupling to LF REJ.

25



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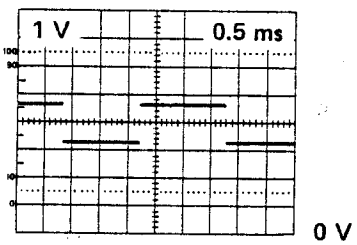

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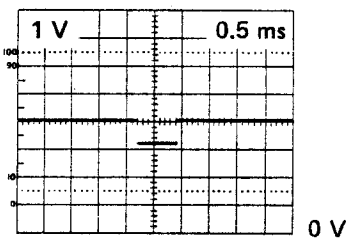
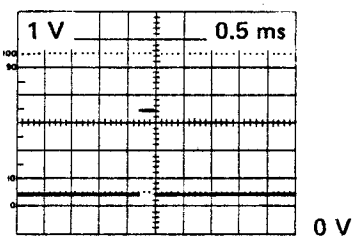
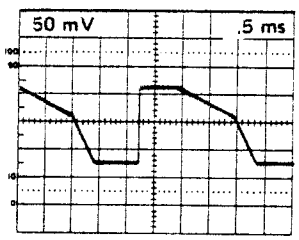


28





Sweep ramp from pin 2 of U2900 for time comparison.

2237-117

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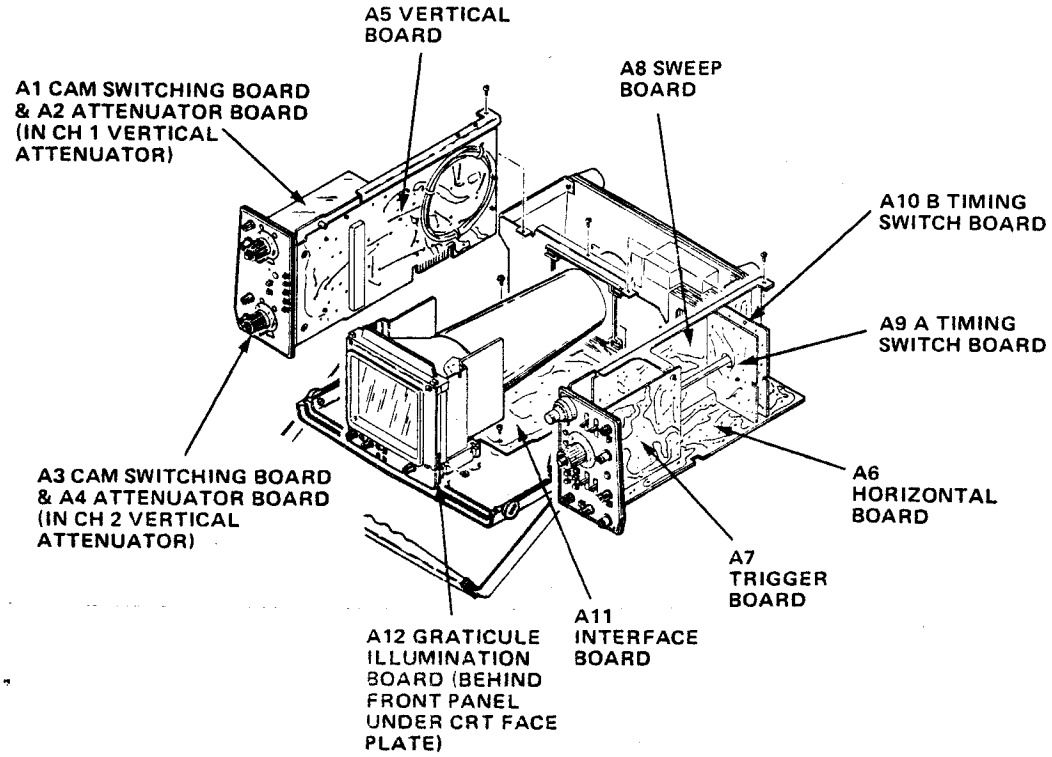
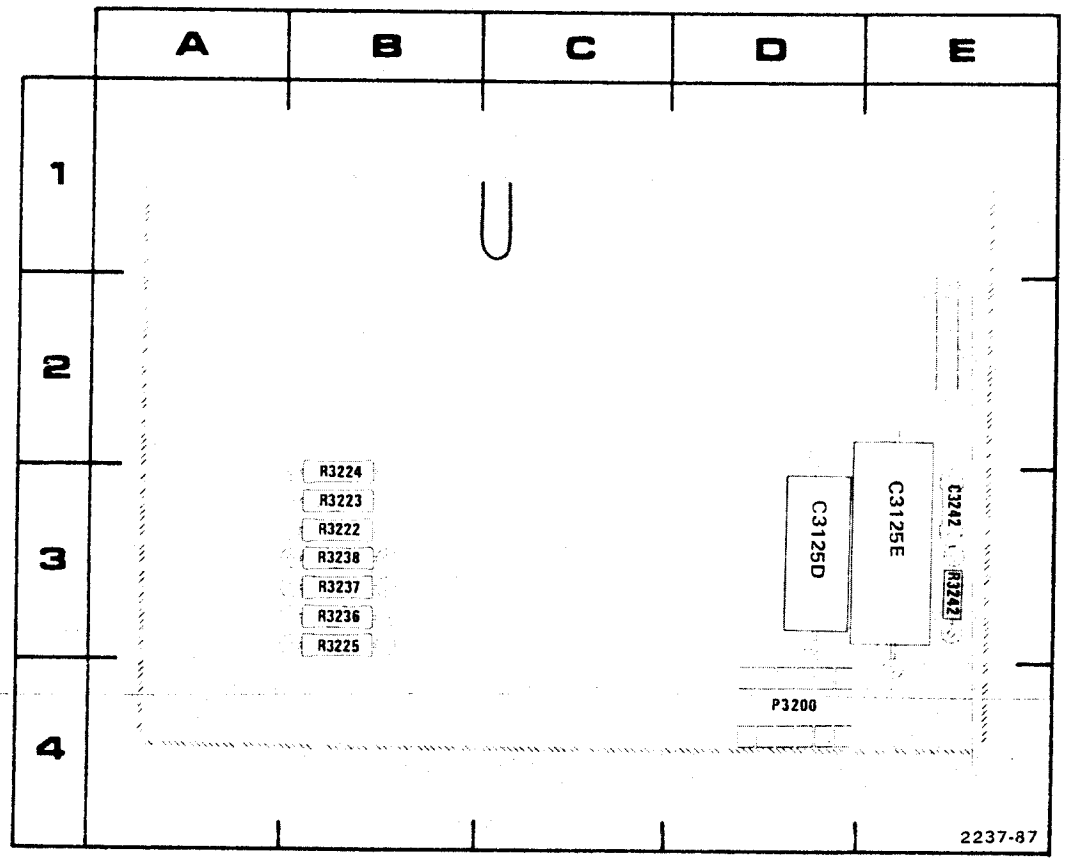

A5 VERTICAL BOARD
A8 SWEEP BOARD
A1 CAM SWITCHING BOARD & A2 ATTENUATOR BOARD (IN CH 1 VERTICAL ATTENUATOR)
A10 B TIMING SWITCH BOARD
A9 A TIMING SWITCH BOARD
A3 CAM SWITCHING BOARD & A4 ATTENUATOR BOARD (IN CH 2 VERTICAL ATTENUATOR)
A6 HORIZONTAL BOARD
A7 TRIGGER BOARD
A11 INTERFACE BOARD
A12 GRATICULE ILLUMINATION BOARD (BEHIND FRONT PANEL UNDER CRT FACE PLATE)



FOR LOCATION OF R3129, SEE A8 SWEEP BOARD

Figure 6-13. A10 Timing Switch bd (B Sweep) component locations.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C3242	3E	R3222	3B	R3237	3B
C3125D	3D	R3223	3B	R3238	3B
C3125E	3E	R3224	3B	R3242	3E
		R3225	3B		
P3200	4D	R3236	3B		

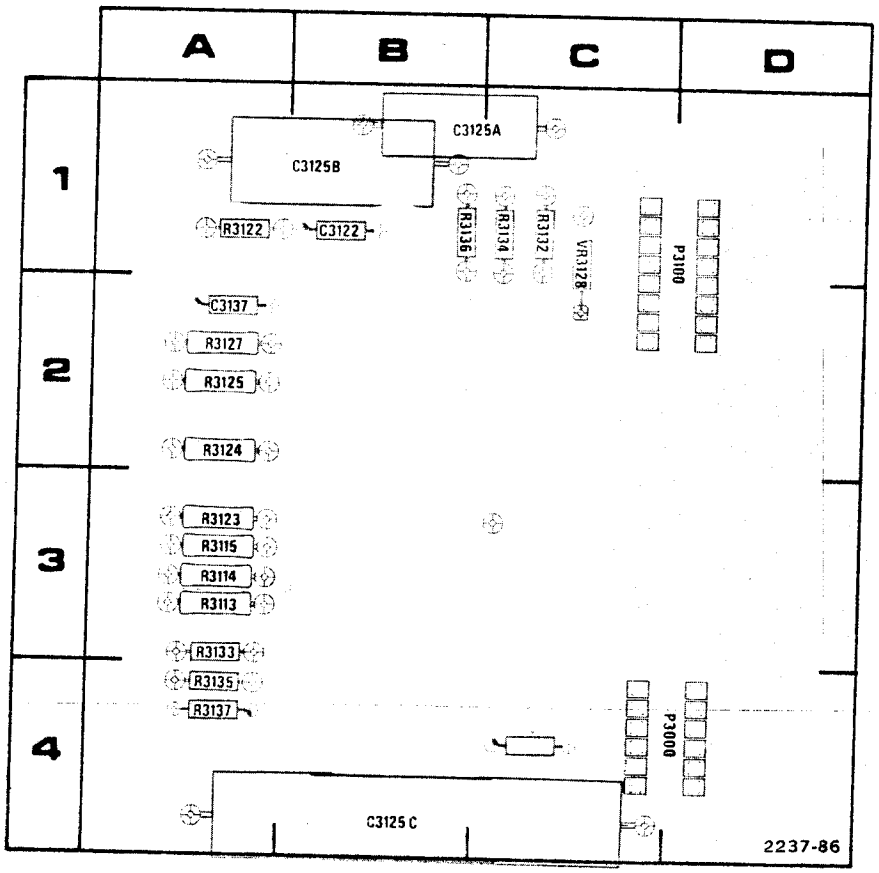
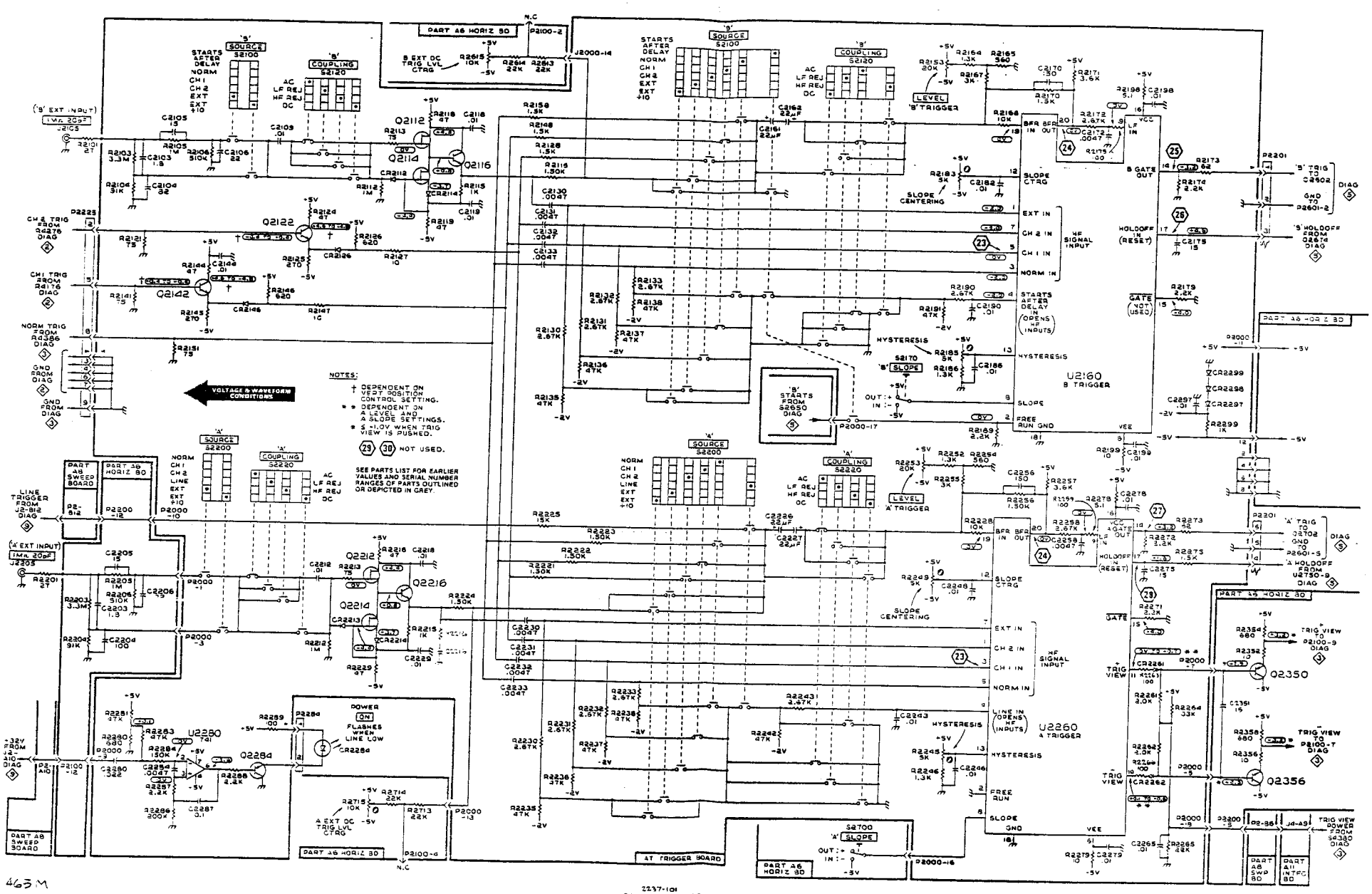


Figure 6-12. A9 Timing Switch bd (A Sweep) component locations.

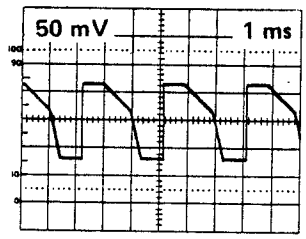
CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C3122	1B	R3113	3A	R3132	1C
C3125A	1B	R3114	3A	R3133	3A
C3125B	1B	R3115	3A	R3134	1C
C3125C	4B	R3122	1A	R3135	4A
C3137	2A	R3123	3A	R3136	1B
		R3124	2A	R3137	4A
P3000	4D	R3125	2A		
P3100	1D	R3127	2A	VR3128	1C

A9 TIMING SW (A) BD & A10 TIMING SW (B) BD COMPONENT LOCATIONS


TRIGGER AMPLIFIER
2237-101
REV A SEPT 1980
463 M
NOTES:
† DEPENDENT ON VERT POSITION CONTROL SETTING.
* * DEPENDENT ON A LEVEL AND A SLOPE SETTINGS.
* +1.0V WHEN TRIG VIEW IS PUSHED.
29 30 NOT USED.
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
VOLTAGE & WAVEFORM CONDITIONS
U2160 B TRIGGER
U2260 A TRIGGER
U2250
Q2112
Q2114
Q2116
Q2122
Q2142
Q2212
Q2214
Q2216
Q2284
Q2350
Q2356
HF SIGNAL INPUT
HYSTERESIS
SLOPE CENTERING
LEVEL
COUPLING
SOURCE
STARTS AFTER DELAY
POWER ON
FLASHES WHEN LINE LOW
A EXT DC TRIG LVL CTRG
B EXT DC TRIG LVL CTRG
A TRIGGER BOARD
PART A6 HORIZ BD
PART A8 SWEEP BOARD
TRIG VIEW POWER FROM A4380 DIAG
'A' TRIG TO J2702 DIAG
'B' TRIG TO J2502 DIAG
'A' HOLDOFF FROM U2750-9 DIAG
'B' HOLDOFF FROM J2674 DIAG
LINE TRIGGER FROM J2-812 DIAG
+32V FROM J2-A10 DIAG
CH 1 TRIG FROM A4176 DIAG
CH 2 TRIG FROM A4276 DIAG
NORM TRIG FROM A4386 DIAG
GND FROM DIAG
TRIG VIEW TO P2100-9 DIAG
TRIG VIEW TO P2100-7 DIAG
TRIGGER AMPL (FO-6)
FO-6 (Front)

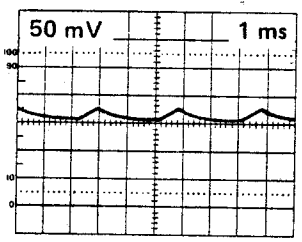
Refer to Waveform and Voltage Test Conditions.

(31) Use this waveform for time comparison



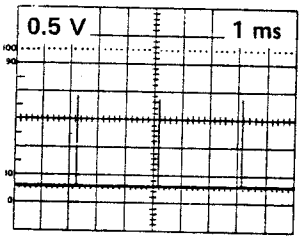
AC Coupled

(32) AC Coupled

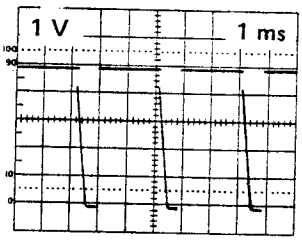


Amplitude of waveform increases as time between end of holdoff and triggering increases.

(33)

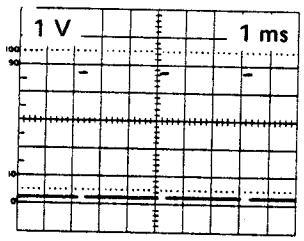


(34)



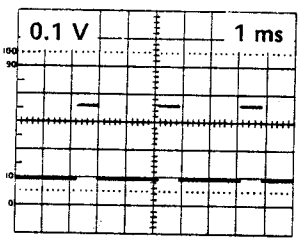
0 V

(35)



0 V

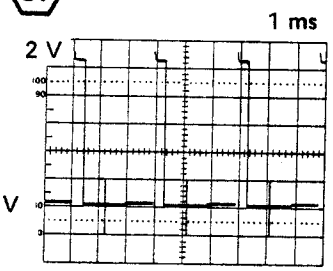
(36)



0 V

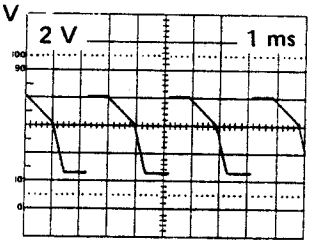
Instrument HORIZ MODE set to A or A INTEN. In B DLY'D or MIX, TP2797 is at −5 V dc.

(37)



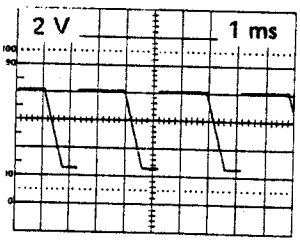
Slight positive step at −0.6 V only present in MIX. Positive spike at −0.6 V is higher in A INTEN and B DLY'D modes.

(38)



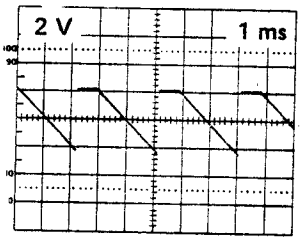
Position of transition between A and B sweep rates dependent on setting of instrument DELAY TIME POS control.

(38)

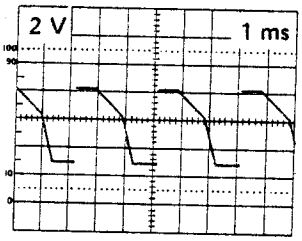


Instrument HORIZ MODE to B DLY'D. Beginning of sweep ramp dependent on setting of instrument DLEAY TIME POS control.

(39)

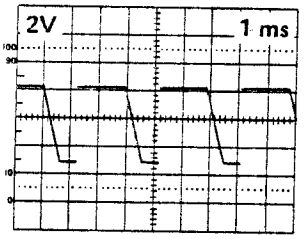


(40)



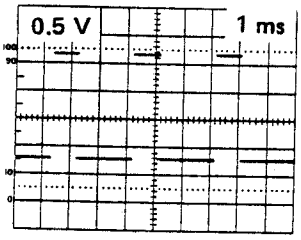
Instrument HORIZ MODE set to B DLY'D.

(40)



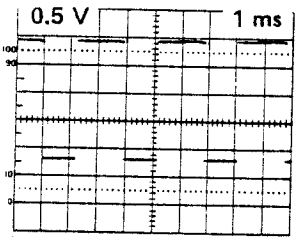
With instrument HORIZ MODE set to A or A INTEN, TP2697 goes to −5 V dc.

(41)



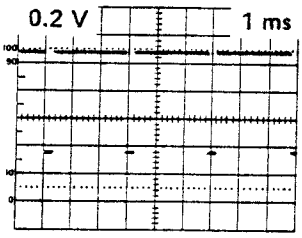
0 V

(42)



0 V

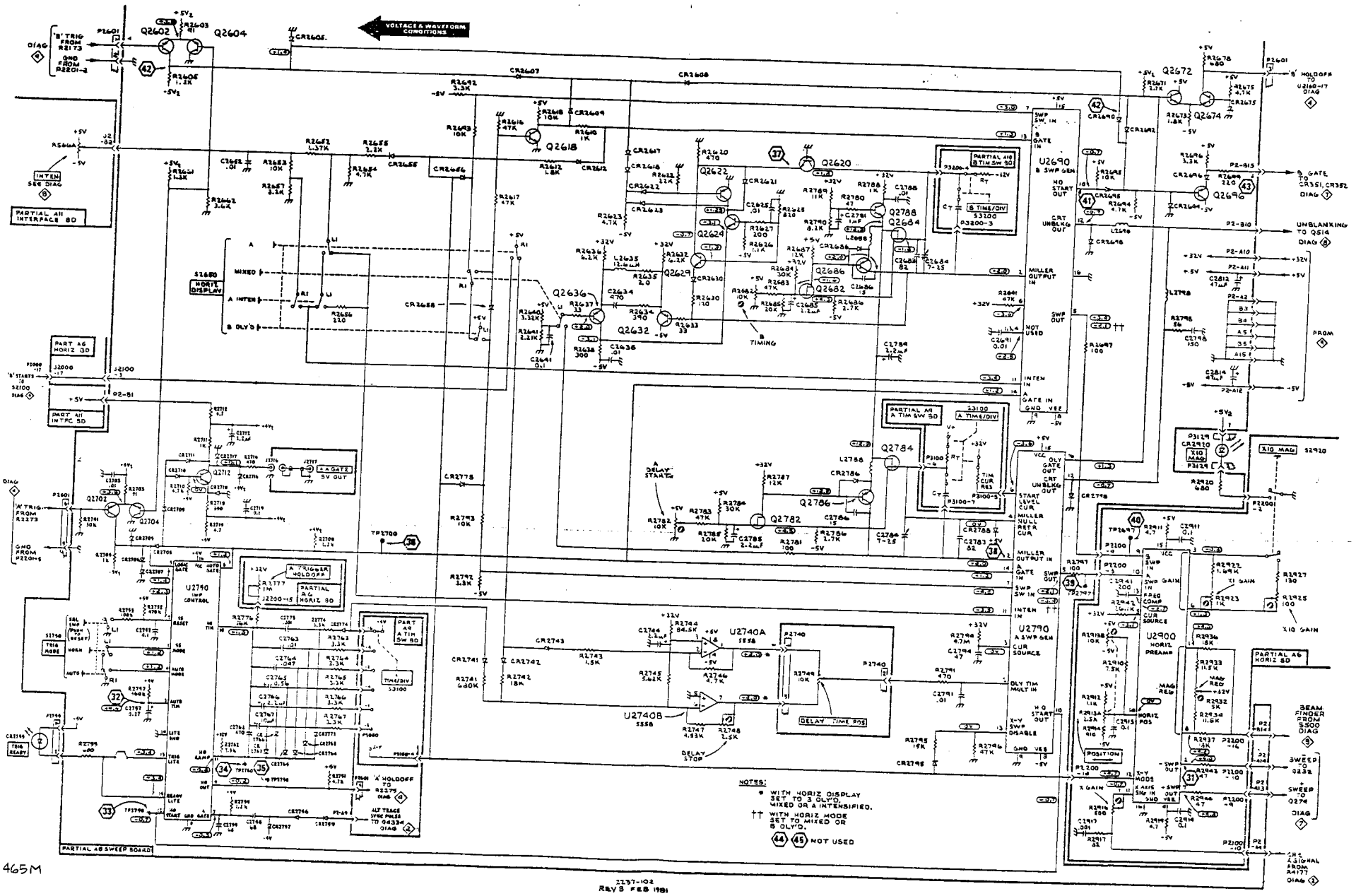
(43)



0 V

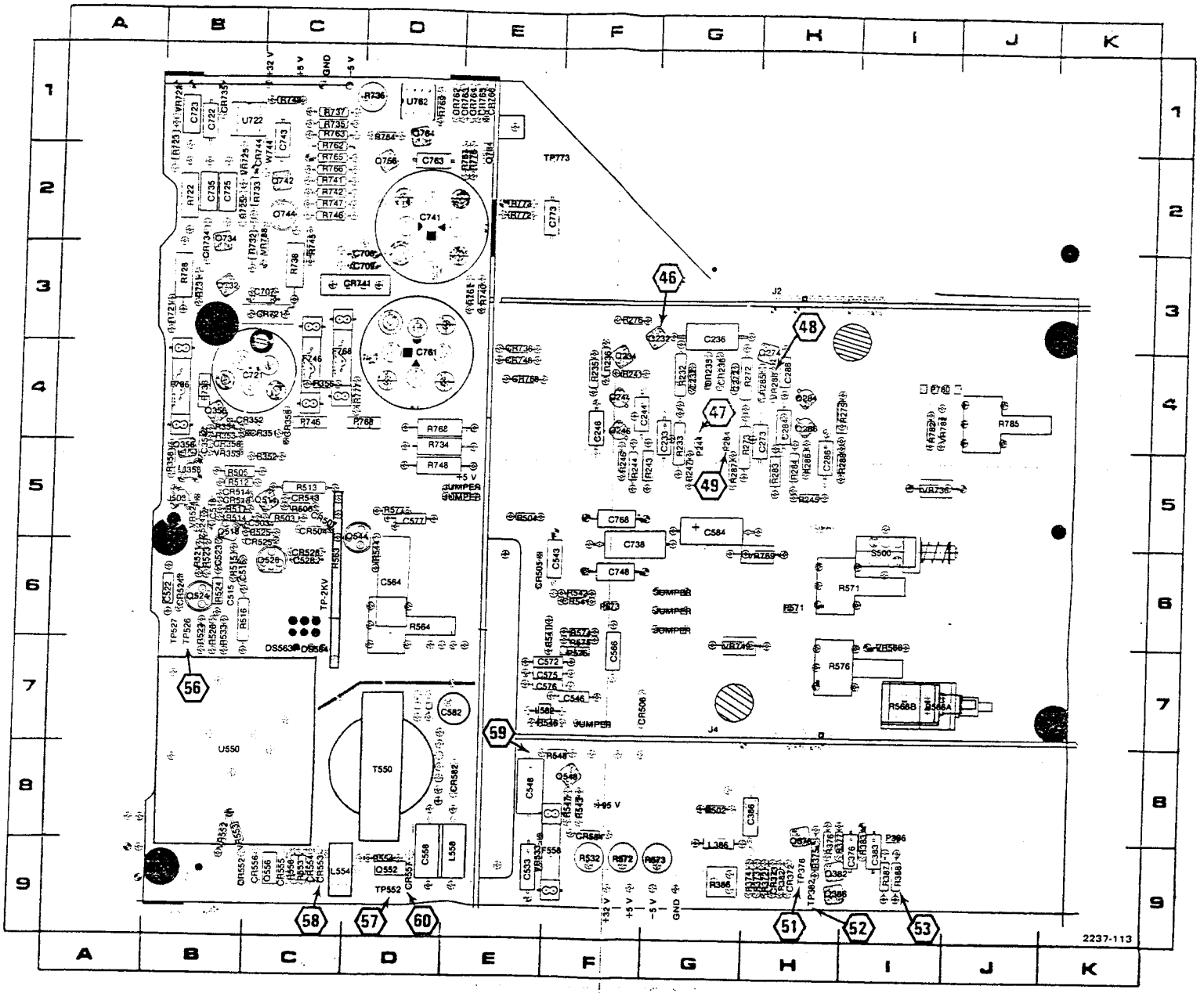
LO when (41) (42) are both LO

2237-118



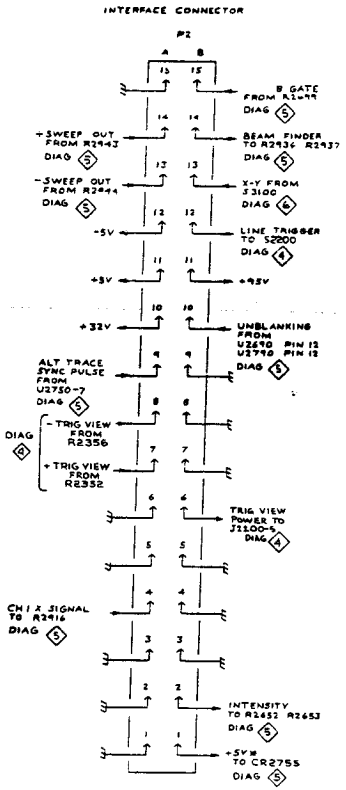
FO-7 (Front)
(FO-7 Rear Blank)

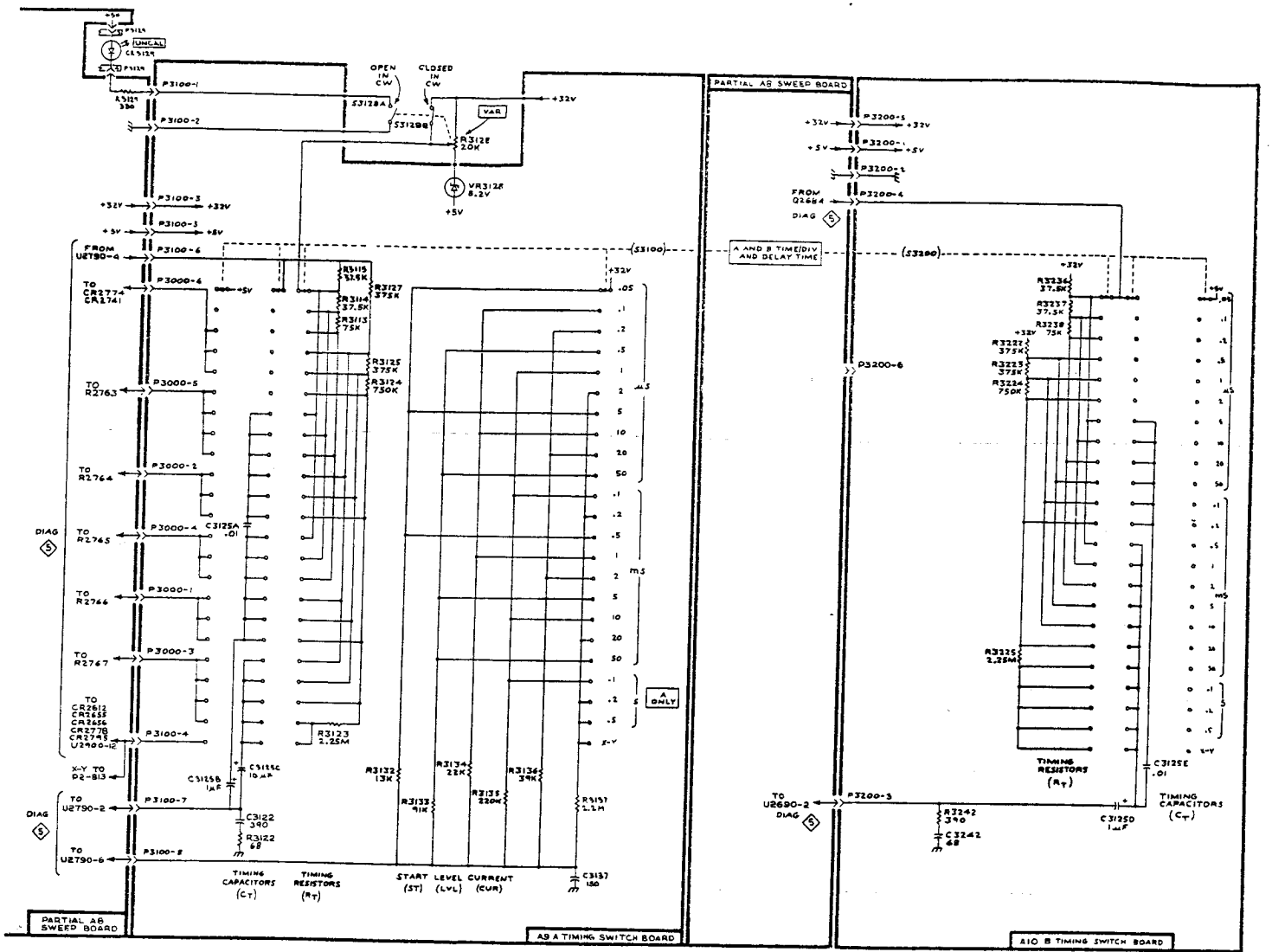
CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C232	4G	C721	4B	CR557	9D	P571	6H	R235	4F	R506	5C	R723	2B	TP376	9H
C233	4G	C722	1B	CR582	8E	P573	6F	R236	4F	R512	5B	R725	2B	TP382	9H
C236	3G	C723	1B	CR584	8F	P575	7F	R241	4F	R513	5C	R728	3B	TP526	6B
C244	4F	C725	2B	CR721	3C	P736	4B	R243	5F	R514	5B	R731	3B	TP527	6B
C246	4F	C735	2B	CR734	3B	P746	4C	R244	5F	R515	6B	R732	3B	TP552	9D
C272	4G	C738	5F	CR735	1B	P768	4D	R245	5H	R516	6B	R733	2B	TP773	2E
C273	4H	C741	2D	CR738	4E	P780	4I	R246	5F	R517	5B	R734	5D		
C284	4H	C743	1C	CR741	3C			R247	5G	R521	6B	R735	1C	U550	8B
C286	5H	C748	6F	CR744*	2B	Q232	3G	R272	4G	R522	6B	R736	1D	U722	1B
C288	4H	C761	4D	CR748	4E	Q234	4F	R273	4G	R523	6B	R737	1C	U762	1C
C354	5B	C763	2D	CR762	1D	Q244	4F	R275	4H	R524	6B	R738	3C		
C376	9I	C768	5F	CR763	1E	Q246	4F	R276	3F	R525	5C	R740	3E	VR288	4H
C383	9I	C773	2E	CR764	1E	Q274	4H	R283	5H	R526	6B	R741	2C	VR353	5B
C386	8G			CR765	1E	Q284	4H	R284	5H	R532	9F	R742	2C	VR524	5B
C503	5C	CR235	4G	CR766	1E	Q286	4H	R285	4H	R533	6B	R743	1C	VR533	9E
C515	6B	CR236	4G	CR768	4E	Q356	4B	R286	5H	R541	6F	R745	3C	VR552	8B
C516	6B	CR351	4C			Q358	5B	R287	5G	R542	6F	R746	2C	VR553*	8B
C518	5B	CR352	4B	DS563	7C	Q376	8G	R288	5H	R543	8F	R747	2C	VR566	7I
C522	6B	CR353	5B	DS564	7C	Q382	9H	R352	5C	R544	6D	R748	5D	VR722	1B
C523	6B	CR358	4C			Q386	9H	R353	4B	R546	7F	R761	3E	VR725	2B
C524	5B	CR372	9H	F558	9F	Q514	5C	R354	4B	R547	8F	R762	2C	VR736	5I
C528	6C	CR373	9H	F736	4B	Q518	5B	R356	4C	R548	8F	R763	1C	VR738	3C
C533	9E	CR504	5C	F746	4C	Q524	6B	R358	5B	R553	9C	R764	1D	VR749	7G
C543	6F	CR505	6E	F768	4C	Q526	6C	R372	9H	R554	9D	R765	2C	VR769	6H
C545	7F	CR506	7F			Q544	5D	R373	9H	R556	9C	R766	2C	VR782	4I
C548	8E	CR507	5C	J2	3H	Q548	8F	R374	9H	R563	6C	R767	2E		
C558	9D	CR513	5C	J4	7G	Q552	9D	R375	9H	R564	6D	R768	4D	W744*	2C
C564	6D	CR514	5B	J358	5B	Q556	9C	R376	8H	R566A	7I	R769	1D		
C566	7F	CR518	5B	J503	5B	Q732	3B	R377	8H	R566B	7I	R772	2E		
C572	7F	CR524	6B			Q734	2B	R382	9H	R571	6I	R773	2E		
C575	7F	CR525	6C	L386	9G	Q742	2C	R383	9I	R572	9F	R776	2E		
C576	7F	CR528	6C	L554	9C	Q744	2C	R386	9G	R573	9G	R777	4D		
C577	5D	CR541	6F	L558	9E	Q764	1D	R387	9I	R574	6F	R782	4I		
C582	7E	CR552	9B	L582	7E	Q766	2D	R388	9I	R575	6F	R785	4J		
C584	5G	CR553	9C			Q784	2E	R502	8G	R576	7H				
C707	3C	CR554	9C	P244	4G			R503	5C	R577	5D	S500	6I		
C708	3D	CR555	9C	P284	4G	R232	4G	R504	5E	R721	3B				
C709	3D	CR556	9C	P386	9I	R233	4G	R505	5B	R722	2B	T550	8D		



*See Parts List for serial number ranges.

Figure 6-14. A11 Interface board component locations.





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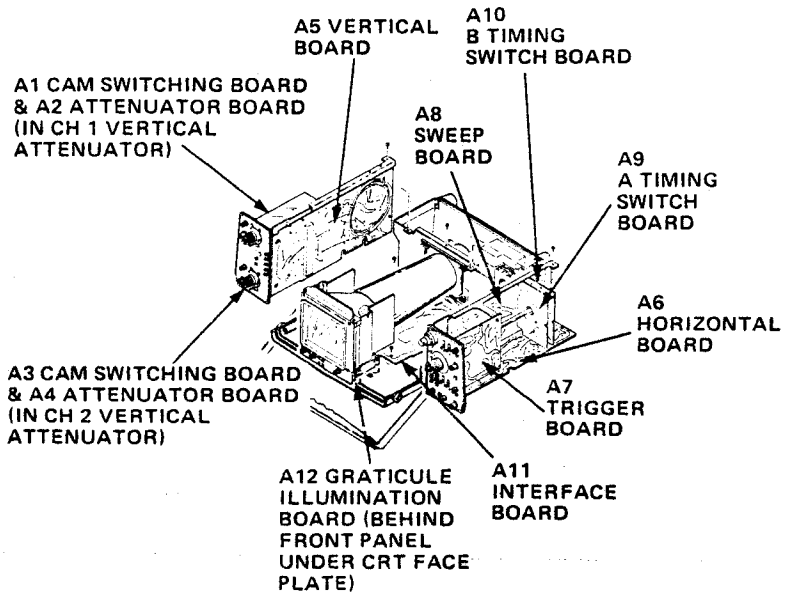
REV B FEB 1981

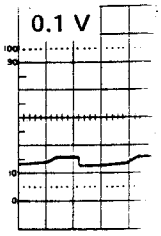
A&B TIMING SWITCH & INTERFACE CONNECTOR 6

465M

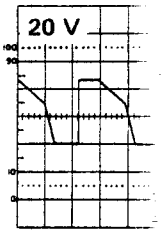
FO-8 (Front)
(FO-8 Rear Blank)



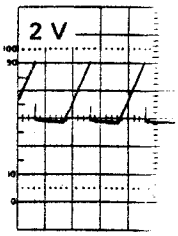
46



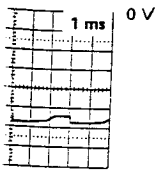
49

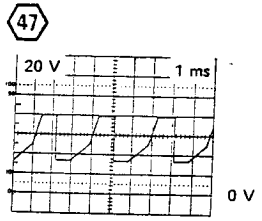


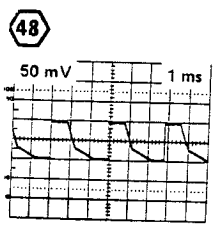
52

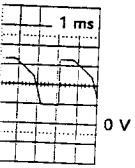


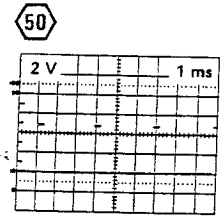
Refer to Waveform and Voltage Test Conditions.

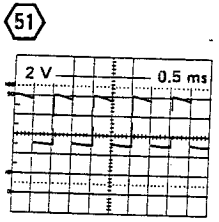


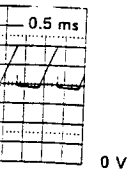


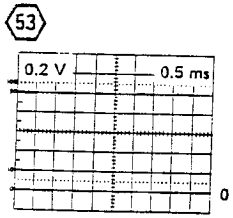












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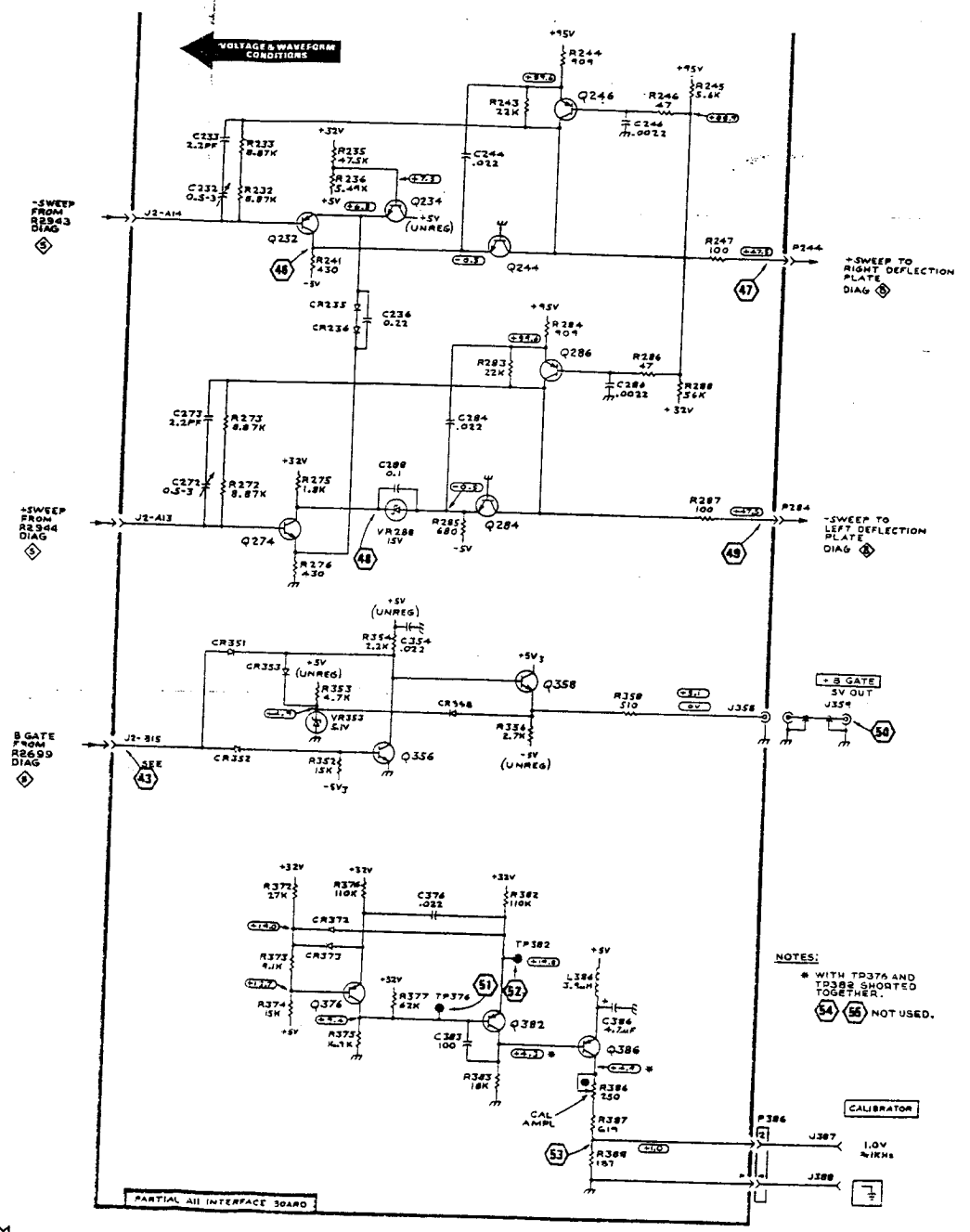

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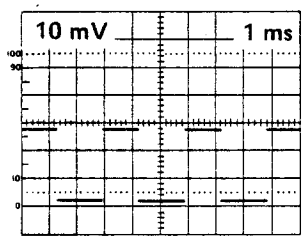
REV B FEB 1981

HORIZONTAL AMPLIFIER, +B GATE & CALIBRATOR 7

FO-9 (Front)
(FO-9 Rear Blank)

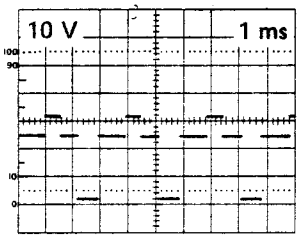
Refer to Waveform and Voltage Test Conditions.

56



0 V

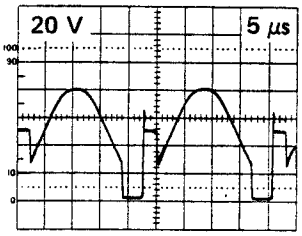
56



0 V

Instrument HORIZ MODE to A INTEN

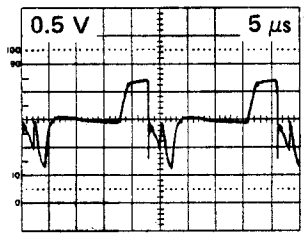
57



0 V

Test scope trigger SOURCE to CH 1

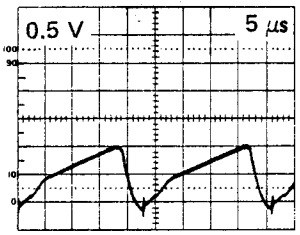
58



0 V

Test scope trigger SOURCE to CH 1

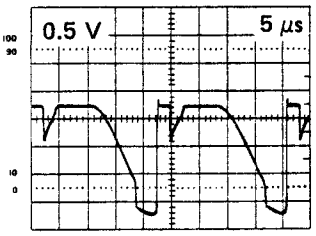
59



0 V

Test scope trigger SOURCE to CH 1

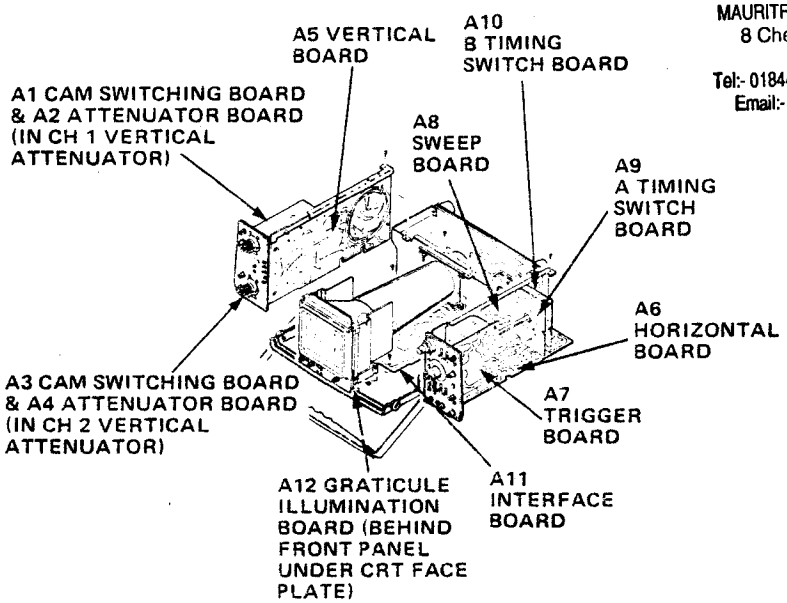
60

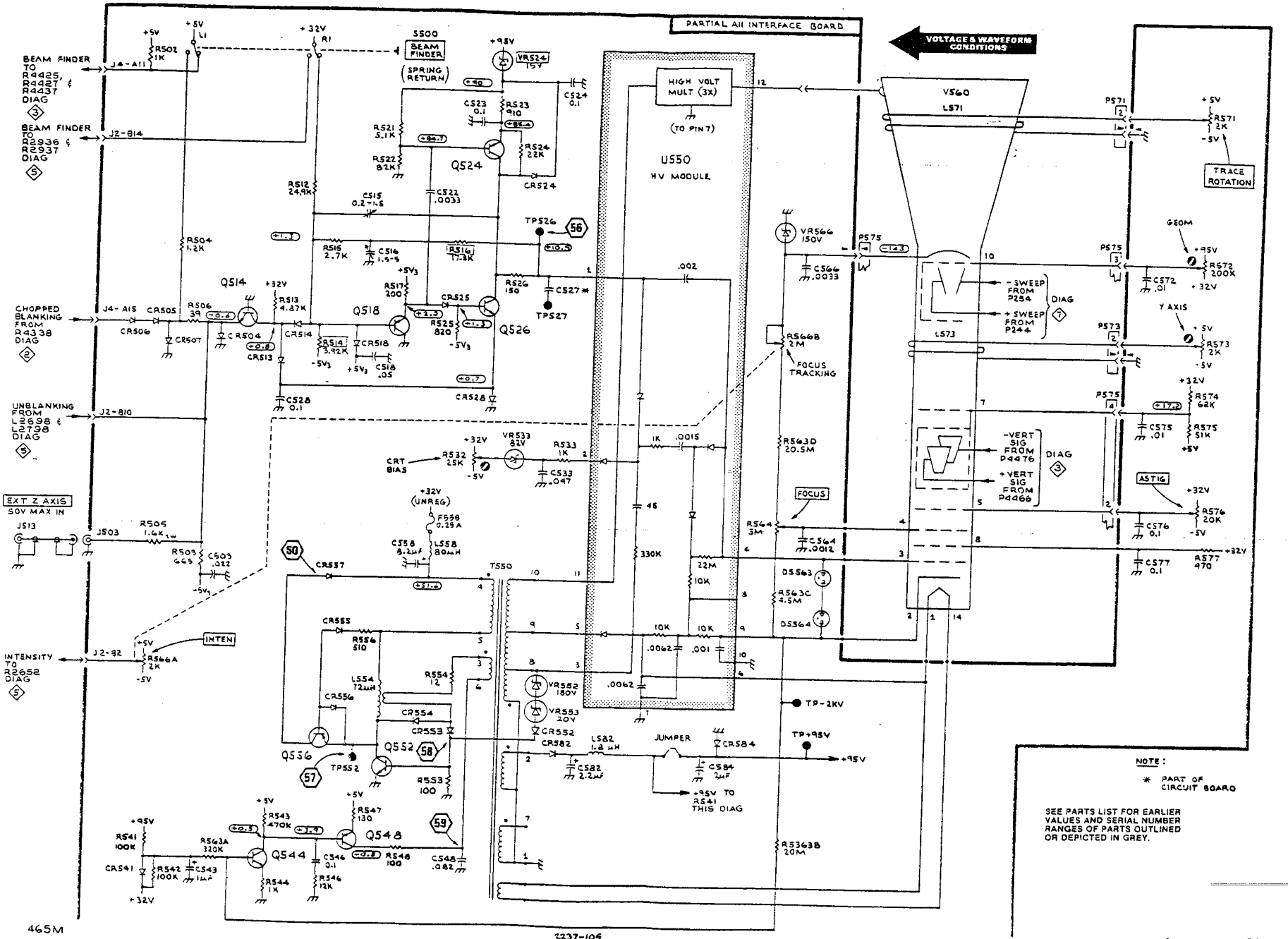


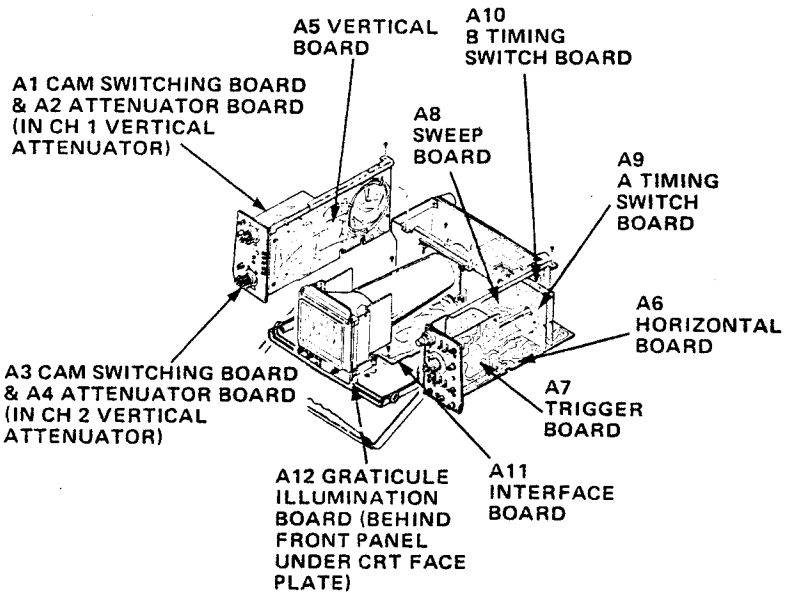
0 V

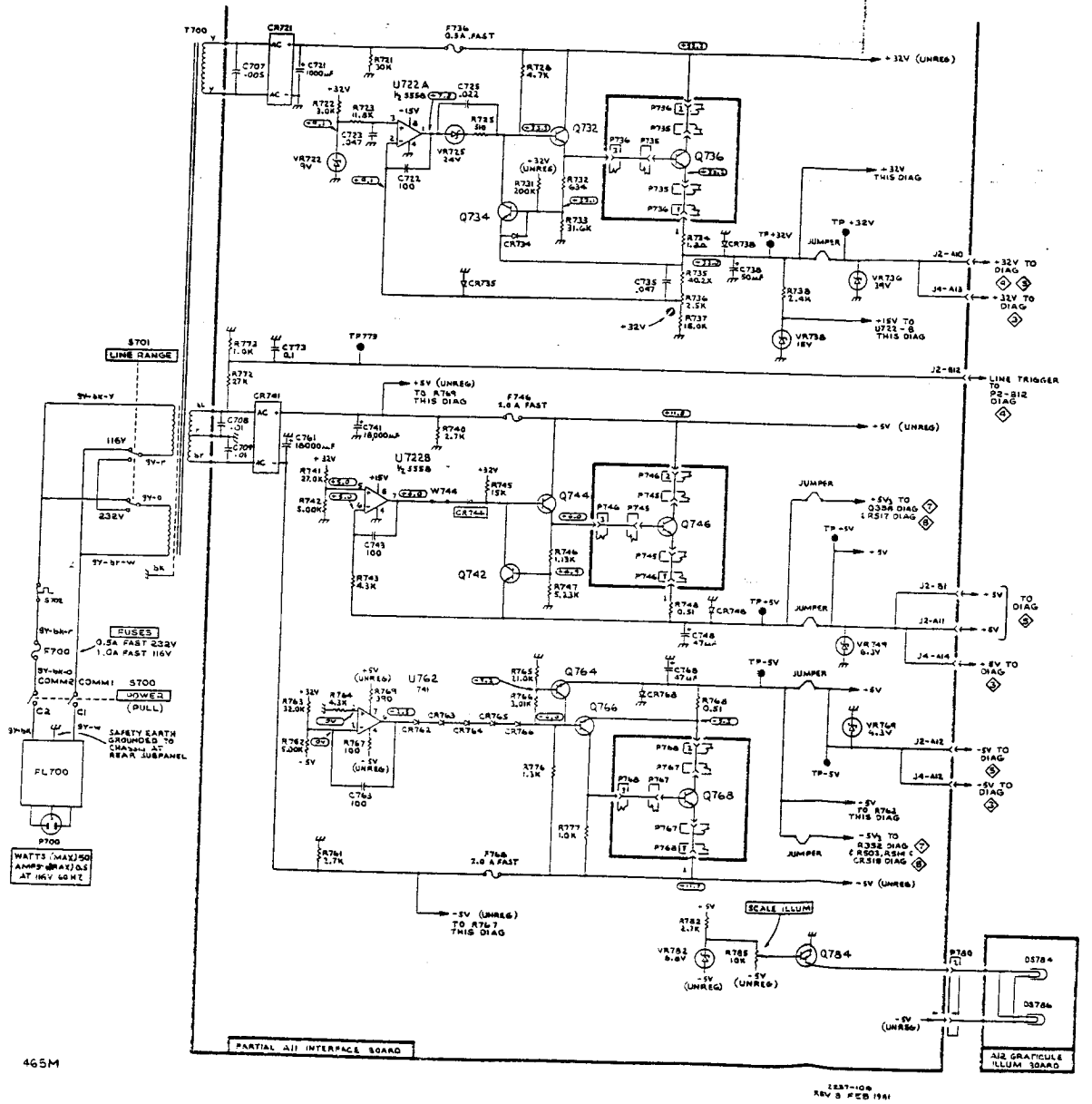
Test scope trigger SOURCE to CH 1

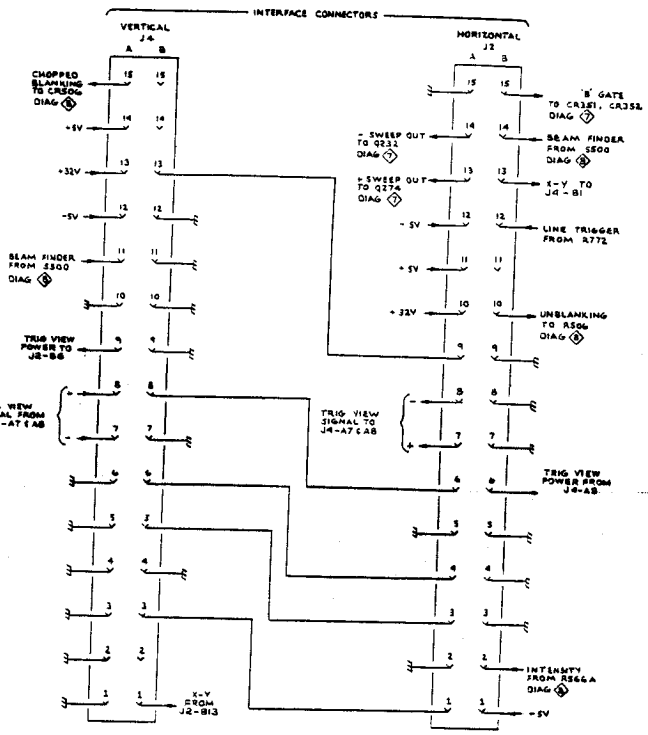
2237-120




PARTIAL A11 INTERFACE BOARD
VOLTAGE & WAVEFORM CONDITIONS
BEAM FINDER TO R4425, R4427 & R4437 DIAG
BEAM FINDER TO R2936 & R2937 DIAG
S500 BEAM FINDER (SPRING RETURN)
HIGH VOLT MULT (3X)
U550 HV MODULE
V560 LS71
TRACE ROTATION
CHOPPED BLANKING FROM R4338 DIAG
UNBLANKING FROM L2698 & L2798 DIAG
EXT Z AXIS 50V MAX IN
INTENSITY TO R2652 DIAG
INTEN
CRT BIAS
FOCUS
FOCUS TRACKING
ASTIG
GEOM
Y AXIS
-SWEEP FROM P254
+SWEEP FROM P244
-VERT SIG FROM P4476
+VERT SIG FROM P4466
DIAG
LS73
JUMPER
TP-2KV
TP+95V
+95V TO R541 THIS DIAG
NOTE :
* PART OF CIRCUIT BOARD
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
2237-105
REV B FEB 1981
465M
CRT & Z AXIS
FO-10 (Front)
(FO-10 Rear Blank)

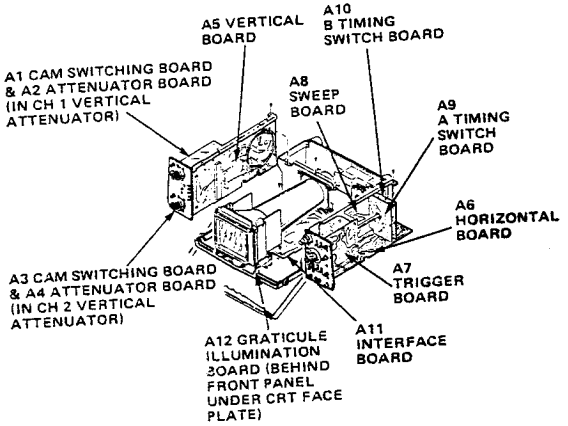


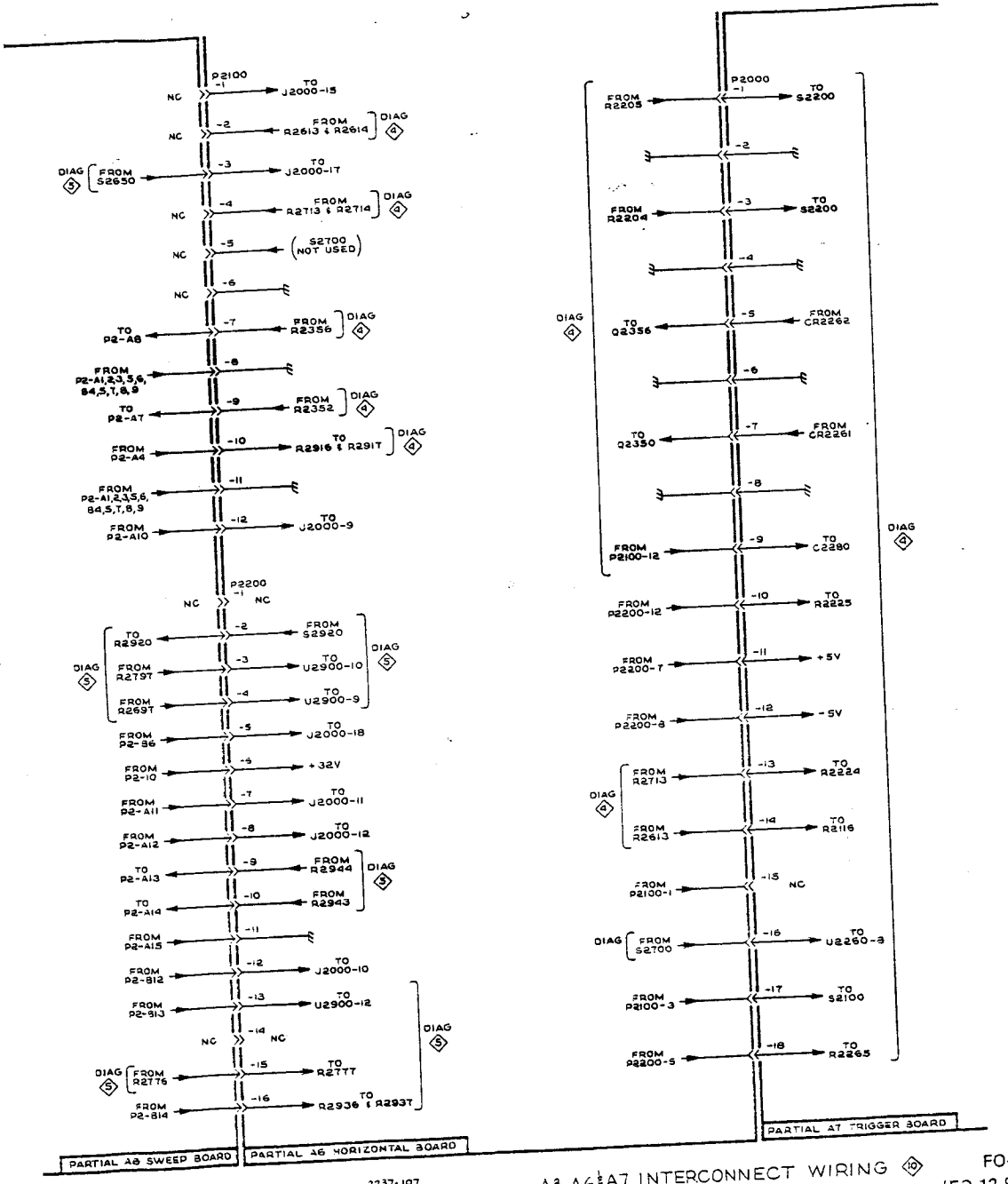




SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.

POWER SUPPLY & INTERFACE CONNECTORS ⑨

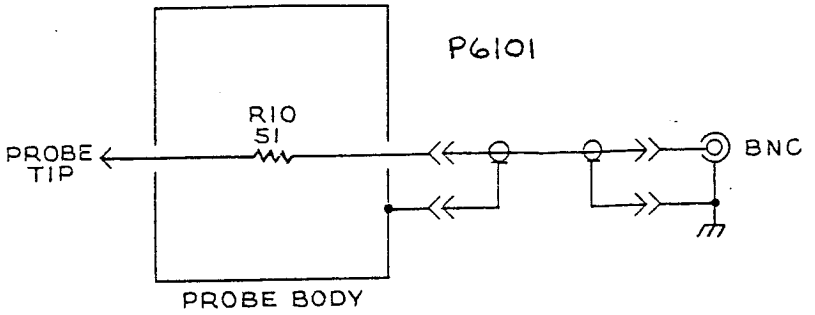


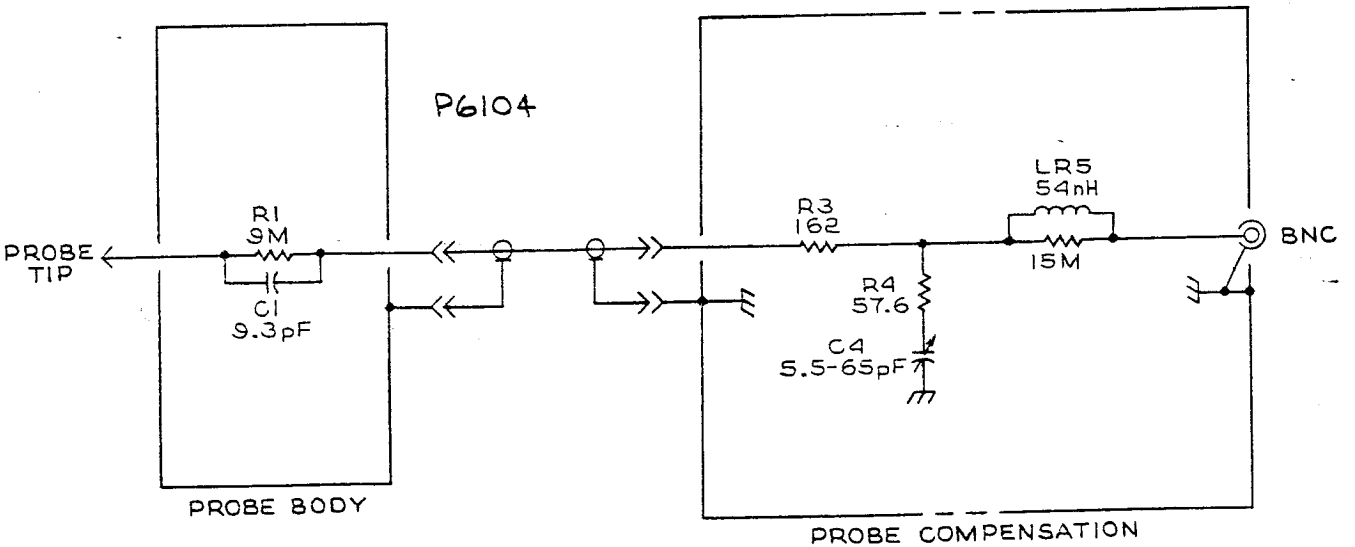


A8, A6 & A7 INTERCONNECT WIRING ⑩

FO-12 (Front)
(FO-12 Rear Blank)

7137-107
REV B FEB 1981





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