Instruction Manual

Tektronix

TPG–625
PAL Pattern Generator
070-7248-00

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

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Subsidiaries and distributors worldwide

WARRANTY

Tektronix warrants that this product that it manufactures and sells 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; 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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Certificate of the Manufacturer/Importer

We hereby certify that the TPG-625 PAL Pattern Generator complies with the RF Interference Suppression requirements of Amtsbl.-Vfg 1046/1984.

The German Postal Service was notified that the equipment is being marketed.

The German Postal Service has the right to re-test the series and to verify that it complies.

TEKTRONIX

Bescheinigung des Herstellers/Importeurs

Hiermit wird bescheinigt, daß der/die/das TPG-625 PAL Pattern Generator in Übereinstimmung mit den Bestimmungen der Amtsblatt-Verfügung 1046/1984 funkentstört ist.

Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprufüng der Serie auf Einhalten der Bestimmungen eingeräumt.

TEKTRONIX

NOTICE to the user/operator:

The German Postal Service requires that this equipment, when used in a test setup, may only be operated if the requirements of Postal Regulation, Vfg. 1046/1984, Par. 2, Sect. 1.7.1 are complied with.

HINWEIS für den Benutzer/Betreiber:

Dies Gerät darf in Meßaufbauten nur betrieben werden, wenn die Voraussetzungen des Par. 2, Ziff. 1.7.1 der Vfg. 1046/1984 eingehalten werden.

NOTICE to the user/operator:

The German Postal Service requires that Systems assembled by the operator/user of this instrument must also comply with Postal Regulation, Vfg. 1046/1984, Par. 2, Sect. 1.

HINWEIS für den Benutzer/Betreiber:

Die vom Betreiber zusammengestellte Anlage, innerhalb derer dies Gerät eingesetzt wird, muß ebenfalls den Voraussetzungen nach Par. 2, Ziff. 1 der Vfg. 1046/1984 genugen.

SAFETY SUMMARY

The general safety information in this part of the summary is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

TERMS

In This Manual

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

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

As Marked on Equipment

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

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

SYMBOLS

In This Manual

This symbol indicates where applicable cautionary or other information is to be found.

As Marked on Equipment

DANGER — High voltage.

Protective ground (earth) terminal.

ATTENTION — refer to manual.

Power Source

This product is intended to operate from a power module connected to a power source that will not apply more than 250 volts 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.

Ground the Product

This product is grounded through the grounding conductor of the power module power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A protective ground connection by way of the grounding conductor in the power module 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 electric shock.

Use the Proper Fuse

To avoid fire hazard, use only the fuse of correct type, voltage rating, and current rating as specified in the parts list for your product.

Refer fuse replacement to qualified service personnel.

Do Not Operate in Explosive Atmospheres

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

Do Not Operate Without Covers

To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

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.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ILLUSTRATIONS

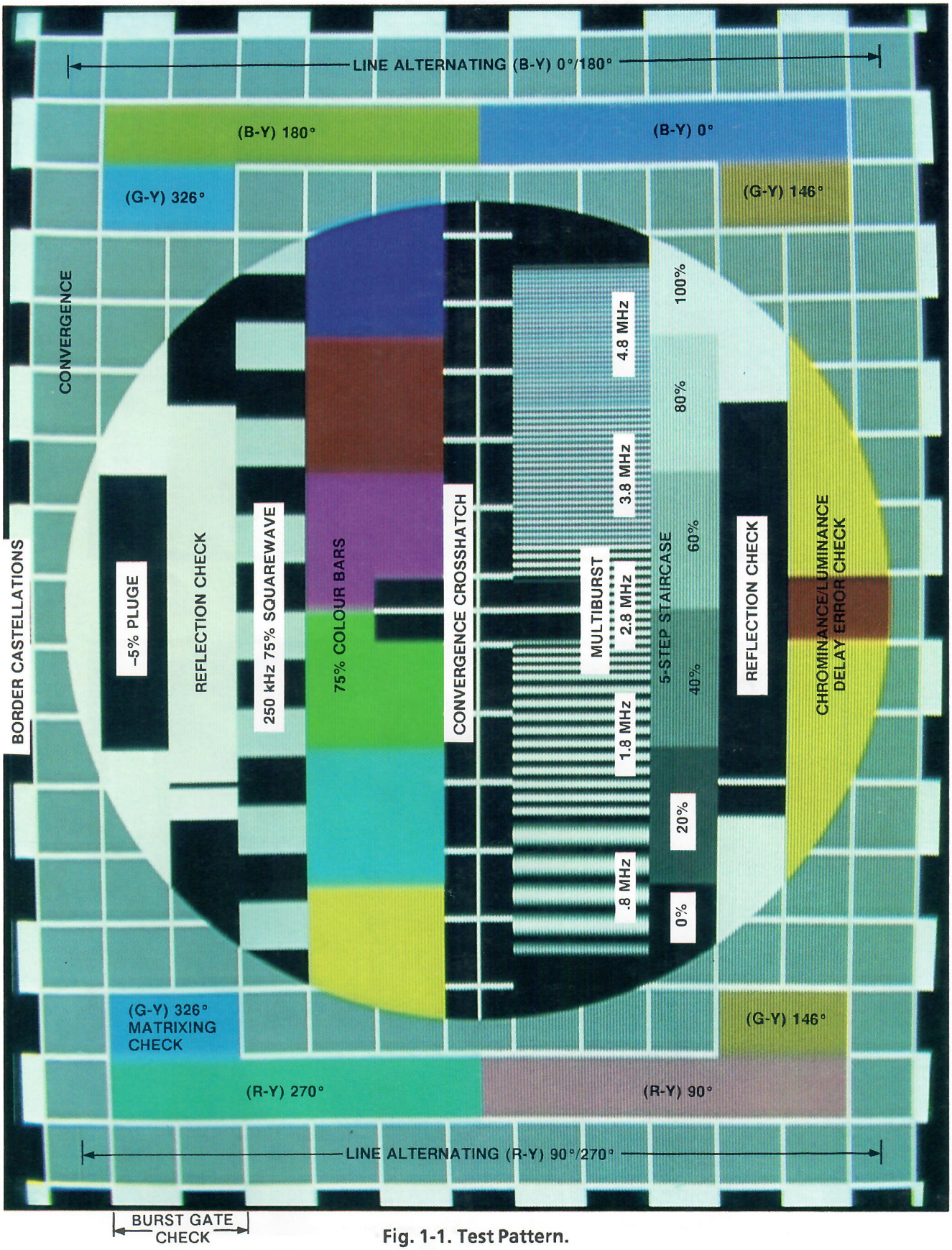


Fig. 1-1. Test Pattern.

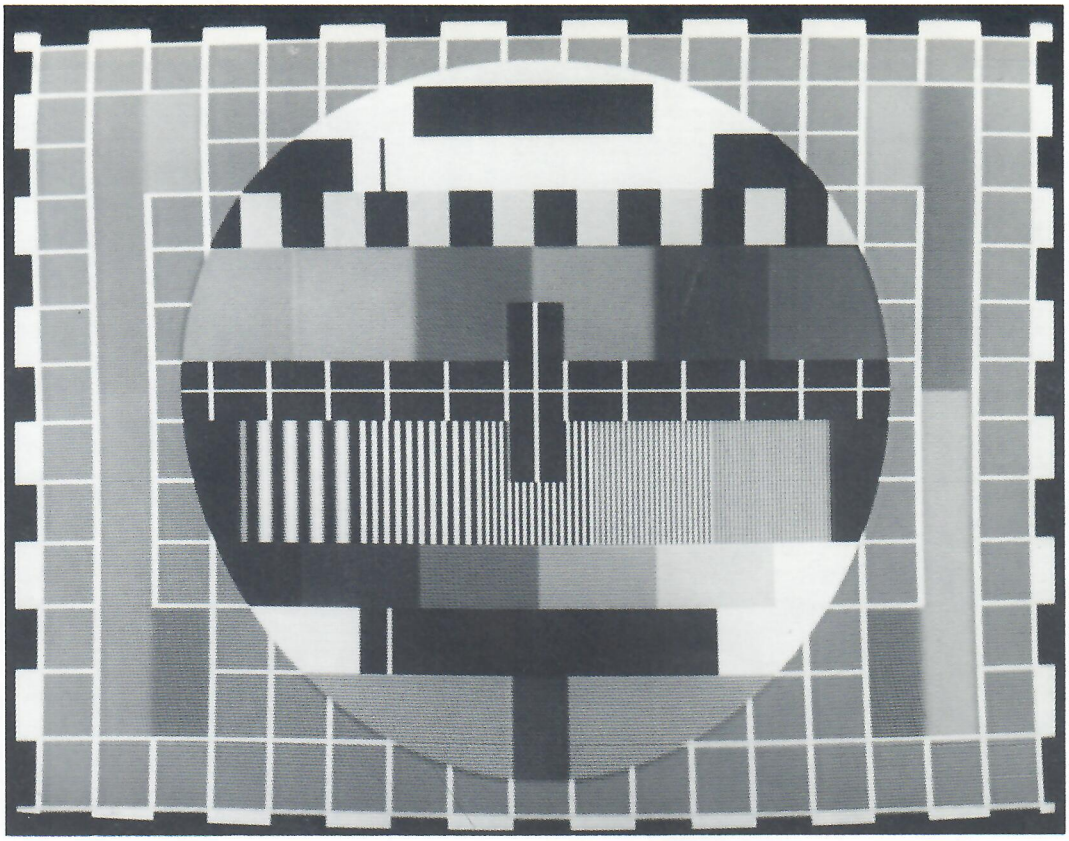


Fig. 1-2. Circle has an incorrect aspect ratio.

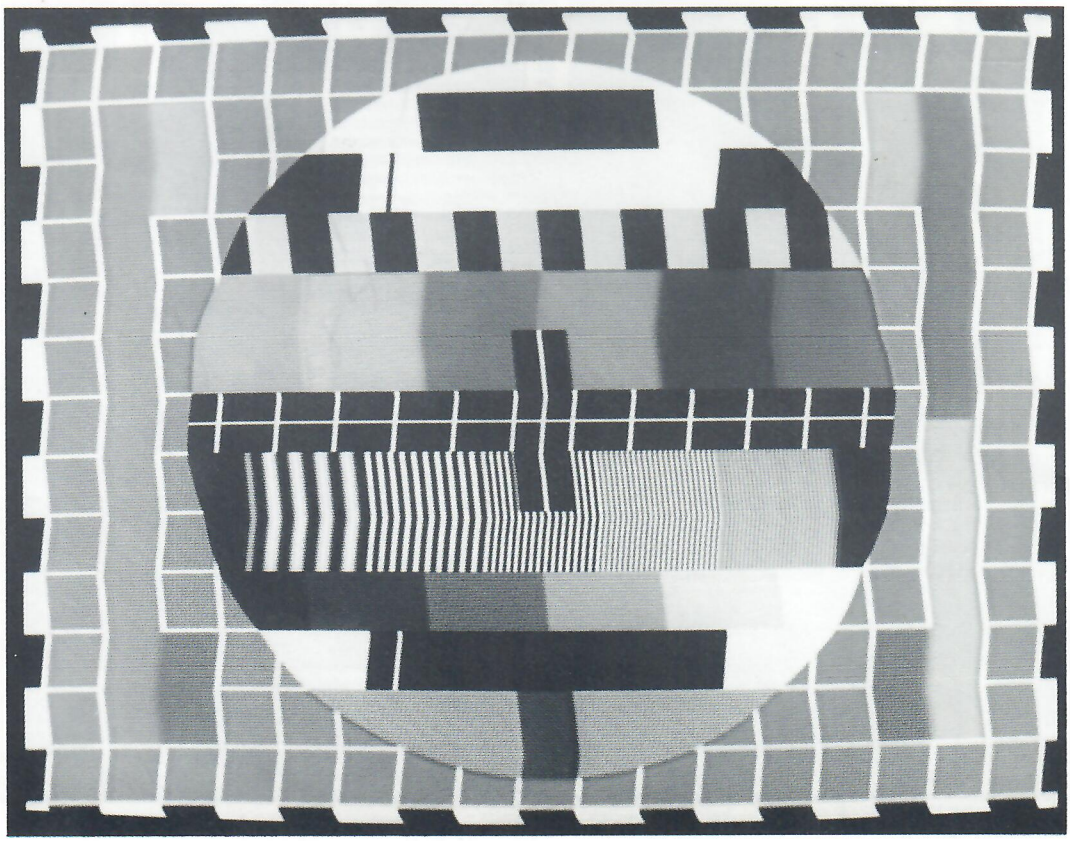


Fig. 1-3. Sync separator problem.

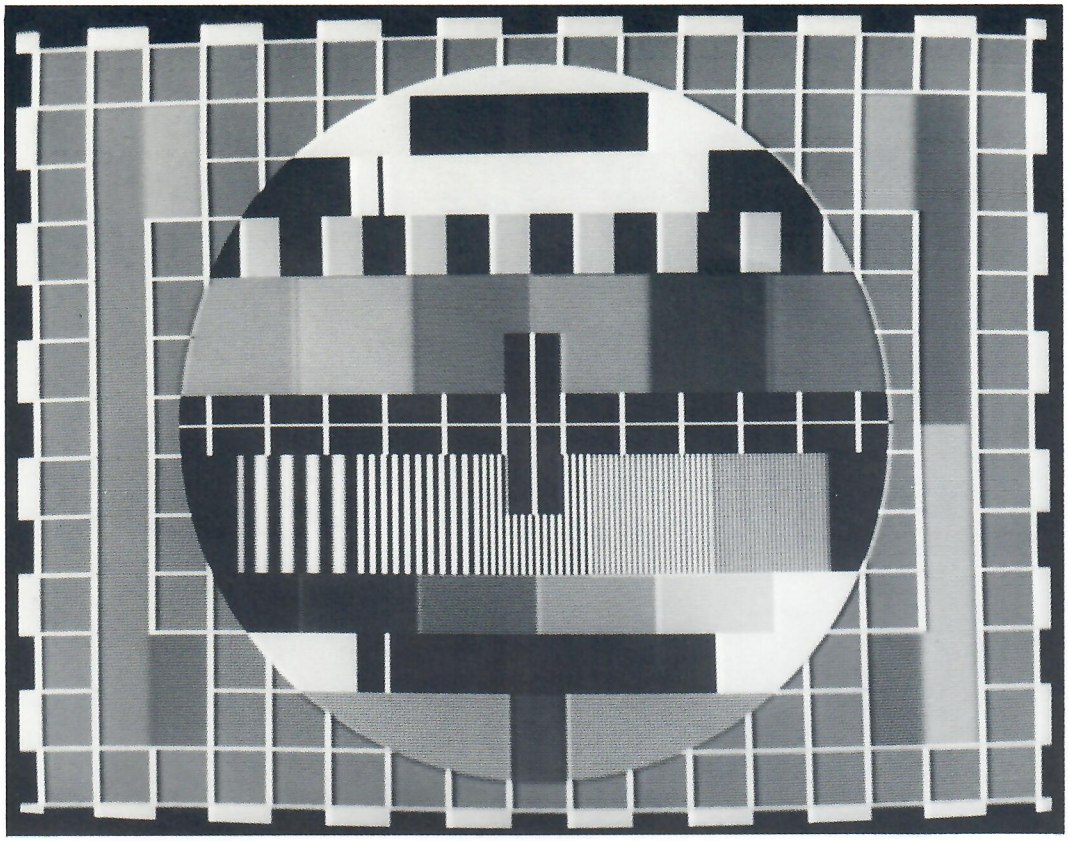


Fig. 1-4. Single echo.

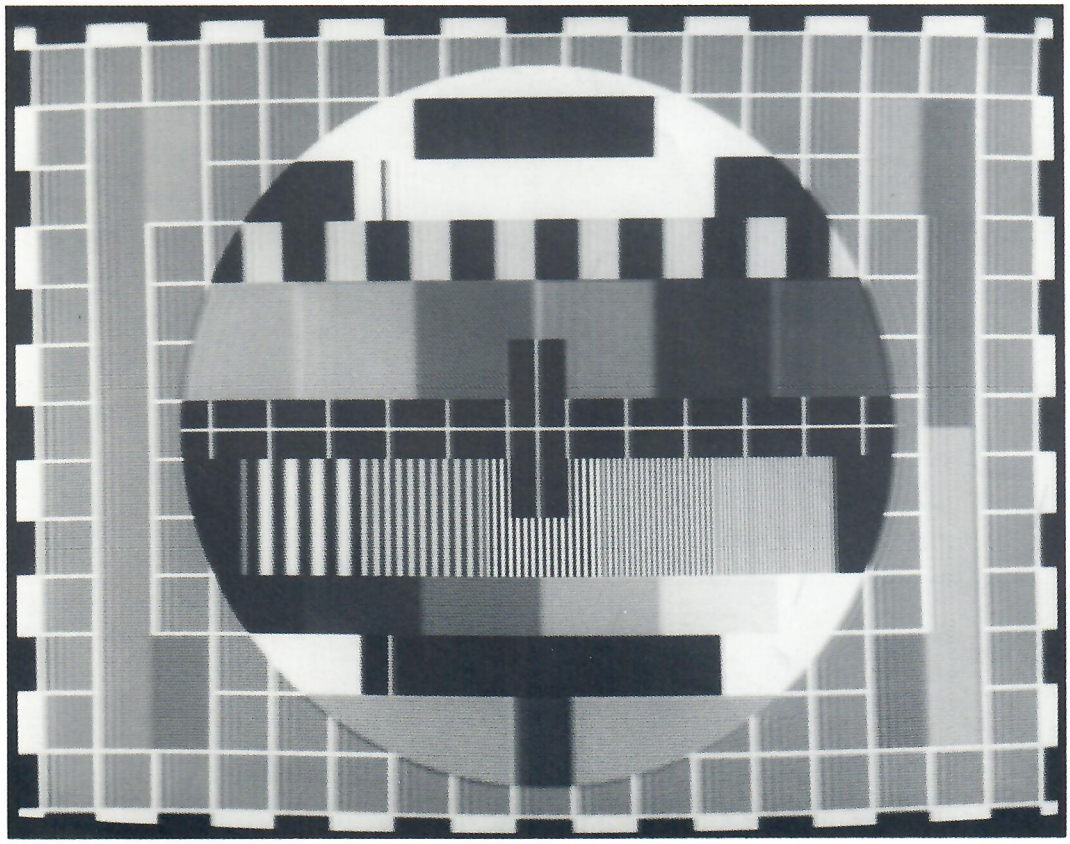


Fig. 1-5. Multiple echos.

SECTION 2
OPERATING INSTRUCTIONS

This section explains how to operate the TPG–625. It also describes the test pattern and the rear-panel connector outputs.

FRONT-PANEL CONTROLS

Nine click-dome switches control the TPG–625 (see Fig. 2-1A). The MODE SELECT switch on the right selects three modes of operation: NORMAL OPERATION, SET IDENTIFICATION, and SET GENLOCK TIMING. The test pattern is displayed in all three modes.

The eight remaining switches act as controls for selecting genlock timing and identification (ID) when the front panel is in the appropriate mode.

The four leftmost switches control ID in SET IDENTIFICATION mode. The four right switches control genlock timing in SET GENLOCK TIMING mode.

In this manual, the multi-function mode select switch has multiple names, one for each function it controls. Fig. 2-1B shows the modes of operation. Operation of the front panel in each of the three modes is described in more detail below.

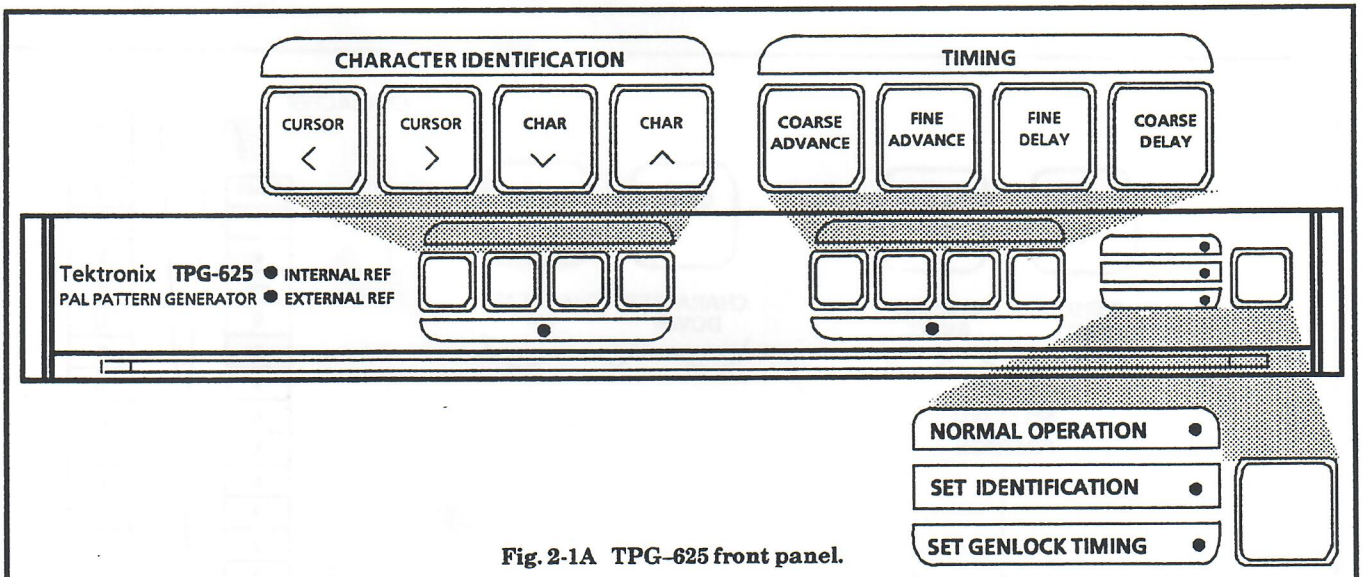


Fig. 2-1A TPG–625 front panel.

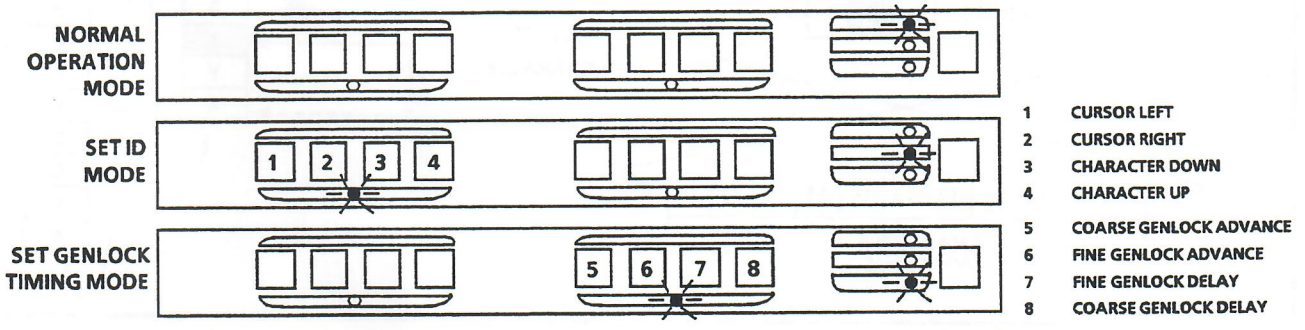


Fig. 2-1B TPG–625 front panel switch names in the three front panel modes.

NORMAL OPERATION SIGNAL MODE

In this mode, all eight switches are disabled. The instrument is powered up in the NORMAL OPERATION mode. If the instrument is not in this mode, press the MODE SELECT switch on the right of the front panel until the NORMAL OPERATION LED is lighted.

SET IDENTIFICATION MODE

In the SET IDENTIFICATION mode, the four leftmost switches write up to 7 characters over pluge and 11 characters over the bottom reflection check.

As Fig. 2-2 shows, the cursor can be moved horizontally (with the CURSOR LEFT and CURSOR RIGHT switches) into 18 positions or vertically (with the CHARACTER UP and CHARACTER DOWN switches) to select one of the characters in the character list. The CHARACTER UP and CHARACTER DOWN switches select the characters. Characters available are A through Z, 0 through 9, a space, and three punctuation marks: slash, hyphen, and period.

Selecting the ID

To select an ID character, press the MODE SELECT switch until the SET IDENTIFICATION LED is lighted. The LED below the four leftmost switches is lighted to indicate these switches control ID selection. Looking at the 18 character positions on a video monitor, you can see a gray box is superimposed over one of the characters to indicate the cursor position.

Assume a Z is in the fifth character position and the cursor is in the third position, as in Fig. 2-2. To change the Z to an X, press the CURSOR RIGHT switch until the gray square is on the Z. Then press the CHARACTER DOWN switch twice until the X is displayed. To reselect the Z, press the CHARACTER UP switch twice until the Z is displayed. When these switches are held down, they automatically scroll left/right or up/down.

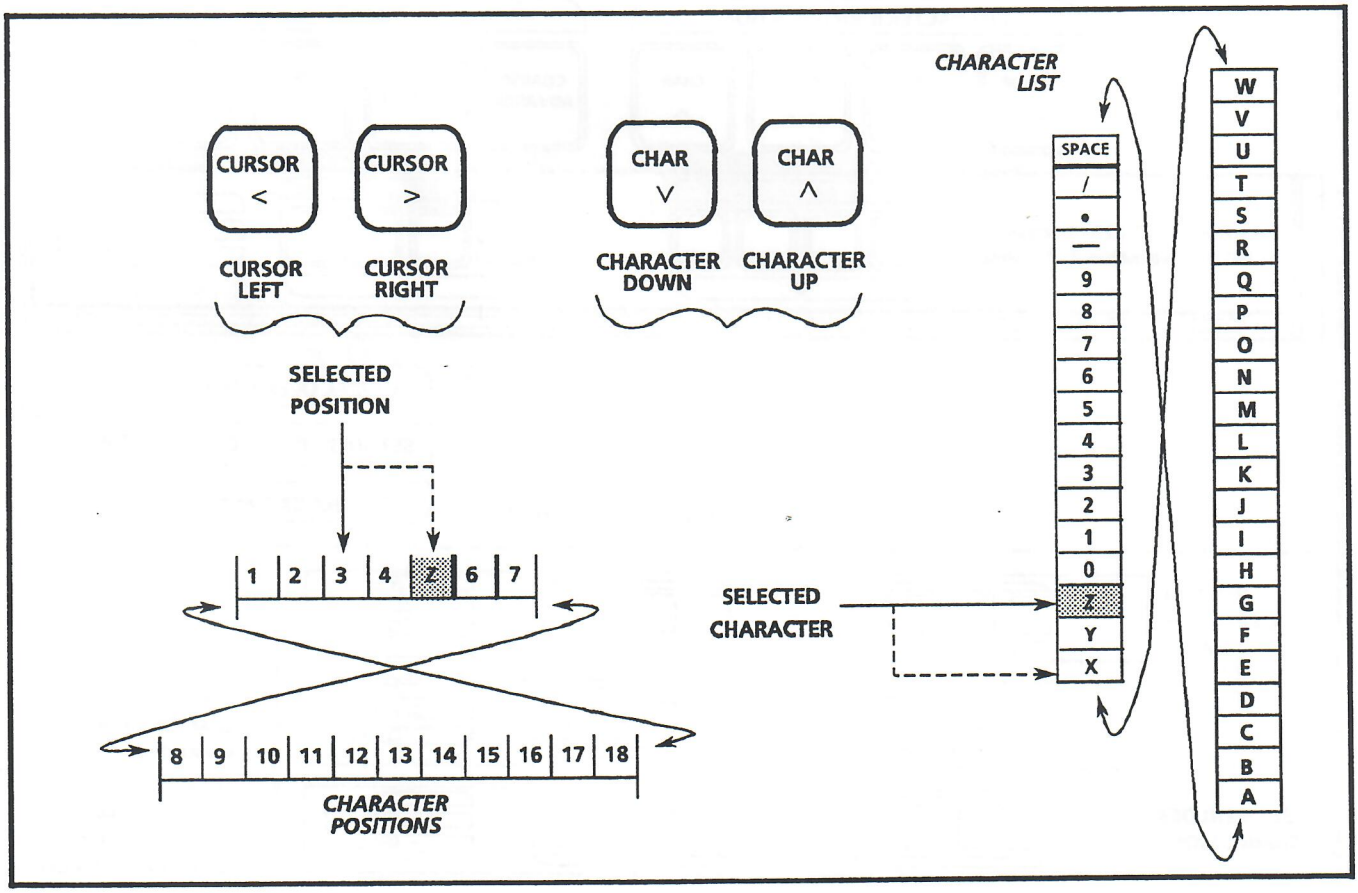


Fig. 2-2. Selecting characters from the front panel.

To move the cursor from position 5 to 12, press the CURSOR RIGHT switch until the cursor loops around to position 12. Alternatively press the CURSOR LEFT switch until the cursor loops around to position 12.

Storing the ID

To store multiple IDs refer to the remote operation instructions. To store a single ID refer to the storing genlock setting instructions.

Switching Off the Characters

To switch off the Character Generator and the black background window, delete all the characters by selecting a blank in all 18 character positions. To save the stored ID, a jumper on the output board (J200) can be moved to position 2–3, switching off the characters and the black background windows. To switch the ID and background windows back on, move the jumper (J200) back to position 1–2.

SET GENLOCK TIMING MODE

In SET GENLOCK TIMING mode, the four right switches shift the timing of the pattern and black burst signals together with respect to the Genlock Input.

FINE ADVANCE and FINE DELAY provide fine-adjustment of the patterns over a total range of about ±55° in 0.2° steps. COARSE ADVANCE and COARSE DELAY provide coarse adjustment over a total range of approximately ±7 μs in 28 ns (45°) steps. See Fig. 2-3.

Setting Genlock Timing

To adjust genlock timing, first press the MODE SELECT switch until the SET GENLOCK TIMING LED is lighted. Note the red LED under the right four timing switches indicates that these switches control genlock timing.

To advance genlock timing, press the FINE ADVANCE switch for fine increments of advance (steps of 0.2°) or press the COARSE ADVANCE switch for coarse increments (steps of 45°). To delay genlock timing, press and hold down the FINE DELAY switch for fine increments of delay or press the COARSE DELAY switch for coarse increments of delay.

If you don't make a timing selection within 30 seconds after entering the SET GENLOCK TIMING mode, the front panel automatically reverts to the NORMAL OPERATION mode.

If you reach the end of the FINE ADVANCE range and want more adjustment, push the COARSE ADVANCE switch to advance the phase by a whole coarse step. If this introduces more advance than you need, press the FINE DELAY switch to reduce the amount of advance.

Note that when the genlock timing switches are held down, they shift genlock timing at a rate of three steps per second for the first three seconds and then speed up to 25 steps per second.

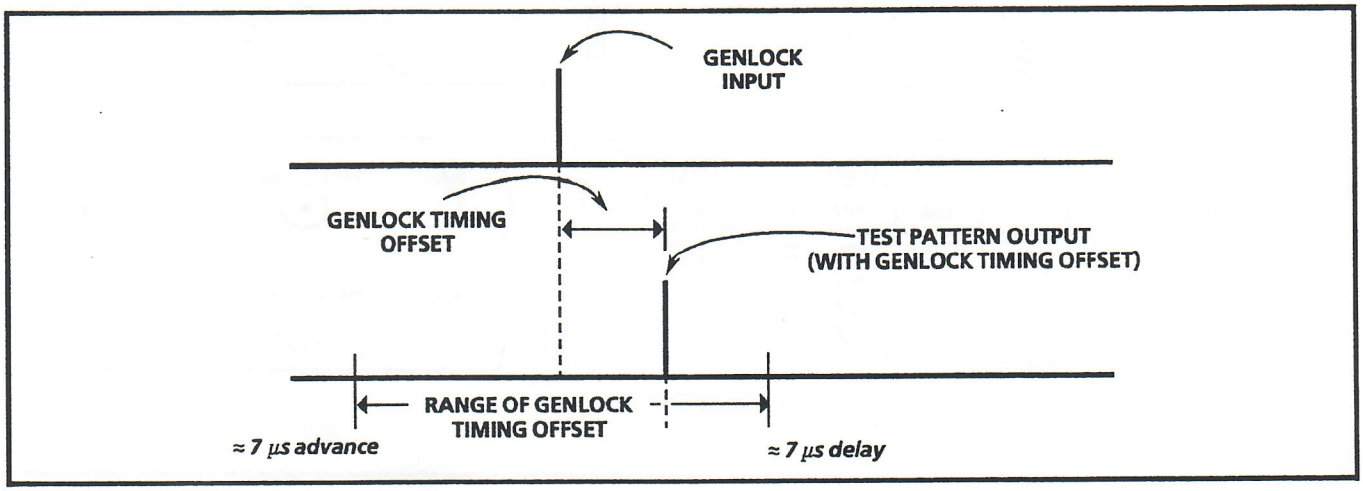


Fig. 2-3. Relative timing of Genlock Input signal and Test pattern.

Storing Genlock Setting

The front panel automatically stores your selection by returning to NORMAL OPERATION mode 30 seconds after your selection.

If you want to store the signal faster, just manually return the MODE SELECT switch to NORMAL OPERATION mode after selecting the settings.

REAR-PANEL CONNECTORS

The rear panel has 6 bnc video connectors, one 9-pin Remote Control connector and one power socket (see Table 2-1). Fig. 2-4 shows the rear panel.

Table 2-1
Rear-Panel Connectors

CONNECTOR	STANDARD SIGNAL
GENLOCK LOOP-THROUGH	Genlock Input.
TEST PATTERN	Test Pattern Output.
BLACK	Black Burst.
REMOTE	Remote Control Input.

REAR-PANEL CONTROLS

POWER ON/OFF push-push switch.

REMOTE OPERATION

The TPG–625 can be remotely controlled through the 9-pin Remote Control connector located on the rear panel. By TTL-compatible ground closure, these pins control four different functions (described below).

Typically, the pins would be grounded through user-supplied switches, using pin 9 as ground. The instrument can be locked into a fixed operating mode by wiring directly at the remote connector. To do this, attach a male 9-pin DIN plug to the remote connector and solder the appropriate pins to ground. Fig. 2-5 shows the connector pinout.

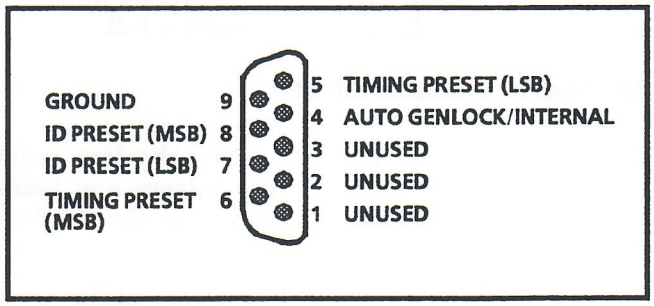


Fig. 2-5. Remote Connector (female) pinout.

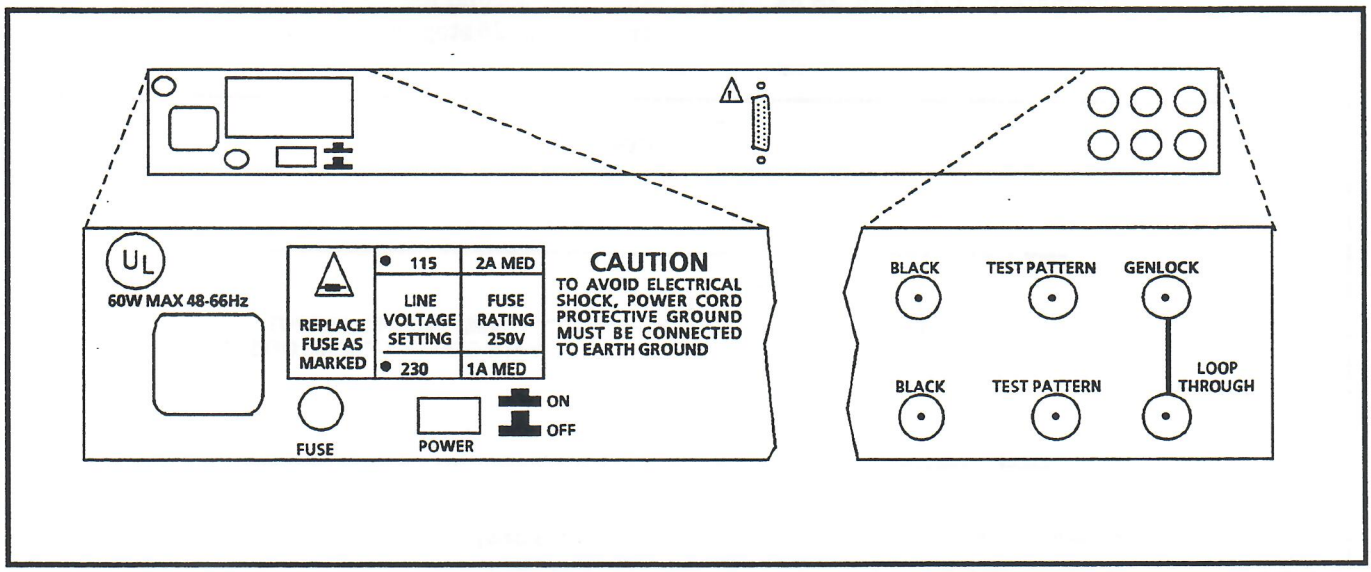


Fig. 2-4. TPG–625 rear panel.

Explanation of Pins

Pin 4

Selects Internal Sync Generator Reference mode when grounded. Otherwise, automatically switches to GENLOCK mode when a Genlock Input signal is present.

Pins 5 & 6

Two binary-coded control lines programmed to select one of four sets of genlock timing presets.

You can reprogram a timing preset to select a different genlock timing setting. To do this, ground the appropriate pins, set the genlock timing at the front panel, then cycle the front-panel MODE SELECT switch back to NORMAL OPERATION mode.

Pins 7 & 8

Two binary-coded control lines programmed to select three different character ID presets. To reprogram an ID preset, ground the appropriate pins, select the ID at the front panel,then cycle the front-panel MODE SELECT switch back to NORMAL OPERATION mode.

Pin 9

Ground.

SECTION 3
SPECIFICATIONS

The performance requirements are valid within the environmental limits if the TPG-625 is operated at 25°C ± 5°C and a minimum warm-up time of 20 minutes is allowed.

This product is designed and tested in accordance with the requirements for industry safety standards. These standards include the following:

- UL1244 — Second Edition — Standard for Electrical and Electronic Measuring and Testing Equipment.
- ANSI C39.5 — Safety Requirements for Electrical and Electronic Measuring and Controlling Instrumentation, 1984, Draft #11.
- CSA — Electrical Bulletin No. 556B.
- IEC 348 — Second Edition — Safety Standards for Electronic Measuring Apparatus.
- VDE 0871.5 (Class B) — Radio Frequency Interference Suppression of Electrical Equipment and Systems.
- FCC EMI Compatibility — FCC Rules Part 15, Subpart J, Class A.

Table 3-1. Patterns Outside Circle.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPEMENTAL INFORMATION	PER CHECK
Border Castellations			
Pattern		9 black and 10 white castellations vertical on upper and lower border. 7 black and 8 white castellations horizontally on right and left hand borders.	
Luminance Amplitude	700.0 mV		12.
Luminance Rise Time	108.5 ns ± 25 ns		28.
Convergence			
Pattern		Crosshatch — 14 horizontal and 18 vertical lines per field.	
Luminance Amplitude	700.0 mV		13.
Luminance Rise Time	150.0 ns ± 25 ns		29.
Pulse HAD	225.0 ns ± 25 ns		37.
Burst Gate Check			
Pattern		Overlaid over the first full white and second full black castellations from the top left corner of the screen. Has line alternating phase (R-Y) signal.	
Luminance Amplitude			
White	700.0 mV		14.
Black	0.0 mV		14.
Phase (Line Alternating)	270° / 90°		
Subcarrier Amplitude	300 mV_{p-p}		41.
Line Alternating Phase R-Y			
Pattern		Overlaid between the 1st and 2nd vertical convergence lines from the left side of the pattern (should not be visible).	
Luminance Amplitude			
Gray	336.0 mV		
White	700.0 mV		
Phase (Line Alternating)	270° / 90°		
Subcarrier Amplitude	300 mV_{p-p}		42.

Table 3-1. Patterns Outside Circle. cont.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPEMENTAL INFORMATION	PER CHECK
R-Y Blocks Pattern		Located between the 2nd and 3rd vertical convergence lines from the left side of the pattern.	
Luminance Amplitude	336.0 mV		
Phase			
(Top Block)	270°		
(Bottom Block)	90°		
Subcarrier Amplitude	300.0 mV_{p-p}		44.
G-Y Blocks Pattern		Located between the 3rd & 4th and 15th & 16th vertical convergence lines from the right side of the pattern.	
Luminance Amplitude	336.0 mV		
Phase			
(Top Blocks)	326°		
(Bottom Blocks)	146°		
Subcarrier Amplitude	300.0 mV_{p-p}		43.
B-Y Blocks Pattern		Located between the 2nd and 3rd vertical convergence lines from the left side of the pattern.	
Luminance Amplitude	336.0 mV		
Phase			
(Top Block)	180°		
(Bottom Block)	0°		
Subcarrier Amplitude	300.0 mV_{p-p}		45.
Line Alternating Phase B-Y Pattern		Overlaid between the 1st and 2nd vertical convergence lines from the left side of the pattern.	
Luminance Amplitude			
(Gray)	336.0 mV		
(White)	700.0 mV		
Phase (Line Alternating)	180° / 0°		
Subcarrier Amplitude	300.0 mV_{p-p}		48.

Table 3-2. Patterns Inside Circle.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER CHECK
Pluge			
Pattern		5% below black, centered between two black blocks.	
Luminance Amplitude			
(Black)	0.0 mV		15.
(5% below Black)	-35.0 mV		15.
Luminance Rise Times	150.0 ns ± 25 ns		30.
Reflection Check (Top)			
Pattern		Black pulse on white background.	
Luminance Amplitude	700.0 mV		16.
Ringing	1.5%		35.
Luminance Rise Times	150.0 ns ± 25 ns		31.
Pulse HAD	225.0 ns ± 25 ns		38.
250 kHz Square Wave			
Pattern		Black and 75% white transitions at a 250 kHz rate.	
Luminance Amplitude	525.0 mV		17.
Luminance Rise Times	150.0 ns ± 25 ns		32.
75% Color Bars			
Luminance Rise Times	150.0 ns ± 25 ns		
	Lum Amp (mV) / **Subc Amp (mV_{p-p})** / **Subc Phase (deg)**		
White	700.0 / 0.0 / 0.0		49.
Yellow	465.1 / 470.5 / 167.1		
Cyan	368.0 / 663.8 / 283.5		
Green	308.2 / 620.1 / 240.7		
Magenta	216.8 / 620.1 / 60.7		
Red	157.0 / 663.8 / 103.5		
Blue	59.9 / 470.5 / 347.1		
Convergence			
Pattern		Crosshatch — 1 horizontal and 13 vertical lines per field.	
Amplitude			
(Black)	0.0 mV		18.
(White)	700.0 mV		18.
Luminance Rise Times	150.0 ns ± 25 ns		
Pulse HAD	225.0 ns ± 25 ns		39.

Table 3-2. Patterns Inside Circle. cont.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER CHECK
Multiburst (Sinusoidal) Pattern		5 sets of Multiburst packets in 1 MHz increments from 0.8 to 4.8 MHz.	
Pedestal	350.0 mV		
Packet Amplitude	700.0 mVp-p		
Burst Frequencies	0.8, 1.8, 2.8, 3.8, & 4.8 MHz		53.
Packet Rise Times	350.0 ns		
5-Step Staircase Pattern		20% luminance steps from 0 to 700 mV.	
Luminance Amplitudes	0.0, 140.0, 280.0, 420.0, 560.0, & 700.0 mV		19.
Linearity Error	≤ 1%	Relative step matching.	27.
Reflection Check (Bottom) Pattern		White pulse on black background.	
Luminance Amplitude	700.0 mV		20.
Ringing	1.5%		36.
Luminance Rise Times	150.0 ns ± 25 ns		33.
Pulse HAD	225.0 ns ± 25 ns		40.
Chrominance/Luminance Delay Error Check Pattern		Red block on yellow background.	
Luminance Rise Times	150.0 ns ± 25 ns		50.
Luminance Amplitude			
(Yellow)	465.1 mV		
(Red)	157.0 mV		
Subcarrier Amplitude			
(Yellow)	470.5 mV_{p-p}		
(Red)	663.8 mV_{p-p}		
Subcarrier Phase			
(Yellow)	167.1°		
(Red)	103.5°		

Table 3-3.
Test Pattern Generator — General Test Pattern and Black Burst Characteristics.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER CHECK
Luminance Amplitude Accuracy	± 1%	Measured at 700 mV.	25.
Frequency Response	± 2% to 4.8 MHz.		53.
Chrominance to Luminance Delay	≤ 5 ns		54.
SC/H Phase Accuracy	± 2.5 ns typical.	± 4° typical	51.
DC Output Level	0 V_{dc} ± 50 mV	Measured at blanking.	10.
Chrominance Rise Time	350 ns ± 35 ns		
Burst Amplitude	300 mV ± 6 mV_{p-p}		26.
Burst Rise Time	350 ns ± 35 ns	Slower than BBC spec to avoid ringing.	
Sync Amplitude	300 mV ± 3 mV		24.
Sync Rise Time	250 ns ± 25 ns		34.
Front Porch Duration	1.55 µs minimum	1.65 µs typical	
Line Blanking Interval Nominal Blanking	12.05 µs	Beginning at 50% point of active video.	
Breezeway Duration	900 ns ± 50 ns		
Horizontal Sync Duration	4.7 µs ± 50 ns	50% amplitude point.	56.
Vertical Serration Duration	4.7 µs ± 50 ns	50% amplitude point.	57.
Equalizing Pulse Duration	2.35 µs ± 50 ns	50% amplitude point.	58.
Burst Delay from Sync Burst Duration	 5.6 µs ± 50 ns 2.255 µs ± 100 ns	 From 50% point of sync. 10 cycles of subcarrier.	
Output Impedance	75 Ω		
Return Loss	36 dB to 5 MHz		65.
Crosstalk	≥ 60 dB down		
Residual Subcarrier	≥ 60 dB down		
Glitches	≤ 2 mV		

Table 3-4. TEST PATTERN Generator — Black Burst.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER CHECK
Black Amplitude	Blanking level ± 5 mV	0 V_{dc} ± 5 mV	11.
Blanking Width	< 11.2 µs		
Glitch Amplitude	< 20 mV		22.
Phasing	< 2°	Compared to TEST PATTERN output.	52.

Table 3-5. VITS Signals (S/N B010243 and above).

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER CHECK
CCIR Line 17			59.
2T Bar			
Width	10 µs		
Rise Time	192.9 ns ± 20 ns		
2t Pulse			
HAD	200 ns ± 20 ns		
20T Modulated Pulse			
CCIR Line 18			60.
White Reference Bar			
Amplitude	560.0 mV		
Pedestal	350 mV		
Packet Amplitudes	420 mV_{p-p}	Equal width packets.	
Burst Frequencies	0.5, 1.0, 2.0, 4.0, 4.8, & 5.8 MHz		
Packet Rise Time		350 ns typical, Sin^2 shaped packets.	
CCIR Line 330			61.
White Bar			
Width	10 ms		
Rise Time	192.9 ns ± 20 ns		
2T Pulse			
HAD	200 ns ± 20 ns		
5-Step			
Modulation Amplitude	280 mV_{p-p}		
Phase	60.7°		
CCIR Line 331			62.
Luminance Pedestal			
Amplitude	350 mV		
Rise Time	192.9 ns ± 20 ns		
Chrominance Bars			
Amplitude	140, 420, & 700 mV_{p-p}		
Phase	60.7°		

Table 3-6. Genlock Function.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER CHECK
Burst Lock			
Genlock Phase Change with Input Amplitude Change	≤ 1° burst phase change for input sync or burst amplitude range of 300 mV ± 3 dB.	For either composite video or burst errors.	2.
	≤ 2° burst phase change for input sync or burst amplitude range of 300 mV ± 6 dB.		2.
Genlock Phase Change with Input Signal APL Change	≤ 1° burst phase change over 10% to 90% APL change.		5.
Frequency Dependence on Input Burst	≤ 1° burst phase change for ± 20 Hz change in incoming subcarrier.		4.
Lock Range	4.43361875 MHz ± 20 Hz		4.
Genlock Phase Jitter		Typically ≤ 0.3° peak for input sync or burst amplitude range of 300 mV ± 3 dB. No noise on input signal.	2.
		Typically ≤ 0.4° peak for input sync or burst amplitude range of 300 mV ± 6 dB. No noise on input signal.	2.
Horizontal Timing Range Genlock Timing		≈ 7 µs advance and delay relative to Genlock input. 55° of fine sync in 0.175° steps. (Front panel control.)	6. & 8.
Color Framing Decisions	Will be correct for input SC/H of 0° ± 40°.		9.
Sync Lock Jitter	< 10 ns for input sync amplitude range of 300 mV ± 3 dB.	No noise on input signal.	1.
Genlock Stability with gross Input Amplitude Variations	≤ 40° for input sync or burst amplitude range of 300 mV +7 dB to -12 dB.		3.
Vertical Timing Range	0, 1, or 2 lines advance. 1 line delay.		7.
Input Configuration	75 Ω loop-through		
Return Loss (Genlock Input)	≥ 40 dB to 5 MHz		64.

Table 3-7. Output Board (ID over Test Pattern).

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION	PER CHECK
Identification	7 top characters. 11 bottom characters. 7 x 9 matrix.		
Black Level Matching	± 5 mV	Referenced to TEST PATTERN blanking.	55.

Table 3-8. Power Supply.

CHARACTERISTICS	PERFORMANCE REQUIREMENTS	SUPPLEMENTAL INFORMATION
Supply Accuracy +12 V +5 V -5.2 V -12 V		 12 V ± 300 mV 5 V ± 100 mV -5.2 V ± 300 mV -12 V ± 300 mV
Current Limit +12 V +5 V -5.2 V -12 V		Total Power limited to 75 W.
Hum +12 V +5 V -5.2 V -12 V		Typical: 10 mV 10 mV 20 mV 10mV
Noise +12 V +5 V -5.2 V -12 V		 ≤ 50 mV (5 MHz bandwidth) ≤ 50 mV (5 MHz bandwidth) ≤ 50 mV (5 MHz bandwidth) ≤ 50 mV (5 MHz bandwidth)
Line Voltage Range 110 V_{ac} 220 V_{ac}	 90 - 132 V_{ac} 180 - 250 V_{ac}	
Crest Factor		≥ 1.35
Fuse Data 115 V Setting 230 V Setting		 2 A Med-Blow 1 A Med-Blow
Power Consumption Maximum		60 W
Line Frequency		48 Hz to 62 Hz

Table 3-9. Physical Characteristics.

CHARACTERISTICS	SUPPLEMENTAL INFORMATION
Dimensions Rackmount Height Width Length	 4.4 cm (1.734 inches) 48.3 cm (19.0 inches) 56.1 cm (22.1 inches)
Net Weight	6.12 kg (13.5 lbs.)
Shipping Weight	9.53 kg (21 lbs.)

Table 3-10. Environmental Characteristics.

CHARACTERISTICS	SUPPLEMENTAL INFORMATION
Temperature Non-Operating Operating	 -40°C to +65°C 0°C to +40°C
Altitude Non-Operating Operating	 To 15,240 meters (50,000 feet). To 4,572 meters (15,000 feet).
Vibration (Operating)	15 minutes each axis at 0.025 inch, frequency varied from 10-55-10 c/s in 4-minute cycles with instrument secured to vibration platform. Ten minutes each axis any resonant point or at 55 c/s.
Shock	50 g's, ½ sine, 11 ms duration, 3 guillotine-type shocks per side.
Transportation	Qualified under NTSC Test Procedure 1A, Category II (24-inch drop).

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.

SECTION 4
INSTALLATION

PACKAGING

At installation time, save the shipping carton and packaging materials for repackaging in case reshipment becomes necessary. See Fig. 4-1.

ELECTRICAL INSTALLATION

Power Supply Frequency and Voltage Ranges

The power supply in this instrument operates over a line frequency range of 48 to 62 Hz and is set by jumper J810. The power cord option you order determines which rating of fuse and which power supply voltage your generator is set for. Table 4-1 describes these options.

Plug in power cable, then mount to extreme left of the line filter using one of the screws (on the instrument), loop clamp, and washer. See Fig. 4-2.

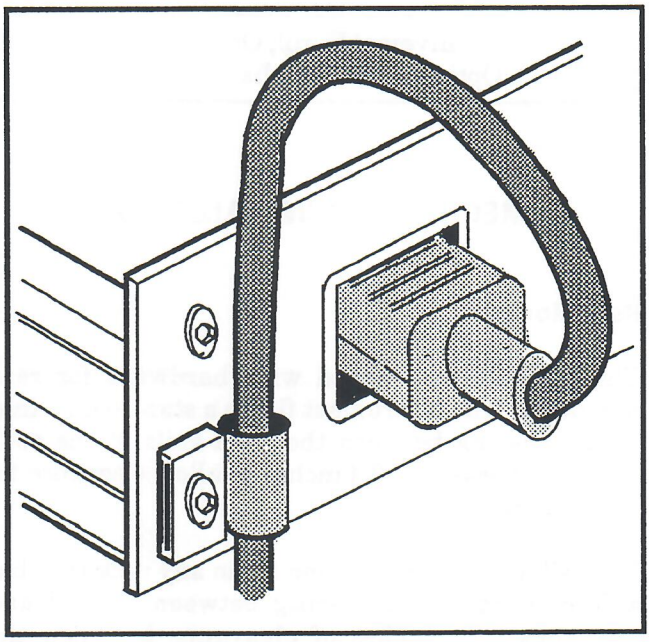


Fig. 4-2. Mounting the power cord.

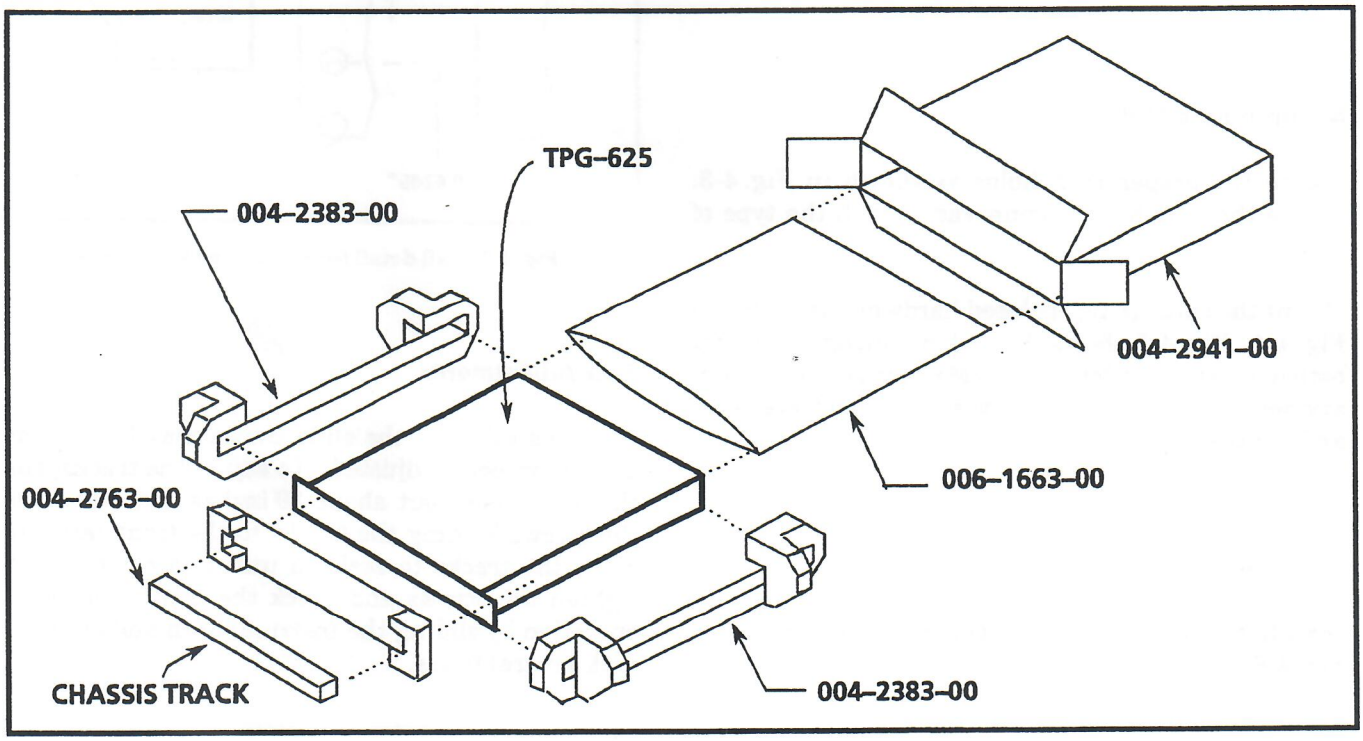


Fig. 4-1. Repackaging instructions.

Table 4-1
Jumper Settings for Power Cord Options

POWER CORD OPTION	FUSE RATING	J810, POWER SUPPLY (115/230V SELECT)
Standard North American	2 Amp Medium Blow	Pin 1 aligned with 115 V.
Option A1 (Universal Euro), Option A2 (UK), Option A3 (Australia)	1 Amp Medium Blow	Pin 1 aligned with 230 V.

MECHANICAL INSTALLATION

Rack Mounting

The TPG–625 is shipped with hardware for rack mounting. The instrument fits in a standard 19-inch rack. Spacing between the front rails of the rack must be at least 17–3/4 inches to allow clearance for the slide-out tracks.

Rack slides conveniently mount in any rack that has a front-to-rear rail spacing between 15–1/2 and 28 inches. Six inches of clearance between the instrument's rear panel and any rear cabinet panel is required for connector space and to provide adequate air circulation.

Mounting the Slide Tracks

Locate the proper rack holes as shown in Fig. 4-3. Notice that the hole spacing varies with the type of rack.

Mount the rails using enclosed hardware as shown in Fig. 4-4. Fig. 4-5 shows the rail mounting details for both deep and shallow racks. Make sure the stationary sections are horizontally aligned and are level and parallel.

Installing the Instrument

Install the instrument in the rack, as shown in Fig. 4-6.

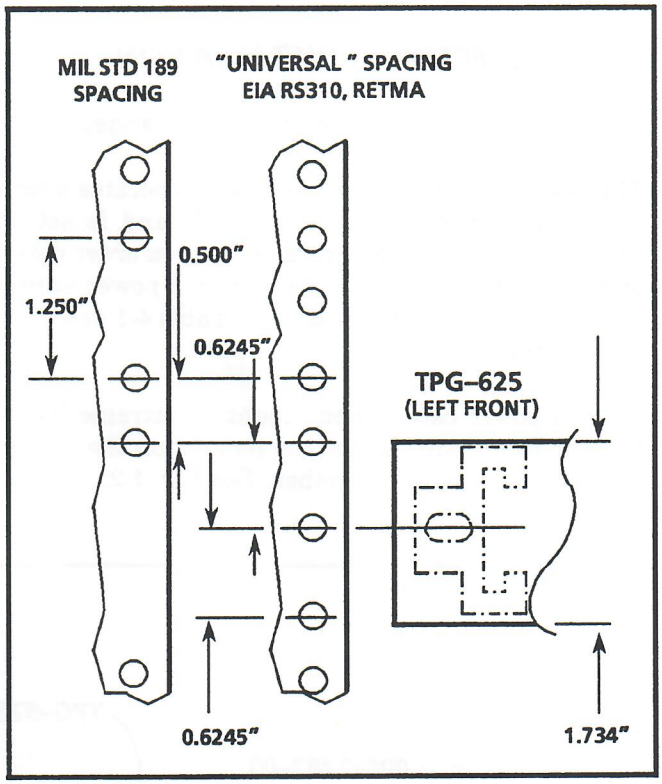
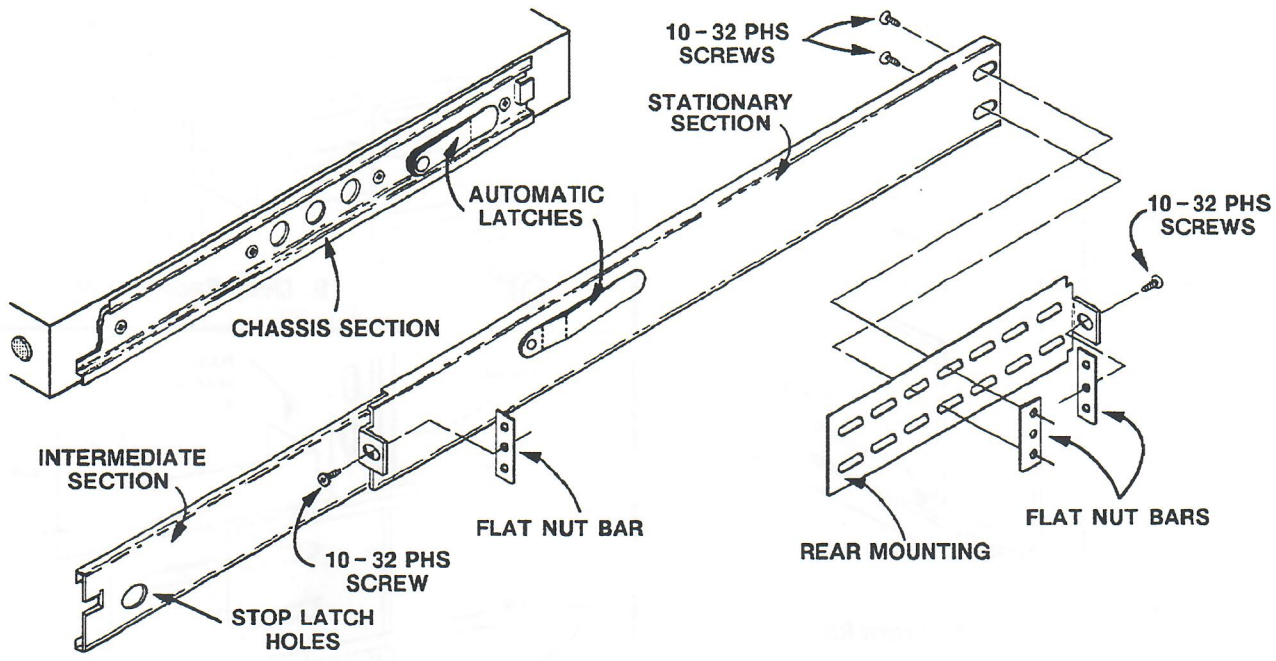


Fig. 4-3. Rail detail for mounting slide tracks.

Rack Adjustments

After installation, the slide tracks may bind if they are not properly adjusted. To adjust the tracks, slide the instrument out about 10 inches, slightly loosen the screws holding the tracks to the front rails, and allow the tracks to seek an unbound position. Retighten the screws and check the tracks for smooth operation by sliding the instrument in and out of the rack several times.



NOTE:

Right hand and left hand stationary section is designated by the RH and the LH marked on the rails. Stop latch holes should be towards the bottom when slides are in place. (The right hand rail is shown above.)

Fig. 4-4. Assembly of rack mounting hardware.

Once the instrument is in place within the rack, tighten the knurled retaining screw to fasten it securely into the rack.

Rack Slide Maintenance

The slide-out tracks do not require lubrication. The dark gray finish on the tracks is a permanent, lubricated coating.

Removing the Instrument

First, loosen the front-panel knurled retaining screw. See Fig. 4-6. Grasp the front handles and pull the instrument out until all three slide sections latch. The instrument is firmly held in this position.

To completely remove the instrument, press both release-latch buttons (visible in the stop-latch holes) and carefully slide the instrument free from the tracks. Be sure that all cabling is disconnected before removing the instrument.

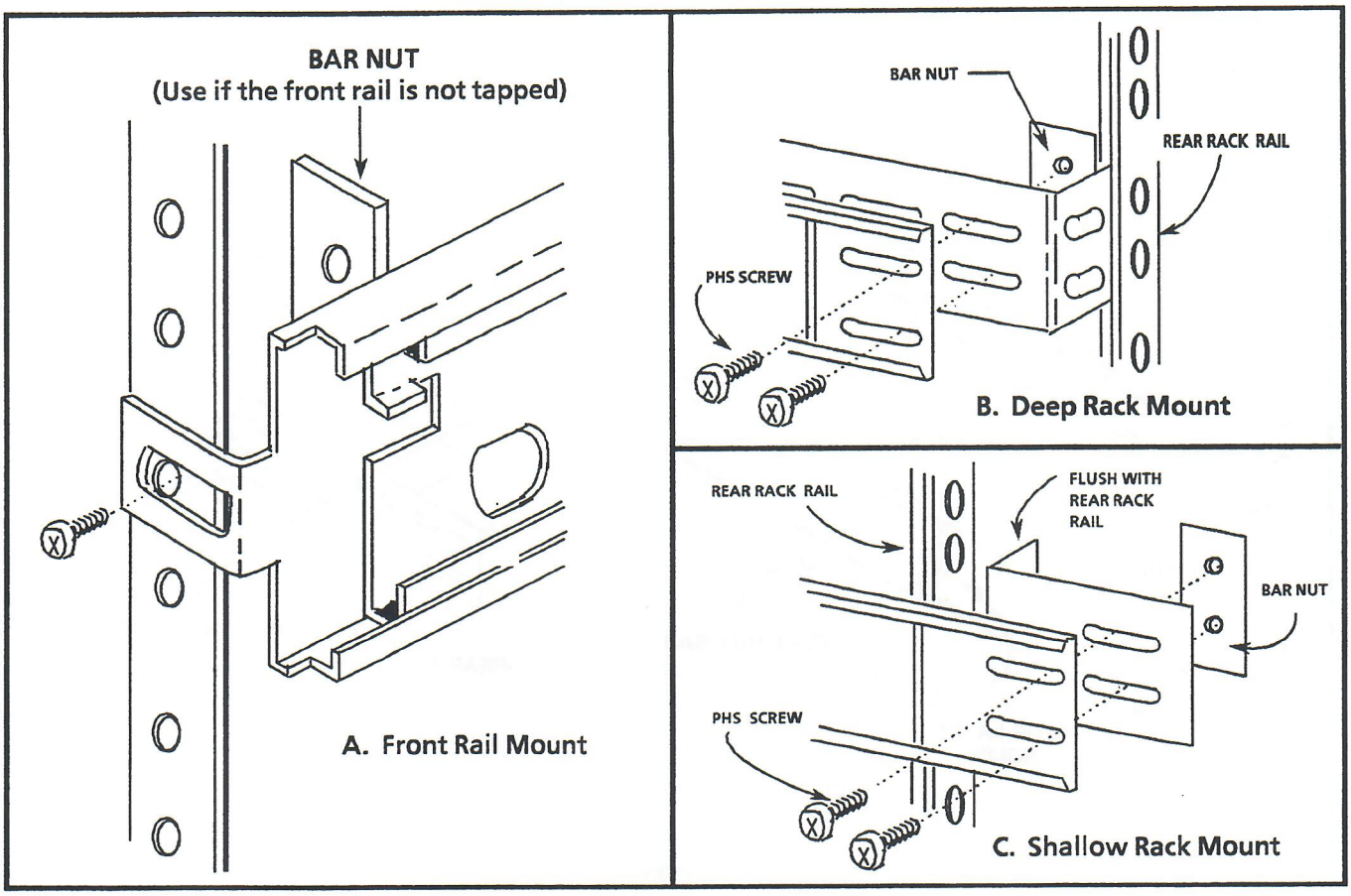


Fig. 4-5. Mounting stationary track sections.

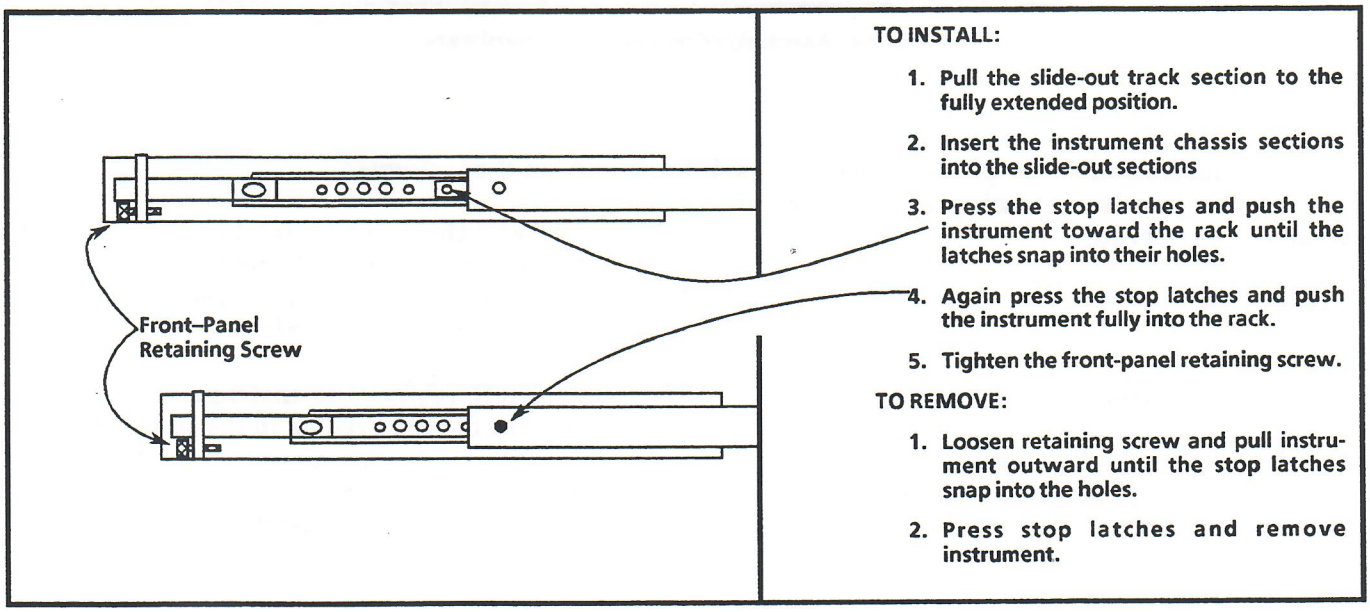


Fig. 4-6. Racking and unracking the TPG–625.

Jumper Tables

This section gives jumper tables for the entire instrument. In all cases, the ▼ symbol on the circuit boards identifies pin 1. Green jumpers are for selecting operating modes. Red jumpers are for testing the instrument. The red jumpers should be used only by qualified service personnel. The < > symbol represents schematic numbers. For jumper locations see Fig. 4-7.

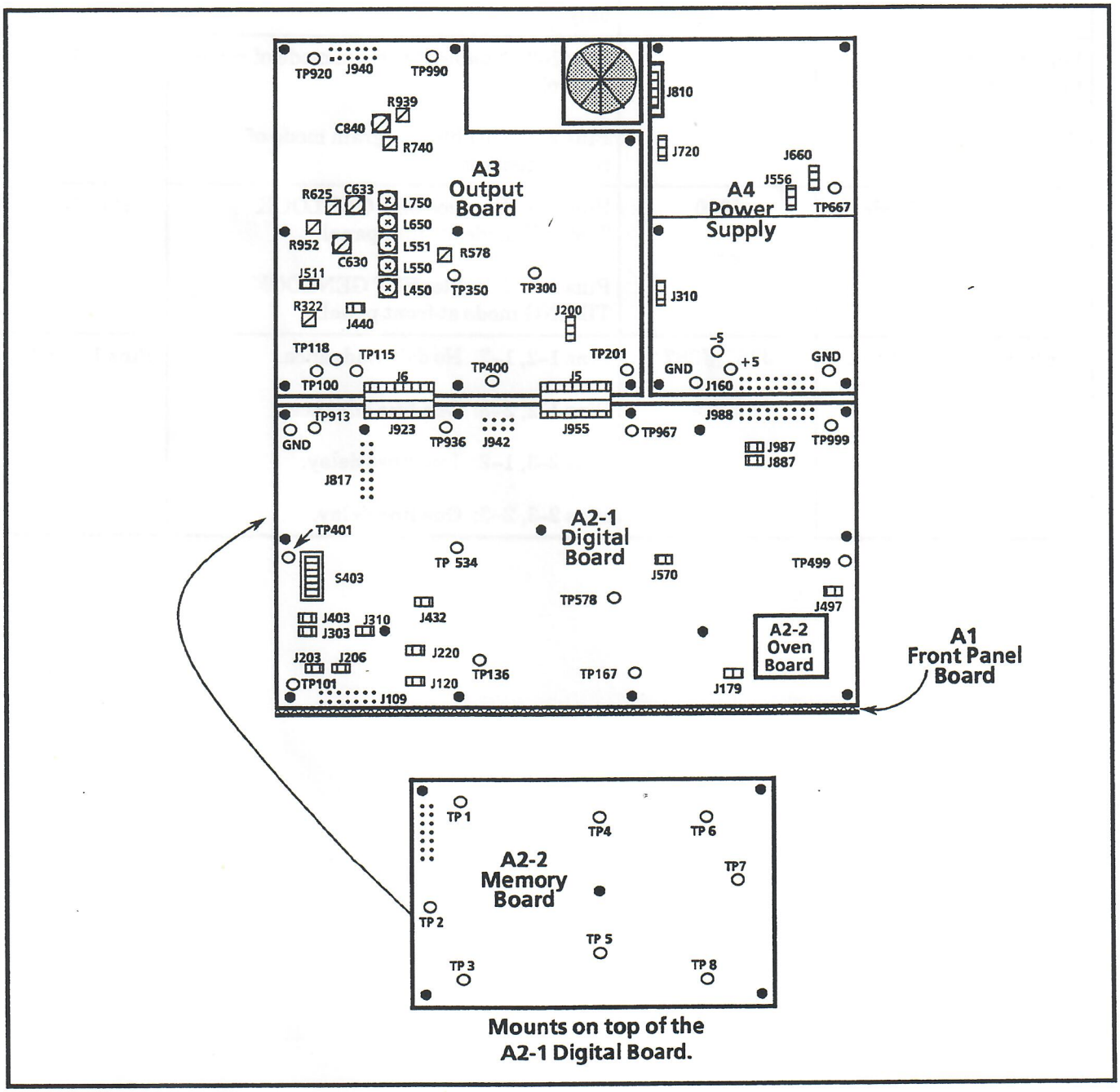


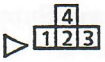
Fig. 4-7. TPG–625 Adjustment and Jumper Locations.

Table 4-2
Digital Board (A2–1) Operating Mode Selection Jumpers (Green)

FUNCTION	JUMPER # AND <SCHEMATIC>	DESCRIPTION	FACTORY SET
Front Panel Mode Select	J203 <1>	Pins 1–2: Allows all front panel modes to be selected. Pins 2–3: Allows Normal Operation mode only.	Pins 1–2
Remote Control Enable/Disable	J206 <1>	Pins 1–2: Enables program mode of remote control. Pins 2–3: Disables program mode of remote control.	Pins 1–2
Genlock Timing Mode Select	J310 <1>	Pins 1–2: Enables SET GENLOCK TIMING mode at front panel. Pins 2–3: Disables SET GENLOCK TIMING mode at front panel.	Pins 1–2
Genlock Vertical Offset (lines of delay/advance)	J887, J987 <5>	Pins 1–2, 1–2: No delay/advance. Pins 1–2, 2–3: One line advance. Pins 2–3, 1–2: Two lines delay. Pins 2–3, 2–3: One line delay.	Pins 1–2, 1–2

Table 4-3
Digital Board (A2–1) Test Jumpers (Red)

FUNCTION	JUMPER # AND <SCHEMATIC>	DESCRIPTION	FACTORY SET
Manual Reset	J120 <2>	Pins 1–2: No reset. Pins 2–3: Resets μP.* *J273 must be in 1–2 position.	Pins 1–2
Hard Reset †	J220 <2>	Pins 1–2: Allows hard reset of μP. Pins 2–3: Forced reset of μP. Pins 2–4: Disables hard reset of μP.	Pins 1–2
Soft Reset	J432 <2>	Pins 1–2: Enable. Pins 2–3: Disable.	Pins 1–2
VCO Test ‡	J179 <4>	Pins 1–3: Sets VCO control voltage to mid-range (ground) so VCO can be tuned to 17.734375 MHz with C19. Pins 2–3: μP controls genlock loop response. Pins 3–4: Fixed test voltage (–10 V) VCO increases frequency. Pins 3–5: Fixed test voltage (+10 V) decreases VCO frequency.	Pins 2–3
For Future Use	J403, J303 <1>	Pins 1–2, 1–2: Standard position. Pins 1–2, 2–3: Not used. Pins 2–3, 1–2: Not used. Pins 2–3, 2–3: Not used.	Pins 1–2, 1–2
Crystal Oven Heater	J497 <4>	Pins 1–2: Enabled. Pins 2–3: Disabled.	Pins 1–2
Field Reference Disable	J570 <5>	Pins 1–2: Enables FLD REF signal to provide a genlocked field reference (field 1, line 7) pulse to the timing circuits. Pins 2–3: Disables FLD REF signal.	Pins 1–2

† Visual aid for J220 

‡ Visual aid for J179 

Table 4-4
Output Board (A3) Test Jumpers (Red)

FUNCTION	JUMPER # AND <SCHEMATIC>	DESCRIPTION	FACTORY SET
Input Clamp Disable	J511 <12>	Pins 1–2: Enables clamp timing circuit. Pins 2–3: Disables clamp timing circuit.	Pins 1–2
Test Pattern Disable	J440 <11>	Pins 1–2: Enables test pattern at TEST PATTERN connector. Pins 2–3: Disables test pattern at TEST PATTERN connector to allow for testing of return loss.	Pins 1–2
Identification Disable	J200 <10>	Pins 1–2: Enables Identification. Pins 2–3: Disables Identification.	Pins 1–2

Table 4-5
Power Supply Board (A4) Operating Mode Selection Jumper

FUNCTION	JUMPER #	DESCRIPTION	FACTORY SET
230 V/115 V Line Voltage Select	J810 <13>	Pin 1 aligned with 230 V: Power Supply accepts 230 V line voltage. Fuse rating must be 1 A, medium blow. Pin 1 aligned with 115 V: Power Supply accepts 115 V line voltage. Fuse rating must be 2 A, medium blow.	230 V

Table 4-6
Power Supply Board (A4) Test Jumpers (Red)

FUNCTION	JUMPER # AND <SCHEMATIC>	DESCRIPTION	FACTORY SET
Primary Enable	J556 <13>	Jacks 1 and 2 shorted: Normal operation Jacks 1 and 2 unshorted: Disconnects 300V supply from T440.	Shorted
Undervoltage Lockout	J660 <13>	Jacks 1 and 2 shorted: Normal operation. Jacks 1 and 2 unshorted: Power Supply disabled, cycles through kick start sequence.	Shorted
Current Limit Disable	J720 <13>	Jacks 1 and 2 shorted: Normal operation. Jacks 1 and 2 unshorted: Current Limit Disabled.	Shorted

SECTION 5 PERFORMANCE CHECK AND ADJUSTMENT PROCEDURE

This section consists of short form and detailed procedures for use in checking the performance and adjusting the TPG-625.

The order of these procedures has been chosen, in part, to minimize changes in equipment setup. Performance parameters may be checked in any order; begin at a step accompanied by a setup illustration. Because many adjustment steps are interactive, however, care must be taken when adjusting individual parameters to ensure that all others remain within specification.

The following is a list of equipment required for Performance Verification and Adjustment. Use of inadequate equipment may result in inaccurate measurements or adjustment.

RECOMMENDED TEST EQUIPMENT

1. **PAL Video Measurement Set**
   For measuring and displaying field-rate and line-rate waveforms, differential phase and gain, and SC/H phase.

   Example: Tektronix 1781R.

2. **PAL Test Signal Generator (TSG)**
   Able to provide the following signals:

   Subcarrier (2.0 V_{p-p}).

   Black Burst with frequency variable from 20 Hz below to 20 Hz above nominal.

   Variable Amplitude Flat Field, or "Bounce."

   Color Bars with and without burst.

   Variable SC/H.

   Example: Tektronix 1411 with SPG12 (Opt. AA)/TSP11/TSG11/TSG13/TSG15/TSG16.

3. **Test Oscilloscope**
   Vertical Amplifiers: 1) 50 MHz bandwidth, 1 mV sensitivity, 5 MHz switchable bandwidth, DC offset and 2) Dual trace with minimum deflection factor of 50 mV/div with 10x probe.

   Time Base: 5 ns/div to 5 s/div sweep speeds, triggering to 5 MHz, and capable of accepting both direct and delayed external triggers.

   Example: Tektronix 2430A Oscilloscope with a 1x probe P6101A.

4. **Step Attenuator**
   Attenuates in 1 dB steps; DC coupled with 75Ω impedance; flat response to 5 MHz.

   Example: KAY Elemetrics Corp. 847 Attenuator.

5. **Frequency Counter/Timer**
   Must be accurate to within 2.5 Hz out of 5 MHz.

   Example: Tektronix DC 501, Opt. 01 (plugs into a TM 503 Power Mainframe).

6. **Variable Autotransformer (Variac)**
   Example: General Radio Metered Auto Transformer W10MT3W. If 220 V operation must be checked, a conversion transformer or appropriate 220 V auto transformer is needed.

7. **Spectrum Analyzer**
   Able to measure to at least 5 MHz.

   Example: Tektronix 2710.

8. **Digital Volt Meter**
Range: 0 to greater than 100 Vdc; accuracy: ± 0.1%.

Example: Tektronix DM501A.

9. **75Ω BNC Coax Cables (5 required)**
Example: Tektronix part number 012-0074-00.

10. **Precision 50Ω BNC Coax Cables (2 required)**
Example: Tektronix part number 012-0482-00.

11. **End-Line Termination (3 required)**
75Ω termination equipped with a bnc connector.

Example: Tektronix part number 011-0102-00.

12. **50Ω to 75Ω Minimum Loss Attenuator**
DC coupled, equipped with bnc connectors.

Example: Tektronix part number 011-0057-01.

13. **Feed-Through Termination (2 required)**
75Ω termination equipped with bnc connectors.

Example: Tektronix part number 011-0103-00.

14. **Test Signal Generator with Black Burst output**
A PAL signal generator with Black Burst output.

Example: Tektronix TSG 131A.

SHORT FORM PERFORMANCE CHECK

NOTE

To obtain the range of signal levels required for the following tests, the GENLOCK loop-through of the TPG-625 must remain **UN-terminated**. *This results in an input signal which is 6 dB above nominal levels, or 6 dB above that indicated by the Step Attenuator. Subtracting the Attenuator reading from +6 will yield the true signal change, in dB, from nominal. Setting the Step Attenuator to read 6 (indicating 6 dB attenuation), then, results in a normal signal level.*

SYNC LOCK

1. Jitter
   ≤ 10 ns

BURST LOCK

2. Phase Shift and Jitter with Change in Incoming Amplitude
   ≤ 1° ϕ change for ± 3 dB sync or burst change
   ≤ 2° ϕ change for ± 6 dB sync or burst change
   ≤ 0.3° jitter for ± 3 dB sync or burst change
   ≤ 0.4° jitter for ± 6 dB sync or burst change
3. Genlock Stability with Gross Input Amplitude Variations
   ≤ 40° for Input Sync or Burst Amplitude Range of +7 dB to -12 dB
4. Burst Phase Shift with Change in Incoming Burst Frequency
   ≤ 1° for 20 Hz change in incoming subcarrier
5. Phase Shift with Change in Incoming APL
   ≤ 1° over 10% to 90% APL

GENLOCK AND SYNC TIMING

6. Genlock Timing Range (Coarse)
   ≈ 7 µs advance and delay
7. Vertical Timing Range
   up to 2 lines advance and 1 line delay
8. Genlock Timing Range (Fine)
   ≈ 55° advance and delay
9. Color Framing Decisions
   Correct for input SC/H of 0° ± 40°

BLANKING LEVELS

10. TEST PATTERN Blanking Level
    0 mV ± 50 mV
11. BLACK Blanking Level
    0 mV ± 5 mV

LUMINANCE AMPLITUDE LEVELS

12. Luminance Amplitude
    Boarder Castellations — 700 mV ± 1%
13. Luminance Amplitude
    Convergence (outside circle) — 700 mV ± 1%
14. Luminance Amplitude
    Burst Gate Check —
    White . . . . . 700 mV ± 1%
    Black . . . . . 0 mV ± 7 mV
15. Luminance Amplitude
    Pluge
    Black . . . . . 0.0 mV ± 7 mV
    5% below Black . . . . . -35 mV ± 7 mV
16. Luminance Amplitude
    Reflection Check (top) — 700 mV ± 1%
17. Luminance Amplitude
    250 kHz Square Wave — 525 mV ± 1%
18. Luminance Amplitude
    Convergence (inside the circle)
    Black . . . . . .0 mV
    White . . . . . 700 mV ± 1%
19. Luminance Amplitudes
    5-Step Staircase —
    0, 140, 280, 420, 560, & 700 mV (± 7 mV)
20. Luminance Amplitude
    Reflection Check (bottom) — 700 mV ± 1%
21. BLACK Sync Amplitude
    300 mV ± 3 mV
22. BLACK Glitch Amplitude
    < 20 mV
23. BLACK Burst Amplitude
    300 mV ± 6 mV
24. TEST PATTERN Sync Amplitude
    300 mV ± 3 mV

25. TEST PATTERN Luminance Amplitude
    700 mV ± 7 mV
26. TEST PATTERN Burst Amplitude
    300 mV ± 6 mV
27. Linearity Error
    ≤1%

LUMINANCE RISE TIME CHECKS

28. Border Castellations
    108.5 ns ± 25 ns
29. Convergence (outside circle)
    150.0 ns ± 25 ns
30. Pluge
    150.0 ns ± 25 ns
31. Reflection Check (top)
    150.0 ns ± 25 ns
32. 250 kHz Square Wave
    150 ns ± 25 ns
33. Reflection Check (bottom)
    150.0 ns ± 25 ns
34. Sync Rise Time
    250 ns ± 25 ns

RINGING

35. Reflection Check (Top)
    < 1.5%
36. Reflection Check (Bottom)
    < 1.5%

PULSE HADs

37. Convergence (outside circle)
    225.0 ns ± 25 ns
38. Convergence (inside circle)
    225.0 ns ± 25 ns
39. Reflection Check (bottom)
    225.0 ns ± 25 ns

SIGNAL CHROMINANCE CHARACTERISTICS

40. Chrominance Amplitude
    Burst Gate Check — 300 mV ± 6 mV
41. Chrominance Amplitude
    R-Y 270° — 300 mV ± 6 mV
42. Chrominance Amplitude
    G-Y Blocks 326°— 300 mV ± 6 mV
43. Chrominance Amplitude
    R-Y 90° — 300 mV ± 6 mV
44. Chrominance Amplitude
    B-Y Blocks 180° — 300 mV ± 6 mV
45. Chrominance Amplitude
    G-Y Blocks 146°— 300 mV ± 6 mV
46. Chrominance Amplitude
    B-Y Blocks 180° — 300 mV ± 6 mV
47. Chrominance Amplitude
    Line Alternating Phase B-Y — 300 mV ± 6 mV
48. 75% Color Bars
    Phase Accuracy . . . . . within 3°
    Amplitude Accuracy . . . . . .within 5%
49. Chrominance/Luminance Delay Error Check
    Phase Accuracy . . . . . within 3°
    Amplitude Accuracy . . . . . .within 5%
50. SC/H Phase Accuracy
    within 4° typical
51. BLACK Phase Matching
    within 2°

FREQUENCY RESPONSE

52. TEST PATTERN Frequency Response
    Flat within 2% to 4.8 MHz
53. Chrominance-to-Luminance Delay
    (S/N B010243 and above only)
    ≤ 5 ns

ID CHECKS

54. Black Level Matching
    ± 5 mV referenced to TEST PATTERN blanking

VERTICAL INTERVAL CHECKS

55. Horizontal Sync Duration
    4.7 µs ± 50 ns
56. Vertical Serration Duration
    4.7 µs ± 50 ns
57. Equalizing Pulse Duration
    2.35 µs ± 50 ns

NOTE

The next four checks (59. through 62.) only need to be performed on instruments with VITs lines installed (S/N B010243 and above). If an older instrument is under test please skip to step 63.

58. CCIR Line 17
    2T Bar Rise Time . . . . . 192.9 ns ± 20 ns
    2T Pulse HAD . . . . . 200 ns ± 20 ns
59. CCIR Line 18
    Frequency Response . . . . . .
    flat to 4.8 MHz within 2%
60. CCIR Line 330
    White Bar Rise Time . . . . 192.9 ns ± 20 ns
    2T Pulse HAD . . . . . 200 ns ± 20 ns
61. CCIR Line 331
    Rise Time . . . . . .192.9 ns ± 20 ns

RETURN LOSS

62. Preparation for Return Loss Measurements

NOTE

All return loss checks will be measured in dB below this 5 MHz reference level.

63. GENLOCK Loop-through
64. TEST PATTERN and BLACK Outputs

LONG FORM PERFORMANCE CHECK

NOTE

Before proceeding with any of the Performance Checks make sure that the Character ID is disabled by moving J200 to the 1-2 position.

NOTE

To obtain the range of signal levels required for the following tests, the GENLOCK loop-through of the TPG-625 must remain **UN-terminated**. *This results in an input signal which is 6 dB above nominal levels, or 6 dB above that indicated by the Step Attenuator. Subtracting the Attenuator reading from +6 will yield the true signal change, in dB, from nominal. Setting the Step Attenuator to read 6 (indicating 6 dB attenuation), then, results in a normal signal level.*

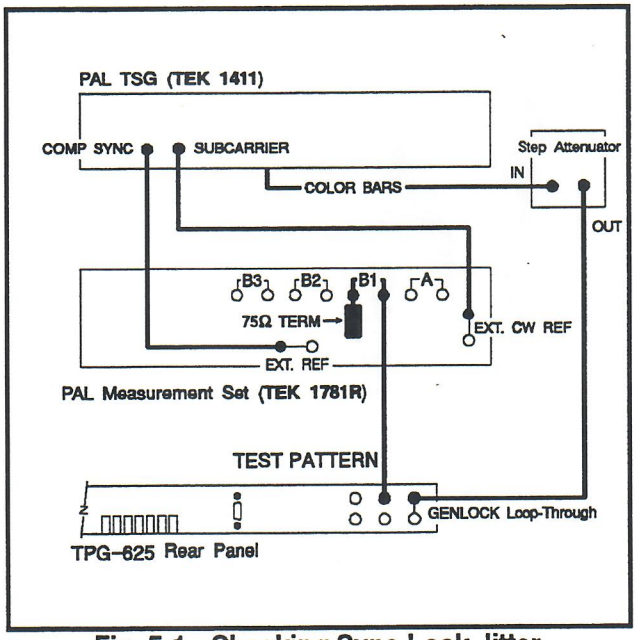


Fig. 5-1. Checking Sync Lock Jitter.

SYNC LOCK

1. **Jitter**
   ≤ 10 ns

   a. Connect test equipment as in Fig. 5-1.

   b. Select Color Bars with no burst from the PAL TSG.

   c. Use the 1781R PHASE SHIFT mode and variable Vector gain to normalize one of the burst vectors to the 0° position on the vector graticule. Press REFERENCE SET to zero the readout.

   d. Set the Step Attenuator to read 3 (+ 3 dB signal).

   e. **CHECK** — for ≤ 16° (10 ns) of jitter.

   f. Set the Step Attenuator to read 9 (– 3 dB signal).

   g. **CHECK** — for ≤ 16° (10 ns) of jitter.

BURST LOCK

2. **Phase Shift and Jitter with Change in Incoming Amplitude**
   ≤ 1° ϕ change for ± 3 dB sync or burst change
   ≤ 2° ϕ change for ± 6 dB sync or burst change
   ≤ 0.3° jitter for ± 3 dB sync or burst change
   ≤ 0.4° jitter for ± 6 dB sync or burst change

   a. Restore burst to the Color Bars signal at the PAL signal generator.

   b. With the attenuator set to 6 (nominal signal level), confirm that the TPG-625 burst vector remains normalized to 0°.

   c. Set the Step Attenuator to read 0 (+ 6 dB).

   d. **CHECK** — for typical jitter of ≤ 0.4°.

   e. **CHECK** — for ≤ 2° burst phase change.

   f. Set the Step Attenuator to read 3 (+ 3 dB).

   g. **CHECK** — for typical jitter of ≤ 0.3°.

   h. **CHECK** — for ≤ 1° burst phase change.

   i. Set the Step Attenuator to read 9 (– 3 dB).

   j. **CHECK** — for typical jitter of ≤ 0.3°.

   k. **CHECK** — for ≤ 1° burst phase change.

   l. Set the Step Attenuator to read 12 (– 6 dB).

m. **CHECK** — for typical jitter of ≤ 0.4°.

n. **CHECK** — for ≤ 2° burst phase change.

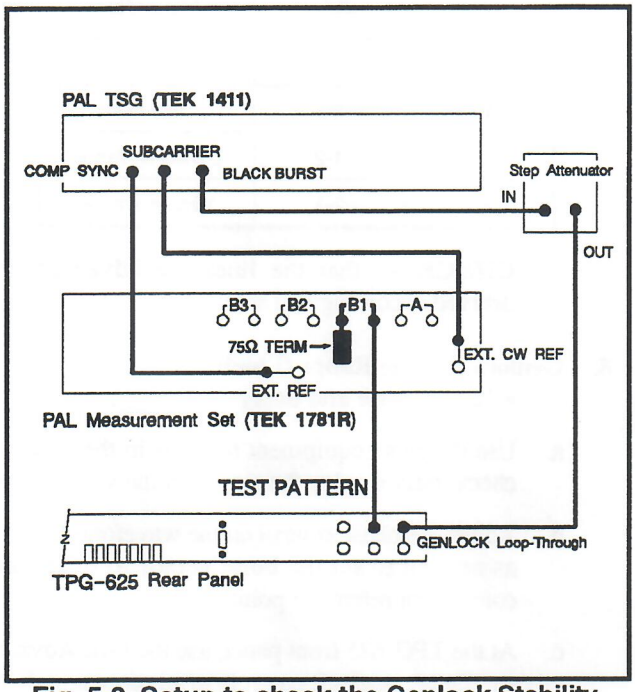


Fig. 5-2. Setup to check the Genlock Stability with gross Input Amplitude Variations.

k. Set the attenuator for 18 dB (12 dB down).

l. **CHECK** — that the TPG-625 is genlocked.

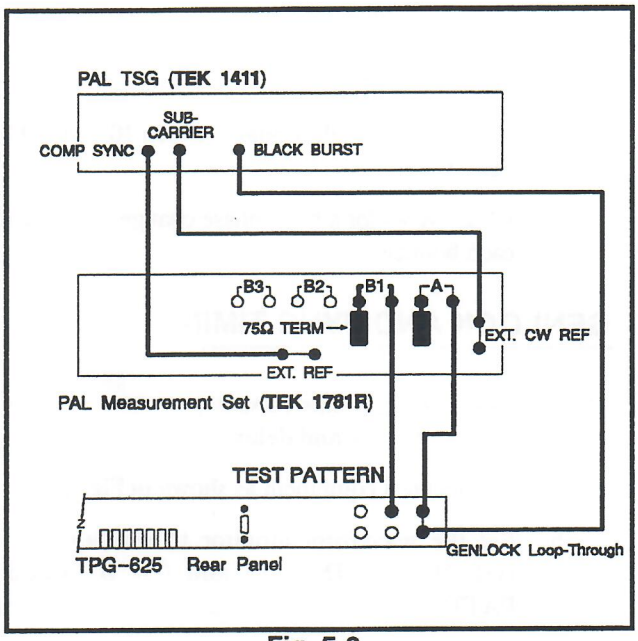


Fig. 5-3. Setup to check the rest of the Genlock functions.

3. **Genlock Stability with Gross Input Amplitude Variations**

   ≤ 40° for Input Sync or Burst Amplitude Range of +7 dB to -12 dB

   a. Connect the equipment as shown in Fig. 5-2.

   b. Display CH A and CH B1 in parade mode.

   c. Set the attenuator for 6 dB (0 dB actual).

   d. **CHECK** — that the TPG-625 is genlocked.

   e. Use the voltage cursors to measure the amplitude of the sync or burst.

   f. Set this level as 0 dB.

   g. Adjust the voltage cursors until they are +7 dB. Set the cursors to track.

   h. Set the Attenuator to 0 dB (6 dB high).

   i. Use the variable amplitude control on the 1411 to adjust the amplitude of the CH A signal to +7 dB (use the voltage cursors).

   j. **CHECK** — that the TPG-625 is genlocked.

4. **Burst Phase Shift with Change in Incoming Burst Frequency**

   ≤ 1° for 20 Hz change in incoming subcarrier

   a. Replace the Color Bars signal to the TPG-625 GENLOCK Input with a Black Burst signal. Bypass the Step Attenuator and connect a termination to the TPG-625 GENLOCK loop-through (see Fig. 5-3).

   b. Confirm that the TEST PATTERN burst vector remains normalized to 0° dϕ. Readjust the 1781R if necessary.

   c. Offset the frequency of the Black Burst Genlock input by + 20 Hz.

   d. **CHECK** — that the TPG-625 re-acquires lock.

   e. **CHECK** — that burst phase has shifted ≤ 1°.

   f. Offset the Genlock input frequency by – 20 Hz.

   g. **CHECK** — that the TPG-625 re-acquires lock.

   h. **CHECK** — that burst phase has shifted ≤ 1°.

   i. Reset the input frequency to zero offset.

5. **Phase Shift with Change in Incoming APL**
≤ 1° over 10% to 90% APL

   a. Replace the Black Burst GENLOCK input with a Variable Amplitude Flat Field (or Bounce) signal locked to the field rate.

   b. Vary the Flat Field signal between 10% and 90% Peak White.

   c. **CHECK** — for a burst phase change of ≤ 1° after each bounce.

GENLOCK AND SYNC TIMING

6. **Genlock Timing Range (Coarse)**
≈ 7 µs advance and delay

   a. Connect test equipment as shown in Fig. 5-3.

   b. Set the waveform monitor to overlay CH A (GENLOCK INPUT) and CH B1 (TEST PATTERN).

   c. At the TPG-625 front panel, advance and delay the TEST PATTERN output as far as it will go (with the coarse timing buttons).

   d. **CHECK** — that the TEST PATTERN advances and delays approximately 7 µs relative to the GENLOCK input (CH A).

   e. Replace the TEST PATTERN with BLACK on CH B1 and repeat steps c and d.

7. **Vertical Timing Range**
up to 2 lines advance and 1 line delay

   a. Connect the test equipment as shown in Fig. 5-3.

   b. Set the waveform monitor to: external reference, two field display, full horizontal magnification (display five or six lines).

   c. Adjust the trace on the waveform monitor to display where transitions between signals occur.

   d. Move jumpers J887 and J987 according to the following table:

Table 5-1. Vertical timing jumper placement.

J887	J987	RESULT
1-2	1-2	0 (no change)
1-2	2-3	1 line delay
2-3	1-2	2 lines advance
2-3	2-3	1 line advance

   e. **CHECK** — that the lines are advanced and delayed according to Table 5-1.

8. **Genlock Timing Range (Fine)**
≈ 55° advance and delay

   a. Use the same equipment setup as in the previous check, only display the signal on the vectorscope.

   b. Adjust the phase control on the waveform monitor as needed to set the burst vector to 0° (or any convenient reference point).

   c. At the TPG-625 front panel, use the Fine Advance and Delay genlock controls to advance and delay the signal as much as possible.

   d. **CHECK** — that the FINE button advances and delays the signal about 55° on the vectorscope.

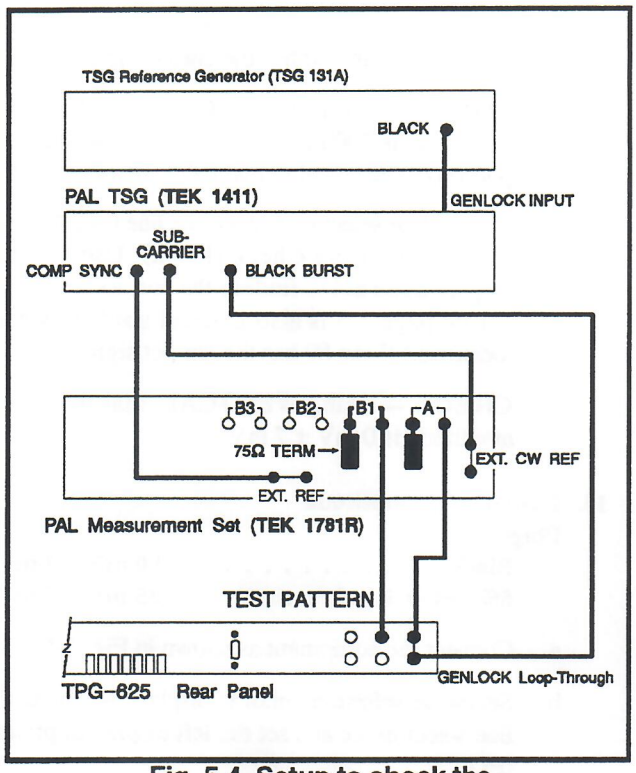


Fig. 5-4. Setup to check the Color Framing Decisions.

9. **Color Framing Decisions**
   Correct for input SC/H of 0° ± 40°

   a. Connect the equipment as shown in Fig. 5-4.

   b. Set the attenuator to 6 dB (0 dB).

   c. Set the SCH adjustment on the 1411 to 0°.

   d. Display CH A and CH B1 on the vectorscope in overlay mode.

   e. Make sure that the TPG-625 is using the external reference.

   f. Slowly adjust the SCH phase on the 1411 ± 40°.

   g. **CHECK** — that the SCH vector for the TPG-625 stays in the same color frame as the 1411's black burst signal. (If it changes color framing it will "jump" 90°.)

   h. **CHECK** — that the signal does change color frames ("jumps") after the SCH is adjusted beyond 40° but before 90°.

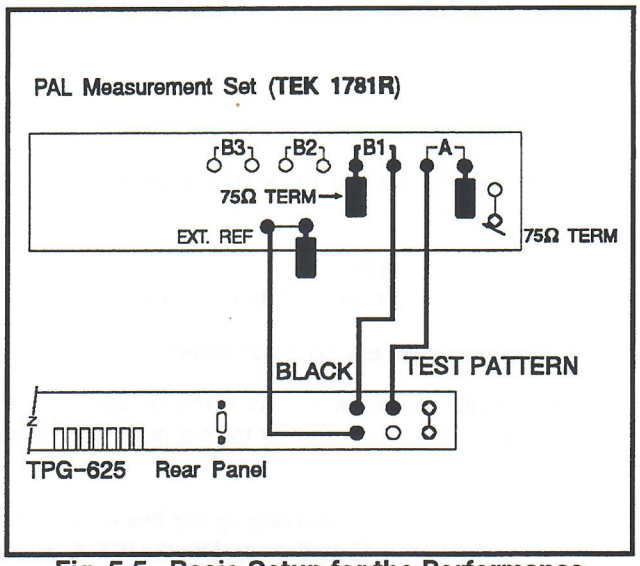


Fig. 5-5. Basic Setup for the Performance Checks.

BLANKING LEVELS

10. **TEST PATTERN Blanking Level**
    0 mV ± 50 mV

    a. Connect the equipment as shown in Fig. 5-5.

    b. Set the waveform monitor to display the TEST PATTERN signal (CH A).

    c. Switch the waveform monitor to ground-coupled.

    d. Set the ground line to a convenient reference graticule to establish a 0 V reference.

    e. Return to DC coupling.

    f. **CHECK** — that the blanking level is within 50 mV of the established reference graticule.

11. **BLACK Blanking Level**
    0 mV ± 5 mV

    a. Connect the equipment as shown in Fig. 5-5.

    b. Set the waveform monitor to display the BLACK signal (CH B1).

    c. Switch the waveform monitor to ground-coupled.

    d. Set the ground line to a convenient reference graticule to establish a 0 V reference.

    e. Return to DC coupling.

f. **CHECK** — that the blanking level is within 5 mV of the established reference graticule.

g. Repeat for the other BLACK output.

LUMINANCE AMPLITUDE LEVELS

12. Luminance Amplitude
Border Castellations — 700 mV ± 1%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Border Castellations. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 25 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the signal amplitude is 700 mV ± 1% (7 mV).

13. Luminance Amplitude
Convergence (outside circle) — 700 mV ± 1%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Convergence pattern outside of the circle. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 36 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the pulse amplitudes are 700 mV ± 1% (7 mV).

14. Luminance Amplitude
Burst Gate Check —
White . . . . . 700 mV ± 1%
Black . . . . . 0 mV ± 7 mV

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Burst Gate Check (white). Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 60 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the signal amplitude is 700 mV ± 1% (7 mV). Use the right portion of the signal to make this measurement.

e. Use the line select to display one line (of all fields) of the Burst Gate Check (black). Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 80 has the correct signal.)

f. **CHECK** — using WFM+CAL, that the signal amplitude is 0 mV ± 7 mV.

15. Luminance Amplitude
Pluge
Black . . . . . 0.0 mV ± 7 mV
5% below Black . . . . . -35 mV ± 7 mV

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Pluge. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 60 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the signal amplitude is 0 mV ± 7 mV and -35 mV ± 7 mV.

16. Luminance Amplitude
Reflection Check (top) — 700 mV ± 1%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Reflection Check (top). Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 80 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the signal amplitude is 700 mV ± 1% (7 mV).

17. Luminance Amplitude
250 kHz Square Wave — 525 mV ± 1%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the 250 kHz Square Wave. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 110 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the signal amplitude is 525 mV ± 1% (5 mV).

18. Luminance Amplitude
Convergence (inside the circle)
Black . . . . . 0 mV
White . . . . . 700 mV ± 1%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Convergence horizontal bar (inside the circle). Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 166 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the signal amplitude is 700 mV ± 1% (7 mV).

e. Use the line select to display one line (of all fields) of the Convergence vertical bars (inside the circle). Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 165 has the correct signal.)

f. **CHECK** — using WFM+CAL, that the signal amplitude is 0 mV ± 5 mV.

19. Luminance Amplitudes
5-Step Staircase —
0, 140, 280, 420, 560, & 700 mV (± 7 mV)

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Border 5-Step Staircase. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 231 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the signal amplitudes are 0.0 mV, 140.0 mV, 280.0 mV, 420.0 mV, 560.0 mV, and 700.0 mV ± 7 mV.

20. Luminance Amplitude
Reflection Check (bottom) — 700 mV ± 1%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Reflection Check (bottom). Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 250 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the signal amplitude is 700 mV ± 1% (7 mV).

21. BLACK Sync Amplitude
300 mV ± 3 mV

a. Connect the test equipment as in Fig. 5-5.

b. Turn off line select mode.

c. Select WFM+CAL and CH B1 INPUT.

d. **CHECK** — using WFM+CAL, for a sync amplitude of 300 mV ± 3 mV (1%).

22. BLACK Glitch Amplitude
< 20 mV

a. Connect the test equipment as in Fig. 5-5.

b. Turn off line select mode.

c. Select CH B1 INPUT.

d. **CHECK** — using the voltage cursors or the graticule that the glitches on the Black Burst signal are < 20 mV.

23. BLACK Burst Amplitude
300 mV ± 6 mV

a. Connect the test equipment as in Fig. 5-5.

b. Select WFM+CAL and CH B1 INPUT.

c. Turn off line select mode.

d. **CHECK** — using WFM+CAL, for a peak-to-peak burst amplitude of 300 mV ± 6 mV (2%).

24. TEST PATTERN Sync Amplitude
300 mV ± 3 mV

a. Connect the test equipment as in Fig. 5-5.

b. Select WFM+CAL and CH A INPUT.

c. **CHECK** — using WFM+CAL, for a sync amplitude of 300 mV ± 3 mV (1%).

25. TEST PATTERN Luminance Amplitude
700 mV ± 7 mV

a. Connect the test equipment as in Fig. 5-5.

b. Turn off line select mode.

c. Select WFM+CAL and CH A INPUT.

d. **CHECK** — that the White Level of the lower waveform matches the Blanking Level of the upper waveform within 7 mV.

26. TEST PATTERN Burst Amplitude
300 mV ± 6 mV

a. Connect the test equipment as in Fig. 5-5.

b. Turn off line select mode.

c. Select WFM+CAL and CH A INPUT.

d. **CHECK** — for a peak-to-peak burst amplitude of 300 mV ± 6 mV (2%).

27. Linearity Error
≤1%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the 5-Step Staircase signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 229 has the correct signal.)

d. Display the 5-Step Staircase on the waveform monitor using the DIFF filter.

e. **CHECK** — for < 1% variation in the step spikes.

LUMINANCE RISE TIME CHECKS

28. Border Castellations
108.5 ns ± 25 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Border Castellations signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 25 has the correct signal.)

d. Use the horizontal magnification to expand on one of the luminance rises.

e. Use the variable vertical gain to adjust the amplitude of the Border Castellation rise to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the rise time from 100 mV to 900 mV is 108.5 ns ± 25 ns.

29. Convergence (outside circle)
150.0 ns ± 25 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Convergence (outside the circle) signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 35 has the correct signal.)

d. Use the horizontal magnification to expand on one of the luminance rises.

e. Use the variable vertical gain to adjust the amplitude of the rising edge to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the rise time from 100 mV to 900 mV is 150.0 ns ± 25 ns.

30. Pluge
150.0 ns ± 25 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Pluge signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 70 has the correct signal.)

d. Use the horizontal magnification to expand on one of the luminance rises.

e. Use the variable vertical gain to adjust the amplitude of the rise to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the rise time from 100 mV to 900 mV is 150.0 ns ± 25 ns.

31. Reflection Check (top)
150.0 ns ± 25 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Reflection Check (top) signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 80 has the correct signal.)

d. Use the horizontal magnification to expand on one of the luminance rises.

e. Use the variable vertical gain to adjust the amplitude of the rise to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the rise time from 100 mV to 900 mV is 150.0 ns ± 25 ns.

32. 250 kHz Square Wave
150 ns ± 25 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the 250 kHz Square Wave signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 100 has the correct signal.)

d. Use the horizontal magnification to expand on one of the luminance rises.

e. Use the variable vertical gain to adjust the amplitude of the rise to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the rise time from 100 mV to 900 mV is 150.0 ns ± 25 ns.

33. Reflection Check (bottom)
150.0 ns ± 25 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Reflection Check (bottom) signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 250 has the correct signal.)

d. Use the horizontal magnification to expand on one of the luminance rises.

e. Use the variable vertical gain to adjust the amplitude of the rise to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the rise time from 100 mV to 900 mV is 150.0 ns ± 25 ns.

34. Sync Rise Time
250 ns ± 25 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Take the waveform monitor out of line select mode.

c. Use the horizontal and vertical magnification to display the sync on the full screen with 1000 mV_{p-p} amplitude.

d. **CHECK** — using the timing cursors, that the time between the 100 mV and 900 mV points is 250 ns ± 25 ns.

RINGING

35. Reflection Check (Top)
< 1.5%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Reflection Check (top) signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 80 has the correct signal.)

d. Use the horizontal magnification to expand on one of the pulses.

e. Use the variable vertical gain to adjust the amplitude of the pulse to 1000 mV_{p-p}.

f. **CHECK** — using the voltage cursors or the graticule, that the ringing is < 1.5% of the peak.

36. Reflection Check (Bottom)
< 1.5%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Reflection Check (bottom) signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 250 has the correct signal.)

d. Use the horizontal magnification to expand on the pulse.

e. Use the variable vertical gain to adjust the amplitude of the pulse to 1000 mV_{p-p}.

f. **CHECK** — using the voltage cursors or the graticule, that the ringing is < 1.5%.

PULSE HADs

37. Convergence (outside circle)
225.0 ns ± 25 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Convergence (outside circle) signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 35 has the correct signal.)

d. Use the horizontal magnification to expand on one of the pulses.

e. Use the variable vertical gain to adjust the amplitude of the pulse to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the time between the 500 mV points of the pulse is 225.0 ns ± 25 ns.

38. Reflection Check (top)
225.0 ns ± 25 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Reflection Check (top) signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 80 has the correct signal.)

d. Use the horizontal magnification to expand on one of the pulses.

e. Use the variable vertical gain to adjust the amplitude of the pulse to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the time between the 500 mV points of the pulse is 225.0 ns ± 25 ns.

39. Convergence (inside circle)
225.0 ns ± 25 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Convergence (inside circle) signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 170 has the correct signal.)

d. Use the horizontal magnification to expand on one of the pulses.

e. Use the variable vertical gain to adjust the amplitude of the pulse to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the time between the 500 mV points of the pulse is 225.0 ns ± 25 ns.

40. Reflection Check (bottom)
225.0 ns ± 25 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Reflection Check (bottom) signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 250 has the correct signal.)

d. Use the horizontal magnification to expand on one of the pulses.

e. Use the variable vertical gain to adjust the amplitude of the pulse to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the time between the 500 mV points of the pulse is 225.0 ns ± 25 ns.

SIGNAL CHROMINANCE CHARACTERISTICS

41. Chrominance Amplitude
Burst Gate Check — 300 mV ± 6 mV

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Burst Gate signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 60 has the correct signal.)

d. Use the horizontal gain to display just the burst gate and set the horizontal magnification to 5x.

e. **CHECK** — using WFM+CAL, that the chrominance amplitude is 300 mV_{p-p} ± 6 mV_{p-p}.

42. Chrominance Amplitude
R-Y 270° — 300 mV ± 6 mV

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Line Alternating Phase R-Y signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 60 has the correct signal.)

d. Use the horizontal gain to display just the burst and set the horizontal magnification to 5x.

e. **CHECK** — using WFM+CAL, that the chrominance amplitude is 300 mV_{p-p} ± 6 mV_{p-p}.

43. Chrominance Amplitude
G-Y Blocks 326°— 300 mV ± 6 mV

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the G-Y Blocks signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 60 has the correct signal.)

d. Use the horizontal gain to display just the burst and set the horizontal magnification to 5x.

e. **CHECK** — using WFM+CAL, that the chrominance amplitude is 300 mV_{p-p} ± 6 mV_{p-p}.

44. Chrominance Amplitude
R-Y 90° — 300 mV ± 6 mV

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the R-Y Blocks signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 260 has the correct signal.)

d. Use the horizontal gain to display just the burst and set the horizontal magnification to 5x.

e. **CHECK** — using WFM+CAL, that the chrominance amplitude is 300 mV_{p-p} ± 6 mV_{p-p}.

45. Chrominance Amplitude
B-Y Blocks 180° — 300 mV ± 6 mV

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the B-Y Blocks signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 60 has the correct signal.)

d. Use the horizontal gain to display just the burst and set the horizontal magnification to 5x.

e. **CHECK** — using WFM+CAL, that the chrominance amplitude is 300 mV_{p-p} ± 6 mV_{p-p}.

46. Chrominance Amplitude
G-Y Blocks 146°— 300 mV ± 6 mV

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the G-Y Blocks signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 260 has the correct signal.)

d. Use the horizontal gain to display just the burst and set the horizontal magnification to 5x.

e. **CHECK** — using WFM+CAL, that the chrominance amplitude is 300 mV_{p-p} ± 6 mV_{p-p}.

47. Chrominance Amplitude
B-Y Blocks 180° — 300 mV ± 6 mV

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the B-Y Blocks signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 60 has the correct signal.)

d. Use the horizontal gain to display just the burst and set the horizontal magnification to 5x.

e. **CHECK** — using WFM+CAL, that the chrominance amplitude is 300 mV_{p-p} ± 6 mV_{p-p}.

48. Chrominance Amplitude
Line Alternating Phase B-Y — 300 mV ± 6 mV

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Line Alternating Phase B-Y signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.)

d. Use the horizontal gain to display just the burst and set the horizontal magnification to 5x.

e. **CHECK** — using WFM+CAL, that the chrominance amplitude is 300 mV_{p-p} ± 6 mV_{p-p}.

49. 75% Color Bars
Phase Accuracy . . . . . within 3°
Amplitude Accuracy . . . . . within 5%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the 75% Color Bars signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 140 has the correct signal.)

d. Display the signal on the vectorscope.

e. Return the horizontal and vertical magnification to nominal.

f. Use the phase adjustment to align the vectors to their boxes, if necessary.

g. **CHECK** — that the vectors are all within their small boxes (phase is within 3° and amplitude is within 5%).

50. Chrominance/Luminance Delay Error Check
Phase Accuracy . . . . . within 3°
Amplitude Accuracy . . . . . within 5%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Chrominance/Luminance Delay Error Check signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.)

d. Display the signal on the vectorscope.

e. Use the phase adjustment to align the vectors to their boxes, if necessary.

f. **CHECK** — that the vectors are all within their small boxes (phase is within 3° and amplitude is within 5%).

51. SC/H Phase Accuracy within 4° typical

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line of CH A and set the left display to SC/H.

c. Take the waveform monitor out of line select mode.

d. Make sure that the waveform monitor is internally referenced.

e. **CHECK** — that the SC/H is within 4°.

52. BLACK Phase Matching within 2°

a. Begin with the equipment setup shown in Fig. 5-5. Select CH A input (TEST PATTERN).

b. Confirm that the 1781R is set to EXT CW Sync, then exit the Configure menu to view the vector display.

c. Select Phase Shift and align the burst vectors to 0° and 90° on the vector graticule. Press the Reference Set button to zero the phase. Adjust Vector Gain to normalize the 0° vector to the vector graticule.

d. At the rear panel of the TPG-625, move the cable from the TEST PATTERN output to the lower BLACK output (see Fig. 5-6).

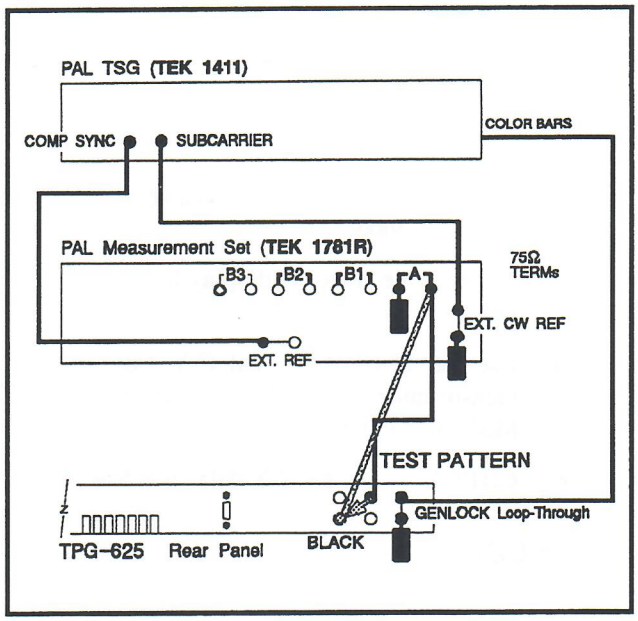


Fig. 5-6. Move the cable as shown to measure the BLACK.

e. **CHECK** — on the vector display, that the black burst vector is within ± 2° of the 0° graticule.

f. Repeat for the other BLACK outputs.

g. Replace BLACK with TEST PATTERN on the waveform monitor's CH A input (return the equipment to the setup shown in Fig. 5-5).

FREQUENCY RESPONSE

53. TEST PATTERN Frequency Response Flat within 2% to 4.8 MHz

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Multiburst signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 200 has the correct signal.)

d. **CHECK** — using the voltage cursors or WFM+CAL feature, that the signal is flat within 2% out to 4.8 MHz.

54. Chrominance-to-Luminance Delay (S/N B010243 and above only)
≤ 5 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode.

c. Use the line select to display line 17 (in 4 of 8 fields).

d. Use the 1781R's internal C-Y gain and delay measurement to find the C-Y delay of the 20T Modulated Pulse.

e. **CHECK** — that the C-Y delay is < 5 ns.

ID CHECKS

55. Black Level Matching
± 5 mV referenced to TEST PATTERN blanking

a. Connect the equipment as shown in Fig. 5-5.

b. Enable the ID display by putting jumper J200 in the 1-2 position.

c. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

d. Use the line select to display one line (of all fields) of the ID signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 50 has the correct signal.)

e. **CHECK** — that the black level of the ID is within 5 mV of the rest of the Test Pattern signal.

VERTICAL INTERVAL CHECKS

56. Horizontal Sync Duration
4.7 µs ± 50 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display two lines.

c. Turn the line select off.

d. Use the horizontal magnification to expand the sync to fill the screen.

e. Use the vertical magnification to expand the sync to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the sync duration from the 500 mV point of the falling edge to the 500 mV point of the rising edge is 4.7 µs ± 50 ns.

57. Vertical Serration Duration
4.7 µs ± 50 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode.

c. Use the line select to display one line of the vertical interval where the vertical serrations are located (line 2).

d. Use the horizontal magnification to expand the vertical serrations to fill the screen.

e. Use the vertical magnification to expand them to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the vertical serration duration from the 500 mV point of the rising edge to the 500 mV point of the falling edge is 4.7 µs ± 50 ns.

58. Equalizing Pulse Duration
2.35 µs ± 50 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode.

c. Use the line select to display one line of the vertical interval where the equalizing pulses are located (line 4).

d. Use the horizontal magnification to expand one equalizing pulse to fill the screen.

e. Use the vertical magnification to expand it to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the duration from the 500 mV point of the falling edge to the 500 mV point of the rising edge is 2.35 µs ± 50 ns.

NOTE

The next four checks (59. through 62.) only need to be performed on instruments with VITs lines installed (S/N B010243 and above). If an older instrument is under test please skip to step 63.

59. CCIR Line 17

2T Bar Rise Time . . . . . 192.9 ns ± 20 ns
2T Pulse HAD . . . . . 200 ns ± 20 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display line 17 (4 of 8 fields with 1, 5, 3, 7 selected).

d. Use the horizontal magnification to enlarge the rising edge of the 2T Bar so that it fills the screen.

e. Use the vertical magnification so that the amplitude is 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the time from the 100 to 900 mV points is 192.9 ns ± 20 ns.

g. Display the 2T Pulse.

h. Use the horizontal magnification to enlarge the pulse to fill the screen.

i. Use the vertical magnification to normalize the pulse to 1000 mV_{p-p}.

j. **CHECK** — using the timing cursors, that the time between the 500 mV points of the pulse is 200 ns ± 20 ns.

60. CCIR Line 18

Frequency Response
. . . . . flat to 4.8 MHz within 2%

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display line 18 (4 of 8 fields with fields 1, 5, 3, 7 selected).

d. **CHECK** — using the voltage cursors or WFM+CAL feature, that the burst packets are flat within 2% out to 4.8 MHz.

61. CCIR Line 330

White Bar Rise Time . . . 192.9 ns ± 20 ns
2T Pulse HAD . . . . . 200 ns ± 20 ns

a. Connect the equipment as shown in Fig. 5-5.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display line 330 (4 of 8 fields with 2, 6, 4, 8 selected).

d. Use the horizontal magnification to enlarge the rising edge of the White Bar so that it fills the screen.

e. Use the vertical magnification so that the amplitude is 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the time from the 100 to 900 mV points is 192.9 ns ± 20 ns.

g. Display the 2T Pulse.

h. Use the horizontal magnification to enlarge the pulse to fill the screen.

i. Use the vertical magnification to normalize the pulse to 1000 mV_{p-p}.

j. **CHECK** — using the timing cursors, that the time between the 500 mV points of the pulse is 200 ns ± 20 ns.

62. CCIR Line 331

Rise Time . . . . . 192.9 ns ± 20 ns

a. Connect the equipment as shown in Fig. 5-5.

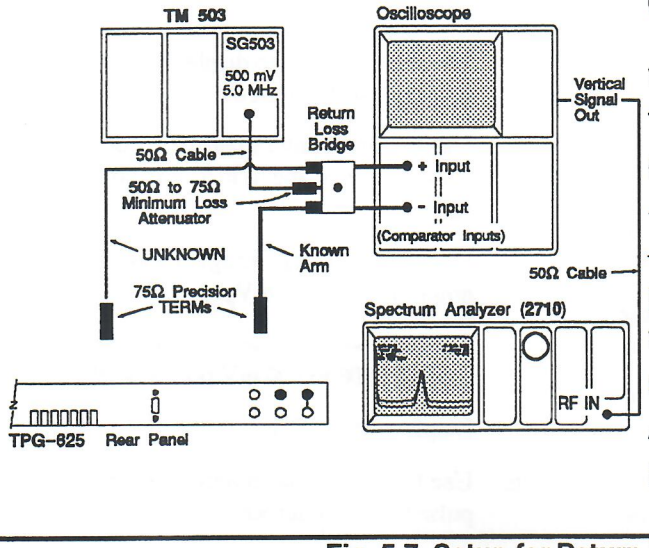
b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display line 331 (4 of 8 fields with fields 2, 6, 4, 8 selected).

d. Use the horizontal magnification to enlarge the rising edge of the Luminance Pedestal so that it fills the screen.

e. Use the vertical magnification so that the amplitude is 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the time from the 100 to 900 mV points is 192.9 ns ± 20 ns.



EQUIPMENT CONTROL SETTINGS:

OSCILLOSCOPE		SPECTRUM ANALYZER	
Vertical Mode	Left	Freq Start	0 MHz
Trig Source	Left	Freq Stop	10 MHz
COMPARATOR		Ref Level	-10 dB
+Input	DC	Display Mode	10 dB/Div
– Input	DC	Freq Span/Div	1MHz
Bandwidth	Full	Resolution	300 kHz
Volt/Div	50 mV	Video Filter	On
SINE WAVE GENERATOR			
Amplitude	500 mV		
Frequency	5 MHz		

Fig. 5-7 Setup for Return Loss Measurements.

RETURN LOSS

63. Preparation for Return Loss Measurements

a. Connect the equipment as shown in Fig. 5-7.

b. With both precision terminators connected, adjust the Return Loss Bridge to null the 5 MHz response displayed on the spectrum analyzer.

c. Remove the terminator from the UNKNOWN cable.

d. Place the peak of the displayed 5 MHz response at the top line of the graticule by choosing "marker to reference level" from the MKR/FREQ menu of the 2710.

NOTE

All return loss checks will be measured in dB below this 5 MHz reference level.

64. GENLOCK Loop-through

a. Connect the 75Ω precision term to one of the TPG-625 GENLOCK loop-through connectors.

b. Connect the UNKNOWN cable to the other TPG-625 GENLOCK loop-though connector.

c. **CHECK** — that the return loss is > 40 dB (4 major divisions) as the SG503 frequency is varied between 5 MHz and 500 kHz.

65. TEST PATTERN and BLACK Outputs

a. Move jumper J440 (Analog board) to pins 2 and 3 to disable the TEST PATTERN.

b. Connect the UNKNOWN cable to the TEST SIGNAL output.

c. **CHECK** — that the return loss is > 36 dB as the SG503 frequency is varied between 5 MHz and 500 kHz.

d. Connect the UNKNOWN cable to the top BLACK output.

e. **CHECK** — that the return loss is > 36 dB as the SG503 frequency is varied between 5 MHz and 500 kHz.

f. Move the UNKNOWN cable to the other BLACK outputs and repeat step e.

g. Remove the UNKNOWN cable from the BLACK output and return J440 to pins 1 and 2.

SHORT FORM CALIBRATION PROCEDURES

NOTE

Calibration of the TPG-625 should be attempted only after the instrument has reached normal operating temperature, usually after 30 minutes warm-up.

POWER SUPPLY

NOTE

The Power Supply voltage should be adjusted only if it is out of tolerance. The adjustment is not necessary during routine maintenance.

1. +5 V Output and Current Limit . . . . . R510 & R415

NOTE

This procedure assumes that the TPG-625 is set for 110 V operation. If it is set for 220 V, please change the variac setting to 180 V.

SUBCARRIER

2. Subcarrier Frequency C19

Steps 3 Through 12 Share the Same Basic Equipment Setup and Settings. This Reference Setup is Shown in Fig. 5-11.

DC OFFSET

3. Black Burst DC Offset R952
4. Test Pattern & ID DC Offset R322

BLACK LEVEL

5. Test Pattern Black Level R740
6. Character ID Black Level R578

SIGNAL GAIN

7. Black Burst Gain R625
8. Test Pattern Gain R939

FREQUENCY RESPONSE

9. Black Burst Amplitude
   . . . . . C630 (fine)
   . . . . . C633 (coarse)
10. Test Pattern Burst Amplitude C840
11. Test Pattern Frequency Response C945

If both specs cannot be met continue on to Adjustment #12, otherwise the adjustment procedures are finished.

NOTE

Inductors L450, L550, L551, L650, and L750 are factory set. Only perform step 12. if the Test Signal output cannot be brought into frequency spec using C633.

12. Test Pattern Frequency Response . . . . . .
    L450, L550, L551, L650, and L750

LONG FORM
CALIBRATION PROCEDURES

NOTE

Calibration of the TPG-625 should be attempted only after the instrument has reached normal operating temperature, usually after 30 minutes warm-up.

POWER SUPPLY

NOTE

The Power Supply voltage should be adjusted only if it is out of tolerance. The adjustment is not necessary during routine maintenance.

1. +5 V Output and Current Limit . . . . . R510 & R415

a. Connect power to the TPG-625 through a Variac set to 90 Volts AC. Connect the probe as shown in Fig. 5-8.

NOTE

This procedure assumes that the TPG-625 is set for 110 V operation. If it is set for 220 V, please change the variac setting to 180 V.

b. Set R415 (current limit) 1/4 turn from its counter-clockwise limit.

c. **CHECK** — the +5 V test point on the Power Supply board for +5 V ± 100 mV.

d. Adjust R510 if necessary for +5 V ± 100 mV.

e. Set R415 (Current Limit) to its clockwise limit.

f. **CHECK** — to see if LED DS670 is flashing. If the LED is flashing, then the supply is current limiting. If the LED is not flashing go on to part g.

g. **ADJUST** — R415 slowly counterclockwise until the LED stops flashing (the supply stops current limiting).

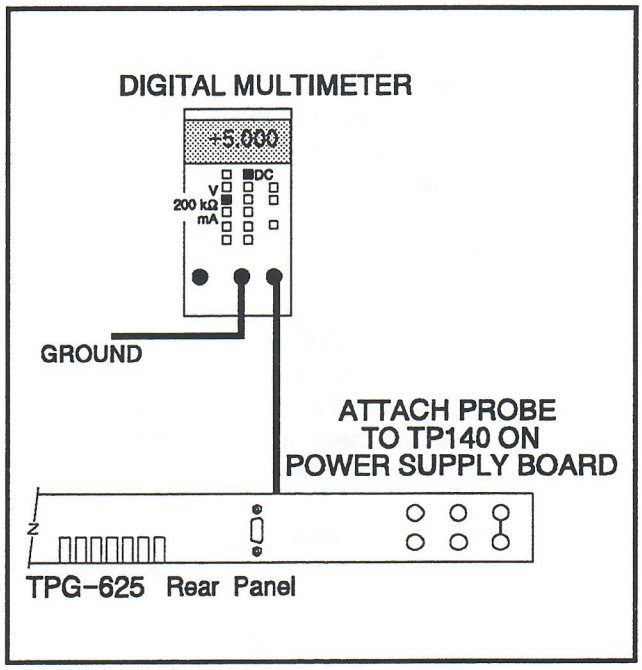


Fig. 5-8. Setup to adjust R510 & R415

h. **ADJUST** — R415 counterclockwise 1/4 turn from the point where the LED stops flashing or 1/4 turn counterclockwise from the clockwise stop if the LED was not flashing in part e.

i. **CHECK** — that the +5 V test point is still at +5 V ± 100 mV.

j. Repeat this procedure as necessary to obtain both current +5 V voltage and no current limiting.

SUBCARRIER

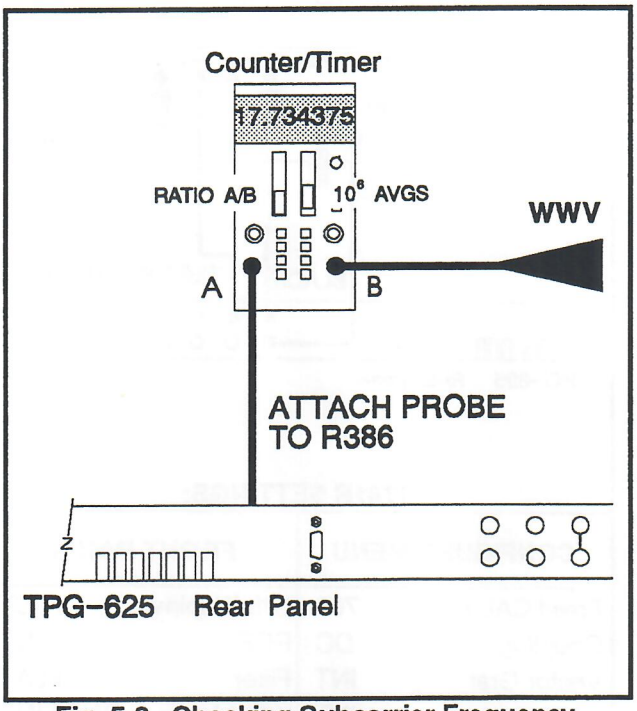


Fig. 5-9. Checking Subcarrier Frequency.

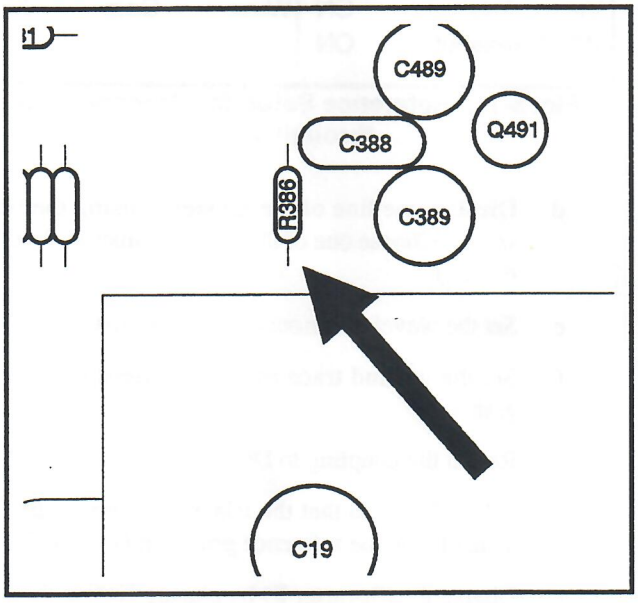


Fig. 5-10. Where to attach the probe to adjust C19.

2. **Subcarrier Frequency C19**

   a. Connect the equipment as shown in Fig. 5-9. Confirm that there are no connections to the TPG-625 outputs.

   b. Attach probe to R386 as shown in Fig. 5-10.

   c. Move Jumper J179 to the 1-3 position.

   d. Remove the cap from the Crystal Oven board.

   e. Adjust C19 for a subcarrier frequency of 17.734375 MHz ±1 Hz.

   f. Reinstall the cap on the Crystal Oven board.

   g. Return jumper J179 to the 2-3 position.

Steps 3 Through 12 Share the Same Basic Equipment Setup and Settings. This Reference Setup is Shown in Fig. 5-11.

DC OFFSET

3. **Black Burst DC Offset R952**

   a. Begin with the 1781R Reference Setup (Fig. 5-11). Select WFM display and CH B1 input.

   b. Set the 1781R to GND coupling and set the trace on a convenient reference graticule.

   c. Switch back to DC coupled.

   d. Adjust R952 for a dc level of 0 Volts ± 50 mV.

4. **Test Pattern & ID DC Offset R322**

   a. Begin with the 1781R Reference Setup (Fig. 5-11). Select WFM display and CH A input.

   b. Set the 1781R to GND coupling and set the trace on a convenient reference graticule.

   c. Switch back to DC coupled.

   d. Adjust R322 for a dc level of 0 Volts ± 50 mV.

BLACK LEVEL

5. **Test Pattern Black Level R740**

   a. Begin with the 1781R Reference Setup (Fig. 5-11).

   b. Select the CH A INPUT.

   c. Display one line of the bottom Reflection Check signal.

   d. Set the 1781R to GND coupling and set the trace on a convenient reference graticule.

   e. Switch back to DC coupled.

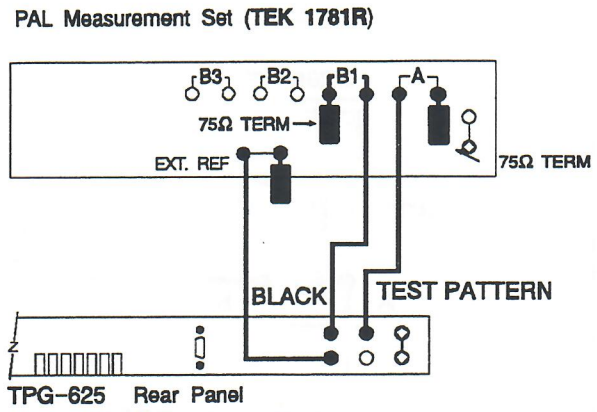
   f. Adjust R740 for a dc level of 0 Volts ± 50 mV.

6. **Character ID Black Level R578**

   a. Begin with the 1781R Reference Setup (Fig. 5-11).

   b. Select the CH A INPUT.

   c. Enable the Character ID by placing J200 on the Output board in the 1-2 position.



1781R SETTINGS:

CONFIGURE MENU		FRONT PANEL	
Fixed CAL Ampl.	700	Left Display	VECT
Coupling	DC	REF	INT
Vector Grat	INT	Filter	FLAT
WFM Grat	INT	WFM Horiz.	ONE/LINE
CW Sync	EXT	Vector Gain	VAR
Vector Readout	ON	Waveform Gain	X5
WFM Readout	ON		

Fig. 5-11. Reference Setup for Procedures 3 through 12.

   d. Display one line of the ID signal using the line select. (Choose one of the all black lines or disable the ID.)

   e. Set the waveform monitor coupling to GND.

   f. Set the ground trace to a convenient reference graticule.

   g. Return the coupling to DC.

   h. Adjust R578 so that the Black portions of the ID signal lie on the reference graticule (± 50 mV).

   i. Disable the Character ID by placing J200 in the 2-3 position.

SIGNAL GAIN

7. **Black Burst Gain R625**

   a. Begin with the 1781R Reference Setup (Fig. 5-11).

b. Select WFM + CAL display and CH B1 input (BLACK BURST).

c. Set CAL to 300 mV.

d. Adjust R625 to match the sync tip of the upper waveform to the blanking level of the lower.

8. Test Pattern Gain R939

a. Begin with the 1781R Reference Setup (Fig. 5-11). Replace BLACK with TEST SIGNAL on CH A. Select WFM + CAL display and CH A input (TEST PATTERN).

b. Select Fixed CAL (700 mV).

c. Display one line of the top Reflection Check signal, using the 2 field display with maximum horizontal magnification.

d. Adjust R939 to match the White Level of the lower waveform to the Blanking Level of the upper waveform (700 mV).

FREQUENCY RESPONSE

9. Black Burst Amplitude
. . . . . C630 (fine)
. . . . . .C633 (coarse)

a. Begin with the 1781R Reference Setup (Fig. 5-11).

b. Select WFM + CAL Display and CH B1.

c. Set CAL to 300 mV.

d. Adjust C630 to match the bottom of the upper burst to the top of the lower burst display.

e. If C630 cannot bring the burst amplitude into spec, continue with the rest on the steps in this procedure.

f. Readjust C630 to the center of its range.

g. Adjust C633 to match the bottom of the upper burst to the top of the lower burst display.

h. Adjust C630 to get the black burst amplitude within 6 mV of 300 mV.

10. Test Pattern Burst Amplitude C840

a. Begin with the 1781R Reference Setup (Fig. 5-11).

b. Select WFM + CAL Display and CH A.

c. Set CAL to 300 mV.

d. Adjust C840 to match the bottom of the upper burst to the top of the lower burst display.

11. Test Pattern Frequency Response C945

a. Begin with the 1781R Reference Setup (Fig. 5-11).

b. Display CH A in line select mode, with one line of the Multiburst signal selected.

c. Adjust C945 for as flat a frequency response as possible (within 2%) out to 4.8 MHz.

d. **CHECK** — that the burst is still within 6 mV of 300 mV. If not repeat steps 10 and 11 until both specs can be met.

If both specs cannot be met continue on to Adjustment #12, otherwise the adjustment procedures are finished.

NOTE

Inductors L450, L550, L551, L650, and L750 are factory set. Only perform step #12 if the TEST PATTERN output cannot be brought into frequency spec using C633.

12. Test Pattern Frequency Response . . . . . L450, L550, L551, L650, and L750

a. Begin with the 1781R Reference Setup (Fig. 5-11). Select WFM + CAL Display, Fixed CAL, and CH A input.

b. Use the Line Select on the waveform monitor to display the Multiburst signal.

c. Adjust L450, L550, L551, L650, and L750 for as flat a response as possible.

d. Repeat Adjustments #10 and #11.

SECTION 6
THEORY OF OPERATION

NOTE

The following conventions are used throughout this manual for signal names:

① (B_DITHER) *is equivalent to* $\overline{\text{B\_DITHER}}$ *— negation.*

② [CLK_C] *is an aside.*

③ [(B_DITHER)] *is an aside of* (B_DITHER).

OVERVIEW

The TPG-625 Theory of Operation is simply an overview which describes the basic architecture of the TPG-625 via function blocks. There is a reference to the schematics where each function block can be found

BLOCK DIAGRAM

This section divides the TPG-625 into six functions: Input Processing, Genlock Loop, Signal Generation, Signal Timing, Output Processing, and Power Supply. Refer to Fig. 6-1 or the more detailed block diagram in Section 9 when reading the description of these functions.

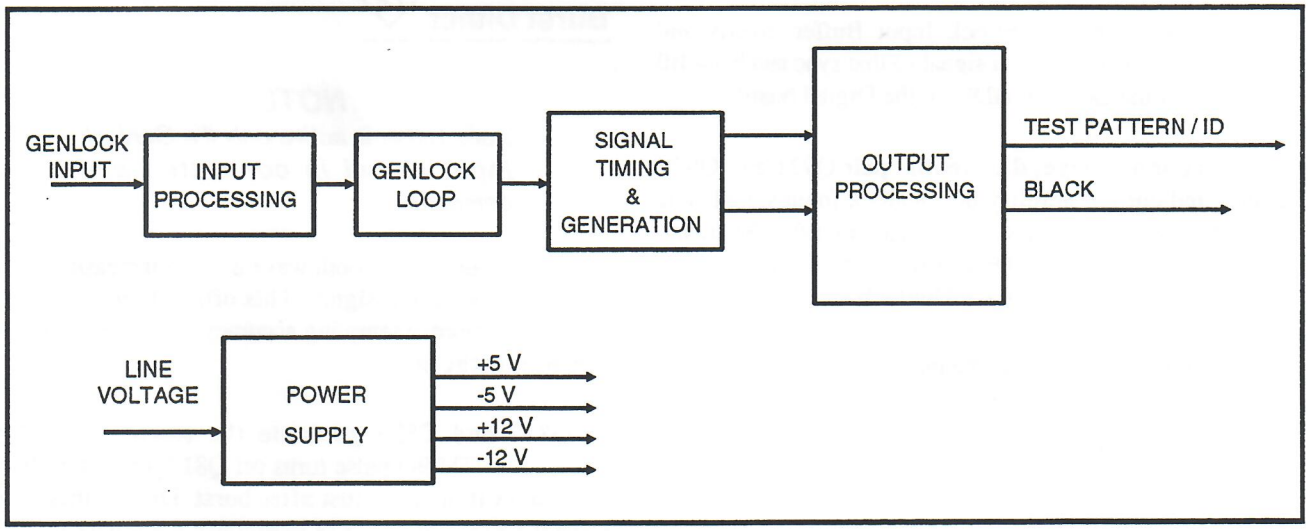


Fig. 6-1. Basic block diagram of the TPG-625.

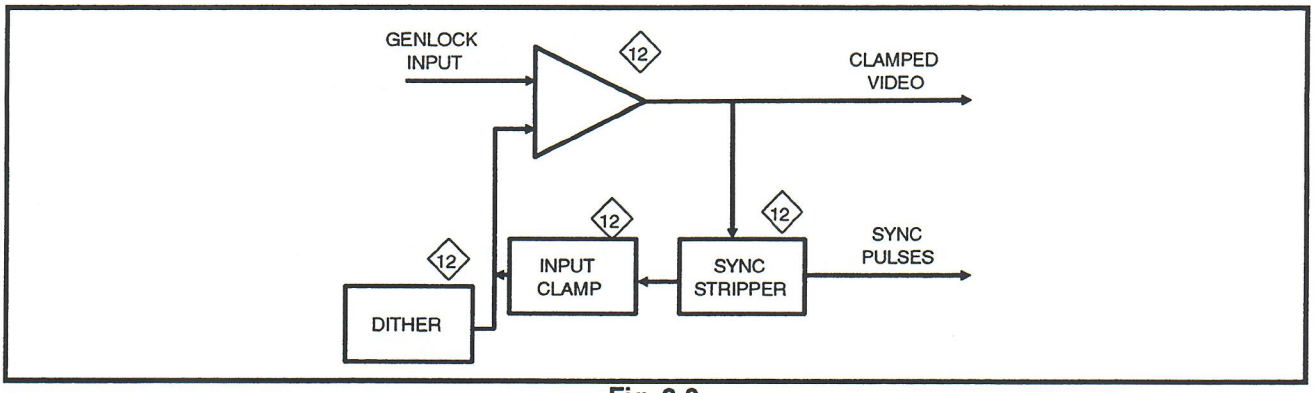


Fig. 6-2.
Block Diagram of the Input Processing circuit.

INPUT PROCESSING (See Fig. 6-2)

Overview

To prepare the reference input (GENLOCK Input) for ADC sampling, the Input Processing circuit inverts it, clamps the sync tips to -50 mV, and filters it. The Sync Separator extracts composite sync from the Genlock Input signal, then supplies it to the Input Clamp and the Address Controller (in the Genlock Loop). Both of these circuits use the composite sync as a timing reference. The processed Genlock Input signal is passed to the Genlock Loop, where it is continuously sampled by the Genlock ADC.

Genlock Input Buffer 12

The AC-coupled Genlock Input Buffer inverts and amplifies the Genlock Input signal so that sync and burst fill the range of the Genlock ADC on the Digital board.

At the input stage, differential pair Q921 and Q924 isolate and current-amplify the Genlock Input signal. The second stage Q924 inverts and voltage-amplifies the signal. The third stage, an emitter follower (Q920), applies the signal to the input filter on the Digital board.

The signal is fed back to the input of the amplifier, at the base of Q921. Two other signals are also added in at the summing node: the Input Clamp feedback and the Burst Dither.

Input Clamp 12

By comparing the sync tip voltage of the Genlock Input signal with a -50 mV reference, the Input Clamp circuit generates a DC offset voltage to clamp the incoming signal to -50 mV. It does this as follows:

Monostable multivibrator U411A shortens the incoming 4.7 µs sync pulse detected by the Sync Stripper to about 2.0 µs. The shortened pulse enables U313, allowing it to generate a voltage equal to the difference between the sync of the input video applied to pin 3 and the -50 mV reference (U720A and associated components) applied to pin 2. The difference is stored in C212 for the remainder of the line. This correction voltage is buffered by U211 and applied to the base of Q921 through R915, where it clamps the sync tip of the Genlock Input to -50 mV.

Burst Dither 12

NOTE

Burst Dither is active only if a Genlock Input signal is connected and detected.

During burst, a sawtooth wave adds an increasing offset to the Genlock Input signal. This offset dithers the burst samples to improve sampling accuracy in the Genlock Data Acquisition circuits.

Q817 and C823 generate the sawtooth. A low (BURST_DITHER) pulse turns off Q817 just before burst and leaves it off until just after burst. During this time, resistor R814 charges C823 to produce the sawtooth. This signal feeds to the Genlock Input buffer through R916.

Sync Stripper 12

The Sync Stripper extracts sync pulses from the buffered Genlock Input signal and applies them to the Input Clamp and the Genlock Data Acquisition circuits 3. C806 filters off the chrominance portion of the Genlock Input. The remainder of the signal goes to the sync peak detector U710A and inverting op amp U710B. U511 compares the output of these devices and produces the composite sync.

In addition to driving the Clamp circuit, the stripped sync signal is applied to the µP Kernel through U711 3.

GENLOCK LOOP (See Fig. 6-4)

Overview

The Genlock Loop locks the TPG-625 outputs to the Genlock Input signal. It does this by generating two signals (system clocks and field reference) which control the timing of the Signal Generation circuits. CLK1 is the 1135F_H system clock and FLD_REF (field reference) is a field timing reference signal from which the Signal Generation circuits derive vertical and horizontal timing when the instrument is genlocked to composite video.

To lock to composite video, the Genlock circuit finds the sync and burst portion of the incoming composite video signal (called the sync and burst window) and stores it in the Sample RAM every line. Using this data, the µP calculates sync timing and burst phase, so the Genlock Loop can lock to sync and burst, as described below.

Locking to Sync

Initially, the Genlock Loop acquires horizontal sync by locking its Line Counter in the Address Control circuits directly to the incoming sync. This allows the µP to sample the sync and burst window to find vertical sync. Once it has found vertical sync, the Genlock Loop obtains a more accurate horizontal sync lock as follows: (1) First, the µP switches the Line Counter to internal timing, and synchronizes the Line Counter timing with incoming sync timing as calculated from the window data. (Since internal timing has less jitter than incoming sync, it provides a more accurate reference.) (2) Once the Address Control is set to internal timing, the µP begins locking the VCO to either incoming burst or sync samples, depending on whether the incoming composite video signal has burst or is monochrome.

Locking to Burst

When the Genlock Input is composite video with burst, the µP uses burst samples contained in the sync and burst window to lock the VCO to incoming burst. Four cycles of burst on a line of video are sampled and averaged together.

Because the ADC is clocked by the VCO, samples of incoming burst indicate VCO phase relation to the incoming burst phase. The µP extracts the burst-to-VCO phase information during the next four video lines and uses it to generate a VCO correction word on the fifth. The Genlock DAC converts the correction word to a voltage. This voltage is integrated and used to keep the VCO and its CLK1 output phase-locked to incoming burst by shifting the VCO frequency.

Because the Genlock Clock is line-locked and the PAL burst frequency is offset from the line-locked frequency by 25 Hz, the burst-to-VCO phase varies throughout the video field. As the phase calculations are done, a phase offset value is read from a line offset look-up table.

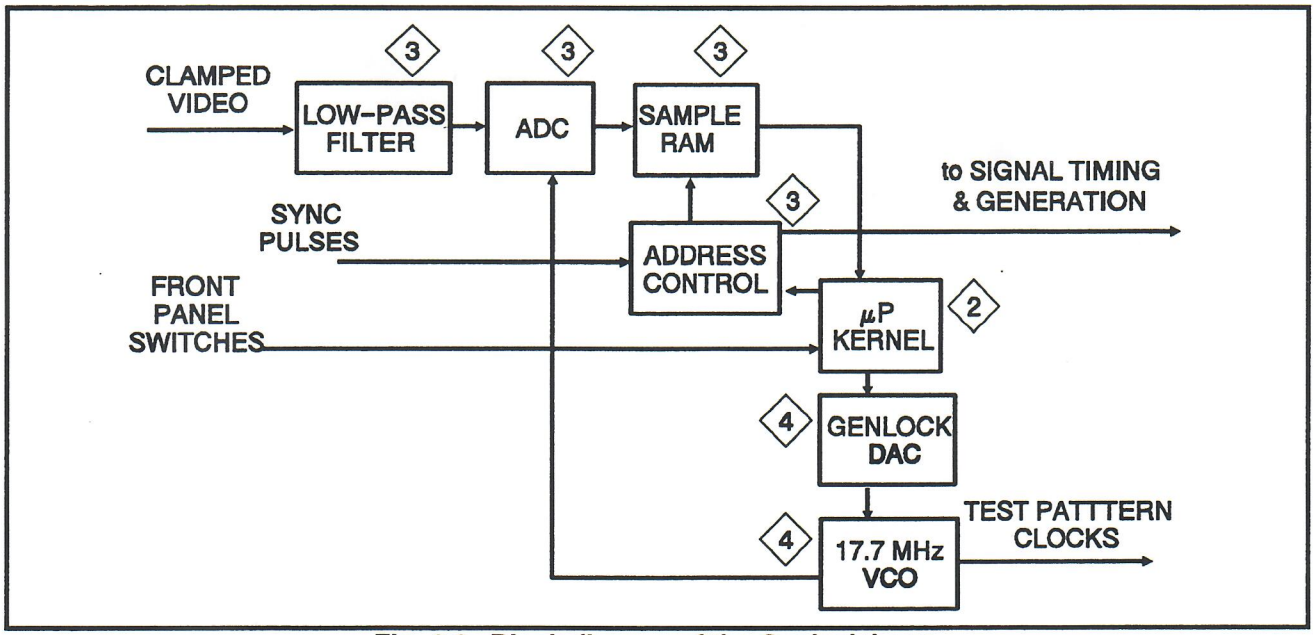


Fig. 6-3. Block diagram of the Genlock Loop.

The phase calculations executed by the μP include an arctangent trigonometric function. To improve the execution speed, the arctangent calculation is replaced with a table look-up from the Arctangent PROM. Once the VCO is burst locked, the μP calculates the timing for line 7 of field 1 and indicates it with a pulse to the Address Decoder. The Address Decoder gates this pulse with the 50% point of sync to generate the FLD_REF signal.

When the Genlock Input is monochrome composite video, the μP uses incoming sync samples to calculate the VCO phase relative to the incoming sync. It then generates a correction word to shift the VCO frequency (which shifts phase accordingly). Thus, the VCO output (CLK1) is locked to incoming sync.

Fine Genlock Timing

Adjustment of the fine genlock timing is done inside the Genlock Loop. When fine genlock timing is adjusted at the front panel, the μP adds an offset to its VCO correction word to shift VCO phase in the desired direction. This results in new ADC sample timing, and consequently, new sample values. When analyzing the new values, the μP takes into account the timing offset. Hence, it does not attempt to "correct" its own offset.

INPUT FILTER ◈3

Made up of C907, C908, C909, and L904, this filter attenuates spectral components above the video band to prevent aliasing of the Genlock Input signal when it is quantized by the ADC.

DATA ACQUISITION

Analog-To-Digital Converter (ADC) ◈3

The ADC (U810) converts the clamped and inverted video signal from the Output board into 6-bit data. Dither is inserted into the signal on the Output board to increase the resolution. U807 provides a regulated +2.5 V reference that U803 inverts and scales down to provide a precise -1 V reference to the ADC.

Because the ADC is clocked by the VCO with CLK1B, the ADC output indicates the VCO-to-burst phase relationship. During each field, the μP repeatedly checks this phase relationship and, if necessary, shifts the VCO frequency to keep it in phase with incoming burst.

The data from the ADC is latched in U714 and sent to the Sample RAM.

Sample RAM ◈3

The main function of the Sample RAM (U514) is to store samples, in real time, of the Genlock Input sync and burst. Each acquisition stores 256 samples of sync and burst. The μP uses these samples to obtain and maintain lock with the Genlock Input. The Sample RAM occupies addresses C000-C0FF (hex). Both the μP (U240, ◈2) and Memory Controller (U711) control the Sample RAM, but the μP has priority. When the μP needs to analyze the sync and burst samples stored in the Sample RAM, it asserts SAMPLER_EN to gain control. The μP then asserts (SAMPL_RAM_EN) to read the RAM and also asserts (WR) to write to the RAM.

When the μP is not looking at sync and burst samples, it pulls SAMPLER_EN low to give control of the Sample RAM to the Memory Controller. Storage of sync and burst data in the Sample RAM is described under Memory Controller in this section.

ADDRESS CONTROL

Five circuits make up the Address Control section: the Line Counter (U503, U603, and U703), the Line Counter Offset latch (U411), the Address Decoder (U607), the Memory Controller (U711), and the Address Counter (U507 and U511). The combined function of these circuits is to provide timing to the Sample RAM such that the RAM's 28^{th} sample (out of 256 samples) is coincident with the 50% point of horizontal sync.

Line Counter and Address Decoder ◈3

By counting 1135 cycles of CLK1D on every line, the Line Counter provides the Address decoder with unique addresses for each sample on the line. The Address Decoder generates timing pulses from these addresses. On the 1135^{th} count, the S_HSYNC pulse is generated. Twenty-eight counts before S_HSYNC, the START_SAMPLE pulse is generated. During burst time, the Address Decoder generates the (BURST_DITHER) output.

To provide correct timing, the Line Counter should be accurately locked to incoming sync. When the instrument is powered up, or when the μP has lost the position of sync, the μP asserts (UNLOCKED). In this condition, the Memory Controller generates the (LOAD) pulse, deriving

it from HYSYNC, since this is the most accurate timing available. This pulse loads the Line Counter with a nominal starting count of B92 (hex). Once the µP has found the vertical interval, it can provide a more accurate sync reference by locking the Line Counter to the 50% point of the leading edge of incoming sync. The µP calculates this point by analyzing the samples of the sync window stored in the Sample RAM. To lock the Line Counter to the 50% point of sync, the µP waits until the end of the vertical interval and pulls (UNLOCKED) high. This allows the Memory Controller to use the HSYNC signal to produce the (LOAD) pulse. The µP then analyzes the sampled data and shifts (in 212 ns increments) the Line Counter offset until HSYNC coincides with the 50% of incoming sync. At this point, the µP returns the offset to B92 (hex).

At the start of line 7 of field 1, the µP asserts (F1_L7). The Address Decoder gates this signal with (L_HSYNC) to generate FLD_REF for the Signal Generation circuits.

Voltage-Controlled Oscillator (VCO) 4

The VCO circuit generates the 1135F_H signal from which the test signal generation clocks in the instrument are derived.

Capacitor C19 and the series combination of C15, C8, and C6 appear in parallel with crystal Y11. This parallel circuit is the heart of the oscillator. The series combination of varactor CR16 also appears in parallel with the crystal and determine the frequency correction range of the oscillator. As the µP changes the VCO correction voltage (at J286 pin 4), the reverse-biased diode shifts the frequency over a correction range centered around the oscillator's free-running frequency. Jumper J179 (in the 1-3 position) allows the VCO correction voltage to be grounded when the free-running frequency is being adjusted with C19. Jumper positions 3-4 and 3-5 select the minimum and maximum correction voltages to check the full VCO correction range.

Oven Heater Circuit 4

CAUTION

If it becomes necessary to remove Q293 from its heat sink, move jumper J497 to the 2-3 position to prevent Q293 from overheating.

Thermistor RT11, U495B, Q293, and associated parts makeup the Oven Heater circuit which is a feedback loop that keeps the crystal oven at a constant 60°C.

When the oven is cold, the resistance of RT11 is high, placing a more negative voltage at pin 6 of U495B. This causes the output of U495B to rise and biases Q293 on. As current flows in the transistor, it heats up. As the oven heats up, the resistance of RT11 decreases. This decreases the bias at the base of Q293 and consequently, the transistor power dissipation.

Diode CR395 prevents U495B from excessively reverse biasing Q293 by limiting the negative voltage to -5.6 V. Diodes CR394 and DS494 current limit Q293 when U495B is at its maximum value. This current limiting occurs only when the oven is cold. This allows DS494 to act as an "Oven Cold" indicator.

DAC Integrator and Switcher 4

The µP controls the VCO through the VCO DAC (U170). Enabled by the (VCO_DAC) signal, the VCO DAC converts the µP correction words to current pulses and applies them to integrator U270A. The correction word ranges from 00 to FF (hex).

Integrator U270A has two main functions. First, it works as a current-to-voltage converter for the correction pulses generated by the VCO DAC. These pulses shift the VCO frequency to correct VCO phase. Second, the integrator produces an average of the correction pulses. This average is essentially a DC level that changes only to track the input burst frequency.

The switches in U176 put the Genlock Loop in one of four operating modes: Internal, Genlock, Acquire, and Hold. Each is described below. The µP controls the switches through the (INT)/GENLOCK and (HOLD)/ACQUIRE lines.

Internal Mode

When the µP cannot detect a valid Genlock Input signal, it switches the Genlock Loop into Internal mode by pulling the (INT)/GENLOCK line low. This pulls the correction voltage at the integrator output to midrange or zero volts by closing three switches. The first switch shorts out the integrator capacitor; the second and third switches short out any residual voltage to ensure the correction voltage applied to the VCO is truly zero or midrange.

Genlock Mode

When the µP detects a valid Genlock Input signal, it pulls the (INT)/GENLOCK line high to apply the VCO correction voltage to the VCO.

Acquire Mode

To acquire lock with the Genlock Input, the Genlock Loop needs to be faster than when it is just holding lock. To speed up the Genlock Loop, the µP increases integrator gain by pulling the (HOLD)/ACQUIRE line high. This adds a large resistance (R174) to the integrator feedback loop.

Hold Mode

To hold lock, the µP slows down the Genlock Loop by pulling the (HOLD)/ACQUIRE line low to remove R174 from the integrator feedback loop.

Clock Shapers and Drivers 

Q491 buffers the VCO output. ECL driver U592A converts the buffered output into a complementary pair of squarewave clocks. Two RC circuits (R596 with C596 and R594 with C594) average the square waves. Op amp U495A amplifies the difference between these averages and shifts the bias of the VCO output to correct the duty cycle to 50%.

U592C and U588C generate a pair of corrected differential ECL clocks. U584, U741, and U532 convert the clock signals to TTL levels and distribute them throughout the Digital board.

SIGNAL TIMING & GENERATION (See Fig. 6-4)

Overview

The Signal Generation section puts out the line-locked test pattern data. The signal is locked to the Genlock Input signal. The circuits that generate this signal are described below.

Test Pattern Generation

The main job of the Test Pattern Generation circuitry is to produce the test pattern. It does this by using two genlocked timing signals [CLK1 and FLD_REF] plus delay information from the µP to drive its memory and timing circuits. These circuits control the Test Pattern and Memory Counter, which contain the test pattern. The circuit blocks which generate the timing are: the Genlock Timing Offset, the H Timing Counter, the Vertical Counter, and the H and V Timing PROMs.

The Genlock Timing Offset is controlled by the µP. When coarse genlock timing is adjusted at the front panel, the Genlock Timing Offset shifts the timing of the H and V Counters, thus shifting the timing of the whole Test Pattern Generation circuitry by up to ±7 µs.

The H Timing Counters provide timing to the Test Pattern Memory & Counter by addressing the horizontal components of the selected signal. The Vertical Counter provides vertical timing to the V Timing PROM, which in turn provides vertical timing to the Signal Selector.

Character ID Generation

The Character ID Generation circuitry makes a 18-character ID (7 characters on the top and 11 characters on the bottom) and inserts the data into the test signal data stream. The Character IDs are programmed through the front panel. The µP writes Character selection codes to the character RAM. The character Generator State machine reads the selection codes and generates the timing and amplitude data representing the characters.

Genlock Timing Offset 5

The Genlock Timing Offset circuit is comprised of two 4-bit counters (U467 and U367) and two D flip-flops (U470A and U470B). The job of this circuit is to add the front-panel offset to the Pattern Generation circuits. It does this by delaying the time at which the FLD_REF signal loads the Horizontal and Vertical Timing Counters. Normally, counters U467 and U367 are in the load mode (disabled). But on line 7 of field 1, the FLD_REF pulse enables the counters through flip-flop U470A, and counters count to 255, beginning from the offset value at their load

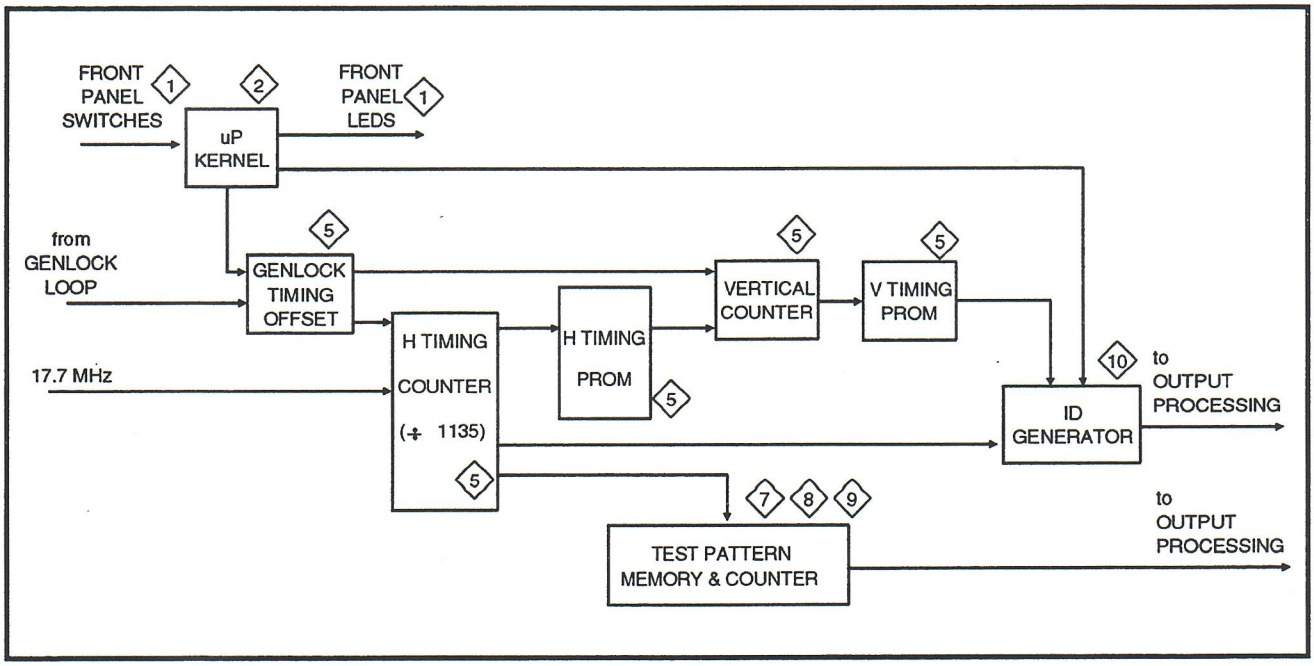


Fig. 6-4.
Block diagram of the Signal Timing & Generation circuit.

inputs GEN_DEL_[0..7]. At the end of the count, the Carry output from U467 loads the Horizontal and Vertical Counters (through U470B) with their fixed offset values. In addition, the Carry output disables counters U467 and U367 through U470B and U470A. Jumper J570 can be moved to the 2-3 position to disable the FLD_REF input to U470A.

When coarse genlock timing is adjusted at the front panel, the µP sends a new 8-bit offset word GEN_DEL_[0..7] to U467 and U367. On line 7 of field 1, the word is loaded into U467 and U367. As a result, U467 and U367 start their count at a different value, thus changing the time that the Horizontal and Vertical Timing Counters are loaded.

H Timing Counter 5

Loaded by the delayed FLD_REF signal and clocked at the 1135F_H rate, the Horizontal Timing Counter (U659, U759, and U859) provides horizontal timing to the H Timing PROM and Character ID Generation 10. It does this by addressing the PROMs at a rate of 1135 words per video line.

When the H Timing Counter has reached count 1134, the H Timing PROM (U863) clears it with the (H_CNT_CLR) signal. This signal is gated at U880 to prevent the H Timing Counter from being cleared while a genlock timing offset is being loaded.

The load inputs to the H Timing Counter present a fixed offset of 09F (hex). This offset allows the Genlock Timing Offset circuit to both advance and delay genlock timing.

H Timing Decoder 5

Addressed by the genlocked H Timing Counter, the H Timing PROM (U863) and the H Timing Decoder (U873) have three functions: (1) to generate the TEST_SIG_DSBL and BURST_GATE pulses coincident with burst and active video for the Output board, (2) to generate timing control signals for the H and V Timing circuits, and (3) to align the vertical timing inputs of latch U673 with the H Timing Counter.

Vertical Counter 5

Four 4-bit counters (U688, U684, U784, and U884) make up the 13-bit Vertical Counter. Clocked by the 1135F_H clock, the Vertical Counter provides vertical timing for the V Pulse PROM (U789) and the V Timing PROM (U794). It does this by addressing the PROMs at a rate of 5000 counts per color frame [(625 counts/field)(8 fields)=5000 counts], one count occurring every half line. The counting cycle for the Vertical Counter is as follows:

Every half line, the V_CNT_EN output of the H Timing Decoder enables the counters for one clock cycle, allowing the clock to increment the counters once. This is repeated until the counters have reached a count of 5000 (9C4 hex), at which point gate U997 clears the counters with (VERT_CNT_CLR) to start a new color frame.

The V_CNT_EN signal is combined with 1H8 and 1V0 (in U880B, U880C, and U880D) to prevent the counters from clearing in the middle of a line when the instrument is operating as a master generator, i.e., when the Genlock Input is without sync.

When the Vertical Counter attempts to clear in the middle of the line, its timing is a half line off, and the 1V0 bit is high. Consequently, the 1V0 input locks out VERT_CNT_EN, making the Vertical Counter skip a count and thus shifting its timing by half a line.

When the instrument is operating in genlocked mode, the delayed FLD_REF signal inserts the genlock timing into the Vertical Counter just as it does for the H Timing Counter. That is, it delays the loading of the Vertical Counter's fixed offset. When the instrument is operating in internal mode, the delayed FLD_REF signal never occurs and the Vertical Counter is never loaded.

Jumpers J987 and J887 together advance vertical timing by as much as two lines or delay it by one line. The Vertical Timing table in Schematic 5 shows the appropriate jumper positions for advance/delay.

V Timing PROM 5

Addressed by the genlocked Vertical Counter, the V Timing PROM (U794) has one function: to provide vertical timing for the Character ID Generator on the Output board.

V Pulse PROM ◈5◈

The V Pulse PROM (U796) has two functions: (1) to produce vertical timing for the Test Pattern Memory, and (2) to provide a vertical timing interrupt for the µP Kernel ◈2◈.

Four of the V Pulse PROM outputs [D1-D3 and D6] are latched in U695 with V_LATCH1 (test signal timing) where they provide timing for the Test Pattern Memory.

The latched D3 output of the V Pulse PROM (LV_DRIVE at U695 pin 2) is also sent to CTC1 (U213, ◈2◈) where it interrupts the µP to tell it to start servicing the front panel during the vertical interval when there is no Genlock Input signal.

Character Generation ◈10◈

The Character ID Generation circuit produces a set of up to 18 characters, in a black box inserted on every field of the test pattern. Each character is made up of a 7 X 9 matrix, and each dot is three horizontal lines high.

Character Control & Character Memory

Initially, the µP loads the character codes into the ID RAM (U330) by asserting the (OP_IO2) line and selecting character locations with address lines OP_A[0..3]. The RAM address is selected with multiplexer U108 and U230. The (OP_IO2) line also triggers a digital one-shot (U260A and U260B), which produces the RAM write pulse. The RAM write pulse /OP enables the character ID data port (U243) and latches the data from the external data bus into the RAM.

In normal operation, the character ID is generated by a state machine. The characters are generated in order across the line and down the field. U285 decodes the horizontal timing count to produce the horizontal timing signals for character generation. Counter U220 specifies the character location and selects the character selection codes from the RAM. As (OP_IO2) is not asserted, multiplexer U108 and U230 passes the counter output through to address the Character RAM.

Character Generator

The character codes output by the ID RAM are latched into U343, which applies them to the character selection inputs of the Character ID Generator IC (U543). Horizontal timing signals DCLK and ST_CHR from U285 and vertical timing signals LCLK and /CLR from U470 and U655 are also applied to U543 to specify the size and position of the characters. The output of U543 is a serial bit stream specifying a black and white corresponding to the character selected.

This data from U543 generates character edges with zero rise time which, if used directly, would produce unacceptable ringing on the analog output. The data is therefore digitally low-pass filtered by U655.

Character DAC ◈12◈

U670 takes the signal from the Character Generator, U655, and converts it to an analog current. The associated components convert the current to a voltage that is ready to be multiplexed with the test pattern signal.

Test Pattern Memory & Counter ◈7◈, ◈8◈, & ◈9◈

The Test Pattern Memory is a 3 x 8 array of PROMs where the test pattern is stored. The Timing Control Memory Counters count out the 16-bit address for the PROMs so that each bit of the entire 8 field has its own address. The PROMs load into the Memory registers which then sequentially registers out the test pattern data to the Test Pattern DAC.

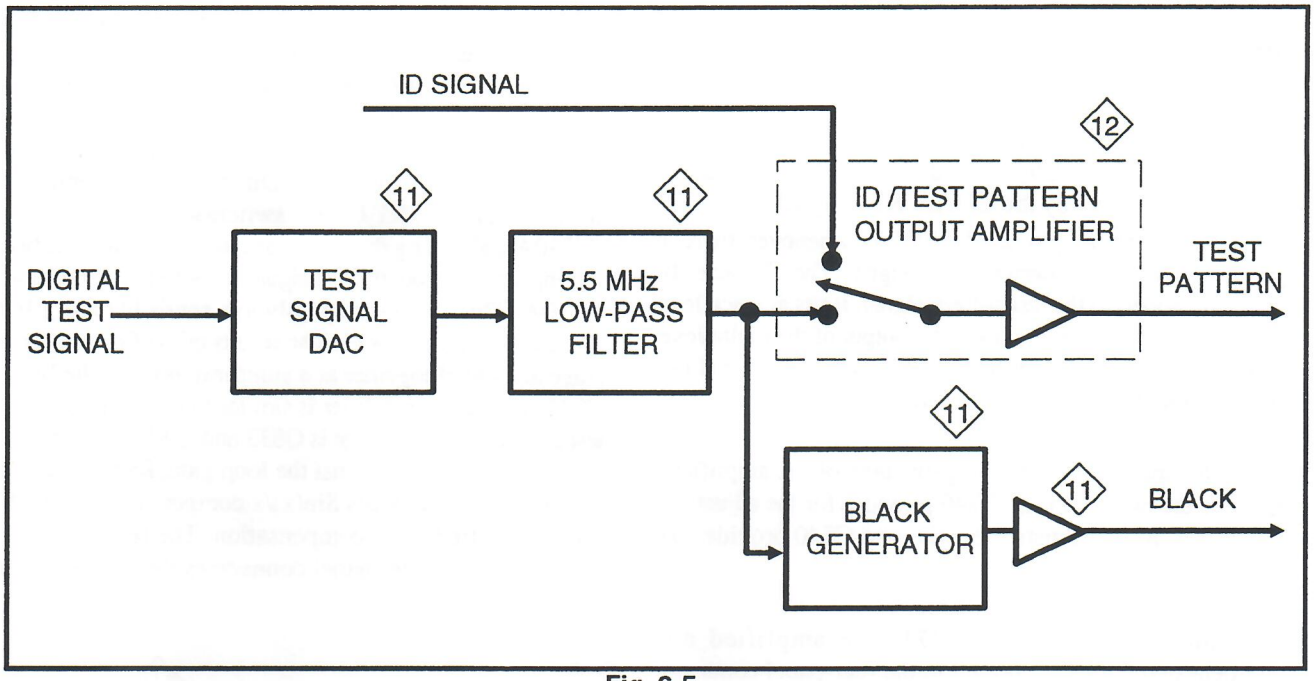


Fig. 6-5.
Block diagram of the Output Processing circuit.

OUTPUT PROCESSING (See Fig. 6-5)

Overview

Test Pattern Output

The test pattern output from the Signal Memory circuitry is converted to analog by the Test Pattern DAC. It is then low-pass filtered to remove out-of-band components. The Output Amplifier provides the signal with the correct power and amplitude levels. It also boosts the high end of the signal frequency spectrum to compensate for sin(x)/x roll-off.

The signal is then combined with the character ID as controlled by the µP. The resulting signal is then amplified to drive the 75Ω output.

Black Generation

Black is generated by switching the test pattern to blanking level (ground) during active video and then switching back to the test pattern during sync and burst.

Test Pattern DAC 11

The Test Pattern DAC (U250 & U350) takes the signal from the Test Pattern Memory and converts it into a current. The associated resister network weights the MSBs and LSBs appropriately and converts it to a voltage for the Output Filter.

Output Filter 11

To remove out-of-band signal components, the analog test pattern from the Output DAC is filtered by a low-pass reconstruction filter.

The first section of the filter is the group delay compensation (L450 and L550), while the last three sections of the filter (L551, L650, and L750 and associated capacitors) form a 7-pole elliptic low-pass reconstruction filter.

ID / Test Pattern Output Amplifier 12

The signal from the ID DAC and the Test pattern Filter are multiplexed by U955A and U955B. The test pattern signal is turned off by the CHAR_KEY signal from U655 10 going high to pin 2 of U955A, whenever there is character data to be inserted on the signal. The Character ID is always added to the test pattern signal, it sits at black level unless there is data on the line. The output of the multiplexer is added together at the base of Q963. This is the signal that will be output as the test pattern signal.

Q963 and Q964 form the gain stage of the amplifier a Q971 is the output driver. R740 provides for the adjustable DC offset, R939 adjusts the gain, and C840 provides the Sin(x)/x compensation.

From the emitter of Q971, the amplified and compensated signal is applied to the rear-panel connector through a pair of 75Ω resistors (R931 and R930).

Black Output 11

The Black Amplifier generates the black signal by using the currently-generated test signal and inserting blanking-level during the active video portion of the signal.

Taken from the Output Filter, the test signal is buffered by a pair of emitter followers (Q748 and Q850). It is then applied to a switchable op amp made up of three differential amplifier stages and an output driver. The TEST_SIG_DSBL signal controls the first two differential stages (U730A and U730B). During the horizontal sync interval, TEST_SIG_DSBL switches on the first stage (U730A), allowing the first stage to pass sync and burst. During active video, the test signal is turned off by disabling U730A. This second stage always sends blanking level (ground) to the third stage. The results of the first and second stage are added together at a summing node at the base of Q833. The output amplifier is similar to that amplifier of the test pattern. The gain stage is Q833 and Q 834 and the output driver is Q831. R625 adjust the loop gain, R952 adjusts the dc offset, C630 provides Sin(x)/x compensation, and C633 provide for frequency compensation. The resulting output is applied to the rear-panel connectors through R934 and R933.

POWER SUPPLY 13

The switching power supply generates ±5 V for TTL and ECL devices. A stable linear supply of ±12 V is provided for powering the analog circuitry.

SECTION 7
MAINTENANCE

INTRODUCTION

This section has four main parts: preventive maintenance, troubleshooting aids, diagnostics, and corrective maintenance.

PREVENTIVE MAINTENANCE

Under average environmental conditions, preventive maintenance should be done about every 2000 hours. This includes cleaning, visual inspection, a performance check, and, if needed, calibration. See Section 5 for performance check and calibration procedures.

Cleaning

Clean the instrument often enough to prevent dust or dirt from accumulating in or on it. Dirt prevents efficient heat dissipation. It also provides high-resistance electrical leakage paths between conductors or components in a humid environment.

CAUTION

The front panel is molded plastic. Do not allow water to get inside any enclosed assembly or component. Do not clean any plastic materials with organic cleaning solvents, such as benzene, toluene, xylene, acetone, or similar compounds, because they may damage the plastic.

Static-Sensitive Components

CAUTION

Static discharge can damage any semiconductor component in this instrument.

This instrument contains electrical components that are susceptible to damage from static discharge. Static voltages of 1 kV to 30 kV are common in unprotected environments.

Observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.
2. Transport and store static-sensitive components or assemblies in their original containers, on a metal rail, or on conductive foam. Label any package that contains static-sensitive assemblies or components.
3. Discharge the static voltage from your body by wearing a wrist strap while handling these components. Servicing static-sensitive assemblies or components should be performed only at a static-free work station by qualified personnel.
4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.
5. Keep the component leads shorted together whenever possible.
6. Pick up components by the body, never by the leads.
7. Do not slide the components over any surface.
8. Avoid handling components in areas that have a floor or work surface covering capable of generating a static charge.
9. Use a soldering iron that is connected to earth ground.
10. Use only special antistatic, suction-type or wick-type desoldering tools.

TROUBLESHOOTING AIDS

The following is miscellaneous information about schematics, circuit board illustrations, component numbering, and assembly numbering.

NOTE

No repair should be attempted during the warranty period.

Foldout Pages

The foldout pages at the back of the manual give block and schematic diagrams and circuit board illustrations. See Fig. 7-1.

Diagrams

The circuit number and electrical value of each component is shown on the diagrams. The first page in the Diagrams section explains the schematic symbols. The Replaceable Electrical Parts List gives a complete description of each component. Those portions of the circuit that are mounted on circuit boards or assemblies are enclosed in a gray border, with the name and assembly number shown on the border.

NOTE

Check the Change Information section at the rear of the manual for inserts describing corrections and modifications to the instrument and manual.

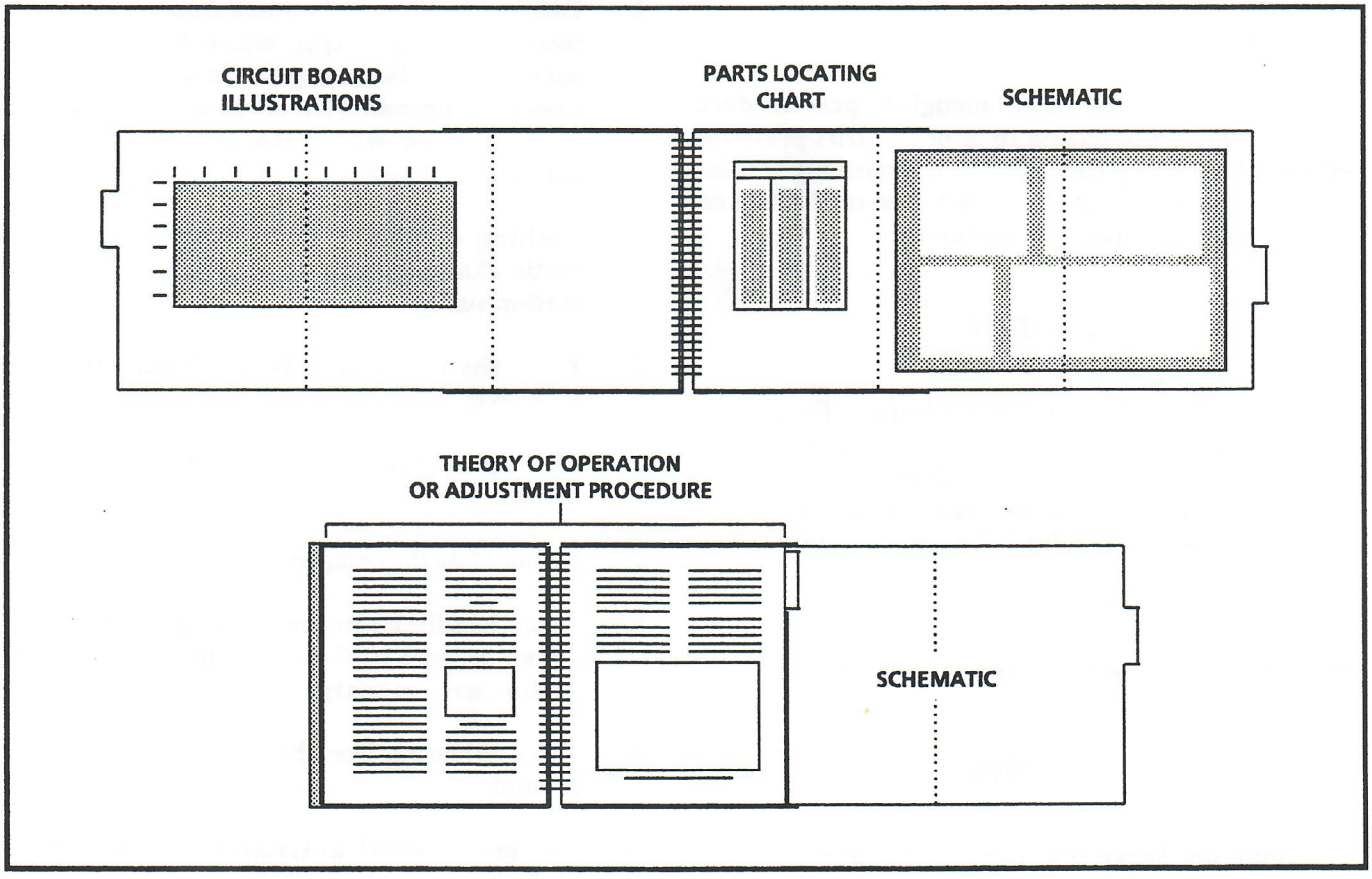


Fig. 7-1. Using the foldout pages.

Circuit Board Illustrations

Electrical components, connectors, and test points are identified on circuit board illustrations located on the inside fold of the corresponding circuit diagram or the back of the preceding diagram.

Assembly and Circuit Numbering

The circuit board assemblies are assigned assembly numbers starting with A1. Fig. 7-2 shows the location of the circuit board assemblies in the instrument. This illustration also shows the location of chassis-mounted components.

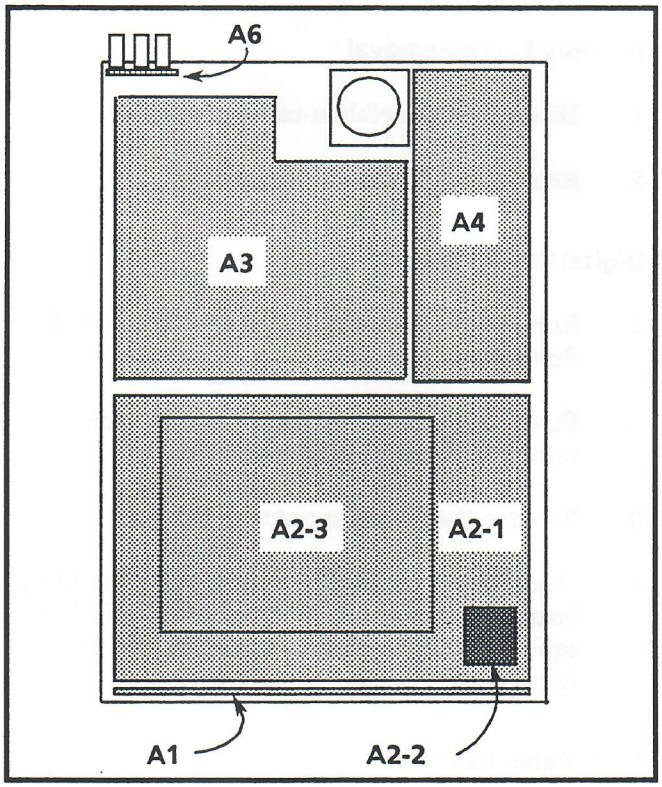


Fig. 7-2. Circuit board assembly locations.

Circuit boards have been assigned an assembly number so that they may be ordered from Tektronix, Inc. They are as follows:

A1	Front Panel Board Assembly
A2-1	Digital Board Assembly
A2-2	VCO Assembly
A2-3	Memory Board
A3	Output Board Assembly
A4	Power Supply Board
A6	BNC Board Assembly

The part numbers for ordering these boards are given on the first page of the Replaceable Electrical Parts List in Section 8.

Each component is assigned a circuit number according to its location within an assembly.

The Replaceable Electrical Parts List is arranged in assembly-by-assembly order, as designated by ANSI Standard Y32.16-1975. The circuit number in the parts list is made up by combining the assembly number and the circuit number.

EXAMPLE: R123 on A2 would be listed in the Replaceable Parts List as A2R123.

In the Replaceable Electrical Parts List, assemblies are listed first, followed by circuit board-mounted parts in alphanumeric order.

NOTE

The parts list number should be used when ordering replacement parts.

CORRECTIVE MAINTENANCE

Corrective maintenance deals with obtaining replacement parts, torque specifications, and component replacement.

Obtaining Replacement Parts

Replacement parts are available from or through the local Tektronix, Inc., field office or representative.

When ordering parts be sure to **include the following information** in your order:

1. Instrument type (and option numbers, if any).
2. Instrument serial number.
3. Description of the part, as it appears in the Replaceable Electrical or Mechanical Parts Lists.
4. The Tektronix part number.

If a part that has been ordered is replaced with a new or improved part, the local Tektronix field office or representative will contact you concerning any change in the part number. After repair, the circuits may need readjustment.

Torque Specifications

Only #4, #6, and #8 screws are used in the TPG–625. Table 7-1 shows the torque ranges for these.

Table 7-1
Torque Ranges

Screw #	Torque Range (in inch pounds)
4	3½ – 5
6	7–9
8	14–18

Correct torque is critical on the screws holding the devices to the Power Supply heat sink.

REPLACING CIRCUIT ASSEMBLIES

WARNING

Disconnect the instrument power cord before replacing components.

Use the following procedures to remove circuit board assemblies. Reverse the order of the removal procedures to reinstall or replace an assembly.

Power Supply Board Removal

1. Remove the main power connector, fan cable connector, and Digital board ribbon-cable connector.
2. Remove the nuts and screws attaching the line filter to the rear panel.
3. Remove the three screws attaching the shield and circuit board to the bottom pan.
4. Remove the remaining three mounting screws.

Output Board Removal

1. Remove the bnc and remote ribbon-cable connectors.
2. Remove the eight mounting screws.
3. Disconnect the Output board from the 48-pin DIN connector, making sure to keep the Output board square with the Digital board (to prevent bending the pins).

Memory Board Removal

1. Disconnect the ribbon-cable connector.
2. Remove the five mounting screws.

Digital Board Removal

1. Remove the Memory board (see Memory Board Removal).
2. Disconnect the front panel, power supply, and remote ribbon-cable connectors.
3. Remove the eleven mounting screws.
4. Disconnect the Digital board from the Output board, making sure to keep the Digital board square with the Output board to prevent bending the pins.

Front Panel Removal

1. Remove the two nuts securing the front panel to the frame.
2. Disconnect the front-panel ribbon connector from the Digital board.
3. Making sure to avoid pushing on the front-panel LEDs, push the front panel away from the front-panel frame to break the glue which holds them together. Avoid bending the front panel any more than necessary.

BNC Board Removal

1. Remove the Output board ribbon-cable connector.
2. Unsolder the BNC board from the six center connector lugs and the three terminal lugs.
3. Pull BNC board away from the lugs.

BNC Removal

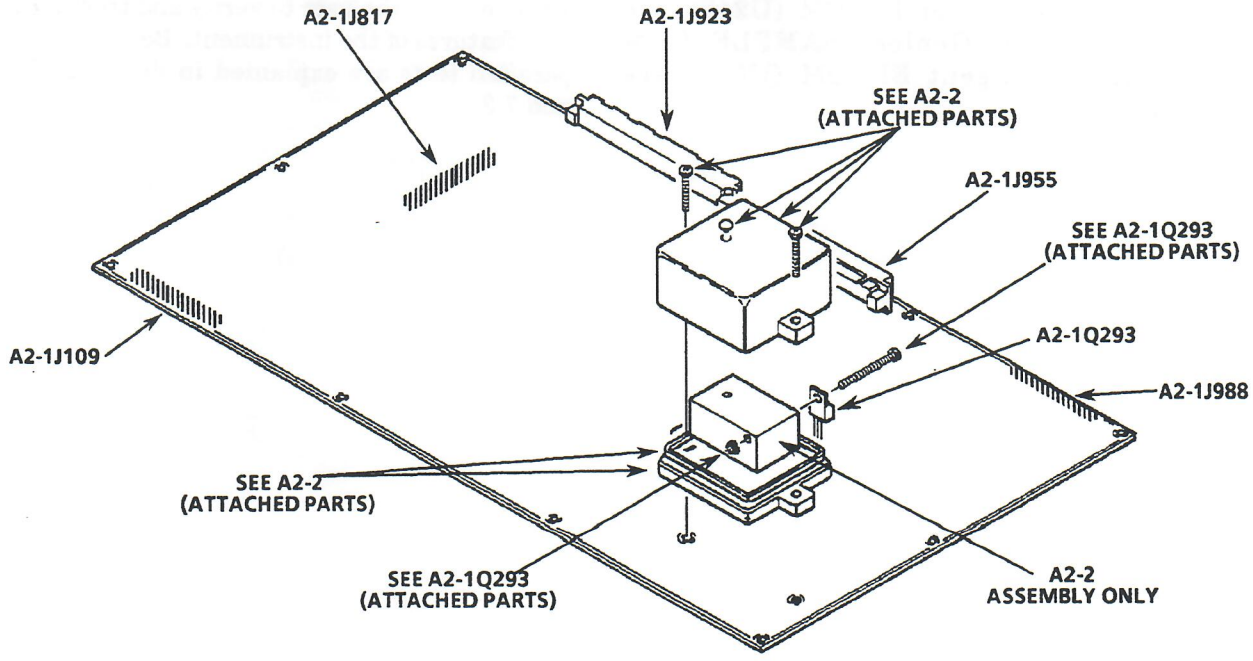
1. To remove any of the top three BNC connectors, unsolder the center connector lug and the terminal lug (if attached).
2. Unbolt the BNC connector from the rear panel and pull out the connector.

Oven Assembly Removal (See Fig. 7-3).

1. Unscrew the plastic insulating case and remove the top part of the case.
2. Remove the screw and nut that attach the power transistor to the outside of the metal oven.
3. Remove the oven from the Digital board by carefully pulling the oven off the five square pins that attach it to the Digital board.
4. Remove the screw attaching the metal cover to the oven.
5. Remove the screw attaching the circuit board to the oven and pull the oscillator out of the oven.

Microprocessor EPROM Replacement Procedure

1. Making sure the power is switched off, remove the old EPROM (U247) from the Digital board and replace it with the new EPROM.
2. Switch on power.



See Electrical Parts List for Component Assembly part numbers.

Fig. 7-3. Oven exploded view.

NVRAM Replacement Schedule

The NVRAM (U258, Schematic 2) will save at least 10,000 front-panel timing selections before it must be replaced. This amounts to about three years of use if you make ten selections a day.

DIAGNOSTICS

Overview

The TPG–625 diagnostics are split into two levels, the Power-up diagnostics and the User diagnostics. The Power-up diagnostics are executed each time the instrument is powered up. If the tests are successfully passed then the software continues on to normal instrument operation (i.e., front-panel service routines and genlocking). If the tests are failed then the software turns on all front-panel LEDs and continues running the diagnostic routines.

Power-up Diagnostics

The Power-up diagnostics is a set of routines that the processor runs to verify that the μP kernel is functional. It verifies that the microprocessor RAM (U253), the microprocessor EPROM (U247), the NVRAM (U258), the Genlock SAMPLE RAM (U514), and Arctangent EPROM (U547) are functional.

User Diagnostics

To enter the User diagnostics mode, set switch 6 of S403 (Schematic 1) to zero position (ground or closed), then reset the μP by switching power off and on. If switch 6 is not set to zero before resetting the μP, the μP will proceed directly with initialization and Power-up diagnostics and then start normal instrument operation.

When the User diagnostics mode is selected (switch 6 is set to zero) switches 1 through 5 can be used to select the desired diagnostic (see Tables 7-2 and 7-3).

The User diagnostics can be classified into two types: pass/fail and interactive. The pass/fail test requires the user to simply set the diagnostic switch, in some cases press front-panel buttons, and watch the front-panel LEDs and the monitor for an indication of pass or fail. The pass/fail tests are the PROM checksum test, μP RAM test, NVRAM test, SAMPLE RAM test, PATTERN MEMORY test, and the NVROM test. A complete explanation of these tests will be given a little later.

The interactive tests exercise the TPG–625's hardware to allow the user to verify and troubleshoot specific features of the instrument. Both interactive and pass/fail tests are explained in detail in Tables 7-2 and 7-3.

Table 7-2
Power-up Diagnostics

SWITCH SETTING 654321	TEST	TEST FUNCTION	PASS/FAIL INDICATION
N/A	SYSTEM PROM Checksum Test (U247, Schematic 2)	Computes the checksum of the System PROM and compares the value with one that has been written in the PROM. During Power-up diagnostics this test is run one time.	Lights SET IDENTIFICATION and SET GENLOCK TIMING LEDs on error. Prints "SYSPROM U247 ERROR" on the monitor.
N/A	μP RAM Read/Write Test (U253, Schematic 2)	Writes to and then reads from all μP RAM locations and checks for a match between data written to and read from μP RAM. During Power-up diagnostics this same test is run one time.	Lights NORMAL OPERATION, INTERNAL/EXTERNAL REFERENCE and TIMING LEDs on error. Prints "UP RAM U253 ERROR" on the monitor.
N/A	NVRAM Read/Write Test (U258, Schematic 2)	Writes to and then reads from all NVRAM locations and checks for a match between data written to and read from NVRAM. During Power-up diagnostics this test is run one time.	Lights SET IDENTIFICATION and TIMING LEDs on error. Prints "NVRAM U258 ERROR" on the monitor
N/A	SAMPLE RAM Read/Write Test (U514, Schematic 3)	Writes to and then reads from all SAMPLE RAM locations and checks for a match between data written to and read from SAMPLE RAM. During Power-up diagnostics this test is run one time.	Lights SET GENLOCK TIMING LED on error. Prints "SAMPRAM U514 ERROR" on the monitor.
N/A	Arctan PROM Checksum Test (U547, Schematic 1)	Computes the checksum of the Arctangent PROM and compares the value with one that has been written in the PROM. During Power-up diagnostics this test is run one time.	Lights INTERNAL/EXTERNAL REFERENCE, CHARACTER IDENTIFICATION, and TIMING LEDs on error. Prints "ARCPROM U547 ERROR" on the monitor.

Table 7-3
User Diagnostics

SWITCH* SETTING 654321	TEST	TEST FUNCTION	PASS/FAIL INDICATION
011111	SYSTEM PROM Checksum Test (U247, Schematic 2)	Computes the checksum of the System PROM and compares the value with one that has been written in the PROM. This test is run continuously.	Lights SET IDENTIFICATION and SET GENLOCK TIMING LEDs on error. Prints "SYSPROM U247 ERROR" on the monitor.
011110	μP RAM (U253, Schematic 2)	Writes to and then reads from all μP RAM locations and checks for a match between data written to and read from μP RAM. This test is run continuously.	Lights NORMAL OPERATION, INTERNAL/EXTERNAL REFERENCE, and TIMING LEDs on error. Prints "UP RAM U253 ERROR" on the monitor.
011101	NVRAM (U258, Schematic 2)	Writes to and then reads from all NVRAM locations and checks for a match between data written to and read from NVRAM. This test is run continuously.	Lights SET IDENTIFICATION and TIMING LEDs on error. Prints "NVRAM U258 ERROR" on the monitor.
011100	SAMPLE RAM (U514, Schematic 3)	Writes to and then reads from all Sample RAM locations and checks for a match between data written to and read from SAMPLE RAM. This test is run continuously.	Lights SET GENLOCK TIMING LED on error. Prints "SAMPRAM U514 ERROR" on the monitor.
011011	Port Test	Counts from 0–255 on the I/O ports of the microprocessor system. This is the ED0-ED7 bus.	For checking the data and load paths connected to the I/O ports.
011010	VCO DAC Test (U176, Schematic 4)	Generates a field rate ramp at the VCO DAC.	For checking the VCO DAC and integrator.
011001	Sampler Test 1 (U176, Schematic 4)	Acquires a sample of sync and burst via the genlock input and then reconstructs the sampled sync and burst at equivalent time through the VCO DAC.	For checking Genlock Acquisition circuitry.
011000	Sampler Test 2	Sets up the Genlock Acquisition system to sample incoming video continuously for checking acquisition timing.	For checking Genlock Acquisition circuitry.
010111	Front Panel LED Test	Turns on all the front-panel LEDs.	For checking brightness consistency.
010110	Software Reset Test (U225, U231, Schematic 2)	Sets up the CTCs (Counter Timer Chips) allowing them to pull the NMI line on the μP low. This causes the μP to start executing genlock code. The test procedure is to have the genlock input connected to the instrument, select the Software Reset Test while in diagnostics and see that the instrument locks to the genlock source.	Tests the software reset function.

*0 = Closed, 1 = Open

Table 7-3
User Diagnostics (cont.)

SWITCH* SETTING 654321	TEST	TEST FUNCTION	PASS/FAIL INDICATION
010101	Hardware Reset Test	First set J220 (Schematic 2) to the 1–2 position and then select the hardware reset test. Check J220 pin 1 with a scope and verify that there is a 1200 ms square wave (low true) occurring at a 67 ms rate.	Tests the hardware reset circuitry.
010100	ID Test	When this test is running all locations of the ID RAM (U330, Schematic 10) are sequentially written to. This test continuously exercises the circuitry that writes to the character ID.	The ID windows should have 0123456 and 0123456789 in the top and bottom windows. The 0's should have cursors over them, and both ID windows should have noise in them.
010010	NVROM Test (U258, Schematic 2)	Tests the ROM portions of the Non-volatile RAM. Since writing to the ROM portion of the NVRAM is destructive, a key sequence is required to run the test. First set the diag-port switch to the NVROM test and switch power on and off. Now press the CURSOR< switch until the CHARACTER IDENTIFICATION LED lights. Next press the COARSE DELAY switch until the TIMING LED lights. The last step is to press the CURSOR< switch until the CHARACTER IDENTIFICATION LED lights.	The NORMAL OPERATION LED will light if the NVROM has passed the test and "NVROM U258 PASSED" is printed. The SET IDENTIFICATION LED will light on a failure and "NVROM U258 ERROR" is printed on the monitor.
010001	Timing Initialization	Since this initialization writes to the NVROM portion of the NVRAM, the same key sequence as the NVROM test is used to run the timing initialization.	Initializes the NVRAM, setting the Genlock timings to mid-range.
010000	CTC Test	This test sets up the Counter Timer Chips (CTCs) U225 and U231 as timers and checks to see that they can generate interrupts. Each of the CTC's four sections are set up to interrupt after the 4096 processor clock cycles. If any of the CTC's sections have not interrupted within the allocated time an error is logged, and the test continues.	An error in U225 is indicated by lighting the CHARACTER IDENTIFICATION LED and "CTC U225 ERROR" prints on the monitor; if there is an error, in U231 the TIMING LED is lighted, and "CTC U231 ERROR" prints on the monitor.

*0 = Closed, 1 = Open

Table 7-3
User Diagnostics (cont.)

SWITCH* SETTING 654321	TEST	TEST FUNCTION	PASS/FAIL INDICATION
001111	ARCTAN PROM Test (U547, Schematic 1)	Computes the checksum of the Arctangent PROM and compares the value with one that has been written in the PROM. This test is run continuously.	Lights INTERNAL/EXTERNAL REFERENCE, CHARACTER IDENTIFICATION, and TIMING LEDs on error. Prints "ARC PROM U547 ERROR" on the monitor.
010011	PATTERN PROM GROUP Checksum Test (All Memory Board PROMs)	Computes a checksum on all 30 of the Pattern Memory EPROMs and compares the calculated checksum to the one stored in the Pattern Memory. This test may take up to 1 minute to run. If the test fails, then the PATTERN PROMS test should be run to narrow down the error to a single PROM.	If the test passes "TEST PASSED" is printed on the screen. If the test fails the SET GENLOCK TIMING, TIMING, and INTERNAL/EXTERNAL REFERENCE LEDs are lighted, and "PATTERN MEM FAILED" is printed on the monitor.
001110	PATTERN PROMS Checksum Test (All Memory Board PROMs)	Computes a separate checksum on each of the 30 Pattern Memory EPROMs and compares the calculated checksum to the one stored in the Pattern Memory MSBs. This test should only be run after the PATTERN PROM GROUP Test as it can take up to 15 minutes to find an error. The EPROM in which the error was found is then looped on to allow probing with a scope probe.	When an error is found, the message "U__ BAD CHECKSUM" is printed on the monitor and the LEDs come on according to which row the error was found in. See Table 7-4 for the LED codes.
000000	Cycle Test	Continuously cycles through the EPROM, μP RAM, NVRAM, SAMPLE RAM, CTC, ARCTANGENT EPROM, PATTERN MEMORY tests and then turns on all the LEDs.	On failure the error is logged by turning on the appropriate front-panel LEDs and an error is printed on the monitor.

*0 = Closed, 1 = Open

Table 7-4
LED Codes

	NORMAL OPERATION	SET IDENTIFICATION	SET GENLOCK TIMING	TIMING	INTERNAL REFERENCE	EXTERNAL REFERENCE
Bit 0 (U9, U10, U11)	*				*	*
Bit 1 (U13, U14, U15)		*			*	*
Bit 2 (U17, U18, U19)	*	*			*	*
Bit 3 (U21, U22, U23)			*		*	*
Bit 4 (U25, U26, U27)	*		*		*	*
Bit 5 (U29, U30, U31)		*	*		*	*
Bit 6 (U33, U34, U35)	*	*	*		*	*
Bit 7 (U37, U38, U39)				*	*	*
Bit 8 (U41, U42, U43)	*			*	*	*
Bit 9 (U45, U46, U47)		*		*	*	*

REPLACEABLE ELECTRICAL PARTS LIST

PARTS ORDERING INFORMATION

Replaceable parts are available from or through your local Tektronix, Inc., field office or representative.

It is important, when ordering parts, to include the following information in your order. Part number, instrument type and number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc., field office or representative will contract you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

CROSS INDEX–MFR. CODE NUMBER TO MANUFACTURER

The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names, and addresses of manufacturers of components listed in the Electrical Parts List.

ABBREVIATIONS

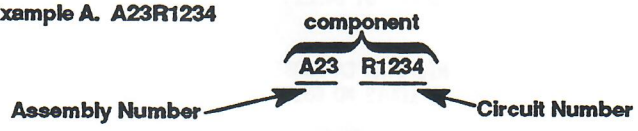
Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER

(Column 1 of the Electrical Parts List)

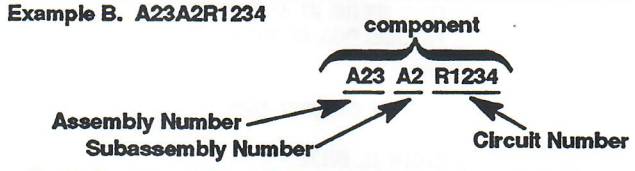
A numbering method has been used to identify assemblies, subassemblies, and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example A. A23R1234



Read: Resistor 1234 of Assembly 23

Example B. A23A2R1234



Read: Resistor 1234 of Subassembly 2 of Assembly 23

Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its sub assemblies and parts, precedes assembly A2 with its subassemblies and parts).

Mechanical subparts to the circuit boards are listed in the Electrical Parts List. These mechanical subparts are listed with their associated electrical part. For example, fuse holder follows fuse.

Chassis–mounted parts and cable assemblies have no assembly number prefix and are located at the end of the Electrical Parts List.

TEKTRONIX PART NO.

(Column 2 of the Electrical Parts List)

Indicates part number to be used when ordering replacement parts from Tektronix.

SERIAL/ASSEMBLY NO.

(Column 3 and 4 of the Electrical Parts List)

Column 3 indicates the serial or assembly number at which the part was first used. Column 4 indicates the serial or assembly number at which the part was removed. No serial or assembly number entered indicates part is good for all serial numbers.

NAME AND DESCRIPTION

(Column 5 of the Electrical Parts List)

In the 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, the U.S. Federal Cataloging Handbook H6–1 can be utilized where possible. The Mechanical Subparts are shown as *ATTACHED PARTS* / *END ATTACHED PARTS* or *MOUNTING PARTS* / *END MOUNTING PARTS* in column 5.

MFR. CODE

(Column 6 of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross–reference can be found immediately after this page.)

MFR. PART NUMBER

(Column 7 of the Electrical Parts List)

Indicates actual manufacturer's part number.

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
01121	ALLEN-BRADLEY CO	1201 S 2ND ST	MILWAUKEE WI 53204-2410
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPY PO BOX 655012	DALLAS TX 75265
01536	TEXTRON INC CAMCAR DIV SEMS PRODUCTS UNIT	1818 CHRISTINA ST	ROCKFORD IL 61108
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT	W GENESEE ST	AUBURN NY 13021
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR	5005 E MCDOWELL RD	PHOENIX AZ 85008-4229
05292	ITT COMPONENTS DIV		CLIFTON NJ
05397	UNION CARBIDE CORP MATERIALS SYSTEMS DIV	11901 MADISON AVE	CLEVELAND OH 44101
05828	GENERAL INSTRUMENT CORP GOVERNMENT SYSTEMS DIV	600 W JOHN ST	HICKSVILLE NY 11802
07716	TRW INC TRW IRC FIXED RESISTORS/BURLINGTON	2850 MT PLEASANT AVE	BURLINGTON IA 52601
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
11236	CTS CORP BERNE DIV THICK FILM PRODUCTS GROUP	406 PARR ROAD	BERNE IN 46711-9506
12327	FREEWAY CORP	9301 ALLEN DR	CLEVELAND OH 44125-4632
12969	MICROSEMI CORPORATION WATERTOWN DIVISION	530 PLEASANT STREET	WATERTOWN MA 02172
17856	SILICONIX INC	2201 LAURELWOOD RD	SANTA CLARA CA 95054-1516
18565	CHOMERICS INC	77 DRAGON COURT	WOBURN MA 01801-1039
19701	PHILIPS COMPONENTS DISCRETE PRODUCTS DIV RESISTIVE PRODUCTS FACILITY AIRPORT ROAD	PO BOX 760	MINERAL WELLS TX 76067-0760
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT ELECTRONICS DEPT	515 FISHING CREEK RD	NEW CUMBERLAND PA 17070-3007
24165	SPRAGUE ELECTRIC CO	267 LOWELL ROAD	HUDSON NH 03051
24546	CORNING GLASS WORKS	550 HIGH ST	BRADFORD PA 16701-3737
26364	COMPONENTS CORP	6 KINSEY PLACE	DENVILLE NJ 07834-2611
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051-0606
31223	MICRO PLASTICS INC	20821 DEARBORN ST	CHATSWORTH CA 91311-5916
32436	SYSCON INTERNATIONAL INC	1701 S MAIN ST	SOUTH BEND IN 46613-2211
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507-2114
33096	COLORADO CRYSTAL CORP	2303 W 8TH ST	LOVELAND CO 80537-5268
54937	DEYOUNG MANUFACTURING INC	12920 NE 125TH WAY	KIRKLAND WA 98034-7716
55285	BERGQUIST CO INC THE	5300 EDINA INDUSTRIAL BLVD	MINNEAPOLIS MN 55435-3707
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195-4526
56708	ZILOG INC	1315 DELL AVE	CAMPBELL CA 95008-6609
57668	ROHM CORP	8 WHATNEY PO BOX 19515	IRVINE CA 92713
57924	BOURNS INC NETWORKS DIV	1400 NORTH 1000 WEST	LOGAN UT 84321
58361	QUALITY TECHNOLOGIES CORP		
60395	XICOR INC	851 BUCKEYE CT	MILPITAS CA 95035-7408
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
71744	CHICAGO MINIATURE LAMP INC	CHEVY CHASE BUSINESS PARK 1080 JOHNSON DRIVE	BUFFALO GROVE IL 60089
73743	FISCHER SPECIAL MFG CO	111 INDUSTRIAL RD	COLD SPRING KY 41076-9749
75042	IRC ELECTRONIC COMPONENTS PHILADELPHIA DIV TRW FIXED RESISTORS	401 N BROAD ST	PHILADELPHIA PA 19108-1001
76493	BELL INDUSTRIES INC JW MILLER DIV	19070 REYES AVE PO BOX 5825	COMPTON CA 90224-5825
77900	ILLINOIS TOOL WORKS SHAKEPROOF DIV	ST CHARLES RD	ELGIN IL 60120

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIV	ST CHARLES ROAD	ELGIN IL 60120
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
81073	GRAYHILL INC	561 HILLGROVE AVE PO BOX 10373	LA GRANGE IL 60525-5914
81312	WINCHESTER ELECTRONICS DIVISION OF LITTON SYSTEMS INC	400 PARK RD	WATERTOWN CT 06795-1612
91506	AUGAT INC	33 PERRY AVE P O BOX 779	ATTLEBORO MA 02703-2417
91637	DALE ELECTRONICS INC	2064 12TH AVE PO BOX 609	COLUMBUS NE 68601-3632
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108-5181
S3629	SCHURTER AG H C/O PANEL COMPONENTS CORP	2015 SECOND STREET	BERKELEY CA 94170
S4307	SCHAFFNER ELECTRONIK AG		LUTERBACH SWITZERLAND
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609-3320
TK0510	PANASONIC COMPANY DIV OF MATSUSHITA ELECTRIC CORP	ONE PANASONIC WAY	SECAUCUS NJ 07094
TK0858	STAUFFER SUPPLY CO (DIST)		
TK1134	TUSONIX INC	2155 N FORBES BLVD	TUCSON AZ 85705
TK1345	ZMAN & ASSOCIATES		
TK1424	MARCON AMERICA CORP		
TK1573	WILHELM WESTERMAN	PO BOX 2345 AUGUSTA-ANLAGE 56	6800 MANNHEIM 1 WEST GERMANY
TK1960	U S TOYO FAN CORP	4915 WALNUT GROVE AVE DRAWER G	SAN GABRIEL CA 91776
TK2165	TRIQUEST CORP		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1	333-3679-00			PANEL,FRONT:	80009	333-3679-00
A2-1	671-0958-00			CIRCUIT BD ASSY:DIGITAL	80009	671-0958-00
A2-2	119-2501-03	B010100	B010181	OVEN ASSEMBLY:	80009	119-2501-03
A2-2	119-2501-04	B010182	B010193	OVEN ASSEMBLY:TPG625	80009	119-2501-04
A2-2	119-2501-05	B010194		OVEN ASSEMBLY:TPG625	80009	119-2501-05
A2-3	671-0959-00	B010100	B010242	CIRCUIT BD ASSY:MEMORY	80009	671-0959-00
A2-3	671-0959-02	B010243		CIRCUIT BD ASSY:MEMORY (STANDARD ONLY)	80009	671-0959-02
A2-3	671-0959-01			CIRCUIT BD ASSY:MEMORY (OPTION 01 ONLY)	80009	671-0959-01
A3	671-0960-00			CIRCUIT BD ASSY:OUTPUT	80009	671-0960-00
A4	671-0572-00	B010100	B010109	CIRCUIT BD ASSY:PWR SPLY	80009	671-0572-00
A4	671-0572-01	B010110	B010195	CIRCUIT BD ASSY:PWR SPLY	80009	671-0572-01
A4	671-0572-02	B010196	B010205	CIRCUIT BD ASSY:PWR SPLY	80009	671-0572-02
A4	671-0572-03	B010206	B010261	CIRCUIT BD ASSY:PWR SUPPLY	80009	671-0572-03
A4	671-0572-04	B010262	B010276	CIRCUIT BD ASSY:POWER SUPPLY	80009	671-0572-04
A4	671-0572-05	B010277	B010290	CIRCUIT BD ASSY:POWER SUPPLY	80009	671-0572-05
A4	671-0572-06	B010291		CIRCUIT BD ASSY:POWER SUPPLY	80009	671-0572-06
A6	671-0763-00			CIRCUIT BD ASSY:BNC	80009	671-0763-00
A1	333-3679-00			PANEL,FRONT:	80009	333-3679-00
A1DS142	150-1097-00			LT EMITTING DIO:GREEN,565NM,10MA MAX,2.2V	80009	150-1097-00
A1DS168	150-1097-00			LT EMITTING DIO:GREEN,565NM,10MA MAX,2.2V	80009	150-1097-00
A1DS426	150-1068-00			LT EMITTING DIO:RED,635NM,10MA MAX	80009	150-1068-00
A1DS492	150-1097-00			LT EMITTING DIO:GREEN,565NM,10MA MAX,2.2V	80009	150-1097-00
A1DS626	150-1068-00			LT EMITTING DIO:RED,635NM,10MA MAX	80009	150-1068-00
A1DS692	150-1097-00			LT EMITTING DIO:GREEN,565NM,10MA MAX,2.2V	80009	150-1097-00
A1DS892	150-1068-00			LT EMITTING DIO:RED,635NM,10MA MAX	80009	150-1068-00
A2-1	671-0958-00			CIRCUIT BD ASSY:DIGITAL	80009	671-0958-00
				ATTACHED PARTS		
	131-0157-00			TERMINAL,PIN:0.25 L X 0.04 OD,BRS,SLDR PL (QUANTITY 2)	80009	131-0157-00
				END ATTACHED PARTS		
A2-1C103	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C170	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C173	290-0990-00			CAP,FXD,ELCTLT:10UF,20%,50V	24165	502D437
A2-1C260	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C263	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C270	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C276	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C303	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C304	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C314	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C335	283-0629-00			CAP,FXD,MICA DI:62PF,1%,500V	80009	283-0629-00
A2-1C340	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C348	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C360	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C370	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C376	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C382	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C388	283-0785-00			CAP,FXD,MICA DI:250PF,1%,500V	80009	283-0785-00
A2-1C389	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C429	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C456	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C470	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C471	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C474	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C476	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C479	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-1C482	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C484	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C486	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C487	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C488	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C489	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C492	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C495	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C496	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C498	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C532	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C541	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C584	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C594	283-0666-00			CAP,FXD,MICA DI:890PF,2%,100V	80009	283-0666-00
A2-1C595	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C596	283-0666-00			CAP,FXD,MICA DI:890PF,2%,100V	80009	283-0666-00
A2-1C603	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C611	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C620	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C625	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C659	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C707	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C710	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C720	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C741	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C759	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C784	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C803	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C805	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C807	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C820	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C823	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C827	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C829	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C833	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C843	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C844	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C845	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C846	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C847	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C848	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C859	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C884	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C903	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C907	283-0647-00			CAP,FXD,MICA DI:70PF,1%,100V	80009	283-0647-00
A2-1C908	283-0772-00			CAP,FXD,MICA DI:497 PF,1%,500V	80009	283-0772-00
A2-1C909	283-0625-00			CAP,FXD,MICA DI:220PF,1%,500V	80009	283-0625-00
A2-1C910	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C932	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C933	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C939	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C944	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C945	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C946	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-1C970	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C973	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C975	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A2-1C978	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-1CR179	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A2-1CR358	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A2-1CR394	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A2-1CR395	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A2-1CR458	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A2-1CR459	152-0322-00			DIODE,SIG:SCHTKY,;15V,410MVF AT 1MA,1.2PF;5082-2811,T&R	80009	152-0322-00
A2-1CR460	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A2-1CR808	152-0322-00			DIODE,SIG:SCHTKY,;15V,410MVF AT 1MA,1.2PF;5082-2811,T&R	80009	152-0322-00
A2-1DS494	150-1014-00			DIODE,OPTO:,LED;RED,660NM,1 MCD AT 10 MA;T1 3/4	58361	Q6444/MV5054-1
A2-1J109	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 34)	80009	131-0608-00
A2-1J120	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2-1J179	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 5)	80009	131-0608-00
A2-1J203	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2-1J206	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2-1J220	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 4)	80009	131-0608-00
A2-1J286	131-0787-00			TERMINAL,PIN: (QUANTITY 5)	22526	47359-001
A2-1J303	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2-1J310	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2-1J403	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2-1J432	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2-1J497	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2-1J570	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2-1J817	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 34)	80009	131-0608-00
A2-1J887	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A2-1J923	131-3440-00			CONN,DIN:PCB,;MALE,RTANG,3 X 16,0.1 CTR,0.498 X 0.114 TAIL,30 GOLD,BD RETENTION;	80009	131-3440-00
				MOUNTING PARTS		
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0185-00			SCREW,MACHINE:2-56 X 0.438,PNH,STL (QUANTITY 2)	TK0435	ORDER BY DESCR
				END MOUNTING PARTS		
A2-1J942	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 10)	80009	131-0608-00
A2-1J955	131-3440-00			CONN,DIN:PCB,;MALE,RTANG,3 X 16,0.1 CTR,0.498 X 0.114 TAIL,30 GOLD,BD RETENTION;	80009	131-3440-00
				MOUNTING PARTS		
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL	73743	12157-50

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
				(QUANTITY 2)		
	211-0185-00			SCREW,MACHINE:2-56 X 0.438,PNH,STL	TK0435	ORDER BY DESCR
				(QUANTITY 2)		
				END MOUNTING PARTS		
A2-1J987	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
				(QUANTITY 3)		
A2-1J988	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
				(QUANTITY 34)		
A2-1L904	108-0103-01			COIL,RF:FIXED,2.5UH,2%	80009	108-0103-01
				ATTACHED PARTS		
	337-1417-00			SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1
				END ATTACHED PARTS		
A2-1P120	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A2-1P179	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A2-1P203	131-0993-05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100-5
A2-1P206	131-0993-05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100-5
A2-1P220	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A2-1P303	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A2-1P310	131-0993-05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100-5
A2-1P403	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A2-1P432	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A2-1P497	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A2-1P570	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A2-1P887	131-0993-05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100-5
A2-1P987	131-0993-05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100-5
A2-1Q236	151-0199-00			TRANSISTOR,SIG:BIPOLAR,PNP;12V,80MA,SWITCHI	80009	151-0199-00
				NG;MPS3640,TO-92 EBC		
A2-1Q293	151-0656-00			TRANSISTOR,PWR:BIPOLAR,NPN;80V,8.0A,4.0MHZ,	80009	151-0656-00
				DARLINGTON,AMPLIFIER;2N6044,TO-220		
				MOUNTING PARTS		
	210-0586-00			NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00
	211-0021-00			SCREW,MACHINE:4-40 X 1.25,PNH,STL	TK0435	ORDER BY DESCR
				END MOUNTING PARTS		
A2-1Q356	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ	80009	151-0220-00
				,AMPLIFIER;2N3906(SEL),TO-92 EBC		
A2-1Q491	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ	80009	151-0190-00
				,AMPLIFIER;2N3904,TO-92 EBC		
A2-1R117	315-0272-00			RES,FXD,FILM:2.7K OHM,5%,0.25W	80009	315-0272-00
A2-1R118	315-0272-00			RES,FXD,FILM:2.7K OHM,5%,0.25W	80009	315-0272-00
A2-1R174	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A2-1R180	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 P	57668	CRB20 FXE 20K0
				PM;AXIAL,T&R,SMALL BODY		
A2-1R181	321-0441-00			RES,FXD,FILM:383K OHM,1%,0.125W,TC=T0	80009	321-0441-00
A2-1R209	315-0621-00			RES,FXD,FILM:620 OHM,5%,0.25W	80009	315-0621-00
A2-1R210	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	80009	315-0331-00
A2-1R211	315-0621-00			RES,FXD,FILM:620 OHM,5%,0.25W	80009	315-0621-00
A2-1R212	315-0621-00			RES,FXD,FILM:620 OHM,5%,0.25W	80009	315-0621-00
A2-1R213	315-0621-00			RES,FXD,FILM:620 OHM,5%,0.25W	80009	315-0621-00
A2-1R214	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	80009	315-0331-00
A2-1R215	315-0331-00			RES,FXD,FILM:330 OHM,5%,0.25W	80009	315-0331-00
A2-1R271	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A2-1R272	315-0222-00			RES,FXD,FILM:2.2K OHM,5%,0.25W	80009	315-0222-00
A2-1R273	315-0203-00			RES,FXD,FILM:20K OHM,5%,0.25W	80009	315-0203-00
A2-1R274	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A2-1R298	308-0677-00			RES,FXD,WW:1 OHM,5%,2W	75042	ORDER BY DESC
A2-1R320	307-0650-00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750-101-R2.7K
A2-1R335	315-0822-00			RES,FXD,FILM:8.2K OHM,5%,0.25W	80009	315-0822-00
A2-1R336	315-0621-00			RES,FXD,FILM:620 OHM,5%,0.25W	80009	315-0621-00
A2-1R337	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A2-1R355	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-1R356	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A2-1R357	315-0112-00			RES,FXD,FILM:1.1K OHM,5%,0.25W	80009	315-0112-00
A2-1R358	315-0271-00			RES,FXD,FILM:270 OHM,5%,0.25W	80009	315-0271-00
A2-1R359	308-0433-00			RES,FXD,WW:1 OHM,10%,0.25W	80009	308-0433-00
A2-1R372	321-1643-07			RES,FXD,FILM:11.03K OHM,0.1%,0.125W,TC=T9	80009	321-1643-07
A2-1R373	321-1264-07			RES,FXD,FILM:5.56K OHM,0.1%,0.125W,TC=T9	07716	
A2-1R374	315-0362-00			RES,FXD,FILM:3.6K OHM,5%,0.25W	80009	315-0362-00
A2-1R379	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	80009	315-0242-00
A2-1R380	321-0264-07			RES,FXD,FILM:5.49K OHM,0.1%,0.125W,TC=T9	07716	CEAE54900B
A2-1R381	321-0264-07			RES,FXD,FILM:5.49K OHM,0.1%,0.125W,TC=T9	07716	CEAE54900B
A2-1R386	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A2-1R391	321-0387-00			RES,FXD,FILM:105K OHM,1%,0.125W,TC=T0	07716	CEAD10502F
A2-1R392	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 20K0
A2-1R393	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 100K
A2-1R395	321-0413-00			RES,FXD,FILM:196K OHM,1%,0.125W,TC=T0	07716	CEAD19602F
A2-1R396	322-3318-00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 20K0
A2-1R397	321-0353-00			RES,FXD,FILM:46.4K OHM,1%,0.125W,TC=T0	07716	CEAD46401F
A2-1R398	321-0353-00			RES,FXD,FILM:46.4K OHM,1%,0.125W,TC=T0	07716	CEAD46401F
A2-1R399	321-0413-00			RES,FXD,FILM:196K OHM,1%,0.125W,TC=T0	07716	CEAD19602F
A2-1R405	307-0650-00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750-101-R2.7K
A2-1R457	315-0106-00			RES,FXD,FILM:10M OHM,5%,0.25W	01121	CB1065
A2-1R458	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A2-1R460	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A2-1R472	315-0271-00			RES,FXD,FILM:270 OHM,5%,0.25W	80009	315-0271-00
A2-1R473	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A2-1R480	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A2-1R481	315-0271-00			RES,FXD,FILM:270 OHM,5%,0.25W	80009	315-0271-00
A2-1R482	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A2-1R491	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	80009	315-0242-00
A2-1R493	315-0394-00			RES,FXD,FILM:390K OHM,5%,0.25W	80009	315-0394-00
A2-1R497	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A2-1R534	307-1318-00			RES NTWK,FXD,FI:(2) 162 OHM,(2) 260 OHM,2%,0.125W	80009	307-1318-00
A2-1R582	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A2-1R590	307-0526-00			RES,NTWK:THICK FILM;(5)510 OHM,10%,0.125W EACH,TC=100 PPM;SIP6,PIN 1 COMMON	57924	4306X-101-511
A2-1R594	315-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.25W	80009	315-0682-00
A2-1R596	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A2-1R597	315-0392-00			RES,FXD,FILM:3.9K OHM,5%,0.25W	80009	315-0392-00
A2-1R778	307-0650-00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750-101-R2.7K
A2-1R801	322-3179-00			RES,FXD,FILM:715 OHM,1%,0.2W,TC=T0	80009	322-3179-00
A2-1R806	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A2-1R807	321-0929-07			RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0929-07
A2-1R808	322-3193-07			RES,FXD,FILM:1K OHM,0.1%,0.2W,TC=T9	80009	322-3193-07
A2-1R846	307-0650-00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750-101-R2.7K
A2-1R912	321-0793-07			RES,FXD,FILM:37.5 OHM 0.1%,0.125W TC=T9	24546	NE55E37R5B
A2-1R921	307-0539-00			RES NTWK,FXD,FI:(7)510 OHM,10%,1W	80009	307-0539-00
A2-1R926	307-0526-00			RES,NTWK:THICK FILM;(5)510 OHM,10%,0.125W EACH,TC=100 PPM;SIP6,PIN 1 COMMON	57924	4306X-101-511
A2-1R929	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A2-1R930	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A2-1R953	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A2-1R954	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A2-1S403	260-1589-00			SWITCH,ROCKER:(6)SPST,125MA,30VDC	81073	76SB06S
A2-1TP101	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-1TP136	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-1TP167	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-1TP401	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-1TP436	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-1TP464	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-1TP499	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-1TP901	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-1TP910	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-1TP933	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-1TP967	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-1TP997	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-1U120	156-3050-00			IC,MISC:	80009	156-3050-00
A2-1U170	156-1367-00			IC,CONVERTER:CMOS,D/A;8 BIT,400NS,CURRENT OUT,MPU COMPATIBLE,MULTIPLYING;AD7524JN,DIP16.3	80009	156-1367-00
A2-1U176	156-1850-00			IC,MISC:CMOS,ANALOG SWITCH;QUAD;DG211,DIP16.3	17856	SDG21107
A2-1U225	156-2628-00			IC,PROCESSOR:NMOS,PERIPHERAL;COUNTER TIMER;Z80-CTC,DIP28	56708	Z8430B PS OR CS
				MOUNTING PARTS		
	136-0755-00			SOCKET,DIP:	09922	DILB28P-108
				END MOUNTING PARTS		
A2-1U231	156-2628-00			IC,PROCESSOR:NMOS,PERIPHERAL;COUNTER TIMER;Z80-CTC,DIP28	56708	Z8430B PS OR CS
				MOUNTING PARTS		
	136-0755-00			SOCKET,DIP:	09922	DILB28P-108
				END MOUNTING PARTS		
A2-1U240	156-0983-03			IC,PROCESSOR:NMOS,MICROPROCESSOR;8-BIT;Z80B,DIP40.6	56708	Z80BCPUDS
				MOUNTING PARTS		
	136-0757-00			SOCKET,DIP:	09922	DILB40P-108
				END MOUNTING PARTS		
A2-1U247	160-5969-00	B010100	B010131	MICROCKT,DGTL:NMOS,32768 X 8 EPROM,PRGM	80009	160-5969-00
A2-1U247	160-5969-01	B010132		MICROCKT,DGTL:NMOS,32768 X 8 EPROM,PRGM	80009	160-5969-01
				MOUNTING PARTS		
	136-0755-00			SOCKET,DIP:	09922	DILB28P-108
				END MOUNTING PARTS		
A2-1U253	156-1632-00			MICROCKT,DGTL:CMOS,2048 X 8 SRAM	80009	156-1632-00
				MOUNTING PARTS		
	136-0751-00			SOCKET DIP::	09922	DILB24P108
				END MOUNTING PARTS		
A2-1U258	156-2491-00			IC,MEMORY:NMOS,EEPROM;128 X 8,200NS;2001,DIP24.6	60395	X2001 P OR D
				MOUNTING PARTS		
	136-0751-00			SOCKET DIP::	09922	DILB24P108
				END MOUNTING PARTS		
A2-1U263	160-4908-00			IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA,PRGM 156-2983-00;16V8-25,DIP20.3	80009	160-4908-00
				MOUNTING PARTS		
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P-108
				END MOUNTING PARTS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-1U267	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A2-1U270	156-0158-07			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 158-00,DO NOT USE;MC1458P1,DIP08.3	80009	156-0158-07
A2-1U276	156-1437-00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIV E,5V,1.0%,25PPM,SERIES;MC1404AU5,DIP08.3	80009	156-1437-00
A2-1U303	156-1215-01			IC,DIGITAL:CMOS,MUX/ENCODER;20-KEY ENCODER; 74C923,DIP18.3,TUBE,SCRN	27014	MM74C923JA+
A2-1U306	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A2-1U310	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A2-1U314	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A2-1U325	160-4409-00	671-0958-00	671-0958-00	MICROCKT,DGTL:QUAD 16 INP RGTR AND/OR,PRGM	80009	160-4409-00
A2-1U325	160-4409-01	671-0958-00		IC,DIGITAL:STTL,PLD;PAL,16R4,37MHZ,180MA,PR GM 156-2664-00;16R4B,DIP20.3	80009	160-4409-01
				MOUNTING PARTS		
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P-108
				END MOUNTING PARTS		
A2-1U329	156-2338-00			IC,DIGITAL:ASTTL,FLIP FLOP;DUAL D-TYPE;74AS 74,DIP14.3,TUBE	80009	156-2338-00
A2-1U332	156-2626-00			IC,DIGITAL:ALSTTL,GATE;QUAD 2-INPUT NAND, O C;74ALS03,DIP14.3,TUBE	01295	74ALS03
A2-1U352	160-6112-00			IC,DIGITAL:CMOS,PLD;OTP,20G10,25NS,55MA,PRG M 156-3229-00;20G10-25,DIP24.3	80009	160-6112-00
				MOUNTING PARTS		
	136-0925-00			SOCKET,DIP::	91506	224-AG30D
				END MOUNTING PARTS		
A2-1U367	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4
A2-1U376	156-0158-07			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 158-00,DO NOT USE;MC1458P1,DIP08.3	80009	156-0158-07
A2-1U407	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A2-1U411	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A2-1U417	156-1111-02			IC,DIGITAL:LSTTL,TRANSCEIVER;DUPLICATE OF 1 56-1111-00;74LS245,DIP20.3,TUBE	80009	156-1111-02
A2-1U421	156-1111-02			IC,DIGITAL:LSTTL,TRANSCEIVER;DUPLICATE OF 1 56-1111-00;74LS245,DIP20.3,TUBE	80009	156-1111-02
A2-1U467	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4
A2-1U470	156-2338-00			IC,DIGITAL:ASTTL,FLIP FLOP;DUAL D-TYPE;74AS 74,DIP14.3,TUBE	80009	156-2338-00
A2-1U495	156-0158-07			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 158-00,DO NOT USE;MC1458P1,DIP08.3	80009	156-0158-07
A2-1U503	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4
A2-1U507	156-2331-00			IC,DIGITAL:LSTTL,COUNTER;8-BIT, WITH STORAG E REGISTER, 3-STATE;74LS590,DIP16.3,TUBE	01295	SN74LS590N3
A2-1U511	156-2065-00			IC,DIGITAL:ASTTL,LATCH;OCTAL D-TYPE TRANSPA RENT, 3-STATE;74AS373,DIP20.3	01295	SN74AS373N
A2-1U514	156-2992-00			IC,MEMORY:CMOS,SRAM;2K X 8,35NS,OE;,DIP24.3	80009	156-2992-00
A2-1U520	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A2-1U526	156-1026-02			IC,DIGITAL:LSTTL,DEMUX;DUPLICATE OF 156-102 6-00;74LS154,DIP24.6,TUBE	01295	SN74LS154N P3
A2-1U532	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-1U541	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A2-1U547	160-4906-00			MICROCKT,LINEAR:OP AMP,OP-14 TYPE,DIE FORM *MOUNTING PARTS*	80009	160-4906-00
	136-0755-00			SOCKET,DIP: *END MOUNTING PARTS*	09922	DILB28P-108
A2-1U584	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L
A2-1U588	156-0860-02			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE;10116,D IP16.3,TUBE,SCRN	80009	156-0860-02
A2-1U592	156-0860-02			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE;10116,D IP16.3,TUBE,SCRN	80009	156-0860-02
A2-1U603	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4
A2-1U607	160-4496-00			IC,DIGITAL:CMOS,PLD;OTP,20G10,25NS,55MA,PRG M 156-3229-00;20G10-25,DIP24.3 *MOUNTING PARTS*	80009	160-4496-00
	136-0925-00			SOCKET,DIP:: *END MOUNTING PARTS*	91506	224-AG30D
A2-1U659	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4
A2-1U680	160-4421-00	671-0958-00	671-0958-00	IC,DIGITAL:CMOS,PLD;EEPLD,16V8,PRGM;16V8,DI P20.3	80009	160-4421-00
A2-1U680	160-4421-01	671-0958-00		IC,DIGITAL:CMOS,PLD;EEPLD,16V8,10NS,115MA,P RGM 156-3906-00;16V8-10,DIP20.3 *MOUNTING PARTS*	80009	160-4421-01
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP *END MOUNTING PARTS*	09922	DILB20P-108
A2-1U684	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4
A2-1U688	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4
A2-1U695	156-1911-00			IC,DIGITAL:FTTL,FLIP FLOP;HEX D-TYPE, WITH /MR;74F174,DIP16.3,TUBE	04713	MC74F174S
A2-1U703	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4
A2-1U711	160-4422-00			IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA,PR GM 156-2983-00;16V8-25,DIP20.3 *MOUNTING PARTS*	80009	160-4422-00
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP *END MOUNTING PARTS*	09922	DILB20P-108
A2-1U714	156-2065-00			IC,DIGITAL:ASTTL,LATCH;OCTAL D-TYPE TRANSPA RENT, 3-STATE;74AS373,DIP20.3	01295	SN74AS373N
A2-1U720	156-1754-01			IC,DIGITAL:ALSTTL,BUFFER/DRIVER;OCTAL NONIN V, 3-STATE;74ALS244,DIP20.3,TUBE	01295	SN74ALS244AN3
A2-1U723	156-2434-00			IC,DIGITAL:ASTTL,BUFFER/DRIVER;NONINV OCTAL , DRIVER, 3-STATE;74AS244,DIP20.3,TUBE	80009	156-2434-00
A2-1U727	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A2-1U729	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A2-1U733	156-0865-02			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0865-00;74LS273,DIP20.3,TUBE	80009	156-0865-02
A2-1U741	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L
A2-1U744	156-2484-00			IC,DIGITAL:ASTTL,GATE;QUAD 2-INPUT NAND;74A S00,DIP14.3,DUPLICATE OF 156-2319-00	01295	SN74AS00(NORJ)
A2-1U748	156-2484-00			IC,DIGITAL:ASTTL,GATE;QUAD 2-INPUT NAND;74A S00,DIP14.3,DUPLICATE OF 156-2319-00	01295	SN74AS00(NORJ)
A2-1U759	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-1U784	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4
A2-1U789	160-4337-01			MICROCKT,DGTL:NMOS,8192 X 8 EPROM,PRGM	80009	160-4337-01
				MOUNTING PARTS		
	136-0755-00			SOCKET,DIP:	09922	DILB28P-108
				END MOUNTING PARTS		
A2-1U794	160-5970-00			MICROCKT,DGTL:NMOS,8192 X 8 EPROM,PRGM	80009	160-5970-00
				MOUNTING PARTS		
	136-0755-00			SOCKET,DIP:	09922	DILB28P-108
				END MOUNTING PARTS		
A2-1U803	156-0067-13			IC,LINEAR:	80009	156-0067-13
A2-1U807	156-1173-00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIV E,2.5V,1.0%,40PPM,SERIES;MC1403U,DIP08.3	80009	156-1173-00
A2-1U810	156-2487-00			IC,CONVERTER:BIPOLAR,A/D;6-BIT,25MSPS FLASH ;TDC1046,DIP18.3	80009	156-2487-00
				MOUNTING PARTS		
	136-0756-00			SOCKET,DIP:PCB,;FEMALE,STR,2 X 9,18 POS,0.1 X 0.3 CTR,0.175 H X 0.130 TAIL,BECU,TIN	09922	DILB18P-108
				END MOUNTING PARTS		
A2-1U820	156-0368-03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL-TO-ECL;1 0124,DIP16.3,TUBE	80009	156-0368-03
A2-1U823	156-0368-03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL-TO-ECL;1 0124,DIP16.3,TUBE	80009	156-0368-03
A2-1U827	156-0368-03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL-TO-ECL;1 0124,DIP16.3,TUBE	80009	156-0368-03
A2-1U829	156-2338-00			IC,DIGITAL:ASTTL,FLIP FLOP;DUAL D-TYPE;74AS 74,DIP14.3,TUBE	80009	156-2338-00
A2-1U839	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A2-1U848	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A2-1U851	156-0956-02			IC,DIGITAL:LSTTL,BUFFER/DRIVER;DUPLICATE OF 156-0956-00;74LS244,DIP20.3,TUBE	80009	156-0956-02
A2-1U859	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4
A2-1U863	160-5971-00			MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM	80009	160-5971-00
				MOUNTING PARTS		
	136-0925-00			SOCKET,DIP::	91506	224-AG30D
				END MOUNTING PARTS		
A2-1U880	156-1707-00			IC,DIGITAL:FTTL,GATE;QUAD 2-INPUT NAND;74F0 0,DIP14.3,TUBE	80009	156-1707-00
A2-1U884	156-2520-00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4-BIT BINARY ;74AS163,DIP16.3,TUBE	01295	SN74AS163N3ORJ4
A2-1U892	156-0465-02			IC,DIGITAL:LSTTL,GATES;DUPLICATE OF 156-046 5-00;74LS30,DIP14.3,TUBE	80009	156-0465-02
A2-2	119-2501-03	B010100	B010181	OVEN ASSEMBLY:	80009	119-2501-03
A2-2	119-2501-04	B010182	B010193	OVEN ASSEMBLY:TPG625	80009	119-2501-04
A2-2	119-2501-05	B010194		OVEN ASSEMBLY:TPG625	80009	119-2501-05
				ATTACHED PARTS		
	134-0209-00			BUTTON,PLUG:0.187 DIA HOLE,PLASTIC	31223	62PP018BM14
	200-3264-00			COVER,TOP:ALUMINUM	80009	200-3264-00
	200-3266-01			CAP,HEAT SINK:PLASTIC	80009	200-3266-01
	211-0513-00			SCREW,MACHINE:6-32 X 0.625,PNH,STL (QUANTITY 2)	93907	B80-00032-003
	211-0661-00			SCR,ASSEM WSHR:4-40 X 0.25,PNH,STL,CD PL,PO Z,MACHINE (QUANTITY 2)	01536	821-01655-024
	214-3863-01			HEAT SINK,ELEC:ALUMINUM	80009	214-3863-01
	348-0935-00			GASKET:2.0 X 1.7,NEOPRENE	80009	348-0935-00
	432-0154-00			BASE,HEAT SINK:PLASTIC	80009	432-0154-00
				END ATTACHED PARTS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-2C6	283-5025-00	119-2501-03	119-2501-04	CAP,FXD,CER DI:220PF,5%,50V	80009	283-5025-00
A2-2C6	283-5238-00	119-2501-05		CAP,FXD,CER DI:150PF,5%,100V	04222	12061A151JAT1A
A2-2C8	283-5025-00			CAP,FXD,CER DI:220PF,5%,50V	80009	283-5025-00
A2-2C15	283-5000-00	119-2501-03	119-2501-04	CAP,FXD,CER DI:10PF,5%,50V	80009	283-5000-00
A2-2C15	283-5007-00	119-2501-05		CAP,FXD,CER DI:8PF,+/- 0.5PF,50V	80009	283-5007-00
A2-2C16	283-5206-00			CAP,FXD,CER DI:56PF,5%,100V	80009	283-5206-00
A2-2C17	283-5004-00			CAP,FXD,CER DI:0.1UF,10%,25V	80009	283-5004-00
A2-2C19	281-0165-00			CAP,VAR,AIR DI:0.8-10PF,250V	80009	281-0165-00
A2-2CR14	152-0269-01			DIODE,SIG:,VVC;C4=33PF,5%,C4/C20=2;SMV1263-1,DO-7,T&R	04713	SMV1263-1
A2-2Q10	151-5001-00	119-2501-03	119-2501-03	TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPLIFIER;MMBT3904L,TO-236/SOT-23,8MM T&R	80009	151-5001-00
A2-2Q10	151-5035-00	119-2501-04		TRANSISTOR,SIG:BIPOLAR,NPN;25V,30MA,650MHZ,AMPLIFIER;MMBTH10L,TO-236/SOT-23,8MM T&R	04713	MMBTH10T1
A2-2R1	321-5043-00			RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM;1206,T&R	80009	321-5043-00
A2-2R3	307-1161-00			RES,FXD,FILM:1M OHM,5%,0.062W,0805,8MM	TK0510	ERJ-6GCSJ105V
A2-2R4	321-5078-00			RES,FXD,FILM:20K OHM,1%,125MW,0805 PKG	80009	321-5078-00
A2-2R5	321-5078-00			RES,FXD,FILM:20K OHM,1%,125MW,0805 PKG	80009	321-5078-00
A2-2R9	321-5012-00			RES,FXD:THICK FILM;332 OHM,1%,0.125W,TC=100 PPM;1206,T&R	80009	321-5012-00
A2-2RT11	307-0181-01			RES,THERMAL:20K OHM,5%,AT 60 DEG C	80009	307-0181-01
A2-2Y11	----- -----			XTAL UNIT,QTZ:17.734380 MHZ,32 PF,HC43/U (REPLACEABLE AT A2-2 ONLY)		
A2-3	671-0959-00	B010100	B010242	CIRCUIT BD ASSY:MEMORY	80009	671-0959-00
A2-3	671-0959-02	B010243		CIRCUIT BD ASSY:MEMORY (STANDARD ONLY)	80009	671-0959-02
A2-3	671-0959-01			CIRCUIT BD ASSY:MEMORY (OPTION 01 ONLY)	80009	671-0959-01
A2-3C1	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C2	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C3	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C4	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C5	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C6	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C7	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C8	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C9	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C10	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C11	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C12	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C13	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C14	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C15	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C17	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C18	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C19	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C21	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C22	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C23	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C25	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C26	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C27	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C29	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C30	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C31	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C33	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C34	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C35	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C37	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-3C38	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C39	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C41	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C42	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C43	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C45	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C46	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C47	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C50	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C51	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C52	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A2-3C60	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A2-3C61	290-0747-00			CAP,FXD,ELCTLT:100UF,+50-20%,25WVDC	24165	516D107M025LM7B
A2-3J1	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 34)	80009	131-0608-00
A2-3R1	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A2-3R2	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A2-3TP1	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-3TP2	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-3TP3	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-3TP4	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-3TP5	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-3TP6	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-3TP7	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-3TP8	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A2-3U1	156-1935-00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4-BIT BINARY; 74F163,DIP16.3,TUBE	80009	156-1935-00
A2-3U2	156-1752-00			IC,DIGITAL:FTTL,GATE;TRIPLE 3-INPUT NAND;74F10,DIP14.3,TUBE	04713	MC 74F10N
A2-3U3	156-1935-00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4-BIT BINARY; 74F163,DIP16.3,TUBE	80009	156-1935-00
A2-3U4	156-1935-00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4-BIT BINARY; 74F163,DIP16.3,TUBE	80009	156-1935-00
A2-3U5	156-1935-00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4-BIT BINARY; 74F163,DIP16.3,TUBE	80009	156-1935-00
A2-3U6	156-1935-00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4-BIT BINARY; 74F163,DIP16.3,TUBE	80009	156-1935-00
A2-3U7	156-1935-00			IC,DIGITAL:FTTL,COUNTER;SYNCH 4-BIT BINARY; 74F163,DIP16.3,TUBE	80009	156-1935-00
A2-3U8	156-1727-00			MICROCKT,DGTL:1 OF 8 DCDR/DEMULTIPLEXER	04713	MC74F138 N
A2-3U9	160-6063-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200NS,27C010,DIP32.6	80009	160-6063-00
A2-3U9	160-6063-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6063-01
A2-3U9	160-6855-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200NS,27C010 (OPTION 01 ONLY)	80009	160-6855-00
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-3U10	160-6064-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200NS,27C010,DIP32.6	80009	160-6064-00
A2-3U10	160-6064-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6064-01
A2-3U10	160-6854-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200NS,27C010 (OPTION 01 ONLY)	80009	160-6854-00
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U11	160-6065-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200NS,27C010,DIP32.6	80009	160-6065-00
A2-3U11	160-6065-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6065-01
A2-3U11	160-6853-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200NS,27C010 (OPTION 01 ONLY)	80009	160-6853-00
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U12	156-3643-00			IC,DIGITAL:FTTL,SHIFT REGISTER;8-BIT SI/PISO, WITH /MR;74F166,DIP16.3,TUBE	80009	156-3643-00
A2-3U13	160-6066-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200NS,27C010,DIP32.6	80009	160-6066-00
A2-3U13	160-6066-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6066-01
A2-3U13	160-6858-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200NS,27C010 (OPTION 01 ONLY)	80009	160-6858-00
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U14	160-6067-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200NS,27C010,DIP32.6	80009	160-6067-00
A2-3U14	160-6067-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6067-01
A2-3U14	160-6857-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200NS,27C010 (OPTION 01 ONLY)	80009	160-6857-00
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U15	160-6068-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200NS,27C010,DIP32.6	80009	160-6068-00
A2-3U15	160-6068-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6068-01
A2-3U15	160-6856-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200NS,27C010 (OPTION 01 ONLY)	80009	160-6856-00
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U16	156-3643-00			IC,DIGITAL:FTTL,SHIFT REGISTER;8-BIT SI/PISO, WITH /MR;74F166,DIP16.3,TUBE	80009	156-3643-00
A2-3U17	160-6069-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200NS,27C010,DIP32.6	80009	160-6069-00
A2-3U17	160-6069-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6	80009	160-6069-01

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
				(STANDARD ONLY)		
A2-3U17	160-6861-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200 ONS,27C010	80009	160-6861-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U18	160-6070-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200 ONS,27C010,DIP32.6	80009	160-6070-00
A2-3U18	160-6070-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6	80009	160-6070-01
				(STANDARD ONLY)		
A2-3U18	160-6860-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200 ONS,27C010	80009	160-6860-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U19	160-6071-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200 ONS,27C010,DIP32.6	80009	160-6071-00
A2-3U19	160-6071-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6	80009	160-6071-01
				(STANDARD ONLY)		
A2-3U19	160-6859-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200 ONS,27C010	80009	160-6859-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U20	156-3643-00			IC,DIGITAL:FTTL,SHIFT REGISTER;8-BIT SI/PISO, WITH /MR;74F166,DIP16.3,TUBE	80009	156-3643-00
A2-3U21	160-6072-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200 ONS,27C010,DIP32.6	80009	160-6072-00
A2-3U21	160-6072-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6	80009	160-6072-01
				(STANDARD ONLY)		
A2-3U21	160-6864-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200 ONS,27C010	80009	160-6864-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U22	160-6073-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200 ONS,27C010,DIP32.6	80009	160-6073-00
A2-3U22	160-6073-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6	80009	160-6073-01
				(STANDARD ONLY)		
A2-3U22	160-6863-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200 ONS,27C010	80009	160-6863-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U23	160-6074-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200 ONS,27C010,DIP32.6	80009	160-6074-00
A2-3U23	160-6074-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6	80009	160-6074-01
				(STANDARD ONLY)		
A2-3U23	160-6862-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200 ONS,27C010	80009	160-6862-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-3U24	156-3643-00			IC,DIGITAL:FTTL,SHIFT REGISTER;8-BIT SI/PIS O, WITH /MR;74F166,DIP16.3,TUBE	80009	156-3643-00
A2-3U25	160-6075-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6075-00
A2-3U25	160-6075-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6075-01
A2-3U25	160-6867-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010 (OPTION 01 ONLY) *MOUNTING PARTS*	80009	160-6867-00
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN *END MOUNTING PARTS*	00779	2-644018-3
A2-3U26	160-6076-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6076-00
A2-3U26	160-6076-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6076-01
A2-3U26	160-6866-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010 (OPTION 01 ONLY) *MOUNTING PARTS*	80009	160-6866-00
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN *END MOUNTING PARTS*	00779	2-644018-3
A2-3U27	160-6077-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6077-00
A2-3U27	160-6077-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6077-01
A2-3U27	160-6865-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010 (OPTION 01 ONLY) *MOUNTING PARTS*	80009	160-6865-00
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN *END MOUNTING PARTS*	00779	2-644018-3
A2-3U28	156-3643-00			IC,DIGITAL:FTTL,SHIFT REGISTER;8-BIT SI/PIS O, WITH /MR;74F166,DIP16.3,TUBE	80009	156-3643-00
A2-3U29	160-6078-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6078-00
A2-3U29	160-6078-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6078-01
A2-3U29	160-6870-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010 (OPTION 01 ONLY) *MOUNTING PARTS*	80009	160-6870-00
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN *END MOUNTING PARTS*	00779	2-644018-3
A2-3U30	160-6079-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6079-00
A2-3U30	160-6079-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6079-01
A2-3U30	160-6869-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010 (OPTION 01 ONLY) *MOUNTING PARTS*	80009	160-6869-00
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN *END MOUNTING PARTS*	00779	2-644018-3
A2-3U31	160-6080-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6080-00
A2-3U31	160-6080-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6	80009	160-6080-01

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
				(STANDARD ONLY)		
A2-3U31	160-6868-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010	80009	160-6868-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U32	156-3643-00			IC,DIGITAL:FTTL,SHIFT REGISTER;8-BIT SI/PIS O, WITH /MR;74F166,DIP16.3,TUBE	80009	156-3643-00
A2-3U33	160-6081-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6081-00
A2-3U33	160-6081-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6	80009	160-6081-01
				(STANDARD ONLY)		
A2-3U33	160-6873-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010	80009	160-6873-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U34	160-6082-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6082-00
A2-3U34	160-6082-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6	80009	160-6082-01
				(STANDARD ONLY)		
A2-3U34	160-6872-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010	80009	160-6872-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U35	160-6083-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6083-00
A2-3U35	160-6083-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6	80009	160-6083-01
				(STANDARD ONLY)		
A2-3U35	160-6871-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010	80009	160-6871-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U36	156-3643-00			IC,DIGITAL:FTTL,SHIFT REGISTER;8-BIT SI/PIS O, WITH /MR;74F166,DIP16.3,TUBE	80009	156-3643-00
A2-3U37	160-6084-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6084-00
A2-3U37	160-6084-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6	80009	160-6084-01
				(STANDARD ONLY)		
A2-3U37	160-6876-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010	80009	160-6876-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U38	160-6085-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6085-00
A2-3U38	160-6085-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6	80009	160-6085-01
				(STANDARD ONLY)		
A2-3U38	160-6875-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010	80009	160-6875-00
				(OPTION 01 ONLY)		
				MOUNTING PARTS		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN *END MOUNTING PARTS*	00779	2-644018-3
A2-3U39	160-6086-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6086-00
A2-3U39	160-6086-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6086-01
A2-3U39	160-6874-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010 (OPTION 01 ONLY) *MOUNTING PARTS*	80009	160-6874-00
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN *END MOUNTING PARTS*	00779	2-644018-3
A2-3U40	156-3643-00			IC,DIGITAL:FTTL,SHIFT REGISTER;8-BIT SI/PIS O, WITH /MR;74F166,DIP16.3,TUBE	80009	156-3643-00
A2-3U41	160-6087-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6087-00
A2-3U41	160-6087-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6087-01
A2-3U41	160-6879-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010 (OPTION 01 ONLY) *MOUNTING PARTS*	80009	160-6879-00
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN *END MOUNTING PARTS*	00779	2-644018-3
A2-3U42	160-6088-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6088-00
A2-3U42	160-6088-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6088-01
A2-3U42	160-6878-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010 (OPTION 01 ONLY) *MOUNTING PARTS*	80009	160-6878-00
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN *END MOUNTING PARTS*	00779	2-644018-3
A2-3U43	160-6089-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6089-00
A2-3U43	160-6089-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6089-01
A2-3U43	160-6877-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010 (OPTION 01 ONLY) *MOUNTING PARTS*	80009	160-6877-00
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN *END MOUNTING PARTS*	00779	2-644018-3
A2-3U44	156-3643-00			IC,DIGITAL:FTTL,SHIFT REGISTER;8-BIT SI/PIS O, WITH /MR;74F166,DIP16.3,TUBE	80009	156-3643-00
A2-3U45	160-6090-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6090-00
A2-3U45	160-6090-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRG M 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6090-01
A2-3U45	160-6882-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,20 ONS,27C010 (OPTION 01 ONLY) *MOUNTING PARTS*	80009	160-6882-00
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN *END MOUNTING PARTS*	00779	2-644018-3
A2-3U46	160-6091-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 20 ONS,27C010,DIP32.6	80009	160-6091-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2-3U46	160-6091-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6091-01
A2-3U46	160-6881-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200NS,27C010 (OPTION 01 ONLY)	80009	160-6881-00
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U47	160-6092-00	671-0959-00	671-0959-00	MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM 200NS,27C010,DIP32.6	80009	160-6092-00
A2-3U47	160-6092-01	671-0959-02		IC,DIGITAL:CMOS,EPROM;131072 X 8,27C010,PRGM 156-3676-00,200NS,DIP32.6 (STANDARD ONLY)	80009	160-6092-01
A2-3U47	160-6880-00			MICROCKT,DGTL:CMOS,131072 X 8 EPROM,PRGM,200NS,27C010 (OPTION 01 ONLY)	80009	160-6880-00
				MOUNTING PARTS		
	136-0963-00			SKT,PL-IN ELEK:MICROCKT,32 PIN	00779	2-644018-3
				END MOUNTING PARTS		
A2-3U48	156-3643-00			IC,DIGITAL:FTTL,SHIFT REGISTER;8-BIT SI/PSO, WITH /MR;74F166,DIP16.3,TUBE	80009	156-3643-00
A2-3U50	156-1962-00			IC,DIGITAL:FTTL,BUFFER;OCTAL NONINV BUFFER/DRIVER, 3-STATE;74F244,DIP20.3,TUBE	80009	156-1962-00
A2-3U51	156-1962-00			IC,DIGITAL:FTTL,BUFFER;OCTAL NONINV BUFFER/DRIVER, 3-STATE;74F244,DIP20.3,TUBE	80009	156-1962-00
A2-3U52	156-1962-00			IC,DIGITAL:FTTL,BUFFER;OCTAL NONINV BUFFER/DRIVER, 3-STATE;74F244,DIP20.3,TUBE	80009	156-1962-00
A3	671-0960-00			CIRCUIT BD ASSY:OUTPUT	80009	671-0960-00
				ATTACHED PARTS		
	131-0157-00			TERMINAL,PIN:0.25 L X 0.04 OD,BRS,SLDR PL (QUANTITY 2)	80009	131-0157-00
				END ATTACHED PARTS		
A3C109	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C122	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C128	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C210	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C212	283-0594-00			CAP,FXD,MICA DI:0.001UF,1%,100V	80009	283-0594-00
A3C221	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C222	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C230	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C231	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C237	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C238	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C239	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C240	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C244	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C245	290-0804-00			CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A3C247	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C248	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C261	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C262	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C271	283-0766-00			CAP,FXD,MICA DI:47 PF,1%,500V	80009	283-0766-00
A3C284	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C286	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C315	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C316	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C321	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR303E105ZAA
A3C327	283-0198-00			CAP,FXD,CER DI:0.22UF,20%,50V	05397	C330C224M5U1CA
A3C330	283-0644-00			CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A3C331	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3C336	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C344	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C345	290-0804-00			CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A3C347	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C350	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C410	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C411	283-0672-00			CAP,FXD,MICA DI:200PF,1%,500V	80009	283-0672-00
A3C421	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C427	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C431	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C435	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C440	283-0623-00			CAP,FXD,MICA DI:1200PF,1%,100V	80009	283-0623-00
A3C442	283-0630-00			CAP,FXD,MICA DI:110PF,1%,100V	80009	283-0630-00
A3C454	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C456	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C471	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C510	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C515	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C530	283-0707-00			CAP,FXD,MICA DI:385PF,1%,500V	80009	283-0707-00
A3C540	283-0730-00			CAP,FXD,MICA DI:274PF,1%,500V	80009	283-0730-00
A3C541	283-0629-00			CAP,FXD,MICA DI:62PF,1%,500V	80009	283-0629-00
A3C542	283-0779-00			CAP,FXD,MICA DI:27 PF,2%,500V	80009	283-0779-00
A3C543	283-0640-00			CAP,FXD,MICA DI:160PF,1%,500V	80009	283-0640-00
A3C544	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C577	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C583	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C600	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C606	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C614	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C617	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C622	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A3C630	281-0153-00			CAP,VAR,AIR DI:1.7-10PF,250V	80009	281-0153-00
A3C633	281-0122-00			CAP,VAR,CER DI:2.5-9PF,100V	80009	281-0122-00
A3C640	283-0622-00			CAP,FXD,MICA DI:450PF,1%,300V	80009	283-0622-00
A3C641	283-0640-00			CAP,FXD,MICA DI:160PF,1%,500V	80009	283-0640-00
A3C642	283-0673-00			CAP,FXD,MICA DI:455PF,1%,500V	80009	283-0673-00
A3C643	283-0639-00			CAP,FXD,MICA DI:56PF,1%,500V	80009	283-0639-00
A3C656	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C674	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C689	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C691	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C705	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C710	283-0636-00			CAP,FXD,MICA DI:36PF,1.4%,500V	80009	283-0636-00
A3C713	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C720	283-0051-00			CAP,FXD,CER DI:0.0033UF,5%,100V	80009	283-0051-00
A3C723	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C724	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C731	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C749	283-0692-00			CAP,FXD,MICA DI:670PF,1%,300V	80009	283-0692-00
A3C755	283-0707-00			CAP,FXD,MICA DI:385PF,1%,500V	80009	283-0707-00
A3C770	283-0647-00			CAP,FXD,MICA DI:70PF,1%,100V	80009	283-0647-00
A3C779	283-0663-00			CAP,FXD,MICA DI:16.8PF,+/0.5PF,500V	80009	283-0663-00
A3C805	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C806	283-0051-00			CAP,FXD,CER DI:0.0033UF,5%,100V	80009	283-0051-00
A3C813	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C821	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C823	283-0645-00			CAP,FXD,MICA DI:790PF,1%,300V	80009	283-0645-00
A3C833	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A3C835	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3C840	281-0153-00			CAP,VAR,AIR DI:1.7-10PF,250V	80009	281-0153-00
A3C870	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C880	283-0637-00			CAP,FXD,MICA DI:20PF,2.5%,500V	80009	283-0637-00
A3C881	283-0665-00			CAP,FXD,MICA DI:190PF,1%,100V	80009	283-0665-00
A3C905	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C912	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C913	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C919	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A3C920	283-0223-00			CAP,FXD,CER DI:3PF,+/-5PF,50V	TK1134	835XXXC0J0309D
A3C921	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A3C923	290-0990-00			CAP,FXD,ELCTLT:10UF,20%,50V	24165	502D437
A3C925	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C927	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C930	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C931	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C932	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C933	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A3C934	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A3C945	281-0895-00			CAP,FXD,CER DI:6.8PF,100VDC	80009	281-0895-00
A3C951	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C952	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C953	290-0973-00			CAP,FXD,ELCTLT:100UF,20%,25VDC	24165	513D107M025BB4D
A3C956	281-0775-01			CAP,FXD,CER DI:0.1UF,20%,50V	04222	SA105E104MAA
A3C963	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A3CR226	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A3CR250	152-0322-00			DIODE,SIG:SCHTKY,;15V,410MVF AT 1MA,1.2PF;5082-2811,T&R	80009	152-0322-00
A3CR313	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A3CR350	152-0322-00			DIODE,SIG:SCHTKY,;15V,410MVF AT 1MA,1.2PF;5082-2811,T&R	80009	152-0322-00
A3CR709	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A3CR710	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A3CR841	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A3CR868	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A3J200	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL(QUANTITY 3)	80009	131-0608-00
A3J210	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL(QUANTITY 3)	80009	131-0608-00
A3J440	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL(QUANTITY 3)	80009	131-0608-00
A3J511	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL(QUANTITY 3)	80009	131-0608-00
A3J940	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL(QUANTITY 20)	80009	131-0608-00
A3L327	108-1212-00			COIL,RF:FIXED,9UH,2%	TK1345	108-1212-00
A3L450	120-1768-00			TRANSFORMER,RF:VARIABLE,POT CORE,1.95UH-2.20UH	54937	500-4205
A3L550	114-0422-00			COIL,RF:VARIABLE,POT CORE,645NH-770NH	54937	500-4206
A3L551	114-0423-00			COIL,RF:VARIABLE,POT CORE,2.0UH-2.30UH	54937	500-4207
A3L650	114-0366-00			COIL,RF:VARIABLE,2.40-2.70UH,Q MIN 190 @ 2.6 UH, POT CORE	54937	114-0366-00
A3L750	114-0344-00			COIL,RF:VARIABLE,1.8-2.13UH	80009	114-0344-00
A3L788	108-0368-00			COIL,RF:FIXED,9.7UH	TK1345	108-0368-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3L789	108-0443-00			COIL,RF:FIXED,23.5UH	80009	108-0443-00
A3P140	131-3439-00			CONN,DIN:PCB,;FEMALE,RTANG,3 X 16,0.1 CTR,0 .209 MLG X 0.114 TAIL,30 GOLD;,, *MOUNTING PARTS*	81312	48S-6043-0731-0
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0185-00			SCREW,MACHINE:2-56 X 0.438,PNH,STL (QUANTITY 2) *END MOUNTING PARTS*	TK0435	ORDER BY DESCR
A3P155	131-3439-00			CONN,DIN:PCB,;FEMALE,RTANG,3 X 16,0.1 CTR,0 .209 MLG X 0.114 TAIL,30 GOLD;,, *MOUNTING PARTS*	81312	48S-6043-0731-0
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0185-00			SCREW,MACHINE:2-56 X 0.438,PNH,STL (QUANTITY 2) *END MOUNTING PARTS*	TK0435	ORDER BY DESCR
A3P200	131-0993-05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100-5
A3P210	131-0993-05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100-5
A3P440	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A3P511	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A3Q222	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A3Q309	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A3Q735	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3Q740	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3Q745	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3Q748	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3Q817	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3Q830	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A3Q831	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3Q833	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A3Q834	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A3Q840	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A3Q850	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3Q852	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3Q860	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3Q870	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3Q920	151-0367-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,30MA,1.0GHZ; MPS-H10 SPECIAL,TO-92 EBC	80009	151-0367-00
A3Q921	151-0367-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,30MA,1.0GHZ; MPS-H10 SPECIAL,TO-92 EBC	80009	151-0367-00
A3Q923	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3Q924	151-0367-00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,30MA,1.0GHZ; MPS-H10 SPECIAL,TO-92 EBC	80009	151-0367-00
A3Q949	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A3Q950	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3Q963	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A3Q964	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A3Q970	151-0220-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A3Q971	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A3R145	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A3R211	321-0793-07			RES,FXD,FILM:37.5 OHM 0.1%,0.125W TC=T9	24546	NE55E37R5B
A3R212	315-0107-00			RES,FXD,FILM:100M OHM,5%,0.25W	80009	315-0107-00
A3R213	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A3R226	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A3R227	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A3R228	321-0395-00			RES,FXD,FILM:127K OHM,1%,0.125W,TC=T0	07716	CEAD12702F
A3R240	322-3222-07			RES,FXD,FILM:2K OHM,0.1%,0.2W TC=T9	80009	322-3222-07
A3R241	321-0830-03			RES,FXD,FILM:2.41K OHM,0.25%,0.125W,TC=T2	07716	CEAC24100C
A3R242	322-3392-00			RES,FXD,FILM:118K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 118K
A3R243	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0	91637	CCF50-2G76R80F
A3R244	322-3086-00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0	91637	CCF50-2G76R80F
A3R245	322-3085-00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PP M;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 75E0
A3R246	315-0910-00			RES,FXD,FILM:91 OHM,5%,0.25W	80009	315-0910-00
A3R255	307-0540-00			RES NTWK,FXD,FI:(5)1K OHM,2%,0.7W	91637	CSC06A-01-102G
A3R271	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A3R272	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A3R273	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A3R311	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A3R312	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A3R313	315-0203-00			RES,FXD,FILM:20K OHM,5%,0.25W	80009	315-0203-00
A3R322	311-0633-00			RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3329H-L58-502
A3R327	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A3R328	315-0104-00			RES,FXD,FILM:100K OHM,5%,0.25W	80009	315-0104-00
A3R340	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A3R341	321-0793-07			RES,FXD,FILM:37.5 OHM 0.1%,0.125W TC=T9	24546	NE55E37R5B
A3R342	321-0830-03			RES,FXD,FILM:2.41K OHM,0.25%,0.125W,TC=T2	07716	CEAC24100C
A3R343	321-0793-07			RES,FXD,FILM:37.5 OHM 0.1%,0.125W TC=T9	24546	NE55E37R5B
A3R344	322-3001-00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PP M;AXIAL,T&R,SMALL BODY	80009	322-3001-00
A3R350	322-3222-07			RES,FXD,FILM:2K OHM,0.1%,0.2W TC=T9	80009	322-3222-07
A3R355	307-0540-00			RES NTWK,FXD,FI:(5)1K OHM,2%,0.7W	91637	CSC06A-01-102G
A3R405	322-3324-00			RES,FXD,FILM:23.2K OHM,1%,0.2W,TC=T0	91637	CCF50-2F23201F
A3R406	322-3385-00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 100K
A3R413	315-0163-00			RES,FXD,FILM:16K OHM,5%,0.25W	80009	315-0163-00
A3R414	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A3R427	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A3R428	315-0513-00			RES,FXD,FILM:51K OHM,5%,0.25W	80009	315-0513-00
A3R456	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A3R457	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A3R513	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A3R530	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A3R531	315-0362-00			RES,FXD,FILM:3.6K OHM,5%,0.25W	80009	315-0362-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3R532	321-0247-00			RES,FXD,FILM:3.65K OHM,1%,0.125W,TC=T0	80009	321-0247-00
A3R533	322-3260-00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 4K99
A3R534	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K00
A3R541	307-0650-00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750-101-R2.7K
A3R578	311-0635-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3329H-L58-102
A3R589	315-0622-00			RES,FXD,FILM:6.2K OHM,5%,0.25W	80009	315-0622-00
A3R590	315-0332-00			RES,FXD,FILM:3.3K OHM,5%,0.25W	80009	315-0332-00
A3R610	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A3R611	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A3R612	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A3R613	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A3R618	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0	80009	322-3126-00
A3R619	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322-3289-00
A3R625	311-0634-00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	80009	311-0634-00
A3R630	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0	80009	322-3175-00
A3R631	322-3164-00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 499E
A3R632	322-3178-00			RES,FXD,FILM:698 OHM,1%,0.2W,TC=T0	91637	CCF50-2G698R0F
A3R633	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K50
A3R687	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A3R688	315-0513-00			RES,FXD,FILM:51K OHM,5%,0.25W	80009	315-0513-00
A3R689	322-3132-00			RES,FXD,FILM:232 OHM,1%,0.2W,TC=T0	80009	322-3132-00
A3R690	322-3132-00			RES,FXD,FILM:232 OHM,1%,0.2W,TC=T0	80009	322-3132-00
A3R691	322-3179-00			RES,FXD,FILM:715 OHM,1%,0.2W,TC=T0	80009	322-3179-00
A3R692	322-3132-00			RES,FXD,FILM:232 OHM,1%,0.2W,TC=T0	80009	322-3132-00
A3R709	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A3R710	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322-3289-00
A3R711	321-0343-00			RES,FXD,FILM:36.5K OHM,1%,0.125W,TC=T0	07716	CEAD36501F
A3R712	322-3193-00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K00
A3R713	322-3250-00			RES,FXD:METAL FILM;3.92K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	91637	CCF50-2F39200F
A3R719	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0	80009	322-3126-00
A3R720	322-3184-00			RES,FXD,FILM:806 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 806E
A3R721	321-0926-07			RES,FXD,FILM:4K OHM,0.1%,0.125W,TC=T9	19701	5033RE4K00B
A3R722	322-3193-07			RES,FXD,FILM:1K OHM,0.1%,0.2W,TC=T9	80009	322-3193-07
A3R736	322-3156-00			RES,FXD,FILM:412 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 412E
A3R737	322-3161-00			RES,FXD,FILM:464 OHM,1%,0.2W,TC=T0	91637	CCF50-2G464R0F
A3R739	322-3327-00			RES,FXD,FILM:24.9K OHM,1%,0.2W,TC=T0	80009	322-3327-00
A3R740	311-0644-00			RES,VAR,NONWW:TRMR,20K OHM,0.5W	80009	311-0644-00
A3R741	322-3198-00			RES,FXD,FILM:1.13K OHM,1%,0.2W,TC=T0	80009	322-3198-00
A3R742	315-0150-00			RES,FXD,FILM:15 OHM,5%,0.25W	80009	315-0150-00
A3R751	322-3085-00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 75E0
A3R755	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A3R756	315-0362-00			RES,FXD,FILM:3.6K OHM,5%,0.25W	80009	315-0362-00
A3R766	322-3156-00			RES,FXD,FILM:412 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 412E
A3R767	322-3161-00			RES,FXD,FILM:464 OHM,1%,0.2W,TC=T0	91637	CCF50-2G464R0F
A3R768	322-3176-00			RES,FXD,FILM:665 OHM,1%,0.2W,TC=T0	80009	322-3176-00
A3R770	322-3179-00			RES,FXD,FILM:715 OHM,1%,0.2W,TC=T0	80009	322-3179-00
A3R812	322-3289-00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322-3289-00
A3R814	321-0372-00			RES,FXD,FILM:73.2K OHM,1%,0.125W,TC=T0	07716	CEAD73201F
A3R820	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A3R821	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3R822	315-0752-00			RES,FXD,FILM:7.5K OHM,5%,0.25W	80009	315-0752-00
A3R823	322-3334-00			RES,FXD,FILM:29.4K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 29K4
A3R824	322-3254-00			RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0	80009	322-3254-00
A3R830	321-0059-00			RES,FXD,FILM:40.2 OHM,0.5%,0.125W,TC=T0	80009	321-0059-00
A3R831	322-3030-00			RES,FXD:METAL FILM;20 OHM,1%,0.2W,TC=100 PP M;AXIAL,T&R,SMALL BODY	80009	322-3030-00
A3R840	322-3164-00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 499E
A3R841	322-3178-00			RES,FXD,FILM:698 OHM,1%,0.2W,TC=T0	91637	CCF50-2G698R0F
A3R842	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K50
A3R843	322-3176-00			RES,FXD,FILM:665 OHM,1%,0.2W,TC=T0	80009	322-3176-00
A3R844	315-0150-00			RES,FXD,FILM:15 OHM,5%,0.25W	80009	315-0150-00
A3R845	322-3232-00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0	80009	322-3232-00
A3R849	322-3227-00			RES,FXD,FILM:2.26K OHM,1%,0.2W,TC=T0	80009	322-3227-00
A3R851	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A3R855	322-3260-00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 4K99
A3R856	321-0247-00			RES,FXD,FILM:3.65K OHM,1%,0.125W,TC=T0	80009	321-0247-00
A3R868	322-3232-00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0	80009	322-3232-00
A3R869	322-3030-00			RES,FXD:METAL FILM;20 OHM,1%,0.2W,TC=100 PP M;AXIAL,T&R,SMALL BODY	80009	322-3030-00
A3R885	322-3132-00			RES,FXD,FILM:232 OHM,1%,0.2W,TC=T0	80009	322-3132-00
A3R910	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A3R911	322-3126-00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0	80009	322-3126-00
A3R912	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A3R913	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PP M;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K00
A3R914	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A3R915	321-0351-00			RES,FXD,FILM:44.2K OHM,1%,0.125W,TC=T0	07716	CEAD44201F
A3R916	321-0447-00			RES,FXD,FILM:442K OHM,1%,0.125W,TC=T0	01121	
A3R917	322-3306-00			RES,FXD:METAL FILM;15K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 15K0
A3R918	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PP M;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K00
A3R919	322-3306-00			RES,FXD:METAL FILM;15K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 15K0
A3R923	322-3207-00			RES,FXD,FILM:1.4K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K4
A3R924	322-3286-00			RES,FXD,FILM:9.31K OHM,1%,0.2W,TC=T0	80009	322-3286-00
A3R930	322-3085-00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PP M;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 75E0
A3R931	322-3085-00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PP M;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 75E0
A3R932	322-3210-00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 1K50
A3R933	322-3085-00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PP M;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 75E0
A3R934	322-3085-00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PP M;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 75E0
A3R939	311-0634-00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	80009	311-0634-00
A3R949	307-1318-00			RES NTWK,FXD,FI:(2) 162 OHM,(2) 260 OHM,2%, 0.125W	80009	307-1318-00
A3R950	307-1318-00			RES NTWK,FXD,FI:(2) 162 OHM,(2) 260 OHM,2%, 0.125W	80009	307-1318-00
A3R951	322-3327-00			RES,FXD,FILM:24.9K OHM,1%,0.2W,TC=T0	80009	322-3327-00
A3R952	311-0644-00			RES,VAR,NONWW:TRMR,20K OHM,0.5W	80009	311-0644-00
A3R956	322-3175-00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0	80009	322-3175-00
A3R957	322-3222-00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PP M;AXIAL,T&R,SMALL BODY	57668	CRB20 FXE 2K00
A3R980	321-0059-00			RES,FXD,FILM:40.2 OHM,0.5%,0.125W,TC=T0	80009	321-0059-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3TP100	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP115	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP118	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP201	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP300	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP350	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP400	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP429	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP920	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3TP990	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A3U108	156-2182-00			IC,DIGITAL:ALSTTL,MUX/ENCODER;QUAD NONINV 1-OF-2 SELECTOR;74ALS157,DIP16.3,TUBE	80009	156-2182-00
A3U127	156-1173-00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIVE,2.5V,1.0%,40PPM,SERIES;MC1403U,DIP08.3	80009	156-1173-00
A3U211	156-1149-01			IC,LINEAR:BIFET,OP-AMP;DUPLICATE OF 156-1149-00,DO NOT USE;LF351N,DIP08.3	27014	AL160307
A3U220	156-0784-02			IC,DIGITAL:LSTTL,COUNTER;DUPLICATE OF 156-0784-00;74LS163,DIP16.3,TUBE	80009	156-0784-02
A3U227	156-0912-01			IC,LINEAR:	80009	156-0912-01
A3U230	156-0530-02			IC,DIGITAL:LSTTL,MUX/ENCODER;DUPLICATE OF 156-0530-00;74LS157,DIP16.3,TUBE	80009	156-0530-02
A3U243	156-1754-01			IC,DIGITAL:ALSTTL,BUFFER/DRIVER;OCTAL NONINV, 3-STATE;74ALS244,DIP20.3,TUBE	01295	SN74ALS244AN3
A3U250	155-0282-00			MICROCKT,DGTL:DIGITAL TO ANALOG CONVERTER M219B	80009	155-0282-00
				MOUNTING PARTS		
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P-108
				END MOUNTING PARTS		
A3U260	156-1611-00			IC,DIGITAL:FTTL,FLIP FLOP;DUAL D-TYPE;74F74,DIP14.3,TUBE	80009	156-1611-00
A3U263	156-0860-02			IC,DIGITAL:ECL,RECEIVER;TRIPLE LINE;10116,DIP16.3,TUBE,SCRN	80009	156-0860-02
A3U285	160-5972-00			MICROCKT,DGTL:CMOS,2K X 8 REG,PRGM	80009	160-5972-00
				MOUNTING PARTS		
	136-0925-00			SOCKET,DIP::	91506	224-AG30D
				END MOUNTING PARTS		
A3U313	156-0912-01			IC,LINEAR:	80009	156-0912-01
A3U330	156-2992-00			IC,MEMORY:CMOS,SRAM;2K X 8,35NS,OE;,DIP24.3	80009	156-2992-00
A3U343	156-1664-00			IC,DIGITAL:ALSTTL,FLIP FLOP;OCTAL NONINV D-TYPE, 3-STATE;74ALS574,DIP20.3,TUBE	80009	156-1664-00
A3U350	155-0282-00			MICROCKT,DGTL:DIGITAL TO ANALOG CONVERTER M219B	80009	155-0282-00
				MOUNTING PARTS		
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P-108
				END MOUNTING PARTS		
A3U411	156-1335-00			IC,DIGITAL:LSTTL,MULTIVIBRATOR;DUAL RETRIG MONOSTABLE;96LS02,DIP16.3	80009	156-1335-00
A3U427	156-0067-13			IC,LINEAR:	80009	156-0067-13
A3U455	156-1722-00			IC,DIGITAL:FTTL,GATE;HEX INV;74F04,DIP14.3,TUBE	04713	MC74F04ND

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3U470	156-0982-03			IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0982-00;74LS374,DIP20.3,TUBE	80009	156-0982-03
A3U485	156-0316-04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TO TTL;1 0125,DIP16.3,TUBE	04713	MC10125P/L
A3U511	156-1324-00			IC,LINEAR:BIPOLAR,COMPARATOR;TTL,20NS,COMPL EMENTARY OUTPUT,W/STROBES;LM361N,DIP14.3	27014	LM361N/GLAA054
A3U543	156-2517-00			MICROCKT,DGTL:7 X 9 UPPERCASE CHARACTER GEN ERATOR	27014	DM86S64 BWF/N
A3U655	160-4866-00			IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA,PR GM 156-2983-00;16V8-25,DIP20.3	80009	160-4866-00
				MOUNTING PARTS		
	136-0752-00			SKT,PL-IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P-108
				END MOUNTING PARTS		
A3U670	156-1255-00			IC,CONVERTER:BIPOLAR,D/A;8 BIT,85NS,CURRENT OUT,MULTIPLYING;DAC08HP,DIP16.3	80009	156-1255-00
A3U690	156-0067-13			IC,LINEAR:	80009	156-0067-13
A3U710	156-1272-00			IC,LINEAR:BIPOLAR,OP-AMP;DUAL,HIGH OUTPUT D RIVE,LOW NOISE;NE5532N,DIP08.3	80009	156-1272-00
A3U720	156-0158-07			IC,LINEAR:BIPOLAR,OP-AMP;DUPLICATE OF 156-0 158-00,DO NOT USE;MC1458P1,DIP08.3	80009	156-0158-07
A3U730	156-0534-01			IC,LINEAR:DUAL DIFF AMPL,BURN-INCA3102,MI	80009	156-0534-01
A3U955	156-0534-01			IC,LINEAR:DUAL DIFF AMPL,BURN-INCA3102,MI	80009	156-0534-01
A3VR823	152-0688-00			DIODE,ZENER:,;2.4V,5%,0.4W;1N4370A,DO-7 OR 35	04713	1N4370A
A3W345	131-0566-00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	80009	131-0566-00
A3W750	131-0566-00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	80009	131-0566-00
A4	671-0572-00	B010100	B010109	CIRCUIT BD ASSY:PWR SPLY	80009	671-0572-00
A4	671-0572-01	B010110	B010195	CIRCUIT BD ASSY:PWR SPLY	80009	671-0572-01
A4	671-0572-02	B010196	B010205	CIRCUIT BD ASSY:PWR SPLY	80009	671-0572-02
A4	671-0572-03	B010206	B010261	CIRCUIT BD ASSY:PWR SUPPLY	80009	671-0572-03
A4	671-0572-04	B010262	B010276	CIRCUIT BD ASSY:POWER SUPPLY	80009	671-0572-04
A4	671-0572-05	B010277	B010290	CIRCUIT BD ASSY:POWER SUPPLY	80009	671-0572-05
A4	671-0572-06	B010291		CIRCUIT BD ASSY:POWER SUPPLY	80009	671-0572-06
A4C142	290-1069-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A4C142	290-1301-00	671-0572-04		CAP,FXD,ALUM:,;2700UF,20%,10V,12.5 X 30MM(0 .492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE,BU LK	80009	290-1301-00
A4C161	290-0804-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A4C161	290-0943-02	671-0572-04		CAP,FXD,ELCTLT:47UF,20%,25V	55680	UVX1E470MDA1TD
A4C169	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	MD015E224ZAA
A4C225	290-1069-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A4C225	290-1301-00	671-0572-04		CAP,FXD,ALUM:,;2700UF,20%,10V,12.5 X 30MM(0 .492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE,BU LK	80009	290-1301-00
A4C241	290-1034-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:330UF,25V,20%	TK1424	CEUFM1E331
A4C241	290-1302-00	671-0572-04		CAP,FXD,ALUM:,;1000UF,20%,35V,12.5 X 30MM(0 .492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE,BU LK	80009	290-1302-00
A4C250	290-1034-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:330UF,25V,20%	TK1424	CEUFM1E331
A4C250	290-1302-00	671-0572-04		CAP,FXD,ALUM:,;1000UF,20%,35V,12.5 X 30MM(0 .492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE,BU LK	80009	290-1302-00
A4C258	290-1069-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A4C258	290-1301-00	671-0572-04		CAP,FXD,ALUM:,;2700UF,20%,10V,12.5 X 30MM(0 .492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE,BU LK	80009	290-1301-00
A4C269	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	MD015E224ZAA
A4C270	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	MD015E224ZAA
A4C320	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	MD015E224ZAA
A4C321	283-0005-00	671-0572-01		CAP,FXD,CER DI:0.01UF,+100-0%,250V	04222	SR30VE103ZAA
A4C325	290-1069-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4C325	290-1301-00	671-0572-04		CAP,FXD,ALUM:,;2700UF,20%,10V,12.5 X 30MM(0 .492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE,BU LK	80009	290-1301-00
A4C358	290-1069-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A4C358	290-1301-00	671-0572-04		CAP,FXD,ALUM:,;2700UF,20%,10V,12.5 X 30MM(0 .492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE,BU LK	80009	290-1301-00
A4C360	290-1069-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A4C360	290-1301-00	671-0572-04		CAP,FXD,ALUM:,;2700UF,20%,10V,12.5 X 30MM(0 .492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE,BU LK	80009	290-1301-00
A4C361	290-0804-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A4C361	290-0943-02	671-0572-04		CAP,FXD,ELCTLT:47UF,20%,25V	55680	UVX1E470MDA1TD
A4C370	290-1069-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A4C370	290-1301-00	671-0572-04		CAP,FXD,ALUM:,;2700UF,20%,10V,12.5 X 30MM(0 .492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE,BU LK	80009	290-1301-00
A4C371	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	MD015E224ZAA
A4C415	283-0268-00			CAP,FXD,CER DI:0.015UF,20%,50V	80009	283-0268-00
A4C464	290-1069-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A4C464	290-1301-00	671-0572-04		CAP,FXD,ALUM:,;2700UF,20%,10V,12.5 X 30MM(0 .492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE,BU LK	80009	290-1301-00
A4C475	290-1069-00	671-0572-00	671-0572-03	CAP,FXD,ELCTLT:1000UF,20%,6.3V	80009	290-1069-00
A4C475	290-1301-00	671-0572-04		CAP,FXD,ALUM:,;2700UF,20%,10V,12.5 X 30MM(0 .492 X 1.180);RADIAL,LOWIMP,1.95A RIPPLE,BU LK	80009	290-1301-00
A4C521	283-0672-00			CAP,FXD,MICA DI:200PF,1%,500V	80009	283-0672-00
A4C525	285-1196-00			CAP,FXD,PPR DI:0.01UF,20%,250V	80009	285-1196-00
A4C540	285-1329-00			CAP,FXD,PLASTIC:METALIZED FILM;680PF,10%,16 00V,POLYPROPYLENE,.70X.43; RADIAL,T/A	80009	285-1329-00
A4C548	285-1331-00			CAP,FXD,MTLZD:0.47UF,5%,400V	TK1573	MKS4 .47/400/5
A4C575	283-0005-00	671-0572-01		CAP,FXD,CER DI:0.01UF,+100-0%,250V	04222	SR30VE103ZAA
A4C621	283-0051-00			CAP,FXD,CER DI:0.0033UF,5%,100V	80009	283-0051-00
A4C648	285-1187-00			CAP,FXD,MTLZD:0.47 UF,10%,100 V	05292	PMT 3R .47K 100
A4C656	290-0844-00			CAP,FXD,ELCTLT:100UF,+75-20%,35WVDC	24165	513D107M035CC4D
A4C717	290-0804-00			CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A4C718	283-0211-00			CAP,FXD,CER DI:0.1UF,10%,200V	80009	283-0211-00
A4C722	283-0032-00			CAP,FXD,CER DI:470PF,5%,500V	80009	283-0032-00
A4C727	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	MD015E224ZAA
A4C730	285-1196-00			CAP,FXD,PPR DI:0.01UF,20%,250V	80009	285-1196-00
A4C830	285-1196-00			CAP,FXD,PPR DI:0.01UF,20%,250V	80009	285-1196-00
A4C845	290-1070-00	671-0572-00	671-0572-04	CAP,FXD,ELCTLT:220UF,20%,200V	80009	290-1070-00
A4C845	290-1293-00	671-0572-05		CAP,FXD,ALUM:390UF,20%,200V,25 X 30MM;SNAP IN,105 DEG,BULK	80009	290-1293-00
A4C865	290-1070-00	671-0572-00	671-0572-04	CAP,FXD,ELCTLT:220UF,20%,200V	80009	290-1070-00
A4C865	290-1293-00	671-0572-05		CAP,FXD,ALUM:390UF,20%,200V,25 X 30MM;SNAP IN,105 DEG,BULK	80009	290-1293-00
A4C920	285-1323-00			CAP,FXD,MTLZD:0.22UF,250V,X	80009	285-1323-00
A4CR169	152-0198-00			SEMICOND DVC,DI:RECT,SI,200V,3A,A249	03508	1N5624
A4CR170	152-0066-00			DIODE,RECT:,;400V,1A,IFSM = 30A;GP10G,DO-41 ,T&R,SAFETY CONTROLLED	05828	GP10G-020
A4CR215	152-0066-00			DIODE,RECT:,;400V,1A,IFSM = 30A;GP10G,DO-41 ,T&R,SAFETY CONTROLLED	05828	GP10G-020
A4CR269	152-0198-00			SEMICOND DVC,DI:RECT,SI,200V,3A,A249	03508	1N5624
A4CR320	152-0884-00			SEMICOND DVC,DI:16 AMP,35V,TO-220,AC PKG	04713	MBR1635
				MOUNTING PARTS		
	210-0586-00			NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00
	210-1178-00			WASHER,SHLDR:	80009	210-1178-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
	211-0097-00			SCREW,MACHINE:4-40 X 0.312,PNH,STL	93907	ORDER BY DESCR
	214-2953-00			HEAT SINK,XSTR:TO-220,AL	80009	214-2953-00
	342-0563-00			INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINF ORCED SILICON RUBBER	18565	69-11-8805-1674
				END MOUNTING PARTS		
A4CR340	152-0601-01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A4CR348	152-0601-01			SEMICOND DVC,DI:RECTIFIER,SI,150V,1A,35NS	04713	MUR115RL
A4CR369	152-0066-00			DIODE,RECT:,;400V,1A,IFSM = 30A;GP10G,DO-41 ,T&R,SAFETY CONTROLLED	05828	GP10G-020
A4CR545	152-0897-00			DIODE,RECT:,FAST RCVRY;1000V,1.5A,300NS,SOF T RCVRY;BYV96E,T&R	80009	152-0897-00
A4CR556	152-0400-00			DIODE,RECT:,FAST RCVRY;400V,1A,200NS;1N4936 ,DO-41,T&R	80009	152-0400-00
A4CR575	152-0884-00			SEMICOND DVC,DI:16 AMP,35V,TO-220,AC PKG	04713	MBR1635
				MOUNTING PARTS		
	210-1178-00			WASHER,SHLDR:	80009	210-1178-00
	211-0097-00			SCREW,MACHINE:4-40 X 0.312,PNH,STL	93907	ORDER BY DESCR
	214-2953-00			HEAT SINK,XSTR:TO-220,AL	80009	214-2953-00
	214-4115-00			HEAT SINK:COPPER	80009	214-4115-00
	342-0563-00			INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINF ORCED SILICON RUBBER	18565	69-11-8805-1674
	211-0244-00			SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
				END MOUNTING PARTS		
A4CR640	152-0841-00			DIODE,RECT:,ULTRA FAST;1KV,100NS;BYT-12P-10 00,TO-220	80009	152-0841-00
A4CR648	152-0864-00			SEMICOND DVC,DI:RECT,SI,150V,1A	80009	152-0864-00
A4CR649	152-0864-00			SEMICOND DVC,DI:RECT,SI,150V,1A	80009	152-0864-00
A4CR651	152-0581-00			DIODE,RECT:SCHTKY,;20V,1A,.450VF,25A IFSM;1 N5817	80009	152-0581-00
A4CR820	152-0750-00			DIODE,RECT:,FAST RCVRY;BRIDGE,600V,3A,IFSM= 125A,250NS,SAFETY CONTROLLED;RKBPC606	80009	152-0750-00
A4DS670	150-1017-00			LT EMITTING DIO:GREEN,550NM,55MA MAX	80009	150-1017-00
A4DS720	150-0035-00			LAMP,GLOW:90V MAX,0.3MA,AID-T,WIRE LD	71744	A1B-120
A4F940	159-0023-00			FUSE,CARTRIDGE:3AG,2A,250V,SLOW BLOW (FOR 90-132VAC OPERATION)	71400	MDX2
A4F940	159-0019-00			FUSE,CARTRIDGE:3AG,1A,250V,SLOW BLOWSAFETY CONTROLLED (FOR 180-250VAC OPERATION)	71400	MDL 1
				MOUNTING PARTS		
	200-2264-00			CAP,FUSEHOLDER:3AG FUSES	S3629	FEK 031 1666
	204-0906-00			BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES	S3629	TYPEFAU031.3573
				END MOUNTING PARTS		
A4J160	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 34)	80009	131-0608-00
A4J310	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131-0608-00
A4J556	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131-0608-00
A4J660	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131-0608-00
A4J720	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 2)	80009	131-0608-00
A4J810	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY 3)	80009	131-0608-00
A4L230	108-0554-00			COIL,RF:FIXED,5UH,+/-20%	TK1345	108-0554-00
A4L261	108-1262-00			COIL,RF:FXD,100UH,10%,Q=30,SRF 8.2MHZ,DCR 0 .23 OHM,I MAX 0.75ARADIAL LEAD	80009	108-1262-00
A4L358	108-0554-00			COIL,RF:FIXED,5UH,+/-20%	TK1345	108-0554-00
A4L361	108-1262-00			COIL,RF:FXD,100UH,10%,Q=30,SRF 8.2MHZ,DCR 0 .23 OHM,I MAX 0.75ARADIAL LEAD	80009	108-1262-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4L520	108-1448-00			COIL,RF:TOROID,1MH,+/-30%,AWG #20,PKG 0.65 DIA X 0.6	TK1345	108-1448-00
A4L770	108-0205-00			COIL,RF:FIXED,1MH	76493	8209
A4LF950	119-1946-00			FILTER,RFI:1A,250V,400HZ W/PC TERMINAL	S4307	FN326-1/02-K-D-T
A4P556	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A4P660	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A4P720	131-0993-02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1-850100-0
A4Q127	151-0528-00			THYRISTOR,PWR:BIPOLAR,SCR;50V,16A RMS,PHASE CONTROL;2N6400,TO-220	80009	151-0528-00
A4Q215	151-0435-00			TRANSISTOR:DARLINGTON,PNP,SI,TO-92	80009	151-0435-00
A4Q638	151-0908-00			TRANSISTOR,PWR:BIPOLAR,NPN;500V VCEO,1000V VCEV,5A,SWITCHING;MJH16002A,TO-218	80009	151-0908-00
				MOUNTING PARTS		
	210-0586-00			NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00
	210-1178-00			WASHER,SHLDR:	80009	210-1178-00
	211-0097-00			SCREW,MACHINE:4-40 X 0.312,PNH,STL	93907	ORDER BY DESCR
	214-2953-00			HEAT SINK,XSTR:TO-220,AL	80009	214-2953-00
	342-0354-00			INSULATOR,PLATE:TRANSISTOR	55285	7403-09FR-52
				END MOUNTING PARTS		
A4Q648	151-0323-00			TRANSISTOR,PWR:BIPOLAR,NPN;80V,4.0A,2.0MHZ, AMPLIFIER;2N5192,TO-126	80009	151-0323-00
A4Q660	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A4Q667	151-0750-00			TRANSISTOR,SIG:BIPOLAR,NPN;400V,300MA,20MHZ ,AMPLIFIER;MPSA44,TO-92 EBC	80009	151-0750-00
A4Q717	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ ,AMPLIFIER;2N3906,TO-92 EBC	80009	151-0188-00
A4Q727	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A4Q741	151-0324-00			TRANSISTOR,PWR:BIPOLAR,PNP;80V,4.0A,2.0MHZ, AMPLIFIER;2N5195,TO-126	80009	151-0324-00
A4Q750	151-0323-00			TRANSISTOR,PWR:BIPOLAR,NPN;80V,4.0A,2.0MHZ, AMPLIFIER;2N5192,TO-126	80009	151-0323-00
A4Q755	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ ,AMPLIFIER;2N3906,TO-92 EBC	80009	151-0188-00
A4R120	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A4R215	315-0272-00			RES,FXD,FILM:2.7K OHM,5%,0.25W	80009	315-0272-00
A4R216	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A4R225	301-0680-00			RES,FXD,FILM:68 OHM,5%,0.5W	80009	301-0680-00
A4R314	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A4R315	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A4R316	315-0163-00	671-0572-00	671-0572-01	RES,FXD,FILM:16K OHM,5%,0.25W	80009	315-0163-00
A4R316	322-3254-00	671-0572-02		RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=TO	80009	322-3254-00
A4R321	315-0100-00	671-0572-01		RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A4R415	311-1225-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	80009	311-1225-00
A4R416	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A4R510	311-0978-00			RES,VAR,NONWW:TRMR,250 OHM,0.5W	80009	311-0978-00
A4R560	301-0204-00	671-0572-00	671-0572-05	RES,FXD,FILM:200K OHM,5%,0.5W	80009	301-0204-00
A4R560	303-0204-00	671-0572-06		RES,FXD,CMPSN:200K OHM,5%,1W	80009	303-0204-00
A4R575	315-0100-00	671-0572-01		RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A4R614	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A4R615	322-3181-00	671-0572-00	671-0572-02	RES,FXD,FILM:750 OHM,1%,0.2W,TC=TO	80009	322-3181-00
A4R615	322-3175-00	671-0572-03		RES,FXD,FILM:649 OHM,1%,0.2W,TC=TO	80009	322-3175-00
A4R616	322-3258-00			RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100 PPM;AXIAL,T&R,SMALL BODY	80009	322-3258-00
A4R617	315-0182-00			RES,FXD,FILM:1.8K OHM,5%,0.25W	80009	315-0182-00
A4R619	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A4R620	315-0432-00	671-0572-00	671-0572-01	RES,FXD,FILM:4.3K OHM,5%,0.25W	80009	315-0432-00
A4R620	322-3254-00	671-0572-02		RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=TO	80009	322-3254-00
A4R621	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4R622	322-3275-00	671-0572-00	671-0572-03	RES,FXD,FILM:7.15K OHM,1%,0.2W,TC=T0	80009	322-3275-00
A4R622	322-3248-00	671-0572-04		RES,FXD,FILM:3.74K OHM,1%,0.2W,TC=T0	80009	322-3248-00
A4R625	322-3181-00	671-0572-00	671-0572-02	RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0	80009	322-3181-00
A4R625	322-3199-00	671-0572-03		RES,FXD,FILM:1.15K OHM,1%,0.2W,TC=T0	80009	322-3199-00
A4R630	308-0755-00			RES,FXD,WW:0.75 OHM,5%,2W	91637	CPF-1-0R75JT1
A4R647	301-0274-00			RES,FXD,FILM:270K OHM,5%,0.5W	80009	301-0274-00
A4R665	315-0332-00			RES,FXD,FILM:3.3K OHM,5%,0.25W	80009	315-0332-00
A4R666	315-0473-00			RES,FXD,FILM:47K OHM,5%,0.25W	80009	315-0473-00
A4R667	301-0105-00	671-0572-00	671-0572-05	RES,FXD,FILM:1M OHM,5%,0.50W	19701	5053CX1M000J
A4R667	303-0105-00	671-0572-06		RES,FXD,CMPSN:1M OHM,5%,1W	01121	GB1055
A4R717	315-0183-00			RES,FXD,FILM:18K OHM,5%,0.25W	80009	315-0183-00
A4R718	315-0221-00			RES,FXD,FILM:220 OHM,5%,0.25W	80009	315-0221-00
A4R722	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A4R723	307-0863-00			RES,THERMAL:10 OHM,10%,NTC	80009	307-0863-00
A4R731	315-0473-00			RES,FXD,FILM:47K OHM,5%,0.25W	80009	315-0473-00
A4R746	303-0750-00			RES,FXD,CMPSN:75 OHM,5%,1W	80009	303-0750-00
A4R747	303-0750-00			RES,FXD,CMPSN:75 OHM,5%,1W	80009	303-0750-00
A4R765	301-0105-00			RES,FXD,FILM:1M OHM,5%,0.50W	19701	5053CX1M000J
A4R766	322-3439-00			RES,FXD,FILM:365K OHM,1%,0.2W,TC=T0	80009	322-3439-00
A4R767	322-3439-00			RES,FXD,FILM:365K OHM,1%,0.2W,TC=T0	80009	322-3439-00
A4R768	322-3374-00	671-0572-00	671-0572-03	RES,FXD,FILM:76.8K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE76K8
A4R768	315-0104-00	671-0572-04		RES,FXD,FILM:100K OHM,5%,0.25W	80009	315-0104-00
A4R818	315-0106-00			RES,FXD,FILM:10M OHM,5%,0.25W	01121	CB1065
A4R822	301-0105-00			RES,FXD,FILM:1M OHM,5%,0.50W	19701	5053CX1M000J
A4R830	301-0154-00			RES,FXD,FILM:150K OHM,5%,0.5W	80009	301-0154-00
A4R831	301-0154-00			RES,FXD,FILM:150K OHM,5%,0.5W	80009	301-0154-00
A4RV820	307-0449-00			RES,V SENSITIVE:1900PF,100A,130V,METAL OXD SAFETY CONTROLLED	03508	V130LA20A
A4RV920	307-0449-00			RES,V SENSITIVE:1900PF,100A,130V,METAL OXD SAFETY CONTROLLED	03508	V130LA20A
A4S930	260-1849-07			SWITCH,PUSH:DPST,4A,250VAC	80009	260-1849-07
				ATTACHED PARTS		
	200-2735-00			COVER,POWER SW:BLACK,POLYCARBONATE	TK2165	ORDER BY DESCR
	210-0001-00			WASHER,LOCK:#2 INTL,0.013 THK,STL (QUANTITY 2)	77900	1202-00-00-0541C
	210-0405-00			NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157-50
	211-0022-00			SCREW,MACHINE:2-56 X 0.188,PNH,STL (QUANTITY 2)	TK0435	ORDER BY DESCR
	366-1160-00			PUSH BUTTON:CHARCOAL,0.523 X 0.253 X 0.43	80009	366-1160-00
				END ATTACHED PARTS		
A4T440	120-1782-00			TRANSFORMER,RF:	80009	120-1782-00
A4TP133	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP137	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP140	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP173	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP341	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP350	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4TP667	214-4085-00			TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIA PCB,0.015 X 0.032 BRASS,W/ RED NYLON COLLAR	26364	104-01-02
A4U176	156-3633-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE,12V,1A,3%,LOW DROPOUT;LM2940CT-12,TO-220	80009	156-3633-00
				MOUNTING PARTS		
	210-0586-00			NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
	210-1178-00			WASHER,SHLDR:	80009	210-1178-00
	211-0097-00			SCREW,MACHINE:4-40 X 0.312,PNH,STL	93907	ORDER BY DESCR
	214-2953-00			HEAT SINK,XSTR:TO-220,AL	80009	214-2953-00
	342-0563-00			INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINF ORCED SILICON RUBBER	18565	69-11-8805-1674
				END MOUNTING PARTS		
A4U215	156-3217-00			IC,MISC:	80009	156-3217-00
A4U276	156-2559-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIV E,-12V,1.5A,2%;MC7912ACT,TO-220	80009	156-2559-00
				MOUNTING PARTS		
	210-0586-00			NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00
	210-1178-00			WASHER,SHLDR:	80009	210-1178-00
	211-0097-00			SCREW,MACHINE:4-40 X 0.312,PNH,STL	93907	ORDER BY DESCR
	214-2953-00			HEAT SINK,XSTR:TO-220,AL	80009	214-2953-00
	342-0563-00			INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINF ORCED SILICON RUBBER	18565	69-11-8805-1674
				END MOUNTING PARTS		
A4U410	156-1631-00			IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;SHUNT,A DJUSTABLE,100MA;TL431CLP,TO-92	01295	TL431C-LP
A4U520	156-0885-00			CPLR,OPTOELECTR:LED,5KV ISOLATION	04713	SOC 123A
A4U615	156-1225-01			IC,LINEAR:BIPOLAR,COMPARATOR;DUPLICATE OF 1 56-1225-00,DO NOT USE;LM393N,DIP08.3	80009	156-1225-01
A4U722	156-2524-00	671-0572-00	671-0572-03	IC,LINEAR:	12969	UC3842N
A4U722	156-4236-00	671-0572-04		IC,LINEAR:	80009	156-4236-00
A4VR120	152-0662-00			DIODE,ZENER:,;5V,1%,0.4W;1N751 FMLY,DO-7 OR 35,TR	04713	SZG195RL
A4VR650	152-0395-00			DIODE,ZENER:,;4.3V,5%,0.4W;1N749A,DO-35 OR 7,TR	80009	152-0395-00
A4VR765	152-0304-00			DIODE,ZENER:,;20V,5%,0.4W;1N968B,DO-35 OR 7 ,TR	80009	152-0304-00
A4W810	198-5653-00			WIRE SET,ELEC:	80009	198-5653-00
A6	671-0763-00			CIRCUIT BD ASSY:BNC	80009	671-0763-00
A6J9	131-3074-00			CONN,HDR:PCB,;MALE,STR,2 X 10,0.1 CTR,0.318 MLG X 0.110 TAIL,30 GOLD;,,	80009	131-3074-00
A6L1	108-0655-00			COIL,RF:FIXED,63NH	80009	108-0655-00
B100	119-2068-00	B010100	B010175	FAN,TUBEAXIAL:24VDC,20CFM,60 X 60 MM 4800RP M, SAFETY CONTROLLED	TK1960	TFDD6024RXA
B100	119-2068-01	B010176		FAN,TUBEAXIAL:	80009	119-2068-01
J1	131-0955-03			CONN,RF JACK:	80009	131-0955-03
				ATTACHED PARTS		
	210-0255-00			TERMINAL,LUG:0.391 ID,LOCKING,BRS CD PL	12327	ORDER BY DESCR
				END ATTACHED PARTS		
J2	131-0955-03			CONN,RF JACK:	80009	131-0955-03
J3	131-0955-03			CONN,RF JACK:	80009	131-0955-03
				ATTACHED PARTS		
	210-0255-00			TERMINAL,LUG:0.391 ID,LOCKING,BRS CD PL	12327	ORDER BY DESCR
				END ATTACHED PARTS		
J4	131-0955-03			CONN,RF JACK:	80009	131-0955-03
J5	131-0955-03			CONN,RF JACK:	80009	131-0955-03
J7	131-0955-03			CONN,RF JACK:	80009	131-0955-03
				ATTACHED PARTS		
	210-0255-00			TERMINAL,LUG:0.391 ID,LOCKING,BRS CD PL	12327	ORDER BY DESCR
				END ATTACHED PARTS		
W515	174-0034-00			CA ASSY,SP,ELEC:28 AWG,3.0 L,RIBBONSAFETY C ONTROLLED	80009	174-0034-00
W817	174-0034-00			CA ASSY,SP,ELEC:28 AWG,3.0 L,RIBBONSAFETY C ONTROLLED	80009	174-0034-00
W940	174-0333-00			CA ASSY,SP,ELEC:20,26 AWG,2.5 L,RIBBON	80009	174-0333-00
W942	175-9877-00			CA ASSY,SP,ELEC:10,28 AWG,12.5 L,RIBBON	80009	175-9877-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
W988	174-0034-00			CA ASSY,SP,ELEC:28 AWG,3.0 L,RIBBONSAFETY CONTROLLED	80009	174-0034-00

DIAGRAMS/CIRCUIT BOARD ILLUSTRATIONS

Symbols

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

Both overline and parenthesis indicate a low asserting state.

Example: $\overline{\text{ID CONTROL}}$ or (ID CONTROL)

Abbreviations are based on ANSI Y1.1-1972.

Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

Y14.15, 1966 — Drafting Practices.
Y14.2, 1973 — Line Conventions and Lettering.
Y10.5, 1968 — Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.

American National Standard Institute
1430 Broadway, New York, New York 10018

Component Values

Electrical components shown on the diagrams are in the following units unless noted otherwise:

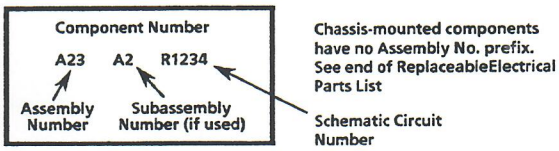
Capacitors:
Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).
Resistors = Ohms (Ω).

The following information and special symbols may appear in this manual.

Assembly Numbers

Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the diagram (in circuit board outline), circuit board illustration title, and lookup table for the schematic diagram.

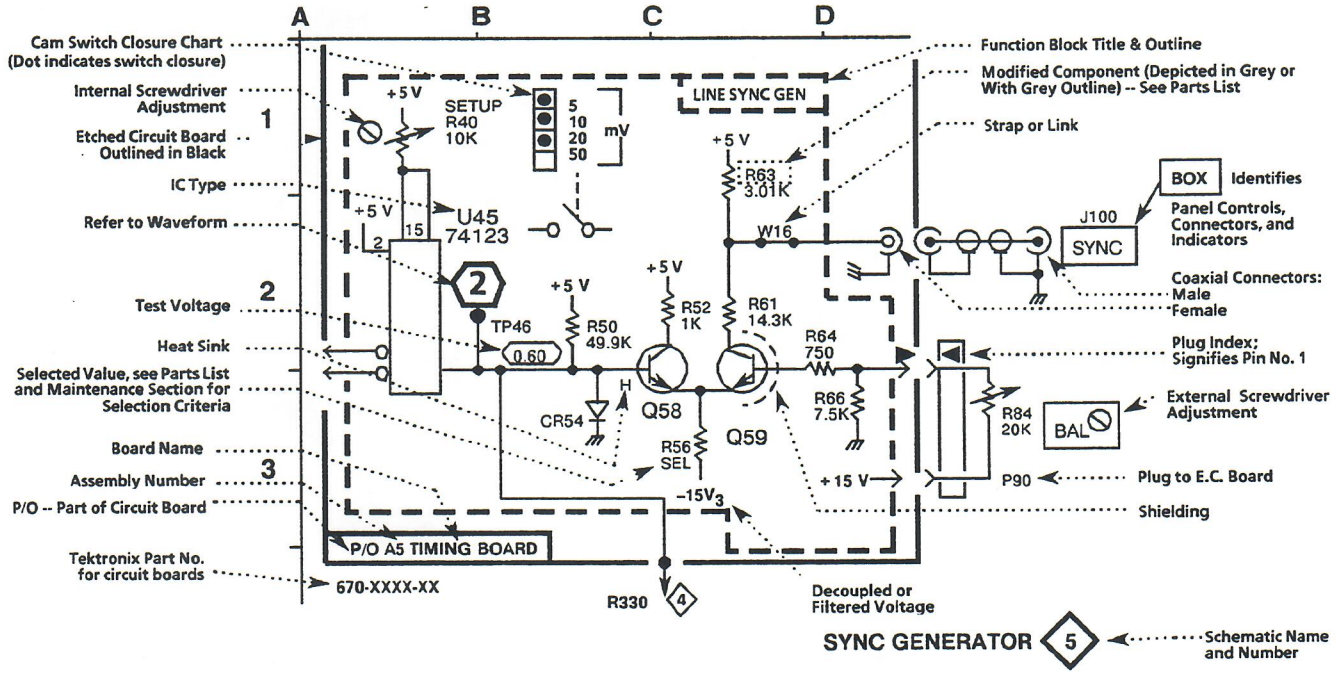
The Replaceable Electrical Parts List is arranged by assembly number in numerical sequence; the components are listed by component number. Example:

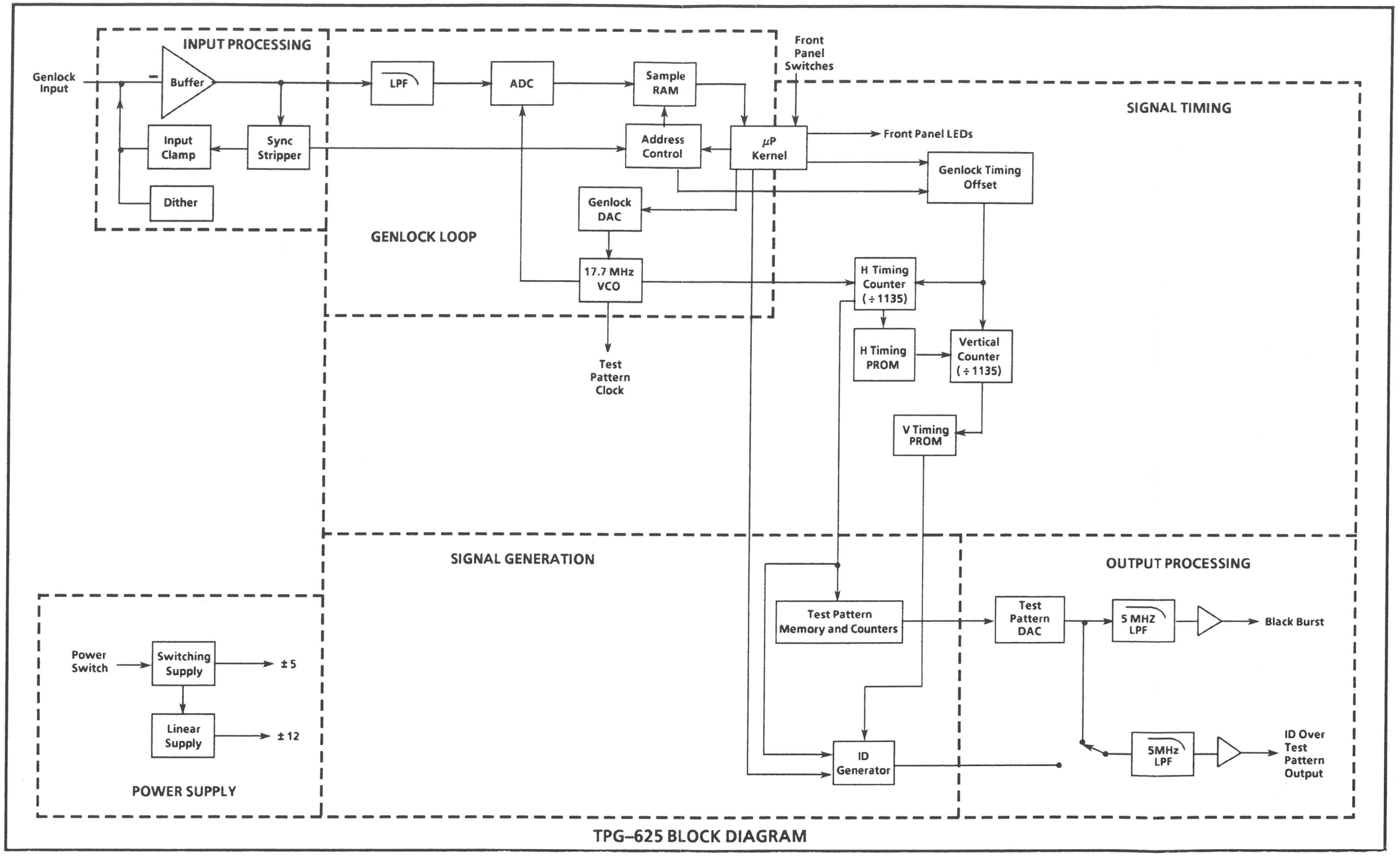


Grid Coordinates

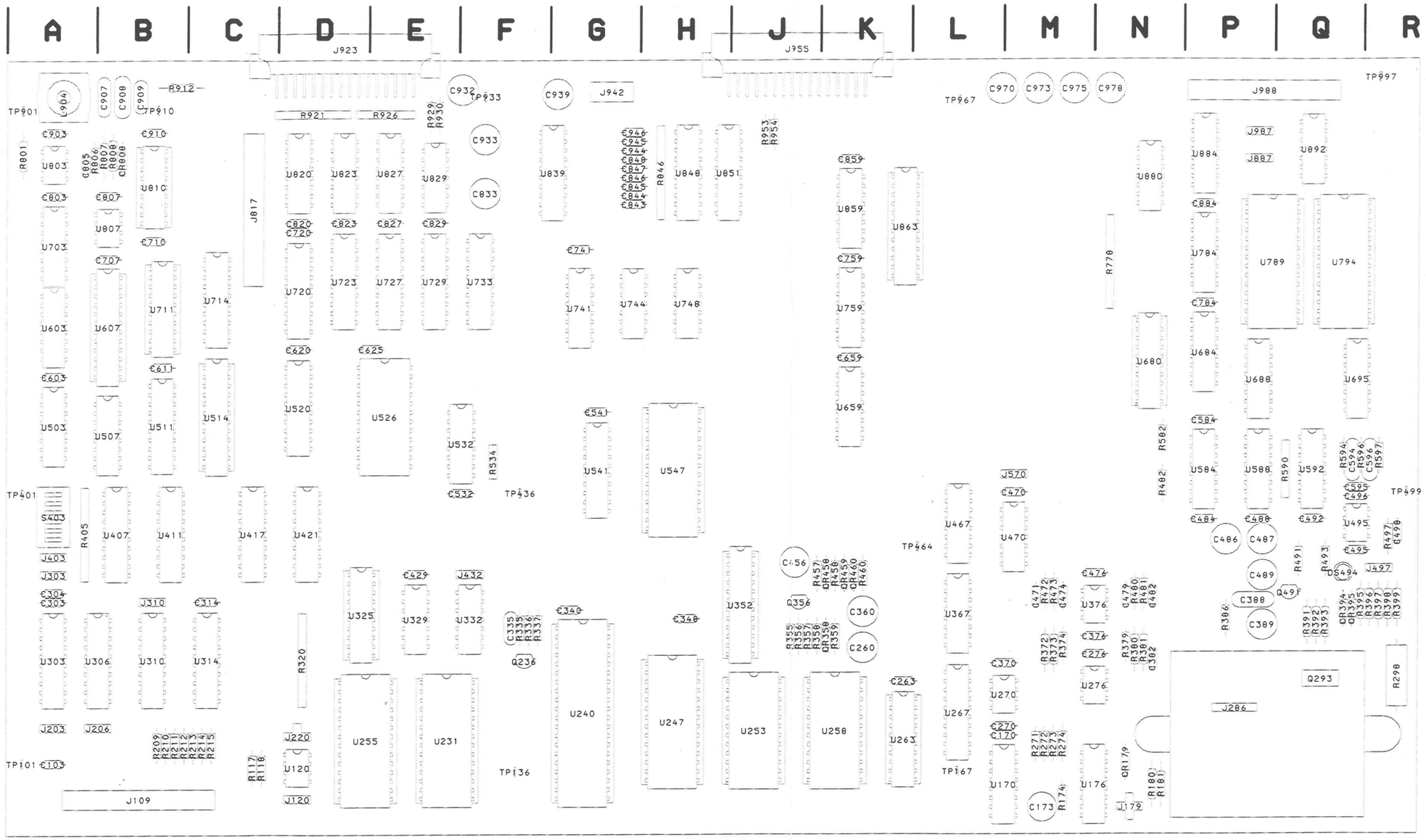
The schematic diagram and circuit board component location illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table.

When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration may only appear opposite the first diagram; the lookup table will list the diagram number of other diagrams that the other circuitry appears on.





TPG–625 BLOCK DIAGRAM



DIGITAL BOARD

SCHEMATIC 1

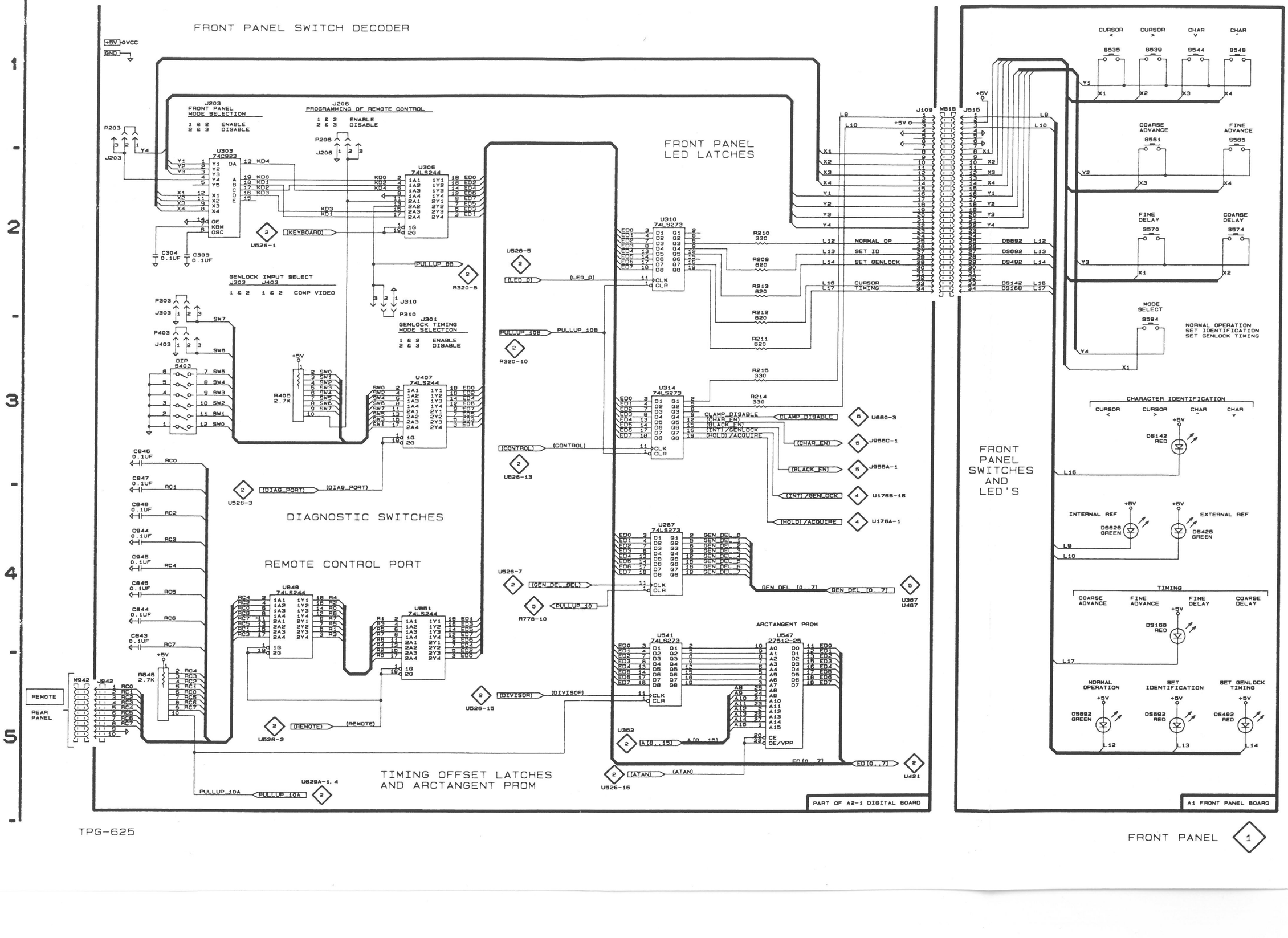
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the lower left corner, as pictured in this manual.

ASSEMBLY A2-1. *Partial A2-1 also shown on Schematics 2, 3, 4, 5, and 6.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C303	B2	A7
C304	A2	A6
C843	A4	G2
C844	A4	G2
C845	A4	G2
C846	A3	G2
C847	A4	G2
C848	A4	G2
C944	A4	G2
C945	A4	G1
J109	F1	B9
J203	A1	A8
J206	B1	B8
J303	A2	A6
J310	C2	B7
J403	A3	A6
J942	A5	G1
R209	E2	B8
R210	E2	B8
R211	E3	B8
R212	E3	B8
R213	E2	C8
R214	E3	C8
R215	E3	C8
R405	B3	A6
R846	A5	H2
S403	A3	A6
U267	D4	K8
U303	B2	A7
U306	C2	A7
U310	D2	B7
U314	D3	C7
U407	C3	B6
U541	D4	G5
U547	E4	H5
U848	B4	H2
U851	C4	H2

Static Sensitive Devices
See Maintenance Section

A2-1 DIGITAL BOARD


FRONT PANEL SWITCH DECODER
FRONT PANEL LED LATCHES
DIAGNOSTIC SWITCHES
REMOTE CONTROL PORT
TIMING OFFSET LATCHES AND ARCTANGENT PROM
FRONT PANEL SWITCHES AND LED'S
PART OF A2-1 DIGITAL BOARD
A1 FRONT PANEL BOARD
REMOTE
REAR PANEL
NORMAL OPERATION
SET IDENTIFICATION
SET GENLOCK TIMING
CHARACTER IDENTIFICATION
TIMING
COARSE ADVANCE
FINE ADVANCE
FINE DELAY
COARSE DELAY
INTERNAL REF
EXTERNAL REF
ARCTANGENT PROM

TPG-625

DIGITAL BOARD

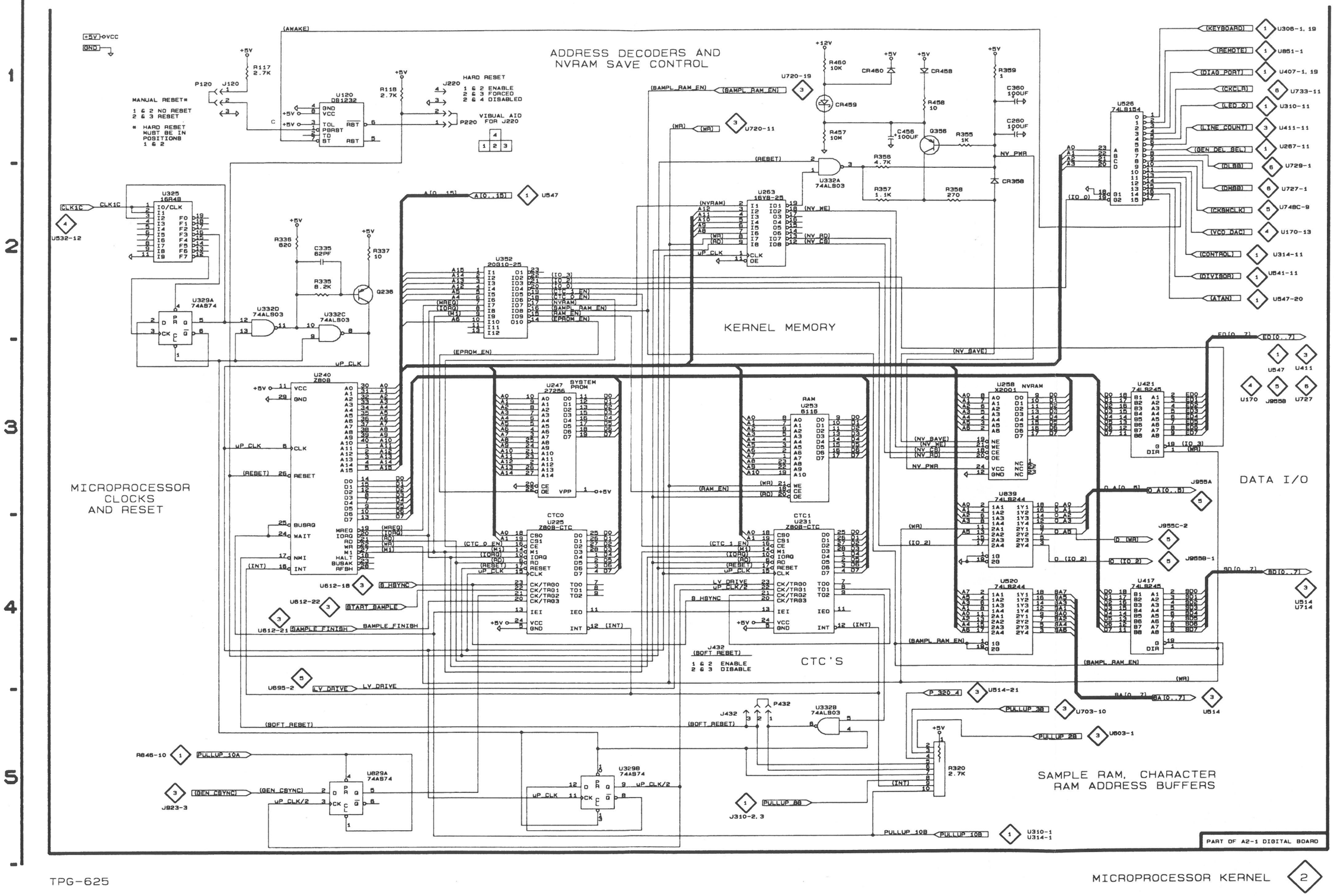
SCHEMATIC 2

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A2-1 *Partial A2-1 also shown on Schematics 1, 3, 4, 5, and 6.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C260	G1	J7
C335	B2	F7
C360	G1	J7
C456	F1	I6
CR358	F2	J7
CR458	F1	J6
CR459	E1	J6
CR460	F1	J6
J120	B1	D9
J220	C1	D8
J432	E5	F6
Q236	C2	F7
Q356	F1	I6
R117	B1	C8
R118	C1	C8
R320	F5	D7
R335	B2	F7
R336	B2	F7
R337	C2	F7
R355	F1	I7
R356	F2	I7
R357	F2	I7
R358	F2	I7
R359	F1	J7
R457	E1	J6
R458	F1	J6
R460	E1	J6

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
U120	B1	D8
U225	D4	D8
U231	E4	E8
U240	B3	G8
U247	D3	H8
U253	E3	I8
U258	F3	J8
U263	E2	J8
U325	A2	D7
U329A	A2	E7
U329B	D5	E7
U332A	E1	F7
U332B	E5	F7
U332C	B2	F7
U332D	B2	F7
U352	C2	I7
U417	G4	C6
U421	G3	D6
U520	F4	D4
U526	G1	E4
U829A	B5	E2
U839	F3	F2


ADDRESS DECODERS AND NVRAM SAVE CONTROL
KERNEL MEMORY
CTC'S
DATA I/O
MICROPROCESSOR CLOCKS AND RESET
SAMPLE RAM, CHARACTER RAM ADDRESS BUFFERS
MANUAL REBET*
1 & 2 NO REBET
2 & 3 REBET
* HARD REBET MUST BE IN POSITIONS 1 & 2
HARD RESET
J220
1 & 2 ENABLE
2 & 3 FORCED
2 & 4 DISABLED
VISUAL AID FOR J220
J432 (SOFT REBET)
1 & 2 ENABLE
2 & 3 DISABLE
(AWAKE)
(BAMPL RAM EN)
(NV SAVE)
(NV PWR)
(KEYBOARD)
(REMOTE)
(DIAG PORT)
(CKCLR)
(LED 0)
(LINE COUNT)
(GEN DEL SEL)
(DLSB)
(DMSB)
(CKSWCLK)
(VCO DAC)
(CONTROL)
(DIVISOR)
(ATAN)
(EPROM EN)
(RAM EN)
(NVRAM)
(SAMPL RAM EN)
(IO 3)
(IO 2)
(IO 0)
(CTC 0 EN)
(CTC 1 EN)
(NV WE)
(NV RD)
(NV CE)
(WR)
(RD)
(MREQ)
(IORQ)
(M1)
(INT)
(REBET)
uP CLK
uP CLK/2
B HBYNC
START SAMPLE
SAMPLE FINISH
LV DRIVE
(SOFT REBET)
(GEN CBYNC)
PULLUP 10A
PULLUP 10B
PULLUP 2B
PULLUP 3B
PULLUP 8B
PART OF A2-1 DIGITAL BOARD

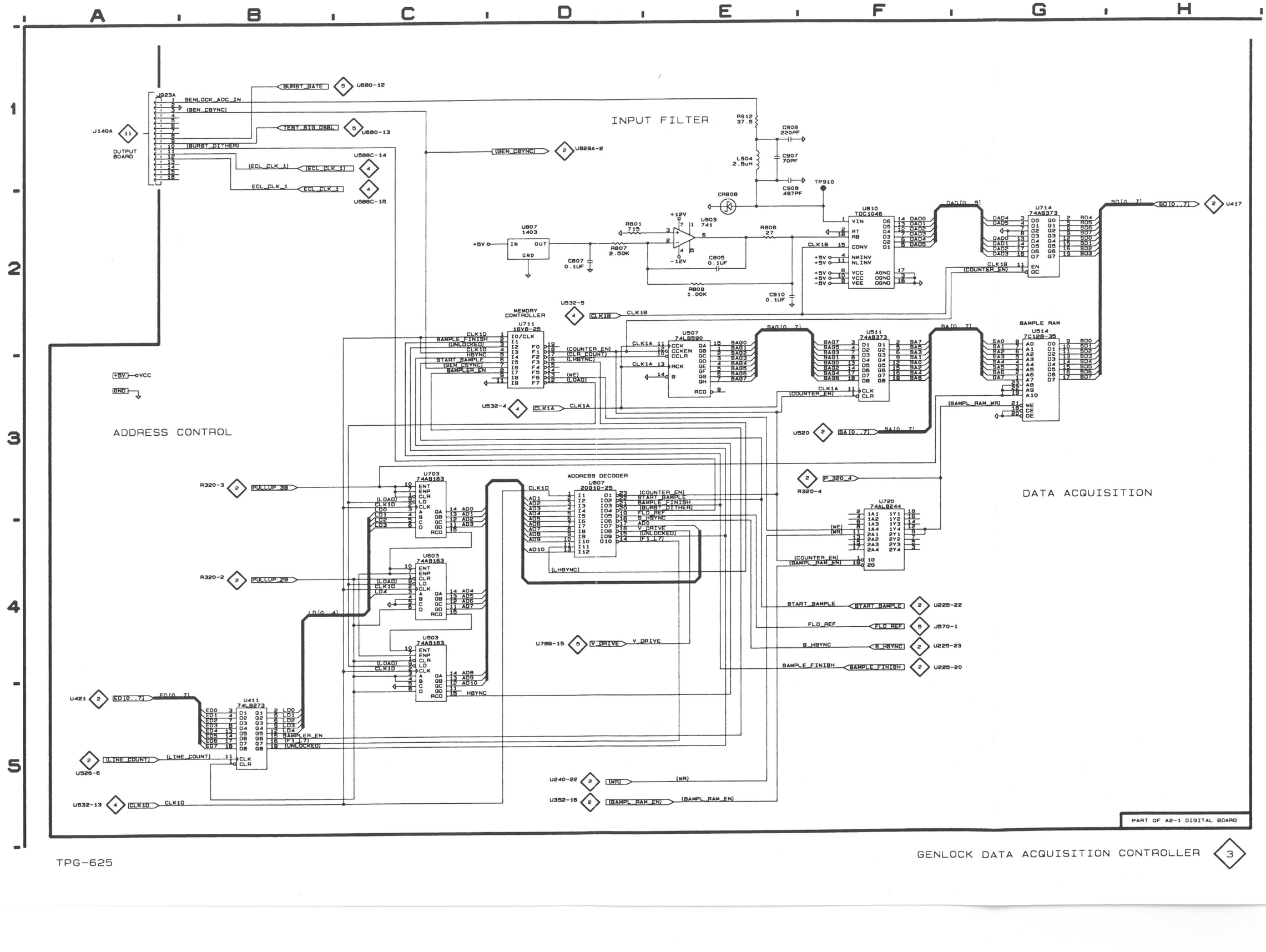
DIGITAL BOARD

SCHEMATIC 3

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A2-1. *Partial A2-1 also shown on Schematics 1, 2, 4, 5, and 6.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C805	E2	A2
C807	D2	B2
C907	E1	B1
C908	E1	B1
C909	E1	B1
C910	E2	B1
CR808	E2	B2
J923A	A1	D1
L904	E1	A1
R801	D2	A2
R806	E2	B2
R807	D2	B2
R808	E2	B2
R912	E1	B1
TP910	F2	B1
U411	B5	B6
U503	C4	A5
U507	E2	B5
U511	F2	B5
U514	G2	C4
U603	C4	A3
U607	D3	B3
U703	C3	A3
U711	D2	B3
U714	G2	C3
U720	F3	D3
U803	E2	A2
U807	D2	B2
U810	F2	B2



TPG-625

GENLOCK DATA ACQUISITION CONTROLLER 3

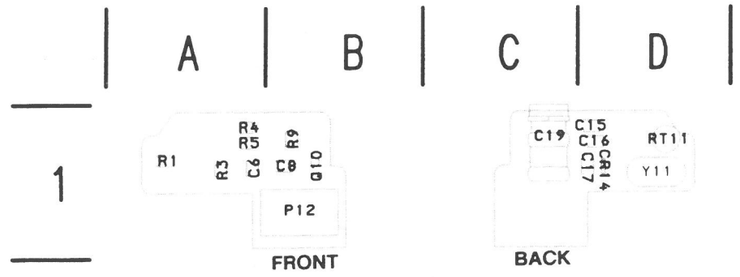
DIGITAL AND OVEN BOARDS

SCHEMATIC 4

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A2-1 *Partial A2-1 also shown on Schematics 1, 2, 3, 5, and 6.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
ASSEMBLY A2-1		
C170	D5	L8
C173	C1	L9
C276	B5	M7
C382	F5	M7
C388	D2	N7
C471	D5	L6
C474	C5	L6
C479	F5	M6
C482	F5	M6
C496	E3	O5
C498	B3	P6
C594	E3	O5
C596	E3	P5
CR179	D3	M8
CR394	C4	O7
CR395	B4	O7
DS494	B4	O6
J179	D2	M9
J286	D4	N8
J497	B4	P6
Q293	C4	O7
Q491	E2	O6
R174	D2	L9
R180	D3	M9
R181	D3	M9
R271	B1	L8
R272	C1	L8
R273	C1	L8
R274	D2	L8
R298	C4	P7
R372	C5	L7
R373	C5	L7
R374	C5	L7
R379	E5	M7
R380	E5	M7
R381	F5	M7
R386	D3	N7
R391	D3	O7
R392	D2	O7
R393	E3	O7
R395	A4	O7
R396	A4	P7
R397	A4	P7
R398	C4	P7
R399	C4	P7
R472	D5	L6
R473	C5	L6
R480	F5	M6
R481	F5	M6
R482	G1	M5
R491	E3	O6
R493	E3	O6
R497	B4	P6
R534	F3	F5
R582	G1	M5
R590	F2	O5
R594	E3	O5
R596	E3	P5
R597	E3	P5
R929	G4	E1
R930	G4	E1
R953	G3	I1
R954	G3	I1
U170	B1	K9
U176A	C2	L9
U176B	C2	L9
U176C	C2	L9
U176D	C2	L9
U270A	C1	K8
U270B	B2	K8
U276	A5	L7
U376A	C5	L7
U376B	F5	L7
U495A	E3	O6
U495B	B4	O6
U532	G2	E5
U584	G1	N5
U588A	G1	N5
U588B	G2	N5
U588C	F4	N5
U592A	E3	O5
U592B	F3	O5
U592C	F3	O5
U723	G4	D3
U741	G2	G3
ASSEMBLY A2-2		
C6	D5	A1
C8	D5	B1
C15	D5	D1
C16	C5	D1
C17	D5	D1
C19	C5	C1
CR14	C5	D1
P12	D4	B1
Q10	D5	B1
R1	C5	A1
R3	C5	A1
R4	D5	A1
R5	D5	A1
R9	D5	B1
RT11	C5	D1
Y11	D5	D1



A2–2 Oven Board

Static Sensitive Devices
See Maintenance Section

TPG-625

CLOCK CIRCUIT 4

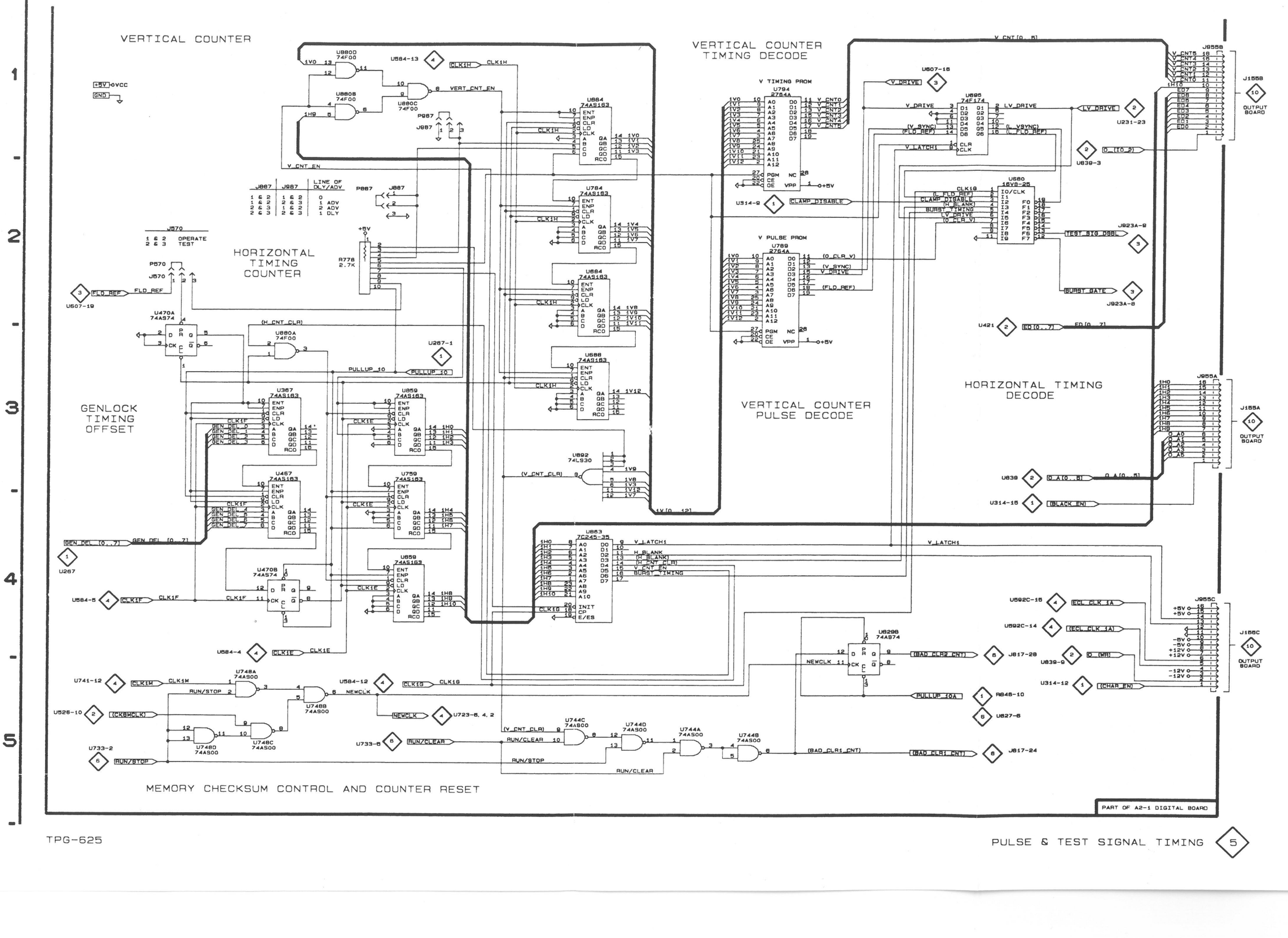
DIGITAL BOARD

SCHEMATIC 5

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A2-1. *Partial A2-1 also shown on Schematics 1, 2, 3, 4, and 6.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J570	A2	L5
J887	C2	N2
J955A	H3	I1
J955B	H1	I1
J955C	H4	I1
J987	C1	N1
R778	C2	M3
U367	B3	K7
U467	B3	K6
U470A	A3	L6
U470B	B4	L6
U659	C4	J4
U680	G2	M4
U684	D2	N4
U688	D3	N4
U695	F1	O4
U744A	E5	G3
U744B	E5	G3
U744C	D5	G3
U744D	D5	G3
U748A	B5	H3
U748B	B5	H3
U748C	B5	H3
U748D	B5	H3
U759	C3	J3
U784	D2	N3
U789	E2	N3
U794	E1	O3
U829B	F4	E2
U859	C3	J2
U863	D4	J2
U880A	B3	M2
U880B	B1	M2
U880C	C1	M2
U880D	B1	M2
U884	D1	N2
U892	D3	O2



TPG-625

PULSE & TEST SIGNAL TIMING 5

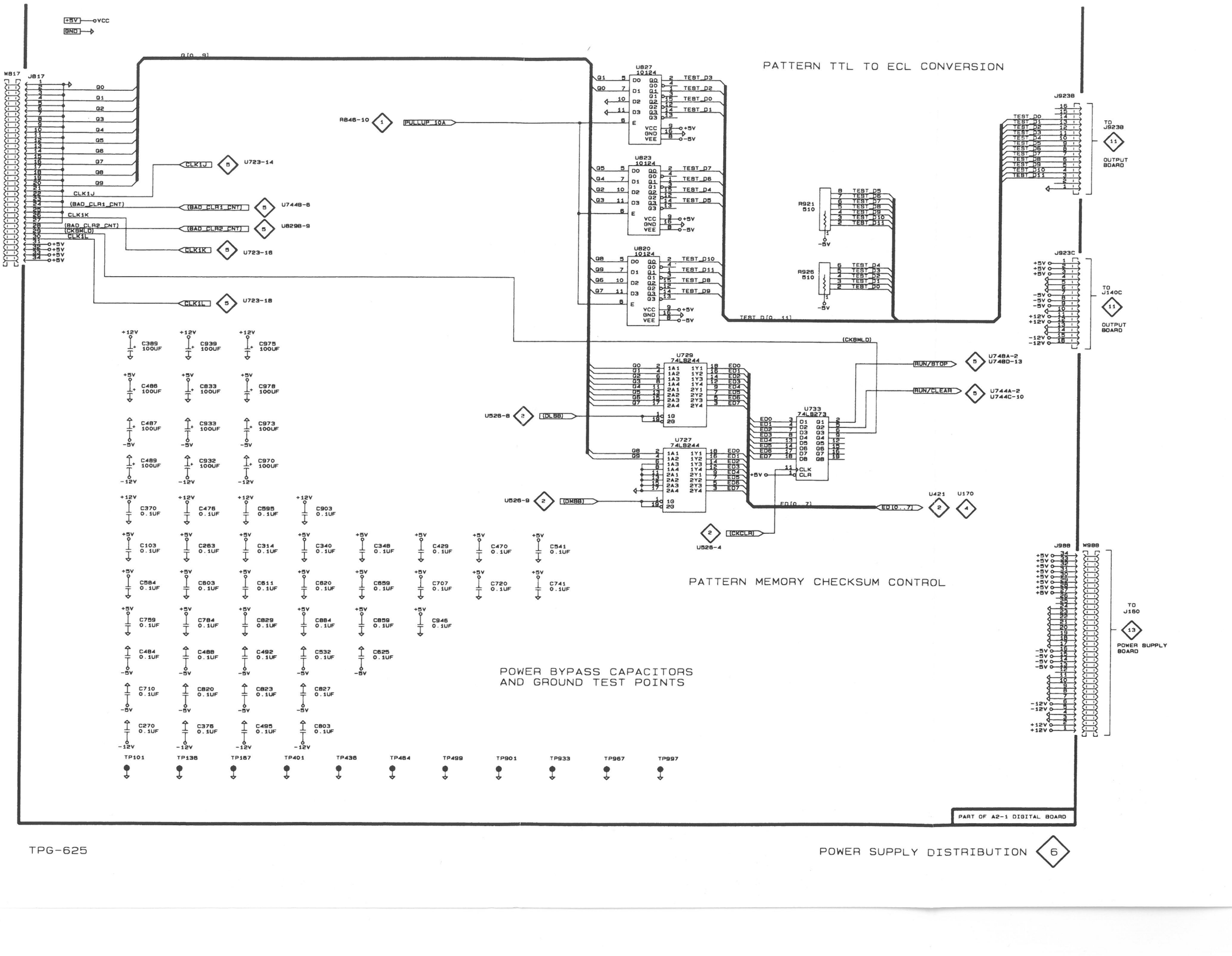
DIGITAL BOARD

SCHEMATIC 6

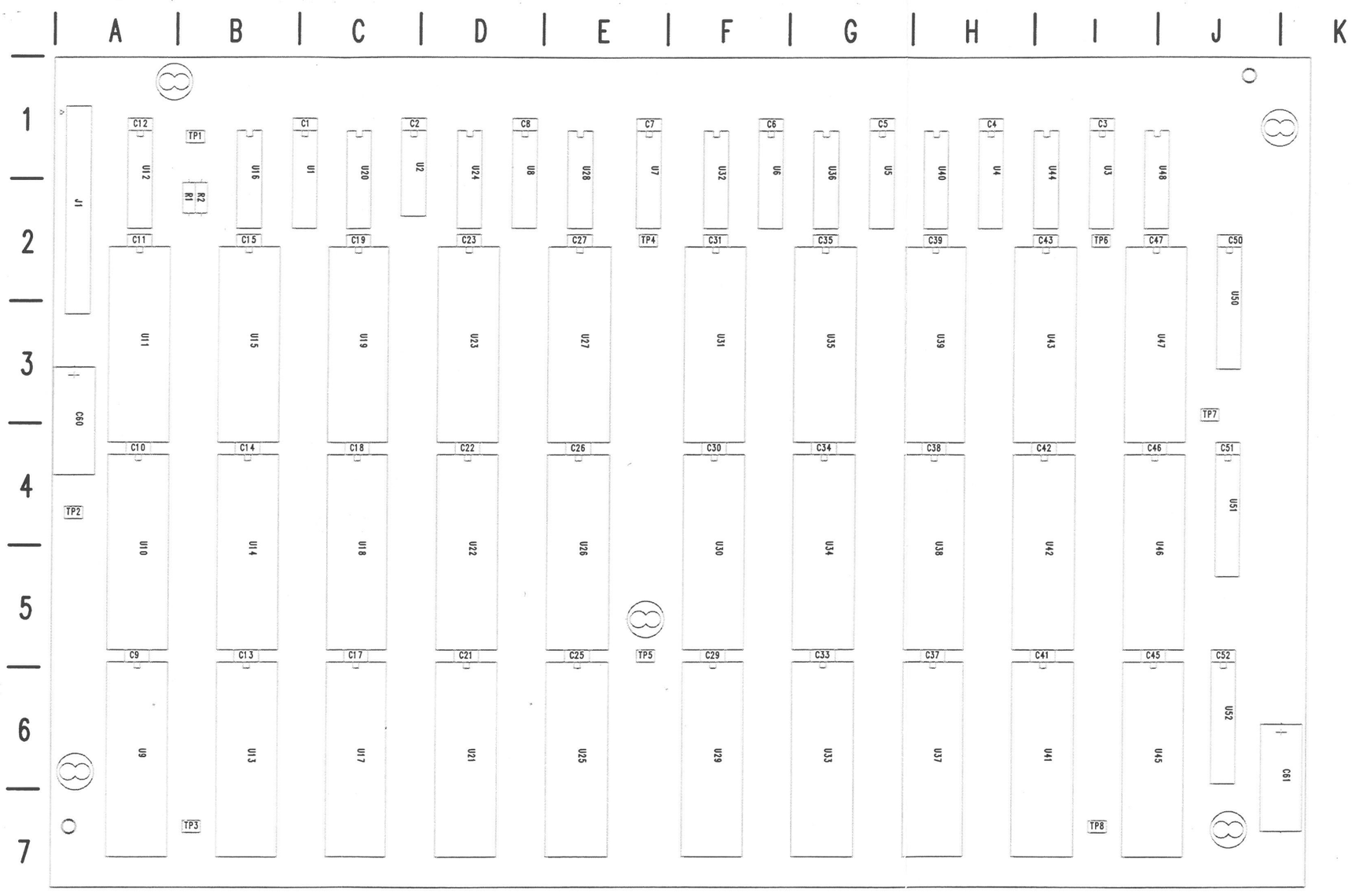
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A2-1. *Partial A2-1 also shown on Schematics 1, 2, 3, 4, and 5.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C103	B4	A8
C263	B4	J7
C270	B5	L8
C314	B4	C6
C340	C4	G7
C348	C4	H7
C370	B4	L7
C376	B5	M7
C389	B3	N7
C429	C4	E6
C470	D4	L5
C476	B4	M6
C484	B4	N6
C486	B3	N6
C487	B3	N6
C488	B4	N6
C489	B3	N6
C492	B4	O6
C495	B5	O6
C532	C4	F5
C541	D4	G4
C584	B4	N4
C595	B4	O5
C603	B4	A4
C611	B4	B4
C620	C4	D4
C625	C4	E4
C659	C4	J4
C707	C4	B3
C710	B5	B2
C720	D4	D2
C741	D4	G3
C759	B4	J3
C784	B4	N3
C803	C5	A2
C820	B5	D2
C823	B5	D2
C827	C5	E2
C829	B4	E2
C833	B3	F2
C859	C4	J2
C884	C4	N2
C903	C4	A1
C932	B3	E1
C933	B3	F1
C939	B3	G1
C946	C4	G1
C970	B3	K1
C973	B3	L1
C975	B3	L1
C978	B3	M1
J817	A1	C2
J923B	H1	D1
J923C	H2	D1
J988	H4	N1
R921	F2	D1
R926	F2	E1
TP101	B5	A8
TP136	B5	F8
TP167	B5	K8
TP401	C5	A5
TP436	C5	F5
TP464	C5	K6
TP499	D5	P5
TP901	D5	A1
TP933	D5	F1
TP967	E5	K1
TP997	E5	P1
U727	E3	E3
U729	E3	E3
U733	F3	F3
U820	E2	D2
U823	E2	D2
U827	E1	E2


PATTERN TTL TO ECL CONVERSION
PATTERN MEMORY CHECKSUM CONTROL
POWER BYPASS CAPACITORS
AND GROUND TEST POINTS
POWER SUPPLY DISTRIBUTION
PART OF A2-1 DIGITAL BOARD
MEMORY BOARD
OUTPUT BOARD
POWER SUPPLY BOARD
U827 10124
U823 10124
U820 10124
U729 74LB244
U727 74LB244
U733 74LB273
PULLUP 10A
(CKBMLD)
(DL88)
(DM88)
(CKCLA)
RUN/BTOP
RUN/CLEAR
TEST D[0..11]
ED[0..7]
TP101
TP136
TP167
TP401
TP436
TP464
TP499
TP901
TP933
TP967
TP997

TPG-625



Static Sensitive Devices
See Maintenance Section

A2-3 MEMORY BOARD (STD & OPTION 01)

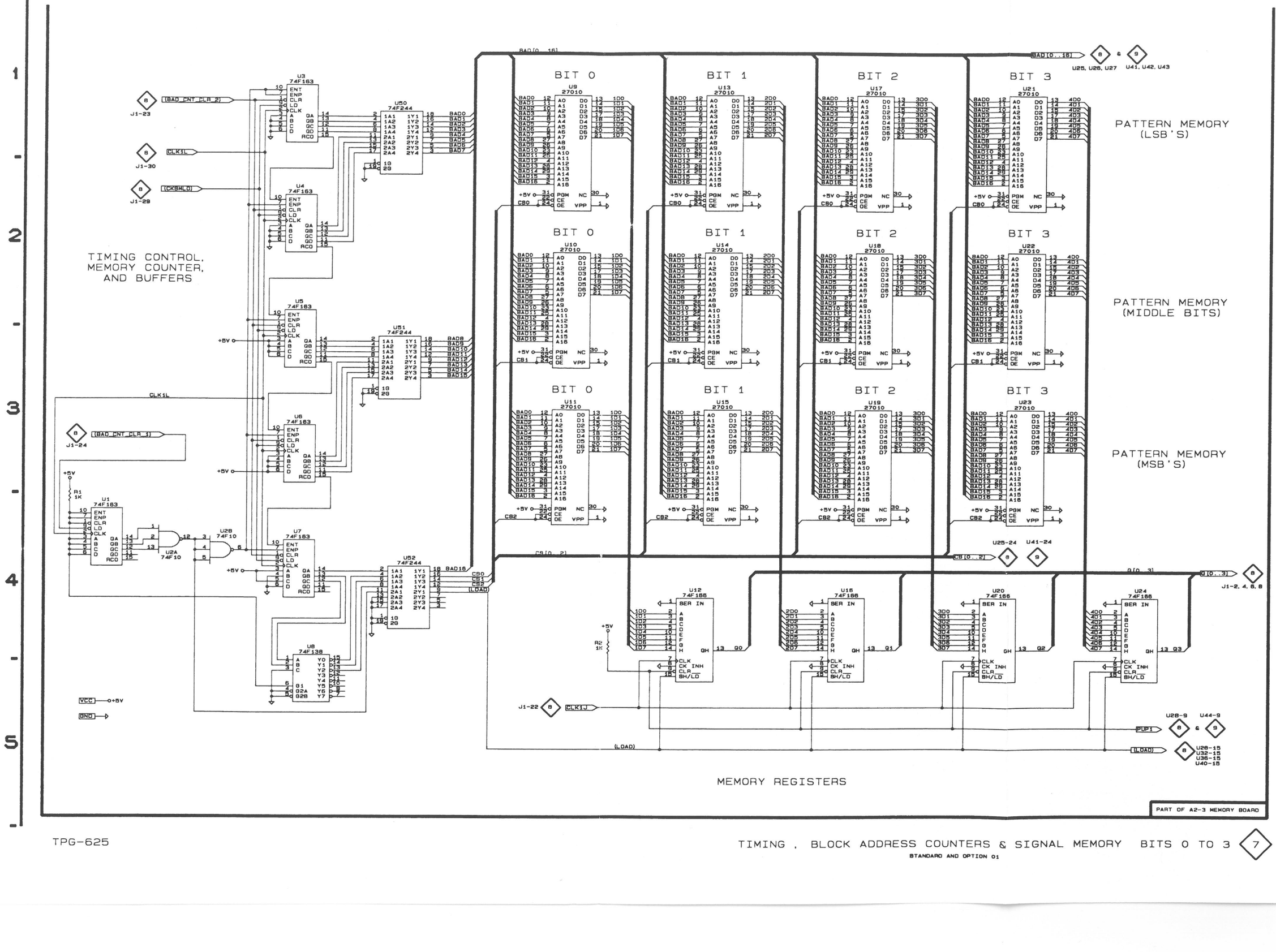
MEMORY BOARD (STD & OPTION 01)

SCHEMATIC 7

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A2-3. *Partial A2-3 also shown on Schematics 8 and 9.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R1	A3	B2
R2	D4	B2
U1	A4	C1
U2A	A4	C1
U2B	B4	C1
U3	B1	I1
U4	B2	H1
U5	B2	G1
U6	B3	F1
U7	B4	E1
U8	B4	D1
U9	D1	A6
U10	D2	A4
U11	D3	A3
U12	E4	A1
U13	E1	B6
U14	E2	B4
U15	E3	B3
U16	F4	B1
U17	F1	C6
U18	F2	C4
U19	F3	C3
U20	G4	C1
U21	G1	D6
U22	G2	D4
U23	G3	D3
U24	H4	D1
U50	C1	J2
U51	C3	J4
U52	C4	J6



TPG-625

TIMING , BLOCK ADDRESS COUNTERS & SIGNAL MEMORY BITS 0 TO 3 7

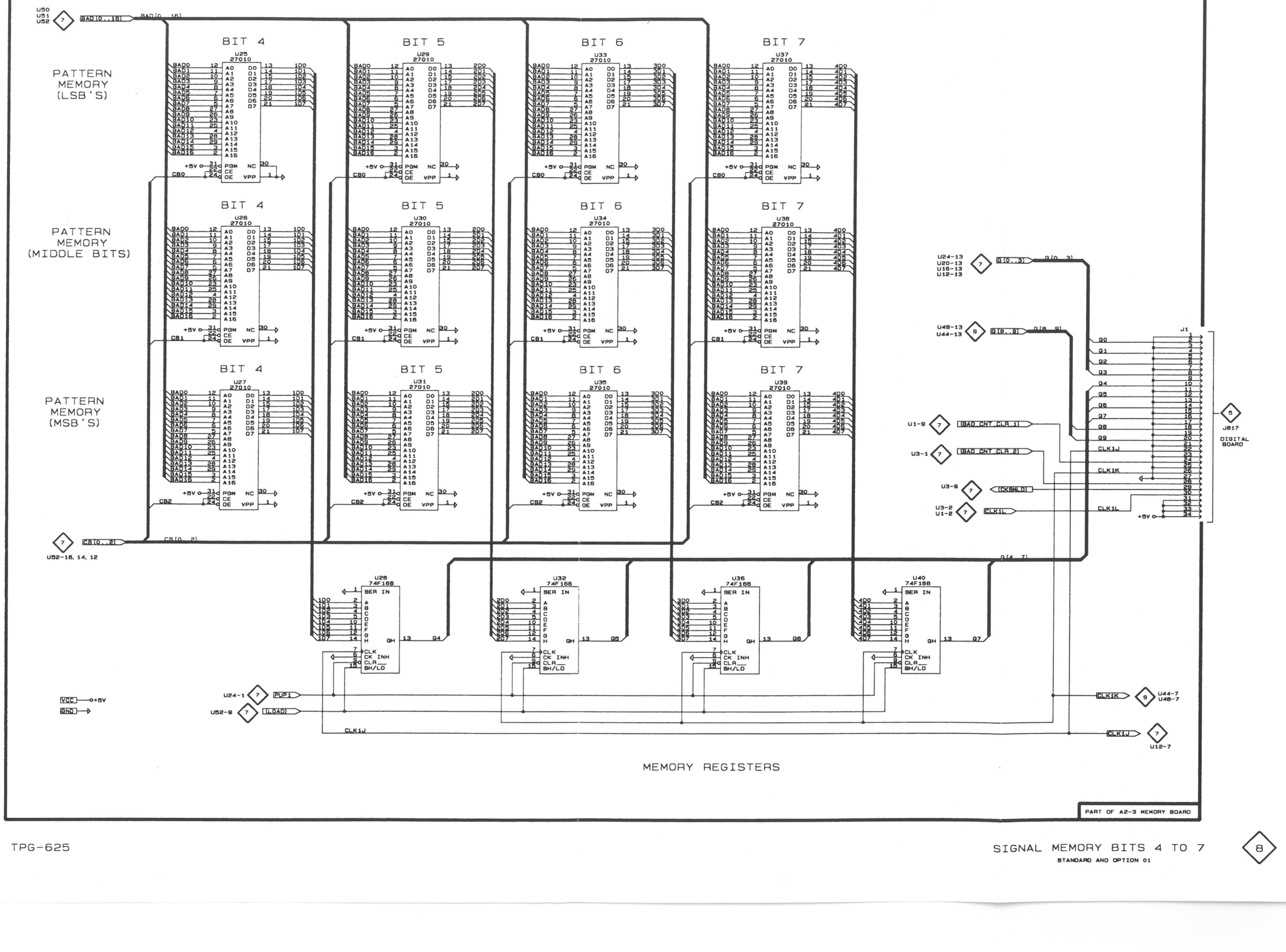
STANDARD AND OPTION 01

MEMORY BOARD
(STD & OPTION 01)
SCHEMATIC 8

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A2-3 *Partial A2-3 also shown on Schematics 7 and 9.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
J1	H3	A1
U25	B1	E6
U26	B2	E4
U27	B3	E3
U28	C4	E1
U29	C1	F6
U30	C2	F4
U31	C3	F3
U32	D4	F1
U33	D1	G6
U34	D2	G4
U35	D3	G3
U36	E4	G1
U37	E1	H6
U38	E2	H4
U39	E3	H3
U40	F4	H1



TPG-625

SIGNAL MEMORY BITS 4 TO 7

STANDARD AND OPTION 01

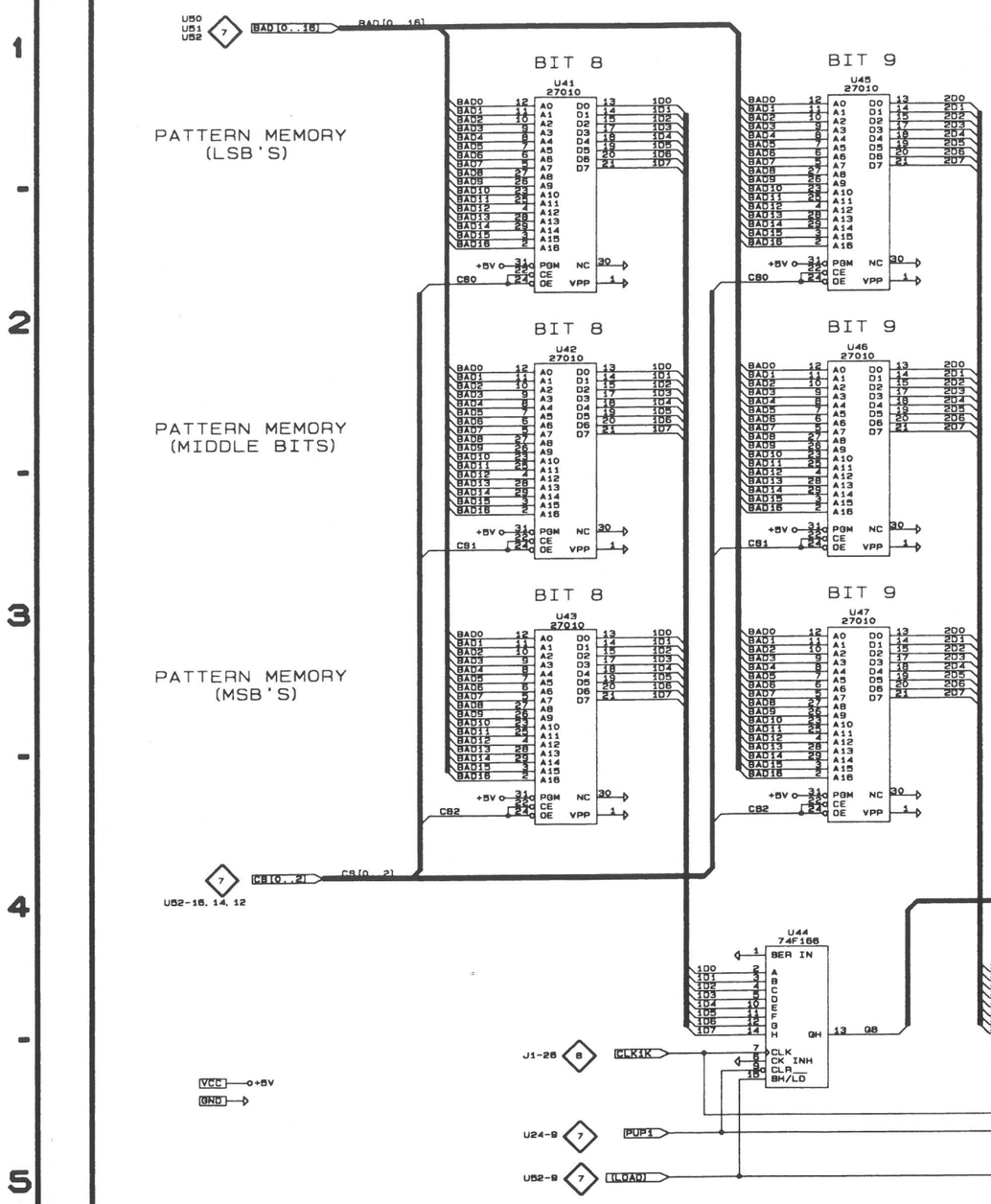
8

MEMORY BOARD
(STD & OPTION 01)
SCHEMATIC 9

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A2-3. *Partial A2-3 also shown on Schematics 7 and 8.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C1	E1	C1	C39	F3	H2
C2	E1	C1	C41	F3	I5
C3	F1	I1	C42	F3	I4
C4	F1	H1	C43	F3	I2
C5	F1	G1	C45	F3	I5
C6	F1	F1	C46	G3	I4
C7	F1	E1	C47	G3	I2
C8	G1	D1	C50	G3	J2
C9	G1	A5	C51	E3	J4
C10	G1	A4	C52	E3	J5
C11	E2	A2	C60	F3	A3
C12	E2	A1	C61	F3	K6
C13	F2	B5	TP1	E4	B1
C14	F2	B4	TP2	E4	A4
C15	F2	B2	TP3	F4	B7
C17	F2	C5	TP4	F4	E2
C18	F2	C4	TP5	F4	E5
C19	G2	C2	TP6	F4	I2
C21	G2	D5	TP7	F4	J3
C22	G2	D4	TP8	G4	I7
C23	E2	D2	U41	B1	I6
C25	E2	E5	U42	B2	I4
C26	F2	E4	U43	B3	I3
C27	F2	E2	U44	C4	I1
C29	F2	F5	U45	C1	J6
C30	F2	F4	U46	C2	J4
C31	F2	F2	U47	C3	J3
C33	G2	G5	U48	D4	J1
C34	G2	G4			
C35	G2	G2			
C37	E3	H5			
C38	E3	H4			

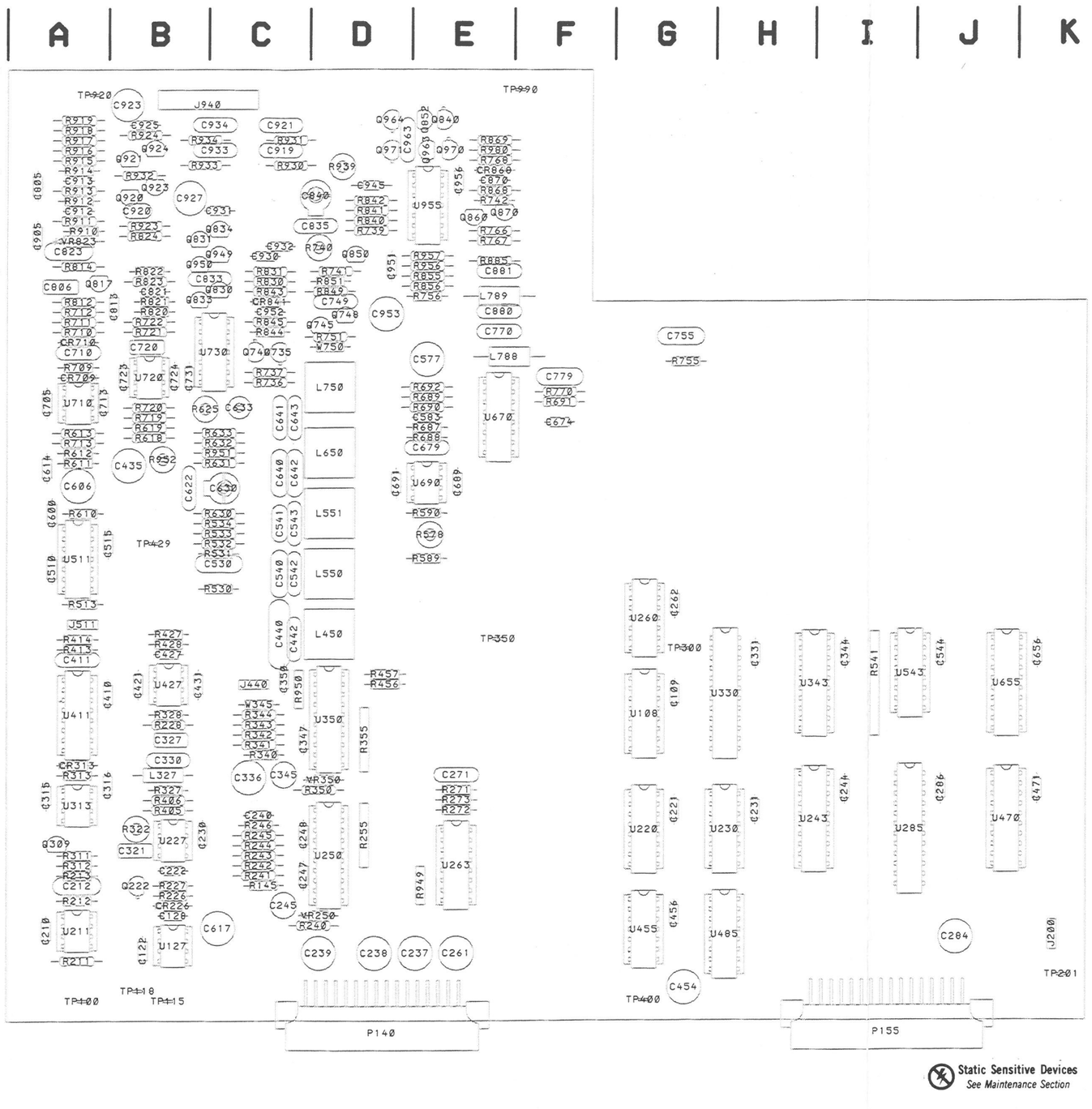


TPG-625

SIGNAL MEMORY BITS 8 AND 9

STANDARD AND OPTION 01

9



A3 OUTPUT BOARD

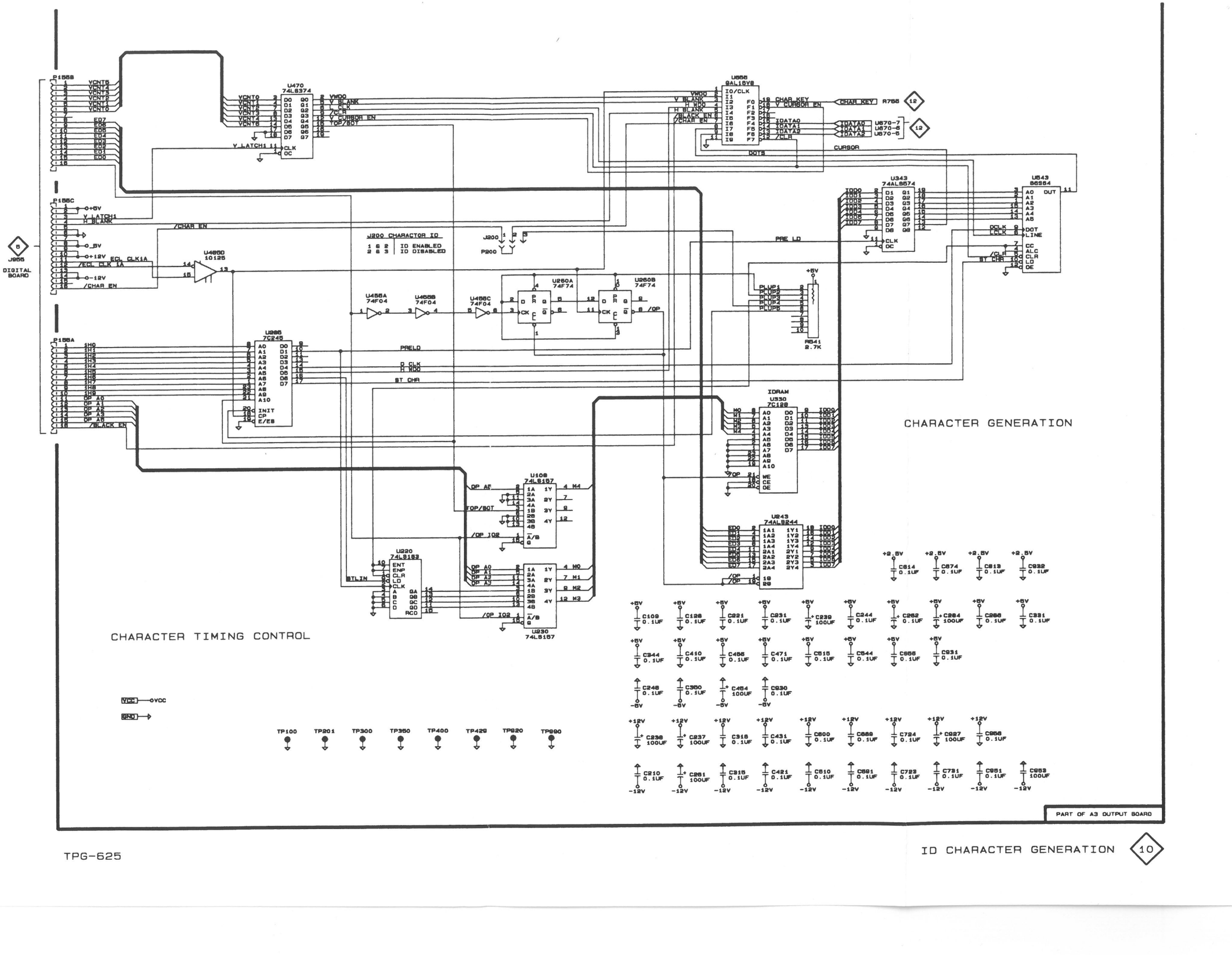
OUTPUT BOARD

SCHEMATIC 10

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A3 *Partial A3 also shown on Schematics 11 and 12.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C109	E4	G7	C931	G4	C2
C128	E4	B9	C932	G4	C2
C210	E5	A9	C951	G5	D2
C221	E4	G8	C953	H5	D3
			C956	G5	E2
C231	F4	H8			
C237	E5	E9	J200	D2	K9
C238	E5	D9			
C239	F4	D9	R541	F2	I6
C244	F4	I8	TP100	C5	A10
C248	E5	D8	TP115	E1	B10
C261	E5	E9	TP118	F1	B10
C262	F4	G6	TP201	C5	K10
C284	G4	J9	TP300	C5	G6
C286	G4	J8	TP350	C5	E6
C315	H5	A8	TP400	D5	G10
C316	F5	B8	TP429	D5	B5
C331	G4	H6	TP920	D5	A1
C344	E4	I6	TP990	D5	F1
C350	E5	C7			
C410	E4	B7	U108	D3	G7
			U220	C4	G8
C421	F5	B7	U230	D4	H8
C431	F5	B7	U243	F4	H8
C454	F5	G10			
C456	E4	G9	U260A	D2	G6
			U260B	E2	G6
C471	F4	K8	U285	C3	I8
C510	F5	A5	U330	F3	H7
C515	F4	B5			
C544	F4	J6	U343	F2	H7
			U455A	C2	G9
C600	F5	A5	U455B	D2	G9
C614	F4	A4	U455C	D2	G9
C656	F4	K6			
C674	G4	F4	U470	C1	J8
			U485D	B2	H9
C689	F5	E5	U543	G2	I7
C691	F5	D5	U655	E1	J7
C723	G5	B4			
C724	G5	B4			
C731	G5	B4			
C813	G4	B3			
C927	G5	B2			
C930	F5	C2			


CHARACTER GENERATION
CHARACTER TIMING CONTROL
J200 CHARACTER ID
1 & 2 ID ENABLED
2 & 3 ID DISABLED
PART OF A3 OUTPUT BOARD

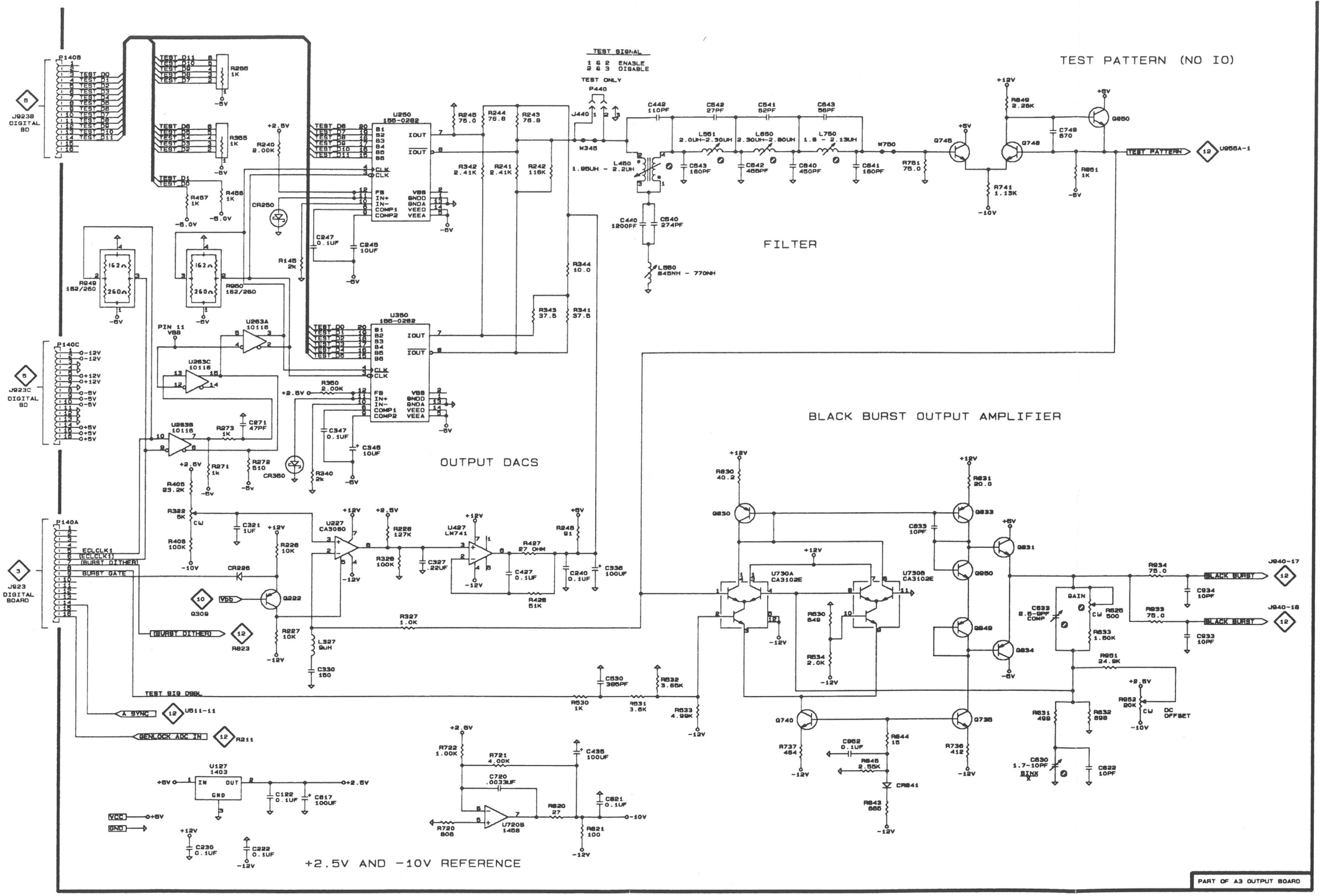
OUTPUT BOARD

SCHEMATIC 11

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A3 *Partial A3 also shown on Schematics 10 and 12.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C122	B5	B9
C222	B5	B9
C230	B5	C8
C240	D4	C8
C245	C2	C9
C247	C2	D8
C271	B3	E8
C321	B3	B8
C327	C4	B7
C330	B4	B7
C336	D4	C8
C345	C3	C8
C347	C3	D7
C427	D4	B6
C435	D5	B4
C440	D2	C6
C442	D1	C6
C530	D4	C5
C540	D2	C5
C541	E1	C5
C542	E1	C5
C543	E1	C5
C617	B5	C9
C622	G5	B5
C630	G5	C5
C633	G4	C4
C640	E1	C4
C641	F1	C4
C642	E1	C4
C643	E1	C4
C720	D5	B3
C749	G1	D3
C821	D5	B3
C833	F3	C3
C933	H4	C1
C934	H4	C1
C952	F5	C3
CR226	B4	B9
CR250	B2	D9
CR350	B3	D8
CR841	F5	C3
J440	D1	C7
L327	B4	B8
L450	D1	D6
L550	D2	D5
L551	E1	D5
L650	E1	D4
L750	E1	D4
Q222	B4	B9
Q735	F4	C3
Q740	E4	C3
Q745	F1	D3
Q748	F1	D3
Q830	E3	C3
Q831	F4	B2
Q833	F3	B3
Q834	F4	C2
Q850	G1	D2
Q949	F4	C2
Q950	F4	B2
R145	B2	C9
R226	B4	B9
R227	B4	B9
R228	C3	B7
R240	B1	D9
R241	D1	C9
R242	D1	C8
R243	D1	C8
R244	C1	C8
R245	C1	C8
R246	D3	C8
R255	B1	D8
R271	B3	E8
R272	B3	E8
R273	B3	E8
R322	B3	B8
R327	C4	B8
R328	C4	B7
R340	B3	C7
R341	D2	C7
R342	C1	C7
R343	D2	C7
R344	D2	C7
R350	C3	D8
R355	B1	D7
R405	B3	B8
R406	B4	B8
R427	D4	B6
R428	D4	B6
R456	B2	D7
R457	B2	D7
R530	D4	C6
R531	D4	C5
R532	D4	C5
R533	E4	C5
R534	E4	C5
R625	G4	C4
R630	E4	C5
R631	G4	C4
R632	G4	C4
R633	G4	C4
R720	C5	B4
R721	D5	B3
R722	C5	B3
R736	F5	C4
R737	E5	C4
R741	F2	D3
R751	F1	D3
R820	D5	B3
R821	D5	B3
R830	E3	C3
R831	F3	C3
R843	F5	C3
R844	F5	C3
R845	F5	C3
R849	F1	D3
R851	G1	D3
R933	G4	B2
R934	G4	B1
R949	A2	E9
R950	B2	C7
R951	G4	C4
R952	G4	B4
U127	B5	B9
U227	C4	B8
U250	C1	D8
U263A	B2	E8
U263B	B3	E8
U263C	B3	E8
U350	C2	D7
U427	C4	B7
U720B	C5	B4
U730A	E4	C3
U730B	F4	C3
W345	D1	C7
W750	F1	D3



TPG-625

ANALOG VIDEO OUTPUT 11

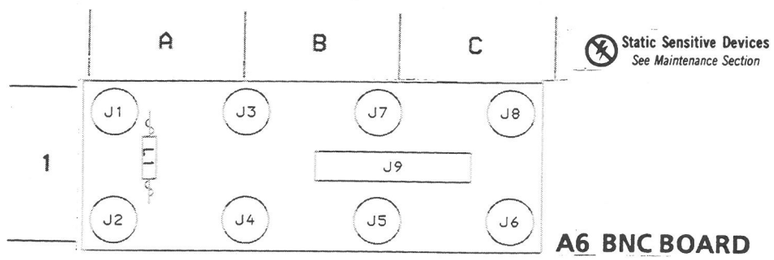
OUTPUT AND BNC BOARDS

SCHEMATIC 12

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A3. *Partial A3 also shown on Schematics 10 and 11.*

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
OUTPUT BOARD — A3		
C212	C3	A9
C411	F2	A6
C577	B3	E3
C583	B3	E4
C606	E2	A5
C679	A3	E4
C705	E2	A4
C710	E2	A3
C713	E2	B4
C755	C5	G3
C770	C4	E3
C779	A4	F4
C805	D2	A2
C806	D2	A3
C823	B2	A2
C835	F5	D2
C840	F5	D2
C870	E5	E2
C880	C4	E3
C881	C4	E3
C905	D2	A2
C912	D2	A2
C913	C2	A2
C919	G4	C1
C920	C2	B2
C921	G4	C1
C923	B3	B1
C925	C1	B1
C945	F4	D2
C963	E4	E1
CR313	G2	A7
CR709	E2	A3
CR710	E2	A3
CR868	E5	E2
J511	F2	A6
J940	G4	B1
L788	B4	E3
L789	C4	E3
Q309	G3	A8
Q817	B2	A3
Q840	E4	E1
Q852	E4	E1
Q860	D5	E2
Q870	E5	E2
Q920	D2	B2
Q921	C2	B1
Q923	D1	B2
Q924	C2	B1
Q963	E3	E1
Q964	F4	D1
Q970	D3	E1
Q971	F4	D1
R211	D1	A9
R212	D3	A9
R213	G3	A9
R311	G3	A8
R312	G3	A8
R313	G2	A8
R413	F2	A6
R414	F3	A6
R513	F2	A6
R578	A3	E5
R589	A3	E5
R590	A3	E5
R610	F1	A5
R611	E2	A4
R612	D2	A4
R613	E1	A4
R618	D3	B4
R619	E3	B4
R687	B3	E4
R688	A3	E4
R689	B3	E4
R690	B4	E4
R691	A4	F4
R692	B4	E4
R709	D2	A4
R710	E2	A3
R711	E2	A3
R712	D1	A3
R713	E1	A4
R719	E3	B4
R739	F4	D2
R740	F5	D2
R742	E5	E2
R755	C5	G3
R756	C5	E3
R766	E5	E2
R767	D5	E2
R768	E5	E1
R770	A4	F4
R812	D2	A3
R814	B1	A3
R822	B2	B3
R823	B2	B3
R824	C2	B2
R840	F5	D2
R841	F5	D2
R842	F4	D2
R855	D5	E3
R856	D5	E3
R868	E5	E2
R869	E3	E1
R885	C4	E2
R910	D2	A2
R911	D2	A2
R912	D2	A2
R913	C2	A2
R914	C2	A2
R915	C3	A1
R916	B2	A1
R917	C2	A1
R918	C3	A1
R919	B3	A1
R923	C2	B2
R924	C2	B1
R930	G4	C2
R931	G4	C1
R932	C1	B2
R939	F4	D1
R956	E4	E3
R957	E4	E2
R980	D3	E1
U211	C3	A9
U313	D3	A8
U411A	F2	A7
U411B	G2	A7
U511	F2	A5
U670	B4	E4
U690	A3	E5
U710A	E2	A4
U710B	E1	A4
U720A	D3	B4
U955A	D4	E2
U955B	E4	E2
VR823	B2	A2
BNC BOARD — A6		
J1	H3	A1
J2	H3	A1
J3	H4	B1
J4	H4	B1
J5	H4	B1
J7	H4	B1
J9	G4	B1
L1	H3	A1



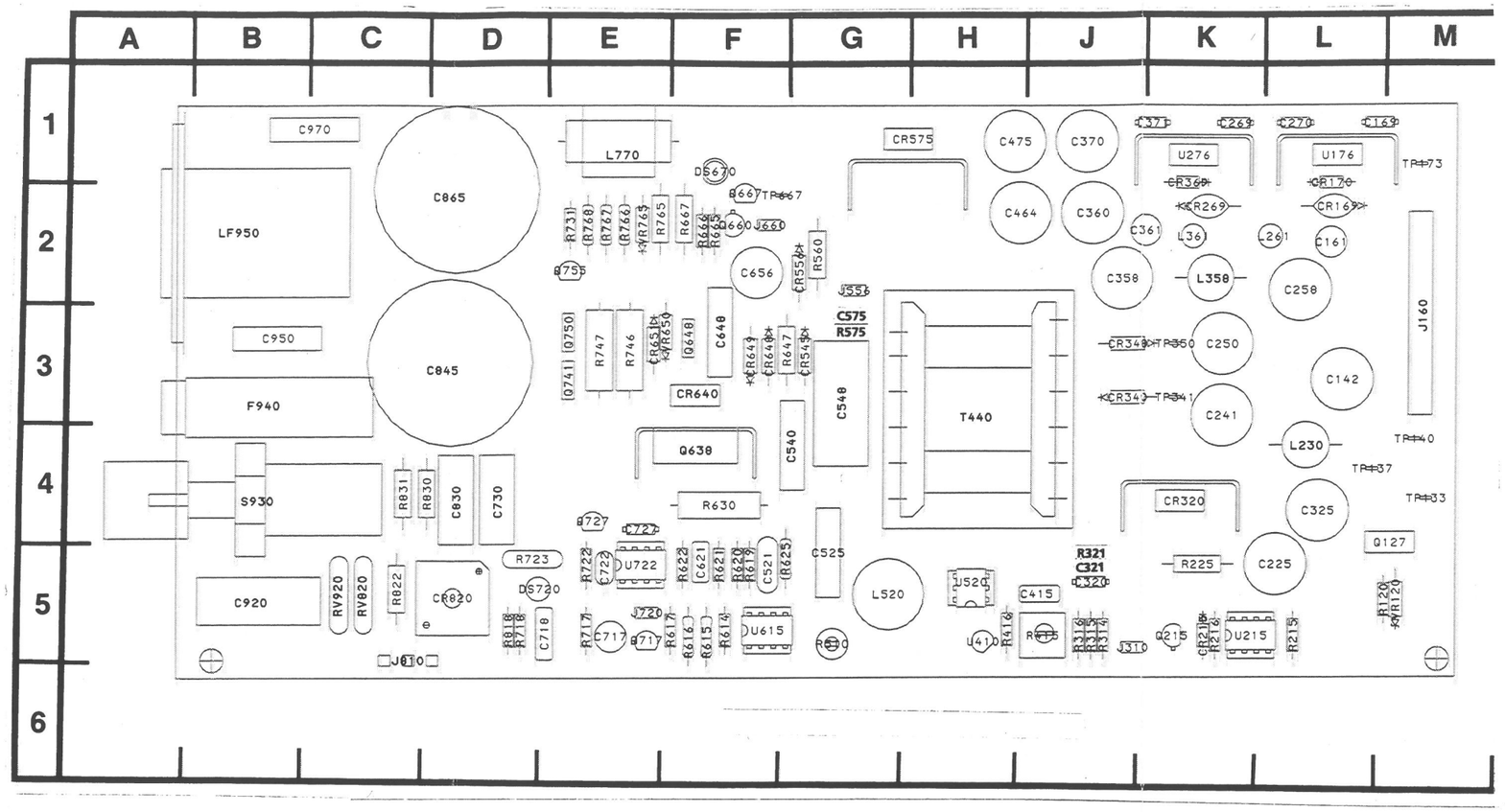
A6 BNC BOARD

GENLOCK INPUT BUFFER
SYNC STRIPPER
INPUT CLAMP
ID/TEST PATTERN OUTPUT AMPLIFIER
GENLOCK ADC IN
P140A-15
A SYNC
P140A-14
P140A-7
(BURST DITHER)
CLAMP TIMING
1 & 2 ENABLE
2 & 3 DISABLE
BLACK LEVEL
CW
CHAR KEY
TEST PATTERN
BLACK BURST
DC OFFSET
GAIN
SYNC
GENLOCK LOOP THROUGH
REAR PANEL
PART OF A3 OUTPUT BOARD
A8 BNC BOARD
VCC +5V
GND

POWER SUPPLY BOARD
DIAGRAM 13

The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A4.



A4 POWER SUPPLY BOARD

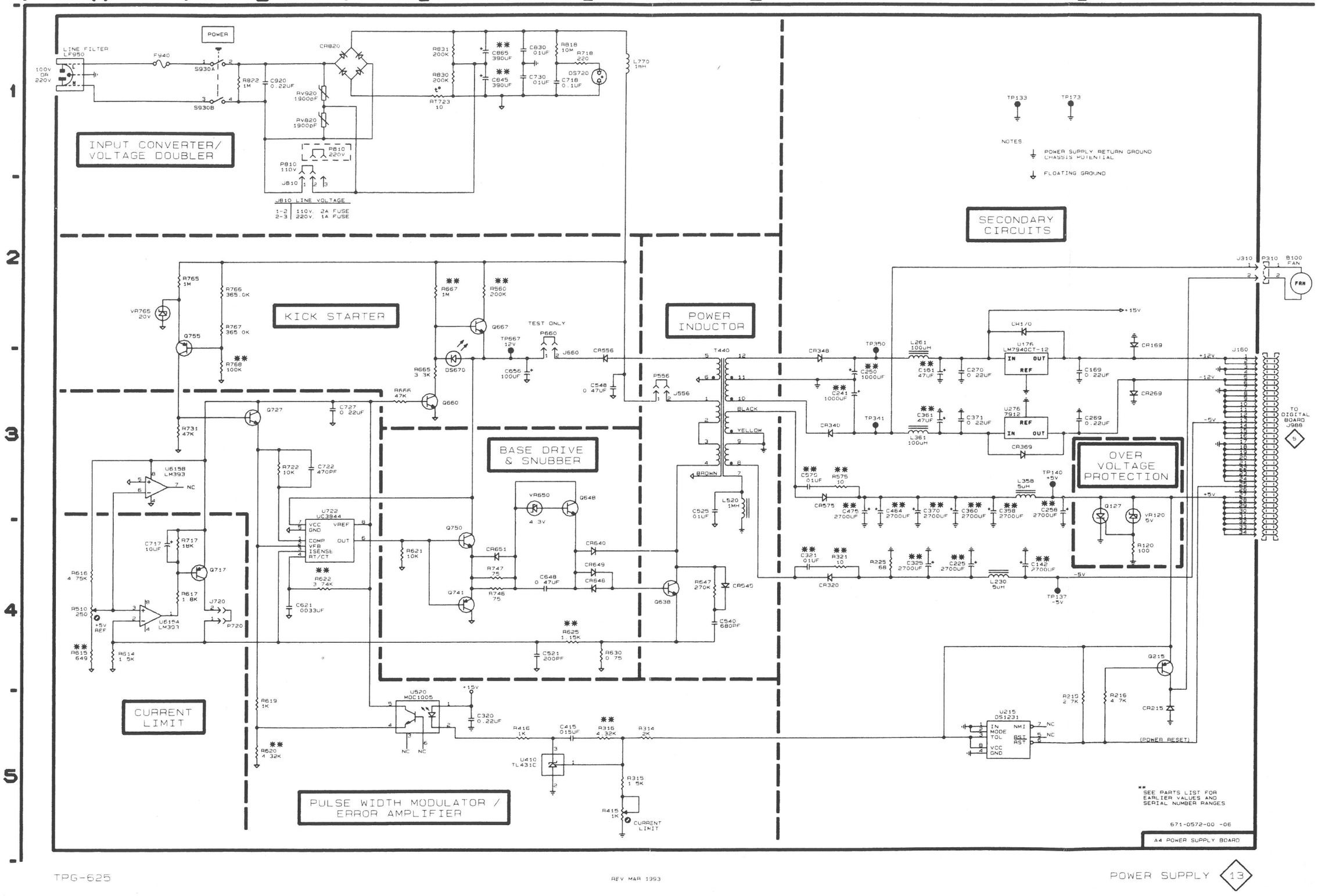
Static Sensitive Devices
See Maintenance Section

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
B100	A4	
C142	F4	L3
C161	F3	L2
C169	G3	L1
C225	F4	L5
C241	F3	K3
C250	F3	K3
C258	G4	L2
C269	G3	K1
C270	F3	L1
C320	C4	J5
C321 *	E4	J5
C325	F4	L4
C358	G4	J2
C360	F4	J2
C361	F3	J2
C370	F4	J1
C371	F3	K1
C415	D5	J5
C464	F4	H2
C475	F4	H1
C521	D4	F5
C525	E4	G5
C540	E4	F4
C548	D3	G3
C575 *	E4	G3
C621	B4	F5
C648	D4	F3
C656	D2	F2
C717	A4	E5
C718	D1	D5
C722	B3	E5
C727	B3	E4
C730	D1	D4
C830	D1	D4
C845	D1	D3
C865	D1	D2
C920	B1	B5
CR169	G3	L2
CR170	G2	L1
CR215	G4	K5
CR269	G3	K2
CR320	E4	K4
CR340	F3	J3
CR348	E3	J3
CR369	G3	K2
CR545	E4	G3
CR556	D2	G2
CR575	E4	G1
CR640	D4	F3
CR648	D4	F3
CR649	D4	F3

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
CR651	C4	E3
CR820	C1	D5
DS670	C2	F1
DS720	D1	D5
F940	B1	B3
J160	H3	M3
J310	H2	J5
J556	E3	G2
J660	D2	F2
J720	B4	E5
J810	B1	C5
L230	F4	L4
L261	F3	L2
L358	G4	K2
L361	F3	K2
L520	E3	G5
L770	D1	E1
LF950	A1	B2
Q127	G4	L5
Q215	G4	K5
Q638	E4	F4
Q648	D3	F3
Q660	C3	F2
Q667	C2	F2
Q717	B4	E5
Q727	B3	E4
Q741	C4	E3
Q750	C4	E3
Q755	B2	E2
R120	G4	L5
R215	G4	L5
R216	G4	K5
R225	F4	K5
R314	D5	J5
R315	D5	J5
R316	D5	J5
R415	D5	J5
R321 *	E4	J5
R416	D5	H5
R510	A4	G5
R560	C2	G2
R614	A4	F5
R615	A4	F5
R616	A4	F5
R617	B4	F5
R619	B4	F5
R620	B5	F5
R621	C4	F5
R622	B4	F5
R625	D4	F5

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
R630	D4	F4
R647	E4	F3
R665	C2	F2
R666	C3	F2
R667	C2	F2
R717	A4	E5
R718	D1	D5
R722	B3	E5
R723	C1	D5
R731	B3	E2
R746	C4	E3
R747	C4	E3
R765	B2	E2
R766	B2	E2
R767	B2	E2
R768	B2	E2
R575 *	F4	G3
R818	D1	D5
R822	B1	C5
R830	C1	C4
R831	C1	C4
RV820	C1	C5
RV920	C1	C5
S930A	B1	B4
S930B	B1	B4
T440	E3	H3
TP133	G1	M4
TP137	F4	L4
TP140	G3	M4
TP173	G1	M1
TP341	F3	K3
TP350	F3	K3
TP667	D2	F2
U176	G3	L1
U215	G5	K5
U276	G3	K1
U410	D5	H5
U520	C4	F5
U615A	A4	F5
U615B	A3	F5
U722	B4	E5
VR120	G4	M5
VR650	D3	E3
VR765	A2	E2

*** See Parts List for serial number ranges.**


INPUT CONVERTER/ VOLTAGE DOUBLER
KICK STARTER
BASE DRIVE & SNUBBER
POWER INDUCTOR
SECONDARY CIRCUITS
OVER VOLTAGE PROTECTION
CURRENT LIMIT
PULSE WIDTH MODULATOR / ERROR AMPLIFIER
POWER
LINE FILTER LF950
100V OR 220V
F940
S930A
S930B
CR820
R822 1M
C920 0.22UF
RV920 1900pF
RV820 1900pF
R831 200K
R830 200K
C865 390UF
C645 390UF
C830 .01UF
C730 .01UF
R818 10M
R718 220
DS720
C718 0.1UF
L770 1mH
RT723 10
P810 220V
P810 110V
J810
J810 LINE VOLTAGE
1-2 110V. 2A FUSE
2-3 220V. 1A FUSE
TP133
TP173
NOTES
POWER SUPPLY RETURN GROUND CHASSIS POTENTIAL
FLOATING GROUND
R765 1M
R766 365.0K
R767 365.0K
R768 100K
VR765 20V
Q755
R667 1M
R560 200K
Q667
TEST ONLY
P660
TP667 12V
C656 100UF
J660
CR556
DS670
R665 3.3K
R666 47K
Q660
C548 0.47UF
P556
J556
T440
BLACK
YELLOW
BROWN
Q727
C727 0.22UF
R731 47K
U615B LM393
R722 10K
C722 470PF
U722 UC3844
VCC
GND
VREF
COMP
VFB
ISENSE
RT/CT
OUT
R622 3.74K
C621 0033UF
C717 10UF
R717 18K
Q717
R616 4.75K
R617 1.8K
R510 250
+5V REF
U615A LM393
J720
P720
R614 1.5K
R615 649
R621 10K
Q750
CR651
R747 75
R746 75
Q741
C648 0.47UF
VR650
4.3V
Q648
CR640
CR649
CR648
Q638
R647 270K
CR545
C540 680PF
R625 1.15K
C521 200PF
R630 0.75
C525 .01UF
L520 1MH
CR348
TP350
C250 1000UF
C241 1000UF
CR340
TP341
L261 100UH
C261 47UF
C270 0.22UF
U176 LM7940CT-12
IN OUT REF
CR170
CR169
C169 0.22UF
+15V
+12V
L361 100UH
C361 47UF
C371 0.22UF
U276 7912
CR269
C269 0.22UF
-12V
CR369
-5V
C575 .01UF
R575 10
CR575
C475 2700UF
C464 2700UF
C370 2700UF
C360 2700UF
C358 2700UF
C256 2700UF
L358 5UH
TP140 +5V
+5V
Q127
VR120 5V
R120 100
C321 .01UF
R321 10
CR320
R225 68
C325 2700UF
C225 2700UF
C142 2700UF
L230 5UH
TP137 -5V
-5V
J310
P310
B100 FAN
FAN
J160
TO DIGITAL BOARD J986
U520 MOC1005
+15V
C320 0.22UF
R619 1K
R620 4.32K
R416 1K
C415 .015UF
R316 4.32K
R314 2K
U410 TL431C
R315 1.5K
R415 1K
CURRENT LIMIT
Q215
R215 2.7K
R216 4.7K
CR215
U215 DS1231
IN
MODE
TOL
VCC
GND
NMI
RST
NC
(POWER RESET)
** SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES
671-0572-00 -06
A4 POWER SUPPLY BOARD

REPLACEABLE MECHANICAL PARTS LIST

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc., field office.

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 Developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, and modification number, if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc., field office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

ITEM NAME

In the 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, the U.S. Federal Cataloging Handbook H6–1 can be utilized where possible.

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This Mechanical Parts List is indented to indicate item relationship. Following is an example of the indentation system used in the description column.

```
1  2  3  4  5      Name & Description
Assembly and/or Component
Mounting parts for Assembly and/or Component
*MOUNTING PARTS*/*END MOUNTING PARTS*
   Detail Part of Assembly and/or Component
   Mounting parts for Detail Part
   *MOUNTING PARTS*/*END MOUNTING
   PARTS*
      Parts of Detail Part
      Mounting parts for Parts of Detail Part
      *MOUNTING PARTS*/*END MOUNTING
      PARTS*
```

Mounting Parts always appear in 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.

Mounting parts must be purchased separately, unless otherwise specified.

CHASSIS PARTS

Chassis–mounted parts and cable assemblies may be found at the end of the Electrical Parts List.

ABBREVIATIONS

"	INCH	ELCTRN	ELECTRON	IN	INCH	SE	SINGLE END
#	NUMBER SIZE	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ACTR	ACTUATOR	ELCTLT	ELECTROLYTIC	INSUL	INSULATOR	SEMICOND	SEMICONDUCTOR
ADPTR	ADAPTER	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
ALIGN	ALIGNMENT	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
AL	ALUMINUM	EQPT	EQUIPMENT	MACH	MECHINE	SKT	SOCKET
ASSEM	ASSEMBLED	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ASSY	ASSEMBLY	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF–LOCKING
ATTEN	ATTENUATOR	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVING
AWG	AMERICAN WIRE GAUGE	FLH	FLAT HEAD	NONWIRE	NOT WIRE WOUND	SPR	SPRING
BD	BOARD	FLTR	FILTER	OBD	ORDER BY DESCRIPTION	SQ	SQUARE
BRKT	BRACKET	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRS	BRASS	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BRZ	BRONZE	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
BSHG	BUSHING	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAB	CABINET	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CAP	CAPACITOR	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CER	CERAMIC	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CHAS	CHASSIS	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
CKT	CIRCUIT	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
COMP	COMPOSITION	HLCPS	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
CONN	CONNECTOR	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
COV	COVER	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CPLG	COUPLING	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W/	WITH
CRT	CATHODE RAY TUBE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DEG	DEGREE	IDENT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
DWR	DRAWER	IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR

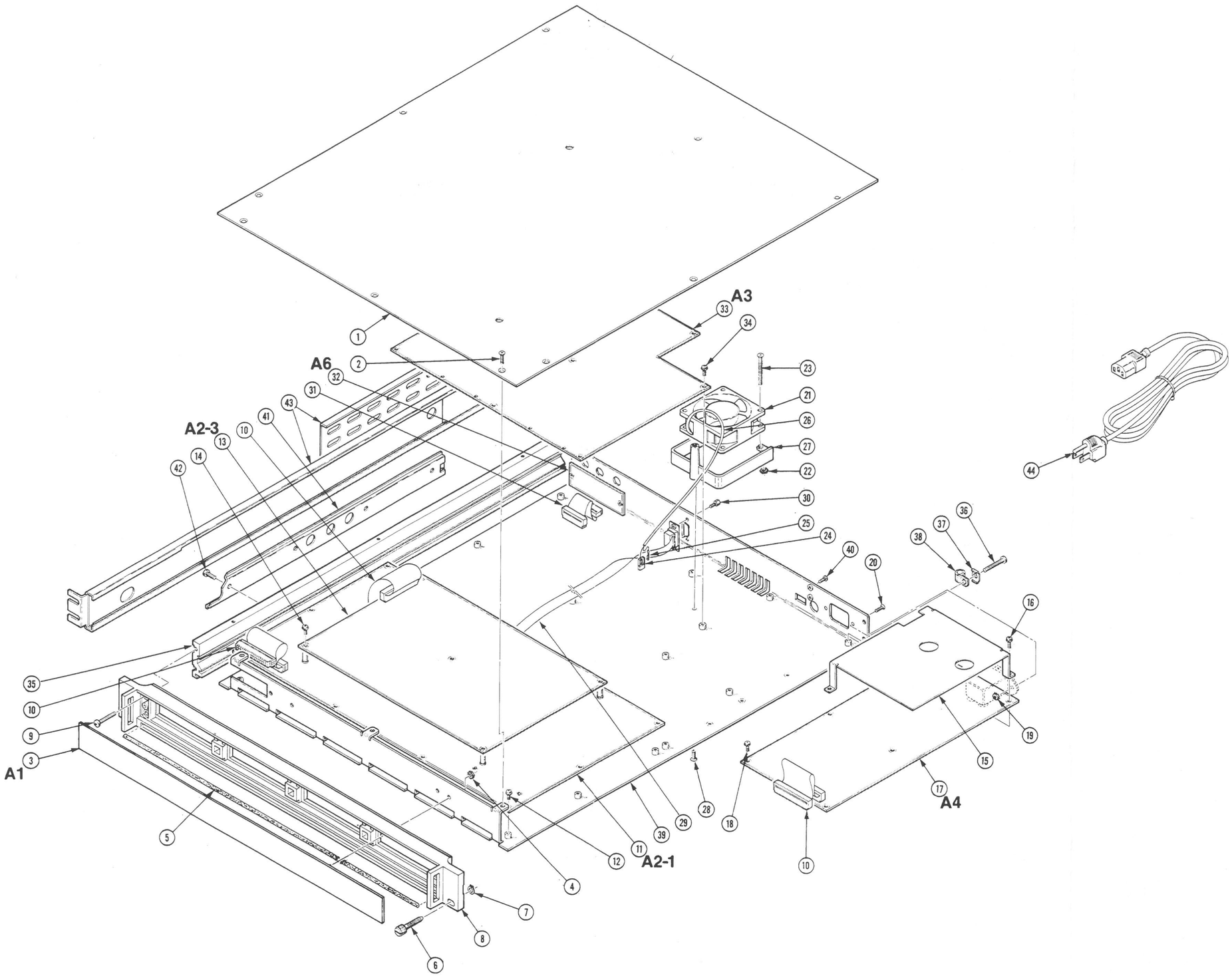
CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
06666	GENERAL DEVICES CO INC	1410 S POST RD PO BOX 39100	INDIANAPOLIS IN 46239-9632
06915	RICHCO PLASTIC CO	5825 N TRIPP AVE	CHICAGO IL 60646-6013
71468	ITT CANNON DIV OF ITT CORP	666 E DYER RD	SANTA ANA CA 92702
72228	AMCA INTERNATIONAL CORP CONTINENTAL SCREW CO DIV	459 MT PLEASANT	NEW BEDFORD MA 02742
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIV	ST CHARLES ROAD	ELGIN IL 60120
79136	WALDES KOHINOOR INC	47-16 AUSTEL PLACE	LONG ISLAND CITY NY 11101-4402
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
83385	MICRODOT MFG INC GREER-CENTRAL DIV	3221 W BIG BEAVER RD	TROY MI 48098
83486	ELCO INDUSTRIES INC	1101 SAMUELSON RD	ROCKFORD IL 61101
95987	BRADY/WECKESSER MFG CO	4444 WEST IRVING PARK RD	CHICAGO IL 60641
96904	HIGH VOLTAGE ENGINEERING CORP NARVAR CO DIV	ROUTE 70 EAST PO BOX 658	CLAYTON NC 27520
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609-3320
TK0858	STAUFFER SUPPLY CO (DIST)		
TK1960	U S TOYO FAN CORP	4915 WALNUT GROVE AVE DRAWER G	SAN GABRIEL CA 91776

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-1	200-3645-00			1	COVER,TOP: *MOUNTING PARTS*	80009	200-3645-00
-2	211-0559-00			10	SCREW,MACHINE:6-32 X 0.375,FLH,100 DEG,STL *END MOUNTING PARTS*	TK0435	1593-300
-3	----- -----			1	PANEL,FRONT: (SEE A1 REPL) *MOUNTING PARTS*		
-4	210-0457-00			2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL *END MOUNTING PARTS*	78189	511-061800-00
-5	378-0269-00			1	FILTER,AIR:	80009	378-0269-00
-6	213-0216-00			1	THUMBSCREW:10-32 X 0.85,0.375 OD HD,SST *MOUNTING PARTS*	80009	213-0216-00
-7	354-0025-00			1	RING,RETAINING:EXTERNAL,U/O 0.187 DIA SFT *END MOUNTING PARTS*	79136	5555-18
-8	426-2116-01			1	FRAME,FRONT: *MOUNTING PARTS*	80009	426-2116-01
-9	213-0760-00			4	SCREW,TPG,TF:8-32 X 0.875,SPCL TAPTITE,FILH ,STL *END MOUNTING PARTS*	72228	ORDER BY DESCR
-10	----- -----			3	CA ASSY,SP,ELEC:28 AWG,3.0 L,RIBBONSAFETY C ONTROLLED (SEE W515,W817,W988 REPL)		
-11	----- -----			1	CIRCUIT BD ASSY:DIGITAL (SEE A2-1 REPL) *MOUNTING PARTS*		
-12	211-0244-00			11	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL *END MOUNTING PARTS*	TK0858	211-0244-00
-13	----- -----			1	CIRCUIT BD ASSY:MEMORY (SEE A2-3 REPL) *MOUNTING PARTS*		
-14	211-0244-00			5	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL *END MOUNTING PARTS*	TK0858	211-0244-00
-15	337-3286-01			1	SHIELD,PWR SPLY:LOW VOLTAGE *MOUNTING PARTS*	80009	337-3286-01
-16	211-0244-00			3	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL *END MOUNTING PARTS*	TK0858	211-0244-00
-17	----- -----			1	CIRCUIT BD ASSY:PWR SPLY (SEE A4 REPL) *MOUNTING PARTS*		
-18	211-0244-00			3	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
-19	210-0586-00			2	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	78189	211-041800-00
-20	211-0025-00			2	SCREW,MACHINE:4-40 X 0.375,FLH,100 DEG,STL *END MOUNTING PARTS*	TK0435	ORDER BY DESCR
-21	----- -----			1	FAN,TUBEAXIAL:24VDC,20CFM,60 X 60 MM 4800RP M, SAFETY CONTROLLED (SEE B100 REPL) *MOUNTING PARTS*		
-22	210-0458-00			2	NUT,PL,ASSEM WA:8-32 X 0.344,STL CD PL	78189	511-081800-00
-23	212-0012-00			2	SCREW,MACHINE:8-32 X 1.25,FLH,100 DEG,STL *END MOUNTING PARTS*	83385	ORDER BY DESCR
-24	352-0169-00	B010100	B010175	1	HLDR,TERM CONN:2 WIRE,BLACK	80009	352-0169-00
-25	131-0707-00	B010100	B010175	2	CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL	80009	131-0707-00
-26	162-0013-00	B010100	B010175	1	INSUL SLVG,ELEC:0.148 ID,VINYL,BLK,105 DEG C,0.168 OD	96904	TYPE400SIZE7BLK
-27	407-3379-01			1	BRKT,FAN MTG:ALUMINUM *MOUNTING PARTS*	80009	407-3379-01
-28	211-0559-00			1	SCREW,MACHINE:6-32 X 0.375,FLH,100 DEG,STL *END MOUNTING PARTS*	TK0435	1593-300
-29	----- -----			1	CA ASSY,SP,ELEC:10,28 AWG,12.5 L,RIBBON (SEE W942 REPL) *MOUNTING PARTS*		
-30	131-0890-00			2	SCREW LOCK:4-40 X 0.312 L HEX HD,STLCD PL *END MOUNTING PARTS*	71468	D 20418-2
-31	----- -----			1	CA ASSY,SP,ELEC:20,26 AWG,2.5 L,RIBBON (SEE W940 REPL)		
-32	----- -----			1	CIRCUIT BD ASSY:BNC (SEE A6 REPL)		
-33	----- -----			1	CIRCUIT BD ASSY:OUTPUT (SEE A3 REPL)		

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-					*MOUNTING PARTS*		
-34	211-0244-00			8	SCR,ASSEM WSHR:4-40 X 0.312,PNH STL	TK0858	211-0244-00
					END MOUNTING PARTS		
-35	426-2115-00			2	FRAME SECTION:SIDE	80009	426-2115-00
					MOUNTING PARTS		
-36	213-0760-00			4	SCREW,TPG,TF:8-32 X 0.875,SPCL TAPTITE,FILH ,STL	72228	ORDER BY DESCR
					END MOUNTING PARTS		
-37	210-0863-00			1	WSHR,LOOP CLAMP:0.091 ID U/W 0.5 W CLP,STL CD PL	95987	C191
-38	343-0003-00			1	CLAMP,LOOP:0.25 ID,PLASTIC	06915	E4 CLEAR ROUND
-39	200-3667-00			1	COVER,BOTTOM:	80009	200-3667-00
-40	211-0177-00			1	SCREW,MACHINE:4-40 X 0.312,PNH,STL	TK0435	ORDER BY DESCR
-41	351-0104-03			1	SL SECT,DWR EXT:12.625 L,W/O HARDWARE	06666	C-720-3
					MOUNTING PARTS		
-42	212-0158-00			8	SCREW,MACHINE:8-32 X 0.375,PNH,STL	83486	ORDER BY DESCR
					END MOUNTING PARTS		
-43	351-0751-00	B010100	B010137	1	TRK,SL OUT SECT:STATIONARY & INTERMEDIATE	80009	351-0751-00
	351-0751-01	B010138		1	TRK,SL OUT SECT:STATIONARY &INTERMEDIATE	80009	351-0751-01
-44	161-0066-00			1	CABLE ASSY,PWR,:3,18AWG,98 L,SVT,GREY/BLK,60 DEG C,IEC BME X STR,IEC RCPT,10A/125V;,,	80009	161-0066-00
	070-7248-00			1	MANUAL,TECH:USERS,TPG625	80009	070-7248-00

FIG. 1 EXPLODED VIEW



TPG–625

Appendix A
TPG–625 Option 01

The TPG–625 Option 01 is a special version of the TPG–625 PAL Pattern Generator. This version is designed for use with the Tektronix VM700A Video Measurement Set. The only external difference between a TPG–625 Standard and the Option 01 is an Option 01 sticker on the right side of the instrument.

Option 01 substitutes a full field test signal matrix in place of the standard colour monitor/receiver evaluation pattern. This matrix consists of 12 test signals, selected for use with the VM700A measurement routines. Each of these signals is displayed for 12 lines, and repeated twice in each field. The VM700A block mode can then be used to make specific measurements at different times in the video field.

The test signal matrix consists of the following signals:

- CCIR 17
- CCIR 330
- CCIR 331
- CCIR 18
- 75% Colour Bars
- SIN $^{X}/_{X}$
- 75% Red Field
- Multipulse
- 50% Pedestal
- Shallow Ramp Matrix
- UK ITS 1
- UK ITS 2

Table A-1 describes the matrix, and gives typical uses for each of the signals. Table A-2 describes the test signals for Option 01, replacing Table 3-1. Table A-3 shows changes and additions to the General Test Signal Characteristics in Table 3-2. Figs. A-1 through A-12 show the test signals as they appear on a VM700A, and Fig. A-13 shows the matrix sequence.

The SIN $^{X}/_{X}$ signal has a bandwidth of 6 MHz, and is used for frequency response and group delay measurements.

The Multipulse signal provides a 700 mV white bar (4.1 μs HAD), a 700 mV 2T pulse, and pulses of 1.0, 2.0, 3.0, 4.0, and 5.0 MHz. This signal is not needed for the VM700A, but is used in manufacturing.

The Shallow Ramp Matrix consists of 12 separate 70-millivolt ramp signals, one for each line of the Shallow Ramp portion of the test signal matrix. Each of the ramp signals are at a different amplitude level, with the lowest one centered around zero volts (spanning from –35 to +35 millivolts) and the highest one centered around 700 millivolts (665 to 735 millivolts). These shallow ramps are used for noise testing of digital codecs; the multiple ramps allow testing of all codec cut points.

Table A-1. Test Signal Matrix Description.

Signal	Located on Lines				Used For
CCIR Line 17	23 – 34,	167 – 178,	336 – 347,	480 – 491.	Line Time Distortion, Chroma-Luma Gain & Delay, Luminance Non-Linearity, K-Factor
CCIR Line 330	35 – 46,	179 – 190,	348 – 359,	492 – 503.	Bar Line Time, Diff Gain, Diff Phase, Luma Non-Linearity
CCIR Line 331	47 – 58,	191 – 202,	360 – 371,	504 – 515.	Chroma Non-Linearity
CCIR Line 18	59 – 70,	203 – 214,	372 – 383,	516 – 527.	Multiburst Frequency Response
75% Colour Bars	71 – 82,	215 – 226,	384 – 395,	528 – 539.	Colour Bar Measurements
$SINX/_{X}$	83 – 94,	227 – 238,	396 – 407,	540 – 551.	Group Delay, Frequency Response
75% Red Field	95 – 106,	239 – 250,	408 – 419,	552 – 563.	AM & PM Noise
Multipulse	107 – 118,	251 – 262,	420 – 431,	564 – 575.	Manufacturing
50% Flat Field	119 – 130,	263 – 274,	432 – 443,	576 – 587.	Noise Spectrum
Shallow Ramp Matrix	131 – 142,	275 – 286,	444 – 455,	588 – 599.	Noise Spectrum
UK ITS 1	143 – 154,	287 – 298,	456 – 467,	600 – 611.	Bar Line Time, Chroma-Luma Gain & Delay, Luminance Non-Linearity, K-Factor, Diff Gain, Diff Phase
UK ITS 2	155 – 166,	299 – 310,	468 – 479,	612 – 623.	Chroma-Luma Gain

Table A-2. TPG–625 Option 01 Test Signal Characteristics

Characteristics	Performance Requirements	Supplemental Information
CCIR Line 17		See Fig. A-1.
2T bar Width	10 μs.	
Rise Time	192.9 ns ±20 ns.	
2T Pulse HAD	200 ns ±20 ns.	
20T modulated pulse	60.7°.	
5-step		
CCIR Line 330		See Fig. A-2.
2T Bar Width	10 μs.	
Rise Time	192.9 ns ±20 ns.	
2T Pulse HAD	200 ns ±20 ns.	
5-Step	280 mV p-p modulation (60.7°).	
CCIR LIne 331		See Fig. A-3.
Luminance Pedestal		
Amplitude	350 mV.	
Rise Time	192.9 ns ±20 ns.	
Chroma Bar Amplitudes (60.7°)	140 mV p-p, 420 mV p-p, and 700 mV p-p on pedestal; followed by 420 mV p-p.	
CCIR Line 18		See Fig. A-4.
Amplitudes		
White Reference Bar	560.0 mV.	
Packets	420.0 mV p-p.	Equal width packets.
Pedestal	350.0 mV.	
Burst Frequencies	500 kHz, 1.0 MHz, 2.0 MHz, 4.0 MHz, 4.8 MHz, 5.8 MHz.	
Packet Rise Time	350 ns typical.	Sine-squared-shaped packets.
75% Colour Bars		See Fig. A-5.
Colour Packets	Lum Ampl (mV) / Subcarrier Ampl (mV p-p) / Subcarrier Phase (deg)	
White	700.0 / 0.0 / 0.0	
Yellow	465.1 / 470.5 / 167.1	
Cyan	367.9 / 664.2 / 283.5	
Green	308.3 / 621.5 / 240.7	
Magenta	217.0 / 621.5 / 60.7	
Red	157.2 / 665.2 / 103.5	
Blue	60.0 / 471.7 / 347.1	
Luminance Rise Times	150 ns ±25 ns	
SIN X/X		See Fig. A-6.
Bandwidth	6 MHz.	
Pedestal	124.9 mV.	
Peak	575.1 mV.	Peak amplitude from pedestal.

Table A-2 (Cont). TPG–625 Option 01 Test Signal Characteristics

Characteristics	Performance Requirements	Supplemental Information
75% Red Field Luminance Amplitude Rise Time Chrominance Amplitude Phase	 157.0 mV. 150 ns. 663.8 mV. 103.5°.	See Fig. A-7.
Multipulse Amplitude Frequencies	 700 mV. 1.0 MHz, 2.0 MHz, 3.0 MHz, 4.0 MHz, 5.0 MHz.	See Fig. A-8.
50% Flat Field Amplitude	 350 mV.	See Fig. A-9.
Shallow Ramp Matrix	Twelve 35 mV ramps, one ramp per line, centered around 0, 63,6, 127.3, 190.9, 254.6, 318.2, 381.8, 445.5, 509.1, 572.7, 636.4, and 700.0 mV.	See Fig. A-10.
UK ITS 1 2T bar Width Rise Time 2T Pulse HAD 10T modulated pulse 5-step	 10 μs. 192.9 ns ±20 ns. 200 ns ±20 ns. 60.7°. 140 mV p-p modulation (60.7°).	See Fig. A-11.
UK ITS 2 Pedestal Amplitude Chroma Amplitude Chroma Bar	 350 mV. 700 mV p-p (60.7°). 280 mV p-p (60.7°).	See Fig. A-12.

Table A-3. TPG–625 Option 01 General Test Signal Characteristics

Characteristics	Performance Requirements	Supplemental Information
Frequency Response†	±1% to 5 MHz.	
Chrominance-to-Luminance Gain	±1%	
Group Delay	≤5 ns to 5 MHz.	
Diff Gain	0.6% Maximum	Measured on CCIR Line 330
Diff Phase	0.3° Maximum	Measured on CCIR Line 330
Tilt	≤0.5%	

† Changed Spec. All others are added.

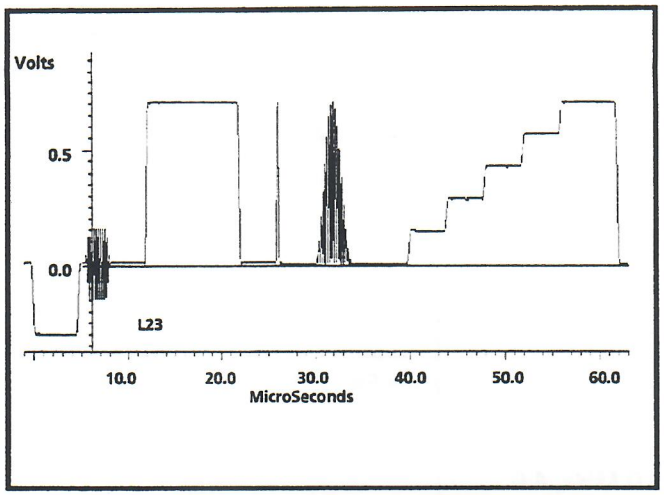


Fig. A-1. First band of Matrix, CCIR Line 17 signal.

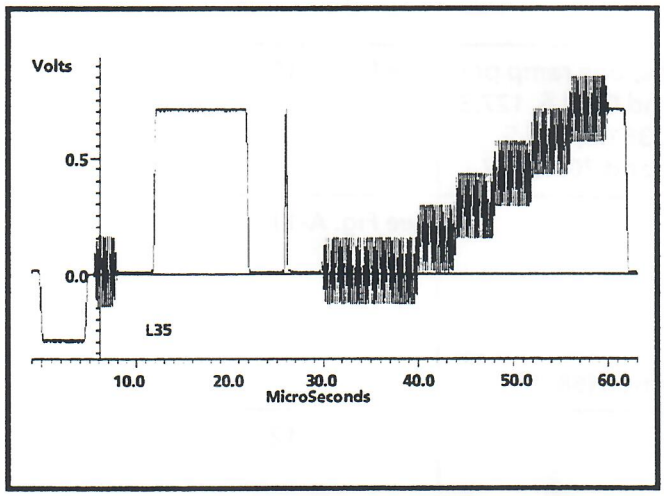


Fig. A-2. Second band of Matrix, CCIR Line 330 signal.

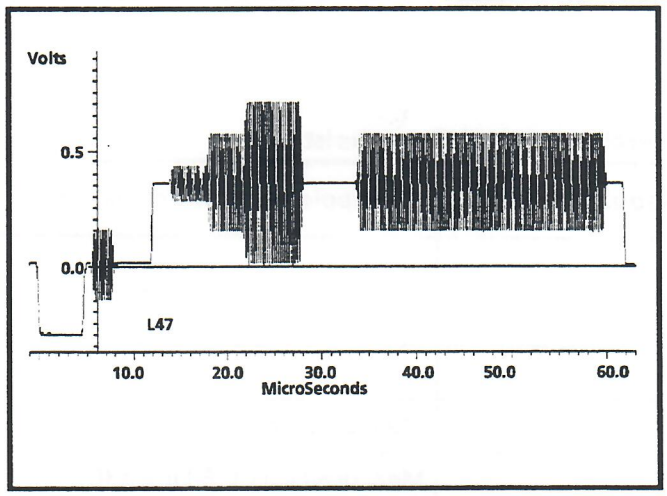


Fig. A-3. Third band of Matrix, CCIR Line 331 signal.

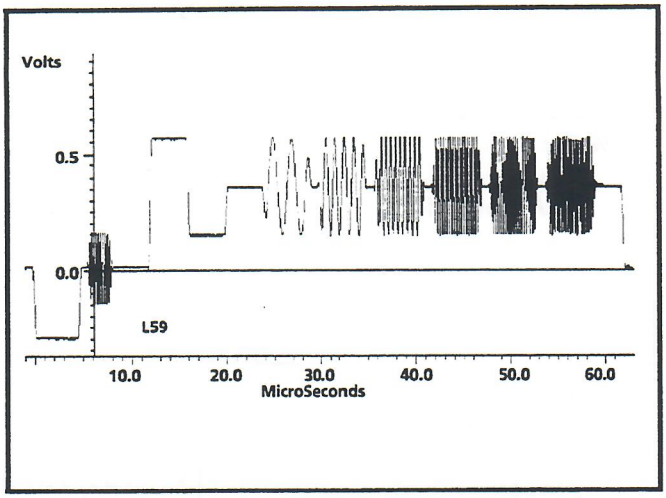


Fig. A-4. Fourth band of Matrix, CCIR Line 18 signal.

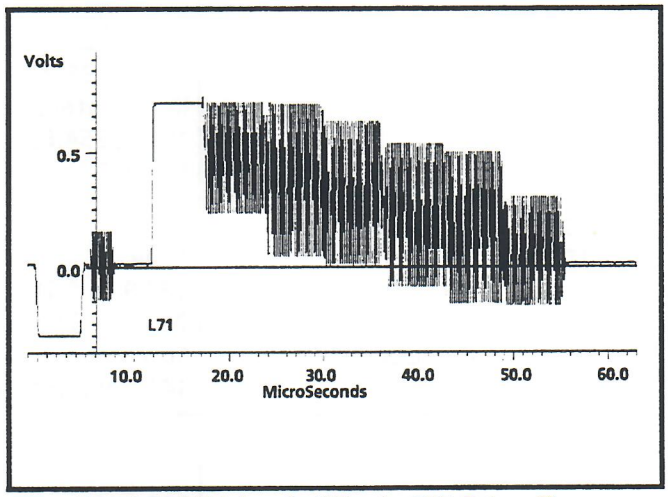


Fig. A-5. Fifth band of Matrix, 75% Colour Bars.

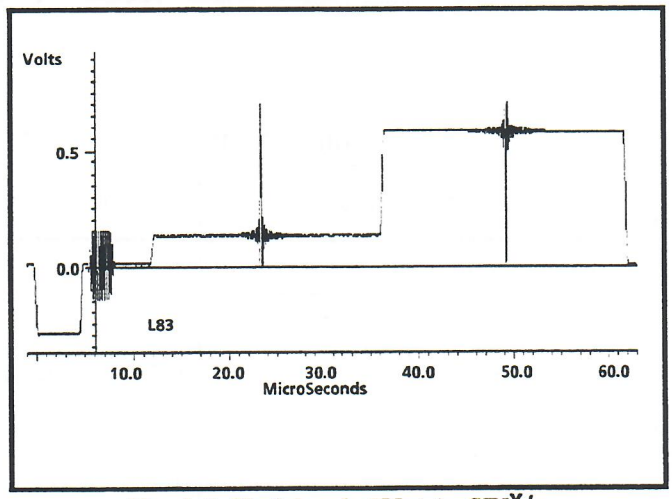


Fig. A-6. Sixth band of Matrix, $SIN^X/_X$.

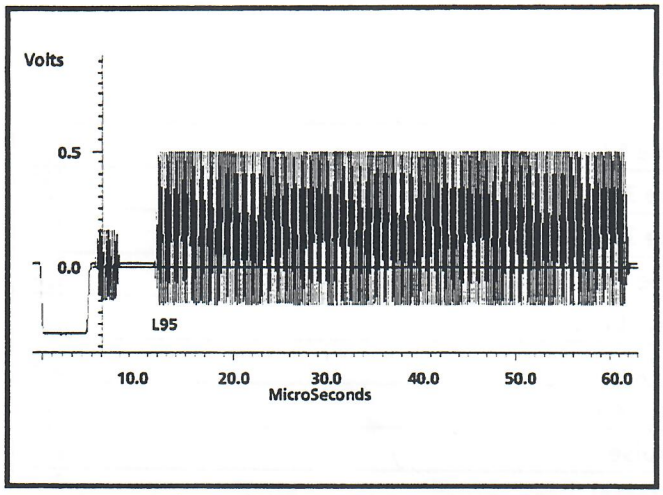


Fig. A-7. Seventh band of Matrix, 75% Red Field.

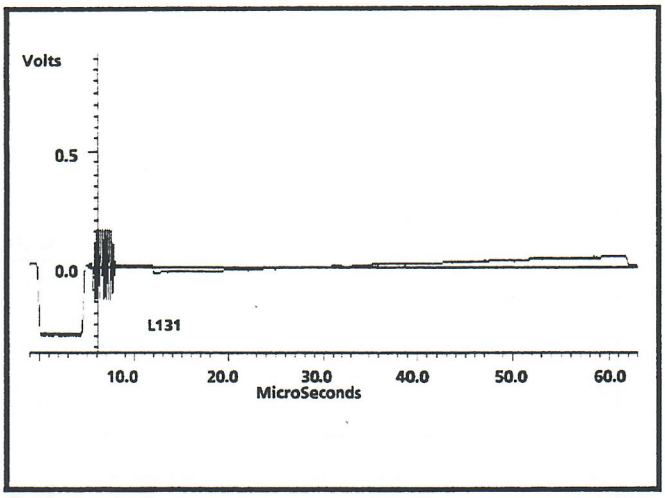


Fig. A-10. Tenth band of Matrix, Shallow Ramp Matrix. One of twelve levels shown.

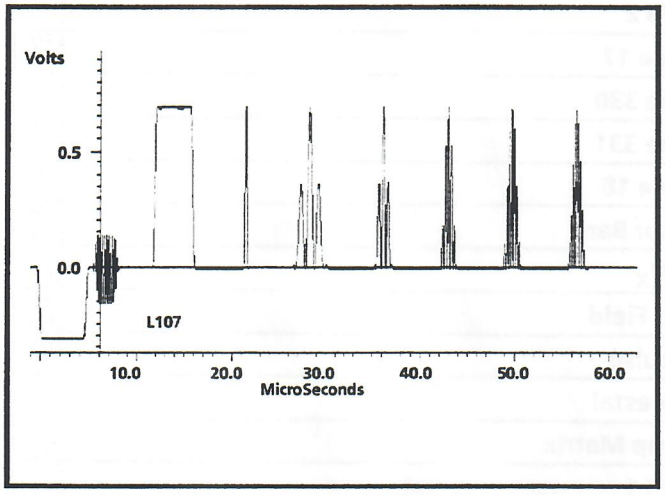


Fig. A-8. Eighth band of Matrix, Multipulse.

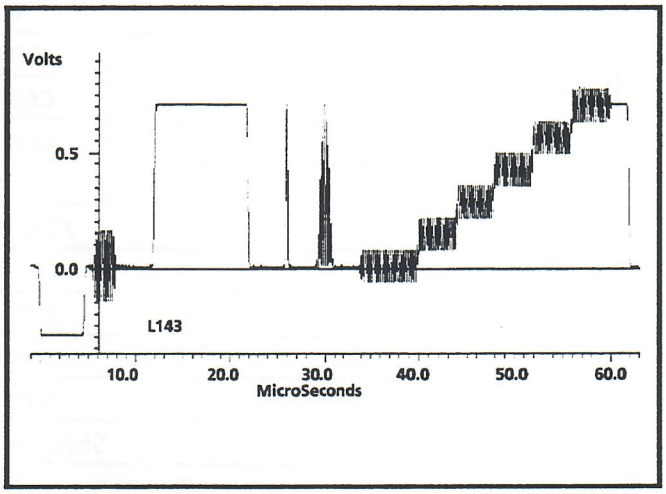


Fig. A-11. Eleventh band of Matrix, U.K. ITS 1.

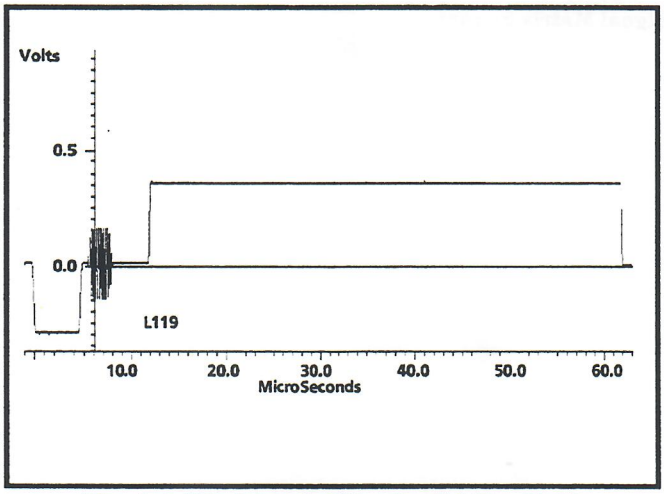


Fig. A-9. Ninth band of Matrix, 50% Flat Field.

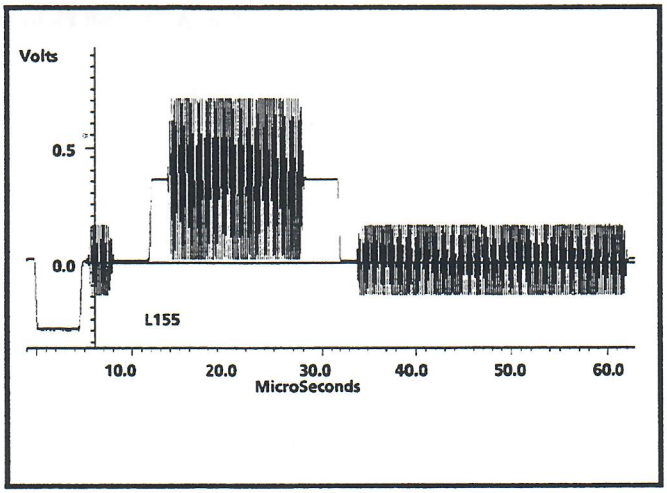


Fig. A-12. Twelfth band of Matrix, U.K. ITS 2.

23 34	CCIR Line 17	336 347
35 46	CCIR Line 330	348 359
47 58	CCIR Line 331	360 371
59 70	CCIR Line 18	372 383
71 82	75% Colour Bars	384 395
83 94	SIN X/X	396 407
95 106	75% Red Field	408 419
107 118	Multipulse	420 431
119 130	50% Pedestal	432 443
131 142	Shallow Ramp Matrix	444 455
143 154	UK ITS 1	456 467
155 166	UK ITS 2	468 479
167 178	CCIR Line 17	480 491
179 190	CCIR Line 330	492 503
191 202	CCIR Line 331	504 515
203 214	CCIR Line 18	516 527
215 226	75% Colour Bars	528 539
227 238	SIN X/X	540 551
239 250	75% Red Field	552 563
251 262	Multipulse	564 575
263 274	50% Pedestal	576 587
275 286	Shallow Ramp Matrix	588 599
287 298	UK ITS 1	600 611
299 310	UK ITS 2	612 623

Fig. A-13. Full Field Test Signal Matrix Sequence.

PERFORMANCE CHECK AND ADJUSTMENT PROCEDURE

This section consists of short form and detailed procedures used in verifying the performance and adjusting the TPG-625 option 01.

SHORT FORM PERFORMANCE CHECK

Changes from the Standard Instrument

NOTE

To obtain the range of signal levels required for the following tests, the GENLOCK loop-through of the TPG-625 must remain **UN-terminated**. *This results in an input signal which is 6 dB above nominal levels, or 6 dB above that indicated by the Step Attenuator. Subtracting the Attenuator reading from +6 will yield the true signal change, in dB, from nominal. Setting the Step Attenuator to read 6 (indicating 6 dB attenuation), then, results in a normal signal level.*

SYNC LOCK

1. Jitter
   ≤ 10 ns

BURST LOCK

2. Phase Shift and Jitter with Change in Incoming Amplitude
   ≤ 1° ϕ change for ± 3 dB sync or burst change
   ≤ 2° ϕ change for ± 6 dB sync or burst change
   ≤ 0.3° jitter for ± 3 dB sync or burst change
   ≤ 0.4° jitter for ± 6 dB sync or burst change
3. Genlock Stability with Gross Input Amplitude Variations
   ≤ 40° for Input Sync or Burst Amplitude Range of +7 dB to -12 dB
4. Burst Phase Shift with Change in Incoming Burst Frequency
   ≤ 1° for 20 Hz change in incoming subcarrier
5. Phase Shift with Change in Incoming APL
   ≤ 1° over 10% to 90% APL

GENLOCK AND SYNC TIMING

6. Genlock Timing Range (Coarse)
   ≈ 7 µs advance and delay
7. Vertical Timing Range
   up to 2 lines advance and 1 line delay
8. Genlock Timing Range (Fine)
   ≈ 55° advance and delay
9. Color Framing Decisions
   Correct for input SC/H of 0° ± 40°

BLANKING LEVELS

10. TEST PATTERN Blanking Level
    0 mV ± 50 mV
11. BLACK Blanking Level
    0 mV ± 5 mV

LUMINANCE AMPLITUDE LEVELS

12. Luminance Amplitude
    CCIR Line 331 . . . . . 350 mV ± 1%
13. Luminance Amplitude
    CCIR Line 18 White Reference Bar
    . . . . . 560 mV_{p-p} ± 1%
14. Luminance Amplitude
    50% Flat Field . . . . . 350 mV± 1%
15. Luminance Amplitude
    UK ITS 2 Pedestal . . . . . 350 mV± 1%
16. BLACK Sync Amplitude
    300 mV ± 3 mV
17. BLACK Glitch Amplitude
    < 20 mV

18. BLACK Burst Amplitude
    300 mV ± 6 mV
19. TEST PATTERN Sync Amplitude
    300 mV ± 3 mV
20. TEST PATTERN Luminance Amplitude
    700 mV ± 7 mV
21. TEST PATTERN Burst Amplitude
    300 mV ± 6 mV
22. Linearity Error
    ≤1%

LUMINANCE RISE TIME CHECKS

23. Luminance Rise Time
    CCIR Line 17 . . . . . 192.9 ns ± 20 ns
24. Luminance Rise Time
    CCIR Line 330 . . . . . 192.9 ns ± 20 ns
25. Luminance Rise Tise
    CCIR Line 331 . . . . . 192.9 ns ± 20 ns
26. Luminance Rise Time
    UK ITS 1 . . . . . 192.9 ns ± 20 ns
27. Sync Rise Time
    250 ns ± 25 ns

PULSE HADs

28. CCIR Line 17 . . . . . 200 ns ± 20 ns
29. CCIR Line 330 . . . . . 200 ns ± 20 ns
30. UK ITS 1 . . . . . 200 ns ± 20 ns

SIGNAL CHROMINANCE CHARACTERISTICS

31. Chrominance Amplitude
    CCIR Line 331 . . . . . 140, 420, & 700 mV_{p-p}
32. Chromiance Amplitude
    75% Red . . . . . .663.8 mV
33. Chrominance Amplitude
    UK ITS 1 . . . . . 140 mV_{p-p}
34. Chrominance Amplitude
    UK ITS 2 . . . . . 700 mV_{p-p}
35. 75% Color Bars
    Phase Accuracy . . . . . within 3°
    Amplitude Accuracy . . . . . within 5%
36. SC/H Phase Accuracy
    within 4° typical
37. BLACK Phase Matching
    within 2°

FREQUENCY RESPONSE

38. TEST PATTERN Frequency Response
    Flat within 1% to 5 MHz
39. Group Delay . . . . . ≤ 5 ns to 5 MHz
40. Chrominance-to-Luminance Delay & Gain
    ≤ 5 ns & ± 1%
41. Differential Phase & Gain
    0.3° &0.6% maximum

ID CHECKS

42. Black Level Matching
    ± 5 mV referenced to TEST PATTERN blanking

VERTICAL INTERVAL CHECKS

43. Horizontal Sync Duration
    4.7 µs ± 50 ns
44. Vertical Serration Duration
    4.7 µs ± 50 ns
45. Equalizing Pulse Duration
    2.35 µs ± 50 ns

RETURN LOSS

46. Preparation for Return Loss Measurements

NOTE

All return loss checks will be measured in dB below this 5 MHz reference level.

47. GENLOCK Loop-through
48. TEST PATTERN and BLACK Outputs

LONG FORM PERFORMANCE CHECK

NOTE

Before proceeding with any of the Performance Checks make sure that the Character ID is disabled by moving J200 to the 1-2 position.

Changes from the Standard Instrument

NOTE

To obtain the range of signal levels required for the following tests, the GENLOCK loop-through of the TPG-625 must remain **UN-terminated**. *This results in an input signal which is 6 dB above nominal levels, or 6 dB above that indicated by the Step Attenuator. Subtracting the Attenuator reading from +6 will yield the true signal change, in dB, from nominal. Setting the Step Attenuator to read 6 (indicating 6 dB attenuation), then, results in a normal signal level.*

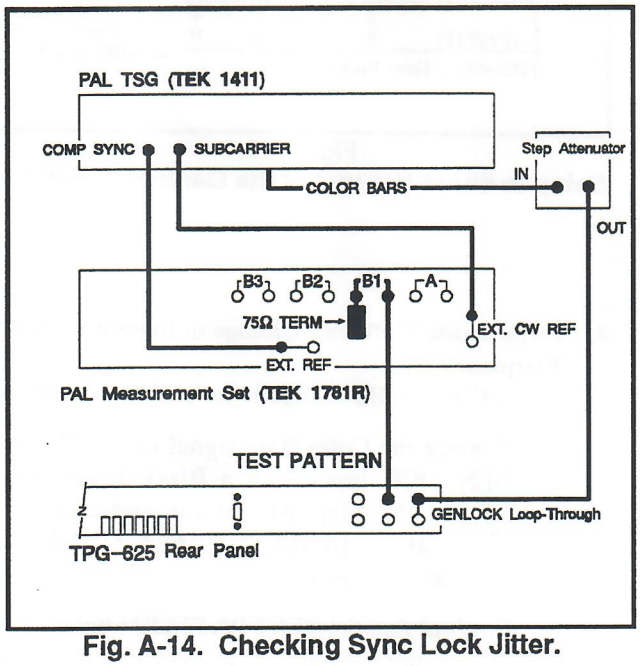


Fig. A-14. Checking Sync Lock Jitter.

SYNC LOCK

1. **Jitter**
   ≤ 10 ns

   a. Connect test equipment as in Fig. A-14.

   b. Select Color Bars with no burst from the PAL TSG.

   c. Use the 1781R PHASE SHIFT mode and variable Vector gain to normalize one of the burst vectors to the 0° position on the vector graticule. Press REFERENCE SET to zero the readout.

   d. Set the Step Attenuator to read 3 (+ 3 dB signal).

   e. **CHECK** — for ≤ 16° (10 ns) of jitter.

   f. Set the Step Attenuator to read 9 (– 3 dB signal).

   g. **CHECK** — for ≤ 16° (10 ns) of jitter.

BURST LOCK

2. **Phase Shift and Jitter with Change in Incoming Amplitude**
   ≤ 1° ϕ change for ± 3 dB sync or burst change
   ≤ 2° ϕ change for ± 6 dB sync or burst change
   ≤ 0.3° jitter for ± 3 dB sync or burst change
   ≤ 0.4° jitter for ± 6 dB sync or burst change

   a. Restore burst to the Color Bars signal at the PAL signal generator.

   b. With the attenuator set to 6 (nominal signal level), confirm that the TPG-625 burst vector remains normalized to 0°.

   c. Set the Step Attenuator to read 0 (+ 6 dB).

   d. **CHECK** — for typical jitter of ≤ 0.4°.

   e. **CHECK** — for ≤ 2° burst phase change.

   f. Set the Step Attenuator to read 3 (+ 3 dB).

g. **CHECK** — for typical jitter of ≤ 0.3°.

h. **CHECK** — for ≤ 1° burst phase change.

i. Set the Step Attenuator to read 9 (– 3 dB).

j. **CHECK** — for typical jitter of ≤ 0.3°.

k. **CHECK** — for ≤ 1° burst phase change.

l. Set the Step Attenuator to read 12 (– 6 dB).

m. **CHECK** — for typical jitter of ≤ 0.4°.

n. **CHECK** — for ≤ 2° burst phase change.

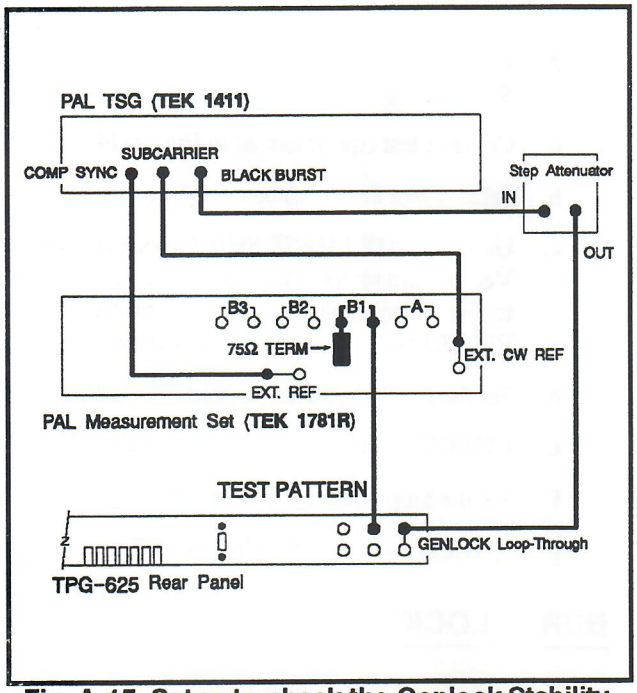


Fig. A-15. Setup to check the Genlock Stability with gross Input Amplitude Variations.

3. Genlock Stability with Gross Input Amplitude Variations

≤ 40° for Input Sync or Burst Amplitude Range of +7 dB to -12 dB

a. Connect the equipment as shown in Fig. A-15.

b. Display CH A and CH B1 in parade mode.

c. Set the attenuator for 6 dB (0 dB actual).

d. **CHECK** — that the TPG-625 is genlocked.

e. Use the voltage cursors to measure the amplitude of the sync or burst.

f. Set this level as 0 dB.

g. Adjust the voltage cursors until they are +7 dB. Set the cursors to track.

h. Set the Attenuator to 0 dB (6 dB high).

i. Use the variable amplitude control on the 1411 to adjust the amplitude of the Ch A signal to +7 dB (use the voltage cursors).

j. **CHECK** — that the TPG-625 is genlocked.

k. Set the attenuator for 18 dB (12 dB down).

l. **CHECK** — that the TPG-625 is genlocked.

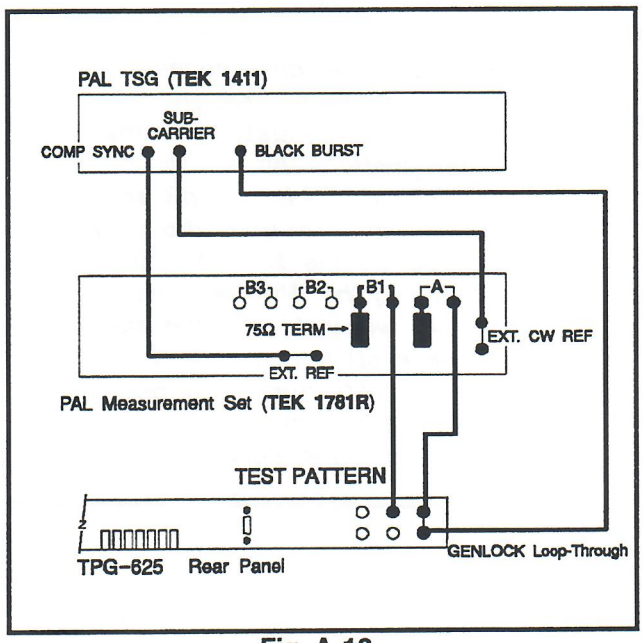


Fig. A-16.
Setup to check the rest of the Genlock functions.

4. Burst Phase Shift with Change in Incoming Burst Frequency

≤ 1° for 20 Hz change in incoming subcarrier

a. Replace the Color Bars signal to the TPG-625 GENLOCK Input with a Black Burst signal. Bypass the Step Attenuator and connect a termination to the TPG-625 GENLOCK loop-through (see Fig. A-16).

b. Confirm that the TEST PATTERN burst vector remains normalized to 0° dϕ. Readjust the 1781R if necessary.

c. Offset the frequency of the Black Burst Genlock input by + 20 Hz.

d. **CHECK** — that the TPG-625 re-acquires lock.

e. **CHECK** — that burst phase has shifted ≤ 1°.

f. Offset the Genlock input frequency by – 20 Hz.

g. **CHECK** — that the TPG-625 re-acquires lock.

h. **CHECK** — that burst phase has shifted ≤ 1°.

i. Reset the input frequency to zero offset.

5. **Phase Shift with Change in Incoming APL**
≤ 1° over 10% to 90% APL

a. Replace the Black Burst GENLOCK input with a Variable Amplitude Flat Field (or Bounce) signal locked to the field rate.

b. Vary the Flat Field signal between 10% and 90% Peak White.

c. **CHECK** — for a burst phase change of ≤ 1° after each bounce.

GENLOCK AND SYNC TIMING

6. **Genlock Timing Range (Coarse)**
≈ 7 µs advance and delay

a. Connect test equipment as shown in Fig. A-16.

b. Set the waveform monitor to overlay CH A (GENLOCK INPUT) and CH B1 (TEST PATTERN).

c. At the TPG-625 front panel, advance and delay the TEST PATTERN output as far as it will go (with the coarse timing buttons).

d. **CHECK** — that the TEST PATTERN advances and delays approximately 7 µs relative to the GENLOCK input (CH A).

e. Replace the TEST PATTERN with BLACK on CH B1 and repeat steps c and d.

7. **Vertical Timing Range**
up to 2 lines advance and 1 line delay

a. Connect the test equipment as shown in Fig. A-16.

b. Set the waveform monitor to: external reference, two field display, full horizontal magnification (display five or six lines).

c. Adjust the trace on the waveform monitor to display where transitions between signals occur.

d. Move jumpers J887 and J987 according to the following table:

Table A-4. Vertical timing jumper placement.

J887	J987	RESULT
1-2	1-2	0 (no change)
1-2	2-3	1 line delay
2-3	1-2	2 lines advance
2-3	2-3	1 line advance

e. **CHECK** — that the lines are advanced and delayed according to Table A-4.

8. **Genlock Timing Range (Fine)**
≈ 55° advance and delay

a. Use the same equipment setup as in the previous check, only display the signal on the vectorscope.

b. Adjust the phase control on the waveform monitor as needed to set the burst vector to 0° (or any convenient reference point).

c. At the TPG-625 front panel, use the Fine Advance and Delay genlock controls to advance and delay the signal as much as possible.

d. **CHECK** — that the FINE button advances and delays the signal about 55° on the vectorscope.

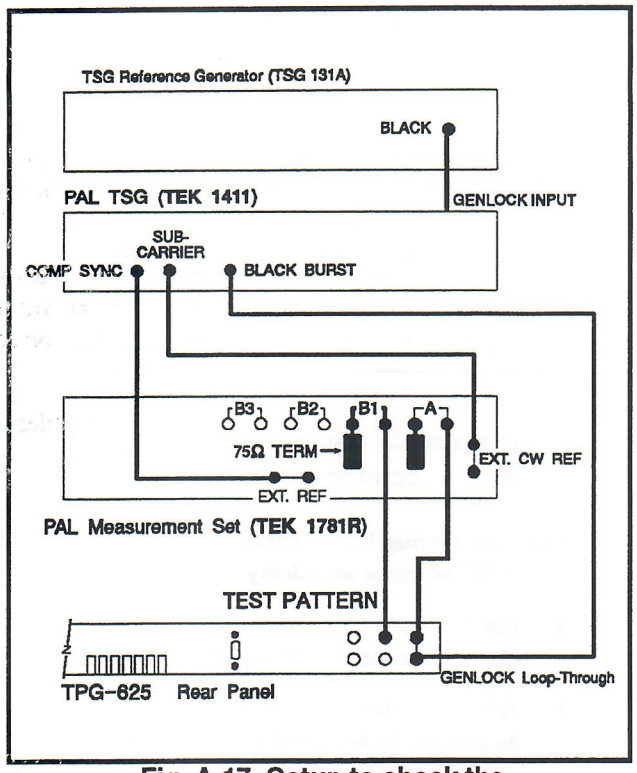


Fig. A-17. Setup to check the Color Framing Decisions.

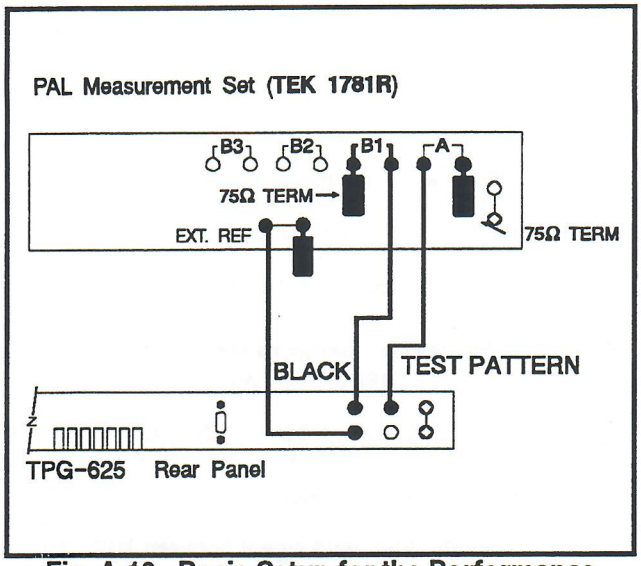


Fig. A-18. Basic Setup for the Performance Checks.

9. **Color Framing Decisions**
   Correct for input SC/H of 0° ± 40°

   a. Connect the equipment as shown in Fig. A-17.

   b. Set the attenuator to 6 dB (0 dB).

   c. Set the SCH adjustment on the 1411 to 0°.

   d. Display CH A and CH B1 on the vectorscope in overlay mode.

   e. Make sure that the TPG-625 is set to external reference.

   f. Slowly adjust the SCH phase on the 1411 ± 40°.

   g. **CHECK** — that the SCH vector for the TPG-625 stays in the same color frame as the 1411's black burst signal. (If it changes color framing it will "jump" 90°.)

   h. **CHECK** — that the signal does change color frames ("jumps") after the SCH is adjusted beyond 40° but before 90°.

BLANKING LEVELS

10. **TEST PATTERN Blanking Level**
    0 mV ± 50 mV

    a. Connect the equipment as shown in Fig. A-18.

    b. Set the waveform monitor to display the TEST PATTERN signal (CH A).

    c. Switch the waveform monitor to ground-coupled.

    d. Set the ground line to a convenient reference graticule to establish a 0 V reference.

    e. Return to DC coupling.

    f. **CHECK** — that the blanking level is within 50 mV of the established reference graticule.

11. **BLACK Blanking Level**
    0 mV ± 5 mV

    a. Connect the equipment as shown in Fig. A-18.

    b. Set the waveform monitor to display the BLACK signal (CH B1).

    c. Switch the waveform monitor to ground-coupled.

    d. Set the ground line to a convenient reference graticule to establish a 0 V reference.

    e. Return to DC coupling.

f. **CHECK** — that the blanking level is within 5 mV of the established reference graticule.

g. Repeat for the other BLACK output.

LUMINANCE AMPLITUDE LEVELS

12. Luminance Amplitude
CCIR Line 331 . . . . . 350 mV ± 1%

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of CCIR Line 331. Use the PIX display as an aid to finding the correct line. (Line 50 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the signal amplitude is 350 mV ± 1%.

13. Luminance Amplitude
CCIR Line 18 White Reference Bar
. . . . . 560 mV_{p-p} ± 1%

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of CCIR Line 18. Use the PIX display as an aid to finding the correct line. (Line 60 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the signal amplitude is 560 mV ± 1%.

14. Luminance Amplitude
50% Flat Field . . . . . .350 mV± 1%

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of 50% Flat Field. Use the PIX display as an aid to finding the correct line. (Line 120 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the signal amplitude is 350 mV ± 1%.

15. Luminance Amplitude
UK ITS 2 Pedestal . . . . . .350 mV± 1%

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of UK ITS 2. Use the PIX display as an aid to finding the correct line. (Line 60 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the pedestal amplitude is 350 mV ± 1%.

16. BLACK Sync Amplitude
300 mV ± 3 mV

a. Connect the test equipment as in Fig. A-18.

b. Turn off line select mode.

c. Select WFM+CAL and CH B1 INPUT.

d. **CHECK** — using WFM+CAL, for a sync amplitude of 300 mV ± 3 mV (1%).

17. BLACK Glitch Amplitude
< 20 mV

a. Connect the test equipment as in Fig. A-18.

b. Turn off line select mode.

c. Select CH B1 INPUT.

d. **CHECK** — using the voltage cursors or the graticule that the glitches on the Black Burst signal are < 20 mV.

18. BLACK Burst Amplitude
300 mV ± 6 mV

a. Connect the test equipment as in Fig. A-18.

b. Select WFM+CAL and CH B1 INPUT.

c. Turn off line select mode.

d. **CHECK** — using WFM+CAL, for a peak-to-peak burst amplitude of 300 mV ± 6 mV (2%).

19. TEST PATTERN Sync Amplitude
300 mV ± 3 mV

a. Connect the test equipment as in Fig. A-18.

b. Select WFM+CAL and CH A INPUT.

c. **CHECK** — using WFM+CAL, for a sync amplitude of 300 mV ± 3 mV (1%).

20. TEST PATTERN Luminance Amplitude
700 mV ± 7 mV

a. Connect the test equipment as in Fig. A-18.

b. Turn off line select mode.

c. Select WFM+CAL and CH A INPUT.

d. **CHECK** — that the White Level of the lower waveform matches the Blanking Level of the upper waveform within 7 mV.

21. TEST PATTERN Burst Amplitude
300 mV ± 6 mV

a. Connect the test equipment as in Fig. A-18.

b. Turn off line select mode.

c. Select WFM+CAL and CH A INPUT.

d. **CHECK** — for a peak-to-peak burst amplitude of 300 mV ± 6 mV (2%).

22. Linearity Error
≤1%

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of CCIR Line 17l. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 25 has the correct signal.)

d. Display CCIR Line 17 on the waveform monitor using the DIFF filter.

e. **CHECK** — for < 1% variation in the step spikes.

LUMINANCE RISE TIME CHECKS

23. Luminance Rise Time
CCIR Line 17 . . . . . 192.9 ns ± 20 ns

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the CCIR Line 17 signal. Use the PIX display as an aid to finding the correct line. (Line 25 has the correct signal.)

d. Use the horizontal magnification to expand on one of the luminance rises.

e. Use the variable vertical gain to adjust the amplitude of the rise to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the rise time from 100 mV to 900 mV is 192.9 ns ± 20 ns.

24. Luminance Rise Time
CCIR Line 330 . . . . . 192.9 ns ± 20 ns

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of CCIR Line 330. Use the PIX display as an aid to finding the correct line. (Line 40 has the correct signal.)

d. Use the horizontal magnification to expand on one of the luminance rises.

e. Use the variable vertical gain to adjust the amplitude of the rise to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the rise time from 100 mV to 900 mV is 192.9 ns ± 20 ns.

25. Luminance Rise Tise
CCIR Line 331 . . . . . 192.9 ns ± 20 ns

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of CCIR Line 331. Use the PIX display as an aid to finding the correct line. (Line 50 has the correct signal.)

d. Use the horizontal magnification to expand on one of the luminance rises.

e. Use the variable vertical gain to adjust the amplitude of the rise to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the rise time from 100 mV to 900 mV is 192.9 ns ± 20 ns.

26. Luminance Rise Time
UK ITS 1 . . . . . 192.9 ns ± 20 ns

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of UK ITS 1. Use the PIX display as an aid to finding the correct line. (Line 290 has the correct signal.)

d. Use the horizontal magnification to expand on one of the luminance rises.

e. Use the variable vertical gain to adjust the amplitude of the rise to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the rise time from 100 mV to 900 mV is 192.9 ns ± 20 ns.

27. Sync Rise Time . . . . . 250 ns ± 25 ns

a. Connect the equipment as shown in Fig. A-18.

b. Take the waveform monitor out of line select mode.

c. Use the horizontal and vertical magnification to display the sync on the full screen with 1000 mV_{p-p} amplitude.

d. **CHECK** — using the timing cursors, that the time between the 100 mV and 900 mV points is 250 ns ± 25 ns.

PULSE HADs

28. CCIR Line 17 . . . . . 200 ns ± 20 ns

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of CCIR Line 17. Use the PIX display as an aid to finding the correct line. (Line 30 has the correct signal.)

d. Use the horizontal magnification to expand on one of the pulses.

e. Use the variable vertical gain to adjust the amplitude of the pulse to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the time between the 500 mV points of the pulse is 200.0 ns ± 20 ns.

29. CCIR Line 330 . . . . . 200 ns ± 20 ns

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of CCIR Line 330. Use the PIX display as an aid to finding the correct line. (Line 180 has the correct signal.)

d. Use the horizontal magnification to expand on one of the pulses.

e. Use the variable vertical gain to adjust the amplitude of the pulse to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the time between the 500 mV points of the pulse is 200.0 ns ± 20 ns.

30. UK ITS 1 . . . . . 200 ns ± 20 ns

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of UK ITS 1. Use the PIX display as an aid to finding the correct line. (Line 150 has the correct signal.)

d. Use the horizontal magnification to expand on one of the pulses.

e. Use the variable vertical gain to adjust the amplitude of the pulse to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the time between the 500 mV points of the pulse is 200.0 ns ± 20 ns.

SIGNAL CHROMINANCE CHARACTERISTICS

31. Chrominance Amplitude
CCIR Line 331 . . . . . 140, 420, & 700 mV_{p-p}

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of CCIR Line 331. Use the PIX display as an aid to finding the correct line. (Line 50 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the chrominance amplitude is 140, 420, & 700 mV_{p-p} ± 2%.

32. Chrominance Amplitude
75% Red . . . . . .663.8 mV

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of 75% Red. Use the PIX display as an aid to finding the correct line. (Line 100 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the chrominance amplitude is 663.8 mV_{p-p} ± 2%.

33. Chrominance Amplitude
UK ITS 1 . . . . . 140 mV_{p-p}

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of UK ITS 1. Use the PIX display as an aid to finding the correct line. (Line 290 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the chrominance amplitude is 140 mV_{p-p} ± 2%.

34. Chrominance Amplitude
UK ITS 2 . . . . . 700 mV_{p-p}

a. nnect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of UK ITS 2. Use the PIX display as an aid to finding the correct line. (Line 300 has the correct signal.)

d. **CHECK** — using WFM+CAL, that the chrominance amplitude is 700 mV_{p-p} ± 2%.

35. 75% Color Bars
Phase Accuracy . . . . . within 3°
Amplitude Accuracy . . . . . within 5%

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the 75% Color Bars signal. Use the PIX display as an aid to finding the correct line. (Line 80 has the correct signal.)

d. Display the signal on the vectorscope.

e. Return the horizontal and vertical magnification to nominal.

f. Use the phase adjustment to align the vectors to their boxes, if necessary.

g. **CHECK** — that the vectors are all within their small boxes (phase is within 3° and amplitude is within 5%).

36. SC/H Phase Accuracy . . . . . within 4° typical

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line of CH A and set the left display to SC/H.

c. Take the waveform monitor out of line select mode.

d. Make sure that the waveform monitor is internally referenced.

e. **CHECK** — that the SC/H is within 4°.

37. BLACK Phase Matching . . . . . within 2°

a. Begin with the equipment setup shown in Fig. 5-18. Select CH A input (TEST PATTERN).

b. Confirm that the 1781R is set to EXT CW Sync, then exit the Configure menu to view the vector display.

c. Select Phase Shift and align the burst vectors to 0° and 90° on the vector graticule. Press the Reference Set button to zero the phase. Adjust

Vector Gain to normalize the 0° vector to the vector graticule.

d. At the rear panel of the TPG-625, move the cable from the TEST PATTERN output to the lower BLACK output (see Fig. 5-19).

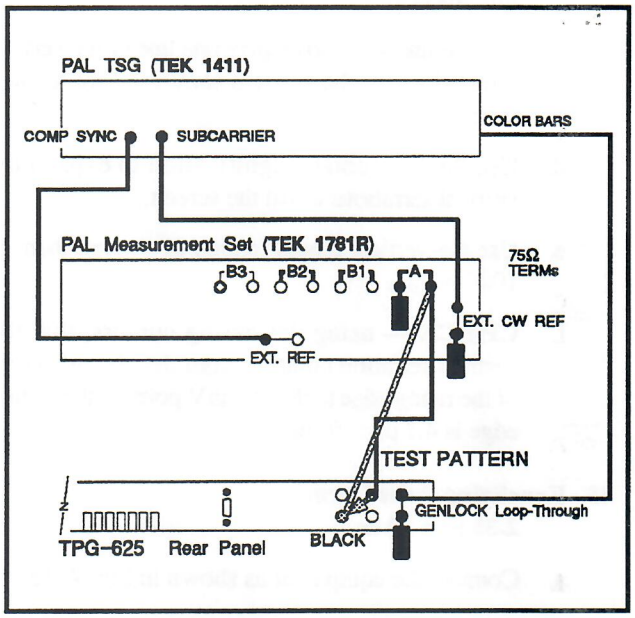


Fig. 5-19. Move the cable as shown to measure the BLACK.

e. **CHECK** — on the vector display, that the black burst vector is within ± 2° of the 0° graticule.

f. Repeat for the other BLACK outputs.

g. Replace BLACK with TEST PATTERN on the waveform monitor's CH A input (return the equipment to the setup shown in Fig. 5-18).

FREQUENCY RESPONSE

38. TEST PATTERN Frequency Response . . . . . Flat within 1% to 5 MHz

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Multipulse signal. Use the PIX display as an aid to finding the correct line. (Line 260 has the correct signal.)

d. **CHECK** — using the voltage cursors or WFM+CAL feature, that the pulses are the same heighth within 1% out to 5 MHz (last pulse).

39. Group Delay . . . . . ≤ 5 ns to 5 MHz

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

c. Use the line select to display one line (of all fields) of the Multipulse signal. Use the PIX display as an aid to finding the correct line. (Line 260 has the correct signal.)

d. Use the 1781R's internal C-Y gain and delay measurement to find the C-Y delay of each of the 10T pulses.

e. **CHECK** — that the maximum delay of any of the pulses is ≤ 5 ns.

40. Chrominance-to-Luminance Delay & Gain . . . . . ≤ 5 ns & ± 1%

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode.

c. Use the line select to display CCIR Line 17 (located on line 25).

d. Use the 1781R's internal C-Y gain and delay measurement to find the C-Y delay and gain of the 20T Modulated Pulse.

e. **CHECK** — that the C-Y delay is < 5 ns and the gain is within 1%.

41. Differential Phase & Gain . . . . . 0.3° &0.6% maximum

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode.

c. Use the line select to display CCIR Line 330 (located on line 40).

d. Use the 1781R's internal diff phase and diff gain measurement to measure the differential phase and gain.

e. **CHECK** — that the diff phase is ≤ 0.3° and the diff gain is ≤ 0.6%.

ID CHECKS

42. Black Level Matching
± 5 mV referenced to TEST PATTERN blanking

a. Connect the equipment as shown in Fig. A-18.

b. Enable the ID display by putting jumper J200 in the 1-2 position.

c. Set the waveform monitor to display one line in the line select mode and set the left display to picture (PIX).

d. Use the line select to display one line (of all fields) of the ID signal. Use the PIX display as an aid to finding the correct line. (Fig. 1-1 on page 1-3 is also a useful guide to signal locations.) (Line 50 has the correct signal.)

e. **CHECK** — that the black level of the ID is within 5 mV of the rest of the Test Pattern signal.

VERTICAL INTERVAL CHECKS

43. Horizontal Sync Duration
4.7 µs ± 50 ns

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display two lines.

c. Turn the line select off.

d. Use the horizontal magnification to expand the sync to fill the screen.

e. Use the vertical magnification to expand the sync to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the sync duration from the 500 mV point of the falling edge to the 500 mV point of the rising edge is 4.7 µs ± 50 ns.

44. Vertical Serration Duration
4.7 µs ± 50 ns

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode.

c. Use the line select to display one line of the vertical interval where the vertical serrations are located (line 2).

d. Use the horizontal magnification to expand the vertical serrations to fill the screen.

e. Use the vertical magnification to expand them to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the vertical serration duration from the 500 mV point of the rising edge to the 500 mV point of the falling edge is 4.7 µs ± 50 ns.

45. Equalizing Pulse Duration
2.35 µs ± 50 ns

a. Connect the equipment as shown in Fig. A-18.

b. Set the waveform monitor to display one line in the line select mode.

c. Use the line select to display one line of the vertical interval where the equalizing pulses are located (Line 4).

d. Use the horizontal magnification to expand one equalizing pulse to fill the screen.

e. Use the vertical magnification to expand it to 1000 mV_{p-p}.

f. **CHECK** — using the timing cursors, that the duration from the 500 mV point of the falling edge to the 500 mV point of the rising edge is 4.7 µs ± 50 ns.

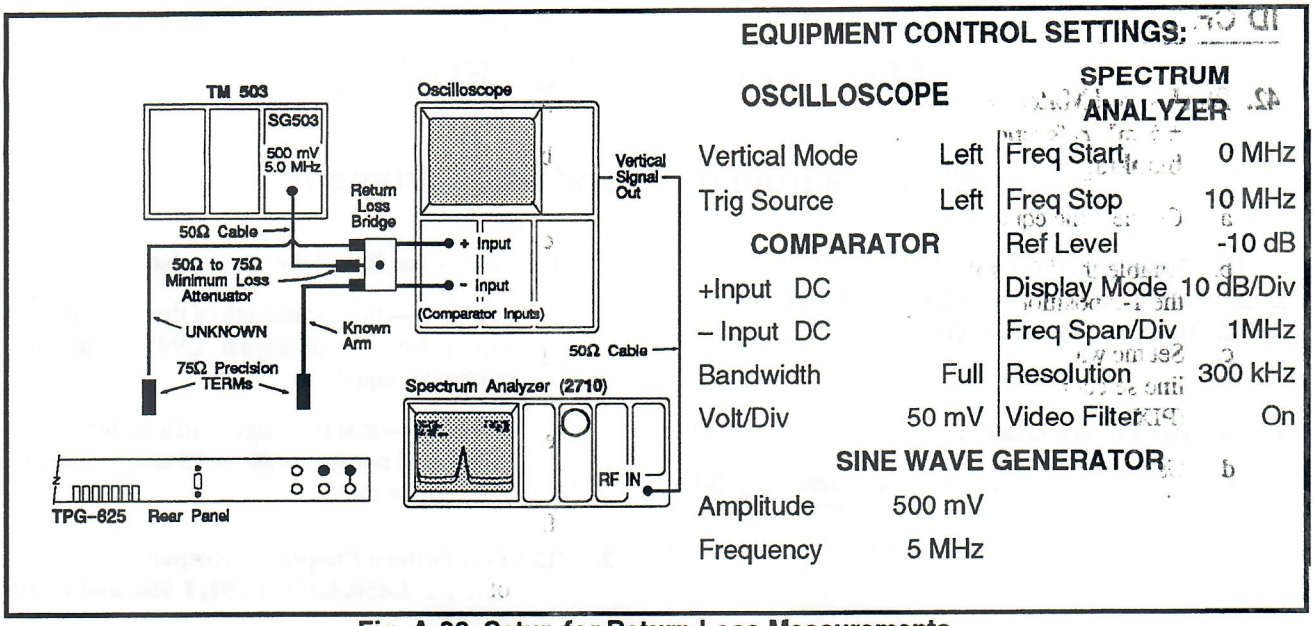


Fig. A-20 Setup for Return Loss Measurements.

RETURN LOSS

46. Preparation for Return Loss Measurements

a. Connect the equipment as shown in Fig. A-20.

b. With both precision terminators connected, adjust the Return Loss Bridge to null the 5 MHz response displayed on the spectrum analyzer.

c. Remove the terminator from the UNKNOWN cable.

d. Place the peak of the displayed 5 MHz response at the top line of the graticule by choosing "marker to reference level" from the MKR/FREQ menu of the 2710.

NOTE

All return loss checks will be measured in dB below this 5 MHz reference level.

47. GENLOCK Loop-through

a. Connect the 75Ω precision term to one of the TPG-625 GENLOCK loop-through connectors.

b. Connect the UNKNOWN cable to the other TPG-625 GENLOCK loop-though connector.

c. **CHECK** — that the return loss is > 40 dB (4 major divisions) as the SG503 frequency is varied between 5 MHz and 500 kHz.

48. TEST PATTERN and BLACK Outputs

a. Move jumper J440 (Analog board) to pins 2 and 3 to disable the TEST PATTERN.

b. Connect the UNKNOWN cable to the TEST SIGNAL output.

c. **CHECK** — that the return loss is > 36 dB as the SG503 frequency is varied between 5 MHz and 500 kHz.

d. Connect the UNKNOWN cable to the top BLACK output.

e. **CHECK** — that the return loss is > 36 dB as the SG503 frequency is varied between 5 MHz and 500 kHz.

f. Move the UNKNOWN cable to the other BLACK outputs and repeat step e.

g. Remove the UNKNOWN cable from the BLACK output and return J440 to pins 1 and 2.

ADJUSTMENT PROCEDURE

Changes from the Standard Instrument

The Adjustment Procedure for the option 01 is the same as the standard instrument with the exception of steps 8, 11, and 12. The revized steps are given below.:

1. **(8.) Test Pattern Gain R939**

   a. Begin with the 1781R Reference Setup (Fig. 5-11). Replace BLACK with TEST PATTERN on CH A. Select WFM+CAL display and CH A input (TEST PATTERN).

   b. Select Fixed CAL (700 mV).

   c. Display one line of CCIR Line 330 (line 180).

   d. Adjust R939 to match the White Level of the lower waveform to the Blanking Level of the upper waveform (700 mV).

2. **(11.) Test Pattern Frequency Response C945**

   a. Begin with the 1781R Reference Setup (Fig. 5-11).

   b. Display CH A in the line select mode, with one line of CCIR Line 18 (Multiburst) selected.

   c. Adjust C945 for as flat a frequency response as possible (1%).

   d. Display one line of the Multipulse.

   e. **CHECK** — that the heighth of the pulses are equal within 1%. If not adjust C945 to make the amplitudes equal.

   f. **CHECK** — that the burst is still within 6 mV os 300 mV. If not repeat steps 10 and 11 until both specs can be met.

3. **(12.) Test Pattern Frequency Response . . . . . L450, L550, L551, L650, and L750**

   a. Begin with the 1781R Reference Setup (Fig. 5-11).

   b. Display CH A in the line select mode, with one line of CCIR Line 18 (Multiburst) selected.

   c. Adjust L450, L550, L551, L650, and L750 for as flat a frequency response as possible (1%).

   d. Display one line of the Multipulse.

   e. **CHECK** — that the heighth of the pulses are equal within 1%. If not adjust L450 and L550 to make the amplitudes equal.

   f. Repeat Adjustments #10 and #11.

MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Since the change information sheets are carried in the manual until all changes are permanently entered, some duplication may occur. If no such change pages appear following this page, your manual is correct as printed.