Instruction Manual

Tektronix

SPG 271
PAL Sync Generator

070-6814-02

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

For further information, contact: Tektronix, Inc., Corporate Offices, P.O. Box 1000, Wilsonville, OR 97070-1000. Phone: (503) 627–7111; TLX: 192825; TWX: (910) 467–8708; Cable: TEKWSGT.

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General Safety Summary

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

Only qualified personnel should perform service procedures.

To Avoid Fire or Personal Injury

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

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

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

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

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

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

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

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

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

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

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

Symbols and Terms

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

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

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

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

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

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

CAUTION indicates a hazard to property including the product.

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

Service Safety Summary

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

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

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

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

To avoid electric shock, do not touch exposed connections.

SECTION 1
INTRODUCTION

SPG-271 PAL SYNC GENERATOR

The SPG-271 is a PAL color bar and sync pulse generator. Featuring a unique digital architecture and innovative technology, the SPG-271 offers:

- Precise 12-bit digitally derived test signals.
- SCH phase accuracy, guaranteed by the use of a single DAC.
- Stable internal reference, ideal for master sync operation.
- Reliable slave operation through the use of digital genlock.
- Separate front panel genlock and sync timing controls.

Color Bars

The SPG-271 uses digital signal generation and a precision 12-bit DAC to ensure signal accuracy and long-term stability. Digital generation of the composite PAL signal, without analog modulators, allows use of a single DAC to inherently match chrominance and luminance timing. This ensures accurate SCH phasing. With the SPG-271's simple front-panel controls either 75% or 100% color bars are available.

Both the color bars and the black burst outputs include a white pulse inserted on line 7 of field 1 for color-frame identification.

Sync Generator with Digital Genlock

The SPG-271 Sync Generator's stable color standard and unique digital genlock make it ideal for either master or slave operation. All outputs are correctly SCH phased, even if the SPG-271 is locked to an improperly SCH phased reference input. The digital genlock calculates sync timing and subcarrier phase to properly identify color-framing of the reference signal. The SPG-271 automatically senses composite video reference input and will automatically switch to its own internal reference in the absence of a reference input signal.

With its constant temperature oven, the high-stability crystal oscillator ensures long term frequency stability.

Flexible Timing Controls

Front-panel controls allow phasing of all outputs relative to the genlock source. In addition, a separate set of timing controls move the pulse outputs relative to the black burst and test signal outputs. This simplifies system timing and eliminates delay lines. All timing settings are stored in non-volatile memory to prevent loss in the case of a power failure. A front-panel lockout feature prevents inadvertent changes to the front-panel controls.

Remote Control

Remote operation of the test signal selection, genlock timing presets, and ID presets are available by simple ground closure controls through a rear-panel connector.

Packaging

The SPG-271's rugged 1-3/4 inch package makes it ideal for outside broadcast vans, or anywhere space is a premium.

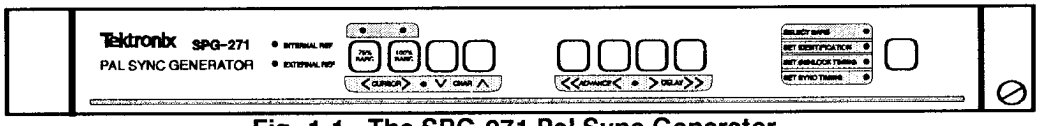


Fig. 1-1. The SPG-271 Pal Sync Generator.

SECTION 2
OPERATING INSTRUCTIONS

This section explains how to operate the SPG-271. It also describes each of the test signals and the rear-panel connector outputs.

CONTROLS, INDICATORS, AND CONNECTORS

FRONT-PANEL CONTROLS

Nine click-dome switches control the SPG-271 (See Fig. 2-1).

The MODE SELECT switch on the far right selects the operating mode: OFF, SELECT BARS, SET IDENTIFICATION, SET GENLOCK TIMING, and SET SYNC TIMING.

There are also eight multifunction switches which perform different functions depending upon the Operating Mode selected by the MODE SELECT switch. See Fig. 2-2.

INDICATORS

There are ten LED indicator lamps on the front-panel. They indicate what mode the instrument is in. The set of four LEDs on the far right indicate the Operating Mode. If none of these LEDs are lit then the instrument is in the OFF mode.

The LED under the right set of four switches indicates that these buttons are operating. This LED should only be lit in conjunction with either the SET GENLOCK TIMING or SET SYNC TIMING Operating Mode LED.

The LED under the left set of switches indicates that these buttons are operating in the SET IDENTIFICATION Mode. This LED should only be lit in conjunction with the SET IDENTIFICATION Operating Mode LED.

The two LEDs above the two far left buttons indicate that they are operating in the SELECT BARS mode and only one of them should be lit at a time depending upon which bars (75% or 100%) is selected. These LEDs should either be lit in conjunction with the SELECT BARS Operating Mode LED or alone in the OFF Mode simply indicating which signal is available at the TEST SIGNAL Output.

The far left set of LEDs indicates whether the SPG-271 is operating in the genlocked external reference state or using its internally generated clock as the reference.

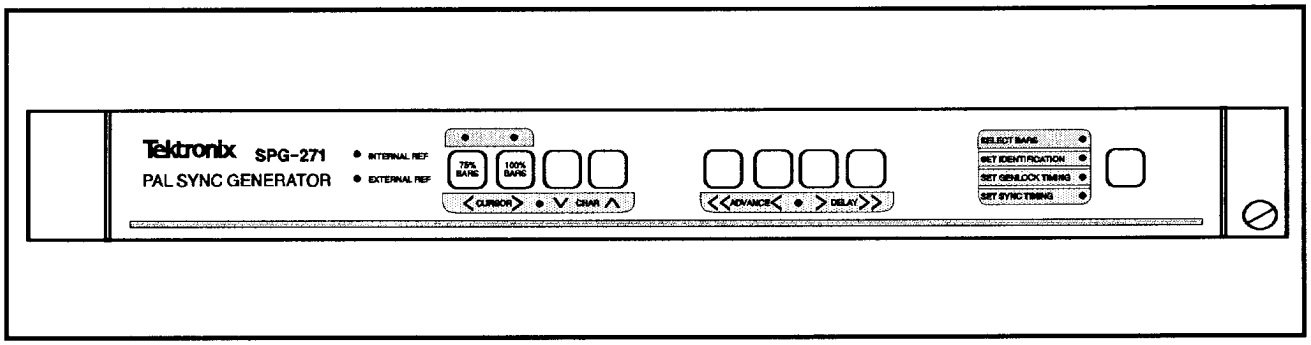
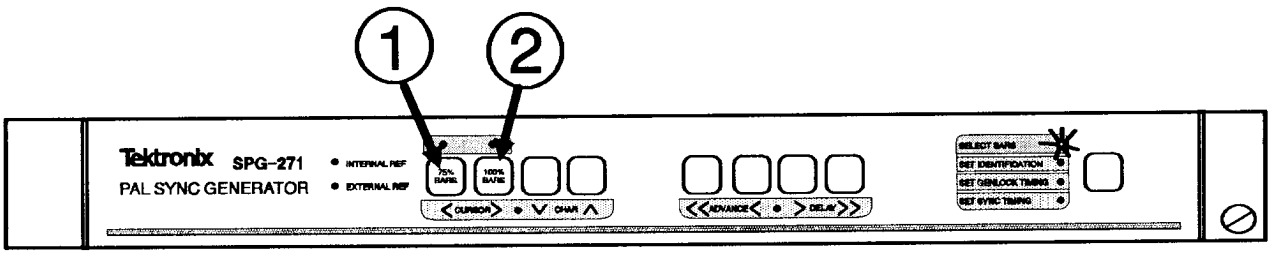
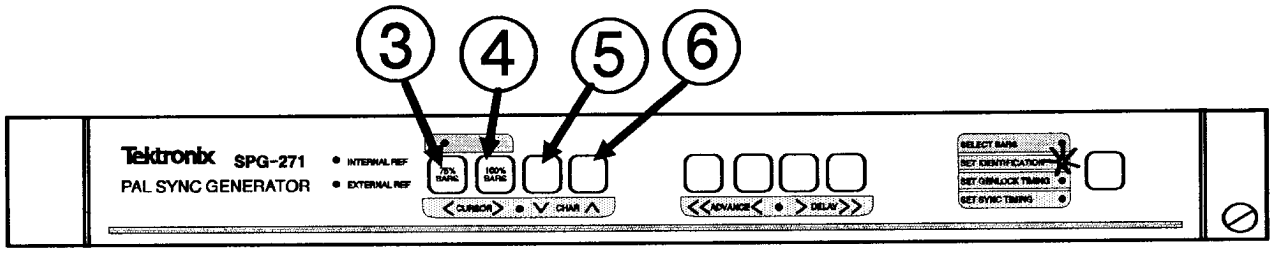


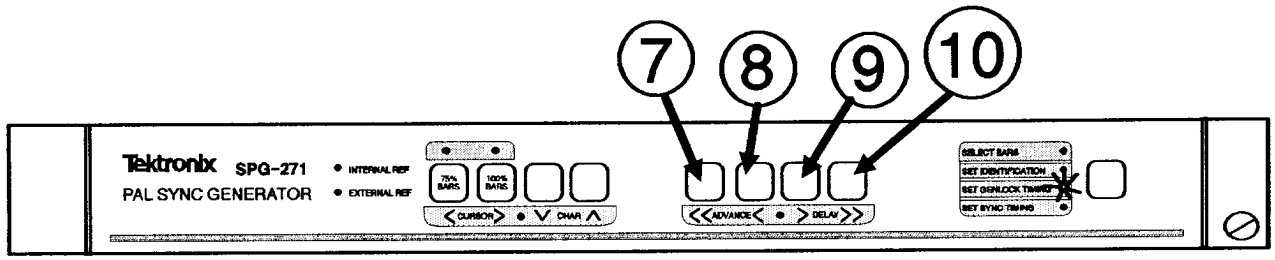
Fig. 2-1. SPG-271 Front Panel.



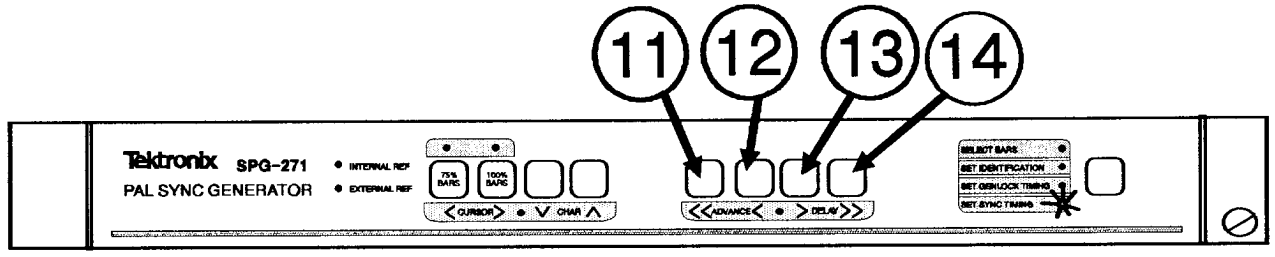
1. 100% BARS SIGNALS
2. 75% BARS SIGNALS



3. CURSOR LEFT
4. CURSOR RIGHT
5. CHARACTER DOWN
6. CHARACTER UP



7. COARSE GENLOCK ADVANCE
8. FINE GENLOCK ADVANCE
9. FINE GENLOCK DELAY
10. COARSE GENLOCK DELAY



11. COARSE SYNC TIMING ADVANCE
12. FINE SYNC TIMING ADVANCE
13. FINE SYNC TIMING DELAY
14. COARSE SYNC TIMING DELAY

Fig. 2-2. Switch functions in the four operating modes.

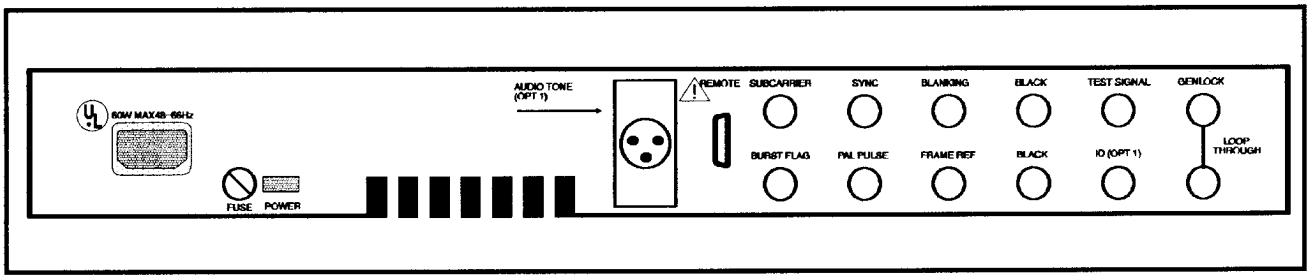


Fig. 2-3. The rear panel of the SPG-271.

REAR-PANEL CONNECTORS

The rear-panel has twelve BNC video connectors, one 9-pin remote control connector, one audio XLR connector, and one power socket. Fig. 2-3 shows the rear panel, and Table 2-1 shows the rear panel outputs.

REAR-PANEL CONTROLS

POWER - ON/OFF push-push switch.

USING THE CONTROLS

OPERATING MODES

OFF Mode

The instrument is powered up in the OFF mode (none of the MODE SELECT LEDs will be on). Only the MODE SELECT switch is enabled, providing a simple lockout to prevent inadvertent changes in the instrument setup.

Table 2-1. Rear Panel Connector Outputs.

CONNECTOR	STANDARD SIGNAL	OPTIONAL SIGNAL (Jumper Selectable)
GENLOCK LOOP-THROUGH	Genlock Input	--------
TEST SIGNAL	Test Signal Output	--------
ID (OPT. 1)	Selected Test Signal with Character ID.	--------
BLACK	Black Burst	--------
BLANKING	Composite Blanking	--------
FRAME REF	Field Reference Pulse	Color Frame Squarewave or Composite Sync -2V, -4V, or TTL level
SYNC	Composite Sync	-2 V or -4 V level
PAL PULSE	H/2 Square Wave	-2 V or -4 V level
SUBCARRIER	4.433 MHz Color Subcarrier	--------
BURST FLAG	Burst Flag	-2 V or -4 V level
AUDIO TONE (OPT. 1)	1000 Hz	500 Hz Jumper selectable ID click. Click rate variable between 0.2 and 4 Hz.

SELECT BARS Mode

In this mode, the two leftmost switches select between 75% and 100% color bars. To get into this mode, press the MODE SELECT switch on the far right of the front-panel until the SELECT BARS LED is lit. (See Fig. 2-4.)

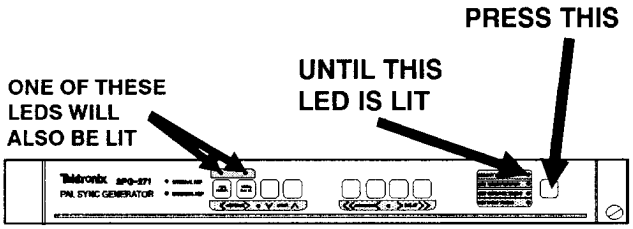


Fig. 2-4. How to put the SPG-271 in Select Bars mode.

SET GENLOCK TIMING Mode

In the SET GENLOCK TIMING mode, the four right switches shift the timing of the test and sync pulse signals together with respect to the Genlock Input.

While the front panel is in this mode, the four right switches assume the following functions (from left to right): Coarse Genlock Advance, Fine Genlock Advance, Fine Genlock Delay, and Coarse Genlock Delay.

Fine Genlock Advance and Fine Genlock Delay provide adjustment of genlock test signals and sync timing over a total timing range of about $\pm 55^{\circ}$ in 0.2° steps. Coarse Genlock Advance and Coarse Genlock Delay provide coarse adjustment over a total range of approximately $\pm 7\ \mu$sec in 28 ns (45°) steps. Arrows below the switches indicate the direction (advance or delay) and amount of timing offset.

Setting Genlock Timing

To adjust genlock timing, first press the MODE SELECT switch until the SET GENLOCK TIMING LED is lit. Note the red LED under the right four switches indicates that these switches now control genlock timing. (See Fig. 2-5.)

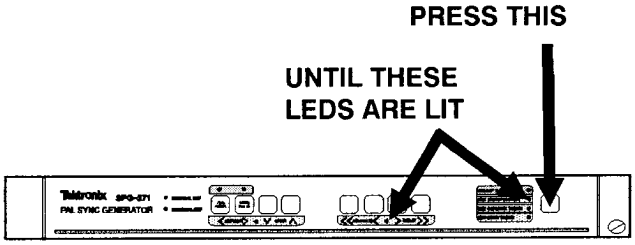


Fig. 2-5.
How to put the SPG-271 in the Set Genlock Timing mode.

To advance genlock timing, press the Fine Genlock Advance switch for fine increments of advance (steps of 0.2°) or press the Coarse Genlock Advance switch for coarse increments (steps of 45°). To delay genlock timing, press and hold down the Fine Genlock Timing switch for fine increments of delay or press the Coarse Genlock Delay switch for coarse increments of delay. (See Fig. 2-6.)

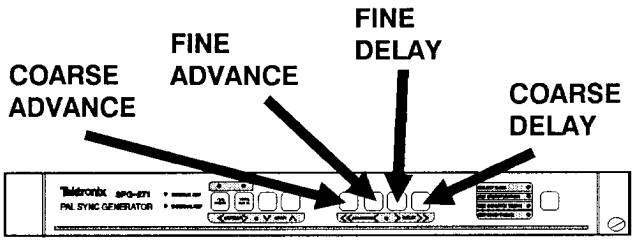


Fig. 2-6.
How to advance and delay the genlock timing.

If the end of the fine adjustment range is reached and more adjustment is needed, push the coarse adjustment switch to change the phase by a whole coarse step. If the introduces more change than is desired, then press the opposite fine switch to reduce the amount of desired change.

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.

If a timing selection is not made within 30 seconds of entering the SET GENLOCK TIMING Mode, the front panel automatically reverts to the OFF mode.

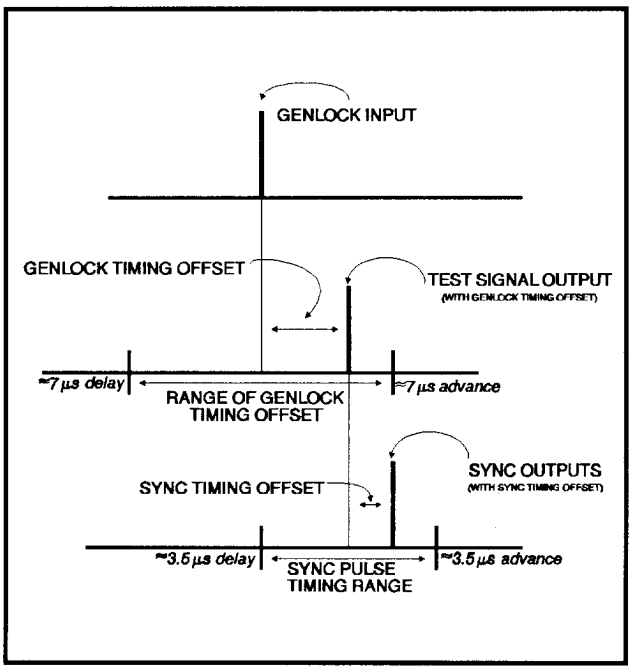


Fig. 2-7. Relative Timing.

Storing Genlock Setting

The front panel will automatically store the genlock timing when returning to the OFF Mode, through either 30 second time-out or cycling with the MODE SELECT switch to the OFF Mode.

SET SYNC TIMING Mode

In the SET SYNC TIMING Mode, the four right switches advance or delay the generator's sync pulse outputs relative to the test signal output. (Fig. 2-7 shows this timing relationship.) While the front-panel is in SET SYNC TIMING Mode, these switches take on the following functions (from left to right): Coarse Sync Timing Advance, Fine Sync Timing Advance, Fine Sync Timing Delay, and Coarse Sync Timing Delay.

Fine Sync Timing Advance and Delay provide fine adjustment of sync timing over a range of about $\pm 50^{\circ}$ in approximately $\pm 0.2^{\circ}$ steps. Coarse Sync Timing Advance and Delay provide coarse adjustment over a range of approximately ± 3.5 µsec in 28 ns (45°) steps. Arrows below the switches indicate the direction and amount of timing shift.

Setting Sync Timing

To adjust the timing offset of the sync pulse signals with respect to the test signal output, press the MODE SELECT switch until the SET SYNC TIMING LED is lit. Note that the red LED under the four right switches indicates that these switches control sync pulse timing. (See Fig. 2-8.)

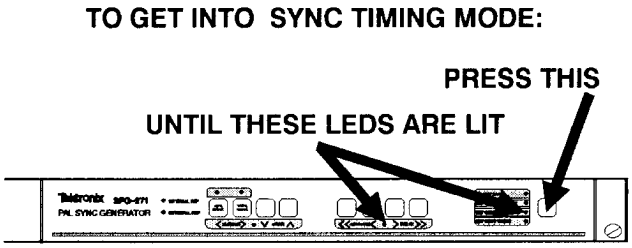


Fig. 2-8.
How to enter Sync Timing mode.

Press and hold down the Fine Sync Advance switch to select small increments (approximately 0.2°) of advance, or press Coarse Sync Advance to SELECT coarse increments (45°). Press the Fine Sync Timing Delay and Coarse Sync Timing Delay switches to add fine and coarse amounts of delay, respectively. (See Fig. 2-9.)

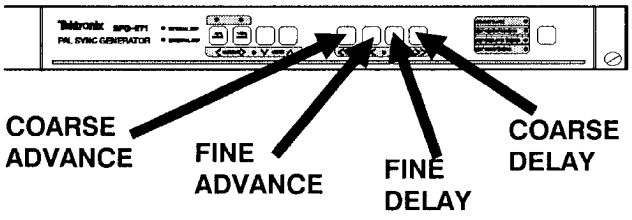


Fig. 2-9.
How to advance and delay the sync timing.

If the end of the Fine Advance range is reached and more adjustment is needed, push the Coarse Sync Timing Advance switch to advance the phase by a whole coarse step. If this introduces more advance than wanted, press the Fine Sync Timing Switch to reduce the amount of advance.

When the advance or delay switches are held down, they shift sync timing at a rate of three steps per second for the first three seconds and then speed up to 25 steps per second.

If a timing selection is not made within 30 seconds after entering the SET SYNC TIMING Mode, the front panel automatically reverts to the OFF Mode.

Storing Sync Setting

The front panel will automatically store the sync timing when returning to the OFF Mode, through either 30 second time-out or cycling with the MODE SELECT switch to the OFF Mode.

SET IDENTIFICATION Mode (Option 1)

In the Set Identification Mode, the four left-most switches select up to twelve characters of text for display on the upper portion of the selected color bars. While the front panel is in this mode, these switches assume the following functions (from left to right): Cursor Left, Cursor Right, Character Down, and Character Up.

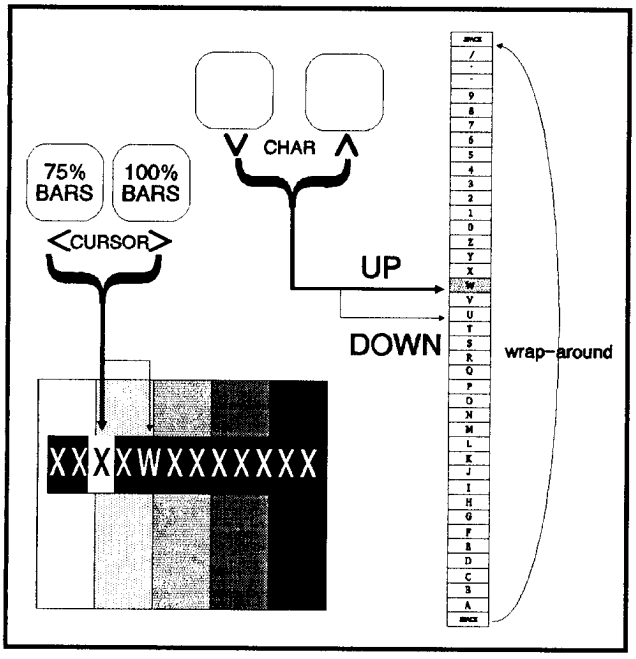


Fig. 2-10. Selecting Option 1 ID from the front panel.

As Fig. 2-10 shows, the cursor can be moved horizontally (with the Cursor Left and Cursor Right switches) into one of 12 positions. The Character Up and Character Down switches select the characters from the character list. Character available are A through Z, 0 through 9, space, slash, hyphen, and period.

Selecting the ID

To select an ID character, press the MODE SELECT switch until the SET IDENTIFICATION LED is lit. The LED below the four leftmost switches is lit to indicate that these switches control ID selection and one of the twelve characters on the video monitor will be highlighted to show cursor position. (See Fig. 2-11.)

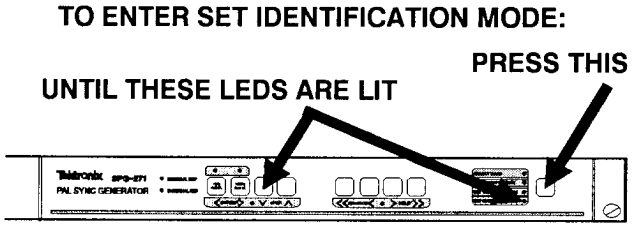


Fig. 2-11. How to enter the Set Identification mode.

Assume a W is in the fifth character position and the cursor is in the third position (as shown in Fig. 2-10). To change the W to a U, press the cursor right switch until the W is highlighted. Then press the Character Down switch repeatedly until the U is displayed. To reselect the W, press the Character Up switch until the W is displayed. When these switches are held down, they automatically scroll left/right or up/down.

To move the cursor position from 5 to 12, press the Cursor Right switch until the cursor is in the desired position. Alternatively, press the Cursor Left switch until the cursor loops around to position 12.

Storing the ID Selection

The front panel will automatically store the ID when returning to the OFF Mode, through either 30 second time-out or cycling with the MODE SELECT switch to the OFF Mode.

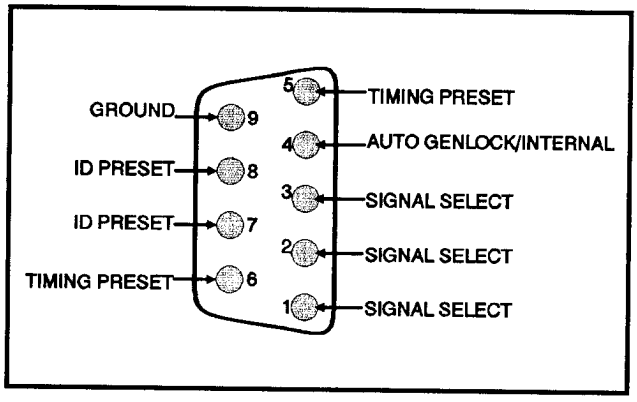
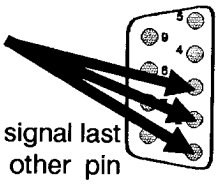


Fig. 2-12. Pinout of the REMOTE connector.

REMOTE CONTROL

The SPG-271 can be remotely controlled through the 9-pin REMOTE CONTROL connector located on the rear panel. Through TTL-compatible ground closures, these pins control the functions described in Table 2-2. 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 to the connector. To do this, attach a male 9-pin DIN plug to the REMOTE connector and solder the appropriate pins to ground. Fig 2-12 shows the connector's pin out.

Signal Select (pins 1-3)



Remote pin setting 111 selects the signal last selected at the front panel. Any other pin setting chooses the signal programmed for that setting.

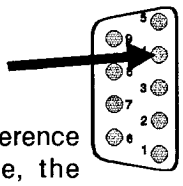
How to Reprogram the Signals

1. Turn the power off.
2. Set jumper J208 on the Digital Board to position 2-3 (program position).
3. Turn the power on.
4. Set the Remote Pins to their desired position from 000 to 111 (1 = open, 0 = ground).
5. Select the desired signal from the front panel. This signal is now programmed for the given pin setting.
6. If more signals are desired repeat steps 4 and 5 until the desired number of signals are programmed (up to eight).
7. Turn the power off.
8. Return J208 to the nonprogram position.
9. Turn the power on.

Table 2-2. List of Remote Control Pins and Functions.

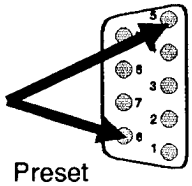
FUNCTION	PINS	DESCRIPTION
Signal Select	1-3	Three binary-coded control lines programmed to select a set of eight test signals. These pins can be reprogrammed to select a different set.
Auto Genlock/(Internal)	4	Selects Internal Sync Generator Reference Mode when grounded. Otherwise, the SPG-271 automatically switches to Genlock Mode whenever a valid Genlock Input is present.
Genlock Preset	5 & 6	Binary-coded control lines programmed to select one of four genlock timing presets.
ID Preset	7 & 8	Binary-coded control lines programmed to select one of four ID presets or the Tape Leader Countdown.
Ground	9	Ground.

Auto Genlock/Internal (pin4)



Selects Internal Sync Generator Reference Mode when grounded. Otherwise, the SPG-271 automatically switches to Genlock Mode whenever a valid Genlock Input is present.

Genlock Preset (pins 5 &6)

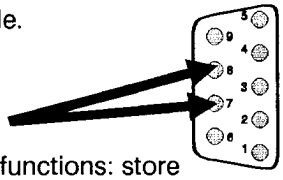


The REMOTE CONTROL's Genlock Preset chooses one of four advance or delays to add to the test signals.

To set a Genlock Preset perform the following steps:

1. Set the Remote Pins to their desired position from 00 to 11 (1 = open, 0 = ground).
2. Set the amount of advance or delay from the front panel. This timing is now programmed for the given pin setting.
3. If other are desired repeat steps 1 and 2 until the desired number of signals are programmed (up to four).
4. Cycle the MODE SELECT Button back to the Off mode.

ID Preset (pins 7 & 8)



The ID Preset can perform two functions: store up to three IDs or run the Tape Leader Countdown.

Up to three IDs can be stored in non-volatile memory using the following procedure:

Procedure to Program IDs

1. Set the Remote Pins to their desired position: 00, 01, or 10 (1 = open, 0 = ground).
2. Cycle the MODE SELECT button to the Set Identification mode.
3. Select the ID from the front panel using the procedure to set an ID.
4. Cycle the MODE SELECT button to Off Mode. The ID is now programmed for the given pin setting.
5. If more IDs are desired repeat steps 4 through 6 until the desired number of IDs are programmed (up to three).

Tape Leader Countdown

To select the Tape Leader Countdown, set pins 7 and 8 to 00.

The Tape Leader Countdown goes through the following sequence:

1. Switches off Audio Tone.
2. Selects a character ID countdown from 10 to 2 against a black background.
3. Selects black background until pins 7 and 8 are ungrounded.

NOTE

While in Tape Leader mode, Set Identification mode cannot be entered. Conversely, in Set Identification mode, the Tape Leader won't start until this mode is exited.

SECTION 3

TABLE OF SPECIFICATIONS

The performance requirements are valid within the environmental limits if the SPG-271 is adjusted at 25°C, ±5°C, and a minimum warm-up of 20 minutes is allowed.

Table 3-1
Test Signal Generator — General Test Signal Characteristics

Characteristics	Performance Requirements	Supplemental Information
Luminance Amplitude Accuracy	±1%.	Measured at 700 mV.
Chrominance-to-Luminance Gain	±1%.	Measured at 980 mV p-p and 4.43 MHz referenced to 500 kHz.
Frequency Response	±1% to 5 MHz.	
Chrominance-to-Luminance Delay	≤5 ns.	
Group Delay Variation	≤5 ns to 5 MHz.	10 mV p-p = 9 ns delay on a 10T pulse.
SCH Phase Accuracy	0° ±5°.	
DC Output Level	0 Vdc ±50 mV.	Measured at blanking.
Luminance Rise Time	150 ns ±25 ns.	
Chrominance Rise Time	350 ns ±35 ns.	
Burst Amplitude	300 mV ±6 mV p-p.	
Burst Rise Time	350 ns ±35 ns.	Slower than BBC spec to avoid ringing.
Sync Amplitude	300 mV ±3 mV.	
Sync Rise Time	250 ns ±25 ns.	
Front Porch Duration	1.55 μs minimim.	1.65 μs typical.
Line Blanking Interval Nominal Blanking	12.05 μs nominal.	Beginning at 50% point of active video.
Breezeway Duration	900 ns ±50 ns.	
Horizontal Sync Duration	4.7 μs ±50 ns.	50% amplitude point.
Vertical Serration Duration	4.7 μs ±50 ns.	50% amplitude point.
Equalizing Pulse Duration	2.35 μs ±50 ns.	50% amplitude point.
Burst Delay from Sync Burst Duration	 5.6 μs ±50 ns. 2.255 μs ±0.1 μs.	 From 50% point of sync. 10 cycles of subcarrier.
Output Impedance	75Ω.	
Return Loss	≥36 dB to 5 MHz.	

Table 3-1 (cont.)
Test Signal Generator — General Test Signal Characteristics

Characteristics	Performance Requirements	Supplemental Information
Crosstalk	≥60 dB down.	
Residual Subcarrier	≥60 dB down.	
Glitches	≤2 mV.	

Table 3-2
Test Signal Generator — Test Signals

Characteristics	Performance Requirements			Supplemental Information
75% Color Bars				
Luminance Rise Times	150 ns ±25 ns.			
	Lum Ampl. (mV)	**Subc. Ampl. (mV p-p)**	**Subc. Phase (deg)**	
White	700.0	0.0	0.0	
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	
100% Color Bars				
Luminance Rise Times	150 ns ±25 ns.			
	Lum Ampl. (mV)	**Subc. Ampl. (mV p-p)**	**Subc. Phase (deg)**	
White	700.0	0.0	0.0	
Yellow	620.2	627.3	167.1	
Cyan	490.7	885.1	283.5	
Green	410.9	826.8	240.7	
Magenta	289.1	826.8	60.7	
Red	209.3	885.1	103.5	
Blue	79.8	627.3	347.1	

Table 3-3
Test Signal Generator — Diagnostic Signals
(Available via the TEST SIGNAL output with switch S156 in position 01011)

Characteristics	Performance Requirements	Supplemental Information
DAC Test 1	Split field: 500 kHz followed by 4.43 MHz (980 mV p-p).	Non-composite signal. Accessed through the 75% BARS switch.
25 Hz Offset Test	25 Hz sine wave, 980 mV p-p.	Non-composite signal. Accessed through the 100% BARS switch.
Nonburst Color Bars		75% bars with no burst. Accessed through the 100% BARS switch.
Multipulse		Accessed through the 75% BARS switch.
Amplitude	700.0 mV.	
Frequencies	1.0 MHz, 2.0 MHz, 4.0 MHz, 4.433 MHz, 4.8 MHz.	
Line Sweep		
Amplitude	700.0 mV p-p.	Markers at 1, 2, 3, 4, and 5 MHz. Accessed through the 75% BARS switch.
Sweep Range	250 kHz to 5.1 MHz.	
Field Timing		
Markers	Lines 26-62.	
Sweep	Lines 63-270.	
Markers	Lines 271-310.	

Table 3-4
Test Signal Generator — Black Burst Output

Characteristics	Performance Requirements	Supplemental Information
Black (or Blanking) Level	0 V ±5.0 mV.	
Blanking Width	< 11.2 μs.	
Glitch Amplitude	< 20 mV.	
Black Burst Phase	Within 2° of test signal output.	

Table 3-5
Sync Generator — General Pulse Output Characteristics

Characteristics	Performance Requirements	Supplemental Information
Amplitude	-2.0 ±0.2 V.	Jumper selectable to -4 V.
Impedance	75Ω.	
Return Loss	≥30 dB to 5 MHz.	
Rise Time	250 ns ±50 ns.	

Table 3-6
Sync Generator – Pulse Output Signals

Characteristics	Performance Requirements	Supplemental Information
Composite Sync		
Horizontal Sync Duration	4.70 μs ±0.1 μs.	
Vertical Serrations	4.70 μs ±0.1 μs.	
Equalizing Pulse Duration	2.35 μs ±0.1 μs.	
Blanking		
(SN B010150 & Up)		
Horizontal Blanking Duration	12.01 μs ±0.1 μs.	Factory set to 12.01; jumper selectable for 11.79 or 12.24 μs.
Vertical Blanking Duration	25 lines.	Jumper selectable for 24 or 25 lines. Factory set to 25.
(SN B010149 & Below)		
Horizontal Blanking Duration	11.84 μs ±0.1 μs.	Factory set to 11.84; jumper selectable for 11.6 or 12.1 μs.
Vertical Blanking Duration	25 lines.	Jumper selectable for 24 or 25 lines. Factory set to 25.
Burst Flag		
Delay from Horizontal Sync	5.6 μs ±0.1 μs.	Measured from sync pulse output to burst flag output.
Duration	2.255 μs ±0.1 μs.	10 cycles of subcarrier.
PAL Pulse	(H/2 Square Wave.)	Selectable polarity. Factory set to high for 135° burst.
Frame		
Field Reference Pulse	Low for active portion of line 7, field 1.	
Color Frame Square Wave Position	Low for fields 1-4, high for fields 5-8.	Selectable for -2 V, -4 V, or TTL compatible output.

Table 3-7
Sync Generator — Subcarrier Output

Characteristics	Performance Requirements	Supplemental Information
Amplitude	2 V p-p ±0.2 V.	
Free-Running Frequency	4.43361875 MHz ±1 Hz.	After 20-minute warm up.
Long-Term Stability		Typical: 1 Hz per year after initial aging.
Sidebands and Harmonics	>50 dB down.	
DC Level	0 V ±100 mV.	
Return Loss	≥30 dB to 4.43 MHz.	
Phase Stability Over Temperature		<1°. Referenced to test signal output.

Table 3-8
Genlock Function

Characteristics	Performance Requirements	Supplemental Information
Burst Lock		
Genlock Phase Change with Input Amplitude	≤1° burst phase change for input sync and/or burst amplitude range of 300 mV +3 to -3 dB. ≤2° burst phase change for amplitude range of 300 mV +6 to -6 dB.	
Genlock Phase Change with Input Signal APL	≤1° burst phase change over 10% to 90% APL.	
Frequency Dependence on Input Burst	≤1° burst phase change for ±20 Hz change in incoming subcarrier.	
Lock Range	4.43361875 MHz ±20 Hz.	
Genlock Phase Jitter		Typically ≤0.3° peak for input sync or burst amplitude range of 300 mV +3 to -3 dB. No noise on input signal. Typically ≤0.4° peak for input amplitude range of 300 mV +6 to -6 dB. No noise on input signal.
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.)
Sync Timing		≈3.5 μs advance and delay relative to Genlock Input. At least 50° of fine sync in ≈0.2° steps. (Front-panel control.)
Color Framing Decisions	Will be correct for input SCH of 0° ±40°.	
Sync Lock		
Jitter	<10 ns for input sync amplitude range of 300 mV +3 to -3 dB.	No noise on input signal.
Noise Performance		Remains locked at 29 dB S/NR.

Table 3-8 (cont.)
Genlock Function

Characteristics	Performance Requirements	Supplemental Information
Genlock Stability with Gross Input Amplitude Variations	≤40° for input sync or burst amplitude range of 300 mV +7 to -12 dB.	
Vertical Timing Range	0, 1, or 2 lines advance. 1 line delay.	
Input Configuration	75Ω loop-through.	
Return Loss (Genlock Input)	≥40 dB to 5 MHz.	

Table 3-9
Option 1 (Audio Tone, and ID Over Selected Test Signal)

Characteristics	Performance Requirements	Supplemental Information
Option 1		Adds Audio tone and additional test signal output with or without ID over Black Field or selected test signal.
Option 1 Phase	Within 2° of test signal output.	
Identification	12 characters, 7 x 9 matrix.	
Character Amplitudes	680 mV ±20 mV.	
Audio Tone		
Amplitude	0 to +8 dBu* adjustable.	50Ω output balanced XLR impedance to drive 150Ω, 600Ω, or high impedance load.
Frequency	500 Hz or 1 kHz.	Locked to horizontal. Jumper selectable. Factory set to 1 kHz.
Distortion (THD)	≤0.01%.	1 kHz into 600Ω.
Audio ID "click" Frequency Range	4 Hz to 0.2 Hz.	

* dBu is the voltage equivalent to 1 mV into 600Ω, regardless of whether the actual load is 600Ω.

Table 3-10
Option 02 (Test Signal Generator — Test Signals)

Characteristics	Performance Requirements			Supplemental Information
75% Color Bars Over Red				Replaces 75% Color Bars. Selection for Option 02 only.
Luminance Rise Times	150 ns ±25 ns.			
	Lum Ampl. (mV)	**Subc. Ampl. (mV p-p)**	**Subc. Phase (deg)**	
White	700.0	0.0	0.0	
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	
Field Timing				
Color Bars	Lines 23-166.			
Red	Lines 167-310.			
100% Color Bars Over Red				Replaces 100% Color Bars. Selection for Option 02 only.
Luminance Rise Times	150 ns ±25 ns.			
	Lum Ampl. (mV)	**Subc. Ampl. (mV p-p)**	**Subc. Phase (deg)**	
White	700.0	0.0	0.0	
Yellow	620.2	627.3	167.1	
Cyan	490.7	885.1	283.5	
Green	410.9	826.8	240.7	
Magenta	289.1	826.8	60.7	
Red	209.3	885.1	103.5	
Blue	79.8	627.3	347.1	
Field Timing				
Color Bars	Lines 23-166.			
Red	Lines 167-310.			

Table 3-11
Power Supply

Characteristics	Performance Requirements	Supplemental Information
Supply Accuracy		
+12 V		12 V ±300 mV.
+5 V		5 V ±100 mV.
-5.1 V		-5.1 V ±200 mV.
-12 V		-12 V ±300 mV.
Current Limit		**Nominal**
+12 V		1.5 A.
+5 V		8.0 A.
-5.1 V		3.0 A.
-12 V		1.5 A.
Hum		**Typical**
+12 V		10 mV.
+5 V		10 mV.
-5.1 V		20 mV.
-12 V		10 mV.
Noise		
+12 V		≤50 mV (5 MHz bandwidth).
-12 V		≤50 mV (5 MHz bandwidth).
+5 V		≤50 mV (5 MHz bandwidth).
-5.1 V		≤50 mV (5 MHz bandwidth).
Line Voltage Range		
110 Vac	90 – 132 Vac.	
220 Vac	180 – 250 Vac.	
Crest Factor		≥1.35.
Fuse Data		
115 V Setting		2A Med-Blow.
230 V Setting		1A Med-Blow.
Power Consumption		
Typical		40 W.
Maximum		60 W.
Line Frequency		48 Hz to 62 Hz.

Table 3-12
Physical Characteristics

Characteristics	Information
Dimensions	
Rack Mount	
Height	1.734 inches (4.4 cm).
Width	19.0 inches (48.3 cm).
Length	22.1 inches (56.1 cm).
Net Weight	6.14 kg (13.5 lbs).
Shipping Weight	10.4 kg (22 lbs, 14 oz).

Table 3-13
Environmental Characteristics

Characteristics	Information
Temperature	
Non-Operating	-40°C to +65°C.
Operating	0°C to +40°C.
Altitude	
Non-Operating	To 50,000 feet.
Operating	To 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 at any resonant point or at 55 c/s.
Shock	50 g's, 1/2 sine, 11 ms duration, 3 guillotine-type shocks per side.
Transportion	Qualified under NTSC Test Procedure 1A, Category II (24-inch drop).

Table 3–14: Certifications and compliances

Category	Standards or description
EC Declaration of Conformity – EMC[1]	Meets intent of Directive 89/336/EEC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Union: EN 50081-1 Emissions: EN 55022 Class B Radiated and Conducted Emissions EN 50082-1 Immunity: IEC 801-2 Electrostatic Discharge Immunity IEC 801-3 RF Electromagnetic Field Immunity IEC 801-4 Electrical Fast Transient/Burst Immunity
FCC Compliance	Emissions comply with FCC Code of Federal Regulations 47, Part 15, Subpart B, Class A Limits.

[1] **High quality shielded cables must be used to ensure compliance to the listed specifications.**

Table 3–14: Certifications and compliances (cont.)

Category	Standards or description	
Installation (Overvoltage) Category	Terminals on this product may have different installation (overvoltage) category designations. The installation categories are:	
	CAT III	Distribution-level mains (usually permanently connected). Equipment at this level is typically in a fixed industrial location.
	CAT II	Local-level mains (wall sockets). Equipment at this level includes appliances, portable tools, and similar products. Equipment is usually cord-connected.
	CAT I	Secondary (signal level) or battery operated circuits of electronic equipment.
Pollution Degree	A measure of the contaminates that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.	
	Pollution Degree 2	Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.
Safety Standards		
U.S. Nationally Recognized Testing Laboratory Listing	UL1244	Standard for electrical and electronic measuring and test equipment.
Canadian Certification	CAN/CSA C22.2 No. 231	CSA safety requirements for electrical and electronic measuring and test equipment.
European Union Compliance	Low Voltage Directive 73/23/EEC, amended by 93/69/EEC	
	EN 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use.
Additional Compliance	IEC61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use.
Safety Certification Compliance		
Temperature, operating	+5 to +40° C	
Altitude (maximum operating)	2000 meters	
Equipment Type	Test and measuring	
Safety Class	Class 1 (as defined in IEC 1010-1, Annex H) – grounded product	
Overvoltage Category	Overvoltage Category II (as defined in IEC 1010-1, Annex J)	
Pollution Degree	Pollution Degree 2 (as defined in IEC 1010-1). Note: Rated for indoor use only.	

WARNING

The following servicing instructions are for use only by qualified personnel. To avoid injury, do not perform any servicing other than that stated in the operating instructions unless you are qualified to do so. Refer to all Safety Summaries before 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 determines which rating of fuse and which power supply voltage the 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.

MECHANICAL INSTALLATION

Rack Mounting

The SPG-271 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.

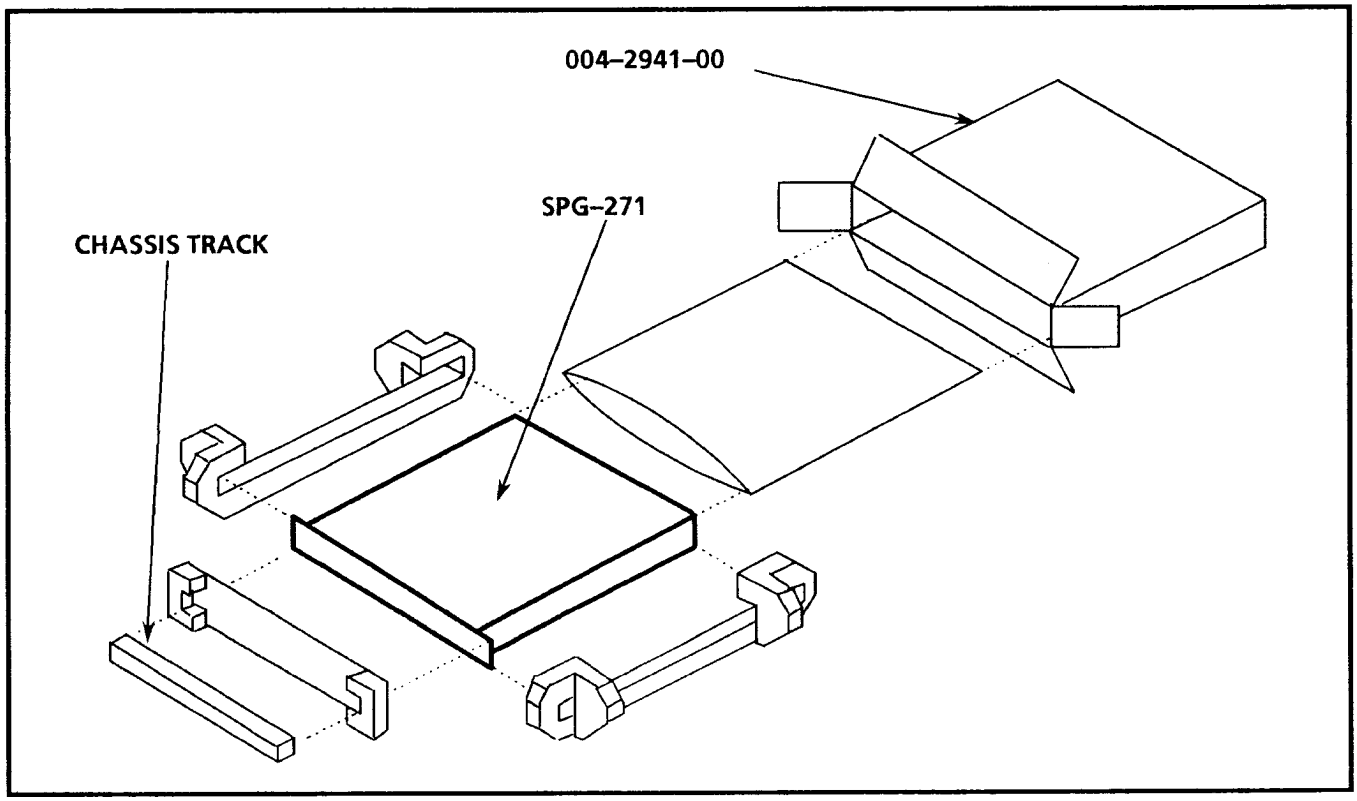


Fig. 4-1. Repacking instructions.

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.

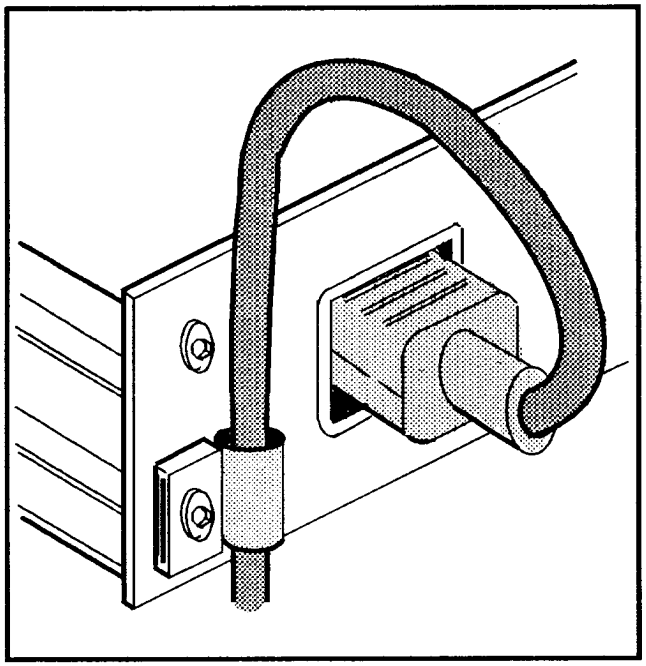


Fig. 4-2. Mounting the power cord.

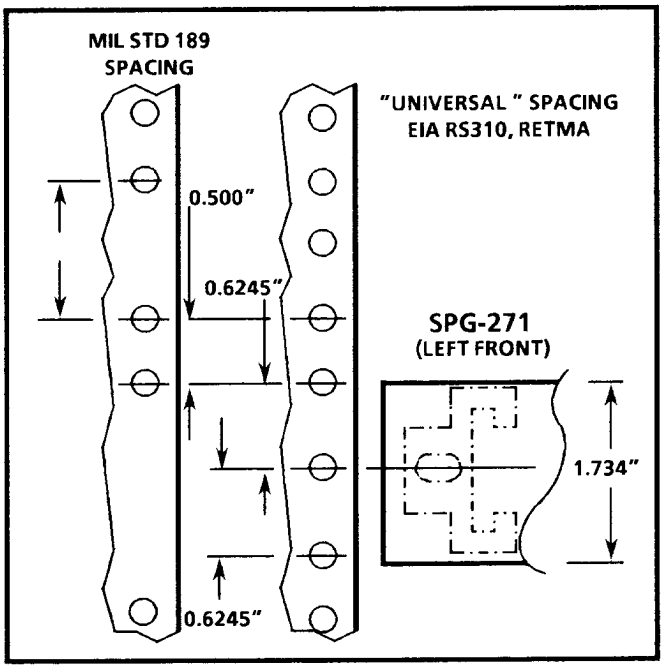


Fig. 4-3. Rail detail for mounting slide tracks.

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 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. When installing the slides in EIA-type racks, make certain that the slides are attached to the 1/2-inch-spaced holes.

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.

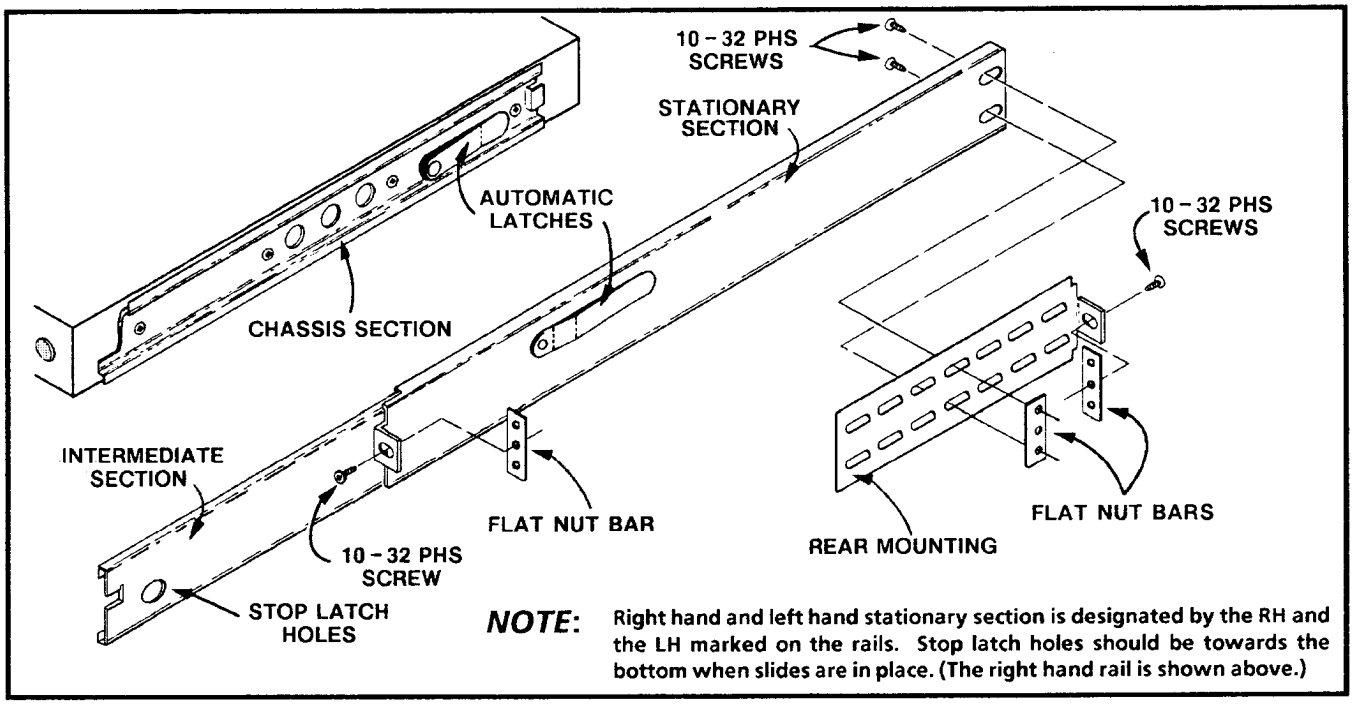


Fig. 4-4. Assembly of rack mounting hardware.

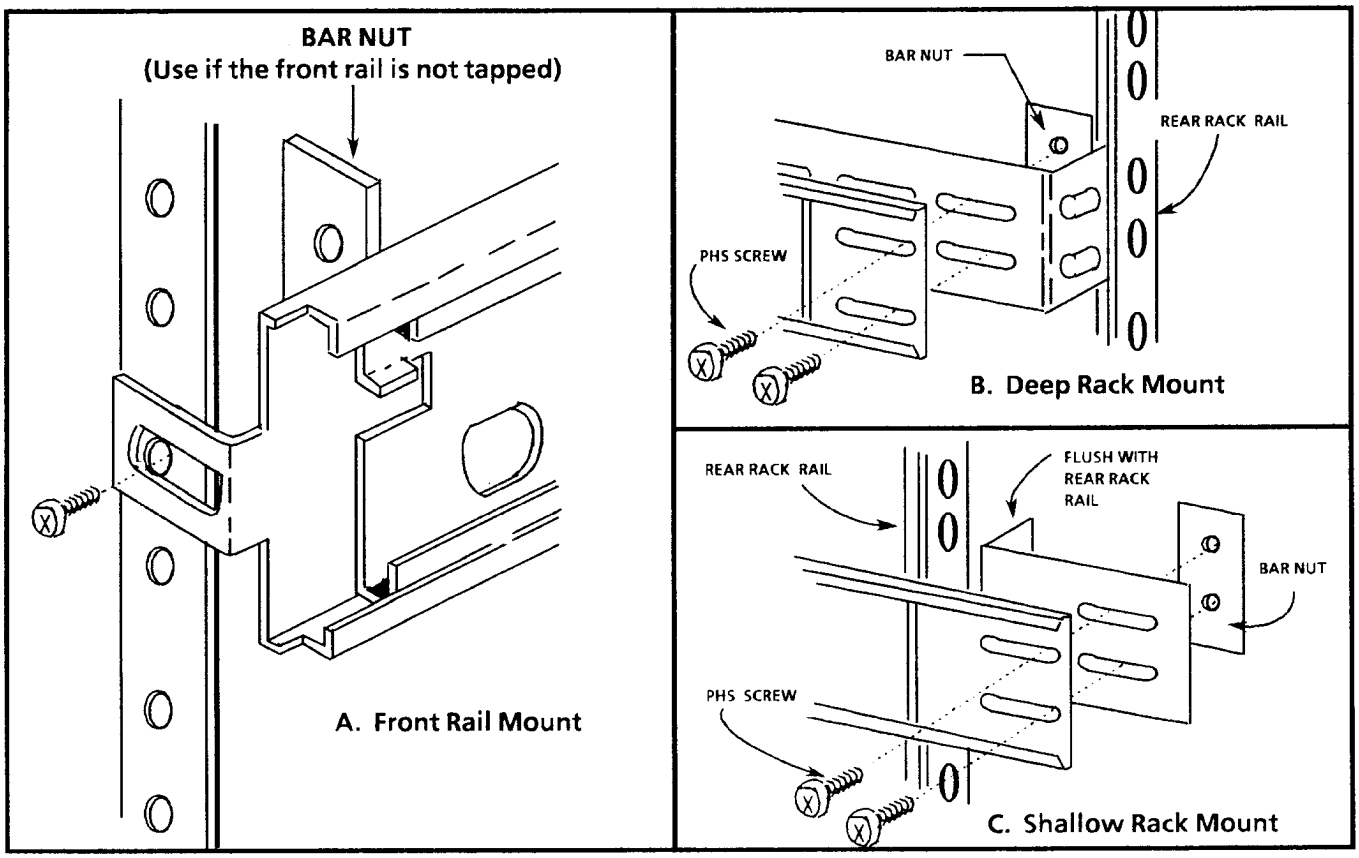


Fig. 4-5. Mounting stationary track sections.

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.

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.

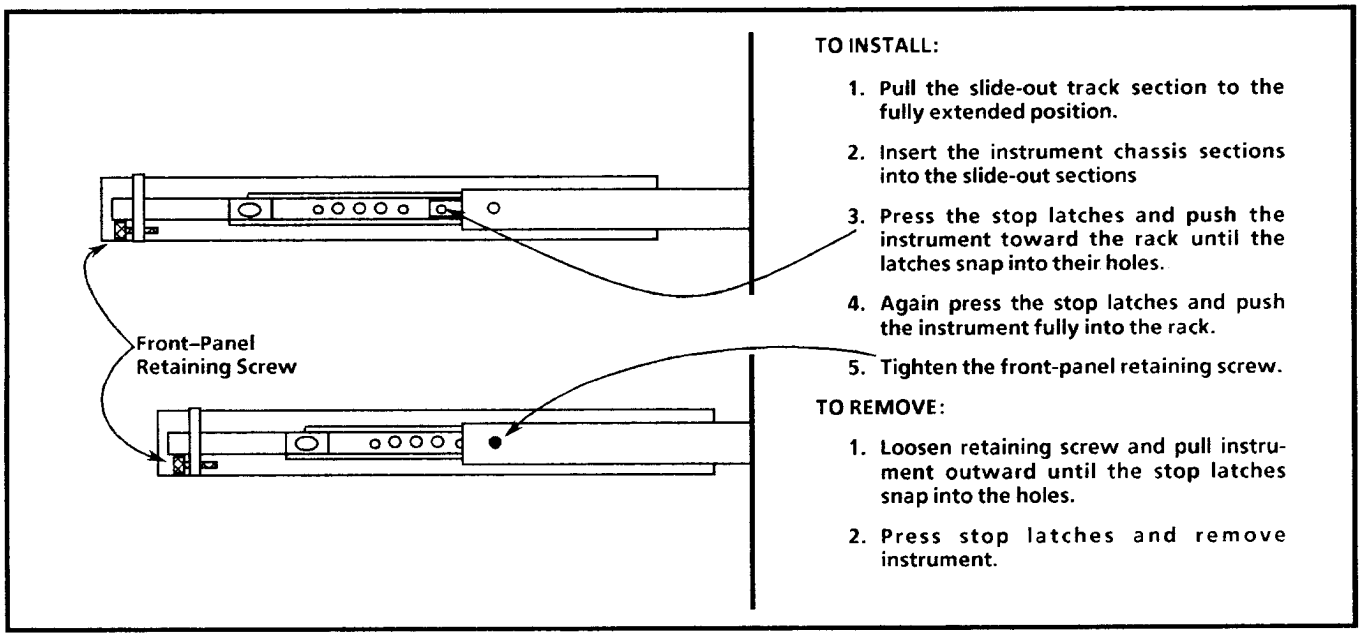


Fig. 4-6. Racking and unracking the SPG-271.

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.

Table 4-2
Analog Board (A3) Operating Mode Selection Jumpers

Function	Jumper #	Description	Factory Set
Blanking Output Level	J678 <8>	Pins 1–2: Selects -2 V output level. Pins 2–3: Selects -4 V output level.	Pins 1–2
Field Reference/Color Frame/ Comp Sync Select (See graphic illustration below.)	J375 <8>	Pins 1–2: Enables Field Reference signal at FRAME REF connector. Pins 2–3: Enables Color Frame signal at FRAME REF connector. Pins 2–4: Enables Composite Sync signal at FRAME REF connector.	Pins 1–2
Color Frame Output Level	J460 J660 <8>	Pins 1–2: Enables -4 V output level (terminated in 75Ω).* Pins 2–3: Enables TTL output level (+5 V unterminated or +3 V terminated in 75Ω).* *Move J460 and J660 together. *J668 must be in the 2–3 position.	Pins 1–2
Field Reference/Color Frame/ Comp Sync Output Level	J668 <8>	Pins 1–2: Selects -2 V output level.* Pins 2–3: Selects -4 V output level.* *J440 and J660 must be in the 1–2 position.	Pins 1–2
Comp Sync	J780 <8>	Pins 1–2: Selects -2 V output level. Pins 2–3: Selects -4 V output level.	Pins 1–2
PAL Pulse	J965 <8>	Pins 1–2: Selects -2 V level. Pins 2–3: Selects -4 V level.	Pins 1–2
Burst Flag	J978 <8>	Pins 1–2: Selects -2 V level. Pins 2–3: Selects -4 V level.	Pins 1–2

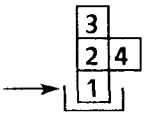


Table 4-3
Digital Board (A2-1) Operating Mode Selection Jumpers

Function	Jumper #	Description	Factory Set
Front Panel Mode Select	J111 <1>	Pins 1–2: Allows all front panel modes to be selected. Pins 2–3: Forces instrument to OFF mode.	Pins 1–2
Genlock and Sync Timing Modes Select	J308 <1>	Pins 1–2: Enables SET GENLOCK TIMING and SET SYNC TIMING modes at front panel. Pins 2–3: Disables SET GENLOCK TIMING and SET SYNC TIMING modes at front panel.	Pins 1–2
Genlock Vertical Offset (lines of delay/advance)	J885 J985 <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
Horizontal Blanking Width (SN B010150 & Up)	J690 <5>	Pins 1–2: 12.0 μs. Pins 2–3: 12.2 μs. Pins 3–4: 11.8 μs.	Pins 1–2
Horizontal Blanking Width (SN B010149 & Below)	J690 <5>	Pins 1–2: 11.8 μs. Pins 2–3: 12.1 μs. Pins 3–4: 11.6 μs.	Pins 1–2
PAL Pulse Polarity	J145 <5>	Pins 1–2: Positive for Field 1, Line 7. Pins 2–3: Negative for Field 1, Line 7.	Pins 1–2
Vertical Blanking Window	J883 <5>	Pins 1–2: 25 lines. Pins 2–3: 24 lines.	Pins 1–2

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

Function	Jumper #	Description	Factory Set
115 V/230 V Line Voltage Select	J810 <10>	Pin 1 aligned with 115 V: Power Supply accepts 115 V line voltage. Fuse rating must be 2 A, medium blow. Pin 1 aligned with 230 V: Power Supply accepts 230 V line voltage. Fuse rating must be 1 A, medium blow.	Determined by power cord option. See Table 4-1.

Table 4-5
Digital Board (A2–1) Test Jumpers

Function	Jumper #	Description	Factory Set
Manual Reset	J229 <2>	Pins 1–2: No reset. Pins 2–3: Resets μP.* *J223 must be in 1–2 position.	Pins 1–2
Hard Reset	J223 <2>	Pins 1–2: Allows hard reset of μP. Pins 2–3: Forced reset of μP. Pins 3–4: Disables hard reset of μP.	Pins 1–2
VCO Test	J180 <4>	Pins 1–3: Sets VCO control voltage to mid-range (ground) so VCO can be tuned to $4F_{SC}$ with C387. Pins 2–3: μP controls genlock loop response. Pins 4–3: Fixed test voltage (-10 V) decreases VCO frequency. Pins 5–3: Fixed test voltage (+ 10 V) increases VCO frequency.	Pins 2–3
Crystal Oscillator Frequency (SN B020730 & Below)	J391 <4>	For coarse adjustment of free-running crystal frequency. Setting should only be changed when calibrating the subcarrier oscillator frequency.	See Performance Checks and Calibration Procedures.
Crystal Oven Heater	J497 <4>	Pins 1–2: Enabled. Pins 2–3: Disabled.	Pins 1–2

Table 4-5 (cont.)
Digital Board (A2-1) Test Jumpers

Function	Jumper #	Description	Factory Set
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
Luminance Disable	J551 <6>	Pins 1–2: Normal luminance. Pins 2–3: Forces luminance to 350 mV (mid-scale).	Pins 1–2
Chrominance Disable	J470 <6>	Pins 1–2: Normal chrominance. Pins 2–3: No chrominance.	Pins 1–2
Offset Test	J939 <7>	Pins 1–2: Enables Subcarrier Generator to produce normal subcarrier. Pins 2–3: Enables Subcarrier Generator to produce 25 Hz offset only.* *Allows inspection of digitally generated offset, immediately following the output DAC. This sine wave is not viewable at the reconstruction filter output.	Pins 1–2
Offset Disable	J523 <7>	Pins 1–2: Enable 25 Hz offset of the Subcarrier Generator output. Pins 2–3: Disable 25 Hz offset of the Subcarrier Generator output.	Pins 1–2
Soft Reset	J423 <2>	Pins 1–2: Enable Soft Reset. Pins 2–3: Disable Soft Reset.	Pins 1–2
Bruch Blanking	J651 <7>	Pins 1–2: Enable Bruch Blanking. Pins 2–3: Disable Bruch Blanking.	Pins 1–2
Programming or Remote Control	J208 <1>	Pins 1–2: Enables program mode of remote control. Pins 2–3: Disables program mode of remote control.	Pins 1–2

Table 4-5 (cont.)
Digital Board (A2-1) Test Jumpers

Function	Jumper #	Description	Factory Set
For Future Use	J156 J164 <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

Table 4-6
Analog Board (A3) Test Jumpers

Function	Jumper #	Description	Factory Set
Input Clamp Disable	J511 <8>	Pins 1–2: Enables clamp timing circuit. Pins 2–3: Disables clamp timing circuit.	Pins 1–2
Test Signal Disable	J440 <9>	Pins 1–2: Enables test signal at TEST SIGNAL connector. Pins 2–3: Disables test signal at TEST SIGNAL connector to allow for testing of return loss.	Pins 1–2
Genlock Input Select	J115 <8>	Pins 1–2: DC coupling for composite video. Pins 2–3: AC for CW.	Pins 1–2
	J807 <8>	Pins 1–2: Comp video or 5 MHz CW. Pins 2–3: 4.43 MHz CW.	Pins 1–2
	J815 <8>	Pins 1–2: Enable input clamp for comp video. Pins 2–3: Disable for CW.	Pins 1–2
For Future Use	J518 <8>	Pins 1–2: Standard position. Pins 2–3: Not Used.	Pins 1–2

Table 4-7
Power Supply Board (A4) Test Jumpers

Function	Jumper #	Description	Factory Set
Overvolts Sensor Test (-5 V)	J120 <10>	Jacks 1 and 2 unshorted: Normal operation (voltage at pin 9 of U220B should be about +0.3 V). Jacks 1 and 2 shorted: Shuts down Power Supply.	Unshorted
Overvolts Sensor Test (+5 V)	J242 <10>	Jacks 1 and 2 unshorted: Normal operation (voltage at pin 10 of U335B should be about +2.1 V). Jacks 1 and 2 shorted: Shuts down Power Supply.	Unshorted

Table 4-8
Option 1 Board

Function	Jumper #	Description	Factory Set
Audio ID Click	J643	Pins 1–2: Normal. Pins 2–3: Click.	Pins 1–2
Tone Frequency	J825	Pins 1–2: 1 kHz. Pins 2–3: 500 Hz.	Pins 1–2 Move jumpers together.
	J520	Pins 1–2: 1 kHz. Pins 2–3: 500 Hz.	

SECTION 5
PERFORMANCE VERIFICATION AND CALIBRATION

This section consists of checklists and detailed procedures to use in verifying and calibrating SPG-271 performance parameters.

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 calibration 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 Calibration. While alternate equipment may be used for performance checks, it is not recommended for calibration. Use of inadequate equipment may result in inaccurate measurements or calibration.

Recommended Test Equipment

1. **PAL Video Measurement Set**

   For measuring and displaying field-rate and line-rate waveforms, differential phase and gain, and SCH phase.

   Example: Tektronix 1781R.

   For Performance Verification only, the following alternate equipment may be used:

   1a. PAL Waveform Monitor

   For displaying and measuring field-rate and line-rate waveforms.

   Example: Tektronix 1485R Mod W5F.

   1b. PAL Vectorscope

   With specific modes for measuring differential phase and gain.

   Example: Tektronix 521A.

   1c. Video Amplitude Calibration Fixture (VAC)

   Provides a chopped voltage reference accurate to 0.05% from 0 to 1 V in 0.1 mV increments. (Used with the waveform monitor.)

   Example: Tektronix part number 067-0916-00 (plugs into Tektronix TM 503 Power Mainframe).

2. **PAL Test Signal Generator (TSG)**

   Able to provide the following signals:

   Component Sync (– 2.0 V).

   Subcarrier (2.0 V_{p-p}).

   Color Bars with and without burst.

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

   Variable Amplitude Flat Field, or "Bounce".

   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 µs/div sweep speeds, triggering to 5 MHz, and capable of accepting both direct and delayed external triggers.

   Example: Tektronix 7603 Oscilloscope with a 7A13 Differential Comparator, 7A26 Dual Trace Amplifier, and 7B53A Dual Time Base. Use with P6106 10x probes (Tek part number 010-610-03).

4. **Step Attenuator**

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

   Example: Wavetek 7580.

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. **Distortion Analyzer**

   Must test power output over range of 0 to 8 dBm and be capable of detecting THD of 0.01% or less.

   Example: Tektronix AA501.

7. **Leveled Sine Wave Generator**

   Minimum output range of 250 kHz to 5 MHz.

   Example: Tektronix SG503A (plugs into TM 503 Power Mainframe).

8. **Spectrum Analyzer**

   Able to measure to at least 5 MHz.

   Example: Tektronix 2710.

9. **Audio Amplifier**

   600Ω impedance.

10. **75Ω BNC Coax Cables (5 required)**

    Example: Tektronix part number 012-0074-00.

11. **Precision 50Ω BNC Coax Cables (2 required)**

    Example: Tektronix part number 012-0482-00.

12. **End-Line Termination (3 required)**

    75Ω termination equipped with a bnc connector.

    Example: Tektronix part number 011-0102-00.

13. **50Ω to 75Ω Minimum Loss Attenuator**

    DC coupled, equipped with bnc connectors.

    Example: Tektronix part number 011-0057-01.

14. **Feed-Through Termination (2 required)**

    75Ω termination equipped with bnc connectors.

    Example: Tektronix part number 011-0103-00.

15. **Audio Connector-to-Triple Banana Cable**

    Example: ITT Pamona Electronics, Model 4953-J-36. Must be configured to match the SPG-271 audio output. Pin 1, shield; pin 2, +; pin 3, –.

PERFORMANCE VERIFICATION CHECKLIST

Sync Lock

1. Jitter (≤ 16° for Genlock input sync amplitude range of 300 mV ± 3 dB).

Burst Lock

2. Jitter and Phase vs. Genlock input burst/sync amplitude (≤ 1° change for nominal ± 3 dB; ≤ 2° change for nominal ± 6 dB).
3. Genlock Phase vs. input frequency (≤ 1° change from 4.433599 MHz to 4.433639 MHz).
4. Genlock Phase vs. input APL (≤ 1° change from 10% to 90% APL).

Genlock and Sync Timing

5. Genlock advance and delay ranges (7 µs, coarse; 55°, fine).
6. Sync advance and delay ranges (3.5 µs, coarse; 50°, fine).

Blanking Levels

7. TEST SIGNAL blanking (0 V ± 50 mV).
8. ID (Opt. 1) blanking (within ± 5 mV of TEST SIGNAL).
9. BLACK blanking levels (horizontal blanking, 0 V ± 50 mV; active video, within ± 5 mV of horizontal blanking).
10. SUBCARRIER blanking (0 V ± 100 mV) and amplitude (2.0 V_{p-p} ± 200 mV).

Pulse Outputs

11. Sync Amplitude (2.0 V ± 200 mV).
12. Sync Rise and Fall Times (250 ns ± 50 ns).

Video Signal Amplitude Levels

13. Black Sync Amplitude (300 mV ± 3 mV).
14. Black Burst Amplitude (300 mV ± 3 mV).
15. TEST SIGNAL Luminance Amplitude (700 mV ± 7 mV).
16. ID (Opt. 1) Luminance Amplitude (700 mV ± 7 mV).
17. ID (Opt. 1) Character Amplitude (660 mV ± 20.0 mV).

Video Signal Chrominance Characteristics

18. SCH Phase error (≤ 5°).
19. BLACK phase matching (within ± 2°).
20. ID (Opt. 1) phase matching (within ± 2°).
21. TEST SIGNAL ringing (≤ 7 mV).
22. ID (Opt. 1) ringing (≤ 7 mV).
23. TEST SIGNAL group delay (≤ 5 ns).
24. ID (Opt. 1) group delay (≤ 5 ns).
25. TEST SIGNAL frequency response (± 7 mV to 5 MHz).
26. ID (Opt. 1) frequency response (± 7 mV to 5 MHz).
27. TEST SIGNAL chrominance-to-luminance gain (≤ 9.8 mV).
28. ID (Opt. 1) chrominance-to-luminance gain (≤ 9.8 mV).

Return Loss and Subcarrier Harmonics

29. GENLOCK loop-through (> 40 dB to 5 MHz).
30. TEST SIGNAL, ID, and BLACK outputs (> 36 dB to 5 MHz).
31. SYNC and PULSE outputs (> 30 dB to 5 MHz).
32. SUBCARRIER output (> 30 dB to 4.43 MHz).
33. SUBCARRIER harmonics (> 40 dB down).

Subcarrier Frequency

34. Free-Running Frequency (4.43361875 MHz ± 1 Hz).

Audio Tone (Opt 1) Output

35. THD (≤ 0.01%).
36. Audio tone amplitude (0 to + 8 dBu).
37. Audio ID "click" frequency (0.2 Hz to 4.0 Hz).

PERFORMANCE VERIFICATION PROCEDURES

SYNC LOCK

1. Jitter

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

b. Select Color Bars with no burst from the PAL TSG and 75% Color Bars from the SPG-271.

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

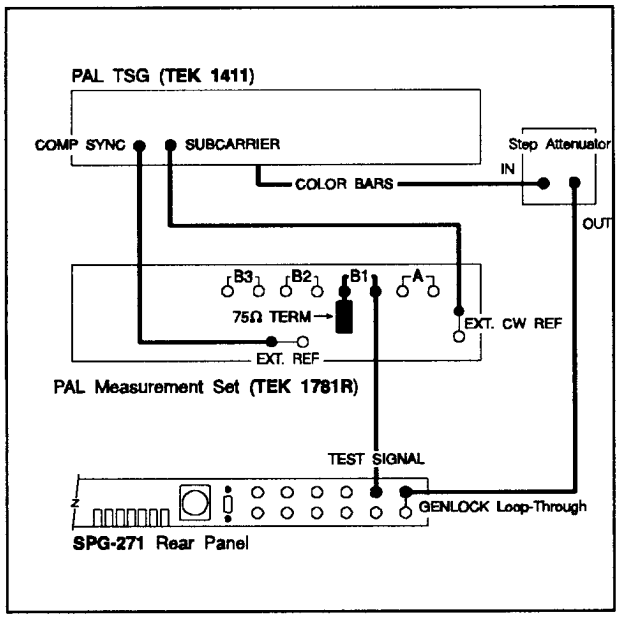


Fig. 5-1 Checking Sync Lock Jitter.

NOTE

To obtain the range of signal levels required for the following tests, the GENLOCK loop-through of the SPG-271 must remain UN-terminated. This results in an input signal which is 6 dB above nominal levels, or 6dB 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.

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. Jitter and Phase Shift with Change in Incoming Amplitude

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 SPG-271 burst vector remains normalized to 0° dϕ.

c. Set the step attenuator to read 0 (+ 6 dB).

d. CHECK — for typical jitter of ≤ 0.4° and for ≤ 2° burst phase change.

e. Set the step attenuator to read 3 (+ 3 dB).

f. CHECK — for typical jitter of ≤ 0.3° and for ≤ 1° burst phase change.

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

h. CHECK — for typical jitter of ≤ 0.3° and for ≤ 1° burst phase change.

i. Set the step attenuator to read 12 (– 6 dB).

j. CHECK — for typical jitter of ≤ 0.4° and for ≤ 2° burst phase change.

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

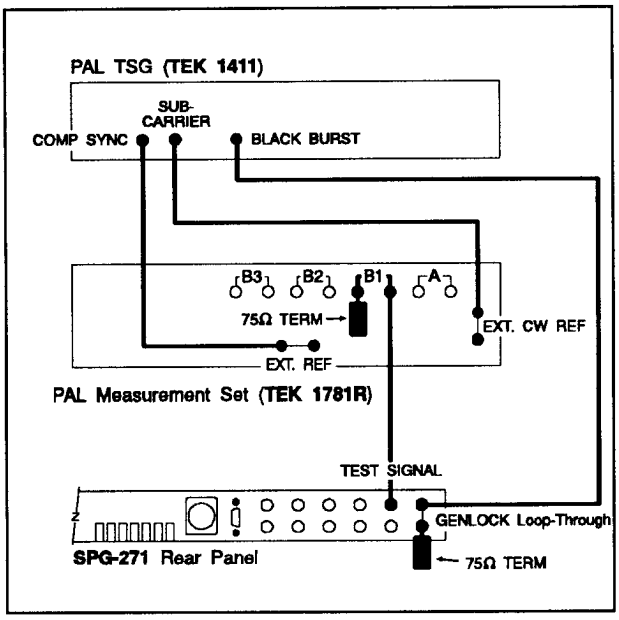


Fig. 5-2 Checking Genlock Jitter.

a. Replace the Color Bars signal to the SPG-271 GENLOCK Input with a Black Burst signal. Bypass the step attenuator and connect a termination to the SPG-271 GENLOCK loop-through (see Fig. 5-2).

b. Confirm that the Test Signal 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 SPG-271 re-acquires lock, and that burst phase has shifted ≤ 1°.

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

f. CHECK — that the SPG-271 re-acquires lock, and that burst phase has shifted ≤ 1°.

g. Reset the input frequency to zero offset.

4. **Phase Shift with Change in Incoming APL**

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

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

c. CHECK — for a burst phase change of ≤ 1°.

GENLOCK AND SYNC TIMING

5. **Genlock Timing Range**

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

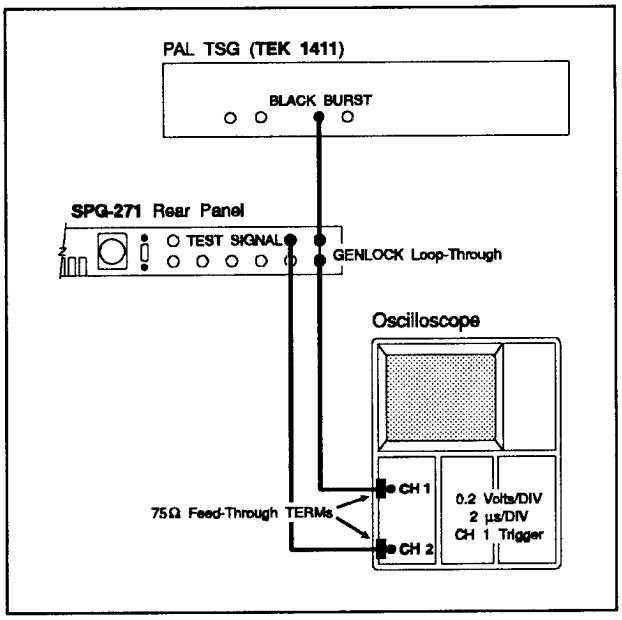


Fig. 5-3 Checking Genlock and Sync Timing Ranges.

b. Set the oscilloscope to display both signals at a horizontal rate. (Use Channel 1 as the trigger source.)

c. At the SPG-271 front panel, advance and delay the Test Signal output as far as it will go (with the coarse timing buttons).

d. CHECK — that the Test Signal advances and delays approximately 7 µs relative to the GENLOCK input (Black Burst) signal.

6. **Sync Timing Range**

a. Connect the SPG-271 SYNC output to the oscilloscope in place of the TEST SIGNAL.

b. At the SPG-271 front panel, advance and delay the Sync output as far as it will go.

c. CHECK — that the sync pulse advances and delays approximately 3.5 µs relative to the Black Burst input signal.

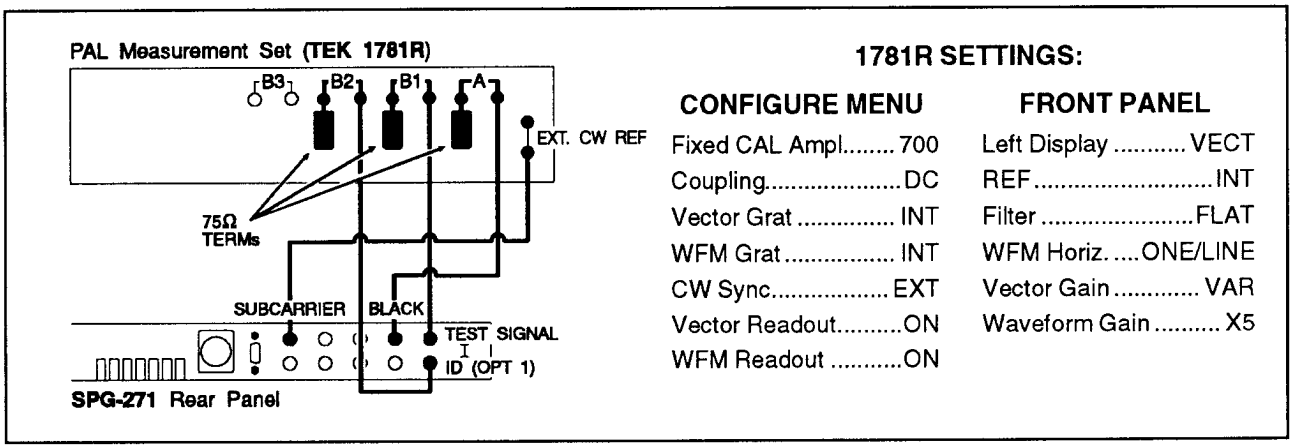


Fig. 5-4 Reference Setup for Procedures 13 through 26.

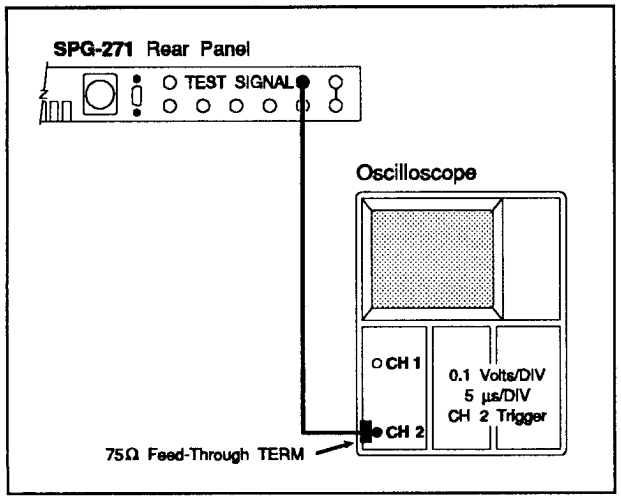


Fig. 5-5 Checking Test Signal Blanking.

BLANKING LEVELS

7. Test Signal Blanking Level

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

b. Set the oscilloscope to display and trigger off the Test Signal (CH 2).

c. Switch the oscilloscope to ground-coupled to establish a 0 V reference, then return to DC coupling and view the test signal.

d. CHECK — that the blanking level is 0 V ± 50 mV.

8. ID (Opt. 1) Blanking Level

a. Move the cable from the SPG-271 TEST SIGNAL output to the ID (Opt. 1) output, if active.

b. CHECK — for an ID output blanking level within ± 5 mV of the TEST SIGNAL output.

9. Black Blanking Level

a. Move the cable to the top BLACK output.

b. CHECK — for a blanking level (horizontal blanking interval) of 0 V ± 50 mV and that the active video black level is ≤ 5 mV from blanking.

c. CHECK — for glitch amplitudes of < 20 mV.

d. Repeat steps (b) and (c) for the second BLACK output.

10. Subcarrier Blanking Level and Amplitude

a. Move the cable from the BLACK output to the SUBCARRIER output.

b. CHECK — that the DC level is 0 V ± 100 mV.

c. CHECK — for 2 V ± 200 mV peak-to-peak amplitude and check, by visual inspection, that the sine wave is undistorted.

PULSE OUTPUTS

11. Amplitudes

a. Connect the SPG-271 SYNC output to the oscilloscope.

b. Set the oscilloscope to display the SYNC output at a line rate.

c. CHECK — that the amplitude of the SYNC output is – 2 V ± 200 mV or – 4 V ± 400 mV, depending on the position of circuit board jumpers (see the Jumper Tables in the Installation section of this manual).

d. Repeat steps (a) through (c) for the other pulse outputs (BURST FLAG, PAL PULSE, and FRAME REF).

12. Rise and Fall Times

a. Set the oscilloscope to display sync transitions.

b. CHECK — that the rise and fall times — between 10% and 90% amplitude — are 250 ns ± 50 ns.

c. Repeat this step for the other pulse outputs.

VIDEO SIGNAL AMPLITUDE LEVELS

13. Black Sync Amplitude

a. Connect test equipment as in Fig. 5-5, select WFM + CAL and CH A INPUT.

b. CHECK — for a sync amplitude of 300 mV ± 3 mV (1%).

14. Black Burst Amplitude

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

15. Test Signal Luminance Amplitude

a. Begin with the equipment setup as shown in Fig. 5-5. Select WFM + CAL Display and CH B1 INPUT.

b. Select Fixed CAL (700 mV).

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

16. ID (Opt. 1) Luminance Amplitude

a. Begin with the equipment setup shown in Fig. 5-5. Select WFM + CAL Display and CH B2 INPUT.

b. Select Fixed CAL (700 mV).

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

17. ID (Opt.1) Character Amplitude

a. Select Variable CAL at the 1781R, and adjust the differential to 660 mV.

b. CHECK — that the character amplitude is 660 mV ± 20 mV.

VIDEO SIGNAL CHROMINANCE CHARACTERISTICS

18. SCH Phase (Black, Test Signal, and ID)

a. Begin with the equipment setup shown in Fig. 5-5. Select CH A INPUT.

b. Set the 1781R to INT CW Sync (Configure menu) and SCH Left Display (front panel). Exit the Configure menu to view the SCH display.

c. CHECK — for a BLACK SCH phase error of ≤ 5°.

d. Select CH B1 INPUT and check for a TEST SIGNAL SCH error of ≤ 5°.

e. Select CH B2 INPUT and check for an ID (Opt. 1) SCH error of ≤ 5°.

19. Black Burst Phase Matching

a. Begin with the equipment setup shown in Fig. 5-5. Select CH B1 INPUT.

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 dϕ graticule.

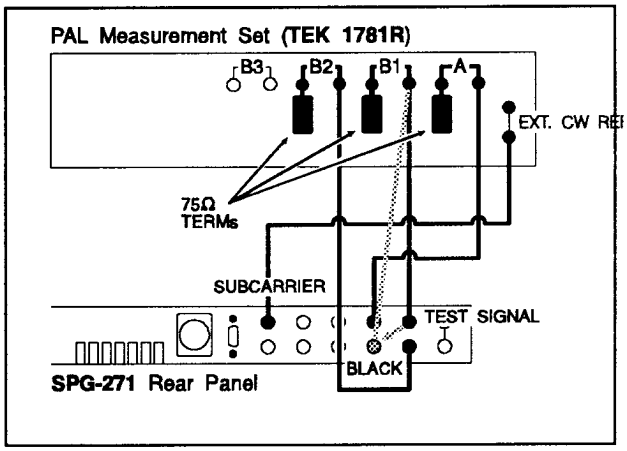


Fig. 5-6 Checking Black Phase.

d. At the rear panel of the SPG-271, move the cable from the TEST SIGNAL output to the lower BLACK output (see Fig. 5-6).

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

20. ID (Opt. 1) Phase Matching

Move the cable from the BLACK to the ID (Opt. 1) output and repeat step (e) of the previous check.

NOTE

Before performing checks 21 through 28, close switches 6, 4, and 3 on S156 (Digital board) and reset the SPG-271 by turning it OFF, then back ON. This will make three diagnostic signals —

DAC Test, Multipulse, and Sweep — available at the TEST SIGNAL and ID (Opt. 1) outputs. When the SPG-271 is in this mode, the 75% BARS switch is used to choose among the three signals.

21. Test Signal Ringing

a. Begin with the equipment setup shown in Fig. 5-5. Select WFM Display and CH B1 INPUT.

b. Select the Multipulse signal from the SPG-271 (with the 75% BARS switch).

c. Set the waveform monitor to view the bottom of the 2T pulse.

d. CHECK — for ≤ 7.0 mV (1%) of ringing.

22. ID (Opt. 1) Ringing

a. Begin with the equipment setup shown in Fig. 5-5. Select WFM Display and CH B2 INPUT.

b. Select the Multipulse signal from the SPG-271 (with the 75% BARS switch).

c. Set the waveform monitor to view the bottom of the 2T pulse.

d. CHECK — ID output for ≤ 7.0 mV (1%) of ringing.

23. Test Signal Group Delay

a. Begin with the equipment setup shown in Fig. 5-5. Select WFM Display and CH B1 INPUT.

b. Select Multipulse from the SPG-271.

c. Set the waveform monitor to view the bottom of the pulses.

d. CHECK—that the sine-wave-like envelope at the base of the pulses is ≤ 2.8 mV_{p-p} (5 ns) for the 20T pulse and ≤ 5.5 mV_{p-p} (5 ns) for the first three 10T pulses.

24. ID (Opt. 1) Group Delay

a. Begin with the equipment setup shown in Fig. 5-5. Select WFM Display and CH B2 INPUT.

b. Select Multipulse from the SPG-271.

c. Set the waveform monitor to view the bottom of the pulses.

d. CHECK—that the sine-wave-like envelope at the base of the pulses is ≤ 2.8 mV_{p-p} (5 ns) for the 20T pulse and ≤ 5.5 mV_{p-p} (5 ns) for the first three 10T pulses.

25. Test Signal Frequency Response

a. Begin with the equipment setup in Fig. 5-5. Select WFM + CAL Display, Fixed CAL, and CH B1 INPUT.

b. Select the Sweep signal from the SPG-271 (with the 75% BARS switch).

c. CHECK — that the line sweep amplitude is 700 mV ± 7 mV (1%) out to 5 MHz (last marker).

26. ID (Opt. 1) Frequency Response

a. Begin with the equipment setup in Fig. 5-5. Select WFM + CAL Display and CH B2 INPUT.

b. Select Fixed CAL (700 mV).

c. Select the Sweep signal from the SPG-271 (with the 75% BARS switch).

d. CHECK—that the line sweep is flat within 2% (± 7 mV) out to 5 MHz.

27. Test Signal Chrominance-Luminance Gain

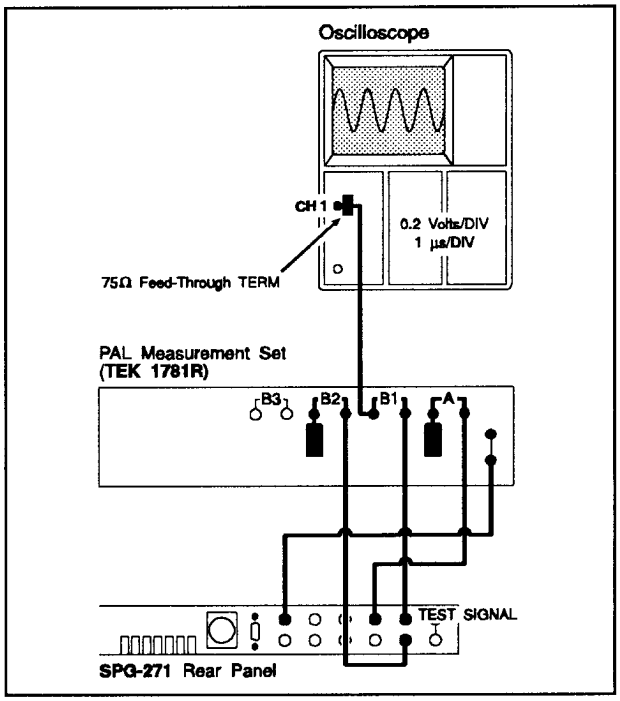


Fig. 5-7 Checking C/Y Gain of Test Signal.

a. Connect an oscilloscope to the CH B1 loop-through of the 1781R as shown in Fig. 5-7.

b. Select the DAC Test signal from the SPG-271 with the 75% BARS switch (the 1781R will not lock on to this signal).

c. Adjust the oscilloscope triggering to view both the 500 kHz and 4.43 MHz sine waves.

d. CHECK — that the sine wave amplitudes are equal within 5 mV_{p-p}.

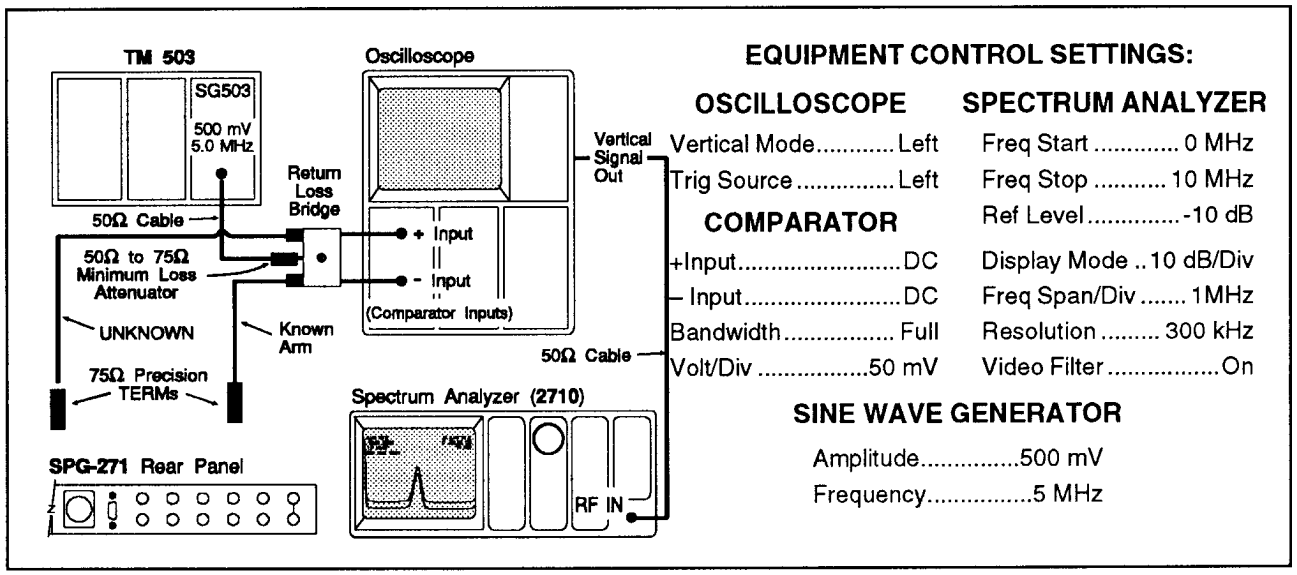


Fig. 5-8 Setup for Return Loss Measurements.

28. ID (Opt. 1) Chrominance-Luminance Gain

a. Connect the oscilloscope to the CH B2 loop-through of the 1781R (as previously connected to the CH 1 loop-through in Fig. 5-7).

b. Select the DAC Test signal from the SPG-271 with the 75% BARS switch (the 1781R will not lock on to this signal).

c. Adjust the oscilloscope triggering to view both the 500 kHz and 4.43 MHz sine waves.

d. CHECK — that the sine wave amplitudes are equal within 5 mV.

NOTE

Before proceeding, return the SPG-271 to normal operation. To disable the diagnostic signals open switches 6, 4, and 3 on S156, then turn the instrument OFF momentarily.

RETURN LOSS AND SUBCARRIER HARMONICS

Preparation for Return Loss Measurements

a. Connect the equipment as shown in Fig. 5-8.

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.

29. GENLOCK Loop-Through

a. Connect the 75Ω precision term to one of the SPG-271 GENLOCK LOOP-THROUGH connectors.

b. Connect the UNKNOWN cable to the other SPG-271 GENLOCK LOOP-THROUGH connector.

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

30. TEST SIGNAL, ID, and BLACK Outputs

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

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

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

d. If Opt. 1 is present, move the UNKNOWN cable from the TEST SIGNAL output to the ID (Opt. 1) output. If Opt. 1 is not present, proceed to step (f).

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

f. Return J440 to pins 1 and 2 and connect the UNKNOWN cable to the top BLACK output.

g. CHECK — that the return loss is > 36 dB as you vary the SG503 frequency between 5 MHz and 500 kHz.

h. Move the UNKNOWN cable to the bottom BLACK output.

i. CHECK — that the return loss is > 36 dB as you vary the SG503 frequency between 5 MHz and 500 kHz.

j. Remove the UNKNOWN cable from the BLACK output.

31. SYNC and PULSE Outputs

a. Connect the UNKNOWN cable to the SYNC, BLANKING, BURST FLAG, and FRAME REF outputs in turn and, for each output, check that the return loss is > 30 dB as you vary the SG503 between 5 MHz and 500 kHz.

b. Remove jumper J145 (Digital board).

c. Connect the UNKNOWN cable to the PAL PULSE output of the SPG-271.

d. CHECK — that the return loss is > 30 dB as you vary the SG503 frequency between 5 MHz and 500 kHz.

e. Remove the UNKNOWN cable from the PAL PULSE output. Return J145 to pins 1 and 2.

32. SUBCARRIER Output

a. Move J939 (Digital board) to pins 2 and 3.

b. Connect the UNKNOWN cable to the SUBCARRIER output.

c. CHECK — that the return loss is > 30 dB as you vary the SG503 frequency between 4.43 MHz and 500 kHz.

d. Return J939 to pins 1 and 2.

33. SUBCARRIER Harmonics

a. Connect the equipment as in Fig. 5-9.

b. CHECK — that the harmonics are > 40 dB down from the subcarrier frequency.

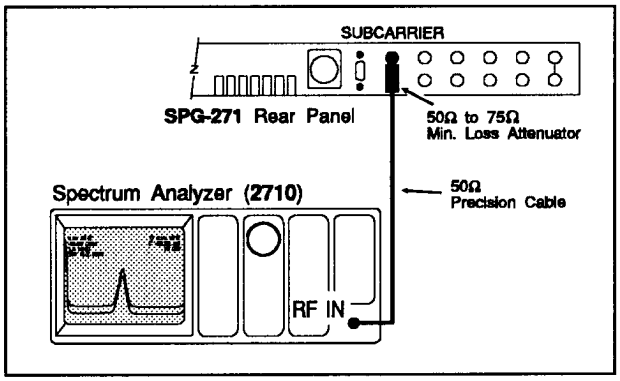


Fig. 5-9 Checking Subcarrier Harmonics.

SUBCARRIER FREQUENCY

34. Free-Running Frequency

NOTE

After initial setup or long storage, allow a two-hour warm up to re-age the crystal. Thereafter, 30 minutes warm up is sufficient.

a. Connect test equipment as in Fig. 5-10.

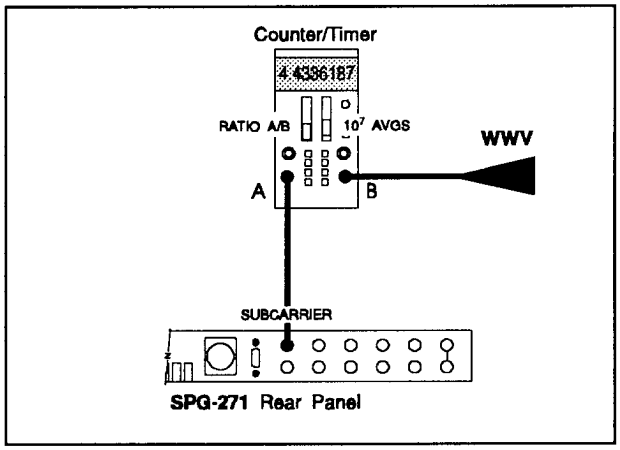


Fig. 5-10 Checking Subcarrier Frequency.

b. Check — for a subcarrier frequency between 4.43361775 MHz and 4.43361975 MHz.

AUDIO TONE (Opt. 1) OUTPUT

35. Total Harmonic Distortion

a. Connect the equipment as in Fig. 5-11, and place a 150Ω or 600Ω resistor (to represent the impedance of your system) across the analyzer + and - terminals.

b. Set the distortion analyzer to measure THD.

c. CHECK — that the THD is no more than 0.01%. If the ID click is active and prevents

accurate measurement, it may be disabled by moving J643 (Option board) to pins 1 and 2.

36. Audio Tone Amplitude

a. Retain the setup from the previous step. Set the distortion analyzer to measure signal level.

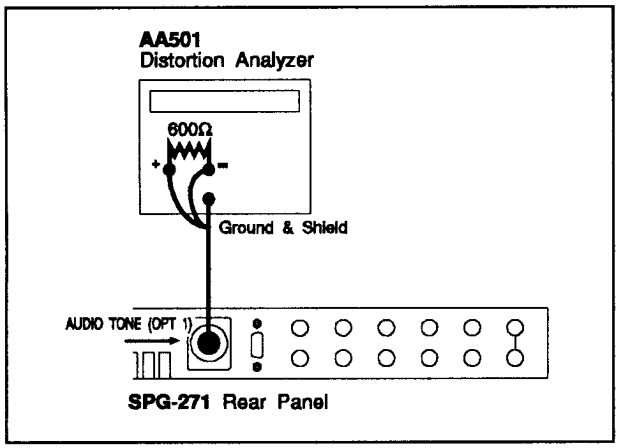


Fig. 5-11 Checking Audio (Opt. 1) THD and Gain.

b. CHECK — that the audio tone amplitude is between 0 and + 8 dB (factory setting is 8 dBu).

37. Audio ID "Click" Frequency

a. Connect the SPG-271 as shown in Fig. 5-12.

b. Move J643 (Option board) to Pins 2 and 3, if necessary, to enable the click.

c. CHECK — that the interval between clicks is from 0.25 to 5.0 seconds, corresponding to a frequency of 4 to 0.2 Hz.

d. Return J643 to pins 1 and 2 to disable the click, if desired.

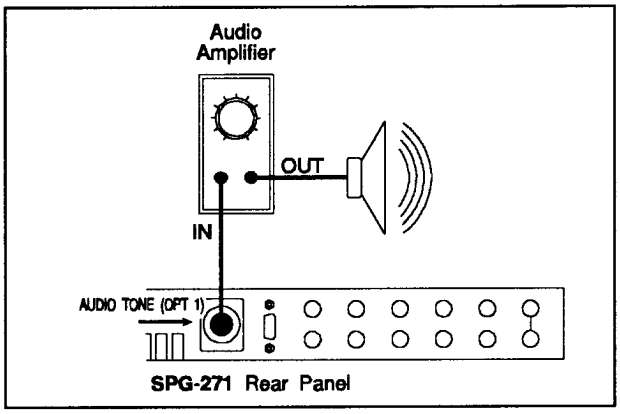


Fig. 5-12 Checking Audio Click (Opt. 1)

CALIBRATION CHECKLIST

Power Supply

1. +5 V Output (R415)

Subcarrier Output

2. DC Level and Gain (R393 and R288)
3. Output Frequency (C19)

Blanking Levels

4. Black (R726)
5. Test Signal (R832)
6. ID (Opt. 1) (R578)

Luminance Amplitudes

7. Black (R625)
8. Test Signal (R952)
9. ID (Opt. 1) (R935)

Test Signal And Black Chrominance

10. Burst Amplitude and Phase Matching (C630 and C633)
11. Frequency Response (L450, L550, L551, L650, and L750)
12. Group Delay (L450 and L550)
13. Chrominance-Luminance Gain (C838)

ID (Opt. 1) Chrominance

14. Burst Amplitude and Phase Matching (C840 and C945)
15. Frequency Response (C840)
16. Group Delay (C840)
17. Chrominance-Luminance Gain (C840)

Audio Tone (Opt. 1)

18. Audio ID Click Frequency (R740)
19. Audio Tone Amplitude (R507)

CALIBRATION PROCEDURES

NOTE

Calibration of the SPG-271 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

a. Connect power to the SPG-271 through a Variac set to 90 Volts AC.

b. Turn the SPG-271 ON.

c. Set the Variac to 115 Volts.

d. Adjust R415 (on the Power Supply board) to make the voltage at pin 24 of U667 (Digital Board) 5.00 V ± 50 mV.

SUBCARRIER OUTPUT

2. DC Level and Gain

a. Connect the test equipment as shown in Fig. 5-13.

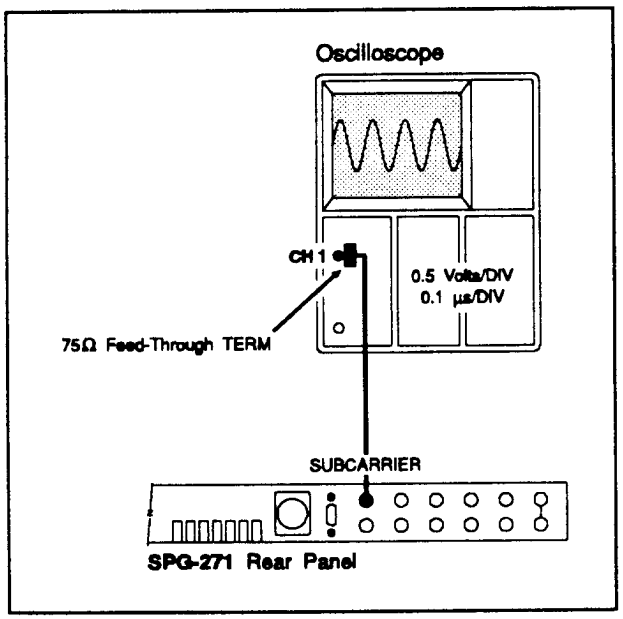


Fig. 5-13 Checking Subcarrier DC Level and

b. Move jumper J939 to pins 2 and 3.

c. Set the oscilloscope to ground-coupled and center the trace on the display graticule.

d. Switch to DC coupling and adjust R393 for a DC level of 0 V.

e. Return jumper J939 to pins 1 and 2.

f. Adjust R288 for a sine wave amplitude of 2.0 V ± 0.2 V, peak-to-peak.

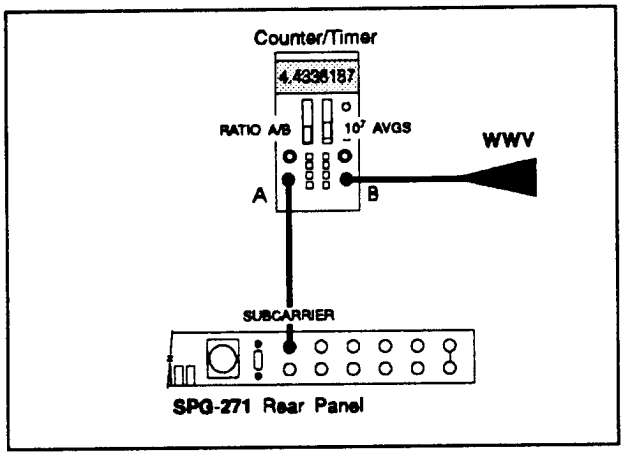


Fig. 5-14 Checking Subcarrier Frequency.

3. Output Frequency

a. Connect the equipment as shown in Fig. 5-14. Confirm that there are no other connections to the SPG-271 outputs.

b. Adjust C19 for a Subcarrier Frequency of 4.4336187 MHz or 4.4336188 MHz (the specification is 4.43361875 MHz ± 1 Hz).

Steps 4 Through 17 Share the Same Basic Equipment Setup and Settings. This Reference Setup is Shown in Fig. 5-15 .

BLANKING LEVELS

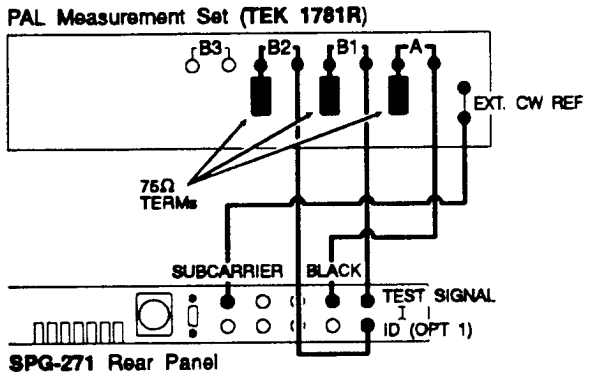
4. Black

a. Begin with the 1781R Reference Setup (Fig. 5-15). Select WFM Display and CH A INPUT.

b. Adjust R726 to match the inserted line blanking to sync and burst blanking.

5. Test Signal

a. Begin with the 1781R Reference Setup (Fig. 5-15). Select WFM Display and CH B1 INPUT.



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. 5-15 Reference Setup for Procedures 4 through 17.

b. Set the 1781R to GND coupling and center the trace on the display graticule.

c. Switch back to DC coupled. Adjust R832 for a blanking level of 0 Volts ± 25 mV.

6. ID (Opt. 1)

a. Begin with the 1781R Reference Setup (Fig. 5-15). Select WFM Display and CH B2 INPUT.

b. Adjust R578 to match the blanking levels of the character ID and Test Signal.

LUMINANCE AMPLITUDES

7. Black

a. Begin with the 1781R Reference Setup (Fig. 5-15). Select WFM + CAL Display and CH A INPUT.

b. Set CAL to 300 mV.

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

8. Test Signal

a. Begin with the 1781R Reference Setup (Fig. 5-15). Select WFM + CAL Display and CH B1 INPUT.

b. Select Fixed CAL (700 mV).

c. Adjust R952 to match the White Level of the lower waveform to the Blanking Level of the upper.

9. ID (Opt. 1)

a. Begin with the 1781R Reference Setup (Fig. 5-15). Select WFM + CAL Display and CH B2 INPUT.

b. Select Fixed CAL (700 mV).

c. Adjust R935 to match the White Level of the lower waveform to the Blanking Level of the upper.

TEST SIGNAL AND BLACK CHROMINANCE

10. Burst Amplitude and Phase Matching

a. Begin with the 1781R Reference Setup (Fig. 5-15). Select WFM + CAL Display and CH B1 INPUT.

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 dϕ graticule.

d. At the rear panel of the SPG-271, move the cable from the TEST SIGNAL output to the second BLACK output (see Fig. 5-16).

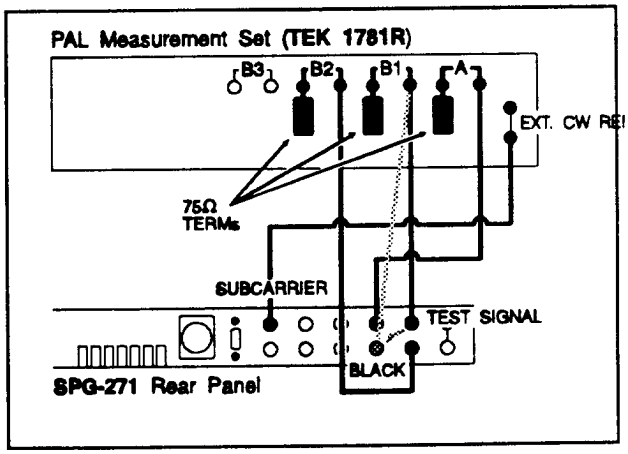


Fig. 5-16 Checking Black Phase.

e. Set CAL to 300 mV.

f. Adjust C630 to match the bottom of the upper burst to the top of the lower on the right display.

g. Adjust C633 to align the burst vectors to 0° and 90°.

h. Repeat steps (f) and (g) as necessary to achieve both 300 mV burst amplitude and phase matching.

NOTE

Before performing steps 11 through 13, close switches 6, 4, and 3 on S156 and reset the SPG-271 by turning it OFF, then back ON. This will make three diagnostic signals — DAC Test, Multipulse, and Sweep — available at the TEST SIGNAL output. When the SPG is in this mode, the 75% BARS switch is used to choose among the three signals.

Steps 11 through 13 are interactive and should be repeated, in sequence, until satisfactory results are obtained.

11. Frequency Response

a. Begin with the 1781R Reference Setup (Fig. 5-15). Select WFM + CAL Display, Fixed CAL, and CH B1 INPUT.

b. Select the Sweep signal from the SPG-271 (with the 75% BARS switch).

c. Adjust L450, L550, L551, L650, and L750 for as flat a response as possible. The line sweep should be flat within 2% (± 7 mV) out to 5 MHz (last marker).

12. Group Delay

a. Return the Measurement Set to WFM Display.

b. Select the Multipulse signal from the SPG-271 (with the 75% BARS switch).

c. Adjust L450 and L550 for the smallest possible distortion envelopes at the base of each modulated pulse. The 20T pulse will have no more than 2.8 mV_{p-p} distortion, and the 10T pulses no more than 5.5 mV_{p-p} distortion when the delay is 5 ns or less.

13. Chrominance-Luminance Gain

a. Connect an oscilloscope to the CH B1 loop-through of the 1781R as shown in Fig. 5-17.

b. Select the DAC Test signal from the SPG-271 with the 75% BARS switch (the 1781R will not lock on to this signal).

c. Adjust the oscilloscope triggering to view both the 500 kHz and 4.43 MHz sine waves.

d. Adjust C838 to match the sine wave amplitudes within 5 mV.

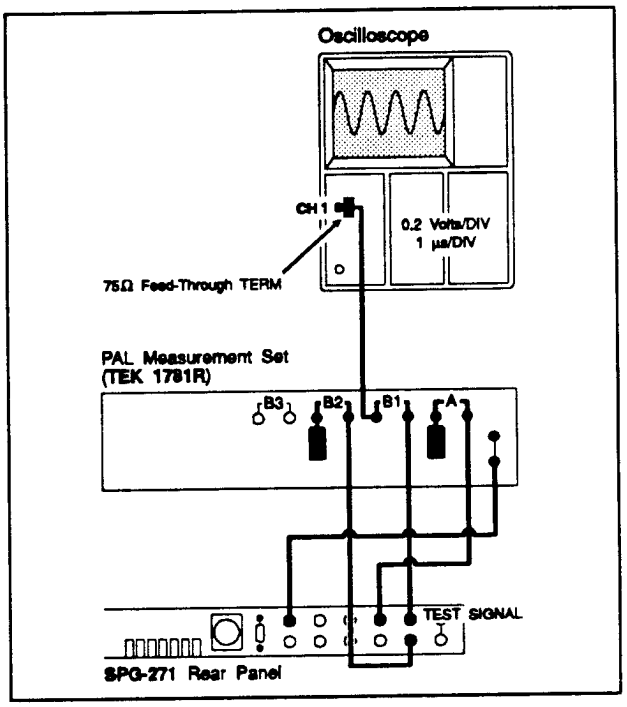


Fig. 5-17 Checking C/Y Gain of Test Signal.

e. Repeat steps 11 through 13 as necessary for best results.

f. To return the SPG to normal operation, open switches 6, 4, and 3 on S156, then turn the instrument OFF momentarily.

g. Use WFM + CAL on the 1781R to check for a Test Signal burst amplitude of 300 mV ± 6 mV. If this specification is not met, repeat steps 10 through 13 as necessary.

ID (Opt. 1) CHROMINANCE

NOTE

Steps 14 through 17 are interactive and should be repeated, in sequence, until satisfactory results are obtained.

14. Burst Amplitude and Phase Matching

a. Begin with the 1781R Reference Setup (Fig. 5-15). Select WFM + CAL Display and CH B1 INPUT.

b. Confirm that the 1781R is set to EXT CW

Sync, then exit Configure to view the vector display.

c. Select Phase Shift and align the burst vectors to 0° and 90° on the vector display. Press REFERENCE SET to zero the phase. Adjust Vector Gain to normalize the 0° vector to the dϕ graticule.

d. At the rear panel of the SPG-271, move the cable from the TEST SIGNAL output to the ID (Opt. 1) output (see Fig. 5-18).

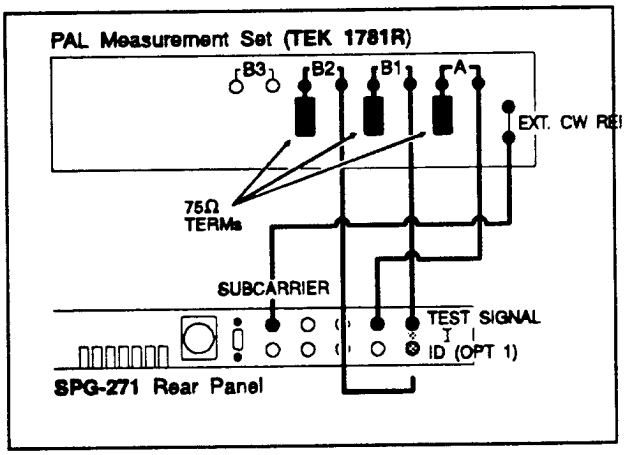


Fig. 5-18 Checking ID (Opt. 1) Phase.

e. Set CAL to 300 mV.

f. Adjust C840 to match the bottom of the upper burst to the top of the lower on the right display.

g. Adjust C945 to align the burst vectors to 0° and 90°.

h. Repeat steps (f) and (g) as necessary to achieve both 300 mV burst amplitude and phase matching.

NOTE

Before performing steps 15 through 17, close switches 6, 4, and 3 on S156 and reset the SPG-271 by turning it OFF, then back ON. This will make three diagnostic signals — DAC Test, Multipulse, and Sweep — available at the ID (Opt. 1) output. When the SPG is in this mode, the 75% BARS switch is used to choose among the three signals.

15. Frequency Response

a. Begin with the 1781R Reference Setup (Fig. 5-15). Select WFM + CAL Display and CH B2 INPUT.

b. Set CAL to 700 mV.

c. Select the Sweep signal from the SPG-271 (with the 75% BARS switch).

d. The line sweep should be flat within 2% (± 7 mV) out to 5 MHz (last marker). If this spec is not met, adjust C840 slightly for a flatter response.

16. Group Delay

a. Return the Measurement Set to WFM Display.

b. Select the Multipulse signal from the SPG-271 (with the 75% BARS switch).

c. View the distortion envelopes at the base of each modulated pulse. The 20T pulse will have no more than 2.8 mV_{p-p} distortion, and the 10T pulses no more than 5.5 mV_{p-p} distortion when delay is 5 ns or less. If this spec is not met, adjust C840 slightly for smaller distortion envelopes.

17. Chrominance-Luminance Gain

a. Connect an oscilloscope to the CH B2 loop-through of the 1781R as shown in Fig. 5-19.

b. Select the DAC Test signal from the SPG-271 with the 75% BARS switch (the 1781R will not lock on to this signal).

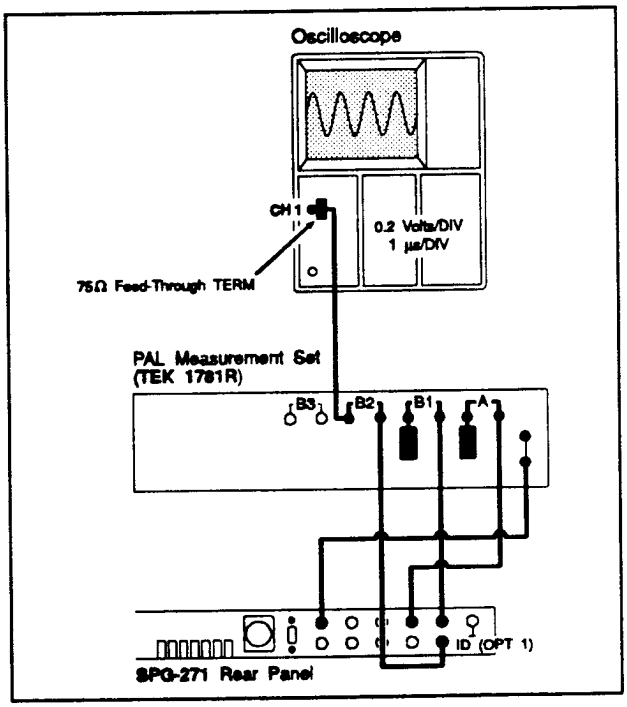


Fig. 5-19 Checking C/Y Gain of ID (Opt. 1) Signal.

c. Adjust the oscilloscope triggering to view both the 500 kHz and 4.43 MHz sine waves.

d. If the sine wave amplitudes do not match within 5 mV, adjust C840 to make them do so.

e. Repeat procedures 11 through 13 as necessary for best results.

f. To return the SPG to normal operation, open switches 6, 4, and 3 on S156, then turn the instrument OFF momentarily.

g. Use WFM + CAL on the 1781R to check for an ID signal burst amplitude of 300 mV ± 6 mV. If this specification is not met, repeat steps 14 through 17 as necessary.

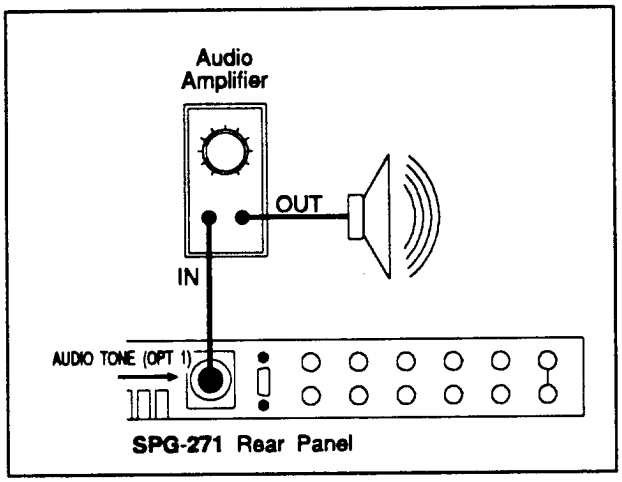


Fig. 5-20 Checking Audio Click (Opt. 1)

AUDIO TONE (Opt. 1)

18. Audio ID Click Frequency

a. Connect the equipment as shown in Fig. 5-20.

b. Adjust R740 for the desired interval between ID clicks. The range of adjustment is from approximately 0.25 seconds to over 5 seconds.

19. Audio Tone Amplitude

a. Connect the equipment as shown in Fig. 5-21. Appropriate settings for a Tektronix AA501 Distortion Analyzer would be:

Input Level Range ...Auto Range

dBm Switch.....In

Level Switch .....In

All Filter Switches .....Out

b. Adjust R507 to obtain the desired audio output level (the factory setting is +8 dBm).

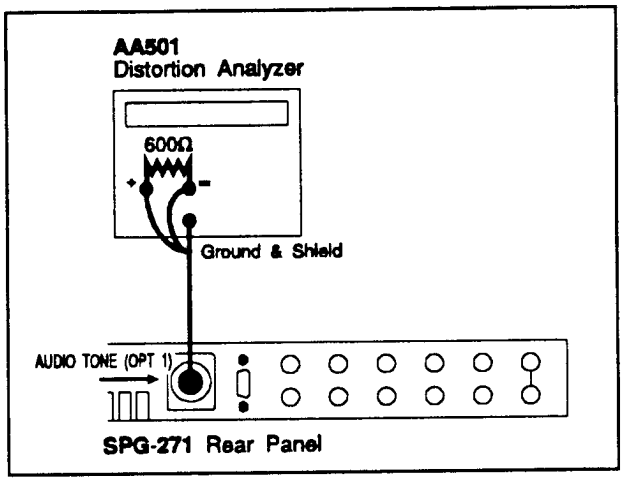


Fig. 5-21 Checking Audio (Opt. 1) Gain.

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 SPG-271 Theory of Operation is made up of two parts. First, the Block Diagram which describes the basic architecture of the SPG-271 via function blocks. The Circuit Descriptions are second. These describe the schematic diagrams that make up the function blocks.

BLOCK DIAGRAM

This section divides the SPG-271 into six functions: Input Processing, Genlock Loop, Signal Generation, Signal Interpolation, 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.

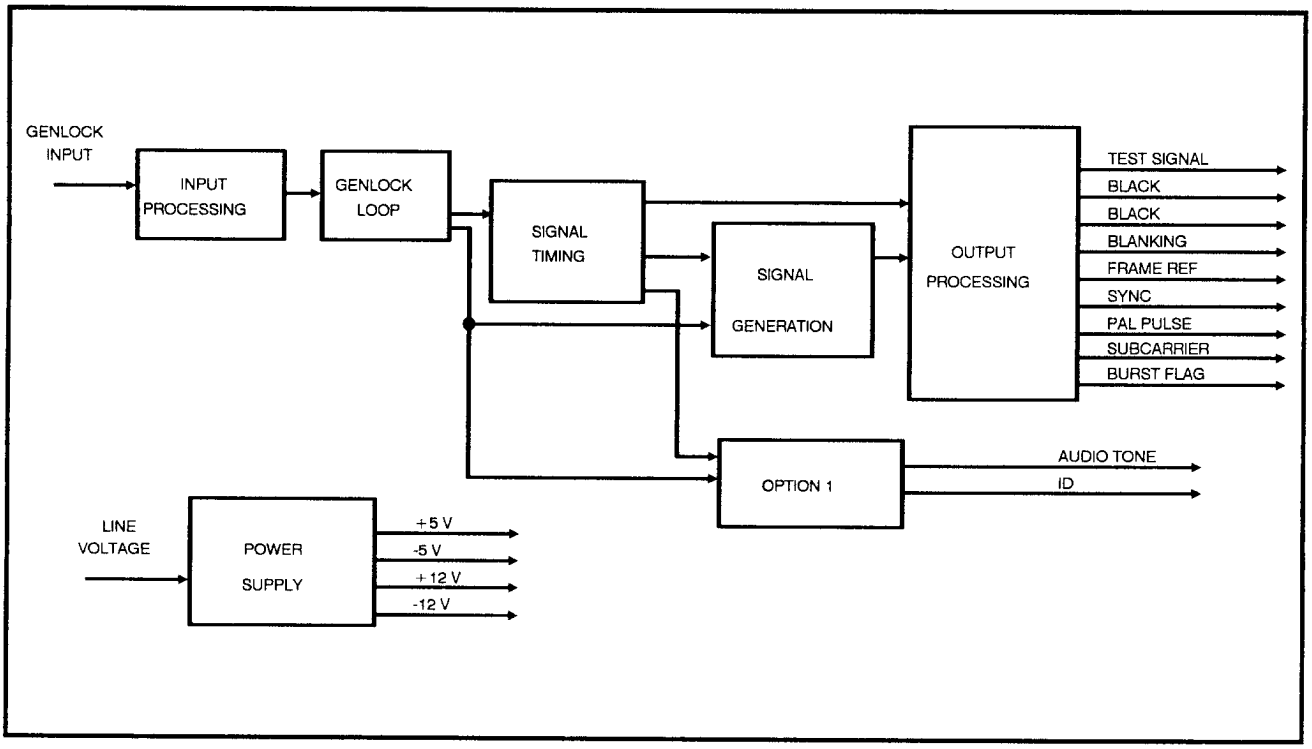


Fig. 6-1. Basic block diagram of the SPG-271.

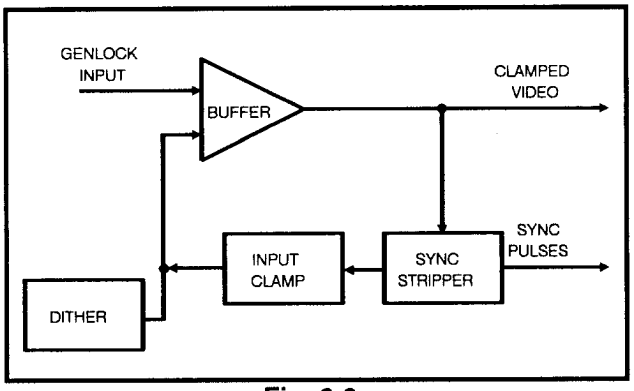


Fig. 6-2.
Block diagram of the Input Processing circuit.

INPUT PROCESSING
(See Fig. 6-2)

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 Stripper extracts composite sync from the Genlock Input signal, then supplies it to the Input Clamp and the Memory 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 ADC.

GENLOCK LOOP
(See Fig. 6-3)

The Genlock Loop locks the SPG-271 outputs to the Genlock Input signal. It does this by generating two signals [CLK1 and FLD_REF] 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

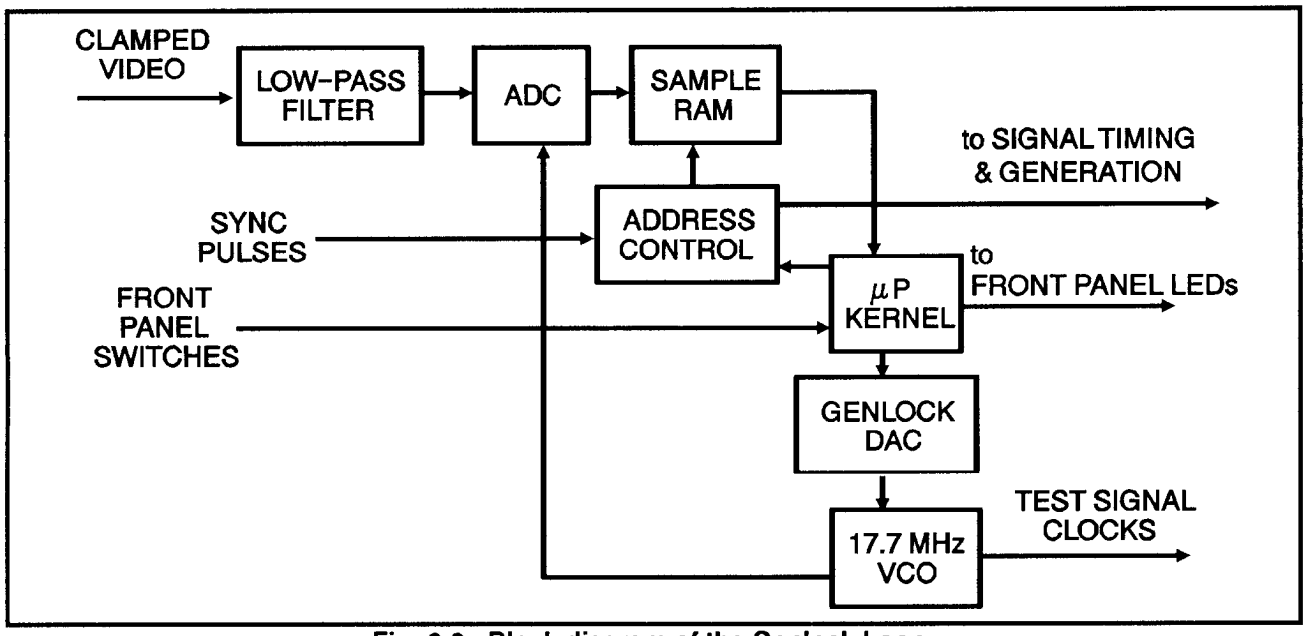


Fig. 6-3. Block diagram of the Genlock Loop.

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.

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.

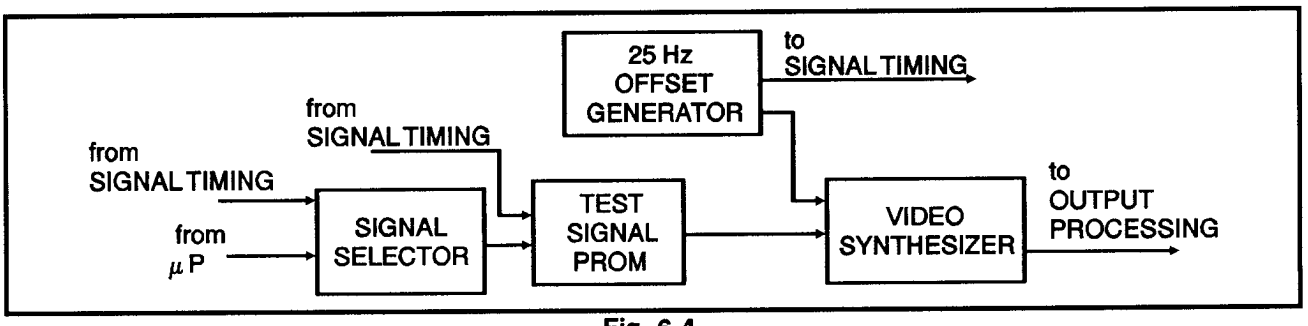


Fig. 6-4.
Block diagram of the Signal Generation circuit.

SIGNAL TIMING & GENERATION (See Figs. 6-4 & 6-5)

The Signal Generation section puts out two sets of signals: the sync pulses and the line-locked test signal data. All the signals are locked to the Genlock Input signal. The circuits that generate these signals are described below.

Test Signal Generation

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

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 Signal Generation circuitry by up to ±7 μs and the sync pulses by up to ±3.5 μs.

The H Timing Counters provide timing to the Test Signal PROMs 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.

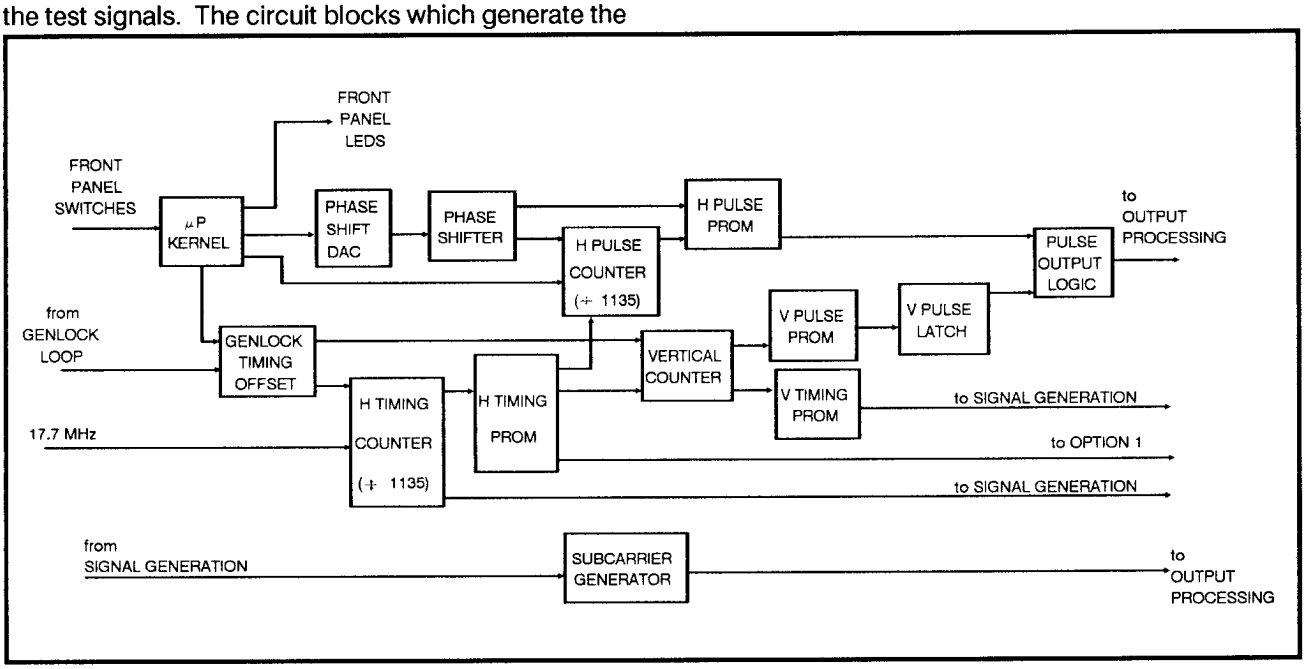


Fig. 6-5. Block diagram of the Signal Timing.

Signal Selection is updated during the vertical interval. The μP sends out a selection code that, combined with V Timing PROM outputs, tells the Signal Selector which signal to select and when to select it. The V Timing PROM also tells the Selector which elements of the signal to select. The V Pulse PROM tells the Selector when to select vertical sync.

The signals selected at the Test Signal PROMs are sent on to the Signal Interpolation circuitry.

Sync Pulse Generation

The main job of the Sync Pulse Generation section is to produce correctly timed sync pulse signals. It does this by using the two genlock signals [CLK1 and FLD_REF] plus delay information from the μP to generate timing for its H and V Pulse PROMs. The output of these PROMs makes up the sync pulse signals sent to the Output board. The circuit clocks that generate timing for the H and V Sync Pulse PROMs are: the Sync Phase Shifter, Phase Shift DAC, H Pulse Counter, and V Pulse Latch.

The Sync Phase Shifter and Phase Shift DAC allow the μP to match the pulse output timing with the Test Signal output. The Sync Phase Shifter adjusts the phase of the clocks which drive the Sync Pulse Generation circuit blocks.

Deriving its timing from the H Timing PROM, the H Pulse Counter divides the clock by 1135 to address the horizontal sync pulse components in the H Pulse PROM. The coarse sync timing from the μP is added to the H Pulse PROM through this counter. The μP adds this offset by changing the counter's reset count.

The Vertical Counter generates vertical timing for the V Pulse PROM. However, the Vertical Counter does not have sync timing offset, so the H Pulse PROM aligns the timing of the V Pulse PROM outputs with its own timing by controlling the timing of the V Pulse Latch.

OUTPUT PROCESSING (See Fig. 6-6)

Test Signal Output

The test signal output from the Signal Interpolation circuitry is converted to analog by the Test Signal DAC, 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.

Black Generation

Black is generated by switching the currently-selected test signal to blanking level during active video and then switching back to the sync and burst portion of the test signal during the sync and burst time.

Pulse Outputs

The functions of the Aux Output circuits are to convert the TTL level outputs from the Pulse Output Logic to standard TV levels and to supply the necessary power to drive a 75Ω load.

OPTION 1

Audio Tone Generation

The Audio Tone Generation block generates an analog and digital audio tone at 500 Hz or 1 kHz. The frequency is locked to the video vertical rate.

Character ID Generation

The Character ID Generation circuitry makes a 12-character ID and inserts the data into the test signal data stream. The data is inserted through the switch which either outputs the test signal or the character data. 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.

POWER SUPPLY

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.

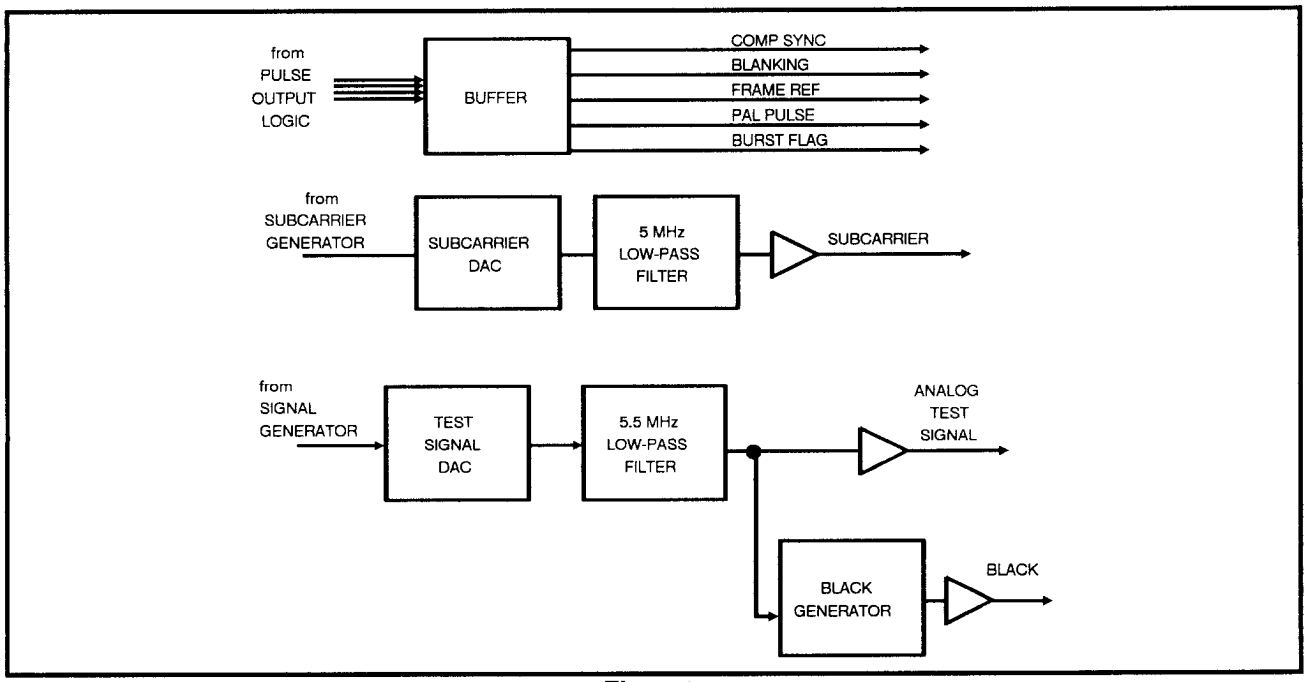


Fig. 6-6.
Block Diagram of the Output Processing circuit.

CIRCUIT DESCRIPTIONS

FRONT PANEL ① AND FRONT PANEL INTERFACE ② (See Fig. 6-7)

The five main functions of the Front Panel I/O circuitry are (1) to transfer front-panel user selections to the μP, (2) to transfer signal timing offset data from the μP to the Digital board, (3) to transfer diagnostic switch data to the μP, (4) to transfer remote control data to the μP, and (5) to transfer operating status and diagnostic data from the μP to the front-panel LEDs. Each of these is described below.

FRONT-PANEL SELECTION

Decoder U205 converts the front-panel data selected by the 11 switches into a 4-bit word and applies it to buffer U208. During the vertical interval, the μP checks the front panel by asserting (KEYBOARD). This loads the 4-bit word onto the data bus. To determine if a new selection has been made at the front panel, the μP checks for a high level on the ED4 line. The Data Available output (U205, pin 13) pulls this line high for about 20 ms whenever a new front-panel selection is made.

The (OPT._1) line is pulled low to indicate if the OPTION 1 board is installed. It is high if the board is not installed. Jumpers J111, J208, and J308 are shipped in the 1-2 position. These positions select the normal front-panel operation. In the 2-3 position, jumper J111 disables the selection of operating modes from the front panel. In the 2-3 position, jumper J208 enables the programming of remote controlled test signal selection. In the 2-3 position, J308 disables any attempts to change genlock timing.

TIMING OFFSET LATCHES

The μP sends the coarse sync-timing and genlock-timing offsets to the Signal Generation circuits through two latches (U880 and U364, respectively). The genlock timing offset is sent to the Genlock Timing Offset circuit ⑥. The sync timing offset is sent to the H Pulse Counter circuit ⑥. The LSB of the sync timing offset is the PHASE FLIP line which is sent to the Phase Flip circuit ⑤.

DIAGNOSTIC SWITCHES

The user selects the diagnostic routines through the Diagnostic Switches (S156). Immediately after the μP is reset, it checks the diagnostic switch buffer (U161) by asserting the (DIAG_PORT) line, and performs the selected diagnostic routine(s). When all switches are open, the instrument is in normal operation. Refer to Diagnostics in the Maintenance section for a full description of the diagnostic routines.

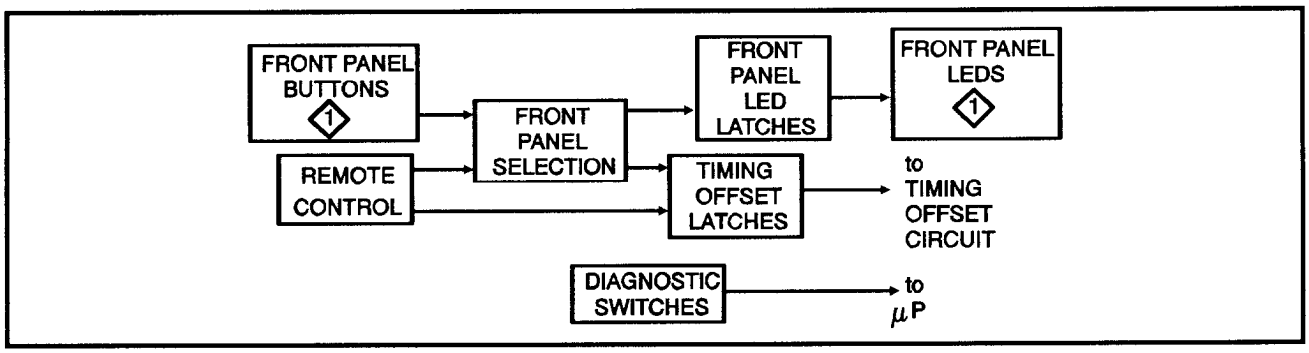


Fig. 6-7.
Block diagram of the Front Panel Interface.

REMOTE CONTROL PORT

The remote control and front panel can both operate simultaneously, but the remote has priority. That is, during the vertical interval, the μP first checks the remote control buffers (U846 and U849) and then the front-panel buffer (U208). But if a new selection since the previous vertical interval has been made at the remote control, the μP executes the new selection and does not check for the front-panel input.

FRONT-PANEL LED LATCHES AND LEDS

The front-panel LEDs are all controlled by the μP through the three latches (U302, U211, and U214). The μP enables these latches with the (LED0), (LED1), and (CONTROL) signals. U214 also puts out five additional signals: CLAMP_DISABLE, (CHAR_EN), (BLACK_EN), (INT)/GEN, and (HOLD)/ACQIR. CLAMP_DISABL disables the test signal output clamp. (CHAR_EN) provides μP control over the Character ID Generator. (BLACK_EN) forces the test signal output to black and shuts off the audio tone. When the (INT)/GEN line is high, the instrument is forced to use the internal reference; when the line is low, the instrument will genlock to the reference input (if it is available). (HOLD)/ACQIR controls the loop response of the Genlock Loop.

MICROPROCESSOR (μP) KERNEL 3 (See Fig. 6-8)

This section briefly describes the functions of the μP Kernel and its components. For a description of the diagnostics executed by the μP, refer to the Maintenance section of this manual.

The μP Kernel has four main functions: (1) to acquire and maintain genlock with the incoming reference signal, (2) to service the front panel and remote control, (3) to control the test signal timing, and (4) to execute diagnostics. The components of the Kernel are described as follows.

MICROPROCESSOR

The Microprocessor (μP) (U427) is the heart of the Kernel. Receiving its program instructions from the EPROM (U333), the μP controls the Kernel through address lines [A0-A15], data lines [D0-D7], and various other control lines.

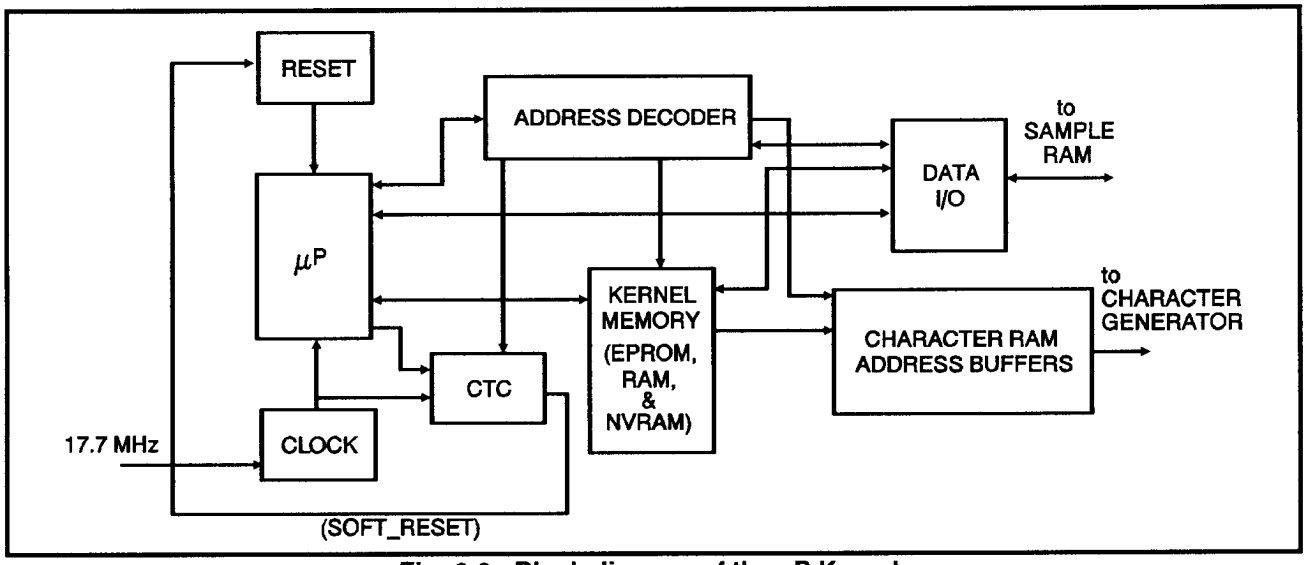


Fig. 6-8. Block diagram of the μP Kernel.

The clock that drives the μP is derived from the 17.7 MHz CLK_B. PAL U129 divides this clock by 3 to obtain a 5.9 MHz clock, named μP_CLK, for the μP and the CTCs. U232B, U232C, and the associated parts shape the clock signal and apply it to the μP.

When the instrument is being powered up, the (RESET) pulse from U321 goes low, resetting the μP Kernel. The μP can be manually reset by momentarily moving jumper J229 to the 2-3 position.

During normal operation, the CTCs (U240 and U245) monitor the μP. If the μP is not sending correct data and addresses to the CTCs, the CTCs put out (SOFT_RESET) to interrupt and re-initialize the μP. The CTC's (SOFT_RESET) pulse can be prevented from interrupting the μP by moving jumper J423 to the 2-3 position.

U321 also contains a timer circuit. During normal operation, the μP keeps this timer reset by asserting (AWAKE) repeatedly. If, for some reason, the μP fails to reset the timer, U321 resets the μP. Moving jumper J223 to the 2-3 position forces (RESET) low and moving J223 to the 2-4 position disables μP resets for troubleshooting purposes.

KERNEL MEMORY

EPROM (U333) contains the instructions that control the μP. The EPROM occupies the μP's address space between 0000 and 7FFF (hex).

RAM (U340) stores temporary data and program variables for the μP. The RAM occupies addresses A000-A7FF (hex).

The Arctangent PROM (U122) is a look-up table of the trigonometric arctangent function of a ratio of two numbers. While doing genlock calculations, the μP looks up the solution to the arctangent calculation in the PROM instead of calculating it.

The μP first outputs the divisor of the calculation to latch U217. This provides the lower half of the PROM address. Then the μP reads from the ATAN I/O location. By virtue of the μP architecture, the upper 8 address lines contain the I/O port address. These 8 bits form the upper 8 bits of the PROM address. The PROM outputs are then available on the external data bus ED0-ED7. NVRAM (U345) is a combined non-volatile memory and a static RAM. The NVRAM contains genlock timing presets, character ID presets, and remote control signal selection data. The NVRAM occupies addresses E000-E07F.

Immediately following a μP reset, the μP loads the front-panel data from the non-volatile portion of the NVRAM into the RAM portion. Then, from the RAM portion, it loads the timing offset into the H and V Timing circuits ⑥, and loads the character ID data into the Character RAM on the Output board.

If a new timing offset or character ID is selected at the front panel, the μP loads the new data into the RAM portion of the NVRAM during the vertical interval. When the MODE SELECT switch is cycled back to the SELECT BARS position or the mode times out, the new data is stored in the non-volatile part of the NVRAM.

The NVRAM is controlled by the μP via the NVRAM Controller PAL (U236). The Controller PAL decodes the μP address and control lines to generate read, write, and chip select pulses for the NVRAM. Consisting of Q541, U232D, and the associated parts, the NVRAM Save Control prevents the NVRAM from saving data during power-up and power-down. During power-up, (RESET) forces the output of U232D high to keep the (NV_SAVE) line high (inactive). During power-down, Q541 and its associated components keep the (NV_SAVE) line high until the NV_PWR power supply has dropped below 3 V.

CTCS

CTC0 and CTC1 (U240 and U245, respectively) are 4-channel programmable counter/timer chips configured as programmable event counters. Their job is to count pulse signals generated by the Genlock circuit and indicate to the μP the sequence in which these signals occur. The μP instructs each channel clock to count a specified number of input pulses and to interrupt the μP when it has reached this count. In this manner, the μP can determine the sequence in which the genlock signals are occurring.

The CTC input signals are synchronized with the system clock. CLK_A latches the Genlock Loop pulses ④, and CLK_2.95 latches the (ASYNC) in U519A. The CTCs are daisy-chained (with their IEI and IEO lines) so that CTC0 has interrupt priority. This means that interrupts caused by channels 0 through 3 of CTC0 have higher priority than those caused by channels 0 through 3 of CTC1. When CTC0 interrupts, its IEO line goes low, disabling CTC1 interrupts. When CTC0 is not interrupting, its IEI line is high, enabling CTC1 to interrupt the μP.

ADDRESS DECODERS

PAL U126 decodes the μP address and control lines to generate chip select signals for: the Kernel Memories, the Sample RAM, CTCs, the I/O Decoder, the Character ID Memory, and the External Data Bus Buffer.

The I/O Decoder (U320) decodes the μP I/O port addresses 0-15 to enable Front-Panel, Remote Control and Diagnostic Switch Input Buffers ②; Front-Panel LED and Timing Offset Latch Outputs ②; the Genlock Line Counter ④; the Sync Timing and VCO Control DACs ⑤; and the Signal Select Latch ⑦.

ADDRESS BUFFERS

When reading from or writing to the Sample RAM, the μP uses the Sample RAM Address Buffer (U415) [enabled by (SMP_RAM_EN)] as a port.

The Character ID Address Buffer (U723) isolates the Character ID Generator from the Kernel. It sends the Character ID RAM addresses and control signals to the Character Generator.

DATA I/O BUFFERS

The External Data Bus transceiver (U405) isolates the Kernel while allowing two-way communication with external devices.

The Sample RAM Data transceiver (U402) sends data to and receives data from the Sample RAM (U503, ④). Normally, U402 receives data samples on every video line.

GENLOCK DATA ACQUISITION CONTROLLER 4

The Genlock Data Acquisition circuit is the part of the Genlock Loop that acquires samples of the incoming reference signal for the μP to analyze. See Fig. 6- for a block diagram of the circuit. For a general description of the Genlock Loop, refer to the Genlock Loop section in the Block Diagram description.

INPUT FILTER

Made up of C905, C906, C907, and L902, 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)

The ADC (U802) converts the clamped and inverted video signal from the Analog board into 6-bit data. Dither is inserted into the signal on the Output board to increase the resolution. U605 provides a regulated +2.5 V reference that U808 inverts and scales down to provide a precise -1 V reference to the ADC.

Because the ADC is clocked by the VCO with CLK_A, 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 U602 and sent to the Sample RAM.

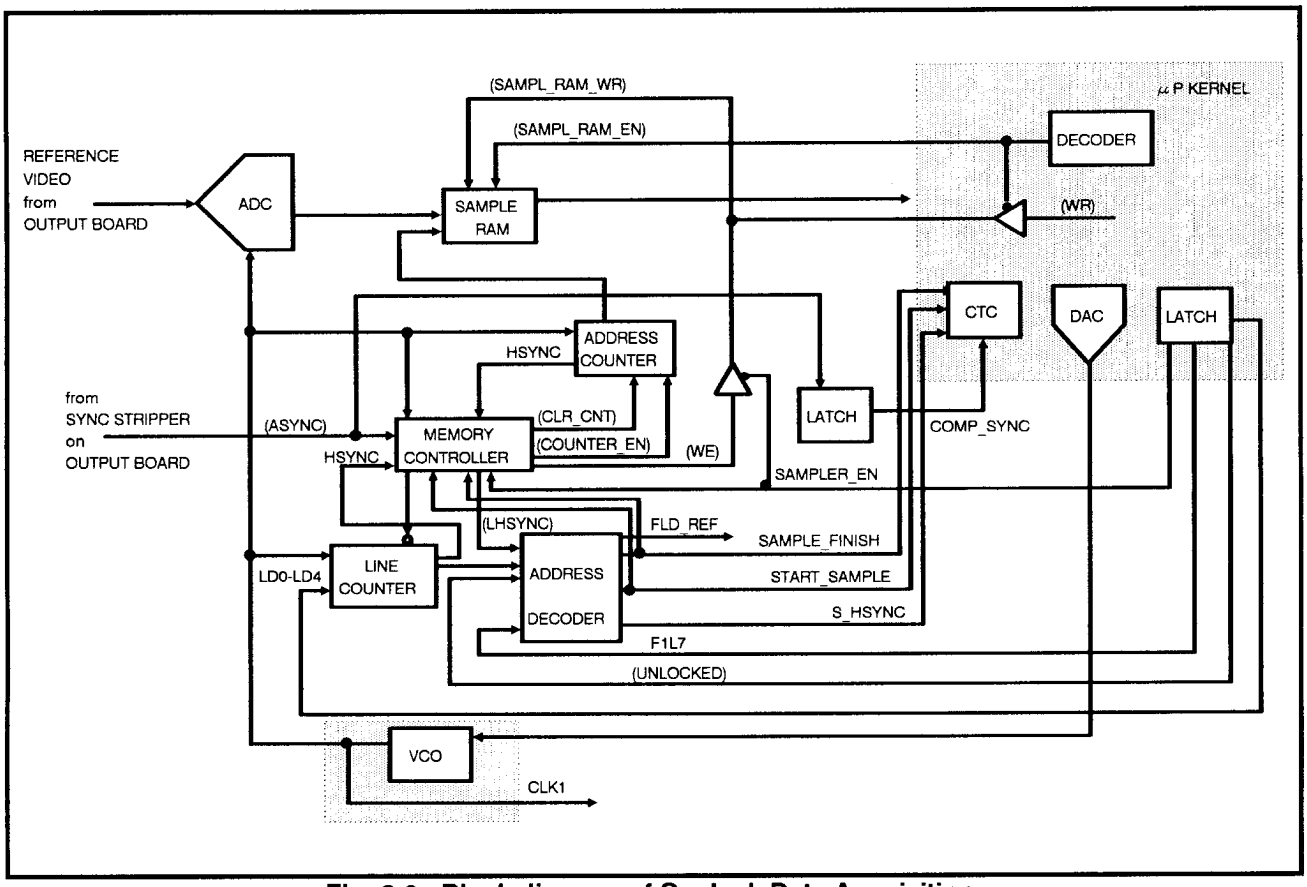


Fig. 6-9. Block diagram of Genlock Data Acquisition.

Sample RAM

The main function of the Sample RAM (U503) 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 (U427, ③) and Memory Controller (U615) 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 (U509, U609, and U709), the Line Counter Offset latch (U409), the Address Decoder (U612), the Memory Controller (U615), and the Address Counter (U512 and U515). The combined function of these circuits is to provide timing to the Sample RAM such that the RAM's 28th sample (out of 256 samples) is coincident with the 50% point of horizontal sync.

Line Counter and Address Decoder

By counting 1135 cycles of CLK_A 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 1135th 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 (B_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 Address Decoder generates the (LOAD) pulse, deriving it from (ASYNC), 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 (F1L7). The Address Decoder gates this signal with (L_HSYNC) to generate FLD_REF for the Signal Generation circuits.

Memory Controller and Address Counter

The Memory Controller (U615) controls the storage of ADC data in the Sample RAM. The Address Counter (U512) generates 256 addresses (0 to 255) in which the Sample RAM stores the ADC samples. Fig. 6-10 shows the timing for the Memory Controller and Address Counter outputs.

When START_SAMPLE is high and both SAMPLER_EN and (COUNTER_EN) are low, the Memory Controller enables the Address Counter on the next rising edge of the clock. The Memory Controller then asserts (WE) and a sample point is written into the Sample RAM. The Memory Controller repeats this sequence of (COUNTER_EN) followed by (WE) until the Address Counter generates SAMPL_FINISH pulse on the 256th count.

During the vertical interval, START_SAMPLE never occurs if (UNLOCKED) is low. Remember, when (UNLOCKED) is low, the Address Decoder uses (ASYNC) to derive the (LOAD) pulse for the Line Counter. In the vertical interval, this pulse occurs at a half-line rate. Because this prevents the counter from reaching a full line count, the Address Decoder cannot generate START_SAMPLE.

Memory Controller outputs START_SAMPLE, SAMPL_FINISH, and S_HSYNC are sent to the CTCs along with (ASYNC). The μP continuously analyzes the sequence of these four signals to find and keep track of the vertical interval.

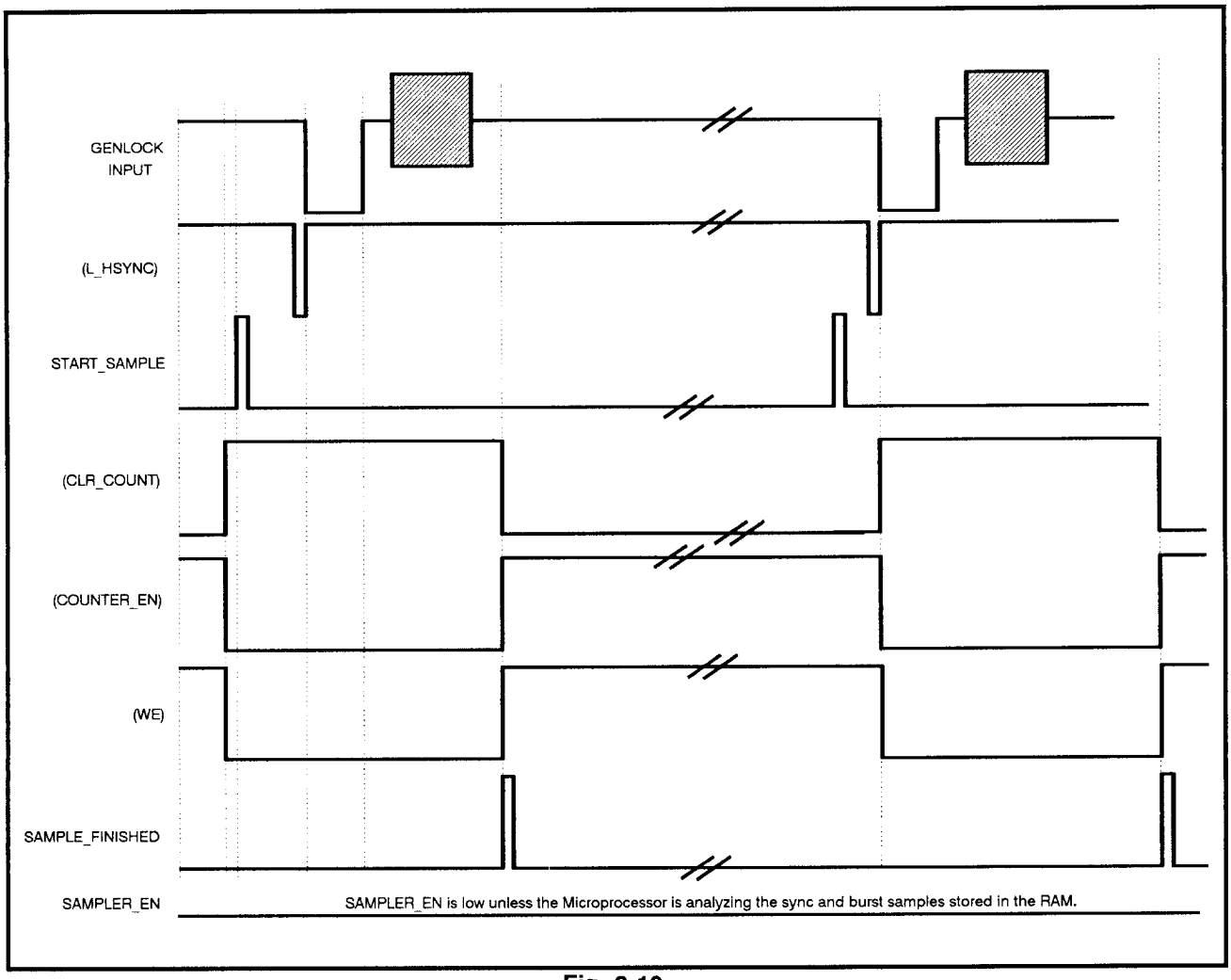


Fig. 6-10.
Timing for the Memory Controller and Address Counter.

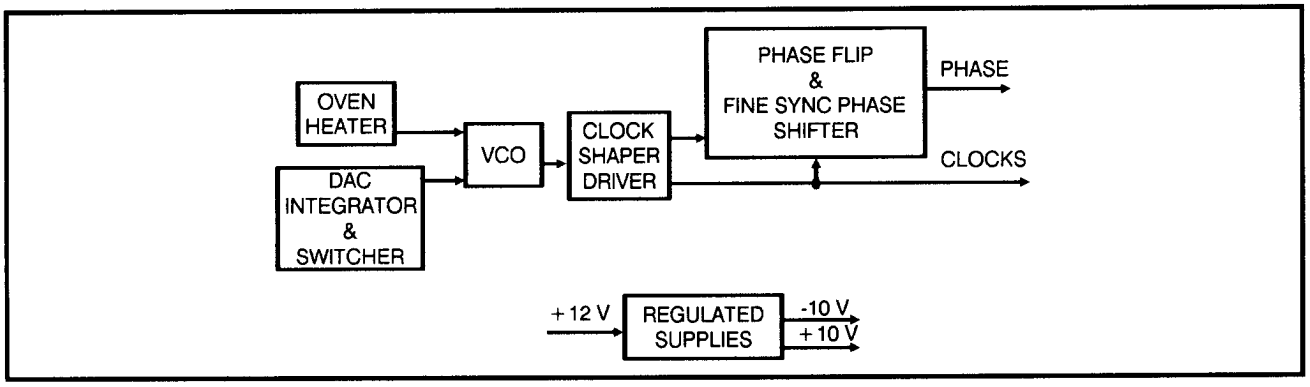


Fig. 6-11. Block diagram of the Clock Circuit.

CLOCK CIRCUIT 5 (See Fig. 6-11)

The Clock Circuit generates several 1135F_H clock signals that it distributes throughout the instrument. It has four main sections: (1) VCO and Oven Heater, (2) DAC, Integrator, and Switcher, (3) Clock Shaper and Drivers, and (4) Phase Flip and Fine Sync Phase Shifter.

At the heart of the Clock circuit is the Voltage Controlled Oscillator (VCO). Controlled by the μP, the VCO generates an 1135F_H signal that is either free-running or locked to the Genlock Input.

The Clock Shaper circuit converts the VCO output to an ECL square wave and ensures its duty cycle is exactly 50%. The Drivers distribute this square wave throughout the instrument.

The Phase Flip circuit inverts the Clock Shaper output to produce a clock that has the smallest increment of coarse sync advance/delay. The Fine Sync Phase Shifter delays the inverted Clock Shaper outputs to generate a pair of delayed clocks. These two clocks provide timing for the sync pulse outputs.

VOLTAGE-CONTROLLED OSCILLATOR (VCO)

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.

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 CR14 and C16 also appear 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 J180 (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

Thermistor RT11, U495B, Q293, and associated parts make up 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

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)/GEN and (HOLD)/ACQIR 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)/GEN 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)/GEN 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)/ ACQIR 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 square-wave clocks. Two RC circuits (R596 with C598 and R595 with C597) 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%.

Through U588A and U588C, a pair of corrected differential ECL clocks are applied to the Output board. U719 and U749 convert the clock signals to TTL levels and distribute them throughout the Digital board.

PHASE FLIP AND FINE SYNC PHASE SHIFTER

These circuits are used by the μP to align the sync pulse outputs with the analog test signal outputs. The Phase Flip circuit (U636, U585B, and U585C) generates phase offsets in increments of 28 ns (45° of subcarrier) by inverting the clock when the PHASE-FLIP line is high. The phase-flipped clock signal is applied to the Fine Phase Shifter.

The Fine Phase Shifter provides up to ±27° of fine sync phase advance/delay relative to the test signal output. The μP advances or delays the clock with timing data it applies to the DAC (U370). Converted to an analog voltage by the DAC and op amp U270B, this data reverse-biases the varactor diodes in two tank circuits connected to the inputs of U578B and U578C. The resulting change in tank capacitance changes the tank resonant frequency and advances or delays the phase-flipped clock by up to 27° in each tank circuit.

The outputs of the Phase Flip and each tank are also applied to the Fine Sync Pulse Timing Offset circuit ⑥.

Variable resistor R469, labeled SYNC TIMING RANGE CENTER, centers the tank circuits so that a half scale on DAC U370 causes 0° advance or delay.

SIGNAL GENERATION ⑥ - ⑧

The Signal Generation section consists of three schematics: Pulse & Test Signal Timing ⑥, Signal Selection ⑦, and Signal Memory & Multiplexing ⑧. See Fig. 6-12 for a block diagram of the Signal Generation circuits.

OVERVIEW

The H Pulse Counter and Vertical Counter provide timing to the H Pulse and V Pulse PROMs. The Pulse Output Logic combines the outputs of these two PROMs to generate the various Pulse Outputs.

The H Timing Counter and Vertical Counter provide timing to the H Timing and V Timing PROMs, respectively. These PROMs provide timing to the Signal Selection Logic, which uses this timing, along with a code generated by the μP, to select the test signal in the Test Signal PROMs. The test signal components are selected and combined by the Video Synthesizer. The test signal output is a digital representation of the test signal, sampled at 1135F_H. This signal is applied to the Output board.

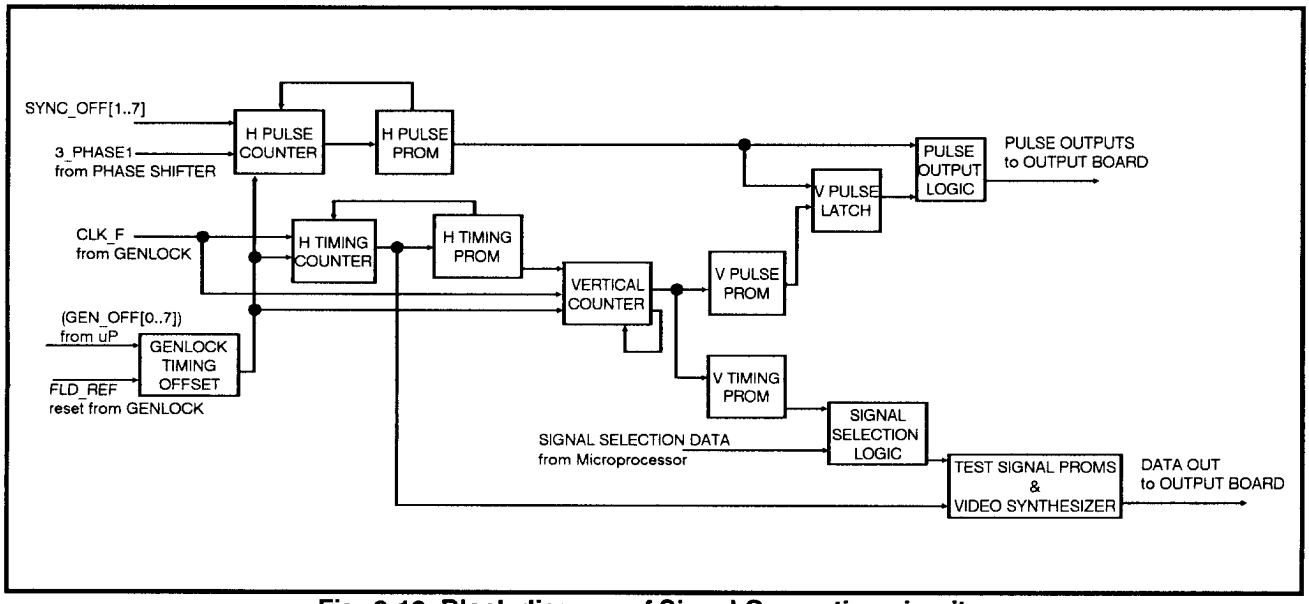


Fig. 6-12. Block diagram of Signal Generation circuits.

PULSE & TEST SIGNAL TIMING ⑥

GENLOCK TIMING OFFSET

The Genlock Timing Offset circuit is comprised of two 4-bit counters (U267 and U367) and two D flip-flops (U570A and U570B). The job of this circuit is to add the front-panel offset to the Signal Generation circuits. It does this by delaying the time at which the FLD_REF signal loads the Horizontal and Vertical Timing Counters. Normally, counters U267 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 U570A, and counters count to 255, beginning from the offset value at their load inputs (GEN_OFF[0..7]). At the end of the count, the Carry output from U267 loads the Horizontal and Vertical Counters (through U570B) with their fixed offset values. In addition, the Carry output disables counters U267 and U367 through U570B and U570A. Jumper P570 can be moved to the 2-3 position to disable the FLD_REF input to U570A.

When coarse genlock timing is adjusted at the front panel, the μP sends a new 8-bit offset word (GEN_OFF[0..7]) to U267 and U367 via U364. On line 7 of field 1, the word is loaded into U267 and U367. As a result, U267 and U367 start their count at a different value, thus changing the time that the Horizontal and Vertical Timing Counters are loaded.

HORIZONTAL TIMING

H Timing Counter

Loaded by the delayed FLD_REF signal and clocked at the $1135F_H$ rate, the Horizontal Timing Counter (U870, U770, and U670) provides horizontal timing to the H Timing PROM and the Luminance and Chrominance Segment PROMs ⑦. 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 (U773) clears it with the (H_CNT_CLR) signal. This signal is gated at U994A 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.

Table 6-1. Horizontal Timing PROM.

OUTPUT	SIGNAL NAME	FUNCTION
D0	V_LATCH1	Positive pulse twice/line used to latch vertical information from the V Timing PROM, V pulse PROM, and the Signal Selection PROM.
D1	(PHASE_HI_CLR)	25 Hz Offset Generator Phase Clear.
D2		Unused.
D3	(H_BLANK)	Horizontal Blanking timing.
D4	H_CNT_CLR	Positive, 56 ns pulse to clear the H Timing Counter to zero at count 1133.
D5	V_CNT_EN	Positive, 70 ns pulse twice/line enables the Vertical Counter to count twice/line.
D6	(BURST_TIMING)	Negative pulse that is NORed with V DR to provide the BURST GATE signal. This signal is used on the Output board to clamp the test signal output.
D7	(HP_LOAD)	Negative, 56 ns pulse used to load the H Pulse Counter once/line with a count specified by the μP

H Timing PROM

See Table 6-1 and Fig. 6-13 for a summary of the H Timing PROM outputs.

Addressed by the genlocked H Timing Counter, the H Timing PROM (U773) and the H Timing Decoder (U873) have four functions: (1) to generate the TSB_GATE and BB_ENABLE pulses coincident with burst and active video for the Analog board, (2) to generate timing control signals for the H and V Timing circuits, (3) to generate timing signals for the Signal Selection Logic ⑦, and (4) to align the vertical timing inputs of latch U673 with the H Timing Counter.

H Pulse Counter

The H Pulse Counter (U977, U877, and U777) provides horizontal timing for the H Pulse PROM. It does this by addressing the H Pulse PROM at a rate of 1135 words per video line. The (HP_LOAD) output from the H Timing PROM is delayed by four flip-flops (U685, U682, U679, and U676). This delayed pulse loads the H Pulse Counters, thus locking the H Timing and H Pulse Counters together.

Fig. 6-13.
Horizontal Timing PROM (Numbers are in μs.)

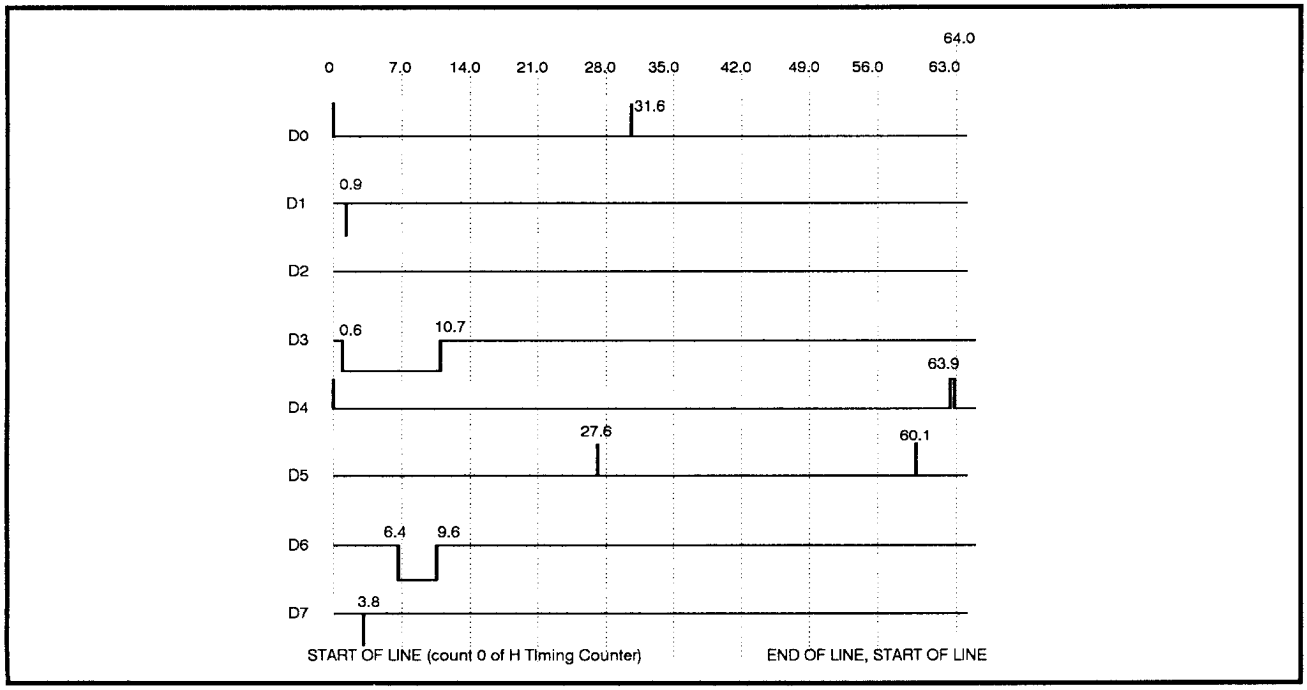


Table 6-2. Horizontal Pulse PROM Output.

Output	Signal Name	Function
D0	(PC_CLR)	Negative pulse to clear the V Pulse Counter at count 1133.
D1	(PHASE_H2_CLR)	Subcarrier phase clear timing.
D2	(H_BLKNG)	Timing for H Blanking portion of Blanking output. Low from start of blanking until end of blanking.
D3	SERRATION	Timing for vertical sync serrations in SYNC output.
D4	(EQUALIZER)	Timing for equalizing pulses in SYNC output.
D5	(H_SYNC)	Timing for horizontal sync portion of SYNC output.
D6	(B_FLAG)	Timing for BURST FLAG output.
D7	V_LATCH2	Positive (twice/line) 70 ns signal to latch the V Pulse PROM outputs, aligning them with the H Pulse PROM timing.

Fine Sync Pulse Timing Offset

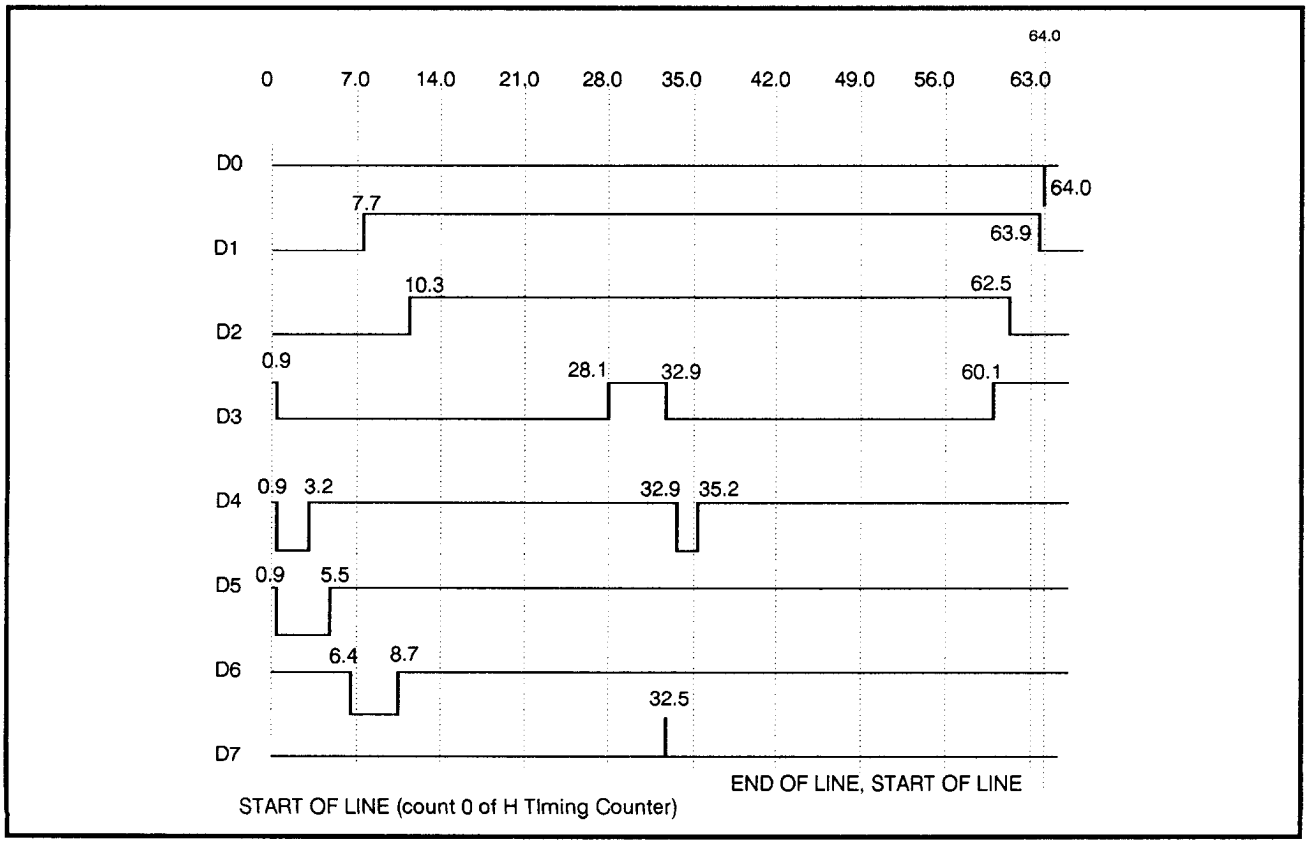
Even though the counters are locked together, the H Pulse Counter is offset by the μP coarse and fine sync timing. The μP applies all but the smallest increment of the coarse sync offset to the load inputs of the H Pulse Counter through the SYNC_OFF[1..7] lines. The phase-flipped and fine-sync-delayed clocks delay the load pulse as it passes through U682, U679, and U676.

H Pulse PROM

The H Pulse PROM (U780) has three functions: (1) to clear the H Pulse Counter after it has counted a line of addresses, (2) to provide horizontal timing pulses to the Pulse Output Logic, and (3) to provide latch timing for V Pulse PROM outputs.

Output D0 of the H Pulse PROM clears the H Pulse Counter. U690A prevents this counter from being cleared and loaded simultaneously. Outputs D1-D6 provide the timing pulses to the Pulse Output Logic. Output D7 controls the timing of the V Pulse Latch (U783). Table 6-2 and Fig. 6-14 summarizes the outputs of this PROM.

Fig. 6-14. Horizontal Pulse PROM Output.



VERTICAL TIMING

Vertical Counter

Four 4-bit counters (U988, U886, U786, and U687) make up the 13-bit Vertical Counter. Clocked by the 1135F_H clock, the Vertical Counter provides vertical timing for the V Pulse PROM (U796) and the V Timing PROM (U791). 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 PROM 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 U994B, U994C, and U994D) 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 J985 and J885 together advance vertical timing by as much as two lines or delay it by one line. The Vertical Timing table in Schematic ⑥ shows the appropriate jumper positions for advance/delay.

Table 6-3. Vertical Timing PROM.

DDDDD 65432	Signal Selected	Matrix Timing (lines in Field 1 shown)
00000	Equalizers	
00001	Serrations	
00010	Blanking	
00011	F1L7 White Flag	
00100	CCIR 17ITS	
00101	CCIR 18 ITS	
00110	CCIR330 ITS	
00111	CCIR 331 ITS	
01000	UK 1 ITS	
01001	UK 2 ITS	
01010	Unused	
01011	Unused	
01100	Unused	
01101	Unused	
01110	Unused	
01111	Unused	
10000		23.5 - 62
10001		63 - 82
10010		83 - 88
10011		89 - 104
10100		105 - 114
10101		115 - 145
10110		146 - 156
10111		157 - 166
11000		167 - 176
11001		177 - 187
11010		188 - 218
11011		219 - 228
11100		229 - 244
11101		245 - 250
11110		251 - 270
11111		271 - 310

Table 6-4. Vertical Pulse PROM Outputs.

Output	Signal Name	Function
D0	(PHASE_CLR_V)	Field 1 line 1 vertical phase clear.
D1	1/2_LINE	Half-line signal selection timing.
D2	(V_SYNC)	Timing for Sync output when D3 is low.
D3	V_DRIVE	High during vertical sync time.
D4	(VBL_22)	V-Timing for 24-line V-Blanking portion of Blanking output.
D5	(VBL_23)	Timing for 25-line V-Blanking portion of Blanking output.
D6	(FLD_REF)	Timing for Field Reference output (low during line 7 of field 1)
D7	(COLOR_FRAME _SQ_WAVE)	Timing for Color-Frame Square Wave output (low during fields 1-4; high during fields 5-8)

V Timing PROM

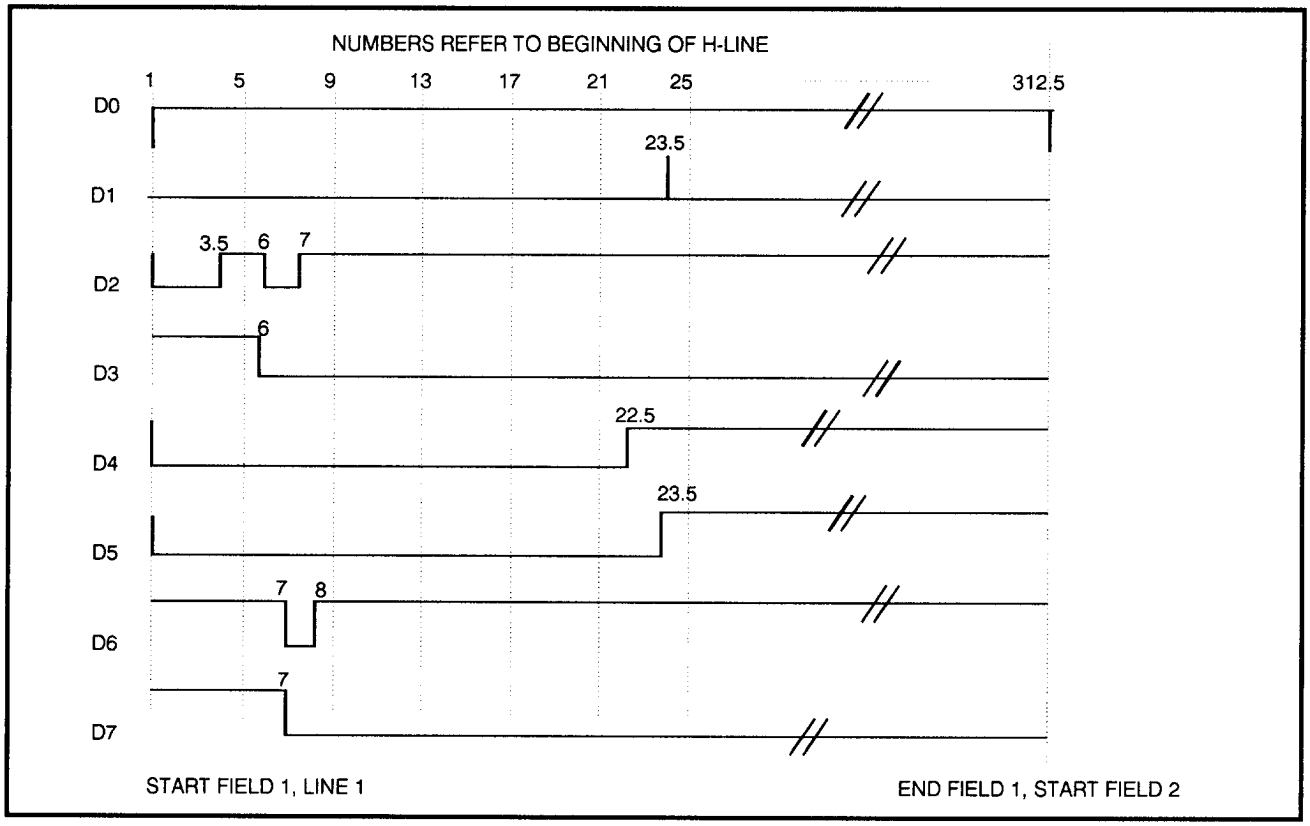
Addressed by the genlocked Vertical Counter, the V Timing PROM (U791) has two functions: (1) to provide vertical timing for the Signal Selection PROM (U356, ⑦) and (2) to provide vertical timing for the Character ID Generator on the Option board.

Output D0 provides timing for APL & bounce signals. This signal has the following pattern throughout active video: high for 18 lines & low for 6 lines. Output D1 provides the timing pattern for the selection of horizontal lines in the convergence signal: low for 1 line every 20 lines. Outputs D2-D6 provide ITS selection, test signal matrix, & vertical sync timing as summarized in Table 6-3.

V Pulse PROM

The V Pulse PROM (U796) has three functions: (1) to produce vertical sync pulse components for the Pulse Output Logic, (2) to produce vertical timing for the Test Signal Selection Logic, and (3) to provide a vertical timing interrupt for the μP Kernel ③. Table 6-4 and Fig. 6-15 summarize the outputs of this PROM.

Fig. 6-15. Vertical Pulse PROM Outputs (Field 1 of 4).



The outputs of the V Pulse PROM are programmed to have advanced timing. This allows the V_LATCH2 signal from the H Pulse PROM to add the sync timing offset to the genlocked V Pulse PROM outputs applied to the Pulse Output Logic. It does this by either advancing or delaying the time at which these outputs are latched into U783.

Four of these outputs [D1-D3 and D6] are latched in U673 with V_LATCH1 (test signal timing) and are sent to the Test Signal Selection circuits ⑦, where they provide timing for the Signal Selection Logic.

The latched D3 output of the V Pulse PROM (LV_DRIVE1 at U673 pin 2) is also sent to CTC1 (U245, 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.

NOTE

When a Genlock Input signal is present, the μP uses the vertical sync of the Genlock Input as a front-panel interrupt, not (LV_DRIVE1).

Pulse Output Logic

The Pulse Output Logic combines the outputs of the H and V Pulse PROMs to produce the sync pulse signals that are applied to the Pulse Output Drivers on the Output board. It generates the pulse outputs as follows:

The two field reference signals, (PL_FLD_REF) and (L_COLOR_FIELD_SQ_WAVE), derived from the V Pulse PROM, feed directly to the Output board through inverting buffer U883.

The H Pulse PROM (U780) puts out the (H_BLKNG) signal slightly ahead of its other outputs. This allow shift register U693 and its associated gates to produce horizontal blanking pulses of different widths (see H Blanking Width table at J690 on ⑥).

Jumper J883 sets the vertical blanking width by selecting between (L_VBL_22) and (L_VBL_23), giving 24 or 25 lines of vertical blanking on the COMP BLANK signal (see V Blanking Window table at J883 on ⑥). Gate U991B combines the selected vertical and horizontal blanking signals and buffer U883 passes the signal to the Output board.

Multiplexer U697 uses L_VDRIVE2 and (PL_VSYNC) as select lines to determine which of three signals [(EQUALIZER), SERRATION, and (H_SYNC)] from PROM U780 make up the (COMP_SYNC) signal applied to the Output board through buffer U883.

Multiplexer U697 also gates (B_FLAG) off during the vertical interval to produce the (BURST_FLAG) signal.

SIGNAL SELECTION & SIGNAL MEMORY ⑦

SIGNAL SELECTION

The heart of the Signal Selection Logic is the Signal Select PROM (U356). Addressed by the μP ③ and the Vertical Timing PROMs ⑥, the Signal Selection PROM provides the selection code that determines which test signal is generated.

When a test signal is selected at the front panel, the μP encodes the selection into an 8-bit data word and sends it to the Signal Selection PROM via latch U153. (See Table 6-5 for a summary of the test signal selection codes.) The V Timing PROM (U791 on ⑥) provides the Signal Selection PROM with timing for selecting split-field signals, including the vertical interval. The Signal Selection PROM output is latched in U352.

Table 6-5. Test Signal Selection Codes.

μP Selection Code	Signal Selected
000000	75% Color Bars (not available with Opt. 02)
000001	75% Color Bar over 75% Red (Opt. 02 ONLY)
000100	100% Color Bars (not available with Opt. 02)
000101	100% Color Bars over 100% Red (Opt. 02 ONLY)
001101	Multipulse
010000	Line Sweep
100001	500 kHz and 4.43 MHz CW signal (non-composite)
100010	25 Hz Offset Test (non-composite)
100011	Monochrome 75% Color Bars

LUMINANCE AND CHROMINANCE SEGMENT ADDRESSING

The Signal Selection codes are pointers into test signal segment look-up tables: the Luminance Segment Addressing PROM and the Chrominance Segment Addressing PROM (U454 and U460, respectively). The Luminance and Chrominance Segment Addressing PROMs are, in turn, pointers into tables of test signal segments. Each Signal Selection code causes the Segment Addressing PROMs to output a series of Segment addresses which describe the selected test signal.

The Luminance Segment Addressing PROM is addressed by: 6 bits from the Signal Selection PROM, the 7 most-significant bits from the Horizontal Timing Counter ⑥, and timing for generating half lines from the V Pulse PROM (U796 on ⑥). The Luminance Segment Addresses are latched in U450 and then presented to the inputs of the Luminance Segment Memory. (For troubleshooting purposes, jumper J551 can be moved to the 2-3 position to force the selection of a half-scale luminance signal.)

The Chrominance Segment Addressing PROM is addressed by: 5 bits from the Signal Selection PROM, the 7 most-significant bits from the Horizontal Timing Counter ⑥, and timing for generating half lines and correct PAL chroma phase from the V Pulse PROM (U796 on ⑥). The Chrominance Segment Addresses are latched in U464 and then presented to the inputs of the Chrominance Segment Memories. (For troubleshooting purposes, jumper J470 can be moved to the 2-3 position to turn off the chrominance portion of the signal.)

LUMINANCE SEGMENT MEMORY

The Luminance Segment Memory is a 4K by 12-bit memory array made up of U639, U645, and U648. The array is addressed with the 8-bit Segment Selection code (from U454) and the 4 least-significant bits of the Horizontal Timing Counter ⑥.

U639 contains the lower 8 bits of the lower half of the memory, while U642 contains the lower 8 bits of the upper half of the memory. U645 holds the upper 4 bits

of the entire memory. Multiplexer U648 selects the appropriate outputs of U645, depending on which half of the memory is in use.

The 12-bit Luminance output is sent to the Luminance Adder ⑧.

CHROMINANCE SEGMENT MEMORY

The Chrominance Segment Memory consists of two memory arrays: the Chroma Differential Phase Memory and the Chroma Amplitude Memory.

The Chroma Differential Phase Memory is a 4K by 12-bit memory array made up of U661, U667, and U467 (U664 with Option 2). The array is addressed with the 8-bit Segment Selection code (from U460) and the 4 least-significant bits of the Horizontal Timing Counter ⑥.

U661 contains the lower 8 bits of the lower half of the memory, while U664 contains the lower 8 bits of the upper half of the memory. U667 holds the upper 4 bits of the entire memory. Multiplexer U467 selects the appropriate outputs of U667, depending on which half of the memory is in use.

The 12-bit Chroma Differential Phase Memory output is sent to the Chroma Phase Adder ⑧.

The Chroma Amplitude Memory is a 4K by 8-bit memory array made up of U654 (and U657 if Option 2 is loaded). The array is addressed with the 8-bit Segment Selection code (from U460) and the 4 least-significant bits of the Horizontal Timing Counter ⑥.

U654 contains the lower 8 bits of the lower half of the memory, while U657 contains the lower 8 bits of the upper half of the memory.

The 8-bit Chroma Amplitude Memory output is sent to the Chroma Modulator ⑧.

VIDEO SYNTHESIS ⑧

Schematic ⑧ contains three separate but similar circuits: the Video Synthesizer, 25 Hz Offset Generator, and the CW Subcarrier Generator.

The Video Synthesizer takes the video components (luminance, chroma amplitude, and chroma differential phase) from Schematic ⑦ and combines them to form the composite representation of the test signal. This process is divided into five pieces: (1) the 25 Hz Offset Generator, (2) the Chroma Phase Adder and Chroma Generator, (3) the Chroma Modulator, (4) the Luminance Adder, and (5) the TTL-to-ECL Conversion.

The CW Subcarrier Generator takes timing information from Schematic ⑥ and generates a digital representation of a CW color subcarrier signal. This signal is used to lock the $4F_{SC}$ oscillator on the Output board.

25 Hz OFFSET GENERATOR

The 25 Hz Offset Generator (U632, U629, U526, and U726A) generates a pulse which represents the phase offset between the $1135F_H$ clock and the color subcarrier frequency.

If the digitized sine wave (in U861) were accessed at exactly four times the effective digitizing rate, the PROM outputs would represent a sine wave sampled at 0°, 90°, 180°, and 270°. Thus, the output sine wave would be at exactly one-fourth of the sample rate. If the phase increment was slightly above 90°, then the output sine wave would be at a slightly higher frequency.

In this generator, the master oscillator frequency is at 17.734375 MHz. But to generate the PAL subcarrier frequency, it is necessary to add a small phase offset to the phase pointer (enough to raise the generated frequency to 4.43361875 MHz). The output of the 25 Hz Offset Generator (U726A, pin 6) has the proper duty cycle to properly offset the phase in the Chroma Phase Adder.

Moving jumper J523 to the 2-3 position allows the Offset Generator to be disabled for troubleshooting.

VIDEO SYNTHESIZER

Chroma Phase Adder and Chroma Generator

The Chroma Phase Adder (U761, U764, and U767) adds the current chroma phase and the chroma differential phase signal (from ⑦). The carry input to the adder is the output of the 25 Hz Offset Generator.

At the beginning of each color frame, the chroma phase in the Phase Accumulator (U864A, U864B, and U867) is reset by (PHASE_CLR1). On every clock cycle, the 2's-complement Chroma Differential Phase signal is added to the current phase and the output of the 25 Hz Offset Generator. Then the Chroma Phase Adder is updated.

The current chroma phase signal is a pointer into the digitized sine wave look-up table, Chroma Generator (U861). Its output is a representation of the phase-modulated subcarrier sine wave.

Chroma Modulator

The chroma sine wave from the Chroma Generator is multiplied (amplitude-modulated) by the Chroma Amplitude data (from ⑦) in the digital multiplier (U856). The output of the multiplier is an unsigned representation of the chroma signal modulated on the color subcarrier.

The unsigned chroma signal is converted to a 2's-complement form by the XOR PALs (U752 and U852). Controlled by the chroma phase sign bit, SIGN, the XOR PALs invert the chroma signal and increment the signal by one (in the Luminance Adder) whenever the SIGN bit is asserted.

Luminance Adder

The Luminance Adder (U739, U742, and U745) adds the 2's-complement modulated chroma signal to the luminance signal (from ⑦). The Adder's carry input is set whenever the chroma SIGN bit is asserted.

The outputs of the Luminance Adders are latched in U732 and U736.

TTL-to-ECL Conversion

The 12-bit output of the Luminance Adder latches are routed to TTL-to-ECL converters U811, U813, and U816 where they are converted from TTL levels to ECL. The ECL representation of the composite test signal, sampled at $1135F_H$, is then routed to the Analog board for interpolation and D-to-A conversion.

CW SUBCARRIER GENERATOR

The CW Subcarrier Generator (U836, U833, U839, U830, and U827) is a simplified version of the Chroma Phase Adder and Chroma Generator circuit. Counter U836 provides a pointer into the sine wave look-up PROMs (U830 and U827). The phase increment is 90° plus the delayed output of the 25 Hz Offset Generator SHIFT_OFFSET.

Although the PROMs are only 8-bit devices, the bit SC_11 is latched in U726B and becomes the SIGN bit for the sine wave data. The output of the CW Subcarrier Generator is a 9-bit representation of the CW chroma subcarrier.

This signal is converted from TTL to ECL levels in U824, U821, and U819 and sent to the Analog board.

GENLOCK INPUT PROCESSING

◈10◈

(See Fig. 6-16)

GENLOCK INPUT BUFFER

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 Q923 inverts and voltage-amplifies the signal. The third stage, an emitter follower (Q920), applies the signal to the Sync Stripper and Input Clamp.

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 Burst Dither.

INPUT CLAMP

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 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 the series resistance (R813, R915, and optionally R815) where it clamps the sync tip of the Genlock Input to -50 mV.

BURST DITHER

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 (B_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

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 ◈4◈. 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.

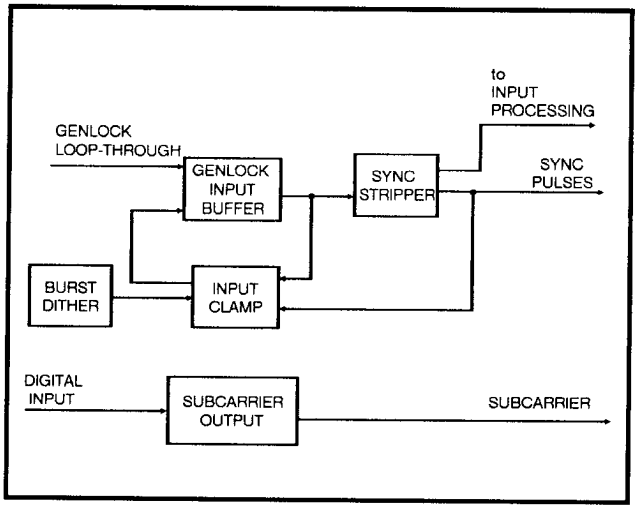


Fig. 6-16.
Block diagram of the Input Processing circuit.

SUBCARRIER OUTPUT

The Subcarrier Output circuitry takes the digital subcarrier signal from the Digital board and converts it to analog for output at the SUBCARRIER BNC.

The SUBC_D[0..8] signal comes from the Digital board to the Subcarrier DAC (U275). The signal is then filtered through L295, C290, C189, C291, R290, and R289 to remove digital artifacts and smooth the subcarrier. After filtering, the signal is applied to the output amplifier which is a discrete, non-inverting op amp composed of an input buffer (Q290 and Q284), gain stage (Q388), and output driver (Q490). From the emitter of Q490, the amplifier and compensated signal is applied to the rear panel connector through a 75Ω resistor (R962).

PULSE OUTPUTS ⟨11⟩ (See Fig. 6-17)

The pulse outputs are generated from the Pulse Output Logic (U883 on ⟨6⟩). Five nearly identical pulse output amplifiers are available. These amplifiers shape the edges of the pulse signals and convert from TTL to -2 V or -4 V levels.

Taking the Blanking Output Amplifier as an example, the selected pulse is normally low. This shuts off Q585, which in turn shuts off Q693 and the output goes to zero. When the pulse input is high, current source Q585 charges C690. The rising voltage across the capacitor is buffered by Q683 and amplified by Q672 and the output falls. The capacitor voltage is clamped by Q598 and Q686, limiting the voltage swing to the desired value. The gain of the output is changed by changing the resistance in the emitter of Q672 (via jumper J678).

Jumper J375 selects the pulse signal to be generated for the FRAME REFERENCE output. Jumpers J678, J668, J780, J965, and J978 select the Pulse Output's amplitude.

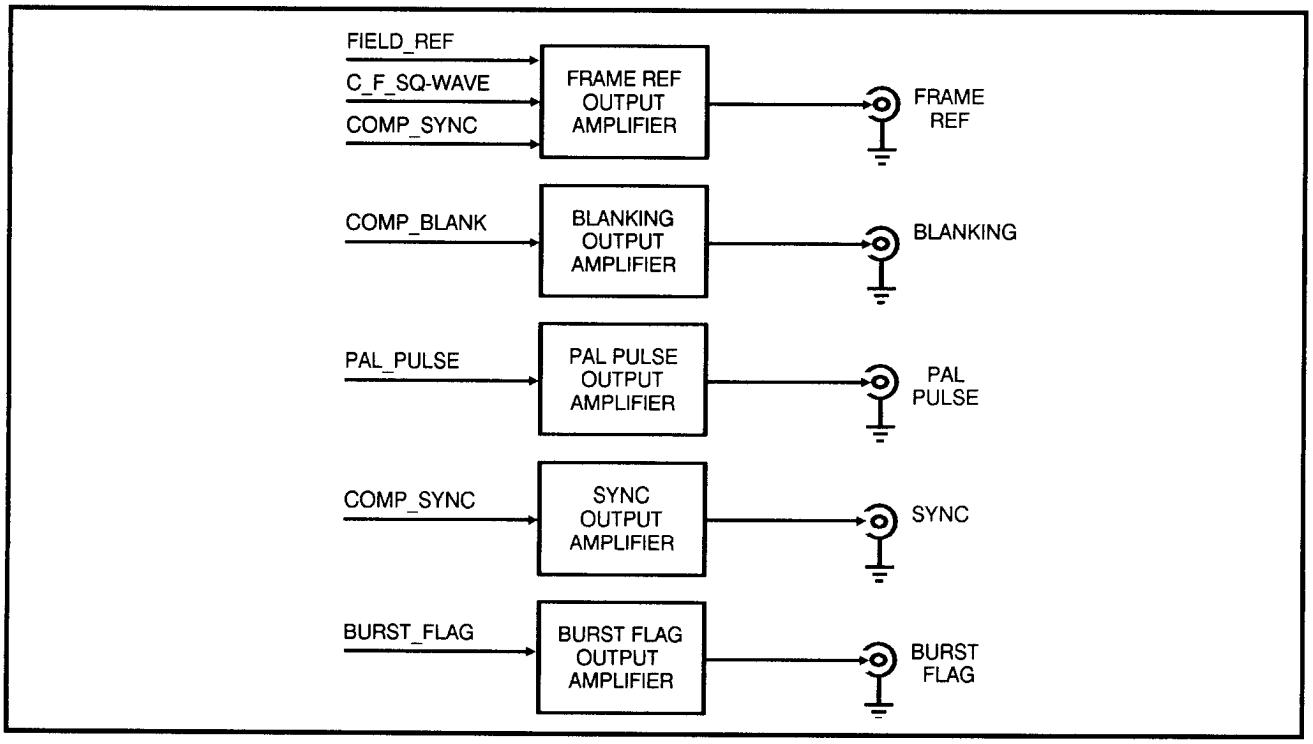


Fig. 6-17. Block Diagram of the Pulse Outputs.

TEST SIGNAL & BLACK OUTPUTS

12

(See Fig. 6-18.)

OUTPUT DAC

DACs (U250 and U350) are 6-bit digital-to-analog converters which convert the test signal data into an analog output signal.

The output of the DAC is a current source which is converted to voltage in the resistor network. The resistor network also acts as a weighting summing node to add both the upper and lower set of bits.

OUTPUT CLAMP

The filtered test signal is applied to Chroma Notch filter (L327 and C330) and to the negative input of U227. During the burst time, Q222 enables U227 to force the test signal blanking level to ground. To do this, U227 generates a correction voltage across C327. The correction voltage is buffered by U427 and applied to the Filter through a resistor network.

OUTPUT FILTER

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

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

VIDEO DRIVER

The Video Driver is a two stage amplifier which buffers the signal and prevents loading from the three driven outputs. Q745 and Q749 are a buffer stage and Q850 is a gain stage.

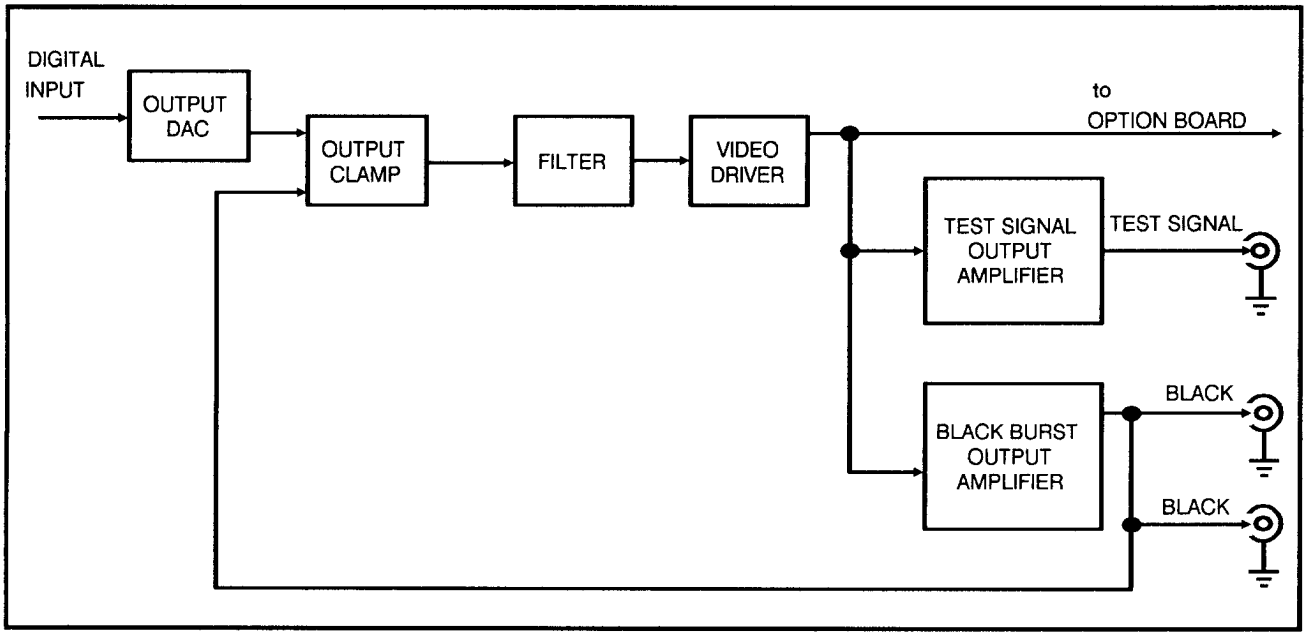


Fig. 6-18. Test Signal and Black Outputs.

TEST SIGNAL OUTPUT AMPLIFIER

After filtering, the signal is applied to the Output Amplifier, which is a discrete, non-inverting op amp composed of two differential amplifiers and an output stage. The first stage (Q848 and Q942) is an input buffer, the second (Q849 and Q852) is a gain stage, and the third (Q950) is an output driver.

From the emitter of Q950, negative feedback is applied to Q942 through a voltage divider network. At R952, the output gain is adjusted. In this feedback path, an RC network (connected to C838) provides adjustable sin(x)/x compensation through C838 increasing or decreasing negative feedback in the high end of the video spectrum. R832 provides DC offset adjustment.

From the emitter of Q950, the amplified and compensated signal is applied to the rear-panel connector through a 75Ω resistor (R942) and then to the bnc on ⇳.

BLACK BURST OUTPUT AMPLIFIER

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 Video Driver, the test signal is applied to a switchable op amp made up of three differential amplifier stages and an output driver. The BB_ENABLE signal controls the first two differential stages (U730A and U730B). During the horizontal sync interval, BB_ENABLE switches on the first stage (U730B), allowing the first stage to pass sync and burst to the third stage (Q830 and Q833). During active video, the test signal is turned off by disabling U730B. BB_ENABLE also switches the second stage (U730A) on. This second stage sends blanking level to the third stage. The resulting output is buffered by Q831 and applied to the rear-panel connector through R934 and R935. R625 adjusts the gain of the Black signal.

POWER SUPPLY ◇14a
B020000 & UP

This type of power supply is called a current-mode-controlled, discontinuous, flyback, switching power supply. See Fig. 6-19 for a functional block diagram. The current output is distributed between the four supplies as follows:

+12 V	0.5 Amps max
+5 V	7 Amps max
-5 V	2 Amps max
-12 V	0.5 Amps max

The maximum power is limited by the maximum current in the primary of T440. This is also the only current limit for the ±5 V supplies, as they have no secondary current limit. The ±12 V supplies are current limited in the secondaries by the ±12 V linear regulators, U176 and U276.

The power inductor, T440, is driven by switching the current to its primary on and off. T440 is not used as a transformer, but as an energy storage device, storing the energy in the primary while the current is being applied. On the second half of the switching cycle the current in the primary is switched off, and the energy stored in the primary is transferred to the secondaries (flyback). Regulation is accomplished by applying feedback from the +5 V supply to the Pulse Width Modulator controlling the current to the primary. This varies the length of time that the current is applied to the primary, causing it to store either more or less energy.

There is also circuitry to provide for operation from both 110 and 220 V_{ac} supplies, under-voltage shutdown if the ac input is too low, overvoltage protection (crowbar) on the +5 V supply, and shutdown circuitry which forces a restart of the supply if it remains in current limit for more than a short period of time (<1 second).

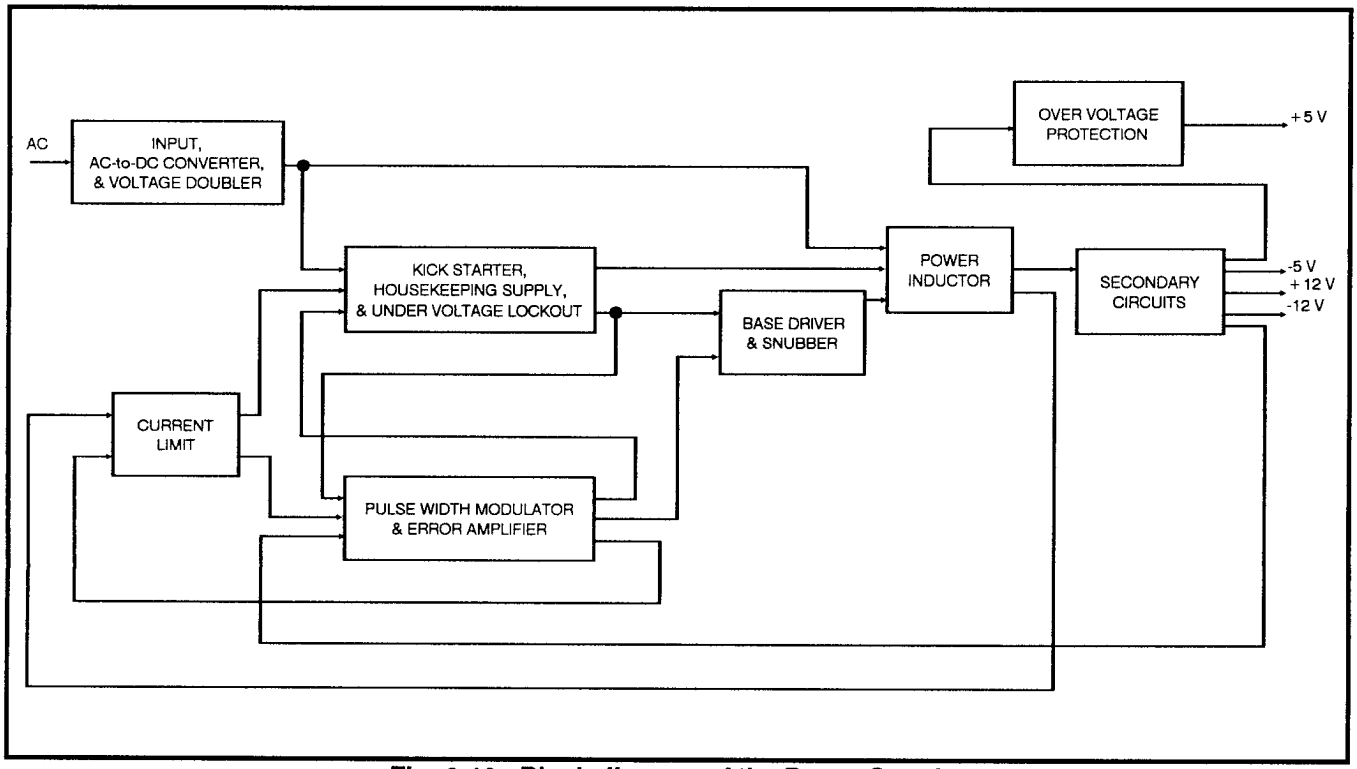


Fig. 6-19. Block diagram of the Power Supply.

WARNING

All primary voltages are referenced to a floating ground, not chassis ground. An isolation transformer or differential amplifier is needed in order to troubleshoot the circuitry in the primary, the Pulse Width Modulator, and their supporting circuitry.

As the current never flows simultaneously in both the primary and the secondary, there is never any actual transformer action. As the magnetic flux in the inductor goes to zero at the end of each switching cycle, it is discontinuous.

Input, AC to DC Converter, and Voltage Doubler

This circuitry filters and rectifies the input ac voltage, placing a charge of approximately 320 V_{dc} across capacitors C845 and C865.

The line current passes through line filter LF950, fuse F940, and power switch S930, and is applied to rectifier CR820. At the input of CR820, J810 is used to select between 110 V and 220 V operation. If set to 220 V, CR820 works as a full-wave rectifier and C845 and C865 act in series, charging to the peak voltage (approximately 320 V_{dc}) during the first part of each one-half cycle. They then maintain that voltage through the rest of the cycle, as the input voltage and current falls to zero.

If, on the other hand, J810 is set for 110 V operation, CR820, C845, and C865 act as a half-wave rectifier and voltage doubler. During the positive half-cycle of the ac input, only one of the diodes within CR820 conducts, charging C865 to the peak positive voltage. A different diode within CR820 conducts during the negative half cycle, and charges C845 to the negative peak. The total voltage across C845 and C865 is then approximately 320 V_{dc}. RV920 and RV820 limit voltage surges on the input which might pass the line filter, while R831 and R830 discharge C865 and C845 when the power is off. C830 and C730 bypass switching noise to ground, keeping it out of the input power line. DS720 and associated parts form a relaxation oscillator, so DS720 blinks when the instrument is powered up.

Kick Starter, Housekeeping Supply, and Undervoltage Lockout Circuits

These circuits supply the power to start and maintain oscillation of the Pulse Width Modulator, so long as the input ac voltage is sufficient to maintain regulation. The primary purpose of the undervoltage lockout circuit is to prevent the supply from starting up when set for 220 V operation and 110 V is applied instead, but it will stop oscillation in the Pulse Width Modulator whenever the voltage across C845 and C865 (normally at 320 V) falls below approximately 200 V.

VR765 holds the emitter of Q755 at about 20 V, while the base is controlled by a divider comprised of R766, R676, and R768. So long as the charge across C845 and C865 remains around 320 V, Q755's base is held at approximately +30 V, and the transistor is off. As the voltage across C845 and C865 decreases, the base voltage does as well; when the voltage across the caps is down to approximately 200 V, Q755's base is at about +19 V, and Q755 is turned on. This, in turn, turns on Q727, applying the +5 V reference from U722-8 to U722-2. This disables the Pulse Width Modulator.

When the input voltage is sufficient to maintain the charge across C845 and C865 above 200 V, Q755 is off. This allows the Kick Start circuit to operate, providing the initial power to start up the Pulse Width Modulator. It does this by charging up C656 through Q667 and R560. During start-up, the +5 V reference output of U722 is at 0 V, and Q660 is off. The base current for Q667 during this time is supplied by R667.

When the charge across C656 reaches approximately 16 V, U722 starts to operate. It switches Q638 on and off through the base drive circuitry (Q741, Q750, Q648, and associated circuitry). The +5 V reference voltage at U722-8 is developed, which turn Q660 on. This diverts the base current from Q667, so it turns off and DS670 turns on to indicate normal operation.

The power to maintain the +16 V charge on C656 is now provided by the housekeeping winding of T440, pins 5 and 6 through CR556. If there is insufficient power to maintain the charge on C656 for any reason, such as the removal of J660, then the charge on C656 is quickly depleted. This stops the operation of U772, and the kick start sequence is repeated.

Power Inductor Operation

The heart of this power supply is T440, the multiwinding power inductor. The operation of T440 is as follows (see Fig. 6-20): Inductor T440 is initially uncharged (has zero magnetic flux). Q638, acting as a switch, is turned on by the base drive from U722. This places the charge developed on C845 and C865 (approximately 320 V) across the primary winding. The polarity of the charge is such that the voltages induced in the secondaries all reverse bias their respective diodes (note the polarity dots). In this way, there is no current flowing in the secondaries while it is flowing in the primary.

The primary current builds a linear ramp, storing the energy in T440 according to the relation $E = \frac{1}{2}Li^2$, where L is the primary inductance and i is the current flowing through it.

The current path is broken when Q638 is switched off, so current stops flowing in the primary. The flyback action of T440 then causes the voltages in the secondaries linearly ramps down to zero as the energy which was stored in T440's primary is delivered to the load, charging the output capacitors.

When all of the energy which was stored in T440 during the first half of this cycle is delivered to the load, the current in the secondaries is at zero, and the diodes turn off. There is no current flowing in either the primary or the secondaries until Q638 is turned back on to start the next cycle. As there is not a continuous flow of energy in T440, this is called discontinuous flyback operation.

Load regulation is provided by sensing the +5 V supply with a divider comprised of R314, R315, and R415, and using U410 to convert this to an error signal. This error signal is optically coupled through U520

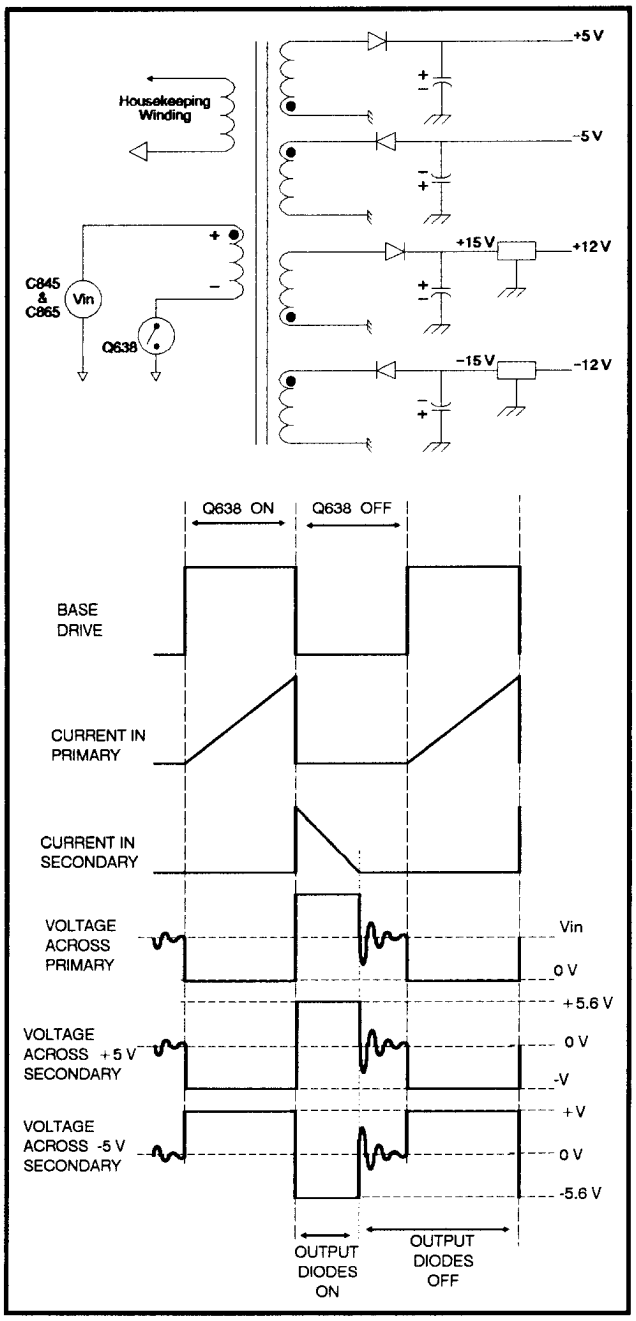


Fig. 6-20. Basic operation of T440.

back to the Pulse Width Modulator, U722. U722 uses the error signal to vary the width of the pulse which drives Q638.

When +5 V goes too high, U722 narrows the pulse width. This reduces the amount of energy stored in T440, and therefore the amount transferred to the load, so the +5 V goes down. Inversely, when the +5 V is

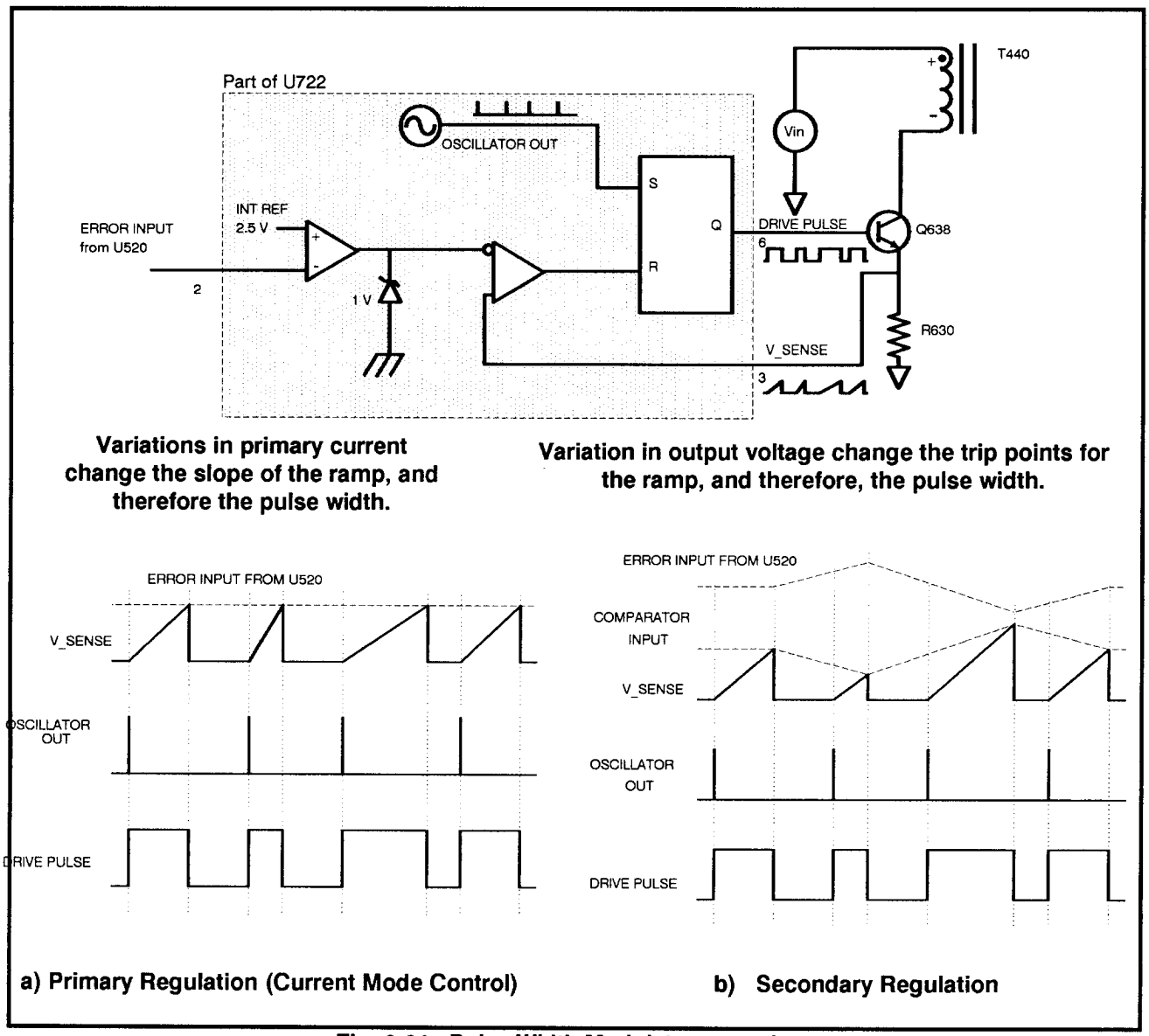


Fig. 6-21. Pulse Width Modulator operation.

too low, the pulse width is increased, increasing the amount of energy stored in T440 and then transferred to the load, so the voltage goes up.

Pulse Width Modulator and Error Amplifier

The Pulse Width Modulator, U722, is a current-mode controller. It uses inputs from the primary circuit and from the +5 V output to vary the width of the pulse which controls Q638, as mentioned above. This regulates the secondary voltages through variations of input voltage, output load, temperature, etc.

Current mode control works by allowing the current flowing in the primary to reach a peak level that is set by the output of the error amp, which is controlled by the +5 V output (see Fig. 6-21). The current in the primary winding is sensed by R630, and applied to U722-3 as a voltage. At the start of the cycle the oscillator sets the flip-flop within U722, which turns on Q638. The primary current, and therefore the voltage to U722-3, ramps up until the I_SENSE level is sufficient

to trip the comparator. This resets the flip-flop, ending the drive pulse to Q638, and the energy stored in the transformer is transferred to the secondaries.

Line regulation, then, is a function of line voltage. As the line voltage varies, so will the primary current. An increase in line voltage causes an increase in primary current, so the slope of the ramp increases and the trip point is reached sooner. This results in a shorter pulse width. A decrease in line voltage causes a decrease in primary current, the slope of the ramp decreases, and it takes longer to reach the trip point. However, the same peak current is reached in both cases, so the same amount of energy is transferred to the load. Line regulation is then achieved without having to wait for output voltage variations.

Load regulation is accomplished by sensing the output voltage of the +5 V supply, and applying an error signal through the optoisolator U520 to U722-2. If the load increases, the supply voltage decreases, and so does the error signal at U722-2. This has the following results:

1. The comparator input increases, due to the inversion of the IC.
2. The output pulse width increases, keeping Q638 on for a longer time.
3. I_p increases.
4. Power flow increases.

On the other hand, if the load decreases, the +5 V increases, so the output pulse width decreases along with I_p, and less power is transferred to the secondaries. In this way, the +5 V is kept constant through changes in the load, and, as it varies the amount of energy transferred to the other secondaries too, it regulates them as well.

The error amplifier is U410, a band-gap reference. It keeps the voltage at its cathode at a constant 2.5 V, set by the voltage applied to its reference, pin 2. This reference is set by R314, R315, and R415. R415 is also used to adjust the +5 V supply.

As U410's cathode is held at 2.5 V, the current through R416 will vary with changes in the output voltage, as will the current through the LED within optoisolator, U520. This changes the conductance of the transistor element of the optoisolator, which then varies the voltage applied to the feedback input, U722-2.

Current Limit

Current limit is provided for the primary circuit by the internal circuitry of U722. As the ramp voltage at U722-2 reaches 1 V, the output drive pulse ends. This shuts Q638 off, so no further current is supplied. The maximum primary current is approximately 1.5 Amps, which corresponds to a maximum power level of approximately 75 Watts.

As supply goes into current limit, U615A and Q717 come into play. U615A starts to turn on as the ramp voltage passes approximately 900 mV, and starts to charge C717. If the current limit condition persists long enough for the charge on C717 to reach 700 or 800 mV, Q717 is turned on. This applies the reference voltage from U722-8 directly to U722-3, shutting down the supply and forcing a kick start. The supply will then cycle through kick start, current limit, and shutdown until the problem is corrected.

Base Drive and Snubber

The pulse width modulator drive pulse from U722-6 is amplified by emitter followers Q741 and Q750. When the drive pulse is positive, Q750 is on and Q741 is off. Current flows through R746 and R747, through Q648 and CR649, and turns Q638 on. CR640, CR648, and CR649 form a Baker clamp to keep Q638 out of hard saturation.

As Q638 approaches saturation its collector-emitter voltage differential falls, and it needs less base current to maintain the same collector current. As saturation is approached, then CR640 starts to conduct, providing a path for the excess base current.

When U722-6 goes to 0 V, Q750 is shut off and Q741 is turned on, so current is shunted to ground through CR651. C648 and VR650 speed up the switching off of Q638. The driven side of C648 is charged to approximately 5 V during the positive half-cycle; then, when Q741 is turned on, C748's driven side is pulled down to +0.7 V by CR651, which pulls the base of Q638 down to approximately -3.3 V, through CR684. This abrupt transition draws a large current spike from

the base momentarily (approximately 1 A for $<0.3\mu s$), turning off Q638 very rapidly, along with CR640 and CR649.

When Q638 is turned off, there is a voltage spike applied to its collector. A combination of reflected secondary voltages, input voltage, and transformer leakage inductance can combine to produce a spike of over a thousand volts. Since this can exceed the ratings of Q638, a snubber circuit, consisting of C540, CR545, and R647, limits the spike to approximately 800 V.

Secondary Circuits

The secondary circuits all work in the same manner. As mentioned earlier, under basic operation, during the first half of the cycle, all their diodes are reverse-biased, so there is no current flow.

On the second half of the cycle, when Q638 is shut off, the flyback action reverses the polarities of the secondaries, and the diodes are forward-biased. This allows the energy stored within T440 to charge up the capacitors in the secondaries.

The +5 V and the -5 V supplies use LC filters from this point, to further smooth the voltage and eliminate most of the ripple.

The +12 V and -12 V supplies actually start as +15 V and -15 V, at the transformer. These voltages are used for the fan, B100 (-15 V), and for the optoisolator (+15 V) only. Then they are filtered and applied to linear regulators, U176 and U276, which provide clean +12 V and -12 V outputs, respectively. CR169 prevents the +12 V from going negative, while CR170 keeps it from exceeding +15.7 V. CR269 and CR369 perform identical functions for the -12 V output.

Overvoltage Protection

Overvoltage protection is provided on the +5 V output by a crowbar circuit comprised of Q127, VR120, and R120. If the +5 V output exceeds approximately +5.5 V, VR120 will start to conduct. When VR120 is drawing enough current through R120 to raise SCR Q127's gate voltage above its cathode, Q127 will turn on. This shorts the +5 V output to ground, forcing the primary circuit into current limit.

POWER SUPPLY 14b
SN B019999 & BELOW

Overview

The SPG-271 Power Supply consists of a Buck-type switching power supply that generates two regulated voltages (±5 V) and a linear supply that uses outputs from the switching supply (±15 V) to generate ±12 V. The Power Supply circuitry is contained on one board (A4). Fig. 6-22 shows a functional block diagram of the Power Supply.

The AC line voltage enters the Power Supply through the Line Filter, where an EMI filter removes noise. The 300 V supply rectifies and filters the line voltage to provide +300 V to the Switching circuit.

Using the 300 V supply, the Switching Circuits provide the current from which the regulated ±5 V and ±12 V supplies are generated. The Pulse Width Modulator regulates the ±5 V output and the Linear Supply regulates the ±12 V supply.

Line Filter

The Line Filter (LF950) isolates the instrument from the power line. This prevents noise on the power line from affecting the instrument's performance and, conversely, prevents any noise generated by the instrument from reaching the power lines.

300 V Supply

CAUTION

When modulator operation is in doubt, protect the FET's from high voltage by removing wire strap (W950) that connects them to the 300 V supply.

The purpose of the 300 V supply is to convert the AC line voltage to 300 V for use in the switching circuit.

Jumper J810 allows the Power Supply to accept either 115 or 230 V_{ac} line voltage. When the arrow of the jumper plug is lined up with the 115 arrow on the circuit board, the two primary windings of T610 are in parallel and bridge rectifier CR810 acts as a full wave voltage

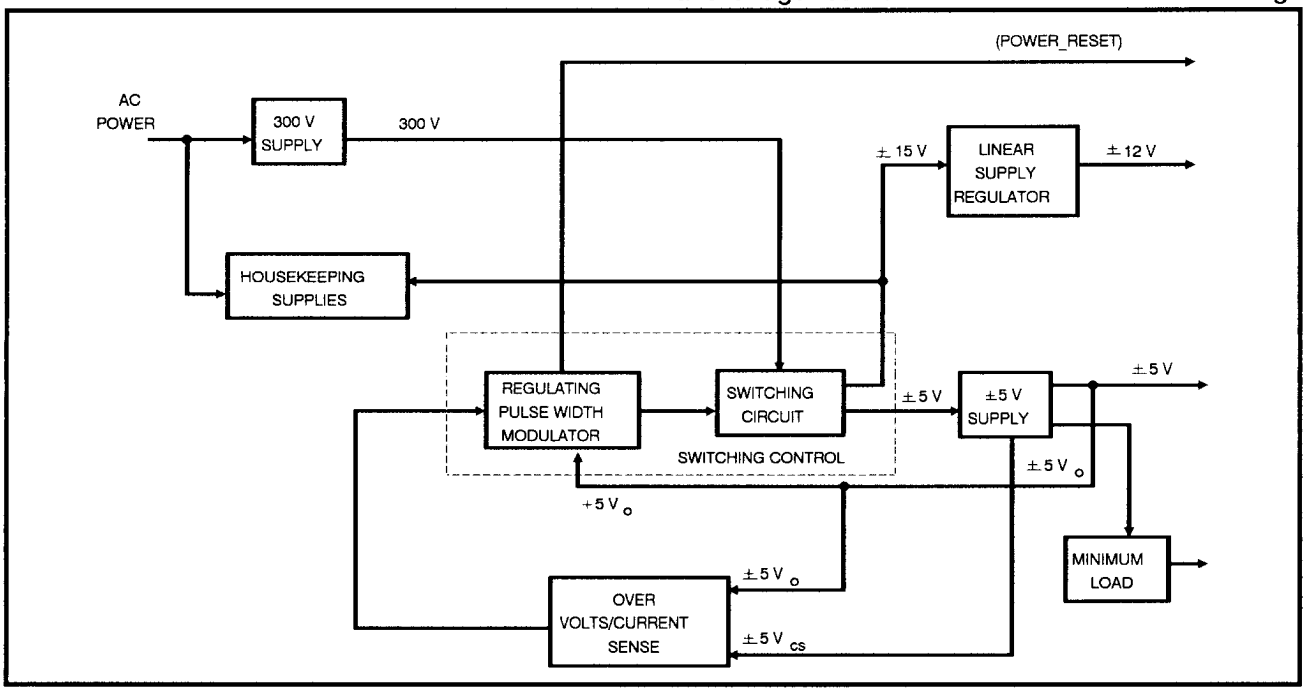


Fig. 6-22. Block diagram of the Power Supply circuit.

doubler. When the jumper housing is rotated 180° so that its arrow is lined up with the 230 arrow, the windings of T610 are in series and CR810 acts as a full wave bridge rectifier.

Housekeeping Supplies

The Housekeeping Supply provides the Power Supply with a precision +2.5 V reference, a regulated ±8 V, and also a ±14.4 V supply. The 2.5 V reference is used as a yardstick against which all other Power Supply generated voltages can be measured. The ±8 supplies the regulation and protection circuits throughout the Power Supply. From the +8 V supply, the +5 V Housekeeping Supply (+5 V_{ref}) is derived. This +5 V supply is generated across a 5 V Zener diode connect to pin 18 inside U435. Current to the Zener diode is from the +8 V supply. The +14.4 V supply provides power to the Pulse Width Modulator output buffer, U525.

When the instrument is first powered up, the secondary of T610 provides power for the Housekeeping Supply. Bridge rectifier CR510 converts the filtered line voltage to ±14.4 V_{dc}. C412 averages the positive output of CR510. U310 regulates this averaged output to generate the +8 V housekeeping voltage. U210 then accurately regulates the +8 V to produce the +2.5 V reference. C410 averages the negative output of CR510, and U212 regulates it to provide the -8 V reference.

Once the instrument is powered up, T610 no longer provides power for the housekeeping and reference voltages. Instead, the ±15 V at the input of the Linear Supply provides the power. This ±15 V supply is stepped down to ±14.4 V by diodes CR420 and CR410. The presence of ±14.4 V at the outputs of CR510 shuts CR510 off by reverse biasing its diodes.

Having two power sources for the Housekeeping Supply (one during power-up and one for after power-up) makes the Housekeeping Supply independent of the regulated supplies that power the rest of the instrument. The Housekeeping Supply will always be powered up even if the rest of the regulated power supplies are shut down.

Switching Control (Pulse Width Modulator and Switching Circuit)

WARNING

When replacing the FETs (Q660 and Q661), be sure to replace the FET shield before powering up the supply. This shield is a protection from flying fragments should an FET explode.

The heart of the Switching Control circuit is the Pulse Width Modulator and the Switching circuit. Their combined purpose is to convert the 300 V_{dc} supply to a high frequency supply and then to a lower voltage supply that can be efficiently stepped down to generate the regulated supplies (±12 V and ±5 V).

The main purpose of the Pulse Width Modulator (U435) is to provide and control the switching pulses for the FET gates (Q660 and Q661) in the Switching circuit. An oscillator inside the Modulator generates the switching pulses. This oscillator is set at 47 kHz by the RC network connected to pins 9-11. The duty cycle of the switching pulses will vary in proportion to the load at the output and line voltage into the Power Supply. The output pulses from U435 are buffered by U525 and combined in the primary of T735 to form a signal that drives the FET gates on and off, one at a time.

The primary current for the main power transformer (T650) is gated by the FETs (Q660 and Q661) switching the 300 V supply on and off at a 47 kHz rate across the primary windings. C766 and C768 isolate DC voltage from the primary of the transformer.

When the Power Supply is first starting, U435 is not operational until the Housekeeping Supply reaches +8 V. Once U435 is operational, C433 charges, and the output duty cycle of U435 increases from minimum until the power requirements of the instrument are met. This process of increasing the duty cycle from minimum to meet power demand is called "Soft Start". It prevents the FETs from being damaged as the supply charges the filter capacitors and attempts to regulate.

As the Power Supply is starting up, comparator U325B holds the (POWER_RESET) line low. This disables the μP on the Digital board until the Power Supply is

powered up and operating at proper voltage levels. Even after the voltage is up to the proper level, U325B will continue to hold the (POWER_RESET) line low for a few more moments to wait until the voltage has stabilized.

Troubleshooting Notes -- When the FETs (Q660 and Q661) fail, the gate resistors (R750 and R751) also fail, so both the FETs and resistors should be replaced.

To ensure sufficient heat transfer, be sure that heatsink-mounted components are screwed down with 4 inch-lbs torque.

±12 V Linear Supply

The ±12 V supply is derived from the line-regulated ±15 V generated by one of the secondaries of T650. The secondary voltage is rectified by CR533 - CR536 and applied to L435. This inductor acts as a current storage device. During the first of each switching cycle, the inductor current increases from zero, storing energy taken from the input. During the second part, the stored energy discharges into the load, pumping energy from input to output. C156 and C176 filter the inductor output and then pass it to U360 and U260 (monolithic voltage regulators), which regulate it down to ±12 V. The nominal tolerance on the ±12 V supplies is 1%. If the current drawn from the ±12 V supply exceeds approximately 2 A, the monolithic regulators shut down to protect the regulators and the circuits they supply.

The ±15 V also powers the Housekeeping Supply once the Power Supply is powered up, providing a more regulated voltage than CR510 provides.

±5 V Supply

The ±5 V supply is regulated by the Pulse Width Modulator (U435). The output from the secondary of T650 (pins 15 and 18) is rectified by CR460 and CR360, then applied to L451, which "pumps" the current to the load as described above. C155, C235, C250, C345, C346, C350, and C351 filter the inductor output to provide the ±5 V supply.

The Pulse Width Modulator samples the +5 V (+5 V_o) and compares it at the Voltage Sense circuit (U331A) to a precise 2.5 V reference generated by the Housekeeping Supply. The difference is applied to the positive error input of U435. In response, U435 varies the duty cycle of the Switching Regulator, which, in turn, corrects the voltage of the ±5 V supply. This also causes a corresponding change to the other secondaries.

Overvolt Sensing

Comparators U335B and U220B monitor the regulated ±5 V power supply. If one of the supplies increases in magnitude by more than approximately 1 V, the output of one of the Comparators will pull the input to timer U133 low and shut down U435. The normal operating voltages at pin 10 of U335B is +2.1 V, and at pin 9 of U220B is +0.3 V. Jumpers J242 and J120 provide easy testing of the sensors. When pins 1 and 2 of either jumper are shorted together, the Power Supply should shut down.

Overcurrent Sensing

Comparators U335A and U220A monitor the current output from the ±5 V supplies. If current flow from the +5 V supply exceeds approximately 8 A, or if the current flow from the -5 V supply exceeds approximately -4 A, the comparators shut down U435 in the same manner as the Overvolt Sensors.

Minimum Load

This circuit ensures the Power Supply always has the minimum load required to keep it operational. When the Digital board is attached to the supply, the base of Q160 is grounded and the transistor draws no current. But if the Digital board is disconnected, the 5 V supply at the base of Q160 switches on the transistor, which draws current.

Indicator Lights

The Power Supply has two indicator lights. The first is the neon safety light , DS810, located in the 300 V supply. This light flashes when it has at least 70 V across it. When the main power is switched off, the light will still remain flashing for about 30 seconds to indicate that the neighboring capacitors still have a residual charge.

The second light is a two-color LED, DS112, that indicates with a red LED when the instrument is in power-reset mode, and with a green LED when the instrument has powered up.

When the instrument is powering up, the (POWER_RESET) line is low and the +5 V_{ref} supply lights the red LED. Shortly after, the power reaches the +12 V supply and it lights the green LED. For a brief moment, both LEDs are on. Finally, as full power is reached, the (POWER_RESET) line is pulled high and the red LED switches off.

Fan Supply

The Fan has a main supply (-15 V) and an additional supply (+5 V) to help it get up to speed during power-up.

When the instrument is powering up, the (POWER_RESET) line is low, switching on Darlington Q340 and placing 20 V (-15 V - +5 V) across the fan. But as the supply reaches full power, the (POWER_RESET) line is pulled high and switches off Q340. This switches off the +5 V supply, leaving just the -15 V supply to power the fan (-14.3 V across the fan and -0.3 V across diode CR409).

OPTION 1 BOARD 15 & 16

CHARACTER ID GENERATOR 15 (See Fig. 6-23)

The Character ID Generation circuit produces a set of up to 12 characters, in a black box inserted on every field of the test signal. Each character is made up of a 7 X 9 matrix, and each dot is three horizontal lines high. The black window is on video lines 118-152 of each field and the character ID is on lines 122-148 of each field.

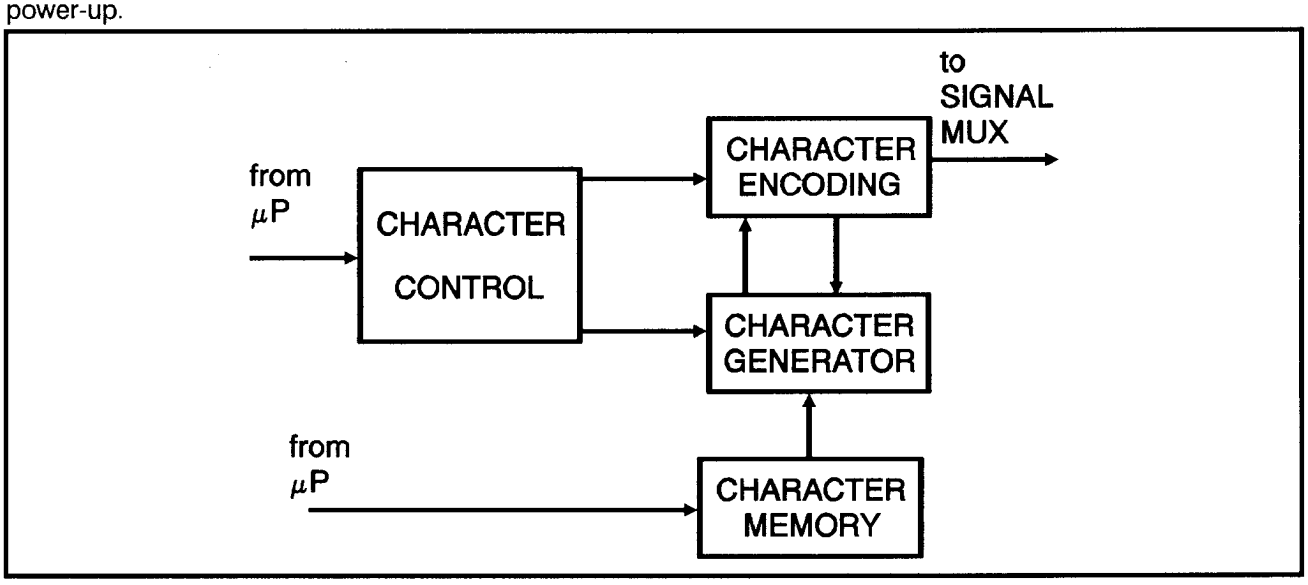


Fig. 6-23. Block Diagram of Character ID Generator.

CHARACTER TIMING CONTROL

Initially, the μP loads the character codes into the Character 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 U230. The (OP_IO2) line IS OR'ed with (OP_WR) to produce the RAM write pulse. The RAM write pulse 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 U230 passes the counter output through to address the Character RAM.

CHARACTER GENERATOR

The character codes output by the Character RAM are latched into U343, which applies them to the character selection inputs of the Character ID Generator IC (U543). Horizontal timing signals D_CLK and ST_CHR from U285 and vertical timing signals LCLK and (CLR) from U445 and U260 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.

While the characters are being changed by the user, the character position is marked with a cursor. This is enabled by the μP by setting bit 7 of the character selection code, which generates the CURSOR signal. CURSOR modifies the state machine in U655 to create a white cursor with shaped edges, and then insert the character in reverse video.

The output of U655 is converted to analog in the U670 DAC. This output is level adjusted by R578 and U690A. The signal then goes to the ID/TEST SIGNAL Amplifier.

Tape Leader Operation

The tape leader function clears the active video to black while the characters count down from 10 to 2. To do this, the μP asserts the BLACK_EN signal. The signal is then expanded to cover all of the active video region. The Character Generator works normally in the usual area, while the μP updates the counting-down characters. Finally, the μP pulls the (CHAR_EN) line high to turn off the character ID. The rest of the screen uses blanking data created by U655.

ID TEST SIGNAL OUTPUT AMPLIFIER

The output of the character generator is first filtered to remove any high frequency components and unacceptable sharp edges from the Character Generator. This signal is then multiplexed with the Test Signal from the Analog Board in U955. The multiplexer allows either the test signal or ID signal as controlled by a signal from U655. The result is the ID output signal. The ID signal is buffered (Q970), amplified (Q963), and output through Q971 to drive the ID output on the rear panel.

R935 adjusts the gain, C840 adjust the $\sin x/x$ compensation, and C945 corrects compensation.

AUDIO TONE GENERATOR (16) (See Fig. 6-24)

The audio tone is generated by counting pulses and then converting the digital signal to analog. U608 counts the 16H/8H pulses from the PLD (U620). The count is sent to the PROM (U530) where it is converted to the audio data. The audio data signal is converted to analog in the DAC (U310). The gain of the DAC output is determined by the value of R507. This resistor adjusts the value of the reference input and offset of the DAC.

The DAC output is reconstructed with an active low-pass filter comprised of U708A and its associated components. The bandwidth of the filter selects the frequency of the Audio Output. Jumper J825 selects the bandwidth. U708B is used as a low-impedance buffer amplifier which drives the output XLR connector on the rear panel.

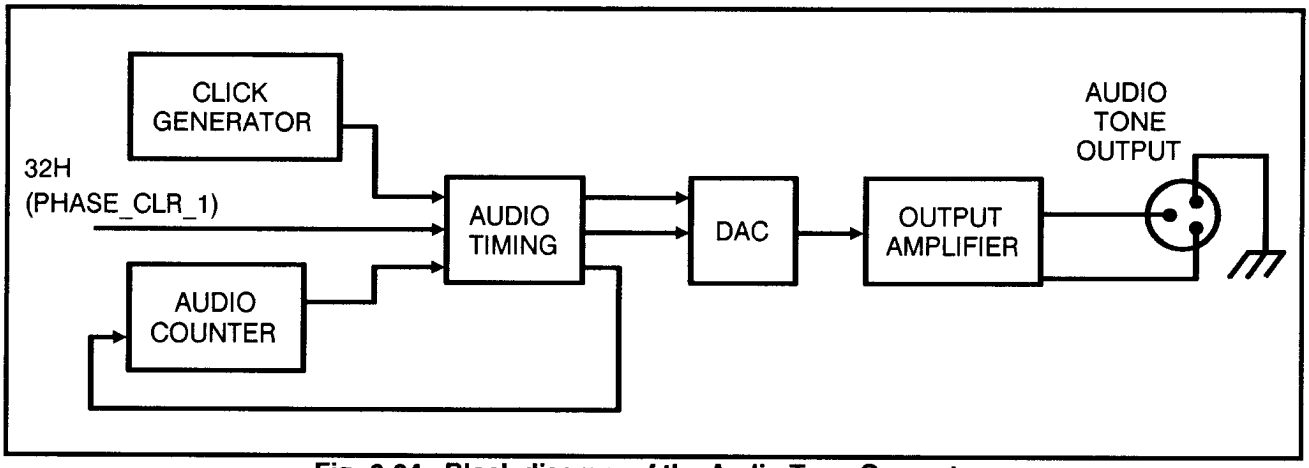


Fig. 6-24. Block diagram of the Audio Tone Generator.

SECTION 7
MAINTENANCE

DIAGNOSTICS

Overview

The SPG-271 diagnostics are split into two levels, the Power-up Diagnostics and User Diagnostics. The Power-up Diagnostics are executed each time the instrument is powered up. If the tests pass successfully then the software continues on to normal instrument operation (i.e., front-panel service routines and genlocking). If the tests fail, then the software turns on all front-panel LEDs and continues running the diagnostic routines.

Power-up Diagnostics

The Power-up Diagnostics are a set of routines that the processor runs to verify that the μP kernel is functional. It verifies that the microprocessor RAM (U340, Schematic 2), the microprocessor EPROM (U333, Schematic 2), the NVRAM (U345, Schematic 2, RAM portion only), the Genlock Sample RAM (U503), and Arctangent EPROM (U122) are functional. An explanation of these tests is given in Table 7-1.

User Diagnostics

To enter the User Diagnostics mode, set switch 6 of S156 (Schematic 1) to zero position (ground), 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 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 7-1 and 7-2).

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 for a pass or fail indication. The pass/fail tests are the PROM checksum test, μP RAM test, NVRAM test, Sample RAM test, and the NVROM test.

The interactive tests exercise the SPG-271's hardware to allow the user to verify and troubleshoot specific features of the instrument. The User Diagnostic Tests are explained in Table 7-2.

Table 7-1
Power-Up Diagnostics
(S156-6 in Position 1)

Test	Test Function	Pass/Fail Indication
System PROM Checksum Test (U333, 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 once.	Lights the 75% BARS LED on error.
μP RAM Read/Write Test (U340, 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 test is run once.	Lights the 100% BARS LED on error.
NVRAM Read/Write Test (U345, 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 once.	Lights the SELECT BARS LED on error.
Sample RAM Read/ Write Test (U503, 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 once.	Lights the SET IDENTIFICATION LED on error.
Arctan PROM Checksum Test (U122, Schematic 2)	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 once.	Lights the SET GENLOCK TIMING LED on error.

Table 7-2
User Diagnostics
(S156-6 in Position 0)

Switch Setting 654321	Test	Test Function	Pass/Fail Indication
011111	System PROM Checksum Test (U333, 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 the 75% BARS LED on error.
011110	μP RAM (U340, 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 the 100% BARS LED on error.
011101	NVRAM (U345, 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 the SELECT BARS LED on error.

Table 7-2 (cont.)
User Diagnostics
(S156-6 in Position 0)

Switch Setting 654321	Test	Test Function	Pass/Fail Indication
011100	Sample RAM (U503, Schematic 2)	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 the SET IDENTIFICATION LED on error.
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 (U370, 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 Sync Fine Timing 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 (U240, U245, 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.
010101	Hardware Reset Test	First set J223 (Schematic 2) to the 1–2 position and then select the hardware reset test. Check J223 pin 1 with a scope and verify that there is a 1200 ms square wave.	Tests the hardware reset circuitry.
010100	Option Board Test	When this test is running all locations of the I.D. RAM (U330, Schematic 12) are sequentially written to.	This test exercises the circuitry that writes to the character I.D. board.

Table 7-2 (cont.)
User Diagnostics

Switch Setting 654321	Test	Test Function	Pass/Fail Indication
010011	Calibration Signals Select	Configures front panel to allow consecutive selection of three signals (DAC Test Signal, multipulse signal, and Line Sweep) through the 75% BARS switch. Also, the 100% BARS switch allows selection of bars without burst or selection of 25 Hz offset signal.	For calibrating output filter and output amplifier. Non-burst bars provides a signal for sync lock; 25 Hz offset signal allows checking of 25 Hz offset circuit.
010010	NVROM Test U345, 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. Press the 75% BARS switch until the 75% BARS LED lights. Next press the 100% BARS switch until the 100% BARS LED lights. The last step is to press the 75% BARS switch until the 75% BARS LED lights.	The SELECT BARS LED will light if the NVROM has passed the test and the Set Sync Timing LED will light on a failure.
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 U240, U245, Schematic 2)	Sets up the Counter Timer Chips (CTCs), U240 and U245, as timers and checks that they can generate interrupts. Each of the CTC's four sections are set up to interrupt after 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.	U240 Error: CHAR ID CONTROLS LED on. U245 Error: TIMING CONTROLS LED on.
001111	ARCTAN PROM Test U122, Schematic 2)	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 the SET GENLOCK TIMING LED on error.
000000	Cycle Test	Continuously cycles through the EPROM, μPRAM, NVRAM, Sample RAM tests and then turns on all the LEDs. On failure the error is logged by turning on the appropriate front-panel LED.	

Section 8
Replaceable Electrical Parts

This section contains a list of the components that are replaceable for the SPG-271. Use this list to identify and order replacement parts. There is a separate Replaceable Electrical Parts list for each instrument.

Parts Ordering Information

Replacement parts are available from or through your local Tektronix, Inc., Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest circuit improvements. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If 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.

Using the Replaceable Electrical Parts List

The tabular information in the Replaceable Electrical Parts list is arranged for quick retrieval. Understanding the structure and features of the list will help you find all of the information you need for ordering replaceable parts.

Cross Index–Mfr. Code Number to Manufacturer

The Mfg. Code Number to Manufacturer Cross 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 Standards Institute (ANSI) standard Y1.1.

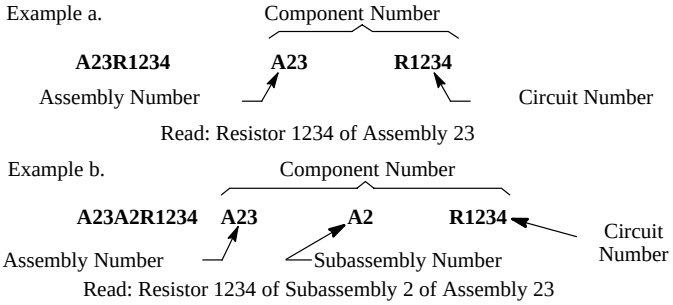
List of Assemblies

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.

Column Descriptions

Component No. (Column 1)

The component circuit number appears on the diagrams and circuit board illustrations, located in the diagrams section. Assembly numbers are also marked on each diagram and circuit board illustration, in the Diagram section and on the mechanical exploded views, 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 arranged by assemblies in numerical sequence (A1, with its subassemblies and parts, precedes 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)

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

Serial/Assembly No. (Column 3 and 4)

Column three (3) indicates the serial or assembly number at which the part was first used. Column four (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)

An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.

The mechanical subparts are shown as *ATTACHED PARTS* / *END ATTACHED PARTS* or *MOUNTING PARTS* / *END MOUNTING PARTS* in column five (5).

Mfr. Code (Column 6)

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 No. (Column 7)

Indicates actual manufacturer's part number.

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code.	Manufacturer	Address	City, State, Zip Code
TK0213	TOPTRON CORP		TOKYO JAPAN
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK0515	EVOX–RIFA INC	100 TRI–STATE INTERNATIONAL SUITE 290	LINCOLNSHIRE IL 60015
TK0679	DILECTRON INC	2669 S MRYTLE AVE	MONROVIA CA 91016
TK0891	MICONICS	1 FAIRCHILD AVE	PLAINVIEW NY 11803
TK1075	FUJI SEMICONDUCTOR NEW YURAKUCHO BLDG	12–1 YURAKUCHO 1–CHOME CHIYODAKU	TOKYO 100 JAPAN
TK1416	SHARP CORP	22–22 NAGAIKE–CHO ABENO–KU	OSAKA JAPAN
TK1727	PHILIPS NEDERLAND BV AFD ELONCO	POSTBUS 90050	5600 PB EINDHOVEN THE NETHERLANDS
TK1743	UNITRODE (UK) LTD	6 CRESSWELL PARK BLACKHEATH	LONDON SE 3 9RD ENGLAND
TK1828	LITE SPECIALTY METAL WORKS	20460 SW AVERY CT	TUALATIN OR 97062
TK1913	WIMA THE INTER–TECHNICAL GROUP IND	2269 SAW MILL RIVER ROAD PO BOX 127	ELMSFORD NY 10523
TK1960	U S TOYO FAN CORP	4915 WALNUT GROVE AVE DRAWER G	SAN GABRIEL CA 91776
TK1989	GASKET SPECIALTIES	4968 NE 122ND AVE	PORTLAND OR 97220
TK2027	PROCO MANUFACTURING CO	10950 SW 5TH ST SUITE 280	BEAVERTON OR 97005
TK2058	TDK CORPORATION OF AMERICA	1600 FEEHANVILLE DRIVE	MOUNT PROSPECT, IL 60056
TK2073	TOKYO AMERICA INC	565 W GULF ROAD	ARLINGTON HEIGHTS IL 60005
TK2096	KELVIN ASSOCIATES	14724 VENTURA BLVD SUITE 1003	SHERMAN OAKS CA 91403–3501
TK2319	COLLMER	14368 PROTON RD	DALLAS TX 75244
TK2540	SONY CORPORATION OF AMERICA COMPONENT PRODUCTS DIVISION SEMICONDUCTOR DIVISION	10833 VALLEY VIEW STREET	CYPRESS CA 90630–0016
TK2598	MAXIM – ASIC	14150 SW KARL BRAUN DRIVE	BEAVERTON, OR 97077
TK2601	MAXTEK COMPONENTS CORPORATION	13335 SW TERMAN RD PO BOX 1480	BEAVERTON, OR 97075–1480
TK2611	STACKPOLE CORPORATION	PO BOX 14466	RALEIGH, NC 27610
0B0A9	DALLAS SEMICONDUCTOR CORP	4350 BELTWOOD PKWY SOUTH	DALLAS TX 75244
0GV52	SCHAFFNER EMC INC	9–B FADEM ROAD	SPRINGFIELD, NJ 07081
0H1N5	TOSHIBA MARCON ELECTRONICS AMERICA CORPORATION	998 FIRST EDGE DRIVE	VERNON HILLS IL 60061
0JR03	ZMAN MAGNETICS INC	7633 S 180th	KENT WA 98032
0JR04	TOSHIBA AMERICA INC ELECTRONICS COMPONENTS DIV	9775 TOLEDO WAY	IRVINE CA 92718
0JR05	TRIQUEST CORP	3000 LEWIS AND CLARK HWY	VANCOUVER WA 98661–2999
0J260	COMTEK MANUFACTURING OF OREGON (METALS)	PO BOX 4200	BEAVERTON OR 97076–4200
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
0LUA3	PHILIPS COMPONENTS	100 PROVIDENCE PIKE	SLATERSVILLE, RI 02876
0MS63	QUALITY TECHNOLOGIES CORP	610 N MARY AVENUE	SUNNYVALE CA 94086

Mfr. Code.	Manufacturer	Address	City, State, Zip Code
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPY PO BOX 655303	DALLAS TX 75262–5303
01884	DEARBORN ELECTRONICS INC	1221 NORTH HIGHWAY 17/92	LONGWOOD FL 32750
04222	AVX/KYOCERA DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR	5005 E MCDOWELL RD	PHOENIX AZ 85008–4229
05276	ITT POMONA ELECTRONICS DIV	1500 E 9TH ST PO BOX 2767	POMONA CA 91766–3835
05292	ITT COMPONENTS DIV		CLIFTON NJ
07716	IRC, INC	2850 MT PLEASANT AVE	BURLINGTON IA 52601
07933	RAYTHEON CO SEMICONDUCTOR DIV HQ	350 ELLIS ST	MOUNTAIN VIEW CA 94042
08530	RELIANCE MICA CORP	341–39TH ST	BROOKLYN NY 11212–2903
09922	BURNDY CORP	1 RICHARDS AVE	NORWALK CT 06856
1CH66	PHILIPS SEMICONDUCTORS	811 E ARQUES AVENUE PO BOX 3409	SUNNYVALE CA 94088–3409
11236	CTS CORPORATION RESISTOR NETWORKS DIVISION	406 PARR ROAD	BERNE IN 46711–9506
11502	IRC, INC	PO BOX 1860	BOONE NC 28607–1860
13103	THERMALLOY CO INC	2021 W VALLEY VIEW LN PO BOX 810839	DALLAS TX 75381
13409	SENSITRON SEMICONDUCTOR DIV OF RSM ELECTRON POWER INC	221 W INDUSTRY COURT	DEER PARK NY 11729–4605
14433	ITT SEMICONDUCTOR	2510 WEST 237TH ST SUITE 208	TORRANCE CA 90505
14752	ELECTRO CUBE INC	1710 S DEL MAR AVE	SAN GABRIEL CA 91776–3825
14936	GENERAL INSTRUMENT CORP POWER SEMICONDUCTOR DIV	600 W JOHN ST	HICKSVILLE NY 11802–0709
15454	KETEMA RODAN DIVISION	2900 BLUE STAR STREET	ANAHEIM CA 92806–2591
17856	SILICONIX INC	2201 LAURELWOOD RD	SANTA CLARA CA 95054–1516
18565	CHOMERICS INC	77 DRAGON COURT	WOBURN MA 01801–1039
18796	MURATA ELECTRONICS NORTH AMERICA INC. STATE COLLEGE OPERATIONS	1900 W COLLEGE AVE	STATE COLLEGE PA 16801–2723
19701	PHILIPS COMPONENTS DISCRETE PRODUCTS DIV RESISTIVE PRODUCTS FACILITY AIRPORT ROAD	PO BOX 760	MINERAL WELLS TX 76067–0760
2K262	BOYD CORP	6136 NE 87th AVE PO BOX 20038	PORTLAND OR 97220
20462	PREM MAGNETICS INC	3519 N CHAPEL HILL	MCHENRY IL 60050–2504
22526	BERG ELECTRONICS INC (DUPONT)	857 OLD TRAIL RD	ETTERS PA 17319
24355	ANALOG DEVICES INC	1 TECHNOLOGY DRIVE	NORWOOD MA 02062
24546	DALE ELECTRONICS A VISHAY INTERTECHNOLOGY INC CO	550 HIGH ST	BRADFORD PA 16701–3737
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
26364	COMPONENTS CORP	6 KINSEY PLACE	DENVILLE NJ 07834–2611

Mfr. Code.	Manufacturer	Address	City, State, Zip Code
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051–0606
31918	ITT SCHADOW INC	8081 WALLACE RD	EDEN PRAIRIE MN 55344–2224
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507–2114
33096	COLORADO CRYSTAL CORP	2303 W 8TH ST	LOVELAND CO 80537–5268
34333	LINFINITY MICROELECTRONICS (FORMERLY: SILICON GENERAL)	11861 WESTERN AVE	GARDEN GROVE CA 92641
34371	HARRIS CORP HARRIS SEMICONDUCTOR PRODUCTS GROUP	200 PALM BAY BLVD PO BOX 883	MELBOURNE FL 32919
48726	UNITRODE INTEGRATED CIRCUITS CORP (UICC)	7 CONTINENTAL BLVD PO BOX 399	MERRIMACK NH 03054–0399
5Y400	TRIAX METAL PRODUCTS INC DIV OF BEAVERTON PARTS MFG CO	1800 NW 216TH AVE	HILLSBORO OR 97124–6629
50139	ALLEN–BRADLEY CO ELECTRONIC COMPONENTS	1414 ALLEN BRADLEY DR	EL PASO TX 79936
50434	HEWLETT–PACKARD CO OPTOELECTRONICS DIV	370 W TRIMBLE RD	SAN JOSE CA 95131–1008
54937	DEYOUNG MANUFACTURING INC	12920 NE 125TH WAY	KIRKLAND WA 98034–7716
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195–4526
56708	ZILOG INC	1315 DELL AVE	CAMPBELL CA 95008–6609
56845	DALE ELECTRONICS INC	2300 RIVERSIDE BLVD PO BOX 74	NORFOLK NE 68701–2242
57668	ROHM CORPORATION	15375 BARRANCA PARKWAY SUITE B207	IRVINE CA 92718
59660	TUSONIX INC	7741 N BUSINESS PARK DR PO BOX 37144	TUCSON AZ 85740–7144
6L334	DIODES INC	8900 WINNETKA AVE	NORTHRIDGE, CA 91324–3234
60395	XICOR INC	851 BUCKEYE CT	MILPITAS CA 95035–7408
61935	SCHURTER INC	1016 CLEGG COURT	PETALUMA CA 94952–1152
62643	UNITED CHEMICON INC	9801 W HIGGINS ST SUITE 430	ROSEMONT, IL 60018–4771
65786	CYPRESS SEMICONDUCTOR CORP	3901 N 1ST ST	SAN JOSE CA 95134–1506
65896	LOGIC DEVICES INC	628 E EVELYN AVE	SUNNYVALE CA 94086–6489
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
73138	BECKMAN INDUSTRIAL CORP BECKMAN ELECTRONIC TECHNOLOGIES SUB OF EMERSON ELECTRIC	4141 PALM ST	FULLERTON CA 92635
73743	FISCHER SPECIAL MFG CO	111 INDUSTRIAL RD	COLD SPRING KY 41076–9749
74970	JOHNSON E F CO	299 10TH AVE S W	WASECA MN 56093–2539
75042	IRC ELECTRONIC COMPONENTS PHILADELPHIA DIV TRW FIXED RESISTORS	401 N BROAD ST	PHILADELPHIA PA 19108–1001
75498	MULTICOMP INC	3005 SW 154TH TERRACE #3	BEAVERTON OR 97006
76493	BELL INDUSTRIES INC JW MILLER DIV	306 E ALONDRA BLVD PO BOX 2859	GARDENA, CA 90247–1059
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIV	ST CHARLES ROAD	ELGIN IL 60120
79963	ZIERICK MFG CO	RADIO CIRCLE	MT KISCO NY 10549
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001

Mfr. Code.	Manufacturer	Address	City, State, Zip Code
81073	GRAYHILL INC	561 HILLGROVE AVE PO BOX 10373	LA GRANGE IL 60525–5914
82389	SWITCHCRAFT INC SUB OF RAYTHEON CO	5555 N ELSTRON AVE	CHICAGO IL 60630–1314
84411	AMERICAN SHIZUKI CORP OGALLALA OPERATIONS	301 WEST O ST	OGALLALA NE 69153–1844
9M860	ELECTRONIC SUB ASSEMBLY MFG CORP (ESAM)	930 SE M STREET PO BOX 376	GRANTS PASS OR 97526–3248
91293	JOHANSON MFG CO	400 ROCKWAY VALLEY RD	BOONTON NJ 07005
91637	DALE ELECTRONICS INC	2064 12TH AVE PO BOX 609	COLUMBUS NE 68601–3632

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A1	333–3575–00			PANEL,FRONT:SPG271	80009	333357500
A2–1	670–9905–50	B010100	B010174	CIRCUIT BD ASSY:DIGITAL	80009	670990550
A2–1	670–9905–51	B010175	B020729	CIRCUIT BD ASSY:DIGITAL	80009	670990551
A2–1	670–9905–52	B020730	B021747	CIRCUIT BD ASSY:DIGITAL	80009	670990552
A2–1	670–9905–54	B021748		CIRCUIT BD ASSY:DIGITAL (STANDARD ONLY)	80009	670990554
A2–1	670–9905–53	B010100	B021747	CIRCUIT BD ASSY:DIGITAL	80009	670990553
A2–1	670–9905–55	B021748		CIRCUIT BD ASSY:DIGITAL (OPTION 02 ONLY)	80009	670990555
A2–2	119–2501–01	B010100	B020729	OVEN ASSEMBLY:TSG271	80009	119250101
A2–2	119–2501–03	B020730	B020885	OVEN ASSEMBLY:TPG625	80009	119250103
A2–2	119–2501–04	B020886		OVEN ASSEMBLY:TPG625	80009	119250104
A3	670–9906–01	B010100	B020309	CIRCUIT BD ASSY:ANALOG	80009	670990601
A3	670–9906–02	B020310	B020447	CIRCUIT BD ASSY:ANALOG	80009	670990602
A3	670–9906–03	B020448	B020970	CIRCUIT BD ASSY:ANALOG	80009	670990603
A3	670–9906–04	B020971	B021926	CIRCUIT BD ASSY:ANALOG	80009	670990604
A3	670–9906–05	B021927	B033174	CIRCUIT BD ASSY:ANALOG	80009	670990605
A3	670–9906–06	B033175		CIRCUIT BD ASSY:ANALOG	80009	670990606
A4	670–9113–04	B010100	B010114	CIRCUIT BD ASSY:PWR SPLY	80009	670911304
A4	670–9113–05	B010115	B010169	CIRCUIT BD ASSY:PWR SPLY	80009	670911305
A4	670–9113–06	B010170	B020220	CIRCUIT BD ASSY:PWR SPLY	80009	670911306
A4	671–0572–00	B020221	B020617	CIRCUIT BD ASSY:PWR SPLY	80009	671057200
A4	671–0572–01	B020618	B021117	CIRCUIT BD ASSY:PWR SPLY	80009	671057201
A4	671–0572–02	B021118	B021326	CIRCUIT BD ASSY:PWR SPLY	80009	671057202
A4	671–0572–03	B021327	B021831	CIRCUIT BD ASSY:PWR SPLY	80009	671057203
A4	671–0572–04	B021832	B021937	CIRCUIT BD ASSY:PWR SPLY	80009	671057204
A4	671–0572–05	B021938	B021988	CIRCUIT BD ASSY:PWR SPLY	80009	671057205
A4	671–0572–06	B021989		CIRCUIT BD ASSY:PWR SPLY	80009	671057206
A5	671–0219–01	B010100	B010128	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021901
A5	671–0219–02	B010129	B010199	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021902
A5	671–0219–03	B010200	B020246	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021903
A5	671–0219–04	B020247	B020448	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021904
A5	671–0219–05	B020449	B021585	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021905
A5	671–0219–06	B021586	B022106	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021906
A5	671–0219–07	B022107		CIRCUIT BD ASSY:IDENTIFICATION (OPTION 01 ONLY)	80009	671021907
A6	670–9368–00			CIRCUIT BD ASSY:BNC	80009	670936800
A1	333–3575–00			PANEL,FRONT:SPG271	80009	333357500
A1S535				(PART OF A1)		
A1S539				(PART OF A1)		
A1S544				(PART OF A1)		
A1S548				(PART OF A1)		
A1S561				(PART OF A1)		
A1S565				(PART OF A1)		
A1S570				(PART OF A1)		
A1S574				(PART OF A1)		
A1S594				(PART OF A1)		
A1DS142	150–5004–00			DIODE,OPTO:LED;HI EFFIC RED,635NM,1.0 MCD AT 10MA,YOKE LEAD BEND	50434	HLMP–6300–021
A1DS168	150–5004–00			DIODE,OPTO:LED;HI EFFIC RED,635NM,1.0 MCD AT 10MA,YOKE LEAD BEND	50434	HLMP–6300–021
A1DS292	150–5004–00			DIODE,OPTO:LED;HI EFFIC RED,635NM,1.0 MCD AT 10MA,YOKE LEAD BEND	50434	HLMP–6300–021
A1DS426	150–5003–00			DIODE,OPTO:LED;GRN,569NM,1MCD AT 10MA,90 D EG VIEW ANGL,YOKE LEAD BEND	50434	HLMP–6500–021
A1DS492	150–5004–00			DIODE,OPTO:LED;HI EFFIC RED,635NM,1.0 MCD AT 10MA,YOKE LEAD BEND	50434	HLMP–6300–021

Replaceable Electrical Parts

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A1DS626	150–5003–00			DIODE,OPTO:LED;GRN,569NM,1MCD AT 10MA,90 D EG VIEW ANGL,YOKE LEAD BEND	50434	HLMP–6500–021
A1DS692	150–5004–00			DIODE,OPTO:LED;HI EFFIC RED,635NM,1.0 MCD AT 10MA,YOKE LEAD BEND	50434	HLMP–6300–021
A1DS835	150–5003–00			DIODE,OPTO:LED;GRN,569NM,1MCD AT 10MA,90 D EG VIEW ANGL,YOKE LEAD BEND	50434	HLMP–6500–021
A1DS839	150–5003–00			DIODE,OPTO:LED;GRN,569NM,1MCD AT 10MA,90 D EG VIEW ANGL,YOKE LEAD BEND	50434	HLMP–6500–021
A1DS892	150–5003–00			DIODE,OPTO:LED;GRN,569NM,1MCD AT 10MA,90 D EG VIEW ANGL,YOKE LEAD BEND	50434	HLMP–6500–021
A2–1	670–9905–50	B010100	B010174	CIRCUIT BD ASSY:DIGITAL	80009	670990550
A2–1	670–9905–51	B010175	B020729	CIRCUIT BD ASSY:DIGITAL	80009	670990551
A2–1	670–9905–52	B020730	B021747	CIRCUIT BD ASSY:DIGITAL	80009	670990552
A2–1	670–9905–54	B021748		CIRCUIT BD ASSY:DIGITAL (STANDARD ONLY)	80009	670990554
A2–1	670–9905–53	B010100	B021747	CIRCUIT BD ASSY:DIGITAL	80009	670990553
A2–1	670–9905–55	B021748		CIRCUIT BD ASSY:DIGITAL (OPTION 02 ONLY)	80009	670990555
A2–1C104	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C170	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C173	290–0990–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=13 OHM (120HZ,25C),8 X 11.5MM	55680	UET1H100MPH
A2–1C180	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C205	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C221	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C228	283–0629–00			CAP,FXD,MICA DI:62PF,1%,500V	TK0891	RDM10ED620F03
A2–1C249	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C261	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C262	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C264	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C267	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C270	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C275	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C276	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C280	283–0421–00	670–9905–50	670–9905–51	CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C305	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C306	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C309	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C312	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C315	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C349	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C352	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C361	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C367	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C370	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C372	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C373	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C374	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C376	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C378	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C380	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C381	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C383	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C387	281–0284–00	670–9905–50	670–9905–51	CAP,VAR,CER DI:2.2–34PF,250V	74970	193–0010–005
A2–1C390	283–0633–00	670–9905–50	670–9905–51	CAP,FXD,MICA DI:77PF,1%,100V	TK0891	RDM15ED770F03
A2–1C391	283–0635–00	670–9905–50	670–9905–51	CAP,FXD,MICA DI:51PF,1%,500V	TK0891	RDM15ED510F03
A2–1C392	283–0779–00	670–9905–50	670–9905–51	CAP,FXD,MICA DI:27 PF,2%,500V	TK0891	RDM15ED270G03
A2–1C393	283–0631–00	670–9905–50	670–9905–51	CAP,FXD,MICA DI:95PF,1%,500V	TK0891	RDM15FD950F03

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2–1C409	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C412	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C415	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C421	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C441	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C447	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C449	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C464	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C470	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C473	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C474	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C477	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C478	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C479	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C482	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C483	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C484	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C485	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C486	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C487	283–0706–00	670–9905–50	670–9905–51	CAP,FXD,MICA DI:91PF,1%,500V	TK0891	RDM15FD910F03
A2–1C488	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C489	283–0785–00			CAP,FXD,MICA DI:250PF,1%,500V	TK0891	RDM15FD251F03
A2–1C492	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C495	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C496	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C498	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C509	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C529	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C532	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C539	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C542	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C545	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C547	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C554	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C557	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C561	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C564	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C593	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C596	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C597	283–0666–00			CAP,FXD,MICA DI:890PF,2%,100V	TK0891	RDM15FA891G03
A2–1C598	283–0666–00			CAP,FXD,MICA DI:890PF,2%,100V	TK0891	RDM15FA891G03
A2–1C619	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C623	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C626	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C629	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C632	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C636	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C639	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C642	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C645	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C648	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C649	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C654	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C657	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C661	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C664	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C667	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C670	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB

Replaceable Electrical Parts

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2–1C673	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C680	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C683	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C704	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C705	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C706	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C709	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C712	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C715	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C719	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C721	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C724	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C727	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C730	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C733	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C736	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C739	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C742	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C745	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C749	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C761	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C764	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C767	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C770	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C805	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C807	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C808	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C809	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C811	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C813	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C816	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C840	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C841	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C842	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C843	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C844	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C845	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C846	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C847	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C852	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C870	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C873	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C880	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C891	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A2–1C905	283–0647–00			CAP,FXD,MICA DI:70PF,1%,100V	TK0891	RDM15ED700F03
A2–1C906	283–0772–00			CAP,FXD,MICA DI:497 PF,1%,500V	TK0891	RDM15FD4970F03
A2–1C907	283–0625–00			CAP,FXD,MICA DI:220PF,1%,500V	TK0891	RDM10FD221F03
A2–1C928	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C930	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C933	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C938	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C970	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C972	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C975	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1C978	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A2–1J109	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2–1J111	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J145	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J156	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J164	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J180	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J208	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J223	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J229	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J286	131–0787–00			TERMINAL,PIN:PCB/PRESSFIT;MALE,STR,0.025 SQ,0.448 MLG X 0.137 TAIL,0.600 L,PHOS BRZ,50 GOLD,0.049 +/– 0.002 PCB	22526	47359–001
A2–1J308	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J391	131–0608–00	670–9905–50	670–9905–51	CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J423	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J470	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J497	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J523	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J551	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J570	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J651	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J690	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J712	131–0608–00	670–9905–50	670–9905–51	CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J883	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J885	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J914	131–3692–00			CONN,DIN:PCB;MALE,RTANG,3 X 32,0.1CTR,0.104 TAIL,BD RETENTION	00779	536416–5
				MOUNTING PARTS		
	210–0001–00			WASHER,LOCK:#2 INTL,0.013 THK,STL (QUANTITY 2)	78189	1202–00–00–0541
	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)	0KB01	ORDER BY DESC
				END MOUNTING PARTS		
A2–1J939	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J942	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J955	131–3440–00			CONN,DIN:PCB;MALE,RTANG,3 X 16,0.1CTR,0.20 9 MLG X 0,114 TAIL,30 GOLD,BD RETENTION	00779	148020–5

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
				MOUNTING PARTS		
	210–0001–00			WASHER,LOCK:#2 INTL,0.013 THK,STL (QUANTITY 2)	78189	1202–00–00–0541
	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)	0KB01	ORDER BY DESC
				END MOUNTING PARTS		
A2–1J985	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1J988	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A2–1L375	108–0683–00			COIL,RF:FIXED,900NH	0JR03	108–0683–00
A2–1L381	108–0683–00			COIL,RF:FIXED,900NH	0JR03	108–0683–00
A2–1L902	108–0103–01			INDUCTOR,FXD:SIGNAL;2.5UH,2%,ON FORM 307–0005–01	0JR03	108–0103–01
A2–1P111	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A2–1P145	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A2–1P156	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P164	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P180	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P208	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P223	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P229	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P308	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A2–1P391	131–0993–02	670–9905–50	670–9905–51	BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P423	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P470	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P497	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P523	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P551	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P570	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P651	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P690	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A2–1P712	131–0993–02	670–9905–50	670–9905–51	BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P883	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A2–1P885	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A2–1P939	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A2–1P985	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A2–1Q229	151–0199–00			TRANSISTOR,SIG:BIPOLAR,PNP;12V,80MA,SWITCHING	04713	MPS3640
A2–1Q293	151–0656–00			TRANSISTOR,PWR:BIPOLAR,NPN;80V,8.0A,4.0MHZ, DARLINGTON,AMPLIFIER	04713	2N6044
				MOUNTING PARTS		
	210–0586–00			NUT,PL,ASSEM WA:4–40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
	211–0021–00			SCREW,MACHINE:4–40 X 1.25,PNH,STL	TK0435	ORDER BY DESC
				END MOUNTING PARTS		
A2–1Q491	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A2–1Q541	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A2–1R112	315–0621–00			RES,FXD,FILM:620 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R113	315–0621–00			RES,FXD,FILM:620 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R114	315–0621–00			RES,FXD,FILM:620 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R115	315–0621–00			RES,FXD,FILM:620 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R116	315–0621–00			RES,FXD,FILM:620 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R117	307–0636–00			RES NTWK,FXD,FI:8,330 OHM,2%,0.125 W	11236	761–3–R330OHM
A2–1R158	307–0650–00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750–101–R2.7K
A2–1R172	315–0472–00			RES,FXD,FILM:4.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R173	315–0222–00			RES,FXD,FILM:2.2K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R174	315–0393–00	670–9905–50	670–9905–50	RES,FXD,FILM:39K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R174	315–0203–00	670–9905–51		RES,FXD,FILM:20K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R178	315–0202–00			RES,FXD,FILM:2K OHM,5%,0.25W	TK1727	SFR25 2322–181–

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2–1R179	315–0202–00			RES,FXD,FILM:2K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R202	307–0636–00			RES NTWK,FXD,FI:8,330 OHM,2%,0.125 W	11236	761–3–R330OHM
A2–1R225	315–0272–00			RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R226	315–0272–00			RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R227	315–0621–00			RES,FXD,FILM:620 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R228	315–0822–00			RES,FXD,FILM:8.2K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R234	315–0100–00			RES,FXD,FILM:10 OHM,5%,0.25W,	TK1727	SFR25 2322–182–
A2–1R272	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A2–1R273	321–1643–07			RES,FXD,FILM:11.03K OHM,0.1%,0.125W,TC=T9	19701	5033RE11K03B
A2–1R274	321–1264–07			RES,FXD,FILM:5.56K OHM,0.1%,0.125W,TC=T9	19701	5033RE5K560BB29
A2–1R275	315–0362–00			RES,FXD,FILM:3.6K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R277	315–0242–00			RES,FXD,FILM:2.4K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R278	321–0264–07			RES,FXD,FILM:5.49K OHM,0.1%,0.125W,TC=T9	19701	5033RE5K490B
A2–1R279	321–0264–07			RES,FXD,FILM:5.49K OHM,0.1%,0.125W,TC=T9	19701	5033RE5K490B
A2–1R298	308–0677–00			RES,FXD,WW:1 OHM,5%,2W	75042	SPH 1 OHM 5 PER
A2–1R317	307–0650–00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750–101–R2.7K
A2–1R373	315–0271–00			RES,FXD,FILM:270 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R374	315–0270–00			RES,FXD,FILM:27 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R378	315–0270–00			RES,FXD,FILM:27 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R379	315–0331–00	670–9905–50	670–9905–51	RES,FXD,FILM:330 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R379	315–0271–00	670–9905–52		RES,FXD,FILM:270 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R389	321–0454–00	670–9905–50	670–9905–51	RES,FXD,FILM:523K OHM,1%,0.125W,TC=T0MI	07716	CEA523KOHM 1PER
A2–1R389	322–3318–00	670–9905–52		RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2–1R390	322–3437–00	670–9905–50	670–9905–51	RES,FXD,FILM:348K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G34802F
A2–1R390	321–0441–00	670–9905–52		RES,FXD,FILM:383K OHM,1%,0.125W,TC=T0MI	TK1727	2322–151–383K
A2–1R395	322–3318–00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2–1R396	321–0413–00			RES,FXD,FILM:196K OHM,1%,0.125W,TC=T0MI	19701	5043ED196KOF
A2–1R397	321–0353–00			RES,FXD,FILM:46.4K OHM,1%,0.125W,TC=T0MI	19701	5043ED46K40F
A2–1R398	321–0353–00			RES,FXD,FILM:46.4K OHM,1%,0.125W,TC=T0MI	19701	5043ED46K40F
A2–1R399	321–0413–00			RES,FXD,FILM:196K OHM,1%,0.125W,TC=T0MI	19701	5043ED196KOF
A2–1R437	315–0103–00			RES,FXD,FILM:10K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R439	315–0100–00			RES,FXD,FILM:10 OHM,5%,0.25W,	TK1727	SFR25 2322–182–
A2–1R440	315–0106–00			RES,FXD,FILM:10M OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R442	315–0271–00			RES,FXD,FILM:270 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R443	315–0112–00			RES,FXD,FILM:1.1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R444	315–0472–00			RES,FXD,FILM:4.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R445	315–0102–00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R446	308–0433–00			RES,FXD,WW:1 OHM,10%,0.25W	75498	308–0433–00
A2–1R469	311–2234–00			RES,VAR,TRMR:CERMET;5K OHM,20%,0.5W,0.197 S Q,TOP ADJUST	TK2073	GF06UT2 502 M L
A2–1R470	315–0123–00			RES,FXD,FILM:12K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R471	321–0816–00			RES,FXD,FILM:5K OHM,1%,0.125W,TC=T0	19701	5033RD5K000F
A2–1R472	321–0932–00			RES,FXD,FILM:2.5K OHM,1%,0.125W,TC=T0MI	19701	5033RD2K500F
A2–1R473	322–3204–00			RES,FXD,FILM:1.3K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G13000F
A2–1R474	315–0103–00			RES,FXD,FILM:10K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R475	322–3252–00			RES,FXD,FILM:4.12K OHM,1%,0.2W,TC=T0TAPED &	91637	CCF501G41200F
A2–1R476	321–0816–00			RES,FXD,FILM:5K OHM,1%,0.125W,TC=T0	19701	5033RD5K000F
A2–1R478	322–3204–00			RES,FXD,FILM:1.3K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G13000F
A2–1R479	322–3204–00			RES,FXD,FILM:1.3K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G13000F
A2–1R480	315–0103–00			RES,FXD,FILM:10K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R481	322–3252–00			RES,FXD,FILM:4.12K OHM,1%,0.2W,TC=T0TAPED &	91637	CCF501G41200F
A2–1R482	321–0816–00			RES,FXD,FILM:5K OHM,1%,0.125W,TC=T0	19701	5033RD5K000F
A2–1R483	322–3204–00			RES,FXD,FILM:1.3K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G13000F
A2–1R485	315–0511–00			RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R486	315–0751–00			RES,FXD,FILM:750 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R487	315–0102–00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R488	321–0249–00	670–9905–50	670–9905–51	RES,FXD,FILM:3.83K OHM,1%,0.125W,TC=T0MI	19701	5033ED3K83F
A2–1R489	322–3098–00	670–9905–50	670–9905–51	RES,FXD,FILM:102 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G102ROF

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2–1R489	315–0471–00	670–9905–52		RES,FXD,FILM:470 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R490	315–0242–00			RES,FXD,FILM:2.4K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R491	321–0387–00			RES,FXD,FILM:105K OHM,1%,0.125W,TC=T0MI	19701	5043ED105K0F
A2–1R492	322–3318–00			RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A2–1R493	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10002F
A2–1R497	315–0102–00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R506	307–0650–00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750–101–R2.7K
A2–1R523	315–0272–00			RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R568	315–0272–00			RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R572	307–0650–00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750–101–R2.7K
A2–1R576	307–0539–00			RES NTWK,FXD,FI:(7)510 OHM,10%,1W	11236	750–81–R510 OHM
A2–1R580	307–0539–00			RES NTWK,FXD,FI:(7)510 OHM,10%,1W	11236	750–81–R510 OHM
A2–1R590	307–0539–00			RES NTWK,FXD,FI:(7)510 OHM,10%,1W	11236	750–81–R510 OHM
A2–1R593	315–0394–00			RES,FXD,FILM:390K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R595	315–0682–00			RES,FXD,FILM:6.8K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R596	315–0302–00			RES,FXD,FILM:3K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R597	315–0392–00			RES,FXD,FILM:3.9K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R651	315–0272–00			RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R652	315–0272–00			RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R695	307–0650–00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750–101–R2.7K
A2–1R706	321–0929–07			RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	TK1727	2322–141–2K5
A2–1R707	322–3179–00			RES,FXD,FILM:715 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G715R0F
A2–1R717	307–0526–00			RES,NTWK:THICK FILM;(5)510 OHM,10%,0.125W EACH,TC=100 PPM	11236	750–61–R510 OHM
A2–1R747	315–0511–00			RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R748	315–0511–00			RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R805	315–0270–00			RES,FXD,FILM:27 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R806	322–3193–07			RES,FXD,FILM:1K OHM,0.1%,0.2W,TC=T9	91637	CCF501C10000B
A2–1R844	307–0650–00			RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750–101–R2.7K
A2–1R906	321–0793–07	670–9905–50	671–9905–51	RES,FXD,FILM:37.5 OHM 0.1%,0.125W TC=T9 MI	07716	CEA 37.5 OHM 0.
A2–1R906	322–3193–07	670–9905–52		RES,FXD,FILM:1K OHM,0.1%,0.2W,TC=T9	91637	CCF501C10000B
A2–1R912	307–0539–00			RES NTWK,FXD,FI:(7)510 OHM,10%,1W	11236	750–81–R510 OHM
A2–1R913	307–0539–00			RES NTWK,FXD,FI:(7)510 OHM,10%,1W	11236	750–81–R510 OHM
A2–1R918	315–0102–00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R919	315–0102–00			RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R921	307–0503–00			RES NTWK,FXD,FI:(9) 510 OHM,20%,0.125WTC=50PPM/ DEG C	11236	750–101–R510 OR
A2–1R939	315–0272–00			RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R948	315–0511–00			RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1R949	315–0511–00			RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A2–1S156	260–1589–00			SWITCH,ROCKER:(6)SPST,125MA,30VDC	81073	76SB06S
A2–1U122	160–4906–00			MICROCKT,LINEAR:OP AMP,OP–14 TYPE,DIE FORMH3501	80009	160490600
A2–1U126	160–4954–00	670–9905–50	670–9905–55	IC,DIGITAL:STTL,PLD;PAL,20L10,50NS,165MA	80009	160495400
A2–1U126	160–4954–01	670–9905–54		IC,DIGITAL:CMOS,PLD;EEPLD,22V10,25NS,33.3MHZ, 90MA,22V10–25,DIP24.3,TUBE	80009	160495401
A2–1U129	160–4409–00	670–9905–50	670–9905–51	MICROCKT,DGTL:QUAD 16 INP RGTR AND/OR,PRGM	80009	160440900
A2–1U129	160–4409–01	670–9905–52		IC,DIGITAL:STTL,PLD;PAL,16R4,37MHZ,180MA	80009	160440901
A2–1U132	156–2338–00			IC,DIGITAL:ASTTL,FLIP FLOP;DUAL D–TYPE	01295	SN74AS74N
A2–1U149	156–2338–00			IC,DIGITAL:ASTTL,FLIP FLOP;DUAL D–TYPE	01295	SN74AS74N
A2–1U153	156–0865–02			IC,DIGITAL:LSTTL,FLIP FLOP	01295	SN74LS273N
A2–1U161	156–0956–02			IC,DIGITAL:LSTTL,BUFFER/DRIVER	01295	SN74LS244N
A2–1U170	156–1367–00			IC,CONVERTER:CMOS,D/A;8 BIT,400NS,CURRENT OUT,MPU COMPATIBLE,MULTIPLYING	24355	AD7524JN
A2–1U176	156–1850–00			IC,MISC:CMOS,ANALOG SWITCH;QUAD	17856	DG211CJ
				MOUNTING PARTS		
	210–1178–00			WASHER,SHLDR:U/W TO–220 TRANSISTOR	13103	7721–7PPS
	211–0661–00			SCR,ASSEM WSHR:4–40 X 0.25,PNH,STL,CD PL,POZ,MACH	TK0435	ORDER BY DESC
				END MOUNTING PARTS		

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2–1U205	156–1215–01			IC,DIGITAL:CMOS,MUX/ENCODER	27014	MM74C923N
A2–1U208	156–0956–02			IC,DIGITAL:LSTTL,BUFFER/DRIVER	01295	SN74LS244N
A2–1U211	156–0865–02			IC,DIGITAL:LSTTL,FLIP FLOP	01295	SN74LS273N
A2–1U214	156–0865–02			IC,DIGITAL:LSTTL,FLIP FLOP	01295	SN74LS273N
A2–1U217	156–0865–02			IC,DIGITAL:LSTTL,FLIP FLOP	01295	SN74LS273N
A2–1U232	156–2626–00			IC,DIGITAL:ALSTTL,GATE;QUAD 2–INPUT NAND, OC	01295	SN74ALS03BN
A2–1U236	160–4908–00			IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA	80009	160490800
A2–1U240	156–2628–00			IC,PROCESSOR:NMOS,PERIPHERAL;COUNTER TIMER	56708	Z0843006PSC
A2–1U245	156–2628–00			IC,PROCESSOR:NMOS,PERIPHERAL;COUNTER TIMER	56708	Z0843006PSC
A2–1U249	156–0480–02			IC,DIGITAL:LSTTL,GATES	01295	SN74LS08N
A2–1U264	156–1973–00			IC,DIGITAL:FTTL,FLIP FLOP;QUAD D–TYPE, WITH	01295	SN74F175N
A2–1U267	156–0784–02	670–9905–50	670–9905–51	IC,DIGITAL:LSTTL,COUNTER	01295	SN74LS163AN
A2–1U267	156–2520–00	670–9905–52		IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U270	156–0158–07			IC,LINEAR:BIPOLAR,OP–AMP	01295	MC1458P
A2–1U276	156–1437–00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIVE, 5V,1.0%,25PPM,SERIES	04713	MC1404AU5
A2–1U302	156–0865–02			IC,DIGITAL:LSTTL,FLIP FLOP	01295	SN74LS273N
A2–1U320	156–1026–02			IC,DIGITAL:LSTTL,DEMUX	27014	DM74LS154N
A2–1U321	156–3050–00			IC,MISC:CMOS,PWR SUPPLY SUPERVISOR;MPU RESET GENERATOR,5V SUPPLY SENSING,MPU WATCHDOG TIMER	0B0A9	DS1232
A2–1U333	160–5162–00	670–9905–50	670–9905–51	MICROCKT,DGTL:NMOS,32768 X 8 EPROM,PRGM2725 6–25,250NS,DIP28	80009	160516200
A2–1U333	160–5162–01	670–9905–52	670–9905–53	MICROCKT,DGTL:NMOS,32768 X 8 EPROM,PRGM2725 6,250NS,DIP28	80009	160516201
A2–1U333	160–5162–02	670–9905–54		MICROCKT,DGTL:NMOS,32768 X 8 EPROM,PRGM,272 56,250NS,DIP28	80009	160516202
A2–1U340	156–1632–00			IC,MEMORY:CMOS,SRAM;2K X 8,250NS	TK1416	LH5116–10
A2–1U345	156–2491–00			IC,MEMORY:NMOS,EEPROM;128 X 8,200NS	60395	X2001 P OR D
A2–1U349	156–1723–00			IC,DIGITAL:FTTL,GATE;QUAD 2–INPUT AND	01295	SN74F08N
A2–1U352	156–0865–02			IC,DIGITAL:LSTTL,FLIP FLOP	01295	SN74LS273N
A2–1U356	160–5163–00			MICROCKT,DGTL:NMOS,16384 X 8 OPT EPROM,PRGM (STANDARD ONLY)	80009	160516300
A2–1U356	160–8151–00	670–9905–53		MICROCKT,DGTL:NMOS,16384 X 8 OPT EPROM,PRGM ,27128A–3,DIP28 (OPTION 02 ONLY)	80009	160815100
A2–1U361	156–1722–00			IC,DIGITAL:FTTL,GATE;HEX INV	04713	MC74F04N
A2–1U364	156–0865–02			IC,DIGITAL:LSTTL,FLIP FLOP	01295	SN74LS273N
A2–1U367	156–0784–02	670–9905–50	670–9905–51	IC,DIGITAL:LSTTL,COUNTER	01295	SN74LS163AN
A2–1U367	156–2520–00	670–9905–52		IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U370	156–1367–00			IC,CONVERTER:CMOS,D/A;8 BIT,400NS,CURRENT OUT,MPU COMPATIBLE,MULTIPLYING	24355	AD7524JN
A2–1U376	156–0158–07			IC,LINEAR:BIPOLAR,OP–AMP	01295	MC1458P
A2–1U402	156–1111–02			IC,DIGITAL:LSTTL,TRANSCEIVER	01295	SN74LS245N
A2–1U405	156–1111–02			IC,DIGITAL:LSTTL,TRANSCEIVER	01295	SN74LS245N
A2–1U409	156–0865–02			IC,DIGITAL:LSTTL,FLIP FLOP	01295	SN74LS273N
A2–1U412	156–1754–01			IC,DIGITAL:ALSTTL,BUFFER;OCTAL,3–STATE	01295	SN74ALS244CN
A2–1U415	156–0956–02			IC,DIGITAL:LSTTL,BUFFER/DRIVER	01295	SN74LS244N
A2–1U427	156–0983–03			IC,PROCESSOR:NMOS,MICROPROCESSOR;8–BIT	56708	Z0840006PSC
A2–1U450	156–2634–00			IC,DIGITAL:FTTL,FLIP FLOP;OCTAL D–TYPE, CLEAR	1CH66	N74F273N
A2–1U454	160–5154–00			MICROCKT,DGTL:NMOS,16384 X 8 OPT EPROM,PRGM (STANDARD ONLY)	80009	160515400
A2–1U454	160–8152–00	670–9905–53		MICROCKT,DGTL:NMOS,16384 X 8 OPT EPROM,PRGM ,27128A–3,DIP28 (OPTION 02 ONLY)	80009	160815200
A2–1U460	160–5155–00			MICROCKT,DGTL:NMOS,16384 X 8 OPT EPROM,PRGM (STANDARD ONLY)	80009	160515500
A2–1U460	160–8153–00	670–9905–53		MICROCKT,DGTL:NMOS,16384 X 8 OPT EPROM,PRGM ,27128A–3,DIP28 (OPTION 02 ONLY)	80009	160815300

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2–1U464	156–2634–00			IC,DIGITAL:FTTL,FLIP FLOP;OCTAL D–TYPE, CLEAR	1CH66	N74F273N
A2–1U467	156–1909–00			IC,DIGITAL:FTTL,MUX;QUAD 2–TO–1 DATA SELECTOR	01295	SN74F157AN
A2–1U495	156–0158–07			IC,LINEAR:BIPOLAR,OP–AMP	01295	MC1458P
A2–1U503	156–2992–00			IC,MEMORY:CMOS,SRAM;2K X 8,35NS,OE	65786	CY7C128A–35PC
A2–1U509	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U512	156–2331–00			IC,DIGITAL:LSTTL,COUNTER;8–BIT, WITH STORAGE REGISTER, 3–STATE	01295	SN74LS590N
A2–1U515	156–2065–00			IC,DIGITAL:ASTTL,LATCH;OCTAL D–TYPE TRANSPARENT, 3–STATE	01295	SN74AS373N
A2–1U519	156–2338–00	670–9905–52		IC,DIGITAL:ASTTL,FLIP FLOP;DUAL D–TYPE	01295	SN74AS74N
A2–1U526	156–2389–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 8–BIT UP/DOWN, ASYNCH CLEAR	01295	SN74AS867NT
A2–1U570	156–2338–00			IC,DIGITAL:ASTTL,FLIP FLOP;DUAL D–TYPE	01295	SN74AS74N
A2–1U574	156–0316–04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TOTTL	04713	MC10125P
A2–1U578	156–0860–02			IC,DIGITAL:ECL,RECEIVER	04713	MC10116P
A2–1U582	156–0860–02			IC,DIGITAL:ECL,RECEIVER	04713	MC10116P
A2–1U585	156–0295–02			IC,DIGITAL:ECL,GATE	04713	MC10107P
A2–1U588	156–0860–02			IC,DIGITAL:ECL,RECEIVER	04713	MC10116P
A2–1U592	156–0860–02			IC,DIGITAL:ECL,RECEIVER	04713	MC10116P
A2–1U602	160–4351–00	670–9905–50	670–9905–51	MICROCKT,DGTL:STTL,OCTAL 16 INP RGTR PRGM	80009	160435100
A2–1U602	156–2065–00	670–9905–52		IC,DIGITAL:ASTTL,LATCH;OCTAL D–TYPE TRANSPARENT, 3–STATE	01295	SN74AS373N
A2–1U605	156–1173–00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIVE, 2.5V,1.0%,40PPM,SERIES	04713	MC1403U
A2–1U609	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U612	160–4496–00			IC,DIGITAL:CMOS,PLD;OTP,20G10,25NS,55MA	80009	160449600
A2–1U615	160–4422–00			IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA	80009	160442200
A2–1U629	160–4429–00			MICROCKT,DGTL:32 X 8 PROM,TRI STATE OUTPUT, BIPOLAR,PRGM	80009	160442900
A2–1U632	156–0784–02	670–9905–50	670–9905–51	IC,DIGITAL:LSTTL,COUNTER	01295	SN74LS163AN
A2–1U632	156–2251–00	670–9905–52		IC,DIGITAL:FTTL,COUNTER;SYNCH 4–BIT BINARY	04713	MC74F161AN
A2–1U632	156–2520–00	670–9905–52	670–9905–52	IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U636	156–1756–00			IC,DIGITAL:ALSTTL,FLIP FLOP;DUAL D–TYPE W/CLEAR	01295	SN74ALS74AN
A2–1U639	160–5156–00			MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM7C245–35, DIP24 (STANDARD ONLY)	80009	160515600
A2–1U639	160–8154–00	670–9905–53		MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM,7C245–35,DIP24 (OPTION 02 ONLY)	80009	160815400
A2–1U645	160–5157–00			MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM7C245–35,DIP24 (STANDARD ONLY)	80009	160515700
A2–1U645	160–8155–00	670–9905–53		MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM,7C245–35,DIP24 (OPTION 02 ONLY)	80009	160815500
A2–1U648	156–1909–00			IC,DIGITAL:FTTL,MUX;QUAD 2–TO–1 DATA SELECTOR	01295	SN74F157AN
A2–1U654	160–5160–00			MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM7C245–35,DIP24 (STANDARD ONLY)	80009	160516000
A2–1U654	160–8156–00	670–9905–53		MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM,7C245–35, DIP24 (OPTION 02 ONLY)	80009	160815600
A2–1U657	160–8157–00	670–9905–53		MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM,7C245–35,DIP24 (OPTION 02 ONLY)	80009	160815700
				MOUNTING PARTS		
	136–0925–00	671–9905–53		SOCKET,DIP:PCB;24 POS,2 X 12,0.1 X 0.3 CTR,0.196 H X 0.130 TAIL,BECU,TIN,ACCOM 0.008–0.015THRU 0.014 X 0.022 LEADS	00779	2–641932–3
				END MOUNTING PARTS		

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2–1U661	160–5158–00			MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM7C245–3 5,DIP24 (STANDARD ONLY)	80009	160515800
A2–1U661	160–8158–00	670–9905–53		MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM,7C245– 35,DIP24 (OPTION 02 ONLY)	80009	160815800
A2–1U664	160–8159–00	670–9905–53		MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM,7C245– 35,DIP24 (OPTION 02 ONLY)	80009	160815900
				MOUNTING PARTS		
	136–0925–00	671–9905–53		SOCKET,DIP:PCB;24 POS,2 X 12,0.1 X 0.3 CTR,0.196 H X 0.130 TAIL,BECU,TIN,ACCOM 0.008–0.015THRU 0.014 X 0.022 LEADS	00779	2–641932–3
				END MOUNTING PARTS		
A2–1U667	160–5159–00			MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM7C245–3 5,DIP24 (STANDARD ONLY)	80009	160515900
A2–1U667	160–8160–00	670–9905–53		MICROCKT,DGTL:CMOS,2048 X 8 REG,PRGM,7C2451 35,DIP24 (OPTION 02 ONLY)	80009	160816000
A2–1U670	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U673	156–1911–00			IC,DIGITAL:FTTL,FLIP FLOP;HEX D–TYPE,WITH /MR	04713	MC74F174N
A2–1U676	156–1973–00			IC,DIGITAL:FTTL,FLIP FLOP;QUAD D–TYPE, WITH	01295	SN74F175N
A2–1U679	156–2928–00			IC,DIGITAL:ASTTL,FLIP FLOP;HEX D–TYPE, CLEAR	01295	SN74AS174N
A2–1U682	156–2928–00			IC,DIGITAL:ASTTL,FLIP FLOP;HEX D–TYPE, CLEAR	01295	SN74AS174N
A2–1U685	156–2928–00			IC,DIGITAL:ASTTL,FLIP FLOP;HEX D–TYPE, CLEAR	01295	SN74AS174N
A2–1U687	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U690	156–1724–00			IC,DIGITAL:FTTL,GATE;QUAD 2–INPUT OR	01295	SN74F32N
A2–1U693	156–2120–00			IC,DIGITAL:FTTL,SHIFT REGISTER;8–BIT SIPO,WITH /MR	1CH66	N74F164N
A2–1U697	156–0798–02			IC,DIGITAL:LSTTL,MUX/ENCODER	01295	SN74LS153N
A2–1U709	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U719	156–0316–04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TOTTL	04713	MC10125P
A2–1U723	156–0956–02			IC,DIGITAL:LSTTL,BUFFER/DRIVER	01295	SN74LS244N
A2–1U726	156–2338–00			IC,DIGITAL:ASTTL,FLIP FLOP;DUAL D–TYPE	01295	SN74AS74N
A2–1U732	156–1704–01			IC,DIGITAL:FTTL,FLIP FLOP;OCTAL D, 3–STATE	1CH66	N74F374N
A2–1U736	156–1973–00			IC,DIGITAL:FTTL,FLIP FLOP;QUAD D–TYPE, WITH	01295	SN74F175N
A2–1U739	156–1705–00			IC,DIGITAL:FTTL,ARITH FUNC;4–BIT BINARY FULL ADDER, W/FAST CARRY	04713	MC74F283N
A2–1U742	156–1705–00			IC,DIGITAL:FTTL,ARITH FUNC;4–BIT BINARY FULL ADDER, W/FAST CARRY	04713	MC74F283N
A2–1U745	156–1705–00			IC,DIGITAL:FTTL,ARITH FUNC;4–BIT BINARY FULL ADDER, W/FAST CARRY	04713	MC74F283N
A2–1U749	156–0316–04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TOTTL	04713	MC10125P
A2–1U752	160–4423–00			IC,DIGITAL:STTL,PLD;PAL,16R8,25MHZ,180MA	80009	160442300
A2–1U761	156–1705–00			IC,DIGITAL:FTTL,ARITH FUNC;4–BIT BINARY FULL ADDER, W/FAST CARRY	04713	MC74F283N
A2–1U764	156–1705–00			IC,DIGITAL:FTTL,ARITH FUNC;4–BIT BINARY FULL ADDER, W/FAST CARRY	04713	MC74F283N
A2–1U767	156–1705–00			IC,DIGITAL:FTTL,ARITH FUNC;4–BIT BINARY FULL ADDER, W/FAST CARRY	04713	MC74F283N
A2–1U770	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U773	160–4349–00			MICROCKT,DGTL:CMOS,2048 X 8 REGISTERED PROM	80009	160434900
A2–1U777	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U780	160–4350–02			MICROCKT,DGTL:CMOS,2048 X 8 REG PROM,PRGM	80009	160435002
A2–1U783	156–0865–02			IC,DIGITAL:LSTTL,FLIP FLOP	01295	SN74LS273N
A2–1U786	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U791	160–5161–00			MICROCKT,DGTL:NMOS,8192 X 8 EPROM,PRGMW/3 STATE OUT,2764A,DIP28	80009	160516100
A2–1U796	160–4337–01			MICROCKT,DGTL:NMOS,8192 X 8 EPROM,PRGMW/3 STATE OUT,2764A–25,DIP28	80009	160433701

Replaceable Electrical Parts

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2–1U802	156–2487–00			IC,CONVERTER:BIPOLAR,A/D;6–BIT,25MSPS FLASH	07933	TDC1046B8C
A2–1U808	156–0067–13	670–9905–50	670–9905–55	IC,LINEAR:BIPOLAR,OP–AMP;BURN–IN & CERAMIC VERSION OF 156–0067–00,DO NOT USE:UA741CJG, DIP08.3	01295	UA741CJG4
A2–1U808	156–0067–00	670–9905–54		IC,LINEAR:BIPOLAR,OP–AMP	01295	UA741CP
A2–1U811	156–0368–03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL–TO–ECL	04713	MC10124P
A2–1U813	156–0368–03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL–TO–ECL	04713	MC10124P
A2–1U816	156–0368–03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL–TO–ECL	04713	MC10124P
A2–1U819	156–0368–03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL–TO–ECL	04713	MC10124P
A2–1U821	156–0368–03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL–TO–ECL	04713	MC10124P
A2–1U824	156–0368–03			IC,DIGITAL:ECL,TRANSLATOR;QUAD TTL–TO–ECL	04713	MC10124P
A2–1U827	160–4405–00			MICROCKT,DGTL:CMOS,2048 X 8 REGISTERED PROM	80009	160440500
A2–1U830	160–4406–00			MICROCKT,DGTL:CMOS,2048 X 8 REGISTERED PROM	80009	160440600
A2–1U833	156–1704–01			IC,DIGITAL:FTTL,FLIP FLOP;OCTAL D, 3–STATE	1CH66	N74F374N
A2–1U836	156–2389–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 8–BIT UP/DOWN, ASYNCH CLEAR	01295	SN74AS867NT
A2–1U839	160–4424–00	670–9905–50	670–9905–51	IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA	80009	160442400
A2–1U839	160–4424–01	670–9905–52		IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA	80009	160442401
A2–1U846	156–0956–02			IC,DIGITAL:LSTTL,BUFFER/DRIVER	01295	SN74LS244N
A2–1U849	156–0956–02			IC,DIGITAL:LSTTL,BUFFER/DRIVER	01295	SN74LS244N
A2–1U852	160–4425–00			IC,DIGITAL:STTL,PLD;PAL,16R8,25MHZ,180MA	80009	160442500
A2–1U856	156–2979–00			IC,DIGITAL:ACMOS,ARITH FUNC;8X8 MULTIPLIER	65896	LMU8UPC50
A2–1U861	160–4407–00			MICROCKT,DGTL:CMOS,2048 X 8 REGISTERED PROM	80009	160440700
A2–1U864	156–2232–00			IC,DGTL:ASTTL,FLIP FLOP;DUAL 4–BITD POSEDGE TRIG	01295	SN74AS874NT
A2–1U867	156–1973–00			IC,DIGITAL:FTTL,FLIP FLOP;QUAD D–TYPE, WITH	01295	SN74F175N
A2–1U870	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U873	160–4421–00	670–9905–50	670–9905–52	IC,DIGITAL:CMOS,PLD;EEPLD,16V8,PRGM	80009	160442100
A2–1U873	160–4421–01	670–9905–52		IC,DIGITAL:CMOS,PLD;EEPLD,16V8,10NS,115MA	80009	160442101
A2–1U877	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U880	156–0865–02			IC,DIGITAL:LSTTL,FLIP FLOP	01295	SN74LS273N
A2–1U883	156–0914–02			IC,DIGITAL:LSTTL,BUFFER/DRIVER	01295	SN74LS240N
A2–1U886	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U977	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U988	156–2520–00			IC,DIGITAL:ASTTL,COUNTER;SYNCH 4–BIT BINARY	01295	SN74AS163N
A2–1U991	156–0480–02			IC,DIGITAL:LSTTL,GATES	01295	SN74LS08N
A2–1U994	156–1707–00			IC,DIGITAL:FTTL,GATE;QUAD 2–INPUT NAND	04713	MC74F00N
A2–1U997	156–0465–02			IC,DIGITAL:LSTTL,GATES	01295	SN74LS30N
A2–1CR179	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2–1CR394	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2–1CR395	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2–1CR437	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2–1CR438	152–0322–00			DIODE,SIG:SCHTKY;15V,410MVF AT 1MA,1.2PF	50434	5082–2672–T25
A2–1CR439	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2–1CR445	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2–1CR474	152–0269–00			SEMICOND DVC,DI:VVC,SI,35V,33PF AT 4V,DO–7 1N5450 FAMILY	04713	SMV1263RL
A2–1CR475	152–0269–00			SEMICOND DVC,DI:VVC,SI,35V,33PF AT 4V,DO–7 1N5450 FAMILY	04713	SMV1263RL
A2–1CR480	152–0269–00			SEMICOND DVC,DI:VVC,SI,35V,33PF AT 4V,DO–7 1N5450 FAMILY	04713	SMV1263RL
A2–1CR481	152–0269–00			SEMICOND DVC,DI:VVC,SI,35V,33PF AT 4V,DO–7 1N5450 FAMILY	04713	SMV1263RL
A2–1CR905	152–0322–00			DIODE,SIG:SCHTKY;15V,410MVF AT 1MA,1.2PF	50434	5082–2672–T25
A2–1DS494	150–1014–00			DIODE,OPTO:LED;RED,66ONM,1 MCD AT 10MA	0MS63	Q6444/MV5054–1
A2–1TP101	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP101	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A2–1TP136	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP136	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A2–1TP164	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP164	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A2–1TP401	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP401	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A2–1TP469	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP469	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A2–1TP499	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP499	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A2–1TP538	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP538	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A2–1TP903	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP903	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A2–1TP907	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP907	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A2–1TP942	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP942	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A2–1TP965	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP965	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A2–1TP996	214–0579–00	670–9905–50	670–9905–51	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A2–1TP996	214–4085–00	670–9905–52		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A2–2	119–2501–01	B010100	B020729	OVEN ASSEMBLY:TSG271	80009	119250101
A2–2	119–2501–03	B020730	B020885	OVEN ASSEMBLY:TPG625	80009	119250103
A2–2	119–2501–04	B020886		OVEN ASSEMBLY:TPG625	80009	119250104
				MOUNTING PARTS		
	200–3264–00			COVER,TOP:ALUMINUM	5Y400	ORDER BY DESC
	211–0513–00			SCREW,MACHINE:6–32 X 0.625,PNH,STL (QUANTITY 2)	TK0435	ORDER BY DESC
	211–0661–00			SCR,ASSEM WSHR:4–40 X 0.25,PNH,STL,CD PL,POZ,MACH (QUANTITY 2)	TK0435	ORDER BY DESC
	348–0935–00			GASKET:2.0 X 1.7,NEOPRENE	TK1989	ORDER BY DESC
	432–0154–00			BASE,HEAT SINK:PLASTIC	80009	432015400
	200–3266–00	119–2501–01	119–2501–01	CAP,HEAT SINK:PLASTIC	80009	200326600
	200–3266–01	119–2501–03		CAP,HEAT SINK:PLASTIC	0JR05	200–3266–01
	214–3863–00	119–2501–01	119–2501–01	HEAT SINK,ELEC:ALUMINUM	TK1828	ORDER BY DESC
	214–3863–01	119–2501–03		HEAT SINK,ELEC:ALUMINUM	TK1828	ORDER BY DESC

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
				END MOUNTING PARTS		
A2–2C2	283–0632–00	119–2501–01	119–2501–01	CAP,FXD,MICA DI:87PF,1%,500V	TK0891	RDM15ED870F03
A2–2C3	283–0779–00	119–2501–01	119–2501–01	CAP,FXD,MICA DI:27 PF,2%,500V	TK0891	RDM15ED270G03
A2–2C4	281–0773–00	119–2501–01	119–2501–01	CAP,FXD,CERAMIC:MLC;0.01UF,10%,100V,,	TK1743	CGB103KEX
A2–2C6	283–5025–00	119–2501–03		CAP,FXD,CERAMIC:MLC;220PF,5%,50V,NPO,1206	TK2058	C3216COG1H221J–
A2–2C8	283–5025–00	119–2501–03		CAP,FXD,CERAMIC:MLC;220PF,5%,50V,NPO,1206	TK2058	C3216COG1H221J–
A2–2C15	283–5000–00	119–2501–03		CAP,FXD,CERAMIC:MLC;10PF,5%,50V,NPO,1206	TK2058	C3216COG1H100J–
A2–2C16	283–5206–00	119–2501–03		CAP,FXD,CER DI:56PF,5%,100V	04222	0805A560JAT050R
A2–2C17	283–5004–00	119–2501–03		CAP,FXD,CERAMIC:MLC;0.1UF,10%,25V,X7R,1206	TK2058	C3216X7R1E104K–
A2–2C19	281–0165–00	119–2501–03		CAP,VAR,AIR DI:0.8–10PF,250V	91293	5201/3469
A2–2J286	131–2002–00	119–2501–01	119–2501–01	CONN,BOX:PCB;FEM,RTANG,1 X 5,0.1 CTR,0.14 X 0.115 TAIL,2 X5 PCB,0.31 X 0.1 CTR PTH,40 GOLD,SIDE ENTRY,DAP	22526	65001–110
A2–2Q1	151–1124–00	119–2501–01	119–2501–01	TRANSISTOR,SIG:JFET,N–CH;4.5V,30MA,6MS,110 OHM,5.5MS @450MHZ	17856	J–2400
A2–2Q10	151–5001–00	119–2501–03	119–2501–03	TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	MMBT3904LT1
A2–2Q10	151–5035–00	119–2501–04		TRANSISTOR,SIG:BIPOLAR,NPN;25V,30MA,650MHZ,AMPL	04713	MMBTH10LT1
A2–2R1	321–5043–00	119–2501–03		RES,FXD:THICK FILM;47.5 OHM,1%,0.125W,TC=100 PPM	57668	MCR18FWEA47E5
A2–2R3	307–1161–00	119–2501–03		RES,FXD,FILM:1M OHM,5%,0.062W,0805,8MMTAPED	50139	ACD1004JT
A2–2R4	321–5078–00	119–2501–03		RES,FXD,FILM:20K OHM,1%,125MW,0805 PKGTAPE& REEL	91637	CRCW 0805 2002F
A2–2R5	317–0105–00	119–2501–01	119–2501–01	RES,FXD,CMPSN:1M OHM,5%,0.125W	50139	BB1055
A2–2R5	321–5078–00	119–2501–03		RES,FXD,FILM:20K OHM,1%,125MW,0805 PKGTAPE& REEL	91637	CRCW 0805 2002F
A2–2R9	317–0105–00	119–2501–01	119–2501–01	RES,FXD,CMPSN:1M OHM,5%,0.125W	50139	BB1055
A2–2R9	321–5012–00	119–2501–03		RES,FXD:THICK FILM;332 OHM,1%,0.125W,TC=100	50139	BCK3320FT
A2–2R10	317–0470–00	119–2501–01	119–2501–01	RES,FXD,CMPSN:47 OHM,5%,0.125W	TK1727	SFR16 2322–180–
A2–2Y11	————————			XTAL UNIT,QTZ:17.734380 MHZ,32 PF,HC43/U (REPLACEABLE AT A2–2 ONLY)		
A2–2CR7	152–0719–00	119–2501–01	119–2501–01	DIODE,SIG:VVC;30V,100PF,5%	04713	1N5456B
A2–2CR14	152–0269–01	119–2501–03		DIODE,SIG:VVC;C4=33PF,5%,C4/C20=2	04713	SMV1263–1
A2–2CR488	152–0141–02	119–2501–01	119–2501–01	DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2–2CR489	152–0141–02	119–2501–01	119–2501–01	DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A2–2RT6	307–0181–01	119–2501–01	119–2501–01	RES,THERMAL:20K OHM,5%,AT 60 DEG C	91637	C771
A2–2RT11	307–0181–01	119–2501–03		RES,THERMAL:20K OHM,5%,AT 60 DEG C	91637	C771
A3	670–9906–01	B010100	B020309	CIRCUIT BD ASSY:ANALOG	80009	670990601
A3	670–9906–02	B020310	B020447	CIRCUIT BD ASSY:ANALOG	80009	670990602
A3	670–9906–03	B020448	B020970	CIRCUIT BD ASSY:ANALOG	80009	670990603
A3	670–9906–04	B020971	B021926	CIRCUIT BD ASSY:ANALOG	80009	670990604
A3	670–9906–05	B021927	B033174	CIRCUIT BD ASSY:ANALOG	80009	670990605
A3	670–9906–06	B033175		CIRCUIT BD ASSY:ANALOG	80009	670990606
A3C108	290–0804–00			CAP,FXD,ELCTLT:10UF,+50–20%,25V	0H1N5	CEUSM1E100
A3C122	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C127	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C189	283–0693–00			CAP,FXD,MICA DI:1730PF,1%,500V	TK0891	RDM19FD1731F03
A3C207	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C212	283–0594–00			CAP,FXD,MICA DI:0.001UF,1%,100V	TK0891	RDM15FA102F03
A3C215	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C222	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C225	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C230	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C235	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C240	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C245	290–0804–00			CAP,FXD,ELCTLT:10UF,+50–20%,25V	0H1N5	CEUSM1E100
A3C247	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C248	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C275	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C281	283–0648–00			CAP,FXD,MICA DI:10PF,+/–0.5PF,500V	TK0891	RDM15CD100D03
A3C290	283–0594–00			CAP,FXD,MICA DI:0.001UF,1%,100V	TK0891	RDM15FA102F03

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A3C291	283–0672–00			CAP,FXD,MICA DI:200PF,1%,500V	TK0891	RDM15FD201F03
A3C295	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C306	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C313	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C327	283–0198–00			CAP,FXD,CERAMIC:MLC;0.22UF,20%,50V,X7R,0.30	04222	SR305C224MAA
A3C330	283–0644–00			CAP,FXD,MICA DI:150PF,1%,500V	TK0891	RDM15FD151F03
A3C336	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C345	290–0804–00			CAP,FXD,ELCTLT:10UF,+50–20%,25V	0H1N5	CEUSM1E100
A3C347	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C348	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C370	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C375	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C376	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C388	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C390	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C411	283–0672–00			CAP,FXD,MICA DI:200PF,1%,500V	TK0891	RDM15FD201F03
A3C413	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C421	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C427	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C430	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C431	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C435	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C440	283–0623–00			CAP,FXD,MICA DI:1200PF,1%,100V	TK0891	RDM19FD122F03
A3C442	283–0630–00			CAP,FXD,MICA DI:110PF,1%,100V	TK0891	RDM15FD111F03
A3C450	290–0804–00			CAP,FXD,ELCTLT:10UF,+50–20%,25V	0H1N5	CEUSM1E100
A3C466	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C483	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C489	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C490	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C495	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C505	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C513	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C517	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C530	283–0707–00			CAP,FXD,MICA DI:385PF,1%,500V	TK0891	RDM15FD3850F03
A3C540	283–0730–00			CAP,FXD,MICA DI:274PF,1%,500V	TK0891	RDM15FD2740F03
A3C541	283–0629–00			CAP,FXD,MICA DI:62PF,1%,500V	TK0891	RDM10ED620F03
A3C542	283–0781–00			CAP,FXD,MICA DI:27PF,5%,500V	TK0891	RDM15ED270J03
A3C543	283–0640–00			CAP,FXD,MICA DI:160PF,1%,500V	TK0891	RDM15FD161F03
A3C550	290–0804–00			CAP,FXD,ELCTLT:10UF,+50–20%,25V	0H1N5	CEUSM1E100
A3C564	283–0692–00			CAP,FXD,MICA DI:670PF,1%,300V	TK0891	RDM15FC671F03
A3C606	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C611	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C615	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C617	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C622	283–0648–00	670–9906–01	670–9906–05	CAP,FXD,MICA DI:10PF,+/–0.5PF,500V	TK0891	RDM15CD100D03
A3C622	281–0893–00	670–9906–06		CAP,FXD,CERAMIC:MLC;4.7PF,+/–0.5PF,100V,0.100 X 0.170	04222	SA102A4R7DAA
A3C630	281–0153–00			CAP,VAR,AIR DI:1.7–10PF,150V	74970	187–0106–055
A3C633	281–0122–00			CAP,VAR,CER DI:2.5–9PF,100V	59660	518–000A2.5–9
A3C640	283–0622–00			CAP,FXD,MICA DI:450PF,1%,300V	TK0891	RDM15FD451F03
A3C641	283–0768–00			CAP,FXD,MICA DI:132 PF,1%,500V	TK0891	RDM15FD132OFO3
A3C642	283–0673–00			CAP,FXD,MICA DI:455PF,1%,500V	TK0891	RDM15FD4550F03
A3C643	283–0639–00			CAP,FXD,MICA DI:56PF,1%,500V	TK0891	RDM15ED560F03
A3C676	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C689	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C690	283–0692–00			CAP,FXD,MICA DI:670PF,1%,300V	TK0891	RDM15FC671F03
A3C705	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C710	283–0636–00			CAP,FXD,MICA DI:36PF,2%,500V,0.370 X 0.460;RADIAL	TK0891	RDM15ED360G03
A3C713	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB

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A3C720	283–0051–00			CAP,FXD,CER DI:0.0033UF,5%,100V	04222	SR211A332JAA
A3C722	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C723	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C724	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C749	283–0692–00			CAP,FXD,MICA DI:670PF,1%,300V	TK0891	RDM15FC671F03
A3C755	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C756	283–0692–00			CAP,FXD,MICA DI:670PF,1%,300V	TK0891	RDM15FC671F03
A3C793	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C805	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C806	283–0051–00			CAP,FXD,CER DI:0.0033UF,5%,100V	04222	SR211A332JAA
A3C821	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C823	283–0645–00			CAP,FXD,MICA DI:790PF,1%,300V	TK0891	RDM15FC791F03
A3C824	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C829	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C833	283–0175–00	670–9906–03		CAP,FXD,CER DI:10PF,5%,200V	18796	RPE110NPO100D20
A3C835	283–0648–00	670–9906–01	670–9906–05	CAP,FXD,MICA DI:10PF,+/–0.5PF,500V	TK0891	RDM15CD100D03
A3C835	281–0893–00	670–9906–06		CAP,FXD,CERAMIC:MLC;4.7PF,+/–0.5PF,100V,0.100 X 0.170	04222	SA102A4R7DAA
A3C838	281–0153–00			CAP,VAR,AIR DI:1.7–10PF,150V	74970	187–0106–055
A3C842	283–0648–00			CAP,FXD,MICA DI:10PF,+/–0.5PF,500V	TK0891	RDM15CD100D03
A3C853	283–0175–00	670–9906–03		CAP,FXD,CER DI:10PF,5%,200V	18796	RPE110NPO100D20
A3C855	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C863	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C877	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C888	283–0692–00			CAP,FXD,MICA DI:670PF,1%,300V	TK0891	RDM15FC671F03
A3C905	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C912	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C913	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C920	283–0223–00			CAP,FXD,CER DI:3PF,+/–5PF,50V	TK0679	TC501–NPO–309D
A3C923	290–0990–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=13 OHM (120HZ,25C), 8 X 11.5MM	55680	UET1H100MPH
A3C925	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C930	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C931	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C933	283–0648–00			CAP,FXD,MICA DI:10PF,+/–0.5PF,500V	TK0891	RDM15CD100D03
A3C942	281–0122–00	670–9906–01	670–9906–02	CAP,VAR,CER DI:2.5–9PF,100V	59660	518–000A2.5–9
A3C942	283–0260–00	670–9906–03		CAP,FXD,CER DI:5.6PF,+/–0.25PF,200V	04222	SR152A5R6CAA
A3C949	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C952	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3C953	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A3C960	283–0779–00			CAP,FXD,MICA DI:27 PF,2%,500V	TK0891	RDM15ED270G03
A3C987	283–0692–00			CAP,FXD,MICA DI:670PF,1%,300V	TK0891	RDM15FC671F03
A3C990	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A3J115	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3J375	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 4)	22526	48283–018
A3J420	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 34)	22526	48283–018
A3J440	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3J460	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3J511	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018

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A3J518	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3J660	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3J668	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3J678	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3J751	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 2)	22526	48283–018
A3J780	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3J807	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3J815	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3J940	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 34)	22526	48283–018
A3J965	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3J978	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A3L118	108–0655–00			COIL,RF:FIXED,63NH	0JR03	108–0655–00
A3L124	108–0655–00			COIL,RF:FIXED,63NH	0JR03	108–0655–00
A3L295	108–0146–00			INDUCTOR,FXD:SIGNAL;5.4UH,10%,ON FORM 307–0005–01	0JR03	108–0146–00
A3L327	108–1212–00			INDUCTOR,FXD:SIGNAL;9UH,2%,IDC<300 MA,RDC<1.6 OHM,Q>60 (4MHZ),SRF>50 MHZ	0JR03	108–1212–00
A3L450	120–1768–00			TRANSFORMER,RF:VARIABLE,POT CORE,1.95UH–2.2 0UH	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 MIN190 @ 2.6	54937	114–0366–00
A3L750	114–0344–00			COIL,RF:VARIABLE,1.8–2.13UHPOT CORE	54937	500–3883
A3P115	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A3P140	131–3693–00			CONN,DIN:PCB;FEMALE,RTANG,3 X 32,0.1 CTR,0 .504 MLG X 0.104 TAIL,W/BD RETENTION	00779	650895–4
				MOUNTING PARTS		
	210–0001–00			WASHER,LOCK:#2 INTL,0.013 THK,STL (QUANTITY 2)	78189	1202–00–00–0541
	210–0405–00	670–9906–01	670–9906–05	NUT,PLAIN,HEX:2–56 X 0.188,BRS CD PL (QUANTITY 2)	73743	12157–50
	211–0185–00	670–9906–01	670–9906–05	SCREW,MACHINE:2–56 X 0.438,PNH,STL (QUANTITY 2)	0KB01	ORDER BY DESC
				END MOUNTING PARTS		
A3P375	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A3P440	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A3P460	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A3P511	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A3P518	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A3P660	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A3P668	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3P678	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A3P780	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A3P807	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A3P815	131–0993–02			BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A3P965	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A3P978	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A3Q222	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q284	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q290	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q309	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q380	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q388	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q463	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q468	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q470	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q475	151–0216–00			TRANSISTOR,SIG:BIPOLAR,PNP;25V,100MA,170MHZ,AMPL	04713	MPS6523
A3Q490	151–0103–02			TRANSISTOR,SIG:BIPOLAR,NPN	04713	2N2219A
A3Q567	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q585	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q589	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q660	151–0192–00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA,200MHZ,AMPL	04713	SPS8801
A3Q667	151–0192–00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA,200MHZ,AMPL	04713	SPS8801
A3Q672	151–0192–00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA,200MHZ,AMPL	04713	SPS8801
A3Q683	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q686	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q693	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q735	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q740	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q745	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q748	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q760	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q767	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q785	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q786	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q790	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q793	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q817	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q830	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q831	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q833	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q834	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q840	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q844	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q848	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q849	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q850	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q852	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q861	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q863	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q867	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q872	151–0192–00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA,200MHZ,AMPL	04713	SPS8801
A3Q878	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q880	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q893	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q920	151–0367–00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,30MA,1.0GHZ	04713	SPS8811
A3Q921	151–0367–00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,30MA,1.0GHZ	04713	SPS8811
A3Q923	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q924	151–0367–00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,30MA,1.0GHZ	04713	SPS8811

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A3Q942	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q949	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q950	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q960	151–0192–00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA,200MHZ,AMPL	04713	SPS8801
A3Q965	151–0192–00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA,200MHZ,AMPL	04713	SPS8801
A3Q972	151–0192–00			TRANSISTOR,SIG:BIPOLAR,NPN;25V,100MA,200MHZ,AMPL	04713	SPS8801
A3Q978	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3Q983	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A3Q988	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A3R110	322–3385–00			RES,FXD:METAL FILM;100K OHM,1%,0.2W,TC=100PPM	91637	CCF501G10002F
A3R145	315–0202–00	670–9906–01	670–9906–05	RES,FXD,FILM:2K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R145	322–3222–00	670–9906–06		RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R160	315–0271–00	670–9906–01	670–9906–05	RES,FXD,FILM:270 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R160	322–3138–00	670–9906–06		RES,FXD,FILM:267 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G267R0F
A3R161	315–0511–00	670–9906–01	670–9906–05	RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R161	322–3165–00	670–9906–06		RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G511R0F
A3R162	315–0271–00	670–9906–01	670–9906–05	RES,FXD,FILM:270 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R162	322–3138–00	670–9906–06		RES,FXD,FILM:267 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G267R0F
A3R163	315–0511–00	670–9906–01	670–9906–05	RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R163	322–3165–00	670–9906–06		RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G511R0F
A3R175	315–0511–00	670–9906–01	670–9906–05	RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R175	322–3165–00	670–9906–06		RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G511R0F
A3R188	315–0511–00	670–9906–01	670–9906–05	RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R188	322–3165–00	670–9906–06		RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G511R0F
A3R210	321–0926–07			RES,FXD,FILM:4K OHM,0.1%,0.125W,TC=T9MI	TK1727	MPR24–2322–141–
A3R211	321–0793–07			RES,FXD,FILM:37.5 OHM 0.1%,0.125W TC=T9 MI	07716	CEA 37.5 OHM 0.
A3R212	315–0107–00			RES,FXD,FILM:100M OHM,5%,0.25W	50139	CB1075
A3R213	315–0103–00	670–9906–01	670–9906–05	RES,FXD,FILM:10K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R213	322–3289–00	670–9906–06		RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R226	315–0103–00	670–9906–01	670–9906–05	RES,FXD,FILM:10K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R226	322–3289–00	670–9906–06		RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R227	315–0103–00	670–9906–01	670–9906–05	RES,FXD,FILM:10K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R227	322–3289–00	670–9906–06		RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R228	315–0154–00	670–9906–01	670–9906–05	RES,FXD,FILM:150K OHM,5%,0.25W,,MI	TK1727	SFR25 2322–181–
A3R228	322–3402–00	670–9906–06		RES,FXD:METAL FILM;150K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G15002F
A3R240	322–3222–07			RES,FXD,FILM:2K OHM,0.1%,0.2W TC=T9,SMALL BODY	91637	CCF501C20000B
A3R241	321–0830–03			RES,FXD,FILM:2.41K OHM,0.25%,0.125W,TC=T2	19701	5033RC2K410C
A3R242	322–3392–00			RES,FXD,FILM:118K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G11802F
A3R243	322–3086–00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50–2G76R80F
A3R244	322–3086–00			RES,FXD,FILM:76.8 OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50–2G76R80F
A3R245	322–3085–00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G75R00F
A3R246	315–0820–00	670–9906–01	670–9906–05	RES,FXD,FILM:82 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R246	322–3089–00	670–9906–06		RES,FXD:METAL FILM;82.5 OHM,1%.0.2W,TC=100PPM	57668	CRB20 FXE 82E5
A3R255	307–0540–00			RES NTWK,FXD,FI:(5)1K OHM,2%,0.7W	11236	770–61–R1K OR 7
A3R260	315–0271–00	670–9906–01	670–9906–05	RES,FXD,FILM:270 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R260	322–3138–00	670–9906–06		RES,FXD,FILM:267 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G267R0F
A3R261	315–0511–00	670–9906–01	670–9906–05	RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R261	322–3165–00	670–9906–06		RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G511R0F
A3R262	315–0511–00	670–9906–01	670–9906–05	RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R262	322–3165–00	670–9906–06		RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G511R0F
A3R263	315–0271–00	670–9906–01	670–9906–05	RES,FXD,FILM:270 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R263	322–3138–00	670–9906–06		RES,FXD,FILM:267 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G267R0F
A3R276	322–3234–00			RES,FXD,FILM:2.67K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2F26700F
A3R288	311–0643–00	670–9906–01	670–9906–05	RES,VAR,NONWW:TRMR,50 OHM,0.5W	32997	3329H–L58–500
A3R288	311–2226–00	670–9906–06		RES,VAR,TRMR:CERMET;50 OHM,20%,0.5W,0.197 SQ, TOP ADJUST	TK2073	GF06UT2 500 M L
A3R289	322–3254–00			RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G4321FT
A3R290	322–3254–00			RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G4321FT

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A3R291	322–3231–00			RES,FXD,FILM:2.49K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–1G24900F
A3R292	322–3193–07			RES,FXD,FILM:1K OHM,0.1%,0.2W,TC=T9	91637	CCF501C10000B
A3R311	315–0302–00	670–9906–01	670–9906–05	RES,FXD,FILM:3K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R311	322–3239–00	670–9906–06		RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G30100F
A3R312	315–0202–00	670–9906–01	670–9906–05	RES,FXD,FILM:2K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R312	322–3222–00	670–9906–06		RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R313	315–0203–00	670–9906–01	670–9906–05	RES,FXD,FILM:20K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R313	322–3318–00	670–9906–06		RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A3R322	311–1035–00	670–9906–01	670–9906–01	RES,VAR,NONWW:TRMR,50K OHM,0.5W	73138	82PR50K–40C
A3R327	315–0511–00	670–9906–01	670–9906–05	RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R327	322–3165–00	670–9906–06		RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G511R0F
A3R328	315–0104–00	670–9906–01	670–9906–01	RES,FXD,FILM:100K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R328	315–0124–00	670–9906–02	670–9906–05	RES,FXD,FILM:120K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R328	322–3393–00	670–9906–06		RES,FXD:METAL FILM;121K OHM,1%,0.2W,TC=100PPM	91637	CCF501G12102F
A3R340	315–0202–00	670–9906–01	670–9906–05	RES,FXD,FILM:2K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R340	322–3222–00	670–9906–06		RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R341	321–0793–07			RES,FXD,FILM:37.5 OHM 0.1%,0.125W TC=T9 MI	07716	CEA 37.5 OHM 0.
A3R342	321–0830–03			RES,FXD,FILM:2.41K OHM,0.25%,0.125W,TC=T2	19701	5033RC2K410C
A3R343	321–0793–07			RES,FXD,FILM:37.5 OHM 0.1%,0.125W TC=T9 MI	07716	CEA 37.5 OHM 0.
A3R344	322–3001–00			RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A3R350	322–3222–07			RES,FXD,FILM:2K OHM,0.1%,0.2W TC=T9,SMALL BODY	91637	CCF501C20000B
A3R355	307–0540–00			RES NTWK,FXD,FI:(5)1K OHM,2%,0.7W	11236	770–61–R1K OR 7
A3R362	315–0511–00	670–9906–01	670–9906–05	RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R362	322–3165–00	670–9906–06		RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G511R0F
A3R363	315–0511–00	670–9906–01	670–9906–05	RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R363	322–3165–00	670–9906–06		RES,FXD,FILM:511 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G511R0F
A3R375	322–3204–00			RES,FXD,FILM:1.3K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G13000F
A3R376	322–3185–00			RES,FXD:METAL FILM;825 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G825ROF
A3R377	322–3147–00			RES,FXD:METAL FILM;332 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G332R0F
A3R380	315–0472–00	670–9906–01	670–9906–05	RES,FXD,FILM:4.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R380	322–3258–00	670–9906–06		RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R387	308–0076–00			RES,FXD,WW:300 OHM,5%,3W	TK2096	KM300 300 OHM 5
A3R390	315–0150–00	670–9906–01	670–9906–05	RES,FXD,FILM:15 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R390	322–3018–00	670–9906–06		RES,FXD:METAL FILM;15 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE15E0
A3R392	322–3183–00			RES,FXD,FILM:787 OHM,1%,0.2W,TC–T0MI,SMALL BODY	91637	CCF501G787ROF
A3R393	321–0247–00	670–9906–01	670–9906–03	RES,FXD,FILM:3.65K OHM,1%,0.125W,TC=T0MI	TK1727	MR25–2322–151–3
A3R393	322–3248–00	670–9906–04	670–9906–04	RES,FXD,FILM:3.74K OHM,1%,0.2W,TC=T0TAPED &	91637	CCF50G37400F
A3R393	322–3242–00	670–9906–05		RES,FXD,FILM:3.24K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G32400F
A3R394	311–0634–00	670–9906–01	670–9906–04	RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3329H–L58–501
A3R394	311–0635–00	670–9906–05	670–9906–05	RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3329H–L58–102
A3R394	311–2231–00	670–9906–06		RES,VAR,TRMR:CERMET;1K OHM,20%,0.5W,0.197 SQ, TOP ADJUST	TK2073	GF06UT2 102 M L
A3R413	315–0163–00	670–9906–01	670–9906–05	RES,FXD,FILM:16K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R413	322–3308–00	670–9906–06		RES,FXD,FILM:15.8K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G15801F
A3R414	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R414	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R427	315–0270–00	670–9906–01	670–9906–05	RES,FXD,FILM:27 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R427	322–3044–00	670–9906–06		RES,FXD:METAL FILM;28 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE28E0
A3R428	315–0513–00	670–9906–01	670–9906–05	RES,FXD,FILM:51K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R428	322–3357–00	670–9906–06		RES,FXD,FILM:51.1K OHM,1%,0.2W,TC=T0	91637	CCF501G51101F
A3R456	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R456	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R457	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R457	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R460	323–0099–00			RES,FXD,FILM:105 OHM,1%,0.5W,TC=T0	91637	CMF65116G105R0F
A3R463	322–3073–00			RES,FXD:METAL FILM;56.2 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G56R20F
A3R464	321–0025–00	670–9906–01	670–9906–05	RES,FXD,FILM:17.8 OHM,1%,0.125W,TC=T0MI	TK1727	MR25 2322–151–9
A3R464	322–3025–00	670–9906–06		RES,FXD:METAL FILM;17.8 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE17E8

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3R465	321–0113–00	670–9906–01	670–9906–05	RES,FXD,FILM:147 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322–151–1
A3R465	322–3113–00	670–9906–06		RES,FXD,FILM:147 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB20 FXE 147E
A3R466	322–3171–00			RES,FXD,FILM:590 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G590R0F
A3R474	321–0103–00	670–9906–01	670–9906–05	RES,FXD,FILM:115 OHM,1%,0.125W,TC=T0	19701	5043ED115R0F
A3R474	322–3102–00	670–9906–06		RES,FXD,FILM:113 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2F113R0F
A3R475	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R475	322–3222–00	670–9906–06		RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R476	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1500F
A3R480	322–0180–00			RES,FXD,FILM:732 OHM,1%,0.25W,TC=T0	91637	CMF6042G732R0F
A3R490	315–0150–00	670–9906–01	670–9906–05	RES,FXD,FILM:15 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R490	322–3018–00	670–9906–06		RES,FXD:METAL FILM;15 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE15E0
A3R513	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R513	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R530	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R530	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R531	315–0362–00	670–9906–01	670–9906–05	RES,FXD,FILM:3.6K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R531	322–3246–00	670–9906–06		RES,FXD,FILM:3.57K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G35700F
A3R532	321–0247–00	670–9906–01	670–9906–05	RES,FXD,FILM:3.65K OHM,1%,0.125W,TC=T0MI	TK1727	MR25–2322–151–3
A3R532	322–3247–00	670–9906–06		RES,FXD,FILM:3.65K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G3651FT
A3R533	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A3R534	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R534	322–3222–00	670–9906–06		RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R560	323–0049–00			RES,FXD,FILM:31.6 OHM,1%,0.5W,TC=T0	91637	CMF65116G31R60F
A3R563	323–0085–00			RES,FXD,FILM:75.0 OHM,1%,0.5W,TC=T0	91637	CMF65116G75R00F
A3R564	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R564	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R570	323–0085–00			RES,FXD,FILM:75.0 OHM,1%,0.5W,TC=T0	91637	CMF65116G75R00F
A3R573	321–0180–00			RES,FXD,FILM:732 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322–151–7
A3R575	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R575	322–3222–00	670–9906–06		RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R581	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1500F
A3R582	322–3073–00			RES,FXD:METAL FILM;56.2 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G56R20F
A3R584	321–0103–00	670–9906–01	670–9906–05	RES,FXD,FILM:115 OHM,1%,0.125W,TC=T0	19701	5043ED115R0F
A3R584	322–3102–00	670–9906–06		RES,FXD,FILM:113 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2F113R0F
A3R588	321–0025–00	670–9906–01	670–9906–05	RES,FXD,FILM:17.8 OHM,1%,0.125W,TC=T0MI	TK1727	MR25 2322–151–9
A3R588	322–3025–00	670–9906–06		RES,FXD:METAL FILM;17.8 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE17E8
A3R589	321–0113–00	670–9906–01	670–9906–05	RES,FXD,FILM:147 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322–151–1
A3R589	322–3113–00	670–9906–06		RES,FXD,FILM:147 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB20 FXE 147E
A3R610	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R610	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R611	315–0270–00	670–9906–01	670–9906–05	RES,FXD,FILM:27 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R611	322–3044–00	670–9906–06		RES,FXD:METAL FILM;28 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE28E0
A3R612	315–0471–00	670–9906–01	670–9906–05	RES,FXD,FILM:470 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R612	322–3162–00	670–9906–06		RES,FXD:METAL FILM;475 OHM,1%,0.2W,TC=100 PPM	91637	CCF50G475R0F
A3R613	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R618	322–3126–00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A3R619	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R625	311–0634–00	670–9906–01	670–9906–05	RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3329H–L58–501
A3R625	311–2230–00	670–9906–06		RES,VAR,TRMR:CERMET;500 OHM,20%,0.5W,0.197 SQ,TOP ADJUST	TK2073	GF06UT2 501 M L
A3R630	322–3175–00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A3R631	322–3164–00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A3R632	322–3178–00			RES,FXD,FILM:698 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2G698ROF
A3R633	322–3210–00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A3R667	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	91637	CMF6042G56R20F
A3R669	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	91637	CMF6042G56R20F
A3R674	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1500F
A3R675	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3R675	322–3222–00	670–9906–06		RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R678	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	91637	CMF6042G56R20F
A3R679	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	91637	CMF6042G56R20F
A3R689	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R689	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R690	322–3171–00			RES,FXD,FILM:590 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G590R0F
A3R709	315–0472–00	670–9906–01	670–9906–05	RES,FXD,FILM:4.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R709	322–3258–00	670–9906–06		RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A3R710	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R711	321–0343–00	670–9906–01	670–9906–05	RES,FXD,FILM:36.5K OHM,1%,0.125W,TC=T0MI	19701	5043ED36K50F
A3R711	322–3343–00	670–9906–06		RES,FXD,FILM:36.5K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G36501FT
A3R712	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R713	322–3250–00			RES,FXD:METAL FILM;3.92K OHM,1%,0.2W,TC=100	91637	CCF50–2F39200F
A3R719	322–3126–00			RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A3R720	322–3184–00			RES,FXD,FILM:806 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF501G806FOR
A3R721	321–0926–07			RES,FXD,FILM:4K OHM,0.1%,0.125W,TC=T9MI	TK1727	MPR24–2322–141–
A3R722	322–3193–07			RES,FXD,FILM:1K OHM,0.1%,0.2W,TC=T9	91637	CCF501C10000B
A3R724	315–0823–00	670–9906–02	670–9906–03	RES,FXD,FILM:82K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R724	315–0563–00	670–9906–04		RES,FXD,FILM:56K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R724	322–3361–00	670–9906–06		RES,FXD:METAL FILM;56.2K OHM,1%,0.2W,TC=100	91637	CCF50–2F56201F
A3R725	315–0563–00	670–9906–02	670–9906–03	RES,FXD,FILM:56K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R725	315–0473–00	670–9906–04	670–9906–05	RES,FXD,FILM:47K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R725	322–3354–00	670–9906–06		RES,FXD:METAL FILM;47.5K OHM,1%,0.2W,TC=100	91637	CCF501G47501F
A3R726	311–1035–00	670–9906–02	670–9906–03	RES,VAR,NONWW:TRMR,50K OHM,0.5W	73138	82PR50K–40C
A3R726	311–0613–00	670–9906–04	670–9906–05	RES,VAR,NONWW:TRMR,100K OHM,0.5W	32997	3329H–G48–104
A3R726	311–2239–00	670–9906–06		RES,VAR,TRMR:CERMET;100K OHM,20%,0.5W,0.197	TK2073	GF06UT2 104 M L
A3R736	322–3156–00			RES,FXD,FILM:412 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G412ROF
A3R737	322–3161–00			RES,FXD,FILM:464 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2G464R0F
A3R738	322–3176–00			RES,FXD,FILM:665 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G6650FT
A3R739	315–0101–00	670–9906–02	670–9906–05	RES,FXD,FILM:100 OHM,5%,0.25W,,MI	TK1727	SFR25 2322–181–
A3R739	322–3097–00	670–9906–06		RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R740	322–3232–00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G25500F
A3R741	322–3198–00			RES,FXD,FILM:1.13K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G11300F
A3R751	322–3085–00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G75R00F
A3R756	322–0180–00			RES,FXD,FILM:732 OHM,1%,0.25W,TC=T0	91637	CMF6042G732R0F
A3R762	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1500F
A3R763	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R763	322–3222–00	670–9906–06		RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R764	322–3073–00			RES,FXD:METAL FILM;56.2 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G56R20F
A3R765	321–0103–00	670–9906–01	670–9906–05	RES,FXD,FILM:115 OHM,1%,0.125W,TC=T0	19701	5043ED115R0F
A3R765	322–3102–00	670–9906–06		RES,FXD,FILM:113 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2F113R0F
A3R766	321–0025–00	670–9906–01	670–9906–05	RES,FXD,FILM:17.8 OHM,1%,0.125W,TC=T0MI	TK1727	MR25 2322–151–9
A3R766	322–3025–00	670–9906–06		RES,FXD:METAL FILM;17.8 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE17E8
A3R770	323–0085–00			RES,FXD,FILM:75.0 OHM,1%,0.5W,TC=T0	91637	CMF65116G75R00F
A3R775	322–3073–00			RES,FXD:METAL FILM;56.2 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G56R20F
A3R778	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	91637	CMF6042G56R20F
A3R780	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	91637	CMF6042G56R20F
A3R790	321–0103–00	670–9906–01	670–9906–05	RES,FXD,FILM:115 OHM,1%,0.125W,TC=T0	19701	5043ED115R0F
A3R790	322–3102–00	670–9906–06		RES,FXD,FILM:113 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2F113R0F
A3R791	321–0025–00	670–9906–01	670–9906–05	RES,FXD,FILM:17.8 OHM,1%,0.125W,TC=T0MI	TK1727	MR25 2322–151–9
A3R791	322–3025–00	670–9906–06		RES,FXD:METAL FILM;17.8 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE17E8
A3R792	321–0113–00	670–9906–01	670–9906–05	RES,FXD,FILM:147 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322–151–1
A3R792	322–3113–00	670–9906–06		RES,FXD,FILM:147 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB20 FXE 147E
A3R793	322–3171–00			RES,FXD,FILM:590 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G590R0F
A3R812	322–3289–00			RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A3R813	321–0332–00			RES,FXD,FILM:28.0K OHM,1%,0.125W,TC=T0MI	19701	5043ED28K00F
A3R814	321–0372–00			RES,FXD,FILM:73.2K OHM,1%,0.125W,TC=T0MI	19701	5043ED73K20F
A3R815	322–3241–00			RES,FXD,FILM:3.16K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G3161FT

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3R820	315–0270–00	670–9906–01	670–9906–05	RES,FXD,FILM:27 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R820	322–3044–00	670–9906–06		RES,FXD:METAL FILM;28 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE28E0
A3R821	315–0330–00	670–9906–01	670–9906–05	RES,FXD,FILM:33 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R821	322–3051–00	670–9906–06		RES,FXD:METAL FILM;33.2 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE33E2
A3R822	315–0752–00	670–9906–01	670–9906–05	RES,FXD,FILM:7.5K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R822	322–3277–00	670–9906–06		RES,FXD,FILM:7.5K OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF501G75000F
A3R823	322–3334–00			RES,FXD,FILM:29.4K OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB20 FXE 29K4
A3R824	322–3254–00			RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G4321FT
A3R830	321–0059–00	670–9906–01	670–9906–05	RES,FXD,FILM:40.2 OHM,0.5%,0.125W,TC=T0 MI	TK1727	MR25 2322–151–9
A3R830	322–3058–00	670–9906–06		RES,FXD:METAL FILM;39.2 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–1G39R20F
A3R831	322–3030–00			RES,FXD:METAL FILM;20 OHM,1%,0.2W,TC=100 PPM	91637	CCF50G20R00F
A3R832	311–0644–00	670–9906–01	670–9906–05	RES,VAR,NONWW:TRMR,20K OHM,0.5W	32997	3329H–L58–203
A3R832	311–2236–00	670–9906–06		RES,VAR,TRMR:CERMET;20K OHM,20%,0.5W,0.197 SQ,SIDE ADJUST	TK2073	GF06UT2 203 M L
A3R840	322–3156–00			RES,FXD,FILM:412 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G412ROF
A3R841	322–3156–00			RES,FXD,FILM:412 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G412ROF
A3R842	322–3176–00			RES,FXD,FILM:665 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G6650FT
A3R843	322–3232–00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G25500F
A3R844	315–0150–00	670–9906–01	670–9906–05	RES,FXD,FILM:15 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R844	322–3018–00	670–9906–06		RES,FXD:METAL FILM;15 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE15E0
A3R849	322–3227–00			RES,FXD,FILM:2.26K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G2261FT
A3R850	322–3227–00			RES,FXD,FILM:2.26K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G2261FT
A3R851	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R851	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R862	321–0113–00	670–9906–01	670–9906–05	RES,FXD,FILM:147 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322–151–1
A3R862	322–3113–00	670–9906–06		RES,FXD,FILM:147 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB20 FXE 147E
A3R863	322–3171–00			RES,FXD,FILM:590 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G590R0F
A3R864	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R864	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R865	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	91637	CMF6042G56R20F
A3R867	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	91637	CMF6042G56R20F
A3R874	322–3114–00			RES,FXD:METAL FILM;150 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1500F
A3R875	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R875	322–3222–00	670–9906–06		RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R876	322–3073–00			RES,FXD:METAL FILM;56.2 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G56R20F
A3R887	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R887	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R888	321–0103–00	670–9906–01	670–9906–05	RES,FXD,FILM:115 OHM,1%,0.125W,TC=T0	19701	5043ED115R0F
A3R888	322–3102–00	670–9906–06		RES,FXD,FILM:113 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2F113R0F
A3R890	321–0025–00	670–9906–01	670–9906–05	RES,FXD,FILM:17.8 OHM,1%,0.125W,TC=T0MI	TK1727	MR25 2322–151–9
A3R890	322–3025–00	670–9906–06		RES,FXD:METAL FILM;17.8 OHM,1%,0.2W,TC=100 PPM	57668	CRB20FXE17E8
A3R910	315–0101–00	670–9906–01	670–9906–05	RES,FXD,FILM:100 OHM,5%,0.25W,,MI	TK1727	SFR25 2322–181–
A3R910	322–3097–00	670–9906–06		RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R911	315–0201–00	670–9906–01	670–9906–05	RES,FXD,FILM:200 OHM,5%,0.25W,,MI	TK1727	SFR25 2322–181–
A3R911	322–3126–00	670–9906–06		RES,FXD,FILM:200 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G200ROF
A3R912	315–0100–00	670–9906–01	670–9906–05	RES,FXD,FILM:10 OHM,5%,0.25W,	TK1727	SFR25 2322–182–
A3R912	322–3001–00	670–9906–06		RES,FXD:METAL FILM;10 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10R00F
A3R913	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R913	322–3222–00	670–9906–06		RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R914	315–0101–00	670–9906–01	670–9906–05	RES,FXD,FILM:100 OHM,5%,0.25W,,MI	TK1727	SFR25 2322–181–
A3R914	322–3097–00	670–9906–06		RES,FXD:METAL FILM;100 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G100R0F
A3R915	322–3301–00			RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G13301F
A3R916	321–0447–00	670–9906–01	670–9906–05	RES,FXD,FILM:442K OHM,1%,0.125W,TC=T0MI	19701	5043ED442K0F
A3R916	322–3447–00	670–9906–06		RES,FXD,FILM:442K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CC501G44202F
A3R917	322–3306–00			RES,FXD:METAL FILM;15K OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1502F
A3R918	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R918	322–3222–00	670–9906–06		RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A3R919	322–3306–00			RES,FXD:METAL FILM;15K OHM,1%,0.2W,TC=100 PPM	91637	CCF50–2–G1502F

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A3R923	322–3207–00			RES,FXD,FILM:1.4K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF501G14000F
A3R924	321–0286–00			RES,FXD,FILM:9.31K OHM,1%,0.125W,TC=T0MI	19701	5043ED9K310F
A3R931	322–3327–00			RES,FXD,FILM:24.9K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G24901F
A3R932	322–3210–00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A3R933	322–3085–00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G75R00F
A3R934	322–3085–00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G75R00F
A3R940	322–3164–00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A3R941	322–3178–00			RES,FXD,FILM:698 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2G698ROF
A3R942	322–3085–00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G75R00F
A3R949	321–0059–00	670–9906–01	670–9906–05	RES,FXD,FILM:40.2 OHM,0.5%,0.125W,TC=T0 MI	TK1727	MR25 2322–151–9
A3R949	322–3058–00	670–9906–06		RES,FXD:METAL FILM;39.2 OHM,1%,0.2W,TC=100 PPM	91637	CCF50–1G39R20F
A3R950	322–3030–00			RES,FXD:METAL FILM;20 OHM,1%,0.2W,TC=100 PPM	91637	CCF50G20R00F
A3R951	322–3210–00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A3R952	311–0634–00	670–9906–01	670–9906–05	RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3329H–L58–501
A3R952	311–2230–00	670–9906–06		RES,VAR,TRMR:CERMET;500 OHM,20%,0.5W,0.197 SQ,TOP ADJUST	TK2073	GF06UT2 501 M L
A3R960	322–0180–00			RES,FXD,FILM:732 OHM,1%,0.25W,TC=T0	91637	CMF6042G732R0F
A3R962	322–3085–00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G75R00F
A3R963	323–0085–00			RES,FXD,FILM:75.0 OHM,1%,0.5W,TC=T0	91637	CMF65116G75R00F
A3R970	323–0085–00			RES,FXD,FILM:75.0 OHM,1%,0.5W,TC=T0	91637	CMF65116G75R00F
A3R975	322–0180–00			RES,FXD,FILM:732 OHM,1%,0.25W,TC=T0	91637	CMF6042G732R0F
A3R978	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	91637	CMF6042G56R20F
A3R980	322–0073–00			RES,FXD,FILM:56.2 OHM,1%,0.25W,TC=T0	91637	CMF6042G56R20F
A3R984	315–0102–00	670–9906–01	670–9906–05	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A3R984	322–3193–00	670–9906–06		RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A3R990	321–0113–00	670–9906–01	670–9906–05	RES,FXD,FILM:147 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322–151–1
A3R990	322–3113–00	670–9906–06		RES,FXD,FILM:147 OHM,1%,0.2W,TC=T0MI,SMALL BODY	57668	CRB20 FXE 147E
A3R991	322–3171–00			RES,FXD,FILM:590 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G590R0F
A3U127	156–1173–00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIVE, 2.5V,1.0%,40PPM,SERIES	04713	MC1403U
A3U211	156–1149–00			IC,LINEAR:BIFET,OP–AMP;	27014	LF351N
A3U227	156–0356–01			IC,LINEAR:OPNL AMPL,CHECKED	34371	CA3080TX
A3U250	155–0282–00			MICROCKT,DGTL:DIGITAL TO ANALOG CONVERTER M219B	TK2598	155028200
				MOUNTING PARTS		
	136–0752–00			SKT,PL–IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P–108
				END MOUNTING PARTS		
A3U263	156–0860–02			IC,DIGITAL:ECL,RECEIVER	04713	MC10116P
A3U275	156–2984–00			IC,CONVERTER:BIPOLAR,D/A;10 BIT,30MHZ,CURRENT OUTPUT,ECL INPUTS	TK2540	CX20051A
				MOUNTING PARTS		
	136–0755–00			SOCKET,DIP:PCB;FEMALE,STR,2 X 14,28 POS,0.1 X 0.6 CTR,0.175 H X0.130 TAIL,BECU,TIN,ACCOM 0.008–0.0015 X 0.014–0.022	09922	DILB28P–108
				END MOUNTING PARTS		
A3U313	156–0356–01			IC,LINEAR:OPNL AMPL,CHECKED	34371	CA3080TX
A3U350	155–0282–00			MICROCKT,DGTL:DIGITAL TO ANALOG CONVERTER M219B	TK2598	155028200
				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 RETRIGMO-NOSTABLE	27014	DM96LS02N
A3U427	156–0067–13	670–9906–01	670–9906–05	IC,LINEAR:BIPOLAR,OP–AMP;UA741CJG,DIP08.3	01295	UA741CJG4
A3U427	156–0067–00	670–9906–05		IC,LINEAR:BIPOLAR,OP–AMP	01295	UA741CP
A3U511	156–1324–00			IC,LINEAR:BIPOLAR,COMPARATOR;TTL,20NS,COMPLE-MENTARY OUTPUT,W/STROBES	27014	LM361N
A3U710	156–1272–00			IC,LINEAR:BIPOLAR,OP–AMP;DUAL,HIGH OUTPUT DRIVE,LOW NOISE	01295	NE5532P

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A3U720	156–0158–07			IC,LINEAR:BIPOLAR,OP–AMP	01295	MC1458P
A3U730	156–0534–01			IC,LINEAR:DUAL DIFF AMPL,BURN–INCA3102,MI	34371	93910
A3W326	131–0566–00	670–9906–01	670–9906–05	BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225L	24546	OMA0207
A3W345	131–0566–00	670–9906–01	670–9906–05	BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225L	24546	OMA0207
A3W730	131–0566–00	670–9906–01	670–9906–05	BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225L	24546	OMA0207
A3W739	131–0566–00	670–9906–01	670–9906–01	BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225L	24546	OMA0207
A3W750	131–0566–00	670–9906–01	670–9906–05	BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225L	24546	OMA0207
A3CR226	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR250	152–0322–00			DIODE,SIG:SCHTKY;15V,410MVF AT 1MA,1.2PF	50434	5082–2672–T25
A3CR313	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR350	152–0322–00			DIODE,SIG:SCHTKY;15V,410MVF AT 1MA,1.2PF	50434	5082–2672–T25
A3CR465	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR466	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR564	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR575	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR689	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR709	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR710	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR741	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR762	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR763	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR775	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR830	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR831	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR841	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR850	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR851	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR876	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3CR887	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A3TP105	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A3TP115	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A3TP118	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A3TP188	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A3TP495	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A3TP504	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A3TP804	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A3TP997	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A3VR823	152–0688–00			DIODE,ZENER:2.4V,5%,0.4W	04713	1N4370A
A4	670–9113–04	B010100	B010114	CIRCUIT BD ASSY:PWR SPLY	80009	670911304
A4	670–9113–05	B010115	B010169	CIRCUIT BD ASSY:PWR SPLY	80009	670911305
A4	670–9113–06	B010170	B020220	CIRCUIT BD ASSY:PWR SPLY	80009	670911306
A4	671–0572–00	B020221	B020617	CIRCUIT BD ASSY:PWR SPLY	80009	671057200
A4	671–0572–01	B020618	B021117	CIRCUIT BD ASSY:PWR SPLY	80009	671057201
A4	671–0572–02	B021118	B021326	CIRCUIT BD ASSY:PWR SPLY	80009	671057202
A4	671–0572–03	B021327	B021831	CIRCUIT BD ASSY:PWR SPLY	80009	671057203
A4	671–0572–04	B021832	B021937	CIRCUIT BD ASSY:PWR SPLY	80009	671057204
A4	671–0572–05	B021938	B021988	CIRCUIT BD ASSY:PWR SPLY	80009	671057205
A4	671–0572–06	B021989		CIRCUIT BD ASSY:PWR SPLY	80009	671057206
				ATTACHED PARTS		
	131–0157–00	670–9113–04	670–9113–06	TERMINAL,PIN:0.25 L X 0.04 OD,BRS,SLDR PL	05276	013–100–1000–47

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
	200–2269–01	670–9113–04	670–9113–06	COVER,XSTR:7612D,	0JR05	ORDER BY DESC
	210–0273–00	670–9113–04	670–9113–06	TERMINAL,LUG:0.196 ID,PLAIN,BRS TINNED	79963	ORDER BY DESC
	211–0513–00	670–9113–04	670–9113–06	SCREW,MACHINE:6–32 X 0.625,PNH,STL (QUANTITY 2)	TK0435	ORDER BY DESC
	342–0449–01	670–9113–04	670–9113–06	INSULATOR,PLATE:TRANSISTOR,ALUMINA,	TK2601	342044901
	342–0458–00	670–9113–04	670–9113–06	INSULATOR,PLATE:TRANSISTOR,MICA,	08530	1339X1–2MC
	211–0661–00	670–9113–04	670–9113–06	SCR,ASSEM WSHR:4–40 X 0.25,PNH,STL,CD PL,POZ,MACH (QUANTITY 2)	TK0435	ORDER BY DESC
	214–3797–00	670–9113–04	670–9113–06	HEAT SINK:ALUMINUM, *END ATTACHED PARTS*	TK2027	ORDER BY DESC
A4C130	283–0421–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A4C133	283–0212–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:2UF,20%,50V	04222	SR405E205MAA
A4C142	290–1069–00	671–0572–00	671–0572–03	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C142	290–1301–00	671–0572–04		CAP,FXD,ALUM:2700UF,20%,10V,12.5 X 30MM(0.492 X 1.180)	0H1N5	CEEFM1A272M7
A4C155	290–1069–00	670–9113–00	670–9113–06	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C156	290–0798–00	670–9113–00	670–9113–06	CAP,FXD,ELCTLT:180UF,+100–10%,40V	62643	672D708A
A4C160	283–0059–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:1UF,+80–20%,50V	04222	SR305C105MAA
A4C161	290–0804–00	671–0572–00	671–0572–03	CAP,FXD,ELCTLT:10UF,+50–20%,25V	0H1N5	CEUSM1E100
A4C161	290–0943–00	671–0572–04		CAP,FXD,ALUM:47UF,+50–20%,25V,6 X 11MM	0H1N5	CEUSM1E470–Q
A4C169	283–0423–00	671–0572–00		CAP,FXD,CER DI:0.22UF,+80–20%,50VDIP STYLE	04222	MD015E224ZAA
A4C175	283–0423–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.22UF,+80–20%,50VDIP STYLE	04222	MD015E224ZAA
A4C176	283–0423–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.22UF,+80–20%,50VDIP STYLE	04222	MD015E224ZAA
A4C210	283–0421–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A4C212	290–0804–00	670–9113–00	670–9113–06	CAP,FXD,ELCTLT:10UF,+50–20%,25V	0H1N5	CEUSM1E100
A4C213	290–0804–00	670–9113–00	670–9113–06	CAP,FXD,ELCTLT:10UF,+50–20%,25V	0H1N5	CEUSM1E100
A4C220	290–0804–00	670–9113–00	670–9113–06	CAP,FXD,ELCTLT:10UF,+50–20%,25V	0H1N5	CEUSM1E100
A4C221	283–0421–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A4C224	283–0811–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.01UF,20%,100V	04222	MDO11C103MAB
A4C225	290–1069–00	671–0572–00	671–0572–03	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C225	290–1301–00	671–0572–04		CAP,FXD,ALUM:2700UF,20%,10V,12.5 X 30MM(0.492 X 1.180)	0H1N5	CEEFM1A272M7
A4C230	283–0114–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:1500PF,5%,200V	59660	805–534–Y5D0–15
A4C235	290–1069–00	670–9113–00	670–9113–06	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C241	290–1034–00	671–0572–00	671–0572–03	CAP,FXD,ALUM:330UF,20%,25V,13 X 25MM	55680	UPL1J331MHH
A4C241	290–1302–00	671–0572–04		CAP,FXD,ALUM:1000UF,20%,35V,12.5 X 30MM(0.492 X 1.180)	0H1N5	CEEFM1V102M7
A4C250	290–1034–00	671–0572–00	671–0572–03	CAP,FXD,ALUM:330UF,20%,25V,13 X 25MM	55680	UPL1J331MHH
A4C250	290–1302–00	671–0572–04		CAP,FXD,ALUM:1000UF,20%,35V,12.5 X 30MM(0.492 X 1.180)	0H1N5	CEEFM1V102M7
A4C254	283–0211–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.1UF,10%,200V	04222	SR302C104KAA
A4C256	290–0798–00	670–9113–00	670–9113–06	CAP,FXD,ELCTLT:180UF,+100–10%,40V	62643	672D708A
A4C258	290–1069–00	671–0572–00	671–0572–03	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C258	290–1301–00	671–0572–04		CAP,FXD,ALUM:2700UF,20%,10V,12.5 X 30MM(0.492 X 1.180)	0H1N5	CEEFM1A272M7
A4C269	283–0423–00	671–0572–00		CAP,FXD,CER DI:0.22UF,+80–20%,50VDIP STYLE	04222	MD015E224ZAA
A4C270	283–0423–00	671–0572–00		CAP,FXD,CER DI:0.22UF,+80–20%,50VDIP STYLE	04222	MD015E224ZAA
A4C317	283–0328–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.03UF,+80–20%,200V	18796	RPE122166Z5U303
A4C320	283–0423–00	671–0572–00		CAP,FXD,CER DI:0.22UF,+80–20%,50VDIP STYLE	04222	MD015E224ZAA
A4C321	283–0005–00	671–0572–01		CAP,FXD,CER DI:0.01UF,+100–0%,250V	04222	SR30VE103ZAA
A4C322	283–0421–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A4C323	283–0421–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A4C325	290–1069–00	671–0572–00	671–0572–03	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH

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A4C325	290–1301–00	671–0572–04		CAP,FXD,ALUM:2700UF,20%,10V,12.5 X 30MM(0.492 X 1.180)	0H1N5	CEEFM1A272M7
A4C335	283–0059–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:1UF,+80–20%,50V	04222	SR305C105MAA
A4C345	290–1069–00	670–9113–00	670–9113–06	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C346	290–1069–00	670–9113–00	670–9113–06	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C350	290–1069–00	670–9113–00	670–9113–06	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C351	290–1069–00	670–9113–00	670–9113–06	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C358	290–1069–00	671–0572–00	671–0572–03	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C358	290–1301–00	671–0572–04		CAP,FXD,ALUM:2700UF,20%,10V,12.5 X 30MM(0.492 X 1.180)	0H1N5	CEEFM1A272M7
A4C360	290–1069–00	671–0572–00	671–0572–03	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C360	290–1301–00	671–0572–04		CAP,FXD,ALUM:2700UF,20%,10V,12.5 X 30MM(0.492 X 1.180)	0H1N5	CEEFM1A272M7
A4C361	290–1084–00	671–0572–00	671–0572–03	CAP,FXD,ELCTLT:100UF,20%,16V	80009	290108400
A4C361	290–0943–00	671–0572–04		CAP,FXD,ALUM:47UF,+50–20%,25V,6 X 11MM	0H1N5	CEUSM1E470–Q
A4C370	290–1069–00	671–0572–00	671–0572–03	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C370	290–1301–00	671–0572–04		CAP,FXD,ALUM:2700UF,20%,10V,12.5 X 30MM(0.492 X 1.180)	0H1N5	CEEFM1A272M7
A4C371	283–0423–00	671–0572–00		CAP,FXD,CER DI:0.22UF,+80–20%,50VDIP STYLE	04222	MD015E224ZAA
A4C410	290–0919–00	670–9113–00	670–9113–06	CAP,FXD,ALUM:470UF,+50–20%,35V	55680	UVX1V471MPA
A4C412	290–0919–00	670–9113–00	670–9113–06	CAP,FXD,ALUM:470UF,+50–20%,35V	55680	UVX1V471MPA
A4C415	283–0268–00	671–0572–00		CAP,FXD,CER DI:0.015UF,20%,50V	04222	SR215C153KAA
A4C420	283–0594–00	670–9113–00	670–9113–06	CAP,FXD,MICA DI:0.001UF,1%,100V	TK0891	RDM15FA102F03
A4C422	283–0330–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:100PF,5%,50V	18796	RPE121151C0G101
A4C429	283–0169–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.022UF,10%,200V	04222	SR302C223KAA
A4C430	283–0220–00	670–9113–00	670–9113–06	CAP,FXD,CERAMIC:MLC;0.01UF,20%,50V,X7R,0.20	04222	SR155C103MAA
A4C433	290–0776–00	670–9113–00	670–9113–06	CAP,FXD,ALUM:22UF,20%,10V,ESR=15.07 OHM (120HZ,20C)	0H1N5	CEUSM1A220
A4C434	283–0330–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:100PF,5%,50V	18796	RPE121151C0G101
A4C460	283–0079–00	670–9113–06	670–9113–06	CAP,FXD,CER DI:0.01UF,20%,250V	04222	SR50VC103MAA
A4C464	290–1069–00	671–0572–00	671–0572–03	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C464	290–1301–00	671–0572–04		CAP,FXD,ALUM:2700UF,20%,10V,12.5 X 30MM(0.492 X 1.180)	0H1N5	CEEFM1A272M7
A4C475	290–1069–00	671–0572–00	671–0572–03	CAP,FXD,ALUM:1000UF,20%,6.3V,ESR=0.16 OHM (120HZ,20C),12.5 X 25MM	55680	UPL1E102MHH
A4C475	290–1301–00	671–0572–04		CAP,FXD,ALUM:2700UF,20%,10V,12.5 X 30MM(0.492 X 1.180)	0H1N5	CEEFM1A272M7
A4C520	283–0220–00	670–9113–00	670–9113–06	CAP,FXD,CERAMIC:MLC;0.01UF,20%,50V,X7R,0.20	04222	SR155C103MAA
A4C521	283–0672–00	671–0572–00		CAP,FXD,MICA DI:200PF,1%,500V	TK0891	RDM15FD201F03
A4C525	285–1196–00	671–0572–00		CAP,FXD,PPR DI:0.01UF,20%,250V,	TK0515	PME 290 MB 5100
A4C532	283–0203–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.47UF,20%,50V	04222	SR305C474MAA
A4C540	285–1329–00	671–0572–00		CAP,FXD,PLASTIC:METALIZED FILM;680PF,10%,1600V, POLYPROPYLENE,.70X.43	TK1913	FKP1 680/1600/1
A4C548	285–1331–00	671–0572–00		CAP,FXD,MTLZD:0.47UF,5%,400V,	TK1913	MKS4 .47/400/5
A4C550	283–0786–00	670–9113–00	670–9113–06	CAP,FXD,MICA DI:745PF,1%,500V	TK0891	RDM19FD7450F03
A4C575	283–0005–00	671–0572–01		CAP,FXD,CER DI:0.01UF,+100–0%,250V	04222	SR30VE103ZAA
A4C621	283–0051–00	671–0572–00		CAP,FXD,CER DI:0.0033UF,5%,100V	04222	SR211A332JAA
A4C648	285–1187–00	671–0572–00		CAP,FXD,MTLZD:0.47 UF,10%,100 V	05292	PMT 3R .47K 100
A4C656	290–0844–00	671–0572–00		CAP,FXD,ELCTLT:100UF,+75–20%,35WVDC	0H1N5	CEUSM1V101
A4C717	290–0804–00	671–0572–00		CAP,FXD,ELCTLT:10UF,+50–20%,25V	0H1N5	CEUSM1E100
A4C718	290–0211–00	671–0572–00		CAP,FXD,ELCTLT:10/160UF,+75–10%,350V	62643	D38373–DFP
A4C722	283–0032–00	671–0572–00		CAP,FXD,CER DI:470PF,5%,500V	59660	831 621 Z5E0 47

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A4C727	283–0423–00	671–0572–00		CAP,FXD,CER DI:0.22UF,+80–20%,50VDIP STYLE	04222	MD015E224ZAA
A4C730	285–1196–00	671–0572–00		CAP,FXD,PPR DI:0.01UF,20%,250V	TK0515	PME 290 MB 5100
A4C750	283–0625–00	670–9113–00	670–9113–06	CAP,FXD,MICA DI:220PF,1%,500V	TK0891	RDM10FD221F03
A4C766	285–1278–00	670–9113–00	670–9113–06	CAP,FXD,PLASTIC:2.2UF,10%,250V	84411	X661 2.2 10 250
A4C768	285–1278–00	670–9113–00	670–9113–06	CAP,FXD,PLASTIC:2.2UF,10%,250V	84411	X661 2.2 10 250
A4C810	283–0211–00	670–9113–00	670–9113–06	CAP,FXD,CER DI:0.1UF,10%,200V	04222	SR302C104KAA
A4C822	285–1222–00	670–9113–00	670–9113–06	CAP,FXD,PLASTIC:0.068UF,20%,250V	TK0515	PME 271 M 568
A4C830	285–1196–00	671–0572–00		CAP,FXD,PPR DI:0.01UF,20%,250V	TK0515	PME 290 MB 5100
A4C845	290–1106–01	670–9113–00	670–9113–06	CAP,FXD,ELCTLT:470UF,20%,200VDC	0H1N5	CEAWF2D471M30
A4C845	290–1070–00	671–0572–00	671–0572–04	CAP,FXD,ALUM:220UF,20%,200V,ESR=0.75 OHM (120HZ,20C),1.2X1.1 INCHES	0H1N5	CEAWF2D221M10
A4C845	290–1293–00	671–0572–05		CAP,FXD,ALUM:390UF,20%,200V,ESR=0.425 OHM(120HZ,20C),25X30MM,105C	0H1N5	CEAUF2D391M20
A4C854	285–1246–00	670–9113–00	670–9113–06	CAP,FXD,PPR DI:0.022UF,20%,250VAC	TK0515	PME 289 MB 5220
A4C865	290–1106–01	670–9113–00	670–9113–06	CAP,FXD,ELCTLT:470UF,20%,200VDC	0H1N5	CEAWF2D471M30
A4C865	290–1070–00	671–0572–00	671–0572–04	CAP,FXD,ALUM:220UF,20%,200V,ESR=0.75 OHM (120HZ,20C),1.2X1.1 INCHES,,	0H1N5	CEAWF2D221M10
A4C865	290–1293–00	671–0572–05		CAP,FXD,ALUM:390UF,20%,200V,ESR=0.425 OHM(120HZ,20C),25X30MM,105C	0H1N5	CEAUF2D391M20
A4C910	285–1222–00	670–9113–00	670–9113–06	CAP,FXD,PLASTIC:0.068UF,20%,250V,	TK0515	PME 271 M 568
A4C911	285–1222–00	670–9113–00	670–9113–06	CAP,FXD,PLASTIC:0.068UF,20%,250V,	TK0515	PME 271 M 568
A4C919	285–1222–00	670–9113–00	670–9113–06	CAP,FXD,PLASTIC:0.068UF,20%,250V,	TK0515	PME 271 M 568
A4C920	285–1323–00	671–0572–00		CAP,FXD,PAPER:METALIZED PAPER;0.22UF,20%,250 VAC	TK0515	PME271M622
A4C970	285–1246–00	670–9113–00	670–9113–06	CAP,FXD,PPR DI:0.022UF,20%,250VAC,	TK0515	PME 289 MB 5220
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 BLOW, (FOR 180–250VAC OPERATION)	71400	MDL 1
A4F940	200–2264–00			CAP,FUSEHOLDER:3AG FUSES	61935	FEK 031 1666
A4F940	200–2735–00			COVER,POWER SW:BLACK,POLYCARBONATE	0JR05	ORDER BY DESC
A4F940	204–0906–00			BODY,FUSEHOLDER:3AG & 5 X 20MM FUSES	61935	TYPE FAU 031.35
A4J120	131–0608–00	670–9113–00	670–9113–06	CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4J160	131–0608–00	670–9113–00	670–9113–06	CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4J160	131–0608–00	671–0572–00		CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4J242	131–0608–00	670–9113–00	670–9113–06	CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4J310	131–0608–00	670–9113–00	670–9113–06	CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4J310	131–0608–00	671–0572–00		CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4J556	131–0608–00	671–0572–00		CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4J660	131–0608–00	671–0572–00		CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4J720	131–0608–00	671–0572–00		CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4J810	131–0608–00	670–9113–00	670–9113–06	CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4J810	131–0608–00	671–0572–00		CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4J950	131–0608–00	670–9113–00	670–9113–06	CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A4L230	108–0554–00	671–0572–00		INDUCTOR,FXD:POWER;5UH,20%,I<10A,DCR<0.01 OHM,17.5 TURNS/2LAYERS ONCORE 276–0147–00	0JR03	108–0554–00
A4L258	108–0554–00	671–0572–00		INDUCTOR,FXD:POWER;5UH,20%,I<10A,DCR<0.01 OHM,17.5 TURNS/2LAYERS ONCORE 276–0147–00	0JR03	108–0554–00

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A4L261	108–1262–00	671–0572–00		INDUCTOR,FXD:POWER;100UH,10%,I<0.75A,RDC<0.23 OHM,Q>15,SRF>5.4MHZ	TK2058	TSL0807–101KR75
A4L361	108–1262–00	671–0572–00		INDUCTOR,FXD:POWER;100UH,10%,I<0.75A,RDC<0.23 OHM,Q>15,SRF>5.4MHZ	TK2058	TSL0807–101KR75
A4L435	120–1668–00	670–9113–00	670–9113–06	TRANSFORMER,RF:TOROIDAL,265UH,1.5 AMPS	0JR03	120–1668–00
A4L451	120–1669–00	670–9113–00	670–9113–06	TRANSFORMER,RF:TOROIDAL,65UH,10 AMPS	0JR03	TO BE ASSIGNED
A4L520	108–1448–00	671–0572–00		INDUCTOR,FXD:SIGNAL;2.33MH,30%,TOROID CORE	0JR03	108–1448–00
A4L770	108–0205–00	671–0572–00		INDUCTOR,FXD:SIGNAL;FXD,1MH,5%,DCR=2.12OHMS	76493	8209
A4L950	108–0959–00	670–9113–00	670–9113–06	INDUCTOR,FXD:SIGNAL;150UH,10%,ON FORM 276–0240–00	0JR03	108–0959–00
A4P556	131–0993–02	671–0572–00		BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A4P660	131–0993–02	671–0572–00		BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A4P720	131–0993–02	671–0572–00		BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A4P810	198–5653–00	671–0572–00		WIRE SET,ELEC:TSG170A	9M860	ORDER BY DESC
A4P950	131–0993–02	670–9113–00	670–9113–06	BUS,CONDUCTOR:SHUNT ASSEMBLY,RED	00779	1–850100–O
A4Q127	151–0528–00	671–0572–00		THYRISTOR,PWR:BIPOLAR,SCR;50V,16A RMS,PHASE	04713	2N6400
A4Q160	151–0736–00	670–9113–00	670–9113–06	TRANSISTOR,SIG:BIPOLAR,NPN;40V,600MA,250MHZ,AMPL	0JR04	2N4401
A4Q215	151–0435–00	671–0572–00		TRANSISTOR:DARLINGTON,PNP,SI,TO–92MPSA65	04713	MPSA64
A4Q230	151–0190–00	670–9113–00	670–9113–06	TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A4Q331	151–0482–00	670–9113–00	670–9113–06	TRANSISTOR,PWR:BIPOLAR,PNP;100V,3.0A,3.0MHZ,AMPL	04713	TIP32C
A4Q340	151–0435–00	670–9113–00	670–9113–06	TRANSISTOR:DARLINGTON,PNP,SI,TO–92MPSA65	04713	MPSA64
A4Q638	151–0908–00	671–0572–00		TRANSISTOR,PWR:BIPOLAR,NPN;500V VCEO,1000V VCEV,5A,SWITCHING	04713	MJH16002A
				ATTACHED PARTS		
	210–0586–00	671–0572–00		NUT,PL,ASSEM WA:4–40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
	210–1178–00	671–0572–00		WASHER,SHLDR:U/W TO–220 TRANSISTOR	13103	7721–7PPS
	211–0097–00	671–0572–00		SCREW,MACHINE:4–40 X 0.312,PNH,STL	TK0435	ORDER BY DESC
	214–2953–00	671–0572–00		HEAT SINK,SEMIC:TRANSISTOR,TO–220;VERTICALM OUNT,SLOT HOLE,(3)SOLDERABLE TABS,COPPER,BL ACK PAINT	13103	6030B–TT
				END ATTACHED PARTS		
A4Q638	342–0354–00	671–0572–00		INSULATOR,PLATE:TRANSISTOR,SILICONE RUBBER	2K262	342–0354–00
A4Q648	151–0323–00	671–0572–00		TRANSISTOR,PWR:BIPOLAR,NPN;80V,4.0A,2.0MHZ,AMPL	04713	2N5192
A4Q660	151–1141–01	670–9113–00	670–9113–06	TRANSISTOR,PWR:MOS,N–CH	04713	MTP5N40E
A4Q660	151–0190–00	671–0572–00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A4Q661	151–1141–01	670–9113–00	670–9113–06	TRANSISTOR,PWR:MOS,N–CH	04713	MTP5N40E
A4Q667	151–0750–00	671–0572–00		TRANSISTOR,SIG:BIPOLAR,NPN;400V,300MA,20MHZ,AMPL	04713	MPSA44
A4Q717	151–0188–00	671–0572–00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPL	04713	2N3906
A4Q727	151–0190–00	671–0572–00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A4Q741	151–0324–00	671–0572–00		TRANSISTOR,PWR:BIPOLAR,PNP;80V,4.0A,2.0MHZ,AMPL	04713	2N5195
A4Q750	151–0323–00	671–0572–00		TRANSISTOR,PWR:BIPOLAR,NPN;80V,4.0A,2.0MHZ,AMPL	04713	2N5192
A4Q755	151–0188–00	671–0572–00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ,AMPL	04713	2N3906
A4R112	321–0206–02	670–9113–00	670–9113–06	RES,FXD,FILM:1.37K OHM,0.5%,0.125W,TC=T2	19701	5033RC1K370D
A4R114	315–0821–00	670–9113–00	670–9113–06	RES,FXD,FILM:820 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R118	315–0561–00	670–9113–00	670–9113–06	RES,FXD,FILM:560 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R119	321–0932–00	670–9113–00	670–9113–06	RES,FXD,FILM:2.5K OHM,1%,0.125W,TC=T0MI	19701	5033RD2K500F
A4R120	321–1696–07	670–9113–00	670–9113–06	RES,FXD,FILM:6K OHM,0.1%,0.125W,TC=T9MI	19701	5033RE6K00B
A4R120	315–0101–00	671–0572–00		RES,FXD,FILM:100 OHM,5%,0.25W,,MI	TK1727	SFR25 2322–181–
A4R121	321–0001–01	670–9113–00	670–9113–06	RES,FXD,FILM:10.0 OHM,0.5%,0.125W,TC=T0 MI	19701	5033RD10R00D
A4R122	322–3194–00	670–9113–00	670–9113–06	RES,FXD,FILM:1.02K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2G10200F
A4R160	308–0297–00	670–9113–00	670–9113–06	RES,FXD,WW:24.7 OHM,1%,3W	TK2096	KM300 24.7 OHM
A4R161	315–0102–00	670–9113–00	670–9113–06	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R162	315–0361–00	670–9113–00	670–9113–06	RES,FXD,FILM:360 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R215	321–1133–02	670–9113–00	670–9113–06	RES,FXD,FILM:240 OHM,0.5%,0.125W,TC=T2MI	19701	5033RC240R0D
A4R215	315–0272–00	671–0572–00		RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R216	315–0472–00	671–0572–00		RES,FXD,FILM:4.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R218	315–0224–00	670–9113–00	670–9113–06	RES,FXD,FILM:220K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R219	315–0472–00	670–9113–00	670–9113–06	RES,FXD,FILM:4.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R220	315–0272–00	670–9113–00	670–9113–06	RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A4R222	322–3289–00	670–9113–00	670–9113–06	RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A4R223	321–0253–00	670–9113–00	670–9113–06	RES,FXD,FILM:4.22K OHM,1%,0.125W,TC=T0MI	19701	5033ED 4K 220F
A4R224	321–0452–00	670–9113–00	670–9113–06	RES,FXD,FILM:499K OHM,1%,0.125W,TC=T0MI	TK1727	2322–151–499K
A4R225	315–0202–00	670–9113–00	670–9113–06	RES,FXD,FILM:2K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R225	301–0680–00	671–0572–00		RES,FXD,FILM:68 OHM,5%,0.5W	TK2611	RC1/2 0680J
A4R226	322–3289–00	670–9113–00	670–9113–06	RES,FXD:METAL FILM;10K OHM,1%,0.2W,TC=100 PPM	91637	CCF50G10001F
A4R227	315–0561–00	670–9113–00	670–9113–06	RES,FXD,FILM:560 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R228	321–0932–00	670–9113–00	670–9113–06	RES,FXD,FILM:2.5K OHM,1%,0.125W,TC=T0MI	19701	5033RD2K500F
A4R230	322–3193–00	670–9113–00	670–9113–06	RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A4R233	321–0245–00	670–9113–00	670–9113–06	RES,FXD,FILM:3.48K OHM,1%,0.125W,TC=T0MI	19701	5033ED3K48F
A4R234	321–0168–00	670–9113–00	670–9113–06	RES,FXD,FILM:549 OHM,1%,0.125W,TC=T0	TK1727	MR25 2322–151–5
A4R235	321–0001–01	670–9113–00	670–9113–06	RES,FXD,FILM:10.0 OHM,0.5%,0.125W,TC=T0 MI	19701	5033RD10R00D
A4R245	308–0802–00	670–9113–00	670–9113–06	RES,FXD,WW:0.01 OHM,5%,5W	91637	SPR 100S–R01J
A4R246	308–0802–00	670–9113–00	670–9113–06	RES,FXD,WW:0.01 OHM,5%,5W	91637	SPR 100S–R01J
A4R314	321–1133–02	670–9113–00	670–9113–06	RES,FXD,FILM:240 OHM,0.5%,0.125W,TC=T2MI	19701	5033RC240R0D
A4R314	315–0202–00	671–0572–00		RES,FXD,FILM:2K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R315	321–0206–02	670–9113–00	670–9113–06	RES,FXD,FILM:1.37K OHM,0.5%,0.125W,TC=T2	19701	5033RC1K370D
A4R315	315–0152–00	671–0572–00		RES,FXD,FILM:1.5K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R316	321–0612–07	670–9113–00	670–9113–06	RES,FXD,FILM:500 OHM,0.1%,0.125W,TC=T9MI	TK1727	MPR24–2322–141–
A4R316	315–0163–00	671–0572–00	671–0572–01	RES,FXD,FILM:16K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R316	322–3254–00	671–0572–02		RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G4321FT
A4R317	321–0612–07	670–9113–00	670–9113–06	RES,FXD,FILM:500 OHM,0.1%,0.125W,TC=T9MI	TK1727	MPR24–2322–141–
A4R318	315–0752–00	670–9113–00	670–9113–06	RES,FXD,FILM:7.5K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R319	315–0752–00	670–9113–00	670–9113–06	RES,FXD,FILM:7.5K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R320	321–0452–00	670–9113–00	670–9113–06	RES,FXD,FILM:499K OHM,1%,0.125W,TC=T0MI	TK1727	2322–151–499K
A4R321	322–3383–00	670–9113–00	670–9113–06	RES,FXD,FILM:95.3K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G95301F
A4R321	315–0100–00	671–0572–01		RES,FXD,FILM:10 OHM,5%,0.25W,	TK1727	SFR25 2322–182–
A4R322	315–0223–00	670–9113–00	670–9113–06	RES,FXD,FILM:22K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R340	315–0472–00	670–9113–00	670–9113–06	RES,FXD,FILM:4.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R410	315–0102–00	670–9113–00	670–9113–06	RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R411	321–0312–00	670–9113–00	670–9113–06	RES,FXD,FILM:17.4K OHM,1%,0.125W,TC=T0MI	19701	5033ED17K40F
A4R413	315–0100–02	670–9113–00	670–9113–06	RES,FXD,CMPSN:10 OHM,5%,0.25W	50139	CB1005
A4R415	311–1225–00	671–0572–00		RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3386F–1–102
A4R420	315–0473–00	670–9113–00	670–9113–06	RES,FXD,FILM:47K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R434	315–0270–00	670–9113–00	670–9113–06	RES,FXD,FILM:27 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R460	315–0100–00	670–9113–06	670–9113–06	RES,FXD,FILM:10 OHM,5%,0.25W,	TK1727	SFR25 2322–182–
A4R510	311–0978–00	671–0572–00		RES,VAR,NONWW:TRMR,250 OHM,0.5W	32997	3329H–K28–251
A4R522	315–0101–00	670–9113–00	670–9113–06	RES,FXD,FILM:100 OHM,5%,0.25W,,MI	TK1727	SFR25 2322–181–
A4R523	315–0101–00	670–9113–00	670–9113–06	RES,FXD,FILM:100 OHM,5%,0.25W,,MI	TK1727	SFR25 2322–181–
A4R536	303–0360–00	670–9113–00	670–9113–06	RES,FXD,CMPSN:36 OHM,5%,1W	24546	FP32 OR FP1 36
A4R560	301–0204–00	671–0572–00	671–0572–05	RES,FXD,FILM:200K OHM,5%,0.5W	19701	5053CX200K0J
A4R560	303–0204–00	671–0572–06		RES,FXD,CMPSN:200K OHM,5%,1W,	50139	GB2045
A4R575	315–0100–00	671–0572–01		RES,FXD,FILM:10 OHM,5%,0.25W,	TK1727	SFR25 2322–182–
A4R614	315–0152–00	671–0572–00		RES,FXD,FILM:1.5K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R615	322–3181–00	671–0572–00	671–0572–02	RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G750ROF
A4R615	322–3175–00	671–0572–03		RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A4R616	322–3258–00	671–0572–00		RES,FXD:METAL FILM;4.75K OHM,1%,0.2W,TC=100	56845	CCF50–2–G4751FT
A4R617	315–0182–00	671–0572–00		RES,FXD,FILM:1.8K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R619	315–0102–00	671–0572–00		RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R620	315–0432–00	671–0572–00	671–0572–01	RES,FXD,FILM:4.3K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R620	322–3254–00	671–0572–02		RES,FXD,FILM:4.32K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G4321FT
A4R622	322–3275–00	671–0572–00	671–0572–03	RES,FXD,FILM:7.15K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G71500F
A4R622	322–3248–00	671–0572–04		RES,FXD,FILM:3.74K OHM,1%,0.2W,TC=T0	91637	CCF50G37400F
A4R625	322–3181–00	671–0572–00	671–0572–02	RES,FXD,FILM:750 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G750ROF
A4R625	322–3199–00	671–0572–03		RES,FXD,FILM:1.15K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G11500F
A4R630	308–0755–00	671–0572–00		RES,FXD,WW:0.75 OHM,5%,2W	91637	CPF–2–0R75JT
A4R647	301–0274–00	671–0572–00		RES,FXD,FILM:270K OHM,5%,0.5W	TK2611	RC1/2 0274J
A4R665	315–0332–00	671–0572–00		RES,FXD,FILM:3.3K OHM,5%,0.25W	TK1727	SFR25 2322–181–

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A4R666	315–0473–00	671–0572–00		RES,FXD,FILM:47K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R667	301–0105–00	671–0572–00	671–0572–05	RES,FXD,FILM:1M OHM,5%,0.50W	TK2611	RC1/20105J
A4R667	303–0105–00	671–0572–06		RES,FXD,CMPSN:1M OHM,5%,1W	24546	FP32 OR FP1 1 M
A4R717	315–0183–00	671–0572–00		RES,FXD,FILM:18K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R718	315–0221–00	671–0572–00		RES,FXD,FILM:220 OHM,5%,0.25W,,MI	TK1727	SFR25 2322–181–
A4R722	315–0102–00	671–0572–00		RES,FXD,FILM:1K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R731	315–0473–00	671–0572–00		RES,FXD,FILM:47K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R735	315–0511–00	670–9113–00	670–9113–06	RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R736	315–0511–00	670–9113–00	670–9113–06	RES,FXD,FILM:510 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R746	303–0750–00	671–0572–00		RES,FXD,CMPSN:75 OHM,5%,1W	24546	FP32 OR FP1 75
A4R747	303–0750–00	671–0572–00		RES,FXD,CMPSN:75 OHM,5%,1W	24546	FP32 OR FP1 75
A4R750	308–0874–00	670–9113–00	670–9113–06	RES,FXD,WW:10 OHM,5%,1W,	11502	SP–20F 10 OHM 5
A4R751	308–0874–00	670–9113–00	670–9113–06	RES,FXD,WW:10 OHM,5%,1W,	11502	SP–20F 10 OHM 5
A4R765	301–0105–00	671–0572–00		RES,FXD,FILM:1M OHM,5%,0.50W	TK2611	RC1/20105J
A4R766	322–3439–00	671–0572–00		RES,FXD,FILM:365K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50–2F36502FT
A4R767	322–3439–00	671–0572–00		RES,FXD,FILM:365K OHM,1%,0.2W,TC=T0MI,SMALL	91637	CCF50–2F36502FT
A4R768	322–3374–00	671–0572–00	671–0572–03	RES,FXD,FILM:76.8K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G76801F
A4R768	315–0104–00	671–0572–04		RES,FXD,FILM:100K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R810	315–0221–00	670–9113–00	670–9113–06	RES,FXD,FILM:220 OHM,5%,0.25W,,MI	TK1727	SFR25 2322–181–
A4R811	315–0106–00	670–9113–00	670–9113–06	RES,FXD,FILM:10M OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R818	315–0106–00	671–0572–00		RES,FXD,FILM:10M OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R820	301–0154–00	670–9113–00	670–9113–06	RES,FXD,FILM:150K OHM,5%,0.5W	19701	5053CX150K0J
A4R821	301–0154–00	670–9113–00	670–9113–06	RES,FXD,FILM:150K OHM,5%,0.5W	19701	5053CX150K0J
A4R822	301–0105–00	671–0572–00		RES,FXD,FILM:1M OHM,5%,0.50W	TK2611	RC1/20105J
A4R830	301–0204–00	671–0572–00		RES,FXD,FILM:200K OHM,5%,0.5W	19701	5053CX200K0J
A4R831	301–0204–00	671–0572–00		RES,FXD,FILM:200K OHM,5%,0.5W	19701	5053CX200K0J
A4R850	301–0101–00	670–9113–00	670–9113–06	RES,FXD,FILM:100 OHM,5%,0.5W	TK1727	SFR30 2322–182–
A4R852	315–0220–00	670–9113–00	670–9113–06	RES,FXD,FILM:22 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A4R910	301–0105–00	670–9113–00	670–9113–06	RES,FXD,FILM:1M OHM,5%,0.50W	TK2611	RC1/20105J
A4R950	315–0226–00	670–9113–00	670–9113–06	RES,FXD,FILM:22M OHM,5%,0.25W	50139	CB2265
A4S930	260–1849–07			SWITCH,PUSH:DPST,4A,250VAC, *ATTACHED PARTS*	31918	601955
	210–0001–00			WASHER,LOCK:#2 INTL,0.013 THK,STL (QUANTITY 2)	78189	1202–00–00–0541
	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 DESC
	366–1160–00			PUSH BUTTON:CHARCOAL,0.523 X 0.253 X 0.43 *END ATTACHED PARTS*	80009	366116000
A4T440	120–1782–00	671–0572–00		TRANSFORMER,RF:FLYBACK,70KHZ,PRI 230V,SEC5V2.0	75498	128–7044–00
A4T610	120–1667–00	670–9113–00	670–9113–06	XFMR,PWR,STPDN:60HZ	20462	SPW053
A4T650	120–1666–00	670–9113–00	670–9113–06	XFMR,PWR,STPDN:50KHZ	75498	120–1666–00
A4T735	120–1472–00	670–9113–00	670–9113–06	XFMR,PWR,STPDN:GATE DRIVE HF	75498	120–1472–00
A4U133	156–1408–01	670–9113–00	670–9113–06	IC,MISC:CMOS,TIMER	01295	TLC555CP3 OR TL
A4U176	156–3633–00	671–0572–00		IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE, 12V,1A,3%,LOW DROPOUT	27014	LM2940CT–12
A4U176	210–0586–00	671–0572–00		NUT,PL,ASSEM WA:4–40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
A4U176	210–1178–00	671–0572–00		WASHER,SHLDR:U/W TO–220 TRANSISTOR	13103	7721–7PPS
A4U176	211–0097–00	671–0572–00		SCREW,MACHINE:4–40 X 0.312,PNH,STL	TK0435	ORDER BY DESC
A4U176	214–2953–00	671–0572–00		HEAT SINK,SEMIC:TRANSISTOR,TO–220;VERTICAL- MOUNT,SLOT HOLE,(3)SOLDERABLE TABS,COP- PER,BLACK PAINT	13103	6030B–TT
A4U176	342–0563–00	671–0572–00		INSULATOR,PLATE:TRANSISTOR,FIBERGLASS RE- INFORCED SILICON RUBBER	18565	69–11–8805–1674
A4U210	156–1173–00	670–9113–00	670–9113–06	IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIVE, 2.5V,1.0%,40PPM,SERIES	04713	MC1403U
A4U212	156–1451–00	670–9113–00	670–9113–06	IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIVE, ADJUSTABLE,1.5A,4%	01295	LM337KC

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A4U215	156–3217–00	671–0572–00		IC,MISC:CMOS,PWR SUPPLY SUPERVISOR;MPU RESET GENERATOR,5V SUPPLY SENSING,NMI OUTPUT	0B0A9	DS1231–50
A4U220	156–1226–01	670–9113–00	670–9113–06	IC,LINEAR:BIPOLAR,COMPARATOR;DUPLICATE OF 1 56–1226–00,DO NOT USE	1CH66	LM319N
A4U260	156–2559–00	670–9113–00	670–9113–06	IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIV E,–12V,1.5A,2%	48726	UC7912ACT
				ATTACHED PARTS		
	210–1178–00	670–9113–00	670–9113–06	WASHER,SHLDR:U/W TO–220 TRANSISTOR	13103	7721–7PPS
	211–0661–00	670–9113–00	670–9113–06	SCR,ASSEM WSHR:4–40 X 0.25,PNH,STL,CD PL,PO Z,MACHINE	TK0435	ORDER BY DESC
	342–0563–00	670–9113–00	670–9113–06	INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINF ORCED SILICON RUBBER	18565	69–11–8805–1674
				END ATTACHED PARTS		
A4U276	156–2559–00	671–0572–00		IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;NEGATIV E,–12V,1.5A,2%	48726	UC7912ACT
				ATTACHED PARTS		
	210–0586–00	671–0572–00		NUT,PL,ASSEM WA:4–40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
	210–1178–00	671–0572–00		WASHER,SHLDR:U/W TO–220 TRANSISTOR	13103	7721–7PPS
	211–0097–00	671–0572–00		SCREW,MACHINE:4–40 X 0.312,PNH,STL	TK0435	ORDER BY DESC
	214–2953–00	671–0572–00		HEAT SINK,SEMIC:TRANSISTOR,TO–220;VERTICALM OUNT,SLOT HOLE,(3)SOLDERABLE TABS,COPPER,BL ACK PAINT	13103	6030B–TT
	342–0563–00	671–0572–00		INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINF ORCED SILICON RUBBER	18565	69–11–8805–1674
				END ATTACHED PARTS		
A4U310	156–1161–00	670–9113–00	670–9113–06	IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIV E,ADJUSTABLE,1.5A,4%	04713	LM317T
A4U325	156–1226–01	670–9113–00	670–9113–06	IC,LINEAR:BIPOLAR,COMPARATOR	1CH66	LM319N
A4U331	156–0853–02	670–9113–00	670–9113–06	IC,LINEAR:BIPOLAR,OP–AMP	01295	LM358P
A4U335	156–1226–01	670–9113–00	670–9113–06	IC,LINEAR:BIPOLAR,COMPARATOR	1CH66	LM319N
A4U360	156–2558–00	670–9113–00	670–9113–06	IC,LINEAR:BIPOLAR,VOLTAGE REGULATOR;POSITIVE, 12V,1.5A,2%	01295	TL780–12CKC
				ATTACHED PARTS		
	210–1178–00	670–9113–00	670–9113–06	WASHER,SHLDR:U/W TO–220 TRANSISTOR	13103	7721–7PPS
	211–0661–00	670–9113–00	670–9113–06	SCR,ASSEM WSHR:4–40 X 0.25,PNH,STL,CD PL,POZ,MACH	TK0435	ORDER BY DESC
	342–0563–00	670–9113–00	670–9113–06	INSULATOR,PLATE:TRANSISTOR,FIBERGLASS RE-INFORCED SILICON RUBBER	18565	69–11–8805–1674
				END ATTACHED PARTS		
A4U410	156–1631–00	671–0572–00		IC,LINEAR:BIPOLAR,V R;SHUNT,ADJUSTABLE,100MA	01295	TL431CLP
A4U435	156–1585–02	670–9113–00	670–9113–06	IC,LINEAR:BIPOLAR,SW–REGULATOR CONTROLLER;PWM, PUSH–PULL TOTEM POLE OUTPUTS, IND TEMP RANGE	34333	SG2526BJ
				MOUNTING PARTS		
	136–0756–00	670–9113–00	670–9113–06	SOCKET,DIP:PCB;FEMALE,STR,2 X 9,18 POS,0.1	09922	DILB18P–108
				END MOUNTING PARTS		
A4U520	156–0885–00	671–0572–00		CPLR,OPTOELECTR:LED,5KV ISOLATION	80009	156088500
A4U525	156–0328–00	670–9113–00	670–9113–06	IC,DIGITAL:MOS,DRIVER;DUAL CLOCK DRIVER	27014	DS0026CN
				MOUNTING PARTS		
	136–0727–00	670–9113–00	670–9113–06	SKT,PL–IN ELEK:MICROCKT,8 CONTACT	09922	DILB8P–108
				END MOUNTING PARTS		
A4U615	156–1225–00	671–0572–00		IC,LINEAR:BIPOLAR,COMPARATOR;DUAL,OPEN COLLECTOR,300NS	01295	LM393P
A4U722	156–2524–00	671–0572–00	671–0572–03	IC,LINEAR:BIPOLAR,SW–REGULATOR CONTROLLER;PWM, CURRENT MODE,SINGLE TOTEM POLE OUTPUT	48726	UC3842N
A4U722	156–4236–00	671–0572–04		IC,LINEAR:BIPOLAR,SW–REGULATOR CONTROLLER;PWM, CURRENT MODE,SINGLE TOTEM POLE OUTPUT	04713	UC3844BN
A4CR119	152–0141–02	670–9113–00	670–9113–06	DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A4CR121	152–0141–02	670–9113–00	670–9113–06	DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A4CR140	152–0198–02	670–9113–00	670–9113–06	SEMICOND DVC,DI:RECT,SI,200V,3A,A249G	13409	SEN–R–235
A4CR145	152–0198–02	670–9113–00	670–9113–06	SEMICOND DVC,DI:RECT,SI,200V,3A,A249G	13409	SEN–R–235
A4CR160	152–0198–02	670–9113–00	670–9113–06	SEMICOND DVC,DI:RECT,SI,200V,3A,A249G	13409	SEN–R–235

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A4CR161	152–0066–03	670–9113–00	670–9113–06	DIODE,RECT:400V,1A,1.1VF AT 1A,30A IFSM,2US	14433	LG4017
A4CR162	152–0066–03	670–9113–00	670–9113–06	DIODE,RECT:400V,1A,1.1VF AT 1A,30A IFSM,2US	14433	LG4017
A4CR169	152–0198–00	671–0572–00		DIODE,RECT:200V,3A,125A IFSM,1VF AT3A,SAFETY CONT	14936	1N5624
A4CR170	152–0066–00	671–0572–00		DIODE,RECT:400V,1A,IFSM=30A,1.2VF,2US	0LUA3	1N5060
A4CR175	152–0066–03	670–9113–00	670–9113–06	DIODE,RECT:400V,1A,1.1VF AT 1A,30A IFSM,2US	14433	LG4017
A4CR215	152–0066–00	671–0572–00		DIODE,RECT:400V,1A,IFSM=30A,1.2VF,2US	0LUA3	1N5060
A4CR225	152–0141–02	670–9113–00	670–9113–06	DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A4CR226	152–0141–02	670–9113–00	670–9113–06	DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A4CR228	152–0141–02	670–9113–00	670–9113–06	DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A4CR269	152–0198–00	671–0572–00		DIODE,RECT:200V,3A,125A IFSM,1VF AT3A,SAFETY CONT	14936	1N5624
A4CR320	152–0884–00	671–0572–00		DIODE,RECT:SCHTKY;35V,16A,150A IFSM,630MVF	04713	MBR1635
				ATTACHED PARTS		
	210–0586–00	671–0572–00		NUT,PL,ASSEM WA:4–40 X 0.25,STL CD PL	TK0435	ORDER BY DESC
	210–1178–00	671–0572–00		WASHER,SHLDR:U/W TO–220 TRANSISTOR	13103	7721–7PPS
	211–0097–00	671–0572–00		SCREW,MACHINE:4–40 X 0.312,PNH,STL	TK0435	ORDER BY DESC
	214–2953–00	671–0572–00		HEAT SINK,SEMIC:TRANSISTOR,TO–220;VERTICALM OUNT,SLOT HOLE,(3)SOLDERABLE TABS,COPPER,BL ACK PAINT	13103	6030B–TT
	342–0563–00	671–0572–00		INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINF ORCED SILICON RUBBER	18565	69–11–8805–1674
				END ATTACHED PARTS		
A4CR340	152–0601–01	671–0572–00		DIODE,RECT:ULTRA FAST;150V,25NS,35A IFSM	04713	MUR115RL
A4CR345	152–0141–02	670–9113–00	670–9113–06	DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A4CR348	152–0601–01	671–0572–00		DIODE,RECT:ULTRA FAST;150V,25NS,35A IFSM	04713	MUR115RL
A4CR360	152–0905–00	670–9113–04	670–9113–04	SEMICOND DVC,DI:DUAL RECT,SCHOTTKY,40V,8ATO –220,SR1604A	6L334	SR1604A
A4CR360	152–0914–00	670–9113–05	670–9113–05	SEMICOND DVC,DI:DUAL RECT,SCHOTTKY,SI,60V,8A, TO–220	14936	SBN1660T–4
A4CR360	152–0905–00	670–9113–06	670–9113–06	SEMICOND DVC,DI:DUAL RECT,SCHOTTKY,40V,8ATO –220,SR1604A	6L334	SR1604A
				ATTACHED PARTS		
	210–1178–00	670–9113–04	670–9113–04	WASHER,SHLDR:U/W TO–220 TRANSISTOR	13103	7721–7PPS
	211–0661–00	670–9113–04	670–9113–04	SCR,ASSEM WSHR:4–40 X 0.25,PNH,STL,CD PL,POZ,MACH	TK0435	ORDER BY DESC
	342–0563–00	670–9113–04	670–9113–04	INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINF ORCED SILICON RUBBER	18565	69–11–8805–1674
				END ATTACHED PARTS		
A4CR369	152–0066–00	671–0572–00		DIODE,RECT:400V,1A,IFSM=30A,1.2VF,2US	0LUA3	1N5060
A4CR409	152–0066–03	670–9113–00	670–9113–06	DIODE,RECT:400V,1A,1.1VF AT 1A,30A IFSM,2US	14433	LG4017
A4CR410	152–0066–03	670–9113–00	670–9113–06	DIODE,RECT:400V,1A,1.1VF AT 1A,30A IFSM,2US	14433	LG4017
A4CR420	152–0066–03	670–9113–00	670–9113–06	DIODE,RECT:400V,1A,1.1VF AT 1A,30A IFSM,2US	14433	LG4017
A4CR421	152–0141–02	670–9113–00	670–9113–06	DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A4CR422	152–0141–02	670–9113–00	670–9113–06	DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A4CR460	152–0793–00	670–9113–00	670–9113–06	SEMICOND DVC,DI:DUAL RECT,SI,40V,25AESAD83–004	TK1075	ESAD83–004K
				MOUNTING PARTS		
	211–0012–00	670–9113–00	670–9113–06	SCREW,MACHINE:4–40 X 0.375,PNH,STL	TK0435	ORDER BY DESC
				END MOUNTING PARTS		
A4CR510	152–0585–00	670–9113–00	670–9113–06	DIODE,RECT:BRIDGE,200V,1A,50A IFSM,1.0VFAT 1A	14936	W02G
A4CR533	152–0864–00	670–9113–00	670–9113–06	DIO,RECT:ULTRA FAST;150V,2A,25NS,IFSM=50A,SOFT REC	0LUA3	BYV27–150
A4CR534	152–0864–00	670–9113–00	670–9113–06	DIO,RECT:ULTRA FAST;150V,2A,25NS,IFSM=50A,SOFT REC	0LUA3	BYV27–150
A4CR535	152–0864–00	670–9113–00	670–9113–06	DIO,RECT:ULTRA FAST;150V,2A,25NS,IFSM=50A,SOFT REC	0LUA3	BYV27–150
A4CR536	152–0864–00	670–9113–00	670–9113–06	DIO,RECT:ULTRA FAST;150V,2A,25NS,IFSM=50A,SOFT REC	0LUA3	BYV27–150
A4CR545	152–0897–00	671–0572–00		DIODE,RECT:FAST RCVRY;1000V,1.5A,300NS,SOFT RCVRY	0LUA3	BYV96E
A4CR556	152–0400–00	671–0572–00		DIODE,RECT:FAST RCVRY;400V,1A,200NS	0LUA3	1N4936
A4CR575	152–0884–00	671–0572–00		DIODE,RECT:SCHTKY;35V,16A,150A IFSM,630MVF	04713	MBR1635
				ATTACHED PARTS		
	210–1178–00	671–0572–00		WASHER,SHLDR:U/W TO–220 TRANSISTOR	13103	7721–7PPS
	211–0097–00	671–0572–00		SCREW,MACHINE:4–40 X 0.312,PNH,STL	TK0435	ORDER BY DESC

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
	214–2953–00	671–0572–00		HEAT SINK,SEMIC:TRANSISTOR,TO–220;VERTICALM OUNT,SLOT HOLE,(3)SOLDERABLE TABS,COPPER,BL ACK PAINT	13103	6030B–TT
	214–4115–00	671–0572–00		HEAT SINK:COPPER	5Y400	ORDER BY DESC
	342–0563–00	671–0572–00		INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINF ORCED SILICON RUBBER	18565	69–11–8805–1674
				END ATTACHED PARTS		
A4CR640	152–0841–00	671–0572–00		DIODE,RECT:ULTRA FAST;1KV,8A,100NS	04713	MUR8100E
A4CR648	152–0864–00	671–0572–00		DIO,RECT:ULTRA FAST;150V,2A,25NS,IFSM=50A,SOFT REC	0LUA3	BYV27–150
A4CR649	152–0864–00	671–0572–00		DIO,RECT:ULTRA FAST;150V,2A,25NS,IFSM=50A,SOFT REC	0LUA3	BYV27–150
A4CR651	152–0581–00	671–0572–00		DIODE,RECT:SCHTKY;20V,1A,.450VF,25A IFSM	04713	1N5817
A4CR810	152–0750–00	670–9113–00	670–9113–06	DIO,RECT:FAST RCVRY;BRIDGE,600V,3A,IFSM=125A,250NS	TK2319	RKBPC606
A4CR820	152–0750–00	671–0572–00		DIO,RECT:FAST RCVRY;BRIDGE,600V,3A,IFSM=125A,250NS	TK2319	RKBPC606
A4DS112	150–1049–00	670–9113–00	670–9113–06	DIODE,OPTO:LED;RED/GREEN,BI–COLOR	57668	SPR54MVW
A4DS670	150–1017–00	671–0572–00		LT EMITTING DIO:GREEN,550NM,55MA MAX	50434	HLMP3910
A4DS720	150–1017–00	671–0572–00		LT EMITTING DIO:GREEN,550NM,55MA MAX	50434	HLMP3910
A4DS810	150–0035–00	670–9113–00	670–9113–06	LAMP,GLOW:NEON;90V,0.3MA,AID–T,WIRE LD	TK0213	JH005/3011JA
A4LF950	119–1946–00	670–9113–00	670–9113–06	FILTER,RFI:1A,250V,400HZ W/PC TERMINAL	0GV52	FN326–1/02–K–D–
A4LF950	119–1946–00	671–0572–00		FILTER,RFI:1A,250V,400HZ W/PC TERMINAL	0GV52	FN326–1/02–K–D–
A4RT723	307–0863–00	671–0572–00		RES,THERMAL:10 OHM,10%,NTC	15454	SG13–S
A4RV820	307–0449–00	671–0572–00		RES,V SENSITIVE:1900PF,100A,130V,METAL OXDS AFETY CONTROLLED	34371	V130LA20A
A4RV852	307–0638–00	670–9113–00	670–9113–06	RES,V SENSITIVE:18V,20%,0.5 W,	34371	V18ZA1
A4RV915	307–0449–00	670–9113–00	670–9113–06	RES,V SENSITIVE:1900PF,100A,130V,METAL OXD SAFETY CONTROLLED	34371	V130LA20A
A4RV917	307–0449–00	670–9113–00	670–9113–06	RES,V SENSITIVE:1900PF,100A,130V,METAL OXD SAFETY CONTROLLED	34371	V130LA20A
A4RV920	307–0449–00	671–0572–00		RES,V SENSITIVE:1900PF,100A,130V,METAL OXD SAFETY CONTROLLED	34371	V130LA20A
A4TP133	214–4085–00	671–0572–00		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A4TP137	214–4085–00	671–0572–00		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A4TP140	214–4085–00	671–0572–00		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A4TP173	214–4085–00	671–0572–00		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A4TP212	214–0579–00	670–9113–00	670–9113–06	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A4TP234	214–0579–00	670–9113–00	670–9113–06	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A4TP340	214–4085–00	671–0572–00		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A4TP350	214–4085–00	671–0572–00		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A4TP510	214–0579–00	670–9113–00	670–9113–06	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A4TP534	214–0579–00	670–9113–00	670–9113–06	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A4TP535	214–0579–00	670–9113–00	670–9113–06	TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A4TP667	214–4085–00	671–0572–00		TERM,TEST POINT:0.070 ID,0.220 H,0.063 DIAP CB,0.015 X 0.032 BRASS,W/RED NYLON COLLAR	26364	104–01–02
A4VR120	152–0175–00	670–9113–00	670–9113–06	DIODE,ZENER:5.6V,5%,0.4W	04713	SZG35008 (1N752
A4VR120	152–0662–00	671–0572–00		DIODE,ZENER:5V,1%,0.4W	04713	SZG195RL
A4VR130	152–0662–00	670–9113–00	670–9113–06	DIODE,ZENER:5V,1%,0.4W	04713	SZG195RL
A4VR233	152–0175–00	670–9113–00	670–9113–06	DIODE,ZENER:5.6V,5%,0.4W	04713	SZG35008 (1N752
A4VR650	152–0395–00	671–0572–00		DIODE,ZENER:4.3V,5%,0.4W	04713	1N749ARL
A4VR765	152–0304–00	671–0572–00		DIODE,ZENER:20V,5%,0.4W	04713	1N968BRL

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A5	671–0219–01	B010100	B010128	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021901
A5	671–0219–02	B010129	B010199	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021902
A5	671–0219–03	B010200	B020246	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021903
A5	671–0219–04	B020247	B020448	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021904
A5	671–0219–05	B020449	B021585	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021905
A5	671–0219–06	B021586	B022106	CIRCUIT BD ASSY:IDENTIFICATION	80009	671021906
A5	671–0219–07	B022107		CIRCUIT BD ASSY:IDENTIFICATION (OPTION 01 ONLY)	80009	671021907
A5C130	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C150	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C180	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C208	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C220	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C230	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C243	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C295	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C304	283–0421–00	671–0219–02		CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C305	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C310	285–0889–00	671–0219–01	671–0219–01	CAP,FXD,PLASTIC:0.0027UF,5%,100V	84411	TEK180–27251
A5C318	290–0973–00	671–0219–01	671–0219–01	CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C355	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C370	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C395	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C405	285–1389–00	671–0219–02		CAP,FXD,MTLZD:0.015UF,1%,250V	84411	X428 .015 1 250
A5C415	285–1221–00	671–0219–01	671–0219–01	CAP,FXD,MTLZD:0.1UF,2%,100V	01884	LP68A1B104G
A5C415	285–1221–00	671–0219–02		CAP,FXD,MTLZD:0.1UF,2%,100V	01884	LP68A1B104G
A5C421	290–0973–00	671–0219–01	671–0219–01	CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C430	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C443	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C455	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C460	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C477	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C478	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C519	290–0973–00	671–0219–01	671–0219–01	CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C547	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C577	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C583	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C604	283–0421–00	671–0219–01	671–0219–01	CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C605	283–0421–00	671–0219–01	671–0219–01	CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C608	283–0421–00	671–0219–02		CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C620	283–0421–00	671–0219–02		CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C630	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C647	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C665	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C695	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C705	285–1188–00	671–0219–01	671–0219–01	CAP,FXD,MTLZD:0.082 UF,5%,100 V	05292	PMT 3R ADVISE
A5C705	285–1389–00	671–0219–02		CAP,FXD,MTLZD:0.015UF,1%,250V	84411	X428 .015 1 250
A5C710	283–0421–00	671–0219–02		CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C725	285–1130–00	671–0219–02		CAP,FXD,PLASTIC:0.22UF,1%,100V	84411	TEK153 .22 1 10
A5C730	290–0973–00	671–0219–02		CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C735	290–0974–00			CAP,FXD,ALUM:10UF,20%,50V,ESR=16.58 OHM (120HZ,20C)	55680	UVX1H100MAA
A5C748	290–0973–00			CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C755	283–0707–00			CAP,FXD,MICA DI:385PF,1%,500V	TK0891	RDM15FD3850F03
A5C760	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C765	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C770	283–0752–00	671–0219–01	671–0219–01	CAP,FXD,MICA DI:345PF,1%,500V	TK0891	RDM15FD3450F03
A5C770	283–0631–00	671–0219–02		CAP,FXD,MICA DI:95PF,1%,500V	TK0891	RDM15FD950F03
A5C779	283–0617–00			CAP,FXD,MICA DI:4700PF,10%,300V	TK0891	RDM19FD472K03

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A5C780	283–0637–00	671–0219–01	671–0219–01	CAP,FXD,MICA DI:20PF,2.5%,500V	TK0891	RDM15ED200D03
A5C785	283–0631–00	671–0219–02		CAP,FXD,MICA DI:95PF,1%,500V	TK0891	RDM15FD950F03
A5C789	283–0766–00	671–0219–01	671–0219–01	CAP,FXD,MICA DI:47 PF,1%,500V	TK0891	RDM15ED470D03
A5C805	290–0973–00	671–0219–02		CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C816	285–1307–00	671–0219–02		CAP,FXD,PLASTIC:0.02UF,1%,50V	14752	650D1A203F
A5C817	285–1307–00	671–0219–02		CAP,FXD,PLASTIC:0.02UF,1%,50V	14752	650D1A203F
A5C820	283–0421–00	671–0219–01	671–0219–01	CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C825	290–0973–00	671–0219–01	671–0219–01	CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C830	283–0421–00	671–0219–01	671–0219–01	CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C830	290–0973–00	671–0219–02		CAP,FXD,ELCTLT:100UF,20%,25VDC	0H1N5	CEUSM1E101
A5C835	283–0648–00			CAP,FXD,MICA DI:10PF,+/–0.5PF,500V	TK0891	RDM15CD100D03
A5C840	281–0153–00			CAP,VAR,AIR DI:1.7–10PF,150V	74970	187–0106–055
A5C849	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C850	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C860	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C870	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C880	283–0779–00	671–0219–02		CAP,FXD,MICA DI:27 PF,2%,500V	TK0891	RDM15ED270G03
A5C881	283–0598–00	671–0219–02		CAP,FXD,MICA DI:253PF,5%,500V	TK0891	RDM15FD2530J03
A5C885	283–0779–00	671–0219–02		CAP,FXD,MICA DI:27 PF,2%,500V	TK0891	RDM15ED270G03
A5C886	283–0598–00	671–0219–02		CAP,FXD,MICA DI:253PF,5%,500V	TK0891	RDM15FD2530J03
A5C920	283–0648–00			CAP,FXD,MICA DI:10PF,+/–0.5PF,500V	TK0891	RDM15CD100D03
A5C945	281–0122–00			CAP,VAR,CER DI:2.5–9PF,100V	59660	518–000A2.5–9
A5C960	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5C963	283–0175–00	671–0219–05		CAP,FXD,CER DI:10PF,5%,200V	18796	RPE110NPO100D20
A5C975	283–0421–00			CAP,FXD,CER DI:0.1UF,+80–20%,50VDIP STYLE	04222	MD015C104MAB
A5J155	131–3439–00			CONN,DIN:PCB;FEMALE,RTANG,3 X 16,0.1 CTR,0.209 MLG X 0.114 TAIL,30 GOLD	00779	650893–4
A5J520	131–0608–00	671–0219–02		CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A5J555	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A5J635	131–0608–00	671–0219–01	671–0219–01	CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A5J643	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A5J825	131–0608–00	671–0219–02		CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 3)	22526	48283–018
A5J910	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A5J920	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A5J940	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A5L785	108–0368–00	671–0219–02		COIL,RF:FIXED,9.7UH	0JR03	108–0368–00
A5L786	108–0443–00	671–0219–02		COIL,RF:FIXED,23.5UH	0JR03	108–0443–00
A5L788	114–0345–00	671–0219–01	671–0219–01	COIL,RF:VARIABLE,4.13–4.83UHPOT CORE	80009	114034500
A5L788	108–0368–00	671–0219–02		COIL,RF:FIXED,9.7UH	0JR03	108–0368–00
A5L789	108–0443–00	671–0219–02		COIL,RF:FIXED,23.5UH	0JR03	108–0443–00
A5P209	131–0566–00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225L	24546	OMA0207
A5P210	131–0566–00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225L	24546	OMA0207
A5P591	131–0566–00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225L	24546	OMA0207
A5P635	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A5P643	131–0993–05			BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A5P825	131–0993–05	671–0219–02		BUS,CONDUCTOR:SHUNT ASSEMBLY,GREEN	00779	850100–5
A5Q863	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A5Q870	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A5Q963	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A5Q964	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A5Q970	151–0220–00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ,AMPL	27014	S036228.22
A5Q971	151–0190–00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ,AMPL	04713	2N3904
A5R405	322–3287–00	671–0219–01	671–0219–01	RES,FXD,FILM:9.53K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50G95300F
A5R405	321–0229–00	671–0219–02		RES,FXD,FILM:2.37K OHM,1%,0.125W,TC=T0MI	TK1727	2322–151–2K37
A5R406	322–3287–00	671–0219–01	671–0219–01	RES,FXD,FILM:9.53K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50G95300F
A5R406	321–0229–00	671–0219–02		RES,FXD,FILM:2.37K OHM,1%,0.125W,TC=T0MI	TK1727	2322–151–2K37
A5R407	321–0614–00	671–0219–01	671–0219–01	RES,FXD,FILM:10.1K OHM,1%,0.125W,TC=T0MI	91637	CMF55116G10101F
A5R408	321–0614–00	671–0219–01	671–0219–01	RES,FXD,FILM:10.1K OHM,1%,0.125W,TC=T0MI	91637	CMF55116G10101F
A5R408	321–0771–01	671–0219–02		RES,FXD,FILM:50 OHM,0.5%,0.125W,TC=T0MI	57668	RB14DXE 50E
A5R409	322–3318–00	671–0219–01	671–0219–01	RES,FXD:METAL FILM;20K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20001F
A5R409	322–3292–00	671–0219–02		RES,FXD,FILM:10.7K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10701F
A5R410	322–3039–00	671–0219–01	671–0219–01	RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50–2–G24R90F
A5R506	322–3039–00	671–0219–01	671–0219–01	RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50–2–G24R90F
A5R507	311–0614–00			RES,VAR,NONWW:TRMR,30K OHM,0.5W	32997	3329H–L58–303
A5R508	321–0771–01	671–0219–01	671–0219–01	RES,FXD,FILM:50 OHM,0.5%,0.125W,TC=T0MI	57668	RB14DXE 50E
A5R509	321–0771–01			RES,FXD,FILM:50 OHM,0.5%,0.125W,TC=T0MI	57668	RB14DXE 50E
A5R558	315–0272–00	671–0219–02		RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A5R559	315–0272–00	671–0219–02		RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A5R560	307–0650–00	671–0219–01	671–0219–01	RES NTWK,FXD,FI:9,2.7K OHM,5%,0.150W	11236	750–101–R2.7K
A5R570	315–0272–00	671–0219–02		RES,FXD,FILM:2.7K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A5R578	311–0635–00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3329H–L58–102
A5R589	315–0622–00	671–0219–01	671–0219–05	RES,FXD,FILM:6.2K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A5R589	322–3269–00	671–0219–06		RES,FXD,FILM:6.19K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G61900F
A5R590	315–0332–00	671–0219–01	671–0219–05	RES,FXD,FILM:3.3K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A5R590	322–3241–00	671–0219–06		RES,FXD,FILM:3.16K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF502G3161FT
A5R687	315–0270–00			RES,FXD,FILM:27 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A5R688	315–0513–00			RES,FXD,FILM:51K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A5R689	322–3132–00			RES,FXD,FILM:232 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G232ROF
A5R690	322–3132–00			RES,FXD,FILM:232 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G232ROF
A5R691	322–3179–00			RES,FXD,FILM:715 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G715R0F
A5R692	322–3132–00			RES,FXD,FILM:232 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G232ROF
A5R707	322–3292–00	671–0219–02		RES,FXD,FILM:10.7K OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G10701F
A5R708	321–0229–00	671–0219–02		RES,FXD,FILM:2.37K OHM,1%,0.125W,TC=T0MI	TK1727	2322–151–2K37
A5R720	321–0229–00	671–0219–02		RES,FXD,FILM:2.37K OHM,1%,0.125W,TC=T0MI	TK1727	2322–151–2K37
A5R721	321–0614–00	671–0219–02		RES,FXD,FILM:10.1K OHM,1%,0.125W,TC=T0MI	91637	CMF55116G10101F
A5R722	321–0614–00	671–0219–02		RES,FXD,FILM:10.1K OHM,1%,0.125W,TC=T0MI	91637	CMF55116G10101F
A5R740	311–0698–00			RES,VAR,NONWW:TRMR,1MEG OHM,0.5W	32997	3329H–L58–105
A5R741	315–0222–00			RES,FXD,FILM:2.2K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A5R742	315–0243–00			RES,FXD,FILM:24K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A5R755	322–3193–00			RES,FXD:METAL FILM;1K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G10000F
A5R756	315–0362–00			RES,FXD,FILM:3.6K OHM,5%,0.25W	TK1727	SFR25 2322–181–
A5R765	322–3132–00	671–0219–01	671–0219–01	RES,FXD,FILM:232 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G232ROF
A5R766	322–3156–00			RES,FXD,FILM:412 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G412ROF
A5R767	322–3161–00			RES,FXD,FILM:464 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2G464R0F
A5R768	322–3176–00			RES,FXD,FILM:665 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G6650FT
A5R770	322–3179–00			RES,FXD,FILM:715 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G715R0F
A5R815	322–3039–00	671–0219–02		RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50–2–G24R90F
A5R840	322–3164–00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF501G499ROF
A5R841	322–3178–00			RES,FXD,FILM:698 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2G698ROF
A5R842	322–3210–00			RES,FXD:METAL FILM;1.5K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G15000F
A5R855	322–3260–00			RES,FXD,FILM:4.99K OHM,1%,0.2W,TC=T0	91637	CCF501G49900F
A5R856	321–0247–00			RES,FXD,FILM:3.65K OHM,1%,0.125W,TC=T0MI	TK1727	MR25–2322–151–3
A5R868	322–3232–00			RES,FXD,FILM:2.55K OHM,1%,0.2W,TC=T0MI,SMAL L BODY	91637	CCF501G25500F
A5R869	322–3030–00			RES,FXD:METAL FILM;20 OHM,1%,0.2W,TC=100 PP M	91637	CCF50G20R00F
A5R870	315–0150–00	671–0219–03		RES,FXD,FILM:15 OHM,5%,0.25W	TK1727	SFR25 2322–181–
A5R885	322–3132–00	671–0219–02		RES,FXD,FILM:232 OHM,1%,0.2W,TC=T0MI,SMALL BODY	91637	CCF50–2–G232ROF

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A5R915	322–3039–00	671–0219–02		RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50–2–G24R90F
A5R930	322–3085–00			RES,FXD:METAL FILM;75 OHM,1%,0.2W,TC=100 PPM	91637	CCF501G75R00F
A5R935	311–0634–00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3329H–L58–501
A5R956	322–3175–00			RES,FXD,FILM:649 OHM,1%,0.2W,TC=T0,SMALL BODY	91637	CCF50G649R0F
A5R957	322–3222–00			RES,FXD:METAL FILM;2K OHM,1%,0.2W,TC=100 PPM	91637	CCF501G20000F
A5R980	321–0059–00			RES,FXD,FILM:40.2 OHM,0.5%,0.125W,TC=T0 MI	TK1727	MR25 2322–151–9
A5U108	156–0479–02			IC,DIGITAL:LSTTL,GATE	01295	SN74LS32N
A5U220	156–0784–02			IC,DIGITAL:LSTTL,COUNTER	01295	SN74LS163AN
A5U230	156–0530–02	671–0219–01	671–0219–03	IC,DIGITAL:LSTTL,MUX/ENCODER	01295	SN74LS157N
A5U230	156–2159–00	671–0219–04		IC,DIGITAL:ASTTL,MUX;QUAD 2–TO–1 DATASELECTOR, NONINV	01295	SN74AS157N
A5U243	156–1754–01			IC,DIGITAL:ALSTTL,BUFFER;OCTAL,3–STATE	01295	SN74ALS244CN
A5U260	160–4848–00	671–0219–01	671–0219–06	MICROCKT,DGTL:NMOS,8192 X 8 EPROM,PRGMW/3 STATE OUT,2764A,DIP28	80009	160484800
A5U260	160–4848–01	671–0219–07		IC,DIGITAL:CMOS,EPROM;8K X 8 W/3 STATE OUT	80009	160484801
A5U285	160–4850–00			MICROCKT,DGTL:CMOS,2K X 8 REG PROM,PRGMW/3 STATE OUT,CY7C245,DIP24	80009	160485000
A5U309	156–1272–00	671–0219–01	671–0219–01	IC,LINEAR:BIPOLAR,OP–AMP;DUAL,HIGH OUTPUT DRIVE,LOW NOISE	01295	NE5532P
A5U310	156–2459–00	671–0219–02		IC,CONVERTER:BIPOLAR,D/A;12 BIT,VOLTAGEOUT, MPU COMPATIBLE,REFERENCE	24355	AD667JN
A5U330	156–1632–00			IC,MEMORY:CMOS,SRAM;2K X 8,250NS	TK1416	LH5116–10
A5U335	156–0530–02	671–0219–01	671–0219–02	IC,DIGITAL:LSTTL,MUX/ENCODER	01295	SN74LS157N
A5U335	156–2159–00	671–0219–03		IC,DIGITAL:ASTTL,MUX;QUAD 2–TO–1 DATASELECTOR, NONINV	01295	SN74AS157N
A5U343	156–1664–00			IC,DIGITAL:ALSTTL,FLIP FLOP;OCTAL NONINV D–TYPE, 3–STATE	01295	SN74ALS574BN
A5U455	156–2331–00			IC,DIGITAL:LSTTL,COUNTER;8–BIT, WITH STORAGE REGISTER, 3–STATE	01295	SN74LS590N
				MOUNTING PARTS		
	136–0729–00	671–0219–01	671–0219–01	SOCKET,DIP:PCB;FEMALE,STR,2 X 8,16 POS,0.1	09922	DILB16P–108T
				END MOUNTING PARTS		
A5U470	156–2382–00			IC,DIGITAL:ASTTL,FLIP FLOP;OCTAL D–TYPE, 3–STATE	01295	SN74AS374N
				MOUNTING PARTS		
	136–0752–00	671–0219–01	671–0219–01	SKT,PL–IN ELEK:MICROCIRCUIT,20 DIP	09922	DILB20P–108
				END MOUNTING PARTS		
A5U485	156–0316–04			IC,DIGITAL:ECL,TRANSLATOR;QUAD ECL TOTTL	04713	MC10125P
A5U490	156–1173–00			IC,LINEAR:BIPOLAR,VOLTAGE REFERENCE;POSITIVE, 2.5V,1.0%,40PPM,SERIES	04713	MC1403U
A5U530	160–4849–00			MICROCKT,DGTL:CMOS,1024 X 8 PROM,PRGM7C281–45,DIP24	80009	160484900
A5U543	156–2517–00			IC,MEMORY:STTL,ROM;7 X 9 UPPERCASE CHARACTER GENERATOR	80009	156251700
A5U608	156–3289–00	671–0219–02		IC,DIGITAL:HCTCMOS,COUNTER;DUAL 4–BITSYNCH BINARY	1CH66	74HCT4520N
A5U620	160–4851–01	671–0219–02		IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA	80009	160485101
A5U643	156–0402–00			IC,MISC:BIPOLAR,TIMER	27014	LM555CN
A5U655	160–4866–00			IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA	80009	160486600
A5U670	156–1255–00			IC,CONVERTER:BIPOLAR,D/A;8 BIT,85NS,CURRENT	24355	DAC08HP
A5U690	156–0158–07			IC,LINEAR:BIPOLAR,OP–AMP	01295	MC1458P
A5U708	156–1272–00	671–0219–02		IC,LINEAR:BIPOLAR,OP–AMP;DUAL,HIGH OUTPUT DRIVE,LOW NOISE	01295	NE5532P
A5U710	156–2459–00	671–0219–01	671–0219–01	IC,CONVERTER:BIPOLAR,D/A;12 BIT,VOLTAGEOUT, MPU COMPATIBLE,REFERENCE	24355	AD667JN
A5U730	160–4851–00	671–0219–01	671–0219–01	IC,DIGITAL:CMOS,PLD;EEPLD,16V8,25NS,90MA	80009	160485100
A5U815	156–3289–00	671–0219–01	671–0219–01	IC,DIGITAL:HCTCMOS,COUNTER;DUAL 4–BITSYNCH BINARY	1CH66	74HCT4520N
A5U955	156–0534–01			IC,LINEAR:DUAL DIFF AMPL,BURN–INCA3102,MI	34371	93910
A5W209	131–0566–00	671–0219–01	671–0219–01	BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225L	24546	OMA0207

Component Number	Tektronix Part Number	Serial / Assembly Number Effective	Discontinued	Name & Description	Mfr. Code	Mfr. Part Number
A5W210	131–0566–00	671–0219–01	671–0219–01	BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225L	24546	OMA0207
A5CR868	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A5CR965	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A5CR966	152–0141–02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF	27014	FDH9427
A5TP105	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A5TP195	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A5TP510	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A5TP795	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A5TP908	214–0579–00			TERM,TEST POINT:PCB,TEST POINT;EYELET 0.055 /0.045 TIPCHAMFER	0J260	ORDER BY DESC
A6	670–9368–00			CIRCUIT BD ASSY:BNC	80009	670936800
A6J307	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE	22526	48283–018
A6J420	131–0608–00			CONN,TERMINAL:PRESSFIT/PCB;MALE,STR,0.025SQ,0.248 MLG X 0.137 TAIL,50 GOLD,PHZ BRZ,W/FERRULE (QUANTITY 34)	22526	48283–018
A6L118	108–0655–00			COIL,RF:FIXED,63NH	0JR03	108–0655–00
A6L124	108–0655–00			COIL,RF:FIXED,63NH	0JR03	108–0655–00
B100	119–2068–00	B010100	B020789	FAN,TUBEAXIAL:24VDC,20CFM,60 X 60 MM 4800RPM	TK1960	TFDD6024RXA
B100	119–2068–01	B020790		FAN,DC:TUBEAXIAL;24V,4650 RPM,3.84W,18CFM,34DBA, BALL BEARING,60MM X 20MM,9” SLEEVED LEAD W/CONN	TK1960	USTF602024HW–11
J107	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
J134	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
J207	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
J234	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
J407	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
J434	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
J607	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
J634	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
J707	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
J734	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
J907	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
J910	131–3207–00			CONN,RCPT,ELEC:MALE,3 CONTACT (OPTION 01 ONLY)	82389	D3M
J934	131–0955–03			CONN,RF JACK:BNC;FEMALE,STR,SLDR CUP/FRONT HD,D/1 FLAT,SILVER/NICKEL	24931	28JR200–1
W751	174–0080–01			CABLE ASSY,RF:75 OHM COAX,9.0 L	9M860	ORDER BY DESC

Section 9
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.

Overline, parenthesis, or leading slash indicate a low asserting state.

Example: $\overline{\text{ID CONTROL}}$, (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).

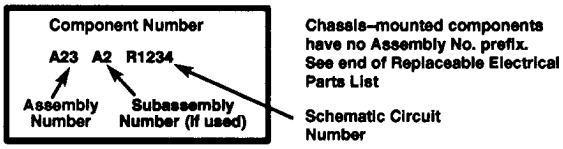
Resistors Ohms (Ω).

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.

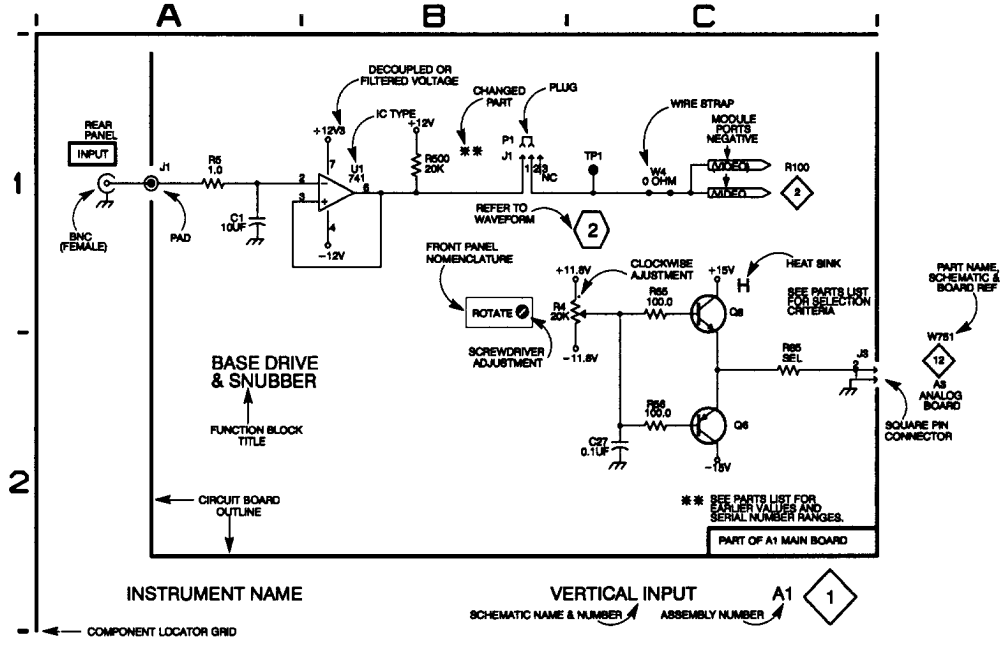
The Replaceable Electrical Parts List is arranged by assembly number in numerical sequence; the components are listed by component number. Example:

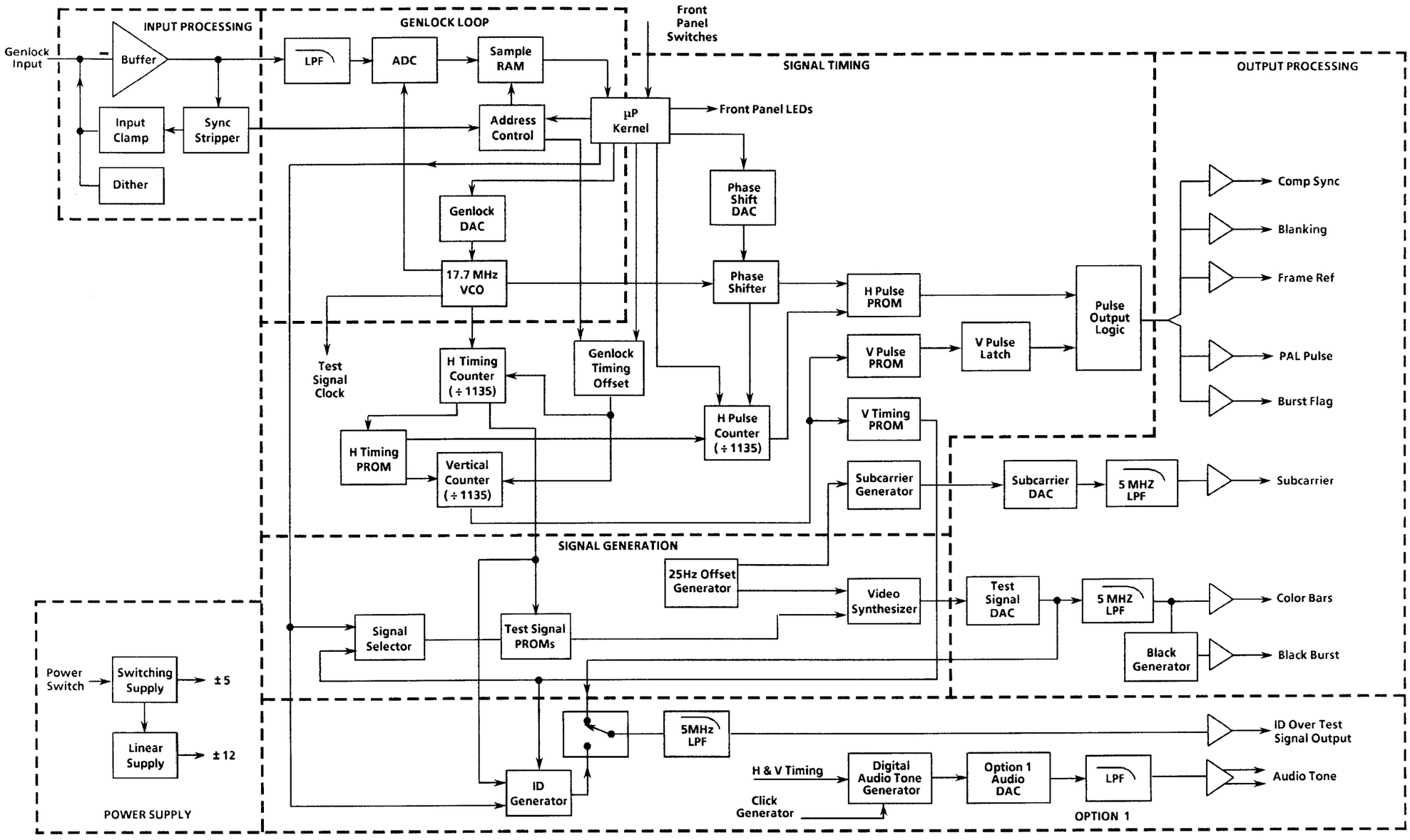


Grid Coordinates

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 will only appear opposite the first diagram; the lookup table will list the diagram number of other diagrams that the other circuitry appears on.



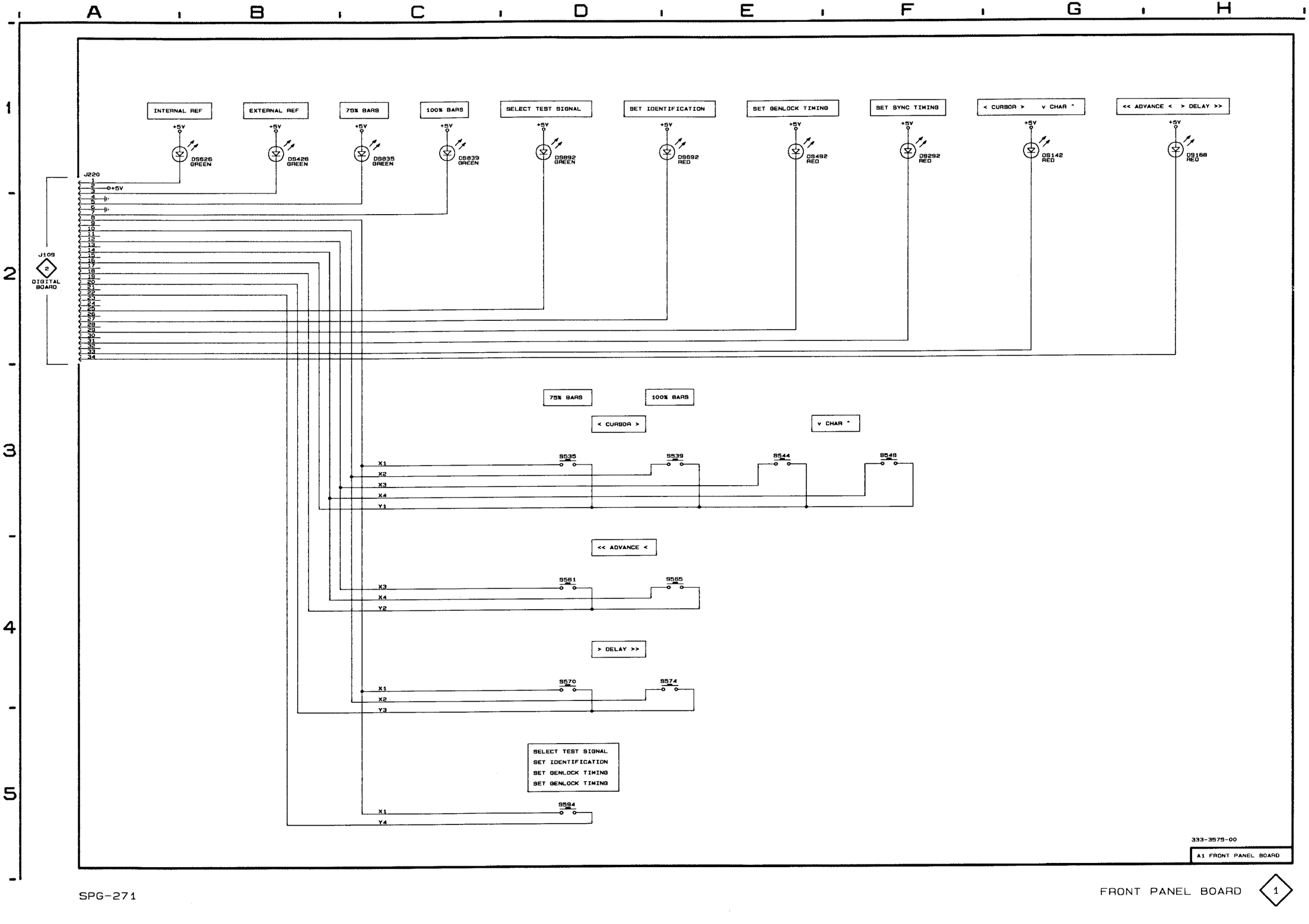


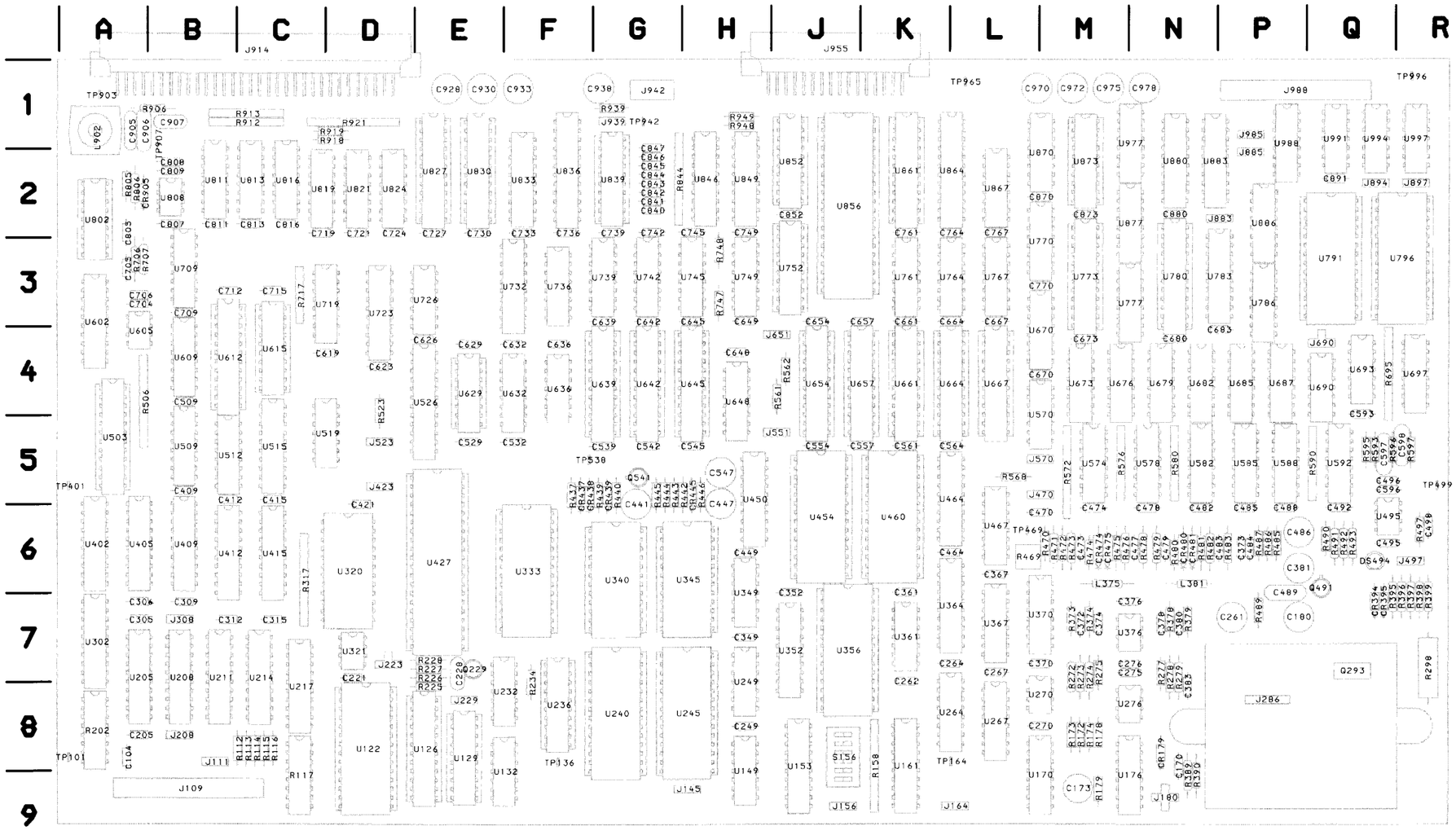
SPG-271 BLOCK DIAGRAM

SCHEMATIC DIAGRAM <1>
LOOK-UP CHART

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.

Circuit Number	Schematic Diagram Location
A1 FRONT PANEL	
DS142	G1
DS168	H1
DS292	F1
DS426	B1
DS492	E1
DS626	A1
DS692	D1
DS835	C1
DS839	C1
DS892	D1
J220	A1
S535	D3
S539	E3
S544	E3
S548	F3
S561	D4
S565	E4
S570	D4
S574	E4
S594	D5


INTERNAL REF
EXTERNAL REF
75% BARS
100% BARS
SELECT TEST SIGNAL
SET IDENTIFICATION
SET GENLOCK TIMING
SET SYNC TIMING
< CURSOR > v CHAR ^
<< ADVANCE < > DELAY >>
+5V
DS626 GREEN
DS426 GREEN
DS835 GREEN
DS839 GREEN
DS892 GREEN
DS692 RED
DS492 RED
DS292 RED
DS142 RED
DS168 RED
J220
J109
2
DIGITAL BOARD
75% BARS
100% BARS
< CURSOR >
v CHAR ^
S535
S539
S544
S548
X1
X2
X3
X4
Y1
<< ADVANCE <
S561
S565
X3
X4
Y2
> DELAY >>
S570
S574
X1
X2
Y3
SELECT TEST SIGNAL
SET IDENTIFICATION
SET GENLOCK TIMING
SET GENLOCK TIMING
S594
X1
Y4
333-3575-00
A1 FRONT PANEL BOARD



A2-1 DIGITAL BOARD (SN B020730 & ABOVE)

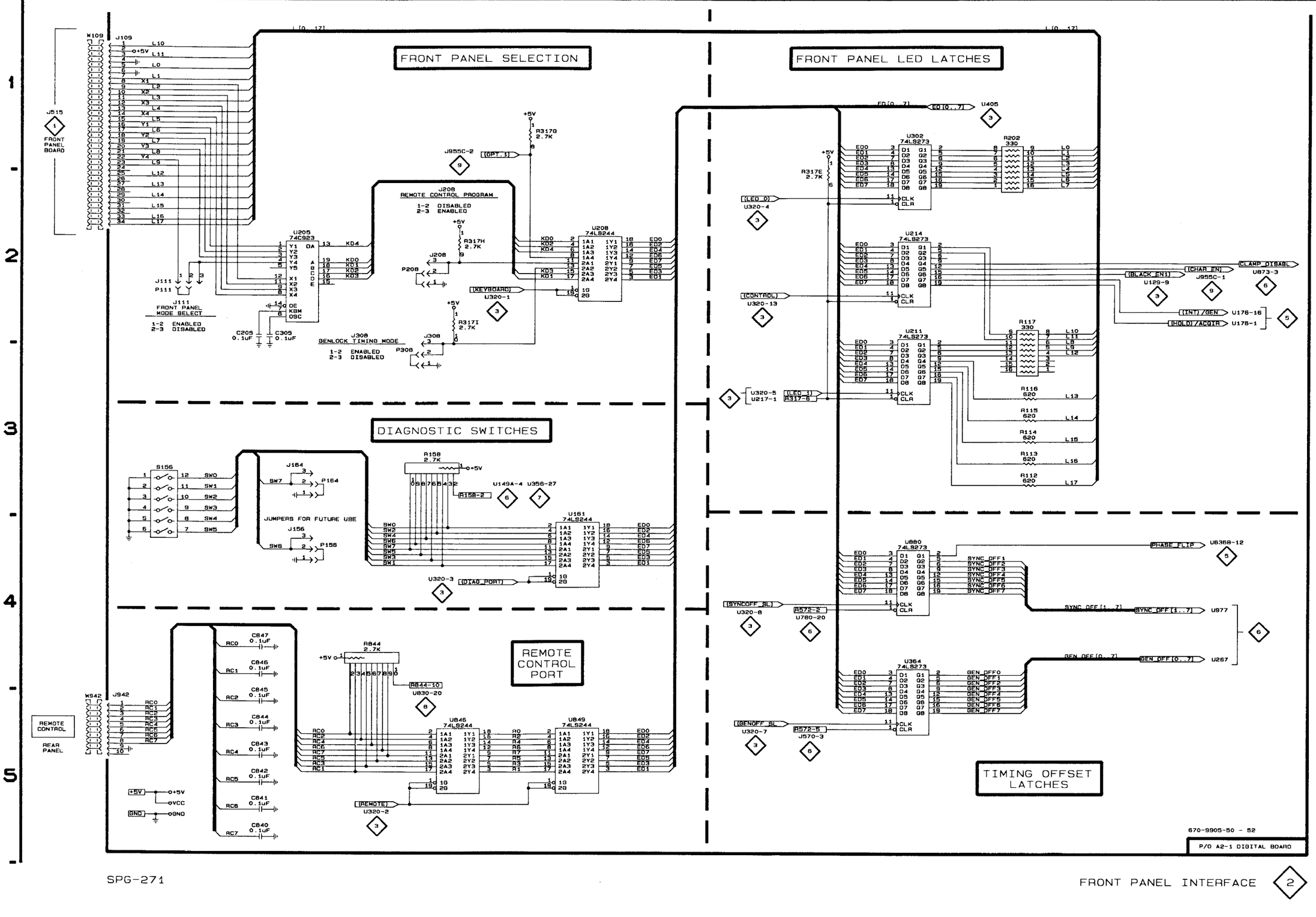
Static Sensitive Devices
See Maintenance Section

SCHEMATIC DIAGRAM <2> LOOK-UP CHART

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.

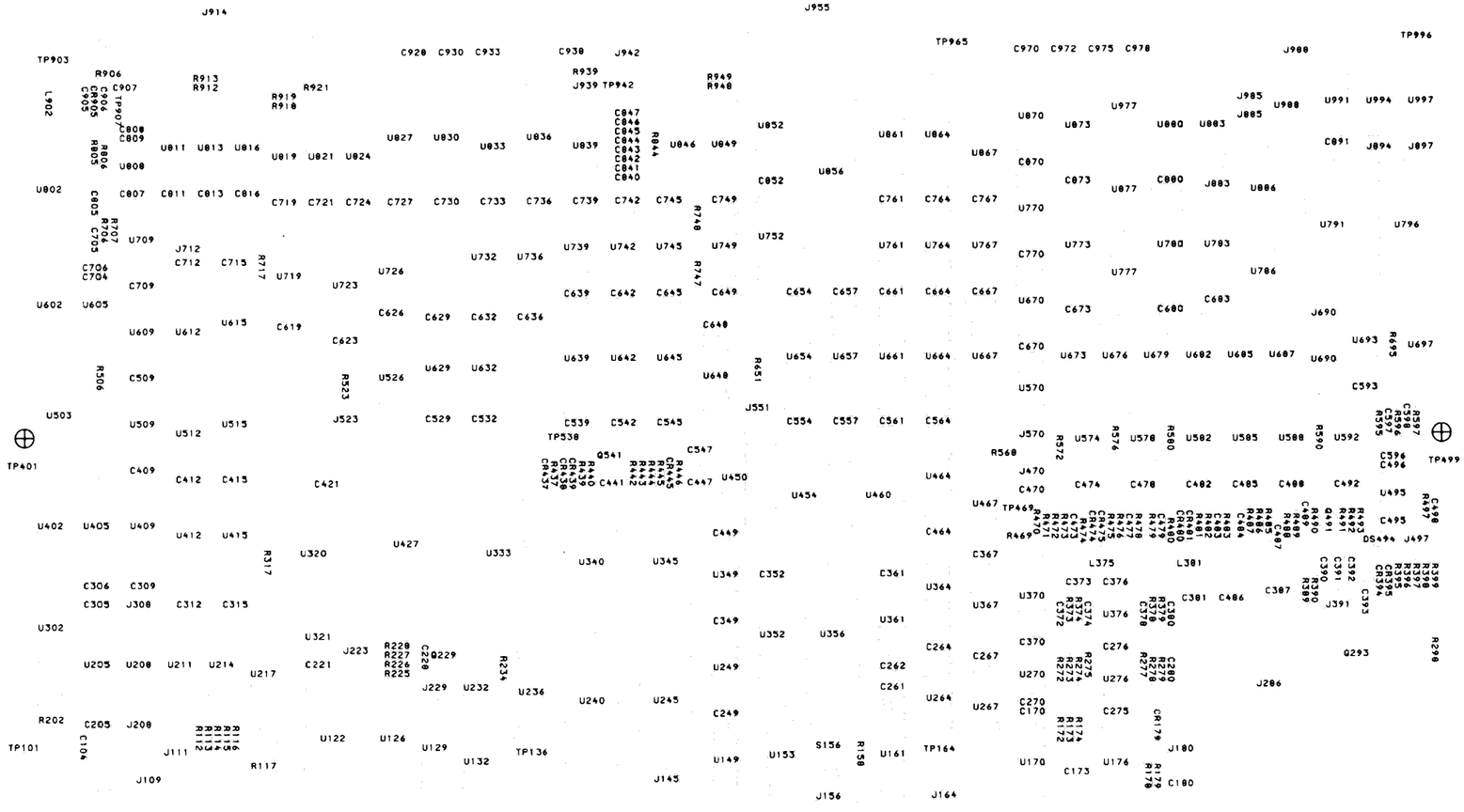
ASSEMBLY A2-1. *Partial Assembly A2-1 also shown on Schematics 3, 4, 5, 6, 7, 8, and 9.*

Circuit Number	Schematic Diagram Location
A2-1 DIGITAL	
C205	B2
C305	B2
C840	B5
C841	B5
C842	B5
C843	B5
C844	B5
C845	B5
C846	B4
C847	B4
J109	A1
J111	A2
J156	B4
J164	B3
J208	C2
J308	C2
J942	A5
P111	A2
P156	B4
P164	B3
P208	C2
P308	C3
R112	G3
R113	G3
R114	G3
R115	G3
R116	G3
R117	G2
R158	C3
R202	G1
R317E	E1
R317G	D1
R317H	C2
R317I	C2
R844	C4
S156	A3
U161	D4
U205	B2
U208	D2
U211	F2
U214	F2
U302	F1
U364	F4
U846	C5
U849	D5
U880	F4
W109	A1
W942	A5



SPG-271

FRONT PANEL INTERFACE 2



Static Sensitive Devices
See Maintenance Section

A2-1 DIGITAL BOARD
(SN B020729 & BELOW)

SCHEMATIC DIAGRAM <3>
LOOK-UP CHART

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 Assembly A2-1 also shown on Schematics 2, 4, 5, 6, 7, 8, and 9.*

Circuit Number	Schematic Diagram Location
A2-1 DIGITAL	
C228	C1
C441	E1
C447	F1
C547	F1
CR437	E1
CR438	E1
CR439	F1
CR445	F2
J223	E1
J229	D1
J423	A4
P223	E1
P229	D1
P423	A4
Q229	C1
Q541	F1
R225	D1
R226	E1
R227	C1
R228	C1
R234	D1
R317A	A3
R317B	A4
R317C	C1
R317D	A5
R317F	B4
R437	E1
R439	F1
R440	E1
R442	F2
R443	E2
R444	E2
R445	F1
R446	F1
R506F	B5
U122	G3
U126	C2
U129	B1
U132A	B1
U132B	A5
U217	G3
U232A	A4
U232B	C1
U232C	C1
U232D	E2
U236	D2
U240	C4
U245	D4
U320	G2
U321	D1
U333	C3
U340	D3
U345	E3
U402	G5
U405	G4
U415	E5
U427	A3
U519A *	B5
U519B *	C5
U723	E4

*See Parts List for earlier serial number ranges.

MICROPROCESSOR, 2.95 MHz CLOCK, & RESET

ADDRESS DECODERS & NV RAM SAVE CONTROL

KERNEL MEMORY

SAMPLE RAM & CHARACTER RAM ADDRESS BUFFERS

DATA I/O

CTC'S

HARD RESET
1-2 ENABLE
2-3 FORCED
1-4 DISABLED

J229 MANUAL RESET*
1-2 NO RESET
2-3 RESET
*NOTE J223 MUST BE POSITION 1-2

J423 SOFT RESET
1-2 ENABLE
2-3 DISABLE

NOTE: ** SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES.

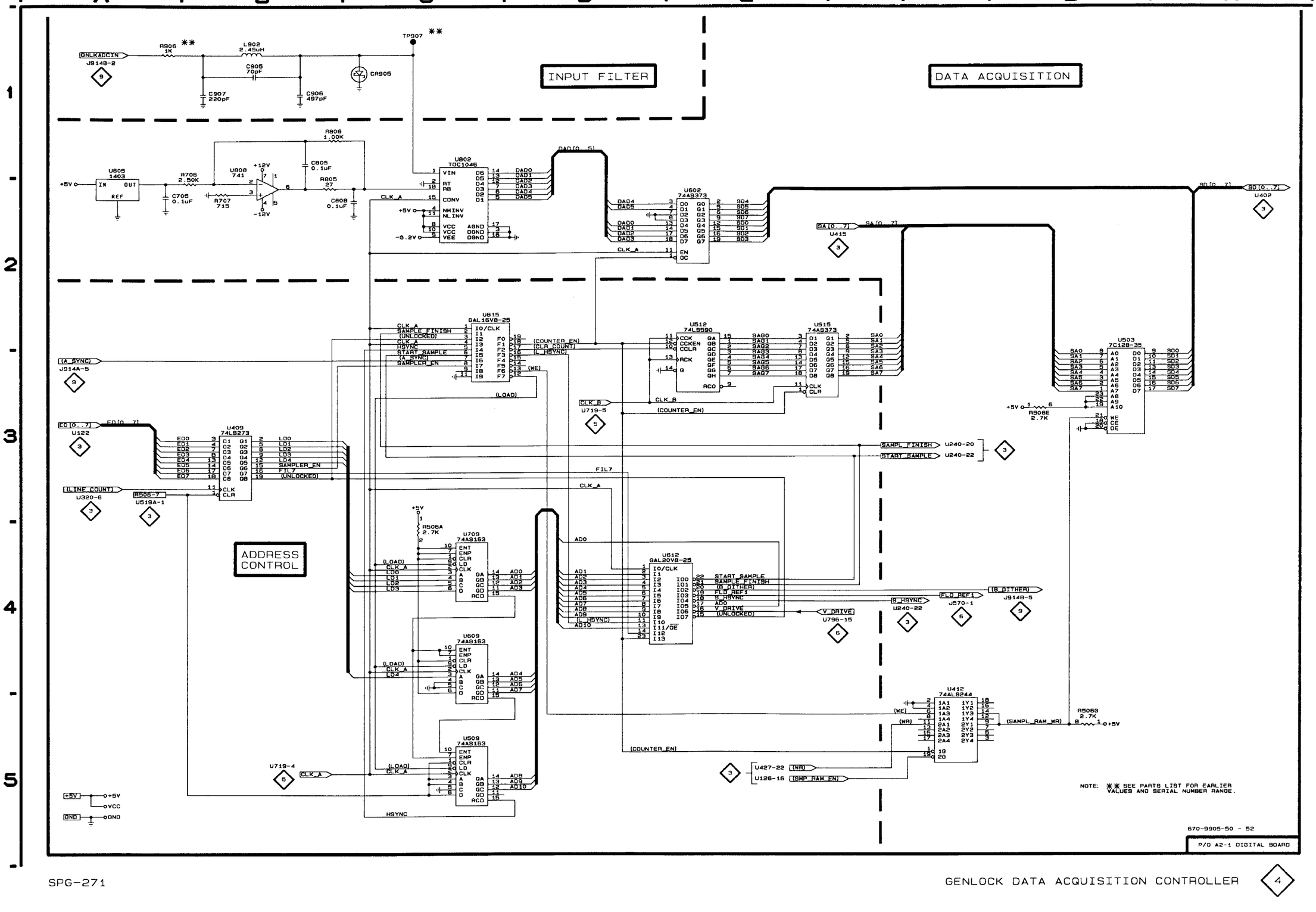
P/O A2-1 DIGITAL BOARD

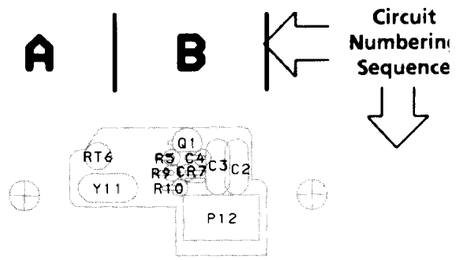
SCHEMATIC DIAGRAM <4> LOOK-UP CHART

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 Assembly A2-1 also shown on Schematics 2, 3, 5, 6, 7, 8, and 9.*

Circuit Number	Schematic Diagram Location
A2-1 DIGITAL	
C705	A2
C805	B1
C808	C2
C905	B1
C906	B1
C907	B1
CR905	C1
L902	B1
R506A	C4
R506E	G3
R506G	G5
R706	B2
R707	B2
R805	B2
R806	B1
R906	A1
TP907	C1
U409	B3
U412	F5
U503	G3
U509	C5
U512	E2
U515	E2
U602	E2
U605	A2
U609	C4
U612	D4
U615	C2
U709	C4
U802	C1
U808	B2


INPUT FILTER
DATA ACQUISITION
ADDRESS CONTROL
GNLKADCIN
J914B-2
R906 1K **
L902 2.45uH
C905 70pF
C907 220pF
C906 497pF
CR905
TP907 **
U605 1403
C705 0.1uF
R706 2.50K
U808 741
R707 715
R806 1.00K
C805 0.1uF
R805 27
C808 0.1uF
U802 TDC1046
CLK_A
DAD[0..5]
U602 74AS373
U415
SA[0..7]
SD[0..7]
U402
U503 7C128-35
R505E 2.7K
(A_SYNC)
J914A-5
U615 BAL16V8-25
(COUNTER_EN)
(CLA COUNT)
(L_HSYNC)
(LOAD)
U512 74ALS590
U515 74AS373
CLK_B
U719-5
ED[0..7]
U122
U409 74ALS273
(LINE COUNT)
U320-6
R506-7
U519A-1
SAMPL_FINISH
U240-20
START SAMPLE
U240-22
FIL7
R506A 2.7K
U709 74AS163
U609 74AS163
U509 74AS163
U719-4
U512 GAL20V8-25
V_DRIVE
U796-15
S_HSYNC
U240-22
FLD_REF1
U570-1
(B_DITHER)
J914B-5
U412 74ALS244
(WE)
(WR)
(SAMPL_RAM_WR)
R505G 2.7K
U427-22 (WR)
U126-16 (SMP RAM EN)
HSYNC
+5V
VCC
GND
NOTE: ** SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGE.
670-9905-50 - 52
P/O A2-1 DIGITAL BOARD



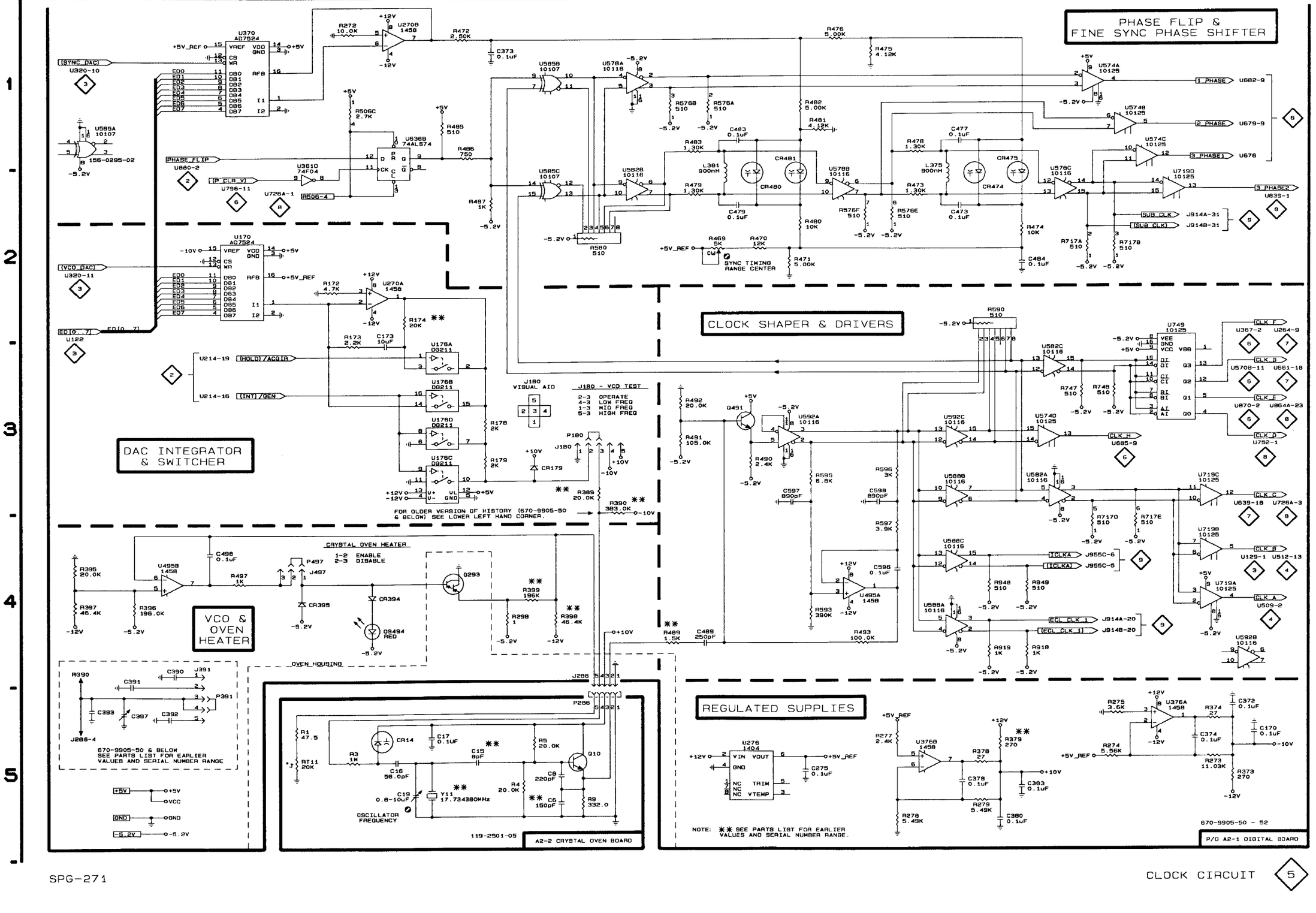
A2-2 OVEN BOARD

SCHEMATIC DIAGRAM <5> LOOK-UP CHART

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 Assembly A2-1 also shown on Schematics 2, 3, 4, 6, 7, 8, and 9.*

Circuit Number	Schematic Diagram Location
A2-1 DIGITAL	
C170	H5
C173	C3
C275	E5
C372	H5
C373	C1
C374	H5
C378	F5
C380	G5
C383	G5
C473	F2
C477	F1
C479	E2
C483	E1
C484	G2
C489	E4
C498	B4
C596	F4
C597	E3
C598	F3
CR179	D3
CR394	C4
CR395	B4
CR474	F1
CR475	G1
CR480	E1
CR481	E1
DS494	C4
J180	D3
J286	D4
J497	B4
L375	F1
L381	E1
P180	D3
P497	B4
Q293	C4
Q491	E3
R172	B2
R173	C3
R174	C2
R178	C3
R179	C3
R272	B1
R273	H5
R274	G5
R275	G5
R277	F5
R278	F5
R279	F5
R298	C4
R373	H5
R374	H5
R378	F5
R379	G5
R389	D3
R390	D3
R395	A4
R396	A4
R397	A4
R398	D4
R399	D4
R469	E2
R470	E2
R471	E2
R472	C1
R473	F2
R474	G2
R475	F1
R476	E1
R478	F1
R479	E2
R480	E2
R481	E1
R482	E1
R483	E1
R485	C1
R486	C1
R487	C2
R489	D4
R490	E3
R491	E3
R492	E3
R493	F4
R497	B4
R576A	E1
R576B	D1
R576E	F2
R576F	F2
R580	D2
R590	F2
R593	E4
R595	E3
R596	F3
R597	F4
R717A	G2
R717B	G2
R717D	G4
R717E	G4
R747	G3
R748	G3
R918	G4
R919	F4
R948	F4
R949	G4
U170	B2
U176A	C3
U176B	C3
U176C	C3
U176D	C3
U270A	C2
U270B	C1
U276	E5
U361D	B2
U370	B1
U376A	G5
U376B	F5
U495A	F4
U495B	A4
R506C	C1
U574A	G1
U574B	G1
U574C	G1
U574D	G3
U578A	D1
U578B	F2
U578C	G2
U582A	G3
U582B	D2
U582C	G3
U585A	A1
U585B	D1
U585C	D2
U588A	F4
U588B	F3
U588C	F4
U592A	E3
U592B	H4
U592C	F3
U636B	C1
U719A	H4
U719B	H4
U719C	H3
U719D	H2
U749	H2
A2-2 OVEN	
C6	D5
C8	D5
C15	C5
C16	C5
C17	C5
C19	C5
CR14	C5
Q10	D5
R1	B5
R3	B5
R4	D5
R5	D5
R9	D5
RT11	B5
Y11	C5

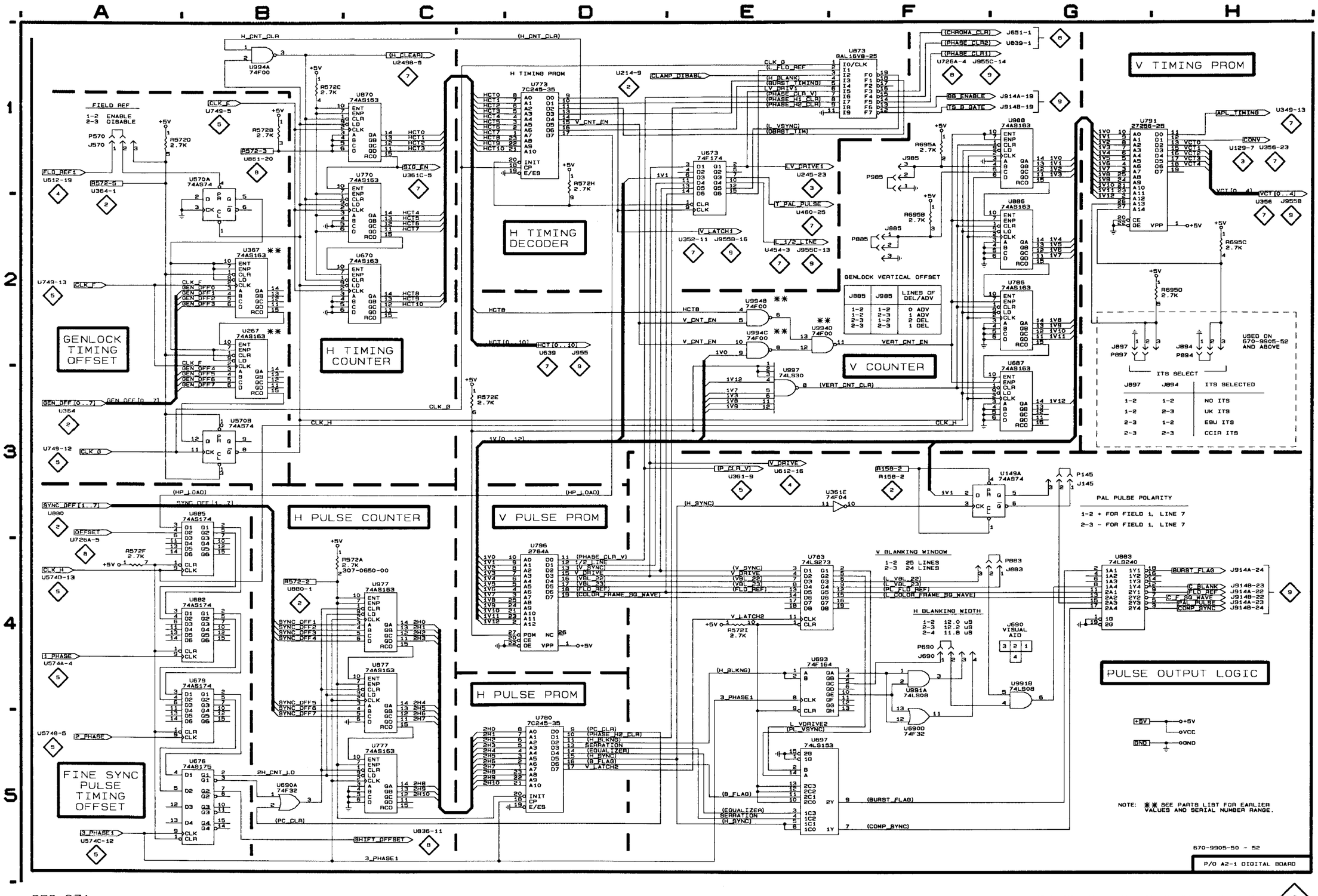

PHASE FLIP & FINE SYNC PHASE SHIFTER
CLOCK SHAPER & DRIVERS
DAC INTEGRATOR & SWITCHER
VCO & OVEN HEATER
REGULATED SUPPLIES
[SYNC DAC]
U320-10
PHASE FLIP
U880-2
(P CLR V)
U796-11
[VCO DAC]
U320-11
ED[0..7]
U122
U214-19 [HOLD]/ACQIA
U214-16 [INT]/GEN
J180 VISUAL AID
J180 - VCO TEST
2-3 OPERATE
4-3 LOW FREQ
1-3 MID FREQ
5-3 HIGH FREQ
FOR OLDER VERSION OF HISTORY (670-9905-50 & BELOW) SEE LOWER LEFT HAND CORNER.
CRYSTAL OVEN HEATER
1-2 ENABLE
2-3 DISABLE
OVEN HOUSING
670-9905-50 & BELOW SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGE
OSCILLATOR FREQUENCY
119-2501-05
A2-2 CRYSTAL OVEN BOARD
SYNC TIMING RANGE CENTER
NOTE: ** SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGE.
670-9905-50 - 52
P/O A2-1 DIGITAL BOARD
1 PHASE
2 PHASE
3 PHASE1
3 PHASE2
SUB CLK
[SUB CLK]
CLK_H
CLK_F
CLK_G
CLK_E
CLK_D
CLK_C
CLK_B
CLK_A
[CLKA]
[ECL CLK 1]

SCHEMATIC DIAGRAM <6> LOOK-UP CHART

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 Assembly A2-1 also shown on Schematics 2, 3, 4, 5, 7, 8, and 9.*

Circuit Number	Schematic Diagram Location
A2-1 DIGITAL	
J145	G3
J570	A1
J690	F4
J883	F4
J885	F2
J894	H2
J897	G2
J985	F1
P145	G3
P570	A1
P690	F4
P883	F4
P885	F2
P894	H2
P897	G2
P985	F1
R572A	B4
R572B	B1
R572C	B1
R572D	A1
R572E	C3
R572F	A4
R572H	D1
R572I	E4
R695A	F1
R695B	F2
R695C	H2
R695D	H2
U149A	F3
U267	B2
U361E	F3
U367	B2
U570A	B1
U570B	B3
U670	C2
U673	E1
U676	B5
U679	B4
U682	B4
U685	B3
U687	G3
U690A	B5
U690D	F4
U693	E4
U697	E5
U770	C1
U773	D1
U777	C5
U780	D5
U783	E4
U786	G2
U791	G1
U796	D4
U870	C1
U873	F1
U877	C4
U883	G4
U886	G2
U977	C4
U988	G1
U991A	F4
U991B	G4
U994A	B1
U994B	E2
U994C	E2
U994D	E2
U997	E2

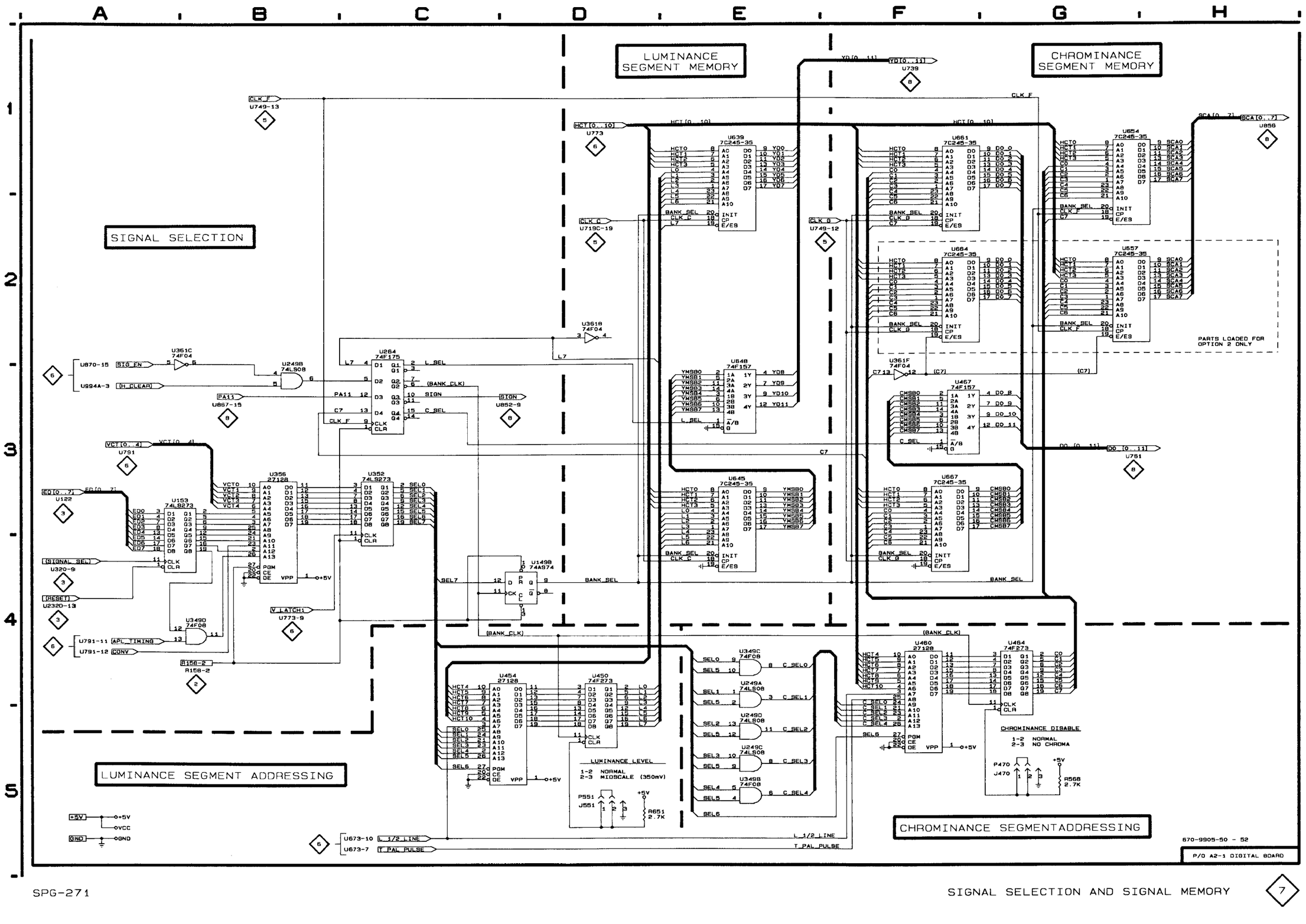

H TIMING DECODER
H TIMING COUNTER
GENLOCK TIMING OFFSET
H PULSE COUNTER
V PULSE PROM
H PULSE PROM
FINE SYNC PULSE TIMING OFFSET
V COUNTER
V TIMING PROM
PULSE OUTPUT LOGIC
GENLOCK VERTICAL OFFSET
V BLANKING WINDOW
H BLANKING WIDTH
PAL PULSE POLARITY
ITS SELECT
USED ON 670-9905-52 AND ABOVE
NOTE: ** SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGE.
670-9905-50 - 52
P/O A2-1 DIGITAL BOARD

SCHEMATIC DIAGRAM <7> LOOK-UP CHART

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 Assembly A2-1 also shown on Schematics 2, 3, 4, 5, 6, 8, and 9.*

Circuit Number	Schematic Diagram Location
A2-1 DIGITAL	
J470	G5
J551	D5
P470	G5
P551	D5
R568	G5
R651	D5
U149B	D4
U153	A3
U249A	E4
U249B	B3
U249C	E5
U249D	E5
U264	C2
U349B	E5
U349C	E4
U349D	B4
U352	C3
U356	B3
U361B	D2
U361C	A2
U361F	F3
U450	D4
U454	C4
U460	F4
U464	G4
U467	F3
U639	E1
U645	E3
U648	E3
U654	G1
U657	G2
U661	F1
U664	F2
U667	F3

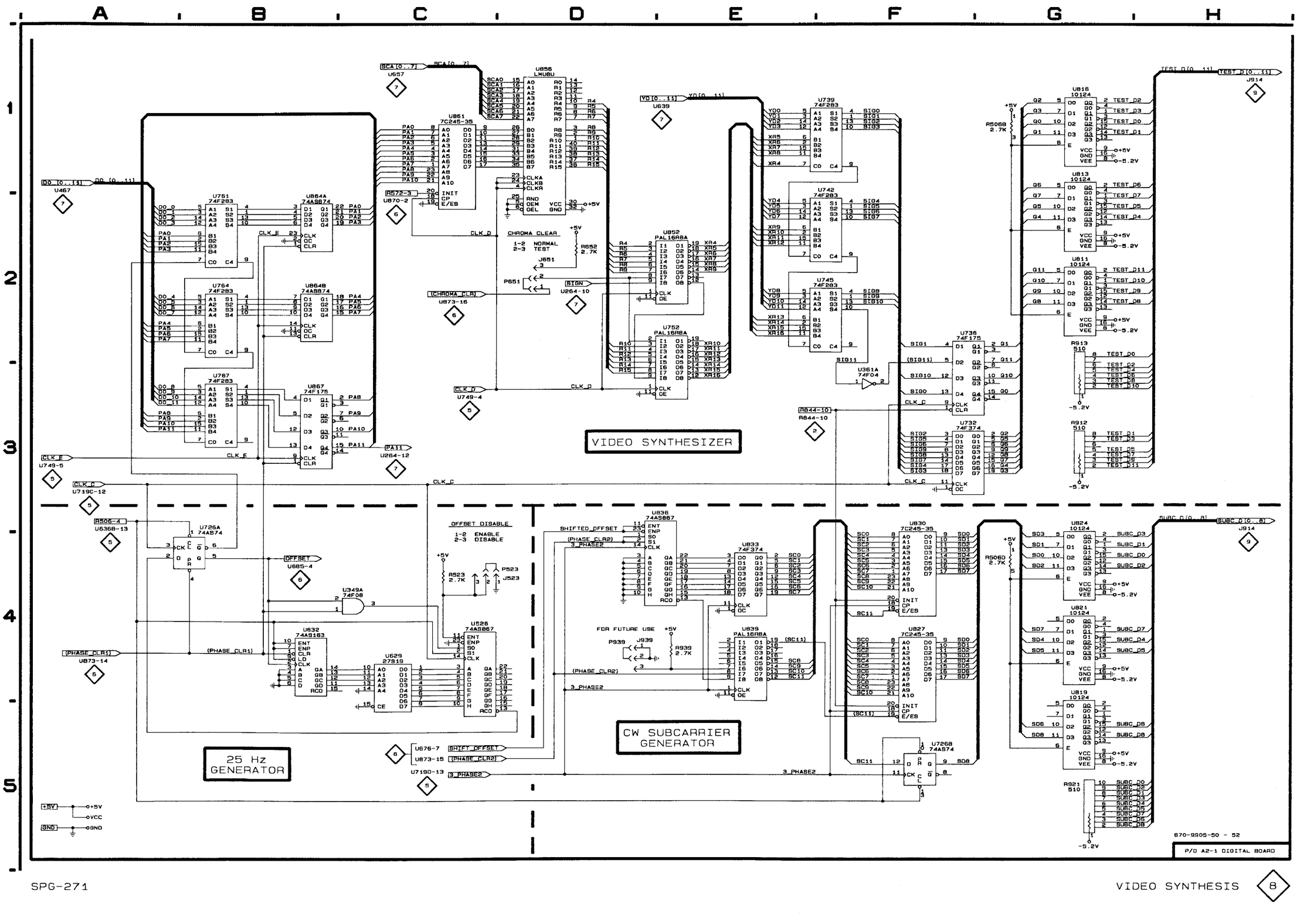

LUMINANCE SEGMENT MEMORY
CHROMINANCE SEGMENT MEMORY
SIGNAL SELECTION
LUMINANCE SEGMENT ADDRESSING
CHROMINANCE SEGMENTADDRESSING
PARTS LOADED FOR OPTION 2 ONLY
LUMINANCE LEVEL
1-2 NORMAL
2-3 MIDSCALE (350mV)
CHROMINANCE DISABLE
1-2 NORMAL
2-3 NO CHROMA
670-9905-50 - 52
P/O A2-1 DIGITAL BOARD

SCHEMATIC DIAGRAM <8> LOOK-UP CHART

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 Assembly A2-1 also shown on Schematics 2, 3, 4, 5, 6, 7, and 9.*

Circuit Number	Schematic Diagram Location
A2-1 DIGITAL	
J523	C4
J651	D2
J939	D4
P523	C4
P651	D2
P939	D4
R506B	G1
R506D	G4
R523	C4
R652	D2
R912	G3
R913	G2
R921	G5
R939	E4
U349A	C4
U361A	F3
U526	C4
U629	C4
U632	B4
U726A	A4
U726B	F5
U732	F3
U736	F2
U739	E1
U742	E2
U745	E2
U752	E2
U761	B2
U764	B2
U767	B3
U811	G2
U813	G1
U816	G1
U819	G5
U821	G4
U824	G4
U827	F4
U830	F4
U833	E4
U836	D3
U839	E4
U852	E2
U856	D1
U861	C1
U864A	B2
U864B	B2
U867	B3

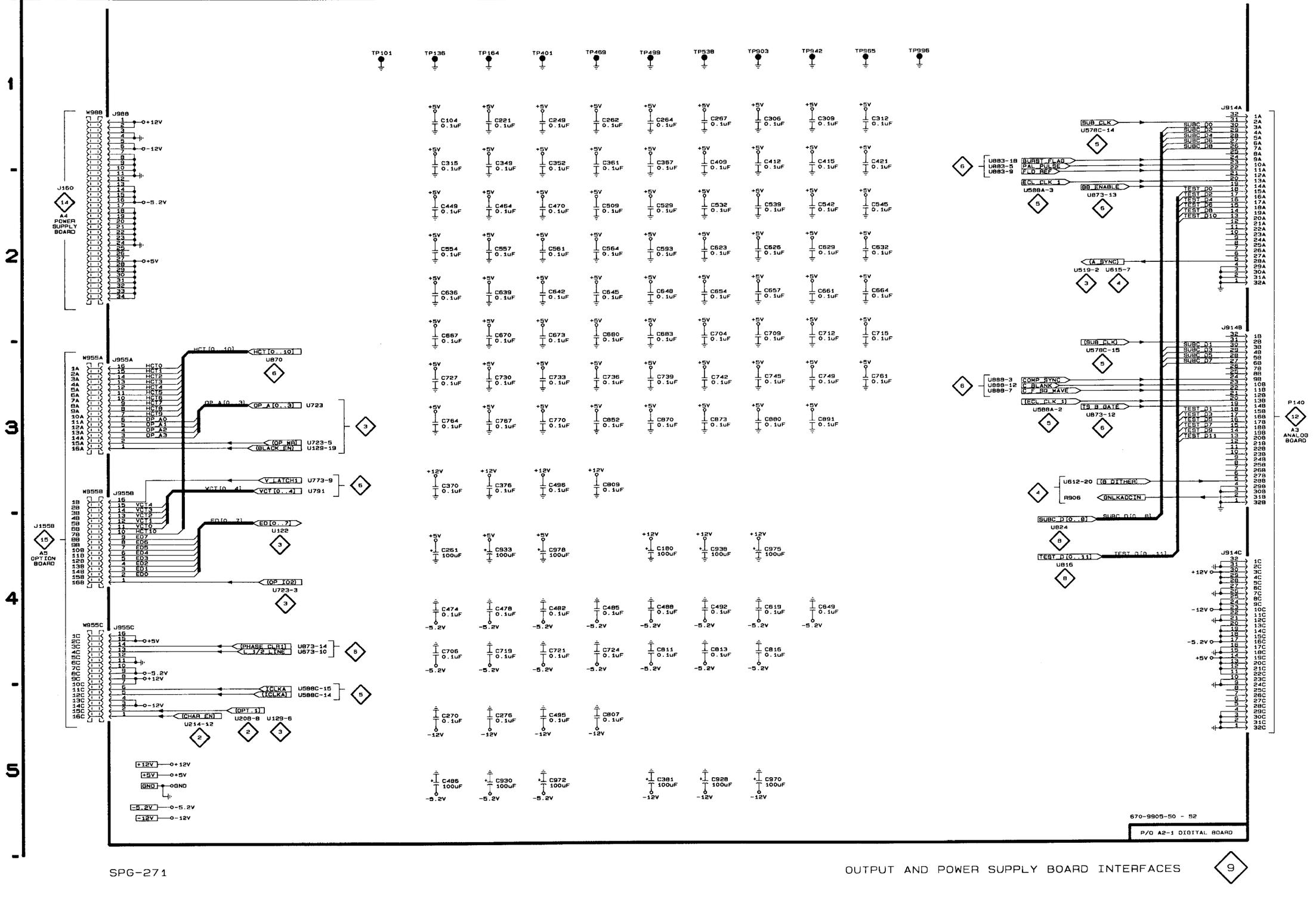

VIDEO SYNTHESIZER
CW SUBCARRIER GENERATOR
25 Hz GENERATOR
U855 LMU8U
U861 7C245-35
U751 74F283
U764 74F283
U767 74F283
U864A 74AS874
U864B 74AS874
U867 74F175
U852 PAL16R8A
U752 PAL16R8A
U739 74F283
U742 74F283
U745 74F283
U736 74F175
U732 74F374
U361A 74F04
U836 74AS867
U833 74F374
U839 PAL16R8A
U830 7C245-35
U827 7C245-35
U726A 74AS74
U726B 74AS74
U349A 74F08
U632 74AS163
U629 27S19
U526 74AS867
U816 10124
U813 10124
U811 10124
U824 10124
U821 10124
U819 10124
CHROMA CLEAR
1-2 NORMAL
2-3 TEST
OFFSET DISABLE
1-2 ENABLE
2-3 DISABLE
FOR FUTURE USE
TEST_D[0..11]
SUBC_D[0..8]
870-9905-50 - 52
P/O A2-1 DIGITAL BOARD

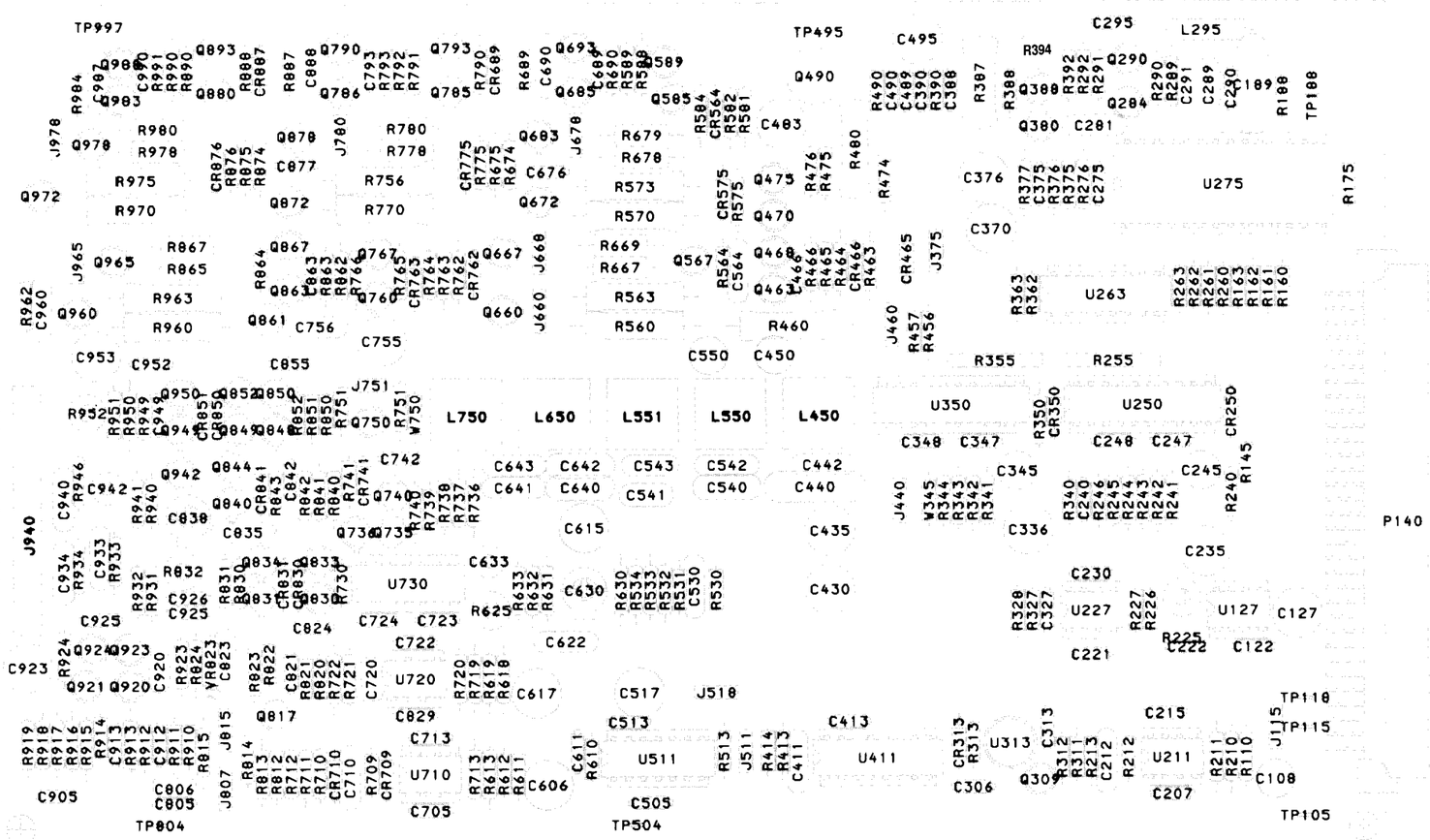
SCHEMATIC DIAGRAM <9> LOOK-UP CHART

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 Assembly A2-1 also shown on Schematics 2, 3, 4, 5, 6, 7, and 8.*

Circuit Number	Schematic Diagram Location
A2-1 DIGITAL	
C104	C1
C180	D4
C221	C1
C249	D1
C261	C4
C262	D1
C264	D1
C267	E1
C270	C5
C276	C5
C306	E1
C309	E1
C312	F1
C315	C1
C349	C1
C352	D1
C361	D1
C367	D1
C370	C3
C376	C3
C381	D5
C409	E1
C412	E1
C415	E1
C421	F1
C449	C2
C464	C2
C470	D2
C474	C4
C478	C4
C482	D4
C485	D4
C486	C5
C488	D4
C492	E4
C495	D5
C496	D3
C509	D2
C529	D2
C532	E2
C539	E2
C542	E2
C545	F2
C554	C2
C557	C2
C561	D2
C564	D2
C593	D2
C619	E4
C623	E2
C626	E2
C629	E2
C632	F2
C636	C2
C639	C2
C642	D2
C645	D2
C648	D2
C649	E4
C654	E2
C657	E2
C661	E2
C664	F2
C667	C2
C670	C2
C673	D2
C680	D2
C683	D2
C704	E2
C706	C4
C709	E2
C712	E2
C715	F2
C719	C4
C721	D4
C724	D4
C727	C3
C730	C3
C733	D3
C736	D3
C739	D3
C742	E3
C745	E3
C749	E3
C761	F3
C764	C3
C767	C3
C770	D3
C807	D5
C809	D3
C811	D4
C813	E4
C816	E4
C852	D3
C870	D3
C873	E3
C880	E3
C891	E3
C928	E5
C930	C5
C933	C4
C938	E4
C970	E5
C972	D5
C975	E4
C978	D4
J914A	H1
J914B	H2
J914C	H4
J955A	A3
J955B	A3
J955C	A4
J988	A1
TP101	C1
TP136	C1
TP164	C1
TP401	D1
TP469	D1
TP499	D1
TP538	E1
TP903	E1
TP942	E1
TP965	F1
TP996	F1


A
B
C
D
E
F
G
H
1
2
3
4
5
TP101
TP136
TP164
TP401
TP469
TP499
TP538
TP903
TP942
TP985
TP996
W988
J988
J160
A4 POWER SUPPLY BOARD
+12V
-12V
-5.2V
+5V
W955A
J955A
HCT[0..10]
HCT[0..10]
U870
OP_A[0..3]
OP_A[0..3]
U723
(OP_WA)
(BLACK_EN)
U723-5
U129-19
V_LATCH1
U773-9
W955B
J955B
VCT[0..4]
VCT[0..4]
U791
ED[0..7]
ED[0..7]
U122
(OP_IO2)
U723-3
J155B
A5 OPTION BOARD
W955C
J955C
(PHASE_CLR1)
L_1/2_LINE
U873-14
U673-10
(TCLKA
(TCLKA)
U588C-15
U588C-14
(CHAR_EN)
U214-12
(OPT.1)
U208-8
U129-6
+12V
+5V
GND
-5.2V
-12V
C104 0.1uF
C221 0.1uF
C249 0.1uF
C262 0.1uF
C264 0.1uF
C267 0.1uF
C306 0.1uF
C309 0.1uF
C312 0.1uF
C315 0.1uF
C349 0.1uF
C352 0.1uF
C361 0.1uF
C387 0.1uF
C409 0.1uF
C412 0.1uF
C415 0.1uF
C421 0.1uF
C449 0.1uF
C464 0.1uF
C470 0.1uF
C509 0.1uF
C529 0.1uF
C532 0.1uF
C539 0.1uF
C542 0.1uF
C545 0.1uF
C554 0.1uF
C557 0.1uF
C561 0.1uF
C564 0.1uF
C593 0.1uF
C623 0.1uF
C626 0.1uF
C629 0.1uF
C632 0.1uF
C636 0.1uF
C639 0.1uF
C642 0.1uF
C645 0.1uF
C648 0.1uF
C654 0.1uF
C657 0.1uF
C661 0.1uF
C664 0.1uF
C667 0.1uF
C670 0.1uF
C673 0.1uF
C680 0.1uF
C683 0.1uF
C704 0.1uF
C709 0.1uF
C712 0.1uF
C715 0.1uF
C727 0.1uF
C730 0.1uF
C733 0.1uF
C736 0.1uF
C739 0.1uF
C742 0.1uF
C745 0.1uF
C749 0.1uF
C761 0.1uF
C764 0.1uF
C767 0.1uF
C770 0.1uF
C852 0.1uF
C870 0.1uF
C873 0.1uF
C880 0.1uF
C891 0.1uF
C370 0.1uF
C376 0.1uF
C496 0.1uF
C809 0.1uF
C261 100uF
C933 100uF
C978 100uF
C180 100uF
C938 100uF
C975 100uF
C474 0.1uF
C478 0.1uF
C482 0.1uF
C485 0.1uF
C488 0.1uF
C492 0.1uF
C619 0.1uF
C649 0.1uF
C706 0.1uF
C719 0.1uF
C721 0.1uF
C724 0.1uF
C811 0.1uF
C813 0.1uF
C816 0.1uF
C270 0.1uF
C276 0.1uF
C495 0.1uF
C807 0.1uF
C485 100uF
C930 100uF
C972 100uF
C381 100uF
C928 100uF
C970 100uF
J914A
J914B
J914C
SUB_CLK
U578C-14
U883-1B
U883-5
U883-9
BURST_FLAG
PAL_PULSE
FLD_REF
ECL_CLK_1
U588A-3
BB_ENABLE
U873-13
TEST_D0
TEST_D1
TEST_D2
TEST_D3
TEST_D4
TEST_D5
TEST_D6
TEST_D7
TEST_D8
TEST_D9
TEST_D10
TEST_D11
(A_SYNC)
U519-2
U615-7
(SUB_CLK)
U578C-15
U888-3
U888-12
U888-7
COMP_SYNC
C_BLANK
C_F_SQ_WAVE
(ECL_CLK_1)
U588A-2
TS_B_GATE
U873-12
SUBC_D0
SUBC_D1
SUBC_D2
SUBC_D3
SUBC_D4
SUBC_D5
SUBC_D6
SUBC_D7
U612-20
(B_DITHER)
R906
GNLKADCIN
SUBC_D[0..8]
SUBC_D[0..8]
U824
TEST_D[0..11]
TEST_D[0..11]
U816
P140
A3 ANALOG BOARD
670-9905-50 - 52
P/O A2-1 DIGITAL BOARD



Static Sensitive Devices
See Maintenance Section

A3 ANALOG BOARD

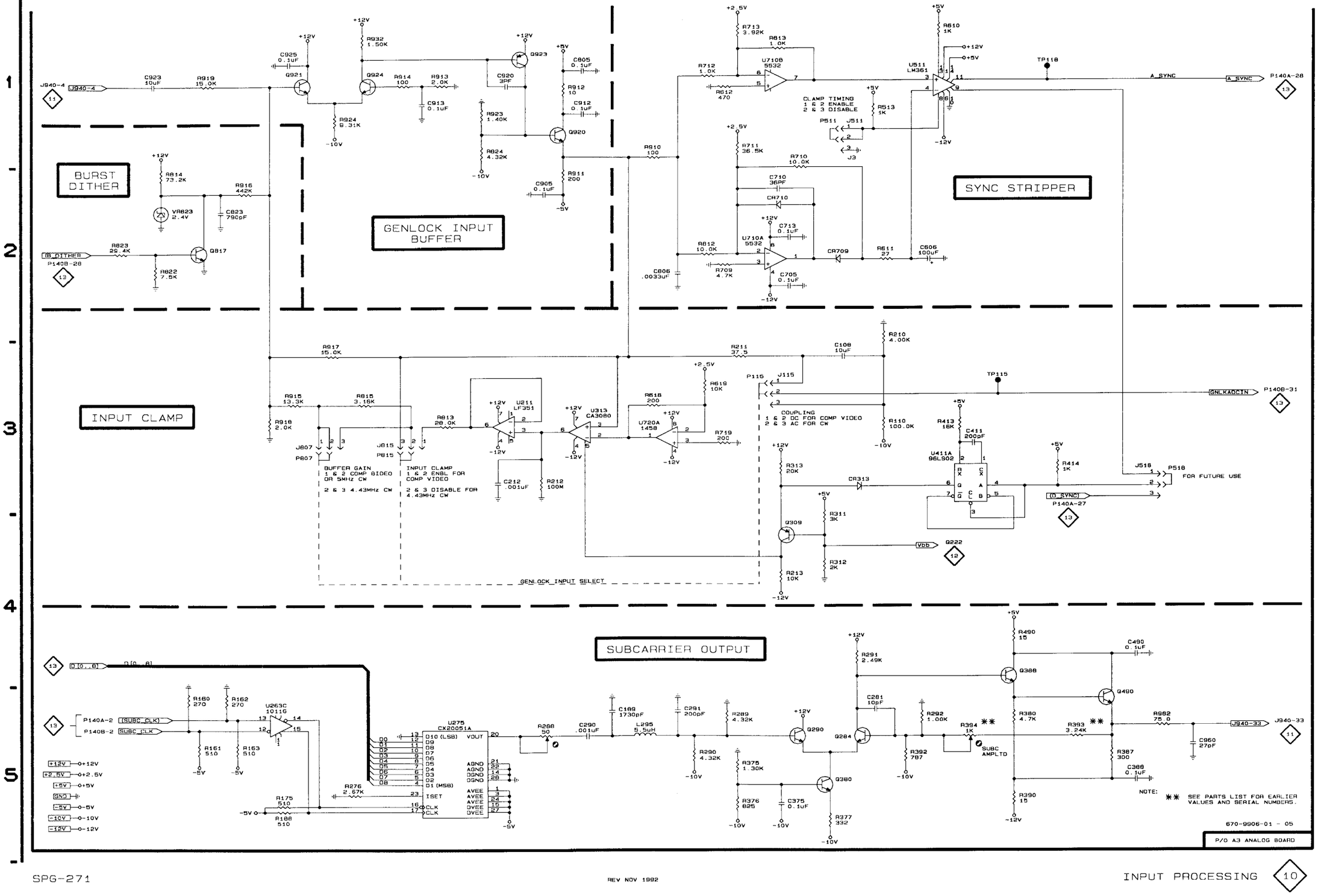
SCHEMATIC DIAGRAM <10> LOOK-UP CHART

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 Assembly A3 also shown on Schematics 11, 12, and 13.*

Circuit Number	Schematic Diagram Location
A3 ANALOG	
C108	F3
C189	D5
C212	C3
C281	F5
C290	D5
C291	E5
C375	E5
C388	G5
C411	F3
C490	G4
C606	F2
C705	E2
C710	E2
C713	E2
C805	D1
C806	E2
C823	B2
C905	D2
C912	D1
C913	C1
C920	C1
C923	A1
C925	B1
C960	H5
CR313	F3
CR709	F2
CR710	E2
J115	E3
J511	F1
J518	G3
J807	B3
J815	C3
L295	D5
P115	E3
P511	E1
P518	H3
P807	B3
P815	C3
Q284	F5
Q290	E5
Q309	E4
Q380	E5
Q388	G4
Q490	G5
Q817	B2
Q920	D1
Q921	B1
Q923	D1
Q924	C1
R110	F3
R160	B5
R161	B5
R162	B5
R163	B5
R175	B5
R188	B5
R210	F2
R211	E3
R212	D3
R213	E4
R276	C5
R288	D5
R289	E5
R290	E5
R291	F4
R292	F5
R311	E3
R312	E4
R313	E3
R375	E5
R376	E5
R377	E5
R380	G5
R387	G5
R390	G5
R392	F5
R393	G5
R394	F5
R413	F3
R414	G3
R490	G4
R513	F1
R610	F1
R611	F2
R612	E1
R613	E1
R618	D3
R619	E3
R709	E2
R710	E1
R711	E1
R712	E1
R713	E1
R719	E3
R812	E2
R813	C3
R814	A2
R815	C3
R822	A2
R823	A2
R824	C1
R910	D1
R911	D2
R912	D1
R913	C1
R914	C1
R915	B3
R916	B2
R917	B3
R918	B3
R919	B1
R923	C1
R924	B1
R932	C1
R962	G5
TP115	F3
TP118	G1
U211	C3
U263C	B5
U275	C5
U313	D3
U411A	F3
U511	F1
U710A	E2
U710B	E1
U720A	D3
VR823	A2

* See Parts List for earlier serial number ranges.


BURST DITHER
GENLOCK INPUT BUFFER
SYNC STRIPPER
INPUT CLAMP
SUBCARRIER OUTPUT
GENLOCK INPUT SELECT
J940-4
C923 10uF
R919 15.0K
C925 0.1uF
Q921
R932 1.50K
Q924
R914 100
R913 2.0K
C913 0.1uF
R924 9.31K
-10V
Q923
C920 3PF
R923 1.40K
R824 4.32K
Q920
C805 0.1uF
R912 10
C912 0.1uF
C905 0.1uF
R811 200
-5V
R810 100
R814 73.2K
R816 442K
VR823 2.4V
C823 790pF
(B_DITHER)
P1408-28
R823 26.4K
Q817
R822 7.5K
R713 3.92K
R613 1.0K
R712 1.0K
U710B 5532
R612 470
U511 LM361
TP118
A_SYNC
P140A-28
CLAMP TIMING
1 & 2 ENABLE
2 & 3 DISABLE
P511 J511
J3
R513 1K
R711 36.5K
R710 10.0K
C710 36PF
CR710
C713 0.1uF
U710A 5532
R812 10.0K
R709 4.7K
C806 .0033uF
CR709
R611 27
C606 100uF
C705 0.1uF
R817 15.0K
R915 13.3K
R815 3.16K
R918 2.0K
J807
P807
BUFFER GAIN
1 & 2 COMP VIDEO OR SMHz CW
2 & 3 4.43MHz CW
J815
P815
INPUT CLAMP
1 & 2 ENBL FOR COMP VIDEO
2 & 3 DISABLE FOR 4.43MHz CW
R813 28.0K
U211 LF351
C212 .001uF
R212 100M
U313 CA3080
R618 200
U720A 1458
R719 200
R619 10K
R211 37.5
C108 10uF
R210 4.00K
P116 J115
COUPLING
1 & 2 DC FOR COMP VIDEO
2 & 3 AC FOR CW
R110 100.0K
TP115
GNLKADCIN
P1408-31
R413 16K
C411 200pF
U411A 96LS02
R313 20K
CR313
R414 1K
J518
P518
FOR FUTURE USE
(D_SYNC)
P140A-27
R311 3K
Q309
Vbb
Q222
R312 2K
R213 10K
D[0..8]
P140A-2 (SUBC CLK)
P1408-2 SUBC CLK
R160 270
R162 270
U263C 1011G
R161 510
R163 510
U275 CX20051A
D10 (LSB)
D1 (MSB)
VOUT
ISET
CLK
AGND
DGND
AVEE
DVEE
R276 2.67K
R175 510
R188 510
R286 50
C290 .001uF
L295 5.5uH
C169 1730pF
C291 200pF
R289 4.32K
R290 4.32K
R375 1.30K
R376 825
C375 0.1uF
Q290
Q284
Q380
R377 332
R291 2.49K
C281 10pF
R292 1.00K
R392 787
R394 1K
SUBC AMPLTD
R490 15
Q388
C490 0.1uF
Q490
R380 4.7K
R393 3.24K
R387 300
C388 0.1uF
R390 15
R662 75.0
C960 27pF
J940-33
NOTE: ** SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBERS.
+12V o+12V
+2.5V o+2.5V
+5V o+5V
GND
-5V o-5V
-10V o-10V
-12V o-12V
670-9906-01 - 05
P/O A3 ANALOG BOARD

SCHEMATIC DIAGRAM <11> LOOK-UP CHART

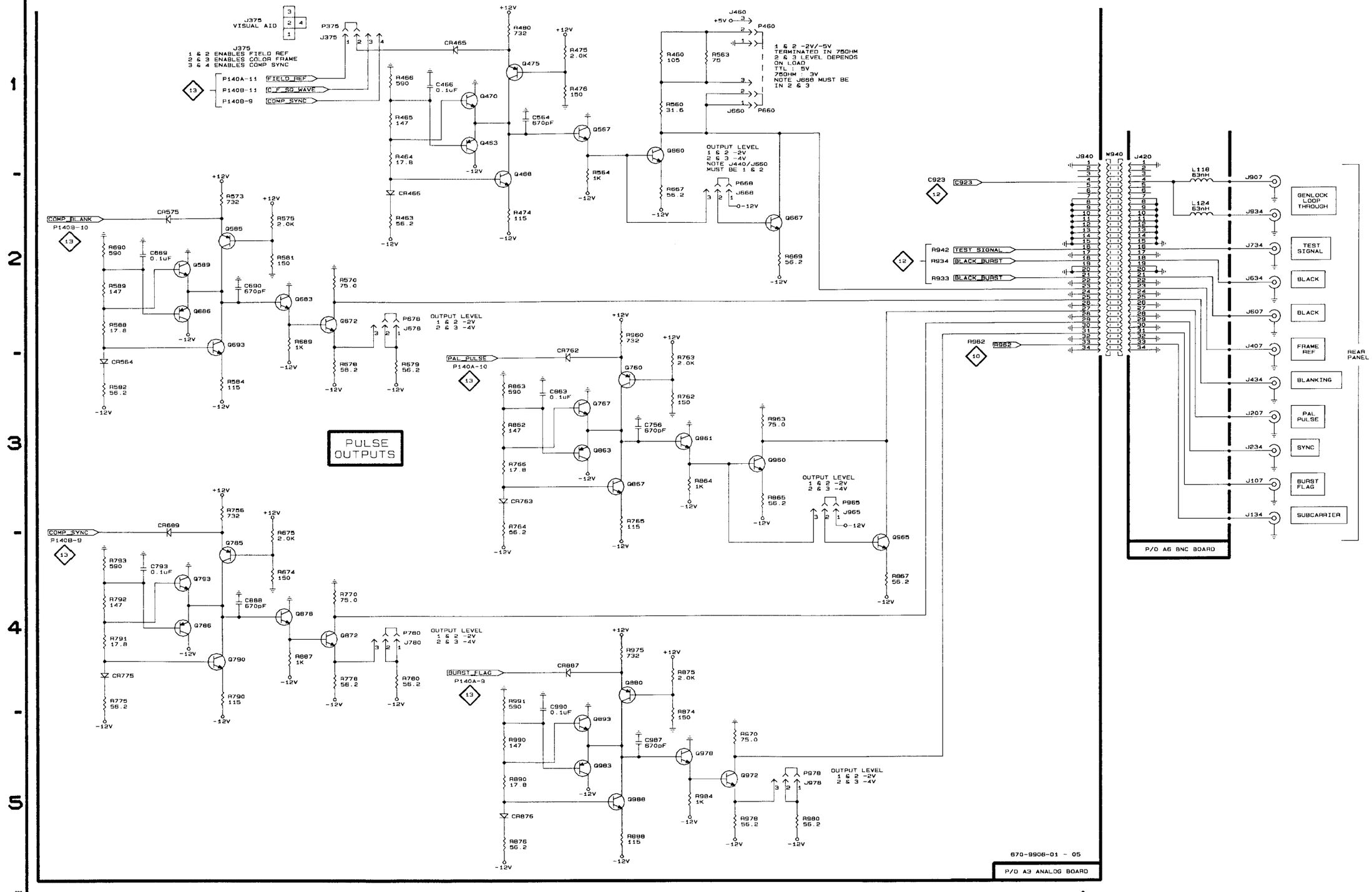
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A3. *Partial Assembly A3 also shown on Schematics 10, 12, and 13.*

Circuit Number	Schematic Diagram Location
A3 ANALOG	
C466	C1
C564	C1
C689	A2
C690	B2
C756	D3
C793	A4
C863	D3
C888	B4
C987	D5
C990	D4
CR465	C1
CR466	C2
CR564	A3
CR575	A2
CR689	A3
CR762	D3
CR763	C3
CR775	A4
CR876	C5
CR887	D4
J107	H3
J134	H3
J207	H3
J234	H3
J375	B1
J407	H2
J420	G1
J434	H3
J460	E1
J607	H2
J634	H2
J660	E1
J668	E2
J678	C2
J734	H2
J780	C4
J907	H2
J934	H2
J940	G1
J965	E3
J978	E5
L118	G2
L124	G2
P375	B1
P460	E1
P660	E1
P668	E2
P678	C2
P780	C4
P965	E3
P978	E5
Q463	C1
Q468	C1
Q470	C1
Q475	C1
Q567	D1
Q585	B2
Q589	A2
Q660	D1
Q667	E2
Q672	B2
Q683	B2
Q686	A2
Q693	B2
Q760	D3
Q767	D3
Q785	B4
Q786	A4
Q790	B4
Q793	A4
Q861	D3
Q863	D3
Q867	D3
Q872	B4
Q878	B4
Q880	D4
Q893	D5
Q960	E3
Q965	F4
Q972	E5
Q978	D5
Q983	D5
Q988	D5
R460	D1
R463	C2
R464	C1
R465	C1
R466	C1
R474	C2
R475	D1
R476	D1
R480	C1
R560	D1
R563	E1
R564	D1
R570	B2
R573	B2
R575	B2
R581	B2
R582	A3
R584	B3
R588	A2
R589	A2
R667	D2
R669	E2
R674	B4
R675	B3
R678	B3
R679	C3
R689	B2
R690	A2
R756	B3
R762	D3
R763	D3
R764	C3
R765	D3
R766	C3
R770	B4
R775	A4
R778	B4
R780	C4
R790	B4
R791	A4
R792	A4
R793	A4
R862	C3
R863	C3
R864	D3
R865	E3
R867	F4
R874	D4
R875	D4
R876	C5
R887	B4
R888	D5
R890	C5
R960	D2
R963	E3
R970	E5
R975	D4
R978	E5
R980	E5
R984	D5
R990	C5
R991	C4

*** See Parts List for earlier serial number ranges.**

PULSE OUTPUTS



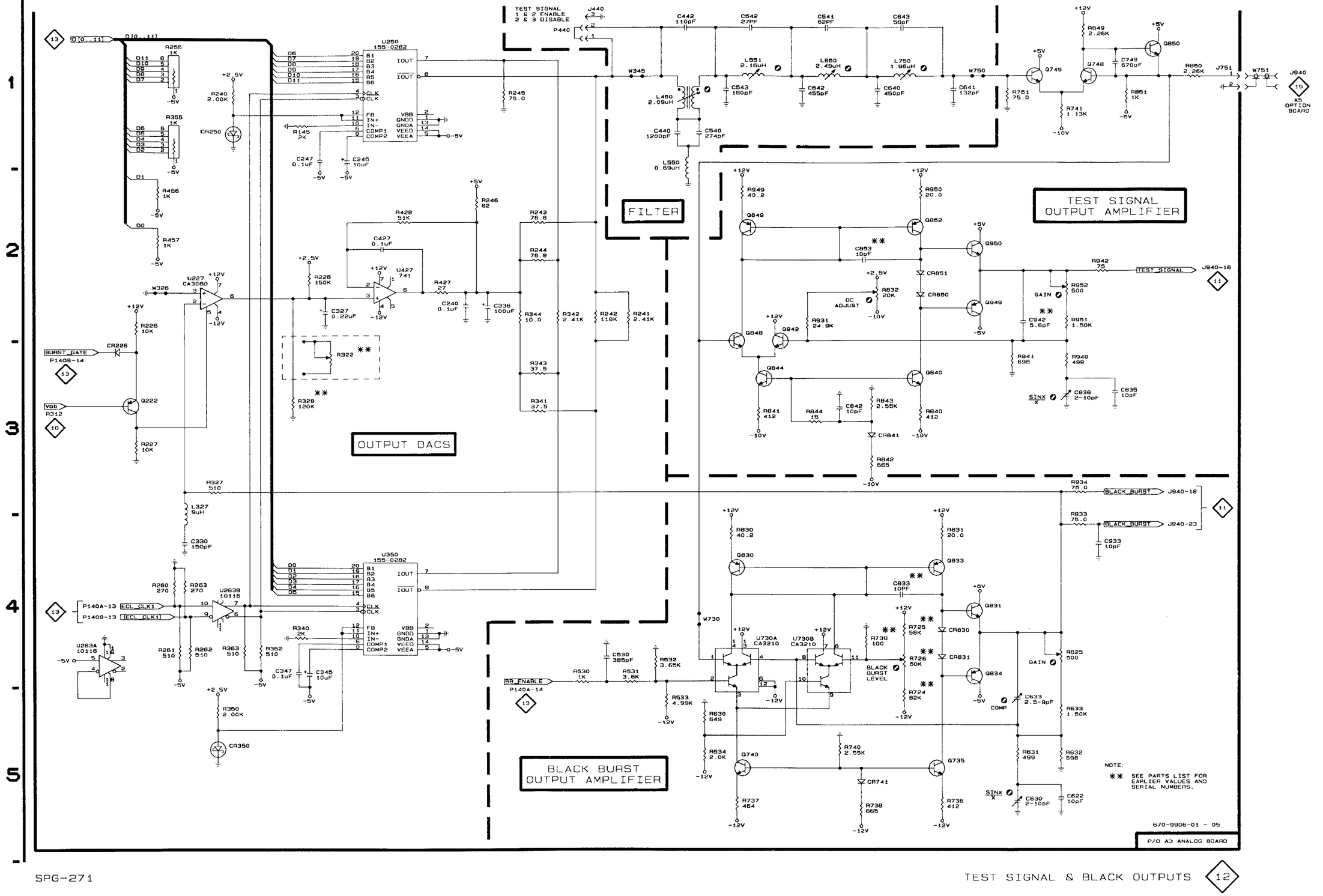
SCHEMATIC DIAGRAM <12> LOOK-UP CHART

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, 11, and 13.*

Circuit Number	Schematic Diagram Location
A3 ANALOG	
C240	C2
C245	B1
C247	B1
C327	B2
C330	A4
C336	C2
C345	B4
C347	B4
C427	C2
C440	E1
C442	E1
C530	D4
C540	E1
C541	E1
C542	E1
C543	E1
C622	G5
C630	G5
C633	G5
C640	F1
C641	F1
C642	E1
C643	F1
C749	G1
C833 *	F4
C835	G3
C838	G3
C842	F3
C853 *	F2
C933	G4
C942	G2
CR226	A3
CR250	B1
CR350	B5
CR741	F5
CR830	F4
CR831	F4
CR841	F3
CR850	F2
CR851	F2
J440	D1
J751	H1
L327	A3
L450	E1
L550	E1
L551	E1
L650	E1
L750	F1
P440	D1
Q222	A3
Q735	F5
Q740	E5
Q745	G1
Q748	G1
Q830	E4
Q831	F4
Q833	F4
Q834	F4
Q840	F3
Q844	E3
Q848	E2
Q849	E2
Q850	G1
Q852	F2
Q942	E2
Q949	F2
Q950	F2
R145	B1
R226	A2
R227	A3
R228	B2
R240	B1
R241	D2
R242	D2
R243	D2
R244	D2
R245	C1
R246	C2
R255	A1
R260	A4
R261	A4
R262	B4
R263	A4
R322 *	B2
R327	B3
R328	B3
R340	B4
R341	D3
R342	D2
R343	D3
R344	D2
R350	B5
R355	A1
R362	B4
R363	B4
R427	C2
R428	C2
R456	A2
R457	A2
R530	D4
R531	D4
R532	D4
R533	D5
R534	E5
R625	G4
R630	E5
R631	G5
R632	G5
R633	G5
R724 *	F5
R725 *	F4
R726 *	F4
R736	F5
R737	E5
R738	F5
R739 *	F4
R740	F5
R741	G1
R751	G1
R830	E4
R831	F4
R832	F2
R840	F3
R841	E3
R842	F3
R843	F3
R844	E3
R849	G1
R850	H1
R851	G1
R931	E2
R933	G4
R934	G3
R940	G3
R941	G3
R942	G2
R949	E2
R950	F2
R951	G2
R952	G2
U227	B2
U250	C1
U263A	A4
U263B	B4
U350	C4
U427	C2
U730A	E4
U730B	E4
W326	A2
W345	D1
W730	E4
W739 *	E5
W750	F1
W751	H1

*** See Parts List for earlier serial number ranges.**


TEST SIGNAL
1 & 2 ENABLE
2 & 3 DISABLE
J440
P440
C442 110pF
C542 27pF
C541 82pF
C643 56pF
L551 2.16uH
L650 2.45uH
L750 1.96uH
W345
W750
L450 2.09uH
C440 1200pF
C540 274pF
L550 0.69uH
C543 150pF
C642 455pF
C640 450pF
C641 132pF
R751 75.0
Q745
R741 1.13K
-10V
+12V
R849 2.26K
+5V
Q850
Q748
C749 470pF
R851 1K
-5V
R850 2.26K
J751
W751
J940
15
A5 OPTION 8CARD
FILTER
TEST SIGNAL
OUTPUT AMPLIFIER
D10..11
D0..11
R255 1K
R355 1K
-5V
+2.5V
R240 2.00K
CR250
U250
155-0282
D5
D7
D8
D9
D10
D11
B1
B2
B3
B4
B5
B6
IOUT
CLK
FB
IN+
IN-
COMP1
COMP2
VBB
GNDD
GNDA
VEED
VEEA
R245 75.0
R145 2K
C247 0.1uF
C245 10uF
D6
D5
D4
D3
D2
D1
D0
R466 1K
R457 1K
R246 82
R428 51K
C427 0.1uF
R243 76.8
R244 76.8
R344 10.0
R342 2.41K
R242 118K
R241 2.41K
R343 37.5
R341 37.5
R228 150K
U227
CA3080
U427
741
R427 27
C240 0.1uF
C336 100uF
C327 0.22uF
W326
R322
R328 120K
OUTPUT DACS
R849 40.2
R950 20.0
Q849
Q852
C853 10pF
Q950
CR851
CR850
Q949
R942 75
TEST SIGNAL
J940-16
11
GAIN
R952 500
R951 1.50K
R941 698
R940 499
C942 5.6pF
SINX
C838 2-10pF
C835 10pF
R832 20K
QC ADJUST
R931 24.9K
Q942
Q848
Q844
Q840
R841 412
R844 15
C842 10pF
R843 2.55K
R840 412
CR841
R842 665
R226 10K
CR226
BURST GATE
P140B-14
13
Vbb
R312
10
Q222
R227 10K
R327 510
L327 9uH
C330 150pF
U350
155-0282
R260 270
R263 270
U263B
10116
P140A-13
ECL CLK1
P140B-13
(ECL CLK1)
U263A
10116
R261 510
R262 510
R363 510
R362 510
R340 2K
C347 0.1uF
C345 10uF
R350 2.00K
CR350
R934 75.0
BLACK BURST
J940-18
R833 75.0
J940-23
C933 10pF
R830 40.2
R831 20.0
Q830
Q833
C833 10PF
Q831
W730
U730A
CA3210
U730B
CA3210
R730 100
R725 56K
R726 50K
R724 82K
CR830
CR831
Q834
BLACK BURST LEVEL
R625 500
GAIN
C633 2.5-9pF
COMP
R633 1.50K
R631 499
R632 698
C630 2-10pF
C622 10pF
SINX
BB_ENABLE
P140A-14
R530 1K
C530 385pF
R531 3.6K
R532 3.65K
R533 4.99K
R630 649
R534 2.0K
Q740
Q735
R740 2.55K
CR741
R738 665
R737 464
R736 412
BLACK BURST
OUTPUT AMPLIFIER
NOTE:
** SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBERS.
670-9906-01 - 05
P/O A3 ANALOG BOARD

SCHEMATIC DIAGRAM <13> LOOK-UP CHART

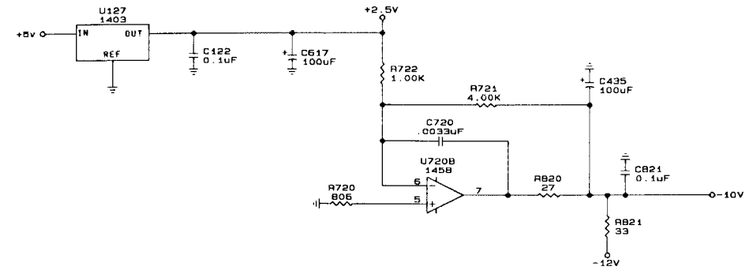
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

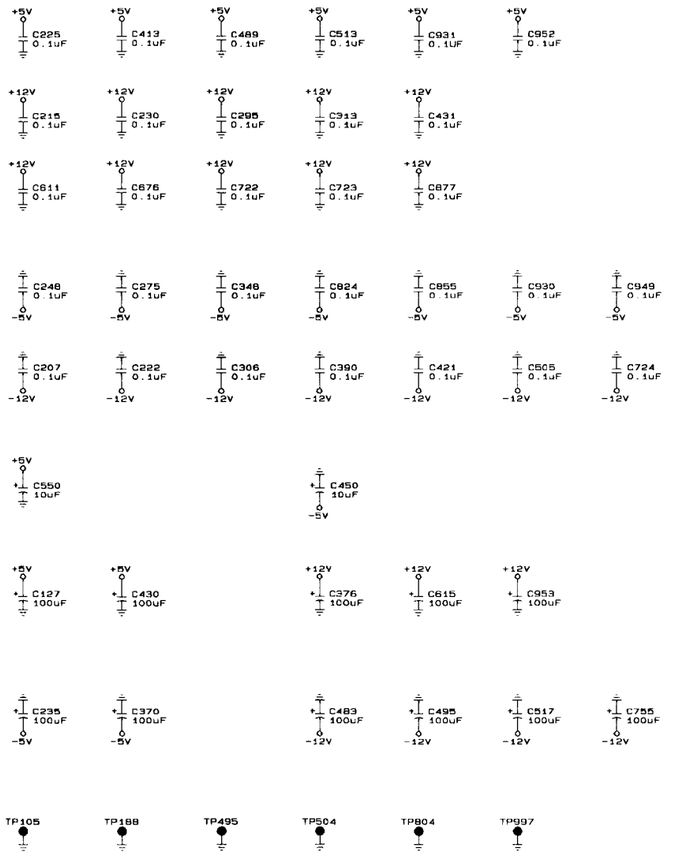
ASSEMBLY A3. *Partial Assembly A3 also shown on Schematics 10, 11, and 12.*

Circuit Number	Schematic Diagram Location
A3 ANALOG	
C122	E1
C127	E4
C207	E3
C215	E2
C222	E3
C225	E2
C230	E2
C235	E5
C248	E3
C275	E3
C295	E2
C306	E3
C313	F2
C348	E3
C370	E5
C376	F4
C390	F3
C413	E2
C421	F3
C430	E4
C431	F2
C435	G1
C450	F4
C483	F5
C489	E2
C495	F5
C505	F3
C513	F2
C517	F5
C550	E4
C611	E3
C615	F4
C617	F1
C676	E3
C720	F1
C722	E3
C723	F3
C724	G3
C755	G5
C821	G2
C824	F3
C829	G3
C855	F3
C877	F3
C930	F3
C931	F2
C949	G3
C952	F2
C953	F4
P140A	A1
P140B	A2
P140C	A4
R720	F2
R721	G1
R722	F1
R820	G2
R821	G2
TP105	E5
TP188	E5
TP495	E5
TP504	F5
TP804	F5
TP997	F5
U127	E1
U720B	F2

*** See Parts List for earlier serial number ranges.**

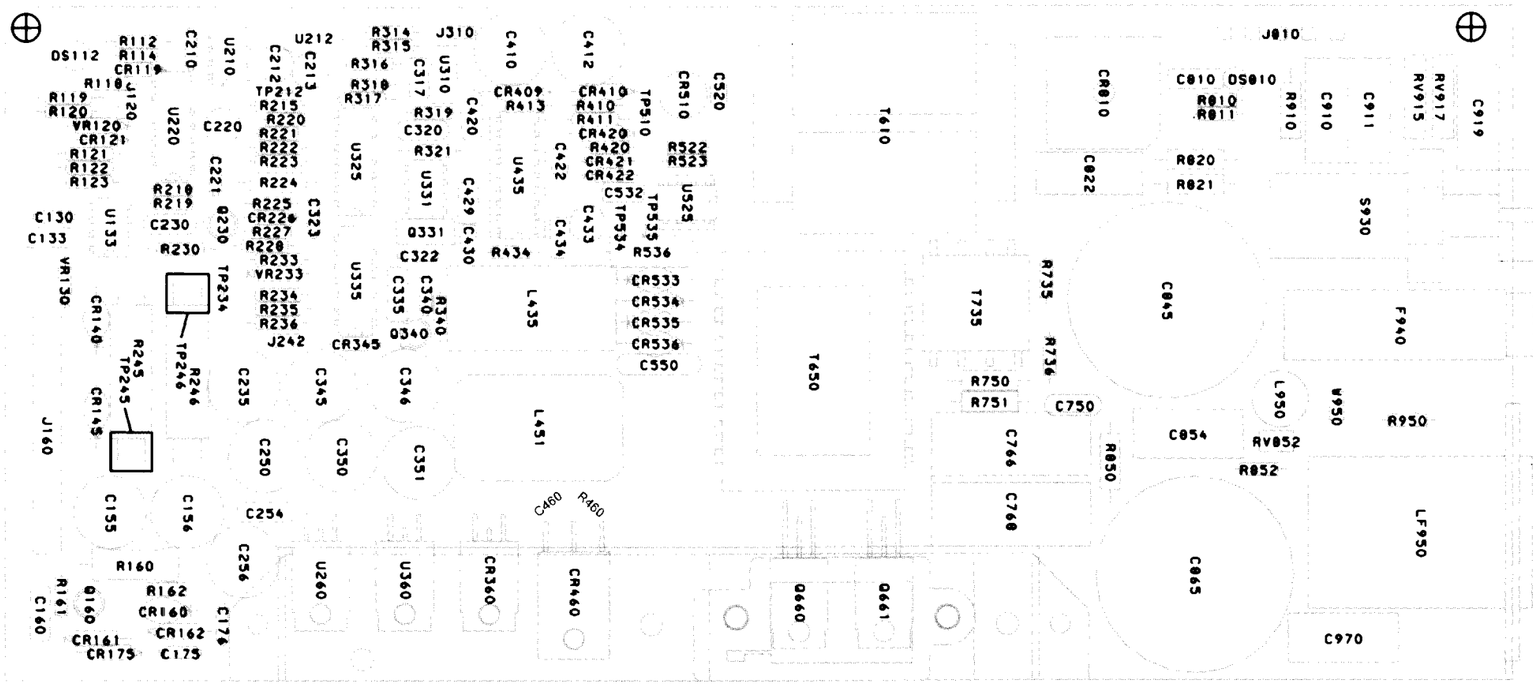
POWER





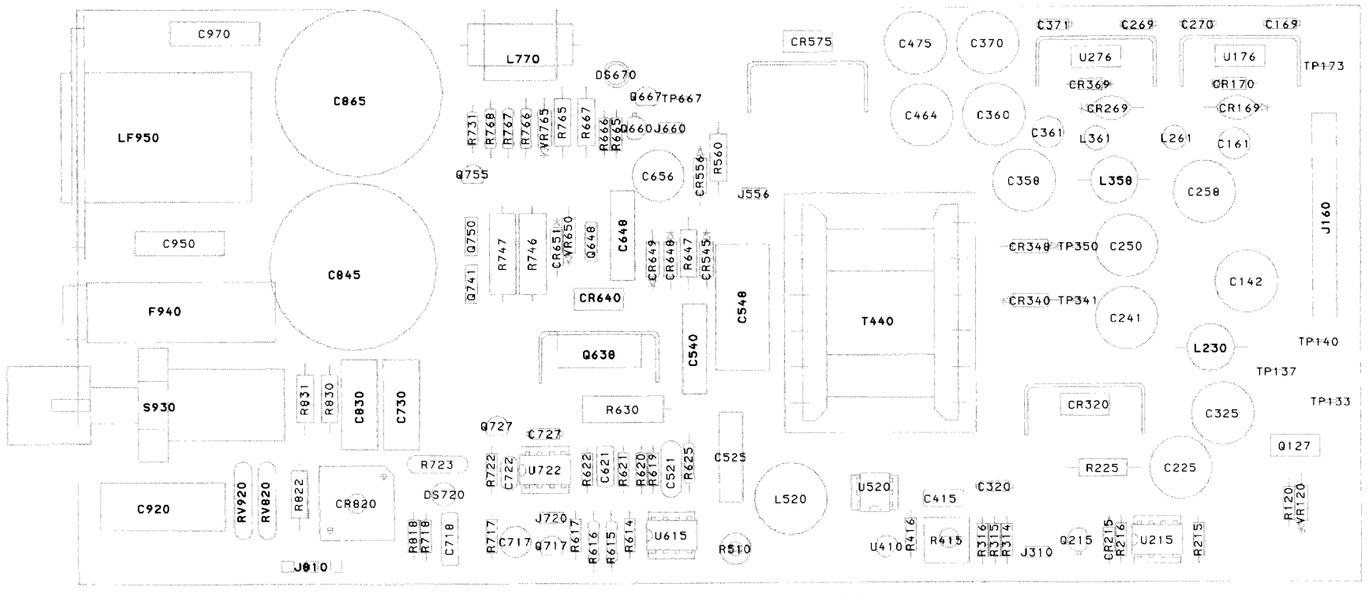
870-9908-01 - 05

P/O A3 ANALOG BOARD



Static Sensitive Devices
See Maintenance Section

A4 POWER SUPPLY BOARD (SN B019999 & BELOW)



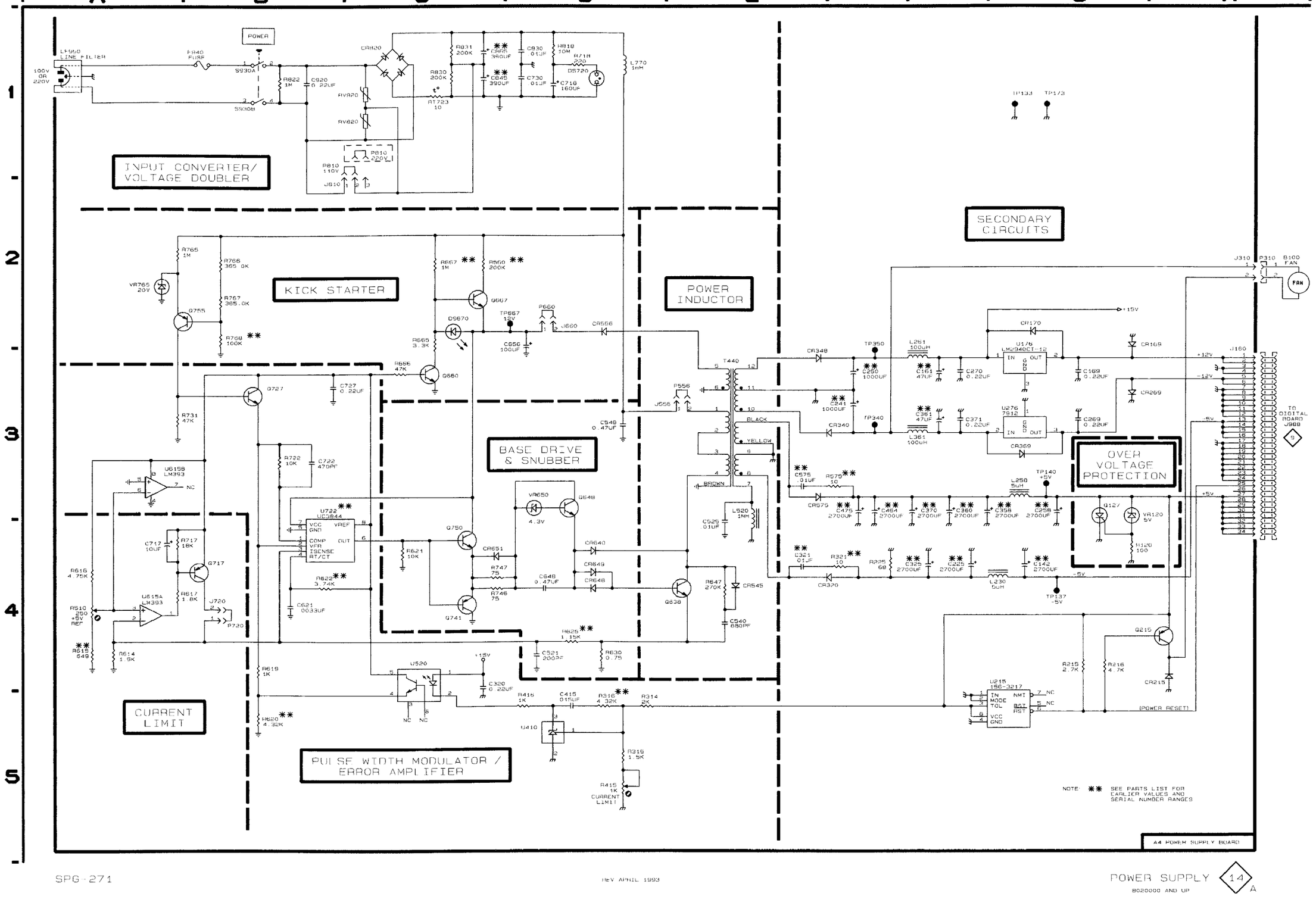
A4 POWER SUPPLY BOARD (SN B020000 & ABOVE)

SCHEMATIC DIAGRAM <14>A LOOK-UP CHART

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.

Circuit Number	Schematic Diagram Location
A4 POWER SUPPLY	
B100	H2
C142	G4
C161	F3
C169	G3
C225	F4
C241	F3
C250	F3
C258	G3
C269	G3
C270	F3
C320	C4
C321	E4
C325	F4
C358	F3
C360	F3
C361	F3
C370	F3
C371	F3
C415	D5
C464	F3
C475	F3
C521	D4
C525	E4
C540	E4
C548	D3
C575	E3
C621	B4
C648	D4
C656	D2
C717	A4
C718	D1
C722	B3
C727	B3
C730	D1
C830	D1
C845	C1
C865	C1
C920	B1
CR169	G2
CR170	G2
CR215	H4
CR269	G3
CR320	F4
CR340	F3
CR348	E3
CR369	G3
CR545	E4
CR556	D2
CR575	E3
CR640	D4
CR648	D4
CR649	D4
CR651	C4
CR820	C1
DS670	C2
DS720	D1
F940	B1
J160	H3
J310	H2
J556	E3
J660	D2
J720	B4
J810	B2
L230	F4
L258	G3
L261	F3
L361	F3
L520	E3
L770	D1
LF950	A1
P310	H2
P556	E3
P660	D2
P720	B4
P810	B1
P810	C1
Q127	G3
Q215	H4
Q638	E4
Q648	D3
Q660	C3
Q667	C2
Q717	B4
Q727	B3
Q741	C4
Q750	C4
Q755	A2
R120	G4
R215	G4
R216	G4
R225	F4
R314	D5
R315	D5
R316	D5
R321	F4
R415	D5
R416	D5
R510	A4
R560	C2
R575	F3
R614	A4
R615	A4
R616	A4
R617	A4
R619	B4
R620	B5
R621	C4
R622	B4
R625	D4
R630	D4
R647	E4
R665	C2
R666	C3
R667	C2
R717	A4
R722	B3
R731	A3
R746	C4
R747	C4
R765	A2
R766	B2
R767	B2
R768	B2
R818	D1
R822	B1
R830	C1
R831	C1
RT723	C1
RV820	C1
RV920	C1
S930A	B1
S930B	B1
T440	E3
TP133	G1
TP137	G4
TP140	G3
TP173	G1
TP340	F3
TP350	F3
TP667	D2
U176	G3
U215	G5
U276	G3
U410	D5
U520	C4
U615A	A4
U615B	A3
U722	B4
VR120	G3
VR650	D3
VR765	A2

* See Parts List for earlier serial number ranges.


INPUT CONVERTER/ VOLTAGE DOUBLER
KICK STARTER
POWER INDUCTOR
BASE DRIVE & SNUBBER
CURRENT LIMIT
PULSE WIDTH MODULATOR / ERROR AMPLIFIER
SECONDARY CIRCUITS
OVER VOLTAGE PROTECTION
POWER
LF950 LINE FILTER
100V OR 220V
F940 FUSE
S930A
S930B
R822 1M
C920 0.22UF
CR820
RV920
RV820
P810 110V
P810 220V
J810
R831 200K
CR85 390UF
C830 .01UF
R818 10M
R718 220
DS720
C718 160UF
R830 200K
RT723 10
C845 390UF
C730 .01UF
L770 1mH
TP133
TP173
R765 1M
R766 365.0K
R767 365.0K
R768 100K
VR765 20V
Q755
R667 1M
R660 200K
Q667
DS670
TP667 12V
P660
J660
CR556
C656 100UF
R665 3.3K
R656 47K
Q660
Q727
C727 0.22UF
R731 47K
R722 10K
C722 470PF
U615B LM393
U615A LM393
C717 10UF
R717 18K
Q717
R617 1.8K
R616 4.75K
R610 250 +5V REF
J720
P720
R614 1.9K
R619 1K
R620 4.32K
U722 UC3844
R622 3.74K
C621 .0033UF
Q750
R621 10K
VR650 4.3V
Q648
CR651
CR640
CR649
CR648
R747 75
R746 75
C648 0.47UF
Q741
Q638
R647 270K
CR545
C540 680PF
R625 1.15K
C521 200PF
R630 0.75
U520
C320 0.22UF
R416 1K
C415 .015UF
R316 4.32K
R314 2K
U410
R315 1.9K
R415 1K CURRENT LIMIT
T440
P556
J556
C548 0.47UF
BLACK
YELLOW
BROWN
C525 .01UF
L520 1mH
CR340
TP340
C241 1000UF
C361 47UF
L361 100uH
C371 0.22UF
CR369
C269 0.22UF
CR269
CR348
TP350
L261 100uH
C161 47UF
C270 0.22UF
C169 0.22UF
CR169
CR170
U176 LM2940CT-12
+15V
+12V
-12V
U276 7912
-5V
C575 .01UF
R575 10
CR575
C475 2700UF
C461 2700UF
C370 2700UF
C360 2700UF
C358 2700UF
C258 2700UF
L250 5uH
TP140 +5V
+5V
Q127
VR120 5V
R120 100
C321 .01UF
R321 10
CR320
R235 68
C325 2700UF
C225 2700UF
L230 5uH
C142 2700UF
TP137 -5V
Q215
R215 2.7K
R216 4.7K
CR215
U215 156-3217
(POWER RESET)
J310
P310
B100 FAN
FAN
J160
TO DIGITAL BOARD V988
9
NOTE: ** SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES
A4 POWER SUPPLY BOARD

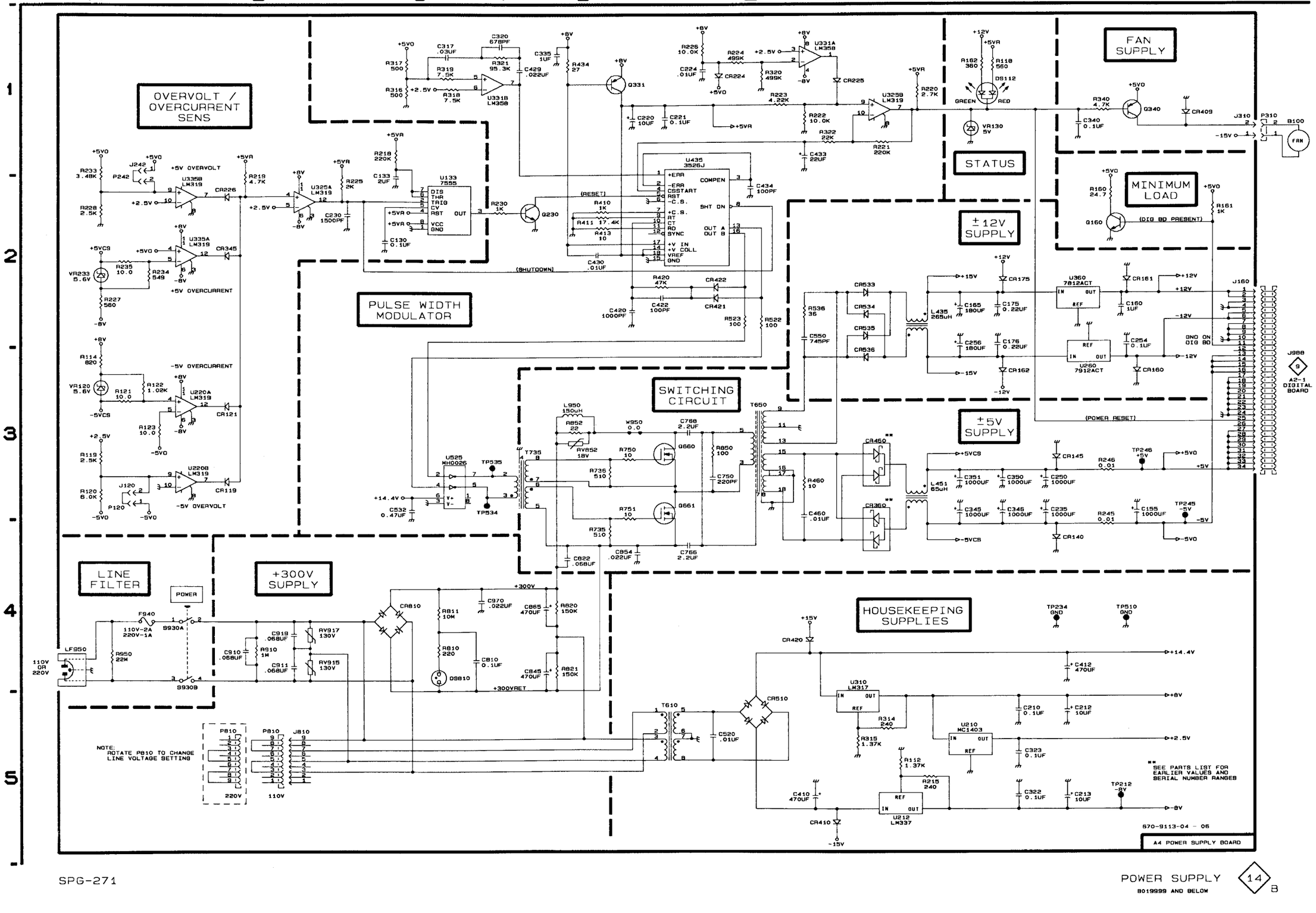
SCHEMATIC DIAGRAM <14>$_B$ LOOK-UP CHART

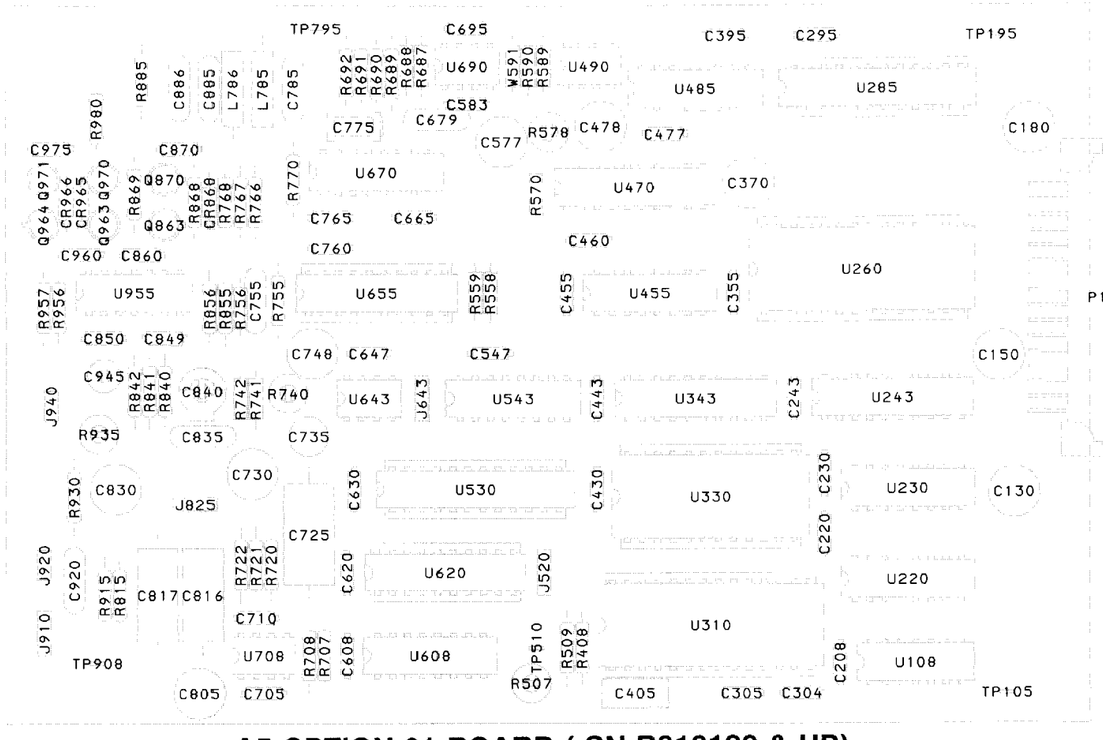
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A4.

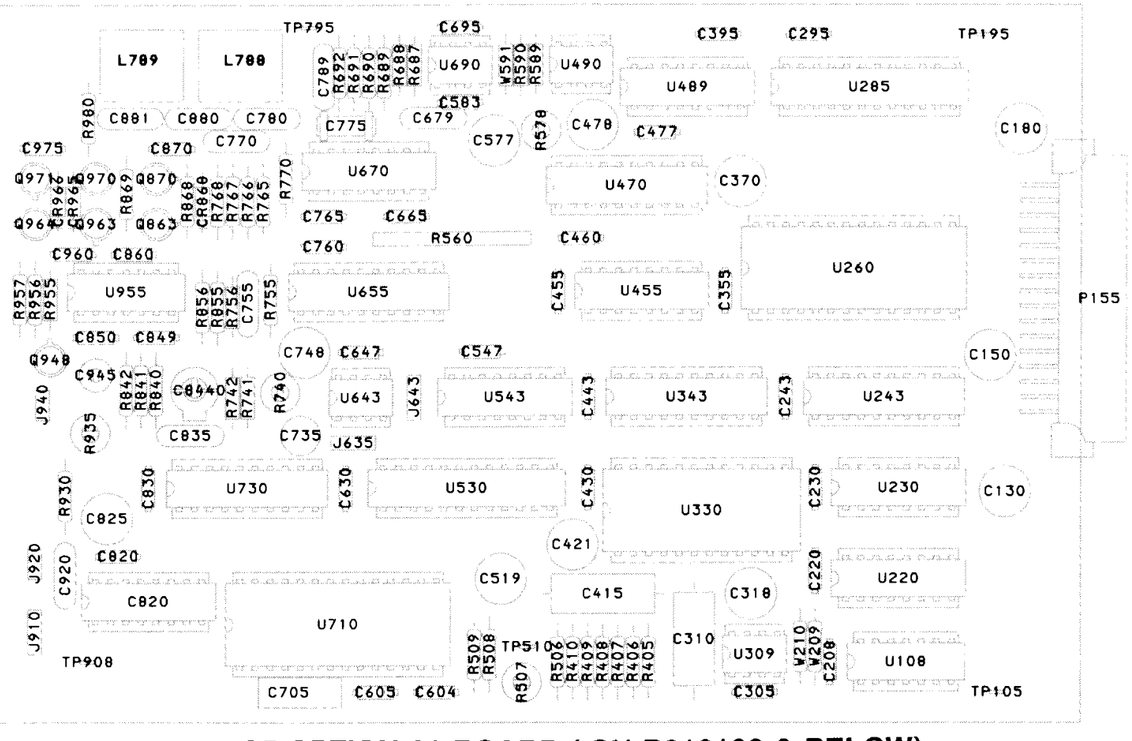
Circuit Number	Schematic Diagram Location
A4 POWER SUPPLY	
B100	H1
C130	C2
C133	C2
C155	G3
C160	G2
C165	F2
C175	G2
C176	G2
C210	G5
C212	G5
C213	G5
C220	D1
C221	D1
C224	E1
C230	C2
C235	G3
C250	G3
C254	G2
C256	F2
C317	C1
C320	C1
C322	G5
C323	G5
C335	D1
C340	G1
C345	F3
C346	G3
C350	G3
C351	F3
C410	E5
C412	G4
C420	D2
C422	E2
C429	D1
C430	D2
C433	E1
C434	E2
C460	E3
C520	E5
C532	C3
C550	E2
C750	E3
C766	E4
C768	E3
C810	C4
C822	D4
C845	D4
C854	D4
C865	D4
C910	B4
C911	B4
C919	B4
C970	C4
CR119	B3
CR121	B3
CR140	G4
CR145	G3
CR160	G3
CR161	G2
CR162	G3
CR175	G2
CR224	E1
CR225	F1
CR226	B2
CR345	B2
CR360	F3
CR409	H1
CR410	F5
CR420	E4
CR421	E2
CR422	E2
CR460	F3
CR510	E5
CR533	F2
CR534	F2
CR535	F2
CR536	F3
CR810	C4
DS112	F1
DS810	C4
F940	A4
J120	A3
J160	H2
J242	A1
J310	H1
J810	B5
L435	F2
L451	F3
L950	D3
LF950	A4
P120	A3
P242	A1
P310	H1
P810	B5
P810	B5
Q160	G2
Q230	D2
Q331	D1
Q340	G1
Q660	D3
Q661	D3
R112	F5
R114	A3
R118	G1
R119	A3
R120	A3
R121	A3
R122	A3
R123	A3
R160	G2
R161	H2
R162	F1
R215	F5
R218	C1
R219	B1
R220	F1
R221	F1
R222	E1
R223	E1
R224	E1
R225	B2
R226	E1
R227	A2
R228	A2
R230	C2
R233	A1
R234	A2
R235	A2
R245	G4
R246	G3
R314	F5
R315	F5
R316	C1
R317	C1
R318	C1
R319	C1
R320	E1
R321	C1
R322	E1
R340	G1
R410	D2
R411	D2
R413	D2
R420	D2
R434	D1
R460	E3
R522	E2
R523	E2
R536	E2
R735	D4
R736	D3
R750	D3
R751	D3
R810	C4
R811	C4
R820	D4
R821	D4
R850	E3
R852	D3
R910	B4
R950	A4
RV852	D3
RV915	B4
RV917	B4
S930A	A4
S930B	A4
T610	D5
T650	E3
T735	D3
TP212	G5
TP234	G4
TP245	H3
TP246	G3
TP510	G4
TP534	C3
TP535	C3
U133	C2
U210	F5
U212	F5
U220A	A3
U220B	A3
U260	G2
U310	F5
U325A	B2
U325B	F1
U331A	E1
U331B	C1
U335A	A2
U335B	A2
U360	G2
U435	E1
U525	C3
VR120	A3
VR130	F1
VR233	A2
W950	D3

*** See Parts List for earlier serial number ranges.**


OVERVOLT / OVERCURRENT SENS
PULSE WIDTH MODULATOR
SWITCHING CIRCUIT
STATUS
FAN SUPPLY
MINIMUM LOAD
±12V SUPPLY
±5V SUPPLY
LINE FILTER
+300V SUPPLY
HOUSEKEEPING SUPPLIES
+5V OVERVOLT
+5V OVERCURRENT
-5V OVERCURRENT
-5V OVERVOLT
(RESET)
(SHUTDOWN)
(DIG BD PRESENT)
(POWER RESET)
GND ON DIG BD
A2-1 DIGITAL BOARD
A4 POWER SUPPLY BOARD
NOTE: ROTATE P810 TO CHANGE LINE VOLTAGE SETTING
** SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES
570-9113-04 - 06



A5 OPTION 01 BOARD (SN B010129 & UP)



Static Sensitive Devices
See Maintenance Section

A5 OPTION 01 BOARD (SN B010128 & BELOW)

SCHEMATIC DIAGRAM <15> LOOK-UP CHART

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 A5. *Partial Assembly A5 also shown on Schematic 16.*

* See Parts List for earlier serial number ranges.

Circuit Number	Schematic Diagram Location
A5 OPTION	
C477	G5
C478	F5
C577	G2
C583	G2
C679	F2
C755	A4
C779	F3
C785	G4
C835	E5
C840	E5
C870	C5
C885	G4
C886	F4
C920	F4
C945	E4
C963	D4
CR868	C5
CR965	D4
CR966	D4
J307	H4
J707	H4
J920	G4
J940	A4
L788	G3
L789	G4
P155A	A1
P155B	A2
P155C	A2
Q863	B5
Q870	D5
Q963	D4
Q964	D4
Q970	B4
Q971	D4
R558	F1
R559	C1
R570	B1
R578	F2
R589	F2
R590	F3
R687	G2
R688	F2
R689	G3
R690	G3
R691	F3
R692	G3
R755	B4
R756	B4
R766	D5
R767	B5
R768	C5
R770	F3
R840	E5
R841	D5
R842	E4
R855	B5
R856	A4
R868	C5
R869	D4
R870	C5
R885	F4
R930	E4
R935	E4
R956	B5
R957	B5
R980	B4
U108A	B3
U108B	B3
U108C	B3
U108D	D2
U220	C1
U230	D1
U243	D2
U260	C3
U285	B1
U330	D1
U343	E1
U445	C3
U470	D3
U485A	A3
U485B	B3
U485C	A3
U485D	A3
U490	F5
U543	F1
U655	E3
U670	F3
U690A	F2
U690B	G4
U955A	B4
U955B	C4
W591	F4

CHARACTER TIMING CONTROL

CHARACTER GENERATION

ID/TEST SIGNAL OUTPUT AMPLIFIER

NOTE:
** SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES

671-0219-01 AND BELOW

671-0219-01 ~ 05

P/O A5 OPTION BOARD

P/O A6 BNC BOARD

REAR PANEL

ID OPTION 1

SCHEMATIC DIAGRAM <16>
LOOK-UP CHART

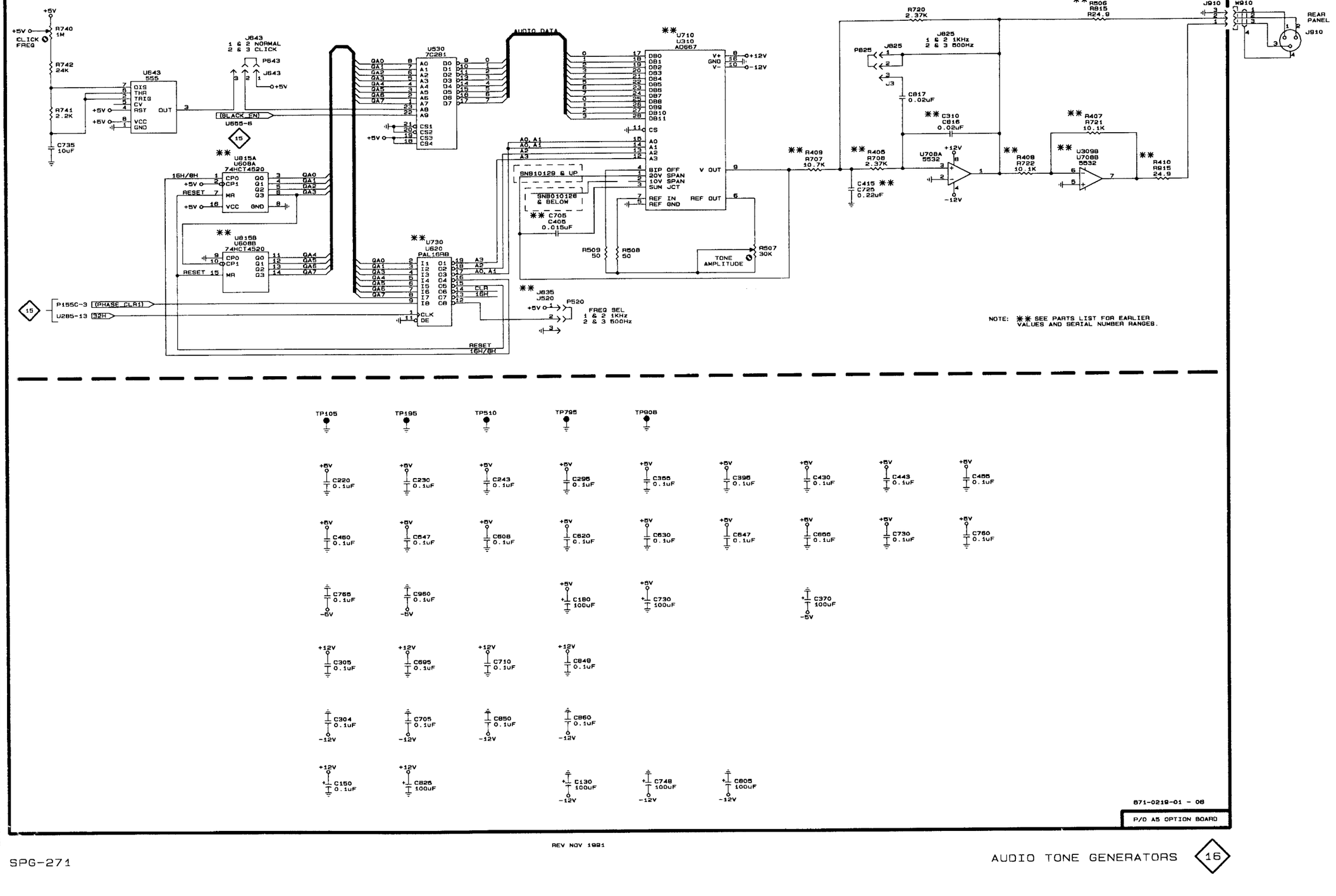
The schematic diagram has an alpha-numeric grid to assist in locating parts within that diagram. The etched circuit boards follow a numbering sequence starting with the lowest number at the upper left corner, as pictured in this manual.

ASSEMBLY A5. *Partial Assembly A5 also shown on Schematic 15.*

Circuit Number	Schematic Diagram Location
A5 OPTION	
C130	D5
C150	B5
C180	D4
C220	B4
C230	C4
C243	C4
C295	D4
C304	B5
C305	B5
C355	D4
C370	E4
C395	E4
C405	D2
C430	E4
C443	F4
C455	F4
C460	B4
C547	C4
C608	C4
C620	D4
C630	D4
C647	E4
C655	E4
C695	C5
C705	C5
C710	C5
C725	E2
C730	D4
C730	F4
C735	A2
C748	D5
C760	F4
C765	B4
C805	E5
C816	F2
C817	F1
C825	C5
C849	D5
C850	C5
C860	D5
C960	C4
J520	D3
J643	B1
J825	F1
J910	H1
J910	H1
R507	E2
R508	D2
R509	D2
R707	E2
R708	F2
R720	F1
R721	G2
R722	F2
R740	A1
R741	A1
R742	A1
R815	G1
R915	G2
TP105	B3
TP195	C3
TP510	C3
TP795	D3
TP908	D3
U310	D1
U530	C1
U608A	B2
U608B	B2
U620	C2
U643	A1
U708A	F2
U708B	G2
W910	H1

*** See Parts List for earlier serial number ranges.**

AUDIO TONE GENERATION



TP105 TP195 TP510 TP795 TP908

C220 0.1uF · C230 0.1uF · C243 0.1uF · C295 0.1uF · C365 0.1uF · C395 0.1uF · C430 0.1uF · C443 0.1uF · C455 0.1uF

C460 0.1uF · C647 0.1uF · C608 0.1uF · C620 0.1uF · C630 0.1uF · C647 0.1uF · C655 0.1uF · C730 0.1uF · C760 0.1uF

C765 0.1uF (-5V) · C960 0.1uF (-5V) · C180 100uF · C730 100uF · C370 100uF (-5V)

C305 0.1uF · C695 0.1uF · C710 0.1uF · C849 0.1uF (+12V)

C304 0.1uF · C705 0.1uF · C850 0.1uF · C860 0.1uF (-12V)

C150 0.1uF · C826 100uF (+12V) · C130 100uF · C748 100uF · C805 100uF (-12V)

871-0219-01 - 08

P/O A5 OPTION BOARD

REV NOV 1991

Section 10
Replaceable Mechanical Parts

This section contains a list of the components that are replaceable for the SPG-271. Use this list to identify and order replacement parts. There is a separate Replaceable Mechanical Parts list for each instrument.

Parts Ordering Information

Replacement parts are available from or through your local Tektronix, Inc., Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available and to give you the benefit of the latest circuit improvements. Therefore, when ordering parts, it is important to include the following information in your order.

- Part number
- Instrument type or model number
- Instrument serial number
- Instrument modification number, if applicable

If 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.

Using the Replaceable Mechanical Parts List

The tabular information in the Replaceable Mechanical Parts list is arranged for quick retrieval. Understanding the structure and features of the list will help you find all of the information you need for ordering replaceable parts.

Cross Index–Mfr. Code Number to Manufacturer

The Mfg. Code Number to Manufacturer Cross Index for the mechanical parts list is located immediately after this page. The cross index provides codes, names, and addresses of manufacturers of components listed in the mechanical parts list.

Abbreviations

Abbreviations conform to American National Standards Institute (ANSI) standard Y1.1.

Chassis Parts

Chassis-mounted parts and cable assemblies are located at the end of the Replaceable Electrical Parts list.

Column Descriptions

Figure & Index No. (Column 1)

Items in this section are referenced by figure and index numbers to the illustrations.

Tektronix Part No. (Column 2)

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

Serial No. (Column 3 and 4)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

Qty (Column 5)

This indicates the quantity of mechanical parts used.

Name and Description (Column 6)

An item name is separated from the description by a colon (:). Because of space limitations, an item name may sometimes appear as incomplete. Use the U.S. Federal Catalog handbook H6-1 for further item name identification.

Following is an example of the indentation system used to indicate relationship.

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.**

Mfr. Code (Column 7)

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 8)

Indicates actual manufacturer's part number.

CROSS INDEX – MFR. CODE NUMBER TO MANUFACTURER

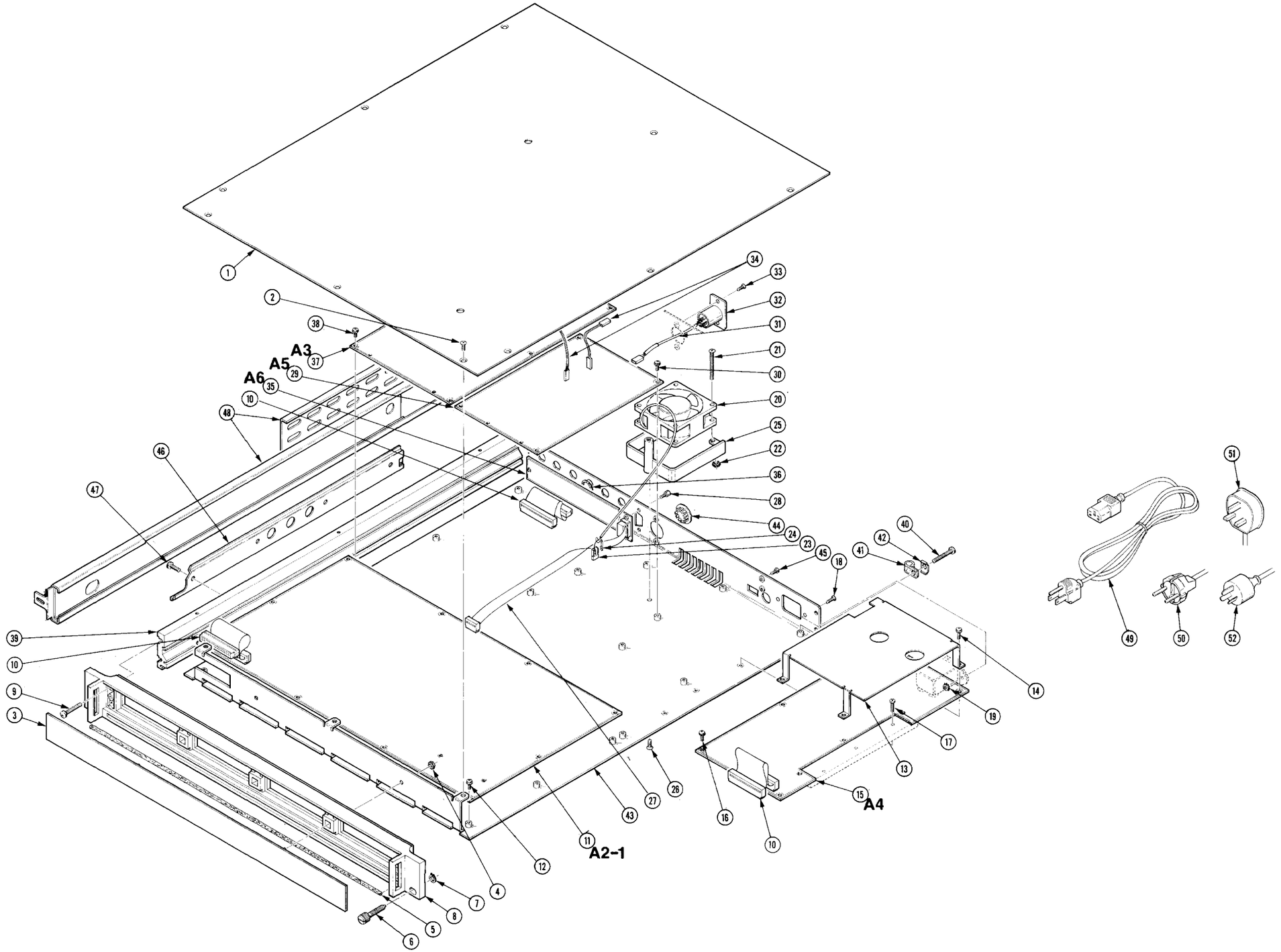
Mfr. Code	Manufacturer	Address	City, State, Zip Code
S3109	FELLER	72 Veronica Ave Unit 4	Summerset NJ 08873
TK0409	HUMKE KEN R	2211 NW NICOLAI PO BOX 5128	PORTLAND OR 97208
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609–3320
TK0941	BEARINGS INC (DIST)	2720 NW 29TH PO BOX 3005	PORTLAND OR 97210–1702
TK1151	QUALITY PLASTIC INC	2101 CRESTVIEW DR PO BOX 740	NEWBERG OR 97132–9518
TK1386	PYRAMID ELECTRONICS SUPPLY INC	9757 JUANITA DRIVE NE	KIRKLAND WA 98034
TK1547	MOORE ELECTRONICS INC (DIST)	19500 SW 90TH COURT PO BOX 1030	TUALATIN OR 97062
TK1572	RAN–ROB INC	631 85TH AVE	OAKLAND CA 94621–1254
TK1960	U S TOYO FAN CORP	4915 WALNUT GROVE AVE DRAWER G	SAN GABRIEL CA 91776
TK2548	XEROX BUSINESS SERVICES DIV OF XEROX CORPORATION	14181 SW MILLIKAN WAY	BEAVERTON OR 97077
0B445	ELECTRI–CORD MFG CO INC	312 EAST MAIN ST	WESTFIELD PA 16950
0JR05	TRIQUEST CORP	3000 LEWIS AND CLARK HWY	VANCOUVER WA 98661–2999
0J260	COMTEK MANUFACTURING OF OREGON (METALS)	PO BOX 4200	BEAVERTON OR 97076–4200
0J7N4	ARCHER PRECISION SHEET METAL INC	10950 SW 5TH ST	BEAVERTON OR 97005
0KB01	STAUFFER SUPPLY	810 SE SHERMAN	PORTLAND OR 97214
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
22526	BERG ELECTRONICS INC (DUPONT)	857 OLD TRAIL RD	ETTERS PA 17319
27264	MOLEX INC	2222 WELLINGTON COURT	LISLE IL 60532–1613
57997	EMI PRECISION (FORMERLY ENGELCKE MFG INC)	20350 71ST AVENUE NE SUITE C	ARLINGTON, WA 98223
72228	AMCA INTERNATIONAL CORP CONTINENTAL SCREW CO DIV	459 MT PLEASANT	NEW BEDFORD MA 02742
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077–0001
82389	SWITCHCRAFT INC SUB OF RAYTHEON CO	5555 N ELSTRON AVE	CHICAGO IL 60630–1314
85471	BOYD CORP	13885 RAMOMA AVE	CHINO CA 91710
85480	BRADY W H CO CORP H Q INDUSTRIAL PRODUCTS DIV	2221 W CAMDEN RD PO BOX 2131	MILWAUKEE WI 53209
9M860	ELECTRONIC SUB ASSEMBLY MFG CORP (ESAM)	930 SE M STREET PO BOX 376	GRANTS PASS OR 97526–3248

Replaceable Mechanical Parts

Fig. & Index No.	Tektronix Part No.	Serial Number Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1–1	200–3552–00			1	COVER,TOP:TSG271 *MOUNTING PARTS*	0J7N4	200–3552–00
–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:TSG271 (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*	TK0435	ORDER BY DESC
–5	378–0269–00			1	FILTER,AIR:TSG170A	85471	ORDER BY DESC
–6	213–0216–00			1	THUMBSCREW:10–32 X 0.85,0.375 OD HD,SST *MOUNTING PARTS*	0KB01	213–0216–00
–7	354–0025–00			1	RING,RETAINING:EXTERNAL,U/O 0.187 DIA SFT *END MOUNTING PARTS*	TK0941	555–18MI
–8	426–2116–01			1	FRAME,FRONT:TSG170A *MOUNTING PARTS*	80009	426211601
–9	213–0760–00			4	SCREW,TPG,TF:8–32 X 0.875,SPCL TAPTITE,FILH,STL *END MOUNTING PARTS*	72228	ORDER BY DESC
–10	174–0034–00			3	CA ASSY,SP,ELEC:28 AWG,3.0 L,RIBBON,2X17 X 2X17 0.1 CTR BOX	TK1547	ORDER BY DESC
–11	————————			1	CIRCUIT BD ASSY:DIGITAL (SEE A2–1 REPL) *MOUNTING PARTS*		
–12	211–0661–00			10	SCR,ASSEM WSHR:4–40 X 0.25,PNH,STL,CD PL,POZ,MACH *END MOUNTING PARTS*	TK0435	ORDER BY DESC
–13	337–3286–00	B010100	B020220	1	SHIELD:LV PWR SUPPLY	0J260	337–3286–00
	337–3286–01	B020221		1	SHIELD,PWR SPLY:LOW VOLTAGE *MOUNTING PARTS*	0J260	337–3286–01
–14	211–0244–00			4	SCR,ASSEM WSHR:4–40 X 0.312,PNH,STL,CD PL,POZ,MACH *END MOUNTING PARTS*	TK0435	7772–312
–15	————————			1	CIRCUIT BD ASSY:PWR SPLY (SEE A4 REPL) *MOUNTING PARTS*		
–16	211–0661–00			2	SCR,ASSEM WSHR:4–40 X 0.25,PNH,STL,CD PL,POZ,MACH	TK0435	ORDER BY DESC
–17	211–0578–00	B010100	B020220	3	SCREW,MACHINE:6–32 X 0.438,PNH,STL	TK0435	ORDER BY DESC
–18	211–0025–00			2	SCREW,MACHINE:4–40 X 0.375,FLH,100 DEG,STL	TK0435	ORDER BY DESC
–19	210–0586–00			2	NUT,PL,ASSEM WA:4–40 X 0.25,STL CD PL *END MOUNTING PARTS*	TK0435	ORDER BY DESC
–20	————————			1	FAN,TUBEAXIAL:24VDC,20CFM,60 X 60 MM 4800RPM (SEE B100 REPL) *MOUNTING PARTS*		
–21	212–0012–00			2	SCREW,MACHINE:8–32 X 1.25,FLH,100 DEG,STL	0KB01	ORDER BY DESC
–22	210–0458–00			2	NUT,PL,ASSEM WA:8–32 X 0.344,STL CD PL *END MOUNTING PARTS*	0KB01	210–0458–00
–23	352–0169–00	B010100	B020789	1	HLDR,TERM CONN:2 WIRE,BLACK	0JR05	ORDER BY DESC
–24	131–0707–00	B010100	B020789	2	CONTACT,ELEC:22–26 AWG,BRS & CU BE GOLDPL SAFETY CONTROLLED	22526	47439–000
–25	407–3379–01			1	BRKT,FAN MTG:ALUMINUM *MOUNTING PARTS*	TK1151	ORDER BY DESC
–26	211–0559–00			1	SCREW,MACHINE:6–32 X 0.375,FLH,100 DEG,STL *END MOUNTING PARTS*	TK0435	1593–300
–27	175–9877–00			1	CA ASSY,SP,ELEC:10,28 AWG,12.5 L,RIBBON *MOUNTING PARTS*	TK1547	ORDER BY DESC
–28	214–3903–01			2	SCREW,JACK:4–40 X 0.312 EXT THD,4–40 INT THD,0.188 HEX,STEEL,CADPLATE *END MOUNTING PARTS*	0KB01	214–3903–01
–29	————————			1	CIRCUIT BD ASSY:IDENTIFICATION (SEE A5 REPL, OPTION 01 ONLY) *MOUNTING PARTS*		

Fig. & Index No.	Tektronix Part No.	Serial Number Effective	Dscont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
–30	211–0661–00			4		SCR,ASSEM WSHR:4–40 X 0.25,PNH,STL,CD PL,POZ,MACH (OPTION 01 ONLY) *END MOUNTING PARTS*	TK0435	ORDER BY DESC
–31	175–9542–00			1		CA ASSY,SP,ELEC:3,26 AWG,4.75 L,MULTI COND (OPTION 01 ONLY)	TK1386	ORDER BY DESC
–32	————————			1		CONN,RCPT,ELEC:MALE,3 CONTACT (SEE J910 REPL, OPTION 01 ONLY) *MOUNTING PARTS*		
–33	211–0025–00			2		SCREW,MACHINE:4–40 X 0.375,FLH,100 DEG,STL (OPTION 01 ONLY) *END MOUNTING PARTS*	TK0435	ORDER BY DESC
–34	174–0080–01			2		CABLE ASSY,RF:75 OHM COAX,9.0 L (OPTION 01 ONLY)	9M860	ORDER BY DESC
–35	————————			1		CIRCUIT BD ASSY:BNC (SEE A6 REPL)		
–36	210–0255–00			3		TERMINAL,LUG:0.391 ID,LOCKING,BRS CD PL	TK1572	ORDER BY DESC
–37	————————			1		CIRCUIT BD ASSY:ANALOG (SEE A3 REPL) *MOUNTING PARTS*		
–38	211–0661–00			6		SCR,ASSEM WSHR:4–40 X 0.25,PNH,STL,CD PL,POZ,MACH *END MOUNTING PARTS*	TK0435	ORDER BY DESC
–39	426–2115–00			2		FRAME SECTION:SIDE *MOUNTING PARTS*	57997	426–2115–00
–40	213–0760–00			4		SCREW,TPG,TF:8–32 X 0.875,SPCL TAPTITE,FILH,STL *END MOUNTING PARTS*	72228	ORDER BY DESC
–41	343–0003–00			1		CLAMP,LOOP:0.25 ID,PLASTIC	06915	E4 CLEAR ROUND
–42	210–0863–00			1		WSHR,LOOP CLAMP:0.091 ID U/W 0.5 W CLP,STLCD PL	85480	C191
–43	200–3392–00			1		COVER,BOTTOM:TSG271	80009	200339200
–44	134–0187–00			1		PLUG,BUTTON:TSG170A	TK0409	SS51334
–45	211–0177–00			1		SCREW,MACHINE:4–40 X 0.312,PNH,STL	TK0435	ORDER BY DESC
–46	351–0104–03			1		SL SECT,DWR EXT:12.625 L,W/O HARDWARE *MOUNTING PARTS*	06666	C–720–3 (WITHOU
–47	212–0158–00			8		SCREW,MACH:8–32 X 0.375,PNH,STL,CDPL,T–20 TORX DR *END MOUNTING PARTS*	0KB01	ORDER BY DESC
						STANDARD ACCESSORIES		
–48	351–0751–00			1		TRK,SL OUT SECT:STATIONARY & INTERMEDIATESAFETY CONTROLLED	06666	3442–99–0004
	070–6814–00			1		MANUAL,TECH:INSTR,SPG271PAL SYNC GENERATOR	TK2548	PER TEK P/N
–49	161–0066–00			1		CA ASSY,PWR:3,18 AWG,250V/10A,98 INCH,STR,IEC320, RCPT X NEMA 5–15P,US,SAFTEY CONTROLLED (STANDARD ONLY)	0B445	ECM–161–0066–00
						OPTIONAL ACCESSORIES		
–50	161–0066–09			1		CA ASSY,PWR:3,0.75MM SQ,250V/10A,99 INCH,STR, IEC320,RCPT,EUROPEAN,SAFTEY CONTROLLED (EUROPEAN OPTION A1 ONLY)	S3109	86511000
–51	161–0066–10			1		CA ASSY,PWR:3,0.1MM SQ,250V/10A,2.5 METER,STR, IEC320,RCPT X 13A,FUSED UK PLUG(13A FUSE),UNITED KINGDOM,SAFTEY CONTROLLED (UNITED KINGDOM OPTION A2 ONLY)	S3109	BS/13–H05VVF3G0
–52	161–0066–11			1		CA ASSY,PWR:3,1.0MM SQ,250V/10A,2.5 METER,STR, IEC320,RCPT,AUSTRALIA,SAFTEY CONTROLLED (AUSTRALIAN OPTION A3 ONLY)	S3109	198–000

FIG 1 EXPLODED VIEW



SPG-271

MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with the 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 the 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.

Tektronix

MANUAL CHANGE INFORMATION

Date: 6/6/94 **Change Reference:** M81265

Product:	Manual P/N:	Product	Manual P/N:
067–1011–00	070–3679–00	TSG 1125	061–3629–00
118AS/118RC	070–5114–00	TSG 1250	061–3719–00
1450–1	070–5568–00	TSG–170A	070–5680–00
1450–2	070–2998–00	TSG–170D	070–6943–00
1450–3A	070–3660–01	TSG200	070–8351–00
1910	070–4523–00	TSG–271	070–6304–00
728D	070–7629–00	TSG–273	070–7956–00
728E	070–7630–02	TSG–300	070–5722–00
728M	070–8045–00	TSG–370	070–7446–00
751	070–7631–00	TSG–371	070–7707–00
ASG100	070–8546–00	TSG–422	070–7022–00
ASG140	070–8867–01	VITS100	061–3939–00
DAC422	070–8595–00	VITS200	061–3923–00
ECO–170A	070–6113–00	VITS200 AA	061–3984–00
PE1000	070–8474–00	VITS201	070–7385–00
SPG1000	070–8074–00	VM700 Vol 1	070–8197–00
SPG–170A	070–5965–00	VM700 Vol 2	070–8275–00
SPG–271	070–6814–00	VM700A	070–8165–00
TPG–625	070–7248–00	VS210	070–8754–00
TSG 1001	070–8625–00	VS211	070–8164–00
TSG 1050	061–3718–00	VS211A	070–8827–00

Mechanical Parts List Changes

In the 1910

CHANGE all occurances of 131–0890–00 **TO READ:**

214–3903–01	1	SCREW,JACK:4–40 X 0.312 EXT THD,4–40 INT THD,0.188 HEX, STEEL,CAD PLATE
		ATTACHED PARTS
210–0004–00	2	WASHER,LOCK:#4 INTL,0.015 THK,STL CD PL
210–0406–00	2	NUT,PLAIN,HEX: 4–40 X 0.188,BRS CD PL
		END ATTACHED PARTS

In all other instruments

CHANGE all occurances of 131–0890–00 **TO READ:**

214–3903–01	1	SCREW,JACK:4–40 X 0.312 EXT THD,4–40 INT THD,0.188 HEX, STEEL,CAD PLATE

Tektronix

MANUAL CHANGE INFORMATION

Date: 7/25/94 **Change Reference:** M81904

Product:	Manual P/N:	Effective S/N:
728M	070–8045–00	B020189
728E	070–7630–02	B020282
ECO 170A	070–6113–00	B021464
SPG 170A	070–5965–00	B022083
SPG 271	070–6814–00	B022464
TPG 625	070–7248–00	B010372
TSG–170A	070–5680–00	B044102
TSG 170D	070–6943–00	B010857
TSG 271	070–6304–00	B033388
TSG 300	070–5722–00	B032112
TSG 370	070–7446–00	N/A
TSG 371	070–7707–00	B011124

Replaceable Electrical Parts Changes

In the 728M and 728E

Change to Read:

A4	671–1836–06	CKT BD ASSY:POWER SUPPLY
A4R510	311–0634–00	RES,VAR,NONWW:TRMR,500 OHM,0.5W CERMET

In the ECO 170A,SPG 170A, SPG 271, TPG 625, TSG 170A, TSG 170D, TSG 271, TSG 300, TSG 370, TSG 371

Change to Read:

A4	671–0572–07	CKT BD ASSY:POWER SUPPLY
A4R510	311–0634–00	RES,VAR,NONWW:TRMR,500 OHM,0.5W CERMET

Tektronix

MANUAL CHANGE INFORMATION

Date: 5/30/95 **Change Reference:** M82523 REV 1

Product:	Manual P/N:	Effective S/N:
SPG170A	070–5965–00	B022188
SPG271	070–6814–00	B022574
TSG170A	070–5680–00	B044296
TSG170D	070–6943–00	B010895
TSG271	070–6304–00	B033558
TSG273	070–7956–00	B010301
TSG371	070–7707–00	B011162
TSG422	070–7022–00	B031482
TPG625	070–7248–00	B010378
TSG300	070–5722–00	B032150
TSG300E	070–8374–00	B032150

Replaceable Electrical Parts Changes

Replaceable Electrical Parts

In the TSG170A. TSG170D, and TSG370, **CHANGE TO READ:**

A2–1	670–9111–14	CKT BD ASSY:DIGITAL;WIRED (TSG170A ONLY)
A2–1	670–9111–15	CKT BD ASSY:DIGITAL;WIRED (TSG170A OPT 2J ONLY)
A2–1	670–9111–16	CKT BD ASSY:DIGITAL;WIRED (TSG170A OPT 1V ONLY)
A2–1	670–9111–59	CKT BD ASSY:DIGITAL;WIRED (TSG170D ONLY)
A2–1	670–9111–60	CKT BD ASSY:DIGITAL;WIRED (TSG170D OPT 1J ONLY)
A2–1	670–9111–61	CKT BD ASSY:DIGITAL;WIRED (TSG170D OPT 1V ONLY)
A2–1	670–9111–71	CKT BD ASSY:DIGITAL;WIRED (TSG370 ONLY)
A2–1R258	308–0677–00	RES,FXD,WW:1 OHM,5%,2W AXIAL LEAD

In the TSG300, TSG300E, and TSG370, **CHANGE TO READ:**

A2–1	670–9130–16	CKT BD ASSY:DIGITAL;WIRED (TSG300 OPT 01 ONLY)
A2–1	670–9130–17	CKT BD ASSY:DIGITAL;WIRED (TSG300 ONLY)
A2–1	670–9130–18	CKT BD ASSY:DIGITAL;WIRED (TSG300E ONLY)
A2–1R997	308–0677–00	RES,FXD,WW:1 OHM,5%,2W AXIAL LEAD

In the SPG170A **CHANGE TO READ:**

A2–1	670–9523–08	CKT BD ASSY:DIGITAL;WIRED (SPG170 ONLY)
A2–1	670–9523–09	CKT BD ASSY:DIGITAL;WIRED (SPG170 OPT 2J ONLY)
A2–1R338	308–0677–00	RES,FXD,WW:1 OHM,5%,2W AXIAL LEAD

In the SPG271, TSG271, TSG273, and TSG371 **CHANGE TO READ:**

A2–1	670–9905–18	CKT BD ASSY:DIGITAL;WIRED (TSG271 ONLY)
A2–1	670–9905–19	CKT BD ASSY:DIGITAL;WIRED (TSG271 OPT 03 ONLY)
A2–1	670–9905–33	CKT BD ASSY:DIGITAL;WIRED (TSG371 ONLY)
A2–1	670–9905–56	CKT BD ASSY:DIGITAL;WIRED (SPG271 ONLY)
A2–1	670–9905–57	CKT BD ASSY:DIGITAL;WIRED (SPG271 OPT 02 ONLY)
A2–1	670–9905–94	CKT BD ASSY:DIGITAL;WIRED (TSG273 ONLY)
A2–1R446	308–0677–00	RES,FXD,WW:1 OHM,5%,2W AXIAL LEAD

In the TSG422 **CHANGE TO READ:**

A2–1	671–0764–12	CKT BD ASSY:DIGITAL;WIRED (TSG422 ONLY)
A2–1R996	308–0677–00	RES,FXD,WW:1 OHM,5%,2W AXIAL LEAD

In the TPG625 **CHANGE TO READ:**

A2–1	671–0958–01	CKT BD ASSY:DIGITAL;WIRED (TPG625 ONLY)
A2–1R359	308–0677–00	RES,FXD,WW:1 OHM,5%,2W AXIAL LEAD

Tektronix

MANUAL CHANGE INFORMATION

Date: 2/15/94 **Change Reference:** M80077

Product(s): SPG–271 **Manual Part No:** 070–6814–00

DESCRIPTION

EFF S/N: B033175

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

CHANGE TO READ:

A3	670–9906–06	CIRCUIT BD ASSY: ANALOG BOARD
A3C622	281–0893–00	CAP,FXD,CERAMIC:MLC;4.7PF,+/–0.5PF,100V
A3C835	281–0893–00	CAP,FXD,CERAMIC:MLC;4.7PF,+/–0.5PF,100V
A3R145	322–3222–00	RES,FXD, FILM:2K OHM,1%,0.2W
A3R160	322–3138–00	RES,FXD, FILM:267 OHM,1%,0.2W
A3R161	322–3165–00	RES,FXD,FILM:511 OHM,1%,0.2W
A3R162	322–3138–00	RES,FXD, FILM:267 OHM,1%,0.2W
A3R163	322–3165–00	RES,FXD,FILM:511 OHM,1%,0.2W
A3R175	322–3165–00	RES,FXD,FILM:511 OHM,1%,0.2W
A3R188	322–3165–00	RES,FXD,FILM:511 OHM,1%,0.2W
A3R213	322–3289–00	RES,FXD,FILM:10K OHM,1%,0.2W
A3R226	322–3289–00	RES,FXD,FILM:10K OHM,1%,0.2W
A3R227	322–3289–00	RES,FXD,FILM:10K OHM,1%,0.2W
A3R228	322–3402–00	RES,FXD,FILM:150K OHM,1%,0.2W
A3R246	322–3089–00	RES,FXD,FILM:82.5 OHM,1%.0.2W
A3R260	322–3138–00	RES,FXD, FILM:267 OHM,1%,0.2W
A3R261	322–3165–00	RES,FXD,FILM:511 OHM,1%,0.2W
A3R262	322–3165–00	RES,FXD,FILM:511 OHM,1%,0.2W
A3R263	322–3138–00	RES,FXD, FILM:267 OHM,1%,0.2W
A3R288	311–2226–00	RES,VAR,NONWW:TRMR,50 OHM,20%,0.5W LINEAR
A3R311	322–3239–00	RES,FXD, FILM:3.01K OHM,1%,0.2W
A3R312	322–3222–00	RES,FXD, FILM:2K OHM,1%,0.2W
A3R313	322–3318–00	RES,FXD, FILM:;20K OHM,1%,0.2W
A3R327	322–3165–00	RES,FXD,FILM:511 OHM,1%,0.2W
A3R328	322–3393–00	RES,FXD,FILM:121K OHM,1%,0.2W
A3R340	322–3222–00	RES,FXD, FILM:2K OHM,1%,0.2W
A3R362	322–3165–00	RES,FXD,FILM:511 OHM,1%,0.2W
A3R363	322–3165–00	RES,FXD,FILM:511 OHM,1%,0.2W
A3R380	322–3258–00	RES,FXD,FILM:4.75K OHM,1%,0.2W
A3R390	322–3018–00	RES,FXD,FILM:15 OHM,1%,0.2W
A3R394	311–2231–00	RES,VAR,TRMR:CERMET,1K OHM,20%,0.5W
A3R413	322–3308–00	RES,FXD,FILM:15.8K OHM,1%,0.2W

A3R414	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R427	322–3044–00	RES,FXD,FILM:28 OHM,1%,0.2W
A3R428	322–3357–00	RES,FXD,FILM:51.1K OHM,1%,0.2W
A3R456	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R457	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R460	323–0099–00	RES,FXD,FILM: 105 OHM,1%,0.5W
A3R464	322–3025–00	RES,FXD,FILM:17.8 OHM,1%,0.2W
A3R465	322–3113–00	RES,FXD,FILM: 147 OHM,1%,0.2W
A3R474	322–3102–00	RES,FXD,FILM:113 OHM,1%,0.2W
A3R490	322–3018–00	RES,FXD,FILM:15 OHM,1%,0.2W
A3R513	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R530	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R531	322–3246–00	RES,FXD,FILM:3.57K OHM,1%,0.2W
A3R532	322–3247–00	RES,FXD,FILM:3.65K OHM,1%,0.2W
A3R560	323–0049–00	RES,FXD,FILM:31.6 OHM,1%,0.5W
A3R563	323–0085–00	RES,FXD,FILM:75.0 OHM,1%,0.5W
A3R564	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R570	323–0085–00	RES,FXD,FILM:75.0 OHM,1%,0.5W
A3R584	322–3102–00	RES,FXD,FILM:113 OHM,1%,0.2W
A3R588	322–3025–00	RES,FXD,FILM:17.8 OHM,1%,0.2W
A3R589	322–3113–00	RES,FXD,FILM: 147 OHM,1%,0.2W
A3R610	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R611	322–3044–00	RES,FXD,FILM:28 OHM,1%,0.2W
A3R612	322–3162–00	RES,FXD,FILM:475 OHM,1%,0.2W
A3R625	311–2230–00	RES,VAR,TRMR:CERMET,500 OHM,20%,0.5W
A3R689	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R709	322–3258–00	RES,FXD,FILM:4.75K OHM,1%,0.2W
A3R711	322–3343–00	RES,FXD,FILM:36.5K OHM,1%,0.2W
A3R725	322–3354–00	RES,FXD,FILM:47.5K OHM,1%,0.2W
A3R726	311–2239–00	RES,VAR,TRMR:CERMET;100K OHM,20%,0.5W
A3R739	322–3097–00	RES,FXD,FILM:100 OHM,1%,0.2W
A3R765	322–3102–00	RES,FXD,FILM:113 OHM,1%,0.2W
A3R766	322–3025–00	RES,FXD,FILM:17.8 OHM,1%,0.2W
A3R770	323–0085–00	RES,FXD,FILM:75.0 OHM,1%,0.5W
A3R790	322–3102–00	RES,FXD,FILM:113 OHM,1%,0.2W
A3R791	322–3025–00	RES,FXD,FILM:17.8 OHM,1%,0.2W
A3R792	322–3113–00	RES,FXD,FILM: 147 OHM,1%,0.2W
A3R820	322–3044–00	RES,FXD,FILM:28 OHM,1%,0.2W
A3R821	322–3051–00	RES,FXD,FILM:33.2 OHM,1%,0.2W
A3R822	322–3277–00	RES,FXD,FILM:7.5K OHM,1%,0.2W
A3R830	322–3058–00	RES,FXD,FILM:39.2 OHM,1%,0.2W
A3R832	311–2236–00	RES,VAR,TRMR:CERMET;20K OHM,20%,0.5W
A3R844	322–3018–00	RES,FXD,FILM:15 OHM,1%,0.2W
A3R851	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R862	322–3113–00	RES,FXD,FILM: 147 OHM,1%,0.2W

A3R864	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R887	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R888	322–3102–00	RES,FXD,FILM:113 OHM,1%,0.2W
A3R890	322–3025–00	RES,FXD,FILM:17.8 OHM,1%,0.2W
A3R910	322–3097–00	RES,FXD,FILM:100 OHM,1%,0.2W
A3R911	322–3126–00	RES,FXD,FILM:200 OHM,1%,0.2W
A3R912	322–3001–00	RES,FXD,FILM:10 OHM,1%,0.2W
A3R914	322–3097–00	RES,FXD,FILM:100 OHM,1%,0.2W
A3R916	322–3447–00	RES,FXD,FILM:442K OHM,1%,0.2W
A3R949	322–3058–00	RES,FXD,FILM:39.2 OHM,1%,0.2W
A3R952	311–2230–00	RES,VAR,TRMR:CERMET,500 OHM,20%,0.5W
A3R963	323–0085–00	RES,FXD,FILM:75.0 OHM,1%,0.5W
A3R970	323–0085–00	RES,FXD,FILM:75.0 OHM,1%,0.5W
A3R984	322–3193–00	RES,FXD,FILM:1K OHM,1%,0.2W
A3R990	322–3113–00	RES,FXD,FILM: 147 OHM,1%,0.2W

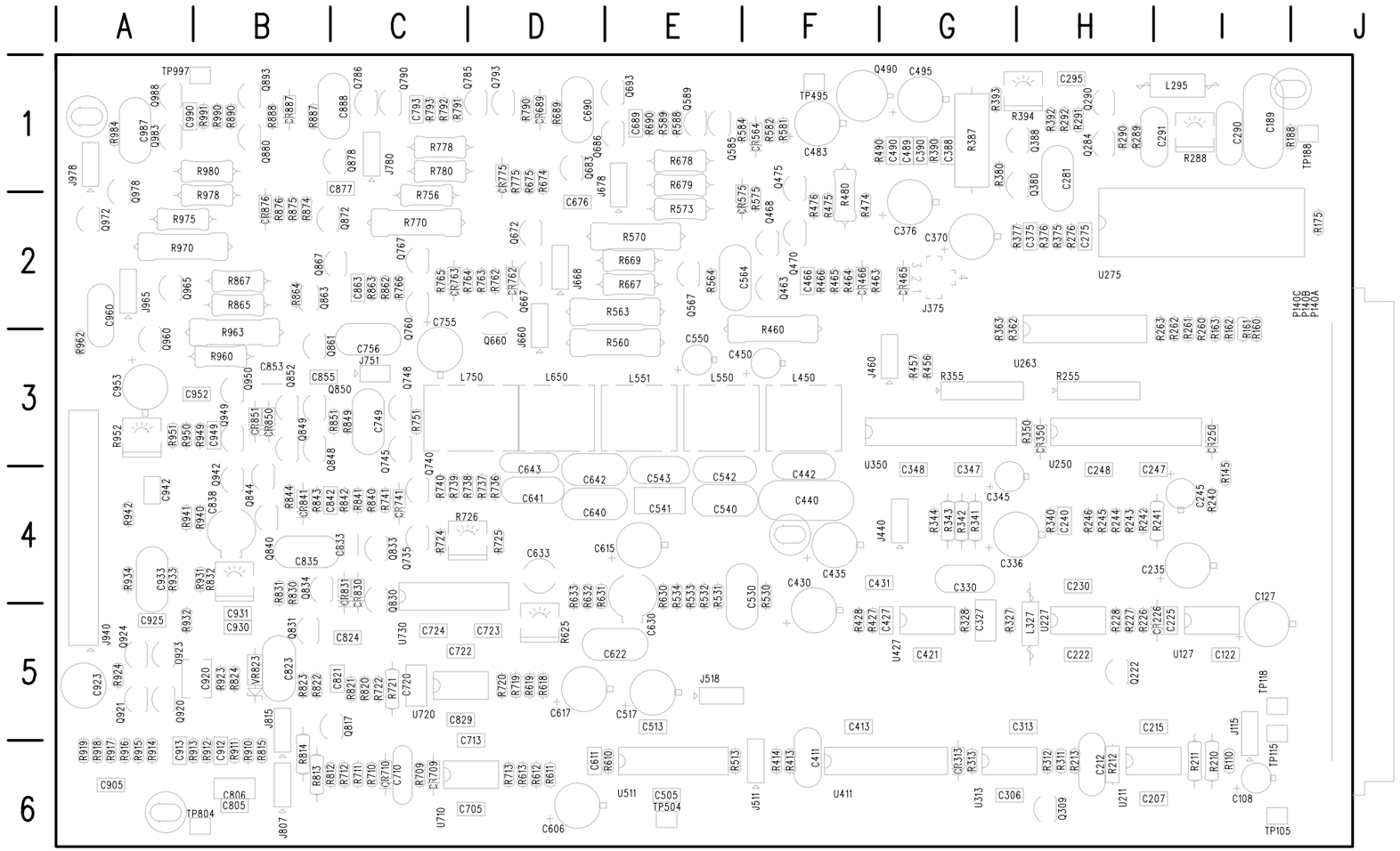
ADD:

A3R475	322–3222–00	RES,FXD, FILM:2K OHM,1%,0.2W
A3R534	322–3222–00	RES,FXD, FILM:2K OHM,1%,0.2W
A3R575	322–3222–00	RES,FXD, FILM:2K OHM,1%,0.2W
A3R675	322–3222–00	RES,FXD, FILM:2K OHM,1%,0.2W
A3R724	322–3361–00	RES,FXD, FILM:56.2K OHM,1%,0.2W
A3R763	322–3222–00	RES,FXD, FILM:2K OHM,1%,0.2W
A3R875	322–3222–00	RES,FXD, FILM:2K OHM,1%,0.2W
A3R913	322–3222–00	RES,FXD, FILM:2K OHM,1%,0.2W
A3R918	322–3222–00	RES,FXD, FILM:2K OHM,1%,0.2W

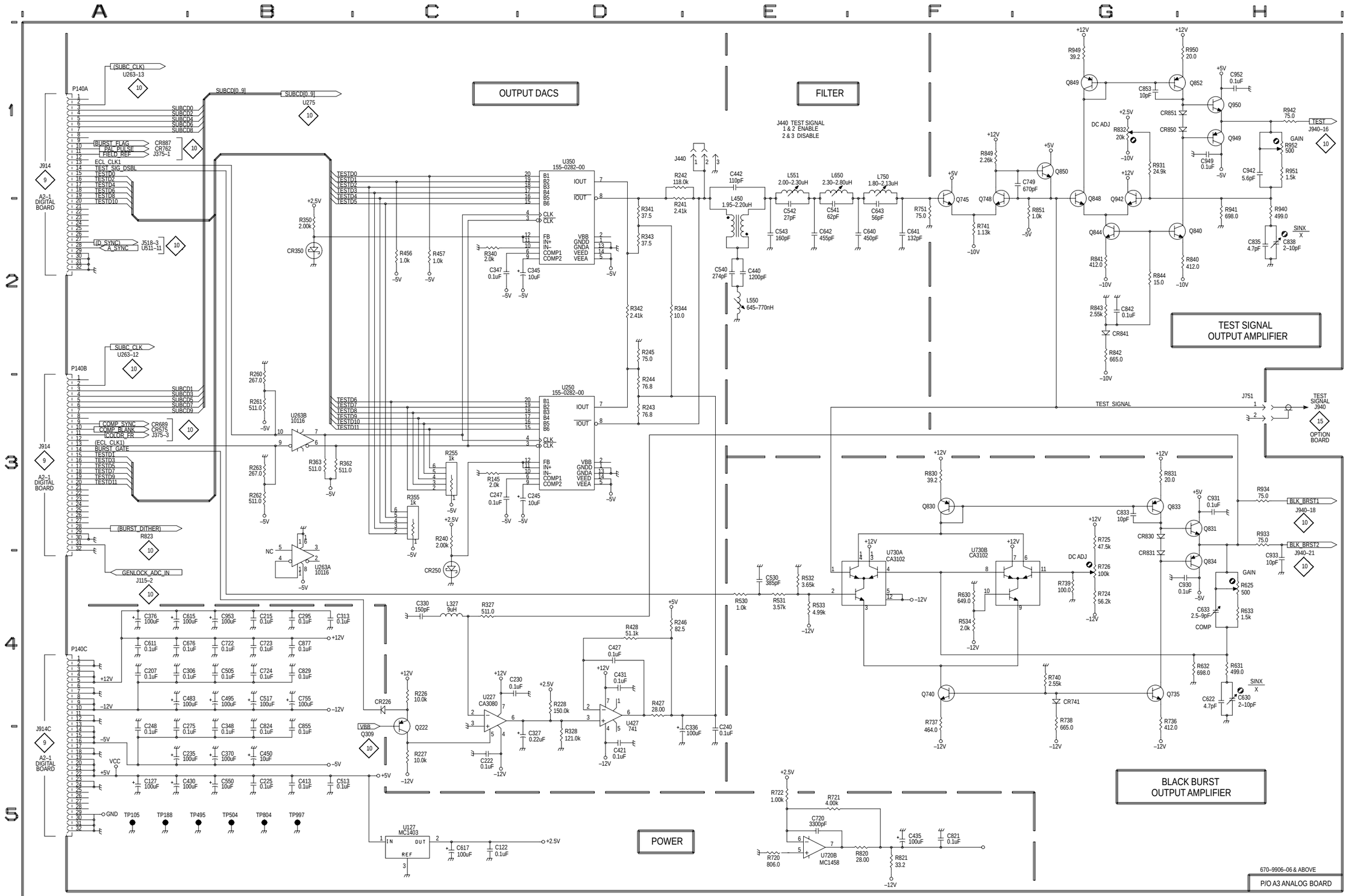
DELETE:

A3W326
A3W345
A3W730
A3W739
A3W750

New circuit board illustration and schematics are shown on the following pages.
New schematics 10 and 11 replace old schematics 10, 11, 12, and 13 for 670–9906–06 & above



SPG–271 **A3 Analog Board** **670-9906-06**


OUTPUT DACS
FILTER
TEST SIGNAL OUTPUT AMPLIFIER
BLACK BURST OUTPUT AMPLIFIER
POWER
P140A
P140B
P140C
J914
A2–1 DIGITAL BOARD
(SUBC_CLK)
U263–13
SUBCD[0..9]
U275
SUBCD0
SUBCD1
SUBCD2
SUBCD3
SUBCD4
SUBCD5
SUBCD6
SUBCD7
SUBCD8
SUBCD9
(BURST_FLAG
PAL_PULSE
FIELD_REF)
CR887
CR762
J375–1
ECL_CLK1
TEST_SIG_DSBL
TESTD0
TESTD1
TESTD2
TESTD3
TESTD4
TESTD5
TESTD6
TESTD7
TESTD8
TESTD9
TESTD10
TESTD11
(D_SYNC)
A_SYNC
J518–3
U511–11
SUBC_CLK
U263–12
COMP_SYNC
COMP_BLANK
COLOR_FR
CR689
CR575
J375–3
(ECL_CLK1)
BURST_GATE
(BURST_DITHER)
R823
GENLOCK_ADC_IN
J115–2
J914C
VCC
GND
TP105
TP188
TP495
TP504
TP804
TP997
U350
155–0282–00
U250
155–0282–00
B1
B2
B3
B4
B5
B6
IOUT
IOUT
CLK
CLK
FB
IN+
IN–
COMP1
COMP2
VBB
GNDD
GNDA
VEED
VEEA
R350
2.00k
CR350
+2.5V
R456
1.0k
R457
1.0k
R340
2.0k
C347
0.1uF
C345
10uF
R145
2.0k
C247
0.1uF
C245
10uF
R355
1k
R255
1k
R240
2.00k
CR250
R260
267.0
R261
511.0
R263
267.0
R262
511.0
U263B
10116
R363
511.0
R362
511.0
NC
U263A
10116
J440
J440 TEST SIGNAL
1 & 2 ENABLE
2 & 3 DISABLE
R242
118.0k
R241
2.41k
R341
37.5
R343
37.5
R342
2.41k
R344
10.0
R245
75.0
R244
76.8
R243
76.8
C442
110pF
L450
1.95–2.20uH
C540
274pF
C440
1200pF
L550
645–770nH
L551
2.00–2.30uH
C542
27pF
C543
160pF
L650
2.30–2.80uH
C541
62pF
C642
455pF
L750
1.80–2.13uH
C643
56pF
C640
450pF
C641
132pF
R751
75.0
Q745
Q748
R749
2.26k
R741
1.13k
C749
670pF
Q850
R851
1.0k
+12V
+5V
–5V
–10V
R949
39.2
Q849
R950
20.0
Q852
C853
10pF
C952
0.1uF
Q950
CR851
CR850
Q949
C949
0.1uF
R942
75.0
TEST
J940–16
GAIN
R952
500
C942
5.6pF
R951
1.5k
R941
698.0
R940
499.0
SINX
X
C835
4.7pF
C838
2–10pF
DC ADJ
R832
20k
R931
24.9k
Q848
Q942
Q844
Q840
R841
412.0
R844
15.0
R840
412.0
R843
2.55k
C842
0.1uF
CR841
R842
665.0
TEST_SIGNAL
J751
TEST SIGNAL J940
OPTION BOARD
R830
39.2
Q830
R831
20.0
Q833
C833
10pF
CR830
CR831
Q831
Q834
R934
75.0
BLK_BRST1
J940–18
R933
75.0
BLK_BRST2
J940–21
C931
0.1uF
C933
10pF
C930
0.1uF
R625
500
R633
1.5k
C633
2.5–9pF
COMP
R632
698.0
R631
499.0
SINX
X
C622
4.7pF
C630
2–10pF
U730A
CA3102
U730B
CA3102
C530
385pF
R532
3.65k
R530
1.0k
R531
3.57k
R533
4.99k
R630
649.0
R534
2.0k
R739
100.0
R725
47.5k
R726
100k
R724
56.2k
Q740
Q735
R737
464.0
R740
2.55k
CR741
R738
665.0
R736
412.0
C330
150pF
L327
9uH
R327
511.0
R428
51.1k
R246
82.5
C427
0.1uF
C431
0.1uF
R226
10.0k
CR226
VBB
Q309
Q222
R227
10.0k
U227
CA3080
C230
0.1uF
R228
150.0k
C227
0.22uF
R328
121.0k
C222
0.1uF
U427
741
C421
0.1uF
R427
28.00
C336
100uF
C240
0.1uF
C376
100uF
C615
100uF
C953
100uF
C215
0.1uF
C295
0.1uF
C313
0.1uF
C611
0.1uF
C676
0.1uF
C722
0.1uF
C723
0.1uF
C877
0.1uF
C207
0.1uF
C306
0.1uF
C505
0.1uF
C724
0.1uF
C829
0.1uF
C483
100uF
C495
100uF
C517
100uF
C755
100uF
C248
0.1uF
C275
0.1uF
C348
0.1uF
C824
0.1uF
C855
0.1uF
C235
100uF
C370
100uF
C450
10uF
C127
100uF
C430
100uF
C550
10uF
C225
0.1uF
C413
0.1uF
C513
0.1uF
U127
MC1403
IN
OUT
REF
C617
100uF
C122
0.1uF
R722
1.00k
R721
4.00k
C720
3300pF
U720B
MC1458
R720
806.0
R820
28.00
C435
100uF
C821
0.1uF
R821
33.2
670–9906–06 & ABOVE
P/O A3 ANALOG BOARD