TEK INSTRUCTION MANUAL

Part No. 070-5549-00
Product Group 06

067-0146-00
CHARACTER GENERATOR

Please Check for
CHANGE INFORMATION
at the Rear of This Manual

First Printing FEB 1985

Tektronix
COMMITTED TO EXCELLENCE

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio communications. It has been tested to comply with the limits for Class A computing devices pursuant to Subpart J or Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the users at thier own expense will be required to take whatever measures may be required to correct the interference.

MANUAL REVISION STATUS

PRODUCT: 067-0146-00 Video Display Generator

This manual supports the following versions of this product: Serial Numbers B010100 and up.

REV DATE	DESCRIPTION
FEB 1985	Original Issue

CONTENTS

ILLUSTRATIONS

TABLES

OPERATORS SAFETY SUMMARY

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

TERMS

IN THIS MANUAL

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

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

AS MARKED ON EQUIPMENT

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

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

SYMBOLS

IN THIS MANUAL

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

AS MARKED ON EQUIPMENT

DANGER high voltage.

Protective ground (earth) terminal.

ATTENTION — refer to manual.

Refer to manual.

POWER SOURCE

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

GROUNDING THE PRODUCT

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

DANGER ARISING FROM LOSS OF GROUND

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

USE THE PROPER POWER CORD

Use only the power cord and connector specified for your product.

Use only a power cord that is in good condition.

Refer cord and connector changes to qualified service personnel.

USE THE PROPER FUSE

To avoid fire hazard, use only the fuse specified in the parts list for your product, and which is identical in type, voltage rating, and current rating.

Refer fuse replacement to qualified service personnel.

DO NOT OPERATE IN EXPLOSIVE ATMOSPHERES

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

DO NOT REMOVE COVERS OR PANELS

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

SERVICE SAFETY SUMMARY

FOR QUALIFIED SERVICE PERSONNEL ONLY

NOTE

Refer also to the preceding Operators Safety Summary.

DO NOT SERVICE ALONE

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

USE CARE WHEN SERVICING WITH POWER ON

Dangerous voltages may exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

Disconnect power before removing the power supply shield, soldering, or replacing components.

DO NOT WEAR JEWELRY

Remove jewelry prior to servicing. Rings, necklaces, and other metallic objects could come into contact with dangerous voltages and currents.

X-RADIATION

X-ray emission generated within this instrument has been sufficiently shielded. Do not modify or otherwise alter the high voltage circuitry or the CRT enclosure.

POWER SOURCE

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

HANDLING

Due to the weight of the Monitor, and its component subassemblies, at least two persons are required to perform installation or service to prevent injury to personnel or damage to the Monitor.

IMPLOSION PROTECTION

Whenever the implosion shield is removed from the CRT, protection against implosion hazard is reduced. Service personnel should wear full face masks and protective clothing at any time the CRT is removed from the CRT module or the implosion shield is not in place.

Section 1

GENERAL INFORMATION AND SPECIFICATIONS

INTRODUCTION

The 067-0146-00 Character Generator is a TEKTRONIX TM500 plug-in unit that provides video test signals for the calibration of a multi-rate display monitor (such as the TEKTRONIX GMA201 Monochrome Raster Monitor).

The Generator provides a Character pattern, a grid pattern, a dense dot pattern, or a white field. Any one of 128 characters can be obtained by proper settings of the front panel controls. A grid display of 9 lines vertically and 7 lines horizontally is available.

Output is 50Ω reverse terminated, and, when connected to a 50Ω system produces 0V for black level and + 1V for white. Characters are displayed at a 240 MHz pixel rate.

SPECIFICATIONS

INTRODUCTION

This section lists those characteristics/specifications that are unique to the Generator and are not dependent upon related products. Specifications are grouped under three columns: Characteristic, Performance Requirement, and Supplemental Information.

The **Characteristic** column lists the names of Generator characteristics.

The **Performance Requirement** column lists the verifiable characteristics. Section 4, Calibration, gives procedures for verifying these characteristics.

OVERALL PERFORMANCE CONDITIONS

In order for these specifications to be achieved and to ensure proper performance, the following general conditions must be met:

1. The Generator must be adjusted at an ambient temperature of 66° to 79°F (19° to 26°C).
2. A warm-up period of 10 minutes must precede operation.
3. Unless otherwise noted, the Generator must be operating within the environmental limits listed.
4. The following test equipment is used:

   TEKTRONIX TM503
   TEKTRONIX 067-0645-02 Extender Cable
   TEKTRONIX Sampler 7511/7T11
   Real time scope with a bandwidth of 15MHz or better

Table 1-1

ENVIRONMENTAL CHARACTERISTICS

Characteristic	Performance Requirement	Supplemental Information
Temperature		Derate maximum operating temperature –1°C for every 1,000 ft. (300m) above sea level.
Operating	10°C to 30°C	
Non-operating	–40°C to 75°C	
Humidity		
Operating	0 to 80% noncondensing	
Non-operating	0 to 95% noncondensing	
Altitude		
Operating	15,000 ft. (4.5 km) maximum	
Non-operating	50,000 ft. (15 km) maximum	
Vibration (non-operating)	0.015 in. (0.38 mm) p-p	10 to 55 Hz (sine wave), 15 min. each axis and 10 min. each axis at resonance or 55 Hz
Shock (non-operating)	1/2 sine, 11 ms duration, 30 gs	

Table 1-2

ELECTRICAL CHARACTERISTICS

Characteristic	Performance Requirement	Supplemental Information
Pixel Rate	239.6 MHz ±0.2%	
Pixel Symmetry	±10% from average width	Comparison of odd to even number pixel at 50% points
Voltage output when terminated in 50 Ω	On +1.0V ±50mv Off 0V ±50mv Rise & Fall time 1.5 nsec	
15 MHz Video	none	Composite sync and video
Horizontal		
Polarity	Falling edge from +5V to 0V	No load
Timing	Edge occurs 1/2 way between the end and start of displayed information	
Pulse Width	0.53 μsec ±0.1 μsec	
Voltage Out		
High	⩾2V	@40 mA
Low	⩽0.5V	@60 mA
Vertical		
Polarity	Falling edge from +5V to 0V	No load
Timing	Edge occurs coincident with the end of displayed information	
Pulse Width	12H lines	
Voltage Out		
High	⩾2V	@40 mA
Low	⩽0.5V	@60 mA
BLANK IN	0 V removes video information	TTL

Characteristic	Performance Requirement	Supplemental Information	
Display Rates		CRTC Register	Data
Hor. period	10.68 μsec	0	13H
H. display time	8.55 μsec	1	10H
H. sync location	9.62 μsec	2	12H
H. sync width	0.53 μsec	3	C1H
Vert. period	16.67 nsec	4	77H
Vert. adjust	— — —	5	00H
Vert. display time	16.39 nsec	6	76H
Vert. sync location	16.39 nsec	7	76H
INTERLACE	— — —	8	00H
SCAN LINES	13	9	0CH
Crosshatch			
Horizontal	8.55 μsec ±0.5%	9 lines	
Vertical	1534 lines	7 lines	

Section 2

INSTALLATION AND OPERATION

INTRODUCTION

This section describes installation procedure, controls and connectors, and operation of the Generator.

INSTALLATION

The Character Generator was inspected both mechanically and electrically before shipment. It should be free of mars or scratches and it should meet or exceed all electrical specifications. Inspect the instrument for physical damage incurred in transit, and check the electrical performance. If there is a problem, contact your local Tektronix Field Office or representative.

Install the Generator by aligning its guide rails with the tracks of the TM500 mainframe compartment and pushing the Generator into the compartment until the instrument's front panel is flush with the front panel of the mainframe. To remove the Generator, pull the pull tab on the lower left of the front panel. Be sure the mainframe power is OFF before installing or removing the Generator.

REPACKAGING

Save and re-use the shipping container in which the Generator was received. If the original container is not available or is damaged, repackage the Generator as follows:

1. Attach a tag to the Generator that indicates the name and address of your firm, the name of the person responsible for the Generator, the serial number of the instrument, and a description of the service required.

2. Obtain a shipping container made of heavy corrugated cardboard or wood. To allow for cushioning, make sure the inside dimensions are no less than 12 by 12 by 18 inches. This container should have a carton test strength of no less than 275 pounds.

3. To protect the finish of the Generator, wrap it in heavy paper or polyethylene. Protect the front panel with urethane foam or strips of cardboard.

4. Cushion the Generator by tightly packing urethane foam or dunnage between the Generator and the shipping container. Allow at least 3 inches on all sides.

5. Seal the container with shipping tape or an industrial stapler.

CONTROLS AND CONNECTORS

Front panel controls consist of 17 buttons and a 7-place dip switch (Figure 2-1). Some buttons, labeled above and below, are dual functioned. Only top label functions are generally necessary for calibration of the TEKTRONIX GMA201. Bottom numbers and letters are functional only when the LOAD button has first been depressed, and these buttons are then depressed to adjust the display functions shown in the chart on the left (shaded) side of the panel.

The display being calibrated should be connected to HORIZ, VERT, and VIDEO 240MHz as shown. External blanking of video can be input as desired, and is TTL compatible, 0V at the connector producing a blank screen. A composite video signal, at a 15 MHz pixel rate, is also available.

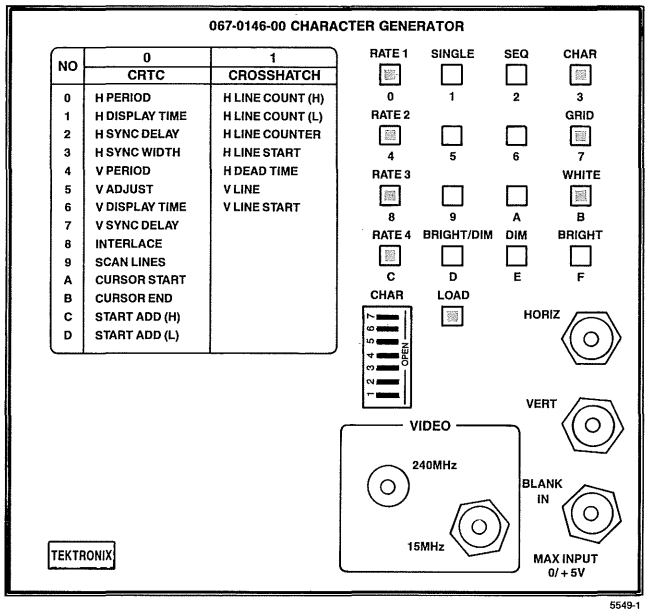


Figure 2-1. Front Panel Controls and Connectors.

OPERATION

The three basic modes of operation of the Generator result in displays of characters, grid patterns, and a white field.

CHARACTER DISPLAY

When first powered up, the Generator is in the SINGLE Character mode. Character display modes can be selected as follows:

- For repetitive horizontal rows of characters, press CHAR.
- For sequenced rows of all available charcters, press SEQ.
- For a repetitive display of a single character, program the SINGLE dipswitch for that character (see Figure 2-2), and press "SINGLE".

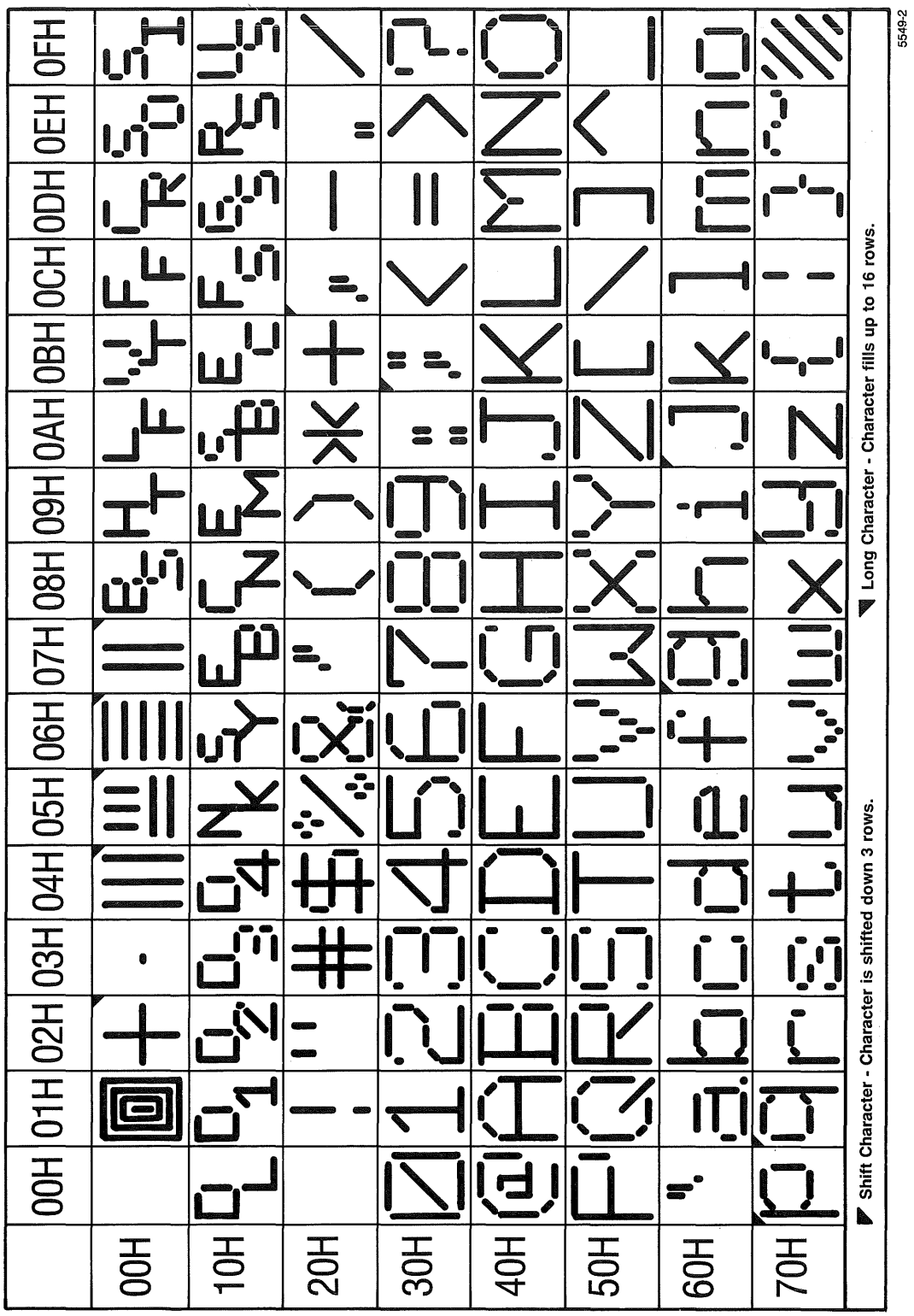


Figure 2-2. Hexadecimal Programming for Specific Characters.

WHITE FIELD AND GRID DISPLAYS

For a full white field, depress WHITE. For a grid pattern, depress GRID. The grid pattern can be displayed simultaneously with any other displayed pattern by pressing the "SINGLE" button. If a grid pattern without background is desired, press all SINGLE dipswitches to their OPEN positions, then press GRID.

SETTING THE LINE RATES

Line rates to match the display being calibrated can be selected by means of the buttons labeled "RATE 1", "RATE 2", "RATE 3", and "RATE 4". These cause the 6845 CRTC (Cathode Ray Tube Controller) to generate the selected line rates. For the Tektronix GMA201 the rate to be selected is "RATE 1". "RATE 2" will result in a rate of 524 lines. "RATE 3" and "RATE 4" are provided to select CRTC rates determined by a customer-supplied microcomputer. Such a μC could be substituted for the existing 8748.

Pattern registers can also be temporarily changed as in the example in Table 2-1. Also see Figure 2-3 for a flow diagram of these register changes.

Table 2-1

TEMPORARY REGISTER CHANGES

Action	Front Panel Indication
Press LOAD	LOAD button lite
Press (0)	LOAD button lite
Press (1)	LOAD button lite
Press (E)	LOAD button lite
Press (8)	LOAD button off

Refer to the shaded chart on the left side of the front panel. It will be seen that, since 0 was selected after LOAD, the CRTC will receive new information. Also, since the next selection was 1, the "H DISPLAY TIME" will be changed. The actual value change is set by the next two buttons pressed.

If it is decided prior to pressing the last button that a mistake has been made, pressing LOAD will turn the LOAD light off and cancel any action.

The basic formulas for determining new or changing existing line rates are as shown in Figure 2-4.

For further information concerning programming the CRTC, refer to the Motorola MC6845 data sheet.

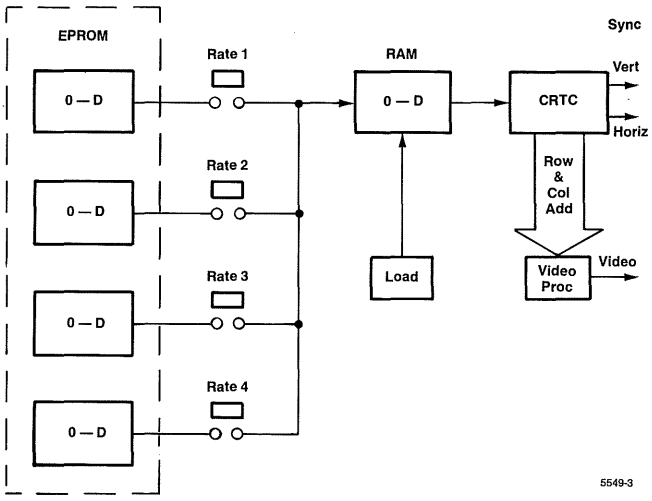
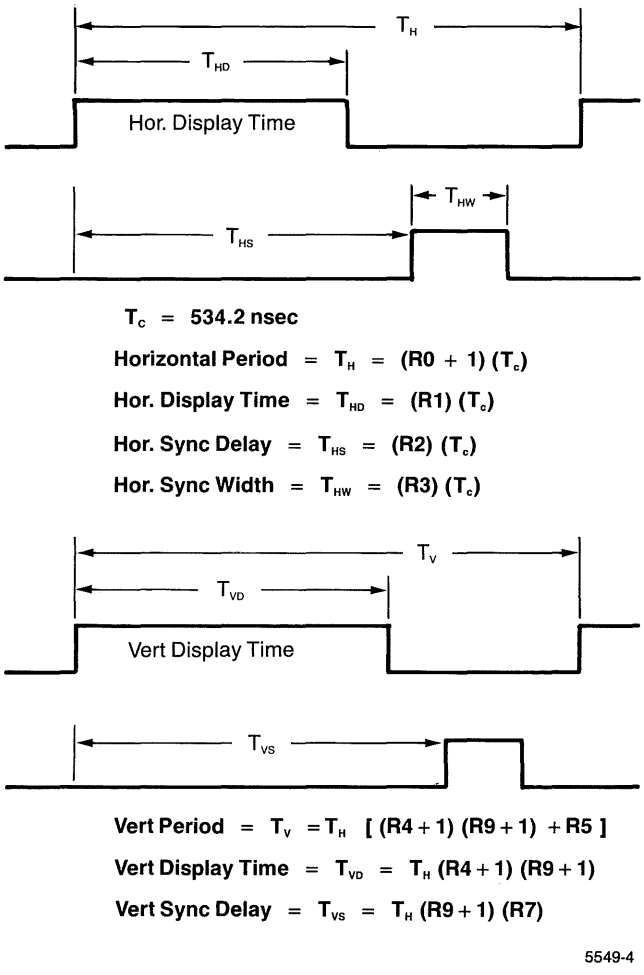


Figure 2-3. Flow Diagram for Register Changes.



T_C = 534.2 nsec

Horizontal Period = T_H = (R0 + 1) (T_c)

Hor. Display Time = T_{HD} = (R1) (T_c)

Hor. Sync Delay = T_{HS} = (R2) (T_c)

Hor. Sync Width = T_{HW} = (R3) (T_c)

Vert Period = T_V = T_H [(R4 + 1) (R9 + 1) + R5]

Vert Display Time = T_{VD} = T_H (R4 + 1) (R9 + 1)

Vert Sync Delay = T_{VS} = T_H (R9 + 1) (R7)

Figure 2-4. Basic Formulas for Determining Line Rates.

Section 3

THEORY OF OPERATION

INTRODUCTION

The 067-0146-00 is a microcomputer-controlled Character Generator with a 240 MHz pixel clock developed by doubling the 119.8 MHz output of a crystal oscillator. An 8748 microcomputer (μC) communicates with both the front-panel switches and the CRTC (Cathode Ray Tube Controller), and also controls several multiplexers and the interval between horizontal grid lines. See Figure 3-1 for a block diagram of the Generator.

The four circuit boards are the ECL Character Generator board, the Main board, the Power Supply board, and the Front Panel board. The crystal oscillator, from which all timing is controlled, is located on the ECL Character Generator board. Raster rates are produced by the 6845 CRTC on the Main board. The registers of the CRTC are loaded with the information developed in the μC EPROM. The 6845 also produces the roll addressing for the 2732 character EPROM.

ECL CHARACTER GENERATOR BOARD

119.8 MHZ OSCILLATOR AND FREQUENCY DOUBLER

The shift register and video output, the counter for selecting the vertical crosshatch, the clock pulse for driving the CRTC, the clock pulse for the low-frequency shift register (the 15 MHz composite video output), and the timing for the microcomputer are all dependent upon the 119.8 MHz crystal oscillator circuit.

U120A, U120B, and U120C form a frequency doubler. Positive-going output from the oscillator circuit, arriving at U120B at different times because of inverter U110B, produces a pulse at one input of U120C. Negative-going output from the oscillator circuit, through U120A, produces another pulse at the other input to U120C. These pulses are combined in U120C to produce the 240 MHz output.

SHIFT REGISTER, VERTICAL LINE WIDTH GENERATOR, AND OUTPUT DRIVER

The 240 MHz output of the frequency doubler is used to clock out character information arriving from the Main board. This information is then applied to one input of U430A. Vertical line information, also arriving from the Main board, passes through the Vertical Line Width Generator, and is applied to the other input of U430A. The output of U430A is then applied to the J6 Video Output at zero to +1 V. +1 V is the white level.

DIVIDE-BY-EIGHT OUTPUT

Another output of the oscillator circuit is applied to a frequency divider circuit, where it is divided by two, three times. After division it is applied to the Main board to operate the CRTC, the μC, and the crosshatch and vertical line generator.

MAIN BOARD

ECL TO TTL AND CLOCK CIRCUITS

The output of the Divide-By-Eight circuit is applied to the Main board through an ECL-to-TTL level shifter, and is then applied to two divider circuits, to be divided by eight and by three. The divide-by-eight output clocks the CRTC. The divide-by-three output clocks the CRT Synchronizer and the μC. The divide-by-8 information is also applied to a 50Ω driver to provide horizontal and vertical sync signals at the front panel connectors.

The divide-by-eight output of the ECL board is also applied to a counter and a one-shot, and is then shifted back to ECL level to be used to shift data out of the shift register on the ECL board.

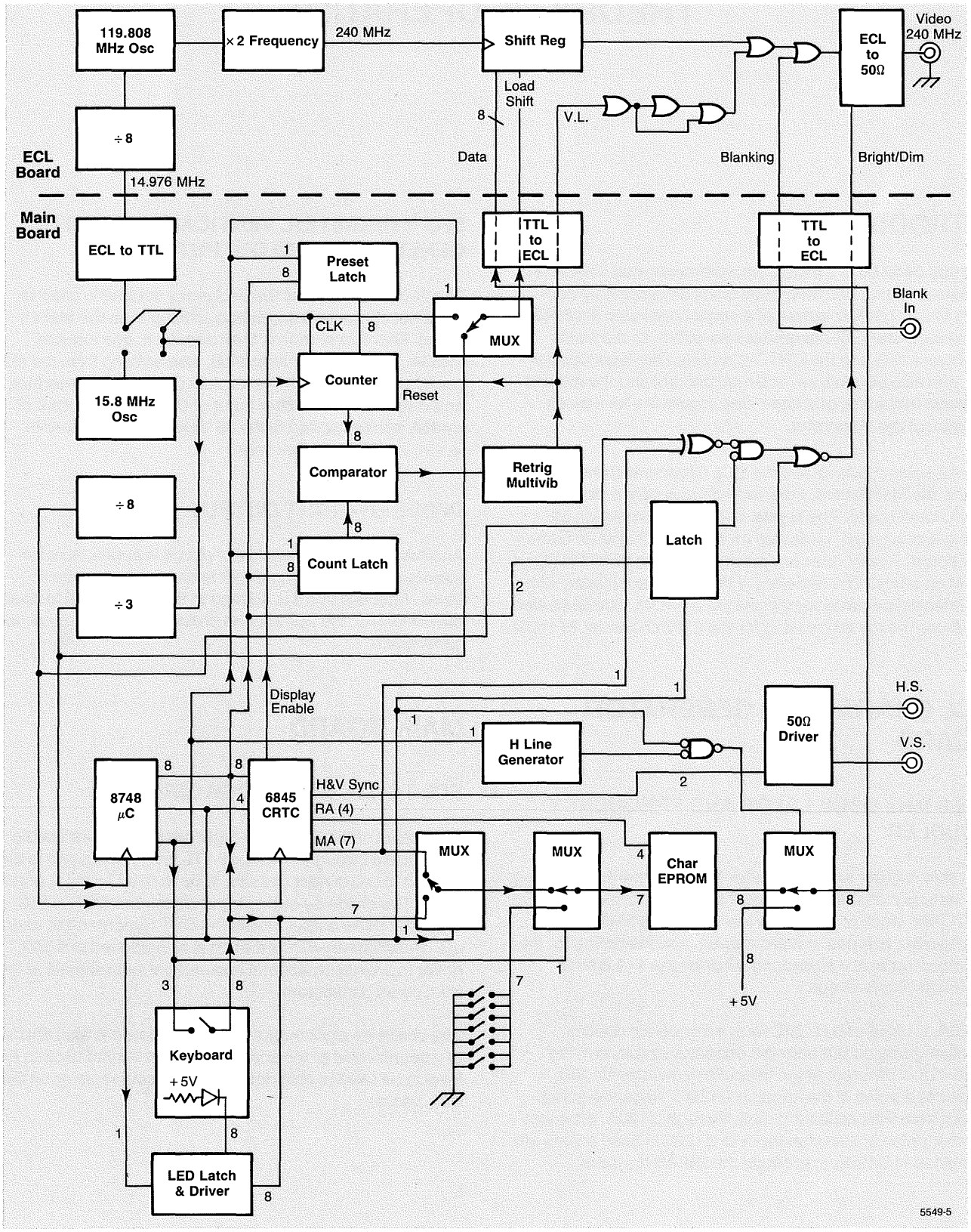


Figure 3-1. Generator Block Diagram.

MICROCOMPUTER AND CRTC

The μC controls the CRTC, the CRTC Synchronizer, the Front Panel Switch Multiplexer, and, through the CRTC, the horizontal and vertical sync output buffer, and the Character EPROM. The instruction cycle of the processor is synchronized to the vertical rate by the CRTC Synchronizer to prevent vertical jitter of the horizontal line when a grid pattern is being displayed. The ALE signal at pin 1 of U156 is shown synchronized and unsynchronized in Figure 3-2. The CRTC controls memory and row addresses through the Character Select Multiplexer and the Character EPROM.

COMPOSITE VIDEO OUTPUT

Data from a Low Frequency Shift Register is combined with sync pulses in the Composite Video circuit to provide the 15 MHz Video output at the front panel.

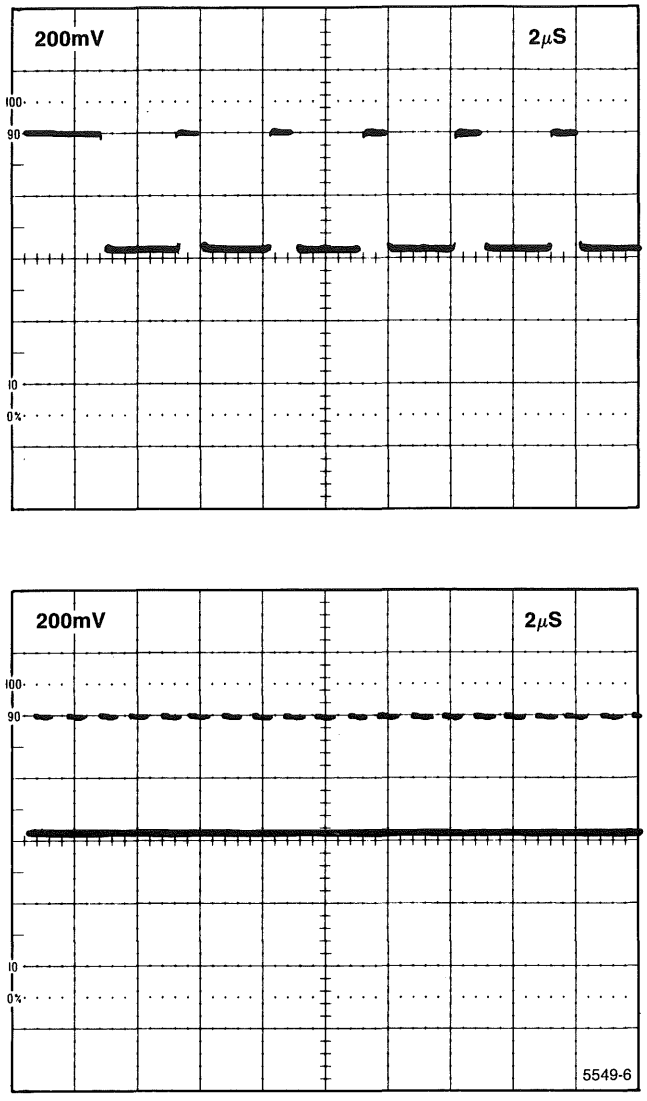


Figure 3-2. ALE Signal, (A) Synchronized, and (B) Unsynchronized.

Section 4

CALIBRATION

INTRODUCTION

This section includes procedures for check and adjustment of the Generator. The Check verifies instrument operation and can be used for an incoming inspection or a check after repairs. Since the Generator was calibrated at the factory, it is recommended that only those circuits be adjusted that do not meet those specifications.

The best performance check of the 067-0146-00 is obtained by displaying its available patterns and fields on the screen of an already-calibrated display monitor.

RECOMMENDED TEST EQUIPMENT

Table 4-1 lists all of the test equipment needed to check and adjust the Generator. The listed equipment specifications are the minimum required to perform these tests. If alternate equipment is used, it must meet or exceed this specification.

Table 4-1

RECOMMENDED TEST EQUIPMENT

Description of Equipment	Equipment Minimum Specification	Example
Oscilloscope (dual trace)	Vertical: 100 mV/div. Time Base: 10 ns/div.	TEKTRONIX 465B
Scope Probe (X10)	Attenuation: 10:1 Resistance: 10 M Ohm Capacitance: 10 pF	TEKTRONIX P6106
Digital Voltmeter	Range: 0 to 1000 Vdc Accuracy: 0.1%	TEKTRONIX DM501
Power Source		TEKTRONIX TM503 Mainframe
Extender Cable		TEKTRONIX 067-0645-02
Monitor		TEKTRONIX GMA201
50 Ohm Coaxial Cable (3)	BNC connectors	
50 Ohm Terminator		TEKTRONIX 011-0049-01

ADJUSTMENT PROCEDURE

This procedure checks all aspects of the Generator Performance Requirements listed in the "Specification" section of this manual. If the Generator passes all of the checks in this procedure, no further check or adjustment procedures are needed.

PERFORMANCE CONDITIONS

The Generator must be calibrated at an ambient temperature between +19 and +26°C. A warm-up period of 10 minutes should be observed before calibration. Unless otherwise noted, the Generator must be operating within the environmental limits listed in Section 1 of this manual.

NOTE

Before calibration, be sure all jumpers, connectors, circuit boards, and ROMs are properly seated or connected.

Preliminary Setup

a. Set the TM503 power to OFF.

b. Connect the Flex Extender Cable from the TM503 to the Generator, and insure the cable installation is correct.

c. Connect the three coax cables from the GMA201 (VIDEO INPUT, V SYNC, and H SYNC) to the Generator (240 MHz, VERT, and HORIZ).

d. Turn on the TM503, and check that the upper left and upper right switch lights are on.

e. Apply power to the GMA201.

Power Supply Check

a. Connect the DVM probe to pin 3 of J2 on the Generator Power Supply board (see the Component Location illustration in the Diagrams Section of this manual).

b. Adjust the –2 V control (R272 on the Power Supply board — see the Component Location illustration in the Diagrams Section of this manual) for –2.00 V ± 0.05 V.

c. Connect the DVM probe to pin 2 of J2 on the Power Supply board.

d. Adjust the –5.2 V control (R251 — Component Location illustration) for –5.2 V ± 0.05 V.

Main Board

a. Connect the DVM probe to the zero-Ohm resistor near U495 on the Main board (see the Component Location illustration).

b. Adjust R399 (see Main board Component Location illustration) for 5.00 V ± 0.05 V.

c. Set the SINGLE dispswitches to the open (right side depressed) position.

d. Press the GRID button, and observe the pattern on the GMA201.

e. Adjust R160 from counterclockwise end to the first point at which there is no vertical movement of horizontal line.

f. Adjust R298 (see Main board Component Location illustration) in the center of the range which produces 9 vertical lines.

g. Adjust R460 (see Main board Component Location illustration) for stability of the second horizontal line from the bottom of the grid pattern.

h. Press the SINGLE button.

i. Press the SINGLE dip switches (so that the left end of each switch is depressed) in the following sequence, and check the display for the corresponding patterns:

Switch Position	Pattern
1 closed	Solid cursor
1,2 closed	Crosses
1,2,3 closed	Vertical lines
1,...,4 closed	S/I
1,...,5 closed	U/S
1,...,6 closed	?
1,...,7 closed	Chopped cursor

j. Press the SEQ button, and check for columns of characters.

k. Press the CHAR button, and check for rows of characters.

l. Set the dip switches to their open positions (right end of each switch depressed).

m. Press the GRID button, and check that the GRID switch light illuminates and a grid pattern is displayed.

n. Press buttons "5" and "6" (shaded), and check that the grid pattern becomes unsynchronized, then "locks in".

o. Press the WHITE button, and check that the WHITE switch light is illuminated amd a white field pattern is displayed.

p. Press buttons "9" and "A" (shaded), and check for a momentary lessening of the intensity of the white field.

q. Press the LOAD button, and check that the switch light is illuminated.

r. With the LOAD button light still illuminated, press "0", "1", "0", "2", and check that a white vertical bar appears on the left side of the Monitor screen. Check that the LOAD light turns off.

s. Disconnect the VIDEO cable from the GMA201. Connect a 50 Ohm terminator to the cable, and connect the terminator to the oscilloscope input.

t. Set the Scope time to 2 μsec/div, and set the amplitude to 0.2 V/div.

u. Adjust R420 (see ECL board Component Location illustration) for a 1 volt ($\pm$ 0.02 V) signal amplitude.

v. Press the DIM button, and adjust R425 (see ECL board Component Location illustration) for a 0.3 V ($\pm$ 0.02 V) signal amplitude.

w. Remove the 50 Ohm terminator, and connect the cable to the GMA201 VIDEO input.

x. Press the WHITE BUTTON, and press the BRIGHT/ DIM button, and check that the white field becomes a "chopped" field of high and low intensity levels.

y. Disconnect the HORIZ cable from the GMA201, and connect it to the oscilloscope.

z. Press RATE 2, then RATE 3, then RATE 4, and check that the frequency changes in each case, and that the corresponding switch light turns on.

aa. Press RATE 1 to reset the correct frequency.

Section 5

MAINTENANCE

This section contains the procedures for preventive and corrective maintenance and for disassembly and reassembly. The preventive maintenance procedures are intended to ensure maximum performance by locating defects not found during normal operation. If a failure occurs, refer to the corrective maintenance procedures for disassembly, reassembly, and part replacement instructions.

SAFETY CONSIDERATIONS

Before performing any of the maintenance procedures listed in this section, carefully read the "Service Safety Summary" at the front of this manual.

PREVENTIVE MAINTENANCE

The Character Generator is designed to require very little routine or preventive maintenance. No routine lubrication or cleaning is required. If cleaning or maintenance appears necessary (due to an adverse operating environment), perform the following procedures every 2000 hours or 1 year.

CLEANING

Read ALL of the warnings and cautions in this cleaning section before attempting any of the cleaning procedures given here.

CAUTION

To avoid damage to the plastics used in the Generator, do NOT use organic cleaning agents such as benzene, acetone, toluene, xylene, or similar chemicals. Use a non-residue type of cleaner such as isopropyl alcohol, or ethyl alcohol.

NOTE

Drying times may be shortened by forced air drying at a maximum temperature of 140° F (60° C).

Remove accumulated dust with a soft cloth or small paint brush. The remaining dust should be removed using a vacuum cleaner with a brush attachment and then a soft cloth dampened in a solution of mild detergent and water. Do not use abrasive detergents.

CAUTION

Static charges can be generated by a brush with synthetic bristles. Such static charges will damage solid state components, so use a brush with natural soft bristles. (Read the Static Protection tips in the Disassembly Procedures, later in this section.)

WARNING

Turn off power to the TM503, and remove the Generator from the TM503 Mainframe before cleaning. Voltages inside the Generator may cause injury if contacted.

WARNING

If a dampened cloth is used for cleaning any parts of the Generator, take extreme care to **NOT** *leave any remaining water or moisture in the Generator. Such moisture could provide a potentially lethal shock hazard to the user when power is reapplied.*

VISUAL INSPECTION

Periodically inspect the Generator for such defects as broken connections, damaged circuit boards, loose connectors, heat damaged parts, broken structural foam mounting features (circuit board retainers), and general mechanical fitness. If the Generator is used in a high vibration environment, pay particular attention to connectors and cable strain relief. Refer to the parts replacement procedure for appropriate details.

The corrective procedure for most visible defects is repair or replacement; however, particular care must be taken if heat-damaged components are found. Overheating usually indicates other trouble in the unit. It is important to correct the cause of overheating to prevent recurrence of the damage.

TRANSISTOR AND INTEGRATED CIRCUIT CHECKS

Periodic checks of the transistors and integrated circuits are not recommended. The best measure of performance is the actual operation of the component in the circuit. Performance of these components is thoroughly checked during the performance or adjustment, and any substandard transistors or integrated circuits will usually be detected at that time.

ADJUSTMENT

If desired, the procedure described in Section 4 can be performed to verify that the Generator is operating at optimum performance. If no circuit boards, electrical, or mechanical parts have been changed, readjustment of the Generator should not be necessary.

FUSES

The Generator contains two fuses, both located on the Main board. They are F396, a 0.7 A. Slo-Blo fuse, and F399, a 1.0 A. Slo-Blo fuse.

WARNING

Before replacing the fuses, disconnect the ac power, and wait one minute for the supplies to discharge to a safe level. Capacitors in the power supply are discharged to a safe level after one minute.

REMOVAL AND REPLACEMENT PROCEDURES

Normally you should send defective boards to a regional service center where component level repairs are performed with ease. If on-site component repairs are necessary, use the following procedure.

⚠ ELECTROSTATIC DISCHARGE PRECAUTIONS

This product contains components that are highly sensitive to electrostatic discharge. To prevent damage to such components and to maintain product reliability, **do NOT** touch or remove the circuit boards or components from the Generator until the following conditions are met.

⚠ Handling Static-Sensitive Components

Handle all static-sensitive components (such as ROMs, EEROMs, custom logic chips, etc.) in a static-safeguarded work area. A static-safe area is any area capable of controlling static charge on conductive and nonconductive materials, and people.

⚠ Transporting Static-Sensitive Components

Transport all static-sensitive components in static-shielded containers. A static-shield container will protect its contents from static discharge as well as static fields.

GENERATOR CIRCUIT BOARD CONFIGURATION

Figure 5-1 shows the Generator circuit board configuration.

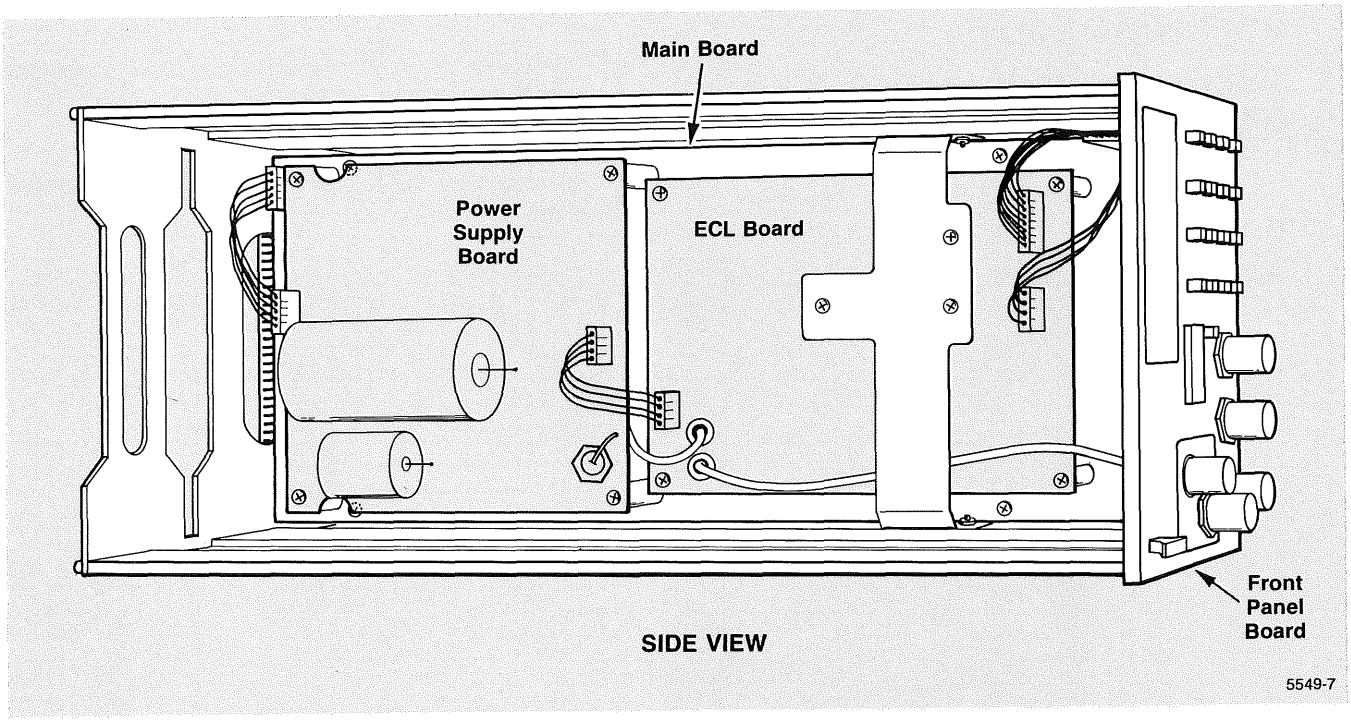


Figure 5-1. Generator Circuit Board Configuration.

PROCEDURES

The following removal and replacement procedures require only those tools common to a service tool kit.

NOTE

Unless otherwise stated, all screws mentioned in these procedures are POZIDRIVE®.

1. Power Supply Board

See Figure 5-2 to remove the Power Supply board.

a. Disconnect the cables from J1 and J2.

b. Remove, from the Main board side, the four screws that attach the Power Supply board to the Main board.

c. With a rotating motion, lift the Power Supply board out of the Generator.

d. To reinstall the Power Supply circuit board, reverse the preceding steps.

2. ECL Board

See Figure 5-3 to remove the ECL board.

a. Remove the Heat Sink by removing the four screws attaching it to the two side panels. Rotate the ends of the Heat Sink a little toward the front and back of the Generator before trying to lift the Heat Sink out of the Generator chassis.

NOTE

Do not remove the three screws at the center of the Heat Sink. These merely attach three pillars to the underside of the Heat sink.

b. Disconnect the cables from J1 and J2 (the other end of the cable connected to J7 was disconnected when removing the Power Supply board).

c. Disconnect the wires to J5 and J6.

d. Remove, from the Main board side, the four screws that attach the ECL board to the Main board, and lift the ECL board away from the Main board.

e. To reinstall the ECL circuit board, reverse the preceding steps.

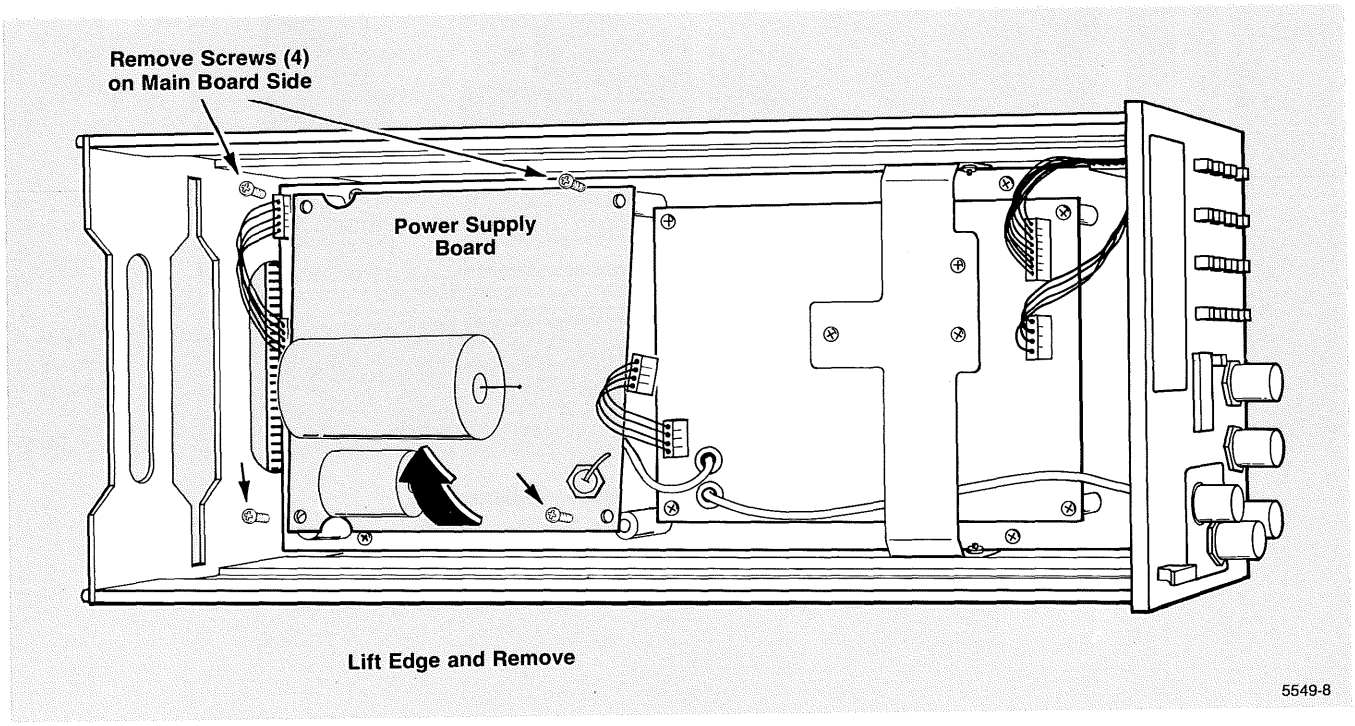


Figure 5-2. Removing the Power Supply Board.

3. Main Board

See Figure 5-4 to remove the Main board.

a. Remove the eight screws holding the back panel to the side panels.

b. Remove the four screws holding the Main board to the side panels.

c. Carefully unplug J1 and remove the Main board by pulling the board rearward.

d. To reinstall the Main circuit board, reverse the preceding steps.

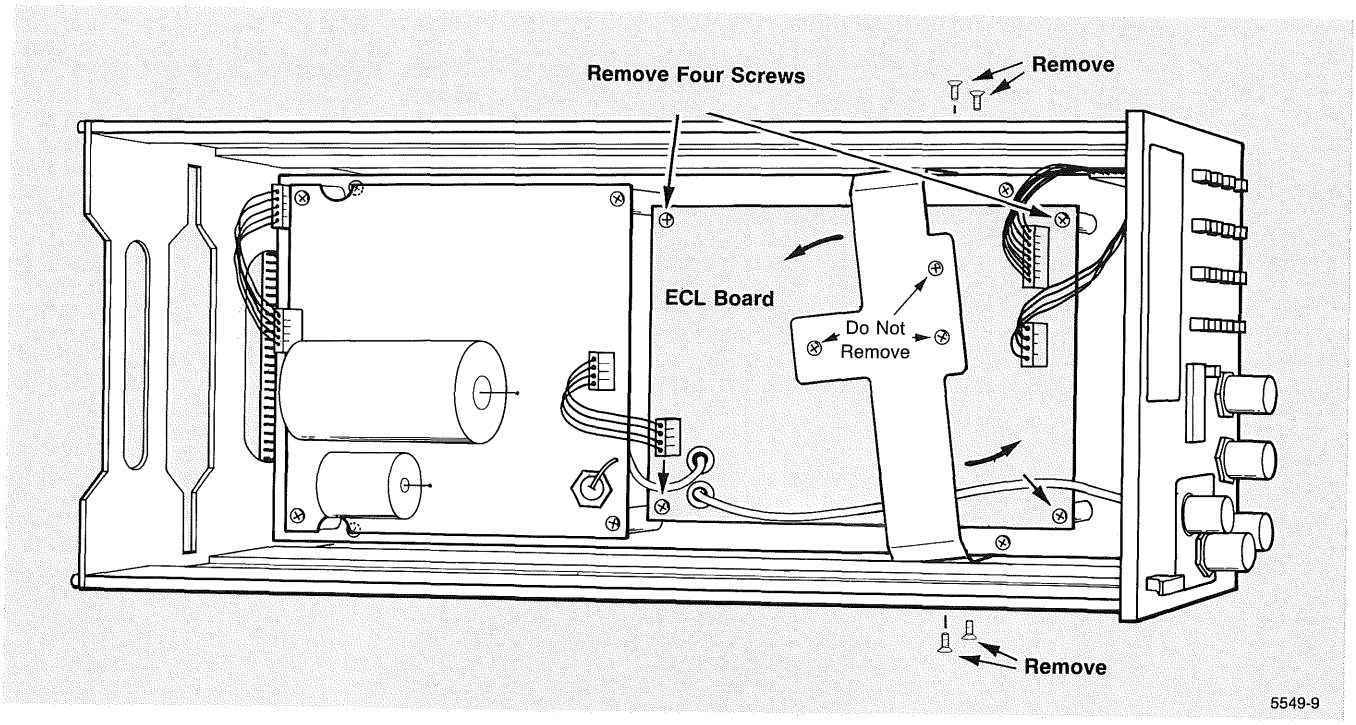


Figure 5-3. Removing the ECL Board.

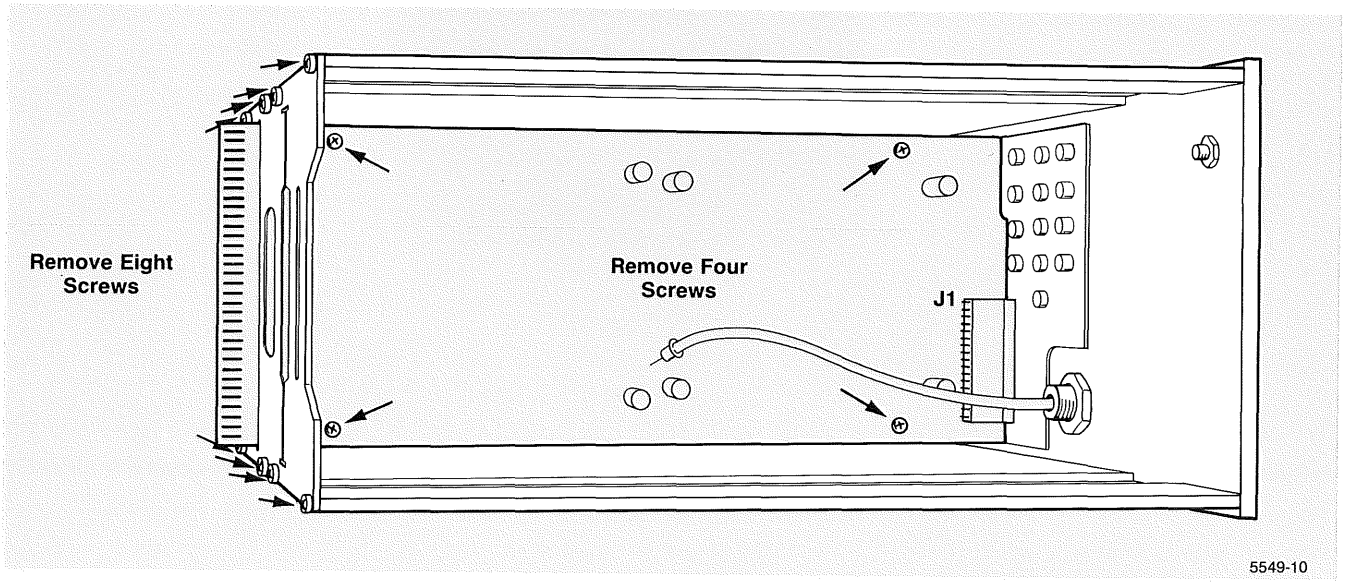


Figure 5-4. Removing the Main Board.

4. Front Panel Board

See Figure 5-5 to remove the Front Panel board.

a. Remove the nut from the rear of the weld stud holding the front panel to the sub panel.

b. Remove the nuts from the four BNC connectors.

c. Remove the TM500 Plug-in Latch by prying the pull tab upward out of the white retainer with a small screw driver. Hold the black and white rear portions of the latch against the side panel while prying the pull tab.

d. To remove the front panel, remove the 8 screws holding the sub panel to the side panels, and remove the Front panel board.

e. To reinstall the Front Panel circuit board, reverse the preceding steps.

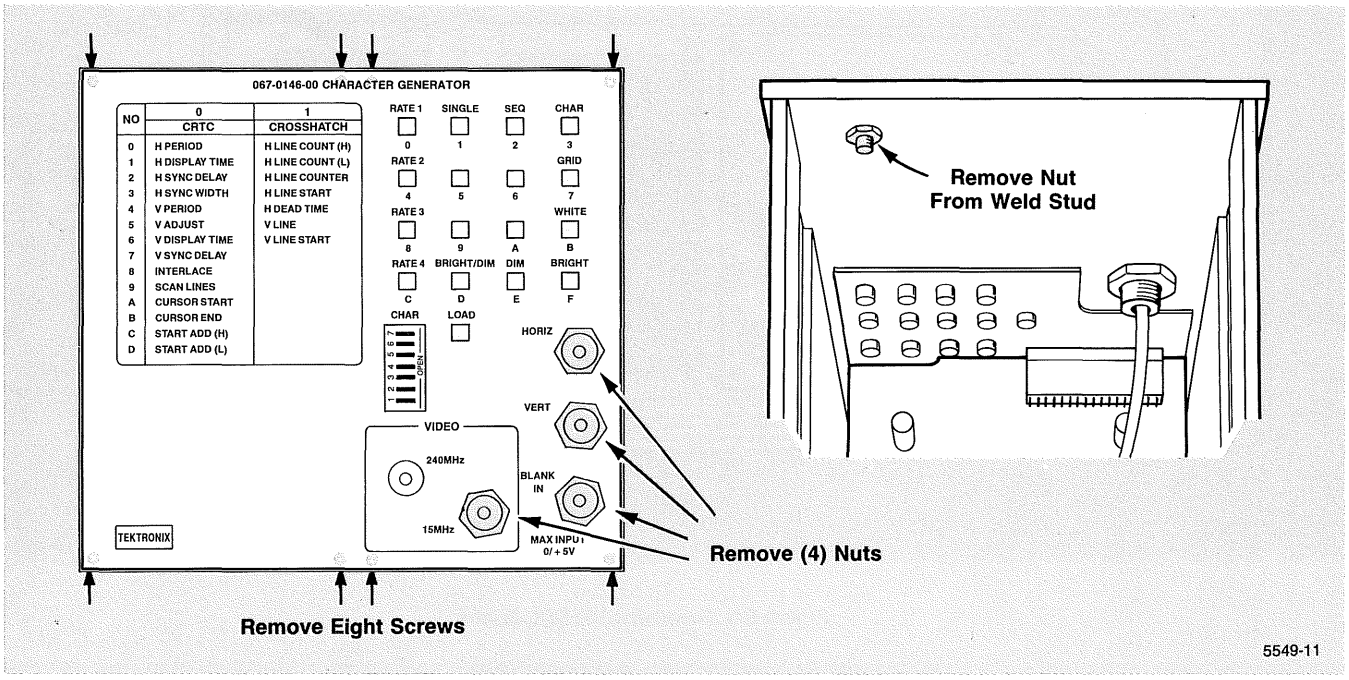


Figure 5-5. Removing the Front Panel Board.

Section 6
REPLACEABLE ELECTRICAL PARTS

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 developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

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

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

LIST OF ASSEMBLIES

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

CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

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

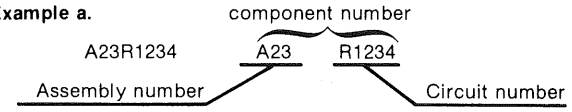
ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

COMPONENT NUMBER (column one of the Electrical Parts List)

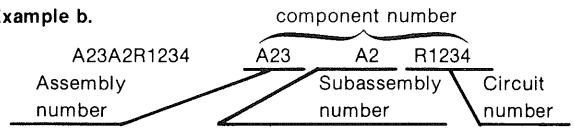
A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following:

Example a.



Read: Resistor 1234 of Assembly 23

Example b.



Read: Resistor 1234 of Subassembly 2 of Assembly 23

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

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

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

TEKTRONIX PART NO. (column two of the Electrical Parts List)

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

SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

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.

NAME & DESCRIPTION (column five of the Electrical Parts List)

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

MFR. CODE (column six of the Electrical Parts List)

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

MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00213	NYTRONICS COMPONENTS GROUP INC SUBSIDIARY OF NYTRONICS INC	ORANGE ST	DARLINGTON SC 29532
00779	AMP INC	P O BOX 3608	HARRISBURG PA 17105
01121	ALLEN-BRADLEY CO	1201 SOUTH 2ND ST	MILWAUKEE WI 53204
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPRESSWAY P O BOX 225012 M/S 49	DALLAS TX 75265
03508	GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS DEPT	W GENESEE ST	AUBURN NY 13021
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR GROUP	5005 E MCDOWELL RD	PHOENIX AZ 85008
05397	UNION CARBIDE CORP MATERIALS SYSTEMS DIV	11901 MADISON AVE	CLEVELAND OH 44101
07263	FAIRCHILD CAMERA AND INSTRUMENT CORP SEMICONDUCTOR DIV	464 ELLIS ST	MOUNTAIL VIEW CA 94042
07716	TRW INC TRW ELECTRONICS COMPONENTS TRW IRC FIXED RESISTORS/BURLINGTON	2850 MT PLEASANT AVE	BURLINGTON IA 52601
11236	CTS OF BERNE INC	406 PARR ROAD	BERNE IN 46711
13409	SENSITRON SEMICONDUCTOR DIV OF RSM ELECTRON POWER INC	221 W INDUSTRY COURT	DEER PARK NY 11729
18324	SIGNETICS CORP	811 E ARQUES	SUNNYVALE CA 94086
19701	MEPCO/ELECTRA INC A NORTH AMERICAN PHILIPS CO	P O BOX 760	MINERAL WELLS TX 76067
20932	EMCON INC	11620 SORRENTO VALLEY RD P O BOX 81542	SAN DIEGO CA 92138
22526	DU PONT E I DE NEMOURS AND CO INC PHOTO PRODUCTS DEPT BERG ELECTRONICS DIV	ROUTE 83	NEW CUMBERLAND PA 17070
24546	CORNING GLASS WORKS	550 HIGH ST	BRADFORD PA 16701
24931	SPECIALTY CONNECTOR CO INC	2620 ENDRESS PLACE P O BOX D	GREENWOOD IN 46142
25403	AMPEREX ELECTRONIC CORP SEMICONDUCTOR AND MICROCIRCUITS DIV	PROVIDENCE PIKE	SLATERSVILLE RI 02876
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051
29604	STACKPOLE COMPONENTS CO	P O BOX 14466	RALEIGH NC 27610
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507
33096	COLORADO CRYSTAL CORP	2303 W 8TH ST	LOVELAND CO 80537
51642	CENTRE ENGINEERING INC	2820 E COLLEGE AVE	STATE COLLEGE PA 16801
55576	SYNERTEK	3001 STENDER WAY	SANTA CLARA CA 95051
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195
56289	SPRAGUE ELECTRIC CO	87 MARSHALL ST	NORTH ADAMS MA 01247
57668	R-OHM CORP	16931 MILLIKEN AVE	IRVINE CA 92713
59660	TUSONIX INC	2155 N FORBES BLVD	TUCSON, ARIZONA 85705
71400	MCGRAW-EDISON CO BUSSMANN MFG DIV	502 EARTH CITY PLAZA P O BOX 14460	ST LOUIS MO 63178
76493	BELL INDUSTRIES INC MILLER J W DIV	19070 REYES AVE P O BOX 5825	COMPTON CA 90224
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
81073	GRAYHILL INC	561 HILLGROVE AVE P O BOX 373	LA GRANGE IL 60525
TK0961	NEC ELECTRONICS USA INC	401 ELLIS ST	MOUNTAIN VIEW CA 94043
TK1483	TEKA PRODUCTS INC	45 SALEM ST	PROVIDENCE RI 02907

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1	670-8460-00			CIRCUIT BD ASSY:PWR SPLY	80009	670-8460-00
A2	670-8461-00			CIRCUIT BD ASSY:ECL	80009	670-8461-00
A3	670-8462-00			CIRCUIT BD ASSY:MAIN BOARD	80009	670-8462-00
A4	670-8459-00			CIRCUIT BD ASSY:FRONT PANEL	80009	670-8459-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1	670-8460-00			CIRCUIT BD ASSY:PWR SPLY	80009	670-8460-00
A1C21	290-0334-00			CAP,FXD,ELCTLT:1250UF,+75-10%,50V	56289	530282
A1C101	290-0931-00			CAP,FXD,ELCTLT:540UF,+100-10%,25VDC	56289	673D356 SPECIAL
A1C111	290-0931-00			CAP,FXD,ELCTLT:540UF,+100-10%,25VDC	56289	673D356 SPECIAL
A1C151	281-0772-00			CAP,FXD,CER DI:4700PF,10%,100V	04222	MA201C472KAA
A1C152	290-0177-00			CAP,FXD,ELCTLT:1UF,20%,50V	05397	T320A105M050AS
A1C153	281-0764-00			CAP,FXD,CER DI:82PF,5%,100V	04222	MA101A820JAA
A1C171	281-0773-00			CAP,FXD,CER DI:0.01MFD,10%,100V	04222	MA201C103KAA
A1C221	290-0117-00			CAP,FXD,ELCTLT:50UF,+75-10%,50V	56289	30D5066050009
A1C231	290-0117-00			CAP,FXD,ELCTLT:50UF,+75-10%,50V	56289	30D5066050009
A1C351	281-0772-00			CAP,FXD,CER DI:4700PF,10%,100V	04222	MA201C472KAA
A1C352	290-0177-00			CAP,FXD,ELCTLT:1UF,20%,50V	05397	T320A105M050AS
A1C353	281-0764-00			CAP,FXD,CER DI:82PF,5%,100V	04222	MA101A820JAA
A1C371	281-0773-00			CAP,FXD,CER DI:0.01MFD,10%,100V	04222	MA201C103KAA
A1CR41	152-0488-01			SEMICOND DVC,DI:SELECTED	80009	152-0488-01
A1CR171	152-0720-00			SEMICOND DVC,DI:RECT,SI,100V,7A,TO-220,FAST RECOVERY	25403	BYM29-100
A1CR250	152-0674-00			SEMICOND DVC,DI:RECT,SI,800V,1.0A,DO-41	13409	1N4947 (FAMILY)
A1CR261	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
A1CR262	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
A1CR271	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
A1CR340	152-0674-00			SEMICOND DVC,DI:RECT,SI,800V,1.0A,DO-41	13409	1N4947 (FAMILY)
A1CR371	152-0720-00			SEMICOND DVC,DI:RECT,SI,100V,7A,TO-220,FAST RECOVERY	25403	BYM29-100
A1J1	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 5)	22526	48283-036
A1J2	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 4)	22526	48283-036
A1L51	108-0473-00			COIL,RF:FIXED,174UH	80009	108-0473-00
A1L141	108-0443-00			COIL,RF:FIXED,23.5UH	80009	108-0443-00
A1L151	108-0538-00			COIL,RF:FIXED,2.7UH	76493	JWM#B7059
A1L341	108-0443-00			COIL,RF:FIXED,23.5UH	80009	108-0443-00
A1L351	108-0538-00			COIL,RF:FIXED,2.7UH	76493	JWM#B7059
A1L352	108-0473-00			COIL,RF:FIXED,174UH	80009	108-0473-00
A1Q151	151-0341-00			TRANSISTOR:NPN,SI,TO-106	04713	SPS6919
A1Q161	151-0342-00			TRANSISTOR:PNP,SI,TO-92	07263	S035928
A1Q170	151-0710-00			TRANSISTOR:NPN,SI,TO-92	27014	92PU01A
A1Q171	151-0190-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS7969
A1Q172	151-0426-00			TRANSISTOR:NPN,SI,TO-220	03508	X44HR242
A1Q351	151-0341-00			TRANSISTOR:NPN,SI,TO-106	04713	SPS6919
A1Q361	151-0342-00			TRANSISTOR:PNP,SI,TO-92	07263	S035928
A1Q370	151-0710-00			TRANSISTOR:NPN,SI,TO-92	27014	92PU01A
A1Q371	151-0190-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS7969
A1Q372	151-0426-00			TRANSISTOR:NPN,SI,TO-220	03508	X44HR242
A1R141	308-0244-00			RES,FXD,WW:0.3 OHM,10%,2W	00213	310S 0.3-10
A1R151	315-0511-00			RES,FXD,CMPSN:510 OHM,5%,0.25W	19701	5043CX510R0J
A1R152	315-0272-00			RES,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
A1R161	315-0682-00			RES,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A1R162	315-0161-00			RES,FXD,CMPSN:160 OHM,5%,0.25W	01121	CB1615
A1R163	315-0103-00			RES,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A1R171	315-0472-00			RES,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A1R172	315-0270-00			RES,FXD,CMPSN:27 OHM,5%,0.25W	19701	5043CX27R0OJ
A1R251	311-1567-00			RES,VAR,NONWW:TRMR,100 OHM,0.5W	32997	3352T-1-101
A1R252	321-0144-00			RES,FXD,FILM:309 OHM,1%,0.125W,TC=TO	07716	CEAD309R0F
A1R254	321-0142-00			RES,FXD,FILM:294 OHM,1%,0.125W,TC=TO	07716	CEAD294R0F
A1R265	321-0151-00			RES,FXD,FILM:365 OHM,1%,0.125W,TC=TO	07716	CEAD365R0F
A1R270	315-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A1R271	321-0099-00			RES,FXD,FILM:105 OHM,1%,0.125W,TC=TO	07716	CEAD105R0F
A1R272	311-1567-00			RES,VAR,NONWW:TRMR,100 OHM,0.5W	32997	3352T-1-101
A1R341	307-0755-00			RES,FXD,CMPSN:0.5 OHM,5%,0.5W	57668	TR50J-E0E5E

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A1R351	315-0511-00			RES,FXD,CMPSN:510 OHM,5%,0.25W	19701	5043CX510R0J
A1R352	315-0272-00			RES,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
A1R361	315-0682-00			RES,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
A1R362	315-0161-00			RES,FXD,CMPSN:160 OHM,5%,0.25W	01121	CB1615
A1R363	315-0103-00			RES,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A1R371	315-0472-00			RES,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
A1R372	315-0270-00			RES,FXD,CMPSN:27 OHM,5%,0.25W	19701	5043CX27R0J
A1VR312	152-0519-00			SEMICOND DVC,DI:ZEN,SI,5.6V,5%,10W,DO-4	04713	1N3997A

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2	670-8461-00			CIRCUIT BD ASSY:ECL	80009	670-8461-00
A2C120	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2C130	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2C131	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2C212	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2C213	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2C220	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2C233	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2C300	281-0123-00			CAP,VAR,CER DI:5-25PF,100V	59660	518-000A5-25
A2C310	281-0123-00			CAP,VAR,CER DI:5-25PF,100V	59660	518-000A5-25
A2C312	283-0060-00			CAP,FXD,CER DI:100PF,5%,200V	59660	855-535U2J101J
A2C320	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2C330	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2C416	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2C421	283-0204-00			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR155E103MAA
A2C433	283-0136-00			CAP,FXD,CER DI:10PF,5%,50V	51642	A100050-NP0-100J
A2C435	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2C440	283-0423-00			CAP,FXD,CER DI:0.22UF,+80-20%,50V	04222	DG015E224Z
A2CR413	152-0141-02			SEMICOND DVC,DI:SM,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
A2J1	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 8)	22526	48283-036
A2J2	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 4)	22526	48283-036
A2J4	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 1)	22526	48283-036
A2J5	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
A2J6	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
A2J7	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 4)	22526	48283-036
A2L102	108-0369-00			COIL,RF:FIXED,120NH	80009	108-0369-00
A2L305	108-0369-00			COIL,RF:FIXED,120NH	80009	108-0369-00
A2L311	108-0369-00			COIL,RF:FIXED,120NH	80009	108-0369-00
A2L410	108-0578-00			COIL,RF:FIXED,45NH	80009	108-0578-00
A2L434	108-0369-00			COIL,RF:FIXED,120NH	80009	108-0369-00
A2Q315	151-0609-00			TRANSISTOR:NPN,SI,MICRO-STRIP LINE PKG	TK0961	NE21935
A2Q320	151-0609-00			TRANSISTOR:NPN,SI,MICRO-STRIP LINE PKG	TK0961	NE21935
A2Q415	151-0712-00			TRANSISTOR:PNP,SI,TO-92	04713	SPS8223
A2R101	317-0750-00			RES,FXD,CMPSN:75 OHM,5%,0.125M	01121	BB7505
A2R111	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R112	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R113	317-0750-00			RES,FXD,CMPSN:75 OHM,5%,0.125M	01121	BB7505
A2R114	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R121	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R122	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R123	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R124	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R125	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R132	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125M	01121	BB1015
A2R140	307-0545-00			RES NTWK,FXD,FI:9,75 OHM,5%,0.15M	11236	750-101-R75
A2R200	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R201	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R202	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125M	01121	BB1015
A2R214	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R221	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R222	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R223	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R229	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R240	307-0546-00			RES NTWK,FXD,FI:5,750HM,5%,0.15 W	11236	750-61-R75
A2R313	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105
A2R314	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125M	01121	BB5105

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A2R315	317-0047-00			RES,FXD,CMPSN:4.7 OHM,5%,0.125W	01121	BB47G5
A2R316	317-0151-00			RES,FXD,CMPSN:150 OHM,5%,0.125W	29604	RC1/8-0151J
A2R317	317-0102-00			RES,FXD,CMPSN:1K OHM,5%,0125W	01121	BB1025
A2R318	317-0047-00			RES,FXD,CMPSN:4.7 OHM,5%,0.125W	01121	BB47G5
A2R319	317-0750-00			RES,FXD,CMPSN:75 OHM,5%,0.125W	01121	BB7505
A2R321	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125W	01121	BB5105
A2R330	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125W	01121	BB5105
A2R331	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125W	01121	BB5105
A2R332	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125W	01121	BB5105
A2R333	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125W	01121	BB5105
A2R334	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125W	01121	BB5105
A2R410	317-0510-00			RES,FXD,CMPSN:51 OHM,5%,0.125W	01121	BB5105
A2R411	317-0682-00			RES,FXD,CMPSN:6.8K OHM,5%,0.125W	01121	BB6825
A2R413	317-0220-00			RES,FXD,CMPSN:22 OHM,5%,0.125W	01121	BB2205
A2R414	317-0470-00			RES,FXD,CMPSN:47 OHM,5%,0.125W	01121	BB4705
A2R415	317-0103-00			RES,FXD,CMPSN:10K OHM,5%,0125W	01121	BB1035
A2R420	311-1563-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3352T-1-102
A2R425	311-1563-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	32997	3352T-1-102
A2R435	317-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.125W	01121	BB1015
A2R436	317-0750-00			RES,FXD,CMPSN:75 OHM,5%,0.125W	01121	BB7505
A2R440	307-0546-00			RES NTWK,FXD,FI:5,750HM,5%,0.15 W	11236	750-61-R75
A2U110	156-0205-02			MICROCKT,DGTL:QUAD 2 INP NOR GATE,SCRN	04713	MC10102PD/LD
A2U120	156-1032-00			MICROCKT,DGTL:QUINT 2 OR/NOR	07263	F100102FC
A2U130	156-1030-00			MICROCKT,DGTL:ECL,8 BIT SHIFT REGISTER	07263	F100141FC
A2U210	156-1032-00			MICROCKT,DGTL:QUINT 2 OR/NOR	07263	F100102FC
A2U220	156-1031-00			MICROCKT,DGTL:TRIPLE D FLIP FLOP	62786	HD100131F
A2U230	156-1032-00			MICROCKT,DGTL:QUINT 2 OR/NOR	07263	F100102FC
A2U430	156-1032-00			MICROCKT,DGTL:QUINT 2 OR/NOR	07263	F100102FC
A2U440	156-1639-01			MICROCKT,DGTL:SCREENED	04713	MC10H131(PDORLD)
A2Y100	158-0301-00			XTAL UNIT,QTZ:119.808MHZ (VYNL FOAM .062X.500 DOUBLE SIDED REQUIRED)	80009	158-0301-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3	670-8462-00			CIRCUIT BD ASSY:MAIN BOARD	80009	670-8462-00
A3C171	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C175	281-0811-00			CAP,FXD,CER DI:10PF,10%,100V	04222	MA101A100KAA
A3C180	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C210	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C215	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C225	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C235	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C240	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C245	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C250	281-0812-00			CAP,FXD,CER DI:1000PF,10%,100V	04222	MA101C102KAA
A3C260	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C267	283-0059-00			CAP,FXD,CER DI:1UF,+80-20%,50V	20932	5034ES50RD105Z
A3C275	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C280	283-0059-00			CAP,FXD,CER DI:1UF,+80-20%,50V	20932	5034ES50RD105Z
A3C287	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C340	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C345	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C350	281-0786-00			CAP,FXD,CER DI:150PF,10%,100V	04222	MA101A151KAA
A3C375	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C415	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C425	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C437	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C440	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C445	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C450	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C463	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C480	283-0479-00			CAP,FXD,CER DI:0.47UF,+80-20%,25V	20932	501ES25DP474Z
A3C489	283-0059-00			CAP,FXD,CER DI:1UF,+80-20%,50V	20932	5034ES50RD105Z
A3C493	281-0812-00			CAP,FXD,CER DI:1000PF,10%,100V	04222	MA101C102KAA
A3C496	290-0891-00			CAP,FXD,ELCTLT:1UF,+75 -10%,50V	55680	ULA1H010TEA
A3C499	290-0891-00			CAP,FXD,ELCTLT:1UF,+75 -10%,50V	55680	ULA1H010TEA
A3CR387	152-0141-02			SEMICOND DVC,DI:SW,SI,30V,150MA,30V,DO-35	03508	DA2527 (1N4152)
A3F396	159-0040-00			FUSE,CARTRIDGE:3AG,0.7A,250V,20SEC	71400	MDL 7/10
A3F399	159-0019-00			FUSE,CARTRIDGE:3AG,1A,250V,SLOW BLOW	71400	MDL 1
A3J1	131-2600-00			CONN,RCPT,ELEC:CIRCUIT BD,RT ANGLE 17/34	00779	1-86063-3
A3J2	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 8)	22526	48283-036
A3J3	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 4)	22526	48283-036
A3J88	131-1003-00			CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
A3J99	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL (QUANTITY OF 5)	22526	48283-036
A3Q291	151-0188-00			TRANSISTOR:PNP,SI,TO-92	03508	X39H3162
A3Q292	151-0190-00			TRANSISTOR:NPN,SI,TO-92	04713	SPS7969
A3R160	311-1558-00			RES,VAR,NONWW:TRMR,20K OHM,0.5W	32997	3352T-1-203
A3R170	315-0103-00			RES,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A3R186	315-0201-00			RES,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
A3R187	315-0121-00			RES,FXD,CMPSN:120 OHM,5%,0.25W	19701	5043CX120R0J
A3R188	315-0183-00			RES,FXD,CMPSN:18K OHM,5%,0.25W	19701	5043CX18K00J
A3R189	315-0183-00			RES,FXD,CMPSN:18K OHM,5%,0.25W	19701	5043CX18K00J
A3R190	315-0391-00			RES,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
A3R191	315-0392-00			RES,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
A3R192	315-0432-00			RES,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
A3R193	315-0221-00			RES,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
A3R194	315-0680-00			RES,FXD,CMPSN:68 OHM,5%,0.25W	01121	CB6805
A3R195	315-0202-00			RES,FXD,CMPSN:2K OHM,5%,0.25W	57668	NTR25J-E 2K
A3R247	315-0242-00			RES,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
A3R253	315-0103-00			RES,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
A3R291	315-0222-00			RES,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3R298	311-1559-00			RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3352T-1-103
A3R388	315-0152-00			RES,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
A3R390	315-0681-00			RES,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
A3R391	131-0566-00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L W/WIRE LEADS	24546	OMA 07
A3R394	315-0182-00			RES,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
A3R395	321-0657-00			RES,FXD,FILM:60 OHM,1%,0.125W,TC=TO	57668	CRB14 FXE 60 OHM
A3R399	311-1564-00			RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3352T-CK5-501
A3R470	315-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R471	315-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
A3R479	131-0566-00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L W/WIRE LEADS	24546	OMA 07
A3R485	308-0245-00			RES,FXD,WW:0.6 OHM,5%,2W	00213	310S .6-5
A3R487	315-0302-00			RES,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
A3U105	156-0368-03			MICROCKT,DGTL:TTL TO ECL QUAD TRANSLATOR	04713	MC10124PD/LD
A3U115	156-1395-01			MICROCKT,DGTL:QUAD 2 LINE TO 1 LINE DATA SEL/MUX,SCRN	01295	SN74LS158NP3
A3U120	156-0734-02			MICROCKT,DGTL:4-BIT R-SHF,L-SHF RGTR W/3 -STATE OUT,SCRN	01295	SN74LS295BNP3
A3U125	156-0734-02			MICROCKT,DGTL:4-BIT R-SHF,L-SHF RGTR W/3 -STATE OUT,SCRN	01295	SN74LS295BNP3
A3U130	156-0384-02			MICROCKT,DGTL:QUAD 2-INP NAND GATE	01295	SN74LS03NP3
A3U135	156-0646-02			MICROCKT,DGTL:4-BIT BINARY COUNTER	18324	N74LS93(NBORFB)
A3U140	156-1183-00			MICROCKT,DGTL:STTL,PRESET BINARY LATCH/CNTR	01295	SN74S197JP4
A3U145	156-0953-02			MICROCKT,DGTL:4 BIT MAGNITUDE CMPRTR	18324	N74LS85(NBORFB)
A3U150	156-0388-03			MICROCKT,DGTL:DUAL D FLIP-FLOP,SCRN	01295	SN74LS74ANP3
A3U171	156-0733-02			MICROCKT,DGTL:DUAL MONOSTABLE MV W/ST INP	01295	SN74LS221N3ORJ4
A3U175	156-0368-03			MICROCKT,DGTL:TTL TO ECL QUAD TRANSLATOR	04713	MC10124PD/LD
A3U180	156-0316-04			MICROCKT,DGTL:QUAD ECL TO TTL TRANSLATOR	04713	MC10125PD/LD
A3U210	156-0368-03			MICROCKT,DGTL:TTL TO ECL QUAD TRANSLATOR	04713	MC10124PD/LD
A3U220	156-1395-01			MICROCKT,DGTL:QUAD 2 LINE TO 1 LINE DATA SEL/MUX,SCRN	01295	SN74LS158NP3
A3U225	156-0707-03			MICROCKT,DGTL:QUAD 2 INP EXCL OR GATE,SEL	18324	N74S86(NB OR FB)
A3U240	156-0735-02			MICROCKT,DGTL:4-BIT BISTABLE LCH,SCRN	18324	N74LS75(NBORFB)
A3U245	156-0735-02			MICROCKT,DGTL:4-BIT BISTABLE LCH,SCRN	18324	N74LS75(NBORFB)
A3U250	156-0733-02			MICROCKT,DGTL:DUAL MONOSTABLE MV W/ST INP	01295	SN74LS221N3ORJ4
A3U260	156-1785-00			MICROCKT,DGTL:CRT CONTROLLER,SCREENED	55576	SYP6845EA
A3U270	160-3096-00			MICROCKT,DGTL:8 BIT MICROCOMPUTER W/UV-E PROM,NMOS,PRGM	80009	160-3096-00
A3U275	156-0479-02			MICROCKT,DGTL:QUAD 2-INP OR GATE,SCRN,	18324	N74LS32(NBORFB)
A3U280	156-0690-03			MICROCKT,DGTL:QUAD 2 INP NOR GATE,BURN IN	18324	N74S02(NB OR FB)
A3U285	156-0388-03			MICROCKT,DGTL:DUAL D FLIP-FLOP,SCRN	01295	SN74LS74ANP3
A3U287	156-0383-02			MICROCKT,DGTL:QUAD 2-INP NOR GATE,SCRN,	18324	N74LS02(NBORFB)
A3U310	156-1407-00			MICROCKT,DGTL:MOS-TO-LED 8-DIGIT DRIVER	27014	DS8863 N OR J
A3U315	156-0735-02			MICROCKT,DGTL:4-BIT BISTABLE LCH,SCRN	18324	N74LS75(NBORFB)
A3U320	156-1395-01			MICROCKT,DGTL:QUAD 2 LINE TO 1 LINE DATA SEL/MUX,SCRN	01295	SN74LS158NP3
A3U325	156-1395-01			MICROCKT,DGTL:QUAD 2 LINE TO 1 LINE DATA SEL/MUX,SCRN	01295	SN74LS158NP3
A3U337	160-3095-00			MICROCKT,DGTL:4096 X 8 ROM,PRGM	80009	160-3095-00
A3U340	156-1183-00			MICROCKT,DGTL:STTL,PRESET BINARY LATCH/CNTR	01295	SN74S197JP4
A3U345	156-0953-02			MICROCKT,DGTL:4 BIT MAGNITUDE CMPRTR	18324	N74LS85(NBORFB)
A3U350	156-0735-02			MICROCKT,DGTL:4-BIT BISTABLE LCH,SCRN	18324	N74LS75(NBORFB)
A3U375	156-0419-02			MICROCKT,DGTL:DUAL 4 INP NAND LINE DRIVER	18324	N74S140(NBORFB)
A3U380	156-0530-02			MICROCKT,DGTL:QUAD 2-INP MUX,SCRN 74LS157	18324	TO BE ASSIGNED
A3U385	156-0388-03			MICROCKT,DGTL:DUAL D FLIP-FLOP,SCRN	01295	SN74LS74ANP3
A3U387	156-0481-02			MICROCKT,DGTL:TRIPLE 3-INP & GATE,SCRN	18324	N74LS11(NBORFB)
A3U415	156-0735-02			MICROCKT,DGTL:4-BIT BISTABLE LCH,SCRN	18324	N74LS75(NBORFB)
A3U425	156-1395-01			MICROCKT,DGTL:QUAD 2 LINE TO 1 LINE DATA SEL/MUX,SCRN	01295	SN74LS158NP3

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A3U437	156-1395-01			MICROCKT,DGTL:QUAD 2 LINE TO 1 LINE DATA SEL/MUX,SCRN	01295	SN74LS158NP3
A3U440	156-0735-02			MICROCKT,DGTL:4-BIT BISTABLE LCH,SCRN	18324	N74LS75(NBORFB)
A3U445	156-0735-02			MICROCKT,DGTL:4-BIT BISTABLE LCH,SCRN	18324	N74LS75(NBORFB)
A3U450	156-0383-02			MICROCKT,DGTL:QUAD 2-INP NOR GATE,SCRN,	18324	N74LS02(NBORFB)
A3U469	156-0383-02			MICROCKT,DGTL:QUAD 2-INP NOR GATE,SCRN,	18324	N74LS02(NBORFB)
A3U480	156-0656-02			MICROCKT,DGTL:DECADE COUNTER,SCRN	01295	SN74LS90NP3
A3U487	156-0656-02			MICROCKT,DGTL:DECADE COUNTER,SCRN	01295	SN74LS90NP3
A3U493	156-0053-00			MICROCKT,LINEAR:VOLTAGE REGULATOR	07263	SL21721
A3Y473	158-0132-00			XTAL UNIT,QTZ:15.808MHZ 0.001 %,SERIES (VYNL FOAM .062X.500 DOUBLE SIDED REQUIRED)	33096	ORDER BY DESCR

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A4	670-8459-00			CIRCUIT BD ASSY:FRONT PANEL	80009	670-8459-00
A4J1	131-1727-00			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR262-1
A4J2	131-2238-00			CONN,RCPT,ELEC:CKT BD,2 X 20,MALE	TK1483	082-2043-S008
A4J3	131-1727-00			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR262-1
A4J4	131-1727-00			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR262-1
A4J5	131-1727-00			CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR262-1
A4R13	315-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A4R17	315-0101-00			RES,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
A4S1	260-2031-00			SWITCH,ROCKER:(7)SPST,30VDC,125MA	81073	76SB07S
A4S2	263-0019-01			SWITCH PB ASSY:MOMENTARY	80009	263-0019-01
A4S3	263-0019-03			SWITCH PB ASSY:MOMENTARY	80009	263-0019-03
A4S4	263-0019-03			SWITCH PB ASSY:MOMENTARY	80009	263-0019-03
A4S5	263-0019-01			SWITCH PB ASSY:MOMENTARY	80009	263-0019-01
A4S6	263-0019-01			SWITCH PB ASSY:MOMENTARY	80009	263-0019-01
A4S7	263-0019-03			SWITCH PB ASSY:MOMENTARY	80009	263-0019-03
A4S8	263-0019-03			SWITCH PB ASSY:MOMENTARY	80009	263-0019-03
A4S9	263-0019-01			SWITCH PB ASSY:MOMENTARY	80009	263-0019-01
A4S10	263-0019-01			SWITCH PB ASSY:MOMENTARY	80009	263-0019-01
A4S11	263-0019-03			SWITCH PB ASSY:MOMENTARY	80009	263-0019-03
A4S12	263-0019-03			SWITCH PB ASSY:MOMENTARY	80009	263-0019-03
A4S13	263-0019-01			SWITCH PB ASSY:MOMENTARY	80009	263-0019-01
A4S14	263-0019-01			SWITCH PB ASSY:MOMENTARY	80009	263-0019-01
A4S15	263-0019-03			SWITCH PB ASSY:MOMENTARY	80009	263-0019-03
A4S16	263-0019-03			SWITCH PB ASSY:MOMENTARY	80009	263-0019-03
A4S17	263-0019-03			SWITCH PB ASSY:MOMENTARY	80009	263-0019-03
A4S18	263-0019-01			SWITCH PB ASSY:MOMENTARY	80009	263-0019-01

Section 7
SCHEMATICS

Symbols and Reference Designators

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).

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.

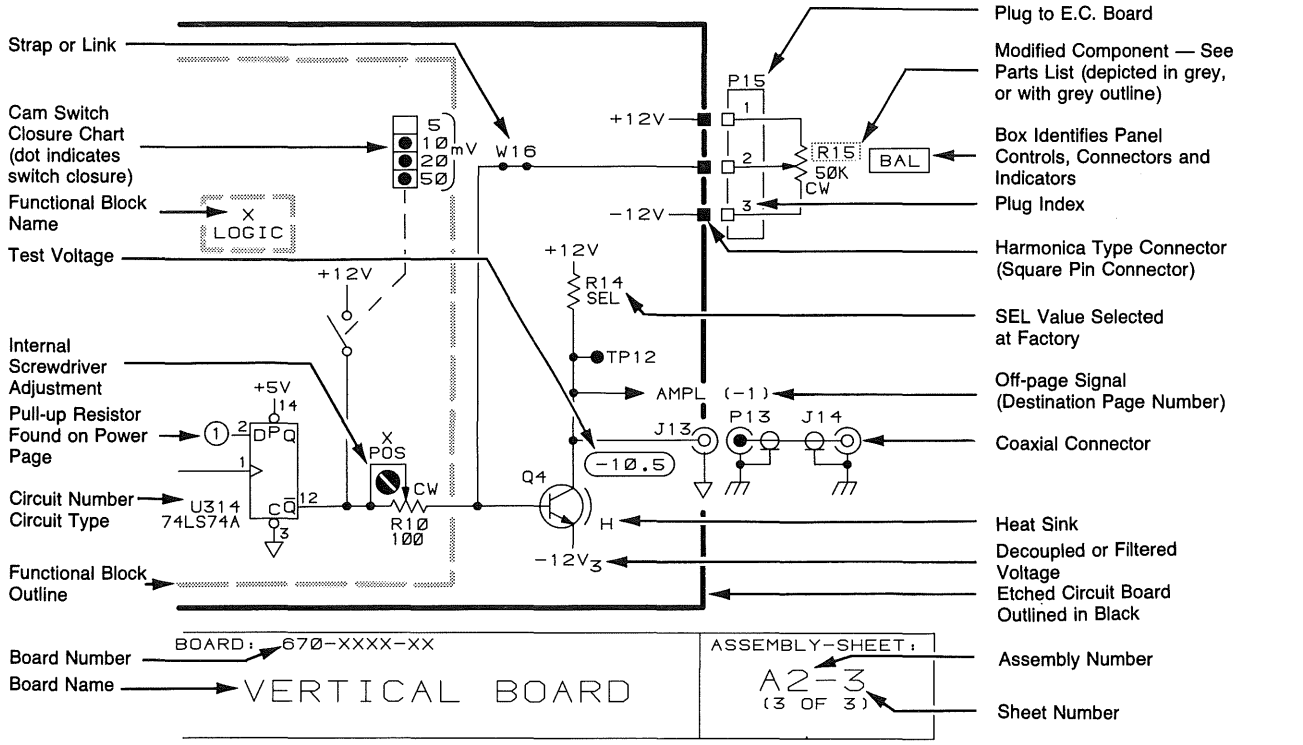
Abbreviations are based on ANSI Y1.1-1972. Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc., are:

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.

The following prefix letters are used as reference designators to identify components or assemblies on the diagrams.

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

The following special symbols may appear on the diagrams:



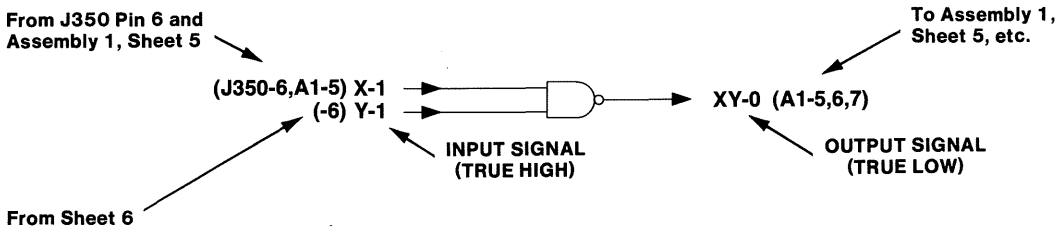
1. True High and True Low Signals

Signal names on the schematics are followed by -1 or a -0. A TRUE HIGH signal is indicated by -1, and a TRUE LOW signal is indicated by -0.

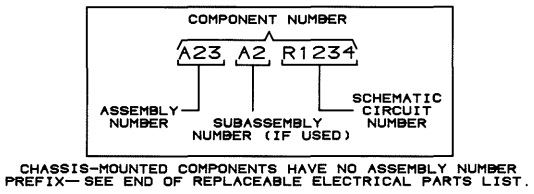
SIGNAL -1 = TRUE HIGH
SIGNAL -0 = TRUE LOW

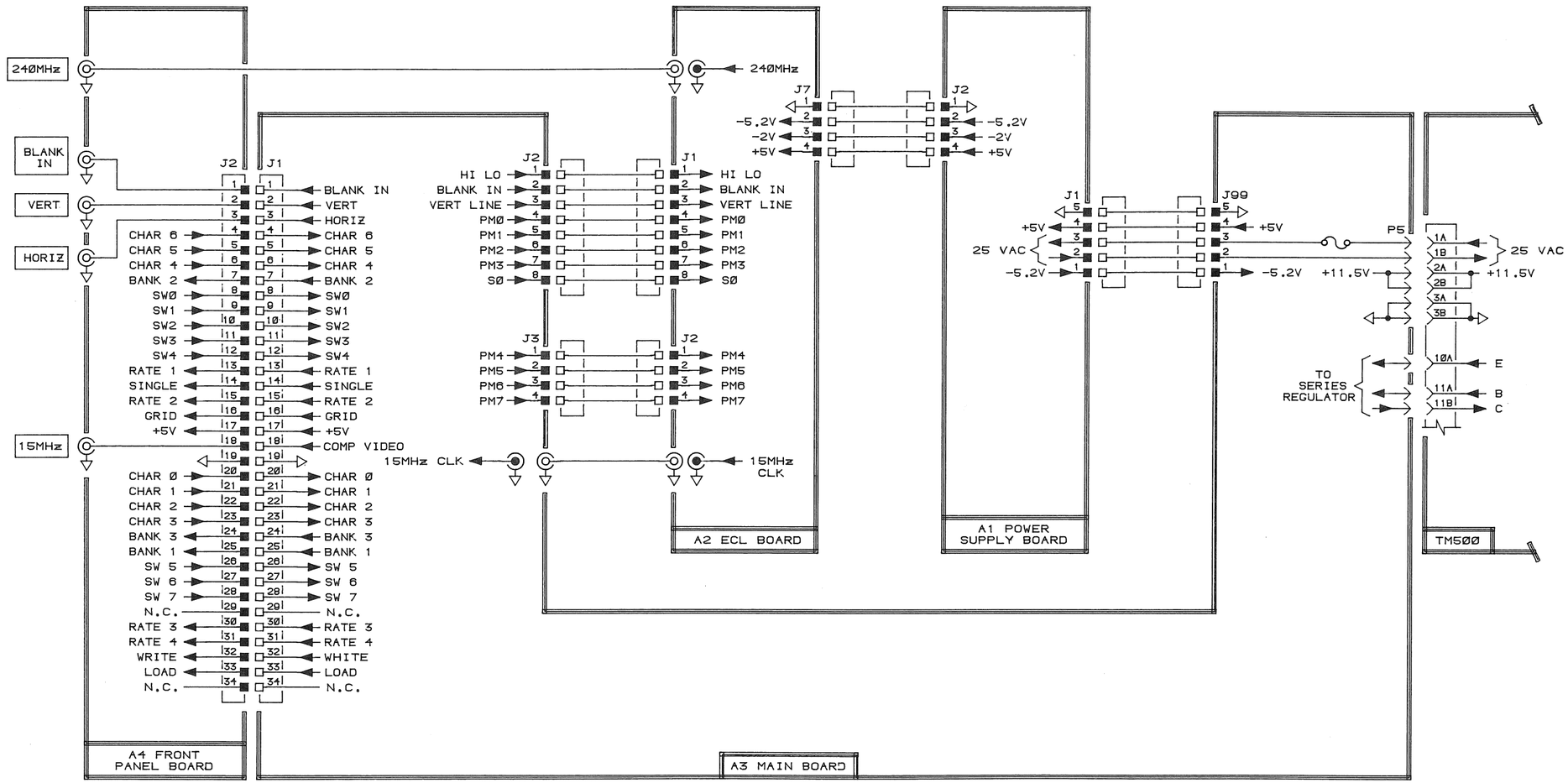
2. Cross-References

Schematic cross-references (from/to information) are included on the schematics. The "from" reference only indicates the signal "source," and the "to" reference lists all loads where the signal is used. All from/to information will be enclosed in parentheses.

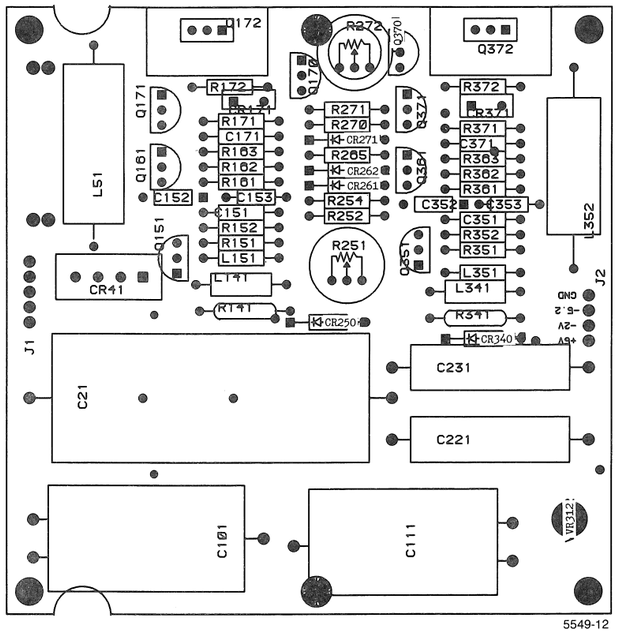


3. Component Number Example



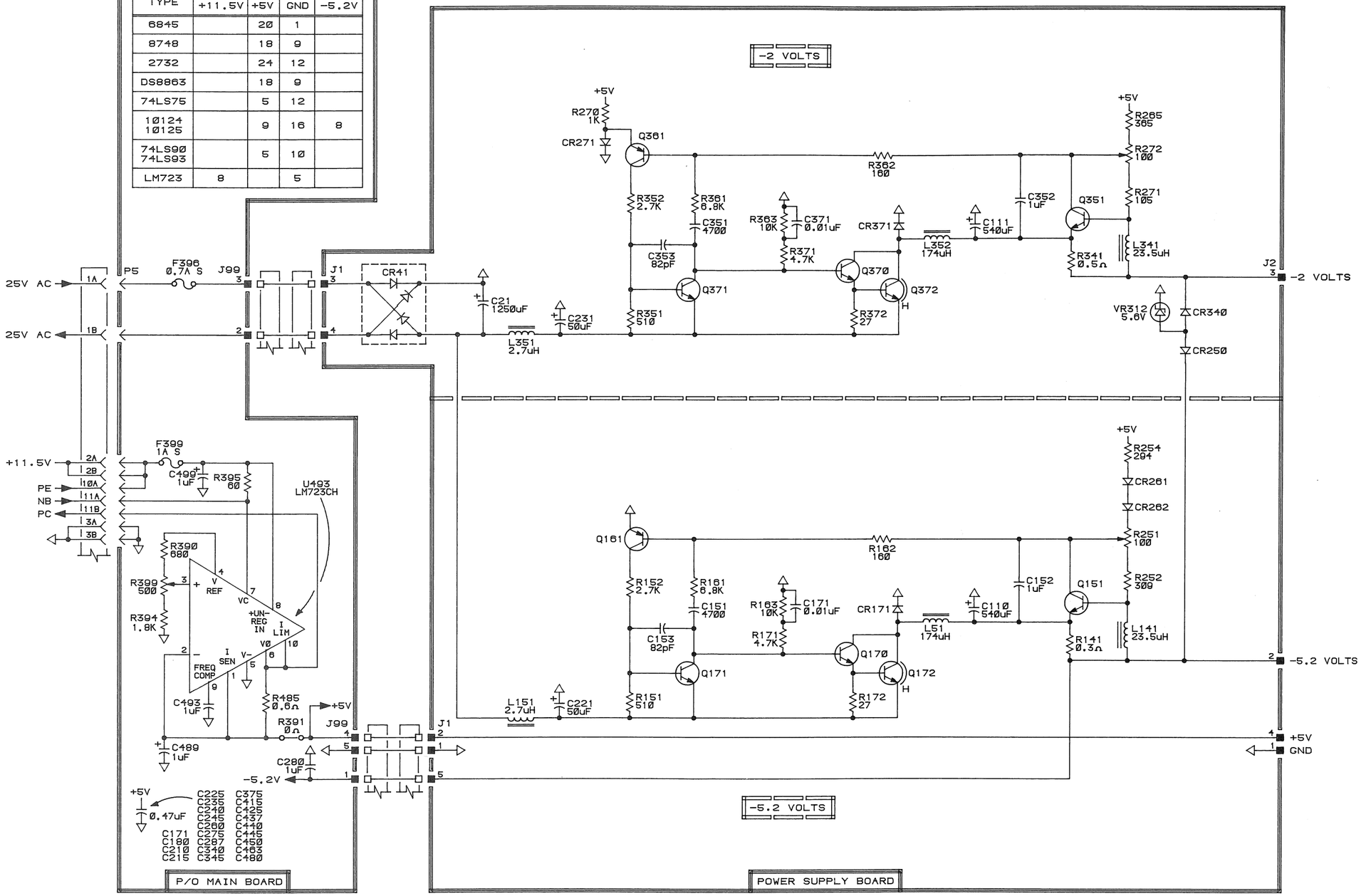


FIRST USE: 067-0146-00	OTHER USES:	NOTES:	TITLE:	Tektronix®	ASSEMBLY:
DATE: REV, 15 JAN 85			VIDEO DISPLAY INTERCONNECT		
CONTROL NO.: ISA039.000		TEKTRONIX, INC. © 1984			SHEET: 1 OF 1

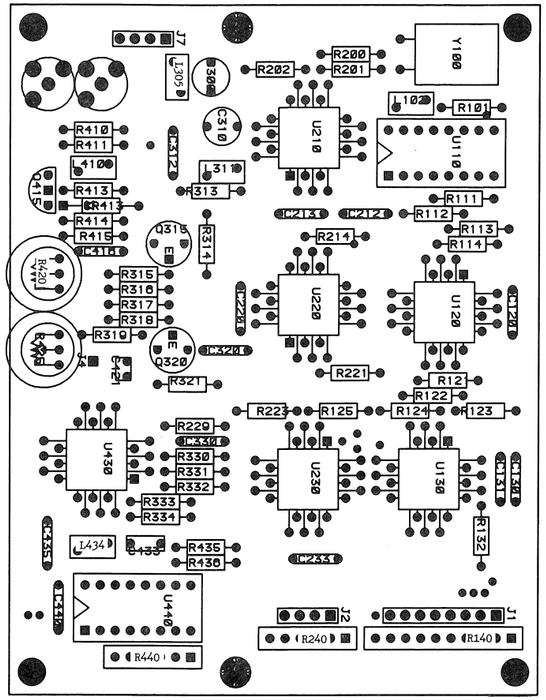


Power Supply (670-8460-00) Component Locations.

IC SUPPLIES				
DEVICE TYPE	PIN			
	+11.5V	+5V	GND	-5.2V
6845		20	1	
8748		18	9	
2732		24	12	
DS8863		18	9	
74LS75		5	12	
10124 10125		9	16	8
74LS90 74LS93		5	10	
LM723	8		5	

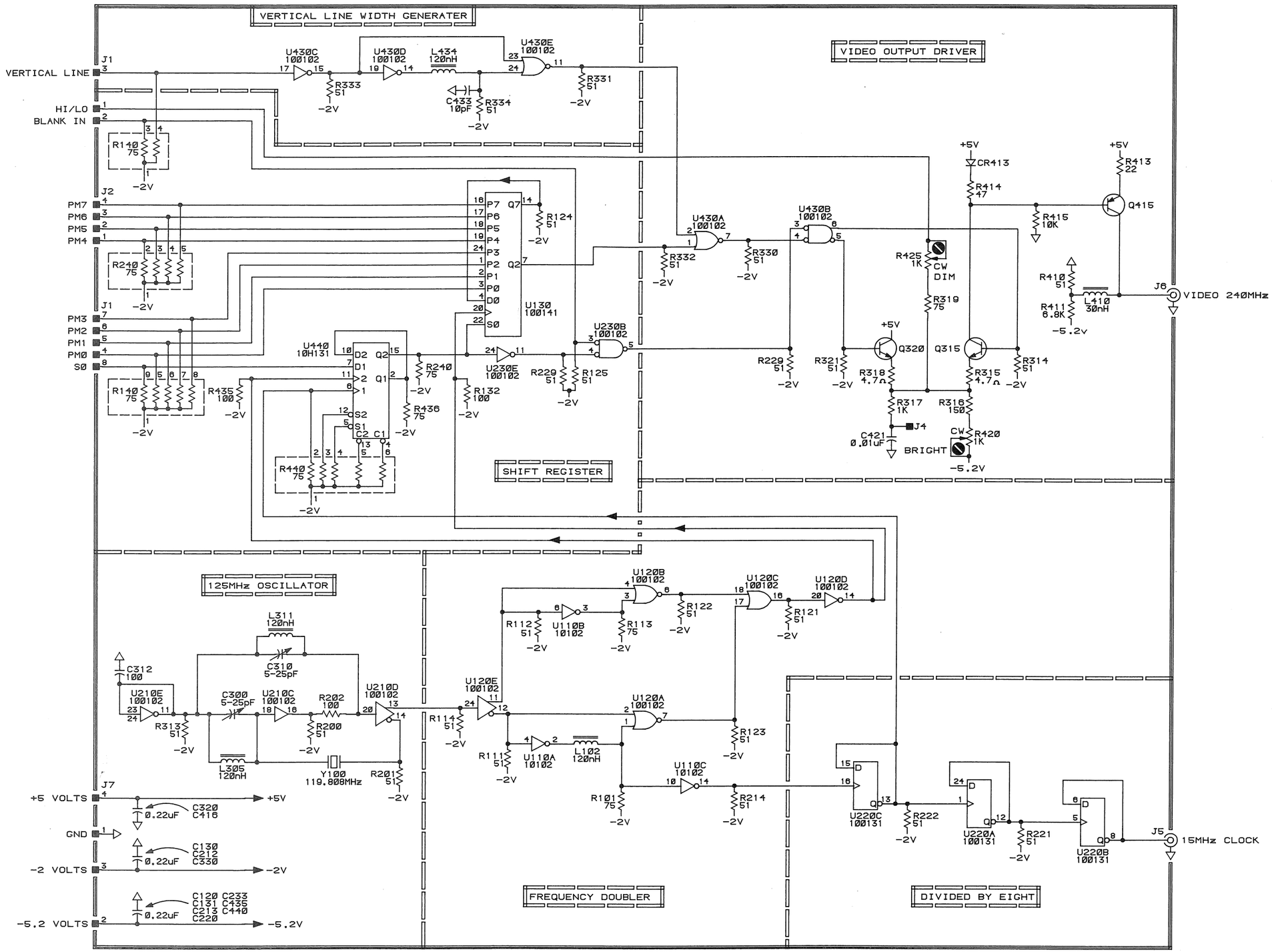


FIRST USE: 067-0146-00	OTHER USES:	NOTES:	TITLE: 670-8460-00/670-8462-00	Tektronix®	ASSEMBLY: A1-1 A3-3
DATE: REV, 16 JAN 85			POWER SUPPLY BOARD		
CONTROL NO.: SSA069.000		TEKTRONIX, INC. © 1984			SHEET: 1 OF 1



5549-13

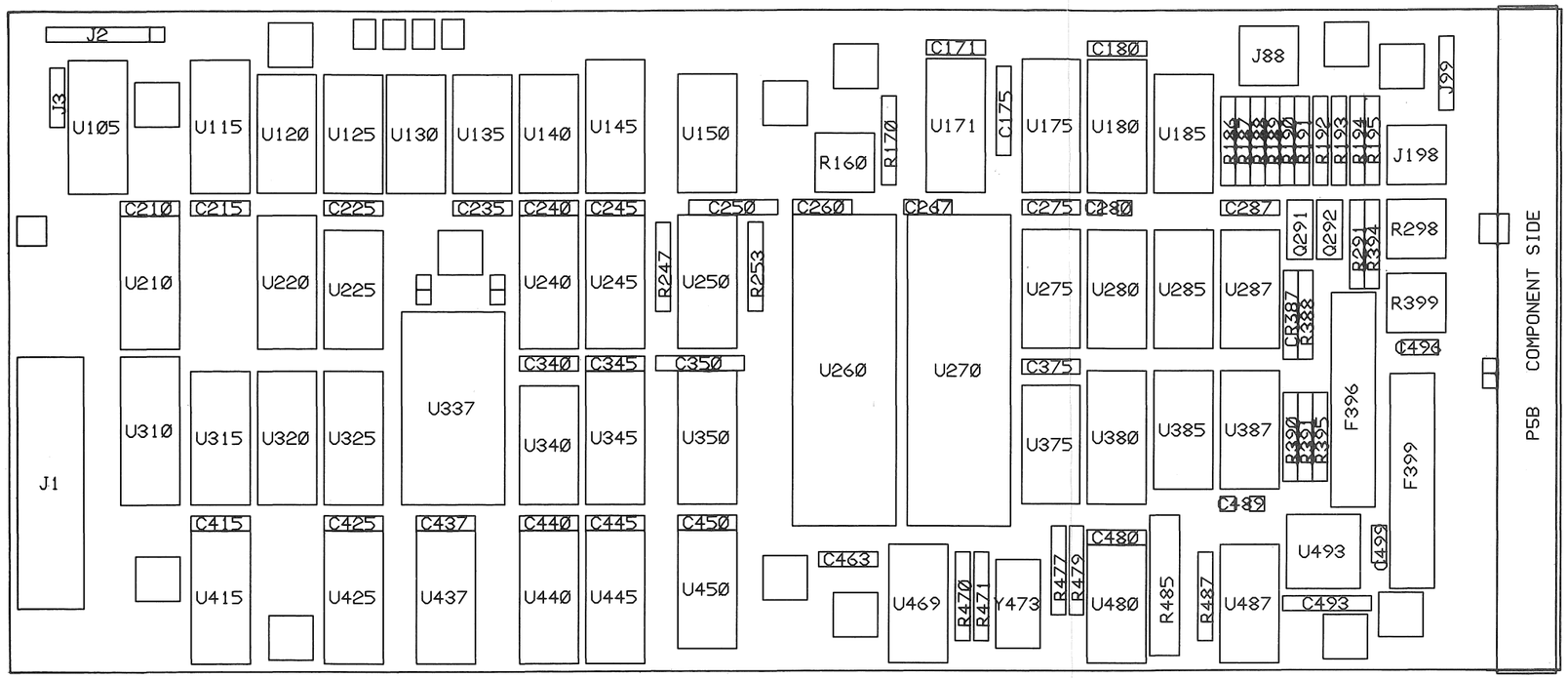
ECL Board (670-8461-00) Component Locations.



FIRST USE: 067-0146-00	OTHER USES:	NOTES:	TITLE: 670-8461-00	ASSEMBLY:
DATE: REV, 16 JAN 85			ECL CHARACTER GENERATOR BOARD	A2-1
CONTROL NO.: SSA071.000		TEKTRONIX, INC. © 1984	Tektronix®	SHEET: 1 OF 1

ECL BOARD
670-8461-00

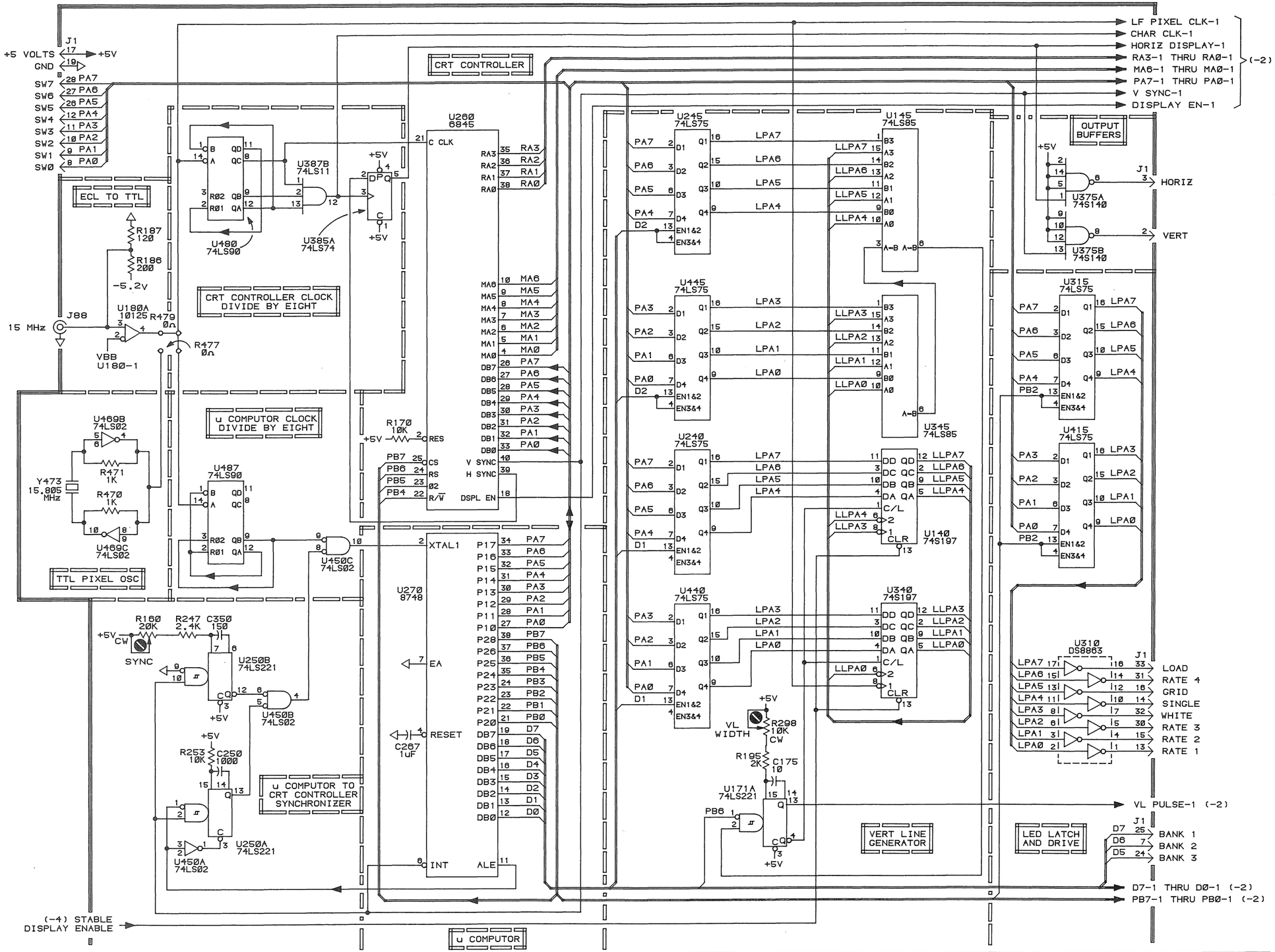
A2-1



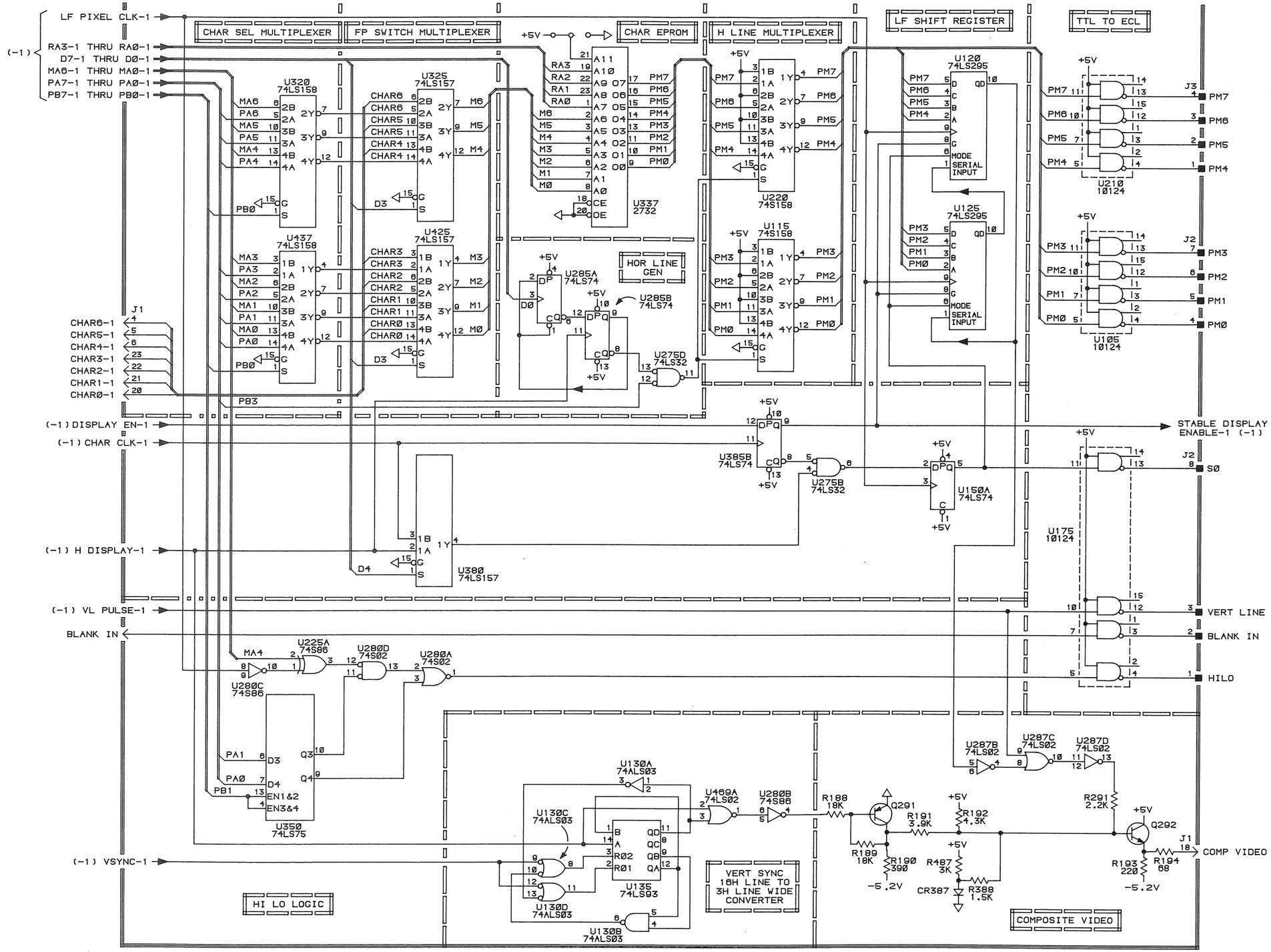
5549-14

Main Board (670-8462-00) Component Locations.

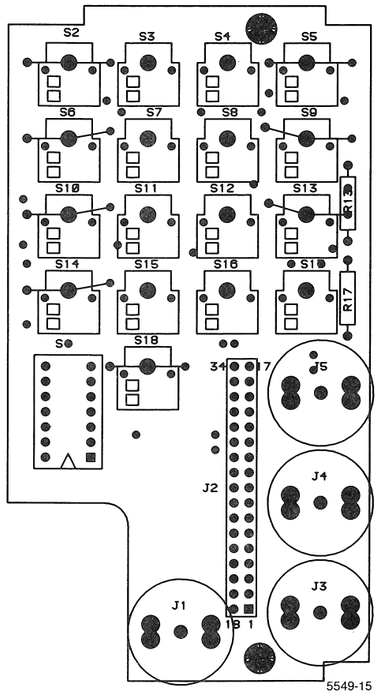
MAIN BOARD
COMPONENT LOCATIONS



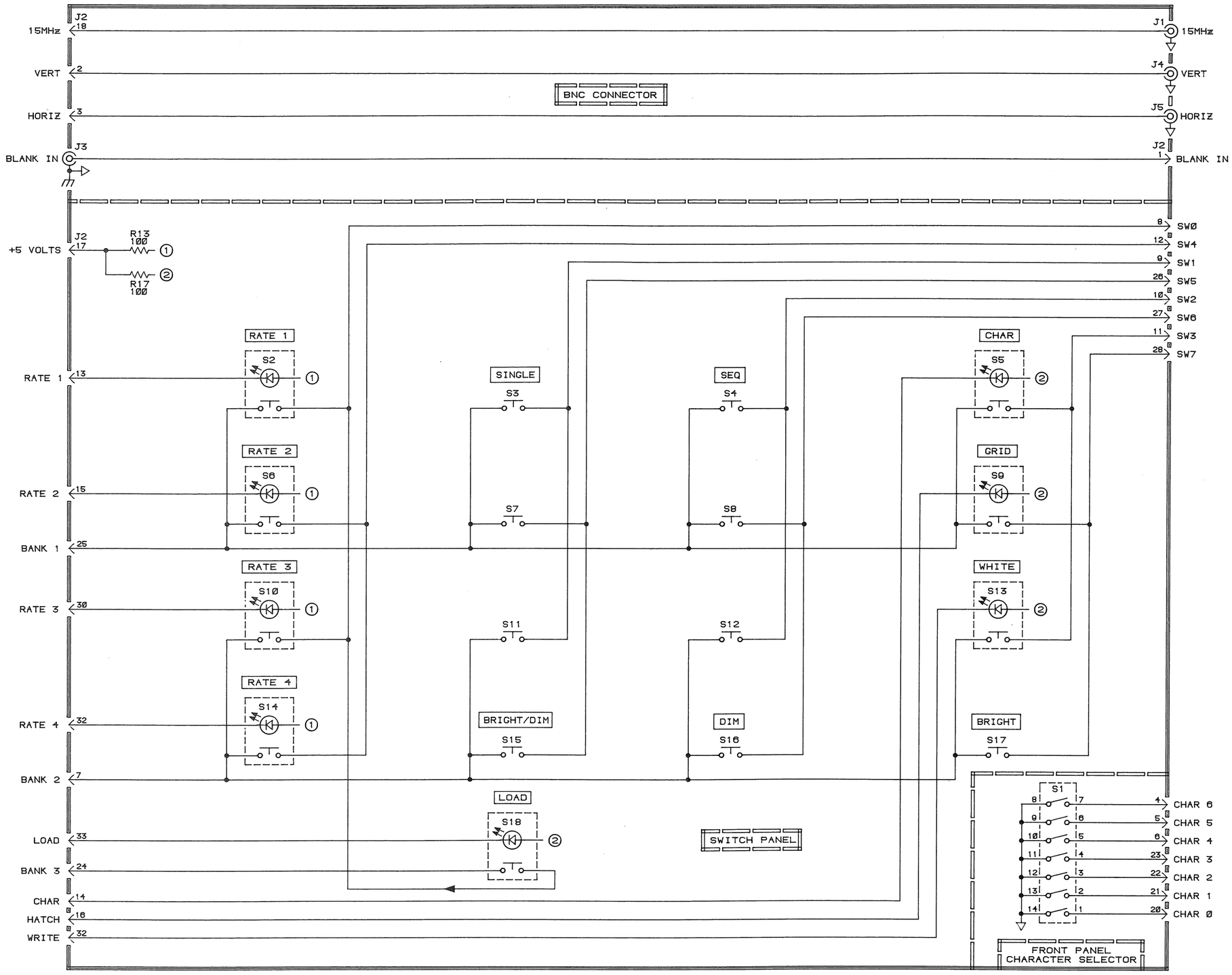
FIRST USE: 067-0146-00	OTHER USES:	NOTES: SEE SHEET A3-3 FOR IC SUPPLIES.	TITLE: 670-8462-00		ASSEMBLY: A3-1
DATE: REV, 15 DEC 85			MAIN BOARD	Tektronix®	SHEET: 1 OF 3
CONTROL NO.: SSA070.000		TEKTRONIX, INC. © 1984			



FIRST USE: 067-0146-00	OTHER USES:	NOTES:	TITLE: 670-8462-00	ASSEMBLY: A3-2
DATE: REV, 15 JAN 85			MAIN BOARD	SHEET: 2 OF 3
CONTROL NO.: SSA070.000		TEKTRONIX, INC. © 1984		



Front Panel (670-8459-00) Component Locations.



FIRST USE: 067-0146-00	OTHER USES:	NOTES:	TITLE: 670-8459-00	Tektronix®	ASSEMBLY:
DATE: REV, 15 JAN 85			FRONT PANEL BOARD		A4-1
CONTROL NO.: SSA068.000		TEKTRONIX, INC. © 1984			SHEET: 1 OF 1

Section 8
REPLACEABLE MECHANICAL PARTS

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 developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

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

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

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

FIGURE AND INDEX NUMBERS

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

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1 2 3 4 5 Name & Description

Assembly and/or Component
Attaching parts for Assembly and/or Component
- - - * - - -
Detail Part of Assembly and/or Component
Attaching parts for Detail Part
- - - * - - -
Parts of Detail Part
Attaching parts for Parts of Detail Part
- - - * - - -

Attaching 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. The separation symbol - - - * - - - indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ABBREVIATIONS

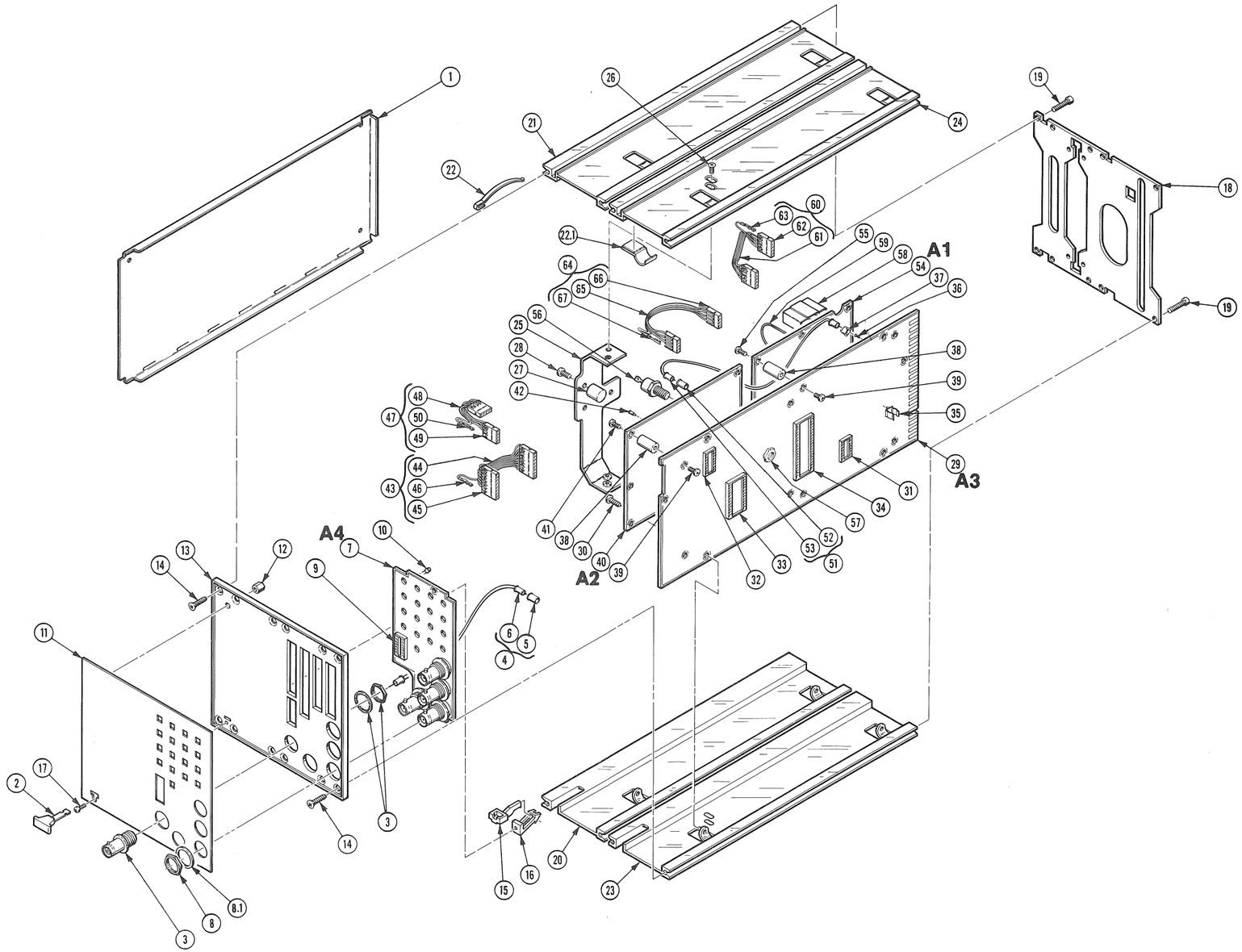
"	INCH
#	NUMBER SIZE
ACTR	ACTUATOR
ADPTR	ADAPTER
ALIGN	ALIGNMENT
AL	ALUMINUM
ASSEM	ASSEMBLED
ASSY	ASSEMBLY
ATTEN	ATTENUATOR
AWG	AMERICAN WIRE GAGE
BD	BOARD
BRKT	BRACKET
BRS	BRASS
BRZ	BRONZE
BSHG	BUSHING
CAB	CABINET
CAP	CAPACITOR
CER	CERAMIC
CHAS	CHASSIS
CKT	CIRCUIT
COMP	COMPOSITION
CONN	CONNECTOR
COV	COVER
CPLG	COUPLING
CRT	CATHODE RAY TUBE
DEG	DEGREE
DWR	DRAWER
ELCTRN	ELECTRON
ELEC	ELECTRICAL
ELCTLT	ELECTROLYTIC
ELEM	ELEMENT
EPL	ELECTRICAL PARTS LIST
EQPT	EQUIPMENT
EXT	EXTERNAL
FIL	FILLISTER HEAD
FLEX	FLEXIBLE
FLH	FLAT HEAD
FLTR	FILTER
FR	FRAME or FRONT
FSTNR	FASTENER
FT	FOOT
FXD	FIXED
GSKT	GASKET
HDL	HANDLE
HEX	HEXAGON
HEX HD	HEXAGONAL HEAD
HEX SOC	HEXAGONAL SOCKET
HLCPS	HELICAL COMPRESSION
HLEXT	HELICAL EXTENSION
HV	HIGH VOLTAGE
IC	INTEGRATED CIRCUIT
ID	INSIDE DIAMETER
IDENT	IDENTIFICATION
IMPLR	IMPELLER
IN	INCH
INCAND	INCANDESCENT
INSUL	INSULATOR
INTL	INTERNAL
LPHLDR	LAMPHOLDER
MACH	MACHINE
MECH	MECHANICAL
MTG	MOUNTING
NIP	NIPPLE
NON WIRE	NOT WIRE WOUND
OBD	ORDER BY DESCRIPTION
OD	OUTSIDE DIAMETER
OVH	OVAL HEAD
PH BRZ	PHOSPHOR BRONZE
PL	PLAIN or PLATE
PLSTC	PLASTIC
PN	PART NUMBER
PNH	PAN HEAD
PWR	POWER
RCPT	RECEPTACLE
RES	RESISTOR
RGD	RIGID
RLF	RELIEF
RTNR	RETAINER
SCH	SOCKET HEAD
SCOPE	OSCILLOSCOPE
SCR	SCREW
SE	SINGLE END
SECT	SECTION
SEMICOND	SEMICONDUCTOR
SHLD	SHIELD
SHLDR	SHOULDERED
SKT	SOCKET
SL	SLIDE
SLFLKG	SELF-LOCKING
SLVG	SLEEVING
SPR	SPRING
SQ	SQUARE
SST	STAINLESS STEEL
STL	STEEL
SW	SWITCH
T	TUBE
TERM	TERMINAL
THD	THREAD
THK	THICK
TNSN	TENSION
TPG	TAPPING
TRH	TRUSS HEAD
V	VOLTAGE
VAR	VARIABLE
W/	WITH
WSHR	WASHER
XFMR	TRANSFORMER
XSTR	TRANSISTOR

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00779	AMP INC	P O BOX 3608	HARRISBURG PA 17105
04713	MOTOROLA INC SEMICONDUCTOR GROUP	5005 E MCDOWELL RD	PHOENIX AZ 85008
05574	VIKING CONNECTORS INC	21001 NORDHOFF ST	CHATSWORTH CA 91311
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
16428	BELDEN CORP ELECTRONIC DIV	2200 US HWY 27 SOUTH P O BOX 1980	RICHMOND IN 47374
22526	DU PONT E I DE NEMOURS AND CO INC PHOTO PRODUCTS DEPT BERG ELECTRONICS DIV	ROUTE 83	NEW CUMBERLAND PA 17070
24931	SPECIALTY CONNECTOR CO INC	2620 ENDRESS PLACE P O BOX D	GREENWOOD IN 46142
50579	LITRONIX INC	19000 HOMESTEAD RD	CUPERTINO CA 95014
75915	LITTELFUSE INC	800 E NORTHWEST HWY	DES PLAINES IL 60016
80009	TEKTRONIX INC	4900 S W GRIFFITH DR P O BOX 500	BEAVERTON OR 97077
83385	MICRODOT MANUFACTURING INC GREER-CENTRAL DIV	3221 W BIG BEAVER RD	TROY MI 48098
90816	PHALO CORP	530 BOSTON TURNPIKE	SHREWBURY MA 01545
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61101
TK0303	FAB TEK INC	17 SUGAR HOLLOW RD	DANBURY CT 06810
TK1072	ADVANCE ELECTRICAL SALES	6650 N BASIN	PORTLAND OR 97217

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-0	067-0146-00			1	FIXTURE,CAL:PROGRAMMED PLUG-IN	80009	067-0146-00
-1	337-1399-00			2	.SHIELD,ELEC:SIDE	80009	337-1399-00
-2	366-1690-00			1	.KNOB,LATCH:SIL GY,0.53 X 0.23 X 1.059	80009	366-1690-00
-3	131-1171-00			1	.CONN,RCPT,ELEC:BNC,FEMALE	24931	28JR231-1
-4	175-2553-00			1	.CABLE ASSY,RF:50 OHM COAX,6.0 L,6-N .(A2J6 TO BNC)	80009	175-2553-00
-5	210-0774-00			2	..EYELET,METALLIC:0.152 OD X 0.218 L,BRS GO ..LD PL	80009	210-0774-00
-6	210-0775-00			2	..EYELET,METALLIC:0.126 OD X 0.205 L,BRS GO ..LD PL	80009	210-0775-00
-7	----- -----			1	.CIRCUIT BD ASSY:FRONT PANEL .(SEE A4 REPL)		
-8	220-0497-00			4	.NUT,PLAIN,HEX:0.5-28 X 0.562 HEX,BRS CD PL	80009	220-0497-00
-8.1	210-0845-00			4	.WASHER,FLAT:0.5 ID X 0.02 THK,STL CD PL,0. .625 OD	80009	210-0845-00
					.CKT BOARD ASSY INCLUDES:		
-9	136-0728-00			1	..SKT,PL-IN ELEK:MICROCKT,14 CONTACT	09922	DILB14P-108
-10	150-1000-00			8	..LT EMITTING DIO:RED,650NM,40MA MAX ..(USED WITH A4S2,S5,S6,S9,S10,S13,S14,S18)	50579	RL-50
-11	333-3125-00			1	.PANEL,FRONT: .(ATTACHING PARTS)	80009	333-3125-00
-12	129-0517-00			1	.SPACER,POST:0.25 L,W/4-40 THD THRU,AL, 0.2 .5 HEX .(END OF ATTACHING PARTS)	80009	129-0517-00
-13	386-2957-00			1	.SUBPANEL,FRONT: .(ATTACHING PARTS)	80009	386-2957-00
-14	213-0227-00			8	.SCREW,TPG,TF:6-32 X 0.5,SPCL TYPE,FLH,100 .DEG,STL CD PL,POZ .(END OF ATTACHING PARTS)	83385	ORDER BY DESCR
-15	105-0718-01			1	.BAR,LATCH RLSE:	80009	105-0718-01
-16	105-0719-00			1	.LATCH,RETAINING:PLUG-IN .(ATTACHING PARTS)	80009	105-0719-00
-17	213-0254-00			1	.SCREW,TPG,TF:2-32 X 0.25,SPCL TYPE,FLH 100 . DEG,STL CD PL,POZ .(END OF ATTACHING PARTS)	80009	213-0254-00
-18	333-2380-01			1	.PANEL,REAR: .(ATTACHING PARTS)	80009	333-2380-01
-19	213-0192-00			8	.SCREW,TPG,TF:6-32 X 0.5,SPCL TYPE,FILH,STL . CD PL,POZ .(END OF ATTACHING PARTS)	80009	213-0192-00
-20	426-0724-00			1	.FR SECT,PLUG-IN:BOTTOM	80009	426-0724-00
-21	426-0725-00			1	.FR SECT,PLUG-IN:TOP	80009	426-0725-00
-22	214-1061-00			1	.CONTACT,ELEC:GROUNDING,CU BE	80009	214-1061-00
-22.1	343-0229-80			1	.:	80009	343-0229-80
-23	426-0724-27			1	.FR SECT,PLUG-IN:BOTTOM	80009	426-0724-27
-24	426-0725-26			1	.FR SECT,PLUG-IN:TOP	80009	426-0725-26
-25	407-3247-00			1	.BRACKET,SUPPORT:HEATSINK,ALUMINUM .(ATTACHING PARTS)	80009	407-3247-00
-26	211-0101-00			4	.SCREW,MACHINE:4-40 X 0.250,FLH,100 DEG,STL .,CD PL .(END OF ATTACHING PARTS)	80009	211-0101-00
-27	214-3676-00			3	.HEAT SINK,ELEC:MEMORY CHIP,ALUMINUM .(ATTACHING PARTS)	80009	214-3676-00
-28	211-0504-00			3	.SCREW,MACHINE:6-32 X 0.250,PNH,STL,CD PL .(END OF ATTACHING PARTS)	80009	211-0504-00
-29	- ---- -----			1	.CIRCUIT BD ASSY:MAIN BOARD .(SEE A3 REPL) .(ATTACHING PARTS)		
-30	213-0146-00			4	.SCREW,TPG,TF:6-20 X 0.312,TYPE B,PNH,STL C .D PL,POZ .(END OF ATTACHING PARTS) .CKT BOARD ASSY INCLUDES:	83385	ORDER BY DESCR
-31	136-0728-00			1	..SKT,PL-IN ELEK:MICROCKT,14 CONTACT	09922	DILB14P-108
-32	136-0729-00			3	..SKT,PL-IN ELEK:MICROCKT,16 CONTACT	09922	DILB16P-108T
-33	136-0751-00			1	..SKT,PL-IN ELEK:MICROCKT,24 PIN	09922	DILB24P108
-34	136-0757-00			2	..SKT,PL-IN ELEK:MICROCIRCUIT,40 DIP	09922	DILB40P-108
-35	344-0326-00			4	..CLIP,ELECTRICAL:FUSE,BRASS	75915	102071
-36	136-0252-01			2	..SOCKET,PIN TERM:U/M 0.0.19 DIA PINS	00779	1-332095-2

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective	Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-37	----- -----			1	..CONN,RCPT,ELEC:CKT BD MT,3 PRONG ..(SEE A3J88 REPL)		
-38	385-0012-00			8	.SPACER,POST:0.562 L W/8-32 THD THRU,NYL O. .312 OD .(ATTACHING PARTS)	80009	385-0012-00
-39	211-0008-00			8	.SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL .(END OF ATTACHING PARTS)	93907	ORDER BY DESCR
-40	----- -----			1	.CIRCUIT BD ASSY:ECL .(SEE A2 REPL) .(ATTACHING PARTS)		
-41	211-0008-00			4	.SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL .(END OF ATTACHING PARTS) .CKT BOARD ASSY INCLUDES:	93907	ORDER BY DESCR
-42	136-0252-01			2	..SOCKET,PIN TERM:U/W 0.0.19 DIA PINS	00779	1-332095-2
-43	175-9515-00			1	.CA ASSY,SP,ELEC:8,22 AWG,4.25 L .(A3J2 TO A2J1)	80009	175-9515-00
-44	175-0857-00			AR	..CABLE,SP,ELEC:8,22 AWG,STRD,PVC JKT,RBN	TK0846	08CF22M7-8BT
-45	352-0166-00			2	..HLDR,TERM CONN:8 WIRE,BLACK	80009	352-0166-00
-46	131-0707-00			16	..CONTACT,ELEC:22-26 AWG,BRS & CU BE GOLD P ..L	22526	47439
-47	175-9516-00			1	.CA ASSY,SP,ELEC:4,22 AWG,3.5 L .(A3J3 TO A2J2)	80009	175-9516-00
-48	175-0861-00			AR	..CABLE,SP,ELEC:4,22 AWG,STRD,PVC JKT,RBN	TK1072	04CF22M7-8BT
-49	352-0162-00			2	..HLDR,TERM CONN:4 WIRE,BLACK	80009	352-0162-00
-50	131-0707-00			8	..CONTACT,ELEC:22-26 AWG,BRS & CU BE GOLD P ..L	22526	47439
-51	175-1871-00			1	.CABLE ASSY,RF:50 OHM COAX,9.5 L .(A2J5 TO A3J88)	80009	175-1871-00
-52	210-0774-00			2	..EYELET,METALLIC:0.152 OD X 0.218 L,BRS GO ..LD PL	80009	210-0774-00
-53	210-0775-00			2	..EYELET,METALLIC:0.126 OD X 0.205 L,BRS GO ..LD PL	80009	210-0775-00
-54	----- -----			1	.CIRCUIT BD ASSY:PWR SPLY .(SEE A1 REPL) .(ATTACHING PARTS)		
-55	211-0008-00			4	.SCREW,MACHINE:4-40 X 0.250,PNH,STL,CD PL .(END OF ATTACHING PARTS) .CKT BOARD ASSY INCLUDES:	93907	ORDER BY DESCR
-56	----- -----			1	..SEMICOND DVC,DI:ZEN,SI,5.6V,5%,10W,DO-4 ..(SEE A1VR312 REPL) ..(ATTACHING PARTS)		
-57	210-0445-00			1	..NUT,PLAIN,HEX:10-32 X 0.375 HEX,STL CD PL ..(END OF ATTACHING PARTS)	80009	210-0445-00
-58	214-2518-01			2	..HEAT SINK,XSTR:TO-202/TO-220,AL	TK0303	332-012
-59	346-0032-00			1	..STRAP,RETAINING:0.075 DIA X 4.0 L,MLD RBR	80009	346-0032-00
-60	175-2774-00			1	.CA ASSY,SP,ELEC:5,26 AWG,3.0 L .(A3J99 TO A1J1)	80009	175-2774-00
-61	175-0828-00			AR	..CABLE,SP,ELEC:5,26 AWG,STRD,PVC JKT,RBN	90816	ORDER BY DESCR
-62	352-0163-05			2	..HLDR,TERM CONN:5 WIRE,GREEN	80009	352-0163-05
-63	131-0707-00			10	..CONTACT,ELEC:22-26 AWG,BRS & CU BE GOLD P ..L	22526	47439
-64	175-3092-00			1	.CA ASSY,SP,ELEC:4,26 AWG,3.0 L .(A1J2 TO A3J7)	80009	175-3092-00
-65	175-0827-00			AR	..CABLE,SP,ELEC:4,26 AWG,STRD,PVC JKT,RBN	90816	ORDER BY DESCR
-66	352-0162-02			2	..HLDR,TERM CONN:4 WIRE,RED	80009	352-0162-02
-67	131-0707-00			8	..CONTACT,ELEC:22-26 AWG,BRS & CU BE GOLD P ..L	22526	47439
					STANDARD ACCESSORIES		
	070-5549-00			1	.MANUAL,TECH:INSTR,067-0146-00	80009	070-5549-00


A1
A2
A3
A4