Tektronix®
COMMITTED TO EXCELLENCE

4631
HARD COPY UNIT

SERVICE MANUAL

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

MANUAL PART NO.
070-1831-02

First Printing JUN 1974
This Printing NOV 1979

WARNING

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO.

WARRANTY

Tektronix warrants to the original purchaser that this product and options, excluding customer supplied equipment, is free from defects in materials and workmanship, under normal use, for a period of one (1) year from the date of shipment. Tektronix will, at its option, repair or replace the product if Tektronix determines it is defective within the warranty period, and it is returned, freight prepaid, to a Tektronix Service Center.

In the forty-eight (48) contiguous United States and the District of Columbia, and in other areas where Tektronix normally has service available for this product, Tektronix will provide on-site warranty service at no charge during the first ninety (90) days from the date of shipment.

Tektronix shall be under no obligation to furnish warranty service if:

a. Attempts to repair or service the product are made by personnel other than Tektronix service representatives.

b. Modifications are made to the hardware or software by personnel other than Tektronix representatives.

c. Damage results from connecting the product to incompatible equipment.

There is no implied warranty of fitness for a particular purpose. Tektronix is not liable for consequential damages.

Specifications and price change privileges reserved.

U.S.A. and foreign TEKTRONIX products covered by U.S. and foreign patents and/or patents pending.

TEKTRONIX is a registered trademark of Tektronix, Inc.

TABLE OF CONTENTS

TABLE OF CONTENTS (cont)

TABLE OF CONTENTS (cont)

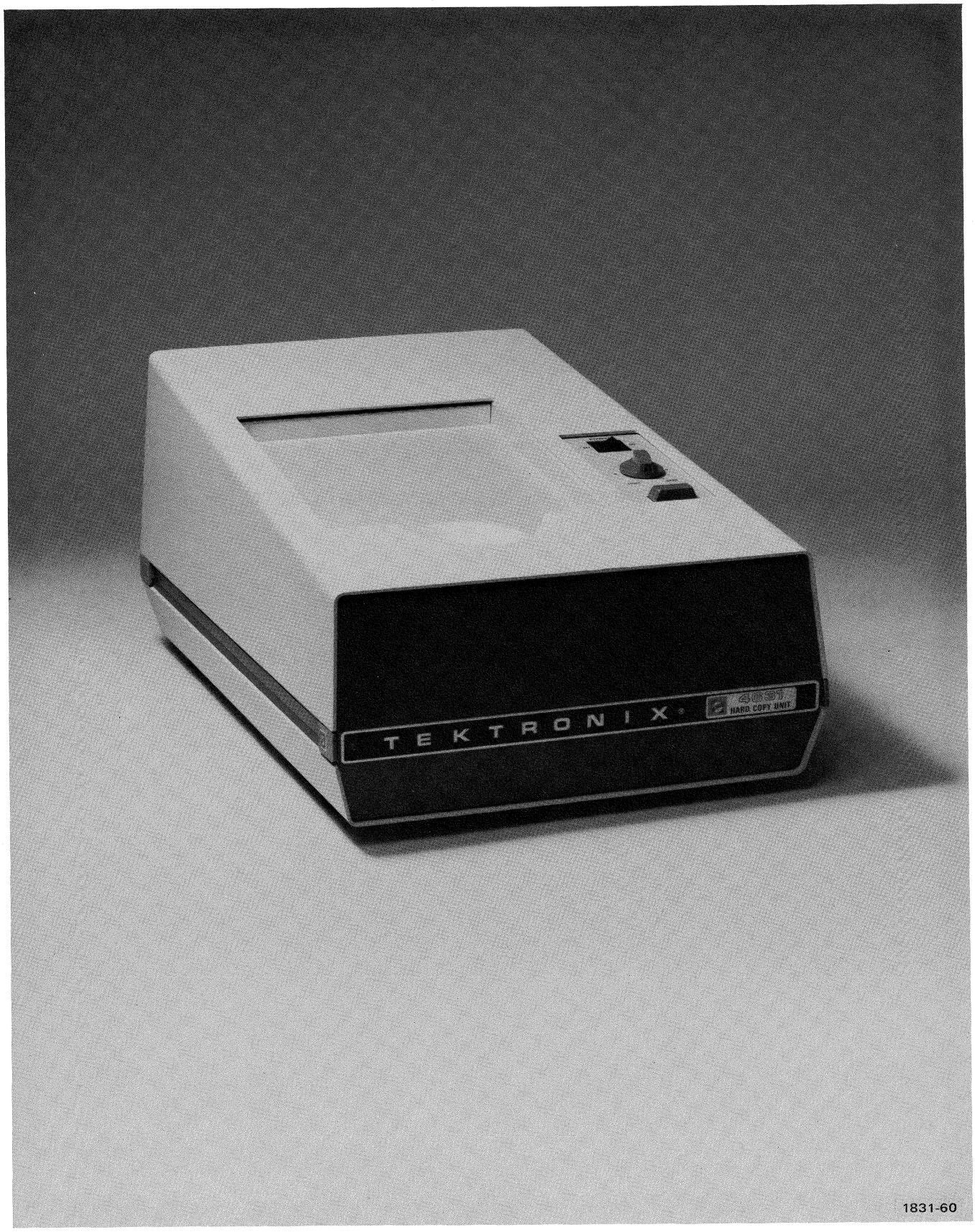


Fig. 1-1. 4631 Video Hard Copy Unit.

Section 1
OPERATING INSTRUCTIONS

Introduction

Unvarying video information is required during the scanning period. Scanning time is 7 seconds. An additional 11 seconds are required to develop the hard copy.

The 4631 Hard Copy Unit is designed to make facsimile copies from storage display units and computer terminals such as Tektronix 613, 4010-1, 4012, 4013, 4014-1, and 4015-1.

Hard copies are produced by scanning the target of the display unit or terminal. Upon receipt of a copy command, a signal is taken from the target electrode of the display unit and applied to the Z axis of a line-scan crt in the Hard Copy Unit. A fibre-optic faceplate couples the light output of the crt phosphor to the recording material. The latent image is heat-developed and a hard copy is produced for most requirements in approximately 18 seconds from the time the copy command is received.

Safety Considerations

CAUTION

The instrument is intended to be operated from a single-phase power source which has one of its current-carrying conductors (the neutral conductor) at ground (earth) potential. Operation from other power sources where both current-carrying conductors are live with respect to ground (such as phase-to-phase on a multi-phase system, or across the legs of a 117-234 V single-phase three-wire system) is not recommended, as only the Line Conductor has over-current (fuse) protection within the instrument.

During processing, the 3M Dry Silver paper gives off an organic sublimate which condenses on the cooler surfaces of the Hard Copy Unit. Toxicologic tests conducted by 3M Company indicate that this substance is not toxic.

Tektronix recommends that its Hard Copy units be operated in a normally ventilated room. Some may experience an allergic reaction from inhaling the substance at concentrations that could be reached in an unventilated room.

Hard Copy Paper

One roll of 3M® Type 777 Dry Silver Paper (Tektronix Part No. 006-1603-00) is included with the Hard Copy Unit. Refills may be purchased from Tektronix, Inc.

Paper Storage

Unexposed paper. The shelf life of the unexposed rolls of paper is six months, providing the paper is not removed from its protective wrapper, and is stored at low room temperature. Since the paper is heat sensitive, a storage temperature of approximately 40° F is recommended.

Exposed paper. No special precautions need be taken. However, temperatures above about 55° C (130° F) or high humidity levels will tend to darken the background of processed copies.

The Cover

The top cover of the instrument is hinged at the back, and held in the down position by its own weight. When the instrument cover is tilted back, it is held in place by a latch at the right rear corner. To close the cover, grasp the latch and lift while tilting the cover down (Fig. 1-2).

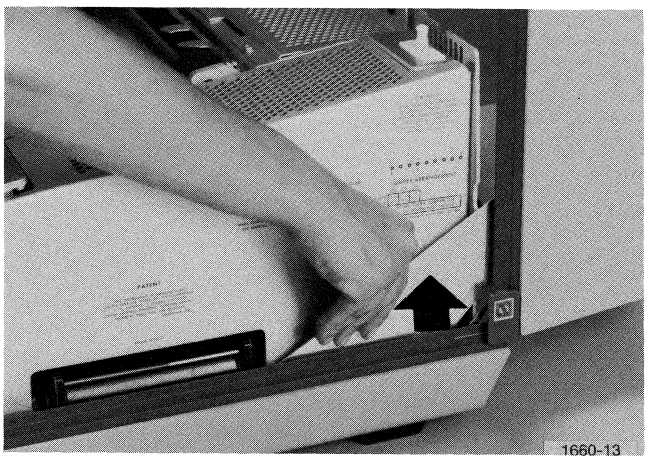


Fig. 1-2. Closing the cover.

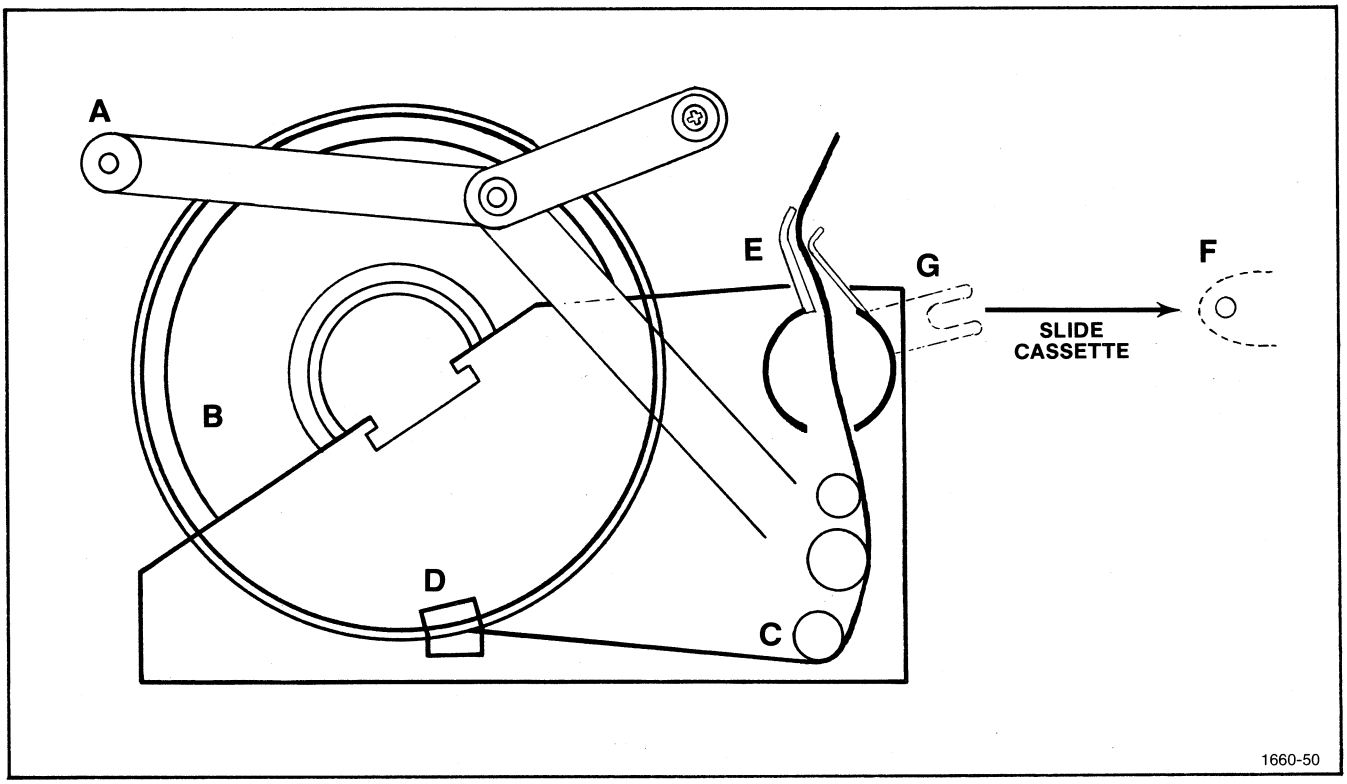


Fig. 1-3a. General paper loading illustration.

Loading the Paper Cassette

Connect the Hard Copy Unit power cord to the power line, then proceed with the following instructions. Refer to Fig. 1-3a and 1-3b for nomenclature identification.

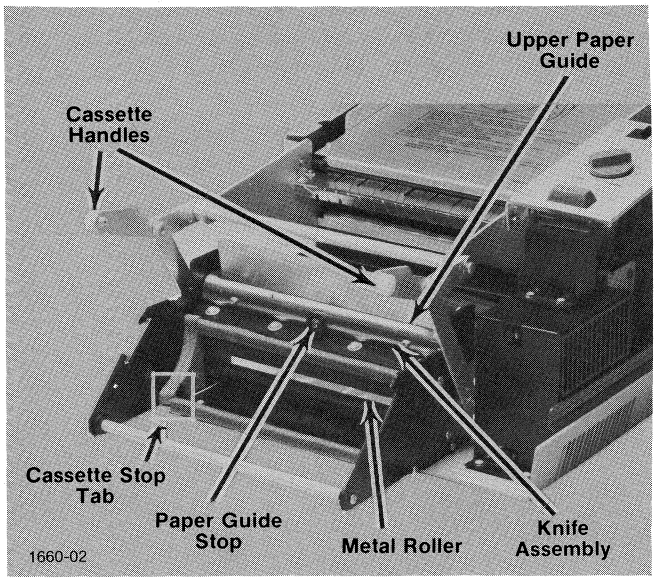
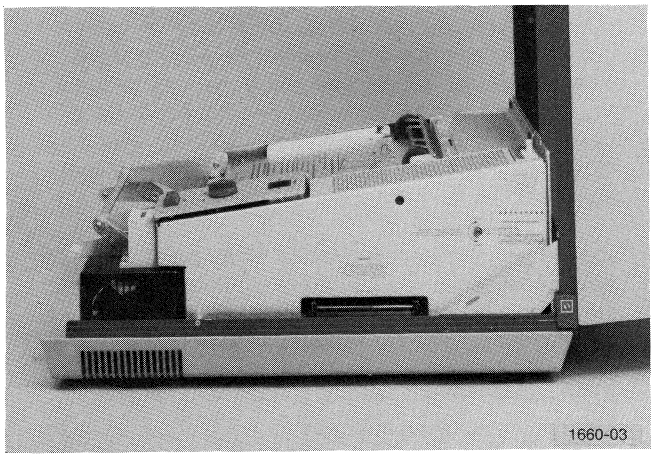
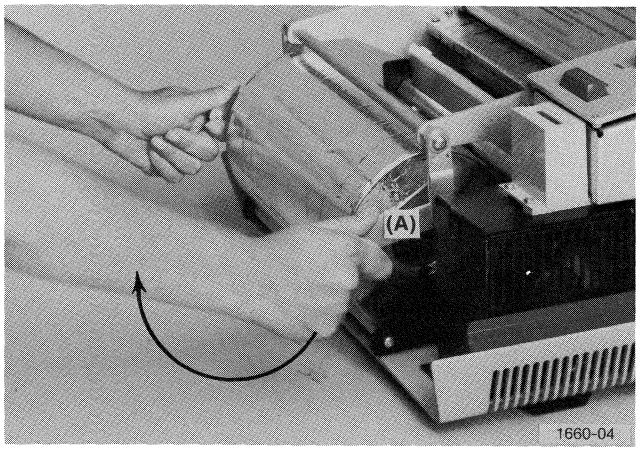


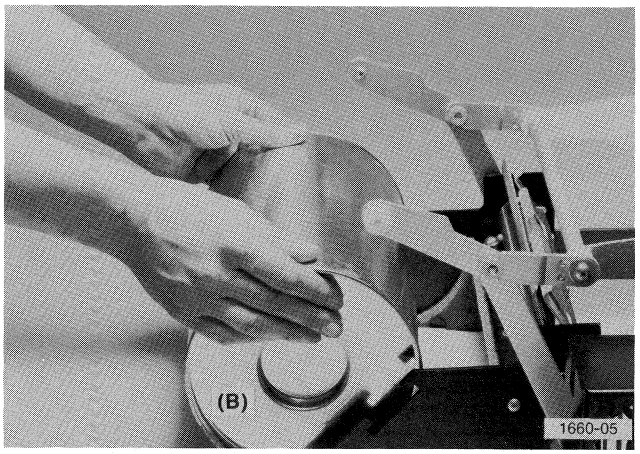
Fig. 1-3b. General paper loading illustration.



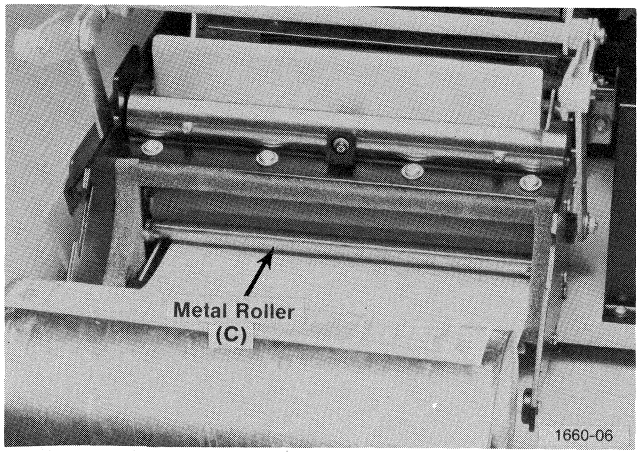
1. Lift the instrument cover, and push it all the way back to latch it in the "up" position.



2. Push the cassette handles (A) down, then pull them out in an upward arc.



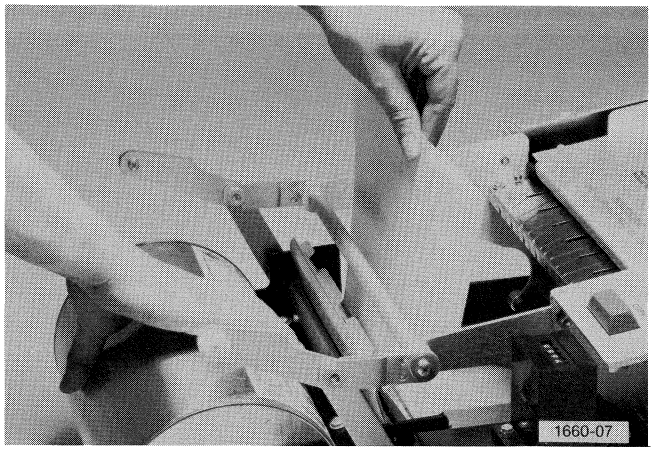
3. If a paper cassette (B) is installed, remove the cassette. (For shipment, a cassette is packed separately in the Hard Copy Unit shipping carton.)



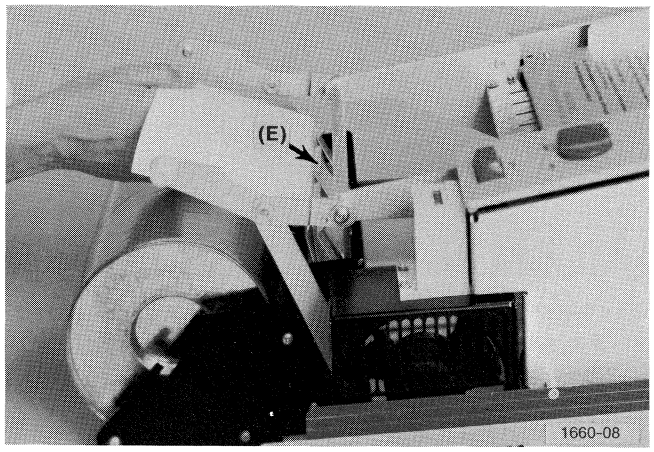
NOTE

Ignore the instructions printed on the cassette label.

4. Tear the metallic light seal strip off the new paper cassette (B), and pull out 18 inches of paper. Insert the paper end under the metal roller (C) centered between the white lines marked on the cassette holder bottom plate.



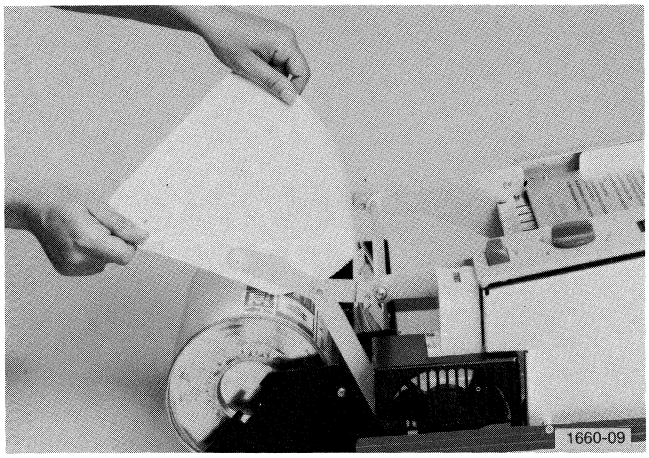
5. Pick up the paper end and take up the slack while placing the cassette canister into the frame. Rotate the cassette to engage the cassette stop locator (D) into the cassette slot.



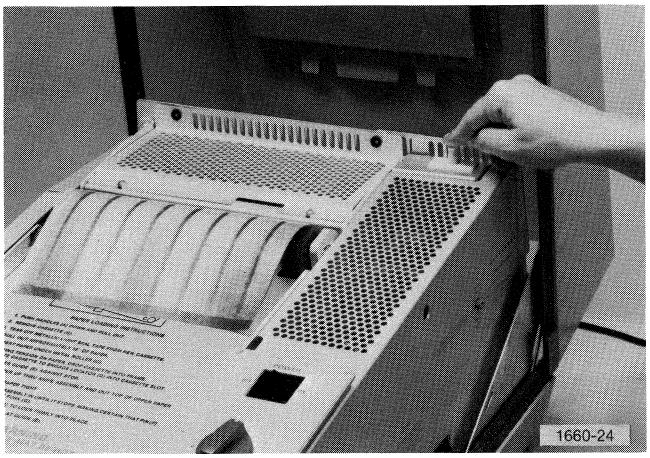
WARNING

Do not insert fingers into the opening at the bottom of the knife assembly. The sharp, paper-cutting edges are located at that point.

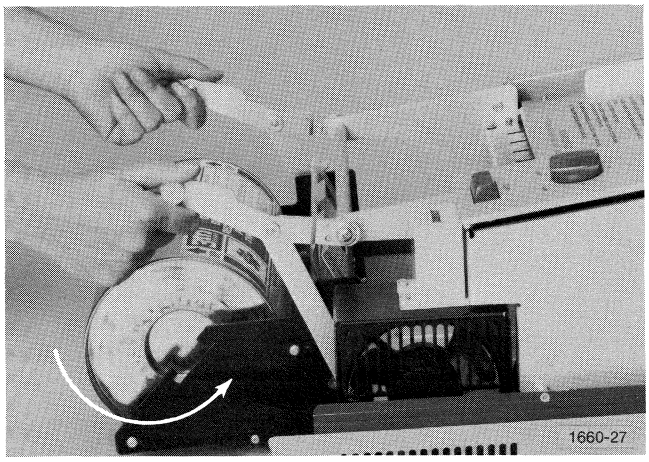
6. Pull the upper paper guide (E) toward the paper cassette (until the stop contacts the guide bar). Thread the paper end up through the bottom of the knife assembly, and out the top of the upper paper guide.



7. Pull the excess paper tight, and tear off evenly at the guide plate (E).

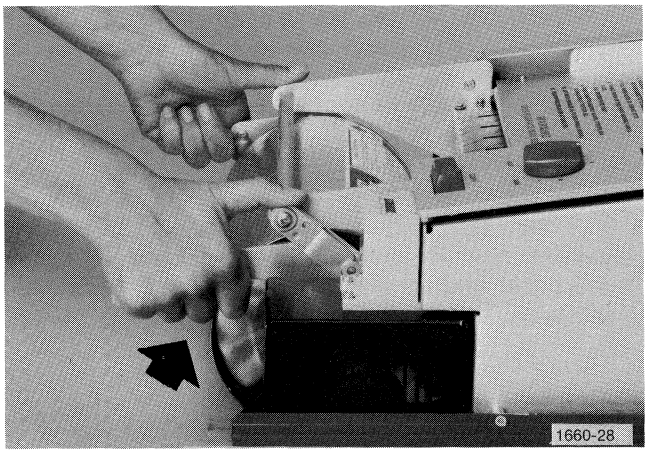


10. Push the POWER switch on, then depress the cover interlock button (upper right rear corner) two seconds to recycle.

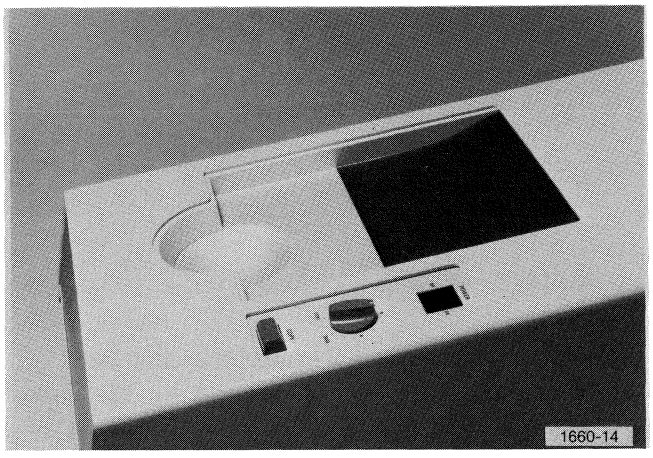


8. Check that the stop on the paper guide is still against the guide bar, then push the cassette assembly in until it stops, making certain that pin (F) is engaged by the fork (G).

11. Lift the cover latch (lower right-rear corner) and close the cover.



9. Lift both handles (A) to lock the cassette assembly firmly into place.



12. Push the copy button and discard the first copy (which will be black because of exposure to light).

The Control Panel (Fig. 1-4)

POWER. The POWER switch is a rocker switch which applies operating power to the electronic circuits, drive motor, and paper processor.

LIGHT-DARK. The LIGHT-DARK control varies the darkness of the delivered copy.

COPY. The COPY switch is a pushbutton which initiates production of a paper copy from the Hard Copy Unit.

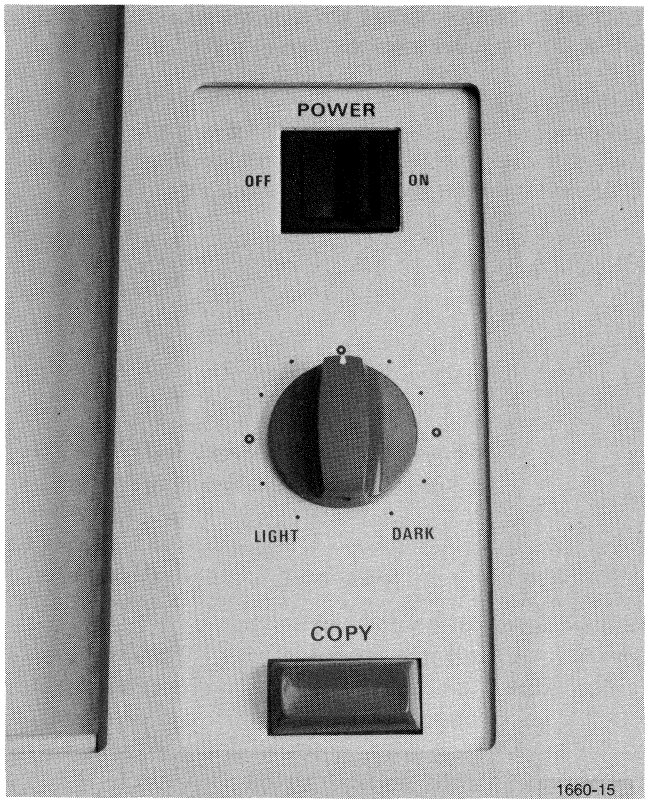


Fig. 1-4. The control panel.

Rear-Panel Connector

The standard 4631 rear panel contains a 15-pin connector for attachment to a Tektronix storage terminal or display unit (Fig. 1-5). For further information on the rear panel connector, refer to the Installation instructions in Section 3, or contact your local Tektronix Applications/Field Engineer or representative.

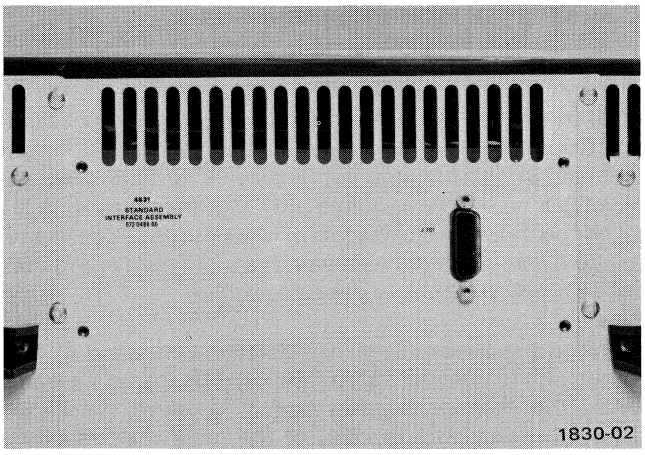


Fig. 1-5. 4631 rear panel.

Optional Rear Panel

An optional rear panel (Fig. 1-6) and display multiplexer is available, at additional cost. It has connections for four 15-pin signal input cables. A rotary switch on the rear panel selects which of the inputs is copied when the front panel COPY button is pressed. When the switch is placed in the MULTIPLEX position, the multiplexer selects the first input to apply a remote COPY command; subsequent copy commands are stored and copied in rotation. Connect to any of the four input sets as though it were a single input set, as described in the installation section.

The signal locations on the 15-pin connector are identical to those shown in Fig. 3-1, with the exception of the HCU signal added on pin 13, in place of COPY BUSY, and the WAIT output added on pin 14.

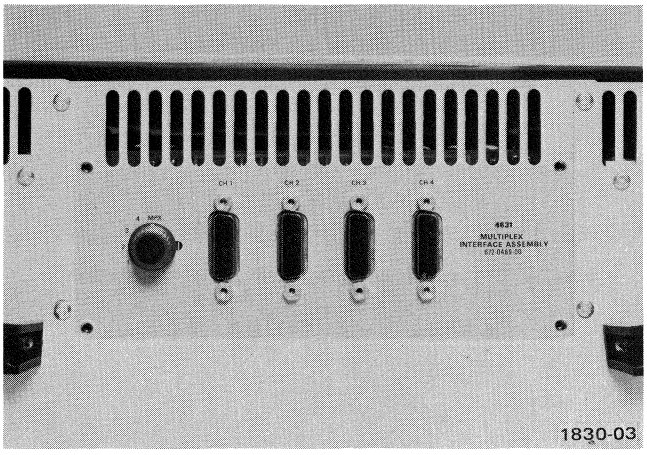


Fig. 1-6. Optional rear panel.

Operating the Hard Copy Unit

The Hard Copy Unit must first be connected to the terminal or storage or display units, the paper cassette must be loaded, and a ten-minute warmup period observed. Connect the Hard Copy Unit as described in the Installation instructions in Section 3 of this manual. Making a copy then requires only that the control panel COPY pushbutton be pressed, or a remote copy command applied. Be sure that the power cord is plugged in and that the POWER switch is in the ON position.

When the paper supply is depleted (indicated by red marks on the last few copies), replace the paper cassette using the procedure given under "Loading the Paper Cassette." Incorrect loading of the paper can result in paper jams or a copy not being delivered.

Except for the processor temperature, internal adjustments should be made only by qualified technical personnel.

Processor Temperature Adjustment

To adjust the processor temperature for darker copies, lift the instrument cover and make certain it latches in the "up" position. The processor temperature adjustment is located at the right rear corner of the Hard Copy Unit (Fig. 1-7). Using a small insulated screwdriver, turn the adjustment 1/8 turn. (Turning the adjustment clockwise increases the processor temperature, darkening the copy; counterclockwise decreases the temperature, causing lighter copies.) Close the instrument cover, wait about 1 minute, then run two copies (the first copy is always dark due to exposure to light).

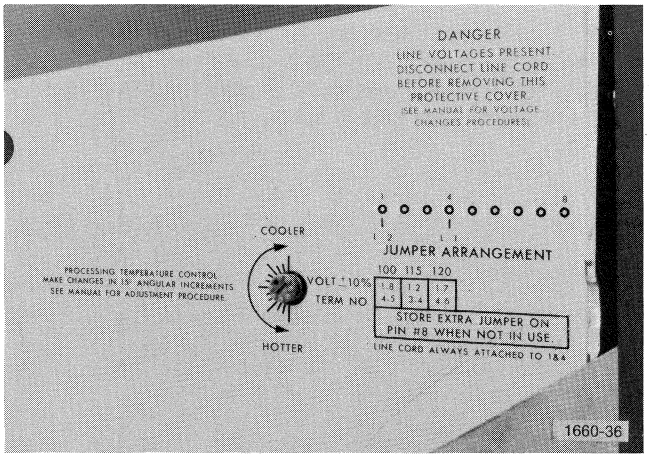


Fig. 1-7. Processor temperature adjustment location.

Causes of Poor Copies

Copies which are too light or too dark can be caused by incorrect adjustment of the LIGHT-DARK control, incorrect temperature adjustment, or paper which has aged or become insensitive. (The paper should be used before the date stamped on the paper cassette.)

To correct for copies which are too light or too dark, first check the position of the front-panel LIGHT-DARK control. If darker copies are desired, rotate the LIGHT-DARK control clockwise in 30 degree increments, running a copy after each adjustment, until the desired darkness is reached. If lighter copies are desired, rotate the LIGHT-DARK control counterclockwise in a similar manner.

If the above procedure does not solve the problem, compare the Indications column in Table 1-1 with the hard copy to determine the specific problem, then follow the directions given in the Correction column.

TABLE 1-1

Darkness Problems Caused by Temperature and/or Paper

Problem	Indication	Correction
Temperature Setting Too High	White portions of the display appear as gray, and gray portions appear as black.	Refer to information given under "Processor Temperature Adjustment."
Temperature Setting Too Low	Gray portions of the display appear as white, and black portions appear as gray.	
Over-age or insensitive paper[1]	White portions of the display appear as gray, and black portions appear as a darker gray.	Replace the paper cassette.

[1]**Paper stored for too long a time or at too high a temperature will lose its sensitivity. Refer to "Paper Storage" in this section.**

Paper Processing Unit

The front section of the processor pulls paper from the cassette, past the Cathode Ray Tube (crt) and through the knife assembly, where the paper is cut. The rear section of the processor pulls the paper across a heated plate that develops the image produced by the crt (Fig. 1-8).

Cause and Correction of Paper Jams

Since paper jams can occur as a result of incorrect paper loading, be sure the instructions under "Loading the Paper Cassette" in this section are carefully followed. If the paper is correctly loaded, check that the power cord is plugged in and that the POWER switch is in the ON position. If, under these conditions, no copy is delivered when the COPY button is pushed, proceed to the flow chart (Fig. 1-9).

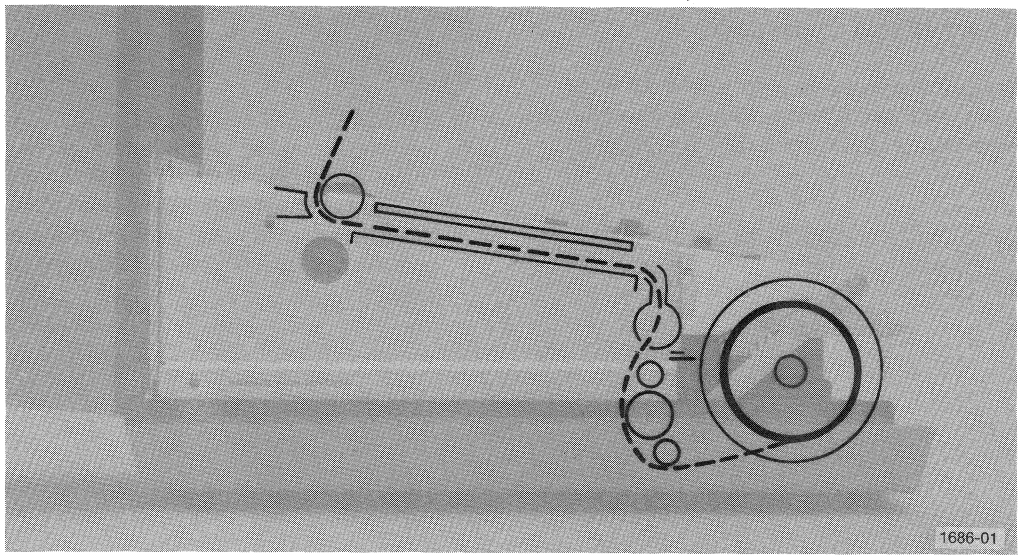


Fig. 1-8. Paper travel through Hard Copy Unit.

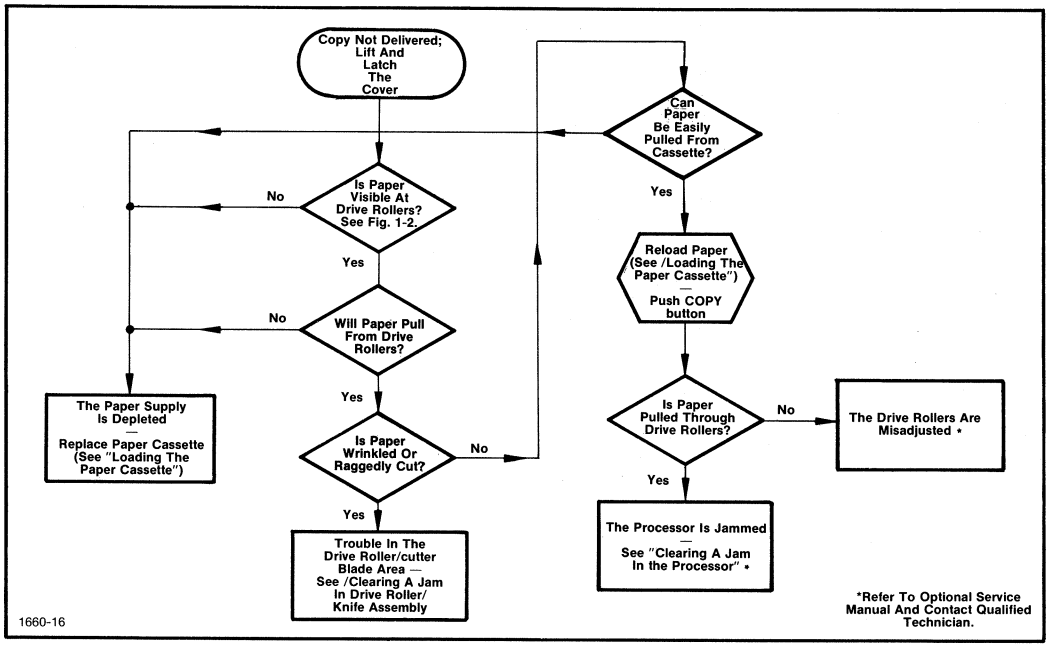


Fig. 1-9. Troubleshooting flow chart.

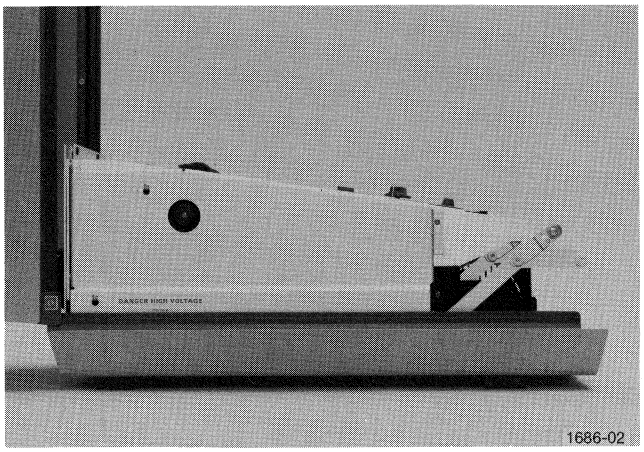
Clearing a Jam in the Drive Roller/Knife Assembly

WARNING

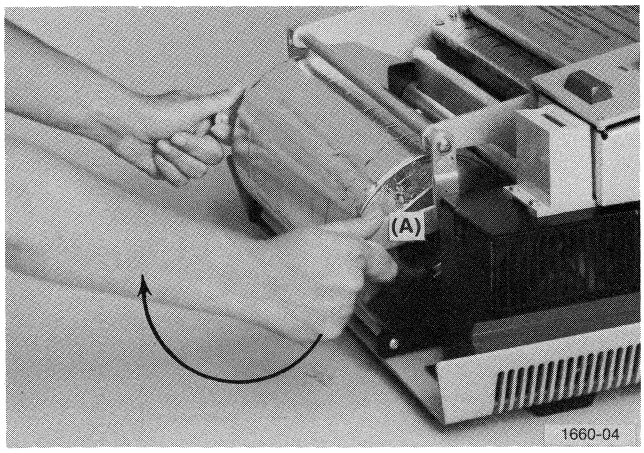
(A) Before attempting to clear a paper jam, be sure to remove or secure anything which might come in accidental contact with the drive rollers or chains (i.e., jewelry, necktie, long hair, shirt-tail, etc.).

(B) Do not insert fingers into the opening at the bottom of the knife assembly. The sharp paper-cutting edges are located at that point.

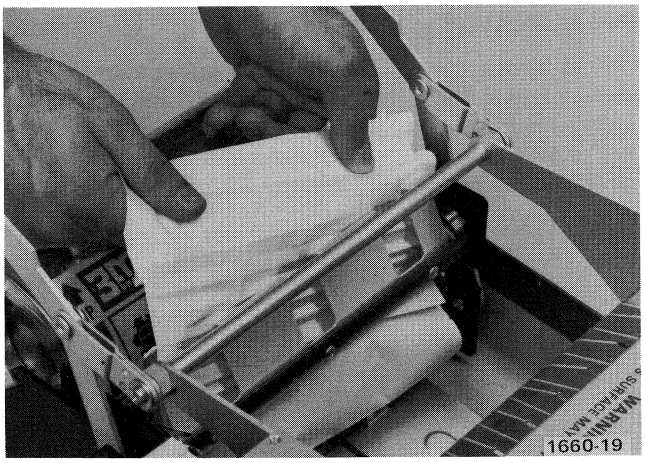
(C) The processor becomes very hot when the Hard Copy Unit is in operation. When working around the processor, use caution to contact only the jammed paper.



1. Push the POWER switch OFF. Make certain the instrument cover is latched in the "up" position.

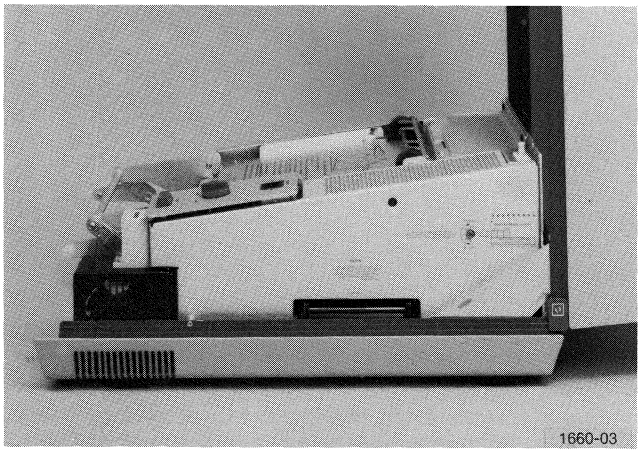


2. Push the cassette handles down, then pull them out in an upward arc.

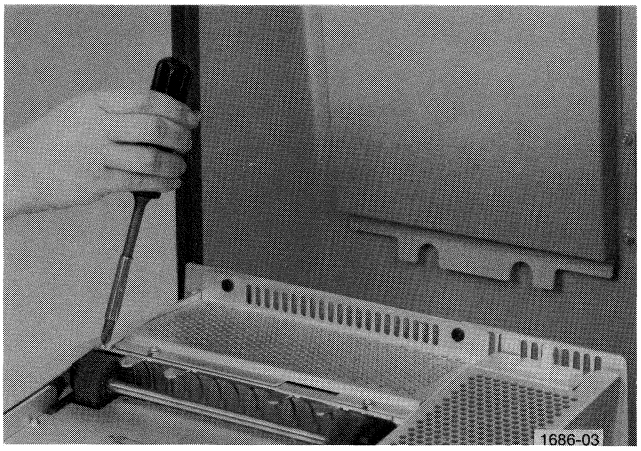


3. Remove wrinkled and jammed paper from within the knife assembly. Scraps of paper which cannot be readily removed may be reached with tweezers. After the paper jam is cleared, reload the paper, using the procedures given under "Loading the Paper Cassette."

Clearing a Jam in the Processor



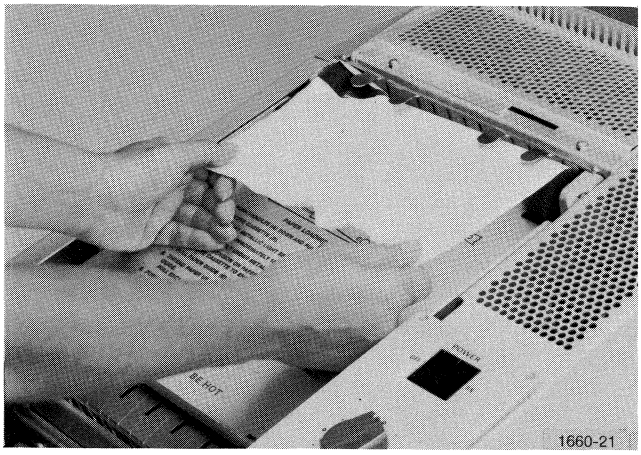
1. Push the POWER switch OFF. Make certain the instrument cover is latched in the "up" position.



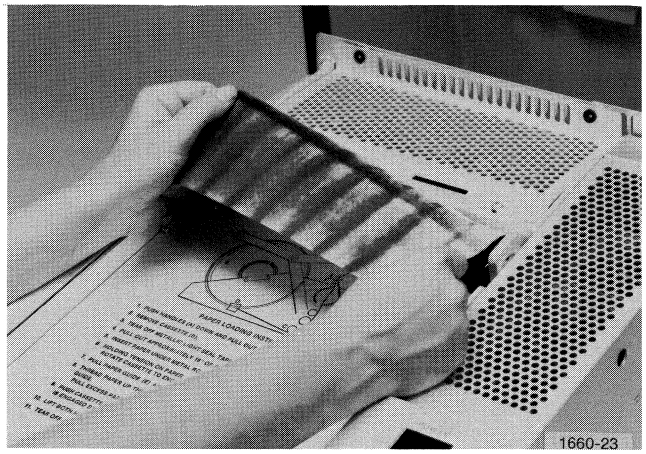
3. If paper has been carried into the return side (bottom side) of the processor belt, it may be necessary to remove the rear paper guide to reach it. Use a Phillips-head screwdriver to remove the two screws which attach the guide to the processor. Remove the guide.

WARNING

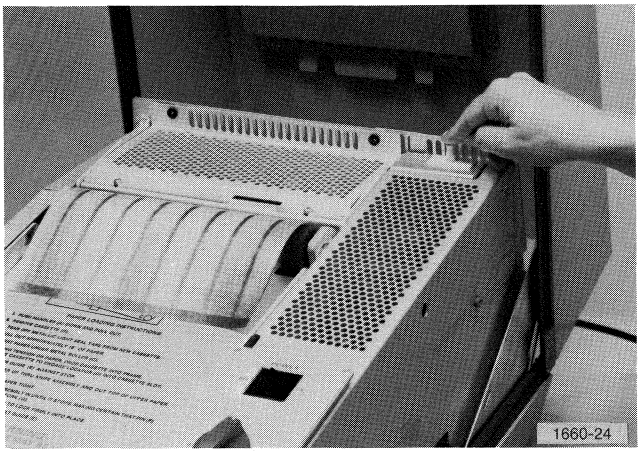
When working around the processor, use caution to contact only the jammed paper. The processor becomes very hot when the Hard Copy Unit is in operation.



2. Clear paper which may be wrinkled and jammed at the back edge of the processor, against the paper guide.



4. Remove wrinkled paper and paper fragments from the rear paper guide area.

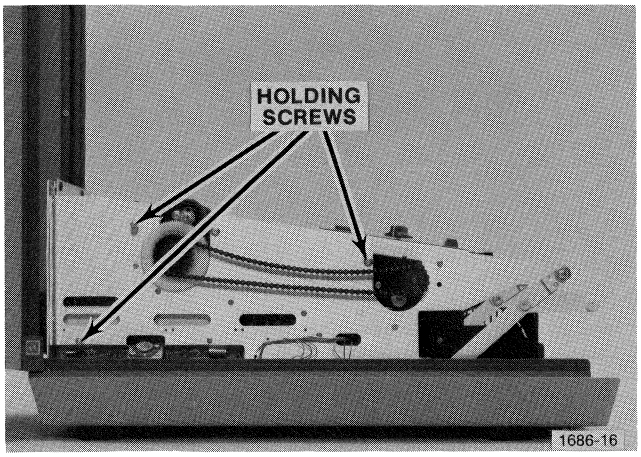


5. Push the POWER switch ON and depress the interlock button for a few seconds to clear any paper which may be trapped within the processor. Close the cover and push the COPY button. If copies run through freely, the paper jam is corrected; unplug the Hard Copy Unit and proceed to step 15. If paper is still trapped within the processor, push the POWER switch off and unplug the unit. Lift and latch the cover, then continue with the procedure.

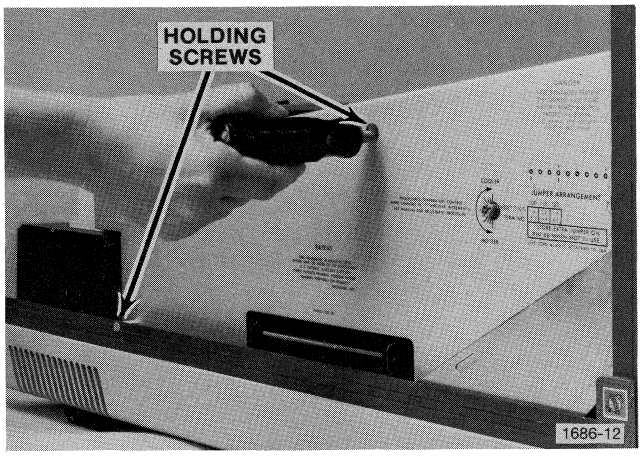
   For complete Disassembly and Assembly procedure, see Section 3.

WARNING

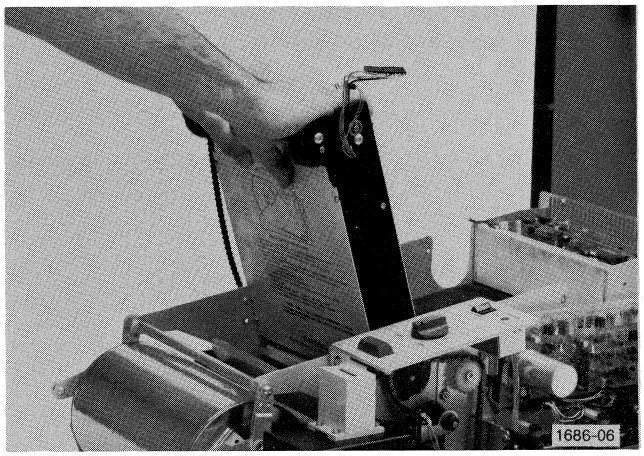
The following instructions are for use by qualified service personnel only.



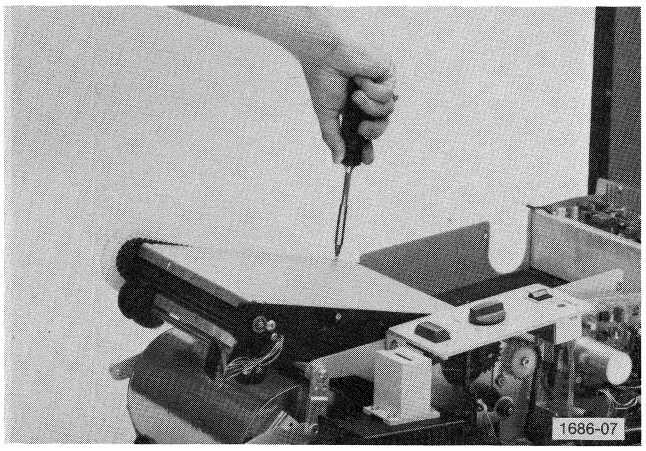
6. Loosen the three screws attaching the processor drive chain guard to the Hard Copy Unit mainframe. Remove the guard. Refer to Section 3 for Protection Shield Removal, left side.



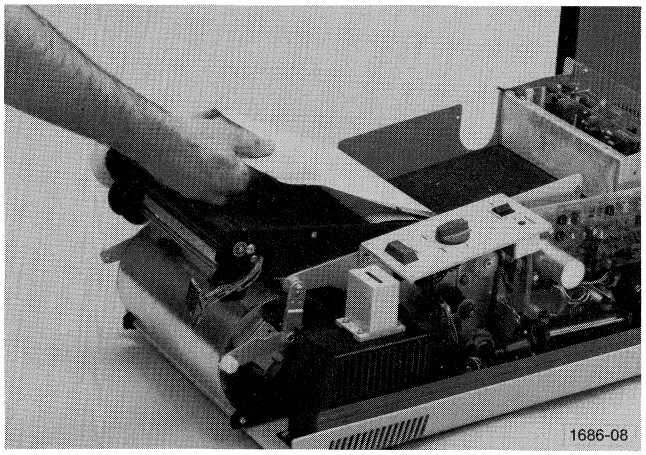
7. Check that the power cord is disconnected from the power source. Then remove the Line Voltage cover. Refer to Section 3 for Protection Shield Removal, right side. Disconnect the processor heater wires.



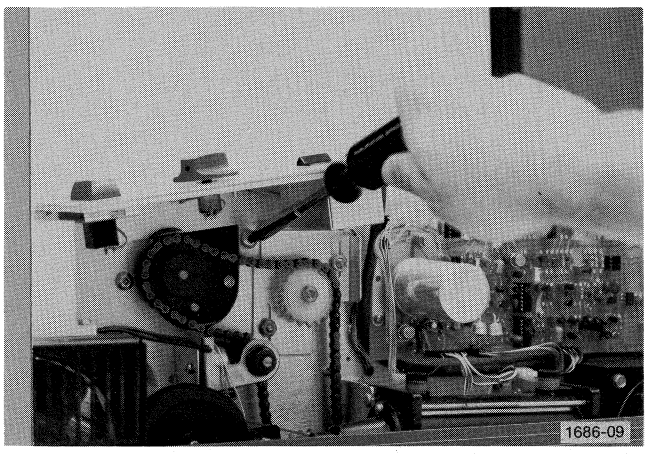
8. Remove the screws attaching the processor unit to the Hard Copy Unit mainframe. Tilt the rear of the processor unit forward and upward, but do not remove it. Refer to Fig. 3-15 for location of the processor holding screws.



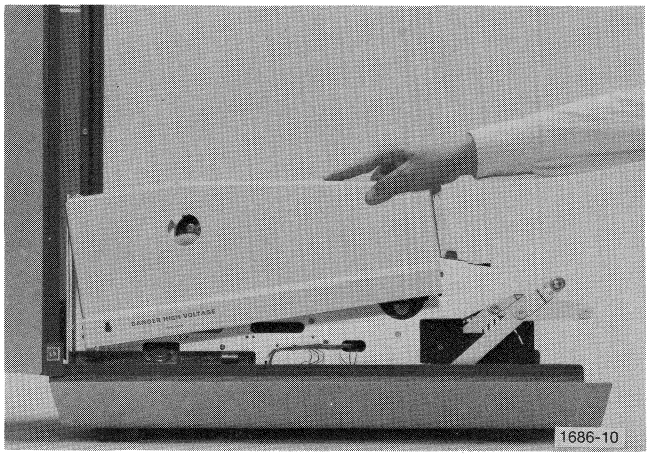
9. Remove the four screws attaching the bottom cover plate to the processor unit, and remove the plate.



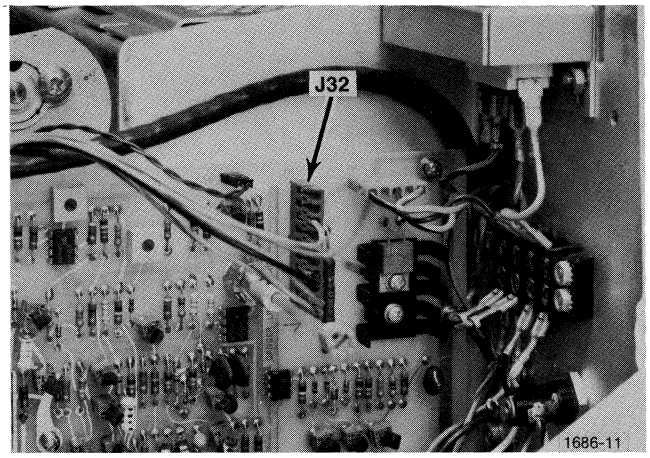
10. Clear any paper which might be caught within the processor unit. Place the plate back on the bottom of the processor and install the four attaching screws.



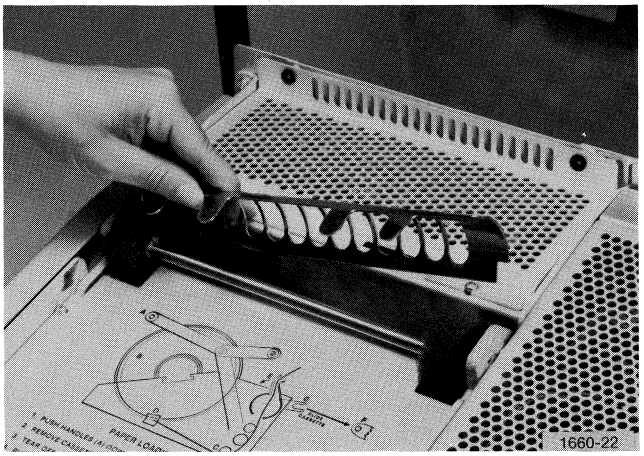
11. Tilt the processor back into place and install the screws which attach the processor to the mainframe.



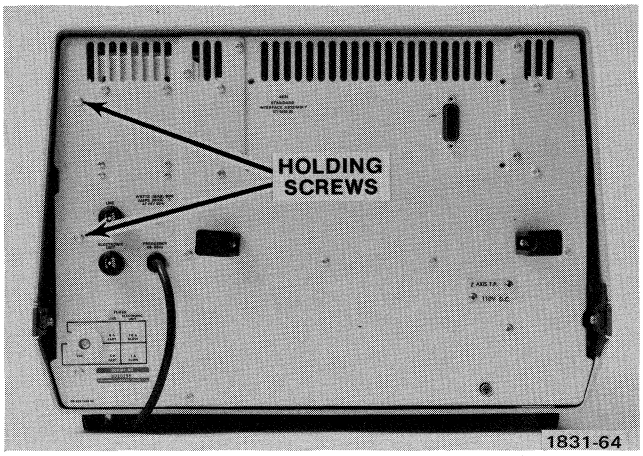
12. Place the processor drive chain guard back into place and tighten the attaching screws.



13. Reconnect the processor heater harmonica connector, attaching pin 1 of the connector to the top pin on the board.



15. Put the rear paper guide back into place and install the attaching screws. The forward curved edge should not contact the sponge rollers. Close the cover, plug in the Hard Copy Unit, and push the POWER switch to ON. Push the COPY button; the first copy will be dark due to exposure to light.



14. Replace the Line Voltage cover and install the four attaching screws. Refer to Section 3 for Protection Shield replacement.

Section 2
CHARACTERISTICS

Paper Characteristics

The light-exposed image on the 3M Type 777 paper is developed with heat. The image will remain stable in normal environmental conditions. Temperatures above about 55° C (130° F) or high humidity tend to darken the background of the paper, but the image remains readable. The paper may be written upon with pen or pencil. Refer to Table 2-1 for additional 3M Type 777 paper characteristics.

Table 2-1
3M TYPE 777 PAPER CHARACTERISTICS

Characteristic	Information
Paper Thickness	0.003 inches
Development Conditions	2 to 6 seconds at 260° to 285° F
Roll Size	8 1/2 inches X 500 feet

CHARACTERISTICS

The following performance characteristics are only valid under the conditions listed below.

The instrument must have been calibrated at an ambient temperature between +20° C and +30° C.

The instrument must be in an environment whose limits are described in Table 2-7.

The instrument must have a warmup period of at least 10 minutes.

Table 2-2

GENERAL INFORMATION

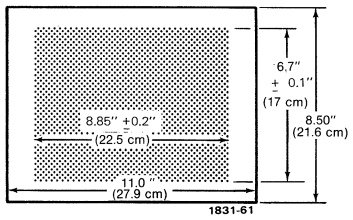
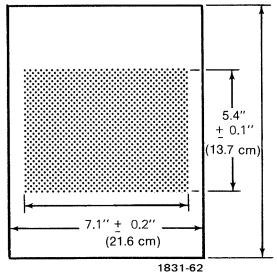
Characteristics	Performance Requirements	Supplemental Information
Group Selection		10 pin harmonica connector on Timing Board
Group I		11" displays and 19" displays-low resolution. Format A
Group II		11" displays. Format B
Group III		19" displays. Format A
Format A		
Format B		
Copy Size	8.5" by (11" ± 0.25")	
Copy Time		
Group I & II	18 sec.	(7 sec. exposure time)
Group III	36 sec.	(14 sec exposure time)
Resolution	100 discernible lines per inch	

Table 2-3

POWER SOURCE CHARACTERISTICS

Characteristics	Performance Requirements	Supplemental Information
LINE VOLTAGE RANGE		
Factory Wired Options	100 Volts 115 Volts, 50/60 Hz 120 Volts	±10%
MAXIMUM POWER CONSUMPTION		750 W at High Line (during copying)
NORMAL STANDBY OPERATION		240 W at High Line (during standby)

Table 2-4

FUSES

Characteristics	Performance Requirements	Supplemental Information
FUSE DATA	100-120V	
Line	8 A fast	
Electronics	1 A slow	
H V	0.6 A slow	
Deflection Amp	1.5 A fast	
(2 ea.) +400 volts	1/16 A fast	

Table 2-5

MOTOR AND TEMPERATURE CONTROL CHARACTERISTICS

Characteristics	Performance Requirements	Supplemental Information
Temperature		Adjustable (120° C to 150° C)
Stability		±2° C of set point at sensor location
Thermal Cut-Out		174° C
Motor Control		Speed adjustable to 2 in/second. Maintains speed at ±3% of set speed—all conditions
Motor Speed (Group I and II only)		61.7 rpm measured as 3.6 ms to ±0.3 ms periods at the interrupter output.
Motor Speed (Group III only)		30.9 rpm measured as 7.2 ms ±0.3 ms periods at the interrupter output.
Idle Speed		Approximately 1/2 Set-Speed

Table 2-6

REAR-PANEL INTERFACE CHARACTERISTICS

Characteristics	Performance Requirements	Supplemental Information
Inputs		
Pin 7 Target Signal		TTL Compatible
Pin 12 Front-Panel Copy		Ground closure disabled in multiplex position
Pin 11 Remote Copy	Pulse width >1 msec	TTL Compatible
Outputs		
Pin 5 Interrogate		TTL Compatible
Period. (11" display)		
Period. (19" display)		
Pin 9 Read		TTL Compatible
Pin 13 Copy Busy	Copy time plus a minimum of 2 sec to a maximum of 3 sec.	Open Collector

Table 2-7

ENVIRONMENTAL CHARACTERISTICS

Characteristics	Performance Requirements	Supplemental Information
Temperature		
Operating		0° C to +35° C
Nonoperating		−15° C to +55° C NOTE: Paper life degrades as temperature increases. Typical useful paper life at 20° C is approximately six months. Typical useful paper life at 30° C is approximately 15 days.
Altitude		
Operating		To 15,000 feet. Maximum allowable ambient temperature decreases by 1° C/1,000 feet from 5,000 feet to 15,000 feet.
Nonoperating		To 50,000 feet.
Vibration		
Nonoperating		15 minutes along each of the 3 major axes at a total displacement of 0.015" with frequency varied from 10 to 50 Hz 1-minute sweep. Hold for 3 minutes at 50 Hz. All major resonances must be above 50 Hz.

Table 2-8

PHYSICAL CHARACTERISTICS

Characteristics	Performance Requirements	Supplemental Information
Finish	Vinyl painted cabinet with anodized control panel and paper tray.	
Weight	Approximately 65 lbs. (29.48 kg)	
Dimensions (overall)		
Height (back)	11.63 in. (29.54 cm)	
Height (front)	7.88 in. (20.02 cm)	
Length	25.56 in. (64.92 cm)	
Width	16.00 in (40.64 cm)	

Section 3
SERVICING

Introduction

This section of the manual contains information about installation, ac power requirements, line voltage selection, protection shield removal, preventive and corrective maintenance.

Installation

Installation of the Hard Copy Unit consists basically of selecting the proper line voltage and connecting to the power source, then connecting a 15-pin interconnecting cable to the connector on the rear panel. Once connected, the two securing screws on the cable connector should be tightened into the rear-panel connector. The signal locations on the 15-pin connector are shown in Fig. 3-1. As can be seen from this diagram, the connector is not only an input connection, but also handles some output signals. The function of this connector is explained in Section 2, Table 2-6 of this manual.

The Line Voltage, described later in this section, is connected to the instrument via an attached cord.

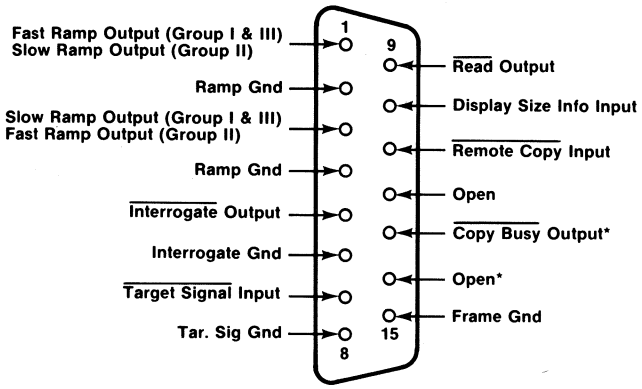


Fig. 3-1. 15-pin connector signal locations.

Copy Format Selection

There are three possible settings for 10-pin harmonica connector P110 on the Timing board. The location of this connector is shown in Fig. 3-2. The characteristics of these connector positions are shown in Table 3-1. Format A produces an 8.85 by 6.7 inch image, oriented horizontally; Format B produces a 7.1 by 5.4 inch image oriented vertically.

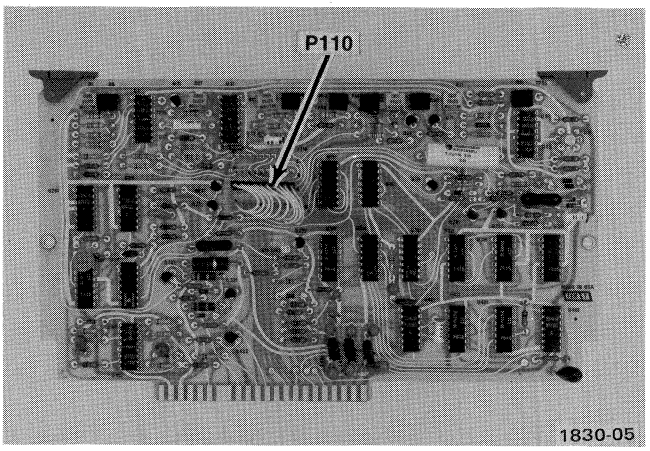


Fig. 3-2. Copy format selection jumper.

TABLE 3-1

Connector Position Characteristics

Connector Position	Format	Copy Time	Compatibility
I	A	18 sec	11 inch displays and 19 inch displays (low resolution)
II	B	18 sec	11 inch displays only
III	A	36 sec	11 inch displays and 19 inch displays (high resolution)

Use connector position I for most copy operations involving both 11 inch and 19 inch displays. From some 19 inch displays where graphic displays become complicated, an excellent copy can be obtained using connector position III.

AC Power Requirements

The Hard Copy Unit is designed to operate from a 115 volt nominal line voltage source at a frequency of 48 to 62 Hz; select the voltage range (100 V, 115 V, or 120 V) that is closest in value to the line voltage used.

A fuse change and a transformer jumper arrangement permit the Hard Copy Unit to be modified to suit the voltage supply. A yellow disc on the back panel (Fig. 3-3) identifies (through a notch on the disc) the internal voltage setting for which the unit is wired when shipped from the factory. If, for any reason, the jumper arrangement is changed, loosen the securing screw and rotate the disc until the new voltage setting shows through the notch.

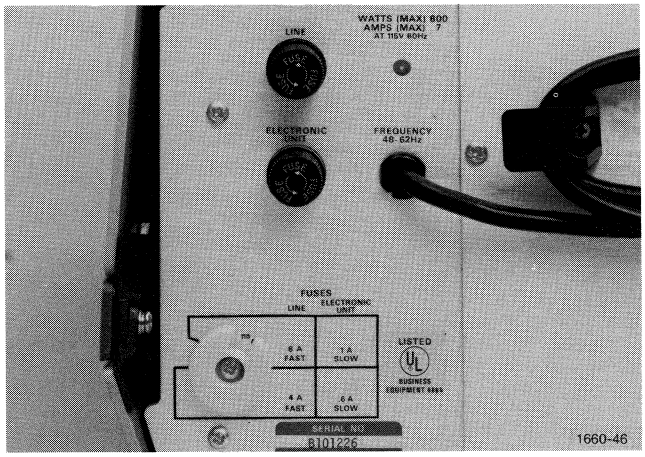


Fig. 3-3. Line indicator and fuses.

NOTE

Rotating the disc does not change the internal setting; it is an indicator only.

WARNING

The following instructions are for use by qualified service personnel only. To avoid injury, do not perform the following instructions unless qualified to do so.

Dangerous voltages exist inside this unit if the power cord is connected to the voltage supply. Disconnect the power cord before changing transformer connections.

Line Voltage Selection

To change the Line voltage selection, first disconnect the power cord from the power source, then lift and latch the instrument cover. The Line Voltage cover must then be removed (see Protection Shield Removal for right side in this section); this provides access to the jumper arrangement (Fig. 3-4).

Wiring instructions are shown on the line voltage protection cover at the right rear corner of the unit. Fig. 3-5 and the wiring instructions on the metal protection cover show the transformer terminals 1 through 8 with the line cord attached to terminals 1 and 4 (L1 and L2). By placing the proper jumpers to the terminals, ac input voltage ranges of 100, 115, 120, all ±10% can be used. Use the jumper arrangement table as shown in Fig. 3-5; for example, with 115 volts ac, ±10% input voltage, jumper terminal 1 to 2 and 3 to 4 only. Change the transformer terminal taps to conform to the input ac line voltage.

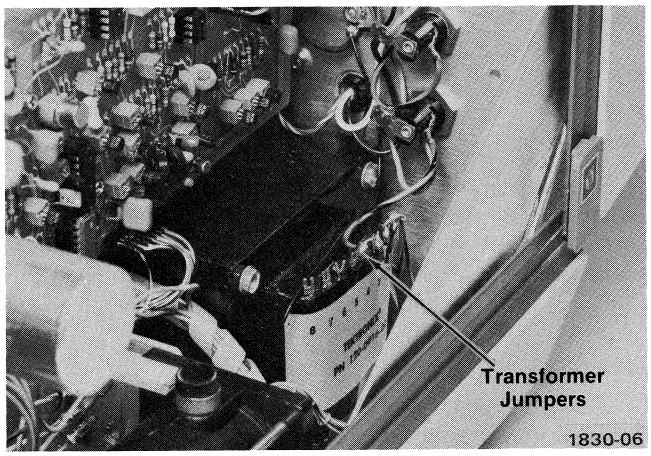


Fig. 3-4. Transformer jumper location (with protection shield removed).

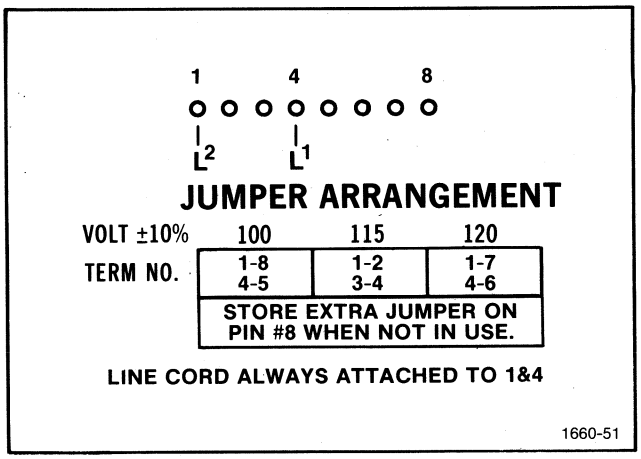


Fig. 3-5. Transformer terminals and jumper arrangement.

Change the yellow disc on the rear of the instrument to reflect the change in the instrument's operating voltage.

The instrument is provided with an attached three-wire power cord with a three-terminal, polarized plug for connection to the power source. The grounding terminal of the plug is directly connected to the instrument frame as recommended by national and international safety codes.

Power Cord Conductor Identification

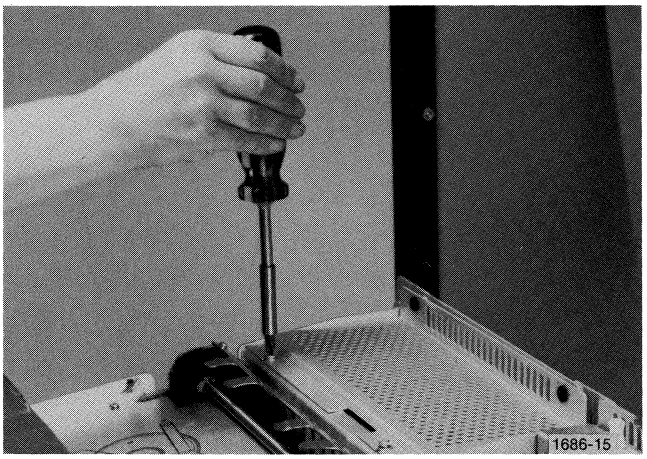
Conductor	Color	Alternate Color
Ungrounded (Line)	Brown	Black
Grounded (Neutral)	Blue	White
Grounding (Earthing)	Green-Yellow	Green-Yellow

PROTECTION SHIELD REMOVAL

Protection shields cover all electronic circuitry and the mechanical paper transport assembly. To gain access to these assemblies for mechanical adjustments, strap option changes, changing terminal jumpers on line input transformer (to adjust for input line voltage), cleaning, calibration, repair, etc., the following procedure should be used.

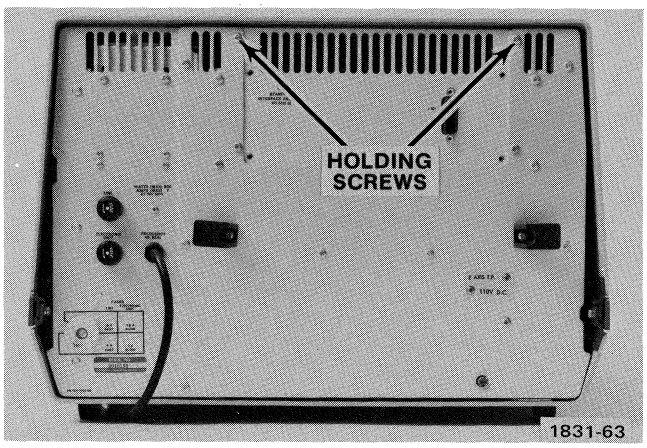
WARNING

Before proceeding, disconnect the instrument from the power source.

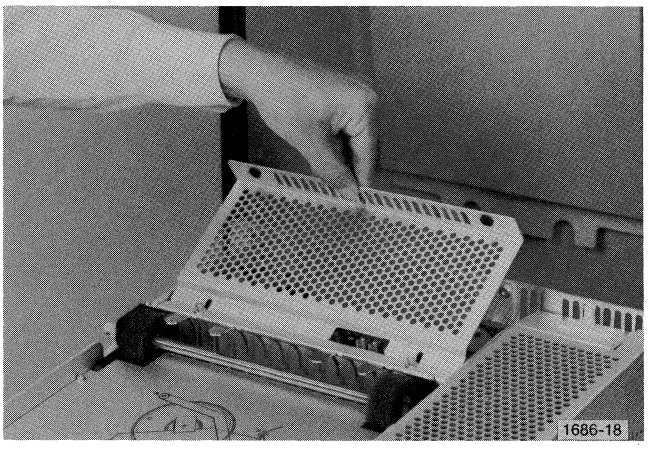


2. Raise the instrument cover. Loosen (do not remove) the two screws holding the front portion of the protective shield, located behind the rear paper guide.

Access to Timing, Interrogate, or Multiplexer Boards



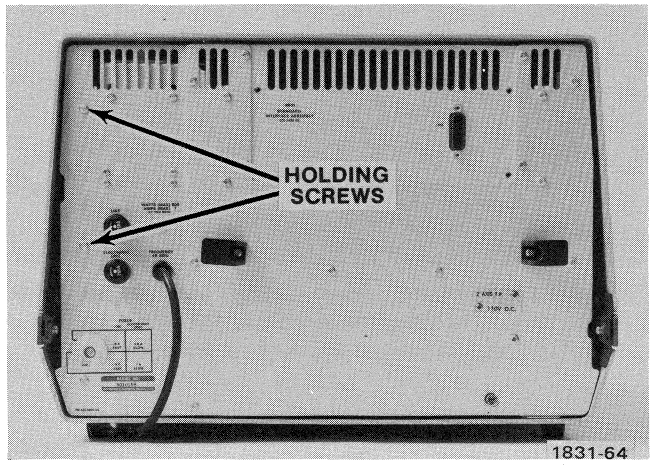
1. The circuit board protection shield is located at the top rear of the instrument; with the instrument cover closed, remove the two mainframe holding screws that secure the protective shield to the back panel.



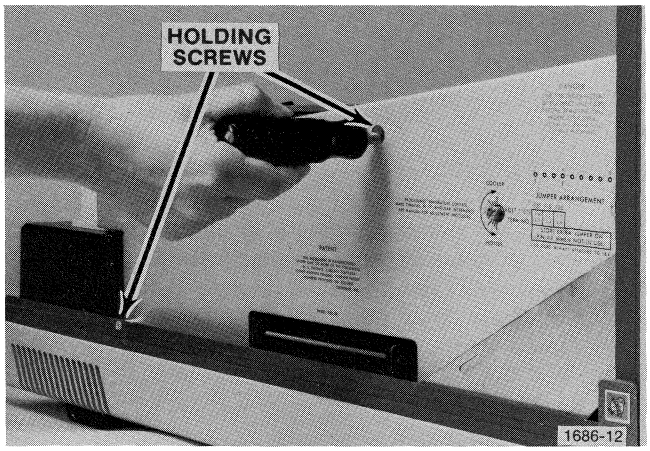
3. Lift the back of the protective shield and slide the shield toward the rear of the instrument. The circuit boards are easily removed or placed on an extender board for troubleshooting or adjustment. (See Test Equipment Required for part numbers of extenders.)

Access to Right Side

Contains paper transport motor, input line transformer terminal jumpers, control board, holding screws for the right side of the processor.



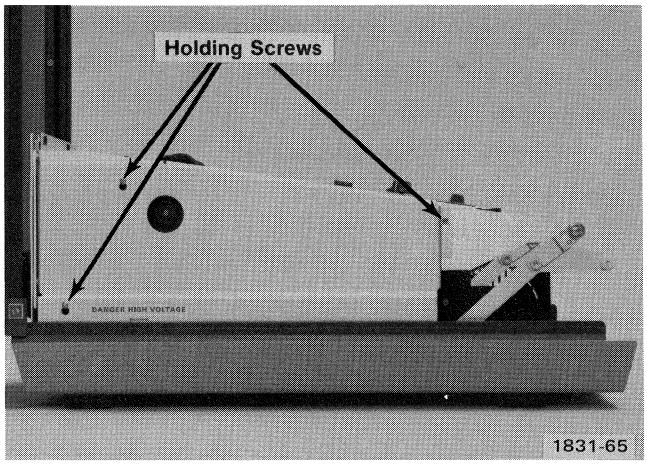
1. With the instrument cover closed, remove the two screws that are accessible on the back panel of the instrument.



2. Raise the cover and remove the screw that holds the lower front corner of the protective shield. The remaining screw holding the shield can be reached through an access hole. With a 4" Phillips screwdriver, loosen one turn (do not remove this screw) and carefully lift the shield up and forward out of the instrument.

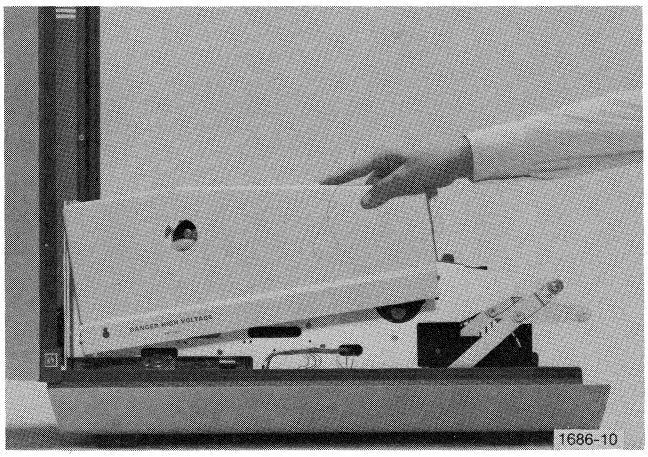
Access to Left Side

Contains rear paper drive, holding screws for the left side of the processor, and high voltage board.



1. Raise the instrument cover to the "up" position.

2. It is not necessary to remove (just loosen) the three screws holding the protection shield. Two of these screws are near the rear and the third is at the front of the protection shield.



3. Lift the protection shield about 1/4-inch to clear the narrow portion of the slotted screw holes and lift free.

PROTECTION SHIELD REPLACEMENT

To replace the protection shields, reverse the order in which they were removed.

PREVENTIVE MAINTENANCE

General

Preventive maintenance consists of cleaning, visual inspection, lubrication, etc. Preventive maintenance performed on a regular basis may prevent instrument breakdown and will improve the reliability of this instrument. The severity of the environment to which the instrument is subjected determines the frequency of maintenance. A convenient time to perform preventive maintenance is preceding recalibration.

Removing Instrument from Cabinet

With the cover closed, tip the instrument up on its back. There are eight screws holding the unit to the bottom of the cabinet as shown in Fig. 3-6. Remove all but the top two. Set the instrument upright, slide it forward on the bench far enough to expose the two remaining screws from underneath. Remove these screws. Remove the transformer cover or guard and unsolder the fan-motor leads from the transformer (#2 and #3). If the unit contains a copy counter, disconnect the leads to it. The unit may now be lifted up out of the cabinet for easier servicing. (The fan-motor stays in the cabinet.)

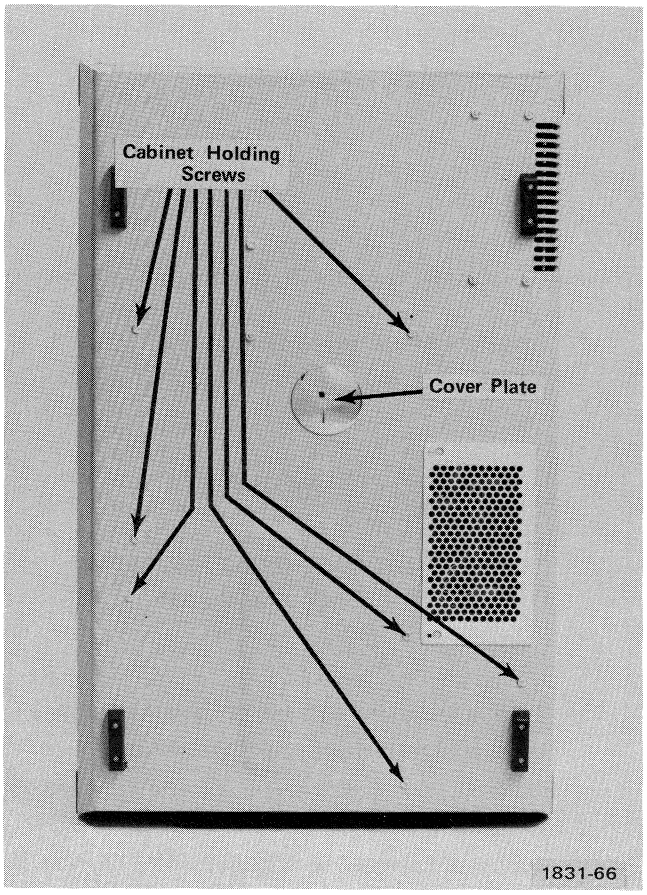


Fig. 3-6. Bottom view of 4631.

Mainframe Cleaning

General. The Hard Copy Unit should be cleaned as often as operating conditions require. Accumulation of dirt in the instrument can cause overheating and component breakdown. Dirt on components acts as an insulating blanket and prevents efficient heat dissipation. It also provides an electrical conduction path which may result in instrument failure.

CAUTION

Avoid the use of chemical cleaning agents which might damage the plastics used in this instrument. Avoid chemicals which contain benzene, toluene, xylene, acetone, or similar solvents.

Exterior. Loose dust accumulated on the outside of the instrument can be removed with a soft cloth or small paint brush. The paint brush is particularly useful for dislodging dirt on and around controls. Dirt which remains can be removed with a soft cloth dampened in a mild detergent and water solution. Abrasive cleaners should not be used.

WARNING

Do not clean the interior of this instrument with high pressure air, as this may cause the chemical powder to be blown into the eyes.

Interior. Dust in the interior of the mainframe should be removed occasionally due to its electrical conductivity under high humidity conditions. The best way to clean the interior is to blow off the accumulated dust with dry, low-pressure air, such as the exhaust from a vacuum cleaner. Remove any dirt which remains using a soft brush or a soft cloth dampened with a mild detergent and ammonia solution. Abrasive cleaners should not be used. A cotton-tipped applicator is useful for cleaning in narrow spaces or for cleaning circuit boards.

The high-voltage circuits, particularly parts located in the high-voltage compartment and the area surrounding the Post-Acceleration Anode connector, should receive special attention. Excessive dirt in these areas may cause high-voltage arcing and result in improper instrument operation.

Planned Maintenance. The processor should be inspected after each roll of paper is processed, and cleaned if necessary. Chemical powder, from the paper, builds up on the surfaces. A soft paint brush and a vacuum cleaner are the recommended cleaning tools. If the above method fails to remove the accumulated powder, remove the two screws and washers that secure the paper exit guide (see exploded view of Processor, Replaceable Mechanical Parts); then, remove the two screws that secure the insulation cover (see exploded view of CRT and Rear, Replaceable Mechanical Parts). After removal, clean any powder which remains with ammonia and cotton swabs.

After each four rolls of paper, the instrument should be cleaned more thoroughly to remove accumulations of the sublimate. Any hardened build up of the paper sublimate should be removed using a mild detergent solution and a soft cloth. Nylon scouring pads may be used, but gently. Look for build up of paper sublimate in these areas, especially: (a) the slotted exit guide at the rear of the processor, (b) the paper guides that belt into the top of the rotary knife blade (on the cassette holder assembly), and (c) the rear lip of the paper tray.

Processor Cleaning

Inspect the processor after each empty paper cassette is removed; clean the processor if necessary. Chemical powder (from the paper) builds up on the interior surfaces, and on the face of the crt. A vacuum cleaner and soft brush (1" paint brush) are the recommended cleaning tools.

WARNING

Dangerous electrical potentials exist at several points throughout this instrument. Some transistor cases operate at fairly high voltage levels. When the unit is operated with the cover opened, if any protection shields are removed do not touch the exposed connections or components. Disconnect power before cleaning the instrument or replacing parts. Be sure not to let any water or soap drip down into the instrument.

A regular schedule for maintenance is given in Table 3-2. The "Interval" columns indicate the frequency that service procedures are to be performed. For instance, the check marks in column 3 show that procedures 1, 2, 3, 5, 8, etc. should be performed every 10 rolls or 1,000 hours of operation, whichever comes first. It is recommended that a log book be kept of service performed, date, and copy or roll count.

Table 3-2

PLANNED MAINENTANCE SCHEDULE

Interval					Service Procedure
1 Roll	4 Rolls	10 Rolls or 1,000 HR	20 Rolls or 2,000 HR	200 Rolls	
X	X	X	X	X	1. Remove any dust or paper chaff visible in the area of the rollers and cutter blades. *WARNING* *Use caution around the blades—They are sharp!* Use a brush or soft cloth to wipe out any accumulated dust or paper residue.
	X	X	X	X	2. Clean the instrument thoroughly. A small vacuum cleaner is recommeded for chaff, dust, etc.

Table 3-2 (cont)

PLANNED MAINENTANCE SCHEDULE

Interval					Service Procedure
1 Roll	4 Rolls	10 Rolls or 1,000 HR	20 Rolls or 2,000 HR	200 Rolls	
					WARNING *Do not clean the interior of the instrument with compressed air, as this may cause the paper's sublimate to be blown into the eyes.* Any hardened buildup of the paper sublimate should be removed using a mild detergent solution and a soft cloth. Nylon scouring pads may be used, but gently. Possible locations of buildup and resulting jams are: (a) the slotted exit guide at the rear of the processor, (b) the guides that bolt into the top of the rotary blade (in the cassette holder assembly), and (c) the rear lip of the paper tray (under the top cover).
X	X	X	X	X	3. Wipe the face of the crt with a soft cloth. A detergent solution is recommended for removing hardened buildup of the paper sublimate. **DO NOT** use alcohol or petroleum-based solvents; they may damage the drive rollers and the processor belt. Be carefult not to scratch the crt face.
			X	X	4. Remove the Main board assembly to clean the electronic components.
		X			5. Pull out the interlock button and turn on the instrument. Visually check the processor belt for slippage, stalling, or damage. If problems are evident, replace the belt using the kit for that purpose. [a]

[a] Part numbers for maintenance kits are located in the Accessories portion of the Replaceable Mechanical Parts list.

Table 3-2 (cont)

PLANNED MAINENTANCE SCHEDULE

Interval					Service Procedure
1 Roll	4 Rolls	10 Rolls or 1,000 HR	20 Rolls or 2,000 HR	200 Rolls	
			X	X	6. Examine the heater plate for worn plating at the bend near the rear edge. If the nickel plating is worn through to the metal, replace the heater plate. A worn plate will cause excessive belt wear, reducing its life.
			X		7. Install Motor Processor Maintenance Kit.[a]
				X	8. Install Overhaul Maintenance Kit.[a]
		X	X	X	9. Check drive belt tension. The brown cogged belt should be just snug, not tight. The four motor bracket retaining nuts may be loosened and the motor moved forward or backward to adjust belt tension.
		X	X	X	10. Check drive chain free play. The drive chain from the motor should have a small amount—about 1/4"—of free play. Raise or lower the idler sprocket, if indicated, to adjust.
		X	X	X	11. Lubricate the six processor bearings. Turbine oil is recommended. Place a drop of oil in the timing sprocket where it turns on its shaft. See "Lubrication" in this section.
		X	X	X	12. Grease the drive roller bearings, the cassette assembly rollers bearings, the cutter arm actuator, and the left end of the rotary blade.

[a]Part numbers for maintenance kits are located in the Accessories portion of the Replaceable Mechanical Parts list.

Table 3-2 (cont)

PLANNED MAINENTANCE SCHEDULE

Interval					Service Procedure
1 Roll	4 Rolls	10 Rolls or 1,000 HR	20 Rolls or 2,000 HR	200 Rolls	
		X	X	X	13. Check the cut edges of a copy. The paper coating may have small nicks, but the paper itself should be cut cleanly, with no "furry" spots or tearing. Tighten the lower blade adjusting screws, if necessary, in the area not cutting. Do not overtighten. If the blades cut properly when operated by hand, but leave a small tear in the right side when the unit is operating, try adjusting the lower cutter blade position. If this does not help, check the adjustment of the cutter actuator arm. (See "Paper Cutter Adjustment" and "Cutter Actuator Adjustment" later in this section.)
		X	X	X	14. Check for unusual or objectionable noise. Potential noise generators are the drive roller clutch (groan), processor belt (groan), and interrupter wheel (squeak). Also, the paper cannister may squeak or groan when nearly empty of paper. Clutch groan may be prevented with the application of Turbine Oil. Disassembly of the clutch may be required. If this procedure fails, replace the clutch. The driver roller clutch solenoid must be kept clean and free of lubricants. Processor belt groan is generally due to the belt rubbing against the left or right side frame section. Replace the belt.

Table 3-2 (cont)

PLANNED MAINENTANCE SCHEDULE

Interval					Service Procedure
1 Roll	4 Rolls	10 Rolls or 1,000 HR	20 Rolls or 2,000 HR	200 Rolls	
					Interrupter wheel squeak is caused by the wheel rubbing against the LED-photo-transistor bracket. Readjust the bracket or wheel position on the timing sprocket shaft.
		X	X	X	15. Check drive motor current during idle. If the current is more than 2.2 A, remove the drive chain and drive belt from the motor drive sprocket and check the motor current "unloaded" which should be about 0.6 A. If the motor current is now OK, look for a drag problem in the transport. If the motor current exceeds 0.7 A, replace the brushes or replace the motor to correct.
		[b]	[b]	X	16. Verify electrical performance as described under "Electrical Adjustments" later in this section. Make adjustments as required.
X	X	X	X	X	17. Load the new roll of paper and turn on the instrument. After warmup, make several copies and check paper contrast. Adjust the processor temperature if indicated.
		X	X	X	18. Check the range of the CONTRAST control for its effect on the copies. Also check NORMAL/INVERT operation by moving the NORMAL/INVERT strap on the Video board.
		X	X	X	19. Make other adjustments as necessary to provide good quality copies.

[b]Electrical calibration of the unit is recommended at least once per year. In installations where copy quality, especially gray scale, is critical, the electrical performance should be verified each 1,000 operating hours.

Visual Inspection

The Hard Copy Unit should be inspected occasionally for such defects as broken connections, improperly seated transistors, damaged circuit boards, heat-damaged parts, and small pieces of paper inside the processor.

The corrective procedure for most visible defects is obvious; however, particular care must be taken if heat-damaged components are found. Overheating usually indicates other trouble in the instrument; therefore, it is important that the cause of overheating be corrected to prevent recurrence of the damage.

Transistor Checks

Periodic checks of the transistors are not recommended. The best check of transistor performance is actual operation in the instrument.

Readjustment

To assure accurate reproductions, check the adjustments of this instrument whenever copy quality deteriorates. Any time components are replaced, readjustment of the affected circuits may be necessary. Complete adjustment instructions are given in the Electrical Adjustments section.

The adjustment procedure can also be helpful in localizing certain troubles in the instrument. In some cases, minor troubles may be revealed and/or corrected by the adjustment procedure.

Lubrication

The Hard Copy Unit is properly lubricated at the factory. Relubrication is recommended after 10 rolls of paper have been processed or every 4 months, whichever comes first.

Remove the cassette as previously described, and refer to Fig. 3-7. Apply a small amount of Houghtons Cosmolube 102-T2470 (Tektronix Part No. 006-1229-01) to each end of all three rollers in the cassette assembly. It is not necessary to remove the rollers; the lubricant will work in. Put a little Cosmolube on the cutter arm actuator at the right end of the cutter, and to each end of the cutters where they make contact at all times. Rub a little stick lubricant, such as Door-Ease, along the rest of the moving cutter.

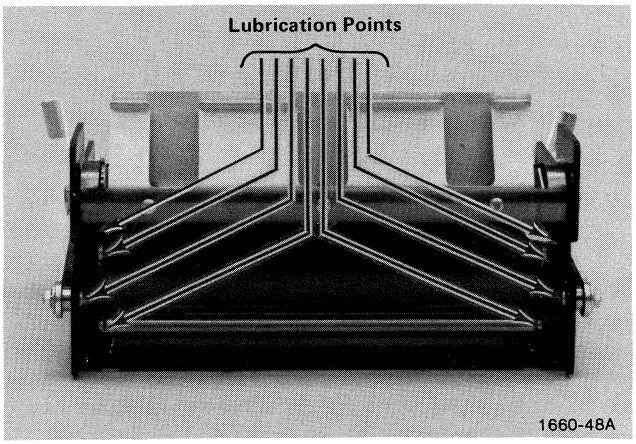


Fig. 3-7. The cassette assembly lube points.

Use Cosmolube on the bearings at each end of the drive roller that runs just above the crt. Also put a dab on the outside of these bearings where they slide into the slots on the cassette assembly.

Remove the chain cover from the side of the processor unit by removing the single Phillips screw at the front and the two at the back (accessible through holes). Oil holes are provided at each end of the four rollers in the processor. These can be seen at the four corners of the unit. Put a drop or two of Union AW 313 Turbine Oil (Tektronix Part No. 006-0626-01) in each hole. Put a drop of oil on the shaft of the chain idler sprocket.

The two clutches should not require lubrication. However, if a definite indication of sticking occurs, place a drop of oil (turbine oil, PN 006-0626-01) at each end of the clutch and check operation several times. If trouble persists, the clutches will need to be replaced.

The chains should not need lubrication. However, if they appear dry, apply oil very sparingly.

CORRECTIVE MAINTENANCE

General

Corrective maintenance consists of component replacement and instrument repair. Special techniques required to replace components in this instrument are given here.

Component Replacement

CAUTION

Disconnect the instrument from the power source before replacing components. When selecting replacement parts, it is important to remember that the physical size and shape of a component may affect its performance in the instrument, particularly at high frequencies. All replacement parts should be direct replacements, unless it is known that a different component will not adversely affect instrument performance.

Standard Parts. All electrical and mechanical part replacements can be obtained through your local Tektronix Field Office or representative. However, many of the standard electronic components can be obtained locally in less time than is required to order them from Tektronix, Inc. Before purchasing or ordering replacement parts, check the parts lists for value, tolerance, rating and description.

Special Parts. In addition to the standard electronic components, some special components are used. These components are manufactured or selected by Tektronix, Inc. to meet specific performance requirements, or are manufactured for Tektronix, Inc. in accordance with our specifications. Most of the mechanical parts used in this instrument have been manufactured by Tektronix, Inc. Order all special parts directly from your local Tektronix Field Office or representative.

WARNING

Disconnect the instrument from the power source before replacing components.

Circuit Card or Board Replacement. If a circuit card or board is damaged beyond repair, the entire assembly including all soldered-on components can be replaced. The cards are plug-in type cards which can be removed by firmly pulling straight out. To replace the cards, reverse the order of removal. Insert the card in the edge guide and firmly press straight in.

Transistor and Integrated Circuit Replacement. Transistors and Integrated Circuits should not be replaced unless actually defective. If removed from their sockets during routine maintenance, return them to their original sockets. Unnecessary replacement of transistors or ICs may affect the calibration of this instrument. When transistors or ICs are replaced, check the operation of the part of the instrument which may be affected.

Replacement transistors or ICs should be of the original type or a direct replacement. If a transistor is replaced by a transistor made by a different manufacturer than the original, check the manufacturer's basing diagram for correct basing. Transistors which have heat radiators or which are mounted on the chassis use silicone grease to increase heat transfer. Replace the silicone grease when replacing these transistors.

WARNING

Handle silicone grease with care. Avoid getting silicone grease in the eyes. Wash hands thoroughly after use.

Fuse Replacement

There are six fuses in the Hard Copy Unit; two are located on the rear panel and four on the Main board.

The value of the two fuses on the rear panel varies according to the line voltage to which the Hard Copy Unit is attached. For 100-120 Vac operation, the line fuse (upper fuse) is an 8A fast-blow, and the electronics fuse (lower) is a 1A slow-blow (Fig. 3-8).

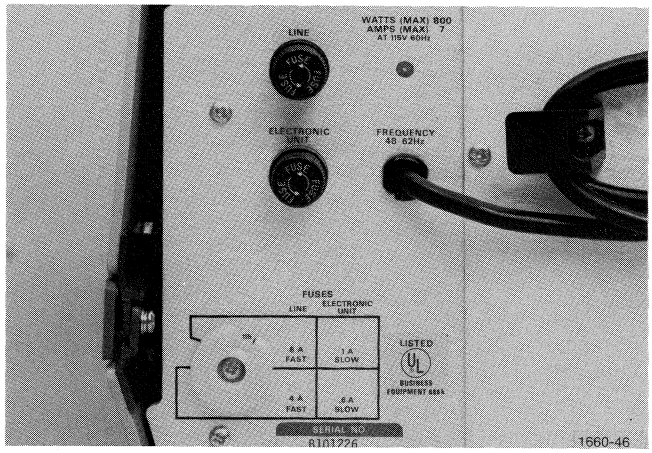


Fig. 3-8. Rear-panel fuses.

The fuses on the Main board are as follows (Fig. 3-9):

a. Two 1.5A fast-blow fuses which protect the Deflection Amplifier transistors.

b. One 1/16A fast-blow fuse which protects the crt bias circuit.

c. One 0.6A slow-blow fuse which protects the high voltage circuit.

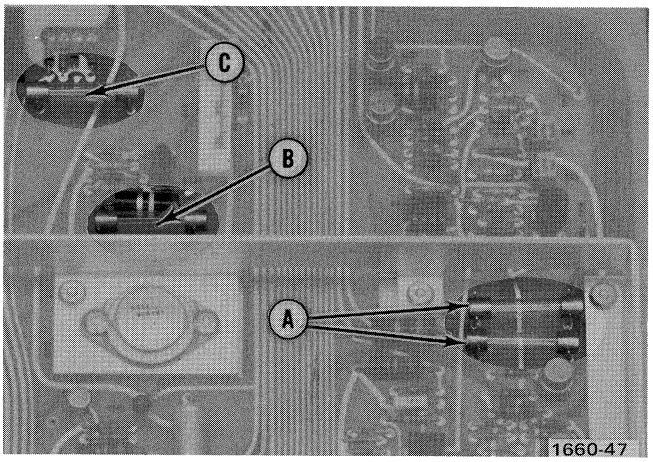


Fig. 3-9. Main board fuses.

The Main board fuses may be made accessible (after turning the POWER switch off and disconnecting the power cord), by removing the six screws which attach the Main board to the rear panel, and sliding the rear panel and Main board out.

CAUTION

If any fuse in the Hard Copy Unit fails repeatedly, a qualified technician should be contacted to determine the cause of the trouble.

Cathode Ray Tube Replacement

WARNING

The crt may implode if it is scratched or struck severely enough. Wear protective clothing and a face shield when replacing the crt.

To remove the Cathode Ray Tube, use the following procedure:

1. Disconnect the signal cable from the instrument. Disconnect the power cord from the power source.

2. Remove the six mainframe holding screws from the back panel (Fig. 3-10).

3. Pull mainframe and back-panel out and set aside.

4. Disconnect crt socket.

5. Lay the instrument on its side and remove the cover plate located on the bottom, near the center.

6. Disconnect the post accelerator button, accessible through the uncovered hole. Then set the unit back on its base.

7. Swing the cover open. Swing the cassette holder out and remove the paper cassette. The cassette holder is connected to the unit by cassette arm latches located at the first mechanical junction from the handle knobs. Unlatch these latches and remove the cassette holder. Loosen the two nuts which hold the control panel (Fig. 3-11). Then lift the bracket and swing it out of the way.

8. Using an offset Phillips screwdriver, loosen the screw holding the optical interrupter bracket (Fig. 3-12) and swing the bracket toward the rear of the instrument, away from the wheel. Grasp the outer edge of the interrupter wheel firmly and pull straight out to remove it from the shaft, being careful not to damage the interrupter disc on the center of the wheel.

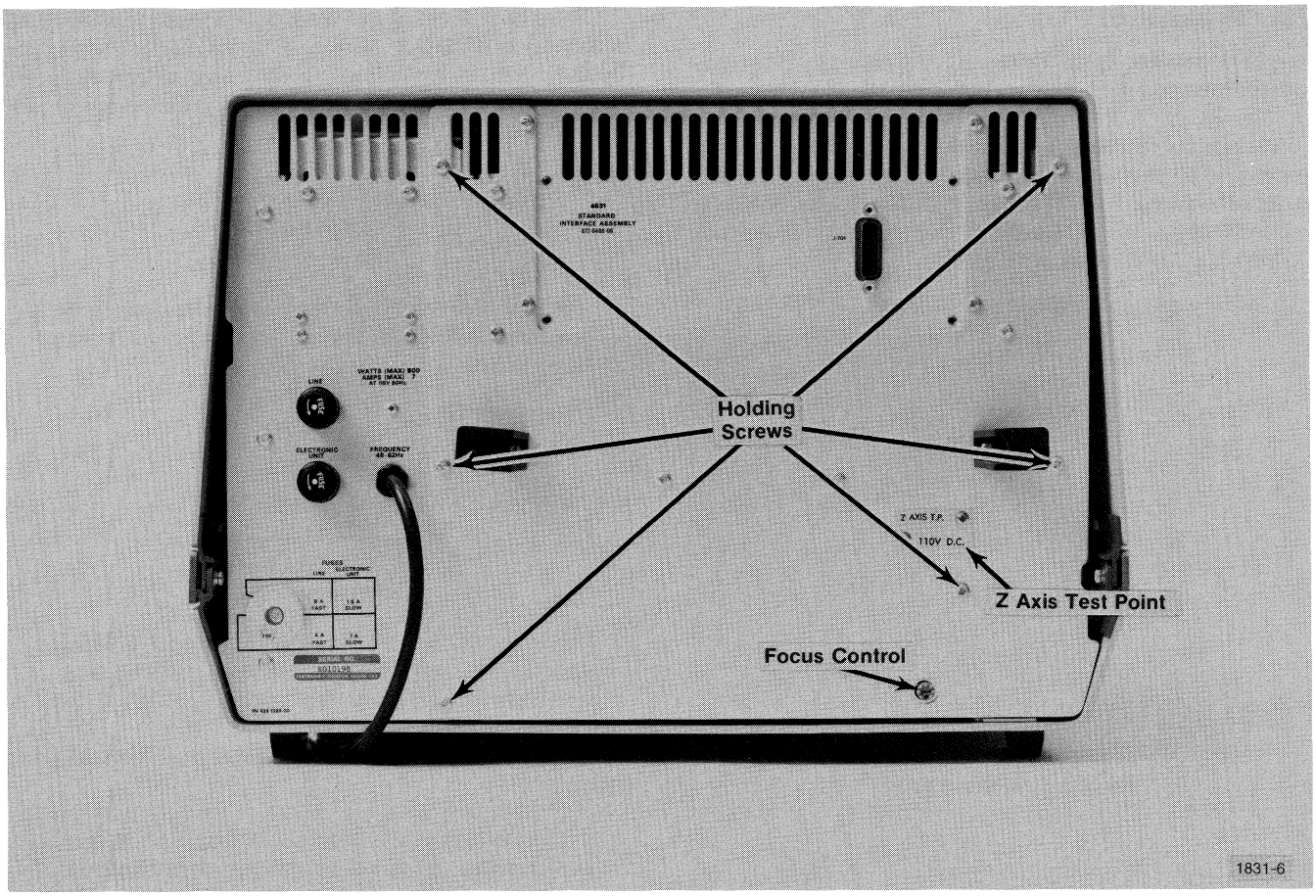


Fig. 3-10. Location of mainframe holding screws and Z axis test point.

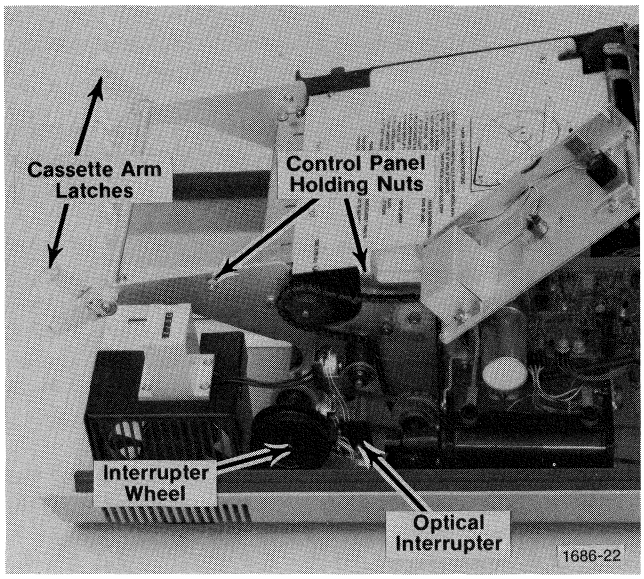


Fig. 3-11. Location of control panel holding nuts. Cassette arm latches and optical interrupter (control panel shown in raised position).

9. Loosen the allen screw, which holds the drive roller clutch assembly to the shaft (Fig. 3-12).

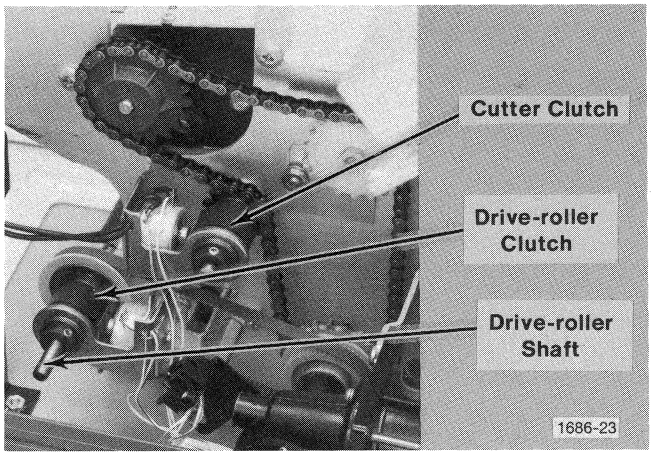


Fig. 3-12. Clutches with interrupter bracket and interrupter wheel removed.

10. Remove the nut which holds the drive roller bearing on the opposite end of the drive roller shaft (left side as you face the instrument). Remove the bearing.

11. Slide the left side of the drive roller forward clear of its mounting and then slide it out of the left side of the instrument. Be careful not to lose the washers on each end of the drive roller.

12. Loosen the two Phillips-head screws which hold the crt clamp on each side of the crt. Unscrew them about 1/2 inch. Then using a flat-bladed screwdriver, pry up on the crt's upper clamping strap at the screws, sliding the strap up the screw on each side, freeing the crt.

13. At the front of the crt, lift it up to free it from the lower bracket and slide it forward out of the instrument. The neck of the crt slip-fits in the yoke. It may be necessary to rotate the tube slightly to free it from the yoke before pulling the tube out.

To replace the crt, reverse the above procedure. Note that the crt should be fully inserted before the clamp screws are tightened. Also note that the positioning tang on the drive roller clutch assembly must be located in the circular hole on the mainframe when reinstalled. Don't forget to reconnect the post-accelerator cable on the bottom of the crt. After installation of a crt, it may be necessary to readjust the instrument and reposition the trace and crt.

When replacing the crt, be careful not to push the foam rubber light shields back into the unit. They should be positioned on top of the crt so as to cover the holes at the holding clamps on each side and across the bottom of the crt.

The crt should be pushed back into the unit far enough so that the face protrudes .01 to .03 inch in front of the drive-roller. It may be necessary to "jockey" the tube slightly to maintain this spacing all across the face of the tube, before the clamp-holding screws are completely tightened.

If the crt is not level horizontally, the side blocks may be moved up or down after loosening the two 5/16 inch hex-head bolts at the front of the holding clamps.

After replacing the crt, it may be necessary to adjust the trace rotation.

To check trace rotation, connect pin 5 and pin 7 on J701 together with a jumper as shown in Fig. 3-13. Push the COPY button and observe the trace on the fibre-optic crt. If the trace does not appear horizontally even, loosen the hex nuts holding the yoke to the mainframe (Fig. 3-14). The slotted holes allow the yoke to be rotated. A lever attached to the yoke protrudes from the left side of the mainframe to allow rotating the yoke while observing the crt. Move this lever up or down as required to obtain an even trace. After adjustment, CAREFULLY tighten the yoke holding nuts.

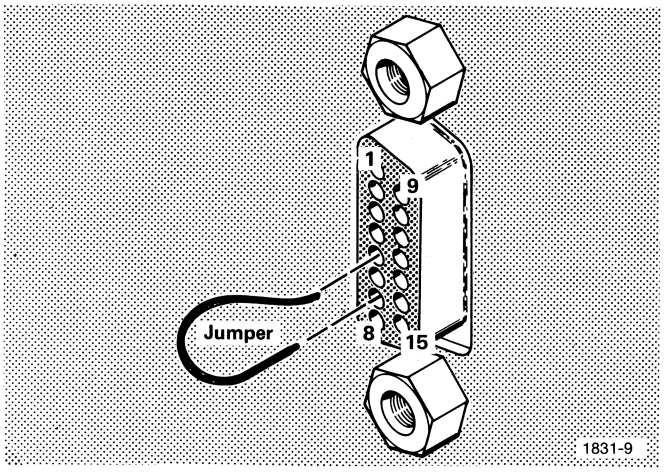


Fig. 3-13. Jumper connection on J701 to check trace rotation.

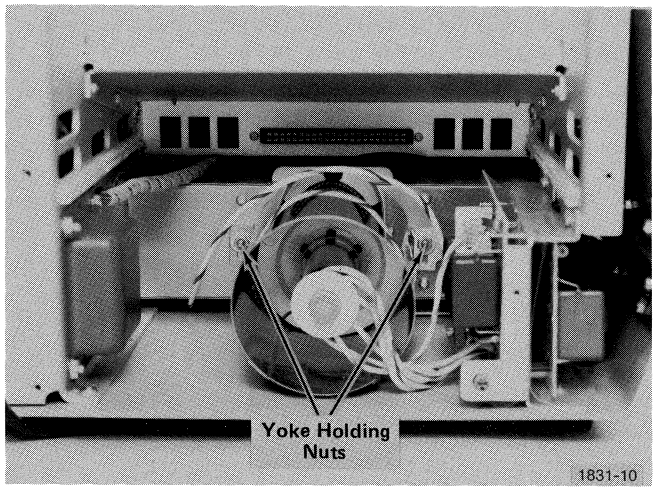


Fig. 3-14. Yoke positioning.

CAUTION

The crt shield and crt neck shield are fabricated from a metal that protects the crt yoke and electron trajectories from external magnetic interference. Since a sharp blow may cause the shield to lose some of its protective properties, handle it carefully. If the shield is damaged and a loss of shielding occurs, contact your local Tektronix, Inc. Application Engineer.

Processor Removal and Installation

To remove the processor assembly (P/N 640-0503-XX) from the instrument:

1. Disconnect the instrument from the power source and lift the cabinet top to gain access to the inside of the instrument.

2. Remove the left and right mechanical drive guards. Refer to Section 3, Servicing, of the manual. When removing the right mechanical drive guard, take care not to damage the processing temperature control, R71, on the control board.

3. Unlock the cassette assembly and slide it away from the front of the instrument.

4. Loosen (do not remove) the two nuts that secure the control panel bracket so that it may be flipped up.

5. Loosen (do not remove) the two nuts that secure the chain tension bracket so that the drive chain is slack.

6. Disconnect J31 and J32 from the control board.

7. Remove the four 10x32 truss head screws securing the processor within the instrument mainframe.

8. Grasp the processor by the rear paper guide and lift upward and forward.

9. Disengage the drive chain from the drive sprocket.

10. Lift the processor assembly out of the instrument.

CAUTION

Use care in handling the processor out of the instrument. Bumping the front paper guide against a hard object can cause the tensioned fishline to snap.

Install the processor by reversing the above procedure, keeping in mind the following:

WARNING

Do not approach the feed side of a gear, pulley or sprocket with tools or fingers.

Adjust the chain tension bracket while the instrument is running to allow for eccentricities in the sprockets. Use caution as this adjustment involves proximity to moving parts.

If the processor was disassembled, it may be necessary to reposition the processor drive sprocket upon its shaft for the chain to track smoothly without binding.

Reposition the front panel control bracket for a slight clearance between it and the cabinet top.

Processor Disassembly and Assembly

Once removed from the instrument, the processor can be disassembled and reassembled as follows for such maintenance as heater belt or heater element replacment:

The necessary tools are:

Magnetic Screwdriver	
003-0293-00 or equivalent	
Pozidriv Bit #1	003-0602-00 or equivalent
Pozidriv Bit #2	003-0603-00 or equivalent
3/32" Hex Wrench	003-0091-00 or equivalent
¼" Nutdriver	003-0132-00 or equivalent
Turbine Oil	006-0626-01

For the following steps, refer to Figure 3-15.

1. Using the 3/32" hex wrench, remove the processor drive sprocket.

2. Using the #1 Pozidriv bit, remove the two 4x40 screws securing the processor entrance paper guide, and remove the guide.

3. Remove the four 4x40 screws securing the processor top plate, and remove the plate.

4. Remove the two fiberglass insulators. The finished sides should be up when reassembling.

5. Use the ¼" nutdriver to remove the nuts on the heating element studs. Remove the flat washers beneath these nuts.

6. Remove the two 4x40 screws securing the processor rear paper guide, and remove the guide.

7. Remove the four 4x40 screws securing the processor bottomplate, and remove the plate.

8. Using the #2 Pozidriv bit, remove two 8x32 pan head screws and one 6x32 countersunk screw from the processor right frame section.

9. In order not to disrupt the wiring to J31 and J32, remove the right frame section and the heating element together. Slide the heating element out from between the thick spacers and the rubber heater belt.

10. Remove the loose idler roller.

11. Remove the heater belt.

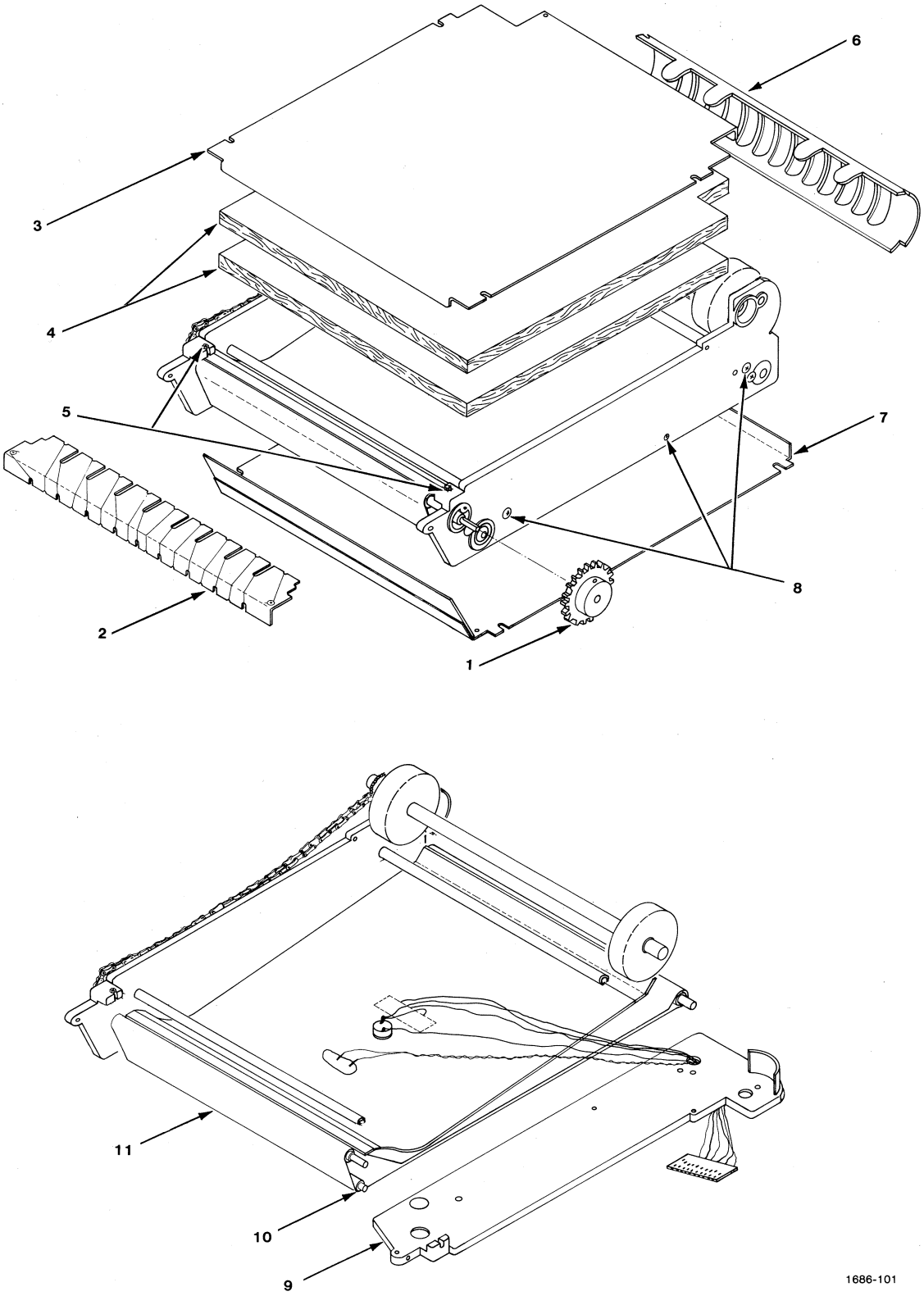


Fig. 3-15. Steps in Processor Disassembly and Assembly.

At this time, inspect the heating element for wear. Worn elements contribute to premature belt failure. The first indications of excessive wear appear along the crease on the rear of the element. If the nickel plating appears pitted, cratered, highly polished or flaking off, replace the element. Avoid the use of sandpaper or emery cloth. Sanding drastically reduces the life of heating elements and heater belts.

Inspect the frame sections for large scratches. Such damage may impair the functioning of the conductive paint sprayed onto the outer surface. when in doubt, measure for a resistance of about 1KΩ per inch.

It is also convenient at this time to put two drops of turbine oil onto each wick within each bearing. There are eight wicks.

When installing the heater belt, put the rough-finished seam on the inside (to travel over the drive rollers).

Reassemble the processor by reversing the above procedure. If the connectors fall out of the holder for J32, see Figure 3-16 for color coding of the wires for either 100 volts or 220 volts operation.

Yoke Replacement

To gain access to the conductor on which the yoke leads are soldered, it is necessary to remove the processor, following the procedure given under Processor Removal. Unsolder the yoke's four leads from the connector. (The four leads are contained in a black insulating sleeve.) Note the wire color codes to facilitate replacement. Remove the back panel and Main board after removing the six screws shown in Fig. 3-10.

Unscrew the two nuts holding the neck shield in place. Remove the crt base plug. Pull the neck shield and yoke off the neck. To replace, reverse the procedure. Align the yoke as explained under "Cathode Ray Tube Replacement."

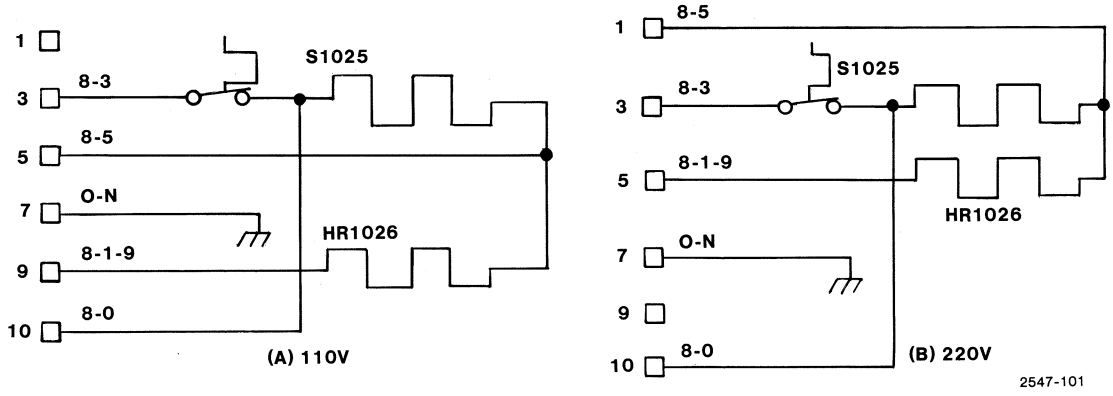


Fig. 3-16. J32 Color Coding for 110V or 220V Operation.

Section 4
ADJUSTMENT

Introduction

Adjustment information for the Hard Copy Unit is given in this section. The unit can be returned to original performance by completion of each step in this procedure. Limits, tolerances and waveforms in this procedure are given as adjustment guides, and are not instrument specifications. A short-form adjustment procedure is provided for the experienced calibrator.

The Hard Copy Unit should be checked and adjusted, if necessary, whenever copy quality deteriorates.

CAUTION

The yellow button on the back panel indicating line voltage is NOT AN ADJUSTMENT. It only indicates the line voltage input to which the instrument is set. See Table 2-3 (Power Source Characteristics) in Section 2. For instructions on changing line voltage see "Line Voltage Selection" in Section 3 of this manual.

TEST EQUIPMENT REQUIRED

General

The following test equipment or its equivalent is required for the complete adjustment procedure. Specifications given for the test equipment are the minimum necessary for accurate adjustment of this instrument. All test equipment is assumed to be accurately calibrated, and operating within the given specifications. If equipment is substituted, it must meet or exceed specifications of the recommended equipment.

1. Precision DC Voltmeter. Accuracy: within ±0.5%. Range: 0 to 6 kilovolts. For example, a Tektronix TM-500 series mainframe with the DM-501 Digital Multimeter. Use a high voltage divider (such as Fluke Model 80E-5) with the voltmeter to measure voltages above 500 volts.

2. DC Ammeter. Range: 0 to 5 amperes. They are available from the Simpson Company.

3. Test Oscilloscope. Bandwidth: dc to at least 30 megahertz. Minimum Deflection Factor: 0.005 volt per division, and differential dc offset. For example, a Tektronix Model 7603 Oscilloscope, with the 7A13, 7A18, and 7B53A plug-in units.

4. Variable Auto Transformer. Must be capable of supplying at least 800 watts over a range of 99 to 132 volts ac. If auto transformer does not have an ac voltmeter to indicate output voltage and a wattmeter to indicate wattage, monitor output with an ac voltmeter (rms) with a range of at least 132 volts, and with a wattmeter having a range of at least 800 watts. For example, General Radio W10MT3W Metered Variac Auto Transformer.

5. A display unit to use as a signal source. For example, a Tektronix 4010-Family Storage Display Terminal or a 613-Series Storage Monitor.

6. Ruler. Should have centimeter and inch scale and be at least 11 inches long.

7. Recording Paper. Minnesota Mining and Manufacturing Co. Type 777 Dry Silver Paper recommended. May be ordered from Tektronix, Inc., using Tektronix Part No. 006-1603-00.

8. Extenders
   a. Board Extender, Tektronix Part No. 067-0687-00.
   b. Card Extender, Tektronix Part No. 067-0708-00.

9. Adjustment Tools
   a. Insulated Screw Driver, 1 1/2-inch shaft, non-metallic. Tektronix Part No. 003-0000-00.
   b. Screw Driver, 3-inch shaft. Tektronix Part No. 003-0192-00.
   c. Wrench (for adjusting rollers). Tektronix Part No. 003-0738-00.

SHORT FORM ADJUSTMENT PROCEDURE AND INDEX

This short-form adjustment procedure is provided to aid in checking the operation of the Hard Copy Unit. It may be used as a guide by the experienced calibrator, or it may be used as a record of adjustment. Since the step numbers and titles used here correspond to those used in the complete procedure, this procedure also serves as an index to locate a step in the complete adjustment procedure. Performance requirements correspond to those given in the characteristic tables.

ADJUSTMENT PROCEDURE

General

Any needed maintenance should be performed before proceeding with adjustments. Troubles which become apparent during the procedure should be corrected immediately.

To prevent readjustment of other circuits when performing a partial procedure readjust only if the listed tolerance is not met. However, when performing a complete procedure, best overall performance will be provided if each adjustment is made to the exact setting even if the CHECK is within the allowable tolerance.

The following procedure uses equipment listed under Equipment Required. If equipment is substituted, control settings or test equipment set-up may need to be altered to meet the requirements of the test equipment used.

ELECTRICAL ADJUSTMENT PROCEDURE

1. Visual Inspection

a. Disconnect line cord from power source.

b. Check for the following:

   (1) Transistors out of sockets.

   (2) Damaged or missing parts.

   (3) Circuit cards properly inserted.

   (4) Interconnecting cables correctly installed.

   (5) Proper fuses.

2. CHECK or ADJUST Power Supplies (Fig. 4-1)

a. Remove mainframe and place on extender (Fig. 4-1). See Removing the Instrument from the Cabinet in this Section.

b. Ground the Z axis input in the High Voltage assembly (spring contact). See Fig. 4-2.

c. Remove cassette assembly.

d. Connect the line cord to the power source (i.e., metered auto-transformer) and turn on the Hard Copy Unit.

e. CHECK or ADJUST +15 Volt Supply (R545).

(1) Connect the Precision DC Voltmeter between the +15 volt test point (+ end of C449) and ground.

(2) CHECK—The output voltage should be between +14.85 and +15.15 volts.

(3) ADJUST—R545 for a voltmeter reading of +15 volts.

(4) INTERACTION—Operation of all circuits within the Hard Copy Unit may be affected by the +15 volt supply.

f. CHECK Low Voltage Power Supplies.

(1) Connect voltmeter between the −15 volt check point (− end of C465) and ground.

(2) CHECK—The output voltage should be between −14.55 and −15.45 volts (−15 V ±3%).

(3) Connect voltmeter between the +110 V check point (+ end of C475) and ground.

(4) Press COPY.

(5) CHECK—Reading should be between +106.7 and +113.3 volts (+110 volts ±3%).

(6) Connect voltmeter between the +5 V checkpoint (+ end of C445) and ground.

(7) CHECK—Voltage should be between +4.8 and +5.2 volts.

(8) Connect voltmeter between the + 180 V checkpoint (forward end of R426) and ground.

(9) Voltage should be between + 162 V and + 198 V.

g. CHECK Operation of Low and High Line Voltage.

(1) Set Auto Transformer output to 104 Vac.

(2) CHECK—Repeat 2f steps (1) through (7).

(3) Set Auto Transformer output to 126 Vac.

(4) CHECK—Repeat 2f steps (1) through (7).

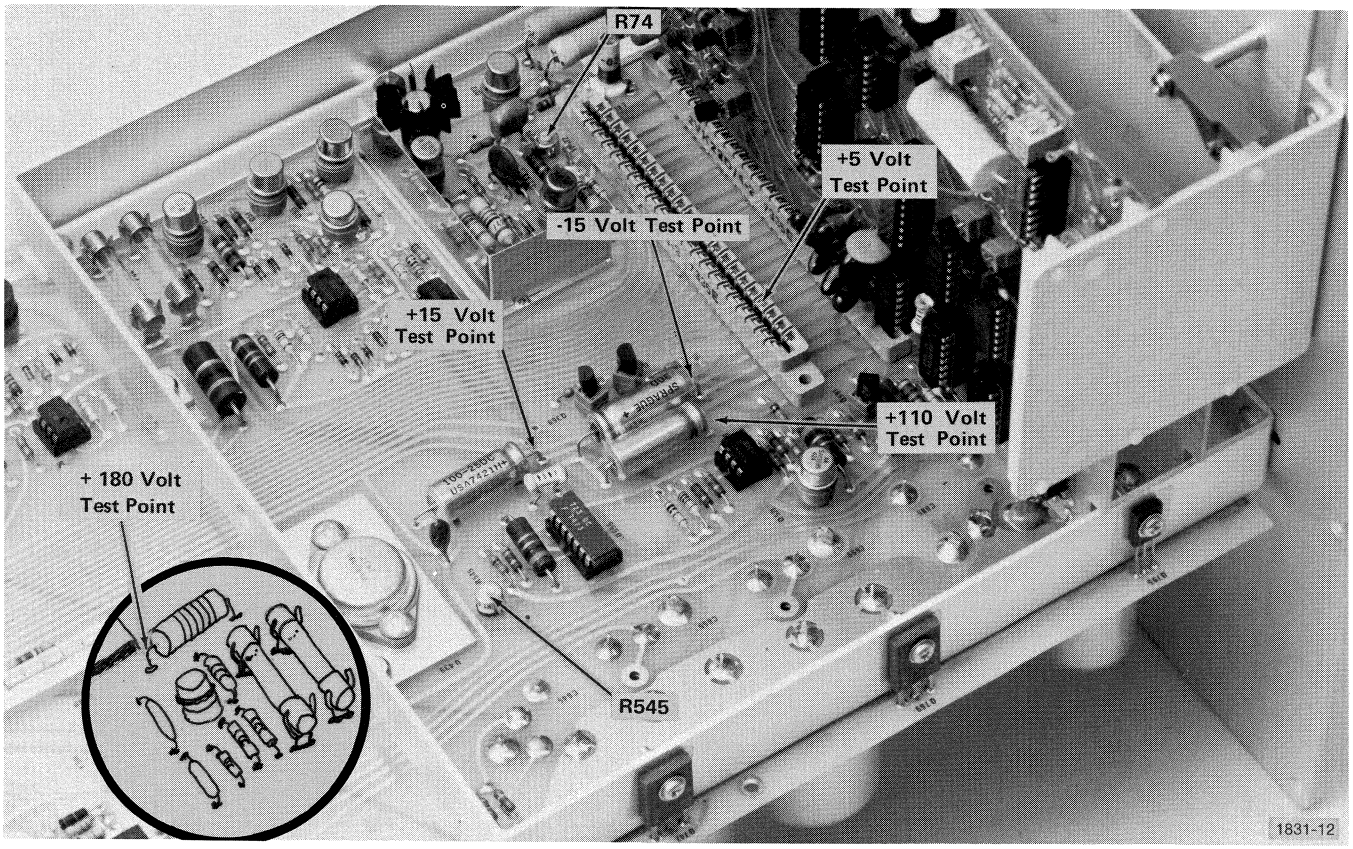


Fig. 4-1. Low voltage test points.

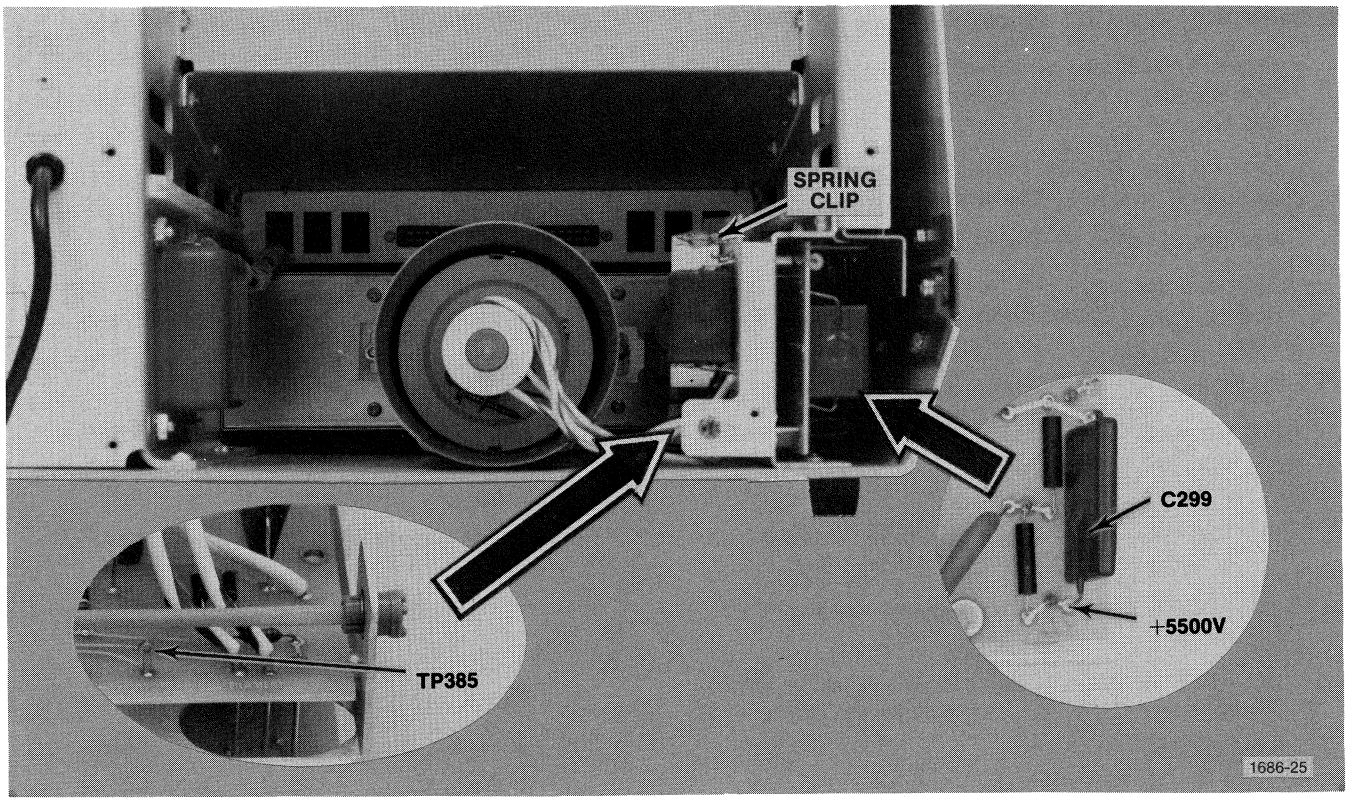


Fig. 4-2. Z axis input ground location.

h. Check or Adjust High Voltage Supplies (Fig. 4-2 and 4-3). Refer to Section 3 for Protection Shield Removal, left side.

(1) Set voltmeter to read −5500 V and connect it between the −5500 V test point (shown in Fig. 4-3) and ground.

(2) ADJUST R264 for a voltmeter reading of −5500 volts.

(3) Set the voltmeter to read +5500 V and connect it between the +5500 V test point (shown in Fig. 4-3) and ground.

(4) CHECK for reading between +5225 volts and +5775 volts (+5500 volts ±5%).

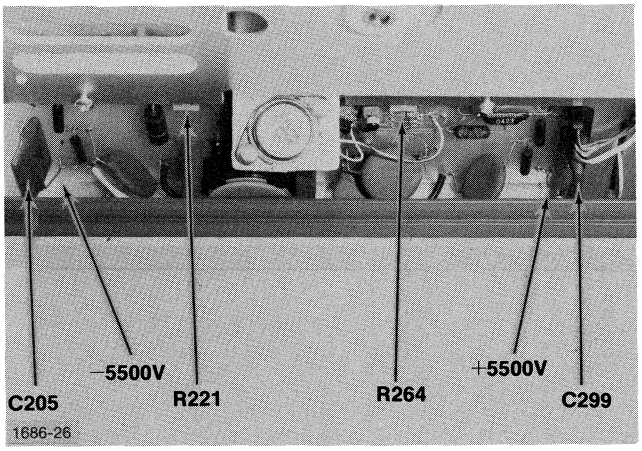


Fig. 4-3. High voltage test point and intensity locations.

3. Control Board (Fig. 4-4)

a. CHECK motor speed control operation. Refer to Section 3 for Protection Shield Removal, right side.

(1) Rotate R61 on the Control board (Fig. 4-4) through its range.

(2) CHECK that the motor speed varies smoothly as the control is rotated.

b. ADJUST motor speed.

(1) Connect the oscilloscope probe to pin 6 of U51 on the Control board (Fig. 4-4).

(2) Put the harmonica connector on the Timing board (Fig. 4-7) in position I.

(3) Press COPY.

(4) ADJUST R61 on the Control board (Fig. 3-4) for a square wave with a period of 3.6 milliseconds. (The display will jitter somewhat so it will be necessary to use discretion when making this adjustment.)

(5) Move the harmonica connector on the Timing board (Fig. 4-7) to position III.

(6) Press COPY.

(7) ADJUST R51 on the Timing board (Fig. 4-7) for a square wave with a period of 7.2 milliseconds.

(8) Move the harmonica connector back to position I.

c. Preset and CHECK operation of heater control.

(1) Connect 10X probe from test oscilloscope to pin 5 on J32 (Fig. 4-4). Set oscilloscope at 50 V/div, 10 ms/div, ac coupled and use storage mode.

(2) CHECK for pulsed heater control waveform as in Fig. 4-5.

(3) Install cassette assembly and paper. Press COPY. The first copy will be black. Discard it. While running copies, adjust R71 clockwise until paper just begins to darken, then turn R71 counterclockwise slightly. The final adjustment should be such that the temperature is just below the point where the paper begins to darken. An easy way to check the paper darkness is to fold over a corner and compare front copy side to back.

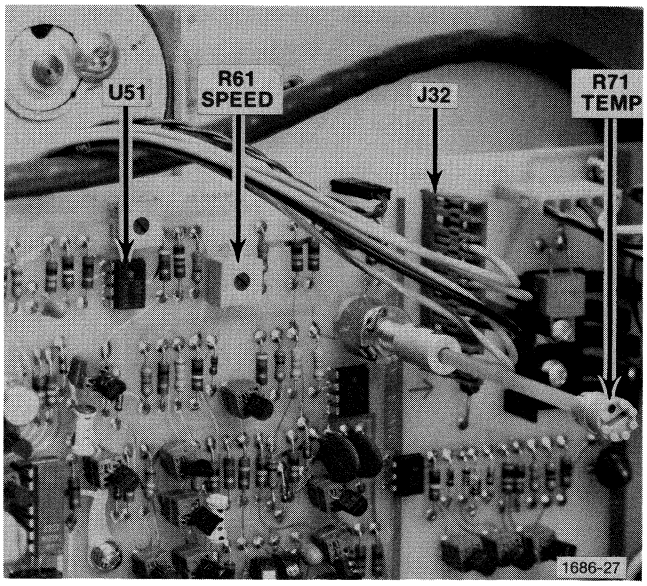


Fig. 4-4. Control board adjustment and test point locations.

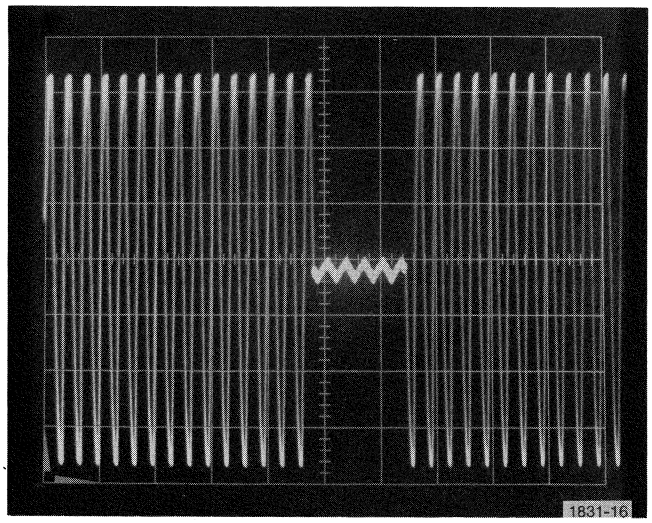


Fig. 4-5. Heater control waveform.

d. CHECK motor current and clutch operation.

(1) Disconnect the red wire from the upper front terminal of the drive motor (right side of unit). Connect a 0 to 5 A dc ammeter between the wire and the motor, with the negative side of the meter connected to the upper front motor terminal and connect the positive side to the red wire.

(2) CHECK for current during idle of 1.5-2.0 A (typical), not to exceed 2.2 A.

(3) Press COPY. CHECK to see that the shafts associated with the two clutches operate smoothly without binding, and with no unusual noise (Fig. 4-6).

(4) Remove the ammeter and reconnect the red wire to the motor terminal.

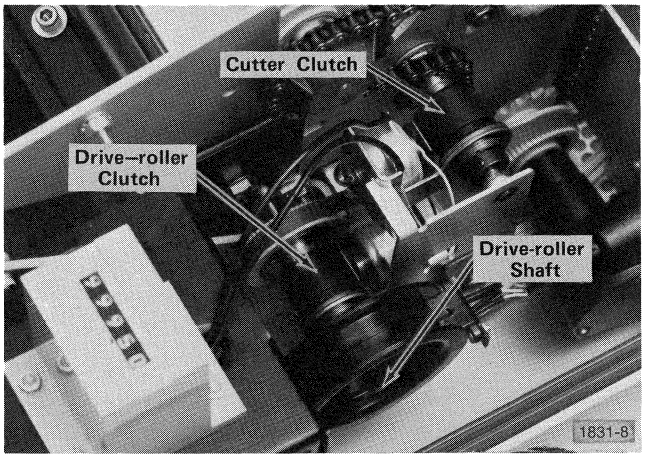


Fig. 4-6. Clutch locations.

4. Z Axis DC Level

a. Adjust Z axis dc level

(1) Attach the test oscilloscope probe to the Z axis test point TP81 on the Main board. TP81 is available through the rear panel; see Fig. 3-10.

(2) Remove the input signal from the Hard Copy Unit.

(3) Press COPY and ADJUST R74 on the Main board (Fig. 4-1) for the 20 volt dc level during copy time.

(4) Connect a signal from a terminal or storage unit to the 15-pin connector on the back panel of the Hard Copy Unit.

(5) Press COPY and CHECK for a signal having a 77.5 V ±5% peak level with a 20 V base line.

5. Intensity and Focus

a. ADJUST grid bias (intensity)

(1) Observe the face of the Hard Copy Unit crt while the COPY button is depressed. ADJUST R221 (Intensity, Fig. 4-3) on the HV assembly clockwise until dark portions of the crt display just begin to fill in. Reduce the intensity until dark portions are not visible.

b. ADJUST Focus.

(1) Press COPY. ADJUST the focus control on the Hard Copy Unit rear panel (Fig. 3-10) for best Focus at the center of the crt.

c. ADJUST Dynamic Focus.

(1) Refer to Fig. 4-8. Connect a 10X probe from the oscilloscope to TP14 on the Main board. Connect a 1X probe from the external trigger input on the oscilloscope to the R181-R182 junction on the Timing Board (Fig. 4-7). Set the oscilloscope to external trigger.

(2) ADJUST R23 (width) and R19 (amplitude), for a waveform similar to the idealized waveform as shown in Fig. 4-8.

(3) Press COPY. CHECK Hard Copy Unit display. Readjust R19 for best focus on edge of crt.

(4) Press COPY. ADJUST Focus on back panel of Hard Copy Unit (Fig. 3-10) for best overall focus.

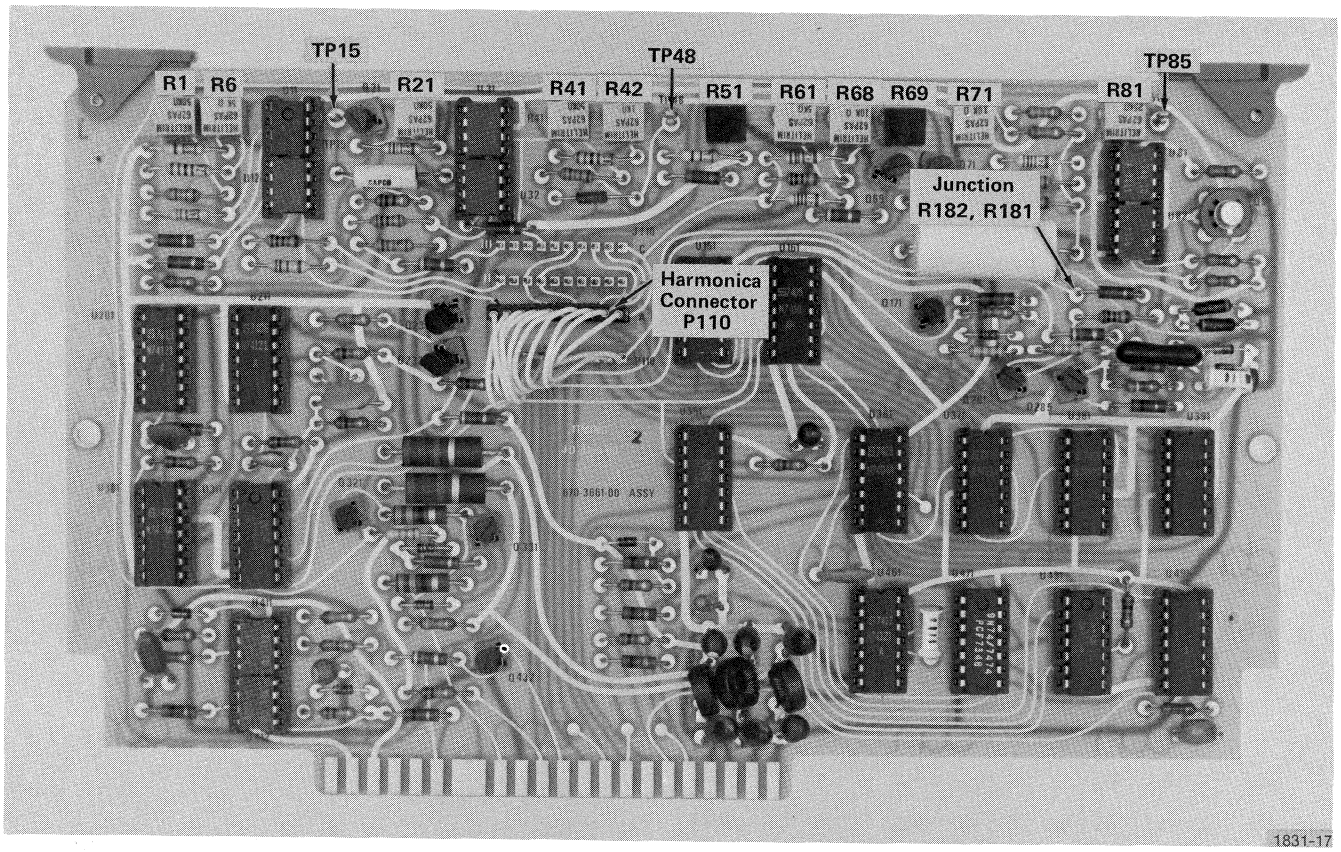


Fig. 4-7. Timing board adjustments.

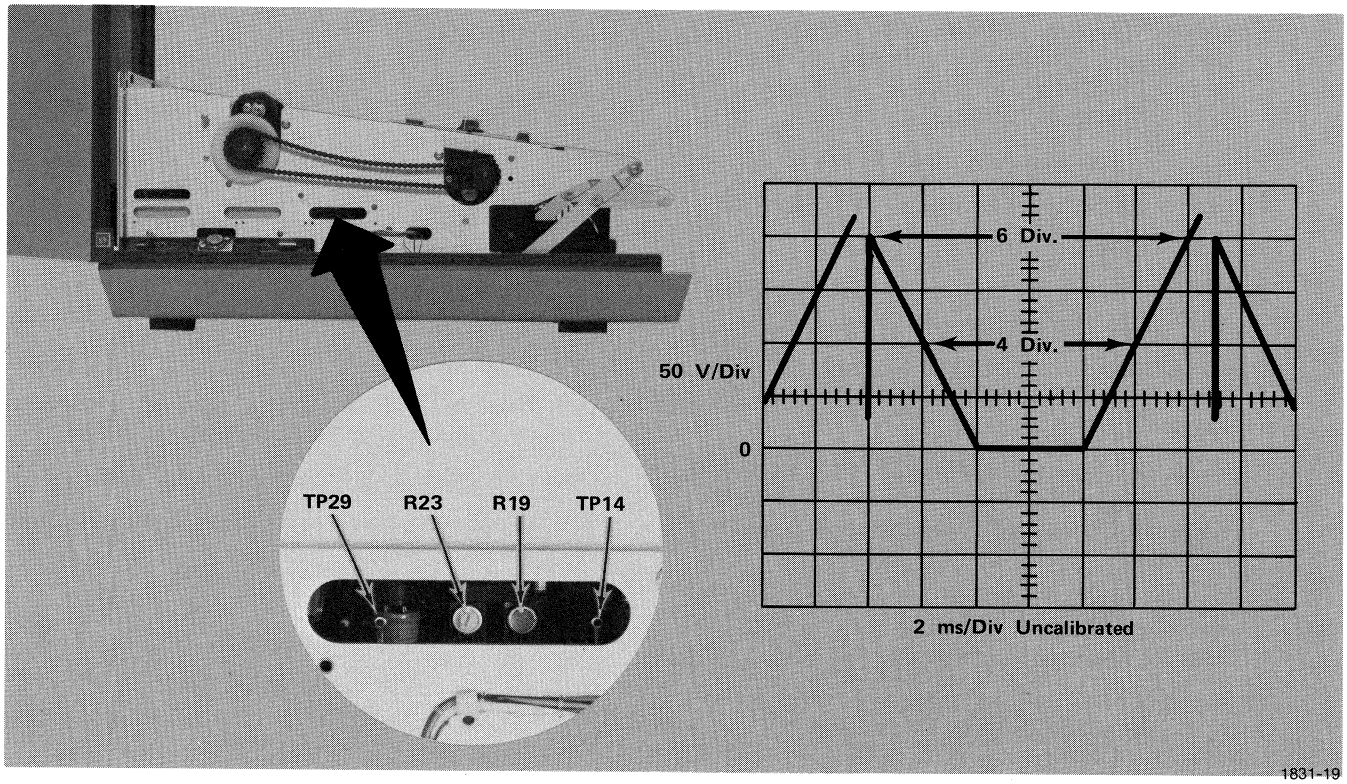


Fig. 4-8. Test point, adjustments and (idealized) waveform for Dynamic Focus adjustment.

6. Interrogate Rate

a. ADJUST Interrogate rate.

(1) Refer to Fig. 4-9. Connect a 10X probe from the oscilloscope to TP400 on the Interrogate Board. Set the oscilloscope for 0.5 ms/div and 0.1 V/div.

(2) Press COPY.

(3) ADJUST R28 for a rectangular waveform with a period of 2 μs. (See Fig. 4-10A.)

(4) Ground pin 10 of J701.

(5) Press COPY.

(6) ADJUST R24 for a rectangular waveform with a period of 1.4 μs. (See Fig. 4-10B.)

(7) Remove ground from pin 10 of J701.

7. Fast Ramp

a. ADJUST Fast Ramp (Fig. 4-7).

(1) Connect a 10X probe from the test oscilloscope to TP 15 on the Timing board. Set the oscilloscope to 500 μs/div.

(2) Press COPY.

(3) ADJUST R21 for a 2.8 ms ramp. (This is only the time the ramp is running. It does not include the time between ramps.)

(4) Connect a 10X probe from the differential amplifier of the oscilloscope to TP 48. The oscilloscope is a Tektronix 7603 with the 7A13 plug-in unit. Set the oscilloscope as follows: vertical sensitivity = 50 mV/div., − input = V_c, + input = D_c, comparison voltage = +5 V.

(5) ADJUST R41 for a reading of +5 V ±50 mV.

(6) Switch the comparison voltage to −5 V.

(7) Press COPY.

(8) ADJUST R42 for a reading at the bottom of the ramp equal to −5 V ±50 mV.

(9) Refer to Fig. 4-8. Place a shorting strap between pins 5 and 7 J701. Insert a paper cassette in the cassette holder.

(10) Press COPY. A copy with a completely dark background should result. It should be a black rectangle 22.5 cm by 17 cm (refer to Table 2-2 Format A).

(11) Refer to Fig. 4-7. If the 17 cm measurement is incorrect, ADJUST R6 (while making copies) until the short measurement is 17 cm.

(12) ADJUST R1 until the black rectangle is centered in the short axis of the copy.

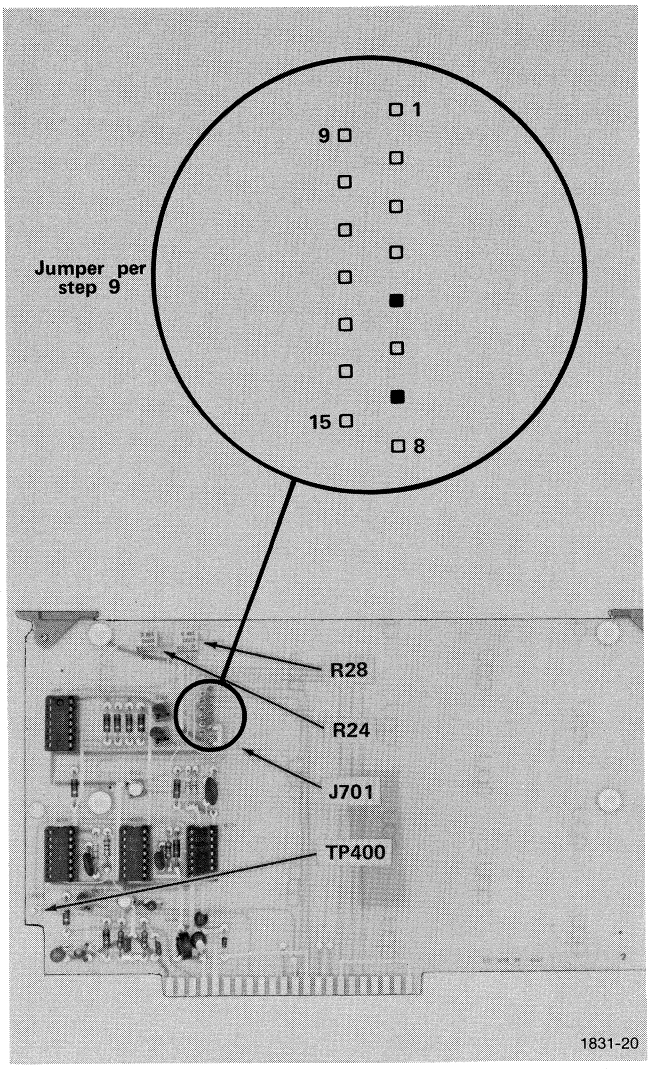


Fig. 4-9. Interrogate test point and adjustment locations.

(13) Move the harmonica connector (P110) to position II.

(14) Press COPY.

(15) CHECK—the short axis of the copy should be 13.7 cm (refer to Table 2-2 Format B).

(16) CHECK—the long axis should be 18 cm.

17) Remove the short from between pins 5 and 7 of J701 (Fig. 4-9).

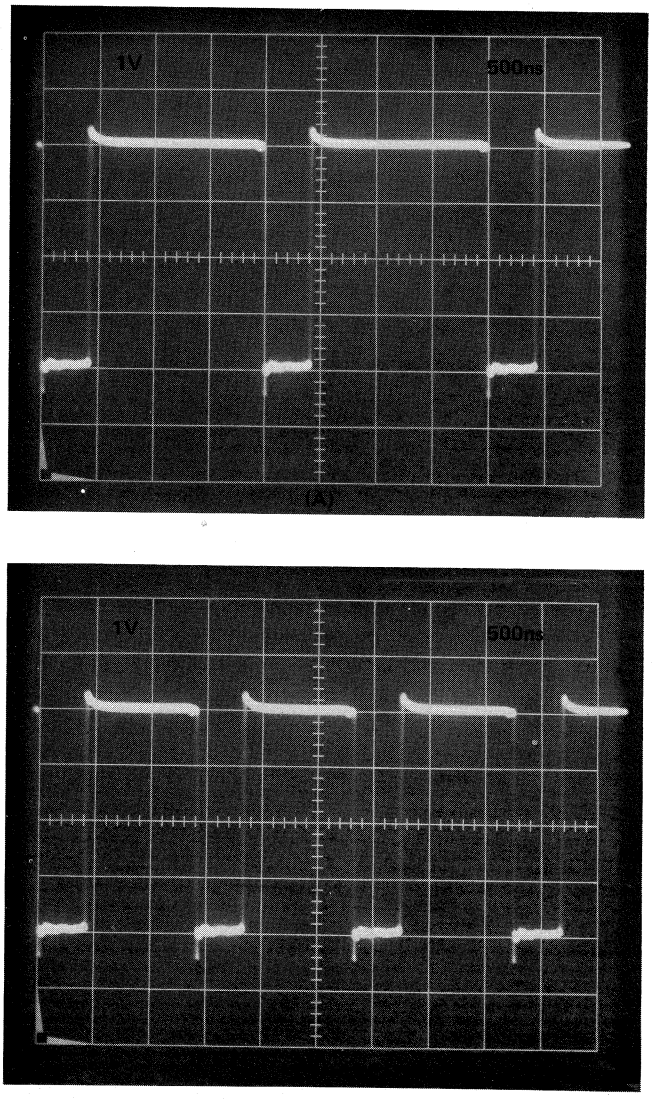


Fig. 4-10. Waveforms at TP400 for Interrogate adjustments.

8. Slow Ramp

a. ADJUST Slow Ramp Position (Fig. 4-7).

(1) Move the test oscilloscope probe from TP48 on the Timing board to TP85.

(2) Switch the comparison voltage select to +5 V.

(3) ADJUST R81 for a reading of 5 V ±50 mV.

b. ADJUST Slow Ramp Ending.

(1) Move the harmonica connector P110 to position III.

(2) Short pin 10 of J701 to ground (Fig. 4-9).

(3) Switch the comparison voltage on the oscilloscope to −5 V.

(4) Press COPY.

(5) ADJUST R69 (Fig. 4-7) for a ramp ending at −5 V ±50 mV.

(6) Remove short from pin 10 of J701 (Fig. 4-9).

(7) Move the harmonica connector P110 (Fig. 4-7) to position II.

(8) Press COPY.

(9) ADJUST R68 for a ramp ending at −5 V ±50 mV.

(10) Move the harmonica connector P110 to position I.

(11) Press COPY.

(12) ADJUST R61 for a ramp ending at −5 V ±50 mV.

(13) Remove paper cassette.

(14) Press COPY.

(15) ADJUST R71 until the beam writes in the center (short axis) of the fibre-optic faceplate of the crt in the Hard Copy Unit.

MECHANICAL ADJUSTMENT PROCEDURE

Cutter Blades

If the paper is not being properly cut, the cutter may need to be mechanically adjusted. With the cassette holder removed from the instrument, the moving cutter blade can be operated by hand. If a drag or "hump" is felt, loosen all four screws on the stationary blade. Tighten the two outside screws to a minimum tension, yet tight enough to bring the blades into smooth contact. Then adjust the two inner screws just tight enough to cut paper as you pull it through the cutters and operate the cutter manually. Adjust for paper cutting with minimum amount of drag between blades.

Paper Tracking

If the paper does not track properly, pulling to one side as it emerges from the cutter area, adjust the cams on the Roller assembly as follows:

1. With the cassette holder removed, locate the eccentric cam nuts on each side of the roller assembly and mark the position of these cams.

2. Hold the cam in place and loosen the Phillips screw in its center slightly. Repeat for the other cam nut. Loosen these screws only enough to be able to turn the cam.

3. Remove the paper guide (Fig. 4-11) by loosening the screw on either side, toward the rear of the instrument. DO NOT loosen the two screws toward the front.

4. Slide the paper guide forward out of the instrument and lay it aside.

5. Install the cassette assembly. Make sure the assembly is properly seated. Install paper.

6. Turn the Hard Copy Unit on and press the COPY button. Guide the paper by hand. (It will not go through the processor with the guide removed.) Check that the paper exits from the cutter blade area approximately centered in the guide.

7. If paper does not appear even, adjust the cam nuts, using the special wrench (Tektronix Part No. 003-0738-00). Do not turn more than 5° up or down. This should be enough to correct tracking.

8. Run several copies after adjusting cams. If tracking is still unsatisfactory, repeat the adjustment. The paper tension may affect the tracking so the adjustment may vary with the amount of paper left on the roll.

9. Replace the paper guide. Make sure it is seated all the way back and that the washers are in position on top.

If for any reason the drive chain should need adjustment, loosen the two hex nuts holding the idler sprocket bracket and move it up or down as necessary. The chain should be just tight enough to drive smoothly without binding.

It should not be necessary to adjust the drive belt. However, the bracket that holds the motor to the mainframe has slotted holes. The motor can be moved forward or back as required for proper belt tension after loosening the four hex nuts.

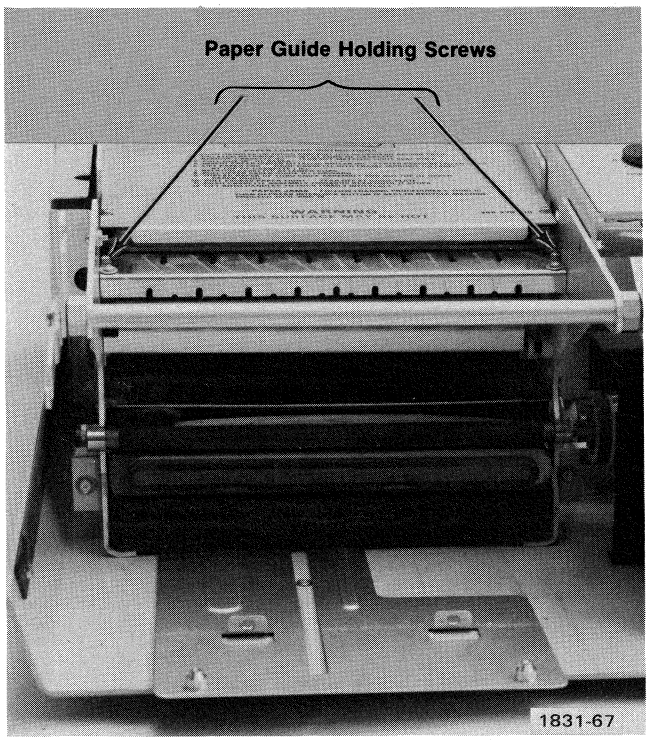


Fig. 4-11. Paper guide.

Section 5

DESCRIPTION

Introduction

This section contains the electrical circuit descriptions in the same order as the diagrams appear in Section 7. The diagrams are on fold-out pages so they may be followed while reading the circuit description. Where waveforms are referred to in a description, they are located on the aprons of the foldout pages. The electrical parts list in Section 6 may be referred to for part numbers and values of components discussed in the description. The mechanical description is given at the end of Section 5.

MAIN FRAME BLOCK DIAGRAM

General

Four boards are shown on this diagram: the Main board, the High Voltage Oscillator Board, the High Voltage Board, and the Control Board.

Mainboard

Five power supplies are located on the Mainboard. The +15 volt supply is the basic supply and it may be adjusted to +15 volts ±1%. The +15 volt supply serves as a reference for the other supplies.

All of the power supplies consist of standard bridge rectifiers, filters, and regulator circuits. The +15 volt supply serves as the reference for the +180 volt supply and the −15 volt supply; the −15 volt supply in turn is the reference for the +110 volt supply. The +5 volt supply has a self-contained regulator and does not require a reference.

The Z axis amplifier on the Main board receives its input from the Interrogate Board, amplifies it, and sends it on to the high voltage circuits to control the Z axis amplitude.

The dynamic focus circuit modulates the signal from the deflection amplifier. It is then sent to the High Voltage Board and used to control the focus voltage.

The deflection amplifier (on the Main board) receives a horizontal deflection signal from the timing board. This signal is applied to the deflection preamplifier and linearity control, which applies it to the deflection amplifier. From there it goes to the horizontal deflection coil to provide horizontal deflection to the crt.

There are some connections on the Main board that are not altered on the board, but rather run through the board. These connections include the Vertical Deflection, Drive Roller signal, and Stepper Pulse.

High Voltage Boards

The High Voltage Boards are connected by soldered pins and may be considered as a single board. The high voltage oscillator circuit receives an unregulated +20 volts from the Main board. It uses a regulated blocking oscillator and rectifier circuit to supply the required high voltages. The High Voltage Boards also contain a circuit to set the grid bias and a focus circuit that controls and adjusts the focus.

Control Board

The Control Board contains circuits that control the drive to the mechanical functions for the Hard Copy Unit. The board also contains the heater controls.

The Drive Roller signal, along with the signal from the interrupter wheel, is fed to a cutter logic circuit. The output of the circuit goes to the cutter clutch drive circuit whose output is used to operate the cutter clutch. The Drive Roller signal is also used to control the drive roller clutch.

An output signal from the control board controls the operation of the dc motor. A tachometer, located on the motor shaft, feeds a signal back to an amplifier, which, through a pulse modulator, controls the motor drive. The idle speed control receives the Drive Roller signal and slows the motor speed when no copy is being made.

The heater operates on the line voltage through a heater control circuit. Information from the heat sensor is fed into an amplifier along with the output of a saw-tooth generator which determines the off-on rate of the heater. The signal from the amplifier is fed through an optic coupler to isolate the signal from line voltages.

MAIN BOARD

General

Refer to the Main board Schematic diagram. The Main board is the heart of the Hard Copy Unit. With the exception of the high voltage supplies, it contains all of the circuits necessary for driving the crt and the interface cards. Included are the low voltage power supply circuits, deflection amplifier, dynamic focus, and interface card connectors. It also has etched wiring for connection of signals between Interface Cards, Control Board, and front panel controls.

Power Supplies

+15 Volt. The +15 V supply provides the reference voltage for the other regulated supplies. The output from a secondary of T1001 is rectified by bridge rectifier CR612. The unregulated voltage across filter capacitor C699 is applied to the +15 V regulator control stage (U555) and also provides the +20 V unregulated supply. Q747 is the series pass element and R454 allows adjustment of the +15 V supply to within 1%.

−15 Volt. The −15 V supply consists of bridge rectifier CR611, regulator circuit U569 and Q571, current limiting transistor Q579, and the series pass transistor Q769. The regulated +15 volts and the regulated output at the collector of Q769 are fed back to a summing point at the inverting input of U569. The gain of the total regulator circuit is determined by R562 and R563. With the values given, this gain will be equal to −1. Therefore, the output of the regulator circuit is +15 V times −1, or −15 V. The regulated −15 V is used as the reference for the 110 V supply.

+110 Volt. The bridge rectifier circuit for the +110 V supply consists of CR511, CR512, CR513, and CR514. The regulator consists of operational amplifier U589 and Q589, current limiting resistor R583, current limiting transistor Q581, driver Q689 and series pass transistor Q795. This regulator uses the regulated −15 V as a reference. The gain of the regulator circuit is determined by R584 and R585. With the values shown, the gain is −7.32; so the regulated output will be −7.32 times −15, or +110 V.

The supply output voltage is changed by the Drive Roller signal through Q369-Q365 to provide Z Axis switching capability.

+5 Volt. The +5 V supply is self-regulated and does not require a reference voltage. A secondary voltage from T1001 is rectified by bridge rectifier CR613 and filtered by C655. The unregulated voltage is fed to an integrated circuit regulator U439, which produces the regulated +5 V.

+400 Volt (unregulated). A secondary voltage of T1001 is rectified by a bridge rectifier circuit consisting of CR711, CR712, CR713 and CR714. This rectified voltage is filtered by C645A, C645B, R639, and bleeder resistor R638. This voltage, through fuse F431, is the unregulated +400 V supply.

+180 Volt. The +180 V regulated supply for the crt grid bias is obtained from the +400 supply. The required voltage for the base of regulator Q424 is supplied by a voltage divider consisting of R424 and R425. The +15 V supply is used (through CR422) as the reference voltage. CR423 and CR425 provide protection in case of a short in the +180 V supply.

Deflection Amplifier

The deflection amplifier is designed so that 1 volt of input results in 1 A of output. The 1 A output corresponds to approximately 15 cm of deflection on the crt. The Horizontal Deflection signal is applied to pre-amplifier U259, which has a gain of approximately 2.7 as determined by R157 and R158. Linearity correction is accomplished by reducing the slope of the Horizontal Deflection ramp signal at the plus and minus ends of the ramp. The slope is reduced at the plus end by conduction of CR253 and CR251 through R253. The reverse of this occurs on the minus end of the ramp by conduction of CR249 and CR250.

The linearity-corrected ramp is applied to pin 3 of amplifier U151. U151 is the input to the operational amplifier composed of the remaining horizontal circuitry. The output of U151 is amplified by Q55A, Q55B, and Q56. These are coupled so that the overall gain is approximately 5.7 as determined by R52 and R53. The output of this amplifier provides the driving signal for a two-stage complementary current amplifier consisting of Q51, Q44, Q1010 and Q1012. This amplifier, in turn, drives the horizontal deflection yoke, L1012. Current sensing resistor R144 provides feedback through R145 for the total operational amplifier. R144 is a 1 ohm resistor and therefore the requirement of 1 A output for 1 V input is satisfied.

Dynamic Focus

The signal for the dynamic focus circuitry is taken from the current sampling resistor R144 in the output of the deflection amplifier. This signal is applied to the cathode of CR30 and also to U126, where it is inverted with unity gain, and then applied to the cathode of CR29. The anodes of CR29 and CR30 are connected to a common point and the signal at this common point will follow the ramp whose value is most negative (the input or output of U126). The waveform at the CR29-CR30 junction is buffered by Q29A and applied to the base of Q29B. The collector output of Q29B will be an amplified and inverted image of the input waveform. The bottom of the signal from Q29B is at a level determined by dynamic focus width control R23. The amplitude of this signal may be adjusted by dynamic focus amplitude control R19. This Dynamic Focus signal is then amplified by Q11A, Q11B, Q219, and emitter follower Q211 to become the Dynamic Focus voltage reference for the focus circuitry on the High Voltage Boards.

Z Axis Amplifier

Q61, Q171 and CR165 form a quasi-differential feedback amplifier. R172 is the input resistor and R164 is the feedback resistor. The base of Q171 is at a current summing junction. The circuit acts as a voltage-to-current converter so that a known voltage input via the Z Axis signal results in a known current through the R161-R163 combination. This current signal is applied to a cascode amplifier consisting of Q62 and Q72. The voltage at the collector of Q72 is an amplified version of the Z Axis input, and is the Z Axis output. T-coil L81 is included as a coupling device for bandwidth improvement.

The Drive Roller signal is applied to the +110 V supply through Q369-Q365 to provide a high-voltage switching capability. When the Drive Roller signal is low, as is the case before and after a copy is made, the +110 V supply is at +20 V unregulated level and the Z axis output will be approximately −10 V, providing a hard cut-off signal to the crt. During copy time the Drive Roller signal is high and the +110 V supply is at the +110 V regulated level. The Z Axis signal from the interrogate board is applied to the Z axis amplifier at J2-1. With 0 V applied, the Z axis output will be at +20 V. (Adjustable by R74.)

A 0 V to 3.8 V input voltage swing will cause the Z axis output to swing from +20 V to approximately +77 V during copy time; the crt beam will be turned on and the paper will be exposed.

HIGH VOLTAGE BOARDS

General

The High Voltage Boards control the filament supply, the cathode supply, the grid drive, and the focus supply. Refer to the High Voltage Boards schematic diagram.

A regulated blocking oscillator drives a high voltage transformer T1015 to produce the high voltages required by the crt.

High-Voltage Oscillator

Blocking oscillator transistor Q1016 provides current to the primary winding of T1015. When current in the primary winding is increasing, a secondary winding provides positive voltage to the base of Q1016. When the collector current in Q1016 reaches Beta times its base drive, Q1016 stops increasing conduction. The positive voltage to the base of Q1016 decreases and eventually goes negative, driving the transistor into cut off. The base drive current is obtained by charging C236. Therefore changes in the collector current of Q251 affect the base drive to Q1016. The current in Q251 is controlled by a feedback from the −5500 V cathode supply through R367, and is adjustable by R264. This voltage is compared with the +15 V coupled through R367, and also from R264 and R266, and is applied to the gate of Q265, which is the input to the high-voltage oscillator regulator. An input from the sensing winding of the oscillator (4 and 5 on T1015) is also fed to the regulator input through C251 and R262. Q265 is a source follower FET and provides impedance coupling to drive the high gain amplifiers Q257 and Q251.

Cathode Supply

Power for this supply is provided by the 8-5 winding of T1015. Voltage from this high-voltage secondary is doubled by C215, CR207, CR209, and C205. This voltage is filtered and provides the −5500 volts for the cathode of the crt. The −5500 volts is also applied through R377 and R378, to the filament supply, elevating it to the proximity of the voltage on the cathode.

Post Acceleration Supply

This voltage is also taken from the 8-5 winding of the transformer and the opposite half-cycles of the sine wave are applied to a doubler consisting of C281, CR289, CR291, and C299. This voltage, after being filtered by R309, C309, and R311, provides the +5500 supply for post acceleration.

Grid Drive Voltage

The grid of the crt is referenced to the cathode and is controlled by the grid bias and the Z axis signals.

Description—4631 Service

To assist in describing the operation of this circuit, the simplified circuit shown in Fig. 5-1 is included. The protection devices (including R383, R387, R371 and the neons) are omitted in the simplified circuit. In addition, in the interest of simplicity, the series diodes in the original circuit are shown as one equivalent diode in the simplified circuit. Connection points are arbitrarily labeled to facilitate the explanation.

During the positive half-cycle at connection 7 on the transformer, V_1 is approximately equal to V_{bias} and V_2 is approximately equal to $V_{cathode}$. Therefore, the voltage across C382 is equal to V_{bias} minus $V_{cathode}$. During the negative half-cycle this charge is transferred to C395. The voltage across C395 is V_z minus V_{grid} and this is now equal to V_{bias} minus $V_{cathode}$, and therefore the grid voltage is equal to the cathode voltage minus the difference between the grid bias and the voltage from the Z axis amplifier. The grid bias may be set so that in the absence of a Z axis signal the grid is enough more negative than the cathode to keep the beam turned off and allow it to be turned on by the Z axis signal.

Focus Supply

The voltage at the 6-9 winding of the high voltage transformer is doubled by a circuit consisting of CR268, C268, C269, and CR269. This rectified and doubled voltage, along with the reference voltage from the dynamic focus circuit on the Main board, forms the focus voltage, which is adjustable by R345.

Clutch Drives

A positive TTL signal applied to J34-4 will turn on the circuit consisting of Q236 and Q15, thus allowing current to flow in the drive roller clutch coil L1020. The current flowing in L1020 activates the drive roller and causes it to pull paper as long as a positive TTL Drive Roller signal is present at J34-4.

An "interrupter wheel" having 270 openings around its circumference is located on the axle of the drive roller. In U1020, a light-emitting diode emits a beam toward a photo-sensitive transistor. The beam, interrupted by the interrupter wheel, is detected by the photo transistor. This interrupter signal is amplified by U51. Pulses corresponding to the leading and trailing edges of the square wave output of U51 are formed by Q248 and Q148 creating 540 pulses per drive roller revolution. A monostable multivibrator (U242) converts these pulses to pulses of uniform width to be used as Stepper Pulses for the timing circuits. These pulses also feed a retriggerable monostable multivibrator (U342) which is armed by the TTL Drive Roller signal. When the drive roller stops at the end of a copy, the Stepper Pulses also stop, and U342 reverts to its initial state. At this time Q241 turns on, causing its collector voltage to fall until the charge on C236 is depleted. This pulse is amplified by Q141 and applied to Q140 which acts as a switch to control the current in cutter clutch coil L1022. This pulse in L1022 activates the solenoid and the cutter clutch makes one revolution to cut the paper.

CONTROL BOARD

General

The Control Board contains the circuits necessary to operate the drive roller clutch, the cutter clutch, the copy counter, and the motor and heater controls. In order to facilitate the circuit descriptions, the Control Board has been divided into three parts; clutch drives, motor control, and heater control.

Motor Control Circuits

Tachometer feedback (B1024) is used to sense the motor speed. Pulse width modulation is used to control the motor speed. A current-limiting circuit prevents power from being applied to the motor continuously if it is stalled for any reason. An idle speed control circuit slows the motor between copy times to minimize mechanical wear.

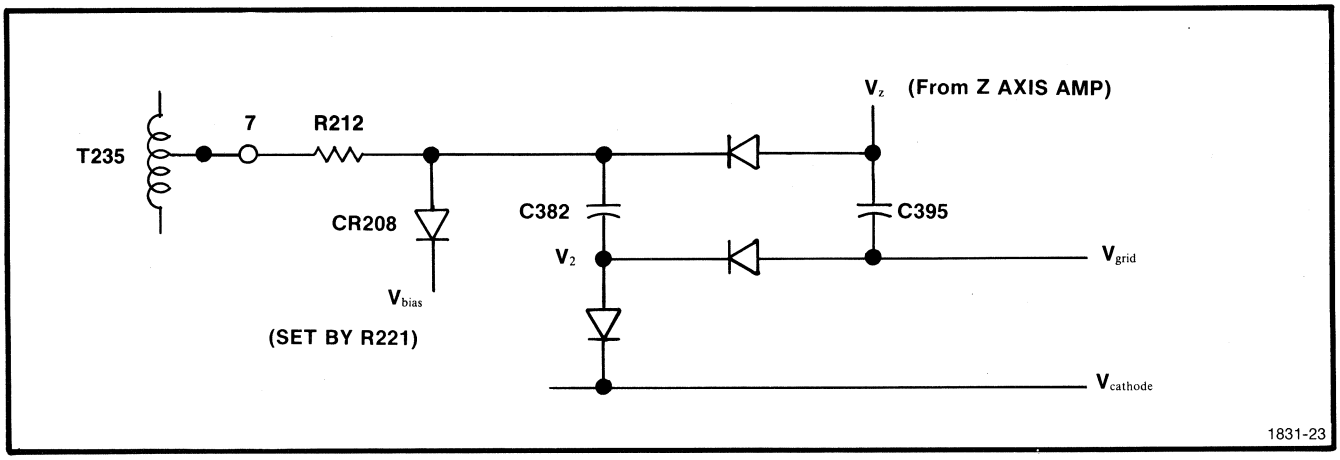


Fig. 5-1. Simplified Circuit for Grid Drive Voltage.

To drive the motor, a chopped waveform from U21 is applied to complementary emitter follower Q318 and Q319 where it is amplified and used to drive Q1026. Q1026 is thus operated in a switching mode so that most of the power consumed in the circuit is used by the motor. When Q1026 is on, it draws current from the power supply through the motor. The motor stores a large amount of electrical energy, so that when Q1026 turns off, the voltage across the motor reverses and turns CR311 on, allowing the current to continue to flow and the motor continues to supply torque. Before the stored energy depletes itself, Q1026 will turn on again and draw current from the power supply.

As a safety measure, the motor current is sampled by R315 in the emitter circuit of Q1026. The pulse-typed signal at the top of R315 is averaged by R320 and C321. If this voltage gets high enough to fire Q323, a signal is fed back to U121, turning off the pulse width modulator and the motor power. The anode of Q323 is also coupled into the heater control circuit via CR264 to shut the heater down.

The control element for the idle speed control is Q354, a programmable unijunction transistor. When the Drive Roller signal goes high, C351 is discharged, turning Q354, Q254, and Q253 off. This allows the motor speed to be controlled by R61 through Q161. After the Drive Roller signal goes low (end of copy), Q351 turns off, allowing C351 to charge from current-source transistor Q355. When the voltage on C351 exceeds the voltage on the gate of Q354, Q354 triggers, turning Q254 on. Q354 remains in the triggered state because its gate is pulled down by Q254. Q253 also turns on and forms a voltage divider between R260 and R261, which determines the motor idle speed. Note that the output of Q161 is also fed to current source Q355 and thereby controls the time-delay before the motor begins to idle.

The voltage from Q161 is presented to the negative terminal of the tachometer generator (B1024) through R261. The tachometer generator generates a voltage opposite in polarity to that at Q161. This voltage is applied to the input of operational amplifier U121, which is the error amplifier for the servo-loop that controls the motor.

U21 is the pulse-width modulator. The output of the error amplifier U121 is applied to U21 through R31. U21 is an operational amplifier with both positive feedback (through R32) and negative feedback (through R25) so that it operates as a controlled oscillator. The output of U21 is a chopped waveform whose duty cycle is controlled by the output of U121.

Heater Control Circuits

The termperature on the heater is sensed by a bridge composed of R65, R1024, R66 and the combination of R71 and R72. The input of an amplifier, U171, is from the bridge network that senses the temperature of the heating plate. R1024, which is mounted directly on the heating plate, has a negative temperature coefficient. The temperature is initially adjusted by R71. Temperature changes as sensed by R1024 cause a change in the input to U171.

The sawtooth generator is composed of unijunction transistor Q370 and emitter-follower Q369. The sawtooth generator determines the rate at which the heater is turned on or off. The heater takes time to reach operating temperature after being turned on and conversely takes time to cool after being turned off. The sawtooth generator produces a slow sawtooth signal which is coupled through R264 (a comparatively large resistor). This causes the heater to cycle prior to the time it gets to the temperature set by R71, creating a band of proportional control around the set point and minimizing the hysteresis effects.

Optic Coupler. The optic coupler, U275, is an integrated circuit containing a light-emitting diode and a photo transistor. When the diode is lit, it turns the photo transistor on. This happens when the sensor (R1024) is cold. The output of U275 is used to control a Triac (Q193) as explained in the Heater Control description.

Heater Control. The main control element for the heater is a Triac Q193. The ac voltage is rectified by CR282, regulated by VR281, and stored by C294 to form the supply for this portion of the circuit. Q379 acts as a zero-crossing detector. During a positive half-cycle at pin 1 of J33, CR280 is on and CR279 is off. During the negative half cycle at the same point, CR279 is on and CR280 is off. This gives a range between −1.2 V and +1.2 V where Q379 is off. At all other times it is on, therefore we have pulses at the base of Q392, which appear at approximately the zero-crossings of the input waveform. These pulses serve to trigger Q193 and turn it on at the zero-crossings. The pulses are controlled by Q376. Q376 is essentially in parallel with Q379 and therefore if Q376 is on, the pulses are effectively defeated and the heater remains off. Q376 is on whenever U254 is off. Therefore the heater is switched on only when a signal is present at the output of U275 and the ac wave is passing through zero volts. Gate current keeps the Triac on until the next zero voltage crossing, at which time the Triac switches off unless it is pulsed on again.

INTERFACE BLOCK DIAGRAM

General

The 4631 Interface Block diagram shows a 15 pin connector, the Interrogate Board, the Timing Board and a portion of the Mainboard (connections). The 15 pin connector is physically connected to the Interrogate Board with solder connections and will be considered as a unit.

Timing Board

Upon receipt of a Copy signal, the Timing Board will generate several signals.

The Read signal controls the switches in the display unit and switches the display unit into the Hard Copy mode.

The Copy Busy signal is sent to the display unit to tell the display unit that the 4631 is busy.

The Drive Roller signal controls the paper transport.

Upon receipt of the Stepper Pulse signal from the Control Board, the Timing Board generates Slow Ramp and Fast Ramp signals used by the display unit. The Fast Ramp also goes to the deflection system in the 4631 Hard Copy Unit.

A group selector on the Timing Board allows selection between different groups and format.

The Interrogate Control signal is sent to the Interrogate Board.

Interrogate Board

The Interrogate Board generates Interrogate clock pulses for the display unit. When it receives a Target Signal from the display unit, it generates a Z Axis signal that drives the Z axis amplifier on the Main board in the 4631. All other signals to the Interface Connector, J701, from the Timing Board are fed through the Interrogate board to the Interface Connector.

TIMING BOARD

Refer to the Timing Board schematic and the appropriate waveforms.

Drive Roller

During instrument turn-on, R361 and C361 will keep the U471 "clear" input (pin 13) low and ensure that no copy will be initiated during this time. To initiate a copy, pin three or pin four of U461 is pulled low either by pushing the front panel COPY button (ground closure), or by a remote TTL input from the display unit (waveform 1). The positive step pulse from U461 will set the Q output of U471B high. This signal (waveform 2), goes to the drive roller control on the Control Board and will start the drive roller and paper transport. From the Control Board, the Timing Board will receive 540 Stepper Pulses per drive roller revolution. These pulses (waveform 10) go to the counter consisting of U391, U381, and U371. After 3,584 pulses (which correspond to approximately 6 3/4 revolutions) pins 8, 9, and 11 of U371 all go high, making the output at pin 6 of U161B go low and thereby clearing U471B.

The signal to the drive roller (waveform 2) goes low and the drive roller stops at seven revolutions, which is equivalent to an 11-inch copy. When the drive roller stops, it activates the cutter mechanism. The Drive Roller signal going low also clears all counters and D type flip-flops, resetting the total system.

Group Selector

A group selector (10 pin harmonica J110, pin 9) selects two numbers from the counter (U371, U381, and U391). These numbers correspond to "start the display scanning," which sets the front margin, and "stop the display scanning," which sets the rear margin. In groups I and III (format A) the start is at 32 and the stop is at 3,072. In group II (format B) the start is at 512 and the stop at 2,368. (See specifications Table 2-2 in Section 2 of this manual.)

At 32 (format A) or 512 (format B), pin 11 of U481B will receive a positive step and set the Q at pin 9 high (waveform 3). Pin 6 is in the high state (waveform 4), which means that at this time the output of U351A at pin 3 will go low (waveform 7). The output of U351A going low causes the following actions.

1) Starts the slow ramp generator.

2) Enables Stepper Pulses (waveform 11), through U311C to control the Fast Ramp.

3) It will set the D input of U301A, through U311B, high. This makes it possible for the Q output to go high (waveform 17) and start the Interrogate pulses.

At 2,368 or 3,072, pin 3 of U481A will receive a positive step and set Q low. This will terminate the slow ramp, stop the fast ramp generator, and set the interrogate control low (waveform 17), which will stop the interrogation clock pulses.

Two additional signals are generated from the drive logic. They are the Read and Copy Busy.

The Read signal (waveform 6), goes low upon copy initiation and then back high at the time the scanning stops. This signal is then furnished to the display unit to switch it into the HCU mode.

The inverted Drive Roller signal from pin 8 of U471B, is ANDed with the Q signal from a monostable multivibrator U491, which is triggered on the trailing edge of the inverted Drive Roller signal. The resulting signal (waveform 5) is a low-going signal that extends from copy initiation until two seconds after the copy is finished. This time extension is enough for resetting the mechanical operation. This signal (waveform 5) is fed back to the input to prevent unwanted copy initiation and therefore, paper jams. This is the Copy Busy signal and is fed through J701 to the terminal or display unit as an information signal.

The Stepper pulses from the Control Board are also used for stepping the Slow Ramp and triggering the Fast Ramp. Depending on the logic level at input M, waveform 11 at the output of inverter U361A will either be the Stepper Pulse or a square wave at half the stepping rate.

Slow Ramp

With waveform 11 applied to the base of Q281, the voltage at the collector of Q281 will switch between a high level set by R182 and one of the combinations R63-R68, R64-R61, or R62-R69 and a low level set by CR193 and CR195. These diodes are added for temperature compensation of CR191 and CR192.

When no copy is being made, waveform 7 is high, which turns Q171 on and keeps C76 shorted. The output (waveform 8) of the slow ramp generator, is therefore at 0 volts.

During scanning time, waveform 7 goes low, which turns Q171 off and allows a charge to build up on C76. The ramp generators consist of a step generator connected as a "bucket and ladle" circuit, with C76 being the bucket and C192, the ladle. At each negative going step at the junction of R181, C291, and C192, the charge (V_{step} times C193), will be transferred to C76, resulting in a step at the output of the ramp generator. The voltage of this step will be a function of C192/C76. For the different groups (I, II, and III), different numbers of steps are required to scan the display unit. Since we require the same output amplitude of 5 volts during scan time, the output step amplitudes are adjusted by adjusting the input steps, using R68 for group II, R61 for group I and R69 for group III.

The circuit, consisting of Q321 and Q331 and the associated components, positions the beam in the vertical direction on the fiber optic crt. Q321 and Q331 introduce a 1/8 inch vertical scan during the Slow Ramp to avoid using the same position on the crt for repetitive scan lines. The Slow Ramp is amplified by a factor of 2, inverted and positioned by U81 and the associated circuitry. R81 is the position control. The output is a ramp (actually a staircase) from plus 5 volts to minus 5 volts.

Fast Ramps

During scanning time, waveform 7 is low and therefore the input at pin 10 of U311C is high. This allows waveform 11 to be inverted by U311C. At each negative step to U211 pin 3 (which occurs at the same time as the slow ramp step), a low-going pulse of approximately 140 microseconds will result at the Q output of U211. The negative edge of this pulse, through U311D and U311A, presets U301B. The Q at pin 9 will go high and terminate the ramp if it is present (discussed later). The positive edge of the 140 μs clock input to U301B will set Q low, turn Q21 off, and allow the ramp (waveform 14), to run up at a rate set by C22, R22, and rate control potentiometer R21. When the ramp reaches approximately 5 volts, the base of Q232 will become greater than 0 volts, and the collector will switch from plus 5 volts to 0. This step, through U311D and U311A, resets the ramp. This is the normal ramp reset. The other reset (mentioned earlier), is provided if for some reason there should be a short interval between pulses to U211 to ensure the Fast Ramp is reset.

Interrogate Control

The Q output (a high signal) at pin 8 of U301B triggers U201, causing a 70 microsecond pulse (waveform 16), which clocks U301A. The Q output of U301A (waveform 17) at pin 5 is set the same logic level as the D input (pin 2). Except during scanning time, this is always low. During scanning time, D is high, which means that approximately 70 microseconds after the Fast Ramp starts, waveform 17 goes high. When the ramp is reset, U301A is cleared and waveform 17 goes low. This signal (waveform 17), is called Interrogate Control and is used on the Interrogate Board to control Interrogate pulses.

Protection Blanking

The circuit consisting of U412, U411, and Q432 is supplied as a protection against crt phosphor burns. The Ramp Sense signal at F is taken from the current sampling resistor, R144, in the deflection amplifier on the Mainboard. This signal is amplified, by a factor of 10, by U412 on the Timing board. The peaks of its triangular waveform keep C403 negatively charged and C422 positively charged. If the Fast Ramp deflection is in the normal operating amplitude, the difference in the voltages on C403 and C422 is large enough to overcome the bias of U411. (The non inverting input becomes negative compared to the inverting input.) This will hold the output low and cut off Q432. If the deflection amplitude falls below approximately 2/3 of normal, Q432 will be turned on. This signal is used on the Interrogate Board to control the Z axis amplifier. It turns off the beam in case of a malfunction.

INTERROGATE BOARD

Refer to the Interrogate Board schematic and the appropriate waveforms.

Slow Ramp, Fast Ramp, and Read signals are fed directly to J701. The Copy Busy signal goes through an open-collector inverter, U111, to J701. During Fast Ramp and Slow Ramp scan, the Interrogate Control is high (waveform 17). The initial high triggers U331, giving an approximate 400 ns positive pulse at the Q output (pin 6 of U331). The trailing edge of this 400 ns pulse triggers U321, which gives a positive pulse at pin 8 of U321. The duration of the pulse is controlled either by current through adjustment of R24 when the Display Size infor signal is low (19 inch display) or by current through adjustment R28 when the Display Size Info Signal is high (11-inch display). The trailing edge of the pulse from U321 triggers U301, which again triggers U321. This continues until waveform 17 goes low and disables U331. The Interrogate signal from U331 pin 6 is inverted by Q221 and sent to the display unit (waveform 18). If a Target Signal (waveform 19) is received from the display unit, it will trigger U311, a 1 μs monostable multivibrator. The negative pulse from Q at pin 6 of U311 will turn off Q420. The collector of Q420 will jump to the voltage level at the emitter of Q413, thus producing the Z Axis signal (waveform 20). This voltage level is controlled by the front panel LIGHT-DARK control which comes in at pin 12 on the interface connector to set the base voltage of Q413. Waveform 20, which is the collector wavform slightly rounded off through a RC low-pass filter, is the Z Axis signal to the Z axis amplifier on the Main board.

MECHANICAL DESCRIPTION

General

The 4631 Hard Copy Unit consists of four basic mechanical assemblies: The cassette holder; the processor; the main-frame; and the cabinet.

Cassette Holder

The dry-silver paper used here is light-sensitive and is stored in a light-tight cassette. Before changing the cassette, it is important to read the instructions in the Operating Instructions Section under "Loading the Paper Cassette". The paper cassette is loaded into the cassette holder, which contains two major components. (1) A spring-loaded pinch roller which presses against a drive roller on the mainframe, and (2) a rotary cutter actuated by a lever in the mainframe. Paper is pulled past the fiber optic crt by the drive and pinch rollers. As the paper passes the crt, it is exposed, and it is then guided through the cutter and into the processor.

Processor

The paper is heated to develop the latent image created as the paper passed the crt. The processor is composed of a heater and an elastic, moving belt. The belt pulls the paper through the processor and holds it in contact with the heater. The temperature of the heater is fixed by the control board. As the paper passes across the heater, the image is developed and ejector rollers propel the finished copy into the paper-tray on the top cover.

Mainframe

A tachometer-controlled dc gearhead motor furnishes power to the drive-roller clutch through a fine-tooth timing belt. The motor also provides power to the cutter clutch and processor through a roller chain. The motor slows to idle speed shortly after a copy has been completed and returns to normal speed upon initiation of another copy command. The one-half revolution drive roller clutch is actuated by signal from the Control Board to allow the drive roller to make seven revolutions for an 11 inch copy. When a copy has been completed, the single-revolution cutter clutch is actuated to cut the paper. The mainframe also serves as a mounting for all of the circuit boards and other electronic components, including the control panel that appears as part of the cover when the instrument is closed.

Cabinet

The 4631 cabinet is designed so that all electrical and mechanical components are readily accessible. The cover is hinged at the back so it will swing up and open. An interlock switch automatically disables all hazardous voltages. The paper stack tray is on top of the cabinet.

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.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

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.

ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P O BOX 128	PICKENS, SC 29671
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
01963	CHERRY ELECTRICAL PRODUCTS CORPORATION	3600 SUNSET AVENUE	WAUKEGAN, IL 60085
03508	GENERAL ELECTRIC COMPANY, SEMI-CONDUCTOR PRODUCTS DEPARTMENT	ELECTRONICS PARK	SYRACUSE, NY 13201
03888	KDI PYROFILM CORPORATION	60 S JEFFERSON ROAD	WHIPPANY, NJ 07981
04222	AVX CERAMICS, DIVISION OF AVX CORP.	P O BOX 867, 19TH AVE. SOUTH	MYRTLE BEACH, SC 29577
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
05574	VIKING INDUSTRIES, INC.	21001 NORDHOFF STREET	CHATSWORTH, CA 91311
08806	GENERAL ELECTRIC CO., MINIATURE LAMP PRODUCTS DEPARTMENT	NELA PARK	CLEVELAND, OH 44112
10389	CHICAGO SWITCH, INC.	2035 WABANSIA AVE.	CHICAGO, IL 60647
14099	SEMTECH CORP.	652 MITCHELL RD.	NEWBURY PARK, CA 91320
14936	GENERAL INSTRUMENT CORP., SEMICONDUCTOR PRODUCTS GROUP	P.O. BOX 600,600 W. JOHN ST.	HICKSVILLE, NY 11802
18583	CURTIS INSTRUMENTS, INC.	200 KISCO AVE.	MOUNT KISCO, NY 10549
19701	ELECTRA-MIDLAND CORP., MEPCO ELECTRA INC.	P O BOX 760	MINERAL WELLS, TX 76067
24546	CORNING GLASS WORKS, ELECTRONIC COMPONENTS DIVISION	550 HIGH STREET	BRADFORD, PA 16701
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
32480	JONES MOTROLA CORPORATION	P. O. BOX 825,432 FAIRFIELD AVE.	STAMFORD, CT 06904
32496	PSI, DIV. WARNER ELECTRIC BRAKE AND CLUTCH COMPANY	P O BOX 118	PITMAN, NJ 08071
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
50157	MIDWEST COMPONENTS INC.	P. O. BOX 787 1981 PORT CITY BLVD.	MUSKEGON, MI 49443
55292	LEDCO DIV., WILBRECHT ELECTRONICS, INC.	240 EAST PLATO BLVD.	ST. PAUL, MN 55107
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
71400	BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
72136	ELECTRO MOTIVE CORPORATION, SUB OF INTERNATIONAL ELECTRONICS CORPORATION	LAUTER AVE, P O BOX 7600	FLORENCE, SC 29501
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
73559	CARLINGSWITCH, INC.	505 NEW PARK AVENUE	WEST HARTFORD, CT 06110
75042	TRW ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
82877	ROTRON, INC.	7-9 HASBROUCK LANE	WOODSTOCK, NY 12498
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY AND CO., INC.	3029 E. WASHINGTON STREET P. O. BOX 372	INDIANAPOLIS, IN 46206
91418	RADIO MATERIALS COMPANY, DIV. OF P.R. MALLORY AND COMPANY, INC.	4242 W BRYN MAWR	CHICAGO, IL 60646
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601
99409	SYNTRONIC INSTRUMENTS, INC.	100 INDUSTRIAL	ADDISON, IL 60101

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
				CIRCUIT BOARD ASSEMBLIES		
A1	670-2577-03	B030000	B030399	CKT BOARD ASSY:MAIN	80009	670-2577-03
A1	670-2577-05	B030400	B051587	CKT BOARD ASSY:MAIN	80009	670-2577-05
A1	670-4200-00	B051588	B062199	CKT BOARD ASSY:MAIN	80009	670-4200-00
A1	670-4200-01	B062200	B079999	CKT BOARD ASSY:MAIN	80009	670-4200-01
A1	670-4200-02	B080000	B119999	CKT BOARD ASSY:MAIN	80009	670-4200-02
A1	670-4200-03	B120000	B126489	CKT BOARD ASSY:MAIN	80009	670-4200-03
A1	670-4200-04	B126490	B158359	CKT BOARD ASSY:MAIN	80009	670-4200-04
A1	670-4200-05	B158360	B171899	CKT BOARD ASSY:MAIN	80009	670-4200-05
A1	670-4200-07	B171900		CKT BOARD ASSY:MAIN	80009	670-4200-07
A2, A3	672-0503-00	B010100	B079999	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-00
A2, A3	672-0503-01	B080000	B105689	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-01
A2, A3	672-0503-02	B105690	B136599	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-02
A2, A3	672-0503-04	B136600	B136699	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-04
A2, A3	672-0503-05	B136700		CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-05
A4	670-3025-02	B010100	B039999	CKT BOARD ASSY:CONTROL	80009	670-3025-02
A4	670-4104-00	B040000	B040949	CKT BOARD ASSY:CONTROL	80009	670-4104-00
A4	670-4104-01	B040950	B079999	CKT BOARD ASSY:CONTROL	80009	670-4104-01
A4	670-4104-02	B080000	B157079	CKT BOARD ASSY:CONTROL	80009	670-4104-02
A4	670-4104-04	B157080	B174179	CKT BOARD ASSY:CONTROL	80009	670-4104-04
A4	670-4104-05	B174180		CKT BOARD ASSY:CONTROL	80009	670-4104-05
A5	670-3661-00	B010100	B029999	CKT BOARD ASSY:TIMING	80009	670-3661-00
A5	670-3661-01	B030000	B040999	CKT BOARD ASSY:TIMING	80009	670-3661-01
A5	670-3661-02	B041000	B041134	CKT BOARD ASSY:TIMING	80009	670-3661-02
A5	670-3661-03	B041135	B079999	CKT BOARD ASSY:TIMING	80009	670-3661-03
A5	670-3661-07	B080000		CKT BOARD ASSY:TIMING	80009	670-3661-07
A6	672-0488-00	B010100	B079999	CKT BOARD ASSY:INTERROGATE	80009	672-0488-00
A6	672-0488-01	B080000		CKT BOARD ASSY:INTERROGATE	80009	672-0488-01
A7	672-0489-00	B010100	B089999	CKT BOARD ASSY:MULTIPLEXER (OPTION 2 ONLY)	80009	672-0489-00
A7	672-0489-01	B090000		CKT BOARD ASSY:MULTIPLEXER (OPTION 2 ONLY)	80009	672-0489-01
A8	670-5740-00			CKT BOARD ASSY:TIMING (OPTION 31 ONLY)	80009	670-5740-00
				A1 MAIN ASSEMBLY		
A1	670-2577-01	B010100	B029999	CKT BOARD ASSY:MAIN	80009	670-2577-01
A1	670-2577-03	B030000	B030399	CKT BOARD ASSY:MAIN	80009	670-2577-03
A1	670-2577-05	B030400	B051587	CKT BOARD ASSY:MAIN	80009	670-2577-05
A1	670-4200-00	B051588	B062199	CKT BOARD ASSY:MAIN	80009	670-4200-00
A1	670-4200-01	B062200	B079999	CKT BOARD ASSY:MAIN	80009	670-4200-01
A1	670-4200-02	B080000	B119999	CKT BOARD ASSY:MAIN	80009	670-4200-02
A1	670-4200-03	B120000	B126489	CKT BOARD ASSY:MAIN	80009	670-4200-03
A1	670-4200-04	B126490	B158359	CKT BOARD ASSY:MAIN	80009	670-4200-04
A1	670-4200-05	B158360	B171899	CKT BOARD ASSY:MAIN	80009	670-4200-05
A1	670-4200-07	B171900		CKT BOARD ASSY:MAIN	80009	670-4200-07
C63	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C72	290-0559-00			CAP.,FXD,ELCTLT:22UF,20%,35V	90201	TDC226M035WLG
C162	290-0559-00			CAP.,FXD,ELCTLT:22UF,20%,35V	90201	TDC226M035WLG

A1 MAIN (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C445	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C449	290-0215-00			CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C455	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C465	290-0215-00			CAP.,FXD,ELCTLT:100UF,+75-10%,25V	56289	30D107G025DD9
C475	290-0582-00	B010100	B029999	CAP.,FXD,ELCTLT:5UF,+75-10%,150V	90201	TT5RON150C0P3P
C475	290-0405-00	B030000		CAP.,FXD,ELCTLT:10UF,+50-10%,150V	56289	30D106F150DD4
C584	281-0580-00	XB051588		CAP.,FXD,CER DI:470PF,10%,500V	04222	7001-1374
C585	281-0543-00	XB030400	B051587	CAP.,FXD,CER DI:270PF,10%,500V	72982	301055X5P271K
C585	281-0519-00	B051588		CAP.,FXD,CER DI:47PF,+/-4.7PF,500V	72982	308-000C0G0470K
C645A,B	290-0668-00			CAP.,FXD,ELCTLT:10UF X 10UF,500V	56289	68D20200
C655	290-0520-00			CAP.,FXD,ELCTLT:4500UF,+100-0%,40V	56289	68D10474
C685	290-0577-00			CAP.,FXD,ELCTLT:2000UF,50V	56289	68D10504
C695	290-0468-00	B010100	B126259	CAP.,FXD,ELCTLT:250UF,+75-10%,150V	56289	68D10470
C695	290-0511-00	B126260		CAP.,FXD,ELCTLT:250UF,+75-10%,250V	90201	20-35958
C699	290-0520-00			CAP.,FXD,ELCTLT:4500UF,+100-0%,40V	56289	68D10474
CR26	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR29	152-0141-02	B010100	B062807	SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR29	152-0246-00	B062808	B126489	SEMICOND DEVICE:SILICON,40V,200MA	80009	152-0246-00
CR29	153-0065-00	B126490		SEMICOND DVC,SE:MATCHED,15MV AT 0.1MA	80009	153-0065-00
	----- -----			(FURNISHED AS A MATCHED PAIR WITH CR30)		
CR30	152-0141-02	B010100	B062807	SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR30	152-0246-00	B062808	B126489	SEMICOND DEVICE:SILICON,40V,200MA	80009	152-0246-00
CR30	153-0065-00	B126490		SEMICOND DVC,SE:MATCHED,15MV AT 0.1MA	80009	153-0065-00
	----- -----			(FURNISHED AS A MATCHED PAIR WITH CR29)		
CR48	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR49	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR51	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR111	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	80009	152-0333-00
CR165	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR249	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR250	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR251	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR253	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR422	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR423	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR425	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR511	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	80009	152-0107-00
CR512	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	80009	152-0107-00
CR513	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	80009	152-0107-00
CR514	152-0107-00			SEMICOND DEVICE:SILICON,400V,400MA	80009	152-0107-00
CR583	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR589	152-0061-00			SEMICOND DEVICE:SILICON,175V,100MA	80009	152-0061-00
CR594	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR611	152-0488-00	B010100	B030799	SEMICOND DEVICE:SILICON,200V,1500MA	80009	152-0488-00
CR611	152-0462-00	B030800		SEMICOND DEVICE:SILICON,200V,2.5A	80009	152-0462-00
CR612	152-0488-00	B010100	B030799	SEMICOND DEVICE:SILICON,200V,1500MA	80009	152-0488-00
CR612	152-0462-00	B030800		SEMICOND DEVICE:SILICON,200V,2.5A	80009	152-0462-00
CR613	152-0488-00	B010100	B030799	SEMICOND DEVICE:SILICON,200V,1500MA	80009	152-0488-00
CR613	152-0462-00	B030800		SEMICOND DEVICE:SILICON,200V,2.5A	80009	152-0462-00
CR711	152-0107-00	B010100	B126489	SEMICOND DEVICE:SILICON,400V,400MA	80009	152-0107-00
CR711	152-0586-00	B126490		SEMICOND DEVICE:SILICON,600V,500MA	14936	RGP10J
CR712	152-0107-00	B010100	B126489	SEMICOND DEVICE:SILICON,400V,400MA	80009	152-0107-00
CR712	152-0586-00	B126490		SEMICOND DEVICE:SILICON,600V,500MA	14936	RGP10J
CR713	152-0107-00	B010100	B126489	SEMICOND DEVICE:SILICON,400V,400MA	80009	152-0107-00
CR713	152-0586-00	B126490		SEMICOND DEVICE:SILICON,600V,500MA	14936	RGP10J
CR714	152-0107-00	B010100	B126489	SEMICOND DEVICE:SILICON,400V,400MA	80009	152-0107-00
CR714	152-0586-00	B126490		SEMICOND DEVICE:SILICON,600V,500MA	14936	RGP10J

A1 MAIN (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
F44	159-0016-00			FUSE,CARTRIDGE:3AG,1.5A,250V,FAST-BLOW	71400	AGC 1 1/2
F139	159-0016-00			FUSE,CARTRIDGE:3AG,1.5A,250V,FAST-BLOW	71400	AGC 1 1/2
F431	159-0024-00			FUSE,CARTRIDGE:3AG,0.06A,250V,FAST BLOW	71400	AGC 1/16
F511	159-0043-00			FUSE,CARTRIDGE:3AG,0.6A,250V,SLOW-BLOW	71400	MDL 6/10
J2	131-1229-00			CONNECTOR,RCPT:22/44 CONTACT	05574	2VK22D/4-2
L81	114-0336-00			TRANSFORMER,RF:7.6-25MH	80009	114-0336-00
M411	149-0030-00	B010100	B051587X	METER,T TOTLZ:ELAPSED TIME,DC,CKT BD MT	18583	120-LC
Q11A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q29A,B	151-0361-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0361-00
Q44	151-0134-00			TRANSISTOR:SILICON,PNP	80009	151-0134-00
Q51	151-0136-00			TRANSISTOR:SILICON,NPN	80009	151-0136-00
Q55A,B	151-0232-00			TRANSISTOR:SILICON,NPN,DUAL	80009	151-0232-00
Q56	151-0134-00			TRANSISTOR:SILICON,PNP	80009	151-0134-00
Q61	151-0411-00			TRANSISTOR:SILICON,NPN	80009	151-0411-00
Q62	151-0169-00	B010100	B158359	TRANSISTOR:SILICON,NPN	80009	151-0169-00
Q62	151-0150-00	B158360		TRANSISTOR:SILICON,NPN	80009	151-0150-00
Q72	151-0169-00	B010100	B158359	TRANSISTOR:SILICON,NPN	80009	151-0169-00
Q72	151-0150-00	B158360		TRANSISTOR:SILICON,NPN	80009	151-0150-00
Q171	151-0450-00			TRANSISTOR:SILICON,PNP,SEL FROM 2N5583	80009	151-0450-00
Q211	151-0169-00			TRANSISTOR:SILICON,NPN	80009	151-0169-00
Q219	151-0169-00			TRANSISTOR:SILICON,NPN	80009	151-0169-00
Q365	151-0292-00			TRANSISTOR:SILICON,NPN	80009	151-0292-00
Q369	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q424	151-0292-00			TRANSISTOR:SILICON,NPN	80009	151-0292-00
Q571	151-0134-00			TRANSISTOR:SILICON,PNP	80009	151-0134-00
Q579	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q581	151-0292-00			TRANSISTOR:SILICON,NPN	80009	151-0292-00
Q589	151-0292-00			TRANSISTOR:SILICON,NPN	80009	151-0292-00
Q689	151-0150-00			TRANSISTOR:SILICON,NPN	80009	151-0150-00
Q747	151-0349-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE2801	80009	151-0349-00
Q769	151-0349-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE2801	80009	151-0349-00
Q795	151-0311-01			TRANSISTOR:SILICON,NPN	80009	151-0311-01
R12	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R13	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R14	315-0911-00			RES.,FXD,CMPSN:910 OHM,5%,0.25W	01121	CB9115
R19	311-1281-00			RES.,VAR,NONWIR:2.5K OHM,10%,0.5W	32997	3329W-L58-252
R21	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R22	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R23	311-1282-00			RES.,VAR,NONWIR:5K OHM,10%,0.50W	32997	3329W-L58-502
R24	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R25	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R26	315-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R29	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R43	315-0101-03			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R44	315-0102-03			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R45	301-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.50W	01121	EB1035
R48	315-0101-03			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R49	315-0102-03			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R52	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R53	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R54	315-0221-03			RES.,FXD,CMPSN:220 OHM,5%,0.25W	01121	CB2215
R55	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R56	315-0101-03			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R57	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535

A1 MAIN (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R58	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R63	315-0681-03			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R64	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R71	301-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.50W	01121	EB7515
R72	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R73	301-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.50W	01121	EB7515
R74	311-1261-00			RES.,VAR,NONWIR:500 OHM,10%,0.50W	32997	3329P-L58-501
R75	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R76	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R81	307-1032-00			RES.,FXD,FILM:1.8K OHM,5%,10	24546	FP10 1.8K 5%
R82	307-1032-00			RES.,FXD,FILM:1.8K OHM,5%,10	24546	FP10 1.8K 5%
R112	315-0102-03			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R113	304-0154-00			RES.,FXD,CMPSN:150K OHM,10%,1W	01121	GB1541
R118	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R119	315-0102-03			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R121	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R122	315-0821-03			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R124	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R131	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R132	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R139	306-0560-00			RES.,FXD,CMPSN:56 OHM,10%,2W	01121	HB5601
R144	308-0677-00	B010100	B171899	RES.,FXD,WW:1 OHM,5%,2W	75042	BWH-1R000J
R144	308-0799-00	B171900		RES.,FXD,WW:1 OHM,1%,4W	91637	NS21R000F
R145	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R146	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R147	321-0243-00			RES.,FXD,FILM:3.32K OHM,1%,0.125W	91637	MFF1816G33200F
R155	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R156	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R157	321-0340-00			RES.,FXD,FILM:34K OHM,1%,0.125W	91637	MFF1816G34001F
R158	321-0318-00			RES.,FXD,FILM:20K OHM,1%,0.125W	91637	MFF1816G20001F
R159	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R161	323-0089-00			RES.,FXD,FILM:82.5 OHM,1%,0.50W	19701	MF7CD82R50F
R163	323-0089-00			RES.,FXD,FILM:82.5 OHM,1%,0.50W	19701	MF7CD82R50F
R164	323-0185-00			RES.,FXD,FILM:825 OHM,1%,0.50W	75042	CECT0-8250F
R167	315-0681-03			RES.,FXD,CMPSN:680 OHM,5%,0.25W	01121	CB6815
R171	323-0190-00			RES.,FXD,FILM:931 OHM,1%,0.50W	75042	CECT0-9310F
R172	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R253	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R254	315-0102-03			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R365	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R369	315-0393-00			RES.,FXD,CMPSN:39K OHM,5%,0.25W	01121	CB3935
R411	315-0395-00	B010100	B051587X	RES.,FXD,CMPSN:3.9M OHM,5%,0.25W	01121	CB3955
R423	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R424	321-0344-00			RES.,FXD,FILM:37.4K OHM,1%,0.125W	91637	MFF1816G37401F
R425	321-0444-00			RES.,FXD,FILM:412K OHM,1%,0.125W	91637	MFF1816G41202F
R426	306-0104-00			RES.,FXD,CMPSN:100K OHM,10%,2W	01121	HB1041
R545	311-1263-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329P-L58-102
R548	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R549	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R551	308-0677-00			RES.,FXD,WW:1 OHM,5%,2W	75042	BWH-1R000J
R562	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R563	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R564	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R565	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R571	315-0101-03	B010100	B062199	RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R571	301-0221-00	B062200		RES.,FXD,CMPSN:220 OHM,5%,0.50W	01121	EB2215
R572	315-0102-03			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025

A1 MAIN (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R573	315-0471-00	B010100	B062199	RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R573	301-0221-00	B062200		RES.,FXD,CMPSN:220 OHM,5%,0.50W	01121	EB2215
R574	308-0677-00			RES.,FXD,WW:1 OHM,5%,2W	75042	BWH-1R000J
R575	315-0102-03			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R576	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R581	315-0121-00	B010100	B051587	RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R581	321-0122-00	B051588	B062807	RES.,FXD,FILM:182 OHM,1%,0.125W	91637	MFF1816G182R0F
R581	321-0120-00	B062808		RES.,FXD,FILM:174 OHM,1%,0.125W	91637	MFF1816G174R0F
R582	301-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.50W	01121	EB4735
R583	309-0058-00			RES.,FXD,FILM:2 OHM,1%,0.50W	91637	A20-2R000F
R584	321-0360-00			RES.,FXD,FILM:54.9K OHM,1%,0.125W	91637	MFF1816G54901F
R585	321-0277-00			RES.,FXD,FILM:7.5K OHM,1%,0.125W	91637	MFF1816G75000F
R586	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R594	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R595	315-0101-03			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R596	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R597	301-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.50W	01121	EB4735
R638	315-0474-00			RES.,FXD,CMPSN:470K OHM,5%,0.25W	01121	CB4745
R639	315-0392-00	B010100	B051587	RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R639	301-0392-00	B051588		RES.,FXD,CMPSN:3.9K OHM,5%,0.50W	01121	EB3925
RT580	307-0124-00	XB051588		RES.,THERMAL:5K OHM,10%	50157	1D1618
U126	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U151	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U259	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U439	156-0176-00			MICROCIRCUIT,LI:5V REGULATOR	80009	156-0176-00
U555	156-0071-00			MICROCIRCUIT,LI:VOLTAGE REGULATOR	80009	156-0071-00
U569	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U589	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
VR18	152-0279-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	80009	152-0279-00
VR113	152-0243-00			SEMICOND DEVICE:ZENER,0.4W,15V,5%	80009	152-0243-00
VR164	152-0149-00			SEMICOND DEVICE:ZENER,0.4W,10V,5%	80009	152-0149-00

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
	672-0503-00	B010100	B089999	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-00
	----- -----			(INCLUDES CIRCUIT BOARD ASSY'S A2 AND A3)		
	672-0503-01	B080000	B105689	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-01
	----- -----			(INCLUDES CIRCUIT BOARD ASSY'S A2 AND A3)		
	672-0503-02	B105690	B136599	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-02
	----- -----			(INCLUDES CIRCUIT BOARD ASSY'S A2 AND A3)		
	672-0503-04	B136600	B136699	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-04
	----- -----			(INCLUDES CIRCUIT BOARD ASSY'S A2 AND A3)		
	672-0503-05	B136700		CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-05
	----- -----			(INCLUDES CIRCUIT BOARD ASSY'S A2 AND A3)		
Q1016	151-0256-00			TRANSISTOR:SILICON,NPN	80009	151-0256-00
				A2 HIGH VOLTAGE OSC ASSEMBLY		
C205	283-0101-00	B010100	B105689	CAP.,FXD,CER DI:4700PF,+80-20%,6000V	56289	45C11A
C205	285-1137-00	B105690		CAP.,FXD,PLSTC:0.0047UF,10%,8000V	56289	430P472980
C208	290-0480-00			CAP.,FXD,ELCTLT:0.5UF,+50-10%,200V	80009	290-0480-00
C215	283-0043-00			CAP.,FXD,CER DI:0.0068UF,3000V	56289	41C186A
C236	283-0059-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N031Z5U0105Z
C251	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C261	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C268	283-0043-00			CAP.,FXD,CER DI:0.0068UF,3000V	56289	41C186A
C269	283-0105-00			CAP.,FXD,CER DI:0.01UF,+80-20%,2000V	56289	41C316
C277	290-0117-00			CAP.,FXD,ELCTLT:50UF,+75-10%,50V	56289	30D506G050DD9
C281	283-0043-00			CAP.,FXD,CER DI:0.0068UF,3000V	56289	41C186A
C299	283-0101-00	B010100	B105689	CAP.,FXD,CER DI:4700PF,+80-20%,6000V	56289	45C11A
C299	285-1137-00	B105690		CAP.,FXD,PLSTC:0.0047UF,10%,8000V	56289	430P472980
CR207	152-0429-00			SEMICOND DEVICE:SILICON,5000V,10MA	14099	SA3282
CR208	152-0242-00	B010100	B010199	SEMICOND DEVICE:SILICON,225V,200MA	80009	152-0242-00
CR208	152-0426-00	B010200		SEMICOND DEVICE:SILICON,400V,400MA	01295	G2017-1
CR209	152-0429-00			SEMICOND DEVICE:SILICON,5000V,10MA	14099	SA3282
CR242	152-0333-00			SEMICOND DEVICE:SILICON,55V,200MA	80009	152-0333-00
CR251	152-0412-00			SEMICOND DEVICE:SILICON,50V,3A	80009	152-0412-00
CR266	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR267	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR268	152-0385-00			SEMICOND DEVICE:SILICON,2000V,100MA	80009	152-0385-00
CR269	152-0385-00			SEMICOND DEVICE:SILICON,2000V,100MA	80009	152-0385-00
CR289	152-0429-00			SEMICOND DEVICE:SILICON,5000V,10MA	14099	SA3282
CR291	152-0429-00			SEMICOND DEVICE:SILICON,5000V,10MA	14099	SA3282
L241	108-0234-00			COIL,RF:130UH	80009	108-0234-00
L278	108-0422-00			COIL,RF:FIXED,82UH	80009	108-0422-00
Q251	151-0334-00			TRANSISTOR:SILICON,NPN	80009	151-0334-00
Q257	151-0333-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS918	80009	151-0333-00
Q265	151-1005-00			TRANSISTOR:SILICON,JFE,N-CHANNEL	80009	151-1005-00
R208	315-0102-00	B010100	B136699	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R208	315-0102-03	B136700		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R211	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R212	306-0155-00			RES.,FXD,CMPSN:1.5M OHM,10%,2W	01121	HB1551
R221	311-1164-00			RES.,FXD,NONWIR:50K OHM,20%	32997	3386M-T07-503
R255	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R256	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R261	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R262	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R264	311-1164-00			RES.,FXD,NONWIR:50K OHM,20%	32997	3386M-T07-503

A2 HIGH VOLTAGE OSC (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R265	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R266	321-0431-00			RES.,FXD,FILM:301K OHM,1%,0.125W	91637	MFF1816G30102F
R278	308-0463-00			RES.,FXD,WW:0.3 OHM,1%,3W	91637	RS2B-KR3000F
T1015	120-0917-00	B010100	B040819	XFMR,PWR,STU:HV	80009	120-0917-00
T1015	120-0917-01	B040820		XFMR,PWR,SDN&SU:HIGH VOLTAGE	80009	120-0917-01

A3 HIGH VOLTAGE ASSEMBLY

C309	283-0101-00	B010100	B105689	CAP.,FXD,CER DI:4700PF,+80-20%,6000V	56289	45C11A
C309	285-1137-00	B105690		CAP.,FXD,PLSTC:0.0047UF,10%,8000V	56289	430P472980
C339	283-0043-00			CAP.,FXD,CER DI:0.0068UF,3000V	56289	41C186A
C351	283-0101-00	B010100	B105689X	CAP.,FXD,CER DI:4700PF,+80-20%,6000V	56289	45C11A
C359	283-0101-00	B010100	B105689	CAP.,FXD,CER DI:4700PF,+80-20%,6000V	56289	45C11A
C359	285-1138-00	B105690		CAP.,FXD,PLSTC:0.01UF,10%,8000V	56289	430P558
C365	283-0291-00			CAP.,FXD,CER DI:25PF,10%,6000V	56289	41C426
C382	283-0101-00	B010100	B105689	CAP.,FXD,CER DI:4700PF,+80-20%,6000V	56289	45C11A
C382	285-1137-00	B105690		CAP.,FXD,PLSTC:0.0047UF,10%,8000V	56289	430P472980
C395	283-0101-00	B010100	B105689	CAP.,FXD,CER DI:4700PF,+80-20%,6000V	56289	45C11A
C395	285-1137-00	B105690		CAP.,FXD,PLSTC:0.0047UF,10%,8000V	56289	430P472980
CR371	152-0242-00	B010100	B010199	SEMICOND DEVICE:SILICON,225V,200MA	80009	152-0242-00
CR371	152-0426-00	B010200		SEMICOND DEVICE:SILICON,400V,400MA	01295	G2017-1
CR375	152-0242-00	B010100	B010199	SEMICOND DEVICE:SILICON,225V,200MA	80009	152-0242-00
CR375	152-0426-00	B010200		SEMICOND DEVICE:SILICON,400V,400MA	01295	G2017-1
CR383	152-0242-00	B010100	B010199	SEMICOND DEVICE:SILICON,225V,200MA	80009	152-0242-00
CR383	152-0426-00	B010200		SEMICOND DEVICE:SILICON,400V,400MA	01295	G2017-1
CR384	152-0242-00	B010100	B010199	SEMICOND DEVICE:SILICON,225V,200MA	80009	152-0242-00
CR384	152-0426-00	B010200		SEMICOND DEVICE:SILICON,400V,400MA	01295	G2017-1
CR387	152-0242-00	B010100	B010199	SEMICOND DEVICE:SILICON,225V,200MA	80009	152-0242-00
CR387	152-0426-00	B010200		SEMICOND DEVICE:SILICON,400V,400MA	01295	G2017-1
CR389	152-0242-00	B010100	B010199	SEMICOND DEVICE:SILICON,225V,200MA	80009	152-0242-00
CR389	152-0426-00	B010200		SEMICOND DEVICE:SILICON,400V,400MA	01295	G2017-1
DS365	150-0030-00	B010100	B010199X	LAMP,GLOW:NEON,T-2,60 TO 90 VOLTS	08806	A2B-T
DS366	150-0030-00	B010100	B010199X	LAMP,GLOW:NEON,T-2,60 TO 90 VOLTS	08806	A2B-T
DS373	150-0030-00			LAMP,GLOW:NEON,T-2,60 TO 90 VOLTS	08806	A2B-T
DS375	150-0030-00			LAMP,GLOW:NEON,T-2,60 TO 90 VOLTS	08806	A2B-T
DS376	150-0030-00			LAMP,GLOW:NEON,T-2,60 TO 90 VOLTS	08806	A2B-T
E365	119-0181-00	XB010200		ARSR,ELEC SURGE:230V,GAS FILLED	80009	119-0181-00
R309	315-0104-00	B010100	B136699	RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R309	315-0104-03	B136700		RES.,FXD CMPSN:100K OHM,5%,0.25W	01121	CB1045
R311	307-0428-00			RES.,FXD,FILM:100M OHM,10%,1W	03888	FL1-F10005K
R325	315-0223-00	B010100	B136699	RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R325	315-0223-03	B136700		RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R329	305-0755-00			RES.,FXD,CMPSN:7.5M OHM,5%,2W	01121	HB7555
R334	305-0565-00			RES.,FXD,CMPSN:5.6M OHM,5%,2W	01121	HB5655
R345	311-1312-00			RES.,VAR,NONWIR:5M OHM,20%,1W	01121	73M4G048L505M
R365	315-0224-00			RES.,FXD,CMPSN:220K OHM,5%,0.25W	01121	CB2245
R367	307-0314-00			RES.,FXD,FILM:VOLTAGE DIVIDER	80009	307-0314-00
R371	315-0202-00	B010100	B136699	RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R371	315-0202-02	B136700		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R376	315-0106-00			RES.,FXD,CMPSN:10M OHM,5%,0.25W	01121	CB1065
R377	315-0101-03	B010100	B010199	RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R377	315-0101-00	B010200		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R378	315-0101-03	B010100	B010199	RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R378	315-0101-00	B010200		RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R383	315-0202-00	B010100	B136699	RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025

A3 HIGH VOLTAGE (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R383	315-0202-02	B136700		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R387	315-0202-00	B010100	B136699	RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R387	315-0202-02	B136700		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R389	315-0223-00	B010100	B136699	RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R389	315-0223-03	B136700		RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
				A4 CONTROL ASSEMBLY		
A4	670-3025-02	B010100	B039999	CKT BOARD ASSY:CONTROL	80009	670-3025-02
A4	670-4104-00	B040000	B040949	CKT BOARD ASSY:CONTROL	80009	670-4104-00
A4	670-4104-01	B040950	B079999	CKT BOARD ASSY:CONTROL	80009	670-4104-01
A4	670-4104-02	B080000	B157079	CKT BOARD ASSY:CONTROL	80009	670-4104-02
A4	670-4104-04	B157080	B174179	CKT BOARD ASSY:CONTROL	80009	670-4104-04
A4	670-4104-05	B174180		CKT BOARD ASSY:CONTROL	80009	670-4104-05
C20	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C22	281-0540-00			CAP.,FXD,CER DI:51PF,5%,500V	72982	301-000U2J0510J
C23	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C24	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C42	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C111	290-0509-00			CAP.,FXD,ELCTLT:3000UF,+100-10%,50V	56289	68D10454
C120	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C122	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C125	281-0540-00			CAP.,FXD,CER DI:51PF,5%,500V	72982	301-000U2J0510J
C134	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C148	281-0580-00			CAP.,FXD,CER DI:470PF,10%,500V	04222	7001-1374
C232	283-0203-00	XB062545		CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
C234	283-0177-00	XB030500		CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039 E 105Z
C236	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C240	290-0532-00	XB040000		CAP.,FXD,ELCTLT:150UF,20%,6V	90201	TDC157M006WLC
C241	283-0198-00			CAP.,FXD,CER DI:0.22UF,20%,50V	72982	8121N083Z5U0224M
C255	283-0523-00			CAP.,FXD,MICA D:500PF,5%,500V	72136	CM19C501J
C266	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C270	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C294	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C318	283-0211-00	XB062808	B174179X	CAP.,FXD,CER DI:0.1UF,10%,200V	72982	8141N210X7R0104K
C321	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C341	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C351	290-0533-00			CAP.,FXD,ELCTLT:330UF,20%,,6V	90201	TDC337M006WLD
C365	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C366	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C367	290-0523-00	B010100	B039999	CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C367	290-0525-00	B040000	B040949	CAP.,FXD,ELCTLT:4.7UF,20%,50V	56289	196D475X0050KA1
C367	290-0523-00	B040950		CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
CR14	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR33	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR133	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR142	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR143	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR144	152-0141-02	XB062808		SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR160	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR249	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR264	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR265	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR279	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR280	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR282	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR311	152-0412-00			SEMICOND DEVICE:SILICON,50V,3A	80009	152-0412-00
CR331	152-0198-00			SEMICOND DEVICE:SILICON,200V,3A	03508	1N5624
CR334	152-0198-00			SEMICOND DEVICE:SILICON,200V,3A	03508	1N5624
CR348	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR349	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
L363	108-0406-00			COIL,RF:80UH,TOROIDAL	80009	108-0406-00
L364	108-0406-00			COIL,RF:80UH,TOROIDAL	80009	108-0406-00

A4 CONTROL (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q15	151-0136-00			TRANSISTOR:SILICON,NPN	80009	151-0136-00
Q71	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q140	151-0136-00			TRANSISTOR:SILICON,NPN	80009	151-0136-00
Q141	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q148	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q161	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q193	151-0522-00			TRANSISTOR:SILICON,TRIAC,400V	03508	SC141DX164
Q236	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q241	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q248	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q253	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q254	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q270	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q318	151-0183-00			TRANSISTOR:SILICON,NPN	80009	151-0183-00
Q319	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q323	151-0503-00			SCR:SILICON,TO-92	04713	2N5060
Q351	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q354	151-0508-00			TRANSISTOR:SILICON,NPN,PROGRAMMABLE	03508	2N6027
Q355	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q369	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q370	151-0504-00			TRANSISTOR:SILICON,N-CHAN,UNIJUNCTION	04713	2N4851
Q376	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q379	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q392	151-0254-00			TRANSISTOR:SILICON,NPN	80009	151-0254-00
R17	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R25	315-0513-00			RES.,FXD,CMPSN:51K OHM,5%,0.25W	01121	CB5135
R31	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R32	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R33	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R39	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R40	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R41	315-0512-00	B010100	B039999	RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R41	315-0241-00	B040000		RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R43	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R44	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R45	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R50	311-1227-00	XB040000		RES.,VAR,NONWIR:5K OHM,20%,0.50W	32997	3386F-T04-502
R51	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R54	315-0243-00			RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R55	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R61	311-1227-00			RES.,VAR,NONWIR:5K OHM,20%,0.50W	32997	3386F-T04-502
R63	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R65	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R66	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R71	311-1227-00	B010100	B069999	RES.,VAR,NONWIR:5K OHM,20%,0.50W	32997	3386F-T04-502
R71	311-1068-00	B070000		RES.,VAR,NONWIR:5K OHM,10%,0.50W	01121	W-7682
R72	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R73	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R118	315-0102-00	XB174180		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R123	315-0244-00			RES.,FXD,CMPSN:240K OHM,5%,0.25W	01121	CB2445
R131	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R132	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R142	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R143	315-0563-00	B010100	B157109	RES.,FXD,CMPSN:56K OHM,5%,0.25W	01121	CB5635
R143	315-0273-00	B157110		RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R149	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R150	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225

A4 CONTROL (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R152	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R154	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R155	315-0104-00	B010100	B039999	RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R155	315-0683-00	B040000		RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R163	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R164	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R165	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R166	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R180	308-0272-00			RES.,FXD,WW:20K OHM,5%,5W	91637	RS2A-B20001J
R220	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R221	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R222	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R225	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R226	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R231	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R232	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R233	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R234	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R240	315-0154-00			RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R244	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R250	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R251	315-0134-00			RES.,FXD,CMPSN:130K OHM,5%,0.25W	01121	CB1345
R255	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R260	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R261	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R262	315-0132-00			RES.,FXD,CMPSN:1.3K OHM,5%,0.25W	01121	CB1325
R263	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R264	315-0105-00			RES.,FXD,CMPSN:1M OHM,5%,0.25W	01121	CB1055
R265	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R271	315-0203-00	B010100	B041343	RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R271	315-0152-00	B041344		RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R272	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R276	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R283	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R291	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R292	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R293	315-0300-00			RES.,FXD,CMPSN:30 OHM,5%,0.25W	01121	CB3005
R294	315-0102-00	XB040000		RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R315	308-0463-00			RES.,FXD,WW:0.3 OHM,1%,3W	91637	RS2B-KR3000F
R320	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R323	315-0243-00	XB040000		RES.,FXD,CMPSN:24K OHM,5%,0.25W	01121	CB2435
R340	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R341	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R342	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R344	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R345	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R360	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R361	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R371	315-0154-00	B010100	B039999	RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R371	315-0204-00	B040000	B040949	RES.,FXD,CMPSN:200K OHM,5%,0.25W	01121	CB2045
R371	315-0154-00	B040950		RES.,FXD,CMPSN:150K OHM,5%,0.25W	01121	CB1545
R372	315-0201-00			RES.,FXD,CMPSN:200 OHM,5%,0.25W	01121	CB2015
R373	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
U21	156-0105-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0105-00
U51	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U121	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U171	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00

A4 CONTROL (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
U242	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00
U275	156-0399-00	B010100	B157079	MICROCIRCUIT,DI:OPTOELECTRONIC ISOLATOR	80009	156-0399-00
U275	156-0885-00	B157080		MICROCIRCUIT,LI:OPTOELECTRONIC ISOLATOR	04713	MOC1005
U342	156-0081-00			MICROCIRCUIT,LI:SGL RETRIGGERABLE MV	80009	156-0081-00
VR39	152-0278-00			SEMICOND DEVICE:ZENER,0.4W,3V,5%	80009	152-0278-00
VR223	152-0280-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0280-00
VR224	152-0280-00			SEMICOND DEVICE:ZENER,0.4W,6.2V,5%	80009	152-0280-00
VR281	152-0195-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	80009	152-0195-00
VR362	152-0168-00			SEMICOND DEVICE:ZENER,0.4W,12V,5%	80009	152-0168-00

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
				A5 TIMING ASSEMBLY		
A5	670-3661-00	B010100	B029999	CKT BOARD ASSY:TIMING	80009	670-3661-00
A5	670-3661-01	B030000	B040999	CKT BOARD ASSY:TIMING	80009	670-3661-01
A5	670-3661-02	B041000	B041134	CKT BOARD ASSY:TIMING	80009	670-3661-02
A5	670-3661-03	B041135	B079999	CKT BOARD ASSY:TIMING	80009	670-3661-03
A5	670-3661-07	B080000		CKT BOARD ASSY:TIMING	80009	670-3661-07
C22	285-0808-00			CAP.,FXD,PLSTC:0.1UF,10%,50V	56289	LP66A1A104K004
C45	281-0580-00			CAP.,FXD,CER DI:470PF,10%,500V	04222	7001-1374
	----- -----			(ON 670-3661-03 AND UP BOARD ONLY)		
C76	285-0894-00			CAP.,FXD,PLSTC:5UF,5%,50V	56289	LP68A1A505J
C192	283-0711-00			CAP.,FXD,MICA D:2700PF,2%,500V	00853	D195E272G0
C201	283-0080-00			CAP.,FXD,CER DI:0.022UF,+80-20%,25V	56289	19C611
C211	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C222	283-0023-00			CAP.,FXD,CER DI:0.1UF,+80-20%,12V	91418	MX0104Z1205R5
C291	281-0580-00			CAP.,FXD,CER DI:470PF,10%,500V	04222	7001-1374
C351	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C352	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C361	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C403	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C422	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C450	290-0527-00	XB041135	B089999X	CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C451	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C452	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C453	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C454	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C455	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C456	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C461	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C471	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C491	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
CR172	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR191	152-0324-00			SEMICOND DEVICE:SILICON,35V,100MA	80009	152-0324-00
CR192	152-0324-00			SEMICOND DEVICE:SILICON,35V,100MA	80009	152-0324-00
CR193	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR195	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR332	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR334	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR341	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR401	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR422	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
L451	108-0406-00			COIL,RF:80UH,TOROIDAL	80009	108-0406-00
L453	108-0406-00			COIL,RF:80UH,TOROIDAL	80009	108-0406-00
L455	108-0406-00			COIL,RF:80UH,TOROIDAL	80009	108-0406-00
Q21	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q69	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q71	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q91	151-1036-00			TRANSISTOR:SILICON,JFE,N-CHANNEL,DUAL	80009	151-1036-00
Q171	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q231	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q232	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q281	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q285	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q321	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q331	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q335	151-0188-00	XB041000		TRANSISTOR:SILICON,PNP	80009	151-0188-00

A5 TIMING (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q432	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
R1	311-1286-00			RES.,VAR,NONWIR:50K OHM,10%,0.5W	32997	3329W-L58-503
R2	321-0285-00			RES.,FXD,FILM:9.09K OHM,1%,0.125W	91637	MFF1816G90900F
R3	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R4	321-0371-00			RES.,FXD,FILM:71.5K OHM,1%,0.125W	91637	MFF1816G71501F
R5	321-0258-00			RES.,FXD,FILM:4.75K OHM,1%,0.125W	91637	MFF1816G47500F
R6	311-1282-00			RES.,VAR,NONWIR:5K OHM,10%,0.50W	32997	3329W-L58-502
R21	311-1286-00			RES.,VAR,NONWIR:50K OHM,10%,0.5W	32997	3329W-L58-503
R22	321-0364-00			RES.,FXD,FILM:60.4K OHM,1%,0.125W	91637	MFF1816G60401F
R23	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R24	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R36	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R41	311-1286-00			RES.,VAR,NONWIR:50K OHM,10%,0.5W	32997	3329W-L58-503
R42	311-1280-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329W-L58-102
R43	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R44	321-0371-00			RES.,FXD,FILM:71.5K OHM,1%,0.125W	91637	MFF1816G71501F
R45	321-0338-00			RES.,FXD,FILM:32.4K OHM,1%,0.125W	91637	MFF1816G32401F
R51	311-1280-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329W-L58-102
R52	321-0285-00			RES.,FXD,FILM:9.09K OHM,1%,0.125W	91637	MFF1816G90900F
R53	315-0821-00			RES.,FXD,CMPSN:820 OHM,5%,0.25W	01121	CB8215
R61	311-1282-00			RES.,VAR,NONWIR:5K OHM,10%,0.50W	32997	3329W-L58-502
R62	321-0201-00			RES.,FXD,FILM:1.21K OHM,1%,0.125W	91637	MFF1816G12100F
R63	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R64	321-0239-00			RES.,FXD,FILM:3.01K OHM,1%,0.125W	91637	MFF1816G30100F
R65	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R66	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R68	311-1283-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	32997	3329W-L58-103
R69	311-1280-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329W-L58-102
R71	311-1283-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	32997	3329W-L58-103
R72	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R73	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R74	321-0318-00			RES.,FXD,FILM:20K OHM,1%,0.125W	91637	MFF1816G20001F
R75	321-0354-00			RES.,FXD,FILM:47.5K OHM,1%,0.125W	91637	MFF1816G47501F
R76	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R81	311-1285-00			RES.,VAR,NONWIR:25K OHM,+/-10%,0.5W	32997	3329W-L58-253
R91	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R92	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R93	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R101	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R102	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R103	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R111	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R112	321-0292-00			RES.,FXD,FILM:10.7K OHM,1%,0.125W	91637	MFF1816G10701F
R121	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R122	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R170	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R171	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R172	315-0363-00			RES.,FXD,CMPSN:36K OHM,5%,0.25W	01121	CB3635
R181	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R182	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R183	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R184	315-0363-00			RES.,FXD,CMPSN:36K OHM,5%,0.25W	01121	CB3635
R185	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R186	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R187	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R201	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325

A5 TIMING (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R202	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R211	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R221	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R222	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R223	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R224	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R231	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R232	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R233	304-0151-00	B010100	B040999	RES.,FXD,CMPSN:150 OHM,10%,1W	01121	GB1511
R233	308-0385-00	B041000		RES.,FXD,WW:200 OHM,5%,3W	91637	CW2B-200R0J
R234	304-0151-00			RES.,FXD,CMPSN:150 OHM,10%,1W	01121	GB1511
R331	301-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.50W	01121	EB3305
R332	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R333	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R334	301-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.50W	01121	EB3305
R336	315-0152-00	XB041000		RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R337	315-0472-00	XB041000		RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R338	315-0273-00	XB041000		RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R339	315-0202-00	XB080000		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R340	315-0202-00	XB080000		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R341	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R342	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R361	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R402	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R403	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R404	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R421	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R422	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R423	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R431	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R432	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R433	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R434	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R440	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R441	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R442	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R450	315-0102-00	XB041135	B079999X	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R481	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R491	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
U11	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U12	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U31	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U32	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U81	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U82	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U151	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	80009	156-0030-00
U161	156-0047-00			MICROCIRCUIT,DI:TPL 3-INPUT POS NAND GATE	80009	156-0047-00
U201	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00
U211	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00
U301	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U311	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	80009	156-0030-00
U341	156-0140-00	XB090000		MICROCIRCUIT,DI:HEX BFR,15V,TTL	80009	156-0140-00
U351	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	80009	156-0030-00
U361	156-0058-00			MICROCIRCUIT,DI:HEX.INVERTER	80009	156-0058-00
U371	156-0032-00			MICROCIRCUIT,DI:4-BIT BINARY COUNTER	80009	156-0032-00
U381	156-0032-00			MICROCIRCUIT,DI:4-BIT BINARY COUNTER	80009	156-0032-00
U391	156-0032-00			MICROCIRCUIT,DI:4-BIT BINARY COUNTER	80009	156-0032-00

A5 TIMING (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
U411	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U412	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U461	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00
U471	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U481	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U491	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
				A6 INTERROGATE ASSEMBLY		
A6	672-0488-00	B010100	B079999	CKT BOARD ASSY:INTERROGATE	80009	672-0488-00
A6	672-0488-01	B080000		CKT BOARD ASSY:INTERROGATE	80009	672-0488-01
C231	283-0060-00			CAP.,FXD,CER DI:100PF,5%,200V	72982	855-535U2J101J
C313	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C323	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	0831085Z5E00471J
C412	290-0517-00			CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1
C414	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C421	283-0108-00			CAP.,FXD,CER DI:220PF,10%,200V	56289	272C13
C424	283-0108-00			CAP.,FXD,CER DI:220PF,10%,200V	56289	272C13
C431	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C432	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C433	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
CR435	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
L426	108-0406-00			COIL,RF:80UH,TOROIDAL	80009	108-0406-00
Q124	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q126	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q221	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q413	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q420	151-0127-00			TRANSISTOR:SILICON,NPN	80009	151-0127-00
R24	311-1283-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	32997	3329W-L58-103
R28	311-1283-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	32997	3329W-L58-103
R116	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R118	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R120	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R122	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R212	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R226	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R228	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R229	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R232	321-0266-00			RES.,FXD,FILM:5.76K OHM,1%,0.125W	91637	MFF1816G57600F
R314	321-0230-00			RES.,FXD,FILM:2.43K OHM,1%,0.125W	91637	MFF1816G24300F
R316	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R325	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R326	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R411	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R416	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R419	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R422	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
U111	156-0153-00			MICROCIRCUIT,DI:HEX INVERTER,BUFFER	01295	SN7406N
U311	156-0143-00			MICROCIRCUIT,DI:RETRIGGERABLE MONOST/MV	80009	156-0143-00
U321	156-0143-00			MICROCIRCUIT,DI:RETRIGGERABLE MONOST/MV	80009	156-0143-00
U331	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
				A7 MULTIPLEXER ASSEMBLY		
A7	672-0489-00	B010100	B089999	CKT BOARD ASSY:MULTIPLEXER (OPTION 2 ONLY)	80009	672-0489-00
A7	672-0489-01	B090000		CKT BOARD ASSY:MULTIPLEXER (OPTION 2 ONLY)	80009	672-0489-01
C101	283-0123-01			CAP.,FXD,CER DI:0.1UF,+80-20%,10V	56289	20C374
C115	283-0032-00			CAP.,FXD,CER DI:470PF,5%,500V	72982	0831085Z5E00471J
C123	283-0023-00			CAP.,FXD,CER DI:0.1UF,+80-20%,12V	91418	MX0104Z1205R5
C135	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C145	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C155	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C165	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C184	283-0023-00			CAP.,FXD,CER DI:0.1UF,+80-20%,12V	91418	MX0104Z1205R5
C303	283-0128-00			CAP.,FXD,CER DI:100PF,5%,500V	72982	871-536T2H101J
C315	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-518-Z5D0102J
C323	283-0023-00			CAP.,FXD,CER DI:0.1UF,+80-20%,12V	91418	MX0104Z1205R5
C344	283-0023-00			CAP.,FXD,CER DI:0.1UF,+80-20%,12V	91418	MX0104Z1205R5
C358	283-0023-00			CAP.,FXD,CER DI:0.1UF,+80-20%,12V	91418	MX0104Z1205R5
C359	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C365	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C366	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C377	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C384	283-0023-00			CAP.,FXD,CER DI:0.1UF,+80-20%,12V	91418	MX0104Z1205R5
C403	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C410	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0020HA1
C413	283-0108-00			CAP.,FXD,CER DI:220PF,10%,200V	56289	272C13
C417	283-0108-00			CAP.,FXD,CER DI:220PF,10%,200V	56289	272C13
C421	290-0517-00			CAP.,FXD,ELCTLT:6.8UF,20%,35V	56289	196D685X0035KA1
C430	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C433	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C447	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C451	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C459	283-0080-00			CAP.,FXD,CER DI:0.022UF,+80-20%,25V	56289	19C611
C473	283-0080-00			CAP.,FXD,CER DI:0.022UF,+80-20%,25V	56289	19C611
C476	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C484	283-0023-00			CAP.,FXD,CER DI:0.1UF,+80-20%,12V	91418	MX0104Z1205R5
C491	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
CR31	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR43	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR53	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR62	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR234	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR248	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR258	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR266	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR445	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
L431	108-0406-00			COIL,RF:80UH,TOROIDAL	80009	108-0406-00
L453	108-0406-00			COIL,RF:80UH,TOROIDAL	80009	108-0406-00
Q9	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q12	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q141	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q152	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q160	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00
Q273	151-0223-00			TRANSISTOR:SILICON,NPN	80009	151-0223-00

A7 MULTIPLEXER (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
Q401	151-0127-00			TRANSISTOR:SILICON,NPN	80009	151-0127-00
Q411	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
R15	311-1283-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	32997	3329W-L58-103
R17	311-1283-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	32997	3329W-L58-103
R33	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R35	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R41	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R45	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R47	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R52	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R54	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R55	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R61	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R63	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R64	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R74	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R79	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R81	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R83	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R109	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R110	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R112	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R113	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R116	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R133	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R143	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R154	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R163	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R233	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R239	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R242	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R244	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R246	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R252	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R254	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R255	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R257	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R259	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R261	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R262	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R265	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R273	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R275	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R277	315-0471-00			RES.,FXD,CMPSN:470 OHM,5%,0.25W	01121	CB4715
R300	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R305	321-0266-00			RES.,FXD,FILM:5.76K OHM,1%,0.125W	91637	MFF1816G57600F
R316	321-0230-00			RES.,FXD,FILM:2.43K OHM,1%,0.125W	91637	MFF1816G24300F
R334	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R404	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R406	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R415	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R419	315-0510-00			RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R423	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R457	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R470	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R472	315-0822-00	B010100	B156949	RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225

A7 MULTIPLEXER (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R472	315-0183-00	B156950		RES.,FXD,CMPSN:18K OHM,5%,0.25W	01121	CB1835
R487	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R489	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
U21	156-0098-00			MICROCIRCUIT,DI:DUAL 4 LINE-1 LINE DATA SEL	80009	156-0098-00
U85	156-0058-00			MICROCIRCUIT,DI:HEX.INVERTER	80009	156-0058-00
U91	156-0047-00			MICROCIRCUIT,DI:TPL 3-INPUT POS NAND GATE	80009	156-0047-00
U101	156-0110-00			MICROCIRCUIT,DI:DUAL 2 - 4 LINE DCDR DEMUX	80009	156-0110-00
U121	156-0092-00			MICROCIRCUIT,DI:HEX INV W/OPEN COLLECTOR	80009	156-0092-00
U185	156-0047-00			MICROCIRCUIT,DI:TPL 3-INPUT POS NAND GATE	80009	156-0047-00
U191	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	80009	156-0030-00
U301	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00
U311	156-0143-00			MICROCIRCUIT,DI:RETRIGGERABLE MONOST/MV	80009	156-0143-00
U321	156-0143-00			MICROCIRCUIT,DI:RETRIGGERABLE MONOST/MV	80009	156-0143-00
U331	156-0153-00			MICROCIRCUIT,DI:HEX INVERTER,BUFFER	01295	SN7406N
U341	156-0141-00			MICROCIRCUIT,DI:DUAL 2 TO 4 LINE DCDR/DMUX	80009	156-0141-00
U351	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	80009	156-0030-00
U355	156-0098-00			MICROCIRCUIT,DI:DUAL 4 LINE-1 LINE DATA SEL	80009	156-0098-00
U361	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U371	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U381	156-0153-00			MICROCIRCUIT,DI:HEX INVERTER,BUFFER	01295	SN7406N
U385	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	80009	156-0030-00
U391	156-0129-00			MICROCIRCUIT,DI:QUAD 2-INPUT GATE	80009	156-0129-00
U455	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00
U461	156-0402-00			MICROCIRCUIT,LI:TIMER	80009	156-0402-00
U481	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	80009	156-0030-00
U485	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
				A8 TIMING ASSEMBLY		
A8	670-5740-00			CKT BOARD ASSY:TIMING	80009	670-5740-00
	----- -----			(OPTION 31 ONLY)		
C22	285-0808-00			CAP.,FXD,PLSTC:0.1UF,10%,50V	56289	LP66A1A104K004
C45	281-0580-00			CAP.,FXD,CER DI:470PF,10%,500V	04222	7001-1374
C76	285-0894-00			CAP.,FXD,PLSTC:5UF,5%,50V	56289	LP68A1A505J
C192	283-0711-00			CAP.,FXD,MICA D:2700PF,2%,500V	00853	D195E272G0
C201	283-0080-00			CAP.,FXD,CER DI:0.022UF,+80-20%,25V	56289	19C611
C211	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C222	283-0023-00			CAP.,FXD,CER DI:0.1UF,+80-20%,12V	91418	MX0104Z1205R5
C291	281-0580-00			CAP.,FXD,CER DI:470PF,10%,500V	04222	7001-1374
C351	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C352	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C361	290-0536-00			CAP.,FXD,ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C403	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C422	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C451	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C452	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C453	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C454	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C455	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C456	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C461	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C471	281-0523-00			CAP.,FXD,CER DI:100PF,+/-20PF,500V	72982	301-000U2M0101M
C491	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
CR172	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR191	152-0324-00			SEMICOND DEVICE:SILICON,35V,100MA	80009	152-0324-00
CR192	152-0324-00			SEMICOND DEVICE:SILICON,35V,100MA	80009	152-0324-00
CR193	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR195	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR332	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR334	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR341	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR401	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
CR422	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	80009	152-0141-02
L451	108-0406-00			COIL,RF:80UH,TOROIDAL	80009	108-0406-00
L453	108-0406-00			COIL,RF:80UH,TOROIDAL	80009	108-0406-00
L455	108-0406-00			COIL,RF:80UH,TOROIDAL	80009	108-0406-00
Q21	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q69	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q71	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q91	151-1036-00			TRANSISTOR:SILICON,JFE,N-CHANNEL,DUAL	80009	151-1036-00
Q171	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q231	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q232	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q281	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q285	151-0192-00			TRANSISTOR:SILICON,NPN,SEL FROM MPS6521	80009	151-0192-00
Q321	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q331	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q335	151-0188-00			TRANSISTOR:SILICON,PNP	80009	151-0188-00
Q432	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
R1	311-1286-00			RES.,VAR,NONWIR:50K OHM,10%,0.5W	32997	3329W-L58-503
R2	321-0285-00			RES.,FXD,FILM:9.09K OHM,1%,0.125W	91637	MFF1816G90900F
R3	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F

A8 TIMING (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R4	321-0371-00			RES.,FXD,FILM:71.5K OHM,1%,0.125W	91637	MFF1816G71501F
R5	321-0258-00			RES.,FXD,FILM:4.75K OHM,1%,0.125W	91637	MFF1816G47500F
R6	311-1282-00			RES.,VAR,NONWIR:5K OHM,10%,0.50W	32997	3329W-L58-502
R21	311-1286-00			RES.,VAR,NONWIR:50K OHM,10%,0.5W	32997	3329W-L58-503
R22	321-0364-00			RES.,FXD,FILM:60.4K OHM,1%,0.125W	91637	MFF1816G60401F
R23	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R24	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R36	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R41	311-1286-00			RES.,VAR,NONWIR:50K OHM,10%,0.5W	32997	3329W-L58-503
R42	311-1280-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329W-L58-102
R43	321-0306-00			RES.,FXD,FILM:15K OHM,1%,0.125W	91637	MFF1816G15001F
R44	321-0371-00			RES.,FXD,FILM:71.5K OHM,1%,0.125W	91637	MFF1816G71501F
R45	321-0338-00			RES.,FXD,FILM:32.4K OHM,1%,0.125W	91637	MFF1816G32401F
R51	311-1280-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329W-L58-102
R52	321-0285-00			RES.,FXD,FILM:9.09K OHM,1%,0.125W	91637	MFF1816G90900F
R53	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R61	311-1282-00			RES.,VAR,NONWIR:5K OHM,10%,0.50W	32997	3329W-L58-502
R62	321-0193-00			RES.,FXD,FILM:1K OHM,1%,0.125W	91637	MFF1816G10000F
R63	321-0264-00			RES.,FXD,FILM:5.49K OHM,1%,0.125W	91637	MFF1816G54900F
R64	321-0210-00			RES.,FXD,FILM:1.5K OHM,1%,0.125W	91637	MFF1816G15000F
R65	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R66	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R68	311-1283-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	32997	3329W-L58-103
R69	311-1280-00			RES.,VAR,NONWIR:1K OHM,10%,0.50W	32997	3329W-L58-102
R71	311-1283-00			RES.,VAR,NONWIR:10K OHM,10%,0.50W	32997	3329W-L58-103
R72	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R73	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R74	321-0318-00			RES.,FXD,FILM:20K OHM,1%,0.125W	91637	MFF1816G20001F
R75	321-0354-00			RES.,FXD,FILM:47.5K OHM,1%,0.125W	91637	MFF1816G47501F
R76	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R81	311-1285-00			RES.,VAR,NONWIR:25K OHM,+/-10%,0.5W	32997	3329W-L58-253
R91	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R92	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R93	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R101	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R102	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R103	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R111	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R112	321-0292-00			RES.,FXD,FILM:10.7K OHM,1%,0.125W	91637	MFF1816G10701F
R121	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R122	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R170	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R171	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R172	315-0363-00			RES.,FXD,CMPSN:36K OHM,5%,0.25W	01121	CB3635
R181	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R182	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R183	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R184	315-0363-00			RES.,FXD,CMPSN:36K OHM,5%,0.25W	01121	CB3635
R185	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R186	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R187	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R201	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R202	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R211	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R221	315-0332-00			RES.,FXD,CMPSN:3.3K OHM,5%,0.25W	01121	CB3325
R222	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R223	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025

A8 TIMING (CONT)

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R224	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R231	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R232	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R233	308-0385-00			RES.,FXD,WW:200 OHM,5%,3W	91637	CW2B-200R0J
R234	304-0151-00			RES.,FXD,CMPSN:150 OHM,10%,1W	01121	GB1511
R331	301-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.50W	01121	EB3305
R332	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R333	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R334	301-0330-00			RES.,FXD,CMPSN:33 OHM,5%,0.50W	01121	EB3305
R336	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R337	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R338	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R339	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R340	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R341	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R342	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R361	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R402	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R403	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R404	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R421	315-0133-00			RES.,FXD,CMPSN:13K OHM,5%,0.25W	01121	CB1335
R422	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R423	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R431	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R432	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R433	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R434	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R440	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R441	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R442	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R481	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R491	315-0333-00			RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
U11	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U12	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U31	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U32	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U81	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U82	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U151	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	80009	156-0030-00
U161	156-0047-00			MICROCIRCUIT,DI:TPL 3-INPUT POS NAND GATE	80009	156-0047-00
U201	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00
U211	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00
U301	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U311	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	80009	156-0030-00
U341	156-0140-00			MICROCIRCUIT,DI:HEX BFR,15V,TTL	80009	156-0140-00
U351	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	80009	156-0030-00
U361	156-0058-00			MICROCIRCUIT,DI:HEX.INVERTER	80009	156-0058-00
U371	156-0032-00			MICROCIRCUIT,DI:4-BIT BINARY COUNTER	80009	156-0032-00
U381	156-0032-00			MICROCIRCUIT,DI:4-BIT BINARY COUNTER	80009	156-0032-00
U391	156-0032-00			MICROCIRCUIT,DI:4-BIT BINARY COUNTER	80009	156-0032-00
U411	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U412	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U461	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00
U471	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U481	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U491	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
				CHASSIS PARTS		
B1002	119-0026-00			FAN,AXIAL:1.500 X 4.750 INCH,WHISPER	82877	WR2A1
B1024	147-0039-00			MOTOR,DC:BRUSH,24V,3A,155RPM	32480	PP1112-101
B1025						
DS1012	150-0134-00	B010100	B069999X	LAMP,CARTRIDGE:6.3V,200MA	55292	T6009H5292"&4"LD
	----- -----			(S/N B070000 UP FURN AS A UNIT WITH S1002)		
F1001	159-0046-00			FUSE,CARTRIDGE:3AG,8A,250V,MED-BLOW	71400	ABC 8
F1001	159-0017-00			FUSE,CARTRIDGE:3AG,4A,250V,FAST BLOW	71400	MTH4
	----- -----			(220V OPERATION ONLY)		
F1002	159-0003-00	B010100	B030859	FUSE,CARTRIDGE:3AG,1.6A,250V,SLOW-BLOW	71400	MDX16-10
F1002	159-0019-00	B030860		FUSE,CARTRIDGE:3AG,1A,250V,SLOW BLOW	71400	MDL1
F1002	159-0019-00			FUSE,CARTRIDGE:3AG,1A,250V,SLOW BLOW	71400	MDL1
	----- -----			(220V OPERATION ONLY)		
HR1026	119-0475-03			HEATING ELEM,EL:	80009	119-0475-03
J1	136-0156-01			CONNECTOR,RCPT,:22/44 PIN,CHASSIS MOUNT	05574	2VH22-1AN5
L1012	108-0769-00			COIL,TUBE DEFLE:	99409	C8640-3
L1020	105-0519-00			CLUTCH,MAGNETIC:24VDC,W/PULLY ON INPUT HUB	32496	501061
L1022	105-0520-00			CLUTCH,MAGNETIC:24VDC,W/SPROCKET ON INPUT	32496	501063
Q1010	151-0349-00			TRANSISTOR:SILICON,NPN,SEL FROM MJE2801	80009	151-0349-00
Q1012	151-0373-00			TRANSISTOR:SILICON,PNP	80009	151-0373-00
Q1026	151-0337-00			TRANSISTOR:SILICON,NPN	80009	151-0337-00
R1012	301-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.50W	01121	EB1035
R1024	----- -----			(FURNISHED AS A UNIT WITH HR1026)		
R1031	311-0310-00			RES.,VAR,NONWIR:5K OHM,20%,0.50W	01121	W-7350A
S1001	260-1497-00			SWITCH,PUSH:DPDT,10A,250VAC	01963	E79-30A
S1002	260-1490-00	B010100	B069999	SWITCH,TOGGLE:1 SECT,3 POSN,30 DEG	10389	27-112-298
S1002	260-1804-00	B070000		SWITCH,ROCKER:DPST,15A,125VAC,ON/OFF	73559	LTGM-0501-GNXTE5
	----- -----			(ALSO 10A,250VAC)		
S1012	260-1393-00			SWITCH,PUSH:SPST,NO KEYBOARD SWITCH	01963	M61-0100
S1025	----- -----			(FURNISHED AS A UNIT WITH HR1026)		
S1030	260-1719-00			SWITCH,ROTARY:1 SECT,5 POS,30 DEG	80009	260-1719-00
	----- -----			(OPTION 2 ONLY)		
T1001	120-0916-00			XFMR,PWR:	80009	120-0916-00
U1020	156-0417-00			MICROCIRCUIT,DI:OPTOELECTRONIC	03508	H13B1
V1	154-0629-01	B010100	B041549	ELECTRON TUBE:CRT	80009	154-0629-01
V1	154-0739-00	B041550		ELECTRON TUBE:CRT	80009	154-0739-00

OPTIONS

The 4631 Hard Copy Unit has the following options available at the time of this printing. Please refer to the TEKTRONIX Catalog for an up-to-date listing of options.

Option 1 Copy Counter

The Copy Counter option is factory installed with a four-digit readout located on the Control Panel.

Option 2 Multiplexer

The Multiplexer option permits the 4631 to be connected simultaneously to as many as four storage display units and/or computer terminals. All maintenance and operating information peculiar to this option is described on the following pages.

Option 31 4025 Hard Copy Compatability

The 4025 Hard Copy Compatability option permits the 4631 to be operated in conjunction with the 4025 Terminal. All maintenance information unique to this option is described on the following pages.

4631 HARD COPY UNIT
OPTION 2
MULTIPLEXER

CONTENTS

4631 HARD COPY UNIT OPTION 2

INTRODUCTION

Option 2 adds multiplexing capability to the 4631 Hard Copy Unit and thus permits it to make copies from up to four storage display units and/or computer terminals.

With Option 2, the 4631 Multiplex Interface Assembly is installed in place of the Standard Interface Assembly. The Multiplex Interface Assembly consists of a rear panel with a Multiplex card attached. Option 2 rear panel contains four 15-pin connectors, one for each channel, and a Multiplexer/Channel Select switch.

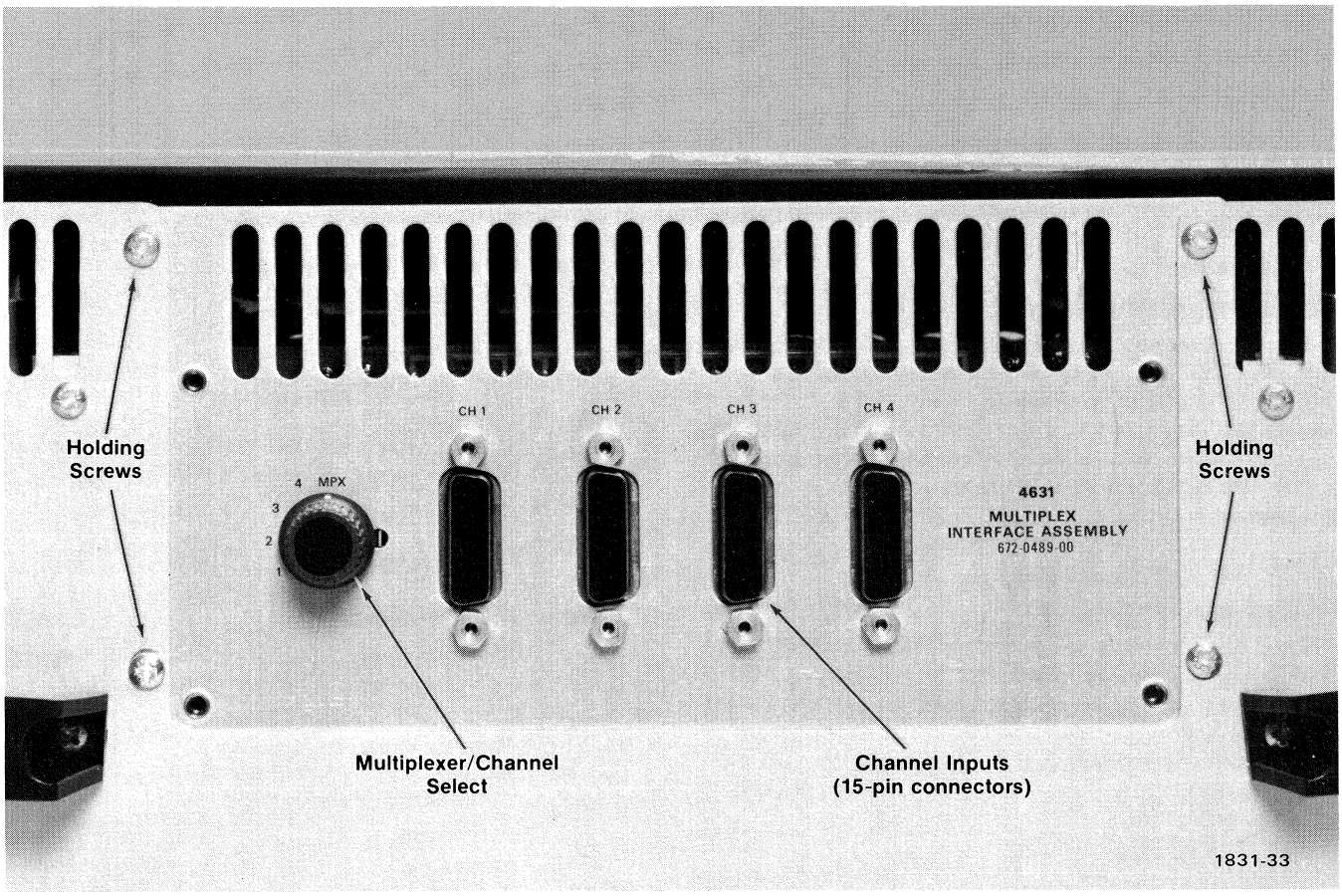
With the exception of the Multiplexer/Channel Select switch, the basic operation of the unit with the Option 2 is the same as for the standard 4631 Hard Copy Unit.

This description contains a circuit description and other information unique to Option 2 and not included elsewhere in the manual. Whenever information contained elsewhere in the manual might be useful, the reader is referred to the proper section of the manual. The diagrams unique to Option 2 appear at the end of the Diagrams section. The Replaceable Electrical and Mechanical Parts lists for Option 2 are located at the end of their respective sections.

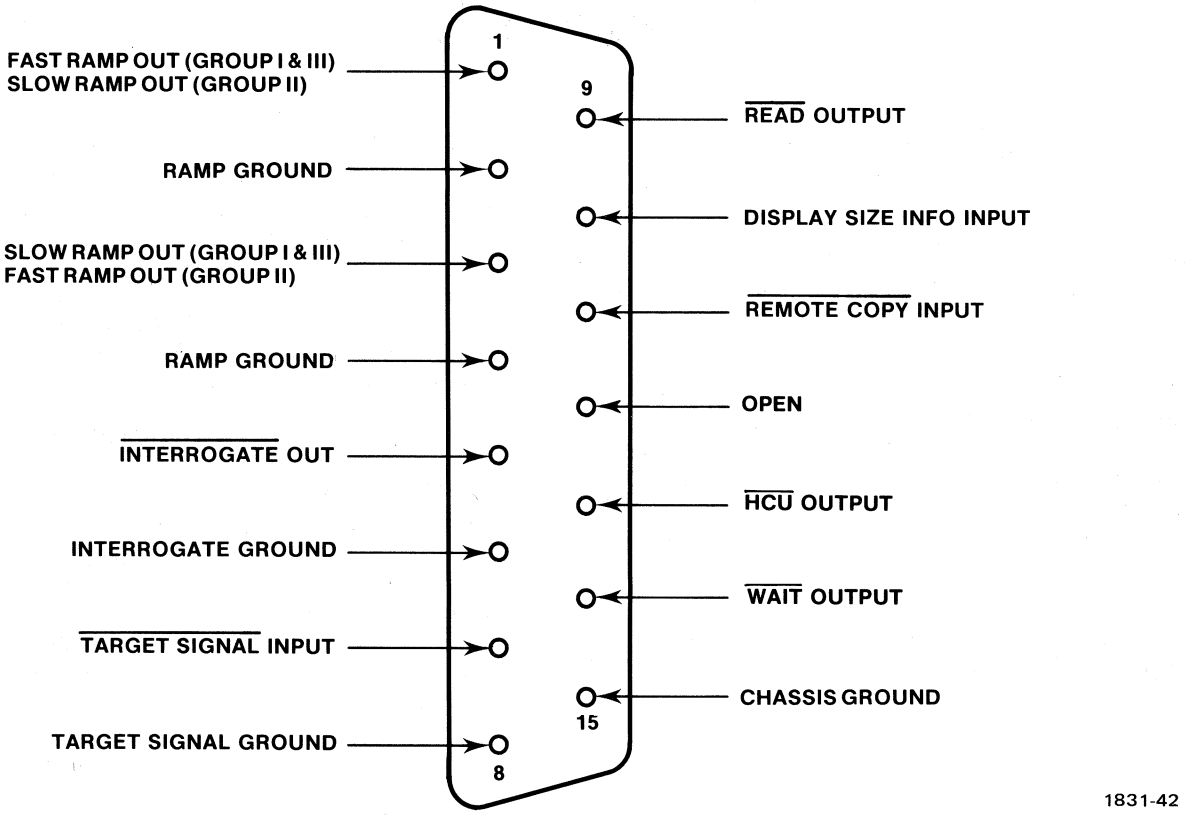
EXTERNAL CONNECTORS

15-Pin Connectors

Four 15-pin signal input connectors are located on the rear panel (see Option 2, Fig. 1). These connectors allow up to 4 Tektronix storage terminals or compatible display units such as Tektronix 613 and 613-1 to be connected. Tektronix 611 Display Unit is not compatible with the 4631. The 15-pin connector signal locations are given in Option 2, Fig. 2.



Option 2 Fig. 1. Multiplex Interface Assembly (installed) showing the rear panel.



Option 2 Fig. 2. 15-pin connector signal locations.

CONTROLS

Multiplexer/Channel Select Switch

The five-position rotary switch on the rear panel selects CH 1, CH 2, CH 3, CH 4, or MPX (Multiplex) position. When the switch is placed in the MPX position, the instrument selects the first input that supplies a remote copy command; subsequent remote copy commands are stored and copied in rotation. The front-panel COPY button is disabled when the switch is in the MPX position.

P110, Copy Format Select

The 10-pin harmonica connector P110 is located on the Timing board (see Option 2, Fig. 3) and can be set to positions I, II, or III. The position selected sets the format and the copy time for the incoming signal. Signals from 11 inch displays use position I, or II. Signals from 19 inch displays use position I for low resolution and position III for high resolution.

Use connector position I for most copy operations involving both an 11 inch and 19 inch display. From some 19 inch displays where graphic displays become complicated, an excellent copy can be obtained using connector position III. For additional information see the 4631 Hard Copy Unit users manual.

ACCESSORIES

See the Accessories as listed in the 4631, since no additional accessories are given for the 4631 Option 2.

CHARACTERISTICS

General Characteristics

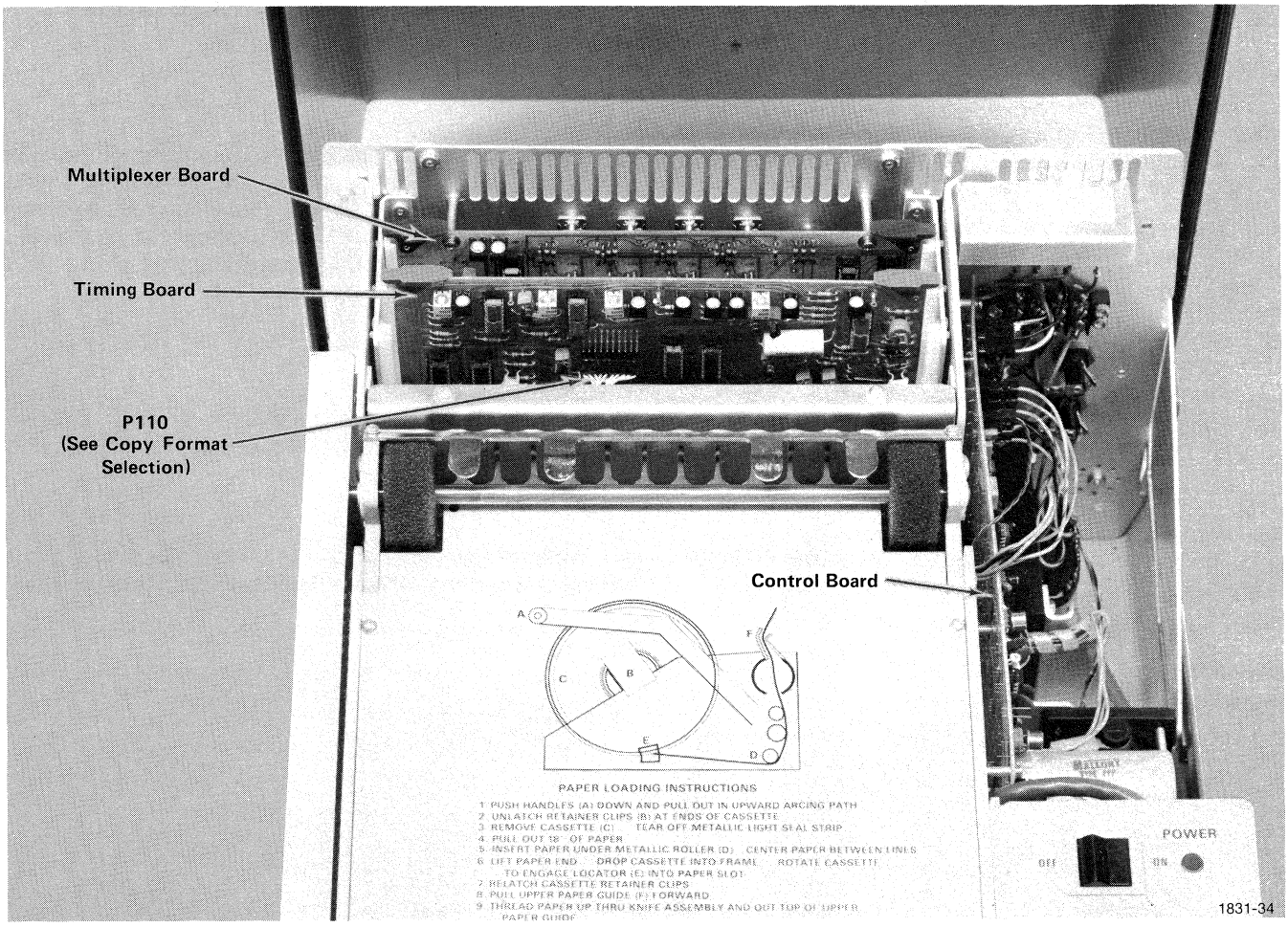
1. The 4631 Hard Copy Unit Option 2 has four channel capacity with a 15-pin connector for each channel.

2. Multiplex mode or single-channel selectable with a 5-position rotary switch on the rear panel.

Table

The following Table includes characteristics that are unique to 4631 Hard Copy Unit Option 2.

@



Option 2 Fig. 3. Location of the Multiplex card (part of the Multiplex Interface Assembly) and the Timing card.

OPTION 2 TABLE 1

Multiplex

Characteristics	Specification
Target Signal Input	TTL from Display Unit
Front-panel COPY	Ground Closure Disabled in MPX (Multiplex)
Remote Copy	TTL (pulse width > 1 ms)
Interrogate	TTL to Display Unit
Period (11″ display)	2.0 μs
Period (19″ display)	1.4 μs
Read	TTL to Display Unit
Z Axis Signal	Max 5 V signal to Z axis amplifier. Amplitude controlled by front-panel LIGHT-DARK control.
HCU	Open Collector, Low if HCU can be addressed.
WAIT	Open Collector, Low until the Display has been scanned.

ADJUSTMENTS

The adjustment procedure for the 4631 Hard Copy Unit Option 2 is the same as for the 4631 Hard Copy Unit as given in Section 3 of this manual, with the exception of Step 8 (Interrogate Board).

Make the following changes:

Step 8a. (3) Change R28 to R17

Step 8a. (6) Change R24 to R15

Note the locations of R15 and R17 are shown in Option 2 Fig. 4.

OPTION 2 INTERFACE BLOCK DESCRIPTION

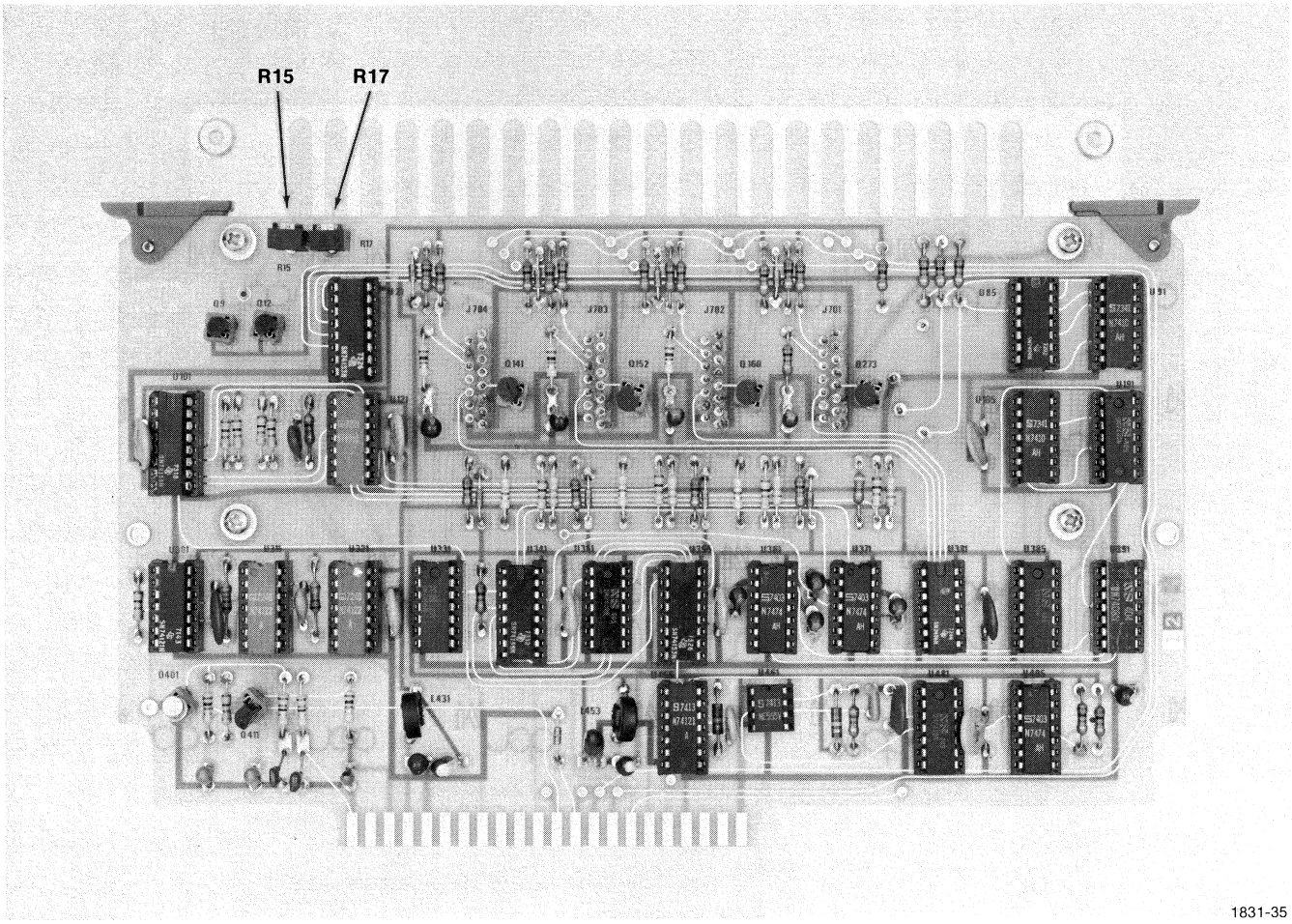
General

The Option 2 Interface Block Diagram shows the 4631 Option 2 Multiplex Interface Assembly including a 15-pin connector, Multiplex/Channel Select switch, and the Multiplex board. Also included to show the interfacing connections are the Timing board and part of the Main board.

Channel Selection

Selection of the input channel CH 1, CH 2, CH 3, CH 4, or MPX is set by Multiplex/Channel Select switch located on the rear panel.

When the switch is set to CH 1, CH 2, CH 3, or CH 4, it controls the Channel Select Logic, which allows the clock



Option 2 Fig. 4. Multiplex Interface Assembly showing the Component side of the Multiplex board.

to advance the counter in a four position sequence to the appropriate channel. Then the counter output sets the Select inputs of the three Multiplexers and two Demultiplexers to connect the selected channel.

When the switch is set to the MPX (Multiplex) position, it allows the clock to advance the counter in the same 4 position sequence. When a REMOTE COPY input signal is received, the command is recorded in the appropriate channel of the Remote Copy Memory. When the counter has sequenced to set this channel, a REMOTE COPY output signal is applied to the Timing board via the Main board. A resulting COPY BUSY signal is received by the counter to stop and hold the counter during COPY BUSY. So during COPY BUSY the counter holds the Select inputs of the three Multiplexers and two Demultiplexers to connect the commanded channel.

Interrogate

The Interrogate circuit generates an INTERROGATE signal for the appropriate display unit. The DISPLAY SIZE INFO signal and the INTERROGATE CONTROL signal control the circuit.

Target Signal

When the TARGET SIGNAL is received from the display unit, the Z Axis Drive circuit generates a Z AXIS output signal to the Main board. The output is affected by the LIGHT-DARK CONTROL signal, and timed by the INTERROGATE CONTROL signal.

Ramps

The FAST RAMP and the SLOW RAMP are connected through the Multiplex board to all four input connectors.

MULTIPLEXER BOARD DESCRIPTION

General

The Multiplex Board (see the circuit diagram) contains the following circuits: Channel Select Logic, HCU Drivers, Counter, Clock, (Three) 4:1 MUX (Multiplexers), (Two) 1:4 DEMUX (Demultiplexers), Remote Copy Memory, Wait Drivers, Interrogate, Interrogate Output, and Z Axis Drive.

Channel Select Logic

The position of the Multiplex Channel Select switch on the rear panel sets the state of the four, three-input nand gates U85A, U85B, U91A, and U91B. The outputs from these gates drive nand gates (U191A, B, C, and D) and sets four nand gates in the Counter circuit (U385A, B, C, and D). When the switch is set to MPX, the nand gates allow the counter to free run. When the switch is set to any of the channel positions, the nand gates lock the logic in the counter to the proper state for the selected channel.

Nand gates U191 A, B, C, and D drive the HCU Drivers to output the HCU signal to all four outputs (provided the switch is in the MPX position), or output HCU to the channel selected. The nand gates also drive four and gates (U391A, B, C, and D) in the Remote Copy Memory circuit to enable all gates in the MPX position, or to enable one gate for the channel selected.

In addition, when the switch is in the MPX position, the MPX signal is inverted by U381A to drive the FRONT COPY ENABLE signal to disable the front-panel COPY control.

Clock and Counter

The Clock consists of free running oscillator U461 with the frequency and duty cycle controlled by R470, R472, and C473. Assume that COPY BUSY signal is high; the rectangular-wave output signal from the Clock through and gate U481B drives the counter, and is sent through U481A to U455. The counter consists of two multivibrators (U485A and B) with signal-connecting nand gates U385A, B, C, and D. When a channel is selected by the Multiplex-/Channel Select switch S1030, one of the gates is disabled. All of the gates are enabled when MPX is selected. The counter output sets the coded signals to the Select lines of the Multiplexers and the Demultiplexers (per Option 2 Table 2). For example, when channel 1 is selected, Gate U385A is disabled to hold the counter output at U485B pin 9 (B) low and U485A pin 5 (A) low.

OPTION 2 TABLE 2

Counter Output

Select Lines	CH 1	CH 3	CH 4	CH 2
A	L	L	H	H
B	L	H	H	L

When the MPX is selected, the counter free runs, producing the output conditions as shown in Option 2, Table 2. When a Remote Copy command is processed, a resulting COPY BUSY signal is received to disable and gate U481B, halting further clock outputs. This holds the counter on the commanded channel during COPY BUSY. U481B output (during COPY BUSY) also disables U455.

Remote Copy Memory

The Remote Copy Memory consists of four D-type flip-flops; U361A, U361B, U371A, and U371B. The flip-flops are cleared by and gates U391A, B, C, and D with signals from the Channel Select Logic circuit. When the power is

first applied, the output of the and gates are held low by R489 and C491 to initially clear the flip-flops. If a single channel is selected, the clear input of the selected channel flip-flop is held high, while the other clear inputs of the other remaining flip-flops are held low. If MPX is selected, all of the clear inputs are held high by the and gates.

Assume that MPX is selected, When an initial REMOTE COPY command is received from one of the four inputs, the appropriate flip-flop is preset to output a low signal to the 4:1 MUX U355A input. Then, when the counter sequences to the commanded channel, the 4:1 MUX outputs the low signal to drive U455 and output REMOTE COPY. The resulting COPY BUSY signal holds the counter in the commanded channel for the duration of COPY BUSY. Subsequent REMOTE COPY commands preset their memory flip-flops to present low signals to the 4:1 MUX. Then, when the COPY BUSY signal goes high, the counter sequences the 4:1 MUX to the next activated channel in the memory to output another REMOTE COPY signal.

The READ signal is connected to the Clock input of the selected memory channel by the 1:4 DEMUX U341A. The selected memory channel (D flip-flop) is reset (clocked to a high Q output) when the READ signal goes positive. So the memory is ready to accept another REMOTE COPY command. In addition, the 1:4 DEMUX outputs the READ signal to the appropriate display unit.

WAIT DRIVERS

The READ signal or the Remote Copy Memory output signal of each channel is outputed as a WAIT signal using or gates U351A, B, C, or D and inverters U331B, C, D, or E.

Interrogate

The Interrogate circuit generates an interrogate signal that is output through the 1:4 DEMUX U101B and the Interrogate Output circuit for the appropriate display. The DISPLAY SIZE INFO that is selected by the 4:1 MUX U21A, and the INTERROGATE CONTROL signal regulate the circuit.

Initially, when the INTERROGATE CONTROL signal goes high, it triggers monostable multivibrator U301, to initiate an approximate 400 nanosecond positive pulse at the Q output (pin 6 of U301). The trailing edge of this 400 nanosecond pulse triggers U321, which gives a positive pulse at pin 8 of U321. The duration of the pulse is controlled either by current through adjustment R15 when the Display Size Info is low (19 inch display) or by current through adjustment R17 when the Display Size Info is high (11-inch display). The trailing edge of the pulse from U321 triggers U301, which again triggers U321. This continues until the INTERROGATE CONTROL goes low and disables U301. The output of the circuit at U301 pin 1 is connected by the 1:4 DEMUX U101B to the appropriate Interrogate Output circuit. Each Interrogate output circuit, consisting of an inverter and a transistor, drives a display unit.

Z Axis Drive

The circuit consists of U311, Q401, and Q411. It outputs the Z AXIS signal during the INTERROGATE CONTROL signal time. The TARGET SIGNAL from a display Unit is selected by the 4:1 MUX U21B to trigger U311, a one microsecond monostable multivibrator. The resulting negative pulse from U311 pin 6 turns off Q401. The collector of Q401 will go to the voltage level at the emitter of Q411, thus producing the Z AXIS output signal. This voltage level is controlled by the front-panel LIGHT-DARK CONTROL signal through edge connector pin 12 to set the base voltage of Q411.

4025 HARD COPY COMPATIBILITY
4631 OPTION 31

CONTENTS

4025 HARD COPY COMPATABILITY 4631 OPTION 31

INTRODUCTION

When a 4631 unit has been modified with Option 31, this text supports that modification and supersedes conflicting data in the 4631 Service Manual. The modification consists of hardware changes on the Timing Board, adjustment of the Fast Ramp signal, installation of a new interrupter wheel, and adjustment of the motor speed. (This modification has already been made if Option 31 is installed at Tektronix.)

The diagram unique to Option 31 appears after the standard timing board diagram 4 in the Diagrams section. The Replaceable Electrical and Mechanical parts lists for Option 31 are located at the end of their respective sections.

INSTALLATION

Installation of Option 31 in the 4631 Hard Copy Unit requires two operations: installation and adjustment of the 312 slot interrupter wheel and insertion of the new Timing board. For the interrupter wheel, refer to Cathode Ray Tube Replacement in the Service section of the 4631 Service Manual; for the Timing board, refer to Circuit Card or Board Replacement, also in the Service section.

CHARACTERISTICS

The following table includes characteristics that are unique to 4631 Option 31.

Option 31 Table 1

Characteristic	Specification	Supplemental Information
Copy time Group III	50 seconds	(20 seconds exposure time)

ADJUSTMENTS

The following adjustment procedure should be used in place of the 4631 Service Manual procedures.

1. Connect an oscilloscope probe to connector J34-6 on the Control board. Push COPY and adjust R50 to obtain a clean signal with a period of about 3.1 ms. The interrupter photodiode assembly alignment may need slight changes to ensure a clean signal.

2. Perform, with the exceptions indicated, the following procedures in Electrical Adjustment Procedure in Section 4 of the 4631 Service Manual.

a. Control board—ADJUST Motor Speed: In Step 4, the square wave should have a period of 3.3 ms, and in Step 7, the square wave should have a period of 6.6 ms.

b. ADJUST Fast Ramp: In Step 3, make the ramp 2.9 ms.

c. ADJUST Slow Ramp Position.

d. ADJUST Slow Ramp Ending.

THEORY OF OPERATION

Making the 4631 Hard Copy Unit compatible with the 4025 requires changing the number of interrogate pulses per video line and changing the aspect ratio of the hard copy. The Fast Ramp signal is increased to 2.9 ms, allowing approximately 2070 interrogate pulses to be delivered to the 4025. This enables the 4025 to generate data for a complete video line and transmit it to the 4631. (Fifty-three lines of memory are hard copied each time a hard copy is initiated even though only 32 lines can be displayed on the 4025 screen.) The new interrupter wheel has 312 slots as opposed to 270 for the standard 4631. The

resulting increase in the horizontal line rate (by changing the interrupter wheel) necessitates altering the stepper counter gating circuitry. The 4096 count end-of-copy signal produces an eleven-inch paper copy length.

The Timing board ensures that the margin and end-of-paper signals are correct for the modified stepper pulse count.

On instrument power-up, U351D acts as an inverter and clears U471B due to the time constant of C361 and R361. When REMOTE COPY or FRONT PANEL COPY go low, U461 generates a pulse which sets U471B. Stepper pulses increment the counter (consisting of U391, U381, and U371). U161A controls the bottom margin in group II at a count of 2816. U161C controls the right margin in group I and III at a count of 3584. U161B controls the Drive Roller signal. When the stepper pulse count reaches 2048, pin 11 of U371 goes high so that pin 11 of U471B receives a high-to-low transition. At a count of 4096, pin 11 of the U471B flip-flop receives a low-to-high transition which resets the flip-flop, stopping the drive roller.

Resister R53 is a current-limiting resistor to slow the motor speed. Resistors R63, R64, and R62, in the Slow Ramp circuitry, enable the Slow Ramp to reach −5 volts.

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

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.

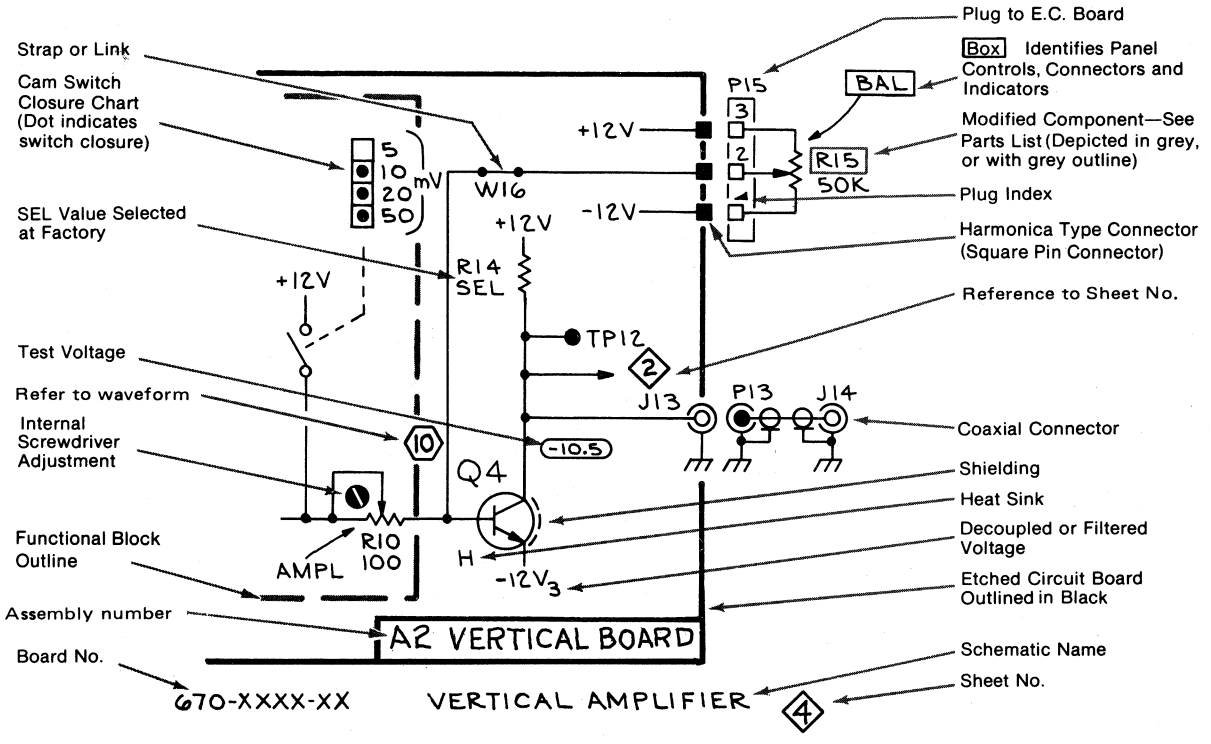
Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

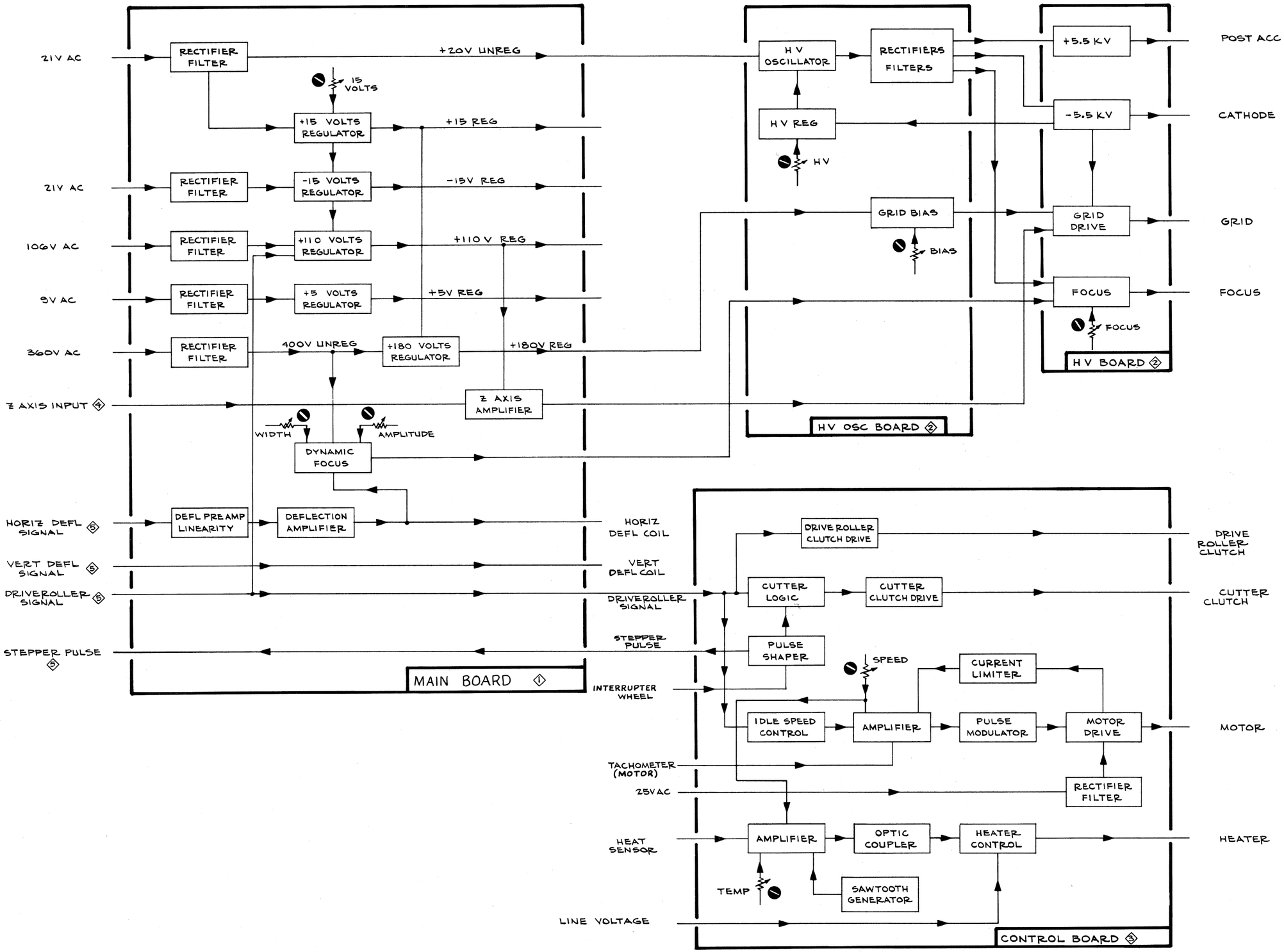
Y14.15, 1966	Drafting Practices.
Y14.2, 1973	Line Conventions and Lettering.
Y10.5, 1968	Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.

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:





4631

1831-43
REV B JUN 1978

MAIN FRAME BLOCK DIAGRAM

DIAGRAM

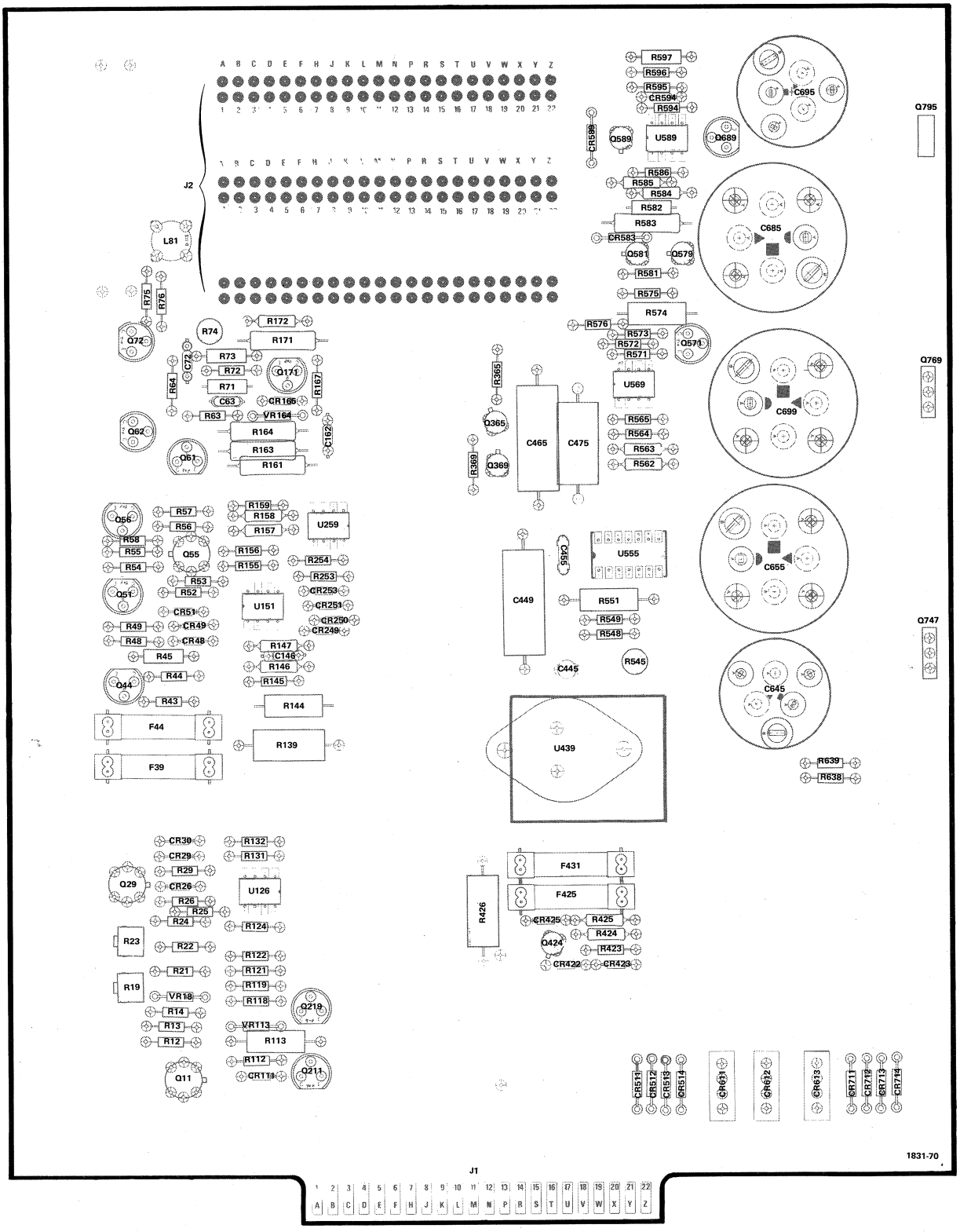
MAIN BOARD CONNECTORS

J-2
(INTERFACE CARD CONNECTORS)

GND	Z	22	GND
-15V	Y	21	-15V
+15V	X	20	+15V
+5V	W	19	+5V
$\overline{\text{COPY BUSY}}$	V	18	DRIVEROLLER CONTROL
$\overline{\text{REMOTE COPY}}$	U	17	STEPPER PULSE
$\overline{\text{READ}}$	T	16	FRONT COPY ENABLE
RAMP	S	15	FRONTPANEL COPY
RAMP GND	R	14	MOTOR CONTROL
RAMP	P	13	5K POT CW (DARK)
RAMP GND	N	12	5K POT WIPER
DISPLAY INFORMATION	M	11	5K POT CCW (LIGHT)
GND	L	10	GND
+110	K	9	VERT DEFLECT COIL
INTER CONTROL	J	8	VERT DEFLECT COIL
GND	H	7	GND
HORIZ RAMP SENSE	F	6	HORIZ RAMP IN
GND	E	5	GND
+5V	D	4	+5V
+15V	C	3	+15V
-15V	B	2	-15V
GND	A	1	Z-AXIS INPUT Z~1K

J-1
(MAINBOARD CONNECTOR)

	22	Z	360V AC
GND	21	Y	360V AC
GND	20	X	9.3V AC (5V SUP)
+5V	19	W	9.3V AC (5V SUP)
+15V	18	V	21.2V AC (15V SUP)
+15V	17	U	21.2V AC (15V SUP)
-15V	16	T	21.2V AC (-15V SUP)
-15V	15	S	21.2V AC (-15V SUP)
DRIVEROLLER CONTROL TTL	14	R	106V AC (100V SUP)
STEPPER PULSE	13	P	106V AC (100V SUP)
FRONT COPY ENABLE	12	N	25V TO HV
FRONTPANEL COPY	11	M	180V TO HV
MOTOR SPEED	10	L	
5K POT CW (DARK)	9	K	
5K POT WIPER	8	J	
5K POT CCW (LIGHT)	7	H	
VERT DEFLECT YOKE (YELLOW)	6	F	Q1012 EMITTER
VERT DEFLECT YOKE (BLACK)	5	E	Q1010 EMITTER
HORIZ DEFLECT YOKE (BLUE)	4	D	Q1012 BASE
HORIZ DEFLECT YOKE (RED)	3	C	Q1012 COLLECTOR
GND (DYN FOC SHIELD)	2	B	Q1010 BASE
DYNAMIC FOCUS OUTPUT	1	A	Q1010 COLLECTOR



Component locations for Main board and Power Supply.

TRANSFORMER INPUT CONNECTIONS

VOLTAGE	CONNECTION
100V	1-8, 4-5
115V	1-2, 3-4
120V	1-7, 4-6
200V	5-8
220V	5-7, 6-8
230V	2-3
240V	6-7

FIELD RAMP 4

DEFLECTION AMP

DYNAMIC FOCUS

AMPLITUDE

Z AXIS AMPL

Z AXIS 4

TP172

T1001

DRIVE ROLLER FROM J2-18

CONTROL BOARD 3

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

CONTROL 3 SLOW RAMP 4

4 FRONT PANEL COPY

5 OR 6 LIGHT-DARK CONTROL

4 +15V

4 DRIVE ROLLER SIGNAL

4 MOTOR SPEED

5 OR 6 STEPPER PULSE 4

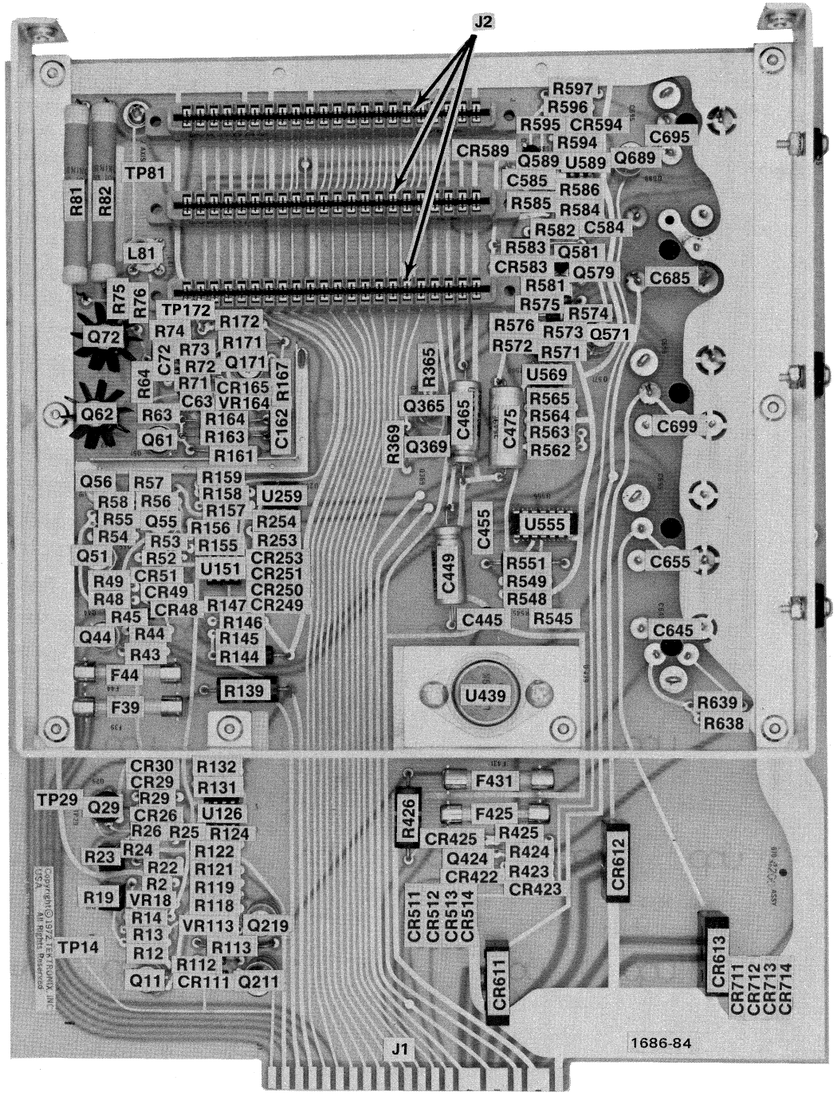
A1 MAIN BOARD

4631

REV F, JUN 1979
1831-46

MAIN BOARD & POWER SUPPLY 1
A1 670-2577-01,03,05

SUPPLY A1 670-2577-01 03, 05 1

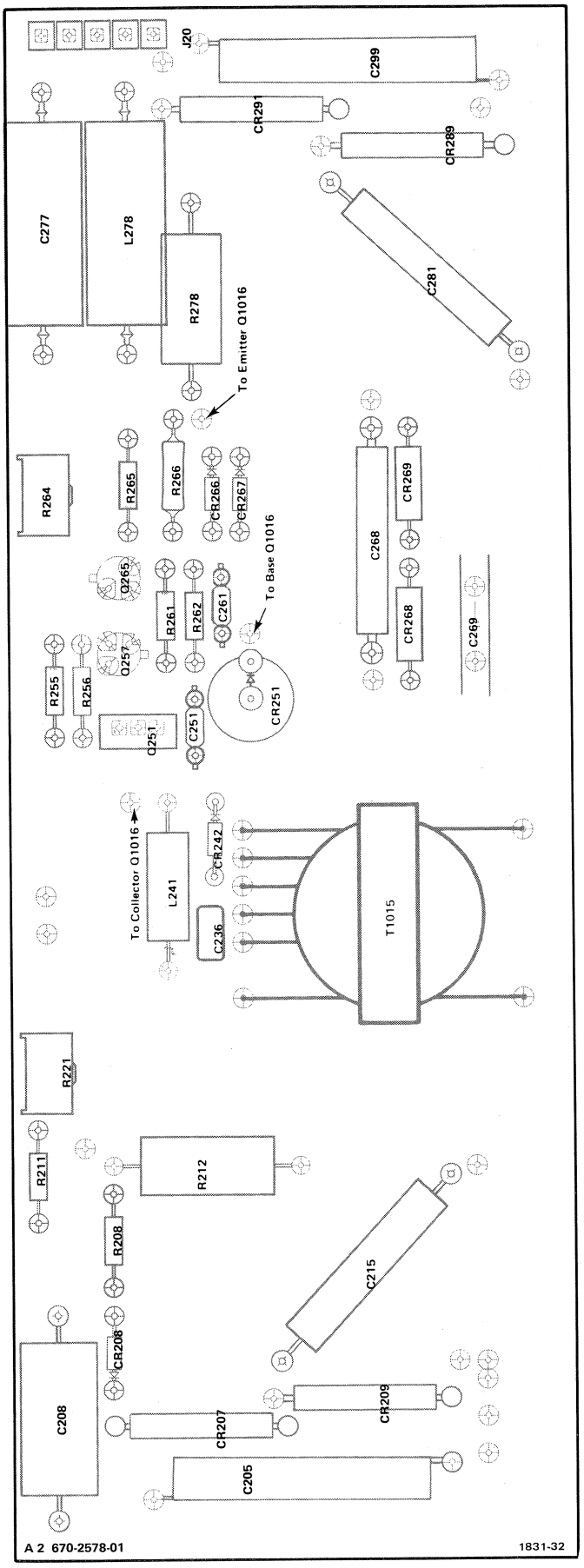


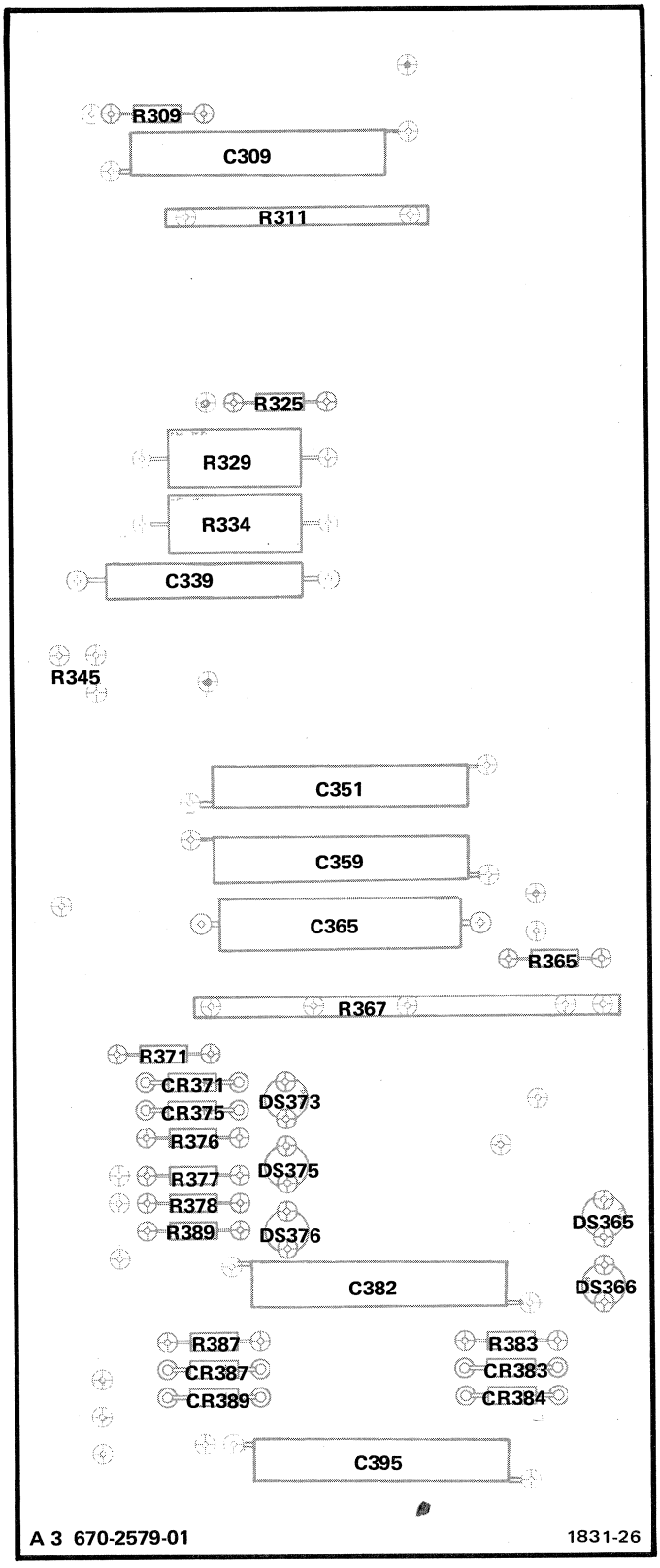
Component locations for Main Frame board and Power Supply (670-4200-00 & up).

TRANSFORMER INPUT CONNECTIONS

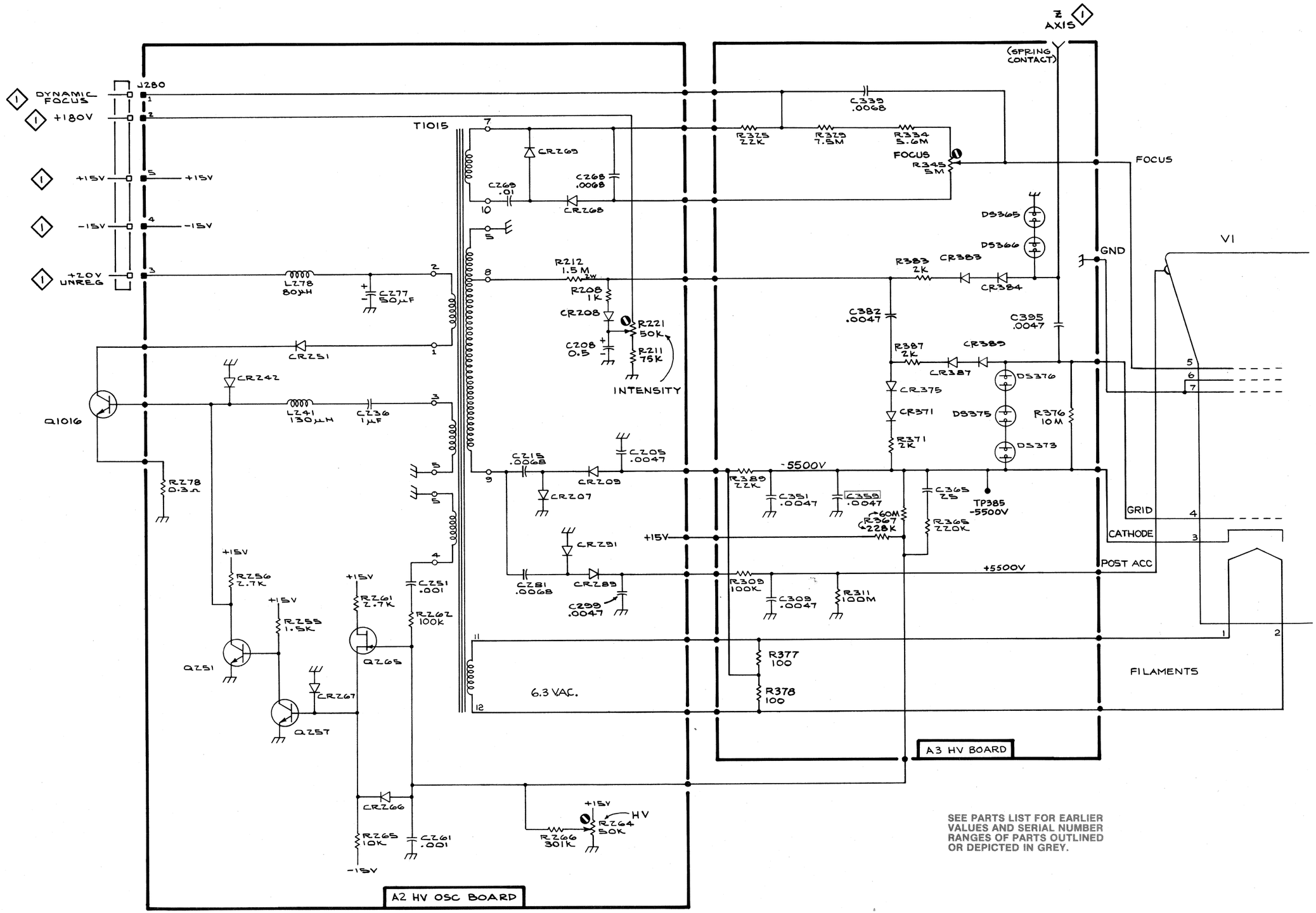
VOLTAGE	CONNECTION
100V	1-8, 4-5
115V	1-2, 3-4
120V	1-7, 4-6
200V	5-8
220V	5-7, 6-8
230V	2-3
240V	6-7

SUPPLY A1 670-4200-00 & UP





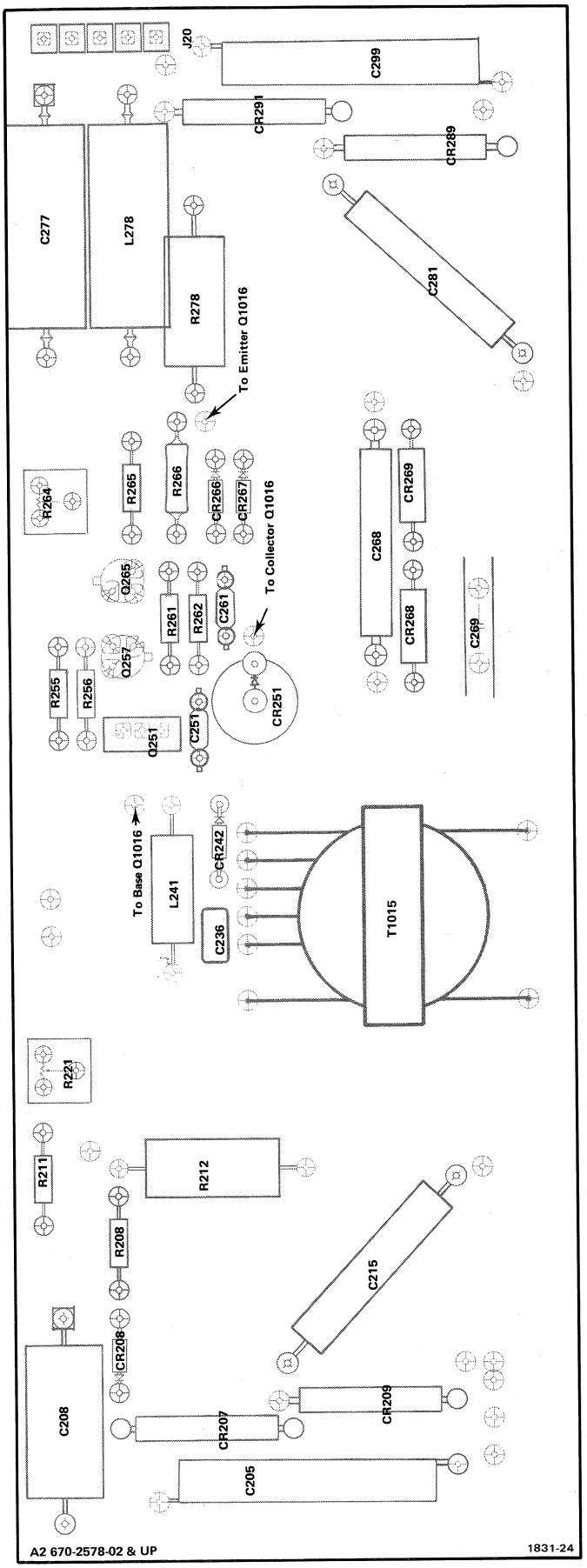
Component locations for High Voltage boards.



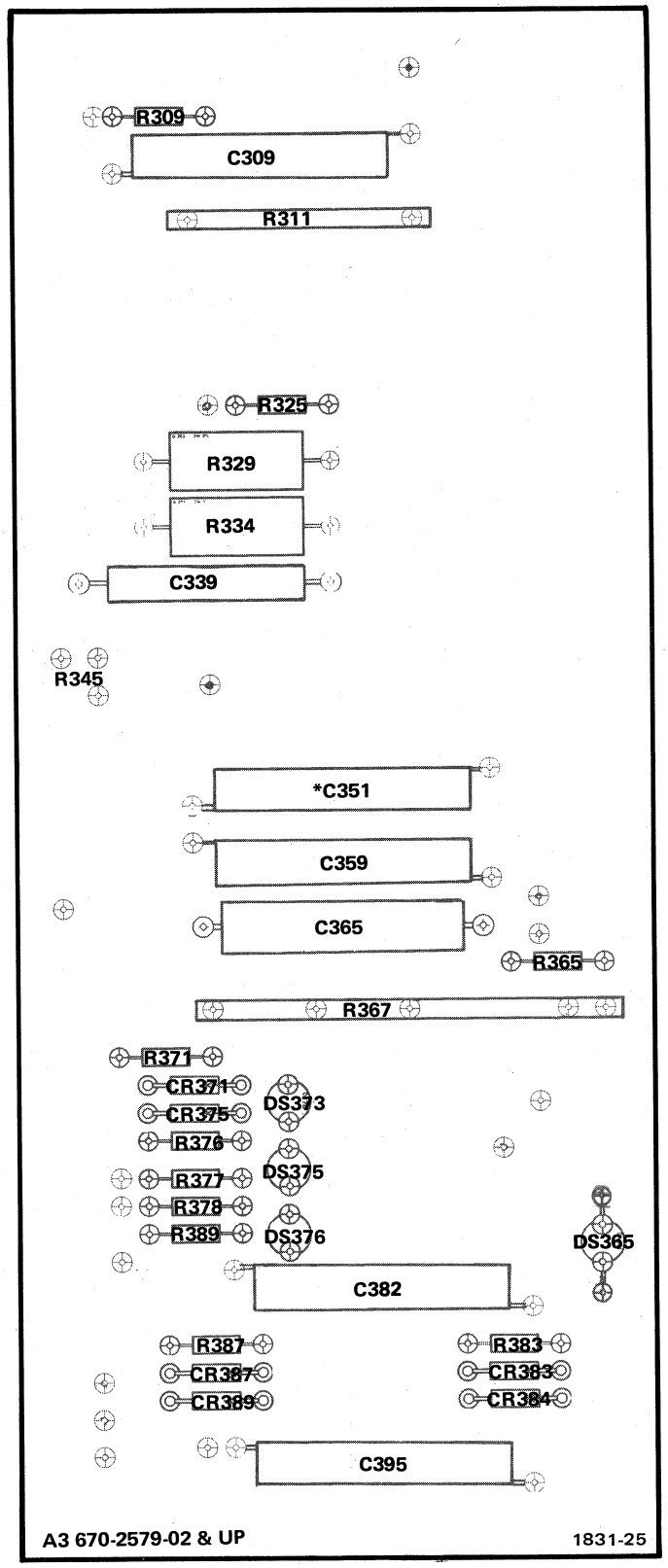
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.

REV'D, JUN 1979
1831-49

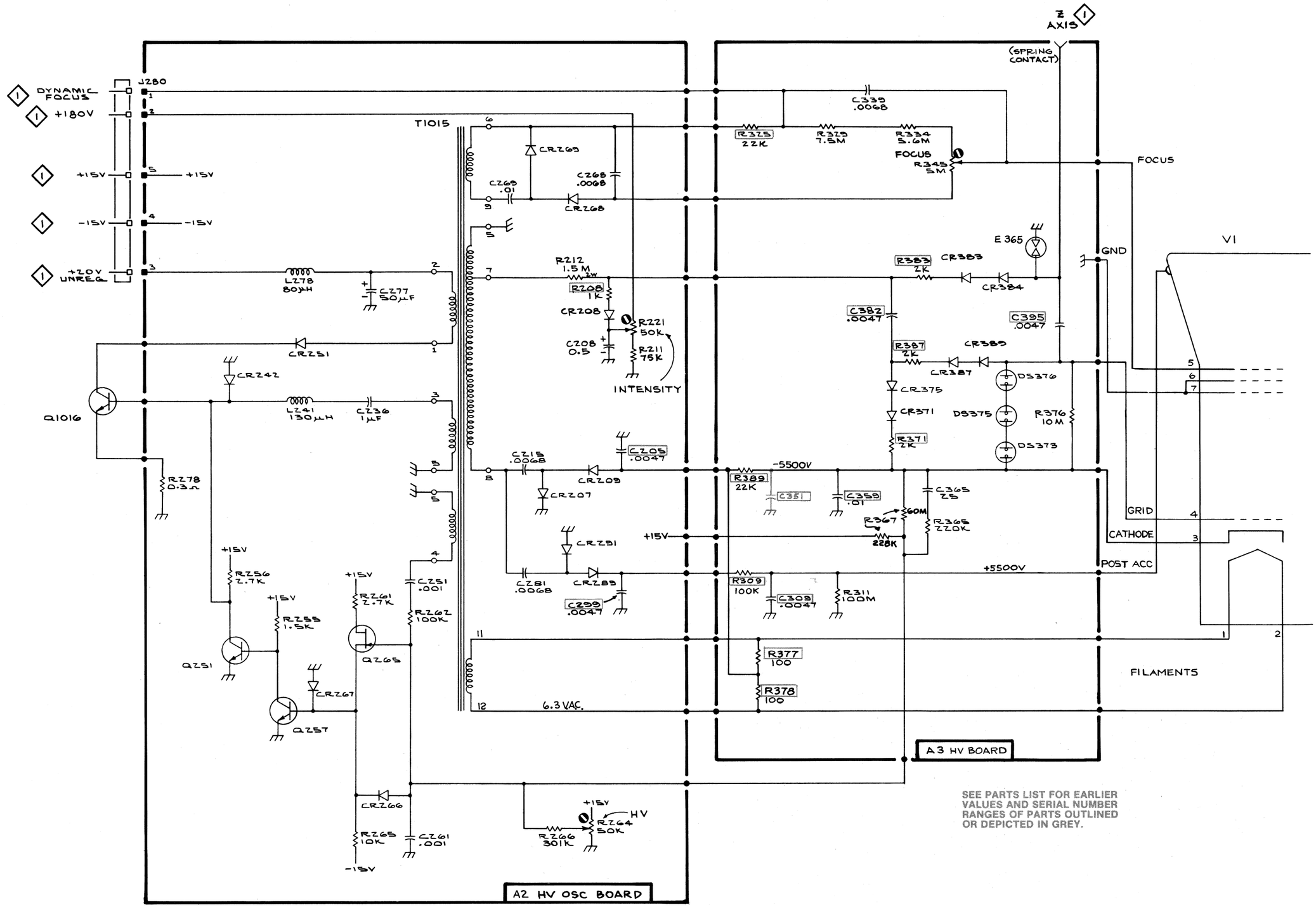
HIGH VOLTAGE BOARDS
A2 670-2578-01
A3 670-2579-01
2



*See Parts List for serial number ranges.



Component locations for High Voltage boards.



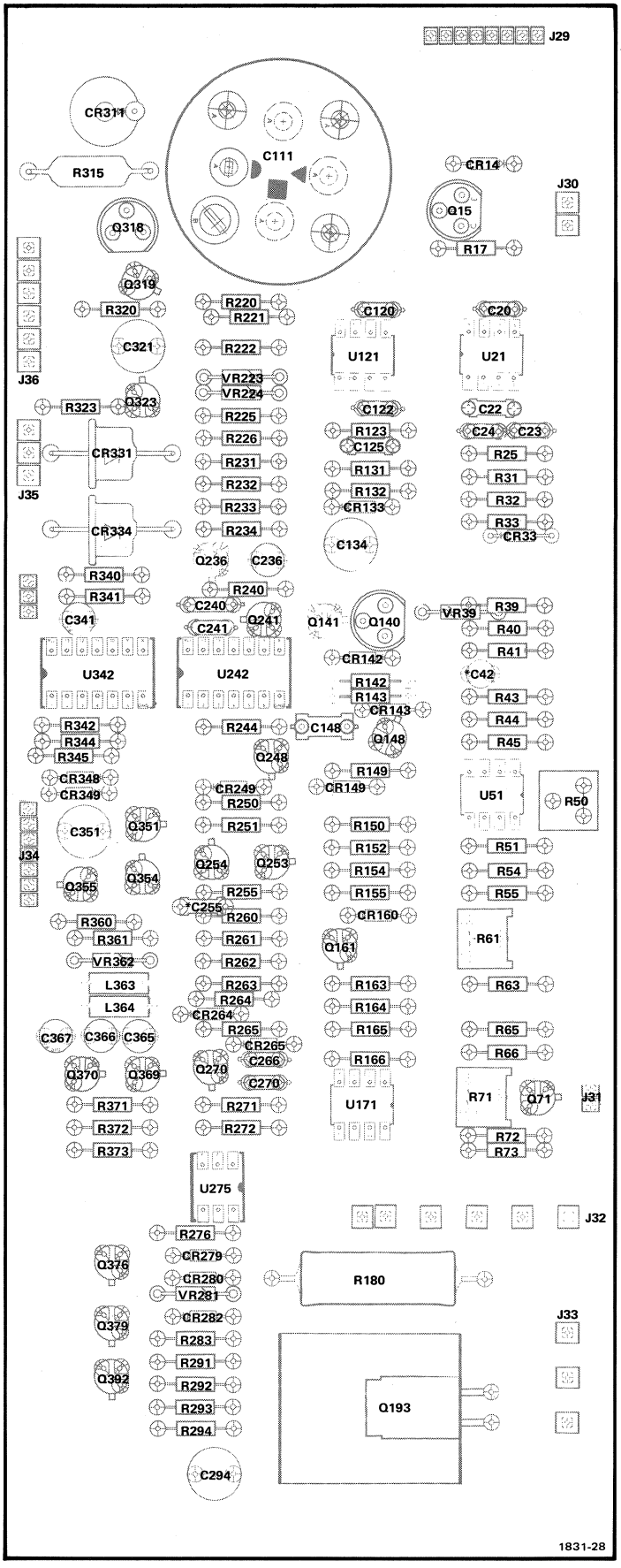
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.

4631

REV D, JUN 1979
1831-48

HIGH VOLTAGE BOARDS
A2 670-2578-02 & UP
A3 670-2579-02 & UP

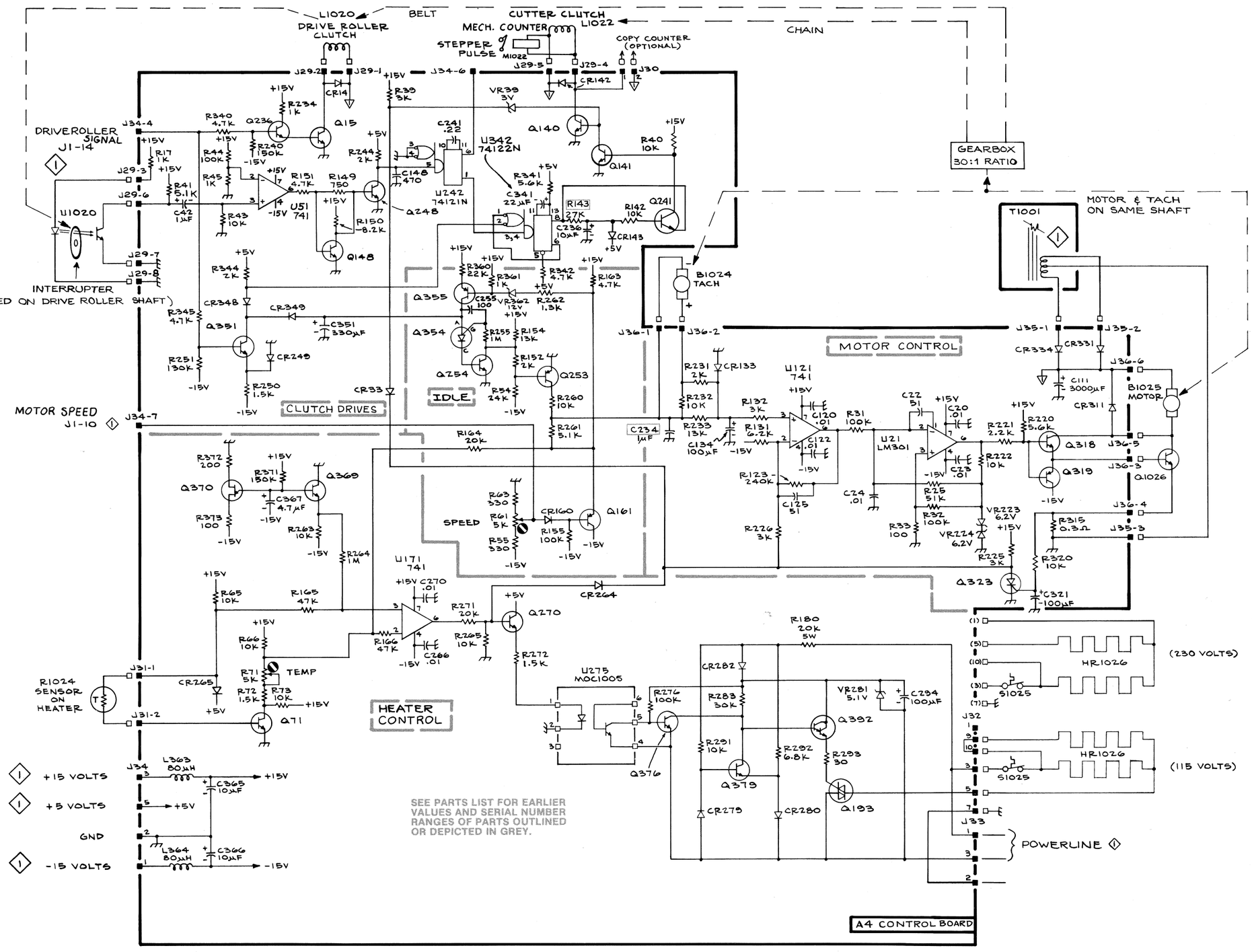
HIGH VOLTAGE BOARDS
A2 670-2578-02 & UP
A3 670-2579-02 & UP



Component locations for Control board (A4 670-3025-02 & up).

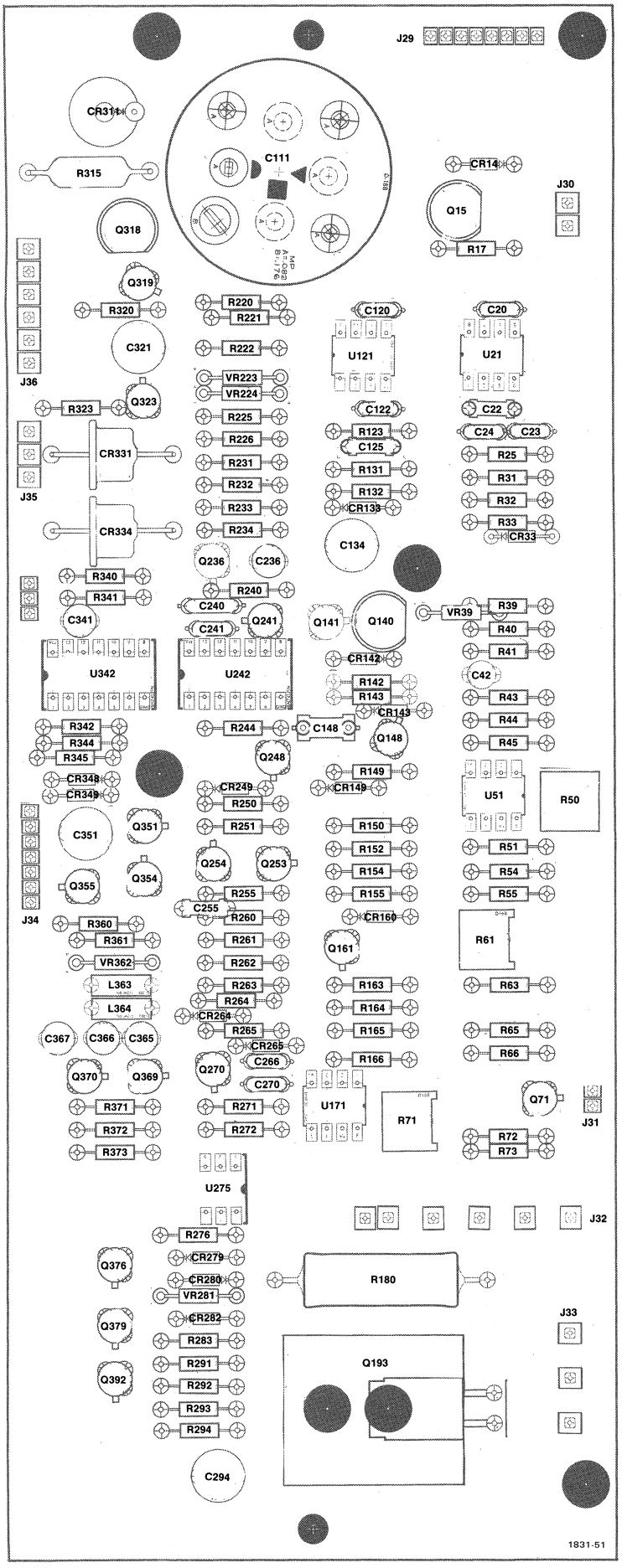
***See Parts List for serial number ranges.**

Located on back of board
C234



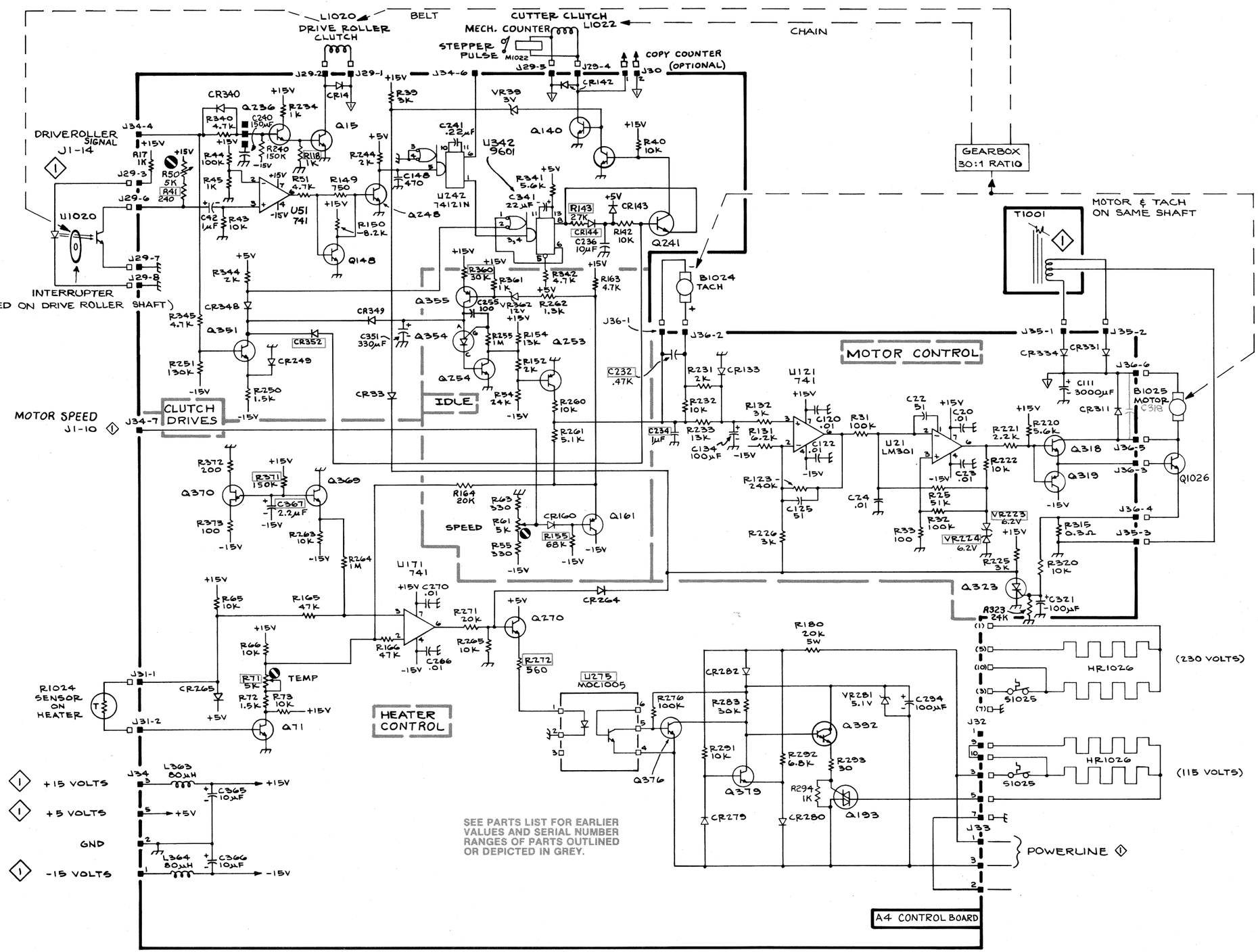
1831-50
REV E, NOV 1979

CONTROL BOARD ◇3
A4 670-3025-02 & UP



Component locations for Control board (A4 670-4104-00 & up).

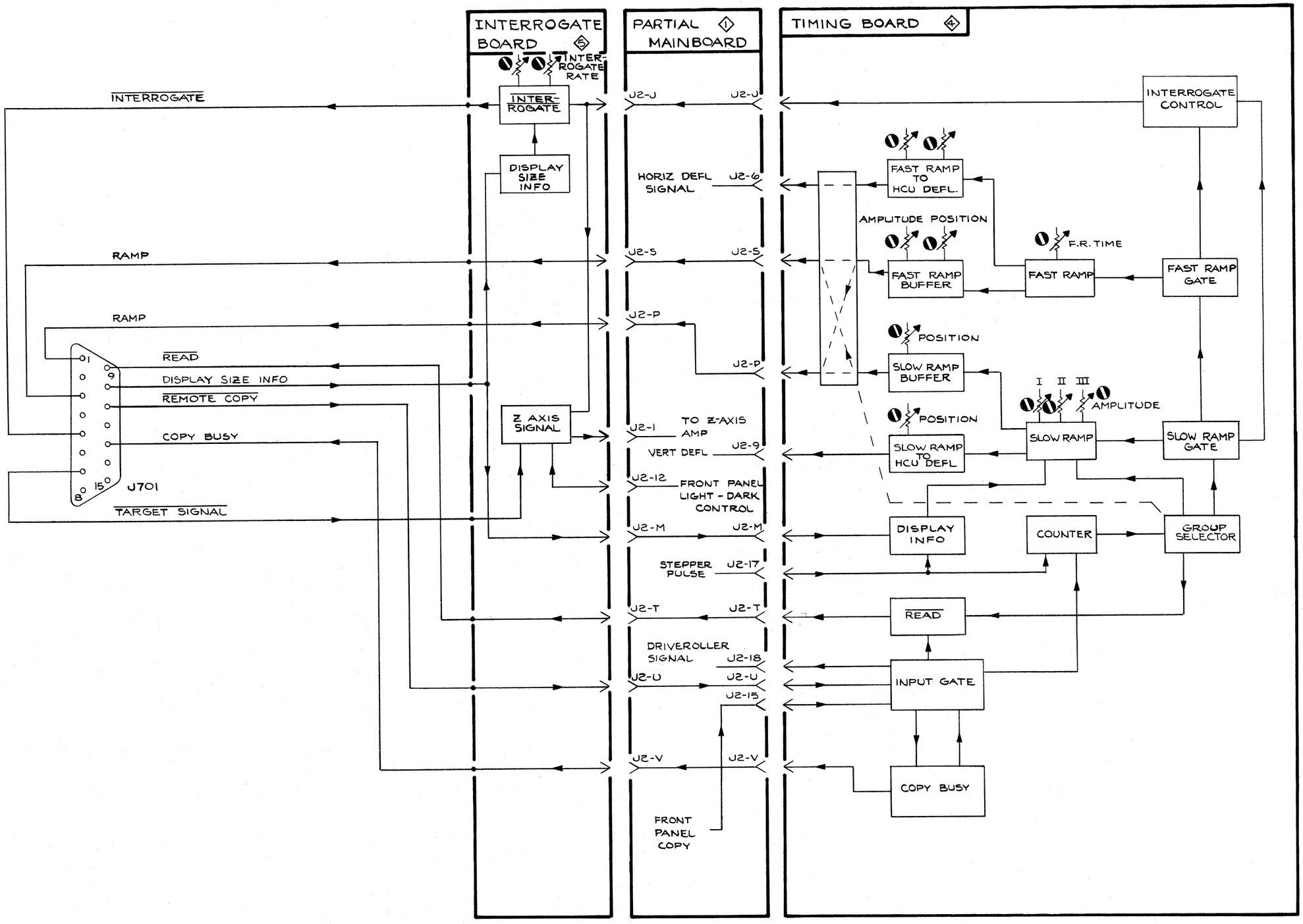
Located on back of board
C232 & C234



REV E, NOV 1979
(1831) 1831-52

CONTROL BOARD ③
A4 670-4104-00 & UP

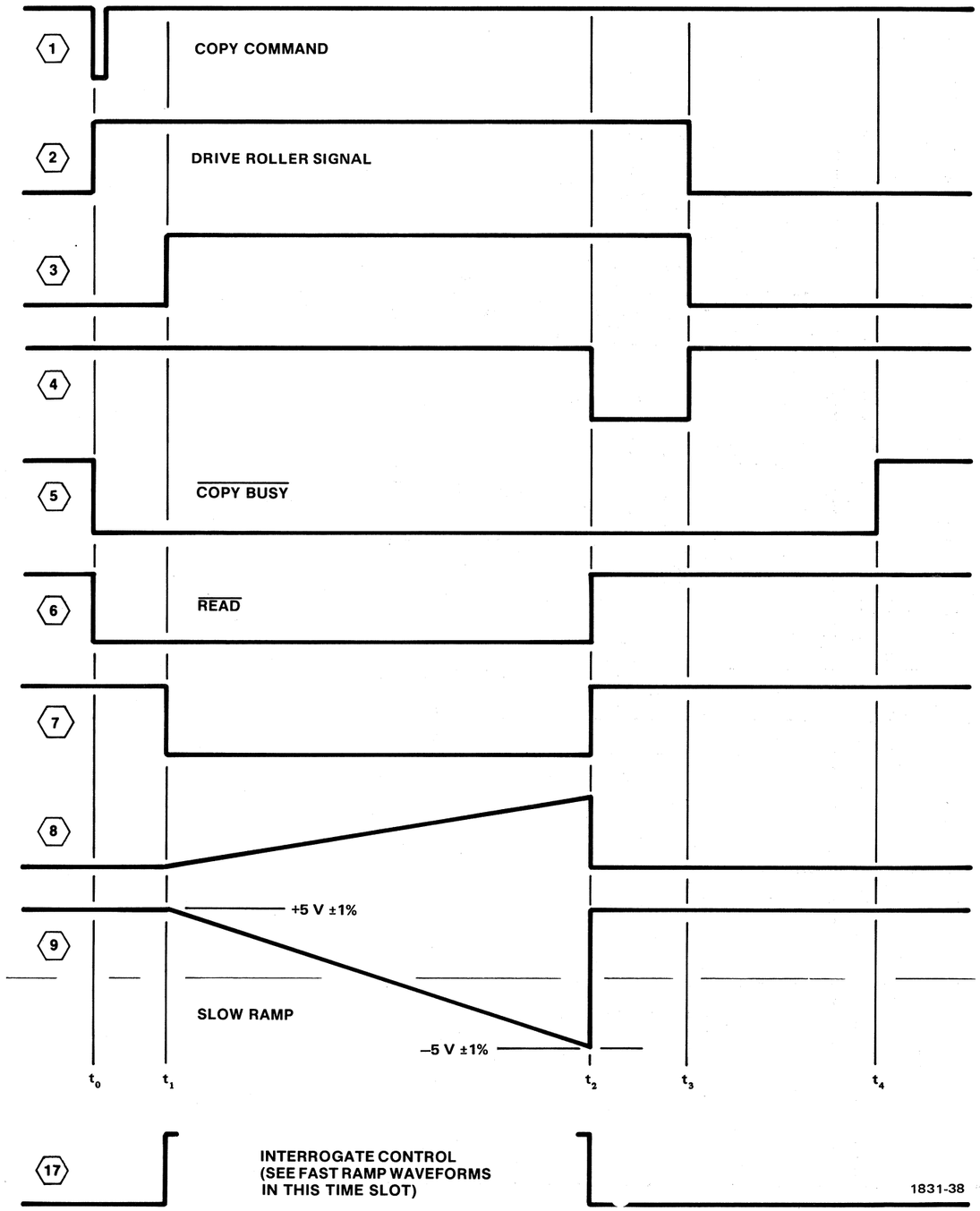
A4 670-4104-00 & UP



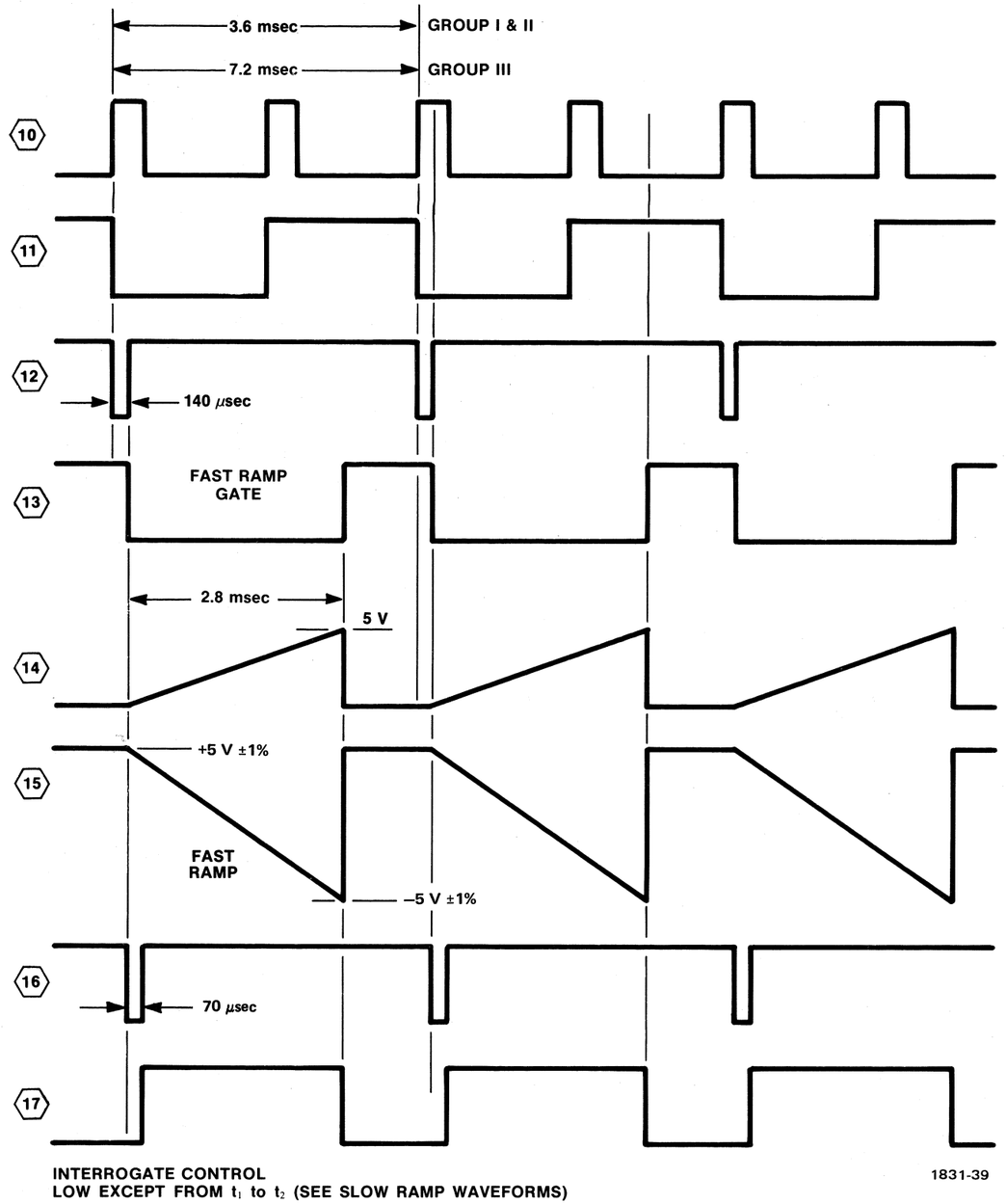
4631 STANDARD INTERFACE

REV C, JUN 1978
1831-53

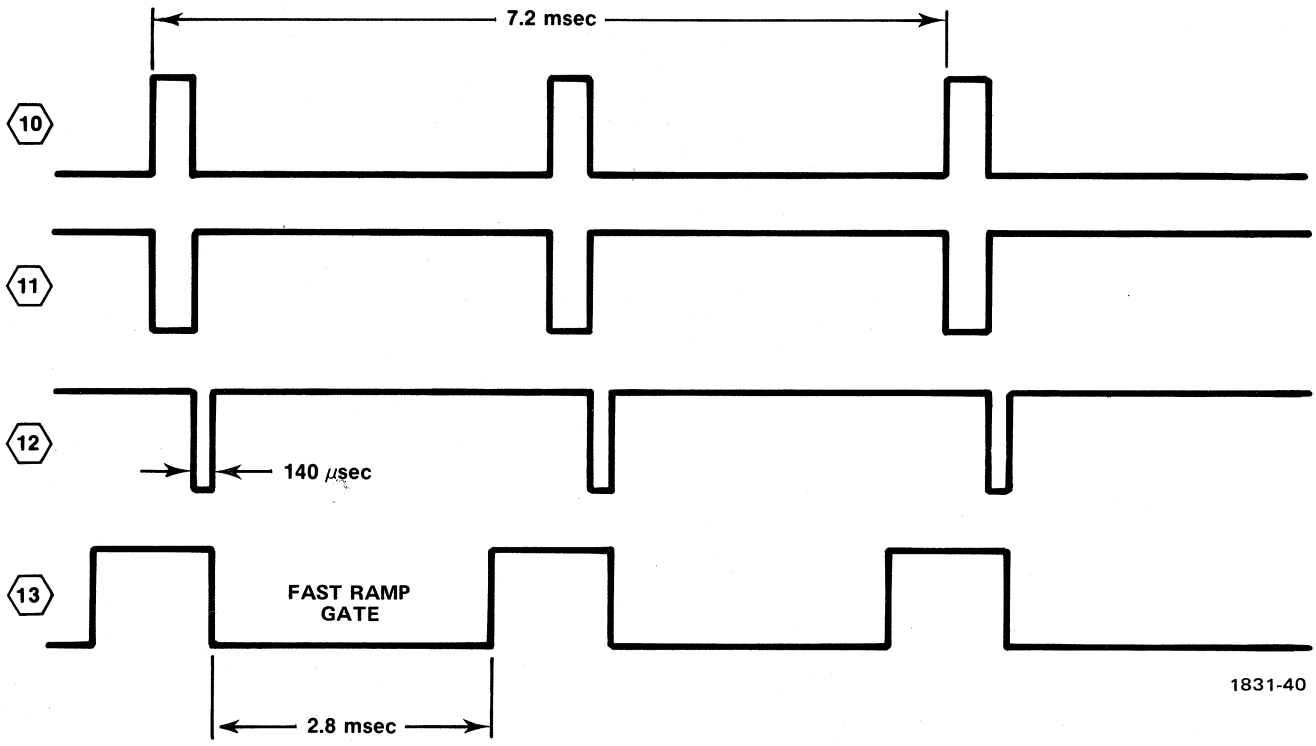
BLOCK DIAGRAM



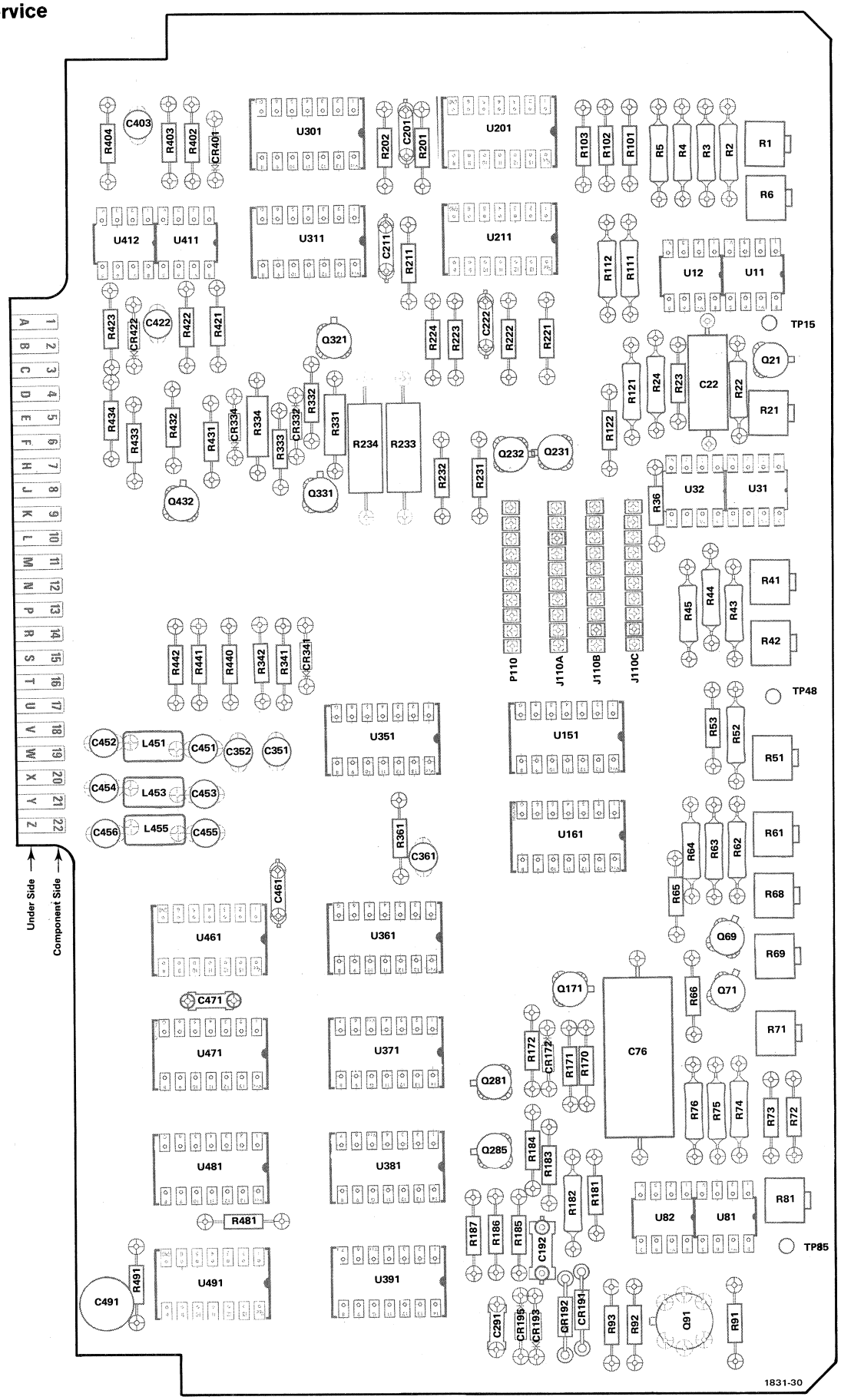
Timing Waveforms for the Drive roller, Read, Copy Busy, and Slow Ramp signals.



Timing waveforms: Group I, II and III with 11 inch display, Fast Ramp, and Interrogate Control.



Timing waveforms: Group III with 19 inch display, and Fast Ramp Gate.



Component locations for the Timing board (A5 670-3661-00).

DRIVE ROLLER

REMOTE COPY ⑤ OR ⑥

FRONT PANEL COPY ①

MOTOR SPEED ③

STEPPER COUNTER

STEPPER PULSE ③

DISPLAY INFO ⑤ OR ⑥

RAMP SENSE ①

FAST RAMP

SLOW RAMP

SLOW RAMP AMPLITUDE (DISPLAY)

SLOW RAMP POSITION (DISPLAY)

FAST RAMP AMPLITUDE (HCU)

FAST RAMP AMPLITUDE (TO DISPLAY)

FAST RAMP TIME

FAST RAMP POSITION (TO DISPLAY)

VERT POSITION (HCU)

INTERROGATE CONTROL

PROTECTION BLANKING

DRIVE ROLLER SIGNAL ① ③

READ ⑤ OR ⑥

COPY BUSY ⑤ OR ⑥

SLOW RAMP ①

TP85

INTERROGATE CONTROL ⑤ OR ⑥

P110-7 S RAMP
P110-6 R GND
P110-4 P RAMP
P110-3 N GND
OR ⑤ ⑥

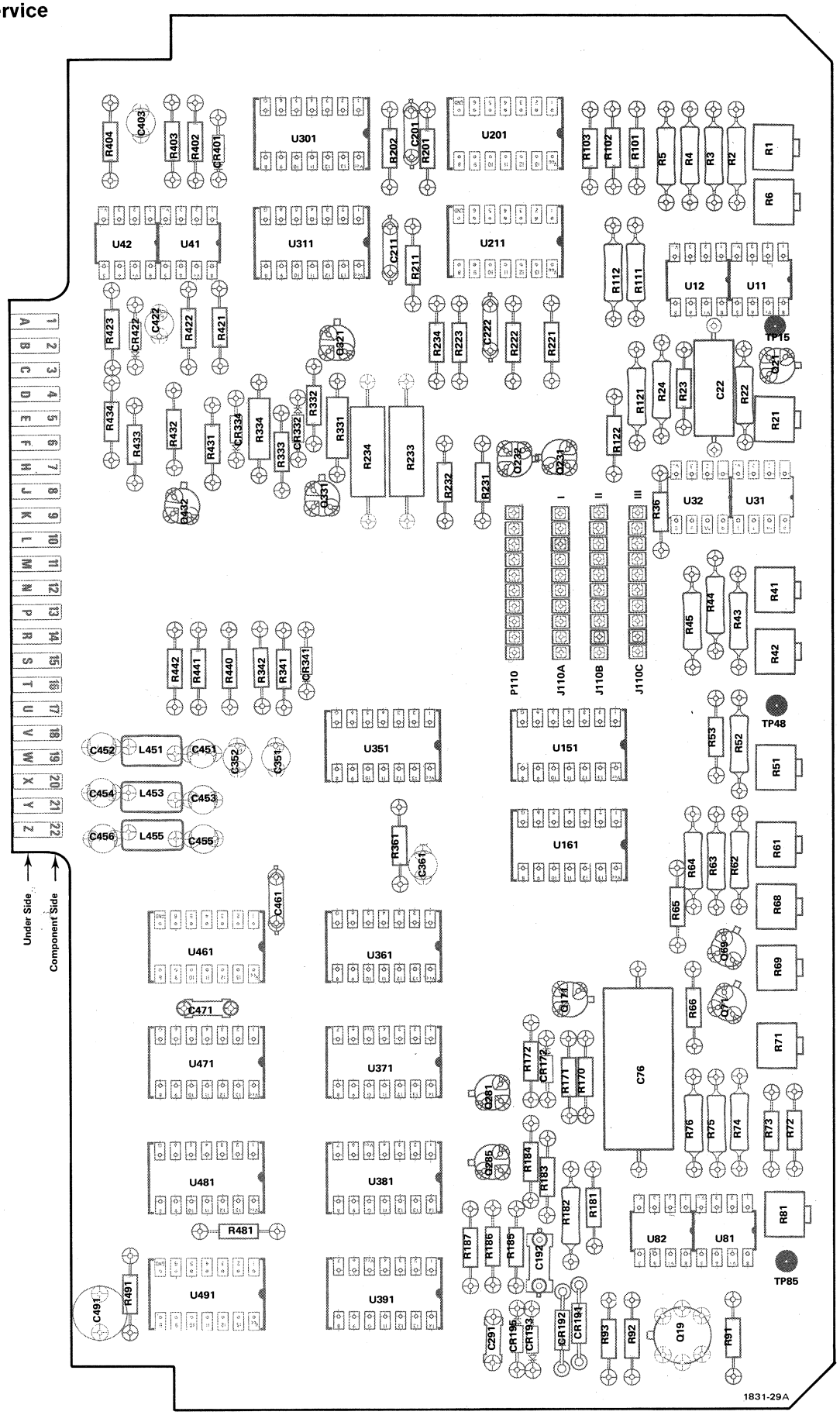
P110-1 6 FIELD RAMP ①

4631

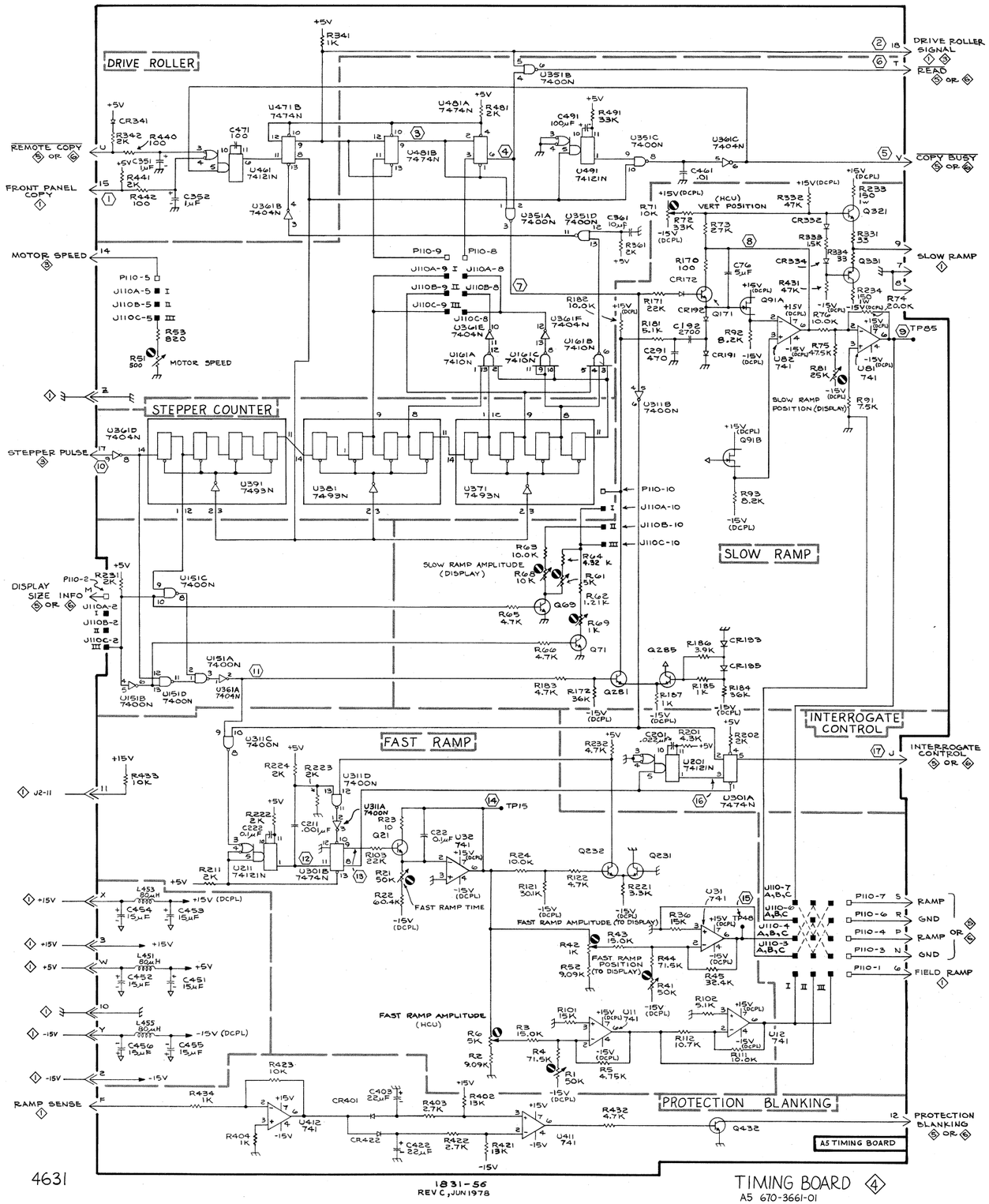
A5 TIMING BOARD

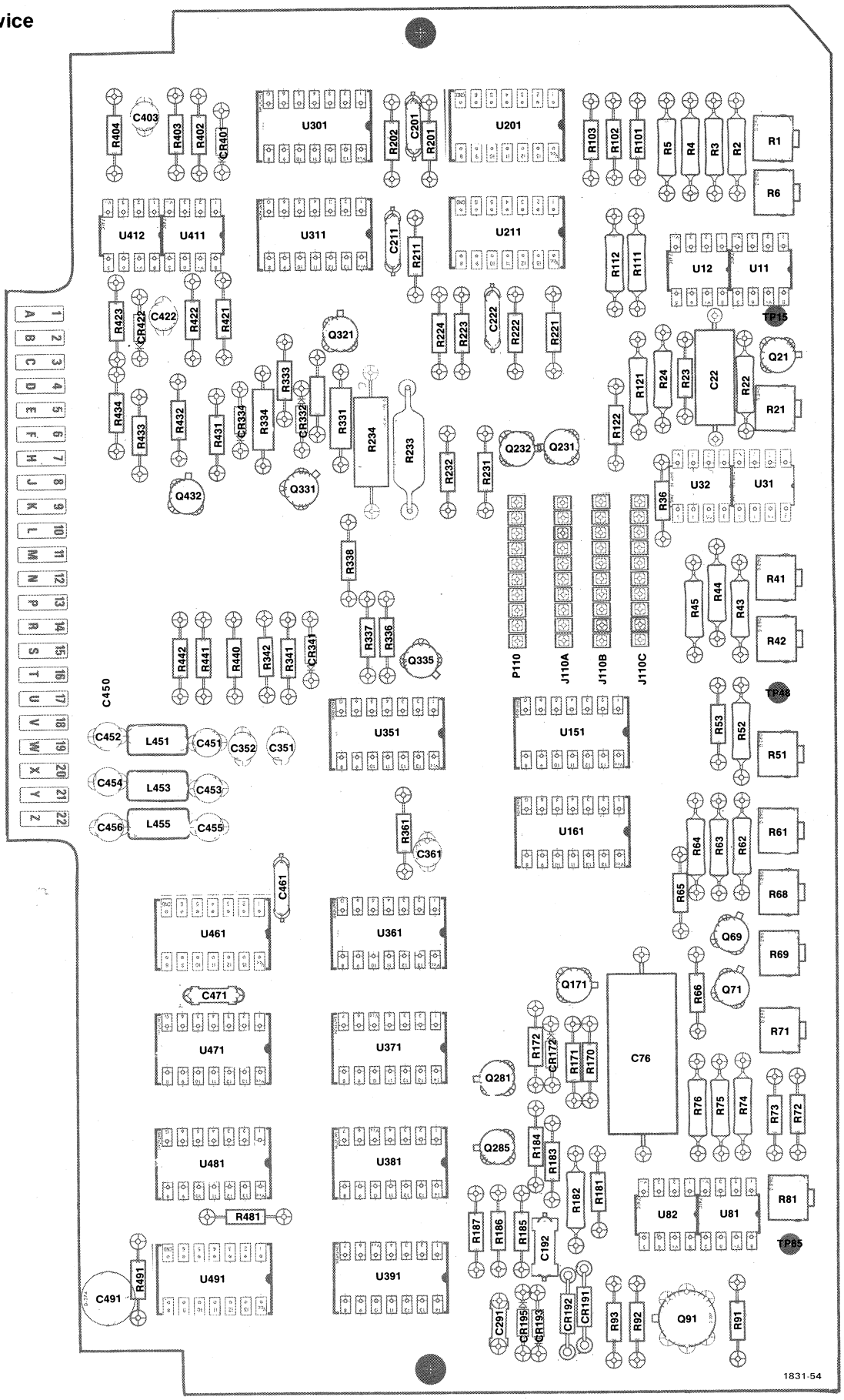
REV C, JUN 1978
1831-57

TIMING BOARD
A5 670-3661-00



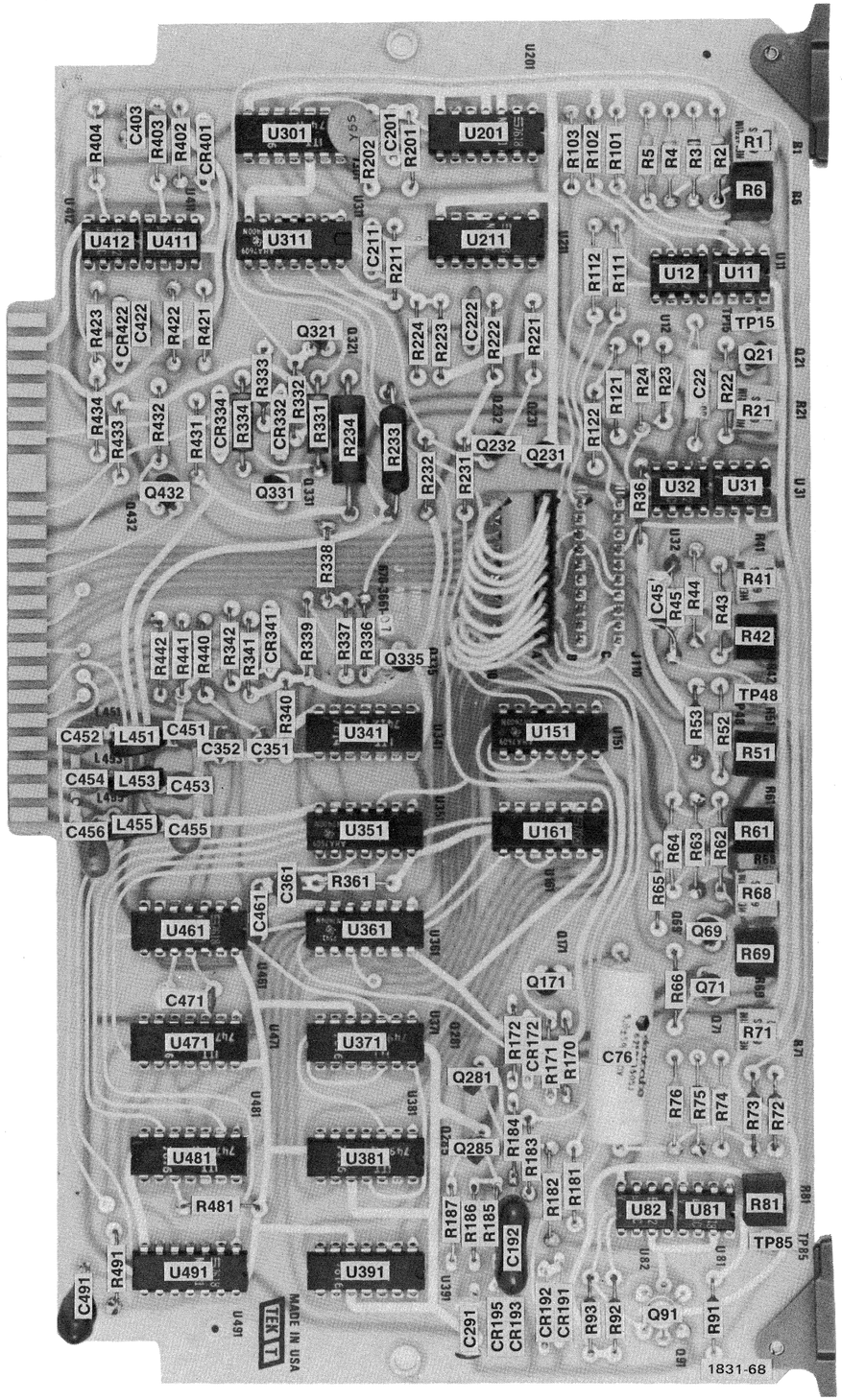
Component locations for the Timing board (A5 670-3661-01).


DRIVE ROLLER
STEPPER COUNTER
FAST RAMP
SLOW RAMP
INTERROGATE CONTROL
PROTECTION BLANKING
DRIVE ROLLER SIGNAL
READ OR
REMOTE COPY
FRONT PANEL COPY
COPY BUSY OR
MOTOR SPEED
SLOW RAMP
TP85
STEPPER PULSE
DISPLAY SIZE INFO OR
SLOW RAMP AMPLITUDE (DISPLAY)
SLOW RAMP POSITION (DISPLAY)
FAST RAMP TIME
FAST RAMP AMPLITUDE (TO DISPLAY)
FAST RAMP POSITION (TO DISPLAY)
FAST RAMP AMPLITUDE (HCU)
VERT POSITION (HCU)
RAMP SENSE
INTERROGATE CONTROL OR
RAMP
GND
FIELD RAMP
A5 TIMING BOARD
4631
1831-56
REV C, JUN 1978
TIMING BOARD 4
A5 670-3661-01

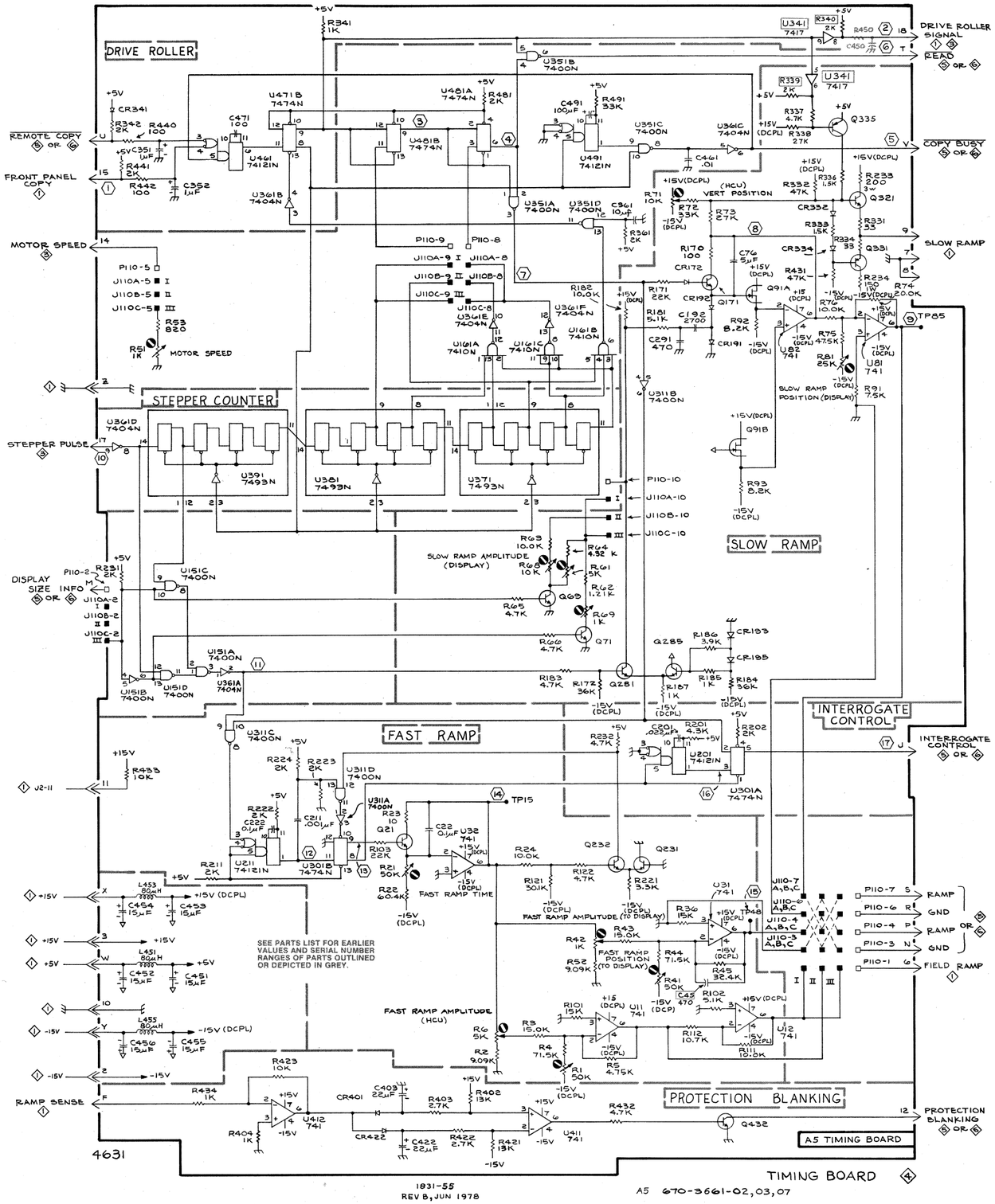


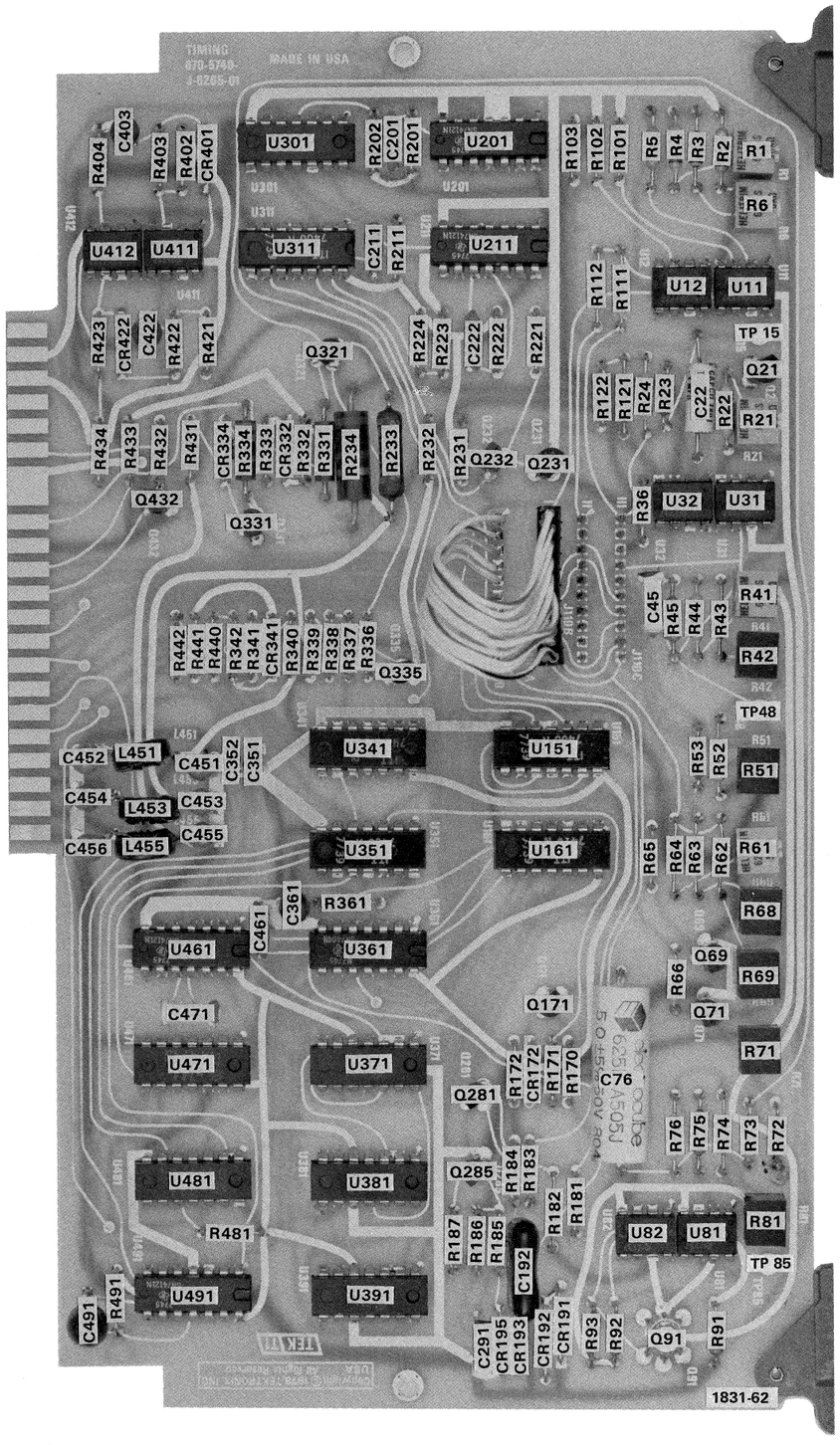
Located on back of board
R450

Component locations for the Timing board (A5 670-3661-02,03).

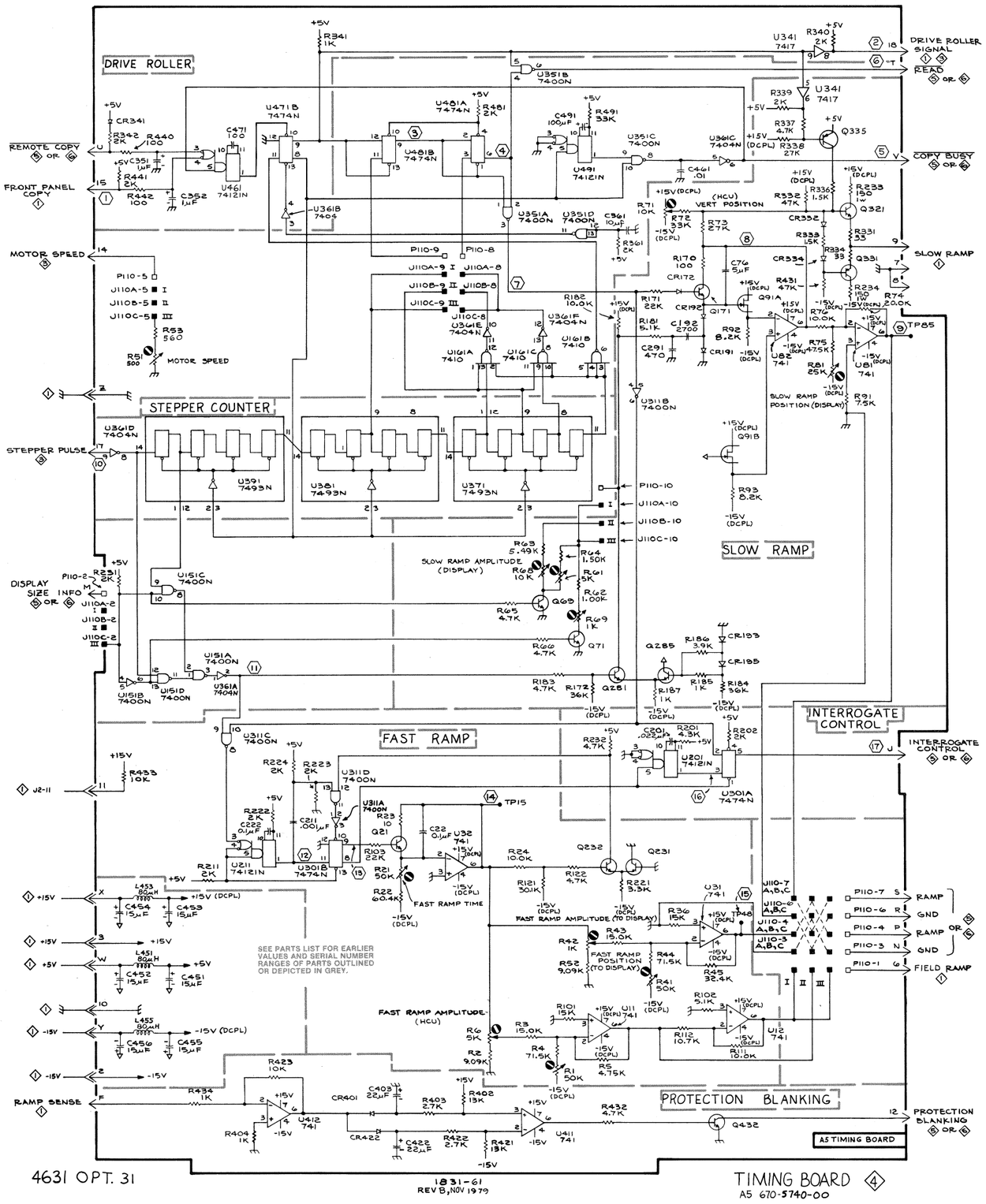


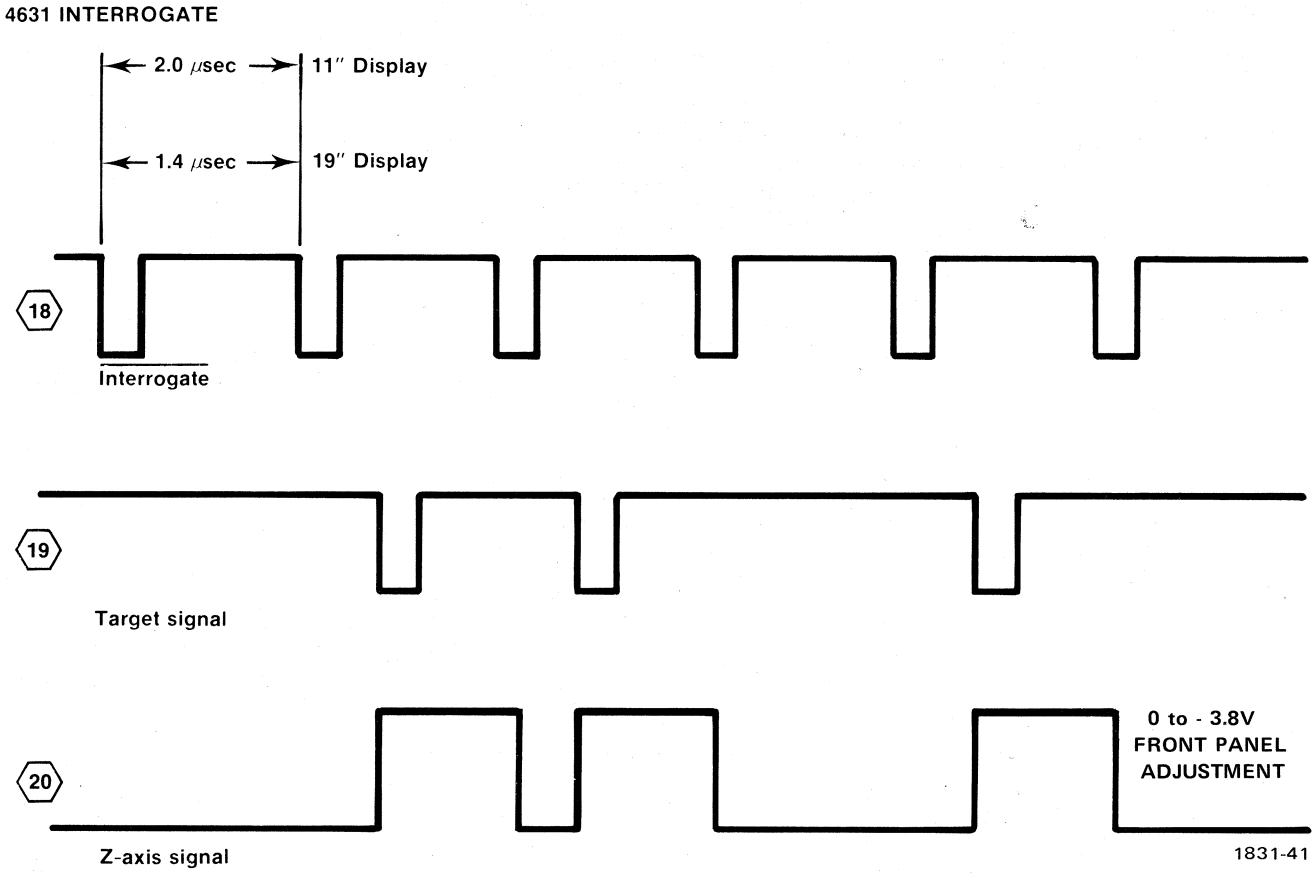
Component locations for the Timing board (A5 670-3661-07).





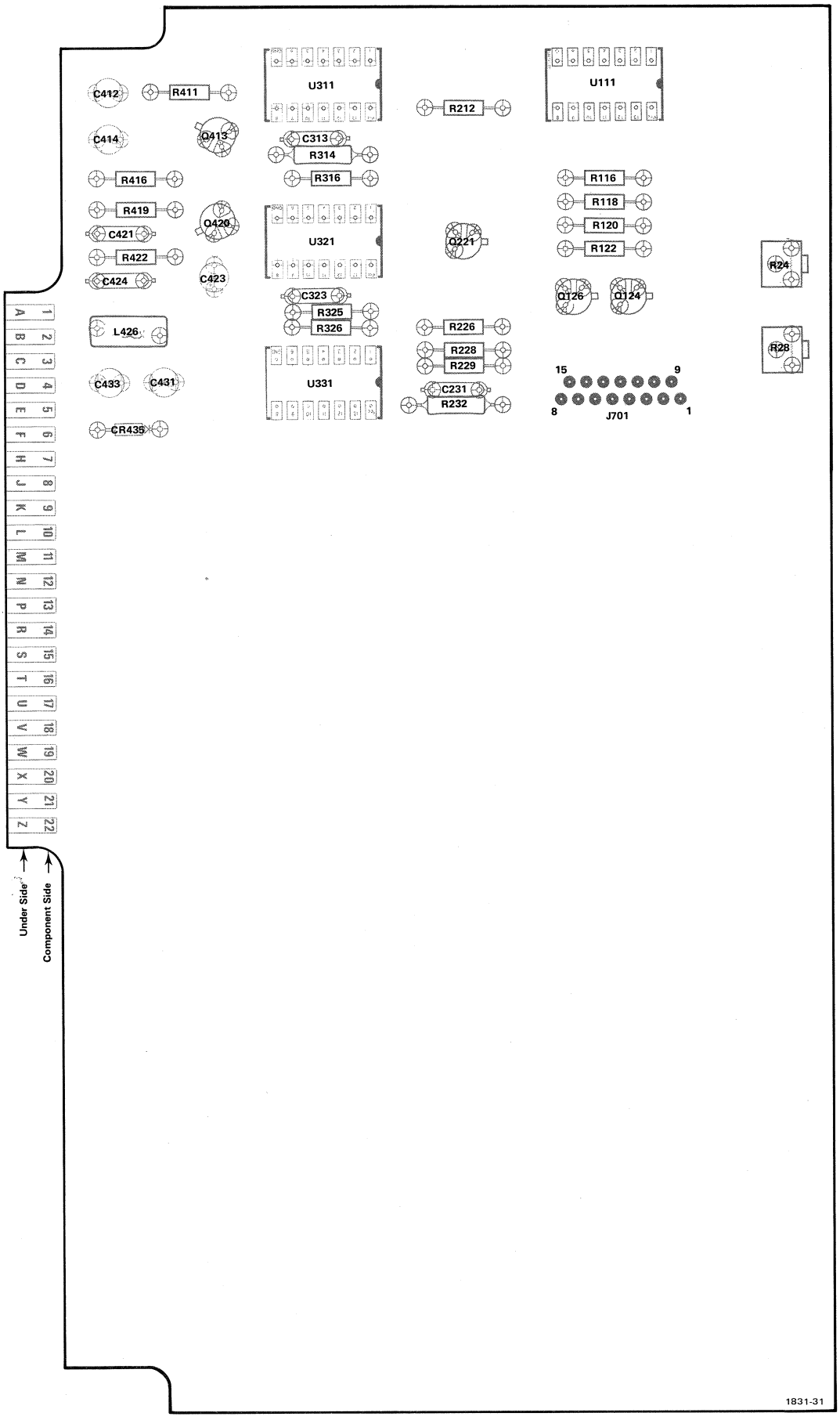
Component locations for Option 31 Timing board (A5 670-5740-00).





Interrogate waveforms.

@



Component locations for Interrogate board.

J701-15 ⟷ FRAME GND

REMOTE COPY — J701-11 — U — REMOTE COPY (4)

READ (4) — T — J701-9 — READ

COPY BUSY (4) — V — U111 7406N (1, 2) — J701-13 — COPY BUSY

RAMP (4) — P — J701-1 — RAMP

GND (4) — N — J701-2 — RAMP GND

RAMP (4) — S — J701-3 — RAMP

GND (4) — R — J701-4 — RAMP GND

DISPLAY INFO — J701-10 — M — DISPLAY INFO (4)

INTERROGATE

INTERROGATE OUTPUT

U111E 7406N (11, 10)

+5V — R116 1K — R118 1K — +5V — Q126

U111D 7406N (9, 8)

+5V — R120 1K — R122 1K — +5V — Q124

FRONT COPY ENABLE (1) — 16 — 22

108-0406 L426 80μH — 4 — +5V

C433 15μ — C431 15μ

R28 10K — R24 10K — INTERROGATE RATE

R325 3K — C323 470 — U321 74122N (13, 11, 8, Q)

R326 1K — +5V

+5V — R232 5.76K — C231 100P 5% — (11, 10, 6, Q)

U331 7412IN — (3, 4, 5, Q̄, 1) — TP 400 (18)

+5V — R228 470 — R226 1K — Q221

+5V — R229 470

J701-5 — INTERROGATE

J701-6 — INTERROGATE GND

Z AXIS DRIVE

+15V — R411 100 — C412 6.8μ — Q413

+5V — R314 2.43K — C313 1000 5% — (13, 11)

C432 2.2μ — C414 2.2μ

U311 74122N (1, 2, 3, 4, 5, 6)

R416 100 — R419 51 — R422 51 (20) — 1 — Z AXIS SIGNAL (1)

R316 1K — Q420

C421 220 — C424 220

J701-8 — 5 — (1)

(1) — A

+5V — (19) — R212 1K — J701-7 — TARGET SIGNAL

INTERROGATE CONTROL (4) — J

LIGHT-DARK CONTROL AND PROTECTION BLANKING (4) — 12 — 15 — C — CR435 — +15V

A6 INTERROGATE

INTERROGATE (5)
A6 670-3688-00,01

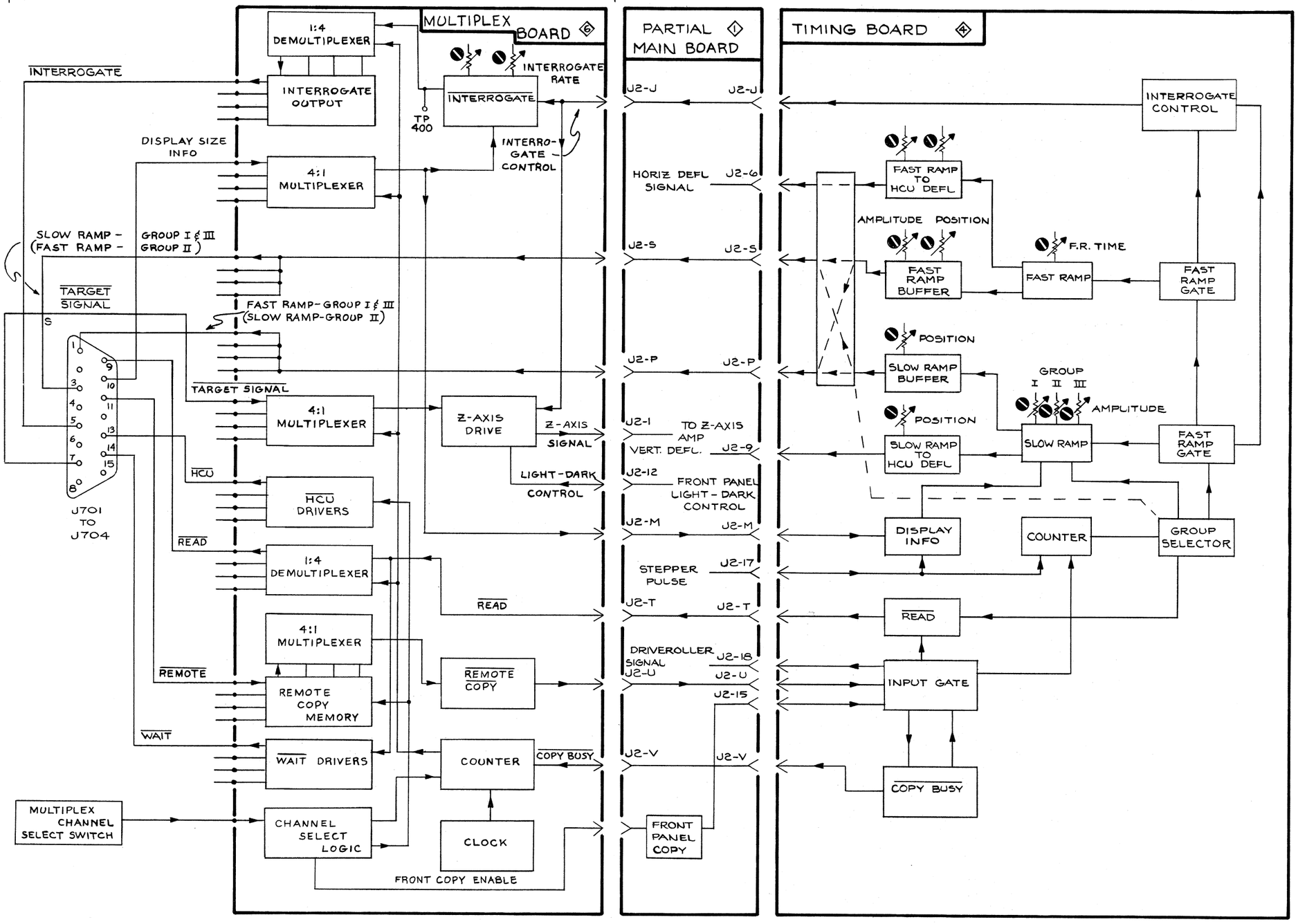
4631

REV D, JUN 1979
1831-58

INTERROGATE BOARD
A6 670-3688-00, 01

(5)

4631 OPTION 2 MULTIPLEX INTERFACE ASSEMBLY

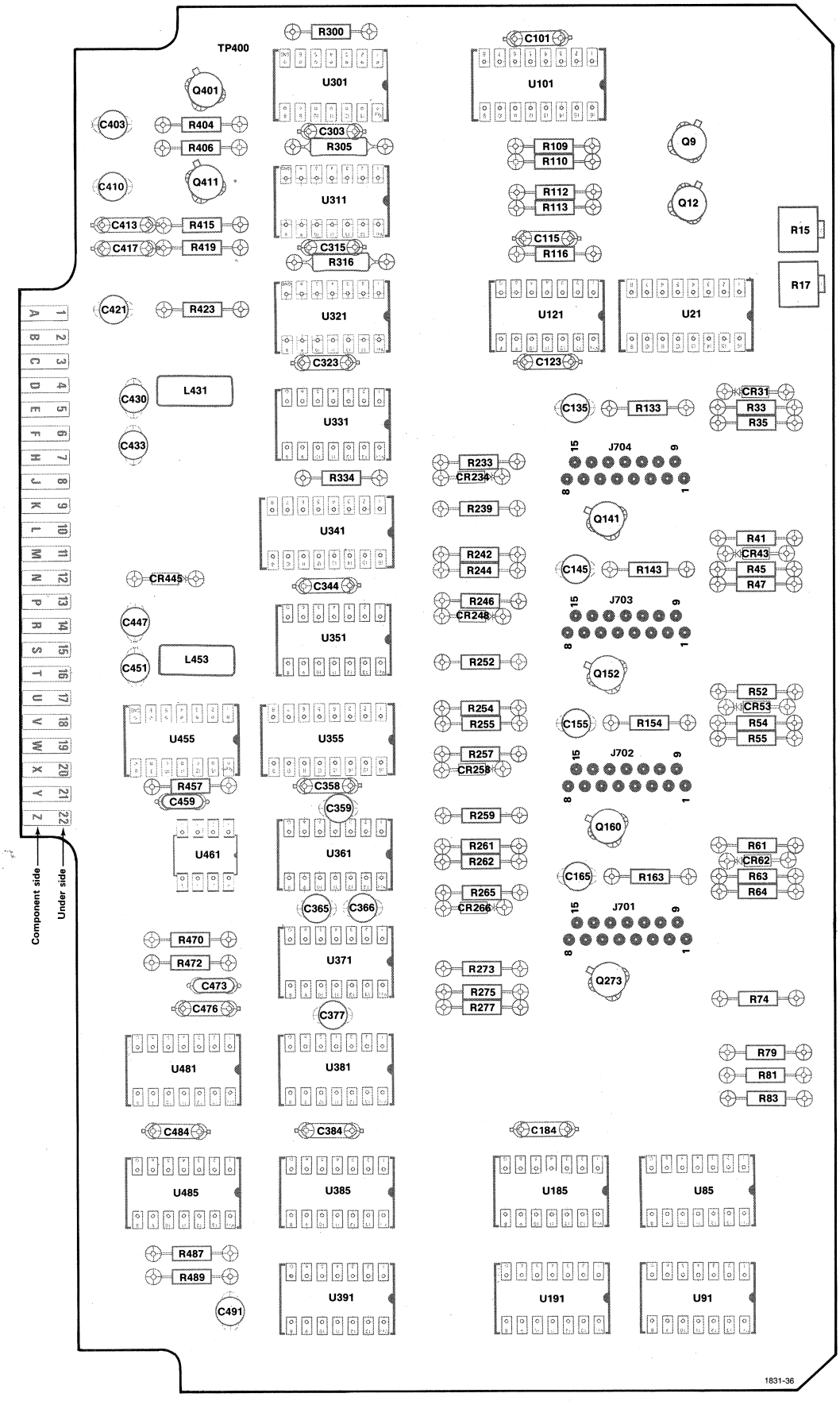


4631 MULTIPLEX INTERFACE (OPTION 2)

1831-71
REV A, JUN 1978

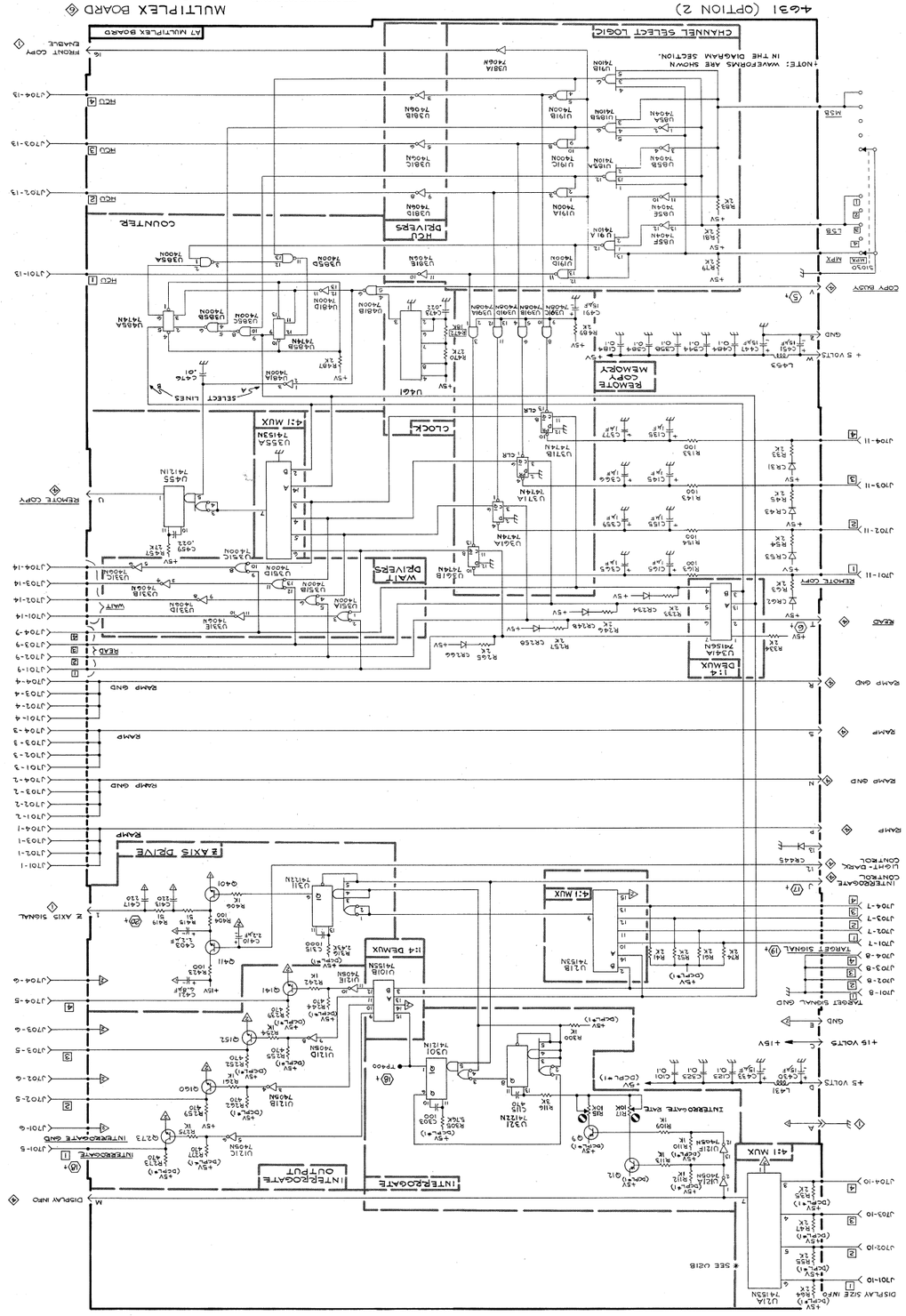
BLOCK DIAGRAM

OPTION 2 BLOCK DIAGRAM



Option 2 Multiplex circuit board 670-3741-00, component locations.

OPTION 2 MULTIPLEX
BOARD 670-3741-00 & UP



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.

SPECIAL NOTES AND SYMBOLS

X000	Part first added at this serial number
00X	Part removed after this serial number

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.

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.

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
000AG	INDUSTRIAL GASKET, INC.	1623 SE 6TH	PORTLAND, OREGON 97214
000AH	STANDARD PRESSED STEEL CO., UNBRAKO DIV.	8535 DICE ROAD	SANTA FE SPRINGS, CA 90670
000AQ	CONNOR SPRING & MFG. COMPANY	1426 SE 6TH	PORTLAND, OREGON 97214
000BK	STAUFFER SUPPLY	105 SE TAYLOR	PORTLAND, OR 97214
000CP	AIMSCO	2110 WEST RUFFNER	SEATTLE, WA 98199
000CY	NORTHWEST FASTENER SALES, INC.	7923 SW CIRRUS DRIVE	BEAVERTON, OREGON 97005
000EH	DURO FOAM PRODUCTS	30518 UNION CITY BLVD.	UNION CITY, CA 94587
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
01963	CHERRY ELECTRICAL PRODUCTS CORPORATION	3600 SUNSET AVENUE	WAUKEGAN, IL 60085
02768	ILLINOIS TOOL WORKS, INC., FASTEX DIV.	195 ALGONQUIN ROAD	DES PLAINES, IL 60016
03614	BUSSMAN MFG., DIV. OF MCGRAW EDISON CO.	502 EARTH CITY PLAZA	EARTH CITY, MO 63045
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
05574	VIKING INDUSTRIES, INC.	21001 NORDHOFF STREET	CHATSWORTH, CA 91311
05820	WAKEFIELD ENGINEERING, INC.	AUDUBON ROAD	WAKEFIELD, MA 01880
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
11406	REXNORD, INC.	4701 GREEN FIELD AVENUE	MILWAUKEE, WI 53214
12327	FREEWAY CORPORATION	9301 ALLEN DRIVE	CLEVELAND, OH 44125
13150	VERNITRON ELECTRICAL COMPONENTS, BEAU PRODUCTS DIVISION	P O BOX 10	LACONIA, NH 03246
14519	DESIGNATRONICS, INC.	55 S. DENTON AVE.	NEW HYDE PARK, NY 11040
18911	DURANT DIGITAL INSTRUMENTS, A CUTLER HAMMER COMPANY	901 S 12TH STREET	WATERTOWN, WI 53094
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
26365	GRIES REPRODUCER CO., DIV. OF COATS AND CLARK, INC.	125 BEECHWOOD AVE.	NEW ROCHELLE, NY 10802
27264	MOLEX PRODUCTS CO.	5224 KATRINE AVE.	DOWNERS GROVE, IL 60515
27907	PLASTIMATIC, INC.	380 CHESTNUT ST.	NORWOOD, NJ 07648
28520	HEYMAN MFG. CO.	147 N. MICHIGAN AVE.	KENILWORTH, NJ 07033
29440	WINFRED M BERG, INC.	499 OCEAN AVENUE	EAST ROCKAWAY, LI, NY 11518
32480	JONES MOTROLA CORPORATION	P. O. BOX 825,432 FAIRFIELD AVE.	STAMFORD, CT 06904
32496	PSI, DIV. WARNER ELECTRIC BRAKE AND CLUTCH COMPANY	P O BOX 118	PITMAN, NJ 08071
43766	NICE BALL BEARING CO.	30TH AND HUNTING PARK AVE.	PHILADELPHIA, PA 19140
50293	GENERAL ELECTRIC COMPANY, INSTALLATION AND SERVICE ENGINEERING DEPT.	1 RIVER ROAD	SCHENECTADY, NY 12306
59730	THOMAS AND BETTS COMPANY	36 BUTLER ST.	ELIZABETH, NJ 07207
65814	WILLIAMS, J. H. AND CO., A UNITED-GREENFIELD DIV. OF TRW INC.	400 VULCAN ST.	BUFFALO, NY 14207
70485	ATLANTIC INDIA RUBBER WORKS, INC.	571 W. POLK ST.	CHICAGO, IL 60607
71400	BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
71785	TRW, CINCH CONNECTORS	1501 MORSE AVENUE	ELK GROVE VILLAGE, IL 60007
72962	ESNA, DIV. OF AMERACE CORPORATION	2330 VAUXHALL ROAD	UNION, NJ 07083
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
73803	TEXAS INSTRUMENTS, INC., METALLURGICAL MATERIALS DIV.	34 FOREST STREET	ATTLEBORO, MA 02703
74445	HOLO-KROME CO.	31 BROOK ST. WEST	HARTFORD, CT 06110
74921	ITEN FIBRE CO.,	4001 BENEFIT AVE., P O BOX 9	ASHTABULA, OH 44004
75915	LITTELFUSE, INC.	800 E. NORTHWEST HWY	DES PLAINES, IL 60016
76381	MINNESOTA MINING AND MFG. CO.	3M CENTER	ST. PAUL, MN 55101
77132	DOT FASTENER CO., A UNITED-CARR DIV. OF TRW INC.	ROUND HOUSE INDL PK,PO BOX 710	WATERBURY, CT 06720
77250	PHEOLL MANUFACTURING CO., DIVISION OF ALLIED PRODUCTS CORP.	5700 W. ROOSEVELT RD.	CHICAGO, IL 60650
77339	NATIONAL LOCK WASHER COMPANY	P O BOX 5115,INDUSTRIAL PARKWAY	NORTH BRANCH, NJ 08856
77342	AMF INC., POTTER AND BRUMFIELD DIV.	200 RICHLAND CREEK DRIVE	PRINCETON, IN 47671
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
78553	EATON CORPORATION, ENGINEERED FASTENERS DIVISION, TINNERMAN PLANT	PO BOX 6688,8700 BROOKPARK RD.	CLEVELAND, OH 44101
79136	WALDES, KOHINOOR, INC.	47-16 AUSTEL PLACE	LONG ISLAND CITY, NY 11101
79142	VEEDER-ROOT CO.	70 SARGEANT ST.	HARTFORD, CT 06102
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
82877	ROTRON, INC.	7-9 HASBROUCK LANE	WOODSTOCK, NY 12498
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
83486	ELCO INDUSTRIES, INC.	1103 SAMUELSON ROAD	ROCKFORD, IL 61101
86445	PENN FIBRE AND SPECIALTY CO., INC.	2032 E. WESTMORELAND ST.	PHILADELPHIA, PA 19134
86928	SEASTROM MFG. COMPANY, INC.	701 SONORA AVENUE	GLENDALE, CA 91201

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
87473	INSULECTRO, A DIVISION OF QUINTEC INDST.	343 CORAL CIRCLE	EL SEGUNDO, CA 90245
89663	REESE, J. RAMSEY, INC.	71 MURRAY STREET	NEW YORK, NY 10007
91260	CONNOR SPRING AND MFG. CO.	1729 JUNCTION AVE.	SAN JOSE, CA 95112
93907	CAMCAR SCREW AND MFG. CO.	600 18TH AVE.	ROCKFORD, IL 61101
95987	WECKESSER CO., INC.	4444 WEST IRVING PARK RD.	CHICAGO, IL 60641
97464	INDUSTRIAL RETAINING RING CO.	57 CORDIER ST.	IRVINGTON, NJ 07111
97913	INDUSTRIAL ELECTRONIC HARDWARE CORP.	109 PRINCE STREET	NEW YORK, NY 10012
98978	INTERNATIONAL ELECTRONIC RESEARCH CORP.	135 W. MAGNOLIA BLVD.	BURBANK, CA 91502

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-1	334-2349-00			1		PLATE,IDENT:MKD 4631	80009	334-2349-00
						(ATTACHING PARTS)		
-2	211-0584-00			2		SCR,CAP,SOC HD:6-32 X 0.250 INCH LG,STL	74445	OBD
						- - - * - - -		
-3	334-1555-00			4		PLATE,IDENT:TRADEMARK	80009	334-1555-00
-4	426-0928-01			4		FRAME,TRIM:GRAY PLASTIC	80009	426-0928-01
						(ATTACHING PARTS)		
-5	213-0088-00			2		SCR,TPG,THD CTG:4-24 X 0.25 INCH,PNH STL	83385	OBD
	213-0107-00			2		SCR,TPG,THD FOR:4-40 X 0.25 INCH,FLH STL	93907	OBD
						- - - * - - -		
-6	333-1805-01	B010100	B099999	1		PANEL,FRONT:WITH BRACKETS	80009	333-1805-01
	333-1805-02	B100000		1		PANEL,FRONT:W/BRACKETS	80009	333-1805-02
						(ATTACHING PARTS)		
-7	210-0457-00			4		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-8	337-1983-00			1		SHIELD,THERMAL:PAPER HEAT	80009	337-1983-00
						(ATTACHING PARTS)		
-9	211-0565-00			2		SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
						- - - * - - -		
-10	436-0115-00			1		TRAY,PAPER:	80009	436-0115-00
						(ATTACHING PARTS)		
-11	210-0457-00			6		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-12	105-0513-00			1		STOP,PAPER:	80009	105-0513-00
						(ATTACHING PARTS)		
-13	220-0778-00			6		NUT,STAMPED:FOR 0.095 TO 0.1 DIA,SST	78553	C19259SS-010
						- - - * - - -		
-14	390-0395-00	B010100	B099999	1		COVER,TOP:WRAPAROUND	80009	390-0395-00
	390-0395-01	B100000		1		CAB.,WRAPAROUND:	80009	390-0395-01
						(ATTACHING PARTS)		
-15	210-0457-00			8		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-15.1	351-0501-00	XB100000		1		GUIDE,COVER:WHITE PLASTIC	80009	351-0501-00
						(ATTACHING PARTS)		
-15.2	210-0457-00	XB100000		2		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-16	214-2077-00	B010100	B069999X	1		ARM,LINK:CABINET TOP	80009	214-2077-00
	214-2077-01	B070000		1		LINK,CAB. TOP:	80009	214-2077-01
						(ATTACHING PARTS)		
-17	212-0068-00			2		SCREW,MACHINE:8-32 X 0.312 INCH,TRH STL	77250	OBD
						- - - * - - -		
-18	361-0657-01	B010100	B173799	1		SPACER,BLOCK:	80009	361-0657-01
	361-0657-05	B173800		1		SPACER,BLOCK:CAB TOP ARM	80009	361-0657-05
	361-0658-01			1		BLOCK,PIVOT:	80009	361-0658-01
						(ATTACHING PARTS)		
-19	211-0541-00			4		SCREW,MACHINE:6-32 X 0.25"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-20	426-1092-00			1		FRAME SECT,CAB.:UPPER RIGHT	80009	426-1092-00
	426-1093-00			1		FRAME SECT,CAB.:UPPER LEFT	80009	426-1093-00
						(ATTACHING PARTS)		
-21	211-0601-00			2		SCR,ASSEM WSHR:6-32 X 0.312,DOUBLE SEMS	83385	OBD
						- - - * - - -		
-22	119-0493-00			1		COUNTER,ELEK,DI:24V DC,1.5W DIGITAL READOUT	79142	743795-006-24
						(ATTACHING PARTS)		
-23	210-0586-00			4		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
-24	210-0994-00			4		WASHER,FLAT:0.125 ID X 0.25" OD,STL	86928	5714-147-20N
						- - - * - - -		
-25	179-2116-00	B010100	B172769X	1		WIRING HARNESS,:FAN	80009	179-2116-00
	198-1773-00	B010100	B172769X	1		WIRE SET,ELEC:	80009	198-1773-00
	175-2305-00	XB172770		1		CA ASSY,SP,ELEC:16,22 AWG,18.0 L	80009	175-2305-00
-26	343-0549-00			4		. STRAP,TIEDOWN:0.091 W X 3.62 INCH LONG	59730	TY23M
-27	119-0026-00			1		FAN,AXIAL:1.500 X 4.750 INCH,WHISPER	82877	WR2A1
						(ATTACHING PARTS)		
-28	211-0540-00			4		SCREW,MACHINE:6-32 X 0.50 INCH,TRH STL	83385	OBD
-29	210-0457-00			4		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-30	380-0301-00			1		HOUSING,FAN:ALUMINUM	80009	380-0301-00
						(ATTACHING PARTS)		
-31	211-0540-00			4		SCREW,MACHINE:6-32 X 0.50 INCH,TRH STL	83385	OBD
-32	210-0457-00			4		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
-33	166-0030-00			4		SPACER,SLEEVE:0.25 OD X 0.188 INCH LONG	80009	166-0030-00
-34	348-0003-00			4		GROMMET,RUBBER:0.312 INCH DIAMETER	70485	1411B6040
						- - - * - - -		
-35	426-1094-00	B010100	B069999	1		FRAME SECT,CAB.:LOWER RIGHT	80009	426-1094-00
	426-1094-01	B070000		1		FRAME SECT,CAB.:LOWER RIGHT	80009	426-1094-01
						(ATTACHING PARTS)		
-36	210-0457-00			4		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-37	426-1095-00			1		FRAME SECT,CAB.:LOWER LEFT	80009	426-1095-00
						(ATTACHING PARTS)		
-38	210-0457-00			4		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-39	351-0411-00			1		SLIDE,CASSETTE:0.500 INCH OD,PLASTIC	80009	351-0411-00
						(ATTACHING PARTS)		
-40	211-0511-00			1		SCREW,MACHINE:6-32 X 0.50 INCH,PNH STL	83385	OBD
-41	210-0457-00			1		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-42	351-0413-00			1		SLIDE,CASSETTE:0.312 INCH OD	80009	351-0413-00
						(ATTACHING PARTS)		
-43	211-0538-00			1		SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
-44	210-0457-00			1		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-45	351-0412-00			2		SLIDE,GUIDE:CASSETTE UNIT,BRONZE	80009	351-0412-00
						(ATTACHING PARTS)		
-46	211-0538-00			2		SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-47	351-0410-00			1		SLIDE:CASSETTE UNIT	80009	351-0410-00
-48	200-1694-00			1		COVER,ACCESS:MOTOR	80009	200-1694-00
						(ATTACHING PARTS)		
-49	211-0507-00			3		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
-50	348-0128-00			4		BUMPER,PLASTIC:CABINET MTG,2.022 INCH LONG	80009	348-0128-00
						(ATTACHING PARTS)		
-51	211-0551-00			8		SCREW,MACHINE:6-32 X 0.562 INCH,PNH STL	83385	OBD
	211-0513-00	XB171110		2		SCREW,MACHINE:6-32 X 0.625 INCH,PNH STL	83385	OBD
-52	210-0801-00			8		WASHER,FLAT:0.14 ID X 0.281 OD NP STL	12327	OBD
						- - - * - - -		
-53	214-2168-00			1		BUTTON,PLUG:CABINET BOTTOM	77132	XS-48175-K1210
-54	390-0396-01	B010100	B099999	1		COV,COPYING MAC:BOTTOM,0.125 AL	80009	390-0396-01
	390-0396-02	B100000		1		COV,COPYING MAC:BOTTOM	80009	390-0396-02

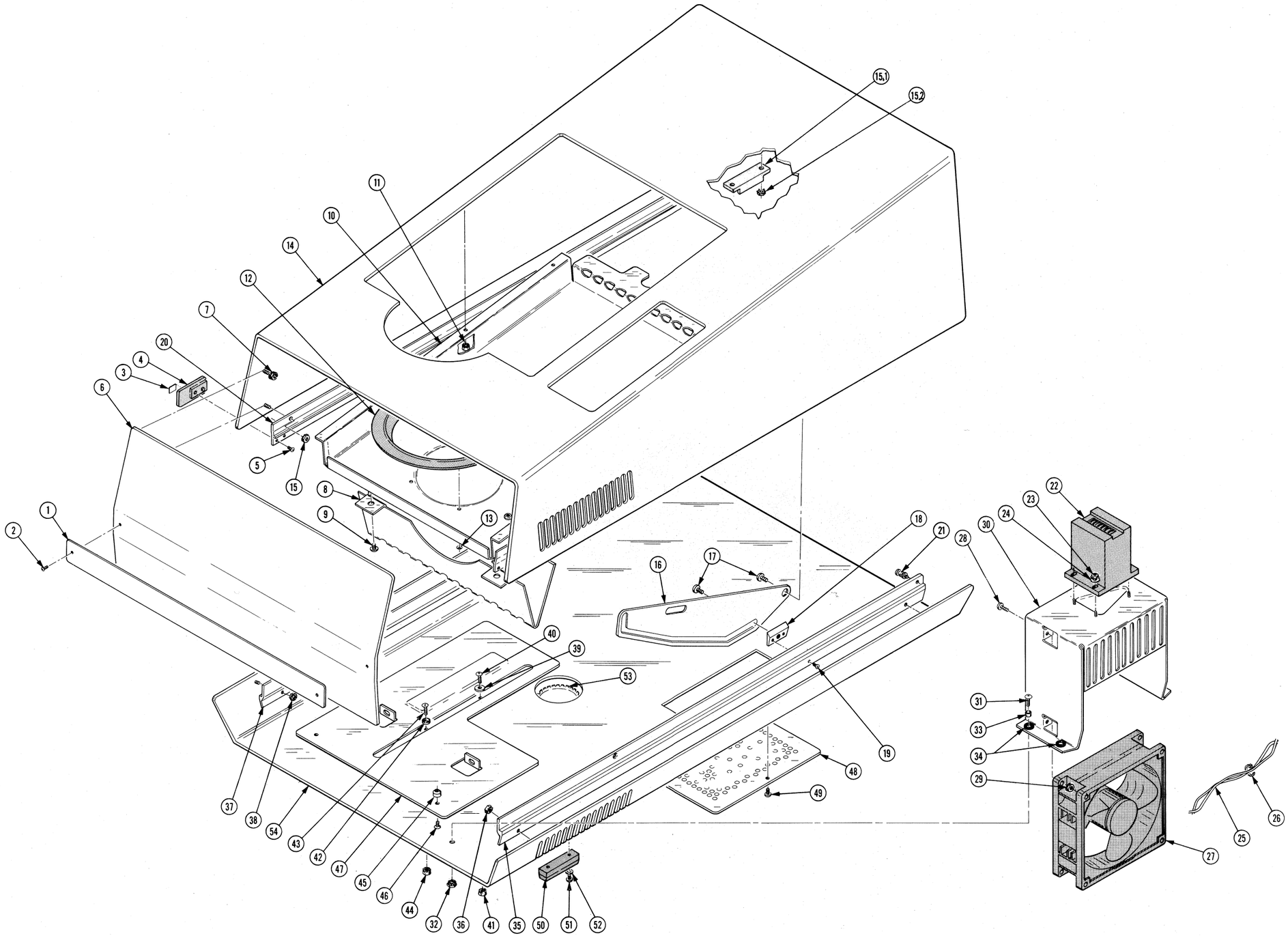

15,1
15,2
11
10
14
12
7
20
4
3
6
5
15
8
9
13
1
2
16
17
18
21
22
23
24
30
28
40
39
53
19
48
49
31
33
34
29
26
25
27
37
38
54
43
42
47
45
46
44
32
36
41
35
50
51
52

FIG. 2 PROCESSOR

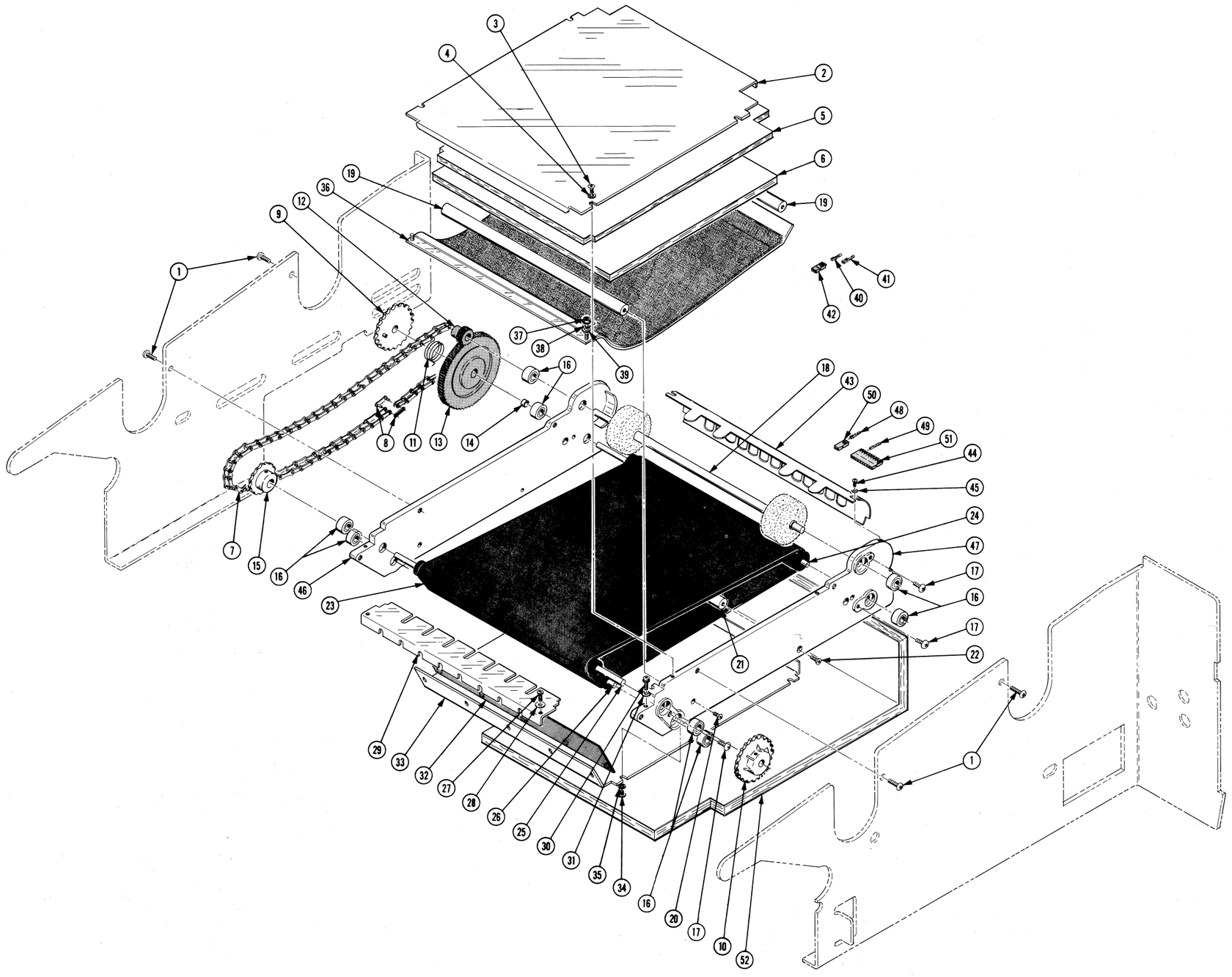


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-	640-0503-00	B010100	B019999	1		PROCESSOR ASSY:	80009	640-0503-00
	640-0503-02	B020000		1		PROCESSOR ASSY:	80009	640-0503-02
						(ATTACHING PARTS)		
-1	212-0535-00			4		SCREW,MACHINE:10-32 X 0.312 INCH,TRH STL	83385	OBD
						- - - * - - -		
	----- -----			-		. PROCESSOR ASSY INCLUDES:		
-2	386-2791-00	B010100	B083799	1		. PLATE,PROCESSOR:TOP	80009	386-2791-00
	386-2791-01	B083800		1		. PLATE,PROCESSOR:TOP	80009	386-2791-01
						(ATTACHING PARTS)		
-3	211-0008-00	B010100	B157169	4		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	211-0661-00	B157170		4		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH,STL	83385	OBD
-4	210-0994-00			4		. WASHER,FLAT:0.125 ID X 0.25" OD,STL	86928	5714-147-20N
						- - - * - - -		
-5	342-0217-00			1		. INSULATOR:PROCESSOR,UPPER,9 X 15 INCH	80009	342-0217-00
-6	342-0226-00			1		. INSULATOR:PROCESSOR,UPPER,9 X 9 INCH	80009	342-0226-00
-7	401-0259-00	B010100	B041579	FT		. CHAIN,ROLLER:2.083 FEET LONG	29440	RC25-72
	401-0347-00	B041580		1		. CHAIN,ROLLER:2.125 FT L,NO. 25,STEEL	80009	401-0347-00
-8	401-0260-00			1		. LINK,CONNECTING:CHAIN	11406	25-SPCL
-9	401-0266-00	B010100	B019999	1		. SPROCKET,WHEEL:21 TEETH	14519	6T7-2521
	401-0266-01	B020000		1		. SPROCKET,WHEEL:21 TEETH,PLASTIC W/PIN	80009	401-0266-01
-10	401-0266-00			1		. SPROCKET,WHEEL:21 TEETH	14519	6T7-2521
-11	214-2323-00	XB020000		1		. SPR,HLCL,TRSN:0.937 OD X 0.488",HOOK ENDS	80009	214-2323-00
	214-2279-00			8		. WICK,OIL:0.156 OD X 0.25 INCH LONG	000AG	OBD
-12	401-0267-00	B010100	B019999	1		. GEAR,SPUR:16 TEETH	14519	RL 2749-1
	401-0346-00	B020000		1		. GEAR,SPUR:14 TEETH,PLASTIC	80009	401-0346-00
	213-0075-00			1		. . SETSCREW:4-40 X 0.094 INCH,HEX SOC STL	000BK	OBD
-13	401-0268-00	B010100	B019999	1		. GEAR,SPUR:96 TEETH	80009	401-0268-00
	401-0268-01	B020000	B172039	1		. GEAR,SPUR:96 TEETH,PLASTIC,W/PIN	80009	401-0268-01
	401-0422-01	B172040		1		. GEAR,SPUR:DELRIN,96 TEETH,32 PITCH	80009	401-0422-01
	213-0126-00			1		. . SETSCREW:6-32 X 0.250 INCH,HSS STL	74445	OBD
-14	361-0412-00	XB020000		1		. SPACER,SLEEVE:0.25 ID X 0.312 OD X 0.125"L	80009	361-0412-00
-15	401-0265-00			1		. SPROCKET,WHEEL:15 TEETH	80009	401-0265-00
-16	401-0316-00			8		. BEARING,ROLLER:PAPER EJECTOR	80009	401-0316-00
						(ATTACHING PARTS)		
	210-0963-00			1		. WASHER,FLAT:0-25 ID X 0.500 INCH OD,PLSTC	80009	210-0963-00
-17	212-0533-00			6		. SCREW,MACHINE:10-24 X 0.312 INCH,TRH STL	83385	OBD
						- - - * - - -		
-18	214-1940-01	B010100	B019999	1		. ROLLER,PAPER:COPY EJECTOR,WITH FOAM	80009	214-1940-01
	214-1940-03	B020000		1		. ROLLER,PAPER:COPY EJECTOR,WITH FOAM	000EH	OBD
-19	384-1224-01	B010100	B157109	2		. SPACER,ROD:9.08 L,W/8-32THD EA END,AL	80009	384-1224-01
	384-1224-02	B157110		2		. SPACER,ROD:9.08 L,W/8-32THO EA END,AL	80009	384-1224-02
						(ATTACHING PARTS)		
-20	212-0008-00			4		. SCREW,MACHINE:8-32 X 0.500 INCH,PNH STL	83385	OBD
						- - - * - - -		
-21	384-0919-00			1		. ROD,SPACER:0.325 OD X 9.07 INCH LONG	80009	384-0919-00
						(ATTACHING PARTS)		
-22	211-0512-00			2		. SCREW,MACHINE:6-32 X 0.50" 100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-23	214-1969-00	B010100	B173519	1		. BELT,HEATER:RUBBER	80009	214-1969-00
	214-1969-01	B173520		1		. BELT,HEATER:7.0 OD X 6.901 ID	80009	214-1969-01
-24	401-0235-01	B010100	B019999	1		. ROLLER,BELT:REAR,10.80" L,W/PHEN INSUL	80009	401-0235-01
	401-0235-02	B020000		1		. ROLLER,BELT:REAR,W/PHENOLIC INSERT	80009	401-0235-02
-25	401-0236-01			1		. ROLLER,BELT:FRONT,11.43" L,W/PHEN INSUL	80009	401-0236-01
-26	401-0255-01			1		. ROLLER,BELT:IDLER,9.81" LG,W/PHEN INSUL	80009	401-0255-01
-27	213-0044-00			2		. SCR,TPG,THD FOR:5-32 X 0.188 INCH,PNH STL	83385	OBD
-28	210-0803-00			2		. WASHER,FLAT:0.15 ID X 0.032 THK,STL CD PL	12327	OBD
-29	351-0378-00	B010100	B157169	1		. GUIDE,PAPER:PROCESSOR ENTRANCE	80009	351-0378-00
	351-0378-01	B157170		1		. GUIDE,PAPER:	80009	351-0378-01
						(ATTACHING PARTS)		
-30	211-0116-00	B010100	B157169	2		. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
	211-0661-00	B157170		2		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH,STL	83385	OBD
-31	210-0005-00	B010100	B157169X	2		. WASHER,LOCK:EXT #6	78189	1106-00
						- - - * - - -		
-32	378-2023-00	XB020000		1		. BAFFLE,AIR:	80009	378-2023-00
-33	386-2789-00	B010100	B019999	1		. PLATE,PROCESSOR:BOTTOM	80009	386-2789-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-	386-2789-01	B020000	B157109	1		. PLATE,PROCESSOR:BOTTOM	80009	386-2789-01
	386-2789-02	B157110		1		. PLATE,PROCESSOR:	80009	386-2789-02
						(ATTACHING PARTS)		
-34	211-0008-00	B010100	B157169	4		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	211-0661-00	B157170		4		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH,STL	83385	OBD
-35	210-0994-00	B010100	B157169X	4		. WASHER,FLAT:0.125 ID X 0.25" OD,STL	86928	5714-147-20N
						- - - * - - -		
-36	119-0475-03			1		. HEATING ELEM,EL:	80009	119-0475-03
						(ATTACHING PARTS)		
-37	210-0586-00			2		. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
-38	210-0287-00			1		. TERMINAL,LUG:# 6 RING	00779	34142
-39	210-0994-00			2		. WASHER,FLAT:0.125 ID X 0.25" OD,STL	86928	5714-147-20N
						- - - * - - -		
	----- -----			-		. . HEATER ASSY INCLUDES:		
-40	131-0707-00			2		. . CONNECTOR,TERM.:22-26 AWG,BRS& CU BE GOLD	22526	47439
-41	131-0621-00			2		. . CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
-42	352-0169-01			1		. . HLDR TERM CONN:2 WIRE,BROWN	80009	352-0169-01
	----- -----			1		. . RES.,THERMAL:(SEE R1024 EPL)		
	----- -----			1		. . SW,THERMOSTATIC:(SEE S1025 EPL)		
-43	351-0397-00			1		. GUIDE,PAPER:PROCESSOR,REAR	80009	351-0397-00
						(ATTACHING PARTS)		
-44	211-0008-00	B010100	B157169	2		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
	211-0661-00	B157170		2		. SCREW,MACHINE:4-40 X 0.25 INCH,PNH,STL	83385	OBD
-45	210-0994-00	B010100	B157169X	2		. WASHER,FLAT:0.125 ID X 0.25" OD,STL	86928	5714-147-20N
						- - - * - - -		
-46	426-1043-00			1		. FRAME SECTION:PROCESSOR,LEFT	80009	426-1043-00
-47	426-1089-00			1		. FRAME SECTION:PROCESSOR,RIGHT	80009	426-1089-00
-48	131-0621-00			5		. CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
-49	131-0707-00	B010100	B099999X	2		. CONNECTOR,TERM.:22-26 AWG,BRS& CU BE GOLD	22526	47439
-50	352-0169-01			1		. HLDR TERM CONN:2 WIRE,BROWN	80009	352-0169-01
-51	352-0206-02			1		. CONN BODY,PL,EL:10 WIRE RED	80009	352-0206-02
-52	342-0218-00			1		INSULATOR:PROCESSOR,LOWER	80009	342-0218-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
3-	640-0504-00			1	CASSETTE ASSY:	80009	640-0504-00
-1	385-0101-00			2	. INSULATOR,STDF:0.375 L W/8-32 THD THRU,NYL	80009	385-0101-00
					(ATTACHING PARTS)		
-2	212-0023-00			2	. SCREW,MACHINE:8-32 X 0.375 INCH,PNH STL	83385	OBD
					- - - * - - -		
-3	214-1936-00			2	. ARM,LATCH:CASSETTE HOLDER,RIGHT	80009	214-1936-00
					(ATTACHING PARTS)		
-4	220-0410-00			2	. NUT,EXTENDED WA:10-32 X 0.375 INCH,STL	83385	OBD
-5	210-1061-00			2	. WASHER,FLAT:0.203 ID X 0.625 INCH OD,STL	12327	OBD
-6	358-0506-00			2	. BUSHING,HANDLE:0.500 INCH DIAMETER	80009	358-0506-00
-7	212-0562-00	B010100	B041579	2	. SCREW,MACHINE:10-32 X 0.875INCH,FLH STL	83385	OBD
	212-0624-00	B041580		2	. SCREW,MACHINE:10-32 X 0.750,FLH,100 DEG	83385	OBD
					- - - * - - -		
-8	384-0957-00			1	. ROD,SPACER:0.375 OD X 9.8 INCH LONG	80009	384-0957-00
					(ATTACHING PARTS)		
-9	212-0023-00			2	. SCREW,MACHINE:8-32 X 0.375 INCH,PNH STL	83385	OBD
-10	361-0654-00			2	. SPACER,DISK:CASSETTE CENTERING	80009	361-0654-00
					- - - * - - -		
-11	351-0396-00			1	. GUIDE,PAPER:CASSETTE,REAR	80009	351-0396-00
					(ATTACHING PARTS)		
-12	211-0565-00			3	. SCREW,MACHINE:6-32 X 0.250 INCH,TRH STL	83385	OBD
					- - - * - - -		
-13	105-0591-00			1	. STOP,RTRY KNIFE:	80009	105-0591-00
					(ATTACHING PARTS)		
-14	211-0514-00	B010100	B170149	1	. SCREW,MACHINE:6-32 X 0.750 INCH,PNH STL	83385	OBD
	211-0513-00	B170150		1	. SCREW,MACHINE:6-32 X 0.625 INCH,PNH STL	83385	OBD
-15	210-0852-00	B010100	B170149X	1	. WASHER,FLAT:0.188 ID X 375 TL	12327	OBD
-16	210-0006-00	XB050000		1	. WASHER,LOCK:#6 INTL,0.018THK,STL CD PL	78189	1206-00-00-0541C
					- - - * - - -		
-17	351-0393-00			1	. GUIDE,PAPER:CASSETTE,FRONT	80009	351-0393-00
					(ATTACHING PARTS)		
-18	211-0551-00	B010100	B171109	2	. SCREW,MACHINE:6-32 X 0.562 INCH,PNH STL	83385	OBD
	211-0513-00	B171110		2	. SCREW,MACHINE:6-32 X 0.625 INCH,PNH STL	83385	OBD
-19	210-0055-00			2	. WASHER,LOCK:SPLIT,0.145 ID X 0.253 OD,STL	83385	OBD
					- - - * - - -		
-20	214-1935-00	B010100	B049999	1	. BLADE,PAPER CTR:ROTARY	80009	214-1935-00
	214-1935-01	B050000		1	. BLADE,PAPER CTR:ROTARY	80009	214-1935-01
					(ATTACHING PARTS)		
	213-0001-00	B010100	B049999	2	. SCREW,CAP,SCH:0.25-20 X 0.50 INCH LONG STL	000AH	OBD
-21	384-1429-00	B050000		2	. SHAFT,STRAIGHT:ROTARY CUTTER	80009	384-1429-00
	210-0016-00	B010100	B049999X	2	. WASHER,LOCK:SPLIT,0.259 ID X 0.489 OD,STL	77339	6507
	210-1091-00	B010100	B049999X	2	. WASHER,FLAT:0.266 ID X 0.437 INCH OD,STL	12327	OBD
	210-0011-00	B010100	B049999X	2	. WASHER,LOCK:INTL,0.062 IDX 0.253 OD,STL	78189	1214-00-00-0541C
	384-1225-00	B010100	B049999X	2	. SHAFT,BEARING:0.374 INCH OD	80009	384-1225-00
					- - - * - - -		
	401-0257-00	B010100	B049999X	2	. BEARING:0.375 ID X 1.125 OD W/DBL SHL	43766	3014-DS
-22	348-0382-00			2	. GASKET:LIGHT SEAL,TOP AND BOTTOM	80009	348-0382-00
-23	348-0402-00			2	. GASKET:LIGHT SEAL,SIDES	80009	348-0402-00
-24	214-1934-00			1	. BLADE,PAPER CTR:STATIONARY	80009	214-1934-00
					(ATTACHING PARTS)		
-25	212-0605-00	B010100	B049999	4	. SCR,CAP,SOC.HD:10-32 X 1 INCH,STL	000CP	OBD
	212-0626-00	B050000		4	. SCREW,MACHINE:10-24 X 0.875L,PNH,STL	000AH	OBD
-26	220-0723-00	B010100	B049999	4	. NUT,BLOCK:0.375 OD X 9.600 INCH LONG	80009	220-0723-00
	220-0784-00	B050000		4	. NUT,SHEET SPR:10-24 X 1.138X 0.375,STL	78553	C71011-022-67
-27	210-1227-00			4	. WASHER,FLAT:0.203 ID X 0.50 INCH OD,STL	12327	OBD
					- - - * - - -		
	214-1960-00	B010100	B049999X	1	. SPRING,BL LDG:STATIONARY	80009	214-1960-00
-28	214-1968-00			2	. PIN,SPRING:0.125 OD X 0.375"L,POLARIZING	72962	59-028-125-0375
-29	213-0256-00			2	. SETSCREW:6-32 X 0.375 STL,HEX SKT,CUPPT	74445	OBD
-30	210-0407-00			2	. NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
-31	386-2745-00			1	. SPRT,PPR CTR BL:	80009	386-2745-00
					(ATTACHING PARTS)		
-32	212-0023-00			2	. SCREW,MACHINE:8-32 X 0.375 INCH,PNH STL	83385	OBD
					- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
3-33	401-0282-00			2	. CAM,ADJUSTING:ROLLER ASSEMBLY	80009	401-0282-00
					(ATTACHING PARTS)		
-34	212-0562-00			2	. SCREW,MACHINE:10-32 X 0.875INCH,FLH STL	83385	OBD
					- - - * - - -		
-35	361-0100-00			2	. POST,ELEC-MECH:0.420 INCH LONG	80009	361-0100-00
					(ATTACHING PARTS)		
-36	211-0514-00			2	. SCREW,MACHINE:6-32 X 0.750 INCH,PNH STL	83385	OBD
-37	210-0407-00			2	. NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
-38	210-0055-00			2	. WASHER,LOCK:SPLIT,0.145 ID X 0.253 OD,STL	83385	OBD
					- - - * - - -		
-39	214-1961-00			1	. SPR,HLCL,TRSN:PRINTER,LEFT	91260	OBD
	214-1961-01			1	. SPR,HLCL,TRSN:PRINTER,RIGHT	91260	OBD
-40	401-0281-00			2	. BEARING:0.625 INCH DIA,ROLLER ASSY SUPPORT	80009	401-0281-00
					(ATTACHING PARTS)		
-41	354-0459-00			2	. RING,RETAINING:FOR 0.50 INCH DIA SHAFT	97464	3100-50STCD
					- - - * - - -		
-42	401-0234-00			1	. BRG,ROLLER ASSY:RIGHT,2.130 INCH LONG	80009	401-0234-00
-43	401-0233-00			1	. BRG,ROLLER ASSY:LEFT,2.130 INCH LONG	80009	401-0233-00
-44	214-1939-01			1	. ROLLER,PAPER:PINCH,WITH PAD	80009	214-1939-01
-45	401-0280-00			1	. ROLLER,PRESSURE:0.840 OD X 9.45 INCH LONG	000EH	OBD
-46	214-1938-00			1	. ROLLER,PAPER:IDLER	80009	214-1938-00
-47	426-1087-00			2	. FRAME SECT,CAB.:CASSETTE HOLDER L AND R	80009	426-1087-00
					(ATTACHING PARTS)		
-48	211-0510-00			4	. SCREW,MACHINE:6-32 X 0.375 INCH,PNH STL	83385	OBD
					- - - * - - -		
-49	351-0058-00	B010100	B099999X	1	. SLIDE,GUIDE:8.875 L,CUT TO 4.375 L	80009	351-0058-00
-50	105-0623-00			1	. ACTUATOR,CAM SW:TIME/CM,FRONT	80009	105-0623-00
					(ATTACHING PARTS)		
-51	211-0538-00			2	. SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
					- - - * - - -		
-52	214-1968-00			6	. PIN,SPRING:0.125 OD X 0.375"L,POLARIZING	72962	59-028-125-0375
-53	426-1084-00	B010100	B099999	1	. FRAME SECTION:CASSETTE HOLDER,BOTTOM	80009	426-1084-00
	426-1084-01	B100000		1	. FR SECT,CASSETT:BOTTOM	80009	426-1084-01
-54	214-1933-00			4	ARM,CASSETTE:LATCHING	80009	214-1933-00
					(ATTACHING PARTS)		
-55	212-0534-00			2	SCREW,MACHINE:10-32 X 1 INCH,PNH STL	83385	OBD
-56	210-0010-00			2	WASHER,LOCK:INT,0.20 ID X0.376" OD,STL	78189	1210-00-00-0541C
-57	210-1061-00			2	WASHER,FLAT:0.203 ID X 0.625 INCH OD,STL	12327	OBD
-58	210-0077-00			2	WASHER,SPR TNSN:0.375 ID X 0.0025 OD	78189	3515-20-19-1744
-59	401-0243-00			2	CAM,ADJUSTING:HANDLE LATCH,0.665 INCH LONG	80009	401-0243-00
					- - - * - - -		
-60	384-0961-00			1	ROD,SPACER:RIGHT	80009	384-0961-00
-61	211-0538-00	XB070000		1	SCREW,MACHINE:6-32 X 0.312"100 DEG,FLH STL	83385	OBD
-62	385-0070-00	XB070000		1	SPACER,POST:0.5 L W/6-32 THD THRU,AL	80009	385-0070-00
					(ATTACHING PARTS)		
-63	211-0507-00	XB070000		1	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
					- - - * - - -		
	348-0150-00	B010100	B069999X	1	GROMMET,PLASTIC:U SHAPED	80009	348-0150-00
	337-1930-00	B010100	B069999	1	SHLD,ELECTRICAL:LINE VOLTAGE	80009	337-1930-00
-64	200-1923-00	B070000	B116179	1	GUARD,MECH DR:RIGHT,ALUMINUM	80009	200-1923-00
	200-1923-01	B116180		1	GUARD,MECH DR:RIGHT SIDE	80009	200-1923-01
					(ATTACHING PARTS)		
-65	211-0507-00	B010100	B069999	4	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
	211-0507-00	B070000		2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
					- - - * - - -		
-66	366-1528-00			1	PUSH BUTTON:GRAY,BLANK--COPY	01963	028-0007
-67	366-0426-01			1	KNOB:GRAY	80009	366-0426-01
	213-0153-00			1	. SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-68	333-1804-00	B010100	B069999	1	PANEL,TOP:	80009	333-1804-00
	333-1804-02	B070000		1	PANEL,TOP:CONTROL	80009	333-1804-02
					(ATTACHING PARTS)		
-69	211-0038-00			4	SCREW,MACHINE:4-40 X 0.314,FLH,100 DEG	83385	OBD
-70	210-0586-00			4	NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
					- - - * - - -		

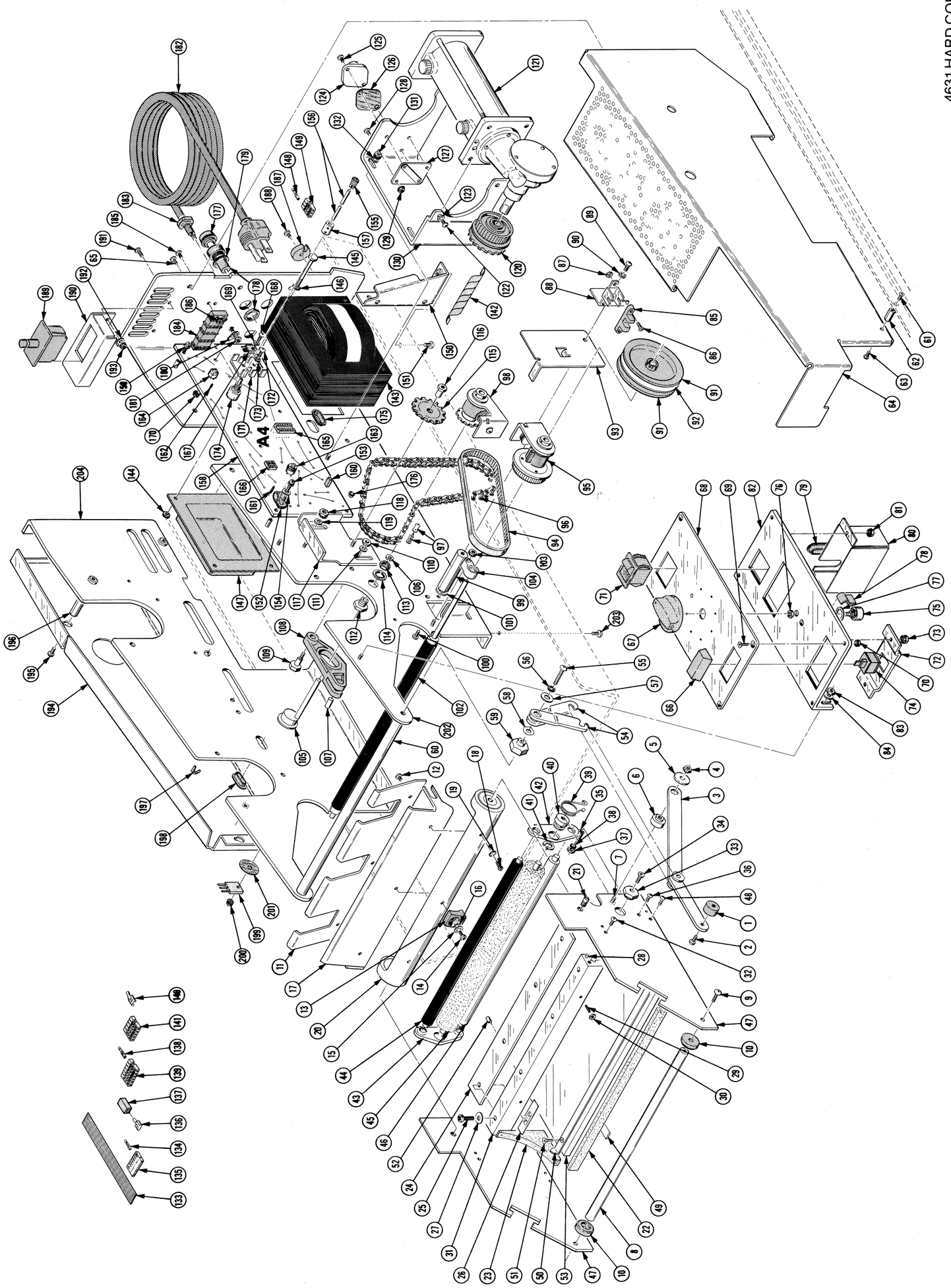
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-71	----- -----			1		SWITCH,TOGGLE:POWER(SEE S1001,S1002 EPL)		
	----- -----	B010100	B069999X	1		LAMP,CARTRIDGE:GREEN LENS(SEE DS1012 EPL)		
-72	407-1425-00			1		BRACKET,SWITCH:ALUMINUM	80009	407-1425-00
						(ATTACHING PARTS)		
-73	210-0457-00			2		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-74	----- -----			1		SWITCH,PUSH:COPY(SEE S1012 EPL)		
-75	----- -----			1		RES.,VAR:INTENSITY(SEE R1031 EPL)		
						(ATTACHING PARTS)		
-76	210-0583-00			1		NUT,PLAIN,HEX.:0.25-32 X 0.312 INCH,BRS	73743	2X20317-402
-77	210-0046-00			1		WASHER,LOCK:INTL,0.26 ID X 0.40" OD,STL	78189	1214-05-00-0541C
						- - - * - - -		
-78	343-0298-00	B010100	B069999	2		CLAMP,LOOP:PLASTIC,W/ADHESIVE BACK	95987	HPC25
	343-0298-00	B070000		3		CLAMP,LOOP:PLASTIC,W/ADHESIVE BACK	95987	HPC25
-79	348-0253-00	XB070000		1		GROMMET,PLASTIC:BLACK,OBLONG,3.0X0.925	80009	348-0253-00
	348-0171-00	B010100	B069999X	1		GROMMET,PLASTIC:U-SHAPED	80009	348-0171-00
-80	337-1953-00	B010100	B069999	1		SHIELD,ELEC:POWER SWITCH	80009	337-1953-00
	337-1953-02	B070000		1		SHIELD,ELEC:POWER SWITCH	80009	337-1953-02
						(ATTACHING PARTS)		
-81	210-0457-00			2		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-82	407-1439-00	B010100	B069999	1		BRACKET,ANGLE:CONTROL PANEL,ALUMINUM	80009	407-1439-00
	407-1439-01	B070000		1		BRACKET,ANGLE:CONTROL PANEL,ALUMINUM	80009	407-1439-01
						(ATTACHING PARTS)		
-83	210-0458-00			2		NUT,PLAIN,EXT W:8-32 X 0.344 INCH,STL	83385	OBD
-84	210-0804-00			2		WASHER,FLAT:0.17 ID X 0.375 INCH OD,STL	12327	OBD
						- - - * - - -		
-85	----- -----			1		MICROCIRCUIT,DI:(SEE U1020 EPL)		
						(ATTACHING PARTS)		
-86	211-0038-00			2		SCREW,MACHINE:4-40 X 0.314,FLH,100 DEG	83385	OBD
-87	210-0407-00			2		NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
						- - - * - - -		
-88	407-1532-00	B010100	B157959	1		BRACKET,ANGLE:INTERRUPTER	80009	407-1532-00
	407-1532-01	B157960		1		BRACKET,ANGLE:INTERRUPTER,STEEL	80009	407-1532-01
						(ATTACHING PARTS)		
-89	212-0039-00	B010100	B157959	1		SCREW,MACHINE:8-32 X 0.375 INCH,TRH STL	83385	OBD
	212-0099-00	B157960		1		SCREW,MACHINE:8-32 X 0.5 HEX HD,STL	83486	OBD
-90	210-0804-00	B010100	B157959	1		WASHER,FLAT:0.17 ID X 0.375 INCH OD,STL	12327	OBD
	210-0864-00	B157960		1		WASHER,FLAT:0.188 ID X 0.05 THK,STL	12327	OBD
	210-0069-00	XB157960		1		WASHER,LOCK:0.168 ID X 0.293 " OD,SPLIT,STL	83385	OBD
						- - - * - - -		
	401-0329-01			1		ROT INTERRUPTER:	80009	401-0329-01
-91	----- -----			2		. HUB,ROTOR:INTERRUPTER		
-92	----- -----			1		. ROTOR,INTRPT:2.50 INCH DIA		
-93	407-1674-00	XB010120		1		BRACKET,CLUTCH:ALUMINUM	80009	407-1674-00
	407-1530-00	B010100	B010119X	1		BRACKET,CLUTCH:STEEL	80009	407-1530-00
	407-1531-00	B010100	B010119X	1		BRACKET,CLUTCH:STEEL	80009	407-1531-00
-94	401-0261-00			1		BELT,POS DRIVE:40 DP,153 TEETH	14519	GRG-153-025
-95	105-0519-00			1		CLUTCH,MAGNETIC:24VDC,W/PULLY ON INPUT HUB	32496	501061
-96	401-0259-00	B010100	B041579	FT		CHAIN,ROLLER:2.083 FEET LONG	29440	RC25-72
	401-0348-00	B041580		1		CHAIN,ROLLER:1.583 FEET,NO.25,STL	29440	RC25-72
-97	401-0260-00			1		LINK,CONNECTING:CHAIN	11406	25-SPCL
-98	105-0520-00			1		CLUTCH,MAGNETIC:24VDC,W/SPROCKET ON INPUT	32496	501063
-99	129-0513-00	B010100	B010119	1		POST,ELEC-MECH:0.375 HEX X 2.25 INCH LONG	80009	129-0513-00
	129-0560-00	B010120		1		POST,ELEC-MECH:0.375 HEX X 2.09 LONG	80009	129-0560-00
						(ATTACHING PARTS)		
-100	212-0008-00			1		SCREW,MACHINE:8-32 X 0.500 INCH,PNH STL	83385	OBD
-101	210-0008-00			1		WASHER,LOCK:INTL,0.172 ID X 0.331"OD,STL	78189	1208-00-00-0541C
						- - - * - - -		
-102	401-0232-01			1		ROLLER,PAPER DC:13.350 INCH LONG RBR COV	80009	401-0232-01
						(ATTACHING PARTS)		
-103	210-0458-00			2		NUT,PLAIN,EXT W:8-32 X 0.344 INCH,STL	83385	OBD
-104	352-0395-01			2		HOLDER,BEARING:W/BEARING	80009	352-0395-01
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
3-105	401-0229-00	B010100	B010109	1	CAM,CUTTER ACTR:2.540 INCHES LONG	80009	401-0229-00
	401-0229-01	B010120		1	CAM,CUTTER,ACTR:W/SHAFT	80009	401-0229-01
					(ATTACHING PARTS)		
-106	354-0184-00			1	RING,RETAINING:FOR 0.250 INCH DIA SHAFT	79136	5555-25
					- - - * - - -		
-107	214-1941-00			1	PIN,STR HDLS:0.25 X 0.50 INCH L,STL	74445	OBD
-108	214-1932-00	B010100	B170149	1	ACTR,CUTTER BL:	80009	214-1932-00
	105-0781-00	B170150		1	ACTR,CUTTER BL:PLASTIC	80009	105-0781-00
					(ATTACHING PARTS)		
-109	213-0342-00			1	SCREW,SHOULDER:10-24 X 0.375 INCH,HEX.SOC	80009	213-0342-00
-110	210-0415-00			1	NUT,PLAIN,HEX.:10-24 X 1.25 INCH,BRS	80009	210-0415-00
-111	210-0805-00			1	WASHER,FLAT:0.204 ID X 0.438 INCH OD,STL	12327	OBD
					- - - * - - -		
-112	401-0227-00			1	BSHG,MACH.THD:0.375-32 X 0.43 INCH LONG	80009	401-0227-00
					(ATTACHING PARTS)		
-113	210-0413-00			1	NUT,PLAIN,HEX.:0.375-32 X 0.50 INCH,STL	73743	3145-402
-114	210-0013-00			1	WASHER,LOCK:INTL,0.375 ID X 0.688" OD,ST	78189	1220-00-00-0541C
					- - - * - - -		
-115	401-0264-00			1	SPROCKET,WHEEL:19 TEETH	27907	OBD
					(ATTACHING PARTS)		
-116	129-0495-00			1	POST,ELEC-MECH:0.245 OD X 0.500 INCH LONG	80009	129-0495-00
					- - - * - - -		
-117	407-1427-00			1	BRACKET,ANGLE:CHAIN TENSIONER,ALUMINUM	80009	407-1427-00
					(ATTACHING PARTS)		
-118	220-0410-00			1	NUT,EXTENDED WA:10-32 X 0.375 INCH,STL	83385	OBD
-119	210-0805-00			1	WASHER,FLAT:0.204 ID X 0.438 INCH OD,STL	12327	OBD
					- - - * - - -		
-120	401-0241-00			1	PULLEY,GROOVE:MOTOR W/SPROCKET	80009	401-0241-00
					(ATTACHING PARTS)		
	213-0006-00			1	SETSCREW:8-32 X 0.188 INCH,HSS STL	50293	28701-98C-3B
					- - - * - - -		
-121	147-0039-00			1	MOTOR,DC:BRUSH,24V,3A,155RPM	32480	PP1112-101
					(ATTACHING PARTS)		
-122	212-0023-00			4	SCREW,MACHINE:8-32 X 0.375 INCH,PNH STL	83385	OBD
-123	210-0804-00			4	WASHER,FLAT:0.17 ID X 0.375 INCH OD,STL	12327	OBD
					- - - * - - -		
-124	----- -----			1	TRANSISTOR:(SEE Q1026 EPL)		
					(ATTACHING PARTS)		
-125	213-0104-00			2	SCR,TPG,THD FOR:6-20 X 0.375 INCH,TRH STL	83385	OBD
					- - - * - - -		
-126	386-0978-00			1	INSULATOR,PLATE:TRANSISTOR,MICA	80009	386-0978-00
-127	136-0280-00			1	SOCKET,PLUG-IN:FOR TO-3 FOR TO-3	97913	LST 2202-2
					(ATTACHING PARTS)		
-128	211-0038-00			2	SCREW,MACHINE:4-40 X 0.314,FLH,100 DEG	83385	OBD
-129	210-0586-00			2	NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
					- - - * - - -		
-130	407-1404-00	B010100	B069999	1	BRACKET,MOTOR:ALUMINUM	80009	407-1404-00
	407-1404-01	B070000		1	BRACKET,MOTOR:	80009	407-1404-01
					(ATTACHING PARTS)		
-131	210-0458-00			4	NUT,PLAIN,EXT W:8-32 X 0.344 INCH,STL	83385	OBD
-132	210-0804-00			4	WASHER,FLAT:0.17 ID X 0.375 INCH OD,STL	12327	OBD
					- - - * - - -		
	198-2424-00			1	WIRE SET,ELEC:	80009	198-2424-00
	----- -----			1	. CABLE ASSY:J129/ROTOR ASSY/CLUTCH		
-133	175-0831-00			FT	. . WIRE,ELECTRICAL:8 WIRE RIBBON	08261	OBD
-134	131-0707-00			8	. . CONNECTOR,TERM.:22-26 AWG,BRS& CU BE GOLD	22526	47439
-135	352-0166-09			1	. . CONN BODY,PL,EL:8 WIRE WHITE	80009	352-0166-09
	----- -----			1	. CABLE ASSY:J36/Q1026/B1024/B1025		
-136	131-0861-00			4	. . TERM,QIK DISC:16-20 AWG,0.22 W X 0.02 THK	00779	42617-2
-137	200-1075-00			4	. . COVER,ELEC CONN:PLASTIC	00779	1-480435-0
-138	131-0621-00			6	. . CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
-139	352-0202-06			1	. . CONN BODY,PL,EL:6 WIRE BLUE	80009	352-0202-06
	----- -----			1	. CABLE ASSY:J33/TERM STRIP		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-140	131-0861-00			3		. . TERM,QIK DISC:16-20 AWG,0.22 W X 0.02 THK	00779	42617-2
	131-0621-00			1		. . CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
	131-0792-00			2		. . CONNECTOR,TERM:18-20 AWG,CU BE GOLD PL	22526	46221
-141	352-0201-03			1		. . CONN BODY,PL,EL:5 WIRE ORANGE	80009	352-0201-03
	131-0861-00			5		. TERM,QIK DISC:16-20 AWG,0.22 W X 0.02 THK	00779	42617-2
-142	162-0579-00			FT		INS SLV,ELEC:0.25 ID,SPL WRAP	87473	OBD
-143	----- -----			1		TRANSFORMER:POWER(SEE T1001 EPL)		
						(ATTACHING PARTS)		
-144	220-0410-00			4		NUT,EXTENDED WA:10-32 X 0.375 INCH,STL	83385	OBD
	210-0813-00	B010100	B126259	2		WSHR,SHOULDERED:# 10 FIBER	74921	OBD
	210-0813-00	B126260		4		WSHR,SHOULDERED:# 10 FIBER	74921	OBD
						- - - * - - -		
	----- -----			-		. XFMR ASSY INCLUDES:		
-145	212-0515-00	B010100	B126259	4		. SCREW,MACHINE:10-32 X 2.250" HEX.HD STL	83385	OBD
	212-0515-00	B126260		2		. SCREW,MACHINE:10-32 X 2.250" HEX.HD STL	83385	OBD
	212-0522-00	B126260		2		. SCREW,MACHINE:10-32 X 2.50",HEX HD STL	83385	OBD
-146	210-0812-00			4		. WASHER,NONMETAL:#10,FIBER	86445	OBD
	166-0457-00			4		. INSUL SLVG,ELEC:0.19 ID X 1.875"LONG MYLAR	80009	166-0457-00
-147	200-0234-00			1		. COVER,ELEC XFMR:3.437 X 4.125X 1.0,STEEL	80009	200-0234-00
-148	131-0621-00			3		. CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
-149	352-0199-01			1		. HLDR,TERM CONN:3 WIRE BROWN	80009	352-0199-01
-150	407-1641-00			1		BRACKET,XFMR:ALUMINUM	80009	407-1641-00
						(ATTACHING PARTS)		
-151	212-0023-00			1		SCREW,MACHINE:8-32 X 0.375 INCH,PNH STL	83385	OBD
						- - - * - - -		
-152	343-0004-00			1		CLAMP,LOOP:0.312 INCH DIAMETER,PLSTC	95987	5-16-6B
						(ATTACHING PARTS)		
-153	211-0152-00	B010100	B157169	1		SCR,ASSEM WSHR:4-40 X 0.625 INCH,PNH BRS	83385	OBD
	211-0246-00	B157170		1		SCR,ASSEM WSHR:4-40 X 0.625 INCH,PNH,STL	78189	OBD
-154	210-0851-00			1		WASHER,FLAT:0.119 ID X 0.375 INCH OD,STL	12327	OBD
						- - - * - - -		
-155	366-0261-00	XB070000		1		KNOB:0.312 OD X 0.406 INCH LONG	80009	366-0261-00
	214-0949-00	XB070000		1		. SPR,HLCL,TRSN:0.282" OD X 0.125" LONG	80009	214-0949-00
-156	384-1140-00	XB070000		1		EXTENSION SHAFT:0.125 DIA X 2.34 INCH LONG	80009	384-1140-00
-157	376-0029-00	XB070000		1		CPLG,SHAFT,RGD:0.128 ID X 0.312 OD X 0.5"L	80009	376-0029-00
	213-0075-00			2		. SETSCREW:4-40 X 0.094 INCH,HEX SOC STL	000BK	OBD
-158	----- -----			1		CKT BOARD ASSY:MOTOR CONTROL(SEE A4 EPL)		
						(ATTACHING PARTS)		
-159	211-0152-00	B010100	B157169	5		SCR,ASSEM WSHR:4-40 X 0.625 INCH,PNH BRS	83385	OBD
	211-0246-00	B157170		5		SCR,ASSEM WSHR:4-40 X 0.625 INCH,PNH,STL	78189	OBD
						- - - * - - -		
	----- -----			-		. CKT BOARD ASSY INCLUDES:		
-160	131-0993-00			1		. BUS,CONDUCTOR:2 WIRE BLACK	00779	530153-2
-161	131-0589-00			20		. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-162	131-0608-00			20		. TERMINAL,PIN:0.365 L X 0.25 PH,BRZ,GOLD PL	22526	47357
-163	136-0183-00			-		. SOCKET,PLUG-IN:3 PIN,ROUND	80009	136-0183-00
	----- -----			-		. (USED AS REQUIRED)		
-164	136-0220-00			-		. SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB MT	71785	133-23-11-034
	----- -----			-		. (USED AS REQUIRED)		
-165	136-0269-00			-		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	73803	CS9002-14
	----- -----			-		. (USED AS REQUIRED)		
-166	136-0514-00			-		. SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	73803	CS9002-8
	----- -----			-		. (USED AS REQUIRED)		
-167	----- -----			1		. TRANSISTOR:(SEE Q193 EPL)		
						(ATTACHING PARTS)		
-168	211-0097-00			1		. SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL	83385	OBD
-169	210-0801-00			1		. WASHER,FLAT:0.14 ID X 0.28I OD NP STL	12327	OBD
-170	210-0586-00			1		. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
						- - - * - - -		
-171	214-1914-00			1		. HEAT SINK,ELEC:	98978	PB1-ZCB
						(ATTACHING PARTS)		
-172	211-0097-00			1		. SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL	83385	OBD
-173	210-0801-00			1		. WASHER,FLAT:0.14 ID X 0.28I OD NP STL	12327	OBD
	210-0586-00			1		. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
						- - - * - - -		
-174	----- -----			1		. RES.,VAR:TEMP(SEE R71 EPL)		
-175	348-0253-00			1		GROMMET,PLASTIC:BLACK,OBLONG,3.0XO.925	80009	348-0253-00

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
3-176	348-0055-00	B010100	B069999	1		GROMMET,PLASTIC:0.25 INCH DIA	80009	348-0055-00
	348-0442-00	B070000		1		GROMMET,PLASTIC:BLACK,ROUND,0.375" ID	28520	SB-500-6
	352-0362-00	B010100	B030909	2		FUSEHOLDER: W/MOUNTING HARDWARE	75915	345001
-177	200-0582-00	B030910		2		CAP,ELECTRICAL:FUSE HOLDER	71400	9435 1/2
-178	352-0010-00	B030910		2		FUSEHOLDER:WITH HARDWARE	03614	HKP-L
-179	210-0863-00			2		WSHR,LOOP CLAMP:FOR 0.50" WIDE CLAMP,STL	95987	C191
-180	210-0204-00	B010100	B051587	1		TERMINAL,LUG:0.146 INCH DIA DE,45 DEG BEND	78189	2157-06-01-2520N
	210-0202-00	B051588		2		TERMINAL,LUG:0.146 ID,LOCKING,BRZ TINNED	78189	2104-06-00-2520N
						(ATTACHING PARTS)		
	211-0097-00	B010100	B051587X	1		SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL	83385	OBD
-181	210-0586-00	B010100	B051587	1		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
	210-0407-00	B051588		2		NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402
						- - - * - - -		
-182	161-0049-03			1		CABLE ASSY,PWR:3,28 AWG,125V,80.0 L	80009	161-0049-03
						(ATTACHING PARTS)		
-183	358-0161-00			1		BSHG,STRAIN RLF:FOR 0.50 INCH HOLE,PLASTIC	28520	SR5P4
						- - - * - - -		
	----- -----			-		. PWR CORD ASSY INCLUDES:		
	131-0861-00			1		. TERM,QIK DISC:16-20 AWG,0.22 W X 0.02 THK	00779	42617-2
-184	124-0002-00	B010100	B051587	1		TERMINAL STRIP:4 POINT	71785	109-J-194-81
	124-0320-00	B051588		1		TERMINAL CARD:4-SECT,W/10 0.187 QDISC TAB	13150	OBD
						(ATTACHING PARTS)		
-185	211-0014-00			4		SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	OBD
-186	210-0586-00			4		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
						- - - * - - -		
-187	366-1522-00			1		KNOB:LINE VOLTAGE INDICATOR	80009	366-1522-00
						(ATTACHING PARTS)		
-188	211-0507-00			1		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
-189	----- -----			1		SWITCH,PUSH:LINE VOLTAGE(SEE S1001 EPL)		
-190	407-1406-00			1		BRACKET,ELEC SW:ALUMINUM	80009	407-1406-00
						(ATTACHING PARTS)		
-191	211-0510-00			2		SCREW,MACHINE:6-32 X 0.375 INCH,PNH STL	83385	OBD
-192	210-0804-00			2		WASHER,FLAT:0.17 ID X 0.375 INCH OD,STL	12327	OBD
-193	210-0457-00			2		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
						- - - * - - -		
-194	200-1655-00	B010100	B069999	1		GUARD,CHAIN:PROCESSOR	80009	200-1655-00
	200-1922-00	B070000		1		GUARD,MECH DR:LEFT SIDE	80009	200-1922-00
						(ATTACHING PARTS)		
-195	211-0507-00			3		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
	348-0171-00	B010100	B069999X	1		GROMMET,PLASTIC:U-SHAPED	80009	348-0171-00
	337-1965-00	B010100	B069999X	1		SHIELD,ELEC:POWER SUPPLY	80009	337-1965-00
						(ATTACHING PARTS)		
	211-0507-00	B010100	B069999X	2		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
-196	129-0591-00	XB070000		1		SPACER,POST:0.937 L,W/6-32 INT-EXT THD	80009	129-0591-00
	129-0592-00	XB070000		1		SPACER,POST:0.812 L,W/6-32 INT-EXT THD	80009	129-0592-00
-197	343-0088-00			1		CLAMP,LOOP:0.062 INCH DIA	80009	343-0088-00
-198	348-0253-00			1		GROMMET,PLASTIC:BLACK,OBLONG,3.0X0.925	80009	348-0253-00
-199	----- -----			2		TRANSISTORS:(SEE Q1010,Q1012 EPL)		
						(ATTACHING PARTS)		
-200	210-0586-00			2		NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
						- - - * - - -		
-210	342-0136-00			2		INSULATOR,WSHR:0.812 OD X 0.0025 INCH THK	04713	OBD
-202	426-1086-00	B010100	B069999	1		FRAME SECT,CAB.:RIGHT	80009	426-1086-00
	426-1086-01	B070000		1		FRAME SECT,CAB.:RIGHT	80009	426-1086-01
						(ATTACHING PARTS)		
-203	211-0507-00			8		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
-204	426-1085-00			1		FRAME SECT,CAB.:LEFT	80009	426-1085-00
						(ATTACHING PARTS)		
	211-0507-00			6		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		

FIG. 3 CASSETTE & MAINFRAME



4631 HARD COPY UNIT

REV. B NOV 1976

FIG. 4 CRT & REAR

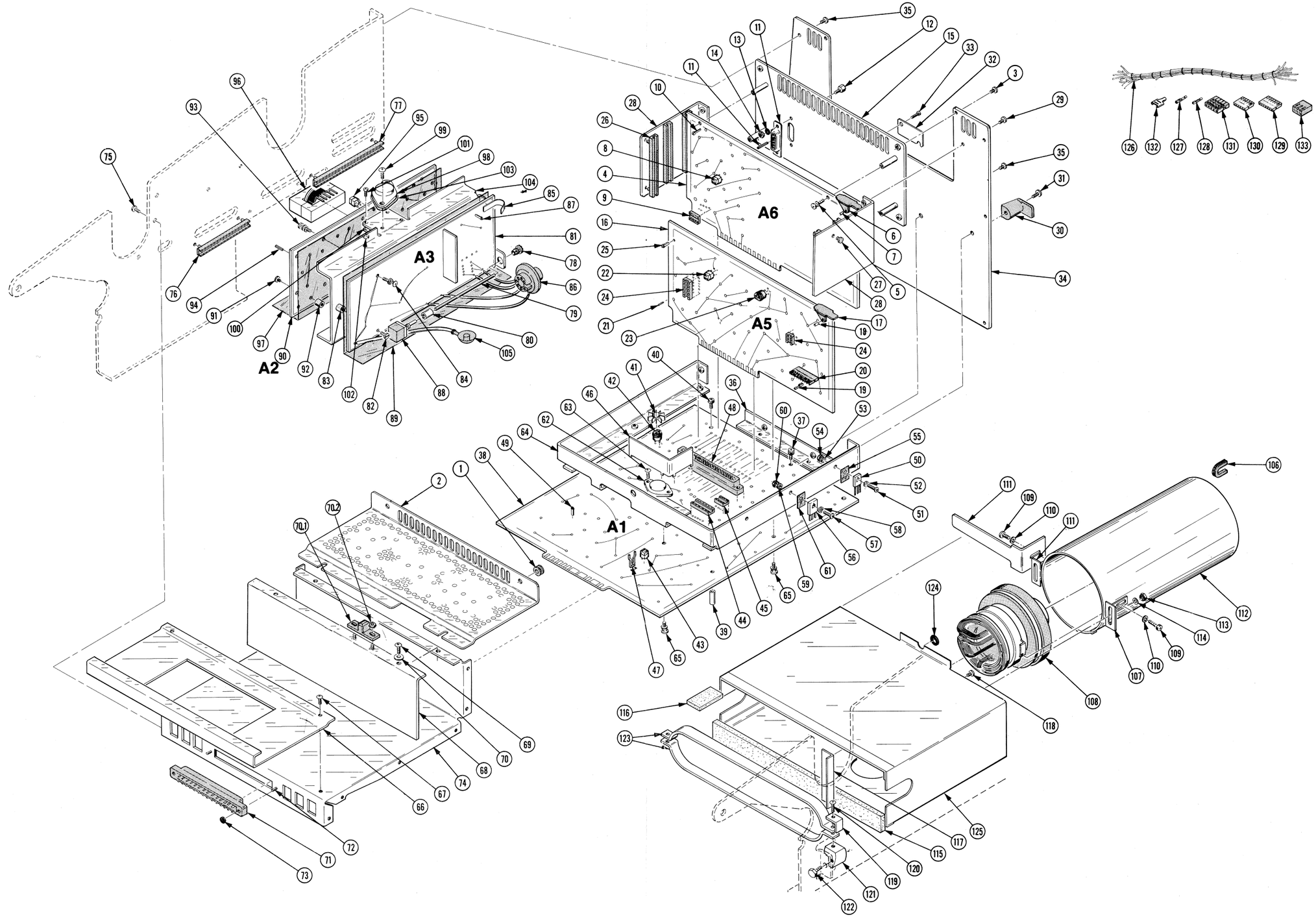


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
4-1	348-0093-00	XB070000		2		GROMMET,RUBBER:0.375 INCH	70485	MOLDCM6368
-2	337-2281-00	XB070000		1		SHIELD,PROT:CIRCUIT CARD	80009	337-2281-00
	672-0488-00	B010100	B079999	1		CKT BOARD ASSY:INTERROGATE	80009	672-0488-00
	672-0488-01	B080000		1		CKT BOARD ASSY:INTERROGATE	80009	672-0488-01
						(ATTACHING PARTS)		
-3	211-0507-00			4		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
						- - - * - - -		
	----- -----			-		. INTERFACE ASSY INCLUDES:		
-4	----- -----			1		. CKT BOARD ASSY:INTERROGATE(SEE A6 EPL)		
						(ATTACHING PARTS)		
-5	211-0116-00	B010100	B157169	4		. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
	211-0244-00	B157170		4		. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL	78189	OBD
						- - - * - - -		
	----- -----			-		. . CKT BOARD ASSY INCLUDES:		
-6	105-0160-02			2		. . EJECTOR,CKT CD:BLUE PLASTIC	80009	105-0160-02
						(ATTACHING PARTS)		
-7	214-1337-00			2		. . PIN,SPRING:0.10 OD X 0.25 INCH L,STL	80009	214-1337-00
						- - - * - - -		
-8	136-0220-00			-		. . SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB MT	71785	133-23-11-034
	----- -----			-		. . (USED AS REQUIRED)		
-9	136-0269-00			-		. . SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	73803	CS9002-14
	----- -----			-		. (USED AS REQUIRED)		
-10	214-0579-00			1		. . TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-11	131-1472-00			1		. CONNECTOR,RCPT,:15 CONTACT,FEMALE	00779	205736-6
						(ATTACHING PARTS)		
-12	129-0260-00			2		. POST,ELEC-MECH:0.255 HEX X 0.500 INCH L	80009	129-0260-00
-13	210-0003-00			2		. WASHER,LOCK:EXT,0.123 ID X 0.245" OD,STL	78189	1104-00-00-0541C
-14	210-0406-00			2		. NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
						- - - * - - -		
-15	386-3155-00	B010100	B079999	1		. PLATE,CONN MTG:CIRCUIT BOARD	80009	386-3155-00
	386-3155-01	B080000		1		. PLATE,CONN MTG:CIRCUIT BOARD,AL	80009	386-3155-01
-16	----- -----			1		CKT BOARD ASSY:TIMING INTERFACE(SEE A5 EPL)		
-17	105-0160-02			2		. EJECTOR,CKT CD:BLUE PLASTIC	80009	105-0160-02
						(ATTACHING PARTS)		
-18	214-1337-00			2		. PIN,SPRING:0.10 OD X 0.25 INCH L,STL	80009	214-1337-00
						- - - * - - -		
	198-2991-00			1		. WIRE SET,ELEC:	80009	198-2991-00
	175-0833-00			FT		. . WIRE,ELECTRICAL:10 WIRE RIBBON	08261	SS-1026-7
-19	131-0707-00			10		. . CONNECTOR,TERM.:22-26 AWG,BRS& CU BE GOLD	22526	47439
-20	352-0168-00			1		. . CONN BODY,PL,EL:10 WIRE BLACK	80009	352-0168-00
-21	131-0608-00			30		. TERMINAL,PIN:0.365 L X 0.25 PH,BRZ,GOLD PL	22526	47357
-22	136-0220-00			-		. SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB MT	71785	133-23-11-034
	----- -----			-		. (USED AS REQUIRED)		
-23	136-0235-00			-		. SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
	----- -----			-		. (USED AS REQUIRED)		
-24	136-0269-00			-		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	73803	CS9002-14
	----- -----			-		. (USED AS REQUIRED)		
	136-0260-01			-		. SOCKET,PLUG-IN:16 CONTACT,RECT SHAPE	71785	133-51-02-075
	----- -----			-		. (USED AS REQUIRED)		
-25	214-0579-00			3		. TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-26	351-0303-00			6		GUIDE,CKT CARD:3 INCH LONG,PLASTIC	80009	351-0303-00
-27	348-0023-00			4		PLUG,HOLE:	02768	207090201000101
-28	386-2778-00			2		SUPPORT,GUIDE:CIRCUIT BOARD	80009	386-2778-00
						(ATTACHING PARTS)		
-29	211-0504-00			4		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		
-30	407-0322-02			2		BRKT,POWER CA:CHARCOAL GRAY,DELRIN	80009	407-0322-02
						(ATTACHING PARTS)		
-31	211-0510-00			2		SCREW,MACHINE:6-32 X 0.375 INCH,PNH STL	83385	OBD
						- - - * - - -		
-32	200-1757-00			1		COVER,ACCESS:2 AXIS TEST POINT	80009	200-1757-00
						(ATTACHING PARTS)		
-33	211-0116-00			2		SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
						- - - * - - -		
-34	386-2743-02			1		PANEL,REAR:	80009	386-2743-02
						(ATTACHING PARTS)		
-35	211-0504-00			6		SCREW,MACHINE:6-32 X 0.25 INCH,PNH STL	83385	OBD
						- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
4-36	407-1407-00			1	BRACKET,CKT BD:REAR	80009	407-1407-00
					(ATTACHING PARTS)		
-37	211-0116-00			2	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
					- - - * - - -		
-38	----- -----			1	CKT BOARD ASSY:MAIN(SEE A1 EPL)		
-39	129-0273-00			1	. POST,ELEC-MECH:0.625 X 0.188 INCH OD	80009	129-0273-00
					(ATTACHING PARTS)		
-40	211-0116-00	B010100	B157169	1	. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
	211-0244-00	B157170		1	. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL	78189	OBD
					- - - * - - -		
-41	214-1291-00			2	. HEAT SINK,ELEC:XSTR,0.72 OD X 0.375"H	05820	207-AB
-42	136-0183-00			-	. SOCKET,PLUG-IN:3 PIN,ROUND	80009	136-0183-00
	----- -----			-	. (USED AS REQUIRED)		
	136-0235-00			-	. SOCKET,PLUG-IN:6 CONTACT,ROUND	71785	133-96-12-062
	----- -----			-	. (USED AS REQUIRED)		
-43	136-0220-00			-	. SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB MT	71785	133-23-11-034
	----- -----			-	. (USED AS REQUIRED)		
-44	136-0269-00			-	. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	73803	CS9002-14
	----- -----			-	. (USED AS REQUIRED)		
-45	136-0514-00			-	. SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	73803	CS9002-8
	----- -----			-	. (USED AS REQUIRED)		
-46	337-1964-00			1	. SHIELD,ELEC:CIRCUIT CARD	80009	337-1964-00
-47	344-0154-00			8	. CLIP,ELECTRICAL:FOR 0.25 INCH DIA FUSE	80009	344-0154-00
-48	131-1229-00			3	. CONNECTOR,RCPT:22/44 CONTACT	05574	2VK22D/4-2
-49	214-0579-00			4	. TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-50	----- -----			1	. TRANSISTOR:(SEE Q747 EPL)		
					(ATTACHING PARTS)		
-51	211-0014-00			1	. SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	OBD
-52	210-1122-00			1	. WASHER,LOCK:0.228 ID X 0.375 INCH OD,STL	04713	B52200F006
-53	210-0994-00			1	. WASHER,FLAT:0.125 ID X 0.25" OD,STL	86928	5714-147-20N
-54	210-0586-00			1	. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
					- - - * - - -		
-55	342-0163-00			1	. INSULATOR,PLATE:XSTR,0.675 X 0.625 X 0.001"	80009	342-0163-00
-56	----- -----			2	. TRANSISTORS:(SEE Q769,Q795 EPL)		
					(ATTACHING PARTS)		
-57	211-0014-00			2	. SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	OBD
-58	210-1122-00			2	. WASHER,LOCK:0.228 ID X 0.375 INCH OD,STL	04713	B52200F006
-59	210-0994-00			2	. WASHER,FLAT:0.125 ID X 0.25" OD,STL	86928	5714-147-20N
-60	210-0586-00			2	. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
					- - - * - - -		
-61	342-0163-00			2	. INSULATOR,PLATE:XSTR,0.675 X 0.625 X 0.001"	80009	342-0163-00
-62	----- -----			1	. MICROCIRCUIT:(SEE U439 EPL)		
					(ATTACHING PARTS)		
-63	211-0542-00			2	. SCREW,MACHINE:6-32 X 0.312 INCH,TRH STL	83385	OBD
					- - - * - - -		
-64	407-1409-00	B010100	B157109	1	. BRACKET,CKT BD:ALUMINUM	80009	407-1409-00
	407-1409-01	B157110		1	. BRACKET,CKT BD:ALUMINUM	80009	407-1409-01
					(ATTACHING PARTS)		
-65	211-0116-00	B010100	B157169	8	. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
	211-0244-00	B157170		8	. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL	78189	OBD
					- - - * - - -		
-66	386-2788-00	B010100	B109999	1	SUPPORT,INSUL:MAIN FRAME	80009	386-2788-00
	386-2788-01	B110000		1	SUPPORT,INSUL:	80009	386-2788-01
					(ATTACHING PARTS)		
-67	213-0124-00			2	SCR,TPG,THD FOR:6-20 X 0.250 INCH,PNH STL	83385	OBD
					- - - * - - -		
-68	200-1687-00	B010100	B099999	1	COV,INSULATION:ALUMINUM	80009	200-1687-00
	200-1687-01	B100000		1	COVER,INSUL:	80009	200-1687-01
					(ATTACHING PARTS)		
-69	211-0507-00			2	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
-70	210-0803-00			2	WASHER,FLAT:0.15 ID X 0.032 THK,STL CD PL	12327	OBD
					- - - * - - -		
-70.1	214-2481-00	XB100000		1	PIN,GUIDE:PLASTIC	80009	214-2481-00
					(ATTACHING PARTS)		
-70.2	210-0457-00	XB100000		2	NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
					- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5 Name & Description	Mfr Code	Mfr Part Number
4-71	136-0156-01			1	CONNECTOR,RCPT,:22/44 PIN,CHASSIS MOUNT	05574	2VH22-1AN5
					(ATTACHING PARTS)		
-72	211-0014-00			2	SCREW,MACHINE:4-40 X 0.50 INCH,PNH STL	83385	OBD
-73	210-0586-00			2	NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
					- - - * - - -		
-74	386-2746-00	B010100	B109999	1	SUPPORT,FR SECT:	80009	386-2746-00
	386-2746-01	B110000		1	SUPPORT,FR SECT:	80009	386-2746-01
					(ATTACHING PARTS)		
-75	211-0507-00			12	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
					- - - * - - -		
-76	351-0303-00			4	GUIDE,CKT CARD:3 INCH LONG,PLASTIC	80009	351-0303-00
-77	351-0087-00			2	GUIDE,CKT CARD:4.75 INCH LONG,PLASTIC	80009	351-0087-00
	672-0503-00	B010100	B079999	1	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-00
	672-0503-01	B080000	B136599	1	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-01
	672-0503-04	B136600	B136699	1	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-04
	672-0503-05	B136700		1	CKT BOARD ASSY:HIGH VOLTAGE	80009	672-0503-05
					(ATTACHING PARTS)		
	211-0507-00			3	SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
					- - - * - - -		
	----- -----			-	. CKT BOARD ASSY INCLUDES:		
-78	366-0261-00	B010100	B173519	1	. KNOB:0.312 OD X 0.406 INCH LONG	80009	366-0261-00
	366-0261-02	B173520		1	. KNOB:GRAY,0.129 IDX 0.312 OD	80009	366-0261-02
	214-0949-00	B010100	B173519	1	. . SPR,HLCL,TRSN:0.282" OD X 0.125" LONG	80009	214-0949-00
	214-2564-00	B173520		1	. . SPR,HLCL,TRSN:0.23 ID X 0.084	000AQ	OBD
-79	384-1227-00			1	. EXTENSION SHAFT:0.123 OD X 3.650 INCH LONG	80009	384-1227-00
-80	376-0029-00			1	. CPLG,SHAFT,RGD:0.128 ID X 0.312 OD X 0.5"L	80009	376-0029-00
	213-0075-00			2	. . SETSCREW:4-40 X 0.094 INCH,HEX SOC STL	000BK	OBD
-81	----- -----			1	. CKT BOARD ASSY:HIGH VOLTAGE(SEE A3 EPL)		
					(ATTACHING PARTS)		
-82	211-0040-00			2	. SCREW,MACHINE:4-40 X 0.25",BDGH PLSTC	26365	OBD
-83	129-0143-00			2	. INSULATOR,STDF:0.312 OD X 0.406" L,NYLON	80009	129-0143-00
-84	211-0116-00			2	. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
					- - - * - - -		
	----- -----			-	. . CKT BOARD ASSY INCLUDES:		
-85	131-1530-00			1	. . CONTACT,ELEC:GROUNDING,CU BE	80009	131-1530-00
-86	136-0579-00			1	. . SKT,PL-IN ELEK:ELCTRN TUBE,7 CONT W/LEADS	80009	136-0579-00
	200-0801-00			1	. . . COVER,SOCKET,PL:ELECTRON TUBE,PLASTIC	80009	200-0801-00
	136-0278-00			1	. . . SOCKET,PLUG-IN:WITH PINS	80009	136-0278-00
-87	214-0579-00			1	. . TERM,TEST POINT:BRS CD PL	80009	214-0579-00
-88	----- -----			1	. . RES.,VAR:FOCUS(SEE R345 EPL)		
-89	342-0275-00			1	. INSUL SH,ELEC:HIGH VOLTAGE	80009	342-0275-00
-90	----- -----			1	. CKT BOARD ASSY:H.V. OSCILLATOR(SEE A2 EPL)		
					(ATTACHING PARTS)		
-91	211-0040-00			2	. SCREW,MACHINE:4-40 X 0.25",BDGH PLSTC	26365	OBD
-92	129-0143-00			2	. INSULATOR,STDF:0.312 OD X 0.406" L,NYLON	80009	129-0143-00
-93	211-0116-00			2	. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
					- - - * - - -		
	----- -----			-	. . CKT BOARD ASSY INCLUDES:		
-94	131-0589-00			5	. . TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-95	136-0183-00			-	. . SOCKET,PLUG-IN:3 PIN,ROUND	80009	136-0183-00
	----- -----			-	. . (USED AS REQUIRED)		
	136-0220-00			-	. . SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB MT	71785	133-23-11-034
	----- -----			-	. . (USED AS REQUIRED)		
-96	----- -----			1	. . TRANSFORMER:H.V.(SEE T1015 EPL)		
-97	342-0274-00	B010100	B079999	1	. INSULATOR,PLATE:HV OSCILLATOR,MYLAR	80009	342-0274-00
	342-0274-01	B080000		1	. INSUL SH,ELEC:HIGH VOLTAGE OSCILLATOR	80009	342-0274-01
-98	----- -----			1	. TRANSISTOR:(SEE Q1016 EPL)		
					(ATTACHING PARTS)		
-99	213-0104-00			2	. SCR,TPG,THD FOR:6-20 X 0.375 INCH,TRH STL	83385	OBD
					- - - * - - -		
-100	136-0280-00			1	. SOCKET,PLUG-IN:FOR TO-3 FOR TO-3	97913	LST 2202-2
					(ATTACHING PARTS)		
-101	211-0038-00			2	. SCREW,MACHINE:4-40 X 0.314,FLH,100 DEG	83385	OBD
-102	210-0586-00			2	. NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL	78189	211-041800-00
					- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
4-103	386-0978-00			1		. INSULATOR,PLATE:TRANSISTOR,MICA	80009	386-0978-00
-104	441-1191-01	B010100	B079999	1		. CHAS,HD COPY UN:HIGH VOLTAGE	80009	441-1191-01
	441-1191-02	B080000		1		. CHAS,HD COPY UN:HIGH VOLTAGE	80009	441-1191-02
-105	131-1108-00	B010100	B116599	1		LEAD,ELECTRICAL:STRD,18 AWG,6.5KV,26.0 L	80009	131-1108-00
	131-1108-01	B116600		1		LEAD,ELECTRICAL:STRD,16 AWG,23KV,26.0 L	00779	863559-1
-106	348-0085-00			1		GROMMET,PLASTIC:U-SHAPED	80009	348-0085-00
-107	105-0592-00			1		LEVER,MNL CONT:	80009	105-0592-00
-108	----- -----			1		COIL,TUBE DEFLE:(SEE L1012 EPL)		
						(ATTACHING PARTS)		
-109	213-0049-00	B010100	B061949	2		SCREW,MACHINE:6-32 X 0.313 INCH,STL	83385	OBD
	211-0655-00	B061950		2		SCREW MACHINE:6-32 X 0.50 INCH,HHS	000AH	OBD
-110	210-1227-00			2		WASHER,FLAT:0.203 ID X 0.50 INCH OD,STL	12327	OBD
						- - - * - - -		
-111	----- -----			2		BRKT,CRT SHIELD:L-SHAPED,REAR		
-112	337-1931-00			1		SHLD,ELCTRN TUB:REAR	80009	337-1931-00
						(ATTACHING PARTS)		
-113	210-0457-00			2		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
-114	210-1227-00			2		WASHER,FLAT:0.203 ID X 0.50 INCH OD,STL	12327	OBD
						- - - * - - -		
	----- -----			1		ELECTRON TUBE:CRT(SEE V1 EPL)		
-115	348-0383-00			1		GASKET:LIGHT SEAL	80009	348-0383-00
-116	348-0384-00			2		GASKET:LIGHT SEAL	80009	348-0384-00
-117	407-1405-00			2		BRKT,CRT SHIELD:FRONT,STEEL	80009	407-1405-00
						(ATTACHING PARTS)		
-118	211-0503-00	B010100	B136649	2		SCREW,MACHINE:6-32 X 0.188 INCH,PNH STL	83385	OBD
	211-0503-00	B136650		1		SCREW,MACHINE:6-32 X 0.188 INCH,PNH STL	83385	OBD
	343-0081-00	XB136650		1		STRAP,RETAINING:	95987	3/16-H
						- - - * - - -		
	211-0507-00	B136650		1		SCREW,MACHINE:6-32 X 0.312 INCH,PNH STL	83385	OBD
-119	343-0462-00			2		CLAMP,HOLD DOWN:ELECTRON TUBE	80009	343-0462-00
						(ATTACHING PARTS)		
-120	212-0509-00			2		SCREW,MACHINE:10-32 X 0.625INCH,PNH STL	83385	OBD
						- - - * - - -		
-121	391-0117-00			2		BLOCK,CRT MTG:FRONT	80009	391-0117-00
						(ATTACHING PARTS)		
-122	213-0090-00			2		SCREW,MACHINE:10-32 X 0.50 INCH,HEX	83385	OBD
						- - - * - - -		
-123	343-0463-00			2		CLAMP HALF:ELECTRON TUBE	80009	343-0463-00
-124	348-0003-00			1		GROMMET,RUBBER:0.312 INCH DIAMETER	70485	1411B6040
-125	337-1932-00			1		SHLD,ELCTRN TUB:FRONT	80009	337-1932-00
						(ATTACHING PARTS)		
	210-0457-00			4		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
	211-0510-00			4		SCREW,MACHINE:6-32 X 0.375 INCH,PNH STL	83385	OBD
						- - - * - - -		
-126	179-2312-00			1		WIRING HARNESS,:MAIN	80009	179-2312-00
-127	131-0621-00			4		. CONNECTOR,TERM:22-26 AWG,BRS& CU BE GOLD	22526	46231
	131-0622-00			1		. CONTACT,ELEC:0.577"L,28-32 AWG WIRE	22526	46241
	131-1918-00			6		. CONTACT,ELEC:22-26 AWG WIRE,CRIMP ON,BRS	27264	08-56-0107
-128	131-0707-00			7		. CONNECTOR,TERM.:22-26 AWG,BRS& CU BE GOLD	22526	47439
-129	352-0165-04			1		. CONN BODY,PL,EL:7 WIRE YELLOW	80009	352-0165-04
-130	343-0549-00	XB157680	B159009	11		. STRAP,TIEDOWN:0.091 W X 3.62 INCH LONG	59730	TY23M
	343-0549-00	B159010		13		. STRAP,TIEDOWN:0.091 W X 3.62 INCH LONG	59730	TY23M
-131	352-0201-00			1		. CONN BODY,PL,EL:5 WIRE BLACK	80009	352-0201-00
-132	131-1215-00			1		. CONTACT,ELEC:CRIMP MT W/RED INS	77342	42599-4
-133	204-0671-00			2		. BODY,CONN,PLUG,:3 FEMALE POSN. NYLON	27264	09-50-4031

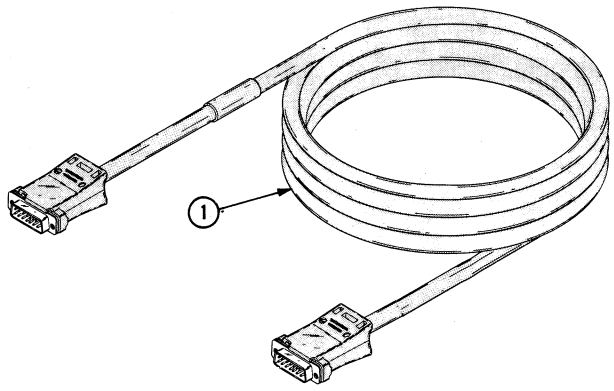


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
5-1	012-0547-00			1		CABLE,INTCON:120.0 L	80009	012-0547-00
	070-1830-01			1		MANUAL,TECH:USERS(NOT SHOWN)	80009	070-1830-01
						OPTIONAL ACCESSORIES		
	003-0738-00			1		WRENCH,TAPPET:ADJUSTING,0.500 X 0.562 INCH	65814	1090D
	012-0548-00			1		CABLE,INTCON:240.0 L	80009	012-0548-00
	012-0549-00			1		CABLE,INTCON:600.0 L	80009	012-0549-00
	070-1831-02			1		MANUAL,TECH:SERVICE	80009	070-1831-02
	006-1603-00			1		PAPER,COPYING:THERMOGRAPHIC	76381	OBD
	006-1603-01			1		CASSETTE,PAPER:4 ROLLS	80009	006-1603-01
	003-0791-00			1		MAINT KIT,ELEK:	80009	003-0791-00
	003-0792-00			1		MAINT KIT,ELEK:	80009	003-0792-00

OPTION 1

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
	119-0595-00			1		COUNTER,ELEC:4 DIGIT,24VDC ACTR	18911	4Y41314422MEQ
	333-1804-01	B010100	B079999	1		PANEL,TOP:	80009	333-1804-01
	333-1804-03	B080000		1		PANEL,TOP:CONTROL W/COUNTER	80009	333-1804-03
	210-0055-00			2		WASHER,LOCK:SPLIT,0.145 ID X 0.253 OD,STL	83385	OBD
	210-0407-00			2		NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS	73743	3038-0228-402

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
	672-0489-00	B010100	B089999	1		CKT BOARD ASSY:MULTIPLEXER	80009	672-0489-00
	672-0489-01	B090000		1		CKT BOARD ASSY:MULTIPLEXER	80009	672-0489-01
-1	----- -----			1		. CKT BOARD ASSY:MULTIPLEXER		
						(ATTACHING PARTS)		
-2	211-0116-00			4		. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
	211-0244-00			4		. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH STL	78189	OBD
						- - - * - - -		
	----- -----			-		. . CKT BOARD ASSY INCLUDES:		
-3	105-0160-02			2		. . EJECTOR,CKT CD:BLUE PLASTIC	80009	105-0160-02
						(ATTACHING PARTS)		
-4	214-1337-00			2		. . PIN,SPRING:0.10 OD X 0.25 INCH L,STL	80009	214-1337-00
						- - - * - - -		
-5	136-0220-00			-		. . SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB MT	71785	133-23-11-034
	----- -----			-		. . (USED AS REQUIRED)		
-6	136-0269-00			-		. . SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	73803	CS9002-14
	----- -----			-		. . (USED AS REQUIRED)		
	136-0260-00			-		. . SOCKET,PLUG-IN:16 CONTACT,RECT SHAPE	71785	133-51-92-008
	----- -----			-		. . (USED AS REQUIRED)		
	136-0514-00			-		. . SKT,PL-IN ELEC:MICROCIRCUIT,8 DIP	73803	CS9002-8
	----- -----			-		. . (USED AS REQUIRED)		
-7	366-1024-00			1		. KNOB:GY,0.252 ID X0.706 OD X 0.6H	80009	366-1024-00
	213-0153-00			1		. . SETSCREW:5-40 X 0.125,STL BK OXD,HEX	000CY	OBD
-8	260-1719-00			1		. SWITCH,ROTARY:1 SECT,5 POS,30 DEG	80009	260-1719-00
						(ATTACHING PARTS)		
-9	210-0413-00			1		. NUT,PLAIN,HEX.:0.375-32 X 0.50 INCH,STL	73743	3145-402
-10	210-0840-00			1		. WASHER,FLAT:0.39 ID X 0.562 INCH OD,STL	89663	644R
						- - - * - - -		
-11	131-1472-00			4		. CONNECTOR,RCPT,:15 CONTACT,FEMALE	00779	205736-6
						(ATTACHING PARTS)		
-12	210-0406-00			8		. NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-13	210-0003-00			8		. WASHER,LOCK:EXT,0.123 ID X 0.245" OD,STL	78189	1104-00-00-0541C
-14	129-0260-00			8		. POST,ELEC-MECH:0.255 HEX X 0.500 INCH L	80009	129-0260-00
						- - - * - - -		
-15	386-3159-00	B010100	B089999	1		. PLATE,CONN MTG:MULTIPLEXER,AL	80009	386-3159-00
	386-3159-01	B090000		1		. PLATE,CONN MTG:MULTIPLEXER,AL	80009	386-3159-01
-16	131-0707-00			14		. CONNECTOR,TERM.:22-26 AWG,BRS& CU BE GOLD	22526	47439
-17	352-0171-00			4		. HLDR,TERM CONN:1 WIRE BLACK	80009	352-0171-00
-18	352-0169-00			5		. HLDR,TERM CONN:2 WIRE BLACK	80009	352-0169-00

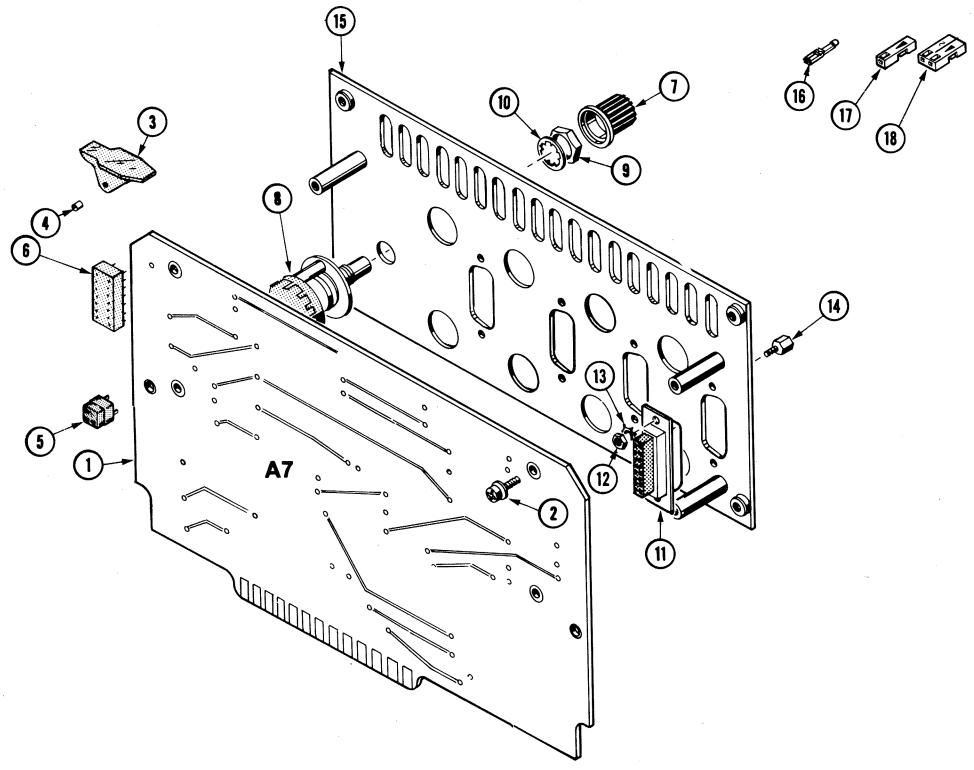


Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
	670-5740-00			1		CKT BOARD ASSY:TIMING	80009	670-5740-00
	105-0160-02			2		EJECTOR,CKT CD:BLUE PLASTIC	80009	105-0160-02
	131-0608-00			33		TERMINAL,PIN:0.365 L X 0.25 PH,BRZ,GOLD PL	22526	47357
	198-2991-00			1		WIRE SET,ELEC:	80009	198-2991-00
	131-0707-00			10		. CONNECTOR,TERM.:22-26 AWG,BRS& CU BE GOLD	22526	47439
	175-0833-00			FT		. WIRE,ELECTRICAL:10 WIRE RIBBON	08261	SS-1026-7
	352-0168-00			1		. CONN BODY,PL,EL:10 WIRE BLACK	80009	352-0168-00
	214-1337-00			2		PIN,SPRING:0.10 OD X 0.25 INCH L,STL	80009	214-1337-00
	401-0329-03			1		ROT INTRPT ASSY:	80009	401-0329-03

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
	334-2890-00			1		PLATE,IDENT:BLANK	80009	334-2890-00
	334-2864-00			4		PLATE,IDENT:BLANK	80009	334-2864-00