# 7934 <br> OSCILLOSCOPE 

## WARNIMG

The following service instructions are for use by qualified personnel only. To avoid personal injury, do not perform any service other than that contained in operating instructions unless you are qualified to do so. Refer to Operators Safety Summary and Service Summary prior to performing any service.

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## OPERATORS SAFETY INFORMATION

The following general safety information applies to all operators and service personnel. Specific warnings will be found throughout the manual where they apply and should be followed in each instance.

WARNING statements identify conditions or practices which could result in personal injury or loss of life.
CAUTION statements identify conditions or practices which could result in damage to the equipment or other property.
The word DANGER on the equipment identifies areas of immediate hazard which could result in personal injury or loss of life.
The following safety symbols may appear on the equipment.


CAUTION—Refer to manual
DANGER-High voltage
Protective ground (earth) terminal
Other warning symbols where they apply.

## WARNING

## AC Power Source and Connection

This instrument operates from a single-phase power source. It has a three-wire power cord and a two-pole, three-terminal grounding-type plug. The voltage to ground (earth) from either pole of the power source must not exceed the maximum rated operating voltage-250 volts.

Before making connection to the power source, determine that the instrument is adjusted to match the voltage of the power source, and has a suitable two-pole, three-terminal grounding-type connector. Refer any changes to qualified service personnel.

## Grounding the Instrument

This instrument is safety class I equipment (IEC designation). All accessible conductive parts are directly connected through the grounding conductor of the power cord to the grounding contact of the power connector.

The power-input plug must only be inserted in a mating receptacle with a grounding contact. Do not defeat the grounding connection. Any interruption of the grounding connection can create an electric-shock hazard. Refer to qualified service personnel for verification of adequate protective grounding system to which this instrument is to be connected.

For electric-shock protection, the grounding connection must be made before making connection to the instrument's input or output terminals.

## Do Not Remove Instrument Covers

To avoid electric-shock hazard, operating personnel must not remove the protective instrument covers. Component replacement and internal adjustments must be made by qualified service personnel only.

## Do Not Remove CRT Implosion Shield

Do not remove the clear plastic implosion shield covering the crt face plate. This crt implosion shield provides protection to the operator from crt implosion.

## Do Not Operate in Explosive Atmosphere

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


## Use the Proper Fuse

Refer fuse replacement to qualified prersonnel only. To avoid fire hazard, use only the fuse specified in the parts list for your instrument and which is identical in the following respects:
A. Type: Slow blow, fast blow, etc.
B. Voltage rating: 250 V , etc.
C. Current rating.

## Operating-Power Considerations

To prevent damage to the instrument always check the LINE VOLTAGE SELECTOR switch, located on the rear of the instrument, before connecting the instrument to the supply circuit.

## Exercise Care with Intensity Level

Crt phosphor damage can occur under adverse conditions. Avoid any condition where an extremely bright, sharply-focused dot exists on the crt. Also, remember that the light filter reduces the apparent light output from the crt.

## Prevent Instrument Damage

Plug-in units should not be installed or removed without first turning the instrument power off, to prevent instrument damage.


## 7934 FEATURES

The Tektronix 7934 Storage Oscilloscope is a solid-state, wide-bandwidth instrument designed for fast-writing speed storage applications. Three display modes are available - Nonstore, Store, and Save; as well as four storage modes Bistable, Variable Persistence, Fast Bistable, and Fast Variable Persistence. In addition, the Reduced Scan feature increases the stored-writing speed capability.

The 7934 accepts up to four Tektronix 7000 -series plug-in units. The flexibility of the plug-in feature and variety of plug-in units available allows the system to be used for many measurement applications. The left pair of plug-in compartments are reserved for vertical deflection and the right pair are reserved for horizontal deflection. Electronic switching between each pair produces multi-trace vertical and/or horizontal displays.

Power supply voltages are closely regulated to maintain instrument performance when variations in line voltage, line frequency, or plug-in load occur. The light-weight, high-efficiency power supply operates from 115- or 230-volt nominal supply sources ( 50 to 400 hertz).

# GENERAL INFORMATION 

## INTRODUCTION

## Operator's Manual

The Operator's Manual is divided into three main sections.

Section 1 - General Information contains instrument description, electrical specifications, environmental characteristics, standard and recommended accessories, installation, and instructions for packaging for shipment.

Section 2 - Operating Instructions contains information relative to operating and checking the instrument operation.

Section 3 - Instrument Options contains a description of available options and gives the location of the associated information for those options.

## Instruction Manual

The Instruction Manual contains both operating and servicing information for the 7934 Storage Oscilloscope. Sections 1 through 3 of the Instruction Manual contain the same information as Sections 1 through 3 of the Operator's Manual; the remaining sections of the Instruction Manual are as follows:

## WARMING

The additional sections of the Instruction Manual contain servicing instructions. These servicing instructions are for use by qualified service personnel only. To avoid electric shock or other personal injury, do not perform any servicing other than that described in the Operating instructions unless you are qualified.

Section 4 - Theory of Operation contains basic and general circuit analysis to help in understanding the operation of the instrument and that may be useful for servicing the instrument.

Section 5 - Maintenance describes routine and corrective maintenance procedures with detailed instructions for replacing assemblies, subassemblies, and individual components.

Section 6 - Checks and Adjustments contains procedures to check the operational performance and electrical characteristics of the instrument. Procedures also include methods for adjustment of the instrument to meet specifications.

Section 7 - Replaceable Electrical Parts contains information necessary to order replaceable parts and assemblies related to the electrical functions of the instrument.

Section 8 - Diagrams and Circuit Board Illustrations includes detailed circuit schematics, locations of assembled boards within the instrument, voltage and waveform information, circuit board and schematic component locators, and locations of adjustments to aid in performing the adjustment procedure.

Section 9 - Replaceable Mechanical Parts includes information necessary to order replaceable mechanical parts and shows exploded drawings which identify assemblies.

## INSTALLATION

## Initial Inspection

This instrument was inspected both mechanically and electrically before shipment. It should be free of mars or scratches and should meet or exceed all electrical specifications. To confirm this, inspect the instrument for physical damage incurred in transit and test the electrical performance by following the Operator's Checkout Procedure in the Operating Instructions, Section 2, and the Performance Check given in Checks and Adjustments, Section 6 of the Instruction Manual. If there is damage or deficiency, contact your local Tektronix Field Office or representative.

## General Information-7934 Service

## Operating Power Information

This instrument can be operated from either a 115 -volt or 230 -volt nominal supply source, 48 to 440 hertz.


To prevent damage to the instrument, always check the setting of the LINE VOLTAGE SELECTOR switch located on the rear panel of the instrument before connecting the instrument to the supply circuit.

## WARNING

AC POWER SOURCE AND CONNECTION. This instrument operates from a single-phase power source. It has a three-wire power cord and two-pole, threeterminal grounding-type plug. The voltage to ground (earth) from either pole of the power source must not exceed the maximum rated operating voltage - 250 volts.

GROUNDING. This instrument is safety class I equipment (IEC designation). All accessible conductive parts are directly connected through the grounding conductor of the power cord to the grounding contact of the power plug.

The power input plug must only be inserted in a mating receptacle with a grounding contact. Do not defeat the grounding connection. Any interruption of the grounding connection can create an electric shock hazard.

For electric shock protection, the grounding connection must be made before making connection to the instrument's input or output terminals.

## Power Cord Information

A power cord with the appropriate plug configuration is supplied with the 7934. If you need to change the power plug, refer to Table 1-1 and Table 1-2 for power-cord and plug identification information.

Table 1-1
POWER-CORD CONDUCTOR IDENTIFICATION

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

## Operating Voltage

The LINE VOLTAGE SELECTOR switch (located on the rear panel) allows selection of 115 -volt or 230 -volt nominal line voltage operation. To convert from 115 -volt to 230 -volt operation, change the power cord and plug to match the power-source receptacle. Then use a small screwdriver to move the LINE VOLTAGE SELECTOR switch to the desired range.

## Operating Temperature

The 7934 can be operated where the ambient air temperature is between 0 and $+50^{\circ} \mathrm{C}$. This instrument can be stored in ambient temperatures from -55 to $+75^{\circ} \mathrm{C}$. After storage at temperatures outside the operating limits, allow the chassis temperature to reach a safe operating limit before applying power.

The 7934 is cooled by air drawn in through holes in the top, side, and bottom panels and blown out through the fan exhaust. To ensure proper cooling of the instrument, maintain the clearance provided by the feet on the bottom and allow at least two inches clearance (more if possible) at the top, sides, and rear of the instrument.

## Operating Position

A bail-type stand, mounted on the bottom of the instrument, permits the instrument to be tilted up about $10^{\circ}$ for more convenient crt viewing.

## PACKAGING FOR SHIPMENT

If the 7934 is to be shipped for long distances by commercial transportation, it is recommended that the instrument be repackaged in the original manner. The carton and packaging material in which your instrument was shipped should be saved and used for this purpose.

Also, if this instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag to the instrument showing the following: Owner of the instrument (with address), name of a person at your firm who can be contacted if required, complete instrument type and serial number, and a detailed description of the service required.

If the original packaging is unfit for use or is not available, package the instrument as follows:

1. Obtain a corrugated cardboard shipping carton having inside dimensions at least six inches greater than the instrument dimensions. Refer to Table 1-3 for carton test strength requirements.

TABLE 1-2
Power-Cord and Plug Identification Information

| Plug <br> Configuration | Usage | Nominal <br> Line-Vollage (AC) | Reference Standards | Option \# |
| :---: | :---: | :---: | :---: | :---: |
|  | North American 120V/15A | 120 V | 'ANSI C73.11 <br> ${ }^{2}$ NEMA $5-15-P$ ${ }^{3}$ IEC 83 | Standard |
|  | Universal Euro $220 \mathrm{~V} / 6-16 \mathrm{~A}$ | 220 V | ${ }^{4}$ CEE (7),II,IV,VII ${ }^{3}$ IEC 83 | A1 |
|  | $\begin{gathered} \text { UK } \\ 240 \mathrm{~V} / 6-13 A \end{gathered}$ | 240 V | $\begin{aligned} & { }^{5} \text { BS } 1363 \\ & { }^{3} \text { EC } 83 \end{aligned}$ | A2 |
|  | Australian 240V/6-10A | 240 V | ${ }^{6}$ AS C112 | A3 |
|  | North American 240V/15A | 240 V | ${ }^{1}$ ANSI C73.20 <br> ${ }^{2}$ NEMA 6-15-P <br> ${ }^{3}$ IEC 83 | A4 |
|  | Switzerland 220V/6-10A | 220 V | ${ }^{7}$ SEV | A5 |

${ }^{1}$ ANSI-American National Standards Institute
${ }^{2}$ NEMA-National Electrical Manulacturer's Association
${ }^{3}$ IEC-International Electrotechnical Commission
${ }^{4} \mathrm{CEE}$ - International Commission on Rules for the Approval Electrical Equipment
2. Enclose the instrument with polyethylene sheeting or equivalent to protect the finish of the instrument.
3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between the carton and the instrument, allowing three inches on each side.
4. Seal the carton with shipping tape or with an industrial stapler.
5. Mark the address of the Tektronix Service Center and your return address on the carton in one or more prominent locations.
${ }^{5}$ BS—British Standards Institution
${ }^{6}$ AS-Standards Association of Australia
'SEV-Schweizevischer Elektrotechischer Verein

Table 1-3 SHIPPING CARTON TEST STRENGTH

| Gross Weight (pounds) | Carton Test Strength <br> (pounds) |
| :---: | :---: |
| $0-10$ | 200 |
| $10-30$ | 275 |
| $30-120$ | 375 |
| $120-140$ | 500 |
| $140-160$ | 600 |

## SPECIFICATION

The electrical characteristics listed in Table 1-4 apply at ambient temperatures between 0 and $+50^{\circ} \mathrm{C}$, unless otherwise stated, when the following conditions are met: 1) The instrument was adjusted at an ambient temperature between +20 and $+30^{\circ} \mathrm{C}$; 2) The instrument is allowed a 30 minute warm-up period; 3) The instrument is operated in an
environment that meets the limits described in Table 1-5. All specifications are valid in both Full Scan and Reduced Scan modes unless stated otherwise.

Any applicable conditions not listed above are expressly stated as part of the appropriate characteristic.

Table 1-4
ELECTRICAL CHARACTERISTICS

| Characteristic | Performance Requirement |
| :---: | :---: |

## VERTICAL SYSTEM

| Deflection Factor | Compatible with all 7000-series plug-in units. |
| :---: | :---: |
| Difference Between Vertical Compartments | 1\% or less. |
| Low-Frequency Linearity | 0.1 division or less compression of a center-screen two-division display positioned anywhere vertically within graticule area. |
| Bandwidth | Varies with plug-in unit selected. See 7934 Oscilloscope Vertical System Specification, Table 1-8. |
| Isolation Between Vertical Compartments <br> All Vertical Modes | At least 100:1 from dc to 150 MHz and at least 30:1 from 150 MHz to 500 MHz . |
| Delay Line | Permits viewing the leading edge of triggering signal. <br> NOTE <br> Not all 7B50-series time-base units can display the leading edge of the trigger signal in the 7934. Refer to the Tektronix Products Catalog under the specific time-base unit for recommended mainframe use. |
| Vertical Display Modes | Selected by front-panel VERTICAL MODE switch. |
| LEFT | Signal from left vertical plug-in unit displayed. |
| ALT | Display alternates between left and right vertical plug-in units. |
| ADD | Display is algebraic sum of left and right vertical plug-in units. |
| CHOP | Display chops between left and right vertical plug-in units. |
| RIGHT | Signal from right vertical plug-in unit displayed. |
| Chopped Mode Repetition Rate | 1 MHz within $20 \%$. |
| Vertical Trace Separation | Positions B trace at least four divisions above and below A trace when 7934 operates in dual-sweep mode. |

Table 1-4 (cont)

| Characteristic | Performance Requirement |
| :---: | :---: |

## HORIZONTAL SYSTEM

| Deflection Factor <br> Difference Between Horizontal <br> Compartments <br> Fastest Calibrated Sweep Rate <br> Horizontal Display Mode <br> A | $1 \%$ or less. |
| :--- | :--- |
| ALT | Selected by front-panel HORIZONTAL MODE switch. |
| CHOP | A horizontal plug-in unit displayed. |
| B | Display alternates between A and B horizontal plug-in units. |
| Chopped Mode Repetition Rate | Display chops between A and B horizontal plug-in units. |
| Phase Shift Between Vertical and <br> Horizontal Deflection Systems | B horizontal plug-in unit displayed. |
| With Option 02 (B HORIZ <br> Compartment Only) | $2^{\circ}$ or less from dc to at least 35 kHz. |
| Bandwidth (7934 Horizontal System Only <br> with 10 Division Reference) | From dc to at least 1 MHz. |
| With Option 02 (B HORIZ <br> Compartment Only) | $2^{\circ}$ or less from dc to 1 MHz. |

TRIGGER SYSTEM

| A and B TRIGGER SOURCE | Selected by front-panel TRIGGER SOURCE switches. |
| :--- | :--- |
| VERT MODE | From vertical plug-in unit selected by VERTICAL MODE switch; CHOP mode <br> signals are added algebraically. |
| LEFT VERT | From left vertical plug-in unit only. |
| RIGHT VERT | From right vertical plug-in unit only. |

Table 1-4 (cont)

| Characteristic | CALIBRATOR |
| :--- | :--- |
|  | Performance Requirement |
| Waveshape | Square wave. |
| Polarity | Positive going with baseline near zero volts. |
| Source Impedance | Approximately 450 ohms. |
| Output Voltage <br> Into 100 Kilohms or Greater | Selected by front-panel CALIBRATOR switch. |
| Into 50 Ohms | $40 \mathrm{mV}, 0.4 \mathrm{~V}, 4 \mathrm{~V}$. |
| Output Current | $4 \mathrm{mV}, 40 \mathrm{mV}, 0.4 \mathrm{~V}$. |
|  | 40 mA available through CALIBRATOR output with optional BNC-to-Current <br> Loop adapter. CALIBRATOR switch must be set to 4 V for calibrated current <br> output. |
| Amplitude Accuracy (P-P Voltage) | Within 1\%. |
| Repetition Rate | 1 kHz within $0.25 \%$. |
| Duty Factor | 49.8 to $50.2 \%$. |
| Rise Time and Fall Time | 250 nanoseconds or less into 100 pF or less. |

SIGNAL OUTPUTS

| Sawtooth Output <br> Source <br> A Sweep | Selected by internal Sweep Selector jumper. |
| :--- | :--- |
| B Sweep | A HORIZ time-base unit or B HORIZ time-base unit. |
| Polarity | Derived from A HORIZ time-base sweep. |
| Output Voltage | Derived from B HORIZ time-base sweep. |
| Rate of Rise  <br> Into 50 ohms Positive going with baseline at 0 V , within 1 V , into 1 Megohm. <br> Into 1 Megohm $50 \mathrm{mV} / \mathrm{unit}$ of time selected by time-base unit time/division switch, within $15 \% ;$ <br> 100 ns/division sweep rate maximum.  |  |
| Output Resistance | $1 \mathrm{~V} / \mathrm{unit}$ of time selected by time-base unit time/division switch, within $10 \% ;$ <br> $1 \mu \mathrm{~s} /$ division sweep rate maximum. |

Table 1-4 (cont)

| Characteristic | Performance Requirement |
| :---: | :---: |
| Gate Output | Selected by internal Gate Selector jumper. |
| Source | A HORIZ time-base unit or B HORIZ time-base unit. |
| A Gate | Derived from the A HORIZ time-base unit main gate. |
| $B$ Gate | Derived from the B HORIZ time-base unit main gate. |
| Dly'd Gate | Derived from the A HORIZ time-base unit delayed gate. |
| Polarity A or B Gate | Positive going with baseline at 0 V , within 1.0 V , into 1 Megohm. |
| A Dly'd Gate | Positive level when A time-base delayed sweep or B sweep is enabled. O V, within 1.0 V , into 1 Megohm when sweeps are disabled. Output is always positive when no plug-in is used or plug-in does not provide delayed gate. |
| Output Voltage Into 50 Ohms | 0.5 V within $10 \%$. |
| Into 1 Megohm | 10 V within $10 \%$ (up to $1 \mu \mathrm{~s} /$ division sweep rate). |
| Rise Time Into 50 ohms | 20 nanoseconds or less. |
| Output Resistance | Approximately 950 ohms. |
| Vertical Signal Out | Selected by B TRIGGER SOURCE switch. |
| Source | Same as B TRIGGER SOURCE. |
| Output Voltage Into 50 Ohms | $25 \mathrm{mV} /$ division of vertical deflection within $25 \%$. |
| Into 1 Megohm | $0.5 \mathrm{~V} /$ division of vertical deflection within $25 \%$. |
| Bandwidth into 50 Ohms | Varies with vertical plug-in selected; see 7934 Oscilloscope Vertical System Specification, Table 1-8. |
| DC Centering | 0 V , within 1 V , into 1 megohm. |
| Aberrations | 25\% or less p-p within 2 nanoseconds of step. |
| Output Resistance | Approximately 950 ohms. |

Z-AXIS SYSTEM

| External Z-Axis Input <br> Polarity and Sensitivity | Positive 2 V provides complete blanking from maximum-intensity condition; <br> negative 2 V provides complete unblanking from minimum-intensity condition. |
| :--- | :--- |
| Low-Frequency Response | To dc. |
| Input Resistance | Approximately 470 ohms. |
| Maximum Input Voltage | Within 15 V (dc plus peak ac). |
| Maximum Repetition Rate | 1 MHz. |

Table 1-4 (cont)

| Characteristic | Performance Requirement |
| :---: | :---: |

READOUT DISPLAY

| Readout Modes | Selected by front-panel READOUT control. |
| :---: | :---: |
| Free Run Readout (READOUT Control in Variable Area) |  |
| Storage Mode |  |
| STORE OFF | Readout continuously displayed. |
| BISTABLE or VAR PERSIST | Readout continuously displayed, except turns off during erase cycle. |
| FAST BISTABLE or FAST VAR PERSIST | Readout continuously displayed, except turns off at beginning of erase cycle or at initiation of single-sweep reset until end of transfer cycle. Also, turns off when displayed time base operates in other than single-sweep mode and MULTI TRACE DELAY control is not in detent. |
| SAVE | Readout displayed for approximately one second after save mode is entered, then turns off. |
| Pulsed Readout (READOUT Control in PULSED Detent) |  |
| Storage Mode |  |
| STORE OFF | One frame of readout is provided at end of displayed sweep. |
| BISTABLE | Readout continuously displayed except turns off from beginning of erase cycle until end of first displayed sweep. |
| VAR PERSIST | One frame of readout is provided at the end of displayed sweep. Erase cycle inhibits readout display. |
| FAST BISTABLE | Readout continuously displayed except turns off at beginning of erase cycle, or at initiation of single-sweep reset until end of transfer cycle. Also, turns off when displayed time base operates in other than single-sweep mode and when MULTI TRACE DELAY control is not in detent. |
| FAST VAR PERSIST | One frame of readout is provided at the end of transfer cycle; turns off when displayed time base operates in other than single-sweep mode and when the MULTI TRACE DELAY control is not in detent. |
| SAVE |  |
| BISTABLE or FAST BISTABLE | Readout displayed for approximately one second after SAVE mode is entered, then turns off. |
| VAR PERSIST | Allows one frame of readout to be displayed at end of displayed sweep. |
| FAST VAR PERSIST | Allows one frame of readout to be displayed at end of transfer cycle. |
| Character Height |  |
| Full Scan | 0.35 to 0.5 division. |
| Reduced Scan | At least 0.2 division. |

Table 1-4 (cont)

| Characteristic | Performance Requirement |
| :---: | :---: |
|  | DISPLAY |
| Cathode Ray Tube Graticule Type | Internal; illuminated with variable edge lighting. |
| Area Full Scan | $8 \times 10$ divisions; $0.9 \mathrm{~cm} /$ division . |
| Reduced Scan | $8 \times 10$ divisions; $0.45 \mathrm{~cm} /$ division, centered on faceplate. |
| Phosphor | P31. |
| Stored Vertical and Horizontal Resolution in VAR PERSIST and FAST VAR PERSIST (Full Scan Only) | 10 lines/division. |
| High Voltage - Overall Accelerating Voltage | Approximately 10 kV (approximately 12 kV in Reduced Scan). |
| Geometry | Within 0.1 division of vertical and horizontal graticule lines. |
| Beamfinder | Actuating BEAMFINDER limits display to within graticule area. |

## STORAGE

| Stored Writing Speed <br> Full Scan (Center $6 \times 8$ Divisions) <br> FAST VAR PERSIST |  |
| :--- | :--- |
| FAST BISTABLE | 300 divisions/microsecond $(270 \mathrm{~cm} / \mu \mathrm{s})$. |
| VAR PERSIST | 50 divisions/microsecond $(45 \mathrm{~cm} / \mu \mathrm{s})$. |
| BISTABLE | 2 divisions/microsecond $(1.8 \mathrm{~cm} / \mu \mathrm{s})$. |
| Reduced Scan (Center $8 \times 10$ <br> Divisions) | 0.03 division/microsecond $(0.027 \mathrm{~cm} / \mu \mathrm{s})$. |
| FAST VAR PERSIST | 8,800 divisions/microsecond $(4,000 \mathrm{~cm} / \mu \mathrm{s})$. |
| FAST BISTABLE | 776 divisions/microsecond $(350 \mathrm{~cm} / \mu \mathrm{s})$. |
| VAR PERSIST | 12 divisions/microsecond $(5.4 \mathrm{~cm} / \mu \mathrm{s})$. |
| BISTABLE | 0.2 division/microsecond $(0.09 \mathrm{~cm} / \mu \mathrm{s})$. |
| Stored Save Time (SAVE Mode) |  |
| BISTABLE and FAST BISTABLE | At least 30 minutes (SAVE 1 NTENSITY at minimum). |
| Stored View Time |  |
| VAR PERSIST and FAST VAR |  |
| PERSIST |  |

Table 1-4 (cont)

| Characteristic | Performance Requirement |
| :--- | :--- |
| Auto Erase View Time | Less than 1 second. |
| Minimum | Greater than 10 seconds. |
| Maximum |  |
| Multi Trace Delay Time | Less than 1 second. |
| Minimum | Greater than 4 seconds. |

REAR-PANEL CONNECTORS AND SWITCHES

| CONTROL ILLUMINATION | High, medium, and off (three position switch located on rear panel of power <br> supply). |
| :--- | :--- |
| PROBE POWER | Two connectors for compatible Tektronix probes. |
| REMOTE RESET INPUT | Input to reset single-sweep function of time-base units installed in A and B <br> HORIZ compartments (compatible time-base units only). High-to-low transition <br> resets sweep. |
| REMOTE STORAGE GATE INPUT | Allows remote operation of high-speed transfer. Low-to-high transition enables <br> High Speed Target to receive information to be stored. High-to-low transition <br> initiates transfer from high-speed target to storage target. |
| REMOTE ERASE INPUT | Allows remote erasure of stored display. High-to-low transition initiates an erase <br> cycle when in a storage mode. |
| REMOTE SAVE INPUT | Allows remote control of Save mode. High state allows control from front panel. <br> Low state holds storage circuitry in Save mode when in storage mode. |

POWER SOURCE

| Voltage Range (ac, rms) | Selected by rear-panel LINE VOLTAGE SELECTOR switch. |
| :--- | :--- |
| 115 V Nominal | From 90 V to 132 V. |
| 230 V Nominal | From 180 V to 250 V |
| Line Frequency | From 48 to 440 Hz. |
| Maximum Power Consumption | 230 Watts. |
| Maximum Current 3.5 amps at 60 Hz. <br> 90 V Line 1.8 amps at 60 Hz. <br> 180 V Line 4 amp fast blow. |  |

Table $1-5$
ENVIRONMENTAL

| Characteristic | NOTE |
| :--- | :--- |
| This instrumation <br> Requirement column of |  |
| will meet the electrical characteristics given in the Performance |  |

Table 1-6
PHYSICAL

| Characteristic | Information |
| :--- | :--- |
| Ventilation | Safe operating temperature maintained by dc fan. |
| Warm-up Time | 30 minutes for rated accuracy. |
| Finish | Anodized front and rear panel with blue-vinyl painted aluminum cabinet. |
| Overall Dimensions | Measured at maximum points; see Fig. 1-1 for dimensional drawing. |
| Height | 34.5 cm (13.6 inches). |
| Width | 30.5 cm (12.0 inches). |
| Length | 62.25 cm (24.5 inches). |
| Net Weight (Instrument Only) | 17.2 kg (38.0 pounds). |



Figure 1-1. 7934 dimensional drawing.

## SYSTEM ELECTRICAL SPECIFICATION

The Tektronix 7934 Oscilloscope system provides exceptional flexibility in operation with a wide choice of gen-eral- and special-purpose plug-in units. The type number of a particular plug-in unit identifies its usage as follows:

The first digit (7) denotes that the unit is designed to operate in a 7000 -series oscilloscope system.

The second letter describes the purpose of the plug-in unit as follows:

A - Amplifier
B - Real-time Time-base
C - Curve Tracer
D - Digital Unit
L - Spectrum Analyzer
M - Miscellaneous
S - Sampling Unit
T - Sampling Time-base

The third and fourth digits of the plug-in type number carry no special connotation.

An "N" suffix letter added to the normal four-digit type number means that the instrument does not have the circuitry necessary to encode data for the 7000-series readout system.

Table 1-7 lists any incompatibilities between the 7934 and the variety of plug-in units available.

Table 1-8 lists the vertical specifications which are system dependent. For more complete specifications on vertical plug-in units for the 7934 Oscilloscope system, refer to the current Tektronix Products Catalog.

Table 1-9 lists the horizontal specifications which are system dependent. For more complete specifications on horizontal plug-in units for the 7934 Oscilloscope system, refer to the current Tektronix Products Catalog.

Table 1-10 lists some of the special purpose plug-in units that can be used with the 7934 Oscilloscope.

Table 1-7
PLUG-IN INCOMPATIBILITIES

The 7934 Oscilloscope is compatible with Tektronix 7000 -Series Plug-In units with the exceptions listed in the following table:

\left.| Plug-In Unit | Operating Conditions | Symptoms | Cause |
| :--- | :--- | :--- | :--- |
| 7A21N | All. | No display. | No vertical signal connection. |$\right]$| Leading edge of triggering |
| :--- |
| waveform cannot be viewed. |
| 7B50 |
| 7B51 <br> 7B53A <br> 7B53AN <br> 7B53N |
| All. |

Table 1-7 (cont)

| Plug-In Unit | Operating Conditions | Symptoms | Cause |
| :---: | :---: | :---: | :---: |
| 7L12 | Any 7934 storage mode with 7L12 set for single-sweep operation. | 7L12 will not automatically reset after an erase or multi-trace cycle. | 7 L 12 single-sweep logic output is always LO. |
|  | 7934 fast storage modes with MULTI TRACE DELAY control operational. | Storage display will not remain viewable. |  |
| 7L13 | 7934 fast storage modes with 7 L13 set for single-sweep operation. | 7L13 will not activate multi-trace function. | 7L13 does not provide single-sweep reset. |
| $7 \mathrm{S12}$ | 7 S12 set for single-scan operation. | 7 S12 will not start by remote reset or camera reset or after an erase cycle; 7S12 start button will not activate multi-trace function. | 7S12 does not provide singlesweep reset. |
|  | 7934 fast storage modes with MULTI TRACE DELAY control operational and 7 S 12 set for single scan. | Storage display will not remain viewable. | 7S12 single-sweep logic output is always LO. |
| 7S14 | 7 S14 set for single-scan mode. | 7934 storage modes and PULSED readout do not operate normally. | Sweep gate remains HI at the end of a scan. (Can be overcome by activating both the Rep and Single Scan buttons.) |
|  | 7 S14 set for single-scan operation (both Rep and Single Scan buttons activated). | 7S14 will not start after an erase cycle. | 7S14 has no single-sweep logic output. |
|  | 7934 fast storage modes with MULTI TRACE DELAY control operable and 7S14 set for singlescan operation (both Rep and Single Scan buttons activated). | Storage display will not remain viewable. |  |
| 7T11A | All. | SAVE, AUTO ERASE, PULSED readout, and fast storage modes do not operate normally; 7T11A will not alternate with other sweep plug-ins. | 7T11A does not generate holdoff pulses. |

Table 1-8
7934 OSCILLOSCOPE VERTICAL SYSTEM SPECIFICATION

| Amplifier Plug-In Unit | Probe | Bandwidth (MHz) | Rise Time (ns) | $\begin{gathered} \text { Accuracy }{ }^{*} \\ \left(0 \text { to }+50^{\circ} \mathrm{C}\right) \end{gathered}$ |  | Vertical Signal Out |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | Bandwidth (MHz) | Rise Time (ns) |
|  |  |  |  | Ext Cal (\%) | Int Cal (\%) |  |  |
| 7A11 | Integral | 250 | 1.4 | 2 | 3 | 140 | 2.5 |
| 7A12 | None | 120 | 2.9 | 2 | 3 | 110 | 3.2 |
| 7A13 | None | 105 | 3.4 | 1.5 | 2.5 | 100 | 3.5 |
|  | P6130 |  |  |  |  |  |  |
|  | P6055 | 65 | 5.4 |  |  | 65 | 5.4 |
| 7A14 | P6021 | 55 | 6.4 | 2 | 3 | 50 | 7.0 |
|  | P6022 | 120 | 2.9 |  |  | 100 | 3.5 |
| 7A15A | None | 80 | 4.4 | 2 | 3 | 70 | 5.0 |
|  | P6057 |  |  | 3 | 4 |  |  |
| 7A16A | None | 225 | 1.6 | 2 | 3 | 140 | 2.5 |
|  | P6130 | 200 | 1.8 | 3 | 4 |  |  |
| 7 717 | None | 150 | 2.4 |  |  | 15 | 24 |
| 7A18A | None | 100 | 3.5 | 2 | 3 | 90 | 4.7 |
|  | P6130 | 75 | 4.7 | 3 | 4 |  |  |
| 7A19 | None | 500 | 0.8 | 3 | 4 | 300 | 1.2 |
|  | P6056 |  |  | 4 | 5 |  |  |
|  | P6201 | 430 | 0.9 |  |  |  |  |
| 7A22 | None or Any | $\begin{aligned} & 1 \text { (within } \\ & 10 \% \text { ) } \end{aligned}$ | $\begin{aligned} & 350 \text { (within } \\ & 9 \% \text { ) } \end{aligned}$ | 2 | 3 | 1 (within 9\%) | 350 (within 9\%) |
| 7A24 | None | 500 | 1.0 | 3 | 4 | 140 | 2.5 |
|  | P6056 | 300 | 1.2 | 4 | 5 |  |  |
|  | P6201 | 280 | 1.3 |  |  |  |  |
| 7A26 | None | 200 | 1.8 | 2 | 3 | 140 | 2.5 |
|  | P6201 | 155 | 2.4 | 3 | 4 |  |  |
| 7A29 | None | 500 | 0.7 | 2 | 4 | 300 | 1.2 |
|  | P6056 |  |  | 3 | 5 |  |  |
| 7A42 | None | 300 | 1.2 | 3 | 4 | NA | NA |
|  | P6320 |  |  | 4 | 5 |  |  |
|  | P6131 |  |  |  |  |  |  |

*EXT CAL, 0 to $+50^{\circ} \mathrm{C}$ - Plug-in gain set at a temperature within $10^{\circ} \mathrm{C}$ of operating temperature using an external calibrator with accuracy within $0.25 \%$.
INT CAL, 0 to $+50^{\circ} \mathrm{C}$ - Plug-in gain set at a temperature within $10^{\circ} \mathrm{C}$ of operating temperature using the 7934 calibrator output signal.

Table 1-9
7934 OSCILLOSCOPE HORIZONTAL SYSTEM SPECIFICATION

| Time-Base Unit | Performance Feature | Maximum Calibrated Sweep Rate | Triggered Frequency Range |
| :---: | :---: | :---: | :---: |
| 7B10 | Delayed Sweep | $0.5 \mathrm{~ns} / \mathrm{div}$ | DC to 700 MHz |
| 7B15 | Delta Delaying Sweep | $0.5 \mathrm{~ns} / \mathrm{div}$ | DC to 700 MHz |
| 7B50A | Delayed Sweep | $5 \mathrm{~ns} / \mathrm{div}$ | DC to 150 MHz |
| 7B70 | Delayed Sweep and Ext Amplifier | 2 ns/div | DC to 200 MHz |
| 7871 | Dual-Sweep Delaying and Delayed | $2 \mathrm{~ns} / \mathrm{div}$ | DC to 200 MHz |
| 7880 | Delayed Sweep | $1 \mathrm{~ns} / \mathrm{div}$ | DC to 400 MHz |
| 7B85 | Delaying Sweep | $1 \mathrm{~ns} / \mathrm{div}$ | DC to 400 MHz |
| 7887 | Time Base (with pre-trigger acquire clock when used with 7854 only) | $1 \mathrm{~ns} / \mathrm{div}$ | DC to 400 MHz |
| 7B92A | Display Switching | $0.5 \mathrm{~ns} / \mathrm{div}$ | DC to 500 MHz |

## General Information-7934 Service

Table 1-10
SPECIAL PURPOSE PLUG-IN UNITS

| Plug-In Unit | Performance Feature |
| :---: | :---: |
| 7CT1N | Low-Power Semiconductor Curve Tracer |
| 7D01/7D01F | Logic Analyzer |
| 7D02/7D02F | Logic Analyzer |
| 7D10 | Digital Events Delay |
| 7D11 | Digital Delay |
| 7D12 | A/D Converter - plug-in modules provide flexible measurement capability |
| 7D13A | Digital Multimeter - Temperature, voltage, current, and resistance measurement |
| 7D14 | Directly Gated Counter |
| 7D15 | Universal Counter Timer |
| 7D20 | Programmable Digitizer |
| 7K11 | CATV Preamplifier |
| 7L5 | 20 Hz to 5 MHz Spectrum Analyzer |
| 7L12 | 100 kHz to 1.7 GHz Spectrum Analyzer |
| 7L13 | 1 kHz to 1.8 GHz Spectrum Analyzer |
| 7L14 | 10 kHz to 1.8 GHz Spectrum Analyzer |
| 7L18 | 1.5 GHz to 60 GHz Spectrum Analyzer |
| 7M11 | Dual 50-Ohm Delay Line |
| 7M13 | Readout Access Unit |
| 7S11 | Accepts Plug-In Sampling Heads |
| 7 S 12 | Time Domain Reflectometer and Sampling Applications |
| 7S14 | Dual-Trace Delay Sweep Sampler |
| 7T11A | Random or Sequential, Equivalent or Real-Time Sampling Time Base |

## STANDARD ACCESSORIES

| Operators Manual | 1 each | $070-5879-00$ |
| :--- | :--- | :--- |
| Instruction Manual | 1 each | $070-5880-00$ |
| Gray Faceplate Protector (installed) | 1 each | $378-0625-02$ |
| Storage Green Faceplate Filter | 1 each | $378-0625-08$ |
| Power Cord | 1 each | $161-0066-00$ |

## RECOMMENDED ACCESSORIES

## (not included)

The following accessories are available for use with the 7934 Oscilloscope. For more information or to order recommended accessories, contact your local Tektronix Field Office or representative.

| Current Loop Probe Adapter | 012-0341-00 |
| :--- | :--- |
| Camera, Low-Cost General Purpose | C-5A |
| Camera, For Automatic Single-Sweep | C-52 |
| $\quad$ Photos |  |
| Tek Lab Cart | Model 3 |

## OPERATING INSTRUCTIONS

To operate the 7934 effectively, the user must become familiar with its operation and capabilities. This section describes how to use the front- and rear-panel controls and connectors.

For detailed operating information on specific plug-in units used with the 7934, refer to the manual for that unit.

## WARNING

To avoid electric-shock hazard, see installation in the General Information section of this manual before operating this instrument.

## PLUG-IN UNITS

The 7934 accepts up to four Tektronix 7000-Series plugin units. This feature allows selection of bandwidth, sensitivity, display mode, etc., and provides for future expansion of the system.

The overall capabilities of the system are mainly determined by the characteristics of the selected plug-ins. Some typical combinations are given under Applications in this section. For information on other plug-in units, refer to the current Tektronix Products Catalog.

## Installation of Plug-In Units



To prevent instrument damage, plug-in units should not be installed or removed without first turning the instrument power off.

To install a plug-in unit into a compartment, align the slots in the top and bottom of the plug-in unit with the associated guide rails in the plug-in compartment. Insert the plug-in unit into the compartment until it locks into place. To remove a plug-in unit, pull outward on the release latch to disengage the plug-in. To meet the EMC (electromagnetic compatibility) specifications, cover all unused plug-in compartments with an EMC shielded blank plug-in panel, Tektronix Part 016-0155-00.

The gain of the 7934 vertical and horizontal systems has been normalized to allow plug-in units to be interchanged among plug-in compartments without readjustment of the system. The basic calibration of the plug-in units should be checked when installed to verify their accuracy (refer to the operating instructions in the plug-in manual).

## CONTROLS AND CONNECTORS

The 7934 front and rear panels are shown in Figure 2-1 and Figure 2-2. A brief, functional description of each control and connector is included in these illustrations. Refer to Detailed Operating Information for additional information.

## Front-Panel Color Coding

The 7934 front panel is color coded to define areas by function. Blue identifies controls that affect the display mode; green identifies triggering controls.

Other colors such as gray, orange, and yellow have no functional assignment, but indicate a relationship among controls and/or connectors.

## OPERATOR'S CHECKOUT PROCEDURE

The Operator's Checkout Procedure may be used to verify proper operation of the controls and to get acquainted with the instrument. Only instrument functions (not measurement quantities or specifications) are checked in this procedure; therefore, a minimum amount of test equipment is required. If performing the Operator's Checkout Procedure reveals improper performance or instrument malfunction, first check the operation of associated equipment; then refer to qualified service personnel for repair or adjustment of the instrument.

## Test Equipment Required

The following test equipment is required for the Operator's Checkout Procedure. Other test equipment which meets these requirements may be substituted. When other equipment is substituted, the control settings or setup may need to be altered.


Fig. 2-1a. Front-panel controls, connectors and indicators.

## FRONT-PANEL CONTROLS, CONNECTORS, AND INDICATORS

(1) GRAT ILLUM - Controls illumination of graticule lines.
2) PRESET (Readout) - Screwdriver adjustment to set PULSED Readout Mode intensity.
(3) READOUT - Controls brightness of the readout display. Disables Readout System in counterclockwise OFF detent. Activates Pulsed Readout Mode in clockwise PULSED detent.
(4) Camera Power Connector (not labeled) - Three-pin connector provides power for camera operation and receives single-sweep-reset signal.
5) TRACE ROTATION - Screwdriver adjustment to align trace(s) with graticule lines.
6) ASTIG - Screwdriver adjustment used with the FOCUS control to obtain a well-defined display.
(7) A INTENSITY (indicator) - Illuminates when A HORIZ plug-in selected for display.
(8) A INTENSITY - Controls brightness of trace produced by the plug-in installed in the A HORIZ compartment.
(9) FOCUS - Optimizes crt trace definition.
(10) B INTENSITY (indicator) - Illuminates when B HORIZ plug-in selected for display.
(11) B INTENSITY - Controls brightness of trace produced by the plug-in installed in the B HORIZ compartment.
(12) BEAMFINDER - When pressed, compresses and defocuses display within graticule area.
13. REDUCED SCAN (switch and indicator) - Calibrated area of crt is reduced to inner half-size graticule and stored writing speed is increased when indicator is on.
(14) Storage Mode Switch (not labeled) - Selects one of four storage modes or the STORE OFF display mode.
15) STORAGE LEVEL - Varies writing speed of VAR PERSIST, FAST BISTABLE, and FAST VAR PERSIST storage modes.
16) SAVE (control and indicator) - Retains stored display in a noneraseable mode with continuously variable intensity when indicator is on.
(17) MULTI TRACE DELAY - Controls time between successive sweeps when operating in FAST BISTABLE and FAST VAR PERSIST storage modes.
(18) AUTO ERASE - Controls viewtime in automatic erase mode.
(19) ERASE - Erases stored display.
(20) PERSISTENCE - Controls rate of continuous erasure of VAR PERSIST and FAST VAR PERSIST storage display modes.
21) SAVE INTENSITY - Controls intensity of the SAVE display.
22) Ground (not labeled) - Binding post to establish common ground between associated equipment.
(23) B TRIGGER SOURCE - Seiects internal trigger source for B HORIZ plug-in unit.
(24) VERT TRACE SEPARATION (B) - Vertically positions the B HORIZ trace with respect to the A HORIZ trace (dual-sweep modes only).
(25) HORIZONTAL MODE - Selects source of horizontal signal and horizontal display mode.
(26) A TRIGGER SOURCE - Selects internal trigger source for A HORIZ plug-in unit.
27) Horizontal Selector (located at rear of A HORIZ compartment) - Three position switch which over-rides the HORIZONTAL MODE switch to determine the source of the horizontal display signal.
(28) VERTICAL MODE - Selects source of vertical input signal and vertical display mode.
29) POWER (switch and indicator) - Switch controls power to instrument; indicator illuminates when power is applied.
(30) CALIBRATOR - Provides calibrated square-wave voltages at 1 kHz repetition rate at CALIBRATOR output connector.

Fig. 2-1b. Front-panel controls, connectors and indicators.


Fig. 2-2a. Rear-panel controls and connectors.

## REAR-PANEL CONTROLS AND CONNECTORS

(1) REMOTE ERASE INPUT - Allows external operation of the ERASE function.
(2) REMOTE SAVE INPUT - Allows external operation of the SAVE function.
(3) REMOTE STORAGE GATE INPUT - Allows external operation of the transfer function (FAST BISTABLE and FAST VAR PERSIST only).
(4) CONTROL ILLUMINATION - Sets illumination level of the indicators and the lighted pushbutton switches on the 7934 front panel and the associated plug-in units.
(5) LINE VOLTAGE SELECTOR - Sets instrument to $\mathbf{1 1 5}$-volt or 230 -volt nominal line operation.
(6) PROBE POWER (two connectors) - Provides power to active probe system.
(7) Z-AXIS INPUT - Input for external intensity modulation of the crt display.
(8) VERT SIG OUT - Output signal derived from vertical signal as selected by the B TRIGGER SOURCE switch.
(9) +SAWTOOTH OUT - Sawtooth output signal derived from the A or B time-base unit.
(10) + GATE OUT - Output signal derived from the A Gate, B Gate, or the A Dely'd Gate.
(11) REMOTE RESET IN - Allows external single-sweep reset of time-base unit(s).

Fig. 2-2b. Rear-panel controls and connectors.

## 1. Amplifier Unit (two required)

Description: Compatible with 7934 Oscilloscope. One dualtrace unit required to completely check vertical readout fields.

Type: Any compatible 7A-series units. Refer to Table 1-8 in the General Information Section for suitable units.

## 2. Time-Base Unit (two required)

Description: Compatible with 7934 Oscilloscope. One dual time-base or delaying time-base required to completely check horizontal readout fields.

Type: Any compatible 7B-series units. Refer to Table 1-9 in the General Information section for suitable units.

## 3. Sine-Wave Generator

Description: Frequency range, 250 kilohertz to 1 megahertz; output amplitude, two volts peak-to-peak into 50 ohms; waveform, sine wave.

Type: Tektronix SG 503 (requires TM 500 power module).

## 4. Cables (two required)

Description: Length, 42 inches; connectors, BNC.
Type: RG-58/U, 50-ohm coaxial, Tektronix Part 012-005701.

## 5. BNC T Connector

Description: Connectors, two BNC female, one BNC male.
Type: BNC "T" connector, Tektronix Part 103-0300-00.

## 6. Adapter

Description: Connectors, BNC female to BNC female.
Type: BNC female to BNC female adapter, Tektronix part 103-0028-00.

## Preliminary Set Up

1. Set the front-panel controls as follows:

| A INTENSITY | Counterclockwise |
| :--- | :--- |
| FOCUS | Midrange |
| B INTENSITY | Counterclockwise |
| READOUT | OFF |
| GRAT ILLUM | Counterclockwise |
| REDUCED SCAN | Button out |
| STORE OFF | Button in |
| POWER | Button out |
| CALIBRATOR | 4 V |
| VERTICAL MODE | LEFT |
| A TRIGGER SOURCE | VERT MODE |
| HORIZONTAL MODE | A |
| VERT TRACE SEPARATION (B) | Midrange |
| B TRIGGER SOURCE | VERT MODE |
| Horizontal Selector (at rear | Norm |
| of A HORIZ compartment) |  |

2. Connect the 7934 to a power source that meets the voltage and frequency requirements. If the available line voltage is outside the limits of the LINE VOLTAGE SELECTOR switch setting (on rear panel), see Operating Power Information under Installation (General Information Section).
3. Install Tektronix 7A-Series amplifier units in the LEFT VERT and RIGHT VERT compartments. Install Tektronix 7B-Series time-base units in the A HORIZ and B HORIZ compartments.
4. Press the POWER switch to the on position (button in).
5. Set both time-base units to 1 millisecond/division and triggering to auto mode with ac coupling from the internal source.
6. Rotate the A INTENSITY control until the trace is at a desirable viewing level (near midrange). Position the trace as necessary for an on-screen display.
7. Connect the CALIBRATOR output to the input of the left amplifier unit with a 42 -inch BNC cable.
8. Set the left amplifier unit deflection factor to display a signal amplitude of two divisions centered on the screen.
9. Set the A horizontal time-base triggering for a stable display.

## Display Focus

10. Rotate the FOCUS control and observe the squarewave display. Notice that the thickness of the trace varies as the FOCUS control is rotated. Set the FOCUS control for a well-defined trace. If a well-defined trace cannot be obtained, adjust the ASTIG screwdriver adjustment along with the FOCUS control for the best trace.

## Trace Alignment

11. Disconnect the input signal. Use the left amplifier unit position control to align the trace with the center horizontal graticule line. If necessary set the TRACE ROTATION adjustment so the trace is parallel to the center graticule line.

## Graticule Illumination

12. Rotate the GRAT ILLUM control throughout its range and notice that the graticule lines are illuminated as the control is turned clockwise.

## Control Illumination

13. Set the rear-panel CONTROL ILLUMINATION switch to HIGH. Notice that the A INTENSITY indicator and the lighted pushbutton switches are illuminated. Sequentially press all of the HORIZONTAL MODE switch positions and notice the A and B INTENSITY lights; these lights indicate which intensity control is active. Set the CONTROL ILLUMINATION switch to the MEDIUM position. Observe that the selected intensity indicator and the lighted pushbutton switches on the plug-in units are dimmed. Set the CONTROL ILLUMINATION switch to OFF and notice that the selected intensity indicator and pushbutton switches are extinguished.
14. Set the rear-panel CONTROL ILLUMINATION switch to the HIGH position. Return the HORIZONTAL MODE switch to A.

## Vertical Deflection System

15. Connect the 4 V CALIBRATOR output to the input connectors of both amplifier units with two 42 -inch BNC cables and a BNC T connector. Set the deflection factor of the left amplifier unit to display about two divisions of signal on the screen.
16. Notice that the position control of only the left amplifier unit affects the vertical position of the displayed trace. Position the trace to the upper half of the graticule.
17. Set the VERTICAL MODE switch to RIGHT. Set the deflection factor of the right amplifier unit to display about two divisions of signal on the screen.
18. Notice that the position control of only the right amplifier unit affects the vertical position of the displayed trace. Position the trace to the lower half of the graticule.
19. Set the VERTICAL MODE switch to ALT. Notice that two traces are displayed on the screen. The top trace is produced by the left amplifier unit and the bottom trace is produced by the right amplifier unit; the sweep for both traces is produced by the A time-base unit. Set the sweep rate of the A time-base unit to 50 milliseconds/division; notice that the display alternates between the left and right amplifier plug-in units after each sweep. Turn the A timebase sweep rate switch throughout its range; notice that the display alternates between amplifier units at all sweep rates.
20. Set the VERTICAL MODE switch to CHOP. Turn the A time-base unit sweep rate switch throughout its range. Notice that a dual-trace display is presented at all sweep rates, and that both amplifier units are displayed by the A time-base unit on a time-sharing basis. Set the A time-base unit sweep rate switch to 0.5 millisecond/division.
21. Set the VERTICAL MODE switch to ADD. The display should be four divisions in amplitude. Notice that the position control of either amplifier unit moves the display. Set the VERTICAL MODE switch to LEFT.

## Horizontal Deflection System

22. Notice that the position control of only the A timebase unit affects the horizontal position of the displayed trace. Position the start of the trace to the left graticule line with the A time-base unit position control.
23. Set the HORIZONTAL MODE switch to B. Advance the B INTENSITY control until the display becomes defocused. The defocused display indicates that the BINTENSITY control is set too high. Reduce the setting of the B INTENSITY control to obtain a bright, well-defined display.
24. Notice that only the B time-base unit position control affects the horizontal position of the displayed trace. Position the start of the trace to the left graticule line with the B time-base unit position control. Set the B time-base unit triggering controls for a stable display.
25. Set the HORIZONTAL MODE switch to ALT. Two traces should be presented on the screen. If the traces overlap. adjust the VERT TRACE SEPARATION (B) control to position one trace to the bottom of the graticule area. Turn the sweep rate switches of both time-base units throughout their range. Observe that each time-base unit controls one of the traces independently of the other time-base unit. Also notice that when one of the time-base units is set to a slow sweep rate (below about 50 milliseconds/division), sweep alternation is evident (only one of the traces is presented on the screen at a time). Set the sweep rates of both time-base units to 0.5 millisecond/division. Adjust the A INTENSITY control; notice that it changes the intensity of the trace produced by the A time-base unit only. Likewise, the B INTENSITY control changes the intensity of the trace produced by the B time-base unit only. Return both intensity controls to desirable levels.
26. Set the HORIZONTAL MODE switch to CHOP. Notice that two traces are displayed on the screen in a manner similar to that of the ALT display. Turn the sweep rate switches of both time-base units throughout their ranges. Observe that two traces are displayed on the screen at all sweep rates. Also notice that when both time-base units are set to a slow sweep rate ( 50 milliseconds/division or slower), both traces are visible on the screen at the same time. Return the sweep rate switches of both time-base units to 0.5 millisecond/division.
27. Set the CALIBRATOR switch to 0.4 V . Set the VERTICAL MODE switch to CHOP. Four traces should be displayed on the screen. If not, adjust the position controls of the amplifier units and the VERT TRACE SEPARATION (B) control to position the four traces into view. Set the position controls of the plug-in units to identify which trace is produced from each plug-in unit (if amplifier units have the identify feature, it can be used to identify the traces). Set the A time-base unit for a sweep rate of 1 millisecond/division. Notice that the left-amplifier unit is displayed at the sweep rate of both the $A$ and $B$ time-base units and that the rightamplifier unit is also displayed at the sweep rate of both time-base units.
28. Set the HORIZONTAL MODE switch to ALT. Observe that the display is very similar to that obtained in the previous step. The main difference in this display is that the traces are now displayed alternately (noticeable only at slow sweep rates).
29. Set the VERTICAL MODE switch to ALT. Set the CALIBRATOR switch to 4 V . Notice that the trace produced by the left amplifier unit is displayed at the sweep rate of the B time-base unit and the trace produced by the right amplifier unit is displayed at the A time-base unit sweep rate. This feature is called slaved-alternate operation and is obtained
only when the VERTICAL MODE switch is in the ALT position, the HORIZONTAL MODE switch is in either the ALT or the CHOP position, and the time-base units are in the independent mode.

## Triggering

30. Set the VERTICAL MODE switch to LEFT and the HORIZONTAL MODE switch to A. Center the display on the screen with the left amplifier unit position control. Disconnect the input signal from the right amplifier unit input connector. Sequentially select all of the VERTICAL MODE switch positions. Notice that a stable display is obtained for all positions of the VERTICAL MODE switch (a straight line in RIGHT switch position).
31. Set the A TRIGGER SOURCE switch to LEFT VERT. Again, sequentially select all of the VERTICAL MODE switch positions. Notice that the display is again stable in all positions, as in the previous step, and that the LEFT VERT button is illuminated.
32. Set the A TRIGGER SOURCE switch to RIGHT VERT. Sequentially select all of the VERTICAL MODE switch positions and notice that a stable display cannot be obtained in any position (this is because there is no input signal connected to the right vertical unit). The RIGHT VERT button is illuminated. Return the A TRIGGER SOURCE switch to VERT MODE; notice that this button is illuminated.
33. The B TRIGGER SOURCE switch operates in a manner similar to the A TRIGGER SOURCE switch when the B time-base unit is selected to provide the display. Set the B TRIGGER SOURCE switch to VERT MODE, and the VERTICAL MODE switch to ALT.
34. Set the HORIZONTAL MODE switch to ALT or CHOP. Notice that this is the same display obtained in step 29 (slaved-alternate operation).

## Readout

35. Turn the READOUT control clockwise until an alphanumeric display is visible within the top or bottom division of the screen. Change the deflection factor of the amplifier unit that is selected for display; notice that the readout display changes as the deflection factor is changed. Likewise, change the sweep rate of the time-base unit which is selected for display; notice that the readout display for the time-base unit changes as the sweep rate is changed.
36. Set the time-base unit for X 10 magnification. Notice that the readout display changes to indicate the correct
magnified sweep rate. If a readout-coded 10X probe is available for use with the amplifier unit, install it on the input connector of the right amplifier plug-in unit. Notice that the deflection factor indicated by the readout is increased by 10 times when the probe is added. Return the time-base unit to normal sweep operation and disconnect the probe.
37. Sequentially select all of the VERTICAL MODE and HORIZONTAL MODE switch positions. Notice that the readout from a particular plug-in occupies a specific location on the display area. If either of the vertical plug-in units is a dual-trace unit, notice that the readout for channel 2 appears within the lower division of the screen. Return the VERTICAL MODE switch to LEFT and the HORIZONTAL MODE switch to A. Set the READOUT control to OFF.

## Beamfinder

38. Set the deflection factor of the left amplifier unit to 0.1 volt/division. Notice that a square-wave display is not visible, since the deflection exceeds the scan area of the crt.
39. Press the BEAMFINDER button; notice that the display is returned to the viewing area in compressed form while the BEAMFINDER is pressed. Release the BEAMFINDER and notice that the display again disappears from the viewing area.
40. With the BEAMFINDER button pushed in, increase the amplifier-unit deflection factor until the display is reduced to about two divisions vertically. Adjust the position control of the displayed amplifier unit to position the compressed display near the center of the graticule. Release the BEAMFINDER and notice that the display remains within the viewing area.

## Calibrator

41. Connect the CALIBRATOR output to both the left and right vertical units with two BNC cables and a BNC T connector. The display amplitude should be approximately two divisions. If not, adjust the deflection factor accordingly.
42. Press the different CALIBRATOR buttons (labeled $4 \mathrm{~V}, 0.4 \mathrm{~V}$, and 40 mV ) and notice that the displayed signal changes accordingly (CALIBRATOR output must be terminated into more than a 100-kilohm load for stated output). When the CALIBRATOR output is terminated into 50 ohms, the output is one-tenth of the stated output. Disconnect the CALIBRATOR signal.

## Z-Axis Input

43. If an external signal is available (two volts peak-topeak minimum), the function of the Z-AXIS INPUT can be demonstrated. Connect the external signal to both the input connector of the displayed amplifier unit and the rear-panel Z-AXIS INPUT connector. Set the sweep rate of the displayed time-base unit to display about five cycles of the signal. Set the amplitude of the signal generator until intensity modulation is visible on the display (change the amplifier unit deflection factor as necessary to produce an on-screen display). The positive peaks of the waveform should be blanked out and the negative peaks intensified. Notice that the setting of the intensity controls determines the amount of intensity modulation that is visible. Disconnect the cables.

## Storage Operation

44. Connect the CALIBRATOR output to the input connector of the left amplifier unit, press the 4 V button, and set the vertical deflection factor for a two-division display. Set the time-base unit triggering mode to single sweep and set the sweep rate for 0.5 millisecond/division.
45. Press the BISTABLE button and set the AUTO ERASE control fully counterclockwise into the detent position.
46. Press the ERASE button. The calibrator signal should be stored on the screen. If not, increase the $A \mathbb{N}$ TENSITY control slightly and press the ERASE button again. Repeat this sequence until a stored display is obtained.
47. Press the SAVE button. The signal stored in the previous step should remain on the screen; it may be necessary to adjust the SAVE INTENSITY control to view the display. Turn the SAVE INTENSITY control throughout its range and observe the effect on the display.
48. Press the ERASE button. Notice that the display cannot be erased (the SAVE mode inhibits the erase function). Press and release the SAVE button.
49. Set the STORAGE LEVEL and the PERSISTENCE controls fully counterclockwise. Press the VAR PERSIST button. Observe that an erase cycle and sweep occurs (when switching between the BISTABLE and VAR PERSIST modes) and that the screen goes dark except for the stored display.
50. Slowly turn the PERSISTENCE control clockwise and notice that the stored display fades into the background (background lighting will be observed as the PERSISTENCE control is advanced clockwise). The PERSISTENCE control determines the time interval during which the stored display is retained in the VAR PERSIST mode. Set the PERSISTENCE control fully counterclockwise.
51. Press the ERASE button, then set the PERSISTENCE control to midrange just long enough for the display to fade out. Quickly turn the PERSISTENCE control fully counterclockwise. Slowly increase the STORAGE LEVEL (clockwise) and notice that the faded display again becomes visible, against the background.
52. Turn the PERSISTENCE, STORAGE LEVEL, and A INTENSITY controls fully counterclockwise and set the time-base unit for auto triggering at a sweep rate of 0.5 second/division.
53. Set the PERSISTENCE control to midrange and slowly increase the A INTENSITY (clockwise) until the trace appears. Vary the PERSISTENCE control setting and notice that the trace can be made to build up or fade more quickly, depending on the control setting. Varying the A INTENSITY control also affects the display in the same manner. Return the PERSISTENCE control to midrange and slowly decrease the A INTENSITY control to the point where the trace is just extinguished; then set the STORAGE LEVEL control fully clockwise and notice that the trace becomes visible again.
54. Turn the PERSISTENCE, STORAGE LEVEL, and A INTENSITY controls fully counterclockwise and set the time-base unit for auto triggering at a sweep rate of 0.5 millisecond/division.

## 55. Press the FAST BISTABLE button.

56. Press the ERASE button and notice that the screen background appears to alternate between bright and dim. This indicates that the sweep and transfer functions are operating.
57. Set the MULTI TRACE DELAY control fully clockwise; then, slowly increase the A INTENSITY control (clockwise) until the display stores. Notice that each sweep is stored without erasing the previously stored sweep. This is easily observed if the vertical position control is varied between sweeps.
58. Press the ERASE button and notice that the display is erased.
59. Set the time-base unit for single sweep and press the ERASE button. Notice that only one sweep is stored (trigger time-base unit if necessary).
60. Change the setting of the vertical position control and initiate another sweep by pressing the reset button on the time-base unit. Notice that the new sweep is stored along with the one stored in the previous step.
61. Alternately press the ERASE button and reduce the A INTENSITY control to the point where the display just fails to store.
62. Alternately increase the STORAGE LEVEL (clockwise) and press the ERASE button. Notice that as the STORAGE LEVEL is increased, the display begins to store.
63. The FAST VAR PERSIST mode operates as outlined for the VAR PERSIST mode except that the sweep and transfer functions are operative as described for FAST BISTABLE operation.
64. Press the BISTABLE button. Set the time-base unit for auto triggering.
65. Set the A INTENSITY control to the one o'clock position. Turn the AUTO ERASE control out of the detent position and notice that the erase cycles occur automatically and with increasing frequency as the control is turned clockwise.
66. Return the ERASE control to the detent (OFF) position and set the time-base unit for single sweep and external triggering. Turn the SAVE INTENSITY control fully counterclockwise.
67. Press the ERASE button; notice that no sweep occurs.
68. Press the SAVE button; notice that no sweep occurs (this is the "Auto Save" mode). Since no trigger was available, the sweep did not run; therefore, the system waits in a ready-to-store mode.
69. Set the time-base unit to internal trigger and notice that the screen goes dark. This indicates that a sweep has occurred and that the system has entered the SAVE mode.
70. Turn the SAVE INTENSITY control clockwise and notice that the stored display becomes visible.
71. Press the STORE OFF button and set the time-base unit for auto triggering.

This completes the Operator's Checkout Procedure for the 7934 .

## DETAILED OPERATING INFORMATION

## Graticule

The graticule is marked on the inside of the crt faceplate, providing accurate, parallax-free measurements. The graticule is divided into eight vertical and ten horizontal divisions. Each full scan division is 0.9 - centimeter square divided into five minor divisions along each axis. A reduced scan graticule is etched in the center of the full scan graticule. Each reduced scan division is exactly one-half of a full scan division ( 0.45 centimeter). The vertical gain and horizontal timing of the plug-in units are calibrated to the graticule so that accurate measurements can be made from the crt in either full or reduced scan mode. The illumination of the graticule lines can be varied with the GRAT ILLUM control.

Figure 2-3 shows the graticule and defines the various measurement lines. The terminology defined here will be used in all discussions involving measurements from the graticule. The $0 \%, 10,90$, and 100 markings on the left side of the graticule are provided to facilitate rise-time measurements.


Figure 2-3. Definition of graticule measurement lines.

## Light Filter

The tinted crt face-plate filter minimizes light reflections from the face of the crt to improve contrast when viewing the display under high-ambient-light conditions. This filter may be removed for waveform photographs or for viewing high-writing-rate displays. To remove the filter, pull outward on the bottom of the plastic crt mask and remove it from the crt bezel. Remove the tinted filter; leave the clear plastic face-plate protector installed and replace the mask. The face-plate protector should be left in place at all times to protect the ort face plate from scratches, and to protect the operator from crt implosion.

## WARNING

Do not remove the clear plastic implosion shield covering the crt face plate; the crt implosion shield provides protection to the operator from crt implosion.

An optional mesh filter is available from Tektronix (included with Option 03). This filter provides shielding against radiated electromagnetic interference from the face of the crt. It also serves as a light filter to make the trace more visible under high-ambient-light conditions. The mesh filter fits in place of the plastic tinted filter. Order the mesh filter by Tektronix Part 378-0603-00.

## Control Illumination

The rear-panel CONTROL ILLUMINATION switch sets the illumination level of the A and B INTENSITY indicators, the $A$ and B TRIGGER SOURCE switches, and the lighted pushbutton switches on the plug-in units. The positions available are OFF, MEDIUM, and HIGH. The CONTROL ILLUMINATION switch does not affect the function-indicator lights on plug-in units (such as triggered or single-sweep ready lights).

## Intensity Controls

The A INTENSITY control determines the brightness of the display produced by the plug-in unit installed in the A HORIZ compartment; the B INTENSITY control determines the brightness of the display produced by the plug-in unit installed in the B HORIZ compartment. The READOUT intensity control affects the brightness of only the readout portion of the crt display.


Crt damage can occur under high-intensity conditions. Avoid any condition where an extremely bright, sharply-focused dot exists on the crt. Also, remember that the light filter reduces the apparent light output from the crt.

The beam current is limited during $X-Y$ mode operation or when either, or both, time-base units being displayed are set for a slow sweep rate. This reduces the danger of damaging the crt with a stationary or slowly moving spot.

## Display Focus

This instrument contains an automatic-focusing circuit which maintains optimum focus for all intensity levels after a correct setting of the FOCUS control is established. The easiest way to obtain the correct setting of the FOCUS control is to set the READOUT intensity control so that the readout portion of the display is clearly visible. Then adjust the FOCUS control for best definition of the readout display.

## Astigmatism and Focus Adjustments

If a well-defined display cannot be obtained with the FOCUS control, set the ASTIG adjustment as follows:

## NOTE

To check for proper setting of the ASTIG adjustment, slowly turn the FOCUS control through the optimum setting. If the ASTIG adjustment is correctly set, the vertical and horizontal portions of the display will come into focus at the same position of the FOCUS control. This setting of the ASTIG adjustment should be correct for any display.

1. Install an amplifier unit in the LEFT VERT compartment and a time-base unit in the A HORIZ compartment.
2. Set the VERTICAL MODE switch to LEFT and the HORIZONTAL MODE switch to A.
3. Connect the output of a sine-wave generator to the input of the amplifier unit. Set the sine-wave generator repetition rate to 1 kilohertz and the vertical amplifier deflection factor for a two-division display.
4. Set the time-base unit sweep rate for 0.2 millisecond/division and the triggering for a stable display. Set the A INTENSITY control so the display is at a usable intensity level (about midrange).
5. Turn the FOCUS control fully counterclockwise and set the ASTIG adjustment to midrange.
6. Set the FOCUS control so the thickness of the sinewave trace is as thin as possible.
7. Adjust the ASTIG adjustment so the width of the sinewave trace is as thin as possible.

## 8. Repeat steps 6 and 7 for the best overall focus

## Beamfinder

The BEAMFINDER helps locate a display that overscans the crt viewing area vertically and/or horizontally. When the BEAMFINDER button is pressed, the display is compressed and defocused within the graticule area. To locate and reposition an overscanned display, use the following procedure:

1. Press the BEAMFINDER button. While the display is compressed, change the vertical and horizontal deflection factors until the vertical deflection is about two divisions high and the horizontal deflection is about four divisions wide (the horizontal deflection needs to be reduced only when operating in an $X-Y$ mode).
2. Adjust the vertical and horizontal position controls to center the display on the graticule.
3. Release the BEAMFINDER button; the display should remain within the graticule area.

## Trace Alignment

The TRACE ROTATION adjustment allows the trace to be aligned with the horizontal graticule lines. To set trace alignment, set the amplifier unit input coupling to ground. Then, position the trace to the center horizotal line and adjust the TRACE ROTATION adjustment so that the trace is parallel with the center horizontal graticule line.

## Readout Display

The Readout System provides an alpha-numeric display of information on the crt along with the analog waveform display. The information displayed by the Readout System is obtained from the plug-in units installed in the plug-in compartments.

The readout information from each channel of each plugin unit is called a word. Up to eight words of readout information can be displayed on the crt (two channels from each of the four plug-in compartments). The location of each readout word is fixed and is directly related to the plug-in unit and channel from which it originated. Figure 2-4 shows the area of the graticule where the readout from each plugin unit and/or channel is displayed. Notice that the readout from channel 1 of each plug-in unit is displayed in the top division of the graticule and the readout from channel 2 is displayed directly below in the bottom division of the graticule.


Figure 2-4. Location of readout on the crt identifying the originating plug-in and channel.

The reduced scan mode changes the location of the readout display. Figure $2-5$ shows the correct readout location for the reduced scan mode. Notice that the readout display is positioned outside the half-size inner graticule and that the location of the readout words is directly related to the plug-in unit and channel from which they originated.

Usually, the readout information for plug-in units and/or channels, which are selected by the mode switches, appear in the readout display. (Some special purpose plug-in units may over-ride the mode switches to display readout even though the compartment is not selected for display.)

## Readout Identify

An identify feature is provided by the Readout System to correlate the readout word with the originating plug-in unit and channel (amplifier units only). When the "identify" button of an amplifier unit is pressed, the word IDENTIFY appears in the readout location allocated to that plug-in and channel. Other readout words in the display remain unchanged. When the "identify" button is released, the readout display from this plug-in channel is again displayed. Circuitry may also be provided in the amplifier unit to produce a noticeable change in the analog waveform display to identify the associated trace when the identify button is pressed (see the plug-in unit instruction manual for details).

## Readout Intensity

The READOUT control determines the intensity of only the readout portion of the display. independently of the


Figure 2-5. Location of readout on the crt when reduced scan is selected.
traces. The Readout System is inoperative when the READOUT control is in the fully counterclockwise OFF position. This may be desirable when the top and bottom divisions of the graticule are to be used for waveform display, or when the trace interruptions necessary to display characters interfere with the waveform display.

## Readout Modes

The READOUT intensity control determines the operating mode of the Readout System. With the READOUT intensity control set in the variable area, the Readout System operates continuously, interrupting the crt display at random (for about 20 microseconds) in order to write each character on the crt. In the PULSED position, the Readout System operates in a triggered mode; one complete frame (up to eight words) of readout is displayed after the displayed time-base unit completes each sweep of the crt. Brightness of the readout display when operating in the PULSED mode is set by the READOUT PRESET adjustment.

## Readout Operation With Storage

Each of the storage modes modify the operation of the Readout System to some extent.

Normal Readout Mode. With the READOUT control set in the variable area, the Readout System operates as follows:

BISTABLE and VAR PERSIST. In the BISTABLE and VAR PERSIST storage modes, the readout display is turned off during the storage erase cycle; otherwise, the Readout System operates as previously described under Readout Modes.

FAST BISTABLE and FAST VAR PERSIST. In the FAST BISTABLE and FAST VAR PERSIST storage modes, the Readout System turns off at the beginning of an erase cycle or when the single-sweep time-base mode is reset and remains off until the end of the storage transfer cycle. In addition, the Readout System is held off whenever the MULTI TRACE DELAY control is in operation (out of its detent position) and the displayed time-base unit is in a repetitive sweep mode.

Pulsed Readout Mode. With the READOUT control set to PULSED, the Readout System operates as follows:

BISTABLE. In the BISTABLE storage mode, the readout display runs continuously; however, the Readout System turns off when the storage erase cycle begins and remains off until the end of the first displayed sweep.

VAR PERSIST. In the VAR PERSIST storage mode one complete frame of readout is displayed after the displayed time-base unit completes each sweep; however, there is no readout display during a storage erase cycle.

FAST BISTABLE. In the FAST BISTABLE storage mode the readout display runs continuously (as in the normal mode); however, the Readout System turns off at the beginning of each erase cycle or when the single sweep timebase mode is reset and remains off until the end of the storage transfer cycle. In addition, the Readout System is held off whenever the MULTI TRACE DELAY control is in operation (out of its detent position) and the displayed timebase unit is in a repetitive sweep mode.

FAST VAR PERSIST. In the FAST VAR PERSIST storage mode, one complete frame of readout is displayed after the completion of the storage transfer cycle. However, there is no readout during the storage erase cycle and there is no readout when the MULTI TRACE DELAY control is out of the detent position and the displayed time-base unit is in a repetitive sweep mode.

Readout With Save Storage Mode. When the SAVE storage mode is used, operation of the Readout System changes from that previously described. (Refer to the SAVE mode discussion, in this manual, for information on SAVE storage mode operation.)

Save With Normal Readout. With the READOUT control set in the variable area and any of the storage modes selected, the Readout System turns off approximately one second after the storage system enters the SAVE mode.

Save With Pulsed Readout. With the READOUT control set to PULSED and the storage mode switch set to BISTABLE or FAST BISTABLE, the readout is displayed for approximately one second after the storage system enters the SAVE mode; then it turns off. With the READOUT control set to PULSED and the storage mode switch set to VAR PERSIST, one complete frame of readout is displayed at the end of the displayed sweep. With the READOUT control set to PULSED and the storage mode switch set to FAST VAR PERSIST, one frame of readout is displayed at the end of the storage transfer cycle, or whenever the storage system is set to the SAVE mode and the MULTI TRACE DELAY control is out of its detent position.

## Reduced Scan Mode

The reduced scan mode increases the stored writing speed. The calibrated graticule division is reduced to 0.45 centimeters in the reduced scan mode. Calibrated measurements are confined to the inner half-size $8 \times 10$ graticule area. The operation of the instrument controls do not change from their operation in the fuil scan mode.

## Storage Display

The 7934 Storage Oscilloscope has four selectable storage modes. Listed in order of increasing writing speed, they are: BISTABLE, VAR PERSIST, FAST BISTABLE, and FAST VAR PERSIST. In each mode the viewed image is stored on the storage target located in the front of the crt.

Bistable Storage. In the BISTABLE mode the luminance of any point on the storage target takes on one of two discrete levels, either written or unwritten. In this mode, only the A or B INTENSITY controls affect the stored writing speed; writing speed is quite low but the stored view time is indefinitely long.

Variable Persistence Storage. In the VAR PERSIST mode, points on the storage target can vary in luminance between totally dark and very bright. In this mode, writing speed is greater than in the BISTABLE mode, but the stored display is essentially unstable, or continuously fading away. The rate of fading is adjusted by the PERSISTENCE control. The VAR PERSIST storage mode is particularly useful for viewing high-speed repetitive signals with low repetition rates. The PERSISTENCE control can be adjusted in conjunction with the STORAGE LEVEL and INTENSITY controls, to produce a steady, bright trace. Writing speed is varied in this mode by the STORAGE LEVEL control as well
as the crt INTENSITY controls. Maximum stored writing speed is achieved by setting the INTENSITY controls and the STORAGE LEVEL control fully clockwise.

Fast Storage. The 7934 crt has a special high-speed target, known as the fast target, located just behind the storage target. The fast target has an extremely high writing speed but retains images for only a fraction of a second. For this reason images stored on the fast target are quickly and automatically transferred to the storage target; this operation is called transfer storage. Transfer storage can be used with the storage target operating in either bistable or variable persistence mode, resulting in the FAST BISTABLE and FAST VAR PERSIST modes.

In either of the FAST modes the writing speed is adjusted by the STORAGE LEVEL control as well as the crt INTENSITY controls. Maximum stored writing speed in both FAST storage modes is attained by setting the STORAGE LEVEL and INTENSITY controls fully clockwise.

Erase. In all storage modes, an erase cycle removes any previous display from the storage target. This prepares the storage and fast targets (in the FAST storage modes) to receive the next waveform. Erase cycles are initiated by pressing the ERASE button, grounding the rear-panel REMOTE ERASE INPUT, or by rotating the AUTO ERASE control out of the OFF (detent) position. The AUTO ERASE control can be set to erase the storage display in 1- to-10second intervals.

## WARNING

Electric-shock hazard. Only qualified service personnel should internally modify the operation of the instrument.

Two modes of operation are available for the AUTO ERASE function, either Erase After Sweep or Periodic Erase (selection jumper located behind right side panel; refer selection of mode to qualified personnel only). The two modes differ in the following ways: The Erase After Sweep mode requires that the displayed time-base unit complete a sweep in order to initiate the delay interval prior to the erasure; the Periodic Erase mode repetitively erases independent of the displayed time-base operation. The 7934 is set to the Erase After Sweep mode at the factory.

Both time-base units and the readout system are inhibited during the erase cycle. Also during each erase cycle, the displayed time-base unit is reset if it is in single-sweep mode. (The other time base will also be reset at this time if it
is also in single-sweep mode.) In the BISTABLE and VAR PERSIST storage modes, the erase cycle takes approximately 1.4 seconds. The additional time is required for preparing the fast target.

In all storage modes the time-base unit(s) is free to run immediately following an erase cycle. However, in FAST BISTABLE or FAST VAR PERSIST storage modes, the time-base unit(s) is locked out immediately after the first sweep occurs, so that transfer can occur. (In the ALT or CHOP horizontal modes, both time-base units are allowed to run once before transfer occurs.) If the time-base unit(s) is set for single-sweep operation, it remains locked out indefinitely after transfer occurs. The operator can initiate a cycle, however, called the multi-trace cycle, which causes another trace to be stored without erasing the initial display. This is accomplished by pressing the single-sweep-reset button on the time-base unit(s), or by grounding the REMOTE RESET INPUT on the 7934 rear panel. When this is done the storage system initiates a cycle, lasting approximately 600 milliseconds, which prepares the fast target to store another display and sends an additional single-sweep-reset command to the time-base unit(s). After the multi-trace cycle, the time-base unit(s) can again sweep once, after which it is again locked out and the transfer function occurs.

When the time-base unit(s) is operated in other than a single-sweep mode, the multi-trace cycle is controlled by the MULTI TRACE DELAY control. If the MULTI TRACE DELAY control is set to its detent position, operation is as previously described for the single-sweep mode. If the MULTI TRACE DELAY control is out of the detent position, the multi-trace cycle is triggered automatically following the transfer cycle. The length of the cycle can be varied by the MULTI TRACE DELAY control over a range from approximately 600 milliseconds to more than four seconds.

Save Mode. The SAVE mode can be entered from any storage mode by pressing the SAVE button or by grounding the rear-panel REMOTE SAVE INPUT. The indicator next to the SAVE button illuminates when the SAVE mode is activated. When in the SAVE mode, the time-base unit(s) and readout system are inhibited and the display cannot be erased. The SAVE INTENSITY control adjusts the intensity of the saved display. Minimum intensity provides the greatest viewing time in the VAR PERSIST and FAST VAR PERSIST modes; and although the view time of the BISTABLE and FAST BISTABLE storage modes is very long without the use of the SAVE mode, the SAVE mode simplifies photography by allowing the operator to control the intensity of the stored display.

The SAVE mode can be selected with or without a stored display present. If it is selected after an erase cycle and before a sweep has occurred (no stored display), the display waits in the STORE mode until a sweep occurs, at which time the display automatically enters the SAVE mode. (This is referred to as the Auto Save mode.)

## Care of Storage Screen

The following precautions will prolong the useful storage life of the crt in this instrument:

1. Use minimum beam intensity to produce a clear, welldefined display.
2. Use minimum SAVE INTENSITY when storing images for extended periods of time.
3. Avoid repeated use of the same area of the screen. If a particular display is to be stored repeatedly, change the vertical position occasionally to use other portions of the display area.

## Vertical and Horizontal Mode Combinations

There are 20 possible combinations of VERTICAL MODE and HORIZONTAL MODE switch settings. The total possible number of display combinations is further multiplied by the variety of plug-in units available for use with this instrument, the interchangeability of plug-ins (e.g., either an ampli-
fier or a time-base unit can be installed in any compartment), and by the capabilities of the plug-in units which are used in the instrument (e.g., a dual-trace amplifier unit can be used in either of the two single-channel modes, in the dual-trace mode, or added-algebraically mode; a delaying time base may be used either for a normal sweep or for delayed sweep). Therefore, it is difficult to list all of the display combinations which can occur during use of the 7934 and available plug-in units. Table 2-1 lists the combination of VERTICAL MODE and HORIZONTAL MODE switch positions available and the type of display obtained with each combination.

## Vertical Modes

Left or Right. When the LEFT or RIGHT button of the VERTICAL MODE switch is pressed, only the signal from the plug-in unit in the selected compartment is displayed.

Alternate Mode. The ALT position of the VERTICAL MODE switch produces a display which alternates between the LEFT VERT and RIGHT VERT compartments with each sweep of the crt. Although the ALT mode can be used at all sweep rates, the CHOP mode provides a more satisfactory

Table 2-1
DISPLAY COMBINATIONS*

| Vertical Mode | Horizontal Mode | Comments |
| :---: | :---: | :---: |
| LEFT | $A$ or B | One trace. Vertical deflection from single unit; horizontal deflection from single unit. |
|  | ALT or CHOP | Two traces. Vertical deflection from single unit; horizontal deflection from both units. |
| ALT | A or B | Two traces. Vertical deflection from both units; horizontal deflection from single unit. |
|  | ALT or CHOP | Two traces. Vertical deflection from both units; horizontal deflection from both units. Independent-pairs (sweep slaving) operation, see Alternate Mode discussion in this section. |
| ADD | A or B | One trace. Vertical deflection is algebraic summation of signals from both units; horizontal deflection from single unit. |
|  | ALT or CHOP | Two traces. Vertical deflection is algebraic summation of signals from both units; horizontal deflection from both horizontal compartments. |
| CHOP | A or B | Two traces. Vertical deflection from both units; horizontal deflection from single unit. |
|  | ALT or CHOP | Four traces. Vertical deflection from both units; horizontal deflection from both units. |
| RIGHT | A or B | One trace. Vertical deflection from single unit; horizontal deflection from single unit. |
|  | ALT or CHOP | Two traces. Vertical deflection from single unit; horizontal deflection from both units. |

[^0]display at sweep rates below about 20 milliseconds/division. At these slower rates, alternate-mode switching becomes perceptible.

Alternate Mode displays have three types of triggering available. When the A and B TRIGGER SOURCE switches are set to the VERT MODE positions, each sweep is triggered by the signal being displayed on the crt. This provides a stable display of two unrelated signals, but does not indicate the time relationship between the signals. In either the LEFT VERT or RIGHT VERT positions of the TRIGGER SOURCE switches, the two signals are displayed showing true time relationship. However, if the signals are not time related, the display from the plug-in that is not providing a trigger signal will be unstable on the crt.

When the ALT vertical mode is selected and either the ALT or CHOP button of the HORIZONTAL MODE switch is selected, the instrument operates in the slaved-alternate mode. Under this condition, the signal from the LEFT VERT unit is always displayed at the sweep rate of the B HORIZ time-base unit, and the signal from the RIGHT VERT unit is displayed at the sweep rate of the A HORIZ time-base unit (non-delayed sweep only). This results in two displays that are completely independent as to vertical deflection and sweep rate. This display is equivalent to the display obtainable with a dual-beam oscilloscope for most repetitivedisplay combinations.

If delayed-sweep operation is used with this mode, a different sequence is displayed. First the LEFT VERT unit is displayed at the sweep rate of the A HORIZ time-base unit (delaying sweep) and then at the sweep rate of the B HORIZ time-base unit (delayed sweep). The vertical display then shifts to the RIGHT VERT unit and its signal is displayed consecutively at the delaying and delayed sweep rates.

Chopped Mode. The CHOP position of the VERTICAL MODE switch produces a display which is electronically switched between channels at about a one-megahertz rate. In general, the CHOP mode provides the best display at sweep rates slower than about 20 milliseconds/division or whenever dual-trace, single-shot phenomena are to be displayed. At faster sweep rates the chopped switching becomes apparent and may interfere with the display.

When the A or B TRIGGER SOURCE switches are set to VERT MODE, internal trigger signals from the vertical plugins are algebraically added and the time-base units are triggered from the resultant signal. In the LEFT VERT or RIGHT VERT trigger-source positions, the trigger signal to the timebase units is a sample of the internal trigger signal from the selected vertical unit only. This allows two time-related signals to be displayed showing true time relationship. (If the signals are not time-related, the display from the channel that is not providing the trigger signal will appear unstable.)

The CHOP mode can be used to compare two singleshot, transient, or random signals that occur within the time interval determined by the time-base unit (ten times selected sweep rate). To provide correct triggering, the displayed signal which provides the trigger signal must precede the second display in time. Since the signals show true time relationship, time-difference measurements can be made from the display.

Algebraic Addition. The ADD position of the VERTICAL MODE switch can be used to display the sum or difference of two signals, for common-mode rejection to remove an undesired signal, or for dc offset (applying a dc voltage to one channel to offset the dc component of a signal on the other channel). The common-mode rejection ratio between the vertical plug-in compartments is at least 100:1 from dc to 150 megahertz. The rejection ratio decreases to $30: 1$ from 150 to 500 megahertz.

The overall deflection on the crt in the ADD mode is the algebraic sum of the signals from the two vertical plug-in units. It is difficult to determine the voltage amplitude of the resultant display unless the amplitude of the signal applied to one of the plug-ins is known. This is particularly true when the vertical units are set to different deflection factors, since it is not obvious which portion of the display results from the signal applied to a given plug-in unit. The polarity and repetition rate of the applied signals also affect the ADD display.

The following precautions should be observed when using the ADD mode:

1. Do not exceed the input-voltage ratings of the plug-in units.
2. Do not apply large signals to the plug-in inputs. A good rule is to not apply a signal of more than about eight times the vertical deflection factor. For example, with a vertical deflection factor of 0.5 volts/division, the voltage applied to that plug-in should not exceed four volts. Larger voltages may result in a distorted display.
3. To ensure the greatest dynamic range in the ADD mode, set the position controls of the plug-in units to a setting which would result in a mid-screen display if viewed in the LEFT or RIGHT positions of the VERTICAL MODE switch.
4. For similar response from each channel, use identical plug-ins and set the plug-in units for the same input coupling mode.

## Horizontal Modes

A or B. When either the A or B button of the HORIZONTAL MODE switch is pressed, the signal is displayed at the sweep rate of the selected time-base unit. Set the applicable intensity control and trigger-source switch for the desired display.

Alternate Mode. The ALT position of the HORIZONTAL MODE switch provides crt sweeps derived alternately from the two time-base units. Although the ALT horizontal mode can be used at all sweep rates, the CHOP mode provides a more satisfactory display at sweep rates below about 20 milliseconds/division. At slower sweep rates, the switching between the alternate-mode traces becomes apparent and may interfere with correct analysis of the display.

## NOTE

This instrument will not operate in the ALT position of the HORIZONTAL MODE switch if either horizontal plug-in compartment is left vacant.

The A and B INTENSITY controls allow individual adjustment of the traces produced by the time-base units in the $A$ HORIZ and B HORIZ compartments. Correct triggering of both time-base units is essential in obtaining the correct display in the ALT horizontal mode. If either of the time-base units does not receive a correct trigger, and therefore does not produce a sweep, the other unit cannot produce a sweep either. This means that one time-base unit cannot begin its sweep until the previous unit has completed its entire display. This can be avoided if the time-base units are set for auto-mode triggering (sweep free runs if not correctly triggered). See Trigger Source for operation of the A and B TRIGGER SOURCE switches. Also, see Vertical Trace Separation for information on positioning the B HORIZ display when in the ALT dual-sweep mode.

Chopped Mode. When the CHOP button of the HORIZONTAL MODE switch is pressed, the display is electronically switched between the two time-base units at about a 200-kilohertz rate. In general, the CHOP horizontal mode provides the best display when either of the time-base units is set to a sweep rate slower than about 20 milliseconds/division. It also provides the best display when the two time-base units are set to widely differing sweep rates. In the CHOP horizontal mode, equal time segments are displayed from each of the time-base units. This provides a display which does not change greatly in intensity as the sweep rate of either time-base unit is reduced (in contrast to ALT horizontal mode operation where the slowest trace tends to be the brightest).

The A and B INTENSITY controls allow individual adjustment of the intensity of the traces produced by the time-
base units in the A HORIZ and B HORIZ compartments. Triggering is not as critical in the CHOP horizontal mode as in ALT; if one of the units is not triggered properly, only the trace from the untriggered time-base unit is missing from the display. The other trace is presented in the normal manner. See Trigger Source and Vertical Trace Separation for information on positioning the trace produced by the B HORIZ unit in relation to the trace from the A HORIZ unit.

Horizontal Selection. The Horizontal Selector switch (located behind the metal shield at the rear of the A HORIZ compartment) provides a means to override the HORIZONTAL MODE switch in selecting the horizontal compartment for deflection. The Horizontal Selector switch has three positions (Normal, A, and B). In Normal the operation of the HORIZONTAL MODE switch is unchanged. In A or B the plug-in compartment selected by the Horizontal Selector switch provides the signal for horizontal deflection. The plug-in compartment selected by the HORIZONTAL MODE switch provides the other control signals, such as unblanking, storage control, etc. The Horizontal Selector switch is set to Normal at the factory.

The Horizontal Selector switch provides a method of storing X-Y displays using the FAST BISTABLE or FAST VAR PERSIST storage modes. These storage modes require control signals provided by a time-base unit or an external input signal (see Remote Storage Gate Input), to develop a stored display. For X-Y storage, the Horizontal Selector switch can be set to display the signal from an amplifier unit installed in one of the horizontal compartments. The HORIZONTAL MODE switch can then select the other horizontal compartment with a time-base unit installed, allowing the storage circuitry and crt unblanking to be controlled by the time-base unit while the horizontal deflection is provided by the amplifier unit.

## Vertical Trace Separation

When one of the dual-sweep horizontal modes is selected, the VERT TRACE SEPARATION (B) control allows the trace produced by the B HORIZ sweep to be positioned above or below the trace produced by the A HORIZ sweep. To use this control, first position the trace produced by the A HORIZ plug-in unit with the vertical position control. Then adjust the VERT TRACE SEPARATION (B) control to move the trace produced by the B HORIZ plug-in unit away from the A HORIZ display. If both waveforms are larger than four divisions in amplitude, the displays can only be positioned so they do not directly overlap since each waveform cannot be positioned to a unique area of the crt.

## Trigger Source

The A and B TRIGGER SOURCE switches select the internal trigger signals for the A HORIZ and B HORIZ timebase units. For most applications, these switches can be left
in the VERT MODE position. This position is the most convenient since the internal trigger signal is automatically switched as the VERTICAL MODE switch is changed or as the display is electronically switched between the LEFT VERT and RIGHT VERT plug-ins in the ALT position of the VERTICAL MODE switch. It also provides a usable trigger signal in the ADD position of the VERTICAL MODE switch, since the internal trigger signal in these modes is the algebraic sum of the signais applied to the vertical plug-in units. In the CHOP position, the left vertical plug-in is the trigger source. Therefore, the VERT MODE position ensures that the time-base units receive a trigger signal regardless of the VERTICAL MODE switch setting without the need to change the trigger source selection.

If correct triggering for the desired display is not obtained in the VERT MODE position, the trigger source for either the A HORIZ or B HORIZ time-base unit can be changed to obtain the trigger signal from either the LEFT VERT or RIGHT VERT plug-in. The internal trigger signal is obtained from the selected vertical compartment whether the plug-in in that compartment is selected for display on the crt or not. If the internal trigger signal is obtained from one of the vertical units but the other vertical unit is selected for display, the internal trigger signal must be time-related to the displayed signal in order to obtain a triggered (stable) display.

## Calibrator Output

The CALIBRATOR provides a convenient signal for checking basic vertical gain and sweep timing. The calibrator signal is also very useful for adjusting probe compensation as described in probe instruction manuals. In addition. the calibrator can be used as a convenient signal source for application to external equipment.

Voltage. The CALIBRATOR provides accurate output oltages of 40 millivolts, 0.4 volt, and 4 volts into highnpedance loads. In addition, it provides 4 millivolts, 40 milliolts, and 0.4 volt into 50 -ohm loads.

Current. The optional current loop accessory provides a 10-milliamp output current (the CALIBRATOR must be set or 4 volt output), which can be used to check and calibrate zurrent-measuring probe systems. The current signal is obtained by clipping the probe around the current loop.

Repetition Rate. The repetition rate of the CALIBRATOR is 1 kilohertz. The calibrator circuit uses frequencystable components to maintain accurate frequency and a constant duty factor. Thus, the CALIBRATOR can be used for checking the basic sweep timing of time-base units.

Wave Shape. The square-wave output signal of the CALIBRATOR can be used as a reference wave shape
when checking or adjusting the compensation of passive, high-resistance probes. The square-wave output from the CALIBRATOR has a flat top; any distortion in the displayed waveform is due to the probe compensation.

## Signal Outputs

+ Sawtooth Out. The + SAWTOOTH OUT connector provides a positive-going sawtooth signal derived from the time-base unit installed in the A HORIZ compartment or from the time-base unit installed in the B HORIZ compartment.


## WARNING


#### Abstract

Electric-shock hazard present. Only qualified service personnel should internally modify the operation of this instrument.


It is possible to select either the A HORIZ or the B HORIZ compartment as the source of the sawtooth output signal (selection jumper located behind the right side panel; refer selection to qualified service personnel only). The 7934 is set to A HORIZ at the factory. The unit of time for the sawtooth output is determined by the setting of the time-base-unit Time/Division switch. Refer to Table 1-4 in the General Information section for signal parameters.

[^1]
## WARNING

Electric-shock hazard present. Only qualified service personnel should internally modify the operation of this instrument.

The Gate Out signal can be selected from the time-base unit instalied in the A HORIZ compartment or B HORIZ compartment (selection jumper located behind the right side panel; refer selection to qualified service personnel only). The 7934 is set to A HORIZ at the factory. The duration of the + GATE OUT signal is the same as the duration of the respective sweep or, in the case of the delayed gate, it starts at the end of the delay period and lasts until the end of the sweep from the delaying time-base unit. Amplitude of the output signal at the + GATE OUT connector is about 0.5 volt into 50 ohms or about 10 volts into 1 megohm.

Vertical Signal. The VERT SIG OUT connector provides a sample of the vertical deflection signal. The source of the
output signal at this connector is determined by the B TRIGGER SOURCE switch. In the VERT MODE position of the $B$ TRIGGER SOURCE switch, the output signal is determined by the setting of the VERTICAL MODE switch. The output signal in the LEFT and RIGHT positions of the VERTICAL MODE switch is obtained only from the selected vertical unit. In the ALT position of the VERTICAL MODE switch, the output signal at the VERT SIG OUT connector switches between signals from the two vertical units, along with the crt display. However, the vertical output signal in the CHOP position is a composite signal and is the same as that obtained in the ADD position due to the requirements of the triggering system. The LEFT VERT and RIGHT VERT positions of the B TRIGGER SOURCE switch are independent of the selection of the VERTICAL MODE switch and provide the vertical output signal only from the selected vertical unit even when it is not selected for display.

The output voltage into a 50 -ohm load is about 25 millivolts/division of crt display into a 1-megohm load. The output signal frequencies are determined by the vertical plug-in unit used (see Table 1-8, Vertical System Specification, in the General Information section).

Probe Power. The two PROBE POWER connectors on the rear panel provide operating power for active probe systems. It is not recommended that these connectors be used as a power source for applications other than the compatible probes or other accessories which are specifically designed for use with this system.

## Display Photography

A permanent record of the crt display can be obtained with an oscilloscope camera system. The instruction manual for the Tektronix Oscilloscope Cameras includes complete instructions for obtaining waveform photographs.

The crt bezel provides integral mounting for Tektronix Oscilloscope Cameras. The three pins located on the left side of the crt bezel connect power to compatible camera systems. Control signals can also be received from Tektronix automatic cameras to allow camera-controlled single-shot photography (see camera manual for further information).

If the readout portion of the display is to be included on waveform photographs, the following suggestions will aid in obtaining good photographs.

1. Focus the oscilloscope display and the camera on the readout portion of the crt display. The auto-focus feature in this instrument will maintain the traces at optimum focus.
2. Set the READOUT intensity control for the minimum setting that allows the characters to be writter. This notmally occurs at a slightly lower intensity level than is necessary for complete writing of the waveform display. Some experimentation may be necessary to establish the correct level. Too high a setting of the READOUT intensity control will result in a broad, poorly defined photograph of the readout display.
3. If single-shot photography is used, set the READOUT intensity control to the PULSED position (see Readout Display for complete operating information). Then, the readout is displayed in a single-shot manner after the trace is complete (be sure the camera shutter remains open at least 0.5 second after the sweep is completed to photograph the entire readout). Also, set the GRAT ILLUM control counterclockwise while the trace is being photographed. Then, the graticule can be photographed later to produce a doubleexposed picture showing the complete information.

## Intensity Modulation

Intensity (Z-axis) modulation can be used to relate a third item of electrical phenomena to the vertical ( $Y$-axis) and the horizontal ( $X$-axis) coordinates without affecting the waveshape of the displayed signal. This is accomplished by changing the intensity of the displayed waveform to provide a "gray scale" display.

The voltage amplitude required for visible trace modulation depends on the setting of the A and B INTENSITY controls. A two-volt peak-to-peak signal will completely blank the display even at maximum intensity levels; lower amplitude signals can be used to change only the relative trace brightness. Negative-going signals increase the display intensity and positive-going signals decrease the display intensity.

Refer to Table 1-4 in the General Information section for specifications on Z-axis signal requirements.

Time markers applied to the rear-panel Z-AXIS INPUT connector can provide direct time reference on the display. With uncalibrated horizontal sweep or X-Y mode operation, the time markers provide a means of reading time directly from the display. If the markers are not time-related to the displayed waveform, use a single-sweep display.

## Remote Input Signals

The signal source requirements to operate the remote input functions on the rear panel can be either active (pulse generator, logic circuit, etc.) or passive (switch or relay). Refer to Table 1-4, in the General Information section for specific parameters on each input.

Remote Reset Input. An external single-sweep-reset signal can be applied to time-base units installed in the horizontal plug-in compartments through the rear-panel REMOTE RESET INPUT connector. This remote reset function is a duplication of the manually-operated single sweep reset function (pushbutton) located on the front panel of the 7BSeries time-base units.

Remote Erase Input. The storage screen can be erased by applying a signal to the REMOTE ERASE INPUT. However, if the SAVE mode is being used, the stored display cannot be erased by either the front-panel erase button or the rear-panel REMOTE ERASE INPUT signal.

Remote Save Input. The SAVE storage mode can be entered into by applying a signal to the REMOTE SAVE INPUT connector. The SAVE mode prevents accidental erasure and/or additional storage of the stored display.

Remote Storage Gate Input. The FAST BISTABLE and FAST VAR PERSIST storage modes can be externally controlled by applying a gate signal to the REMOTE STORAGE GATE INPUT. The positive-going transition of the gate enables the transfer storage mesh to retain the display. The negative-going transition transfers the display stored on the transfer storage mesh to the storage screen (the display is not visible until transferred to the storage screen). However, if the displayed sweep starts before the positive transition of the remote storage gate, the transfer storage mesh is enabled at the start of the displayed sweep. Then, the display stored on the transfer storage mesh will not be transferred until the displayed sweep has ended and the negative transition of the remote storage gate occurs.

## APPLICATIONS

The 7934 Oscilloscope and its associated plug-in units provide a flexible measurement system. The capabilities of the overall system depends mainly upon the plug-in units selected for use with this instrument. Specific applications for the individual plug-in units are described in the plug-in unit instruction manuals. The overall system can also be used for many applications which are not described in detail, either in this manual or in the manuals for the individual plugin units. Contact your Tektronix Field Office or representative for assistance in making specific measurements with this instrument.

The following books describe oscilloscope measurement techniques which can be adapted for use with this instrument:

[^2]J. Czech, "Oscilloscope Measuring Techniques", Springer-Verlag, New York, 1965.
J. F. Golding, "Measuring Oscilloscopes", Transatlantic Arts, Inc., 1971.

Charles H. Roth, Jr., "Use of the Oscilloscope", programmed text, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1970.

## Vertical Amplifier Plug-in Units

All 7A-Series plug-in units (except the 7A21N unit) can be used with the 7934. Bandwidth and sensitivity ranges should be taken into consideration when selecting amplifier plug-in units.

Single-Trace. Any single-channel amplifier will display a signal, with the sweep provided by any 7B-Series time-base plug-in. This combination leaves two unused compartments available for other special purpose units. Blank plug-in panels are available to cover any unfilled plug-in compartments.

Dual-Trace. A dual-channel amplifier in either vertical compartment can display two separate signals with the other vertical compartment free for other uses.

Three-trace. A dual-channel amplifier can be used with any single-channel amplifier to display three separate signals. If two time-base plug-in units are used in the horizontal compartments, two signals can be displayed at one sweep rate while the third signal is displayed at the other sweep rate.

Four-Trace. Two dual-channel amplifiers can display four separate signals. if one time-base unit is used, all four signals will be displayed at the same sweep rate.

## Time-Base Plug-In Units

The 7934 is compatible with time-base units of the 7B70, 7B80, and 7B90 Series. Sweep rates and triggering ranges should be taken into consideration when selecting time-base plug-in units.

To obtain a delayed-sweep display, a delaying time-base unit must be installed in the A HORIZ compartment and a delayed time-base unit installed in the B HORIZ compartment. If a dual time-base unit is used, a delayed-sweep display can be obtained with one horizontal plug-in unit in either horizontal compartment. This leaves the other hori-
zontal compartment available for other plug-in units as suggested later in this section.

## NOTE


#### Abstract

7B50-Series time-base units are not recommended for use with this instrument because they require a longer delay line than is in the 7934. Therefore, the triggering event may not appear on the display.


## Sampling Displays

Sampling-system plug-in units for the 7000 -Series oscilloscopes provide displays of fast-changing signals that cannot be examined using any other method. For example, sampling systems available for the 7934 can resolve repetitive signals having less than 10 millivolts of peak amplitude and occurring in less than 1 nanosecond.

The technique used for sampling is very similar in principle to the use of stroboscopic light to study fast motion. Samples of successive waveforms are taken, amplified by a relatively low-bandwidth amplifier, and then displayed on the crt as a replica of the sample waveforms.

Three sampling systems are available at this time for the 7934: (1) the 7S12, which provides time-domain-reflectometry displays for general-purpose measurements, (2) the 7S11/7T11A system and (3) the 7S14, a dual-channel vertical sampling system, including main and delayed sweep functions. See the Tektronix Products Catalog to determine the characteristics of the individual units mentioned and of additional units made available after this manual is published.

Single-Trace Sampling. A single-trace sampling display requires either a double-width 7S12 (which includes a timebase), or the 7S11 sampling unit and the 7T11A sampling sweep unit. Direct interconnections between the 7S11 and the 7T11A require these units to be adjacent, with the 7S11 in the RIGHT VERT compartment and the 7T11A in the A HORIZ compartment. If either the 7S12 or the 7S14 is used, it must be located in the middle two compartments to make the proper connections with the 7934.

Dual-Trace Sampling. Two 7S11 plug-ins can be used with a single sampling time-base unit for time-related displays of two signals. Direct interconnections from the LEFT VERT 7S11 pass through the RIGHT VERT 7S11 to reach the A HORIZ time-base unit.

The 7S14 is a dual-channel sampling unit with delaying sweep capability. It must be used in the middle two plug-in compartments..

Dual-trace sampling displays can also be made by a 7S12 in the middle two compartments and a 7S11 in the LEFT VERT compartment. In this application, the 7S12 supplies the time-base for both traces.

X-Y Sampling. One 7 S 11 inserted in the RIGHT VERT compartment and one in the adjacent A HORIZ compartment automatically share a 50 kilohertz free-running strobe condition specified for X-Y displays. The 7S14 has an X-Y operation incorporated as one of its normal mode functions.

## Special Purpose Plug-In Units

Digital Counters and Multimeter Plug-In Units. The digi-tal-multimeter plug-in units measure current, voltage, temperature, and resistance; digital-frequency-counter plug-in units measure frequency, from dc to above 500 MHz . These units make use of the readout system to display the measured information on the crt and can function in any compartment, in combination with each other, or with any other plug-in units available for use with the 7934 oscilloscope system.

The ability of digital readout plug-in units to operate with other plug-in units makes it possible to process and monitor signals at the same time the digital measurement is being made. For example, by locating a frequency counter in one of the vertical compartments and an amplifier unit in the other vertical compartment, the crt can display the trigger waveform, superimposed on the displayed signal, to indicate the actual triggering point. Or, if the counter is placed in a horizontal compartment, a low-amplitude signal can be applied to a vertical amplifier and amplified before it is internally routed by the trigger source switches to the counter trigger circuit. This allows the unit to be used on signals too small to trigger other counters.

Readout Access Plug-In Unit. The 7M13 Readout plugin unit provides front-panel keyboard operation for convenient access to the crt readout characters. This allows information, such as dates and identifying nomenclature, to be displayed on the crt with the normal crt display. This capability is particularly useful when making photographs.

Transistor Curve-Tracer Plug-In Units. The 7CT1N Curve Tracer plug-in checks small-signal transistors and diodes by producing a display showing the basic characteristic curves for the device being tested. Stepped sweep signals from an internal power supply are applied to the device under test. The resulting output signals are, in turn, applied to the horizontal and vertical deflection systems of the oscilloscope to plot a family of characteristic curves. This plot can be used to check for damaged transistors and diodes, or to select for special or matched characteristics and to calculate gain, leakage, breakdown voltage, etc.

Spectrum Analyzer Plug-In Units. The 7000-Series spectrum analyzer plug-in units display applied-signal amplitudes dispersed over portions of the rf spectrum. Absolute signal energy is plotted on the vertical axis against frequency on the horizontal axis. Applications include waveform and distortion analysis, EMC and random noise measurements, filter design, spectrum surveillance, etc.

## X-Y Operation

in some applications, it is desirable to display one signal versus another ( $\mathrm{X}-\mathrm{Y}$ ) rather than against time (internal sweep). The flexibility of the amplifier plug-in units available for use with the 7934 provide the means of applying external signals to the horizontal-deflection system.

Installation of a 7A-Series amplifier plug-in unit in one of the horizontal and one of the vertical compartments provides X-Y operation. For further information, refer to the horizontal specifications in this manual and to the individual instruction manuals for the amplifier units.

Some of the 7B-Series time-base units can be operated as amplifiers in addition to their normal uses as time-base generators. This feature allows an external signal to provide the horizontal deflection to the crt. For most of the timebase units with the amplifier function, the X (horizontal) deflection signal can be connected either to an external input connector on the time-base unit, or it can be routed to the time-base unit through the internal triggering system (see time-base instruction manual for details). If the latter method is used, the A and B TRIG SOURCE switches must be set so that the $X$ (horizontal) deflection signal is obtained from one of the vertical amplifier units and $Y$ (vertical) deflection signal is obtained from the other vertical unit. The attenuator switch on the amplifier unit can provide the horizontal with a preconditioned signal, compatible with the horizontal defiection factor. Also, plug-in units need not be moved from one compartment to another to change from X-Y operation to other modes of operation.

The Horizontal Selector switch (located behind the metal shield at the rear of the A HORIZ compartment) provides a method of storing X-Y displays using the FAST BISTABLE or FAST VAR PERSIST storage modes. Details on use of this switch to store X-Y displays is given under Horizontal Selection earlier in this section.

## Raster Displays

A raster-type display can be used effectively to increase the apparent sweep length. For this type of display, the trace is deflected both vertically and horizontally by sawtooth signals. This is accomplished in the 7934 by installing a 7B-Series time-base unit in one of the vertical plug-in compartments. Normally, the time-base unit in the vertical compartment should be set at a slower sweep rate than the time-base unit in the horizontal compartment; the number of horizontal traces in the raster depends upon the ratio between the two sweep rates.

Information can be displayed on the raster using several different methods. In the ADD position of the VERTICAL MODE switch, the signal from an amplifier unit can be algebraically added to the vertical waveform. With this method, the vertical signal amplitude on the crt should not exceed the distance between the horizontal lines of the raster. Another method of displaying information on the raster is to use the Z-AXIS INPUT to provide intensity modulation for the display. This type of raster display could be used to provide a television-type display. Complete information on operation using the Z-axis feature is given under Intensity Modulation.

To provide a stable raster display, both time-base units must be correctly triggered. Internal triggering is not provided for the time-base units when they are in the vertical compartments; external triggering must be used. Also, blanking is not provided from the time-base units when they are installed in a vertical compartment.

Table 3-1
OPTION INFORMATION LOCATOR

| Instrument Option | Manual Section | Location of Information |
| :---: | :---: | :---: |
| Option 02 <br> (Provides X-Y Delay Compensation) | Section 1 <br> General <br> Information | Specification. <br> Table 1-4 contains the electrical characteristics for Option 02. |
|  | Section 6 Checks and Adjustments | Horizontal System. <br> E3. Check/Adjust X-Y Compensation. |
|  | Section 7 <br> Replaceable <br> Electrical Parts | Replaceable Electrical Parts. <br> Replaceable parts unique to Option 02 are footnoted "Option 02 only". |
|  | Section 8 Diagrams and Circuit Board Illustrations | Horizontal Interface (Diagram 8). Diagram 8, shows circuitry unique to Option 02. |
|  | Section 9 Replaceable Mechanical Parts | Instrument Options (pull-out page). <br> Provides a mechanical parts list and an explodedview drawing unique to Option 02. |
| Option 03 (Provides EMC) | Section 1 General Information | Specification. <br> Table 1-4 contains the electrical characteristics for Option 03. |
|  | Section 02 <br> Operating <br> instructions | Detailed Operating Information. <br> Light Filter; includes basic description. <br> Installation of Plug-In Units. <br> Refers to EMC shielded blank plug-in panel. |
|  | Section 7 <br> Replaceable Electrical Parts | Replaceable Electrical Parts. <br> Replaceable parts unique to Option 03 contain the footnote "Option 03 only". |
|  | Section 9 Replaceable Mechanical Parts | Instrument Options (pull-out page). <br> Provides a mechanical parts list and an explodedview drawing unique to Option 03. |

## THEORY OF OPERATION

This section describes the circuitry used in the 7934 Storage Oscilloscope. The description begins with a discussion of the instrument, using the block diagram shown in Figure 4-1. Next, each circuit is described in detail with supporting illustrations, when appropriate, to show the relationship between the stages in each major circuit. Detailed schematics of each circuit are located in the Diagrams section at the rear of this manual. Refer to these schematics throughout the following circuit description for specific electrical values and relationships.

## BLOCK DIAGRAM DESCRIPTION

The following block diagram discussion is provided to aid in understanding the overall concept of the 7934 before the individual circuits are discussed in detail. A basic block diagram of the 7934 is shown in Figure 4-1. Only the basic interconnections between the individual blocks are shown on this diagram. Each major circuit within the instrument is given a block number (shown in a diamond). The number of each block refers to the complete circuit diagram located at the rear of this manual.

Vertical signals to be displayed on the crt are applied to the Vertical Interface circuit from both vertical plug-in compartments. The VERTICAL MODE switch determines whether the signals from the LEFT VERT or RIGHT VERT compartment are displayed on the crt. The selected vertical signal(s) are amplified by the Vertical Amplifier circuit to bring them to the level necessary to drive the vertical deflection plates of the crt (cathode-ray tube). The Vertical Amplifier circuit also includes an input from the Readout System to produce the vertical portion of the alphanumeric readout display.

Horizontal signals for display on the crt are connected to the Horizontal Interface circuit from both horizontal plug-in compartments. The HORIZONTAL MODE switch determines whether the signals from the A HORIZ or B HORIZ units are displayed by the crt. The selected horizontal signal(s) are amplified by the Horizontal Amplifier circuit to provide horizontal deflection on the crt. The Horizontal Amplifier circuit also accepts an input signal from the Readout System to produce the horizontal portion of the alphanumeric display.

The Readout System provides an alphanumeric display of information encoded by the plug-in unit(s). The readout display is written on the crt on a time-shared basis with the analog waveform display. The Mode Switch circuits determine which plug-in units display readout information.

The internal trigger signals from the vertical plug-in units are connected to the Trigger Selector circuit. The Mode Switch and Trigger Selector circuits direct trigger signals from the LEFT VERT or RIGHT VERT units to the A HORIZ or B HORIZ units. The A Trigger Selector circuit also produces the drive signal for the Vertical Signal Output which is a sample of the vertical signal.

The Logic circuit develops control signals for use in other circuits within this instrument and the plug-in units. These control signals automatically determine the correct instrument operation in relation to the plug-in units, plug-in unit control settings, and the 7934 control settings.

The CRT Circuit contains the control circuits necessary for operation of the crt. The Auto Focus Amplifier provides control voltages to maintain optimum focus of the crt display. The Z-Axis Amplifier provides the drive signal to control the intensity level of the crt display.

The Calibrator circuit produces a 1 kilohertz square-wave signal which can be used to check the calibration of this instrument and the compensation of probes. The calibrator signal is available as a voltage at the CALIBRATOR connector or as a current through a 40 milliamp optional current loop accessory.

The Output Signals circuit processes signals from the plug-in units for rear-panel output.

The Storage Display and Storage Control circuits produce the timing signals and control voltages required to operate the storage functions of the crt.

The Converter/Rectifiers and Low-Voltage Regulator circuits provide the power necessary to operate this instrument. These voltages are connected to all circuits within the instrument. The CRT Circuit contains a high-voltage power supply that provides accelerating potential for the crt.


Figure 4-1a. Basic block diagram of the 7934 Storage Oscilloscope.


Figure 4-1b. Basic block diagram of the 7934 Storage Oscilloscope.

## DETAILED CIRCUIT OPERATION

This portion of the Theory of Operation section provides a detailed description of the electrical operation and relationship of the circuits in the 7934. The theory of operation for circuits unique to this instrument is described in detail in this discussion. Circuits commonly used in the electronics industry are not described in detail. If more information is desired on these commonly used circuits, refer to available textbooks.

The following circuit analysis is accompanied by supporting illustrations that give the names of the individual stages within the major circuits, and show how they are connected together to form the major circuit. These illustrations also show the inputs and outputs for each circuit and the relationship of the front-panel controls to the individual stages. The detailed circuit diagrams from which the illustrations are derived are shown in the Diagrams section.

## LOGIC FUNDAMENTALS

Digital logic techniques are used to perform many functions within this instrument. The function and operation of the logic circuits are described using logic symbology and terminology. This portion of the manual is provided to aid in the understanding of these symbols and logic concepts. It is not a comprehensive discussion of the subject. For further information on binary number systems and the associated Boolean algebra concepts, the derivation of logic functions, or a more detailed analysis of digital logic, refer to available textbooks.

## Symbols

The operation of circuits in this instrument which use digital techniques is described using graphic symbols set forth in military standard MIL-STD-806B. Table 4-1 provides a basic logic reference for the logic devices used within this instrument. Any deviations from the standard symbology, or devices not defined by the standard are described in the circuit description for the applicable device.

> NOTE
> Logic Symbols used on the diagrams depict the logic function as used in this instrument and may differ from the manufacturer's data.

## Logic Polarity

All logic functions are described using the positive logic convention. Positive logic is a system of notation where the more positive of two levels $(\mathrm{HI})$ is called the true or 1 -state;
the more negative level ( LO ) is called the false or 0 -state. The HI-LO method of notation is used in this logic description. The specific voltages that constitute a HI or LO state vary between individual devices. Whenever possible, the input and output lines are named to indicate the function that they perform when at the HI (true) state.

## Input/Output Tables

Input/Output (truth) tables are used to show the input combinations important to a particular function, along with the resultant output conditions. This table may be given either for an individual device or for a complete logic stage. For examples of input/output tables for individual devices, see Table 4-1.

## NON-DIGITAL DEVICES

Not all of the integrated circuit devices in this instrument are digital logic devices. The function of non-digital devices is described individually, using operating waveforms or other techniques to illustrate their function.

## CABLING Diagram 1

Diagram 1, in the Diagrams and Circuit Board Illustrations section at the rear of this manual, shows the interconnections between the circuit boards within the 7934.

## CALIBRATOR AND MODE SWITCH Diagram 2

The Calibrator circuit provides square-wave voltage outputs at the front-panel CALIBRATOR output connector. A current output of 40 milliamp is available from the Calibrator with an optional current loop adapter (CALIBRATOR switch must be set to the 4 V position).

The Mode Switch circuit includes front-panel switching and provides the logic for selection of the vertical and horizontal compartments that provide deflection for the crt. The Mode Switch circuit operates in conjunction with the Logic circuit (diagram 4) to develop control signals for use in other circuits within this instrument, and within plug-in units installed in the plug-in compartments.

Figure 4-2 shows a detailed block diagram of the Calibrator and Mode Switch circuits. A schematic of these circuits is shown on diagram 2 at the rear of this manual.

Table 4-1
basic logic reference

| Device | Symbol | Description | Input/Output Table |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| AND gate |  | A device with two or more inputs and one output. The output of the AND gate is HI if and only if all of the inputs are at the HI state. | Input |  | Output |
|  |  |  | A | B | X |
|  |  |  | LO | LO | LO |
|  |  |  | LO | HI | LO |
|  |  |  | HI | LO | LO |
|  |  |  | HI | HI | HI |
| NAND gate |  | A device with two or more inputs and one output. The output of the NAND gate is LO if and only if all of the inputs are at the HI state. | Input |  | Output |
|  |  |  | A | B | $X$ |
|  |  |  | LO | LO | HI |
|  |  |  | LO | HI | HI |
|  |  |  | HI | LO | HI |
|  |  |  | HI | HI | LO |
| OR gate |  | A device with two or more inputs and one output. The output of the OR gate is HI if one or more of the inputs are at the HI state. | Input |  | Output |
|  |  |  | A | B | X |
|  |  |  | LO | LO | LO |
|  |  |  | LO | HI | HI |
|  |  |  | HI | LO | HI |
|  |  |  | HI | HI | HI |
| NOR gate |  | A device with two or more inputs and one output. The output of the NOR gate is LO if one or more of the inputs are at the HI state. | Input |  | Output |
|  |  |  | A | B | X |
|  |  |  | LO | LO | HI |
|  |  |  | LO | HI | LO |
|  |  |  | HI | LO | LO |
|  |  |  | HI | HI | LO |
| Inverter |  | A device with one input and one output. The output state is always opposite to the input state. | Input |  | / Output |
|  |  |  | A |  | X |
|  |  |  | LO |  | HI |
|  |  |  | HI |  | LO |

Table 4-1 (cont.)

| Device | Symbol | Description | Input/Output Table |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| LO-state indicator | $-d$ | A small circle at the input or output of a symbol indicates that the LO state is the significant state. Absence of the circle indicates that the HI state is the significant state. Two examples follow: | Input |  |  | Output |
|  |  |  | A | B |  | X |
|  |  |  | LO | LO |  | LO |
|  |  |  | LO | HI |  | HI |
|  |  |  | HI | LO |  | LO |
|  |  | AND gate with LO-state indicator at the $A$ input. <br> The output of this gate is HI if and only if the A input is LO and the B input is HI . | HI | HI |  | LO |
|  |  |  |  |  |  |  |
|  |  | OR gate with LO-state indicator at the A input: <br> The output of this gate is HI if either the A input is LO or the B input is HI . | Input |  |  | Output |
|  |  |  | A | B |  | X |
|  | $A \longrightarrow$ |  | LO | LO |  | HI |
|  | -x |  | LO | HI |  | HI |
|  |  |  | HI | LO |  | LO |
|  |  |  | HI | HI |  | HI |
| Edge symbol |  | Normally superimposed on an input line to a logic symbol. Indicates that this input (usually the trigger input of a flip.flop) responds to the indicated transition of the applied signal. |  |  |  |  |
| Triggered <br> (toggle) <br> Flip-Flop |  | A bistable device with one input and two outputs (either or both outputs may be used). When triggered, the outputs change from one stable state to the other stable state with each trigger. The outputs are complementary (i.e., when one output is HI the other is LO). The edge symbol on the trigger ( $T$ ) input may be of either polarity depending on the device. | Input |  | / Output |  |
|  |  |  |  | ition <br> trigger <br> Ise | Con <br> after pu | ndition <br> trigger pulse |
|  |  |  | X | $\bar{X}$ | X | $\bar{X}$ |
|  |  |  | LO | HI | HI | LO |
|  |  |  | HI | LO | LO | HI |

Table 4-1 (cont.)



## Calibrator

Transistors Q376 and Q382 comprise a 1 kilohertz, square-wave oscillator. Oscillation occurs as follows: Initially assume that Q376 is conducting and Q382 is not conducting. The voltage at the emitter of Q382 becomes more negative as C376 discharges through R381. Capacitor C376 discharges until the emitter-base junction of Q382 becomes forward biased. As Q382 begins conducting the oscillator changes states. Regeneration starts when Q382 conducts and C376 stops discharging; this reduces the collector current of Q376. Thus, the collector voltage of Q376 rises positive which causes the base and emitter of Q382 to rise positive. The positive-going voltage is coupled by C376 to the emitter of Q376, turning it off.

Now, Q382 is conducting and Q376 is not conducting. The voltage at the emitter of Q376 goes negative as C376 charges through R376. When the emitter-base junction of Q376 becomes forward biased the oscillator will again change states to complete the cycle.

> The square wave signal produced at the collector of Q382 switches Q384 on and off. When Q384 is on, the current from R383 and R384 flows to ground. When Q384 is off, this current flows through CR386 and R386 into the voltage divider network of R388, R392, R393, R394, R395, R396, and R397 to produce the 4 volt, 0.4 volt, and 40 millivolt Calibrator output voltages. The accuracy of the Calibrator is set by the 0.4 Volts DC adjustment, R385. Both the 4 V and 0.4 V Calibrator pushbutton switches must be engaged when adjusting R385. The Calibrator frequency is set by the 1 kHz adjustment, R375.

## Plug-in Single Sweep Logic

The Plug-in Single Sweep Logic stage (consisting of U322B, U326B, U326C, Q304, and Q308) develops the A or B Single Sweep Logic level for use by the Storage Control circuit on diagram 16. A Hi logic level is produced at pin 8 of U326C whenever the time-base unit selected by the HORIZONTAL MODE switch is set for single-sweep operation. When the HORIZONTAL MODE switch is set to ALT or CHOP, pin 8 of U326C will be HI if either the A or B timebase unit is set for single-sweep operation.

## Storage Sweep Gate Logic

The Storage Sweep Gate Logic stage develops the Storage Sweep Gate used by the Storage Control circuit on diagram 16. Gate signals from the time-base unit(s) selected by the HORIZONTAL MODE switch determine when the Storage Sweep Gate will occur.

Storage Sweep Gate Latch. The Storage Sweep Gate Latch, U322C and U332D, produces the positive-going

Storage Sweep Gate at pin 8 of U322C. Once pin 10 of U322C goes LO, the output at pin 8 of U322C goes HI and remains HI until pin 13 of U332D goes LO, at which time the output will return to its LO state.

Storage Sweep Gate Latch Set. The Storage Sweep Gate Latch Set stage, consisting of U322A, U322D, Q321, Q325, U326A, and U326D provides the signal to set the output of the Storage Sweep Gate Latch stage to the HI state. The HORIZONTAL MODE switch determines whether the A Sweep Gate/A Auxiliary Gate or the B Sweep Gate/B Auxiliary Gate is used to set the Storage Sweep Gate Latch. The HORIZONTAL MODE switch applies logic levels to pin 2 of U322A and U326A for the gate selection. When the HORIZONTAL MODE switch is set to ALT or CHOP, pin 2 of U322A and U326A are HI so that the gate which occurs first (from either the A or B time-base unit) sets the output of the Storage Sweep Gate Latch HI.

Storage Sweep Gate Latch Reset. The Storage Sweep Gate Latch Reset stage, consisting of U330A, U330B, U332A, U332B, U332C, U334A, U334B, U334C, U334D, Q328, Q332, and Q336, provides the signal to reset the output of the Storage Sweep Gate Latch stage to its LO state. The reset signal is produced when any one of the following conditions occur:
(1) The Storage Lockout signal (pin 2 of J344) goes HI.
(2) The Alternate Pulse signal (pin 14 of J344) goes HI with the HORIZONTAL MODE switch set to A or B.
(3) The A Holdoff and B Holdoff signals (pin 2 and 21 of P344 respectively) both go HI with the HORIZONTAL MODE switch set to ALT or CHOP.

In condition 1 above, the positive-going Storage Lockout signal is inverted by Q328 to reset the Storage Sweep Gate Latch through U322D. This reset can occur at any time with any setting of the HORIZONTAL MODE switch.

In condition 2 the positive-going Alternate Pulse signal occurs at the beginning of each A and B Holdoff signal. The Alternate Pulse signal passes through U332C when pin 9 is HI (HORIZONTAL MODE switch set to A or B). The signal is then inverted by U332B and applied to the base of Q328; this, in turn, resets the output of the Storage Gate Latch to its LO state.

In condition 3 the positive-going A Holdoff signal is coupled through Q332 and U334D to the clock input (pin 3) of U330A setting pin 5 of U330A HI at the beginning of the A Holdoff signal. Likewise, the positive-going B Holdoff signal sets pin 9 of U330B HI. When pins 5 and 9 of U330A and U330B are HI, a LO is applied to pin 4 of U332B. This LO is inverted by U332B and applied to the base of Q328 to reset the Storage Sweep Gate Latch output to its LO state.

## Trigger Control Logic

The Trigger Control Logic stage determines the control signals to the A and B Trigger Selector circuits based on the setting of the VERTICAL MODE and A and B TRIGGER SOURCE switches. Active components for the A Trigger Control signals are U340B, U344A, U344B, U346B, U346C, and U350B. For B Trigger, U344C, U344D, U346A, U346D, U350A, and U350C.

Control for the front panel A Trigger Source lights is provided by Q346, Q349, U304A, U338A, and U338B. This circuit allows the A Trigger Source lights to track the output signals of the A Trigger Selector circuit and thereby provide an indication of the A trigger source. The B Trigger Source light driver, Q354, Q356, U338C, U338D, U340C, provides the same function to indicate the $B$ Trigger source.

## MAIN INTERFACE Diagram 3

Diagram 3 at the rear of this manual shows the plug-in interface and the inter-connections between the plug-in compartments, circuit boards, etc., of this instrument. Also, the signal and voltage connections of each interface connector are identified. Function of components on this diagram are described along with other circuits as applicable.

## LOGIC Diagram 4

The Logic circuit develops control signals for use in other circuits within this instrument and the plug-in units installed in the vertical and horizontal compartments. These control signals automatically determine the correct instrument operation in relation to the plug-in units installed or selected, plug-in control settings, and 7934 control settings. A block diagram of the Logic circuit is shown in Figure 4-3. A schematic of the Logic circuit is given on diagram 4 at the rear of this manual.

This circuit description for the Logic circuit is written with the approach that each of the integrated circuits and its associated discrete components compose an individual stage as shown by the block diagram (Fig. 4-3). The operation of each stage is discussed, relating the input signals or levels to the output, with consideration given to the various modes of operation that may affect the stage. A logic diagram is also provided for each stage. These diagrams are not discussed in detail but are provided to aid in relating the function performed by a given stage to standard logic techniques. It should be noted that these logic diagrams are not an exact representation of the internal structure of the integrated circuit but are only a logic diagram of the function performed by the stage. An input/output table is given,
where applicable, for use with the circuit description and logic diagram. These input/output tables document the combination of input conditions that are of importance to perform the described function of an individual stage.

## Horizontal Logic

The Horizontal Logic stage performs three separate logic functions: A Sweep Lockout, B Sweep Lockout, and Alternate Pulse generation. Most of the logic for these functions is contained within the Horizontal Logic IC. U4428. Figure 44 identifies the three individual stages within U4428 and the input and output terminals associated with each. Note that some of the input levels are connected internally to more than one of the individual stages.

A Sweep Lockout Stage. The A Sweep Lockout Stage determines if the A HORIZ time-base unit can produce a sweep. If this output is HI, the A HORIZ unit is locked out (disabled) so it cannot produce a sweep. If the level is LO, the A HORIZ unit is enabled and can produce a sweep when triggered.

As shown by the logic diagram and input/output table of Figure 4-5, only two combinations of input conditions to U4428 produce an A Sweep Lockout level (HI).

The first combination disables the A sweep while the B sweep is being displayed with the HORIZONTAL MODE switch in ALT position (both time-base units must be in sweep mode), if non-delayed operation is being used. The second combination disables the A sweep during delayedsweep operation so that the B sweep can complete its holdoff before the next A sweep begins. If neither of these conditions occurs, the A Sweep Lockout level is determined by the Storage Lockout signal. (This signal originates in the Storage Control circuit on diagram 16.) Figure 4-5a shows the Storage Lockout signal connected to the output of the A Sweep Lockout stage through a phantom-OR gate. (A phantom-OR gate performs the OR-logic function merely by interconnection of two or more signal lines.)

B Sweep Lockout Stage. The B Sweep Lockout stage produces an output level at the collector of Q4468 that determines if the B HORIZ time-base unit can produce a sweep. A HI output level locks out (inhibits) the B HORIZ unit and a LO level enables the B HORIZ unit to produce a sweep.


Figure 4-3. Detailed block diagram of the Logic circait.


Figure 4-4. Breakdown of separate stages within Horizontal Logic IC (U4428) showing inputs and outputs for each stage.

As shown by Figure 4-6B, the output of this stage is HI only under one set of input conditions to U4428. This set of conditions disables the B sweep while the A sweep is being displayed in the ALT, HORIZONTAL MODE switch position, if both time-base units are in a sweep mode and non-delayed sweep is used. For any other combination of input conditions, the B Sweep Lockout level is determined by the Delay Gate (from A time-base unit) and the Storage Lockout signal (from Storage Control circuit, diagram 16).

Figure 4-6A shows Delay Gate and Storage Lockout connections to the output of the B Sweep Lockout stage through a phantom-OR gate.

Alternate Puise Stage. The third function performed by the Horizontal Logic stage is to produce an Alternate Pulse signal for use by the Horizontal and Vertical Binary stages, and the Storage Sweep Gate circuit on the mode switch circuit board.


Figure 4-5. (A) Logic diagram for A Sweep Lockout Stage; (B) Table of input/output combinations.


Figure 4-6. (A) Logic diagram for B Sweep Lockout stage; (B) Table of input/output combinations.

The Alternate Pulse is produced at the end of either sweep, depending upon the operating conditions as shown in Figure 4-7B. The holdoff gate produced at the end of the sweep by the respective time-base unit is differentiated by either C4420 or C4423 to provide a positive-going pulse to pin 6 or 9 of U4428.

In Figure 4-7A, note the resistors shown connected to pins 6 and 9 . These resistors, which are internal to the IC, hold the levels at pin 6 and 9 LO unless a HI level is applied to the corresponding input. Since the holdoff gate is capaci-tively-coupled to pins 6 and 9 , these inputs are at the LO level except when a differentiated A or B Holdoff gate is received.

The following discussions describe the operation of the Alternate Pulse stage in relation to the various combinations of input conditions shown in Figure 4-7B.

1. A (Only) Mode. An Alternate Pulse is produced at the end of each A sweep when the HORIZONTAL MODE switch is set to the A position.
2. B (Only) Mode. In the B position of the HORIZONTAL MODE switch, an Alternate Pulse is produced at the end of each B sweep. (A time-base must be in independent, nondelayed mode.)
3. Alt or Chop Mode. When the HORIZONTAL MODE switch is set to ALT or CHOP (A time-base must be in independent, non-delayed mode), an Alternate Pulse is produced at the end of each sweep. For example, an Alternate Puise is produced at the end of the A sweep, then at the end of the B sweep, again at the end of the A sweep, etc. Although Alternate Pulses are produced in the CHOP horizontal mode, they are not used in this instrument.

$\Phi=$ HAS NO EFFECT IN THIS CASE
${ }^{1}$ POSITIVE-GOING PULSE. WHERE BOTH A AND B HOLDOFF ARE REQUIRED TO BE HI, A HI AT EITHER INPUT PRODUCES AN ALTERNATE PULSE.
${ }^{2}$ NEGATIVE-GOING PULSE.
(B)

Figure 4-7. (A) Logic diagram for Alternate Pulse Generator stage; (B) Table of input/output combinotiona.
4. Delayed Sweep (A Delays B). When the A time-base unit is set for delayed, the operation of the Altemate Pulse Stage is changed so an Alternate Pulse is produced only at the end of the A sweep, even when the HORIZONTAL MODE switch is set to $B$. This is necessary since the $A$ timebase establishes the amount of delay time for the B timebase unit whenever it is displayed.
5. Amplifier Unit in Horizontal Compartment. When an amplifier unit is installed in either of the horizontal plug-in compartments, the Alternate Pulse can be produced only from the remaining time-base unit. If amplifier units are installed in both horizontal compartments, an Alternate Pulse is not produced since there are no time-base units to produce a holdoff pulse.

## Z-Axis Logic

Figure 4-8A shows a logic diagram of the Z-Axis Logic stage. Notice the current-driven inputs as indicated by the current generator symbols at the associated inputs. An input/output table for the Z-Axis Logic stage is given in Figure $4-8 \mathrm{~B}$.

The Z-Axis Logic stage produces an output current signal at pin 8 of $\cup 4494$ which sets the intensity of the crt display except for the readout display which is controlled by the Readout System. The output current at pin 8 is determined by the setting of the A or B INTENSITY controls, the conditions of various logic gates, and by an external Z-Axis signal. The input current from the $A$ and $B$ INTENSITY controls is switched so the output current matches the horizontal display. The Vertical Chopped Blanking, Horizontal Chopped Blanking, and readout blanking signals are applied to this stage to block the output current and blank the crt display for vertical chopping, horizontal chopping, or during a readout display.

The Z-Axis Logic stage is current-driven at all inputs except pins 5 and 15. The current at pins 1,2, and 16 is variable from zero to four milliamp and is determined by the applicable current source to control the output current at pin 8.

The Vertical Chopped Blanking signal connected to pin 7, and the Horizontal Chopped Blanking connected to both pins 6 and 7 through Q4336, CR4487, CR4488, enable or disable this stage to control all output current. Quiescently, the level at pins 6 and 7 is HI so that the intensity current from pins 1,2,9, and 16 can pass to the output. However, pin 7 goes LO during Vertical Chopped Blanking and both pins 6 and 7 go LO for Horizontal Chopped Blanking or during a readout display. This blocks the output current and the crt is blanked. The Vertical Chopped Blanking signal is connected to pin 7 of U4494 directly from pin 4 of U4320.

The Horizontal Chopped Blanking signal is connected to U4494 from pin 4 of IJ4340 through LR4338, Q4336, CR4487, and CR4488. Notice that this signal is connected to the collector of Q4336. This transistor is normally operating in the saturated condition, and the HI Horizontal Chopped Blanking level from U4340 is the collector source voltage. When the Horizontal Chopped Blanking level goes LO, the current through Q4336 drops to produce a corresponding LO level at its emitter. This level is connected to pins 6 and 7 of U4494 through CR4488 and CR4487 respectively.

Transistor Q4336 also controls the levels at pins 6 and 7 for readout displays. The Z-Axis Inhibit command from the Readout System is connected to the base of Q4336 through VR4334 and R4335. This level is normally HI, so Q4336 operates as controlled by the Horizontal Chopped Blanking level at its collector. When a readout display is to be presented, the Z-Axis Inhibit command drops LO and this level is coupled to the base of Q4336 through VR4334. Transistor Q4336 is reverse biased to produce a LO level at its emitter. This level is coupled to pins 6 and 7 of U4494 through CR4487 and CR4488 to block the Z-Axis Logic output current during the readout display. (The intensity of the readout display is determined by a separate READOUT intensity level connected directly to the Z-Axis Amplifier; see CRT Circuit description.) Diode CR4486 clamps the emitter of Q4336 at about - 0.6 volt when the transistor is off.

Intensity limiting is provided for high crt beam currents at slow sweep rates and X-Y operation by the Intensity Limit input. Quiescently, Q4474 is reverse biased; resistors R4474, R4481, and R4485 establish the current at pins 6 and 10 of U4494. When the Intensity Limit input is connected to ground in the plug-in units for slow sweep rates and amplifier operation, the emitter of Q4474 is grounded through CR4472. Transistor Q4474 takes current from pins 6 and 10 of U4494 to limit the output current from this stage. Z-Axis Level adjustment R4480 sets the correct operating levels for this stage.

The A INTENSITY control sets the output current level when the A Gate at pin 14 is HI and the main frame channel switch signal (Display B) at pin 15 is LO. Whenever the $A$ Gate level goes LO indicating that the A sweep is complete or the Display B goes HI indicating that the B sweep is being displayed, the A INTENSITY current is blocked. The current from the A INTENSITY control (located on diagram 15) is connected to pin 16 through R4496.

In the delayed mode, current is added to the A INTENSITY current during the A-sweep time to intensify a portion of the trace. This intensified portion is coincident with the $B$ sweep time to provide an indication of which portion of the A sweep is displayed in the delayed mode. The A intensifier current is supplied to pin 2 of U4494 from the A INTENSIT)


Figure 4-8. (A) Logic diagram for Z-Axis Logic stage; (B) Table of input/output combinations.

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control through R4497. With this configuration, the intensified current increases as the A INTENSITY control setting is advanced to provide a proportional intensity increase in the intensified zone as the overall A-sweep intensity increases. Therefore, the intensified zone is more readily visible at high intensity levels. The intensified current is added to the A INTENSITY current to produce an intensified zone on the A sweep under the following conditions: HI A Gate level at pin 14, LO Display B level at pin 15, HI B Gate level at pin 4, and HI Delay Mode Control level at pin 5.

The B INTENSITY control determines the output current when the B Gate level at pin 4 and the Display B at pin 15 are both HI . The current from the B INTENSITY control (diagram 15) is connected to the Z-Axis Logic stage through R4498.

The current levels established by the intensity controls can be altered by the Auxiliary Z-Axis current level at pin 9. The current at this pin can come from the Z-AXIS INPUT connector on the rear panel or from any of the plug-in compartments. This current either increases or decreases (depending on polarity) the output current to modulate the intensity of the display. Input from the Z-AXIS INPUT connector allows the trace to be modulated by external signals. The Auxiliary Z-Axis inputs from the plug-in compartments (see diagram 3) allow special-purpose plug-in units to modulate the display intensity. Diodes CR4473 and CR4474 limit the maximum voltage change at pin 9 to about + and -0.6 volt to protect the Z-Axis Logic stage if an excessive voltage is applied to the Z AXIS INPUT connector.

## Horizontal Binary

The Horizontal Binary stage produces the Main Frame Channel Switch Signal (Display B) to determine which horizontal unit provides the sweep display on the crt. When this level is HI, the B HORIZ unit is displayed; when it is LO, the A HORIZ unit is displayed.

The Display B signal is used in the following stages within the Logic circuit: Horizontal Logic (A and B Sweep Inhibit), Z-Axis Logic, Vertical Binary, and Trace Separation. In addition, it is connected to the following circuits elsewhere in the instrument to indicate which horizontal unit is to be displayed: Main Interface (A and B HORIZ plug-in compartments). Horizontal Interface (for horizontal channel selection), and the Auto Focus Amplifier.

Figure 4-9A shows a logic diagram for the Horizontal Bi nary Stage. An input/output table showing the conditions for each position of the HORIZONTAL MODE switch is shown in Figure 4-9B. Notice that the levels at pins 3, 4, 7, and 10 of U4358 are determined by the HORIZONTAL MODE switch (on Logic diagram 4). This switch indicates which horizontal mode has been selected by providing a HI output
level on only one of four output lines; the remaining lines are LO.

The Horizontal Binary stage operates as follows for each position of the HORIZONTAL MODE switch (refer to Figure 4-9B for input/output conditions):

1. A Mode. When the HORIZONTAL MODE switch is set to A. Display B at pin 6 of U4358 is LO to indicate to all circuits that the A HORIZ unit is to be displayed.
2. B Mode. Selecting the B HORIZONTAL MODE provides a HI Display B signal to all circuits.
3. CHOP Mode. In the CHOP position of the HORIZONTAL MODE switch, the Display B signal switches between HI and LO levels to produce a display that switches between the A and B HORIZ units at a 0.2 megahertz rate. The repetition rate of Display $B$ in this mode is determined by the Horizontal Chopped Blanking pulse (see Chop Counter description). Each time the Horizontal Chopped Blanking pulse at pin 1 drops LO, the output at pin 6 switches to the opposite state.
4. ALT Mode. For ALT HORIZONTAL MODE operation, the Display B signal switches to the opposite state each time the negative portion of the Alternate Pulse is received from the Horizontal Logic stage. Repetition rate of Display B in this mode is one-half the repetition rate of the Alternate Pulse applied to pin 8.

## Vertical Binary

The Vertical Binary stage produces the Vertical Alternate Command to determine which vertical unit is to be displayed when the VERTICAL MODE switch is set for ALT. When this output level is HI, the RIGHT VERT unit is displayed; when it is LO, the LEFT VERT unit is displayed. In the ALT or CHOP positions of the HORIZONTAL MODE switch (non-delayed operation only), the output of this stage is slaved to the output of the Horizontal Binary stage so that the Vertical Alternate Command is always HI when Display $B$ is LO, and vice versa. This action allows slaved-alternate operation (sweep-slaving) in the ALT position of the VERTICAL MODE switch and the ALT or CHOP positions of the HORIZONTAL MODE switch whereby the LEFT VERT unit is always displayed at the sweep rate of the B time-base and the RIGHT VERT unit is displayed at the sweep rate of the A time-base. Thus, slaved-alternate operation can simulate dual-beam operation for repetitive sweeps.

When the A time-base unit is set to the delaying mode, the repetition rate of the Vertical Alternate Command is one-

(A) $U 4358$
(1) OUTPUT
$\Phi=$ HAS NO EFFECT IN THIS CASE
$n+1$ = IF OUTPUT IS LO PRIOR TO LO ${ }^{1}$, IT GOES HI, AND VICE VERSA
${ }^{1}$ ACTUATED BY NEGATIVE-GOING EDGE.
${ }^{2}$ REPETITION RATE ONE-HALF HORIZONTAL CHOPPED BLANKING RATE.
${ }^{3}$ REPETITION RATE ONE-HALF ALTERNATE PULSE RATE.

Figure 4-9. (A) Logic diagram for Horizontal Binary stage; (B) Table of input/output combinations.
half the repetition rate of Display $B$. This results in each vertical unit being displayed first against the A time-base unit (delaying), then the B time-base unit (delayed), before the display is switched to the other vertical unit.

The Vertical Alternate Command is used in the Plug-in Binary and Vertical Mode Logic stages. This stage uses the same type of IC as the Horizontal Binary stage. Notice the Display $\wedge$ level at pin 7. This input is the inverse of the

Display B level at pin 8. Therefore, the Display A level is always HI when the Display $B$ level is LO, and vice versa (Q4364 generates the Display A level). Also, notice the line connected to pin 4 of the Vertical Binary U4368. The level at pin 4 is generated by Q 4424 and is HI only when the HORIZONTAL MODE switch is set for ALT or CHOP and the A time base unit is set for nondelayed operation. The Vertical Binary uses the information at pin 4 for correct slaving of the Vertical Alternate Command to the Display B signal (necessary for slaved-alternate operation)

A logic diagram of the Vertical Binary stage is shown in Figure 4-10A. Several logic functions in this stage are performed by logic devices made up of discrete components. The components that make up these logic devices are identified on the logic diagram. An input/output table for the Vertical Binary stage is given in Figure 4-10B.

The following discussions describe operation of the Vertical Binary stage in relation to the modes of operation that can occur.


Figure 4-10. (A) Logic diagram for Vertical Binary stage; (B) Table of input/output combinations.

1. A OR B Mode. When the HORIZONTAL MODE switch is set to either $A$ or $B$, the Vertical Alternate command switches to the opposite state each time an Alternate Pulse is received from the Horizontal Logic stage. Repetition rate of the Vertical Alternate Command in this mode is one-half the repetition rate of the Alternate Pulse. The input conditions for these modes are:

Pin 1 LO - Alternate Pulse generated by the Horizontal Logic stage goes negative.

Pin 4 LO - HORIZONTAL MODE switch in any position except ALT, CHOP, or when the A time-base unit is set for delayed sweep.

Pin 10 HI - HORIZONTAL MODE switch set to A or B .
2. ALT OR CHOP Mode (HORIZ) - Nondelayed. In the ALT or CHOP positions of the HORIZONTAL MODE switch, the output level at pin 6 is the same as the Display $A$ level at pin 7. The display $A$ level is produced by inverting the Display B level from the Horizontal Binary stage. Therefore, the repetition rate of the output signal is the same as the Display B signal. The result (with the VERTICAL MODE switch set to ALT or CHOP and the A time-base unit set for nondelayed operation) is that the RIGHT VERT unit is always displayed at the sweep rate of the $A$ time-base unit, and the LEFT VERT unit at the sweep rate of the B timebase unit (slaved-alternate operation or sweep slaving). The input conditions to provide a HI output level so that the RIGHT VERT unit can be displayed at the A sweep rate are:

Pin 4 HI - HORIZONTAL MODE switch set to ALT or CHOP with nondelayed sweep.

Pin 7 HI - A sweep is to be displayed (Display B LO).
Pin 10 LO - HORIZONTAL MODE switch set to any position except $A$ or $B$.

The input conditions required to provide a LO output level to display the LEFT VERT unit at the B sweep rate are:

Pin 4 HI - HORIZONTAL MODE switch set to ALT or CHOP with nondelayed sweep.
Pin 7 LO - B sweep is to be displayed (Display B HI).
Pin 10 LO - HORIZONTAL MODE switch set to any position except $A$ or $B$.
3. ALT OR CHOP Mode (HORIZ) - Delayed. If the A time-base unit is set to the delayed mode when the HORIZONTAL MODE switch is set to either ALT or CHOP, the operation of the stage is changed from that discussed above. Now, the Vertical Alternate Command switches between the HI and LO states at a rate that is one-half the repetition rate of the Display B signal. The resultant crt display in the ALT position of the VERTICAL MODE switch allows the RIGHT VERT unit to be displayed first against the $A$ sweep (delaying) and then against the $R$ sweep (de-
layed). Then the display switches to the LEFT VERT unit and is displayed consecutively against the $A$ and $B$ sweeps in the same manner. The input conditions for this mode of operation are:

Pin 4 LO - A time-base unit set for delayed operation.
Pin 8 HI or LO - Vertical Alternate command changes state at HI to LO transition of Display $B$.
Pin 10 LO - HORIZONTAL MODE switch set to any position except A or B.

## Plug-In binary

The Plug-In Binary stage produces the Alternate Drive signal to alternate dual-trace units. This stage uses the same type of integrated circuit as the Horizontal Binary and Vertical Binary stages. Figure 4-11A shows a logic diagram of the Plug-in Binary stage. An input/output table for this stage is given in Figure 4-118.

When the Alternate Drive level at pin 6 of U 4412 is HI and the plug-in unit is set for alternate operation, Channel 2 of the dual-trace unit is displayed. When it is LO, channel 1 is displayed. The repetition rate of the Plug-In Alternate Drive signal is determined by the setting of the VERTICAL MODE switch. For all positions of the VERTICAL MODE switch except ALT, the Plug-In Alternate Drive level is the same as the Vertical Alternate Command from the Vertical Binary stage. Since the Vertical Alternate Command is derived directly from the Display B signal, the two channels of a dual-trace vertical unit are allowed to be slaved to the time-base units (nondelayed, dual-sweep horizontal modes only) in the same manner as previously described for slavedalternate operation between the vertical and time-base units. The resultant crt presentation (when the dual-trace unit is set for alternate operation) displays the Channel 1 trace at the sweep rate of the B time-base unit and Channel 2 trace at the sweep rate of the A time-base unit.

The Plug-in Alternate Drive switches from HI to LO as the Display B signal (from the Horizontal Binary stage) switches from LO to HI, and vice versa. When the VERTICAL MODE switch is set to ALT, the Vertical Alternate Command from the Vertical Binary stage switches the vertical display between the two vertical units. However, if either of the vertical plug-in units are dual-trace units, they can be operated in the alternate mode also. To provide a switching command to these units, the Plug-In Binary stage produces an output signal with a repetition rate that is one-half the repetition rate of the Vertical Alternate Command. The sequence of operation when two dual-trace vertical units are installed in the vertical plug-in compartments and both are set for alternate operation is as follows (VERTICAL MODE and HORIZONTAL MODE switches set to ALT): 1) Channel 1 of LEFT VERT unit at sweep rate of $B$ time-base unit, 2) Channel 1 of RIGHT VERT unit at sweep rate of A timebase unit, 3) Channel 2 of LFFT VERT unit at sweep rate of

(A) U4412

! = HAS NO EFFECT IN THIS CASE.
$n+1=I F$ OUTPUT IS LO PRIOR TO LO' IT GOES HI, AND VICE VERSA.
' actuated by negative-going edge.
${ }^{2}$ REPETITION RATE ONE.HALF VERTICAL ALTERNATE COMMAND RATE.

Figure 4-11. (A) Logic diagram for Plug-In Binary stage; (B) Table of input/output combinations.

B time-base unit, 4) Channel 2 of RIGHT VERT unit at sweep rate of A time-base unit. Notice that under these conditions, both channels of the LEFT VERT unit are displayed at the B-sweep rate and that both channels of the RIGHT VERT unit are displayed at the A-sweep rate. Input conditions when the VERTICAL MODE switch is set to ALT are:

Pin 4 LO - VERTICAL MODE switch set to ALT.
Pin 8 HI or LO - Plug-In Alternate Drive signal changes state at HI to LO transition of Vertical Alternate Command pulse.

## Clock Generator

Part of integrated circuit U4320 along with the external components shown in Figure 4-12A make up the Clock Generator stage. R1, Q1, Q2, and Q3 represent an equivalent circuit within Q4320. This circuit along with discrete components C4314-R4312-R4313-R4314 comprise a two-megahertz free-running oscillator that provides a timing (clock) signal used to synchronize the vertical, horizontal, and plugin chopping modes.


Figure 4-12. (A) Diagram of Clock Generator stage; (B) Idealized waveforms for Clock Generator stage.

This stage operates as follows: Assume that $\mathbf{Q} 2$ is conducting and Q1 is off. The collector current of Q2 produces a voltage drop across R1 to turn off Q1. This negative level at the collector of Q2 is also connected to pin 14 through Q3 (see waveforms in Figure 4-12B at time $T_{0}$ ). Since there is no current through Q1, C4314 begins to charge towards -15 volts through R4312-R4313. The emitter of Q1 goes negative as C4314 charges, until it reaches a level about 0.6 volts more negative than the level at its base. Then Q1 is forward biased and its emitter rapidly rises positive (see Time $\mathrm{T}_{1}$ on waveforms). Since C4314 cannot change its charge instantaneously, the sudden change in voltage at the emitter of Q1 also pulls the emitter of Q2 positive to re-verse-bias it. With Q2 reverse biased, its collector rises positive to produce a positive output level at pin 14.

Now, conditions are reversed. Since Q2 is reverse biased, there is no current through it. Therefore, C4314 can begin to discharge through R4314. The emitter level of Q2 follows the discharge of C4314, until it reaches a level of about 0.6 volt more negative than its base. Then Q2 is forward biased and its collector drops negative to reverse-bias Q1. The level at pin 14 drops negative to complete the cycle.

Once again, C4314 begins to charge through R4312-R4313 to start the second cycle.

Two outputs are provided from this oscillator. The Delay Ramp signal from the junction of R4312-R4313 is connected to the Vertical Chopped Blanking stage. This signal has the same waveshape as shown by the waveform at pin 13; its slope is determined by the divider ratio between R4312-R4313. A wide-pulse train output is provided at pin 14. The frequency of this pulse train is determined by the overall RC relationship between C4314-R4312-R4313R4314 and its duty cycle is determined by the ratio of R4312 and R4313 to R4314.

The pulse train at pin 14 is connected to pin 16 through C4315. Capacitor C4315, along with the internal resistance of U4320, differentiates the pulse train at pin 14 to produce a narrow negative-going pulse coincident with the falling edge of the pulse train (positive-going pulse coincident with rising edge has no effect on circuit operation). This negativegoing pulse is connected to pin 15 through an invertershaper that is also part of U4320A. The output at pin 15 is a positive-going clock with a repetition rate of about two megahertz.

## Vertical Chopped Blanking

The Vertical Chopped Blanking stage is made up of the remainder of U4320. This stage determines if Vertical Chopped Blanking pulses are required, based upon the operating mode of the vertical system or the plug-in units (dual-trace units only). Vertical Chopped Blanking pulses are produced if: 1) VERTICAL MODE switch is set to CHOP; 2) Dual-trace vertical unit is operating in the chopped mode and is being displayed; 3) Dual-trace vertical unit operating in the chopped mode with the VERTICAL MODE switch set to ADD. The repetition rate of the negative-going Vertical Chopped Blanking pulse output at pin 4 is two megahertz for all of the above conditions as determined by the Clock Generator stage.

Figure 4-13 shows a logic diagram and an input/output table for the Vertical Chopped Blanking stage. Notice the comparator block on the diagram. The output of this comparator is determined by the relationship between the levels at its inputs. If pin 10 is more positive ( HI ) than the grounded input, the output is HI also: if it is more negative, the output is LO.

The Delay Ramp signal from the Clock Generator stage determines the repetition rate and pulse width of the Vertical Chopped Blanking pulses. The Delay Ramp applied to pin 10 starts to go negative from a level of about +1.1 volts coincident with the leading edge of the Clock pulse (see waveforms in Fig. 4-14). This results in a HI quiescent condition for the Vertical Chopped Blanking pulse. The slope of the negative-going Delay Ramp is determined by the Clock Generator stage. As it reaches a level slightly negative from ground, the Vertical Chopped Blanking pulse output level changes to the LO state and remains LO until the Delay Ramp goes HI again.

Notice the delay between the leading edge of the Clock pulse generated by U4320A, and the leading edge of the Vertical Chopped Blanking pulses. the amount of delay between the leading edges of these pulses is determined by the Delay Ramp applied to pin 10. This delay is necessary due to the delay line in the vertical deflection system. Otherwise, the trace blanking resulting from the Vertical Chopped Blanking pulse would not coincide with the switching between the displayed traces. The duty cycle of the wide pulse train produced in the Clock Generator stage determines the pulse width of the Vertical Chopped Blanking pulses (see Clock Generator description for more information).

## Chop Counter

Chop Counter stage $U 4340$ produces the Vertical Chopping Signal, the Plug-In Chop Drive, and the Horizontal Chopped Blanking signal. The Clock pulse produced by the Clock Generator stage provides the timing signal for this stage. A logic diagram of the Chop Counter stage is shown
in Figure 4-15A. Details of operation for the flip-flops (FF) are shown in Table 4-1 at the front of this section. Idealized waveforms showing the timing relationship between the input and output signals for this stage are shown in Figure 4-15B.

The repetition rate of the output signals from this stage is determined by the setting of the HORIZONTAL MODE switch. When the HORIZONTAL MODE switch is set to any position except CHOP, the repetition rate of the Vertical Chopping Signal output at pin 1 is one megahertz (one-half Clock rate). This determines the switching between the LEFT and RIGHT VERT units when the VERTICAL MODE switch is set to CHOP. At the same time, the repetition rate of the Plug-In Chop Drive at pin 8 is 0.5 megahertz (onefourth Clock rate). This provides a chopping signal for switching between the two channels of dual-trace vertical units. The relationship between these output signals and the Clock input is shown by the waveforms in Figure 4-15B during the time between $T_{0}$ and $T_{1}$. During this time, the level at pin 4 remains HI .

When the HORIZONTAL MODE switch is set to CHOP, the basic repetition rate of the Vertical Chopping Signal and Plug-In Chop Drive is altered. For example, if the HORIZONTAL MODE switch is changed to the CHOP position at time $\mathrm{T}_{1}$ (see Fig. 4-15B), a HI level is applied to pin 6 . This stage continues to produce outputs at pins 1 and 8 in the normal manner until both outputs are HI. (See time $\mathrm{T}_{2}$; this condition only occurs once every fifth Clock pulse and only when the HORIZONTAL MODE switch is set to CHOP.) When both of these outputs are HI , the next Clock pulse switches both outputs LO, and at the same time switches the Horizontal Chopped Blanking to the LO level.

This change at time $T_{2}$ does not appear at pin 4 immediately, due to a delay network in the circuit. The delay is necessary to make the Horizontal Chopped Blanking coincide with the Vertical Chopped Blanking produced by U4320 and the switching between the displayed signals. (Compare bottom two waveforms of Fig. 4-15B; also see Vertical Chopped Blanking for further information.) After the delay time, the output level at pin 4 goes LO where it remains for about 0.5 microsecond which is equal to the period of the clock pulse (two-megahertz repetition rate).

The Horizontal Chopped Blanking time must be longer than the Vertical Chopped Blanking time, since it takes more time for the display to switch between horizontal units than between vertical units. During the time that the level at pin 4 is LO, the crt is blanked and the Vertical Chopping Signal and the Plug-In Chop Drive cannot change levels. The Clock pulse at $\mathrm{T}_{3}$ changes only the Horizontal Chopped Blanking output at pin 4. The level on this pin goes HI after the delay time to unblank the crt.


Figure 4-13. (A) Logic diagram for Vertical Chopped Blanking stage; (B) Table of input/output combinations.


Figure 4-14. Idealized waveforms for Vertical Chopped Blanking stage.

For the next three Clock pulses, the Vertical Chopping Signal output and Plug-In Chop Drive operate in the normal manner. However, just prior to the fourth Clock pulse (time $\mathrm{T}_{4}$ ), both outputs are again at their HI level. The fourth clock pulse at $\mathrm{T}_{4}$ switches the output at pin 1, pin 8, and pin 4 (after delay) to the LO level to start the next cycle. Notice that a Horizontal Chopped Blanking pulse is produced at pin 4 with every fifth Clock pulse. Also notice that with the HORIZONTAL MODE switch set to CHOP, two complete cycles of the Vertical Chopping Signal are produced with each five Clock pulses (repetition rate two-fifths clock rate) and one complete cycle of the Plug-In Chop Drive for every five clock pulses (one-fifth clock rate). Notice that the large shaded area produced by the Horizontal Chopped Blanking pulse (see Fig. 4-15B) is not part of the display time (crt display blanked). However, about the same time segment is displayed from the vertical signal source with or without Horizontal Chopped Blanking, due to the change in repetition rate with the HORIZONTAL MODE switch set to CHOP.

The Vertical Chopping Signal at pin 1 of U4340 is connected to the Vertical Mode Logic stage (see following description) through L4342-R4342. This signal is HI when the RIGHT VERT unit is to be displayed and LO when the LEFT VERT unit is to be displayed. The Plug-In Chop Drive at pin 8 is connected to the plug-in units in the vertical compartments through L4344-R4344, via the Main Interface board. When this signal is HI, Channel 2 of the plug-in units can be displayed; when this level is LO, Channel 1 can be displayed. The Horizontal Chopped Blanking signal at pin 4 is connected through L4338-R4338 to the Horizontal Binary stage U4358, and to the Z-Axis Logic stage U4494 by way of Q4336. When this signal is HI, the crt is unblanked to display the selected signal. When it is LO, the crt is blanked to allow switching between the horizontal units.

## Vertical Mode Logic

The Vertical Mode Logic stage is made up of discrete components CR4322-CR4323, CR4368-CR4369, and buffer Q4382-Q4392. These components develop the Main Frame Channel Switch signal (Display Right), which is connected to the Main Interface, Vertical Interface, and Trigger Selector circuits to indicate which vertical unit is to be displayed. When this output level is HI, the RIGHT VERT unit is displayed; when it is LO, the LEFT VERT unit is displayed. A logic diagram of the Vertical Mode Logic stage is shown in Figure 4-16. The discrete components that make up each logic function are identified.

The VERTICAL MODE switch shown on diagram 2 provides control levels to this stage. This switch provides a HI level on only one of five output lines to indicate the selected vertical mode; the remaining lines are LO. Notice that only four of the lines from the VERTICAL MODE switch are connected to the Logic circuit. Operation of this stage is as follows:

When the VERTICAL MODE switch is set to RIGHT, a HI level is connected to the base of Q4382 through R4321. This forward biases Q4382, and the positive-going level at its emitter is connected to the emitter of Q4392. The collector of Q4392 goes HI to indicate that the RIGHT VERT unit is to be displayed. For the CHOP position of the VERTICAL MODE switch, a HI level is applied to the anodes of CR4322-CR4323 through R4322. Both diodes are forward biased so that the Vertical Chopping Signal from pin 1 of U4340 can pass to the base of Q4382. This signal switches between the HI and LO levels at a one-megahertz rate and produces a corresponding Display Right output at the collector of Q4392. When the output is HI, the RIGHT VERT unit is displayed and when it switches to LO, the LEFT VERT unit is displayed.


Figure 4-15. (A) Logic diagram of Chop Counter stage; (B) Idealized waveforms for Chop Counter stage.


Figure 4-16. Logic diagram of Vertical Mode Logic stage.

In the ALT position of the VERTICAL MODE switch, a HI level is applied to the anodes of CR4368-CR4369 through R4369. These diodes are forward biased so the Vertical Alternate Command from pin 6 of the Vertical Binary stage can pass to the base of Q4382 to determine the Display Right Level. The Vertical Alternate Command switches between its HI and LO levels at a rate determined by the Vertical Binary stage.

The control levels in the LEFT and ADD positions of the VERTICAL MODE switch are not connected to this stage. However, since only the line corresponding to the selected vertical mode can be HI, the RIGHT, CHOP, and ALT lines must remain at their LO level when either LEFT or ADD are selected. Therefore, the base of Q4382 remains LO to produce a LO Display Right output level at the collector of Q4392.

## Trace Separation

The Trace Separation stage is made up of discrete components Q4438, Q4442, Q4448, and Q4456. This stage produces the Trace Separation output to the Vertical Amplifier circuit to offset the B-sweep display when operated in a dual-sweep mode (horizontal). The level of this output current is determined by the setting of the VERT TRACE SEPARATION (B) control (on diagram 2). The current from the VERT TRACE SEPARATION control is switched so that the Trace Separation output is provided only when the $B$ sweep is being displayed in the ALT or CHOP horizontal modes and not when the B sweep only is being displayed, nor for independent-pairs operation (sweep slaving). Operation of this stage is as follows:

The VERT TRACE SEPARATION (B) control (on diagram 2) provides current to the Trace Separation output
through R4456 and Q4456 when Q4456 is forward biased. When the B sweep is being displayed (for ALT or CHOP horizontal operation), the Display B signal at the base of Q4442 is HI. This forward biases Q4442. Its collector goes negative to forward bias Q4448, causing Q4448 to saturate and its collector goes positive to forward bias Q4456. During the time the A sweep is being displayed, the Display B signal is LO. This reverse biases Q4442 and Q4448; Q4456 is reverse biased and the VERT TRACE SEPARATION (B) control is disconnected while the A sweep is being displayed.

When the HORIZONTAL MODE switch is set to $B$, a HI level is connected to the emitter of Q4442 through R4431. This reverse biases Q4442 even though Display B at its base is HI for this mode. Therefore, the VERT TRACE SEPARATION (B) control has no effect. When the VERTICAL MODE switch is set to ALT and the Delay Mode Control Out level from the A time-base unit is LO (indicating nondelayed sweep operation), a HI level is applied to the emitter of Q4442 even though the Display B level is HI. This action disconnects the VERT TRACE SEPARATION (B) control for slaved-alternate operation so that the vertical position of the B sweep display is determined by the slaved LEFT VERT plug-in unit only. If delayed-sweep operation is selected, the Delay Mode Control level is HI to forward bias Q4438 and Q4448. This allows the VERT TRACE SEPARATION (B) control to position the 8 sweep display, since slaved-alternate operation is not possible when operating in a delayedsweep mode.

A logic diagram of the Trace Separation stage is shown in Figure 4-17A. The discrete components which make up each logic function are identified. An input/output table for this stage is given in figure 4-17B.


Figure 4-17. (A) Logic diagram of Trace Separation stage; (B) Table of input/output combinations.

## TRIGGER SELECTOR Diagram 5

The Trigger Selector circuit determines the source of the internal triggering signals connected to the A and B Horizontal compartments. Figure 4-18 shows a detailed block diagram of the Trigger Selector circuit. A schematic of the Trigger Selector is given on diagram 5 at the rear of this manual.

Operation of the $A$ and $B$ Trigger is similar. Circuit numbers in this discussion are for the $B$ Trigger circuit.

## Trigger Signals

Amplifier units installed in the vertical compartments provide a differential trigger signal to the mainframe. These signals are terminated into 50 -ohm power dividers. The 50 -ohm strip transmission lines carry half of the input signal from the power dividers to the A and B Trigger Selector circuits. The inputs of the channel switches, U3 and U4 have a 50 -ohm input impedance, and terminate the transmission lines.

## B Trigger Channel Switch

Channel Switch U4 has two differential inputs and one differential output. Control voltages at pins 1, 2, 11, and 12


Figure 4-18. Detailed block diagram of the Trigger Selector circuit.
determine whether the trigger input signals are coupled through to the output or are terminated within the channel switch. U2B and Q1 set the output dc common-mode voltage as sensed by L1-R22 and L2-R25 and is compared with a reference voltage set by divider R23 and R24. If a higher than normal common-mode dc voltage is sensed, the output of U2B goes negative to lower the base voltage of Q1. This reduces the current into pin 13A, causing the dc common mode voltage at pin 3 and 13 to decrease. The actual voltages required at pin 13A to establish the correct output dc common-mode voltage varies with the setting of the VERTICAL MODE switch.

Each channel within U4 has an independent pair of control pins for channel selection. If the "ON" pin is more positive than the "OFF" pin, that channel is selected. All of the "ON" pins are held at about +2.0 volts. The "OFF" pins are either HI (+2.5 volts) or LO. The B Trigger Channel Switch has four operating modes: Left, Right, Alt, and Add. In the Left and Right modes, the Add logic level is HI (on pin CF); the Right Logic Level (on pin CD) is LO for Left and is HI for Right. In the ALT mode, Add is HI, and Right alternates between LO and HI. In the ADD Mode, both Add and Right are LO.

## B Trigger Output Amplifier

The B Trigger Output Amplifier provides the internal trigger signal to the B HORIZ compartment. Transistors Q5 and Q6 are connected as a paraphase amplifier. The B Trigger Center adjustment R44 balances the emitter current of Q5 and Q6 for equal dc output levels. B Trigger Gain adjustment R41 sets the emitter degeneration of Q5 and Q6 to adjust the gain of the B Trigger Output Amplifier. Components C4 and R99 are selected for optimum amplifier bandwidth. The output impedance of this stage is 100 ohms differentially, determined primarily by R48 and R50.

## Vertical Signal Out Amplifier

The Vertical Signal Out Amplifier provides the signal to the VERT SIG OUT connector on the rear panel. Transistors Q3 and Q4 are connected as a push-pull to singlephase convertor. DC Center adjustment R28 sets the emitter current of Q3 and Q4 which determines the quiescent dc output voltage at J549. The source of the output signal is determined by the B TRIGGER SOURCE switch and the VERTICAL MODE switch.

## VERTICAL INTERFACE Diagram 7

The Vertical Interface circuit selects the vertical deflection signal for display on the crt from the output of the LEFT and/or RIGHT VERT plug-in compartment(s). Figure 4-19 shows a detailed block diagram of the Vertical Interface circuit. A schematic of the Vertical Interface circuit is given on diagram 7 at the rear of this manual.

## Vertical Channel Selector

The Vertical Channel Selector interfaces Channel Switch U668 to logic signals from the Main Interface. The Channel Switch stage requires two pairs of complementing control voltages; one pair for each channel. To select a channel, a HI level must be applied to the "ON" input of U668 (pin 2 for LEFT and pin 12 for RIGHT VERTICAL MODE switch positions) and a LO level must appear at the "OFF" input (pin 1 for LEFT and pin 11 for RIGHT VERTICAL MODE switch positions). To inhibit a channel the control voltages are reversed.

When the VERTICAL MODE switch is set to LEFT, the Display Right command from the Main Interface is set LO, the Add line is LO and, normally, X-Y inhibit is LO. Transistors Q652, Q658, and Q558 are turned on; Q656 and Q556 are off. The result is pins 1 and 12 of U668 are pulled LO but pins 2 and 11 are HI. Consequently, the LEFT VERT channel is turned on while the RIGHT VERT channel is turned off. Signals applied at J602 and J603 are fed to the outputs at J592 and J694. Similarly, if Display Right is HI, the RIGHT VERT channel is turned on and LEFT VERT channel off.

RIGHT VERT channel signals are fed to the outputs and LEFT VERT channel signals are terminated within U668.

When the VERTICAL MODE switch is set to either ALT or CHOP, the Display Right signal line switches between the LO and HI levels at a rate determined by either the Chop Counter or Vertical Binary stages (see Logic circuit description). This action displays the signal from the LEFT VERT unit when the Display Right signal line is LO and displays the signal from the RIGHT VERT unit when the signal line is HI.

When ADD vertical mode operation is selected the Add signal line is HI, and the Display Right signal is LO. This allows both the RIGHT VERT and LEFT VERT signals to pass to U668. The signals from both vertical units are algebraically added in U668 and the resultant signal determines the vertical deflection.

The X-Y inhibit command has absolute control over the output of the Channel Switch stage. Quiescently, this signal is LO; however, when the Readout System is ready to display information on the crt, this level goes HI, blocking the signals from both vertical units.

When X-Y Inhibit is HI, Q652 is turned off. Current in R653 now flows through CR552 and CR654 lowering the base voltage of Q556 by one diode drop, and that of Q658 by two diode drops. This insures that Q558 and Q656 are turned on regardless of the state of Display Right or Add.

## Right And Left Channel Feedbeside

Operation of the Left and Right Channel Feedbeside stages are identical. Circuit numbers used in this discussion are for the Right Channel Feedbeside.

Function of the Feedbeside stage is to compensate for low-frequency imperfections in the frequency response of the Channel Switch stage, U668. Self heating of the transistor base-emitter junction of some transistors within U668 causes the low-frequency gain to appear larger than the midband gain. To correct this, a portion of the input signal is picked off through R502 and R504 and applied to U508. This differential signal is converted to a single-ended signal and distributed into four RC (resistive-capacitative) networks, each having a different time constant. Variable components R512, R515, R520, R525, R530, and C538 are adjusted to provide an accumulated waveform. This waveform is converted to a paraphase signal by U538, Q542, and Q548, and is then injected into U668 through pins 4 and 6, where it is subtracted from the signal entering U668 at pins 7 and 9. Proper adjustment results in flat-frequency response and optimum-transient response at output pins 3 and 13. Right Center adjustment R535 sets the level at pin 2


Figure 4-19. Detailed block diagram of Vertical Interface circuit.
of U538 to determine the dc centering at the output of U668.

## Vertical Channel Switch

The vertical deflection signal from the left and right vertical plug-in units is either terminated within this stage or coupled through as determined by the Vertical Channel Selector stage. The Vertical Channel Switch stage is made up primarily of integrated circuit U668. Inputs 7 and 9 provide a differential input for the signal from the right vertical plug-in unit. Input pins 17 and 19 provide a differential input for the
signal from the left vertical plug-in unit. The differential output signal at pins 3 and 13 is connected to J694 and J592 respectively.

Components U672, Q672, Q676, and Q682 supply standing current to pin 3A of U668 to maintain the output common-mode dc level at pins 3 and 13. The output com-mon-mode level at pins 3 and 13 of U668 is sensed by R559-R659, and compared with a reference level determined by divider R680-R681. Assume for example that pin 2 of U682 is lower than pin 3 , indicating a low common-mode
output level at pins 3 and 13. The output of U682 at pin 6 is driven positive and current flows in R683. This current must be supplied from the +15 V supply via R682, thereby lowering the base voltage of Q682 and increasing its collector current. Common-base amplifier Q676 passes along the increased collector current to pin 3A of U668. This increases the output common-mode level, thus bringing U682 into balance. The actual voltage required at pin 3A of U668 to establish the correct output dc common-mode voltage depends on the Vertical Channel Switch mode.

## VERTICAL AMPLIFIER Diagram 8

The Vertical Amplifier circuit provides final amplification for the vertical signal received from delay-line DL5 before it is applied to the crt vertical deflector. In addition, lowfrequency signals to provide the VERT TRACE SEPARATION (B) function, crt scale factor readout, and the vertical portion of the BEAMFINDER function are also handled in the Vertical Amplifier. Figure 4-20 shows a detailed block diagram of the Vertical Amplifier circuit. A schematic of the Vertical Amplifier is given on diagram 8 at the rear of this manual.

## Delay-Line

Delay-line DL5 delays the vertical signal approximately 65 nanoseconds to allow the horizontal circuits time to initi-
ate a sweep before the vertical signal reaches the crt vertical deflection plates. This allows the instrument to display the leading edge of the signal originating the trigger pulse when using internal triggering. The delay-line impedance is 100 ohms differentially, and because it is coaxial, does not produce preshoot or phase distortion in the crt display.

## Delay-Line Compensation

The Delay-Line Compensation stage provides frequency compensation to offset delay line losses due to "skin-effect" in the cable. This compensation is achieved by attenuating the signal at low frequencies approximately 4.8 dB . At high frequencies (about 1.0 gigahertz) the signal passes with little attenuation. Transient response front-corner adjustment is achieved by C215, L100, and R215. The components connecting the input signal to U415 provide forward termination of the delay-line.

## Feedbeside

The Feedbeside stage compensates for low-frequency imperfections in the frequency response of the Output Amplifier stage, U415 and U515. Self heating of the transistor base-emitter junction of some transistors within U415 and U515 causes the low-frequency gain to appear larger than the midband gain. To correct this, a portion of the input signal is picked off via the Delay-Line Compensation stage and applied to U335. The paraphase signal is converted to a single-ended signal by U335 and distributed into six RC (re-


Figure 4-20. Detailed block diagram of the Vertical Amplifier circuit.
sistive capacitive) networks, each having a different time constant. Resistors R130, R131, R132, R237, R238, R335, and C200 are adjusted to provide an accumulated waveform. This waveform is converted to a paraphase signal by U100, Q303, and Q400, and is then injected into U415 through Pins 1 and 5 where it is subtracted from the signal entering U415 at pins 7 and 9. Proper adjustment of the RC components results in a flat-frequency response and opti-mum-transient response at the output of U415 (pins 17 and 19).

Diodes CR333 and CR334 improve the vertical amplifier overdrive recovery by limiting the amplitude of the feedbeside correction signals that exceed the dynamic range of the Output Amplifier. Thermistor RT303 varies the gain of the feedbeside amplifier to provide increased correction at high ambient temperature where transistor self-heating is aggravated.

## Output Amplifier

The Output Amplifier consists of two thin-film Hybrid wideband amplifiers, U415 and U515, and their associated bias circuitry. These amplifiers provide a voltage gain of 4 and 10 respectively resulting in an overall voltage gain from J 9 and J 10 to the crt vertical deflector of about 40 . All signal path interconnections between and within hybrids are made with 50 -ohm strip transmission lines via the HYPCON system.

Integrated circuit U 415 receives the delayed and compensated signal from the delay-line compensation stage at input pins 7 and 9 . Variable resistor R211 provides vertical amplifier gain adjustment by shunting the differential signal. Trimmers C401, R404, and R405 are transient response adjustments, effective in the first 10 nanoseconds of the step response. Bias current for U415 is supplied by U700B. U700A and associated circuitry operate as a power supply to maintain a constant common-mode dc level at the input to U515 regardless of current demand from U415.

When the BEAMFINDER switch (on diagram 15) is depressed, the current source for U515 is changed to provide the BEAMFINDER function. Normally, the current source for U515 is directly from ground through the BEAMFINDER switch. However, when the BEAMFINDER switch is actuated, the only current source for U515 is through R712. This limits the dynamic range of the stage by limiting its available current, so the display is compressed vertically within the crt graticule area.

The signal at the output of U515 (pins 17 and 19) is connected, via a flexible coplaner transmission line, to the crt vertical deflection plate neck pins. A distributed deflection plate system is used in the crt for maximum bandwidth. The
signal travels along the deflectors at a velocity essentially the same as the velocity of the electron beam passing through the vertical deflector. This synchronism of the deflection signal and the electron beam reduces the loss in high-frequency sensitivity due to electron-transit time through the deflection plate structure. After propagating along the deflection plates, the signal exits the crt into a termination network consisting of R83. R83 is adjustable to match the crt impedance deflection structure to the crt termination.

## Output Protection

Transistors Q720 and Q722 comprise a protection circuit for U515 in case the +15 volt supply is shorted to ground. If this occurs, Q722 turns on causing the base of Q720 to drop negative, limiting the emitter voltage of Q720 at a safe level for U515.

## Auxiliary Amplifier

The Auxiliary Amplifier is used to inject low-frequency (less than 2 MHz ) signals, associated with crt scale-factor readout and alternate sweep switching, into the vertical deflection system. Normally, the X-Y Inhibit signal at J26 is LO, Q541 and Q630 are off, and Q631 is on. The Vertical Trace Separation signal at $J 43$ is coupled through Q631 to the input of paraphase amplifier Q530 and Q435. Transistors Q430 and Q431 form a shunt-feedback amplifier with sufficient gain to drive the inputs of U 415 (pins 7 and 9 ).

When the Readout System initiates a character display, it sets the X-Y Inhibit logic level HI. Emitter follower Q540 turns Q541 on. The voltage on the collector of Q541 drops to zero which turns Q631 off and turns Q630 on. The Vertical Trace Separation signal is then blocked by Q631. Y Readout signals are inverted by U630 and coupled through Q630 to paraphrase amplifier Q530 and Q435. Readout centering is added to the composite readout signal from R737. At the end of the character display period, $X-Y$ inhibit returns LO.

In the reduced scan mode the X-Y Reduced Scan input to the gate of Q740 goes HI. Q740 turns off taking R633 out of the circuit. R634, without the parallel resistance of R633. reduces the $Y$ readout drive to pin 2 of U630 resulting in smaller readout characters on the crt in the reduced scan mode.

## HORIZONTAL INTERFACE Diagram 9

The Horizontal Channel Switch circuit determines whether the signal from the output of the A horizontal or B horizontal plug-in unit provides the horizontal deflection sig-
nal. This circuit also accepts an input from the Readout System (diagram 6) which blocks the horizontal signal while the readout display is presented on the crt. Figure 4-21 shows a detailed block diagram of the Horizontal Interface circuit. A schematic of the Horizontal Interface circuit is given on diagram 9 at the rear of this manual.

## Horizontal Channel Switch

The Horizontal Channel Switch operates as a switched amplifier and consists primarily of U884. The differential horizontal signal from the A HORIZ plug-in compartment is applied to pins 2 and 15. The differential horizontal signal from the B HORIZ plug-in compartment is applied to pins 7 and 10. The Display B control signal determines whether the A or B horizontal signal is coupled to output pins 12 and 13.

When the HORIZONTAL MODE switch is set to A the Display B signal, applied to pin 4 of U884 through S865, is LO. This level allows the signal from the A horizontal unit to pass to the output while the signal from the $B$ horizontal unit is blocked. In the B position of the HORIZONTAL MODE switch, the level at pin 4 of U884 is HI. Now, the signal from the $B$ horizontal unit is connected to the output while the signal from the A horizontal unit is blocked. When the HORIZONTAL MODE switch is set to ALT or CHOP, the Display B signal at pin 4 of U884 switches between the HI and LO levels at a rate determined by the Horizontal Binary stage in the Logic circuit. This action allows the signals from the A horizontal unit to be displayed when the Display B signal is

LO and the signal from the B horizontal unit to be displayed when it is HI .

Horizontal Selector switch S865 selects the horizontal compartment that provides horizontal deflection. In the Norm position, horizontal deflection is determined by the HORIZONTAL MODE switch as described above. In the A position, the A horizontal compartment provides horizontal deflection regardless of the HORIZONTAL MODE switch setting. Likewise, the B horizontal compartment is selected in the $B$ position.

The X-Y Inhibit signal from the Readout System, diagram 6, applied to pin 6 of U884 has absolute control over the Horizontal Channel Switch stage. Quiescently, this signal is LO to allow the signal from the selected horizontal unit to pass to the output. However, when the Readout System displays information on the crt, this signal goes HI to block the signals from both horizontal compartments.

## B Horizontal X-Y Delay Compensation

The Horizontal Interface circuit includes the X-Y Compensation network (Option 2 only). This network provides a delay for the horizontal $(X)$ signal from the B HORIZ plug-in compartment to match the delay of the vertical $(\mathrm{Y})$ signal due to the delay line. For instruments which are not equipped with this feature, the $B$ horizontal signal from the B HORIZ plug-in compartment is connected directly to the


Figure 4-21. Detailed block diagram of the Horizontal Interface circuit.

Horizontal channel Switch U884 through the Horizontal Interconnect board.

Time-Base Operation. When the plug-in unit installed in the B HORIZ compartment is operated as a standard timebase unit to produce a horizontal sweep for deflection of the crt beam, the B Delay Compensation network is effectively disabled. The X-Y Compensation command, applied to pin BY, is HI and relays K822-K838 are not actuated. Therefore, the relay contacts remain in the normally-closed position so the horizontal signal passes directly through this network to the Horizontal Channel Switch.

X-Y Operation. If the time-base unit installed in the B HORIZ compartment is operated as an amplifier, or if an amplifier unit is installed in the B HORIZ compartment, the $X-Y$ Compensation command to the B Delay Compensation network drops to the LO level. This actuates relays K822K838 to connect the B Delay Compensation network into the circuit.

## HORIZONTAL AMPLIFIER Diagram 10

The Horizontal Amplifier circuit amplifies the push-pull horizontal deflection signal from the plug-in unit installed in either horizontal compartment and connects it to the horizontal deflection plates of the crt. Figure 4-22 shows a detailed block diagram of the Horizontal Amplifier circuit. A schematic of the Horizontal Amplifier is given on diagram 10 at the rear of this manual.

## Input Amplifier

The Input Amplifier stage consists of an FT doubler, Beamfinder, and readout positioning circuitry. Two differential pairs of transistors, Q3 - Q4 and Q5 - Q6, plus two common-base amplifiers, Q9-Q10, comprise the FT doubler. The signal from the Horizontal Interface circuit is connected to the bases of Q3 and Q6. The gain of this input stage is controlled by the emitter resistors of the differential pairs. Overall gain is set by Horizontal Gain adjustment R22. High frequency adjustments are also provided in the dif-


Figure 4-22. Detailed block diagram of the Horizontal Amplifier circuit.
ferential pair emitters by R15-C1 and R25-C5. Horizontal Center adjustment R8 balances the base currents of Q3 and Q6 to horizontally center the display.

## Beamfinder Network

Emitter current for the differential pairs is normally supplied through Q8 and the BEAMFINDER switch (see diagram 15). However, when the BEAMFINDER switch is pressed, Q8 turns off limiting the emitter current to Q3- Q4 and Q5-Q6. This reduces the dynamic range of the differential pairs to keep the horizontal display confined to the screen. When Q8 turns off, Q7 is turned on to maintain the bias current for Q11 and Q13 at nearly the normal level even though the output current from the differential pairs is reduced.

## Auxiliary Amplifier

When readout is to be displayed, the X-Y Inhibit signal turns Q1 on. Readout Centering adjustment R13 balances the base current of Q3 and Q6 to position the readout display horizontally. The $X$ readout signal is connected to the base of Q6 through Q2. The normal horizontal signal is blocked in the Horizontal Interface circuit.

In the reduced scan mode the X-Y Reduced Scan input to the gate of Q2 goes HI, turning it off. R34 reduces the $X$ readout drive to Q6, resulting in smaller readout characters on the crt in the reduced scan mode.

## Left and Right Driver Amplifier

The Left and Right driver Amplifiers each consist of an operational amplifier to drive their respective output amplifier stages. Transistors Q13 and Q14 comprise the operational amplifier for the Left Driver Amplifier. Transistors Q11 and Q12 comprise the operational amplifier for the Right Driver Amplifier. To prevent the Left Output Amplifier from being overdriven, signal limiting occurs in the Left Driver Amplifier when the collector of Q13 is driven far enough negative for CR1 and CR2 to become forward biased. As CR1 and CR2 conduct, the effective gain of the stage is greatly reduced, and in turn, the drive to the Left Driver Amplifier. Similarly, to prevent the Right Output Amplifier from being overdriven, signal limiting occurs in the Right Driver Amplifier when the collector of Q11 is driven far enough positive for CR4 and CR5 to become forward biased. As CR4 and CR5 conduct the gain of the stage is greatly reduced, and in turn, the drive to the Right Output Amplifier is reduced.

## Left and Right Output Amplifier

The Left Output Amplifier consists of a mid-frequency operational amplifier paralleled by a high-frequency signal
path. The network of R68, R69, C13, and C14 comprise the input impedance, while R73 and C41 comprise feedback impedance for the operational amplifier. High-frequency components of the horizontal signal are amplified by Q22 and coupled directly to the common-base output transistor Q24 through C25. High-frequency compensation is provided by C14, C24, and R86.

Basic operation of the Right Output Amplifier is the same as just described for the Left Output Amplifier.

## OUTPUT SIGNALS Diagram 11

The Output Signals circuit provides the + SAWTOOTH OUT and + GATE OUT signal to the rear panel. These output signals are samples of signals from the associated plugin units. Figure $4-23$ shows a detailed block diagram of the Output Signals circuit. A schematic of the Output Signals circuit is given on diagram 11 at the rear of this manual.

## Sawtooth Out Amplifier

The sawtooth signals from the $A$ and $B$ time-base units are connected to the Sawtooth Amplifier stage through series resistors R192 and R193 respectively (see diagram 3). Sweep Selector jumper S3 determines whether the Asweep or the B-sweep sawtooth signal provides the + SAWTOOTH OUT signal. The unused sawtooth signal is terminated by R3.

Transistors Q10-Q11-Q17 compose an inverting feedback amplifier. The gain of the stage is about two, as determined by the ratio of feedback resistor R16 to the input resistance (made up of R9 and either R192 or R193 depending on which sawtooth source is selected). RC network R17-C17 provides frequency-response stabilization for this stage.

## Gate Out Amplifier

The +GATE OUT signal is selected from three input gate signals by Gate Selector jumper S46. In the A and B positions a positive gate signal from the selected horizontal compartment is connected to the base of Q62, and the base of Q49 is connected to ground. Before a gate occurs, Q62 is biased off and Q49 is conducting. The collector of Q49 is low enough to cut off Q77. When a gate occurs, it is coupled to the emitter of Q49, cutting it off. The current through R49 now fiows through Q77 to produce the +GATE OUT.

In the DLY'D position, the base of Q62 is connected to ground and the base of Q49 is ungrounded. This allows the negative-going Delayed Gate signal from a delaying time-


Figure 4-23. Detailed block diagram of the Output Signals circuit.
base unit to reach the base of Q49. When a gate occurs, Q49 is cut off, producing a positive-going signal at the +GATE OUT connector, as in the case of the A and B Sweep Gates.

## Probe Power

Connectors J30 and J33 provide power for compatible active probes.

## READOUT SYSTEM Diagram 6

The Readout System provides an alpha-numeric display of information encoded by the plug-in units. This display is presented on the crt, and is written by the crt beam on a time-shared basis with the analog waveform display. A schematic of the Readout System is given on diagram 6 at the rear of this manual.

The following terms are used to describe the Readout System:

Character - A single number, letter, or symbol displayed on the crt, either alone or in combination with other characters.
Word - A group of related characters. In the Readout System, a word can consist of up to 10 characters.

Frame - A display of all words for a given operating mode and plug-in combination. Up to eight words can be
displayed in one frame. Figure 4-24 shows the position of each word in a complete frame.


Figure 4-24. Location of readout display on the crt identifying the originating plug-in and channel.

Column - One of the vertical lines in the Character Se lection Matrix (see Figure 4-25). Columns C-0 (column zero) through C-10 (column 10) can be addressed by the system.


Figure 4.25. Character selection matrix for 7934 Readout System.

Row - One of the horizontal lines in the Character Selection matrix. Rows R-1 (row 1) through R-10 (row 10) and R-14 (row 14) can be addressed by the system.

Time-Slot - A location in a pulse train. In the Readout System, the pulse train consists of 10 negative-going pulses. Each time-slot pulse is assigned a number between 1 and 10. For example, the first time-slot is TS-1.

Time-Multiplexing - Transmission of data from two or more sources over a common path by using different time intervals for different signals.
Hexidecimal - The hexidecimal numbering system uses the numerals 0 through 9 and the letters $A$ through $F$ to represent the 16 possible combinations of four binary digits.
Octal - The octal numbering system uses the numerals 0 through 7 to represent the eight possible combinations of three binary digits.
Binary-Coded Decimal (BCD) - The Binary-Coded Decimal system uses 10 unique combinations of four binary digits to represent the decimal numbers 0 through 9 .

## Display Format

Up to eight words of readout information can be displayed on the crt. The position of each word is fixed and is directly related to the plug-in unit from which it originated. Figure 4-24 shows the area of the graticule where the readout from each plug-in unit is displayed. Notice that Channel 1 of each plug-in unit is displayed within the top division of the crt, and Channel 2 is displayed directly below within the bottom division. Figure 4-26 shows a typical display where only Channel 2 of the Right Vertical and B Horizontal units is selected for display.


Figure 4-26. Typical readout display where only Channel 2 of the Right Vertical and B Horizontal units is displayed.

Each word in the readout display can contain up to 10 characters, although the typical display will contain between two and seven characters per word. The characters are selected from the Character Selection Matrix shown in Figure 4-25. In addition, 13 operational addresses are provided for special instructions to the Readout System. The unused locations in the Matrix (shaded area) are available for future expansion of the Readout System. The method of addressing the locations in the Character Selection Matrix is described in the following discussion.

## Developing the Display

This description is intended to relate the basic function of each stage to the operation of the overall Readout System. Detailed information on circuit operation is given later. Figure 4-27 shows a detailed block diagram of the Readout System.

The key block in the Readout System is the Timer stage. This stage produces the basic signals that establish the timing sequences within the Readout System. The period of the timing signal is about 250 microseconds (drops to about 210 microseconds when Display-Skip is received; see detailed description of Timer stage for further information). This stage also produces control signals for other stages within this circuit and interrupt signals to the Vertical Amplifier, Horizontal Amplifier, and Logic circuits, which allow a readout display to be presented. The Time-Slot Counter stage receives a trapezoidal voltage signal from the Timer stage and directs it to one of ten output lines. These output lines are labeled TS-1 through TS-10 (time-slots 1 through 10) and are connected to the vertical and horizontal plug-in compartments as well as to various stages within the Readout System. The output lines are energized sequentially, so there is a pulse on only one of the ten lines during any 250microsecond timing period. After the Time-Siot Counter stage has counted time-slot 10, it produces an End-of-Word pulse which advances the system to the next channel.

Two output lines (row and column) are connected from each channel of the plug-in unit back to the Readout System. Data is typically encoded on these output lines by connecting resistors between them and the time-slot input lines. The resultant output is a sequence of 10 analog current levels that range from 0 to 1 milliamp ( $100 \mathrm{microamps} / \mathrm{step}$ ) on the row and column output lines. This row and column corresponds to the row and column of the Character Selection Matrix in Figure 4-25. The standard format for encoding information onto the output lines is given in Table 4-2. (Spe-cial-purpose plug-in units may have their own format for readout; these special formats will be defined in the manuals for these units.)

Table 4-2
STANDARD READOUT FORMAT

| Time-Slot Number | Description |
| :--- | :--- |
| TS-1 | Determines decimal magnitude (number of zeros displayed or prefix change information) or <br> the IDENTIFY function (no display during this time-slot). |
| TS-2 | Indicates normal or inverted input (no display during this time-slot). |
| TS-3 | Indicates calibrated or uncalibrated condition of plug-in variable control (no display for <br> calibrated condition). |
| TS-4 | Scaling. |
| TS-5 | Not encoded by plug-in unit. Left blank to allow addition of zeros by Readout System. |
| TS-6 | Defines the prefix which modifies the units of measurement. |
| TS-8 | Defines the units of measurement of the plug-in unit. May be standard unit of measure- <br> ment (V, A, S, etc.) or special units selected from the Character Selection Matrix. |
| TS-9 |  |

The encoded column and row data from the plug-in units is selected by the Column Data Switch and Row Data Switch stages respectively. These stages take the analog current from the eight data lines (two channels from each of the four plug-in compartments) and produce a timemultiplexed analog voltage output containing all of the column and row information from the plug-ins. The Column Data Switch and Row Data Switch are sequenced by the binary Channel Address Code from the Channel Counter.

The time-multiplexed output of the Column Data Switch is monitored by the Display-Skip Generator to determine if it represents valid information that should be displayed. Whenever information is not encoded in a time-slot, the Dis-play-Skip Generator produces an output level to prevent the Timer stage from producing the control signals that normally interrupt the crt display and present a character.

The analog outputs of the Column Data Switch and Row Data Switch are connected to the Column Decoder and Row Decoder stages respectively. These stages sense the magnitude of the analog voltage input and produce an output current on one of ten lines. The outputs of the Column Decoder stage are identified as C-1 through C-10 (column 1 through 10) corresponding to the encoded column information. Likewise, the outputs of the Row Decoder stage are identified as R-1 through R-10 (row 1 through 10) corresponding to the encoded row information. The row and column outputs are then converted to binary coded decimal ( $B C D$ ) and used to address memory locations within the Character Generator. These outputs are also used at other points within the system to indicate when certain information has been encoded. One such stage is the Zeros Logic and Memory. During time-slot 1 (TS-1), this stage checks if
zero-adding or prefix-shifting information has been encoded by the plug-in unit, and stores it in memory until time-slots 5 , 6 , or 8 . After storing this information, it triggers the DisplaySkip Generator stage so there is no display during time-slot 1 (as defined by Standard Readout Format; see Table 4-2). When time-siots 5, 6, and 8 occur, the memory is addressed and any information stored there during time-slot 1 is transferred to the input of the Column Decoder stage to modify the analog data during the applicable time-slot.

Another operation of the Zeros Logic and Memory stage is to produce the identify function. When time-slot 1 is encoded for Identify (column 10, row 3 ), this stage produces an output level connected with the Row Decimal-to-BCD Converter and the Row and Column Data Switches. This output level connects the Column Data Switch with a coding network within the Readout System to produce an analog current during time-slots 2 through 9 . The current is then converted to binary-coded decimal and combined with the Row Decimal-to-BCD Converter output to address locations within the Character Generator necessary to display "IDENTIFY" on the crt. The Zeros Logic and Memory stage is reset after each word by the End-of-Word pulse.

Each character displayed on the crt consists of a series of connected points within an 8 -point by 8 -point grid. The Character Generator contains grid locations of the points required to create any of the 50 possible characters shown in the Character Selection Matrix of Figure 4-25. The row and column data encoded during a time-slot are converted to BCD and used to address a location within the Character Generator containing the first grid point of the character to be displayed. The 4-bit binary output from the lower order address generator is combined with the address created by the row and column data to provide the other grid points necessary to complete the character.


Figure 4-27a. Detailed block diagram of the Readout System.


Figure 4-27b. Detailed block diagram of the Readout System.

## Theory of Operation-7934 Service

Only one character is addressable in any one time-slot or a space can be added into the displayed word by the Horizontal Character Position Counter stage, when encoded by the plug-in. The latter stage counts the number of characters generated and produces an output current to step the display one character position to the right for each character. In addition, the character position is advanced once during each of time-slots 1,2 , and 3 whether a character is generated during these time-slots or not. This action fixes the starting point of the standard-format display such that the first digit of the scaling factor always starts at the same point within each word regardless of the information encoded in time-slot 1, 2, or 3 preceding this digit. Also, by encoding row 10 and column 0 during any time-slot, a blank space can be added to the display. Decimal points can be added to the display at any time by addressing the appropriate row and column (see Character Selection Matrix for location of decimal points). The Horizontal Position Counter stage is reset after each word by the Word Trigger pulse.

The Character Generator's binary output is shaped by the $X$ and $Y$ Vector Generators into the appropriate $X$ - and Y -axis signals to create characters. The Vector Generator outputs are amplified by the $X$ and $Y$ Output Amplifiers for use by the horizontal and vertical deflection systems. The Channel Counter output is also used by these stages so the display from each channel is positioned to the area of the crt which is associated with the plug-in and channel originating the word (see Figure 4-24). The character positioning current or decimal positioning current generated by the Horizontal Position Counter or Decimal Point Logic stages is added to the $X$ (horizontal) signal at the input to the $X$ Output Amplifier, providing horizontal positioning of the characters within each word.

The Word Trigger stage produces a trigger from the End-of-Word pulse generated by the Time-Slot Counter stage after the tenth time-slot. This Word Trigger pulse advances the Channel Counter to display the information from the next channel or plug-in. This Word Trigger stage can also be advanced to jump a complete word, or a portion of a word, when a Jump Command is received from the Row Data Switch stage.

The following discussion describes the operation of the various circuits in the Readout System in more detail.

## Timer

Timer stage U3426 establishes the timing sequence for all circuits within the Readout System. This stage produces six time-related output waveforms (see Figure 4-28). The triangle waveform produced at pin 6 forms the basis for the remaining signals. The basic period of this triangle waveform is about 250 microseconds as controlled by RC network R3435 and C3435 at pin 6. The triangle waveform is clipped and amplified by U3426 to form the trapezoidal out-
put signal at pin 10. The amplitude of this output signal is exactly 15 volts as determined by U3426 (precise amplitude necessary to accurately encode data in plug-in units; see Encoding the Data). The trigger output at pin 5 provides the switching signal for the Time-Slot Counter and Word Trigger stages.


5880-1!

Figure 4-28. Output waveforms of the Timer stage.

The signals at pins 12,13 , and 14 are produced only when the triangle waveform is on its negative slope and the trapezoidal waveform has reached the lower level. The timing sequence of these waveforms is important to the operation of the Readout System (see expanded waveforms in Figure 4-29). The Z-Axis Inhibit command at pin 14 is produced first. This negative-going signal provides a blanking pulse to the Z-Axis Logic stage (see diagram 4) to blank the crt before the display is switched to the Readout System. It also produces the strobe pulse through Q3438 and CR3439 which is connected to pin 15 of the Zeros Logic and Memory stage U3532.


5880-20

Figure 4-29. Detail of output at pins 12, 13, and 14 of U3426.

The purpose of this configuration is to prevent the Zeros Logic and Memory stage from storing incorrect data during the quiescent period of the strobe pulse. When the strobe pulse goes positive, CR3439 is reverse biased to disconnect Q3438 and allow U3532 to operate in the normal manner.

The next signal to be produced is the $X$ - $Y$ Inhibit Command at pin 13. This positive-going signal disconnects the plug-in signals from the vertical and horizontal deflection systems. The Ready signal is also derived from this output and connected to Character Generator stage U3502B through Q3442 and the two Output Amplifier stages through U3457B and Q3550.

The Readout Intensity output at pin 12 is produced next. This current is connected to the crt circuit through Q3452 to unblank it to the intensity level determined by the voltage on the Readout Intensity line.

The Timer stage operates in one of two modes as controlled by the Display-Skip level at pin 4. The basic mode just described is a condition that does not occur unless all ten characters of each word ( 80 characters total) are displayed on the crt. Under typical conditions, only a few characters are displayed in each word. The Display-Skip level at pin 4 determines the period of the Timer output signal. When a character is to be generated, pin 4 is LO and the circuit operates as just described. However, when a character is not to be displayed, a HI level is applied to pin 4 of U3426 through CR3425 from the Display-Skip Generator stage. This signal causes the Timer to shorten its period of operation to about 210 microseconds. The waveforms in Figure 4-30 show the operation of the Timer stage when the Display-Skip condition occurs for all positions in a word. Notice that there is no output at pins 12,13, and 14 under this condition. This means that the crt display is not interrupted to display characters. Also notice that the triangle waveform at pin 6 does not go as far negative, and that the negative portion of the trapezoidal waveform at pin 10 is shorter. Complete details on operation of the Display-Skip Generator are given later.

The Timer operation is also controlled by the Readout Gate level at pin 2. If this level is LO, the Timer operates as just described. However, if the Readout Gate sets a HI level at this pin, the Timer stage is locked out and can not produce any output signals (see Readout Gate description for further information).

A negative voltage on the Readout Intensity line sets the intensity of the readout display independently of the A or B INTENSITY controls. The Readout Intensity line also provides a means of turning the Readout System off when a readout display is not desired. When the Readout Intensity line is left open, the current from pin 11 of U3426 is interrupted, and at the same time, a positive voltage is applied to pin 4 through CR3424. This positive voltage switches the stage to the same conditions as were present under the Display-Skip condition. Therefore, the crt display is not interrupted to present characters. However, time-slot pulses continue to be generated.

## Time-Slot Counter

Time-Slot Counter U3459 is a sequential switch which directs the trapezoidal waveform input at pin 8 to one of its 10 output lines. These time-slot pulses are used to interrogate the plug-in units to obtain data for the Readout System. The Trigger pulse at pin 15 switches the Time-Slot


Figure 4-30. Timer stage operation when display-skip condition occurs.

Counter to the next output line, causing the output signal to be sequenced consecutively from time-slot 1 through timeslot 10. Figure 4-31 shows the time relationship of the timeslot pulses. Notice that only one line carries a time-slot pulse
at any given time. When time-slot 10 is completed, a nega-tive-going End-ot-Word pulse is produced at pin 2. Ihe tnd-of-Word pulse provides a drive pulse for Word Trigger stage U3427B and also provides an enabling level to the DisplaySkip Generator during time-slot 1 only.

Pin 16 is a reset input for the Time-Siot Counter. When this pin is LO, the Time-Slot Counter resets to time-slot 1.

## Word Trigger

Word Trigger U3427B is a single-shot multivibrator that provides a reset pulse for Horizontal Position Counter U3502A. The negative-going End-of-Word pulse from pin 2 of U3459 triggers the single shot and causes its output at pin 11 to go HI .

## Channel Counter

Channel Counter U3427A is a binary counter that produces the Channel Address Code for the Column and Row Data Switches and the Output Amplifier stage. This code instructs these stages to sequentially select and display the eight channels of data from the plug-ins.

## Readout Gate

The Readout Gate stage allows a single readout frame (eight complete words) to be displayed on the crt, after which the Readout System is locked out so further readout displays are not presented until the circuit is reset. U3420A and U3420B are connected to form a bistable flip-flop. For free-run operation, pin 2 of U3420A is held HI. This activates U3420A and results in a LO output level at pin 1, enabling the Timer stage to operate in a free-running manner.

The output of the Readout Gate stage remains LO to allow Timer U3426 to operate in the free-running mode until a LO is received at pin 2 of U3420A. When this occurs, the output level at pin 1 of U3420A does not change immediately. However, the Readout Gate stage is now enabled.

If the Channel Counter has not completed word 8, the Readout System continues to operate in the normal manner. When word 8 is completed, the negative-going End-ofFrame pulse is produced at pin 5 of U3427A as the Channel Counter shifts to the code necessary to display word 1. This pulse is applied to pin 8 of $U 3420 \mathrm{C}$, which produces a HI at pin 6 of U3420B because of the momentary LO at pin 9 . The HI at pin 6 produces a LO at pin 4, which causes pin 3 of U3420A to go LO. Because pin 2 is already LO, pin 1 goes HI. This disables the Timer stage so it operates in the Dis-play-Skip mode.


Figure 4-31. Time relationship of the tïme-slot (TS) pulses produced by U3A59.

The Readout Gate stage remains in this condition until a positive-going trigger pulse is applied to pin 2 of U3420A. This trigger pulse produces a LO at pin 1 of U3420A to enable U3426 and disable U3420B. Now, the Timer stage can operate in the normal manner for another complete frame. When word 8 is completed, the Channel Counter produces another End-of-Frame pulse to again lock out the Timer stage.

## Encoding the Data

Data is conveyed from the plug-in units to the Readout System in the form of an analog (current level) code. The characters that can be selected by the encoded data are shown on the Character Selection Matrix (see Figure 4-25). Each character or special function requires two currents to define it (except Jump, which requires only one). These currents are identified as the column current and the row current, corresponding to the column and row of the matrix. The column and row data is encoded by programming in the plug-in units.

Figure 4-32 shows a typical encoding scheme using resistors for a voltage-sensing amplifier plug-in unit. Notice that the 10 time-slot pulses produced by the Time-Slot Counter stage are connected to the plug-in unit. However, time-siots 5, 6, and 10 are not used by the plug-in unit to encode data when using the Standard Readout Format (see Table 4-2). The amplitude of the time-slot pulse is exactly -15 volts as determined by the Timer stage. Therefore, the resultant output current from the plug-in units can be accurately controlled by the programming resistors in the plug-in units.

For example, in Figure 4-32 resistors R10 though R90 control the row analog data, which is connected back to the Readout System. Figure 4-33 shows an idealized output current waveform of row analog data, which results from the time-slot pulses. Each of the row-current levels shown in these waveforms correspond to 100 microamps of current. The row numbers on the left-hand side of the waveform correspond to the rows in the Character Selection Matrix (see Figure 4-25). The row analog data is connected back to the Readout System via terminal B37 of the plug-in interface.

The column analog data is defined by resistors R110 through R190. These program resistors are connected to the time-slot lines by switch closures to encode the desired data. The data as encoded by the circuit shown in Figure 4-32 indicates a 100 microvolt sensitivity with the crt display showing inverted and calibrated deflection factors. This results in the idealized output current waveform shown in Figure 4-33B at the column analog data output, terminal A37 of the plug-in intorfaco.


Figure 4-32. Typical encoding scheme for voltage-sensing plug-in unit. Coding shown for deflection factor of $\mathbf{1 0 0}$ microvolts.

Resistor R111, connected between time-slot 1 and the column analog data output, encodes two units of current during time-slot 1. Referring to the Character Selection Matrix (Figure 4-25), two units of column current, along with the two units of row current encoded by resistor R10 (row 3), indicates that two zeros should be added to the display. Resistor R120 adds one unit of column current during timeslot 2, and along with the one unit of current from the row output the Readout System is instructed to add an invert arrow to the display. Resistor R130 is not connected to the time-slot 3 line, since the deflection factor is calibrated. Therefore, there is no display on the crt during time slot 3 (see Display-Skip Generator for further information).

During time slot 4, two units of column current are encoded by R140. There is no row current encoded during this time slot; this results in the numeral 1 being displayed on the crt. Neither row nor column analog data is encoded during time-slots 5, 6, and 7 as defined by the Standard Readout Format shown in Table 4-2. During time-slot 8, two units of column current and three units of row current are encoded by resistors R181 and R80, respectively. This addresses the micro prefix in the Character Selection Matrix (Figure 4-25). The final data output is provided from time-slot 9 by R190 connected to the column output and R90 to the row output. These resistors encode two units of column current and four units of row current to cause a V (volts) to be displayed.


Figure 4-33. Idealized current waveforms of; (A) Row analog data and (B) Column analog data.

Time-slot 10 is not encoded, in accordance with the Standard Readout Format. The resultant crt readout will be 1 $100 \mu \mathrm{~V}$.

In the above example, the row analog data was programmed to define which row of the Character Selection Matrix was addressed to obtain information in each timeslot. The column data changes to encode the applicable readout data as the operating conditions change. For example, if the variable control of the plug-in unit was activated, R130 would be connected between time-slot 3 and the column analog data output line. This encodes 10 units of column current (see shaded area in time-slot 3 of the waveform shown in Figure 4-33). Since one unit of row current is also encoded during this time-slot by R30, a $>$ (greater than) symbol is added to the display. The crt readout will now show $\downarrow>100 \mu \mathrm{~V}$. In a similar manner, the other switches can change the encoded data for the column output and thereby change the readout display. See the descriptions which follow for decoding this information.

The column analog data encoded by most plug-in units can be modified by attenuator probes connected to the input connectors of amplifier plug-in units. A special coding ring around the input connector of the plug-in unit senses the attenuation ratio of the probe (with readout-encoding probes only). The probe contains a circuit that provides additional column current. For example, if a 10X attenuator probe is connected to a plug-in unit encoded for 100 microvolts as shown in Figure 4-32, an additional unit of current is added to the column analog data during time-slot 1. Since two units of current were encoded by R111, this additional current results in a total of three units of column analog current during this time-slot. Referring to the Character Selection Matrix (Figure 4-25), three units of column current, along with the two units of row current encoded by R10, indicates that the prefix should be shifted one column to the left. Since this instruction occurs in the same time-slot that previously indicated that two zeros should be added to the display and only one instruction can be encoded during a time-slot, the zeros do not appear in the display. The crt readout will now be changed to 1 mV (readout program produced by plug-in same as for previous example).

Three other lines of information are connected from the plug-in compartments to the Readout System. The column and row analog data from channel 2 of a dual-channel plugin are connected to the Readout System through terminals A38 and B38 of the plug-in interface, respectively. Force readout information is encoded on terminal A35; the function of this input is described under Column and Row Data Switches. The preceding information gave a typical example of encoding data from an amplifier plug-in unit. Specific encoding data and circuitry is shown in the individual plug-in unit manuals.

## Column and Row Data Switches

The encoded data from the plug-in units is connected to the Column and Row Data Switch stages. A column-data line and a row-data line convey analog data from each of the eight data sources (two channels from each of the four plugin compartments).

The Column Data Switch U3262 and the Row Data Switch U3232 receive the Channel Address Code from the Channel Counter. This binary code directs the Column Data Switch and the Row Data Switch to the channel which is the source of the encoding data. These stages have nine inputs and provide a time-multiplexed output at pin 7, which includes the information from all of the input channels. Eight of the nine inputs to each stage originate in the plug-in units; the ninth input (Column Data Switch only) comes from a special data-encoding network composed of Resistors R241 through R248 (see Zeros Logic and Memory description for further information on the ninth channel).

## Theory of Operation-7934 Service

In addition to the encoded data inputs from the plug-in units, inputs are provided to the Column Data Switch from the VERTICAL MODE and HORIZONTAL MODE switches to inhibit the readout for any plug-in unit(s) not selected for display. When a unit is not selected, the line corresponding to the opposite channel is HI to forward bias the associated diodes; CR212 and CR213, CR214 and CR215, CR216 and CR217, or CR218 and CR219. The forward-biased diodes cause the channel switches to bypass the encoded data from the inhibited channel. However, since it may be desired to display information from special-purpose plug-in units (even though they do not produce a normal waveform display on the crt), a feature is provided to over-ride the channel inhibit. This is done by applying a LO to the associated Force Readout input. The LO level diverts the HI channelinhibit current and allows the data from this plug-in unit to reach the Column Data Switch, even though it has not been selected for display by the mode switch.

## Display-Skip Generator

The Display-Skip Generator is made up of Q3523, Q3526, Q3527, and Q3529. This stage monitors the timemultiplexed column data at the output of the Column Data Switch during each time-slot to determine if the information at this point is valid data that should result in a crt display. Quiescently, about 100 microamps of current flows through R3542 from Q3543 and the Zeros Logic and Memory stage. (The purpose of this quiescent current will be discussed in connection with the Zeros Logic and Memory stage.) This current biases Q3523A so that its base is more positive than the base of Q3523B in the absence of column data. Therefore, since Q3523A and Q3523B are connected as a comparator, Q3523A remains on unless its base is pulled more negative than the base of Q3523B.

The analog data output from the Column Data Switch produces about a 0.5 volt change for each unit of column current that has been encoded by the plug-in unit. Whenever information appears at the output of the Column Data Switch, the base of Q3523A is pulled more negative than the base of Q3523B, resulting in a negative (LO) DisplaySkip output to the Timer stage through Q3529. Recall that a LO was necessary at the skip input of the Timer so it could perform the complete sequence necessary to display a character.

Transistors Q3526 and Q3527 also provide Display-Skip action. The End-of-Word level connected to their emitters is LO only during time-slot 1 . This means they are enabled only during this time-slot. These transistors allow the Zeros Logic and Memory stage to generate a Display-Skip signal during time-slot 1 when information that is not to be displayed on the crt has been stored in memory. (Further information is given under Zeros Logic and Memory.)

## Column and Row Decoders

Column Decoder U3544 and Row Decoder U3485 sense the magnitude of the analog voltages at their inputs (pin 10) and produce a binary output on one of ten lines corresponding to the column or row data encoded by the plug-in unit. These outputs provide the Column Digital Data and Row Digital Data, which is encoded by the Decimal-to-BCD converters to create the address used by the Character Generator in determining which character to display. The column and row data is also used throughout the Readout System to perform other functions.

The input current at pin 10 of the Column Decoder stage is steered to only one of the ten Column Digital Data outputs. When a Display-Skip signal is present (collector of Q3529 HI), pin 9 is pulled HI through CR3529. This ensures that no current is connected to the Character Generator stage under this condition. Notice that the corresponding input on the Row Decoder is connected to ground and causes only one of the ten row outputs to saturate to ground.

Column Match adjustment R3543 and Row Match adjustment R3483 determine the input level to the Column Decoder and Row Decoder respectively. This sets the output for correct display of the readout characters.

## Jump Detector

The network at the input of the Row Decoder, made up of Q3481 and its associated components, is a Row-14 detector that produces the Jump Command. This row current is encoded by special-purpose plug-ins to cause all or part of a word to be jumped. Whenever row 14 (13 units of row current or 1.3 milliamps) is encoded, the base of Q3481 is pulled negative enough so that this transistor is forward biased to produce a LO Jump Command output at its emitter. The Jump Command is connected to the set input of RS flipflop U3462B, whose reset input is connected to the Trigger Signal from pin 5 of the Timer. When the Jump Command and Trigger inputs are low, U3462B produces a LO output to reset the Time-Slot Counter as well as advancing the Horizontal Position Counter and the Channel Counter. U3462B also produces a HI output to signal Display Skip at pin 4 of the Timer.

## Zeros Logic and Memory

The Zeros Logic and Memory stage U3532 stores data encoded by the plug-in units to provide zeros-adding and prefix-shifting logic for the Readout System. The Strobe pulse at pin 15 goes positive when the data has stabilized and can be inspected. This activates the Zeros Logic and Memory stage so that it can store the encoded data.

Typical output waveforms for the five possible input conditions that can occur are shown in Figure 4-34. When timeslot 1 occurs, a store command is given to all of the memories. If the plug-in units encoded data for column 1,2, 3,4 , or 10 during time-slot 1 , the appropriate memory (or memories) is set. Notice that row 3 information from the Row Decoder must also be present at pin 16 for data to be stored in the memory of U3532.

If data was encoded during time-slot 1, a negative-going output is produced at pin 7 while the memories are being set. This negative-going pulse is connected to the base of Q3527 in the Display-Skip Generator to produce a DisplaySkip output. Since the information encoded during time-slot 1 was only provided to set the memories and not intended to be displayed on the crt at this time, the Display-Skip output prevents a readout display during this time-slot.


Figure 4-34. Typical output waveforms for Zeros Logic and Memory stage operation (at pin 7 of U3532).

## Theory of Operation-7934 Service

During time-slot 5, a memory within U3532 is interrogated. If information was stored in this memory, a positivegoing output is produced at pin 7. This pulse is connected to pin 10 of the Column Decoder through Q3543 to add one unit of current at the input of the Column Decoder. This produces a zero after the character displayed during timeslot 4. During time-slot 6, another memory within U3532 is interrogated to see if another zero should be added. If another zero is necessary, a second positive output is produced at pin 7, which again results in a column 1 output from the Column Decoder and a second zero in the crt display.

Finally, a third memory within U3532 is interrogated during time-slot 8 to determine whether the prefix should be changed, or left at the value that was encoded. If data has been encoded that calls for a shift in prefix, a negative-going output level is produced at pin 7. This negative level subtracts one unit of column current from the data at the input to the Column Decoder. Notice on the Character Selection Matrix (Figure 4-25) that when row 4 is programmed, a reduction of one column results in a one-column shift of the prefix. For example, with the 100 uV program shown in Fig. 4-32, if the data received from the plug-in called for a shift in prefix, the crt readout would be changed to 1 mV (zeros deleted by program; see Encoding the Data).

The 100 microamps of quiescent current through R3542 provided by Q3543 (see Display-Skip Generator) allows the prefix to be shifted from $m$ ( 100 microamps of column current, column 1) to no prefix ( 0 column current, column 0 ) so only the unit of measurement encoded during time-slot 9 is displayed. Notice that reducing the prefix program from column 1 to column 0 programs the Readout System to not display a character at this readout location.

A further feature of the Zeros Logic and Memory is the Identify function. If 10 units of column current are encoded by the plug-in unit along with row 3 during time-slot 1 , the Zeros Logic and Memory produces a negative-going output pulse at pin 1 to switch the Column Data Switch and Row Data Switch to the ninth channel. Then, time-slot pulses 2 through 9 encode the identify input current through resistors R241 to R248 for column data. Pin 10 of the Row Decimal-to-BCD Converter is also enabled by the output at pin 1 of U3532. This provides the addresses necessary to display the word IDENTIFY in the word position allotted to the channel that originated the Identify command. After completion of this word, the Column Data Switch and Row Data Switch continue with the next word in the sequence.

The End-of-Word signal from the Time-Slot Counter is connected to pin 9 of U3532 through C3539. At the end of each word of readout information, this pulse goes LO. This erases the memories in the Zeros Logic and Memory in preparation for the data to be received from the next channel.

## Character Generator

Each character to be displayed on the crt consists of a series of connecting points developed on a possible $8 \times 8$ point grid (see Figure 4-35). The 8 -bit binary output from the Character Generator is used to determine the location of points within the grid, whether or not to provide a trace connecting two points, and the point at which a character has been completed. The Character Generator stage consists of an oscillator, the Lower Order Address Generator, and an EPROM connected to a latch.

Q3451 and Q3452 form a square-wave oscillator whose frequency is adjustable with C3455 to provide 16 cycles within the time allotted for developing a character. The base of Q3452 goes LO when the Timer produces a negativegoing Ready pulse at pin 13 (connected through Q3442, U3457B, and CR3457). This starts the oscillator by turning Q3452 on. The emitter of Q3451 becomes more negative as C3454 and C3455 discharge through R3454. The capacitors continue to discharge until the emitter-base junction of Q3451 becomes forward biased. Q3451 then begins to conduct and causes the oscillator to begin changing states. As Q3451 conducts, the discharge through C3454 and C3455 stops and causes a collector current reduction in Q3452. The current reduction causes the emitter and base of Q3452 to rise positive which pulls the emitter of Q3451 along with them through C3454 and C3455. This positive shift on the emitter of Q3451 turns it off. Now with C3451 conducting and Q3452 turned off, the voltage on the emitter of Q3452 begins to go negative with C3454 and C3455 beginning to charge through R3455. When the emitter-base junction of Q3452 becomes forward biased, the oscillator again changes states and completes one cycle.

The signal produced by the oscillator at the collector of Q3452 switches Q3453 on and off to create the clock pulses used by the Lower Order Address Generator and the EPROM latch. The oscillator continues to run until the Timer Ready signal goes positive and pulls up the base of Q3452.

The Lower Order Address Generator U3502B is a 4-bit binary counter. The negative-going Timer Ready pulse, inverted by Q3442, resets U3502B at pin 12. The oscillator is also enabled by the Ready signal and begins providing the clock input at pin 13. The counter begins at count 0000 and counts at the frequency of the oscillator, continuing to do so until the Ready signal goes positive. The Lower Order Address Generator's 4-bit output is connected to the four lower order address inputs on Character Generator U3503.

U3504 is an octal D-type flip-flop used as a latch to stabilize and synchronize the Character Generator EPROM output. It is reset by the same signal that starts the oscillator and is clocked at pin 11 by the oscillator output from Q3453. U3504 will be considered part of the Character Generator in the discussion that follows.


HORIZONTAL (OCTAL)

| "K" CHARACTER |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
| CHARACTER GENERATOR ADDRESS (HEXIDECIMAL) | CHARACTER GENERATOR OUTPUT |  | BIT 7 $\qquad$ <br> DRAW $\qquad$ | BIT 8 <br> END OF <br> CHARACTER? |
|  | BINARY $87654321$ | OCTAL |  |  |
| B 90 | 00000000 | 000 | MOVE | NO |
| B91 | 00001000 | 010 | MOVE | NO |
| 392 | 01111000 | 170 | DRAW | NO |
| E93 | 01001000 | 110 | DRAW | NO |
| B94 | 01111000 | 170 | DFAW | NO |
| B95 | 00001100 | 014 | MOVE | NO |
| 896 | 01100000 | 140 | DRAW | NO |
| 897 | 01111100 | 174 | DRAW | NO |
| B98 | 01100000 | 140 | DRAW | NO |
| B99 | 01001100 | 114 | DRAW | NO |
| B9A | 1000000 | 200 | MOVE | YES |

Figure 4-35. Developing a typical character on the crt.

Character Generator U3503 is a $4 \mathrm{k} \times 8$-bit EPROM which contains the binary words used by the output stages to create the signals necessary to form readout characters. There are 12 address inputs, with the lower four coming from Lower Order Address Generator U3502B, the center four from Column Decimal-to-BCD Converter U3546, and the upper four from Row Decimal-to-BCD Converter U3486. As previously mentioned, each character is developed on an $8 \times 8$ point grid (see Figure $4-35$ for a typical character). The Character Generator's 8-bit output provides the information necessary to move the instrument beam around within the grid, to turn the beam on and off, and to indicate when a character is complete.

The row and column data cause a 4-bit binary code to be generated at the outputs of the Row and Column Decimal-to-BCD Converters when a readout character is to be displayed. The Lower Order Address Generator is enabled and also provides a 4-bit binary code. These 12 bits are combined to form the EPROM address containing the 8 -bit binary word which locates the instrument beam at the character's starting grid location.

The 8-bit word can be broken down into four parts. The lower three bits are the horizontal grid coordinate, bits 4 through 6 are the vertical coordinate, bit 7 turns the $Z \wedge x i s$

## Theory of Operation-7934 Service

Readout on and off, and bit 8 indicates whether or not the character is complete.

The character grid (Figure 4-35) can be thought of as having vertical and horizontal coordinates numbered 0 through 7, with location " 0,0 " in the lower left corner. The 8 bit binary word from the Character Generator is converted to octal to easier recognize the vertical and horizontal coordinates. A binary "00001010" becomes octal "012". This number causes the crt beam to point at grid coordinates vertical " 1 " and horizontal " 2 ". The fact that the first octal digit is " 0 " indicates two things. First it shows that bit 7 of the binary word is LO which turns off Q3432 and disables the Z-Axis Readout signal to the instrument. It also shows that bit 8 is LO so the character is not complete. When bit 7 is HI , it advances the Horizontal character Position Counter for the next character within the readout word.

The 4-bit outputs from the Row and Column Decimal-toBCD Converters remain the same until the character is complete. However, the Lower Order Address Generator keeps counting and combines with the Row and Column Decimal-to-BCD Converter's outputs to address all EPROM locations necessary to form the readout character.

Suppose the next address produces a Character Generator output of " 01111010 " or octal "172". The octal digit " 1 " indicates binary bit 7 is high which turns on Q3432 and enables the Z-Axis Readout output to the instrument. The instrument now provides a trace from the previous vertical and horizontal coordinates to the new ones, vertical "7" and horizontal " 2 ". Thus, the character is formed by a series of binary words causing the crt beam to move or draw between points.

## Horizontal Position Counter

Horizontal Position Counter U3502A is a 4-bit binary counter. Its output is converted to current by R3566 through R3569 and added to the $X$ (horizontal) signal for spacing readout characters horizontally on the crt. The counter is reset to "0000" with a Word Trigger pulse from U3427B and is advanced with inputs from two possible sources. The first is a HI End-of-Character signal from pin 19 of U3504. The counter can also be advanced when a Space instruction is encoded by the plug-in unit to cause a space to be left between two characters on the crt. A Space instruction occurs when row 10 from the Row Decoder goes LO and is inverted by U3457D to advance Horizontal Character Position Counter U3502A. No character is displayed in this situation as no character information is stored at the Character Generator addresses formed using row 10.

Time-slots 1, 2, and 3 are also connected to the Space instruction through VR3485, VR3486, and VR3487 respectively. This configuration adds a space to the displayed
word during time-slots 1,2 , and 3 even if information is not encoded during these time slots. With this feature, the information which is displayed during time-slot 4 (1-2-5 data) always starts in the fourth character position whether data has been displayed in the previous time-slots or not. Therefore. the resultant crt display does not shift positions as normal/invert or cal/uncal information is encoded by the plug-in.

## Decimal Position Logic

The Decimal Position Logic stage allows decimal points to be displayed at five possible locations within a readout word (see Figure 4-36). The decimal location encoded by a plug-in during time-slot 1 is achieved by adding positioning current to the $X$ (horizontal) readout signal. Circuitry for this stage includes five 2-input NOR gates in U3551 and U3557 with precision resistors connected to their outputs. One input of each NOR gate is connected to row 7 on the Row Decoder and the other to one of columns 3 through 7 on the Column Decoder. When a decimal is to be displayed, row 7 goes LO and disables the Horizontal Position Counter by keeping the four outputs of U3564 LO. It also sets one input of the five NOR gates LO. One of columns 3 through 7 also goes LO, depending on which decimal position is encoded, causing the NOR gate to which it is connected to go HI. This HI adds current to the X (horizontal) signal in the amount determined by the resistor connected to the NOR gate's output. Each Character Generator location addressed by row 7 and column 3 through 7 contains information necessary to form a decimal point on the crt in the position indicated. The Horizontal Position Counter resumes normal operation and the Decimal Position Logic is disabled when row 7 goes back HI at the end of the time-slot.

Some plug-ins require decimal points at locations in the readout word other than the five provided by the Decimal Position Logic stage. An additional decimal point can be displayed in any position normally available to characters by encoding row 8 with column 9. The Horizontal Position Counter provides positioning current in this mode and the Decimal Position Logic stage is disabled.

## Vector Generators

The $Y$ Vector Generator consists of U3510A and U3510B. Vertical character size adjustment is provided with R3510 as a variable feedback resistor for U3510A. Input to the Vector Generator is provided by the three bits of vertical character information from pins 9.12, and 15 of Character Generator latch U3504. The digital HIs and LOs across R3506, R3507, and R3508 are mixed as stepped current levels at pin 2 of U3510A. These sudden analog steps are converted into a smooth transition from one level to the next by RCL network R3512, C3512, and L3512. U3510B current buffers the resulting signal to be mixed with the Channel Counter vertical information at the input of the Y Output Amplifier.


Figure 4-36. Readout word relating 10 possible character locations to the decimal point instructions that can be encoded, and the resultant crt display.

The $X$ Vector Generator operates similarly to the $Y$ Vector Generator. Gain for this stage is fixed by the circuit components and its output is current buffered to be mixed at the input of the $X$ Output Amplifier.

## Output Amplifiers

The $Y$ Output Amplifier provides the $Y$ (vertical) signal to the instrument by combining the signal from the $Y$ Vector Generator with the channel 1 or 2 information from the Channel Counter. The amplifier consists of U3557A with Q3555 in its input circuit. Amplifier gain is adjustable with R3560 to control the vertical separation between readout words displayed at the top and bottom of the graticule area. Q3555 switches the amplifier input on and off with the Timer Ready signal, using Q3550 to provide impedance matching. The channel 1 or 2 information from pin 3 of Channel Counter U3427A is inverted by U3551A and converted to current by R3552 and R3553. The Channel Counter produces a LO at pin 3 when the readout word is to be displayed at the top of the graticule. The LO is inverted to a HI by U3551A and adds current to the $Y$ (vertical) readout signal.

The X Output Amplifier consists of U3557B and Q3596. It operates similarly to the $Y$ Output Amplifier to provide the $X$ (horizontal) signal to the instrument. Input to the amplifier is a combination of outputs from the $X$ Vector Generator, Horizontal Position Counter, Decimal Position Logic, and
horizontal word position information from the Channel Counter. The gain of this stage is fixed by the resistor values in the circuit.

## Display Sequence

Figure $4-37$ shows a flow chart for the Readout System. This chart illustrates the sequence of events occurring in the Readout System each time a character is generated and displayed on the crt.

## CONVERTER/RECTIFIERS Diagram 12

The Converter/Rectifiers circuit provides the operating power for the 7934 from an ac line-voltage source. Figure 4-38 shows a detailed block diagram of the Converter/ Rectifiers circuit. A schematic of the Converter/Rectifiers is given on diagram 12 at the rear of this manual.

## Line Input

Power is applied to the 7934 through line filter FL10, line fuse F10, and POWER switch S10. The line filter is designed to keep power line interference from entering the instrument, and to keep the approximate 25 -kilohertz inverter signal from entering the power line. Network C5 suppresses reverse-recovery transients of rectifier CR15.


Figure 4-37. Flow chart for character generation by the Readout System.


Figure 4-38. Detailed block diagram of the Converter/Rectifiers circuit.

LINE VOLTAGE SELECTOR switch, S12, allows the instrument to operate from either a 115 -volt nominal or a 230volt nominal line voltage source. In the 115 -volt position, rectifier CR15 operates as a full-wave doubler with energystorage capacitors C16 and C17, so the voltage across the two capacitors in series is the approximate peak-to-peak value of the line voltage. For 230 -volt operation, CR15 is connected as a bridge rectifier, and the voltage across C16 and C17 is the approximate peak value of the line voltage. Thus, the dc voltage applied to the Inverter stage is about the same for either 115 -volt or 230 -volt operation.

Thermistors RT9 and RT13 limit surge current when the power supply is first turned on. After the instrument is in operation, the resistance of the thermistors decreases so that they have little effect on the circuit. When the instrument is turned off, the Inverter Control stage turns off the Inverter, which prevents it from discharging C16 and C17. C16 and C17 discharge slowly through R21 to allow for
thermistor thermal-recovery time. This ensures sufficient thermistor resistance to limit the turn-on surge current to a safe level. Since C16 and C17 discharge slowly, dangerous potentials exist within the power supply for several minutes after the POWER switch is turned OFF. The presence of voltage in the circuit is indicated by relaxation oscillator R19, C19, and DS19. Noon bulb DS19 blinks until the potential across C16 and C17 drops to about 80 volts.

Spark gap electrodes E8 and E13 are surge-voltage protectors. When the LINE VOLTAGE SELECTOR switch is in the 115 -volt position, only E8 is connected across the line input. If a peak voltage greater than 230 volts is present on the line, E8 conducts and quickly opens line fuse F10 to interrupt the input power before the instrument can be damaged. In the 230-volt position, E8 and E13 are connected in series across the line input to provide protection for peak voltages greater than 460 volts.

Transformer T8 provides a sample of the line voltage to the plug in connectors for triggering at line frequencies. This line frequency signal is also connected to the Inverter Control stage to sense when line voltage is present.

## Inverter Start

Components R10 and C42 provide a turn-on path between the input line and the negative side of line-input filter capacitor C17. Capacitor C42 charges on each cycle of the input line voltage. When the charge on C42 reaches about 33 volts, Zener diode VR38 turns on, which causes programmable unijunction transistor Q30 to fire. This provides base drive to turn on Q40 through C39. When Q40 turns on, it shock-excites series-resonant network L37 and C37 to generate a damped oscillation. This damped oscillation provides the drive necessary to start the Inverter switching action. After the Inverter is operating, the recurrent waveform at the collector of Q40 keeps C42 discharged through CR49, thus disabling the Inverter Start network while the instrument is on.

## Inverter

The Inverter stage converts the dc voltage across C16 and C17 to a sine-wave current to drive power transformer T110. Once the Inverter has been started by the Inverter Start network, transformer T30 provides feedback to the bases of Q34 and Q40 to sustain oscillation. These transistors operate at a forced beta of four due to the turns ratio of T30. Also, T30 provides a 60:1 turn ratio center-tapped winding for pre-regulation and fault protection shut-down. The Inverter Control stage short circuits one-half of this winding to either delay the turn-on of Q34 and Q40 or to completely stop their switching action.

The switching action of Q34 and Q40 generates a square-wave voltage with an amplitude approximately equal to the dc voltage at the input to this stage. The square-wave voltage at the emitter of Q34 supplies the drive necessary to maintain a sine-wave current in the series-resonant network of L37 and C37. Diodes CR34 and CR41 provide paths for series-resonant current when Q34 and Q40 are held off for pre-regulation.

To aid in understanding circuit operation, Figure 4-39A shows a representation of the Inverter stage as a switch. The three possible states of the Inverter are depicted by the three possible switch positions: Q34 is on in position A; Q40 is on in position C ; or both transistors are held off for preregulation in position B . In the composite current waveform of Figure $4-39 B$, the relative phase and amplitude of each component of $I_{T}$ is shown for periods $T_{a}, T_{b}$, and $T_{c}$ corresponding to the three switch positions. Figure 4-39C and Figure 4-39D show the relationship of the Inverter voltage and primary winding voltages with respect to the current waveform.

The normal sequence of operation is as follows: Assume that the voltage at point $X$ is some voltage more positive than the negative supply voltage and that Q40 has just turned on. The current labeled $\mathrm{I}_{4}$ in Figures 4-39A and 4-39B flows as the voltage at point $W$ goes negative. Point $X$ goes toward the negative supply voltage as C37 charges through L37. The voltage across the primaries of T110 and T35 at point Y produces a voltage at the secondary of T35 that is sensed by Inverter Control U75 (see Fig. 4-39D). When this voltage changes phase from negative to positive, Q40 is held off (turned off) by U75. Due to the inductive action of L37, current continues to flow through the Inverter circuit, pulling the voltage at point $W$ below the negative supply voltage. This forward biases CR41, which now conducts current $\mathrm{l}_{1}$ (Figures 4-39A and 4-39B).

After a predetermined time, U75 allows Q34 to turn on and conduct the current labeled $\mathrm{I}_{2}$ in Figures 4-39A and 439B. Since Q34 is now conducting, the voltage at point $X$ charges toward the positive supply voltage through L37. Once again, voltage phase change is sensed at the secondary of T35 by U75 as previously described. Transistor Q34 is held off at this time, and current $\mathrm{I}_{3}$ flows due to the inductive action of L37 pulling the anode of CR34 to a voltage greater than the positive supply voltage. After a time determined by the Inverter Control stage, Q40 conducts the current labeled $\mathrm{I}_{4}$, and the cycle repeats.

## Over-Voltage Stop

Whenever the voltage across the primary of T110 exceeds a safe level, the Over-Voltage Stop stage shuts down the Inverter to protect Inverter components from damage. For example, this stage activates whenever the normal voltage regulating path through Q52 and T30 is inoperative.

Capacitor C43 charges through R44 and CR38 to the peak voltage across the primary of T110. If this voltage exceeds a safe level, Q45 conducts to cause Q43 and Q46 to turn on. When Q46 turns on, the base-drive winding of T30 is short-circuited, which stops the Inverter switching action. Since Q43 is turned on, C42 (in the Inverter Start network) is prevented from charging and from firing Q30, thus preventing the Inverter from starting. Transistors Q43 and Q45 continue to conduct until C43 discharges sufficiently, through R45, to turn Q45 off. At this point, Q43 and Q46 turn off and the Inverter starts on the next positive half cycle of the line.

## Inverter Control

The Inverter Control stage, made up primarily of U75, provides pre-regulation and fault protection functions. For pre-regulation purposes, U75 varies the hold-off time ( $\mathrm{T}_{\mathrm{b}}$, in Fig. 4-39B) of the Inverter switching transistors.
(A)


Figure 4-39. (A) Representation of Inverter stage. Idealized waveforms of (B) total inverter current, $\mathrm{I}_{\mathrm{T}}$, (C) Voltage across CR41, and (D) Voltage across primaries of T110 and T35.

Under normal operating conditions, only the voltage sense ( $E$ Sense) input at pin 15 controls the hold-off time. However, various fault conditions can affect hold-off time or stop the Inverter operation altogether. The operation of individual functions of the Inverter Control stage is described in the following discussion.

Pre-Regulator. The pre-regulator operation of U75, maintains constant voltage at the outputs of the LowVoltage Rectifiers stage. It also provides constant peak-topeak voltage to the Z-Axis and CRT circuit (diagram 14).

Transformer T35 provides Inverter phase information and power to U75. The phase information is connected to pins 10 and 11 through C77 and C78. Bridge rectifier CR73, CR74, CR75, and CR76 provides positive and negative operating voltages to U75. A shunt regulator in U75 maintains the +7.5 volts at pin 6 . The -2 volt (nominal) supply connected to pin 7 is unregulated. Zener diode VR72 provides protection against open circuit conduction (U75 removed) and is normally not conducting.

Pin 15 is the voltage sensing ( E Sense) point of the preregulator circuit. Zero volts at pin 15 indicates proper regulation. Zener diode VR88 provides a stable reference voltage for sensing-divider resistors R86, R87, R93, and R95. Variable resistor R93, in this divider, adjusts the ratio of the divider to adjust the output of the +108 volt supply. Outputs of the other supplies are then set by the turns ratio of T110.

Integrated circuit U75 regulates the Inverter by varying the hold-off time of switching transistors Q34 and Q40. A variable pulse-width monostable multivibrator in U75 is triggered at pins 10 and 11 whenever the Inverter current changes direction. The pulse width holds off the Inverter by turning on transistor Q52 through pin 9 of U75, thus shorting out the base drive to Q34 and Q40. The pulse width, and therefore holdoff, is controlled by a ramp at pin 12. If the voltage at the E Sense input, pin 15, is too low, the ramp is not allowed to rise very high and the pulse width and holdoff are short. As the E Sense voltage rises, the ramp is allowed to rise to a higher voltage level, increasing the holdoff time.

Fault Protection. The fault protection portions of U75 provide protection for the power supply components due to short circuits, turn-on surge currents, and other malfunctions. When a fault is detected at the Fault Sense input (pin 2) or I Sense input (pin 13), C64 begins to charge by a current from the Fault Holdoff Time output (pin 1). If the detected fault lasts longer than about 10 milliseconds, C64 charges positive enough to initiate a positive output at pin 8. This output turns on Q54 and Q52 which turns off the Inverter. The Inverter remains off while C54 discharges through R54, keeping Q54 and Q52 turned on. The Inverter
restarts in roughly 500 milliseconds when the current through R54 is insufficient to keep Q54 and Q52 turned on. When the inverter restarts, C54 recharges through CR59 and R59. This cycle repeats until the fault is corrected, with the Inverter on for about 10 milliseconds and off for about 500 milliseconds.

Inverter Current Limiter. The inverter current limiter protects the Inverter components from damage due to excessive current turn-on or short circuits. Operation of this stage is similar to the pre-regulator (voltage regulation). The inverter current limiter takes control of the Inverter hold-off time whenever pin 13 starts to go negative. Transformer T35 provides a current step-down. The current is rectified and flows through current-sensing resistor R84. The voltage across R84 is negative and proportional to the Inverter current. The I Sense input at pin 13 of U75 is normally held positive through divider R81, R83, and R84. The inverter current limiter takes control of regulation when pin 13 reaches near zero volts. Peak Inverter current is limited to about 5 amps . If the voltage at pin 13 remains near zero for more than about 10 milliseconds, pin 8 goes positive to turn off the Inverter.

Fault Sense. The fault sense portion of U75 provides overload protection for supplies on the Low Voltage Regulators schematic (diagram 13) and other supplies generated throughout the instrument. Resistive networks from supplies are connected to the Fault Sense input at pin 2 of U75. During normal operation, the voltage at the Fault Sense input remains near zero. If one of the inputs changes sufficiently to cause this voltage level to vary 200 millivolts (positive or negative) for more than 10 milliseconds, a positive output at pin 8 of U75 stops the Inverter.

Line Stop. The line stop portion of U75 stops the Inverter when the front-panel POWER switch is turned OFF. The line stop stage also stops the Inverter if the ac line voltage falls below a minimum value.

The line-frequency signal from transformer T8 is connected to pin 4, the Line Stop Sense input of U75. During normal operation, the line-frequency signal causes the line stop timer at pin 3 to periodically discharge to ground. When the line-frequency signal is interrupted or falls below a minimum value, C 67 charges to approximately +0.7 volts causing the line stop stage to produce a positive output at pin 8 of U75 which stops the Inverter.

## Low-Voltage Rectifiers

The Low-Voltage Rectifiers stage rectifies the squarewave ac voltages at the output windings of T110 to the dc levels used for all regulated supplies in this instrument.

## LOW-VOLTAGE REGULATOR Diagram 13

The Low-Voltage Regulator converts semi-regulated voltages from the Converter/Rectifiers circuit (diagram 12) to stabilized low-ripple output voltages. The regulators are series type, using the +50 volt supply as a reference. Figure $4-40$ shows a detailed block diagram of the Low-Voltage Regulator circuit. A schematic of the Low-Voltage Regulator circuit is given on diagram 13 at the rear of this manual.

## Operating Supplies

The operational amplifiers used to regulate the +50 , $+15,+5,-50$, and -15 volt supplies require that four special voltages be generated for their operation:
(1) The +22 volt supply is generated from the semiregulated +54 volt supply by reference Zener diode VR32 and emitter follower Q34.
(2) The -2 volt supply is generated from the semiregulated -54 volt supply by reference Zener diode VR36 and emitter follower Q38.
(3) The +5.6 volt supply is generated from the semiregulated +17 volt supply by Zener diode VR152.
(4) The -5.6 volt supply is generated from the semi-regulated -17 volt supply by Zener diode VR156.

## +50 V Regulator

Semi-regulated +54 volts from the Converter/Rectifiers circuit (diagram 12) provides the unregulated voltage source for this supply. Differential amplifier U15 compares the feedback voltage at pin 2 against the reference voltage at pin 3. The error output at pin 6 of U 15 reflects a difference between these two inputs. Zener diode VR12 sets a reference level of about +9 volts at pin 3 of U15. A sample of the output voltage from the +50 volt supply is connected to pin 2 of U15 through divider network R14, R15, and R16. Variable resistor R15 in this divider sets the output level of this supply. Notice that the feedback voltage of this divider is obtained from a line labeled +50 VS (sense). If the feedback voltages were obtained at the output of this supply, the voltage at the load would not stay constant due to the inherent resistance of the interconnecting cable between the supply and its load. The sense configuration overcomes this problem by sensing the voltage at the load. Since the current in the sense line is small and constant, the load voltage is held constant regardless of the load current.

Voltage regulation occurs as follows: If the output level of this supply decreases (becomes less positive) due to an increase in load or a decrease in input voltage (as a result of line-voltage change or ripple), the voltage across divider R14, R15, and R16 decreases also. This results in a less positive level at pin 2 of U15 than that established by Zener
diode VR12 at pin 3 of U15. The current through CR15 and VR17 decreases causing an increase in current through the base-emitter junction of Q28. This results in increased conduction of Q28, the +50 volt series regulator. The load current increases, therefore the voltage across the load also increases (becomes more positive) sufficiently to balance the input into differential amplifier U15. The +50 V ADJ, R15, sets the output level of this supply.

Current limiting is provided for the +50 volt supply if excessive current is demanded from the supply. All current from the +50 volt supply must flow through R28. Under normal operation, there is insufficient voltage drop across R28 to turn Q22 off. However, when excessive current is demanded from +50 volt series regulator Q28 due to a short circuit or similar malfunction at the output of this supply, the voltage drop across R28 increases and begins to turn off Q22. The reduced collector current of Q22 results in a reduction of current through Q28. This current limiting protects Q28 from damage due to excessive power dissipation.

Several protection diodes are also included in this circuit. Diode CR28 prevents the output of this supply from going more negative than about -0.6 volt if it is shorted to a negative supply. Zener diode VR10 and diode CR10 supply a turn-on voltage for U 15 to start the +50 volt supply when the instrument is first turned on. As soon as the +50 volt supply turns on, CR10 stops conducting.

## -15 V Regulator

Basic operation of all stages in the -15 V Regulator is the same as for the +50 V Regulator. The reference level for this supply is established to ground through R82 at pin 5 of U84B. The divider ratio of R80 and R81 sets a level of zero volts at pin 6 of U84B. The level on the +50 VS (sense) line is held stable by the +50 volt supply. Any change at the output of the -15 volt supply appears at pin 6 of U84B as an error signal. The output voltage is regulated in the same manner as described for the +50 volt supply. Diode CR96 keeps the output of this supply from going more positive than about +0.6 volt if it is shorted to one of the more positive supplies. Operational amplifier U84A provides current limiting for Q94 by monitoring the voltage drop across R95. When too much current is demanded from the supply, the increased voltage drop across R95 allows U84A to turn Q88 off, reducing the current through Q94.

## +5 V Regulator

Operation of the $+5 \vee$ Regulator is basically the same as described for the previous supply regulators. Error voltage is provided through R131 to pin 2 of U114A, and pin 3 is referenced to the +50 VS (sense) line. The divider ratio of R113 and R114 is 10:1, so pin 3 of U114A is at +5 volts


Figure 4-40. Detailed block diagram of the Low-Voltage Regulator circuit.
when the supply is operating normally. The level on the +50 $\checkmark$ Sense line is held stable by the +50 volt supply. Therefore, any change at the output of the +5 volt supply appears at pin 2 of U114A as an error signal. The output voltage is regulated in the manner described previously for the +50 volt supply. Diode CR132 limits the output of this supply to about -0.6 volt, if it is shorted to one of the negative supplies.

The +5 volt current limiting, accomplished by U114B, protects this supply from excessive output current damage. With normal supply current through R133 and R134, the voltage drop across this parallel resistance biases Q118 on. If the current through R133 and R134 increases above a safe level, pin 7 of U114B reduces the forward bias current to Q118. Now, the base current of Q122 is reduced which decreases the voltage on the base of Q126. This limits the conduction of Q126 to a safe current level.

## +15 V Regulator

The +15 V Regulator regulates in the same manner as the +50 volt supply; current limiting operates in the manner described for the +5 volt supply. Error feedback voltage to pin 2 of U64A is provided through R69. Pin 3 of U64A is referenced to the +50 VS (sense) line. The divider ratio of R61 and R62 sets pin 3 of U64A at +15 volts. Any change in the output level of the +15 volt supply appears at pin 2 of U64A as an error signal. This results in an opposite change at the output, pin 1 of U64A, which is conveyed to the +15 volt series regulator transistor Q74, through CR64 and Q68, to correct the error in the output voltage of the supply. Diode CR76 limits the output of this supply to about -0.6 volt if it is shorted to one of the negative supplies.

## - 50 V Regulator

Operation of the -50 V Regulator is basically the same as described for the +50 volt supply; current limiting operates in a similar manner, as described for the +50 volt supply. Error voltage to pin 2 of U45 is provided by divider R45R46 and is referenced to the -50 VS (sense) line. The divider ratio of R45 and R46 sets the level at pin 2 of U45 at zero volts when the output of this supply is correct. Protection diode CR58 limits the output voltage of this supply to +0.6 volt should the supply be shorted to a positive supply.

## Graticule Light Supply

The Graticule Light Supply provides power for the graticule lights. The front-panel GRAT ILLUM control determines the output of this supply to set the brightness of the graticule lights. Transistors Q144. Q148, and diode CR148 form a voltage-following current buffer. The output voltage at the collector of Q148 follows the voltage set at the base of Q144 by the divider made up of R141, R142, R143, and the front-panel GRAT ILLUM control on diagram 2. Resistor

R148 limits the output current from this supply to protect Q148 from damage due to a short circuit.

## Z AXIS AND CRT Diagram 14

The CRT Circuit provides the high voltage and control circuits necessary for operation of the crt (cathode-ray tube). This circuit also includes the Z-Axis Amplifier. Figure 4-41 shows a detailed block diagram of the CRT Circuit. A schematic of this circuit is shown on diagram 14 at the rear of this manual.

## High-Voltage Power Transformer

High-Voltage Power Transformer T2010 provides preregulated voltages for the high-voltage supplies, and 6.3 volts ac for the crt heater. The crt heater is elevated to the cathode potential through R2074. The high-voltage winding of T2010 provides a two-kilovolt peak square-wave voltage to the Anode Voltage Multiplier and CRT Cathode Supply. A 600 -volt winding supplies ac to the Control-Grid DC Restorer stage and is also rectified to supply +600 volts dc. Taps on this winding provide +130 volts, through CR2118 and CR2119 in full-wave configuration, and current sensing through resistor R2121.

## Anode Voltage Multiplier

Positive accelerating potential for the crt anode is supplied by the four-times voltage multiplier contained within U2012. The voltage applied to the input of U2012 from the high-voltage secondary of T2010 is about two kilovolts peak. This results in an output voltage of about +8 kilovolts at the crt anode. The internal resistance of this supply is about 15 megohms and subject to meter loading when measured.

## CRT Cathode Supply

In the full scan mode (front-panel REDUCED SCAN pushbutton out) the crt cathode supply voltage is about -2 kilovolts; in the reduced scan mode, about -4 kilovolts. The negative potential for the crt cathode is generated by half-wave rectifier CR2012 for the full scan mode and modified to a doubler in the reduced scan mode by activating K2014 which connects CR2014 into the circuit. Diode CR2023 provides the return path for the rectified current in the full scan mode; the reduced scan mode and the X 4 multiplier require an ac return path which is provided by C2021, CR2021, CR2022, and VR2021.

A tetrode voltage, which is maintained at about +2 kilovolts above cathode potential in either full or reduced scan, is also obtained from the high-voltage secondary. Filtering


Figure 4-41. Detailed block diagram of the Z-Axis and CRT Circuit.
for this voltage is accomplished by R2016 and C2014. Resistor R2015 limits current under fault conditions. Diode CR2016 clamps the tetrode voltage a few volts above ground if shorted to a positive supply. Components C2016 and R2017 are an isolation filter.

## Cathode-Supply Regulator

The Cathode-Supply Regulator maintains the potential on the crt cathode and actively reduces the ac ripple through C2034. A sample of the output from the CRT Cathode Supply is connected to amplifier U2224 through resistor divider network R2218. High-frequency changes from the CRT Cathode Supply are coupled through C2282 and R2282.

The output of U2224 drives Q2132. The collector of Q2132 is in the dc current return path of the Cathode Supply. Any change in collector voltage directly changes the cathode voltage. Diodes VR2133 and CR2133 prevent the voltage on the collector of Q2132 from exceeding safe levels.

The -1955 V Adjust (full scan cathode voltage) adjustment R2285 sets the crt cathode voltage to -1955 volts in Full Scan mode. The Reduced Scan Horiz Gain adjustment R2220 sets crt horizontal sensitivity by setting the crt cathode voltage when in Reduced Scan mode.

## Z-Axis Amplifier

The Z-Axis Amplifier controls crt intensity by varying the grid drive. High speed changes are coupled through C2289. Slow changes and dc levels are coupled through the Control Grid DC Restorer. The Logic circuit and the Readout System provide input signals to the Z-Axis Amplifier.

Transistors Q2206 and Q2216 are common-base amplifiers to establish a low input impedance for the Z-Axis Amplifier. Transistors Q2236, Q2242, Q2254, Q2264, and Q2274 form a current-to-voltage amplifier with feedback resistors R2233 and R2248. The Z-Axis Amplifier is compensated by R2235 and C2235 for optimum square corner on the Z-Axis signal.

## Control Grid DC Restorer

The Control Grid DC Restorer couples dc and low frequency components of the Z-axis signal to the crt control grid, where difference in potential prohibits direct coupling. The dc restorer is actually a cathode-referenced bias supply for the crt control grid. Quiescentiy, its output voltage is more negative than the cathode by an amount set by the CRT Bias (grid) adjustment R2135.

The Control Grid DC Restorer is current driven from the +600 volt winding of T2010 through C2041-R2041-R2042. This approximate 25-kilohertz drive signal is connected to the junction of CR2045-CR2055-C2052. Diodes CR2045 and CR2055 limit the peak-to-peak amplitude of the drive to the difference between their forward-bias levels. The CRT Bias adjustment R2135 and the output level of the Z-Axis Amplifier set the forward bias levels of CR2045 and CR2055 respectively. Capacitor C2052 couples the limited-amplitude drive to the junction of CR2052-CR2054. During positive half cycles of the drive, CR2054 charges the control grid side of C2055 to a level equal to the peak-to-peak value of the drive signal. The resulting control-grid voltage is more negative than the cathode by an amount equal to the difference between the CRT Grid Bias adjustment setting and the Z-Axis Amplifier output level.

## Focus Supply

The Focus Supply provides a regulated dc voltage to the crt focus and astigmatism elements. The supply voltage is produced by half-wave rectifier CR2155. In the Reduced Scan mode the contacts of K2155 close to connect CR2152 into the circuit to form a half-wave voltage doubler.

Regulation of the Focus Supply is accomplished by Q2156, Q2160, and Q2162. Normally the voltage at the base of Q2162 is +15 volts. Any error in this voltage changes the voltage at the collector of Q2156 to correct the Focus Supply voltage. Front-panel FOCUS control R1101A determines the quiescent operating voltage of the Focus Supply for a well-defined crt display.

In the Full Scan mode, feedback from the focus grid electrode is provided by two parallel resistor networks, R2166R2167 and R2141-R2142. In the Reduced Scan mode Q2140 turns on, routing the current flowing through R2141 and R2142 through R2140 to ground. This action doubles the effective feedback resistance, increasing focus grid voltage. Reduced Scan Focus adjustment R2140 is operational only in the Reduced Scan mode. All of the load current for the Focus Supply flows through Q2156 and R2153. If the load current exceeds about 8 milliamps, the voltage across R2153 causes Q2152 to conduct. The additional current in the I Sense line causes the low-voltage supply to turn off, preventing component damage.

## CRT Control Circuits

Front-panel ASTIG adjustment R2195 varies the potential on the astigmatism element of the crt. The range of adjustment of R2195 is determined by the current path through Q2188 and Q2182. In the reduced scan mode the current path is through Q2178 and Q2172, activating the Reduced Scan Astig adjustment for optimizing the Reduced Scan mode display.

## Theory of Operation-7934 Service

The Reduced Scan Vert Gain adjustment R2175 determines the vertical sensitivity of the crt when the crt is operated in the reduced scan mode.

The Stigmator adjustment, R2110, also affects the focus of the crt beam. The Vert Shield Comp adjustment, R2105, sets the voltage level on the vertical shield, which provides isolation for the vertical deflection plates.

Two coils control trace alignment by varying the magnetic field around the crt. Y-Axis alignment coil L2201 affects the crt beam after vertical deflection but before horizontal deflection. Therefore, only the vertical $(\mathrm{Y})$ compo-
nents of the display are affected. Trace Rotation coil L2200 affects both the vertical and horizontal rotation of the crt beam.

## AUTO FOCUS AMPLIFIER Diagram 15

The Auto Focus Amplifier provides control voltages to maintain optimum focus of the crt display with various settings of the front-panel A INTENSITY, B INTENSITY, and READOUT INTENSITY controls. Figure 4-42 shows a detailed block diagram of the Auto Focus Amplifier. A schematic of the Auto Focus Amplifier is given on diagram 15 at the rear of this manual.

(A)
(B)

| INPUT |  | OUTPUT |
| :---: | :---: | :---: |
| X.Y <br> INHIBIT | DISPLAY |  |
| BO | LO | DATA SWITCH |
| OUTPUT CURRENT |  |  |$|$| A INTENSITY |  |
| :---: | :---: |
| LO | HI |

Figure 4-42. (A) Detailed block diagram of the Auto Focus Amplifier circuit, (B) Logic table for intensity controls.

## Data Switch

The Data Switch consists of Q2302, Q2306, and Q2316. Output of the Data Switch is based upon A INTENSITY, B INTENSITY, or READOUT INTENSITY setting as determined by the Dispiay $B$ and X-Y Inhibit input signals. The Logic Table in Figure 4-42B shows the intensity controls that determine the output current of this stage for different combinations of Display $B$ and $X-Y$ Inhibit input levels.

## Current to Voltage Amplifier

The Current to Voltage Amplifier stage, consisting of Q2322, Q2328, and Q2332, converts the current output from the Data Switch to a voltage in order to drive the NonLinear Amplifier stage.

## Non-Linear Amplifier

The Non-Linear Amplifier stage, consisting of Q2336 and CR2335, inverts the input signal in a nonlinear manner. When the input signal is too low to forward bias the emitter base junction of Q2336, no current flows and the collector of Q2336 is at its most positive level. As the signal becomes more positive, Q2336 conducts causing the collector voltage to decrease. When the voltage at the base of Q2336 becomes positive enough to cause CR2335 to conduct, this emitter degeneration is reduced which increases the gain of the stage.

Variable resistors R2365 and R2366 determine the gain of the Non-Linear Amplifier stage in the Full Scan and Reduced Scan modes. In the Full Scan mode collector current for Q2336 flows through Q2368 as determined by R2366. When Reduced Scan is selected, Q2336 collector current flows through Q2362 as set by R2365.

## Output Amplifier

The signal from the Non-Linear Amplifier stage is applied to the Output Amplifier consisting of Q2372, Q2374, Q2378, Q2384, and Q2394. This stage provides final amplification for the auto focus signal which is then connected to pin 5 of the crt to automatically determine optimum focus of the display in all display modes.

## Emitter Follower

The signal applied to pin 5 of the crt is also connected to Emitter Follower stage Q2406, Q2436. Variable resistors R2425 and R2435 determine the ratio of the divider in the reduced Scan and Full Scan modes. The output at the emitter of Q2436 is connected to pin 6 of the crt to automatically set optimum astigmatism of the display in all display modes.

## STORAGE CONTROL AND TRACE ALIGN Diagram 16

## STORAGE DISPLAY Diagram 17

The Storage Control and Storage Display circuits comprise the Storage System. The Storage Control circuit develops digital and analog signals for input to the Storage Display circuit. The Storage Control circuit includes frontpanel switching and rear-panel connectors for control of the Storage System. The Storage Control also includes circuits to coordinate the operation of the Readout System and associated time-base unit(s) with storage functions. The Storage Display circuit decodes the signals that are generated by the Storage Control circuit and develops the waveforms that are applied to the crt storage electrodes.

Figure 4-43 shows a detailed block diagram of the Storage System. The schematic for the Storage Control and the Storage Display circuits are on diagrams 16 and 17 respectively at the rear of this manual. Figures 4-44, 4-45, 4-46, and 4-47 show the timing sequence of signals used throughout the Storage System in each of the four storage modes (BISTABLE, VAR PERSIST, FAST BISTABLE, and FAST VAR PERSIST).

The Trace Alignment circuit develops outputs to drive the Trace Rotation and $Y$-Axis coils. The schematic for this circuit is shown on diagram 16.

## Storage Mode Switching

This stage, comprised of Q2642, Q2644, and S2404, provides dc control signals for the Storage System. Table 4-3 lists the logic levels of the control signals for the five positions of Storage Mode Switch S2404.


Figure 4-43. Detailed block diagram of the 7934 Storage System.



Figure 4-44. Bistable storage mode timing diagram.


Figure 4-45. Variable persistence storage mode timing diagram.


Figure 4-46. Fast bistable storage mode timing diagram.


Figure 4-47. Fast variable persistence mode timing diagram.

Table 4-3
STORAGE MODE SWITCH OUTPUT LOGIC LEVELS

| Storage <br> Display Mode | $\mathbf{N S}$ | $\overline{\mathbf{N S}}$ | $\overline{\mathbf{N S}} \mathbf{( + 1 5 \mathbf { V } ) ^ { * }}$ | $\mathbf{V P ( + 1 5 \mathbf { V } ) ^ { * }}$ | $\overline{\mathbf{V P}}$ | FAST |
| :--- | :---: | :---: | :---: | :---: | :---: | :---: |
| STORE OFF | HI | LO | LO | LO | HI | HI |
| BISTABLE | LO | HI | HI | LO | HI | HI |
| VAR PERSIST | LO | HI | HI | HI | LO | HI |
| FAST BISTABLE | LO | HI | HI | LO | HI | LO |
| FAST VAR PERSIST | LO | HI | HI | HI | LO | LO |

* A HI logic level is $\mathbf{+ 5}$ volts except for $\overline{\mathrm{NS}}(+15 \mathrm{~V})$ and $\mathrm{VP}(+15 \mathrm{~V})$ which are +15 volts in the HI state.


## Erase

This stage develops the Erase and Erase pulses, which initiate the storage erase cycle. It consists of three sections: (1) monostable multivibrator, U2562A, (2) input logic for the stage, Q2514, Q2526, Q2528, and Q2542, (3) oscillator Q2532, Q2536, and Q2538.

Each time pin 2 of U2562A goes HI and pin 1 is LO, an Erase pulse is generated. However, if pin 1 of U2562A is HI (see Save Mode Switching) no Erase pulse can be generated by the signal on pin 2. The width of the Erase pulse, as determined by R2562 and C2562, is approximately 100 milliseconds.

When front-panel ERASE button S2538 is pressed, the $\overline{\mathrm{NS}}(+15 \mathrm{~V})$ logic level is connected to R2516. In all storage modes the $\overline{\mathrm{NS}}(+15 \mathrm{~V})$ signal is at +15 volts. Therefore, current from the +15 volt supply passes through C2521 to momentarily turn on Q2526. When Q2526 conducts, Q2542 turns off and a HI is applied to pin 2 of Q2562A to generate an Erase pulse. Likewise, a LO applied to the REMOTE ERASE INPUT causes an Erase pulse to be generated.

Whenever a storage mode is selected with Storage Mode Switch S2404, or the REDUCED SCAN button S2558 is pressed, the switching transition coupled through C2523 and Q2526 or C2528 and Q2528 initiate an Erase pulse.

Transistors Q2532, Q2536, and Q2538 comprise a variable frequency low-speed oscillator controlled by front-panel AUTO ERASE control R1401-S1401. The PUT (programmable unijunction transistor) Q2538 is connected as a relaxation oscillator with C2534 as the timing capacitor. Current to charge C2534 is provided by a variable-current source, Q2536, controlled by the AUTO ERASE viewtime control R1401. Each time Q2538 turns on to discharge

C2534, a voltage spike is applied to R2540 which turns Q2542 off and triggers an Erase pulse.

When Q2532 is on, the operation of the oscillator is inhibited by holding C2534 discharged. When P2531 is set for Periodic operation, the $X+Y$ logic signal (see Main Timing) turns Q2532 on for approximately 1.4 seconds after the start of each Erase pulse, and then allows C2534 to resume charging. When P2531 is set for After Sweep operation, the Multi signal (see Transfer and Multi) turns Q2532 on at the beginning of the Erase pulse and holds it on until the end of the next sweep. When AUTO ERASE switch S1401 is set to the OFF position, Q2532 is biased on to inhibit the Auto Erase function.

When the Save signal (see Save Mode Switching) connected to R2539 goes HI, the auto erase oscillator is inhibited. However, Q2538 is allowed to turn on immediately after the Save signal returns LO, providing C2534 is sufficiently charged.

## Transfer and Multi

This stage develops the Tsfr and Tsfr pulses which initiate the transfer operation in the fast storage modes, the Multi and Multi signals which indicate whether a display has been stored since the last erase cycle occurred, and the Swp+Tsfr signal which indicates whether a waveform is being written or the transfer operation is occurring.

When the Storage Sweep Gate is HI , current flows into R2584 turning off Q2586 and causing a HI level to appear at its collector. Also, a HI level applied to the REMOTE STORAGE GATE INPUT turns off Q2586 to provide a HI level at its collector. U2588A inverts the HI and applies it to pin 8 of U2588C. If the Storage Lockout signal (see Storage Lockout) at pin 9 of U2588C is LO, the signal is inverted to provide a replica of the Storage Sweep Gate or the Remote Storage Gate signals at pin 10 of U2588C.

The four gates of U2592, along with C2592, comprise a moncstable multivibrator which generates a short positive pulse whenever the output of U2588C goes LO. This End-of-Sweep circuit operates as follows: Assume that the output of U2588C is LO and that the output of U2592D is HI . Then, the outputs of U2592A and U2592C will be LO. When the output of U2588C goes HI, the flip-flop comprised of U2592A and U2592D changes states. The output of U2592C, however, still remains LO. When the output of U2588C returns LO, the output of U2592C immediately goes HI since both of its inputs are now LO.

Both inputs of U2592B are also LO so its output switches to the HI state. Capacitor C2592 loads the output of U2592B to provide a delay of approximately 100 nanoseconds in the LO to HI transition. At the end of this delay the flp-flop, U2592A and U2592D, switches back to its initial state and the output of U2592C returns LO.

The 100 nanosecond End-of-Sweep pulse from U2592C provides a trigger to U2594A, to generate a 100 -millisecond wide Tsfr pulse at the end of the sweep whenever the Fast signal is LO. This pulse also clocks U2682B so that the Multi signal goes HI at the end of the first sweep after an erase pulse occurs; the Erase pulse clears this flip-flop. The End-of-Sweep pulse is also coupled to U2608B in the Readout Control stage (see Readout Control). U2608C generates the Swp+Tsfr signal through a combination of inputs from U2588C and U2594A.

## Save Mode Switching

The Save Mode switching stage, consisting of Q2626, Q2632, and U2588D, develops the Save signal which enters the Storage System into the Save mode of operation. Pressing the front-panel SAVE switch, S2624, or grounding the rear-panel REMOTE SAVE INPUT initiates the Save signal by turning off Q2626 which in turn saturates Q2632. However, if one of the storage modes is not selected, NS ( +15 V ) connected to the collector of Q2626 is at zero volts and Q2632 remains off to prevent the Save signal from occurring.

When Q2632 saturates to produce the Save signal, frontpanel SAVE light DS2624 turns on and a LO is applied to pin 12 of U2588D. The Save output signal goes HI only if the $\overline{M u l t i}$ signal at pin 11 is LO. That is, the Save signal can only be produced if a sweep has occurred since the last Erase pulse. This action performs the Auto Save function.

## Main Timing

This stage develops the $W, X, Y$, and $Z$ signals, their complements, the $X+Y$ signal, and the $X$-Multi signal. These signals control the major sequence of voltages applied to the crt during the Erase and Multi-Trace cycles. This stage also accepts input information from the time-base
unit(s) via the A or B Single Sweep Logic line and the Storage Single Sweep Reset line, and generates the Storage Single Sweep Reset signal to reset the time-base unit(s) during any erase or Multi-Trace cycle.

The $X$ signal, developed by U2684A, is a positive pulse with a duration between 150 milliseconds and 4 seconds. The X signal goes HI when Q2674 turns on pulling pin 1 of U2684A LO. This occurs under one of the following three conditions: (1) When an Erase pulse occurs, (2) in the Fast Storage modes when the MULTI TRACE DELAY control R1301 is in the detent position, or the time-base unit(s) is in the Single Sweep mode and a Multi-Trace cycle is externally initiated, and (3) in the Fast Storage modes when S1301 is out of the detent, the time-base unit(s) is in a repetitive sweep mode, and the Multi-Trace cycle automatically recurs.

The input path for condition number 1 above is through R2673 when Erase goes HI. The input path for condition number 2 is through CR2664, C2668, and Q2668 when the Storage Single Sweep Reset line is pulled LO (time base unit single sweep reset button is pushed, or the REMOTE RESET INPUT is grounded). Transistor Q2658 must be off so $W$ (explained later) must be LO insuring that any previously initiated Erase or Multi-Trace cycle has been terminated. The input path for condition number 3 is through C2671 when Tsfr returns HI after the transfer operation. Transistor Q2654 must be off so the time-base unit(s) must be in a repetitive sweep mode and the MULTI TRACE DELAY control must be out of the detent.

The width of the $X$ pulse is determined by Q2612, Q2678, and U2552B. When the $X$ pulse is triggered by an Erase pulse, Multi (emitter of Q2612) is LO and Multi is HI. Diodes CR2610 and CR2615 are reverse-biased and charging current for timing capacitor C2676 passes through CR2614, R2613, and R2676. In this condition, the $X$ pulse lasts approximately 900 milliseconds.

When the Multi-Trace cycle is externally initiated, Multi is HI and the output of U2552B is LO (A or B Single Sweep Logic line is HI or R1301 is in the detent position), so Q2612 is on. Diode CR2614 is reverse-biased so charging current for C2676 passes through Q2612, CR2610, and R2676. Under this condition, the $X$ pulse duration is approximately 150 milliseconds. When the Multi-Trace cycle automatically recurs, the output of U2552B is LO. If Multi is HI, timing current passes through MULTI TRACE DELAY control R1301 and the pulse width is variable from approximately 150 milliseconds to 4 seconds. If MULTI is LO, timing is as in condition number 1. Transistor Q2678 is a current stage which insures adequate drive for pin 15 of U2684A under any of the above timing conditions. The connection at pin 3 of U2684A inhibits the $X$ pulse when NS is LO. When Save or FAST are HI, the X pulse is inhibited through R2655 and R2657.

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At the end of the $X$ pulse (if the $A$ or $B$ Single Sweep Logic line is $H I$ ) current from the rising edge of $\bar{X}$ is coupled through R2662 and C2663 to the base of Q2664 producing a negative reset pulse on the Storage Single Sweep Reset line.

The $Y$ signal, generated by $U 2684 B$, is a positive pulse which occurs at the end of the $X$ pulse. The $Y$ pulse is triggered by $\bar{X}$ coupled through C2684 to pin 10 of U2684B. Transistor Q2694 inhibits the generation of the $Y$ pulse whenever X, Save, or Fast are HI. R2685 and C2685 set the width of the $Y$ pulse to approximately 400 milliseconds.

The W signal is generated by U2682A. W goes HI at the beginning of the $Y$ pulse and is normally reset LO at the end of the Tsfr pulse by the coupling of Tsfr through C2683. However, if X, Save, or Fast go HI, Q2694 will also reset W LO.

The $Z$ signal, generated by U2594B, is a positive pulse which occurs at the end of the Y pulse. R2696 and C2696 set the width of the $Z$ pulse at approximately 100 milliseconds.

The $X+Y$ signal is formed directly by U2556A, and the $X$ Multi signal is formed directly by U2588B.

## Clock

This stage generates the Clock and 10-kilohertz Ramp signals for use by the rest of the storage system. Programmable unijunction transistor (PUT) Q2772, and components R2770, C2770, and R2779 form a relaxation oscillator operating at a frequency of approximately 100 hertz. Q2774, R2774, R2775, R2779, and C2774 form a similar oscillator operating at a frequency of approximately 10 kilohertz. Both oscillators share a common gate-biasing resistor, R2779, that provides synchronous oscillations. To illustrate, consider that C2770 is initially discharged and Q2772 is not conducting. The time constant of C2774 and R2774 is much shorter than the time constant of C2770 and R2770. Therefore, Q2774 oscillates at approximately 10 kilohertz while the anode voltage of Q2772 slowly rises. Each time Q2774 turns on, gate current is drawn from R2779 causing the gates of Q2772 and Q2774 to drop approximately 350 millivolts. Thus, the anode firing voltage for Q2772 is lower when Q2774 is on. This causes Q2772 to synchronize with Q2774.

When Q2772 is on, it draws sufficient gate current to temporarily stop the oscillation of Q2774 and turn Q2784 on for approximately 50 microseconds. This action generates the Clock puises. Amplitude of the Clock pulses is approximately 10 volts with a -5 volt base line as set by Q2788, R2785, R2786, and R2787. The 10-kilohertz Ramp signal is taken directly from the anode of Q2774.

## Persistence Pulse Generator

This stage, comprised of Q2502, Q2506, Q2508, and U2565A, generates a clock-frequency pulse train at the collector of Q2506 with the pulse width continuously variable by the PERSISTENCE control. These pulses control the persistence of the display in both of the variable persistence modes. Operation of the stage is as follows:

Transistors Q2502 and Q2506 are connected as a comparator. PERSISTENCE control R1201 determines the voltage level applied to the base of Q2502. When the Clock pulse goes HI, Q2508 switches on to discharge C2507 to about -5 volts. When the PERSISTENCE control is adjusted away from the MAX position, Q2502 turns on and Q2506 turns off. At the same time, the output of U2565A goes LO to hold the collector of Q2506 LO. When the Clock pulse returns LO, a positive pulse begins at the collector of Q2506. Current through R2507 begins to charge C2507, raising the base voltage of Q2506. When the base voltage of Q2506 exceeds that of Q2502, transistor Q2506 turns on and the collector of Q2506 again goes LO. When the PERSISTENCE control is set to the MIN position, the pulse width is approximately 1.8 milliseconds. If the PERSISTENCE control is set to MAX, Q2506 never turns off and no positive pulses are produced at the collector of Q2506.

## Save Intensity Pulse Generator

This stage, comprised of Q2572, Q2576, Q2578, and U2565C generates a clock-frequency pulse train at the collector of Q2576 with pulse width continuously variable by SAVE INTENSITY control R1101. These pulses are applied directly to the Flood Gun Cathode Driver stage to adjust the display intensity in the Save mode. With the SAVE INTENSITY control set to MIN, pulses are not produced; with the SAVE INTENSITY control set to MAX, the pulse width is approximately 10 milliseconds. Operation of this stage is identical to the previously described Persistence Pulse Generator Stage.

## Prep

This stage, comprised of U2552C, U2556B, U2556C. and U2556D, develops the Prep signal. This signal directs the Storage Mesh Logic Decoder to switch the Storage Mesh to the Prep Level when operating in the Variable Persistence storage modes (see Figures 4-49 and 4-51). The inputs to this stage are from the Persistence Pulse Generator, Save Mode Switching, Transfer and Multi, and Main Timing stages.

## Fast Prep

This stage, comprised of U2562B and U2552A, generates the Fast Prep signal. The Fast Prep signal is used by the Storage Mesh Decoder and Fast Mesh Decoder stages
in the transier (FAST BISTABLE or FAST VAR PERSIST) modes. U2562B produces a clock-frequency pulse train; the width of the pulses (set by R2565 and C2565) is approximately 1.8 microseconds. When $\bar{W}$ is LO, these pulses are inverted by U2552A to form the Fast Prep signal. When SWP-TSFR is LO and $\bar{W}$ is LO, the Fast Prep signal remains HI . When $\bar{W}$ is HI , the Fast Prep signal stays LO.

## Storage Lockout

This stage, comprised of Q2588, U2552D, CR2551, CR25.52, CR2553, CR2554, and CR2555, develops the Storage Lockout signal when the storage system is unprepared to produce a stored display. The Storage Lockout signal inhibits the time-base unit(s), the Storage Sweep Gate, the Remote Storage Gate, and blanks the crt. The five diodes; connected to the base of Q2588 form a five-input OR gate. A HI level applied to the anode of any one of these five diodes; produces a HI Storage Lockout signal at the emitter of Q2!58 (pins 11 and 12 of U2552D must both be LO for a HI to be applied to the anode of CR2553).

## Readout Control Logic

This stage provides two signals to the Readout System: The Fieadout Gate and the Gated Readout Intensity. The Readout Gate signal is generated by U2608A, U2608B, U2608D, U2565B, U2565D, and S1303. When S1303 is set to the variable position, the Readout Gate is HI which allows the Readout System to operate continuously in a freerunning manner. When S1303 is set to the PULSED position, the state of the Readout Gate depends upon the End-of-Sweep pulse from U2592C (see Transfer and Multi stage) and the setting of the Storage Mode Switch. In the STORE OFF or the VAR PERSIST mode, the Readout Gate duplicates the End-of-Sweep pulses causing the Readout System to produce one complete frame (eight words) at the end of each sweep. In the FAST VAR PERSIST mode a Readout Gate is also produced at the end of each sweep. However, :he Gated Readout Intensity (explained below) inhibits the Readout System so it will not write on the Fast Mesh. Instead, R2608 and C2608 differentiate the $\bar{W}$ signal and couple the rising edge into the Readout Gate circuit to initiate one complete frame of readout at the end of each transfer operation.

In BISTABLE and FAST BISTABLE modes the writing speed of the Storage Target is too low to store a single frame of readout. For this reason, the Readout System free runs at the end of a sweep until the next Erase pulse occurs. The Fleadout Gate goes LO at the initiation of the Erase pulse since Multi is HI and applied to pin 2 of U2608A. The MULTI signal goes LO at the first End-of-Sweep pulse, causing the Readout Gate signal to go HI.

The Gated Readout Intensity is an analog current signal which controls the crt intensity during the readout display.

At zero current it also inhibits the Readout System. When Q2688 is on, the Readout Intensity control adjusts this current to control the brightness of the readout display. When Q2688 is off, the current is zero, turning off the readout. Transistor Q2688 is off during the Erase and Muiti Trace cycles ( X or WHI ) and in the fast storage modes up to the end of the transfer operation (W HI). Additionally, Q2686 is turned on when the Save signal is HI. The delay of R2686 and C2686 allows the readout to run for a sufficient time upon entering the SAVE mode to store the readout display in the Bistable or Fast Bistable modes. When the Save mode is entered during a Multi Trace cycle, CR2686 holds C2686 discharged until the end of the $X$ pulse to allow the readout to be stored.

## Trace Alignment

The Trace Rotation supply, consisting of U2468A, Q2468, and Q2469, is an operational amplifier providing a low-impedance adjustable voltage source for the trace rotation coil. TRACE ROTATION adjustment R2465 determines the output voltage and therefore the current in the trace rotation coil. The Reduced Scan Trace Rotation adjustment, R2470, sets the difference in current required for the trace rotation coil in the Reduced Scan mode. Resistor R2470 is activated only when the Reduced Scan mode is selected by S2558.

The $Y$-Axis alignment supply, consisting of U2468B, Q2478, and Q2479, operates similarly to the Trace Rotation supply, except that the difference in current required between Full Scan and Reduced Scan modes is provided by fixed resistors R2471 and R2472.

## Flood Gun Cathode Driver

Transistors Q3054 and Q3064 (diagram 17) comprise the Flood Gun Cathode Driver stage. The output of this stage has two states. When Q3064 is saturated, the flood gun cathode is at ground potential and the flood guns are on. When Q3064 is off, CR3066 clamps the flood gun cathode at approximately 1 volt above the flood gun anode and the flood guns are off. The flood guns are on continuously in all display modes except Save. In the Save mode, the flood guns are modulated by the Save Intensity signal, turning the flood guns on and off at a duty cycle that is determined by the setting of the front-panel SAVE INTENSITY control. Resistor R3052 and capacitor C3053 delay the turn off of the flood guns when the Save signal switches HI, allowing the Readout System to turn off before flood gun modulation begins.

The Power On signal overrides all other inputs, turning the flood guns off when the 7934 power is switched on or off. This prevents spurious erasure of the stored display due to rapid changes in supply voltages applied to the storage circuits.

## Collimation Electrode \#1 and Flood Gun Anode Driver

This stage consists of a current-input operational amplifier, Q3022 and Q3026, and emitter follower Q3048 driven by a resistive divider. The inverting input (base of Q3022) operates at zero volts; R3026 is the feedback resistor. The input current signal is provided by the Collector and Collimation Electrode Decoder stage. This amplifier drives the flood gun anode through R3027. The output of the Flood Gun Anode Driver is connected to Q3048 through resistive divider R3045, R3046, and R3047 to provide the drive for Collimation Electrode \#1 (CE1).

## Collimation Electrode Drivers \#2, \#3, and \#4

These driver stages are operational amplifiers similar to that discussed above for the Flood Gun Anode Driver. Transistors Q2992-Q2996 comprise the driver for CE2, Q2972Q2976 for CE3, and Q2942-Q2946 for CE4.

## Collector Mesh Driver

This stage consisting of Q2914, Q2918, and Q2924 is an operational amplifier similar to those just discussed for the Collimation Electrode Driver stages. Transistor Q2924 is an emitter follower stage added within the feedback loop to reduce the amplifier output impedance for ac and transient signals which are coupled into the output of this amplifier from the Fast Mesh Driver stage through the inter-mesh capacitance of the crt. Capacitor C2915 increases the amplifier response to these injected transients and provides highfrequency compensation.

## Collector and Collimation Electrode Decoder

This stage consists of Q2904, Q2988, Q3012, Q3016, and associated diode-resistor networks. This stage decodes the logic inputs from the Main Timing, Transfer and Multi, and Storage Mode Switching stages, into discrete current level signals for input to the Collector Mesh, Collimation Electrodes, and Flood Gun Anode driver stages. This stage uses transistor switches and diode current steering networks to convert the input logic signals into currents.

## Fast Mesh Driver

This stage consisting of Q2862, Q2864, Q2868, Q2873, and Q2874 is an expanded version of the simple operational amplifiers previously discussed. Transistor Q2864 is a voltage shifter stage which permits the output transistors to operate from a negative supply. Transistor Q2873 provides current limiting to protect the amplifier from output short circuits. Transistor Q2874 is an emitter follower for low ac output impedance.

## Fast Mesh Decoder

This stage, consisting of Q2842, Q2852, CR2848, and CR2849, decodes inputs from the Storage Mode Switching, Tsfr and Multi, and Fast Prep stages into discrete current levels for the Fast Mesh Driver stage. When Fast Prep is LO, CR2849 is reverse biased and CR2848 is forward biased. If VP ( +15 V ) is LO or Q2904 is on, all of the current in R2902 provides input to the Fast Mesh Driver stage, and the output voltage to the Fast Mesh is +125 volts. When $\mathrm{VP}(+15 \mathrm{~V})$ is HI and Q2904 is off, the current flow through R2901 offsets some of the current in R2902 causing the Fast Mesh to drop to +100 volts. When Fast Prep is HI, CR2848 is reverse biased and Q2852 is off. Resistors R2850 and R2855, in Fast Variable Persistence and Fast Bistable respectively, adjust the Fast Prep Level in each Fast Storage mode between zero and +20 volts. The "pump pulses" which appear on the Fast Mesh when it is at the Fast Prep Level are the result of the oscillation of the Fast Prep logic signal.

During a sweep or a transfer operation, Q2842 turns off. Resistors R2845 and R2846, in Fast Bistable and Fast Var Persist respectively, adjust the Fast Transfer Level (delta V) in each Fast Storage mode between zero and 3 volts below the Fast Prep Level. Front-panel STORAGE LEVEL control R2720 provides offset to the Fast Transter Level in both Fast storage modes through R2748.

## Storage Mesh Driver

This driver stage consists of two parts: Operational amplifier Q2802, Q2804, Q2808, and Q2814 which is similar to the Fast Mesh Driver stage, and a 600 volt switching circuit Q2818, Q2822, Q2826, Q2828, Q2834, and Q2838.

When Tsfr and Erase are both LO, Q2818 and Q2822 are off; Q2826 and Q2828 are saturated. Diode CR2833 conducts current from R2833 and holds the Storage Mesh potential at approximately 0.8 volts above the output level of the operational amplifier.

When the Erase or Tsfr signals go HI, Q2818 and Q2822 turn on and Q2826 and Q2828 turn off. Transistors Q2834 and Q2838 turn on and drive the Storage Mesh to the +600 volt supply. CR2839 disconnects the operational amplifier from the Storage Mesh at this time. Bootstrap capacitor C2833 maintains base drive to Q2834 and Q2838 throughout the 100 millisecond duration of either the Erase or Tsfr pulses.

Current limiting is provided in both the operational amplifier and 600 volt switch by light emitting diodes CR2813 and CR2831 in the output sections.

## Storage Mesh Decoder

This stage, consisting of Q2704, Q2714, Q2730, Q2734, Q2745, Q2752, Q2755, and associated diode-resistor networks, develops discrete current levels for input to the Storage Mesh Driver.

Consider operation in the Bistable mode. Initially, the currents in R2715, R2717, CR2726, R2727, and R2736 are all zero. Transistors Q2745 and Q2755 are saturated and the net current into the Storage Mesh Driver is the sum of the currents in R2746; R2747, and R2716. Resistor R2745 sets the Bistable Operating Level between +35 volts and +120 volts. When Erase goes HI, Q2752 saturates, turning off Q2755 and Q2745 and charging C2753. At the end of the Erase pulse, the voltage on the Storage Mesh is at -15 volts set by R2716. However, C2753 discharges through R2753 and R2754, causing the Storage Mesh voltage to ramp back up to the Bistable Operating Level in approximately 600 milliseconds. In Fast Bistable mode the operation of the Storage Mesh Decoder is unchanged.

Consider operation in the Variable Persistence mode. Initially, the currents in R2736, Q2745, R2727, and R2717 are zero. Diode CR2726 is forward biased and Q2714 is off so the net current into the Storage Mesh Driver is the sum of the currents in R2724, R2726, R2715, and R2716. Resistor R2725 sets the Variable Persistence Operating Level between zero and +15 Volts, while the STORAGE LEVEL control, R2720, provides an adjustable offset of zero to -5 Volts. The coupling of the 10 kilohertz Ramp waveform
through C2718 and R2718 produces a 2 volt ramp at the Storage Mesh superimposed on the Variable Persistence Operating Level.

When Erase goes HI, Prep also goes HI turning Q2714 on and Q2730 off. Transistor Q2755 also turns off, momentarily interrupting the current flow through R2733 which turns Q2734 on. After the Erase pulse, Q2734 is still on so the voltage on the Storage Mesh is at the level set by R2725. As C2753 discharges, the emitter of Q2755 falls turning off Q2734 after approximately 200 milliseconds. This causes current to flow through R2736 to raise the Storage Mesh to the Variable Persistence Prep Level, adjusted by R2735 from zero to 12 volts above the Operating Level. At the end of the $X$ pulse, the Prep signal goes LO returning the decoder to its initial state.

In the Fast Variable Persistence mode, operation of the Storage Mesh Decoder is unchanged until the end of the $X$ pulse. In this mode, however, the $Y$ pulse follows the $X$ pulse holding the Prep signal HI and the Storage Mesh at the Prep Level for another 400 milliseconds. In addition W goes HI and remains HI until the end of the Tsfr pulse, and Fast Prep oscillates at the Clock signal frequency. These signals cause the Storage Mesh to drop to the Hold Level at -35 Volts after the $Y$ pulse and remain at that level until the Tsfr pulse occurs. Superimposed on the Hold Level are the "pump pulses", logically inverted from the Fast Prep signal and with height adjustable by R2705 from zero to 15 Volts above the Operating Level.

## MAINTENANCE

This section of the manual contains information for performing preventive maintenance, troubleshooting, and corrective maintenance for the 7934 Storage Oscilloscope.

## PREVENTIVE MAINTENANCE

Preventive maintenance, when performed on a regular basis, can prevent instrument breakdown and may improve the reliability of the instrument. The severity of the environment to which the instrument is subjected will determine the frequency of maintenance. A convenient time to perform preventive maintenance is preceding electrical adjustment of the instrument.

## Cabinet Panel Removal

## WARNING

Dangerous potentials exist at several points throughout this instrument. When the instrument is operated with the covers removed, do not touch exposed connections or components. Some transistors have voltages present on their cases. Disconnect power before cleaning the instrument or replacing parts.

The cabinet panels provide protection to personnel from operating potentials present within the instrument. In addition, they reduce radiation of electromagnetic interference from the instrument. Operate the instrument with the panels in place to protect the interior from dust. The panels also channel the air in the instrument for proper cooling.

The cabinet panels are held in place by slotted fasteners. To remove the panels, turn each fastener counterclockwise a quarter turn with a large screwdriver. Lift the panels away. When replacing the panels, the right panel (as you face the front of instrument) has ventilation holes near the front; the left panel has ventilation holes about two-thirds toward the rear.

## Cleaning

The 7934 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. The side panels reduce the amount of dust reaching the interior of the instrument. Operation without the panels in place necessitates more frequent cleaning.


Avoid the use of chemical cleaning agents which might damage the plastics used in this instrument. Use a non-residue type of cleaner, preferably isopropyl alcohol, totally denatured ethyl alcohol, or TP35. Before using any other type of cleaner, consult your Tektronix Service Center or representative.

Cleaning The Exterior. Loose dust accumulated on the outside of the instrument can be removed with a soft cloth or small brush. The brush is particularly useful for dislodging dirt on and around the front-panel 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.

Cleaning The CRT. Clean the plastic light filter, implosion shield, and the crt faceplate with a soft, lint-free cloth dampened with denatured alcohol.

The crt mesh filter (furnished with Option 3 only) can be cleaned as follows:

1. Hold the mesh filter in a vertical position and brush lightly with a soft, No. 7 water color brush to remove light coatings of dust or lint.
2. Greasy residues, or dried-on dirt, can be removed with a solution of warm water and a neutral-pH liquid detergent. Use the brush to lightly scrub the filter.
3. Rinse the filter thoroughly in clean water and allow to air dry.
4. If any lint or dirt remains, use clean low-pressure air to remove it. Do not use tweezers or other hard cleaning tools on the filter, as the special finish may be damaged.
5. When not in use, store the mesh filter in a lint-free dust-proof container, such as a plastic bag.

Cleaning The Interior. Cleaning the interior of the instrument should only be occasionally necessary. The best way to clean the interior is to blow off the accumulated dust with dry, low-velocity air (approximately 5 psi ). Remove any dirt with a soft brush or a cloth dampened with a mild detergent and water solution. A cotton-tipped applicator is useful for cleaning in narrow spaces, or for cleaning more delicate circuit components.

## CAUTION

Circuit boards and components must be dry before applying power to prevent damage from electrical arcing.

The high-voltage circuits should receive special attention. Excessive dirt in this area may cause high-voltage arcing and result in improper instrument operation.

## Visual Inspection

The 7934 should be inspected occasionally for such defects as broken connections, improperly installed circuit boards, and heat-damaged parts. The corrective procedure for most visible defects is obvious; however, particular care must be taken if heat-damaged parts are found. Overheating usually indicates other trouble in the instrument; therefore, correcting the cause of overheating is important to prevent recurrence of the damage.

## Semiconductor Checks

Periodic checks of semiconductors are not recommended. The best check of semiconductor performance is actual operation in the instrument. More details on semiconductors are given under Troubleshooting later in this section.

## Periodic Electrical Adjustments

To ensure accurate measurements, check the electrical adjustment of this instrument after each 1000 hours of oper-
ation, or every six months if used infrequently. In addition, replacement of components may necessitate adjustment of the affected circuits. Complete adjustment instructions are given in Section 6, Checks and Adjustments. The Checks and Adjustments procedure can be helpful in localizing certain troubles in the instrument, and in some cases, may correct them.

## TROUBLESHOOTING

The following information is provided to facilitate troubleshooting of the 7934 Storage Oscilloscope. Information contained in other sections of this manual should be used in conjunction with the following data to aid in locating a defective component. An understanding of the circuit operation is helpful in locating troubles. See Section 4, Theory of Operation, for this information.

## Troubleshooting Aids

Diagrams. Complete schematic diagrams are given on the pullout pages in Section 8, Diagrams and Circuit Board Illustrations. The component number and electrical value of each component in this instrument are shown on these diagrams. (See the first page of the Diagrams and Circuit Board lllustrations section for definitions of the reference designators and symbols used to identify components in this instrument.) Important voltages and numbered waveform test points are also shown on the diagrams. Important waveforms are located adjacent to each diagram. The portions of circuits mounted on circuit boards are enclosed with heavy, solid-black lines. The component locator table on the back of the preceding schematic provides an index to help locate components on the diagram. Each schematic is overlayed by a grid locator with a cross-reference table to facilitate location of components on the schematic or the circuit board.

Circuit Board Illustrations. To aid in locating circuit boards, a picture showing the location of all circuit boards in the 7934 is shown on the first pullout page in Section 8 , Diagrams and Circuit Board Illustrations. In addition, a smaller circuit-board locator picture is given on the back of the pullout page facing the associated schematic diagram. Also provided here is an illustration of the circuit board(s) for the circuit shown on the adjacent diagram. The illustration shows the physical location of the components on the board. Each circuit board illustration is overlayed by a grid locator with a cross-reference table to facilitate rapid location of components on the schematic diagram or circuit board.

Troubleshooting Chart. A troubleshooting chart is given in Section 8, Diagrams and Circuit Board Illustrations to aid in locating a defective circuit. The shaded blocks on the

Troubleshooting Chart indicate circuit(s) that may cause the indicated malfunction. Operation of the circuits listed is discussed in detail in Section 4. Theory of Operation.

Adjustment and Test Point Locations. To aid in locating test points and adjustable components called out in the various sections of the Check and Adjustment procedure, the Adjustment and Test Point Locations pullout pages are provided in Section 8, Diagrams and Circuit Board Illustrations.

Component Color Coding. This instrument contains carbon composition resistors, metal-film resistors, and wirewound resistors. The resistance values of wire-wound resistors are usually printed on the component body. The resistance values of composition resistors and metal-film resistors are color coded on the components using the EIA color code (some metal-film resistors may have the value printed on the body). The color code is read starting with the stripe nearest the end of the resistor. Composition resistors have four stripes, which consist of two significant figures, a multiplier, and a tolerance value (see Fig. 5-1). Metal-film resistors have five stripes consisting of three significant figures, a multiplier, and a tolerance value.

The values of common disc capacitors and small electrolytics are marked on the side of the component body. The white ceramic and epoxy-coated tantalum capacitors are color coded using a modified EIA code (see Fig. 5-1).

The cathode end of glass-encased diodes is indicated by a stripe, a series of stripes, or a dot. The cathode and anode ends of metal-encased diodes can be identified by the diode symbol marked on the body.

Semiconductor Lead Configurations. Figure 5-2 shows the lead configurations of the semiconductor devices used in the 7934 Storage Oscilloscope.


Static discharge can damage semiconductor components in this instrument.

Static-Sensitive Devices. This instrument contains electrical components that are susceptible to damage from static discharge. See Table 5-1 for relative susceptibility of various classes of semiconductors. Static voltages of 1 kV to 30 kV are common in unprotected environments.

Observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.
2. Transport and store static-sensitive components or assemblies in their original containers, on a metal rail, or conductive foam. Label any package that contains staticsensitive assemblies or components.
3. Discharge the static voltage from your body by wearing a wrist strap while handling these components. Servicing static-sensitive assemblies or components should be performed only at a static-free work station by qualified service personnel.
4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.
5. Keep the component leads shorted together when storing the component whenever possible.
6. Pick up components by the body, never by the leads.
7. Do not slide the components over any surface.
8. Avoid handling components in areas that have a floor or work-surface covering capable of generating a static charge.
9. Use a soldering iron that is connected to earth ground.
10. Use only special antistatic vacuum type desoldering tools such as the Pace model PC10.


Figure 5-1. Color code for resistors and capacitors.


Table 5-1
RELATIVE SUSCEPTIBILITY TO STATIC DISCHARGE DAMAGE

| Semiconductor Classes | Voltage <br> Equivalent* |
| :--- | :--- |
| MOS or CMOS microcircuits or <br> discretes, or linear microcircuits with <br> MOS inputs (most sensitive) | 100 to 500 volts |
| ECL | 200 to 500 volts |
| Schottky signal diodes | 250 volts |
| Schottky TTL | 500 volts |
| High-frequency bipolar transistors | 400 to 600 volts |
| JFETs | 600 to 800 volts |
| Linear Microcircuits | 400 to 1000 volts |
| Low-power Schottky TTL | 900 volts |
| TTL (least sensitive) | 1200 volts |

*Voltage discharged from a 100 pF capacitor through a resistance of 100 ohms.

Multi-Pin Connector Holders. The multi-pin connector holders are keyed with two triangles, one on the holder and one on the circuit board. When a connection is made to a circuit board the orientation of the triangle on the multi-pin connector holder is determined by the index (triangle, dot, or square) printed on the circuit board (see Fig. 5-3).

## Troubleshooting Equipment

The following equipment is useful for troubleshooting the 7934 Storage Oscilloscope:

## 1. Transistor Tester

Description: Dynamic-type tester.
Purpose: Test semiconductors.
Recommended type: Tektronix 577/177 Curve Tracer, Tektronix 576 Curve Tracer, Tektronix 7CT1N Curve Tracer plug-in unit and a 7000 -series oscilloscope system, or a Tektronix 5CT1N Curve Tracer plug-in unit and a 5000 -series oscilloscope system.

## 2. Digital Multimeter

Description: 10 megohm input impedance and 0 to 1 ki lovolt range, ac and dc; ohmmeter, 0 to 50 megohms; accuracy, within $0.1 \%$. Test probes must be insulated to prevent accidental shorting.
Purpose:Check voltages and resistances.


Figure 5-3. Orientation of multi-pin connector holders.

## 3. Test Oscilloscope

Description: Frequency response, dc to 100 megahertz minimum; deflection factor, 5 millivolts to 5 volts/division and 1 milliamp to $1 \mathrm{amp} /$ division. A $10 \mathrm{X}, 10$-megohm voltage probe should be used to reduce circuit loading for voltage measurements. For current waveforms, use a Tektronix current probe with passive termination.
Purpose: Check operating waveforms.
Recommended type: Refer to the Tektronix Products Catalog for applicable oscilloscope system.

## 4. Variable Autotransformer

Description: Output variable from 0 to 140 volts (or 0 to 280 volts), 10 amp minimum rating. Must have three-wire power cord, plug, and receptacle.

Purpose: Vary input line voltage when troubleshooting in the power-supply unit.
Recommended type: General Radio W10MT3W Variac Autotransformer (for 115 -volt line only).

## 5. Isolation Transformer

Description: 1:1 turns ratio, 500 volt-amperes minimum rating. 50-60 cycle. Must have three-wire power cord, plug, and receptacle with ground connection carried through from input to output.

Purpose: To isolate 7934 from line potential when troubleshooting power supply.

Recommended type: Stancor \#P6298 (for 115-volt line only) modified to include three-wire power cord, plug, and receptacle.

## Troubleshooting Techniques

This troubleshooting procedure is arranged to check the simple trouble possibilities before proceeding with extensive troubleshooting. The first few checks ensure proper connection, operation, and adjustment. If the trouble is not located by these checks, the remaining steps aid in locating the defective component. When the defective component is located, replace it following the replacement procedures given under Corrective Maintenance.

## 1. Check Control Settings

Incorrect control settings can indicate a trouble that does not exist. If there is any question about the correct function or operation of any control on the 7934, refer to Section 2, Operating Instructions.

## 2. Check Associated Equipment

Before proceeding with troubleshooting, check that the equipment used with this instrument is operating correctly. Also, check that the input signals are properly connected and that the interconnecting cables are not defective. Check the line-voltage source.

## 3. Visual Check

Visually check that portion of the instrument in which the trouble is located. Many troubles can be found by visible indications, such as unsoldered connections, broken wires, damaged circuit boards, and damaged components.

## 4. Check Instrument Adjustment

Check the electrical adjustment of this instrument, or of the affected circuit if the trouble appears in one circuit. The apparent trouble may only be a result of misadjustment. Complete adjustment instructions are given in Section 6, Checks and Adjustments.

## 5. Isolate Trouble to a circuit

To isolate trouble to a particuiar circuit, note the trouble symptom. The symptom often identifies the circuit in which the trouble is located. When trouble symptoms appear in more than one circuit, check the affected circuits by taking voltage and waveform measurements. Also check for the correct output signals at the rear-panel output connectors with a test oscilloscope. If the signal is correct, the circuit is
working correctly up to that point. For example, correct sawtooth output indicates that the time-base unit and sawtooth output portion of the Output Signals circuit is operating correctly. If a malfunction in the Readout System is suspected of causing trouble to appear in the Z-Axis Amplifier, Vertical Amplifier, or Horizontal Amplifier circuits, the trouble can be localized by disconnecting the Readout System circuit board. This board can be disconnected without significantly affecting the operation of other circuits in the instrument.

Incorrect operation of all circuits often indicates trouble in the power supply. Check first for correct voltage of the individual supplies. However, a defective component elsewhere in the instrument can appear as a power-supply trouble and may also affect the operation of other circuits. If incorrect operation of the power supplies is suspected, refer to Troubleshooting the High-Efficiency Power-Supply Unit given later in this section.

Figure 8-51 provides a guide for locating a defective circuit. Start at the top of the chart and perform the checks given on the left side of the page until a step is found that does not produce the indicated results. Further checks, or the circuit in which the trouble is probably located, are listed to the right of the step. This chart does not include checks for all possible defects; use steps 6 and 7 in such cases.

After the defective circuit has been located, proceed with steps 6 and 7 to locate the defective component(s).

## 6. Check Voltages and Waveforms

Often the defective component can be located by checking for the correct voltages or waveforms in the circuit. Typical voltages and waveforms are given in Section 8, Diagrams and Circuit Board Illustrations.

## NOTE

Voltages and waveforms given in Section 8, Diagrams and Circuit Board Illustrations, are not absolute and may vary slightly between 7934 Storage Oscilloscopes. To obtain operating conditions similar to those used to take these readings, see the appropriate schematic.

## 7. Check Individual Components

The following procedures describe methods of checking individual components in the 7934. Components which are soldered in place are best checked by first disconnecting one end. This isolates the measurement from the effects of surrounding circuitry.

## WARNING

To avoid electric-shock hazard, always disconnect the 7934 from the power source before removing or replacing components.

FUSES. Check for open fuses by checking continuity with an ohmmeter.

TRANSISTORS. A good check of transistor operation is actual performance under operating conditions. A transistor can most effectively be checked by substituting a new component for it (or one which has been previously checked). However, be sure that circuit conditions are not such that a replacement transistor might also be damaged. If substitute transistors are not available, use a dynamic tester. Statictype testers are not recommended, since they do not check operation under simulated operating conditions.

INTEGRATED CIRCUITS. Integrated circuits can be checked with a voltmeter, test oscilloscope, or by direct substitution. A good understanding of the circuit operation is essential to troubleshooting circuits using integrated circuits. In addition, operating waveforms, logic levels, and other operating information for the integrated circuits are given in Section 4, Theory of Operation and Section 8, Diagrams and Circuit Board Illustrations. Use care when checking voltages and waveforms around the integrated circuits so that adjacent leads are not shorted together. A convenient means of clipping a test probe to the in-line, multi-pin integrated circuits is with an integrated-circuit test clip. This device also doubles as an integrated-circuit extraction tool.

DIODES. A diode can be checked for an open or shorted condition by measuring the resistance between terminals with an ohmmeter scale having a low internal source current, such as the $R \times 1 \mathrm{~K}$ scale. The resistance should be very high in one direction and very low when the meter leads are reversed.

## CAUTION

When checking diodes, do not use an ohmmeter scale that has a high internal current, since high currents may damage the diodes under test.

RESISTORS. Check the resistors with an ohmmeter. Resistor tolerances are given in Section 7, Replaceable Electrical Parts. Normally, resistors do not need to be replaced unless measured value varies widely from the specified value.

CAPACITORS. A leaky or shorted capacitor can best be detected by checking resistance with an ohmmeter on the highest scale. Do not exceed the voltage rating of the capacitor. The resistance reading should be high after initial charge of the capacitor. An open capacitor can best be detected with a capacitance meter or by checking if the capacitor passes ac signals.

## 8. Repair and Adjust the Circuit

If any defective parts are located, follow the replacement procedures given under Component Replacement in this section. Check the performance of any circuit that has been repaired or that has had any electrical components replaced. Adjustment of the circuit may be necessary. See Section 6, Checks and Adjustments for performance check and adjustment procedure.

## TROUBLESHOOTING THE HIGHEFFICIENCY POWER-SUPPLY UNIT

## General

The following information is provided to facilitate troubleshooting the high-efficiency power-supply unit. Information contained in other sections of this manual should be used in conjunction with this procedure to aid in locating a defective component. An understanding of the circuit operation is valuable in locating troubles. See Section 4, Theory of Operation, for this information. Specifications for the troubleshooting equipment referred to in this procedure are given earlier in this section under Troubleshooting Equipment.

## WARNING

Extreme caution must be used when troubleshooting in the power-supply unit due to the line voltage and the high-voltage/high-current potentials present in the unit.

When a fault condition occurs which is not of sufficient magnitude to open the line fuse, power-supply protection circuitry causes the inverter to operate in a pulse mode. In this mode the inverter turns on for a short period of time, and then turns off for a longer period of time. This cycle repeats until power is disconnected or the malfunction is corrected. This pulse mode causes either a "ticking" or a "chirping" sound. Whenever either of these sounds is heard, turn off the 7934 and proceed with the Preliminary PowerSupply Check Procedure given below.

## Preliminary Power-Supply Check Procedure

## WARNING

To avoid electric shock, always disconnect the instrument from the power source before removing or replacing components or plug-in units.

1. Remove all plug-in units from the mainframe.
2. Set the CONTROL ILLUMINATION switch on the rear panel to the OFF position, and the GRAT ILLUM control on the front panel to the fully clockwise position.
3. Remove the power-supply unit from the mainframe following the procedure given later in this section under Component Removal and Replacement.
4. Connect the power-cord plug of the 7934 to the output of a variable autotransformer which is set for 115 volts (or 230 volts). Connect the autotransformer to an isolation transformer and plug the isolation transformer into a 115 -volt (or 230 volt) power source.
5. Push the 7934 POWER button in (to turn the instrument on) and note the trouble symptoms.
6. Turn the 7934 off and proceed to the appropriate step in the Troubleshooting Procedure as indicated by the Trouble symptom column in Table 5-2.

## Power-Supply Troubleshooting Procedure

STEP A: Check Line Fuse. To check the line fuse, proceed as follows:

1. Check the line fuse ( F 10 ), located on the rear panel of the power-supply unit, for continuity and proper rating (see Section 7, Replaceable Electrical Parts).
2. If the line fuse is open, replace with a new one of proper rating.

STEP B: Isolate Power Supply Malfunction From Mainframe Circuitry. To isolate the malfunction, proceed as follows:

Table 5-2
RECOMMENDED POWER SUPPLY TROUBLESHOOTING SEQUENCE

| Trouble Symptom | Procedure | Proceed to Troubleshooting Step: |
| :---: | :---: | :---: |
| 7934 inoperative; no pulse mode. | 1. Check line fuse. | A |
| 7934 inoperative; no pulse mode; line fuse open | 1. Isolate malfunction from the mainframe circuitry. | B |
|  | 2. Check line input circuit. | D |
|  | 3. Check inverter circuit. | G |
| 7934 inoperative; no pulse mode; line fuse normal. | 1. Check inverter circuit. | G |
| 7934 operating in the pulse mode. | 1. Isolate malfunction from the mainframe circuitry. | B |
|  | 2. Check pre-regulated power supplies. | C |
|  | 3. Check crt and high-voltage circuits. | E |
|  | 4. Check inverter control circuit. | F |
|  | 5. Check inverter circuit. | G |

## WARNING

Use extreme caution when troubleshooting in the Power-Supply Unit, to avoid electric shock. Stored dc potentials on the Power-Supply Inverter circuit board remain long after the instrument is disconnected from the power source. Verify that the power-cord plug is disconnected and that the line storage capacitors (C16 and C17) are completely discharged before attempting any repairs or resistance measurements. (A warning-indicator neon bulb, located on the PowerSupply Inverter board, flashes when this stored voltage exceeds about 80 volts. However, simply because the neon bulb is not flashing does not mean that the capacitors are fully discharged.)

1. Remove the 7934 power-cord plug from the power source.
2. Remove the protective cover from the power-supply unit following the procedure under Access to Components in the Power-Supply Unit given later in this section.
3. Manually discharge the line storage capacitors using the procedure given under Access to Components in the Power-Supply Unit.
4. Disconnect P3068, the four pin connector with the black housing on the lower rear of the Storage board, before making the following resistance checks. Check the resistance of the power supplies at the test points given in Table 5-3. (See Figures 8-43 for the location of these test points.)

## NOTE

Connect the common lead of the ohmmeter to ground when measuring power-supply resistance.
5. If any of the resistance readings are significantly lower than that listed, remove the electrical connections between the mainframe and the power-supply unit. Disconnect P82 and P83 on the LV Regulator board (see Figure 8-19). This isolates the circuitry in the mainframe from the powersupply unit. Recheck the resistance. If the readings remain low, the malfunction is located within the power supply. If the readings increase to normal or above, the malfunction is in the mainframe.
6. Replace all electrical connections which were disconnected in parts 4 and 5 .

STEP C: Check Pre-Regulated Power Supplies. To check the pre-regulated power supplies, proceed as follows:

1. Connect a 10 X voltage probe from the test oscilloscope to resistor R84 on the Control Rectifier board (see Figure 8-16). Refer to Access to Components in the PowerSupply Unit given later in this section for access to the Control Rectifier board. Set the test oscilloscope vertical deflection factor as necessary for an on-screen display; set the horizontal sweep rate for 2 milliseconds/division.
2. Set the variable autotransformer for 115 volts (or 230 volts). Connect the 7934 power-cord plug to the variable autotransformer; turn on the 7934.
3. Compare the waveform on the test oscilloscope to those shown in Figure 5-4. If the waveform resembles that of Figure $5-4 A$, proceed to Step $E$ of this procedure. If it resembles that of Figure $5-4 \mathrm{~B}$, proceed with part 4 of this step.
4. Disconnect the 10X probe. Set the test oscilloscope vertical coupling to dc and the horizontal sweep rate to 10 milliseconds/division.

Table 5-3
TYPICAL POWER-SUPPLY RESISTANCE

| Power Supply | Test Point | Ohmmeter Range | Typical Resistance <br> Reading (ohms) |
| :---: | :---: | :---: | :---: |
| +50 V | TP +50 V Sense | 20 k | 1.8 k |
| +15 V | TP +15 V Sense | 2 k | 130 |
| +5 V | TP +5 V Sense | 2 k | 15 |
| -15 V | TP -15 V Sense | 2 k | 100 |
| -50 V | TP -50 V Sense | $\times 100$ | 500 |



Figure 5-4. Current sensing waveform at R84 showing: A) Power supplies not in current limit operation. B) Power supplies in current limit operation.
5. Connect the $10 \times$ probe to the test point for each power supply given in Table 5-4 (see Figs 8-16 and 8-19 for test points). Note the polarity, amplitude, and shape of the waveform present at each test point. (Adjust the vertical deflection factor of the test oscilloscope as necessary to maintain an on-screen display.)

## NOTE

Look for a power supply where the voltage is very low in relation to the specified supply voltage.
6. When a low supply voltage is found, disconnect the 7934 from the power source and discharge the line storage capacitors following the procedure given under Access to Components in the Power-Supply Unit. Check for shorted components in the suspected power supply; also check the filter capacitors for leakage.

STEP D: Check Line Input Circuit. To check the input circuit, proceed as follows:

1. Disconnect the 7934 from the variable autotransformer and discharge the line storage capacitors following the procedure given under Access to Components in the Power-Supply unit.

Table 5-4
POWER SUPPLY TEST POINTS

| Pre-Regulated <br> Power supply | Test Point Located <br> on Control Rectifier Board |
| :---: | :--- |
| +108 V | TP126 |
| +54 V | Pin 4 of P52 |
| +17 V | Pin 6 of P52 |
| -17 V | Pin 2 of P52 |
| +8 V | Pin 7 of P50 |
| -54 V | Pin 3 of P52 |
| +5 V Lights | Pin 10 of P82 (on LV <br> Regulator board) |

## 2. Replace the line fuse.

3. Check diode bridge CR15 on the Inverter board (see Figure 8-18) and the associated line input circuit for a shorted component. If the circuit appears normal, connect the power-cord plug to the variable autotransformer.
4. Attach a 10X voltage probe from the test oscilloscope to one of the screws used to discharge C16 and C17 (see Figure 5-11). Set the variable autotransformer for 20 volts and turn the 7934 on. Set the test oscilloscope for line triggering.
5. Check for an ac waveform on the test oscilloscope (see Figure 5-5). Note the amount of dc offset in the waveform. Move the probe tip to the other capacitor screw. Check for an ac waveform which is both dc offset an equal amount and is opposite in polarity from the previous waveform. (This checks the condition of the line storage capacitors.)

STEP E: Check CRT and High-Voltage Circuits. To check the crt and high-voltage circuitry, proceed as follows:

1. Disconnect the 7934 from the power source and discharge the line storage capacitors following the procedure given under Access to Components in the Power-Supply Unit.
2. Remove multi-lead cable P40 from the Control Rectifier board (see Figure 8-16).


Figure 5-5. Typical waveforms on C16 and C17 with the line voltage set to about 20 V .
3. Set the variable autotransformer for 115 volts (or 230 volts). Connect the 7934 power-cord plug to the variable autotransformer; turn the 7934 on.
4. Check for stable operation (no pulse mode) of the power supplies. If the power supplies operate properly, a crt failure or malfunction in the high-voltage circuitry is indicated.

STEP F: Check Inverter Control Circuit. To check the inverter control circuit, proceed as follows:

1. Disconnect the 7934 from the power source and discharge the line storage capacitors following the procedure given under Access to Components in the Power-Supply Unit.
2. Remove Q54 (see Figure 8-16) from the Control Rectifier board.
3. Connect the 7934 power-cord plug to the variable autotransformer. Turn the 7934 on and apply 115 volts (or 230 volts) from the variable autotransformer. If the power supplies stabilize, check the inverter control circuit for a malfunction. If the 7934 continues in pulse mode, proceed to part 4 of this step.
4. Repeat part 1 of this step. Then remove Q52 from the Control Rectifier board (see Figure 8-16).
5. Set the variable autotransformer to 0 volts. Connect the 7934 power-cord plug to the variable autotransformer.

Turn the 7934 on. While monitoring the +108 V test point TP126 on the LV Regulator board (see Figure 8-32) with a voltmeter, slowly increase the output of the variable autotransformer until the voltmeter just reads +108 volts.

## NOTE

If the variable autotransformer output is increased past the point where the voltmeter just reaches a reading of +108 volts, the 7934 will switch to pulse mode.
6. If the power supplies stabilize, check U75 and the inverter control circuit for a malfunction. If the 7934 continues in the pulse mode, replace Q52 and Q54 and proceed to Step $G$ of this procedure.

STEP G: Check Inverter Circuit. To check the inverter circuit, proceed as follows:

1. Disconnect the 7934 power-cord plug from the power source and discharge the line storage capacitors following the procedure given under Access to Components in the Power-Supply Unit.
2. Remove Q34, Q40, CR34, and CR41 on the PowerSupply Inverter board (see Figure 8-18) and check the characteristics of each with a curve tracer. Install the tested or replaced components in the Power-Supply Inverter board. Replace the line fuse, if it is open.
3. If the faulty component was not found, check Q43, Q45, and VR45 (see Figure 8-18) with a curve tracer.

## NOTE

A shift in the Zener voltage of VR45 can cause erratic operation of the inverter circuit.
4. If the 7934 continues in the pulse mode or continues to open the line fuse, check the current waveform through T30. To do this, first repeat part 1 of this step. Then connect a current probe from the test oscilloscope to the gray lead that passes through toroid transformer T30, Set the test oscilloscope for a vertical deflection factor of about 1 volt/ division and a horizontal sweep rate of 2 milliseconds/ division. Connect the 7934 power-cord plug to the variable autotransformer which is set for 0 volt. Turn the 7934 on and slowly increase the variable autotransformer output to about 60 volts. Check for a burst waveform on the test oscilloscope (similar to that shown in Figure 5-6).


Figure 5-6. Current waveform at T30 showing burst operation at line voltage of about 60 V .

## NOTE

The burst waveform indicates that the inverter circuit is attempting to start. If a burst waveform occurs, proceed to part 5; if no burst waveform is obtained, proceed to part 6.
5. If a burst waveform was obtained in part 4 above. check for stable inverter operation when the line input voltage is increased to about 85 volts. Figure $5-7$ shows the current waveform at T30 for normal inverter operation at a line voltage of 115 volts. (NOTE: The test oscilloscope horizontal sweep rate has been changed to about 50 microseconds/division for Figure 5-7.)


Figure 5-7. Current waveform at T30 for normal inverter opera" tion at line voltage of 115 V .
6. If no burst waveform occurred in part 4, repeat part 1 of this step. Then disconnect the current probe. Connect a 10X voltage probe from the test oscilloscope to TP34 on the Power-Supply Inverter board (see Figure 8-18). (After following the procedure under Access to Components in the Power Supply Unit, remove the line inverter shield from the circuit board. TP34 is labeled "TANK" on the Power Supply Inverter board. Set the variable autotransformer for 20 volts and check for a filtered line waveform which is centered about 0 volts (see Figure $5-8$ ). If the waveform is not centered, check Q46, CR32, CR40, CR45, and CR49 for shorts or leakage.


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Figure 5-8. Waveform at TP34 on the Power-Supply Inverter board with the line voltage at about 20 V .

STEP H: Check LV Rectifier Circuit. To check the LV Rectifier circuit, proceed as follows:

1. Disconnect the 7934 power-cord plug from the power source and discharge the line-storage capacitors following the procedure given under Access to Components in the Power-Supply Unit. Inspect the Control Rectifier board and connecting cables for shorts or damaged components.
2. Remove dual diode CR151 from the Control Rectifier board (see Fig 8-16) and check with a curve tracer. Reinstall tested or replaced parts, making certain that the case is not shorted to the heat sink.
3. Lift one side of CR140, CR141, CR142, and CR143 on the Control Rectifier board (see Figure 8-16) and check with a curve tracer. Reconnect tested or replaced parts.
4. Lift one side each of CR130, CR131, CR132, CR133, CR150, and CR153 on the Control Rectifier board (see Figure 8-16) and check with a curve tracer. Reconnect tested or replaced parts.

## Maintenance-7934 Service

5. Check the electrolytic capacitors which filter the supplies for shorts.

## CORRECTIVE MAINTENANCE

Corrective maintenance consists of component replacement and instrument repair. Special techniques required to replace components in the 7934 Storage Oscilloscope are given here.

## Obtaining Replacement Parts

All electrical and mechanical part replacements for the 7934 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 parts list for value, tolerance, rating, and description.

## NOTE

When selecting replacement parts, remember that the physical size and shape of a component may affect its performance in the instrument. All replacement parts should be direct replacements unless you know that a different component will not adversely affect instrument performance.

Special Parts. Some parts are manufactured or selected by Tektronix, Inc. to satisfy particular requirements, or are manufactured to Tektronix, Inc. specifications. Most of the mechanical parts used in this instrument have been manufactured by Tektronix, Inc. To determine manufacturer of parts, refer to Cross Index to Manufacturers given in the parts list.

Also, some electrical parts are selected for a value that provides optimum circuit operation. These parts are identified by "SEL" next to the value on the schematic diagram. Criteria for these selected parts are provided in tables adjacent to the schematic diagram on which the part is located.

Ordering Parts. When ordering replacement parts from Tektronix, Inc., include the following information:

1. Instrument type.
2. Instrument serial number.
3. A description of the part (if electrical, include circuit number).
4. Tektronix part number.

## Soldering Techniques

## WARNING

To avoid electric-shock hazard, disconnect the insirument from the power source before soldering.

The reliability and accuracy of this instrument can be maintained only if proper soldering techniques are used when repairing or replacing parts. General soldering techniques which apply to maintenance of any precision electronic equipment should be used when working on this instrument. Use only 60/40 rosin/core, electronic-grade solder. The choice of soldering iron is determined by the repair to be made.

## CAUTION

> Several of the circuit boards in the 7934 are multilayer type boards with a conductive path laminated between the top and bottom board layers. All soldering on these board's should be done with extreme care to prevent breaking connections to this center conductor. Only experienced maintenance personnel should attempt repair of the following boards: Main Interface, Logic, Trigger Selector, Vertical Interface, Control Rectifier, Readout, and Storage circuit board.

When soldering on circuit boards or small wiring, use only a 15 -watt, pencil-type soldering iron. A higher wattage soldering iron may cause the etched circuit wiring to separate from the board base material and melt the insulation from small wiring. Always keep the soldering-iron tip properly tinned to ensure the best heat transier to the solder joint. Apply only enough heat to remove the component or to make a good solder joint. To protect heat-sensitive components, hold the component lead with a pair of long-nose pliers between the component body and the solder joint. Use a solder-removing wick to remove excess solder from connections or to clean circuit board pads.

The following technique should be used to replace a component on any of the circuit boards not mentioned in the preceding Caution. Most components can be replaced without removing the board(s) from the instrument.

1. Touch the soldering iron to the lead at the solder connection. Never place the iron directly on the board, as this may damage the board.
2. Melt a small amount of solder onto the component lead connection. This replaces the flux, which may have been removed during instrument cleaning, and facilitates removal of the component.
3. Grip the component lead with a pair of long-nose pliers. When the solder begins to flow, gently pull the component lead from the board. If unable to separate the lead from the board, try removing the other end of the component.

## NOTE

Some components are difficult to remove from the circuit boards due to a bend placed in each lead during machine insertion of the component. The purpose of the bent leads is to hold the component in position during a flow-solder manufacturing process which solders all components at once. To make removal of machine inserted components easier, straighten the leads of the component on the back of the circuit board, using a small screwdriver or pliers, while heating the soldered connection.
4. Bend the leads of the replacement component to fit the holes in the circuit board. If the component is replaced while the board is mounted in the instrument, cut the leads so they will just protrude through the board. Insert the leads into the holes in the board so that the component is firmly seated against the board, or as originally positioned.
5. Touch the iron to the connection and apply enough solder to make a firm solder joint.
6. Cut off any excess lead protruding through the board (if not clipped in step 4).
7. Clean the area around the solder connection with a flux-removing solvent. Be careful not to remove information printed on the circuit board.

## COMPONENT REMOVAL AND REPLACEMENT

## WARNING

To avoid electric-shock hazard, always disconnect the instrument from the power source before removing or replacing components or plug-in units.

The exploded-view drawings associated with the Replaceable Mechanical Parts list (located at the rear of this manual) may be helpful in the removal or disassembly of individual components or sub-assemblies.

## Display Unit Kickstand

The Display Unit of the 7934 Storage Oscilloscope is equipped with a kickstand to ease access to internal components of the instrument (see Figure 5-9). To use the kickstand, disconnect the power-cord plug from the power source. Then remove the side panels as described under Cabinet Panel Removal. Remove the two screws on each side of the 7934 which connect the two units. This allows the upper portion of the frame coupling to be pivoted outward. The Display Unit and Acquisition Unit of the 7934 can now be separated at the front of the instrument; the kickstand holds the units apart.

To completely separate the two units, first disconnect all cables between the two units. Then remove the two clamp brackets at the rear of the frame-coupling channel. Snap the ends of the kickstand out of its brackets (it may be necessary to drop the kickstand slightly) and then separate the units.

To assemble the units, reverse the disassembly procedure.

## Power-Supply Unit Removal

The power-supply unit can be slid out of the rear of the 7934 to gain better access to the Logic board, Trigger Selector board, LV Regulator board, or for power-supply maintenance and troubleshooting. To remove the power-supply unit from the mainframe, first remove the four screws which hold the power-supply unit to the rear frame of the instrument (see Figure 5-10). Slide the power-supply unit out of the mainframe until it can be set down on the work surface (be sure to guide the interconnecting cables so they do not catch on other parts of the instrument). The power-supply unit remains electrically connected to the rest of the instrument in this position, allowing for troubleshooting. If it is necessary to operate this instrument with the power-supply unit removed for a period of time, we recommend that the power-supply unit be secured to the instrument with long screws and spacers between the rear frame and the powersupply unit.

Reverse the above procedure when installing the powersupply unit into the mainframe of the instrument; be careful not to pinch the interconnecting cables when replacing the unit. Be sure that all securing screws are tight enough to hold the power-supply unit in place.


Figure 5-9. Use of kickstand to gain access to interior of the 7934.

## Access to Components in the Power-Supply Unit

To reach components located inside the power-supply unit for maintenance or repair, use the following procedure:

## WARMING

Disconnect the instrument from the power source and allow the line storage capacitors to discharge before removing the power-unit cover. The line storage capacitors remain charged with high voltage dc for several minutes after the line power is disconnected unless they are manually discharged. A warning-indi-
cator neon bulb, located on the Power-Supply Inverter board, flashes when this stored voltage exceeds about 80 volts. Do not remove the power-unit cciver while this light is flashing.

1. Slide out the power unit as previously described.
2. Remove the four small screws that secure the cover to the rear heatsink.
3. Remove the nine screws that attach the sides of the cover to the power unit chassis.


Figure 5-10. Power-supply unit securing screws.
4. Disconnect the two coaxial connectors from P40 on the Control Rectifier board (see Figure 8-16).
5. Remove the cover from the power-supply unit.
6. The power-supply unit is now open for maintenance or repair. If the 7934 is to be operated with the cover removed, first reconnect the coaxial cables to P40 on the Control Rectifier board.
7. Reverse the order of removal to replace the powerunit cover.

Before performing maintenance or taking resistance measurements in the power-supply unit, manually discharge the line storage capacitors (C16 and C17) as follows:

1. Remove the protective cover from the power-supply unit following the above procedure.
2. Apply a 1.5 kilohm, 2-watt, insulated resistor across the capacitor screws as indicated in Figure 5-11.


Figure 5-11. Location of line storage capacitor screws used to manually discharge C16 and C17.

## Cathode-Ray Tube Removal

Remove the cathode-ray tube (crt) as follows:

## WARNING

The crt may retain a dangerous electrical charge. Before removing the crt, the anode must be fully discharged by shorting the anode lead from the crt to the chassis. Wait approximately ten minutes and again firmly short this lead to the chassis. Then remove the crt. After removal, short the anode lead to the silvered patch on the funnel portion of the crt just prior to further handling.

## WARNING


#### Abstract

Use care when handling a crt. Breakage of the crt causes a high-velocity scattering of glass fragments (implosion). Protective clothing and safety glasses should be worn. Avoid striking the crt on any object which might cause it to crack or implode. When storing a crt, place it in a protective carton or set it face down in a protected location on a smooth surface with a soft mat under the faceplate.


1. Remove the crt base-pin socket from the rear of the crt.
2. Loosen the two screws located above and below the crt base pins until the tension of the springs on these screws is released. Then, press in on the screws to be certain that the crt clamp inside the crt shield is loose.
3. Disconnect the four vertical deflection-plate connectors from the left side of the crt.
4. Disconnect the two horizontal deflection-plate connectors and the geometry connector from the top of the crt.
5. Disconnect the cables from P2976 and P3068 on the Storage board (see Figure 8-29), and the Y-Axis coil cable from P2443 on the Storage Mode Switch board (see Figure 8-27). Note the location and dress of the cables so they can be correctly replaced.
6. Disconnect the crt anode lead from the jack located at the high-voltage box on the right of the instrument. Ground this lead to the chassis to dissipate any stored charge remaining in the crt.
7. Remove the plastic mask which covers the crt bezel.
8. Remove the two screws and the metal tabs securing the light filter to the crt bezel. Remove the light filter and frame.
9. Remove the two remaining screws securing the crt bezel to the front panel. Remove the bezel while disconnecting the three-pin connector from the left rear of the bezel.
10. Remove the plastic face-plate protector, the graticule light assembly, and black crt face-plate mask. (The
graticule light assembly need not be unsoldered from its leads.)
11. Hold one hand on the crt face-plate and gently push forward on the crt base with the other. Slowly pull the crt out from the front of the instrument while guiding the storage and $Y$-Axis coil cables, and the crt anode lead, through the holes in the crt shield.

## Cathode-Ray Tube Replacement

Replace the cathode-ray tube (crt) as follows:

1. Insert the crt into the shield, guiding the crt anode plug and the storage and $Y$-Axis coil cables throught the holes in the crt shield. Set the crt firmly against the cushions mounted at each corner of the face-plate.
2. Clean the crt face-plate, plastic face-plate protector, and the light filter with denatured alcohol.
3. Place the black crt mask over the face-plate. Reconnect the multi-pin connector to the crt bezel (align the arrow on the connector with the arrow on the bezel).
4. Hold the face-plate protector in position and replace the crt bezel, graticule light assembly, light filter frame, and light filter. Firmly tighten the four screws making sure that the two metal clips securely hold the light filter.
5. Gently push forward on the crt base to ascertain that the crt is as far forward as possible. Then tighten the two screws beside the crt base until the springs on the screws are fully compressed.
6. Place the crt base-pin socket onto the crt base pins.
7. Reconnect the crt anode plug.
8. Carefully reconnect all cables and crt neck-pin connectors.
9. Replace the plastic crt bezel mask.

## NOTE

Replacement of the crt will require that the instrument be re-adjusted. Refer to Section 6, Checks and Adjustments.

## Circuit Board Replacement

If a circuit board is damaged beyond repair, replace the entire board assembly. Part numbers are given in Section 7, Replaceable Electrical Parts, for the completely wired boards.

Most of the circuit boards in this instrument are mounted on the chassis: pin connectors are used for electrical interconnection with chassis-mounted components and other circuit boards. Several boards plug onto the front and rear of the Main Interface board; feed-thru connectors connect these plug-on boards to the Main Interface board.

## NOTE

When removing wires from a circuit board, tag the wires and the corresponding connection point on the circuit board.

Main Interface Plug-on Boards. Remove and replace the Main Interface plug-on boards (Logic, Trigger Selector, Vertical Interface, and Horizontal Interface) as follows:

1. Remove the plug-in units or the power-supply unit (see Power-Supply Unit Removal) as necessary to gain access to the boards mounted on the front or rear of the Main Interface board.
2. Disconnect any end-lead coaxial connectors located on the front of the Main Interface board, or those which pass across a portion of the board. Note the location so they can be correctly replaced.
3. Loosen all of the board's securing screws.
4. Keeping the board parallel to the Main Interface board, gently pull out on the edge of the board until the feedthru terminals are cleared.
5. To replace a plug-on circuit board, position the board parallel to the Main Interface board so that all feed-thru pins are properly aligned with their sockets.
6. Gently press the circuit board against the mounting surface. Be sure that all feed-thru pins and sockets mate properly.
7. Uniformly tighten the securing screws (recommended torque: four to six inch-pounds).
8. Replace any connectors. Correct location is shown on the circuit board illustrations in Section 8, Diagrams and Circuit Board Illustrations.

Main Interface Circuit Board. Remove and replace the Main Interface circuit board as follows:

1. Remove the plug-in units and the power-supply unit (see Power-Supply Unit Removal).
2. Remove the three metal shields in front of the Main Interface board at the rear of the plug-in compartments.
3. Disconnect all multi-pin connectors and coaxial cables from the Main Interface board. Note the location of the connectors so they can be correctly replaced.
4. Remove the screws from inside each plug-in compartment which hold the plug-in interface connectors to the chassis (see Figure 5-12). Also remove the screws which hold the ground straps to the chassis.
5. Slide the Main Interface board assembly to the rear of the instrument and remove it.
6. Replace the Main Interface circuit board in the reverse order of removal. Match the index arrow on the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on Figure 8-4.

Follower Circuit Boards. A follower circuit board with six interface contacts is used in each vertical interface connector (two left plug-in compartments) to provide optimum signal and trigger connections between the plug-in unit and the 7934. Each Follower board is held in place by a spring so that the board can move back and forth within the interface connector to compensate for length differences between plug-in units. If a contact on a Follower board is damaged, the entire board with contacts and interconnecting cables must be replaced as a unit.

Remove a Follower circuit board as follows:

1. Disconnect the instrument from the power source and remove the plug-in units.
2. Remove the power supply unit (see Power Supply Unit Removal).


Figure 5-12. Location of securing screws for the Main Interface board.
3. Remove the metal shields in front of the Main Interface board at the rear of the plug-in compartments.
4. Disconnect the coaxial leads of the Follower board from the Vertical Interface and the Trigger Selector circuit boards. Note the location so they can be correctly replaced.
5. Using long-nose pliers, remove the spring from the Follower board.
6. Remove the Follower board with interconnecting cables from the rear of the interface connector, through the hole in the Main Interface board.

To replace a Follower circuit board, a folded length of thin shim stock as wide as the Follower board is required to compress the contacts while the board is inserted into the interface connector. Proceed as follows:

1. Hold the Follower board between the ends of the shim stock with the fold directly in front of the contacts. With the shim stock held against the sides of the board, the contacts on the sides of the board should be pressed together.
2. Insert the folded end of the shim stock (with the Follower board) into the rear of the interface connector through the hole in the Main Interface board. When the Follower board contacts are almost fully inserted into the connector, hold the board in place and remove the shim stock through the front of the interface connector while inserting the Follower board.
3. Secure the Follower board with the spring.
4. Reconnect the Follower board coaxial leads to the Vertical Interface and Trigger Selector boards.
5. Replace the power supply unit.
6. Replace the metal shields at the rear of the plug-in compartments.

Mode Switch Circuit Board. Remove and replace the Mode Switch circuit board as follows:


Do not allow solder or solder flux to flow under circuit board switches. The circuit board is part of the switch contacts and intermittent operation can occur if contaminated.

1. Separate the Display Unit from the Acquisition Unit as described previously under Display Unit Kickstand.
2. Remove the VERT TRACE SEPARATION (B) knob.
3. Disconnect all multi-pin connectors from the Mode Switch board. Note the location so they can be correctly replaced.
4. Remove the four screws holding the board to the chassis.
5. Slide the board toward the rear of the instrument until the pushbuttons clear the front panel.
6. Lift the board from the instrument.
7. Replace the board by reversing the order of removal. Match the index arrow on the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

Storage Mode Switch Circuit Board. Remove and replace the Storage Mode Switch board as follows:

1. Disconnect all multi-pin connectors from the Storage Mode Switch board. Note the location so they can be correctly replaced.
2. Remove the two screws securing the board to the chassis.
3. Slide the board toward the rear of the instrument until the attached pushbuttons clear the front panel.
4. Remove the board from the instrument.
5. Replace the Storage Mode Switch board by reversing the order of removal. Match the index arrow on the connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the Circuit Board illustration in Section 8, Diagrams and Circuit Board Illustrations.

Storage Control Circuit Board. Remove and replace the Storage Control Board as follows:

1. Disconnect all multi-pin connectors from the Storage Control board. Note the location so they can be correctly replaced.
2. Remove the MULTI TRACE DELAY, SAVE INTENSITY, PERSISTENCE, ERASE, and AUTO ERASE knobs (ERASE knob pulls off).
3. Remove the securing nuts on each of the above controls.
4. Slide the board toward the rear of the instrument until the control shafts clear the front panel.
5. Lift the board from the instrument.
6. Replace the Storage Control board by reversing the order of removal. Match the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

Signal Output Circuit Board. Remove and replace the Signal Output board as follows:

1. Remove the power supply unit (see Power Supply Unit Removal).

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2. Disconnect all multi-pin connectors and coaxial cables from the board. Note the location so they can be correctly replaced.
3. Using a vacuum-type desoldering tool, disconnect the BNC and probe power connectors from the board.
4. Remove the four screws securing the board to the chassis.
5. Replace the Signal Output board in the reverse order of removal. Match the index arrow on the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

Vertical Amplifier Circuit Board. Remove and replace the Vertical Amplifier board as follows:

1. Disconnect all multi-pin connectors and coaxial cables from the Vertical Amplifier board. Note the location so they can be correctly replaced.
2. Carefully disconnect the two vertical deflection-plate connectors from the side of the crt.
3. Remove the two bronze-colored screws from the front Hypcon connector.
4. Remove the four screws securing the board to the chassis.
5. Remove the board from the instrument.
6. Replace the Vertical Amplifier board by reversing the order of removal. Match the index arrow on the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

Horizontal Amplifier Circuit Board. Remove and replace the Horizontal Amplifier board as follows:

1. Disconnect all multi-pin connectors and coaxial cables from the Horizontal Amplifier board. Note the location so they can be correctly replaced.
2. Carefully disconnect the three connections to the Horizontal Amplifier board from the top of the crt.
3. Remove the four screws securing the board to the chassis.
4. Remove the board from the instrument.
5. Replace the Horizontal Amplifier board by reversing the order of removal. Match the index arrow on the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

Readout Circuit Board. Remove and replace the Readout board as follows:

1. Separate the Display Unit from the Acquisition Unit as described previously under Display Unit Kickstand.
2. Disconnect all multi-pin connectors and coaxial cables from the Readout board. Note the location so they can be correctly replaced.
3. Remove the four screws securing the board to the chassis.
4. Remove the board from the instrument.
5. Replace the Readout board by reversing the order of removal. Match the index arrow on the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

Storage Circuit Board. Remove and replace the Storage board as follows:

1. Remove the protective plastic shield from the upper right-hand corner of the Storage board by removing the plastic securing screw.
2. Disconnect all multi-pin connectors and coaxial cables from the Storage board. Note the location so they can be correctly replaced.
3. Remove the six screws securing the board to the chassis.
4. Slide the board toward the rear of the instrument until the attached front-panel pushbuttons clear the chassis. Remove the board from the instrument.
5. Replace the Storage board by reversing the order of removal. Match the index arrow on the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

Intensity Control Circuit Board. Remove and replace the Intensity Control Board as follows:

1. Remove the Storage board as described above.
2. Disconnect all multi-pin connectors from the Intensity Control board. Note the location so they can be correctly replaced.
3. Remove the FOCUS, A INTENSITY, BEAMFINDER, B INTENSITY, READOUT, and GRAT ILLUM knobs (BEAMFINDER knob pulls off).
4. Remove the securing nuts on each of the above controls.
5. Slide the board toward the rear of the instrument until the control shafts clear the front panel.
6. Lift the board from the instrument.
7. Replace the Intensity Control board by reversing the order of removal. Match the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board lilustrations.

Z-Axis Circuit Board. The Z-Axis board is located behind the fan housing at the rear of the Display Unit. Remove and replace the Z-Axis board as follows:

1. Remove the four screws which attach the fan cover to the rear of the Display Unit (two on each side).
2. Remove the two plastic screws securing the plastic cover to the board.
3. Disconnect all multi-pin connectors and coaxial cables from the Z-Axis board. Note the location so they can be correctly replaced.
4. Remove the four screws securing the board to the chassis.
5. Remove the board from the instrument.
6. Replace the Z-Axis board by reversing the order of removal. Match the index arrow on the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

Focus Circuit Board. The Focus board is located in the high-voltage box. Remove and replace the Focus board as follows:

1. Remove the four screws which attach the fan housing to the rear of the Display Unit (two on each side).
2. Remove the four screws securing the high-voltage protective cover to the chassis.
3. Disconnect all multi-pin connectors from the Focus board. Note the location so they can be correctly replaced.
4. Remove the four screws securing the Focus board to the chassis.
5. Lift the board from the instrument.
6. Replace the Focus board by reversing the order of removal. Match the index arrow on the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

High-Voltage Circuit Board. The High-Voltage board is located in the high-voltage box. Remove and replace the High-Voltage board as follows:

1. Remove the Focus board, as previously described, to gain access to the High-Voltage board.
2. Disconnect the multi-pin connectors from the HighVoltage board. Note the location so they can be correctly replaced.
3. Disconnect the crt anode lead. Ground the lead to the chassis to dissipate any stored charge remaining in the crt.

## CAUTION

Do not touch any components with the crt anode lead until it is fully discharged.

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4. Remove the two screws securing the High-voltage board to the chassis.
5. Lift the board from the instrument.
6. To replace the High-voltage board, reverse the order of removal. Match the index arrow on the pin connectors to the arrow on the board. Correct location of the pin connectors is shown of the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

LV Regulator Circuit Board. Remove and replace the LV Regulator circuit board as follows:

1. Remove the power-supply unit (see Power-Supply Unit Removal).
2. Disconnect the multi-pin connectors from the LV Regulator board. Note the location so they can be correctly replaced.

## NOTE

If the LV Regulator board is to be removed to allow access to other parts of the power-supply unit, proceed with steps 3 and 4 only. If the board is to be removed from the instrument, proceed with the remaining steps of the procedure.
3. Remove the two screws located in the access holes under the LV Regulator board. These screws secure the board to the chassis.
4. Remove the four screws securing the LV Regulator chassis to the rear heatsink. Then remove the two screws securing the LV Regulator chassis to the main power supply chassis (located in front of the LV Regulator board). Now remove the board with attached chassis.
5. Remove the mounting hardware securing the plastic-cased power transistors to the rear heatsink (see Fig. 5-13). Note the position of the lockwashers so they can be correctly replaced.
6. Remove the five securing screws and lift the board with attached power transistors from the chassis.
7. To replace the LV Regulator board, first apply a thin coat of silicone grease to the back (mounting surface) of each power transistor.

Handle silicone grease with care. Avoid getting silicone grease in your eyes. Wash hands thoroughly after use.
8. Place the LV Regulator board on the chassis. Replace but do not tighten, the securing screws.
9. Check that the power transistors are aligned with their mounting screws and that the insulating washers are in place between the transistor cases and the rear heatsink.
10. Secure the transistors with the mounting harclware. Do not over-tighten the nuts; recommended torque is four to six inch-pounds.
11. Tighten the screws holding the LV Regulator board to the chassis.
12. Install the chassis on the power-supply unit.
13. Connect the multi-pin connectors to the LV Regulator board. Match the index arrow on the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown in the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.
14. Replace the power-supply unit in the instrument.

Control Rectifier Circuit Board. An exploded-view drawing of the power-supply unit is given in Section 9, Replaceable Mechanical Parts, at the rear of this manual. To remove the Control Rectifier board, use the following procedure.

1. Remove the power-supply unit (see PowerSupply Unit Removal).
2. Remove the protective cover from the power-supply unit (see Access to Components in the Power-Supply Unit).
3. Remove the LV Regulator board with attached chassis as described previously.
4. Disconnect the multi-pin connectors from the Control Rectifier board. Note the location so they can be correctly replaced.


Figure 5-13. Correct placement of power transistor and mounting hardware on rear heatsink.
5. Remove the two plastic screws which hold the circuitboard shield to the Inverter Board.
6. Unsolder the three power-transformer leads from the Power-Supply Inverter board. Remove the excess solder from the board pads with a vacuum-type desoldering tool.
7. Remove the four screws securing the power transformer to the power-supply rear heatsink.
8. Remove the five securing screws from the Control Rectifier board.
9. Lift the Control Rectifier board and attached power transformer from the power-supply unit.
10. To replace the Control Rectifier board, reverse the order of removal. Match the index arrow on the pin connec-
tors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

Inverter Circuit Board. An exploded-view drawing of the power-supply unit is given in Section 9, Replaceable Mechanical Parts, at the rear of this manual. Remove and replace the Inverter board as follows:

## WARNIMG

The power-supply unit has been tested at the factory to ensure safe operation. Improper repair of this unit can result in hazardous potentials on the instrument chassis. Do not remove the plate insulator, block insulator, or transistor shield from the heatsink. (See the exploded-view drawing of the power-supply unit for location of these components.)

## Maintenance-7934 Service

1. Remove the power-supply unit (see PowerSupply Unit Removal).
2. Remove the protective cover from the power-supply unit (see Access to Components in the Power-Supply Unit).
3. Remove the Control Rectifier board as described previously.
4. Remove the five securing screws from the Inverter board.
5. Unsolder the line-input leads from the Inverter board. Remove any excess solder from these circuit board pads with a vacuum-type desoldering tool.
6. Remove the two power transistors by removing the securing nuts and pulling the transistors from the ceramic heatsinks.
7. Remove the Inverter board from the powersupply unit.
8. To replace the Inverter board, reverse the order of removal. Match the index arrow on the pin connectors to the corresponding arrow on the board. Correct location of the pin connectors is shown on the circuit board illustration in Section 8, Diagrams and Circuit Board Illustrations.

## Plug-In Interface Connectors

Individual contacts of the plug-in interface connectors can be replaced. However, we recommend replacing the entire Main Interface board if a large number of contacts are damaged. An alternative solution is to refer the maintenance of the damaged Main Interface board to your local Tektronix Field Office. Use the following procedure to remove and replace an individual contact of the plug-in interface connectors:

## NOTE

The plug-in interface contacts which are mounted on the Follower circuit boards cannot be replaced. A Follower board with contacts and interconnecting cables is replaced as a unit. See Follower Circuit Boards under Circuit Board Replacement earlier in this section.

1. Remove the Main Interface board from the instrument as described previously.
2. Snap the white plastic connector cover off the side of the damaged plug-in interface connector.
3. Unsolder and remove the damaged contact.
4. Install the replacement contact. Carefully position it to fit against the connector body.
5. Snap the white plastic connector cover back onto the plug-in interface connector. Check that the replaced contact is aligned with the other contacts.

## 6. Replace the Main Interface board.

## Delay Line Repair

The vertical delay line is carefully assembled and matched to the instrument at the factory. Therefore, it is not recommended that repair be attempted. Instead, contact your local Tektronix Service Center.

## Semiconductors

Semiconductors should not be replaced unless actually defective. If removed from their sockets during routine maintenance, return them to their original sockets. Unnecessary replacement of semiconductors may affect the adjustiment of the instrument. When semiconductors are replaced, check the operation of circuits which may be affected.

## WARNING

> To avoid electric-shock hazard, always disconnect the 7934 from the power source before removing or replacing components.

Replacement semiconductors should be of the original type or a direct replacement. Lead configurations of the semiconductors used in this instrument are shown in Figure 5-2. Some plastic case transistors have lead configurations which do not agree with those shown. If a replacement transistor is made by a different manufacturer than the original, check the manufacturer's basing diagram for correct ba:sing. All transistor sockets in this instrument are wired for standard basing as used for metal-cased transistors.

When removing soldered-on transistors use a solder-removing wick to remove the solder from the circuit board pads (see Soldering Techniques in this section). Transisitors which have heat radiators or are mounted on the chalssis
use silicone grease to increase heat transfer. Replace the silicone grease on both sides of the insulating washer when replacing these transistors.

## WARNING

Handle silicone grease with care. Avoid getting silicone grease in your eyes. Wash hands thoroughly atter use.

To replace one of the power transistors mounted on the heatsink at the rear of the power-supply unit, first remove the mounting hardware. Then, unsolder and remove the defective transistor. When replacing the transistor, be sure to install the insulating washer between the transistor and the heatsink (use silicone grease as previously described). Tighten the mounting nut just tight enough to hold the transistor in place. Then solder the replacement transistor to the LV Regulator board.

An extracting tool should be used to remove the in-line integrated circuits to prevent damaging the pins. This tool is available from Tektronix, Inc.; order Tektronix Part 003-0619-00. If an extracting tool is not available, use care to avoid damaging the pins. Pull slowly and evenly on both ends of the integrated circuit. Try to avoid disengaging one end from the socket before the other end.

## Hypcon Connectors

The Hypcon (hybrid-printed connector) is a precisionmade connector designed to provide low-loss electrical and thermally efficient connection between the circuit board and hybrid integrated circuits. An exploded view of the Hypcon connector is shown in Figure 5-14. Care must be taken when replacing the hybrid ICs not to touch the elastomer gold-plated contacts with your fingers or to use a cleaner which might degrade contact reliability. If it becomes necessary to use a cleaning solvent near the connector when replacing adjacent circuit board components (within $1 / 2$ inch), the Hypcon connector and hybrid IC should be removed.

## IMPORTANT

Remove all traces of solder flux or foreign material contamination from the circuit board contact area before replacing the connector. Contamination usually occurs during the soldering and cleaning process. Even when soldering is done carefully, flux, oil, or other contaminants can be carried under the connector during the cleaning operation. When the solvent evaporates, nonconductive contaminants may remain on or near the contact interfaces.

The cleaning process (either hand cleaning with a solvent or machine cleaning in an automatic detergent wash) is not recommended for boards containing Hypcon connectors.

If a component adjacent to a Hypcon connector must be replaced, the foilowing steps are recommended:

1. Remove the hybrid IC and Hypcon connector (see disassembly and removal instructions in Figure 5-14) before any soldering or cleaning and store in a dirt-free covered container. When several hybrids and Hypcon connectors are removed, keep parts together and replace as sets; do not interchange parts.
2. When hand soldering:
a. Use small diameter solder ( 0.030 to 0.040 inch).
b. Use low wattage soldering iron ( 15 to 20 watts).
c. Use care with solder amount and placement.
3. Remove solder flux and contact contamination with isopropyl alcohol, denatured ethyl alcohol, or a Freon TF cleaner such as Spray-On \#2002.
4. Flush the hybrid and Hypcon connector mounting area with isopropyl alcohol. Do not scrub with a cotton-tipped applicator as cotton fibers may adhere to edges and surfaces of contact areas and cause open or intermittent connections. The elastomer should be examined under light for dust, hair, etc., before it is re-installed. If the etched circuit board surfaces require more cleaning, scrub with a soft rubber eraser and blow or vacuum clean while dusting the surface with a small cleaning brush.
5. If the hybrid IC and elastomer contact holder are contaminated, clean by flushing or spraying with alcohol and oven dry at $50^{\circ} \mathrm{C}$. Do not scrub with a cotton-tipped applicator or similar device. If the contact holder is excessively contaminated, replace with a new one.

Two inch-pounds of torque should be applied to the mounting screws to secure the Hypcon to the circuit board.


Figure 5-14a. Hypcon assembly removal and replacement.

## DISASSEMBLY AND REMOVAL

(1) Note index on circuit board (arrow, triangle, or dot) and HYPCON plastic frame (pointed mounting ear).
(2) Unscrew and remove the 4 screw/washer assemblies. Where the HYPCON connector serves to heatsink the hybrid to the chassis, 2 of the 4 screws are longer. Note the location of the yellow tinted screws for proper replacement.
(3) Lift HYPCON connector from board.
(4) Note index location of hybrid and remove from board with tweezers.
(5) Note index location of elastomer contact holder and remove by grasping a corner of the contact holder with tweezers and lifting up. Do not touch the gold-plated contacts with your fingers.

## REASSEMBLY AND REPLACEMENT

Grasp corner of elastomer contact holder with tweezers and place in plastic frame slot being careful to match the flat contact holder with the flat frame corner. Place a clean plastic envelope over finger and press with finger to seat contact holder into the frame. The contact holder must be evenly seated on all four sides.

Flush HYPCON: Match hybrid flat corner with board receptable flat corner and place hybrid in receptable. Match pointed mounting ear of HYPCON connector with flat comer of receptacle and guide registration pins into the board hold.

Stepped HYPCON: Using tweezers, match the hybrid corner index with the elastomer contact holder index and insert between the registration pins. Turn the assembly over, grasp the hybrid "hat" with the tweezers, and guide the registration pins into the board holes. Match the plastic frame pointed mounting ear with the circuit board arrow.

Insert mounting hardware and apply 2 inch-pounds of torque to secure the connector assembly.

Figure 5-14b. Hypcon assembly removal and replacement.

## Maintenance-7934 Service

Make sure that the elastomer is properly seated in the contact holder before remounting the assembly to the circuit board. Exercise care when mounting the frame, elastomer contact holder, and hybrid IC assembly to the circuit board to prevent misalignment between the connector and board.

## CAUTION


#### Abstract

Because of the close tolerances involved, special care must be taken to assure correct index alignment of each Hypcon part during reassembly. Failure to do so can result in a cracked hybrid substrate. See Figure 5-14 for index locations.


If your instrument contains both the flush and stepped type of Hypcon connectors, be careful not to mix the elastomer contact holders during reassembly. The flush Hypcon connectors have green elastomer contact holders and the plastic frame is marked FLUSH. The stepped Hypcons have neutral-colored elastomer contact holders with a slight ridge or step on the contact surface; the large frames are marked STEPPED. The registration pins on the stepped plastic frame are slightly longer than those on the flush frame. The elastomer contact holder in the small stepped connectors is indexed differently than the large connectors. Look for a small gold arrow in one corner of the holder instead of a flat corner. Match this corner arrow with the pointed corner of the plastic frame. Give close attention to this indexing as it is easy to insert the elastomer contact holder incorrectly.

Differences also exist between the large flush and large stepped Hypcon circuit board receptacles. Figure 5-14 shows the cross-sectional differences which must be observed when working with an instrument that contains both types of Hypcon connectors.


Damage to the elastomer contact holder can result if the connectors are not mated properly with the board receptacle.

When replacing the hybrid, insert it into the board opening and then position the Hypcon connector in the board registration holes for perfect alignment. The outer portion of the Hypcon frame should be flush with the circuit board before the four mounting screws are tightened. Avoid touching the hybrid and elastomer contact holder with your fingers; finger oils can degrade reliability.

A procedure for removal and replacement of the Hypcon assembly is included in Figure 5-14.

Hybrid substrate contact numbers 1 and 20 are printed on the substrate at the index corner. See Figure 5-2, Semiconductor Lead Configurations.

## Interconnecting Pins

Two methods of interconnection are used in this instrument to electrically connect the circuit boards with other boards and components. When the interconnection is made with a coaxial cable a special end-lead connector plugs into a socket on the board. Other interconnections are made with a pin soldered into the board. Two types of mating connectors are used for these interconnecting pins. If the mating connector is mounted on a plug-on circuit board, a special socket is soldered into the board. If the mating connector is on the end of a lead, an end-lead pin connector is used which mates with the interconnecting pin. The following information provides the removal and replacement for the various types of interconnecting methods.

Coaxiai-Type End-Lead Connectors. Replacement of the coaxial-type end-lead connectors requires special tools and techniques; only experienced maintenance persionnel should attempt to remove or replace these connectors. We recommend that the damaged cable or wiring harness be replaced as a unit. For cable or wiring harness part numbers, see Section 9, Replaceable Mechanical Parts. An alternative solution is to refer the replacement of the delective connector to your local Tektronix Service Center. Figure 5-15 gives an exploded view of a coaxial end-lead connector assembly.

Circuit-Board Pins. A circuit-board pin replacement kit (including necessary tools, instructions, and replacement pins with attached ferrules) is available from Tektronix, Inc. Order Tektronix Part 040-0542-00. Replacing circuit-board pins on multi-layer boards is not recommended. (The multilayer boards in this instrument are listed under Soldering Techniques in this section.)

To replace a damaged pin, first disconnect any multi-pin connectors. Then unsolder the damaged pin and pull it from the board with a pair of pliers, leaving the ferrule (see Figure $5-16$ ) in the circuit board if possible. If the ferrule remains in the circuit board, remove the spare ferrule from the resplacement pin and press the new pin into the hole in the circuit board. If the ferrule is removed with the damaged pin, clean out the hole using a solder-removing wick and a scribe. Then press the replacement pin, with attached spare ferrule, into the circuit board. Position the replacement pin in the same manner as the original. Solder the pin to both sides of the circuit board. If the original pin was bent at an angle to mate with a connector, carefully bend the new pin to the same angle. Replace the multi-pin connector.


Figure 5-15. Coaxial end-lead connector assembly.

Circuit-Board Pin Sockets. The pin sockets on the circuit boards are soldered to the back of the board. To remove or replace one of these sockets, first unsolder the pin (use a vacuum-type desoldering tool to remove excess solder). Then straighten the tabs on the socket and remove the socket from the board. Place the new socket in the circuit board hole and press the tabs down against the board. Solder the tabs of the socket to the circuit board; be careful not to get solder inside the socket.

## CAUTION

The spring tension of the pin sockets ensures a good connection between the circuit board and the pin. This spring tension can be destroyed by using the pin sockets as a connecting point for spring-loaded probe tips, alligator clips, etc.


Figure 5-16. Exploded view of circuit-board pin and ferrule.

Multi-Pin Connectors. The multi-pin connectors used to connect wires to the interconnecting pins are clamped to the end of the associated leads. To remove or replace damaged multi-pin connectors, remove the old pin connector from the end of the lead and clamp the replacement connector to the lead. Some of the pin connectors are grouped together and mounted in a plastic holder; the overall result is that these connectors are removed and installed as a multi-pin connector (see Troubleshooting Aids). If the individual multi-pin connectors are removed from the plastic holder, note the order of the individual wires for correct replacement in the holder.

## Pushbutton Switches

The pushbutton switches used in the 7934 Storage Oscilloscope are circuit board mounted. First remove the associated circuit board following the procedure given under Circuit Boards in this section. Figure 5-17 gives removal and replacement instructions for the pushbutton switches.

(1) Make sure that all switch shafts are in the OUT position to clear the rear clip.
(2) Place the long edge of a six-inch rule or similar thin straight edge between the top edge of the rear clip and the switch body.
(3) Carefully pry the rear clip back just far enough to push the steel rule down between the clip and switch body.


When the switch is removed, the contacts may drop free and be damaged or lost. Body salts or acids can contaminate the switch contacts. Wear cotton gloves to prevent touching the contacts in the switch or on the board with bare hands.
(4) Pull the rear of the switch up, remove the steel rule, and pull the switch out of the front clip.
(5) To replace the switch, first check that the slide contacts are properly installed in the carrier. Then, place the front of the switch into the front clip and push the rear of the switch down until the rear clip catches and holds the switch in place.

Figure 5-17. Removal procedure for pushbutton switches.

## Graticule Light Bulbs

To remove or replace the graticule light bulbs, first remove the plastic crt mask, light filter, and metal light shield. Pull on the white tabs to remove the graticule lamp assembly. Unsolder the base of the damaged bulb from the circuit board and pull the bulb out of the circuit board. Reverse the order of removal for replacement.

## Power Transformer

Replace the power transformer only with a direct replacement Tektronix transformer. Remove and replace the power transformer as follows:

1. Remove the Control Rectifier board as described under Circuit Board Removal in this section.
2. Unsolder the transformer leads from the Control Rectifier board. Remove the excess solder from the circuit-board pads (see Soldering Techniques). Note the position of the transformer leads so they can be correctly replaced.
3. Remove the bracket which holds the transformer to the rear heatsink.
4. Place the new transformer in position but do not solder the leads to the circuit-board pads.
5. Secure the bracket to the Control Rectifier board and attach the transformer to the bracket with the four securing screws.
6. Reposition the Control Rectifier board and secure with the three screws. Attach the bracket securely to the rear heatsink.
7. Solder the transformer leads to the circuit-board pads.
8. Finish replacing the Control Rectifier board.

## Line Fuse

The line fuse is located on the rear panel of the powersupply unit. Replace only with a fuse of proper type and rating.

## NOTE

The line fuse is used for both 110 and 220 volt operation. No change in the fuse is necessary when switching the LINE VOLTAGE SELECTOR switch between 110 volts and 220 volts.

## ADJUSTMENT AFTER REPAIR

After any electrical component has been replaced, the adjustment of that particular circuit should be checked, as well as the adjustment of any closely related circuits. Since the low-voltage supplies affect all circuits, adjustment of the entire instrument should be checked if components have been replaced in these supplies or if the power transformer has been replaced. See Section 6, Checks and Adjustments, for a complete adjustment procedure.

## CHECKS AND ADJUSTMENTS

This section contains information necessary to perform a complete instrument check and adjustment. Limits given in this procedure are adjustment guides and should not be interpreted as performance requirements unless preceded by a check mark ( $\sim$ ). Where possible, instrument performance is checked before an adjustment is made.

## PRELIMINARY INFORMATION

## Adjustment Interval

To maintain instrument accuracy, check the performance of the 7934 every 1000 hours of operation, or every 6 months if used infrequently. Before complete adjustment, thoroughly clean and inspect this instrument as outlined in Section 5, Maintenance.

## Tektronix Field Service

Tektronix Field Service Centers and the Tektronix Factory Service Center provide instrument repair and adjustment services. Contact your Tektronix Field Office or representative for further information.

## Using This Procedure

This Check and Adjustment procedure can be used for a complete adjustment procedure or as a check of the instrument's performance. Completion of each step in the procedure ensures that the instrument is correctly adjusted and operating within specified limits. Refer to the following discussion for instructions on a complete or partial check and adjustment.

Index. An index precedes the procedure to aid in locating individual steps in the Checks and Adjustments procedure.

Performance Check. Instrument performance can be checked by performing the complete Checks and Adjustments procedure and omitting only the ADJUST part of the steps. A check mark ( $\checkmark$ ) preceding a CHECK step indicates that the limit given is a performance requirement specified in the Specification tables in Section 1.

Adjustment. Completion of each step in the Checks and Adjustments procedure ensures that the instrument is correctly adjusted and performing within specified limits. Where possible, instrument performance is checked before an adjustment is made. For best overall performance when performing the complete adjustment procedure, make each adjustment to the exact setting indicated.

Partial Procedures. The following procedure is written to completely check and adjust the instrument to the Performance Requirements listed in the Specification tables, Section 1. If the application for which the instrument is used does not require the full available performance, the procedures and the required equipment list can be shortened accordingly.

A partial performance check and adjustment may be desirable after replacing components, or to touch up the adjustment of a portion of the instrument. To check or adjust only part of the instrument, refer to the Equipment Required list which precedes the portion of the procedure you want to perform. To avoid unnecessary adjustment of other parts of the instrument, adjust only if the tolerance given in each CHECK is not met.

## TEST EQUIPMENT REQUIRED

The test equipment listed in Table 6-1 is required for a complete check and adjustment of this instrument. The test equipment specifications given in Table 6-1 are the minimum required to meet the Performance Requirements listed in the Specification tables, Section 1. Detailed operating instructions for test equipment are omitted in this procedure. Refer to the test equipment instruction manual if more information is needed.

## Special Fixtures

Special fixtures are used only where they facilitate instrument adjustment. These fixtures are available from Tektronix, Inc. Order by part number from your local Tektronix Field Office or representative.

## Checks \& Adjustments-7934 Service

## Test Equipment Alternatives

The test equipment listed in the Examples of Applicable Test Equipment column of Table 6-1 is required to check and adjust this instrument. The Checks and Adjustments procedure is based on the first item of equipment given as an example. If other equipment is substituted, control settings or setups may need to be altered. If the exact item of equipment given as an example is not available, refer to the Minimum Specifications column to determine if other equipment may be substituted. Then check the Purpose column. If you determine that your measurement requirements
will not be affected, the item and corresponding step(s) can be deleted.

## Signal Connections

Detailed signal-connection information is not provided except when critical for a particular test. Rear-panel output connectors should be connected to other equipment with 50 -ohm BNC cables. When simultaneously connecting a signal to two inputs, use a BNC T connector. For test equipment signal-connection and termination information, refer to the test equipment instruction manuals.

Table 6-1 TEST EQUIPMENT

| Description | Minimum Specification | Purpose | Examples of Applicable Test Equipment |
| :---: | :---: | :---: | :---: |
| 1. Precision DC Voltmeter | Range, -75 to +150 volts; accuracy, within $0.1 \%$ | Check and adjustment of calibrator output accuracy, power supply voltages, Z-axis display, and storage system voltages. | a. Tektronix DM 501 Digital Multimeter with power module. <br> b. Fluke Model 825A Differential DC Voltmeter. |
| 2. DC Voltmeter (VOM) | Range, to 2000 volts; accuracy, checked to within $1 \%$ at -1955 volts. | High-voltage power supply adjustment. | a. Triplett Model 630-NA. <br> b. Simpson Model 262. <br> c. Item 1 used with a precision voltage divider. |
| 3. Time-Mark Generator | Marker outputs, 2 nanoseconds to 0.1 second; marker accuracy within $0.1 \%$; trigger output, 1 millisecond. | Check and adjustment of crt geometry, horizontal timing, and calibrator frequency. | a. Tektronix TG 501 Time-Mark Generator with power module. <br> b. Tektronix 2901 Time-Mark Generator. <br> c. Tektronix Type 184 Time-Mark Generator. |
| 4. Low-Frequency Sine-Wave Generator | Frequency, 250 kilohertz to 1 megahertz; output amplitude, variable from 50 millivolts to 3 volts into 50 ohms | Check and adjust stored writing speed and hroizontal bandwidth. | a. Tektronix SG 503 Signal Generator with power module. <br> b. General Radio 1310-B Oscillator. |
| 5. Medium-Frequency Sine-Wave Generator | Frequency, 2.5 to 150 megahertz; output amplitude 1 volt p-p into 50 ohms; accuracy, within $2 \%$. | Z-axis input check and stored writing speed checks and adjustments. | a. Tektronix SG 503, VariableLeveled Output Signal Generator with power module. <br> b. Tektronix 191 ConstantAmplitude Signal Generator. <br> c. General Radio 1215-C with 1263-C Amplitude-Regulating Power Supply. |

Table 6-1 (cont)

|  | Description | Minimum Specification | Purpose | Examples of Applicable Test Equipment |
| :---: | :---: | :---: | :---: | :---: |
|  | High-Frequency Sine-Wave Generator | Frequency. 245 megahertz to 1 gigahertz; reference frequency, 20 megahertz or lower; output amplitude, variable from 0.5 to 4 volts into 50 ohms; amplitude accuracy, constant within $1 \%$ of reference as output frequency changes. | Check and adjustment of vertical bandwidth, vertical channel isolation, and stored writing speed. | a. Tektronix SG 504, Signal Generator with power module. b. Wiltron Model 610C Swept Frequency Generator with Model 61083C, 10 to 1220 megahertz plug-in. |
|  | Amplifier Unit | Tektronix 7A-series plug-in unit. | Used throughout procedure to provide vertical input to the instrument under adjustment. | a. Tektronix 7A29 Amplifier unit. <br> b. Tektronix 7A19 Amplifier unit. |
|  | Dual-Trace Amplifier Unit | Any 7A-series dual-trace amplifier unit. | Used to check position and operation of READOUT display. | a. Any 7A-series dual-trace amplifier unit (may be shared with 7000-series test oscilloscope item 11). |
|  | Time-Base Unit (Two Required) | Tektronix 7B80 series; delaying unit needed for checking DLY'D gate out (7B85). | Used throughout procedure to provide sweep (delaying time base). | a. Tektronix 7B85 Time Base. <br> b. Tektronix 7B10 Time Base. |
|  | Signal Standardizer Calibration Fixture | Produces gain-check and pulse-response waveforms. | Used throughout procedure to standardize instrument so plug-in units can be interchanged without complete readjustment. | a. Tektronix Calibration Fixture 067-0587-02. <br> b. 7000-series plug-in units with suitable signal sources may be substittuted if lower performance is acceptable. |
|  | Test Oscilloscope | Bandwidth, dc to 75 megahertz; minimum deflection factor, 10 millivolts/division; accuracy, within 3\%. Dualchannel with an inverting input and both added and alternate vertical modes. | Used for performance check and adjustment. | a. Tektronix 7603 Oscilloscope System with 7A18 Amplifier,7B53A Time Base. <br> b. Tektronix 465 Oscilloscope. <br> c. Refer to the Tektronix Products Catalog for compatible oscilloscope system. |
|  | 10X Passive Probe (Two Required) | Compatible with test oscilloscope used. | Used to check power-supply ripple, signals out, calibrator, and Z-axis adjustment. | a. Tektronix P6053B or P6054A probe. |
|  | T Connector | BNC-to-BNC. | External Z-axis operation check. | a. Tektronix Part 103-0030-00. |
|  | Termination (Two Required) | Impedance, 50 ohms; accuracy, within $2 \%$; connectors, BNC. | Output termination for signal generators if amplifier unit is not 50 -ohm input impedance. | a. Tektronix Part 011-0049-01. |

## Checks \& Adjustments-7934 Service

Table 6-1 (cont)

| Description | Minimum <br> Specification | Purpose | Examples of Applicable <br> Test Equipment |
| :--- | :--- | :--- | :--- |
| 15. Cable (Two Required) | Impedance, 50 ohms; type, <br> RG-58/U; length, 18 inches; <br> connectors, BNC. | Signal interconnection. | a. Tektronix Part 012-0076-00. |

* Used for calibration only; not used for performance check.


## PERFORMANCE CHECK/ADJUSTMENT PROCEDURE

7934 Serial No.
Calibration Date
Performance Check Date
Tested by

## Introduction

The following procedure checks and adjusts the 7934 to meet the performance requirements given in the Specifications section.

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## Setup Procedure

## NOTE

The performance of this instrument can be checked at any ambient temperature from 0 to $+50^{\circ} \mathrm{C}$ unless otherwise stated. Adjustments must be performed at an ambient temperature from +20 to $+30^{\circ} \mathrm{C}$ for specified accuracies.

1. Remove the side and bottom covers from the 7934. Refer to the Maintenance section of this manual for panel removal information.
2. Connect the instrument to a power source which meets the voltage and frequency requirements marked on the instrument rear panel. (Refer to the General Information section in this manual for operating voltage information.) Press the POWER button in.
3. Allow at least 30 minutes warmup before proceeding. When the 7934 power is turned off during this procedure, allow the instrument to return to operating temperature before proceeding.

## NOTE

Titles for external controls of the 7934 are capitalized in this procedure (e.g., B TRIGGER SOURCE). Internal adjustments are initial capitalized only (e.g., Horiz Gain).

## CAUTION

To prevent instrument damage, plug-in units should not be installed or removed without first turning the instrument power off.

## A. POWER SUPPLY

Equipment Required (see Table 6-1, Test Equipment)

1. Precision DC Voltmeter [1]
2. Slotted Screwdriver [18]

## Control Settings

Set the 7934 controls as follows:

| A INTENSITY | Counterclockwise |
| :--- | :--- |
| B INTENSITY | Counterclockwise |
| READOUT | OFF (in detent) |
| GRAT ILLUM | Counterclockwise |
| REDUCED SCAN | Button out |
| STORE OFF | Button in |
| POWER | Button out |
| All Other Controls | No change |

See Power Supply Adjustments pullout in the Diagrams section for location of adjustments and test points.

## A1. Adjust Preregulator (R93)

a. Connect the precision dc voltmeter between TP126 and chassis ground (see Figure 8-32). Access to TP126 is through the prereg adjustment hole in the bottom of the power supply unit.
b. Check meter reading for +108 volts within the limits of +107.9 to +108.1 volts. If meter reading is within the given tolerance, proceed to step A2.
c. ADJUST - Prereg ADJ R93 (see Figure 8-32) for a meter reading of +108 volts within 0.1 volt.

## A2. Adjust +50 Volt Power Supply (R15)

## WARMING

Extreme caution must be used when operating the 7934 with the power unit removed due to the line voltage, high voltage, and high current potentials present.

NOTE
The Power Supply voltages can be checked without removing the power unit by using the 7000 -Series plug-in (rigid) extender, part 067-0589-00.
a. Disconnect the line cord from the power source. Remove any plug-in units from the plug-in compartments. Expose the 7934 Power Supply adjustments and test points by removing the power unit from the rear of the 7934 (interconnecting cables remain connected). See the Maintenance section in this manual for power unit removal instructions.
b. Connect the line cord to the power source and press the POWER button in.
c. Connect the precision dc voltmeter between TP +50 $\checkmark$ Sense and TP GND Sense on the Low-Voltage Regulator circuit board (see Figure 8-33).
d. Check the meter reading for +50 volts, within the limits of +49.8 to +50.2 volts.
e. ADJUST -+50 V ADJ R15 (see Figure 8-33) for a meter reading of +50 volts within 0.1 volt.
f. INTERACTION - Any change in the setting of R15 may affect the operation of all circuits in this instrument.

## A3. Check Power-Supply Voltages

a. Table 6-2 lists the low-voltage power supplies in this instrument. Check each supply with the precision dc voltmeter for output voltage within the given tolerance. Connect meter common lead to TP GND Sense (see Figure 8-33).
b. INTERACTION - If the power supplies are not within the tolerances given in Table 6-2, repeat steps A1 and A2.

Table 6-2
POWER SUPPLY TOLERANCES

| Power Supply Test Points <br> (see Figure 8-33) | Output Voltage Limits |
| :--- | :--- |
| $T P-50 \vee$ Sense | -49.8 to -50.2 Volts |
| $T P-15 V$ Sense | -14.85 to -15.15 Volts |
| $T P+5 V$ Sense | +4.9 to +5.1 Volts |
| $T P+15 V$ Sense | +14.85 to +15.15 Volts |
| $T P+50 V$ Sense | +49.5 to +50.5 Volts |

c. Disconnect the precision dc voltmeter.

## Checks \& Adjustments-7934 Service

## NOTE

Regulation of the individual power supplies can be checked using the procedure given under Troubleshooting Techniques in the Maintenance section.
d. Disconnect the line cord from the power source.

## NOTE

Access to Trigger System adjustments requires that the power unit be removed. If adjustment of the Trigger System is anticipated, do not install the power unit until after completing Step $D$.
e. Install the power unit and connect the line cord.

## B. Z-AXIS AND DISPLAY

Equipment Required (see Table 6-1, Test Equipment)

1. Precision DC Voltmeter [1]
2. DC Voltmeter (VOM) [2]
3. Low-Frequency Sine-Wave Generator [4]
4. Amplifier Unit [8]
5. Time-Base Unit [9]
6. Signal Standardizer Calibration Fixture [10]
7. Test Oscilloscope [11]
8. 10X Passive Probe [12]
9. T connector (BNC) [13]
10. Slotted Screwdriver [18]
11. Low-Capacitance Screwdriver [19]

## Control Settings

Set the 7934 controls as follows:

| A INTENSITY | Fully counterclockwise |
| :--- | :--- |
| FOCUS | Midrange |
| B INTENSITY | Fully counterclockwise |
| READOUT | OFF (in detent) |
| GRAT ILLUM | Midrange |
| REDUCED SCAN | Button out |
| STORE OFF | Button in |
| POWER | Button out |
| VERTICAL MODE | RIGHT |
| A TRIGGER SOURCE | VERT MODE |
| HORIZONTAL. MODE | A |
| VERT TRACE SEPARATION (B) | Midrange |
| B TRIGGER SOURCE | VERT MODE |
| Horizontal Selector (rear | Norm |
| of A HORIZ. compartment) |  |

See Z-Axis/Display Adjustments pullout in the Diagrams section for location of adjustments and test points.

## B1. Adjust - 1955 V Supply (R2285)

a. Remove the four screws that secure the fan housing to the rear of the Display Unit. Connect the dc voltmeter (VOM), set to measure at least 2000 volts, between the -1955 V test point TP2298 (see Figure 8-34) and chassis ground.
b. Press the POWER button in.
c. Check meter reading; -1955 volts within the limits of -1935.5 to -1974.5 volts.
d. ADJUST - - 1955 V adjustment R2285 (see Figure $8-34$ ) for a meter reading of -1955 volts.
e. Press and release the POWER button and disconnect the voltmeter
f. Press the POWER button in.

## B2. Adjust CRT Grid Bias (R2135, R4480)

a. Connect the precision dc voltmeter between the DC Z-Axis test point TP2264 and chassis ground (see Figure 8-34).
b. ADJUST - Z-Axis Level adjustment R4480 (see Figure 8-35) for the lowest obtainable voltage on the voltmeter; then, set the Z-Axis level adjustment R4480 for 1 volt above the lowest obtainable voltage.
c. Disconnect the voltmeter
d. Install the signal standardizer calibration fixture in the RIGHT VERT compartment and a time-base unit in the A HORIZ compartment.
e. Set the time-base unit for a free-running sweep at a sweep rate of 0.2 millisecond/division.
f. Connect the 10 X passive probe to the input of the test oscilloscope (be sure the probe is correctly compensated).
g. Set the test oscilloscope for dc input coupling with a vertical deflection factor of 2 volts/division ( 20 volts/division at the probe tip) and a sweep rate of 1 millisecond/division.
h. Connect the probe tip to the DC Z-Axis test point TP2264 (see Figure 8-34). Connect the probe ground to chassis ground with a short grounding strap.

## i. Set the A INTENSITY control fully clockwise.

1. Note the pulse amplitude indicated on the test oscilloscope. If the pulse amplitude is 73 volts or less, no adjustment is necessary; if the pulse amplitude is greater than 73 volts, set the Z-Axis Level adjustment R4480 (see Figure 8 -35) for a pulse amplitude of 73 volts by lowering the level at the top of the pulse without raising the bottom level of the pulse.
k. Set the A INTENSITY control for an 8 volt pulse displayed on the test oscilloscope.

## Checks \& Adjustments-7934 Service

I. Press the VAR PERSIST button and set the PERSISTENCE control fully clockwise.
m. Set the AUTO ERASE control fully counterclockwise but not in the MAX/OFF detent position.
n. Set the STORAGE LEVEL control for a light green crt background.
o. Set the time-base unit for a sweep rate of 5 seconds/ division.
p. ADJUST - CRT Grid Bias adjustment R2135 (see Figure 8-36) so that the trace on the crt screen is just extinguished.
q. Disconnect the 10X probe.

## -B3. Check/Adjust Trace Alignment (R22, R2105,

 R2470, R2475)a. Press the STORE OFF button.
b. Set the time-base unit for auto triggering with ac coupling from the internal source at a sweep rate of 1 millisecond/division.
c. Set the A INTENSITY control for a visible trace. Set the FOCUS control and ASTIG adjustment for a welldefined trace.

## d. Position the trace to the center graticule line.

e. Measure the voltage between chassis ground and each of the vertical crt deflection plates with the precision dc voltmeter; then, determine the vertical plate average (add both measurements together and divide by 2 ).
f. Connect the precision dc voltmeter between chassis ground and the Vert Shield test point TP2105 (see Figure 8-36).
g. ADJUST - Vert Shield Comp adjustment R2105 (see Figure 8-36) for a meter reading that is 5 volts less positive than the vertical plate average determined in part $e$.

Wh. CHECK - Trace aligns with the center horizontal graticule line within 0.1 division.
i. ADJUST - Front-panel TRACE ROTATION adjustment to align the trace with the center horizontal graticule line.
j. Remove the signal standardizer calibration fixture and the time-base unit from the 7934. Install the signal standardizer calibration fixture in the A HORIZ compartment and the time-base unit in the RIGHT VERT compartment.
k. Position the trace to the center horizontal graticule line.
I. CHECK - Trace aligns with the center horizontal graticule line within 0.1 division.
m. ADJUST - Y-Axis Align adjustment R2475 (see Figure 8-37) to align the trace with the center horizontal graticule line.
n . Set the signal standardizer calibration fixture Test switch to Vert or Horiz Gain.
o. CHECK - Second and tenth vertical traces align with the second and tenth graticule lines within 0.08 division.
p. ADJUST - The Full Scan Horiz Gain adjustment R22 (see Figure 8-38) for eight divisions of deflection.
q. Press the REDUCED SCAN button.
r. CHECK - Second and tenth vertical traces align with the second and tenth reduced scan graticule lines within 0.08 division.
s. ADJUST - Reduced Scan Horiz Gain adjustrnent R2220 (see Figure 8-34) for eight divisions of deflection on the reduced scan graticule.
t. Remove the time-base unit and the signal standardizer. Install the time-base unit in the A HORIZ compartrnent and the signal standardizer calibration fixture in the RIGHT VERT compartment. Set the signal standardizer calibration fixture Test switch to Vert or Horiz Aux in.

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vu. CHECK - Trace aligns with the center horizontal graticule line, within 0.1 reduced scan division.
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v. ADJUST - Reduced Scan Trace Rotation adjustment R2470 (see Figure 8-37) to align the trace with the center horizontal graticule line.
w. Press and release the REDUCED SCAN button.

## B4. Adjust Stigmator (R2110)

a. Remove the time-base unit and install an amplifier unit in the A HORIZ compartment.
b. Set the FOCUS and INTENSITY controls, and ASTIG adjustment, for a vertical line approximately 1.5 divisions in length on the crt.
c. ADJUST - Stigmator adjustment R2110 (see Figure $8-36$ ) so the line is aligned with the vertical graticule lines.
d. Set the FOCUS control and ASTIG adjustment for a small, well-defined dot.
e. Remove the amplifier unit from the A HORIZ compartment.

## B5. Adjust Auto-Focus Operation (R2140, R2180, R2315, R2365, R2366, R2425, R2435).

a. Install a time-base unit in the A HORIZ compartment.
b. Connect the low-frequency sine-wave generator to the signal standardizer calibration fixture Aux In connector: set for a 6-kilohertz display, three divisions in amplitude.
c. Set the time-base unit for auto internal triggering at a sweep rate of 20 microseconds/division.
d. Set the signal standardizer calibration fixture amplitude for a six-dvision display.
e. Set the A INTENSITY control for a low-intensity display.
f. Set the FOCUS control and ASTIG adjustment for a well-defined display.
g. Press the REDUCED SCAN button.
h. ADJUST - Reduced Scan Focus adjustment R2140 and Reduced Scan Astig adjustment R2180 (see Figure 8 -36) for a well-defined display.
i. Set the A INTENSITY control fully clockwise.
j. ADJUST - Reduced Scan Auto Focus adjustment R2365 and Reduced Scan Auto Astig adjustment R2425 (see Figure 8-34) for the best well-defined display possible.
k. Press and release the REDUCED SCAN button.
I. ADJUST - Full Scan Auto Focus adjustment R2366 and Full Scan Auto Astig adjustment R2435 (see Figure 8 -34) for the best well-defined display possible.
m . Disconnect the low-frequency sine-wave generator.
n. Set the A INTENSITY control for a low intensity level.
o. Set the READOUT control fully clockwise (not in PULSED detent).
p. ADJUST - Readout Focus adjustment R2315 (see Figure 8-34) for a well-defined readout display.
q. Set the READOUT control fully counterclockwise to the OFF detent position.

## B6. Adjust Z-Axis Transient Response (C2235, C2425, C2435, R2235)

a. Set the test oscilloscope for a vertical deflection factor of 0.2 volt/division ( 2 volts/division at probe tip) at a sweep rate of 20 nanoseconds/division.
b. Set the A INTENSITY control fully clockwise.

[^3]c. Connect the 10 X probe to the Z -Comp test point TP2288 (see Figure 8-34).
d. ADJUST — Z Comp 1 adjustment C2235 and Z Comp 2 adjustment R2235 (see Figure 8-34) for an optimum square corner on the displayed pulse.
e. Move the 10 X probe to the Auto Astig test point TP2408 (see Figure 8-34).
f. Set the test oscilloscope vertical deflection factor for 1 volt/division ( 10 voits/division at probe tip) at a sweep rate of 1 microsecond/division.
g. Set the 7934 HORIZONTAL MODE switch to CHOP.
h. Set the A INTENSITY control fully clockwise and the B INTENSITY control fully counterclockwise.
i. ADJUST - Full Scan Auto Astig compensation adjustment C2435 (see Figure 8-34) for a flat top on the test oscilloscope displayed waveform.
j. Press the REDUCED SCAN button.
k. ADJUST - Reduced Scan Auto Astig compensation adjustment C2425 (see Figure 8-34) for a flat top on the test oscilloscope displayed waveform.
I. Press and release the REDUCED SCAN button.
m. Disconnect the 10X probe.

## B7. Check/Adjust Geometry (R100)

a. Set the HORIZONTAL MODE switch to A.
b. Set the A INTENSITY control to midrange.
c. Install the signal standardizer calibration fixture in the A HORIZ compartment and the time-base unit in the RIGHT VERT compartment.
d. Set the signal standardizer calibration fixture Test switch to Vert or Horiz Gain and the Rep Rate switch to 100 kHz .
e. Set the time-base unit sweep rate to 1 microsecond/division.
f. CHECK - Vertical bowing and tilt of the display is less than 0.1 division.
g. ADJUST - Geometry adjustment R100 (see Figure $8-38$ ) for minimum bowing and tilt of the display.
h. Remove the signal standardizer calibration fixture and time-base unit.

## レB8. Check External Z-Axis Operation

a. Install an amplifier unit in the RIGHT VERT compartment and the time-base unit in the A HORIZ compartment.
b. Connect the output of the low-frequency sine-wave generator to the amplifier unit input (use a BNC T connector at the amplifier input).
c. Set the amplifier unit for a calibrated deflection factor of $0.5 \mathrm{volt} /$ division and the time-base unit sweep rate for 20 microseconds/division.
d. Set the low-frequency sine-wave generator for a fourdivision display at 50 kilohertz (one volt above and below ground).
e. Set the A INTENSITY control for a dim display.
f. Connect the signal from the output of the $T$ connector at the amplifier input to the Z-AXIS INPUT connector on the rear panel.
g. CHECK - Positive portion of the displayed waveform is blanked out.
h. Disconnect all test equipment and remove the plug-in units.
i. Press and release the POWER button.
j. Replace the fan housing.

## C. CALIBRATOR AND OUTPUT SIGNALS

Equipment Required (see Table 6-1, Test Equipment)

1. Precision DC Voltmeter [1]
2. Time-Mark Generator [3]
3. Amplifier Unit [8]
4. Time-Base Unit (with delaying mode) [9]
5. Test Oscilloscope (dual-trace) [11]
6. T connector (BNC) [13]
7. Cable (18-inch) [15]
8. Cable (42 inch, two required) [16]
9. Slotted Screwdriver [18]

## Control Settings

Set the 7934 controls as follows:

| A INTENSITY | Fully counterclockwise |
| :--- | :--- |
| FOCUS | No change |
| B INTENSITY | Fully counterclockwise |
| READOUT | OFF (in detent) |
| GRAT ILLUM | Midrange |
| REDUCED SCAN | Button out |
| STORE OFF | Button in |
| POWER | Button in |
| VERTICAL MODE | RIGHT |
| A TRIGGER SOURCE | VERT MODE |
| HORIZONTAL MODE | A |
| VERT TRACE SEPARATION (B) | Midrange |
| B TRIGGER SOURCE | VERT MODE |
| Horizontal Selector (rear | Norm |
| of A HORIZ compartment) |  |

See Calibrator/Output Signals Adjustments pullout in the diagrams section for location of adjustments and test points.

## صC1. Check/Adjust Calibrator Output Voltage (R385)

a. Press both the 4 V and 0.4 V CALIBRATOR buttons.
b. Connect the precision dc voltmeter between the CALIBRATOR output connector and ground.
r. CHECK - Meter reading for 0.4008 volt within the limits of 0.3968 to 0.4048 volt.
d. ADJUST - 0.4 Volts DC adjustment R385 (see Figure 8-39) for a meter reading of exactly 0.4008 volt.
e. Disconnect the precision dc voltmeter.

## 上C2. Check/Adjust Calibrator $\mathbf{1 k H z}$ Repetition Rate (R375)

## NOTE

A frequency counter with an accuracy of at least $0.1 \%$ may be used to adjust the calibrator repetition rate.
a. Connect 1-millisecond time-markers to the test oscilloscope external trigger input and to the non-inverting vertical channel of the test oscilloscope (use a BNC T connector). Connect the 7934 CALIBRATOR output to the other test oscilloscope vertical channel. Press the 4 V CALIBRATOR button in.
b. Set the test oscilloscope triggering to auto mode with ac coupling from the external source and adjust the triggering level for a stable display. Set the sweep rate for 1 millisecond/division and the vertical mode to alternate.
c. Set the test oscilloscope vertical deflection factor to display two divisions of CALIBRATOR signal and one division of time-marker signal.
d. Set the test oscilloscope vertical mode to add, and the sweep rate for 0.2 second/division.

Ve. CHECK - Time required for the 1-millisecond time marks to drift from the positive level of the CALIBRATOR signal to the negative level, and back to the positive level must be at least 0.4 seconds ( 2 divisions). This time can be measured directly from the display by observing the number of divisions that the markers move across the display area before it returns to the positive level.
f. ADJUST - 1 kHz ADJ adjustment R375 (see Figure 8-39) for minimum drift of the time marks.
g. Disconnect all test equipment

## レC3. Check Calibrator Rise Time, Fall Time, and Duty Cycle

a. Set the Calibrator to the 4 V position.
b. Connect the CALIBRATOR output to the inverting vertical input of the test oscilloscope and set the vertical mode to display the inverting channel.

## Checks \& Adjustments-7934 Service

c. Set the test oscilloscope vertical deflection to display four divisions of CALIBRATOR signal.
d. Set the test oscilloscope for a stable display, internally triggered on the rising portion of the calibrator signal at a sweep rate of 0.1 microsecond/division.

Ve. CHECK - Displayed waveform for not more than 2.5 divisions between the $10 \%$ to $90 \%$ points of the waveform (rise time, 250 nanoseconds or less).
f. Set the test oscilloscope for a stable display triggered on the falling portion of the waveform.

Vg . CHECK - Displayed waveform for not more than 2.5 divisions between the $90 \%$ and $10 \%$ points (fall time, 250 nanoseconds or less).
h. Set the test oscilloscope triggering for auto mode with ac coupling from the internal source at a sweep rate of 0.1 millisecond/division. Set the triggering controls so the display starts at the $50 \%$ point on the rising edge of the waveform.
i. Set the test oscilloscope sweep magnifier to X 10 . Then, position the display horizontally so the falling edge of the waveform aligns with the center vertical graticule line.
j. Set the test oscilloscope vertical to invert the display. (NOTE: The display is triggered on the opposite slope, even though the display appears the same.)
-k. CHECK - The 50\% point on the falling edge of the waveform now displayed is within 0.4 division horizontally of the center line (indicates duty cycle of $50 \%$ within $0.1 \%$ ).
I. Disconnect all cables.

## 上C4. Check A and B Sawtooth Output Signals

a. Install a time-base unit in the A HORIZ compartment and set the sweep rate for 0.1 millisecond/division.
b. Set the test oscilloscope sweep rate for 0.2 millisecond/division and the vertical deflection factor for 2 volts/ division.
c. Connect the +SAWTOOTH OUT connector to the test oscilloscope vertical input (1 megohm input) with the 42 -inch cable.
d. Set Sweep Selector jumper S3 (see Figure 8-40) to the A position.
$\checkmark$ e. CHECK - Slope of the test Oscilloscope display is 2 volts/division within 10\% (10 volt sawtooth display for 10division sweep).
f. Move the time-base unit to the B HORIZ compartment.
g. Set Sweep Selector jumper S3 to the B position.

Vh. CHECK - Test oscilloscope display for 1 volt/ division of sweep within 10\% (10 volt sawtooth display for 10 -division sweep).
i. Disconnect all test equipment.

## VC5. Check A Gate, B Gate, and Delayed Gate Output Signals

a. Install a delaying time-base unit in the A HORIZ compartment. Set the time-base unit for non-delayed operation at a sweep rate of 0.5 millisecond/division. Set triggering for auto mode.
b. Set Gate Selector jumper S46 to A (see Figure 8-40).
c. Connect the rear panel + GATE OUT connector to the test oscilloscope vertical input. Set the test oscilloscope vertical deflection factor for 2 volts/division and swersp rate for 2 milliseconds/division.
rd. CHECK - Test oscilloscope display for a gate waveform five divisions in amplitude within $10 \%$.
e. Set the delaying time-base unit for delaying sweep operation.
f. Set Gate Selector jumper S46 to Dly'd.

## -Performance Requirement check; see introductory information.]

レg. CHECK - Test oscilloscope display for a gate waveform five divisions in amplitude within 10\%.
h. Move the delaying time-base unit into the B HORIZ compartment. Set the time-base unit for non-delayed operation at a sweep rate of 0.5 millisecond/division with auto mode triggering.
i. Set Gate Selector jumper S46 to B.
vj. CHECK - Test oscilloscope display for a gate waveform five divisions in amplitude within 10\%.
k. Disconnect cables and remove plug-in units.

## D. TRIGGER SYSTEM

Equipment Required (see Table 6-1, Test Equipment)

1. Dual-Trace Amplifier Unit [8]
2. Time-base Unit (two required) [9]
3. Signal Standardizer Calibration Fixture [10]
4. Test Oscilloscope (dual trace) [11]
5. Termination ( 50 -ohm BNC, two required) [14]
6. Cable (18-inch, two required) [15]
7. Cable (42-inch) [16]
8. Slotted Screwdriver [18]
9. Rigid Plug-in Extender [21]

## Control Settings

Set the 7934 front-panel controls as follows:

| A INTENSITY | Midrange |
| :--- | :--- |
| FOCUS | No change |
| B INTENSITY | Midrange |
| READOUT | OFF (in detent) |
| GRAT ILLUM | Midrange |
| REDUCED SCAN | Button out |
| STORE OFF | Button in |
| POWER | Button out |
| VERTICAL MODE | RIGHT |
| A TRIGGER SOURCE | VERT MODE |
| HORIZONTAL MODE | A |
| VERT TRACE SEPARATION (B) | Midrange |
| B TRIGGER SOURCE | VERT MODE |
| Horizontal Selector (rear of | Norm |
| A HORIZ compartment) |  |

See Trigger Adjustments pullout in the Diagrams section for location of adjustments and test points.

## D1. Adjust A Trigger DC Centering and Gain (R86, R91)

## WARNIMG

Extreme caution must be used when operating the 7934 with the power unit removed due to the line voltage, high voltage, and high current potentials present.
a. Disconnect the line cord from the power source. Remove all plug-in units from the plug-in compartments. Expose the 7934 trigger system adjustments and test points by removing the power unit from the rear of the 7934 (interconnecting cables remain connected). See the Maintenance section in this manual for power unit removal instructions.
b. Connect the line cord to the power source and press the POWER button in.
c. Within the plug-in extender (rigid calibration fixture), disconnect the top connector on the left and right sides (labeled A20 and B20). Connect each female connector to one of the test oscilloscope inputs with the 42 -inch 50 -ohm BNC cable and 50 -ohm BNC termination (omit 50 -ohm BNC termination if the test oscilloscope has 50 -ohm input impedance).
d. Install the plug-in extender (rigid calibration fixture) in the A HORIZ compartment.
e. Set both channels of the test oscilloscope for a deflection factor of 50 millivolts/division with the inputs grounded.
f. Set the test oscilloscope for differential operation between the two channels (added display mode with one channel inverted) at a sweep rate of 0.1 millisecond/division.
g. Establish a ground reference level for the test oscilloscope by positioning the trace to the center horizontal line of the graticule. Do not change the test oscilloscope position controls after setting this ground reference.
h. Set both channels of the test oscilloscope for dc input coupling.
i. CHECK - Check the test oscilloscope display for a dc level within 0.5 division ( 25 millivolts) of the ground reference level in the LEFT, RIGHT, and ADD positions of the 7934 VERTICAL MODE switch.
j. ADJUST - A Trig DC Center adjustment R91 (see Figure 8-41) for a display dc level within 0.5 division ( 25 millivolts) of ground reference level in the LEFT, RIGHT, and ADD positions of the 7934 VERTICAL MODE switch.
K. Install the signal standardizer calibration fixture in the LEFT VERT compartment.
I. Set the VERTICAL MODE switch to LEFT.
m. Set the signal standardizer calibration fixture Test switch to Triggering Gain and the Rep Rate switch to 1 MHz .
n. CHECK - Test oscilloscope display for nine traces with six divisions of vertical deflection between the center seven traces, within 0.9 division ( 300 millivolts within 45 millivolts).
o. ADJUST - A Trig Gain adjustment R86 (see Figure 8-41) for a test oscilloscope display of six divisions of deflection between center seven traces, within 0.9 division ( 300 millivolts within 45 millivolts).
p. Remove the signal standardizer and plug-in extender calibration fixtures (leave cables connected for next step).

## D2. Adjust B Trigger DC Centering and Gain (R41, R44)

a. Install the plug-in extender in the B HORIZ compartment (see step D1 for test oscilloscope connection).
b. Set both channels of the test oscilloscope for a deflection factor of 50 millivolts/division with the inputs grounded.
c. Set the test oscilloscope for differential operation between the two channels (added display mode with one channel inverted) at a sweep rate of 20 microseconds/division.
d. Establish a ground reference level for the test oscilloscope by setting the input coupling to ground and positioning the trace to the center horizontal line of the graticule. Do not change the test oscilloscope position controls after setting this ground reference.
e. Set both channels of the test oscilloscope for dc input coupling.
f. CHECK - Test oscilloscope display for a dc level within 0.5 division ( 25 millivolts) of the ground reference level in the LEFT, RIGHT, and ADD positions of the 7934 VERTICAL MODE switch.
g. ADJUST - B Trig DC Center adjustment R44 (see Figure 8-41) for a dc level within 0.5 division ( 25 millivolts) of ground reference level in the LEFT, RIGHT, and ADD positions of the 7934 VERTICAL MODE switch.
h. Install the signal standardizer calibration fixture in the LEFT VERT compartment.
i. Set the VERTICAL MODE switch to LEFT.
j. Set the signal standardizer calibration fixture Test switch to Triggering Gain and Rep Rate switch to 1 MHz .
k. CHECK - Test oscilloscope display for nine traces with the deflection between the second and eight traces to be six divisions within 0.9 division ( 300 millivolts within 45 millivolts).

1. ADJUST - B Trig Gain adjustment R41 (see Figure 8-41) for a test oscilloscope display of six divisions of deflection between the center seven traces, within 0.9 division ( 300 millivolts within 45 millivolts).
m. Remove the plug-in extender and disconnect all test equipment.

## $\checkmark$ D3. Check/Adjust Vertical Signal Out DC Centering (R28)

a. Set the test oscilloscope vertical deflection factor to 1 volt/division and establish a ground reference at the graticule center line.
b. Connect the VERT SIG OUT connector to the vertical input of the test oscilloscope with the 42 -inch, 50 -ohm BNC cable.
rc. CHECK - Test oscilloscope display for a dc level within one division of the ground reference established in step a.
d. ADJUST - Vert Sig Out DC Center adjustment R28 (see Figure 8-41) for a dc level within one division of the ground reference level.
e. Disconnect all cables.

## D4. Check Trigger Selector Operation

a. Install the signal standardizer calibration fixture in the RIGHT VERT compartment, an amplifier unit in the LEFT VERT compartment, and time-base units in both horizontal compartments.
b. Set both time-base units for auto, internal triggering at a 0.2 millisecond/division sweep rate.
c. Connect the CALIBRATOR 0.4 V output to the amplifier unit with the 18 -inch BNC cable. Set the amplifier for a two-division display in the upper half of the graticule area.
d. Set the VERTICAL MODE switch to RIGHT.
e. Set the signal standardizer calibration fixture Test switch to Vert or Horiz + Step Resp, the Rep Rate switch to 10 kHz , and the Amplitude control for a two-division display in the lower half of the graticule area.
f. Set the VERTICAL MODE switch to ALT.
$\checkmark \mathrm{g}$. CHECK - The crt display for 1 kHz and 10 kHz triggered waveforms (adjust the time-base unit trigger level control as necessary).
h. Set the A TRIGGER SOURCE switch to RIGHT VERT.
Vi. CHECK - Sequentially select all positions of the VERTICAL MODE switch and check for a stable display of only the 1 kHz waveform.
j. Set the A TRIGGER SOURCE switch to RIGHT VERT.
vk. CHECK - Sequentially select all positions of the VERTICAL MODE switch and check for a stable display of only the 10 kHz waveform.
I. Set the VERTICAL MODE switch to ALT and the HORIZONTAL MODE switch to B.

Vm. CHECK - Crt display for 1 kHz and 10 kHz triggered waveforms.
n. Set the B TRIGGER SOURCE switch to LEFT VERT.
vo. CHECK - Sequentially select all positions of the VERTICAL MODE switch and check for a stable display of only the 1 kHz waveform.
p. Set the B TRIGGER SOURCE switch to RIGHT VERT.
$\checkmark$ q. CHECK - Sequentially select all positions of the VERTICAL MODE switch and check for a stable display of only the 10 kHz waveform.
r. Set the VERTICAL MODE switch to ALT, the HORIZONTAL MODE switch to ALT, and the B TRIGGER SOURCE switch to VERT MODE.
$\checkmark \mathrm{s}$. CHECK - The crt display for the B HORIZ timebase unit should be triggered on the 1 kHz waveform; the A HORIZ time-base unit should be triggered on the 10 kHz waveform (slaved-alternate mode).
t. Disconnect all test equipment and remove the plug-in units.

## E. HORIZONTAL SYSTEM

Equipment Required (see Table 6-1, Test Equipment)

1. Precision DC Voltmeter [1]
2. Time-Mark Generator [3]
3. Low-Frequency Sine-Wave Generator [4]
4. Amplifier Unit (two required) [8]
5. Time-base Unit [9]
6. Signal Standardizer Calibration Fixture [10]
7. T Connector (BNC) [13]
8. Cable (18-inch) [15]
9. Cable (42-inch) [16]
10. Slotted Screwdriver [18]
11. Low-Capacitance Screwdriver [19]

## Control Settings

Preset the 7934 controls as follows:

A INTENSITY
FOCUS
B INTENSITY
READOUT
GRAT ILLUM
REDUCED SCAN
STORE OFF
POWER
VERTICAL MODE
A TRIGGER SOURCE HORIZONTAL MODE VERT TRACE SEPARATION (B)
B TRIGGER SOURCE Horizontal Selector (rear of A HORIZ compartment)

Midrange No change Midrange OFF (in detent) As desired Button out Button in Button in RIGHT VERT MODE A
Midrange VERT MODE Norm
d. CHECK - Trace is within 0.5 division of the center vertical graticule line.
e. ADJUST - Horiz Center adjustment R8 (see Figure 8-42) to align the displayed trace with the center vertical graticule line.
f. Set the signal standardizer calibration fixture Test switch to Vert or Horiz Gain with the Rep Rate switch set to 1 MHz . Align the bright vertical trace with the center vertical graticule line using the signal standardizer Position control.
rg. CHECK - Second and tenth vertical traces align with the second and tenth graticule lines within 0.08 division. Note the exact error for comparison in part $t$.
h. ADJUST - Horiz Gain adjustment R22 (see Figure 8-42) for eight divisions between the second and tenth traces.
vi. CHECK - The other vertical traces align with their respective graticule lines within 0.05 division. (Horiz Gain adjustment R22 should be set to optimum for valid check.)
j. Press the REDUCED SCAN button.

Vk. CHECK - Second and tenth vertical traces align with the second and tenth reduced scan graticule lines within 0.08 division.
I. ADJUST - Reduced Scan Horiz Gain adjustment R2220 (see Figure 8-43) for eight divisions between the second and tenth traces.
m. Press and release the REDUCED SCAN button.
n. Move the signal standardizer calibration fixture to the B HORIZ compartment.
o. Set the HORIZONTAL MODE switch to B.
p. Set the signal standardizer calibration fixture Test switch to Vert or Horiz Com Mode and the 8 INTENSITY control for a usable display.

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q. CHECK - Horizontal centering of the trace is within 0.5 division of the center graticule line.
r. ADJUST - If necessary, compromise the setting of R8 for optimum centering for both horizontal compartments. If readjustment is necessary, recheck parts a through $q$.
s. Set the signal standardizer calibration fixture Test switch to Vert or Horiz Gain.
vt. CHECK - Second and tenth vertical traces align within 0.08 division of the error noted in part g . Also check that the other vertical traces align with their respective graticule lines within 0.05 division. (Specified at the center graticule line.)
u. ADJUST - If necessary, compromise the setting of R22 for optimum gain for both horizontal compartments. If readjustment is necessary, recheck parts a through $t$.
v. Remove the signal standardizer from the B HORIZ compartment.

## E2. Adjust High-Frequency Timing (C14, C18, C24, R86)

a. Install an amplifier unit in the LEFT VERT compartment.
b. Set the VERTICAL MODE switch to LEFT.
c. Move the time-base unit to the B HORIZ compartment.
d. Set the time-base unit triggering for auto mode with ac coupling from the internal source at a sweep rate of 1 millisecond/division.
e. Connect 1-millisecond markers from the time-mark generator to the amplifier unit input and adjust the amplifier unit deflection factor for about two divisions of display.
f. Set the time-base unit triggering controls for a stable display.
g. Position the first marker to the extreme left line on the graticule.
$\sim$ Performance Requirement check; see introductory information.
h . Set the time-base unit sweep-calibration adjustment for one marker at each major graticule division between the second and tenth graticule lines (center eight divisions).
i. CHECK - Refer to the time-base unit instruction manual for performance check or calibration procedures for checking high-frequency timing and linearity. Use the procedures and limits given for the three fastest sweep rates that do not exceed 0.5 nanosecond/division. If the given limits are met, omit the remainder of this step.
j. Set the time-base unit for a 10 nanoseconds/division sweep rate with X 1 sweep magnification.
k. Apply 10 nanosecond time markers and set the amplifier unit vertical deflection for about two divisions of display.
I. ADJUST - 10 nanosecond adjustments C14 and C18 (see Figure 8-42) for one time marker for each division over the center eight graticule full-scan divisions.
m . Set the time-base unit sweep rate to 20 nanoseconds/division with X 10 sweep magnification (2 nanoseconds/division).
n. Press the REDUCED SCAN button.
o. Apply 2-nanosecond time markers and set the amplifier unit vertical deflection for about two divisions of display.
p. ADJUST - 2 ns Lin adjustment R86 (see Figure 8-42) for optimum linearity over the center 10 divisions of the REDUCED SCAN graticule area.
q. Set the time-base unit sweep rate to 10 nanoseconds/division and magnification to $\times 10$.
r. Press and release the REDUCED SCAN button.
s. ADJUST - 1 ns adjustment C24 (see Figure 8-42) for one time marker every two divisions on the full-scan graticule area.
t. INTERACTION - Repeat part i.

## E3. Check/Adjust X-Y Compensation (C832)

a. Install amplifier units in the LEFT VERT and A HORIZ compartments.
b. Set the HORIZONTAL MODE switch to A.
c. Set both amplifier units for a deflection factor of 50 millivolts/division with dc input coupling.
d. Connect the low-frequency sine-wave generator to the input of either amplifier with the 42 -inch 50 -ohm BNC cable, and a T connector (BNC). Connect the output of the T connector to the input of the other amplifier with the 18 -inch 50 -ohm cable.
e. Set the low-frequency sine-wave generator output for eight divisions of vertical and horizontal deflection at a frequency of 35 kilohertz.
-f. CHECK - Crt lissajous display for a separation of 0.28 division or less (indicates $2^{\circ}$ or less phase shift; see Figure 6-1).


Fig. 6-1. Typical display when checking X-Y compensation.
g. Remove the amplifier unit from the A HORIZ compartment and install it in the B HORIZ compartment (leave signals connected).
h. Set the HORIZONTAL MODE switch to B.
i. Repeat parts e and f.

## NOTE

If the instrument under test does not contain Option 02, omit the remainder of this step.
j. Press and release the POWER button.
k. Remove the plug-in from the B HORIZ compartment.
I. Remove the metal shield at the rear of the B HORIZ compartment.
m. Install the amplifier unit in the B HORIZ compartment.
n. Press the POWER button.
o. Set the low-frequency sine-wave generator for eight divisions of vertical and horizontal deflection at one megahertz.
vp. CHECK - Crt lissajous display for a separation of 0.28 division or less (indicates 2 degrees or less phase shift).
q. ADJUST - X-Y Comp adjustment C832 (see Figure 8 -44) for minimum separation of the display. It may be necessary to remove the left side cover of the plug-in unit installed in the B HORIZ compartment to provide access to C832.
r. Press and release the POWER button.
s. Disconnect all cables and remove plug-in units.
t. Replace the metal shield at the rear of the B HORIZ compartment.

## E4. Check Horizontal Bandwidth

a. Install a time-base unit in the RIGHT VERT compartment and an amplifier unit in the B HORIZ compartment.

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Vk. CHECK - For one trace per reduced-scan graticule division within 0.05 division.
I. ADJUST - Reduced Scan Vert Gain adjustment R2175 (see Fig. 8-47) for one division between each of the center seven displayed traces within 0.05 division.
m. Press and release the REDUCED SCAN button.

## VF3. Check Vertical Low-Frequency Linearity

a. Set the signal standardizer calibration fixture Test switch to Vert or Horiz + Step Resp with the Rep Rate switch set to 1 kHz .
b. Set the signal standardizer calibration fixture Amplitude and Position controls so the display is exactly two divisions in amplitude in the center of the graticule area.
v. CHECK - Position the two-division display vertically and check for not more than 0.1 division of compression or expansion anywhere within the graticule area.
d. INTERACTION - If the specification of part c is not met, perform steps F1, F2, F4, and F5.

## F4. Adjust Vertical Thermal Compensation (C200, R130, R131, R132, R237, R238, R335)

a. Move the signal standardizer calibration fixture to the RIGHT VERT compartment.
b. Set the A TRIGGER SOURCE switch to RIGHT VERT.
c. Set the signal standardizer calibration fixture Rep Rate switch to 100 kHz .
d. Set the time-base unit for a sweep rate of 1 microsecond/division with internal triggering in the auto, dc mode.
e. Set the signal standardizer calibration fixture Position and Amplitude controls for an eight-division display centered on the crt.
f. Set the VERTICAL MODE switch to CHOP.
g. Set the READOUT INTENSITY control for a visible readout display.
h. CHECK - Readout display for less than 0.05 division of jitter and less than 0.05 division of deviation in the center displayed trace using the time-base sweep rates and signal standardizer repetition rates given in Table 6-3.
i. ADJUST - Thermal Compensation adjustments (see Figure 8-45) as given in Table 6-3 for minimum readout display jitter and minimum deviation of the displayed center trace.
j. INTERACTION - The adjustments listed in Table 6-3 may interact with steps F2, F3, F5, and F6; repeat as necessary.

Table 6-3
THERMAL COMPENSATION ADJUSTMENTS

| Adjustment | Signal Standardizer Calibration <br> Fixture Rep Rate | Sweep Rate |
| :---: | :---: | :---: |
| C200, R130 | 1 Mhz | $1 \mu \mathrm{~s}$ |
| R238 | 100 kHz | $10 \mu \mathrm{~s}$ |
| R335 | 10 kHz | 0.1 ms |
| R237 | 1 kHz | 1 ms |
| R132 | 100 Hz | 10 ms |
| R131 | 10 Hz | 50 ms |

[^5]F5. Adjust Vertical Channel Switch Compensation (C538, C638, R512, R515, R520, R525, R530, R612, R615, R620, R625, R630)
a. Set the VERTICAL MODE switch to RIGHT.
b. Set the A TRIGGER SOURCE switch to VERT MODE.
c. Set the time-base for a sweep rate of 2 microseconds/division.
d. Set the signal standardizer calibration fixture Amplitude control for a six-division display.
e. Set the time-base Triggering and Position controls for a stable display.
f. CHECK - Displayed pulse for optimum flat top, within 0.06 division, with the signal standardizer calibration fixture Rep Rate and time-base sweep rates given in Table 6-4.
g. ADJUST - Compensation adjustments (see Figure 8-46) as given in Table 6-4 for optimum fiat top on the displayed waveform.
j. Set the signal standardizer calibration fixture Rep Rate to 100 kHz and the time-base unit sweep rate to 2 microseconds/division. Set the Amplitude and Position controls for a six-division display, centered on the graticule area.
k. CHECK - Displayed pulse for optimum flat top, within 0.06 division, with the signal standardizer calibration fixture Rep Rate and the time-base unit sweep rates given in Table 6-5.
I. ADJUST - Compensation adjustment (see Figure 8-46) as given in Table 6-5 for optimum flat top on the displayed waveform.

## F6. Adjust Vertical High-Frequency Compensation

 (C215, C401, L100, R83, R215, R404, R405)a. Set the signal standardizer calibration fixture Rep Rate switch to 1 MHz .
b. Set the time-base unit for a sweep rate of 2 nanoseconds/division triggered on the positive slope.
c. Set the signal standardizer calibration fixture Amplitude and Position controls for a six-division display centered on the crt. Set the time-base unit Position control to align the $50 \%$ point of the step with the second vertical graticule line.
d. CHECK - Transient response for optimum square corner and flat top on the displayed pulse within the following limits: Aberrations in the first 5 nanoseconds after the $50 \%$ point of the step should not exceed 0.3 division peak-

Table 6-4
RIGHT CHANNEL-SWITCH COMPENSATION SIGNAL REP RATE VS: SWEEP RATE)

| Adjustment | Signal Standardizer Calibration <br> Fixture Rep Rate | Sweep Rate |
| :---: | :---: | :---: | | C538, R530 | 100 kHz | $2.0 \mu \mathrm{~s}$ |
| :--- | :---: | :---: | :---: |
| R525 | 10 kHz | $20.0 \mu \mathrm{~s}$ |
| R520 | 1 kHz | 0.2 ms |
| R515 | 100 Hz | 2.0 ms |
| R512 | 10 Hz | 20.0 ms |

to-peak. Aberrations from 5 to 10 nanoseconds after the $50 \%$ point of the step should not exceed 0.18 division peak-to-peak. Aberrations after 10 nanoseconds of the 50\% point should not exceed 0.06 division peak-to-peak except to allow 0.12 division of aberrations for delay-line termination at about 130 nanoseconds from the step (change time/division setting as necessary to view 130 nanoseconds from step). Rise time of the pulse should be 600 picoseconds between the $10 \%$ and $90 \%$ points.
e. ADJUST - High-frequency compensation adjustments (see Figure 8-45) as given in Table 6-6.
f. INTERACTION - Adjustments in this step interact with steps F2, F3, and F4; repeat as necessary.
g. Move the signal standardizer calibration fixture to the RIGHT VERT compartment.
h. Set the VERTICAL MODE switch to RIGHT.
i. CHECK - Displayed pulse for optimum square corner and flat top with aberations within the limits given in part d .
j. INTERACTION - If necessary, compromise the highfrequency compensation adjustments given in Table 6-6 for best overall vertical frequency response.

## F7. Check Vertical Amplifier 500 MHz Gain

a. Connect the high-frequency sine-wave generator to the Aux-In CW In Input connector of the signal standardizer calibration fixture.
b. Set the signal standardizer calibration fixture Amplitude control fully clockwise and the Test switch to the Vert or Horiz Freq Resp.

Table 6-5
LEFT CHANNEL-SWITCH COMPENSATION
(SIGNAL REP RATE VS: SWEEP RATE)
\(\left.\begin{array}{l|c|c}\hline Adjustment \& \begin{array}{c}Signal Standardizer Calibration <br>

Fixture Rep Rate\end{array} \& Sweep Rate\end{array}\right]\)| C638, R630 | 100 kHz | $2.0 \mu \mathrm{~s}$ |
| :--- | :---: | :---: |
| R625 | 10 kHz | $20.0 \mu \mathrm{~s}$ |
| R620 | 1 kHz | 0.2 ms |
| R615 | 100 Hz | 2.0 ms |
| R612 | 10 Hz | 20.0 ms |

Table 6-6
HIGH-FREQUENCY COMPENSATION ADJUSTMENTS

| Adjustment | Pulse Time Segment <br> (From 50\% point of step) | Adjust For (See Part d for <br> detailed adjustment limits) |
| :--- | :--- | :--- |
| C401, R404, R405 | First 5 nanoseconds | Optimum rise time and flat top with <br> abberations not to exceed 0.3 divisions <br> peak-to-peak. |
| R83 (crt termination on <br> 7934 chassis) | First 7 nanoseconds (time-base unit sweep <br> at 10 nanoseconds/dovosopm) | Minimum slope. R83 interacts with <br> Vert Gain adjustment R211. |
| C215, R215 | Front corner | Best front corner and minimum <br> abberations. Adjust rise time for <br> 600 picoseconds or less. |
| L100 | From 2 to 5 nanoseconds | Best flat top. |

c. Set the time-base unit for a sweep rate of 0.1 millisecond/division with a free-running sweep.
d. Set the high-frequency sine-wave generator for a 10 division display at the reference frequency (between 6 and 50 megahertz) centered on the graticule. (To obtain a 10division display, first obtain an eight-division display, then vertically position the display one division down and increase the output amplitude of the sine-wave generator so that the top of the display reaches the top of the graticule.)
e. Set the signal standardizer calibration fixture Amplitude control for a six-division display, centered on the graticule. (The CW Leveled indicator should be on.)
f. Without changing the output amplitude, increase the generator frequency until the displayed amplitude is reduced to 4.6 divisions. If the CW Leveled indicator extinguishes, increase the amplitude of the sine-wave generator signal until the light just turns on.

## NOTE

The signal standardizer calibration fixture CW Leveled light must be on and the sine-wave generator must be properly connected for a valid check. Refer to the signal standardizer calibration fixture and high-frequency sine-wave generator manuals.
g. CHECK - Sine-wave generator frequency is 500 MHz or higher (verifies 500 megahertz gain).
h. Move the signal standardizer calibration fixture to the LEFT VERT compartment (leave signal connected).
i. Set the VERTICAL MODE switch to LEFT.
j. CHECK - Repeat parts e through $g$ for the LEFT VERT compartment.
k. INTERACTION - If the specifications of parts $g$ or j are not met, repeat steps F1, F2, F3, F4, F5, and F6.

## ~F8. Check Vertical Channel Isolation

a. Install the amplifier unit in the LEFT VERT compartment.
b. Set the time-base for a sweep rate of 1 millisecond/division.
c. Connect the output of the high-frequency sine-wave generator to the amplifier unit input.
d. Set the output of the high-frequency sine-wave generator and the amplifier deflection factor for eight-divisions of deflection at 500 MHz .
e. Set the VERTICAL MODE switch to RIGHT.
-f. CHECK - Crt display amplitude for 0.2 division or less of the 500 MHz signal (verifies isolation of at least 30:1 at 500 MHz ).
g. Move the amplifier unit to the RIGHT VERT compartment without changing any settings.
h. Set the VERTICAL MODE switch to LEFT.
$\checkmark$ i. CHECK - Crt display amplitude for 0.2 division or less of the 500 MHz signal (verifies isolation of at least $30: 1$ at 500 MHz ). Disconnect the high-frequency sine-wave generator.
j. Set the VERTICAL MODE switch to RIGHT.
k. Connect the medium-frequency sine-wave generator to the amplifier unit input.
I. Set the medium-frequency sine-wave generator for eight divisions of deflection at 150 megahertz.
m. Set the VERTICAL MODE switch to LEFT.
vn. CHECK - Crt display amplitude for 0.08 division or less of 150 megahertz signal (verifies isolation of at least 100:1 from dc to 150 megahertz).
o. Move the amplifier to the LEFT VERT compartment without changing any settings.
p. Set the VERTICAL MODE switch to RIGHT.

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v. CHECK - Crt display amplitude for 0.08 division or less of 150 megahertz signal (verifies isolation of at least 100:1 from dc to 150 megahertz).

## VF9. Check Vertical Display Modes

a. Install an amplifier unit or the signal standardizer calibration fixture in the RIGHT VERT compartment.
b. Position the trace to the upper half of the graticule area with the right vertical unit Position control.
c. Set the VERTICAL MODE switch to LEFT and position the trace to the lower half of the graticule area with the left vertical unit Position control.
rd. CHECK - For two traces in the ALT and CHOP positions of the VERTICAL MODE switch.
e. Set the VERTICAL MODE switch to ADD.

Vf. CHECK - For a single trace that can be positioned vertically with either vertical unit Position control.

## $\checkmark$ F10. Check Vertical Trace Separation (B) Operation

a. Install a time base unit in the B HORIZ compartment.
b. Set both time-base units for a free-running sweep at 1 millisecond/division.
c. Set the VERTICAL MODE switch to ADD and the HORIZONTAL MODE switch to CHOP.

Vd. CHECK - Rotate the VERT TRACE SEPARATION (B) control throughout its range and check that the trace produced by the $B$ time-base unit can be positioned above and below the trace produced by the $A$ time-base unit by at least 4 divisions. Repeat with the HORIZONTAL MODE switch set to ALT.

## G. READOUT SYSTEM

Equipment Required (see Table 6-1, Test Equipment)

1. Dual-Trace Amplifier Unit [8]
2. Time-Base Unit [9]
3. Test Oscilloscope [11]
4. 10X Passive Probe (two required) [12]
5. Slotted Screwdriver [18]
6. Low-Capacitance Screwdriver [19]

## Control Settings

Set the 7934 controls as follows:

| A INTENSITY | Midrange |
| :--- | :--- |
| FOCUS | No change |
| B INTENSITY | Midrange |
| READOUT | OFF (in detent) |
| GRAT ILLUM | Midrange |
| REDUCED SCAN | Button out |
| STORE OFF | Button in |
| POWER | Button out |
| VERTICAL MODE | RIGHT |
| A TRIGGER SOURCE | VERT MODE |
| HORIZONTAL MODE | A |
| VERT TRACE SEPARATION (B) | Midrange |
| B TRIGGER SOURCE | VERT MODE |
| Horizontal Selector (rear | Norm |
| of A HORIZ compartment) |  |

See Readout Adjustments pullout in the Diagrams section for location of adjustments and test points.

## G1. Adjust Readout Vertical Separation, Centering, and Character Height (R13, R737, R3510, R3560)

a. Move plug P3484 to pins 2 and 3 (see Fig. 8-47)
b. Remove all plug-in units.
c. Press the POWER button.
d. Set the READOUT Intensity control for visible characters (all zeros).

## nOTE

The following tolerances are provided as guides to correct instrument operation and are not instrument specifications.
e. CHECK - Crt display for two rows of zeros, 40 zeros to a row with no character overlap. The two rows of zeros should be located vertically in the middle of the top and bottom divisions of the graticule.

## NOTE

The MVA Center (Main Vertical Amplifier) Adjustment R736 must be correct before making the next adjustment. Refer to Step F1, Vertical System procedure.
f. ADJUST - Vert Separation adjustment R3560 (see Figure 8-48) and Vert Readout Center adjustment R737 (see Figure 8-49) to position the two rows of readout characters to the middle of the top and bottom divisions of the graticule. Set Vert Size adjustment R3510 (see Figure 8-48) as desired.
g. CHECK - Display for two rows of zeros, 40 zeros to each row with no character overlap. Total length of each row of characters is between 9.5 and 10 divisions.
h. ADJUST - Horiz Readout Center adjustment R13 (see Figure 8-50) to horizontally center the zeros display.
i. Press and release the POWER button.

1. Replace P3484 on pins 1 and 2.

## G2. Adjust Character Clock (C3455)

a. Connect channel 1 of the test oscilloscope to pin 12 of U3502 (see Figure 8-48 with a 10X probe.
b. Connect channel 2 of the test oscilloscope to pin 13 of U3502 with a 10X probe.
c. Press the POWER button.
d. Set the test oscilloscope time-base sweep rate for 5 microseconds/division, negative triggering with the amplifier unit trigger source set to CH 1 .
e. ADJUST - C3455 (see Figure 8-48) for 18 positive pulses displayed on channel 2 of the test oscilloscope. Figure 6-2 shows a typical waveform.


Figure 6-2. Typical display when adjusting character clock.

## G3. Adjust Column and Row Match (R3483, R3543)

a. Install the dual-trace amplifier in the RIGHT VERT compartment.
b. Install the time-base unit in the A HORIZ compartment.
c. Press and hold one of the 7934 amplifier unit traceidentify buttons.
d. CHECK - The readout display for correct indication of "IDENTIFY". If the readout display is incorrect, adjustment is required.
e. ADJUST - Column Match adjustment R3543 and Row Match adjustment R3483 (see Figure 8-48) for correct readout of "IDENTIFY". Set these adjustments to the center of the range which provides correct readout indication. Release the amplifier trace-identify button.

## G4. Check Readout Modes

a. Set the time-base unit for a free-running sweep.
b. CHECK - Set the time-base unit on several sweep rates throughout the time/division switch range. Check that the readout characters are presented on a free-run basis and are displayed independent of the sweep rate.
c. Set the READOUT Intensity control to PULSED and adjust the PRESET adjustment for a visible display.
d. Set the time-base unit for a free-running sweep at a rate of 0.5 second/division.
e. CHECK - Readout characters are blanked out while the sweep is running, and are displayed immediately after the end of the sweep; each character encoded by the plugin units is displayed only once for each sweep.

## H. STORAGE SYSTEM

Equipment Required (see Table 6-1, Test Equipment)

1. Precision DC Voltmeter [1]
2. Low-Frequency Sine-Wave Generator [4]
3. Medium-Frequency Sine-Wave Generator [5]
4. High-Frequency Sine-Wave Generator [6]
5. Amplifier Unit [7]
6. Time-Base Unit [9]
7. Test Oscilloscope [11]
8. 10X Passive Probe [12]
9. Cable (42-inch, two required) [16]
10. Slotted Screwdriver [18]

## Control Settings

Preset the 7934 controls as follows:

| A INTENSITY | Counterclockwise |
| :--- | :--- |
| FOCUS | No change |
| B INTENSITY | Midrange |
| READOUT | OFF (in detent) |
| GRAT ILLUM | Midrange |
| REDUCED SCAN | Button out |
| STORE OFF | Button in |
| SAVE | Button out |
| SAVE INTENSITY | Fully clockwise |
| STORAGE LEVEL | Fully clockwise |
| MULTI TRACE DELAY | OFF (in detent) |
| PERSISTENCE | MAX (clockwise) |
| AUTO ERASE | OFF (in detent) |
| POWER | Button in |
| VERTICAL MODE | LEFT |
| A TRIGGER SOURCE | VERT MODE |
| HORIZONTAL MODE | B |
| VERT TRACE SEPARATION (B) | Midrange |
| B TRIGGER SOURCE | VERT MODE |
| Horizontal Selector (rear | Norm |
| of A HORIZ compartment) |  |

See Storage Adjustments pullout in the Diagrams section for location of adjustment and test point locations.

## NOTE

Focus and astigmatism adjustment affect stored writing speed. If the stored writing speed specifications in the following procedure cannot be met, refer to Step B, Z-Axis and Display procedure. Also, optimum stored writing speed can only be obtained when actual operating voltages and waveforms are within the limits specified in the voltage and waveform conditions (see the Storage Display schematic in the Diagrams section of this manual).

## ~H1. Check/Adjust Bistable Operation (R2745)

a. Install an amplifier unit in the LEFT VERT compartment and a time-base unit in the B HORIZ compartment.
b. Set the amplifier unit for deflection factor of 0.5 volt/ division.
c. Set the time-base unit for auto mode triggering with ac coupling from the internal source and a 0.5 millisecond/ division sweep rate.
d. Connect the low-frequency sine-wave generator to the amplifier unit and set for a 6.4 -division, 1.5 -kilohertz display.
e. Set the time-base unit for single-sweep operation.
f. Set the B INTENSITY control fully clockwise.
g. Press the BISTABLE button.

Vh. CHECK - Press the ERASE button and check that the waveform will store anywhere within the center $6 \times 8$ divisions of the graticule area without trace fade out or background fade up, within one minute. This checks the bistable writing speed at 0.03 division/microsecond. If the conditions given in this check are met, proceed to part p of this step.
i. Connect the precision dc voltmeter to Front Mesh test point TP2839 (see Figure 8-51).
j. Press the ERASE button and note the meter reading after the erase cycle.
k. Press the ERASE button and adjust the Bistable (BS) Op Level adjustment R2745 (see Figure 8-51) for a lower meter reading (after the erase cycle) until the stored waveform starts to fade out within about 15 seconds. Note the meter reading (this is the lower writing threshold). (If fade out does not occur within 15 seconds, set to the lowest attainable voltage.)
I. Press the ERASE button and adjust BS Op Level adjustment R2745 for a higher meter reading (after the erase

[^6]
## Checks \& Adjustments-7934 Service

cycle), until the nonstored background begins to fade up (display loses contrast) within 15 seconds. Note the meter reading (this is the upper writing limit). (If background fade up does not occur within 15 seconds, set to the highest obtainable voltage on the meter.)
m. ADJUST - BS Op Level adjustment R2745 for a meter reading midway between the upper writing limit and lower writing threshold (optimum bistable operation will normally occur at midrange, however some instruments may require a slightly higher or lower setting to achieve optimum view time; adjust R2745 as necessary).
n. Disconnect the voltmeter.
o. INTERACTION - Recheck parts c through h of this step.
p. Set the B INTENSITY control to midrange.
q. Set the time-base unit for auto mode triggering.
r. Press the REDUCED SCAN and STORE OFF buttons.
s. Set the time-base unit sweep magnifier to $X 10$ and triggering level control for a stable display.
t. Set the low-frequency sine-wave generator output for a 6.4-division, 10 -kilohertz display on the reduced scan graticule area.
u. Press the BISTABLE button.
v. Set the time-base unit for single-sweep operation.
w. Set the B INTENSITY control fully clockwise.
$\checkmark \times$. CHECK - Press the ERASE button and check that the signal will store anywhere within the reduced scan graticule area without trace fade out or background fade up within one minute. (This checks the reduced scan bistable writing speed at 0.2 division/microsecond.) If the conditions in this part cannot be met, return to part $i$ of this step.
-H2. Check Save Mode and Save Intensity Control
a. Press the ERASE button.
b. Press the SAVE button.
v. CHECK - Display will not erase when the ERASE button is pressed.
rd. CHECK - Screen goes dark as the SAVE INTENSITY control is turned counterclockwise.
e. Press and release the SAVE button.
f. Disconnect all cables.
g. Press and release the REDUCED SCAN button.

## レH3. Check/Adjust Fast Bistable Operation

 (R2845, R2855)a. Press the STORE OFF button.
b. Set the B INTENSITY control to midrange.
c. Set the time-base unit for auto mode triggering with ac coupling from the internal source at a sweep rate of 0.2 microsecond/division with X1 sweep magnification.
d. Connect the medium-frequency sine-wave generator to the amplifier unit.
e. Set the generator and amplifier controls for a 6.4-division, 2.5-megahertz display.
f. Set the time-base unit for single-sweep operation.
g. Set the B INTENSITY control fully clockwise.
h. Press the FAST BISTABLE button.
i. Turn the STORAGE LEVEL control to the 3 o'clock position.

Vj. CHECK - Press the ERASE button and check that the sine wave will store anywhere within the center $6 \times 8$ divisions of the graticule area with little or no background spattering (indicated by mottling and uneven texture of the crt background lighting); use the STORAGE LEVEL control as necessary. (This checks the fast bistable writing speed at 50 divisions/microsecond.) If the conditions given in this check are met, proceed to part r of this step.
k. ADJUST - Repetitively press the ERASE button and set the Bistable (BS) Tsfr Level adjustment R2845 (see Figure 8-51) to the point where the lighted crt background begins to spatter.
I. Set the time-base unit triggering source switch to external.
m . Connect the precision dc voltmeter to the Fast Mesh test point TP2876 (see Figure 8-51).
n . Set the time-base unit triggering source switch to external.
vo. CHECK - Press the ERASE button and wait one full minute. Then, set the triggering source switch to internal. If the stored waveform and crt background spatter are nearly the same as obtained in part $k$, proceed to part $s$ of this step.
p. ADJUST - If the display observed in part o indicated additional spatter, press the ERASE button and set the Bistable (BS) Fast Prep adjustment R2855 (see Figure 8-51) for a more-positive meter reading (about 0.5 volt). If the display observed in part o indicated less spatter or portions of the waveform dropped out, set R2855 for a less-positive meter reading (about 0.5 volt).
q. Disconnect the precision dc voltmeter.
r. Set the time-base unit triggering source switch to internal and repeat parts $j$ through o of this step.
s. ADJUST - Repetitively press the ERASE button and set the BS Tsfr Level adjustment R2845 (see Figure 8-51) to the point where spatter is just eliminated, and return to part a of this step.

## t. Press the STORE OFF button.

u. Set the B INTENSITY control to midrange.
v. Set the time-base unit for auto mode triggering and 0.2 microsecond/division sweep rate with X 10 sweep magnification.
w. Press the REDUCED SCAN button.
$x$. Set the medium-frequency sine-wave generator for a 6.4 -division, 39-megahertz display on the reduced scan graticule area.
y. Set the time-base unit for single-sweep operation.
z. Set the B INTENSITY control fully clockwise.
aa. Press the FAST BISTABLE button.
rab. CHECK - Press the ERASE button and check that the sine wave will store anywhere within the reduced scan graticule area (this checks the reduced scan fast bistable writing speed at 780 divisions/microsecond); use the STORAGE LEVEL control as necessary. If the conditions given in this part cannot be met, return to part j of this step.
ac. Press and release the REDUCED SCAN button.

## レH4. Check Fast Variable Persistence Full Scan Writing Speed

a. Press the STORE OFF button.
b. Set the B INTENSITY control to midrange.
c. Set the time-base unit for auto mode triggering and sweep rate for 0.5 microsecond/division with X10 sweep magnification.
d. Connect the medium-frequency sine-wave generator to the amplifier unit and set for a 6.4-division, 15-megahertz display.
e. Set the time-base unit trigger level control for a stable display.
f. Set the time-base unit for single-sweep operation.
g. Set the B INTENSITY control fully clockwise.
h. Set the STORAGE LEVEL control to the 3 o'clock position and the PERSISTENCE control fully clockwise.

## i. Press the FAST VAR PERSIST button.

$\vee \mathrm{j}$. CHECK - Press the ERASE button and check that the sine wave will store, and can be viewed for at least 30 seconds, over the center $6 \times 8$ divisions of the Full Scan graticule area (this checks the Fast Variable Persistence writing speed at 300 divisions/microsecond; use the STORAGE LEVEL control as necessary). If the conditions given in this check are met, proceed to step H8.

## H5. Adjust Variable Persistence Op Level and Prep Level (R2725, R2735)

a. Press the VAR PERSIST button.
b. Set B INTENSITY control fully counterclockwise and the STORAGE LEVEL control fully clockwise.
c. Set the time-base unit for auto mode triggering.
d. Connect a 10 X probe from the test oscilloscope to the Front Mesh test point TP2839 (see Figure 8-51).
e. Set the test oscilloscope sweep rate for 1 millisecond/division and the vertical deflection factor for 0.5 volt/ division ( 5 volts/division at probe tip) with de input coupling.
f. Preset the Variable Persistence (VP) OP Level adjustment R2725 (see Figure 8-51) for the lowest possible voltage level on the Front Mesh test point TP2839 (approximately 0 volts). Disregard the 10 -kilohertz signal.
g. Set the AUTO ERASE control fully clockwise. Preset the Variable Persistence (VP) Prep adjustment R2735 (see Figure 8-51) during the erase cycle, for the lowest possible voltage level on the Front Mesh test point TP2839 (approximately 0 volts). Disregard the pulse at the beginning of the erase cycle.
h. ADJUST - Set the AUTO ERASE control fully counterclockwise (in detent). Press the ERASE button and observe the crt screen. If the crt screen is dark or shaded areas are noticeable, set the VP OP Level adjustment R2725 for a more positive voltage level (in 3-volt steps) at the Front Mesh test point TP2839; press the ERASE push button and observe the crt screen. Repeat until a voltage level is reached where further increases in voltage at TP2839 cause no noticeable change in crt screen luminance (target saturated). If saturation cannot be achieved, set the Front Mesh test point TP2839 to the highest attainable voltage.
i. Set the STORAGE LEVEL control to the 3 o'clock position.

1. Repetitively press the ERASE button and preser: VP Prep adjustment R2735 (see Figure 8-51) to the point where the crt screen is just completely dark after an erase cycle.

## k. Press the FAST VAR button.

I. Move the jumper on P2531 to test connection P2.849 (see Figure 8-51). Press the ERASE button and note that the crt screen is dark. (If the crt screen is not dark, preset the Variable Persistence (VP) Fast Prep adjustment R2850 to midrange.)
m. ADJUST — VP Prep Adjustment R2735 (see Figure 8 -51) to the point where approximately $60 \%$ of the crt screen has a light-green background immediately after an erase cycle (should be viewed in dim ambient lighting).

## H6. Adjust Fast Variable Persistence Front Mesh Stability (R2705)

a. Connect a 10X probe from the test oscilloscope to the Front Mesh test point TP2839 (see Figure 8-51).
b. Set the test oscilloscope sweep rate to 2 microseconds/division and the vertical deflection factor to 1 volt/ division ( 10 volts/division at probe tip).
c. Press the ERASE button and observe the crt background luminance.
d. Set the time-base unit triggering for single-sweep operation and the source switch to external.
e. CHECK - Press the ERASE button and note the amplitude of the 2-microsecond-wide pump pulse on the Front Mesh test point TP2839 (as viewed on test oscilloscope); wait one minute and set the time-base unit triggering source switch to internal. The background luminance should remain the same as observed in part $c$. If the conditions of this check are met, proceed to step H 7 .
f. ADJUST - If the background is brighter after a one minute waiting period, increase the pump pulse amplitude a small amount with the Variable Persistence (VP) Fast Stability adjustment R2705 (see Figure 8-51); if the background is darker after the one minute waiting period, decrease the pump pulse amplitude a small amount with R2705. Repeat parts $c$ through e to recheck.
g. Disconnect the 10X probe.

## H7. Adjust Fast Variable Persistence Mesh Stability and Transfer Level (R2846, R2850)

a. Set the time-base unit triggering for auto mode with ac coupling from the internal source.
b. Move the test jumper on P2849 to P2848 (see Figure 8-51).
c. ADJUST - Repetitively press the ERASE button and adjust the Variable Persistence (VP) Tsfr Level adjustment R2846 (see Figure 8-51) until approximately $35 \%$ of the crt screen is illuminated after an erase cycle.
d. Turn the B INTENSITY control fully clockwise; press the ERASE button and notice the display.
e. Set the time-base unit for single-sweep operation and triggering source switch to external.
f. Press the ERASE button and wait one minute; then, set the triggering source switch to internal and notice the display.
g. Compare the crt display observed in part f with the display observed in part $d$; if there was little or no noticeable change in the crt display (background and trace), proceed to part $k$ of this step.
h. Connect the precision dc voltmeter to the Fast Mesh test point TP2876 (see Figure 8-51).
i. Set the time-base unit triggering to external. Press the ERASE button and note the voltage level on the Fast Mesh test point TP2876.
j. ADJUST - If the crt display in part $f$ faded up from that in part d, adjust Variable Persistence (VP) Fast Prep adjustment R2850 (see Figure 8-51) to lower the Fast Mesh test point TP2876 voltage by approximately 0.5 volt. If the crt display observed in part f faded down from the crt display observed in part d, adjust VP Fast Prep adjustment R2850 to increase the voltage on the Fast Mesh test point TP2876 by approximately 0.5 volt.
k. Disconnect the dc voltmeter.
I. Set the time-base unit triggering source switch to internal.
m. Turn the B INTENSITY control fully counterclockwise.
n. Repeat parts c through j of this step.
o. Move the jumper on P2848 to P2531 (see Figure 8-50).
p. INTERACTION - Recheck step H4.

## VH8. Check Fast Variable Persistence Reduced Scan Writing Speed

a. Press the STORE OFF button.
b. Connect the high-frequency sine-wave generator to the amplifier unit.
c. Set the B INTENSITY control to midrange.
d. Press the REDUCED SCAN button.
e. Set the time-base unit triggering for auto mode.

## Checks \& Adjustments-7934 Service

f. Set the time-base unit sweep rate to 20 nanoseconds/ division with X10 sweep magnification (2 nanoseconds/ division).
g. Set the generator and amplifier controls for a 6.4 -division, 440-megahertz display on the reduced scan graticule area.
h. Set the time-base unit triggering level control for a stable display.
i. Set the time-base unit for single-sweep operation.
j. Set the B INTENSITY control fully clockwise.
k. Press the FAST VAR PERSIST button.
VI. CHECK - Press the ERASE button; check that the waveform will store and can be viewed for at least 30 seconds anywhere within the reduced scan graticule area. (Use the STORAGE LEVEL control if necessary.) This checks variable persistence fast writing speed at 8,800 divisions/ microsecond. If the conditions given in this check are not met return to step H 5 .
m. Disconnect all cables.

## - H9. Check Variable Persistence Operation

a. set the B INTENSITY control to midrange.
b. Press the STORE OFF button.
c. Set the time-base unit for auto triggering at a sweep rate of 10 microseconds/division with X1 sweep magnification.
d. Press and release the REDUCED SCAN button.
e. Connect the low-frequency sine-wave generator to the amplifier unit and set the generator for a 6.4-division, 100-kilohertz display.
f. Set the time-base unit for single-sweep operation.
g. Set the B INTENSITY control fully clockwise.
h. Press the VAR PERSIST button.
i. Set the PERSISTENCE control fully clockwise.
vj. CHECK - Press the ERASE button and check that the waveform will store and can be viewed for at least 30 seconds in the center $6 \times 8$ divisions of the full scan graticule area; use the STORAGE LEVEL control if necessary. This checks the variable persistence writing speed at 2 divisions/microsecond. If the conditions given in this check are not met, return to step H5.
k. Set the B INTENSITY control to midrange.
I. Press the STORE OFF button.
m . Set time-base unit triggering for auto mode and sweep rate for 10 microseconds/division with X10 sweep magnification.
n. Press the REDUCED SCAN button.
o. Set the low-frequency signal generator for a 6.4-division, 600-kilohertz display on the reduced scan graticule area.
p. Set the time-base unit triggering level control for a stable display.
q. Set the time-base unit for single-sweep operation.
r. Set the B INTENSITY control fully clockwise.
s. Press the VAR PERSIST button.
$v_{\mathrm{t}}$ CHECK - Press the ERASE button and check that the waveform will store and can be viewed for 30 seconds anywhere in the reduced scan graticule area. Use the STORAGE LEVEL control as necessary. This checks the reduced scan variable persistence writing speed at 12 divisions/microsecond. If the conditions in this step cannot be met return to step H 5 .
u. CHECK - Turn the PERSISTENCE control fully counterclockwise. Press the ERASE button and check that the background has a uniform light green glow and that the stored waveform fades out in approximately two seconds. Slowly turn the PERSISTENCE control clockwise and check that the background darkens. Leave the PERSISTENCE control fully clockwise.
v. Press and release the REDUCED SCAN button.
w. Disconnect all cables.

## H10. Check Auto Erase

a. Place jumper P2531 in the Periodic Erase position as shown in Figure 8-50.
b. Turn the AUTO ERASE control fully clockwise (minimum view time).
c. Set the time-base unit triggering for auto mode and sweep rate for 0.2 second/division with X1 sweep magnification. Position the starting point of the trace to the first graticule line.
d. Set the B INTENSITY and STORAGE LEVEL controls for a usable display.
e. CHECK - Erase period is less than one second by observing the trace length to be less than five divisions.
f. Set the time-base unit sweep rate to 2 seconds/ division.
g. Turn the AUTO ERASE control fully counterclockwise (but not in detent).
h. CHECK - Erase period is 10 seconds or greater as shown by a trace length of at least five divisions.
i. Place jumper P2531 in the Erase After Sweep position as shown in Figure 8-50. Set the time-base unit sweep rate to single sweep.
j. Turn the AUTO ERASE control fully clockwise.
vk. CHECK - Erasure occurs only after the completion of a sweep.
I. Set the AUTO ERASE control to the OFF detent position.
vm. CHECK - Crt screen no longer erases automatically.
n. Set the B INTENSITY control to midrange.

## H11. Check Readout Storage Functions and Multi Trace Delay

a. Set the time-base unit for auto triggering and a 1 millisecond/division sweep rate.
b. Press the FAST VAR PERSIST button.
c. Set the MULTI TRACE DELAY control fully clockwise and check that the crt screen flashes approximately once every second.
d. Set the MULTI TRACE DELAY control fully counterclockwise (but not in the detent position) and check that the crt screen flashes at an interval of approximately four or more seconds.
e. Set the READOUT Intensity control fully clockwise (not in PULSED detent).
f. Press the FAST BISTABLE button.
g. Press the ERASE button and note that readout is not displayed.
h. Set the READOUT Intensity control to PULSED position and the MULTI TRACE DELAY control fully counterclockwise to the detent position.
i. CHECK - Readout display is visible (adjust PRESET adjustment if necessary for visible display).
j. Set the READOUT control fully counterclockwise to the OFF detent position and press the ERASE button.

## Checks \& Adjustments-7934 Service

k. CHECK - Readout is not displayed.
I. Turn the READOUT Intensity control fully clockwise (not in PULSED detent) and notice that readout is displayed.
m. Turn the READOUT intensity control fully counterclockwise and press the FAST VAR PERSIST button.
n. CHECK - Press the ERASE button and turn the READOUT Intensity control fully clockwise (not in PULSED detent). Notice that no readout is displayed.
o. Set the READOUT Intensity control to OFF.
p. Press the BISTABLE push button and set the B INTENSITY control for a visible trace.
q. CHECK - Press the ERASE button and notice that the displayed trace is blanked during the ERASE cycle.
r. Press the STORE OFF button.
s. Press and release the POWER button.

This completes the Checks and Adjustments procedure. Disconnect all test equipment and replace the side panels.

## 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 imporlant. when ordering parts, to include the following information in your order: Part number. instrument type or number, seria number, and modification number if applicable

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

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

## LIST OF ASSEMBLIES

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

## CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

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

## ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1.

## COMPONENT NUMBER (column one of the Electrical Parts List)

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


Read: Resistor 1234 of Assembly 23


Read: Resistor 1234 ol Subassembly 2 of Assembly 23

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

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e g. assembly A1 with its subassemblies and parts. precedes assembly $A 2$ with its subassemblies and parts)

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

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

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

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

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

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

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

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

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

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

Indicates actual manufacturers part number

## CFIOSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

| Mr. Code | Manufacturer | Address | City, State, Zip Code |
| :---: | :---: | :---: | :---: |
| 00213 | NYTRONICS COMPONENTS GROUP INC SUBSIOIARY OF NYTRONICS INC | orange st | DARLINGTON SC 29532 |
| 00853 | Sangamo neston inc <br> sangamo capacitor div | $\begin{array}{ll} \text { SANGAMO } & \text { RD } \\ \text { PO BOX } 128 \end{array}$ | PICKENS SC 29679 |
| 01121 | allen-bradley co | 1201 SOUTH 2NO ST | MI UNAUKEE WI 53204 |
| 01295 | TEXAS INSTRUMENTS INC SEIICONDUCTOR GROUP | 13500 N CENTRAL EXPRESSWAY <br> P 0 BOX 225012 M/S 49 | DALLAS TX 75265 |
| 02111 | SPECTROL ELECTRONICS CORP Sue of carrier corp | 17070 e gale ave <br> P 0 㫙 1220 | CITY OF INDUSTRY CA 91749 |
| 02114 | amperex electronic corp FERROXCUBE OIV | 5083 KINGS HWY | SAUGERIIES NY 12477 |
| 02735 | RCA CORP <br> solid state division | ROUTE 202 | SOMERVILLE NJ 08876 |
| 02777 | HOPKINS ENGINEERING CO | 12900 FOOTHILL BLVD | SAN FERNANDO CA 91342 |
| 035178 | GENERAL ELECTRIC CO SEMI-CONDUCTOR PRODUCTS OEPT | W GENESEE St | AUQURN NY 13021 |
| 04099 | CAPCO INC | FORESIGHT industrial park P 0 80X 2164 | GRAND JUNCTION CO 81501 |
| 0922.2 | avx ceramics div of avx corp | 19Th ave south P 0 80X 867 | MYRTLE BEACH SC 29577 |
| 04713 | MOTOROLA INC SEMICONDUCTOR GROUP | 5005 E MCDONELL RO | PHOENIX AL 85008 |
| 05397 | UNION CARBIOE CORP MATERIALS SYSTEMS oiv | 11901 MAOISON AVE | CLEVELAND OH 44101 |
| 05828 | GENERAL INSTRUMENT CORP gOVERNMENT SYSTEMS OIV | 600 K JOHN ST | HICKSVILLE NY 11802 |
| 07263 | fairchil camera ano instrument corp SEMICONDUCTOR DIV | 464 ELLIS ST | mountain viex ca 94042 |
| 07716 |  | 2850 mt Pleasant ave | QURLINGTON IA 52601 |
| 11236 | CTS OF BERNE INC | 406 PaRR ROAD | BERNE IN 46711 |
| 12697 | CLAROSTAT MFG CO INC | LOMER HASHINGTON ST | DOVER NH 03820 |
| 12954 | MICROSEMI CORP | 8700 E THOMAS RD <br> P 0 80X 1390 | SCOTTSDALE AZ 85252 |
| 12969 | UNITRODE CORP | 580 PLEASANT ST | HATERTOWN MA 02172 |
| 14193 | CAL-R INC | 1601 OLYMPIC BLVO | SANTA MONICA CA 90404 |
| 144.33 | ITT SEMICONDUCTORS OIV |  | HEST PGLLI 8EACH FL |
| 14552 | MICRO/SENICONDUCTOR CORP | 2830 S FAIRVIEN St | SANTA ANA CA 92704 |
| 14731 | HRRRIS CORP NEB PRESS OIV | P $080 \times 515$ | HESTERLY RI 02891 |
| 14752 | ELECTRO CUBE INC | 1710 S DEL MAR AVE | SAN GABRIEL CA 91776 |
| 18324 | SIGNETICS CORP | 811 E AROUES | SUNOYVALE CA 94086 |
| 19396 | ILLINDIS TOOL WORKS INC PAKTRON OIVISION | 900 FOLLIN Lane 5 E | VIENA VG 22180 |
| 19701 | mepco/electra inc <br> a NORTH AMERICAN PHILIPS CO | P 0 80X 760 | MINERAL MELLS TX 76067 |
| 20932 | KYOCERA INC | 11620 SORRENTO VALLEY RD | SAN OIEGO CA 92121 |
| 21897 | TRH MICROHAVE INC SUB OF TRN INC | 825 STEAART DR | SUNNYYALE CA 94086 |
| 22526 | ou pont e I de nemours and co inc dU PONI CONNECTOR SYSTEMS | 30 hunter lane | CAMP HILL PA 17011 |
| 24546 | CORNING GLASS MORKS | 550 HIGH ST | BRADFORD PD 16701 |
| 25088 | SIEMENS CORP | 186 HOOD AVE S | ISELIN MJ 08830 |
| 25403 | amperex electronic corp <br> SEMICONDUCIOR AND MICROCIRCUITS DIV | PROVIDENCE PIKE | SLATERSVILLE RI 02876 |
| 27014 | NATIONAL SEMICONDUCTOR CORP | 2900 SEMICONDUCTOR OR | SANTA CLARA CA 95051 |
| 31918 | ITT SCHADOM INC | 8081 WALLACE RD | EDEN PRAIRIE HN 55343 |
| 32159 | MEST-CAP ARIZONA | 2201 E ELVIRA ROAD | TUCSON AZ 85706 |
| 32997 | BOURNS INC TRIMPOT OIV | 1200 Columbia ave | RIVERSIDE CA 92507 |
| 44655 | OHMITE MFG CO | 3601 \% HOMARD ST | SKOKIE IL 60076 |
| 50434 | henleit-packard co optoelectronics DIV | 640 Page mill RD | PALO ALTO CA 94304 |
| 50558 | ELECTRONIC CONCEPTS INC | 526 INDUSTRIAL MAY WEST | EATONTONN NJ 07724 |
| 54406 | mURATA ERIE NORTH AMERICA INC GEORGIA OPERATIONS | 1148 FRankLIN RO SE | MARIETIA GA 30067 |
| 51642 | centre engineering inc | 2820 E COLLEGE OVE | State college pa 16801 |

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## CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr.

| Code | Manufacturer | Address | City, State, Zip Code |
| :---: | :---: | :---: | :---: |
| 519184 | NEC AMERICA INC | 2741 PROSPERITY AVE | FAIRFAX VA 22031 |
| 52763 | STETTNER ELECTRONICS INC | 6135 AIRWAYS BLVD P0 BoX 21947 | Chattandoga tn 37421 |
| 527769 | SPRAGUE-G000MAN ELECTRONICS INC | 134 FULTON AVE | GARDEN CITY PARK NY 11040 |
| 54473 | MATSUSHITA ELECTRIC CORP OF AMERICA | ONE PANASONIC WAY | SECAUCUS NJ 07094 |
| 54583 | TDK ELECTRONICS CORP | 755 EASTGATE BLVD | GARDEN CITY NY 11530 |
| 55112 | WESTLAKE CAPACITORS INC | 5334 STERLING CENTER DRIVE | MESTLAKE VILLLAGE CA 91361 |
| 55680 | NICHICON /AMERICA/ CORP | 927 E STATE PKY | SCHAUMBURG IL 60195 |
| 562889 | SPRAGUE ELECTRIC CO | 87 MARSHALL ST | NORTH ADAMS MA 01247 |
| 57668 | ROHM CORP | 16331 MILLIKEN AVE | IRVINE CA 92713 |
| 58361 | gENERAL INSTRUMENT CORP OPTOELECTRONICS OIV | 3400 HILLVIEN aVE | PALO ALTO CA 94304 |
| 58854 | GTE PRODUCTS CORP <br> LIGHTING PRODUCTS GROUP | 60 BOSTON ST | SALEM MA 01970 |
| 59660 | TUSDNIX INC | 2155 N FORBES BLVD | TUCSON, ARI ZONA 85705 |
| 598121 | CENTRALAB INC <br> SUB NORTH AMERICON PHILIPS CORP | 7158 MERCHANT AVE | EL PASO TX 79915 |
| 60211 | VOLTAGE MULTIPLIERS INC | 8711 WEST R00SEVELT | VISALIA CA 93291 |
| 60705 | CERA-NITE CORPORATION | 1327 6TH AVE | GRAFTON WI 53024 |
| 71400 | MCGRAM-EDISON CO BUSSWANH MFG DIV | 502 EARTH CITY PLAZA <br> P 0 BOX 14460 | ST LOUIS M0 63178 |
| 71590 | GLOBE-UNION INC CENTRALAB ELECTRONICS DIV | $\begin{aligned} & \text { HWY } 20 \\ & \text { PO BOX } 858 \end{aligned}$ | FORT DODGE IA 50501 |
| 71707 | COTO CORP | 65 PAVILION AVE | PROVIDENCE RI 02905 |
| 73138 | BECKMAN INSTRUMENTS INC HELIPOT DIV | 2500 HARBOR BLVD | FULLERTON CA 92634 |
| 74970 | JOHNSON E F CO | 299 10TH AVE S W | WASECA MN 56093 |
| 75042 | TRW INC <br> TRW ELECTRONIC COMPONENTS <br> IRC FIXED RESISTORS PHILADELPHIA DIV | 401 N BRDAD ST | PHILADELPHIA PA 19108 |
| 764193 | BELL INDUSTRIES INC MILLER J W OIV | 19070 REYES AVE P 0 BOX 5825 | COMPTON CA 90224 |
| 77342 | AMF INC POTTER AND BRUMFIELD DIV | 200 RICHLAND CREEK OR | PRINCETON IN 47670 |
| 79727 | C-W INDUSTRIES | $\begin{aligned} & 550 \text { DAVISVILLE RD } \\ & \text { P } 0 \text { BOX } 96 \end{aligned}$ | WARMINSTER PA 18974 |
| 80009 | TEKTRONIX INC | 4900 S W GRIFFITH DR P 0 BOX 500 | BEAVERTON OR 97077 |
| 800131 | MEPCO/ELECTRA INC | 22 COLUNBIA RD | MORRISTOWN NJ 07960 |
| 82389 | SWITCHCRAFT INC sub of raytheon co | 5555 N ELSTRON AVE | CHICAGO IL 60630 |
| 83003 | VARO INC | 2203 WALNUT ST P 0 BOX 401426 | GARLAND TX 75040 |
| 91637 | OALE ELECTRONICS INC | P 0 BOX 609 | COLUMBUS NE 68601 |
| 92966 | GTE PRODUCTS CORP <br> LIGHTING PRODUCTS gROUP HILLSBORO <br> MINIATURE LAMP PLANT | MEST MAIN ST | HiLLSBORO NH 03244 |
| TK01191 | SONY TEKTRONIX | P. 0. B0X 14, HANEDA AIRPORT | TOKYO, JAPAN |
| TK01213 | TOPTRON CORP | TOKYO | JAPAN |
| TK01271 | COMPONENT CONCEPTS INC | 3229 PINE ST | EVERETT WA 98201 |
| TK1450 | TOKYO COSMOS ELECTRIC CO LTD | 2-268 SOBUDAI ZAMA | Kanagana 228 JAPAN |
| TK1727 | PHILIPS NEDERLAND BV afd ELONCO | POSTBUS 90050 | 5600 PB EINOHOVEN THE NETHERLANBS |


| Component No． | lektronix Part No． | Serial／Assembly No． Effective Dscont | Name \＆Description | Mfr． Code | Mfr．Part No． |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 01 | 670－0702－06 |  | circuit bo assy：graticule lamps | 80009 | 670－0702－06 |
| 02 | 670－9179－00 |  | CIRCUIT BD ASSY：CALIBRATOR ANO MODE SWITCH | 80009 | 670－9179－00 |
| 03 | 672－0189－00 |  | CIRCUIT BD ASSY：MaIN INTFC | 80009 | 672－0189－00 |
| Q301 | 670－8051－00 |  | CIRCUIT BD ASSY：FRONT PANEL DISPLAY | 80009 | 670－8051－00 |
| －3022 | 670－8051－00 |  | CIRCUIT BD ASSY：FRONT PANEL DISPLAY | 80009 | 670－8051－00 |
| АЗ， 3 |  |  | CIRCUIT Bo assy：main interface （NOT AVAILABLE，ORDER R3） |  |  |
| 08 | 670－9178－00 |  | eircuit bo assy：mgic | 80009 | 670－9178－00 |
| A7 | 670－9177－00 |  | CIRCUIT 80 ASSY：TRIGGER SELECT | 80009 | 670－9177－00 |
| ¢8 | 670－4769－20 |  | CIRCUIT 80 ASSY：VERTICAL CHANNEL SHITCH | 80009 | 670－4769－20 |
| 09 | 670－3959－01 |  | CIRCUIT BD ASSY：X－Y COMP （OPTION 02 ONLY） | 80009 | 670－3959－04 |
| ค10 | 670－3960－00 |  | CIRCUIT BD ASSY：HORIZONTAL INTERCONNECT | 80009 | 670－3960－00 |
| Q11 | 670－3958－01 |  | CIRCUIT BO ASSY：HORIZONTAL INTERFACE | 80009 | 670－3958－01 |
| 012 | 814－0699－00 |  | SIGNaL OUT ASSY： | 80009 | 614－0699－00 |
| A12al | －．．－－－．．－－ |  | CIRCUIT BD ASSY：SIGNALS OUT <br> （NOT AVAILA日LE，ORDER A12） |  |  |
| 013 | 670－8622－03 |  | CIRCUIT BD ASSY：READOUT | 80009 | 670－8622－03 |
| 014 | 620－0283－02 |  | POHER SUPPLY： | 80009 | 620－0283－02 |
| 0：401 | 670－5959－04 |  | CIRCUIT BD ASSY：CONTROLLED RECTIFIER | 80009 | 670－5959－04 |
| 01402 | 670－5960－04 |  | CIRCUIT BO ASSY：LV REGULATOR | 80009 | 670－5960－04 |
| 01403 | 670－8259－02 |  | CIRCUIT BD ASSY：INVERTER | 80009 | 670－6259－02 |
| A17 | 670－9175－00 |  | CIRCUIT BD ASSY：INTENSITY CONTROL | 80009 | 670－9175－00 |
| A18 | 119－0757－00 |  | OELAY LINE，ELEC：65NS，100 OHMS | 80009 | 119－0757－00 |
| A19 | 672－1176－00 |  | CIRCUIT BD ASSY：VERT AMPL W／FLEX CONN | 80009 | 672－1176－00 |
| 01901 | －－－－－－－－－－ |  | CIRCUIT BD ASSY：VERT AMP （NOT AVAILABLE，OROER A19） |  |  |
| Q1902 | 670－8046－00 |  | CIRCUIT BD ASSY：FLEX CON （NO ELECTRICAL PARTS） | 80009 | 670－8046－00 |
| A20 | 670－9172－00 |  | CIRCUIT BD ASSY：HORIZ AMP | 80009 | 670－9172－00 |
| A21 | 670－3970－00 |  | CIRCUIT BD ASSY：Z AXIS | 80009 | 670－3970－00 |
| 222 | 670－9180－00 |  | CIRCUIT 日D ASSY：HIGH VOLTAGE | 80009 | 670－9180－00 |
| A23 | 670－9499－00 |  | CIRCUIT BD ASSY：FOCUS | 80009 | 670－9499－00 |
| 024 | 670－9496－00 |  | CIRCUIT 日D ASSY：STORAGE MOOE SMITCH | 80009 | 670－9496－00 |
| Q25 | 670－9383－00 |  | CIRCUIT BD ASSY：StORAGE | 80009 | 670－9383－00 |
| R26 | 670－9176－00 |  | CIRCUIT 80 assy：storage control | 80009 | 670－9176－00 |
| A27 | 670－4778－01 |  | CIRCUIT BD ASSY：TRIGGER LIGHT | 80009 | 670－4778－01 |
| A28 | 670－4778－01 |  | CIRCUIT BD ASSY：TRIGGER LIGHT | 80009 | 670－4778－01 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 01 | 670-0702-06 |  | CIRCUIT BD ASSY:GRATICULE LAMPS | 80009 | 670-0702-06 |
| A105304 | 150-0097-00 |  | LAMP, INCAND: $6.3 V, 0.20 .47381$ | 92966 | 7381 |
| A105305 | 150-0097-00 |  | LAMP, INCAND:6.3V,0.2A, 77381 | 92966 | 7381 |
| A10S306 | 150-0097-00 |  | LAMP, INCAND: $6.3 V, 0.2 \mathrm{~A}, \# 7381$ | 92966 | 7381 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| $\mathrm{A}_{2}$ | 670-9179.00 |  | CIRCUIT BD ASSY:CALIBRATOR AND MODE SWITCH | 80009 | 670-9179-00 |
| 920332 | 281-0788-00 |  | CAP,FXD, CER DI:470PF, 10\%, 100V | 04222 | MA101C471KAA |
| A2C336 | 281-0788-00 |  | CAP, FXD, CER DI:470PF, 10\%, 100V | 04222 | MA101C471KAA |
| 920 356 | 281-0775-00 |  | CAP , FXD, CER DI:0.1UF, 20\%,50V | 04222 | MA205E104MAA |
| A2C357 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF, 20\%,50V | 04222 | MA205E104MAA |
| 920359 | 281-0775-00 |  | CAP, FXO, CER DI:0.1UF, 20\%,50V | 04222 | MA205E104MAA |
| a2C376 | 285-1130-00 |  | CAP , FXD, PLASTIC: $0.22 \mathrm{UF}, 1 \%, 100 \mathrm{~V}$ | 50558 | MH120224F |
| A2C384 | 281-0798-00 |  | CAP, FXD, CER OI:51PF, 1\%, 100V | 04222 | MA101A510GAA |
| A2C386 | 281-0798-00 |  | CAP, FXD,CER DI:51PF, 1\%, 100V | 04222 | MA101A510gAA |
| A2CR303 | 152-0141-02 |  | SEMICOND DVC, DI: SW, SI, 30V, 150MA, 30V , 00-35 | 03508 | 0A2527 (1N4152) |
| A2CR307 | 152-0141-02 |  | SEMICONO DVC, DI:5N,SI, $30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | DA2527 (1N4152) |
| D2CR319 | 152-0141-02 |  | SEMICOND DVC , DI: SW, S1, 30V, 150MA , 30V , 00-35 | 03508 | DA2527 (1N4152) |
| A2CR321 | 152-0141-02 |  | SEMICONO DVC, DI: $5 \mathrm{H}, 51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | 042527 (1N4152) |
| A2CR322 | 152-0141-02 |  | SEMICOND DVC,DI:SW,SI, 30V, 150MA , 30V , 00-35 | 03508 | 0A2527 ( 1 N4152) |
| A2CR323 | 152-0141-02 |  | SEMICOND DVC, $01: 5 K, S 1,30 V, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | 002527 (1N4152) |
| A2CR325 | 152-0141-02 |  | SEMICOND DVC, $01: S H, S I, 30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | 002527 ( 1 N4152) |
| A2CR326 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI, 30V, 150MA , 30V , 00-35 | 03508 | 0A2527 (1N4152) |
| A2CR327 | 152-0141-02 |  | SEMICOND OVC, DI:SW, SI , 30V, 150MA , 30V, 00-35 | 03508 | 042527 ( 1 N4152) |
| A2CR328 | 152-0141-02 |  | SEMICOND OVC, DI: SH, SI, 30V, 150MA, 30V , 00-35 | 03508 | DA2527 ( 1 N4152) |
| A2CR329 | 152-0141-02 |  | SEMICONO OVC, DI:SH, SI, 30V, 150MA, 30V, $00-35$ | 03508 | DA2527 ( 1 N4152) |
| A2CR330 | 152-0141-02 |  | SEMICOND DVC, DI: SW, SI , 30V, 150MA, 30V, D0-35 | 03508 | DA2527 ( 1 N4152) |
| A2CR341 | 152-0141-02 |  | SEMICOND OVC, DI:SW, SI , 30V , 150WA, 30V,00-35 | 03508 | DA2527 (1N4152) |
| A2CR342 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI , 30V , 150MA, 30V , D0-35 | 03508 | DA2527 ( 1 N41522) |
| A2CR349 | 152-0141-02 |  | SEMICOND OVC, DI: SW, SI, 30V, 150MA , 30V, 00-35 | 03508 | 0 A 2527 (1N4152) |
| A2CR354 | 152-0141-02 |  | SEMICOND DVC, DI: $5 \mathrm{~S}, \mathrm{SI}, 30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | DA2527 (1N4152) |
| A2CR386 | 152-0141-02 |  | SEMICONO DVC, DI: SW, SI , 30V, 150MA , 30V ,00-35 | 03508 | DA2527 ( 1 N4152) |
| A20304 | 151-0341-00 |  | TRANSISTOR:NPN, SI , T0-106 | 04713 | SP56919 |
| 420308 | 151-0341-00 |  | TRANSISTOR:NPN, SI , T0-106 | 04713 | SP56919 |
| A20321 | 151-0223-00 |  | TRANSISTOR:NPN, SI, T0-92 | 04713 | SPS8026 |
| A20325 | 151-0223-00 |  | TRANSISTOR: NPN, SI , T0-92 | 04713 | SPS8026 |
| 420328 | 151-0223-00 |  | TRANSISTOR:NPN, SI, T0-92 | 04713 | 5PS8026 |
| A20332 | 151-0223-00 |  | TRANSISTOR:NPN, 51, T0-92 | 04713 | SPS8026 |
| A20336 | 151-0223-00 |  | TRANSISTOR:NPN, SI, T0-92 | 04713 | SPS8026 |
| 020346 | 151-0223-00 |  | TRANSISTOR:NPN, SI, T0-92 | 04713 | SPSB026 |
| A20349 | 151-0223-00 |  | TRANSISTOR:NPN, SI, T0-92 | 04713 | SPS8026 |
| A20354 | 151-0223-00 |  | TRANSISTOR:NPN, SI , T0-92 | 04713 | SPS8026 |
| A20356 | 151-0223-00 |  | TRANSISTOR:NPN, SI, T0-92 | 04713 | SPS8026 |
| A20376 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SPS8801 |
| 920382 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SPS8801 |
| 020384 | 151-0342-00 |  | TRANSISTOR:PNP, SI, T0-92 | 07263 | 5035928 |
| A2R303 | 315-0104-00 |  | RES , FXD, FILM: 100 K OHM , 5\% , 0.25N | 57668 | NTR25J-E100K |
| A2R304 | 315-0912-00 |  | RES, FXD, FILM:9.1K OHM, $5 \%, 0.25 \mathrm{~N}$ | 57668 | NTR25J-E09K1 |
| A2R307 | 315-0104-00 |  | RES, FXD, FILM: 100 K OHM , $5 \%, 0.25 \mathrm{~K}$ | 57668 | NTR25J-E100K |
| A2R308 | 315-0912-00 |  | RES, FXD, FILM:9.1K OHM , $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25,-E09K1 |
| A2R319 | 315-0392-00 |  | RES, FXD, FILM:3.9K OHM $, 5 \%, 0.25 \mathrm{~K}$ | 57668 | NTR25J-E03K9 |
| A2R320 | 315-0122-00 |  | RES, FXD, FILM: 1.2 K OHM, $5 \%, 0.25 \mathrm{~K}$ | 57668 | NTR25J-E01K2 |
| A2R321 | 315-0222-00 |  | RES, FXD, FILM:2.2K OHM , 5\%, 0.25 N | 57668 | NTR25J-E02K2 |
| A2R322 | 315-0302-00 |  | RES, FXD, FILM: 3 K OHM , $5 \%, 0.25 \mathrm{M}$ | 57668 | NTR25.j-E03K0 |
| A2R323 | 315-0912-00 |  | RES, FXD, FILM:9.1K OHM , 5\%, 0.25 W | 57668 | NTR25J-E09K1 |
| A2R324 | 315-0302-00 |  | RES, FXD, FILM: 3 K OHM , 5\%, 0.25 K | 57668 | NTR25J-E03K0 |
| A2R325 | 315-0222-00 |  | RES, FXD, FILM:2.2K OHM ,5\%, 0.25 H | 57668 | NTR25J-E02K2 |
| A2R326 | 315-0103-00 |  | RES, FXD, FILH: 10 K OHM , $5 \%, 0.25 \mathrm{H}$ | 19701 | 5043CX10K00J |
| A2R327 | 315-0471-00 |  | RES, FXD, FILM:470 OHM, $57,0.25 \mathrm{~W}$ | 57668 | NTR25J-E470E |
| A2R328 | 315-0512-00 |  | RES, FXD, FILM:5.1K OHM , 5\%, 0.25 W | 57668 | NTR25J-E05K1 |
| A2R329 | 315-0912-00 |  | RES, FXD , FILM:9.1K OHM , 5\%, 0.25N | 57668 | NTR25.-E09K1 |
| A2R331 | 315-0123-00 |  | RES, FXD, FILM: 12K OHM , $5 \%, 0.25 \mathrm{~N}$ | 57668 | NTR25.J-E12KO |
| A2R332 | 315-0103-00 |  | RES, FXD, FILM: 10 K OHM $, 5 \%, 0.25 \mathrm{~W}$ | 19701 | 5043CX10K00J |
| A2R334 | 315-0103-00 |  | RES, FXO, FILM:10K OHM , 5\% , 0.25 H | 19701 | 5043CX10K00」 |
| A2R335 | 315-0123-00 |  | RES, FXO, FILM: 12 K OHM $, 5 \%, 0.25 \mathrm{~N}$ | 57668 | NTR25J-E12K0 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr, Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A2R336 | 315-0103-00 |  | RES, FXD, FILM: 10 K OHM, $5 \%, 0.25 \mathrm{H}$ | 19701 | $50436 \times 10 \mathrm{KOOJ}$ |
| A2R342 | 315-0912-00 |  | RES, FXD, FILM:9.1K OHM , $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E09K1 |
| A2R343 | 307-0109-00 |  | RES, FXD, CMPSN: 8.2 OHM , $5 \%, 0.25 \mathrm{~W}$ | 80009 | 307-0109-00 |
| A2R344 | 307-0109-00 |  | RES, FXD, CMPSN:8.2 OHM , $5 \%, 0.25 \mathrm{~W}$ | 80009 | 307-0109-00 |
| A2R345 | 311-1373-00 |  | RES, VAR, NONWW: PNL, 5K OHM, 1\% | 32997 | 81C10-E20-800344 |
| A2R346 | 315-0202-00 |  | RES, FXD, FILM: 2 K OHM, $5 \%, 0.25 \mathrm{~K}$ | 57668 | NTR25J-E 2 K |
| 928347 | 315-0162-00 |  | RES, FXD, FILM: 1.6 K OHM $, 5 \%, 0.25 \mathrm{~W}$ | 19701 | 5043C×1к600. |
| A2R348 | 307-0109-00 |  | RES, FXD, CMPSN:8.2 OHM $54,0.25 \mathrm{~W}$ | 80009 | 307-0109-00 |
| A2R349 | 315-0202-00 |  | RES, FXD, FILM: 2 K OHM, $54,0.25 \mathrm{~W}$ | 57668 | NTR25J-E 2K |
| A2R351 | 307-0109-00 |  | RES, FXD, CMPSN: 8.2 OHM , 5\% , 0.25W | 80009 | 307-0109-00 |
| A2R352 | 307-0109-00 |  | RES, FXD, CMPSN: 8.2 DHM , $5 \%, 0.25 \mathrm{~W}$ | 80009 | 307-0109-00 |
| A2R354 | 345-0202-00 |  | RES, FXD, FILM: 2 K OHM $, 5 \%, 0.25 \mathrm{~W}$ | 57668 | NIR25J-E 2K |
| A2R355 | 315-0162-00 |  | RES, FXD, FILM: 1.6 K OHM $, 5 \%, 0.25 \mathrm{~W}$ | 19701 | 5043CX1K600J |
| A2R356 | 315-0100-00 |  | RES, FXD, FILM: 10 OHM, $5 \%, 0.25 \mathrm{~W}$ | 19701 | 5043CX10RR00J |
| A2R357 | 315-0202-00 |  | RES, FXD, FILM: $2 \mathrm{~K} 0 \mathrm{HM}, 5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E 2K |
| A2R358 | 307-0109-00 |  | RES , FXD, CMPSN:8.2 OHM , 5\% , 0.25 W | 80009 | 307-0109-00 |
| A2R360 | 315-0102-00 |  | RES , FXD, FILM: 1 K OHM $, 5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25JE01K0 |
| A2R361 | 315-0102-00 |  | RES, FXD, FILH: 1 K OHM $, 5 \chi, 0.25 \mathrm{~W}$ | 57668 | NTR25JE01K0 |
| A2R362 | 315-0102-00 |  | RES, FXO, FILM: 1 K OHM $, 5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25JE01K0 |
| A2R364 | 315-0102-00 |  | RES, FXD, FILM: 1 K OHM , 5\%, 0.25 M | 57668 | NTR25JE01K0 |
| A2R365 | 315-0512-00 |  | RES, FXD, FILM: 5.1 K OHM , $5 \mathrm{~K}, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E05K1 |
| A2R366 | 315-0512-00 |  | RES, FXD, FILM: 5.1 K OHM , $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E05K1 |
| A28368 | 315-0102-00 |  | RES, FXD, FILM: 1 K OHM, $5 \%, 0.25 \mathrm{k}$ | 57668 | NTR25JE01K0 |
| A2R369 | 315-0102-00 |  | RES, FXD, FILM: 1 K OHM , 5\%, 0.25 W | 57668 | NTR25JE01K0 |
| A2R370 | 315-0102-00 |  | RES, FXD, FILM: 1 K OHM , 5\%, 0.25 W | 57668 | NTR25JE01K0 |
| A2R371 | 315-0102-00 |  | RES, FXD, FILM: 1 K OHM, $5 \%, 0.25 \mathrm{M}$ | 57668 | NTR25JE01K0 |
| A2R372 | 315-0823-00 |  | RES, FXD, FILM:82K OHM , $5 \%, 0.25 \mathrm{~K}$ | 57668 | NTR25J-E82K |
| A2R373 | 321-0258-00 |  | RES, FXD, FILM:4.75K $0 \mathrm{HM}, 11,0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 19701 | 5033ED4K750F |
| A2R374 | 321-0822-06 |  | RES, FXD, FILM: 1.76 K OHM , $0.25 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T9 | 19701 | 5033RE1K760C |
| A28375 | 311-2229-00 |  | RES, VAR , NONWW: TRMR , 250 OHM, 20\%, 0.5 W LINEAR | TK1450 | GFO6UT 250 |
| A2R376 | 321-0321-07 |  | RES, FXD, FILM: 21.5 K OHM, $0.1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T9 | 19701 | 5033RE21K508 |
| A2R380 | 315-0362-00 |  | RES, FXD, FILM 3.6 K OHM $, 5 \%, 0.25 \mathrm{~W}$ | 19701 | $5043 \mathrm{CX3K600J}$ |
| A2R381 | 321-0321-07 |  | RES, FXD, FILM: 21.5 K OHM, $0.12,0.125 \mathrm{~W}, \mathrm{TC}=$ T9 | 19701 | 5033RE21K50B |
| A2R382 | 315-0123-00 |  | RES, FXD, FILM: 12 K OHM , $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E12K0 |
| A2R383 | 323-0289-00 |  | RES, FXD, FILM: $10.0 \mathrm{~K} 0 \mathrm{HM}, 1 \%, 0.5 \mathrm{H}, \mathrm{TC}=$ T0 | 75042 | CECT0-1002F |
| A2R384 | 323-0289-00 |  | RES, FXD, FILM: $10.0 \mathrm{~K} 0 \mathrm{HM}, 1 \mathrm{C}, 0.5 \mathrm{H}, \mathrm{TC}=$ TO | 75042 | CECTO-1002F |
| A2R385 | 311-2231-00 |  | RES, VAR , NONWW: TRMR, 1 K OHM, 20\%, 0.5 W | TK1450 | Gfobut 1K |
| A2R386 | 315-0512-00 |  | RES, FXD, FILM: $5.1 \mathrm{~K} 0 \mathrm{HM}, 5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E05K1 |
| A2R387 | 321-0164-00 |  | RES, FXD, FILM:499 OHM , 1\%, 0.125W, TC=TO | 19701 | 5033ED499R0F |
| A2R388 | 321-1611-07 |  | RES, FXD, FILM: 550 OHM , $0.18,0.125 \mathrm{H}, \mathrm{TC}=\mathrm{T9}$ | 19701 | 5033RE550R0B |
| A2R389 | 321-1008-04 |  | RES, FXD, FILM: 12.0 OHH , $0.1 \%, 0.125 \mathrm{H}, \mathrm{TC}=$ T2 | 57668 | CR814 BYE 12 OHM |
| A2R392 | 321-1612-07 |  | RES, FXD, FILM: 4.455 K OHM , $0.12,0.125 \mathrm{~W}, \mathrm{TC}=$ T9 | 19701 | 5033RE4K4558 |
| A28393 | 321-1611-07 |  | RES , FXD, FILM: $5500 \mathrm{OHM}, 0.17,0.125 \mathrm{~W}, \mathrm{TC}=$ T9 | 19701 | 5033RES50ROB |
| A2R394 | 321-1612-07 |  | RES, FXD, FILH:4.455K OHM, $0.1 \%, 0.125 \mathrm{~N}, \mathrm{TC}=\mathrm{T} 9$ | 19701 | 5033RE4K4558 |
| A2R395 | 321-1611-07 |  | RES, FXD, FILM: $5500 \mathrm{HH}, 0.12,0.125 \mathrm{~N}, \mathrm{TC}=\mathrm{T9}$ | 19701 | 5033RES50ROB |
| A2R396 | 321-1612-07 |  | RES, FXD, FILM: 4.455 K OHM $, 0.18,0.125 \mathrm{~W}, \mathrm{TC}=\mathrm{T} 9$ | 19701 | 5033RE4K4558 |
| A2R397 | 321-0813-07 |  | RES, FXD, FIL : 495 OHM , 0.1\% , 0. $125 \mathrm{~N}, \mathrm{TC}=\mathrm{T9}$ | 19701 | 5033RE4950B |
| A25342 | 263-0021-00 |  | SWITCH PB ASSY:4 LATCH, $7.5 \mathrm{WW}, 6$ CONT, 3 FR | 80009 | 263-0021-00 |
| A25344 | 263-0022-00 |  | SWITCH PB ASSY:5 LATCH, 7.54M, 5 CONT, 4 FR | 80009 | 263-0022-00 |
| A25352 | 263-0013-10 |  | SWITCH PB ASSY: 3 LATCH, 10 MM, M/3 CONTACTS | 80009 | 263-0013-10 |
| A2S354 | 263-0013-10 |  | SWITCH PB ASSY: 3 LATCH, $10 \mathrm{mH}, \mathrm{W} / 3$ CONTACTS | 80009 | 263-0013-10 |
| A2S395 | 263-0013-08 |  | SHITCH PB ASSY:3 LATCH, 10MM, 5 CONTACT | 80009 | 263-0013-08 |
| A2U322 | 156-0382-02 |  | MICROCKT, DGTL: OUAD 2 INP NAND GATE BURN | 18324 | N74LSOONB |
| A2U326 | 156-0382-02 |  | MICROCXT, DGTL: OUAD 2 INP NAND GATE BURN | 18324 | N74LSOONB |
| A2U330 | 156-0388-03 |  | MICROCKT, DGTL:DUAL D FLIP-FLOP, SCRN | 01295 | SN74LS74anp3 |
| A20332 | 156-0382-02 |  | MICROCKT, DGTL: QUAD 2 INP NAND GATE BURN | 18324 | N74LSOONB |
| A2U334 | 156-0383-02 |  | MICROCKT, DGTL: QUAD 2-INP NOR GATE, SCRN, | 18324 | N74LS02NB |
| A2U338 | 156-0382-02 |  | MICROCKT, DGTL: QUAD 2 INP NAND GATE BURN | 18324 | N74LSDONB |
| A2U340 | 156-0386-02 |  | MICROCKI, DGIL: TRIPLE 3-INP NaND GAIE, SCRN | 07263 | 74LS10PCOR |


| Component No. | I ektronix Part No. | Serial/Assembly No. Erfective Dscont | Name \& Description | Mfr. Code | Mir. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| a2U344 | 156-0382-02 |  | MICROCKT, OGTL:QUAO 2 INP NAND GATE BURN | 18324 | N74LSOONB |
| a 20346 | 156-0382-02 |  | MICROCKT, DGTL:OUAD 2 INP NANO GATE BURN | 18324 | N74LSOONB |
| A2U350 | 156-0386-02 |  | MICROCKT, DGTL:TRIPLE 3 -INP NAND GATE,SCRN | 07263 | 74LS10PCOR |

Tektronix Serial/Assembly No. Component No. Part No. Effective Dscont Name \& Description CIRCUIT BD ASSY:MAIN INTFC A3

Mfr.

| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A301 | 670-8051-00 |  | CIRCUIT BD ASSY: FRONT PANEL DISPLAY | 80009 | 670-8051-00 |

Tektronix Serial/Assembly No, Component No, Part No, Effective Dscont 670-8051-00

Effective Dscont Name \& Description CIRCUIT BD ASSY:FRONT PANEL DISPLAY

MFr.

| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mifr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| a3a3 | ---------- |  | CIRCUIT BD ASSY:MAIN INTERFACE (NOT AVAILABLE,ORDER A3) |  |  |
| АЗА3С29 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF, 20\%,50V | 04222 | MA205E104MAA |
| АЗаЗС117 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF,20\%,50V | 04222 | MA205E104MAD |
| Д3а3С135 | 281-0773-00 |  | CAP, FXD, CER DI:0.01UF,10\%,100V | 04222 | MA201C103KAA |
| a3A3C142 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF,20\%,50V | 04222 | MA205E104MAA |
| a303C 145 | 290-0747-00 |  | CAP , FXD, ELCTLT: 100UF , +50-10\% , 25V | 54473 | ECE-825V100L |
| А3A3C146 | 290-0769-00 |  | CAP , FXD, ELCTLT: 10UF, +50-10\%, 100VDC | 54473 | ECEB20Y100S |
| АЗАЗС 147 | 290-0769-00 |  | CAP, FXD, ELCTLT: 10UF, +50-10\%, 100VDC | 54473 | ECEB2aV1005 |
| ДЗАЗС148 | 290-0747-00 |  | CAP , FXO, ELCTLT: 100UF, +50-10\%, 25V | 54473 | ECE-B25V100L |
| АЗАЗС149 | 290-0747-00 |  | CAP, FXD, ELCTLT: 100UF, +50-10\%, 25V | 54473 | ECE-825V100L |
| А3a3C172 | 281-0774-00 |  | CAP, FXD, CER DI:0.022MFD, 20\%, 100V | 114722 | MA201E223MAA |
| АЗАЗС173 | 281-0774-00 |  | CAP, FXD, CER DI:0.022MFD, 20\%,100V | 114222 | MA201E223MAA |
| АЗАЗС178 | 281-0775-00 |  | CAP, FXD, CER 01:0.1UF, 20\% , 50V | 04222 | MA205E104MAA |
| A303C920 | 283-0167-00 |  | CAP, FXD, CER DI:0.1UF, 10\%, 100V | 04222 | 3430-100C-104K |
| A303CR18 | 152-0141-02 |  | SEIICOND DVC, DI: SH, SI , 30V, 150MA , 30V,00-35 | 03508 | 092527 (1N4152) |
| A3A3CR21 | 152-0141-02 |  | SEMICOND DVC, DI:SH,SI, 30V, 150MA, 30V, DO-35 | 03508 | 002527 (1N4152) |
| A3A3CR22 | 152-0141-02 |  | SEMICOND DVC, $\mathrm{DI}:$ SH, SI , 30V, 150MA , 30V , DO-35 | 03508 | DA2527 (1N4152) |
| Q3A3CR23 | 152-0141-02 |  | SEMICOND OVC, DI:SH,SI, 30V, 150MA , 30V , 00-35 | 03508 | 0.2527 ( $1 \times 4152$ ) |
| A3A3CR24 | 152-0141-02 |  | SEMICOND DVC, DI:SH, SI , 30V, 150MA, 30V, 00-35 | 03508 | 002527 (1N4152) |
| A3A3CR25 | 152-0141-02 |  | SEMICOND DVC, DI:SK, SI, 30V, 150MA, 30V, D0-35 | 03508 | 092527 (1N4152) |
| -3A3CR26 | 152-0141-02 |  | SEMICOND DVC, DI:SH,SI, 30V, 150MA, 30V, DO-35 | 03508 | 002527 (1N4152) |
| D3A3CR27 | 152-0141-02 |  | SEMICOND DVC, DI:SW, SI , 30V, 150M0, 30V, $00-35$ | 03508 | 022527 (1N4152) |
| -303CR28 | 152-0141-02 |  | SEMICOND DVC, OI:SH, 5I , 30V, 150MA , 30V, 00-35 | 03508 | 0a2527 (1N4152) |
| A303CR31 | 152-0141-02 |  | SEMICOND DVC, DI:SN,SI, 30V, 150NQ, 30V, D0-35 | 03508 | 022527 (1N4152) |
| A3A3CR32 | 152-0141-02 |  | SEMICOND DVC, DI:SN,SI, 30V, 150MA, 30V, DO-35 | 03508 | 002527 (1N4152) |
| АЗа3CR33 | 152-0141-02 |  | SEMICOND DVC, DI:SW, 5I, 30V, 150MA, 30V, D0-35 | 03508 | DA2527 (1N4152) |
| АЗа3CR34 | 152-0141-02 |  | SEMICOND DVC, DI: SW, SI , 30V, 150MA, 30V,00-35 | 03508 | 002527 (1N4152) |
| A3A3CR35 | 152-0141-02 |  | SEMICOND DVC, DI:SK, SI, 30V, 150MA, 30V,00-35 | 03508 | Da2527 (1N4152) |
| АЗАЗСR36 | 152-0141-02 |  | SEMICONO DVC, DI:SH, SI, 30V, 150MA, 30V, 00-35 | 03508 | 022527 (1N4152) |
| A303CR37 | 152-0141-02 |  | SEMICOND DVC, DI : SN, SI , 30V, 150MA , 30V, 00-35 | 03508 | 0.2527 (1N4152) |
| A3A3CR38 | 152-0141-02 |  | SEMICOND DVC, DI:SK, SI , 30V, 150MA, 30V , 00-35 | 03508 | 092527 (1N4152) |
| АЗАЗСR41 | 152-0141-02 |  | SEMICOND DVC, DI:SH,SI, 30V, 150MA, 30V,00-35 | 03508 | Da2527 (1N4152) |
| A3A3CR42 | 152-0141-02 |  | SEAICOND OVC, DI : SH, SI , 30V, 150MA, 30V, 00-35 | 03508 | 002527 (1N4152) |
| A3A3CR43 | 152-0141-02 |  | SEMICOND DVC, DI:SH,SI, 30V, 150MA, 30V,00-35 | 03508 | DA2527 (1N4152) |
| АЗАЗСR44 | 152-0141-02 | \# | SEAICOND DVC, DI:SH,5I, 30V, 1504a, 30V, 00-35 | 03508 | Da2527 (1N4152) |
| A3A3CR45 | 152-0141-02 |  | SEMICOND DVC, OI:SH,SI, 30V, 1504A, 30V,00-35 | 03508 | 002527 (1N4152) |
| A3A3CR46 | 152-0141-02 |  | SEMICOND DVC, $12 .: S H, S I, 30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | 002527 (1N4152) |
| D3A3CR47 | 152-0141-02 |  | SEMICOND DVC, DI:SN,SI, 30V, 150MA, 30V, DO-35 | 03508 | DA2527 (1N4152) |
| АЗаЗСR48 | 152-0141-02 |  | SEAICOND DVC, DI:SH,SI, 30V, 150MA , 30V, D0-35 | 03508 | DA2527 (1N4152) |
| АЗА3CR5 | 152-0141-02 |  | SEMICOND DVC, DI:SK, SI , 30V, 150MA , 30V , 00-35 | 03508 | Da2527 (1N4152) |
| A3A3CR52 | 152-0141-02 |  | SEMICOND DVC , DI: SH, $51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, \mathrm{DO}-35$ | 03508 | 002527 (1N4152) |
| АЗА3CR53 | 152-0141-02 |  | SEMICOND DVC, DI:SW,SI , 30V, 150MA, 30V, D0-35 | 03508 | 002527 (1N44152) |
| A3A3CR54 | 152-0141-02 |  | SEAICOND DVC, $01: S M, 51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | Da2527 (1N4152) |
| -3A3CR55 | 152-0141-02 |  | SEAICOND DVC,OI:SM,SI, 30V,150MA,30V,00-35 | 03508 | DA2527 (1N4152) |
| A3A3CR56 | 152-0141-02 |  | SEMICOND DVC, DI:SH,SI, 30V, 150MA, 30V, 00-35 | 03508 | D22527 (1N4152) |
| A3A3CR57 | 152-0141-02 |  | SEMICOND DVC, DI:SH,SI, 30V, 150MA, 30V, DO-35 | 03508 | 022527 (1N4152) |
| АЗа3CR58 | 152-0141-02 |  | SEMICOND DVC, DI:SK,SI , 30V, 150MA, 30V, D0-35 | 03508 | DA2527 (1N4152) |
| A3A3CR114 | 152-0141-02 |  | SEMICOND OVC, DI: SH, SI , 30V, 150MA, 30V,00-35 | 03508 | Da2527 (1N4152) |
| A3A3CR124 | 152-0141-02 |  | SEMICONO DVC, DI:SK, SI , 30V, 150MA , 30V , 00-35 | 03508 | DA2527 (1N4152) |
| A303CR128 | 152-0141-02 |  | SEMICOND DVC , DI:SK, SI , 30V, 150MA, 30V, 00-35 | 03508 | DA2527 (1N4152) |
| АЗа3CR136 | 152-0141-02 |  | SEMICOND DVC, $01: 5 N, 51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | DA2527 (1N4152) |
| A3A3CR138 | 152-0141-02 |  | SENICOND OVC, DI : SN, SI , 30V, 150Ma, 30V, $00-35$ | 03508 | D02527 (1N4152) |
| АЗаЗСR142 | 152-0141-02 |  | SEMICOND DVC, DI : SH, SI , 30V, 150MA, 30V, D0-35 | 03508 | Da2527 (1N4152) |
| АЗАЗCR152 | 152-0141-02 |  | SEIICOND DVC, DI:SH,SI , 30V, 150MA, 30V, D0-35 | 03508 | D02527 (1N4152) |
| A3A3CR156 | 152-0141-02 |  | SEAICOND DVC, DI: SH, $51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | Da2527 (1N4152) |
| АЗАЗСR162 | 152-0141-02 |  | SEMICOND DVC, $01: S H, S 1,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | Da2527 (1N4 152) |
| АЗДЗСR164 | 152-0141-02 |  | SEMICOND DVC, DI: SN, SI , 30V, 150MA, 30V, DO-35 | 03508 | DA2527 (1N4152) |
| A3A3CR172 | 152-0141-02 |  | SEMICOND DVC, DI: SK, SI , 30V,150M0,30V, $00-35$ | 03508 | Da2527 (1N4152) |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr . Code | Mrr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| म3a3CR180 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI, 30V , 150MA, 30V , 00-35 | 03508 | DQ2527 (1N4152) |
| АЗАЗСR181 | 152-0141-02 |  | SEMICOND DVC, DI:SW, $51.30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | Da2.527 ( 1 N4 152) |
| АЗаЗСR184 | 152-0141-02 |  | SEMICOND DVC, DI:SN, 5I, 30V, 150MA, 30V, D0-35 | 03508 | DA2527 (1N4152) |
| АЗАЗСR212 | 152-0141-02 |  | SEMICOND DVC, DI:SW, SI, 30V, 150MA, 30V, D0-35 | 03508 | Da2527 (1N4 152) |
| АЗАЗСR213 | 152-0141-02 |  | SEMICOND DVC, DI:SW, SI, 30V, 150MA, 30V,00-35 | 03508 | 002527 (1N4152) |
| Q 3 аЗCR214 | 152-0141-02 |  | SEMICOND DVC, DI:SN, SI, 30V, $150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | Da2527 ( ${ }^{1} 14152$ ) |
| АЗАЗCR215 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI, 30V , 150MA , 30V ,00-35 | 03508 | 0 O 2527 (1N4152) |
| АЗАЗCR216 | 152-0141-02 |  | SEMICOND DVC, DI:SH,SI, 30V, 150MA, 30V,00-35 | 03508 | Da2527 ( 1 N4 152) |
| A303CR217 | 152-0141-02 |  | SEMICOND DVC,0I:SH,SI, 30V, 150MA, 30V ,00-35 | 03508 | Da2527 (1N4152) |
| А303CR218 | 152-0141-02 |  | SEAICOND DVC, DI:SW, SI, 30V, 150MA,30V,00-35 | 03508 | DA2527 (1N4152) |
| АЗа3CR219 | 152-0141-02 |  | SEMICOND DVC, DI: SW, SI, 30V , 150MA, 30V,00-35 | 03508 | 002527 (1N4152) |
| АЗаз060 | 151-0190-00 |  | TRANSISTOR:NPN, SI, T0-92 | 80009 | 151-0190-00 |
| АЗа30182 | 151-0341-01 |  | TRANSISTOR:PNP, SI, TO-92 | 57688 | $4 \mathrm{AB} \mathrm{\times C228CP0341}$ |
| A3a3R18 | 315-0202-00 |  | RES, FXD, FILM: 2 K OHM, $5 \%, 0.25 \mathrm{~W}$ | 57688 | NTR25J-E 2K |
| A3a3R22 | 307-0106-00 |  | RES, FXD, CMPSN: 4.7 OHM , $5 \mathrm{~K}, 0.25 \mathrm{~W}$ | 01421 | CB 4765 |
| म3a3R24 | 307-0106-00 |  | RES, FXD, CMPSN:4.7 OHM , 5\%,0.25 | 01121 | CB 4765 |
| A303R26 | 307-0106-00 |  | RES,FXD,CMPSN:4.7 DHM , 57,0.25 | 01121 | C8 4765 |
| A3a3R28 | 307-0106-00 |  | RES, FXD, CMPSN:4.7 OHM , 5\%, 0.25N | 01121 | CB 4765 |
| Аэa3R29 | 315-0471-00 |  | RES, FXX, FILM:470 OHM , 5\% , 0.25H | 57668 | NTR25J-E470E |
| АЗа3R32 | 307-0106-00 |  | RES, FXD, CMPSN:4.7 OHM , 5\%,0.25 | 01121 | CB 9765 |
| A303R34 | 307-0106-00 |  | RES, FXD, CMPSN:4.7 OHM , 5\% , 0.25 H | 01121 | CB 4765 |
| АЗазR36 | 307-0106-00 |  | RES, FXD, CMPSN:4.7 OHM , 5\%,0.25 | 01121 | CB 4765 |
| A3a3R38 | 307-0106-00 |  | RES , FXD, CMPSN: 4.7 OHM, 5\%,0.25 | 01121 | CB 4765 |
| АЗаЗR42 | 307-0106-00 |  | RES , FXD, CMPSN:4.7 OHM, 5\%,0.25 | 01121 | CB 4765 |
| АзазR44 | 307-0106-00 |  | RES, FXD, CMPSN:4.7 OHM , 5\%,0.254 | 01121 | CB 4765 |
| Аэазв45 | 307-0106-00 |  | RES, FXD,CMPSN:4.7 OHM, 5\%,0.25 | 01121 | CB 4765 |
| АЗаЗR48 | 307-0106-00 |  | RES, FXO, CMPSN: 4.7 OHM , 5\%,0.25\% | 01121 | CB 4765 |
| A3a3R52 | 307-0106-00 |  | RES, FXD, CMPSN:4.7 OHM, 57, 0.25 | 01121 | CB 4765 |
| АЗа3R54 | 307-0106-00 |  | RES, FXD, CMPSN:4.7 OHM , 5\%, 0.25 H | 01121 | CB 4765 |
| Aэa3R56 | 307-0106-00 |  | RES, FXO, CMPSN:4.7 OHM , 5\%, 0.25\% | 01121 | CB 4765 |
| Аэазr 58 | 307-0106-00 |  | RES, FXD, CMPSN: 4.7 OHM , 5\%, 0.25 M | 01121 | CB 4765 |
| Аэазr60 | 315-0102-00 |  |  | 57668 | NTR25JE01K0 |
| АЗа3R61 | 315-0202-00 |  | RES, FXD, FILS:2K OHM, 5X, 0.25 H | 57668 | NTR25J-E 2K |
| A3a3R67 | 321-0260-00 |  | RES, FXO, FILM:4.99K OHM, 12,0.125N, TC=TO | 19701 | 5033@ $4 \mathrm{kg90} \mathrm{\%}$ |
| П3a3R68 | 321-0260-00 |  | RES, FXO, FILS:4.99K 0 H1, 17, 0.125 H , $\mathrm{TC}=$ T0 | 19701 | 5033ED4K990F |
| A3a3RB7 | 321-0260-00 |  | RES, FXD,FILM:4.99K OHM, 1X, 0.125K, TC=TO | 19701 | 5033E04K990F |
| A3a3R88 | 321-0260-00 |  | RES, FXD, FILM:4.99K 0 ¢M, $12,0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033@04K990F |
| A 9 A3R102 | 315-0510-00 |  | RES, FXO, FILI: 51 OHM, $5 \chi$, 0.25 W | 19701 | 5043CX51R00J |
| A3A3R112 | 315-0510-00 |  | RES, FXD, FILM: 51 OHM , 5\%, 0.25 M | 19701 | 5043CX51R00J |
| A303R117 | 315-0101-00 |  | RES, FXD, FILM: 100 OHM, 5\%, 0.25 M | 57668 | NTR25J-E 100E |
| A3A3R121 | 315-0510-00 |  | RES, FXO, FILM: 51 OHM, $5 \%, 0.25 \mathrm{H}$ | 19701 | 5043CX51R00J |
| A303R122 | 315-0510-00 |  | RES , FXO, FILS: 51 OHM, $5 \mathrm{LK}, 0.25 \mathrm{~W}$ | 19701 | 5043CX51R00J |
| A3a3R123 | 315-0510-00 |  | RES, FXD, FILM: 51 OHM, 5\%, 0.25 H | 19701 | 5043CX51R00J |
| A3A3R126 | 315-0122-00 |  | RES, FXO, FILK:1.2K OHM, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E01K2 |
| A3A3R127 | 315-0122-00 |  | RES,FXD, FILM:1.2K OHM ,5\%,0.25M | 57668 | NTR25J-E01X2 |
| A3A3R128 | 321-0239-00 |  | RES, FXO, FIUM: 3.01 K OHK, 12, $0.125 \mathrm{~K}, \mathrm{TC}=\mathrm{TO}$ | 19701 | 5043ED3K010F |
| АЗа3R139 | 315-0510-00 |  | RES, FXO, FILM: 51 OHM , 57,0.25M | 19701 | 5043CX51R00J |
| A303R132 | 315-0510-00 |  | RES, FXO, FILM: 51 OHM , 5\% , 0.25 N | 19701 | 5043CX51R00J |
| A3a3R133 | 315-0510-00 |  | RES, FXO, FILM: 51 OHM, $5 \mathbf{7}, 0.25 \mathrm{M}$ | 19701 | 5043CX51R00, |
| A3A3R135 | 315-0105-00 |  | RES, FXO, FILM: 1 M OHM, $5 \mathrm{LK}, 0.25 \mathrm{H}$ | 19701 | 5043CX1*000, |
| A3A3R136 | 315-0152-00 |  | RES, FXD, FILM: 1.5 K OHW, $5 \mathrm{~K}, 0.25 \mathrm{~K}$ | 57668 | NTR25J-E01K5 |
| A3A3R138 | 315-0243-00 |  | RES,FXD, FILN:24K OHM, 5X,0.25M | 57668 | NTR25J-E24K0 |
| A303R142 | 315-0104-00 |  | RES, FXO, FILM: 100K OHM , 52,0.25M | 57668 | NTR25J-E100K |
| म303R144 | 315-0152-00 |  | RES,FXD, FILM: 1.5 K OHM, $5 \mathrm{X}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E01K5 |
| A303R152 | 315-0102-00 |  | RES,FXD,FILM:1K OHM, 57,0.25M | 57668 | NTR25JEO1K0 |
| A303R153 | 315-0402-00 |  | RES, FXD, FILM: 1 K OHM, 5X,0.25M | 57668 | NTR25JEOTK0 |
| A3a3R156 | 315-0102-00 |  | RES, FXO, FILC:1K OHN, $5 \mathrm{~L}, 0.25 \mathrm{~N}$ | 57668 | NTR25JE01K0 |
| 03038157 | 315-0102-00 |  | RES, FXD, FILM: 1K OMW, $5 \mathrm{5X}, 0.25 \mathrm{H}$ | 57668 | NTR25JE01K0 |
| A3A3R162 | 315-0182-00 |  | RES, FXO, FILM:1.8K OHM, $5 \mathrm{X}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E1K8 |


| Component No． | Tektronix Part No． | Serial／Assembly No． Effective Dscont | Name \＆Description | Mfr． <br> Code | Mfr．Part No． |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A3A3R164 | 315－0182－00 |  | RES，FXO，FILM： 1.8 K OHM $, 5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J－E1K8 |
| А 3 A3R172 | 315－0472－00 |  | RES，FXD，FILM：4．7K OHM ，5\％，0．25M | 57668 | NTR25J－E04K7 |
| A3A3R173 | 315－0122－00 |  | RES，FXD，FILM： 1.2 K OHM， $5 \%, 0.25 \mathrm{~K}$ | 57668 | NTR25J－E01K2 |
| АЗ言174 | 315－0122－00 |  | RES，FXD，FILM：1．2K OHM ，5\％，0．25 | 57668 | NTR25J－E01K2 |
| D303R178 | 315－0101－00 |  | RES，FXD，FILM： 100 OHM ，5\％，0．25 | 57668 | NTR25J－E 100E |
| A303R180 | 315－0272－00 |  | RES，FXD，FILK：2．7K OHM，5\％， 0.25 H | 57668 | NTR25J－E02K7 |
| A3A3R181 | 315－0272－00 |  | RES，FXD，FILM： 2.7 K OHM， $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J－002K7 |
| АЗА3R182 | 315－0122－00 |  | RES，FXD，FILM：1．2K OHM，5X，0．25\％ | 57668 | NTR25J－E01K2 |
| АЗ产 183 | 315－0153－00 |  | RES，FXD，FILK：15K OHM ，5\％，0．25 | 19701 | 5043Cx15K00J |
| D3A3R184 | 301－0102－00 |  | RES，FXD，FILM：1K OHM ，5\％，0．50W | 19701 | 5053CX1K000J |
| A303R186 | 315－0472－00 |  | RES，FXD，FILM：4．7K OHM，5X，0．25 | 57668 | NTR25J－E04K7 |
| АЗаЗR187 | 315－0391－00 |  | RES，FXD，FILM： 390 OHM， $5 \%, 0.25 \mathrm{M}$ | 57668 | NTR25J－E390E |
| A3A3R192 | 321－0231－00 |  | RES，FXD，FILH：2．49K OHM ，12， $0.125 \mathrm{~K}, \mathrm{TC}=$ TO | 19701 | 5033E02K49F |
| АЗа3R193 | 321－0231－00 |  | RES，FXO，FILM： 2.49 K OHM ，12， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5033ED2K49F |
| D3A3R194 | 315－0132－00 |  | RES，FXD，FILM：1．3K OHM，5\％，0．25 | 57668 | NTR25J－E01K3 |
| A303R195 | 315－0132－00 |  | RES，FXD，FILM：1．3K OHM， $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J－E01K3 |
| АЗ言196 | 315－0132－00 |  | RES，FXO，FILM： 1.3 K OHM $, 5 \%, 0.25 \%$ | 57668 | NTR25J－E01K3 |
| A3A3R209 | 315－0102－00 |  | RES，FXO，FILK： 1 K OHM， $5 \mathrm{~K}, 0.25 \mathrm{~N}$ | 57668 | NTR25JE01K0 |
| A3A3R202 | 315－0102－00 |  | RES，FXD，FILM： 1 K OHM， $5 \mathrm{~L}, 0.25 \mathrm{H}$ | 57668 | NTR25JE01kO |
| A3A3R203 | 315－0102－00 |  | RES，FXD，FILI： 1 K OHM ，5\％， 0.25 H | 57668 | NTR25JE01K0 |
| A3产204 | 315－0102－00 |  | RES，FXD，FILK： 1 K OHM，5X，0．25 | 57668 | NTR25JE01K0 |
| A3A3R212 | 315－0751－00 |  | RES，FXD，FILM：750 OHM ，5\％，0．25M | 57668 | NTR25J－E750E |
| A3A3R213 | 315－0751－00 |  | RES，FXD，FILM： 750 OHM，5\％，0． 25 M | 57668 | NTR25J－E750E |
| －303R214 | 315－0751－00 |  | RES，FXO，FILK： 750 OHM， $5 \%, 0.25 \mathrm{~m}$ | 57668 | NTR25J－E750E |
| A3A3R215 | 315－0751－00 |  | RES，FXD，FILM： 750 OHM， $5 \%, 0.25 \mathrm{~K}$ | 57668 | NTR25J－E750E |
| A3A3R216 | 315－0751－00 |  | RES，FXO，FILM：750 OHM， $5 \mathrm{~K}, 0.25 \mathrm{~K}$ | 57668 | NTR25J－E750E |
| A3A3R217 | 315－0751－00 |  | RES，FXO，FILM $7500 \mathrm{HH}, 5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J－E750E |
| A303R218 | 315－0751－00 |  | RES，FXD，FILM： 750 OHM， $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J－E750E |
| A303R219 | 315－0751－00 |  | RES，FXO，FILM：750 OHM $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J－E750E |
| A3A3R227 | 315－0511－00 |  | RES，FXO，FILM：510 OHM，5X， 0.25 H | 19701 | 5043CX510R0J |
| A303R228 | 315－0511－00 |  | RES ，FXD，FILM： 510 OHM ，5\％， 0.25 W | 19701 | 5043CX510ROJ |
| АЗ原229 | 315－0511－00 |  | RES，FXD，FILM： 510 OHM， $5 \mathrm{X}, 0.25 \mathrm{H}$ | 19701 | 5043 CX510R0J |
| A3A3R241 | 321－0344－00 |  | RES，FXO，FILS： 37.4 K OHM，12， $0.125 \mathrm{H}, \mathrm{TC}=$ T0 | 19701 | 5033＠37K40F |
| A3A3R242 | 321－0356－00 |  | RES，FXO，FILM：49．9K OHM ，12，0．125 ，TC＝T0 | 19701 | 5033ED49K90F |
| A3A3R243 | 321－0306－00 |  | RES，FXD，FILIM： 15.0 K OHM，17， $0.125 \mathrm{H}, \mathrm{TC}=$ T0 | 19701 | 5033E015J00F |
| A3A3R244 | 321－0973－00 |  | RES，FXD，FILS：75．OK OHA，1\％，0．125 ，TC＝T0 | 19701 | 5033＠${ }^{\text {75K00F }}$ |
| A3A3R245 | 321－0311－00 |  | RES，FXO，FILM：16．9K OHM，1\％， $0.125 \mathrm{~K}, \mathrm{TC}=$ T0 | 07716 | CEAC16901F |
| A3A3R246 | 321－0356－00 |  | RES，FXD，FILM： 49.9 K OHM， $1 \mathrm{~K}, 0.125 \mathrm{M}, \mathrm{TC}=$ T0 | 19701 | 5033En49K90F |
| Q3a3R247 | 321－0321－00 |  | RES，FXO，FIL $: 21.5 \mathrm{~K}$ OHM， $17,0.125 \mathrm{~N}, \mathrm{TC}=$ T0 | 07716 | CEAD21501F |
| A3A3R248 | 321－0335－00 |  | RES，FXO，FILS： 30.1 K OHM，12，0．125 H ，TC＝T0 | 57668 | R614FXE30K1 |
| A3A3R264 | 315－0752－00 |  | RES，FXO，FILH： 7.5 K OHM $, 5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J－E07K5 |
| АЗаэu92 | 156－0043－03 |  | MICROCKT，DGTL：QUAD 2－INP NOR GATE，SCRN | 18324 | N7402（NE OR F8） |
| АЗаЗ 33232 | 155－0015－01 |  | MICROCKT，DGTL：ANALOG DATA SWITCH | 80009 | 155－0015－01 |
| АЗАЗU3262 | 155－0015－01 |  | MICROCKT，DGTL：ANALOG DATA SHITCH | 80009 | 155－0015－01 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A6 | 670-9178-00 |  | CIRCUIT 80 ASSY:LOGIC | 80009 | 670-9178-00 |
| A6C4301 | 290-0778-00 |  | CAP, FXD, ELCTLT: 1 UF , +50-10\%, 50V , NPL20 | 54473 | ECE-A50N1 |
| A6C4302 | 290-0973-00 |  | CAP, FXO, ELCTLT: 100UF, 20\%, 25VOC | 55680 | ULB1E101MEA |
| A6C4303 | 290-0778-00 |  | CAP, FXD, ELCTLT: 1 UF, $+50-10 \%, 50 \mathrm{~V}$, NPLZ | 54473 | ECE-L50N1 |
| A6C4304 | 290-0778-00 |  | CAP, FXD, ELCTLT:1UF, $+50-10 \%, 50 \mathrm{~V}$, NPLZ0 | 54473 | ECE-A50N1 |
| A6C4305 | 283-0177-00 |  | CAP, FXD, CER DI:1UF,+80-20\%, 25 V | 04222 | SR302E105ZAATR |
| A6C4314 | 281-0809-00 |  | CAP, FXD, CER DI:200 PF, 5\%, 100V | 04222 | Ma101a201JAA |
| A6C4315 | 281-0936-00 |  | CAP, FXD, CER D1:39PF, 5\%, 100V | 04222 | Ma101a390JaA |
| A6C4316 | 283-0005-02 |  | CAP, FXD, CER DI:0.01UF, +80\%-20\%, 250V | 54583 | FK2625U201032-T |
| А6С4336 | 281-0936-00 |  | CAP, FXD, CER DI:39PF, 5\%,100V | 04222 | MA1014390JAA |
| А6С4343 | 281-0819-00 |  | CAP, FXD,CER DI:33 PF,5\%,50V | 04222 | GC105A330, |
| A6C4345 | 281-0819-00 |  | CAP, FXD, CER DI:33 PF,5\%,50V | 04222 | GC105A330J |
| A6C4346 | 281-0788-00 |  | CAP, FXD, CER OI:470PF, 10\%, 100V | 04222 | MA101C471KaA |
| A6C4347 | 283-0538-00 |  | CAP, FXD, MICA DI:130PF, 1\%, 100V | 00853 | D155F131F0 |
| A6C4348 | 281-0788-00 |  | CAP, FXD, CER DI:470PF, 10\%,100V | 04222 | Ma101C471KAA |
| А6С4420 | 281-0936-00 |  | CAP, FXD, CER DI:39PF, $5 \%, 100 \mathrm{~V}$ | 04222 | Ma101a390JaA |
| A6C4423 | 281-0936-00 |  | CAP, FXD, CER DI:39PF, 5\%, 100V | 04222 | MA101a390JAA |
| A6C.4441 | 281-0936-00 |  | CAP, FXD,CER DI:39PF,5\%,100V | 04222 | MA1014390Já |
| A6C4449 | 283-0005-02 |  | CAP, FXD, CER DI:0.01UF, +80\%-20\%, 250V | 54583 | FK2625U201032-T |
| A6C4461 | 283-0604-00 |  | CAP, FXD, MICA DI:304PF,2\%,500V | 00853 | D155F3040G0 |
| A6C4467 | 283-0604-00 |  | CAP, FXD, MICA DI:304PF,2\%,500V | 00853 | 0155F3040G0 |
| A6C4471 | 283-0177-00 |  | CAP, FXD, CER DI: $1 \mathrm{UF},+80-20 \%, 25 \mathrm{~V}$ | 04222 | SR302E105IAATR |
| A6C.4482 | 281-0812-00 |  | CAP, FXD, CER DI:1000PF, 10\%, 100 | 04222 | MA101C102KAA |
| $06 \mathrm{C4483}$ | 281-0812-00 |  | CAP, FXD, CER DI: $1000 \mathrm{PF}, 10 \%, 100 \mathrm{~V}$ | 04222 | MA101C102KaA |
| A6C4492 | 283-0177-00 |  | CAP, FXD, CER DI: $1 \mathrm{UF},+80-20 \%, 25 \mathrm{~V}$ | 04222 | SR302E105ZAATR |
| A6C4494 | 281-0814-00 |  | CAP, FXD, CER DI:100 PF, 10\%, 100V | 04222 | MA101A101KAA |
| A6C4497 | 281-0812-00 |  | CAP, FXD, CER DI: 1000PF, 10\%, 100V | 04222 | MA101C102KAA |
| A6CR4322 | 152-0141-02 |  | SEMICOND DVC, DI:SW, SI, 30V, 150MA, 30V, 00-35 | 03508 | Da2527 (1N4152) |
| A6CR4323 | 152-0141-02 |  | SEMICOND DVC, DI: SW, SI, 30V, 150MA , 30V, 00-35 | 03508 | DA2527 (1N4152) |
| А6CR4354 | 152-0141-02 |  | SEMICOND DVC, DI: SN, SI, 30V, 150MA , 30V, DO-35 | 03508 | DA2527 (1N4152) |
| A6C124355 | 152-0141-02 |  | SEMICOND DVC, DI:SW, SI, 30V , 150MA , 30V , DO-35 | 03508 | DA2527 (1N4152) |
| A6CR2356 | 152-0141-02 |  | SEMICOND DVC, DI: SW, SI , 30V, 150MA, 30V, D0-35 | 03508 | DA2527 (1N4152) |
| A6C124357 | 152-0141-02 |  | SEMICOND DVC, DI: SW, SI , 30V , 150MA , 30V , DO-35 | 03508 | DA2527 (1N4152) |
| A6CR4368 | 152-0141-02 |  | SEMICOND DVC, DI: 5H, SI, 30V ,150MA, 30V, D0-35 | 03508 | DA2527 (1N4152) |
| A6CR4369 | 152-0141-02 |  | SEMICOND DVC,DI:SW, SI, 30V,150MA, 30V,00-35 | 03508 | DA2527 (1N4152) |
| A6CR4420 | 152-0141-02 |  | SEMICOND DVC, DI: SW, SI , 30V, 150MA, 30V,00-35 | 03508 | DA2527 (1N4152) |
| A6C124423 | 152-0141-02 |  | SEMICOND DVC, DI: $5 \mathrm{H}, 5 \mathrm{SI}, 30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | DA2527 (1N4152) |
| 96C124433 | 152-0141-02 |  | SEMICOND DVC, DI: SW, SI , 30V , 150MA , 30V , 00-35 | 03508 | DA2527 (1N4152) |
| A6C124434 | 152-0141-02 |  | SEMICOND DVC, DI: SW, SI, 30V ,150MA ,30V, $00-35$ | 03508 | 042527 (1N4152) |
| A6CR4448 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI, 30V , 150MA , 30V , 00-35 | 03508 | DA2527 (1N4152) |
| A6CR4449 | 152-0141-02 |  | SENICOND DVC,DI:SW, 5I , 30V, 150MA , 30V , 00-35 | 03508 | DA2527 (1N4152) |
| A6C134461 | 152-0141-02 |  | SEMICOND DVC, DI: SN, SI, 30V,150MA, 30V,00-35 | 03508 | 042527 (1N4152) |
| a6C124467 | 152-0141-02 |  | SEMICOND DVC, DI: SH, 51, 30V , 150MA , 30V , 00-35 | 03508 | DA2527 (1N4152) |
| A6CR2472 | 152-0141-02 |  | SEMICOND DVC, DI: SN, SI, 30V, 150MA, 30V , 00-35 | 03508 | D42527 (1N4152) |
| A6CR4473 | 152-0333-00 |  | SEAICOND DVC, DI:SN,SI, 55V ,200MA, 00-35 | 07263 | FOH-6012 |
| A6C124474 | 152-0333-00 |  | SEMICOND DVC, DI: SH, $51,55 \mathrm{~V}, 200 \mathrm{MA}, 00-35$ | 07263 | FOH-6012 |
| A6CR4483 | 152-0141-02 |  | SEIICOND DVC, DI: SW, $51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | DA2527 (1N4152) |
| A6CR4484 | 152-0141-02 |  | SEAICOND DVC, DI:SH,SI, 30V, $150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | DA2527 (1N4152) |
| A6C124486 | 152-0141-02 |  | SEAICOND DVC, DI: SH, SI , 30V , 150MA , 30V , 00-35 | 03508 | B42527 (1N4152) |
| A6C184487 | 152-0153-00 |  | SEMICOND OVC, DI:SH, SI, 10V, $50 \mathrm{MA}, . \mathrm{DO}-7$ | 07263 | F07003 |
| A6C124488 | 152-0153-00 |  | SEMICOND DVC, DI: SH, SI, 10V, 50MA, .D0-7 | 07263 | FD7003 |
| A6L4301 | 108-1246-00 |  | COIL,RF: FXD, 3.9UH,10\% | 54583 | SPT 0406-3R9K-6 |
| A6L4302 | 108-1246-00 |  | COIL,RF: FXD, 3.9UH, 10\% | 54583 | SPT 0406-3R9K-6 |
| A6L4303 | 108-1246-00 |  | COIL,RF: PXD, 3.9UH, 10\% | 54583 | SPT 0406-3R9K-6 |
| A6L4304 | 108-1246-00 |  | COIL, RF: FXD, 3.9UH, 10\% | 54583 | SPT 0406-3R9K-6 |
| A6L4317 | 108-1246-00 |  | COIL,RF: FXD, 3.9UH, 10\% | 54583 | SPT 0406-3R9K-6 |
| A6L4342 | 108-1246-00 |  | COIL, RF: FXD, 3.9UH, 10\% | 54583 | SPT 0406-3R9K-6 |
| 96L4344 | 108-1246-00 |  | COIL, RF: FXD, 3.9UH, 10\% | 54583 | SPT 0406-3R9K-6 |
| A6LR4338 | 108-0543-00 |  | COIL,RF:PIXED,1.1UH | 80009 | 108-0543-00 |


| Component No. | Tektronix Part No, | Serial/Assembly No. Effective Dscont | Name \% Description | Mfr. Code | Mfr, Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A6R4425 | 315-0391-00 |  | RES, FXO, FILM:390 0HM, 5\%,0.25H | 57668 | NTR25J-EJ90E |
| A6R4426 | 315-0102-00 |  | RES, FXD, FILM: 1 K OHM, 5\%,0.25W | 57668 | NTR25JE01K0 |
| A6R4427 | 315-0102-00 |  | RES, FXD,FILM:1K OHM, 5\%, 0.25W | 57668 | NTR25JE01K0 |
| A6R4428 | 315-0152-00 |  | RES, FXD, FILM:1.5K OHM, 5\%, 0.25 W | 57668 | NTR25J-E01K5 |
| A6R4431 | 315-0152-00 |  | RES, FXD, FI LM: 1.5 K OHM, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E01K5 |
| A6R4432 | 315-0222-00 |  | RES, FXO, FILM:2.2K OHM, 5\%, 0.25 H | 57668 | NTR25J-E02K2 |
| A6R4437 | 315-0103-00 |  | RES, FXD,FIUM:10X OHM , 57,0.25N | 19701 | 5043C×10K00J |
| A6R4438 | 315-0821-00 |  | RES, FXD, FIL $: 820$ OHM, 5\%,0.25N | 19701 | 5043CX820RDJ |
| A6R4441 | 315-0822-00 |  | RE5, FXD,FILM:8.2K OHM, 5\%, 0.25 W | 19701 | 5043CX8K200J |
| A6R4442 | 315-0132-00 |  | RES, FXD,FILM:1.3K OHM, 5\%, 0.25 W | 57668 | NTR25J-E01K3 |
| A6R4448 | 315-0271-00 |  | RES, FXD, FILM:270 0HM, 5\%,0.25N | 57668 | NTR25J-E270E |
| A6R4449 | 315-0302-00 |  | RES, FXD, FILM:3K OHM,5\%,0.25W | 57688 | NTR25J-E03K0 |
| A6R4456 | 321-0237-00 |  | RES, FXD, FILM:2.87K OHM, 17, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 07716 | CEAD 28700F |
| A6R4457 | 315-0332-00 |  | RES, FXD,FIUM:3.3K OHM,5\%,0.25W | 57668 | NTR25J-E03K3 |
| A6R4461 | 321-0288-00 |  | RES, FXD, FILM:9.76K OHM, 1\%,0.125M, TC= ${ }^{\text {CO}}$ | 19701 | 5033ED9K760F |
| A6R4462 | 321-0246-00 |  | RES, FXD, FILM:3.57K OHM,1\%,0.125N,TC=T0 | 19701 | 5043ED3K570F |
| A6R4467 | 321-0288-00 |  | RES, FXO, FILM:9.76K OHA, 1\%,0.125N, TC= | 19701 | 5033E09K760F |
| A6R4468 | 321-0246-00 |  | RES, FXD, FILM:3.57K OHM, 1\%,0.125W,TC=TO | 19701 | 5043E03K570F |
| A6R4471 | 321-0245-00 |  | RES , FXD, FILM:3.48K OHM, 1\%,0.125M, TC=TO | 19701 | 5033E03K48F |
| $96 R 4472$ | 315-0151-00 |  | RES, FXD, FILM: 150 OHM , 5\%, 0.25N | 57668 | NTR25J-E150E |
| A6R4473 | 301-0471-00 |  | RES, FXD, FILM:470 0HM, 5\%, 0.5 K | 19701 | 5053CX 470R0J |
| A6R4474 | 322-0210-00 |  | RES, FXD, FILM: 1.50 K OHM, 1\%,0.25H, TC $=$ T0 | 75042 | CEBTO-1501F |
| A6R4475 | 315-0361-00 |  | RES, FXD, FILM:360 OHM , 5\% , 0.25 H | 19701 | 5043CX360ROJ |
| A6R4476 | 315-0221-00 |  | RES , FXD, FILM:220 OHM, 5\%,0.25H | 57668 | NTR25J-E220E |
| A6R4477 | 315-0302-00 |  | RES, FXO,FILM:3K OHM, 5\% , 0.25 H | 57668 | NTR25J-E03K0 |
| A6R4478 | 315-0182-00 |  | RES, FXD, FILM: 1.8K OHM,5\%,0.25 | 57668 | NTR25J-E1K8 |
| A6R4879 | 321-0289-00 |  | RES , FXD, FILK: 10.0 K OHM, 12, $0.125 \mathrm{~N}, \mathrm{TC}=\mathrm{TO}$ | 19701 | 5033ED10K0F |
| A6R4480 | 311-2269-00 |  | RES, VAR, NONAN: TRMR, 20 K OHM, 20\%,0.54 | TK1450 | GFOGVT 20 K OHM |
| A6R4481 | 321-0240-00 |  | RES, FXD, FILM:3.09K OHM, 1\%,0.125N, TC=TO | 07716 | CEAD30900F |
| A6R4482 | 315-0100-00 |  | RES, FXD, FILM:10 OHM, 5\% , 0. 25 W | 19701 | 5043CX10RR00J |
| A6R4483 | 315-0103-00 |  | RES, FXD, FILM:10K OHM, 5\%,0.25\% | 19701 | 5043CX10K00J |
| A6R4484 | 315-0683-00 |  | RES,FXO, FILM:68K OHM,5\%,0.25 | 57668 | NTR25J-E68X0 |
| A6R4485 | 321-0237-00 |  | RES , FXD, FILM: 2.87 K OHM, 1\%, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 07716 | CEAD 28700F |
| A6R4486 | 315-0242-00 |  | RES,FXD,FIUM:2.4K OHM, 5\%,0,25K | 57668 | NTR25J-E02K4 |
| A6R4487 | 315-0103-00 |  | RES,FXD,FILM:10K OHM,5\%,0.25W | 19701 | 5043CX10X00J |
| A6R4488 | 315-0751-00 |  | RES , FXD, FILM:750 OHM, 5\%, 0.25 M | 57668 | NTR25J-E750E |
| A6R4489 | 321-0312-00 |  | RES, FXD, FILM:17.4K OHM, 12,0.125W, TC=T0 | 19701 | 5033ED17K40F |
| A6R4490 | 315-0101-00 |  | RES , FXD, FILH: 100 OHM, 5\%, 0.25 | 57668 | NTR25J-E 100E |
| A6R4491 | 315-0201-00 |  | RES,FXD,FILM:200 OHM,5\%,0.25M | 57668 | NTR25J-E200E |
| A6R4492 | 315-0152-00 |  | RES, FXD,FIUM:1.5K OHM, 5\%,0.25N | 57668 | NTR25J-E01K5 |
| A6R4493 | 321-0215-00 |  | RES , FXD, FILM:1.69K OHM, 1\%,0.125 $\mathrm{H}, \mathrm{TC}=$ TO | 07716 | CEAD16900F |
| A6R4494 | 315-0622-00 |  | RES , FXD, FILM: 6.2 K OHM, 5\%,0.25K | 19701 | 5043CX6K200J |
| A6R4495 | 315-0622-00 |  | RES, FXD, FILM: 6.2 K OHW, 5\%,0.25W | 19701 | 5043CX6K200J |
| A6R4496 | 321-0242-00 |  | RES , FXD, FILM:3.24K OHM, 1\% , 0.125M, TC=TO | 19701 | 5043ED3K240F |
| A6R4497 | 315-0272-00 |  | RES, FXD, FILM:2.7K OHM, 5\%, 0.25K | 57668 | NTR25J-E02K7 |
| A6R4498 | 321-0243-00 |  | RES, FXD,FILM:3.32K OHM, 1\%,0.125\%, TC=TO | 19701 | 5033E03K32F |
| A614320 | 155-0011-00 |  | MICROCKT, DGTL:CLOCK \& CHOP BLANKINS | 80009 | 155-0011-00 |
| A6U4340 | 155-0010-00 |  | MICROCKT, DGTL:CHOP COUNTER | 80009 | 155-0010-00 |
| A6U4358 | 155-0013-00 |  | MICROCKT , DGTL:DC BINARY | 80009 | 155-0013-00 |
| AEN4368 | 155-0013-00 |  | MICROCKT, DGTL:DC BINARY | 80009 | 155-0013-00 |
| A6U4412 | 155-0013-00 |  | MICROCKT, DGTL:DC BINARY | 80009 | 155-0013-00 |
| 06U4428 | 155-0009-00 |  | MICROCKT, DGTL:HORIL LOCKOUT LOC | 80009 | 155-0009-00 |
| A6U4494 | 155-0012-00 |  | MICROCKT, DGTL:Z-AXIS AMPLIFIER | 80009 | 155-0012-00 |
| D6VR4334 | 152-0166-00 |  | SENICONO DVC, DI: 2EN,SI, 6.2V,5X,0.4K,00-7 | 04713 | SI11738RL |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr, Part No, |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A7 | 670-9177-00 |  | CIRCUIT BD ASSY:TRIGGER SELECT | 80009 | 670-9177-00 |
| A7C1 | 283-0114-00 |  | CAP,FXD,CER DI:1500PF,5\%,200V | 59660 | 805-534-Y500152J |
| A7C2 | 283-0114-00 |  | CAP,FXD, CER 01:1500PF,5\%,200V | 59660 | 805-534-Y500152J |
| A7C3 | 281-0808-00 |  | CAP, FXD,CER 0I:7 PF, 20\%, 100V | 04222 | MA101A7R04AA |
| A7C4 | 283-0159-00 |  | CAP, FXD, CER OI:18PF,5\%,50V | 04222 | SR155A180JQA |
| A 7 C5 | 283-0114-00 |  | CAP, FXO,CER DI:1500PF ,5\%,200V | 59660 | 805-534-Y500152J |
| A7C6 | 283-0114-00 |  | CAP, FXO, CER OL:1500PF ,5\%,200V | 59660 | 805-534-Y500152J |
| A7C7 | 281-0808-00 |  | CAP, FXD, CER DI:7 PF, 20\%, 100V | 04222 | MA101A7R040A |
| APC8 | 281-0773-00 |  | CAP, FXD, CER DI:0.01UF, 10\%, 100V | 04222 | MA201C103KДA |
| A7C9 | 283-0175-00 |  | CAP, FXD, CER DI:10PF ,5\%,200V | 05397 | C312C1000265CA 8 |
| Q7CR1 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI , 30V, 150MA , 30V , DO-35 | 03508 | DA2527 (1N4152) |
| APCR2 | 152-0141-02 |  | SENICONO DVC, $01: S N, S I, 30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, \mathrm{DO}-35$ | 03508 | DA2527 (1N4152) |
| APL1 | 108-0328-00 |  | COIL,RF:FIXED, O. 3UH | 80009 | 108-0328-00 |
| A7L2 | 108-0328-00 |  | COIL,RF:FIXED, 0.3UH | 80009 | 108-0328-00 |
| A7L9 | 108-0328-00 |  | COIL,RF:FIXED, 0.3UH | 80009 | 108-0328-00 |
| A7L10 | 108-0328-00 |  | COIL,RF:FIXED, O. 3 UH | 80009 | 108-0328-00 |
| A701 | 151-0302-00 |  | TRANSISTOR: NPN , SI, TO-18 | 04713 | ST899 |
| A702 | 151-0302-00 |  | TRANSISTOR:NPN, SI , TO-18 | 04713 | ST899 |
| A703 | 151-0369-00 |  | TRANSISTOR:PNP, SI , X-55 | 04713 | SPS8273 |
| 9704 | 151-0369-00 |  | TRANSISTOR:PNP, SI , X-55 | 04713 | SPS8273 |
| 0705 | 151-0294-00 |  | TRANSISTOR:PNP, SI , U-43 | 04713 | SMT1014 |
| A706 | 151-0294-00 |  | TRANSISTOR:PNP,SI, U-43 | 04713 | SMT1014 |
| A707 | 151-0294-00 |  | TRANSISTOR:PNP, SI , U-43 | 04713 | SMT1014 |
| A708 | 151-0294-00 |  | TRANSISTOR:PNP, SI, U-43 | 04713 | SWT1014 |
| A7R1 | 321-0164-00 |  | RES, FXO, FILM:499 OHM, 1\%, 0.125M, TC=TO | 19701 | 5033E0499R0F |
| A7R2 | 321-0164-00 |  | RES, FXD, FIU:499 OHM, 1\%, 0.125N, TC=TO | 19701 | 5033ED493R0F |
| A7R3 | 321-0164-00 |  | RES, FXD, FILM: 499 OHM, 1\%, 0.125N, TC=TO | 19701 | 5033ED499R0F |
| A7R4 | 321-0164-00 |  | RES, FXD, FILM:499 04H, 17, 0.125N, TC= 0 | 19701 | 5033ED499R0F |
| A7R5 | 325-0053-00 |  | RES, FXO, FILM:50 0HM, 12,0.05 , IC=TO | 91637 | CMF50-F50R00F |
| A7R6 | 325-0053-00 |  | RES, FXD, FILM:50 OHM , 1\%, O. O5N, TC=TO | 91637 | CMF50-F50800F |
| A7R7 | 325-0053-00 |  | RES , FXD, FILM:50 0HM, 1\% , 0.05N, $\mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R8 | 325-0053-00 |  | RES, FXO, FILM: 50 OHM, 1\%, 0.05M, TC= ${ }^{\text {P }}$ | 91637 | CMF50-F50R00F |
| A7R9 | 325-0053-00 |  | RES, FXO, FILM:50 OHM, 1\%,0.05 , TC= $=10$ | 91637 | CMF50-F50R00F |
| A7R10 | 325-0053-00 |  | RES, FXO, FILM:50 OHM, 1\%, 0.05M, TC=T0 | 91637 | CMF50-F50R00F |
| A7R19 | 321-0202-00 |  | RES, FXO, FILM: 1.24 K OHM, 1\%, $0.125 \mathrm{M}, \mathrm{TC}=$ TO | 24546 | NA5501241F |
| A7R12 | 321-0170-00 |  | RES , FXD, FILM: 576 OHM, 12, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 07716 | CEAD576ROF |
| A7R13 | 322-0111-00 |  | RES , FXO, FIUM:140 OHM , 17, 0.25H, TC=TO | 91637 | MFF1421G140ROF |
| A7R14 | 321-0202-00 |  | RES, FXD, FIUM: 1.24 K OHM, $9 \%, 0.125 \mathrm{~K}, \mathrm{TC}=$ TO | 24546 | NA5501241F |
| A7R15 | 301-0271-00 |  | RES , FXD, FILM: 270 OHM , 5\% , 0. 5M | 19701 | 5053CX270R0J |
| APR16 | 301-0271-00 |  | RES, FXD, FILM: 270 OHM, 5\%, 0.5N | 19701 | 5053CX270R0J |
| A7R17 | 315-0102-00 |  | RES, FXD, FILM: 1 K OHM, $5 \%, 0.25 \mathrm{~N}$ | 57668 | NTR25NEOTK0 |
| A7R18 | 321-0202-00 |  | RES, FXD, FILM: 1.24 K OHM, 12, $0.125 \mathrm{M}, \mathrm{TC}=$ TO | 24546 | NA5501241F |
| A7R19 | 321-0170-00 |  | RES , FXD, FILM:576 OHM, 17, 0.125 , TC=TO | 07716 | CEAD576ROF |
| A7R20 | 321-0202-00 |  | RES , FXD, FILM:1.24K OHM, 1\%, 0.125M, TC=T0 | 24546 | Na55D1241F |
| A7R21 | 322-0111-00 |  | RES, FXD, FILM: 140 OHM, 1\% , $0.25 \mathrm{H}, \mathrm{TC}=$ TO | 91637 | MFF1421G140ROF |
| A7R22 | 315-0103-00 |  | RES , FXO, FILH: 10 K OHM, 5\%, 0.25 H | 19701 | 5043CX10K00J |
| A7R23 | 321-0289-00 |  | RES,FXD,FILM:10.0K OHM, 1\%,0.1254, TC=TO | 19701 | 5033ED10K0F |
| A7R24 | 321-0260-00 |  | RES,FXD, FILH:4.99K OHM, 12, 0.125N, TC=T0 | 19701 | 5039E04K990F |
| A7R25 | 315-0103-00 |  | RES ,FXD, FILH: 10 K OHW,5\%,0.254 | 19701 | $5043 \mathrm{CX10K00J}$ |
| A7R26 | 321-0051-00 |  | RES , FXD, FIL 33.2 OHM , 1\%, 0. 125\% , TC=TO | 91637 | CMF55116633R20F |
| A7R27 | 321-0181-00 |  | RES, FXD, FI LM: 750 OHM, 1\%, $0.125 \mathrm{M}, \mathrm{TC}=$ TO | 07716 | CEAD750ROF |
| A7R28 | 311-2275-00 |  |  | TK1450 | GFO6VT 200 OHM |
| A7R29 | 321-0181-00 |  | RES , FXD, FILH: 750 OHm, 17, 0.125\%, TC $=$ TO | 07716 | CEAD750ROF |
| A7R30 | 321-0051-00 |  | RES, FXD, FILH:33.2 OHm, 1\%, 0. $125 \%, \mathrm{~T}=$ TO | 91637 | CMF55116G33R20F |
| A7R31 | 315-0302-00 |  | RES , FXD, FILM: 3K OHM , 5\% , 0.25 M | 57668 | NTR25J-E03K0 |
| A7R32 | 315-0511-00 |  | RES, FXD, FILH:510 OHW,5K, 0.25N | 19701 | 5043CX510R0J |
| A7R33 | 321-0219-00 |  | RES , FXD, FILM:1.87K OHM , 12, 0.125N, TC $=$ T0 | 07716 | CEAD 18700 F |
| A7R34 | 321-0221-00 |  | RES , FXO, FILM: 1.96K OHN, 1\%, 0.125M, TC $=$ T0 | 19701 | 5043E01K960F |
| A7R35 | 315-0151-00 |  | RES , FXD, FILM: 150 OHM , 5\%, 0.25 W | 57668 | NTR25J-E150E |


| Component No. | Tektronix Part No, | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A7R36 | 315-0100-00 |  | RES, FXD, FILM: 10 OHM , 5\% , 0.25 | 19701 | 5043CX10RRDO. |
| A7R37 | 315-0100-00 |  | RES,FXD,FILM:10 OHM, $54,0.25 \mathrm{~W}$ | 19701 | 5043CX10RR00.J |
| A7R38 | 321-0026-00 |  | RES, FXD, FILM: 18.2 OHM , 17, 0.125 $\mathrm{K}, \mathrm{TC}=$ TO | 57668 | RB14FXE 18E2 |
| A7R39 | 321-0026-00 |  | RES, FXO, FILM: 18.2 OHM, 12, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 57668 | RB14FXE 18E2 |
| A7R40 | 315-0510-00 |  | RES, FXD, FILM:51 OHM, 5\%,0.25 | 19701 | 5043CX51R00J |
| A7R41 | 311-2257-00 |  | RES , VAR, NONHM: TRMR, 500 OHM , 20\% , 0.5H | TK1450 | gFobvt 500 OHM |
| A7R42 | 315-0510-00 |  | RES, FXO, FILM: 51 OHM , 5\% , 0.25 | 19701 | 5043Cx51R00J |
| A7843 | 323-0165-00 |  | RES, FXD, FILM:511 OHM, 12, 0.5H, TC=T0 | 24546 | Na6505110F |
| A7844 | 311-2275-00 |  | RES ,VAR,NONHW: TRMR, 200 OHM , 20\%, 0.5H | TK1450 | GF06VT 200 OHM |
| A7R45 | 323-0165-00 |  | RES , FXD, FILH: 511 OHM , 12, $0.5 \mathrm{~W}, \mathrm{TC}=$ TO | 24546 | Na6505110F |
| A7846 | 315-0151-00 |  | RES, FXD,FILK: 150 OHM, 5\%,0.25H | 57668 | NTR25.J-E150E |
| 07847 | 315-0151-00 |  | RES, FXD, FILM: 150 OHM, $5 \mathrm{~K}, 0.25 \mathrm{~N}$ | 57668 | NTR25J-E150E |
| A7R48 | 321-0075-00 |  | RES , FXO, FILM:59.0 OHM , 1\%, 0. $125 \mathrm{~N}, \mathrm{TC}=$ T0 | 91637 | CMF55116G59R00F |
| A7R49 | 323-0193-00 |  | RES, FXD, FILM: 1 K OHM, 17, 0.5 S , TC $=$ TO | 75042 | CECTO-1001F |
| A7R50 | 321-0075-00 |  | RES, FXD , FILM 59.0 OHM, 1\%, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 91637 | CMF55116659R00F |
| A7R51 | 323-0193-00 |  | RES, FXD, FILM: $1 \mathrm{~K} 0 \mathrm{HM}, 1 \%, 0.5 \mathrm{M}, \mathrm{TC}=$ TO | 75042 | CECTO-1001F |
| A7R52 | 321-0164-00 |  | RES, FXD, FILH:499 OHM, 1\%, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033ED499ROF |
| A7R53 | 321-0164-00 |  |  | 19701 | 5033E0499R0F |
| A7R54 | 315-0103-00 |  | RES, FXD, FILM:10X OHM , $5 \%, 0.25 \mathrm{~W}$ | 19701 | 5043C×10K00J |
| A7R55 | 321-0164-00 |  | RES, FXD, FILH:499 ОНН, 12,0.125N, TC=TO | 19701 | 5033ED499R0F |
| A7R56 | 321-0164-00 |  | RE5, FXD, FILH:499 OHM, 1\%,0.125 W, $\mathrm{TC}=10$ | 19701 | 5033ED499R0F |
| A7R5? | 325-0053-00 |  | RES, FXD, FILM:50 OHM, 14, O.05K.TC=T0 | 91637 | CMFS0-F50R00F |
| A7R58 | 325-0053-00 |  | RES, FXD, FILH:50 OHM , 12, O.05\%, $\mathrm{TC}=$ TO | 91637 | CMF50-F50R00F |
| A7R59 | 325-0053-00 |  | RES, PXD, FILM: 50 OHM , 1\%, $0.05 \mathrm{~N}, \mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R60 | 325-0053-00 |  | RES, FXD, FILM: 50 OHM, $9 \mathrm{TK}, 0.05 \mathrm{~N}, \mathrm{IC}=$ TO | 91637 | CMF50-F50R00F |
| A7R61 | 325-0053-00 |  | RES, FXD, FILM:50 ОН⿳, $12,0.05 \mathrm{H}, \mathrm{TC}=$ TO | 91637 | CMF50-F50R00F |
| A7R62 | 325-0053-00 |  | RES, FXO, FILM 50 OHM, 12, $0.05 \mathrm{H}, \mathrm{TC}=$ TO | 91637 | CMF50-F50R00F |
| A7R63 | 321-0143-00 |  | RES . FXD, FILM: 301 OHM, 1\%, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 07716 | CEAD301ROF |
| A7RE4 | 321-0126-00 |  | RES, FXD, FILS:200 онм, 1\%, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033ED200R0F |
| a7R65 | 321-0143-00 |  | RES, FXD, FILH:301 OHM, 1\%,0.125n, $\mathrm{TC}=$ TO | 07716 | CEAO301ROF |
| A7R66 | 321-0126-00 |  | RES, FXO, FILK:200 OHM, 12, 0. 125\%, TC= TO | 19701 | 5033ED200R0F |
| A7R67 | 322-0111-00 |  | RES, FXD, FIUN: 140 OHM, 1\%, $0.25 \mathrm{~W}, \mathrm{TC}=$ TO | 91637 | MFF1421G140ROF |
| A7RE8 | 321-0202-00 |  | RES, FXD, FILM: 1.24 K OHM, 12, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 24546 | Na5501241F |
| A7RE9 | 321-0170-00 |  | RES, FXD, FILA: 576 OHM, 12, $\mathbf{0}$. 125 H , TC $=$ TO | 07716 | CEAD576ROF |
| A7R70 | 321-0202-00 |  | RES, FXD, FILM: 1.24 K OHM , 12, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 24546 | Na55D1241F |
| A7R71 | 321-0202-00 |  | RES, FXD, FILM: 1.24 K OHM, 1\%, $0.125 \mathrm{~K}, \mathrm{TC}=$ TO | 24546 | Na55D1241F |
| A7R72 | 322-0111-00 |  | RES, FXD, FILM: 140 OHM, 1\%, $0.25 \mathrm{~N}, \mathrm{TC}=$ TO | 91637 | MFF14216140ROF |
| A7R73 | 321-0170-00 |  | RES, FXD, FILM: 576 OHM, 12, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 07716 | CEAD576ROF |
| A7R74 | 321-0202-00 |  | RES, FXD, FILM: $1.24 \mathrm{~K} 0 \mathrm{HH}, 17,0.125 \mathrm{H}, \mathrm{TC}=$ TO | 24546 | Na5501241F |
| A7R75 | 301-0271-00 |  | RES, FXD, FIL : 270 DHA, 5\%,0.5 W | 19701 | 5053Cx270ROJ |
| A7R76 | 301-0271-00 |  | RES, FXO, FILM: 270 OHM, 5\%, 0.5 H | 19701 | 5053CX270ROJ |
| A7R77 | 315-0102-00 |  | RES, FXO, FILM: 1 K OHM, $5 \mathrm{LK}, 0.25 \mathrm{M}$ | 57668 | NTR25JE01K0 |
| A7R78 | 315-0103-00 |  | RES, FXD, FILM: 10 K OHM, $5 \%, 0.25 \mathrm{M}$ | 19701 | 5043CX10K00J |
| A7R79 | 315-0103-00 |  | RES, FXD, FILK:10K OHA , 5\%, 0.25 N | 19701 | $5043 \mathrm{CX10K00J}$ |
| A7R80 | 321-0289-00 |  | RES, FXD, FILH: 10.0 K OKM, 12, 0.125 $\mathrm{K}, \mathrm{TC}=$ TO | 19701 | 5033ED10KOF |
| A7R81 | 321-0260-00 |  | RES, FXD, FILM:4.99K OHM, 12,0.125 , TC=TO | 19701 | 5033E04K990F |
| A7R82 | 321-0043-00 |  | RES, FXO, FILM:27.4 OHW, 12,0.125M,TC=TO | 91637 | CMF55116G27R40F |
| A7R83 | 321-0043-00 |  | RES, FXO, FILM: $27.40 \mathrm{HM}, 12,0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 91637 | CMF55116G27R40F |
| A7R84 | 315-0430-00 |  | RES, FXD, FIL 1 : 43 OHM, $5 \times, 0.25 \mathrm{H}$ | 19701 | 5043CX43R00.J |
| A7R85 | 315-0510-00 |  | RES, FXD, FILM: 51 OHM, 5\%, 0.25 N | 19701 | 5043CX51R00J |
| A7R85 | 311-2257-00 |  | RES, VAR, NONH: TRMR, 500 OHM , 208,0.54 | TK1450 | GFO6VT 500 OHM |
| A7R87 | 315-0510-00 |  | RES, FXD, FILH: 51 OHM, $5 \%, 0.25 \mathrm{~N}$ | 19701 | 5093CX51R00J |
| A7R88 | 315-0151-00 |  | RES, FXD, FILM: 150 OHM, $5 \%, 0.25 \mathrm{M}$ | 57668 | NTR25J-E150E |
| A7R89 | 315-0151-00 |  | RES, FKD, FILM: 150 OHM, 5\%, 0.25 M | 57668 | NTR25J-E150E |
| A7R90 | 323-0165-00 |  | RES, FXO, FILM 511 OHM, 12, 0.5 F , TC=TO | 24545 | Na6505110F |
| A7R91 | 311-2275-00 |  | RES, VAR, NONPA: TRMR, 200 OHM, 20\% , 0.5W | TK1450 | GFO6VT 200 ОНМ |
| A7R92 | 323-0165-00 |  | RES, FXD, FILM 511 OHM, 1X, $0.5 \mathrm{SH}, \mathrm{TC}=$ TO | 24546 | Na6505110F |
| A7R93 | 321-0075-00 |  | RES, FXD, FIL 5 : 59.0 OHM, 12, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 91637 | CWF55116659R00F |
| A7R94 | 323-0193-00 |  | RES, FXO, FILS: 1K OHW, 12, $0.5 \mathrm{M}, \mathrm{TC}=$ TO | 75042 | CECTO-1001F |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mifr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A7R95 | 321-0075-00 |  | RES, FXO, FILM:59.0 OHM, 1\%, $0.125 \mathrm{H}, \mathrm{TC}=$ T0 | 91637 | CMF55116G59R00F |
| A7R96 | 323-0193-00 |  | RES, FXD, FILM: 1 K OHM, 1\%, $0.5 \mathrm{~W}, \mathrm{TC}=$ T0 | 75042 | CECTO-1001F |
| 97R97 | 315-0510-00 |  | RES, FXD, FILM: 51 OHM, $5 \%, 0.25 \mathrm{~K}$ | 19701 | 5043CX51R00J |
| A7R98 | 315-0510-00 |  | RES, FXD, FILM: 51 OHM , $5 \%, 0.25 \mathrm{~W}$ | 19701 | $5043 \times \times 51 \mathrm{R00J}$ |
| A7R99 | 315-0220-00 |  | RES, FXO, FILM: 22 OHM , 5\% , 0.25 K | 19701 | 5043 CX22R00. |
| A7R100 | 315-0103-00 |  | RES, FXO, FILM: 10 K OHM, $5 \%, 0.25 \mathrm{H}$ | 19701 | 5043CX10K00 J |
| a701 | 156-0730-02 |  | MICROCKT , DGTL:QUAD 2-INP NOR BFR,SCRN | 01295 | SN74LS33NP3 |
| a7U2 | 155-0158-00 |  | MICROCKT, LINEAR:DUAL OPNL AMPL | 04713 | MC1458P1/MC1458U |
| A7U4 | 155-0173-05 |  | MICROCKT, DGTL:CHANNEL SWITCH | 80009 | 155-0173-05 |
| A7U5 | 155-0173-05 |  | MICROCKT, DGTL:CHANNEL SWITCH | 80009 | 155-0173-05 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A8 | 670-4769-20 |  | CIRCUIT BD ASSY:VERTICAL CHANNEL SWITCH | 80009 | 670-4769-20 |
| A8C505 | 281-0811-00 |  | CAP, FXO, CER DI:10PF, 10\%, 100 V | 04222 | M 1019100 K A |
| 88C508 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF, 20\%,50V | 04222 | MA205E104MAA |
| A8C512 | 285-0650-00 |  | CAP, FXD, PLASTIC:0.027UF ,5z,100V | 56289 | 192P27352M447 |
| A8C515 | 285-0643-00 |  | CAP, FXD, PLASIIC: 0.0047 UF , 5\%, 100V | 56289 | 192P47252R468 |
| A8C520 | 283-0666-00 |  | CAP, FXD, MICA DI:890PF,2\%,100V | 00853 | D151F89160 |
| A8C525 | 283-0649-00 |  | CAP , FXD, MICA DI: 105PF, 1\%,300V | 00853 | 015571050 F0 |
| A8C539 | 285-0598-00 |  | CAP, FXO, PLASTIC:0.01UF , 5\%, 100V | 19396 | Du4908103J |
| A8C538 | 281-0204-00 |  | CAP, VAR, PLASIIC:2-22PF, 100 V | 80031 | 2807C00222M.02 |
| A8C539 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF, 20\% ,50V | 04222 | MA205E104MAD |
| A8C582 | 290-0745-00 |  | CAP , FXD, ELCTLT:22UF.+50-10\%, 25V | 54473 | ECE-A25V22L |
| A8C583 | 290-0745-00 |  | CAP , FXO, ELCTLT:22UF, $+50-10 \%, 25 \mathrm{~V}$ | 54473 | ECE-025V22L |
| A8C584 | 290-0745-00 |  | CAP, FXD, ELCTLT: $220 \mathrm{~F},+50-10 \%$, 25 V | 54473 | ECE-a25v22L |
| A8C605 | 281-0811-00 |  | CAP, FXD, CER DI:10PF, 10\%, 100V | 04222 | MA101a100Kमa |
| A8C608 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF,20\%,50V | 04222 | MA205E104MAD |
| A8C612 | 285-0650-00 |  | CAP , FXD , PLASTIC:0.027UF , 5\% , 100V | 56289 | 192P27352M447 |
| 日8C615 | 285-0643-00 |  | CAP, FXD, PLASIIC:0.0047UF,5\%, 100V | 56289 | 192P47252R468 |
| A8C620 | 283-0666-00 |  | CAP, FXD, MICA OI:890PF, $2 \%, 100 \mathrm{~V}$ | 00853 | 0151F891G0 |
| A8C625 | 283-0649-00 |  | CAP, FXD,MICA DI: 105PF,12,300V | 00853 | 0155F1050F0 |
| A8C631 | 285-0598-00 |  | CAP, FXD, PLASTIC:0.01UF,5z,100V | 19396 | DU4908103J |
| А8С638 | 281-0204-00 |  | CAP, VAR , PLASTIC:2-22PF,100V | 80031 | 2807C00222M002 |
| A8C639 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF,202,50V | 04222 | Ma205E109MAA |
| म8C675 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF,202,50V | 04222 | MA205E104MAD |
| A8C681 | 281-0788-00 |  | CAP, FXD, CER D1:470PF,10\%, 100V | 04222 | M 1016471 KAA |
| A8C695 | 290-0746-00 |  | CAP, FXO, ELCTLT:47UF, +50-10\%, 16V | 54473 | ECE-A6V47L |
| A8CR552 | 152-0141-02 |  | SEIICOND DVC, DI:SW, SI, 30V, 150MA, 30V, 00-35 | 03508 | DA2527 (1N4152) |
| A8CR651 | 152-0141-02 |  | SEMICOND DVC, DI: SW, $51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | DA2527 ( 1 N4152) |
| A8CR654 | 152-0141-02 |  | SEIICOND DVC, DI: SH, SI, 30V, 150MA , 30V,00-35 | 03508 | DA2527 ( 1 N4152) |
| A8.j680 | 131-0608-00 |  | TERMINAL,PIN:0.365 L X 0.025 BRI GLD PL (QUONTITY OF 7) | 22526 | 48283-036 |
| 98L582 | 108-0538-00 |  | COIL,RF: FIXED, 2.7UH | 76493 | JMM\#B7059 |
| 491583 | 108-0538-00 |  | COIL,RF: FIXED, 2.7UH | 76493 | JNMKB7059 |
| A8L584 | 108-0538-00 |  | COIL,RF: FIXED, 2.7UH | 76493 | JWMEP7059 |
| A80542 | 151-0302-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | ST899 |
| म80548 | 151-0302-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | ST899 |
| А80556 | 151-0302-00 |  | TRANSISTOR:NPN,SI, T0-18 | 04713 | ST899 |
| A80558 | 151-0302-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | ST899 |
| 480642 | 151-0302-00 |  | TRANSISTOR:NPN,SI, 10-18 | 04713 | ST899 |
| 480648 | 151-0302-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | 57899 |
| A80652 | 151-0301-00 |  | TRANSISTOR:PNP, SI, T0-18 | 04713 | ST898 |
| A80656 | 151-0302-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | ST899 |
| A80658 | 151-0302-00 |  | TRANSISTOR:NPN, SI , T0-18 | 04713 | ST899 |
| 480672 | 151-0301-00 |  | TRANSISTOR:PNP.SI, T0-18 | 04713 | ST898 |
| 480676 | 151-0134-00 |  | TRANSISTOR:PNP.51, T0-39 | 04713 | Sk3195 |
| A80682 | 151-0301-00 |  | TRANSISTOR:PNP, SI, T0-18 | 04713 | ST898 |
| A8R501 | 321-0289-00 |  | RES, FXO, FILM:10.0K OHM , 1X, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033@10K0F |
| A8R502 | 321-0289-00 |  | RES, FXD, FILS:10.0K OHM, 1X, $0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5033ED10K0F |
| A8R504 | 321-0335-00 |  | RES, FXD, FILL: 30.1 K OHM , 12, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 57658 | R814FXE30K1 |
| A8R505 | 321-0335-00 |  | RES, FXD,FILS:30.1K OHM, 12, $0.125 \mathrm{~N}, \mathrm{TC}=70$ | 57668 | R814FXE30K1 |
| A8R511 | 321-0414-00 |  | RES, FXD, FILM:200K OHM, 12, 0.125M, TC=TO | 07716 | CEAD20002F |
| A8R512 | 311-1214-00 |  | RES, VAR, NOWH:TRUR, 200K OHM, 0.5 H | 32997 | 3386F-T04-204 |
| A88513 | 321-0318-00 |  | RES, FXD, FILM:20.0K OHW, 12, $0.125 \mathrm{w}, \mathrm{TC}=$ TO | 19704 | 5033ED20K00F |
| A8R514 | 321-0385-00 |  | RES, FXD, FILM: 100K OHm, 12,0.125N, TC=T0 | 19701 | 5033@100K0F |
| A8R515 | 311-1235-00 |  | RES, VAR , NONEN: 100 K OHM, 0.5 N | 32997 | 3386F-T04-104 |
| A8R516 | 321-0309-00 |  | RES, FXD, FILM:16.2K OHW , 12, 0. 125w, $\mathrm{TC}=$ T0 | 19701 | 5033@16K20F |
| A8RS 19 | 321-0385-00 |  | RES, FXD, FIUM:100K OHM, 12, 0.125m, TC=T0 | 19701 | 5033E100K0F |
| A8R520 | 311-1232-00 |  |  | 32997 | 3386F-704-503 |
| A8R521 | 321-0281-00 |  | RES, FXD, FIL | 19701 | 5043ED8K250F |
| A8R524 | 321-0357-00 |  | RES, FXO,FILH:51.4K OHM, 12, 0.125M, TC=TO | 07716 | CEAD51101F |


| Component No． | 1 ektronix Part No． | Serial／Assembly No． Effective Dscont | Name \＆Description | Mfr． Code | Mfr，Part No． |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A8R525 | 311－1230－00 |  | RES，VAR ，NONHW：TRMR， 20 K OHM ， 0.5 H | 32997 | 3386F－T04－203 |
| 08R526 | 321－0314－00 |  | RES，FXO，FILM： 18.2 K OHM，1\％， $0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5043ED18K20F |
| A8R529 | 321－0326－00 |  | RES，FXD，FILM：24．3X ОНМ，12， $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5043ED24K30F |
| AER530 | 311－1230－00 |  | RES，VAR，NONNH：TRMR，20K OHM ， 0.5 K | 32997 | 3386F－704－203 |
| A8R531 | 321－0450－00 |  | RES，FXD，FILI： 475 K OHM，1\％， $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5043ED475K0F |
| 0885：32 | 321－0450－00 |  | RES，FXD，FILM： 475 K OHM，1\％， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5043ED475K0F |
| A8R535 | 311－1235－00 |  | RES，VAR，NON：${ }^{\text {a }}$ ： 100 K OHM， 0.5 H | 32997 | 3386F－T04－104 |
| A8R536 | 315－0104－00 |  | RES，FXD，FILH：100K OHM ，5\％，0．25 | 57658 | NTR25J－E100K |
| A8R537 | 315－0244－00 |  | RES，FXO，FILH： 240 K OHM $, 5 \%, 0.25 \mathrm{~K}$ | 19701 | 5043CX240K0J |
| A8R538 | 321－0326－00 |  | RES，FXD，FILM： 24.3 K OHM，1\％， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5043E024K30F |
| A8R542 | 323－0168－00 |  | RES，FXO，FILM： 549 OHM，1\％，O． $5 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5053R0549R0F |
| A8R543 | 321－0065－00 |  | RES，FXO，FILN：46．4 OHM，12，0．125M，TC＝TO | 57668 | R⿴囗才4FXE 46E4 |
| 08R547 | 321－0084－00 |  | RES，FXO，FILM： 73.2 OHM，1\％， $0.125 \mathrm{~K}, \mathrm{TC}=$ TO | 91637 | CMF55116G73R20F |
| ARR548 | 323－0168－00 |  | RES，FXO，FILM：549 OHM ，1\％， $0.5 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5053R0549R0F |
| A8R549 | 321－0010－00 |  | RES ，FXO，FILH： 12.4 OHM，1\％，0．125N，TC＝TO | 57668 | R日14FXE 12E4 |
| A8R550 | 323－0136－00 |  | RES，FXO，FIMM：255 OHM ，1\％，0．5N，TC＝$=0$ | 24546 | Na6502550F |
| A8R552 | 315－0512－00 |  | RES，FXO，FILM： 5.1 K OHM， $5 \%, 0.25 \mathrm{~K}$ | 57668 | NTR25J－E05K1 |
| A8R555 | 315－0102－00 |  | RES，FXD，FILM：1K OHM，5\％，0．25K | 57668 | NTR25JE01K0 |
| A8R556 | 321－0126－00 |  | RES，FXO，FILM：200 OHM，1\％，0．125 $\mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5033E0200ROF |
| Q88557 | 321－0237－00 |  | RES，FXD，FILN：2．87K OHM，1\％，0．125 ，TC＝T0 | 07715 | CEAD 28700F |
| A8R558 | 321－0126－00 |  | RES，FXD，FILM： 200 OHM，1\％， 0.125 H ．TC＝T0 | 19701 | 5033ED200ROF |
| A8R559 | 317－0103－00 |  | RES ，FXO，CIMPSN： 10 K OHM ，5\％，0125M | 01121 | 881035 |
| A8R601 | 321－0289－00 |  | RES，FXD，FILM： $10.0 \mathrm{~K} 0 \mathrm{HM}, 18,0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033E010K0F |
| A8R602 | 321－0289－00 |  | RES，FXO，FILH：10．0K OHM，1\％， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5033E010K0F |
| A8R604 | 321－0935－00 |  | RES，FXO，FILM：30．1K OHM ，12，0．125N，TC＝T0 | 57668 | 8914FXE30K1 |
| A8R605 | 321－0335－00 |  | RES，FXO，FILM：30．1K ОНM，1\％， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 57668 | R814FXE30K1 |
| A8R611 | 321－0414－00 |  | RES，FXO，FILN：200K OHM，1\％，0．125 ，TC＝TO | 07716 | CEAD20002F |
| A8R612 | 311－1214－00 |  | RES，VAR，NONHH：TRMR，200K OHM ， 0.5 H | 32997 | 3386F－104－204 |
| A8R613 | 321－0318－00 |  | RES，FXO，FILH：20．0K OHM ，12，0． $125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 |  |
| ABRS14 | 321－0385－00 |  | RES，FXD，FILM：100K OHM，1\％， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5033ED100K0F |
| A8R615 | 311－1235－00 |  | RES，VAR ，NONHH： 100 K OHM， 0.5 S | 32997 | 3386F－T04－104 |
| A8R616 | 321－0309－00 |  | RES，FXD，FILS： 16.2 KK OHM，17， $\mathrm{O} .125 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5033ED16K20F |
| A8R619 | 321－0385－00 |  | RES，FXO，FILS： 100 K OHM，12， $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033ED100K0F |
| A8R620 | 311－1232－00 |  | RES，VAR ，NDNHIH：TRMR ，50K OHM ． 0.5 W | 32997 | 3386F－T04－503 |
| A8R621 | 321－0281－00 |  | RES ，FXD，FILM：8．25K OHM ，14，0．125 H ，TC＝T0 | 19701 | 5043ED8K250F |
| A8R624 | 321－0357－00 |  | RES，FXO，FILK：51．1K OHM，1K， 0.125 H ，TC＝T0 | 07716 | CEA051101F |
| A8R625 | 311－1230－00 |  | RES，VAR，NONWH：TRMR， 20 K OHM， 0.5 W | 32997 | 3386F－T04－203 |
| ABR626 | 321－0314－00 |  | RES，FXO，FIL ： 18.2 K OHM，12， $0.125 \mathrm{M}, \mathrm{TC}=$ TO | 19701 | 5043E018K20F |
| A8R629 | 321－0326－00 |  | RES，FXD，FILM：24．3K OHM，1\％，0．125M，TC＝TO | 19701 | 5043ED24K30F |
| A8R630 | 311－1230－00 |  | RES，VAR，NONFH：TRMR，20K OHM， 0.5 M | 32997 | 3386F－704－203 |
| A8R631 | 321－0450－00 |  | RES，FXD，FILM：475K OHM，1\％，0．125，TC＝T0 | 19701 | 5043E0475KDF |
| A8R632 | 321－0450－00 |  | RES，FXD，FILM：475K OHM，1\％，0．125 ，TC＝TO | 19701 | 5043ED475K0F |
| A8R638 | 321－0326－00 |  | RES，FXO，FILM：24．3K OHM，1\％， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5043ED24K30F |
| A8R642 | 323－0168－00 |  | RES ，FXO，FILM：549 OHM ，1\％， $0.5 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5053R0549R0F |
| A8R643 | 321－0065－00 |  | RES ，FXO，FILM：46．4 OHm，1\％，0．125，，TC＝T0 | 57668 | R814FXE 46E4 |
| A8R646 | 321－0080－00 |  | RES ，FXO，FL LM：66．5 OHM，1\％， $0.125 \mathrm{~h}, \mathrm{TC}=$ TO | 91637 | CMF55116G66R50F |
| A8R647 | 321－0084－00 |  | RES，FXO，FILM：73． 2 OHM，17，0．125 ，TC＝TO | 91637 | CMF55116G73R21F |
| A8R648 | 323－0168－00 |  | RES，FXD，FILM： 549 OHM，12， $0.5 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5053R0549R0F |
| A8R649 | 321－0010－00 |  | RES ，FXO，FILM： $12.40 \mathrm{HM}, 17,0.125 \mathrm{M}, \mathrm{TC}=$ T0 | 57668 | R814FXE 12E4 |
| A8R650 | 323－0136－00 |  | RES，FXO，FILM： 255 OHM，18， $0.5 \mathrm{H}, \mathrm{TC}=$ T0 | 24546 | Na6502550F |
| R8R651 | 315－0471－00 |  | RES，FXO，FILM：470 OHM， $5 \mathrm{~K}, 0.25 \mathrm{M}$ | 57668 | NTR25J－E470E |
| A8R652 | 315－0153－00 |  | RES，FXD，FILM： 15 K OHM $, 5 \mathrm{X}, 0.25 \mathrm{~K}$ | 19701 | 5043CX15K00J |
| A8R653 | 315－0472－00 |  | RES，FXD，FILM：4．7K OHM，5\％，0．25 | 57668 | NTR25J－ED4K7 |
| A8R654 | 315－0512－00 |  | RES，FXD，FIL $=5.1 \mathrm{~K}$ OHM $, 5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J－E05K1 |
| A8R655 | 315－0102－00 |  | RES，FXO，FILM： 1 K OHM ， $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25JE01K0 |
| A8R656 | 321－0126－00 |  | RES，FXD，FILH：200 OHM，Th，0．125＊，TC＝TO | 19701 | 5033E0200R0F |
| A8R657 | 321－0237－00 |  | RES，FXD，FILM： 2.87 K OHEH，12， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 07716 | CEAD 28700F |
| A8R658 | 321－0126－00 |  | RES，FXO，FIL $: 200$ OHM，12， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5033E0200ROF |
| 08R659 | 317－0103－00 |  | RES，FXO，CMPSN：10X OHM ，5\％，0125H | 01121 | B81035 |


| Component No , | Tektronix Part No, | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr, Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A8R671 | 321-0246-00 |  | RES, FXD, FILM: 3.57 K OHM, 1\% , $0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5043E03K570F |
| A8R672 | 321-0309-00 |  | RES, FXD, FILM: 16.2 K OHM, $1 \mathrm{\chi}, 0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033E016K20F |
| A8R675 | 315-0272-00 |  | RES,FXD,FILM:2.7K OHM , 5\%,0.25 | 57868 | NTR25J-E02K7 |
| A8R680 | 321-0277-03 |  | RES, FXD, FILM: 7.50 K OHM, $0.25 \%, 0.125 \mathrm{H}, \mathrm{T}=\mathrm{T} 2$ | 01121 | ORDER By descr |
| A8R681 | 321-0277-03 |  | RES, FXD, FILM: 7.50 K OHM $, 0.25 \%, 0.125 \mathrm{H}, \mathrm{T}=\mathrm{T} 2$ | 01121 | oroer by oescr |
| A8R682 | 315-0471-00 |  | RES, FXD, FILH:470 OHM , 5\% , 0.25\% | 57668 | NTR25J-E470E |
| A8R683 | 315-0102-00 |  | RES,FXD,FILM: 1 K OHM, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25JEOTK0 |
| A8R684 | 307-0053-00 |  | RES , FXD, CMPSN: 3.3 OHM, $57,0.5 \mathrm{~N}$ | 01121 | E83365 |
| A8R690 | 321-0279-00 |  | RES, FXO,FILM:7.87K OHM, 1\%, 0.125M, TC=TO | 07716 | CEAD78700F |
| A8R691 | 321-0322-00 |  | RES, FXD, FILM:22.1K ОНM, $0.14,0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5033ED22K10F |
| A8R694 | 315-0562-00 |  | RES, FXD, FILM:5.6K OHM , 5\%,0.25\% | 57668 | NTR25J-E05K6 |
| A8TP500 | 214-0579-00 |  | TERM, TEST POINT:8RS CO PL | 80009 | 214-0579-00 |
| A8TP508 | 214-0579-00 |  | TERM, TEST POINT:8RS CD PL | 80009 | 214-0579-00 |
| A8TPS38 | 214-0579-00 |  | TERM, TEST POINT:BRS CO PL | 80009 | 214-0579-00 |
| A8TP552 | 214-0579-00 |  | TERM, TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A8TP555 | 214-0579-00 |  | TERM, TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A8TP582 | 214-0579-00 |  | TERN, TEST POINT:BRS CO PL | 80009 | 214-0579-00 |
| A8TP583 | 214-0579-00 |  | TERM, TEST POINT:BRS CO PL | 80009 | 214-0579-00 |
| A8TP584 | 214-0579-00 |  | TERM, TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A8TP600 | 214-0579-00 |  | TERM, TEST POINT:BRS CO PL | 80009 | 214-0579-00 |
| A8TP608 | 214-0579-00 |  | TERM, TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| А8TP648 | 214-0579-00 |  | TERN, TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A8TP657 | 214-0579-00 |  | TERM, TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A8TP682 | 214-0579-00 |  | TERM, TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A8TP684 | 214-0579-00 |  | TERM, TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A8TP694 | 214-0579-00 |  | TERM, TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A8u508 | 156-1149-00 |  | MICROCKT, LINEAR:OPERATIONAL AMP.JFET INPUT | 27014 | LP351N/GLEA134 |
| Q8u538 | 156-1149-00 |  | MICROCKT, LINEAR:OPERATIONAL AMP, JFET INPUT | 27014 | LF351N/GLEA134 |
| 48u608 | 156-1149-00 |  | MICROCKT, LINEAR:OPERATIONAL AMP, JFET INPUT | 27014 | LF351N/GLEA134 |
| A8U638 | 156-1149-00 |  | MICROCKT, LINEAR:OPERATIONAL AMP, JFET INPUT | 27014 | LF351N/GLEA134 |
| A8u668 | 155-0173-05 |  | MICROCKT, OGTL: CHANNEL SMITCH | 80009 | 155-0173-05 |
| Q8U682 | 156-0067-00 |  | MICROCKT, LINEAR:OPNL AMPL,SEL | 04713 | MC17415P1 |
| A8U694 | 156-0067-00 |  | MICROCKT, LINEAR:OPNL AMPL,SEL | 04713 | HC1741CP1 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A9 | 670-3959-01 |  | CIRCUIT BD ASSY:X-Y COMP <br> (OPTION 02 ONLY) | 80009 | 670-3959-01 |
| 09C822 | 283-0603-00 |  | CAP, FXD,MICA DI:113PF, 24,300V | 00853 | 0155F113060 |
| 09C825 | 283-0668-00 |  | CAP,FXO,MICA 01:184PF, 12, 100V | 00853 | 0155F1840FO |
| 99C827 | 283-0677-00 |  | CAP, FXO, MICA DI:82PF, 12, 500 V | 00853 | 0155E820F0 |
| A9C832 | 281-0118-00 |  | CAP, VAR, MICA OI:8-90PF, 175V | 52789 | GSM231 |
| А9С835 | 283-0668-00 |  | CAP,FXD,MICA DI:184PF, 1\%, 100V | 00853 | 0155F1840F0 |
| A9C837 | 283-0677-00 |  | CAP , FXD, MICA DI:82PF, 4\% ,500V | 00853 | 0155E820F0 |
| а9сR820 | 152-0141-02 |  | SEMICONO DVC, DI: SH, SI , 30 V , 150MA , 30V , D0-35 | 03508 | OA2527 ( $1 \mathrm{Na} \mathrm{152)}$ |
| -968222 | 148-0034-00 |  | RELAY , ARMATURE:OPDT, 15VDC, 600 OHM | 80009 | 148-0034-00 |
| A9x838 | 148-0034-00 |  | RELAY, ARMATURE :OPOT, 15VDC, 600 OHM | 80009 | 148-0034-00 |
| A91822 | 108-0719-00 |  | COIL, RF:FIXED, 805 NH | 80009 | 108-0719-00 |
| A9L825 | 108-0719-00 |  | COIL,RF:FIXED, 805NH | 80009 | 108-0719-00 |
| A9L827 | 108-0718-00 |  | COIL,RF:FIXED, 1.750H | 80009 | 108-0718-00 |
| A9L932 | 108-0719-00 |  | COIL,RF:FIXED, 805NH | 80009 | 108-0719-00 |
| A9L835 | 108-0749-00 |  | COIL, RF:FIXE0,805NH | 80009 | 108-0719-00 |
| -9L837 | 108-0718-00 |  | COIL,RF:FIXED,1.75UH | 80009 | 108-0718-00 |
| 99R822 | 321-0068-00 |  | RES , FXD, FILM:49.9 OHM , 0.5\%, 0.125W, TC= T0 | 91637 | CMF55116G49R90F |
| A9R832 | 321-0068-00 |  | RES, FXO, FILM:49.9 OHM , $0.52,0.125 \mathrm{H}, \mathrm{TC}=$ TO | 91637 | CMF55116G49R90F |



| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Descriotion | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Q11 | 670-3958-01 |  | CIRCUIT bd assy:horizontal interface | 80009 | 670-3958-01 |
| A11C853 | 281-0508-00 |  | CAP, FXD, CER DI:12PF, +/-0.6PF, 500V | 52763 | 2RDPLZOO7 12POJC |
| 211c863 | 281-0508-00 |  | CAP , FXD, CER DI:12PF, +/-0.6PF,500V | 52763 | 2RDPLZ007 12POJC |
| A11R841 | 321-1068-07 |  | RES, FXO, FILM:50.5 OHM, 0.17,0.125 , TC=T9 | 57668 | RB14 BLE 50E5 |
| A11R892 | 321-1068-07 |  | RES, FXD, FILM:50.5 OHM, $0.1 \chi, 0.125 \mathrm{~N}, \mathrm{TC}=$ T9 | 57668 | RB14 BLE 50E5 |
| 011R843 | 321-1068-07 |  | RES, FXO, FIU:50.5 OHM, $0.12,0.125 \mathrm{H}, \mathrm{TC}=$ T9 | 57868 | RB14 BLE 50E5 |
| A11R844 | 321-1068-07 |  | RES, FXO, FILM: 50.5 OHM, $0.14,0.125 \mathrm{n}$, TC $=$ T9 | 57668 | RB14 87E 50E5 |
| A11R851 | 323-0187-00 |  | RES, FXD, FILM: 866 OHM, 14, $0.5 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5053R0866R0F |
| A11R852 | 321-0074-00 |  | RES, FXD, FILH:57.6 OHM , 17, D . 125 H , TC=TO | 91637 | CMF55116G57R60F |
| 011R853 | 321-0074-00 |  | RES, FXD, FILM:57.6 OHM, 12, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 91637 | CMF55116G57R60F |
| A11R861 | 323-0187-00 |  | RES, FXO, FILM: 866 OHM, 1\% , $0.5 \mathrm{H}, \mathrm{TC}=$ T0 | 19701 | 5053R0866ROF |
| 9118862 | 321-0074-00 |  | RES, FXD, FIL | 91637 | CMF55116657R60F |
| A11R863 | 321-0074-00 |  | RES, FXD, FILM: 57.6 OHM, 17, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 91637 | CMF55116G57R60F |
| 011R868 | 315-0512-00 |  | RES, FXD, FILM:5.1K OHM, 5\%, 0.25 H | 57668 | NTR25J-E05K1 |
| A11R863 | 315-0122-00 |  | RES, FXO, FILM: 1.2 K OHM, $5 \mathrm{~L}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E01K2 |
| A11R870 | 321-0218-00 |  | RES, FXO, FILM: 1.82 K OHM, 12, $0.925 \mathrm{~K}, \mathrm{TC}=$ T0 | 19701 | 5033ED1K82F |
| A115865 | 260-0984-00 |  | SWITCH, SLIDE: OPTT , 0.5A, 125V | 79727 | 6-128-5-0012 |
| A114884 | 155-0022-00 |  | MICROCKT, DGIL:CHANNEL SWITCH | 80009 | 155-0022-00 |


| Component No, | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No, |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 012 | 614-0699-00 |  | Nal OUT ASSY: | 80009 | 614-0699-00 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A12. 1 | ---------- |  | CIRCUIT BD ASSY:SIGNaLS OUT (NOT AVAILABLE,ORDER A12) |  |  |
| A1201C13 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF, 20\%,50V | 04222 | MA205E104MAA |
| A12A1C17 | 281-0759-00 |  | CAP, FXD,CER DI: 22PF, 10\%,100V | 04222 | MA101A220KAの |
| -12A1C79 | 281-0936-00 |  | CAP, FXD,CER DI:39PF,5\%,100V | 04222 | MA101a390JAQ |
| -1201C91 | 290-0745-00 |  | CAP, FXD, ELCTLT: 22 UF, $+50-10 \%$, 25 V | 54473 | ECE-A25V22L |
| -1201C95 | 290-0745-00 |  | CAP, FXD, ELCTLT:22UF, $+50-10 \%, 25 V$ | 54473 | ECE-A25V22L |
| A12A1CR12 | 152-0141-02 |  | SEMICONO OVC, DI:SH, SI , 30V, 150MA, 30V, 00-35 | 03508 | 002527 (1N4152) |
| -1201CR19 | 152-0141-02 |  | SEMICOND DVC,DI:SH,SI, 30V,150MA,30V,D0-35 | 03508 | 0A2527 (1N4152) |
| A1201CR76 | 152-0141-02 |  | SEAICONO OVC, DI:SH,SI, 30V,150MA, 30V, DO-35 | 03508 | 0A2527 (1N4152) |
| A12A1CR7? | 152-0141-02 |  | SEMICOND DVC, DI:SH,SI, 30V,150MA,30V,00-35 | 03508 | 002527 (1N4152) |
| A12A1CR78 | 152-0141-02 |  | SEMICOND OVC, DI: SK, SI , 30V, 150MA , 30V,00-35 | 03508 | 002527 (1N4152) |
| -1201010 | 151-0223-03 |  | TRANSISTOR:NPN,SI | 80009 | 151-0223-03 |
| A1201011 | 151-0223-03 |  | TRANSISTOR:NPN, SI | 80009 | 151-0223-03 |
| A1201017 | 151-0220-05 |  | TRANSISTOR:SCREENED | 80009 | 151-0220-05 |
| A1201049 | 151-0223-03 |  | TRANSISTOR:NPN, SI | 80009 | 151-0223-03 |
| D1201062 | 151-0223-03 |  | TRANSISTOR:NPN, SI | 80009 | 151-0223-03 |
| 01201077 | 151-0220-05 |  | TRANSISTOR:SCREENED | 80009 | 151-0220-05 |
| A1201R3 | 315-0470-00 |  | RES, FXD, FILM:47 OHM , 5\%, 0.25 H | 57668 | NTR25J-E47E0 |
| A1201R9 | 315-0101-00 |  | RES , FXD, FILS: 100 OHA , 5\% , 0.25 H | 57668 | NTR25J-E 100E |
| A12A1R11 | 315-0222-00 |  | RES, FXD, FIUM:2.2K OHM,5\%,0.25M | 57668 | NTR25J-E02K2 |
| Q1201R12 | 315-0241-00 |  | RES , FXD, FILM: 240 OHM , 5\% , 0.25 N | 19701 | 5043CX240R0J |
| a12a1R13 | 315-0101-00 |  | RES, FXD, FILM:100 OHM , 5\%, 0.25 N | 57668 | NTR25J-E 100E |
| -1201R16 | 321-0262-00 |  | RES, FXO, FILM:5.23K OHM , 1, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033ED5K230F |
| -1201817 | 315-0152-00 |  | RES, FXO, FILM:1.5K OHm, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-E01K5 |
| Q1201R18 | 315-0272-00 |  | RES, FXD, FIUM: 2.7 K OHM, 5\%,0.25 | 57668 | NTR25J-E02K7 |
| A12a1R19 | 321-0190-00 |  | RES, FXD, FIUM:931 OHM, 1\%, 0.125,$~ \mathrm{TC}=\mathrm{T} 2$ | 19701 | 5043E0931R0F |
| A12A1R45 | 315-0201-00 |  | RES, FXD, FILM: 200 OHM, 5\%,0.25* | 57668 | NTR25J-E200E |
| A12A1R46 | 315-0752-00 |  | RES, FXD, FILM:7.5K OHM, 5\%, 0.25 H | 57668 | NTR25J-E07K5 |
| A1201R47 | 315-0101-00 |  | RES, FXO, FIUM: 100 OHM , 5\%, 0.25N | 57668 | NTR25J-E 100E |
| A1201R49 | 321-0143-00 |  | RES, FXO, FILM: 301 OHM, 1\%, $0.125 \mathrm{n}, \mathrm{TC}=$ TO | 07716 | CEAO301ROF |
| 01204856 | 315-0181-00 |  | RES , FXD , FILM: 180 OHM, $5 \%, 0.25 \%$ | 57668 | NTR25J-E180E |
| -12a185? | 315-0123-00 |  | RES , FXD, FILM:12K OHM, 5\%, 0.25 K | 57668 | NTR25J-E12K0 |
| A12A1R59 | 315-0101-00 |  | RES , FXD, FILM: 100 OHM $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E 100E |
| A12A1R61 | 315-0560-00 |  | RES, FXD, FILM:56 OHA , 5\%, 0.25 H | 57668 | NTR25J-E56E0 |
| A1201862 | 323-0193-00 |  | RES, FXD, FILM: 1 K OHM, 1\%,0.5N,TC=TD | 75042 | CECTO-1001F |
| D1201R67 | 315-0181-00 |  | RES,FXD,FILM:180 DHM, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-E180E |
| A1201R68 | 315-0123-00 |  | RES, FXO,FILM: 12K OHM, 5\%,0.25N | 57668 | NTR25J-E12K0 |
| Q12a1R76 | 321-0180-00 |  | RES, FXO, FILM: 732 OHM, 1\%, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 07716 | CEAD732ROF |
| $01201 R 77$ | 321-0226-00 |  | RES, FXD, FILM:2.21K OHM, 4\%, $0.125 \mathrm{M}, \mathrm{TC}=$ TO | 07716 | CEAD22100F |
| a12A1R78 | 322-0189-00 |  | RES, FXD, FILM:909 OHM, 17,0.25H,TC=TII | 15042 | CEBTO-9090F |
| A12A1R79 | 315-0390-00 |  | RES, FXD, FILM:39 OHM , 5\%, 0.25 n | 57668 | NTR25J-E39E0 |


| Component No． | Tektronix Part No． | Serial／Assembly No． Effective Dscont | Name \＆Description | Mfr． Code | Mir．Part No． |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 013 | 670－8622－03 |  | CIRCUIT BD ASSY：READOUT | 80009 | 670－8622－03 |
| A13C3415 | 290－0804－00 |  | CAP，FXD，ELCTLT：10UF，＋50－10\％，25V | 55680 | ULA1E100TEA |
| A13C3417 | 290－0920－00 |  | CAP，FXD，ELCTLT：33UF，$+50-10 \%, 35 \mathrm{~V}$ | 55680 | ULBiv330TEAANA |
| A13C3418 | 290－0804－00 |  | CAP，FXD，ELCTLT：10UF，＋50－10\％，25V | 55680 | ULA1E100TEA |
| A13C3420 | 281－0862－00 |  | CAP，FXD，CER DI：0．001UF，＋80－20\％，100V | 04222 | Ma101C10ZMAA |
| A13C3421 | 281－0773－00 |  | CAP，FXD，CER DI：0．01UF，10\％，100V | 04222 | MA201C103KAA |
| A13C3427 | 281－0773－00 |  | CAP，FXD，CER DI：0．01UF，10\％，100V | 04222 | MA201C103KAD |
| A13C3435 | 285－0698－00 |  | CAP，FXD，PLASTIC：0．0082UF ，5\％，100V | 19396 | DU490／74－28217 |
| A13C3440 | 281－0816－00 |  | CAP，FXD，CER DI：82 PF，5\％，100V | 04222 | MA106a820JAD |
| A13C3441 | 281－0767－00 |  | CAP，FXD，CER DI：330PF，20\％，100V | 04222 | MA106C331MAD |
| A13C3444 | 281－0810－00 |  | CAP，FXD，CER DI：5．6PF，＋／－0．5PF，100V | 04222 | MA101A5R6DAA |
| A13C3454 | 283－0728－00 |  | CAP，FXD，MICA DI：120PF，1\％，500V （NOMINAL VALUE） | 00853 | D155F121F0 |
| A13C3454 | 283－0644－00 |  | CAP，FXD，MICA DI：150PF， $17,500 \mathrm{~V}$ （TEST SELECTED） | 00853 | 0155F151F0 |
| Q13C3455 | 281－0158－00 |  | CAP，VAR，CER OI：7－45PF，25V | 59660 | 518－006 G 7－45 |
| Q13C3457 | 281－0773－00 |  | CAP，FXD，CER DI：0．01UF，10\％，100V | 04222 | MA201C103KAD |
| $013 C 3461$ | 281－0765－00 |  | CAP，FXD，CER DI：100PF，5\％，100V | 04222 | MA101a101JAD |
| A13C3483 | 281－0788－00 |  | CAP，FXD，CER DI：470PF，10\％，100V | 04222 | MA101C471KAD |
| A13C3485 | 281－0774－00 |  | CAP，FXD，CER DI：0．022MFD，20\％，100V | 04222 | MA201E223MAA |
| A13C3486 | 281－0773－00 |  | CAP，FXD，CER D1：0．01UF，10\％，100V | 04222 | M $201 \mathrm{C1O3K}$ 仡 |
| A13C3501 | 283－0114－00 |  | CAP，FXD，CER DI：1500PF，5\％，200V | 59660 | 805－534－Y500152J |
| А43C3502 | 281－0773－00 |  | CAP，FXD，CER DI：0．01UF，10\％，100V | 04222 | MA201C103KaA |
| A13C3503 | 281－0773－00 |  | CAP，FXD，CER DI：0．01UF，10\％，100V | 04222 | Ma201C103KAA |
| A13C3504 | 281－0773－00 |  | CAP，FXD，CER DI：0．01UF，10\％，100V | 04222 | M $201 \mathrm{C103K} \mathrm{CD}$ |
| A13C3511 | 281－0762－00 |  | CAP，FXD，CER DI：27PF，20\％，100V | 04222 | MA101A270MAA |
| A13C3512 | 283－0666－00 |  | CAP，FXD，MICA DI：890PF，2\％，100V | 00853 | D151F891G0 |
| －13C3513 | 283－0640－00 |  | CAP，FXD，MICA DI：160PF，17，100V | 00853 | D155F161FO |
| A13C3521 | 281－0788－00 |  | CAP，FXO，CER DI：470PF，10\％，100V | 04222 | MA101C471KAA |
| d13C3539 | 281－0788－00 |  | CAP，FXD，CER DI：470PF，10\％，100V | 04222 | MA101C471KAA |
| A13C3544 | 281－0774－00 |  | CAP，FXD，CER DI：0．022MFD，20\％，100V | 04222 | MA201E223MAA |
| A13C3546 | 281－0773－00 |  | CAP，FXD，CER DI：0．01UF，10\％，100V | 04222 | MA201C103KAD |
| A13C3551 | 281－0773－00 |  | CAP，FXO，CER DI：0．01UF，10\％，100V | 04222 | MA201C103Kaの |
| A13C3559 | 281－0759－00 |  | CAP，FXO，CER DI：22PF，10\％，100V | 04222 | Ma101a220xaA |
| －13C3559 | 281－0762－00 |  | CAP，FXD，CER DI：27PF，20\％，100V | 04222 | MA101A270MAA |
| 013C3559 | 281－0763－00 |  | CAP，FXD，CER DI：47PF，10\％，100V | 04222 | MA1019470KAA |
| －13C3559 | 281－0797－00 |  | CAP，FXD，CER DI：15PF，10\％，100V | 04222 | MA106a150KAA |
| ロ13C3559 | 281－0798－00 |  | CAP，FXD，CER DI：51PF，1\％，100V | 04222 | MA1014510GAA |
| A13C3559 | 281－0799－00 |  | CAP，FXD，CER DI：62PF，2\％，100V | 04222 | MA101a620gan |
| A13C3559 | 281－0808－00 |  | CAP，FXD，CER DI：7 PF，20\％，100V | 04222 | MA101a7R04AA |
| A13C3559 | 281－0811－00 |  | CAP，FXD，CER DI：10PF，10\％，100V | 04222 | MA101A100KAA |
| ه13C3559 | 281－0819－00 |  | CAP．FXD，CER DI：33 PF，5Z，50V （A13C3559．TEST SELECTE） | 04222 | GC105A330J |
| A13C3563 | 281－0773－00 |  | CAP，FXO，CER OI：0．04UF，10\％，100Y | 04222 | MA201C103KAA |
| A13C3564 | 281－0773－00 |  | CAP，FXD，CER DI：0．01UF，10\％，100V | 04222 | Mazo1C103KAA |
| Q13C3576 | 281－0762－00 |  | CAP，FXD，CER DI：27PF，20\％，100V | 04222 | MA101A270MAA |
| A13C3577 | 283－0666－00 |  | CAP，FXD，MICA DI：890PF，2\％，100V | 00853 | D151F89160 |
| A13C3579 | 283－0640－00 |  | CAP，FXD，MICA DI：160PF，1\％，100V | 00853 | D155F161FO |
| ه13C3597 | 281－0759－00 |  | CAP，FXD，CER DI：22PF，10\％，100V | 04222 | MA101A220KAA |
| －13C3597 | 281－0762－00 |  | CAP，FXD，CER DI：27PF，20\％，100V | 04222 | Ma101a270Man |
| Q13C3597 | 281－0763－00 |  | CAP．FXD，CER DI：47PF，10\％，100V | 04222 | MA1010470KAD |
| A13C3597 | 281－0797－00 |  | CAP，FXD，CER 01：15PF，10\％，100V | 04222 | Ma106a150KAA |
| A13C3597 | 281－0798－00 |  | CAP，FXD，CER DI：51PF，1\％，100V | 04222 | MA101A510GAA |
| A13C3597 | 281－0799－00 |  | CAP，FXD，CER DI：62PF，2\％， 100 V | 04222 | MA101A620GAA |
| A13C3597 | 281－0808－00 |  | CAP，FXD，CER DI：7 PF，20\％， 100 V | 04222 | MA101A7R04AA |
| 013C3597 | 281－0811－00 |  | CAP，FXD，CER DI：10PF，10\％，100V | 04222 | MA101A100KAA |
| ه13C3597 | 281－0819－00 |  | CAP，FXD，CER DI：33 PF，5K，50V （A13C3597，TEST SELECTED） | 04222 | GC105A330J |
| A13CR2529 | 152－0141－02 |  | SEMICOND DVC，DI：SH，SI，30V，150MA ，30V，DO－35 | 03508 | Da2527（1N4152） |
| A13CR3424 | 152－0141－02 |  | SEAICOHD DYC，DI：SH，SI，30Y，1504A，30V，D0－35 | 03508 | 0n2527（144152） |
| A13CR3425 | 152－0141－02 |  | SEMICOND DVC，DI：SH，SI ，30V，150MA，30V ，DO－35 | 03508 | 002527 （1N4152） |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description. | Mrr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A13CR3437 | 152-0141-02 |  | SEMICOND DVC, DI: SM, SI, 30V , 150MA , 30V , D0-35 | 03508 | DA2527 (1N4152) |
| A13CR3439 | 152-0141-02 |  | SEMICONO DVC, $01: S N, 51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, \mathrm{DO}-35$ | 03508 | OR2527 (1N4152) |
| A13CR3445 | 152-0141-02 |  | SEAICONO DVC, DI: SH, SI ,30V,150MA , 30V, D0-35 | 03508 | DA2527 (1N4152) |
| A13CR3446 | 152-0141-02 |  | SENICOND DVC , DI: $5 \mathrm{H}, 5 \mathrm{SI}, 30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | DA2527 (1N4152) |
| A13CR3453 | 152-0141-02 |  | SEMICOND DVC, DI:SH,SI, 30V, 150MA, 30V,00-35 | 03508 | Da2527 (1N4152) |
| A13CR3457 | 152-0141-02 |  | SEMICONO DVC, DI: $5 \mathrm{H}, \mathrm{SI}, 30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | DA2527 (1N4152) |
| A13CR3461 | 152-0141-02 |  | SEHICOND OVC, $01: S W, S I, 30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, \mathrm{DO}-35$ | 03508 | 0A2527 (1N4152) |
| A13CR3462 | 152-0141-02 |  | SEIICOND DVC, DI:SH, SI, 30V , 150MA, 30V, D0-35 | 03508 | DA2527 ( 1 N4 152) |
| A13CR3487 | 152-0141-02 |  | SEMICONO OVC, DI:SN, SI, 30V,150MA, 30V,00-35 | 03508 | DA2527 (1N4152) |
| A13CR3550 | 152-0141-02 |  | SEHICOND DVC, $01:$ SH, SI , 30V, 150MA, 30V,00-35 | 03508 | Da2527 (1N4152) |
| A13CR3570 | 152-0141-02 |  | SEMICOND DVC, DI:SN,SI, 30V,150MA, 30V,00-35 | 03508 | DA2527 (1N4152) |
| A13CR3571 | 152-0141-02 |  | SEMICOND OVC , 1 I : SH, SI , 30V , 150MA , 30V, D0-35 | 03508 | 002527 (1N4152) |
| 013L3512 | 108-0800-00 |  | COIL,RF: FIXED, 820MH | 04072 | 9230-90 |
| A13L3577 | 108-0800-00 |  | COIL,RF:FIXED, 820MH | 04072 | 9230-90 |
| A13P3489 | 131-0993-00 |  | BUS, CONDUCTOR:SHUNT ASSEMBLY, BLACK | 22526 | 65474-005 |
| 01303431 | 151-0190-00 |  | TRANSISTOR:NPN, SI , T0-92 | 80009 | 151-0190-00 |
| A1303432 | 151-0190-00 |  | TRANS ISTOR:NPN, SI , T0-92 | 80009 | 151-0190-00 |
| A130343B | 151-0188-00 |  | TRANSISTOR: PNP, SI , TO-92 | 80009 | 151-0188-00 |
| 01303442 | 151-0190-00 |  | TRANSISTOR:NPN, SI , T0-92 | 80009 | 151-0190-00 |
| Q1303451 | 151-0190-00 |  | TRANSISTOR:NPN,SI, T0-92 | 80009 | 151-0190-00 |
| Q1303452 | 151-0190-00 |  | TRANSISTOR:NPN, SI , T0-92 | 80009 | 151-0190-00 |
| A1303453 | 151-0190-00 |  | TRANSISTOR:NPN, SI, TO-92 | 80009 | 151-0190-00 |
| A1303481 | 151-0188-00 |  | TRANSISTOR: PNP, SI, T0-92 | 80009 | 151-0188-00 |
| -1303489 | 151-0190-00 |  | TRANSISTOR:NPN, SI , TO-92 | 80009 | 151-0190-00 |
| Q1303523 | 151-0232-00 |  | TRANSISTOR:NPN, SI, T0-78 | 07263 | SP12141 |
| A1303526 | 151-0190-00 |  | TRANSISTOR:NPN, SI, T0-92 | 80009 | 151-0190-00 |
| . 1303527 | 151-0190-00 |  | TRANSISTOR:NPN, SI, T0-92 | 80009 | 151-0190-00 |
| A1303529 | 151-0188-00 |  | TRANSISTOR: PNP, SI, T0-92 | 80009 | 151-0188-00 |
| A1303543 | 151-0190-00 |  | TRANSISTOR:NPN, SI, TO-92 | 80009 | 151-0190-00 |
| A1303550 | 151-0188-00 |  | TRANSISTOR:PNP, SI, T0-92 | 80009 | 151-0188-00 |
| 01303555 | 151-1021-00 |  | TRANSISTOR: FET , N-CHAN, SI , TO-18 | 80009 | 151-1021-00 |
| .1303596 | 151-1021-00 |  | TRANSISTOR: FET, N-CHAN,SI, T0-48 | 80009 | 151-1021-00 |
| A13R3401 | 315-0512-00 |  | RES , FXD, FIUM:5.1K OHM , 5\%, 0.25 K | 57668 | NTR25J-E05K1 |
| A13R3422 | 315-0432-00 |  | RES, FXD, FIUM:4.3K OHM, 5\%,0.25M | 57668 | NTR25, -E04K3 |
| A13R3423 | 315-0683-00 |  | RES, FXD, FILM:68K OHM,5\%,0.25M | 57668 | NTR25J-E68K0 |
| A1383427 | 315-0102-00 |  | RES,FXO,FIUN: 1K OHM , 5\%, 0.25 N | 57668 | NTR25JE01K0 |
| 01383431 | 315-0472-00 |  | RES , FXO, FILM:4.7K OHM , 5\%, 0.25 M | 57668 | NTR25, E04K7 |
| 01383432 | 315-0222-00 |  | RES, FXD, FILM:2.2K OHM, 5X, 0.25 K | 57668 | NTR25J-E02K2 |
| A13R3434 | 315-0302-00 |  | RES, FXD, FILH:3K OHM , 5\%, 0.25 M | 57668 | NTR25J-E03KD |
| Q1383435 | 315-0393-00 |  | RES, FXO, FILM: 39K OHM , 5\%, 0.25 M | 57668 | NTR25J-E39K0 |
| A13R3437 | 345-0752-00 |  | RES, FXD, FILM:7.5K OHM, 5x, 0.25 M | 57668 | NTR25J-E07K5 |
| A13R3439 | 315-0242-00 |  | RES , FXD, FILM:2.4K OHM, 5K, 0.25 H | 57668 | NTR25J-E02K4 |
| A13R3440 | 315-0103-00 |  | RES, FXD, FILM: 10 K OHM , 5\%, 0. 25 M | 19701 | 5043CX40K00J |
| 01383441 | 315-0102-00 |  | RES, FXO, FIUM: 1K OHW , 5\% , 0.25 M | 57668 | NTR25JE01K0 |
| A13R3442 | 315-0472-00 |  | RES , FXD, FILM: 4.7 KK OHM , 5\%, 0. 25M | 57668 | NTR25J-E04K7 |
| -13R3444 | 315-0104-00 |  | RES, FXD, FILM: 100 K OHM, 5K, 0.25 K | 57668 | NTR25J-E100K |
| -13R3446 | 315-0152-00 |  | RES, FXD, FILM: 1.5 K OHM, 5\%, 0.25 N | 57668 | NTR25J-E04K5 |
| A13R3450 | 315-0183-00 |  | RES, FXD, FILM: 18K OHM, 5\%, 0.25 H | 19701 | 5043CX18K00J |
| A13R3451 | 315-0362-00 |  | RES, FXD, FILH:3.6K OHM, 5\%, 0.25 M | 19701 | 5043CX3K600J |
| D13R3452 | 315-0622-00 |  | RES, FXD, FIUM:6.2K OHM, 5K, 0.25 M | 19701 | 5043CX6K200J |
| A13R3453 | 315-0301-00 |  | RES, FXD, FILM:300 OHN, 5X, 0. 25 N | 57668 | NTR25J-E300E |
| A13R3454 | 321-0350-00 |  |  | 19701 | 5043ED43K20F |
| A13R3455 | 321-0350-00 |  | RES , FXD, FILM:43.2K OHM, 1\% , 0.125N, TC=TO | 19704 | 5043ED43K20F |
| A13R3457 | 315-0620-00 |  | RES , FXD, FILM: 62 OHM, 5X, 0.254 | 19701 | 5043CX63R00J |
| A13R3481 | 321-0386-00 |  | RES , FXO, FIUM: 102 K OHM, 12, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 07716 | CEAD10202F |
| A13R3482 | 321-0361-00 |  | RES, FXD, FI LM: 56.2 K OHW, 1\%, $0.125 \mathrm{H}, \mathrm{TC}=\mathrm{TO}$ | 07716 | CEAD56201F |
| A13R3483 | 311-2230-00 |  | RES , VAR , NONM: TRMR, 500 OHM, 20\% , 0.50 LINEAR | TK1450 | GFO6UT 500 |
| A13R3484 | 321-0262-00 |  | RES, FXD, FILM:5.23K OHW, 1,0.125N, TC=T0 | 18701 | 5033ED5K230F |
| A13R3485 | 307-0445-00 |  | RES NTMK,FXO,FI:4.7K OHM,20\%,(9)RES | 32997 | 4310R-101-472 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A13R3486 | 315-0241-00 |  | RES , FXD, FILM: 240 OHM, 5\%, 0.25 W | 19701 | 5043CX240R0J |
| A13R3487 | 315-0102-00 |  | RES, FXD, FILM: 1 K OHM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25JE01K0 |
| A13R3488 | 315-0203-00 |  | RES, FXD, FILM: 20 K OHM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E 20K |
| A13R3489 | 315-0472-00 |  | RES, FXD, FILM: $4.7 \mathrm{~K} 0 \mathrm{HM}, 5 \%, 0.25 \mathrm{~K}$ | 57668 | NTR25J-E04K7 |
| A13R3501 | 315-0471-00 |  | RES, FXD, FILM: 470 OHM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E470E |
| A13R3502 | 315-0182-00 |  | RES, FXD, FILK:1.8K OHM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25-E1K8 |
| A13R3503 | 315-0511-00 |  | RES, FXD, FILM: 510 OHM, $5 \%, 0.25 \mathrm{~W}$ | 19701 | 5043CX510RDJ |
| A13R3504 | 307-0446-00 |  | RES NTWK, FXD, FI: 10 K OHM, 20\%, (9)RES | 11236 | 750-101-R10K |
| A13R3506 | 321-0376-00 |  | RES, FXO, FIL | 19701 | 5043ED80K60F |
| A13R3507 | 321-0405-00 |  | RES, FXD, FILM: 162 K OHM, 17, 0.125\%, TC=TO | 07716 | CEAD16202F |
| A13R3508 | 321-0434-00 |  | RES, FXD, FILM: 324 K OHM, $1 \%, 0.125 \mathrm{H}, \mathrm{TC}=$ T0 | 07716 | CEA032402F |
| A13R3510 | 311-2232-00 |  | RES, VAR, NONWH:TRMR,2K OHM, 20\%,0.5H LINEAR | TK1450 | GF06UT 2 K |
| A13R3511 | 315-0332-00 |  | RES, FXD, FILM:3.3K OHM , 5\%, 0.25 W | 57668 | NTR25J-E03K3 |
| A13R3512 | 321-0218-00 |  | RES, FXD, FILM: 1.82 K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 19701 | 5033ED1K82F |
| Q13R3513 | 321-0221-00 |  | RES , FXD, FIL $: 1.96 \mathrm{~K}$ OHM , 1\%, $0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 19701 | 5043E01K960F |
| A13R3516 | 321-0396-00 |  | RES, FXD, FILM: $130 \mathrm{~K} 0 \mathrm{HM}, 1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 07716 | CEAD13002F |
| A13R3517 | 321-0425-00 |  | RES, FXD, FILM:261K OHM, 1\%, 0.125W, TC=T0 | 07716 | CEAD26102F |
| A13R3518 | 321-0452-00 |  | RES, FXD, FILH:499K OHM, 1\%, $0.125 \mathrm{~K}, \mathrm{TC}=$ TO | 19701 | 5043ED499K0F |
| A13R3522 | 315-0133-00 |  | RES, FXD, FILM: 13 K OHM, $5 \%, 0.25 \mathrm{~K}$ | 19701 | 5043C×13K00J |
| A13R3523 | 315-0124-00 |  | RES, FXD, FILM: $120 \mathrm{~K} 0 \mathrm{HM}, 5 \%, 0.25 \mathrm{~W}$ | 19701 | 5043Cx120K0J |
| A13R3524 | 315-0751-00 |  | RES, FXD, FILM: 750 OHM , $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E750E |
| A13R3525 | 321-0299-00 |  | RES, FXD, FILM 12.7 K OHM, 1\%, $0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5033ED12K70F |
| A13R3526 | 321-0212-00 |  | RES, FXD, FIL $: 1.58 \mathrm{~K}$ OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=70$ | 19701 | 5033ED1K58F |
| A13R3527 | 315-0152-00 |  | RES, FXD, FILM:1.5K OHM , 5\%, 0.25 W | 57668 | NTR25J-E01K5 |
| A13R3529 | 315-0512-00 |  | RES, FXD, FIL | 57668 | NTR25J-E05K1 |
| A13R3530 | 315-0103-00 |  | RES, FXD, FILM:10K OHM, $5 \%, 0.25 \mathrm{~W}$ | 19701 | 5043CX10K00J |
| A13R3535 | 315-0203-00 |  | RES, FXD, FILM:20K OHM, 5\%, 0.25 W | 57668 | NTR25J-E 20K |
| A13R3536 | 315-0203-00 |  | RES, FXD, FILM:20K OHM, 5\%,0.25W | 57668 | NTR25J-E 20K |
| A13R3537 | 315-0203-00 |  | RES, FXD, FILM:20K OHM, 5\%, 0.25 W | 57668 | NTR25J-E 20K |
| A13R3538 | 315-0203-00 |  | RES, FXD, FILM:20K OHM , 5\%, 0.25 W | 57668 | NTR25J-E 20K |
| A1383539 | 315-0303-00 |  | RES , FXD, FILM: 30 K OHM , $5 \%, 0.25 \mathrm{~W}$ | 19701 | 5043Схзок00J |
| A1383542 | 321-0259-00 |  | RES, FXD, FILM: $4.87 \mathrm{~K} 0 \mathrm{HM}, 17,0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 07716 | CEAD48700F |
| A13R3543 | 311-2230-00 |  | RES, VAR, NONHW: TRMR, 500 OHM, 20\%, 0.50 LINEAR | TK1450 | GFO6UT 500 |
| A13R3544 | 321-0326-00 |  | RES, FXD, FILM: 24.3 K OHM, 12,0.125 $\mathrm{W}, \mathrm{TC}=$ T0 | 19701 | 5043E024K30F |
| A13R3545 | 315-0472-00 |  | RES, FXD, FILM:4.7K OHM , $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E04K7 |
| A13R3546 | 307-0445-00 |  | RES NTWK, FXD, FI:4.7K OHM, 20\%, (9)RES | 32997 | 4310R-101-472 |
| A1383550 | 315-0621-00 |  | RES, FXD, FILM: 620 OHM , $57,0.25 \mathrm{M}$ | 57668 | NTR25J-E620E |
| A13R3551 | 315-0472-00 |  | RES, FXD, FILM:4.7K OHM , $5 \mathbf{8}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E04K7 |
| A13R3552 | 321-0202-00 |  | RES, FXD, FILM: 1.24 K OHM, 12, 0.125 H , TC $=$ T0 | 24546 | Na5501241F |
| A13R3553 | 321-0202-00 |  | RES, FXD, FILM:1.24K OHM, 12, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 24546 | Na5501241F |
| A13R3554 | 321-0254-00 |  | RES, FXD, FILM: $4.32 \mathrm{~K} 0 \mathrm{MM}, 17,0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 07716 | CEAD43200F |
| A13R3555 | 321-0301-00 |  | RES, FXD, FILM:13.3K OHM, 1\%, $0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 07716 | CEAD13301F |
| A13R3557 | 321-0251-00 |  | RES, FXD, FILM: 4.02 K OHM, $1 \mathrm{X}, 0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5033E04K020F |
| A13R3558 | 315-0203-00 |  | RES, FXD, FILM:20K OHM , $5 \mathbf{1}, 0.25 \mathrm{M}$ | 57668 | NTR25J-E 20K |
| A13R3559 | 315-0272-00 |  | RES, FXD, FILM:2.7K DHM, 5x, 0.25 W | 57668 | NTR25J-E02K7 |
| A1383560 | 311-2232-00 |  | RES , VAR, NONWH:TRMR, 2K OHM, 20\% , 0.5 W LINEAR | TK1450 | GF06UT 2 K |
| A13R3563 | 307-0696-00 |  | RES NTMK, FXD, FI: $7,10 \mathrm{~K}$ OHM, $2 \mathrm{~L}, 0.15 \mathrm{~K}$ | 01121 | 2080403 |
| A13R3564 | 321-0318-00 |  | RES, FXD, FILK:20.0K OHM, 1\%, 0.125\%, TC=TO | 19701 | 5033ED20K00F |
| A13R3565 | 321-0259-00 |  | RES, FXD, FILL: 4.87 K OHM, $1 \mathrm{1K}, 0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 07716 | CEAD48700F |
| A13R3566 | 321-0430-00 |  | RES, FXD, FILM:294K OHW, 1\%, $0.125 \mathrm{H}, \mathrm{TC}=$ T0 | 07716 | CEAD29402F |
| A13R3567 | 321-0399-00 |  | RES, FXD, FILM:140K OHM, 14, 0.125N, TC=T0 | 07716 | CEAD14002F |
| A13R3568 | 321-0367-00 |  | RES, FXD, FILH:64.9K OHH, 1\%, $0.125 \mathrm{~K}, \mathrm{TC}=$ T0 | 07716 | CEAD64901F |
| A13R3569 | 321-0331-00 |  | RES, FXD, FILM:27.4K 0 HM, 1\%,0.125 $\mathrm{K}, \mathrm{TC}=$ TO | 19701 | 5043ED27K40F |
| A1383571 | 315-0183-00 |  | RES, FXD, FILM: 18 K OHM, $5 \mathbf{\chi}, 0.25 \mathrm{M}$ | 19701 | $5043 \mathrm{CX18K00J}$ |
| A13R3576 | 321-0251-00 |  | RES, FXO,FILM:4.02K OHM, 12,0.125\%,TC=TO | 19701 | 5033ED4K020F |
| A1383577 | 321-0218-00 |  | RES, FXD, FILH: 1.82 K OHM , 1\%,0.125K, $\mathrm{TC}=$ TO | 19701 | 5033ED 1 K 82 F |
| A13R3579 | 321-0221-00 |  | RES, FXD, FILM: 1.96 K OHM, 1\%,0.125 $\mathrm{H}, \mathrm{TC}=$ T0 | 19701 | 5043ED1K960F |
| A13R3580 | 321-0254-00 |  | RES, FXD, FILL: 4.32 K OHM, 1\% , 0.125 $\mathrm{K}, \mathrm{TC}=$ TO | 07716 | CEAD43200F |
| A13R3586 | 307-0651-00 |  | RES NTHK, FXD, FI : $5,3.3 \mathrm{~K}$ OHM, $5 \mathrm{5}, 0.150 \mathrm{H}$ | 11236 | 750-61-R3.3K ОНМ |


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| :---: | :---: | :---: | :---: | :---: | :---: |
| A13R3588 | 321-0353-00 |  | RES, FXD, FILM: 46.4 K OHM, 1\%, $0.125 \mathrm{~K}, \mathrm{TC}=$ T0 | 07716 | CEA046401F |
| A13R3589 | 321-0335-00 |  | RES, FXD, FILM: 30.1 K OHM, 1\%, $0.125 \mathrm{M}, \mathrm{TC}=$ T0 | 57668 | RB14FXE30K1 |
| A13R3590 | 321-0321-00 |  | RES, FXD, FILM:21.5K OHM, 1\%,0.125W, $\mathrm{C}=$ TO | 07716 | CEAD21501F |
| A13R3591 | 321-0310-00 |  | RES, FXD, FILM:16.5K OHM, 1\%,0.125W, TC $=$ TO | 19701 | 5033ED16K50F |
| A13R3592 | 321-0301-00 |  | RES, FXD, FILM:13.3K OHM, 1\%,0.125 , TC=TO | 07716 | CEAD13301F |
| A1383593 | 321-0304-00 |  | RES, FXD, FILM:14.3K OHM, 1\%, 0.125W, $\mathrm{TC}=$ T0 | 19701 | 5033ED14K30F |
| A13R3596 | 321-0251-00 |  | RES, FXD, FILM:4.02K OHM , 1\%, $0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5033ED4K020F |
| A13R3597 | 321-0254-00 |  | RES, FXD, FILM:4.32K OHM, 1\%,0.125N, TC=TO | 07716 | CEA043200F |
| A13R3598 | 315-0203-00 |  | RES, FXD,FILM:20K OHM , 5\%,0.25 | 57668 | NTR25J-E 20K |
| A13U3420 | 156-0043-03 |  | MICROCKT, DGTL:QUAD 2-INP NOR GATE, SCRN | 18324 | N7402(NB OR FB) |
| A13U3428 | 155-0021-01 |  | MICROCKT, DGTL:SCAN OSCILLATOR \& LOGIC | 80009 | 155-0021-01 |
| A13U3427 | 156-1172-01 |  | MICROCKT, DGTL:DUAL 4 8IT BIN CNTR,SCRN | 01295 | SN74LS393NP3 |
| A1303457 | 156-0730-02 |  | MICROCKT, OGTL:QUAD 2-INP NOR BFR,SCRN | 01295 | SN74LS33nP3 |
| A13U3459 | 155-0017-00 |  | MICROCKT, OGTL: BCD DECIMAL | 80009 | 155-0017-00 |
| A13U3462 | 156-0388-03 |  | MICROCKT, DGTL:DUAL D FLIP-FLOP, SCRN | 01295 | SN74L574ANP3 |
| A13U3485 | 155-0014-01 |  | MICROCKT DGTL:A-D CONVERTER | 80009 | 155-0014-01 |
| A13U3486 | 156-1177-01 |  | MICROCKT, DGTL:STET LINE PRIORITY ENCODER | 01295 | SN74LS147NP3 |
| Q13U3502 | 156-1172-01 |  | MICROCKT, DGTL:OUAL 4 BIT BIN CNTR,SCRN | 01295 | SN74L5393NP3 |
| Q13U3503 | 160-2997-00 |  | MICROCKT, OGTL:4096 $\times 8$ EPROM, PRGM | 80009 | 160-2997-00 |
| व13U3504 | 156-0865-02 |  | MICROCKT, DGTL:OCTAL 0 FF W/CLEAR, SCRN | 01295 | 5N74LS273NP3 |
| Q1303510 | 156-1191-00 |  | MICROCKT, LINEAR:DUAL BI-FET OPNL AMPL | 01295 | TLO72ACP |
| A1343532 | 155-0018-00 |  | MICROCKT, OGTL: ZERO LOGIC | 80009 | 155-0018-00 |
| A1309544 | 155-0014-01 |  | MICROCKT, DGTL: A-D CONVERTER | 80009 | 155-0014-01 |
| Q1309546 | 156-1177-01 |  | MICROCKT, DGTL:STET LINE PRIORITY ENCODER | 01295 | SN74LS147NP3 |
| Q13U3551 | 156-0730-02 |  | MICROCKT, OGTL:QUAD 2-INP NOR BFR,SCRN | 01295 | SN74LS33NP3 |
| -1303557 | 156-1191-00 |  | MICROCKT, LINEAR:DUAL BI-FET OPNL AMPL | 01295 | TL072ACP |
| A13U3563 | 156-0140-02 |  | MICROCKT, DGTL:HEX BUFFERS W/OC HV OUT, | 18324 | N7417(NB OR FB) |
| A13U3564 | 156-0480-02 |  | MICROCKT, DGTL:QUAD 2-INP \& GATE,SCRN, | 01295 | SN74LS08NP3 |
| A13U3576 | 156-1191-00 |  | MICROCKT, LINEAR:DUAL BI-FET OPNL AMPL | 01295 | TLO72ACP |
| A13VR3485 | 152-0405-00 |  | SEMICOND OVC, OI: $2 \mathrm{EN}, \mathrm{SI}, 15 \mathrm{~V}, 5 \%$, $1 \mathrm{~W}, \mathrm{TO-41}$ | 12954 | 02841205a |
| A13VR3486 | 152-0405-00 |  | SEMICOND OVC, OI: $2 E N, 51,15 \mathrm{~V}, 5 \%, 1 \mathrm{~W}, \mathrm{T0-41}$ | 12954 | D2841205A |
| A13VR3487 | 152-0405-00 |  | SEMICONO DVC, DI: ZEN, SI, 15V , $5 \%$, $1 \mathrm{~W}, \mathrm{T0}-41$ | 12954 | D2841205A |


| Component No. | Tektronix <br> Part No. | Serial/Assembly No. <br> Fffective | Dscont |
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| $620-0283-02$ |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mir. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A14a1 | 670-5959-04 |  | CIRCUIT BD ASSY:CONTROLLED RECTIFIER | 80009 | 570-5959-04 |
| A 1481652 | 285-1340-00 |  | CAP , FXD , MTL $20: 0.01$ UF, 10\%,63V | 55112 | 185/0.01/X/63aAQ |
| A1401559 | 290-0573-00 |  | CAP, FXD, ELCTLT:2.7UF, 20\%,50V | 05397 | T368B275M050AS |
| A1401C55 | 283-0028-00 |  | CAP, FXO, CER DI:0.0022UF, $20 \%$,50V | 59660 | 0805585Y5S0222M |
| A14aic64 | 290-0263-00 |  | CAP, FXD, ELCTLT:2.7UF,10\%,15V | 05397 | T320a275K015as |
| 01401666 | 285-1340-00 |  | CAP , FXO, WTLZ0:0.01UF , 10\%,63V | 55112 | 185/0.01/K/6Зада |
| A14a1c67 | 290-0573-00 |  | CAP, FXD, ELCTLT:2.7UF, 20\% ,50V | 05397 | T368B2754050aS |
| a14atc70 | 285-1338-00 |  | CAP, FXD, MTLZD:1.OUF, 10\%, 5V | 55112 | 185/1.0/K/50/AGA |
| -1401C7\% | 285-1338-00 |  | CAP, FX0, MTLZO: $1.0 \cup \mathrm{~F}, 10 \mathrm{~K}, 5 \mathrm{~V}$ | 55112 | 185/1.0/X/50/AGA |
| 914a1c74 | 283-0594-00 |  | CAP, FXO, MICA OI:0.001UF, 1\%, 100V | 00853 | D151F102F0 |
| A14A1C77 | 283-0084-00 |  | CAP, FXD,CER DI:270PF, 5\%, 1000V | 59660 | $838533 \times 5$ F02715 |
| 21401678 | 283-0084-00 |  | CAP, FXD,CER DI:270PF, 5\%, 1000V | 59660 | $838533 \times 5 F 02715$ |
| Q1401c80 | 285-1939-00 |  | CAP .FXD,MTL2D:0.022UF, 10\% ,63V | 55112 | 185/0.022/K63AAA |
| -1401C86 | 290-0580-00 |  | CAP, FXO, ELCTLT:0.27UF, 20\%,50V | 05397 | T3680274M05002 |
| A14a1c90 | 290-0778-00 |  | CAP, FXD, ELCTLT:1UF, +50-10\%,50V ,NPLZD | 54473 | ECE-A50N1 |
| A14a1C92 | 285-1123-00 |  | CAP, FXD, PLASTIC:1UF, 20\%, 200V | 14731 | 23081C105* |
| A14a1c9a | 285-0695-00 |  | CAP, FXD, PLASTIC:0.01UF, 10\% ,200V | 56289 | 192 P 10992 |
| A14a1C121 | 285-0892-00 |  | CAP, FXD, PLASTIC:0.22UF,10\%,200V | 14752 | 650B1C224x |
| Q1401C124 | 290-0758-00 |  | CAP, FXO, ELCTLT: 2.2 UF, $+50-10 \%$, 200V | 56289 | 5020227 |
| A1401C125 | 290-0758-00 |  | CAP, FXD, ELCTLT:2.2UF, $+50-10 \%$, 200V | 56289 | 5020227 |
| A1401C132 | 290-0768-00 |  | CAP ,FXD,ELCTLT: 10UF, +50-10\%, 100VOC | 54473 | ECE-A100V10L |
| A14A1C133 | 290-0768-00 |  | CAP, FXD, ELCTLT: 10UF, +50-10\%, 100VOC | 54473 | ECE-A100V10L |
| Q14a1C134 | 290-0768-00 |  | CAP, FXO, ELCTLT: 10UF, +50-10\%, 100VOC | 54473 | ECE-A100V10L |
| A14a1C135 | 290-0768-00 |  | CAP,FXO, ELCTLT: 10UF, +50-10\%, 100VOC | 54473 | ECE-A100V10L |
| A14A1C142 | 290-0772-00 |  | CAP , FXD, ELCTLT: 330UF, +50-10\%, 25VOC | 54473 | ECE-BIEV30S |
| Q1401C143 | 290-0770-00 |  | CAP, FXD, ELCTLT: 100UF, +50-10\%, 25VDC | 54473 | ECE-A25V100L |
| -1401C144 | 290-0772-00 |  | CAP, FXO, ELCTLT:330UF, +50-10\%, 25VDC | 54473 | ECE-BIEV30S |
| A1401C145 | 290-0770-00 |  | CAP, FXO, ELCTLT: 100UF, +50-10\%, 25VOC | 54473 | ECE-A25V100L |
| A14a1C152 | 290-0771-00 |  | CAP, FXO, ELCTLT: 220UF, +50-10\%, 10VOC | 55680 | ULB1A221TPAANA |
| A1401C153 | 290-0771-00 |  | CAP, FXD, ELCTLT: 220UF, +50-10\%, 10VOC | 55680 | ULB1A221TPAana |
| A14A1C154 | 290-0898-01 |  | CAP , FXO, ELCTLT: 2600UF, $+75-10 \%$, 35V | 56289 | 6020×2626035aA2P |
| A14A1C155 | 290-0773-00 |  | CAP , FXD, ELCTLT: 1000 UF, +50-10\%, 10VOC | 54473 | ECE10V1000L |
| A14A1C156 | 290-0771-00 |  | CAP , FXD , ELCILT: 220 UF , +50-10\%, 10VOC | 55680 | ULB1A221TPAANA |
| a14atc 172 | 290-0746-00 |  | CAP, FXO, ELCTLT:47UF, +50-10\%, 16V | 54473 | ECE-A6V47L |
| A14a1C179 | 285-1338-00 |  | CAP, FXO, MTLZD:1.0UF, 10\%, 5V | 55112 | 185/1.0/K/50/AGA |
| A14A1C183 | 285-1300-01 |  | CAP, FXD, MTLID:0.1UF,10\%,63V | 55112 | 185/0.1/K/63/ABA |
| A14A1CR52 | 152-0333-00 |  | SEIICOND DVC, DI:SW,SI, 55V,200MA, D0-35 | 07263 | FDH-6012 |
| A14A1CR59 | 152-0333-00 |  | SEMICOND DVC, DI:SH,SI, 55V, 200MA, DO-35 | 07263 | FDH-6012 |
| Q14a1CR65 | 152-0141-02 |  | SEIICOND DVC, $01:$ SH, $51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | 0A2527 (1N4152) |
| A14a1CR66 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI, 30V, 150MA, 30V,00-35 | 03508 | DA2527 (1N4152) |
| A14A1CR73 | 152-0333-00 |  | SEMICOND DVC, DI:SH,SI, 55V, 200MA, D0-35 | 07263 | FOH-6012 |
| A14A1CR74 | 152-0333-00 |  | SEMICOND OVC, $01: S \mathrm{SH}, 5 \mathrm{SI}, 55 \mathrm{~V}, 200 \mathrm{ma}, 00-35$ | 07283 | FOH-6012 |
| A1401CR75 | 152-0333-00 |  | SEMICOND OVC, DI:SN,SI,55V,200MA, D0-35 | 07263 | FOH-6012 |
| A14A1CR76 | 152-0333-00 |  | SEMICOND DVC, DI:SM,SI,55V,200MA, D0-35 | 07263 | FOH-6012 |
| A14A1CR89 | 152-0333-00 |  | SEMICOND DVC, 1 I:SW, SI ,55V,200MA, D0-35 | 07263 | FOH-6012 |
| A14A1CR82 | 152-0333-00 |  | SEMICOND DVC, DI:SH,SI,55V,200MA, 00-35 | 07263 | FDH-6012 |
| R1401CR83 | 152-0333-00 |  | SEIICOND DVC,DI:SH,SI, 55V,200MA, DO-35 | 07263 | FOH-6012 |
| A1401CR84 | 152-0333-00 |  | SEMICOND OVC, $01: S \mathrm{SH}, \mathrm{SI}, 55 \mathrm{~V}, 200 \mathrm{MA}, 00-35$ | 07263 | FOH-6012 |
| A19a1CR90 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI, 30V, 150 MA , 30V , D0-35 | 03508 | DA2527 (1 1 (152) |
| A14A1CR120 | 152-0242-00 |  | SEAICOND OVC, $01.510,51,225 \mathrm{~V}, 0.20,00-7$ | 07263 | FOH5004 |
| A1401CR121 | 152-0242-00 |  | SENICOND OVC, $01: S 1 \mathrm{~S}, 51,225 \mathrm{~V}, 0.20,00-7$ | 07263 | FOH5004 |
| A1401CR122 | 152-0242-00 |  | SEIICOND DVC,01:SIG, $51,225 \mathrm{~V}, 0.2 \mathrm{~L}, 00-7$ | 07263 | FDH5004 |
| Q1401CR123 | 152-0242-00 |  | SEIICOND OVC, DI:SIG, $51,225 \mathrm{~V}, 0.2 \mathrm{~A}, 00-7$ | 07263 | FOH5004 |
| A14A1CR124 | 152-0242-00 |  | SEMICOND OVC, $01: S I G, S I, 225 \mathrm{~V}, 0.2 \mathrm{~A}, 00-7$ | 07263 | FOH5004 |
| R1401CR125 | 152-0242-00 |  | SEIICOND DVC, $12: S 16,51,225 V, 0.29,00-7$ | 07263 | FOH5004 |
| A14A1CR127 | 152-0242-00 |  | SEMICOND OVC, 01 :SIG, $51,225 \mathrm{~V}, 0.2 \mathrm{~A}, 00-7$ | 07263 | FDH5004 |
| A14a1CR130 | 152-0586-00 |  | SEIICOND DVC, DI:RECT,SI,600V,0.5A | 25403 | BYV960 OR BYV95C |
| A14A1CR131 | 152-0586-00 |  | SEIICOND DVC, DI:RECT, $51,600 \mathrm{~V}, 0.54$ | 25403 | BYV960 OR BYY95C |
| A14A1CR132 | 152-0586-00 |  | SEMICOND DVC,01:RECT, SI,600V,0.5A | 25403 | BYV96D OR 8YV95C |


| Component No, | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mir. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A14A1CR133 | 152-0596-00 |  | SEMICOND DVC, OI:RECT, SI, 600V ,0.54 | 25403 | BYV960 OR BYV95C |
| A1401CR140 | 152-0397-00 |  | SEMICOND DVC,DI:RECT, $51.500 \mathrm{~V}, 12 \mathrm{~A}$ | 80009 | 152-0397-00 |
| A1401CR141 | 152-0397-00 |  | SEMICOND DVC, DI:RECT, SI, 500V,12a | 80009 | 152-0397-00 |
| Q14A1CR142 | 152-0397-00 |  | SEMICOND DVC, DI: RECT, $51,500 \mathrm{~V}, 12 \mathrm{~A}$ | 80009 | 152-0397-00 |
| A14A1CR143 | 152-0997-00 |  | SEMICOND BVC, DI:RECT, SI, 500V,120 | 80009 | 152-0397-00 |
| A14A1CR150 | 152-0586-00 |  | SEIICOND OVC, DI:RECT, SI, 600V,0.5A | 25403 | 8YV960 OR BYV95C |
| A14A1CR151 | 152-0692-00 |  | SEMICOND DVC, DI: DUAL RECT, SI, 30a, 20V, T0-3 | 04713 | S0241 |
| A1401CR153 | 152-0586-00 |  | SEMICOND DVC.OI:RECT, SI, 600V.0.5a | 25403 | 8YV960 OR 日YV95C |
| A14A1CR161 | 152-0725-00 |  | SEMICOND DVC,DI:SI,SCHOTTKY,20V,1.2PF,00-35 | 24847 | Q2X1582 |
| A14A1CR171 | 152-0141-02 |  | SEMICOND DVC, DI:SN,SI, 30V, $950 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | Da2527 ( 1 N4152) |
| A14A1CR183 | 152-0141-02 |  | SEMICOND DVC, DI:SN, SI, 30V, 150MA, $30 \mathrm{~V}, 00-35$ | 03508 | DA2527 ( 1 N4 152) |
| A14A1L132 | 108-0473-00 |  | COIL,RF:FIXED, 174UH | 80009 | 108-0473-00 |
| A1401L134 | 108-0473-00 |  | COIL,RF:FIXED, 174UH | 80009 | 108-0473-00 |
| A1401L142 | 108-0680-00 |  | COIL,RF:FIXED, 27UH | 80009 | 108-0680-00 |
| A14A1L144 | 108-0680-00 |  | COIL,RF:FIXED, 27UH | 80009 | 108-0680-00 |
| A14A1L152 | 108-0473-00 |  | COIL,RF:FIXED, 174UH | 80009 | 108-0473-00 |
| A14A1L154 | 108-0556-00 |  | COIL,RF:FIXED, 12UH | 80009 | 108-0556-00 |
| A1411L156 | 108-0337-00 |  | COIL,RF:FIXED, 25UH | 80009 | 108-0337-00 |
| A1401052 | 151-0302-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | 57899 |
| A1401054 | 151-0273-00 |  | transistor: SElected | 03508 | X16E3616 |
| A14010162 | 151-0190-00 |  | TRANSISTOR:NPN, SI , T0-92 | 80009 | 151-0190-00 |
| A14010171 | 151-0190-00 |  | TRANSISTOR:NPN, SI, T0-92 | 80009 | 151-0190-00 |
| A14A10173 | 151-0188-00 |  | TRANSISTOR:PNP, SI, T0-92 | 80009 | 151-0188-00 |
| A14010177 | 151-0188-00 |  | TRANSISTOR: PNP, SI, T0-92 | 80009 | 151-0188-00 |
| A14a1R52 | 315-0512-00 |  | RES , FXD, FILM 5 , 1K OHM , 5\%,0.25 | 57668 | NTR25J-E05K1 |
| A14A1R54 | 315-0753-00 |  | RES, FXD,FILA:75K ОНM , 5\%,0.25N | 57668 | NTR25J-E75K0 |
| A14A1R55 | 315-0201-00 |  | RES, FXD, FILM: 200 OHM, 5\%, 0.25H | 57668 | NTR25J-E200E |
| A1401859 | 315-0562-00 |  | RES, FXD, FILM:5.6K OHM , 5\%, 0.25 H | 57668 | NTR25J-E05K6 |
| A14日1R60 | 315-0224-00 |  | RES, FXD, FILM:220K OHM, 5\%,0.25 | 57668 | NTR25-E220K |
| A14a1R61 | 315-0123-00 |  | RES, FXD, FILM:12K OHM , 5\%,0.25M | 57668 | NTR25J-E12K0 |
| A1401R62 | 315-0301-00 |  | RES, FXD, FILS: 300 OHA , 5x, 0.25N | 57668 | NTR25J-E300E |
| A14A1R63 | 315-0470-00 |  | RES, FXD, FILIM: 47 OHM, $5 \times, 0.25 \mathrm{H}$ | 57668 | NTR25J-E47E0 |
| A14A1R64 | 315-0102-00 |  | RES, FXD, FIUR: 1 K OHM , $5 \mathrm{LK}, 0.25 \mathrm{~W}$ | 57668 | NTR25JE01K0 |
| A14A1R66 | 315-0202-00 |  | RES, FXD, FILH:2K OHW, $5 \mathrm{LK}, 0.25 \mathrm{M}$ | 57668 | NTR25J-E 2 K |
| A1401R67 | 315-0154-00 |  | RES, FXO, FILH: 150 K OHM, $5 \times, 0.25 \mathrm{H}$ | 57668 | NTR25J-E150K |
| A1401870 | 315-0560-00 |  | RES, FXD, FILH: 56 OHW, $5 \mathrm{~L}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E56E0 |
| A14A1R71 | 315-0560-00 |  | RES, FXD, FILM: 56 OHM , 5\%, 0.25 H | 57668 | NTR25J-E56E0 |
| A1401R74 | 321-0346-00 |  | RES, FXO, FILM: 39.2 K OHM, 1\%,0.125 $\mathrm{N}, \mathrm{TC}=$ TO | 19701 | 5043ED39K20F |
| A1401R80 | 315-0471-00 |  | RES, FXD , FILM: 470 O1/W, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-E470E |
| A14A1R81 | 321-0334-00 |  | RES, FXD, FILM: 29.4 K OHM, 12, $0.125 \mathrm{H}, \mathrm{TC}=$ T0 | 07716 | CEAD29401F |
| A14A1R82 | 321-0340-00 |  | RES, FXD, FILM: 34.0 K OHM , 1\%, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5043E034K00F |
| A14A1R83 | 321-0193-00 |  | RES, FXD, FIL $=1 \mathrm{~K}$ OHM, 12, $0.125 \mathrm{~K}, \mathrm{TC}=$ T0 | 19701 | 5033ED 1 K09F |
| A14A1R84 | 321-0005-00 |  |  | 91637 | CMF55116G11R00F |
| A1401R85 | 321-0284-00 |  | RES, FXD,FILA:8.87K OHM, 12, 0. 125 $\mathrm{N}, \mathrm{TC}=$ TO | 19701 | 5043EDBK870F |
| A1401R87 | 321-0283-00 |  | RES, FXQ, FIU: 8.66 K OHM, 12, $0.125 \mathrm{M}, \mathrm{TC}=$ TO | 19701 | 5043ED8K660F |
| A1401R88 | 315-0122-00 |  | RES, FXD,FILK:1.2K OHM , $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-E01K2 |
| A14A1R90 | 315-0272-00 |  | RES, FXD, FILM:2.7K OHM, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-E02K7 |
| A14A1R92 | 315-0105-00 |  | RES, FXD, FILM: 1M OHM , 5x, 0.25 M | 19701 | 5043CX14000J |
| A14A1R93 | 311-2273-00 |  | RES, VAR, NOWM : TRAR, 2K OHM, 20\% , 0.5 H | TK1450 | GFOSVT 2 K OHM |
| A14alR94 | 315-0203-00 |  | RES, FXD, FILM: 20 K OHM, 5\% , 0.25 M | 57668 | NTR25J-E 20K |
| A1401R95 | 321-0819-00 |  | RES, FXD, FILM:226K OHM, 12, 0.125M, TC=TO | 07716 | CERO22602F |
| A14A1R120 | 315-0150-00 |  | RES, FXD, FILL 15 OHM, 5X, 0.25\% | 19701 | 5043CX15R00J |
| A14A1R121 | 315-0101-00 |  | RES,FX0, FILM: 100 OHM, 5\%,0.25N | 57668 | NTR25J-E 100E |
| A14A1R127 | 304-0391-00 |  | RES, FXO, FILA:390 OHH, 5\%, 0.54 | 01121 | E83915 |
| A14A1R161 | 315-0473-00 |  | RES, FXD, FILN:47K OHM, 52,0.251 | 57668 | NTR25J-E47K0 |
| A14A1R162 | 315-0472-00 |  | RES, FXD, FILM: 4.7 K OHm, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-E04K7 |
| A14A1R170 | 315-0100-00 |  | RES, FXD, FILS: 10 OHW , 5x, 0.25 N | ' 19701 | 5043CX10RROOJ |
| A14A1R171 | 315-0274-00 |  | RES.FXO.FILM: 270 K OHM, $5 \mathrm{X}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E270K |
| A14A1R172 | 315-0474-00 |  | RES, FXO, FILM: 470 K OHW, 5\%,0.25H | 19701 | 5043CX470K0J92U |


| Component No. | lektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. <br> Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A14018173 | 315-0272-00 |  | RES, FXO, FIUM:2.7K OHM , 5\% , 0. 25 K | 57668 | NTR25J-E02K7 |
| 01401R174 | 315-0182-00 |  | RES, FXD, FILM:1.8K OHM, 5\%,0.25 | 57668 | NTR25J-E1K8 |
| A14A1R176 | 315-0203-00 |  | RES, FXD,FILM:20K OHM, 5\%,0.25H | 57668 | NTR25J-E 20K |
| A1401R177 | 315-0203-00 |  | RES, FXD,FILM:20K OHM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E 20K |
| A14A1R179 | 315-0472-00 |  | RES, FXD, FILM:4.7K OHM, 5\%, 0.25 H | 57668 | NTR25J-E04K7 |
| A14A1R181 | 315-0334-00 |  | RES, FXO, FILM: 330 K OHM, 5\%, 0.25 H | 57668 | NTR25J-E 330K |
| A1401R182 | 315-0754-00 |  | RES , FXD, FILM:750K OHM, $5 \%, 0.25 \mathrm{~K}$,MI | 19709 | 5043CX750K0J |
| 01401075 | 155-0067-02 |  | MICROCKT, DGTL:PONER SPLY RGLTR | 80009 | 155-0067-02 |
| A1401U179 | 156-0481-02 |  | MICROCKT, DGTL:TRIPLE 3-INP \& GATE, SCRN | 01295 | 5N74LS11NP3 |
| A1491VR52 | 152-0590-00 |  | SEIICOND DVC DI:ZEN, $51,18 \mathrm{~V}, 5 \%, 0.44,00-7$ | 04713 | S2635014K2 |
| A1401VR72 | 152-0243-00 |  | SEIICOND DVC, DI: $2 \mathrm{EN}, \mathrm{SI}, 15 \mathrm{~V}, 5 \%, 0.4 \mathrm{~N}, 00-7$ | 04713 | SZ13203 (1N9658) |
| A1401VR88 | 152-0212-00 |  | SEMICOND DVC, $01: 2 \mathrm{E}, 51,9 \mathrm{~S}, 5 \mathrm{~L}, 0.5 \mathrm{~W}, 00-7$ | 04713 | S750646RL |


| Component No, | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 014 A 2 | 670-5960-04 |  | CIRCUIT BO ASSY:LY REGULATOR | 80009 | 870-5980-04 |
| A14A2C8 | 290-0778-00 |  | CAP, FXD, ELCTLT:1UF , +50-10\%, 50V ,NPLZO | 54473 | ECE-A50N1 |
| A14A2C12 | 290-0778-00 |  | CAP, FXD, ELCTLT:1UF,+50-10\%,50V,NPL20 | 54473 | ECE-A50N 9 |
| A14A2C13 | 283-0047-00 |  | CAP, FXD,CER DI:270PF,5\%,500V | 59660 | 08316042570271 J |
| A14A2C15 | 281-0629-00 |  | CAP, FXD, CER DI:33PF,5\%,600V | 52763 | 2RDPL2007 33P0.JC |
| A14A2C17 | 290-0778-00 |  | CAP, FXD, ELCTLT: 1UF , +50-10\% , 50V , NPL2D | 54473 | ECE-A50N9 |
| -14A2C24 | 283-0110-00 |  | CAP, FXD , CER DI:0.005UF + 80-20\%, 150V | 59660 | 855-547-E-5022 |
| A14A2C36 | 281-0775-00 |  | CAP, FXD,CER DI:0.1UF,20\%,50V | 04222 | MA205E104MAD |
| A14A2C44 | 283-0057-00 |  | CAP, FXD,CER DI:0.001UF, 10\% ,200V | 59660 | 835-515-YSE0102K |
| A14A2C45 | 281-0511-00 |  | CAP, FXD,CER DI:22PF,+/-2.2PF,500V | 52763 | 2ROPLI007 22P0KC |
| A14A2C47 | 290-0778-00 |  | CAP, FXD, ELCTLT:1UF,+50-10\%,50V,NPLZ | 54473 | ECE-A50N1 |
| A14A2C54 | 283-0100-00 |  | CAP, FXD,CER DI:0.0047UF,10\%,200V | 04222 | SR306A472KAD |
| A14a2C64 | 281-0540-00 |  | CAP, FXD, CER DI:51PF,5\%,500V | 59660 | 301-000U2J0510」 |
| A14A2C68 | 290-0420-00 |  | CAP, FXD, ELCTLT:0.68UF, 20\%,75V | 05397 | T1100684M075AS |
| A14a2C69 | 283-0067-00 |  | CAP,FXD,CER DI:0.001UF,10\%,200V | 59660 | 835-515-YSE0102K |
| A14A2C84 | 281-0629-00 |  | CAP, FXD,CER DI:33PF ,5\%,600V | 52763 | 2RDPL2007 33P0JC |
| A14A2C88 | 290-0420-00 |  | CAP, FXD, ELCTLT:0.68UF, 20\%,75V | 05397 | T110A684M075AS |
| A14A2C114 | 281-0605-00 |  | CAP, FXD, CER DI:200PF, 10\%,500V | 59660 | 301000Y50201K |
| A1402C156 | 290-0745-00 |  | CAP , FXD , ELCTLT:22UF, $+50-10 \%, 25 \mathrm{~V}$ | 54473 | ECE-A25V22L |
| A14A2CR7 | 152-0333-00 |  | SEMICOND DVC, DI:SW, SI , 55V,200MA, 00-35 | 07263 | FDH-6012 |
| A14A2CR8 | 152-0333-00 |  | SEMICOND DVC, DI:SH,SI, 55V,200MA, D0-35 | 07263 | FDH-6012 |
| A14A2CR10 | 152-0333-00 |  | SEMICOND DVC, 01 :SH,SI ,55V,200MA, D0-35 | 07263 | FOH-6012 |
| A14A2CR11 | 152-0333-00 |  | SEMICOND DVC, 1 I : SW, SI , 55V,200MA, D0-35 | 07263 | FOH-6012 |
| A1402CR15 | 152-0333-00 |  | SEMICOND DVC, DI:SH, SI ,55V, 200MA, D0-35 | 07263 | FOH-6012 |
| A14A2CR19 | 152-0141-02 |  | SEAICOND DVC, DI: SH, 5I , 30V , 150MA, 30V , D0-35 | 03508 | DA2527 (1N4152) |
| A14A2CR20 | 152-0141-02 |  | SEMICOND DVC, DI:SN,SI, 30V,150MA.30V.D0-35 | 03508 | 002527 (1N4152) |
| A14A2CR21 | 152-0141-02 |  | SEAICOND DVC, DI:SH, SI , 30V, 150MA , 30V , DO-35 | 03508 | D22527 (1N4152) |
| A1402CR22 | 152-0333-00 |  | SEAICOND DVC,DI:SW,SI,55V,200MA, DO-35 | 07263 | FDH-6012 |
| A1402CR28 | 152-0066-03 |  | SEIICOND DVC, DI: RECT, SI, 400V,1A, D0-41 | 14433 | LG4017 |
| A14A2CR45 | 152-0333-00 |  | SEIICOND DVC, DI : SW, SI , 55V , 200MA , DO-35 | 07263 | FDH-6012 |
| A14A2CR49 | 152-0141-02 |  | SEMICONO DVC, DI: SK, 5I , 30V, 150MA , 30V , 00-35 | 03508 | 002527 (1N4152) |
| A14A2CR50 | 152-0141-02 |  | SEIICOND DVC, DI: 5H, SI , 30V, 150MA , 30V, D0-35 | 03508 | 002527 ( 1 N4152) |
| A14A2CR51 | 152-0141-02 |  | SEAICOND DVC, DI:SH,SI, 30V, 150MA, 30V, D0-35 | 03508 | DA2527 (1N4152) |
| A1402CR52 | 152-0333-00 |  | SEIICOND DVC, DI:SM, SI , 55V ,200MA, D0-35 | 07263 | FOH-6012 |
| A1402CR58 | 152-0066-03 |  | SEMICOND DVC,DI:RECT, SI, 400V , 1A, D0-41 | 14433 | L64017 |
| D1402CR64 | 152-0333-00 |  | SEMICOND DVC, DI : SN, SI ,55V,200MA , DO-35 | 07263 | FDH-6012 |
| A1402CR76 | 152-0066-03 |  | SEMICOND DVC, DI:RECT , $51,400 \mathrm{~V}, 19,00-41$ | 14433 | LG4017 |
| A1402CR84 | 152-0333-00 |  | SENICOND OVC, $12 . S W, S I, 55 V, 200 \mathrm{MA}, 00-35$ | 07263 | FDH-6012 |
| A1402.CR96 | 152-0066-03 |  | SEMICOND DVC,DI:RECT,SI ,400V, 10, D0-41 | 14433 | LG4017 |
| A14A2.CR114 | 152-0333-00 |  | SEAICOND DVC, DI:SN,SI,55V,200MA, D0-35 | 07263 | FDH-6012 |
| A1402CR132 | 152-0066-03 |  | SEMICOND DVC,DI:RECT, SI, 400V,1A, D0-41 | 14433 | LG4017 |
| A14a2CR142 | 152-0423-00 |  | SEMICOND DVC, DI:RECT, SI , 400V, 3A, M176A | 04713 | 1N5000 |
| A14A2CR143 | 152-0141-02 |  | SEAICOND DVC, DI: SH, SI , 30V, 150MA , 30V, DO-35 | 03508 | Da2527 (1N4152) |
| A14A2CR144 | 152-0423-00 |  | SEMICOND DVC, DI:RECT, SI , 400V,3A, M176A | 04713 | 1N5000 |
| A1402CR148 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI , 30V, 150MA , 30V , DD-35 | 03508 | DA2527 ( $1 \mathrm{N4152)}$ |
| 01402022 | 158-0350-00 |  | TRANSISTOR: PNP, SI , T0-92 | 04713 | SPS6700 |
| A14A2028 | 151-0656-00 |  | TRANSISTOR:NPN, SI , T0-220 | 02735 | 2N6044 |
| A14A2034 | 151-0103-00 |  | TRANSISTOR:NPN, SI, T0-5 | 04713 | SM1307 |
| A1402038 | 151-0134-00 |  | TRANSISTOR: PNP, SI , TO-39 | 04713 | S43495 |
| Q1402052 | 151-0347-00 |  | TRANSISTOR:NPN, SI, T0-92 | 04713 | SP57951 |
| A1407058 | 151-0657-00 |  | TRANSISTOR: PNP, SI, T0-220 | 04713 | SJE1973 |
| A14A2068 | 151-0347-00 |  | TRANSISTOR:NPN, SI , T0-92 | 04713 | SPS7951 |
| A14A2074 | 151-0656-00 |  | TRANSISTOR:NPN, SI . TO-220 | 02735 | 2N6044 |
| A1402088 | 151-0342-00 |  | TRANSISTOR: PNP, SI , T0-92 | 07263 | 5035928 |
| A14a2094 | 151-0657-00 |  | TRANSISTOR: PNP, SI, T0-220 | 04713 | SJE1973 |
| A14920118 | 151-0302-00 |  | TRANS ISTOR:NPN, 51. , T0-18 | 04713 | ST899 |
| A14020122 | 151-0349-00 |  | TRANSISTOR:NPN, SI, SELECTED,T0-127 | 04713 | SJE924 |
| 014020126 | 151-0477-11 |  | TRANSISTOR:SCREENED | 80009 | 151-0477-01 |
| A14020144 | 151-0190-00 |  | TRANSISTOR:NPN, SI , T0-92 | 80009 | 151-0190-00 |


| Component No． | Tektronix Part No． | Serial／Assembly No． Effective Dscont | Name \＆Description | Mfr． Code | MFr，Part No． |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A14a20148 | 151－0373－00 |  | TRANSISTOR：PNP，SI ，T0－127 | 04713 | SJE925 |
| A14A2R1 | 321－0369－00 |  | RES，FXO，FILM：68．1K OHM，1\％，0．125 $\mathrm{K}, \mathrm{TC}=$ TO | 19701 | 5043ED68K10F |
| A14A2R2 | 321－0386－00 |  | RES，FXD，FILM：102K OHM ，1\％，0．125 $\mathrm{W}, \mathrm{TC}=$ TO | 07716 | CEAD10202F |
| A14a2R3 | 321－0336－00 |  | RES，FXD，FILM： 30.9 K OHM，1\％， $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5043ED30K90F |
| A1402R4 | 321－0290－00 |  | RES，FXD，FILM： 10.2 K OHA，1\％， $0.12 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5043ED10K20F |
| A1402R5 | 321－0319－00 |  | RES ，FXO，FILK：20．5K OHM，1\％， $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033E020K50F |
| A14A2R8 | 315－0332－00 |  | RES ，FXD，FILM：3．3K OHM，5\％， 0.25 M | 57668 | NTR25J－E03K3 |
| A14A2R10 | 323－0265－00 |  | RES，FXO，FILM：5．62K OHM，1\％， $0.5 \mathrm{H}, \mathrm{TC}=$ TO | 75042 | CECTO－5621F |
| A14a2R12 | 315－0512－00 |  | RES，FXO，FILM：5．1K OHM， $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J－E05K1 |
| A14A2R13 | 315－0103－00 |  | RES，FXO，FILM：10K OHM $, 5 \%, 0.25 \mathrm{~N}$ | 19701 | 5043CX10K00」 |
| A14A2R14 | 321－0730－06 |  | RES，FXO，FILM：5．703K OHM ，0．27，0．125N，TC＝T9 | 19701 | 5033RE5K703C |
| A14A2R15 | 311－1225－00 |  | RES，VAR，NONH：TRMR，1K OHM，O．5 | 32997 | 3386F－T04－102 |
| A14A2R16 | 321－0331－09 |  | RES，FXO，FILM：27．4K OHM，1\％，0．125M，TC＝T9 | 19701 | 5033RE27K4F |
| A1492R17 | 315－0151－00 |  | RES，FXO，FILM： 150 OHM ，5\％， 0.25 m | 57668 | NTR25J－E150E |
| A14A2R21 | 315－0104－00 |  | RES，FXO，FILM： 100 K OHM，5\％， 0.25 H | 57668 | NTR25J－E100K |
| A14A2R22 | 315－0821－00 |  | RES，FXO，FILM：820 OHM，5\％，0．25\％ | 19701 | 5043CX820R0」 |
| A14A2R24 | 315－0331－00 |  | RES，FXO，FILM：330 0HM，5\％，0．25M | 57668 | NTR25J－E330E |
| A14A2R25 | 315－0471－00 |  | RES，FXO，FILM：470 OHM，5\％， 0.25 M | 57668 | NTR25J－E470E |
| A14A2R26 | 315－0181－00 |  | RES，FXD，FILM： 180 OHM，5\％，D． 25 K | 57668 | NTR25J－E180E |
| A14A2R27 | 315－0512－00 |  | RES，FXD，FILM：5．1K OHM，5\％， 0.25 K | 57668 | NTR25J－E05K1 |
| A14A2R28 | 308－0365－00 |  | RES，FXO，NM： 1.5 OHM ，5\％，3\％ | 00213 | 12405－1．5－5 |
| A14A2R32 | 315－0432－00 |  | RES，FXO，FILM：4．3K OHM，5\％，0．25M | 57668 | NTR25J－E04K3 |
| A14A2R34 | 304－0102－00 |  | RES，FXO，CMPSN： 1 K OHM，10\％，1K | 01121 | G81021 |
| A1402R36 | 315－0121－00 |  | RES，FXO，FILH： 120 OHM ，5\％， 0.25 H | 19701 | $5043 \mathrm{CX120R0J}$ |
| A14A2R37 | 315－0123－00 |  | RES，FXD，FILH： 12 K OHM， $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J－E12K0 |
| A14A2R38 | 301－0182－00 |  | RES，FXD，FILM： 1.8 K OHM $, 5 \%, 0.5 \mathrm{M}$ | 19701 | 5053CX1K800J |
| A14A2R42 | 315－0203－00 |  | RES，FXD，FILM：20K OHM ，5\％，0．254 | 57668 | NTR25J－E 20K |
| A14a2R44 | 315－0103－00 |  | RES，FXO，FILH： 10 K OHM，5\％， 0.25 M | 19701 | $5043 \mathrm{CX10K00J}$ |
| A14A2R45 | 321－0924－07 |  | RES，FXO，FILM：40K OHN，0．1\％，0．125w，TC＝T9 | 19701 | 5033RE40K00B |
| A14A2R46 | 321－0924－07 |  | RES，FXO，FILM：40K OHA ，0．1\％， $0.125 \mathrm{M}, \mathrm{TC}=\mathrm{T9}$ | 19701 | 5033RE40K00B |
| A14A2R47 | 315－0151－00 |  | RES，FXD，FIUM： 150 OHM，5\％，0．25M | 57668 | NTR25J－E150E |
| A1402R51 | 315－0104－00 |  | RES，FXD，FILM： 100 K OHM， $5 \%, 0.25 \mathrm{M}$ | 57668 | NTR25J－E100K |
| A14A2R52 | 315－0821－00 |  | RES，FXD，FILM：820 OHM，5\％，0．25N | 19701 | 5043CX820ROJ |
| A14A2R54 | 315－0511－00 |  | RES ，FXD，FILM：510 OHM ，5\％， 0.25 H | 19701 | 5043CX510R0J |
| A14A2R55 | 315－0471－00 |  | RES，FXD，FILM： 470 OHM $5 \mathrm{5X}, 0.25 \mathrm{H}$ | 57668 | NTR25J－E470E |
| A14A2R56 | 315－0181－00 |  | RES，FXO，FILM： 180 OHM ，5\％， 0.25 H | 57668 | NTR25J－E180E |
| A14A2R57 | 315－0512－00 |  | RES ，FXO，FIUM：5．1K OHM，5\％，0．25M | 57668 | NTR25J－E05K1 |
| A14A2R58 | 308－0686－00 |  | RES，FXD，MN： 2.2 OHM，5\％，2\％ | 75042 | BMH－2R200J |
| A14A2R61 | 321－0332－07 |  | RES，FXO，FILM：28．OK OHM，0．17，0．125N，TC＝ 9 | 19701 | 5033RE28K008 |
| A14A2R62 | 321－1296－07 |  | RES，FXO，FIUM：12．0K OHM ，0．17，0．125\％，TC $=$ T9 | 19701 | 5033RE12K00B |
| A14A2R63 | 315－0152－00 |  | RES，FXO，FILH：1．5K OHM，5K， 0.25 H | 57668 | NTR25J－E01K5 |
| A14A2R67 | 315－0123－00 |  | RES ，FXD，FIUM：12K OHM ，5X，0．25H | 57668 | NTR25J－E12K0 |
| A14A2R68 | 315－0302－00 |  | RES，FXD，FILM：3K OHM ，5\％，0．25\％ | 57668 | NTR25J－E03K0 |
| A14A2R69 | 315－0822－00 |  | RES，FXO，FILM：8．2K OHM，5\％， 0.25 W | 19701 | 5043CX8K200」 |
| A14A2R73 | 315－0201－00 |  | RES ，FXD，FILM： 200 OHM ，5\％，0． 25 H | 57668 | NTR25J－E200E |
| A14A2R74 | 315－0393－00 |  | RES，FXO，FILM：39K OHM ，5\％，0．25 | 57668 | NTR25．J－E39K0 |
| A14A2R75 | 308－0804－00 |  | RES，FXO，期： 0.025 OHA ，5\％，0．5M | 80009 | 308－0804－00 |
| A14A2R76 | 315－0151－00 |  | RES，FXD，FILM： 150 OHM ，5\％，0．25 | 57668 | NTR25J－E150E |
| A1492R77 | 315－0432－00 |  | RES ，FXD，FILH：4．3K OHM ，5K， 0.25 K | 57668 | NTR25，－E04K3 |
| A14a2R80 | 321－0924－07 |  | RES，FXD，FILM：40K OHm，0．1\％，0．125M，TC＝T9 | 19701 | 5033RE40X00日 |
| A14A2R81 | 321－1296－07 |  | RES，FXD，FILH：12．0K OHM ，0．1\％，0．125\％，TC＝T9 | 19701 | 5033RE12K008 |
| A14A2R82 | 315－0912－00 |  | RES，FXD，FILH：9．1K OHM，5\％，0．25M | 57668 | NTR25J－E09K1 |
| A14A2R83 | 315－0102－00 |  | RES，FXD，FILM：1K OHM ，5\％， 0.25 H | 57668 | NTR25JE01K0 |
| A14A2RE7 | 315－0123－00 |  | RES，FXD，FILM：12K OHM，5K， 0.25 H | 57668 | NTR25J－E12KO |
| A14A2R88 | 315－0302－00 |  | RES ，FXO，FILM：3K OHK ，5\％，0．25M | 57668 | NTR25，E03K0 |
| A14A2R93 | 315－0201－00 |  | RES，FXD，FILH：200 0HM，5\％， 0.25 N | 57668 | NTR25J－E200E |
| A14A2R94 | 315－0393－00 |  | RES，FXD，FILM：39K OHm，5\％， D ，25m | 57668 | NTR25J－E39K0 |
| A1402R95 | 308－0804－00 |  | RES，FXO，WW： 0.025 OHM，5x， 0.5 M | 80009 | 308－0804－00 |
| $01402 \mathrm{R96}$ | 315－0151－00 |  | RES ，FXO，FILM： 150 OHM ，5\％，0．25M | 57668 | NTR25」－E150E |


| Component No, | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. <br> Code | Mfr, Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A14a2R97 | 315-0432-00 |  | RES, FXO, FILM:4.3K OHm, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E04K3 |
| A14A2R113 | 321-1713-07 |  | RES, FXD, FILM: 36 K OHM 0.12,0.125M, TC=T9 | 19701 | 5033RE36K008 |
| a14a2R114 | 321-0926-07 |  | RES, FXD, FILM: 4K OHM , 0.1\%, $0.125 \mathrm{~W}, \mathrm{TC}=\mathrm{T9}$ | 19701 | 5033REqK00B |
| A14a2R121 | 315-0512-00 |  | RES, FXD, FILM: 5.1 K OHM $, 5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25.J-E05K1 |
| A14A2R126 | 315-0131-00 |  | RES, FXD, FILH: 130 OHH, $57,0.25 \mathrm{H}$ | 19701 | 5043CX130R0 |
| A14A2R127 | 315-0203-00 |  | RES,FXO,FILM:20K OHM , $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-E 20K |
| A14a2R128 | 315-0203-00 |  | RES, FXD, FIL $: 20 \mathrm{~K}$ OHM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E 20K |
| A14A2R129 | 315-0101-00 |  | RES, FXD,FILM: 100 OHM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E 100E |
| A14a2R131 | 315-0362-00 |  | RES,FXD,FILM: 3.6 K OHM, $5 \%, 0.25 \mathrm{~K}$ | 19701 | 5043CX3K600J |
| A14a2R132 | 315-0151-00 |  | RES, FXD, FILM: 150 OHM , $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E150E |
| A14A2R133 | 308-0804-00 |  | RES, FXO, Wh:0.025 OHM , 5\%, 0.5 H | 80009 | 308-0804-00 |
| A14A2R134 | 308-0804-00 |  | RES, FXD, WN: 0.025 OHM , 5\%, 0.5 H | 80009 | 308-0804-00 |
| A14A2R136 | 315-0432-00 |  | RES, FXD, FILM:4.3K OHM , 5\%, 0.25 N | 57668 | NTR25J-E04K3 |
| A14A2R141 | 315-0822-00 |  | RES, FKD, FILM: 8.2 K OHM , 5K, 0.25 H | 19701 | $5043 \mathrm{Cx} 8 \times 200 \mathrm{~J}$ |
| A14A2R142 | 315-0103-00 |  | RES, FXD,FILH:10K OHM , 5\%,0.25N | 19701 | 5043C×10K00J |
| A14A2R143 | 315-0243-00 |  | RES,FXD,FILM: 24 K OHM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E24K0 |
| A14a2R144 | 315-0562-00 |  | RES, FXD, FILM: 5.6 K OHM, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E05K6 |
| A14R2R145 | 315-0221-00 |  | RES, FXO, FILM:220 OHM, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E220E |
| A14a2R148 | 308-0702-00 |  | RES, FXO, NW: 0.33 OHM, 5\% , 2W | 75042 | BMH-R3300, |
| A14A2R152 | 301-0561-00 |  | RES, FXD, FILM:560 OHM , 5\%,0.5 | 01121 | 区 85615 |
| A14A2R156 | 301-0431-00 |  | RES, FXD, FILA:430 OHM , 5K, 0.5 K | 19701 | 5053CX430R0J |
| D1402U15 | 156-0067-12 |  | MICROCKT ,LINEAR:OPERATIONAL AMPLIFIER | 01295 | UA741CJG |
| A1402U45 | 155-0067-12 |  | HICROCKT, LINEAR:OPERATIONAL AMPLIFIER | 01295 | va741CJG |
| A14A2U64 | 156-0158-03 |  | MICROCKT, LINEAR:DUAL OPNL AMPL,CHK | 80009 | 156-0158-03 |
| A14a2u84 | 156-0158-03 |  | MICROCKT, LINEAR:DUAL OPNL AMPL,CHK | 80009 | 156-0158-03 |
| A14A2U114 | 156-0158-03 |  | HICROCKT, LINEAR: DUAL OPNL AMPL, CHK | 80009 | 156-0158-03 |
| A14A2VR10 | 152-0217-00 |  | SEMICOND OVC, DI: 2 EN, SI 8. $2 \mathrm{~V}, 5 \mathrm{5} \mathrm{\%}, 0.4 \mathrm{M}, 00-7$ | 04713 | 52020 |
| A14A2VR12 | 152-0212-00 |  | SEAICOND DVC, DI:ZEN, SI, 9V,5x,0.54, DO-7 | 04713 | 5750646RL |
| a14a2VR17 | 152-0283-00 |  | SEIICOND DVC, DI: $2 E N, S I, 43 V, 5 \chi, 0.4 N, D-07$ | 04713 | S214257KRL |
| A14A2VR32 | 152-0281-00 |  | SEIICOND OVC, DI: $2 \mathrm{EN}, 51,22 \mathrm{~V}, 5 \mathrm{z}, 0.4 \mathrm{~N}, 00-7$ | 12954 | 1N9698/D0-35 |
| A14azVR36 | 152-0281-00 |  | SEMICOND OVC, DI:ZEN, SI, 22V, 5\%, 0.4N, 00-7 | 12954 | 1N9698/00-35 |
| A14azVR47 | 152-0283-00 |  | SEMICOND OVC, DI: $2 \mathrm{~N}, 51,43 \mathrm{~V}, 5 \mathrm{~K}, 0.4 \mathrm{~N}, 0-07$ | 04713 | S214257KRL |
| A14a2VR152 | 152-0175-01 |  | SEAICOND DVC,DI:LEN, $51,5.6 \mathrm{~V}, 5 \mathrm{~L}, 0.4 \mathrm{M}, 00-7$ | 04713 | SZG5021RL |
| A14R2VR156 | 152-0175-01 |  | SEMICOND DVC, DI: $2 \mathrm{~N}, 5 \mathrm{SI}, 5.6 \mathrm{~V}, 5 \mathrm{Z}, 0.4 \mathrm{~N}, 00-7$ | 04713 | SZ65021RL |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | MFr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A14a3 | 670-6259-02 |  | CIRCUIT BO ASSY:INVERTER | 80009 | 670-6259-02 |
| A1403C5 | 119-1168-00 |  | CAPACITOR-RES: $0.10 \mathrm{~F}, 20 \%$ \& 22 OHM, 10\%, 250VAC | 14752 | RG1782-1 |
| 014 D3C 16 | 290-0628-00 |  | CAP , FXO, ELCTLT:950UF , +50-10\% , 200V | 56289 | 3607560 |
| -1403C17 | 290-0628-00 |  | CAP, FXO, ELCTLT:950UF ,+50-10\%, 200V | 56289 | 3607560 |
| А14ДЗС 19 | 283-0057-00 |  | CAP, FXO, CER DI:0.1UF, +80-20\%, 200V | 04222 | SR306E104IAA |
| 21403C27 | 283-0351-00 |  | CAP, FXO,CER DI:5000PF, 20\%, 3000V | 51406 | DHR1725U502M3KV |
| A14A3C28 | 283-0351-00 |  | CAP ,FXD, CER 01:5000PF,20\%,3000V | 51406 | OHR1725U502M3KV |
| А14АЗС29 | 285-0939-00 |  | CAP, FXO, PLASTIC: 3UF , 5\%, 400V | 04099 | TEK13-17 |
| А1403C31 | 290-0891-00 |  | CAP .FXO, ELCTLT: 1UF, +75-10\%,50V | 55680 | ULATHO10TEA |
| А1403C35 | 283-0060-00 |  | CAP, FXD, CER OI:100PF, 5\%,200V | 59660 | 855-535U2J101J |
| А14АЗС36 | 283-0280-00 |  | CAP, FXD, CER DI:2200PF, 10\% ,2000V | 60705 | 564CBA202EH222 |
|  | 283-0279-00 |  | CAP , FXO, CER DI:0.001UF , 202,3000V | 51405 | DHR12Y5S102M3KV |
| 01403C39 | 290-0891-00 |  | CAP, FXO, ELCTLT: 1UF, +75-10\%, 50V | 55680 | ULSTHOTOTEA |
| A1403C42 | 283-0079-00 |  | CAP, FXD, CER O1:0.01UF, 20\%, 250V | 04222 | SR503C103MAA |
| а14азс43 | 290-0767-00 |  | CAP, FXO, ELCTLT:4.7UF, +75-10\%, 160VOC | 54473 | ECEA2C54R7 |
| а14 3 CR15 | 152-0750-00 |  | SEMICOND DVC, OI:RECT BROG, 600V,3a, FAST RCVY | 05828 | RKBPC606-12 |
| А14 ${ }^{\text {a }}$ CR32 | 152-0107-00 |  | SEAICOND DVC, DI:RECT, SI, $400 \mathrm{~V}, 400 \mathrm{MA}, \mathrm{A1}$ | 12969 | "6727" |
| A1403CR33 | 152-0400-00 |  | SEMICONO DVC, OI:RECT, SI, 400V, 1a | 04713 | SR1977K |
| A14a3cr3a | 152-0400-00 |  | SEAICOND OVC, DI:RECT, SI, 400V, 1A | 04713 | SR1977K |
| A14a3CR36 | 152-0061-00 |  | SEMICOND DVC, DI: SK, SI, 175V,0.1A, 00-35 | 07263 | FOH2161 |
| А1403CR37 | 152-0061-00 |  | SEMICOND OVC,0I:SH,SI, 175V,0.1日,00-35 | 07263 | FDH2161 |
| А14а3CR38 | 152-0107-00 |  | SEAICOND DVC, $01:$ RECT, SI, $400 \mathrm{~V}, 400 \mathrm{MA,41}$ | 12969 | "G727" |
| A1403CR39 | 152-0400-00 |  | SEMICOND DVC, DI:RECT, 51.400 V , 1 A | 04713 | SR1977K |
| A1403CR40 | 152-0107-00 |  | SEMICOND DVC, $01:$ RECT, SI, $400 \mathrm{~V}, 400 \mathrm{MA,A1}$ | 12969 | "G727" |
| Д1493CR41 | 152-0400-00 |  | SEMICOND DVC, DI:RECT, $51,400 \mathrm{~V}, 1 \mathrm{~A}$ | 04713 | SR1977K |
| А14A3CR45 | 152-0061-00 |  | SEMICOND DVC, DI:SK, $51,175 \mathrm{~V}, 0.14,00-35$ | 07263 | FDH2161 |
| А1493CR46 | 152-0581-00 |  | SEMICOND DVC, DI:RECT, SI, 20V,14, 559 | 04713 | 9N5817 |
| A14A3CR49 | 152-0107-00 |  | SEIICOND OVC, DI:RECT, $51,400 \mathrm{~V}, 400 \mathrm{MA}, \mathrm{A1}$ | 12969 | "G727" |
| A14a30S19 | 150-0035-00 |  | LAMP, GLOM:9OV MAX, O. 3 MA, AIO-T, MIRE LO | TK0213 | JH005/3011JA |
| a1403E8 | 119-0181-00 |  | arSR,ELEC SURGE:230,GAS FILLED | 25088 | 81-A230 |
| Q14a3E13 | 119-0181-00 |  | ARSR,ELEC SURGE:230,GAS FILLED | 25088 | 81-R230 |
| 21403L24 | 108-0681-00 |  | COIL,RF:FIXED,140UH | 80009 | 108-0681-00 |
| A1493030 | 151-0508-00 |  | TRANSISTOR:UJT, SI, TO-98 | 03508 | $\times 137520$ |
| А1403034 | 151-0632-00 |  | TRANSISTOR: NPN, SILICON, TO-220 | 04713 | SJE1946 |
| 01493040 | 151-0632-00 |  | TRANSISTOR:NPN, SILICON, T0-220 | 04713 | SJE1946 |
| 01403043 | 151-0347-00 |  | TRONSISTOR:NPN, SI, T0-92 | 04713 | SP57951 |
| 01403045 | 151-0350-00 |  | TRANSISTOR:PNP, SI, TO-92 | 04713 | SPS6700 |
| А1403846 | 151-0260-00 |  | TRANSISTOR:NPN, SI, T0-39 | 04713 | ST1083 |
| A14A3Rg | 304-0473-00 |  | RES, FXD, CMPSN: 47 K OHM, 10\%, 11 | 01121 | 684731 |
| A14A3R10 | 303-0184-00 |  | RES, FXD, CMPSN: 180 K OHM, $5 \%$, 1 W | 01121 | G81845 |
| A14A3R13 | 304-0473-00 |  | RES, FXO, CMPSN: 47 K OHM, $10 \%$, iN | 01121 | G84731 |
| A14A3R19 | 302-0565-00 |  | RES, FXD, CMPSN:5.6M OHW, 10\%, 0.5M | 01121 | E85651 |
| 014A3R21 | 304-0154-00 |  | RES , FXD, CMPSN: 150K OHM, 10\%, 1\% | 01121 | GB 1541 |
| A1403R25 | 315-0471-00 |  | RES, FXO, FILM:470 OHM , 5K, 0.254 | 57668 | NTR25J-E470E |
| A14A3R31 | 303-0100-00 |  | RES, FXD, CMPSN: 10 OHM, 5X, 1N | 01121 | CB1005 |
| А14A3R32 | 315-0220-00 |  | RES, FXD, FILM: 22 OHW, $57,0.25 \mathrm{~K}$ | 19701 | 5043CX22R00J |
| А14дзвзб | 315-0103-00 |  | RES, FXD, FIUM: 10 K OHM, $5 \mathbf{X}, 0,25 \mathrm{H}$ | 19701 | 5043CX10k00J |
| А1403837 | 301-0200-00 |  | RES, FXO, FILM: 20 OHM, $5 \%, 0.5 \mathrm{H}$ | 19701 | 5053CX20R00. |
| A1403R38 | 315-0332-00 |  | RES, FXD, FILM: 3.3 K OHM, 5\%,0.25M | 57668 | NTR25J-E03k3 |
| A14A3R39 | 301-0200-00 |  | RES, FXD, FIUM: 20 OHM, 5K, 0.5 M | 19701 | 5053CX20R00J |
| A14A3R40 | 315-0220-00 |  | RES, FXD, FIUM:22 OHM , $57,0.25 \mathrm{M}$ | 19701 | 5043CX22R00J |
| А1403R41 | 315-0753-00 |  | RES, FXD, FIU $: 75 \mathrm{~K}$ OHM , $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E75K0 |
| Д14A3R42 | 315-0303-00 |  | RES, FXO,FILM: 30 K OHM $5 \mathrm{5K}, 0.25 \mathrm{~W}$ | 19701 | 5043CX30k00J |
| Д14A3R43 | 315-0274-00 |  | RES, FXD, FILM:270K OHW, $5 \%, 0.254$ | 57668 | NTR25J-E270K |
| A1403R44 | 315-0270-00 |  | RES , FXD, FILM: 27 OHM, $5 \%, 0.25 \mathrm{~N}$ | 19701 | 5043C×27R00J |
| a1403R45 | 315-0182-00 |  | RES, FXD, FILM: 1.8 K OHM, $5 \mathrm{~L}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E1K8 |
| A14A3R46 | 315-0123-00 |  | RES, FXD,FILM: 12 K OHM, $5 \%, 0.25 \mathrm{M}$ | 57668 | NTR25J-E12K0 |
| А1403R47 | 301-0184-00 |  | RES, FXD, FILM: 180 K OHM, $5 \chi, 0.5 \mathrm{H}$ | 57668 | TR50J-E180K |
| A1403RT9 | 307-0353-00 |  | RES, THERMAL: 5 OHM, 10\% | 80009 | 307-0353-00 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mrr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A14a3RT13 | 307-0353-00 |  | RES , THERMAL: 5 OHM, 10\% | 80009 | 307-0353-00 |
| A1403S12 | 260-1300-00 |  | SWITCH, SLIDE:OPDT, 3a, 125VAC | 82389 | 46206LFE |
| А14A3T8 | 120-0636-00 |  | XFMR, PWR, STPDN: LINE TRIGGER | 80009 | 120-0638-00 |
| А14А3T25 | 120-0743-00 |  | XFMR, TOROID: | 80009 | 120-0743-00 |
| A1403T30 | 120-0744-00 |  | XFMR, TOROID: 5 WINDINGS | 80009 | 120-0744-00 |
| А1403T35 | 120-0747-00 |  | XFMR, TOROID: | 80009 | 120-0747-00 |
| A14a3VR38 | 152-0241-00 |  | SEMICOND DVC, DI: $12 \mathrm{~N}, 5 \mathrm{SI}, 33 \mathrm{~V}, 5 \%, 0,4 \mathrm{~W}, \mathrm{DO}-7$ | 14552 | 1N973B |
| A14a3VR45 | 152-0428-00 |  | SEMICONO DVC, DI:IEN, SI, 120V, $5 \%, 0.4 \mathrm{~W}, 00-7$ | 04713 | S213202 (1N9878) |
| A14R3W5 | 131-0566-00 |  | BUS , COND: DUMMY RES , $0.09400 \times 0.225 \mathrm{~L}$ | 24546 | 0 MA 07 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A17 | 670-9175-00 |  | CIRCUIT BD ASSY:INTENSITY CONTROL | 80009 | 670-9175-00 |
| Q17R1101 | 311-2324-00 |  | RES,VAR,NONWH:PNL,5K OHM/50K OHM,10\%, 0.25 N | 12697 | CM45214 |
| Q17R1201 | 311-2323-00 |  | RES,VAR,NONHW:5K OHM, 102,0.25K,N/PUSH MOM SH | 12697 | CM45215 |
| A17R1301 | 315-0472-00 |  | RES, FXD, FILM:4.7K OHM , 5\%, 0.25 W | 57668 | NTR25J-E04K7 |
| A17R1302 | 315-0472-00 |  | RES, FXD, FILM: 4.7 K OHM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E04K7 |
| A17R1303 | 311-2325-00 |  | RES, VAR, NONWW: 10 K OHM, $10 \%, 0.25 \mathrm{~W}$ | 12697 | CH45213 |
| Q17R1401 | 311-1339-00 |  | RES , VAR , NONWW: TRMR, 5 K OHM, 0.5 W | 02111 | 43P5027672 |
| A17R1402 | 311-2326-00 |  | RES, VAR , NONWW: 10K OHM, 10\%, 0.25 | 12697 | CM45212 |
| A17S1201 | ----------- |  | (PART OF A17R1201) |  |  |
| -1751303 | -- |  | (PART OF 91PR4303) |  |  |

Tektronix Serial/Assembly No. Component No. Part No, Effective Dscont A18

119-0757-00 Name \& Description
deLay Line, elec:65NS, 100 ohms
Mfr.
,
Code Mir. Part No.
80009 119-0757-00

1ektronix Serial/Assembly No Component No. Part No. EHective Dscont A 19

Mfr.

| Component No, | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr Code | Mir. Part No. - |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 01901 | ----- ---- |  | CIRCUIT BD ASSY:VERT AMP <br> (NOT AVAILABLE,ORDER A19) |  |  |
| A19A1C100 | 281-0775-00 |  | CAP, FXD,CER DI:0.1UF,20\%,50V | 04222 | MA205E104MAA |
| A19A1C120 | 285-0683-00 |  | CAP, FXO, PLASTIC:0.022UF , 5\%, 100 V | 19396 | 223J01PT485 |
| A19A1C130 | 285-0686-00 |  | CAP , FXD , PLASTIC:0.068UF , 10\%, 100V | 19396 | 683K01PT605 |
| A19A1C145 | 283-0178-00 |  | CAP, FXD, CER DI:0.1UF, +80-20\%, 100V | 05397 | C330C104 Z1U1CA |
| A19A1C200 | 281-0158-00 |  | CAP, VAR, CER DI:7-45PF,25V | 59660 | 518-006 G 7-45 |
| A19A1C201 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF.20\%,50V | 04222 | MA205E104MAR |
| A19A1C202 | 283-0315-00 |  | CAP,FXD,CER DI:470PF, 10\%, 100 V | 04222 | 10051a471KA2065 |
| A19a1C203 | 283-0314-00 |  | CAP, FXO, CER DI:100PF,10\%,100V | 04222 | 08051A101Kロ2075 |
| A19A1C204 | 283-0407-00 |  | CAP, FXD, CER DI:27PF,5\%,50V | 04222 | ULA105A270J8 |
| A19A1C215 | 281-0151-00 |  | CAP, VAR, CER DI:1-3PF, 100V | 59660 | 518000 A 1.03 |
| A19A1C220 | 283-0315-00 |  | CAP,FXD,CER DI:470PF, 10\%,100V | 04222 | $100514471 \mathrm{KA2065}$ |
| 41901C221 | 283-0314-00 |  | CAP,FXO,CER DI:100PF,10\%,100V | 04222 | $080510101 \mathrm{~K} \mathbf{2}^{2075}$ |
| A19A1C223 | 283-0407-00 |  | CAP, FXD, CER DI:27PF,5\%,50V | 04222 | ULA1050270J8 |
| A19A1C240 | 290-0776-00 |  | CAP, FXD, ELCTLT:22UF, +50-10\%, 10V | 55680 | ULA1A220TEA |
| A1901C241 | 285-0643-00 |  | CAP, FXD, PLASTIC:0.0047UF,5\%,100V | 56289 | 192P47252R468 |
| A19A1C245 | 290-0745-00 |  | CAP, FXD, ELCTLT:22UF, $50-10 \%, 25 V$ | 54473 | ECE-A25V22L |
| A1901C246 | 290-0745-00 |  | CAP, FXD, ELCTLT: 22UF, +50-10\%,25V | 54473 | ECE-A25V22L |
| A1901C333 | 283-0649-00 |  | CAP, FXO,MICD DI:105PF, 1\%, 300V | 00853 | D155F1050FO |
| -19A1C334 | 281-0810-00 |  | CAP, FXO, CER DI:5.6PF, $+1-0.5 \mathrm{PF}$, 100 V | 04222 | MD10145R600A |
| A19A1C340 | 283-0668-00 |  | CAP,FXD,MICA DI:890PF,2\%,100V | 00853 | D151F891G0 |
| A19A1C341 | 281-0775-00 |  | CAP,FXD,CER DI:0.1UF,20\%,50V | 04222 | MA205E104MAA |
| A19A1C400 | 283-0256-00 |  | CAP,FXD,CER DI:130PF,5\%,100V | 51642 | 200100N1500131J |
| A1901C401 | 281-0158-00 |  | CAP, VAR,CER DI:7-45PF,25V | 59660 | 518-006 G 7-45 |
| A1901C530 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF,202,50V | 04222 | MA205E104MAA |
| A1901C605 | 290-0782-00 |  | CAP , FXD.ELCTLT:4.7UF,+75-10\%,35VOC | 55680 | ULAYV4R7TEA |
| A19A1C630 | 281-0771-00 |  | CAP, FXD, CER DI: 2200PF, 220\%,200V | 04222 | MQ106E222MAD |
| A19A1C640 | 281-0814-00 |  | CAP, FXD,CER DI:100 PF, 10\%,100V | 04222 | MA101A101KAD |
| A19A1C700 | 281-0775-00 |  | CAP, FXD, CER DI:0.1UF,20\%,59V | 04222 | MA205E104MAA |
| A19A1C712 | 281-0773-00 |  | CAP, FXD, CER DI:0.01UF,10\%,100V | 04222 | MA201C103KAA |
| A1901C742 | 281-0812-00 |  | CAP, FXD, CER DI:1000PF, 10\%, 100V | 04222 | Ma101C102Kan |
| A19A1CR333 | 152-0322-00 |  | SEMICOND OVC, DI: SCHOTTKY BARRIER,SI, 15V | 50434 | 5082-2672 |
| A19A1CR334 | 152-0322-00 |  | SEAICOND DVC,DI:SCHOTTKY BARRIER,SI,15V | 50434 | 5082-2672 |
| A19A1CR544 | 152-0141-02 |  | SEIICOND DVC, DI: SK, SI , 30V, 150MA, 30V, 00-35 | 03508 | Da2527 ( 1 N4152) |
| A19A1CR641 | 152-0141-02 |  | SEIICOND DVC, DI: $5 \mathrm{H}, 51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | 042527 (1N4152) |
| A1991L100 | 114-0220-00 |  | COIL, RF: VARIABLE, 1-3UH | 80009 | 114-0220-00 |
| A19A1L135 | 108-0538-00 |  | COIL,RF:FIXED, 2.7UH | 76493 | JWHMB7059 |
| A1901L140 | 108-0538-00 |  | COIL,RF:FIXE, 2.7UH | 76493 | JWMB7059 |
| ه4901L141 | 108-0538-00 |  | COIL,RF:FIXED,2.7UH | 76493 | JWM ${ }^{\text {J }}$ 37059 |
| A19A1L200 | 108-0733-00 |  | COIL,RF:FIXED,113NH | 80009 | 108-0733-00 |
| A19A1L201 | 108-0311-00 |  | COIL,RF:FIXED,153NH | 80009 | 108-0311-00 |
| A19A1L220 | 108-0733-00 |  | COIL,RF: FIXED,113NH | 80009 | 108-0733-00 |
| A19a1L221 | 108-0311-00 |  | COIL, RF: FIXED, 153NH | 80009 | 108-0311-00 |
| A19A1LR530 | 108-0543-00 |  | COIL,RF:FIXED,1.1UH | 80009 | 108-0543-00 |
| A19A10303 | 151-0302-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04743 | 51899 |
| Q19A10400 | 151-0302-00 |  | TRANSISTOR:NPN, 51, T0-18 | 04713 | ST899 |
| A19A10430 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SPS8801 |
| A19A10431 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SPS8801 |
| A19A10435 | 151-0216-00 |  | TRAASISTOR: PNP, SI, T0-92 | 04713 | SPS8803 |
| A19010530 | 151-0216-00 |  | TRANSISTOR: PNP, SI, T0-92 | 04713 | SPS8803 |
| -19410540 | 151-0301-00 |  | TRANSISTOR: PNP, SI, T0-18 | 04713 | ST898 |
| A19A10541 | 151-0302-00 |  | TRANSISTOR:NPN,SI, T0-18 | 04713 | 51899 |
| A19A10630 | 151-0221-00 |  | TRANSISTOR:PNP, SI, 10-92 | 80009 | 151-0221-00 |
| A19910631 | 151-0367-00 |  | TRANSISTOR:NPN, S1, X-55 | 04713 | SPS 8811 |
| A19A10720 | 151-0390-00 |  | TRANSISTOR:NPN, SI , X-81 | 04713 | SPS34140RMPSU45 |
| A19A10722 | 151-0126-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | ST1046 |
| 019014740 | 151-1021-00 |  | TRANSISTOR: FET, N-CHAN, SI , T0-18 | 00009 | 151-1021-00 |
| A1901R130 | 311-1230-00 |  | RES , YAR, NOMN: TRMR, 20K OKN, 0.5 M | 32997 | 3386F-T04-203 |


| Component No． | Tektronix Part No． | Serial／Assembly No． Effective Dscont | Name \＆Description | Mfr． Code | Mfr，Part No． |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A19A1R131 | 311－1214－00 |  | RES，VAR ，NONMM：TRMR，200K OHM ， 0.5 K | 32997 | 3386F－T04－204 |
| A1901R132 | 311－1214－00 |  | RES，VAR，NONHM：TRMR，200K OHM， 0.5 K | 32997 | 3386F－T04－204 |
| A19A1R201 | 315－0101－00 |  | RES ，FXD，FILM： 100 OHM ，5\％，0．25M | 57668 | NTR25，${ }^{\text {－E }}$ 100E |
| A19A1R205 | 322－0133－00 |  | RES，FXD，FILM：237 ОНM，1\％，0．254，TC＝T0 | 75042 | CEPTO－2370F |
| A1901R206 | 321－0331－00 |  | RES，FXO，FIUM：27．4K OHM，1\％，0．125W，TC＝TO | 19704 | 5043ED27K40F |
| ［1901R207 | 321－0171－00 |  | RES ，FXD，FILM：590 OHM ，1\％，0．125N，TC＝$=$ | 19701 | 5033 ED 590 RO |
| A19A1R208 | 317－0047－00 |  | RES ，FXD，CMPSN：4．7 OHM ，5\％，0．125H | 01121 | 884765 |
| Q1901R209 | 317－0100－00 |  | RES ，FXD，CMPSN：10 0HM，5\％，0．125 | 01121 | B81005 |
| 01901R210 | 317－0150－00 |  | RES ，FXD，CMPSN： 15 OHM，5\％，0．125M | 01121 | BB1505 |
| Q19a1R211 | 311－1757－00 |  | RES，VAR，NONNM：2．5K OHM 10\％，．5K LIN，CERMET | 73138 | 82PR2．5K－124B |
| A19A1R212 | 321－0172－00 |  | RES ，FXO，FILM：604 OHM ，1\％， $0.125 \mathrm{M}, \mathrm{TC}=$ TO | 19701 | 5033E0604ROF |
| A1901R213 | 321－0179－00 |  | RES，FXD，FILM：715 OHM，1\％，0．125N，TC＝T0 | 07716 | CEAD715ROF |
| A19A1R214 | 315－0181－00 |  | RES ，FXD，FILM： 180 OHM ，5\％，0．25M | 57668 | NTR25J－E180E |
| A1901R215 | 311－0978－00 |  | RES，VAR，NONNH：TRMR， 250 OHM ，0．5M | 73138 | 82－4－2 |
| A1901R220 | 321－0171－00 |  | RES，FXD，FILM：590 OHM，17，0．125M，TC＝TO | 19701 | 5033ED590ROF |
| A19A1R221 | 317－0047－00 |  | RES，FXD，CMPSN： 4.7 DHM ，5\％，0．125 H | 01129 | 884765 |
| A19A1R222 | 317－0100－00 |  | RES，FXD，CMPSN： 10 OHM，5\％，0．125N | 01121 | 881005 |
| D19A1R223 | 317－0150－00 |  | RES，FXD，CMPSN： 15 OHM ，5\％，0．125K | 01121 | 8日1505 |
| A19a1R230 | 321－0365－00 |  | RES，FXD，FIL ：61．9K OHM，1\％，0．125M，TC＝T0 | 07716 | CEA061901F |
| A1901R231 | 321－0361－00 |  | RES，FXD，FILM：56．2K OHM，1\％，0．125M，TC＝TO | 07716 | CEAD56201F |
| A19A1R232 | 321－0402－00 |  | RES，FXD，FILM：150K OHM，1\％，0．125 ，TC＝TO | 19701 | 5033ED150K0F |
| A19A1R233 | 321－0435－00 |  | RES，FXD，FILM：332K OHM，4X，0．125M，TC＝T0 | 07716 | CEAD33202F |
| A19A1R234 | 321－0357－00 |  | RES，FXO，FILH：51．1K OHM，1\％，0．125 ，TC＝TO | 07716 | CEAD51101F |
| A1901R235 | 321－0357－00 |  | RES ，FXD，FIUM：51．1K OHM，1\％，0．125N，TC $=$ TO | 07716 | CEAD51101F |
| A1901R236 | 321－0357－00 |  | RES ，FXD，FILM：51．1K OHM ，1\％，0．125M，TC＝ 0 | 07716 | CEAD51104F |
| A19A1R237 | 311－1214－00 |  | RES，VAR，NONHM：TRAR，200K OHM ，O．5M | 32997 | 3386F－T04－204 |
| A19A1R238 | 311－1214－00 |  | RES，VAR，NONHW：TRMR，200K OHM，O．5M | 32997 | 3386F－T04－204 |
| A1901R300 | 322－0133－00 |  | RES ，FXO，FILH：237 OHM，47， $0.25 \mathrm{~N}, \mathrm{TC}=70$ | 75042 | CEBT0－2370F |
| A19A1R304 | 317－0100－00 |  | RES，FXD，CMPSN： 10 OHM ，5\％， 0.125 H | 01121 | $8 \mathrm{B1005}$ |
| A19A1R310 | 321－0164－00 |  | RES ，FXD ，FILM：499 0HM，1\％，0．125,$~ T C=T 0$ | 19701 | 5033E0499R0F |
| 01901R311 | 321－0239－00 |  | RES ，FXD，FILM： 3.01 K OHM，1\％，0．125M，TC＝TO | 19701 | 5043ED3K010F |
| a1901R312 | 323－0115－00 |  | RES ，FXD，FILM：154 0 H ，1\％，0．5M，TC＝TO | 91637 | MFF1226G154ROF |
| Q19A1R320 | 321－0164－00 |  | RES ，FXD，FILM：499 OHM，12，0．125M，TC＝TO | 19701 | 5033ED499R0F |
| A1981R321 | 321－0193－00 |  | RES ，FXD，FI M ：1K OHM，1\％，0．125H，TC＝T0 | 19701 | 5033E01K00F |
| A1901R330 | 321－0354－00 |  | RES，FXD，FILM：47．5K OHM，1\％，0．125N，TC＝TO | 19701 | 5043ED47K50F |
| A1901R331 | 321－0342－00 |  | RES ，FXO，FIL 35.7 K OHM，1\％， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 07716 | CEAD35701F |
| A19A1R332 | 321－0357－00 |  | RES ，FXO，FILM：51．${ }^{\text {IK }}$ OHN，1\％， $0.125 \mathrm{M}, \mathrm{TC}=$ TO | 07716 | CEAD51101F |
| －1901R333 | 321－0339－00 |  | RES ，FXD，FILM：33．2K OHM，1\％，0．125 ，TC＝T0 | 07716 | CEAD33201F |
| －1901R334 | 321－0239－00 |  | RES ，FXD，FILM：3．01K OHM，1\％，0．125N，TC＝TO | 19701 | 5043E03K010F |
| A1901R335 | 311－1214－00 |  | RES，VAR ，NONW ：TRMR，200K OHM ，0．5N | 32997 | 3386F－T04－204 |
| A19A1R336 | 321－0193－00 |  | RES，FXO，FILM： 1 K OHM，12，0． $125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033E1KK00F |
| A19A1R400 | 324－0123－00 |  | RES ，FXD，FILM： 187 OHM，1\％，0．125\％，TC＝TO | 07716 | CEAD187R0F |
| A1901R404 | 311－1266－00 |  | RES ，VAR ，NONMM：TRMR，2．5K OHM ，0．5M | 32997 | 3329P－L58－252 |
| －1901R405 | 311－0978－00 |  | RES，VAR，NONWH：TRMR， 250 OHM， 0.5 H | 73138 | 82－4－2 |
| A19A1R406 | 317－0100－00 |  | RES，FXD，CMPSN： 10 OHM，57，0．125 | 01121 | B81005 |
| A1901R407 | 317－0100－00 |  | RES，FXD，CMPSN： 10 DHM，5\％， 0.125 H | 01121 | B81005 |
| A19A1R408 | 317－0100－00 |  | RES，FXO，CMPSN： 10 DHW， $5 \%, 0.1254$ | 01121 | B81005 |
| A1901R430 | 321－0233－00 |  | RES，FXO，FILM：2．61K OHM ， $1 \mathrm{~K}, 0.125 \mathrm{M}, \mathrm{TC}=$ TO | 07716 | CEAD26100F |
| A1901R431 | 323－0141－00 |  | RES，FXD，FILM： 287 OHN，1\％，0．5N，TC＝$=10$ | 24546 | NA650 2870F |
| A19ロ4R432 | 321－0189－00 |  | RES，FXD，FILM：909 OHN，12，0．125M，TC＝T2 | 19701 | 5033E0909ROF |
| A1901R433 | 321－0208－00 |  | RES，FXD，FILM： 1.43 K OHM ，12， $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033ED1K43F |
| A1991R434 | 321－0208－00 |  | RES，FXO，FILM：1．43K OHW，12， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5033ED1K43F |
| A19A12435 | 321－0184－00 |  | RES，FXD，FIUM：806 0HM，1\％， $0.125 \mathrm{~m}, \mathrm{TC}=$ T0 | 19701 | 5033ED806ROF |
| A1901R437 | 321－0233－00 |  | RES，FXO，FILM：2．61K OHM，12， $0.125 \mathrm{~K}, \mathrm{TC}=$ TO | 07716 | CEAO26100F |
| A1901R438 | 321－0172－00 |  | RES，FXO，FILM： 604 OHN，1\％， $0.125 \mathrm{M}, \mathrm{TC}=10$ | 19701 | 5033E604ROF |
| A19A1R439 | 321－0114－00 |  | RES，FXD，FIL H ： 150 OHW，1\％，0．125 K，TC $=$ TO | 19701 | 5033ED150ROF |
| D1901R500 | 322－0147－00 |  | RES，FXD，FILM：332 OHM，17，0．254，IC＝T0 | 24546 | Na6003320F |
| A1901R501 | 322－0147－00 |  | RES ，FXD，FILM： 332 OHM，17， $0.25 \mathrm{M}, \mathrm{TC}=$ T0 | 24546 | Na60D3320F |
| A19日1R502 | 315－0122－00 |  | RES，FXD，FILM：1．2K OHM，5\％，0．25 | 57668 | NTR25，－E01K2 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name 8 D | escription |  | Mfr. Code | Mfr. | Part | No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| -19016410 | 131-0566-00 |  | BUS, COND: OUMMY | RES,0.094 | $00 \times 0.225 L$ | 24546 | 0 Ma | 07 |  |
| A1901W420 | 131-0566-00 |  | BUS,COND: DUMMY | RES ,0.094 | $00 \times 0.225 \mathrm{~L}$ | 24546 | 0 MA | 07 |  |
| A19a1W421 | 131-0566-1]0 |  | BUS,COND: DUMMY | RES,0.094 | $00 \times 0.225 \mathrm{~L}$ | 24546 | OMA | 07 |  |
| -1901W510 | 131-0566-00 |  | 8US,COND: DUMMY | RES,0.094 | $00 \times 0.225 \mathrm{~L}$ | 24546 | OMA | 07 |  |
| -19016530 | 131-0566-00 |  | BUS,COND: DUMHY | RES,0.094 | OD X 0.225L | 24546 | OMA | 07 |  |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. <br> Code | Mfr. Part No.- |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A1902 | 670-8046-00 |  | CIRCUIT BO ASSY:FLEX CON (NO ELECTRICAL PARTS) | 80009 | 670-8048-00 |


| Component No． | Tektronix Part No． | Serial／Assembly No． Effective Dscont | Name \＆Description | Mfr． Code | Mfr，Part No． |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A20 | 670－9172－00 |  | CIRCUIT BD ASSY：HORIZ AMP | 80009 | 670－9172－00 |
| A20C1 | 281－0158－00 |  | CAP，VAR，CER DI：7－45PF，25V | 59660 | 518－006 G 7－45 |
| a20c3 | 281－0788－00 |  | CAP，FXD，CER DI：470PF，10\％，100V | 04222 | MA101C471KAA |
| az0C4 | 281－0775－00 |  | CAP，FXD，CER DI： 0.1 UF，20\％， 50 V | 04222 | MA205E104MAA |
| azocs | 281－0158－00 |  | CAP，VAR，CER DI：7－45PF，25V | 59660 | 518－006 G 7－45 |
| azacs | 283－0005－02 |  | CAP，FXD，CER DI：0．01UF，＋80\％－20\％，250V | 54583 | FK2625U201032－T |
| －20C7 | 281－0788－00 |  | CAP，FXD，CER DI：470PF，10\％，100V | 04222 | Ma101C471KAA |
| 920C8 | 281－0812－00 |  | CAP，FXD，CER DI： 1000 PF ，10\％，100V | 04222 | MA101C102K日a |
| a20C13 | 283－0185－00 |  | CAP ，FXD，CER DI：2．5PF ， $0.5 \%$ ，50V | 51642 | 100－050－NPO－259B |
| A20C14 | 281－0077－00 |  | CAP ，VAR，AIR DI：1．3－5．4PF，350V | 74970 | 189－0502－075 |
| a20C15 | 283－0028－00 |  | CAP，FXO，CER DI：0．0022UF ，20\％， 50 V | 59660 | 0805585Y550222M |
| A20C 18 | 281－0077－00 |  | CAP，VAR，AIR DI：1．3－5．4PF，350V | 74970 | 189－0502－075 |
| A20C19 | 283－0185－00 |  | CAP，FXO，CER DI：2．5PF，0．5\％，50V | 51642 | 100－050－NPO－2598 |
| A20C20 | 283－0028－00 |  | CAP，FXD，CER DI：0．0022UF，20\％，50V | 59660 | 0805585Y5S0222M |
| A20C21 | 283－0005－02 |  | CAP ，FXD，CER DI：0．01UF，＋80\％－20\％，250V | 54583 | FK2615U2D1032－T |
| a20C22 | 283－0005－02 |  | CAP ，FXD，CER DI：0．01UF，＋80\％－20\％，250V | 54583 | FK2625U201032－T |
| 020C23 | 283－0647－00 |  | CAP，FXD，MICA DI：70PF，1z，100V | 00853 | 0155E700F0 |
| A20C24 | 281－0187－00 |  | CAP ，VAR ，PLASTIC：4－40PF， 250 V | 80031 | 28100004400N02FB |
| A20C25 | 283－0005－02 |  | CAP ，FXD，CER DI：0．01UF，＋80\％－20\％，250V | 54583 | FK26754201032－T |
| A20C26 | 283－0005－02 |  | CAP，FXD，CER DI：0．01UF，＋80\％－20\％，250V | 54583 | FK2625U201032－T |
| A20C27 | 283－0005－02 |  | CAP，FXD，CER DI：0．01UF，＋802－207，250V | 54583 | FK2625U201032－T |
| A20C28 | 281－0812－00 |  | CAP，FXD，CER DI：1000PF，10\％，100V | 04222 | MA101C102KA日 |
| A20C29 | 283－0005－02 |  | CAP ，FXO，CER DI：0．01UF，＋80\％－20\％，250V | 54583 | FK2625U201032－T |
| 920C30 | 283－0005－02 |  | CAP ，FXD，CER DI：0．01UF，＋80\％－20\％，250V | 54583 | FK2615U201032－T |
| Q20C31 | 283－0005－02 |  | CAP ，FXD，CER DI：0．01UF ，＋80\％－20\％，250V | 54583 | FK2615U201032－T |
| a20C32 | 283－0005－02 |  | CAP ，FXD，CER DI：0．01uF ，＋80\％－20\％，250V | 54583 | FK2615U201032－T |
| A20C33 | 283－0348－00 |  | CAP，FXD，CER DI：0．5PF，＋／－0．1PF，100V | 51642 | M150100NP05088 |
| A20C34 | 283－0167－02 |  | CAP ，FXD，CER DI：0．1UF，10x，100V，0．2 SPACING | 54583 | FK26X5R2A104K－T |
| A20C35 | 290－0920－00 |  | CAP，FXD，ELCTLT：33UF， $500-10 \%$ ，35V | 55680 | ULB1V33OTEAANA |
| A20C36 | 290－0920－00 |  | CAP，FXO，ELCTLT：33UF，$+50-10 \%$ ，35V | 55680 | ULB1V330TEAANA |
| a20C37 | 290－0920－00 |  | CAP，FXO，ELCTLT：33UF， $\mathbf{5 0 - 1 0 \% , 3 5 V}$ | 55680 | ulbivizoterana |
| A20C38 | 281－0812－00 |  | CAP，FKO，CER DI：1000PF，10\％，100V | 04222 | Ma101C102KAA |
| A20C40 | 281－0792－00 |  | CAP，FXD，CER DI：82PF，10\％，100V | 04222 | MA101a820KA日 |
| A20C41 | 283－0348－00 |  | CAP，FXD，CER DI：0．5PF，$+/-0.1 \mathrm{PF}$ ，100V | 51642 | H150100NP05088 |
| －20C42 | 283－0005－02 |  | CAP，FXO，CER 01：0．01UF， $80 \%$－20\％，250V | 54583 | FK2625U201032－T |
| Q20C44 | 283－0203－00 |  | CAP，FXD，CER DI：0．47UF，20\％，50V | 04222 | SR305SC474MAA |
| A20C45 | 283－0167－02 |  | CAP，FXO，CER 0I：0．1UF，10\％，100V，0．2 SPACING | 54583 | FK26X5R2A104K－T |
| a20C46 | 283－0175－00 |  | CAP，FXD，CER DI：10PF，5\％，200V | 05397 | C312C1000265CA 8 |
| A20C60 | 283－0005－02 |  | CAP，FXD，CER DI：0．01UF，$+80 \%-20 \%, 250 \mathrm{~V}$ | 54583 | FK2625U201032－T |
| A20C62 | 283－0260－00 |  | CAP，FXD，CER DI：5．6PF，$+/-0.25 \mathrm{PF}, 200 \mathrm{~V}$ | 51642 | 150 200NP0569C |
| A20C63 | 281－0773－00 |  | CAP，FXD，CER DI：0．01UF，10\％，100V | 04222 | HA201C403KAA |
| A20C85 | 281－0811－00 |  | CAP，FXD，CER DI：10PF．102，100V | 04222 | MA101a100KAA |
| a20c31 | 281－0812－00 |  | CAP，FXO，CER 01：1000PF，10\％，100V | 04222 | Ma101C102KAA |
| A20C200 | 283－0260－00 |  | CAP，FXD，CER DI：5．6PF，＋1－0．25PF，200V | 51642 | 150 200NP0569C |
| A20C220 | 283－0348－00 |  | CAP，FXD，CER DI：0．5PF，＋／－0．1PF，100V | 51642 | M150100NP05088 |
| A20C230 | 283－0154－00 |  | CAP，FXD，CER DI： 22 PF ，5\％，50V | 04222 | 5R155A220JAA |
| A20CR1 | 152－0322－00 |  | SEMICOND DVC，OI：SCHOTTKY BARRIER，SI， 15 V | 50434 | 5082－2672 |
| A20CR2 | 152－0322－00 |  | SEMICOND DVC，DI：SCHOTTKY BARRIER，SI，15V | 50434 | 5082－2672 |
| A20CR3 | 152－0141－02 |  | SEAICOND DVC，OI：SM，SI，30V ，15014A ，30V ，D0－35 | 03508 | DA2527（ 1 N4152） |
| A20CR4 | 152－0322－00 |  | SEIICOND DVC，OI：SCHOTTKY BARRIER，SI，15V | 50434 | 5082－2672 |
| A20CR5 | 152－0322－00 |  | SEMICOND DVC，DI：SCHOTTKY BRRRIER，SI，15V | 50434 | 5082－2672 |
| A20CR6 | 152－0141－02 |  | SEMICOND DVC，DI： $5 \mathrm{M}, \mathrm{SI}, 30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, \mathrm{DO}-35$ | 03508 | DA2527（ 1 N4152） |
| A20CR？ | 152－0141－02 |  | SEMICONO DVC，OI：SM，S1，30V， $150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | Da2527（1N4152） |
| A20CR8 | 152－0141－02 |  | SEMICOND DVC，DI：SH，SI，30V，150MA，30V， $00-35$ | 03508 | 0A2527（1N4152） |
| a20CR9 | 152－0141－02 |  | SEMICOND DVC，OI：SH，SI，30V，150MA，30V，DO－35 | 03508 | DA2527（ 1 N4152） |
| A20CR10 | 152－0141－02 |  | SEMICOND DVC，OI：SM，SI ，30V，1504A，30V，00－35 | 03508 | Da2527（1N4152） |
| A20CR19 | 152－0141－02 |  | SEMICOND DVC，DI：SM，SI ，30V，150MA，30V， $00-35$ | 03508 | DA2527（ 1 N4152） |
| A20CR12 | 152－0141－02 |  | SEMICOND DVC，DI： $5 \mathrm{M}, \mathrm{SI}, 30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, \mathrm{DD}-35$ | 03508 | Da2527（1N4152） |
| A20CR14 | 152－0141－02 |  | SEIICOND DVC，DI：SH，S1，30V，150 MA，30V ，D0－35 | 03508 | Da2527（ 1 N4152） |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. <br> Code | Mfr. Part No.- |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A20L1 | 108-0578-00 |  | COIL, RF: FIXED, 45NH | 80009 | 108-0578-00 |
| 42012 | 108-0578-00 |  | COIL, RF: FIXED, 45 NH | 80009 | 108-0578-00 |
| A2014 | 108-1246-00 |  | COIL,RF:FXD,3.9UH.10\% | 54583 | SPT 0406-3R9K-6 |
| 420L5 | 108-1246-00 |  | COIL,RF: FXD, 3.9UH, 10\% | 54583 | SPT 0406-3R9K-6 |
| A20L6 | 108-1246-00 |  | COIL,RF: FXD, 3.9UH, $10 \%$ | 54583 | SPT 0406-3R9K-6 |
| A2001 | 151-0190-00 |  | TRANSISTOR:NPN, SL , T0-92 | 80009 | 151-0190-00 |
| A2002 | 151-1021-00 |  | TRANSISTOR:FET,N-CHAN,SI. TO-18 | 80009 | 151-1021-00 |
| 42003 | 151-0220-00 |  | TRANSISTOR:PNP, SI, T0-92 | 80009 | 151-0220-00 |
| A2004 | 151-0220-00 |  | TRANSISTOR:PNP, SI, T0-92 | 80009 | 151-0220-00 |
| A2005 | 151-0220-00 |  | TRANSISTOR:PNP, SI, T0-92 | 80009 | 151-0220-00 |
| A2006 | 151-0220-00 |  | TRANSISTOR:PNP.SI, T0-92 | 80009 | 151-0220-00 |
| A2007 | 151-0220-00 |  | TRANSISTOR:PNP.SI, T0-92 | 80009 | 151-0220-00 |
| A2008 | 151-0220-00 |  | TRANSISTOR:PNP.SI, T0-92 | 80009 | 151-0220-00 |
| A2009 | 151-0220-00 |  | TRANSISTOR:PNP, SI, T0-92 | 80009 | 151-0220-00 |
| A20010 | 151-0220-00 |  | TRANSISTOR:PNP.SI, $10-92$ | 80009 | 151-0220-00 |
| A20011 | 151-0441-00 |  | TRANSISTOR:NPN, SI, T0-72 | 04713 | SRF501 |
| A20012 | 151-0712-00 |  | TRANSISTOR:PNP, SI, T0-92 | 04713 | 5P58223 |
| A20013 | 151-0438-00 |  | TRANSISTOR:PNP,SI ,AMPLIFIER, 625 MA | 80009 | 151-0438-00 |
| A20014 | 151-0441-00 |  | TRANSISTOR:NPN.SI, TO-72 | 04713 | SRF501 |
| A20015 | 151-0220-00 |  | TRANSISTOR:PNP, SI, T0-92 | 80009 | 151-0220-00 |
| A20916 | 151-0333-00 |  | TRANSISTOR:SELECTED | 04713 | SPS1752 |
| A20017 | 151-0333-00 |  | TRANSISTOR:SELECTED | 04713 | SPS1752 |
| A20018 | 151-0220-00 |  | TRANSISTOR:PNP , 5I, T0-92 | 80009 | 151-0220-00 |
| 420019 | 151-0410-00 |  | TRANSISTOR:PNP, SI, T0-92 | 04713 | SP56765 |
| A20020 | 151-0220-00 |  | TRANSISTOR:PNP.SI, T0-92 | 80009 | 151-0220-00 |
| A20021 | 151-0220-00 |  | TRLNS ISTOR:PNP, SI, T0-92 | 80009 | 151-0220-00 |
| A20922 | 151-0472-00 |  | TRANSISTOR:NPN,SI, T0-92 | 51984 | NE496328 |
| A20023 | 151-0270-03 |  | TRANSISTOR: SCREENED | 04713 | ST919H |
| A20024 | 151-0274-01 |  | TRANSISTOR:SCREENED | 04713 | SS7394H |
| 920025 | 151-0270-03 |  | TRANSISTOR:SCREENED | 04713 | ST919H |
| A20026 | 151-0274-01 |  | TRANSISTOR:SCREENED | 04713 | S57394H |
| A20R1 | 315-0222-00 |  | RES, FXD, FILM 2.2 K OHM , $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-EO2K2 |
| A20R2 | 321-0181-00 |  | RES, FXO, FILM:750 OHM, 1\% , $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 07716 | CEAD750ROF |
| A20R3 | 315-0822-00 |  | RES, FXD, FILM: 8.2 K OHM, $5 \%, 0.25 \mathrm{H}$ | 19704 | $5043 C \times 8 K 200 J$ |
| A20R4 | 321-0078-00 |  | RES, FXO, FILM:63.4 OHM, 1\%, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 91637 | CMF55116G63R40F |
| A20R5 | 323-0167-00 |  | RES, FXD, FILM:536 OHA, 1\%, $0.5 \mathrm{~K}, \mathrm{TC}=$ TO | 07716 | CECO536R0F |
| A20185 | 315-0822-00 |  | RES, FXD, FIUM:8.2K OHM, $5 \chi$, 0.25 N | 19701 | 5043CXBK200J |
| A20R? | 321-0135-00 |  | RES, FXD, FILM: 249 OHM, 1\%,0.125 H , TC=TO | 07716 | CEAD249ROF |
| A20R8 | 311-2232-00 |  |  | TK1450 | GFO6ut 2K |
| A20R9 | 321-0078-00 |  | RES, FXO, FILM: 63.4 OHM , 1\%,0.125M, TC=T0 | 91637 | CMF55116G63R40F |
| A20R10 | 323-0167-00 |  | RES, FXD, FILM:536 OHM, 1X, $0.5 \mathrm{SH}, \mathrm{TC}=$ T0 | 07716 | CECD536ROF |
| A20R11 | 315-0822-00 |  | RES,FXD, FIL $: 8.2 \mathrm{~K}$ OHM $, 5 \%, 0.25 \mathrm{~K}$ | 19701 | 5043CX8K200J |
| A2OR12 | 315-0563-00 |  | RES, FXD, FILA:56K OHM, 5X,0.25M | 19701 | $5043 \mathrm{Cx} 56 \mathrm{K00J}$ |
| A20R13 | 311-2235-00 |  | RES, VAR, NONWM: TRAR, 10 K OHM , 20\%, 0.5 H LINEAR | TK1450 | GFO6UT 10 K |
| A20R14 | 321-0228-00 |  | RES, FXD, FILH:2.32K OHM, 12, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5043ED2K32F |
| Q20R15 | 311-2228-00 |  | RES, VAR, NONWW:TRUR, 200 OHM, 20\%, 0.5 H LINEAR | TK1450 | gfogut 200 0hm |
| A20R16 | 321-0228-00 |  | RES, FXD, FILH:2.32K OHM, 12, $0.125 \mathrm{M}, \mathrm{TC}=$ T0 | 19701 | 5043ED2K32F |
| A201217 | 315-0300-00 |  | RES, FXO, FILS:30 OHM, 5x, 0.25 H | 19701 | 5043CX30R00J |
| A20R18 | 315-0473-00 |  | RES, FXD, FILH:47K OHM, 5\% , 0.25 M | 57668 | NTR25J-E47k0 |
| A201119 | 321-0124-00 |  | RES, FXD, FILS:199 OHW, 12, O. 125M, TC=TO | 07716 | CEAD191ROF |
| 2201720 | 321-0144-00 |  | RES, FXD, FIL 3 : 309 OHW, 12, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 07716 | CEAD309ROF |
| 420121 | 315-0300-00 |  | RES, FXD, FILS:30 OHH , 5X, 0.25 K | 19701 | 5043CX30R00J |
| A20R22 | 311-2230-00 |  | RES, VAR, NONH: TRMR, 500 OHM, 20\%, 0.50 LINEAR | TK1450 | GFO6UT 500 |
| A20123 | 315-0300-00 |  | RES , FXD, FILH:30 OHM , 5x , 0. 25 H | 19701 | 5043CX30R00 |
| 2001224 | 321-0228-00 |  | RES, FXD, FILM: 2.32 K OHM, 1\% , 0.125m, TC=TO | 19701 | 5043ED2K32F |
| A20125 | 311-2228-00 |  | RES, VAR, NONH: TRAR, 200 OHM, 20\%, 0.54 LINEAR | TK1450 | GFOEUS 200 Ohm |
| A20126 | 321-0228-00 |  | RES, FXD, FILM:2.32K OHW, 1\%, $0.125 \mathrm{H}, \mathrm{TC}=$ T0 | 19701 | 5043ED2K32F |
| Q20127 | 311-2239-00 |  | RES.VAR.NONW : TRMR.100K OHM.20\%.0.5M LINEAR | TK1450 | GFO6UT 100K |
| a20128 | 315-0103-00 |  | RES, FXD, FILM: 10 K OHH , 5\% , 0.25\% | 19701 | $5043 \mathrm{Cx10K00J}$ |


| Component No, | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mir. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A20R86 | 311-2230-00 |  | RES, VAR, NONWH: TRMR, 500 OHM, 20\% , 0.50 LINEAR | TK1450 | GFO6UT 500 |
| A20R87 | 315-0100-00 |  | RES, FXD, FILK: 10 OHM, 57,0.25 | 19701 | 5043CXI0RR00J |
| A20R88 | 301-0302-00 |  | RES,FXD,FILM:3K OHM, 5\%,0.5N | 19701 | $5053 \mathrm{CX3K000J}$ |
| AzOR89 | 323-0385-01 |  | RES, FXD, FILH: $100 \mathrm{~K} 0 \mathrm{HW}, 0.5 \%, 0.5 \mathrm{H}, \mathrm{T}=$ T0 | 19701 | 5053RD100K00 |
| A20R90 | 321-0309-00 |  | RES,FXD,FILM: 16.2 K OHM, 17,0.125 $\mathrm{H}, \mathrm{TC}=10$ | 19701 | 5033E016KZOF |
| A20R91 | 322-0322-00 |  | RES, FXD, FILK:22.1K OHM, 1\%,0.25H,TC=TO | 19701 | 5034RD22K1 |
| A20R92 | 322-0283-00 |  | RES, FXD, FILM: 8.66 K OHM, 12, $0.25 \mathrm{H}, \mathrm{TC}=$ T0 | 19701 | 5043R08K660F |
| A20R93 | 315-0823-00 |  | RES, FXD, FILM:82K OHM, $5 \mathrm{~K}, 0.25 \mathrm{~N}$ | 57668 | NTR25J-E82K |
| A20R94 | 315-0100-00 |  | RES, FXO, FILS: 10 OHM, $5 \mathrm{X}, 0.25 \mathrm{~K}$ | 19701 | 5043CX10RR00.J |
| A20R95 | 315-0100-00 |  | RES, FXD, FILL: 10 OHM, $57,0.25 \mathrm{H}$ | 19701 | 5043CX10RR00J |
| A20R36 | 321-0322-00 |  | RES , FXD, FILM:22.1X OHM, $0.12,0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5033E022K10F |
| A20R97 | 315-0750-00 |  | RES, FXO, FILM:750HM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E75E0 |
| A20R98 | 321-0237-00 |  | RES , FXD, FILM: 2.87 K OHX , 1\%, 0. 125 W , TC=TO | 07716 | CEAD 28700F |
| A20R99 | 315-0203-00 |  | RES, FXO, FILM:20K OHM , 5\% ,0.25M | 57668 | NTR25J-E 20K |
| A20R 100 | 311-2238-00 |  | RES, VAR , NONHM: TRMR,50K OHM, 20\%, 0.5 SH LINEAR | TK1450 | GFO6UT 50 K |
| A20R101 | 321-0277-00 |  | RES, FXD, FIL : 7.50 K OHM, 17,0.125K, TC=TO | 24546 | NA5507501F |
| A20R 102 | 315-0270-00 |  | RES, FXO,FILM:27 OHM , 5\%,0.25w | 19701 | 5043CX27R00J |
| A20R103 | 321-0292-00 |  | RES, FXO, FILX:10.7K OHM, 1X, 0.125M, TC=TO | 07716 | CEA010701F |
| A20R104 | 315-0100-00 |  | RES, FXD, FILM: 10 04m, 5\% , 0.25 | 19701 | 5043 CX10RR00J |
| A20R105 | 321-0223-00 |  | RES, FXD, FIUS:2.05K OHM, 1X, $0.125 \mathrm{~K}, \mathrm{TC}=$ T0 | 80009 | 321-0223-00 |
| A20R106 | 321-0240-00 |  | RES, FXD, FILS:3.09K OHM, 12, 0.125M, TC=TO | 07716 | CEAD30900F |
| A20R107 | 322-0336-00 |  | RES, FXO, FILK:30.9K OHM, 12,0.25 $\mathrm{H}, \mathrm{TC}=\mathrm{TO}$ | 75042 | CE8T0-3092F |
| A20R108 | 315-0750-00 |  | RES, FXD, FILM: 75 OHM, $5 \mathrm{~L}, 0.25 \mathrm{H}$ | 57868 | NTR25J-E75E0 |
| A20R109 | 307-0103-00 |  | RES, FXD, CMPSN:2.7 OHK , 5\% , 0.25W | 01121 | C82765 |
| A20R110 | 307-0103-00 |  | RES, FXD, CMPSN:2.7 OHM , 5x, 0.25 H | 01121 | CB2765 |
| A20R111 | 321-0135-00 |  | RES, FXO, FILH: 249 OHM, 1\% , 0.125 H , TC=TO | 07716 | CEA0249ROF |
| A20R112 | 315-0300-00 |  | RES,FXD, FILS: 30 OHM, $57,0.25 \mathrm{M}$ | 19701 | 5043CX30RO0J |
| A20R'13 | 315-0102-00 |  | RES, FXD, FILA: 1 K OHM, $57,0.25 \mathrm{~K}$ | 57668 | NTR25JE01K0 |
| A20R1 14 | 315-0470-00 |  | RES, FXD, FILM:47 OHM , 5\%,0.25M | 57668 | NTR25J-E47E0 |
| A20R115 | 315-0150-00 |  | RES, FXD, FILM: 15 OHM, 5\%,0.25 | 19701 | 5043CX15R00J |
| A20R200 | 317-0300-00 |  | RES, FXD, CMPSN: 30 OHM , 5x, 0.125 | 01121 | 883005 |
| A20R210 | 317-0100-00 |  | RES, FXD, CMPSN: 10 OHM , 5\%,0.125 | 01121 | 881005 |
| A20R220 | 317-0470-00 |  | RES , FXD, CMPSN:47 OHM , 5\% , 0.125 | 01121 | 884705 |
| A20R230 | 317-0100-00 |  | RES, FXD, CMPSN: 10 OHM , 57,0.125 | 01121 | 881005 |
| A20RT31 | 307-0122-00 |  | RES, THERMAL:50 HM, 10\% ,NTC | 14193 | 1815-500K |
| azovfi | 152-0590-00 |  | SEIICOND DVC, DI:ZEN, 5I, 18V, 5\%, 0. $4 \mathrm{H}, \mathrm{DO}-7$ | 04713 | s2035014K2 |
| AzovR2 | 153-0050-00 |  | SEMICOND DVC, DI:CHECKED | 80009 | 153-0050-00 |
| A20VR3 | 153-0050-00 |  | SEMICOND DVC,DI:CHECKED | 80009 | 153-0050-00 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A21 | 670-3970-00 |  | CIRCUIT BD ASSY:2 AXIS | 80009 | 670-3970-00 |
| A2152205 | 283-0023-00 |  | CAP, FXO,CER OI:0.1UF,+80-20\%, 12V | 11590 | 20DU6681047 |
| A21C2211 | 290-0745-00 |  | CAP, FXD, ELCTLT:22UF , +50-10\%, 25V | 54473 | ECE-A25V22L |
| A21C2212 | 290-0745-00 |  | CAP, FXO, ELCTLT : $22 \mathrm{UF},+50-10 \mathrm{Z}, 25 \mathrm{~V}$ | 54473 | ECE-A25V22L |
| A21C2215 | 283-0023-00 |  | CAP, FXD,CER OI:0.1UF, +80-20\%, 12V | 71590 | 200U6681042 |
| A21C2217 | 283-0003-00 |  | CAP, FXD, CER 01:0.01UF,+80-20\%, 150V | 59821 | D10324025UJDCEX |
| A21C2218 | 290-0778-00 |  | CAP, FXO, ELCTLT: 1 UF, +50-30\%, 50V , NPLZO | 54473 | ECE-A50N1 |
| A21C2224 | 283-0000-00 |  | CAP,FXO, CER OI:0.001UF, +100-0\%,500V | 59660 | 831-610-Y540102P |
| A21C2232 | 281-0592-00 |  | CAP, FXD, CER DI:4.7PF, +/-0.5PF,500V | 52763 | 2R0PL2007 4P70DC |
| A21C2235 | 281-0166-00 |  | CAP, VAR,AIR DI:1.9-15.7 PF,250V | 74970 | 187-0109-055 |
| A21C2236 | 283-0081-00 |  | CAP, FXD, CER DI:0.1UF , +80-20\%, 25V | 59821 | 200U69E1042 |
| A21C2237 | 283-0180-00 |  | CAP, FXD, CER DI:5600PF, 20\%, 200V | 04222 | 3429 200E 562M |
| A21C2242 | 283-0057-00 |  | CAP, FXD, CER OI:0.1UF, +80-20\%, 200V | 04222 | SR306E104 $20 A$ |
| A21C2244 | 283-0177-00 |  | CAP, FXD, CER DI: 1 UF, +80-20\%, 25V | 04222 | SR302E1052AATR |
| a21C2248 | 281-0661-00 |  | CAP, FXD, CER DI:0.8PF, +/-0.1PF, 500V | 52763 | 2ROPL2007 0P80BC |
| A2102249 | 283-0084-00 |  | CAP, FXD,CER DI:270PF,5\%,1000V | 59660 | 838533X5F02715 |
| A21C2253 | 283-0057-00 |  | CAP, FXO, CER DI:0.1UF,+80-20\%,200V | 04222 | SR306E1042AA |
| A24C2263 | 283-0023-00 |  | CAP, FXD, CER DI:0.1UF,+80-20\%, 12V | 71590 | 20DU6681042 |
| A21C2271 | 283-0003-00 |  | CAP, FXD, CER DI:0.01UF, $+80-20 \%$, 150V | 59821 | D10374025UJOCEX |
| A21,2282 | 283-0188-00 |  | CAP,FXD,CER DI:1000PF,207,6000V | 51406 | OHR19X5T102M-6KV |
| A21C2283 | 283-0013-00 |  | CAP, FXD, CER DI:0.01UF, 0 - $100 \%$, 1000V | 59660 | 818-602LSU0103P |
| A21C2288 | 281-0627-00 |  | CAP, FXD, CER DI:1PF,+/-0.25PF,500V | 52763 | 2RDPLZ007 4P00CC |
| A21C2289 | 283-0188-00 |  | CAP, FXD,CER DI:1000PF,20\%,6000V | 51406 | OHR19X5T102M-6KV |
| A21C2297 | 283-0188-00 |  | CAP, FXD,CER DI:1000PF,20\%,6000V | 51406 | OHR19X5T102M-6KV |
| A21C2323 | 283-0054-00 |  | CAP, FXO, CER DI:150PF, $5 \%$,200V | 59660 | 855-535 U2J0151J |
| A21C2326 | 281-0592-00 |  | CAP, FXD, CER DI:4.7PF,+/-0.5PF, 500V | 52763 | 2RDPLZ007 4P700C |
| A21C2327 | 283-0023-00 |  | CAP, FXD, CER DI:0.1UF,+80-20\%, 12V | 71590 | 20DU6681042 |
| A21C2346 | 283-0003-00 |  | CAP, FXO, CER DI:0.01UF, +80-20\%, 150V | 59821 | D10324025UJDCEX |
| A21C2356 | 283-0003-00 |  | CAP, FXO, CER DI:0.01UF, +80-20\%, 150V | 59821 | D10324025UJDCEX |
| 021C2364 | 283-0003-00 |  | CAP, FXD, CER DI:0.01UF, +80-20\%, 150V | 59821 | D10324025UJOCEX |
| 021C2371 | 283-0003-00 |  | CAP, FXD, CER DI:0.01UF $+80-20 \%$, 150V | 59821 | 010324025UJDCEX |
| A21C2379 | 281-0661-00 |  | CAP, FXD, CER DI:0.8PF, +/-0.1PF, 500V | 52763 | 2ROPLZ007 OPB08C |
| A21C2384 | 283-0023-00 |  | CAP, FXD, CER 01:0.1UF, +80-20\%, 12V | 71590 | 20DU6681042 |
| A21C2385 | 283-0000-00 |  | CAP, FXD, CER DI:0.001UF + $100-0 \%$, 500V | 59660 | 831-610-Y5u0102P |
| A21C2393 | 283-0023-00 |  | CAP, FXD, CER DI:0.1UF, +80-20\%, 12V | 74590 | 200U66B1042 |
| A21C2405 | 283-0003-00 |  | CAP, FXO, CER OI:0.01UF,+80-20\%, 150 V | 59821 | D10324025UJOCEX |
| A21C2406 | 283-0023-00 |  | CAP, FXO, CER DI:0.1UF, +80-20\%, 12 V | 71590 | 200U6681042 |
| A21C2425 | 284-0204-00 |  | CAP, VAR, PLASTIC:2-22PF, 100 V | 80031 | 2807C002220102 |
| A21C2432 | 281-0577-00 |  | CAP, FXD,CER DI:14PF,5\%,500V | 52763 | 2RDPLI007 14POJC |
| A21C2435 | 281-0204-00 |  | CAP, VAR, PLASTIC:2-22PF, 100 V | 80031 | 2807C002224102 |
| A21C2436 | 283-0003-00 |  | CAP, FXD, CER DI:0.01UF, +80-20\%, 150V | 59821 | 010324025W0CEX |
| A21CR2181 | 152-0141-02 |  | SEIICOND DVC, DI:SN, SI , 30V,150MA, 30V, DO-35 | 03508 | DA2527 (1N4152) |
| A21CR2182 | 152-0141-02 |  | SEMICOND DVC , DI: SM , SI , 30V, 150MA , 30V ,00-35 | 03508 | DA2527 (1N4152) |
| A21CR2218 | 152-0141-02 |  | SEAICOND DVC ,DI:SN, SI , 30V , 150MA, 30V , D0-35 | 03508 | DA2527 (1N4152) |
| A21CR2222 | 152-0141-02 |  | SEMICOND DVC , OI:SN, SI , 30V, 150MA , 30V , D0-35 | 03508 | Da2527 (1N4152) |
| A21CR2223 | 152-0141-02 |  | SEMICOND DVC , DI:SH,SI, 30V,150MA,30V, D0-35 | 03508 | Da2527 (1N4152) |
| A21CR2227 | 152-0141-02 |  |  | 03508 | DA2527 (1N4152) |
| A21CR2242 | 152-0242-00 |  | SEMICONO DVC,0I:SIG,51,225V ,0.2A,00-7 | 07263 | FOH5004 |
| A21CR2253 | 152-0333-00 |  | SENICOND DVC, OI:SK, SI , 55V, 200Ma,00-35 | 07263 | FOH-6012 |
| A21CR2264 | 152-0141-02 |  | SEMICOMD OVC, DI:SN, SI, 30V,150MA,30V,00-35 | 03508 | DA2527 (1N4152) |
| A21CR2302 | 152-0141-02 |  | SEMICONO DVC, $01: S N, S I, 30 V, 150 \mathrm{MA}, 30 \mathrm{~V}, \mathrm{DO}-35$ | 03508 | DA2527 (1N4152) |
| A21CR2304 | 152-0141-02 |  | SEMICONO OVC , $01: S H, 51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | Da2527 (1N4152) |
| A21CR2306 | 152-0141-02 |  | SEMICOND DVC,DI:SH,SI,30V, 150MA,30V,00-35 | 03508 | DA2527 (1N4152) |
| A21CR2315 | 152-0141-02 |  | SENICONO DVC , DI:SM,SI , 30V, 150MA, $30 \mathrm{C}, \mathrm{DO}-35$ | 03508 | DA2527 (1N4152) |
| A21CR2316 | 152-0141-02 |  | SEMICONO DVC , DI:SM, SI , 30V , 150MA, 30V , DO-35 | 03508 | Da2527 (1N4152) |
| A21CR2317 | 152-0322-00 |  | SEMICCND DVC,DI:SCHOTTKY BARRIER,SI, 15 V | 50434 | 5082-2672 |
| A21CR2333 | 152-0141-02 |  | SEAICOND DVC , DI:SH, SI, 30V, 150i4n, 30V , D0-35 | 03508 | Da2527 (1N4152) |
| A21CR2335 | 152-0141-02 |  | SEMICOND DVC , DI:SH, SI , 30V , 150MA , 30V , 00-35 | 03508 | D22527 (1N4152) |
| A21CR2396 | 152-0141-02 |  | SEAICOND DVC, DI:SH,SI, 30V, 150MA, 30V , D0-35 | 03508 | Da2527 (1N4152) |


| Component No, | Tektronix Part No. | Serial/Assembly No. <br> Effective Dscont | Name \& Description | Mfr. Code | Mir. Part No, |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A21CR2397 | 152-0141-02 |  | SEMICOND DVC, DI: SN, 5I, 30V, 150MA, 30V, 00-35 | 03508 | DA2527 ( 1 N4 152) |
| A21CR2408 | 152-0574-00 |  | SEMICOND DVC, DI:SW, SI, 120V,0.150, 00-35 | 12969 | NDP566 |
| A21CR2438 | 152-0574-00 |  | SEMICOND DVC, OI:SH, SI, 120V,0.150, DO-35 | 12969 | NOP566 |
| A210S2292 | 150-0035-00 |  | LAMP, GLON:90V MAX, O. 3MA,AID-T, HIRE LD | TK0213 | JH005/3011.JA |
| A21052294 | 150-0035-00 |  | LAMP, GLOW:90V MAX, O.3MA, AID-T, WIRE LD | TK0213 | JH005/3011.JA |
| A21052295 | 150-0035-00 |  | LAMP, GLON:9OV MAX, O.3MA, AID-T, MIRE LD | TK0213 | JH005/3011JA |
| A21352296 | 150-0035-00 |  | LAMP, GLOW:90V MAX , O. 3MA, AID-T, MIRE LD | TK0213 | JH005/3011.JA |
| A21JS2298 | 150-0035-00 |  | LAMP GLON:90V MAX, O. 3MA, AID-T, HIRE LD | TK0213 | JH005/3011JA |
| A21L2205 | 276-0507-00 |  | SHLD BEAO, ELEK:FERRITE | 02114 | 56-590-65B/3B |
| A21-2215 | 276-0507-00 |  | SHLD BEAD, ELEK:FERRITE | 02114 | 56-590-658/3В |
| A2132224 | 131-0608-00 |  | TERMINAL, PIN:0.365 L X 0.025 BRZ GLD PL | 22526 | 48283-036 |
| A21P2242 | 131-0608-00 |  | TERMINAL, PIN:0.365 L X 0.025 BRL GLD PL | 22526 | 48283-036 |
| A21P2273 | 131-0589-00 |  | TERM, PIN:0.46 L $\times 0.025$ SO PH BRL GLD | 22526 | 48283-029 |
| A21P2297 | 131-0589-00 |  | TERM,PIN:0.46 L $\times 0.025$ SO PH BRZ GLD | 22526 | 48283-029 |
| A21P2305 | 131-0608-00 |  | TERMINAL, PIN:0.365 L X 0.025 BRL GLD PL | 22526 | 48283-036 |
| A21P2311 | 131-0608-00 |  | TERMINAL, PIN:0.365 L X 0.025 8RI GLD PL | 22526 | 48283-036 |
| A21P2436 | 131-0589-00 |  | TERM, PIN:0.46 L 0 0.025 SO PH BRL | 22526 | 48283-029 |
| A2102206 | 151-0333-00 |  | TRANSISTOR:SELECTED | 04713 | SP51752 |
| 42102216 | 151-0333-00 |  | TRANSISTOR:SELECTED | 04713 | SPS1752 |
| A2102236 | 151-0325-00 |  | TRANS ISTOR: PNP.SI, T0-92, SEL | 80009 | 151-0325-00 |
| A2102242 | 151-0411-00 |  | TRANSISTOR:NPN, SI | 04713 | SRF709 |
| A2102254 | 151-0270-03 |  | TRANSISTOR:SCREENED | 04713 | ST919H |
| A2102264 | 151-0274-01 |  | TRANSISTOR:SCREENED | 04713 | SS7394H |
| A2102274 | 151-0220-00 |  | TRANSISTOR:PNP, SI , TO-92 | 80009 | 151-0220-00 |
| 42102302 | 151-0333-00 |  | TRANSISTOR:SELECTED | 04713 | SPS1752 |
| A2102306 | 151-0333-00 |  | TRANSISTOR:SELECTED | 04713 | SPS1752 |
| 02102316 | 151-0333-00 |  | TRANSISTOR:SELECTED | 04713 | SPS1752 |
| A21@2322 | 151-0302-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | ST899 |
| A2102328 | 151-0302-00 |  | TRANSISTOR:NPN,51, T0-18 | 04713 | ST899 |
| A21012332 | 151-0219-00 |  | TRANSISTOR:PNP, SI , R-124 | 07263 | 5022650 |
| A2102336 | 151-0126-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | ST1046 |
| A2102344 | 151-0302-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | ST899 |
| A2102354 | 151-0302-00 |  | TRANS ISTOR:NPN, SI . 0 -18 | 04713 | ST899 |
| 02102362 | 151-0453-00 |  | TRANS ISTOR:PNP, SI, T0-92 | 27014 | ORDER BY DESCR |
| A2152364 | 151-0302-00 |  | TRANSISTOR:NPN,SI, T0-18 | 04713 | 51899 |
| A2162368 | 151-0453-00 |  | TRANSISTOR: PNP, SI, TO-92 | 27014 | ORDER 8Y DESCR |
| A2102372 | 151-0126-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | ST1046 |
| A2102374 | 151-0126-00 |  | TRANSISTOR:NPN, SI, T0-18 | 04713 | ST1046 |
| A2102378 | 151-0126-00 |  | TRANSISTOR:NPN, SI, TO-18 | 04713 | ST1046 |
| A2102384 | 151-0350-00 |  | TRANSISTOR: PNP, SI , T0-92 | 04713 | SPS6700 |
| A2102394 | 151-0347-00 |  | TRANSISTOR:NPN,SI , T0-92 | 04713 | SP57951 |
| A2102406 | 151-0347-00 |  | TRANSISTOR:NPN, SI , T0-92 | 04713 | SPS7951 |
| A2102422 | 151-0453-00 |  | TRANSISTOR: PNP , SI , T0-92 | 27014 | OROER 8Y OESCR |
| A2102432 | 151-0453-00 |  | TRANSISTOR: PNP, SI, T0-92 | 27014 | OROER BY DESCR |
| A2102436 | 151-0432-00 |  | TRANSISTOR:NPW, 5I , T0-106 | 04713 | SP58512 |
| A21R2204 | 315-0330-00 |  | RES, FXD, FILM: 33 OHM, 57, 0.25 \% | 19701 | 5043CX33800J |
| A21R2205 | 315-0101-00 |  | RES, FXD, FIL $: 100$ OHW, 5\% , O. 25 ${ }^{\text {H }}$ | 57668 | NTR25-E 100E |
| A21R2206 | 321-0345-00 |  | RES , FXD, FILM: 38.3 K OHM, 12, $0.125 \mathrm{M}, \mathrm{TC}=$ TO | 19704 | 5043E038X30F |
| A21R2207 | 321-0350-00 |  | RES, FXD, FILM:43.2K OHM, 12, 0, 125M, TC=TO | 19701 | 5043E043K20F |
| A21R2209 | 321-0394-00 |  | RES , FXD, FILM:124K OHM, 1z,0.125w, TC=TO | 07716 | CEAD12402F |
| A21R2214 | 315-0330-00 |  | RES , FXD, FILM:33 OHM, 5\%, $0.25 \%$ | 19701 | 5043CX33R00J |
| A21R2215 | 315-0101-00 |  | RES, FXD, FILM: 100 OKM , 5\%, 0.25 M | 57668 | NTR25J-E 100E |
| A21R2216 | 321-0345-00 |  | RES , FXD, FILM:38.3K OHM, 1\% , 0.125m, TC=T0 | 19701 | 5043ED38K30F |
| A21R2217 | 315-0221-00 |  | RES, FXD, FILM:220 OHM , 57, 0.25 M | 57668 | NTR25J-E220E |
| A21R2218 | 307-0505-00 |  | RES NTMK, FXD, FI:HIGH VOLTAGE REGULATOR | 80009 | 307-0505-00 |
| A21R2219 | 321-0481-00 |  | RES, FXD, FILM: 14 OHm, 1\%, $0.125 \mathrm{M}, \mathrm{TC}=$ T0 | 19701 | 5043E1M000F |
| A21R2220 | 311-1242-00 |  | RES , VAR, MONWN: TRNR, 200K OHW, O.5M | 32997 | 3386X-T07-204 |
| A21R2221 | 315-0475-00 |  | RES, FXD , FILM:4.7M OHM, 5Z, 0.25 M | 01121 | C84755 |
| Q21R2222 | 316-0126-00 |  | RES ,FXD, CMPSN: 12N OHM, 10\%,0.25N | 01121 | CB1261 |


| Component No. | Tektronix Part No. | Serial/Assembly No. EHective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A21R2223 | 315-0106-00 |  | RES, FXO, FILM 10 M OHM , $5 \%, 0.25 \mathrm{M}$ | 01121 | C81065 |
| A21R2224 | 321-0400-00 |  | RES, FXD, FILM: 143 K OHM, 1\%, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5043@143K0F |
| D21R2226 | 315-0331-00 |  | RES, FXD, FILM: 330 OHM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E330E |
| A21R2227 | 315-0242-00 |  | RES, FXO, FILH:2.4K DHM , 5\%,0.25 | 57668 | NTR25J-E02K4 |
| A21R2228 | 315-0153-00 |  | RES, FXO, FILM: $15 \mathrm{~K} 0 \mathrm{HW}, 5 \chi, 0.25 \mathrm{H}$ | 19701 | 5043CX15K00J |
| A21R2231 | 315-0471-00 |  | RES, FXO, FILM:470 OHM , $5 \mathrm{~K}, 0.25 \mathrm{M}$ | 57668 | NTR25J-E470E |
| A21R2232 | 315-0122-00 |  | RES, FXD, FILM: $1.2 \mathrm{KK} 0 \mathrm{HM}, 57,0.25 \mathrm{H}$ | 57668 | NTR25J-E01K2 |
| A21R2233 | 321-0182-00 |  | RES, FXD, FILH:768 OHM, 1\%,0.125N,TC=T0 | 07716 | CEAD768R0F |
| A21R2234 | 315-0181-00 |  | RES, FXD, FILH: 180 OHM, 5\%,0.25H | 57668 | NTR25J-E180E |
| A21R2235 | 311-1263-00 |  | RES, VAR, NONH: 1 K OHH, 10\%, 0.50 H | 32997 | 3329P-L58-102 |
| A21R2236 | 315-0100-00 |  | RES, FXO, FILM: 10 OHm, $5 \%, 0.25 \mathrm{~W}$ | 19701 | 5043CX10RR00J |
| A21R2240 | 321-0319-00 |  | RES, FXO, FIUS:20.5K OHM, 1\%, $0.125 \mathrm{~N}, \mathrm{TC}=10$ | 19701 | 5033ED20K50F |
| A21R2241 | 315-0102-00 |  | RES, FXD, FILM: 1 K OHM, $57,0.25 \mathrm{~K}$ | 57668 | NTR25JE01K0 |
| A21R2242 | 315-0101-00 |  | RES, FXD, FILM: 100 OHM, $5 \%, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E 100E |
| A21R2244 | 315-0100-00 |  | RES, FXD, FILM: 10 OHM, $5 \mathrm{X}, 0.25 \mathrm{M}$ | 19701 | 5043CX10RR00J |
| A21R2248 | 323-0312-00 |  | RES, FXD, FILH: 17.4 K OHM, $14,0.5 \mathrm{H}, \mathrm{TC}=$ T0 | 91637 | MFF1226G17401F |
| A21R2249 | 315-0103-00 |  | RES, FXO, FILM: 10 K OHM , $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 19701 | 5043CX10K00J |
| Q21R2251 | 321-0261-00 |  | RES, FXO, FILM: 5.11 K OHM, 1\%, $0.125 \mathrm{~m}, \mathrm{TC}=$ TO | 19701 | 5033ED5K110F |
| A21R2252 | 321-0360-00 |  | RES , FXO, FILM: 54.9 K OHM, 12, 0.125 n , IC $=$ TO | 19701 | 50э3@ $54 \mathrm{4k90F}$ |
| A21R2253 | 315-0180-00 |  | RES, FXO, FILH: 18 OHM, $5 \mathrm{X}, 0.25 \mathrm{~W}$ | 19701 | 5043CX18R00J |
| A21R2254 | 321-0158-00 |  | RES, FXD, FILS:432 OHM, 12, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 07716 | CEAD432ROF |
| A21R2255 | 305-0163-00 |  | RES, FXD, CMPSN: 16 K OHM, $57,2 \mathrm{~K}$ | 01121 | H日1635 |
| A21R2261 | 315-0103-00 |  | RES, FXO,FILM: 10 K OHM, 5X, 0.25 M | 19701 | 5043CX10K00J |
| A21R2262 | 315-0222-00 |  | RES, FXO, FILM: 2.2 K OHM, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25-E02K2 |
| A21R2263 | 315-0330-00 |  | RES, FXO, FILM: 33 OHM , $57,0.25 \mathrm{H}$ | 19701 | 5043CX33R00J |
| Q21R2264 | 315-0101-00 |  | RES, FXO, FILM: 100 OHM, 5\% , 0.25 H | 57668 | NTR25J-E 100E |
| A21R2271 | 315-0241-00 |  | RES, FXD, FILM:240 OHM , 5\% , 0.25 H | 19701 | 5043CX240ROJ |
| A21R2272 | 315-0331-00 |  | RES, FXO, FILM:330 OHM , 5\%, 0.25\% | 57668 | NTR25J-E930E |
| A21R2274 | 315-0220-00 |  | RES, FXO, FILS: 22 OHM, $5 \mathbf{7}, 0.25 \mathrm{M}$ | 19701 | 5043CX22R00J |
| A21R2282 | 301-0242-00 |  | RES, FXO, FILH:2.4K OHM , $5 \mathrm{X}, 0.5 \mathrm{M}$ | 19701 | 5053CX2K400. |
| A21R2283 | 301-0302-00 |  | RES, FXO, FILM:3K OHM, $5 \%, 0.5 \mathrm{~K}$ | 19701 | 5053СхЗх000」 |
| A21R2284 | 315-0106-00 |  | RES, FXO, FILM: 10M OHM, $5 \mathrm{Z}, 0.25 \mathrm{M}$ | 01121 | C81065 |
| A21R2285 | 319-1214-00 |  | RES, VAR, NONHW: TRMR ,200K OHM, O.5\% | 32997 | Э386F-T04-204 |
| A21R2289 | 301-0151-00 |  | RES, FXD, FIL $: 150$ OHM , 5\%, 0.5 H | TK1727 | SFR30 2322-182 |
| A21R2294 | 315-0155-00 |  | RES, FXO, FILM: 1.5 MM OHM,5\%,0.25 H | 19701 | 5043 CX14500J |
| A21R2297 | 301-0471-00 |  | RES, FXO, FILH:470 OHM, 5\%, 0.5 H | 19701 | 5053CX 470R0J |
| Q21R2298 | 301-0101-00 |  | RES, FXO, FIL 100 OHM, $5 \mathrm{5x}, 0.5 \mathrm{H}$ | 19701 | 5053CX100R0J |
| A21R2302 | 315-0470-00 |  | RES, FXO, FIL : 47 OHM, $57,0.25 \mathrm{H}$ | 57688 | NTR25J-E47E0 |
| A21R2303 | 321-0303-00 |  | RES, FXO, FILH:14.0K OHM, 12, $0.125 \mathrm{~K}, \mathrm{TC}=$ TO | 07716 | CEAD 14001F |
| A21R2305 | 315-0684-00 |  | RES, FXD,FILM:680K OHM , 5\%,0.25H | 01121 | C86845 |
| A21R2306 | 321-0303-00 |  | RES, FXO, FILM: 14.0X OHW, 1\%, $0.125 \mathrm{M}, \mathrm{TC}=$ T0 | 07716 | CEAD 14001F |
| A21R2309 | 315-0472-00 |  | RES, FXO, FILH:4.7K OHM, 5\%, 0.25 N | 57668 | NTR25J-E04K7 |
| A21R2312 | 315-0472-00 |  | RES , FXO, FILM: 4.7 K OHM , 5x, 0.25 M | 57668 | NTR25J-E04K7 |
| A21R2315 | 311-1245-00 |  | RES, VAR, MONW: TRMR, 10K OHM , 0.5 W | 32997 | 3386X-0Y6-103 |
| A21R2316 | 315-0470-00 |  | RES, FXD, FILU:47 OHW, $57,0.25 \mathrm{H}$ | 57668 | NTR25J-E47E0 |
| A21R2317 | 315-0274-00 |  | RES, FXD,FILM: 270K OHM, 5X,0.25 | 57668 | NTR25N-E270K |
| A21R2318 | 321-0308-00 |  | RES , FXO, FILS:15.8K OHM, 14, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 07716 | CEAD 15801F |
| A21R2319 | 315-0102-00 |  | RES, FXO, FI LX: 1 K OHM, $5 \mathrm{~L}, 0.25 \mathrm{H}$ | 57688 | NTR25JE01k0 |
| A21R2322 | 321-0290-00 |  | RES , FXO, FILG: 10.2 K OHM, 1\%, 0.125M, TC= T0 | 19701 | 5043ED10K20F |
| A21R2323 | 315-0510-00 |  | RES, FXD, FIL | 19701 | 5043CX51R00J |
| A21R2324 | 315-0221-00 |  | RES, FXD, FILM:220 OHM, 5X,0.25\% | 57868 | NTR25J-E220E |
| A21R2325 | 315-0152-00 |  |  | 57668 | NTR25J-E01K5 |
| A2182326 | 321-0277-00 |  | RES, FXO, FIL $: 7.50 \mathrm{~K}$ OHM, $12,0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 24546 | Na5507501F |
| A21R2327 | 315-0102-00 |  | RES, FXD, FILS:1K OHM , 5\%, 0.25 H | 57668 | NTR25JE01K0 |
| A21R2328 | 315-0681-00 |  | RES , FXD , FILM:680 0HM , $5 \mathbf{8}, 0.254$ | 57668 | NTR25J-E680E |
| A21R2332 | 315-0101-00 |  | RES, PXD, FILH: 100 OHH, $5 \mathrm{Z}, 0.25 \mathrm{M}$ | 57668 | NTR25J-E 100E |
| A21R2333 | 315-0332-00 |  | RES, FXD, FI LH: 3. 3 K OHM, 5x, 0.25 M | 57668 | NTR25J-E03K3 |
| A21R2335 | 321-0239-00 |  | RES, FXD, FILM:3.01K OHW, 12, $0.125 \mathrm{M}, \mathrm{TC}=$ TO | 19701 | 5043ED3K010F |
| A21R2336 | 315-0471-00 |  | RES, FXD, FILM:470 OHM , 5X, 0.25 M | 57668 | NTR25J-E470E |


| Component No, | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 421R2338 | 321-0316-00 |  | RES, FXO, FIL 19.19 OHM, 12, 0.125H, TC=TO | 07716 | CEAD19101F |
| 421R2339 | 321-0239-00 |  | RES, FXO, FILM:3.01K OHM, 1\%, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5043E03K010F |
| A21R2342 | 315-0473-00 |  | RES,FXD,FILM:47K OHM , 5\%,0.25M | 57668 | NTR25J-E47K0 |
| A21R2343 | 315-0103-00 |  | RES,FXD,FILM: 10K OHM , 5\%,0.25W | 19701 | 5043CX10K00J |
| A21R2344 | 315-0183-00 |  | RES,FXD,FILS: 18K OHM, 5Z,0.25 | 19701 | 5043CX18K00J |
| A21R2345 | 315-0623-00 |  | RES,FXO,FILH:62K OHM ,5\%,0.25M | 19701 | 5043CX62K00J |
| A21R2346 | 315-0103-00 |  | RES, FXD, FILM: $10 \mathrm{~K} 0 \mathrm{HM}, 57,0.25 \mathrm{H}$ | 19701 | 5043Cx10K00」 |
| A21R2354 | 315-0103-00 |  | RES, FXO,FILM: 10 K OHM, $5 \%, 0.25 \mathrm{H}$ | 19701 | $5043 \mathrm{CX10K00J}$ |
| A21R2355 | 315-0623-00 |  | RES,FXD,FILM:62K OHM, 5\%,0.25W | 19701 | 5043CX62K00J |
| A21R2356 | 315-0103-00 |  | RES,FXD,FILM:10K OHM , 5\%,0.25M | 19701 | 5043CX10K00J |
| A21R2361 | 321-0301-00 |  | RES, FXO, FILM:13.3K ОН世, 1\%, $0.125 \mathrm{~K}, \mathrm{TC}=$ TO | 07716 | CEa013301F |
| A21R2362 | 315-0222-00 |  | RES, FXD, FILM:2.2K OHM, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25.J-E02K2 |
| A21R2363 | 321-0289-00 |  | RES, FXO, FILS: 10.0 OK OHM, 12, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033E010k0F |
| A21R2364 | 301-0152-00 |  | RES, FXD, FILM: 1.5 K OHM , $5 \%, 0.5 \mathrm{H}$ | 19701 | 5053CX1K500J |
| A21R2365 | 311-1238-00 |  | RES, VAR, NONHW:TRMR, 5 K OHH, 0.5 W | 32997 | 3386X-DY6-502 |
| A21R2366 | 311-1238-00 |  | RES, VAR,NONWH:TRMR,5K OHH, 0.5 H | 32997 | 3386X-DY6-502 |
| A21R2368 | 315-0222-00 |  | RES,FXD, FILM:2.2K OHM, 5K,0.25 | 57668 | NTR25J-E02K2 |
| A21R2371 | 315-0470-00 |  | RES, FXO, FILH:47 OHM, 5\%, 0.25 M | 57668 | NTR25J-E47E0 |
| A21R2372 | 315-0432-00 |  | RES, FXD, FILM:4.3K OHA , 5\%,0.25 | 57668 | NTR25J-E04K3 |
| A21R2373 | 315-0102-00 |  | RES, FXO, FILM: 1 K OHM, 5\%,0.25M | 57668 | NTR25JEO1K0 |
| A21R2374 | 315-0132-00 |  | RES, FXD, FILM: 1.3K OHM , 5X, 0.25 H | 57668 | NTR25J-E01K3 |
| A21R2376 | 315-0102-00 |  | RES, FXD, FILS:1K OHM , 5\% , 0.25 H | 57668 | NTR25JE01K0 |
| A21R2377 | 315-0753-00 |  | RES, FXD, FILM:75K OHM, 5\% , 0.25 H | 57668 | NTR25N-E75K0 |
| A21R2378 | 321-0320-00 |  | RES, FXD, FILH:21.0K OHM, 12, 0.125m, TC=TO | 19701 | 5033E021K00F |
| A21R2379 | 321-0394-00 |  | RES, FXD, FILM: 124K OHM, 17, 0.125M, TC=TO | 07716 | CEAO12402F |
| A21R2383 | 315-0122-00 |  | RES, FXO, FILH: 1.2 K OHM, $5 \mathrm{~K}, 0.25 \mathrm{M}$ | 57668 | NTR25J-E01K2 |
| A21R2384 | 315-0101-00 |  | RES, FXD, FIL $: 100$ OHM , 5X, 0.25 H | 57668 | NTR25J-E 100E |
| A21R2385 | 315-0104-00 |  | RES, FXD. FILM: 100K OHW, 5x, 0.25 W | 57668 | NTR25J-E100K |
| A21R2393 | 315-0470-00 |  | RES, FXD, FILM:47 OHM, 5\%,0.25 | 57668 | NTR25J-E47E0 |
| A21R2394 | 315-0561-00 |  | RES, FXO, FILM:560 OHM , 5x, 0.25 H | 19701 | 5043CX560R0J |
| A21R2396 | 315-0432-00 |  | RES, FXD, FILM:4.3K OHM , 5\%, 0.25 H | 57668 | NTR25J-E04K3 |
| A21R2404 | 315-0152-00 |  | RES, FXD, FILM: 1.5 K OHM, 5K,0.25 | 57668 | NTR25J-E01K5 |
| A21R2405 | 315-0470-00 |  | RES, FXD, FILL: 47 OHM, 5\%,0.25M | 57668 | NTR25J-E47E0 |
| A21R2406 | 315-0470-00 |  | RES, FXD, FIL : 47 OHM, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E47E0 |
| A21R2409 | 315-0221-00 |  | RES, FXD, FILM:220 0HM, 5 \% , O. 25 H | 57668 | NTR25J-E220E |
| A21R2422 | 315-0222-00 |  | RES, FXD,FILH:2.2K OHM , 5x, 0.25 H | 57668 | NTR25J-E02K2 |
| A21R2425 | 311-1241-00 |  | RES , VAR , NONHK: TRMR, 100K OHM, 0.5 H | 32997 | 3386X-T07-104 |
| A21R2428 | 321-0305-00 |  | RES, FXD, FILS:15.OK OHM, 1\%, 0.125M, TC=TO | 19701 | 5033ED15J00F |
| A21R2431 | 315-0222-00 |  | RES, FXD, FIL $=2.2 \mathrm{~K}$ OHM, 5X,0.25M | 57868 | NTR25J-E02K2 |
| A21R2432 | 321-0352-00 |  | RES, FXD, FILH:45.3X OHM, 12, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 07716 | CEAD45301F |
| A21R2435 | 311-1241-00 |  | RES, VAR, NONW: TRMR, 100K OHM, 0.5 H | 32997 | 3386X-T07-104 |
| A21R2436 | 315-0471-00 |  | RES, FXD, FILH:470 OHM , 5X, 0. 25 N | 57668 | NTR25J-E470E |
| A21R2437 | 315-0471-00 |  | RES, FXD, FILM:470 OHM, 5K, 0.25\% | 57668 | NTR25J-E470E |
| A21R2439 | 315-0221-00 |  | RES, FXD,FILM:220 OHM , 5X,0.25M | 57668 | NTR25J-E220E |
| A21TP2212 | 214-0579-00 |  | TERN,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A21TP2264 | 214-0579-00 |  | TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A21TP2288 | 214-0579-00 |  | TERA, TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A21TP2298 | 214-0579-00 |  | TERA, TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A21TP2408 | 214-0579-00 |  | TERM,TEST POINT:BRS CD PL | 80009 | 214-0579-00 |
| A21TP2438 | 214-0579-00 |  | TERM, TEST POINT: ERS CD PL | 80009 | 214-0579-00 |
| A21U2224 | 156-0067-00 |  | MICROCKT,LINEAR:OPNL AMPL,SEL | 04713 | HC1741CP1 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name 8 Description | Mfr. Code | Mfr, Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A22 | 670-9180-00 |  | CIRCUIT BD ASSY:HIGH VOLTAGE | 80009 | 670-9180-00 |
| 022C2014 | 283-0261-00 |  | CAP,FXD,CER 01:0.01UF,20\%,4000V | 51406 | OHR2825U103M4KV |
| A22C2016 | 283-0188-00 |  | COP ,FXD,CER DI:1000PF,20\%,6000V | 51406 | DHR19X5T 402N-6KV |
| A22C2021 | 283-0261-00 |  | CAP, FXD,CER DI:0.01UF,20\%,4000V | 51406 | DHR2825U103世4KV |
| A22C2031 | 283-0162~00 |  | CAP ,FXD,CER DI:0.01UF +80-20\%,5000V | 51406 | DHA42Y5510325KV |
| A22C2033 | 283-0261-00 |  | CAP, FXD, CER 01:0.01UF,20\%,4000V | 51406 | DHR2825U103M4KV |
| A22C2034 | 283-0162-00 |  | CAP, FXD, CER D1:0.01UF + 8 - $0-20 \%, 5000 \mathrm{~V}$ | 51406 | DHA42Y5510375KV |
| A22C2041 | 283-0076-00 |  | CAP, FXD,CER DI:27PF, 10\%, 500V | 59660 | 831-50052L270x |
| A22C2045 | 283-0013-00 |  | CAP, FXD,CER 01:0.01UF, -0+100\%, 1000V | 59660 | 818-6022SU0103p |
| A22C2052 | 283-0188-00 |  | CAP,FXD,CER DI:1000PF,20\%,6000V | 51406 | DHR19X5T 1024-6XV |
| A22C2055 | 283-0188-00 |  | CAP,FXD, CER DI:1000PF, 20\%,6000V | 51406 | DHR19X5T1024-6KV |
| A22C2056 | 283-0279-00 |  | CAP, FXD, CER DI:0.001UF, 20\% , 3000V | 51406 | OHR12Y5S102M3KV |
| A22C2066 | 283-0013-00 |  | CAP, FXD, CER DI:0.01UF, $-0+100 \%$, 1000V | 59660 | 818-6027SU0103P |
| A22CR2012 | 152-0409-00 |  | SEMICOND DVC, 01 : RECT , S1, 12K , 5MA , A298J | 83003 | VG12X-1 |
| A22CR2014 | 152-0409-00 |  | SEMICOND DVC, OI:RECT, SI, 12K,5Ma, 0298 J | 83003 | VG12X-1 |
| A22CR2016 | 152-0409-00 |  | SEMICOND DVC,DI:RECT,SI, 12K,5MA, 2298 J | 43003 | VG12X-1 |
| a22CR2021 | 152-0331-00 |  | SEMICOND DVC,DI:RECT, SI, 1,500 25MA | TK0191 | 152-0331-00 |
| A22CR2022 | 152-0331-00 |  | SEMICOND DVC, DI:RECT, SI, 1,500 25MA | TK0199 | 152-0331-00 |
| A22CR2023 | 152-0409-00 |  | SEMICOND DVC, DI:RECT, SI , 12K, 5MA , A298J | 83003 | VG12X-1 |
| 022CR2045 | 152-0242-00 |  | SEMICOND DVC, DI:SIG, SI, 225V,0.24, D0-7 | 07263 | FDH5004 |
| A22CR2052 | 152-0242-00 |  | SEIICOND DVC, DI:SIG, SI, 225V,0.24, D0-7 | 07263 | FOH5004 |
| A22CR2054 | 152-0242-00 |  | SEMICOND DVC,DI:SIG,S1, 225V,0.20,00-7 | 07263 | F0H5004 |
| A22CR2055 | 152-0242-00 |  | SEMICOND DVC, DI:SIG, SI , 225V,0.20,00-7 | 07263 | FDH5004 |
| A22CR2064 | 152-0242-00 |  | SEMICOND DVC, DI:SIG, SI , 225V,0.2A, DO-7 | 07263 | FDH5004 |
| 422052074 | 150-0035-00 |  | LAMP,GLON: 90V MAX, O.3MA, AID-T, MIRE LD | TK0213 | JH005/3011JA |
| A22K2014 | 108-0663-00 |  | COIL,REED SH: $12 \mathrm{~V}, 20 \mathrm{MA}$, SINGLE REED | 71707 | SP-12-P |
| A22L2018 | 108-0553-00 |  | COIL, RF:FIXED, 47NH | 32159 | 647000M |
| A22R2013 | 315-0182-03 |  | RES, FXD, CMPSN: 1.8 K OHM, $5 \%, 0.25 \mathrm{M}$ | 01121 | CB1825 AB ONLY |
| A22R2013 | 315-0202-02 |  | RES, FXD, CMPSN:2K OHM , 5\%, 0.25 N | 01121 | C82025 |
| A22R2013 | 315-0272-03 |  | RES, FXD, CMPSN:2.7K 5\%,0.25M | 80009 | 315-0272-03 |
| A22R2013 | 315-0392-03 |  | RES, FXD,CMPSN:3.9K OHM,57,0.25 | 01121 | CB3925 |
| A22R2013 | 315-0472-03 |  | RES,FXD,CMPSN: 4.7 K OHM, $5 \mathrm{~K}, 0.25 \mathrm{H}$ (NOWINAL VALUE) | 01121 | C84725 |
| A22R2013 | 315-0562-03 |  | RES, FXD, CMPSN:5.6K OHM , 5\%,0.25M | 01124 | CB5625 AB ONLY |
| A22R2013 | 315-0682-03 |  | RES , FXD, CMPSN: 6.8K OHM, $5 \%, 0.25 \mathrm{~N}$ | 01121 | C86825 |
| A22R2013 | 315-0821-03 |  | RES, FXO,CMPSN: 820 OHAM, 5\%, 0.25 M (A22R2013,TEST SELECTED) | 01121 | C88215 CARD PK |
| A22R2014 | 315-0102-03 |  | RES,FXD,CMPSN: 1 K OHM, 5\%,0.254 | 01121 | CB1025 |
| Q22R2015 | 301-0105-00 |  | RES, FXD, FILH: 1M OHM, $5 \%, 0.50 \mathrm{~N}$ | 19701 | 5053CX1M000J |
| A22R2016 | 301-0202-01 |  | RES, FXO, CMPSN: 2 K OHM, 5\%, 0.5 H | 01121 | E82025 |
| A22R2017 | 315-0102-03 |  | RES , FXD, CMPSN: 1 K OHM, 5\% , 0.25 H | 01121 | CB1025 |
| A22R2018 | 301-0153-00 |  | RES, FXO, FILM: 15 K OHM, 5\%, O , 5\% | 19701 | $5053 \mathrm{C} \times 15 \mathrm{K00J}$ |
| A2282031 | 301-0103-02 |  | RES , FXD, CMPSN: 10K OHM , 5\%, 0.5M | 01121 | E81035 |
| 922R2033 | 301-0103-02 |  | RES , FXD, CMPSN: 10 K OHM, 5\%, 0.5 M | 01121 | E81035 |
| A22R2034 | 315-0301-02 |  | RES, FXD, CMPSN: 300 OHM , 5Z, 0.25 H | 01121 | CB3015 |
| A22R2041 | 301-0754-01 |  | RES, FXD, CMPSN: 750 K OHM, 5\%, 0.5 H | 01121 | EB7545 |
| A22R2042 | 301-0754-01 |  | RES, FXD, CMPSN: 750 K OHM, $5 \mathbf{5 \%}, 0.54$ | 01121 | E 7545 |
| A22R2052 | 315-0243-03 |  | RES, FXD, CMPSN: 24 K OHM, 5\%,0.25M | 01121 | C82435 |
| A22R2055 | 315-0102-03 |  | RES , FXD, CMPSN: 1 K OHWN, 5\%,0.25M | 01121 | C81025 |
| A22R2056 | 301-0272-02 |  | RES, FXD, CMPSN:2.7K OHM, 5\%, 0.5 M | 01121 | E82725 |
| A22R2063 | 301-0102-03 |  | RES, FXD, CMPSN: 1 K OHH, 5X,0.5N | 01121 | EB1025 |
| A22R2064 | 307-0506-00 |  | RES NTMK, FXD, FI:HIGH VOLTAGE DIVIDER | 80009 | 307-0506-00 |
| A22R2066 | 315-0102-03 |  | RES , FXD, CMPSN: 1 K OHM , 5\%,0.25M | 01121 | C81025 |
| A22R2068 | 315-0206-01 |  | RES, FXO, CMPSN: 20 M OHM, $5 \mathbf{\%}, 0.25 \mathrm{M}$ | 01121 | CB2065 (AB ONLY) |
| A22R2074 | 315-0104-03 |  | RES, FXO, CMPSN: 100 K OHM $, 5 \%, 0.25 \mathrm{M}$ | 01121 | CB1045 |
| A22T2010 | 120-1065-02 |  | XFMR, PNR, STPDN:HIGH VOLTAGE | 80009 | 120-1065-02 |
| A22U2012 | 152-0652-00 |  | SEIICOND DVC, DI:HV MULT,SI,4KV PP IN, AKV OUT | 60211 | VM466 |
| A22VR2021 | 152-0247-00 |  | SEIICOND OVC, DI: $2 \mathrm{CN}, \mathrm{SI}, 150 \mathrm{~V}, 5 \mathrm{~K}, 0.4 \mathrm{H}, 00-7$ | 04713 | S7G275*1RL |


| Component No， | Tektronix Part No． | Serial／Assembly No． Effective Dscont | Name \＆Description | Mfr． Code | Mfr Part＿No |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 023 | 670－9499－00 |  | CIRCUIT BD ASSY：FOCUS | 80009 | 670－9499－00 |
| A23C2101 | 283－0005－00 |  | CAP，FXO，CER DI：0．01UF，＋100－0\％，250V | 04222 | SR303E1032an |
| A23C2112 | 283－0005－00 |  | CAP，FXD，CER DI：0．01UF，＋100－0\％，250V | 04222 | SR303E1032AA |
| A23C2113 | 283－0005－00 |  | CAP，FXD，CER DI：0．01UF，＋100－0\％，250V | 04222 | SR303E1032AA |
| A23C2146 | 283－0013－00 |  | CAP，FXD，CER DI：0．01UF，$-0+100 \%, 1000 \mathrm{~V}$ | 59660 | B18－60225U0103P |
| A23C2117 | 283－0013－00 |  | CAP，FXD，CER DI：0．04UF，$-0+100 \%, 1000 \mathrm{~V}$ | 59660 | B18－6022SU0103P |
| A23C2119 | 290－0767－00 |  | CAP ，FXD，ELCTLT：4．7UF＋ $75-10 \%$ ，160VDC | 54473 | ECEA2CS4R7 |
| A23C2121 | 290－0767－00 |  | CAP，FXD，ELCTLT：4．7UF，＋75－10\％，160VOC | 54473 | ECEA2CS4R7 |
| A23C2132 | 283－0000－00 |  | CAP，FXD，CER DI：0．001UF ，＋100－0\％，500V | 59660 | 831－610－Y5U0102P |
| A23C2134 | 290－0778－00 |  | CAP，FXO，ELCTLT：1UF ， $50-10 \%$ ，50V ，NPLZO | 54473 | ECE－A50N1 |
| A23C2139 | 283－0000－00 |  | CAP，FXD，CER DI：0．001UF，＋100－0\％，500V | 59660 | 831－610－Y5U0102P |
| A23C2150 | 283－0013－00 |  | CAP，FXD，CER DI：0．01UF，$-0+100 \%$ ，1000V | 59660 | 818－6022Sし0103P |
| A23C2151 | 283－0013－00 |  | CAP，FXD，CER DI：0．01UF，$-0+100 \%$ ，1000V | 59660 | 818－602LSU0103P |
| A23C2152 | 283－0013－00 |  | CAP，FXD，CER DI：0．01UF， 0 ＋100\％，1000V | 59660 | 818－6022SU0103P |
| A23C2455 | 283－0013－00 |  | CAP，FXD，CER DI：0．01UF，$-0+100 \%$ ，1000V | 59660 | 818－602LSU0103P |
| A23C2456 | 283－0084－00 |  | CAP，FXD，CER DI：270PF，5\％，1000V | 59660 | $838533 \times 5$ F02715 |
| A23C2193 | 283－0013－00 |  | CAP，FXD，CER DI：0．01UF ， 0 － 0 100\％，1000V | 59660 | 818－6022SU0103P |
| A23C2197 | 283－0013－00 |  | CAP，FXD，CER DI：0．01UF，$-0+100 \%$ ，1000V | 59660 | 818－60225U0103P |
| A23CR2115 | 152－0331－00 |  | SEMICOND DVC，DI：RECT，SI， 1,500 25MA | TK0191 | 152－0331－00 |
| A23CR2118 | 152－0586－00 |  | SEIICOND DVC，DI：RECT，SI，600V ， 0.54 | 25403 | BYV960 OR BYV95C |
| A23CR2119 | 152－0586－00 |  | SEIICOND DVC，DI：RECT，SI，600V，0．5A | 25403 | BYV96D OR BYV95C |
| A23CR2123 | 152－0141－02 |  | SEMICOND DVC，DI：SH，SI，30V，150MA，30V，00－35 | 03508 | DA2527（1N4152） |
| A23CR2125 | 152－0141－02 |  | SEMICOND DVC，DI：SH，SI，30V ，150MA ，30V ，00－35 | 03508 | DA2527（ 1 N4152） |
| A23CR2133 | 152－0242－00 |  | SEMICOND DVC，DI：SIG， $51,225 \mathrm{~V}, 0.2 \mathrm{~A}, 00-7$ | 07263 | FOH5004 |
| A23CR2134 | 152－0141－02 |  | SEAICOND DVC，DI：SH，SI，30V，150MA，30V ，00－35 | 03508 | 0A2527（1N4 152） |
| A23CR2144 | 152－0141－02 |  | SEMICOND DVC ，DI：SH， $51.30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | DA2527（1N4152） |
| A23CR2145 | 152－0141－02 |  | SEAICOND DVC，DI：SH，SI，30V，150MA，30V，00－35 | 03508 | Da2527（1N4152） |
| A23CR2152 | 152－0331－00 |  | SEMICOND DVC，DI：RECT，SI，1，500 25MA | TK0191 | 152－0331－00 |
| A23CR2153 | 152－0331－00 |  | SEMICOND DVC，DI：RECT，SI，1，500 25MA | TK0491 | 152－0331－00 |
| A23CR2155 | 152－0331－00 |  | SEMICOND DVC，DI：RECT，SI，1，500 25MA | TK0191 | 152－0331－00 |
| A23CR2162 | 152－0141－02 |  | SEMICOHD DVC，DI：SK， $51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | 0A2527（ 1 N4152） |
| A23CR2174 | 152－0242－00 |  | SEMICOHD DVC，DI：SIG ，SI，225V， $0.2 \mathrm{~A}, \mathrm{DO}-7$ | 07263 | FDH5004 |
| A23CR2175 | 152－0242－00 |  | SEMICOND DVC，01：SIG，5I，225V，0．20，D0－7 | 07263 | FDH5004 |
| A23CR2176 | 152－0242－00 |  | SEMICOHD DVC，0I：SIG，51，225V，0．2A，D0－7 | 07263 | FDH5004 |
| A23CR2195 | 152－0141－02 |  | SEMICOND DVC，DI：SN，SI， $30 \mathrm{~V}, 15044,30 \mathrm{C}, 00-35$ | 03508 | Da2527（1N4152） |
| A23K2155 | 108－0405－00 |  | COIL，REED SK： | 80009 | 108－0405－00 |
| A2302108 | 151－0192－00 |  | TRANSISTOR：SELECTED | 04713 | SPS8801 |
| 42302132 | 151－0169－00 |  | TRONSISTOR：NPN，SI ，T0－5 | 04713 | ST830 |
| 42302140 | 151－0190－00 |  | TRANSISTOR：NPN，SI，T0－92 | 80009 | 151－0190－00 |
| A2302152 | 151－0350－00 |  | TRANSISTOR：PNP，SI，T0－92 | 04713 | SPS6700 |
| A2302156 | 151－0385－00 |  | TRANSISTOR：PNP，SI，T0－5 | 02735 | 245416－17 |
| A2302160 | 151－0347－00 |  | TRANSISTOR：NPN，S1，T0－92 | 04713 | SPS7951 |
| A2302162 | 151－0192－00 |  | TRANSISTOR：SELECTED | 04713 | SPS8801 |
| A2302172 | 151－0347－00 |  | TRANSISTOR：NPN，SI，T0－92 | 04713 | SPS7951 |
| A2302178 | 151－0190－00 |  | TRANSISTOR：NPN，SI，T0－92 | 80009 | 151－0190－00 |
| 42302182 | 151－0347－00 |  | TRANSISTOR：NPN，SI，T0－92 | 04713 | SPS7951 |
| 42302188 | 151－0444－00 |  | TRANSISTOR：NPN，SI ，T0－92 | 04713 | SPS797 |
| 42302195 | 151－0444－00 |  | TRANSISTOR：NPN，SI，T0－92 | 04743 | SPS797 |
| 423R2101 | 315－0221－00 |  | RES，FXO，FILM：220 OHM ，5\％， 0.25 M | 57668 | NTR25 $\downarrow$－E220E |
| A23R2102 | 321－0385－00 |  | RES，FXD，FILM：100K OHM，1\％，0．125n， $\mathrm{TC}=\mathrm{TO}$ | 19701 | 5033ED100KDF |
| a23R2103 | 321－0364－00 |  | RES，FXD，FILM：60．4K OHM，1\％， $0.125 \mathrm{H}, \mathrm{TC}=$ T0 | 19701 | 5043ED60K40F |
| A23R2104 | 321－0293－00 |  | RES，FXD，FILM： 11.0 OK OH， $1 \%, 0.125 \mathrm{H}, \mathrm{TC}=$ TO | 07716 | CEAD11001F |
| A23R2105 | 341－2274－00 |  | RES，YAR，NONM：TRMR，5K OKM，20\％，0．5 | TK1450 | GFOEVT 5 K OHM |
| A23R2106 | 321－0314－00 |  | RES，FXO，FILM：18．2K OHM，1\％， $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5043ED18K20F |
| A23R2108 | 315－0683－00 |  | RES，FXD，FILM：68K OHM， $5 \%, 0.25 \mathrm{M}$ | 57668 | NTR25J－E68＊0 |
| 423R2109 | 315－0433－00 |  | RES，FXO，FILM： 43 K OHN， $5 \mathrm{~K}, 0.25 \mathrm{~N}$ | 19701 | 5043CX43K00」 |
| A23R2110 | 311－2265－00 |  | RES ，VAR，NONW：TRWR，200K OHM，20\％，D ．5M | TK1450 | GFO6VT 200 K OHM |
| a73R2111 | 345－0221－00 |  | RES，FXD，FILM：220 0Hw，5\％，0．25W | 5766日 | NTR25J－E220E |
| A23R2112 | 315－0101－00 |  | RES，FXD，FILA： 100 OHM，5\％，0．25M | 57668 | NTR25J－E 100E |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A23R2113 | 315-0104-00 |  | RES , FXD, FILM: 100 K OHM , 5\% , 0.25 ${ }^{\text {W }}$ | 57668 | NTR25J-E100K |
| A23R2114 | 315-0562-00 |  | RES, FXD, FIL $: 5.6 \mathrm{~K}$ OHM , $57,0.25 \mathrm{~W}$ | 57668 | NTR25J-E05K6 |
| A23R2116 | 303-0182-00 |  | RES, FXD, CMPSN:1.8K OHN, 5\%, 1 N | 01121 | GB1825 |
| A23R2119 | 303-0560-00 |  | RES, FXD, CMPSN: 56 OHM , $5 \boldsymbol{\chi}$, 1M | 01121 | G85605 |
| A23R2121 | 301-0100-00 |  | RES, FXD, FILM:10 OHM, $5 \%, 0.50 \mathrm{~N}$ | 80009 | 301-0100-00 |
| A23R2124 | 315-0562-00 |  | RES, FXD, FIL | 57668 | NTR25J-E05K6 |
| A23R2125 | 315-0562-00 |  | RES, FXD, FILM: 5.8 K OHM , 5Z, 0.25 K | 57668 | NTR25J-E05K6 |
| A23R2132 | 315-0332-00 |  | RES, FXO, FILM: 3.3 K OHM , $5 \mathrm{~L}, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E03K3 |
| A23R2134 | 315-0820-00 |  | RES, FXD, FILM: 82 OHM, 5\%, 0.25 H | 57668 | NTR25J-E82E0 |
| A23R2135 | 311-2269-00 |  | RES, VAR,NONH: TRMR, 20K OHM , 20\% , 0.5 | TK1450 | GFO6VT 20 K OHM |
| A23R2136 | 315-0243-00 |  | RES,FXD,FILM:24K OHM, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-E24K0 |
| A23R2137 | 315-0183-00 |  | RES, FXO, FILM: 19 K OHM, $5 \%, 0.25 \mathrm{M}$ | 19701 | 5043 CX18K00J |
| A23R2139 | 315-0102-00 |  | RES, FXD, FILM: 1 K OHM , $57,0.25 \mathrm{H}$ | 57668 | NTR25JE01k0 |
| A23R2140 | 311-2270-00 |  | RES, VAR, NONWH: TRMR, 10K OHM, 20\% , 0.5 W | TK1450 | GFOEVT 10 K OHM |
| A23R2149 | 323-0481-00 |  | RES, FXD, FILS: 1 MEG OHM, 1\%, $0.5 \mathrm{M}, \mathrm{TC}=$ T0 | 75042 | CECTO-1004F |
| A23R2142 | 323-0481-00 |  | RES, FXD, FILS: 1 MEG OHM , 1\%, $0.5 \mathrm{Sh}, \mathrm{TC}=$ T0 | 75042 | CECTO-1004F |
| A23R2144 | 321-0409-00 |  | RES, FXO, FIL 1 178K OHM, 1\%,0.125 , TC=T0 | 07716 | CEAD17802F |
| A23R2145 | 321-0418-00 |  | RES, FXD, FILK:221K OHw, 1\% , 0.125H, TC=T0 | 07716 | CEA022102F |
| A23R2148 | 315-0333-00 |  | RES, FXD, FILM: 33 K OHM, $5 \mathrm{Z}, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E3JK0 |
| A23R2147 | 315-0103-00 |  | RES, FXD, FILM: 10 K OHM , 57,0.25W | 19701 | 5043CX10K00J |
| A23R2150 | 315-0152-00 |  | RES, FXD,FILM: 1.5 K OHM $, 58,0.25 \mathrm{H}$ | 57868 | NTR25J-E01K5 |
| A23R2151 | 315-0153-00 |  | RES, FXD, FILH: 15 K OHM, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 19701 | 5043CX15K00J |
| A23R2152 | 315-0474-00 |  | RES, FXD, FILM: 470 K OHM $, 5 \chi, 0.25 \mathrm{H}$ | 19701 | 5043CX470K0.J92U |
| A23R2153 | 315-0151-00 |  | RES, FXD, FILM: 150 OHM, 5\%, 0.25 M | 57668 | NTR25J-E150E |
| A23R2154 | 315-0153-00 |  | RES, FXD, FILM: 15 K OHM, $5 \mathrm{z}, 0.25 \mathrm{~K}$ | 19701 | $5043 \mathrm{C} \times 15 \mathrm{~K} 00 \mathrm{~J}$ |
| A23R2155 | 315-0153-00 |  | RES, FXD,FILM:15K OHM, $5 \mathbf{\chi}, 0.25 \mathrm{M}$ | 19701 | $5043 \mathrm{C} \times 15 \mathrm{K00J}$ |
| A23R2160 | 315-0333-00 |  | RES, FXD, FIL H :33K OHW, $5 \mathrm{~K}, 0.25 \mathrm{M}$ | 57668 | NTR25J-E33K0 |
| A23R2161 | 315-0473-00 |  | RES, FXD,FILS:47K OHM, 57,0.25H | 57668 | NTR25J-E47K0 |
| A23R2162 | 321-0372-00 |  | RES,FXD,FILM:73.2K OHM, 12,0.125 , TC=T0 | 07716 | CEA073201F |
| A23R2164 | 321-0397-00 |  | RES, FXO, FILM: 133 K OHM, 1\%,0.125H, TC=T0 | 19701 | 5043ED133K0F |
| A23R2166 | 323-0481-00 |  | RES, FXO, FILS: 1 MEG OHW, 1\%, 0.5 H , TC= TO | 75042 | CECTO-1004F |
| A23R2167 | 323-0481-00 |  | RES, FXO, FILM: 1 MEG OHM, 1\%, $0.5 \mathrm{H}, \mathrm{TC}=$ TO | 75042 | СЕСТ0-1004F |
| 223R2168 | 315-0155-00 |  | RES, FXD, FILY: 1.5 M OHM, $57,0.25 \mathrm{H}$ | 19701 | 5043CX14500J |
| A23R2171 | 315-0473-00 |  | RES, FXO,FILM:47K OHM, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E47K0 |
| A23R2172 | 315-0103-00 |  | RES, FXO, FIL $: 10 \mathrm{~K}$ OHW, $5 \%, 0.25 \mathrm{H}$ | 19701 | $5043 \mathrm{CX10} \mathrm{\% 00J}$ |
| A23R2173 | 301-0824-00 |  | RES, FXD, FIU : 820 K OHM, $5 \mathbf{1}, 0.5 \mathrm{H}$ | 19701 | 5053Cx820k0」 |
| A23R2174 | 301-0824-00 |  | RES, FXO, FILM: 820 K OHM, $5 \%, 0.5 \mathrm{M}$ | 19701 | 5053Cx820x0 J |
| A23R2175 | 311-2266-00 |  | RES , VAR , NOW W: TRMR, 100K OHM , 20\% , 0.5 W | TK1450 | GFO6VT 100 K OHM |
| A23R2178 | 315-0474-00 |  | RES, FXO, FILM:470K OHM, 57, 0.25 H | 19701 | 5043CX470K0J92U |
| A23R2180 | 311-2262-00 |  | RES, VAR, NONW | TK1450 | GFOGVT 1 M OHM |
| A23R2181 | 315-0474-00 |  | RES, FXD, FILM: $470 \mathrm{~K} 0 \mathrm{HM}, 5 \mathrm{~K}, 0.254$ | 19701 | 5043CX470K0J92J |
| A23R2182 | 315-0223-00 |  | RES, FXO, FILM: 22K OHM , $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 19701 | 5043C×22K00J92U |
| A23R2183 | 322-0377-00 |  | RES, FXD, FILM:82.5K OHN, 1\%, $0.25 \mathrm{~W}, \mathrm{TC}=$ TO | 24546 | Na6008252F |
| A23R2187 | 321-0298-00 |  | RES, FXD, FIU: 12.4 K OHM, 1\%, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 07716 | CEAD12401F |
| A23R2188 | 315-0473-00 |  | RES, FXD, FILM:47K OHM, 5\%,0.25\% | 57668 | NTR25J-E47KD |
| A2382189 | 301-0304-00 |  | RES, FXD, FIUH:300K OHM , 5x, 0.5 SK | 19701 | 5053CX300K0J |
| A23R2191 | 315-0221-00 |  | RES, FXD,FIUM:220 OHM , 5\%,0.25M | 57668 | NTR25J-E220E |
| A2302192 | 301-0105-00 |  | RES, FXO, FILH: 1 M OHM, $57,0.50 \mathrm{M}$ | 19701 | 5053CX14000J |
| A23R2193 | 301-0105-00 |  | RES, FXO, FIUM: 1 M OHm, $5 \mathrm{~K}, 0.50 \mathrm{H}$ | 19701 | 5053Cx1m000J |
| A23R2194 | 303-0224-00 |  | RES, FXD, CMPSN: 220K OHM, 5\%, 1\% | 01121 | G82245 |
| A23R2196 | 303-0154-00 |  | RES, FXD,CMPSN: 150K OHM , 5\%, in | 24546 | FP1 150K OHM 5\% |
| A2382197 | 301-0153-00 |  | RES, FXD, FILM: 15 K OHM , 5x,0.5 5 | 19701 | 5053CX15K00, |
| A23R2198 | 315-0221-00 |  | RES, FXD, FILM:220 OHM , 5\%, 0.25 K | 57668 | NTR25J-E220E |
| A23VR2133 | 152-0289-00 |  | SENICOND DVC, D1: 2 ES, SI, 180V,5\%, 0.4N, 00-7 | 04713 | SZ12484KRL |


| Component No． | Tektronix Part No． | Serial／Assembly No． Effective Dscont | Name \＆Description | Mfr． Code | Mfr．Part No． |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A25 | 670－9383－00 |  | CIRCUIT 8D ASSY：STORAGE | 80003 | 670－9383－00 |
| A2502507 | 283－0187－00 |  | CAP，FXO，CER DI：0．047UF，10\％，400V | 04222 | 5R308С473K日号 |
| A25C2521 | 290－0778－00 |  | CAP，FXD，ELCTLT： 1 UF，＋50－10\％，50V ，NPLZD | 54473 | ECE－A50N1 |
| A25C2523 | 290－0778－00 |  | CAP，FXD，ELCTLT： $14 \mathrm{~F},+50-10 \%$ ，50V ，NPL 2 D | 54473 | ECE－A50N 9 |
| A25C2528 | 290－0778－00 |  | CAP，FXO，ELCTLT： 1 UF，$+50-10 \%$ ，50V ，NPL 20 | 54473 | ECE－A50N1 |
| A25C2534 | 290－0114－00 |  | CAP，FXO，ELCTLT：47UF，20\％，6V | 05397 | T1108476M006aS |
| A25C2542 | 281－0775－00 |  | CAP ，FXO，CER 01：0．1UF，20\％， 50 V | 04222 | MAZ05E104MAD |
| 025c2562 | 290－0297－00 |  | CAP，FXO，ELCTLT：39UF，10\％，10V | 05397 | T1108396K010as |
| A25C2565 | 281－0850－00 |  | CAP，FXD，CER DI：820PF ，5\％，50VDC | 04222 | Ma1014821JAA |
| A25C2577 | 283－0187－00 |  | CAP，FXO，CER 01：0．047UF，10\％，400V | 04222 | SR30日C473KAA |
| A25C2592 | 281－0826－00 |  | CAP，FXD，CER DI：2200PF，5\％，100V | 20932 | 401EM100AD222K |
| A25C2594 | 290－0297－00 |  | CAP，FXD，ELCTLT：39UF，10\％，10V | 05397 | T1108396K010as |
| A25C2608 | 283－0005－02 |  | CAP，FXD，CER DI：0．01UF，＋80\％－20\％，250V | 54583 | FK2625U201032－T |
| A25C2626 | 283－0005－02 |  | CAP ，FXD，CER DI：0．01UF，$+80 \%$－20\％，250V | 54583 | FK2625U201032－T |
| A25C2662 | 283－0203－00 |  | CAP ，PXO，CER DI：0．47UF， $20 \%$ ，50V | 04722 | SR305SC474MAA |
| A25C2663 | 290－0778－00 |  | CAP，FXO，ELCTLT： 1 UF ，＋50－10x，50V ，NPLZD | 54473 | ECE－A50N1 |
| A25C2668 | 283－0177－00 |  | CAP，FXD，CER DI：1UF，＋80－20\％，25V | 04222 | SR302E 105laatr |
| A25C2679 | 283－0005－02 |  | CAP ，FXD，CER DI：0．01UF ，＋80\％－20\％，250V | 54583 | FK2625U201032－T |
| A25C2676 | 290－0535－00 |  | CAP，FXD，ELCTLT：33UF，20\％，10V TANTALUM | 56289 | 1960336X0010KA1 |
| A25¢2683 | 283－0005－02 |  | CAP ，FXD，CER DI：0．01UF，＋80\％－20\％，250V | 54583 | FX26250201032－T |
| A25C2684 | 283－0005－02 |  | CAP ，FXD，CER DI：0．01UF，＋80\％－20\％，250V | 54583 | FK2625U201032－T |
| A25C2685 | 290－0114－00 |  | CAP，FXD，ELCTLT：47UF，20\％，6V | 05397 | T1108476W006aS |
| A25C2686 | 290－0530－00 |  | CAP，FXD，ELCTLT：68UF，20\％，6V | 56289 | 1960686X0006K01 |
| A25C2696 | 290－0297－00 |  | CAP，FXD，ELCTLT：39UF，10\％，10V | 05397 | T1108396K010as |
| A25C2718 | 281－0589－00 |  | CAP ，FXD，CER DI：170PF ，5x，500V | 52763 | 2RDPL2007170PJK |
| A25C2753 | 290－0340－00 |  | CAP，FXD，ELCTLT：10UF，10\％，50V | 56289 | 1090106×9050C2 |
| A25C2770 | 290－0244－00 |  | CAP，FXD，ELCTLT：0．47UF ，5\％，35V | 56289 | 173D474X5035J |
| A25C2774 | 283－0150－00 |  | CAP，FXD，CER DI：650PF，5\％，200V | 59821 | 20DH60K651J |
| A25C2804 | 283－0005－02 |  | CAP，FXD，CER DI： $0.01 \mathrm{UF}+80 \%$－20\％，250V | 54583 | FK2625U20103L－T |
| A25C2809 | 290－0778－00 |  | CAP，FXD，ELCTLT：1UF，＋50－10\％，50V ，NPL2D | 54473 | ECE－A50N1 |
| A25C2813 | 283－0005－02 |  | CAP，FXD，CER DI：0．01UF，＋80\％－20\％，250V | 54583 | FK2625U201032－T |
| A25C2814 | 283－0005－02 |  | CAP，FXD，CER DI：0．01UF，＋807－20\％，250V | 54583 | FK2625U201032－T |
| A25C2815 | 281－0627－00 |  | CAP，FXD，CER DI：1PF，$+1 / 0.25 \mathrm{PF}, 500 \mathrm{~V}$ | 52763 | 2RDPL2007 1P00CC |
| A25C2827 | 283－0631－00 |  | CAP，FXD，MICA DI：95PF，12，500V | 00853 | 0155F950F0 |
| A25C2833 | 290－0164－00 |  | CAP，FXD，ELCTLT：1UF ，＋50－10\％，150V | 56289 | 5000105F150807 |
| A25C2835 | 283－0631－00 |  | CAP，FXD，MICA OI：95PF，1\％，500V | 00853 | 0155F950F0 |
| A25C2839 | 283－0895－00 |  | CAP，FXO，CER DI：0．033UF，20\％，200V | 04222 | SR306C333MAATR |
| A25C2843 | 283－0107－00 |  | CAP，FXO，CER OI：51PF，5\％，200V | 04222 | SR206A510JAA |
| A25C2864 | 283－0005－02 |  | CAP，FXD，CER DI：0．01UF，＋802－202， 250 V | 54583 | FK2625U201032－T |
| A25C2867 | 281－0775－00 |  | CAP，FXD，CER DI：0．1UF，202，50V | 04222 | MA205E104MAD |
| A25C2869 | 283－0000－00 |  | CAP，FXD，CER DI：0．001UF，＋100－0\％，500V | 59660 | 831－610－Y540102P |
| A25C2874 | 283－0057－00 |  | CAP ，FXD，CER 01：0．1UF ，＋80－20\％，200V | 04222 | SR306E1042aA |
| A25C2912 | 281－0762－00 |  | CAP，FXO，CER 01：27PF，20\％，100V | 04222 | KA1010270MAA |
| A25C2915 | 283－0000－00 |  | CAP，FXD，CER DI： $0.001 \mathrm{UF}, \mathbf{+ 1 0 0 - 0 2 , 5 0 0 V}$ | 59660 | 831－610－Y510102P |
| A25C2927 | 283－0895－00 |  | CAP，FXD，CER DI：0．033UF，202，200V | 04222 | SR306C33ЗМААTR |
| A25C2948 | 283－0057－00 |  | CAP，FXD，CER 01：0．1UF，+80 －20\％，200V | 04222 | SR306E104ZAA |
| A25C3053 | 290－0530－00 |  | CAP，FXD，ELCTLT：68UF，20\％，6V | 56289 | 1960686X0006KA1 |
| A25C3072 | 281－0775－00 |  | CAP，FXD，CER DI：0．1UF，20\％，50V | 04222 | Mazose104man |
| A25C3074 | 290－0944－00 |  | CAP，FXO，ELCTLT：220UF，＋50－10\％，10V | 55680 | ulb1az21tpanna |
| A25C3076 | 281－0775－00 |  | CAP，FXD，CER DI： $0.14 \mathrm{~F}, 20 \mathrm{Z}, 50 \mathrm{~V}$ | 04222 | MAZ05E104MAA |
| A25C3077 | 283－0005－02 |  | CAP，FXD，CER DI：0．01UF，＋802－202，250V | 54583 | FK2615U201031－T |
| A25C3078 | 281－0775－00 |  | CAP，FXO，CER DI：0．1UF，20\％，50V | 04222 | MA205E104MAA |
| A25C3079 | 285－1077－00 |  | CAP，FXO，PLASTIC：0．1UF，20\％，500V | 14752 | 23081F104M |
| A25CR2514 | 152－0141－02 |  | SENICONO DVC， $\mathrm{OL}:$ SM，SI，30V， 150 MA ，30V ，00－35 | 03508 | OA2527（1N4152） |
| A25CR2515 | 152－0141－02 |  | SEAICOND DVC ，DI：SK ，SI ，30V ，150MA ，30V ，D0－35 | 03508 | Da2527（ $1 \times 4152$ ） |
| A25CR2526 | 152－0141－02 |  | SEAICOAD DVC，DI：Sh， $51,30 \mathrm{~V}, 150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | 002527 （1N4152） |
| A25CR2528 | 152－0141－02 |  | SEMICOND DVC，DI：SH，SI，30V，150MA，30V，00－35 | 03508 | DA2527（1N4152） |
| A25CR2535 | 152－0141－02 |  | SEAICOND DVC，DI：SM，SI，30V，150ma，30V，00－35 | 03508 | DA2527（1N4152） |
| A25CR2542 | 152－0141－02 |  | SEMICDND DVC， $01: 5 \mathrm{SH}, \mathrm{SI}, 30 \mathrm{~V}, 150 \mathrm{ma}, 30 \mathrm{~V}, \mathrm{DO}-35$ | 03508 | 0，22527（1N4152） |


| Component No, | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mir. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A25CR2551 | 152-0141-02 |  | SEMICOND DVC , DI:SH, SI , 30V , 150MA , 30V.00-35 | 03508 | 002527 (1N4152) |
| A25CR2552 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI , 30V, 150MA, 30V , DO-35 | 03508 | DA2527 (1N4152) |
| A25CR2553 | 152-0141-02 |  | SEMICOND DVC, DI: SW, SI, 30V,150MA, 30V, D0-35 | 03508 | 0Q2527 (1N4152) |
| A25CR2554 | 152-0141-02 |  | SEMICOND DVC, OI:SW, SI, 30V , 150MA, 30V , 00-35 | 03508 | 002527 (1N4152) |
| A25CR2555 | 152-0141-02 |  | SEMICOND DVC, DI:SN,S1,30V,150MA,30V,00-35 | 03508 | DQ2527 (1N4152) |
| A25CR2564 | 152-0141-02 |  | SEMICOND DVC,DI:SW,SI, 30V,150MA,30V,00-35 | 03508 | DA2527 (1N4152) |
| A25CR2565 | 152-0141-02 |  | SEAICOND DVC, DI:SK, SI ,30V, 150Ma, 30V, D0-35 | 03508 | Da2527 (1N4152) |
| A25CR2582 | 152-0141-02 |  | SEMICOND DVC, DI:SN, SI , 30V , 150Ma, 30V, D0-35 | 03508 | 042527 (1N4152) |
| A25CR2610 | 152-0141-02 |  | SEMICOND DVC, DI:SN,SI, 30V, 150MA , 30V , D0-35 | 03508 | 042527 (1N4152) |
| A25CR2611 | 152-0141-02 |  | SEMICOND OVC, DI: SN, SI, 30V , 150Ma, 30V,00-35 | 03508 | 042527 (1N4152) |
| A25CR2612 | 152-0141-02 |  | SEAICOND DVC, DI:SH,SI,30V,150MA,30V, D0-35 | 03508 | Da2527 (1N4152) |
| A25CR2613 | 152-0141-02 |  | SEAICOND DVC, DI:SH,51, 30V , 150MA,30V , D0-35 | 03508 | 042527 (1N4152) |
| A25CR2614 | 152-0141-02 |  | SEAICOND DVC, DI:SW, SI, 30V, 150MA , 30V , D0-35 | 03508 | 042527 (1N4152) |
| A25CR2615 | 152-0141-02 |  | SEAICOND DVC, DI:SH, SI , 30V, 150MA, 30V , D0-35 | 03508 | DA2527 (1N4152) |
| A25CR2626 | 152-0141-02 |  | SEMICOND DVC, DI:SW, SI, 30V, 150MA, 30V, $00-35$ | 03508 | Da2527 (1N4152) |
| A25CR2643 | 152-0141-02 |  | SEKICOND DVC,DI:SH,5I,30V,150MA ,30V, D0-35 | 03508 | Da2527 (1N4152) |
| A25CR2644 | 152-0141-02 |  | SEMICOND DVC, DI:SH,SI, 30V,150MA, 30V, D0-35 | 03508 | DA2527 (1N4152) |
| A25CR2646 | 152-0141-02 |  | SEMICOND DVC,DI:SH,SI, 30V,150MA,30V,00-35 | 03508 | DA2527 (1N4 152) |
| A25CR2663 | $152-0664-00$ |  | SEMICOND DVC, DI:SCHOTTKY, 5h, SI , 70V, 00-35 | 80009 | $152-0664-00$ |
| A25CR2664 | 152-0141-02 |  | SEMICOND OVC, DI: SH, SI , 30V, 150MA, 30V, 00-35 | 03508 | DA2527 (1N4152) |
| A25CR2686 | 152-0141-02 |  | SEMICOND OVC, DI:SH,5I, 30V, 150MA, 30V, 00-35 | 03508 | DA2527 (1N4152) |
| A25CR2687 | 152-0141-02 |  | SEMICOND DVC, DI:SN, SI , 30V, 150MA, 30V, D0-35 | 03508 | Da2527 (1N4152) |
| A25CR2704 | 152-0141-02 |  | SEMICOND DVC, DI: SM, SI, 3DV, 150MA, 30V, D0-35 | 03508 | DA2527 (1N4152) |
| A25CR2705 | 152-0141-02 |  | SEAICOND DVC, DI:SH, SI , 30V, 150Ma,30V, DO-35 | 03508 | 0A2527 ( 9 N4152) |
| A25CR2706 | 152-0141-02 |  | SEMICOND OVC, DI:SH, SI, 30V, 150MA, 30V,00-35 | 03508 | 042527 ( 4 N4152) |
| A25CR2707 | 152-0141-02 |  | SEMICOND DVC, DI:SH, SI, 30V, 150MA , 30V, 00-35 | 03508 | 092527 (1N4152) |
| A25CR2708 | 152-0141-02 |  | SEMICOND DVC, DI: SN, SI, 30V, 150MA, 30V, 00-35 | 03508 | DA2527 (1N4152) |
| A25CR2709 | 152-0141-02 |  | SEAICOND DVC, DI:SH, SI, 30V, 150MA, 30V,00-35 | 03508 | DA2527 (1N4152) |
| A25CR2710 | 152-0141-02 |  | SEAICOND DVC, DI:SH,SI, 30V, 150MA, 30V, D0-35 | $03508$ | DA2527 (1N4152) |
| A25CR2721 | 152-0141-02 |  | SEMICOND DVC, DI:SK, SI , 30V, 150MA, 30V,00-35 | 03508 | 0A2527 (1N4152) |
| A25CR2722 | 152-0141-02 |  | SEAICOND OVC, DI:SH, SI , 30V, 150MA, 30V , 00-35 | 03508 | Da2527 ( 1 N4152) |
| A25CR2723 | 152-0141-02 |  | SEMICOND DVC, DI:SH, SI , 30V, 150MA, 30V, D0-35 | 03508 | 042527 (1N4152) |
| A25CR2724 | 152-0141-02 |  | SEMICOND DVC, DI:SN,SI, 30V, $150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | 042527 (1N4152) |
| A25CR2725 | $152-0141-02$ |  | SEIICOND DVC, DI: SM, SI , 30V, 150MA, 30V, D0-35 | 03508 | 0A2527 (1N4152) |
| A25CR2726 | 152-0141-02 |  | SEMICOND DVC, DI: 5N, 5I, 30V, 150MA, 30V, D0-35 | 03508 | DA2527 (1N4152) |
| A25CR2737 | 152-0141-02 |  | SEIICOND DVC, DI:SN, SI , 30V, 150MA, 30V, 00-35 | 03508 | DA2527 (1N4152) |
| A25CR2743 | 152-0141-02 |  | SEMICOND OVC, DI: SH, $51,30 \mathrm{~V}, 150 \mathrm{Ma,30V}$, 00-35 | 03508 | 002527 (1N4152) |
| A25CR2774 | 152-0141-02 |  | SEIICONO DVC, DI: SH, SI , 30V, 150ma, 30V , 00-35 | 03508 | 002527 (1N4152) |
| A25CR2813 | 150-1036-00 |  | LT EMITTING DIO:RED,650NM,40MA MAX | 58361 | 06878/MV5074C |
| A25CR2814 | 152-0141-02 |  | SEAICOND DVC, DI:SM,SI, 30V, 150MA, 30V , 00-35 | 03508 | 0.25227 (1N4152) |
| A25CR2825 | 152-0141-02 |  | SEMICOND DVC, DI: SN, SI, 30V, 150MA, 30V, 00-35 | 03508 | DA2527 (1N4152) |
| A25CR2826 | 152-0141-02 |  | SEIICOND DVC,DI:SH,5I, 30V , 150Ma, 30V, D0-35 | 03508 | DA2527 (1N4152) |
| A25CR2828 | 152-0040-00 |  | SENICOMD DVC, DI:RECT , SI, 600V , 19, D0-41 | 80009 | 152-0040-00 |
| A25CR2831 | 150-1036-00 |  | LT EMITTIN DID:RED,650\%m, 40NA MAX | 58361 | 06878/MV5074C |
| A25CR2833 | 152-0040-00 |  | SEMICOND DVC, DI:RECT, SI , 600V , 19, D0-41 | 80009 | $152-0040-00$ |
| A25CR2834 | 152-0141-02 |  | SEIICOND OVC ,DI:SW, SI , 3DV , 150MA.30V , 00-35 | 03508 | Da2527 (1N4152) |
| A25CR2839 | 152-0040-00 |  | SEAICOND DVC, DI :RECT, SI ,600V , 10, 100-41 | 80009 | 152-0040-00 |
| A25CR2848 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI , 30V , 150MA , 30V , D0-35 | 03508 | 002527 (1N4152) |
| A25CR2849 | 152-0141-02 |  | SENICONO DVC, DI: SM, SI, 30V, $150 \mathrm{MA}, 30 \mathrm{~V}, 00-35$ | 03508 | DA2527 (1N4 452) |
| A25CR2874 | 152-0141-02 |  | SEIICOND DVC, DI: SM, SI , 30V,150MA, 30V, D0-35 | 03508 | DA2527 (1M4152) |
| A25CR2876 | 152-0040-00 |  | SEMICOND DVC, DI : RECT, SI , 600V, 10, D0-41 | 80009 | 152-0040-00 |
| AZ5CR2902 | 152-0141-02 |  | SEIICONO OVC, DI: SN, SI , 30V , 150ma, 30V , 00-35 | 03508 | D02527 (1N4152) |
| A25CR2904 | 152-0141-02 |  | SENICOND OVC, DI: SH, SI , 30V, 1504A, 30V, D0-35 | 03508 | 002527 (1N4152) |
| A25CR2905 | 152-0141-02 |  | SENICOND DVC, DI:SH,SI , 30V, 150MA, 30V , DO-35 | 03508 | 002527 (1N4152) |
| A25CR2924 | 152-0141-02 |  | SEIICONO DVC , DI: SW, SI , 30V , 150MA . 30 V , 00-35 | 03508 | DA2527 (1N4152) |
| A25CR2951 | 152-0141-02 |  | SEIICOND DVC , DI:SK, SI , 30V, 150MA. 30V. $00-35$ | 03508 | DA2527 (1N4152) |
| A25CR2953 | 152-0141-02 |  | SEMICOND DVC, DI: SH, SI , 30V,150Ma, 30V , D0-35 | 03508 | Da2527 (1N4152) |
| A25CR2954 | 152-0141-02 |  | SEIICOND OVC, DI:SM, $51,30 \mathrm{~V}, 150 \mathrm{Ma}, 30 \mathrm{~V}, \mathrm{ON}-35$ | 03508 | n02527 (1N4152) |
| A25CR2955 | 152-0141-02 |  | SEMICOND OVC, DI: SH, $51,30 \mathrm{~V}, 1504 \mathrm{~A}, 30 \mathrm{~V}, \mathrm{DO-35}$ | 03508 | 0a2527 (1N4152) |


| Component | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | $\begin{aligned} & \text { Mfr. } \\ & \text { Code } \end{aligned}$ | Mrr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A25CR2962 | 152-0141-02 |  | SEMICOND DVC, DI:SN, SI, 30V, 150MA, 30V,00-35 | 03508 | 0a2527 (1N4152) |
| A25CR2966 | 152-0141-02 |  | SEMICOND DVC, DI:SH,SI, 30V, 150MA, 30V, 00-35 | 03508 | Da2527 (1N4152) |
| A25CR2980 | 152-0141-02 |  | SEIICOND DVC, OI:SN,SI, 30V, 150MA, 30V,00-35 | 03508 | Da2527 ( 1 N4 152) |
| A25CR2981 | 152-0141-02 |  | SEMICOND DVC, DI:SN,SI, 30V, 150MA, 30V,00-35 | 03508 | 0a2527 ( 1 N4 152) |
| A25CR3015 | 152-0141-02 |  | SEMICOND DVC, DI: Sm, SI, 30V, 150MA , 30V, 00-35 | 03508 | DA2527 ( 1 N4152) |
| A25CR3017 | 152-0141-02 |  | SEMICOND DVC, DI:SN, SI, 30V,150MA,30V,00-35 | 03508 | DA2527 (1N4152) |
| A25CR3049 | 152-0141-02 |  | SEMICOND OVC, DI:SM, SI, 30V , 150MA, 30V , 00-35 | 03508 | OA2527 ( 1 N4152) |
| A25CR3052 | 152-0141-02 |  | SEIICOND DVC, DI: SN, SI, 30V, 450Ma, 30V,00-35 | 03508 | 0a2527 ( 1 N4152) |
| A25CR3053 | 152-0141-02 |  | SEMICONO DVC, DI:SM, SI, 30V, 150MA, 30V,00-35 | 03508 | OA2527 (1N4152) |
| A25CR3056 | 152-0141-02 |  | SEMICOND OVC, DI:SN, SI, 30V, 150MA, 30V , 00-35 | 03508 | Da2527 (1N4152) |
| A25CR3061 | 152-0141-02 |  | SEMICONO DVC, DI:SM, SI, 30V , 150MA , 30V,00-35 | 03508 | DA2527 (1N4152) |
| A25CR3062 | 152-0141-02 |  | SEIICONO DVC, OI:SN,SI, 30V, 150Ma,30V,00-35 | 03508 | 0a2527 (1N4 152) |
| A25CR3066 | 152-0061-00 |  | SEMICOND DVC, DI:SH,SI, 175V.0.14, DO-35 | 07263 | FOH2161 |
| A25CR3077 | 152-0141-02 |  | SEMICONO DVC, DI:SK,SI, 30V , 1504A , 30V ,00-35 | 03508 | 002527 (1N4152) |
| A25L3072 | 108-1251-00 |  | COIL,RF:FXD, 2.7UH, 10\% | 54583 | SPT 0406-2R7K-6 |
| A25L3074 | 108-1251-00 |  | COIL,RF:FXD, 2.7UH, 10\% | 54583 | SPT 0406-2R7K-6 |
| A25L3076 | 108-1251-00 |  | COIL,RF:FXO, 2.7UH,10\% | 54583 | SPT 0406-2R7K-6 |
| A2502202 | 151-0192-00 |  | IRANSISTOR:SELECTEO | 04713 | SPS8801 |
| A2502502 | 151-0432-00 |  | TRANSISTOR:NPN, SI, T0-106 | 04713 | 5P58512 |
| A2502506 | 151-0432-00 |  | TRANSISTOR:NPN, SI , T0-106 | 04713 | SP58512 |
| A2502508 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SPS8801 |
| A2502514 | 151-0164-00 |  | TRANSISTOR:PNP, SI, T0-92 | 04713 | 2N2907a |
| A2502528 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SPS8801 |
| A2502528 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SPS8801 |
| A2502532 | 151-0192-00 |  | TRansistor: SELECTED | 04713 | 5PS8801 |
| A2502536 | 151-0164-00 |  | TRANSISTOR:PNP, SI, T0-92 | 04713 | 2N2907A |
| A2502538 | 151-0508-00 |  | TRANSISTOR:UJT, SI, T0-98 | 03508 | X13T520 |
| A2502542 | 151-0192-00 |  | TRONSISTOR:SELECTED | 04713 | SPS8801 |
| A2502572 | 151-0432-00 |  | TRONSISTOR:NPN, SI , T0-106 | 04713 | SP58512 |
| A2502576 | 151-0432-00 |  | TRANSISTOR:NPN, SI , T0-106 | 04713 | SP58512 |
| A2502578 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SPS8801 |
| A2502584 | 151-0223-00 |  | TRANSISTOR:NPN, SI, T0-92 | 04713 | SPS8026 |
| A2502586 | 151-0223-00 |  | TRANSISTOR:NPN,SI,T0-92 | 04713 | SPS8026 |
| A2502589 | 151-0164-00 |  | TRANSISTOR:PNP, SI, T0-92 | 04713 | 2N2907A |
| R2502612 | 151-0164-00 |  | TRANSISTOR:PNP, SI, T0-92 | 04713 | 2N2907日 |
| A2502626 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SP58801 |
| A2502632 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SPS8801 |
| A2502642 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SPS8801 |
| A2502649 | 151-0164-00 |  | TRANSISTOR:PNP , SI , T0-92 | 04713 | 2N2907A |
| A2502654 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SPS8801 |
| A2502658 | 151-0192-00 |  | TRONSISTOR:SELECTED | 04713 | SPS8801 |
| A2502664 | 151-0192-00 |  | TRANSISTQR:SELECTED | 04713 | SP58901 |
| A2502688 | 151-0192-00 |  | transistor:SELECTED | 04713 | SP58801 |
| A2502674 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SP58801 |
| A2502678 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SP58801 |
| A2502686 | 151-0164-00 |  | TRANSISTOR:PNP, SI, T0-92 | 04713 | 2N2907日 |
| A2502688 | 151-0164-00 |  | TRANSISTOR:PNP,SI, T0-92 | 04713 | 2N2907a |
| A2502694 | 151-0192-00 |  | transistor: SELECTED | 04713 | SP58801 |
| A2502704 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | 5P58801 |
| A2502714 | 151-0192-00 |  | TRANSISTOR:SELECTED | 04713 | SP58801 |
| A2502730 | 151-0164-00 |  | TRANSISTOR:PNP, SI, T0-92 | 04713 | 2N2907a |
| A2502734 | 151-0164-00 |  | TRANSISTOR:PNP, S1, T0-92 | 04713 | 2N2907a |
| A2502745 | 151-0164-00 |  | TRANSISTOR:PNP.SI, T0-92 | 04713 | 2N2907a |
| A2502752 | 151-0164-00 |  | TRANSISTOR:PNP, SI, T0-92 | 04713 | 2N2907a |
| A2502755 | 151-0164-00 |  | TRANSISTOR:PNP, SI, T0-92 | 04713 | 2N2907A |
| Q2502772 | 151-0508-00 |  | TRANSISTOR:UWT, SI, T0-98 | 03508 | $\times 13 \mathrm{~T} 20$ |
| A2502774 | 151-0508-00 |  | TRANSISTOR:WT, SI, T0-98 | 03508 | $\times 135520$ |
| A2502784 | 151-0164-00 |  | TRANSISTOR:PNP, SI, TO-92 | 04713 | 2N2907a |
| A2502788 | 151-0164-00 |  | TRANSISTOR:PNP, $51,10-92$ | 04713 | 2N2907a |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name 8 Description | Mfr. Code | Mfr, Part No, |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A25R2532 | 315-0203-00 |  | RES, FXO, FILM: 20 K OHM, 5\%, $0.25 \%$ | 57668 | NTR25J-E 20K |
| 425R2533 | 315-0271-00 |  | RES, FXO, FILM:270 OHM,5\%,0.25M | 57668 | NTR25J-E270E |
| A25R2534 | 315-0914-00 |  | RES, FXD, FILM:910K OHM, 5\% , 0.25 | 19701 | 5043CX910X00J |
| A25R2535 | 315-0273-00 |  | RES, FXD, FILM:27K OHM,5\%,0.25M | 57668 | NTR25J-E27K0 |
| Q25R2536 | 321-0347-00 |  | RES, FXO, FIUM:40.2K OHM, 1\%,0.125 $\mathrm{K}, \mathrm{TC}=$ T0 | 91637 | CHF55116040201F |
| A25R2538 | 321-0337-00 |  | RES, FXO, FILM:31.6K OHM, 12, 0.125M, TC=TO | 07716 | CEA031601F |
| A25R2539 | 321-0285-00 |  | RES , FXD, FILM: 3.09 K OHM , 1\% , 0.125 $\mathrm{K}, \mathrm{TC}=$ TO | 07716 | CEAD90900F |
| A25R2540 | 315-0470-00 |  | RES, FXO, FILM:47 OHM , 5\% , 0.25N | 57668 | NTR25J-E47E0 |
| A25R2542 | 315-0103-00 |  | RES, FXO, FILM: 10 K OHM, 5\%, 0.25 M | 19701 | 5043CX10K00J |
| A25R2556 | 315-0102-00 |  | RES, FXD,FILM:1K OHM, 5\%,0.25H | 57668 | NTR25JE01K0 |
| A25R2558 | 301-0681-00 |  | RES, FXD, FILM:680 0HM, 5\%, 0.54 | 19701 | 5053CX680ROJ |
| A25R2562 | 321-0283-00 |  | RES, FXO, FILM:8.66K OHA, 1\%,0.125M, TC= $=10$ | 19701 | 5043ED8K660F |
| A25R2563 | 345-0471-00 |  | RES, FXD, FILM:470 OHM , 5\%, 0.25M | 57668 | NTR25J-E470E |
| A25R2564 | 315-0302-00 |  | RES, FXO,FILM:3K OHM, $5 \%, 0.25 \mathrm{M}$ | 57668 | NTR25J-E03K0 |
| A25R2565 | 321-0275-00 |  | RES, FXD, FILM:7.15K OHM, 1\%,0.125M,TC=T0 | 07716 | CEA071500F |
| A25R2566 | 315-0471-00 |  | RES, FXO, FIUM:470 OHM,5\%,0.25W | 57668 | NTR25J-E470E |
| A25R2571 | 315-0471-00 |  | RES, FXD, FILM:470 OHM,5\%,0.25\% | 57668 | NTR25J-E470E |
| A25R2572 | 315-0202-00 |  | RES, FXD, FILM:2K OHM, 5\%,0.25M | 57668 | NTR25J-E 2K |
| A25R2576 | 315-0103-00 |  | RES, FXO, FILM: 10K OHM, $5 \%, 0.25 \mathrm{H}$ | 19701 | 5043CX10K00J |
| A25R2577 | 321-0433-00 |  | RES, FXD,FILM:316K OHM, 1\%,0.125 , TC=TO | 07716 | CEA031602F |
| A25R2578 | 315-0103-00 |  | RES, FXD,FILM:10K OHM, 5\%,0.25M | 19701 | 5043CX10K00J |
| A25R2579 | 315-0271-00 |  | RES , FXO, FILM:270 OHM , 5\%,0.25M | 57668 | NTR25s-E270E |
| A25R2581 | 315-0204-00 |  | RES, FXD, FILM:200K OHM,5\%,0.25N | 19701 | 5043CX200K0J |
| A25R2582 | 315-0102-00 |  | RES, FXD,FILM:1K OHM,5\%,0.25 | 57668 | NTR25JE01KO |
| A25R2584 | 315-0392-00 |  | RES, FXD, FILM:3.9K OHM , $5 \%, 0.25 \mathrm{M}$ | 57668 | NTR25J-E03K9 |
| A25R2585 | 315-0102-00 |  | RES, FXD,FILM:1K OHM, 5\%,0.25N | 57668 | NTR25JE01K0 |
| A25R2586 | 315-0302-00 |  | RES, FXD,FILM:3K OHM, 5\%,0.25M | 57668 | NTR25J-E03K0 |
| 925R2587 | 315-0473-00 |  | RES, FXD,FILM:47K OHM,5\%,0.25M | 57668 | NTR25J-E47K0 |
| A25R2588 | 315-0391-00 |  | RES, FXO,FILM:390 OHM, 5\%, 0.25M | 57668 | NTR25J-E390E |
| A25R2593 | 315-0102-00 |  | RES, FXO, FILM: 1K OHM , 5\% , 0.25 N | 57668 | NTR25JE01K0 |
| A25R2594 | 321-0283-00 |  | RES , FXO, FIUM:8.66K OHM, 1\%, $0.125 \mathrm{~N}, \mathrm{TC}=$ T0 | 19701 | 5043E08K660F |
| A25R2595 | 315-0361-00 |  | RES, FXO, FILM: 360 OHM , 5\% ,0.25M | 19701 | 5043CX360ROJ |
| A25R2604 | 315-0102-00 |  | RES, FXO,FILM: 1 K OHM, 57,0.25\% | 57668 | NTR25JEO1K0 |
| A25R2605 | 315-0151-00 |  | RES, FXD,FILM: 150 OHM, 5\%,0.25N | 57668 | NTR25J-E150E |
| A25R2606 | 315-0102-00 |  | RES,FXO,FILM:1K 0HM, 5\%,0.25M | 57668 | NTR25JE01K0 |
| A25R2607 | 315-0102-00 |  | RES, FXD,FILM:1K OHM, 5\%,0.25M | 57668 | NTR25JED1K0 |
| A25R2608 | 315-0822-00 |  | RES, FXD, FILM:8.2K OHM, 5\%, 0.25M | 19701 | 5043CX8K200J |
| A25R2609 | 315-0102-00 |  | RES, FXO, FILM: 1K OHM, 5\%,0.25* | 57668 | MTR25JE01K0 |
| A25R2610 | 315-0102-00 |  | RES, FXD, FIUM: 1K OHM, 57,0.25N | 57668 | NTR25JEDIKO |
| A25R2611 | 315-0753-00 |  | RES, FXD, FILM: 75K OHM,5z,0.25M | 57668 | NTR25J-E75K0 |
| A25R2612 | 315-0753-00 |  | RES, FXD, FIUM:75K OHM, 5X, 0.25 H | 57668 | NTR25.J-E75K0 |
| A25R2613 | 321-0390-00 |  | RES, FXO, FILM: 113 K OHM, 1\%, 0.125M, TC=TO | 07716 | CEAO11302F |
| A25R2614 | 315-0472-00 |  | RES, FXD, FILM:4.7K OHM , 57, 0.25 N | 57668 | NTR25J-E04K7 |
| A25R2615 | 315-0472-00 |  | RES, FXO, FIUM:4.7K OHM, 5\%, 0.25 H | 57668 | NTR25J-E04K7 |
| A25R2622 | 315-0203-00 |  | RES, FXO, FILH:20K OHm, 5\% , 0.25 M | 57668 | NTR25J-E 20K |
| A25R2623 | 315-0203-00 |  | RES,FXO,FIUM:20K OHM,5\%,0.25M | 57668 | NTR25J-E 20K |
| A25R2624 | 315-0203-00 |  | RES, FXD, FILM:20K OHM,5\%,0.25N | 57668 | NTR25J-E 20K |
| A25R2626 | 315-0622-00 |  | RES, FKD, FILM:6.2K OHM, 5\%, 0.25 K | 19701 | 5043CX6K200J |
| A25R2631 | 315-0131-00 |  | RES , FXO, FILM: 130 OHM, 5\%, 0.254 | 19701 | 5043CX130ROJ |
| A25R2632 | 315-0202-00 |  | RES, FXD, FILM: 2 K OHM, 5\%,0.25\% | 57668 | NTR25J-E 2K |
| A25R2634 | 315-0822-00 |  | RES, FXD, FILM:8.2K OHM, 5\%, D. 25 M | 19701 | 5043CXBK200J |
| A25R2641 | 315-0104-00 |  | RES, FXO, FILM: 100 K OHM, 5X, 0.25N | 57668 | NTR25J-E100K |
| A25R2642 | 315-0392-00 |  | RES , FXD, FILM:3.9K OHM, 5\%,0.25N | 57668 | NTR25J-E03K9 |
| A25R2643 | 345-0472-00 |  | RES, FXO, FILM:4.7K OHM, 5\%, 0.25 N | 57668 | NTR25.J-ED4K7 |
| 025R2644 | 315-0302-00 |  | RES , FXD, FILM:3K OHM, 5\%, 0.25 M | 57668 | NTR25J-E03K0 |
| A25R2646 | 315-0152-00 |  | RES, FXD, FILM:1.5K OHW, 5\%, 0.25 N | 57668 | NTR25J-E01K5 |
| A25R2651 | 315-0103-00 |  | RES,FXD,FILM:10K OHM ,5\%,0.25M | 19701 | 5043CX10K00J |
| A25R2652 | 315-0103-00 |  | RES, FXD, FILM:10K OHM, 5\%, 0.25 M | 19701 | $5043 \mathrm{CX10} \mathrm{\times 00J}$ |
| 025R2653 | 315-0103-00 |  | RES ,FXD,FILM:10K OHM ,5\%,0.25M | 19701 | $5043 \mathrm{CX10K00J}$ |


| Component No, | Tektronix Part No. | Serial/Assembly No. Effective Oscont | Name \& Description | Mfr. Code | Mfr, Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A25R2654 | 315-0472-00 |  | RES, FXD, FILM:4.7K OHM , 5\%, 0.25 H | 57668 | NTR25J-E04K7 |
| A25R2655 | 315-0203-00 |  | RES,FXD, FILM:20K OHM, $5 \%, 0.25 \mathrm{~N}$ | 57668 | NTR25J-E 20K |
| A25R2656 | 315-0203-00 |  | RES, FXD, FILY:20K OHM, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-E 20K |
| A25R2657 | 315-0203-00 |  | RES, FXD, FILM:20K OHH, 5\%, 0.25 H | 57668 | NTR25J-E 20K |
| A25R2658 | 315-0202-00 |  | RES, FXD,FILM: 2 K OHM, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-E 2 K |
| A25R2662 | 315-0202-00 |  | RES, FXD, FILM: 2 K OHM, $5 \mathrm{~K}, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E 2 K |
| A25R2663 | 315-0203-00 |  | RES, FXD, FILM:20K OHM , 5\% , 0.25 W | 57668 | NTR25J-E 20K |
| A25R2664 | 315-0104-00 |  | RES, FXD, FILM: 100 K OHW, 5\%, 0.25 W | 57668 | NTR25J-E100K |
| A25R2668 | 315-0103-00 |  | RES, FXD, FILM: $10 \mathrm{~K} 0 \mathrm{OH}, 5 \mathrm{5} \mathrm{\%}, \mathrm{O} .25 \mathrm{H}$ | 19701 | $5043 C \times 10 \mathrm{KOOS}$ |
| A25R2671 | 315-0472-00 |  | RES, FXD, FILM:4.7K OHM, 5\% , 0.25M | 57668 | NTR25J-E04K7 |
| A25R2672 | 315-0103-00 |  | RES, FXD, FIL $: 10 \mathrm{X}$ OHM, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 19701 | $5043 C \times 10 \mathrm{KODJ}$ |
| A25R2673 | 315-0103-00 |  |  | 19701 | 5043 Cx10K00J |
| A25R2674 | 315-0202-00 |  | RES, FXD, FILH:2K ОН世, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E 2K |
| A25R2675 | 315-0751-00 |  | RES, FXD, FILM:750 OHM , $5 \mathrm{~K}, 0.25 \mathrm{~K}$ | 57668 | NTR25J-E750E |
| A25R2676 | 321-0277-00 |  | RES, FXD,FILM:7.50K OHM, 12, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 24546 | Na55D7501F |
| A25R2678 | 315-0203-00 |  | RES, FXD, FILM: 20 K OHM, $5 \mathbf{\chi}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E 20K |
| A25R2680 | 315-0471-00 |  | RES, FXD, FILM:470 OHM , $5 \mathrm{~K}, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E470E |
| A2592681 | 315-0751-00 |  | RES, FXD, FILM: 750 OHM , 5\% , 0.25 M | 57668 | NTR25J-E750E |
| A25R2682 | 315-0472-00 |  | RES, FXD, FILM:4.7K OHM , 5\%,0.25W | 57668 | NTR25J-E04K7 |
| A25R2683 | 315-0432-00 |  | RES, FXD, FILM:4.3K OHM, $5 \mathrm{Z}, 0.25 \mathrm{~K}$ | 57668 | NTR25J-E04K3 |
| A25R2684 | 315-0822-00 |  | RES, FXD, FILM:8.2K OHM, 5\%,0.25 | 19701 | 5043Cx8K200J |
| A25R2685 | 321-0337-00 |  | RES, FXD, FIL $: 31.6 \mathrm{~K}$ OHM, 1\%, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 07716 | CEAD31601F |
| A25R2686 | 315-0103-00 |  | RES, FXD, FILM: 10 K OHM, $5 \chi$, 0.25 K | 19701 | 5043 Cx10K00J |
| A25R2687 | 315-0103-00 |  | RES, FXD, FIL : 10 K OHM, $5 \%, 0.25 \mathrm{H}$ | 19701 | $5043 \mathrm{CX10} \mathrm{\times 00J}$ |
| A25R2688 | 315-0103-00 |  | RES, FXD, FILM: 10 K OHM, $5 \mathrm{~L}, 0.25 \mathrm{H}$ | 19701 | $50435 \times 10 \times 00 \mathrm{~J}$ |
| A25R2689 | 315-0474-00 |  | RES, FXD, FILM:470K OMM, $5 \mathbf{z}, 0.25 \mathrm{~W}$ | 19701 | 5043CX470K0J92U |
| A25R2691 | 315-0752-00 |  | RES, FXD, FILM:7.5K OHM, $5 \mathbf{0}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E07K5 |
| A25P2692 | 315-0752-00 |  | RES, FXD, FILM:7.5K OHA, 5\%,0.25 | 57668 | NTR25J-E07X5 |
| 125R2693 | 315-0752-00 |  | RES, FXD, FILM:7.5K OHM, 5\%,0.25 | 57868 | NTR25J-E07K5 |
| A25R2694 | 315-0103-00 |  | RES, FXO, FILM: 10K OHW, $5 \mathrm{X}, 0.25 \mathrm{H}$ | 19701 | 5043 CX10K00J |
| A25R2696 | 321-0283-00 |  | RES, FXD, FIL $: 8.66 \mathrm{~K}$ OHM, $12,0.125 \mathrm{~K}, \mathrm{TC}=$ TO | 19701 | 5043£88660F |
| A25R2701 | 321-0248-00 |  | RES, FXD, FILK:3.74K OHM, 17, 0.125 $\mathrm{N}, \mathrm{TC}=$ TO | 19701 | 5043E3K740F |
| A25R2702 | 315-0622-00 |  | RES, FXD, FILM: 6.2 K OHM, $5 \%, 0.25 \mathrm{~W}$ | 19701 | 5043CX6K200J |
| A25R2703 | 315-0622-00 |  |  | 19701 | 5043 CX6K200J |
| A25R2705 | 311-2237-00 |  | RES, VAR, NOWW:TRAR, 25K OHW, 20\%, 0.5H LINEAR | TK1450 | GF05U |
| A25R2706 | 321-0383-00 |  | RES, FXD, FILM:95.3K OHM, 1X, 0.125M, TC=TO | 07716 | CEa095301F |
| A25R2708 | 315-0153-00 |  | RES, FXD, FILM: 15K OHM, $5 \mathrm{~K}, 0.25 \mathrm{~N}$ | 19701 | 5043C×15k00J |
| A25R2709 | 321-0375-00 |  | RES, FXD, FILH: 78.7 K OHM, 12, $0.125 \mathrm{M}, \mathrm{TC}=$ TO | 07716 | CE9078701F |
| A25R2711 | 315-0203-00 |  | RES, FXO,FILS:20K OHH, $5 \mathbf{z}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E 20K |
| A25R2712 | 315-0203-00 |  | RES, FXD, FIL | 57668 | NTR25J-E 20K |
| A25R2713 | 315-0393-00 |  | RES,FXD,FILW:39K OHM , 5\%,0.25M | 57668 | NTR25J-E39K0 |
| AZSR2714 | 315-0204-00 |  | RES,FXO,FILK:200K OHW,5\%,0.25H | 19701 | 5043CX200K0J |
| A25R2715 | 321-0356-00 |  | RES, FXO, FILM:49.9K OHm, 12, 0. $125 \mathrm{~N}, \mathrm{TC}=$ T0 | 19701 | 5033ED49K90F |
| A25R2716 | 321-0385-00 |  |  | 19701 | 5033ED100K0F |
| R25R2717 | 321-0360-00 |  | RES, FXD, FILS:54.9K OHM, 12, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5033ED54X90F |
| A25R2718 | 321-0397-00 |  | RES, FXD, FILM: 133 K OHM, 1\%,0.125, TC=T0 | 19701 | 5043@133K0F |
| A25R2719 | 321-0423-00 |  | RES, FXO, FILM: 249 K OHM, 17,0.125M, TC=TO | 19701 | 5043ED249K0F |
| A25R2721 | 315-0822-00 |  | RES, FXD, FILA:8.2K OHM, $5 \mathrm{LK}, 0.25 \mathrm{H}$ | 19701 | $5043 \mathrm{CX8K} 200 \mathrm{~J}$ |
| A25R2722 | 315-0184-00 |  | RES, FXD, FILM: 180K Ofm, $5 \mathbf{7}, 0.25 \mathrm{~N}$ | 19701 | 5043C×180K0J |
| 125R2723 | 321-0299-00 |  | RES, FXO, FILS:12.7K OHM, 12, $0.125 \mathrm{w}, \mathrm{TC}=$ T0 | 19701 | 5033ED12K70F |
| A25R2724 | 321-0383-00 |  | RES,FXO, FILS:95.3K OHM, 12,0.125M, TC=T0 | 07716 | CEA095301F |
| A25R2725 | 311-2237-00 |  | RES, VAR, MOMEN:TRALR, 25K OHM, 20\%,0.5N LINEAR | TK1450 | 6F06U |
| A25R2726 | 321-0383-00 |  | RES, FXD, FILS:95.3K OHW, 12, $0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 07716 | CEAD95301F |
| A25R2727 | 315-0243-00 |  | RES, FXO, FILH:24K OHW, $5 \mathbf{X}, 0.25 \mathrm{~N}$ | 57668 | NTR25J-E24K0 |
| 42582729 | 315-0103-00 |  | RES, FXD,FILM:IOK OHM, 5X,0.25\% | 19701 | 5043Cx10K00 |
| A25R2729 | 315-0683-00 |  | RES, FXD, FID :68\% OHW, 5X, 0.25 H | 57668 | NTR25J-268K0 |
| 42582731 | 315-0681-00 |  | RES, FXD, FILM:680 OHM, 5X,0.254 | 57668 | NTR25N-E680E |
| Q25R2732 | 315-0152-00 |  | RES, FXO.FILM: 1.5 K OHN, 5x, 0.25 H | 57868 | NTR25J -01K5 |
| A25R2733 | 315-0222-00 |  | RES, FXD, FILM:2.2K OHM, 5X, 0.25 N | 57668 | NTR25N-E02K2 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name 8 Description | Mfr. Code | Mir. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A25R2734 | 321-0356-00 |  | RES , FXD, FILM:49.9K OHM, 17,0.125M, TC=TO | 19701 | 5033ED49K90F |
| A25R2735 | 311-2238-00 |  | RES , VAR, NONWH: TRMR, 50 K OHM, 20\% , 0.5 N LINEAR | TK1450 | GFO6UT 50 K |
| 025R2736 | 321-0373-00 |  | RES, FXD, FILM: 75.0 K OHM, 1\%, 0, 125N, TC=T0 | 19701 | 5033EDT5K00F |
| A25R2741 | 315-0103-00 |  | RES, FXD, FILM: 10 K OHM, 5\%, 0.25W | 19701 | 5043CX10K00J |
| A25R2742 | 315-0333-00 |  | RES,FXD,FILM: 33K OHM , 5\%, 0.25N | 57668 | NTR25J-E33K0 |
| A25R2743 | 315-0224-00 |  | RES, FXO, FILM:220K OHM , 5\%, 0.25 H | 57668 | NTR25J-E220K |
| 925R2744 | 321-0385-00 |  | RES, FXD, FILM: 100 K OHm, 17, 0.125N, TC=TO | 19701 | 5033ED100K0F |
| A25R2745 | 311-2237-00 |  | RES , VAR, NONWM:TRMR,25K OHM, 20\%,0.5H LINEAR | TK1450 | GF06U |
| A25R2746 | 321-0311-00 |  | RES, FXD, FILM:16.9K OHM, 12,0.125W, TC=T0 | 07716 | CEAC16901F |
| A25R2747 | 321-0349-00 |  | RES, FXD, FILM:42.2K OHM, 1\%, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 07716 | CEAD42201F |
| A25R2748 | 321-0460-00 |  | RES, FXD, FILM:604K OHM, 1\%,0.125 $\mathrm{N}, \mathrm{TC}=$ TO | 07716 | CEAD60402F |
| A25R2751 | 315-0202-00 |  | RES,FXD,FILM:2K OHM, 5\%,0.25N | 57668 | NTR25J-E 2K |
| A25R2752 | 315-0621-00 |  | RES, FXD, FILA: 620 OHM, 5\%, 0.25M | 57668 | NTR25J-E620E |
| 425R2753 | 321-0402-00 |  | RES, FXD, FILM:150K OHM, 1\%,0.125M, TC=TO | 19701 | 5033ED150K0F |
| A25R2754 | 321-0410-00 |  | RES, FXD, FILM: 182 K OHM, 3\%,0.125N, TC $=10$ | 19701 | 5033ED182K0F |
| A25R2755 | 315-0302-00 |  | RES, FXD, FJ H: 3 K OHM, 5\%, 0.25 W | 57668 | NTR25J-E03K0 |
| A25R2770 | 315-0683-00 |  | RES, FXD, FILM:68X OHM, 5\%, 0.25 W | 57668 | NTR25J-E68KO |
| A25R2772 | 315-0183-00 |  | RES , FXD, FILM: 18 K OHM, 5\%, 0.25 K | 19701 | 5043C×18K00J |
| Q25R2774 | 315-0394-00 |  | RES, FXD, FILM:390K OHM , 5\%, 0.25 K | 57668 | NTR25J-E390K |
| A25R2775 | 315-0202-00 |  | RES, FXD, FILM:2K OHM,5\%,0.25 | 57668 | NTR25J-E 2K |
| A25R2779 | 315-0151-00 |  | RES , FXD, FILM: 150 OHM , 5X, 0.25 | 57668 | NTR25J-E150E |
| A25R2782 | 315-0103-00 |  | RES, FXD, FILM:10K OHM, 5\%, 0.25 H | 19701 | 5043CX10K00J |
| A25R2783 | 315-0103-00 |  | RES, FXD,FILM:10K OHM, 5\%, 0.25 N | 19701 | 5043CX10K00J |
| A25R2785 | 315-0151-00 |  | RES, FXD, FILA: 150 OHM, 5\%, 0.25 | 57668 | NTR25J-E150E |
| A25R2786 | 321-0181-00 |  | RES, FXO, FILM: 750 OHM, 1\%, 0.125H, TC $=$ TO | 07716 | CEAD750R0F |
| A25R2787 | 321-0202-00 |  | RES , FXD, FIUM:1.24K OHM, 1\%, 0.125M, TC=TO | 24546 | NA5SD1241F |
| A25R2788 | 315-0103-00 |  | RES , FXD, FILM:10K OHM, 5\% , 0.25 M | 19701 | 5043CX10K00」 |
| A25R2789 | 315-0102-00 |  | RES , FXD, FILH: 1 K 0HM, 5\%, 0.25N | 57668 | NTR25JE01K0 |
| A25R2802 | 315-0113-00 |  | RES, FXD, FILM:11K OHM, 5\%, 0. 25 M | 19701 | 5043CX11K00J |
| A25R2804 | 315-0391-00 |  | RES , FXD, FILM:390 OHM , 5\%, 0.25 K | 57668 | NTR25J-E390E |
| A25R2805 | 315-0123-00 |  | RES , FXD, FILM:12K OHM, 5\%, 0.25 K | 57668 | NTR25J-E12K0 |
| A25R2808 | 301-0753-00 |  | RES, FXD, FILM:75K OHM, 5\%, 0.5 K | 01121 | EB7535 |
| A25R2809 | 315-0391-00 |  | RES, FXD, FI LM:390 OHM , 5\% , 0.25M | 57668 | NTR25J-E390E |
| A25R2812 | 315-0471-00 |  | RES , FXD, FILM:470 OHM, 5\%, 0.25 | 57668 | NTR25J-E470E |
| A25R2813 | 315-0471-00 |  | RES , FXD, FILM:470 OHM, 5\%, 0.25 M | 57668 | NTR25J-E470E |
| A25R2814 | 315-0102-00 |  | RES , FXD, FILM:1K OHM , 5\%, 0.25 K | 57668 | NTR25JE01K0 |
| A25R2815 | 322-0385-00 |  | RES , FXD, FILM:100K OHM, 1\%,0.25N, TC= 10 | 75042 | CEBTO-1003F |
| A25R2816 | 315-0332-00 |  | RES , FXD, FILM:3.3K OHM, 5\%, 0.25N | 57668 | NTR25J-E03K3 |
| A25R2817 | 315-0332-00 |  | RES , FXD, FILM:3.3K OHM , 5\%, 0.25M | 57668 | NTR25J-E03K3 |
| A25R2819 | 315-0104-00 |  | RES, FXD, FILM:100K OHM, 5\%, 0.25 K | 57668 | NTR25.-E100K |
| A25R2821 | 315-0473-00 |  | RES, FXD, FILM:47K OHM , 5\% , 0.25 M | 57668 | NTR25.-E47K0 |
| A25R2822 | 315-0154-00 |  | RES , FXD, FIUM: 150K OHM, 5\% , 0.25M | 57668 | NTR25,1-E150K |
| A25R2825 | 315-0472-00 |  | RES, FXD, FILM:4.7K OHM , 5\%, 0.25 H | 57668 | NTR25J-E04K7 |
| A25R2826 | 315-0433-00 |  | RES, FXD, FILM:43K OHM,5\%,0.25M | 19701 | 5043CX43K00J |
| A25R2827 | 315-0335-00 |  | RES, FXD, FILM:3.3M OHM , 5\%, 0.25 H | 01121 | CB3355 |
| A25R2828 | 315-0154-00 |  | RES, FXD, FIUM: 150K OHM, 5\% , 0. 25M | 57668 | NTR25J-E150K |
| A25R2831 | 315-0511-00 |  | RES , FXD, FILM:510 OHM , 5\% , 0.25N | 19701 | 5043CX510ROJ |
| A25R2833 | 303-0683-00 |  | RES, FXD, CMPSN: 68 K OHM, 5\%, 1H | 01121 | GB6835 |
| A25R2835 | 315-0335-00 |  | RES , FXD, FILM:3.3M OHM, 5\%,0.25M | 01121 | C83355 |
| A25R2836 | 315-0125-00 |  | RES , FXD, FILM: 1. 2M OHM, $5 \%, 0.25 \mathrm{M}$ | 19701 | 5043CX1M200J |
| A25R2837 | 315-0155-00 |  | RES, FXD, FILM: 1.5M OHM, 5\%,0.25M | 19701 | $5043 \mathrm{CX14500J}$ |
| A25R2838 | 315-0305-00 |  | RES, FXD,FILM:3M OHM, 5\%,0.25W | 01121 | C83055 |
| A25R2839 | 307-0106-00 |  | RES, FXO, CMPSN: 4.7 OHM , 5\%, 0.25 M | 01121 | CB 4765 |
| A25R2841 | 315-0203-00 |  | RES , FXD, FIUM:20K OHm , 5\% , 0.25 K | 57668 | NTR25J-E 20K |
| A25R2842 | 321-0385-00 |  | RES , FXD, FILM: 100 K OHM, 1\% , $0.125 \mathrm{M}, \mathrm{TC}=\mathrm{TO}$ | 19701 | 5033E100K0F |
| A25R2843 | 315-0302-00 |  | RES, FXD, FILM: 3K OHm, $5 \%, 0.25 \mathrm{~N}$ | 57668 | NTR25J-E03K0 |
| A25R2844 | 321-0317-00 |  | RES, FXD,FIUN:19.6K OHM, 1\%, 0.125M, TC $=$ TO | 07746 | CEAD19601F |
| A25R2845 | 311-2231-00 |  |  | TK1450 | GF06UT 1K |


| Component No, | Tektronix Part No, | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr . Code | MFr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 425R2845 | 311-2293-00 |  | RES , VAR , MONW : TRMR, 3.OK OHM , 20\% , 0.5N LINEAR | TK1450 | gFosut3k |
| 425R2847 | 321-0363-00 |  | RES , FXD, FILM: 59.0 K OHM , 12, 0. 125 H , TC=T0 | 07716 | CEAD59001F |
| A25R2B48 | 315-0164-00 |  | RES, FXD, FILH:160K $0 \mathrm{HH}, 58,0.25 \mathrm{~K}$ | 57668 | NTR25J-E160K |
| A25R2849 | 315-0303-00 |  | RES, FXD, FILM: 30 K OHM , 5\%,0.25 | 19701 | 5043CX30K00.J |
| A25R2850 | 311-2233-00 |  | RES, VAR, NONMN:TRMR, 3.0 K OHM, 20\% , 0.5 K LINEAR | TK1450 | grobut3k |
| A25R2851 | 321-0360-00 |  | RES, FXD, FILM:54.9K OHM, 1\%, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5033E054K90F |
| A25R2852 | 321-0193-00 |  | RES, FXD, FILH: 1 K OH\%, 17, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5033ED 1 KOOF |
| A25R2853 | 321-0251-00 |  | RES, FXD, FILA 4.4 .02 K OHM, $17,0.125 \mathrm{H}, \mathrm{TC}=$ T0 | 19701 | 5033ED4K020F |
| A25R2854 | 321-0360-00 |  | RES, FXD, FILK: 54.9 K OHA , 12, $0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5033ED54K90F |
| A25R2855 | 311-2231-00 |  | RES, VAR, NONHH: TRMR, 1K OHH , 202,0.5M | TK1450 | GFO6UT 1K |
| A25R2856 | 321-0314-00 |  | RES, FXD, FILS: 18.2 K OHH, 1\%, $0.125 \mathrm{H}, \mathrm{TC}=$ T0 | 19701 | 5043E018K20F |
| A25R2857 | 321-0300-00 |  | RES, FXD, FILH:13.0K OHM, 12, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 07716 | CEA013001F |
| A25R2861 | 315-0222-00 |  | RES, FXD, FILM:2.2K OHM, $5 \mathrm{5X}, 0.25 \mathrm{M}$ | 57668 | NTR25J-E02X2 |
| A25R2862 | 315-0752-00 |  | RES, FXD, FIL : 7.5 K OHM $5 \%, 0.25 \mathrm{M}$ | 57668 | NTR25J-E07K5 |
| A25R2863 | 322-0385-00 |  | RES, FXD, FIUM: 100 K OH\%, 1\%, $0.25 \mathrm{H}, \mathrm{TC}=$ T0 | 75042 | CEBT0-1003F |
| A25R2864 | 315-0822-00 |  | RES, FXD, FILX:8.2K OHM , 5\%,0.25M | 19701 | $5043 C \times 8 \mathrm{~K} 200 \mathrm{~J}$ |
| A25R2865 | 315-0103-00 |  | RES,FXD,FILM: 10 K OHM, $57,0.25 \mathrm{~W}$ | 19701 | $5043 \mathrm{CX10k00J}$ |
| A25R2867 | 315-0201-00 |  | RES, FXD, FILM: 200 OHM, 5\% , 0.25 W | 57668 | NTR25J-E200E |
| A25R2868 | 301-0203-00 |  | RES, FXD, FILS:20K ОНИ , $5 \mathrm{5}, 0.5 \mathrm{H}$ | 19701 | 5053Cx20K00J |
| A25R2869 | 315-0103-00 |  | RES,FXD,FILS:10K OHH, $5 \%, 0.251$ | 19701 | 5043CX10K00J |
| A25R2874 | 315-0271-00 |  | RES,FXD,FILK: 270 OHA, $5 \%, 0.25 \mathrm{~N}$ | 57668 | NTR25J-E270E |
| A25R2876 | 315-0471-00 |  | RES,FXD, FILM:470 OHM, 5\%,0.25W | 57668 | NTR25J-E470E |
| A25R2900 | 321-0229-00 |  | RES, FXO, FILM:2.37K OHM, 12, $0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5043ED2K37F |
| A25R2901 | 321-0361-00 |  | RES , FXO, FIL $: 56.2 \mathrm{~K}$ OHM, 12, $0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 07716 | CEADS6201F |
| A25R2902 | 321-0346-00 |  | RES, FXD, FILM: 39.2 K OKM, 17, $0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 19701 | 5043ED39K20F |
| A25R2903 | 315-0103-00 |  | RES, FXD, FILM:10K OHM, $5 \boldsymbol{2}, 0.25 \mathrm{H}$ | 19701 | 5043CX10K00J |
| A25R2904 | 315-0103-00 |  | RES, FXD, FILM:10K OHM, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 19701 | $5043 \mathrm{CX10K00J}$ |
| A25R2906 | 321-0388-00 |  | RES, FXD, FILM: 107 K OHm, 1\%,0.125N, TC= TO | 07716 | CEA010702F |
| A25R2907 | 321-0466-00 |  | RES, FXD, FILM:698K 0 HH, 12, $0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 19701 | 5043ED698K0F |
| A25R2911 | 321-0298-00 |  |  | 07716 | CEAD12401F |
| A25R2912 | 321-0408-00 |  | RES, FXD, FILM:174K OKM, 12, 0. 125N, TC=TO | 07716 | CEAD17402F |
| A25R2913 | 321-0382-00 |  | RES , FXD, FILH:93. 1 K OHH , 17, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 07716 | CEA093101F |
| A25R2914 | 315-0223-00 |  | RES,FXD,FILN:22K OHW, $5 \chi, 0.25 \mathrm{~W}$ | 19701 | 5043CX22K00J92U |
| A25R2915 | 321-0423-00 |  | RES, FXD, FILA:249K OHM, 12, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 19701 | 5043E0249K0F |
| A2582918 | 315-0471-00 |  | RES, FXD, FILA:470 OHW , $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57688 | NTR25J-E470E |
| A25R2919 | 315-0753-00 |  | RES,FXD,FILH:75K OHM, 5K, 0.25 M | 57668 | NTR25J-E75K0 |
| A2582924 | 315-0471-00 |  | RES, FXD, FILA: 470 OHW, 5K,0.254 | 57668 | NTR25J-E470E |
| A25R2926 | 303-0823-00 |  |  | 01121 | 688235 |
| 025R2927 | 303-0823-00 |  | RES, FXD, CIPSN: 82K OH\%, $5 \mathrm{5x}$, 1 M | 01121 | 688235 |
| A25R2930 | 315-0333-00 |  | RES, FXD,FILH:33K OHW, 5K,0.25M | 57668 | NTR25J-E33K0 |
| A25R2931 | 315-0103-00 |  | RES,FXD,FILM:10K OHM, 5K,0.25N | 19701 | $50436 \times 10 \mathrm{K00J}$ |
| 225R2932 | 315-0103-00 |  | RES, FXD, FILA:10K OHM $5 \mathbf{5 K}, 0.25 \mathrm{M}$ | 19701 | $5043 \mathrm{CX10K00J}$ |
| A25R2933 | 315-0104-00 |  | RES , FXD, FILM: 100K OHW, 5X, 0.25 M | 57668 | NTR25J-E100K |
| A25R2937 | 315-0125-00 |  | RES, FXD, FILH:1.2N OHW, $5 \mathrm{~K}, 0.25 \mathrm{M}$ | 19701 | 5043CX14200J |
| A25R2940 | 321-0431-00 |  | RES, FXD, FILM:301K OHN, 12,0.125N, TC=T0 | 07716 | CEAD30102F |
| 225R2941 | 321-0379-00 |  | RES, FXD, FIL : 86.6 K OHش, 12,0.125\%, TC= 0 | 07716 | CEAD86601F |
| A25R2942 | 315-0104-00 |  |  | 57668 | NTR25J-E100K |
| A25R2946 | 301-0393-00 |  | RES, FXD, FILM: 39 K OHW, 5x,0.5N | 19701 | 5053Cx39K00J |
| A25R2947 | 321-0452-00 |  | RES , FXD , FILM:499K OHW, 12, 0.125 H , TC=TO | 19701 | 5043E0499K0F |
| A25R2948 | 315-0222-00 |  | RES,FXD,FILM:2.2K OHM,5x,0.25M | 57668 | NTR25J-E02K2 |
| A25R2951 | 315-0872-00 |  | RES, FXD, FILM: 8.2 K OHE, $52,0.25 \mathrm{M}$ | 19701 | 5043C×8K200, |
| A25R2952 | 321-0277-00 |  | RES, FXO, FILM: 7.50 K OHM, 12, $0.125 \mathrm{~N}, \mathrm{TC}=$ TO | 24546 | N45507501F |
| A2502953 | 315-0382-00 |  | RES, FXD, FILM:3.9K 04W, $5 \chi, 0.25 \mathrm{~N}$ | 57668 | NTR25J-E03k9 |
| A25R2954 | 315-0273-00 |  | RES, FXD, FILM:27K OHw, $5 \%, 0.251$ | 57668 | NTR25J-E27K0 |
| A25R2955 | 321-0437-00 |  | RES, FXD, FILM: 348K OHW, 17, $0.125 \mathrm{~m}, \mathrm{TC}=$ T0 | 19701 | 5043ED348K0F |
| A2582956 | 321-0429-00 |  | RES, PXD, FILM:287K OHm, 14, $0.1259, \mathrm{TC}=$ T0 | 07716 | CEA028702F |
| A25R2962 | 315-0473-00 |  | RES, FXD, FIL : 47 K OHW, $5 \mathrm{~K}, 0.25 \mathrm{~N}$ | 57668 | NTR25J-E47K0 |
| A25R2963 | 315-0273-00 |  | RES. FXD, FIUS:27K OPH, 5Z,0.25m | 57668 | NTR2S [2TK0 |
| AC502964 | 321-0466-00 |  |  | 19701 | 5043@698x0F |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mrr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A25R2966 | 315-0753-00 |  | RES, FXD, FILM: 75 K OHM, 5\%,0.25W | 57668 | NTR25.J-E75K0 |
| A25R2967 | 315-0823-00 |  | RES, FXD, FILM: 82 K OHM, $5 \mathbf{1}$, 0.25 H | 5768 | NTR25J-E82K |
| A25R2970 | 321-0397-00 |  | RES,FXD, FILM: 133K OHM, 12,0.125M, TC=T0 | 19701 | 5043E0133K0F |
| A25R2971 | 321-0387-00 |  | RES, FXD, FILM:105K OHM, 12,0.125H, TC=T0 | 07716 | CEA010502F |
| A25R2972 | 315-0104-00 |  | RES, FXD,FILM: 100X OHM, 5\%,0.25\% | 57668 | NTR25J-E100K |
| A25R2976 | 301-0393-00 |  | RES, FXO, FILM: 39 K OHM,5\%,0.5M | 19701 | 5053CX39x00」 |
| A25R2977 | 321-0452-00 |  | RES, FXO, FILM:499K OHM, 1\%, $0.125 \mathrm{~K}, \mathrm{TC}=$ T0 | 19701 | 5043ED499K0F |
| A25R2978 | 315-0222-00 |  | RES, FXD, FILM: 2.2 K OHM, $5 \mathrm{~K}, 0.25 \mathrm{~W}$ | 57668 | NTR25J-E02K2 |
| A25R2980 | 315-0392-00 |  | RES, FXD, FILM: 3.9 K OHM, 5\%,0.25 H | 57668 | NTR25J-E03K9 |
| A25R2981 | 321-0466-00 |  | RES, FXO, FILK: 698K OHM, 1K, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 5043ED698K0F |
| A25R2982 | 321-0496-00 |  | RES, FXD, FIU 1.1 .43 MEG OHM, 1\%, $0.125 \mathrm{H}, \mathrm{TC}=$ TO | 01121 | ORDER BY DESCR |
| A25R2983 | 321-0437-00 |  | RES, FXD, FILH: 348 K OHM, $1 \%, 0.125 \mathrm{H}, \mathrm{TC}=$ TO | 19701 | 504380348 KOF |
| A25R2986 | 315-0623-00 |  | RES, FXO,FILM: 62 K OHM, $5 \mathrm{~K}, 0.251$ | 19701 | 5043CX62K00J |
| A25R2987 | 315-0203-00 |  | RES, FXO, FILM: 20 K OHM, $5 \mathrm{~K}, 0.254$ | 57668 | NTR25J-E 20K |
| A25R2990 | 321-0429-00 |  | RES, FXO, FILS:287K OHM, 1\% , 0.125. , TC=TO | 07716 | CEAD28702F |
| A25R2991 | 321-0397-00 |  | RES, FXO, FILM: $133 \mathrm{~K} 0 \mathrm{HM}, 1 \%, 0.125 \mathrm{~K}, \mathrm{TC}=$ TO | 19701 | 5043ED133K0F |
| A25R2992 | 315-0104-00 |  | RES, FXD, FILM: $100 \mathrm{~K} 0 \mathrm{HM}, 5 \mathrm{~L}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E100K |
| A25R2996 | 301-0393-00 |  | RES,FXO,FILH: 39 K OHM, $5 \%, 0.5 \mathrm{H}$ | 19701 | 5053CX39K00J |
| A25R2997 | 321-0452-00 |  | RES,FXO,FILK:499K OHM, 17,0.125H,TC=T0 | 19701 | 5043E0499K0F |
| A25R2998 | 315-0222-00 |  | RES, FXO,FILN:2.2K OHM,5\%,0.25 | 57668 | NTR25J-E02K2 |
| A25R3010 | 315-0623-00 |  | RES,FXO,FILM:62K OHM,5\%,0.25H | 19701 | 5043CX62K00J |
| A25R3011 | 315-0203-00 |  | RES, FXD, FILM: 20 K OHM, $5 \%, 0.25 \mathrm{H}$ | 57668 | NTR25J-E 20K |
| A25R3012 | 315-0203-00 |  | RES, FXO, FILM: 20 K OHM, $5 \%, 0.254$ | 57668 | NTR25.JE 20K |
| A25R3015 | 315-0393-00 |  | RES,FXD,FILM: 39 K OHM, $5 \mathrm{~K}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E99K0 |
| A25R3016 | 321-0445-00 |  | RES, FXO, FIUM:422K OHM, 17, 0. $125 \mathrm{~K}, \mathrm{TC}=$ T0 | 07716 | CEA042202F |
| A25R3018 | 321-0396-00 |  | RES,FXO, FILN: 130K OHM, 17, 0.125H, TC= $=10$ | 07716 | CEAD13002F |
| A25R3021 | 321-0414-00 |  | RES, FXO, FILM: 200K OHM , 1X, 0.125H,TC=T0 | 07716 | CEAD20002F |
| A25R3022 | 315-0104-00 |  | RES, FXD, FILH: 100K OHM, 5\%,0.25 | 57668 | NTR25J-E100K |
| A25R3026 | 321-0452-00 |  | RES,FXO, FILN:499K OHM, 1\%,0.125N,TC=TO | 19701 | 5043ED499K0F |
| A25R3027 | 315-0102-00 |  |  | 57668 | NTR25JE01K0 |
| A25R3044 | 301-0333-00 |  | RES, FXO, FIUM:33K OHM , $5 \mathbf{\chi}, 0.5 \mathrm{H}$ | 19701 | 5053CX33К00, |
| A25R3045 | 321-0386-00 |  | RES, FXD, FILM: 102K OHM, 12, $0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 07716 | CEA010202F |
| A25R3046 | 321-0402-00 |  | RES, FXD, FILM:150K OHM, 17,0.125N, TC=T0 | 19701 | 5033ED150K0F |
| A25R3047 | 321-0385-00 |  | RES,FXD,FILS:100K OHM, 17,0.125W,TC=T0 | 19701 | 5033E0100K0F |
| A25R3048 | 315-0203-00 |  | RES, FXO,FILH:20K OHM, $5 \mathrm{Z}, 0.25 \mathrm{H}$ | 57668 | NTR25J-E 20K |
| A25R3049 | 315-0683-00 |  | RES,FXO,FILH:68K OHM, $5 \mathbf{Z}, 0.25 \%$ | 57668 | NTR25J-E68K0 |
| A25R3052 | 315-0473-00 |  | RES, FXD, FILK:47K OHM, 5X, 0.25H | 57668 | NTR25J-E47K0 |
| A25R3054 | 315-0273-00 |  | RES, FXD, FILM:27K OHM, 5X,0.25H | 57668 | NTR25J-E27K0 |
| A25R3055 | 315-0273-00 |  | RES, FXO, FILM:27K OHM , 5K, 0.25M | 57668 | NTR25J-E27K0 |
| A25R3064 | 315-0244-00 |  | RES, FXD, FILM:240X OHM, 5x, 0.25 H | 19701 | 5043Cx240K0J |
| A25R3066 | 315-0102-00 |  |  | 57668 | NTR25JE01K0 |
| A25R3068 | 308-0290-00 |  |  | 00213 | 1250SB-8-5 |
| A25R3077 | 315-0103-00 |  | RES, FXO, FILM: 10 K OHM, 5\%, 0.254 | 19701 | 5043Cx10K00, |
| A25R3078 | 315-0100-00 |  | RES,FXD, FIL : 10 OHM,5X,0.25M | 19701 | 5043CX10RROOJ |
| A25S2558 | 260-1209-00 |  | SNITCH, PUSH: 18UTTON, 4 POLE, OISPLAY | 31918 | 601347 |
| A25S2624 | 260-1219-00 |  | SMITCH, PUSH: 10,2 OVOC | 31918 | 601348 |
| A25U2552 | 156-0043-03 |  | MICROCKT, DGIL:QUAD 2-INP NOR GATE, SCRN | 18324 | N7402(N8 OR FB) |
| A25U2556 | 156-0030-03 |  | MICROCKT, DGTL: QUAD 2 INPUT NAND GATE,SCRN | 18324 | N7400(N8 OR FB) |
| A25U2562 | 156-0172-02 |  | MICROCKT , DGTL:DUAL RETRIG MONOSTABLE NV | 07263 | 74123PCOR |
| A25U2565 | 156-0186-02 |  | MICROCKT, DGTL:QUAD 2-INP NAND GATE, | 18324 | N7403(NA OR F8) |
| A25U2588 | 156-0383-02 |  | MICROCKT, DGTL:QUAD 2-INP MOR GATE, SCRN, | 18324 | N74LSO2NB |
| A25U2592 | 156-0043-03 |  | MICROCKT, DGTL:QUAD 2-INP MOR GATE, SCPN | 18324 | N7402(N8 OR F8) |
| A25U2594 | 156-0172-02 |  | MICROCKT, DGTL:OUAL RETRIG MONOSTABLE MV | 07263 | 74123PCOR |
| A25U2608 | 156-0043-03 |  | MICROCKT, DGTL:QUAD 2-INP NOR GATE, SCRN | 18324 | N7402(N0 OR FB) |
| A25U2682 | 156-0041-05 |  | MICROCKT, OGTL:OUAL D FLIP FLOP SCRA | 01295 | SN7474NP3 |
| A25U2684 | 156-0172-02 |  | MICROCKT , OGTL: DUAL RETRIG MONOSTABLE WV | 07263 | 74123PCQR |
| A25VR2808 | 152-0280-00 |  | SEIICOND DVC,DI: $2 \mathrm{EN}, 51,6.2 \mathrm{~V}, 52,0.4 \mathrm{M}, 00-7$ | 04713 | 1N753a |
| A25VR2867 | 152-0280-00 |  | SEIICOND DVC,DI:2EN,51,6.2V,5z,0.4K,00-7 | 04713 | 1N753日 |
| A25VR2927 | 152-0289-00 |  | SEIICOND DVC,DI: $2 \mathrm{~N}, 51,180 \mathrm{~V}, 5 \mathrm{~L}, 0.4 \mathrm{H}, 00-7$ | 04713 | S212484KRL |


| Component No, | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A26 | 670-9176-00 |  | CIRCUIT BD ASSY:STORAGE CONTROL | 80009 | 670-9176-00 |
| A26R1101 | 311-2326-00 |  | RES, VAR , NONWH: 10 K OHM, 10\%,0.25 | 12697 | CM45212 |
| A26R1201 | 311-2326-00 |  | RES, VAR, NONWM: 10 K OHM, 10\% , 0.25 H | 12697 | CM45212 |
| A26R1301 | 311-2322-00 |  | RES, VAR, NONWH: 500 K OHM, 10\%, 0.125 K | 12697 | CM45216 |
| A26R1401 | 311-2327-00 |  | RES, VAR,NONWH: 10 K OHM, 10\%,0.125W | 12697 | CM45217 |
| A26S1301 | --------- |  | (PART OF A26R1301) |  |  |
| A26S1401 | ----- ----- |  | (PART OF A26R1401) |  |  |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A27 | 670-4778-01 |  | CIRCUIT 8D ASSY:TRIGGER LIGHT | 80009 | 670-4778-01 |
| 22705342 | 150-0048-09 |  | LAMP, INCAND:5V,0.06A, \#683, AGED \& SEL | 58854 | 683as 15 |
| A2705345 | 150-0048-01 |  | LAMP, INCAND:5V,0.06A, \%683,AGED \& SEL | 58854 | 6830515 |
| A2705346 | 150-0048-01 |  | LAMP,INCAND:5V,0.06A, $\quad 683, A G E D$ \& SEL | 58854 | 683aS15 |

Tektronix Serial/Assembly No.

| Component No, | Part No. | Effective Dscont | Name \& Description | Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 028 | 670-4778-01 |  | CIRCUIT BD ASSY:TRIGGER LIGHT | 80009 | 670-4778-01 |
| A2e05352 | 150-0048-01 |  | LAMP, INCAND:5V, $0.06 \mathrm{~A}, 683$, AGED \% SEL | 58854 | 683AS15 |
| A2805355 | 150-0048-01 |  | LAMP, INCAND:5V,0.06A, \#883,AGED \& SEL | 58854 | 683AS15 |
| A2805356 | 150-0048-04 |  | LAMP, INCAND:5V,0.06A, \%683,AGED \& SEL | 58854 | 683AS 15 |


| Component No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| 890 | 119-1545-01 |  | FAN, TUPEAXIAL: $12 \mathrm{~V}, 4.8 \mathrm{M}, \mathrm{RPM}, 35 \mathrm{CFM}$ | 54473 | FBP 08812H |
| C37 | 285-0938-00 |  | CAP, FXD, PLASTIC: $0.03 \mathrm{UF}, 5 \%, 900 \mathrm{~V}$ | 50558 | P96-0738, |
| C81 | 283-0003-00 |  | CAP , FXO, CER DI:0.01uF, $+80-202,150 \mathrm{~V}$ | 59821 | 010324025 UJOCEX |
| 01592 | 119-0757-00 |  | DELAY LINE,ELEC:65NS, 100 OHMS | 80009 | 119-0757-00 |
| 05365 | 150-0121-07 |  | LAMP , CARTRIDGE:5V,0.06A, GREEN, 4. $125 \mathrm{~L}, 5-\mathrm{N}$ | 80009 | 150-0121-07 |
| 05901 | 150-0048-01 |  | LAMP , INCAND: $5 \mathrm{~V}, 0.06 \mathrm{~A}, * 683$, AGED \& SEL | 58854 | 683as15 |
| 05902 | 150-0048-01 |  | LAMP, INCAND:5V, $0.064, \# 683$, AGED 8 SEL | 58854 | 683as 15 |
| DS2558 | 150-1033-00 |  | LT EIITIING DID:AMPER,585NW,40MA MAX | 50434 | HLTP 1401 |
| 052624 | 150-1033-00 |  | LT ENITTING DIO:AMBER,585NH,40MA MAX | 50434 | HLAP 1401 |
| F10 | 159-0017-00 |  | FUSE, CARTRIDGE:3AG , 40, 250V , FAST BLON | 71400 | MTH-CH-4 |
| FL10 | 119-0420-00 |  | FILTER,RFI: $6 \mathrm{~A}, 250 \mathrm{VAC}, 400 \mathrm{HZ}$ | 02777 | F-11935-6 |
| 137 | 108-0761-00 |  | COIL, RF:FIXEO, 1WH | 80009 | 108-0764-00 |
| 12200 | 108-0851-00 |  | COIL, TUEE DEFL:TRACE ROTATOR | 80009 | 108-0851-00 |
| LR81 | 108-0685-00 |  | COIL,RF:FIXED, 62 NH | 80009 | 108-0685-00 |
| LR82 | 108-0685-00 |  | COIL, RF: FIXE0, 62 NH | 80009 | 108-0685-00 |
| R6 | 303-0105-00 |  | RES, FXD, CMPSN: 1M OHM , 5x, 1/ | 01121 | GB1055 |
| R83 | 307-0292-24 |  | RES, FXD, FILM: (2) 175 OHM, (2) 33.7 OH\% | 80009 | 307-0292-24 |
| R90 | 308-0175-00 |  | RES, FXD, HN: 10 OHM , 5Z, 10 N | 44655 | 10EX10R00J054 |
| R2195 | 311-1847-00 |  | RES, VAR , NONHW: PNL, 250K OHM , $0.5 \mathrm{5H}$ | 12697 | 382-CW40967 |
| R2465 | 311-0310-00 |  | RES, VAR , NONWH:PNL, 5 K OHM, 0.5 W | 01121 | W7350A |
| R2720 | 311-0546-00 |  | RES, VAR, NONHM:TRMR, 10K OHM, 0.5 F | 01121 | 1-8154a |
| 510 | 260-1709-00 |  | SMITCH, PUSH:DPST, 150, 250VAC , PUSH-PUSH | 77342 | А911-762-6-3 |
| 599 | 260-0450-00 |  | SHITCH, SLIDE:DPIT, 0.5A, 125VAC | 82389 | 110-1007 |
| T110 | 120-1183-00 |  | XFMR, PWR,STPON:HIGH FREQUENCY | 80009 | 120-1183-00 |
| V2200 | 154-0780-01 |  | CRT ASSEMGLY:FINISHED | 80009 | 154-0780-01 |

## DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

## Symbols

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The overline on a signal name indicates that the signal performs its intended function when it is in the low state.

Abbreviations are based on ANSI Y1.1-1972.

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

Y14.15, 1966 Drafting Practices.
Y14.2, 1973 Line Conventions and Lettering.
Y10.5, 1968 Letter Symbols for Quantities Used in Electrical Science and Electrical Engineering.
American National Standard Institute
1430 Broadway
New York, New York 10018

## Component Values

Electrical components shown on the diagrams are in the following units unless noted otherwise:
Capacitors $=$ Values one or greater are in picofarads ( pF ) . Values less than one are in microfarads ( $\mu \mathrm{F}$ ).
Resistors $=$ Ohms ( $\Omega$ ).

## The information and special symbols below may appear in this manual.

## Assembly Numbers and Grid Coordinates

Each assembly in the instrument is assigned an assembly number (e.g., A20). The assembly number appears on the circuit board outline on the diagram, in the title for the circuit board component location illustration, and in the lookup table for the schematic diagram and corresponding component locator illustration. The Replaceable Electrical Parts list is arranged by assemblies in numerical sequence: the components are listed by component number "(see following illustration for constructing a component number).

The schematic diagram and circuit board component location illustration have grids. A lookup table with the grid coordinates is provided for ease of locating the component. Only the components illustrated on the facing diagram are listed in the lookup table. When more than one schematic diagram is used to illustrate the circuitry on a circuit board, the circuit board illustration may only appear opposite the first diagram on which it was illustrated; the lookup table will list the diagram number of other diagrams that the circuitry of the circuit board appears on.



5880-102(a)

Figure 8-1 Location of circuit boards in the 7934 acquisition unit.


5880-102(b)

Figure 8-2 Location of circuit boards in the 7934 display unit.



Figure 8-3. A2-Mode Switch Circuit Board Assembly.


ASSEMBLY A1 - Graticule Light Circuit Board (not pictured)

| CIRCUIT NUMBEA | SCHEM location | board location | CIRCUIT NUMBER | SCHEM location | BOARD LOCATION | CIRCUIT NUMBER | SCHEM location | board location |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| DS304 | G5 | Not pictured |  |  |  |  |  |  |
| DS305 | c5 | Not pictured |  |  |  |  |  |  |
| DS306 | G4 | Not pictured |  |  |  |  |  |  |

ASSEMBLY A2 - Mode Switch Circuit Board

| CIRCUIT NUMBER | SCHEM <br> location | BOARD <br> location | Circuit NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C332 | C4 | D2 | R307 | A4 | D3 | R386 | G2 | B2 |
| C336 | C4 | C2 | R308 | A4 | D3 | R387 | G3 | B3 |
| C356 | H4 | F1 | R319 | B1 | E1 | R388 | G2 | A3 |
| C357 | H3 | F1 | R320 | B1 | E1 | R389 | G2 | A3 |
| C359 | H4 | F2 | ค321 | C5 | D3 | ค392 | G2 | B3 |
| C376 | G3 | A2 | R322 | A4 | D3 | R393 | G2 | B3 |
| С384 | G3 | B3 | R323 | B3 | H2 | R394 | G2 | B3 |
| C386 | G2 | B3 | R324 | 84 | D3 | R395 | G2 | B3 |
|  |  |  | R325 | B4 | D3 | R396 | G2 | B3 |
| CR303 | A4 | D3 | ค326 | B5 | C3 | R397 | H2 | B3 |
| CR307 | A4 | D3 | R327 | B4 | C3 |  |  |  |
| CR319 | B1 | E1 | A328 | B4 | C3 | S342 | C4 | H5 |
| CR321 | A3 | H2 | R329 | B3 | G2 | S344 | D4 | D5 |
| CR322 | B3 | H2 | R331 | B5 | D3 | S352 | E4 | F4 |
| CR323 | A3 | H2 | R332 | C4 | D3 | S354 | F4 | K4 |
| CR325 | 83 | H2 | R334 | B3 | C1 | S395 | G1 | A5 |
| CR326 | B3 | H2 | R335 | C4 | Cl |  |  |  |
| CR327 | B3 | H2 | A336 | C4 | C3 | U322A | A2 | D1 |
| CR328 | C4 | C3 | R342 | C3 | G2 | U3228 | A2 | D1 |
| CR329 | B2 | C3 | ค343 | E4 | G3 | U322C | B1 | D1 |
| CR330 | B5 | C3 | R344 | E4 | G3 | U322D | E2 | D1 |
| CR341 | C3 | H2 | R345 | D1 | K2 | U326A | B2 | D2 |
| CR342 | C3 | H2 | R346 | E3 | H3 | U326B | A2 | D2 |
| CR349 | E4 | H3 | R347 | E4 | G3 | U326C | A2 | D2 |
| CR354 | F4 | H3 | R348 | E4 | G3 | U326D | B2 | D2 |
| CR386 | G2 | B2 | R349 | E3 | H3 | U330A | C3 | C1 |
|  |  |  | R351 | F4 | G3 | U3308 | C3 | C1 |
| J395 | G1 | C3 | R352 | F4 | G3 | U332A | C3 | E2 |
|  |  |  | R354 | F3 | H3 | U332日 | C2 | E2 |
| P325 | C1 | F3 | R355 | F4 | H3 | U332C | C2 | E2 |
| P340 | F4 | 81 | R356 | H3 | F1 | U332D | B1 | E2 |
| P344 | A1 | G1 | R357 | F3 | J3 | U334A | C4 | C2 |
| P344 | A5 | G1 | R358 | F4 | G3 | U334B | C4 | C2 |
| P344 | F1 | G1 | R360 | D3 | E3 | U334C | C4 | C2 |
| P344 | G4 | G1 | R361 | D3 | E3 | U334D | C4 | C2 |
| P352 | E4 | G2 | ค362 | D2 | E3 | U338A | E3 | J3 |
| P365 | G4 | A3 | R364 | F3 | G3 | U338B | E3 | J3 |
| 0304 | A3 | D2 | R365 | E2 | K2 | U338C | F3 | J3 |
| Q308 | A4 | D2 | R366 | F2 | K2 | U338D | F3 | J3 |
| Q321 | A4 | 02 | R368 | E1 | G3 | U340A | E3 | L2 |
| 0325 | B4 | D2 | R369 | E3 | K2 | U3408 | E2 | 12 |
| Q328 | B4 | C2 | R370 | F2 | 12 | U340C | F3 | L2 |
| Q332 | C4 | C 2 | A371 | F1 | $K 2$ | U344A | E2 | $K 1$ |
| 0336 | C4 | C2 | R372 | G3 | A2 | U344B | E3 | K1 |
| 0346 | E4 | H3 | R373 | G3 | A2 | U344C | F2 | K1 |
| Q349 | E4 | H3 | R374 | G3 | E2 | U344D | F2 | K1 |
| Q354 | E4 | H3 | A375 | G3 | J1 | U346A | F2 | J2 |
| Q356 | F4 | H3 | f376 | H3 | B2 | U3468 | E2 | J2 |
| 0376 | G3 | B2 | R380 | G3 | B2 | U346C | E2 | J2 |
| 0382 | G3 | B2 | R381 | H3 | A3 | U3460 | F2 | J2 |
| Q384 | G3 | B2 | R382 | G2 | B2 | U350A | F1 | J2 |
|  |  |  | A383 | G3 | B2 | U3508 | E1 | J2 |
| R303 | A4 | E3 | R384 | G3 | C2 | U350C | F2 | J2 |
| R304 | A3 | E3 | R385 | G2 | $K 1$ |  |  |  |


| CIACUIT <br> NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | Boafd LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOABD } \\ & \text { LOCATION } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| P1401 | A3 | 日2 | R1402 | A3 | 日2 |  |  |  |
| ASSEMBLY A27 - A Trigger Light Circuit Board (not pictured) |  |  |  |  |  |  |  |  |
| CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \\ & \hline \end{aligned}$ | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \\ & \hline \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ |
| DS342 DS345 DS346 | $\begin{aligned} & E 4 \\ & E 4 \\ & E 4 \end{aligned}$ | Not pictured Not pictured Not pictured | P346 | E4 | Not picturec |  |  |  |
| ASSEMBLY A2B - B Trigger Light Circuit Board (not pictured) |  |  |  |  |  |  |  |  |
| CIRCUIT <br> NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION | CIRCUIT <br> NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOGATION } \end{aligned}$ | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | board location |
| $\begin{aligned} & \text { DS352 } \\ & \text { DS355 } \end{aligned}$ DS356 | $\begin{aligned} & F 4 \\ & F 4 \\ & F 4 \end{aligned}$ | Not pictured Not pictured Not pictured | P366 | F4 | Not pictured |  |  |  |
| CHASSIS MOUNTED PARTS (not pictured) |  |  |  |  |  |  |  |  |
| CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD location | CIRCUIT NUMBER | SCHEM LOCATION | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \\ & \hline \end{aligned}$ | CIRCUIT NUMBER | SCHEM LOCATION | board LOCATION |
| $\begin{aligned} & \text { OS365 } \\ & \text { DS901 } \\ & \text { DS9002 } \end{aligned}$ | $\begin{aligned} & \text { G4 } \\ & \text { C1 } \\ & \text { C1 } \end{aligned}$ | Chassis Chassis Chassis | $\begin{aligned} & J 396 \\ & J 399 \end{aligned}$ | $\begin{aligned} & \mathrm{H} 1 \\ & \mathrm{H} \end{aligned}$ | Chassis Chassis | P935 | F5 | Chassis |




ASSEMBLY A3 — Partial Main Interface Circuit Board

| CIRCUIT <br> NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT <br> NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT <br> NUMBER | SCHEM LOCATION | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C29 | B4 | D6 | CR164 | G4 | K6 | P52 | F1 | C2 |
| C117 | D3 | G5 | CR172 | G3 | K6 | R54 | F1 | C2 |
| C135 | G3 | L4 | CR180 | G3 | L7 | R56 | F1 | C2 |
| C142 | G3 | L4 | CR181 | G4 | M7 | A58 | F1 | C2 |
| C145 | G2 | C3 | CR184 | G4 | C6 | P60 | B4 | F3 |
| C146 | G2 | D3 |  |  |  | R61 | B4 | F3 |
| C147 | G2 | D3 | J1 | B1 | B3 | R67 | B4 | C7 |
| C148 | H2 | C3 | J2 | C1 | E3 | R68 | 日4 | C7 |
| C149 | H2 | D5 | J3 | E1 | H3 | R87 | C4 | F7 |
| C172 | G5 | J7 | J4 | F1 | K3 | R88 | D4 | F7 |
| C173 | G5 | J7 | J7 | H5 | M5 | R102 | B2 | J5 |
| C178 | G3 | J5 | J8 | H5 | L5 | R112 | C2 | J5 |
|  |  |  | J9 | H5 | M6 | R117 | D3 | G5 |
| CR18 | F3 | J6 | J10 | H5 | M6 | R121 | E2 | J5 |
| CR21 | B1 | C2 | J11 | H4 | M6 | R122 | D3 | G5 |
| CR22 | B1 | C2 | J270 | E2 | H5 | A123 | D3 | G5 |
| CR23 | B1 | 82 | J271 | E2 | H5 | R126 | E4 | G7 |
| CR24 | E1 | B2 | J472 | F2 | L5 | R127 | E4 | H7 |
| CR25 | B1 | C2 | $J 473$ | F2 | L5 | R128 | E4 | G7 |
| CR26 | B1 | C2 | $J 1738$ | H 2 | J2 | R131 | G2 | K5 |
| CR27 | B1 | B2 | J1814 | A2 | J2 | R132 | G3 | K5 |
| CR28 | B1 | B2 | J2316 | A2 | J2 | R133 | G3 | K5 |
| CR31 | C1 | C2 |  |  |  | R135 | G3 | L4 |
| CR32 | C1 | C2 | P17 | H2 | J1 | P136 | G3 | L4 |
| CR33 | C1 | B2 | P24 | A3 | D2 | R138 | G3 | L4 |
| CR34 | C1 | B2 | P43 | A2 | F2 | R142 | H3 | L4 |
| CR35 | C1 | C2 | P44 | A1 | G1 | R144 | H3 | L4 |
| CR36 | C1 | C2 | P44 | A4 | G1 | R152 | E5 | G7 |
| CR37 | C1 | B2 | P44 | B5 | G1 | R153 | E5 | G7 |
| CR38 | C1 | B2 | P44 | H3 | G1 | P156 | F4 | J7 |
| CR41 | E1 | C2 | P44 | H4 | G1 | R157 | F4 | J7 |
| CR42 | E1 | C2 | P82 | H1 | E2 | R162 | F4 | K6 |
| CR43 | E1 | B2 | P89 | H2 | F2 | R164 | G4 | K6 |
| CR44 | E1 | B2 | P91 | H3 | M4 | R172 | G3 | K6 |
| CR45 | E1 | C2 | P925 | H5 | L1 | R173 | G4 | L6 |
| CR46 | E1 | C2 | P987 | A5 | D1 | R174 | G4 | $K 7$ |
| CR47 | E1 | B2 | P3246 | A4 | K1 | R178 | G3 | J5 |
| CR48 | E1 | B2 |  |  |  | R180 | G3 | L7 |
| CR51 | F1 | C2 | Q60 | B4 | F2 | R181 | G4 | M7 |
| CR52 | F1 | C2 | Q182 | G3 | C7 | R182 | G3 | C6 |
| CR53 | F1 | B2 | R18 | E3 | J6 | R183 | G4 | C6 |
| CR54 | F1 | B2 | R22 | B1 | D2 | R184 | G4 | C6 |
| CR55 | F1 | C2 | R24 | B1 | D2 | H186 | G3 | E6 |
| CR56 | F1 | C2 | R26 | B1 | D2 | P187 | H3 | E6 |
| CR57 | F1 | B2 | R28 | B1 | D2 | R192 | G5 | L7 |
| CR58 | F1 | B2 | R29 | B4 | D6 | R193 | G5 | L6 |
| CR114 | D3 | G7 | R32 | C1 | D2 | R194 | G5 | L7 |
| CR124 | F3 | L6 | R34 | C1 | D2 | R195 | G4 | L7 |
| CR128 | E4 | H7 | R36 | C1 | D2 | ค196 | G5 | L6 |
| CR136 | G3 | L4 | R38 | C1 | 02 |  |  |  |
| CR138 | G3 | L4 | R42 | E1 | D2 | U92A | H3 | D7 |
| CR142 | H3 | L4 | R44 | E1 | D2 | U92日 | D4 | D7 |
| CR152 | G5 | G7 | R46 | E1 | D2 | U92C | D4 | D7 |
| CR156 | G4 | J7 | R48 | E1 | D2 | U92D | D4 | D7 |
| CR162 | F4 | K6 |  |  |  |  |  |  |


TOP $\longrightarrow$


Figure 8-5. A6-Logic Circult Board Assembly.


## ASSEMBLY A6 - Logic Circuit Board

| CIRCUIT NUMBER | SCHEM <br> LOCATION | BOARD LOCATION | CIRCUIT NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT NUMBER | SCHEM LOCATION | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C4301 | G4 | H2 | LR4368 | F2 | G3 | R4437 | F4 | E2 |
| C4302 | G4 | J1 | LR4412 | G2 | G2 | R4438 | F3 | E2 |
| C4303 | G4 | J3 | 04336 | C3 | E3 | R4441 | F4 | F2 |
| C4304 | G5 | J2 | Q4364 | E2 | G3 | R4442 | F4 | F1 |
| C4305 | G5 | D1 | Q4374 | F1 | F2 | R4448 | G3 | F1 |
| C4314 | B2 | J3 | 04382 | G1 | L2 | R4449 | G4 | F2 |
| C4315 | B2 | J3 | 04392 | G1 | K2 | R4456 | G4 | G2 |
| C4316 | B3 | K2 | Q4424 | D2 | E2 | R4457 | G3 | G2 |
| C4336 | C2 | G2 | 04432 | E3 | 日2 | R4461 | F3 | B3 |
| C4343 | C1 | J2 | 04438 | F3 | E2 | P4462 | G3 | B3 |
| C4345 | C2 | H3 | 04442 | F4 | F2 | P4467 | G3 | A3 |
| C4346 | C2 | H2 | 04448 | G4 | F2 | F4468 | G3 | A3 |
| C4347 | C2 | H2 | 04456 | G4 | F3 | R4471 | C5 | C1 |
| C4348 | C3 | J2 | 04462 | F3 | C 3 | F4472 | C5 | C1 |
| C4420 | C4 | B2 | 04468 | G3 | A2 | P4473 | B5 | D1 |
| C4423 | D4 | B3 | Q4474 | B4 | B1 | R4474 | B4 | C1 |
| C4441 | F4 | E2 | 04488 | C5 | D3 | R4475 | B4 | B1 |
| C4447 | C5 | C1 |  |  |  | A4476 | B5 | B1 |
| C4449 | G4 | F2 | R4303 | G5 | H1 | P4477 | 84 | A1 |
| C4461 | E3 | B3 | R4304 | B2 | K1 | R4478 | B4 | A1 |
| C4467 | E3 | A3 | R4305 | B2 | K1 | R4479 | D5 | C2 |
| C4482 | B5 | D3 | R4306 | 82 | K1 | R4480 | D4 | 81 |
| C4483 | 84 | E1 | R4307 | 82 | K1 | R4481 | D4 | C2 |
| C4492 | E4 | C3 | R4312 | B3 | J3 | R4482 | C5 | E3 |
| C4494 | E4 | D3 | F4313 | B3 | J3 | F4483 | B4 | D2 |
| C4497 | E4 | C3 | P4314 | B3 | J3 | F4484 | C5 | D3 |
|  |  |  | R4315 | 83 | J3 | R4485 | D4 | C2 |
| CR4322 | C1 | L1 | F4316 | B3 | K2 | F4486 | D4 | D2 |
| CR4323 | C1 | L2 | R4318 | C2 | J2 | R4487 | B4 | D2 |
| CR4354 | E2 | G2 | R4319 | C2 | J3 | R4488 | C5 | C3 |
| CR4355 | E2 | G2 | R4320 | C1 | J2 | F4489 | D4 | D2 |
| CR4356 | D2 | E2 | R4321 | B1 | L1 | R4490 | B5 | D2 |
| CR4357 | D2 | F2 | R4322 | B1 | L1 | R4491 | E4 | C2 |
| CR4420 | C4 | B2 | R4333 | B3 | E2 | R4492 | E4 | C2 |
| CR4423 | D3 | B3 | ค4334 | B3 | E2 | R4493 | E4 | C2 |
| CR4433 | F4 | E2 | R4335 | C3 | E2 | R4494 | D5 | C 3 |
| CR4434 | F3 | E2 | R4336 | C2 | G1 | R4495 | E5 | $\mathrm{C3}$ |
| CR4448 | G4 | F2 | R4342 | C1 | J2 | R4496 | E5 | C3 |
| CR4449 | G4 | F2 | R4343 | C2 | J2 | R4497 | E5 | D3 |
| CR4461 | E3 | B3 | R4344 | C2 | H3 | R4498 | F5 | D2 |
| CR4467 | E3 | A3 | R4345 | C2 | H3 |  |  |  |
| CR4368 | F1 | L1 | R4355 | E2 | G2 | TP4301 | G4 | H1 |
| CR4369 | F1 | L2 | R4358 | E3 | G1 | TP4302 | G4 | $J 1$ |
| CR4472 | B5 | B2 | R4363 | E2 | H3 | TP4312 | G2 | F2 |
| CR4473 | C5 | C1 | R4366 | F2 | G2 | TP4342 | C2 | J2 |
| CR4474 | C5 | C1 | R4367 | E2 | H2 | TP4392 | G1 | K2 |
| CR4483 | B4 | D2 | R4369 | F1 | L1 | TP4411 | G1 | J3 |
| CR4484 | C5 | D3 | R4374 | F1 | F2 | TP4413 | F3 | B3 |
| CR4486 | D4 | D2 | R4380 | F1 | L1 | TP4462 | E3 | C3 |
| CR4487 | D4 | D2 | P4381 | F1 | L1 | TP4468 | F3 | A2 |
| CR4488 | D4 | D2 | R4382 | G1 | L2 | TP4483 | B4 | D2 |
|  |  |  | R4390 | G1 | K2 | TP4493 | E4 | D2 |
| J4408 | G5 | D1 | R4391 | G1 | K2 |  |  |  |
| J4473 | A5 | D1 | R4392 | G1 | K2 | 44320 | 82 | J2 |
|  |  |  | R4394 | G2 | J1 | U4340 | C2 | H2 |
| L4301 | G4 | H1 | R4413 | G2 | F2 | U4358 | D2 | G1 |
| L4302 | G4 | H1 | R4420 | C4 | B3 | U4368 | E2 | G2 |
| L4303 | G4 | K2 | R4423 | D3 | B3 | U4412 | F2 | F3 |
| L4304 | G5 | H1 | R4424 | D2 | E2 | U4428 | D3 | 82 |
| L4317 | B3 | K2 | R4425 | D4 | B3 | U4494 | E4 | C2 |
| L4342 | C2 | J2 | P4426 | D3 | E2 |  |  |  |
| L4344 | C2 | H3 | P4427 | D2 | E2 | VR4334 | B3 | E2 |
|  |  |  | P4428 | D2 | E2 |  |  |  |
| LR4338 | C2 | H2 | R4431 | F3 | E2 |  |  |  |
| LR4359 | E2 | G1 | R4432 | E2 | G2 |  |  |  |

CHASSIS MOUNTED PARTS (not pictured)

| CIRCUIT <br> NUMBER | SCHEM | LOCATION | LOCARO | CIRCUIT | SCHEM | BOARD | CIRCUIT | SCHEM |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| NUMBER | LOCATION | LOCATION | NUMBER | LOCATION | LOCATI |  |  |  |
| $J 4472$ | A5 | Chassis |  |  |  |  |  |  |

## VOLTAGE CONDITIONS

The voltages shown were obtained with the 7934 controls set as follows:
Front panel controls (knob type) at midrange; VERTICAL MODE, LEFT; TRIGGER SOURCE, VERT MODE; NON STORE button, in HORIZONTAL MODE A. No plug-in units are installed.

Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (Tektronix DM501 Digital Multimeter or Tektronix 7D13 Digital Multimeter used with readout equipped, 7000-series oscilloscope).

## WARNING

Dangerous potentials exist at several points throughout this instrument. When the instrument is operated with the covers removed, do not touch exposed connections or components. Some transistors have voltages present on their cases. Disconnect the power source before replacing parts.



| CIRCUIT <br> NUMGER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD <br> LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C1 | E4 | C2 | R13 | C3 | F3 | R62 | B1 | F3 |
| C2 | E5 | C2 | R14 | D4 | E3 | R63 | c2 | F2 |
| c3 | E4 | C2 | R15 | D4 | C1 | R64 | C2 | F2 |
| C4 | E4 | D2 | R16 | D4 | C1 | R65 | C2 | F2 |
| cs | E1 | H2 | R17 | D4 | D1 | R66 | C2 | F2 |
| C6 | E2 | J2 | R18 | C5 | E1 | R67 | C1 | H3 |
| C7 | E2 | J2 | R19 | C5 | E1 | R68 | C1 | G3 |
| C8 | E2 | H2 | R20 | D5 | E1 | R69 | D1 | G3 |
| C9 | E2 | H2 | R21 | Cs | D1 | R70 | D1 | G3 |
|  |  |  | R22 | D4 | C2 | R71 | c3 | G1 |
| CA1 | E3 | A2 | R23 | D4 | H3 | R72 | c3 | F1 |
| CR2 | F3 | A2 | R24 | D4 | H3 | R73 | D3 | G1 |
|  |  |  | R25 | D5 | C2 | R74 | D3 | G1 |
| J202 | A2 | F2 | R26 | E3 | D2 | R75 | D2 | K3 |
| J203 | A1 | F1 | R27 | E3 | C3 | A76 | D2 | к3 |
| J270 | F1 | C2 | R28 | E3 | B2 | R77 | D2 | к3 |
| J271 | F2 | Cl | R29 | E3 | C1 | R78 | D2 | 12 |
| J402 | A5 | F3 | R30 | E3 | D2 | R79 | D2 | J2 |
| J403 | A5 | F2 | R31 | E3 | D3 | ค80 | D2 | н3 |
| J472 | F4 | $J 1$ | R32 | E3 | D3 | R81 | D2 | нз |
| J473 | F5 | J3 | R33 | F3 | A2 | R82 | E2 | J2 |
| J496 | F3 | A1 | R34 | F3 | A2 | н8з | E2 | J2 |
|  |  |  | R35 | E3 | D1 | R84 | E2 | H2 |
| L1 | D4 | 02 | A36 | E4 | D2 | R85 | E2 | J2 |
| L2 | D5 | D2 | R37 | E5 | D2 | ค86 | E2 | K2 |
| L9 | D2 | H2 | ค38 | E4 | C2 | R87 | E2 | 」2 |
| L10 | D2 | H2 | R39 | E4 | C2 | ค88 | E1 | H2 |
|  |  |  | R40 | E4 | B2 | R89 | E2 | H1 |
| Q1 | D4 | D1 | R4 1 | E4 | B2 | R90 | E2 | J2 |
| Q2 | D2 | J3 | R42 | E4 | B2 | R91 | E2 | к2 |
| 03 | E3 | D3 | A43 | E4 | B2 | R92 | E2 | J2 |
| Q4 | E3 | D2 | R44 | E4 | B2 | R93 | F1 | J1 |
| Q5 | E4 | C2 | R45 | E4 | 82 | R94 | F1 | J1 |
| 06 | E5 | C2 | ${ }^{\text {R46 }}$ | E4 | C3 | R95 | F2 | 」3 |
| 07 | E1 | H2 | R47 | E5 | C1 | R96 | F2 | J3 |
| 08 | E2 | H2 | R48 | F4 | C3 | R97 | E2 | H2 |
|  |  |  | R49 | F4 | B3 | R98 | E2 | H2 |
| R1 | B2 | K1 | R50 | F5 | B1 | R99 | E4 | D2 |
| R2 | B2 | K1 | F51 | F5 | B1 | R100 | 84 | $J 1$ |
| R3 | 84 | $J 9$ | R52 | B4 | K1 |  |  |  |
| R4 | 84 | $J 1$ | 853 | B4 | K1 | U1A | B2 | K1 |
| R5 | B5 | F1 | R54 | B2 | K1 | 418 | A2 | K1 |
| R6 | 85 | F1 | R55 | B2 | H1 | U1C | A4 | K1 |
| R7 | 85 | F1 | R56 | B2 | H1 | U10 | B4 | K1 |
| R8 | B5 | F2 | R57 | C2 | F3 | U2A | D2 | J3 |
| R9 | 日5 | F2 | 958 | C1 | F3 | U28 | D4 | J3 |
| R10 | B5 | F2 | \％59 | C2 | F3 | $u 4$ | D4 | E2 |
| R11 | C4 | E3 | ค60 | B1 | F3 | US | D1 | G2 |
| R12 | D4 | E3 | स61 | 81 | F3 |  |  |  |

CHASSIS MOUNTED PARTS（not pictured）

| CIRCUIT number | SCHEM location | BOARD location | CIRCUIT NUMBER | SCHEM <br> LOCATION | board location | ciacuit NUMBER | SCHEM <br> location | board <br> location |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| J549 | G3 | Chassis |  |  |  |  |  |  |

## VOLTAGE CONDITIONS

The voltages shown were obtained with the 7934 controls set as follows:
Front panel controls (knob type) at midrange; VERTICAL MODE, LEFT; TRIGGER SOURCE, VERT MODE; NON STORE button, in HORIZONTAL MODE A. No plug-in units are installed.

Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (Tektronix DM501 Digital Multimeter or Tektronix 7D13 Digital Multimeter used with readout equipped, 7000-series oscilloscope).

## WARNING

Dangerous potentials exist at several points throughout this instrument. When the instrument is operated with the covers removed, do not touch exposed connections or components. Some transistors have voltages present on their cases. Disconnect the power source before replacing parts.


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Figure 8-8. A3-Main Interface Circuit Board Assembly.

FRONT


Flgure 8-7. A13-Readout Circuit Board Assembly.


| CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION | CIRCUIT <br> NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT NUMBER | SCHEM <br> LOCATION | BOARD <br> LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C3415 | H4 | E3 | 03453 | E1 | D1 | R3544 | E5 | B5 |
| C3417 | H4 | E4 | O3481 | D3 | E3 | R3545 | E5 | E5 |
| C3418 | H4 | E3 | 03489 | F2 | D2 | R3546 | E4 | O5 |
| C3420 | A1 | E1 | 03523 | D4 | B3 | R3550 | F2 | C $\dagger$ |
| C3421 | H4 | E4 | 03526 | D4 | 84 | R3551 | G2 | D1 |
| C3427 | C2 | E4 | Q3527 | D4 | E6 | P3552 | G2 | B6 |
| C3435 | 81 | E2 | 03529 | E4 | F5 | R3553 | G2 | B5 |
| C3440 | C2 | E5 | 03543 | E5 | B6 | R3554 | G2 | B2 |
| C3444 | B2 | E2 | 03550 | F2 | D1 | A3555 | G2 | C4 |
| C3454 | E1 | E1 | 03555 | G2 | B2 | R3557 | H2 | A2 |
| C3455 | E1 | D2 | Q3596 | G4 | 日2 | R3558 | H2 | A2 |
| C3457 | H4 | B5 |  |  |  | R3559 | H2 | A2 |
| C3461 | D2 | E5 | R3401 | A1 | E2 | P3560 | H2 | A2 |
| C3483 | D3 | A3 | R3422 | A3 | E3 | R3563 | G2 | C2 |
| C3485 | E3 | C4 | R3423 | A2 | E3 | R3564 | G2 | C3 |
| C3486 | H4 | C4 | R3427 | C2 | E4 | P3565 | G2 | C3 |
| C3501 | F1 | E2 | R3431 | B1 | E1 | H3566 | G3 | C2 |
| C3502 | H4 | D4 | R3432 | B1 | E1 | R3567 | G3 | C3 |
| C3503 | H4 | D4 | R3434 | B1 | D3 | P3568 | G3 | C3 |
| C3504 | H4 | D3 | R3435 | B1 | E2 | R3569 | G3 | C2 |
| C3511 | G1 | B1 | R3437 | D1 | F4 | R3571 | F3 | E4 |
| C3512 | H1 | B2 | R3439 | D1 | F4 | P3576 | G3 | C2 |
| C3513 | H1 | B2 | R3440 | C2 | E2 | R3577 | G4 | C2 |
| C3521 | D4 | A3 | R3441 | C2 | E3 | A3579 | G3 | C1 |
| C3539 | D5 | F5 | R3442 | D1 | E5 | R3580 | G4 | C2 |
| C3544 | E4 | C5 | R3444 | B2 | E2 | R3586 | G5 | C5 |
| C3546 | H4 | F6 | P3446 | B2 | E3 | R3588 | G5 | B5 |
| C3551 | H4 | C5 | P3450 | E1 | C2 | P3589 | G5 | B5 |
| C3559 | H2 | A2 | R3451 | E1 | C2 | R3590 | G5 | B5 |
| C3563 | H4 | E2 | R3452 | E1 | D1 | R3591 | G5 | B6 |
| C3564 | H4 | D3 | R3453 | E1 | C2 | R3592 | G5 | B5 |
| C3576 | G4 | C2 | ¢3454 | E1 | E1 | R3593 | G5 | C2 |
| C3577 | G4 | C2 | R3455 | E1 | D2 | A3596 | H4 | A2 |
| C3579 | G4 | C1 | R3457 | E2 | D1 | R3597 | H5 | A2 |
| C3597 | H5 | A2 | R3481 | D3 | B3 | R3598 | H5 | B2 |
|  |  |  | R3482 | D3 | B3 | U3420A | A1 | F2 |
| CR3424 | A3 | E3 | P3483 | D3 | B4 | U3420日 | A1 | F2 |
| CR3425 | B3 | E3 | A3484 | D3 | B4 | U3420C | A1 | F2 |
| CR3437 | D1 | F3 | R3485 | E3 | B4 | U34200 | A2 | F2 |
| CR3439 | D1 | F3 | R3486 | F3 | ／I | U3426 | B1 | E2 |
| CR3445 | 日2 | E2 | R3487 | F3 | C2 | U3427A | C2 | E3 |
| CR3446 | B2 | E2 | P3488 | F2 | E3 | U3427B | C2 | E3 |
| CR3453 | E1 | D2 | R3489 | F2 | C2 | U3457A | F5 | B5 |
| CR3457 | E2 | D2 | R3501 | F1 | E1 | U3457日 | E2 | B5 |
| CR3461 | D2 | E5 | R3502 | F1 | E1 | U3457C | F5 | B5 |
| CR3462 | D2 | F6 | R3503 | F1 | C4 | U3457D | F3 | B5 |
| CR3487 | F2 | E4 | R3504 | G1 | C3 | U3459 | D2 | E4 |
| CR3529 | E4 | F6 | R3506 | G1 | c3 | U3462B | D2 | E5 |
| CR3550 | G2 | D1 | R3507 | G1 | C3 | U3485 | E3 | B4 |
| CR3570 | F3 | D3 | R3508 | G1 | C3 | U3486 | F3 | C4 |
| CR3571 | F3 | D3 | R3510 | H1 | A3 | U3502A | F3 | D4 |
|  |  |  | R3511 | G1 | B2 | U3502B | F1 | D4 |
| J3401 | C5 | A4 | R3512 | H1 | B2 | U3503 | F1 | C4 |
| J3402 | C3 | A3 | P3513 | H1 | B2 | U3504 | G1 | C3 |
| J3432 | C1 | E1 | R3516 | G1 | C3 | U3510A | G1 | B1 |
| J3596 | H4 | C1 | R3517 | G2 | C3 | U3510B | H1 | B1 |
| J3599 | H2 | 81 | R3518 | G2 | C3 | U3532 | D5 | E5 |
|  |  |  | R3522 | D4 | A3 | U3544 | E5 | C5 |
| L3577 | G3 | C2 | ค3523 | D4 | A3 | U3546 | F4 | D5 |
|  |  |  | R3524 | D4 | B3 | U3551A | G2 | C5 |
| P3446 | A1 | F3 | R3525 | D4 | 日 | U3551B | F5 | C5 |
| P3446 | C3 | F3 | R3526 | D4 | B4 | U3551C | E5 | C5 |
| P3467 | H5 | F3 | R3527 | D4 | F6 | U3551D | F5 | C5 |
| P3475 | H3 | F3 | R3529 | E4 | F6 | U3557A | H2 | B1 |
| P3484 | D3 | E1 | R3530 | E4 | E5 | U3557B | H4 | B1 |
|  |  |  | R3535 | D5 | F6 | U3563A | G2 | C2 |
| Q3431 | B1 | E1 | R3536 | D5 | E4 | U3563B | G3 | C2 |
| Q3432 | B1 | E1 | R3537 | D5 | E5 | U3564 | G3 | D4 |
| Q3438 | 01 | F4 | R3538 | D5 | E4 | U3576A | G4 | C1 |
| Q3442 | D2 | E4 | R3539 | D5 | F6 | U3576日 | G4 | C1 |
| C3451 | E1 | 01 | R3542 | E4 | A5 |  |  |  |
| Q3452 | E1 | D1 | R3543 | E4 | B5 | VR3485 | E2 | E5 |
|  |  |  |  |  |  | VR3486 | E2 | E5 |
|  |  |  |  |  |  | VR3487 | E2 | E5 |

## VOLTAGE AND WAVEFORM CONDITIONS

The voltages and waveforms shown were obtained with the 7934 controls set as follows:
Front panel controls (knob type) at midrange; VERTICAL MODE, LEFT; TRIGGER SOURCE, VERT MODE; NON STORE button, in.
Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (Tektronix DM501 Digital Multimeter or Tektronix 7D13 Digital Multimeter used with readout equipped, 7000-series oscilloscope).

Waveform Conditions. The waveforms shown below were obtained using a test oscilloscope system with $10 \mathrm{M} \Omega$ input impedance and at least 60 MHz bandwidth. The test oscilloscope is externally triggered through a $1 \times$ probe connected to TP3450 on the 7834 A13 Readout circuit board. (Tektronix 7603 Oscilloscope 7853A Time Base, and 7A13 Differential Comparator equipped with a 10X probe.) The 7B53A Time Base plug-in unit is installed in the mainframe A HORIZ compartment. The 7B53A is set for internal auto-trigger and $0.5 \mathrm{millisecond} / \mathrm{division}$ sweep rate.
 When the instrument is operated with the covers removed, do not touch exposed connections or components. Some transistors have voltages present on their cases. Disconnect the power source before replacing parts.



Figure 8-9. A8-Vertical Interface Circuit Board Assembly.



## VOLTAGE AND WAVEFORM CONDITIONS

The voltages and waveforms shown were obtained with the 7934 front panel variable controls at midrange except A INTENSITY control is set counterclockwise; voltmeter ground is connected to chassis ground; VERTICAL MODE, LEFT: TRIGGER SOURCE, VERT MODE; HORIZONTAL MODE, B; and READOUT OFF.

Voltage Condltions. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (TEKTRONIX DM 501A Digital Multimeter or TEKTRONIX 7D13A Digital Multimeter used with a readoutequipped 7000-series oscilloscope).

Waveform Conditions. The waveforms shown below were obtained using a test oscilloscope system with $10 \mathrm{M} \Omega$ input impedance and at least 60 MHz bandwidth. (TEKTRONIX 7603 Oscilloscope, 7B53A Time Base, and 7A13 Differential Comparator equipped with a 10 X probe.) The test oscilloscope was externally triggered from the Pretrig Out connector of a 067-0587-02 Calibration Fixture installed in the 7904A LEFT VERT compartment. Calibration Fixture was set: +Step Resp (Vert), 10 kHz Rep Rate, and 2 divisions of vertical display centered at 0 volts. The test oscilloscope time base installed in the $B$ HORIZ compartment was set: free-running sweep (not triggered), $50 \mathrm{~ns} / \mathrm{Div}$, +Slope, Auto, Ac, and Ext.

Voltages shown near the wavelorms are display center dc levels.


3




ASSEMBLY A19－Vertical Amplifer Circuit Board

| CIRCUIT <br> NUMBER | SCHEM <br> location | BOARD location | CIRCUIT NUMBER | SCHEM <br> LOCATION | BOARD location | CIRCUIT <br> NUMBER | SCHEM <br> location | BCARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C100 | D4 | C1 | 0740 | A4 | G4 | R533 | G2 | F4 |
| C120 | D2 | B3 |  |  |  | R534 | B3 | F4 |
| C130 | C2 | B4 | R130 | C2 | A4 | A535 | B3 | F4 |
| C145 | G4 | B4 | R131 | C2 | B4 | R537 | B3 | E4 |
| C200 | E2 | B2 | R132 | D2 | B4 | R541 | A4 | E4 |
| C201 | D2 | B2 | R201 | D2 | B2 | R543 | A4 | E4 |
| C202 | B1 | B2 | R205 | E2 | C1 | R544 | A4 | F4 |
| C203 | 81 | C2 | R206 | E1 | B1 | R600 | G2 | F2 |
| C204 | B1 | C2 | R207 | B1 | B2 | R601 | G2 | F2 |
| C215 | 82 | B2 | R208 | B1 | B2 | R602 | G2 | G2 |
| C220 | B2 | B3 | R209 | B1 | C2 | R603 | F2 | G2 |
| C221 | B2 | C3 | P210 | B1 | C2 | R604 | F2 | G2 |
| C223 | B2 | C3 | R211 | C2 | D2 | R605 | G2 | G2 |
| C240 | G4 | B4 | R212 | B2 | C3 | P630 | B4 | F4 |
| C241 | D2 | C4 | R213 | B2 | C3 | P631 | B4 | F4 |
| C245 | G4 | C5 | R214 | C2 | D2 | R632 | B3 | G4 |
| C246 | G5 | C5 | R215 | B2 | B3 | R633 | B3 | G4 |
| C333 | D2 | C4 | R220 | B2 | B3 | R634 | A3 | G4 |
| C334 | C2 | D4 | R221 | 日3 | B3 | R640 | B4 | F4 |
| C340 | D2 | C5 | R222 | 日3 | C3 | R641 | B3 | F4 |
| C341 | D4 | D5 | R223 | 83 | C3 | R642 | 日 3 | F4 |
| C400 | E2 | E1 | R230 | C2 | B4 | R643 | B4 | G4 |
| C401 | E2 | E1 | R231 | D2 | B4 | R700 | F3 | G2 |
| C530 | H2 | E4 | R232 | D2 | C4 | R701 | F3 | H2 |
| C605 | F3 | F2 | R233 | D2 | C4 | R702 | E3 | H2 |
| C630 | B3 | F4 | R234 | C2 | C4 | P703 | E3 | H2 |
| C640 | B4 | F4 | A235 | D2 | C4 | R710 | G2 | H2 |
| C700 | D4 | G1 | P236 | D2 | C4 | R711 | G3 | H2 |
| C712 | G4 | G3 | R237 | D2 | B4 | R712 | G4 | H2 |
| C 742 | A4 | G5 | R238 | C4 | C4 | R731 | G3 | G4 |
|  |  |  | P300 | E2 | C1 | R732 | G3 | G4 |
| CR333 | C2 | D4 | R301 | E3 | D2 | R733 | H3 | G4 |
| CR334 | C2 | D4 | R304 | E2 | D2 | R734 | G3 | G4 |
| CR544 | B3 | F4 | R310 | C4 | C2 | R735 | H3 | H4 |
| CR641 | B3 | F4 | R311 | C2 | C2 | R736 | 84 | H4 |
|  |  |  | R312 | E2 | D2 | R737 | A3 | H4 |
| J11 | A3 | G5 | R320 | C3 | C3 | R740 | B4 | G4 |
| J26 | A4 | E5 | R321 | C2 | C3 | R741 | A4 | G4 |
| 143 | A4 | F5 | R330 | 02 | C4 | R742 | A3 | G4 |
|  |  |  | R331 | D2 | C4 | R744 | B3 | H4 |
| L100 | 82 | A2 | P332 | D2 | C4 | P745 | B3 | H4 |
| L135 | G5 | B4 | R333 | D2 | C4 |  |  |  |
| L140 | G4 | B4 | R334 | C2 | D4 | RT303 | E2 | 01 |
| L141 | G4 | B5 | R335 | D2 | C4 |  |  |  |
| $\llcorner 200$ | B1 | C3 | R336 | C2 | D4 | TP230 | C2 | B4 |
| $\llcorner 201$ | B1 | C3 | R400 | E2 | D1 | TP300 | E2 | 01 |
| $\llcorner 220$ | B2 | C3 | R404 | E2 | E1 | TP500 | G2 | E2 |
| L221 | B2 | C3 | R405 | E2 | E2 | TP502 | G2 | F2 |
| L530 | H2 | E3 | R406 | E3 | D2 | TP630 | E4 | F2 |
|  |  |  | R407 | E1 | D2 | TP700 | F3 | F4 |
| P190 | H3 | H3 | f408 | E2 | D2 | TP720 | H3 | H3 |
| P207 | A3 | B5 | R430 | C3 | D4 | TP721 | H3 | H3 |
| P207 | F4 | B5 | R431 | C4 | D4 |  |  |  |
|  |  |  | R432 | B3 | 04 | U100 | D2 | 81 |
| 0303 | E2 | D2 | R433 | B3 | D4 | U335 | C2 | D4 |
| 0400 | E2 | D1 | R434 | B4 | D4 | U415 | E1 | D3 |
| Q430 | C3 | D4 | R435 | B4 | E4 | U515 | G1 | F3 |
| Q431 | C4 | E4 | R437 | C4 | E4 | U630 | B3 | G4 |
| Q435 | B3 | E4 | P438 | F2 | E4 | U700 | F3 | G2 |
| Q530 | B4 | E4 | R439 | F2 | E4 |  |  |  |
| Q540 | A4 | E5 | R500 | E1 | F1 | W402 | F3 | D3 |
| Q541 | B4 | E5 | P501 | E2 | F1 | W410 | G2 | E2 |
| Q630 | 83 | F4 | R502 | G2 | F2 | W420 | F2 | 03 |
| 0631 | 84 | G4 | R530 | F2 | E4 | W421 | F2 | D3 |
| 0720 | H3 | G3 | R531 | G2 | E4 | W510 | G2 | F2 |
| Q722 | G3 | H3 | R532 | B3 | F4 | W530 | G2 | E3 |

CHASSIS MOUNTED PARTS（not pictured）

| CIRCUIT <br> NUMBER | SCHEM <br> location | BOARD LOCATION | CIRCUIT NUMBER | SCHEM <br> LOCATION | BOARD location | CIRCUIT NUMBER | SCHEM <br> LOCATION | BOARD <br> LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| A31 | H1 | Chassis | J9 | B2 | Chassis | L81 | H1 | Chassis |
| A31 | H3 | Chassis | J10 | B1 | Chassis | L82 | H2 | Chassis |
|  |  |  | J10 | E2 | Chassis |  |  |  |
| C81 | H2 | Chassis | J89 | A2 | Chassis | R81 | H1 | Chassis |
|  |  |  | J90 | A2 | Chassis | R82 | H2 | Chassis |
| DL5 | A2 | Chassis |  |  |  | R83 | H2 | Chassis |

## VOLTAGE AND WAVEFORM CONDITIONS

The voltages and waveforms shown were obtained with the 7934 front panel variable controls at midrange except $B$ INTENSITY control is set at minimum; VERTICAL MODE, LEFT; TRIGGER SOURCE, VERT MODE; HORIZONTAL MODE, B; CALIBRATOR, 4 V; READOUT INTENSITY, OFF.

Voltage Conditlons. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (TEKTRONIX DM 501A Digital Multimeter or TEKTRONIX 7D13A Digital Multimeter used with a readoutequipped 7000 -series oscilloscope). Voltages are taken with no signal input and with the vertical trace centered.

> Waveform Conditions. The waveforms shown below were obtained using a test oscilloscope system with 10 M $\Omega$ input impedance and at least 60 MHz bandwidth. (TEKTRONIX 7603 Oscilloscope, 7B53A Time Base, and 7A13 Differential Comparator equipped with a 10 X probe.) A 7 A -series vertical amplifier plug-in was installed in the 7904A LEFT VERT compartment and a 7B-series time base plug-in in the 7904A B HORIZ compartment. The vertical amplifier was set for a centered, 6 to 8 division display on the 7904A with the CALIBRATOR output fed to the vertical amplifier input. The 7904A oscilloscope time base was externally triggered with the CALIBRATOR signal.

Voltages shown near the waveform are display center dc levele.




1988-159
TOP
Figure 8-13. A11-Horizontal Interface Circuit Board Assembly.


1988-160
TOP
Figure 8-12. A10-Horizontal Interconnect Circult Board Assembly.

## HORIZONTAL INTERFACE DIAGRAM

ASSEMBLY A9 - X-Y Compensation Circuit Board (Option 3 Only)

| CIRCUIT <br> NUMBER | SCHEM <br> LOCATION | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C822 | C5 | C2 | J813 | D5 | A1 | L827 | E6 | B2 |
| C825 | C5 | B1 | J814 | D6 | A2 | L832 | B5 | D1 |
| C827 | C6 | B2 |  |  |  | L835 | C5 | B2 |
| C832 | C5 | C2 | K822 | B5 | D2 | L837 | C5 | B1 |
| C835 | C5 | B2 | K838 | D5 | B2 |  |  |  |
| C837 | C5 | B1 |  |  |  | R822 | B6 | D2 |
|  |  |  | L805 | C5 | B2 | म832 | B5 | D2 |
| J811 | D4 | A2 | L822 | B6 | D2 |  |  |  |
| J812 | D5 | A3 |  |  |  |  |  |  |

ASSEMBLY A10 - Horizontal Interconnect Circuit Board

| CIRCUIT NUMBER | SCHEM <br> LOCATION | BOARD LOCATION | CIRCUIT NUMBER | SCHEM <br> location | BOARD <br> location | CIRCUIT NUMBER | $\begin{aligned} & \text { SGHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| J801 | D1 | A2 |  |  |  |  |  |  |
| J802 | D2 | A3 |  |  |  |  |  |  |
| J803 | D2 | A1 |  |  |  |  |  |  |
| J804 | D3 | A2 |  |  |  |  |  |  |

ASSEMBLY A11 - Horizontal Interface Circult Board

| CIRCUIT NUMBER | SCHEM <br> location | BOARD <br> LOCATION | CIRCUIT <br> NUMBER | SCHEM <br> location | BOARD LOCATION | CIRCUIT NUMEER | SCHEM <br> location | BOARD location |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C853 | E1 | C3 | J881 | G3 | B2 | ค862 | E2 | C2 |
| C863 | E2 | C1 | R841 | E1 | c3 | R863 | E2 | 82 |
|  |  |  | R842 | E1 | C3 | R868 | E3 | 01 |
| CR820 | B5 | D2 | R843 | E2 | C1 | R869 | E3 | D2 |
|  |  |  | R844 | E2 | C1 | R870 | G4 | 82 |
| J841 | E1 | 83 | R851 | E1 | C3 |  |  |  |
| J842 | E2 | D3 | R852 | E1 | B2 | S865 | E3 | D2 |
| 」843 | E2 | D1 | R853 | E1 | C2 |  |  |  |
| J844 | E3 | B1 | F861 | E2 | C1 | U884 | G3 | C2 |
| J871 | G1 | B2 |  |  |  |  |  |  |



Figure 8-11. A9-X-Y Compensation Circuit Board Assembly.


The voltages shown were obtained with the 7934 controls set as follows:
Front panel controls (knob type) at midrange; VERTICAL MODE, LEFT: TRIGGER SOURCE, VERT MODE; NON STORE button, in HORIZONTAL MODE A. No plug-in units are installed.

Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (Tektronix DM501 Digital Multimeter or Tektronix 7D13 Digital Multimeter used with readout equipped, 7000-series oscilloscope).



FRONT
Figure 8-14. A20-Horlzontal Amplifier Circuit Board Assembly.

| CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C1 | 日3 | C1 | P1994 | A5 | B4 | R51 | C3 | D2 |
| C3 | C2 | C2 | Q1 | B5 | A4 | R52 | C3 | D2 |
| C4 | B2 | 84 | Q2 | B5 | A1 | R53 | D4 | D3 |
| C5 | 84 | C3 | Q3 | C2 | C2 | R54 | D4 | D3 |
| C6 | C3 | B2 | Q4 | C3 | C2 | R55 | D4 | C3 |
| C7 | C4 | C3 | 05 | C4 | C3 | R56 | D4 | E4 |
| C8 | B4 | C4 | 06 | C4 | C3 | R57 | D4 | D4 |
| C13 | B4 | D2 | Q7 | C2 | C3 | P58 | D4 | D3 |
| C14 | 03 | D1 | O8 | B2 | C3 | R59 | D3 | D2 |
| C15 | E2 | E2 | 09 | C2 | C2 | F60 | D3 | C1 |
| C17 | D4 | D4 | 010 | C4 | C2 | R61 | D2 | D1 |
| C18 | D4 | D4 | Q11 | D4 | D3 | R62 | D3 | D2 |
| C19 | D4 | D3 | Q12 | D4 | D3 | R63 | D4 | D4 |
| C20 | 5 | E3 | Q13 | D2 | D2 | R64 | D3 | D1 |
| C21 | E4 | E4 | 014 | D2 | D2 | R65 | D4 | D3 |
| C 22 | E4 | F3 | Q15 | E3 | E2 | R66 | D4 | D3 |
| C23 | E3 | E3 | 016 | E3 | E1 | R67 | E5 | E3 |
| C24 | E3 | E2 | 017 | E4 | E3 | R68 | D3 | D2 |
| C25 | F3 | F2 | 018 | E4 | E4 | R69 | D3 | D2 |
| C26 | F2 | F2 | Q19 | F3 | E2 | R70 | E2 | E2 |
| C27 | G2 | F1 | Q20 | E4 | E3 | R71 | E2 | E1 |
| C28 | B3 | B1 | Q21 | E4 | E3 | A72 | E2 | E1 |
| C29 | G4 | G4 | Q22 | E3 | E2 | P73 | E2 | E2 |
| C30 | F4 | F3 | Q23 | F2 | F2 | R74 | E3 | E2 |
| C31 | F4 | F4 | Q24 | F3 | F2 | R75 | E4 | E3 |
| C32 | G5 | F4 | 025 | F5 | F3 | R76 | E4 | E4 |
| C33 | E4 | F3 | Q26 | F4 | F3 | R77 | E4 | E4 |
| C34 | B1 | C4 |  |  |  | R78 | E4 | E4 |
| C35 | B1 | D4 | R1 | B5 | A3 | R79 | E4 | E3 |
| C36 | 81 | C4 | R2 | B2 | B2 | ¢80 | E3 | E2 |
| C37 | 81 | C4 | R3 | B3 | B2 | H81 | F3 | E1 |
| C38 | B5 | A1 | R4 | A3 | B2 | R82 | F3 | E1 |
| C40 | B3 | B2 | R5 | A3 | B2 | R83 | F2 | E1 |
| C41 | E2 | E2 | R6 | A3 | B2 | R84 | F3 | F2 |
| C42 | F4 | F2 | R7 | B4 | B3 | R85 | E3 | E3 |
| C44 | B1 | F1 | R8 | B3 | A2 | R86 | E3 | E2 |
| C45 | B1 | B4 | R9 | A4 | B3 | R87 | E4 | E4 |
| C46 | C3 | C2 | R10 | A4 | B3 | R88 | F3 | F4 |
| C60 | 81 | C1 | ¢11 | B4 | B3 | $R 89$ | E4 | E3 |
| C61 | D3 | D1 | R12 | B3 | B3 | R90 | G2 | F1 |
| C62 | B1 | on back | R13 | B3 | 84 | R91 | G2 | F1 |
| C63 | D4 | D3 | R14 | B3 | C1 | RS2 | F2 | F1 |
| C85 | E3 | E2 | R15 | 日3 | C1 | R93 | F2 | F2 |
| C91 | B1 | F1 | R16 | B3 | C1 | R94 | F3 | F2 |
| C200 | D4 | D4 | R17 | B2 | B2 | R95 | F4 | F2 |
| C220 | D4 | D3 | R18 | B4 | C3 | R96 | F4 | F2 |
| C230 | D3 | D1 | R19 | C3 | C1 | R97 | G3 | F2 |
|  |  |  | R20 | B3 | C2 | R98 | F4 | F2 |
| CR1 | D3 | C2 | R21 | C3 | C2 | R99 | G3 | F4 |
| CR2 | D3 | C2 | R22 | C3 | 82 | R100 | G3 | F4 |
| CR3 | D3 | D1 | R23 | B4 | B3 | R101 | F4 | F3 |
| CR4 | D4 | D3 | R24 | B4 | C3 | R102 | F4 | F3 |
| CR5 | D4 | D3 | R25 | B4 | C3 | R103 | F4 | F3 |
| CR6 | 04 | D4 | R26 | B4 | C3 | R104 | F4 | F3 |
| CR7 | E4 | E3 | f27 | B3 | B2 | R105 | F5 | F3 |
| CR8 | E3 | E2 | R28 | B3 | C1 | R106 | G4 | F3 |
| CR9 | E3 | E2 | R29 | C4 | C3 | R107 | G5 | F4 |
| CR10 | E4 | E3 | R30 | B4 | C2 | R108 | G4 | F3 |
| CR11 | C4 | D2 | R32 | C3 | C2 | R109 | A1 | C4 |
| CR12 | C3 | D2 | R33 | B5 | A2 | R110 | A1 | C 4 |
| CR13 | C2 |  | R34 | B5 | A2 | R111 | B3 | B2 |
| CR14 | C2 | D2 | R35 | B5 | B3 | R112 | C4 | D3 |
|  |  |  | R36 | B5 | A1 | R113 | G3 | F4 |
| J1 | A5 | A3 | R37 | B5 | A1 | A114 | D3 | D2 |
| J2 | A2 | B2 | R38 | B5 | A1 | R115 | E3 | D2 |
| J3 | A4 | B3 | R39 | B3 | B3 | R200 | D4 | D4 |
| J4 | A5 | A2 | R40 | B2 | C4 | R210 | D4 | D3 |
|  |  |  | R41 | B2 | B4 | R220 | D4 | D3 |
| L1 | 日3 | B2 | R42 | C2 | C3 | R230 | D3 | D1 |
| 12 | B4 | B3 | R43 | B2 | C3 |  |  |  |
| L3 | G3 |  | R44 | C3 | C2 | RT31 | 84 | B2 |
| L4 | A1 | C4 | R45 | C4 | C3 |  |  |  |
| L5 | A1 | C4 | R46 | C3 | C2 | VR1 | E4 | E4 |
| L6 | A1 | C4 | R47 | C3 | C2 | VR2 | D3 | D2 |
| P1911 | A1 | B4 | P48 | C3 | C2 | VR3 | D4 | C3 |
| P1911 | A5 | B4 | R49 | C2 | C2 |  |  |  |
| P1994 | A2 | B4 | P50 | C2 | D2 |  |  |  |

The voltages and waveforms shown were obtained with the 7934 controls set as follows:
Front panel controls (knob type) at midrange; VERTICAL MODE, LEFT; TRIGGER SOURCE, VERT MODE; NON STORE button, in.
Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (Tektronix DM501 Digital Multimeter or Tektronix 7D13 Digital Multimeter used with readout equipped, 7000-series oscilloscope).

Waveform Conditions. The waveforms shown below were obtained using a test oscilloscope system with $10 \mathrm{M} \Omega$ input impedance and at least 60 MHz bandwidth (Tektronix 7603 Oscilloscope, 7B53A Time Base, and 7A13 Differential Comparator equipped with a 10X probe). A 7B53A Time Base plug-in unit is installed in the mainframe A HORIZ compartment. The 7B53A is set for internal auto-trigger and 1 microsecond/division sweep rate.


2


3



5




Figure 8-15. A12-Signal Output Circuit Board Assembly.

## ASSEMBLY A12 - Signal Output Circuit Board

| CIRCUIT NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT NUMBER | SCHEM LOCATION | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C13 | D1 | D3 | P35 | F4 | D1 | R45 | B3 | B2 |
| C17 | E2 | D3 |  |  |  | R46 | B3 | B3 |
| C79 | F3 | C3 | Q10 | D2 | D3 | R47 | C3 | B2 |
| C91 | F4 | C2 | Q11 | D2 | D3 | R49 | D3 | B3 |
| C95 | F4 | D2 | Q17Q49 | E2 | D4 | R56 | 84 | A2 |
|  |  |  |  | D3 | B2 | R57 | B4 | A2 |
| CR12 | D2 | D3 | Q49 Q62 | C4 | B2 | R59 | C4 | B2 |
| CR19 | E2 | D3 | $\begin{aligned} & \text { Q62 } \\ & \text { Q77 } \end{aligned}$ | E3 | C3 | R61 | C3 | C2 |
| CR76 | E3 | C2 | Q77 |  |  | R62 | C4 | B2 |
| CR77 | E3 | C3 | R3 | B2 | C2 | R67 | B4 | A2 |
| CR78 | E3 | C3 | R9R11 | C2 | C2 | R68 | B4 | A2 |
|  |  |  |  | D2 | D2 | R76 | D3 | C3 |
| J64 | B1 | C1 | R11 R12 | D1 | D3 | R77 | E3 | C3 |
| J65 | B2 | C1 | R12 R13 | D1 | D3 | R78 | E3 | B4 |
| J66 | B3 | B1 | R13 R16 | D1 | C3 | R79 | F3 | C4 |
| J67 | B4 | A1 | R16 R17 | E2 | D3 |  |  |  |
| J68 | B4 | B1 | R17 | $\begin{aligned} & \text { E2 } \\ & \text { F2 } \end{aligned}$ | D3 | S3 | C1 | C2 |
|  |  |  | $\begin{aligned} & \text { R18 } \\ & \text { R19 } \end{aligned}$ |  | C3 | S46 | C3 | B2 |
| CHASSIS MOUNTED PARTS (not pictured) |  |  |  |  |  |  |  |  |
| CIRCUIT NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT <br> NUMBER | SCHEM LOCATION | BOARD LOCATION |
| J20 | F2 | Chassis | J80 | F3 | Chassis |  |  |  |
| J30 | G1 | Chassis | J96 | E5 | Chassis |  |  |  |
| J33 | G2 | Chassis |  |  |  |  |  |  |



The voltages and waveforms shown were obtained with the 7934 controls set as follows:
Front panel controls (knob type) at midrange; VERTICAL MODE, LEFT; TRIGGER SOURCE, VERT MODE; NON STORE button, in.
Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (Tektronix DM 501 Digital Multimeter or Tektronix 7D13 Digital Multimeter used with readout equipped, 7000-series oscilloscope).

Waveform Conditions. The waveforms shown below were obtained using a test oscilloscope system with $10 \mathrm{M} \Omega$ input impedance and at least 60 MHz bandwidth (Tektronix 7603 Oscilloscope, 7B53A Time Base, and 7A13 Differential Comparator equipped with a 10X probe). A 7B53A Time Base plug-in unit is installed in the mainframe A HORIZ compartment. The 7B53A is set for internal auto-trigger and 0.5 millisecond/division swepp rate,





Figure 8-16. A14A1-Control Rectifier Circuit Board Assembly.


Figure 8-17. A14A2-LV Regulator Circuit Board Assembly.


ASSEMBLY A14A1 - Control Rectifier Circuit Board

| CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION | CIRCUIT NUMBER | SCHEM <br> LOCATION | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMBER | SCHEM location | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C52 | B3 | F4 | CR120 | E1 | E3 | R61 | B4 | B4 |
| C54 | C3 | F4 | CR121 | F1 | D3 | R62 | B4 | B4 |
| C55 | C3 | F4 | CR122 | E2 | E3 | R63 | B4 | B4 |
| C64 | C4 | B4 | CR123 | F2 | D3 | R64 | B5 | A4 |
| C66 | C5 | C4 | CR124 | E1 | E2 | R66 | C5 | C4 |
| C67 | C4 | C4 | CR125 | E2 | E3 | R67 | C4 | C4 |
| C70 | D3 | D4 | CR127 | F1 | E3 | R70 | C3 | D4 |
| C71 | D4 | D4 | CR130 | E2 | D2 | R74 | D4 | E3 |
| C74 | C4 | D4 | CR131 | F2 | D2 | R74 | C4 | C4 |
| C77 | D3 | D4 | CR132 | E2 | D2 | R80 | C5 | D4 |
| C78 | D3 | D4 | CR133 | F2 | D2 | R81 | C4 | D4 |
| C80 | C5 | D4 | CR140 | E2 | C3 | R82 | D4 | D4 |
| C86 | D5 | E4 | CR141 | F2 | B3 | R83 | D5 | D3 |
| C90 | D4 | B4 | CR142 | E2 | D3 | R84 | C5 | D4 |
| C92 | D4 | E2 | CR143 | F2 | C3 | R86 | D5 | E4 |
| C94 | D2 | D3 | CR150 | E3 | E3 | R87 | D5 | F4 |
| C121 | F2 | E3 | CR151 | E3 | F3 | R88 | D5 | B3 |
| C124 | E1 | E3 | CR153 | E3 | E3 | R90 | D4 | B4 |
| C125 | E2 | D3 | CR161 | E4 | B4 | R92 | D4 | D4 |
| C132 | F2 | D2 | CR171 | E4 | B3 | R93 | D4 | E4 |
| C133 | F2 | C1 | CR183 | F3 | A4 | R94 | D4 | D4 |
| C134 | F2 | D2 |  |  |  | R95 | D4 | E4 |
| C135 | F2 | C1 | L132 | F2 | C2 | R120 | E2 | E3 |
| C142 | F2 | B2 | L134 | F2 | C2 | R121 | F2 | E3 |
| C143 | F2 | A1 | L142 | F2 | A2 | R127 | F1 | E4 |
| C144 | F3 | C2 | L144 | F3 | B2 | R161 | E4 | B4 |
| C145 | F3 | B1 | L152 | F3 | E2 | R162 | E3 | B4 |
| C152 | F3 | E2 | L154 | F3 | F2 | R170 | E5 | A2 |
| C153 | F3 | D1 | L156 | F3 | F1 | R171 | E4 | B3 |
| C154 | F3 | F1 |  |  |  | R172 | E4 | B2 |
| C155 | F3 | E1 | P40 | E1 | D1 | R173 | E4 | A3 |
| C156 | F3 | F1 | P48 | G2 | D1 | R174 | E4 | A3 |
| C172 | E4 | A3 | P50 | G3 | E1 | R176 | E4 | A4 |
| C179 | G4 | B3 | P52 | G2 | C1 | R177 | F4 | A3 |
| C183 | F4 | A4 | P54 | E5 | B1 | R179 | F4 | B3 |
|  |  |  | P54 | F4 | 81 | R181 | E3 | A3 |
| CR52 | B3 | F4 |  |  |  | R182 | E3 | A3 |
| CR59 | B3 | F4 | Q52 | B3 | F4 |  |  |  |
| CR65 | B4 | A4 | 054 | C3 | F4 | TP126 | F1 | E4 |
| CR66 | B4 | B4 | Q162 | E4 | B4 |  |  |  |
| CR73 | D3 | D4 | Q171 | E4 | B3 | U75 | C4 | C4 |
| CR74 | D3 | D4 | Q173 | E4 | 83 | U179A | F4 | B3 |
| CR75 | D4 | D4 | Q177 | F4 | B3 | U1798 | F4 | B3 |
| CR76 | D4 | D4 |  |  |  | U179C | F4 | B3 |
| CR81 | D5 | E4 | R52 | 83 | F4 |  |  |  |
| CR82 | D5 | E4 | R54 | C3 | F4 | VR52 | B3 | F4 |
| CR83 | D5 | E4 | R55 | C3 | F3 | VR72 | D3 | D4 |
| CR84 | D5 | E4 | R59 | C3 | F4 | VA88 | D5 | B3 |
| CR90 | D4 | F4 | R60 | B3 | C4 |  |  |  |
| ASSEMBLY A14A2 - Partial LV Regulator Circuit Board |  |  |  |  |  |  |  |  |
| CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMEER | SCHEM LOCATION | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ |
| CB | E5 | F5 | P72 | E4 | F5 | f3 | E5 | E5 |
| CR7 | E5 | F5 | P82 | G5 | B5 | R4 | E5 | E5 |
| CRA | E5 | F5 | P83 | G5 | E5 | R5 | F5 | E6 |
| P54 | E5 | F5 | R1 | E5 | F6 | R8 | E5 | F5 |
| P54 | F4 | F5 | R2 | E5 | E5 |  |  |  |

ASSEMBLY A14A3 - Inverter Circuit Board

| CIRCUIT <br> NUMBER | SCHEM <br> LOCATION | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C5 | A2 | A3 | DS19 | 81 | C1 | R42 | D2 | D1 |
| C16 | 日1 | B3 | E8 | B1 | B2 | R43 | D2 | C2 |
| C17 | B1 | B2 | E13 | A1 | A3 | R44 | D1 | D2 |
| C19 | 日1 | A2 | 124 | C1 | D3 | R45 | D1 | D2 |
| C27 | C1 | C4 |  |  |  | R46 | D2 | D1 |
| C28 | C1 | C4 | 030 | C2 | E2 | R47 | D1 | D3 |
| C29 | C1 | E3 | 034 | D1 | D4 |  |  |  |
| C31 | C1 | E2 | Q40 | D2 | F4 | RT9 | B3 | C2 |
| C35 | D2 | E1 | Q43 | D2 | D1 | RT13 | A1 | c3 |
| C36 | E2 | C3 | Q45 | 01 | C2 |  |  |  |
| C38 | C2 | F1 | Q46 | C2 | F2 | S12 | A1 | B4 |
| C39 | C2 | F3 | R5 | F5 | A2 |  |  |  |
| C42 | D2 | D2 | R9 | B2 | A2 | T8 | B2 | B1 |
| C43 | D2 | C1 | R10 | B3 | C2 | T25 | C1 | D3 |
|  |  |  | R12 | A1 | C3 | T30 | C1 | E1 |
| CR15 | 81 | B3 | R13 | A1 | A3 | T35 | D2 | E1 |
| CR32 | C1 | D2 | R19 | B1 | C1 |  |  |  |
| CR33 | C1 | D3 | R21 | 81 | C3 | TP31 | C1 | E2 |
| CR34 | 01 | D3 | R25 | C1 | D3 | TP34 | D1 | E3 |
| CR36 | C2 | F1 | R31 | C1 | E2 | TP38 | C2 | E2 |
| CR37 | C2 | F1 | R32 | C1 | D2 | TP46 | C2 | D3 |
| CR38 | E1 | E2 | R36 | E2 | C3 |  |  |  |
| CR39 | D1 | F3 | R37 | C2 | F3 | VR38 | C2 | F2 |
| CR40 | C2 | F3 | R38 | C2 | D2 | VR45 | A2 | D3 |
| CR41 | D2 | F3 | R39 | C2 | G3 |  |  |  |
| CR45 | D1 | D2 | R40 | C2 | F3 | W5 | A2 | B3 |
| CR46 | C2 | F3 | R41 | D2 | C2 |  |  |  |
| CR49 | D2 | E2 |  |  |  |  |  |  |

CHASSIS MOUNTED PARTS (not pictured)

| CIRCUIT NUMBEA | SCHEM <br> LOCATION | BOARD location | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD <br> LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C37 | E1 | Chassis | L37 | D1 | Chassis | R6 | A4 | Chassis |
| $F 10$ | A3 | Chassis | P10 | A4 | Chassis | S10 | A3 | Chassis |
| FL10 | A4 | Chassis | P11 | A3 | Chassis |  |  |  |
|  |  |  |  |  |  | T110 | E2 | Chassis |



The voltages shown were obtained with the 7934 controls set as follows:
Front panel controls (knob type) at midrange; VERTICAL MODE, LEFT; TRIGGER SOURCE, VERT MODE; NON STORE button, in HORIZONTAL MODE A. No plug-in units are installed.

Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (Tektronix DM501 Digital Multimeter or Tektronix 7D13 Digital Multimeter used with readout equipped, 7000-series oscilloscope).

C
$\mathbf{E}$



Figure 8-19. A14A2-Partial LV Regulator Circuit Board Assembly.

| CIRCUIT NUMBER | SCHEM <br> LOCATION | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMBER | SCHEM <br> LOCATION | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C 12 | A1 | C4 | P83 | F3 | E5 | R73 | E1 | B2 |
| C13 | B2 | C6 | P90 | A4 | G5 | A74 | E2 | B3 |
| C15 | B2 | C3 | P99 | D4 | F5 | R75 | E1 | B2 |
| C17 | B1 | C3 |  |  |  | A76 | E1 | B4 |
| C24 | 81 | C2 | Q22 | B1 | C3 | A77 | E1 | 日 |
| C36 | B2 | F4 | Q28 | B1 | C1 | R80 | D3 | D5 |
| C44 | B2 | 34 | 034 | A2 | D3 | R81 | 03 | C5 |
| C45 | B3 | D4 | Q38 | B2 | F4 | R82 | D2 | E3 |
| C47 | 日3 | E2 | Q52 | B3 | D2 | R83 | E2 | E3 |
| C54 | 83 | D2 | Q58 | 日3 | D1 | R87 | E2 | E2 |
| C64 | D1 | B3 | 068 | E1 | B1 | R88 | E3 | E2 |
| C68 | E1 | B2 | 074 | E1 | B1 | R93 | E2 | E2 |
| C69 | E1 | B3 | Q88 | E2 | E2 | R94 | E2 | F2 |
| C84 | D3 | E3 | Q94 | E2 | E1 | R95 | E2 | E3 |
| C88 | E3 | F2 | Q118 | E3 | G2 | R96 | E2 | E4 |
| C114 | D3 | G2 | Q122 | E3 | F1 | A97 | E2 | E3 |
| C156 | D2 | F3 | Q126 | E3 | G1 | R113 | D3 | D5 |
|  |  |  | Q144 | D4 | G5 | A114 | D3 | D5 |
| CR10 | A1 | D5 | Q148 | E4 | GS | R121 | E4 | F2 |
| CR11 | A1 | C4 |  |  |  | R126 | E3 | G2 |
| CR15 | B1 | C3 | R10 | A1 | D4 | A127 | E3 | G3 |
| CR19 | B1 | C3 | R12 | A1 | C4 | A128 | E4 | G3 |
| CR20 | B1 | C3 | 813 | B2 | C6 | $R 129$ | E3 | G2 |
| CR21 | 81 | C3 | R14 | A2 | C5 | R131 | E3 | G3 |
| CR22 | 81 | C2 | H15 | A2 | C5 | R132 | E3 | G3 |
| CR28 | C1 | B4 | R16 | B2 | C5 | A133 | E3 | G2 |
| CR45 | B3 | D3 | R17 | B1 | C3 | R134 | E3 | H2 |
| CR49 | 83 | D2 | R21 | B1 | C3 | A135 | F3 | F6 |
| CR50 | 83 | D3 | R22 | B1 | C2 | R136 | E3 | G2 |
| CR51 | 83 | D3 | R24 | B1 | C2 | R141 | D4 | H5 |
| CR52 | B3 | 02 | R25 | B2 | C4 | R142 | D4 | H4 |
| CR5 | C3 | B5 | R26 | B1 | C2 | R143 | D4 | H4 |
| CR64 | D1 | B2 | H27 | C1 | C2 | R144 | E4 | H4 |
| CR76 | E1 | B5 | R28 | B1 | C2 | R145 | E4 | H4 |
| CR84 | D2 | E2 | R32 | A2 | D4 | A148 | E4 | G5 |
| CR96 | E2 | B5 | R34 | A2 | D3 | R152 | D2 | F2 |
| CR114 | D3 | G2 | R36 | B2 | F4 | R156 | D2 | F3 |
| CR132 | F3 | B5 | R37 | B2 | F3 |  |  |  |
| CR142 | D4 | G4 | R38 | B2 | F4 | 415 | A1 | C4 |
| CF143 | D4 | H4 | R42 | A3 | E3 | U45 | A3 | D3 |
| CR144 | D4 | F4 | R44 | B2 | E4 | U64A | D1 | B3 |
| CR148 | E4 | G5 | R45 | A3 | C5 | U64B | E2 | B3 |
|  |  |  | R46 | B3 | C5 | U84A | E2 | E3 |
| P17 | D4 | H5 | R47 | B3 | D3 | U84B | D2 | E3 |
| P48 | C3 | G5 | R51 | B3 | D3 | U114A | D3 | G2 |
| P50 | D5 | F2 | R52 | B3 | D2 | U114日 | E4 | G2 |
| P52 | A1 | D1 | R54 | 83 | D2 |  |  |  |
| P52 | D1 | D1 | R56 | B3 | D4 | VR10 | A1 | D4 |
| P62 | F5 | G5 | R57 | C3 | D2 | VR12 | A1 | D4 |
| P82 | C1 | B5 | 858 | B3 | D2 | VR17 | B1 | C3 |
| P82 | C3 | B5 | R61 | D1 | B6 | VR32 | A2 | D3 |
| P82 | F1 | B5 | F62 | 01 | B5 | VR36 | B2 | G4 |
| P82 | F3 | B5 | R63 | E2 | B2 | VR47 | B3 | D3 |
| P83 | C2 | E5 | R67 | E1 | B2 | VR152 | D2 | F3 |
| P83 | F1 | E5 | R68 | E1 | B2 | VR156 | D2 | F3 |

CHASSIS MOUNTED PARTS（not pictured）

| CIRCUIT <br> NUMBER | SOCHEM | BOARD | CIRCUIT | SCHEM | BOARD | CIRCUIT | SCHEM | BOARD |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| B90 | A4 | Chassis | R90 | A4 | Chassis | S99 | D4 | Chassis |

The voltages shown were obtained with the 7834 controls set as follows:
Front panel controls (knob type) at midrange; VERTICAL MODE, LEFT; TRIGGER SOURCE, VERT MODE; NON STORE button, in HORIZONTAL MODE A. No plug-in units are installed.

Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (Tektronix DM501 Digital Multimeter or Tektronix 7D13 Digital Multimeter used with readout equipped, 7000-series oscilloscope).

E

## 1 <br> 2



LOW-VOLTAGE REGULATORS ${ }^{\text {(13 }}$


5880-207

Figure 8-21. A22-High Voltage Circuit Board Assembly (front).



5880-209
Figure 8-23. A23-Focus Circuit Board Assembly.


1988-172A
Flgure 8-20. A21-Z Axis Circuit Board Assembly.


## ASSEMBLY A21 - Partial $Z$ Axis Circuit Board

| CIRCUIT NUMBER | SCHEM <br> LOCATION | BOARD LOCATION | CIRCUIT <br> NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT <br> NUMBER | SCHEM LOCATION | BOARD <br> LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C2205 | D4 | D3 | 12205 | D4 | C3 | R2232 | E4 | D3 |
| C2211 | 85 | C3 | 12215 | D4 | C4 | R2233 | E4 | E3 |
| C2212 | B5 | C4 |  |  |  | R2234 | E4 | E3 |
| C2215 | D4 | D3 | P2224 | A 4 | E5 | R2235 | D4 | D3 |
| C2217 | B5 | C5 | P2224 | C5 | E5 | R2236 | E4 | D4 |
| C2218 | D5 | F5 | P2242 | 84 | E5 | R2240 | E4 | F3 |
| C2224 | E5 | D5 | P2242 | F3 | E5 | R2241 | E4 | E3 |
| C2232 | E4 | D3 | P2273 | F3 | H4 | R2242 | E4 | F3 |
| C2235 | D4 | D4 | P2297 | G4 | H3 | R2244 | E4 | E3 |
| C2236 | E4 | D4 |  |  |  | R2248 | E4 | E3 |
| C2237 | E4 | E4 | 02206 | D4 | D3 | P2249 | E4 | F4 |
| C2242 | E4 | E4 | 02216 | D4 | D4 | P2251 | E4 | F3 |
| C2244 | E4 | E3 | Q2236 | E4 | 04 | R2252 | E4 | F2 |
| C2248 | E4 | E3 | Q2242 | E4 | E3 | R2253 | E4 | E4 |
| C2249 | F4 | F5 | Q2254 | E4 | F3 | R2254 | E4 | E3 |
| C2253 | E4 | E4 | Q2264 | E5 | F4 | R2255 | E4 | F3 |
| C 2263 | E5 | E4 | 02274 | ES | E4 | R2261 | E4 | D4 |
| C2271 | E5 | E4 |  |  |  | R2262 | E5 | D4 |
| C2282 | F5 | G5 | R2204 | 04 | 03 | R2263 | E5 | E4 |
| C2283 | F5 | F4 | R2205 | D4 | D3 | R2264 | E4 | F4 |
| C2288 | F4 | G4 | R2206 | D4 | C2 | R2271 | E5 | E4 |
| C2289 | F4 | G3 | R2207 | D4 | D3 | R2272 | E5 | D4 |
| C2297 | G5 | G4 | R2209 | D5 | D4 | R2274 | E5 | E4 |
|  |  |  | R2214 | D4 | D4 | R2282 | F5 | G5 |
| CR2218 | E5 | F5 | R2215 | D4 | D3 | R2283 | F5 | G5 |
| CR2223 | E5 | F5 | R2216 | D4 | D4 | R2284 | F5 | B5 |
| CR2227 | E5 | B4 | R2217 | D5 | C5 | R2285 | F5 | B5 |
| CR2242 | E4 | F3 | f2218A | D5 | G5 | R2289 | F4 | F3 |
| CR2253 | E4 | E4 | R2218E | F5 | G5 | R2294 | G4 | H3 |
| CR2264 | E5 | E4 | R2218C | F5 | G5 | R2297 | G5 | H4 |
| CR2281 | F5 | F5 | R2219 | E5 | E5 | P2298 | G5 | H4 |
| CR2282 | F5 | B5 | P2220 | D5 | A5 |  |  |  |
|  |  |  | R2221 | E5 | F5 | TP2212 | B5 | E4 |
| DS2292 | G4 | H3 | P2222 | E5 | D5 | TP2264 | F4 | F3 |
| DS2295 | G5 | H3 | f2223 | E5 | E5 | TP2288 | F4 | F4 |
| DS2296 | G5 | H4 | R2224 | E5 | D5 | TP2298 | G5 | H3 |
| DS2298 | G5 | H4 | R2228 | F5 | D5 |  |  |  |
|  |  |  | R2227 | F5 | D5 | U2224 | E5 | D5 |
| J2203 | D4 | C3 | R2228 | F5 | D5 |  |  |  |
| J2208 | 04 | CA | R2231 | D4 | D3 |  |  |  |

ASSEmbly A22 - High Voltage Circuit Board

| CIRCUIT <br> NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C2014 | E1 | 03 | CR2064 | D1 | E2 | R2017 | F1 | B3 (back) |
| C2016 | F1 | B2 (back) |  |  |  | R2018 | A1 | C2 (back) |
| C2021 | B1 | D2 | DS2074 | F1 | B3 (back) | R2031 | C1 | D3 |
| C2031 | C1 | D2 |  |  |  | R2033 | C1 | D2 |
| C2033 | C1 | C2 | K2014 | B1 | 05 (back) | R2034 | C1 | D1 |
| C2034 | C1 | D3 | K2014S1 | A1 | D5 (back) | R2041 | E1 | A5 |
| C2041 | E1 | A4 |  |  |  | R2042 | E1 | A5 |
| C2045 | E1 | D5 | L2018 | A1 | D3 (back) | R2052 | F1 | B3 (back) |
| C2052 | F1 | B5 (back) |  |  |  | R2055 | E2 | E5 |
| C2055 | F2 | E5 | P2001 | A2 | A2 | R2056 | F2 | E4 |
| C2056 | E1 | E5 | P2017 | A2 | A3 | R2063 | F1 | B3 (back) |
| C2066 | E1 | E2 | P2017 | C2 | A3 | R2064A | D1 | E3 |
|  |  |  | P2048 | A3 | E5 | R2064B | D1 | E3 |
| CR2012 | B1 | C4 (back) | P2048 | E2 | E5 | R2066 | E1 | E2 |
| CR2014 | B1 | C5 (back) | P2064 | D2 | E2 | R2068 | F1 | E3 |
| CR2016 | F1 | E2 | P2073 | A1 | E3 | R2074 | F1 | E3 |
| CR2021 | C1 | D2 | P2073 | F2 | E3 |  |  |  |
| CR2022 | C1 | D2 |  |  |  | T2010 | A1 | D3 (back) |
| CR2023 | B1 | C2 | R2013 | A1 | D4 |  |  |  |
| CR2045 | E1 | D5 | R2014 | B1 | E5 (back) | U2012 | B1 | B3 |
| CR2052 | F1 | E4 | R2015 | E1 | E1 (back) |  |  |  |
| CR2054 | F1 | E4 | R2016 | F1 | C2 (back) | VR2021 | C1 | C2 (back) |
| CR2055 | F1 | E5 |  |  |  |  |  |  |
| ASSEMBLY A23 - Focus Circuit Board |  |  |  |  |  |  |  |  |
| CIRCUIT | SCHEM | BOARD | CIRCUIT | SCHEM | BOARD | CIRCUIT | SCHEM | BOARD |
| NUMEER | LOCATION | LOCATION | NUMBER | LOCATION | LOCATION | NUMBER | LOCATION | LOCATION |
| C2101 | H2 | F2 | P2148 | E2 | F4 | R2141 | D2 | C3 |
| C2112 | H3 | E1 | P2161 | D4 | A2 | R2142 | D3 | D3 |
| C2113 | H3 | E1 | P2161 | E3 | A2 | R2144 | D3 | C2 |
| C2116 | B2 | A4 | P2164 | D2 | B2 | P2145 | C3 | E4 |
| C2117 | B2 | A4 | P2193 | F2 | E2 | R2146 | C3 | C2 |
| C2119 | B2 | 日3 |  |  |  | R2147 | C3 | C2 |
| C2121 | B2 | B3 | 02108 | H3 | D1 | R2150 | C3 | 04 |
| C2132 | C2 | C5 | Q2132 | C2 | C4 | R2151 | B3 | D4 |
| C2134 | C2 | D5 | Q2140 | D3 | C2 | R2152 | C3 | E4 |
| C2139 | D2 | 日2 | Q2152 | C3 | D4 | R2153 | C2 | D4 |
| C2150 | B3 | B4 | Q2156 | C3 | D4 | R2154 | B3 | D4 |
| C2151 | B3 | E3 | Q2160 | B3 | D4 | R2155 | B2 | B4 |
| C2152 | B3 | B4 | Q2162 | C3 | D4 | R2160 | B3 | D4 |
| C2155 | B2 | B4 | Q2172 | D3 | B2 | R2161 | C3 | E4 |
| C2156 | B3 | C4 | Q2178 | D3 | B1 | R2162 | C3 | E4 |
| C2193 | F3 | E2 | Q2182 | E3 | C2 | R2164 | C3 | B2 |
| C2197 | F2 | E2 | $\begin{aligned} & 02195 \\ & \hline \end{aligned}$ | E3 | B1 | R2166 | C2 | C3 |
|  |  |  |  | E3 | E3 | R2167 | C3 | D3 |
| CR2115 | B2 | A4 |  |  |  | R2168 | C3 | E4 |
| CR2118 | B2 | A4 | R2101 | H2 | E2 | R2171 | D3 | C2 |
| CR2119 | B2 | B4 | R2102 | H2 | E2 | R2172 | D3 | C2 |
| CR2123 | C2 | B4 | A2103 | H2 | E2 | R2173 | D3 | A3 |
| CR2125 | C2 | E4 | A2104 | H2 | D1 | R2174 | D3 | B2 |
| CR2133 | D2 | B3 | R2105 | H2 | D1 | R2175 | D3 | C1 |
| CR2134 | C2 | D5 | R2106 | H2 | C1 | R2178 | E3 | B2 |
| CR2144 | D3 | C2 | A2108 | H3 | F1 | R2180 | D3 | B1 |
| CR2145 | D3 | D3 | R2109 | H3 | E1 | R2181 | E3 | C2 |
| CR2152 | B3 | B4 | A2110 | H3 | D1 | R2182 | E3 | C2 |
| CR2153 | B3 | B4 | A2111 | H3 | E1 | R2183 | E3 | B2 |
| CR2155 | B2 | B4 | ¢2112 | H3 | D2 | R2187 | E3 | B2 |
| CR2162 | C3 | E4 | R2113 | H3 | E1 | R2188 | E3 | A1 |
| CR2174 | D3 | B2 | R2114 | H3 | D2 | R2189 | E3 | A1 |
| CR2175 | D3 | 81 | R2116 | B2 | A3 | R2191 | F3 | D2 |
| CR2176 | D3 | C1 | R2119 | B2 | A3 | R2192 | E3 | E2 |
| CR2195 | E3 | E3 | A2121 | C2 | A3 | A2193 | E3 | E3 |
|  |  |  | R2124 | C2 | B4 | R2194 | E2 | C3 |
| K2155 | 83 | C4 | R2125 | C2 | D4 | A2196 | E2 | C3 |
| K2155S1 | B3 | C4 | R2132 | C2 | C5 | R2197 | F2 | D3 |
|  |  |  | R2134 | C2 | D5 | R2198 | F2 | D2 |
| P2113 | B2 | A3 | R2135 | E2 | E1 |  |  |  |
| P2117 | A2 | B5 | R2136 | E2 | E2 | TP2105 | H3 | C1 |
| P2117 | C2 | B5 | R2137 | E2 | F2 | TP2132 | C2 | B4 |
| P2142 | F3 | E5 | R2139 | D2 | B2 |  |  |  |
| P2148 | A3 | F4 | R2140 | D3 | B1 | VR2133 | D2 | B3 |

The voltages shown were obtained with the 7934 controls set as follows:
Front panel controls (knob type) at midrange; VERTICAL MODE, LEFT; TRIGGER SOURCE, VERT MODE; NON STORE button, in HORIZONTAL MODE A. No plug-in units are installed.

Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (Tektronix DM501 Digital Multimeter or Tektronix 7D13 Digital Multimeter used with readout equipped, 7000-series oscilloscope).



Figure 8-24. A21-Z-axis Circuit Board Assembly.


Figure 8-25. A17-Intensity Control Circuit Board Assembly.

ASSEMBLY A17－Partial Intensity Control Circuit Board

| CIRCUIT <br> NUMBER | SCHEM <br> LOCATION | BOARD <br> LOCATION | CIRCUIT <br> NUMBER | SCHEM <br> LOCATION | BOARD <br> LOCATION | CIRCUIT <br> NUMBER | SCHEM <br> LOCATION | BOARD <br> LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| R1101A | D6 | E2 | S1201 | F6 | D2 |  |  |  |
| R1201 | E6 | D2 | S1303 | C6 | C2 |  |  |  |
| R1301 | D6 | C2 |  |  |  |  |  |  |
| R1303 | D6 | C2 |  |  |  |  |  |  |

ASSEMBLY A21－Partial Z Axis Circuit Board

| CIRCUIT NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT NUMBER | SCHEM <br> LOCATION | BOARD LOCATION | CIRCUIT <br> NUMBER | SCHEM <br> LOCATION | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C2323 | C4 | C4 | Q2344 | C1 | 日3 | R2345 | C1 | B2 |
| C2326 | C4 | A3 | Q2354 | C2 | B3 | R2346 | C1 | B2 |
| C2327 | D4 | C3 | Q2362 | D1 | E1 | R2354 | B2 | B3 |
| C2346 | C1 | D2 | Q2364 | B3 | A2 | R2355 | C2 | E2 |
| C2356 | C2 | O2 | Q2368 | D2 | B1 | R2356 | C2 | C2 |
| C2364 | B3 | A2 | Q2372 | E3 | C1 | R2361 | B3 | A2 |
| C2371 | F2 | C2 | Q2374 | E4 | C2 | R2362 | D1 | B2 |
| C2379 | F4 | C1 | Q2378 | E3 | C1 | R2363 | B3 | A2 |
| C2384 | F3 | C2 | Q2384 | F3 | D2 | R2364 | B3 | A2 |
| C2385 | F4 | C2 | Q2394 | F4 | E2 | ค2365 | D1 | B1 |
| C2393 | F4 | E2 | 02406 | G4 | G2 | R2366 | D2 | 81 |
| C2405 | F5 | F2 | Q2422 | F1 | 01 | R2368 | D2 | B2 |
| C2406 | G4 | G2 | Q2432 | F2 | D2 | R2371 | F2 | C2 |
| C2425 | G1 | D1 | Q2436 | G2 | F2 | R2372 | E3 | C2 |
| C2432 | G3 | F2 |  |  |  | R2373 | E4 | C2 |
| C2435 | G2 | E1 | R2302 | A4 | A4 | R2374 | E4 | C2 |
|  |  |  | R2303 | B5 | C4 | R2376 | E4 | C1 |
| CR2302 | B4 | A4 | R2305 | 日5 | B4 | R2377 | F4 | E2 |
| CR2306 | A4 | 84 | R2306 | C5 | C4 | R2378 | F3 | C1 |
| CR2315 | B4 | C4 | R2309 | D5 | C5 | R2379 | F3 | C1 |
| CR2316 | B4 | C4 | R2312 | E5 | C5 | R2383 | F3 | C2 |
| CR2317 | B4 | B4 | R2315 | B5 | A3 | R2384 | F3 | D2 |
| CR2333 | D4 | A3 | R2316 | A4 | A4 | R2385 | F4 | 02 |
| CR2335 | E4 | B2 | R2317 | B5 | B5 | R2393 | F4 | E2 |
| CR2396 | F4 | F2 | R2318 | B5 | A4 | R2394 | F4 | E2 |
| CR2397 | G4 | G2 | R2319 | C4 | B4 | R2396 | F4 | F2 |
| CR2408 | G2 | G2 | R2322 | C4 | B3 | R2404 | G4 | G2 |
| CR2438 | G3 | G2 | R2323 | C4 | B4 | R2405 | G5 | F2 |
|  |  |  | R2324 | C4 | B4 | R2406 | G4 | G2 |
| J2302 | A4 | A4 | R2325 | C4 | B4 | R2409 | G2 | H2 |
| J2316 | A4 | A4 | ค2326 | C4 | B4 | R2422 | F1 | D2 |
|  |  |  | R2327 | D4 | C3 | R2425 | F1 | D1 |
| P2305 | A6 | C5 | R2328 | D3 | 83 | R2428 | F2 | E2 |
| P2311 | C6 | C5 | R2332 | D3 | B3 | R2431 | F2 | D2 |
| P2436 | G2 | H2 | R2333 | D4 | A3 | R2432 | G3 | F2 |
|  |  |  | R2335 | D4 | B2 | R2435 | F2 | E1 |
| Q2302 | B4 | B4 | R2336 | D4 | 82 | R2436 | G1 | F2 |
| 02306 | C4 | B4 | R2338 | E4 | A3 | R2437 | G1 | F2 |
| Q2316 | B4 | B4 | R2339 | E4 | A3 | R2439 | G3 | H2 |
| Q2322 | C4 | 日3 | R2342 | B1 | C3 |  |  |  |
| 02328 | C4 | 83 | R2343 | B1 | C3 | TP2438 | G3 | G2 |
| 02336 | D4 | 81 | R2344 | C1 | B3 | TP2408 | G2 | G2 |

The voltages shown were obtained with the 7834 controls set as follows:
Front panel controls (knob type) at midrange; VERTICAL MODE, LEFT: TRIGGER SOURCE, VERT MODE; NON STORE button, in HORIZONTAL MODE A. No plug-in units are installed.

Voltage Conditions. The voltages shown on the diagram were obtained using a digital multimeter with a $10 \mathrm{M} \Omega$ input impedance (Tektronix DM501 Digital Multimeter or Tektronix 7013 Digital Multimeter used with readout equipped, 7000-series oscilloscope).



Figure 8-26. A25-Storage Circuit Board Assembly.



5880-214
Figure 8-28. A26-Storage Circuit Board Assembly.

ASSEMBLY A26－Parial Storage Control Circuit Board

| CIRCUIT NUMBEA | SCHEM <br> LOCATION | BOARD <br> LOCATION | CIRCUIT <br> NUMBER | SCHEM <br> LOCATION | BOARD <br> LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| R1101 | E5 | A2 | S1301 | F2 | C2 |  |  |  |
| R1201 | E5 | B2 | S1301 | F5 | C2 |  |  |  |
| R1301 | F2 | C2 | S1401A | D5 | D2 |  |  |  |
| R1301 | F5 | C2 | S1401日 | D5 | D2 |  |  |  |
| A1401 | C4 | D2 |  |  |  |  |  |  |
| CHASSIS MOUNTED PARTS（not plctured） |  |  |  |  |  |  |  |  |
| CIRCUIT Number | SCHEM <br> LOCATION | BOARD <br> LOCATION | CIRCUIT <br> NUMBER | SCHEM <br> LOCATION | BOARD LOCATION | CIRCUIT NUMBER | SCHEM <br> LOCATION | BOARD LOCATION |
| DS2558 | 83 | Chassis | J2513 | D5 | Chassis | R2465 | A3 | Chassis |
| DS2624 | C4 | Chassis | J2583 | B5 | Chassis |  |  |  |
|  |  |  | J2625 | C5 | Chassis |  |  |  |
| ASSEMBLY A24－Storage Mode Switch Circult Board |  |  |  |  |  |  |  |  |
| CIRCUIT | SCHEM | BOARD | CIRCUIT | SCHEM | BOARD | CIRCUIT | SCHEM | BOARD |
| NUMEER | LOCATION | LOCATION | NUMBER | LOCATION | LOCATION | NUMBER | location | LOCATION |
| CR2454 | 85 | D1 | C2468 | A1 | C4 | R2470 | 日2 | D2 |
| CR2455 | B5 | D1 | 02469 | A1 | D4 | F2471 | 日2 | C3 |
| CR2471 | B2 | C2 | 02478 | A1 | D4 | A2472 | B2 | C3 |
| CR2472 | 日2 | C2 | 02479 | B1 | C4 | R2473 | 日2 | C2 |
|  |  |  | R2451 | A 4 | D1 | R2474 | B2 | C2 |
| P2404 | A4 | D2 | R2452 | A5 | D2 | R2475 | B2 | D3 |
| P2404 | B3 | D2 | R2454 | B5 | C1 | R2476 | B2 | C3 |
| P2415 | A3 | D4 | R2466 | A2 | C2 | R2478 | A2 | C4 |
| P2426 | A1 | D3 | R2467 | A2 | D3 |  |  |  |
| P2443 | B1 | D4 | R2468 | A2 | D3 | S2404 | B5 | 日2 |
|  |  |  |  |  |  | U2468A | A2 | C4 |
|  |  |  |  |  |  | U2468B | B2 | C4 |
| ASSEMBLY A25－Partial Storage Circuit Board |  |  |  |  |  |  |  |  |
| circuit | SCHEM | BOARD | Cincuit | SCHEM | BOARD | CIRCUIT | SCHEM | BOARD |
| NUMBER | LOCATION | location | NUMEER | LOCATION | LOCATION | NUMBER | location | location |
| C2507 | E4 | C1 | 02588 | B4 | C4 | A2632 | C4 | E4 |
| C2521 | 04 | C2 | Q2612 | F2 | C2 | R2634 | C3 | K4 |
| C2523 | D4 | D2 | 02626 | C4 | C4 | R2641 | A4 | D5 |
| C2528 | 04 | C3 | 02632 | C4 | C4 | R2642 | A4 | D5 |
| C2534 | 03 | D2 | 02642 | A4 | D5 | R2643 | B4 | H4 |
| C2542 | D3 | E3 | 02644 | B4 | H4 | P2644 | 84 | J3 |
| C2562 | D3 | E3 | 02654 | G4 | B5 | R2646 | 84 | J3 |
| C2565 | E2 | F3 | 02658 | G3 | B5 | R2651 | G4 | C5 |
| C2577 | E3 | D2 | 02664 | G3 | B5 | R2652 | G4 | B5 |
| C2592 | 84 | E5 | 02668 | G3 | B5 | R2653 | G4 | C5 |
| C2594 | 83 | E4 | 02674 | G3 | B5 | R2654 | G4 | B5 |
| C2608 | C2 | D4 | 02678 | F3 | E5 | P2655 | G4 | C5 |
| C2626 | C4 | C4 | 02686 | D1 | B5 | R2656 | G4 | C5 |
| C2662 | G3 | C5 | 02688 | D1 | B5 | R2657 | G4 | D5 |
| C2663 | G3 | C6 | 02694 | G2 | G4 | P2658 | G3 | C5 |
| C2668 | G3 | B5 | 02772 | F4 | E1 | R2662 | G4 | C5 |
| C2671 | G4 | B5 | 02774 | F4 | E1 | R2663 | H3 | C5 |
| C2676 | F3 | E5 | 02784 | E4 | G1 | R2664 | G3 | 84 |
| C2683 | G2 | C5 | 02788 | F4 | G1 | R2668 | G3 | A5 |
| C2684 | G2 | G5 |  |  |  | R2671 | G4 | B5 |
| C2685 | G1 | G5 | R2464 | A2 | D3 | A2672 | G3 | B5 |
| C2686 | C1 | C5 | R2501 | E4 | B3 | R2673 | G3 | 84 |
| C2696 | H1 | F4 | R2502 | E4 | B1 | H2674 | G3 | E6 |
| C2770 | F4 | F2 | R2506 | E4 | C1 | R2675 | G2 | G5 |
| C2774 | F4 | E1 | R2507 | E4 | C1 | R2676 | F4 | 84 |
|  |  |  | R2508 | E4 | C1 | P2678 | F3 | F5 |
| CR2514 | D5 | D3 | R2509 | D5 | A3 | R2680 | G1 | G5 |
| CR2515 | D5 | D3 | R2511 | E4 | B1 | R2681 | G2 | G4 |
| CR2526 | D3 | D2 | R2512 | D5 | D3 | R2682 | G2 | D5 |
| CR2528 | D4 | D3 | R2513 | D5 | D3 | R2683 | G2 | E5 |
| CR2535 | D4 | B2 | R2516 | D5 | C3 | R2684 | G2 | G5 |
| CR2542 | D4 | D2 | R2517 | D5 | B3 | R2685 | G1 | G5 |
| CR2551 | C5 | F2 | R2518 | D5 | C3 | R2686 | C2 | C5 |
| CR2552 | C5 | F2 | R2521 | D4 | D3 | F2687 | C2 | C5 |
| CR2554 | C5 | F2 | R2522 | D4 | D3 | R2688 | D2 | D5 |
| CR2555 | C5 | E2 | A2523 | D4 | D3 | R2689 | D1 | B5 |


| CIRCUIT <br> NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT <br> NUMBER | SCHEM LOCATION | BOARD LOCATION | CIRCUIT <br> NUMBER | SCHEM <br> LOCATION | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CR2564 | E2 | F2 | R2526 | D4 | E3 | R2691 | G2 | G5 |
| CR2565 | E3 | H4 | R2527 | D4 | 日3 | R2692 | G2 | HS |
| CR2582 | E5 | D5 | R2528 | D4 | D3 | R2693 | H2 | H5 |
| CR2610 | F2 | C2 | R2529 | D4 | D4 | R2694 | G2 | G5 |
| CR2611 | F3 | B4 | R2531 | D4 | A3 | R2696 | H1 | G4 |
| CR2612 | F3 | C4 | R2532 | D4 | A2 | R2770 | F4 | F1 |
| CR2613 | F3 | B4 | R2533 | D4 | A2 | R2772 | F5 | F1 |
| CR2614 | F3 | B4 | R2534 | D3 | A2 | R2774 | F4 | E1 |
| CR2615 | F2 | C2 | R2535 | D4 | B1 | R2775 | F4 | D1 |
| CR2626 | C5 | $\mathrm{C4}$ | R2536 | D4 | 81 | R2779 | E4 | E1 |
| CR2643 | B4 | H4 | R2538 | D3 | E2 | R2782 | E4 | E1 |
| CR2644 | A4 | J4 | A2539 | D3 | E2 | R2783 | E4 | E1 |
| CR2646 | B4 | H4 | R2540 | D3 | E3 | R2785 | F4 | H2 |
| CR2663 | H4 | C5 | R2542 | D3 | E3 | R2786 | F4 | G1 |
| CR2664 | G3 | B5 | R2556 | E1 | E1 | f2787 | F4 | G1 |
| CR2686 | C2 | C5 | R2558 | B3 | B3 | R2788 | F4 | F1 |
| CR2687 | C1 | C5 | R2562 | D3 | F3 | R2789 | F4 | F1 |
|  |  |  | R2563 | D2 | B3 |  |  |  |
| J2514 | D5 | C 2 | R2564 | E2 | G2 | S2558 | D4 | B2 |
| J2584 | B5 | D5 | R2565 | E2 | G3 | S2624 | C5 | B4 |
| J2626 | C5 | C4 | R2566 | E1 | G2 |  |  |  |
|  |  |  | R2571 | E3 | B3 | U2552A | E2 | E2 |
| P2504 | A3 | 83 | R2572 | E3 | B1 | U2552日 | F3 | E2 |
| P2504 | A4 | B3 | R2576 | E3 | F2 | U2552C | E2 | E2 |
| P2512 | B3 | A1 | R2577 | E3 | D2 | U2556A | E4 | D1 |
| P2531 | D4 | E2 | R2578 | E3 | C2 | U2556B | D2 | D1 |
| P2572 | C4 | B2 | R2579 | E3 | D2 | U2556C | E2 | D1 |
| P2572 | D5 | B2 | R2581 | B5 | E5 | U2556D | E2 | D1 |
| P2572 | D5 | B2 | R2582 | B5 | E5 | U2562A | D3 | F3 |
| P2572 | F2 | E2 | R2584 | B5 | B5 | U2562B | E2 | F3 |
| P2572 | F4 | 82 | R2585 | B5 | E5 | U2565A | E2 | D5 |
| P2572 | F5 | E2 | R2586 | B4 | F5 | U2565B | C 2 | D5 |
| P2587 | B5 | A5 | R2587 | C4 | E4 | U2565C | E2 | D5 |
| P2587 | C1 | A5 | R2588 | B4 | B4 | U2565D | C3 | D5 |
| P2587 | F5 | A5 | R2593 | B2 | F1 | U2588A | 84 | F5 |
| P2587 | G3 | A5 | R2594 | B3 | E4 | U2588日 | D2 | F5 |
| P2613 | C4 | A2 | R2595 | B2 | C4 | U2588C | E4 | F5 |
| P2615 | C3 | B5 | R2604 | C3 | F5 | U2588D | C4 | F5 |
|  |  |  | R2605 | C2 | B5 | U2592A | B3 | E5 |
| 02502 | E4 | B1 | R2606 | C3 | D4 | U2592日 | B4 | E5 |
| 02506 | E4 | C1 | R2607 | C2 | B5 | U2592C | C3 | E5 |
| Q2508 | E4 | C1 | R2608 | C2 | D4 | U2592D | C3 | E5 |
| Q2514 | D5 | C3 | R2609 | C3 | E4 | U2594A | C3 | F4 |
| Q2526 | D3 | D2 | R2610 | F3 | 83 | U2594B | H1 | F4 |
| Q2528 | D4 | D2 | R2611 | F3 | C2 | U2608A | C2 | D4 |
| Q2532 | D4 | A1 | R2612 | F3 | C2 | U2608B | C3 | D4 |
| Q2536 | D4 | A1 | R2613 | F4 | B4 | U2608C | 日2 | D4 |
| 02538 | D3 | D2 | P2614 | F3 | B4 | U2608D | C2 | 04 |
| Q2542 | D3 | D2 | R2615 | F2 | B4 | U2682A | G2 | G5 |
| Q2572 | E3 | B1 | R2622 | C5 | C4 | U2682B | C3 | G5 |
| Q2576 | E3 | C2 | R2623 | C5 | C4 | U2684A | G3 | F5 |
| O2578 | E3 | C1 | R2624 | C5 | C4 | U2684B | G2 | F5 |
| Q2584 | B5 | E5 | R2626 | C4 | C4 |  |  |  |
| O2586 | B4 | E5 | R2631 | C4 | B3 |  |  |  |



The waveforms shown were obtained with the 7934 controls set as follows:
Front panel controls (knob type) at midrange; VERTICAL MODE, LEFT; TRIGGER SOURCE, VERT MODE; NON STORE button, in.
Waveform Conditions. The waveforms shown below were obtained using a test oscilloscope system with $10 \mathrm{M} \Omega$ input impedance and at least 60 MHz bandwidth (Tektronix 7603 Oscilloscope, 7B53A Time Base, and 7A13 Differential Comparator equipped with a 10X probe. A 7B53A Time Base plug-in unit is installed in the mainframe A HORIZ compartment. The 7B53A is set for internal auto-trigger and 0.5 millisecond/division sweep rate.

1


2


3




ASSEMBLY A25 — Partial Storage Circuit Board

| CIRCUIT NUMBER | SCHEM <br> Location | Boafd LocAtion | CIRCUIT NUMBER | SCHEM <br> location | BOARD location | CIRCUIT <br> NUMBER | SCHEM <br> LOCATION | BOARD LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| C2718 | E2 | G1 | 02842 | C3 | G2 | R2855 | D3 | H3 |
| C2753 | B5 | F3 | 02852 | D3 | J3 | R2856 | D3 | J3 |
| C2804 | D2 | F2 | 02862 | E3 | J3 | R2857 | D3 | H3 |
| C2809 | D2 | H3 | 02864 | E3 | K3 | R2861 | E3 | K3 |
| C2813 | D2 | G3 | 02868 | E3 | K3 | R2862 | E3 | K3 |
| C2814 | D2 | H3 | 02873 | E3 | K3 | R2863 | F2 | K3 |
| C2815 | D1 | H3 | 02874 | F3 | L4 | R2864 | E3 | K3 |
| C2827 | F1 | K2 | 02904 | C4 | J2 | (2865 | E3 | к3 |
| C2833 | F1 | L1 | 02914 | E3 | 12 | R2867 | E3 | K3 |
| C2835 | F1 | K1 | 02918 | F3 | 12 | R2868 | E2 | K3 |
| C2839 | E1 | L5 | 02924 | F3 | 13 | R2869 | E2 | L3 |
| C2843 | Cl | J3 | 02942 | E4 | L4 | R2874 | F3 | L3 |
| C2864 | E3 | к3 | 02946 | E4 | 14 | R2876 | F3 | M3 |
| C2867 | E3 | K3 | 02966 | C4 | K4 | R2900 | C3 | J2 |
| C2869 | E2 | L3 | 02972 | E4 | L4 | R2901 | D3 | K2 |
| C2874 | F3 | L3 | 02976 | E4 | L4 | R2902 | D3 | K2 |
| C2912 | E3 | H2 | 02988 | D4 | J2 | R2903 | C3 | H2 |
| C2915 | F3 | 12 | 02992 | F4 | J5 | R2904 | C4 | H2 |
| C2927 | F3 | M2 | 02996 | F4 | J5 | R2906 | C3 | K2 |
| C2948 | F4 | M4 | 03012 | C5 | ${ }^{5}$ | H2907 | D3 | J2 |
| C3053 | F5 | J6 | 03016 | C5 | J5 | R2911 | D3 | K2 |
| C3072 | G1 | L5 | 03022 | F5 | J5 | R2912 | D3 | K2 |
| C3074 | G1 | L5 | 03026 | F5 | J6 | R2913 | E4 | K2 |
| C3076 | G1 | K5 | 03048 | G4 | L4 | R2914 | E3 | L2 |
| C3077 | G2 | F1 | Q3054 | F5 | K5 | R2915 | E4 | K2 |
| C3078 | G2 | K5 | 03064 | F5 | K5 | R2918 | F3 | L3 |
| C3079 | G1 | M2 |  |  |  | $\begin{aligned} & \text { R2919 } \\ & \text { R2924 } \end{aligned}$ | F3 | M2M2 |
|  |  |  | R2701 | A2 | G4 |  |  |  |
| CR2704 | C2 | H2 | R2702 | A2 | G5 | R2926 | F3 | M2 |
| CR2705 | C3 | H2 | R2703 | A2 | G5 | R2927 | F3 | M2 |
| CR2706 | C3 | H1 | R2705 | C3 | H1 | R2930 | C3 | H2 |
| CR2707 | C3 | H2 | R2706 | 日3 | H1 | R2931 | C3 | H2 |
| CR2708 | C3 | H2 | R2708 | C3 | H2 | R2932 | C3 | H2 |
| CR2709 | E3 | H2 | R2709 | B3 | F1 | R2933 | C3 | H2 |
| CR2710 | C3 | H1 | R2711 | A2 | G2 | R2937 | D4 | J3 |
| CR2721 | A2 | E2 | R2712 | A2 | D1 | R2940 | D4 | K3 |
| CR2722 | E2 | E2 | f2713 | B2 | G3 | F2941 | D4 | L3 |
| CR2723 | E2 | D3 | R2714 | B2 | G2 | R2942 | E4 | L3 |
| CR2724 | B3 | C3 | R2715 | B2 | G2 | R2946 | E3 | 14 |
| CR2725 | B3 | C4 | R2716 | B2 | G3 | R2947 | E3 | L3 |
| CR2726 | B3 | D3 | R2717 | B2 | G3 | R2948 | E4 | L3 |
| CR2737 | B4 | C4 | R2718 | B1 | G1 | R2951 | C4 | J4 |
| CR2743 | 84 | G3 | R2719 | B1 | G1 | R2952 | C4 | K3 |
| CR2813 | D2 | G4 | R2721 | A3 | C4 | R2953 | C4 | H5 |
| CR2814 | D2 | H3 | H2722 | A3 | C4 | R2954 | C4 | J4 |
| CR2825 | F2 | J1 | R2723 | B2 | G4 | R2955 | C4 | K4 |
| CR2826 | F2 | K1 | f2724 | B3 | D4 | R2956 | D4 | J2 |
| CR2828 | F1 | K1 | R2725 | B3 | D3 | R2962 | C4 | J4 |
| CR2831 | F1 | L2 | R2726 | B3 | D4 | R2963 | C4 | J4 |
| CR2833 | F1 | K2 | R2727 | A3 | E3 | R2964 | D4 | K3 |
| CR2834 | F1 | L2 | R2728 | A4 | E2 | R2966 | C4 | K3 |
| CR2839 | F2 | L2 | R2729 | B4 | E3 | R2967 | C4 | $\sqrt{ } 14$ |
| CR2848 | D3 | J3 | R2731 | A4 | C4 | R2970 | D4 | K4 |
| CR2849 | D3 | J3 | н2732 | B4 | C4 | R2971 | E4 | K4 |
| CR2874 | F3 | L3 | R2733 | A5 | E3 | R2972 | E4 | K4 |
| CR2876 | F3 | M3 | R2734 | B4 | D4 | R2976 | E4 | L4 |
| CR2902 | D3 | K2 | R2735 | B4 | D3 | R2977 | E4 | K4 |
| CR2904 | C3 | J2 | R2736 | B4 | D3 | R2978 | E4 | L3 |
| CR2905 | D3 | J2 | R2741 | 84 | G3 | R2980 | C4 | H5 |
| CR2924 | F3 | 43 | R2742 | B4 | G4 | R2981 | C4 | J5 |
| CR2951 | C4 | J5 | R2743 | B5 | G3 | R2982 | D4 | H5 |
| CR2953 | C4 | J4 | R2744 | B5 | F3 | R2983 | C4 | K3 |
| CR2954 | C4 | H5 | R2745 | 85 | F3 | R2986 | D4 | H2 |
| CR2955 | C4 | J3 | R2746 | B5 | G3 | R2987 | D4 | H2 |
| CR2962 | C4 | 14 | R2747 | B5 | F3 | A2990 | D4 | K4 |
| CR2966 | C4 | J3 | R2748 | C2 | E3 | R2991 | F4 | H5 |
| CR2980 | C4 | H5 | R2751 | A5 | E3 | R2992 | F4 | J5 |
| CR2981 | D4 | H5 | R2752 | A5 | E3 | A2996 | F4 | J5 |
| CR3015 | C5 | H5 | R2753 | B5 | E3 | A2997 | F4 | J5 |
| CR3017 | D5 | H5 | R2754 | B5 | F3 | R2998 | F4 | J5 |
| CR3049 | G4 | 15 | R2755 | B5 | F3 | R3010 | C5 | H5 |
| CR3052 | F5 | K5 | R2802 | C2 | H3 | R3011 | C5 | H5 |
| CR3053 | F5 | J3 | R2804 | D2 | G3 | R3012 | C5 | J5 |
| CA3056 | E5 | K5 | R2805 | D2 | H4 | R3015 | C5 | H5 |
| CR3061 | E5 | J3 | R2808 | D2 | J4 | R3016 | C5 | H5 |
| CR3062 | F5 | J3 | R2809 | D2 | H4 | R3018 | D5 | H5 |
| CR3066 | G5 | K5 | R2812 | D2 | G3 | R3021 | F5 | H5 |
| CR3077 | G2 | K4 | R2813 | E2 | G3 | R3022 | F5 | J5 |
|  |  |  | R2814 | D2 | H3 | R3026 | F4 | J5 |


| CIRCUIT NUMBER | SCHEM <br> location | BOARD LOCATION | CIRCUIT <br> NUMBER | SCHEM <br> location | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD <br> LOCATION |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| L3072 | G1 | L5 | R2815 | D2 | G3 | R3027 | F4 | K5 |
| L3074 | G1 | L5 | R2816 | E2 | J2 | R3044 | F4 | J5 |
| 13076 | G1 | K5 | R2817 | E2 | J2 | R3045 | F4 | J5 |
|  |  |  | R2821 | E2 | J2 | R3046 | F4 | J5 |
| P2670 | E1 | K5 | R2822 | F2 | J2 | R3047 | F4 | K5 |
| P2711 | C1 | M5 | H2825 | F2 | J2 | R3048 | G4 | L5 |
| P2722 | C1 | B2 | R2826 | F2 | J2 | R3049 | G4 | L3 |
| P2824 | D1 | M5 | R2827 | F1 | K1 | R3052 | F5 | K5 |
| P2848 | B2 | E3 | R2828 | F1 | J1 | R3054 | F5 | K5 |
| P2849 | C2 | E2 | R2831 | F1 | 12 | R3055 | F5 | K5 |
| P2976 | G2 | M3 | R2833 | F1 | K2 | R3064 | F5 | K5 |
| P3013 | G1 | M1 | R2835 | F1 | K2 | R3066 | G5 | L5 |
| P3019 | G1 | M5 | R2836 | F1 | L1 | R3068 | G5 | L5 |
| P3068 | G5 | M4 | R2837 | F1 | L1 | R3077 | G2 | K4 |
|  |  |  | R2838 | F1 | L1 | R3078 | G2 | K5 |
| Q2704 | A2 | H4 | R2839 | E1 | L5 |  |  |  |
| 02714 | B2 | G2 | R2841 | A3 | G2 | S2558 | D1 | B2 |
| 02730 | B4 | E4 | R2842 | C3 | H3 |  |  |  |
| 02734 | B4 | C3 | R2843 | C3 | J3 | TP2839 | G2 | M3 |
| Q2745 | 84 | F3 | R2844 | C3 | G2 | TP2876 | G3 | M3 |
| 02752 | B5 | E3 | R2845 | C3 | G2 | TP2924 | G3 | м 3 |
| Q2755 | B5 | E3 | R2846 | C 2 | H1 | TP2948 | G4 | L3 |
| Q2802 | C2 | H4 | R2847 | C2 | H2 | TP2978 | G4 | L3 |
| Q2804 | C2 | H4 | R2848 | B2 | /1 | TP2998 | G4 | M4 |
| Q2808 | D2 | H3 | R2849 | C2 | F1 | TP3027 | G5 | L5 |
| Q2814 | D2 | H3 | R2850 | D2 | H3 | TP3048 | G4 | M4 |
| 02818 | E2 | J1 | R2851 | D2 | J3 | TP3064 | G5 | L5 |
| 02822 | F2 | J1 | R2852 | D2 | H3 |  |  |  |
| 02826 | F2 | K1 | R2853 | D3 | J3 | VR2808 | D2 | H4 |
| 02828 | F1 | K1 | R2854 | D3 | J3 | VR2867 | E3 | K3 |
| 02834 | F1 | L2 |  |  |  | VR2927 | F3 | M2 |
| 02838 | F1 | L1 |  |  |  |  |  |  |
| CHASSIS MOUNTED PARTS (not pictured) |  |  |  |  |  |  |  |  |
| CIRCUIT | SCHEM | BOARD | CIRCUIT | SCHEM | BOARD | CIRCUIT | SCHEM | boamd |
| NUMBER | LOCATION | LOCATION | NUMBER | location | location | NUMBER | LOCATION | LOCATION |
| R2720 | C1 | Chassis | V2200 | G2 | Chassis |  |  |  |

ASSEMBLY A25 - Partial Storage Circuit Board (not pictured). See Figure 8-26

| CIRCUIT <br> NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD location | CIRCUIT <br> NUMBER | SCHEM <br> location | BOARD location | CIRCUIT <br> NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { POARD } \\ & \text { LOCATION } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| P2824 | C5 | M5 | R2200 | C6 | H5 |  |  |  |
|  |  |  | R2201 | C5 | H5 |  |  |  |
| 02202 | C6 | G4 | P2202 | C5 | H5 |  |  |  |
| CHASSIS MOUNTED PARTS |  |  |  |  |  |  |  |  |
| Circuit | SCHEM | BOARD | CIRCUIT | SCHEM | BOARD | Cincuit | SCHEM | Boand |
| Number | location | location | NUMBER | location | location | NUMBER | LOCATION | location |
| L2200 | G1 | Chassis | R2195 | E3 | Chassis |  |  |  |
| 12201 | G2 | Chassis |  |  |  |  |  |  |
| P2012 | G1 | Chassis | V2200 | G1 | Chassis |  |  |  |

The following information is provided as an aid in understanding and troubleshooting the 7934 Storage System, refer to Figure 8-29 for test point locations.

## Equipment Required:

1. Digital voltmeter (DVM)
2. 100 X probe
3. Test Oscilloscope
4. Time-base unit

## Control Settings:

READOUT INTENSITY. OFF (in detent)
AUTO ERASE . . . . . . . CCW (in detent, off)
PERSISTENCE. . . . . . . .CCW (maximum)
HORIZONTAL MODE. . .A
SAVE INTENSITY . . . . .CW
STORAGE LEVEL . . . . .CW
MULTI TRACE DLY. . . .CCW (in detent)

## 1. CHECK NON-STORE VOLTAGE LEVELS

Use a Digital voltmeter to check dc levels at the following test points:

| Storage Mesh | -36 V within 3 V |
| :---: | :---: |
| Fast Mesh | 125 V within 3 V |
| Collector | . 150 V within 3 V |
| CE 4 | 85 V within 3 V |
| CE 3. | 70 V within 3 V |
| CE 2 | 55 V within 2 V |
| CE 1 | 46 V within 2 V |
| FGA | 36 V within 2 V |
| FGK | $0 \mathrm{~V}+3 \mathrm{~V}-0 \mathrm{~V}$ |

## 2. CHECK BISTABLE VOLTAGE LEVELS

Press the BISTABLE and ERASE push button. Use the DVM to check dc levels on the following test points:

| Fast Mesh | 125 V within 4 V |
| :---: | :---: |
| Collector . | . 150 V within 4 V |
| CE 4 | 85 V within 3 V |
| CE 3. | 70 V within 3 V |
| CE 2. | 55 V within 2 V |
| CE 1. | 46 V within 2 V |
| FGA | 36 V within 2 V |
| FGK | . $0 \mathrm{~V}+.3 \mathrm{~V}-0 \mathrm{~V}$ |

Remove $\mathbf{Q} 2678$ on the A25 Storage Board, press ERASE, and check for the following voltages:

Collector . . . . . . . . . . . 115 V within 4 V
CE 4. . . . . . . . . . . . . . . 65 V within 3 V
CE 3. . . . . . . . . . . . . . . 50 V within 2 V
CE 2 . . . . . . . . . . . . . . . 40 V within 2 V
CE 1. . . . . . . . . . . . . . . 66 V within 3 V
FGA . . . . . . . . . . . . . . . 90 V within 4 V

Replace 02678

## 3. CHECK VARIABLE PERSISTENCE VOLTAGE LEVELS

Press VAR PERSIST and ERASE push buttons and check for the following voltages:

| Fast Mesh | 100 V within 3 V |
| :---: | :---: |
| Collector Mesh | . 100 V within 3 V |
| CE 4 | 65 V within 3 V |
| CE 3. | 44 V within 2 V |
| CE 2. | 45 V within 2 V |
| CE 1. | 40 V within 2 V |
| FGA | 20 V within 1.5 V |
| FGK | $0 \mathrm{~V}+.3 \mathrm{~V}-0 \mathrm{~V}$ |

Replace Q2678, and press ERASE, and check for the following voltages:

| Fast Mesh | 125 V within 4 V |
| :---: | :---: |
| Collector Mesh. | 132 V within 4 V |
| CE 4 | 65 V within 3 V |
| CE 3 | 75 V within 2 V |
| CE 2 | 50 V within 2 V |
| CE 1 | 60 V within 3 V |
| FGA | 74 V within 3 V |
| FGK | $0 \mathrm{~V}+0.3 \mathrm{~V}-0 \mathrm{~V}$ |

## 4. CHECK FAST MODE VOLTAGE LEVELS

Remove all plug-in units from the 7934.
Replace Q2678, press the FAST BISTABLE and ERASE push buttons and check for the following voltages:

> Collector . . . . . . . . . . . . . . 132 V within 4 V
> CE 4 . . . . . . . . . . . . . . . . . . 65 V within 3 V
> CE 3..................... . . . 50 V within 2 V
> CE 2 . . . . . . . . . . . . . . . . . . 45 V within 2 V
> CE 1 . . . . . . . . . . . . . . . . . . 40 V within 2 V
> FGA
> 20 V within 1.5 V

Press the FAST VAR PERSIST push button and check for the following voltages:

| Front Mesh | -35 V within 3 V |
| :---: | :---: |
| Collector | . 132 V within 4 V |
| CE 4 | 65 V within 3 V |
| CE 3 | 60 V within 3 V |
| CE 2 | 45 V within 2 V |
| CE 1. | 40 V within 2 V |
| FGA. | 20 V within 1.5 V |

## 5. CHECK BISTABLE ERASE WAVEFORMS

Connect a 100X probe from the test oscilloscope to the Storage Mesh test point. Adjust the test oscilloscope for a sweep rate of 100 milliseconds/division and a vertical deflection of one volt/division ( 100 volts/division at probe tip). Press the BISTABLE and ERASE push buttons and check for a 100 -millisecond, 600 volt (approximately) erase pulse; see Idealized Erase waveform illustration.

Install a time-base unit in the 7934 A HORIZ compartment. Press the FAST BISTABLE and ERASE push buttons. Set the time-base unit for 1 mic rosecond/division free-running sweep. Check for 100 -millisecond, 600 -volt erase and transfer pulses (see Idealized Erase and Transfer waveform illustration).




5880-214
Figure 8-30. A17-Intensity Control Circuit Board Assembly.


5880-215
Figure 8-31. A26-Storage Control Circuit Board Assembly.

## ASSEMBLY A17 - Partial Intensity Control Circuit Board

| CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD location | CIRCUIT <br> NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD <br> LOCATION | CIRCUIT Number | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| P1101 | D3 | D1 | R1101A | B2 | E2 | R1303 | B1 | C2 |
| P1102 | B3 | D1 | A1101B | B4 | E2 | R1401 | B1 | B2 |
| P1201 | D2 | C2 | R1201 | B3 | D2 | R1402 | B4 | B2 |
| P1301 | D1 | C2 | A1301 | C1 | C2 |  |  |  |
| P1401 | 83 | D4 | (1302 | C2 | C2 | S1303 | C1 | C2 |

## ASSEMBLY A26 - Partial Storage Control Circuit Board

| CIRCUIT NUMBER | SCHEM location | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMBER | SCHEM location | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMBER | SCHEM LOCATION | board location |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| P1101 | E1 | A2 | R1101 | F4 | A2 | S1301 | F2 | C2 |
| P1102 | F1 | B2 | R1201 | F4 | B2 | S1401A | F3 | D2 |
| P1102 | F4 | B2 | A1301 | F2 | C2 | S1401B | F2 | 02 |
| P1201 | F2 | B2 | R1401 | F3 | D2 |  |  |  |

CHASSIS MOUNTED PARTS (not pictured)

| CIRCUIT NUMBEA | SCHEM <br> location | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | BOARD <br> location | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| R2195 | A3 | Chassis |  |  |  |  |  |  |




C
$E$



Figure 8-32. Power Supply test points and adjustments on A14A1-Control Rectifier Clrcuit Board.


Figure 8-33. Power Supply test points and adjustments on A14A2-LV Regulator Circuit Board.



Figure 8-37. CRT adjustments on A24-Storage Mode Switch Circuit Board.




Figure 8-40. Signal out selector jumpers on A12-Signal Output Circuit Board.
FRONT



Figure 8-44. X-Y Compensation adjustment on A9 - X-Y Compensation Circuit Board.
Figure 8-42. Horizontal adjustments and test points on A20-Horizontal Amplifier Circuit Board.


Flgure 8-43. Reduced scan horizontal gain adjustment on A21 - Z-Axis Circuit Board.

A20
HORIZONTAL
AMPLIFIER
$\underset{\text { Z-AXIS }}{\text { A21 }}$

7934



Figure 8-45. Vertical adjustments on A19 — Vertical Amplifier Circuit Board.


Figure 8-46. Vertical Interface adjustments on A8 — Vertical Interface Circuit Board.



FRONT $\longrightarrow$
A23

Figure 8-47. Reduced scan vertical adjustments on A23 - Focus Circuit board.


Figure 8-48. Readout adjustments on A13 - Readout Circuit Board.


Figure 8-49. Readout adjustments on A19 — Vertical Amplifier Circuit Board.


A20
Flgure 8-50. Readout adjustments on A20 — Horizontal Amplifier Circuit Board.






# 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 inerefore 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 Olfice or representative will contact you concerning any change in part number

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

## ITEM NAME

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

## FIGURE AND INDEX NUMBERS

Items in thas 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

12345
Name \& Descriplion
Assembly andior Component
Altaching parts for Assembly and/or Component
....END ATTACHING PARTS....
Detall Part of Assembly andior Component
Attaching parts for Detanl Part
....END ATTACHING PARTS....
Parts of Detall Part
Aftaching parts for Parts of Detall Part
...END ATtACHING PARTS....

Attaching Parts always appear in the same indentation as the item it mounts. while the detall parts are indented to the right Indented items are part of. and included with. the next higher indentation

Attaching parts must be purchased separately, unless otherwise specilied.

ABBREVIATIONS

| - | INCH | ELCTRN | ELECTRON | IN | INCH | SE | SINGLE END |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| * | NUMBER SIZE | ELEC | ELECTRICAL | INCAND | INCANDESCENT | SECT | SECTION |
| ACTR | ACTUATOR | ELCTLT | ELECTROLYTIC | INSUL | insulator | SEMICOND | SEMICONDUCTOA |
| ADPTR | ADAPTER | ELEM | ELEMENT | INTL | INTERNAL | SHLD | SHIELD |
| ALIGN | ALIGNMENT | EPL | ELECTRICAL PARTS LIST | LPHLDR | LAMPHOLDER | SHLDA | SHOULDERED |
| AL | ALUMINUM | EOPT | EOUIPMENT | MACH | MACHINE | SKT | SOCKET |
| ASSEM | ASSEMBLED | EXT | EXTERNAL | MECH | MECHANICAL | SL | SLIDE |
| ASSY | ASSEMBLY | FIL | FILLISTEA HEAD | MTG | MOUNTING | SLFLKG | SELF-LOCKING |
| ATTEN | ATTENUATOR | FLEX | FLEXIBLE | NIP | NIPPLE | SLVG | SLEEVING |
| AWG | AMERICAN WIRE GAGE | FLH | FLAT HEAD | NON WIRE | NOT WIRE WOUND | SPA | SPRING |
| B0 | BOARD | FLTR | FILTER | OBD | ORDER GY DESCRIPTION | SO | SOUARE |
| BRKT | BRACKET | FR | FRAME OT FRONT | 00 | OUTSIDE DIAMETER | SST | STAINLESS STEEL |
| 日RS | BRASS | FSTNR | FASTENER | OVH | OVAL HEAD | STL | STEEL |
| ERZ | BRONZE | FT | FOOT | PH BRZ | PHOSPHOR 日RONZE | SW | SWITCH |
| ESHG | BUSHING | FXD | FIXED | PL | PLAIN or Plate | T | TUBE |
| CAB | CABINET | GSKT | GASKET | PLSTC | Plastic | TERM | TEAMINAL |
| CAP | CAPACITOA | HOL | HANDLE | PN | PART NUMBER | THD | THREAO |
| CEP | CERAMIC | HEX | HEXAGON | PNH | PAN HEAO | THK | THICK |
| CHAS | CHASSIS | HEX HD | HEXAGONAL HEAD | PWR | POWER | TNSN | TENSION |
| CKT | CIPCUIT | HEX SOC | HEXAGONAL SOCKET | ACPT | RECEPTACLE | TPG | TAPPING |
| COMP | COMPOSITION | HLCPS | HELICAL COMPRESSION | RES | AESISTOR | тRн | TRUSS HEAD |
| CONN | CONNECTOR | hlext | HELICAL EXTENSION | RGO | AIGID | $\checkmark$ | VOLTAGE |
| COV | COVER | HV | HIGH VOLTAGE | ALF | felief | VAR | VARIABLE |
| CPLG | COUPLING | IC | INTEGAATED CIRCUIT | RTNA | RETAINER | W/ | WITH |
| CRT | CATHODE RAY TUBE | 10 | INSIDE DIAMETEA | SCH | SOCKET HEAD | WSHR | WASHER |
| DEG | DEGREE | IDENT | IDENTIFICATION | SCOPE | OSCILLOSCOPE | XFMR | TRANSFORMER |
| DWA | DRAWER | IMPLR | IMPELLER | SCA | SCREW | XSTR | TRANSISTOR |

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

| Mfr. Code | Manufacturer | Address | City State_ Zip Code |
| :---: | :---: | :---: | :---: |
| 00779 | AMP INC | P 0 b0x 3608 | HARRISPURG PA 17105 |
| 01121 | allen-8RadLEY CO | 1201 SOUTH 2ND ST | MILHAUKEE MI 53204 |
| 01295 | TEXAS INSTRUMENTS INC semiconductor group | 13500 N CENTRAL EXPRESSHAY <br> P O 80X 225012 M/S 49 | DALLAS TX 75265 |
| 01536 | tExiRON INC |  | ROCXFORD IL 51108 |
|  | camcar oiv | 1818 CHRISTINA 5T |  |
|  | SEMS PRODUCTS UNIT |  |  |
| 02735 | RCA CORP | ROUTE 202 | SOMERVILLE NJ 08876 |
| 02768 | ILLINDIS TOOL MORKS INC FASTEX DIVISION | 495 ALGONQUIN ROAD | OES PLAINES IL 60016 |
| 02777 | hopkins Engineering co | 12900 FOOTHILL BLVD | SAN FERNANDO Ca 94342 |
| 04713 | MOTOROLO INC SEAICONOUCTOR GROUP | 5005 E MCDOMELL RD | PHOENIX AZ 85008 |
| 06383 | Panouit Corp | 17301 RIDGELAND | TINLEY PARK IL 60977 |
| 06950 | vSI CORP SCRENCORP DIVISION | 13001 E TEPPLE AVE | CITY OF INDUSTRY CA 99746 |
| 07707 | USH CORP <br> SUB OF ghart industries inc USM FASTENER OIV | 510 RIVER RO | SHELTON CT 06484 |
| 09772 | mest coast locknasher co inc | 16730 E JOHNSON ORIVE <br> P 0 BOX 3588 | CITY OF INOUSTRY CA 91744 |
| 09922 | BURNOY CORP | RICHARDS AVE | normalx CT 06852 |
| 11897 | PLASTIGLIDE MFG CORP | 2701 M EL SEGundo blvo | hamthorae ca 90250 |
| 12327 | FREENAY CORP | 9301 ALLEN OR | CLEVELONO OH 44125 |
| 12697 | CLAROSTAT MFG CO INC | LOMER MASHINGTON ST | DOVER NH 03820 |
| 13103 | THERMALLOY CO INC | 2021 M Valley viey lane P 0 80X 34829 | OALLAS TX 75234 |
| 93519 | AMPHENOL CADRE OIV BUNKER RAMO CORP |  | los gatos ca |
| 46428 | BELOEN CORP <br> electronic div | 2200 US HAY 27 SOUTH <br> P 0 B0X 1980 | RICHMOND IN 47374 |
| 18565 | CHOMERICS INC | 77 dragon court | moburn ma 01801 |
| 18680 | highland mfo co the oiv of BUELL INOUSTRIES INC |  |  |
| 22526 | OU PONI EI DE NEMOURS aNO CO INC OU PONI CONNECTOR SYSTENS | 30 hunter lane | COMP HILL PQ 17019 |
| 24931 | SPECIALTY CONWECTOR CO INC | 2620 andress place P 0 80X 0 | GREE*000 IN 46142 |
| 26365 | GRIES REPROOUCER CO oiv of coats and clark inc | 125 BEECH\%OOD AVE | NEN ROCHELLE NY 10802 |
| 28520 | HEYCO MOLED PROOUCTS | 147 michigan ave P 0 B0X 160 | KENILAORTH NJ 07033 |
| 30817 | INSTRUMENT SPECIALTIES COMPANY, INC. |  | LITTLE FALLS, NJ 07424 |
| 31918 | ITT SCHAOON INC | 8081 MALLACE RD | EDEN PRAIRIE MN 55343 |
| 32997 | BOURNS INC TRIMPOT OIV | 1200 columaia ave | RIVERSIDE CA 92507 |
| 39785 | DEX INC | 3480 SMENSON ORIVE | St Charles IL 60174 |
| 44655 | OHMITE MFG CO | 3601 A HOMARD ST | SKOKIE IL 60076 |
| 56289 | SPRAGUE ELECTRIC CO | 87 MARSHALL ST | HORTH ADAMS MA 01247 |
| 60211 | VOLTAGE MULTIPLIERS INC | 8711 MEST ROOSEVELT | VISALIA Ca 93291 |
| 70318 | QLIMETAL SCREM PRODUCTS CO INC | 821 STEMART AVE | garoer city my 11530 |
| 70485 | atLantic inoia rubeer morks Inc | 5714 P POLK ST | CHICAGO IL 60607 |
| 70903 | BELDEN CORP | 2000 S batavia ave | GENEVA IL 60934 |
| 73743 | FISCHER SPECIAL MFG CO | 446 MORGAN ST | CINCINMATI OH 45206 |
| 74445 | HOLO-KROME CO | 31 BROOK ST | MEST HARTFORO CT 06110 |
| 77342 | AMF INC POTTER AND BRUMFIEL div | 200 RICHLAND CREEK OR | PRINCETON IN 47670 |
| 77900 | SHAKEPROOF <br> OIV OF ILLINOIS TOOL mORKS | SAINT CHARLES RO | ELGIN IL 60120 |
| 78189 | ILLINOIS TOOL MORKS INC SHAKEPROOF OIVISION | St charles road | ELGIN IL 60120 |
| 80009 | tektronix inc | 4900 S H GRIFFITH DR PO 80X 500 | BEAVERTON OR 97077 |
| 80033 | microoot manufacturing inc PRESTOLE EVERLOCK OIV | $\begin{aligned} & 1345 \text { MIanI ST } \\ & \text { P } 0 \text { 80X } 278 \end{aligned}$ | TOLEDO OH 43605 |

CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr
Code Manufacturer
81350 JOINT ABMY-NAVY SPECIFICATIONS,
PROINLLOATED BY MILITARY DEPARTMENTS
UNDER AUTHORLTY OF DEFENSE STANOARD-
IZATION MANUAL 4120 3-M
SNITCHCRAFT INC 5555 N ELSTRON AVE
SUB OF RAYTHEON CO ROTRON INC
828385 ROIRON INC $\quad$ MICRODOT MANUFACTURING INC GREER-CENTRAL DIV
83553 ASSOCIATED SPRING BARNES GROUP INC
8692 SEASTROM WFG CO INC
87308 N L INDUSTRIES INC
N L FASTENERS
88245 LITTON SYSTEAS INC
USECO DIV
91500 ASHEVILLE-SCHOONMRER MICA CO
91836 KINGS ELECTRONICS CO INC
93907 TEXTRON INC
CAMCAR DIV
95987 HECKESSER CO INC
98159 RUBBER TECK, INC.
98978 INTERNaTIONaL ELECTRONIC RESEARCH CORP
SUA OF OMNAMICS CORP OF ANERICA
53109 FELLER ASA ADOLF AG C/O PANEL COMPONENTS CORP
S3629 SCHURTER AG H
C/O PANEL COMPONENTS CORP
TKO433 PORTLOND SCREN CO
TK0435 LEAIS SCREA CO
TKOB61 H SCHURTER AG DIST PANEL COMPONENTS
TK1281 HICRO PLASTICS INC
TK1373 PATELEC-CEN (ITALY)
TK1543 CAWCAR/TEXTRON

Address
City, State, Zip Code

7-9 hasbrouck lane
3221 M BIG BEAVER RD
150015 bROADMAY
P 0 BOX 231
701 SONORA AVE
BARKLEY RD
P 0 80X 1360
13536 SATICOY St
910 JEFFERSON AVE
P 0 80X 318
40 MARBLEDALE ROAD TUCKAHOE NY 1070 ?
600 18Th aVE
4444 MEST IRVING PARK RD
19195 HAMILTON AVE., P D BOX 389
135 h magnolia blvo

355 TESCONI CIRCLE
2015 SECOND STREET
6520 N BASIN
41145 PEORIA
2015 SECOND STREET
HinY 178 MORTH
10156 TORINO
516 18TH aVE

CHICAGO IL 60630
hoodstock ny 12498
TROY WI 48098
garoena ca 90248
GLENDALE CA 91201
STATESVILLE NC 28677
van nurs Ca 91409
NEAPORT NEMS VA 23607

ROCKFORD IL 61101
CHICAGO IL 60641
GARDENA, CA 90247
BURBANK CA 91502

SANTA ROSA CA 95401
berkeley ca 94170
PORTLAND OR 97217
CHICAGO IL 60609
BERKELEY CA 94170
FLIPPIN AR 72634
VAICENTALL 62/45S ITALY
ROCKFORD IL 61109

| Fig. \& Index No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Qiv | 12345 Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1-1 | 390-0549-00 |  | 1 | CAB.SIDE, SCOPE:LEFI | 80009 | 390-0549-00 |
| -2 | 214-0603-02 |  | 4 | .PIN ASSY,SECRG:H/SPRING HASHER | 80009 | 214-0603-02 |
| -3 | 386-9151-00 |  | 4 | .CLOMP, RIM CLENC:SPG STL CO PL | 83553 | ORDER BY DESCR |
| -4 | 386-0227-00 |  | 4 | . STOP , CLP , RIM CL: | 80009 | 386-0227-00 |
| -5 | 390-0694-00 |  | 1 | CAB.SIDE, SCOPE: RIGHT | 80009 | 390-0694-00 |
| -6 | 214-0603-02 |  | 4 | .PIN ASSY, SECRG:H/SPRING MASHER | 80009 | 214-0603-02 |
| -7 | 386-1151-00 |  | 4 | . CLAMP, RIM CLENC:SPG STL CD PL | 83553 | ORDER BY DESCR |
| -8 | 386-0227-00 |  | 4 | . STOP , CLP , RIM CL: | 80009 | 386-0227-00 |
| -9 | 200-0728-00 |  | 2 | COVER,HDL END: $1.91 \times 0.91 \times 0.36$ 8LUE | 80009 | 200-0728-00 |
| -10 | 367-0108-00 |  | 1 | hanole, CarRying: 19.19 L,aLUE VINYL (attaching parts) | 80009 | 367-0108-00 |
| -11 | 212-0628-00 |  | 4 | SCREN,SHOULDER: 10-32 X 0.4 L, ROH,STL (ENO ATtACHING PARTS) | TK1543 | ORDER BY Descr |
| -12 | 386-9624-00 |  | 2 | PLATE, HDL RTNG:STAINLESS STEEL | 80009 | 386-1624-00 |
| -13 | 386-1283-01 |  | 2 | PLATE, HOL MTG: FRONT | 80009 | 386-1283-01 |
| -14 | 426-0819-09 |  | 1 | FRame SECT, CAB.: TOP CENTER | 80009 | 426-0819-01 |
| -15 | 390-0555-00 |  | 1 | CAB. $80 T$ SCOPE: | 80009 | 390-0555-00 |
| -16 | 214-0603-02 |  | 6 | .PIN ASSY, SECRG:M/SPRING WASHER | 80009 | 214-0603-02 |
| -17 | 386-1151-00 |  | 5 | . CLAMP, RIM CLENC:SPG STL CO PL | 83553 | ORDER 8Y DESCR |
| -18 | 386-0227-00 |  | 6 | .STOP , CLP, RIM CL: | 80009 | 386-0227-00 |
| -19 | 348-0193-00 |  | 1 | FLIP-STAND, CO日. :3.438 H,SST | 80009 | 348-0193-00 |
| - 2 | 348-0074-00 |  | 2 | HINGE BLOCK,STA:R FR,L REAR,BLACK ACETAL (aItaching parts) | 80009 | 348-0074-00 |
| -21 | 211-0532-00 |  | 4 | SCRE , MACHINE:6-32 $\times$. 750 , FILH,STL | TK0435 | ORDER BY DESCR |
| -22 | 210-0457-00 |  | 4 | NUT , PL, ASSEM KA:6-32 X 0.312,STL CO PL (END AATTACHING PARTS) | 78189 | 511-061800-00 |
| -23 | 377-0119-00 |  |  | INSERT, FOOT: $0.352 \times 0.832 \times 0.934, \mathrm{PU}$ | 80009 | 377-0119-00 |
| -24 | 343-0256-00 |  | 2 | RTNR BLK,SCOPE:PLASTIC (ATTACHIMG PARTS) | 80009 | 343-0256-00 |
| $-25$ | 213-0192-00 |  |  | SCREA,TPG, TF:6-32 $\times 0.5$, SPCL TYPE,FILH, STL | 87308 | ORDER by descr |
| -26 | $210-0457-00$ |  | 4 | NUT, PL, ASSEE KA:6-32 X 0.312,STL CD PL (END attaching paris) | 78189 | 511-061800-00 |
| -27 | 348-0073-01 |  | 2 | HINGE BLOCK,STA:L FR,R REAR,BLACK ACETAL (attachimg parts) | 80009 | 348-0073-01 |
| -28 | 211-0532-00 |  | 4 | SCREA, MACHINE: $6-32 \times .750$, FILH STL | TK0435 | ORDER by descr |
| -29 | 210-0457-00 |  | 4 | NUT , PL, ASSEM KA: 6-32 X 0.312 ,STL CD PL (END attaching parts) | 78189 | 511-061800-00 |
| -30 | 377-0149-00 |  | 2 | INSERT, FOOT: $0.352 \times 0.832 \times 0.934$, PU | 80009 | 377-0119-00 |
| -31 | 426-0814-00 |  | 2 | frame sect, Cab.: Bottom lert \& RIGHT (attaching paris) | 80009 | 426-0814-00 |
| -32 | 211-0507-00 |  | 2 | SCREA, MACHINE:6-32 $\times 0.312$, PNH, STL | 83385 | ORDER BY DESCR |
| -33 | 210-0457-00 |  | 2 | NUT, PL, ASSEA NA:6-32 $\times 0.312,5 \mathrm{LL}$ CD PL (ENO ATtACHING PARTS) | 78189 | 511-061800-00 |




Fig. 8

| Index No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Qty | 12345 Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2-1 | 426-0514-00 |  | 1 | FRAME, MRSK: | 80009 | 426-0514-00 |
| -2 | 378-0625-02 |  | 1 | FILTER,LT, CRT:GRAY . $5.15 \times 4.4 \times 0.03$ | 80009 | 378-0625-02 |
| -3 | 331-0258-03 |  | 1 | MaSk, CRT SCALE: | 80009 | 331-0258-03 |
| -4 | 204-0380-00 |  | 1 | BOOY, TERMINAL: (ATTACHING PARTS) | 80009 | 204-0380-00 |
| -5 | 131-0765-01 |  | 3 | TERH, FEEDTHRU: $0.584 ~ L \times 0.62500,8 R S$ (BN ATTACHING PARTS) | 80009 | 131-0765-01 |
| -6 | 200-0939-01 |  | 1 | RTNR,CRT SCALE:5.55 $\times 5.068 \times 0.475$ (attaching parts) | 80009 | 200-0939-01 |
| -7 | 212-0008-00 |  | 4 | SCREA, MACHINE:8-32 X 0.5, PNH,STL (END attaching parts) | 83385 | ORDER BY DESCR |
| -8 | 131-1022-00 |  | 2 | CONTACT, ELEC:GRDUNOING, SST | 80009 | 131-1022-00 |
| -9 | 337-1159-09 |  | 1 | SHLD, IMPLOSION: $4.75 \times 3.93 \times 0.7$ THK, PLSTC SAFETY CONTROLLED | 80009 | 337-1159-03 |
| -10 | 331-0245-00 |  |  | MASK, CRT SCALE: | 80009 | 331-0245-00 |
| -11 | 358-0301-02 |  | 3 | BUSHING, SLEEVE:0.16 ID $\times 0.20500$ | 80009 | 358-0301-02 |
| -12 | 426-1072-00 |  | 7 | FRAME, PUSH ETN:SILVER GRAY PLSTC | 80009 | 426-1072-00 |
| -13 | 366-1391-00 |  | 1 | KNOB:GY, 0.081 IO $\times 0.2800 \times 0.32 \mathrm{H}$ | 80009 | 366-1391-00 |
| -14 | 366-1077-00 |  | 1 | KNOB:GRAY M/SETSCREA | 80009 | 366-1077-00 |
| -15 | 366-1189-00 |  | 5 | LNOB:GY,0.127 ID $\times 0.500 \times 0.531$ | 80009 | 366-1189-00 |
| -16 | 366-1023-01 |  | 1 | RNOB:GY,0.127 IO $\times 0.39200 \times 0.531 \mathrm{H}$ | 80009 | 366-1023-01 |
| -17 | 366-1059-00 |  | 2 | PUSH BUTTON:GRAY,0.227 OD $\times 0.3$ | 80009 | 366-1059-00 |
| -18 | 366-1215-03 |  | 2 | KNOE:GY, $0.12710 \times 0.500 \times 0.531 \mathrm{H}$ | 80009 | 365-1215-03 |
| -19 | 333-3281-00 |  | 1 | PaNEL, FRONT:UPPER UNIT | 80009 | 333-3291-00 |
| -20 | 378-0635-01 |  | 1 | LENS, LIGHT: WHITE, MARKED A | 80009 | 378-0635-01 |
|  | 378-0635-02 |  | 1 | LENS, LIGHT: MAITE, MARKED 8 | 80009 | 378-0635-02 |
| -21 | 37-0635-02 |  | , | CIRCUIT BO ASSY:GRATICULE LMMPS (SEE A1 REPL) CKT BOARD ASSY INCLUDES: |  |  |
| -22 | 378-0614-01 |  | 1 | . REFLECTOR,LIGHT:INI SCALE ILLUMINATION - (attaching parts) | 80009 | 378-0614-01 |
| -23 | 211-0162-00 |  | 2 | . SCREA, MACHINE: $2-56 \times 0.188$, SCH , SST - (END ATYACHING PARTS) | TK0428 | ORDER by oescr |
| -24 | 344-0179-00 |  | 2 | .CLIP ,REFL RTMG:ACETAL, NAT | 80009 | 344-0179-00 |
| -25 | 348-0055-00 |  | 1 | GROMET, PLASTIC:GRAY,ROLND , 0.207 ID | 80009 | 348-0055-00 |
| -26 | 352-0157-00 |  | 4 | LOMPHOLDER: (1)T-2 UNBASED, MHITE | 80009 | 352-0157-00 |
| -27 | 426-2120-00 |  | 1 | FROME SECT, CO日.: FRONT,UPPER (ATTACHING PARTS) | 80009 | 426-2120-00 |
| -28 | 243-0270-00 |  | 3 | SCREN,TPG, TF: $10-32 \times 0.75,5 P C L$ TYPE, FILH (BNO ATTACHING PARTS) FRONT FROME ASSY INCLUDES: | TK1543 | 234-74658-026 |
| -29 | 211-0197-00 |  | 4 | SCREA, MACHINE:4-40 X 0.312, FLH, 100 DEG, SST | 70318 | ORDER ${ }^{\text {a }}$ OESCR |
| -30 | 386-1517-00 |  | 4 | . SUPPORT, CRT: FRONT | 80009 | 386-1517-00 |
| -31 | 211-0538-00 |  | 2 | SCRE日, MACHINE: 6-32 $\times 0.312$, FLH 100 DE (ATTACHING PART TO FIG.3-85 RAPL) | 93907 | ORDER BY DESCR |
| -32 | 348-0031-00 |  | 1 | GROMET, PLASTIC:0.127 ID, GRAY ACETAL | 80009 | 348-0031-00 |
| -33 | 200-0935-00 |  | 4 | BASE, LOMPHOLOER:0.29 $00 \times 0.19 \mathrm{L,BK}$ PLSTC | 80009 | 200-0935-00 |
| -34 | 131-0119-00 |  | 1 | JACK, TIP: BANAMA, CHASSIS MTO | 80009 | 131-0119-00 |
| -35 |  |  | 1 | RES, VAR, MOWM: PNL, 250K OHH , 0.5 M (SEE R2195 REPL) (ATTACHING PARTS) |  |  |
| -36 | 358-0409-00 |  | 1 | ESHG, MACH TH0:0.25-32 $\times 0.159$ ID,0.247 L | 80009 | 358-0409-00 |
| -37 | 210-0046-00 |  | 1 | MASHER, LOCK:0.261 ID, INTL, 0.018 THK , STL | 77900 | 1214-05-00-0541C |
| -38 | 210-0471-00 |  | 1 | MUT,SLEEVE:0.25-32 X $0.594 L \times 0.312 \mathrm{HEX}, \mathrm{AL}$ (END attaching parts) | 80009 | 210-0471-00 |
| -39 | ----- ---- |  | 1 | RES,VAR , MOWMN:PNL,5K OHM, O.5M (SEE R2465 REPL) (attaching parts) |  |  |
| -40 | 358-0409-00 |  | 1 | BSHG MACH THO:0.25-32 $\times 0.15910,0.247 \mathrm{~L}$ | 800009 | 358-0409-00 |
| -41 | 210-0046-00 |  | 1 | MASHER, LOCK:0. 261 ID, INTL, 0.018 THK, STL | 77900 | 1214-05-00-0541C |
| $-42$ | 210-0471-00 |  | 1 | MUT,SLEEVE: $0.25-32 \times 0.594 L \times 0.312$ HEX, AL (ED ATTACHING PARTS) | 80009 | 210-0471-00 |
| -43 | --- |  | 1 | CIRCUIT BD ASSY: INTENSITY CONTROL <br> (SEE R17 REPL) <br> (attachimg parts) |  |  |
| -44 | 210-0583-00 |  | 4 | WUT, PLAIN,HEX:0.25-32 X 0.312,8RS CD PL | 73743 | 2x-20319-402 |

Fig. 8

| Index <br> No. | Tektronix Part No, | Serial/Assembly No. Effective Dscont, | Sty | 12345 Name \& Description | Mfr. Code | Mir, Part No, |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2-45 | 210-0940-00 |  | 4 | MASHER, FLAT:0.25 ID $\times 0.37500 \times 0.02, S T L$ (ENO ATTACHING PARTS) CKT BOARD ASSY INCLDOES: | 12327 | OROER BY OESCR |
| -46 | 131-0589-00 |  | 20 | .TERH, PIN: $0.46 \mathrm{~L} \times 0.025$ SO PH BRZ GLD | 22526 | 48283-029 |
| -47 | - |  | 5 | ```.RES,VAR,NONOA:PNL,5K OHW/50K OHW,10%, .0.25 n .(SEE A17R1101.R1201.R1303,R1401, .R1402 REPL)``` |  |  |
| -48 | ----- ----- |  | 1 | RES,VAR,NONW: TRAR, 1OK OHM,O.5M (SEE R2720 REPL) <br> (ATTACHING PARTS) |  |  |
| -49 | 210-0583-00 |  | 1 | MUT, PLAIN, HEX: $0.25-32 \times 0.312, \mathrm{BRS}$ CD PL | 73743 | 2X-20319-402 |
| -50 | 210-0940-00 |  | 1 | MASHER,FLAT:0.25 ID $\times 0.37500 \times 0.02,5 \mathrm{SL}$ | 12327 | OROER 8Y DESCR |
| -51 | 210-0046-00 |  | 1 | HASHER, LOCK:0.261 ID, INTL, 0.018 THK, STL | 77900 | 1214-05-00-0541C |
| -. 52 | 210-0583-00 |  | 1 | NUT , PLOIN, HEX: $0.25-32 \times 0.312$, BRS CD PL (END ATTACHING PARTS) | 73743 | 2X-20319-402 |
| -53 | ----- ----- |  | 1 | CIRCUIT 80 ASSY:STORAGE CONTROL (SEE AZ6 REPL) (DTtACHING PARTS) |  |  |
| -54 | 210-0589-00 |  | 4 | NUT, PLOIN, HEX: $0.25-32 \times 0.312,8 R S$ CD PL | 73743 | 2X-20319-402 |
| -55 | 210-0940-00 |  | 4 | MASHER,FLAT: 0.25 ID $\times 0.37500 \times 0.02 .5 \mathrm{TL}$ (END attaching parts) CKT BOARO ASSY IMCLUOES: | 12327 | OROER BY DESCR |
| -56 | 131-0589-00 |  | 15 | .TERM, PIM:0.46 L $\times 0.025$ SO PH PRL GU | 22526 | 48283-029 |
| -57 | - ----. |  | 1 | . RES, VAR , NOWM: 500 K OHM, 102,0. 125 H <br> . (SEE AZ6R1301 REPL) |  |  |
| -58 | --..-- --.-- |  | 1 | . RES , VAR , NOWW: 10K OHM, 10\%,0.125M <br> - (SEE AZ6R1401 REPL) |  |  |
| -59 | - |  | 2 | . RES , VAR, NOWH: 10 K OHW, 10\%, 0.25M <br> . (SEE AZ6R1101,R1201 REPL) |  |  |
| -60 | -...-...- |  | 1 | CIRCuIt bo assy:storage mooe smitch (SEE A24 REPL) (attaching parts) |  |  |
| -61 | 211-0008-00 |  | 2 | SCREN, MACHINE: 4-40 X 0.25, PWH ,STL (ED DTTACHING PARTS) <br> CKT BOARD ASSY IMCLUOES: | 93907 | ORDER BY DESCR |
| -62 | 131-0589-00 |  | 17 | .TERA, PIM:0.46 L X 0.025 50 PH BRI GLD | 22526 | 48283-029 |
| -63 | 343-0495-09 |  | 1 | .CLIP SMITCH:FRONT, 7.51W X 9 LNIT <br> - (GTTACHING PARTS) | 80009 | 343-0495-09 |
| -64 | 210-3033-00 |  | 18 | .EYELET, METALLIC: $0.05900 \times 0.156$ L,BRS <br> - (ENO ATTACHING PaRTS) | 07707 | SE-25 |
| -65 | $\begin{aligned} & \text { 343-0499-13 } \\ & 343-0499-14 \end{aligned}$ |  | $\begin{aligned} & 1 \\ & 1 \end{aligned}$ | .CLIP, SWITCH:7.5N $\times 4$ WNIT .CLIP, SMITCH:7.5NW $\times 5$ UNIT (ATTACHING PARTS) | $\begin{aligned} & 80009 \\ & 80009 \end{aligned}$ | $\begin{aligned} & 343-0499-13 \\ & 343-0499-14 \end{aligned}$ |
| -66 | 210-3033-00 |  | 18 | . EYELET, METALLIC: $0.05900 \times 0.156$ L,BRS <br> - (ENO attaching parts) | 07707 | SE-25 |
| -67 | ---------- |  | 1 | .SWITCH PA ASSY:5 LITCH,7.5W,5 CONT,4 FR - (SEE R2452404 REPL) |  |  |
| -68 | 407-3440-00 |  | 1 | BRACKET,CKT BD:ALUMINUM (ATTACHING PARTS) | 80009 | 407-3440-00 |
| -69 | 210-0457-00 |  | 2 | MUT, PL,ASSEN MA:6-32 X 0.312,5TL CD PL (EDD ATTACHING PARTS) | 78189 | 511-061800-00 |
| -70 | 108-0851-00 |  | 1 | COIL, TUBE OEFL: TRACE ROTATOR | 80009 | 108-0851-00 |
| -71 | 214-2417-00 |  | 2 | MUT BAR:3.1 L,M/(4) 4-40 THD,AL (ATTACHIMG PARTS) | 80009 | 214-2417-00 |
| -72 | 211-0110-00 |  | 4 | SCREM, MACHINE: 4-40 $\times$ 0.312, PMH ,BRS (END ATTACHING PARTS) | 83385 | OROER BY DESCR |
| -73 | 348-0233-00 |  | , | GROMET, PLASTIC:GRAY, OPLONG $0.847 \times 0.347$ | 60009 | 349-0233-00 |
| -74 | 337-2217-00 |  | , | SHIELD,CRT: | 80009 | 337-2217-00 |
| -75 | 334-1379-00 |  | 1 | MARKER, IDENT: WKD HI VACUUM | 80009 | 334-1379-00 |
| -76 | 334-2200-00 |  |  | MARKER, IDENT: MKD DOMGER | 80009 | 334-2209-00 |
| -77 | 166-0098-00 |  | 2 | SPACER,POST:0.656 L N/8-32 THD THRU,AL, 0.375 HEX <br> (ATTACHIMG PARTS) | 80009 | 166-0098-00 |
| -78 -79 | 212-0004-00 |  | 2 | SCREM, MACHINE: 8 - $32 \times 0.312$, PRH ,STL (ED ATTACHING PARTS) | TK0435 | OROER GY DESCR |
| -79 | 348-0064-00 |  | 1 | GROMET , PLASTIC:GRAY ,ROLNO ,0.582 ID | 80009 | 348-0064-00 |

Fig.

| Index No. | Tektronix Part No. | Serial/Assembly No. Effective Decont | Qty | 12345 Name \& Description | Mfr. Code | Mfr. Part No |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2-80 | 354-0347-00 |  | 1 | RIMG CRT CLAMP:2.127 IO $\times 2.59500 \times 0.563$ (attaching parts) | 80009 | 354-0347-00 |
| -81 | 219-0170-00 |  | 2 | SCREA, MACHINE:4-40 $\times 2.25$, PNH, SST | TK0435 | ORDER BY DESCR |
| -82 | 214-1333-00 |  |  | SPRING ,HLCPS: $0.21300 \times 0.375, \mathrm{CLE}, \mathrm{CU}-\mathrm{BE}, \mathrm{CO}$ PL <br> (ENO ATTACHING PARTS) | 80009 | 214-1333-00 |
| -83 | 343-0205-01 |  | 1 | RTAR, ELCTRN TU:3.0 DIA $\times 1.5 \mathrm{~L}$ L DELRIN | 80009 | 343-0205-01 |
| -89 | 136-0661-01 |  | 1 | SOCKET RSSY, CRT: <br> CRT SOCKET ASSY INCLUDES: | 80009 | 136-0661-01 |
| -85 | 343-0254-00 |  | 1 | .CLP, ELCTRN TUBE:DELRIN | 80009 | 343-0254-00 |
| -86 | 367-0197-00 |  | 1 | .PULI, SOCKET : CRT, PLASTIC | 80009 | 367-0117-00 |
| -87 | 200-0917-01 |  | 1 | .COVER,CRT SKT:2.052 $00 \times 0.291$ H, PLASTIC | 80009 | 200-0917-01 |
| -88 | 136-0304-03 |  |  | .SKT, PL-IN ELEK: ELECTRON TUBE, 14 CONTACT | 80009 | 136-0304-03 |
|  | 352-0198-01 |  | , | .HLDR, TERM CONN: 2 WIRE, BROWN $^{\text {a }}$ | 80009 | 352-0198-01 |
|  | 352-0198-02 |  | 1 | .HLDR, TERM CONW: 2 MIRE,RED | 80009 | 352-0198-02 |
|  | 352-0198-03 |  | 1 | .hLor, TERM COWN:2 hire, oramge | 80009 | 352-0198-03 |
|  | 352-0203-00 |  | 1 | .HLDR, TERN COWN: 7 HIRE, BLACK | 80009 | 352-0203-00 |
|  | 352-0206-00 |  | 1 | .HLDR, TER CONN: 10 HIRE, BLACK | 80009 | 352-0206-00 |
|  | 343-0549-00 |  | 15 | .STRAP, TIEDOW , E:0.091 M X 4.0 L, ZYTEL | 06383 | PLT1M |
| -89 | 214-0504-00 |  | 4 | SCREM, MACHINE: $6-32 \times 0.250$, PNH, STL (ATTACMING PART TO FIG.1-16 RMPL) | TK0435 | OROER BY OESCR |
| -90 | 385-0154-00 |  | 4 | SPACER,POST:1.296 L W/6-32 THO ER END,AL | 80009 | 385-0154-00 |
| -91 |  |  | 1 | DELAY LINE,ELEC:65NS, 100 OHMS (SEE DL592 REPL) <br> (attaching parts) |  |  |
| -92 | 211-0507-00 |  | 4 | SCREA, MACHINE: $6-32 \times 0.312$, PNH,$S T L$ (ENO ATTACHING PARTS) colay line assy incuoes: | 83385 | ORDER BY DESCR |
| -93 | 386-3358-00 |  | 1 | . PLATE, DLY LINE:BOTTOM <br> - (attaching parts) | 80009 | 386-3358-00 |
| -99 | 213-0041-00 |  | 2 | .SCREA, TPG, TC: 6-32 x 0.375, TYPE T, TRH,STL . (ENO attaching Parts) | 93907 | ORDER BY Descr |
| -95 | 175-1309-00 |  | AR | .CABLE,RF:1.5 NS/FT DLY, 100 OHM, | 80009 | 175-1309-00 |
| -96 | 388-2994-00 |  | 1 | .circuit board:delay line termination . (attaching parts) | 80009 | 388-2194-00 |
| -97 | 210-0586-00 |  | 1 | . NUT, PL, ASSEA MA:4-40 X 0.25 ,STL CD PL <br> - (ENO ATTACHING PARTS) | 78189 | 211-041800-00 |
| -98 | 131-1003-00 |  | 4 | .CONN, RCPT, ELEC:CKT 80 mT, 3 PRONG | 80009 | 131-1003-00 |
| $-99$ | 136-0252-07 |  | 4 | .SOCKET, PIN CONN: H/O OIMPLE | 22526 | $75060-012$ |
| -100 | 386-3357-00 |  | 1 | . PLATE, DLY LINE:TOP <br> - (AITACHING PARTS) | 80009 | 386-3357-00 |
| -101 | 213-0041-00 |  | 2 | . SCREN,TPG, TC: 6 - $32 \times 0.375$, TYPE T,TRH,STL - (ENO ATTACHING PARTS) | 93907 | ORDER BY DESCR |
| $\begin{aligned} & -102 \\ & -103 \end{aligned}$ | 129-0325-00 |  | $\begin{aligned} & 2 \\ & 1 \end{aligned}$ | .SPACER,SLEEVE:1.215 L X 0.107 10,ACETAL CIRCUIT 80 ASSY:STORAGE <br> (SEE AZS REPL) <br> (ATTACHING PARTS) | 80009 | 129-0325-00 |
| -104 | 211-0008-00 |  | 6 | SCREA, MACHINE:4-40 X 0.25, PNH,STL (ENO ÁTTACHIMG PaRTS) CKT BOARD ASSY INCLHOES: | 93907 | OROER BY OESCR |
| -105 |  |  | 1 | . SMITCH, PUSH: 19,28VDC - (SEE AZ5S2624 REPL) |  |  |
| -106 | ----- |  | 1 | .SMITCH, PUSH: 1BUTTON, 4 POLE, DISPLAY <br> . (SEE R2552558 REPL) |  |  |
| -107 | 131-0993-00 |  |  | . BUS , COMDUCTOR:SHLNT ASSEBLY, BLACK | 22526 | 65474-005 |
| -109 | 136-0252-07 |  | 3 | . SOCKET, PIN COWN:M/O DIMPLE | 22526 | 75060-012 |
| -109 | 131-1003-00 |  | 3 | .CON,RCPT, ELEC:CKT BD MT, 3 PRONG | 80009 | 131-1003-00 |
| -110 | 361-0382-00 |  | 4 | . SPACER, PB SM:0.275 L, BROM POLYCARBOMATE | 80009 | 361-0382-00 |
| -114 | 131-0589-00 |  | 92 | . TERM, PIN:0.46 L X 0.025 SO PH BRZ GLD | 22526 | 48283-029 |
| -112 | 397-2294-00 |  | 1 | Shield, elec:high voltage (ATTACHIMG PARTS) | 80009 | 337-2294-00 |
| -413 | 211-0550-00 |  | 1 | SCRET, MACHIME: $6-32 \times 0.25$,BDCH , MYL ( BO ÁTTACHING PARTS) | 26365 | ORDER BY OESCR |
| -414 | 385-0043-00 |  | 1 | SPACER,POST:0.75 L N/6-32 THO THRU,NYL (ATTACHING PARTS) | 80009 | 385-0043-00 |
| -115 | 211-0558-00 |  | 1 | SCRER, MACHIME: $6-32 \times 0.25$,BDGH, NYL (ED attaching parts) | 26365 | OROER BY DESCR |

Fig. \&

| Index <br> No. | Tektronix Part No. | Serial/Assembly No. Effective Oscont | Qty | 12345 Name 8 Oescription | Mfr. Code | Mfr, Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 2-116 | 384-1875-00 |  | 2 | EXTENSION SHAFT:OFFSET,1.235 L EXTENSION SHAFT INCLUDES: | 80009 | 384-1875-00 |
| -117 | 103-0186-01 |  | 2 | . AOAPTER,EXT SFT:PUSH SK, 0.45 OFFSET | 80009 | 103-0186-01 |
| -118 | 384-1136-00 |  | 2 | . EXTENSION SHAFT:0.95 INCH LONG | 80009 | 384-1136-00 |
| -119 | 366-1559-00 |  | 7 | PUSH BUTTON:SIL GY,0.18 $50 \times 0.43$ | 80009 | 366-1559-00 |
| -120 | 210-0202-00 |  | 1 | TERMINQL, WG:0. 146 ID,LCKING, BRI TIN PL (attaching parts) | 85928 | A-373-158-2 |
| -121 | 211-0507-00 |  | 1 | SCRES, MACHINE: $6-32 \times 0.312$, PNH ,STL (END ATtACHING PARTS) | 83385 | OROER BY OESCR |
| -122 | $\begin{array}{r} 426-1291-00 \\ 334-2980-00 \end{array}$ |  | $\begin{aligned} & 2 \\ & 1 \end{aligned}$ | FRAME SECT,CAB.: BOTTOM MARKER,IOENT:MKD CAUTION | 80009 <br> 80009 | $\begin{array}{r} 426-1291-00 \\ 334-2980-00 \end{array}$ |


| Fig. 8 Index <br> No, | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Qty | 12345 Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 3-1 | 200-1834-01 |  | 1 | COVER, PHR SPLY:HIGH VOLTAGE (ATTACHING PARTS) | 80009 | 200-1834-01 |
| -2 | 211-0008-00 |  | 4 | SCREA, MACHINE:4-40 X 0.25 .PNH,STL ( $\operatorname{BNO}$ ItTACHING PARTS) | 93907 | ORDER by descr |
| -3 | ---------- |  | 1 | CIRCUIT BD ASSY:FOCUS <br> (SEE A23 REPL) <br> (attaching parts) |  |  |
| -4 | 219-0008-00 |  | 4 | SCREN, MACHINE: 4-40 $\times 0.25$, PNH, STL (ENO ATTACHING PARTS) circuit board assy includes: | 93907 | ORDER BY DESCR |
| $\begin{aligned} & -5 \\ & -6 \end{aligned}$ | 131-0589-00 |  | $\begin{array}{r} 27 \\ 1 \end{array}$ | .TERN, PIN: 0.46 L $\times 0.025$ SO PH BRZ GLD CIRCUIT BD ASSY:HIGH VOLTAGE <br> (SEE A22 REPL) <br> (attaching parts) | 22526 | 48283-029 |
| -7 | 211-0008-00 |  | 2 | SCREA, MACHINE:4-40 X 0.25, PNH,STL (ENO ATTACHING PARTS) CIRCUIT BOARO ASSY INCLUDES: | 93907 | ORDER BY DESCR |
| -8 | --------- |  | 1 | .SEIICOND DVL, DI:HV MULT, SI, 4KV PP IN, 8KV .OUT <br> . (SEE A22U2012 REPL) <br> . (ATTACHING PARTS) |  |  |
| -9 | 220-0796-00 |  | 2 | . NUT PLAIN, HEX: 8-32 X 0.375 HEX, NYLON <br> - (ENO ATTACHING PARTS) | 95987 | N-832-X |
| -10 | 131-0589-00 |  | 22 | .TERH, PIN: $0.46 \mathrm{~L} \times 0.025$ SO PH BRZ GLD | 22526 | 48283-029 |
| -11 | 346-0032-00 |  | 1 | .STRAP , RETAINING:0.075 OIA $\times 4.0$ L,MLD RER | 98159 | 2829-75-4 |
| -12 | 361-0007-00 |  | 1 | .SPACER, SLEEVE:0.188 L X 0.111 ID, POLTHN | 80009 | 361-0007-00 |
| -13 | 129-0072-00 |  | 1 | . INSULATOR STOF:0.938 L X 0.188 | 80009 | 129-0072-00 |
| -14 | 131-0309-00 |  | 1 | . .JERMINAL, STU0:0.415 L,8IFURCATED | 88245 | 421572-02-9 |
| -45 | 386-2041-00 |  | 2 | .SUPPORT XFAR: <br> . (ATtACHIMG PARTS) | 80009 | 386-2041-00 |
| -96 | 219-0008-00 |  | 4 | .SCREA, MACHINE:4-40 $\times 0.25$, PNH,STL <br> ( (END ATTACHING PARTS) | 93907 | ORDER BY DESCR |
| -47 | 337-2270-00 |  | 1 | SHIELD,ELEC:CIRCUIT BOARD (ATTACHING PARTS) | 80009 | 337-2270-00 |
| - 98 | 211-0558-00 |  |  | SCREN, MACHINE:6-32 $\times 0.25$, BDGH , NYL | 26365 | ORDER GY DESCR |
| -19 | 385-0013-00 |  | 2 | SPACER, POST: 0.75 L W/6-32 THO THRU,NYL (ENO attaching parts) | 80009 | 385-0013-00 |
| -20 | --- |  | 1 | CIRCUIT BD ASSY: 2 aXIS <br> (SEE A24 REPL) <br> (attaching parts) |  |  |
| -21 | 214-0009-00 |  | 4 | SCREA, MACHIME: $4-40 \times 0.25$, PNH, STL (EDO ATTACHING PARTS) CIRCUIT BOARD ASSY INCLUDES: | 93907 | ORDER by descr |
| -22 | 131-0589-00 |  | 6 | .TERH, PIN: $0.46 \mathrm{~L} \times 0.025$ SO PH BRI GLD | 22526 | 48283-029 |
| -23 | 131-0608-00 |  | 29 | .TERHINAL, PIN: 0.365 L $\times 0.025$ BRZ GLD PL | 22526 | 48283-036 |
| -24 | 131-1003-00 |  | 4 | .CONW, RCPT, ELEC:CKT BD MT, 3 PRONG | 80009 | 131-1003-00 |
| -25 | 136-0252-07 |  | 88 | . SOCKET, PIN COWN: W/O DIMPLE | 22526 | 75060-012 |
| -26 | 136-0727-00 |  | 1 | . SKT, PL-IN ELEK:MICROCKT, 8 CONTACT | 09922 | DILP8P-108 |
| -27 | 343-0853-00 |  | 1 | CLAMP, LOOP: 0.5 DIA, NYLON | 34785 | 021-0500 |
| -28 | 348-0233-00 |  | 1 | GROWHEI, PLASTIC:GRAY, OPLOMG $0.847 \times 0.347$ | 80009 | 348-0233-00 |
| -29 | 348-0171-00 |  | 1 |  | 80009 | 348-0171-00 |
| -30 | 220-05A7-01 |  | 6 | MUT BLCK:4-40 $\times 0.282$,NI SIL NP (attaching parts) | 80009 | 220-0547-01 |
| -31 | 211-0007-00 |  | 6 | SCREX, MACHINE:4-40 X 0. 188 , PNH,STL (ENO ATTACHING PARTS) | TK0435 | ORRER BY OESCR |
| -32 | 352-0087-00 |  | 2 | HOLOER, IDENT PL: $3.5 \times 1.844 \times 0.094 . \mathrm{PS}$ | 80009 | 352-0087-00 |
| -33 | 380-0450-01 |  | 1 | HSG ,HV PWR SPLY: (ATTACHING PARTS) | 80009 | 380-0450-01 |
| -34 | 211-0507-00 |  | 4 | SCRES, MACHINE: $6-32 \times 0.312$, PNH,STL (EN ATTACHING PARTS) | 83385 | ORDER by descr |
| -35 | 200-2079-01 |  | 1 | COVER, PLENM:AUMINUM (ATTACHING PARTS) | 80009 | 200-2079-01 |
| -36 | 211-0507-00 |  | 4 | SCRES, MACHINE: 6 - $32 \times 0.312$, PWH , STL (BN ATTACHIMG PARTS) | 83385 | ORDER BY OESCR |
| $\begin{aligned} & -37 \\ & -38 \end{aligned}$ | $\xrightarrow{\text { 131-1315-01 }}$ |  | $\begin{aligned} & 3 \\ & 1 \end{aligned}$ | COWN, RCPT, ELEC: BHC , FEwale <br> RES, FXD, WiN: 10 OHM,5X,10 <br> (SEE R9O REPL) | 80009 | 131-1315-01 |


| Fig. \& Index No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Qty | 12345 Name \& Description | Mfr. Code | Mfr. Part No, |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 3- |  |  |  | (attaching parts) |  |  |
| -39 | 211-0553-00 |  | 1 | SCREA , MACHINE: 6 -32 $\times 1.5$ PNH , STL | TK0435 | ORDER BY DESCR |
| -40 | 211-0507-00 |  | 1 | SCREA, MACHINE:6-32 $\times 0.312$, PMW, STL | 83385 | OROER BY OESCR |
| -41 | 210-0202-00 |  | 1 | TERHINAL, W6:0.146 10, LOCKING, BRZ TIN PL | 86928 | A-373-458-2 |
| -42 | 210-0478-00 |  | 1 | SPACER,POST:0.66 L M/6-32 THD THRU,AL | 80009 | 210-0478-00 |
| -43 | 210-0601-00 |  | 1 | EYELET, METALLIC: $0.18300 \times 0.192$ L, BRASS (ENO ATtACHING PARTS) | 18680 | 77362 |
| -44 | 378-0279-00 |  | 1 | GRILL, FAN: 3.125 DIA SO (ATTACHING PARTS) | 80009 | 378-0279-00 |
| -45 | 211-0513-00 |  | 4 | SCREA, MACHINE: 6-32 $\times 0.625$, PNH, STL | 93907 | 880-00032-003 |
| -46 | 210-0457-00 |  | 4 | NUT, PL, ASSEM MA:6-32 $\times 0.312$,STL CD PL (END ATTACHING PARTS) | 78189 | 511-061800-00 |
| -47 | -...- ----- |  | 1 | FAN, TUPEAXIAL: $12 \mathrm{~V}, 4.8 \mathrm{AN}, 3450 \mathrm{RPW}, 35 \mathrm{CFM}$ (SEE B9D REPL) |  |  |
| -48 | 386-3976-00 |  | 2 | SUBPANEL,REAR:UPPER RIGHT (ATTACHING PARTS) | 80009 | 386-3976-00 |
| -49 | 211-0232-00 |  | 4 | SCRES, MACHINE: $4-40 \times 0.25$,FILH,STL ( $\operatorname{DND}$ attaching parts) | TK0435 | 8005-302 |
| -50 | 425-0809-01 |  | 1 | FRDME SECT, CRB.: REAR (ATTACHING PARTS) | 80009 | 426-0809-01 |
| -51 | 213-0270-00 |  | 3 | SCREA,TPG, TF: $10-32 \times 0.75$, SPCL TYPE,FILH (end áttaching parts) | TK1543 | 234-74658-026 |
| -52 | ----- ----- |  | 1 | CIRCUIT 80 ASSY:VERT AMp (SEE A19A1 REPL) (attaching parts) |  |  |
| -53 | 211-0008-00 |  | 4 | SCREX, MACHINE:4-40 X 0.25, PM , STL | 93907 | ORDER by descr |
| -54 | 211-0259-00 |  | 2 | SCR,ASSEM MSHR:2-56 X 0.437, PNH,STL, POL (ENO ATTACHING PARTS) CIRCUIT BOARD ASSY INCLWOES: | 01536 | ORDER BY DESCR |
| -55 | 426-1351-00 |  | 2 | . FRAME, MICROCKT:1.75 CM <br> - (atraching parts) | 80009 | 426-1351-00 |
| -56 | 211-0260-00 |  | 2 | .SCR,ASSEM MSHR:2-56 X 0.687,PAH,STL,POL <br> - (END attaching parts) | 01536 | OROER EY DESCR |
|  | 131-1967-00 |  | 2 | . CONT SET, ELEC:MICROCKT, 1.75 CM,RLB8ER | 80009 | 131-1967-00 |
| -57 | 214-2543-00 |  | 1 | -HT SK,MICROCKT:MICROCIRCUIT, AL | 80009 | 214-2543-00 |
| -58 | --------- |  | 1 | .TRONS ISTOR:NPN, SI , X-81 <br> . (SEE A19010720 REPL) <br> - (attaching parts) |  |  |
| -59 | 211-0097-00 |  | 1 | . SCREH, MACHINE:4-40 X 0.312, PNW, STL | TK0435 | OROER BY DESCR |
| -60 | 210-0407-00 |  | 1 | . NUT, PLAIN, HEX:6-32 $\times 0.25$, BRS CO PL | 73743 | 3038-402 |
| -61 | 210-0551-00 |  | 1 | .NUT, PLAIN,HEX:4-40 $\times 0.25$,ST CD PL - (ENO ATtaChing parts) | TKD435 | ORDER BY DESCR |
| -62 | 131-0608-00 |  | 13 | . TERMINAL, PIN: $0.365 \mathrm{~L} \times 0.025$ 8RL GLD PL | 22526 | 48283-036 |
| -63 | 136-0252-07 |  | 3 | . SOCKET, PIN COWN:M/O DIMPLE | 22526 | 75060-012 |
| -64 | 131-1003-00 |  | 3 | .CON, RCPI, ELEC:CKT BD MT, 3 PRONG | 80009 | 139-1003-00 |
| -65 | --..-- ----- |  | 1 | CIRCUIT BD ASSY:FLEX COW (SEE A19R2 REPL) |  |  |
| -86 | --.------- |  | 1 | CIRCUIT BD ASSY:HORIZ AMP (SEE AZO REPL) (ATTACHING PARTS) |  |  |
| -67 | 211-0008-00 |  | 4 | SCREI, MACHINE: 4-40 $\times 0.25$, PMW, STL (ENO ATTACHING PARTS) CIRCUIT BOARD ASSY INCLUOES: | 93907 | ORDER BY DESCR |
| -68 | 131-0589-00 |  | 16 | .TERH, PIN: $0.46 \mathrm{~L} \times 0.025$ SO PH BRI GLD | 22526 | 48283-029 |
| -69 | 136-0252-07 |  | 4 | . SOCKET, PIN CONW: M/O DIMPLE | 22526 | 75060-012 |
| -70 | 131-1003-00 |  | , | , CONN, RCPT, ELEC:CKT 80 MT, 3 PRONG | 80009 | 131-9003-00 |
| -71 | --- ----- |  | 1 | RES, FXD, FILM: (2) 175 OHW, (2) 33.7 OHW (SEE R日3 REPL) <br> (ATTACHING PARTS) |  |  |
| -72 | 211-0504-00 |  | 2 | SCREN, WACHINE: 6-32 $\times 0.250$, PMW, STL (END ATTACHING PARTS) | TK0435 | OROER GY DESCR |
| -73 | 210-0202-00 |  | 1 | TERMINAL, WG:0. 146 IO, LOCKING, 日RL TIN PL (ATTACHING PARTS) | 86928 | A-373-158-2 |
| -74 | 211-0504-00 |  | 1 | SCRE , MACHINE: $6-32 \times 0.250$, PW , STL (ENO ATTACHING PARTS) | TK0435 | OROER BY DESCR |
| -75 | 348-0063-00 |  | 1 | GROMET, PLSSTIC:GRAY,ROUND, 0.0457 ID | 80009 | 348-0063-00 |
| -76 | 343-0835-00 |  | 1 | CLAMP, LOOP:0.375 ID,NYLON M/ADH BACK | 80009 | 343-0835-00 |

Fig. 8

| Index <br> No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Qty | 12345 Name \& Description | MPr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 3-77 | 407-1690-00 |  | 1 | bRACKET,CKT B0:ALUMINUM (ATTACHING PARIS) | 80009 | 407-1690-00 |
| -78 | 211-0507-00 |  | 2 | SCREA, MACHINE:6-32 X 0.312, PNH.STL ( E O ATTACHING PARTS) | 83385 | ORDER EY OESCR |
| -79 | 441-1795-00 |  | 1 | CHASSIS SCOPE:VERTICAL AMP (ATtACHING PARTS) | 80009 | 441-1715-00 |
| -80 | 211-0507-00 |  | 4 | SCRES, MACHINE:6-32 X 0.312.PNH.5TL (ENO ATTACHING PARTS) | 83385 | ORDER BY DESCR |
| -81 | 386-3351-00 |  | 1 | SUPPORT CRT:REAR (ATTACHING PARTS) | 80009 | 386-3351-00 |
| -82 | 219-0510-00 |  | 6 | SCREA, MACHINE:6-32 $\times 0.375$. PNH . STL | 83385 | ORDER BY OESCR |
| -83 | 210-0949-00 |  | 6 | MASHER,FLAT: 0.141 IO $\times 0.500 \times 0.062,8 R S$ (EQ ATTACHING PARTS) | 12327 | ORDER BY DESCR |
| -84 | 348-0233-00 |  | 1 | GROWEI, PLASTIC:GRAY, OBLONG $0.847 \times 0.347$ | 80009 | 348-0233-00 |
| -85 | 386-5340-00 |  | 1 | SUPPORT, CHASSIS:MAIN, TOP | 80009 | 386-5340-00 |




Fig. 8

| Index No. | Tektronix Part No. | Serial/Assembly No Effactive Dscont | Qty | 12345 Name \& Description | Mfr. Code | Mfr, Part No, |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 4-1 | 333-2318-00 |  | 1 | PANEL, FRONT: LOMER (attaching parts) | 80009 | 333-2318-00 |
| -2 | 213-0055-00 |  | 5 | SCREA, TPG, TF: 2-32 X 0.188, TYPE B, PNH,STL ( $\operatorname{B}$ K ATTACHING PARTS) | 93907 | ORDER by descr |
| -3 | 426-1072-00 |  | 1 | FRQME, PUSH 日TN:SILVER GRAY PLSTC | 80009 | 426-1072-00 |
| -4 | 426-0681-00 |  | 1 | FRQME, PUSH BTN: | 80009 | 426-0681-00 |
| -5 | 426-0568-00 |  | 9 | FRQME, PUSH BTN: | 80009 | 426-0568-00 |
| -6 | 366-1023-01 |  | 1 | KAOB:GY, 0.127 ID X 0.392 OD X 0.531 H | 80009 | 366-1023-01 |
| -7 | 358-0599-00 |  | 1 | 8USHING,SLEEVE: 0.925 IO $\times 0.2500 \times 0.234$ | 28520 | B-187-125 |
| -8 | 348-0204-00 |  | 1 | SHLD GSKT,ELEX:FINGER TYPE,10.65 L | 80009 | 348-0204-00 |
| -9 | 337-1542-00 |  | 1 | SHLD GSKT, ELEX: EMI | 80009 | 337-1542-00 |
| -10 | 337-1543-00 |  | 3 | SHL GSKT, ELEX: EMI | 80009 | 337-1543-00 |
| -11 | 426-0806-03 |  | 1 | frame pil, CaO.: LONER FRONT (ATTACHING PARTS) | 80009 | 426-0806-03 |
| -12 | 213-0270-00 |  | 4 | SCREA,TPG, TF: $10-32 \times 0.75$, SPCL TYPE, FILH (ED ATTACHING PARTS) | TK1543 | 234-74658-026 |
| -13 | 129-0103-00 |  | 1 | POST, BDG ELEC: ASSEXBLY (attaching parts) | 80009 | 129-0103-00 |
| -14 | 210-0583-00 |  | 1 | NUT, PLAIN, HEX: $0.25-32 \times 0.312$, BRS CD PL | 73743 | 2X-20319-402 |
| -15 | 210-0046-00 |  | 1 | MASHER, LOCK:0.261 ID, INTL, 0.018 THK, STL ( ENO attaching parts) | 77900 | 1214-05-00-0541C |
| -16 | 131-1315-01 |  | 1 | CONW, RCPT, ELEC:BNC, FEMALE | 80009 | 131-1315-01 |
| -47 | --------- |  | 2 | CIRCUIT 00 ASSY:TRIGGER LIGHT <br> (SEE A27, A28 REPL) |  |  |
| -48 | 131-0600-00 |  | 8 | .TERNINAL, PIN:0.365 L $\times 0.025$ ER2 GLD PL | 22526 | 48283-036 |
| -19 | 351-0509-00 |  | 2 | GUIOE,PUSH BTN:THREE LAMP (ATTACHING PARTS) | 80009 | 351-0509-00 |
| -20 | 211-0030-00 |  | 4 | SCREM, MACHINE:2-56 $\times 0.25$, FLH , 82 DEG, STL | TK0435 | ORDER BY DESCR |
| -21 | 210-0405-00 |  | 4 | NUT , PLAIN,HEX:2-56 X 0.188, BRS CD PL (ENO ATtACHING PARTS) | 73743 | 12157-50 |
| -22 | --------- |  | 1 | LOMP, CARTRIDGE:5V,0.06A, GREEN,4.125 L,5-N (FRON DS365 TO A2J365) |  |  |
| -23 | 426-0849-02 |  | 2 | FROME SECT. CAB.: COUPLING (aTtaching parts) | 80009 | 426-0849-02 |
| -24 | 211-0507-00 |  | 4 | SCREI, MACHINE: 6-32 X 0.312, PNH,STL ( $\operatorname{BD}$ ATTACHING PARTS) | 83385 | ORDER BY DESCR |
| -25 | 426-1513-00 |  | 2 | frame sect cab.:TOP RIGHT (ATTACHING PARTS) | 80009 | 426-1513-00 |
| -26 | 211-0507-00 |  | 4 | SCREM, MACHINE:6-32 $\times 0.312$, PNH, STL | 83385 | ORDER EY DESCR |
| -27 | 211-0510-00 |  | 1 | SCREM, MACHINE:6-32 $\times 0.375$, PNH,STL | 83385 | ORDER BY DESCR |
| -28 | 210-0457-00 |  | 1 | MUT, PL, ASSEM MA:6-32 $\times \mathbf{0 . 3 1 2 , S T L}$ CD PL (ENO ATtACHING PaRTS) | 78189 | 511-061800-00 |
| -29 | 407-2093-00 |  | 2 | bracket, angle:hinge,auminum (attaching parts) | 80009 | 407-2093-00 |
| -30 | 211-0538-00 |  | 2 | SCRES, MACHINE: $6-32 \times 0.312$, FLH, 100 DEG (ED ATTACHING PARTS) | 93907 | ORDER BY DESCR |
| -31 | 366-1480-02 |  | 1 | PUSH BUTTON: ELACK , P4R OFF | 80009 | 366-1480-02 |
| -32 | 366-1559-00 |  | 3 | PUSH BUTTON:SIL GY, 0.18 SO $\times 0.43$ | 80009 | 366-1559-00 |
| -33 | 366-1161-57 |  | 1 | PUSH BUTTON:SIL GY,LET | 80009 | 366-1161-57 |
| -34 | 366-1161-31 |  | 2 | PUSH BUTTON:SIL GY, ALT | 80009 | 366-1161-31 |
| -35 | 365-1161-27 |  | 1 | PUSH BUTTON:SIL GY,AOD | 80009 | 366-1161-27 |
| -36 | 366-1161-30 |  | 2 | PUSH BUTTON:SIL GY, CHOP | 80009 | 365-1961-30 |
| -37 | 366-1161-58 |  | 1 | PUSH BUTTON:SIL GY,RIGHT | 80009 | 365-1161-58 |
| -38 | 366-1169-55 |  | 1 | PUSH BUTTON:SIL GY, A | 80009 | 366-1161-55 |
| -39 | 366-1161-56 |  | 1 | PUSH BUTTON:SIL,GY, ${ }^{\text {P }}$ | 80009 | 366-1161-56 |
| -40 | 366-1650-00 |  | 6 | PUSH BUTTON:CLEAR, $0.184 \times 0.214 \times 8.0$ | 80009 | 366-1650-00 |
| -41 | 384-1354-00 |  | 6 | EXTENSION SHAFT: 1.585 L,OFFSET, MY 1 N | 80009 | 384-1354-00 |
| -42 | 389-1136-00 |  | 12 | EXTENSION SHAFT:0.95 INCH LONG | 80009 | 384-1136-00 |
| -43 | 389-1148-00 |  | 1 | EXTESSION SHAFT:3.14 L X 0.123 OD, EPOXY GL | 80009 | 384-1148-00 |
| -4 | 376-0029-00 |  | 1 | CPLO, SHAFT, RGD: $0.12810 \times 0.312$ OD, AL | 80009 | 376-0029-00 |
| -45 | 213-0075-00 |  | 2 | .SETSCREN:4-40 X 0.094,5TL <br> CIRCUIT Bo assy:calibrator and mode shitch (SEE A2 REPL) <br> (ATTACHIMO PARTS) | 74445 | ORDER BY DESCR |
| -46 | 211-0008-00 |  | 5 | SCRE , MACHIME:4-40 $\times 0.25$, PWH STL (ED ATTACHING PARTS) CKT BOARO ASSY IMCLUDES: | 93907 | ORDER BY DESCR |

Fig. \&

| Index No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Oty | 12345 Name \& Description | Mfr. Code | Mfr, Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 4-47 | -- |  | 1 | .SMITCH PB ASSY:3 LATCH, $10 \mathrm{~W}, 5$ CONTACT . (SEE R2S395 REPL) |  |  |
| -48 | ----- ----- |  | 1 | .SMITCH PB ASSY:5 LATCH, 7.5W, 5 CONT, 4 FR . (SEE AZS344 REPL) |  |  |
| -49 | -.--- ----- |  | 2 | .SNITCH PQ ASSY:3 LATCH, 10 m, M/3 CONTACTS <br> . (SEE A2S352,S354 REPL) |  |  |
| -50 | ---------- |  | 1 | .SWITCH PB ASSY:4 LOTCH,7.5W, 6 CONT, 3 FR <br> . (SEE A25342 REPL) |  |  |
| -51 | 343-0495-09 |  | 1 | . CLIP,SMITCH: FRONT, 7.5NM X 9 UNIT <br> - (attaching parts) | 80009 | 343-0495-09 |
| -52 | 210-3033-00 |  | 8 | .EYELET, METALLIC:0.059 $00 \times 0.156 \mathrm{~L}, \mathrm{BRS}$ <br> - (ENO ATTACHINO PARTS) | 07707 | SE-25 |
| -. 53 | 343-0495-07 |  | 1 | .CLIP,SNITCH: FRONT , 7.5NM X 7 UNIT . (attaching parts) | 80009 | 343-0495-07 |
| -54 | 210-3033-00 |  | 7 | .EYELET, METALLIC: $0.05900 \times 0.156$ L,BRS <br> - (ENO ATTACHING PaRTS) | 07707 | SE-25 |
| -55 | 343-0496-03 |  | 3 | .CLIP,SNITCH: FRONT, 10N X 3 UNIT <br> - (ATTACHING PARTS) | 80009 | 343-0496-03 |
| -56 | 210-3033-00 |  | 9 | .EYELET, METALLIC: $0.05900 \times 0.156$ L, BRS <br> - (ENO ATtaching parts) | 07707 | SE-25 |
| -57 | 131-1003-00 |  | 1 | .CON, RCPT, ELEC:CKT 8D MT, 3 PRONO | 80009 | 131-1003-00 |
| -58 | 136-0252-07 |  | 1 | .SOCKET , PIN CONN: W/O DIMPLE | 22526 | 75060-012 |
| -59 | 343-0499-14 |  | 1 | .CLIP, SNITCH:7.5N X 5 UNIT <br> - (attáching parts) | 80009 | 343-0499-14 |
| -60 | 210-3033-00 |  | 5 | .EYELET, METALLIC:0.059 OD X 0.156 L, BRS <br> - (ano attaching parts) | 07707 | SE-25 |
| -61 | 343-0439-12 |  | 1 | .CLIP SMITCH:FRONT.7.54W X 3 WNIT <br> - (gitaching Parts) | 80009 | 343-0499-12 |
| -62 | 210-3033-00 |  | 3 | . EYELET, METALLIC: $0.05900 \times 0.156 \mathrm{~L}, \mathrm{BRS}$ <br> - (end attaching parts) | 07707 | SE-25 |
| -63 | 343-0499-13 |  | 2 | .CLIP, SHITCH:7.5NX X 4 UWIT <br> - (ATTACHIMG PARTS) | 80009 | 343-0499-13 |
| -64 | 210-3033-00 |  | 8 | .EYELET, METALLIC: $0.05900 \times 0.156$ L,BRS <br> - (ENO attaching parts) | 07707 | SE-25 |
| -65 | 343-0497-03 |  | 3 | .CLIP,SMITCH:REAR, 10IW X 3 UNIT <br> - (ATTACHING PARTS) | 80009 | 343-0497-03 |
| -66 | 210-3033-00 |  | 9 | .EYELET, METALLIC: $0.05900 \times 0.156 \mathrm{~L}, 8 \mathrm{BR}$ <br> - (ENO ATTACHING PARTS) | 07707 | SE-25 |
| $\begin{aligned} & -67 \\ & -68 \end{aligned}$ | 131-0589-00 |  | $\underset{9}{54}$ | .TERN,PIN:0.46 L X 0.025 SO PH 8RZ GL . RES, VAR, MONW: PNL,5K OHM, 1 K . (SEE A2R345 REPL) | 22526 | 48283-029 |
| -69 | 384-1876-01 |  | 1 | EXTENSION SHAFT: | 80009 | 384-1876-01 |
| -70 | 407-1873-00 |  | 1 | 8RACKET,ANGLE:POMER SMITCH,AUMINUM (ATTACHING PaRTS) | 80009 | 407-1873-00 |
| -71 | 210-0457-00 |  | 2 | NUT, PL, ASSEM MA:6-32 $\times 0.312,5 T L$ CD PL (EN ATTACHING PARTS) | 78189 | 511-061800-00 |
| -72 | - --- |  | 1 | SWITCH, PUSH:DPST, 15A, 250VAC ,PUSH-PUSH (SEE S10 REPL) <br> (ATTACHING PARTS) |  |  |
| -73 | 211-0008-00 |  | 2 | SCREA, MACHINE: 4-40 $\times 0.25$, PNH, STL (ENO ATTACHING PARTS) | 93907 | OROER BY OESCR |
| -74 | 334-2332-00 |  | 1 | MARKER, IDENT: OANGER:VOLTAGE IN THIS AREA | 80009 | 334-2332-00 |
| -75 | 200-1731-00 |  | 1 | COVER, ELEC SM:1.9 $\times 1.0 \times 0.45$ CLR PLSTC (ATtaCHING PARTS) | 80009 | 200-1731-00 |
| -76 | 211-0034-00 |  | 9 | SCRE , MACHINE: 2 -56 $\times 0.5$, PM ${ }^{\text {a }}$, STL | 06950 | ORDER BY DESCR |
| -77 | 210-0405-00 |  | , | NUT , PLAIN,HEX:2-56 $\times 0.188,8 R 5$ CD PL | 73743 | 12157-50 |
| -78 | 210-0850-00 |  | 1 | HSHR,FLAT: 0.093 IO $\times 0.28100 \times 0.02$, STL (EN ATTACHING PARTS) | 12327 | ORDER BY DESCR |
| -79 | -- --- |  | 1 | CIRCUIT BD ASSY:READOUT (SEE A13 REPL) (attachimg parts) |  |  |
| -80 | 211-0008-00 |  | 4 | SCREA, MACHINE:4-40 X 0.25, PWH,STL (ENO ATTACHING PARTS) <br> CKT BOARO ASSY INCLDEES: | 93907 | OROER BY OESCR |
| -81 | 131-0589-00 |  | 27 | .TERN, PIN:0.46 L X 0.025 SO PH BRZ GL | 22526 | 48283-029 |
| -82 | 136-0751-00 |  | 1 | .SKT, PL-IN ELEX:MICROCKT, 24 PIN | 09922 | 014824P108 |
| -83 | 136-0252-07 |  | 5 | . SOCKET, PIN CONW:M/O DIMPLE | 22526 | 75060-012 |

Fig. 8


Fig. \&

| Index <br> No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Qty | 12345 Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 4-118 | 214-2675-00 |  | 2 | .SPRING, CKT BD: | 80009 | 214-2675-00 |
| -119 | 129-0308-00 |  | 4 | .SPACER,POST:0.465 L,4-40 THRU,BRS,CU SN . 2 N PL,0.25 HEX | 80009 | 129-0308-00 |
| -120 | 211-0008-00 |  | 4 | - (attaching parts) <br> . SCREA , MACHINE:4-40 $\times 0.25$, PNH STL <br> ( (END ATTACHING PARTS) | 93907 | ORDER BY DESCR |
| -121 | 131-0804-00 |  | 2 | . BUS, CONDUCTOR: J-SHAPE, $0.01 \times 1.17 \times 0.82 \times$ <br> . 0.312 OA BRS ALBALOY PL | 80009 | 131-0804-00 |
| -122 | 351-0188-00 |  | 3 | . POST, CKT BO MTG:0.65 INCH LONG | 80009 | 351-0188-00 |
| -123 | 386-1558-00 |  | 4 | . SPACER,CKT 80:0.335 H,ACETAL | 80009 | 386-1558-00 |
| -124 | 344-0147-00 |  | 2 | .CLIP, CIRCUIT BD:ACETAL . (attaching parts) | 80009 | 344-0147-00 |
| -125 | 214-1568-00 |  | 2 | . PIN, GUIDE:0.119 DIA X $1.035 \mathrm{~W} / 0.25$ HEX CLR | 80009 | 214-1568-00 |
| -126 | 210-0406-00 |  | 2 | . NUT, PLAIN, HEX:4-40 $\times 0.188$, BRS CD PL | 73743 | 12161-50 |
| -127 | 210-0054-00 |  | 2 | . MASHER LOCK: \#4 SPLIT, 0.025 THK STL ( (END ATTACHING PARTS) | 78189 | ORDER BY DESCR |
| -128 | ----- --.-- |  | 2 | CIRCUIT BD ASSY: FRONT PANEL DISPLAY (SEE A3A1, A3A2 REPL) |  |  |
| -129 | ---------- |  | 1 | CIRCUIT BO ASSY:LOGIC (SEE A6 REPL) |  |  |
| -130 | 136-0263-07 |  | 44 | . SOCKET, PIN TERM:U/W 0.025 SQ PIN | 22526 | ORDER 8Y DESCR |
| -131 | 131-1003-00 |  | 2 | .CONN,RCPT, ELEC:CKT B0 MT, 3 PRONG | 80009 | 131-1003-00 |
| -132 | 136-0252-07 |  | 2 | .SOCKET ,PIN CONN:H/O DIMPLE | 22526 | 75060-012 |
| -133 | ------ |  | 1 | CIRCUIT BO ASSY:TRIGGER SELECT <br> (SEE A7 REPL) <br> (ATTACHING PARTS) |  |  |
| -134 | 211-0155-00 |  | 3 | .SCREN, EXT RLV:4-40 x 0.375 , PNH, SST , POL <br> . (ENO Attaching parts) <br> .CKT BOARD ASSY INCLUDES: | 80009 | 211-0155-00 |
| -135 | 361-0238-00 |  | 3 | . SPACER, POST: $0.433 \mathrm{~L}, 0.2500$ | 80009 | 361-0238-00 |
| -136 | 426-1352-00 |  | 2 | . FRAME, MICROCKT:1.75 CM, STEPPED | 80009 | 426-1352-00 |
|  | 131-1968-01 |  | 2 | . CONT SET,ELEC:MICROCKT, 1.75 CM,RUBBER . (ATTACHING PARTS) | 80009 | 131-1968-01 |
| -137 | 211-0259-00 |  | 8 | .SCR, ASSEA MSHR:2-56 X 0.437, PNH,STL, POZ <br> - (END ATTACHING PARTS) | 01536 | ORDER BY DESCR |
| -138 | 136-0263-07 |  | 7 | . SOCKET, PIN TERM:U/W 0.025 SO PIN | 22526 | ORDER EY DESCR |
| -139 | 136-0252-07 |  | 15 | . SOCKET, PIN COMN:N/O DIMPLE | 22526 | 75060-012 |
| -140 | 131-1003-00 |  |  | .CONN, RCPT, ELEC:CKT BD MT, 3 PRONG | 80009 | 131-1003-00 |
| -141 | 351-0181-06 |  | 4 | GUIDE,SLIDE:PLUG-IN UNIT, LUR, BLX NYLON (attaching parts) | 80009 | 351-0181-06 |
| -142 | 213-0146-00 |  | 4 | SCREN,TPG, TF: $6-20 \times 0.312$, TYPE B,PNH,STL (END ATTACHING PARTS) | 83385 | ORDER BY OESCR |
| -143 | 407-2109-00 |  | 2 | BRACKET, HINGE: ALUMINUM (ATTACHING PARTS) | 80009 | 407-2109-00 |
| -144 | 210-0457-00 |  | 2 | NUT, PL,ASSEM WA:6-32 $\times 0.312,5 T L$ CD PL (ENO ATTACHING PARTS) | 78189 | 511-061800-00 |
| -145 | 210-0457-00 |  | 1 | NUT, PL,ASSEM HA:6-32 $\times 0.312, S T L C D P L$ (ATTACHES 6-5 GND LEAD) | 78189 | 511-061800-00 |
| -146 -147 | $348-0193-00$ $441-1716-00$ |  | 1 | FLIP-STAND, CAB.: $3.438 \mathrm{H}, \mathrm{SST}$ | 80009 | 348-0193-00 |
| -147 | 441-1716-00 |  | 1 | CHASSIS, PLug-In: | 80009 | 441-1716-00 |

Fig. 8

| index No. | Tektronix Part No. | Serial/Assembly No. Eftective Dscont | Qty | 12345 Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 5- | 620-0283-02 |  | 1 | POMER SUPPLY: <br> (ATTACHING PARTS) | 80009 | 620-0283-02 |
| -1 | 211-0578-00 |  | 4 | SCREN, MACHINE: $6-32 \times 0.438$, PNH , STL (ENO ATTACHING PARTS) POAER SUPPLY ASSY INCLUDES: | TK0435 | ORDER BY descr |
| -2 | 200-1262-02 |  | 1 | .COVER, PHR SPLY:LEFT SIOE . (attaching parts) | 80009 | 200-1262-02 |
| -3 | 211-0503-00 |  | 6 | . SCRE日, MACHINE:6-32 $\times 0.188$, PNH, STL | TK0435 | ORDER GY DESCR |
| -1 | 211-0504-00 |  | 2 | .SCREN, MACHINE:6-32 $\times 0.250$, PNH ,STL . (END ATTACHING PARTS) | TK0435 | ORDER BY DESCR |
| -5 | 200-1263-01 |  | 1 | .COVER PMR SPLY:RIGHT SIOE <br> . (attaching parts) | 80009 | 200-1263-01 |
| -6 | 211-0503-00 |  | 5 | . SCREA, MACHINE:6-32 $\times 0.188$, PNH , STL | TK0435 | OROER BY DESCR |
| -7 | 211-0507-00 |  | 2 | .SCREN, MACHINE: $6-32 \times 0.312$, PNH,STL ( (END ATTACHING PARTS) | 83385 | OROER BY OESCR |
| -8 | 255-0334-00 |  | AR | . PLASTIC CHANNEL: $12.75 \times 0.175 \times 0.155$ | 11897 | 122-37-2500 |
| -9 | 348-0233-00 |  | 1 | .GROMET , PLASTIC:GRAY , 08 LOMG $0.847 \times 0.347$ | 80009 | 348-0233-00 |
| -10 | 351-0279-00 |  | 2 | . GUIDE, SHOE:5. $18 \times 0.375$, MYLON | 80009 | 351-0279-00 |
| -11 | 200-1905-00 |  | 1 | .COVER, PHR SPLY:BOTTON \& FRONT - (attaching parts) | 80009 | 200-1906-00 |
| -12 | 211-0503-00 |  | 2 | . SCREN, MACHINE:6-32 $\times 0.188$, PNK, STL - (END ATTACHING PARTS) | TK0435 | ORDER BY DESCR |
| -13 | ----- ----- |  | 2 | .TRANSISTOR:NPN, SI, TO-220 <br> - (SEE A14R2028,074 REPL) <br> . (attaching paris) |  |  |
| -14 | 210-0406-00 |  | 2 | .NUT, PLAIN,HEX:4-40 $\times 0.188,8 \mathrm{SS}$ CO PL | 73743 | 12161-50 |
| -15 | 211-0101-00 |  | 2 | . SCREA, MACHINE:4-40 X 0.25,FLH, 100 D6, STL | TK0435 | ORDER OY OESCR |
| -16 | 210-1178-00 |  | 2 | . MASHER,SHLOR: <br> - (ENO ATTACHING PARTS) | 13103 | 7721-7PPS |
| -17 | - |  | 2 | .TRONSISTOR: PNP SI , TO-220 <br> . (SEE A1402058, Q94 REPL) <br> - (attaching parts) |  |  |
| -18 | 210-0406-00 |  | 2 | .NUT, PLOIN, HEX:4-40 $\times 0.188,8 R S$ CO PL | 73743 | 12161-50 |
| -19 | 211-0101-00 |  | 2 | . SCREM, MACHINE:4-40 X 0.25, FLH. $100 \mathrm{OC}, \mathrm{STL}$ | TK0435 | ORDER BY DESCR |
| -20 | 210-1178-00 |  | 2 | . MASHER,SHLOR: <br> - (END ATTACHING PARTS) | 13103 | 7721-7PPS |
| -21 | 342-0202-00 |  | 5 | - INSULATOR , PLATE: TRANSISTOR, MICA | 91500 | 10-21-023-106 |
| -22 |  |  | 1 | . TRANSISTOR:NPN, SI , SELECTED,TO-127 <br> . (SEE A14AZO122 REPL) <br> - (AITACHING PARTS) |  |  |
| -23 | 210-0406-00 |  | 1 |  | 73743 | 12161-50 |
| -24 | 211-0038-00 |  | 1 | .SCREA, MACHINE:4-40 X 0.312, FLH, 100 DEG | TK0435 | ORDER BY DESCR |
| -25 | 210-1178-00 |  | 1 | . MASHER , SHLOR: <br> - (ENO ATTACHING PARTS) | 13103 | 7721-7PPS |
| -26 | ------ |  | 1 | .TRONSISTOR:SCREDNE <br> - (SEE A14020126 REPL) <br> - (attaching parts) |  |  |
| -27 | 210-0406-00 |  | 1 | . MUT , PLAIN, HEX:4-40 $\times 0.188,8 R 5 \mathrm{CO}$ PL | 73743 | 12161-50 |
| -28 | 211-0101-00 |  | 1 | . SCREA, MACHINE:4-40 X 0.25,FLH, 100 O6, STL | TK0435 | ORDER BY DESCR |
| -29 | 210-1178-00 |  | 1 | . MASHER, SHLDR: <br> - (ENO attaching parts) | 13103 | 7721-7PPS |
| $\begin{aligned} & -30 \\ & -31 \end{aligned}$ | 342-0911-00 |  | $1$ | - IMSULATOR , PLATE: TRONSISTOR, MICA <br> .CIRCUIT BD ASSY:LON VOLTAGE REGULATOR <br> - (SEE A1402 REPL) <br> - (attaching parts) | 01295 | 64-21-023-212 |
| -32 | 211-0008-00 |  | 5 | . SCREA, MACHIME:4-40 X 0.25, PMW,STL <br> . (ENO ATIACHING ParTS) <br> .CKT BOARO DSSY INCUDES: | 93907 | OROER 8Y DESCR |
| -33 | 131-0589-00 |  | 18 | ..TERN,PIN:0.46 LX 0.025 SO PA BRZ GLD | 22526 | 48283-029 |
| -34 | 214-0579-00 |  | 6 | .. TEPN,TEST POINT:ARS CD PL | 80009 | 214-0579-00 |
| -35 | 136-0252-07 |  | 24 | .. SOCKET , PIN CONN: $/ 0$ DIMPLE | 22526 | 75060-012 |
| -36 | 136-0727-00 |  | 5 | .. SKT, PL-IN ELER : WICROCKT, 8 CONTACT | 09922 | DIL88P-108 |
| -37 | 131-0993-00 |  | 9 | ..8US,CONDUCTOR:SKUNT ASSEPELY, BLACK | 22526 | 65474-005 |
| $\begin{aligned} & -38 \\ & -39 \end{aligned}$ | 131-0608-00 |  | $\begin{array}{r} 54 \\ 1 \end{array}$ | . . TERMINAL,PIN: 0.365 L $\times 0.025$ BRZ GLD PL <br> ..TRANSISTOR: PNP , SI , TO-127 <br> .. (SEE A14020148 REPL) <br> .. (DTTACHING PARTS) | 22526 | 48283-036 |

Fig. 8

| Index <br> No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Oty | 12345 Name \& Pescription | Mfr. Code | Mfr, Part ${ }^{\text {Nos }}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 5.40 | 211-0097-00 |  | 1 | . . SCREA, MACHINE:4-40 $\times 0.312$, PNH, STL | TK0435 | OROER OY DESCR |
| -41 | 210-0554-00 |  | 1 | . NUT, PLAIN, HEX:4-40 $\times 0.25$,5T CO PL | TK0435 | ORDER BY DESCR |
| -42 | 210-1178-00 |  | 1 | . .MASHER SHLOR: <br> . (END attaching parts) | 13103 | 7721-7PPS |
| -43 | 348-0023-00 |  | 1 | . PLWG, HOLE:U/MO. 14 DIA HOLE, Mht PLSTC | 02768 | 207090201000101 |
| -44 | 441-1490-00 |  | 1 | .CHASSIS, SCOPE:CIRCUIT BOARO <br> . (attaching parts) | 80009 | 441-1490-00 |
| -45 | 211-0000-00 |  | 2 | . SCREA , MACHINE:4-40 $\times 0.25$, PNH,STL | 93907 | ORDER BY DESCR |
| -46 | 211-0507-00 |  | 3 | . SCREM, MACHINE: $6-32 \times 0.312$, PNH, STL . (END ATTACHING PARTS) | 83385 | OROER BY OESCR |
| -47 | - - |  | 1 | .CIRCUIT BD ASSY:CONTROLLED RECTIFIER <br> -(SEE A14A1 REPL) <br> -(attaching parts) |  |  |
| -48 | 211-0008-00 |  | 3 | . SCREA, MACHINE:4-40 X 0.25, PNH, 5TL | 93907 | ORDER BY OESCR |
| -49 | 211-0504-00 |  | 1 | .SCRES, MACHINE: $6-32 \times 0.250$, PNH,STL ( (ENO ATTACHING PARTS) .CKT BOARO ASSY INCLUDES: | TK0435 | OROER BY DESCR |
| -50 | 136-0252-07 |  | 6 | .. SOCKET PIM CON: $1 / \mathrm{CO}$ DIMPLE | 22526 | 75060-012 |
| -51 | 136-0729-00 |  | 1 | .. SKT, PL-IN ELEK:MICROCKT, 16 CONTACT | 09922 | DILB16P-108T |
| -52 | 136-0263-07 |  | 4 | ..50CKET, PIN TER4:U/M 0.025 S0 PIN | 22526 | OROER BY DESCR |
| -53 | - |  | 4 | . .SEMICONO DVC, DI:RECT,SI,500V,12A <br> ..(SEE A1491CR140,CR141,CR142,CR143 REPL) <br> . (ATTACHING PARTS) |  |  |
| -54 | 210-0410-00 |  | 4 | ..NUT, PLIIN,HEX: $10-32 \times 0.312 .8 R S$ CD PL | 73743 | 2x-2003-402 |
| -55 | 210-0056-00 |  | 4 | .. MASHER, DCK:\$10 SPLIT, 0.047 THX, SI ERZ | 86928 | OROER BY DESCR |
| -56 | 210-1003-00 |  | 4 | . MASHER, FLOT: $0.210 \times 0.43800 \times 0.036$ BRS <br> .. (ENO attaching parts) | 86928 | 5714-50-32N |
| -57 | 386-4559-00 |  | 2 | .. SPACER , CKT 80:0.47 H,ACETAL | 80009 | 386-1559-00 |
| -58 | --------- |  | 1 | .. SENICONO DVC, OI: DUAL RECI, SI, 300, 20V, TO-3 <br> ..(SEE AT4A1CR151 REPL) <br> .. (attaching parts) |  |  |
| -59 | 211-0012-00 |  | 2 | . . SCREA, MACHINE:4-40 $\times 0.375$, PAW, STL | TK0435 | ORDER BY DESCR |
| -60 | 210-0585-00 |  | 2 | . .NUT, PL, ASSEN MA:4-40 $\times 0.25,5$ TL CD PL <br> .. (ENO aftaching parts) | 78189 | 211-041800-00 |
| -61 | 342-0567-00 |  | 1 | - . INSULATOR, PLATE:TRANSISTOR, SI , RLEBER | 18565 | 60-19-4511-167 |
| -62 | 214-2731-00 |  | 1 | . . HEAT SINK, DIODE:T0-3,AL | 80009 | 214-2731-00 |
| -63 | 290-0628-00 |  |  | CAP , FXD , ELCTLT: 950 UF , $+50-102$, 200V <br> - (SEE C15,C17 REPL) <br> - (GTTACHING PARTS) | 56289 | 3607560 |
| -64 | 212-0518-00 |  | 4 | .SCREN, MACHINE: $10-32 \times 0.312$,PNH, STL | TK0435 | ORDER EY DESCR |
| -65 | 212-0651-00 |  | 4 | .SCREN, MACHINE: $10-32 \times 0.312$ L,PWH ,NYLON <br> . (givo attaching parts) | TK1281 | 011032P031 |
| -66 | 342-0419-00 |  | 2 | . INSULATOR ,CAP .: | 80009 | 342-0419-00 |
| -67 | 407-2111-00 |  | , | .BRACKET, CAP.: AUMINUM | 80009 | 407-2119-00 |
| -68 | -.---.--- |  | 1 | .XFAR, PMR,STPON:HIGH FREQUENCY <br> - (SEE T110 REPL) <br> - (ATTACHING PARTS) |  |  |
| -69 | 211-0008-00 |  | 4 | .SCREN, MACHINE:4-40 $\times 0.25$, PNH,STL <br> - (ENO ATTACHING PARTS) | 93907 | OROER BY DESCR |
| -70 | 348-0023-00 |  | 1 | . PLuG, HOLE:U/Mo. 14 DIA HOLE, MHT PLSTC | 02768 | 207090201000109 |
| -71 | 441-1423-00 |  | 1 | . CHASSIS SCOPE: TRONSFORMER <br> - (ATtaching parts) | 80009 | 441-1423-00 |
| -72 | 211-0097-00 |  | 2 | .SCREA, MACHINE: 4-40 $\times 0.312$, PAW, 5 TL <br> . (ENO ATTACHING PaRTS) | TK0435 | oroer by descr |
| -73 | 337-1490-02 |  | 1 | .SHIED, ELEC:LINE INVERTER,CKT BD BOtTOM . SAFETY CONTROLLED <br> - (attaching parts) | 80009 | 337-1490-02 |
| -74 | 219-0558-00 |  | 1 | . SCREA, MACHINE: $6-32 \times 0.25,806 \mathrm{H}$,NYL | 26365 | OROER EY DESCR |
| -75 | 210-0055-00 |  | 1 | . MASHER,LOCK: 6 SPLIT, 0.031 THK, STL | 81350 | DROER GY OESCR |
| -76 | 211-0040-00 |  | 1 | . SCREA, MACHIME:4-40 X 0.25,BDGH,NYL | 26365 | OROER BY DESCR |
| -77 | 210-0054-00 |  | 1 | . . ( (פw attaching parts) | 78189 | OROER BY DESCR |
| -78 | 220-0623-00 |  | 1 | .NUT BLOCK: $6-32 \times 0.375 \times 0.5 \times 0.448$ - (ATTACHING PARTS) | 80009 | 220-0623-00 |
| -79 -80 | 211-0503-00 |  | 1 | . SCREA, MACHINE: $6-32 \times 0.188$, PWH , 5 TL <br> .CIRCUIT 80 ASSY:INVERTER <br> . (SEE A1403 REPL) | TK0435 | OROER OY DESCR |

Fig. 8


| Fig. 8 Index No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Qty | 12345 Name \& Description | MFr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 5-121 | 210-0407-00 |  | 1 | . NUT , PLAIN, HEX: 6-32 $\times 0.25$,8RS CO PL ( (ENO ATTACHING PARTS) | 73743 | 3038-402 |
| -122 | 210-0202-00 |  | 1 | .TERMINAL, WG:0. 146 [ $0, L 0 C K$ ING, $8 R 2$ TIN PL - (ATtaChing parts) | 86928 | A-373-158-2 |
| - 123 | 210-0407-00 |  | 2 | . NUT , PLAIN, HEX:6-32 $\times 0.25$, BRS CD PL <br> . (ENO ATTACHING PARTS) | 73743 | 3038-402 |
| -124 | -...-. -...- |  | 1 | .SMITCH, SLIDE:DPOT, 3A, 125VAC <br> . (SEE SIO REPL) <br> - (GTTACHING PARTS) |  |  |
| -125 | 211-0097-00 |  | 2 | . SCREE, MACHINE:4-40 $\times 0.312$, PNH, STL | TK0435 | ORDER BY DESCR |
| -126 | 210-0586-00 |  | 2 | .NUT, PL, ASSEM KA:4-40 X $0.25, S T L$ CD PL <br> - (ENO ATTACHING PARTS) | 78189 | 211-041800-00 |
| -127 | 200-2264-00 |  | 1 | .CAP, FUSEHOLDER:3AG FUSES | 53629 | FEX 0311666 |
| -128 | 204-0832-00 |  | 1 | . 800 Y , FUSEHOLOER:3AG $\& 5 \times 20 \mathrm{M}$ ( FUSES | TK0861 | 0311673 |
| -129 | 210-1039-00 |  | 1 | .MASHER,LOCK:0.521 ID, INT,0.025 THK, 5ST | 24931 | ORDER BY DESCR |
| -130 | ----- ----- |  | 1 | .FILTER,RFI:6A, 250VAC, 400HZ <br> . (SEE FL10 REPL) <br> - (aTtaching parts) |  |  |
| $\begin{array}{r} -131 \\ -132 \end{array}$ | 211-0014-00 |  | 2 | . SCREA, MACHINE:4-40 $\times 0.5$, PNH,STL | tK0435 | ORDER BY DESCR |
|  | 210-0586-00 |  |  | . NUT , PL,ASSEM MA:4-40 X 0.25,STL CD PL <br> . (END ATTACHING PARTS) | 78189 | 211-04 1800-00 |
|  | POMER SUPPLY MIRE KIT |  |  |  |  |  |
| -133 | 198-3829-01 |  | 1 | . WIRE SET, ELEC: | 80009 | 198-3829-01 |
|  | 175-6755-00 |  | 1 | ..CA ASSY, SP, ELEC:3,26 AMG, 12.0 L,RIBBON | 80009 | 175-6755-00 |
|  | 352-0161-09 |  | 1 | ...HLDR,TERM CON: 3 HIRE, MHITE <br> ...(A14a2P99 T0 599) | 80009 | 352-0161-09 |
|  | 175-6756-00 |  | 1 | ..CA ASSY, SP, ELEC:4, 26 AME, 6.75 L , RIBBON | 80009 | 175-6756-00 |
|  | 352-0162-09 |  | 2 | ...HLDR, TERA CONN: 4 HIRE, YELLOM <br> ...(A14A2P59 TO ロ1401P54) | 80009 | 352-0162-04 |
|  | 175-6757-00 |  | 1 | ..CA ASSY, SP , ELEC:7, 22 AMG , 8.0 L,RIB8ON | 80009 | 175-6757-00 |
|  | 352-0165-00 |  | 2 | ... HLOR, TERN CON: 7 MIRE,BLACK <br> ...(A14A2P5O TO A14A1P50) | 80009 | 352-0165-00 |
|  | 175-6758-00 |  | 1 | ..CA ASSY.SP , ELEC:6,22 Alm, 7.5 L,RIB8ON | 80009 | 175-6758-00 |
|  | 352-0164-02 |  | 2 | ... HLDR TERM CONN: 6 MIRE,RED <br> ...(A14A2P52 T0 A14A1P52) | 80009 | 352-0164-02 |
|  | 175-6759-00 |  |  |  | $80009$ | 175-6759-00 |
|  | 352-0163-08 |  | 2 | ...HLDR,TERM CONN:5 MIRE,GRAY <br> ...(A14A2P48 T0 А14A1P48) | 80009 | 352-0163-09 |
|  | $175-6760-00$ |  |  | ..CA ASSY, SP , ELEC: 4 , 18 AMo ,31.0 L,8-N | 80009 | 175-6760-00 |
|  | $352-0200-00$ |  | 2 | ...HDR,TERM CONN:4 MIRE,BLACK <br> ...(Q14A1950 TO a14日1P50) | 80009 | $352-0200-00$ |
| $\begin{array}{r} -934 \\ -135 \end{array}$ | 214-2932-01 |  | $\begin{aligned} & 1 \\ & 1 \end{aligned}$ | . HEAT SINK,ELEC:POMER SUPPLY, ALUMINUM CIRCUIT 80 ASSY:SIGNALS OUT (SEE A12A1 REPL) <br> (ATTACHING PARTS) | 80009 | 214-2932-01 |
| -936 | 211-0008-00 |  | 3 | SCREN, MACHINE: 4-40 $\times 0.25$. PNH,STL (ENO ATTACHING PARTS) CKT BOARO ASSY INCLUDES: | 93907 | OROER BY DESCR |
| -197 | 131-0993-00 |  | 4 | . BUS , CONOUCTOR:SHUNT ASSEMBLY, BLACK | 22526 | 65474-005 |
| -138 | 131-0589-00 |  | 19 | . TERH, PIN: $0.46 \mathrm{~L} \times 0.025$ SO PH BRL GLD | 22526 | 48283-029 |
| -139 | 136-0252-07 |  | 5 | .SOCKEI, PIN COAN:M/O DIMPLE | 22525 | 75060-012 |
| -940 | 131-1003-00 |  | 5 | .COAN,RCPT,ELEC:CKT BD MT, 3 PROAG | 80009 | 131-1003-00 |
| -941 | 131-0955-00 |  | 3 |  | 13511 | 39-279 |
| -942 | 131-1315-01 |  | 2 | CONA, RCPT, ELEC: BNC, FEMALE | 80009 | 131-1315-01 |
| -143 | 131-0771-00 |  | 2 | CONN,RCPT,ELEC:2 MALE,2 FEM,PNL MT W/O MTG HDM <br> (ATIACHING PARTS) | 91836 | 1904-2458 |
| -944 | 220-0551-00 |  | 2 | NUT, PLAIN, HEX:9 X $\times 1.00$, BRS NP | 73743 | ORDER OY DESCR |
| -145 | 210-0012-00 |  | 2 | MASHER,LOCK:O.3B4 10,INTL,0.022 THK,5TL (ENO ATTACHIMG PARTS) | 09772 | OROER 8Y DESCR |
| -146 | 333-3280-00 |  | 1 | PANEL, REAR:LOMER UNIT (ATTACHING PARTS) | 80009 | 333-3280-00 |
| -147 | 211-0507-00 |  | 2 | SCREN, MACHINE: 6-32 X 0.312, PAH , STL (ENO ATTACHING PARTS) | 83385 | OROER aY DESCR |
| -148 | 441-1424-00 |  | 1 | CHASSIS, SCOPE:SIG OUT | 80009 | 441-1424-00 |

Fig. 8


Fig. 8

| Index No. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Qty | 12345 Name \& Description | Mfr. Code | Mfr Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 5- | 174-0146-00 |  | 2 | CABLE ASSY,RF:50 OHM COAX, $16.0 \mathrm{~L}, 9-8$ (FROM A3A3J1814 TO A19a1J26) (FROM A21J2208 TO A6J4408) | 80009 | 174-0146-00 |
|  | 174-0147-00 |  | 1 | CABLE ASSY,RF:50 OHM COAX, $16.0 \mathrm{~L}, 9-4$ (FROM A20J1 TO A3A3J1738) | 80009 | 174-0147-00 |
|  | 174-0148-00 |  | 1 | CABLE ASSY,RF:50 OHM COAX, $14.0 \mathrm{~L}, 9-0$ (FROM АЗазј1690 TO $01901 \mathrm{J43}$ ) | 80009 | 174-0148-00 |
|  | 174-0149-00 |  | 1 | CABLE ASSY,RF:50 OHN COAX,6.0 L,6-2 <br> (FROM A7J472 10 A3A3J41) | 80009 | 174-0149-00 |
|  | 174-0150-00 |  | 1 | CABLE ASSY,RF:50 OKM COAX, 19.0 L,9-7 <br> (FRON Q21J2203 TO A13J3432) | 80009 | 174-0150-00 |
|  | 174-0151-00 |  | 1 | CABLE ASSY,RF:50 OHM COAX, $12.0 \mathrm{~L}, 9-3$ <br> (FROM A6J4473 TO J4472) | 80009 | 174-0151-00 |
|  | 174-0152-00 |  | 1 | CABLE ASSY,RF:50 DHM COAX,4.0 L.6-2 (FROM A7J271 TO A3A3J472) | 80009 | 174-0152-00 |
|  | 174-0153-00 |  | 1 | CABLE ASSY,RF:50 OHM COAX, 18.0 L,6-N (FRON ABN694 TO A18, 1641) | 80009 | 174-0153-00 |
|  | 174-0158-00 |  | 1 | CA ASSY,SP, ELEC:5, 26 AMG, 10.0 L (FRON A2P34O TO COM POMER) | 80009 | 174-0158-00 |
|  | 174-0168-00 |  | 1 | CA ASSY,SP,ELEC:30,26 AMG,11.5 L (FRON АЗаЭР3245 ТО А13P3446,А13P3467. A13P3475) | 80009 | 174-0168-00 |
|  | 174-0169-00 |  | 1 | CA ASSY,SP, ELEC: 40,26 AMG, 11.5 L (FROM АЗАЗР44 TO A2P344) | 80009 | 174-0169-00 |
|  | 175-2640-00 |  | 1 | CABLE ASSY,RF:50 OHM COAX,8.0 L.9-1 (FROM D11J842 TO A10J802) | 80009 | 175-2640-00 |
|  | 175-3757-00 |  | 1 | CABLE ASSY,RF:50 OHM COAX, 21,0 L,9-3 <br> (FRON A20J4 TO A13J3596) | 80009 | 175-3757-00 |
|  | 175-3760-00 |  | 1 | COBLE ASSY,RF:50 OHM COAX, $19.0 \mathrm{~L}, 9-\mathrm{N}$ (FROM A个3J3599 TO A19a1J11) | 80009 | 175-3760-00 |
|  | 175-3803-00 |  | 1 | CA ASSY,SP, ELEC: 3,26 AMS, 10.0 L, RIBBON (FROM A24P2415 TO R2465) | 80009 | 175-3803-00 |
|  | 175-4408-00 |  | 1 | CA RSSY,SP, ELEC: 4 , 26 AHE, 11.0 L, RIBBON (FROM A21P2305 TO A3A3P925) | 80009 | 175-4408-00 |
|  | 175-5349-00 |  | 1 | CABLE ASSY,RF:50 OHH COAX, $15.0 \mathrm{~L}, 9-1$ (FRON АЗАЗJ3202 TO म13J3402) | 80009 | 175-5349-00 |
|  | 175-5531-00 |  | 1 | CABLE ASSY,RF:500HM COAX,6.25 L,9-1 <br> (FROM A3a3J8 T0 A12a1j64) | 80009 | 175-5531-00 |
|  | 175-5532-00 |  | 1 | CABLE ASSY,RF:50 OHA COAX,6.25 L.9-5 (FROM A3A3J19 TO A1291J67) | 80009 | 175-5532-00 |
|  | 175-5533-00 |  | 1 | CABLE ASSY,RF:50 OHH COAX 6.25 L.9-4 (FROM A3AJJ10 TO A12A1J68) | 80009 | 175-5533-00 |
|  | 175-5534-00 |  | 1 | CABLE ASSY,RF:50 OHH COAX,6.25 L,9-2 <br> (FRON A3A3J7 TO A12A1J65) | 80009 | 175-5534-00 |
|  | 175-5535-00 |  | 1 | CABLE ASSY,RF:50 OHM COAX,6.25 L,9-3 (FRON A3A3j9 TO A1201J66) | 80009 | 175-5535-00 |
|  | 175-5692-00 |  | 1 | CD8LE ASSY,RF:50 OHM COAX,8.0 L,9-2 <br> (FROM A11J841 TO A10J801) | 80009 | 175-5692-00 |
|  | 175-5694-00 |  | 1 | CRBLE ASSY,RF:50 OHN COAX,8.0 L,9-3 <br> (FROM Q11J844 TO 010 J 804 ) | 80009 | 175-5694-00 |
|  | 175-5696-00 |  | 1 | CABLE ASSY,RF:50 OHM COAX, 8.0 L,9-4 (FROW A11J843 TO A10J803) | 80009 | 175-5696-00 |
|  | 175-6588-00 |  | 1 | CA ASSY,SP, ELEC: 3,26 OMG,4.0 L,RIBBON (FROW A17P1102 TO R2195) | 80009 | 175-6589-00 |
|  | 175-7212-00 |  | 1 | CA ASSY,SP, ELEC:5,26 AHG 4.0 L,RIBBON (FROW A26P1102 TO A25P2615) | 80009 | 175-7212-00 |
|  | 175-7989-00 |  | 1 | CA ASSY,SP, ELEC:2,26 ANG,4.5 L,RIB8ON (FROM AZ5P2613 TO OS2624) | 80009 | 175-7981-00 |
|  | 175-7984-00 |  | 1 | CA ASSY,SP, ELEC:3,26 AnG,6.0 L,RIB8ON ( FRON A25P2722 TO R2720) | 80009 | 175-7984-00 |
|  | 175-7987-00 |  | 1 | CA ASSY,SP,ELEC:4,26 AMG,5.5 L,RIBOON (FROM A22P2048 TO A23P2148) | 80009 | 175-7997-00 |
|  | 175-7994-00 |  | 1 | CA ASSY,SP, ELEC: 7,26 , 16.0 L,RIB8ON (FRON A25P2587 TO AЗАЗР987) | 80009 | 175-7994-00 |
|  | 175-7997-00 |  | 2 | CA ASSY, SP , ELEC:9, 26 QMG,7.0 L,RIPBON | 80009 | 175-7997-00 |


| Fig. 8 Index No, | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Oty | 12345 Name 8 Description | Mfr. <br> Code | Mfr, Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 5- | 175-8000-00 |  | 1 | CA ASSY,SP, ELEC: 10,26 AHG, 3.5 L,RIBBON (FROM A24P2404 TO A25P2504) | 80009 | 175-8000-00 |
|  | 175-8001-00 |  | 1 | CA ASSY,SP, ELEC:10,26 OMN, 15.5 L,RIBBON (FROM A25P2824 TO A21P2224) | 80009 | 175-8001-00 |
|  | 175-8029-00 |  | 1 | CABLE ASSY,RF:50 OHH COAX, $12.0 \mathrm{~L}, 9-2$ (FROM A21J2302 TO A3A3J916) | 80009 | 175-8029-00 |
|  | 175-8130-00 |  | 1 | CA ASSY,SP, ELEC:5,26 AMF 12.0 L, RIBBON ( $\operatorname{FRON}$ АЗаЗР17 TO A14a2P71) | 80009 | 175-8130-00 |
|  | 175-8238-00 |  | 1 | CABLE ASSY,RF:50 OHM COAX, 4.0 L,9-3 (FRON A2J395 TO J396) | 80009 | 175-8238-00 |
|  | 175-8245-00 |  | 1 | CABLE ASSY,RF:50 OHM COAX, $98.0 \mathrm{~L}, 6-0$ (FROM ABN592 TO A18.N1642) | 80009 | 175-8245-00 |
|  | 175-8665-00 |  | 1 | CABLE ASSY,RF:50 OHM CORX, 15.25 L,9-0 (FRON АЗа3j3201 TO ai3J3401) | 80009 | 175-8665-00 |
|  | 175-9318-00 |  | 1 | CA ASSY,SP,ELEC:B,26 AMG, 11.0 L,RIBBON (FROM А3АЗР82 TO A14A2P82) | 80009 | 175-9318-00 |
|  | 175-9324-00 |  | 1 | CA ASSY,SP,ELEC:2,26 ANG, 17.5 L,RIB8ON (FROM A1402P90 TO R90) | 80009 | 175-9324-00 |
|  | 175-9325-00 |  | 1 | CA ASSY,SP, ELEC: 10,22 QMG, 17.0 L,RIBBON (FRON АЗАЗР83 ז0 А14R2P83) | 80009 | 175-9325-00 |
|  | 175-9404-00 |  | 9 | CDBLE ASSY,RF:50 OHN CORX, 12.5 L,9-6 (FROM A3a3.j2316 TO A21J2316) | 80009 | 175-9404-00 |
|  | 175-9607-00 |  | 1 | CO ASSY,SP, ELEC: 2,26 AMG, 3.0 L, RIBBON (FRON A25P2512 TO DS2558) | 80009 | 175-9607-00 |
|  | 179-2964-00 |  | 1 | MIRIMG HARNESS:STORAGE (9-1 - A25J2544 TO TOP BNC; 9-2 - Q25J2626 TO MIDDLE BNC; 9-3 - A25J2584 TO 80T BNC) | 80009 | 179-2964-00 |
|  | 195-0093-02 |  | 1 | LEAD, ELECTRICAL: 26 amg, 2.0 L,9-7 <br> (HORIL; HORIL;GEDM TO CRT NECK PINS) | 80009 | 195-0093-02 |
|  | 195-7224-00 |  | 1 | LEAD, ELECTRICAL: 18 amg, 14.0 L,5-4 (FRON PLUG-IN CHASSIS TO TOP RAIL) | 80009 | 195-7224-00 |
|  | 196-1203-00 |  | 2 | LEAD, ELECTRICAL: 26 ANG, 1.5 L,8-N (VERT TERM TO CRT MECK PINS) | 80009 | 196-1203-00 |
|  | 196-3083-00 |  | 1 | EENO, ELECTRICAL: 24 ame 8.75 L,9-1 <br> (FROM A23P2164 TO A22P2064) | 80009 | 196-3083-00 |
|  | 196-3089-00 |  | 1 | LENO , ELECTRICAL: 26 amo , 10.5 L,8-2 <br> (FRON A2SP3013 10 A23P2113) | 80009 | 196-3084-00 |
|  | 196-3085-00 |  | 2 | LEAO, ELECTRICAL: 26 ANG, 3.5 L,9-N (FROW A19A1P190 TO VERT TERN) (FROM A26P1401 TO A17P1301) | 80009 | 196-3085-00 |
|  | 188-5066-00 |  | 1 | MIRE SET, ELEC: <br> (FRON A23P117 TO A22P2017) | 80009 | 198-5066-00 |




Fig. 8

| Index | Tektronix | Serial/Assembly No. |  |  |  |  | Mfr. |
| :--- | :--- | :--- | :--- | :--- | :--- | :--- | :--- |
| No. | Part No. | Effective | Dscont | Qty | 12345 | Name \& | Description |

6-

| -1 | $--\cdots$ |
| :--- | :--- |
| -2 | $136-0263-04$ |
| -3 | $131-1003-00$ |
| -4 | $136-0252-07$ |
|  |  |
|  |  |
| -5 | $378-0603-00$ |
| -6 | $390-0550-00$ |
| -7 | $348-0332-00$ |
| -8 | $348-0333-00$ |
| -9 | $348-0336-00$ |
| -10 | $214-0603-00$ |
| -11 | $386-1633-00$ |
| -12 | $386-1634-00$ |
| -13 | $390-0695-00$ |
| -14 | $348-0332-00$ |
| -15 | $348-0333-00$ |
| -16 | $348-0336-00$ |
| -17 | $214-0603-02$ |
| -18 | $386-1633-00$ |
| -19 | $386-1634-00$ |
| -20 | $390-0554-00$ |
| -21 | $348-0335-00$ |
| -22 | $348-0334-00$ |
| -23 | $348-0274-00$ |
| -24 | $214-0603-02$ |
| -25 | $386-1633-00$ |
| -26 | $386-1634-00$ |

OPTION 02
1 CIRCUIT 80 ASSY: $X-Y$ COMP (SEE A9 REPL)
8
4
.SOCXET, PIN TERH:U/M 0.025 SO PIN
.CONN,RCPT, ELEC:CKT OD MT, 3 PROMG
.SOCKET,PIN CONN:M/O DIMPLE
22526
22526
OPTION 03

| FILTER,MESH:ENI | 80009 | 378-0603-00 |
| :---: | :---: | :---: |
| CAB.SIDE,SCOPE:LEFT, H/SHIELDING GASKET | 80009 | 390-0550-00 |
| .SHLD GSKT,ELEK:SOLID TYPE,4.285 L | 80009 | 348-0332-00 |
| .SHLO GSKT,ELEK:SOLIO TYPE,4.8 L | 80009 | 348-0333-00 |
| .SHLD GSKT, ELEX:SOLID TYPE,9.625 L | 80009 | 348-0336-00 |
| .PIN,SECURING:0.45 DIa $\times 0.27$, ZAMAK | 26365 | ORDER BY DES |
| . PLATE,LCH LKG:STEEL,CD PL | 80009 | 386-1633-00 |
| . PLATE,LCH IMDEX:ACETAL | 80009 | 386-1634-00 |
| CAB SIDE, SCOPE:RIGHT, EMI | 80009 | 390-0695-00 |
| .SHLO GSKT,ELEX:SOLIO TYPE,4.285 L | 80009 | 348-0332-00 |
| .SHLD GSKT,ELEK:SOLIO TYPE,4.8 L | 80009 | 348-0333-00 |
| .SHLD GSKT, ELEX:SOLID TYPE,9.625 L | 80009 | 348-0336-00 |
| .PIK ASSY SECRG:N/SPRING MASHER | 80009 | 214-0603-02 |
| . PLATE,LCH LKG:STEEL,CD PL | 80009 | 386-1633-00 |
| . PLATE,LCH INDEX:ACETAL | 80009 | 386-1634-00 |
| CAB B EOT SCOPE: | 80009 | 390-0554-00 |
| . SHLD GSKT, ELEX:SOLID TYPE,8.65 L | 80009 | 348-0335-00 |
| .SHLD GSKT,ELEX:SOLID TYPE, 7.64 L | 80009 | 348-0334-00 |
| .SHLD GSKI, ELEK:FIMGER TYPE,24.0 L | 30817 | 97-555COC |
| .PIN ASSY,SECRG:M/SPRING MASHER | 80009 | 214-0603-02 |
| . PLATE,LCH UK:STEEL,CD PL | 80009 | 386-1633-00 |
| . PLATE, LCH INOEX:ACETAL | 80009 | 386-1634-00 |

Fig. \&

| Index №. | Tektronix Part No. | Serial/Assembly No. Effective Dscont | Qiy | 12345 Name \& Description | Mfr. <br> Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 7-1 | 378-0625-08 |  | 1 | FILTER,LT, CRT:GREEN, $4.4 \times 4.15 \times 0.03$. | 80009 | 378-0625-08 |
| -2 | 161-0065-00 |  | 1 | CABLE ASSY, PMR,:3,18ANG,115V,98.0 L | 16428 | CH8481, FH8481 |
| -3 | 161-0066-09 |  | 1 | CABLE ASSY, PHR,: $3,0.75 \mathrm{MH}$ S0,220V,99.0 L (OPTION A1 ONLY) | 53109 | 86511000 |
| -4 | 161-0066-11 |  | 1 | CABLE ASSY, PNR,: $3,0.75 \mathrm{MH}, 240 \mathrm{~V}, 96.0 \mathrm{~L}$ (OPTION A3 ONLY) | 53109 | ORDER BY OESCR |
| -5 | 161-0066-10 |  | 1 | CABLE ASSY, PWR,: $3,0.75 \mathrm{MH} 50,240 \mathrm{~V}, 96.0 \mathrm{~L}$ (OPTION A2 ONLY) | TK1373 | 24230 |
| -6 | 161-0066-12 |  | 1 | CABLE ASSY, PHR,:3، 18 AWG ,250V,99.0 L NORTH AMERICAN <br> (OPTION A4 ONLY) | 70903 | CH-77893 |
| -7 | 161-0154-00 |  | 1 | CABLE ASSY, PHR,: $3,0.75 \mathrm{WM} 50,240 \mathrm{~V}, 6 \mathrm{~A}, 2.5 \mathrm{~K} \mathrm{~L}$ SAFETY CONTROLLED (OPTION AS ONLY) | 53109 | 86515000 |

OPTIONAL ACCESSORIES
012-0341-00 1 CA ASSY,CUR P:12.0 80009 012-0341-00


## MANUAL CHANGE INFORMATION

At Tektronix, we continually strive to keep up with latest electronic developments by adding circuit and component improvements to our instruments as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we can't get these changes immediately into printed manuals. Hence, your manual may contain new change information on following pages.

A single change may affect several sections. Since the change information sheets are carried in the manual until all changes are permanently entered, some duplication may occur. If no such change pages appear following this page, your manual is correct as printed.

Mfivelal
CHANEE INFDF:MATIGUV Manual Insert for Product Group 42

DATE: 7/11/85
MANUAL FAFFT NO.: 070-58B0-00

These changes are effective for all serial numbers.

# FREF-LACEAERLE EIECTF:ICAL FAF:TC: LIGT CHAMME 

CHFINGE TO:

| A7F63 | $321-0114-00$ | FES, FXD,FILM: 150 OHM, $1 \%, 0.125 \mathrm{~W}$ |
| :--- | :--- | :--- |
| A7F64 | $321-0097-00$ | RES,FXD,FILM:100 OHM, $1 \%, 0.125 \mathrm{~W}$ |
| A7F65 | $321-0114-00$ | RES,FXD,FILM:150 OHM, $1 \%, 0.125 \mathrm{~W}$ |
| A7F66 | $321-0097-00$ | RES,FXD,FILM:100 OHM, $1 \%, 0.125 \mathrm{~W}$ |

TEXT CHAANGES

SECTIDN 1 - GENEFAL INFOFMfTION

On page 1-19, the 070-5880-00 Inetruction Manual should be listed under RECOMMEHUEL ACCESSOFIES. It is not a Standard Accessory.

## 1) 1 GGF:GM CITAMUES

CALIEFAAIGF: AND MODE SWITCH

Charige the interconnection information for pin 20 of Fis44 (grid location ES) to read: E SWF/AUX GATE FROM F44-20.

Charige the interconnection information for pin 21 of P344 fgrid location [5) to read: A HOLDOFF FROM P44-21.

Change the interconnection information for pin 19 of F344 (grid location C5l to read: E HOLDOFF FFOM F44-19.

Swap the A and E INTENSITY labels (grid location Cl) so 0S901 15 labeled E INTENSITY and DSg02 is labeled A INTENSITY.

Change F 369 (grid location $E 3$ ) to F 364.

Change R364 (grid location F3) to F 369.

## IIGGFAM CIAMGES (CDTt

ASSEMELY AS

Add pin numbering information to P3246 (grid location K1). The top row of pins should be numbered 1 through 15 (right to left), with an index arrow at pin 1. The botton row of pins should be numbered 16 through 30 (right to left).

MAIN INTEFIFACE

Change F 75 (grid location A4) to F 3246.

Change the pin numbering on P3246 (grid location Di) to read b through 15 (right to left), rather than 1 through 10.

ASSEMELY A7

In the locator tatle for Assembly A7, change the Schematic Location to Cl for Fb 3 and R64, and 02 for R65 and F6b.

TFIIGGEF: SELECTOF:

Change the value of R63 (grid location C1) and R65 (orid location D2) frofit 301 to 150.

Change the value of R64 (grid location Cl) and Fbt (orid location $D Z=$ from 200 to 100.

ASSEMELY AIS

Change the tab latel to: ASSEMELIES AI3 \& A3
Add pin numberifig information to P3246 on assembly A3 (grid location Kl). The top row of pins should be numbered 1 through 15 (right to left), with an inde: arrow at pin 1 . The bottom row of pins should be numbered is through 30 (right to left).

## DIAGFAM EHANGES 《cロrt）

## FEFFILOUT

Change the interconnection information for pin 9 of f3446（grid location A1）to read：READOUT GATE FFOM F3246－29

Change the interconnection information for pin 7 of P344b（grid location A2）to read：TO／FFOM F3246－27 〈3〉．

Change the interconnection information for pin 1 of P3446（grid location A3）to read：READOUT INTENSITY FROM F3246－21 $\langle 3\rangle$.

Change pin 8 of F3246（grid location C1）to pin 28.

Change pin 10 of F3246（grid location C1）to pin 30.

Change the interconnection information for $\mathfrak{F} 3246$ pin 30 （formerly pin 10 ， grid lucation C1）to read：X－Y INHIEIT TO $3814, ~ J 1814, ~ J 2316\langle 3\rangle, F 24-7$, FIN CE VIA $\rangle$ ．

Change piris 16，18，and 20 of F3246（grid location C3）to 23,24 ，arid 25 respectively．

Change pins 14 and 22 of $F 3246$（grid location C4）to 22 and 26 respectively．

Change the intercomection information for $F 3475$（grid location H4）to read：FFOM F3246 $\langle\overrightarrow{3}\rangle$ ．

Change the interfonnection information for F 3467 （grid location $H 5$ ）to read：T0 F3246〈3〉．

UEFTICAL AMFLIFIEF：

Change the interconnectipn information for 326 （grid location A4）to read： $X-Y$ INHIEIT FFOM J1814 〈 $\left.{ }_{3}\right\rangle$ ．

ASSEMELY A7，A10，fil
Charge the latel for the upper third of the locator table to read： ASSEMBLY AQ－－$X-Y$ Compensation Circuit Eoard（Option 2 （naly）

## 

HOF:IZONTAL INTEFFFACE


Change the tab label to read: HORIZONTAL AMPLIFIER Change the interconnection information for 31 (grid location $A 5)$ to read: $X-Y$ INHIBIT FROM J73B 3.

Tektronix COMMITTED TO EXCEUENCE

MANUAL CHANGE INFORMATION
Date:
9-26-86
Change Reference: C2/986
Product: $\qquad$ 7934 OSCILLOSCOPE
$\qquad$
$\qquad$ Manual Part No.: 070-5880-00

DESCRIPTION Product Group 42

THESE CHANGES ARE EFFECTIVE FOR ALL SERIAL NUMBERS

TEXT CORRECTIONS
Page 1-16 Table 1-8
CHANGE TO READ:
Bandwidth (MHz)
7A24
None 350

Page 1-17 Table 1-9

CHANGE TO READ:

7810
7B15

Triggered Frequency Range

DC to 550 MHz
DC to 550 MHz


| DESCRIPTION |  |  |  |
| :---: | :---: | :---: | :---: |
| Change to: |  |  |  |
| A7R99 | 317-0200-00 | RES., FXD,COMPSN: 20 OHM, $5 \%, 0.125 \mathrm{~W}$ (SELECTABLE) |  |
| A7R99 | 317-0240-00 | RES., FXD,COMPSN: 24 OHM, $5 \%, 0.125 \mathrm{~W}$ (SELECTABLE) |  |
| A7R99 | 317-0270-00 | RES., FXD,COMPSN: 27 OHM, $5 \%, 0.125 \mathrm{~W}$ (SELECTABLE) |  |
| Page 5-33 |  |  |  |
| ADD: |  |  |  |
| TABLE 5-4 |  |  |  |
| Components | Nominally Installed | Alternate Values | Affected Characteristics |
| A7C4 | $\begin{aligned} & 283-0168-00 \\ & 12 \mathrm{pf} \end{aligned}$ | $1 \mathrm{pf}-27 \mathrm{pf}$ | Selected for optimum Bandwidth |
| A7R99 | $\begin{aligned} & 317-0100-00 \\ & 10 \mathrm{ohm} \end{aligned}$ | 4.7 ohm - 27 ohm | for the TRIGGER SELECTOR board. |

Figure 8-6. (C4 and R99 raised in tepee position)


Figure 8-6. A7-Trigger Selector Circuit Board Assembly.
Page 2 of 2

Figure 8-6. (C4 and R99 raised in tepee position)

$\dagger$ Tepee. Components
Flgure 8-6. A7-Tilgger Selector Circuit Board Assembly.

Product: 7934 OSCILLOSCOPE
Date: $\qquad$ Change Reference: $\qquad$ C3/1286

Manual Part No.: 070-5880-00
DESCRIPTION Product Group 42

This change is effective for all serial numbers.
Page 2-4 Fig. 2-2u. Rear-panel controls and connectors.
Call out labels 6 thru 11 are changed to correspond with Fig. 2-2b, page 2-5.

# Tektronix 

COMMITTED TO EXCELENCE
Date: 12/12/86
Change Reference:
Product:_7934
Manual Part No.: 070-5880-00
DESCRIPTION PG 42

These changes are effective for all Serial Numbers

MECHANICAL PARTS LIST
ADD:
6-27 346-0045-00 9 STRAP,CONN COV: BNC ONE END, POLY
6-28 200-0678-00 9 COVER, TEST ADAPTER:2.5 $\times 3.5 \times 1.5, \mathrm{AL}$

ADD THESE NEW INDEXED PARTS TO FIG. 6 OPTION 03, EMI (EXPLODED VIEW)


Page 1 of 1

# Tektronix <br> COMMITTED TO EXCELENCE 

7934 OSCILLOSCOPE

Date: $1 / 5 / 87$
$\qquad$ Change Reference: M61521

070-5880-00

These changes are effective at serial number B020321.

REPLACEABLE MECHANICAL PARTS LIST CHANGES
CHANGE TO:
Fig. 5-84 214-0579-00 2 ..TERM TEST POINT:BRS CD PL


REMOVE: TP31 and TP38 shown on A14A3 INVERTER BOARD
Figure 8-18. A14A3-Inverter Circuit Board Assembly.
REMOVE: TP31 and TP38 shown below.


Page 1 of 1

Product: 7934 Oscilloscope

THESE CHANGES ARE EFFECTIVE AT SN B020529

## MECHANICAL PARTS LIST CHANGES

CHANGE TO:
FIG. 3-44
378-2049-00
1 GRILL,FAN:3.07 DIA.

COMMTTTED TO EXCEUENCE

Product: $\qquad$ DESCRIPTION PG. 42

THESE CHANGES ARE EFFECTIVE AT SN BO20535

## REPLACEABLE ELECTRICAL PARTS LIST CHANGES

CHANGE TO:

| A13 | 670-8622-05 | CIRCUIT BD ASSY:READOUT |
| :---: | :---: | :---: |
| A13C3559 | 281-0797-00 | $\begin{aligned} & \text { CAP, FXD, CER, DI, 15PF, } 10 \%, 100 \mathrm{~V} \\ & \text { NOMINAL VALUE } \end{aligned}$ |
| A13C3559 | 281-0759-00 | $\text { CAP,FXD,CER,DI ,22PF, } 10 \%, 100 \mathrm{~V}$ SELECTABLE VALUE |
| A13C3559 | 281-0762-00 | CAP, FXD,CER,DI,27PF,20\%,100V SELECTABLE VALUE |
| A13C3559 | 281-0763-00 | $\text { CAP, FXD,CER, DI , } 47 \mathrm{PF}, 10 \%, 100 \mathrm{~V}$ SELECTABLE VALUE |
| A13C3559 | 281-0819-00 | CAP, FXD,CER,DI ,33PF,5\%,50V SELECTABLE VALUE |
| A13C3597 | 281-0797-00 | $\begin{aligned} & \text { CAP, FXD,CER,DI,15PF,10\%,100V } \\ & \text { NOMINAL VALUE } \end{aligned}$ |
| A13C3597 | 281-0759-00 | CAP,FXD,CER,DI,22PF,10\%,100V SELECTABLE VALUE |
| A13C3597 | 281-0762-00 | CAP,FXD,CER,DI,27PF,20\%,100V SELECTABLE VALUE |
| A13C3597 | 281-0763-00 | CAP,FXD,CER,DI,47PF,10\%,100V SELECTABLE VALUE |
| A13C3597 | 281-0819-00 | CAP,FXD,CER,DI,33PF,5\%,50V SELECTABLE VALUE |
| A13R3482 | 321-0756-00 | RES,FXD,FILM,50K OHM, $1 \%, 0.125 \mathrm{~W}$ |
| A13U3503 | 160-2997-01 | MICROCKT, DGTL, $4096 \times 8$ PROM, PRGM |

ADD:
A13R3480
313-1103-00
RES,FXD,FILM,10K OHM,5\%,0.2W

## DESCRIPTION

Figure 8-7. Al3-Readout Circuit Board Assembly.
Board Location E-5 (Add R3480)


Page 2 of 3




## CR3457

Change to: $152-0322-00$
Move CR3457 anode to R3455


These changes are effective at serial number B020715.

## SCHEMATIC CHANGES

If the schematics indicated for change cannot be found in Section 8 of your manual, check for other change related information at the rear of the manual

READOUT


Page 2 of 2


# Teltronix. MANUAL CHANGE INFORMATION <br> COMMITTED TO EXCELLENCE <br> Date: 10/9/87 <br> Change Reference: M61143 <br> Product: 7934 Oscilloscope Manual Part No.: 070-5880-00 <br> PRODUCT GROUP CODE: 

These changes are effective at serial number B020446

## MECHANICAL PARTS LIST CHANGES

If the components indicated for change cannot be located in the Mechanical Parts List section of your manual, check for related change information at the rear of the manual.

CHANGE TO:

174-0138-01
CA ASSY, SP, ELEC:7, 26 AWG, 10.75 L
(FROM A2P325 TO A17P1401, DS901, DS902)

# Telctronix. MANUAL ChANGE INFORMATION 

Product: $\qquad$ 7934 OSCILLOSCOPE

Manual Part No.: $\qquad$ 070-5880-00
$\qquad$ 42

These changes are effective at serial number B020761.

## ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

If the components listed for this change cannot be found in the Replaceable Electrical Parts List section of your manual, check for related change information at the rear of the manual.

CHANGE TO:

A20
670-9172-01 CIRCUIT BD ASSY:HORIZ AMP
A20R67
321-0289-00
RES,FXD,FILM:10K OHM,1\%,0.125W

## SCHEMATIC CHANGES

The above component is located in Assembly A20 and shown on diagram


Page 1 of 1


| Tadironix <br> Product: $\qquad$ 7934 OSCILLOSCOPE |  | JAL CHANGE INFOR $\qquad$ <br> 1/29/88 <br> Change Reference: <br> Manual Part No.: |
| :---: | :---: | :---: |
| DESCRIPTION Product Group Cod |  |  |
| These changes are effective at serial number 8020800. |  |  |
| REPLACEABLE ELECTRICAL PARTS LIST AND DIAGRAM CHA |  |  |
| If the components listed for this change cannot be found in the Replaceable Electrical Pats List section of your manual check for related information at the roar of the marrual. |  |  |
| CHANGE TO: |  |  |
| Component No. | Tektronix Part No. | Name \& Description |
| A7 | 670-9177-02 | CIRCUIT BD ASSY:TRIGGER SELECT |
| ADD: |  |  |
| Component No. | Tektronix Part No. | Name \& Description |
| C64 | 281-0770-00 | CAP,FXD,CER DI:1000PF, $20 \%, 100 \mathrm{~V}$ |
| C66 | 281-0770-00 | CAP,FXD,CER DI:1000PF,20\%,100V |

These changes are effective at serial number $\mathbf{B 0 2 0 8 0 0}$.
DIAGRAM CHANGES
The components listed for change are added to Assembly A7 and shown on diagram


SCHEMATIC CHANGES
The components listed for change are added to Assembly A7 and shown on diagram


Component No. Part No.

| A14A1 | $670-5959-05$ | CIRCUIT BD ASSY:CONTROLLED RECTIFIER |
| :--- | :--- | :--- |
| A14A1VR88 | $152-1006-00$ | SEMICOND DVC,DI:ZEN,SI,9V,2\%,500 MV,DO-7 |
| A14A1R95 | $321-0418-00$ | RES,FXD,FILM:221K OHM,1\%,0.125W,TC=TO |

DIAGRAM AND SCHEMATIC CHANGES (Page 2 of 2)

These changes are effective at serial number B020745.

The components listed for change are located on Assembly A14A1 and shown on Fig. 8-16 Control Rectifier Circuit Boarc Assembly.

DIAGRAM CHANGES


Figure 8-16. A14A1-Control Rectifier Circuit Board Assembly.


Page 2 of 2


MANUAL CHANGE INFORMATION
Date: $\qquad$ 3/24/88

Change Reference: $\qquad$ M66489

Product: 7934 OSCILLOSCOPE - SERVICE

Manual Part No. $\qquad$ Product Group Code: $\qquad$ DESCRIPTION

This change is effective at serial number B020841.

## REPLACEABLE ELECTRICAL PARTS LIST AND DIAGRAM CHANGES

If the components listed for this change cannot be found in the Replaceable Electrical Parts List section of your manual, check for related change information at the rear of the manual.

CHANGE TO:

| Component <br> No. | Tektronix <br> Pant No. | Name \& Description |
| :--- | :--- | :--- |

REMOVE:

> A13C3427 281-0773-00 CAP,FXD,CER DI:0.01UF,10\%,100V

ADD:

A13Q3428
A13R3424
A13R3461
A13R3541

151-0190-00
313-1103-00
315-0102-00
315-0102-00

TRANSISTOR:NPN,SI,TO-92
RES,FXD,FILM:1OK OHM,5\%,0.2W
RES,FXD,FILM:1K OHM,5\%,0.25W
RES,FXD,FILM:1K OHM,5\%,0.25W

SCHEMATIC, DIAGRAM AND MECHANICAL PARTS LIST CHANGES FOLLOW

## DIAGRAM CHANGES

READOUT

## 6



Page 2 of 4


ADD: R3461 and TEEPEE with C3461




## MECHANICAL PARTS LIST CHANGES

If the components listed for change cannot be located in the Replaceable Mechanical Parts List of your manual, check for related change information at the rear of the manual.

Fig. \& Index No. Tektronix Part No. Qty Name \& Description

4-79 $\qquad$ 1 CIRCUIT BOARD ASSY:READOUT (SEE A13 REPL) (ATTACHING PARTS)
195-2256-00 1 LEAD ELECTRICAL:26 AWG,1.5L,O-N

Date: $\qquad$ Change Reference:
Product:

These changes are effective at serial number B020777. information at the rear of the manual.

CHANGE TO:

| Component No. | Tektronix Part No. | Name \& Description |
| :---: | :---: | :---: |
| A7 | 670-9177-01 | CIRCUIT BD ASSY:TRIGGER SELECT |
| A7C4 | 283-0175-00 | CAP,FXD,CER,DI:10PF,5\%,200V (NOMINAL VALUE SEL) |
|  | 283-0898-00 | CAP,FXD,CER,DI:2.7PF, $0.25 \%, 50 \mathrm{~V}$ (SELECTABLE) |
| A7Q5 | 151-0905-00 | TRANSISTOR:PNP,SI,2GHZ, MICRO-X |
| A7Q6 | 151-0905-00 | TRANSISTOR:PNP,SI,2GHZ, MICRO-X |
| A7Q7 | 151-0905-00 | TRANSISTOR:PNP,SI,2GHZ, MICRO-X |
| A7Q8 | 151-0905-00 | TRANSISTOR:PNP,SI,2GHZ, MICRO-X |
| A7R26 | 321-0041-00 | RES,FXD,FILM: 26 OHM, $1 \%, 0.25 \mathrm{~W}$ |
| A7R30 | 321-0041-00 | RES,FXD,FILM:26 OHM, $1 \%, 0.25 \mathrm{~W}$ |
| A7R36 | 315-0200-00 | RES,FXD,FILM:20 OHM, $5 \%, 0.25 \mathrm{~W}$ |
| A7R37 | 315-0200-00 | RES,FXD,FILM:20 OHM, $5 \%, 0.25 \mathrm{~W}$ |
| A7R84 | 315-0820-00 | RES,FXD,FILM:82 OHM,5\%,0.25W (NOMINAL VALUE SEL) |
| A7R84 | 315-0101-00 | RES,FXD,FILM:100 OHM,5\%,0.25W (SELECTABLE) |
| A7R84 | 315-0121-00 | RES,FXD,FILM:120 OHM,5\%,0.25W (SELECTABLE) |
| A7R84 | 315-0220-00 | RES,FXD,FILM:22 OHM,5\%,0.25W (SELECTABLE) |
| A7R84 | 315-0270-00 | RES,FXD,FILM:27 OHM,5\%,0.25W (SELECTABLE) |
| A7R84 | 315-0330-00 | RES,FXD,FILM:33 OHM,5\%,0.25W (SELECTABLE) |
| A7R84 | 315-0430-00 | RES,FXD,FILM:43 OHM,5\%,0.25W (SELECTABLE) |
| A7R84 | 315-0560-00 | RES,FXD,FILM:56 OHM,5\%,0.25W (SELECTABLE) |
| A7R84 | 315-0680-00 | RES,FXD,FILM: 68 OHM,5\%,0.25W (SELECTABLE) |
| A7R84 | 315-0750-00 | RES,FXD,FILM:75 OHM,5\%,0.25W (SELECTABLE) |
| A7R84 | 315-0820-00 | RES,FXD,FILM:82 OHM,5\%,0.25W (SELECTABLE) |



ADD: (continued)

| A7R101 | $322-3097-00$ |
| :--- | :--- |
| A7R101 | $322-3039-00$ |
| A7R101 | $322-3072-00$ |
| A7R101 | $322-3089-00$ |
| A7R101 | $322-3105-00$ |
| A7R101 | $322-3114-00$ |

RES,FXD,FILM:100 OHM, $1 \%, 0.25 \mathrm{~W}$
(NOMINAL VALUE TEL)
RES,FXD,FILM:24.9 OHM, $1 \%, 0.25 \mathrm{~W}$ (SELECTABLE)
RES,FXD,FILM:54.9 OHM, $1 \%, 0.25 \mathrm{~W}$ (SELECTABLE)
RES,FXD,FILM:82.5 OHM,1\%,0.25W (SELECTABLE)
RES,FXD,FILM:121 OHM, $1 \%, 0.25 \mathrm{~W}$ (SELECTABLE)
RES,FXD,FILM:150 OHM, $1 \%, 0.25 \mathrm{~W}$ (SELECTABLE)

## DIAGRAM CHANGES

TRIGGER SELECTOR


Page 3 of 4


COMMITTED TO EXCELLENCE
Date: $\qquad$ 11-OCT-91

Change Reference: $\qquad$ M75422

Product: $\qquad$ 7934 Instruction Manual

## EFFECTIVE FOR SERIAL NUMBERS B021351 AND ABOVE

## Change Replaceable Electrical Parts to:

| A7 | 670-9177-05 | CIRCUIT BD ASSY: TRIGGER SELECT |
| :---: | :---: | :---: |
| A7C4 | 283-0159-00 | CAP,FXD,CER DI: $18 \mathrm{PF}, 5 \%, 50 \mathrm{~V}$ |
| A7Q5 A7Q6 A7Q7 A7Q8 | 151-0905-02 | TRANSISTOR:SIG,BIPOLAR,PNP;15V,30MA, 50 GHZ , AMP;BFQ51C,4PW CER MICRO-X PKG |
| $\begin{aligned} & \text { A7R38 } \\ & \text { A7R39 } \end{aligned}$ | 321-0022-00 | RES,FXD,FILM:16.5 OHM, $1 \% .0 .125 \mathrm{~W}$ |
| A7R40 A7R42 | 315-0270-00 | RES,FXD,FILM:27 OHM,5\%.0.25W |
| $\begin{aligned} & \text { A7R82 } \\ & \text { A7R83 } \end{aligned}$ | 321-0037-00 | RES,FXD,FILM:23.7 OHM,1\%.0.125W |

## REMOVE:

A7C10
283-0158-00
CAP,FXD,CER D: 1PF, +/-0.1PF,50V

ADD:

| * A7C12 | 283-0181-00 | CAP,FXD,CER DI:1.8PF, $+/-0.1 \%, 100 \mathrm{~V}$ |
| :--- | :--- | :--- |
| * A7R102 | $315-0101-00$ | RES,FXD,FILM:100 OHM,5\%,0.25W |

[^7]
## Schematic Diagram

 TRIGGER SELECT 〈5〉
$\qquad$ Change Reference: $\qquad$

## EFFECTIVE FOR SERIAL ALL NUMBERS B021375 AND ABOVE

Replace the following pages in the manual:
D. Trigger System, pages 6-16 through 6-20.

Replaceable Electrical Parts, pages 7-18, 7-19, 7-20 and add page 7-21.
Schematic pages, Trigger Selector 5, assembly A7.

## D. TRIGGER SYSTEM

Equipment Required: (Numbers correspond to those listed in Table 5-3, Test Equipment.)

1. Test Oscilloscope
2. or 3. Amplifier
3. Time-Base (two required)
4. Plug-in Extender (rigid calibration fixture)
5. Signal Standardizer
6. Coaxial Cable (one 18 -inch required)
7. Coaxial Cable (two 42 -inch required)
8. Tool, Alignment

## D1. TRIGGER SYSTEM PRELIMINARY SETUP

a. Perform the Adjustment and Performance Check Power-Up Sequence.
b. Refer to Section 6, Instrument Options, and the Change Information at the rear of this manual for any modifications which may affect this procedure.
c. See the TEST POINT AND ADJUSTMENT LOCATIONS D foldout page in Section 8, Diagrams and Circuit Board Illustrations.
d. Set the 7934 controls as follows:

POWER switch
VERTICAL MODE ......................... . . RIGHT
VERT TRACE SEPARATION (B) ..... Midrange
A TRIGGER SOURCE............ VERT MODE
A INTENSITY .......... . Fully counterclockwise
HORIZONTAL MODE ............................ A
B INTENSITY.......... Fully counterclockwise
B TRIGGER SOURCE ............. VERT MODE
FOCUS .................................. . . Midrange
READOUT INTENSITY ....... OFF (in detent)
GRAT ILLUM ............................... Midrange
BEAMFINDER................... Pushbutton out

## D2. ADJUST A TRIGGER SELECTOR CENTERING (A7R255, AR270, A7R274, A7R279) <br> NOTE

First perform step D1, then proceed.

a. Within the plug-in extender, disconnect the top connector on the left and right sides (labeled A20 and B20). Connect each female connector to one of the test oscilloscope channels with the 42-inch 50ohm coaxial cables and 50 -ohm bnc terminations (omit the 50 -ohm bnc terminations if the test oscilloscope has a 50 -ohm input impedance).
b. Set the test oscilloscope for differential operation between the two channels (added display mode with one channel inverted).
c. Establish a ground reference level for the test oscilloscope by positioning the trace to the center horizontal line of the graticule. Do not change the test oscilloscope Position controls after setting this ground reference.
d. Set both channels of the test oscilloscope for dc input coupling.
e. EXAMINE-the test oscilloscope display for a dc level within 1 division ( 50 millivolts) of the ground reference level in the LEFT, RIGHT, and ADD positions of the VERTICAL MODE switch.
f. ADJUST-the A DC Center adjustment, R255 (on the A7 Trigger Selector Board) for a dc level within 1 division ( 50 millivolts) of the ground reference level in the LEFT. RIGHT, and ADD positions of the VERTICAL MODE switch.
g. Install the signal standardizer in the 7934 LEFT VERT compartment.
h. Set the VERTICAL MODE switch to LEFT.
i. Set the signal standardizer Test selector to Trigger +Step Resp. and the Rep Rate to 1 kHz . Use the signal standardizer Position and Amplitude controls to center a 6 -division display on the test oscilloscope. Set the test oscilloscope sweep rate to 0.5 millisecond/division.
j. EXAMINE-the test oscilloscope display for less than $+3 \%$ and $-3 \%$ aberrations.
k. ADJUST-the A Thermal adjustment, R270 (on the A7 Trigger Selector Board) for optimum square wave displayed on the test oscilloscope.

1. Set the signal standardizer Test selector to Trigger Gain and the Rep Rate to 1 MHz . Use the signal standardizer Position control to move the bright trace display on the test oscilloscope to the center graticule line.
m. EXAMINE-the test oscilloscope display for nine traces with six divisions of vertical deflection between the center seven traces, within 0.6 division ( 300 millivolts, within 30 millivolts).
n. ADJUST-the A Gain adjustment, R274 (on the A7 Trigger Selector Board) for a test oscilloscope display of six divisions of deflection between the center seven traces, within 0.6 division (300 millivolts, within 30 millivolts).
o. Remove the signal standardizer from the LEFT VERT compartment.
p. Set the test oscilloscope to alternate between channel 1 and channel 2. Re-establish a ground reference for both channels of the test oscilloscope. Then set both channels for dc coupling.
q. EXAMINE-the test oscilloscope display for a dc level within 1 division ( 50 millivolts) of the established ground reference.
r. ADJUST-the A DC Common Mode adjustment, R279 (on the A7 Trigger Selector Board) for a dc level within 1 division of ground.

## D3. ADJUST B TRIGGER SELECTOR CENTERING AND GAIN (A7R455, A7R474, AR479) <br> NOTE

If the preceding step was not performed, first perform step D1, then proceed.

a. Set the test oscilloscope for differential operation between the two channels (added display mode with one channel inverted).
b. Establish a ground reference level for the test oscilloscope by positioning the trace to the center horizontal line of the graticule. Do not change the test oscilloscope Position controls after setting this ground reference.
c. Within the plug-in extender, disconnect the top connector on the left and right sides (labeled A20 and B20). Connect each female connector to one of the test oscilloscope channels with the 42-inch 50 ohm coaxial cables and 50 -ohm bnc terminations (omit the 50 -ohm bnc terminations if the test oscilloscope has a 50 -ohm input impedance).
d. Set both channels of the test oscilloscope for dc input coupling.
e. EXAMINE-test oscilloscope display for a dc level within 1 division ( 50 millivolts) of the ground reference level in the LEFT, RIGHT, and ADD positions of the 7934 . VERTICAL MODE switch.
f. ADJUST-B DC Center adjustment, R455 (on the A7 Trigger Selector Board) for a dc level within 1 division ( 50 millivolts) of the ground reference level in the LEFT, RIGHT, and ADD positions of the VERTICAL MODE switch.
g. Install the signal standardizer in the LEFT VERT compartment.
h. Set the VERTICAL MODE switch to LEFT.
i. Set the signal standardizer Test Selector to Trigger Gain and the Rep Rate to 1 MHz . Use the signal standardizer Position control to align the bright trace displayed on the test oscilloscope with the center graticule line.
j. EXAMINE-the test oscilloscope display for nine traces with six divisions of vertical deflection between the center seven traces, within 0.6 division ( 300 millivolts, within 30 millivolts).
k. ADJUST-B Gain adjustment. R474 (on the A7 Trigger Selector Board) for a test oscilloscope display of six divisions of deflection between the center seven traces, within 0.6 division.
I. Remove the signal standardizer from the LEFT VERT compartment.
$m$. Set the test oscilloscope to alternate between channel 1 and channel 2. Re-establish a ground reference for both channels of the test oscilloscope. Then set both channels for dc coupling.
n. EXAMINE-the test oscilloscope display for a dc level within 1 division ( 50 millivolts) of the established ground references (both traces).
o. ADJUST-the B DC Common Mode adjustment, R479 (on the A7 Trigger Selector Board) for dc levels within 1 division of ground (both traces).
p. INTERACTION-the adjustment of R479, R474, and R455 may interact. Repeat step D3 if necessary.

D4. CHECK/ADJUST VERTICAL SIGNAL OUT DC CENTERING (A7R485, A7R480, A7R490)

## NOTE

If the preceding step was not performed, first perform step D1, then proceed.

a. Establish a ground reference for the test oscilloscope by positioning the trace to the graticule center line. Do not change the test oscilloscope Position control after setting this ground reference.
b. Connect the front-panel SIG OUT connector to the vertical input of the test oscilloscope with the 42 inch, 50 -ohm coaxial cable.
c. Set the test oscilloscope input coupling switch to dc.
d. CHECK-test oscilloscope display for a dc level within 1 division of the ground reference established in part a.
e. ADJUST-Signal Out DC Center adjustment, R485 (on the A7 Trigger Selector Board) for a dc level within 1 division of the ground reference level.
f. Install the signal standardizer in the LEFT VERT compartment.
g. Set the Test selector to Trigger + Step Resp and the Rep Rate to 1 kHz .
h. Rotate the signal standardizer Position and Amplitude controls to display a six-division triggered signal on the test oscilloscope
i. EXAMINE-the test oscilloscope square-wave display for optimum flat top within 0.1 division.
j. ADJUST-the Signal Out Thermal 1 adjustment R480 (on the A7 Trigger Selector Board) to optimize the test oscilloscope square-wave display.
k. Set the signal standardizer Rep Rate to 10 kHz .
I. Set the test oscilloscope sweep rate to 50 microseconds/division
m. EXAMINE-the test oscilloscope square-wave display for a flat top, within 0.2 division.
n. ADJUST-the Signal Out Thermal 2 adjustment. R490 (on the A7 Trigger Selector Board) to optimize test oscilloscope square-wave display.

## D5. CHECK TRIGGER SELECTOR OPERATON <br> NOTE

If the preceding step was not performed, first perform step D1, then proceed.

a. Set the A INTENSITY control for a visible display. Set the amplifier for a 2-division display in the upper half of the graticule area. Use the A time-base Triggering Level control to trigger the display.
b. Set the VERTICAL MODE switch to RIGHT.
c. Set the signal standardizer Amplitude and Position controls for a 2 division display in the lower half of the graticule area.
d. Set the VERTICAL MODE switch to ALT.
e. CHECK-the crt display for 1 kHz and 10 kHz triggered waveforms (adjust the time-base unit Triggering Level controls as necessary).
f. Set the VERTICAL MODE switch to ADD.
g. CHECK-the crt display for a triggered waveform.
h. Set the VERTICAL MODE switch to CHOP.
i. CHECK-the crt for a stable display of the 1 kHz waveform only.
j. Set the A TRIGGER SOURCE switch to LEFT VERT.
k. CHECK-sequentially select all positions of the VERTICAL MODE switch and check for a stable display of only the $\{\mathrm{kHz}$ waveform.
I. Set the A TRIGGER SOURCE switch to RIGHT VERT.
m. CHECK-sequentially select all positions of the VERTICAL MODE switch and check for a stable display of only the 10 kHz waveform.
n. Set the VERTICAL MODE switch to ALT, the HORIZONTAL MODE switch to $B$, and the $B$ INTENSITY control for a visible display.
o. CHECK-the cr display for 1 kHz and 10 kHz triggered waveforms.
p. Set the VERTICAL MODE switch to ADD.
q. CHECK-crt for a stable display.
r. Set the VERTICAL MODE switch to CHOP.
s. CHECK—crt for a stable display of only the 1 kHz waveform.
t. Set the B TRIGGER SOURCE switch to LEFT VERT.
u. CHECK-sequentially select all positions of the VERTICAL MODE switch and check for a stable display of only the 1 kHz waveform.
v. Set the B TRIGGER SOURCE switch to RIGHT VERT.
w. CHECK-sequentially select all positions of the VERTICAL MODE switch and check for a stable display of only the 10 kHz waveform.
$x$. Set the VERTICAL MODE switch to ALT, the HORIZONTAL MODE switch to ALT, and the A and B TRIGGER SOURCE switches to VERT MODE.
y. CHECK-that the B HORIZ time-base is triggered on the 1 kHz waveform and the A HORIZ time-base is triggered on the 10 kHz waveform (set the time base Triggering Level controls for triggered sweeps).

| Component Number | Tektronix <br> Part No. | Serial No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A7 | 670-4776-04 |  | CIRCUIT BD ASSY:TRIGGER SELECT | 80009 | 670-4776-04 |
| A7C237 | 283-0221-00 |  | CAP,FXD.CER DI:0.47UF. $20 \%$,50V | 04222 | SR305C474MAA |
| A7C240 | 290-0183-00 |  | CAP.FXD,ELCTLT:TUF. $10 \%$,35V | 31433 | T322B105K035AS |
| A7C250 | 290-0525-00 |  | CAP,FXD.ELCTLT:4.7UF,20\%.50V | 31433 | T355G475M050AS |
| A7C270 | 283-0177-00 |  | CAP.FXD.CER DI:1UF $+80-20 \%, 25 \mathrm{~V}$ | 04222 | SR305E105ZAA |
| A7C440 | 290-0527-00 |  | CAP.FXD.ELCTLT:15UF.20\%.20V | 31433 | T355F156M020AS |
| A7C447 | 283-0221-00 |  | CAP,FXD,CER DI:0.47UF,20\%,50V | 04222 | SR305C474MAA |
| A7C450 | 290-0488-00 |  | CAP,FXD.ELCTLT:2.2UF. $10 \% .20 \mathrm{~V}$ | 31433 | T322B225K020AS |
| A7C483 | 283-0260-00 |  | CAP.FXD,CER DI:5.6PF, $+1-0.25 \mathrm{PF}, 200 \mathrm{~V}$ | 04222 | SR152A5R6CAA |
| A7C483 | 283-0168-00 |  | CAP.FXD.CER DI:12PF,5\%,100V | 04222 | SR151A120JAA |
| A7C483 | 283-0159-00 |  | CAP.FXD.CER DI:18PF.5\%,50V | 04222 | SR155A180JAA |
| A7C483 | 283-0201-00 |  | CAP,FXD.CER DI:27PF, 10\%,200V (C483 IS SELECTABLE) | 04222 | SR152C270KAA |
| A7C486 | 281-0775-00 |  | CAP,FXD,CER DI:0.7UF.20\%,50V | 04222 | SA105E104MAA |
| A7C487 | 283-0111-00 |  | CAP.FXD.CER DI:0.1UF. $20 \%$,50V | 04222 | SR215C104MAA |
| A7C488 | 281-0775-00 |  | CAP.FXD.CER DI:0.1UF.20\%.50V | 04222 | SA105E104MAA |
| A7C490 | 283-0339-00 |  | CAP,FXD.CER DI:0.22UF.10\%.50V | 04222 | SR305C224KAA |
| A7C493 | 283-0260-00 |  | CAP,FXD,CER DI:5.6PF, +1-0.25PF,200V | 04222 | SR152A5R6CAA |
| A7C493 | 283-0168-00 |  | CAP,FXD.CER DI:12PF.5\%.100V | 04222 | SR151A120JAA |
| A7C493 | 283-0159-00 |  | CAP.FXD,CER DI: $18 \mathrm{PF} .5 \% .50 \mathrm{~V}$ | 04222 | SR155A180JAA |
| A7C493 | 283-0201-00 |  | CAP.FXD,CER DI:27PF. $10 \%, 200 \mathrm{~V}$ (C493 IS SELECTABLE) | 04222 | SR152C270KAA |
| A7J202 | 131-1003-00 |  | CONN,RF JACK:PCB.PELTOLA, FEMALE | 80009 | 131-1003-00 |
| A7J203 | 131-1003-00 |  | CONN.RF JACK: PCB.PELTOLA, FEMALE | 80009 | 131-1003-00 |
| A7J270 | 131-1003-00 |  | CONN.RF JACK: PCB.PELTOLA, FEMALE | 80009 | 131-1003-00 |
| A7J271 | 131-1003-00 |  | CONN.RF JACK. PCB.PELTOLA, FEMALE | 80009 | 131-1003-00 |
| A7J402 | 131-1003-00 |  | CONN.RF JACK:PCB, PELTOLA, FEMALE | 80009 | 131-1003-00 |
| A7J403 | 131-1003-00 |  | CONN.RF JACK:PCB.PELTOLA. FEMALE | 80009 | 131-1003-00 |
| A7J472 | 131-1003-00 |  | CONN.RF JACK: PCB. PELTOLA, FEMALE | 80009 | 131-1003-00 |
| A7J473 | 131-1003-00 |  | CONN,RF JACK:PCB.PELTOLA, FEMALE | 80009 | 131-1003-00 |
| A7J496 | 131-1003-00 |  | CONN.RF JACK:PCB, PELTOLA, FEMALE | 80009 | 131-1003-00 |
| A7L236 | 108-0734-00 |  | COIL,RF:FIXEO.163NH | OJR03 | 108-0734-00 |
| A7L238 | 108-0734-00 |  | COIL.RF:FIXED, 163NH | OJR03 | 108-0734-00 |
| A7L246 | 108-0734-00 |  | COIL.RF:FIXED.163NH | OJR03 | 108-0734-00 |
| A7L248 | 108-0734-00 |  | COIL,RF:FIXED.163NH | OJR03 | 108-0734-00 |
| A7L436 | 108-0734-00 |  | COIL.RF:FIXED.163NH | OJR03 | 108-0734-00 |
| A7L438 | 108-0734-00 |  | COIL,RF:FIXED.163NH | OJR03 | 108-0734-00 |
| A7L446 | 108-0734-00 |  | COIL,RF:FIXED.163NH | OJR03 | 108-0734-00 |
| A7L448 | 108-0734-00 |  | COIL,RF:FIXED. 163 NH | OJR03 | 108-0734-00 |
| A7L.480 | 108-0324-00 |  | COIL.RF:FIXED. 10 MH | 76493 | B6387 |
| A70254 | 151-0302-00 |  | TRANSISTOR.SIG:BIPOLAR,NPN | 04713 | 2N2222A |
| A70454 | 151-0302-00 |  | TRANSISTOR,SIG:BIPOLAR.NPN | 04713 | 2N2222A |
| A7R201 | 321-0164-00 |  | RES,FXD,FILM:499 OHM, 1\%,0.125W,TC = YO | 91637 | CMF55116G499ROF |


| Component Number | Tektronix Part No. | Serial No. Effective Dscont | Name \& Description | Mir. Code | Mrr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A7R202 | 321-0164-00 |  | RES.FXD.FILM:499 OHM.1\%,0.125W.TC = T0 | 91637 | CMF55116G499R0F |
| A7R205 | 315-0103-00 |  | RES,FXD.FILM:10K OHM. $5 \%, 0.25 \mathrm{~W}$ | TK1727 | SFR25 2322-181- |
| A7R208 | 321-0164-00 |  | RES,FXD.FILM:499 OHM, 1\%,0.125W.TC = TO | 91637 | CMF55116G499ROF |
| A7R209 | 321-0164-00 |  | RES.FXD.FILM:499 OHM, 1\%,0.125W.TC = T0 | 91637 | CMF55116G499ROF |
| A7R212 | 325-0053-00 |  | RES.FXD.FILM: 50 OHM, $1 \%, 0.05 \mathrm{~W} . \mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R213 | 325-0053-00 |  | RES.FXD.FILM: 50 OHM. $1 \%, 0.05 \mathrm{~W} . \mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R214 | 325-0053-00 |  | RES,FXD,FILM:50 OHM $, 1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R216 | 325-0053-00 |  | RES,FXD,FILM: 50 OHM, $1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF50-F50ROOF |
| A7R217 | 325-0053-00 |  | RES,FXD,FILM:50 OHM, $1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R218 | 325-0053-00 |  | RES,FXD,FILM: 50 OHM. $1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R232 | 321-0202-00 |  | RES.FXD.FILM: 1.24 K OHM, $1 \%, 0.125 \mathrm{~W}$.TC = TOMI | 91637 | CMF55116G12400F |
| A7R233 | 322-0111-00 |  | RES,FXD.FILM: 140 OHM. $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF6042G140R0F |
| A7R234 | 322-0170-00 |  | RES,FXD.FILM: 576 OHM, $1 \%, 0.25 \mathrm{~W}$,TC $=$ T0 | 19701 | 5043RD576ROF |
| A7R235 | 321-0202-00 |  | RES.FXD.FILM: 1.24 K OHM $.1 \%, 0.125 \mathrm{~W} . \mathrm{TC}=$ TOMI | 91637 | CMF55116G12400F |
| A7R236 | 321-0147-00 |  | RES,FXD,FILM: 332 OHM. $1 \% .0 .125 \mathrm{~W}, \mathrm{TC}=$ TO | 91637 | CMF55116G332ROF |
| A7R237 | 315-0103-00 |  | RES,FXD,FILM:10K OHM, $5 \%, 0.25 \mathrm{~W}$ | TK1727 | SFR25 2322-181- |
| A7R238 | 321-0155-00 |  | RES,FXD,FILM:402 OHM. $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 91637 | CMF55116G402ROF |
| A7R239 | 321-0085-00 |  | RES.FXD,FILM: 75 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | TK1727 | MR25 2322-151-9 |
| A7R240 | 315-0100-00 |  | RES.FXD,FILM:10 OHM. $5 \% .0 .25 \mathrm{~W}$. | TK1727 | SFR25 2322-182- |
| A7R241 | 322-0114-00 |  | RES,FXD,FILM: 150 OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 19701 | 5043RD150ROF |
| A7R242 | 321-0202-00 |  | RES,FXD,FILM:1.24K OHM, $1 \%$,0.125W.TC = TOMI | 91637 | CMF55116G12400F |
| A7R243 | 322-0111-00 |  | RES,FXD,FILM:140 OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF6042G140R0F |
| A7R244 | 322-0170-00 |  | RES.FXD.FILM:576 OHM. $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 19701 | 5043RD576R0F |
| A7R245 | 321-0202-00 |  | RES.FXD.FILM:1.24K OHM $, 1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOMI | 91637 | CMF55116G12400F |
| A7R246 | 321-0147-00 |  | RES,FXD,FILM:332 OHM. $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 91637 | CMF55116G332R0F |
| A7R247 | 315-0103-00 |  | RES,FXD.FILM:10K OHM,5\%,0.25W | TK1727 | SFR25 2322-181- |
| A7R248 | 321-0155-00 |  | RES,FXD,FILM:402 OHM. $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G402R0F |
| A7R250 | 317-0200-00 |  | RES,FXD.CMPSN:20 OHM,5\%,0.125W | TK1727 | SFR16 2322-180- |
| A7R251 | 321-0218-00 |  | RES.FXD,FILM: 1.82 K OHM. $1 \%, 0.125 \mathrm{~W}$.TC = TOMI | 91637 | CMF55116G18200F |
| A7R252 | 321-0242-00 |  | RES.FXD.FILM:3.24K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOMI | 91637 | CMF55116G32400F |
| A7R254 | 315-0102-00 |  | RES.FXD.FILM:1K OHM. $5 \%, 0.25 \mathrm{~W}$ | TK1727 | SFR25 2322-181- |
| A7R255 | 311-1236-00 |  | RES,VAR,NONWW:TRMR, 250 OHM.0.5W | 32997 | 3386X-1-251 |
| A7R256 | 321-0062-00 |  | RES.FXD.FILM:43.2 OHM, 0.5\%,0.125W.TC = TO MI | TK1727 | MR25 2322-151-9 |
| A7R261 | 321-0178-00 |  | RES,FXD,FILM:698 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G698R0F |
| A7R262 | 315-0510-00 |  | RES,FXD,FILM:51 OHM, $5 \%, 0.25 \mathrm{~W}$ | TK1727 | SFR25 2322-181- |
| A7R263 | 322-0151-00 |  | RES.FXD,FILM:365 OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF6042G365ROF |
| A7R264 | 321-0201-00 |  | RES.FXD.FILM: 1.21 K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOMI | 91637 | CMF55116G12100F |
| A7R265 | 321-0285-00 |  | RES.FXD.FILM:9.09K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOMI | 91637 | CMF55116G90900F |
| A7R270 | 311-1239-00 |  | RES,VAR,NONWW:TRMR,2.5K OHM,0.5W | 32997 | 3386X-1-252 |
| A7R271 | 321-0178-00 |  | RES,FXD.FILM: 698 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G698R0F |
| A7R272 | 315-0510-00 |  | RES,FXD,FILM: 51 OHM, $5 \%, 0.25 \mathrm{~W}$ | TK1727 | SFR25 2322-181- |
| A7R273 | 322-0239-00 |  | RES,FXD,FILM:3.01K OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ TOMI | 19701 | 5043RD3K010F |
| A7R274 | 311-1248-00 |  | RES,VAR,NONWW:TRMR, 500 OHM, 0.5 W | 32997 | 3386X-1-501 |


| Component Number | Tektronix <br> Part No. | Serial No. Effective Dscont | Name \& Description | Mfr. Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A7R277 | 317-0510-00 |  | RES,FXD,CMPSN:51 OHM,5\%,0.125W | TK1727 | SFR16 2322-180- |
| A7R278 | 322-0085-00 |  | RES,FXD,FILM:75.0 OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 19701 | 5043RD75R00F |
| A7R279 | 311-1936-00 |  | RES,VAR,NONWW:TRMR, 50 OHM, $20 \%, 0.5 \mathrm{~W}$ | 32997 | 3386X-1-500 |
| A7R280 | 317-0510-00 |  | RES,FXD,CMPSN: 51 OHM, $5 \%, 0.125 \mathrm{~W}$ | TK1727 | SFR16 2322-180- |
| A7R401 | 321-0164-00 |  | RES,FXD,FILM: 499 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 91637 | CMF55116G499R0F |
| A7R402 | 321-0164-00 |  | RES,FXD,FILM:499 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G499R0F |
| A7R405 | 315-0103-00 |  | RES,FXD,FILM:10K OHM, $5 \%, 0.25 \mathrm{~W}$ | TK1727 | SFR25 2322-181- |
| A7R408 | 321-0164-00 |  | RES,FXD,FILM:499 OHM, 1\%,0.125W,TC = T0 | 91637 | CMF55116G499ROF |
| A7R409 | 321-0164-00 |  | RES,FXD,FILM:499 OHM, 1\%,0.125W,TC = T0 | 91637 | CMF55116G499ROF |
| A7R412 | 325-0053-00 |  | RES,FXD,FILM: 50 OHM, $1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R413 | 325-0053-00 |  | RES,FXD,FILM:50 OHM, $1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R414 | 325-0053-00 |  | RES,FXD,FILM: 50 OHM, $1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF50-F50ROOF |
| A7R416 | 325-0053-00 |  | RES,FXD,FILM: 50 OHM, $1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R417 | 325-0053-00 |  | RES,FXD,FILM: 50 OHM, $1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R418 | 325-0053-00 |  | RES,FXD,FILM: 50 OHM, $1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF50-F50R00F |
| A7R419 | 321-0143-00 |  | RES,FXD,FILM: 301 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G301ROF |
| A7R420 | 321-0126-00 |  | RES,FXD,FILM:200 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G200ROF |
| A7R425 | 321-0143-00 |  | RES,FXD,FILM: 301 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G301ROF |
| A7R426 | 321-0126-00 |  | RES,FXD,FILM:200 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G200ROF |
| A7R432 | 321-0202-00 |  | RES,FXD,FILM:1.24K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOMI | 91637 | CMF55116G12400F |
| A7R433 | 322-0111-00 |  | RES,FXD,FILM: 140 OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF6042G140R0F |
| A7R434 | 322-0170-00 |  | RES,FXD,FILM: 576 OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 19701 | 5043RD576R0F |
| A7R435 | 321-0202-00 |  | RES,FXD,FILM:1.24K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOMI | 91637 | CMF55116G12400F |
| A7R436 | 321-0147-00 |  | RES,FXD,FILM: $332 \mathrm{OHM}, 1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 91637 | CMF55116G332ROF |
| A7R437 | 315-0103-00 |  | RES,FXD,FILM:10K OHM, $5 \%, 0.25 \mathrm{~W}$ | TK1727 | SFR25 2322-181- |
| A7R438 | 321-0155-00 |  | RES,FXD,FILM:402 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G402ROF |
| A7R439 | 322-0114-00 |  | RES,FXD,FILM: 150 OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 19701 | 5043RD150R0F |
| A7R440 | 317-0200-00 |  | RES,FXD,CMPSN:20 OHM,5\%,0.125W | TK1727 | SFR16 2322-180- |
| A7R44 1 | 321-0085-00 |  | RES,FXD,FILM: 75 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | TK1727 | MR25 2322-151-9 |
| A7R442 | 321-0202-00 |  | RES,FXD,FILM:1.24K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOMI | 91637 | CMF55116G12400F |
| A7R443 | 322-0111-00 |  | RES,FXD,FILM: 140 OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF6042G140ROF |
| A7R444 | 322-0170-00 |  | RES,FXD,FILM: 576 OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 19701 | 5043RD576ROF |
| A7R445 | 321-0202-00 |  | RES,FXD,FILM:1.24K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOMI | 91637 | CMF55116G12400F |
| A7R446 | 321-0147-00 |  | RES,FXD,FILM: $332 \mathrm{OHM}, 1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G332ROF |
| A7R447 | 315-0103-00 |  | RES,FXD,FILM:10K OHM, $5 \%, 0.25 \mathrm{~W}$ | TK1727 | SFR25 2322-181- |
| A7R448 | 321-0155-00 |  | RES,FXD,FILM: 402 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TO | 91637 | CMF55116G402R0F |
| A7R451 | 321-0218-00 |  | RES,FXD,FILM:1.82K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOMI | 91637 | CMF55116G18200F |
| A7R452 | 321-0242-00 |  | RES,FXD,FILM:3.24K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOMI | 91637 | CMF55116G32400F |
| A7R454 | 315-0102-00 |  | RES,FXD,FILM:1K OHM, $5 \%, 0.25 \mathrm{~W}$ | TK1727 | SFR25 2322-181- |
| A7R455 | 311-1236-00 |  | RES,VAR,NONWW:TRMR,250 OHM,0.5W | 32997 | 3386X-1-251 |
| A7R456 | 321-0062-00 |  | RES,FXD,FILM:43.2 OHM, 0.5\%,0.125W,TC = TO MI | TK1727 | MR25 2322-151-9 |
| A7R462 | 322-0151-00 |  | RES,FXD,FILM: 365 OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF6042G365ROF |
| A7R464 | 321-0201-00 |  | RES,FXD,FILM:1.21K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOM | 91637 | CMF55116G12100F |


| Component Number | Tektronix Part No. | Serial No. Effective Dscont | Name \& Description | Mfr. <br> Code | Mfr. Part No. |
| :---: | :---: | :---: | :---: | :---: | :---: |
| A7R465 | 321-0285-00 |  | RES,FXD,FILM:9.09K OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ TOMI | 91637 | CMF55116G90900F |
| A7R473 | 322-0239-00 |  | RES,FXD,FILM:3.01K OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ TOMI | 19701 | 5043RD3K010F |
| A7R474 | 311-1248-00 |  | RES,VAR,NONWW:TRMR,500 OHM, 0.5 W | 32997 | 3386X-1-501 |
| A7R476 | 317-0510-00 |  | RES,FXD,CMPSN:51 OHM, $5 \%, 0.125 \mathrm{~W}$ | TK1727 | SFR16 2322-180- |
| A7R477 | 317-0510-00 |  | RES,FXD,CMPSN:51 OHM,5\%,0.125W | TK1727 | SFR16 2322-180- |
| A7R478 | 322-0085-00 |  | RES,FXD,FILM:75.0 OHM, $1 \%, 0.25 \mathrm{~W}, \mathrm{TC}=$ T0 | 19701 | 5043RD75R00F |
| A7R479 | 311-1936-00 |  | RES,VAR,NONWW:TRMR, 50 OHM, $20 \%, 0.5 \mathrm{~W}$ | 32997 | 3386X-1-500 |
| A7R480 | 311-1237-00 |  | RES,VAR,NONWW:1K OHM, $10 \%, 0.50 \mathrm{~W}$ | 32997 | 3386X-DY6-102 |
| A7R481 | 321-0179-00 |  | RES,FXD,FILM:715 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G715R0F |
| A7R482 | 321-0182-00 |  | RES,FXD,FILM:768 OHM, 1\%,0.125W,TC = T0 | 91637 | CMF55116G768ROF |
| A7R483 | 317-0200-00 |  | RES,FXD,CMPSN:20 OHM,5\%,0.125W | TK1727 | SFR16 2322-180- |
| A7R484 | 315-0510-00 |  | RES,FXD,FILM:51 OHM,5\%,0.25W | TK1727 | SFR25 2322-181- |
| A7R485 | 311-1936-00 |  | RES,VAR,NONWW:TRMR,50 OHM,20\%,0.5W | 32997 | 3386X-1-500 |
| A7R486 | 325-0026-00 |  | RES,FXD,FILM: 180 OHM, $1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T9,MET | 64537 | PME50 180 OHM 1 |
| A7R490 | 311-1237-00 |  | RES,VAR,NONWW:1K OHM, $10 \%, 0.50 \mathrm{~W}$ | 32997 | 3386X-DY6-102 |
| A7R491 | 321-0179-00 |  | RES,FXD,FILM:715 OHM,1\%,0.125W,TC = T0 | 91637 | CMF55116G715R0F |
| A7R492 | 321-0182-00 |  | RES,FXD,FILM:768 OHM, $1 \%, 0.125 \mathrm{~W}, \mathrm{TC}=$ T0 | 91637 | CMF55116G768R0F |
| A7R493 | 317-0200-00 |  | RES,FXD,CMPSN:20 OHM,5\%,0.125W | TK1727 | SFR16 2322-180- |
| A7R494 | 315-0510-00 |  | RES,FXD,FILM: 51 OHM, $5 \%, 0.25 \mathrm{~W}$ | TK1727 | SFR25 2322-181- |
| A7R495 | 322-0145-00 |  | RES,FXD, FILM:316 OHM, 1\%,0.25W,TC = T0 | 19701 | 5043RD316R0F |
| A7R496 | 325-0026-00 |  | RES,FXD,FILM: $180 \mathrm{OHM}, 1 \%, 0.05 \mathrm{~W}, \mathrm{TC}=$ T9,MET | 64537 | PME50 180 OHM 1 |
| A7R497 | 322-0175-00 |  | RES,FXD,FILM:649 OHM, 1\%,0.25W, TC = T0 | 19701 | 5043RD649R0F |
| A7R498 | 321-0143-00 |  | RES,FXD, FILM:301 OHM, 1\%,0.125W,TC = T0 | 91637 | CMF55116G301R0F |
| A7R499 | 315-0510-00 |  | RES,FXD,FILM:51 OHM, $5 \%, 0.25 \mathrm{~W}$ | TK1727 | SFR25 2322-181- |
| A7U232 | 155-0173-00 |  | MICROCKT,LINEAR:VERTICAL CHANNEL SWITCH | 80009 | 155-0173-00 |
| A7U252 | 156-0158-00 |  | IC,LINEAR:BIPOLAR,OP-AMP;DUAL | 04713 | MC1458P1 |
| A7U274 | 155-0175-00 |  | MICROCKT,LINEAR:TRIGGER AMPLIFIER | 80009 | 155-0175-00 |
| A7U402 | 156-0730-02 |  | IC,DIGITAL:LSTTL,GATES | 01295 | SN74LS33N |
| A7U432 | 155-0173-00 |  | MICROCKT,LINEAR:VERTICAL CHANNEL SWITCH | 80009 | 155017300 |
| A7U452 | 156-0158-00 |  | IC,LINEAR:BIPOLAR,OP-AMP;DUAL | 04713 | MC1458P1 |
| A7U474 | 155-0175-00 |  | MICROCKT,LINEAR:TRIGGER AMPLIFIER | 80009 | 155-0175-00 |
| A7U492 | 155-0175-00 |  | MICROCKT,LINEAR:TRIGGER AMPLIFIER | 80009 | 155-0175-00 |
| ATVR237 | 153-0067-00 |  | SEMICOND DVC SE:ZENER,PAIR | 80009 | 153-0067-00 |
| ATVR247 | 153-0067-00 |  | SEMICOND DVC SE:ZENER,PAIR | 80009 | 153-0067-00 |
| ATVR437 | 153-0067-00 |  | SEMICOND DVC SE:ZENER,PAIR | 80009 | 153-0067-00 |
| ATVR447 | 153-0067-00 |  | SEMICOND DVC SE:ZENER,PAIR | 80009 | 153-0067-00 |



B021375 and ABOVE

| ASSEMBLY A7 |  |  |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \\ & \hline \end{aligned}$ | BOARD LOCATION | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ | CIRCUIT NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \end{aligned}$ |
| C237 | A3 | 12 | R240 | A3 | 12 | R444 | E4 | R1 |
| C240 | A3 | $J 2$ | R241 | 83 | 13 | R445 | E4 | G2 |
| C250 | C3 | 12 | R242 | C4 | H1 | R446 | E3 | E2 |
| C270 | B3 | $J 1$ | R243 | C4 | H1 | 8447 | E3 | E2 |
| C440 | E3 | E2 | R244 | C4 | H1 | R448 | E3 | D2 |
| C447 | D3 | 03 | R245 | C4 | H1 | R451 | E3 | D2 |
| C450 | D3 | D3 | R246 | B3 | 12 | R452 | E3 | 01 |
| C483 | F1 | C2 | R247 | B3 | 12 | R454 | E3 | E1 |
| C486 | F5 | 01 | R248 | B3 | J2 | R455 | E3 | C1 |
| C487 | F5 | 11 | R250 | C3 | J2 | R456 | E3 | C1 |
| C488 | F5 | 03 | R251 | 83 | G3 | R462 | E3 | D3 |
| C490 | G2 | A2 | R252 | 83 | G3 | 8464 | F1 | E1 |
| C493 | G2 | 82 | R254 | B3 | 13 | R465 | $F 1$ | E1 |
|  |  |  | R255 | B3 | 13 | R473 | D2 | C1 |
| J202 | C5 | G1 | R256 | 83 | 13 | 8474 | D2 | Cl |
| J203 | C5 | G2 | R261 | 83 | $J 1$ | R476 | E2 | C2 |
| J270 | C1 | K2 | R262 | B3 | J2 | 8477 | D2 | C2 |
| $J 271$ | AI | K2 | R263 | B3 | $J 1$ | R478 | D1 | C3 |
| J402 | D5 | G3 | R264 | C2 | J3 | 8479 | D1 | B3 |
| J403 | D5 | G2 | R265 | C2 | J3 | R480 | ${ }_{5}$ | B2 |
| 1472 | D1 | C2 | R270 | B3 | J1 | R481 | F1 | B2 |
| J473 | E1 | C2 | R271 | B3 | $J 1$ | R482 | F1 | B2 |
| J496 | G1 | AI | R272 | B3 | $J 1$ | R483 | F1 | B2 |
|  |  |  | R273 | A2 | 13 | R484 | F1 | B2 |
| $\llcorner 236$ | 83 | 12 | R274 | A2 | J3 | R485 | G2 | A3 |
| L238 | 83 | 12 | R277 | B2 | K2 | R486 | G3 | B2 |
| $\llcorner 246$ | B3 | 12 | R278 | B2 | K2 | 8490 | G2 | A2 |
| $\llcorner 248$ | B3 | 12 | R279 | 81 | K3 | R491 | G2 | A2 |
| $\llcorner 436$ | D3 | E2 | R280 | B2 | K2 | R492 | G2 | A2 |
| 1438 | 03 | D2 | R401 | D5 | R1 | R493 | G2 | B2 |
| $\llcorner 446$ | E3 | E2 | 8402 | E5 | G1 | R494 | G2 | B2 |
| L448 | E3 | D2 | R405 | E5 | 11 | R495 | G2 | C3 |
| L480 | G3 | B2 | R408 | E5 | 11 | R496 | G3 | B2 |
|  |  |  | R409 | E5 | 11 | R 497 | G1 | A2 |
| 0254 | B4 | H3 | R412 | D4 | G3 | 8498 | G1 | A2 |
| 0454 | E4 | E1 | 8413 | D4 | G3 | R499 | F1 | A2 |
|  |  |  | 8414 | D4 | G3 |  |  |  |
| R201 | 85 | $J 1$ | R416 | D4 | G2 | U232 | A4 | H2 |
| R202 | B5 | K1 | R417 | D4 | G2 | U252A | B3 | 13 |
| R205 | B5 | 11 | R418 | D4 | G3 | U252B | C2 | 13 |
| R208 | 85 | 12 | 8419 | D4 | G1 | U274 | A2 | 12 |
| R209 | B5 | 12 | R420 | D4 | H1 | U402A | B5 | 11 |
| R212 | C5 | G2 | R425 | E4 | E2 | U402B | 85 | 11 |
| R213 | C5 | G2 | R426 | E4 | E2 | U402C | E5 | 11 |
| R214 | C5 | G2 | R432 | D4 | E3 | U402D | E5 | 11 |
| R216 | C5 | G1 | R433 | D4 | R3 | 0432 | D4 | R2 |
| R217 | C5 | G1 | 8434 | D4 | E3 | U452A | E3 | E1 |
| R218 | C5 | G1 | R435 | D4 | E3 | U4528 | F 1 | E1 |
| R232 | A4 | 62 | f436 | D3 | E2 | 4474 | D2 | C2 |
| R233 | A4 | R3 | R437 | D3 | E2 | 0492 | F1 | B1 |
| R234 | A4 | G3 | R438 | D3 | D2 |  |  |  |
| R235 | A4 | G2 | R439 | D3 | E1 | VR237 | B3 | 12 |
| R236 | B3 | 12 | R440 | E3 | E2 | VR247 | B3 | 12 |
| R237 | B3 | 12 | R441 | D3 | D2 | VR437 | D3 | D2 |
| R238 | B3 | 12 | R442 | E4 | R2 | VR447 | E3 | D2 |
| ค239 | 83 | 12 | R443 | R4 | R1 |  |  |  |
| CHASSIS MOUNTED PARTS |  |  |  |  |  |  |  |  |
| CIRCUIT <br> NUMBER | $\begin{aligned} & \text { SCHEM } \\ & \text { LOCATION } \end{aligned}$ | $\begin{aligned} & \text { BOARD } \\ & \text { LOCATION } \\ & \hline \end{aligned}$ |  |  |  |  |  |  |
| $J 497$ | G1 | CHASSIS |  |  |  |  |  |  |




[^0]:    *Combinations given for single-channel vertical and horizontal units only.

[^1]:    + Gate Out. The + GATE OUT connector provides a positive-going rectangular pulse which is derived from a time-base unit installed in either horizontal plug-in compartment.

[^2]:    John D. Lenk, "Handbook of Oscilloscopes, Theory, and Application", Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1968.

[^3]:    wPorformance Requirenemt check; see intoductory information.

[^4]:    صPerformance Requirement check; see introductory information.

[^5]:    $\checkmark$ Performance Requirement check; see introductory information.]

[^6]:    $\sim$ Performance Requirement check; see introductory information.

[^7]:    *These components to be added to the back of the Trigger board

