BEFORE READING

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TEKTRONIX®

7M13

READOUT UNIT

INSTRUCTION MANUAL

Serial Number _____

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Thanks

Dave & Lynn Henderson
Artek Media

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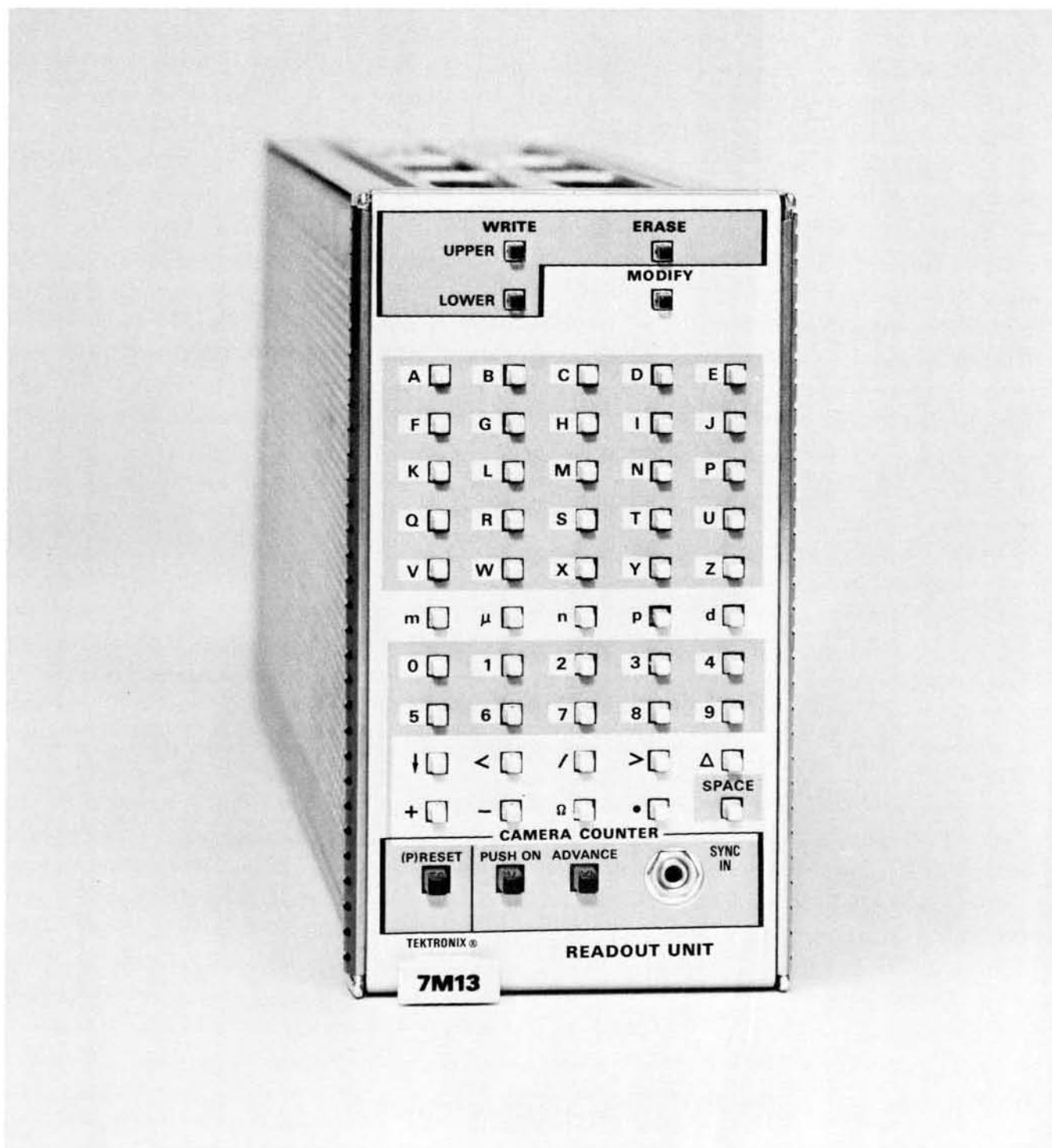Fig. 1-1. 7M13 Readout Unit.

7M13 FEATURES

The 7M13 Readout Unit (Fig. 1-1) provides front panel keyboard operation of any Tektronix 7000 series oscilloscope readout system. A built-in camera counter displays a presettable camera count in channel 2. The camera count can be advanced manually by pushbutton or automatically through the operation of a camera shutter.
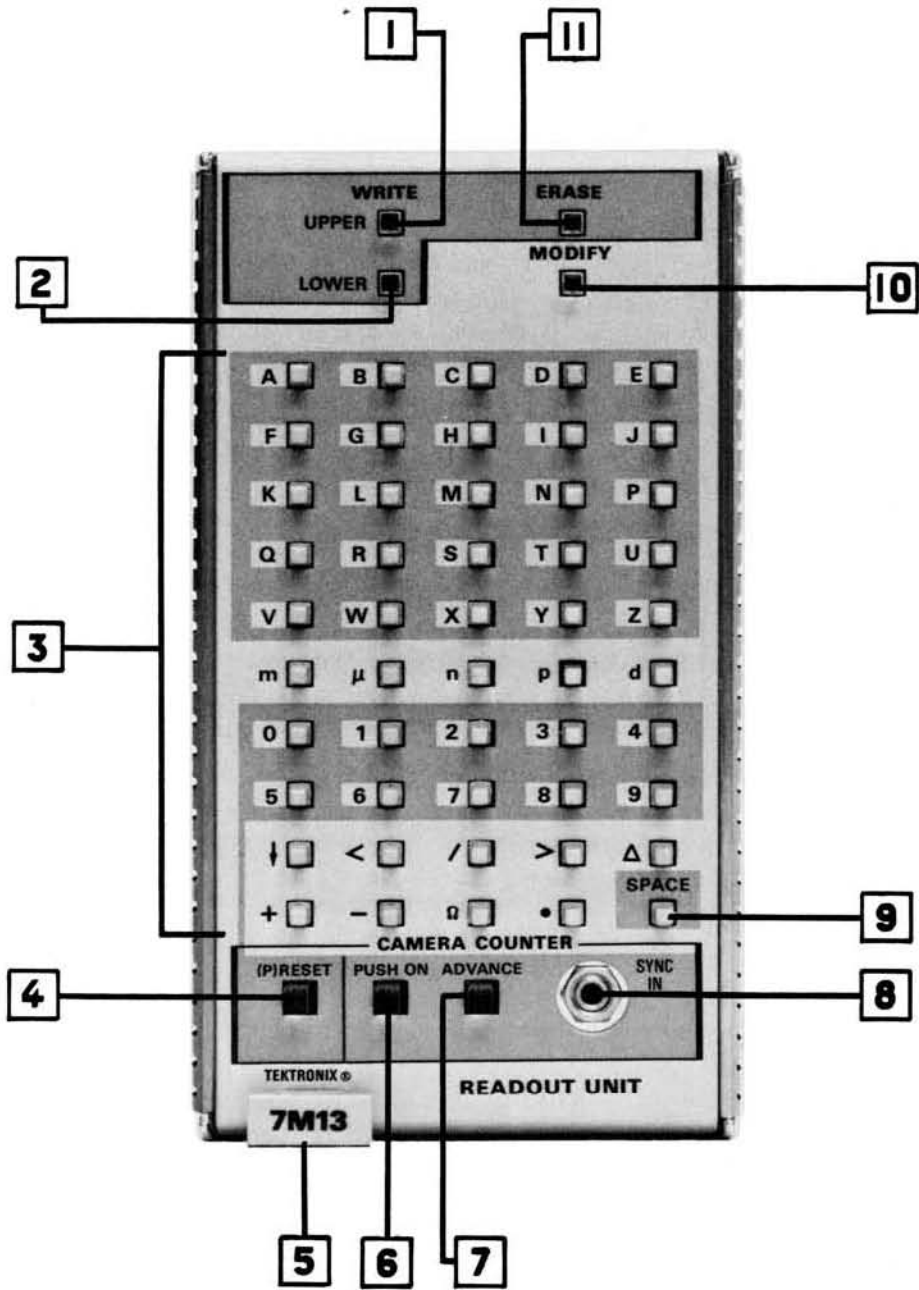
Fig. 1-2. 7M13 Controls and Connectors.

OPERATING INSTRUCTIONS

CONTROLS

All controls and connectors for operation of the 7M13 Readout Unit are located on the front panel of the instrument. These are illustrated in Fig. 1-2. The controls and their functional descriptions are listed below.

1 WRITE UPPER

Illuminated pushbutton switch for selecting channel 1 (upper) display position.

2 WRITE LOWER

Illuminated pushbutton switch for selecting channel 2 (lower) display position.

3 Character Switches

Pushbutton switches that provide character selection and generation for display on the CRT.

4 CAMERA COUNTER (P)RESET

Pushbutton switch for resetting and presetting the camera counter.

5 Release Latch

Releases plug-in lock for removal of instrument from the mainframe.

6 CAMERA COUNTER PUSH ON

Illuminated pushbutton switch for activating the camera counter.

7 CAMERA COUNTER ADVANCE

Pushbutton switch for manually advancing the camera counter.

8 CAMERA COUNTER SYNC IN

Jack for connecting the camera counter advance to a camera shutter for automatic operation.

9 SPACE

Pushbutton switch that provides spacing in the readout display.

10 MODIFY

Pushbutton switch that allows changing the last entered character without erasing the display.

11 ERASE

Pushbutton switch for erasing the display from the selected channel.

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OPERATION

The 7M13 Readout Unit will operate in any plug-in compartment of a Tektronix 7000-series oscilloscope equipped with a readout system. The 7M13 Readout Unit is activated by pressing it firmly into position in a compartment of the oscilloscope mainframe. The display will appear on the CRT in the position associated with the selected plug-in slot.

Channel Selection

The WRITE pushbuttons provide channel selection. Channel 1 is selected by pressing the UPPER pushbutton and channel 2 by pressing the LOWER pushbutton. These pushbuttons illuminate (in compatible mainframes) to indicate the position selected.

Erase

The ERASE pushbutton must be pressed before entering data for display. This clears the selected channel of any previously entered data and resets the 7M13 circuits to accept new data. The ERASE pushbutton does not affect the camera counter display.

Data Display

Both channels have a display capacity of ten characters or spaces. Each character, including the decimal point, requires one space in the display.

Each character pushbutton switch is labeled with the character it selects. Pressing any of these switches causes its associated character to be displayed on the CRT. Spacing between characters or words is provided by the SPACE pushbutton. Pressing this switch causes the display to skip one space.

Subsequent pressing of a character switch when all ten display spaces are filled will cause the tenth space character to be replaced with the newly selected one.

Modify

The MODIFY pushbutton allows the last entered character to be changed without erasing the display. This switch must be pressed and held while the new character switch is pressed. The last entered character will then be replaced with the newly entered one.

Camera Counter Operation

The CAMERA COUNTER is activated by pressing the PUSH ON switch. The switch locks in and illuminates when the CAMERA COUNTER is selected. This causes the 2-digit camera count to be displayed in channel 2.

The camera counter display is set to zero by pressing the (P)RESET switch. Once this is done, two zeros will appear in the display as the camera count. If it is desired to set the camera count to some number other than zero, the (P)RESET switch must be pressed and held while the desired number is entered. When presetting the CAMERA COUNTER, the first number pressed will be entered as the tens digit and the second as the units digit.

A maximum of eight additional characters can be entered in channel 2 when the CAMERA COUNTER is activated. The camera counter display appears in character positions 4 and 5 of channel 2 when no other data is present. As other data is entered, the camera counter display will automatically shift to the right.

The camera count can be advanced by pressing the ADVANCE pushbutton. Each time this button is pressed, it advances the camera count by 1.

The camera count can also be advanced by the action of a camera shutter. This is accomplished by using the remote advance cable provided with the Readout Unit. The cable is connected to the normally open jack of any Tektronix C-50 series camera and to the SYNC IN jack on the front panel of the Readout Unit. When connected in this manner, the camera count will be advanced each time the camera shutter is operated.

An optional remote advance cable, Tektronix Part Number 012-0364-01, is available on special order. This cable permits connection of the CAMERA COUNTER SYNC IN jack to cameras with ASA shutter connectors.

THEORY OF OPERATION

INTRODUCTION

The 7M13 Readout Unit provides front panel operation of the readout system of any Tektronix 7000 series oscilloscope. It will operate in any plug-in position in the oscilloscope mainframe. The readout display will appear on the CRT in the position associated with the selected plug-in compartment. Refer to the mainframe service manual for the readout system circuit description and to diagram 1 in this manual for the following circuit description.

THEORY OF OPERATION

The WRITE pushbuttons select either the UPPER or LOWER (channels 1 and 2 respectively) memory IC's for data storage. This routes the output of U202B through U168C for the UPPER and through U168D for the LOWER channel selection. The signal is then presented to the appropriate column and row memory, write enable inputs.

Each channel has a ten character capacity. As each successive character pushbutton is pressed, the output of U132C causes U198 to advance its count to the next character position address. This continues until all character positions are filled. U129B locks in the tenth position and is reset by pressing ERASE. Pressing a character button when all ten positions are filled will cause the tenth character to be replaced with the newly selected one.

The ERASE pushbutton, when pressed, fires single-shot U170B. The pulse from U170B clears U129B and allows pulses derived from time slot information (output of U163D) to be presented through U168A, U168B, and U132C to U198 (address-to-memory). The output of U168B is also presented to the write-into-memory circuits. These pulses cause U198 to count through all data addresses, while the write-into-memory circuits allow the data present on the data inputs to the row and column IC's to be written into the memories. No data is present on the inputs to the memories during ERASE. This "no data" condition is interpreted as a skip command and results in a blank display for that channel. When single-shot U170B returns to its normal state, it triggers single-shot U170A to reset U129B and the address-to-memory counter, U198.

Time slot pulses 2 through 10 are routed through Q177 and Q185. These pulses are used to advance U195, the read from memory address IC. Time slot 1 is routed through Q190 and is used to reset U195 at the end of each count.

The address multiplexer (U200) determines which address, either time slot (output of U195) or data (output of U198), will be directed to the memory select inputs. Normally, U200 directs time slot addresses to these inputs for data readout, however, when a character pushbutton is pressed on the front panel of the Readout Unit, the output of U202A causes the multiplexer to switch and read the address at the outputs of U198.

Pressing a character button supplies ground closures to the inputs of U109 (column data) and U103 (row data). U109 and U103 are decimal-to-BCD converters. They generate the coded character information presented to the memory data inputs; column data to U280 and U260, row data to U240 and U220.

Since all characters generate column data, the outputs of U109 (through diodes CR109, CR110, CR111, and CR112) are used to initiate the write-into-memory command signals and to trigger the address-to-memory. This signal, through U202A, is also used to switch the address multiplexer (U200) from the read-from-memory address (output of U105) so that data stored in the memories can be read and

displayed on the CRT. Only when a write command signal is present (output of U202A) can U200 read the address present at the output of U198. When the address-to-memory command signal is presented to the memories, information present on the data inputs to the memories will be accepted for storage. Once this is accomplished, U200 returns to reading the addresses from U195 (time slot information) and the newly stored character is displayed on the CRT.

The MODIFY pushbutton permits interruption of the address advance pulse (output of U132C). When pressed and held, the MODIFY pushbutton allows the last entered character to be changed regardless of its position in the display.

The SPACE pushbutton generates only row data, therefore, CR102 is used to allow generation of the write-into-memory and associated signals through the output of U168B. This allows data for space generation to be stored in the memories and displayed in the same manner as a character.

The camera counter works only through the lower, channel 2, display position. When the camera counter is selected, it causes time slots 9 and 10 to be reserved for the camera counter display. This is accomplished by the output of U166A which blocks the memories during these time slots to allow camera counter information from U159 (units digit) and U161 (tens digit) to be displayed.

Pressing (P)RESET clears U129A, blocks U166D and resets U154 and U157 to zero. The output of U105E activates the current necessary for zero character generation when no data is present at the outputs of U159 and U161. Pressing a number pushbutton (while pressing and holding the (P)RESET pushbutton) enters that number in the tens position, U157, which is enabled by U132B. The action of U122, when the number pushbutton is pressed, causes U129A to switch. This allows the next number to be entered as a units digit in U154—now enabled by U132A.

Camera counter data is presented to the inputs of U265 during time slots 9 and 10. U161 is activated by U163C during time slot 9. U159 is activated during time slot 10 by U163B.

The ADVANCE pushbutton, when pressed, provides a ground closure for advancing the camera count. The SYNC IN jack provides the same function when connected to a camera shutter.

The output of U202A provides an over-ride of the blocking action of U166A during time slots 9 and 10 when the camera counter is selected. This permits entry of other information during these time slots. The camera counter display is not erased by the ERASE pushbutton.

The outputs of U225, U245, U265, and U285 determine which characters are generated in the readout system. Refer to the schematic diagram for the functional identification of these IC's. These IC's convert the BCD input to an output current. This is accomplished by using the BCD inputs to select current inputs to pins 10, 11, 12, 13, and 14 which are used either singly or combined to produce the proper current outputs (row and column) for character generation in the readout system.

MAINTENANCE

Change information, if any, affecting this section will be found at the rear of this manual.

INTRODUCTION

This section contains maintenance, troubleshooting, and part ordering information. Further maintenance information relating to components, color codes, and soldering techniques can be found in the Tektronix 7000-series mainframe manuals.

PREVENTIVE MAINTENANCE

Preventive maintenance, consisting of cleaning, visual inspection, lubrication, etc., performed on a regular basis, will improve the reliability of this instrument. Periodic checks on the semiconductor devices used in the unit are not recommended as a preventive maintenance measure. See semiconductor-checking information given under troubleshooting.

Cleaning

CAUTION

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

Front Panel. Loose dust may be removed with a soft brush or cloth. Water and a mild detergent may be used; however, abrasive cleaners should not be used.

Interior. Cleaning the interior of the unit should be done with low-velocity compressed air to blow off the accumulated dust. Hardened dirt can be removed with a soft, dry paint brush, cotton-tipped swab, or a cloth dampened with a solution of mild detergent and water.

Lubrication

Use a cleaning-type lubricant on interconnecting plug contacts and switch contacts. A lubrication kit containing necessary lubricating materials and instructions is available through any Tektronix Field Office. Order Tektronix Part Number 003-0342-01.

TROUBLESHOOTING

The following is provided to augment information contained in other sections of this manual when troubleshooting the 7M13. The schematic diagrams and theory of operation should be used to full advantage. Schematic diagrams appear on foldout pages in section 6 of this manual. The circuit board drawing appears on the back of the foldout diagram. Each board mounted electrical component is identified on the drawing by its circuit number.

Troubleshooting Procedure

This troubleshooting procedure is arranged in an order that checks the simple trouble possibilities before proceeding with more extensive troubleshooting.

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Check Associated Equipment

Before troubleshooting the 7M13 Readout Unit, check that the equipment used with this instrument is operating correctly. If possible, substitute another unit known to be operating correctly into the mainframe and see if the problem persists. Check that the input is properly connected and that the interconnecting leads are not defective.

Visual Check. Visually check the portion of the instrument in which the trouble is suspected. Many troubles can be located by visual indications, such as unsoldered connections, broken wires, damaged circuit boards, damaged components, etc.

Individual Components. The following methods are provided for checking the individual components in the 7M13. Components that are soldered in place are best checked by disconnecting one end to isolate the measurement from the effects of related circuitry. Fig. 3-1 shows the lead configuration of the semiconductor devices used in this instrument.

1. TRANSISTORS AND INTEGRATED CIRCUITS. The best check of transistor and integrated circuit operation is actual performance under operating conditions. If a transistor or integrated circuit is suspected of being defective, it can best be checked by substituting a component known to be good. However, be sure that circuit conditions are not such that a replacement might also be damaged. If substitute transistors are not available, use a dynamic tester, such as Tektronix Type 576. Static-type testers may be used, but since they do not check operation under simulated operating conditions, some defects may go unnoticed. Fig. 3-1 shows base pin arrangements of semiconductor devices. Be sure the power is off before attempting to remove or replace any transistor or integrated circuit.

Integrated circuits can be checked with a voltmeter, test oscilloscope, or by direct substitution. A good understanding of the circuit description is essential to troubleshooting circuits using integrated circuits. Use care when checking voltages and waveforms around the integrated circuits so that adjacent leads are not shorted together. An integrated-circuit test clip provides a convenient means of clipping a test probe to the 14- and 16-pin integrated circuits. This device also doubles as an integrated-circuit extraction tool.
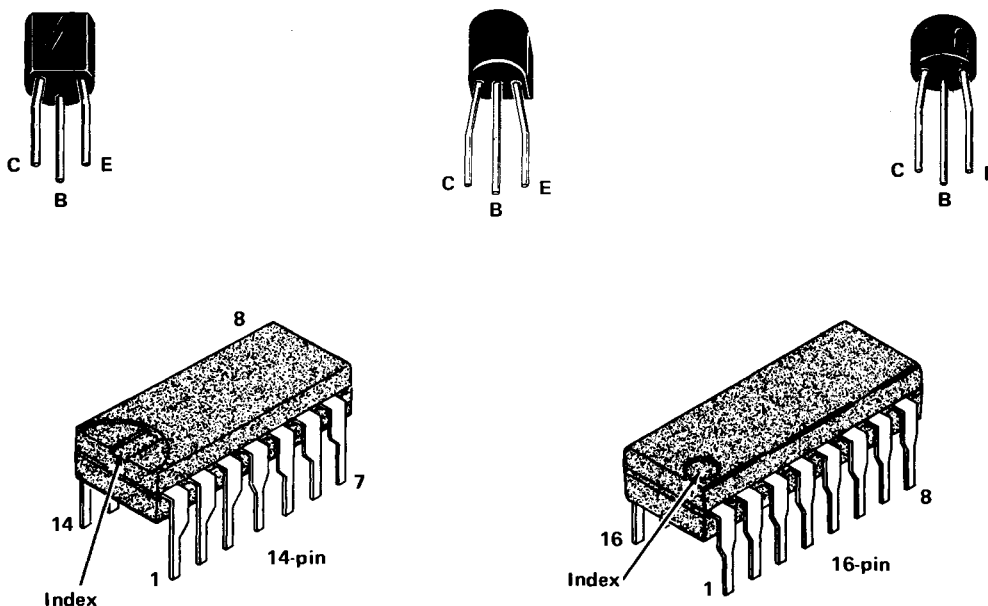

Fig. 3-1. Semiconductor Lead Configuration.

2. DIODES. A diode can be checked for an open or shorted condition by measuring the resistance between terminals. With an ohmmeter scale having an internal source of between 800 millivolts and 3 volts, the resistance should be very high in one direction and very low when the leads are reversed.

CAUTION

Do not use an ohmmeter scale that has a high internal current. High currents may damage the diodes.

3. RESISTORS. Check resistors with an ohmmeter. Resistor tolerance is given in the Electrical Parts List. Resistors normally do not need to be replaced unless the measured value varies widely from the specified value.

4. CAPACITORS. A leaky or shorted capacitor can be detected by checking resistance with an ohmmeter on the highest scale. Use an ohmmeter which will 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 whether the capacitor passes AC signals.

REPLACEMENT PARTS

Standard Parts

All electrical and mechanical part replacements for the 7M13 can be obtained through your local Tektronix Field Office or representative. However, many of the standard electronic components can be obtained locally in less time than is required to order them from Tektronix, Inc. Before purchasing or ordering replacement parts, check the parts lists for value, tolerance, rating, and description.

NOTE

When selecting replacement parts, it is important to remember that the physical size and shape of the component may affect its performance in the instrument. All replacement parts should be direct replacements unless it is known that a different component will not adversely affect the instrument performance.

Special Parts

Some parts are manufactured or selected by Tektronix to satisfy particular requirements, or are manufactured for Tektronix to our specifications. These special parts are indicated in the parts list by an asterisk preceding the part number. Most of the mechanical parts used in this instrument have been manufactured by Tektronix. Order all special parts directly from your local Tektronix Field Office or representative.

Ordering Parts

When ordering replacement parts from Tektronix, Inc., refer to the Parts Ordering Information and Special Notes and Symbols on the page immediately preceding the Electrical Parts List section. Include the following information:

1. Instrument type (7M13)

2. Instrument Serial Number

3. A description of the part (if electrical, include the circuit number)

4. Tektronix Part Number

REPACKAGING FOR SHIPMENT

If the Tektronix instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing: owner (with address) and the name of an individual at your firm that can be contacted, complete instrument serial number and a description of the services required.

Save and re-use the package in which your instrument was shipped. If the original packaging is unfit for use or not available, repackage the instrument as follows:

Surround the instrument with polyethylene sheeting to protect the finish of the instrument. Obtain a carton of corrugated cardboard of the correct carton strength and having inside dimensions of no less than six inches more than the instrument dimensions. Cushion the instrument by tightly packing three inches of dunnage or urethane foam between carton and instrument, on all sides. Seal carton with shipping tape or industrial stapler.

The carton test strength for your instrument is 200 pounds.

PERFORMANCE CHECK

INTRODUCTION

This section outlines the procedure for checking the performance of the 7M13 Readout Unit. This procedure assumes that the associated test instruments are working properly.

TABLE 4-1

Recommended Test Equipment

Description	Usage	Recommended Type
Oscilloscope	Necessary for using the 7M13. It must be equipped with a readout system.	Any Tektronix 7000 series oscilloscope equipped with readout.
Camera (optional)	For use in checking the remote camera count advance.	Any Tektronix C-50 series camera.

PERFORMANCE CHECK PROCEDURE (Refer to Fig. 1-2.)

The 7M13 Readout Unit must be plugged into the Tektronix 7000-series mainframe for these performance checks. Both the mainframe and the readout unit should be allowed to warm up for about 20 minutes after power is applied. Make sure the mainframe readout system is turned on. Once the warm-up period is completed, the unit should be checked as follows:

1. Select the channel 1 WRITE position by pressing the UPPER pushbutton.

2. Press the ERASE pushbutton to clear the selected channel.

3. Press, one at a time, the first ten character pushbuttons (two top horizontal rows). Each character should appear in the display in the order it was selected.

4. Press the ERASE pushbutton to clear the display.

5. Repeat step 3 selecting the next ten character buttons. Erase the display, then, select the next ten character buttons and so on till all characters and symbols have been displayed in channel 1.

6. Press the ERASE pushbutton.

7. Check the SPACE pushbutton by alternately selecting characters and spaces to fill all ten positions in the display.

8. Press the ERASE pushbutton.

9. Select any character or symbol for display in the first character position.

10. Press and hold the MODIFY pushbutton while selecting, at random, several different characters or symbols. The character selected in step 9 should change to each successively selected character or symbol without shifting to the next display position.

11. Release the MODIFY pushbutton and repeat steps 9 and 10 for each of the remaining character display positions. This check is not necessary for the tenth (last) character position.

12. Press the ERASE pushbutton.

13. Select the channel 2 WRITE position by pressing the LOWER pushbutton.

14. Repeat steps 2 through 12 for channel 2.

15. Select the CAMERA COUNTER by pressing the ON-OFF pushbutton.

16. Zero the camera counter display by pressing and releasing the (P)RESET pushbutton. The display should read 00 in channel 2.

17. Press and hold the (P)RESET pushbutton while pressing two of the number pushbuttons. The numbers selected should now appear as the camera count. For example, if numbers 2 & 3 are pressed in that order, the display will read 23.

18. Press the ADVANCE pushbutton. The camera count should increase by one unit each time this button is pressed and released.

19. Connect the shutter of a Tektronix C-50 series camera to the SYNC IN jack on the front panel of the Readout Unit using the remote advance cable supplied with the instrument.

20. Operate the shutter (the camera should not contain film for this check) and check that the camera count is advanced by one unit each time the shutter operates.

NOTE

If a C-50 series camera is not available for this check, step 20 can be made by shorting the shutter connector prongs of the remote advance cable together. This will simulate the camera shutter action and cause the camera count to advance.

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REPLACEABLE
ELECTRICAL PARTS

PARTS ORDERING INFORMATION

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

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

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

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

SPECIAL NOTES AND SYMBOLS

X000   Part first added at this serial number

00X   Part removed after this serial number

ITEM NAME

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

ABBREVIATIONS

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

@

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
01121	ALLEN-BRADLEY COMPANY	1201 2ND STREET SOUTH	MILWAUKEE, WI 53204
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
08806	GENERAL ELECTRIC CO., MINIATURE LAMP PRODUCTS DEPARTMENT	NELA PARK	CLEVELAND, OH 44112
14552	MICRO SEMICONDUCTOR CORP.	2830 F FAIRVIEW ST.	SANTA ANA, CA 92704
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
82389	SWITCHCRAFT, INC.	5555 N. ELSTON AVE.	CHICAGO, IL 60630
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NE 68601

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-2939-00	B010100	B059999	CKT BOARD ASSY:ROW COL DRIVER	80009	670-2939-00
A1	670-2939-01	B060000		CKT BOARD ASSY:ROW COL DRIVER	80009	670-2939-01
A2	670-2938-00			CKT BOARD ASSY:KEYBOARD INTERFACE	80009	670-2938-00
A3	670-2936-00			CKT BOARD ASSY:CHANNEL SWITCH	80009	670-2936-00
A4	670-2935-00			CKT BOARD ASSY:MODIFY ERASE SWITCH	80009	670-2935-00
A5	670-2937-00			CKT BOARD ASSY:CAMERA COUNTER MODE SWITCH	80009	670-2937-00
A6	670-2940-00			CKT BOARD ASSY:KEYBOARD SWITCH	80009	670-2940-00
C116	283-0177-00	XB070000		CAP.,FXD,CER DI:1UF,+80-20%,25V	56289	273C5
C117	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C122	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C125	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C147	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C152	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C170	283-0059-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N031Z5U0105Z
C174	283-0080-00			CAP.,FXD,CER DI:0.022UF,+80-20%,25V	56289	19C611
C196	281-0543-00			CAP.,FXD,CER DI:270PF,10%,500V	72982	301055X5P271K
C202	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z
C204	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C208	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
CR102	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR108	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR109	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR110	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR111	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR112	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR114	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR127	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR142	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR180	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR181	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR182	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR183	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR184	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR185	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR186	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR187	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR188	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR190	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR191	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
CR193	152-0141-02			SEMICOND DEVICE:SILICON,30V,50NA	01295	1N4152R
DS1	150-0048-01			LAMP,INCAND:5V,0.06A,SEL	08806	683AS15
DS4	150-0102-01			LAMP,INCAND:5V,0.06A	80009	150-0102-01
J6	131-0407-00			JACK,TELEPHONE:W/HARDWARE	82389	TR-2A
Q116	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q119	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q143	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q146	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q149	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q177	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q185	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q190	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q209	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
Q216	151-0190-00			TRANSISTOR:SILICON,NPN	07263	S032677
R110	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735

REV G, JUL 1980

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R114	315-0244-00			RES.,FXD,CMPSN:240K OHM,5%,0.25W	01121	CB2445
R116	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R118	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R125	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R127	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R130	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R140	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R141	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R144	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R145	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R146	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R148	315-0432-00			RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R170	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R172	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R174	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R177	315-0621-00			RES.,FXD,CMPSN:620 OHM,5%,0.25W	01121	CB6215
R179	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R180	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R183	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R185	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R190	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R192	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R193	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R197	315-0473-00			RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R202	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R204	315-0273-00			RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R206	315-0241-00			RES.,FXD,CMPSN:240 OHM,5%,0.25W	01121	CB2415
R207	315-0473-00	B010100	B029999	RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R207	315-0273-00	B030000		RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R208	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R209	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R211	315-0473-00	B010100	B029999	RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R211	315-0273-00	B030000		RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R213	315-0473-00	B010100	B029999	RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R213	315-0273-00	B030000		RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R215	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R216	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R221	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R222	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R223	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R224	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R226	315-0432-00	B010100	B049999	RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R226	315-0562-00	B050000		RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R227	321-0311-00			RES.,FXD,FILM:16.9K OHM,1%,0.125W	91637	MFF1816G16901F
R229	321-0340-00			RES.,FXD,FILM:34K OHM,1%,0.125W	91637	MFF1816G34001F
R230	321-0369-00			RES.,FXD,FILM:68.1K OHM,1%,0.125W	91637	MFF1816G68101F
R231	321-0396-00			RES.,FXD,FILM:130K OHM,1%,0.125W	91637	MFF1816G13002F
R232	315-0510-00	XB060000		RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R241	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R242	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R243	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R244	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R246	315-0432-00	B010100	B049999	RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R246	315-0562-00	B050000		RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R247	321-0311-00			RES.,FXD,FILM:16.9K OHM,1%,0.125W	91637	MFF1816G16901F
R249	321-0340-00			RES.,FXD,FILM:34K OHM,1%,0.125W	91637	MFF1816G34001F
R250	321-0369-00			RES.,FXD,FILM:68.1K OHM,1%,0.125W	91637	MFF1816G68101F

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R251	321-0396-00			RES.,FXD,FILM:130K OHM,1%,0.125W	91637	MFF1816G13002F
R252	315-0510-00	XB060000		RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R261	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R262	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R263	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R264	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R265	321-0396-00			RES.,FXD,FILM:130K OHM,1%,0.125W	91637	MFF1816G13002F
R266	315-0432-00	B010100	B049999	RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R266	315-0562-00	B050000		RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R267	321-0311-00			RES.,FXD,FILM:16.9K OHM,1%,0.125W	91637	MFF1816G16901F
R268	321-0340-00			RES.,FXD,FILM:34K OHM,1%,0.125W	91637	MFF1816G34001F
R269	321-0369-00			RES.,FXD,FILM:68.1K OHM,1%,0.125W	91637	MFF1816G68101F
R270	321-0396-00			RES.,FXD,FILM:130K OHM,1%,0.125W	91637	MFF1816G13002F
R272	315-0510-00	XB060000		RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R281	315-0512-00			RES.,FXD,CMPSN:5.1K OHM,5%,0.25W	01121	CB5125
R282	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R283	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R284	315-0822-00			RES.,FXD,CMPSN:8.2K OHM,5%,0.25W	01121	CB8225
R286	315-0432-00	B010100	B049999	RES.,FXD,CMPSN:4.3K OHM,5%,0.25W	01121	CB4325
R286	315-0562-00	B050000		RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R287	321-0311-00			RES.,FXD,FILM:16.9K OHM,1%,0.125W	91637	MFF1816G16901F
R289	321-0340-00			RES.,FXD,FILM:34K OHM,1%,0.125W	91637	MFF1816G34001F
R290	321-0369-00			RES.,FXD,FILM:68.1K OHM,1%,0.125W	91637	MFF1816G68101F
R291	321-0396-00			RES.,FXD,FILM:130K OHM,1%,0.125W	91637	MFF1816G13002F
R292	315-0510-00	XB060000		RES.,FXD,CMPSN:51 OHM,5%,0.25W	01121	CB5105
R301	308-0585-00			RES.,FXD,WW:50 OHM,0.5%,5W	91637	RS5-KF0R00D
R303	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
S1	670-2936-00			SWITCH ASSY:PUSH BUTTON	80009	670-2936-00
S2A,B	670-2935-00			SWITCH ASSY:PUSH BUTTON	80009	670-2935-00
S3	670-2937-00			SWITCH ASSY:PUSH BUTTON	80009	670-2937-00
S4	670-2937-00			SWITCH ASSY:PUSH BUTTON	80009	670-2937-00
S5	670-2937-00			SWITCH ASSY:PUSH BUTTON	80009	670-2937-00
S10	670-2940-00			SWITCH ASSY:PUSH BUTTON	80009	670-2940-00
S11	670-2940-00			SWITCH ASSY:PUSH BUTTON	80009	670-2940-00
S12	670-2940-00			SWITCH ASSY:PUSH BUTTON	80009	670-2940-00
S13	670-2940-00			SWITCH ASSY:PUSH BUTTON	80009	670-2940-00
S14	670-2940-00			SWITCH ASSY:PUSH BUTTON	80009	670-2940-00
U103	156-0347-00			MICROCIRCUIT,DI:10-LINE TO 4-LINE ENCODER	80009	156-0347-00
U105	156-0058-00			MICROCIRCUIT,DI:HEX.INVERTER	80009	156-0058-00
U109	156-0347-00			MICROCIRCUIT,DI:10-LINE TO 4-LINE ENCODER	80009	156-0347-00
U112	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE	01295	SN7400(N OR J)
U122	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00
U129	156-0039-00			MICROCIRCUIT,DI:DUAL J-K FLIP FLOP	80009	156-0039-00
U132	156-0047-00			MICROCIRCUIT,DI:TPL 3-INPUT POS NAND GATE	80009	156-0047-00
U135	156-0347-00			MICROCIRCUIT,DI:10-LINE TO 4-LINE ENCODER	80009	156-0347-00
U137	156-0058-00			MICROCIRCUIT,DI:HEX.INVERTER	80009	156-0058-00
U152	156-0072-00			MICROCIRCUIT,DI:MONOSTABLE MV,TTL,14 DIP	80009	156-0072-00
U154	156-0091-00			MICROCIRCUIT,DI:DIV BY 2 AND 5 RIPPLE CNTR	80009	156-0091-00
U157	156-0091-00			MICROCIRCUIT,DI:DIV BY 2 AND 5 RIPPLE CNTR	80009	156-0091-00
U159	156-0057-00			MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE	01295	SN7401N OR J
U161	156-0057-00			MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE	01295	SN7401N OR J
U163	156-0043-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NOR GATE	80009	156-0043-00
U166	156-0043-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NOR GATE	80009	156-0043-00
U168	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE	01295	SN7400(N OR J)
U170	156-0172-00			MICROCIRCUIT,DI:DUAL RETRIG ONE-SHOT W/CLR	80009	156-0172-00
U195	156-0079-00			MICROCIRCUIT,DI:DECADE COUNTER,TTL	80009	156-0079-00

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
U198	156-0079-00			MICROCIRCUIT,DI:DECADE COUNTER,TTL	80009	156-0079-00
U200	156-0125-00			MICROCIRCUIT,DI:QUAD 2-INPUT MUX	80009	156-0125-00
U202	156-0172-00			MICROCIRCUIT,DI:DUAL RETRIG ONE-SHOT W/CLR	80009	156-0172-00
U220	156-0192-00			MICROCIRCUIT,DI:64-BIT READ/WHITE MEMORY	27014	DM/SN7489
U225	155-0038-01			MICROCIRCUIT,DI:5-BIT DGTL ANALOG CONV	80009	155-0038-01
U240	156-0192-00			MICROCIRCUIT,DI:64-BIT READ/WHITE MEMORY	27014	DM/SN7489
U245	155-0038-01			MICROCIRCUIT,DI:5-BIT DGTL ANALOG CONV	80009	155-0038-01
U260	156-0192-00			MICROCIRCUIT,DI:64-BIT READ/WHITE MEMORY	27014	DM/SN7489
U265	155-0038-01			MICROCIRCUIT,DI:5-BIT DGTL ANALOG CONV	80009	155-0038-01
U280	156-0192-00			MICROCIRCUIT,DI:64-BIT READ/WHITE MEMORY	27014	DM/SN7489
U285	155-0038-01			MICROCIRCUIT,DI:5-BIT DGTL ANALOG CONV	80009	155-0038-01
VR215	152-0243-00			SEMICOND DEVICE:ZENER,0.4W,15V,5%	14552	1N965B

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

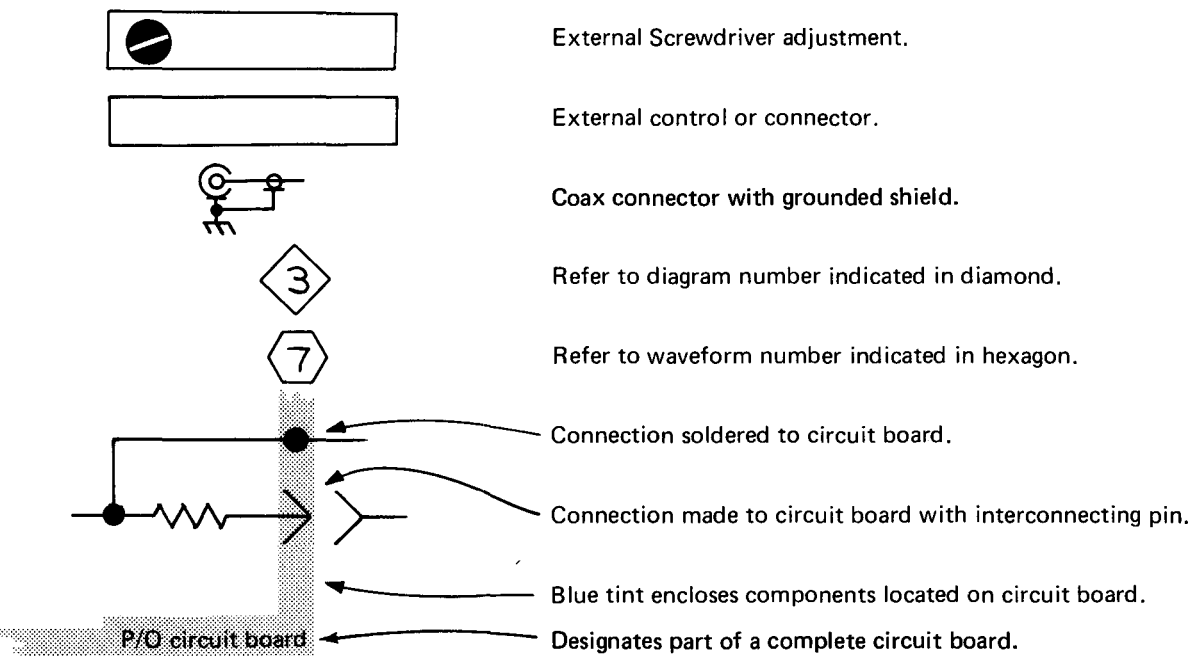## Symbols and Reference Designators

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μF).
Resistors = Ohms (Ω)

Symbols used on the diagrams are based on USA Standard Y32.2-1970.
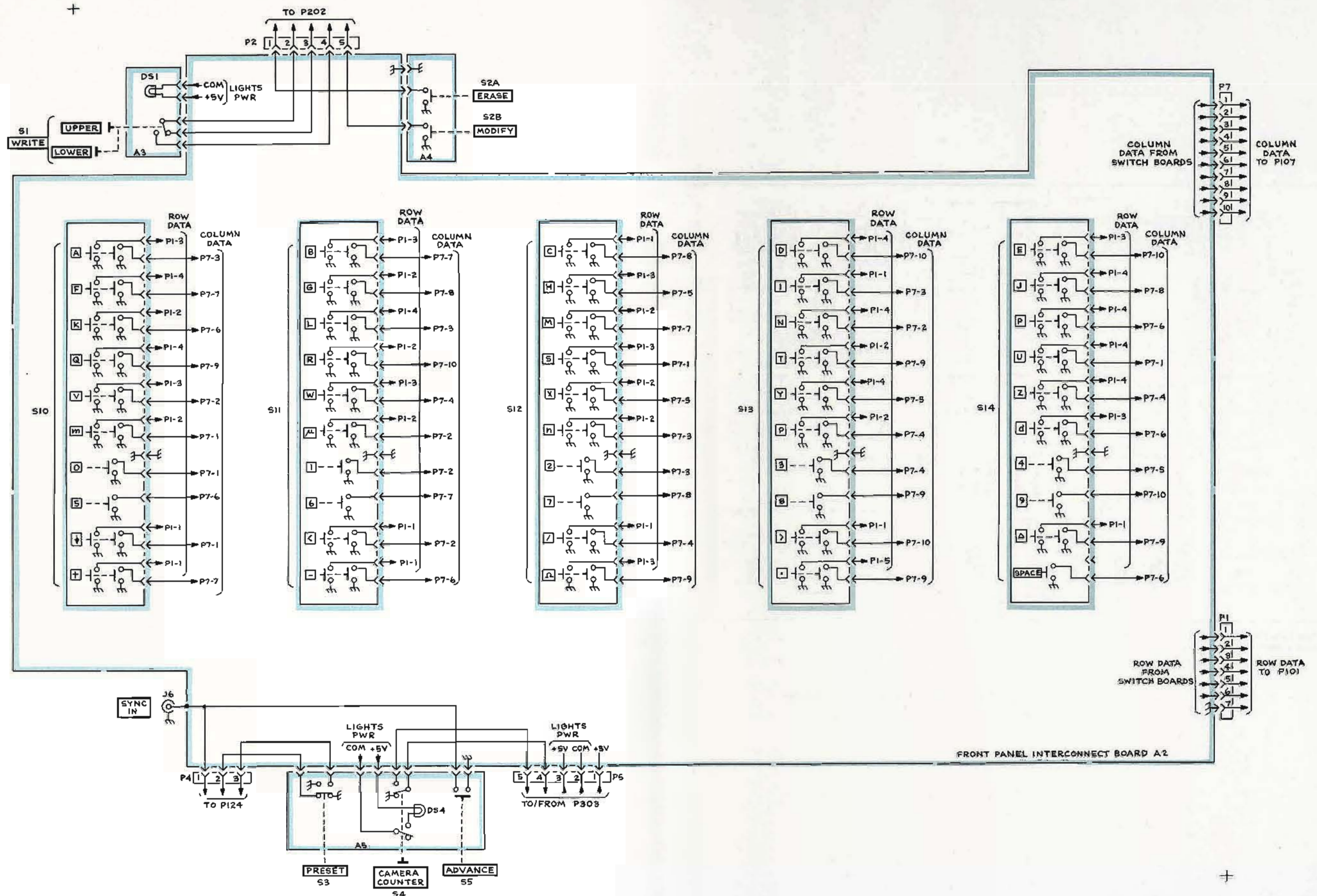
Logic symbology is based on MIL-STD-806B in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.
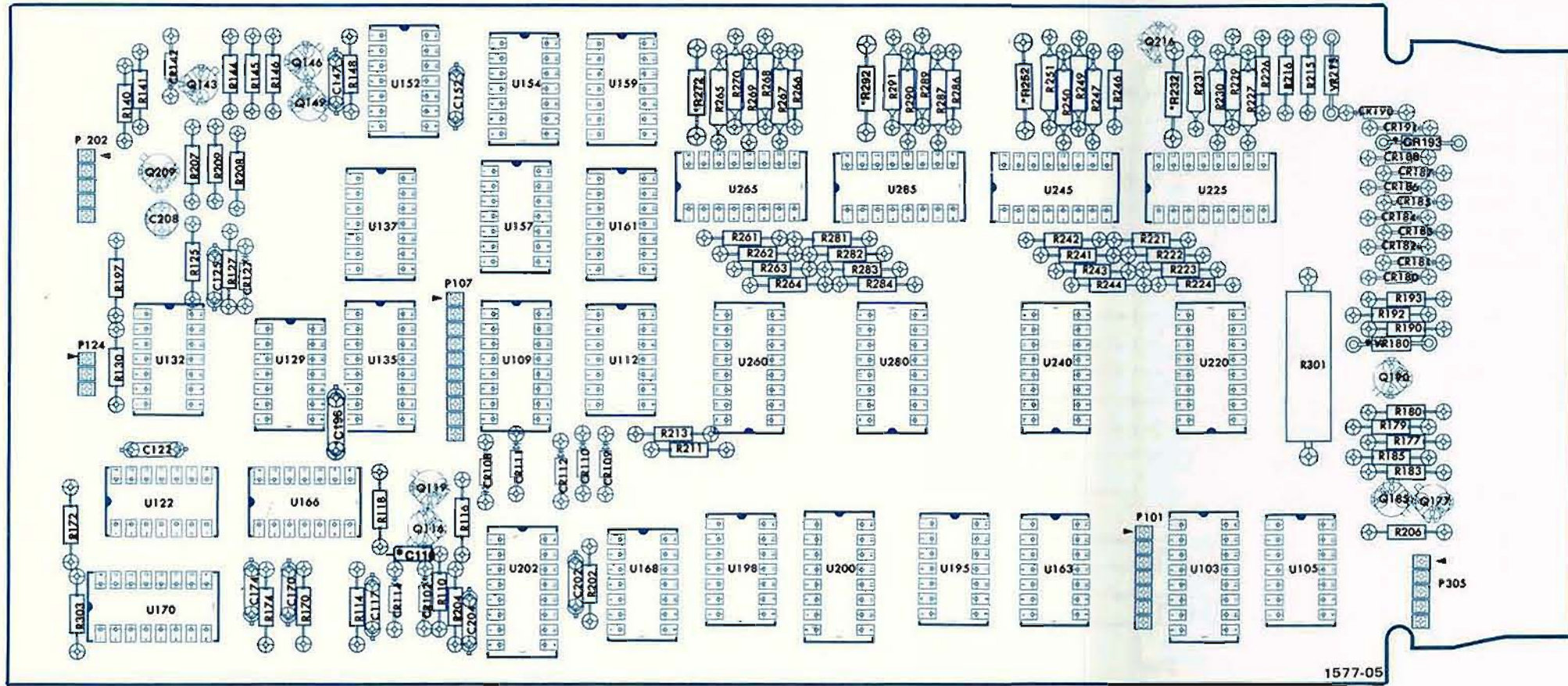
The following special symbols are used on the diagrams:

External Screwdriver adjustment.

External control or connector.

Coax connector with grounded shield.

Refer to diagram number indicated in diamond.

Refer to waveform number indicated in hexagon.

Connection soldered to circuit board.

Connection made to circuit board with interconnecting pin.

Blue tint encloses components located on circuit board.

P/O circuit board ◄——— Designates part of a complete circuit board.

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

A	Assembly, separable or repairable (circuit board, etc.)	LR	Inductor/resistor combination
AT	Attenuator, fixed or variable	M	Meter
B	Motor	Q	Transistor or silicon-controlled rectifier
BT	Battery	P	Connector, movable portion
C	Capacitor, fixed or variable	R	Resistor, fixed or variable
CR	Diode, signal or rectifier	RT	Thermistor
DL	Delay line	S	Switch
DS	Indicating device (lamp)	T	Transformer
F	Fuse	TP	Test point
FL	Filter	U	Assembly, inseparable or non-repairable (integrated
H	Heat dissipating device (heat sink, heat radiator, etc.)		circuit, etc.)
HR	Heater	V	Electron tube
J	Connector, stationary portion	VR	Voltage regulator (zener diode, etc.)
K	Relay	Y	Crystal
L	Inductor, fixed or variable	CW	Clockwise control rotation

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6-1

FRONT PANEL SWITCHING ◇

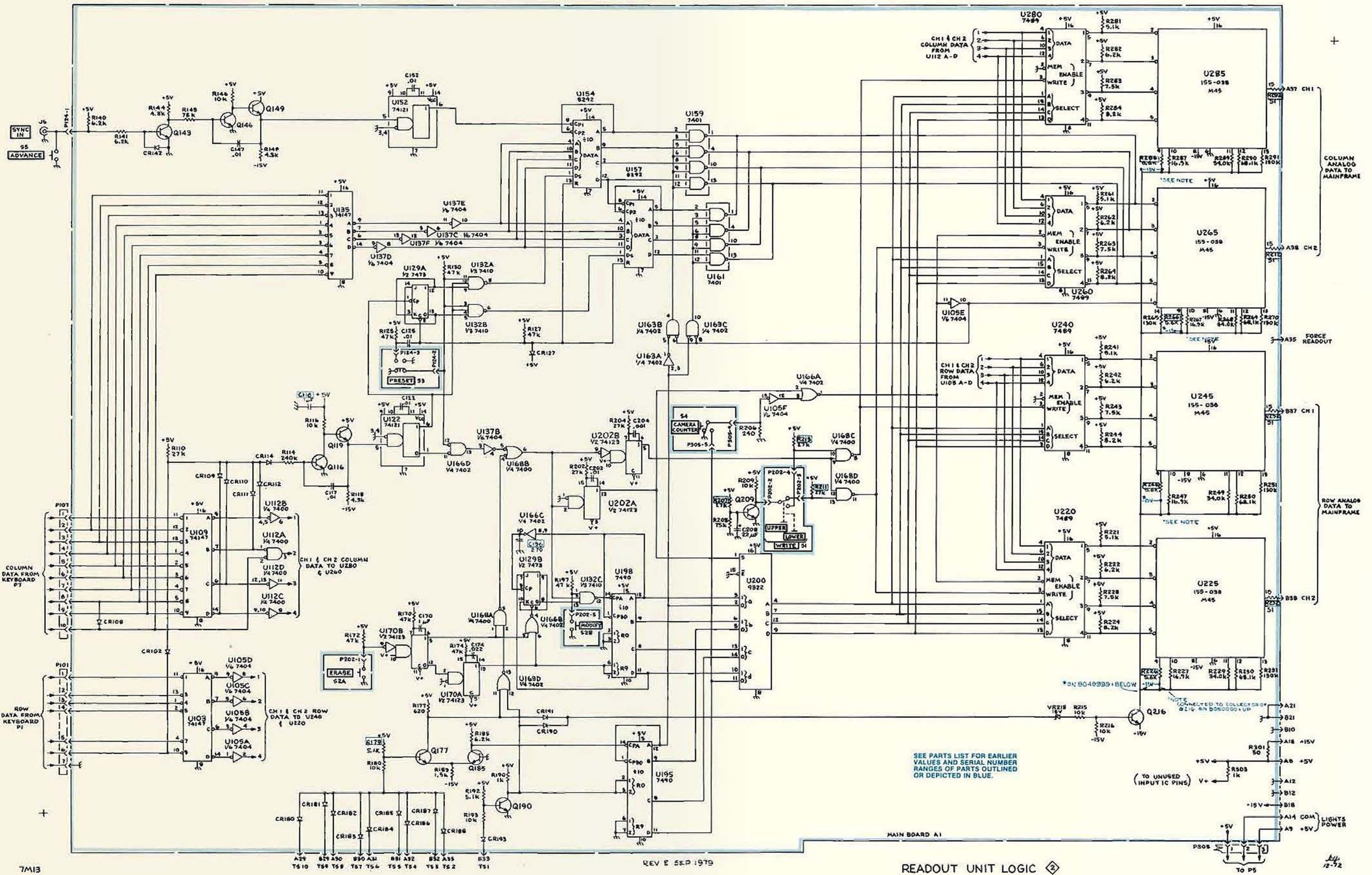7M13

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ASSEMBLY A1

*See Parts List for
serial number ranges.

1577-05

LOCATED ON BACK OF BOARD
EFF. SN B059999 & BELOW
C196

Fig. 6-1. 7M13 Readout Unit Circuit Board.

LOGIC DIAGRAM ②

READOUT UNIT LOGIC ②

REV E SEP 1979

MAIN BOARD A1

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

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

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

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

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

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

SPECIAL NOTES AND SYMBOLS

X000   Part first added at this serial number

00X   Part removed after this serial number

FIGURE AND INDEX NUMBERS

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

INDENTATION SYSTEM

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

1 2 3 4 5   Name & Description

Assembly and/or Component
Attaching parts for Assembly and/or Component
- - - * - - -

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

    Parts of Detail Part
    Attaching parts for Parts of Detail Part
- - - * - - -

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol - - - * - - - indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

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

ABBREVIATIONS

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

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CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
000FW	WESTERN SINTERING CO INC.	2620 STEVENS DRIVE	RICHLAND, WA 99352
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
22599	ESNA, DIV. OF AMERACE CORPORATION	16150 STAGG STREET	VAN NUYS, CA 91409
71785	TRW, CINCH CONNECTORS	1501 MORSE AVENUE	ELK GROVE VILLAGE, IL 60007
73803	TEXAS INSTRUMENTS, INC., METALLURGICAL MATERIALS DIV.	34 FOREST STREET	ATTLEBORO, MA 02703
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
82389	SWITCHCRAFT, INC.	5555 N. ELSTON AVE.	CHICAGO, IL 60630
83385	CENTRAL SCREW CO.	2530 CRESCENT DR.	BROADVIEW, IL 60153
87308	N. L. INDUSTRIES, INC., SOUTHERN SCREW DIV.	P. O. BOX 1360	STATESVILLE, NC 28677
93907	CAMCAR SCREW AND MFG. CO.	600 18TH AVE.	ROCKFORD, IL 61101

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty 1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-1	366-1058-56			1	KNOB:LATCH	80009	366-1058-56
					(ATTACHING PARTS)		
-2	214-1095-00			1	PIN,SPG,SPLIT:0.094 OD X 0.187 INCH LONG	22599	52-022-094-0187
					- - - * - - -		
-3	105-0076-00	B010100	B051244	1	REL BAR,LATCH:PLUG-IN UNIT	80009	105-0076-00
	105-0076-02	B051245		1	REL BAR,LATCH:PLUG-IN UNIT	80009	105-0076-02
-4	214-1280-00			1	SPRING,HLCPS:0.14 OD X 1.126"L,0.16"DIA W	80009	214-1280-00
-5	214-1054-00			1	SPRING,FLAT:0.825 X 0.322,SST	80009	214-1054-00
-6	105-0075-00			1	BOLT,LATCH:7A & 7B SER PL-IN	80009	105-0075-00
-7	348-0235-00			2	SHLD GSKT,ELEC:4.734 INCH LONG	80009	348-0235-00
-8	333-1767-00			1	PANEL,FRONT:	80009	333-1767-00
-9	131-0407-00			1	JACK,TELEPHONE:W/HARDWARE	82389	TR-2A
-10	337-1064-04			2	SHIELD,ELEC:SIDE PLUG-IN UNITS	80009	337-1064-00
-11	386-1447-72			1	SUBPANEL,FRONT:	80009	386-1447-72
					(ATTACHING PARTS)		
-12	213-0192-00			4	SCR,TPG,THD FOR:6-32 X 0.50 INCH,PNH STL	87308	OBD
					- - - * - - -		
-13	----- -----			1	CKT BOARD ASSY:KEYBOARD INTERFACE(SEE A2 EPL)		
-14	131-0589-00			113	. TERM,PIN:0.46 L X 0.025 SQ.PH BRZ GL	22526	47350
-15	131-0608-00			30	. TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
-16	----- -----			1	CKT BD ASSY:CAMERA COUNTER MODE SW(SEE A5 EPL)		
-17	136-0328-03			8	. SOCKET,PIN TERM:HORIZ,SQ PIN RCPT	22526	47710
-18	361-0558-00			1	SPACER,SWITCH:	80009	361-0558-00
-19	----- -----			5	CKT BOARD ASSY:KEYBOARD SWITCH(SEE A6 EPL)		
					(ATTACHING PARTS)		
-20	211-0156-00			15	SCREW,MACHINE:1-72 X 0.25",82 DEG,FLH STL	93907	OBD
					- - - * - - -		
	----- -----			-	. CKT BOARD ASSY INCLUDES:		
-21	136-0328-03			19	. SOCKET,PIN TERM:HORIZ,SQ PIN RCPT	22526	47710
-22	----- -----			1	CKT BOARD ASSY:MODIFY ERASE SW(SEE A4 EPL)		
					(ATTACHING PARTS)		
	211-0156-00			1	SCREW,MACHINE:1-72 X 0.25",82 DEG,FLH STL	93907	OBD
					- - - * - - -		
	----- -----			-	. CKT BOARD ASSY INCLUDES:		
-23	136-0328-03			3	. SOCKET,PIN TERM:HORIZ,SQ PIN RCPT	22526	47710
-24	----- -----			1	CKT BOARD ASSY:CHANNEL SW(SEE A3 EPL)		
					(ATTACHING PARTS)		
	211-0156-00			1	SCREW,MACHINE:1-72 X 0.25",82 DEG,FLH STL	93907	OBD
					- - - * - - -		
	----- -----			-	. CKT BOARD ASSY INCLUDES:		
-25	136-0328-03			5	. SOCKET,PIN TERM:HORIZ,SQ PIN RCPT	22526	47710
-26	386-1402-00			1	PANEL,REAR:	80009	386-1402-00
					(ATTACHING PARTS)		
-27	213-0192-00			4	SCR,TPG,THD FOR:6-32 X 0.50 INCH,PNH STL	87308	OBD
-28	361-0326-00			1	SPACER,SLEEVE:0.18 ID X 0.25 OD X 0.10"L	80009	361-0326-00
					- - - * - - -		
-29	426-0499-04			1	FR SECT,PLUG-IN:BOTTOM	80009	426-0499-04
-30	426-0505-11			1	FR SECT,PLUG-IN:TOP	80009	426-0505-11
-31	214-1061-00			1	SPRING,GROUND:FLAT	80009	214-1061-00
-32	344-0210-00			1	CLIP,SPR TNSN:	80009	344-0210-00
-33	344-0211-00			1	CLIP,SPR TNSN:BOTTOM,PLASTIC	80009	344-0211-00
	105-0072-00	XB040000		1	CATCH,FRICTION:LOCKING TAB &LIP,ACETAL	80009	105-0072-00
					(ATTACHING PARTS)		
	211-0097-00	XB040000		1	SCREW,MACHINE:4-40 X 0.312 INCH,PNH STL	83385	OBD
	210-0586-00	XB040000		1	NUT,PL,ASSEM WA:4-40 X 0.25,STL CD PL	83385	211-041800-00
					- - - * - - -		
-34	----- -----			1	CKT BOARD ASSY:ROW COL DRIVER(SEE A1 EPL)		
					(ATTACHING PARTS)		
-35	211-0105-00			1	SCREW,MACHINE:4-40 X 0.188"100 DEG,FLH STL	83385	OBD
-36	211-0116-00			1	SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
-37	220-0547-01			1	NUT,BLOCK:0.38 X 0.25 X 0.282"OA	000FW	OBD
					- - - * - - -		

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-	----- -----			-		. CKT BOARD ASSY INCLUDES:		
-38	131-0608-00			30		. TERMINAL,PIN:0.365 L X 0.025 PH BRZ GOLD	22526	47357
	361-0816-00	XB060000		1		. SPACER,SWITCH:1.45 L X 0.465 W X 0.63 THK	80009	361-0816-00
	344-0199-00	XB060000		2		. CLIP,SPR,TNSN:U-SHAPED	80009	344-0199-00
-39	136-0252-04	B010100	B030399	478		. SOCKET,PIN TERM:U/W 0.016-0.018 DIA PINS	22526	75060-007
	136-0220-00	B030400	B040539X	10		. SKT,PL-IN ELEK:TRANSISTOR 3 CONTACT,PCB MT	71785	133-23-11-034
	136-0269-02	B030400	B040539X	16		. SKT,PL-IN ELEK:MICROCIRCUIT,14 DIP,LOW CLE	73803	CS9002-14
	136-0260-02	B030400	B040538	14		. SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CLE	71785	133-51-92-008
	136-0260-02	B040539		4		. SKT,PL-IN ELEK:MICROCIRCUIT,16 DIP,LOW CLE	71785	133-51-92-008
-40	131-0707-00			60		CONNECTOR,TERM.:22-26 AWG,BRS& CU BE GOLD	22526	47439
-41	175-0826-00			FT		WIRE,ELECTRICAL:3 WIRE RIBBON	80009	175-0826-00
-42	175-0828-00			FT		WIRE,ELECTRICAL:5 WIRE RIBBON	08261	SS-0526-710610C
-43	175-0830-00			FT		WIRE,ELECTRICAL:7 WIRE RIBBON	08261	SS-0726-710610C
-44	175-0833-00			FT		WIRE,ELECTRICAL:10 WIRE RIBBON	08261	SS-1026-7
-45	352-0161-04			2		CONN BODY,PL,EL:3 WIRE YELLOW	80009	352-0161-04
-46	352-0163-02			2		CONN BODY,PL,EL:5 WIRE RED	80009	352-0163-02
	352-0163-05			2		CONN BODY,PL,EL:5 WIRE GREEN	80009	352-0163-05
-47	352-0165-01			2		CONN BODY,PL,EL:7 WIRE BROWN	80009	352-0165-01
-48	352-0168-07			2		CONN BODY,PL,EL:10 WIRE VIOLET	80009	352-0168-07
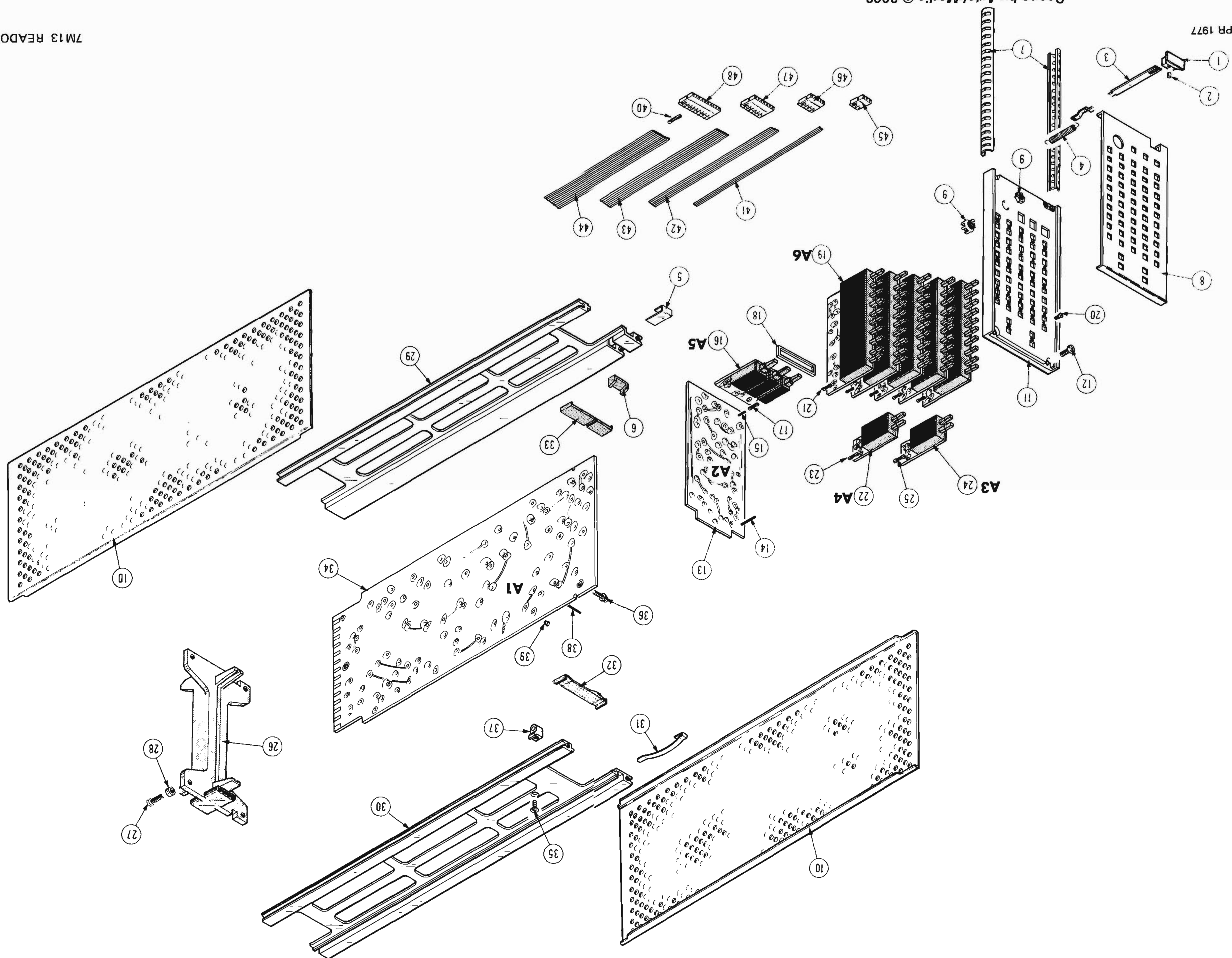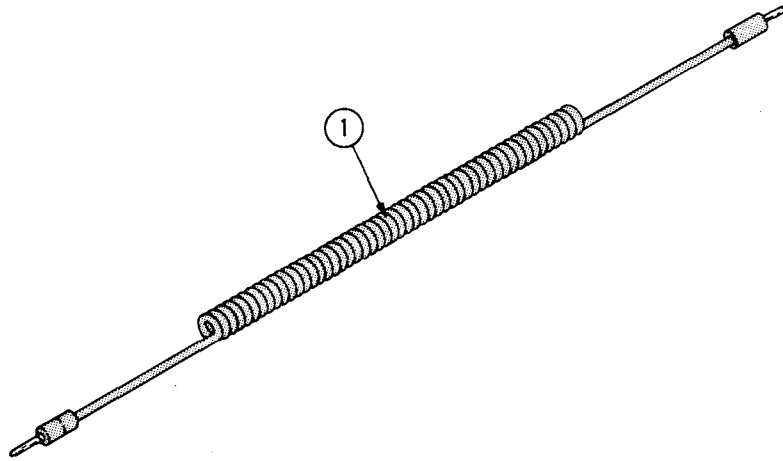
REV. B APR 1977

FIG. 1 EXPLODED

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1	012-0339-01			1		CABLE ASSEMBLY:INTERCONNECTING	82389	4C-4394
	070-1577-00			1		MANUAL:INSTRUCTION(NOT SHOWN)	80009	070-1577-00

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.

SERVICE NOTE

Because of the universal parts procurement problem, some electrical parts in your instrument may be different from those described in the Replaceable Electrical Parts List. The parts used will in no way alter or compromise the performance or reliability of this instrument. They are installed when necessary to ensure prompt delivery to the customer. Order replacement parts from the Replaceable Electrical Parts List.

CALIBRATION TEST EQUIPMENT REPLACEMENT

Calibration Test Equipment Chart

This chart compares TM 500 product performance to that of older Tektronix equipment. Only those characteristics where significant specification differences occur, are listed. In some cases the new instrument may not be a total functional replacement. Additional support instrumentation may be needed or a change in calibration procedure may be necessary.

Comparison of Main Characteristics

DM 501 replaces 7D13		
PG 501 replaces 107	PG 501 - Risetime less than 3.5 ns into 50 Ω.	107 - Risetime less than 3.0 ns into 50 Ω.
108	PG 501 - 5 V output pulse; 3.5 ns Risetime	108 - 10 V output pulse 1 ns Risetime
PG 502 replaces 107		
108	PG 502 - 5 V output	108 - 10 V output
111	PG 502 - Risetime less than 1 ns; 10 ns Pretrigger pulse delay	111 - Risetime 0.5 ns; 30 to 250 ns Pretrigger pulse delay
PG 508 replaces 114		
115	Performance of replacement equipment is the same or better than equipment being replaced.	
2101		
PG 506 replaces 106	PG 506 - Positive-going trigger output signal at least 1 V; High Amplitude output, 60 V.	106 - Positive and Negative-going trigger output signal, 50 ns and 1 V; High Amplitude output, 100 V.
067-0502-01	PG 506 - Does not have chopped feature.	0502-01 - Comparator output can be alternately chopped to a reference voltage.
SG 503 replaces 190, 190A, 190B	SG 503 - Amplitude range 5 mV to 5.5 V p-p.	190B - Amplitude range 40 mV to 10 V p-p.
191 067-0532-01	SG 503 - Frequency range 250 kHz to 250 MHz.	0532-01 - Frequency range 65 MHz to 500 MHz.
SG 504 replaces 067-0532-01	SG 504 - Frequency range 245 MHz to 1050 MHz.	0532-01 - Frequency range 65 MHz to 500 MHz.
067-0650-00		
TG 501 replaces 180, 180A	TG 501 - Trigger output-slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time.	180A - Trigger pulses 1, 10, 100 Hz; 1, 10, and 100 kHz. Multiple time-marks can be generated simultaneously.
181		181 - Multiple time-marks
184	TG 501 - Trigger output-slaved to market output from 5 sec through 100 ns. One time-mark can be generated at a time.	184 - Separate trigger pulses of 1 and 0.1 sec; 10, 1, and 0.1 ms; 10 and 1 μs.
2901	TG 501 - Trigger output-slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time.	2901 - Separate trigger pulses, from 5 sec to 0.1 μs. Multiple time-marks can be generated simultaneously.

NOTE: All TM 500 generator outputs are short-proof. All TM 500 plug-in instruments require TM 500-Series Power Module.

REV B, JUN 1978