



050-2123-01

M57566, M60366

A29U1720 REPLACEMENT

For TEKTRONIX® 7854 Oscilloscopes:

Serial Numbers B010100 - B085124

The FET Switch circuit board (pn 670-9234-00), provided in this kit, replaces the analog switch microcircuit (pn 156-1211-00), used for U1720 on the Display circuit board, A29. The new analog ~~switch~~ ~~microcircuit~~ on the new circuit board have a faster switching time, eliminating the display distortion which was sometimes noticeable when the old microcircuit was being used. The addition of the new FET Switch circuit board requires several changes to the Display circuit board, A29.

NOTE

If the instrument serial number is greater than those listed above or if this kit has been previously installed, these instructions may be disregarded and the FET Switch circuit board, provided in this kit, may be used as a direct replacement for A40.

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KIT PARTS LIST:

Ckt. No.	Quantity	Part Number	Description
A29W 1710 A29W 1810	2 ea	131-0566-00	Bus conductor, dummy resistor, 0Ω
A29C2400	1 ea	283-0651-00	Capacitor, mica, 430pF, 1%, 500V
A29C1610 A29C1611	2 ea	283-0769-00	Capacitor, mica, 278pF, 1%, 500V
A40	1 ea	670-9234-00	Circuit board, FET Switch
	1 ft		Wire, elec, 22 AWG, bare
	1 ea		Label, ident, 050-kit

INSTRUCTIONS:**WARNING**

Dangerous shock hazards may be exposed when the instrument covers are removed. Before proceeding, ensure the POWER switch is in the OFF position. Then, disconnect the power cable from the power source. Only qualified and experienced service personnel should attempt to install this kit.

CAUTION

This procedure requires soldering to be performed on the Display circuit board. This multi-layer circuit board is extremely sensitive to heat damage. Do not apply heat for longer than three seconds. Use only a 15-watt, pencil-type soldering iron and an approved vacuum solder extractor. Refer to the information under Soldering Techniques in the Maintenance section (3) of the 7854 Oscilloscope Service Manual for further details.

- () 1. Remove the right-side cover.
- () 2. Remove the five screws securing the circuit board support to the chassis. The support is located over the seven circuit boards to the right of the crt in the display unit of the instrument.
- () 3. Remove the circuit board support.
- () 4. Simultaneously lift up on the ejectors at each end of the Display circuit board, A29, to release the board from the Mother circuit board, A8.

- () 5. Pull the Display circuit board upward until the two coaxial cables can be disconnected from the jacks, J11 and J12, on the solder side of the board. Note the color coding and locations of the cables for reassembly.
- () 6. Remove the Display circuit board from the instrument.
- () 7. Remove the following components from the Display circuit board (see Fig. 1 on the next page for locations):
 - () a. Microcircuit U1720 from its socket.

CAUTION

This procedure requires the removal of a microcircuit socket from the Display circuit board. Care must be exercised when removing the socket. Excessive heat can damage the thru-hole plating of the multi-layer circuit board, thus, destroying the board. Do not apply heat for longer than three seconds. Do not apply heat to adjacent leads consecutively. Allow a moment for the circuit board to cool before proceeding to the next pin.

The following method is recommended for the removal of the socket.

From the back or solder side of the circuit board, unsolder each lead of the microcircuit socket. Use only an approved vacuum solder extractor to remove the solder. Unsolder the pins in the following order: 1, 5, 9, 13, 2, 6, 10, 14, 3, 7, 11, 15, 4, 8, 12, and 16. Press on each lead with a scribe, or similar device, to ensure all the leads are detached from the feed-through holes. Then, carefully pry the microcircuit socket away from the circuit board.

- () b. The microcircuit socket for U1720.
- () c. Resistor R1830, a 15k Ω located between U1730 and Q1830.
- () d. Transistor Q1820. Note the location of the emitter and base leads.
- () 8. Ensure the feed-through holes for the emitter and base leads of the removed transistor, Q1820, are free of any obstruction.
- () 9. Prepare a small piece of 22 AWG, bare wire, provided in the kit, to connect between the feed-through holes which were used for the emitter and base leads of the removed transistor, Q1820.

- () 10. Install the piece of bare wire into the holes for the emitter and base leads of Q1820 and solder the wire in place. Trim the excess wire length flush with the back of the circuit board.

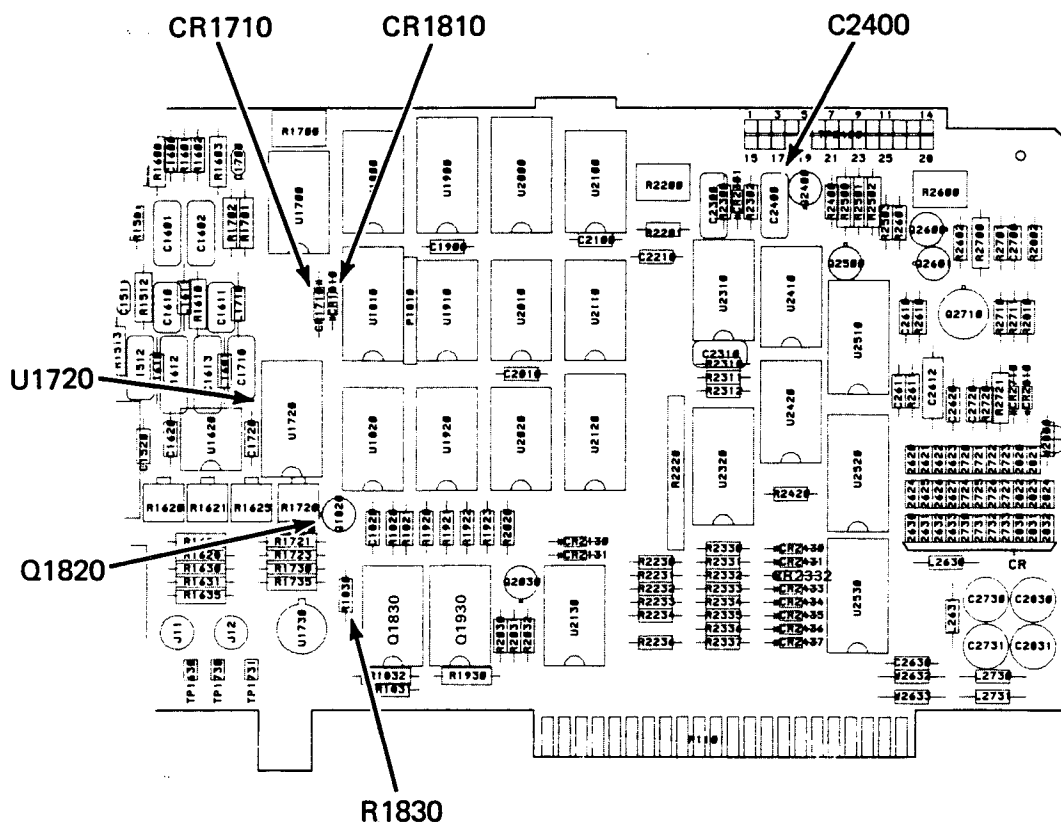


Fig. 1. Partial component side of the Display circuit board, A29, showing affected component locations.

- () 11. Replace the following components on the Display circuit board with the indicated parts provided in the kit:
- () a. The two diodes (CR1710 and CR1810), located adjacent to U1810, with the two bus conductors (dummy resistors), W1710 and W1810.
 - () b. Capacitor C2400 (278pF), located adjacent to Q2400, with the 430pF capacitor.
- () 12. Trim the excess lead length of the microcircuits, U1820 and U1920, as close as possible to the back (solder side) of the Display circuit board.

- () 13. Ensure the feed-through holes which were used for the socket of U1720 are free of any obstruction.

NOTE

Two short pieces of bare wire need to be added perpendicular to the back of the Display circuit board. These wires will provide support for the new FET Switch circuit board as well as supply +5 volts to the board. While only approximately 1/4-inch of wire is actually required, it is recommended that a 1-inch piece be used initially and then cut to the proper length after the board is installed.

- () 14. Carefully solder 1-inch pieces of the 22 AWG. bare wire perpendicular to the back of the Display circuit board at pins 8 and 14 of U2020.
- () 15. Install the new FET Switch circuit board, A40, onto the back of the Display circuit board. Insert the two wires, added to the back of the Display circuit board in the previous step, through the two holes located adjacent to pins 8 and 14 of U1, the 14-pin microcircuit, on the new board. Insert the seven square pins on the back side of the new board through the holes for pins 2 through 8 of the removed microcircuit U1720.

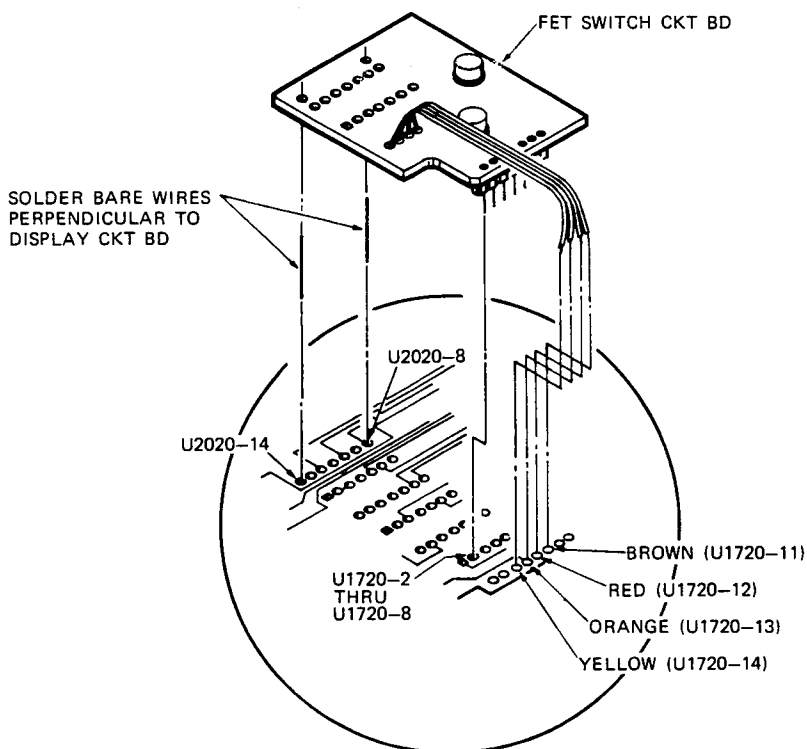


Fig. 2. Installation of the FET Switch circuit board onto the back of the Display circuit board.

NOTE

The plastic form for the seven square pins on the back of the FET Switch circuit board acts as a spacer between the new board and the Display circuit board. Hold the plastic form flat against the Display circuit board and look between the two boards to ensure there is no unnecessary contacts being made. If there are any contacts, remove the FET Switch circuit board and cut off the protrusions causing the contacts. Then, reinstall the FET Switch circuit board.

- () 16. Carefully solder the seven square pins to the front (component side) of the Display circuit board. Ensure the form for the square pins is flat against the back of the Display circuit board and the FET Switch circuit board is parallel to the Display circuit board.
- () 17. Carefully solder the two perpendicular bare wires to the FET Switch circuit board. These two wires need to be soldered quickly so that the wires do not become unsoldered from the Display circuit board.
- () 18. After the solder cools, ensure the solder connection for the two bare wires to pins 8 and 14 of U2020 on the Display circuit board is still good.
- () 19. Trim the excess length of the two bare wires flush with the top side of the FET Switch circuit board.
- () 20. Solder the four-wire ribbon cable on the FET Switch circuit board to the following points on back of the Display circuit board:
 - () a. Brown wire to the hole for pin 11 of the removed socket for U1720.
 - () b. Red wire to the hole for pin 12 of U1720.
 - () c. Orange wire to the hole for pin 13 of U1720.
 - () d. Yellow wire to the hole for pin 14 of U1720.
- () 21. Clean the excess flux from the new solder connections, using isopropyl, methyl, or ethyl alcohol.
- () 22. Install the Display circuit board into the circuit board guides and then connect the two coaxial cables to the coaxial jacks, J11 and J12, on the back of board.
- () 23. Allow the Display circuit board to slide down until the edge-card contacts mate with the connectors on the Mother circuit board. Then, press firmly and evenly on the top edge of the board in the areas directly above the connectors to properly seat the edge-card contacts.

NOTE

Capacitors C1610 and C1611, located on the Display circuit board, A29, have been made selectable components. The capacitors are selected to improve the transisent response of a stored waveform having a low repetition rate, e.g., a 10kHz square wave, when displayed in the VECT mode. The range of selection for the capacitors is 220pF to 300pF. The nominally installed value is 220pF. In most cases, the two 278pF capacitors, provided in the kit, can be used, if necessary, to reduce overshoot on the leading edge of the stored waveform. Two other values, 250pF (pn 283-0785-00) or 300pF (pn 283-0770-00), may be needed in rare instances.

- () 24. Refer to the Calibration section (4) of the 7854 Oscilloscope Service Manual and check instrument performance, making any necessary adjustments. Ensure the Display System is properly adjusted.
- () 25. Install the circuit board support and secure the support with the screws removed earlier.
- () 26. Install the right-side cover.
- () 27. Remove the protective backing from the 050-kit label, provided in the kit, and apply the label to a clean, dry area on the rear panel of the Display Unit.
- () 28. Attach the following manual insert to the 7854 Oscilloscope Service Manual.

TEKTRONIX

MANUAL MODIFICATION INSERT

A29U1720 REPLACEMENT

for

7854 Oscilloscopes

Serial Numbers B010100 - B085124

Installed in SN _____ Date _____

This modification insert is provided to supplement the manual for the above listed product(s). The information given in this insert supersedes that given in the manual.

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GENERAL INFORMATION

The FET Switch circuit board (pn 670-9234-00) replaced the analog switch microcircuit (pn 156-1211-00), used for U1720 on the Display circuit board, A29. The new analog switches on the new circuit board have a faster switching time, eliminating the display distortion which was sometimes noticeable when the old microcircuit, U1720, was used. The new circuit board required several changes to the Display circuit board.

THEORY OF OPERATION

Section 2

Replace the OUTPUT SELECTOR article under the DISPLAY D/A AND AMPLIFIER discription with the following:

FET SWITCH

FET Switch circuit board, A40, provides selection of either dot or vector display of digitized waveforms and amplification of the selected signal.

Integrated circuits U1, U2, and U3 provide a selection circuit to select dot or vector mode of displaying digitized waveforms, depending on the level of the Vect (vector) command at pins 1 and 2 of U1A. When the selection circuit is enabled by a LO on the DSYOFF line, and the Vect command is LO, vertical and horizontal information for a dot display is selected by U2 and U3, respectively. This information is applied to the Vertical Amplifier and Horizontal Amplifier circuits (see diagrams 9 and 11). If the Vect command is HI, information for a vector display is applied to these amplifiers. When the selection circuit is disabled, no digital display information is applied to the Vertical or Horizontal Amplifier circuits. At this time, U1730 is enabled and both outputs are tied to ground potential. Alphanumeric characters are always displayed in dot mode.

REPLACEABLE ELECTRICAL PARTS

Section 6

Ckt. No.	Tektronix Part Number	Description
A29C1610*	283-0625-00	Capacitor, mica, 220pF, 1%, 500V (nominal, sel)
A29C1610*	283-0769-00	Capacitor, mica, 278pF, 1%, 500V (sel)
A29C1610*	283-0770-00	Capacitor, mica, 300pF, 1%, 500V (sel)
A29C1610*	283-0785-00	Capacitor, mica, 250pF, 1%, 500V (sel)
A29C1611*	283-0625-00	Capacitor, mica, 220pF, 1%, 500V (nominal, sel)
A29C1611*	283-0769-00	Capacitor, mica, 278pF, 1%, 500V (sel)
A29C1611*	283-0770-00	Capacitor, mica, 300pF, 1%, 500V (sel)
A29C1611*	283-0785-00	Capacitor, mica, 250pF, 1%, 500V (sel)
A29C1615	281-0809-00	Capacitor, cer, 200pF, 5%, 100V
A29C2400	283-0651-00	Capacitor, mica, 430pF, 1%, 500V
A29CR1710	Deleted	
A29CR1810	Deleted	
A29Q1820	Deleted	
A29R1830	Deleted	
A29W1710	131-0566-00	Bus conductor, dummy resistor, 0Ω
A29W1810	131-0566-00	Bus conductor, dummy resistor, 0Ω

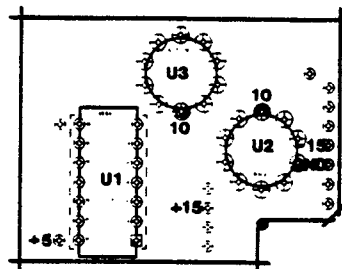
*C1610 and C1610 are selected for best transient response of a stored waveform having a low repetition rate, e.g., a 10kHz square wave, when displayed in the VECT mode.

Ckt. No.	Tektronix Part Number	Description
A40†	670-9234-00	Circuit board, FET Switch
A40U1	156-0382-02	Microcircuit, dgtl, quad 2-inp NAND; 74LS00NP3
A40U2	156-1236-00	Microcircuit, intfc, dual SPST analog switch; DC181
A40U3	156-1236-00	Microcircuit, intfc, dual SPST analog switch; DC181

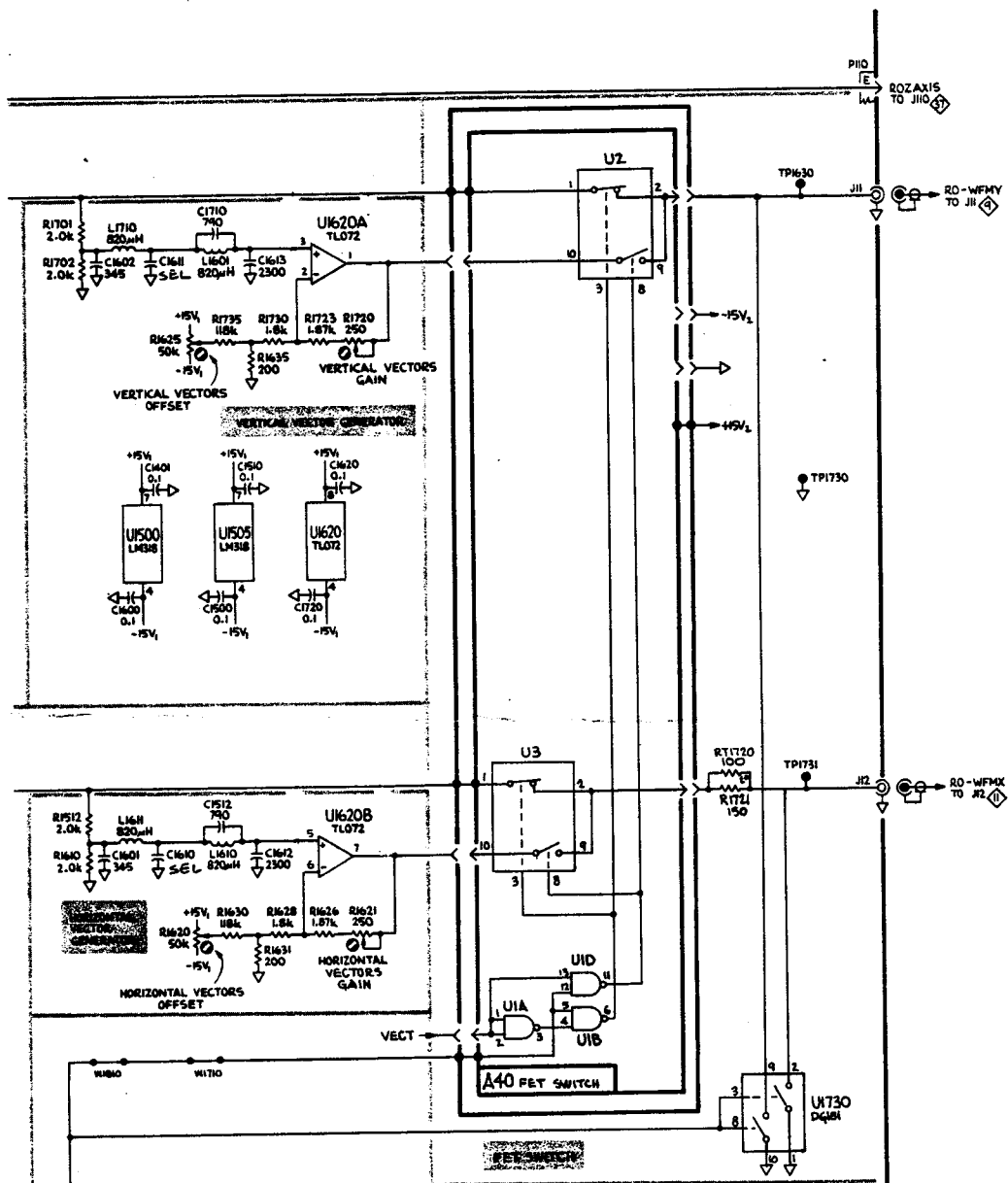
†The Display circuit board, A29, and the FET Switch circuit board, A40, can be ordered as an assembly, using part number 672-0186-XX.

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Section 7



Component locator diagram for the FET Switch circuit board, A40.



Partial - DISPLAY D/A AND AMPLIFIER 34 schematic.