



040-0944-00

Type 465B

DM44 - DIGITAL MULTIMETER

For TEKTRONIX<sup>®</sup> 465B Oscilloscopes\*

Serial Numbers B010100 - Up

This modification kit provides parts and instructions to install the DM44-DIGITAL MULTIMETER.

The DM44 provides the following:

- 1) A digital readout to replace the function of the ten-turn counting dial on the DELAY TIME POSITION Control.
- 2) A precision DC voltmeter with ranges from 0-200mV to 0-1200V in five steps.
- 3) A precision ohmmeter with ranges from 0-200 $\Omega$  to 0-20 Megohms in six decade steps.
- 4) A precision temperature probe with a range of -55°C to +150°C.
- 5) A 1/time function for convenience in making frequency measurements with an accuracy of 2% or better.

All of the above features are included in a unit that mounts on top of the instrument, inside a new-wraparound cover.

\*The 465B DM44 operates on 115-230 VAC ONLY and CANNOT be used with Option 7 (External DC Operation).

## PARTS INCLUDED IN MODIFICATION KIT:

Ckt. No.	Quantity	Part Number	Description
-----	1 ea	-----	DELAY TIME POSITION Assembly, consisting of:
A6R1602	1 ea	311-1709-00	Resistor, variable, 20k $\Omega$ 10-turn
	1 ea	198-3519-00	Cable, 3-wire ribbon w/connector
	1 ea	012-0427-00	Test Leads
	1 ea	016-0594-00	Pouch, Accessory
	1 ea	070-2036-01	Manual, DM44 Service
	10 ea	131-0608-00	Terminal, 0.25-square pin, 0.368 long
	1 ea	175-2755-00	Cable assembly, 10-wire ribbon w/connectors
	1 ea	175-2756-00	Cable assembly, 3-wire ribbon w/connectors
	1 ea	175-2757-00	Cable assembly, 7-wire ribbon w/connectors
	1 ea	200-1722-00	Cover, DM44 top
	1 ea	200-1723-00	Cover, Front, for Oscilloscope w/DM44
	1 ea	210-0012-00 <sup>1</sup>	Washer, lock, 0.375 ID
	1 ea	210-0590-00 <sup>1</sup>	Nut, hex, 0.375-32 x 0.438
	2 ea	210-0803-00 <sup>2</sup>	Washer, flat, 0.375 OD x 0.150 ID
	3 ea	210-0938-00 <sup>3</sup>	Washer, flat, 0.250 OD x 0.109 ID
	1 ea	210-0978-00 <sup>1</sup>	Washer, flat, 0.500 OD x 0.375 ID
	3 ea	211-0008-00 <sup>3</sup>	Screw, 4-40 x 0.250, PNH
	2 ea	212-0130-01 <sup>4</sup>	Screw, 8-32 x 0.625 PNH, w/retainer
	2 ea	213-0146-00 <sup>2</sup>	Screw, 6-20 x 0.312 thread-forming, PNH
R6024,R6025	2 ea	321-0928-07	Resistor, film, 250 $\Omega$ 0.1% 0.125W
A6R6023	1 ea	321-0612-07	Resistor, film, 500 $\Omega$ 0.1% 0.125W
A6R6019	1 ea	321-0252-00	Resistor, film, 4.12k $\Omega$ 1% 0.125W
A6R6012	1 ea	321-0265-00	Resistor, film, 5.62k $\Omega$ 1% 0.125W
	1 ea	348-0063-00	Grommet, plastic, 0.5 OD
	1 ea	366-1563-00	Knob, gray, 0.252 ID x 0.825 OD
	1 ea	437-0174-02	Cabinet, wraparound
	1 ea	672-0453-00	Circuit board, DMM Power Supply
	1 ea	672-0591-10	Circuit board, DM44 Main, w/010-6430-00 temperature probe

<sup>1</sup>Mounting hardware for A6R16002 (DELAY TIME POSITION).<sup>2</sup>Mounting hardware for DM44 Main circuit board assembly.<sup>3</sup>Mounting hardware for DM44 Power Supply.<sup>4</sup>Mounting hardware for Accessory Pouch.

INSTRUCTIONS:

WARNING

DISCONNECT THE INSTRUMENT FROM ITS POWER SOURCE.

A. TO REMOVE THE CABINET:

- ( ) 1. Install the front panel cover and set the instrument face down on a flat surface.
- ( ) 2. Unwrap the power cord from the instrument rear feet.
- ( ) 3. Loosen the four rear feet and the two ring assembly mounting screws.
- ( ) 4. Remove the rear cabinet frame from the instrument as an intact assembly.
- ( ) 5. Lift the cabinet up until it is separated from the instrument and power cord.

B. TO INSTALL THE NEW DELAY-TIME-POSITION CONTROL (R16002):

- ( ) 1. Disconnect the 3-wire ribbon cable connector from P6002 on the Timing circuit board.
- ( ) 2. Remove the DELAY TIME POSITION 10-turn-counting dial and the mounting hardware for the variable resistor (R16002).
- ( ) 3. Replace R16002 (A 2k $\Omega$  10-turn variable resistor) with the 20k $\Omega$  10-turn variable resistor from the kit, using the new hardware indicated by Note 1 in the parts list.
- ( ) 4. Install the gray knob from the kit on the shaft of R16002.
- ( ) 5. Connect the 3-wire ribbon cable from the new R16002 to P6002 on the Timing circuit board.

NOTE: Be sure to match the arrow on the connector holder to the arrow on the circuit board.

### C. TO INSTALL THE DM44 POWER SUPPLY ASSEMBLY:

- ( ) 1. Install the 0.5-inch plastic grommet from the kit in the hole in the 465B bulkhead between the power transformer and the crt assembly.
- ( ) 2. Position the DM44 Power Supply on the crt side of the bulkhead with the open side of the Power Supply chassis toward the top of the instrument.
- ( ) 3. Thread the unterminated end of the 5-wire ribbon cable through the new grommet and dress the cable to the outside edge of the 465B power transformer.
- ( ) 4. Fasten the DM44 Power Supply to the bulkhead using the hardware indicated by Note 3 in the parts list as follows:
  - ( ) a. Install the two top screws from the crt side of the bulkhead.
  - ( ) b. Use a long-bladed magnetic screwdriver to install the third power supply mounting screw from the power transformer side into the press-mount nut on the lower rear edge of the DM44 Power Supply.
5. Solder the wires in the 5-wire ribbon cable to the power transformer as shown in Fig. 1:

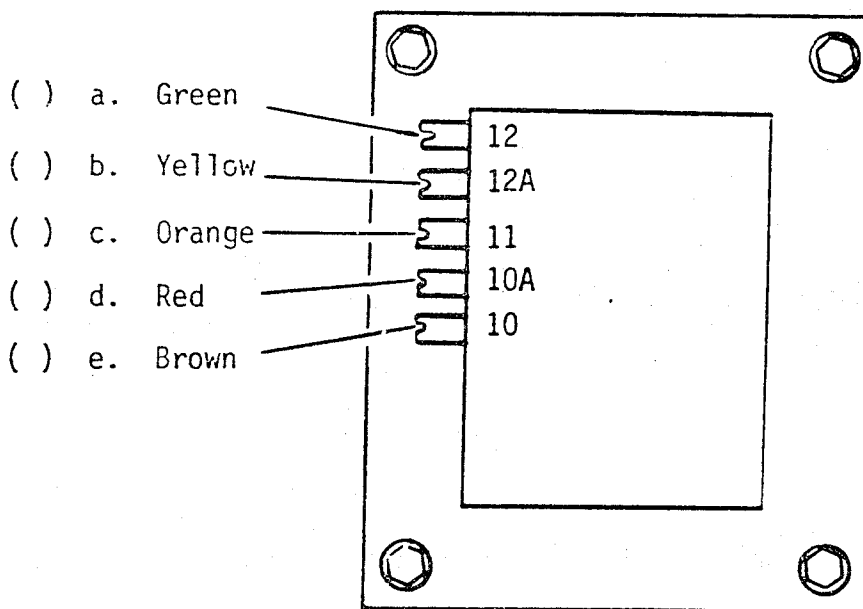


Fig. 1. Power Transformer Connections

D. TO MODIFY THE TIMING CIRCUIT BOARD:

Make the following changes on the Timing circuit board. See Fig. 2 for parts location.

- ( ) 1. Replace R6012 (a  $562\Omega$  0.125W resistor) with the  $5.62k\Omega$  resistor from the kit.
- ( ) 2. Replace R6019 (a  $412\Omega$  0.125W resistor) with the  $4.12k\Omega$  resistor from the kit.
- ( ) 3. Add R6023, the  $500\Omega$  resistor from the kit.
- ( ) 4. Add R6024, one of the  $250\Omega$  resistors from the kit.
- ( ) 5. Add R6025, the other  $250\Omega$  resistor from the kit.
- ( ) 6. Solder the ten square terminal pins from the kit into the ten circuit board holes provided at P6025.

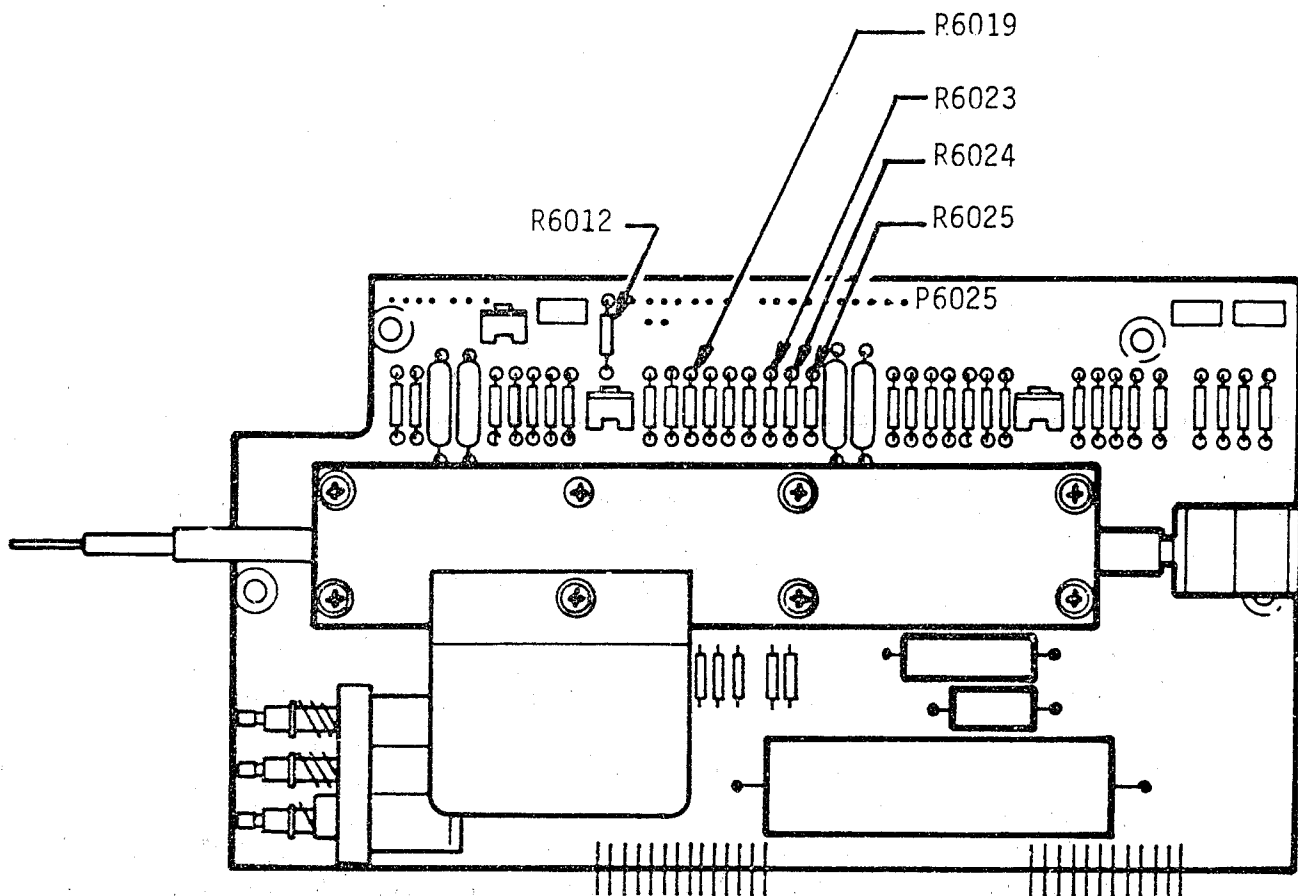


Fig. 2. Timing Circuit Board.

E. TO MODIFY THE TRIGGER GENERATOR & SWEEP LOGIC CIRCUIT BOARD:

- ( ) 1. Remove C7052, a 1.0 $\mu$ F capacitor located next to P7052 on the A7 Trigger Generator & Sweep Logic circuit board.

F. TO INSTALL THE DM44 MAIN CIRCUIT BOARD ASSEMBLY:

(See Fig. 3 for parts locations on the DM44 circuit board.)

- ( ) 1. Dress the 5-wire ribbon cable from the DM44 power supply through the elongated hole in the plastic and aluminum mounting plates at the center rear of the DM44 chassis and connect to P3476 on the DM44 Main circuit board.
- ( ) 2. Connect the appropriate end of the 3-wire ribbon cable included in the kit to P1920 on the 465B Vertical Preamplifier circuit board.
- ( ) 3. Dress the cable from P1920 across the 465B so that the brown and red wires in the cable connect to P3201 on the DM44 Main circuit board, and the orange wire connects to P3215 on the same board.
- ( ) 4. Fit the front end of the DM44 chassis in the slot in the edge of the 465B front casting.
- ( ) 5. Fasten the rear of the DM44 assembly to the edge of the 465B bulk-head, using the hardware indicated by Note 2 in the parts list.
- ( ) 6. Install the 10-wire ribbon cable (from the kit) between P6025 on the 465B Timing circuit board and P3306 on the DM44 Main circuit board.
- ( ) 7. Install the 7-wire ribbon cable (from the kit) between P6015 on the Timing circuit board and P3255 on the DM44 circuit board.
  
- ( ) Refer to the DM44 and 465B Service Manuals to check the calibration adjustments as necessary.

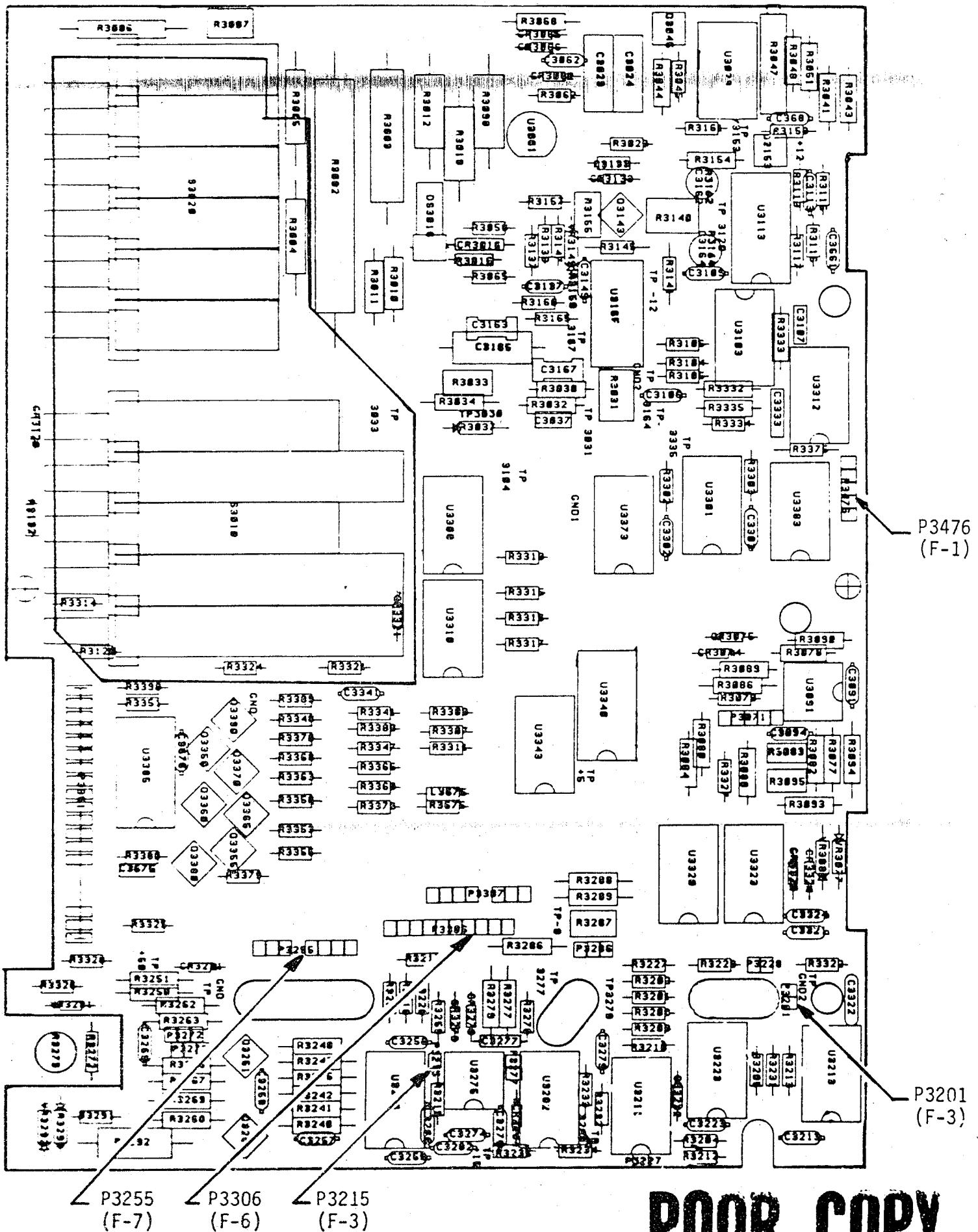


Fig. 3. DM44 Main Circuit Board.

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G. TO INSTALL THE NEW CABINET:

- ( ) 1. Disconnect the instrument from the power source.
- ( ) 2. Install the new front panel cover and set the instrument face down on a flat surface.
- ( ) 3. Place the handle of the new cabinet against the bottom of the cabinet.
- ( ) 4. Pull the power cable through the cabinet and carefully slide the cabinet over the instrument. Avoid pinching cables or damaging components that protrude above the circuit boards.
- ( ) 5. Using both hands, press lightly on the top and bottom sides of the cabinet to guide the front edge of the cabinet into the braid-gasket groove around the periphery of the front panel frame.
- ( ) 6. Pull the power cord through the rear cabinet frame and align the cutout portion in the frame for proper fit at the Line Voltage Selector assembly.
- ( ) 7. Set the rear cabinet frame in place. Seat the cabinet edge in the gasket groove of the front and rear frames and tighten the six screws of the rear frame to a snug fit. Do not overtighten these screws.
- ( ) 8. Install the DM44 plastic cover and the new accessory pouch, using the two 8-32 x 0.625 screws from the kit.

KM:cs