TEKTRONIX®

DM 501
DIGITAL MULTIMETER

INSTRUCTION MANUAL

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INSTRUCTION MANUAL

Tektronix, Inc.
P.O. Box 500
Beaverton, Oregon 97005

Serial Number _____

070-1446-00

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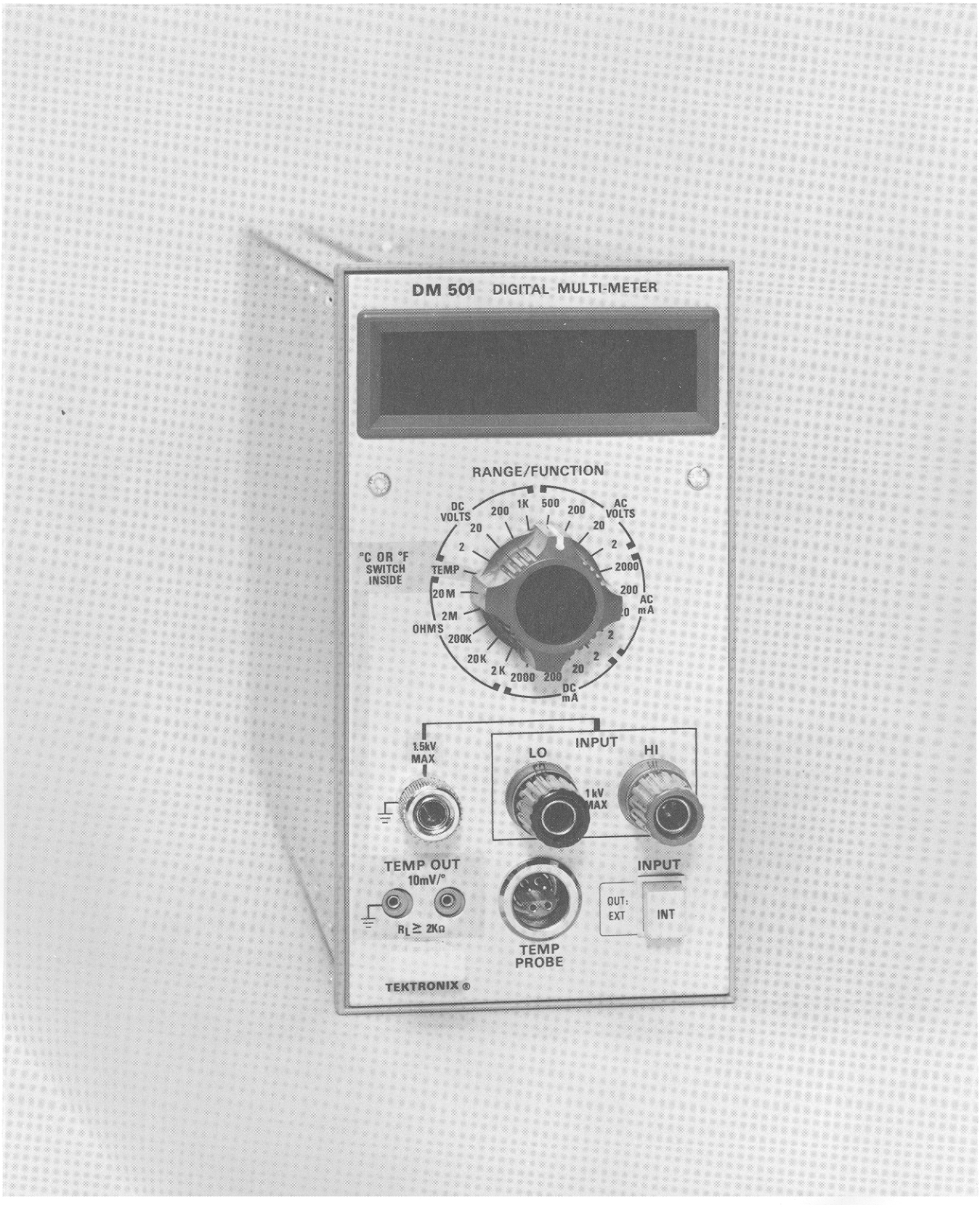
DM 501 DIGITAL MULTI-METER
RANGE/FUNCTION
DC VOLTS
200
1K
500
200
AC VOLTS
20
2
2000
200
AC mA
2
2
20
DC mA
2000
200
20K
2K
200K
2M
OHMS
20M
TEMP
°C OR °F SWITCH INSIDE
1.5kV MAX
INPUT
LO
HI
1kV MAX
TEMP OUT
10mV/°
RL ≥ 2KΩ
TEMP PROBE
INPUT
OUT: EXT
INT
TEKTRONIX ®

OPERATING INSTRUCTIONS

INTRODUCTION

Instrument Description

The DM 501 Digital Multimeter measures DC and AC voltage and current, resistance and temperature. The AC functions respond to average values, and display RMS values. A single front-panel control selects all functions and ranges. A push button selects front panel input or rear interface connector input. Temperature measurements are made using a TEKTRONIX P6058 Probe (Part No. 010-0260-00) or other suitable sensing devices. Option 1 instruments are shipped without the P6058 probe. Front-panel pin jacks provide external temperature readout, independent of the function being displayed. An internal switch selects degrees calibration in either Centigrade or Fahrenheit. Option 2 instruments delete the temperature measuring capability.

The readout is a 4 1/2-digit stored display using seven-segment LED's. The decimal point is automatically positioned by the RANGE/FUNCTION switch and leading zeros (those to the left of the decimal point or most significant digit) are blanked. Polarity indication is automatic. A blinking display indicates overrange. Serial BCD output is available at the rear interface connector.

Installation and Removal

The DM 501 is calibrated and ready for use when received. It operates in any compartment of a TM 500 Series Power Module. See the Power Module instruction manual for line voltage requirements and Power Module operation. Fig. 1-1 shows the DM 501 installation and removal procedure.

CAUTION

Turn the Power Module off before inserting the plug-in; otherwise, damage may occur to the plug-in circuitry. Check that the DM 501 is fully inserted in the Power Module. Pull the PWR switch on the Power Module. One or more characters in the LED display should now be visible.

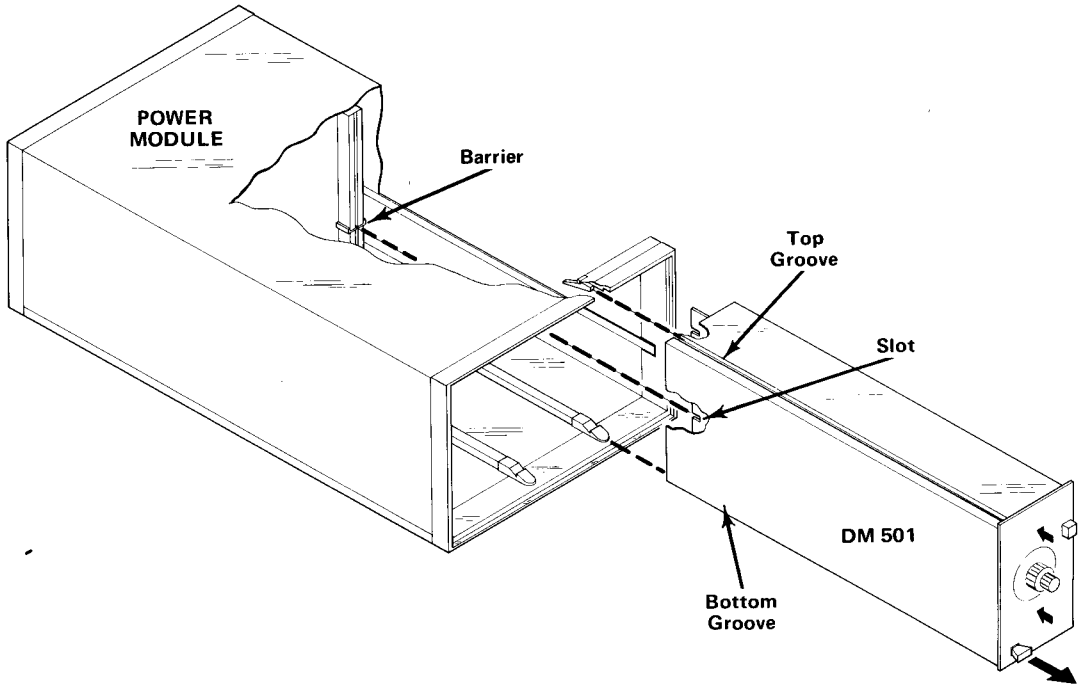

Fig. 1-1. DM 501 Installation and Removal.

The Controls, Connectors and Adjustments foldout page in Section 3 gives a complete description of the front panel. Rotate the RANGE/FUNCTION switch from the 2000 DC mA position to the 2 DC mA position. The decimal point must be visible in the right-hand character, and move one character left as the switch is rotated through each step. No characters are visible to the left of the decimal point, except the polarity sign. Go to the service section of this manual if the above display cannot be obtained.

OPERATING CONSIDERATIONS

Input Connections

Three binding posts provide measurement connections. The HI and LO posts are normally used for all measurements except temperature. Normal measurement conditions will be with the LO terminal ungrounded. A connection between the LO and GND post may be made to reference the input against DM 501 chassis ground. Use caution, as the LO terminal is then connected to earth ground through the three-wire power cord, and false readings may be obtained due to ground loops.

If the INPUT button is pushed in, signal inputs are made via the rear interface connector; if the button is out, signal inputs are made via the front panel.

Functions Available at Rear Connector

HI, LO, GROUND, TEMP OUT and BCD connections are available at the rear interface connector. Fig. 1-2 gives interface connector pin assignments. BCD (binary coded decimal) outputs are serialized by digit in an 8-4-2-1 code. The DM 501 has a slot between pins 17 and 18. A barrier in the corresponding position of the Power Module jack allows only compatible plug-ins to be used in that compartment. This protects the plug-in, should specialized connections be made to that compartment. Consult the Building A System section of the Power Module manual for further information.

Sine-Wave Response

The DM 501 responds to the average value of a sinusoidal current or voltage. The readout indicates the equivalent RMS value. The effective or RMS value of a sine wave is 0.707 times the peak voltage or current. The average value (equivalent DC output of a full wave rectifier) is 0.636 of the peak value. The scale factor of the DM 501 is 0.636/0.707 or 0.9. Multiply the DM 501 readout by 0.9 to obtain the average value of a sinusoidal input voltage or current.

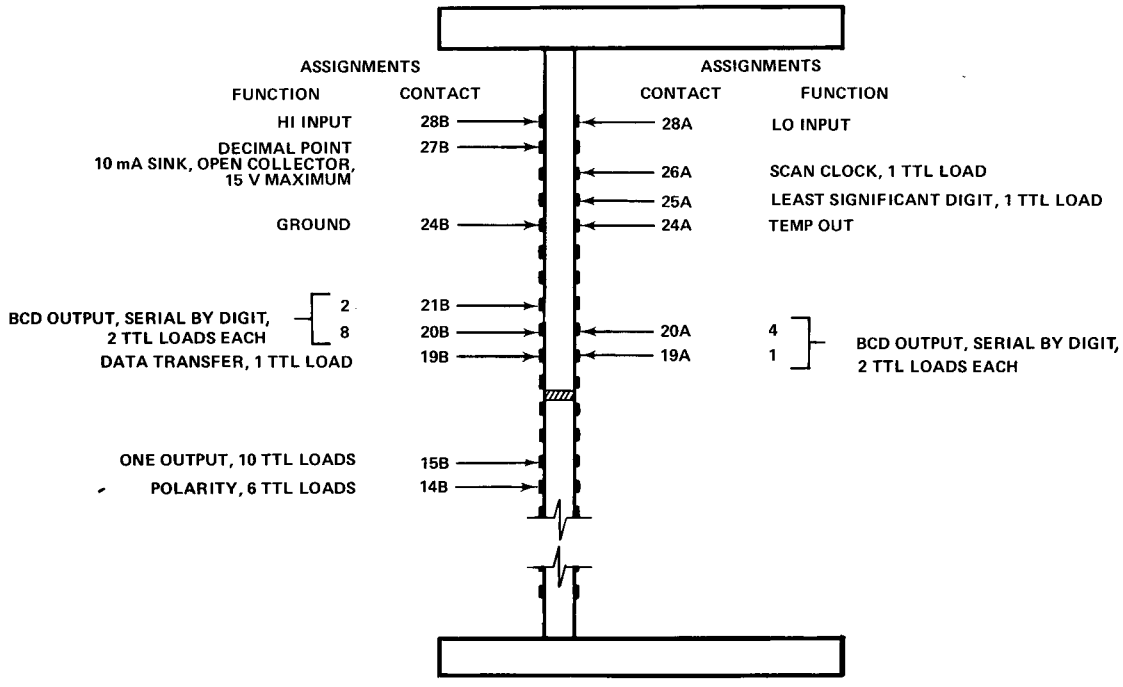

Fig. 1-2. Input-Output assignments, and fanout capabilities, for plug-in rear interface connector contacts.

Temperature Measurements

Connect the P6058 (or other sensing device) to the connector marked TEMP PROBE. Use care to align the connector pins properly. Two front-panel pin jacks labeled TEMP OUT provide continuous output at 10 mV per degree, into loads ≥2 kΩ, for input to external recorders or other readout devices. Select calibration in °F or °C with switch S125 shown on the Controls, Connectors and Adjustments foldout page.

MAKING MEASUREMENTS

With the DM 501 properly installed in the Power Module, allow twenty minutes warmup time for operation to specified accuracy. When the value of the quantity being measured is unknown, select the highest range first. Decrease the range setting until the display blinks indicating over-range. Increase the range switch to the next higher position. This method obtains maximum resolution. Resolution of the DM 501 is 0.005% of full scale setting, except temperature, which is 0.1°. Do not exceed the maximum voltage ratings. With the RANGE/FUNCTION switch in the 1 K DC VOLTS or 500 AC VOLTS positions, internal damage may result before overrange is indicated.

DC Voltage Measurements

Select an appropriate full range DC voltage position on the RANGE/FUNCTION switch. Apply the voltage to be measured to the INPUT binding posts. Observe the maximum voltage ratings as indicated on the front panel. The readout displays a + if the HI input is positive with respect to the LO input. A − is displayed if the LO input is more positive. With the input shorted, the display reads zero, ±1 count.

DC Current Measurements

Select an appropriate full scale DC mA position on the RANGE/FUNCTION switch. Apply the DC current to be measured to the INPUT binding posts. A current (electron flow) into the LO connector and out of the HI connector indicates + on the display. For opposite current flow, a − will be displayed.

AC Voltage, Current, and Resistance Measurements

Select an appropriate full scale AC VOLTS, AC mA, or OHMS position on the RANGE/FUNCTION switch. Connect the unknown voltage, current, or resistance to the INPUT binding posts.

Temperature Measurements

With the P6058 Probe connected to the front panel connector labeled TEMP PROBE, set the RANGE/FUNCTION switch to the TEMP position. Apply the probe sensor tip to the device being measured. For optimum temperature transfer, coat the surface of the device being measured with silicon grease and apply the probe tip squarely to the surface. Allow sufficient time for the probe tip to stabilize before taking a reading. The time required depends upon several factors. Generally, when the tip is first applied to the device under test, the readings change rapidly. As the probe tip temperature approaches the temperature of the device under test, the readings change less rapidly, and finally stabilize. The readings are in °C or °F, depending on the position of the internal S125. See the P6058 Probe manual for more information on temperature measurements and probe use.

Using a Transistor as a Temperature-Sensing Device

Certain NPN transistors such as a 2N2484 can be used as separate sensors in place of the probe with little or no selection of the transistor. Connect the temperature-sensing transistor to the DM 501 through the TEMP PROBE connector as shown in Fig. 1-3. Accuracy without recalibration of the DM 501 is within ±5°C for measurements from −55°C to 125°C. If the measurement to be made requires greater accuracy, check the calibration of the DM 501. Place the sensing device in an environment having a known ambient temperature. Use any difference between the known temperature and the DM 501 readout as a correction factor throughout the entire measurement range.

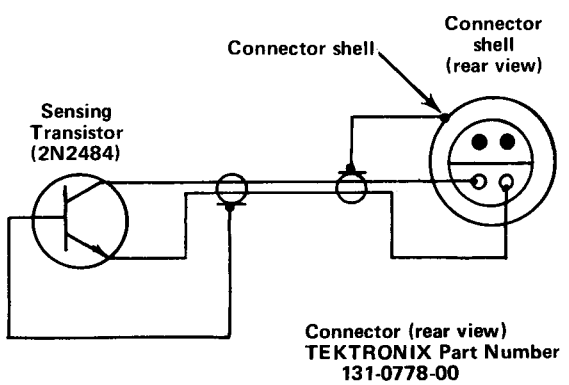

Fig. 1-3. Schematic diagram of temperature-sensing transistor connected to probe connector.

Using the P6058 as a Voltage Measuring Probe

The P6058 probe can be used as a 1X voltage measuring probe. See the probe instruction manual for required accessories and probe use. Internal connections must be made in the DM 501 as shown in Fig. 1-4. When the INPUT button is in, the P6058 is connected to the DM 501 input for voltage measurements. Connect the probe ground strap to the circuit common and the probe tip to the voltage being measured.

To make these connections, unsolder the white-with-red striped wire and the white-with-brown striped wire from the holes in the circuit board in the illustration. Tape the ends of these wires. Cut and strip two wires about 1.5 inches in length. Connect these wires as shown in the illustration.

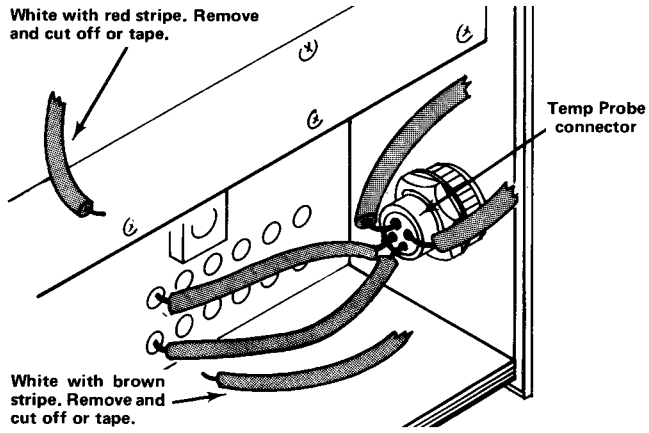

Fig. 1-4. Rear view of TEMP PROBE Connector showing connections necessary to use the P6058 probe as a voltage probe.

SPECIFICATIONS

Performance Conditions

The electrical characteristics are valid only if the DM 501 is calibrated at an ambient temperature between +20°C and +30°C, and operated between +15°C and +35°C, unless otherwise noted.

DC VOLTMETER

RANGES:

2 V, 20 V, 200 V, 1000 V.

ACCURACY:

±0.1% of reading, ±2 counts.

COMMON MODE REJECTION:

≥100 dB at DC, 80 dB at 60 Hz with I kΩ unbalance.

NORMAL MODE REJECTION:

≥30 dB at 60 Hz increasing 20 dB per decade.

STEP RESPONSE TIME:

<1 s.

INPUT RESISTANCE:

10 MΩ.

AC VOLTMETER

RANGES:

2 V, 20 V, 200 V, 500 V.

ACCURACY:

±0.7% of reading, ±2 counts, 40 Hz to 10 kHz.
±1.2% of reading, ±2 counts, 20 Hz to 20 kHz.
Usable to 100 kHz. Typically <5% down between 0.4 V and 500 V at 100 kHz.

RESPONSE TIME:

<10 s.

INPUT IMPEDANCE:

10 MΩ paralleled by <70 pF.

OHMMETER

RANGES:

2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 20 MΩ.

ACCURACY:

2 kΩ thru 2 MΩ Range, ±0.3%, ±2 counts.
20 MΩ Range, 0.5% ±2 counts.

MEASUREMENT CURRENT:

$$\frac{2\ V}{\text{Range Setting}}$$

RESPONSE TIME:

2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ Ranges, ≤1 s.
20 MΩ Range, ≤5 s.

DC AMMETER

RANGES:

2 mA, 20 mA, 200 mA, 2000 mA.

ACCURACY:

±0.2% of reading, ±10 counts.

RESPONSE TIME:

<1 s.

INPUT IMPEDANCE:

$$\frac{0.2\ V}{\text{Range Setting}} \pm 0.1\Omega.$$

AC AMMETER

RANGES:

2 mA, 20 mA, 200 mA, 2000 mA.

ACCURACY:

±0.6% of reading, ±2 counts, 40 Hz to 1 kHz.
±0.6% of reading, ±10 counts, 1 kHz to 10 kHz.

RESPONSE TIME:

<10 s.

INPUT IMPEDANCE:

$$\frac{0.2\ V}{\text{Range Setting}} \pm 0.1\Omega.$$

THERMOMETER

RANGES:

−55°C to +150°C or −67°F to +302°F

ACCURACY:

(With P6058 probe) −55°C (−67°F) to +125°C (257°F), ±1.5°C (2.7°F). +125°C (257°F) to +150°C (302°F), ±2.5°C (4.5°F).

ENVIRONMENTAL CHARACTERISTICS

TEMPERATURE:

Operating: +15°C to +35°C.
Non-operating: −40°C to +75°C.

POWER CONSUMPTION:

12 Watts.

PHYSICAL CHARACTERISTICS

LENGTH:

11.69 inches (29.693 cm)

WIDTH:

2.642 inches (6.711 cm)

HEIGHT:

4.970 inches (12.624 cm)

WEIGHT:

1.88 pounds (0.85 kg)

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 service 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.

THEORY OF OPERATION

Introduction

The DM 501 is basically an analog-to-digital converter with the logic, display devices, and power supplies necessary to display in numerical form the value of a DC voltage. The analog-to-digital converter operates on the modified dual slope principle. Current is measured by passing the unknown through a known resistance and measuring the resultant voltage drop. Resistance is measured by passing a constant current through a divider comprised of a known and unknown resistance in series, and measuring the voltage drop across the unknown resistance. Temperature is measured by obtaining a DC voltage proportional to the temperature and applying it to the integrator input. AC voltages and currents are passed through a rectifier and then to the integrator input. Refer to the Block Diagram in the foldout pages for an overall view of the DM 501 operation. The following circuit description should be used with the schematics. All logic levels are TTL compatible.

Attenuator and Input Switching

The HI and LO binding posts are connected across the appropriate sections of R10, serving as a voltage and current divider. C42, C45, C48, and their associated fixed capacitors are compensating capacitors switched across R10 in the AC voltage mode. C40, in series with the HI input, is the AC coupling capacitor in the AC voltage mode.

Fuse F12 is in series with the unknown resistance and the constant current source. It protects the current source from application of destructive voltages when the RANGE/FUNCTION switch is in the OHMS position. When the voltage across the current sampling resistors (portions of R10 and R12) reaches approximately 0.6 V, diodes CR11 and CR12 conduct. This causes sufficient current through fuse F10 to open the circuit, thus protecting the resistors. See Fig. 2-1.

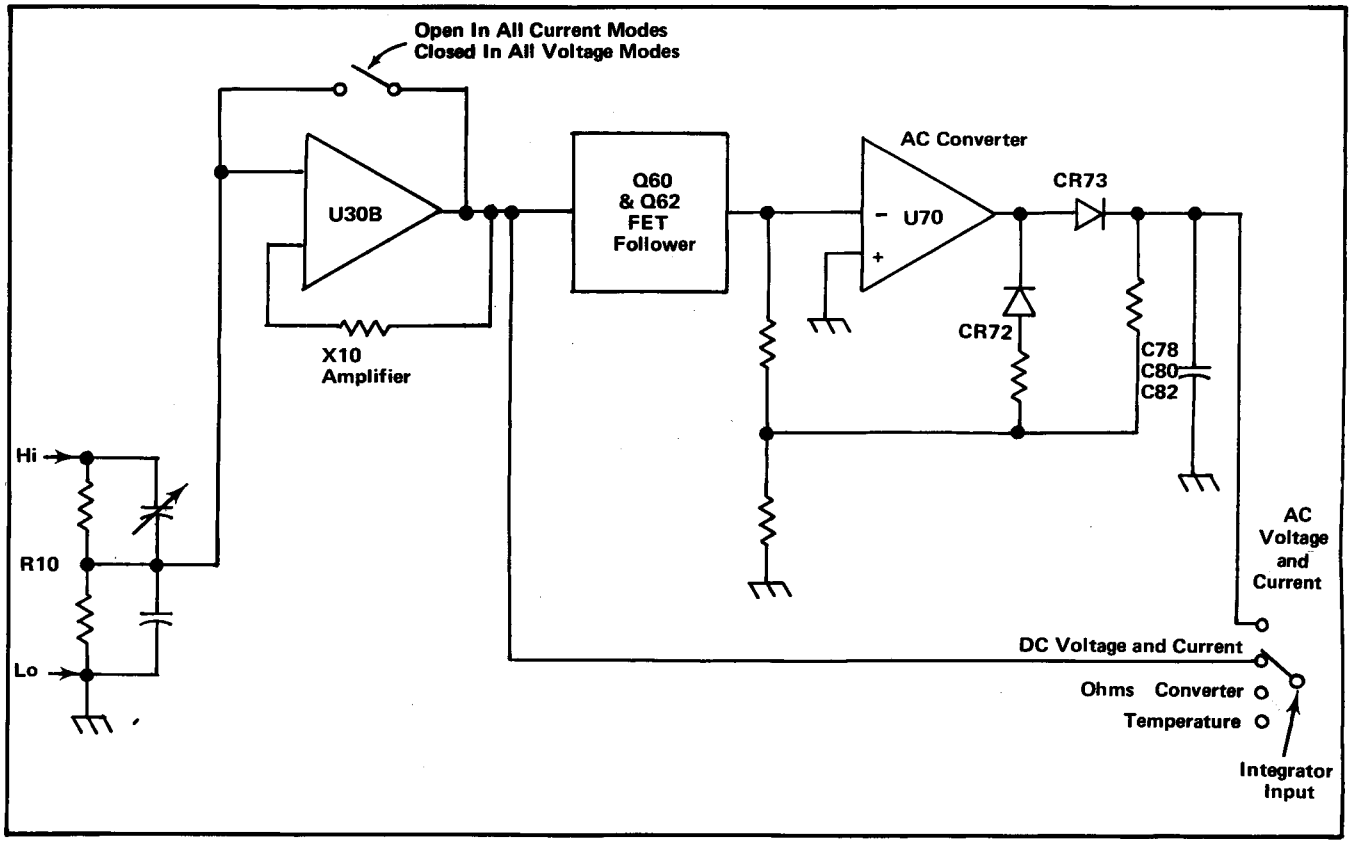

Fig. 2-1. Simplified diagram of AC and DC voltage and current inputs to the integrator.

Current Amplifier

U30B is an operational amplifier with negative AC feedback, producing 10X gain. It is used in all AC and DC current modes. A full scale display readout requires 0.2 V into U30B, developed across the current sampling resistors, for 2.0 V into the integrator input. R50 adjusts for input offset in U30B. With the HI and LO binding posts shorted, and the RANGE/FUNCTION switch in the DC mA position, pin 7 of U30B is at 0 V when R50 is properly adjusted.

AC Converter

In the AC measurement modes, the AC signal is applied to FET Q60. CR60 protects Q60 from negative overvoltage. CR61 protects Q60 from overvoltage in the positive direction. Q62, connected from the source to the drain of Q60, provides positive feedback. The positive feedback serves as a bootstrap to improve the frequency response.

The output of Q60 is fed to the negative input of U70, an operational amplifier. R72, C73, and R73 provide negative DC feedback for stabilizing purposes. The gain of U70 is extremely high until CR72 and CR73 conduct and provide feedback, thus enabling rectification of extremely small signals. The positive half cycle is applied through CR73 to the filter network. The DC voltage from the filter output is switched to the integrator input in the AC measurement modes. Although a half-wave rectifier responds to the average value of a sine wave, the gain of U70 is set by R70 to produce an output equivalent to the RMS value of a sine-wave input.

Ohms Converter

Q20 and U30A, form an operational amplifier. Q35 and Q38 are constant current sources. The known resistance (appropriate values of R10) is connected across the source, from the output of U30A to R20. The unknown resistance is connected from R20 to ground. Q20A, U30A, and Q38 maintain one volt across R10, which is set at a value equal to one half the full scale measurement value shown on the RANGE/FUNCTION switch. When the unknown resistance changes, the voltage at the gate of Q20 changes. This varies the output voltage at U30A, and across the known resistance R10, until the voltage across R10 is again one volt and the current is constant. Since the current stays constant, a change in the unknown resistance causes the voltage across the unknown resistance to vary. This voltage change is connected to the integrator input. CR20 and CR21 are protective diodes. R35 sets the constant current value. Q35 and Q38 base voltages are set by R38 and Q36. Q36 provides temperature compensation for the base voltage. See Fig. 2-2.

Integrator

The analog to digital converter in the DM 501 operates on the modified dual slope principle. Dual slope integration provides accuracy independent of supply voltage changes, component changes, and line voltage effects. Modified means the measured voltage is applied at all times and not switched off during capacitor discharge. A current directly related to the unknown voltage is applied to a capacitor, causing a ramp. At a given time during the ramp, the capacitor is discharged by a known current of opposite

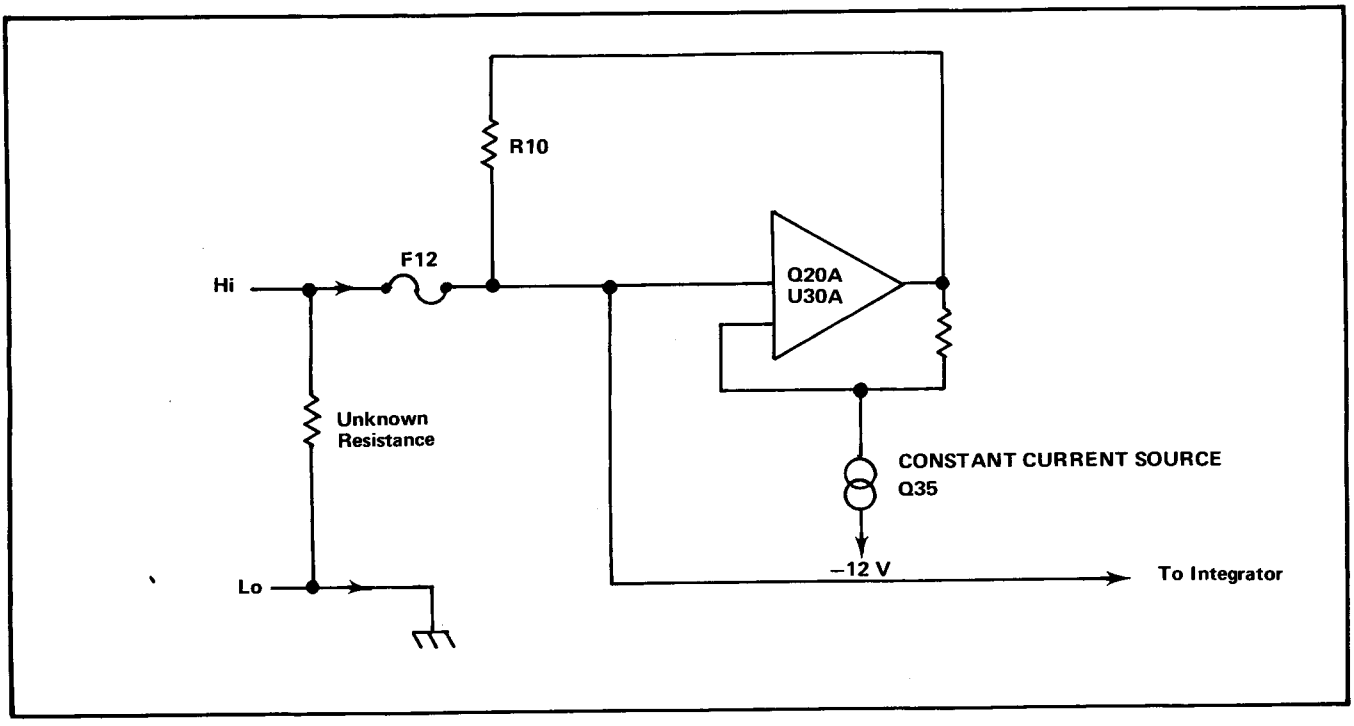

Fig. 2-2. Simplified diagram of Ohms Converter.

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polarity, and four times greater than the maximum possible unknown current. At the time the discharge current is applied, a counter starts. When the integrated waveform reaches zero volts, the number in the counter is stored. The accumulated counts are displayed as the value of the voltage being measured; a higher voltage means a longer time to zero crossing, thus a higher count. Since the same system power supply, time base, components and line voltage effects are present during integration of the known and unknown currents, their effects are not extremely critical.

A DC voltage proportional to the quantity being measured is applied to R140. CR142 and CR145 are protective diodes. R148 and C148 form a low pass filter. This DC voltage, if positive, causes the output of U170 to go positive. A positive step is coupled through C170 to the gate of Q154B which immediately assumes the DC level at the gate of Q154A. Charge current for C170, supplied through R198 and R199, causes the gate of Q154B to go negative. This creates a higher voltage at the output of U170. The cycle is repeated, forming a smooth ramp at the output of U170. Q152 forms a constant current source, and R155 adjusts for circuit unbalance. The base of Q150 follows the sources of Q154A and Q154B and, through VR 150, ensures a constant voltage from source to drain of Q154 irrespective of its gate voltages. Q160 is a constant current source for the drains of Q154.

Discharge Current Sources

After every 80,000 clock pulses, a positive pulse appears at the base of Q250. This is called the Full pulse. See Fig. 2-3. Q250 inverts this pulse and applies it to pin 4 of latch U235A. Pin 5 goes high and pin 6 low. If the ramp

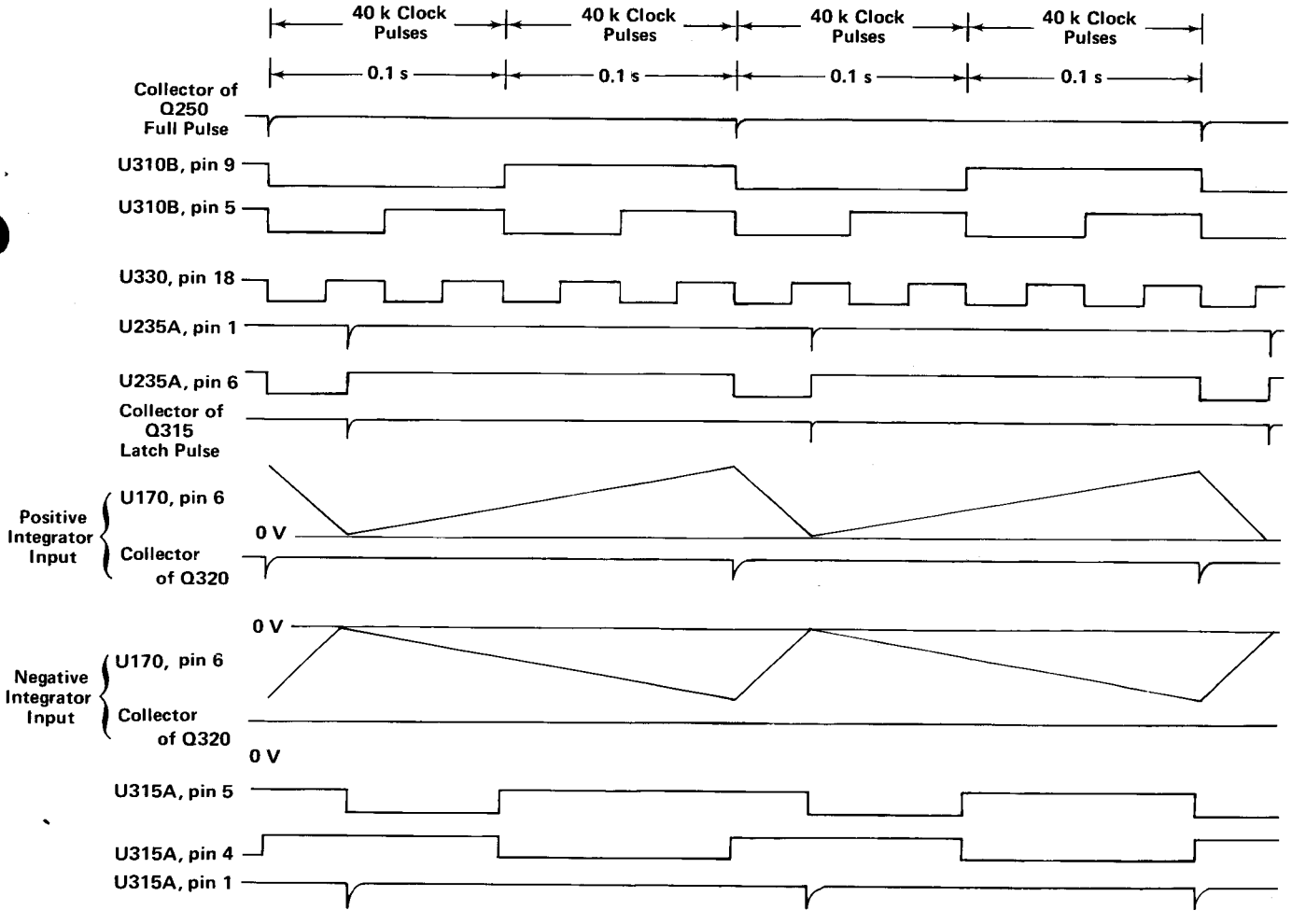


Fig. 2-3. Timing Diagram.

from the integrator is positive, the output of U175 is low. This low is applied to the AND gates U220C and U230A. The output of U220C goes high, turning on Q185. This action turns Q180B on, which supplies discharge current for C170. The discharge current amplitude is set at four times the full scale unknown current. As the ramp passes through zero, the output of U175 goes high, turning off the discharge current. If the ramp increases in the negative direction, the logic of U235A, U230A and U175 places two lows at the input of U230A, and Q200A supplies the discharge current. R182 and R202 set the proper value of discharge current. VR180, VR200, Q180, and Q200 provide temperature compensation and act as constant current sources for the discharge currents.

Zero Crossing Detector

After C170 (at the output of U170) is discharged and passes through zero, the output of U175 goes high. This positive pulse is differentiated by C224 and R224, and applied to U230B, an OR gate. Pin 5 and 6 of U230B are already high. The same pulse is inverted by U220B, differentiated by C220 and R220 and applied to the other input of U230B. With a low on either input, U230B's output goes high, U220A inverts that pulse and applies it to pin 1 of U235A. Pin 5 goes low, pin 6 goes high and both current discharges are turned off. Latch U235A disables the discharge current sources. The positive pulse at pin 6 of U235A is inverted by Q245 and applied to U330 as the Latch pulse. This Latch pulse effectively holds the number of counts in U330 that accumulate after the Full pulse arrives at the base of Q250. This count represents the value of the quantity being measured.

Integrator Offset Current

A slight offset current is always applied through R198 and R199 to charge capacitor C170. If no offset current was applied, the output of U170 would float around zero when the quantity being measured is zero, and U175 would operate in a random manner, giving false displays.

The offset current causes a ramp equal to 10 counts at the same polarity as the last voltage measured. If a voltage measured is less than ten counts, and opposite in polarity to the offset current ramp, one-shot multivibrator U238 prevents the Latch pulse from reaching U330 for one integration. If the zero crossing takes place within ten counts of the Full pulse, U238 also causes the polarity of the offset current to shift in the direction of the applied voltage. See Fig. 2-4. The Full pulse arrives at pin 3 of U238, causing pin 1 to go low for 10 counts. Pin 6 goes high, disabling Q245 and preventing the Latch pulse from passing to U330. The 10 count delay is caused by R238 and C238.

Assume the offset current causes a ramp of 10 count duration in the positive direction and a voltage equal to 5 counts in the negative direction is being measured. For the first cycle, the positive discharge current is turned on and zero crossing takes place 5 counts after the Full pulse. Q245 is disabled for 10 counts and the Latch pulse to U330 is not transmitted. During this 10 count delay, pin 1 of U238 is low. At zero crossing, pin 12 of U220D is also low. Both lows cause a high at the output of U220D, an

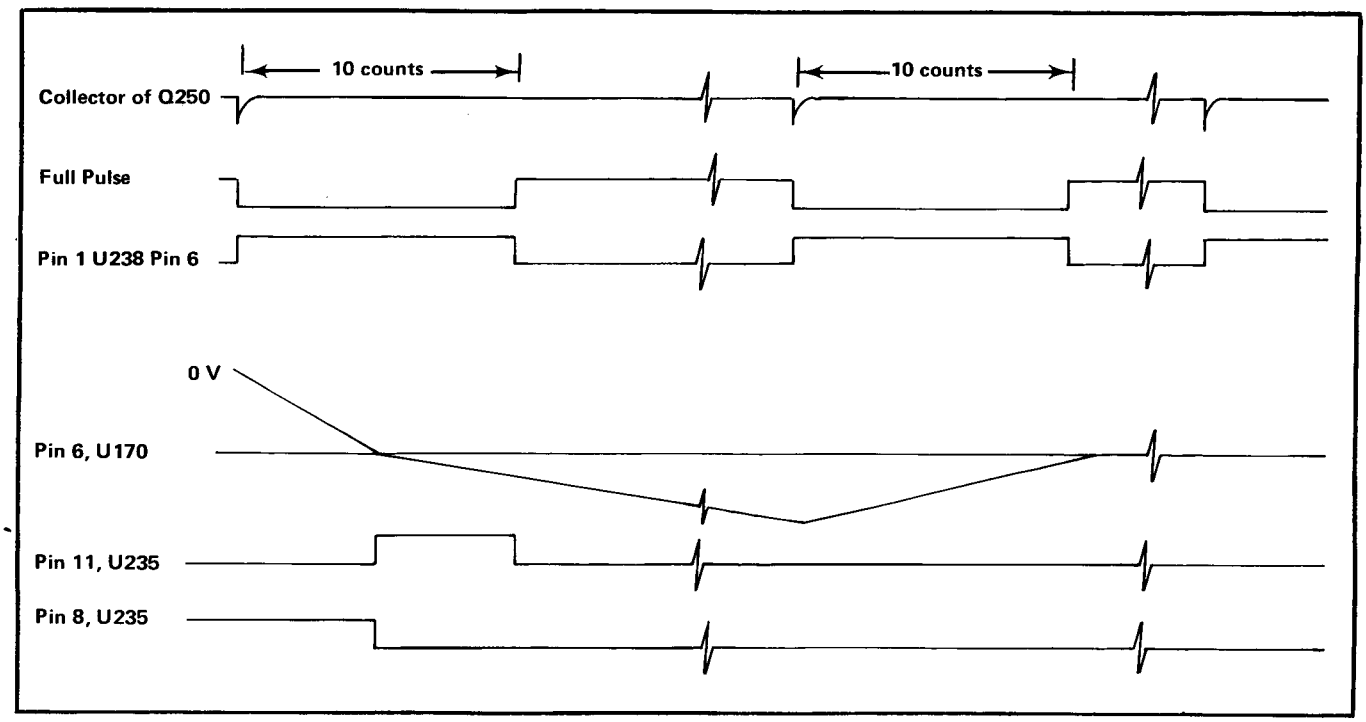


Fig. 2-4. Timing Diagram showing change in offset current polarity with less than 1 mV applied to integrator input.

edge-triggered flip flop. This high is fed to pin 11 of U235B. The high causes pin 8 of U235B to change state. The base of Q190 was high to provide a positive offset current. Q190's base now goes low, applying a negative offset current. The next cycle is 5 counts of measured current and 10 counts of offset current in the same polarity. U330 reads this correctly as a 5 count voltage.

Polarity Sensing

When U238 disables Q245 during the 10 count delay, a differentiated 1 μs positive pulse is transmitted through C230 to the inputs of U230D and U230C. If the ramp is positive, pin 6 of U220B is positive. Pins 9 and 10 of U230C are both positive, causing a low at its output. This low causes U235B to go high at pin 8, pulling down the collector of Q190 and causing the junction of R198 and R199 to drop 1 mV below ground. The top end of R198 is positive with respect to the bottom end. Current is added to C170, and the proper polarity offset is created. If the output of the integrator is negative, pins 12 and 13 of U230D are high, causing pin 8 of U235B to go low. The junction of R198 and R199 is thus raised 1 mV above ground, causing an offset current in the negative direction. A negative pulse (which occurs shortly after the Full pulse) at the anode of CR240, a protective diode, indicates a positive going ramp. No pulse indicates a negative going ramp.

Floating Power Supply

Q270 and Q275 provide regulated +12 V and −12 V with the voltage set by VR270 and VR275. The entire Integrator and the Control logic shown on Schematic 2, as well as the Ohms Convertor, AC Convertor and Current Amplifier, are isolated from the rest of the DM 501 to permit elevation of the input to 1.5 kV maximum above chassis ground. Transformer T290 couples a 40 kHz square wave to full-wave bridge rectifiers with their associated filter capacitors. U295 serves as a divide-by-ten counter. Q294 switches the 40 kHz output and drives Q290-Q292, as a 40 kHz saturated amplifier. CR290 and CR292 are protective diodes.

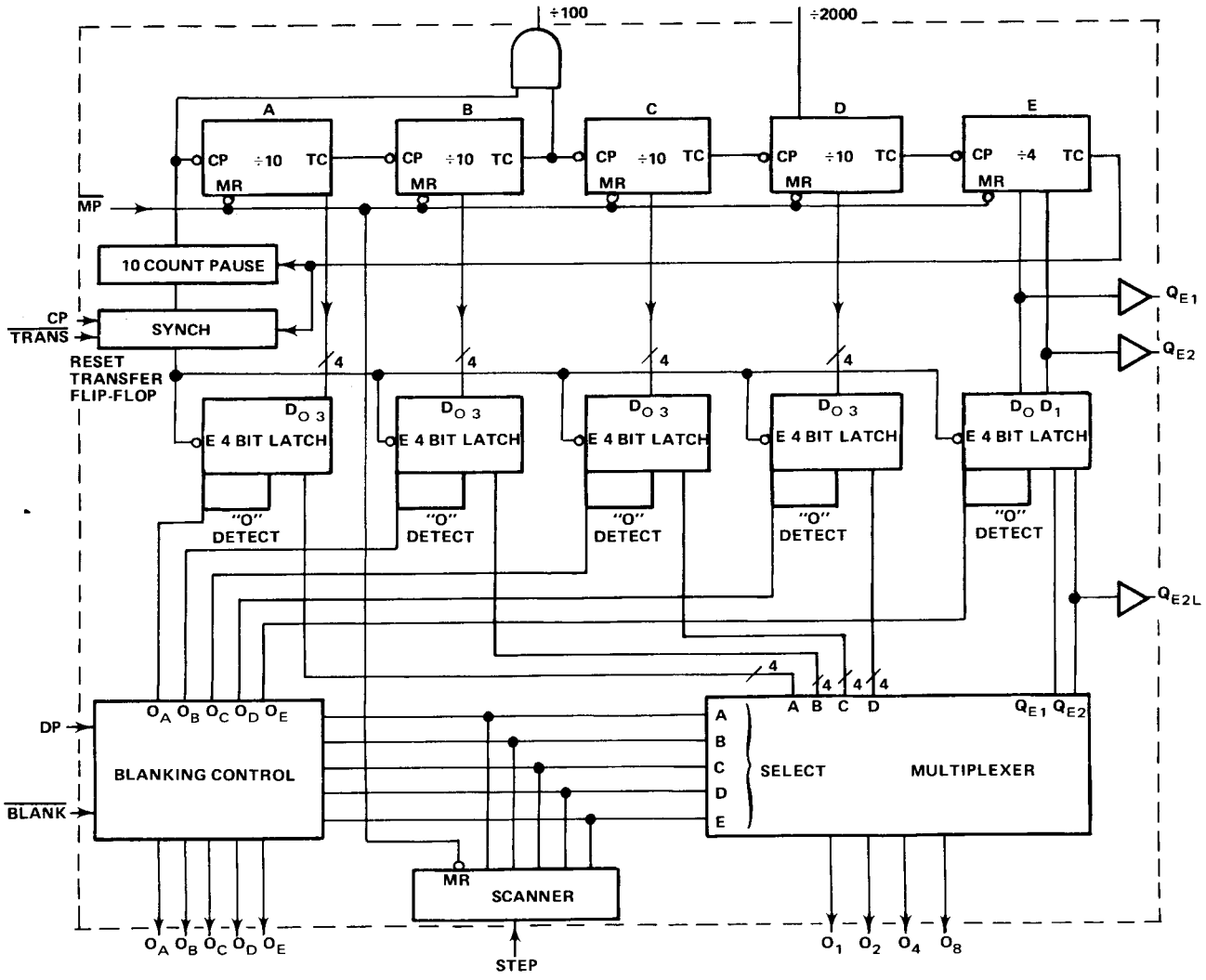
Counters and Display

T300 couples the Full pulse to the control logic, T315 the Latch pulse, and T320 the Polarity pulse. Diodes CR310 and CR315 short the transformers to prevent the collapsing field from inducing a pulse in the opposite polarity. Y330, U325C, U325D, C330, and L330 form a 400 kHz crystal-controlled oscillator that provides the clock pulses. U330 contains five cascaded counters, four divide-by-ten counters and one divide-by-four counter. See Fig. 2-5. The counters are triggered by the positive transition of each clock pulse. These counters operate continuously, as long as power is applied to the instrument. Since the integrator operates on an 80,000 pulse cycle, U310B acts as a divide-by-two flip flop which is driven by pin 16 of U330. U310B, pin 9 produces one negative-going output for every two negative-going input transitions. The square wave from U310B is differentiated by R310 and C310, and results in a positive Full pulse to the integrator logic. The negative-going Latch pulse is received at the anode of CR315. A positive pulse at the base of Q315 causes a negative pulse at pin 1 of U315A, and pin 5 goes low. This low, connected to pin 2 of U330, transfers the count to the five 4-bit latches in U330 at the next positive-going clock pulse. U330's internal circuitry accepts only one transfer pulse for 40,000 counts. Pin 8 of U310B, connected to pin 4 of U315A, allows pin 5 of U315A to go low anytime during 40,000 counts after the Full pulse. U315A then resets, and will not accept a Latch pulse for the next 40,000 counts.

If the voltage being measured is positive, a negative polarity pulse will occur shortly after the Latch pulse. The base of Q320 goes positive and the collector negative. This negative pulse is applied to pin 14 of U310A. Pin 1 of U310A is low because pin 16 of U330 is low, since a Full pulse recently occurred. The negative pulse to pin 2 and 14 of U310A puts a high on pin 13, connected to pin 12 of U320B. Pin 11 of U320B goes high and pin 8 low. The low is applied to the cathodes of the vertical bar in DS380, and the polarity is indicated as positive. Switch S10-39 is closed in the DC and TEMP positions of the RANGE/FUNCTION switch, grounding the cathodes of the minus segments. The ground (low) is inverted by U325A, causing a high on pin 13 and placing the latch in operation. When the switch is opened, pins 1 and 2 of U325A go positive through the diodes of DS380, placing pin 13 low. This locks the plus display cathode positive.

If the counters in U330 reach 9,999 the next pulse, 10,000, places a high on pin 2 on U320A. At the time of the Latch pulse, a high occurs at pin 3 of U320A, causing pin 6 to go low, turning on the 1 digit in DS370. The 1 digit remains on if pin 18 of U330 remains high at the time of Latch pulse occurrence. If the count placed in the latches of U330 exceeds 19,999, pin 9 goes high. Pin 4 of U325B is high for 40,000 counts after the Full pulse. This causes a low on pin 3 of U330, which blanks the entire readout display. The display is blanked for 40,000 counts (0.1 second), then unblanked for an equal time, indicating over-range.

U390 converts the binary coded decimal information to seven-segment information, which is applied to four of the seven-segment display modules simultaneously. The anodes of the display modules are elevated through anode drivers, Q342, Q344, Q348, Q350, Q352, Q354, Q358, and Q360. Each display module is on for 250 μs and off for one ms. The sequence moves from the least significant digit to the most significant digit in step with the changing BCD information, so that each display module is turned on for the appropriate digit. The timing is controlled internally in U330.



CP—Clock Pulse in.

$\overline{MP}$—Not used, connected to +5 V.

$\overline{TRANS}$—Activated by Latch Pulse to transfer accumulated count into Latches.

DP—Provides information to Blanking Control on location of decimal point for leading zero blanking.

$\overline{BLANK}$—Blanks entire display.

O_A O_B O_C O_D O_E—Digit display lines, O_E not used. Indicates the digit selected from the Latches by the Multiplexer.

STEP—Causes Multiplexer and Blanking Control to switch to next digit through the Scanner.

QE2L—Anded with +80,000 count to cause display blanking if in the high state.

QE2—Not used.

QE1—Drives external latch for most significant digit indication.

÷2000—Not used.

÷100—Drives step input.

O_1 O_2 O_4 O_8—BCD output to display modules.

Fig. 2-5. Block diagram of U330 listing functional use in DM 501. Reprinted by permission of Fairchild Semiconductor.

Switches S10-35 through S10-38 select leading zero blanking and positioning of the decimal point. By connecting the various decade outputs, pins 8, 7, 17, and 22 of U330 to the decimal point input, pin 12, leading zero blanking occurs. The selected decade output is also connected to the base of Q335, lowering the cathode that represents the point, along with the decade output to the correct display module. Q340 drives the decimal point output located at the rear interface connector.

Temperature Measurement Circuitry

A 4 kHz pulse from U330 is applied to U315B, which operates as a divide-by-two flip flop. Q90 and Q92 amplify the square wave. When FET Q98 is off, the current to the probe through R98 and R101 is approximately one-tenth the on current. The change in base to emitter voltage of the temperature sensing transistor in the probe is proportional to the temperature of the junction when the collector current is switched between two levels. The collector to base voltage of the temperature sensing transistor in the probe is held constant. When Q90 is off and Q92 is on, Q98 is off and the voltage at pin 2 of U100A goes negative. The output of U100A goes positive, reducing the temperature variable base-emitter current of the sensing transistor until pin 2 of U100A is at ground. A positive-going square wave results at the output of U100A, with an amplitude proportional to the temperature of the base-emitter junction. Q106 is on and Q104 is off, due to the action of Q90 and Q92. A DC voltage, whose amplitude is proportional to temperature, occurs across C105. The opposite occurs when Q90 and Q92 change state, with the exception that Q104 turns on, shorting the negative voltage to ground; and Q106 is off, preventing the discharge of C105.

The DC voltage across C105 is applied to operational amplifier U100B. R115 adjusts the gain. Offset voltage in U100B is compensated for by R125. R128 and R130, through S125, change offset and increase gain for °F readout vs °C. The output of U100B at 10 mV/° is applied to the front panel output pin jacks and passed through divider R112 and R113 to the integrator input at 1 mV/°.

Power Supply

U420 is a precision integrated circuit voltage regulator. The output voltage is adjusted by R420 through a comparator input at pin 5. The reference voltage is obtained internally from U420 at pin 6 and through R419. The output voltage is applied to the base of the series-pass transistor, located in the main frame of the power module. The 11.5 V supply passes current through the series pass transistor to the current limit input at pin 2. The output is taken through R423. If the voltage drop across pins 2 and 3 exceeds 0.6 V, an internal transistor turns on and conduction of the series pass transistor is reduced. Pin 4 is the other half of the input comparator. Frequency compensation for smoothing is applied to pin 13. The −12 V supply is referenced to the +5 V supply through R432 and CR432. If the −12 V goes positive, Q432 reduces conduction. Q438 increase conduction, which increases current flow through the series pass transistor in the main frame. Should the voltage across R444 increase to 0.6 V, due to increased current flow, Q440 turns on, increasing current flow through Q432 and limits the current through the series pass transistor. C436 serves as a filter capacitor. The +12 V is obtained from the +33.5 V through zener VR410 and is smoothed by C410.

DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

Symbols and Reference Designators

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

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

Resistors = Ohms (Ω).

Graphic symbols and class designation letters are based on ANSI Standard Y32.2-1975.

Logic symbology is based on ANSI Y32.14-1973 in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The overline on a signal name indicates that the signal performs its intended function when it goes to the low state.

Abbreviations are based on ANSI Y1.1-1972.

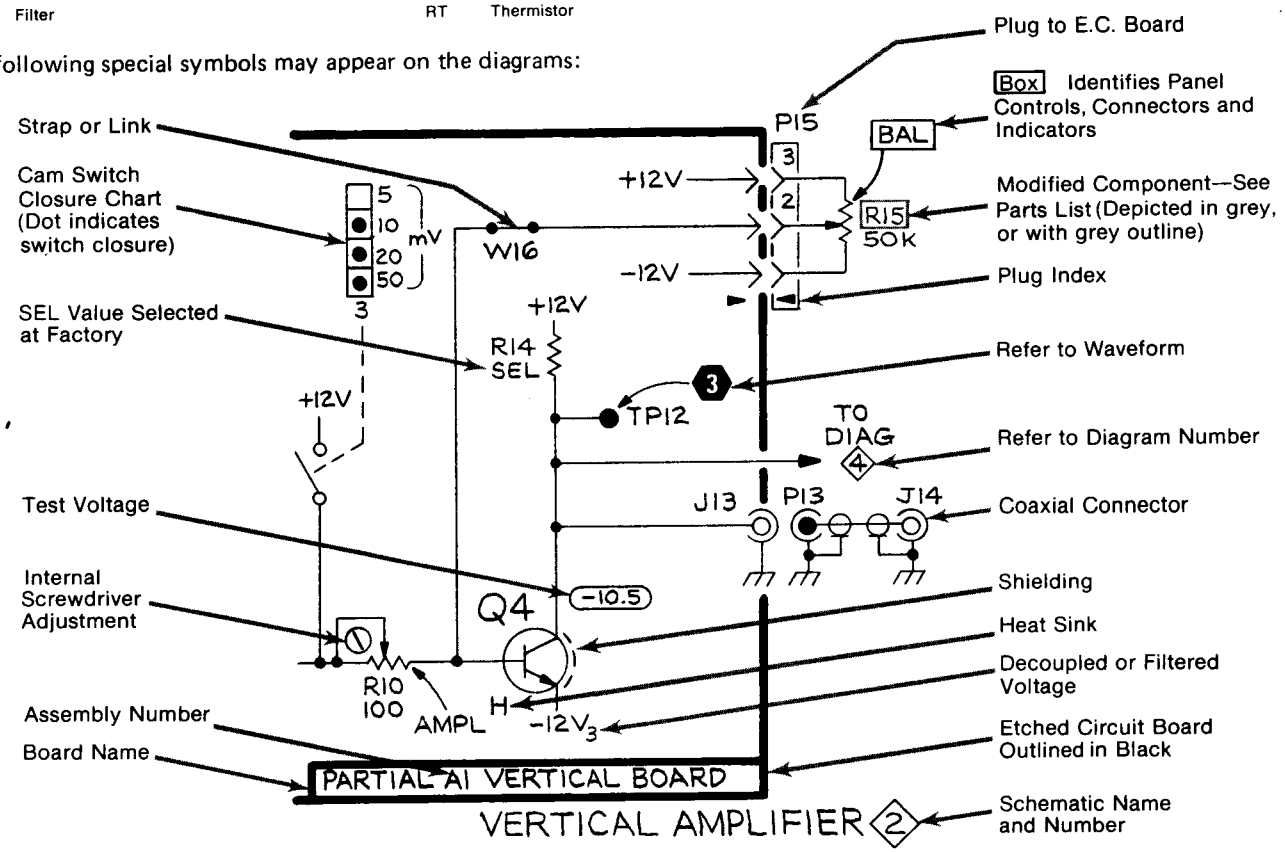
Other ANSI standards that are used in the preparation of diagrams by Tektronix, Inc. are:

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.

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

A	Assembly, separable or repairable (circuit board, etc)	H	Heat dissipating device (heat sink, heat radiator, etc)	S	Switch or contactor
AT	Attenuator, fixed or variable	HR	Heater	T	Transformer
B	Motor	HY	Hybrid circuit	TC	Thermocouple
BT	Battery	J	Connector, stationary portion	TP	Test point
C	Capacitor, fixed or variable	K	Relay	U	Assembly, inseparable or non-repairable (integrated circuit, etc.)
CB	Circuit breaker	L	Inductor, fixed or variable	V	Electron tube
CR	Diode, signal or rectifier	M	Meter	VR	Voltage regulator (zener diode, etc.)
DL	Delay line	P	Connector, movable portion	W	Wirestrap or cable
DS	Indicating device (lamp)	Q	Transistor or silicon-controlled rectifier	Y	Crystal
E	Spark Gap, Ferrite bead	R	Resistor, fixed or variable	Z	Phase shifter
F	Fuse	RT	Thermistor		
FL	Filter				

The following special symbols may appear on the diagrams:



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
0000A	LEMO USA	2015 2ND STREET	BERKLEY, CA 94710
00853	SANGAMO ELECTRIC CO., S. CAROLINA DIV.	P O BOX 128	PICKENS, SC 29671
01002	GENERAL ELECTRIC COMPANY, INDUSTRIAL AND POWER CAPACITOR PRODUCTS DEPARTMENT	JOHN STREET	HUDSON FALLS, NY 12839
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
04222	AVX CERAMICS, DIVISION OF AVX CORP.	P O BOX 867, 19TH AVE. SOUTH	MURTLE BEACH, SC 29577
04713	MOTOROLA, INC., SEMICONDUCTOR PROD. DIV.	5005 E MCDOWELL RD,PO BOX 20923	PHOENIX, AZ 85036
05397	UNION CARBIDE CORPORATION, MATERIALS SYSTEMS DIVISION	11901 MADISON AVENUE	CLEVELAND, OH 44101
07263	FAIRCHILD SEMICONDUCTOR, A DIV. OF FAIRCHILD CAMERA AND INSTRUMENT CORP.	464 ELLIS STREET	MOUNTAIN VIEW, CA 94042
07910	TELEDYNE SEMICONDUCTOR	12515 CHADRON AVE.	HAWTHORNE, CA 90250
10389	CHICAGO SWITCH, INC.	2035 WABANSIA AVE.	CHICAGO, IL 60647
18324	SIGNETICS CORP.	811 E. ARQUES	SUNNYVALE, CA 94086
18853	ELECTRONIC CRYSTALS CORP.	1153 SOUTHWEST BLVD.	KANSAS CITY, KS 66103
22229	SOLITRON DEVICES, INC., DIODES, INTEGRATED CIRCUITS AND CMOS	8808 BALBOA AVENUE	SAN DIEGO, CA 92123
27014	NATIONAL SEMICONDUCTOR CORP.	2900 SEMICONDUCTOR DR.	SANTA CLARA, CA 95051
28480	HEWLETT-PACKARD CO., CORPORATE HQ.	1501 PAGE MILL RD.	PALO ALTO, CA 94304
32293	INTERSIL, INC.	10900 N. TANTAU AVE.	CUPERTINO, CA 95014
32997	BOURNS, INC., TRIMPOT PRODUCTS DIV.	1200 COLUMBIA AVE.	RIVERSIDE, CA 92507
50522	MONSANTO CO., ELECTRONIC SPECIAL PRODUCTS	3400 HILLVIEW AVENUE	PALO ALTO, CA 94304
50579	LITRONIX INC.	19000 HOMESTEAD RD.	CUPERTINO, CA 95014
56289	SPRAGUE ELECTRIC CO.		NORTH ADAMS, MA 01247
58474	SUPERIOR ELECTRIC CO., THE	383 MIDDLE ST.	BRISTOL, CT 06010
71400	BUSSMAN MFG., DIVISION OF MCGRAW-EDISON CO.	2536 W. UNIVERSITY ST.	ST. LOUIS, MO 63107
71450	CTS CORP.	1142 W. BEARDSLEY AVE.	ELKHART, IN 46514
72982	ERIE TECHNOLOGICAL PRODUCTS, INC.	644 W. 12TH ST.	ERIE, PA 16512
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 ELECTRONIC COMPONENTS, IRC FIXED RESISTORS, PHILADELPHIA DIVISION	401 N. BROAD ST.	PHILADELPHIA, PA 19108
76493	BELL INDUSTRIES, INC., MILLER, J. W., DIV.	19070 REYES AVE., P O BOX 5825	COMPTON, CA 90224
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
80294	BOURNS, INC., INSTRUMENT DIV.	6135 MAGNOLIA AVE.	RIVERSIDE, CA 92506
80740	BECKMAN INSTRUMENTS, INC.	2500 HARBOR BLVD.	FULLERTON, CA 92634
90201	MALLORY CAPACITOR CO., DIV. OF P. R. MALLORY CO., INC.	3029 E. WASHINGTON ST.	INDIANAPOLIS, IN 46206
		P. O. BOX 372	
91637	DALE ELECTRONICS, INC.	P. O. BOX 609	COLUMBUS, NB 68601

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
A1[1]	670-2649-00	B010100	B069999	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2649-00
A1[1]	670-2649-02	B070000	B089999	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2649-02
A1[1]	670-2649-03	B090000	B127399	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2649-03
A1[1]	670-2649-05	B127400	B129999	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2649-05
A1[1]	670-2649-06	B130000		CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2649-06
A1[2]	670-2649-00	B010100	B069999	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2649-00
A1[2]	670-2649-02	B070000	B089999	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2649-02
A1[2]	670-2649-03	B090000	B127409	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2649-03
A1[2]	670-2649-05	B127410	B129999	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2649-05
A1[2]	670-2649-06	B130000		CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2649-06
A2[1]	670-2654-00	B010100	B116229	CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-00
A2[1]	670-2654-01	B116230	B127399	CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-01
A2[1]	670-2654-02	B127400	B139999	CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-02
A2[1]	670-2654-03	B140000		CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-03
A2[2]	670-2654-00	B010100	B116329	CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-00
A2[2]	670-2654-01	B116330	B127409	CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-01
A2[2]	670-2654-02	B127410	B139999	CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-02
A2[2]	670-2654-03	B140000		CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-03
A2[3]	670-2654-00	B010100	B116349	CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-00
A2[3]	670-2654-01	B116350	B127239	CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-01
A2[3]	670-2654-02	B127240	B139999	CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-02
A2[3]	670-2654-03	B140000		CKT BOARD ASSY:INTEGRATOR LOGIC	80009	670-2654-03
A3	670-2672-00	B010100	B069999	CKT BOARD ASSY:DISPLAY	80009	670-2672-00
A3	670-2672-01	B070000	B099999	CKT BOARD ASSY:DISPLAY	80009	670-2672-01
A3	670-2672-02	B100000	B129999	CKT BOARD ASSY:DISPLAY	80009	670-2672-02
A3	670-2672-03	B130000		CKT BOARD ASSY:DISPLAY	80009	670-2672-03
A4[3]	670-2838-00	B010100	B069999	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2838-00
A4[3]	670-2838-01	B070000	B089999	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2838-01
A4[3]	670-2838-02	B090000	B127239	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2838-02
A4[3]	670-2838-04	B127240	B129999	CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2838-04
A4[3]	670-2838-05	B130000		CKT BOARD ASSY:DIGITAL MULTI-METER	80009	670-2838-05
A5	670-4528-00	XB140000		CKT BOARD ASSY:INTEGRATED SUB CKT	80009	670-4528-00
C11	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C13[1]	283-0044-00	XB127400		CAP.,FXD,CER DI:0.001UF,3000V	72982	3903BW002Y5S102M
C13[2]	283-0044-00	XB127410		CAP.,FXD,CER DI:0.001UF,3000V	72982	3903BW002Y5S102M
C13[3]	283-0044-00	XB127240		CAP.,FXD,CER DI:0.001UF,3000V	72982	3903BW002Y5S102M
C20	283-0005-00			CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131N300Z5U0103P
C24	283-0178-00	XB080000		CAP.,FXD,CER DI:0.1UF,+80-20%,100V	72982	8131N145 E 104Z
C38	283-0005-00			CAP.,FXD,CER DI:0.01UF,+100-0%,250V	72982	8131N300Z5U0103P
C40	285-0528-00			CAP.,FXD,PLSTC:0.1UF,20%,600V	56289	410P10406
C41	281-0576-00	B010100	B049999	CAP.,FXD,CER DI:11PF,5%,500V	72982	301-000C0G0110J
C41	283-0342-00	B050000		CAP.,FXD,CER DI:6.5PF,+/-5PF,2000V	72982	808-536A759D
C42	281-0081-00	B010100	B010259	CAP.,VAR,AIR DI:1.8-13PF,375VDC	74970	189-6-5
C42	281-0077-00	B010260		CAP.,VAR,AIR DI:1.3-5.4PF,800V	74970	189-2-5
C43	283-0677-00			CAP.,FXD,MICA D:82PF,1%,500V	00853	D155E820F0
C44	281-0576-00	B010100	B049999X	CAP.,FXD,CER DI:11PF,5%,500V	72982	301-000C0G0110J
C45	281-0077-00			CAP.,VAR,AIR DI:1.3-5.4PF,800V	74970	189-2-5
C46	285-0862-00	B010100	B049999	CAP.,FXD,PLSTC:0.001,10%,100V	56289	410P10291
C46	285-0918-00	B050000		CAP.,FXD,PLSTC:0.001UF,5%,200 V	56289	LP66A1C102J002
C47	281-0576-00	B010100	B049999	CAP.,FXD,CER DI:11PF,5%,500V	72982	301-000C0G0110J
C47	283-0342-00	B050000		CAP.,FXD,CER DI:6.5PF,+/-5PF,2000V	72982	808-536A759D
C48	281-0077-00			CAP.,VAR,AIR DI:1.3-5.4PF,800V	74970	189-2-5

[1]Standard only.
[2]Option 1 only.
[3]Option 2 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C49	285-0598-00	B010100	B049999	CAP.,FXD,PLSTC:0.01UF,5%,100V	01002	61F10AC103
C49	285-0916-00	B050000		CAP.,FXD,PLSTC:0.01UF,5%,100V	56289	LP66A1B103J002
C50	281-0576-00	B010100	B049999X	CAP.,FXD,CER DI:11PF,5%,500V	72982	301-000C0G0110J
C51	281-0576-00	XB010260	B049999	CAP.,FXD,CER DI:11PF,5%,500V	72982	301-000C0G0110J
C51	283-0342-00	B050000		CAP.,FXD,CER DI:6.5PF,+/-5PF,200V	72982	808-536A759D
C52[1]	281-0576-00	XB010260	B049999X	CAP.,FXD,CER DI:11PF,(NOM VALUE),SEL	72982	301-000C0G0110J
C53[1]	281-0544-00	XB127400		CAP.,FXD,CER DI:5.6PF,(NOM VALUE),SEL	72982	301-000C0H0569D
C53[2]	281-0544-00	XB127410		CAP.,FXD,CER DI:5.6PF,(NOM VALUE),SEL	72982	301-000C0H0569D
C53[3]	281-0544-00	XB127240		CAP.,FXD,CER DI:5.6PF,(NOM VALUE),SEL	72982	301-000C0H0569D
C54[1]	281-0540-00	XB127400		CAP.,FXD,CER DI:51PF,(NOM VALUE),SEL	72982	301-000U2J0510J
C54[2]	281-0540-00	XB127410		CAP.,FXD,CER DI:51PF,(NOM VALUE),SEL	72982	301-000U2J0510J
C54[3]	281-0540-00	XB127240		CAP.,FXD,CER DI:51PF,(NOM VALUE),SEL	72982	301-000U2J0510J
C56	281-0638-00	XB130000		CAP.,FXD,CER DI:240PF,5%,500V	72982	301000Z5D241J
C65	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C69	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C70	281-0661-00			CAP.,FXD,CER DI:0.8PF,+/-0.1PF,500V	72982	301-000C0K0808B
C71	283-0010-00			CAP.,FXD,CER DI:0.05UF,+100-20%,50V	56289	273C20
C72	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C73	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C78	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
C80	290-0534-00			CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C82	290-0523-00			CAP.,FXD,ELCTLT:2.2UF,20%,20V	56289	196D225X0025HA1
C100[4]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-505B102J
C101[4]	285-0808-00			CAP.,FXD,PLSTC:0.1UF,10%,50V	56289	LP66A1A104K004
C102[1]	283-0114-00	XB116230		CAP.,FXD,CER DI:0.0015UF,5%,200V	72982	805-509B152J
C102[2]	283-0114-00	XB116330		CAP.,FXD,CER DI:0.0015UF,5%,200V	72982	805-509B152J
C102[3]	283-0114-00	XB116350		CAP.,FXD,CER DI:0.0015UF,5%,200V	72982	805-509B152J
C103[4]	281-0546-00			CAP.,FXD,CER DI:330PF,10%,500V	04222	7001-1380
C104[1]	283-0114-00	XB116230		CAP.,FXD,CER DI:0.0015UF,5%,200V	72982	805-509B152J
C104[2]	283-0114-00	XB116330		CAP.,FXD,CER DI:0.0015UF,5%,200V	72982	805-509B152J
C104[3]	283-0114-00	XB126350		CAP.,FXD,CER DI:0.0015UF,5%,200V	72982	805-509B152J
C105[1]	290-0340-00			CAP.,FXD,ELCTLT:10UF,10%,50V	56289	109D106X9050C2
C110[4]	283-0065-00			CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-505B102J
C111[4]	283-0000-00			CAP.,FXD,CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C112[4]	283-0001-00			CAP.,FXD,CER DI:0.005UF,+100-0%,500V	72982	831-559E502P
C125[4]	290-0415-00			CAP.,FXD,ELCTLT:5.6UF,10%,35V	56289	150D565X9035B2
C148	285-0566-00			CAP.,FXD,PLSTC:0.022UF,10%,200V	56289	410P1000
C150	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C165	283-0111-00			CAP.,FXD,CER DI:0.1UF,20%,50V	72982	8121-N088Z5U104M
C168	281-0592-00	B010100	B029999	CAP.,FXD,CER DI:4.7PF,+/-0.5PF,500V	72982	301-023C0H0479D
C168	281-0651-00	B030000		CAP.,FXD,CER DI:47PF,5%,200V	72982	374-001T2H0470J
C170	285-0913-00			CAP.,FXD,PLSTC:3UF,5%,50V	56289	LP66A 1A305J
C172	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C175[1]	283-0067-00	B010100	B116229	CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C175[1]	283-0051-00	B116230	B149599	CAP.,FXD,CER DI:0.0033UF,5%,100V	72982	8131N145 A 332J
C175[1]	283-0067-00	B149600		CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C175[2]	283-0067-00	B010100	B116329	CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C175[2]	283-0051-00	B116630	B149379	CAP.,FXD,CER DI:0.0033UF,5%,100V	72982	8131N145 A 332J
C175[2]	283-0067-00	B149380		CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C175[3]	283-0067-00	B010100	B116349	CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C175[3]	283-0051-00	B116350	B148279	CAP.,FXD,CER DI:0.0033UF,5%,100V	72982	8131N145 A 332J
C175[3]	283-0067-00	B148280		CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C178	283-0003-00			CAP.,FXD,CER DI:0.01UF,+80-20%,150V	72982	855-558Z5U-103Z

[1]Standard only.
[2]Option 1 only.
[3]Option 2 only.
[4]Standard and Option 1 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
C220	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C224	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C230	281-0638-00	B010100	B139999X	CAP.,FXD,CER DI:240PF,5%,500V	72982	301000Z5D241J
C232	281-0638-00	XB140000		CAP.,FXD,CER DI:240PF,5%,500V	72982	301000Z5D241J
C234	290-0512-00	XB140000		CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C236	283-0104-00	XB140000		CAP.,FXD,CER DI:2000PF,5%,500V	72982	811-565B202J
C238	283-0065-00	B010100	B139999X	CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-505B102J
C240	281-0524-00			CAP.,FXD,CER DI:150PF,+/-30PF,500V	04222	7001-1381
C243	283-0067-00			CAP.,FXD,CER DI:0.001UF,10%,200V	72982	835-515B102K
C246	281-0524-00			CAP.,FXD,CER DI:150PF,+/-30PF,500V	04222	7001-1381
C270	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039 E 105Z
C275	283-0177-00			CAP.,FXD,CER DI:1UF,+80-20%,25V	72982	8131N039 E 105Z
C280	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C285	290-0527-00			CAP.,FXD,ELCTLT:15UF,20%,20V	90201	TDC156M020FL
C288	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C290	290-0529-00			CAP.,FXD,ELCTLT:47UF,20%,20V	05397	T368C476M020AZ
C292[1]	283-0363-00	XB127400		RES.,FXD,CER DI:2.2PF,0.25%,200V	72982	838-000C0G229C
C292[2]	283-0363-00	XB127410		RES.,FXD,CER DI:2.2PF,0.25%,200V	72982	838-000C0G229C
C292[3]	283-0363-00	XB127240		RES.,FXD,CER DI:2.2PF,0.25%,200V	72982	838-000C0G229C
C294[2]	290-0534-00	XB149380		CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C294[3]	290-0534-00	XB148280		CAP.,FXD,ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C310	281-0524-00			CAP.,FXD,CER DI:150PF,+/-30PF,500V	04222	7001-1381
C330	281-0543-00			CAP.,FXD,CER DI:270PF,10%,500V	72982	301055X5P271K
C410	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C423	290-0531-00			CAP.,FXD,ELCTLT:100UF,20%,10V	90201	TDC107M010WLC
C425	283-0150-00			CAP.,FXD,CER DI:650PF,5%,200V	72982	835-515B651J
C426	283-0203-00			CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
C435	283-0065-00	B010100	B029999	CAP.,FXD,CER DI:0.001UF,5%,100V	72982	805-505B102J
C435	283-0203-00	B030000		CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
C436	290-0512-00			CAP.,FXD,ELCTLT:22UF,20%,15V	56289	196D226X0015KA1
C444	283-0203-00	B010100	B029999X	CAP.,FXD,CER DI:0.47UF,20%,50V	72982	8131N075 E474M
CR11	152-0423-00			SEMICOND DEVICE:SILICON,400V,3A	04713	1N5000
CR12	152-0423-00			SEMICOND DEVICE:SILICON,400V,3A	04713	1N5000
CR20	152-0246-00			SEMICOND DEVICE:SILICON,400PIV,200MA	07910	CD12676
CR21	152-0246-00			SEMICOND DEVICE:SILICON,400PIV,200MA	07910	CD12676
CR60	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR61	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR72	152-0457-00			SEMICOND DEVICE:SILICON,25V	28480	5082-2671
CR73	152-0457-00			SEMICOND DEVICE:SILICON,25V	28480	5082-2671
CR91[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR93[2]	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR142	152-0246-00			SEMICOND DEVICE:SILICON,400PIV,200MA	07910	CD12676
CR145	152-0246-00			SEMICOND DEVICE:SILICON,400PIV,200MA	07910	CD12676
CR175	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR176	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR232	152-0141-02	XB140000		SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR234	152-0141-02	XB140000		SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR237	152-0141-02	XB140000		SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR240	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR280	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR281	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR282	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152

[1]Standard only.
[2]Option 1 only.
[3]Option 2 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR283	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR286	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR287	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR288	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR289	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR290	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR292	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR310	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR315	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
CR432	152-0141-02			SEMICOND DEVICE:SILICON,30V,150MA	07910	1N4152
DS340	150-1002-00	B010100	B099999X	NUMERICAL DSPL:SEVEN SEGMENT,RED	50579	DATA LIT 8-518
DS340	150-1037-00	XB130000		NUMERICAL DSPL:SEVEN SEGMENT,ORANGE	50522	MAN 3620
DS350	150-1002-00	B010100	B099999X	NUMERICAL DSPL:SEVEN SEGMENT,RED	50579	DATA LIT 8-518
DS350	150-1037-00	XB130000		NUMERICAL DSPL:SEVEN SEGMENT,ORANGE	50522	MAN 3620
DS360	150-1002-00	B010100	B099999X	NUMERICAL DSPL:SEVEN SEGMENT,RED	50579	DATA LIT 8-518
DS360	150-1037-00	XB130000		NUMERICAL DSPL:SEVEN SEGMENT,ORANGE	50522	MAN 3620
DS370	150-1002-00	B010100	B099999	NUMERICAL DSPL:SEVEN SEGMENT,RED	50579	DATA LIT 8-518
DS370	150-1025-00	B100000	B129999	IND,DGTL DSPL:3 DIGIT,7 SEGMENT	50579	DL883
DS370	150-1037-00	B130000		NUMERICAL DSPL:SEVEN SEGMENT,ORANGE	50522	MAN 3620
DS380	150-1003-00	B010100	B099999	NUMERICAL DSPL:PLUG-MINUS-ONE,RED,GAASP	50579	DL-81-700
DS380	150-1023-00	B100000	B129999	IND,DGTL DSPL:1.5 DIGIT,7 SEGMENT	50579	DL881
DS380	150-1038-00	B130000		NUMERICAL DSPL:SEVEN SEGMENT,ORANGE,0.5 DIGIT	50522	MAN 3630
F10	159-0015-00			FUSE,CARTRIDGE:3AG,3A,250V,FAST-BLOW	71400	AGC 3
F12	159-0024-00			FUSE,CARTRIDGE:3AG,0.06A,250V,FAST BLOW	71400	AGC 1/16
J10	129-0064-01			POST,BDG,ELEC:RED,5-WAY MINIATURE	58474	BB10167G2BX
J12	129-0064-00			POST,BDG,ELEC:CHARCOAL,5-WAY MINIATURE	58474	BINP BB10167G13T
J15	129-0103-00			POST,BDG,ELEC:ASSEMBLY	80009	129-0103-00
J100	131-1011-00			CONNECTOR,RCPT,:4 CONTACT,FEMALE	0000A	RA 1304 TPX
L290	120-0382-00			XFMR,TOROID:14 TURNS,SINGLE	80009	120-0382-00
L330	108-0240-00			COIL,RF:820UH	76493	B5147
Q20A,B	151-1044-00			TRANSISTOR:SILICON,JFE,N-CHANNEL	22229	2N3955
Q35	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q36	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q38	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q60	151-1004-00			TRANSISTOR:SILICON,JFE,N-CHANNEL	80009	151-1004-00
Q62	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q90[1]	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q92[1]	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q98[1]	151-1025-00			TRANSISTOR:SILICON,JFE,N-CHANNEL	80009	151-1025-00
Q104[1]	151-1025-00			TRANSISTOR:SILICON,JFE,N-CHANNEL	80009	151-1025-00
Q106[1]	151-1025-00			TRANSISTOR:SILICON,JFE,N-CHANNEL	80009	151-1025-00
Q150	151-0216-00	B010100	B010259	TRANSISTOR:SILICON,PNP	04713	MPS6523
Q150	151-0410-00	B010260		TRANSISTOR:SILICON,PNP	80009	151-0410-00
Q152	151-0192-00			TRANSISTOR:SILICON.NPN,SEL FROM MPS6521	80009	151-0192-00
Q154A,B	151-1047-00			TRANSISTOR:SILICON,JFE	80009	151-1047-00
Q160	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q180A,B	151-0354-00			TRANSISTOR:SILICON,PNP,DUAL	32293	ITS1200A
Q185	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q190	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q200A,B	151-0353-00			TRANSISTOR:SILICON,NPN,DUAL MONOLITH	32293	ITS1251
Q208	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906

[1]Standard and Option 1 only.

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Q245	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q250	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q270	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q272[1]	151-0301-00	XB127400		TRANSISTOR:SILICON.PNP	04713	2N2907A
Q272[2]	151-0301-00	XB127410		TRANSISTOR:SILICON,PNP	04713	2N2907A
Q272[3]	151-0301-00	XB127240		TRANSISTOR:SILICON,PNP	04713	2N2907A
Q275	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q277[1]	151-0302-00	XB127400		TRANSISTOR:SILICON,NPN	04713	2N2222A
Q277[2]	151-0302-00	XB127410		TRANSISTOR:SILICON,NPN	04713	2N2222A
Q277[3]	151-0302-00	XB127240		TRANSISTOR:SILICON,NPN	04713	2N2222A
Q290	151-0260-00			TRANSISTOR:SILICON,NPN	80009	151-0260-00
Q292	151-0260-00			TRANSISTOR:SILICON,NPN	80009	151-0260-00
Q294	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q315	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q320	151-0190-00			TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q335	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q340	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q342	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q344	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q348	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q350	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q352	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q354	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q358	151-0341-00			TRANSISTOR:SILICON,NPN	07263	S040065
Q360	151-0301-00			TRANSISTOR:SILICON,PNP	04713	2N2907A
Q432	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q438	151-0188-00			TRANSISTOR:SILICON,PNP	01295	2N3906
Q440	151-0190-00	B010100	B010259	TRANSISTOR:SILICON,NPN	80009	151-0190-00
Q440	151-0347-00	B010260		TRANSISTOR:SILICON,NPN	80009	151-0347-00
R8[1]	315-0102-00	B010100	B127399	RES.,FXD,CMPSN:1K OHM,(NOM VALUE),SEL	01121	CB1025
R8[1]	321-0193-00	B127400		RES.,FXD,FILM:1K OHM,(NOM VALUE),SEL	91637	MFF1816G10000F
R8[2]	315-0102-00	B010100	B127409	RES.,FXD,CMPSN:1K OHM,(NOM VALUE),SEL	01121	CB1025
R8[2]	321-0193-00	B127410		RES.,FXD,FILM:1K OHM,(NOM VALUE),SEL	91637	MFF1816G10000F
R8[3]	315-0102-00	B010100	B127239	RES.,FXD,CMPSN:1K OHM,(NOM VALUE),SEL	01121	CB1025
R8[3]	321-0193-00	B127240		RES.,FXD,FILM:1K OHM,(NOM VALUE),SEL	91637	MFF1816G10000F
R9	315-0202-00	B010100	B010260X	RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R10	307-1015-00			RES.,NETWORK:FILM	80009	307-1015-00
R12	307-0400-00			RES.,FXD,FILM:10 OHM,0.1%	80009	307-0400-00
R20	303-0303-00	B010100	B010259	RES.,FXD,CMPSN:30K OHM,5%,1W	01121	GB3035
R20	306-0333-00	B010260	B079999	RES.,FXD,CMPSN:33K OHM,10%,2W	01121	HB3331
R20	304-0101-00	B080000		RES.,FXD,CMPSN:100 OHM,10%,1W	01121	GB1011
R22	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R24	315-0752-00			RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R28	315-0303-00			RES.,FXD.CMPSN:30K OHM,5%,0.25W	01121	CB3035
R32	321-0208-00	B010100	B010259	RES.,FXD,FILM:1.43K OHM,1%,0.125W	91637	MFF1816G14300F
R32	321-0207-00	B010260		RES.,FXD,FILM:1.4K OHM,1%,0.125W	91637	MFF1816G14000F
R35	311-1223-00			RES.,VAR,NONWIR:250 OHM,10%,0.50W	32997	3386F-T04-251
R36	321-0285-00			RES.,FXD,FILM:9.09K OHM,1%,0.125W	91637	MFF1816G90900F
R38	315-0203-00			RES.,FXD,CMPSN:20K OHM,5%,0.25W	01121	CB2035
R39	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R43[1]	315-0226-00	XB127400		RES.,FXD,CMPSN:22M OHM,(NOM VALUE),SEL	01121	CB2265
R43[2]	315-0226-00	XB127410		RES.,FXD,CMPSN:22M OHM,(NOM VALUE),SEL	01121	CB2265
R43[3]	315-0226-00	XB127240		RES.,FXD,CMPSN:22M OHM,5%,0.25W	01121	CB2265

[1]Standard only.
[2]Option 1 only.
[3]Option 2 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R44[1]	315-0205-00	XB127400		RES.,FXD,CMPSN:2M OHM,(NOM VALUE),SEL	01121	CB2055
R44[2]	315-0205-00	XB127410		RES.,FXD,CMPSN:2M OHM,(NOM VALUE),SEL	01121	CB2055
R44[3]	315-0205-00	XB127240		RES.,FXD,CMPSN:2M OHM,(NOM VALUE),SEL	01121	CB2055
R50	311-0644-00			RES.,VAR,NONWIR:20K OHM,10%,0.50W	73138	MODEL 82P
R51[1]	315-0184-00	B010100	B029999	RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
R51[1]	315-0474-00	B030000	B127399	RES.,FXD,CMPSN:470K OHM,(NOM VALUE),SEL	01121	CB4745
R51[1]	315-0244-00	B127400		RES.,FXD,CMPSN:240K OHM,(NOM VALUE),SEL	01121	CB2445
R51[2]	315-0184-00	B010100	B029999	RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
R51[2]	315-0474-00	B030000	B127409	RES.,FXD,CMPSN:470K OHM,(NOM VALUE),SEL	01121	CB4745
R51[2]	315-0244-00	B127410		RES.,FXD,CMPSN:240K OHM,(NOM VALUE),SEL	01121	CB2445
R51[3]	315-0184-00	B010100	B029999	RES.,FXD,CMPSN:180K OHM,5%,0.25W	01121	CB1845
R51[3]	315-0474-00	B030000	B127349	RES.,FXD,CMPSN:470K OHM,(NOM VALUE),SEL	01121	CB4745
R51[3]	315-0244-00	B127240		RES.,FXD,CMPSN:240K OHM,(NOM VALUE),SEL	01121	CB2445
R52[1]	321-0385-00	XB127400		RES.,FXD,FILM:100K OHM,1%,0.125W	91637	MFF1816G10002F
R52[2]	321-0385-00	XB127410		RES.,FXD,FILM:100K OHM,1%,0.125W	91637	MFF1816G10002F
R52[3]	321-0385-00	XB127240		RES.,FXD,FILM:100K OHM,1%,0.125W	91637	MFF1816G10002F
R53[1]	321-0084-00	B010100	B039999	RES.,FXD,FILM:73.2 OHM,1%,0.125W	91637	MFF1816G73R20F
R53[1]	321-0082-00	B040000	B127399	RES.,FXD,FILM:69.8 OHM,(NOM VALUE),SEL	91637	MFF1816G69R80F
R53[1]	321-0054-00	B127400		RES.,FXD,FILM:35.7 OHM,(NOM VALUE),SEL	91637	MFF1816G35R70F
R53[2]	321-0084-00	B010100	B039999	RES.,FXD,FILM:73.2 OHM,1%,0.125W	91637	MFF1816G73R20F
R53[2]	321-0082-00	B040000	B127409	RES.,FXD,FILM:69.8 OHM,(NOM VALUE),SEL	91637	MFF1816G69R80F
R53[2]	321-0054-00	B127410		RES.,FXD,FILM:35.7 OHM,(NOM VALUE),SEL	91637	MFF1816G35R70F
R53[3]	321-0084-00	B010100	B039999	RES.,FXD,FILM:73.2 OHM,1%,0.125W	91637	MFF1816G73R20F
R53[3]	321-0082-00	B040000	B127239	RES.,FXD,FILM:69.8 OHM,(NOM VALUE),SEL	91637	MFF1816G69R80F
R53[3]	321-0054-00	B127240		RES.,FXD,FILM:35.7 OHM,(NOM VALUE),SEL	91637	MFF1816G35R70F
R55	321-0666-07			RES.,FXD,FILM:3.04K OHM,0.1%,0.125W	91637	MFF1816C30400B
R56	321-0332-07			RES.,FXD,FILM:28K OHM,0.1%,0.125W	91637	MFF1816C28001B
R59	315-0272-00	B010100	B010259	RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R59	315-0182-00	B010260		RES.,FXD,CMPSN:1.8K OHM,5%,0.25W	01121	CB1825
R60	306-0333-00			RES.,FXD,CMPSN:33K OHM,10%,2W	01121	HB3331
R62	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R63	315-0682-00			RES.,FXD,CMPSN:6.8K OHM,5%,0.25W	01121	CB6825
R65	321-0385-00			RES.,FXD,FILM:100K OHM,1%,0.125W	91637	MFF1816G10002F
R67	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R68	321-0162-00			RES.,FXD,FILM:475 OHM,1%,0.125W	91637	MFF1816G475R0F
R70	311-1258-00			RES.,VAR,NONWIR:50 OHM,10%,0.50W	32997	3329P-L58-500
R72	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R73	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R75	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R76	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R78	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535
R80	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R82	315-0303-00			RES.,FXD,CMPSN:30K OHM,5%,0.25W	01121	CB3035
R90	315-0272-00			RES.,FXD,CMPSN:2.7K OHM,5%,0.25W	01121	CB2725
R91	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R93	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R94	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R96	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R98	321-0365-02			RES.,FXD,FILM:61.9K OHM,0.5%,0.125W	75042	CEAT2-6192D
R99	321-0117-00			RES.,FXD,FILM:162 OHM,1%,0.125W	91637	MFF1816G162R0F
R101[4]	322-0643-01			RES.,FXD,FILM:600K OHM,0.5%,0.25W	75042	CEBT0-6003D
R103[4]	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R104[4]	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035

[1]Standard only.
[2]Option 1 only.
[3]Option 2 only.
[4]Standard and Option 1 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R106[1]	315-0104-00			RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R110[1]	315-0683-00			RES.,FXD,CMPSN:68K OHM,5%,0.25W	01121	CB6835
R112[1]	321-1331-02			RES,FXD,FILM:27.2K OHM,0.5%,0.125W	91637	MFF1816D27701D
R113[1]	321-0240-01			RES.,FXD,FILM:3.09K OHM,0.5%,0.125W	91637	MFF1816G30900D
R115[1]	311-0605-00			RES.,VAR,NONWIR:200 OHM,10%,0.50W	80740	62-54-3
R116[1]	321-0222-00			RES.,FXD,FILM:2K OHM.1%,0.125W	91637	MFF1816G20000F
R118[1]	321-0423-00			RES.,FXD,FILM:249K OHM,1%,0.125W	91637	MFF1816G24902F
R120[1]	321-0446-00			RES.,FXD,FILM:432K OHM,1%,0.125W	91637	MFF1816G43202F
R121[1]	321-0397-00			RES.,FXD,FILM:133K OHM,1%,0.125W	91637	MFF1816G13302F
R123[1]	321-0174-00			RES.,FXD,FILM:634 OHM,1%,0.125W	91637	MFF1816G634R0F
R125[1]	311-1175-00			RES.,VAR,NONWIR:100 OHM,10%,0.50W	73138	66WR101KSM
R126[1]	321-0182-00			RES.,FXD,FILM:768 OHM,1%,0.125W	91637	MFF1816G768R0F
R128	311-1007-00			RES.,VAR,NONWIR:20 OHM,20%,0.50W	80294	3329HG48-200
R129[1]	321-0106-00			RES.,FXD,FILM:124 OHM,1%,0.125W	91637	MFF1816G124R0F
R130[1]	321-0380-00			RES.,FXD,FILM:88.7K OHM,1%,0.125W	91637	MFF1816G88701F
R140	304-0564-00			RES.,FXD,CMPSN:560K OHM,10%,1W	01121	GB5641
R142	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R143	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R145	315-0912-00			RES.,FXD,CMPSN:9.1K OHM,5%,0.25W	01121	CB9125
R146	315-0242-00			RES.,FXD,CMPSN:2.4K OHM,5%,0.25W	01121	CB2425
R148	315-0392-00			RES.,FXD,CMPSN:3.9K OHM,5%,0.25W	01121	CB3925
R152	315-0153-00			RES.,FXD,CMPSN:15K OHM,5%,0.25W	01121	CB1535
R154	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R155	311-1149-00			RES.,VAR,NONWIR:50 OHM,10%,0.75W	73138	89-122-0
R158	321-0289-00			RES.,FXD,FILM:10K OHM,1%,0.125W	91637	MFF1816G10001F
R160	315-0101-00			RES.,FXD,CMPSN:100 OHM,5%,0.25W	01121	CB1015
R164	315-0132-00			RES.,FXD,CMPSN:1.3K OHM,5%,0.25W	01121	CB1325
R165	315-0113-00			RES.,FXD,CMPSN:11K OHM,5%,0.25W	01121	CB1135
R168	315-0104-00	B010100	B029999	RES.,FXD,CMPSN:100K OHM,5%,0.25W	01121	CB1045
R168	315-0103-00	B030000		RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R170	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R174	315-0102-00	B010100	B029999	RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R174	315-0202-00	B030000		RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R178	315-0152-00			RES.,FXD,CMPSN:1.5K OHM,5%,0.25W	01121	CB1525
R180	321-0620-00			RES.,FXD,FILM:8.45K OHM,0.25%,0.125W	91637	MFF1816D84500C
R182	311-1177-00			RES.,VAR,NONWIR:500 OHM,10%,0.75W	80009	311-1177-00
R185	321-0229-00			RES.,FXD,FILM:2.37K OHM,1%,0.125W	91637	MFF1816G23700F
R186	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R188	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R189	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R192	315-0562-00			RES.,FXD,CMPSN:5.6K OHM,5%,0.25W	01121	CB5625
R193	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R195	321-0335-00			RES.,FXD,FILM:30.1K OHM,1%,0.125W	91637	MFF1816G30101F
R196	321-0393-00			RES.,FXD,FILM:121K OHM,1%,0.125W	91637	MFF1816G12102F
R198	323-0794-07			RES.,FXD,FILM::11.17K OHM,0.1%,0.50W	91637	MFF1226C11171B
R199	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R200	321-0620-00			RES.,FXD,FILM:8.45K OHM,0.25%,0.125W	91637	MFF1816D84500C
R202	311-1177-00			RES.,VAR,NONWIR:500 OHM,10%,0.75W	80009	311-1177-00
R205	321-0229-00			RES.,FXD,FILM:2.37K OHM,1%,0.125W	91637	MFF1816G23700F
R206	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R208	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R209	315-0123-00			RES.,FXD,CMPSN:12K OHM,5%,0.25W	01121	CB1235
R210	315-0753-00			RES.,FXD,CMPSN:75K OHM,5%,0.25W	01121	CB7535

[1]Standard and Option 1 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R220	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R222	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R224	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R226	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R228	315-0622-00			RES.,FXD,CMPSN:6.2K OHM,5%,0.25W	01121	CB6225
R230	315-0202-00			RES.,FXD,CMPSN:2K OHM,5%,0.25W	01121	CB2025
R234	315-0752-00	XB140000		RES.,FXD,CMPSN:7.5K OHM,5%,0.25W	01121	CB7525
R236	315-0473-00	XB140000		RES.,FXD,CMPSN:47K OHM,5%,0.25W	01121	CB4735
R237	321-0346-00	XB140000		RES.,FXD,FILM:39.2K OHM,(NOM VALUE),SEL	91637	MFF1816G39201F
R238	315-0333-00	B010100	B049999	RES.,FXD,CMPSN:33K OHM,5%,0.25W	01121	CB3335
R238	321-0340-00	B050000	B139999X	RES.,FXD,FILM:34K OHM,1%,0.125W	91637	MFF1816G34001F
R240	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R243	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R244	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R246	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R250	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R252	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R270	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R272	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R275	315-0100-00			RES.,FXD,CMPSN:10 OHM,5%,0.25W	01121	CB1005
R277	315-0331-00			RES.,FXD,CMPSN:330 OHM,5%,0.25W	01121	CB3315
R290	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R292	315-0302-00			RES.,FXD,CMPSN:3K OHM,5%,0.25W	01121	CB3025
R293	315-0122-00			RES.,FXD,CMPSN:1.2K OHM,5%,0.25W	01121	CB1225
R294[1]	315-0273-00	XB149380		RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R294[2]	315-0273-00	XB148280		RES.,FXD,CMPSN:27K OHM,5%,0.25W	01121	CB2735
R295	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R297	315-0561-00			RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R298	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R299	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R310	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R315	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R317	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R318	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R320	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R322	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R325	315-0472-00			RES.,FXD,CMPSN:4.7K OHM,5%,0.25W	01121	CB4725
R335	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R337	315-0301-00	B010100	B129999	RES.,FXD,CMPSN:300 OHM,5%,0.25W	01121	CB3015
R337	315-0131-00	B130000		RES.,FXD,CMPSN:130 OHM,5%,0.25W	01121	CB1315
R339	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R340	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R342	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R344	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R345	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R348	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R350	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R351	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R352	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R354	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R335	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R358	315-0223-00			RES.,FXD,CMPSN:22K OHM,5%,0.25W	01121	CB2235
R360	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025

[1]Option 1 only.
[2]Option 2 only.

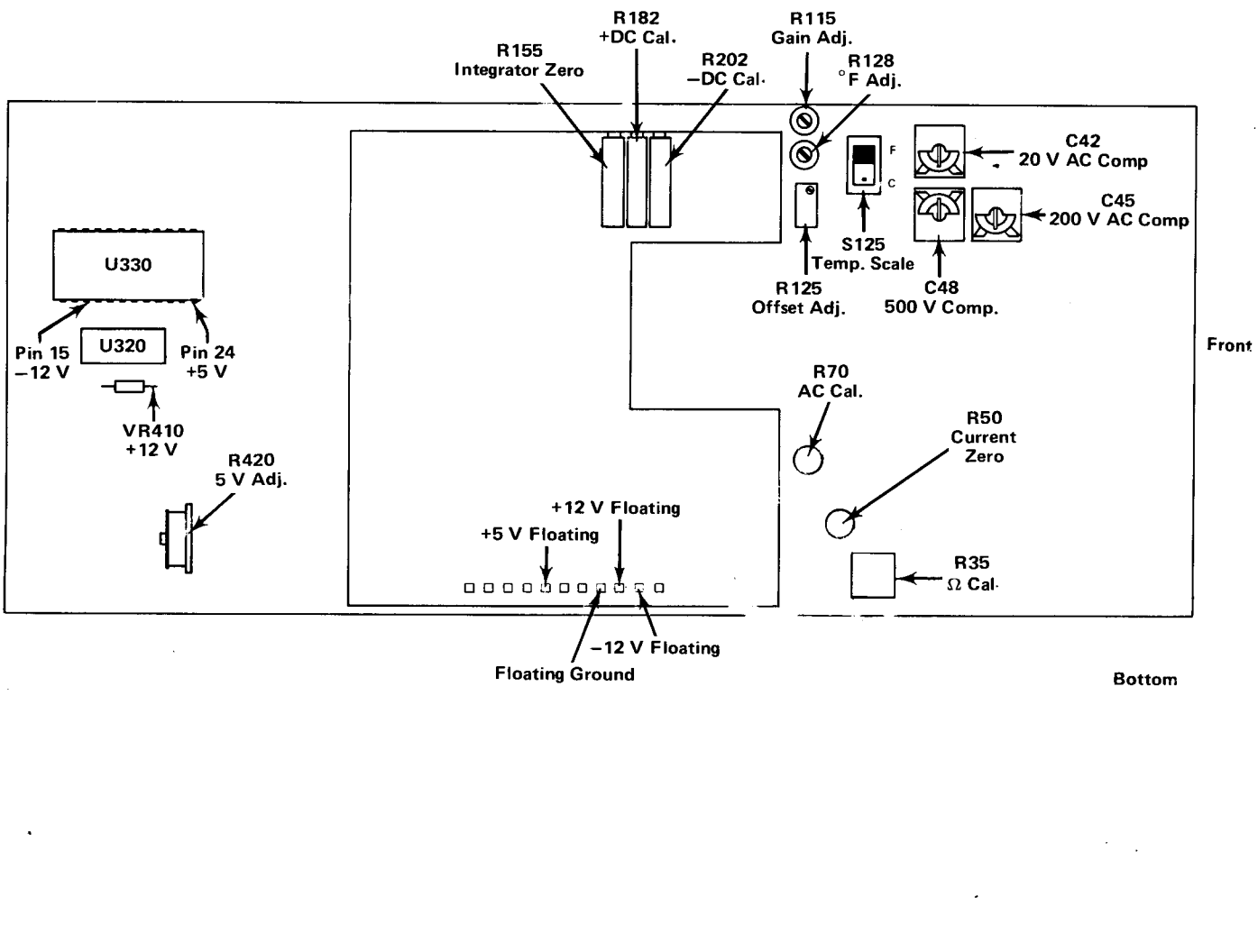
Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R361	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R381	315-0511-00	B010100	B069999	RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R381	315-0391-00	B070000	B099999	RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R381	315-0181-00	B100000	B129999	RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R381	315-0391-00	B130000		RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R382	315-0511-00	B010100	B069999	RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R382	315-0391-00	B070000	B099999X	RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R382	315-0391-00	XB130000		RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R384	315-0511-00	B010100	B069999	RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R384	315-0391-00	B070000	B099999X	RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R385	315-0511-00	B010100	B069999	RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R385	315-0391-00	B070000	B099999	RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R385	315-0181-00	B100000	B129999	RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R385	315-0391-00	B130000		RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R387	315-0511-00	B010100	B069999	RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R387	315-0391-00	B070000	B099999	RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R387	315-0181-00	B100000	B129999	RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R387	315-0391-00	B130000		RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R388	315-0511-00	B010100	B069999	RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R388	315-0391-00	B070000	B099999X	RES.,FXD,CMPSN:390 OHM,5%,0.25W	01121	CB3915
R390	315-0151-00	B010100	B069999	RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R390	315-0121-00	B070000	B129999	RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R390	315-0181-00	B130000		RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R391	315-0151-00	B010100	B069999	RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R391	315-0121-00	B070000	B129999	RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R391	315-0181-00	B130000		RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R392	315-0151-00	B010100	B069999	RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R392	315-0121-00	B070000	B129999	RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R392	315-0181-00	B130000		RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R393	315-0151-00	B010100	B069999	RES.,FXD,CMPSN:150 OHM.5%,0.25W	01121	CB1515
R393	315-0121-00	B070000	B129999	RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R393	315-0181-00	B130000		RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R394	315-0151-00	B010100	B069999	RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R394	315-0121-00	B070000	B129999	RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R394	315-0181-00	B130000		RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R395	315-0151-00	B010100	B069999	RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R395	315-0121-00	B070000	B129999	RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R395	315-0181-00	B130000		RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R396	315-0151-00	B010100	B069999	RES.,FXD,CMPSN:150 OHM,5%,0.25W	01121	CB1515
R396	315-0121-00	B070000	B129999	RES.,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215
R396	315-0181-00	B130000		RES.,FXD,CMPSN:180 OHM,5%,0.25W	01121	CB1815
R410	308-0426-00			RES.,FXD,WW:470 OHM,5%,3W	91637	RS2B-B470R0J
R410[1]	308-0426-00	B010100	B148279	RES.,FXD,WW:470 OHM,5%,3W	91637	RS2B-B470R0J
R410[1]	308-0077-00	B148280		RES.,FXD,WW:1K OHM,5%,3W	91637	RS2B-B10000J
R419	315-0751-00			RES.,FXD,CMPSN:750 OHM,5%,0.25W	01121	CB7515
R420	311-1408-00			RES.,VAR,NONWIR1K OHM,0.25W	71450	X201R102B
R421	315-0222-00			RES.,FXD,CMPSN:2.2K OHM,5%,0.25W	01121	CB2225
R423	307-0093-00			RES.,FXD,CMPSN:1.2 OHM,5%,0.50W	01121	EB12G5
R425	315-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.25W	01121	CB5115
R423	321-0222-00			RES.,FXD,FILM:2K OHM,1%,0.125W	91637	MFF1816G20000F
R435	321-0257-00			RES.,FXD,FILM:4.64K OHM,1%,0.125W	91637	MFF1816G46400F
R438	315-0102-00			RES.,FXD,CMPSN:1K OHM,5%,0.25W	01121	CB1025
R439	315-0103-00			RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035

[1]Option 2 only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
R440	301-0511-00			RES.,FXD,CMPSN:510 OHM,5%,0.50W	01121	EB5115
R442	315-0103-00	B010100	B010259	RES.,FXD,CMPSN:10K OHM,5%,0.25W	01121	CB1035
R442	315-0561-00	B010260		RES.,FXD,CMPSN:560 OHM,5%,0.25W	01121	CB5615
R444	307-0093-00			RES.,FXD,CMPSN:1.2 OHM,5%,0.50W	01121	EB12G5
S10	105-0440-00			ACTR ASSY,CAM S:RANGE/FUNCTION	80009	105-0440-00
S15	260-1209-00			SWITCH,PUSH:4PDT	80009	260-1209-00
S125[1]	260-0960-01			SWITCH,SLIDE:0.5A,120VDC,CKT CD MT	10389	23-021-043
T290	120-0844-00			XFMR,PWR,SDN/SU:	80009	129-0844-00
T300	120-0697-00			XFMR,TOROID:TWO 20 TURN WINDINGS	80009	120-0697-00
T315	120-0697-00			XFMR,TOROID:TWO 20 TURN WINDINGS	80009	120-0697-00
T320	120-0697-00			XFMR,TOROID:TWO 20 TURN WINDINGS	80009	120-0697-00
U30	156-0158-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-00
U70	156-0122-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	18324	NE531T
U100[1]	156-0158-00			MICROCIRCUIT,LI:DUAL OPERATIONAL AMPLIFIER	80009	156-0158-00
U170	156-0067-00			MICROCIRCUIT,LI:OPERATIONAL AMPLIFIER	80009	156-0067-00
U175	156-0134-00			MICROCIRCUIT,LI:SINGLE DIFFERENTIAL COMPARATOR	18324	NS710V
U220	156-0043-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NOR GATE	80009	156-0043-00
U230	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U235	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U236A,B	156-0405-00	XB140000		MICROCIRCUIT,DI:DUAL RETRIG MONOSTABLE MV	07263	9602PC
U238	156-0072-00	B010100	B139999X	MICROCIRCUIT,DI:MONOSTABLE MV,TTL	27014	DM74121N
U295	156-0079-00			MICROCIRCUIT,DI:DECADE COUNTER,TTL	07263	9390PC
U310	156-0039-00			MICROCIRCUIT,DI:DUAL J-K FLIP FLOP	01295	SN7473N
U315	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U320	156-0041-00			MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U325	156-0030-00			MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U330	156-0306-00			MICROCIRCUIT,DI:4.5 DECADE CTR,MOS	07263	3814DC
U390	156-0128-00			MICROCIRCUIT,DI:SGL BCD TO 7-SEG DCDR/DRVR	01295	SN7447AN
U420	156-0071-00			MICROCIRCUIT,LI:VOLTAGE REGULATOR	07263	723DC
VR125[1]	152-0486-00			SEMICOND DEVICE:2ENER,0.25W,6.2V,5%	07910	1N3497
VR150	152-0195-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	80009	152-0195-00
VR180	152-0486-00			SEMICOND DEVICE:2ENER,0.25W,6.2V,5%	07910	1N3497
VR200	152-0486-00			SEMICOND DEVICE:2ENER,0.25W,6.2V,5%	07910	1N3497
VR270	152-0508-00			SEMICOND DEVICE:ZENER,0.4W,12.6V,5%	80009	152-0508-00
VR275	152-0508-00			SEMICOND DEVICE:ZENER,0.4W,12.6V,5%	80009	152-0508-00
VR410	152-0168-00			SEMICOND DEVICE:ZENER,0.4W,12V,5%	04713	1N963B
Y330	158-0082-00			XTAL UNIT,QTZ:400KHZ,0.02%	18853	OBD

[1]Standard and Option 1 only.

INTERNAL ADJUSTMENT PROCEDURE



Services Available

Tektronix, Inc. provides complete instrument repair and adjustment at local Field Service Centers and at the Factory Service Center. Contact your local TEKTRONIX Field Office or representative for further information.

Maintenance

Refer to the TM 500 series Power Module manual for complete maintenance information.

Test Equipment

For calibration, and a complete accuracy check of the DM 501, the following equipment is required:

DC voltmeter to 12 V

DC voltage source to 1 kV

DC current source to 2 A

AC voltage source to 500 V RMS, 40 Hz, 8 kHz and 10 kHz

AC current source to 2 A RMS, 1 kHz

Resistances to 20 MΩ

Temperature source, 0°C and 100°C

Accuracy of calibration and performance checks depend upon the accuracy of the test equipment used.

Calibration of the temperature function requires an accurate temperature source. Satisfactory results may be obtained by using the equalizing block shown in Fig. 3-1A and Fig. 3-1B, shown on the reverse of this foldout, along with an accurate thermometer, suitable container, ice and boiling water.

Preparation

The DM 501 can be operated either fully installed in a TM 500 series Power Module, or connected to the Power Module via a flexible plug-in extender (TEKTRONIX Part No. 067-0645-01). Remove the Power Module cabinet to make adjustments to the DM 501 inside the Power Module. DM 501 adjustments are located on the component side of the board. See center page illustration for adjustment locations. Make adjustments at an ambient temperature between +20°C and +30°C.

1. Adjust 5-Volt Power Supply

Connect the positive lead of a DC voltmeter to pin 24 of U330, +5 V, and the negative lead to chassis ground. Adjust R420, 5 V Adj., for 5 V ±0.1 V.

2. Check 12-Volt Supplies

Check for +12 V ±1.0 V between the cathode of VR410, +12 V, and chassis ground. Check for −12 V ±0.6 V between pin 15 of U330, −12 V, and chassis ground.

3. Check Floating Supplies

Connect the negative lead of a DC voltmeter to the pin labeled Floating Ground. Check for +12 V ±0.6 V at pin labeled +12 V Floating, −12 V ±0.6 V at pin labeled −12 V Floating, and +5 V ±0.50 V at pin labeled +5 V Floating.

4. Adjust Integrator Zero

Set the RANGE/FUNCTION switch at the 2 DC VOLTS position. Short the HI and LO input binding posts together. Adjust R155 for a display readout of all zeros, ±1 count.

5. Adjust DC Calibration

Apply an accurately known DC Voltage (approximately 1.8 V) to the HI and LO binding posts (+ to HI post). Set the RANGE/FUNCTION switch at the 2 DC VOLTS position. Adjust R182, labeled +DC Cal., for a display readout of the applied voltage ±1 count. Reverse polarity of the DC voltage (− to HI post) and adjust R202, labeled −DC Cal., for a display readout of the applied voltage.

6. Check DC Voltage Ranges

Apply accurately known voltages, approximately 10% below each full scale value on the RANGE/FUNCTION switch, to the HI and LO binding posts. Check all ranges for accuracy to specifications.

7. Adjust Temperature Offset

Place the RANGE/FUNCTION switch in the TEMP position. Connect a P6058 probe, or other suitable sensor, to the front panel connector labeled TEMP PROBE. Set the internal switch S125, labeled Temp. Scale, to the C position. With probe tip at 0°C, adjust R125, Offset Adj., for a display readout of probe tip temperature ±1 count. See Fig. 2-1A and Fig. 2-1B for details of probe equalizing block and calibration fixture. If the probe tip temperature is not exactly 0°C, repeat this step after the following step, and continue until no interaction exists.

8. Adjust Temperature Gain

Place RANGE/FUNCTION switch in TEMP position, internal S125 in C position and probe tip at known

temperature near 100°C. Adjust R115, Gain Adj., for a display readout of the probe tip temperature ±1 count. Repeat step 7 if necessary. Leave probe at 100°C for the next step.

9. Adjust °F Calibration

With probe tip at known temperature near 100°C, convert to °F:

$$°F = \frac{9°C}{5} + 32$$

Set RANGE/FUNCTION switch to TEMP position, internal S125, Temp Scale Sw., to °F. Adjust R128, °F Adj., for a display readout of the known temperature ±1 count.

10. Adjust Ohms Calibration

Set RANGE/FUNCTION switch to the 200 K OHMS position. Connect an accurately known resistance near 180 kΩ to the HI and LO binding posts. Adjust R35, Ω Cal, for a display readout of the known resistance ±1 count.

11. Check Resistance Ranges

Connect accurately known resistances, approximately 10% below full scale values, as shown on the RANGE/FUNCTION switch, to the HI and LO binding posts. Check all OHMS ranges for accuracy to specifications.

12. Adjust Current Zero

Set the RANGE/FUNCTION switch to the 2000 DC mA position. Adjust R50, Current Zero, for a display readout of all zeros ±1 count.

13. Check DC mA Ranges

Apply accurately known DC currents, 10% below full scale values as shown on the RANGE/FUNCTION switch, to the HI and LO binding posts. Check all DC mA positions for accuracy to specifications.

14. Adjust AC Voltage Calibration

Set the RANGE/FUNCTION switch to the 2 AC VOLTS position. Connect an accurately known AC voltage near 1.8 volts RMS at 1 kHz to the HI and LO binding posts. Adjust R70, AC Cal., for a display readout of the applied voltage ±1 count.

15. Adjust 20 V AC Compensation

Set the RANGE/FUNCTION switch to the 20 AC VOLTS position. Connect an accurately known AC voltage near 18 volts RMS at a frequency of 8 kHz to the HI and LO binding posts. Adjust C42, labeled 20 V AC Comp., for a display readout of the applied voltage ±1 count.

16. Adjust 200 V AC Compensation

Set the RANGE/FUNCTION switch to the 200 AC VOLTS position. Connect an accurately known AC voltage near 180 volts RMS at a frequency of 8 kHz to the HI and LO binding posts. Adjust C45, labeled 200 V AC Comp., for a display readout of the applied voltage ±1 count.

17. Adjust 500 V AC Compensation

Set the RANGE/FUNCTION switch to the 500 AC VOLTS position. Connect an accurately known AC voltage near 450 volts RMS at a frequency of 8 kHz to the HI and LO binding posts. Adjust C48, labeled 500 V AC Comp., for a display readout of the applied voltage ±1 count.

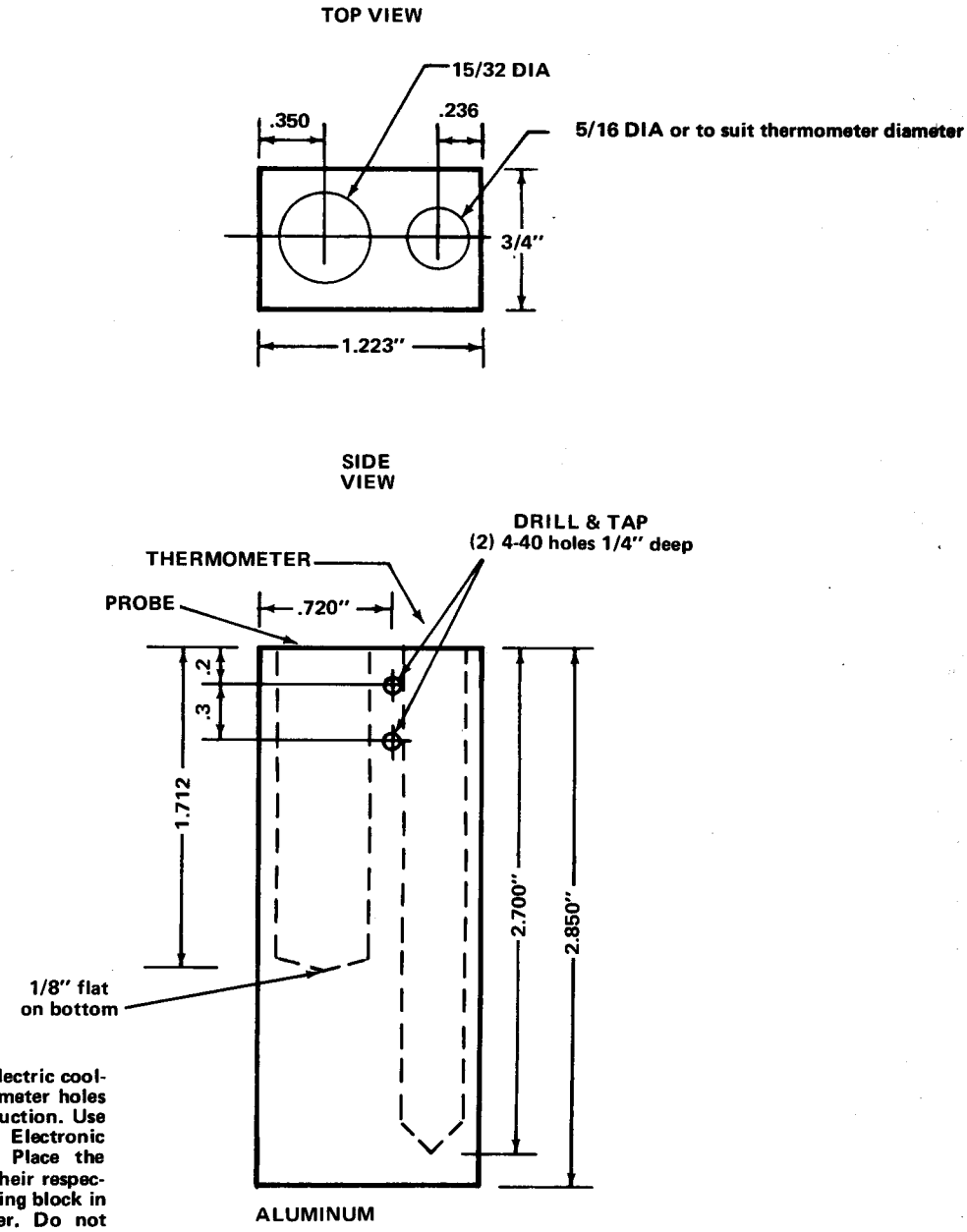
18. Check All AC Voltage Ranges

Apply accurately known AC voltages at frequencies of 40 Hz and 10 kHz to the HI and LO binding posts. Use amplitudes 10% below full scale values as shown on the RANGE/FUNCTION switch. Check each range at each frequency for accuracy to specifications.

19. Check All AC mA Ranges

Apply an accurately known AC current at a frequency of 1 kHz, with an amplitude approximately 10% below full scale values as shown on the RANGE/FUNCTION switch, to the HI and LO binding posts. Check each AC mA position for accuracy to specifications.

TEMPERATURE PROBE
EQUALIZING BLOCK



Place a small quantity of dielectric coolant in the probe and thermometer holes to insure good thermal conduction. Use FC 40 Fluorinert Brand Electronic Liquid or similar coolant. Place the probe and thermometer in their respective holes and set the equalizing block in chipped ice or boiling water. Do not submerge the probe in water. Wait approximately 20 minutes or until the thermometer indicates the equalizing block has temperature-stabilized. To shorten the time required for stabilization, use two equalizing blocks in separate containers of iced and boiling water. Transfer the probe from the low and high temperature containers when called for in the adjustment procedure.

Fig. 3-1A. Temperature Probe Equalizing Block.

Ⓐ

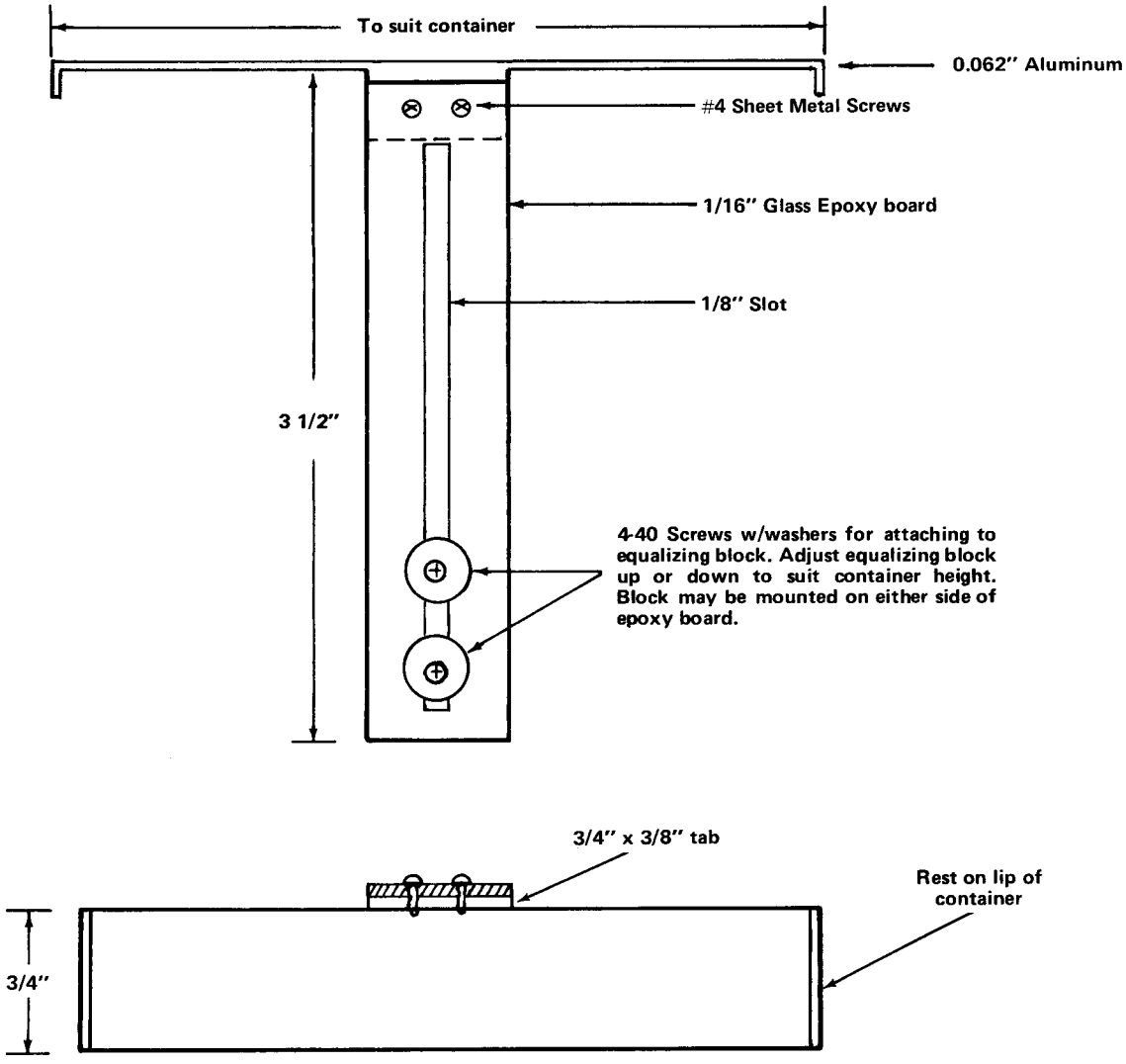
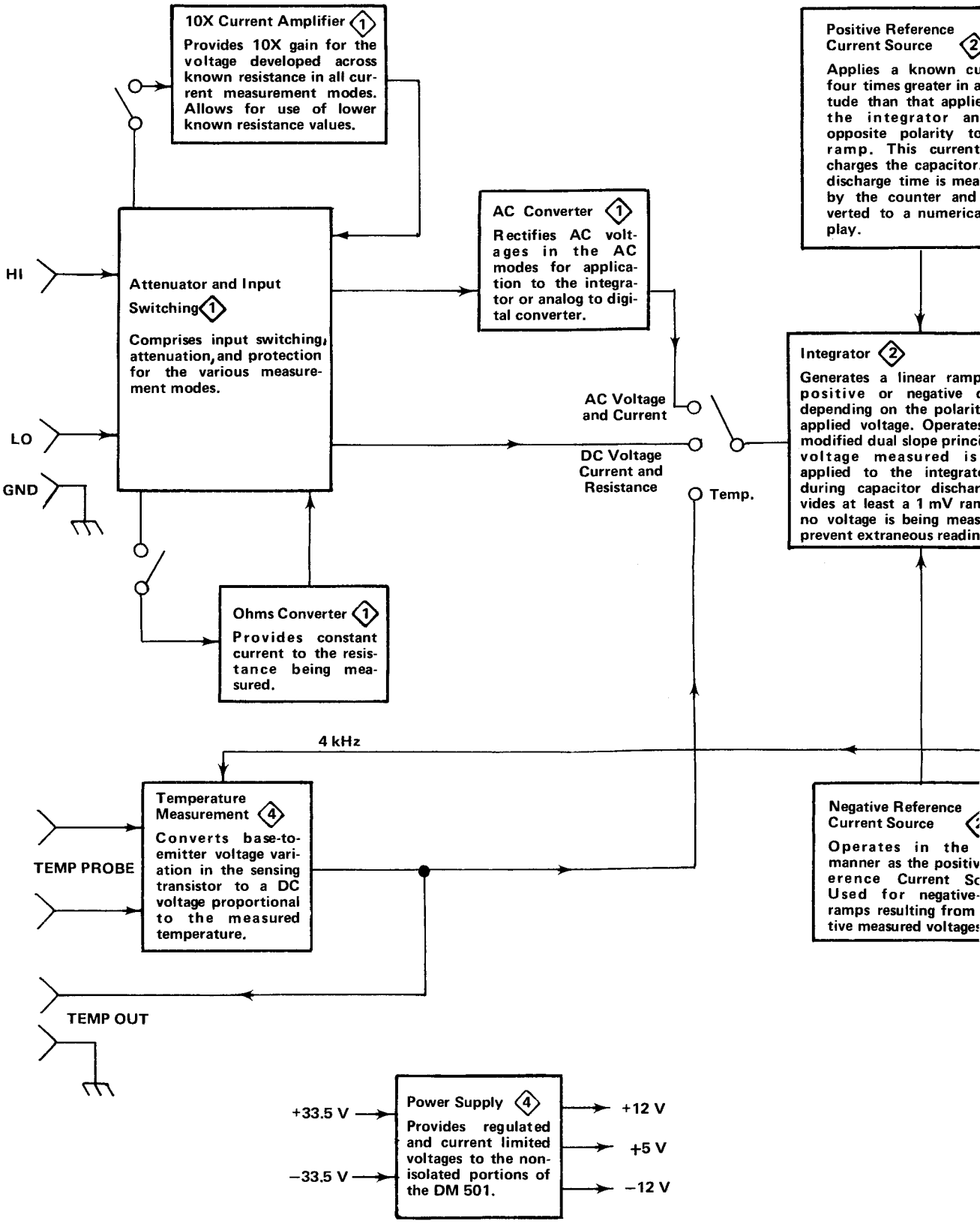


Fig. 3-1B. Suspension bracket for temperature probe equalizing block.

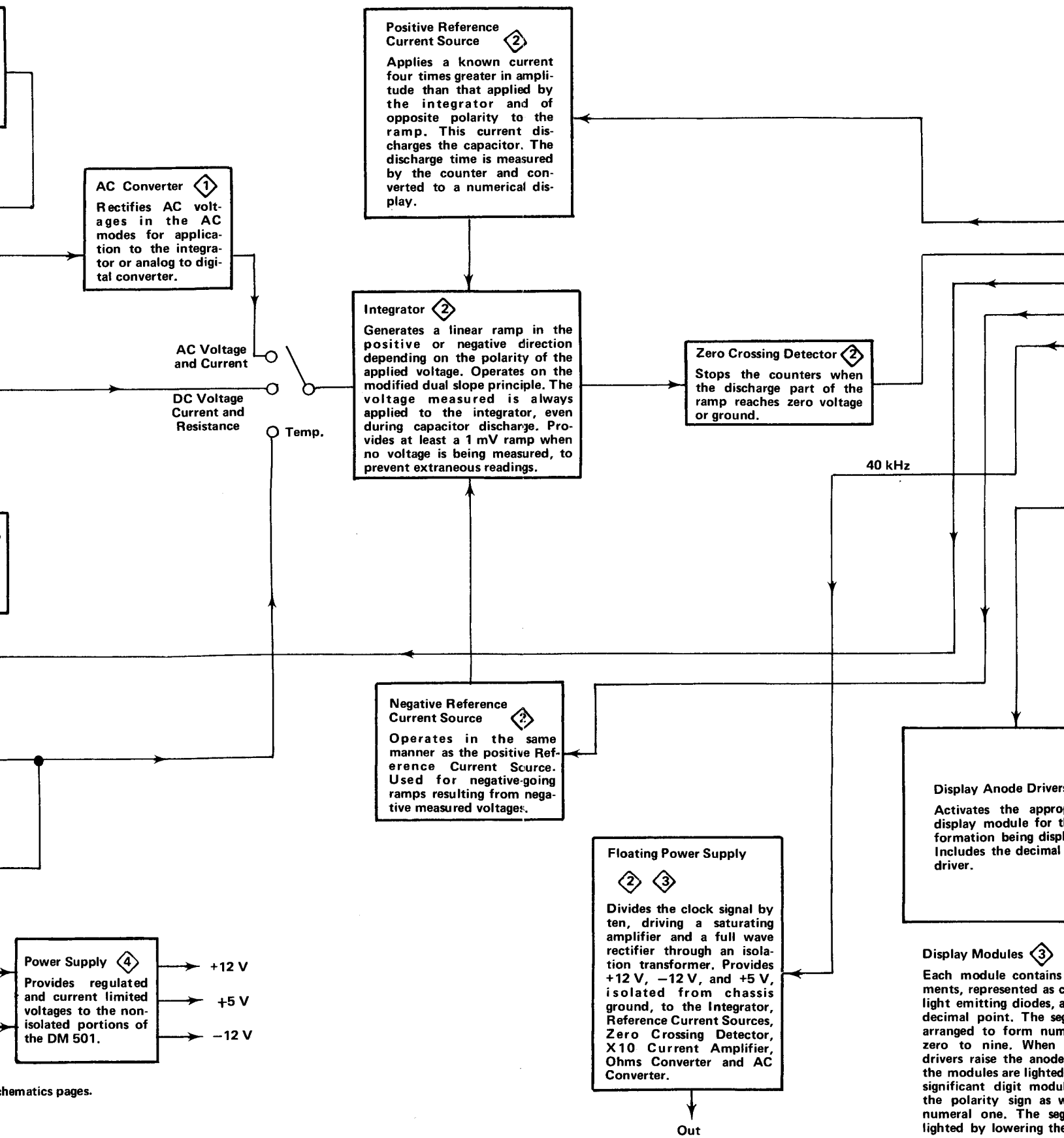
Ⓐ

BLOCK D



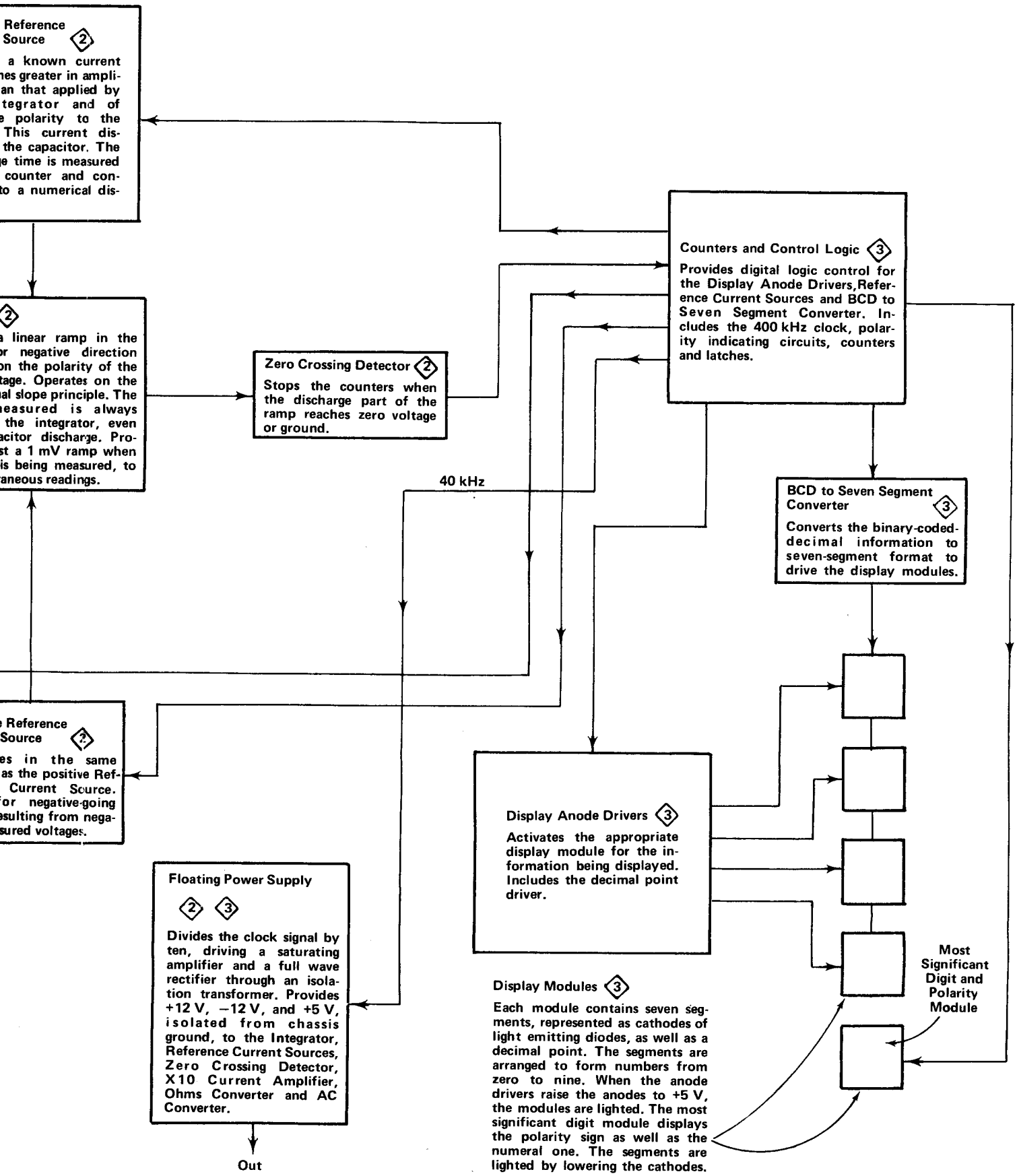
Numbers in diamonds refer to appropriate schematics pages.

BLOCK DIAGRAM



chematics pages.

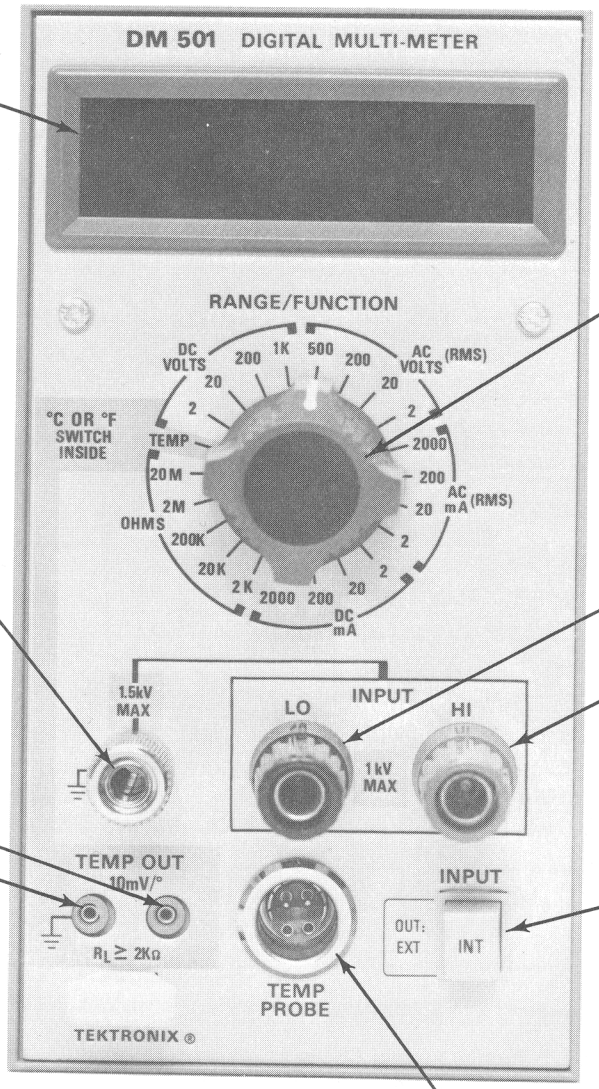
)CK DIAGRAM


Reference Source 2
a known current
nes greater in ampli-
an that applied by
tegrator and of
e polarity to the
This current dis-
the capacitor. The
ge time is measured
counter and con-
to a numerical dis-
2
a linear ramp in the
or negative direction
on the polarity of the
tage. Operates on the
al slope principle. The
easured is always
the integrator, even
acitor discharge. Pro-
st a 1 mV ramp when
is being measured, to
aneous readings.
Zero Crossing Detector 2
Stops the counters when the discharge part of the ramp reaches zero voltage or ground.
Counters and Control Logic 3
Provides digital logic control for the Display Anode Drivers, Reference Current Sources and BCD to Seven Segment Converter. Includes the 400 kHz clock, polarity indicating circuits, counters and latches.
40 kHz
BCD to Seven Segment Converter 3
Converts the binary-coded-decimal information to seven-segment format to drive the display modules.
Reference Source 3
es in the same
as the positive Ref-
Current Source.
or negative-going
esulting from nega-
sured voltages.
Display Anode Drivers 3
Activates the appropriate display module for the information being displayed. Includes the decimal point driver.
Floating Power Supply
2 3
Divides the clock signal by ten, driving a saturating amplifier and a full wave rectifier through an isolation transformer. Provides +12 V, −12 V, and +5 V, isolated from chassis ground, to the Integrator, Reference Current Sources, Zero Crossing Detector, X10 Current Amplifier, Ohms Converter and AC Converter.
Out
Display Modules 3
Each module contains seven segments, represented as cathodes of light emitting diodes, as well as a decimal point. The segments are arranged to form numbers from zero to nine. When the anode drivers raise the anodes to +5 V, the modules are lighted. The most significant digit module displays the polarity sign as well as the numeral one. The segments are lighted by lowering the cathodes.
Most Significant Digit and Polarity Module

CONTROLS AND CONNECTORS

Display Readout

4 1/2 digit LED readout with decimal point positioned by RANGE/FUNCTION switch. Resolution is 0.005% of range except temperature which is 0.1°.



RANGE/FUNCTION Switch

Selects all ranges and functions.

Ground Binding Post

Chassis ground.

INPUT Binding Posts

Binding posts for application of unknown voltage, current, or resistance. May be floated 1.5 kV above ground.

TEMP OUT Pin Jacks

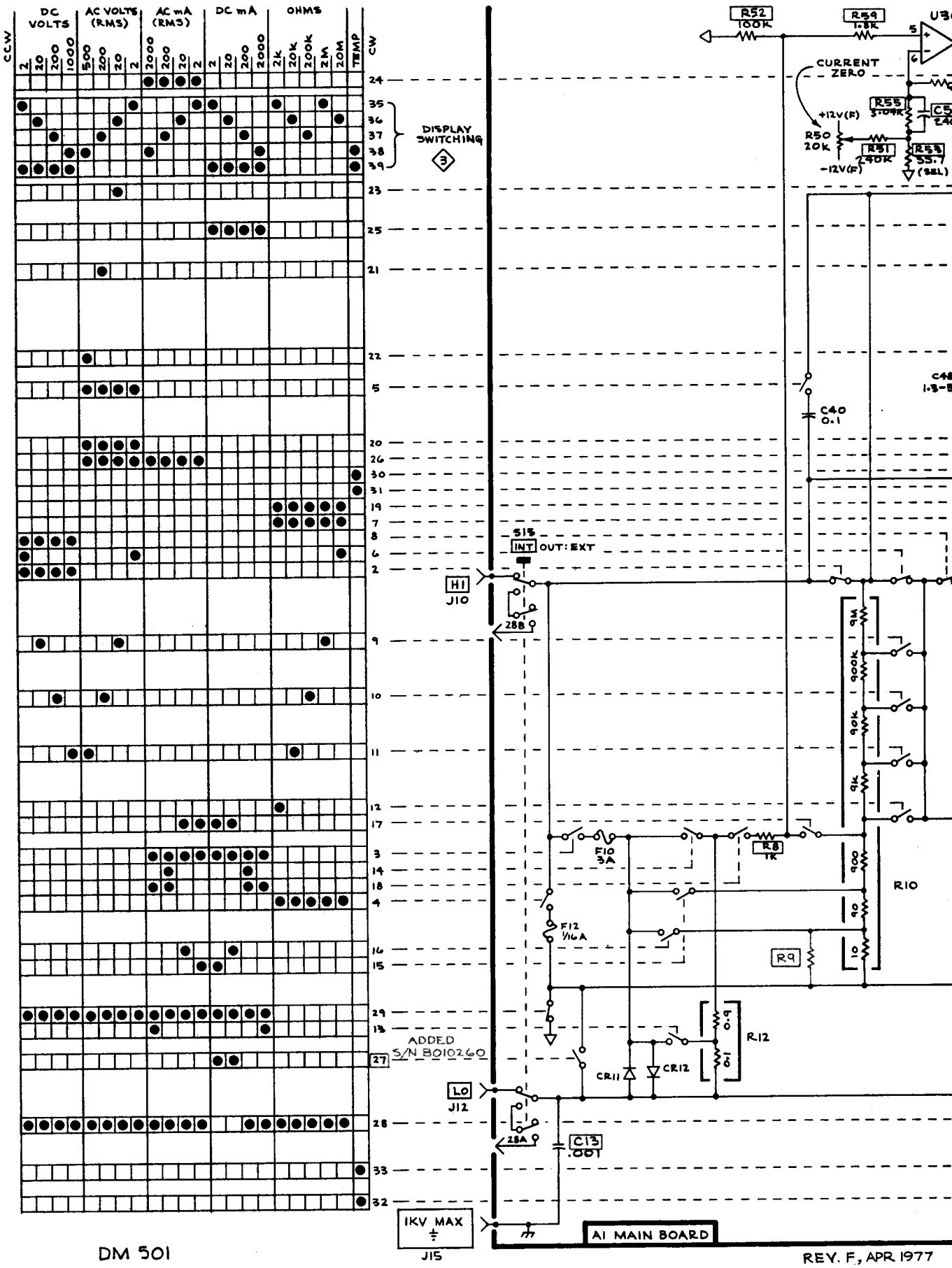
Output available irrespective of RANGE/FUNCTION switch setting. Center terminal ground.

INPUT Pushbutton

Button OUT transfers input to front panel. Button in rear interface connector. Does not switch TEMP input.

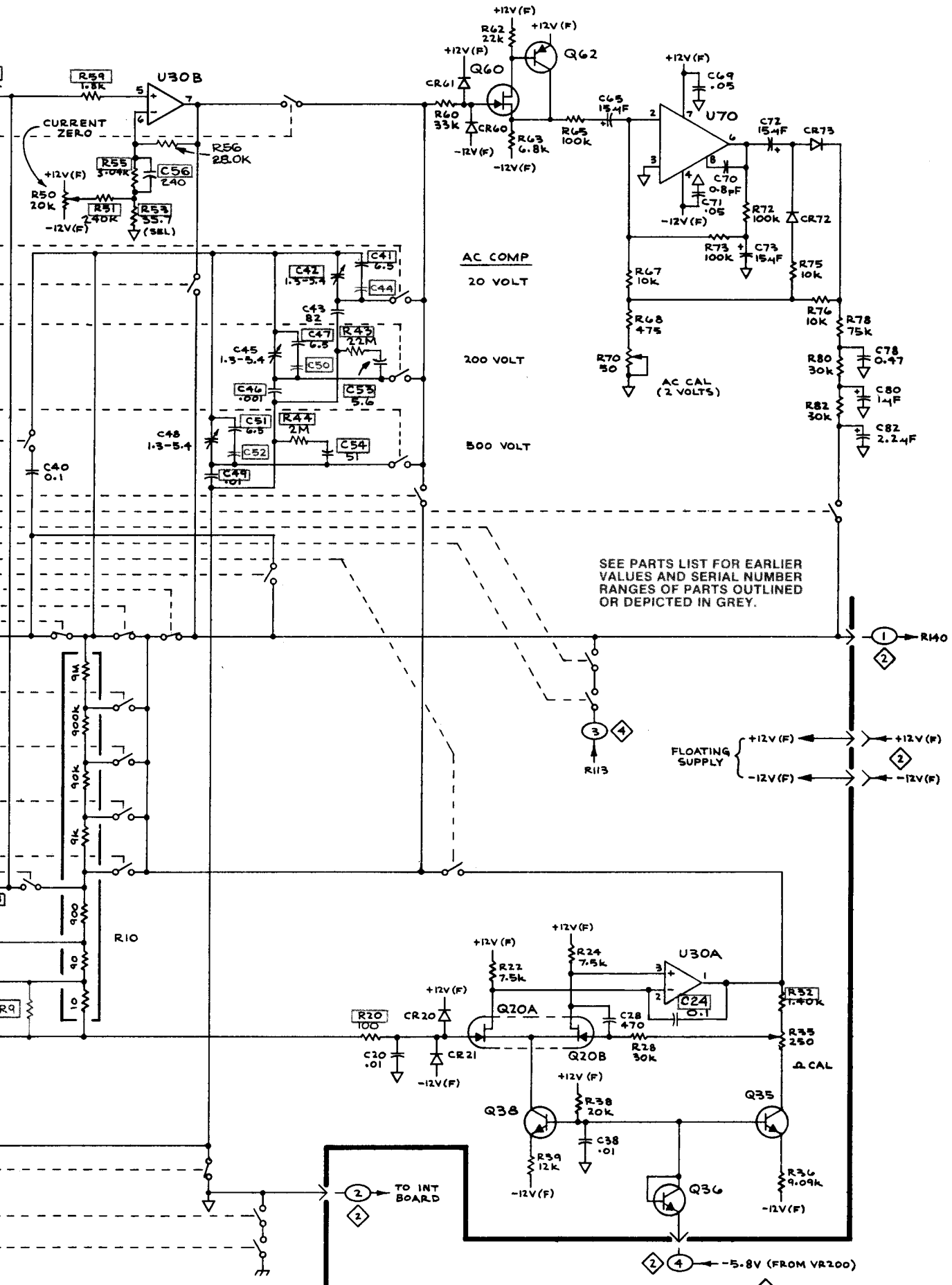
TEMP PROBE Connector

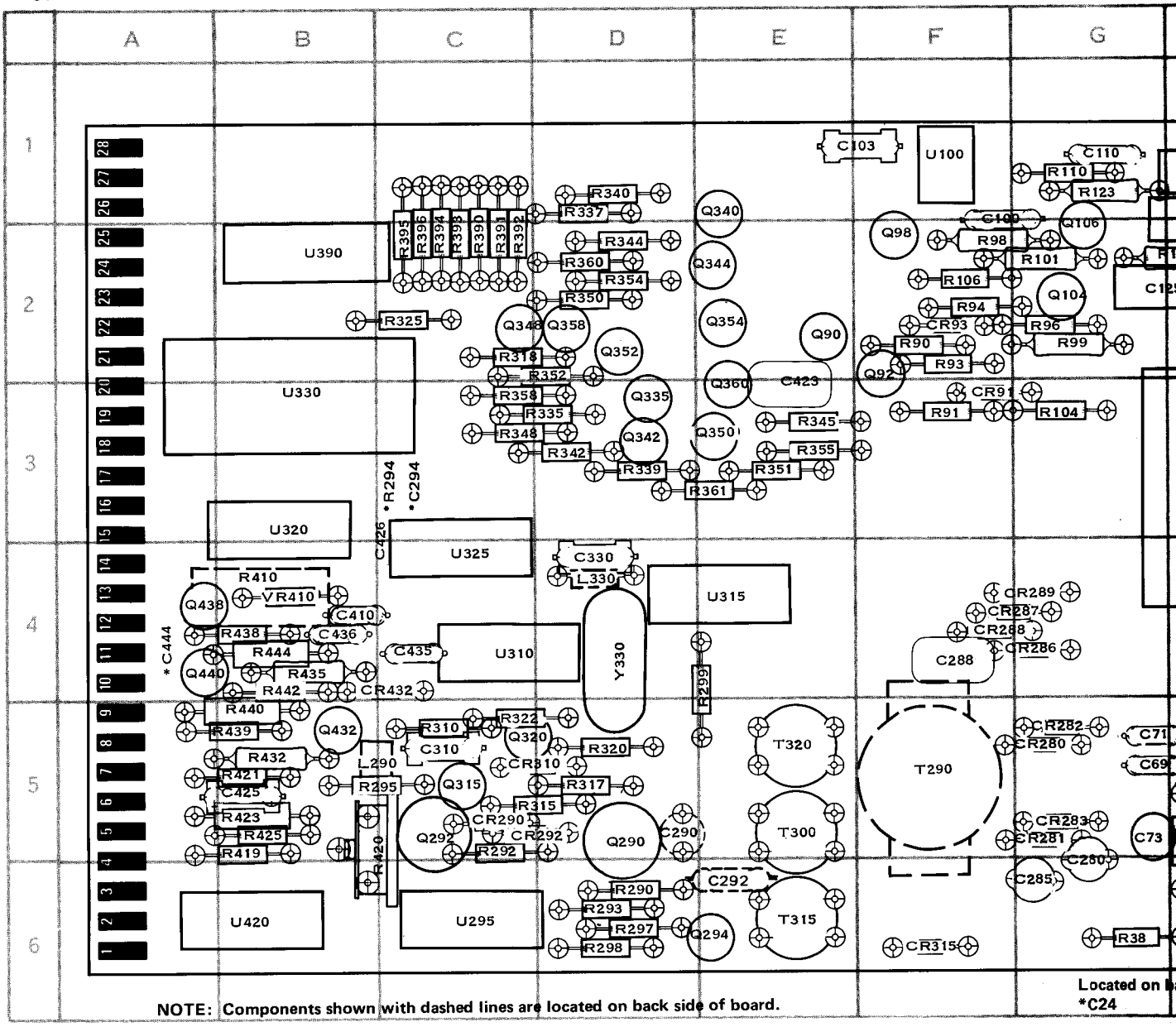
Mates with P6058 probe connector. Also used with other temperature sensing devices.



DM 501

REV. F, APR 1977

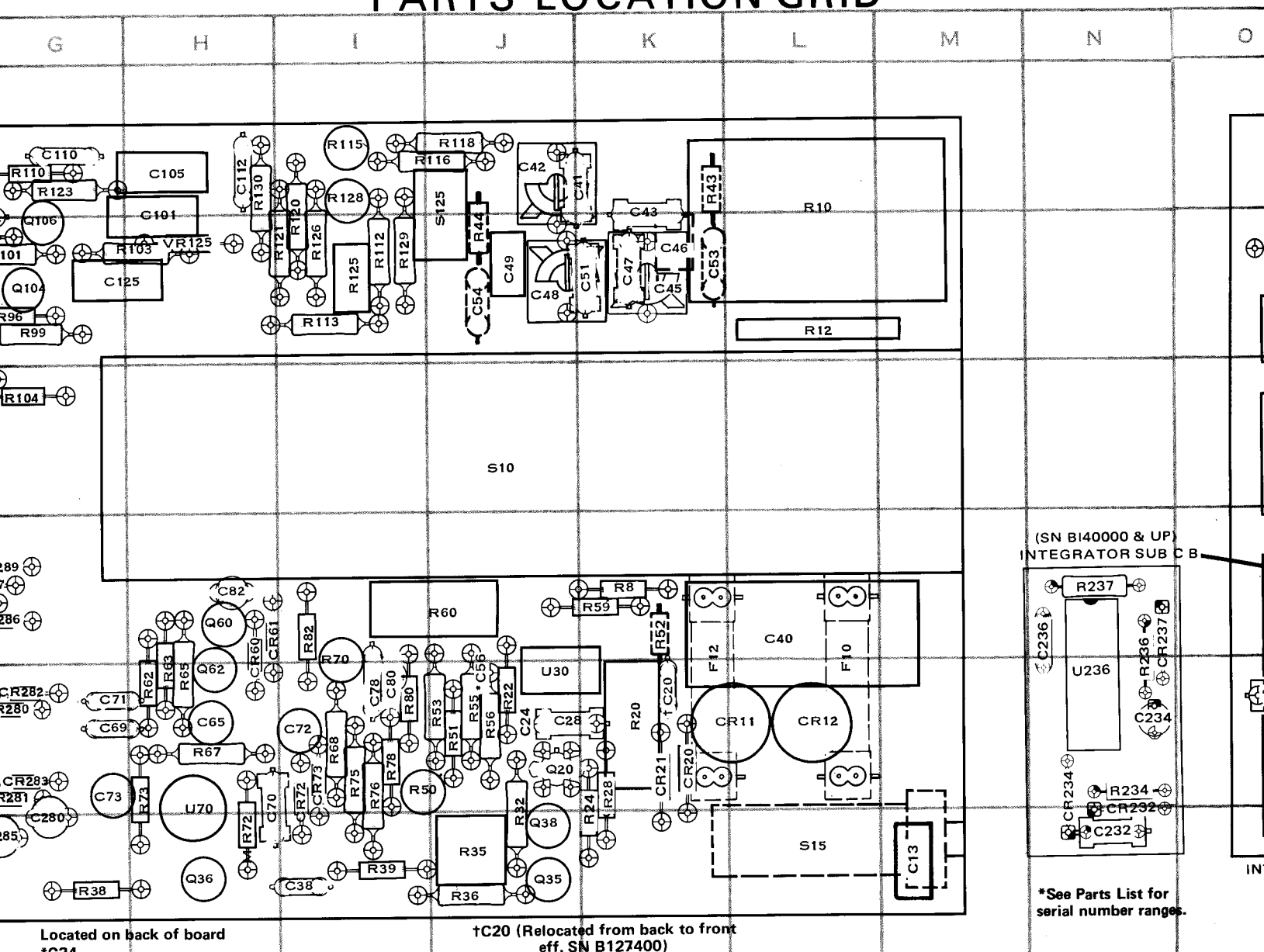

U30B
R59 1.8k
CURRENT ZERO
R56 28.0K
R55 3.09K
C56 240
R50 20k
R51 240K
R53 35.7 (SEL)
+12V(F)
-12V(F)
Q60
Q62
R62 22k
CR61
CR60
R60 33k
R63 6.8k
R65 100k
C65 15μF
U70
C69 .05
C72 15μF
CR73
C70 0.8pF
C71 .05
R72 100k
CR72
R73 100k
C73 15μF
R75 10k
R67 10k
R68 475
R70 50
AC CAL (2 VOLTS)
R76 10K
R78 75k
R80 30k
C78 0.47
C80 1.4F
R82 30k
C82 2.2μF
AC COMP
20 VOLT
200 VOLT
500 VOLT
C41 6.5
C42 1.3-5.4
C44
C43 82
C47 6.5
R43 22M
C45 1.3-5.4
C50
C46 .001
C53 5.6
C51 6.5
R44 2M
C48 1.3-5.4
C52
C54 51
C49 .01
C40 0.1
SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.
R140
R113
FLOATING SUPPLY
+12V(F)
-12V(F)
R10
U30A
R22 7.5k
R24 7.5k
R20 100
CR20
CR21
Q20A
Q20B
C28 470
C24 0.1
R28 30k
R32 1.40k
R35 250
Ω CAL
C20 .01
Q38
Q35
R38 20k
C38 .01
R39 12k
Q36
R36 9.09k
TO INT BOARD
-5.8V (FROM VR200)
CONVERSION CIRCUITS AND SWITCH DETAILS
DEH 0573
REV. F, APR 1977
& SWITCHING DETAILS



NOTE: Components shown with dashed lines are located on back side of board.

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO
C13	M6	C69	G5	C170	Q1	C290	D5	CR73	I5	CR290	C5	Q35
C20	K5	C70	H5	C172	Q2	C292	E6	CR91	F3	CR292	C5	Q36
C24	J5	C71	G5	C175	P2	C294	C3	CR93	F2	CR310	C5	Q38
C28	J5	C72	I5	C178	P2	C310	C5	CR142	R4	CR315	F6	Q60
C38	I6	C73	G5	C220	P3	C330	D4	CR145	R5	CR432	C4	Q62
C40	L4	C78	I5	C224	P3	C410	B4	CR175	P3			Q90
C41	K1	C80	I5	C230	O5	C423	E2	CR176	P3	DS340	U3	Q92
C42	J1	C82	H4	C232	N6	C425	B5	CR232	N5	DS350	U2	Q98
C43	K1	C100	F1	C234	N5	C426	C3	CR234	N5	DS360	U2	Q104
C45	K2	C101	H1	C236	N4	C435	C4	CR237	N4	DS370	U1	Q106
C46	K2	C103	F1	C238	P5	C436	B4	CR240	Q5	DS380	U1	Q150
C47	K2	C105	H1	C240	P5	C444	A4	CR280	G5			Q152
C48	J2	C110	G1	C243	Q5	CR11	L5	CR281	G5	F10	L5	Q154
C49	J2	C112	H1	C246	Q5	CR12	L5	CR282	G5	F12	K5	Q160
C51	K2	C125	G2	C270	P3	CR20	K5	CR283	G5			Q180
C53	K2	C148	R4	C275	P2	CR21	K5	CR286	G4	L290	B5	Q185
C54	J2	C150	Q3	C280	G5	CR60	H4	CR287	F4	L330	D4	Q190
C56	J5	C165	Q4	C285	G6	CR61	H4	CR288	F4			Q200
C65	H5	C168	Q2	C288	F4	CR72	I5	CR289	G4	Q20	J5	Q208

PARTS LOCATION GRID

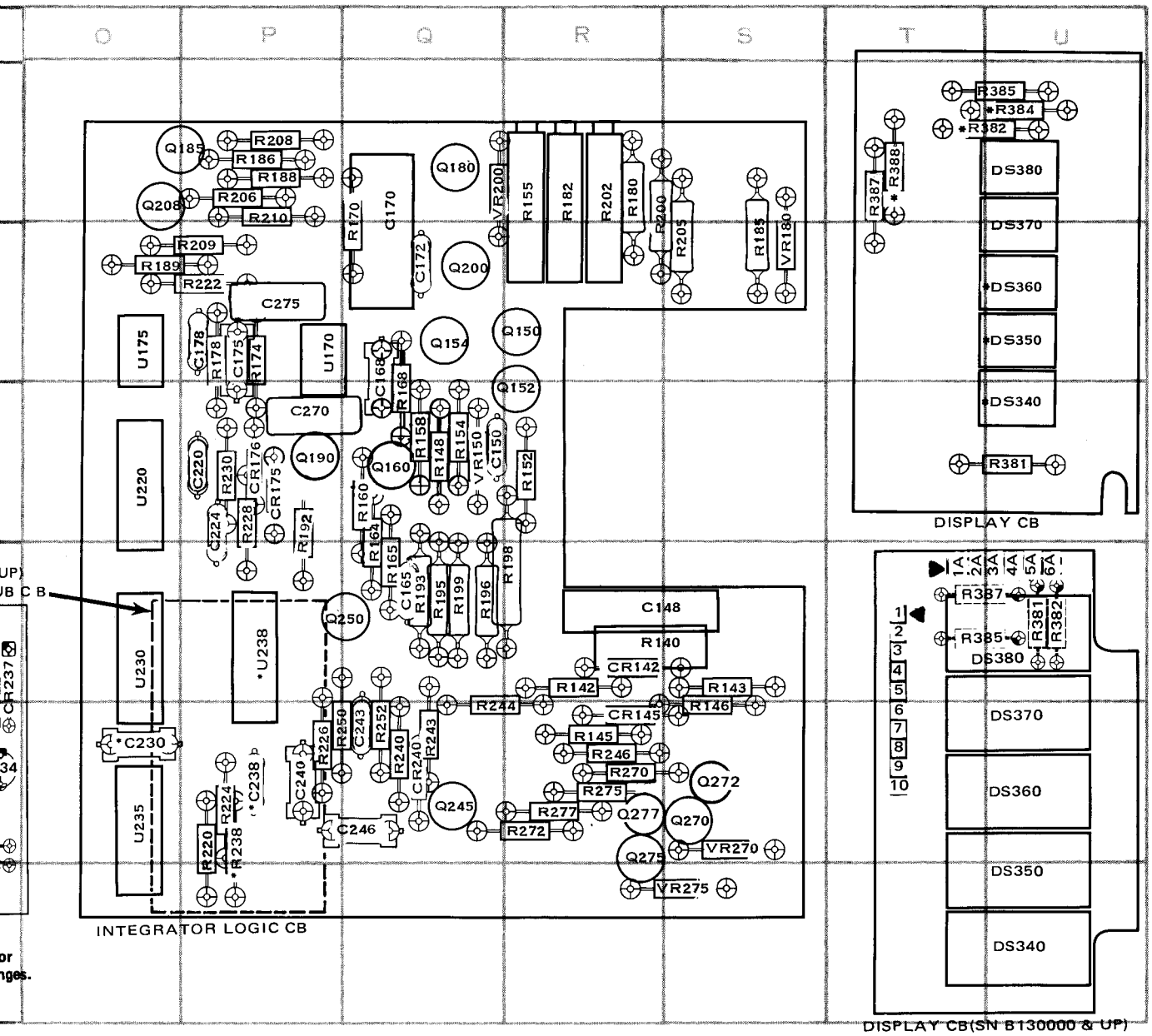


Located on back of board
*C24

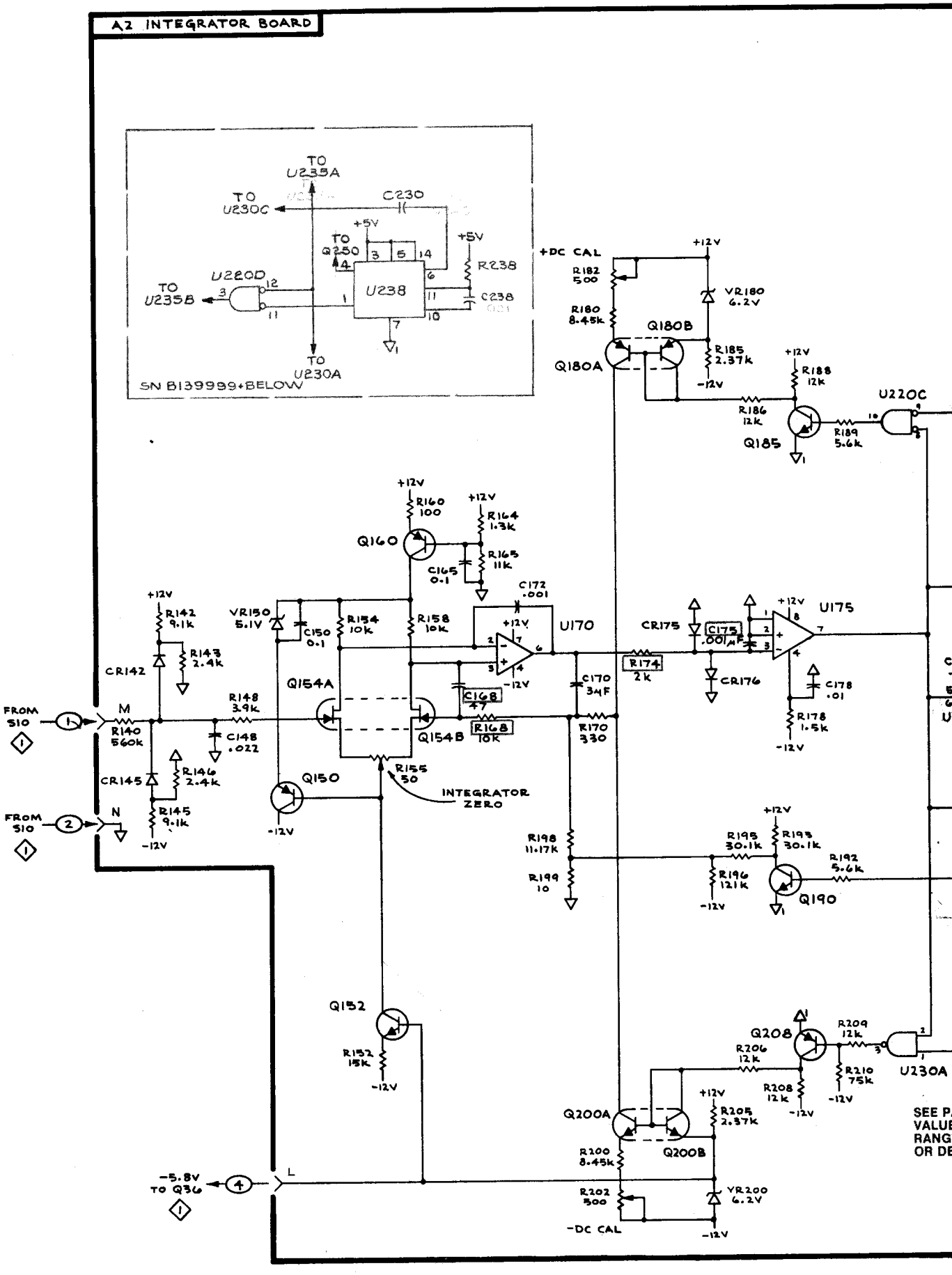
†C20 (Relocated from back to front eff. SN B127400)

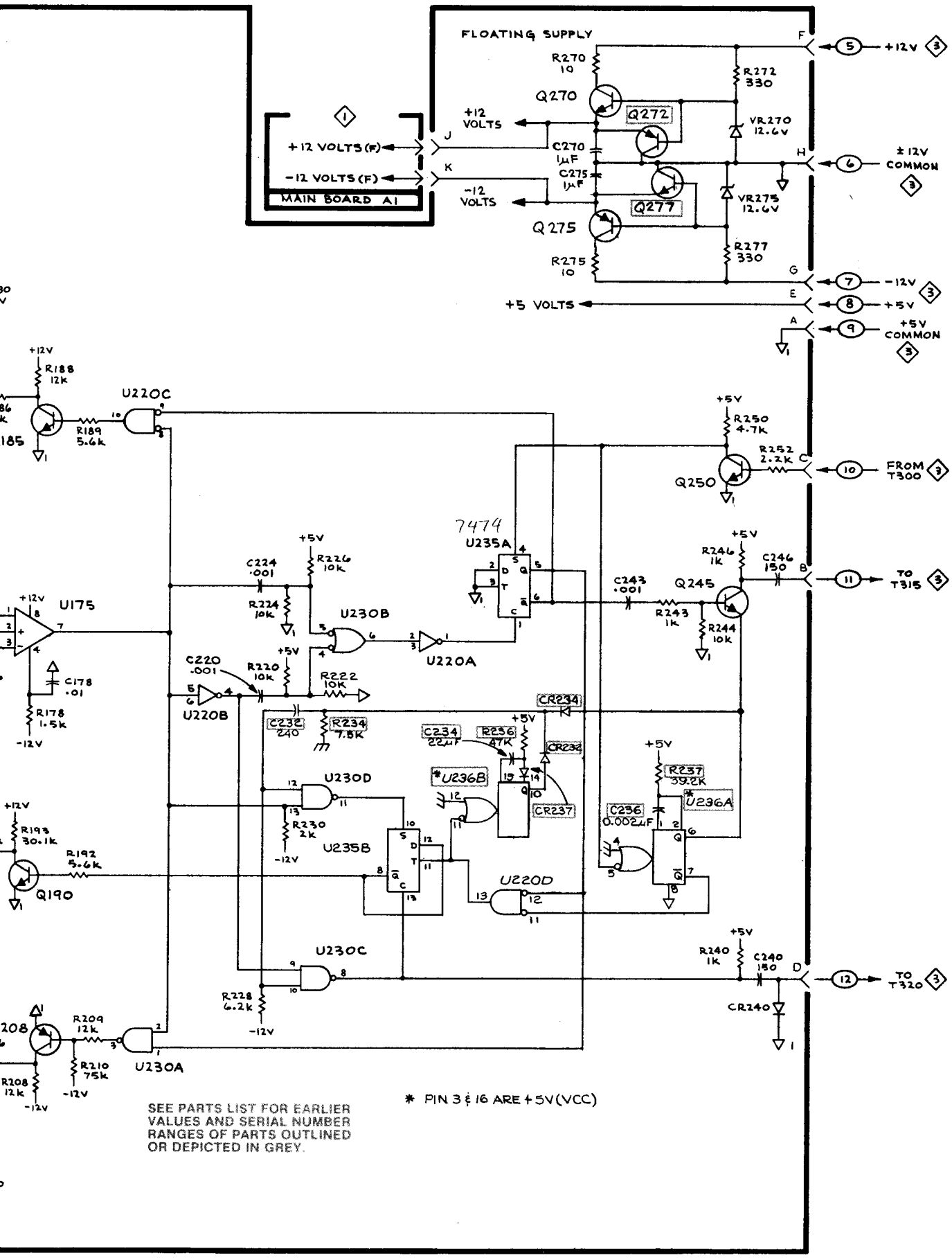
*See Parts List for serial number ranges.

GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID L
C5	Q35	J6	Q245	Q5	Q358	D2	R44	J2	R78	I5	R118	J1	R160	Q3	R200	
C5	Q36	H6	Q250	O4	Q360	E2	R50	I5	R80	I5	R120	I1	R164	Q3	R202	
C5	Q38	J6	Q270	S5	Q432	B5	R51	J5	R82	I4	R121	I2	R165	Q4	R205	
F6	Q60	H4	Q272	S5	Q438	A4	R52	K4	R90	F2	R123	G1	R168	Q3	R206	
C4	Q62	H5	Q275	R5	Q440	A4	R53	J5	R91	F3	R125	I2	R170	Q1	R208	
	Q90	E2	Q277	R5			R55	J5	R93	F2	R126	I2	R174	P2	R209	
U3	Q92	F4	Q290	D5	R8	K4	R56	J5	R94	F2	R128	I1	R178	P2	R210	
U2	Q98	F2	Q292	C5	R10	L1	R59	K4	R96	G2	R129	I2	R180	R1	R220	
U2	Q104	G2	Q294	E6	R12	L2	R60	J4	R98	F2	R130	H1	R182	R1	R222	
U1	Q106	G1	Q315	C5	R20	K5	R62	H5	R99	G2	R140	R4	R185	S2	R224	
U1	Q150	R2	Q320	C5	R22	J5	R63	H4	R101	G2	R142	R4	R186	P1	R226	
	Q152	R3	Q335	D3	R24	K5	R65	H5	R103	H2	R143	S4	R188	P1	R228	
L5	Q154	Q2	Q340	E1	R28	K5	R67	H5	R104	G3	R145	R5	R189	O2	R230	
K5	Q160	Q3	Q342	D3	R32	J5	R68	I5	R106	F2	R146	S4	R192	P3	R234	
	Q180	Q1	Q344	E2	R35	J6	R70	I4	R110	G1	R148	Q3	R193	Q4	R236	
B5	Q185	O1	Q348	C2	R36	J6	R72	H6	R112	I2	R152	R3	R195	Q4	R237	
D4	Q190	P3	Q350	E3	R38	G6	R73	H5	R113	I2	R154	Q3	R196	Q4	R238	
	Q200	Q2	Q352	D2	R39	I6	R75	I5	R115	I1	R155	R1	R198	R4	R240	
J5	Q208	O1	Q354	E2	R43	K1	R76	I5	R116	J1	R158	Q3	R199	Q4	R243	



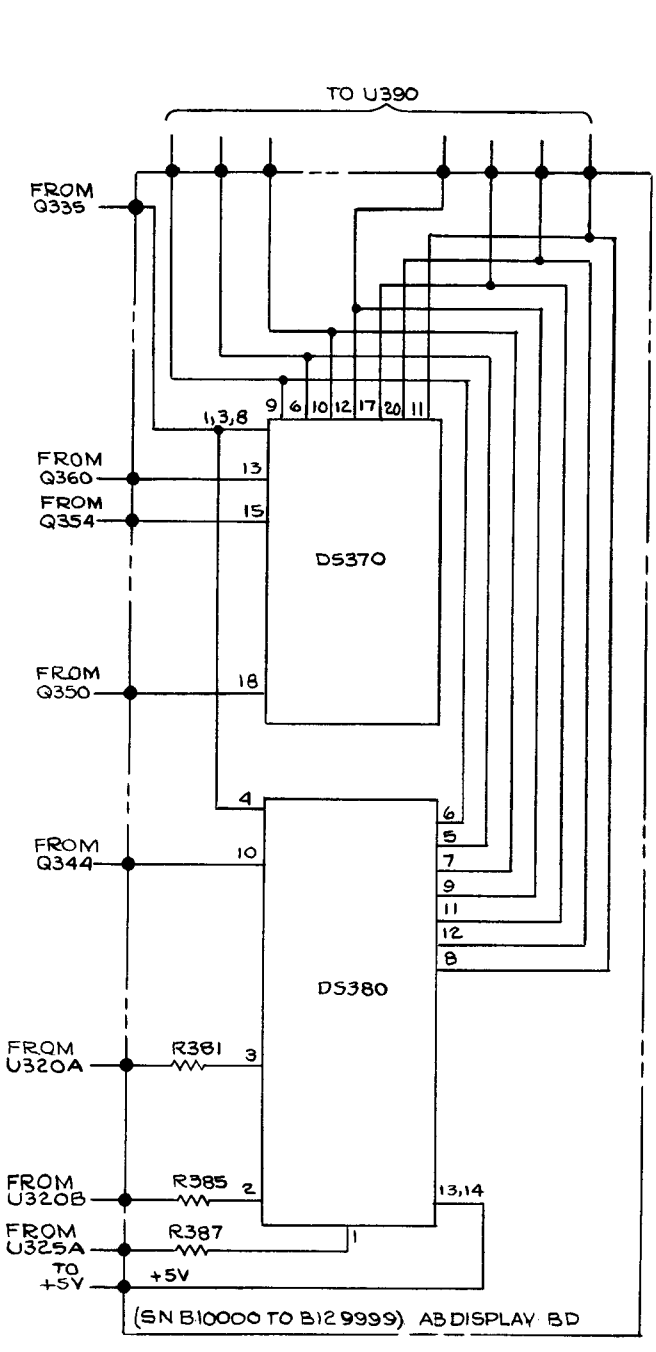
CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
R200	R1	R244	Q4	R318	C2	R361	E3	R425	B5	U70	H5	VR150	Q3
R202	R1	R246	R5	R320	D5	R381	U3	R432	B5	U100	F1	VR180	S2
R205	S2	R250	P5	R322	C5	R382	U1	R435	B4	U170	P2	VR200	Q1
R206	P1	R252	Q5	R325	C2	R384	U1	R438	B4	U175	O2	VR270	S5
R208	P1	R270	R5	R335	D3	R385	U1	R439	B5	U220	O3	VR275	S6
R209	P2	R272	R5	R337	D1	R387	T1	R440	B5	U230	O4	VR410	B4
R210	P1	R275	R5	R339	D3	R388	T1	R442	B4	U235	O5		
R220	P5	R277	R5	R340	D1	R390	C2	R444	B4	U236	N5	Y330	D4
R222	P2	R290	D6	R342	D3	R391	C2			U238	P4		
R224	P5	R292	C5	R344	D2	R392	C2	S10	J3	U295	C6		
R226	P5	R293	D6	R345	E3	R393	C2	S15	L6	U310	C4		
R228	P3	R294	C3	R348	C3	R394	C2	S125	J1	U315	E4		
R230	P3	R295	B5	R350	D2	R395	C2			U320	B3		
R234	N5	R297	D6	R351	E3	R396	C2	T290	F5	U325	C4		
R236	N5	R298	D6	R352	D2	R410	B4	T300	E5	U330	B3		
R237	N4	R299	E4	R354	D2	R419	B5	T315	E6	U390	B2		
R238	P5	R310	C5	R355	E3	R420	B5	T320	E5	U420	B6		
R240	Q5	R315	D5	R358	C3	R421	B5						
R243	Q5	R317	D5	R360	D2	R423	B5	U30	J5	VR125	H2		

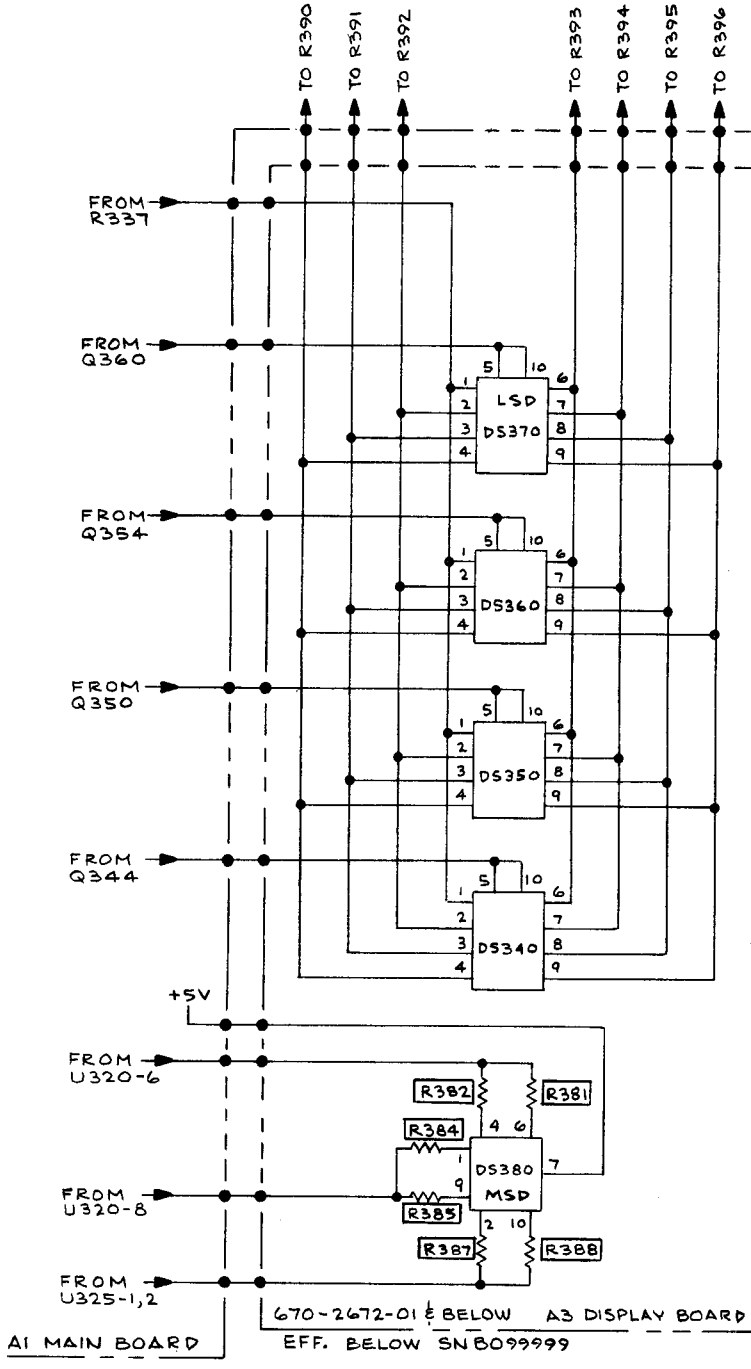

A2 INTEGRATOR BOARD
TO U235A
TO U230C
C230
+5V
TO Q250
3
5
14
4
6
+5V
R238
U220D
12
TO U235B
3
1
U238
11
C238
11
10
7
TO U230A
SN B139999+BELOW
+DC CAL
+12V
R182 500
VR180 6.2V
R180 8.45k
Q180B
Q180A
R185 2.37k
-12V
+12V
R188 12k
U220C
R186 12k
R189 5.6k
Q185
+12V
R160 100
+12V
R164 1.3k
Q160
R165 11k
C165 0.1
C172 .001
+12V
R142 9.1k
VR150 5.1V
C150 0.1
R154 10k
R158 10K
U170
CR175
C175 .001μF
+12V
U175
CR142
R143 2.4k
Q154A
C168 47
-12V
R174 2k
CR176
C178 .01
R178 1.5k
-12V
C170 34F
FROM S10
1
M
R140 560k
R148 3.9k
C148 .022
Q154B
R168 10K
R170 330
CR145
R146 2.4k
R155 50
INTEGRATOR ZERO
Q150
FROM S10
2
N
R145 9.1k
-12V
-12V
R198 11.17k
R199 10
+12V
R195 30.1k
R193 30.1k
R196 12.1k
R192 5.6k
Q190
-12V
Q152
R152 15K
-12V
Q208
R209 12k
R206 12k
R210 75k
U230A
R208 12k
-12V
+12V
Q200A
R205 2.37k
Q200B
R200 8.45k
-5.8V TO Q36
4
L
R202 500
VR200 6.2V
-DC CAL
-12V
SEE P
VALUE
RANG
OR DE

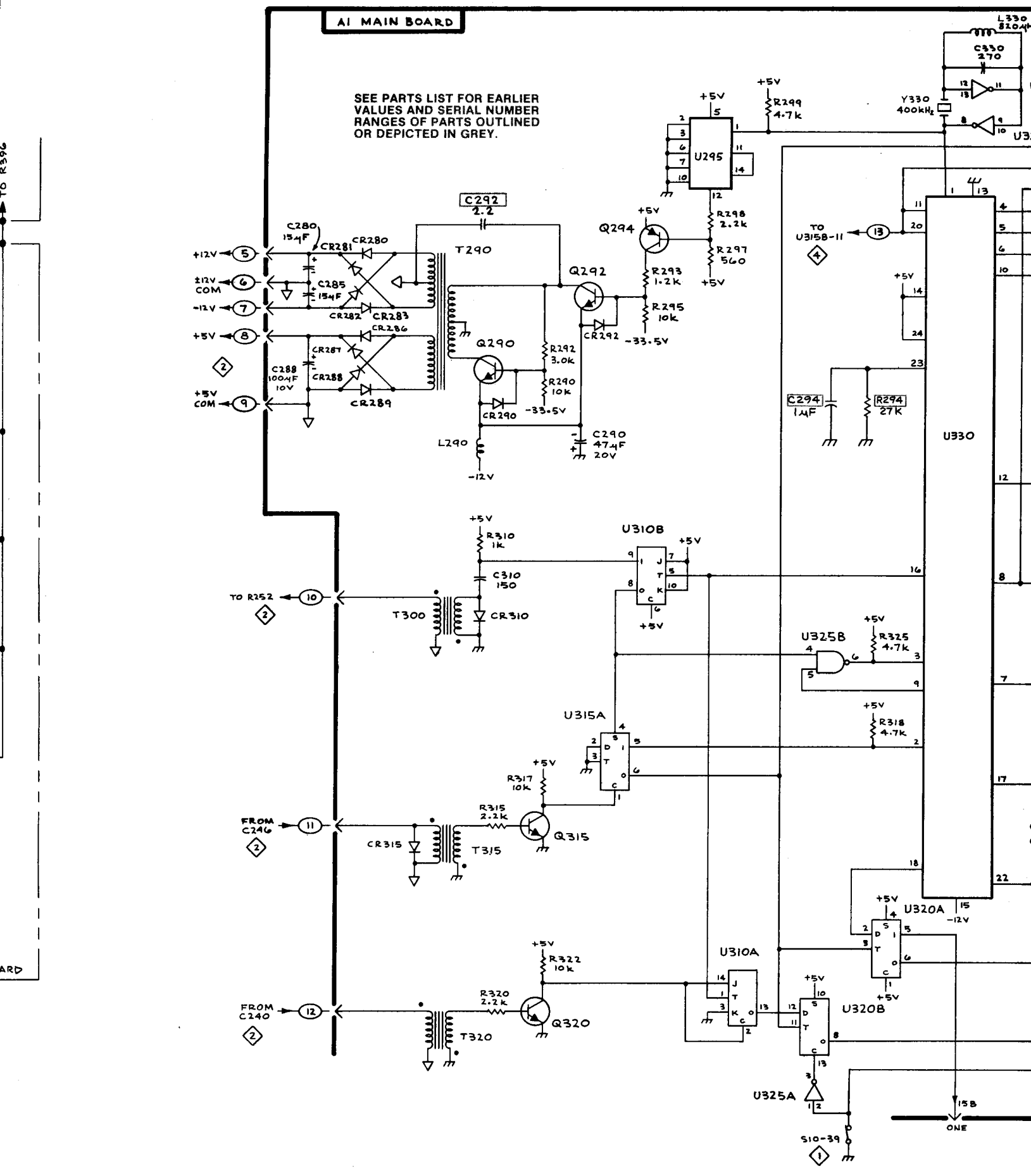


* PIN 3 & 16 ARE +5V(VCC)

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

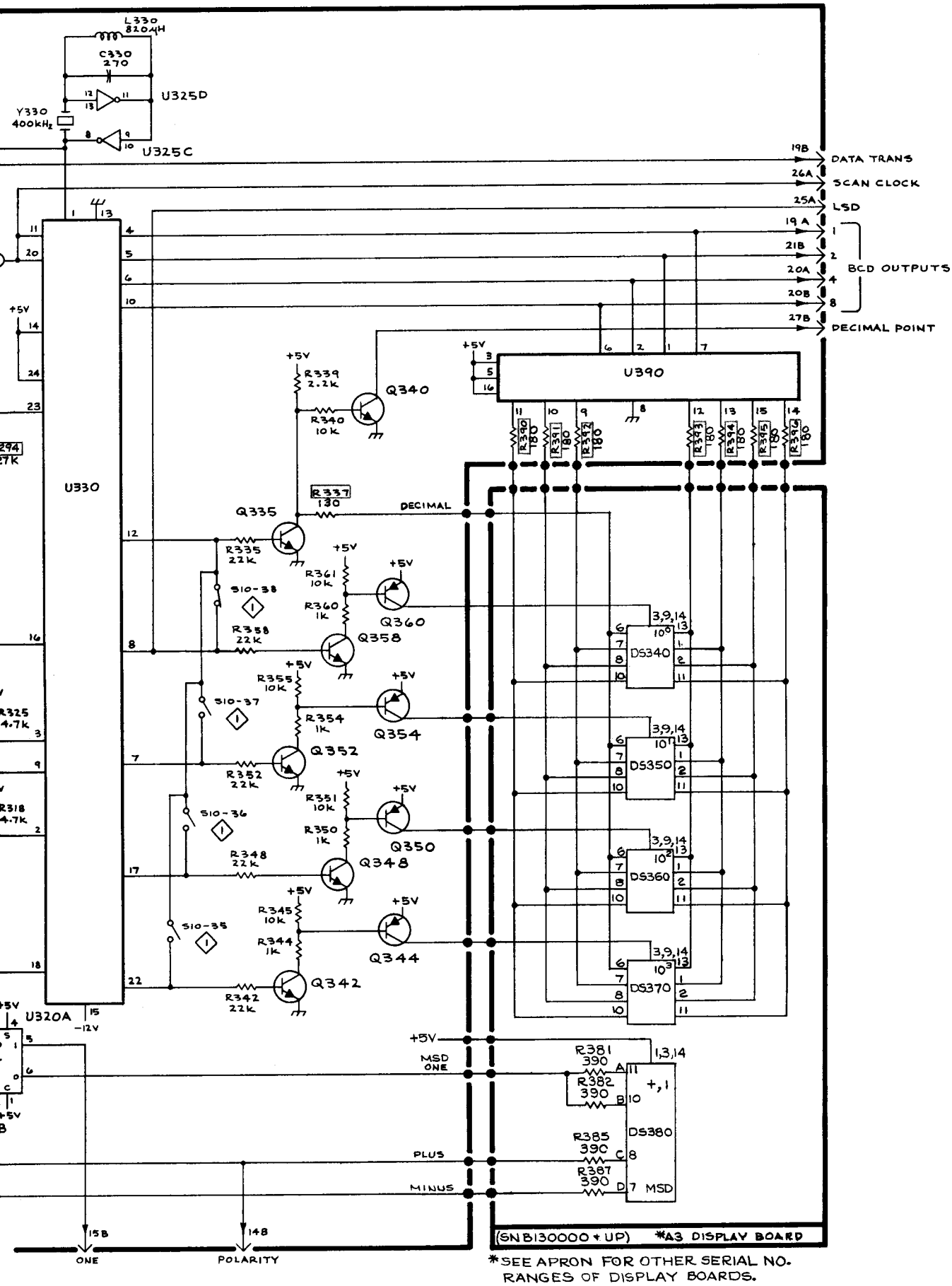

TO U390
FROM Q335
FROM Q360
FROM Q354
FROM Q350
FROM Q344
FROM U320A
FROM U320B
FROM U325A
TO +5V
R381
R385
R387
+5V
DS370
DS380
(SN B10000 TO B129999) AB DISPLAY BD

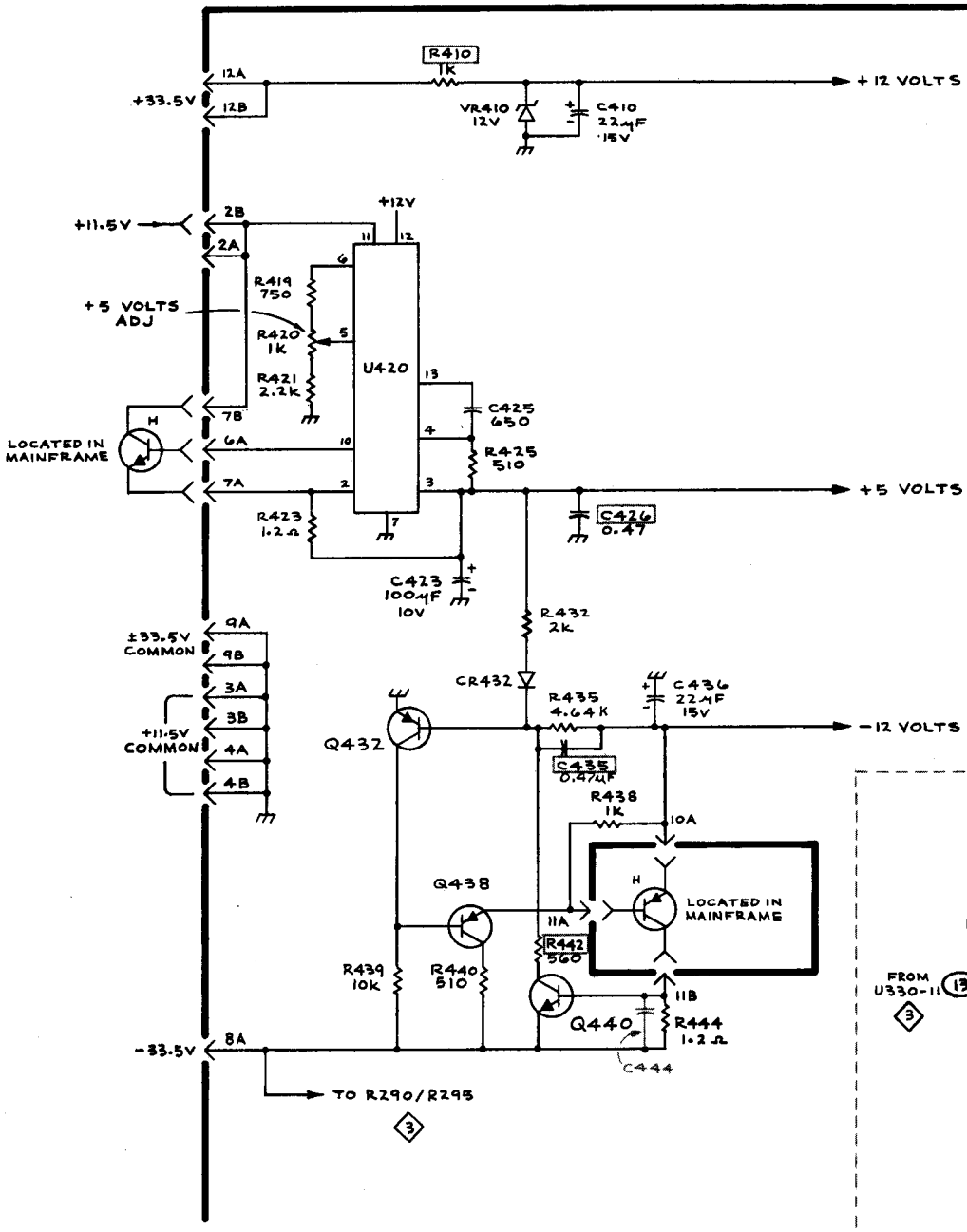

TO R390
TO R391
TO R392
TO R393
TO R394
TO R395
TO R396
FROM R337
FROM Q360
FROM Q354
FROM Q350
FROM Q344
+5V
FROM U320-6
FROM U320-8
FROM U325-1,2
LSD DS370
DS360
DS350
DS340
DS380 MSD
R382
R381
R384
R385
R387
R388
A1 MAIN BOARD
670-2672-01 & BELOW A3 DISPLAY BOARD
EFF. BELOW SN B099999

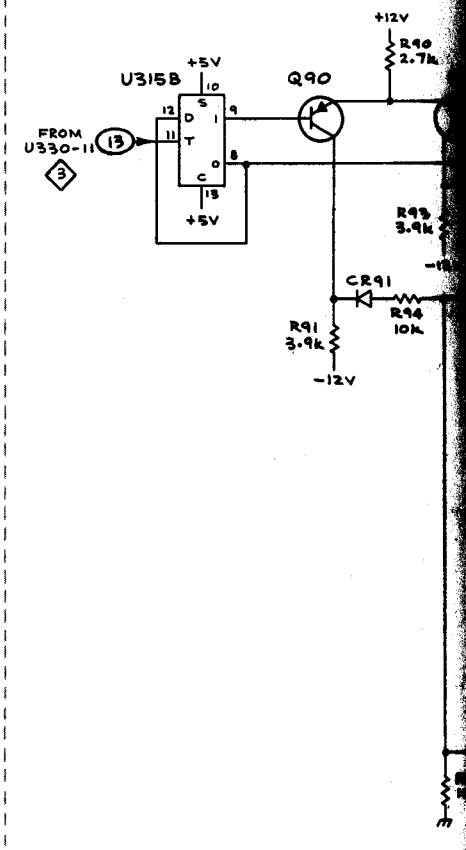


DM 501

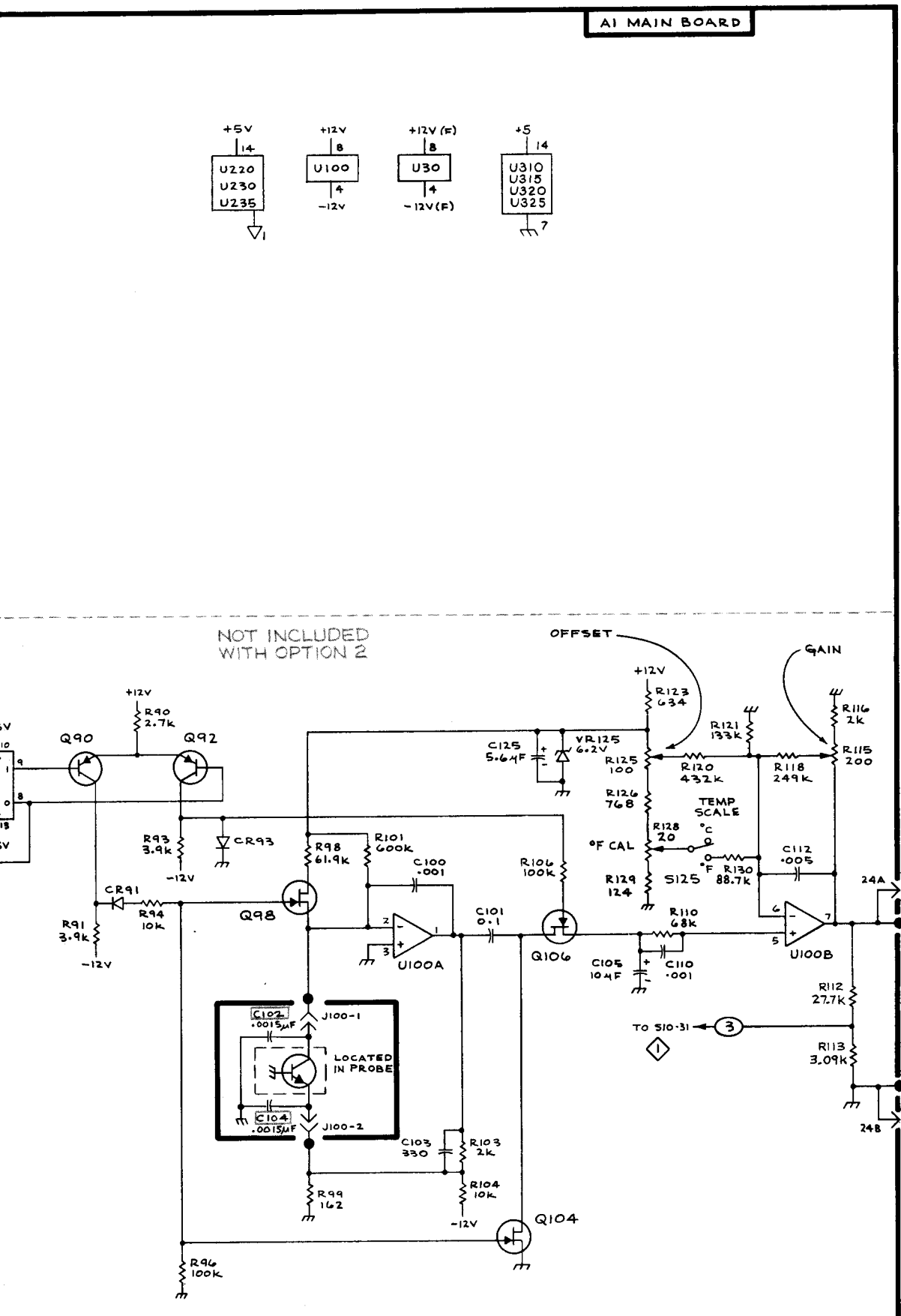
REV. F, APR 1977


L330
820μH
C330
270
U325D
Y330
400kHz
U325C
19B
DATA TRANS
26A
SCAN CLOCK
25A
LSD
19A
21B
20A
20B
BCD OUTPUTS
27B
DECIMAL POINT
U330
U390
U320A
+5V
-12V
R339
2.2k
Q340
R340
10k
R337
180
DECIMAL
Q335
R335
22k
S10-38
R361
10k
R360
1k
Q360
R358
22k
Q358
S10-37
R355
10k
R354
1k
Q354
R352
22k
Q352
S10-36
R351
10k
R350
1k
Q350
R348
22k
Q348
S10-35
R345
10k
R344
1k
Q344
R342
22k
Q342
R390
180
R391
180
R392
180
R393
180
R394
180
R395
180
R396
180
DS340
DS350
DS360
DS370
3,9,14
MSD ONE
R381
390
R382
390
+,1
DS380
R385
390
R387
390
MSD
PLUS
MINUS
15B
ONE
14B
POLARITY
(SN B130000 + UP)
*A3 DISPLAY BOARD
*SEE APRON FOR OTHER SERIAL NO. RANGES OF DISPLAY BOARDS.





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



POWER SUPPLY & TEMPERATURE MEASUREMENT

4

POWER SUPPLY AND TEMPERATURE MEASUREMENT 4 deh 0972

REPLACEABLE MECHANICAL PARTS

PARTS ORDERING INFORMATION

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

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

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

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

SPECIAL NOTES AND SYMBOLS

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

FIGURE AND INDEX NUMBERS

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

INDENTATION SYSTEM

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

1 2 3 4 5 *Name & Description*

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

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

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

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

ABBREVIATIONS

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

CROSS INDEX—MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip
0000A	LEMO USA	2015 2ND STREET	BERKLEY, CA 94710
00779	AMP, INC.	P O BOX 3608	HARRISBURG, PA 17105
01295	TEXAS INSTRUMENTS, INC., SEMICONDUCTOR GROUP	P O BOX 5012, 13500 N CENTRAL EXPRESSWAY	DALLAS, TX 75222
08261	SPECTRA-STRIP CORP.	7100 LAMPSON AVE.	GARDEN GROVE, CA 92642
10389	CHICAGO SWITCH, INC.	2035 WABANSIA AVE.	CHICAGO, IL 60647
12360	ALBANY PRODUCTS CO., DIV. OF PNEUMO DYNAMICS CORPORATION	145 WOODWARD AVENUE	SOUTH NORWALK, CT 06586
22526	BERG ELECTRONICS, INC.	YOUK EXPRESSWAY	NEW CUMBERLAND, PA 17070
45722	USM CORP., PARKER-KALON FASTENER DIV.		CAMPBELLSVILLE, KY 42718
58474	SUPERIOR ELECTRIC CO., THE	383 MIDDLE ST.	BRISTOL, CT 06010
71279	CAMBRIDGE THERMIONIC CORP.	445 CONCORD AVE.	CAMBRIDGE, MA 02138
73743	FISCHER SPECIAL MFG. CO.	446 MORGAN ST.	CINCINNATI, OH 45206
73803	TEXAS INSTRUMENTS, INC., METALLURGICAL MATERIALS DIV.	34 FOREST STREET	ATTLEBORO, MA 02703
74445	HOLO-KROME CO.	31 BROOK ST. WEST	HARTFORD, CT 06110
78189	ILLINOIS TOOL WORKS, INC. SHAKEPROOF DIVISION	ST. CHARLES ROAD	ELGIN, IL 60120
78471	TILLEY MFG. CO.	900 INDUSTRIAL RD.	SAN CARLOS, CA 94070
80009	TEKTRONIX, INC.	P O BOX 500	BEAVERTON, OR 97077
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
97464	INDUSTRIAL RETAINING RING CO.	57 CORDIER ST.	IRVINGTON, NJ 07111

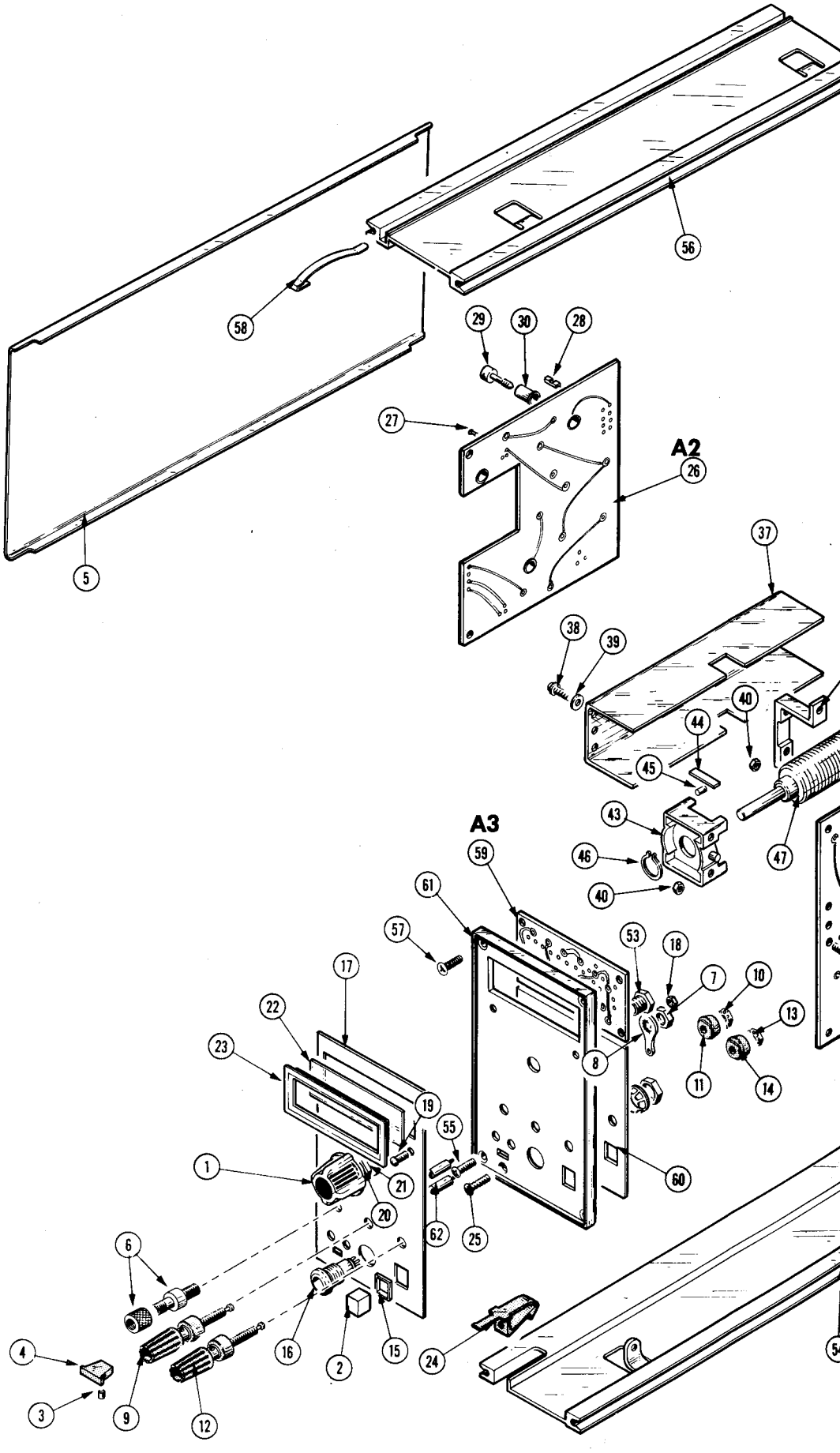
Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-1	366-0500-00			1		KNOB:GRAY,4 SIDED	80009	366-0500-00
	213-0153-00			2		. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL	74445	OBD
-2	366-1402-27			1		PUSH BUTTON:GRAY--ON	80009	366-1402-07
-3	214-1840-00			1		PIN,KNOB SECRG:0.094 OD X 0.120 INCH LONG	80009	214-1840-00
-4	366-1422-01			1		KNOB:LATCH	80009	366-1422-01
-5	337-1399-00			2		SHLD,ELECTRICAL:SIDE	80009	337-1399-00
-6	129-0103-00			1		POST,BDG,ELEC:ASSEMBLY	80009	129-0103-00
	200-0103-00			1		. NUT,PLAIN,KNURL:0.25-28 X 0.375" OD,BRASS	80009	200-0103-00
	129-0077-00			1		. STUD,SHOULDERED:0.938 INCH LONG,BRASS	80009	129-0077-00
						(ATTACHING PARTS)		
-7	210-0455-00			1		NUT,PLAIN,HEX.:0.25-28 X 0.375 INCH,BRASS	73743	3089-402
-8	210-0223-00			1		TERMINAL,LUG:0.25 INCH DIA,SE	78189	2101-14-03-2520N
						- - - * - - -		
-9	129-0064-00			1		POST,BDG,ELEC:CHARCOAL,5-WAY MINIATURE	58474	BINP BB10167G13T
						(ATTACHING PARTS)		
-10	210-0457-00			1		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
-11	358-0181-00			1		INSULATOR,BSHG:CHARCOAL	58474	BB10166G13BX
						- - - * - - -		
-12	129-0064-01			1		POST,BDG,ELEC:RED,5-WAY MINIATURE	58474	BB10167G2BX
						(ATTACHING PARTS)		
-13	210-0457-00			1		NUT,PLAIN,EXT W:6-32 X 0.312 INCH,STL	83385	OBD
-14	358-0181-01			1		INSULATOR,BSHG:RED	58474	BB1066G2
						- - - * - - -		
-15	426-0681-00			1		FR,PUSH BUTTON:GRAY PLASTIC	80009	426-0681-00
-16	131-1011-00			1		CONNECTOR,RCPT,:4 CONTACT,FEMALE	0000A	RA 1304 TPX
-17	333-1697-00			1		PANEL,FRONT:	80009	333-1697-00
	333-1728-00			1		PANEL,FRONT:(OPTION 2 ONLY)	80009	333-1728-00
						(ATTACHING PARTS)		
-18	210-0405-00			2		NUT,PLAIN,HEX.:2-56 X 0.188 INCH,BRS	73743	2X12157-402
	210-0001-00	XB010000		2		WASHER,LOCK:INTL,0.092 ID X 0.18"OD,STL	78189	1202-00-00-0541C
-19	211-0159-00	B010100	B129999	2		SCREW,MACHINE:2-56 X 0.375 INCH,PNH STL	87308	OBD
	211-0034-00	B130000		2		SCREW,MACHINE:2-56 X 0.50 INCH,PNH	83385	OBD
	210-1008-00	XB130000		1		WASHER,FLAT:0.09 ID X 0.188" OD,BRS	12360	OBD
-20	210-0590-00			1		NUT,PLAIN,HEX.:0.375 X 0.438 INCH,STL	73743	2X28269-402
-21	210-0978-00			1		WASHER,FLAT:0.375 ID X 0.50 INCH OD,STL	78471	OBD
						- - - * - - -		
	361-0219-00	XB130000		1		SPACER,SLEEVE:0.060 L X 0.093 ID BRS NI	80009	361-0219-00
-22	331-0314-00			1		WINDOW,READOUT:	80009	333-0314-00
-23	426-0916-00			1		FRAME,RDOUT WDO:	80009	426-0916-00
-24	214-1513-01			1		LCH,PLUG-IN RET:	80009	214-1513-01
						(ATTACHING PARTS)		
-25	213-0254-00			1		SCR,TPG,THD CTG:2-56X0.25"100 DEG,FLH STL	45722	OBD
						- - - * - - -		
-26	----- -----[1]			1		CKT BOARD ASSY:INTEGRATED LOGIC(SEE A2 EPL)		
-27	136-0252-04	B010100	B092919	106		SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0252-04	B092920		34		SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0514-00	B092920		2		. SOCKET,PLUG IN:MICROCIRCUIT,8 CONTACT	73803	C9308-02
	136-0269-02	B092920		4		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C931402
-28	136-0263-03	B010100	B148959	13		. SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN	00779	86250-2
	136-0263-04	B148960		13		. SOCKET,PIN TERM:FOR 0.025 INCH SQUARE PIN	22526	75377-001
-29	211-0155-00			3		. SCREW,EXT,RLV B:4-40 X 0.375 INCH,SST	80009	211-0155-00
-30	361-0238-00			3		. SPACER,SLEEVE:0.25 OD X 0.34 INCH LONG	80009	361-0238-00
-31	----- -----[1]			1		CKT BD ASSY:DIGITAL MULTI-METER(SEE A1 EPL)		
-32	131-0592-00			13		. CONTACT,ELEC:0.885 INCH LONG	22526	47353
-33	131-0604-00			36		. CONTACT,ELEC:0.025 SQ X 0.365 INCH LONG	80009	131-0604-00
	131-0608-00	XB092920	B127399	23		. CONTACT,ELEC:0.365 INCH LONG	22526	47357
	131-0608-00	B127400		26		. CONTACT,ELEC:0.365 INCH LONG	22526	47357
-34	136-0252-04	B010100	B092919	235		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0252-04	B092920		109		. SOCKET,PIN TERM:0.188 INCH LONG	22526	75060
	136-0578-00	B092920		1		. SOCKET,PLUG-IN:24 DIP,LOW PROFILE	01295	C932402
	136-0514-00	B092920		2		. SOCKET,PLUG IN:MICROCIRCUIT,8 CONTACT	73803	C9308-02
	136-0260-02	B092920		1		. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	01295	C931602
	136-0269-02	B092920		6		. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C931402

[1]Refer to Electrical Parts List for part numbers.

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
1-35	260-0960-01			1		. SWITCH,SLIDE:0.5A,120VDC,CKT CD MT	10389	23-021-043
-36	351-0186-00			3		. GUIDE-POST.LOCK:0.84 INCH LONG	80009	351-0186-00
	105-0440-00			1		. ACTR ASSY,CAM,S:	80009	105-0440-00
-37	200-1519-00			1		. . COVER CAM SW:	80009	200-1519-00
						(ATTACHING PARTS)		
-38	211-0008-00			6		. . SCREW,MACHINE:4-40 X 0.25 INCH,PNH STL	83385	OBD
-39	210-0004-00			6		. . WASHER,LOCK:INTL,0.12 ID X 0.26"OD,STL	78189	1204-00-00-0541C
						- - - * - - -		
-40	210-0406-00			12		. . NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-41	401-0146-00			1		. . BEARING,CAM SW:REAR	80009	401-0146-00
-42	407-1199-00			1		. . BRACKET,COVER:	80009	407-1199-00
-43	401-0081-02			1		. . BEARING,CAM SW:FRONT	80009	401-0081-02
-44	214-1139-00[1]			-		. . SPRING,FLAT:GOLD COLORED	80009	214-1139-00
	214-1139-02[1]			-		. . SPRING,FLAT:GREEN COLORED	80009	214-1139-02
	214-1139-03[1]			-		. . SPRING,FLAT:RED COLORED	80009	214-1139-03
-45	214-1127-00			2		. . ROLLER,DETENT:0.125 DIA X 0.125 INCH L	80009	214-1127-00
-46	354-0391-00			1		. . RING,RETAINING:0.395"FREE ID X 0.025" STL	97464	3100-43-CD
-47	105-0439-00			1		. . DRUM,CAM SWITCH:	80009	105-0439-00
						(ATTACHING PARTS)		
-48	211-0116-00			6		. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS	83385	OBD
						- - - * - - -		
-49	----- -----			1		. SWITCH,PUSH:4PDT(SEE S15 EPL)		
-50	361-0384-00			2		. SPACER,PB SW:0.133 INCH LONG	80009	361-0384-00
-51	344-0154-00			4		. CLIP,ELECTRICAL:FOR 0.25 INCH DIA FUSE	80009	344-0154-00
						(ATTACHING PARTS FOR CKT BD)		
-52	213-0146-00	B010100	B062014	4		SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL	83385	OBD
	213-0146-00	B060215		3		SCR,TPG,THD FOR:6-20 X 0.313 INCH,PNH STL	83385	OBD
	213-0336-00	B062105		1		SCR,TPG,THD FOR:6-32 X 1.25 INCH,PNH STL	83385	OBD
	166-0209-00	XB062015		1		SPACER,SLEEVE:0.938 L X 0.18 ID ALUMINUM	80009	166-0209-00
						- - - * - - -		
	337-2030-00			1		SHIELD,ELEC:	80009	337-2030-00
-53	358-0029-00			1		BSHG,MACH.THD:HEX,0.375-32 X 0.438"LONG	80009	358-0029-00
-54	426-0724-00			1		FR SECT,PLUG-IN:BOTTOM	80009	426-0724-00
						(ATTACHING PARTS)		
-55	213-0229-00			2		SCR,TPG,THD FOR:6-20 X0.375"100 DEG,FLH STL	83385	OBD
						- - - * - - -		
-56	426-1014-00			1		FR SECT,PLUG-IN:	80009	426-1014-00
						(ATTACHING PARTS)		
-57	213-0227-00			2		SCR,TPG,THD FOR:6-32 X 0.50 DEG,FLH ST	83385	OBD
						- - - * - - -		
-58	214-1061-00			1		SPRING,GROUND:FLAT	80009	214-1061-00
-59	----- -----			1		CKT BOARD ASSY:DISPLAY(SEE A3 EPL)		
	198-3083-00	B130000		1		. WIRE SET,ELEC:	80009	198-3083-00
	131-0707-00	B130000		16		. . CONTACT,ELEC:0.48"L,22-26 AWG WIRE	22526	75691-005
	352-0164-00	B130000		1		. . CONN BODY,PL.EL:6 WIRE BLACK	80009	352-0164-00
	352-0168-00	B130000		1		. . CONN BODY,PL,EL:10 WIRE BLACK	80009	352-0168-00
	175-0829-00	B130000		FT		. . WIRE,ELECTRICAL:6 WIRE RIBBON	08261	OBD
	175-0833-00	B130000		FT		. . WIRE,ELECTRICAL:10 WIRE RIBBON	08261	OBD
-60	337-1761-00			1		SHIELD,ELEC:	80009	337-1761-00
-61	386-2476-01	B010100	B090000	1		SUBPANEL,FRONT:	80009	386-2476-01
	386-2476-03	B100000		1		SUBPANEL,FRONT:	80009	386-2476-03
-62	136-0387-00			2		. JACK,TIP:GRAY	71279	450-4352-01-0318
	386-2476-00	B010100	B090000	1		SUBPANEL,FRONT:(OPTION 2 ONLY)	80009	386-2476-00
	386-2476-02	B100000		1		SUBPANEL,FRONT:(OPTION 2 ONLY)	80009	386-2476-02
	136-0387-00			2		. JACK,TIP:GRAY	71279	450-4352-01-0318
-63	179-1889-00	B010100	B089999	1		WIRING HARNESS:DISPLAY	80009	179-1889-00
	179-1889-01	B090000	B127399	1		WIRING HARNESS:DISPLAY	80009	179-1889-01
	179-1889-02	B127400	B129999	1		WIRING HARNESS:DISPLAY	80009	179-1889-02
	179-1889-03	B130000		1		WIRING HARNESS:DISPLAY	80009	179-1889-03
	131-0707-00	XB090000	B127399	23		. .CONTACT,ELEC:0.48"L,22-26 AWG WIRE	22526	75691-005
	131-0707-00	B127400	B129999	26		. CONTACT,ELEC:0.48"L,22-26 AWG WIRE	22526	75691-005
	131-0707-00	B130000		10		. CONTACT,ELEC:0.48"L,22-26 AWG WIRE	22526	75691-005

[1]Replace only with part bearing the color code as the original part in your instrument.

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-	352-0171-00	XB127400		3		. CONN BODY,PL,EL:1 WIRE BLACK	80009	352-0171-00
	352-0169-00	XB127400		1		. CONN BODY,PL,EL:2 WIRE BLACK	80009	352-0169-00
	352-0161-00	XB127400		2		. CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0161-00
	352-0164-00	XB127400	B129999	1		. CONN BODY,PL,EL:6 WIRE BLACK	80009	352-0164-00
	352-0168-00	XB127400	B129999	1		. CONN BODY,PL,EL:10 WIRE BLACK	80009	352-0168-00
	179-1968-00	B010100	B089999	1		WIRING HARNESS:(OPTION 2 ONLY)	80009	179-1968-00
	179-1968-01	B090000	B127409	1		WIRING HARNESS:(OPTION 2 ONLY)	80009	179-1968-01
	179-1968-02	B127400	B129999	1		WIRING HARNESS:(OPTION 2 ONLY)	80009	179-1968-02
	131-0707-00	XB090000	B129999	20		. CONTACT,ELEC:0.48"L,22-26 AWG WIRE	22526	75691-005
	352-0171-00	XB127410	B129999	2		. CONN BODY,PL,EL:1 WIRE BLACK	80009	352-0171-00
	352-0161-00	XB127410	B129999	1		. CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0161-00
	352-0164-00	XB127410	B129999	1		. CONN BODY,PL,EL:6 WIRE BLACK	80009	352-0164-00
	352-0168-00	XB127410	B129999	1		. CONN BODY,PL,EL:10 WIRE BLACK	80009	352-0168-00
	198-3082-00	B130000		1		WIRE SET,ELEC:(OPTION 2 ONLY)	80009	198-3082-00
	131-0707-00	B130000		4		. CONTACT,ELEC:0.48"L,22-26 AWG WIRE	22526	75691-005
	352-0161-00	B130000		1		. CONN BODY,PL,EL:3 WIRE BLACK	80009	352-0161-00
	352-0171-00	B130000		2		. CONN BODY,PL,EL:1 WIRE BLACK	80009	352-0171-00
	175-0863-00	B130000		FT		. WIRE,ELECTRICAL:2 WIRE RIBBON	80009	175-0863-00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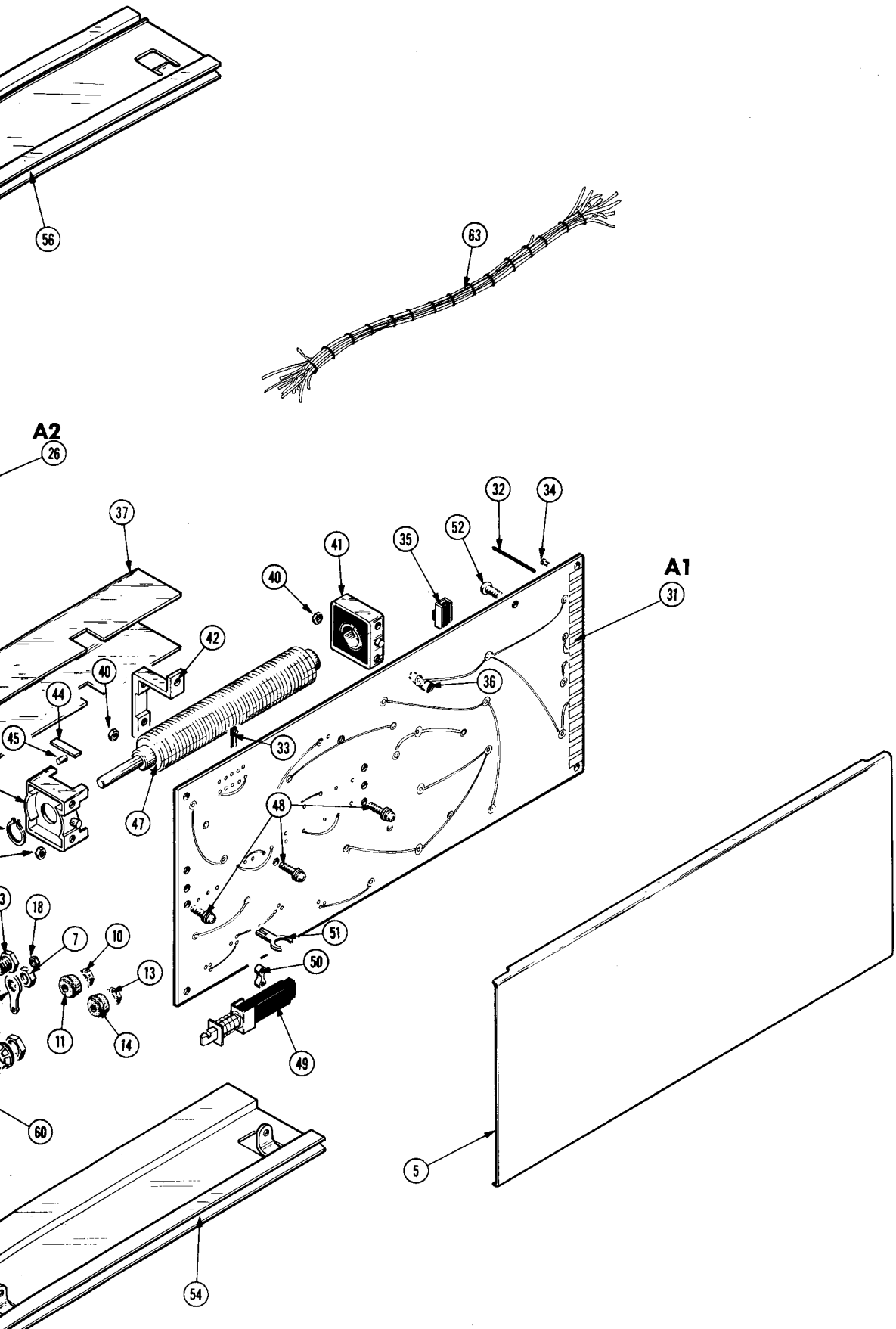

FIG. 1 EXPLODED

DM 501 DIGITAL MULTI-METER

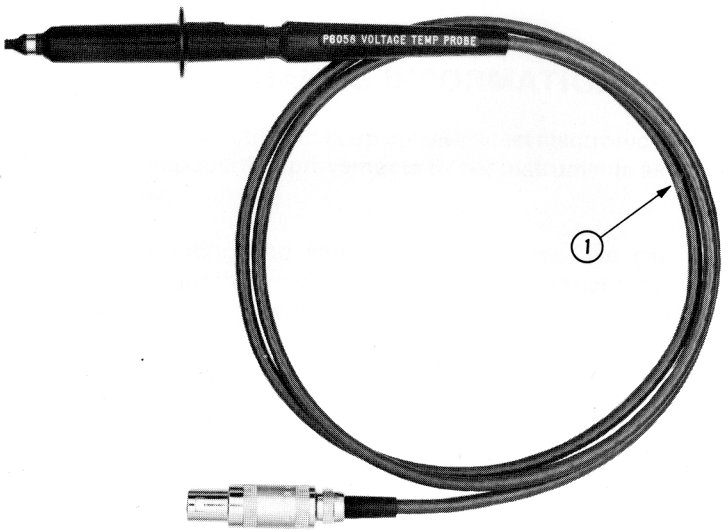

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1 2 3 4 5	Name & Description	Mfr Code	Mfr Part Number
2-1	010-0259-00 [1]			1		LEAD,TEST:PROBE,V/TEMP	80009	010-0259-00
	003-0120-00	XB010260		1		LEAD,TEST:PAIR(NOT SHOWN)	000AD	Z5274
	070-1446-00			1		MANUAL,TECH:INSTRUCTION	80009	070-1446-00

[1]Not furnished with Option 1 or Option 2.

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.
111	PG 501 - Risetime less than 3.5 ns; 8 ns Pretrigger pulse delay.	111 - Risetime 0.5 ns; 30 to 250 ns Pretrigger Pulse delay.
114	PG 501 - ±5 V output.	114 - ±10 V output. Short proof output.
115	PG 501 - Does not have Paired, Burst, Gated, or Delayed pulse mode; ±5 V dc Offset. Has ±5 V output.	115 - Paired, Burst, Gated, and Delayed pulse mode; ±10 V output. Short-proof output.
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.
114	PG 502 - ±5 V output	114 - ±10 V output. Short proof output.
115	PG 502 - Does not have Paired, Burst, Gated, Delayed & Undelayed pulse mode; Has ±5 V output.	115 - Paired, Burst, Gated, Delayed & Undelayed pulse mode; ±10 V output. Short-proof output.
2101	PG 502 - Does not have Paired or Delayed pulse. Has ±5 V output.	2101 - Paired and Delayed pulse; 10 V output.
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	SG 503 - Frequency range 250 kHz to 250 MHz.	191 - Frequency range 350 kHz to 100 MHz.
067-0532-01	SG 503 - Frequency range 250 kHz to 250 MHz.	0532-01 - Frequency range 65 MHz to 500 MHz.
TG 501 replaces 180, 180A	TG 501 - Marker outputs, 5 sec to 1 ns. Sinewave available at 5, 2, and 1 ns. Trigger output - slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time.	180A - Marker outputs, 5 sec to 1 μs. Sinewave available at 20, 10, and 2 ns. Trigger pulses 1, 10, 100 Hz; 1, 10, and 100 kHz. Multiple time-marks can be generated simultaneously.
181	TG 501 - Marker outputs, 5 sec to 1 ns. Sinewave available at 5, 2, and 1 ns.	181 - Marker outputs, 1, 10, 100, 1000, and 10,000 μs, plus 10 ns sinewave.
184	TG 501 - Marker outputs, 5 sec to 1 ns. Sinewave available at 5, 2, and 1 ns. Trigger output - slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time.	184 - Marker outputs, 5 sec to 2 ns. Sinewave available at 50, 20, 10, 5, and 2 ns. Separate trigger pulses of 1 and .1 sec; 10, 1, and .1 ms; 10 and 1 μs. Marker amplifier provides positive or negative time marks of 25 V min. Marker intervals of 1 and .1 sec; 10, 1, and .1 ms; 10 and 1 μs.
2901	TG 501 - Marker outputs, 5 sec to 1 ns. Sinewave available at 5, 2, and 1 ns. Trigger output - slaved to marker output from 5 sec through 100 ns. One time-mark can be generated at a time.	2901 - Marker outputs, 5 sec to 0.1 μs. Sinewave available to 50, 10, and 5 ns. 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. A, OCT 1975