TECHNICAL MANUAL
OPERATION AND MAINTENANCE INSTRUCTIONS

MULTIMETER
AN/PSM-37
PART NUMBER 4D-3573
NSN 6625-00-224-2252

FOURDEE DIVISION
EMERSON ELECTRIC CO.
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SECTION I

INTRODUCTION AND GENERAL INFORMATION

1-1. INTRODUCTION.

1-2. This manual contains operation and maintenance instructions for the AN/PSM-37 Multimeter, part number 4D-3573. This section provides description, purpose, leading particulars, equipment supplied, identification data, related technical manuals, and reference documents for the AN/PSM-37 Multimeter (hereafter referred to as the Multimeter). See figure 1-1.

1-3. PURPOSE. The Multimeter is a general purpose, ruggedized instrument designed for troubleshooting electrical and electronic circuits. The Multimeter is used for measuring resistance, ac and dc voltage, and ac and dc current. Accessories supplied with the Multimeter extend the useable range of the basic meter (see table 1-1). The maximum indications that can be obtained are as follows:

a. Voltage – 1000 volts; 5000 volts dc with MX-1410/V

b. Current – 1 ampere; 10 amperes with MX-9127/PSM-37

c. Resistance – 100 Megohms

Note

All measurements are made with test leads connected to two jacks at the bottom center of the panel, with RANGE, FUNCTION, and POLARITY switches in appropriate positions. (See section IV for operation procedures.)

1-4. GENERAL INFORMATION.

1-5. DESCRIPTION. The Multimeter and accessories are contained in a durable plastic case (see figure 1-2). The Multimeter is watertight with the cover on or off. The overall size of the Multimeter is 8-1/2 inches high, 7 inches wide, 5 inches deep

Table 1-1. Equipment Supplied

Nomenclature	Manufacturer's part number
Multimeter, AN/PSM-37	4D-3573
Test Lead Set, CX-2104A/U	4D-3563
Test Prod, MX-1410/U	4D-3566
Shunt, MX-9127/PSM-37	4D-3565
Test Adapter, MX-9128/PSM-37	4D-3564
Alligator Clips (Part of test lead set)	4D-3592-1 (Red) 4D-3592-2 (Black)
Needle Tip	4D-2674
Adapter, Phone Tip	4D-2887

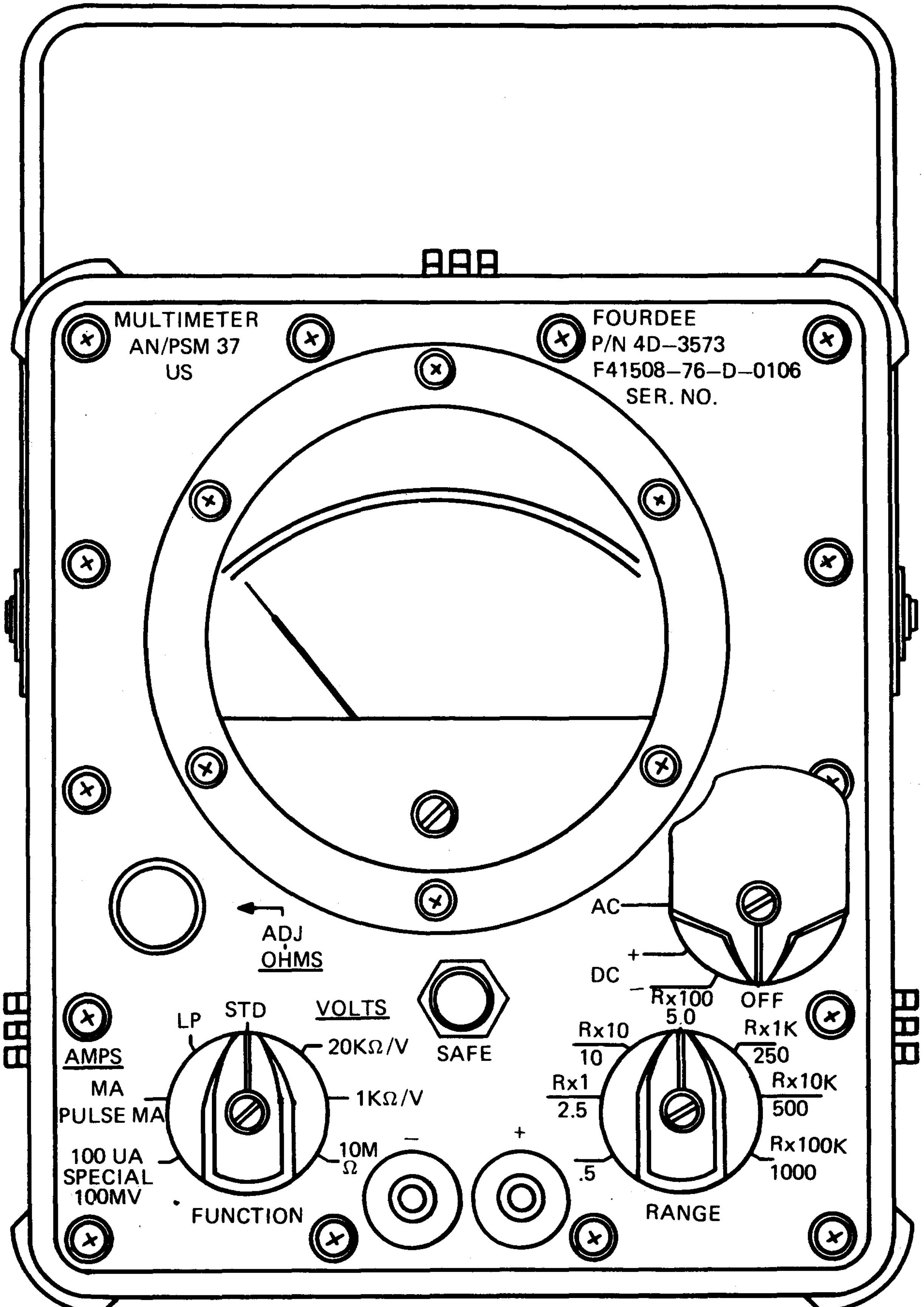


Figure 1-1. AN/PSM-37 multimeter

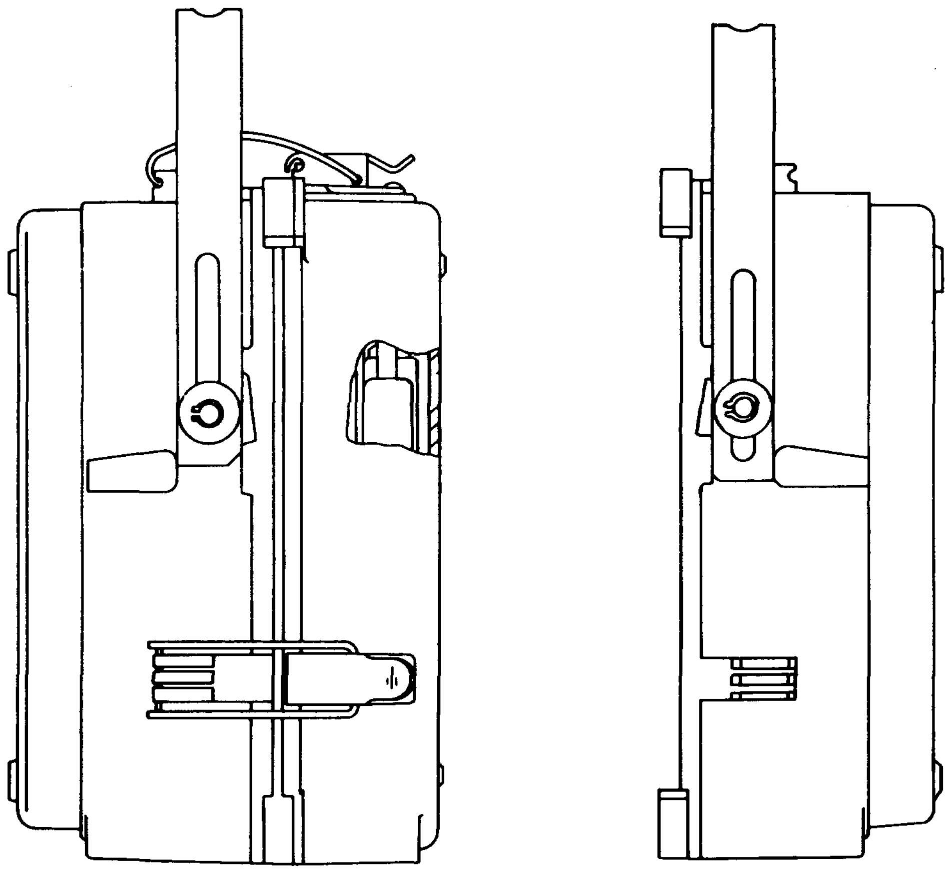


Figure 1-2. AN/PSM-37 multimeter

and weighs 7.5 pounds. The Multimeter requires six AA size 1.5-volt cells (batteries) for proper operation. The basic meter movement is a 50-microampere meter mounted on a plastic case and connected via three selector switches to precision measuring and metering circuits. The Multimeter handle serves multiple functions. It can be used to carry or suspend the Multimeter. The handle may be stowed in a collapsed position, or be pivoted in its extended position to form a fixed easel. This is accomplished by sliding the handle ends into notches in the case lip (see figure 1-2).

1-6. The Multimeter cover is mounted on front or rear of Multimeter case.

1-7. The data plate in the cover opens to provide access to the accessories in the stowage space behind the data plate. To open, slide data plate towards hinged side so that it moves out of slotted catch. The data plate will hold in the open position until pushed closed. Accessories contained in cover are listed in table 1-2 (see figure 1-3).

1-8. RELATED PUBLICATIONS. T.O. 33A1-12-933-14, Technical Manual, Illustrated Parts Breakdown.

1-9. DEFINITIONS.

1-10. The words SHALL or WILL are used in this manual to indicate mandatory requirements. The word SHOULD indicates a nonmandatory desire or a preferred method of accomplishment. The word MAY indicates an acceptable or suggested means of accomplishment.

1-11. WARNINGS, CAUTIONS, AND NOTES. Warnings, cautions, and notes which appear in this manual are defined as follows:

WARNING

An operating procedure, practice, etc., which if not correctly followed, could result in personal injury or loss of life.

CAUTION

An operating procedure, practice, etc., which if not strictly observed, could result in damage to, or destruction of, equipment.

Note

An operating procedure, condition, etc., which it is essential to highlight.

1-12. LIST OF TIME COMPLIANCE TECHNICAL ORDERS.

1-13. This technical order includes all changes, additions, and deletions required by the following time compliance technical orders:

T.O. NO.	DATE	TITLE

1-14. IMPROVEMENT REPORTS.

1-15. Suggestions for improvements to this manual shall be forwarded to OOAMA (MMST), Hill Air Force Base, Utah 84406 in accordance with T.O. 00-5-1.

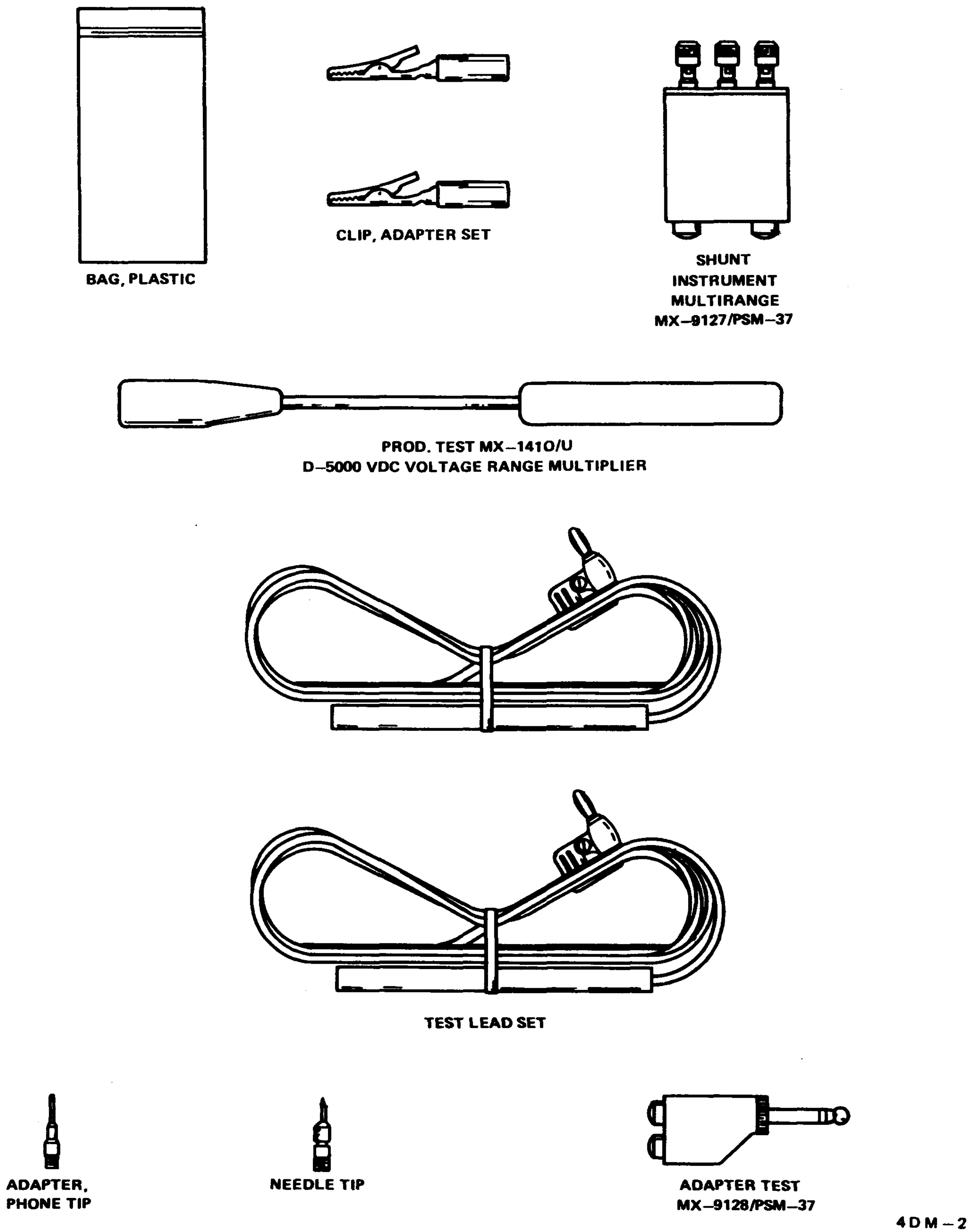


Figure 1-3. AN/PSM-37 multimeter accessory set

SECTION II

SPECIAL TOOLS AND TEST EQUIPMENT

2-1. GENERAL REQUIREMENTS.

2-2. GENERAL. Table 1-2 lists test equipment required for repairing and maintaining the AN/PSM-37 Multimeter.

Table 2-1. Test Equipment Required for Servicing

Equipment number	Nomenclature	Use and application
FLUKE 5205 or Equivalent	CALIBRATOR POWER AMPLIFIER	High ac voltage calibration
FLUKE 5101A or Equivalent	METER CALIBRATOR	Ac and dc voltages, ac and dc amperes, and resistance checks
AN/PSM-37 or Equivalent	MULTIMETER	Impedance checks

SECTION III

PREPARATION FOR USE AND SHIPMENT

3-1. PREPARATION FOR USE.

3-2. GENERAL. The AN/PSM-37 is packaged in a one unit container. The accessories are stowed in the compartment behind the data plate in Multimeter cover. The batteries and a copy of this manual are packaged in the unit container but external to Multimeter case.

CAUTION

When removing Multimeter, do not cut deeper than carton closure, or damage to batteries or manual may result.

3-3. UNPACKING. Open unit container and remove batteries, which are located just inside carton top closure. Remove the manual which is between the cushioning and the carton wall. Remove Multimeter from carton and, remove Multimeter cover. Open data plate and check that listed accessories are all included.

3-4. BATTERY INSTALLATION. Use instructions on the data plate and install batteries. The battery compartment has raised markings showing the proper battery polarities. The Multimeter is not protected against accidental reverse battery installation and will not function properly unless all batteries are properly installed.

3-5. OPERATIONAL CHECK. After completing battery installation, remove test leads from storage compartment in cover. Connect test leads to Multimeter. Rotate FUNCTION switch to OHMS/LP, RANGE switch to RX 10, and AC/DC +-/OFF switch to DC +. Short test leads together and verify meter indicates up-scale. Using ZERO OHMS knob, adjust meter indication for 0 OHMS. When 0 ohm indication is obtained, check that meter continues to indicate approximately full scale, with DC - position and FUNCTION switch in OHMS/STD. If the preceding indications cannot be obtained, check batteries for proper installation.

CAUTION

Prior to using the Multimeter to measure voltage or current, read the operating instructions contained in section IV.

3-6. PREPARATION FOR SHIPMENT.

3-7. Remove the batteries and pack the Multimeter in accordance with current packing and shipping directions.

SECTION IV

OPERATION INSTRUCTIONS

4-1. GENERAL.

4-2. This section contains the theory of operation and operating procedures for the Multimeter.

4-3. THEORY OF OPERATION.

4-4. INTRODUCTION. The Multimeter is a precision general-purpose test instrument which combines the functions of an ac and dc voltmeter (with both 20,000 ohms-per-volt and 1,000 ohms-per-volt meter sensitivities), an ammeter, an ohmmeter, and a 10-megohm function. The settings of the FUNCTION, RANGE, and POLARITY switches control the characteristics and range of the meter circuit, and the discussion of the theory of operation will therefore be divided into the individual circuits resulting from each combination of switch settings. The complete schematic diagram is shown in Section VI, figure 6-2.

4-5. FUNCTIONAL OPERATION.

4-6. DC VOLTAGE – 20,000 OHMS-PER-VOLT. The following paragraphs describe the operation of the Multimeter for measuring dc voltages using the 20KΩ/V function. Refer to figure 4-1 for the following discussion. With the FUNCTION switch (S2) in the 20KΩ/V position, and RANGE switch in any position, resistors A3A4R1 through A3A4R6 provide the series resistance values for the required ranges of the Multimeter. The series resistors and resistors incorporated in the meter amplifier circuit comprise the required resistance for 20KΩ/V operation. The meter amplifier (U3) provides an output current proportional to the input voltage. Due to the large open-loop gain of the operational amplifier, this current is independent of the meter resistance (Rm) but is directly proportional to the very stable sense resistance (Rs) A1R20.

4-7. DC VOLTAGE – 1,000 OHMS-PER-VOLT. The following paragraphs describe the operation of the Multimeter for measuring DC voltages using the 1KΩ/V function. Refer to figure 4-2 for the following discussion. With the FUNCTION switch (S2) in the 1KΩ/V position, and RANGE switch in any position, resistors A3A3R1 through A3A3R7 provide the series resistance values for the required ranges of the Multimeter. The series resistors and resistors contained in the meter amplifier circuit comprise the required resistance for 1KΩ/V operation. The meter amplifier (U3) provides an output current proportional to the input voltage. Due to the large open-loop gain of the operational amplifier, this current is independent of the meter resistance (Rm) but is directly proportional to the very stable sense resistance (Rs) A1R20.

4-8. DC VOLTAGE – 10 MEGOHMS. The simplified circuit is shown in figure 4-3, with the FUNCTION switch in the 10 MEG Ω position. The resistors for the 10 MEGΩ function are located on PWB A3A5, and are labeled A3A5R1 through A3A5R14. The combination of resistors A3A5R1 through A3A5R14 provide the resistance for the required ranges of the Multimeter using the 10 MEGΩ function. The resistors of RANGE switch A3A2 and resistors contained in the meter amplifier circuit comprise the required resistance for 10 MEGΩ operation. The meter amplifier (U3) provides an output current proportional to the input voltage. Due to the large open-loop gain of U3 this current is independent of the meter resistance (Rm), but is directly proportional to the very stable sense resistance (Rs) A1R20.

4-9. METER AMPLIFIER U3. All ac measurements and the dc measurements on OHMS and 10-megohm input impedance functions use amplifier U3. U3 is a high-input impedance integrated operational amplifier selected for low-input bias and offset currents. It features low power consumption, low harmonic distortion and internal frequency compensation. The high-input impedance of U3 does not load the input circuits and thus does not affect the accuracy of meter readings. The low power consumption of U3 prolongs the life of the batteries used in the Multimeter. The internal frequency compensation features allows accurate ac voltage measurements.

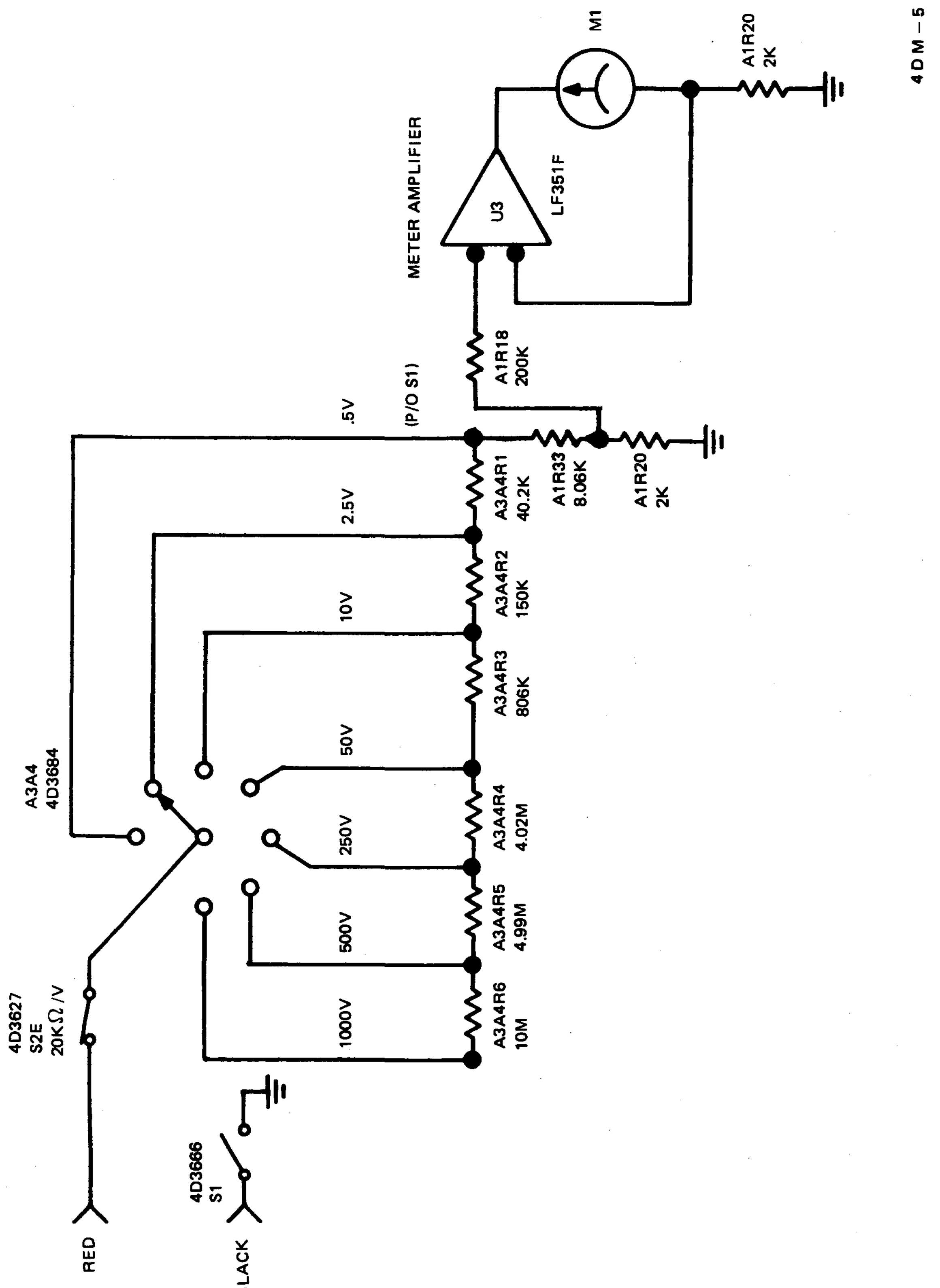


Figure 4-1. Simplified circuit, dc volts – 20K ohms/V

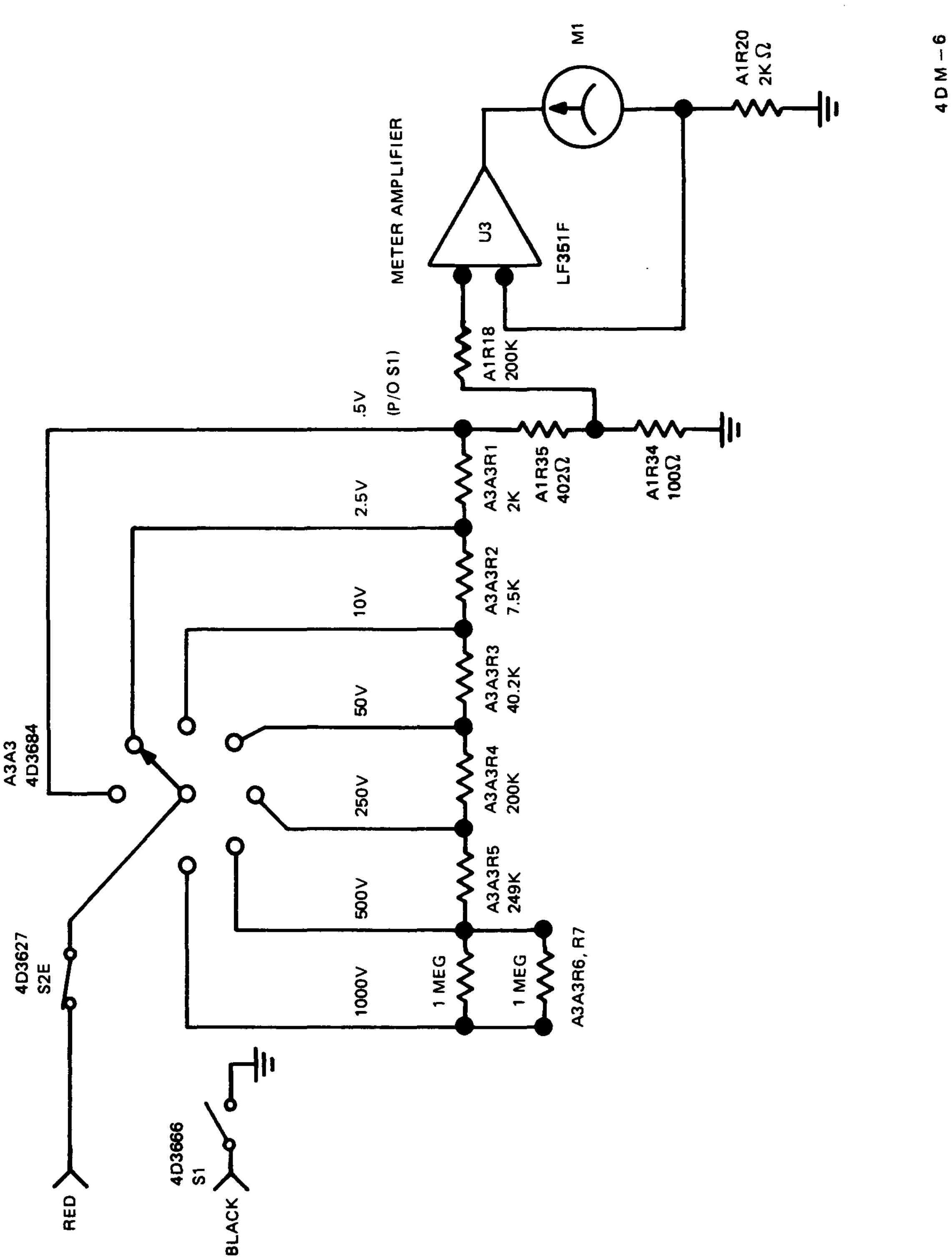


Figure 4-2. Simplified circuit, dc volts – 1K ohms/V

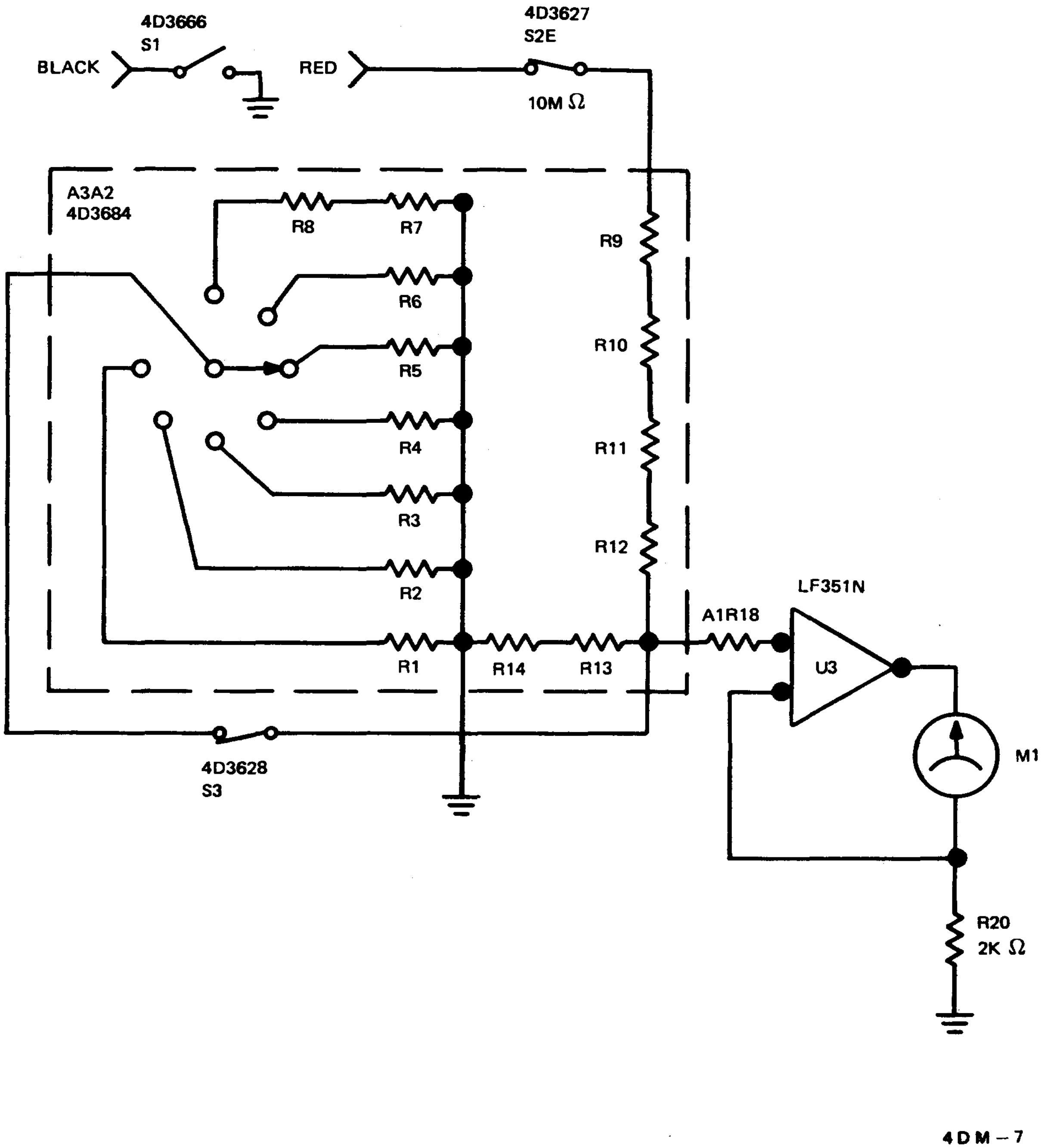


Figure 4-3. Simplified circuit, dc voltage 10 Megohm

4-10. AC VOLTAGE – 20,000 OHMS-PER-VOLT. The simplified circuit is shown in figure 4-4, with the POLARITY switch (S3) at AC and the FUNCTION switch at VOLTS-20KΩ/V. Resistors A3A4R1 through A3A4R6 provide the series resistance values for the required ranges of the Multimeter. The series resistors and resistors contained in the meter amplifier circuit comprise the required resistance values for 20KΩ/V operation. A diode bridge circuit consisting of CR3 through CR6 provides an absolute value function which converts ac inputs to a rectified dc current through the meter (M1). The large gain of U3 eliminates diode voltage drop errors. At higher frequencies, the high slew rate of U3 keeps the errors low. Mechanical inertia in the meter movement averages the waveforms to a stable reading.

4-11. AC VOLTAGE – 1,000 OHMS-PER-VOLT. The simplified circuit is shown in figure 4-5, with the POLARITY switch at AC and the FUNCTION switch at VOLTS-1KΩ/V. This circuit is essentially the same as the 20KΩ/V function, except that the 1KΩ/V resistance string of A3A3R1 through A3A3R7 has been switched in. These series resistors and resistors in the meter amplifier circuit of U3 provide for 1KΩ/V, ac operation.

4-12. AC VOLTAGE – 10 MEGOHMS. The simplified circuit is shown in figure 4-6, with the POLARITY switch in AC position and FUNCTION switch in VOLTS – 10 MEG position. The resistors for the 10-MEGΩ function are located on PWB A3A5. Resistors A3A5R1 through A3A5R14 comprise the input impedance voltage divider. RANGE switch A3A2 switches in the resistors located on PWB A3A5. The combination of these resistors and resistors located in the meter amplifier circuit comprise the required resistance for 10-MEGΩ operation. The diode bridge circuit consisting of CR3 through CR6 provide an absolute value function which converts ac inputs to a rectified dc current through the meter (M1). The large gain of U3 eliminates diode voltage drop errors. At higher frequencies, the high slew rate of U3 keeps the errors low. Mechanical inertia in the meter movement averages the waveforms to a stable reading.

4-13. AMPERES – MILLIAMPERES. The simplified circuit is shown in figure 4-7, with the FUNCTION switch at AMPS-MA/PULSE MA position and the RANGE switch at any position. The resistors for the current-range switch are located on A3A1 switch and A4 (encapsulated module) located on the PWB A1. Current measurements are accomplished through the use of a commutated shunt resistance and the voltage sensitive meter amplifier (U3). Due to the very high input impedance of the meter amplifier, there is no significant loading error. The high-input impedance of U3 also eliminates the contact potential errors of the current-range switch. This is accomplished by allowing the shunt resistance to be in parallel with U3 and switching only the entry point of the current load. The sense resistors (Rs) for the highest current ranges have built in sense taps to obtain the required accuracy. The voltage sensitivity of the ampere function is 50 millivolts, full scale. The current protection circuit provides a shunt for large over-scale currents. Four high-current diodes are incorporated in opposing polarity parallel paths of two series diodes each. Dual series diodes are used to meet the peak voltage requirements for the integral pulse mode. Protection is required to prevent shunt burn-out for ten ampere overloads on all scales.

4-14. SPECIAL. With the FUNCTION switch at SPECIAL and the RANGE switch at any position, the simplified circuit is shown in figure 4-8. There is no RANGE switch in the SPECIAL configuration. The positive lead is connected to the meter amplifier via the S2E portion of the FUNCTION switch. This function is used for measuring very low currents.

4-15. OHMS. With the FUNCTION switch at OHMS, the simplified circuit is shown in figure 4-9. The basic operation of the ohmmeter circuit is derived from a constant current source. Two volt-ampere sensitives exist and both are at 20 ohms center scale. The STANDARD scale is 1.34 volts and the LP (Low Power) scale is at 0.094 volt. The sensitivity of U1 is changed by the FUNCTION switch (LP Ω or STD Ω) and the gain of the meter amplifier is changed by the OHMS RANGE selector switch (A3A1). Protection on the ohm's function is provided at the voltage source. The voltage source for the ohm's function is a unipolar voltage. When the voltage source is overloaded, it becomes a constant current source. The high voltage transistor bears the brunt of the overload voltage for positive swings. The 1N4007 diode blocks the

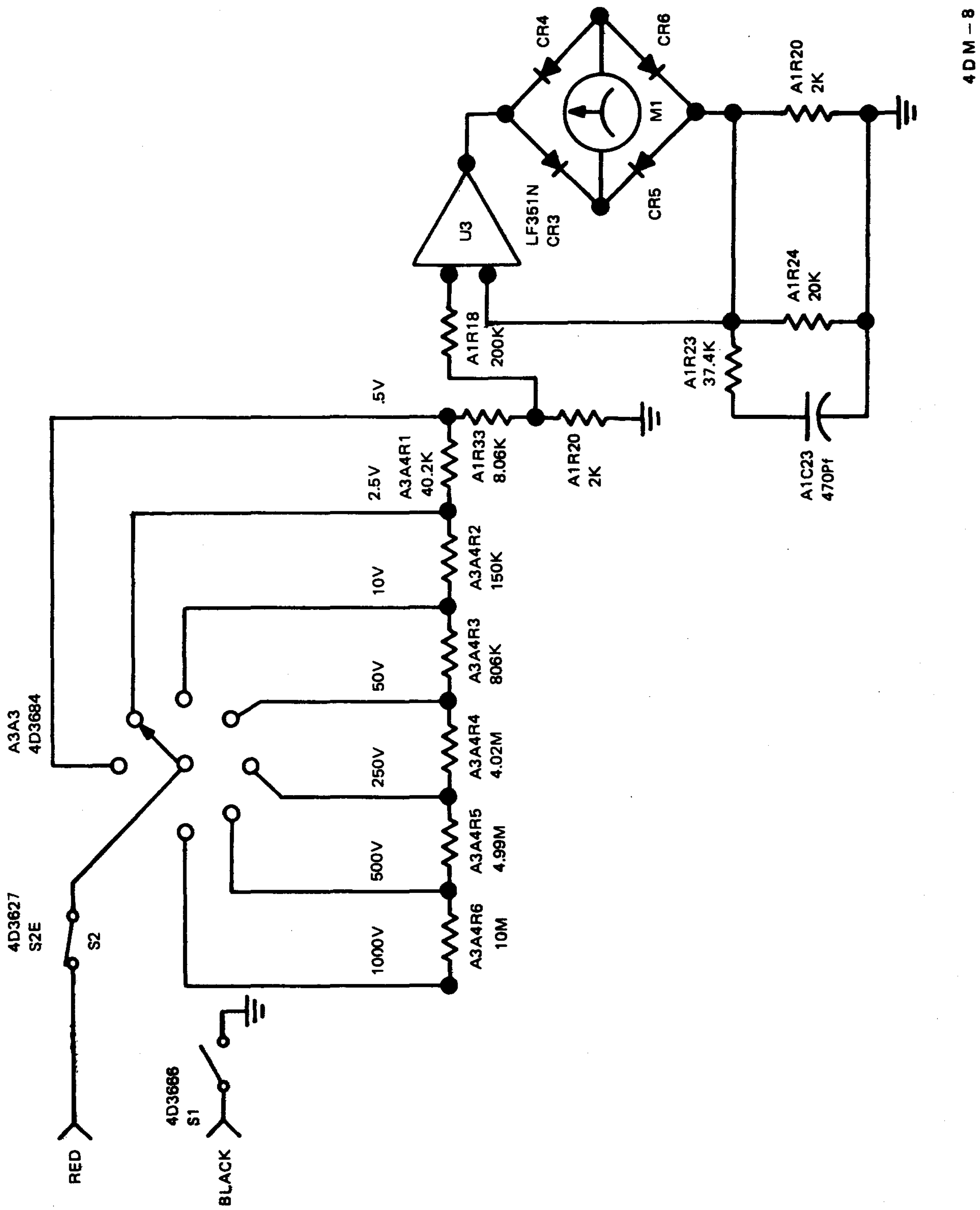


Figure 4-4. Simplified circuit, ac volts, 20K ohms/V

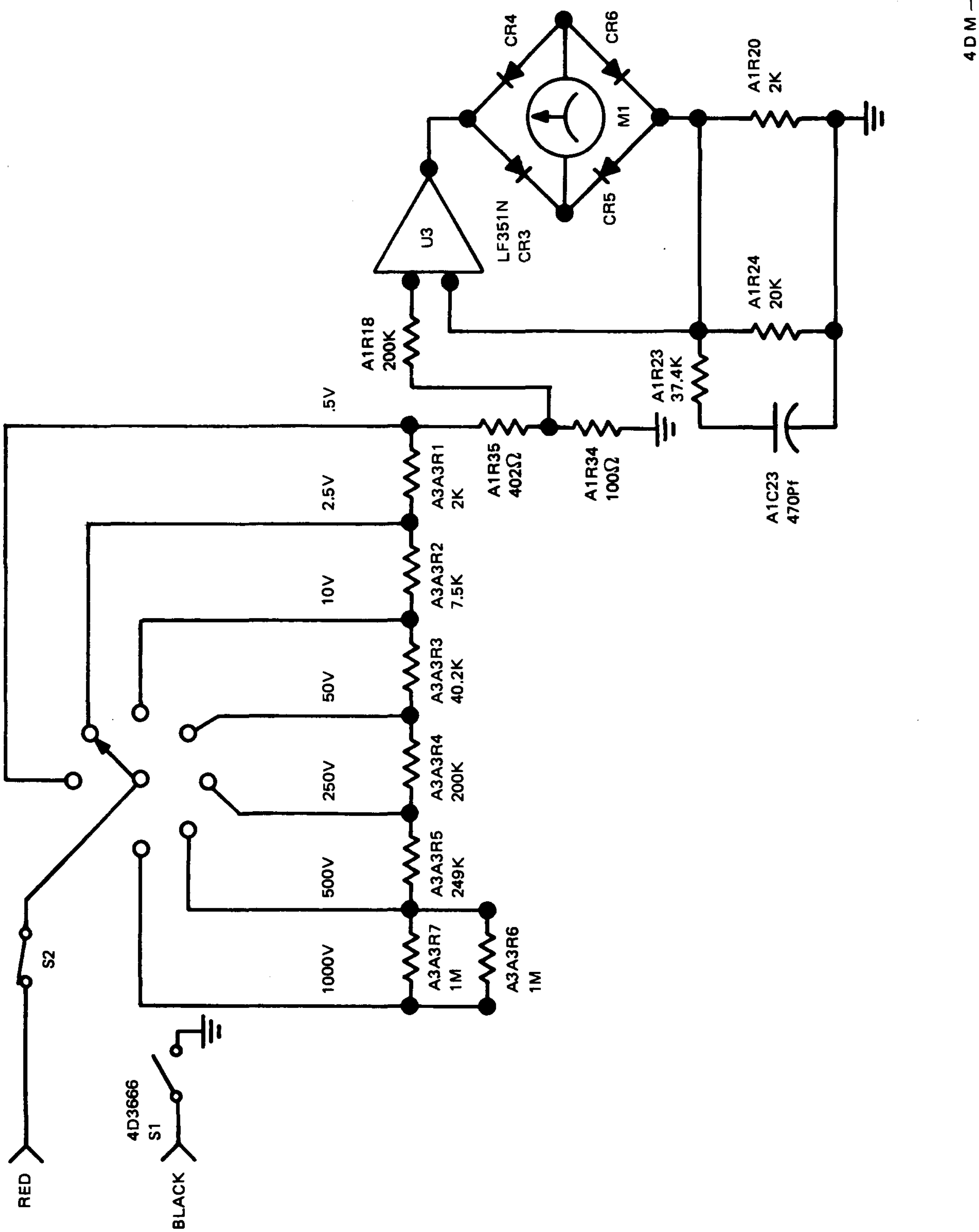


Figure 4-5. Simplified circuit, ac volts, 1K ohms/V

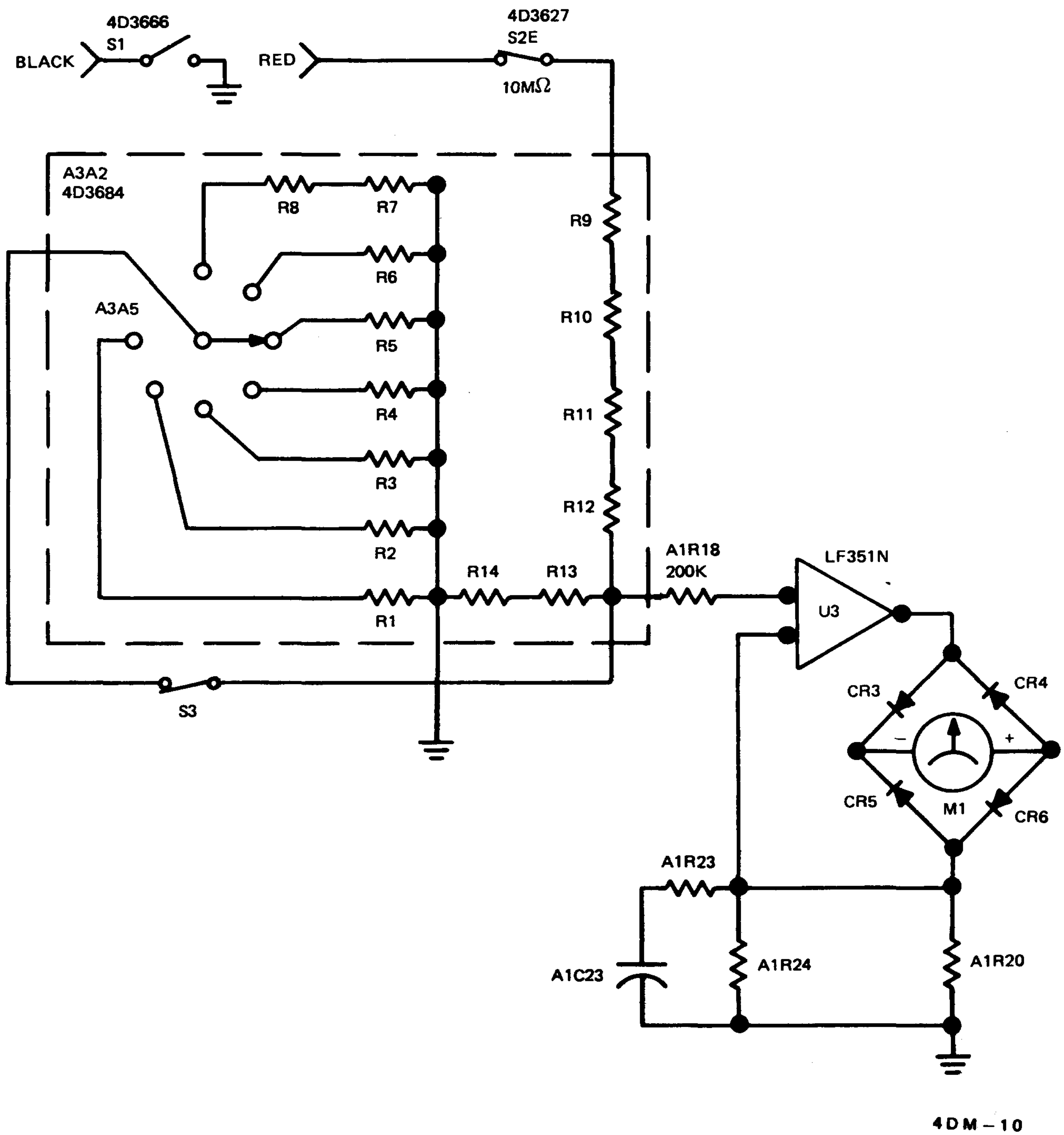


Figure 4-6. Simplified circuit, ac volts – 10 Megohms

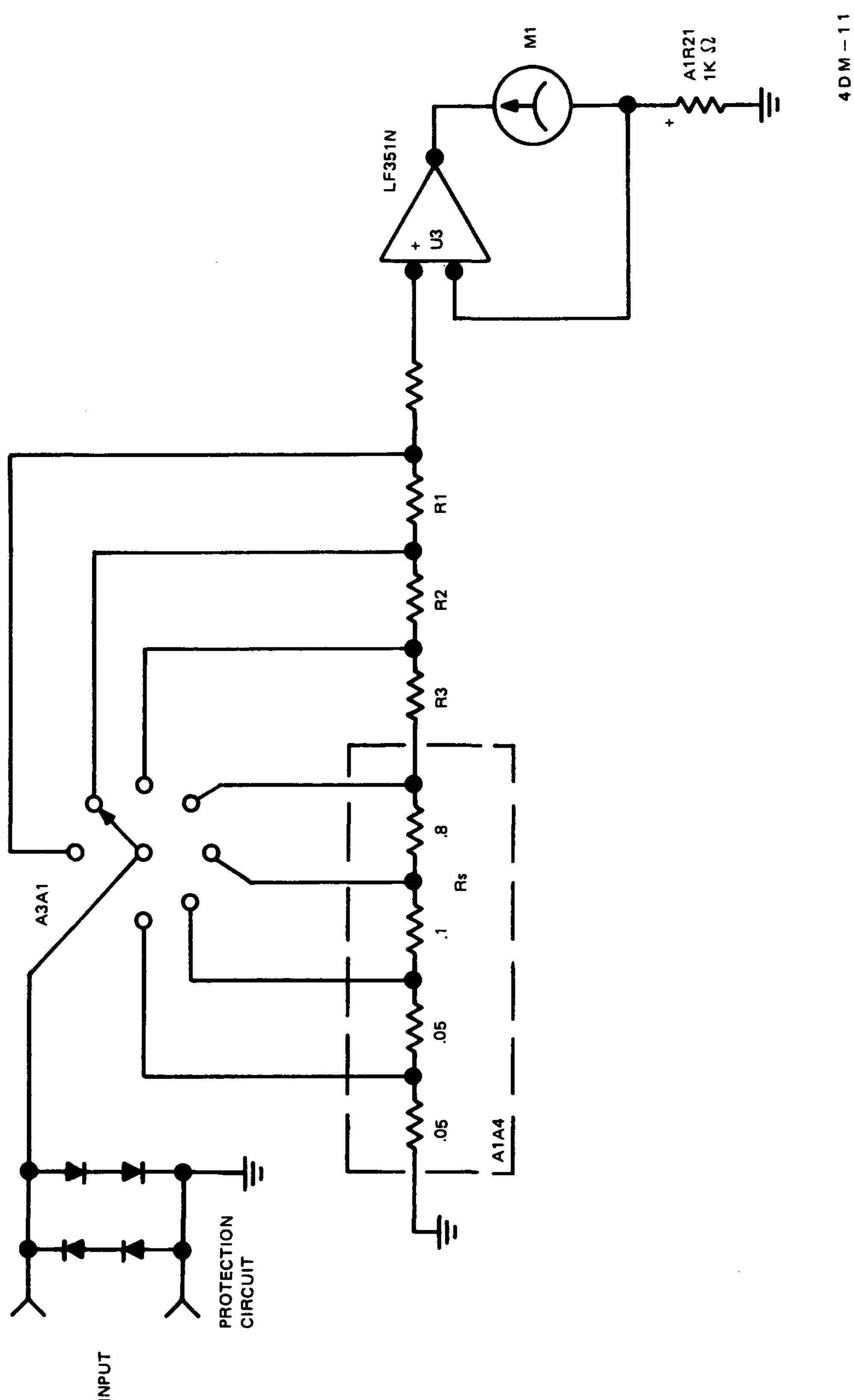


Figure 4.7. Simplified circuit, amps—mA

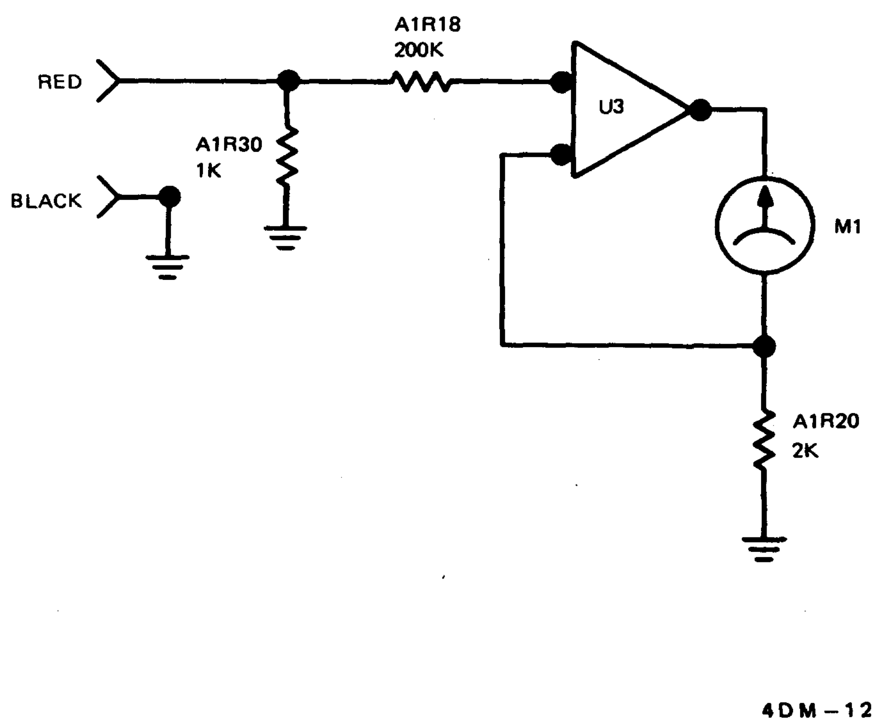


Figure 4-8. Simplified circuit, 100 VA/100 mV

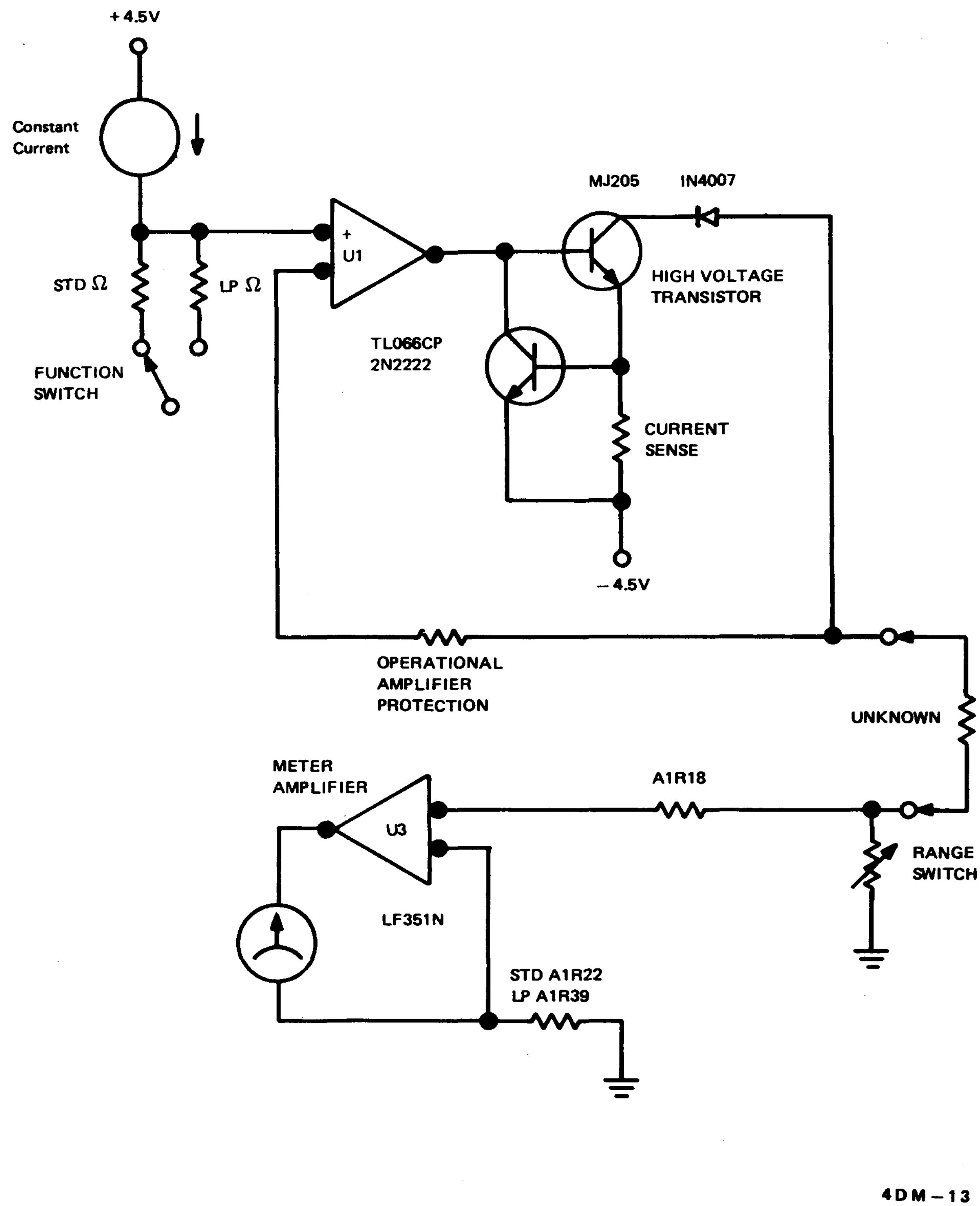


Figure 4-9. Simplified circuit, ohms

overload potentials for a negative voltage swing. High performance for this unit is derived from the operational amplifier (U1) and the constant current source of (Q1).

4-16. OVERLOAD PROTECTION. The following paragraphs describe the functional operation of the voltage protection circuit of the Multimeter. Figure 4-10 is a simplified circuit diagram of the voltage protection circuit. The operational amplifier (U2) is located on the OHM SOURCE/METER AMPLIFIER PWB (A1). The SPARK-GAP, protection circuit (A4) is electrically located in the input circuit of the Multimeter. The VOLTAGE PROTECTION BRIDGE circuit is contained on the A2 PWB. On the 1000-volt range, the voltage protection circuit (PWB A2) protects the meter against overload voltages. For voltages above 1500 V rms, a spark-gap (A4) cuts in to protect against internal arcing. Refer to Section VI, schematic diagram (figure 6-2), for protection circuits of the Multimeter.

4-17. METERING CIRCUITS. All functions of the multimeter are connected through meter amplifier U3 and to meter M1 through FUNCTION switch S2B. M1 has a sensitivity of 50 μa (± 1%) full scale with a resistance of 2KΩ ± 1%.

4-18. BATTERIES. The multimeter requires six 1.5-volt alkaline batteries for proper operation. The batteries are located in the battery compartment on the back of the multimeter. The correct polarity for battery placement is marked in the battery compartment and should be strictly adhered to.

4-19. CONTROLS.

4-20. RANGE SWITCH A3. A3 is the RANGE selector switch and is used to select the correct measurement range. The proper range for voltage or current is normally that which gives the greatest scale deflection without going overscale. The proper ohms range is normally that which produces a reading within the wide-band part of the green arc on meter M1.

a. A3A1 is the range selector switch for OHMS. It connects metering neutral through resistances of 1.78K, 17.8K, 178K and 1.78M ohms and two resistors (R37 and R25) located on the A1 PWB. FUNCTION switch S2C in STD OHMS position also connects resistor R23 (26.7K) of A1 PWB into the metering circuit. In LP OHMS position, R39 of A1 PWB is connected into the metering circuit. The other portion of A3A1 is the RANGE selector switch for AMP. Three resistors R1 (80.6 Ω) R2 (15 Ω), and R3 (4.0 Ω) are physically located on the RANGE switch. Four other resistance values of the AMP RANGE switch are located in encapsulated module A4, located on the A1 PWB. The RANGE switch will allow current measurements from 0.1 mA to 1 amp.

b. A3A2 is the 10 MEGΩ input-impedance range selector switch. It connects the input to the meter amplifier (U3), via S2E, to the appropriate tap on the 10 MEGΩ voltage divider. The resistors of the 10 MEGΩ selector switch are located on PWB A3A5.

c. A3A3 is the 1K Ω/V RANGE selector switch. It connects the positive input terminal to range resistances of 500Ω, 2K, 7.5K, 40.2K, 200K, 249K and two parallel resistors of 1 megohm each. The output of the RANGE selector switch is applied to the meter amplifier circuit via switch S2D.

d. A3A4 is the 20K Ω/V RANGE selector switch. It connects the positive input to resistances of 10K, 40.2K, 150K, 806K, 4.02M, 4.99M and 10M ohms. The output from the 20K Ω/V RANGE selector switch is fed to the meter amplifier via switch S2D. Switch S2C connects the meter amplifier to ground through resistor R20 on the meter amplifier PWB.

4-21. FUNCTION SWITCH S2. S2 is the FUNCTION selector switch and interconnects the input, meter amplifier, overload, and metering circuits to obtain the proper circuit for proper operation for each function.

a. S2E is the input selector switch and connects the positive Multimeter terminal to the appropriate

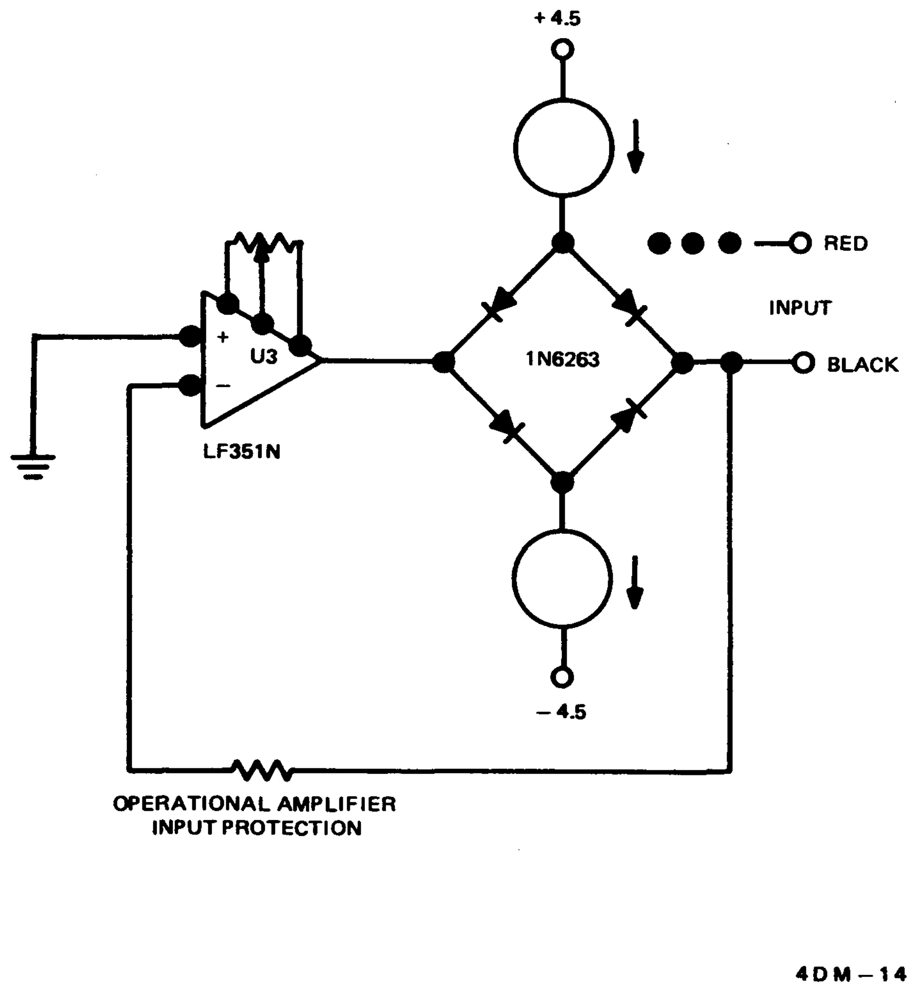


Figure 4-10. Simplified diagram, voltage protection circuit

input circuit according to the function selected. The switch is constructed so that the high voltages or currents applied to one function will not break down to other input circuits incapable of tolerating such overloads.

b. S2C is connected to the negative input terminal and provides a ground path for the particular function selected. A ground path for the meter amplifier is also accomplished through the selected function of the FUNCTION switch (S2C).

c. S2D provides a ground path for the LPΩ function and for the AMP function when measuring an ac current.

d. S2A connects the proper battery voltages to the electronic components incorporated in the multimeter circuitry according to the function selected.

e. S2B connects meter M1 to the meter amplifier circuits. The path for current flow through the meter depends on the function selected for use.

4-22. POLARITY SWITCH S3. The POLARITY switch is used to cut the meter on and off, and to select DC − or DC + and the ac mode.

a. S3A is the amplifier feedback selector switch. In dc polarities, it connects the meter amplifier circuit to the meter via meter FUNCTION switch S2B. For ac operation, S3A provides a ground path for the meter amplifier through the network of R23, R24 and C23. S3A also connects the bridge rectifier circuit of the meter amplifier in the ac position.

b. S3B connects the proper battery voltages and polarities to the proper electronic circuits of the multimeter.

c. S3C provides the path for current flow when the Multimeter FUNCTION switch is in the 10-MEG position.

4-23. OPERATING CONTROLS.

4-24. FUNCTION SWITCH. The FUNCTION switch (see figure 4-11) is located on the lower left of the Multimeter front panel and provides the means for selecting the particular electrical function to be measured.

4-25. RANGE SWITCH. The RANGE switch (see figure 4-11) is located on the lower right side of the Multimeter front panel. Once the FUNCTION switch has been set, the RANGE switch should be set to the proper range to provide an accurate indication on the meter.

4-26. POLARITY SWITCH. The polarity switch is located centrally on the right side of the Multimeter front panel, but is not marked as such. This switch turns the Multimeter on and off and selects the nature of the measurement to be made, DC +, DC −, or AC. The + and − polarity indicates the polarity applied to the red jack when the meter reads upscale on dc measurements, and the output polarity of the red jack when making ohms measurements.

4-27. OHMS ADJ. The OHMS ADJUST control is located centrally on the left side of the Multimeter front panel. The OHMS ADJUST is used only to set full-scale deflection with the test leads shorted prior to making resistance measurements. This control adjusts for variations due to battery condition, temperature, range and function settings.

4-28. SAFE SWITCH. The SAFE switch is a make-and-break switch and is normally closed (NC). The switch is pressed to open the negative input of the Multimeter while connecting the Multimeter leads to a circuit for measurement.

4-29. OPERATING PROCEDURES.

CAUTION

Prior to making any measurements, read the entire portion of the OPERATING PROCEDURES. Failure to follow the operating procedures could cause damage to the meter.

a. General. Check that the meter is mechanically zeroed, if not, adjust in accordance with paragraph 5-6.

4-30. VOLTAGE MEASUREMENTS. Ac and dc voltages may be measured directly on the ME-418/PSM-37 in the range of 0 to 1000 volts at input impedances of 1000 ohms/volt, 20,000 ohms/volt, or at a fixed 10 megohms. These impedance functions are marked on the front panel of the Multimeter under the VOLTS caption around the

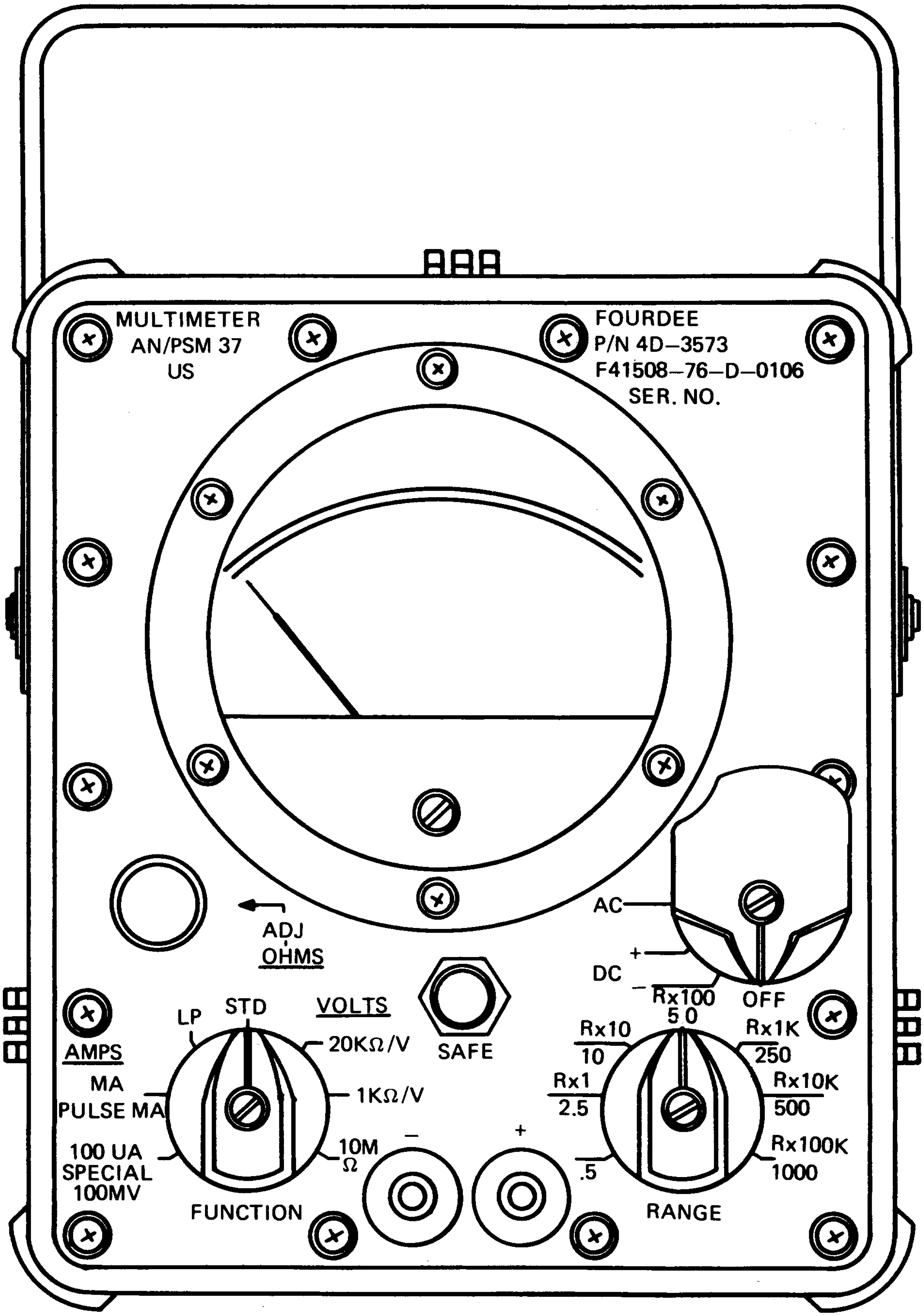


Figure 4-11. AN/PSM-37 multimeter controls

FUNCTION switch. Measurements of small signals up to 100 millivolts at 1000 ohms (10,000 ohms/volt) is available under the SPECIAL function marked on the panel under the AMPS function. To measure voltages in the range of 0 to 1000 volts, the procedure is as follows:

a. Set FUNCTION switch to 20K Ω/V, 1K Ω/V, or 10 MEGΩ as desired.

Note

The 10 MEGΩ function is inherently protected against overload and is recommended for initial measurements.

b. Set RANGE switch to desired full scale range.

CAUTION

Whenever taking an unknown voltage measurement, always set RANGE switch to the highest range and decrease until the proper range is reached.

c. Turn POLARITY switch to DC +, DC −, or AC as desired.

d. Connect test leads to meter jacks – red lead to red (+) jack, black lead to black (−) jack.

e. Connect test lead tips to circuit being measured, with black lead to ground or lower voltage point (if known). If meter indicates in reverse direction on dc measurements, change POLARITY switch to opposite polarity.

f. If a voltage below 100 millivolts is indicated, the FUNCTION switch may be set to SPECIAL and measurements taken. The position of the RANGE switch does not affect full-scale value of the special function.

Note

The 10-MEGΩ function employs a blocking capacitor when set to AC polarity and permits the reading of low level ac signals present on higher level dc voltages.

4-31. HIGH VOLTAGE OR HIGH IMPEDANCE VOLTAGE MEASUREMENTS. The use of test prod MX-1410/U permits dc voltage measurements up to 5,000 volts at an input impedance of 100 megohms. When used with the 500-volt range of the 20K Ω/V function, a full-scale value of 5000 volts is obtained. When used with the 10 MEGΩ function, it becomes a 10 times voltage divider and will produce full-scale deflection from 5 to 10,000 volts. Do not make measurements over 5000 volts. To make high voltage or high impedance measurements, the procedure is as follows.

a. Set FUNCTION switch to 20K Ω/V or MEGΩ as desired.

WARNING

Make sure equipment is turned off when connecting or disconnecting where high voltages may be present. Do not change FUNCTION switch while equipment under test is energized, or damage to Multimeter may occur.

b. Set RANGE switch to 500 for 5000-volt full-scale indication. Other full-scale values may be selected only on the 10 MEGΩ function, and will have a full-scale value equal to 10 times the switch setting.

c. Set POLARITY switch to DC +.

d. Plug red test lead tip into MX-1410/U.

e. Connect MX-1410/U clip to high voltage or high impedance test point. Connect black test lead to low side or ground. Turn on high voltage. If meter indicates in the reverse direction, change POLARITY switch to DC −.

4-32. HIGH VOLTAGE OR HIGH IMPEDANCE AC VOLTAGE MEASUREMENTS. The procedure of paragraph 4-30 may be used for making ac measurements up to 5000 volts peak with the POLARITY switch set to AC. The very high impedance of the MX-1410 may be affected by shunting capacitance of the test leads, power line, etc. Measurements are not recommended above power line frequencies except for the purpose of monitoring changes or fluctuations.

4-33. CURRENT MEASUREMENTS. Ac and dc currents (including pulsed dc) from 0 to 1 ampere may be measured directly on the Multimeter, and currents up to 10 amperes may be measured with the use of the multirange instrument shunt, MX-9127/PSM-37. The procedure is as follows.

a. Set FUNCTION switch to MA/PULSE MA.

b. For measurements up to 1 ampere, set RANGE switch to desired range.

c. Set POLARITY switch to DC +, DC –, or AC as desired.

d. Plug test leads into meter jacks. Connect other end of leads in series with circuit under test while the power is off. Turn on power and read meter.

e. For measurements above 1 ampere, connect test lead tips to pin jacks in shunt MX-9127/ PSM-37. Connect circuit under test to appropriate load circuit binding posts. Set the RANGE switch to 2.5 or 10 to correspond with the shunt section used.

f. Turn on power and read meter. For a 2.5-ampere shunt section, the meter is set for 2.5 and reads a 2.5 amperes full-scale. Use of the 10-ampere shunt section results in a full-scale value of 10 amperes.

g. If a current below 100 microamperes is indicated, the FUNCTION switch may be set to SPECIAL and a full-scale value of 100 microamperes obtained. This function is also useful for standard external shunts.

4-34. RESISTANCE MEASUREMENTS. To measure resistance from 0 to 100 megohms, the procedure is as follows.

a. Set FUNCTION switch to OHMS LP or OHMS STD depending on whether 100-millivolt or 1.4-volt output is desired. OHMS LP is generally used to measure in-circuit resistance where semiconductor junctions will block out the effect of other components. OHMS STD is best to check semiconductors for forward and reverse conduction and to minimize the effects of thermal, chemical, or leakage voltage.

b. Set POLARITY switch to DC +.

c. Set RANGE switch at proper multiplier so that the resistance measured falls in the center portion of the green OHMS scale on the meter.

d. Plug test leads into meter jacks, short circuit the free ends of the test leads and adjust OHMS ADJ until full-scale deflection (0 ohms) is obtained.

e. Clip the test leads across the item to be measured. Read resistance on the OHMS scale and multiply by the range setting.

f. If resistance in the opposite direction is also desired, change POLARITY switch to DC – and read. The polarity of the red jack matches the setting of the POLARITY switch. An internal regulator circuit precludes resetting zero for routine range-to-range, function-to-function, or battery discharge effects. This permits rapid in-circuit measurements at LP and STD, forward and reverse polarity, without disconnecting the leads during test to rezero. Different forward and reverse readings will be obtained on a known passive device only if outside power is passing through the device.

4-35. CRYSTAL CURRENT MEASUREMENTS. To make standard measurements of crystal current, test adapter MX-9128/PSM-37 is used as follows.

a. Set FUNCTION switch to MA.

b. Set RANGE switch to 2.5.

c. Set POLARITY TO DC +.

d. Plug test leads into meter jacks and connect test lead tips to pin jacks on adapter.

e. Connect phone plug to test circuit and read meter.

4-36. TURNING MULTIMETER OFF. Upon completion of measurements turn POLARITY switch to OFF position. The internal amplifiers draw battery current whenever the POLARITY switch is not OFF. The batteries when fresh will operate the Multimeter for at least 500 hours with test leads open on the LP OHMS functions and for 250 hours on OHMS STD. The Multimeter must be off before the cover will fit properly, due to a mechanical interference interlock incorporated into the POLARITY switch knob.

SECTION V

MAINTENANCE

5-1. MINIMUM PERFORMANCE STANDARDS.

5-2. The accuracies which this instrument is designed to meet are marked on the inside cover lid of the Multimeter and in tables 5-1 and 5-2. These measurement accuracies constitute the minimum performance standards and may be checked by comparing the readings of the Multimeter against another AN/PSM-37 or other standard multimeter with accuracies as good or better than the AN/PSM-37 under test. Overload limits are given in table 5-2.

5-3. INSPECTION AND PREVENTIVE MAINTENANCE.

5-4. No periodic maintenance is required beyond replacement of the batteries, adjustment of the mechanical zero, oiling the handle hinge pivots, and visual inspection and cleaning of the Multimeter exterior and accessories. The high voltage test prod, current shunt, and test adapter are precision components which cannot be repaired in the field but must be replaced in their entirety if defective.

5-4A. Repair of AN/PSM-37 Multimeter handle, refer to figure 5-1.

5-5. BATTERY TESTING AND REPLACEMENT.

a. Remove mounting screws from the battery cover on the rear of the case and lift off the cover and gasket.

b. Remove batteries.

c. Use another AN/PSM-37 or equivalent to measure each battery for 1.5 volts.

Note

Fully charged batteries will read above 1.4 volts each. Although proper meter readings may be obtained with batteries reading above 1.1 volts each, batteries under 1.25 volts have little remaining service life and should not be retained except in special circumstances.

Table 5-1. Multimeter Basic Accuracies

Function	77° (25°C)	131°F (55°C)	-40°F (-40°C)
Dc volts or amps*	±3%	±5%	±6%
Ac volts or amps	±4%	±6%	±7%
Ohms	±3%	±5%	±6%

Note: 100 microamp special: Accurate at 77°F (25°C) only, resistance - 1000 ohms

Ac frequency response: 20 Hz to 30 KHz

(Accuracies expressed in percentage of scale length)

Table 5-2. Overload Limits

Ranges	Overload limits
All voltage ranges except 1000 volt ranges	1000 volts ac
	1000 volts dc, either polarity
1000 volt ranges	5000 volts ac
	5000 volts dc, either polarity
All current ranges	10 amperes dc, either polarity
	1000 volts dc, either polarity
	1000 volts ac
All ohms ranges	1000 volts ac
	1000 volts dc, either polarity
	220 volts ac, 30 amperes
	300 volts dc, 30 amperes, either polarity

NOTE: Limits apply within the frequency range of 20 Hz to 30 KHz.

d. Replace weak or defective cells with new AA size alkaline cells, observing proper polarity as marked on battery compartment.

e. Replace battery cover and gasket and tighten the eight mounting screws.

5-6. MECHANICAL ZERO. The mechanical zero adjustment screw is located at the bottom center of the meter panel just above the mounting screw. Adjust the meter for mechanical zero by turning the screw with a small standard screwdriver.

5-7. TEST LEAD SET. In the event that a test lead or pin breaks or a banana plug becomes defective, a replacement plug or pin may be attached as follows.

a. Test Pin.

1. Grip the two plastic cap screws firmly and pull the test lead holder straight back and away from the serrated pin holder.

2. Unscrew the two cap screws and remove the pin and pin holder from the test lead.

3. Strip approximately 1/2 inch of insulation from the lead end.

4. Insert the test lead wire into the pin holder, through the hole, and crimp it around the hole.

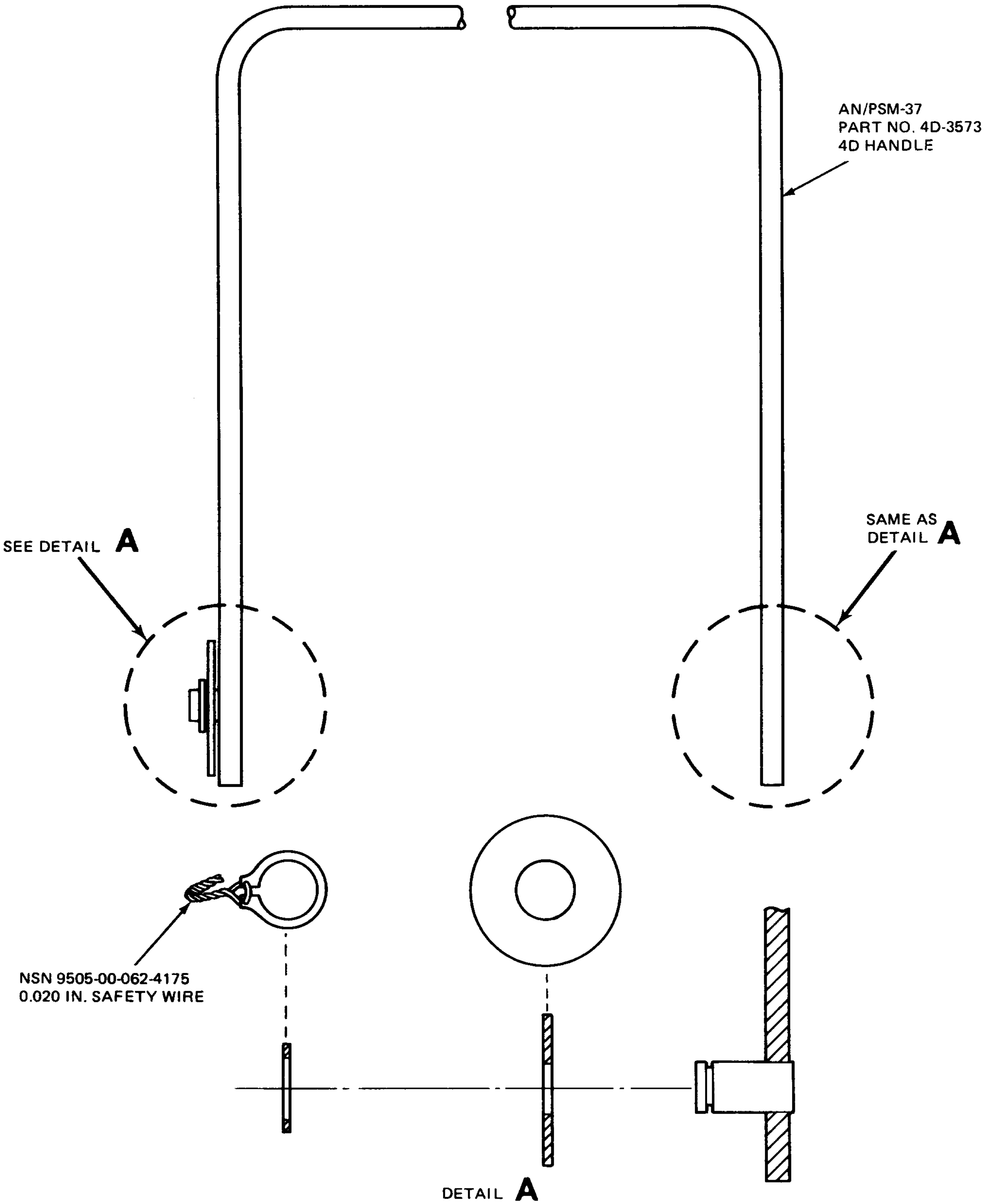
5. Insert the pin into the pin holder and screw the two cap screws onto the pin holder.

6. Slide the test lead holder firmly back onto the serrated pin holder.

b. Banana plug.

1. Unscrew the threaded plastic holder from the banana plug.

2. Pull the threaded holder away from the metal portion of banana plug and remove test lead from the eyelet.



NOTE

INSERT WIRE ON RETAINER RING PRIOR TO SNAPPING IN PLACE. AFTER ATTAINING PROPER TENSION ON WIRE, BEND SHARP END UNDER.

Figure 5-1. AN/PSM-37 Multimeter Handle

3. Strip approximately 1/2 inch of insulation from the test lead.

4. Insert the stripped portion of test lead wire into the eyelet and crimp it around the hole.

5. Slide the threaded holder back over the eyelet and wire.

6. Screw the threaded holder back onto the metal portion of banana plug and tighten.

5-8. EXTERIOR CLEANING. The Multimeter is completely watertight and airtight. It is only necessary to clean the exterior, using a cloth moistened with mild soap and water, and rinse.

5-9. INSPECTION. Under conditions of normal use, only periodic routine visual inspection is necessary to determine mechanical condition, evidence of corrosion, etc.

5-10. TROUBLE ANALYSIS.

5-11. GENERAL. The particular circuit or component causing the trouble may be isolated by following the procedures in the following paragraphs and be referring to the wiring diagram (figure 6-1) and the schematic diagram (figure 6-2). Repair or replacement of components located on the printed wiring boards (PWB's) is discouraged. When a component on a particular PWB is determined to be defective, the PWB will be replaced. Problems with the Multimeter will normally occur during normal use. A note should be made as to the particular function which does not operate properly. This should give an indication as to which section of the meter is not functioning properly. Example: Meter operates on all functions except 10 MEG OHM function. (Refer to figure 6-2 in Section VI.) A resistor (or resistors) on PWB A3A5 or wire W17, W15, W5, W64, W29 or W92 through W98 could be defective.

Note

The AN/PSM-37 is unshielded and pickup from adjacent high voltage lines onto the test leads or into the Multimeter may degrade performance under some circumstances. It is suggested that a record of performance of the AN/PSM-37 in a given situation be made when it is known that the equipment being checked by the AN/PSM-37 is operating correctly.

5-12. PROCEDURE. Measure the input impedance as prescribed in table 5-3 using an operational AN/PSM-37 connected to the test jacks of the unit under test/repair. Place the RANGE, FUNCTION, and POLARITY switches in the positions required for each step in figure 5-3 on the unit under test and the operational AN/PSM-37. Complete all steps and determine that range of any given function which reads off value by the largest percentage from the listed reading. If all impedances are correct or within the allowed tolerances, perform the operational checks listed in paragraph 5-13.

5-13. OPERATIONAL CHECKS.

a. Set meter to zero with POLARITY switch to OFF.

b. Set meter to 10 MEGΩ, 0.5 Volt, + POLARITY. Short test leads together. Meter should read within one division of zero.

1. If meter reads correctly, proceed to step c.

2. If meter reads in excess of one division from zero, open Multimeter case and adjust A1R19 (offset adjust) on the A1 PWB for zero.

(a) If meter now operates correctly, proceed to step c.

(b) If meter continues to read incorrectly, check resistors R7 and R8 located on A3A5 PWB, and resistor R20 on the A1 PWB.

(c) If A3A5R7 or A3A5R8 are defective, replace PWB A3A5. If A1R20 is defective replace the A1 PWB.

(d) If the resistors are good, the meter amplifier U3 is defective and PWB A1 should be replaced.

c. Set the FUNCTION switch to STD OHMS, RANGE switch to any position (except .5), and POLARITY switch to DC +.

Table 5-3. Multimeter Input Impedance Checks

Unit under repair				Operational AN/PSM-37				Probable cause of defect if reading not obtained
Step	Function	Range	Polarity	Function	Range	Polarity	Reading	
1	SPECIAL	ANY	+	LP OHMS	R x 100	+	1000 (10)	A1R30, A1R18, or A1R20 OFF value or U3 defective
2	MA	.5	+	LP OHMS	R x 10	+	100 (10)	A1R18 or A1R21 OFF value
3	MA	2.5	+	LP OHMS	R x 1	+	20	A3A1R1, A1R18, or A1R21 OFF value
4	MA	10	+	LP OHMS	R x 1	+	5	A3A1R2, A1R18, or A1R21 OFF value
5	MA	50	+	LP OHMS	R x 1	+	1	A3A1R3, A1R18, or A1R21 OFF value
6	MA	250	+	LP OHMS	R x 1	+	.5	Encapsulated Module A4 defective
7	MA	500	+	LP OHMS	R x 1	+	.25	Encapsulated Module A4 defective
8	MA	1000	+	LP OHMS	R x 1	+	.125	Encapsulated Module A4 defective
9	20KΩ/V	.5	+	STD OHMS	R x 1K	+	10KΩ (10)	A1R33, A1R18 or A1R20 OFF value or U3 defective
10	20KΩ/V	2.5	+	STD OHMS	R x 1K	+	50KΩ (50)	A3A4R1, A1R18 or A1R20 OFF value or U3 defective
11	20KΩ/V	10	+	STD OHMS	R x 10K	+	200K (20)	A3A4R2, A1R18 or A1R20 OFF value or U3 defective
12	20KΩ/V	50	+	STD OHMS	R x 100K	+	1 MEG (10)	A3A4R3, A1R18 or A1R20 OFF value or U3 defective
13	20KΩ/V	250	+	STD OHMS	R x 100K	+	5 MEG (50)	A3A4R4, A1R18 or A1R20 OFF value or U3 defective

Table 5-3. Multimeter Input Impedance Checks – Continued

Unit under repair				Operational AN/PSM-37				Probable cause of defect if reading not obtained
Step	Function	Range	Polarity	Function	Range	Polarity	Reading	
14	20KΩ/V	500	+	STD OHMS	R x 100K	+	10 MEG (100)	A3A4R5, A1R18 or A1R20 OFF value or U3 defective
15	20KΩ/V	1000	+	STD OHMS	R x 100K	+	20 MEG (200)	A3A4R6, A1R18 or A1R20 OFF value or U3 defective
16	1KΩ/V	.5	+	STD OHMS	R x 100	+	500 (5)	A1R35, A1R18 or A1R20 OFF value or U3 defective
17	1KΩ/V	2.5	+	STD OHMS	R x 100	+	2500 (25)	A3A3R1, A1R18 or A1R20 OFF value or U3 defective
18	1KΩ/V	10	+	STD OHMS	R x 1K	+	10K (10)	A3A3R2, A1R18 or A1R20 OFF value or U3 defective
19	1KΩ/V	50	+	STD OHMS	R x 1K	+	50K (50)	A3A3R3, A1R18 or A1R20 OFF value or U3 defective
20	1KΩ/V	250	+	STD OHMS	R x 10K	+	250K (25)	A3A3R4, A1R18 or A1R20 OFF value or U3 defective
21	1KΩ/V	500	+	STD OHMS	10K	+	500K (50)	A3A3R5, A1R35, A1R18, A1R20 OFF value or U3 defective
22	1KΩ/V	1000	+	STD OHMS	R x 100K	+	1 MEG (10)	A3A3R6 or R7, A1R35, A1R18, A1R20 OFF value or U3 defective
23	10 MEG Ω	ANY	+	STD OHMS	R x 100K	+	10 MEG (100)	A3A3R1 through A3A3R14 OFF value
24	10 MEG Ω	ANY	AC	STD OHMS	R x 100K	+	INFINITE	CAPACITOR LOCATED ON S3C Shorted

* Numbers shown in parentheses are meter scale numbers for value shown.

d. Connect test leads to Multimeter and short them together.

e. Using the OHMS ZERO adjust, zero the meter.

1. If the meter adjusts to zero on the range selected, repeat the check for all ranges.

2. If the meter will adjust to zero on all ranges, the Meter Amplifier (U3), Operational Amplifier (U1), and the batteries are assumed to be good. Proceed to step f.

3. If the meter will not adjust to zero on the lower ranges but will adjust to zero on the higher ranges (RX1K and above), the batteries are weak and should be replaced.

4. If the meter will not zero on range position (RX100 through RX100K), check the resistors A3A1R4 through A3A1R7 on the A3A1 switch for the range affected. (Refer to schematic diagram, figure 6-2.) Replace defective resistor.

5. If the meter will not zero on range position RX1 or RX10, check resistor A1R37 and A1R25 located on the A1 PWB. If either of the resistors are defective, the A1 PWB should be replaced.

6. If the meter will not zero in any range position, check resistor A1R22 located on the meter amplifier PWB (A1). If this resistor is defective replace the A1 PWB.

f. Place the FUNCTION switch in LPΩ position and repeat steps b. through c, (5).

1. If meter does not read zero on any range, check resistor A1R39 on the A1 PWB. If this resistor is defective, replace the A1 PWB.

2. If resistor A1R39 is good and the meter still will not adjust to zero, A1U3, A1U1, or A1Q1 are defective.

Note

Upon determining any component on the OHM SOURCE/METER AMPLIFIER (A1 PWB) to be defective the A1 PWB should be replaced.

5-14. REPAIR.

5-15. GENERAL. Field repair primarily consists of replacing components such as resistors, capacitors, switches and PWB boards. PWB A1, A2, A3A5, M1 and the case (except for the handle) are not repairable and must be replaced. The accuracy of measurement depends completely upon the precision of the component parts; therefore it is necessary that each defective part be replaced by its exact equivalent, both in nominal value and in tolerance. Refer to the Illustrated Parts Breakdown for part numbers and nomenclatures.

5-16. REPAIR TECHNIQUES.

a. Do not use a soldering iron which does not have automatic temperature control when removing or replacing any PWB A1 or PWB A2. Temperature setting of soldering equipment should not exceed 750°F.

b. Use only 60/40 or 63/37 solder with resin or organic flux. Never use acid flux on electrical connections.

c. If a part is known to be defective it is recommended that the lead be cut at one end of the part to facilitate removal.

d. Ensure that all replacement parts have a stress-relief bend similar to that of the part replaced.

e. Mount parts with the markings showing where possible.

WARNING

The use of metal screws for mounting switch knobs will create a hazard if the ground or low side of the potential being measured is removed. This hazard could result in serious injury or death if the potential being measured is great enough.

f. Use only plastic screws when mounting switch knobs, since the switch shafts are electrically connected to the negative Multimeter terminal.

5-17. DISASSEMBLY. The following procedure is to be used to gain access to various parts of the Multimeter.

a. The meter may be removed without removing the case from the chassis as follows:

1. Remove the six round head machine screws from the meter panel.

2. Lift the meter and gasket off the front panel.

3. Unsolder the two leads from the meter.

b. Case.

1. Remove the 14 round head machine screws from the front panel of the meter.

2. Place the meter face down and lift the bottom case and gasket from the chassis.

c. Circuit boards.

1. Remove the four screws with lockwashers, from the circuit board mounting brackets.

2. Gently lift the circuit board straight up and off the brackets.

d. The front panel controls (FUNCTION, RANGE and POLARITY switches and the OHMS ADJUST potentiometer) may be removed as follows:

1. Remove knob retaining screw.

2. Pull knob off shaft.

3. Remove shaft nut.

4. Gently push switch out from panel, being careful not to disturb attached or adjacent wiring.

5-18. INTERIOR CLEANING. If it becomes necessary to clean the interior, a hot, deionized or distilled water rinse followed by a thorough drying is recommended. Drying temperatures shall not exceed 160°F.

CAUTION

Solvents, particularly keytones, shall not be used for cleaning because of possible damage to the dielectric materials in the multimeter.

CAUTION

Always remove batteries before cleaning to avoid shorting components.

5-19. INTERIOR INSPECTION. The following inspection will be performed to evaluate the physical condition of the multimeter.

a. Inspect front panel and case interior to ensure that labeling and the schematic diagram are legible.

b. Inspect for cleanliness to ensure that no dust or dirt is present that could deteriorate components, connections, and grounding.

c. Inspect all wiring for charring, strength, and uniform bonding of soldered connections.

d. Inspect all components for physical tightness and evidence of charring or burning.

e. Inspect the circuit boards for charring, burning, cracks, or warping. Inspect all soldered connections for proper bonding.

f. Inspect rubber gaskets for deterioration and proper fit.

5-20. ASSEMBLY. Assembly is in the reverse order of disassembly.

5-21. CALIBRATION.

5-22. FREQUENCY. This equipment shall be scheduled for calibration as required.

5-23. GENERAL. Verification of calibration consists of full-scale accuracy checks on each range of each function of current or voltage, and mid-scale accuracy checks on each range of the ohms functions. Ac accuracy at 60 Hz is ±4 percent of full-scale deflection on all ranges and functions and with all accessories.

5-24. TEST EQUIPMENT REQUIRED. The test equipment listed in table 5-4, or equivalents, are required to calibrate the AN/PSM-37. Less sophisticated equipments may be used, provided a basic ac or dc accuracy of 0.5 percent or better is obtained. The equipment listed provides the entire spectrum of calibration requirements. Response can be checked from 50 Hz to 30 kHz. Voltage at 1 kHz and above is limited to 600 V rms.

5-25. PROCEDURES.

5-26. DC MICROAMPERES - SPECIAL CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-37 to appropriate jacks of test instrument.

Table 5-4. Test Equipment Required for Calibration

Part number	Nomenclature	Application
FLUKE 5101A or Equivalent	METER CALIBRATOR	Check ac and dc voltage Check ac and dc current Resistance checks
FLUKE 5205 or Equivalent	METER CALIBRATOR	High ac voltage calibration

b. Set FUNCTION switch of Multimeter to SPECIAL, POLARITY switch to DC +, and RANGE switch to any position.

c. Apply 100 microamperes from test instrument and compare with Multimeter reading.

d. If Multimeter does not indicate within ±3 percent of test instrument reading, refer to table 5-4 for probable cause of defect.

5-27. DC MILLIVOLTS - SPECIAL CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-37 to appropriate jacks of test instrument.

b. Set FUNCTION switch of Multimeter to SPECIAL, POLARITY switch to DC +, and RANGE switch to any position.

c. Apply 100 millivolts from test instrument and compare with Multimeter reading.

d. If Multimeter does not indicate within ±3 percent of test instrument reading, refer to table 5-3 for probable cause of defect.

5-28. DC MILLIAMPERES CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-37 to appropriate jacks of test instrument.

b. Set FUNCTION switch of Multimeter to AMPS-MA, POLARITY switch to DC +, and RANGE switch to .5.

c. Apply full-scale value of current from test instrument and compare with Multimeter reading.

d. Repeat step c for the 2.5, 10, 50, 250, 500 and 1000 ranges.

e. If Multimeter indications are not within ±3 percent of test instrument readings, refer to table 5-3 for probable cause of defect.

5-29. DC VOLTS - 20KΩ/V CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-37 to appropriate jacks of test instrument.

b. Set FUNCTION switch of Multimeter to VOLTS - 20KΩ/V, POLARITY switch to DC +, and RANGE switch to .5.

c. Apply full-scale value of voltage from test instrument and compare with Multimeter reading.

d. Repeat step c for the 2.5, 10, 50, 250, 500 and 1000 ranges.

e. If Multimeter indications are not within ±3 percent of test instrument readings, refer to table 5-4 for probable cause of defect.

5-30. DC VOLTS - 1KΩ/V CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-37 to appropriate jacks of test instrument.

b. Set FUNCTION switch of Multimeter to VOLTS - 1KΩ/V, POLARITY switch to DC +, and RANGE switch to .5.

c. Apply full-scale value of voltage from test instrument and compare with Multimeter reading.

d. Repeat step c for the 2.5, 10, 50, 250, 500 and 1000 ranges.

e. If Multimeter indications are not within ±3 percent of test instrument readings, refer to table 5-3 for probable cause of defect.

5-31. DC VOLTS - 10 MEGΩ CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter instrument and compare with Multimeter readings.

b. Set FUNCTION switch of Multimeter to VOLTS 10 MEGΩ, POLARITY switch to DC +, and the RANGE switch to .5.

c. Apply full-scale value of voltage from the test instrument and compare with Multimeter readings.

d. Repeat step c for the 2.5, 10, 50, 250, 500 and 1000 ranges.

e. If Multimeter indications are not within ±3 percent of test instrument readings, refer to table 5-3 for probable cause of defect.

5-32. AC VOLTS - 10 MEGΩ CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-37 to appropriate jacks of test instrument.

b. Set FUNCTION switch of Multimeter to VOLTS - 10 MEGΩ, POLARITY switch to AC, and RANGE switch to .5.

c. Apply full-scale value of voltage from test instrument and compare with Multimeter reading.

d. Repeat step c for the 2.5, 10, 50, 250, 500 and 1000 ranges.

e. If Multimeter indications are not within ±4 percent of test instrument readings, refer to table 5-4 for probable cause of defect.

5-33. AC VOLTS - 1K Ω/V CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-37 to appropriate jacks of test instrument.

b. Set FUNCTION switch of Multimeter to VOLTS - 1K Ω/V, POLARITY switch to AC, and RANGE switch to .5.

c. Apply full-scale value of voltage from test instrument and compare with Multimeter reading.

d. Repeat step c for the 2.5, 10, 50, 250, 500 and 1000 ranges.

e. If Multimeter indications are not within ±4 percent of test instrument readings, refer to table 5-3 for probable cause of defect.

5-34. AC VOLTS - 20K Ω/V CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-37 to appropriate jacks of test instrument.

b. Set FUNCTION switch of Multimeter to VOLTS - 20K Ω/V, POLARITY switch to AC, and RANGE switch to .5.

c. Apply full-scale value of voltage from test instrument and compare with Multimeter reading.

d. Repeat step c for the 2.5, 10, 50, 250, 500 and 1000 ranges.

e. If Multimeter indications are not within ±4 percent of test instrument readings, refer to table 5-3 for probable cause of defect.

5-35. AC MILLIAMPERES CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-37 to appropriate jacks of test instrument.

b. Set FUNCTION switch of Multimeter to AMPS-MA, POLARITY switch to AC, and RANGE switch to .5.

c. Apply full-scale value of current from test instrument and compare with Multimeter reading.

d. Repeat step c for the 2.5, 10, 50, 250, 500 and 1000 ranges.

e. If Multimeter indications are not within ±4 percent of test instrument readings, refer to table 5-3 for probable cause of defect.

5-36. AC MILLIVOLTS - SPECIAL CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-37 to appropriate jacks of test instrument.

b. Set FUNCTION switch of Multimeter SPECIAL, POLARITY switch to AC, and RANGE switch to any position.

c. Apply 100 millivolts from test instrument and compare with Multimeter reading.

d. If Multimeter does not indicate within ±4 percent of test instrument readings, refer to table 5-3 for probable cause of defect.

5-37. AC MICROAMPERES - SPECIAL CALIBRATION PROCEDURE.

a. Connect test leads from test jacks of Multimeter AN/PSM-37 to appropriate jacks of test instrument.

b. Set FUNCTION switch of Multimeter to SPECIAL, POLARITY switch to AC, and RANGE switch to any position.

c. Apply 100 microamperes from test instrument and compare with Multimeter reading.

d. If Multimeter does not indicate within ±4 percent of test instrument readings, refer to table 5-3 for probable cause of defect.

5-38. OHMS - LP CALIBRATION PROCEDURE.

a. Plug test leads into Multimeter AN/PSM-37 test jacks and short the test lead tips together.

b. Set FUNCTION switch of Multimeter to OHMS - LP, POLARITY switch to DC +, and RANGE switch to Rx1.

c. Adjust OHMS ADJUST knob until Multimeter reads zero.

d. Repeat step c for the Rx10, Rx100, Rx1K, Rx10K, and Rx100K ranges.

Note

If pointer cannot be adjusted on all ranges, the battery voltage is low. Refer to paragraph 5-5 for battery testing and replacement instructions.

e. Connect test leads from Multimeter to appropriate jacks of test instrument.

f. Set mid-scale reading on Multimeter with test instrument.

g. Repeat step f for the Rx10, Rx100, Rx1K, Rx10K, and Rx100K ranges.

h. If Multimeter readings are not within ±3 percent of test instrument reading, refer to table 5-3 for probable cause of defect(s).

5-39. OHMS - STD CALIBRATION PROCEDURE. Repeat the procedure outlined in paragraph 5-38.

SECTION VI

DIAGRAMS

The wiring diagram in figure 6-1 and schematic diagram figure 6-2 may be used in conjunction with the individual circuits depicted in Section IV and table 5-3 in Section V for troubleshooting and/or maintenance.

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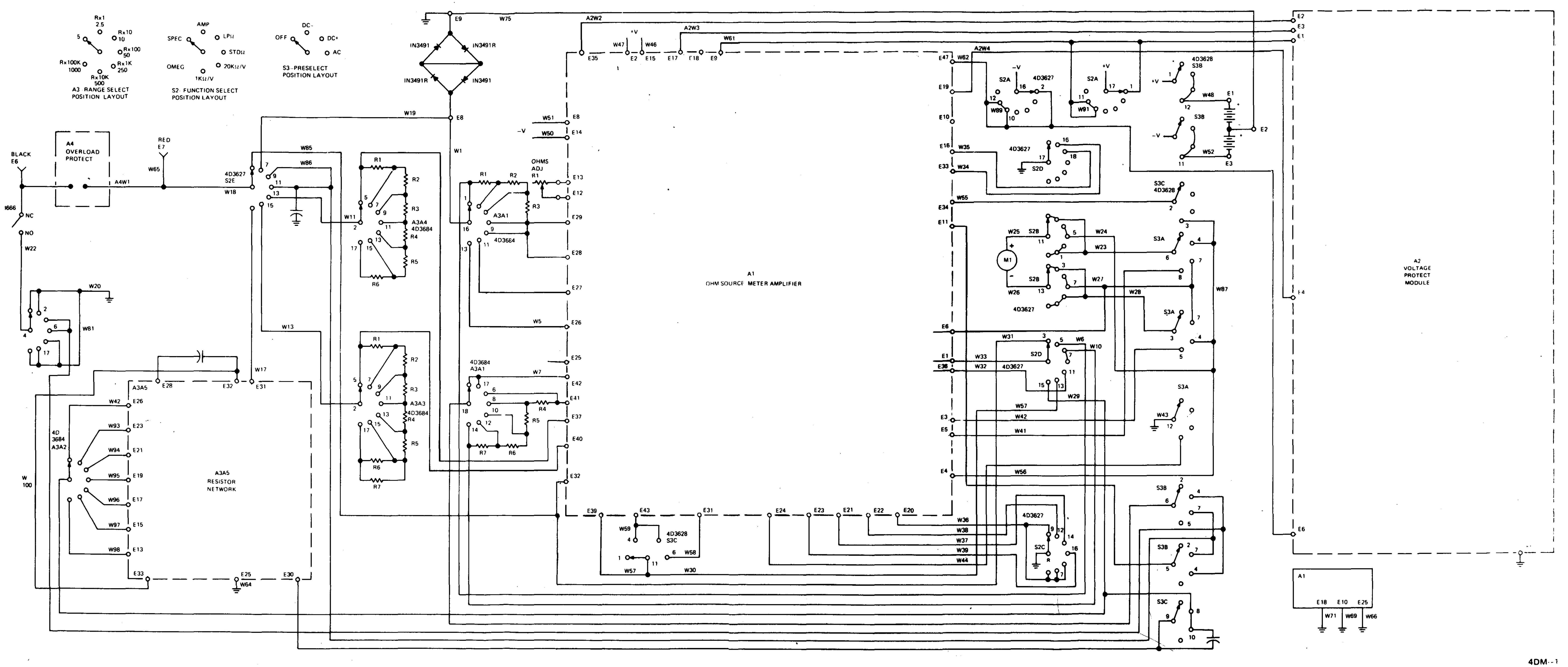

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Figure 6-1. Wiring diagram, AN/PSM-37

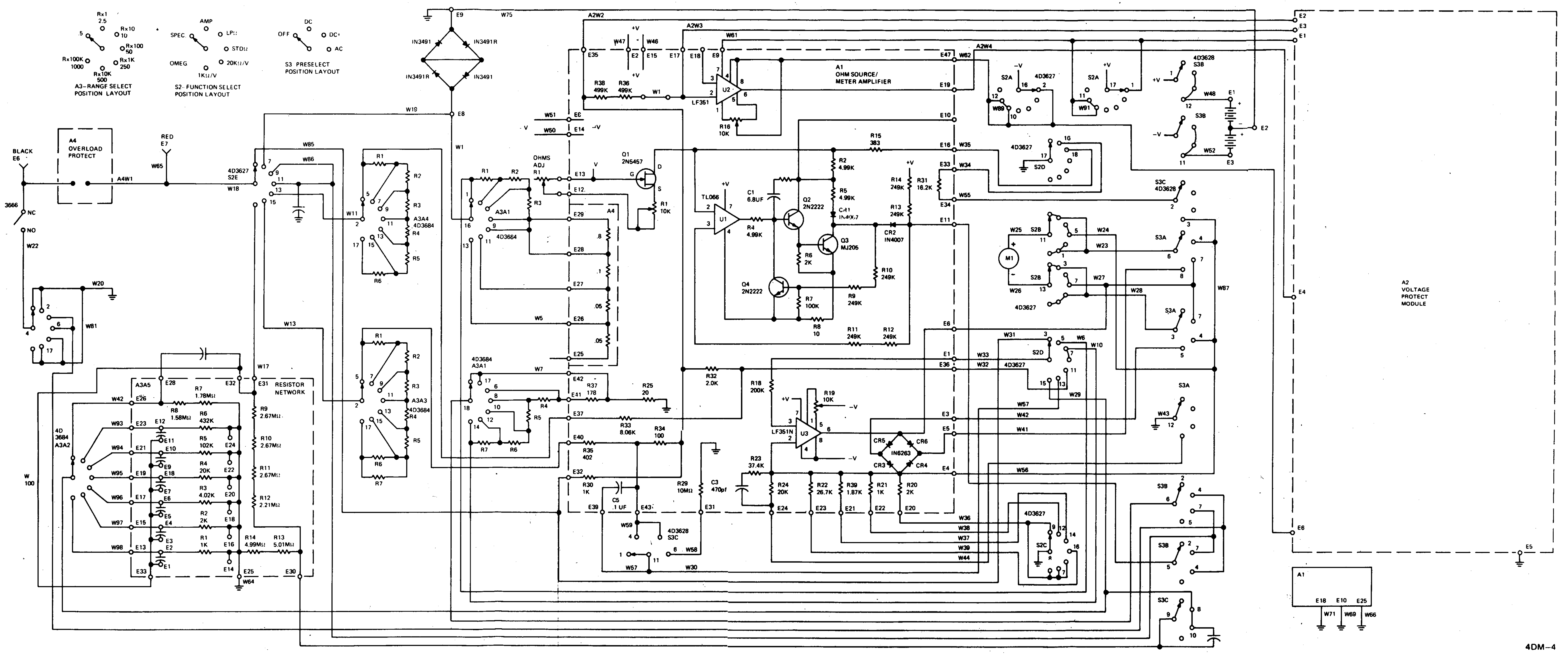

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Figure 6-2. Schematic diagram, AN/PSM-37