CHAPTER 19

INSTALLATION CHECKOUT

This chapter presents general information and practices for the inspection, testing, and checkout of electronic systems and equipment to determine the adequacy and acceptability of the installation methods and practices employed and to assure the efficient and reliable operation of the equipments or systems. More specific and detailed instruction for the checkout of the individual equipments will be found in each applicable technical or instructional manual accompanying the equipment.

19.1 EQUIPMENT IDENTIFICATION

The inspection and testing of equipment during the installation phase, as well as the recording of the performance data, must be done in an orderly manner. While a logical sequence of steps is required to verify the adequacy and acceptability of the installation and the operational reliability of the equipments and system, it does not imply the rigid necessity of making only a step-by-step progression. Working within the overall pattern of the checkout procedures, maintenance personnel should analyze the results obtained to eliminate any unnecessary steps. The checkout procedures must provide information to establish that the installation and operation is up to required standards in accordance with applicable technical manuals or that conditions are either undesirable or unsatisfactory and require corrective action to perform up to government and manufacturers' standards.

In order to maintain proper control of equipment during installation checkout a system is necessary of tagging each unit for identification and to note on the tag the type of tests and results obtained and appropriate follow-up action required. An inspection tag, similar to that shown in figure 19-1, contains all essential information for proper control.

19.2 CABLE AND CONDUCTOR CHECKOUT

During installation checkout, the cables and conductors must be inspected and tested to verify that the installation is in accordance with prescribed standards and practices and that the electrical characteristics and performance falls within the tolerances established by either the government or the manufacturers. A series of tests are made that range from simple checks with an ohmmeter to complicated tests requiring the use of expensive and highly sensitive test equipment. The tests will include checks for continuity of each wire to determine whether any open, short, crossed, or grounded wires exist. The insulation resistance of selected cables and conductors will be measured to verify the voltage rating of the insulation.

19.2.1 Continuity Tests

A continuity test of cables and connections is made to ensure that all wires are properly terminated and that wires maintain continuity throughout the cable. These tests are relatively easy to make and require only an ohmmeter or simple test equipment such as the buzzer lamp or sound powered phone method. The latter does not give accurate qualitative measurements such as can be obtained with a meter. However, their simplicity is of considerable advantage when open and closed circuit tests are made. The continuity tests described in a. and b. below are not conclusive regarding shorts, crosses, or grounded wires unless particular care is exercised in the test and the ohmic resistances variations carefully selected.

a. Ohmmeter Method. The ohmmeter method of performing a continuity test is illustrated in figure 19-2. Before making the test, care must be taken to avoid connecting the ohmmeter across circuits in which a voltage exists, since such a connection can result in damage to the meter. Disconnect the source of input voltage by removing the power plug.

The procedure for performing the continuity test is as follows:

o STEP 1. At one of the cable, connect all conductors together and to the ground. If the cable has a metal sheath, it may be used as the ground.

o STEP 2. Set the selector switch on the ohmmeter to the appropriate scale, connect the leads together, and adjust the deflection of the meter needle to zero ohms.

o STEP 3. At the meter test end of the cable, connect probe A to ground.

o STEP 4. Connect probe B to one of the conductors and note the resistance reading on the meter. Compare the reading obtained with the acceptable standard. If reading is not within acceptable limits, additional tests are necessary to determine the cause.

o STEP 5. Repeat step 4 for each of the remaining conductors in the cable.

o STEP 6. Individual pari checkout.

b. Buzzer Lamp Method. The buzzer lamp method is a simple, practical, and economical means of performing a continuity test when an ohmmeter is not available. The tester consists of a low voltage incandescent lamp and a buzzer connected in series with a source of voltage. Figure 19-3 illustrates the method used to check for continuity. The procedure for using this method is similar to that for the ohmmeter. When the wire is connected to the battery and the circuit is continuous the lamp will light and the buzzer will signal. If the circuit is open, no current flows and the lamp and buzzer will not operate. In checkouts where the buzzing may annoy others, the buzzer may be disconnected from the circuit.

c. Sound Powered Phone Method. The phone or headset method is the preferred method for use during the installation and checkout of telephone lines. It permits the checkout of extremely long and complex lines, which requires the services of two installers, and also provides a means of transmitting information while the checkout is in progress. Figure 19-4 illustrates this method employed which is also similar to that of the ohmmeter.

A tone generator sometimes is connected to the line being tested and the phone or headset connection is moved along the line to locate open or broken circuits. As long as the tone is heard, the line is assumed to be continuous.

d. Cable-Scan Wiring System. The cable-scan wiring system is a wire and circuit identification tool and analyzer. Different models permit identification of 100, 200, or 400 circuits by producing a three digit direct readout display of the number assigned to that particular circuit. The wires to be identified are connected to the analyzer with adapter cables to input connectors of 50 pins each. The cable-scan enables the operator to identify any wire at random (or selectively) by touching the stripped or unstripped end. The operator wears a special wrist strap which provides a low level signal from the resistance-grounded output jack through a snapon type lead wire. By touching the wire, the operator closes the circuit, causing an identifying number to appear on the digital readout of the unit (see figure 19-5).

A mode switch on top of the cable-scan provides two functions:

o Random Mode. This allows the operator to identify any wire by touch and permits the routing, terminating or inspection of the wires. This mode will indicate any direct or high resistance shorts.

o Scan-Search Mode (SELECT). This mode permits the operator to find a specific wire and to identify shorts or multiple circuits, missing wires, or open circuits. The operator can find any specific wire by dialing in that wire number and searching the loose wires with his fingers. When he has isolated the desired wire, the numbers of that wire will appear on the display.

19.2.2 Insulation Resistance Tests

Defective parts can usually be quickly located by measurement of the DC resistance between various points in the circuit and a reference point or points (usually ground), since when a fault develops it will generally produce a change in the resistance values.

Cable and conductor installations present a wide variation of conditions from the standpoint of measuring insulation resistance. These variations result from the different kinds of insulating materials, voltage ratings, and lengths of the lines involved. Table 19-1 lists the insulation resistance values for various types of dielectrics and lengths of coaxial cable.

Insulation resistance is measured with a test set frequently referred to as a "Megger (T)" (trademark of James Biddell Co.), although a "megger" is a specific, unique type of insulation tester. The megger consists of a hand operated DC generator and a unique high-range ohmmeter circuit which is independent fo generator voltage. The resistance range usually extends from 0 to 1000 megohms or more. The generator in different megger models may deliver a potential of 500, 1000, or 2000 volts at the test terminals, but in military applications a 500 volt DC generator is generally used.

Before testing coaxial cable for insulation resistance, it must be determined if the cable will withstand the voltage without a breakdown of the insulation.

a. Preparation for Test. The testing of high power lines and test leads should be performed only by qualified and experienced power men and not be electronic technicians. Before connecting the tester to the equipment or cables for resistance measurements, make sure that all power has been disconnected and that all capacitors have been discharged. The tester should be kept in a level and upright position and placed away from all external magnetic fields so that the reading is not affected. It is advisable for cables to be completely disconnected from the equipment prior to testing.

b. Connecting Test Equipment. Figures 19-6 through 19-9 illustrate the methods of connecting an insulation tester to various electrical equipments. These illustrations are typical and serve as a guide for testing insulation resistance; however, they do not show the method of connection when a guard circuit is used for measurements over 100 megohms. This is described in paragraph 19.2.2.

Figure 19-6 shows the connections at a distribution panel when individual circuits are tested to ground. Figure 19-7 illustrates the connections at the main power board where the entire system may be checked if all switches in the distribution panel are closed.

When testing a multiconductor power cable, the best practice is to disconnect both ends of the cable, if possible. This practice will minimize errors caused by leakage across or through switchboards. Figure 19-8 shows the method for testing a cable of this type. Figure 19-9 illustrates connections to a single-conductor shielded or armored cables.

c. Measuring Insulation Resistance. The following procedure is for the hand cranked Megger (T). Except for the methods of applying voltage, it is similar to the procedures used for other types of testers. The DC generator is operated by a hand crank through a gear train and clutch assembly. The clutch mechanism slips when a certain speed of hand crank rotation is reached, keeping the generator at a relatively constant operating speed. Therefore, the output voltage will be fairly constant as long as the crank is rotated above the speed at which the clutch slips.

- STEP 1. Set the selector switch to megohms divided by 1.

o STEP 2. Before connecting the test leads to the test terminals, rotate the hand crank at normal speed, the pointer on the meter should read infinity. Short circuit the test terminals and rotate the hand crank; the pointer should immediately move to zero (note that when the generator is not being cranked, the meter may rest at any scale reading or float due to the absence of a spring-return).

o STEP 3. Connect test leads to the line and ground terminals. Rotate hand crank and test for leakage. The meter should read infinity. If less than infinity, it indicates there is a leak between the leads which must be corrected before continuing with the test. When the test leads are short circuited, the meter should read zero when the generator is being cranked.

o STEP 4. Connect test leads to the device whose insulation resistance is to be checked.

o STEP 5. For testing to ground, connect line terminal test lead to a conductor of the unit and ground test lead to the frame, sheath of cable, or other good ground. For testing between two conductors, connect test leads to the two connectors.

o STEP 6. Rotate hand crank until clutch slips and the meter reading becomes steady. Compare the reading with the proper value of insulation resistance. It is important that the insulation resistance be measured at the same temperature every time a test is made because the resistance of insulation drops sharply at high temperatures.

Since multiconductor cables are used for purposes other than power, a complete check shall include tests between conductors, from conductors to inner shield (if applicable) and between inner conductors and armor (if applicable). Tests for a five conductor cable from conductor to conductor shall be 1 to 2, 3, 4, and 5; 2 to 3, 4, and 5; 3 to 4 and 5; and 4 to 5. A similar sequence shall be followed for cables with varying numbers of conductors.

d. Using Guard Circuits. A guard circuit is used for measurements of over 100 megohms. The guard circuit shown in light lines of the schematic diagram of a Megger (T) in figure 19-10, consists of a metal ring which surrounds the line terminal, metal plates on which resistors R_1 and R_2 are mounted, and a metal shield cable which connects the ring and plates to the guard terminal. This circuit prevents leakage currents along the surface between the line terminal and ground which can affect the meter readings. These surface leakage currents can flow between the guard circuit and the ground terminal without going through the meter movement.

19.2.3 Checks for Good Installation Practices

At the completion of the installation of an electronic system and prior to the operational test and acceptance, a thorough and detailed inspection and check must be made to ensure that the highest standards of installation practices have been employed throughout the system. The inspection and test must reveal acceptable conditions or reveal practices requiring correction of unsatisfactory work or which may result in marginal operational performance or potential failures of equipment.

To aid in the inspection and tests, a checklist of actions is prepared to note all areas to be inspected and to record the results and/or corrective actions required. Table 19-2 is an installation checklist which would generally cover the common elements of inspection in a standard installation. To this list must be added those specific areas and items peculiar to each installation which require inspection and acceptance. The result is a complete checklist tailored to the requirements of that particular installation.

The following installation practices are discussed at greater length in the referenced chapters of the manual.

a. Crossovers. Cabling on all panels shall be neatly dressed and shall not contain crossovers where conductors branch out from a run, and connect to terminals.

b. Wiring Lengths. Wires shall be cut long enough so that repairs can normally be made without splicing. Wiring for slide-mounted units which use cable retractors must be long enough to allow the units to be pulled out without binding. See chapter 15 for a discussion of slide-mounted units.

c. Bend Radii of Coaxial Cables. Bends for coaxial cables shall not exceed the minimum allowable bend recommended by the manufacturer.

d. Cable Segregation. Active, passive, and susceptible cables shall be routed so that interference is at a minimum.

e. Spare Wires. Spare wires in a cable run shall be stubbed back and the ends protected so as to prevent damage to cables or equipment. Spares reserved for specific future use shall be so identified.

f. Cable and Conductor Marking. Cables and conductors will be marked in accordance with the instruction contained in chapter 8. The tags or labels will be positioned so as to be easily read.

g. Connectors, Lugs, and Terminals. Connectors shall be installed in accordance with the instructions listed in chapter 9. Connectors shall be secured firmly into place, and safety-wired, if required. Coaxial connectors shall have a pull test performed. The cable shall be held in one hand and the connector with the other. A strong pull shall not cause the connector to be separated from the cable. Lugs and terminals shall be inspected for proper soldering and crimping as described in chapter 8. Lugs which connect to terminals shall be given a pull-test after installation.

19.3 RF TRANSMISSION LINE CHECKOUT

At Naval Communication Stations, transmission lines utilizing air dielectric are normally maintained under a constant pressure. The pressurization of transmission lines is based on the principle that a length of cable or waveguide placed under air pressure will maintain a constant pressure throughout its length. Any sudden or steady deviation from the normal amount of air required to maintain the pressure, or any sudden drop in measured pressure in one particular area, will indicate a rupture in the sheath which might normally go undetected.

The principal advantages of pressurized transmission lines are as follows:

- Internal air pressure prevents moisture or damp air from penetrating the cable or waveguide.

- Dry air in cables under pressure keeps the insulation dry, thereby reducing current leakage and undesirable noise conditions.

- Increased reliability of transmission lines and reduction of service complaints.

- Sheath breaks are detected prior to moisture entry by means of alarms, excessive air consumption or flow rates, and routine pressure readings.

- Repair of sheath breaks can be scheduled during normal working hours on routine maintenance rather than on an emergency basis.

- Sheath breaks detected prior to moisture entry can often be repaired without the necessity of opening the cable sheath.

- Leak locating on pressurized cables is facilitated by means of pressure gradients and escaping air pressure.

19.3.1 Pressurization Agent

Dry air is normally used for pressurization. Dry nitrogen may also be used, in which case oil pumped nitrogen should be specified. When pressurizing equipment is connected to the gas port on the cable connector, or when pipe fittings are reassembled, the threads must be covered with a pipe compound to ensure a leak proof connection.

19.3.2 Methods of Detecting Leaks

Pressurization of transmission lines can be accomplished by manual or automatic means depending on the amount of lines in use at the station or whether or not the site is attended. Gauge pressures of 5 to 10 PSI are adequate for most installations. Gauges are checked at regular intervals and if a leak is indicated by an excessive drop in pressure, the following methods may be used to locate the source of the leak.

a. Soap and Water Method. This method is generally effective on most leaks; however, if the leak is small and the source of trouble cannot be located, the freon or methane gas method described later is recommended.

o STEP 1. Apply undiluted liquid detergent or shampoo over all joints, connections, and the suspected area. A solution of soap and water may be used and applied liberally to the area.

o STEP 2. Check a section of the line for bubbles indicating a leak.

o STEP 3. Repeat the process for the remaining sections of the line or waveguide and at any other suspected areas.

b. Freon Gas Method

WARNING

Because of the danger of explosion, use this method only when it is certain that the pressurizing agent is an inert gas.

CAUTION

Freon gas will arc in the presence of rf energy and cause deterioration of the line or waveguide; therefore, it is mandatory that all power be disconnected before starting a check and that all freon is purged from the waveguide after completing the check.

o STEP 1. Admit a small amount of freon gas into the line or waveguide through the compressor intake.

o STEP 2. Allow one-half to one hour for gas to diffuse through the line or waveguide.

o STEP 3. Light a Halide detector torch.

o STEP 4. Use the end of the rubber air intake tube of the detector as a probe at all joints. If a leak exists, the torch flame will change color from yellow or blue to a bright green.

o STEP 5. Repair all leaks and then retest.

o STEP 6. Purge the line of all freon by blowing the line with the original pressuring agent. The Halide detector shall be used at the escape valve furthest from the intake to determine when all traces of freon gas have disappeared.

c. Methane Gas Method. This method of detecting leaks in a coaxial transmission line is particularly effective for the portions of the cable buried below ground. The suspected leak is located by charging the faulty cable with methane gas and using a special testing device to detect the gas fumes that escape to the earth's surface.

WARNING

Methane gas is flammable and must be handled with extreme caution. The procedure for locating transmission line leaks using this method is as follows:

- STEP 1. Charge the transmission line with methane gas to the normal operating pressure.

- STEP 2. Use a Davis Vapotester, Model D-1, to search for underground leaks by following the path of the buried cable. Escaping methane gas fumes can be detected by the Vapotester within a relatively small area.

- STEP 3. Expose the buried cable in the area where escaping gas fumes are detected to locate the leak.

- STEP 4. When the leak is pinpointed, discharge remaining gas from the transmission line and make the necessary repairs.

- STEP 5. Purge the transmission line with the normal pressurizing agent and test the line for residual traces of methane gas at accessible points until no fumes can be detected with the Vapotester.

19.3.3 Waveguide Checks

Waveguides may be pressurized with dry air, nitrogen, or some other inert gas and sealed. Inspections are made at regular intervals to determine that the correct pressure is maintained and to check for the moisture content of the air in the waveguide.

Dry air is obtained by using a manual or mechanical air pump which pushes the air through a desicant, usually silica gel crystals, and extracts the moisture. Silica gel crystals are normally colorless; however, to indicate the moisture condition, small packages of crystals may have a moisture-indicating dye added. The deeper the blue color, the dryer they are; whereas, a pink coloration indicates the crystals have absorbed moisture and indicate a high moisture content in the air in the waveguide which is a signal to purge the moist air and replace it with dry air.

The following actions are taken in the inspection of waveguides:

- STEP 1. Check for proper pressurization and moisture content of the air.

o STEP 2. Check physical condition of waveguide. Dents and scratches will change the electrical characteristics of the waveguide. If it is a flexible waveguide, check for rubber fatigue and deterioration.

o STEP 3. Inspect for evidence of corrosion or chemical action.

o STEP 4. Check to ensure that all sections are properly mated and that there is no evidence of arcing or loss of rf energy.

o STEP 5. When waveguide is disassembled, check the condition of the gaskets. Replace the gaskets if cracked or torn.

o STEP 6. After waveguide is reassembled, purge the air in the system and replace with dry air. Check waveguide for proper air pressure and rf leakage.

19.4 SYSTEM CHECKOUT

A complete checkout of an electronic system is made to ensure the operational reliability of the system and its compliance with the technical specifications and performance requirements established by the government. The checkout procedures are carried out in three categories of inspection: visual, mechanical, and electrical. The instructional and technical manuals prepared for the systems must be reviewed and understood prior to the start of the checkout.

19.4.1 Visual Inspection

The visual inspection of the system will reveal obvious deficiencies in the manufacture, assembly, and installation of the system which are discernible to the eye. Prior to the start of the visual inspection, turn off the main power switch, all auxiliary power switches, and remove all main line fuses and open all circuit breakers. The following checks shall be made during this phase of the checkout:

o Inspect all wiring and cabling for cracked or broken insulation and for exposed or frayed wires.

o Check for accumulation of dirt and evidence of corrosion.

o Check for proper wiring and cabling techniques.

o Check for broken or missing glass on meters and other indicating instruments.

o Check for loose mountings and connections.

o Check for evidence of leaks of oil or other liquids.

19.4.2 Mechanical Inspection

A complete mechanical inspection of the system is made to ensure proper and smooth performance of all mechanically operated components and for compliance with government and manufacturer's specifications. Table 19-3 can serve as a checklist of actions for the conduct of the mechanical inspection. In addition to those items listed on the checklist, the inspection should include the following:

- o A check of all interlock circuits to assure that each operates properly and performs its function without stress or delay.
- o Adjustment of the shorting switches so that they open according to manufacturer's specification.
- o A check of all other switches for proper operation.
- o A check of circuits not normally connected to ground for accidental grounding to frame.
- o Inspection of blowers and generators for shaft rotation and brushes for wear and proper setting.
- o Inspection of terminal boards and junction boxes for bent or missing terminals.

19.4.3 Electrical Inspection

Before starting the electrical inspection, check all power cables and interconnections for proper installation. Replace all fuses previously removed and check for proper size and rating. Turn the system power on.

Table 19-4 can be used as a guide for the electrical inspection checkout. As each item is checked and meets the requirements and specifications, a check mark is placed in the appropriate box. Defective items or malfunctions are noted with an X and corrective remarks noted in the action column.

In addition to going through the checklist of actions, the following detailed actions shall be taken:

- o Check all voltage, current, and power meters for proper indication as specified by the applicable equipment technical manual. Turn power off if there is any indication of a malfunction and investigate the causes.
- o Check blower system for proper operation and direction of air flow.
- o Check operation of time delay relays for proper energizing sequence. Replace or adjust those which do not work as specified.

- Check DC control circuits for proper operation by observing action of floor switches, interlocks, timing devices, lighting circuits and relays.

- Check all press-to-test indicator lamps to ensure proper voltage distribution and that designated lamp lights when power is applied.

- Check all interlocks for satisfactory operation and that power is actually turned off when an interlock is actuated.

- Inspect the liquid cooling system for leaks and proper pressure and rate flow.

- Check waveguide or transmission lines for proper pressurization.

- Turn on low-voltage power switches, one at a time. As each is turned on, observe equipment for possible defects indicated by overheating and smoke. When it is determined that a unit if fully operational, continue with next unit and energize its switch.

- Check all energized units for proper operation, as prescribed in applicable instruction manual.

9.5 ANTENNA TOWER INSPECTION

An antenna installation will be inspected in the following areas to determine the adequacy of the installation and compliance with specifications.

19.5.1 Structural Checks

- Check verticality of tower with transit at two positions 90 degrees apart. Top of tower should not be out of plumb by more than the width of one leg.

- Check bolted connections for tightness of bolts. There should be no missing bolts nor loose connections.

- Check guying for proper tensioning.

- Check antenna lowering gear for proper operation.

- Check tower sway during antenna rotation. Sway should not be excessive.

- Check antenna deenergizing switches, located at access hole to tower, for proper functioning.

- Check for presence of corrosion and deterioration of members.

19.5.2 Tower Support Checks

o Check stability and integrity of concrete base. There should be no cracking, settling, nor tilting of the concrete base. Verify these conditions with the use of a level.

o Check guy anchors for correct placement in ground. The backfill should be well compacted over and around the anchors.

o Check guying for proper tensioning.

o Check guy wire assemblies for proper securing of clamps, clips, and turnbuckles.

o Check guy wires to ensure there are no broken strands, corrosion, nor excessive sagging.

o Check tower ground rods to ensure there are no broken or missing wires.

19.5.3 Reflector Checks

o Visually check for broken members.

o Check parabola for twisting caused by insecure mounting.

o Check against station records for azimuth misalignment.

o Check for corrosion.

19.5.4 Coaxial Line Checks

o Check for leaks at connections; leaks are indicated by a drop in pressure. Use the soap-and-water method, described earlier in this chapter.

o Check for loosely mounted lines which rub or chafe against tower.

o Perform VSWR check.

19.5.5 Electrical Checks

o Check for loose cables and conduits.

o Check lighting system for proper grounding and wiring practices.

o Check photoelectric switch for improper operation; covering the glass front should activate the switch.

- Check flasher for proper number of flashes per minute.

- Check junction boxes for moisture, dirt, rust, and loose hardware, and for improperly placed gaskets, covers, and wiring.

- Check bonding and grounding installation.

19.5.6 Antenna Positioning Device Checks

- Check for proper physical clearances.

- Check for proper operation of mechanical and electrical stops.

- Check sliprings on rotating cable assemblies for electrical contact.

- Check through entire range of travel for binding.

Table 19-1. Coaxial Cable Insulation Resistance

DIELECTRIC	LENGTH (FEET)	MINIMUM RESISTANCE (MEGOHMS)
Plastic	100	40,000
	200	20,000
	500	8,000
	1000	4,000
Rubber	Up to 1000	500
Teflon	Up to 1000	10,000

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Table 19-2. Installation Checklist (Sheet 1 of 2)

ITEM	INSTALLATION CHECKS: SAFETY	MARKING	MOUNTING	PAINTING	BONDING	GROUNDING	MECHANICAL OPERATION	SPECIAL CHECKS	REASON FOR REJECTION AND ACTION RECOMMENDED
Antenna								Rotation, mechanical stops and elevation, misalignment	
Cabinets								Improper door closure; panels and associated hardware not installed or improperly installed	
Cable retracting devices								Uneven operation, poor cable dress or length	
Cables								Improper terminations, frayed insulation, lacing	
Cable trays and duct work									
Capacitors								Oil leakage	
Chokes								Oil leakage	
Coils								Rough rotation	
Connectors								Improper assembly, incorrect type	
Diodes								Front-to-back ratio	
Fuses and fuse boxes									
Generators								Excitation	
Indicators									
Joints, solder								Excessive or insufficient solder, defective connections	
Lamps									

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Table 19-2. Installation Checklist (Sheet 2 of 2)

ITEM	INSTALLATION CHECKS: SAFETY	MARKING	MOUNTING	PAINTING	BONDING	GROUNDING	MECHANICAL OPERATION	SPECIAL CHECKS	REASON FOR REJECTION AND ACTION RECOMMENDED
Liquid-cooling devices								Leakage	
Lugs								Improper or proper size of crimping tool	
Meters								Improper setting, cracked glass	
Mobile vans								Improper cable or cable terminations	
Modulators								Oil leakage	
Motors and Rotating Machinery								Oil leakage	
Power supplies								Improper power strapping	
Receivers									
Relays								Condition of contacts	
Resistors									
Switches								Poor lubrication	
Terminal boards									
Tower and masts								Improper guying and lighting	
Transformers								Oil leakage	
Transistors								Mounting and heat sinks	
Transmitters									
Tubes									
Ventilation								Blower-filter reversal	
Wiring (Internal unit, and subunit)								Improper lacing or dress of leads	

NOTES:

1. Leave blank blocks for functions that are not applicable.
2. Place a checkmark (✓) in blocks for items that meet requirements.
3. Place an X in blocks for items that do not meet requirements.
4. Underline reason for rejection if it is listed in Special Checks column; otherwise, list reason.
5. After a defect has been corrected, the previously entered or the underlined rejection reason shall be circled.
6. Insert additional headings in blank spaces provided.

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Table 19-3. Electrical Inspection Checklist

ITEM	Overheating	Arcing	Smoking	Unusual Odors	Improper Operation	Unusual Noise	Not Energized	Interference	ACTION RECOMMENDED
Antennas									
Cables									
Capacitors									
Chokes									
Coils									
Diodes									
Fuses and Fuse Boxes									
Generators									
Indicators									
Internal Unit & Sub-Unit									
Lamps									
Liquid-Cooling Devices									
Meters									
Modulators									
Motors									
Power Supplies									
Receivers									
Relays									
Resistors									
Switches									
Transformers									
Transistors									
Transmitters									
Tubes									
Ventilation									
Wiring									

NOTES:

1. Place X in block for each malfunction.
2. When defect has been corrected, circle X.

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INSPECTION TAG

MFG. NAME ______________________
EQUIPMENT ______________________
MOD. NO. __________ SERIAL NO. __________
PROJECT ______________________
LOCATION ______________________
DATE __________ INSPECTOR __________

(FAULT ON REVERSE SIDE)

FRONT

DEFICIENCIES NOTED ______________________

____

INSPECTION & REPAIR PROCESS

	TECH	INSP	DATE
DISASSEMBLY			
REPAIR			
MODIFICATION			
TEST			
FINAL INSPECTION			

REAR

A1AG 355

Figure 19-1. Inspection Tag for Checkout

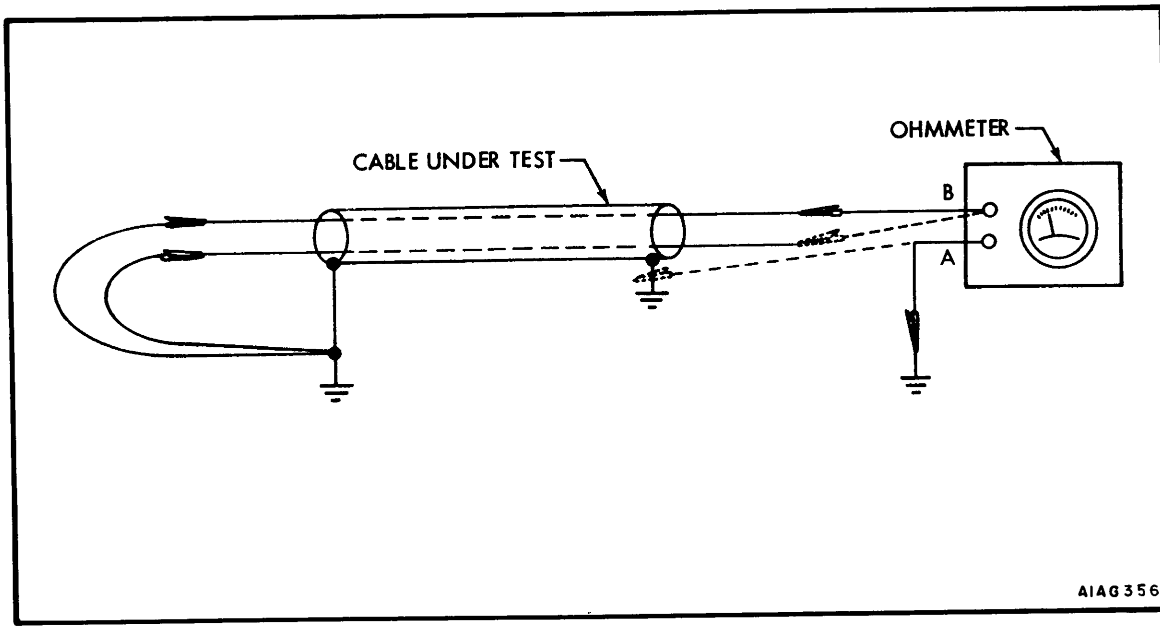

Figure 19-2. Ohmmeter Method for Checking Continuity

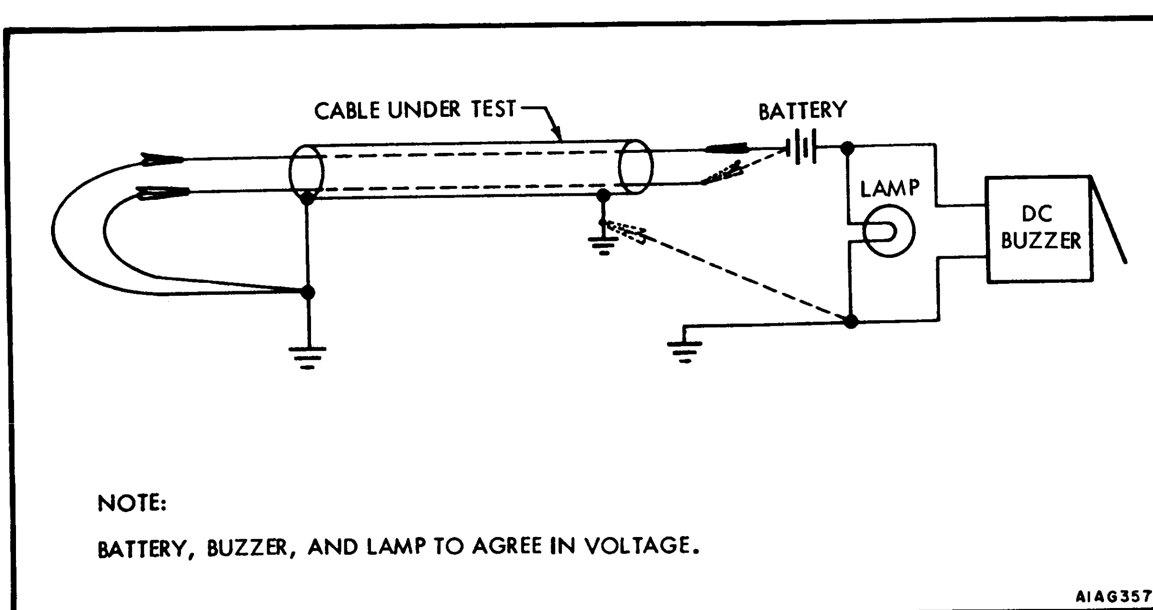

Figure 19-3. Buzzer-Lamp Method for Checking Continuity

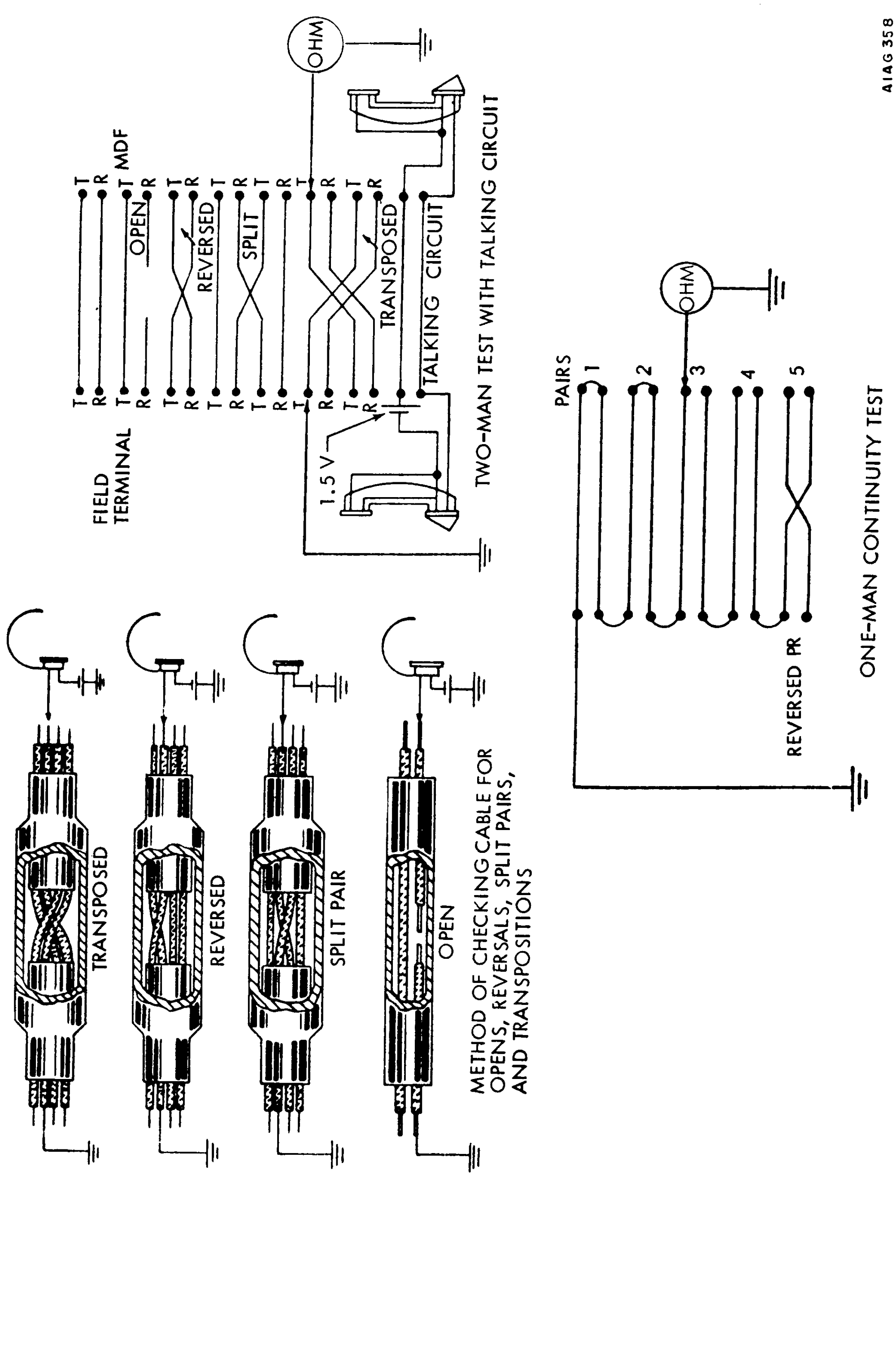

Figure 19-4. Sound-Powered Phone Method for Checking Continuity.

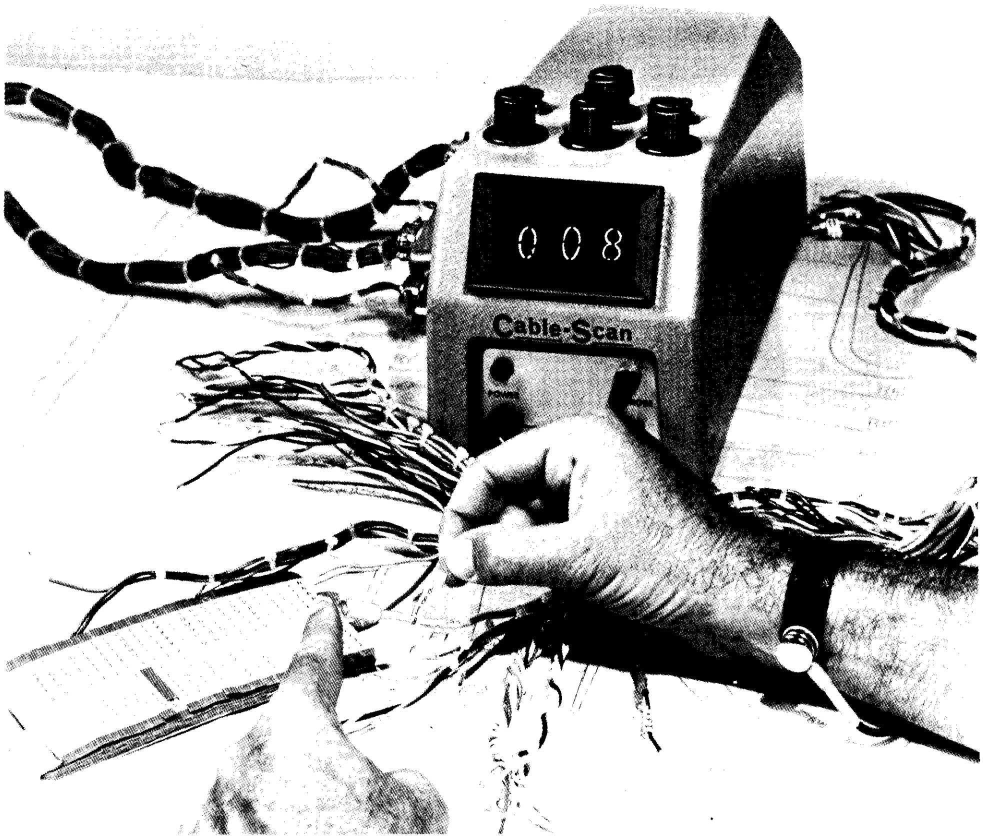

Figure 19-5. Cable-Scan Wiring System

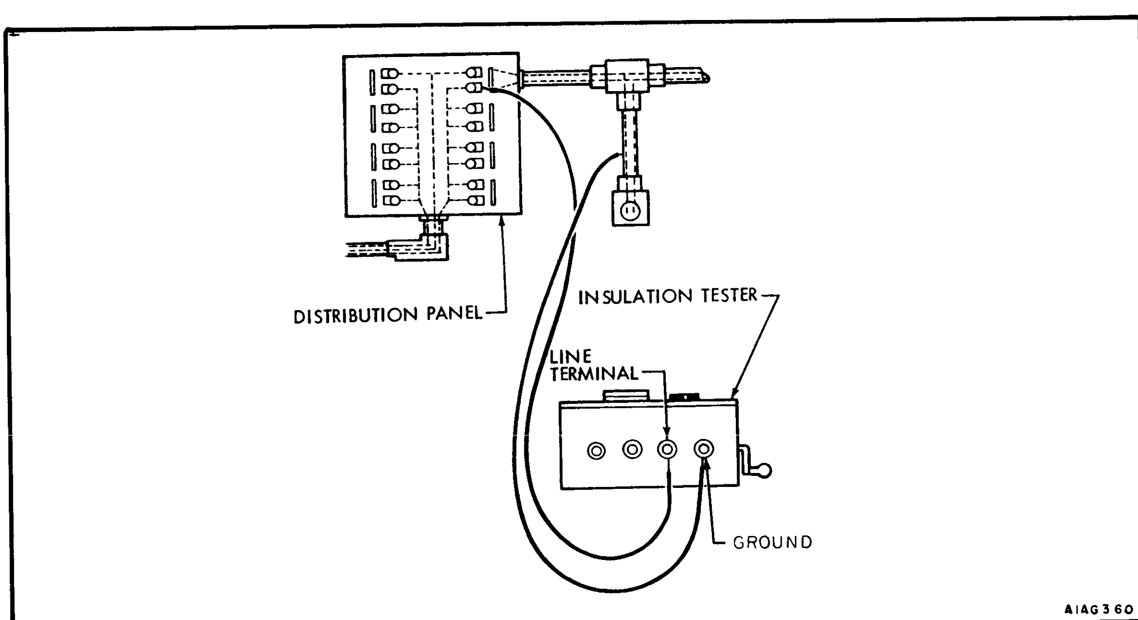

Figure 19-6. Connections for Measuring Insulation Resistance at a Distribution Panel

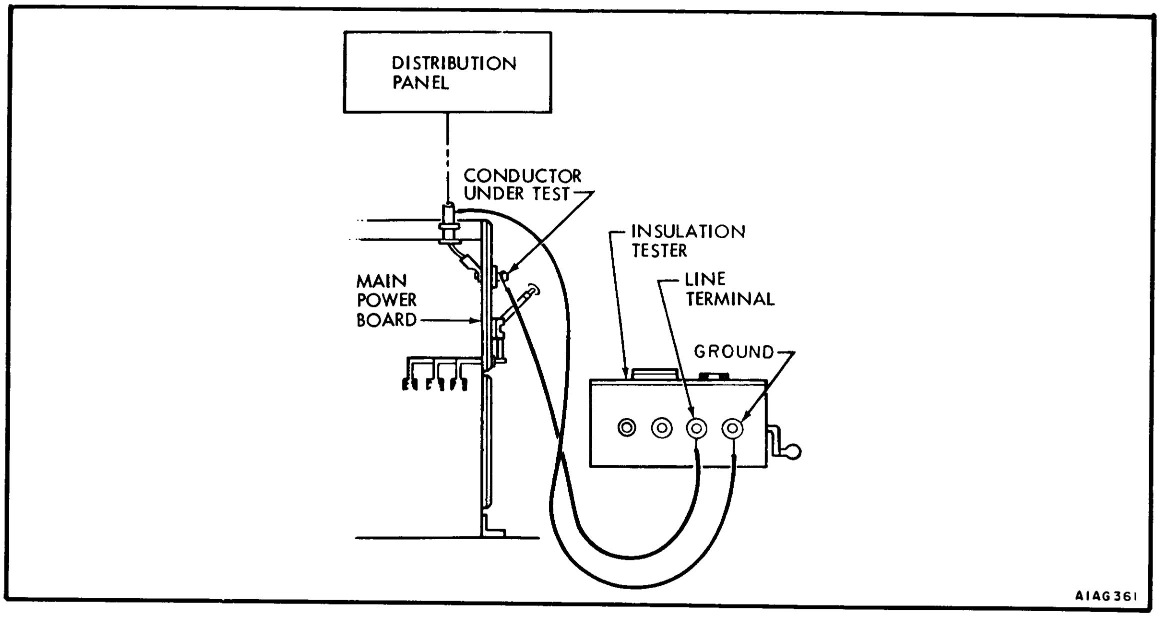

Figure 19-7. Connections for Measuring Insulation Resistance at a Main Power Board

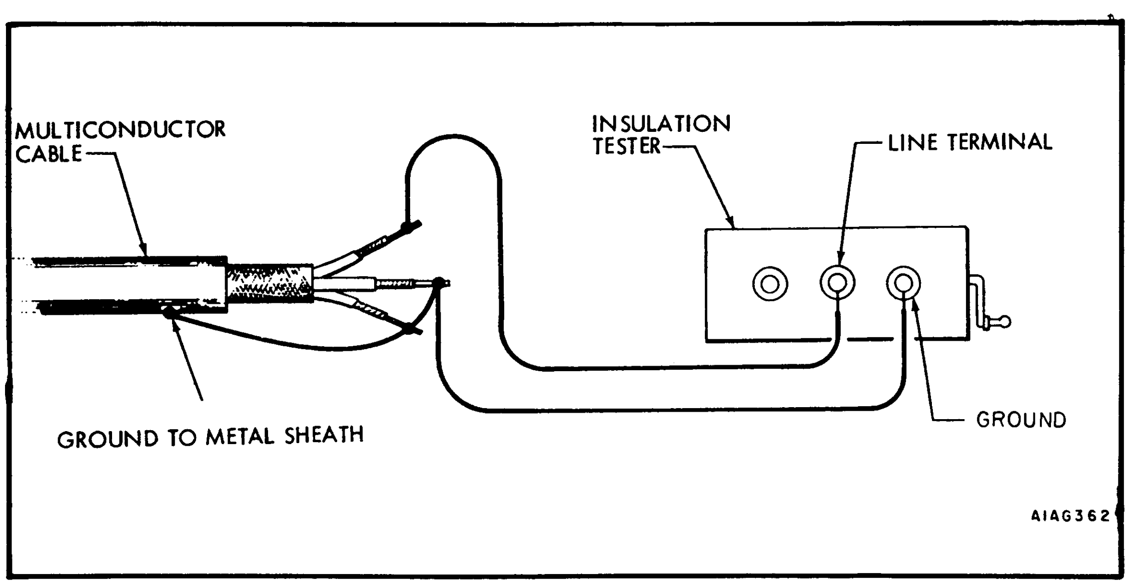

Figure 19-8. Connection for Measuring Insulation Resistance of a Multiconductor Cable

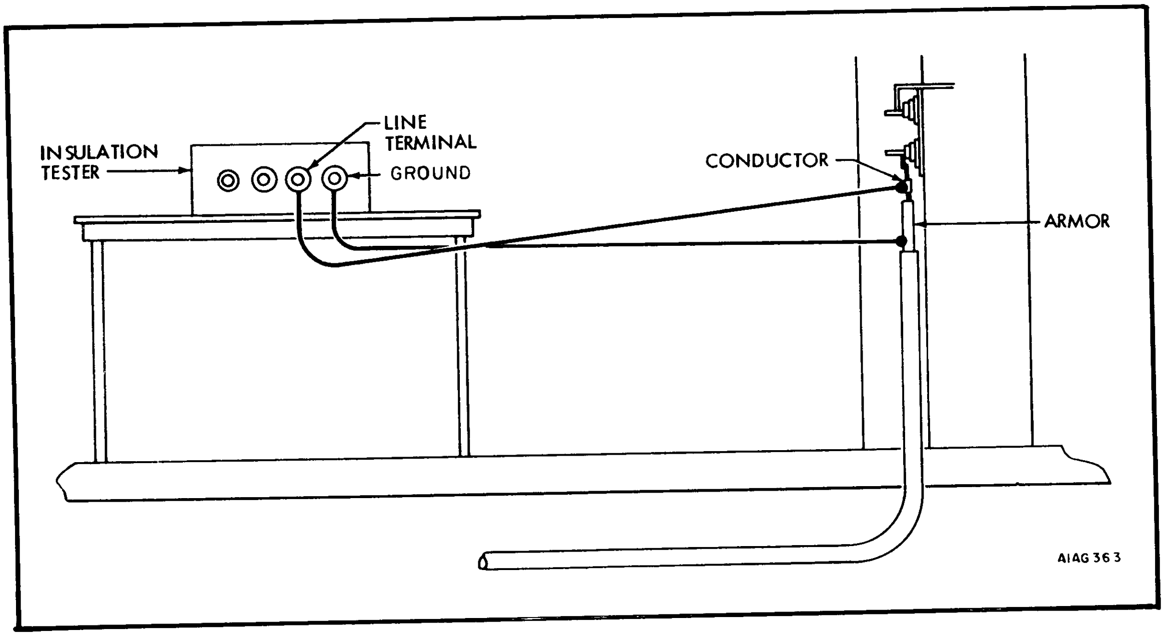

Figure 19-9. Connections for Measuring Insulation Resistance of a Single-Conductor Cable

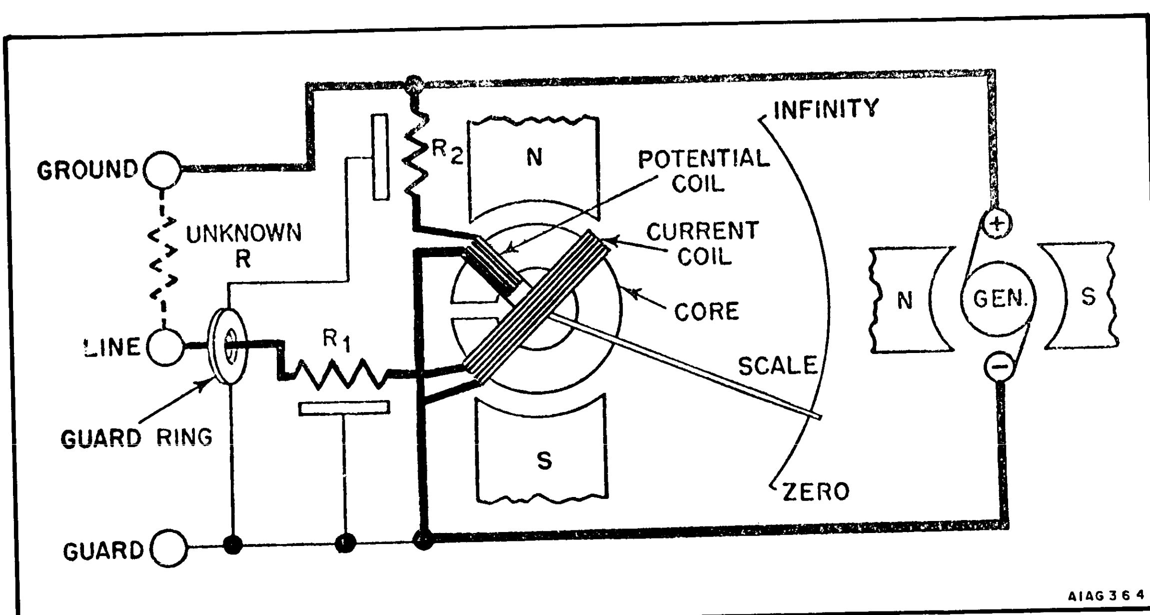

Figure 19-10. Megger® Guard Circuit Schematic Diagram