

TECHNICAL MANUAL

**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT, GENERAL SUPPORT,
AND DEPOT MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST**

**STANDING-WAVE-RATIO
POWER METER
ME-165/G**

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**Operator's, Organizational, DS, GS, and Depot
 Maintenance Manual Including Repair Parts and
 Special Tools List
 STANDING-WAVE-RATIO POWER METER ME-165/G**

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*This manual supersedes TM 11-809-10, 14 May 1958 including all changes, TM 11-809-20, 2 July 1958 and TM 11-809-35 3 December 1958 as pertains to subject equipment.

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CHAPTER 1 INTRODUCTION

1-1. Scope

a. This manual describes Standing-Wave-Ratio Power Meter ME-165/G (fig. 1-1) and covers its installation, operation, and maintenance.

b. Appendix A contains a list of publications applicable to this manual. Appendix C contains the assignment of maintenance functions and repair operations to be performed at the appropriate maintenance category. Appendix D contains the repair parts and special tools list authorized to be kept on hand by units performing maintenance on the equipment.

1-2. Indexes of Publications

a. Refer to DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. Refer to DA Pam 310-7 to determine whether there modification work orders (MWO's) pertaining to the equipment.

1-3. Forms and Records

a. *Reports of Maintenance and Unsatisfactory Equipment.* Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. *Report of Packaging and Handling Deficiencies.* Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58/NAVSUP PUB 378/AFR 71-4/MCO P4030.29, and DSAR 4145.8.

c. *Discrepancy in Shipment Report (DISREP) (SF 361).* Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUP INST 4610.33/AFM 75-18/MCO P4610.19A, and DSAR 4500.15.

1-3.1 Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-C Fort Monmouth, NJ 07703.

1-4. Description of Standing-Wave Ratio Power Meter ME-165/G

a. The ME-165/G is used for measuring transmitter output power and standing-wave-ratio; it may also be used for terminating the transmitter during radio silence operation.

b. All components of the ME-165/G are mounted on the front panel which fastens into a louvered case with 10 screws. The rear of the case has a flange on top and a bracket on the bottom to permit wall mounting (fig. 1-2).

c. The unit is 13-1/2 inches by 9-5/8 inches by 9-5/8 inches, and has a gray, smooth finish. A wingnut on the bottom of the case secures a ground braid.

1-4.1. Component Comprising the Operable End Item

Standing Wave Ratio-Power Meter ME-165/G (FSN 6625-682-4464) comprises the operable end item.

1-5. Differences in Equipments

a. Standing-Wave-Ratio Power Meters ME-165/G, procured on Order Numbers 3219-Phila.-59 and 3241-Phila.-59, are similar in appearance, operation, and purpose to those procured on previous orders. They differ only in some piece-part reference designations which are outlined in the chart below:

NOTE

All reference designations not listed in the chart are identical for all units.

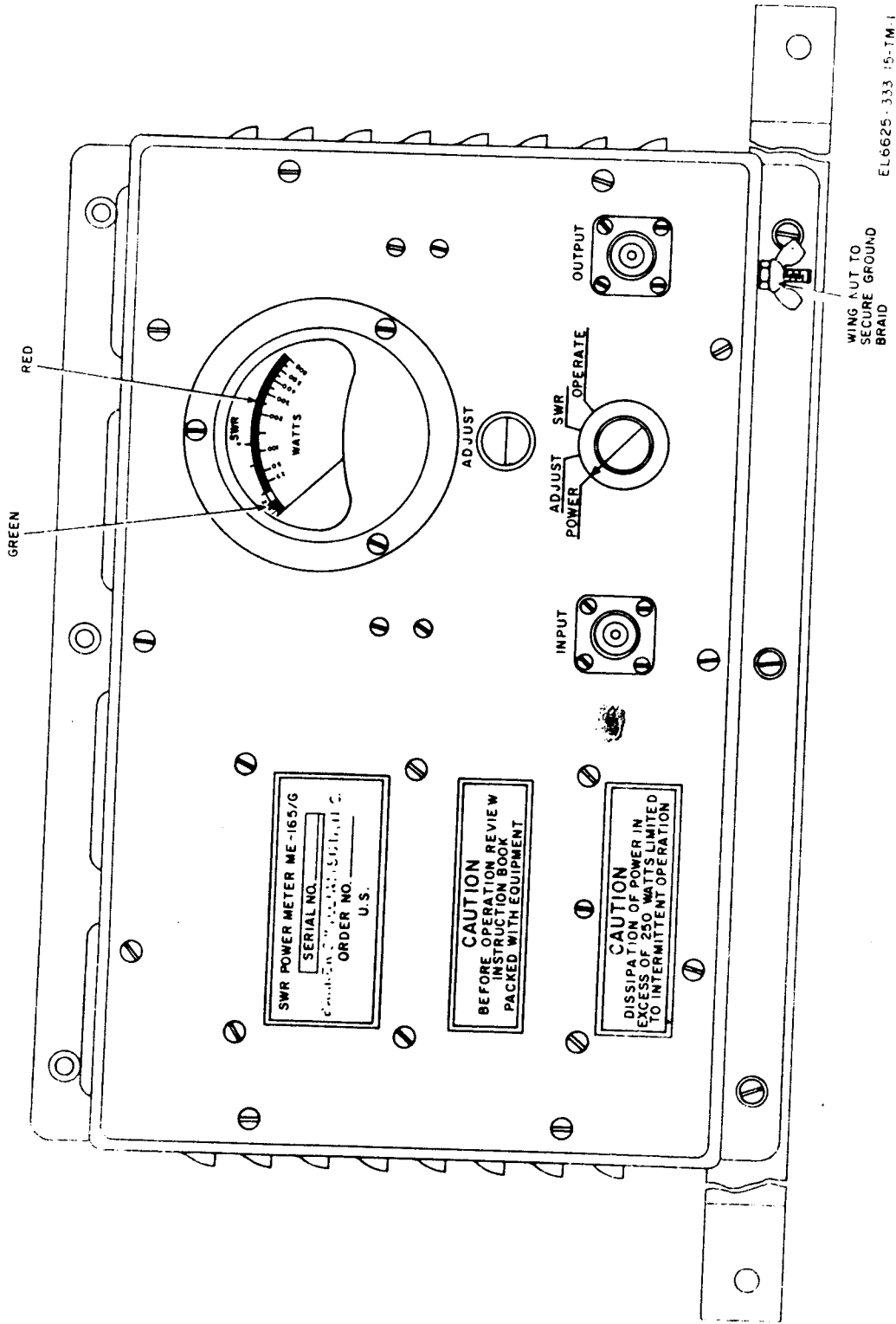


Figure 1-1. Standing-Wave-Ratio Power Meter ME-165/G

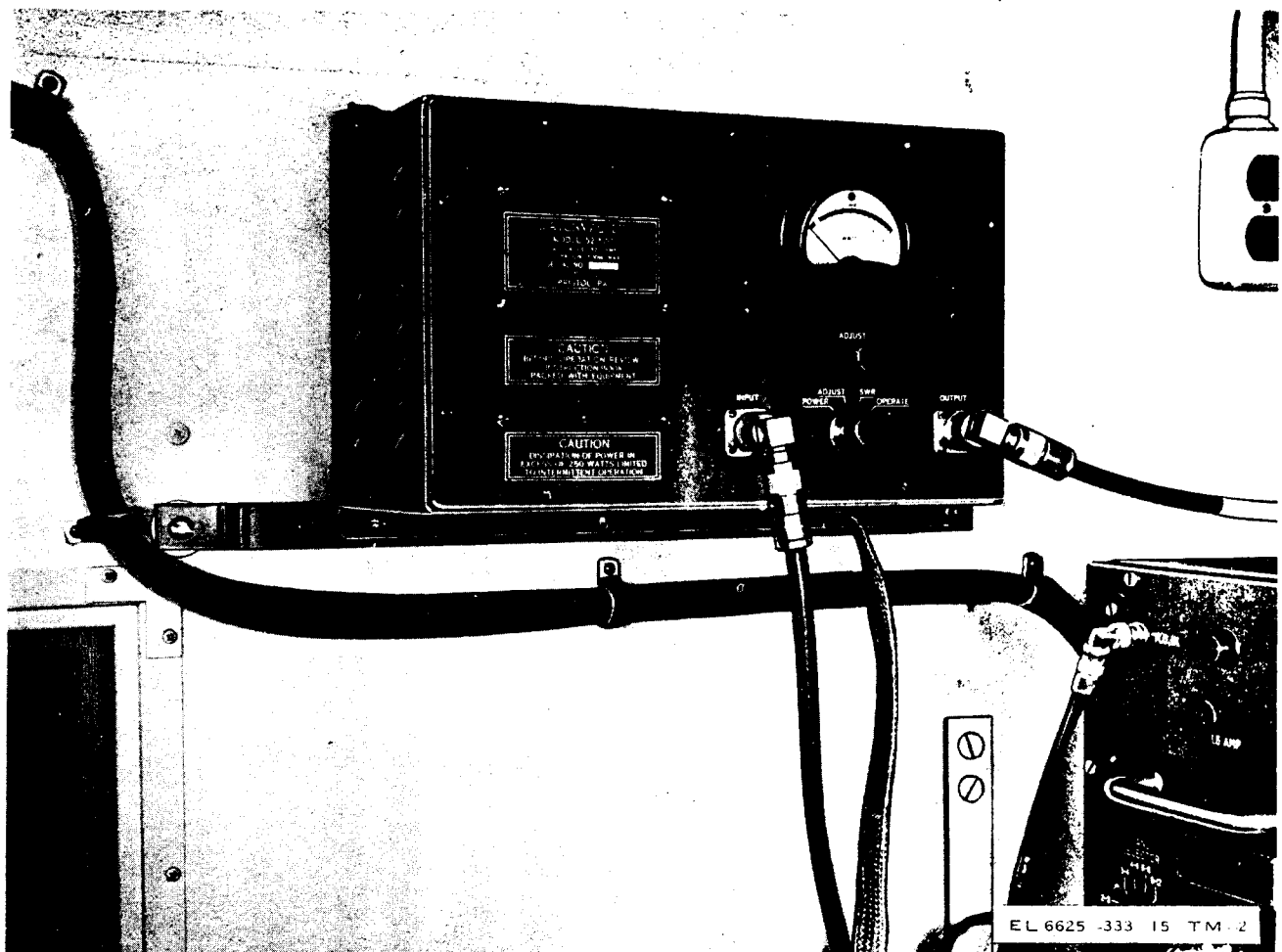


Figure 1-2. Standing-Wave-Ratio Power Meter ME-165/G mounted on wall of shelter.

All orders prior to No. 3219-PP-59 Order No. 3219-PP-59 and 3241-PP-59

All orders prior to No. 3219-PP-59 Order No. 3219 PP 59 and 3241 PP-59

Component	Component
C3	C4
C4	C5
C5	C6
C6	C7
C7	C8
C8	C1
C9	C2
C10	C3
CR1	CR2
CR2	CR1
R13	R20
R14	R21
R15	R13
R16	R22
R17	R23

Component	Component
R18	R14
R19	R15
R20	R16
R21	R17
R22	R18
R23	R19

b. Standing-Wave-Ratio Power Meter ME-165/G procured on Order Numbers 3219-PP-59 and 3241-PP-59 indicate power on the upper meter scale and SWR on the lower scale; those procured on other order numbers indicate power on the lower meter scale and standing wave ratio on the upper meter scale.

CHAPTER 2 INSTALLATION AND OPERATING INSTRUCTIONS

NOTE

The ME-165/G is designed as a ready-to-go equipment; therefore, detailed unpacking procedures do not apply.

2-1. Checking Unpacked Equipment

a. Inspect the equipment for damage that may have been incurred during shipment. If the unit has been damaged, fill out and forward DD Form 6.

b. Check to see that the equipment is complete as listed on the packing slip. Report all discrepancies in accordance with TM 38-750.

NOTE

Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, check to see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number should appear on the front panel near the nomenclature plate. Check to see whether the MWO number (if any) and appropriate notations concerning the modifications have been written into the equipment manuals.

NOTE

Current MWO's applicable to the equipment are listed in DA Pam 310-7.

2-2. Controls and Indicators

(fig. 1-1)

The designation and function of the various controls and indicators of the ME-165/G are described in the chart below.

<i>Control or indicator</i>	<i>Function</i>
POWER	Connects transmitter power output to dummy load; power output of transmitter is indicated on meter.

<i>Control or indicator</i>	<i>Function</i>
ADJUST	Used in conjunction with ADJUST rotary control to calibrate meter for vswr measurements.
SWR	Used to indicate vswr between transmitter and its load.
OPERATE	Connects power output of transmitter directly to load.
ADJUST rotary control	Used in conjunction with function switch to calibrate meter for vswr measurements.
INPUT connector	Used as connection for amplifier input.
OUTPUT connector	Used to apply rf output to radio set antenna
METER	Provides visual indication of average output power in watts, or vswr depending on position of function switch.

2-3. Tuning Procedures

CAUTION

If the transmitting antennas of two or more radio sets are close together, coordinate tuning operations so that one radio set is not transmitting while the function switch of the ME-165/G in the other radio set is set to SWR. Power radiated from a nearby antenna can burn out the dummy load resistor in the ME-165/G.

- a. Place the ME-165/G function switch at POWER
- b. Tune and load the transmitter in accordance with standard operating procedures.
- c. Note that the ME-165/G indicates the transmitter power output.

CAUTION

When the function switch is set to POWER, ADJUST, or SWR, full transmitter output power is dissipated in the dummy load of the ME-165/G. Do not apply power continuously for longer than 10 minutes or the unit may be damaged.

d. Set the ME-165/G function switch to ADJUST.

e. Rotate the ADJUST rotary control to obtain a full-scale indication.

NOTE

Do not keep the control in the ADJUST position any longer than necessary for meter adjustment.

f. Set the function switch to SWR.

g. Observe that the proper standing wave ratio between the transmitter and tuning unit is reflected on the upper scale (green area) of the meter.

h. Set the function switch to OPERATE to connect the output of the transmitter directly to the antenna tuning unit.

2-4 Operational Procedures

Since the ME-165/G can be operated in various modes, the particular mode of operation and the average power indications to be observed are as follows:

- a. Continuous wave (cw) - Approximately 200 watts.
- b. Single sideband (ssb) -- Approximately 200 watts.
- c. Compatible amplitude-modulated (am.) - Approximately 200 watts.
- d. Frequency shift keying (fsk) - Approximately 200 watts.
- e. Voice plus fsk ----- Approximately 100 watts.

CHAPTER 3

OPERATOR AND ORGANIZATIONAL MAINTENANCE

Section I. OPERATOR MAINTENANCE

3-1. Scope of Operator Maintenance

The maintenance duties assigned to the operator of the ME-165/G are listed below together with a reference to the paragraphs covering the specific maintenance function.

- a. Daily preventive maintenance checks and services (para 3-5).
- b. Cleaning (para 3-6).
- c. Troubleshooting (para 3-7).
- d. Touchup painting (para 3-8).

3-2. Tools, Materials, and Test Equipment Required

The only tools and test equipment required for operator maintenance are those furnished as part of the ME-165/G. The required materials are as follows:

- a. Trichloroethane.
- b. Cloth, textile: cheesecloth, lint-free (FSN 8305-267-3015).
- c. Abrasive sheet (FSN 5350-271-7939).

3-3. Operator Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, to reduce downtime, and to assure that the equipment is serviceable.

- a. *Systematic Care.* The procedures given in paragraphs 3-4 through 3-8 cover routine sys-

tematic care and cleaning essential to proper upkeep and operation of the equipment.

- b. *Preventive Maintenance Checks and Services.* The preventive maintenance checks and services chart (para 3-5) outlines functions to be performed at specific intervals. These checks and services are to maintain electronic equipment in a combat-serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in maintaining combat serviceability, the chart indicates what to check, how to check, and the normal conditions; the *References* column lists the illustrations, paragraphs, or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by the operator performing the corrective actions listed, higher category maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements given in TM 38-750.

3-4. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the ME-165/G are required daily by the operator. Paragraph 3-5 specifies the checks and services that must be accomplished daily and under the conditions listed below:

- a. When the equipment is initially installed.
- b. When the equipment is reinstalled after removal for any reason.
- c. At least once each week if the equipment is maintained in standby condition.

3-5. Operator Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Completeness.....	Check to see that equipment is complete.	App B.
2	Exterior surfaces.....	Clean exterior surfaces of equipment.....	Fig. 1-1.
3	Connectors.....	Check tightness of all power connectors.	Fig. 1-1.

3-5. Operator Daily Preventive Maintenance Checks and Services Chart (cont.)

Sequence No.	Item to be inspected	Procedure	References
4	Signal cables and wires.....	Inspect cables for fraying or damaged insulation. Inspect for defective connections with strained wires. Tighten any loose plugs and connections.	
5	Jacks.....	Inspect mechanical action of each jack by inserting a plug.	
6	Hardware.....	Make sure that all threaded hardware is not nicked, burred, or otherwise marred.	
7	Controls and indicators.....	While making the operating checks (sequence No. 8), observe that mechanical action of each knob, dial, and switch is smooth and free of external or internal binding and that no excessive looseness exists.	Fig.1-1
8	Operation.....	Operate equipment according to appropriate instructions. Report any operational failure of equipment. Replace defective items for which running spares are authorized.	

3-6. Cleaning

Inspect the exterior of the equipment. The exterior surfaces should be clean, and free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean, soft cloth.

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. DO NOT use near an open flame. Trichloroethane is not flammable, but exposure of fumes to an open flame converts fumes to highly toxic, dangerous gases.

b. Remove grease, fungus, and ground-in dirt from the equipment case; use a cloth dampened (not wet) with trichloroethane.

c. Remove dust or dirt from plugs and jacks with a brush.

CAUTION

Do not press on the meter face (glass) when cleaning; the meter may become damaged

d. Clean the front panel, meter, and control knobs with a soft, clean cloth. If dirt is difficult to remove, dampen the cloth with water; mild soap may be used for more effective cleaning.

e. Remove dust from around terminal boards

and other small components by using a properly shaped brush to loosen the accumulation. If available, dry compressed air may be used at a line pressure not to exceed 60 pounds-per-square inch (psi) to remove dust from inaccessible places; however, be careful or mechanical damage from the airblast may result.

3-7. Operator Troubleshooting

Whenever an equipment trouble occurs, make a visual inspection of all equipment controls and cable connections before performing any detailed troubleshooting procedures. The following visual checks should be made by the operator to determine the possible cause of malfunction.

a. Check all equipment controls for proper positioning.

b. If necessary, check to see that all signal and power cable arrangements are correctly located and secure.

c. Perform other visual checks as indicated in the appropriate technical manuals (app A).

d. If the trouble is not apparent, or the above checks do not reveal the cause of malfunctioning, higher category maintenance is required.

3-8. Touchup Painting Instructions

Clean rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush

two thin coats of paint on the bare metal to protect it from further corrosion Refer to the

applicable cleaning and refinishing practices specified in TB 746-10.

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Section II. ORGANIZATIONAL MAINTENANCE

3-9. Organizational Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational capability. Preventive maintenance is the responsibility of all categories of maintenance concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies or units that inspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of the equipment at the organizational category of maintenance are made at monthly intervals unless otherwise directed by the commanding officer. The preventive maintenance checks and services should be scheduled concurrently with the periodic service schedule of the carrying vehicle for all vehicular installations.

b. Maintenance forms and records to be used

and maintained on this equipment are specified in TM 38-750.

3-10. Monthly Maintenance

Perform the maintenance functions indicated in the monthly preventive maintenance checks and services chart (para 3-11) once each month. A month is defined as approximately 30 calendar days of 8-hour-per-day operation. If the equipment is operated 16 hours a day, the monthly preventive maintenance checks and services should be performed at 15-day intervals. Adjustment of the maintenance interval must be made to compensate for any unusual operating conditions. Equipment maintained in a standby (ready for immediate operation) condition must have monthly preventive maintenance checks and services performed on it. Equipment in limited storage (requires service before operation) does not require monthly preventive maintenance.

3-11. Organizational Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item to be inspected	Procedure	References
1	Publications.....	Check to see that all publications are complete, serviceable, and current.	DA PAM 310-4.
2	Modifications.....	Check DA Pam 310-7 to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	DA Pam 310-7 and TM 38-750.
3	Spare parts.....	Check all spare parts (operator and organizational) for general condition and method of storage. No overstock should be evident and all shortages must be on valid requisitions.	App A and B.
4	Equipment hardware.....	Tighten loose bolts, nuts, and screws that hold equipment. Replace missing bolts, screws, nuts, and washers. Replace all badly burred screws, bolts, and nuts which cannot be engaged or turned with a screwdriver or wrench.	
5	Signal and power cables and cords.....	Dress all cables and cords neatly.	
6	Miscellaneous items.....	Check to see that all items not required for immediate use are properly stored.	
7	Cable layout.....	Inspect cable layout and relocate cables as necessary so that they are not endangered by, and are not dangerous to personnel.	

Sequence No.	Item to be inspected
8	Resistors and capacitors.....

Procedure

Inspect for cracks, blistering, or other detrimental defects. Inspect variable capacitors for dirt, corrosion, or deformed plates.

References

Fig. 4-2 and 4-3.

3-12. Organizational Troubleshooting Information

The troubleshooting and repair work that can be performed at the organizational category of maintenance is necessarily limited in scope by the

tools, test equipment, and replaceable parts issue, and by existing tactical situation. Accordingly, troubleshooting is based on the performance of the equipment and the use of the senses in determining such troubles as burned out components and loose connections.

CHAPTER 4

DIRECT AND GENERAL SUPPORT MAINTENANCE

4-1. General Maintenance Instructions

a. The preventive maintenance procedures performed at direct and general support categories of maintenance are actions which have been designed to anticipate potential problem areas for the purpose of correcting a possible trouble before it results in equipment outage. The action to be taken consists mainly of the following:

(1) Visual inspection of the equipment for the purpose of determining general condition, unusual noise, and wear, and observing meter indications. Generally, the equipment will remain operational when these inspections are made.

(2) Repair or replacement of parts that have a definite life expectancy

b. The direct and general support maintenance procedures are not complete in themselves but supplement the procedures performed at the organizational category and include any additional techniques required to perform maintenance on the ME-165/G

4-2. Tools, Materials, and Test Equipment Required

a. The test equipment and materials required for maintenance of the ME-165/G are listed in the appropriate paragraphs in which the adjustment procedures are given. The specified test equipment, or suitable equivalents, should be used to comply with the requirements of this chapter.

NOTE

Before using the test equipment, carefully read the operating instructions. For maximum accuracy in all measurements, use the range that will produce a meter indication as close to midscale as possible.

b. When using test equipment, place it on a firm support and position the test equipment so that its controls are within easy reach.

CAUTION

Do Not allow any test lead to drape

across high-voltage circuits. Severe burns or electrical shock to the user and damage to the equipment under test may result.

4-3. Troubleshooting Techniques

To be effective, troubleshooting must be systematic; it will be necessary to perform a sequence of operational checks, observations, and measurements before the cause of a trouble is revealed.

a. The first step in servicing a defective equipment is to sectionalize the fault. Sectionalization means tracing the fault to the major equipment component. The second step is to localize the fault. Localization means tracing the fault to the defective stage. The third step, isolation, means tracing the fault to the defective part. Some faults, such as burned-out resistors, can often be isolated by sight, smell, or hearing. The majority of faults, however, must be isolated by checking voltages, resistance, and signal levels

b. After the trouble has been sectionalized, perform operational tests on the suspected section; figure 4-1 illustrates the test setup. Operational tests serve as a check of the sectionalizing test, and may also be used to indicate whether or not the unit is functioning properly.

4-4. Troubleshooting Procedures

a. Localizing troubles to a defective part or circuit in the ME-165/G is accomplished at direct and general support categories of maintenance by performing the bench test described in *d* below until an abnormal condition is observed, noting the trouble symptom, and performing the related checks and corrective measures indicated in the troubleshooting chart (*d* below).

NOTE

The ME-165/G must be recalibrated after any repairs or adjustments.

b. Bench troubleshooting the ME-165/G requires the following:

- (1) 28-volt direct current (dc) power source to power a radiofrequency (rf) power source.
- (2) Telegraph key KY-116/U, or equivalent.
- (3) A 51-ohm, 1/2-watt composition resistor.
- (4) Wattmeter AN/URM-120.
- (5) Necessary cable assemblies (such as, Radio Frequency Cable Assembly CG-2340A/U, or CG-2568A/U) to connect the equipment.

c. Connect the equipment as shown in figure 4-1 and perform the following:

- (1) Set the ME-165/G function switch to POWER.
- (2) Adjust the transmitter for cw operation at the lowest transmitting frequency.
- (3) Key the transmitter.
- (4) Compare the power indication on the ME-165/G with the power indication on the AN/URM-120; the indications should agree within 10 percent.

(5) Adjust the transmitter for cw operation at the highest transmitting frequency.

(6) Key the transmitter.

(7) Compare the power indication on the ME-165/G with the power indication on the AN/URM-120; the indications should agree within 10 percent.

(8) Set the ME-165/G function switch to ADJUST

(9) Key the transmitter and rotate the ME-165/G ADJUST rotary control until the meter indicates full scale.

(10) Set the ME-165/G function switch to SWR.

(11) Key the transmitter and observe that the ME-165/G meter does not indicate beyond the mid point in the green segment of the dial.

d. The following chart specifies typical symptoms of equipment malfunction and procedures to be followed in connecting these troubles:

Trouble symptom	Probable trouble	Checks and corrective measures
No ME-165/G power meter indication on AN/URM-120.....	a. Defective diode CR1..... b. Defective R13, R16, or R17..... c. Defective capacitor C4..... d. Defective function switch S1..... e. Defective Meter M1.....	a. Check CR1. b. Check R13, R16, and R17 for open circuit. c. Check C4 for short circuit. d. Check contacts and continuity of S1. e. Check M1 by substitution
ME-165/G power indication not within 10 percent of AN/URM-120 power indication at low frequency end.	Meter linearity inaccurate at lower frequencies.....	Adjust meter linearity at low-frequency end.
ME-165/G power indication not within 10 percent of AN/URM-120 power indication at high-frequency end.	Meter linearity inaccurate at higher frequencies.....	Adjust meter linearity at high-frequency end.
No meter indication when function switch is set to ADJUST.....	a. Defective diode CR2..... b. Defective R15, R22, or R23..... c. Defective function switch S1.....	a. Check CR2. b. Check R15, R22, and R23 for open circuit. c. Check contacts of switch S1.
Meter pointer reads beyond green segment of dial when function switch is set to SWR.	Resistor R18, R19, or R21 open or more than 3 percent out of tolerance.	Measure resistance of R18, R19, R20, and R21.

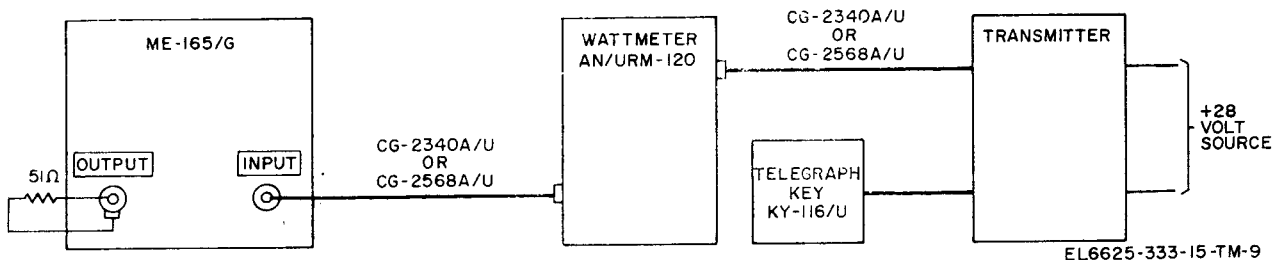


Figure 4-1. Bench test setup diagram.

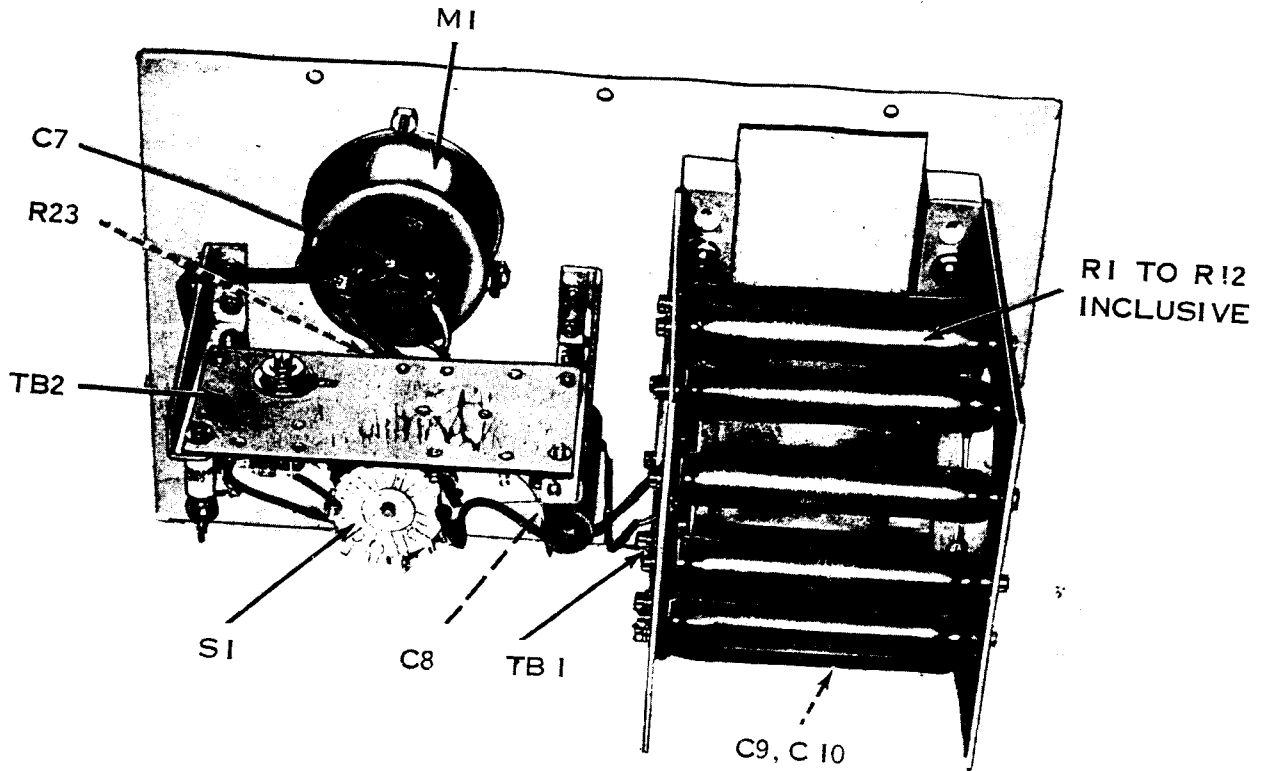
4-5. Replacement of Components

The components of the ME-165/G can be readily identified upon visual inspection. The front panel of the meter on which all components are mounted, can be removed from the case by removing the 10 screws around the panel edge. Parts

location information is given in figures 4-2 and 4-3.

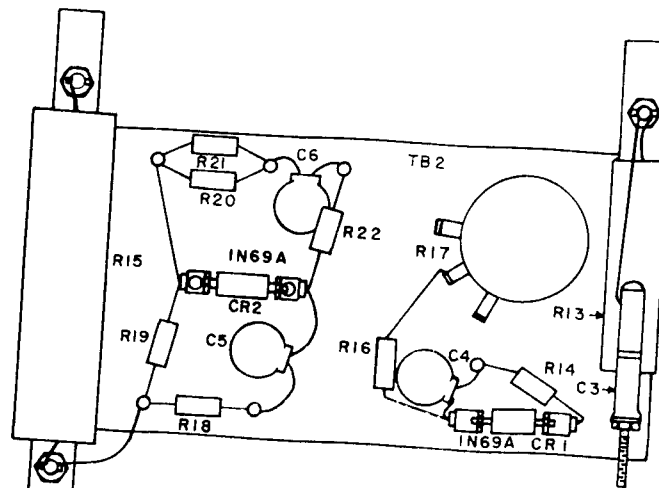
4-6. Linearity Adjustment

The adjustment of the ME-165/G meter linearity requires the test equipment and test setup



EL 6625-333-15-TM-3

Figure 4-2. Standing-Wave-Ratio Power Meter ME-165/G interior view.



EL 6625-333-15-TM-13

Figure 4-3. Terminal board TB2, location of components.

described in paragraph 4-4 and shown in figure 4-1. The 51-ohm terminating resistor shown in figure 4-1 is not required for this adjustment.

- a. Remove the front panel from the ME-165/G case to reach the adjustment controls.
- b. Connect the equipment as shown in figure 4-1.
- c. Set the ME-165/G function switch to POWER.
- d. Adjust the transmitter for cw operation at the low frequency.
- e. Key the transmitter and compare the power indication on the ME-165/G with the power indication on the AN/URM-120 the indications should agree within 5 percent.

CAUTION

Be extremely careful when making the

following adjustments; dangerous RF voltages may be present.

- f. If the ME-165/G power meter indication is not correct within 5 percent, adjust ME-165/G potentiometer R23 so that the power meter indicates the same power as the AN/URM-120
- g. Adjust the transmitter for cw operation at the high frequency.
- h. Key the transmitter and compare the power indication on the ME-165/g with the power indication on the AN/URM-120; the indications should agree within 5 percent.
- i. If the ME-165/G power meter indication is not correct within 5 percent, adjust ME-165/G capacitor C4 so that the power meter indicates the same power as the AN/URM-120.
- j. Repeat the procedures given in d through i above, as necessary, until the ME-165/G power meter indications are correct at both ends of the frequency range.

CHAPTER 5

DEPOT MAINTENANCE AND DEPOT OVERHAUL STANDARDS

Section I. DEPOT MAINTENANCE

5-1. General

Complete rebuild of the ME-165/G and/or its individual components may be accomplished by depot maintenance facilities when authorized.

5-2. Maintenance Procedures

a. Rebuild procedures of the ME-165/G will include all repair, rebuild, replacement, and testing operations necessary to make the equipment suitable for return to the Department of the Army supply system stocks for reissue to using organizations. Detailed procedures for accomplishing the repair and adjustments established in the preceding portions of this manual and such additional repair and rebuild operations as

deemed necessary, will be established by the maintenance facility performing the work.

b. Restore the appearance, performance, and life expectancy of the ME-165/G to a standard comparable to that of new equipment by performing the following procedures:

- (1) Disassemble the unit as required.
- (2) Inspect all component parts of the ME-165/G.
- (3) Repair or replace any worn or unserviceable part with a part that conforms to the original manufacturing specifications and tolerances.
- (4) Reassemble the unit.
- (5) Perform an operational test of the equipment.

Section II. DEPOT OVERHAUL STANDARDS

5-3. Applicability of Depot Overhaul Standards

The tests outlined in this section are designed to measure the performance capability of repaired components that comprise the ME-165/G. Because there are alternate methods to virtually every type of operation, it must not be presumed that the tests described will be satisfactory for complete acceptance of the equipment. Rather, it is the purpose to merely offer assistance and guidance in the most expedient method of determining that the ME-165/G meets the minimum acceptable limit of system performance.

5-4. Applicable References

a. Technical publications applicable to the ME-165/G are listed in appendix A. Applicable procedures and standards of the depots performing these tests form a part of the requirement for testing this equipment.

b. Perform all applicable MWO's pertaining to

the equipment before making the tests specified. DA Pam 310-7 lists all current MWO's.

5-5. Physical Tests and Inspections

a. Inspect the front panel for damaged, loose, or missing screws, knobs, or other parts. There should be no evidence of damage or loose components.

b. Inspect the chassis for signs of excessive wear or damage, missing components, or hardware.

c. Inspect the condition of finish. Check for rust and corrosion. The external surfaces should not show bare metal and all front panel lettering should be legible.

NOTE

Touchup painting is recommended instead of refinishing. Screwheads and receptacles should not be polished with abrasives.

d. Operate each control on the front panel. All controls should operate smoothly with positive action to indicated positions.

5-6. Calibration Procedures

NOTE

The following procedures apply to models procured on Order No. 3219-PP-59, 3241-PP-59, and later.

Resistor R17 and capacitor C3 are used to adjust the accuracy of the ME-165/G in power measurements. Remove the front panel from the case and proceed as follows:

a. Connect Wattmeter AN/URM-120 between the RF OUTPUT receptacle and the INPUT connector on the ME-165/G.

b. Set up the equipment for cw operation at some frequency between 1.5 and 2 megacycles (mc).

c. Set the ME-165/G function switch to POWER.

d. Key the transmitter.

e. Compare the power indications on the AN/URM-120 and the ME-165/G.

NOTE

The power indications should agree within 5 percent.

f. If necessary, adjust resistor R17 until both power indications agree (*e* above).

CAUTION

Be extremely careful when adjusting resistor R17; dangerous RF voltages may be present.

g. Set up the equipment for operation at approximately 19 mc.

h. Key the transmitter and compare the power indications on the AN/URM-120 and the ME-165/G.

i. If necessary, adjust capacitor C3 until both power indications agree within 5 percent.

j. Repeat the procedure outlined in *a* through *i* above until the power indications are correct at both ends of the transmitter frequency range.

CHAPTER 6

FUNCTIONING OF EQUIPMENT

6-1. General

a. Impedance matching a load to its source is an important consideration in transmission systems. If the load and source are mismatched, part of the power is reflected back along the transmission line toward the source. This reflection not only prevents maximum power transfer, but also can be responsible for erroneous measurements of other parameters, or even cause circuit damage in high-power applications.

b. The power reflected from the load interferes with the incident (forward) power causing standing waves of voltages and current to exist along the line. The ratio of standing-wave maxima to minima is directly related to the impedance mismatch of the load; therefore the standing-wave ratio (swr) provides the means of determining impedance and mismatch.

c. The matching unit of the ME-165/G, as shown in figure 6-1, provides a noninductive dummy load of 52 ohms and, when connected between the transmitter and its load, permits direct readings of the transmitter power output and the swr between the transmitter and its load.

6-2. Detailed Circuit Analysis

(fig. 6-1)

a. The ME-165/G is used during preliminary tuneup to eliminate transmitter damage because of impedance mismatch, to permit optimum match between the transmitter and the antenna, and to keep the transmitter off the air until the tuneup is complete. During normal operation, the transmitter RF is applied directly through the ME-165/G to the antenna.

b. When function switch S1 is set to POWER, ADJUST, or SWR, 12 600-ohm resistors (R1 through R12), connected in parallel, are used as a dummy load. When the function switch is set to OPERATE, the transmitter is connected directly through the ME-165/G to the antenna (*a* above).

c. The dummy load has an swr of 1.1 to 1, or less, at frequencies up to 30 megacycles. Capacitors C2 and C3 provide balance and bypass rf from the insulated resistor mounting plates to ground. Capacitor C1 is connected to the input line to compensate for wiring inductance.

d. When the function switch is set to POWER, power is applied through contacts 6 and 2 of switch S1 (A), to the dummy load consisting of resistors R1 through R12 and voltage-divider resistors R20 and R21. Variable capacitor C4 is connected across resistor R20 and is used to adjust the meter linearity at higher frequencies. From the junction of variable capacitor C4 and resistor R20, the circuit to meter M1 is completed through diode CR2, resistor R22, potentiometer R23, and contacts 8 and 12 of switch S1 (C). Capacitor C5 is a filter capacitor for diode CR2. Potentiometer R23 is used to adjust meter linearity at the lower frequencies. The lower scale of meter M1 indicates the RF power directly in watts, and the upper scale indicates the swr. Capacitor C8 is an RF bypass capacitor.

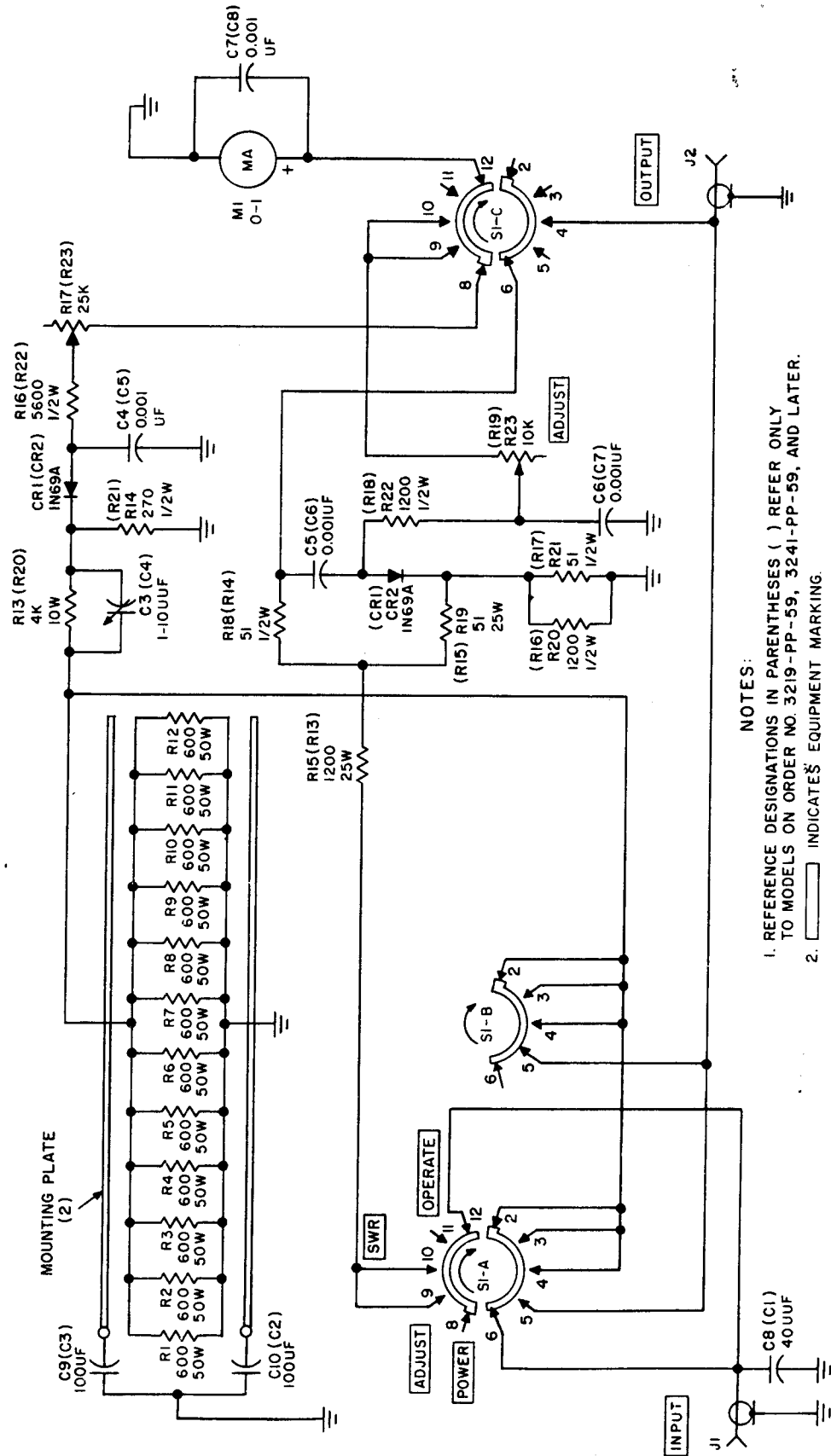
e. When the function switch is set to ADJUST, power is applied to the dummy load as described in *d* above. It is also applied through contacts 12 and 9 of switch S1 (A) and resistor R13 to a bridge circuit consisting of resistor R14, capacitor C6, resistors R15, R16, and R17, and diode CR1. From the junction of diode CR1 and capacitor C6, the voltage is applied through filter resistor R18 and capacitor C7 to ADJUST potentiometer R19. Potentiometer R19 controls the amount of voltage applied to meter M1 and allows the meter to be adjusted to full scale for swr calibration purposes.

f. When the function switch is set to SWR, power is applied to the dummy load, resistor R13, and the bridge circuit as described in *e* above. Also, one leg of the bridge circuit (at the junction of resistor R14 and capacitor C6) is connected through contacts 6 and 4 of switch S1 (C) to OUTPUT jack J2 and the normal transmitter

load. The swr ratio is read on the upper scale of the meter.

g. When the function switch is set to OPER-

ATE, a direct connection is made between INPUT jack J1 and OUTPUT jack J2 through contacts 6 and 5 of switch S1 (A).



- NOTES:
1. REFERENCE DESIGNATIONS IN PARENTHESES () REFER ONLY TO MODELS ON ORDER NO. 3219-PP-59, 3241-PP-59, AND LATER.
 2. ADJUST INDICATES EQUIPMENT MARKING.

Figure 6-1. Standing-Wave-Ratio Power Meter ME-165/G, schematic diagram.

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