

TECHNICAL MANUAL

TEST SETS I-49, I-49-A, AND I-49-B AND RESISTANCE BRIDGES
ZM-4A/U AND ZM-4B/U

TM 11-2019

CHANGE NO. 3

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 19 September 1963

TM 11-2019, 17 October 1957, is changed as follows:

Note: The parenthetical reference to previous changes (example: C2, 14 Oct 58) indicates that pertinent material was published in that change.

Page 5. Add paragraph 1.1 after paragraph 1.

1.1. Index of Publications

Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to your equipment. DA Pam 310-4 is an index of current technical manuals, technical bulletins, supply bulletins, lubrication orders, and modification work orders which are available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the latest Changes to and revisions of each equipment publication.

Delete paragraph 2 (as changed by C2, 14 Oct 62) and substitute:

2. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions in TM 38-750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (Report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).

c. Reporting of Equipment Manual Improvements. The direct reporting by the individual user of errors, omissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended changes to DA technical manual parts lists or supply manual 7, 8, or 9) will be used for reporting these improvements. This form will be completed in triplicate using pencil, pen, or typewriter. The original and one copy will be forwarded direct to: Commanding Officer, U.S. Army Electronics Materiel Support Agency, ATTN: SELMS-MP, Fort Monmouth, N.J., 07703. One information copy will be furnished to the individual's immediate supervisor (e.g., officer, noncommissioned officer, supervisor, etc.).

Page 15, paragraph 15h (as changed by C2, 14 Oct 58). Delete the first two sentences and substitute:

It has been determined (par. 13b) that a cable pair in a length of spiral-four cable is shorted. The cable temperature is 68°F. and the resistance per loop mile of loaded spiral-four cable at 68°F. is 92.6 ohms.

*This change supersedes C2, 14 October 1958.

Page 18, paragraph 18g(2) (as changed by C2. 14 Oct 58). In the equation, change “-B_g” to: -BR_g.

Page 19, paragraph 18j(5) (as changed by C2. 14 Oct 58). In the equation, change:

$$\frac{A(R + R_b - BR_g)}{A + B} \quad \text{to:} \quad \frac{A(R + R_b) - BR_g}{A + B}$$

Page 33, figure 17, caption (as changed by C2. 14 Oct 1958). Change “Figure 17” to: Figure 11.

Paragraph 29c(2). Change to:

(2) Distance from test point to ground , 61.6 x 89.9 , 5,538 feet

Paragraph 29c(3) (as changed by C2, 14 Oct 62). Change to:

(3) Distance from far end to ground , 61.6 x 22.5 , 1,386 feet

Page 36, paragraph 33a, chart (as changed by C2. 14 Oct 58). In the right-hand column, second item, change “17.4 per 100 ft” to: (17.4 per 1,000 ft).

In footnote b, line 3 change “6-milliheavies” to: 6-millihenries. Paragraph 33b chart (as changed by C2. 14 Oct 58). Right-hand column, Change the heading to: Maximum dc res per loop mi at 68°F.(ohms)^a.

Add the following footnote below the table.

^aActual conductor resistance may be lower because of manufacturing variation. For exact resistance either refer to station records or use the test set to measure the resistance of a known length of the conductor and use the measurement to compute the resistance per loop mile.

Page 38. Delete section I and substitute:

Section I. PREVENTIVE MAINTENANCE

35. Scope of Maintenance

The maintenance duties assigned to the operator and organizational repairman of the test set are listed below together with a reference to the paragraphs covering the specific maintenance function. The duties assigned require the use of tools and test equipment listed in TM 11-6625-249-12P.

- a. Daily preventive maintenance checks and services (par. 38).
- b. Weekly preventive maintenance checks and services (par. 38.1).
- c. Cleaning (par. 38.2).
- d. Monthly preventive maintenance checks and services (par. 38.4).
- e. Touchup painting (par. 38.5).

36. 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 37 through 38.5 cover routine systematic 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 (pars. 38, 38.1 and 38.4) outline functions to be performed at specific intervals. These checks and services are to maintain Army 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 charts indicate what to check, how to check, and what the normal conditions are; the

References column lists the illustrations paragraphs, or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by performing the corrective actions listed, higher echelon maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

Delete section II heading.

Delete paragraphs 37 and 38, (as changed by C2, 14 Oct 58) and substitute:

37. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the test set are required daily, weekly, and monthly. Paragraphs 38, 38.1 and 38.4 specify the items to be checked and serviced. In addition to the routine daily, weekly, and monthly checks and services, the equipment should be rechecked and serviced immediately before going on a mission and as soon after completion of the mission as possible.

38. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Completeness -----	Be sure the equipment is complete.	TM 11-6625-249-12P.
2	Cleanliness -----	Clean dirt and moisture from exposed surfaces of housing cabinet, control panel, and the meter window.	Par. 38.2
3	Knobs, dials, and switches -----	During operation (items 5 below), observe that the mechanical action of each knob, dial, and switch is smooth and free of external or internal binding.	Par. 40.
4	Meter movement ----	During operation (item 5 below), check for sticking galvanometer movement.	
5	Operation -----	Operate the equipment according to paragraph 40.	

38.1. Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Handle, hinges, and latch -----	Hand check for looseness of the handle, latch, and hinges.	Par. 38.5.
2	Batteries -----	Inspect dry batteries for leakage.	
3	Preservation -----	Inspect exposed metal surfaces for rust and corrosion. If present, touchup paint the bare spots.	

38.2. Cleaning

Inspect the exterior of the test set. 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: Cleaning compound is flammable and its fumes are toxic. Provide adequate ventilation. Do not use near a flame.

b. Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with Cleaning Compound, (Federal stock No. 7930-395-9542).

c. Remove dust or dirt from binding posts with a brush.

Caution: Do not press on the meter face (glass) when cleaning. The meter may become damaged.

d. Clean the panel, meter, and control knobs; use a soft clean cloth. If necessary dampen the cloth with water; mild soap may be used.

38.3. Monthly Maintenance

Perform the maintenance functions indicated in the monthly preventive maintenance checks and services chart (par. 38.4) 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.

38.4. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Resistors -----	Inspect resistors for cracks, blistering, or other detrimental defect.	
2	Connectors -----	Inspect connectors for snug fit and good contact.	
3	Publications -----	See that all publications are complete, serviceable, and current.	DA Pam 310-4.
4	Modifications -----	Check DA Pam 310-4 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.	TM 38-750 and DA 310-4.
5	Spare parts -----	Check all spare parts (operator and organizational) for general condition and method of storage. There should be no evidence of overstock, and all shortages should be on valid requisitions.	TM 11-6625-305-12P.

38.5. 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 TM 9-213.

Page 39. Delete figure 13(as changed by C2, 14 Oct 58).

Page 40. Delete figure 14 (as changed by C2, 14 Oct 58).

Page 55. Add the appendix after chapter 6.

APPENDIX

REFERENCES

Following is a list of applicable publications available to the operator and repairmen of Test Sets I-49, I-49-A, I-49-B, and Resistance Bridges ZM-4A/U and ZM-4B/U.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TM 9-213	Painting Instructions for Field Use.
TM 11-6625-203-12	Operator and Organizational Maintenance Multimeter AN/URM-105, including Multimeter ME-77/U.
TM 11-6625-249-12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Resistance Bridges, ZM-4A/U and ZM-4B/U.
TM 11-6625-249-35P	Field and depot Maintenance Repair Parts and Special Tools List for Resistance Bridges ZM-4A/U and ZM-4B/U.
TM 38-750	The Army Equipment Record System and Procedures.