

TECHNICAL MANUAL
TEST UNIT I-176

CHANGES }
No. 1 }

WAR DEPARTMENT
WASHINGTON 25, D. C., 18 August 1945

TM 11-2626, 31 July 1944, is changed as follows:
The classification RESTRICTED is removed from the manual.

Figure 1. Test Unit I-176, in wooden case, with cover raised.

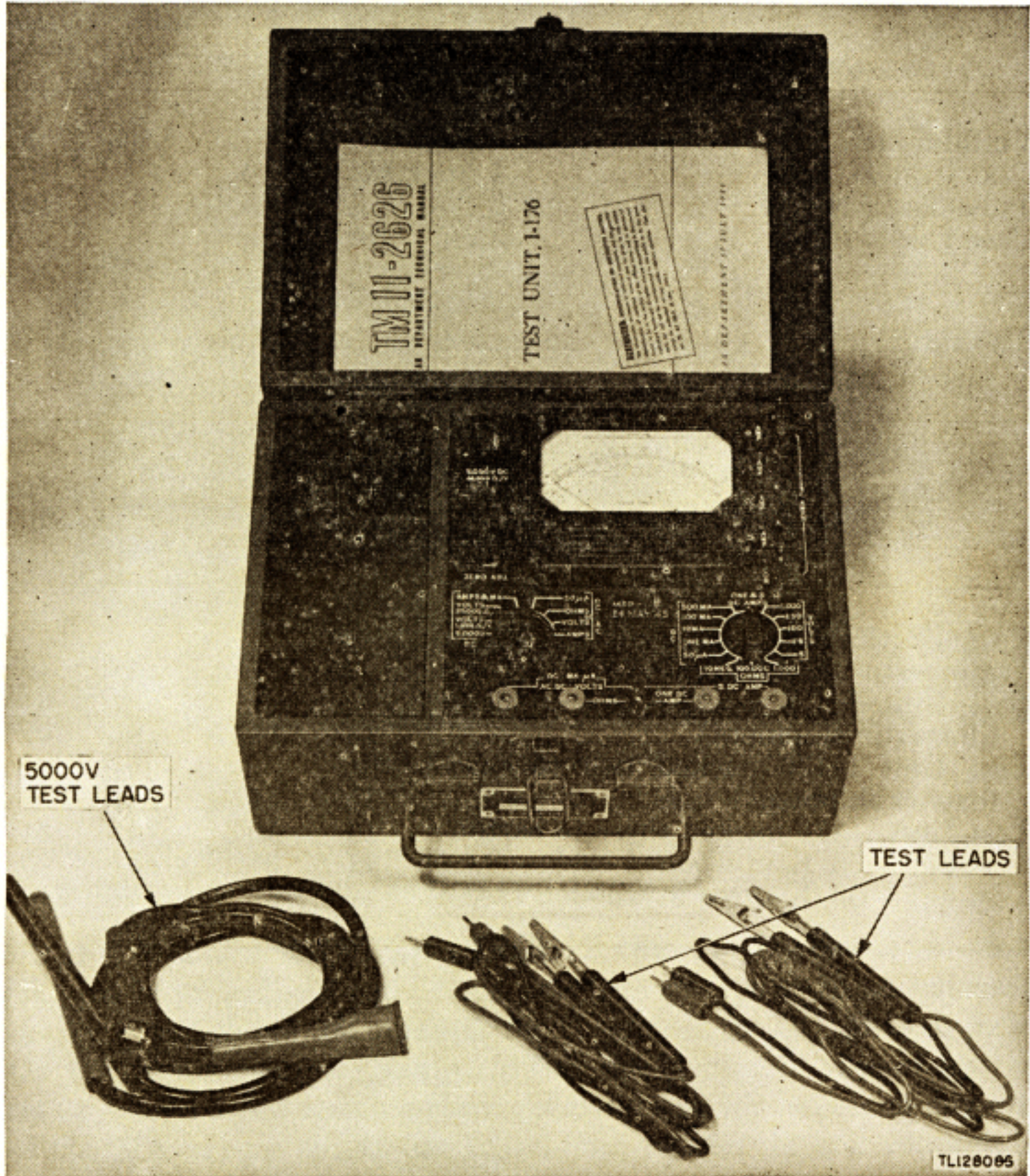


Figure 1.1. Test Unit I-176, in metal case, showing test leads.

2. GENERAL DESCRIPTION.

a. (Superseded). Test Unit I-176 is furnished both separately and as a part of Test Set I-56-K. (See fig. 1.2.) As a part of Test Set I-56-K, the unit fits into a compartment of Carrying Case CS-130. Weights and dimensions of the components of Test Set I-56-K are given below:

<i>Equipment</i>	<i>Dimensions (in.)</i>			<i>Weight (lb)</i>	
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	<i>Wooden case</i>	<i>Metal case</i>
Voltohmeter I-166-----	5½	6	7	4¾	5½
Test Unit I-176-----	5½	11½	8½	9	10
Tube Tester I-177-----	5¾	15½	8½	15¾	16½
Case CS-130-----	14¾	20½	9¾	25¾	-----

The following table gives the dimensions and approximate weights of the packed units.

<i>Equipment</i>	<i>Dimensions (in.)</i>			<i>Weight (lb)</i>
	<i>Height</i>	<i>Width</i>	<i>Depth</i>	
Test Unit I-176 packed individually (domestic shipment)-----	8½	14	10½	10¼
Test Unit I-176 packed two to case (domestic shipment)-----	15¾	14 ⁷ / ₁₆	18¾	42
Test Unit I-176 packed two to case (export shipment)-----	15 ⁵ / ₈	14 ⁷ / ₁₆	18¾	48
Test Unit I-176 packed three to carton-----	14	16	23	21
Test Set I-56-K in wooden case-----	11	21	15	73
Test Set I-56-K three in wooden case--	17½	35	23½	215

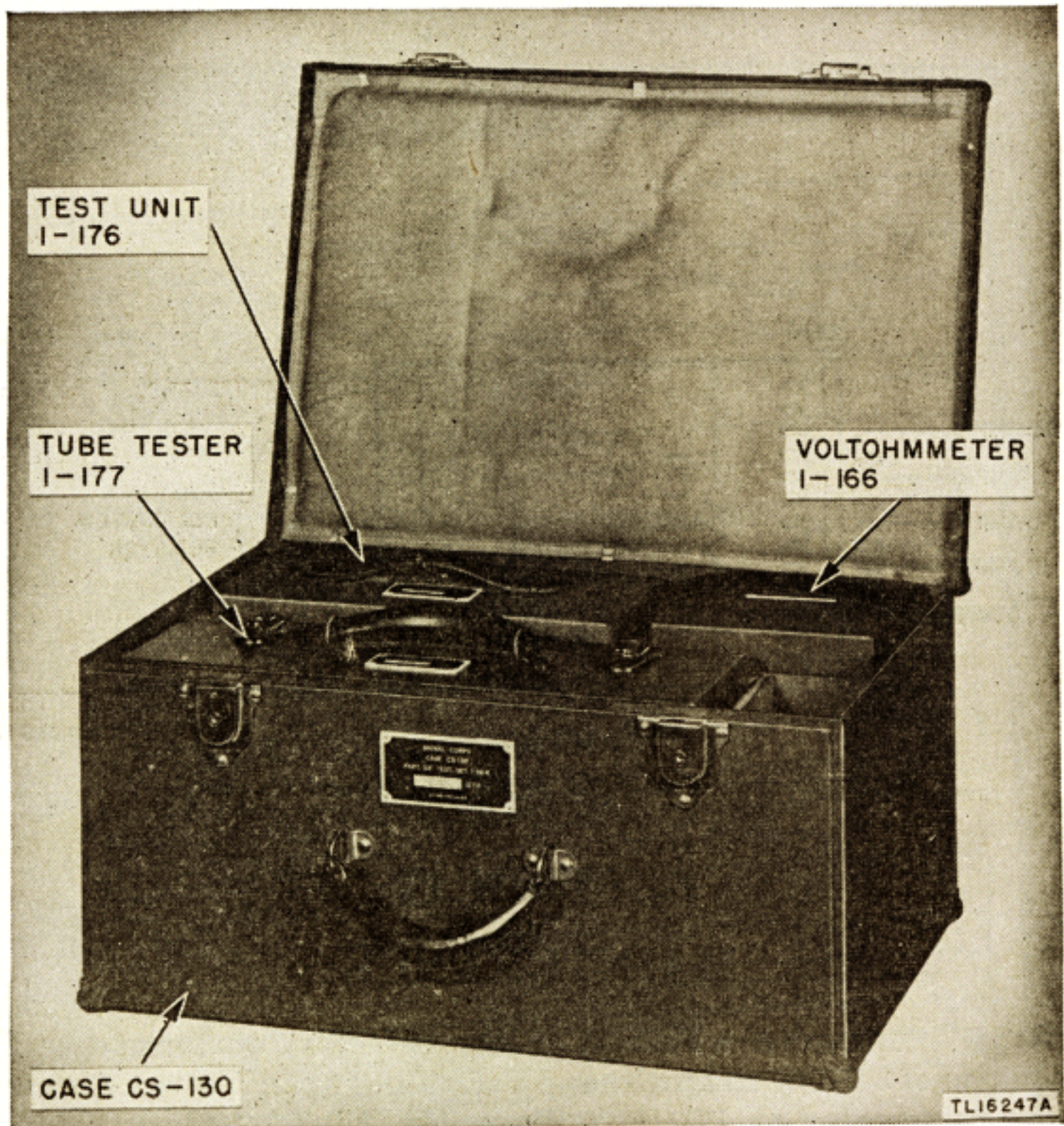


Figure 1.2. Test Set I-56-K.

* * * * *

Figure 5, add arrow to 15,000 \sim ZERO ADJ. control in third diagram as it appears in the first two diagrams.

18. D-C MILLIAMMETER CIRCUIT (fig. 3) (Superseded). Setting the left-hand and right-hand selector switches at $50 \mu\text{A}$ connects the meter and the 16,000-ohm resistor 11 between the DC: MA- μA jacks for the 50-microampere range. With the left-hand selector switch set at AMPS & MA, setting the right-hand selector switch on any one of the MA ranges shorts out 16,000-ohm resistor 11 and connects a suitable shunt resistor across the meter.

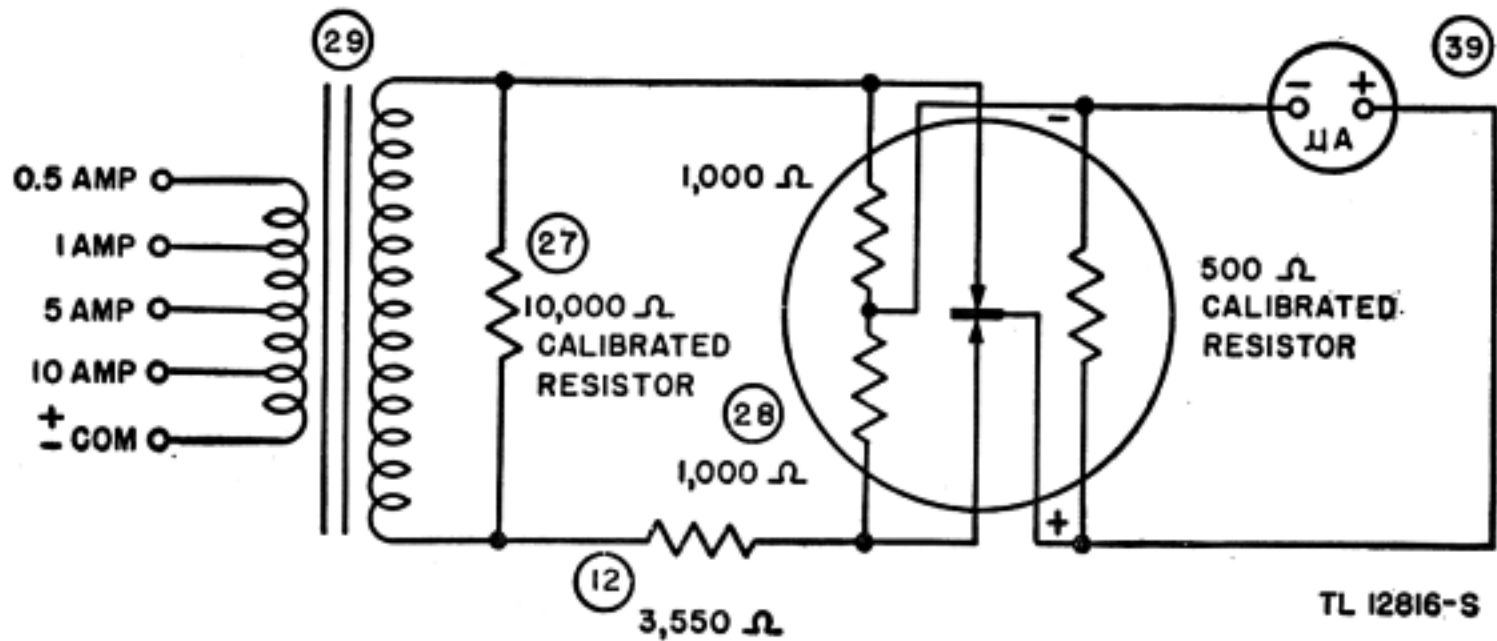


Figure 7. Test Unit I-176, simplified a-c ammeter circuit.

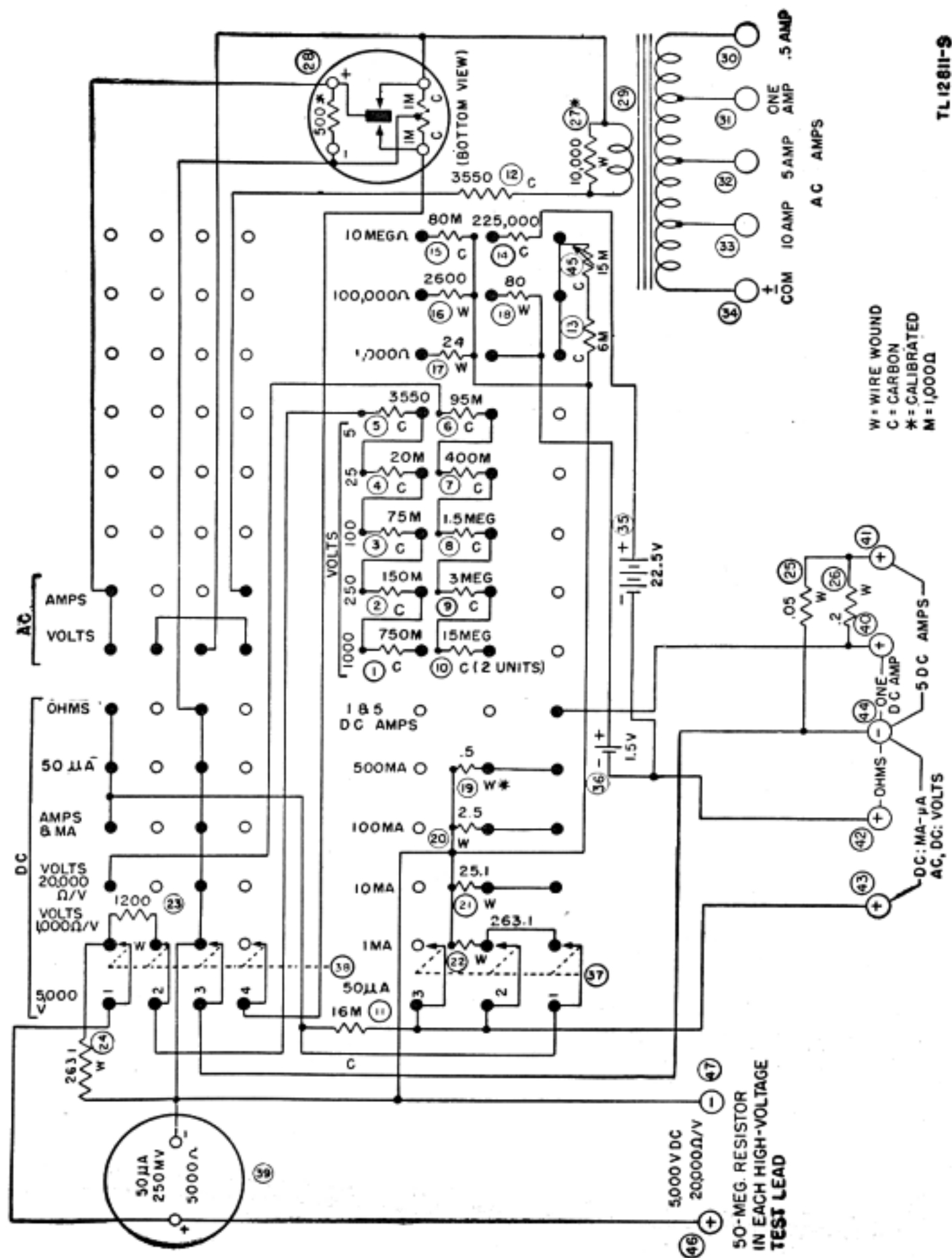
SECTION IV

MAINTENANCE

NOTE (Superseded): Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on WD AGO Form 468 (Unsatisfactory Equipment Report); by Army Air Forces, on Army Air Forces Form 54 (Unsatisfactory Report). If either form is not available, prepare letter containing the data elicited by the sample form reproduced in figure 7.1 without reproducing the form.

WAR DEPARTMENT UNSATISFACTORY EQUIPMENT REPORT									
FOR	TECHNICAL SERVICE Signal Corps	MATERIEL	DATE 1 Feb 45						
FROM	ORGANIZATION 175 Signal Repair Co		STATION APO 102						
TO	NEXT SUPERIOR HEADQUARTERS Supply Sec, Hq Fourth Army Sig Sv	STATION APO 110	TECHNICAL SERVICE Signal Corps						
COMPLETE MAJOR ITEM									
NOMENCLATURE Radio Transmitter BC-123-A		TYPE Ground, vehicular	MODEL A						
MANUFACTURER American Radio Corp		U. S. A. REG. NO. 1234-Phila-45	ORDER NO. 12345						
EQUIPMENT WITH WHICH USED (if applicable) Radio Set SCR-456-A in Tank, Medium, M4		DATE RECEIVED 5 Jan 45							
DEFECTIVE COMPONENT—DESCRIPTION AND CAUSE OF TROUBLE									
PART NO. Sig C	TYPE Capacitor C20; fixed;	MANUFACTURER American Radio Corp	DATE INSTALLED When manufactured						
Stk No. 3B47-2	1-mf; 500 vdcw								
DESCRIPTION OF FAILURE AND PROBABLE CAUSE (if additional space is required, see back of form) Capacitor C20 shorts out due to humid operating conditions									
DATE OF INITIAL TROUBLE 15 Jan 45	TOTAL TIME INSTALLED			TOTAL PERIOD OF OPERATION BEFORE FAILURE					
	YEARS	MONTHS	DAYS	YEARS	MONTHS	DAYS	HOURS	MILES	ROUNDS
	-	-	-	0	0	5			
BRIEF DESCRIPTION OF UNUSUAL SERVICE CONDITIONS AND ANY REMEDIAL ACTION TAKEN Operation in tropics; heavy rainfall. Was replaced and set given moistureproofing and fungiproofing treatment, 20 Jan 45.									
TRAINING OR SKILL OF USING PERSONNEL			RECOMMENDATIONS (if additional space is required, see back of form)						
POOR	FAIR	GOOD	Substitute capacitor designed for tropical operation						
		X							
ORIGINATING OFFICER									
TYPED NAME, GRADE, AND ORGANIZATION E. A. Wilson, 1st Lt, Sig C 175 Signal Repair Co					SIGNATURE <i>E. A. Wilson</i>				
FIRST ENDORSEMENT									
TO CHIEF	TECHNICAL SERVICE	OFFICE			STATION		DATE		
NAME, GRADE, AND STATION									
Instructions									
<p>1. It is imperative that the chief of technical service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in materiel. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.</p> <p>2. This form will be used for reporting manufacturing, design, or operational defects in materiel, petroleum fuels, lubricants, and preserving materials with a view to improving and correcting such defects, and for use in recommending modifications of materiel.</p> <p>3. This form will not be used for reporting failures, isolated materiel defects or malfunctions of materiel resulting from fair wear-and-tear or accidental damage nor for the replacement, repair or the issue of parts and equipment. It does not replace currently authorized operational or performance records.</p> <p>4. Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in AR 700-20 (change No. 2).</p> <p>5. It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as inclosures to the form. Photographs, sketches, or other illustrative material are highly desirable.</p> <p>6. When cases arise where it is necessary to communicate with a chief of service in order to ensure safety to personnel, more expeditious means of communication are authorized. This form should be used to confirm reports made by more expeditious means.</p> <p>7. This form will be made out in triplicate by using or service organization. Two copies will be forwarded direct to the technical service; one copy will be forwarded through command channels.</p> <p>8. Necessity for using this form will be determined by the using or service troops.</p>									
<p>This form supersedes W. D., A. G. O. Form No. 468, 1 December 1943, which may be used until existing stocks are exhausted.</p>									
<p>W. D., A. G. O. Form No. 468 20 August 1944</p>									
<p>U. S. GOVERNMENT PRINTING OFFICE 16-42340-1</p>									
<p>TL19589C</p>									

Figure 7.1. WD AGO Form 468, with sample entries.



TL 12811-9

Figure 9. Test Unit I-176, schematic diagram.

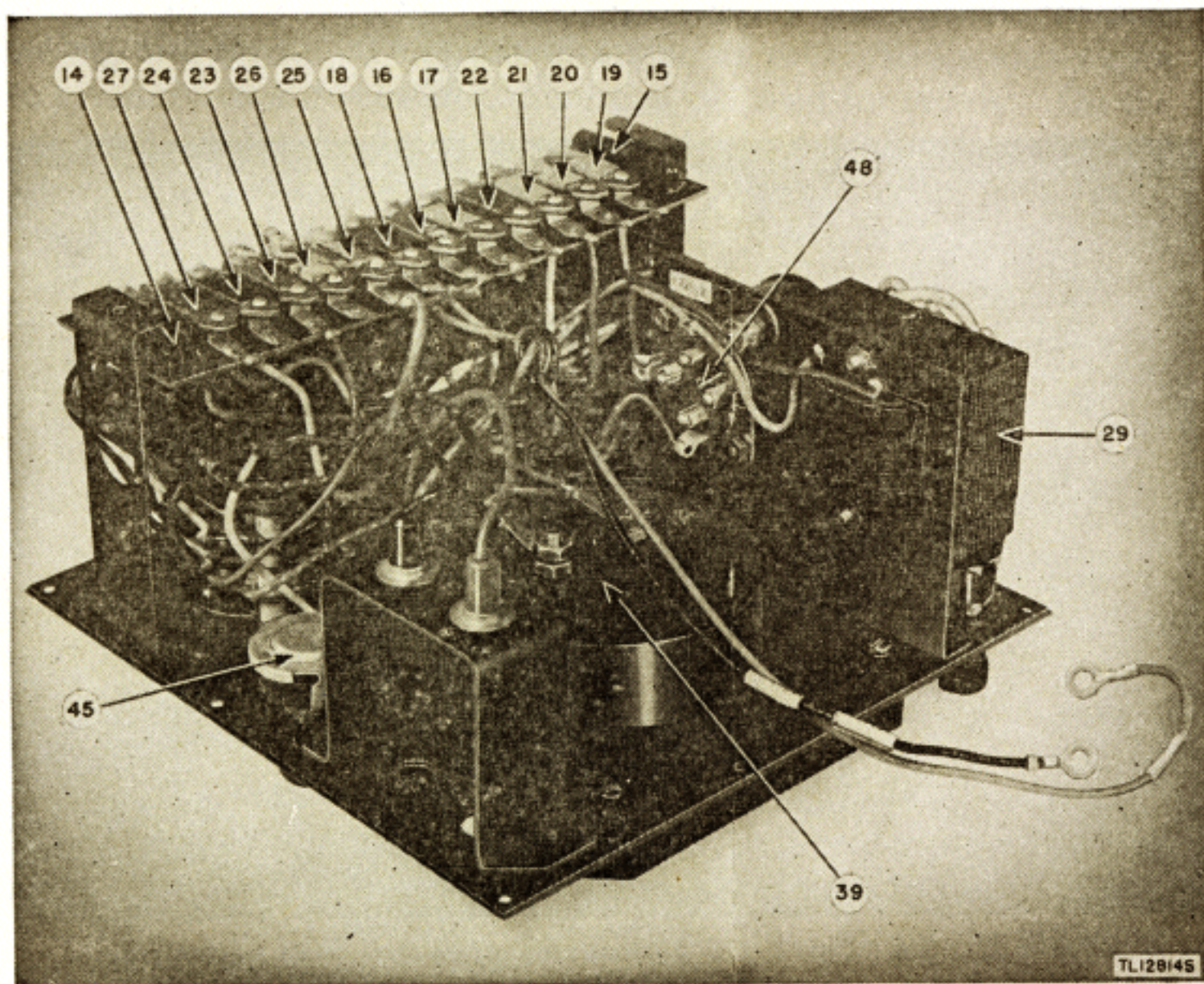


Figure 10. Test Unit I-176, bottom view of chassis from meter side.

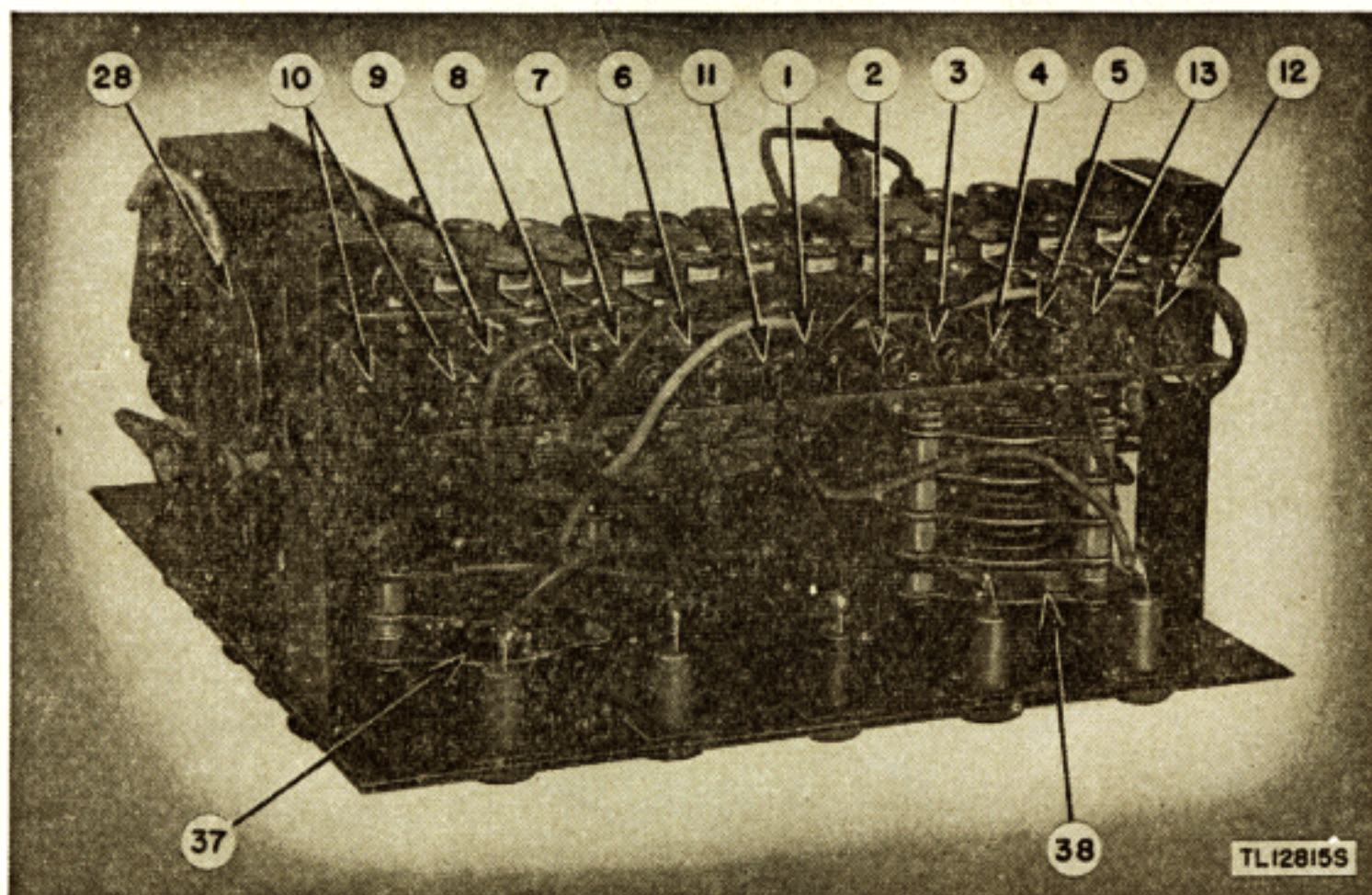


Figure 11. Test Unit I-176, bottom view of chassis from switch side.

26. (Superseded) PREVENTIVE MAINTENANCE TECHNIQUES.

a. Meaning of Preventive Maintenance. Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off, to eliminate major break-downs, unwanted interruptions in service, and to keep equipment operating at top efficiency. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is to *prevent break-downs* and, therefore, the need for repair. On the other hand, the prime function of trouble shooting and repair is to locate and correct *existing* defects. The importance of preventive maintenance cannot be overemphasized. The entire system of communications depends upon the readiness and operating efficiency of each item of equipment when it is needed. In a similar manner, the test equipment by which this condition of readiness in communications equipment is realized must be kept in excellent operating condition at all times.

NOTE: The operations in paragraphs 26, 26.1, and 26.2 are user maintenance.

b. Description of Preventive Maintenance Techniques.

(1) GENERAL. Most of the parts used in Test Unit I-176 require routine preventive maintenance. This preventive maintenance varies. Some parts require a different kind of maintenance than others. Some require more, some less. Definite and specific instructions must be followed. Hit-or-miss techniques cannot be applied. This change contains these specific instructions to guide personnel assigned to perform the six basic maintenance operations: Feel, Inspect, Tighten, Clean, Adjust, and Lubricate. Throughout this change the lettering system for the six operations will be as follows:

F—Feel*
I—Inspect
T—Tighten
C—Clean
A—Adjust
L—Lubricate

The first two operations show if the other four are needed. Selection of operations is based on a knowledge of field needs. For example, dust encountered on dirt roads during cross-country travel filters into

*The Feel operation is not applicable to Test Unit I-176.

equipment no matter how much care is taken to prevent it. Rapid changes in weather (such as heavy rain followed by blistering heat), excessive dampness, snow, and ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary tightening, cleaning, and lubricating operations, equipment becomes undependable and subject to break-down when it is needed most.

(2) **FEEL.*** The feel operation is used most often to check rotating machinery, such as dynamotors, blower motors, and drive motors; also to determine whether electrical connections and bushings are overheated. Feeling will show the need for lubrication or the existence of other defects requiring correction. The maintenance man *must* become familiar with the normal operating temperatures of motors, transformers, and other parts, to recognize signs of overheating.

NOTE: It is important to perform the feel operation as soon as possible after shut-down and always before any other maintenance is done.

(3) **INSPECT.** Inspection is the most important operation in preventive maintenance. A careless observer will overlook evidences of minor trouble. Although these defects may not at the moment interfere with performance of the equipment, invaluable time and effort can be saved if they are corrected *before* they lead to major and costly break-downs. To be able to recognize the signs of a defective set, make every effort to become thoroughly familiar with indications of *normal* functioning. Inspection consists of *carefully* observing all parts of the equipment, noticing their color, placement, state of cleanliness, etc. Inspect for the following conditions:

(a) Overheating, as indicated by discoloration, blistering, or bulging of the parts or surface of the container; leakage of insulating compounds; and oxidation of metal contact surfaces.

(b) Placement, by observing that all leads and cabling are in their original positions.

(c) Cleanliness, by carefully examining all recesses in the units for accumulation of dust, especially between connecting terminals and binding posts. Parts, connections, and joints should be free of dust, corrosion, and other foreign matter. In tropical and high-humidity areas, look for fungus growth and mildew.

(d) Tightness, by testing any connection or mounting which appears to be loose.

(4) **TIGHTEN, CLEAN, AND ADJUST.** These operations explain themselves. Specific procedures to be followed in performing them are given whenever necessary throughout paragraph 26.1.

CAUTION: Screws, bolts, and nuts should not be tightened carelessly. Fittings tightened beyond the pressure for which they are designed will be damaged or broken.

Whenever a loose connection is tightened, it should be moistureproofed and fungiproofed again by applying the varnish with a small brush. See paragraph 27 for details of moistureproofing and fungiproofing.

(5) **LUBRICATE.** Lubrication refers to the application of grease or oil to the bearings of motors or rotating shafts. It may also mean the application of a light oil to door hinges or other sliding surfaces on the equipment.

26.1. ITEMIZED PREVENTIVE MAINTENANCE (Added).

a. Introduction. For ease and efficiency of performance, preventive maintenance on Test Unit I-176 will be broken down into operations that can be performed at different time intervals. In this change the preventive maintenance work to be performed on the test unit at the specific time intervals is broken down into units of work called items. The general techniques involved and the application of the FITCAL operations in performing preventive maintenance on individual parts are discussed in this paragraph. When performing preventive maintenance, see *c* through *f* below. Perform all work with the power removed from the equipment. After preventive maintenance has been performed on a given day, put the equipment into operation and check it for satisfactory performance.

b. Preventive Maintenance Tools and Materials. The following preventive maintenance tools and materials will be needed:

Common hand tools.

Clean cloth.

#0000 sandpaper.

Dry-cleaning solvent (SD).

NOTE: Gasoline will not be used as a cleaning fluid for any purpose. Solvent, dry-cleaning is available as a cleaning fluid through established supply channels. Oil, Fuel, Diesel, may be used for cleaning purposes when dry-cleaning solvent (SD) is not at hand. Carbon tetrachloride will be used as a cleaning fluid only in the following cases: Where inflammable solvents cannot be used because of the fire hazard, and for cleaning electrical contacts including relay contacts, plugs, commutators, etc.

c. Item 1, Outside of Case.

(1) **INSPECT.** Inspect for general cleanliness and condition of protective coating of paint. See that the hinges, the snap fastener, and the carrying handle are securely attached to the case.

(2) **TIGHTEN.** If the hinges, the snap fastener, or the carrying handle are loose and cannot be tightened by using personnel, return the test unit to a higher echelon for repair as soon as possible.

(3) **CLEAN.** Dust, grease, mud, etc., should not be allowed to accumulate on the case. As the meter is a delicate, precision instrument, every effort should be made to prevent such foreign matter from entering the case.

(4) **LUBRICATION.** Apply a light coat of oil to the hinge pins, the pivots of the snap fastener, and the carrying handle. *If the equipment is used in an extremely dusty location, omit this operation.*

d. Item 2, Panel.

(1) **INSPECT.** Check the tip jacks for proper tension of contact surfaces. Check smoothness of operation of the OHMS ZERO ADJ. and selector switches. Check all parts on the panel (including binding posts), for security of mounting.

(2) **TIGHTEN.** Loose parts which can be tightened from the outside should be taken care of by using personnel; otherwise the work should be done by a higher echelon.

(3) **CLEAN.** Remove all dirt and grease from the panel and lead compartment with a dry cloth or, if necessary, a cloth dampened with dry-cleaning solvent (SD).

a. Item 3, Meter.

(1) **INSPECT.** Check the cover glass for cracks or looseness. Since dust and moisture may enter through a broken or loose glass, the accuracy and efficiency of the meter may be seriously affected.

(2) **CLEAN.** Clean the glass and case with a dry cloth or, if necessary, one slightly dampened with dry-cleaning solvent (SD).

(3) **ADJUST.** Normally, the meter in Test Unit I-176 should indicate zero when the unit is not connected to a circuit and the selector switches are not set on OHMS. The procedure for setting a meter to zero is not difficult. The tool required is the thinnest bladed screw driver available. Before deciding that a meter needs readjusting, tap the meter case *lightly* with the tip of one finger. This will help the meter to overcome the slight friction which sometimes exists at the bearings and prevents an otherwise normal unit from coming to rest at zero. If adjustment is needed, insert the tip of the screw driver in the slotted screw head located below the meter glass and *slowly* turn the adjusting screw until the pointer is at zero. Lightly tap the meter case again and view the meter face and pointer *full on* and not

from either side. Avoid turning the screw too far, because the needle may be bent or the hairspring damaged.

f. Item 4, Test Lead Sets.

(1) **INSPECT.** Look for worn or cracked insulation on the leads and prods. Check for loose or corroded connections between leads and test prods.

(2) **TIGHTEN.** Any loose connections found should be tightened.

(3) **CLEAN.** Corroded connections should be cleaned before tightening. Corroded test prods may be cleaned with #0000 sandpaper. Do not sand any more than is necessary to remove the corrosion.

26.2. PREVENTIVE MAINTENANCE CHECK LIST (Added).

The following check list is a summary of the preventive maintenance operations to be performed on Test Unit I-176. The time intervals shown on the check list may be reduced at any time by the local commander. For best performance of the equipment, perform operations at least as frequently as called for in the check list. Operations are indicated by the letters of the word **FITCAL**. For example, if the letters **ITCA** appear in the "Operations" column, the item to be treated must be inspected (**I**), tightened (**T**), cleaned (**C**), and adjusted (**A**).

Item No.	Operations	Item	When performed			
			Before operation	Daily	Weekly	Monthly
1	ITC	Outside of case		X		
1	L	Outside of case				X
2	ITC	Panel		X		
3	A	Meter	X			
3	IC	Meter		X		
4	ITC	Test lead sets			X	

NOTE: X indicates when operations are to be performed.

F	I	T	C	A	L
Feel*	Inspect	Tighten	Clean	Adjust	Lubricate

*The Feel operation is not applicable to Test Unit I-176.

27. MOISTUREPROOFING AND FUNGIPROOFING.

* * * * *
b. Treatment. A moistureproofing and * * * a spray gun. See TB SIG 13 for a detailed description of the varnish-spray method of moistureproofing and fungiproofing and the supplies and equipment required in this treatment. A brief description * * * of application follows:

* * * * *
c. Step-by-step Instructions.
(1) DISASSEMBLY.

* * * * *
(e) (Superseded). The battery bracket is fastened with rivets in metal cases. In wooden cased models, remove four screws and lock-washers holding battery bracket to case; remove bracket.

* * * * *
(5) VARNISHING.
(a) (Superseded). Spray three coats of moistureproofing and fungiproofing varnish (Lacquer, Fungus-resistant, Signal Corps Stock No. 6G1005.3, or equal) on all components, including inside of cases. Allow each coat to air-dry for 15 or 20 minutes before applying the next coat.

* * * * *
(6) REASSEMBLY.
(c) (Superseded). Mark the letters MFP and the date of treatment on the panel, between the two switches, just below the meter.

Example: MFP—21 May 45.

* * * * *
d. Moistureproofing and Fungiproofing after Repairs (Added). If, during repair, the protective coating of varnish has been punctured or broken, and if complete treatment is not needed to reseal the equipment, apply a brush coat to the affected part. Be sure the break is completely sealed.

29. RESISTOR COLOR CODE.

	A	B	C	
Color	1st digit	2d digit	Multiplier	Tolerance code
	*	*	*	*
Black	-----	0	-----	1.0 Silver: 10%
	*	*	*	*

31. MAINTENANCE PARTS LIST FOR TEST UNIT I-176.

NOTE (Superseded) : This table is to be used for reference purposes only ; not for requisitioning of parts.

Ref. symbol	Signal Corps stock No.	Name and part and description	Quan. per unit	Running spares	Orgn. stock	3d ech.	4th ech.	5th ech.	Depot stock
* 26	3Z5972-4	* RESISTOR: fixed; wire-wound; 0.2-ohm \pm 1%; 1-watt.	1	*	*	*	*	*	*
19	3Z5985-3	RESISTOR: fixed; wire-wound; 0.5-ohm \pm 1%; 1-watt; special.	1	---	---	---	---	---	*
20	3Z5992-21	* RESISTOR: fixed; wire-wound; 2.5-ohm \pm 1%; 1-watt.	1	---	---	*	*	*	*
* 27	3Z6610-139	* RESISTOR: fixed; wire-wound; 10,000-ohm \pm 1%; 1-watt; special.	1	---	---	---	---	---	*
11	3Z6616-8	RESISTOR: fixed; carbon; 16,000-ohm \pm 1/2% - 1 1/2%; 1-watt; check at 800 μ a.	1	---	---	---	---	---	*
*	*	*	*	*	*	*	*	*	*

32. MAINTENANCE PARTS FOR TEST SET I-176 (Added). The following information was compiled on 21 May 1945. The appropriate pamphlets of the ASF Signal Supply Catalog for Test Unit I-176 are:

Higher echelon spare parts

SIG-8-I-56

SIG-8-I-176

For an index of available catalog pamphlets, see the latest issue of ASF Signal Supply Catalog SIG 2.

[AG 300.7 (25 Jun 45)]

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Refer to FM 21-6 for explanation of distribution formula.



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