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WAR DEPARTMENT

TECHNICAL MANUAL

MAINTENANCE EQUIPMENT ME-13-D

June 25, 1943

TM 11-306D

SUPERSEDED

HISTORICAL

WAR DEPARTMENT

Washington, June 25, 1943

This Technical Manual, published by The Templetone Radio Company on order No. 25279-Phila-43, is furnished for the information and guidance of all concerned.

N O T E :

Refer to TM 11-605(*) and TM 11-615(*) for information on the radio sets with which Maintenance Equipments ME-13-(*) will be used.

TECHNICAL MANUAL

WAR DEPARTMENT

No. 11-306D

Washington, June 25, 1943

SUPERSEDED

MAINTENANCE EQUIPMENT ME-13-D

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SAFETY NOTICE

WHEN EQUIPMENT WITH WHICH MAINTENANCE EQUIPMENT ME-13-D IS USED IS TAKEN OUT OF ITS CASE, BE CAREFUL. HIGH VOLTAGES OF 150 AND 90 VOLTS DIRECT CURRENT ARE PRESENT AT SEVERAL POINTS ON TOP OF THE CHASSIS OF SUCH EQUIPMENT AS WELL AS UNDERNEATH IT.

DESTRUCTION NOTICE

To prevent the enemy from using or salvaging this equipment for his benefit, or when ordered by your commander, or when you are in immediate danger of capture, destroy this equipment by:

1. Removing screws holding the panels of Voltohmmeter I-107-D and Oscillator VO-4-D. Then:
 2. Smash tubes, switches, sockets, meter, resistors, capacitors, adapters and dials.
 3. Cut all wiring, cables and cords.
 4. Smash panels and shafts.
 5. Destroy wire assembly, books, papers, records, notes, tables, charts, and messages.

USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

DESTROY EVERYTHING.

Section I

DESCRIPTION

1. GENERAL.—Maintenance Equipment ME-13-D is a set of instruments and tools necessary to align and maintain Radio Sets SCR-509-(*), SCR-510-(*), SCR-609-(*), and SCR-610-(*).

2. POWER.—Maintenance Equipment ME-13-D instruments are battery-operated, and the proper batteries are contained, along with the rest of the equipment, in Chest CH-71-C.

3. LIST OF COMPONENTS.—The components of Maintenance Equipment ME-13-D are packed in Chest CH-71-C. The total weight is 34 pounds. The dimensions of Chest CH-71-C are 15-7/16 x 12¹/₈ x 8-1/16 inches.

Quantity	Article	Weight	Stock No.
1	Adapter RS-259	.9 lbs.	2Z294-259
1	Alignment Tool TL-150	.1 "	6Q338-150
4	Batteries BA-30	.2 " ea.	
1	Battery BA-40	6.2 "	
1	Chest CH-71-C	15.2 "	2Z2571C
1	Oscillator VO-4-D	1.7 "	3F3574D
1	Screwdriver TL-15	.1 "	6R15210
2	Technical Manuals	.1 "	6D13091
1	Test Cable	.1 "	
1	Tube M-295	.9 "	2Z10795
2	Tube VT-185	.05 " ea.	2T185
2	Tube VT-239	.05 " ea.	2T239
1	Voltohmmeter I-107-D	7.6 "	3F7107D
1	Wrench 5/16 inch	.1 "	6R57413

4. TOOLS.—

a. Alignment Tool TL-150 is an insulated tool to fit the top of the trimmer capacitors in the radio sets with which Maintenance Equipment ME-13-D is used. All alignment of these capacitors shall be done with this tool.

b. Screwdriver TL-15 is a standard, medium-size screwdriver for general use such as opening cases of instruments and radio sets.

(*) This indicates that the equipment will be supplied with suffix letter such as A, B, or C, etc.

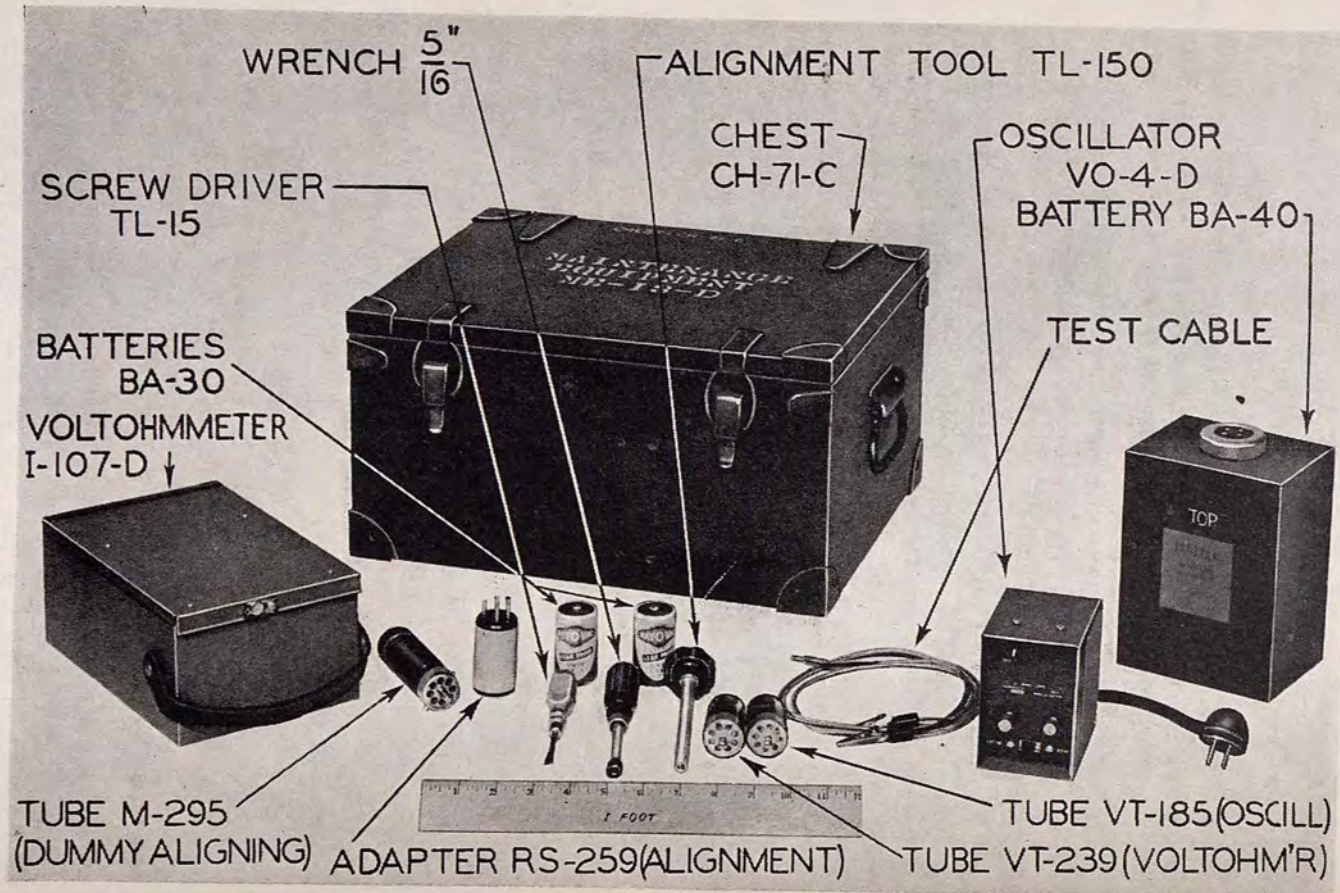


Fig. 1—MAINTENANCE EQUIPMENT ME-13-D, COMPONENTS

c. *Wrench*, 5/16 inch, fits the locknuts at the top of the trimmer capacitors in the radio sets with which Maintenance Equipment ME-13-D is used.

5. **ADAPTER RS-259.**—This adapter is for aligning Radio Sets SCR-509-(*), SCR-510-(*), SCR-609-(*), and SCR-610-(*). It plugs into the transmitter Battery BA-39, thereby placing a 500-ohm, 5-watt resistance in series with the high voltage lead.

6. **TUBE M-295 (DUMMY ALIGNING).**—This tube is for aligning Radio Sets SCR-509-(*), SCR-510-(*), SCR-609-(*), and SCR-610-(*).

7. **OSCILLATOR VO-4-D.**—This instrument is a signal generator which provides either of two frequencies, 2.88 megacycles or 4.3 megacycles, for aligning the intermediate frequency stages and the discriminator of Radio Sets SCR-509-(*), SCR-510-(*), SCR-609-(*), and SCR-610-(*).

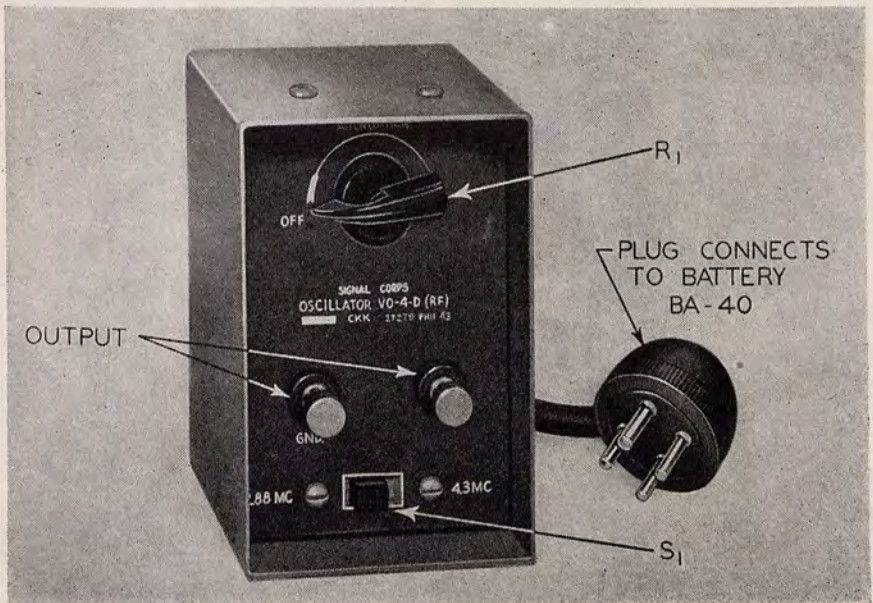


Fig. 2—OSCILLATOR VO-4-D, SHOWING BATTERY PLUG

8. **VOLTOHMMETER I-107-D.**—This instrument is a high-sensitivity, multi-range vacuum tube voltmeter and ohmmeter providing the following ranges:

a. *D-C volts:* 0 to 3, 0 to 10, 0 to 30, 0 to 100, 0 to 300.

b. *Ohms:* 0 to 1,000 (Rx1), 0 to 10,000 (Rx10), 0 to 100,000 (Rx100), 0 to 1 megohm (Rx1000), 0 to 10 megohms (Rx10,000).

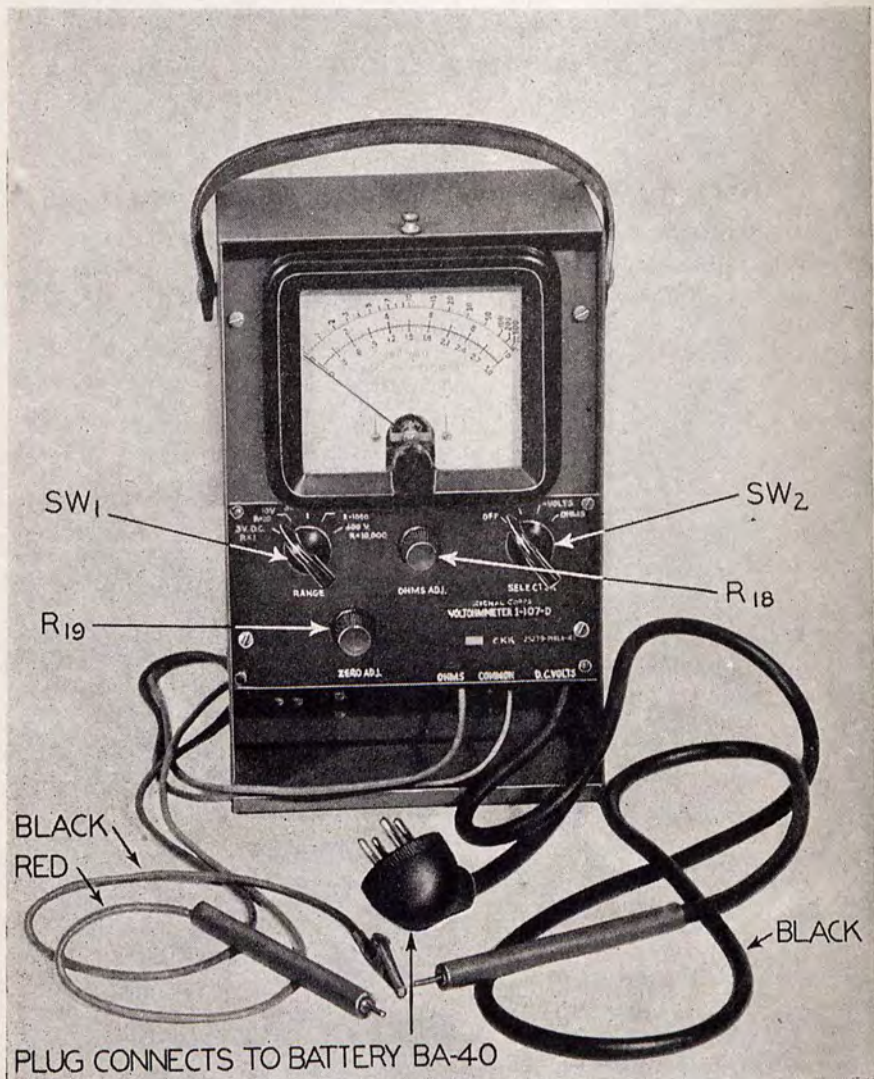


Fig. 3—VOLTOHMMETER I-107-D, SHOWING TEST LEADS AND BATTERY PLUG

Section II

INSTALLATION AND PREPARATION FOR USE

9. REMOVING FROM CHEST CH-71-C.—

a. To obtain any part of Maintenance Equipment ME-13-D, open Chest CH-71-C by unsnapping the two catches and raising the lid.

b. *Voltohmmeter* I-107-D has a lid on its box. Remove the lid by unsnapping the catch and sliding the lid toward the top of the instrument. (The top has a leather handle.)

10. OSCILLATOR VO-4-D.—

a. Power.—Plug the 4-prong male plug into a Battery BA-40.

b. Frequency.—To use in aligning Radio Receiver and Transmitter BC-620-(*), a part of Radio Sets SCR-509-(*), and 510-(*), or in aligning Radio Receiver and Transmitter BC-659-(*), a part of Radio Sets SCR-609-(*), and 610-(*): Push the slide switch in a horizontal direction to the proper frequency marking (2.38 mc or 4.3 mc) for the intermediate frequency of the set being aligned.

c. Test Cable.—Connect outside shield of the test cable (kept in small compartment of Chest CH-71-C) to the GND. terminal and connect the inside lead to other terminal of the oscillator.

11. VOLTOHMMETER I-107-D.—

a. Power.—Plug the 4-prong male plug into a Battery BA-40.

b. D-C Voltage Measurements.—

(1) Turn SELECTOR switch to either (+) VOLTS or (—) VOLTS position. (The sign refers to the polarity of the D-C VOLTS lead.)

(2) Turn RANGE switch to the desired voltage range. (IF MAKING TEST AT A POINT WHERE VOLTAGE IS UNKNOWN, USE THE 300V. RANGE FIRST.)

(3) Short the COMMON and D-C VOLTS test leads together.

(4) Turn ZERO ADJ knob until meter pointer coincides with the zero line of the D-C VOLTS scale.

c. Resistance Measurements.—

- (1) Turn SELECTOR switch to OHMS.
- (2) Turn RANGE switch to desired ohms range.
- (3) Short the COMMON and OHMS test leads together.
- (4) Turn the ZERO ADJ knob until meter pointer coincides with the zero line of the OHMS scale.
- (5) Separate the COMMON from the OHMS test lead.
- (6) Turn OHMS ADJ knob until meter pointer coincides with the full scale (∞) mark setting. (See paragraph 15c if meter pointer fails to reach the full scale (∞) mark.)

Section III**OPERATION****12. OSCILLATOR VO-4-D.—**

a. Clip the alligator connector of the shield on the test cable to the chassis of the radio set to be aligned.

b. Clip the inside lead in accordance with the alignment instructions of the radio set under test.

c. Rotate the ATTENUATOR switch clockwise (to the right) for the position of the lowest signal level. Then rotate in the reverse direction (counter clockwise) until the desired signal level is obtained.

13. VOLTOHMMETER I-107-D.—**a. D-C Voltage Measurements.—**

(1) Clip alligator connector of the COMMON lead to the chassis of the radio set to be tested. Apply the prod of the D-C VOLTS lead to the circuit point where voltage is to be measured. (If meter swings to the left, the SELECTOR switch polarity must be reversed.)

(2) Read D-C Volts on upper, 0 to 10, or lower, 0 to 3.0, scales as follows:

For 3 volt range, read directly on lower, 0 to 3, scale.

For 10 volt range, read directly on upper, 0 to 10, scale.

For 30 volt range, read on 0 to 3 scale and multiply by 10.

For 100 volt range, read on 0 to 10 scale and multiply by 10.

For 300 volt range, read on 0 to 3 scale and multiply by 100.

b. Resistance Measurements.—

(1) Clip alligator connector of the COMMON lead to one end of the resistance to be measured and apply the prod of the OHMS lead to the other end.

(2) Read the uppermost scale (OHMS) and multiply by the number corresponding to the position of the RANGE switch.

Section IV
MAINTENANCE

14. OSCILLATOR VO-4-D.—Should the instrument fail to deliver the required signal, proceed as follows:

a. Replace Battery BA-40.

b. Remove the four screws from the top and back of the box. Remove the oscillator from the box by grasping the terminals and pulling forward.

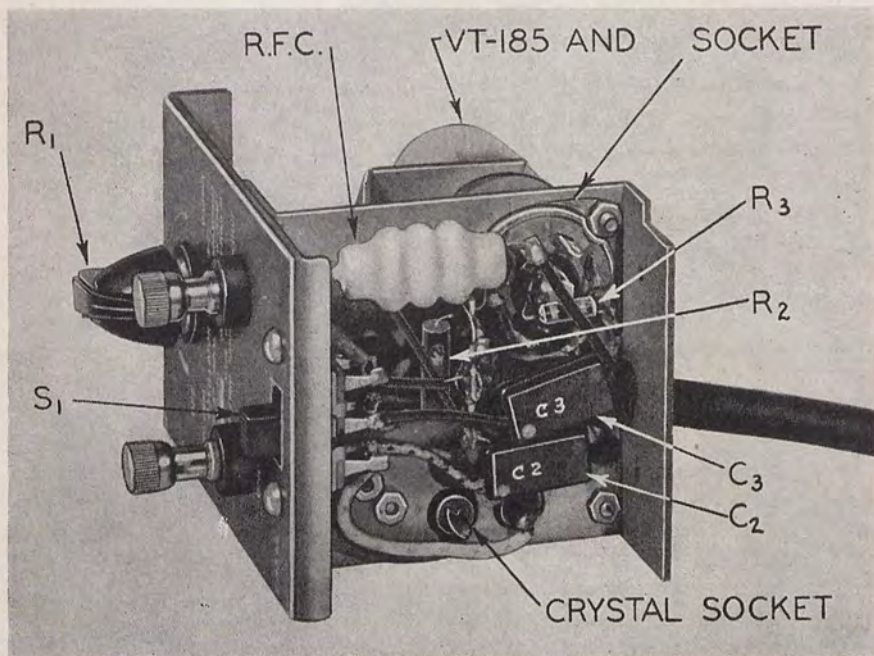


Fig. 4—OSCILLATOR VO-4-D, BOTTOM VIEW

c. Replace Tube VT-185 (6-32" x 5/16" machine screw nut must be loosened so that the retaining bracket will allow the tube to be removed from its socket.)

d. Replace the doubtful crystal.

e. Check values of circuit components with values shown in the circuit diagram attached to the outside of the oscillator box and Fig. 6.

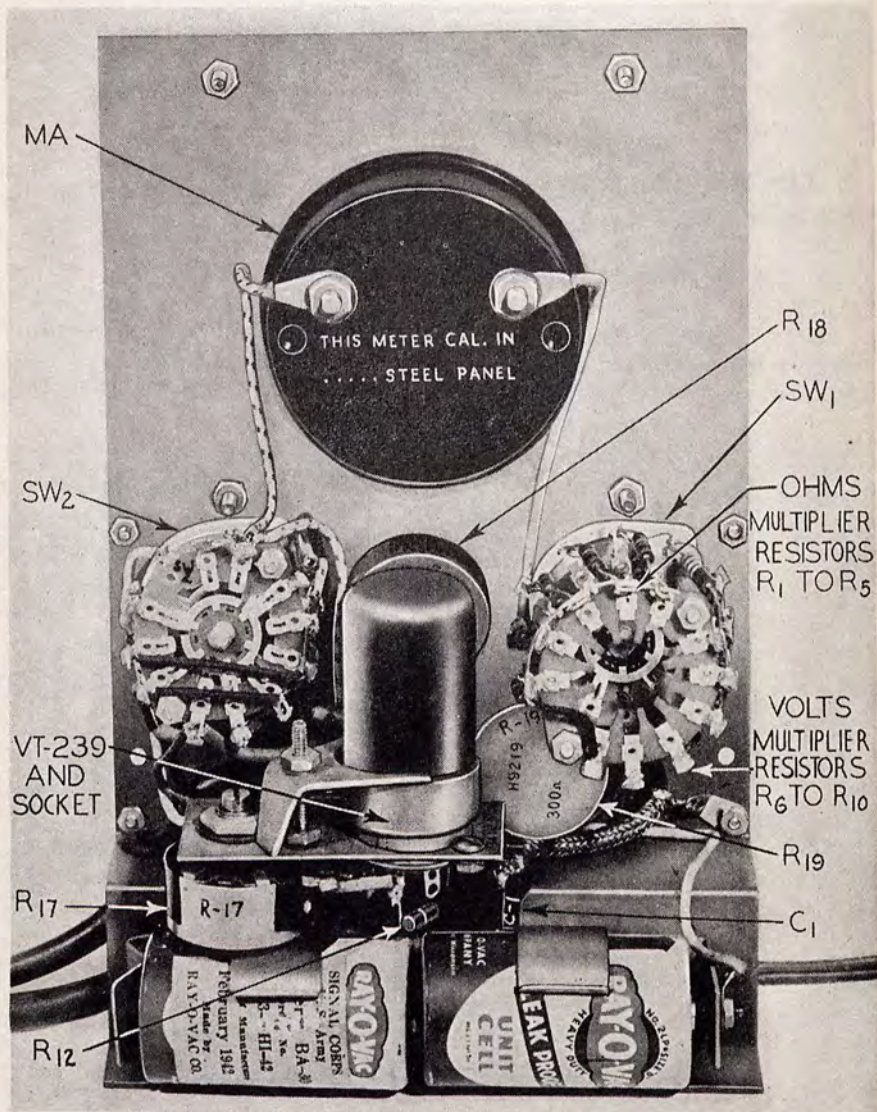


Fig. 5—VOLTOHMMETER I-107-D, REAR VIEW

15. VOLTOHMMETER I-107-D.—

a. Meter pointer is zeroed with SELECTOR switch at OFF by rotating the bakelite ZERO ADJ knob on the front of meter case.

b. If the ZERO ADJ knob can no longer make the meter pointer coincide with the zero lines of the scales, replace Battery BA-40.

c. If the OHMS ADJ knob can no longer make the meter pointer coincide with the full scale (∞) mark, open the instrument and replace the two Batteries BA-30 as follows:

(1) Remove the four screws from the front panel and pull the panel from the box by grasping the edges of the meter between the thumb and forefinger.

(2) Replace the two Batteries BA-30 in the spring clamp assembly, making certain the positive (center) terminals face towards the insulated contact marked +3V.

d. Should the instrument still fail to operate properly, proceed as follows:

(1) Replace Tube VT-239 (6-32" x 5/16" machine screw nut must be loosened so that the retaining bracket will allow the tube to be removed from its socket). Voltohmmeter calibration accuracy may be affected. Check calibration as follows, after tube is locked into its socket:

Connect Battery BA-40. Set SELECTOR switch to (+) VOLTS. Set RANGE switch to 3 V. D-C position. Short the COMMON and D-C VOLTS TEST LEADS together and turn ZERO ADJ control knob until meter pointer rides at zero line of scale plate. Touch alligator clip of COMMON test lead to outside shell (negative) of a fresh Battery BA-30. Touch D-C VOLTS prod to center brass (positive) terminal of same Battery BA-30. Meter should deflect to almost 1.6 volts. If it does not, rotate the control shaft (mounted on Tube VT-239 socket plate) with a screwdriver until meter reads 1.6 volts. Instrument is now fully calibrated until it becomes necessary again to replace Tube VT-239.

(2) Check values of circuit components with the circuit diagram attached inside lid of the box.

SECTION V
SUPPLEMENTARY DATA

16. TABLE OF REPLACEABLE PARTS, ME-13-D.
a) VOLTOHMMETER I-107-D

QUANT.	REF. No.	STOCK No.	NAME OF PART	DESCRIPTION	FUNCTION	**MFR.	DWG. No.
1	MA	3F7107C/A1	Milliammeter	D.C. M.A. 0.4MA. approx. 450 ohms 4" Case (special)	Voltage & ohms indicator	7	†418
2		2Z5844	Pointer Knob	1¼" Knob Cat. 2150	Range & Selector switch knobs	6	†418
1	VT-239	2T-239	VT-239 Tube	RMA Type No. 1LE3	Voltohmmeter vacuum tube	14	
1	Red	3F7107C/L1	Lead (test)	Voltohmmeter lead (special) with isolating resistor R-11	D-C Volts test lead	11	†418
1	Blue	3F7107C/L3	Lead (test)	Ohms lead (special)	Resistance test lead	11	†418
1	Black	3F7107C/L2	Lead (test)	Common Lead (special)	Common test lead	11	†418
1	SW-1	3F7107C/S1	Switch	Range switch with resistors R-1 to R-10 mounted (special)	Volts & ohms range switch	11	†418
1	SW-2	3Z9827.36	Switch	Selector switch (special)	Off & polarity reversing switch	9	†418
2		2Z5762	Knob	¾" Taper Knob black	Ohms & zero adjustment	6	†A385
1	C-1	3DA1-34	Capacitor	.001 µf mica MWW	Input filter capacitor	8	
1	R-12	3Z6801	Resistor	1.0 meg. ½ watt 5% type EB ½	Input filter resistor	1	
1	R-13	2Z5667/15	Resistor	1000 ohms ½ watt 5% type EB ½	Adj. limit resistor	1	
1	R-14	3Z6390-2	Resistor	3900 ohms ½ watt 5% type EB ½	Bridge resistor	1	
1	R-15	3Z6056	Resistor	560 ohms ½ watt 5% type EB ½	Bridge resistor	1	
1	R-16		Resistor	18,000 ohms ½ watt 5% type EB ½	Bridge resistor	1	
1	R-17	2Z7262-3M	Potentiometer	3000 ohms W.W. Cat. 802	Tube adjustment	4	
1	R-18	2Z7262-5M	Potentiometer	5000 ohms W.W. Cat. 802	Ohms adjustment	4	
1	R-19	2Z7262-3	Potentiometer	300 ohms W.W. Cat. 802	Zero adjustment	4	

(Continued on page 13)

†Contractor's drawing No.

* Signal Corps drawing No. **See list of manufacturers on page 15.

16. TABLE OF REPLACEABLE PARTS, ME-13-D.
b) OSCILLATOR VO-4-D

QUANT.	REF. No.	STOCK No.	NAME OF PART	DESCRIPTION	FUNCTION	**MFR.	DWG. No.
1		2Z5844	Pointer Knob	1¼" knob Cat. 2150	Attenuator Knob	6	†419
1	VT-185	2T-185	VT-185 Tube	RMA Type No. 3D6/1299 (JAN 3D6/1299)	Oscillator Tube	14	
1	X-1	2Z3543-4300	FT-243 Crystal	4300 kc crystal and holder	Frequency control	2	*SC-A-6306; †A347A
1	X-2	2Z3543-2880	FT-243 Crystal	2880 kc crystal and holder	Frequency control	2	*SC-A-6306
1	R.F.C.	3C321-1	R.F. Choke	Pie-wound choke, 1.2 M.H. (special)	Oscillator screen choke	10	†A369
1	R-1	2Z7292-150	Attenuator	150 ohm Pot. with switch (special)	Oscillator output control	3	
1	R-2	3Z6100-9	Resistor	1000 ohm ½ watt 5% type EB ½	Plate resistor	1	
1	R-3	3Z6650-10	Resistor	50,000 ohm ½ watt 5% type EB ½	Grid resistor	1	
1	C-1	3DA2.400-1	Capacitor	.0025 µf mica	Output coupling capacitor	8	
1	C-2	3DA1-91	Capacitor	.001 µf mica	Plate & screen bypass capacitor	8	
1	C-3	3DA1-91	Capacitor	.001 µf mica	Crystal coupling capacitor	8	
1	S-1	3Z9700	Switch	D.P.D.T. slide switch Cat. 726	Frequency selector switch	12	

(Continued on page 14)

†Contractor's drawing No.

* Signal Corps drawing No.

**See list of manufacturers on page 15.

16. TABLE OF REPLACEABLE PARTS, ME-13-D.
c) MISCELLANEOUS PARTS

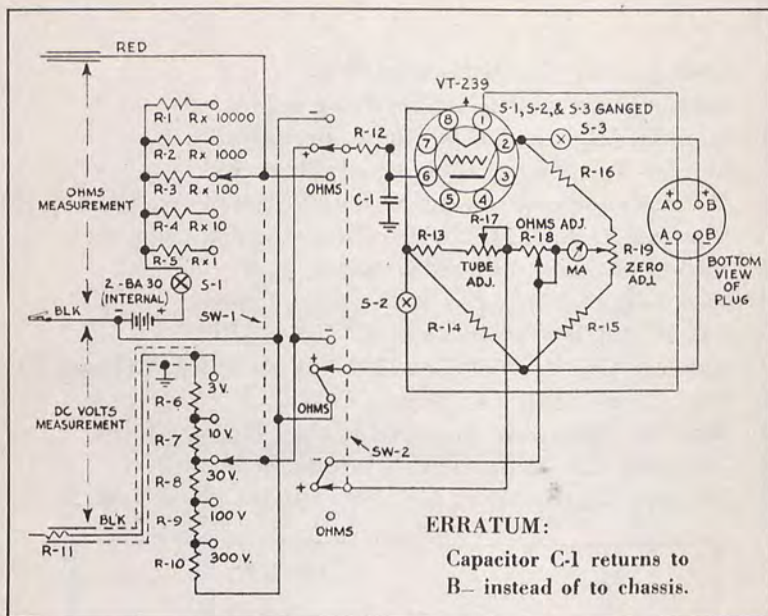
QUANT.	REF. No.	STOCK No.	NAME OF PART	DESCRIPTION	FUNCTION	**MFR.	DWG. No.
1		3F3574C/B1	Base	Chassis base (special)	Oscillator chassis base	11	†386
1		3F3574C/P1	Panel	Front panel, engraved (special)	Oscillator front panel label	11	†367; †A352
1		3F7107C/C2	Cover	Oscillator case (special)	Oscillator housing	11	†351B
1		3F7107C/P1	Panel	Voltohmmerter chassis panel (special)	Chassis mounting panel	11	†367; †382B
1		3F7107C/P2	Panel	Front panel, engraved (special)	Voltohmmerter controls label	11	†470D
1		6Z4996-1	Handle	Leather handle (special)	Voltohmmerter case handle	11	†A360
1		3F7107C/C1	Case	Voltohmmerter housing (special)	Voltohmmerter housing	11	†359A
1		3F7107C/C2	Cover	Protective cover (special)	Voltohmmerter case cover	11	†362
1		2Z2571C	Chest Ch-71-C	Carrying case (special)	Hold component parts	11	†420; †487; †488; †489; †A342
1		6R15210	Screwdriver TL-15	5¾" Screwdriver Cat. No. 90	Utility screwdriver	13	
1		6Q338-150	Alignment Tool TL-150	Insulated Screwdriver	Trimmer alignment tool	11	*SC-A-6511; †A341
1		6R57413	Wrench	5/16" Spintite Cat. No. 51	Trimmer alignment tool	5	
1		3Z59	Adapter RS-259	Alignment Adapter	Alignment adapter	11	
1		2Z10795	Tube M-295	Dummy Aligning Tube	Dummy aligning tube	11	†A416; †A409

†Contractor's drawing No.

* Signal Corps drawing No.

**See list of manufacturers on page 15.

Fig. 7



I-107-D APPARATUS LEGEND

C-1	Capacitor	.001	μf	R-12	Resistor	1	Meg.
R-1	Resistor	.09	Megs.	R-13	Resistor	1000	Ohms
R-2	Resistor	9000	Ohms	R-14	Resistor	3900	Ohms
R-3	Resistor	900	Ohms	R-15	Resistor	560	Ohms
R-4	Resistor	90	Ohms	R-16	Resistor	18000	Ohms
R-5	Resistor	8.6	Ohms	R-17	Resistor	3000	Ohms
R-6	Resistor	7	Megs.	R-18	Resistor	5000	Ohms
R-7	Resistor	2	Megs.	R-19	Resistor	300	Ohms
R-8	Resistor	0.7	Megs.	MA	Milliammeter 0.4 MA	400	Ohms
R-9	Resistor	0.2	Megs.	SW-1	Switch "Range"		
R-10	Resistor	0.1	Megs.	SW-2	Switch "Selector" Ganged with S-1, S-2, and S-3		
R-11	Resistor	1	Meg.				

Fig. 7—VOLTOHMMETER I-107-D, SCHEMATIC DIAGRAM

[A.G. 062.11 (5-10-43)]

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(For explanation of symbols see FM 21-6)

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