DEPARTMENT OF THE ARMY
TECHNICAL MANUAL
DEPARTMENT OF THE AIR
FORCE TECHNICAL ORDER

TM 11-1242
TO 16-35TS268-15

CRYSTAL

RECTIFIER

TEST SET

TS-268(*)/U

This copy is a reprint which includes current pages from Changes 1, 3 and 4.

DEPARTMENTS OF THE ARMY AND THE AIR FORCE

SEPTEMBER 1952

Changes in force: C 1, C 3, and C 4

TM 11-1241
C 4

CHANGE
No. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *14 February 1966*

CRYSTAL RECTIFIER TEST SETS TS-268/U, TS-268A/U, TS-268B/U, TS-268C/U, TS-268D/U, AND TS-268E/U

TM 11-1242, 22 September 1952, is changed as follows:

Note. The parenthetical reference to previous Changes (example: page 1 of C 3) indicates that pertinent material was published in that change.

Page 2. paragraph *2c* (page 2 of C 3). Delete subparagraph *c* and substitute:

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 Publications) will be used for reporting these improvement recommendations. This form will be completed using pencil, pen, or typewriter and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MR-(NMP)-MA, Fort Monmouth, N.J., 07703.

Page 31. Add chapter 5.1 after chapter 5.

CHAPTER 5.1

DEPOT INSPECTION STANDARDS

37.1. Applicability of Depot Inspection Standards

The tests outlined in this chapter are designed to measure the performance capability of a repaired equipment. Equipment that is to be returned to stock should meet the standards given in these tests.

37.2. Applicable References

a. Repair Standards. Applicable procedures of the depots performing these tests and the general standards for repaired electronic equipment given in TB SIG 355-1, 355-2, and 355-3 form a part of the requirements for testing this equipment.

b. Technical Publications. The technical publication applicable to this equipment is TM 11-1242 TO16-35TS268-15.

c. Modification Work Orders. Perform all modification work orders applicable to this equipment before making the tests specified. DA Pam 310-4 lists all available MWOs.

TAGO 1296B—Feb. 200-484°—66

37.3. Test Facilities Required

The following equipments are required for depot testing:

Equipment	Technical manual
Resistor, Decade ZM-16A/U	TM 11-5102
Voltmeter, Electronic AN/USM-98	TM 11-6625-438-10
Dummy crystal adapter	Made in accordance with Fig. 21.
Battery BA-30, 1½ volt.	

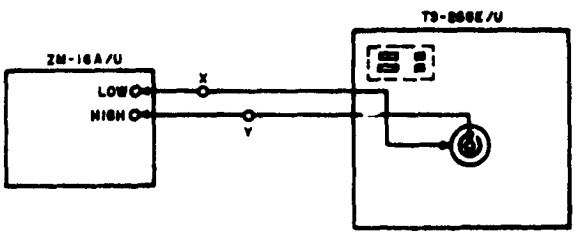
37.4. General Requirements

a. General Test Conditions. All tests should be conducted under the following conditions:

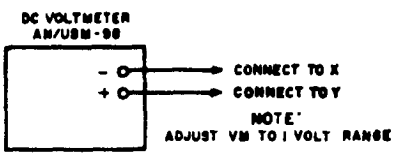
(1) At normal room temperature.
(2) With Battery BA-30 installed in the test set (para 10).
(3) With crystal adapter (fig. 21) installed in the crystal holder of test set (para 14).

b. Preliminary Adjustments.

(1) ADJUST METER switch of the TS-268E/U should be in the OFF position.
(2) Connect Resistor, Decade ZM-16A/U to Crystal Rectifier Test Set TS-268E/U as indicated in figure 20.



A. TEST CONNECTIONS, FORWARD (FRONT) RESISTANCE, BACKWARD (BKWD) RESISTANCE, AND BACK CURRENT TEST.



B. TEST CONNECTIONS, ADJUST METER, (TEST (NO. FOUR))

TM1342-C4-1

Figure 20. Test equipment connections.

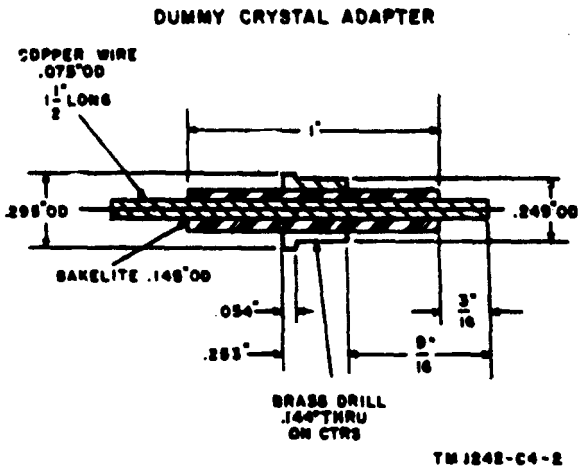


Figure 21. Crystal adapter specifications.

37.5. Test Procedure

With the test equipment connected as shown in figure 20, adjust controls to perform tests as follows:

a. Adjust Meter Test.

(1) Turn the TS-268E/U meter selector switch to the ADJ MTR.
(2) Press the PUSH TO OPERATE switch.
(3) Turn the ADJUST METER control to give a full-scale deflection of the meter pointer.

b. Forward Resistance Test.

(1) With the meter selector switch still set in the ADJ MTR position: connect Resistor, Decade ZM-16A/U to the crystal socket: use the dummy crystal adapter.
(2) Adjust the ADJUST METER control for a reading of 0 on the KILOHMS scale of the TS-268E/U.
(3) Set the meter selector switch to the FRONT RES position. Vary the decade resistor until a reading of 0.5 KILOHMS is obtained on the TS-268E U. The decade resistor should read between 450 and 550 ohms. Leave the ADJUST METER control at this reading.

c. Back Resistance Test.

(1) Set the meter selector switch to the BACK RES position.
(2) Vary the decade resistor until a reading of 4 KILOHMS is obtained on the TS–268E U meter. The decade resistor should rend between 3,600 and 4,400 ohms.

d. ADJ METER Test.

(1) Connect test equipment as shown in figure 20.
(2) Set the meter selector switch to position ADJ MTR.

(3) Repeat the instructions in *a* (2) and (3) above.
(4) The DC Voltmeter AN/USM-98 should read between 0.92 and 0.98 volts dc.

e. Back Current Test.

(1) Set the decade resistor to 2,400 ohms.
(2) Set the meter selector switch to the second ADJ MTR position.
(3) Adjust the ADJUST METER control for a reading of 1 ma on the MA scale of the TS-268E/U meter.
(4) Set the meter selector switch to BACK CUR position. The meter should indicate a reading between .38 and .48 ma.

f. Operational Requirement. The ADJ MTR control should vary the TS-268E/U meter indication smoothly as it is advanced from the extreme right to left position,

Page 33, appendix (page 8 of C 3). Delete and substitute:

APPENDIX

REFERENCES

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9), Supply Bulletins, Lubrication Orders, and Modification Work Orders.
TB SIG 355-1	Depot Inspection Standard for Repaired Signal Equipment.
TB SIG 355-2	Depot Inspection Standard for Refinishing Repaired Signal Equipment.
TB SIG 355-3	Depot Inspection Standard for Moisture and Fungus Resistant Treatment.
TM 9-213	Painting Instructions for Field Use.
TM 11-5102	Resistors, Decade ZM-16/U, ZM-16A/U, and ZM-16B/U.
TM 11-5527	Multimeters TS-352/U, TS-352A/U, and TS-352B/U.
TM ll-6625-438-10	Operator's Manual, Voltmeter Electronic AN/USM-98.
TM 38-750	Army Equipment Record Procedures.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
General. United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General. United States Army,
The Adjutant General.

Distribution:

Active Army:

USASA (2)
CNGB (1)
CofEngrs (1)
TSG (1)
CofSptS (1)
CC-E (2)
Dir of Trans (1)
USAAVNTBD (5)
USCONARC (2)
USAMC (2)
USAMICOM (2)
USAECOM (2)
USASCC (2)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (2) except
USAREUR (5)
USASMC (3)
USACDCEC (10)
USACDCCEA (1)
USACDCCEA (Ft Huachuca (1)
Armies (1) except
EUSA (5)
11th Air Asslt Div (3)
318th USASA Bn (5)
319th USASA Bn (5)
Ft Huachuca (1)
WSMR (1)
Ft Carson (21)
Ft Knox (12)
Ft Devens (5)
Svc Colleges (1)
USASCS (2)
USAAMS (5)
USA Msl & Mun Cen & Sch (5)
USAADS (5)
USACSS (5)
SAAD (6)
TOAD (6)
LEAD (7)
FTWOAD (5)
SHAD (8)
NAAD (5)
CHAD (1)
SVAD (5)
SEAD (5)
Gen Dep (1)
Sig Sec, Gen Dep (4)
Sig Dep (6
MAAG (Vietnam) (5)
USACA, Taiwan (5)
Sig FLDMS (1)
AAF CONUS (5)
5th USASA Fld Sta (5)
AAF CONUS (5)
Units organized under following TOE's—2 each:

11-155	11-587
11-157	11-592
11-158	11-597

NG: None.

USAR: None.

For explanation of abbreviations used, see AR 320–50.

TM 11-1242
*C 3

TECHNICAL MANUAL

CRYSTAL RECTIFIER TEST SETS TS-268/U, TS-268A/U, TS-268B/U, TS-268C/U, TS-268D/U, AND TS-268E/U

TM 11-1242
CHANGE No. 3

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *23 September 1963*

TM 11-1242/TO 16-35TS268-15, 22 September 1952, is changed as follows:

Note. The parenthetical reference to previous changes (example: page 1 of C 2) indicate that pertinent material was published in that change.

(As changed by C 2, 22 Jan 1957) change the title of the manual to: Crystal Rectifier Test Sets TS-268/U, TS-268A/U, TS-268B/U, TS-268C/U, TS-268D/U and TS-268E/U.

(As added by C 2, 22 Jan 1957) the following information changes TM 11-1242 so that the manual applies also to the following equipments.

Nomenclature	*Order No.*	*Serial No.*
Crystal Rectifier Test Set TS-268E/U	47668-PH-56	1 through 48

Page 1. Add the following note (as added by C 2, 22 Jan 1957) at the beginning of chapter 1.

Note. Crystal Rectifier Test Set TS-268E/U procured on Order No. 47668-PH-56 is similar to previous procurements of the TS-268E/U. Unless otherwise indicated, all information applies also to the TS-268E/U (Order No. 47668-PH-56).

Add "and 1N78" after "1N26" in the following places:

Page 6, paragraph 8*c* (as changed by C 2, 22 Jan 1957).

Page 7, paragraph 8*g*.1 (as changed by C 2, 22 Jan 1957).

Page 8, paragraph 4*b* (as changed by C 2, 22 Jan 1957). Add the following to the end of the table:

Crystal	Recommended frequency	Calibrated scales on
1N78	K band	TS-268E/U

Page 2. 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 e new editions, changes, or additional publications pertaining to the

* This change supersedes C 2, 22 January 1957.

equipment. DA Pam 310-4 is a current index of technical manuals, technical bulletins, supply bulletins, lubrication orders, and modification work orders available through publications supply channels. The index lists the individual parts (-10, -20, -35P, etc.) and the late changes to and revisions of each equipment publication.

Delete paragraph 2 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 immedia supervisor (e.g., officer, noncommissioned officer, supervisor, etc.).

Page 17. Delete section I (page 6 of C 1) and substitute:

Section I. MAINTENANCE INSTRUCTIONS

21. 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 functions. The tools and test equipment required are listed in TM 11-6625-305-12P.

a. Daily preventive maintenance checks and services (par. 24).

b. Weekly preventive maintenance checks and services (par. 25).

c. Monthly preventive maintenance checks and services (par. 26).

d. Quarterly preventive maintenance checks and services (par. 26.1).

e. Cleaning (par. 26.2).

f. Touchup painting (par. 26.3).

22. Preventive Maintenance

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

a. Systematic Care. The procedures given in paragraphs 23 through 26.3 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 charts (pars. 24–26.1) 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.

23. Preventive Maintenance Checks and Services Periods

Preventive maintainence checks and services of the test set are required daily, weekly, monthly, and quarterly.

a. Paragraph 24 specifies the checks and services that must be accomplished daily (or at least once each week if the equipment is maintained in standby condition.

b. Paragraphs 25, 26, and 26.1 specify *additional* checks and services that must be performed on a weekly, monthly, and quarterly basis, respectively.

24. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Completeness	See that the equipment is complete (TM 11-6625-305-12P).	
2	Exterior surfaces	Clean the exterior surfaces, including the panel and meter glasses (para 26.2). Check meter glass for cracks.	
3	Controls and indicators.	While making the operating checks (item 4), observe that the mechanical action of each knob, dial, and switch is smooth and free of external or internal binding, and that there is no excessive looseness. Also, check the meter for sticking or bent pointer.	

24. Daily Preventive Maintenance Checks and Services Chart —Continued

Sequence No.	Item	Procedure	References
4	Operation	Operate the equipment according to paragraph 30.	Para 30.

Page 19. Delete section II and substitute:

25. Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Handles and latches	Inspect handles, latches, and hinges for looseness. Replace or tighten as necessary.	None.
2	Metal surfaces	Inspect exposed metal surfaces for rust and corrosion. Clean and touchup paint as required (para 26.3).	None.
3	Battery and compartment.	Inspect the battery for loose terminals and leakage. Check the compartment for corrosion.	None.

26. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Jacks	Inspect jacks for snug fit and good contact.	None.
2	Resistors	Inspect the resistors for cracks, blistering, or other detrimental defects.	None.
3	Gaskets and insulators.	Inspect gaskets, insulators, bushings, and sleeves for cracks, chipping, and excessive wear.	None.
4	Interior	Clean interior of chassis and cabinet.	None.
5	Battery	Before storing or shipping, remove the battery.	

26.1. Quarterly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Publications.....	See that all publications are complete, serviceable, and current.	DA Pam 310-4.
2	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 Pam 310-4.
3	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 must be on valid requisitions.	TM 11-6625-305-12P.

26.2. 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 cases; use a cloth dampened (not wet) with Cleaning Compound (Federal stock No. 7930-395-9542).

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.**

b. Clean the front panel, meter, and control knobs; use a soft clean cloth. If dirt is difficult to remove, use mild soap and water.

26.3. 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 leaning and refinishing practices specified in TM 9-213.

Page 20. Change Section III to: Section II.

Page 24, paragraph 31 (as changed by C 2, 22 Jan 1952). Add the following to the table at the end of the paragraph:

Crystal type	Forward resistance (max allowable in ohms)	Ratio, reverse to forward resistance (min allowable)	Reverse current at 1 volt (max allowable in ma)
1N78.....	500	10 to 1	0.160

Page 25. Delete figure 13 (as changed by C 2, 22 Jan 1957) and substitute:

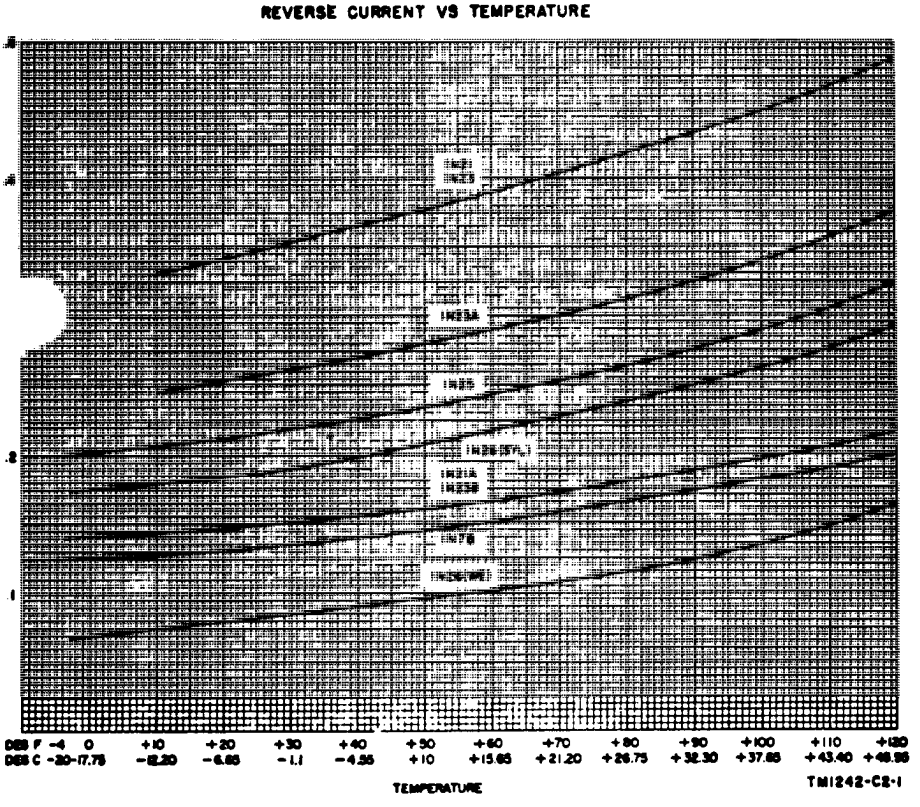


Figure 13. (Superseded) Reverse current versus temperature chart, showing allowable crystal limits of reverse current through the crystal

Page 33. Delete appendix I and substitute:

APPENDIX

REFERENCES

Following is a list of applicable publications available to the operator and repairman of Crystal Rectifier Test Set TS-268(*)/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 11-5527	Multimeters TS-352/U, TS-352A/U, TS-352B/U, and TS-352C/U.
TM 11-6625-305-12P	Operator's and Organizational Maintenance Repair Parts and Special Tools List and Maintenance Allocation Chart for Crystal Rectifier Test Sets TS-268/U, TS-268A/U, TS-268B/U, TS-268C/U, TS-268D/U, and TS-268E/U.
TM 38-750	The Army Equipment Record System and Procedures.

Page 36. Delete appendix II.

By Order of the Secretary of the Army:

EARLE G. WHEELER,
General, United States Army,
Chief of Staff.

Official:

J. C. LAMBERT,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

DASA (6)
USASA (2)
CNGB (1)
CofEngrs (1)
TSG (1)
CSigO (7)
CofT (1)
CofSpts (1)
USA CD Agcy (1)
USCONARC (5)
USAMC (5)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Comd (3)
OS Base Comd (2)
LOGCOMD (2)
USAES (5)
USAMICOM (4)
USASCC (4)
MDW (1)
Armies (2)
Corps (2)
USA Corps (3)
USATC AD (2)
USATC Engr (2)
USATC Inf (2)
USATC Armor (2)
USASTC (5)
Instl (2) except
  Ft Monmouth (65)
Svc Colleges (2)
Br Svc Sch (2) except
GENDEP (OS) (2)
Sig Dep (OS) (12)
Sig Sec, GENDEP (5)
Army Dep (2) except
  Ft Worth (8)
  Lexington (12)
  Sacramento (28)
  Tobyhanna (12)
USA Elct RD Actv, White Sands (13)
USA Elct RD Actv, Ft Huachuca (2)
USA Trans Tml Comd (1)
Army Tml (1)
POE (1)
USAOSA (1)
AMS (1)
WRAMC (1)
AFIP (1)
Army Pic Cen (2)
USA Mbl Spt Cen (1)
USA Elct Mat Agcy (12)
Chicago Proc Dist (1)
USARCARIB Sig Agcy (1)
Sig Fld Maint Shop (3)
Army Afid (CONUS) (2)
Benecia Arsenal (5)
Redstone Arsenal (5)
USA Elect Rsch Dev Lab (2)
Units org under fol TOE: (2 copies each)

11-7	11-127	11-592	44-17
11-15	11-128	11-597	44-115
11-16	11-557	44-15	44-116
11-57	11-587	44-16	44-117

NG: State AG (3); units—same as Active Army except allowance is one copy to each unit.

USAR: None.

For explanation of abbreviations used see AR 320-50.

896-434

DEPARTMENT OF THE ARMY TECHNICAL MANUAL
DEPARTMENT OF THE AIR FORCE TECHNICAL ORDER

CRYSTAL RECTIFIER TEST SET TS-268(*)/U

TM 11-1242
TO 16-35TS268-15
CHANGES No. 1

DEPARTMENTS OF THE ARMY AND
THE AIR FORCE
WASHINGTON 25, D. C., *17 December 1954*

TM 11-1242/TO 16-35TS268-15, 22 September 1952, is changed as follows:

1. Scope

* * * * * * *

b. Official nomenclature followed by (*) is used to indicate all models of the item of equipment included in this manual. Thus, Crystal Rectifier Test Set TS-268(*)/U represents Crystal Rectifier Test Sets TS-268/U (fig. 1), **TS-268A/U,** TS-268B/U (fig. 2), TS-268C/U, TS-268D/U (fig. 3), **and TS-268E/U.** Where differences in equipment exist, and are described in the text or on the figures, the exact type number will be used.

Note (Added). Crystal Rectifier Test Set TS-268E/U is similar to Crystal Rectifier Test Set TS-268D/U. Unless otherwise indicated, all information in TM 11-1242 covering Crystal Rectifier Test Set TS-268D/U applies equally to Crystal Rectifier Test Set TS-268E/U.

4. Technical Characteristics

a. Crystal Rectifier Test * * * the front panel. **Crystal Rectifier Test Set TS-268E/U, however, has two crystal socket holders on the front panel (fig. 9.1).** All circuit components are mounted beneath this panel.

b. Crystal rectifiers that can be tested with the TS-268(*)/U test set are listed in the following table:

Crystal	Recommended frequency	Calibrated scales on
* *	* * *	* *
1N25	L band	TS-268C/U, TS-268D/U, TS-268E/U.
1N26	K band	TS-268E/U.

* * * * * * *

5. Packaging Data

When packaged for export shipment, Crystal Rectifier Test Set TS–268(*)/U is placed in a moisture-vaporproof container (fig. 6). When packed, the dimensions are 6½ inches high by 10½ inches deep by 8 inches wide; the volume is .32 cubic **foot,** and the weight is 8 pounds.

* * * * * * *

6. Description of Crystal Rectifier Test Set TS–268(*)/U

* * * * * * *

b. The front panel components and their functions are as follows:

* * * * * * *

(4) *Meter.* Provides a direct reading indication of the forward and backward resistance in kilohms, and the back current in milliamperes of the crystal under test. In addition, **on all models except the TS–268E/U,** there are a number (four or five, depending on model) of color-coded scales for a direct indication of the condition of the crystal. These scales establish the crystal as good or poor. **With Crystal Rectifier Test Set TS–268E/U, the condition of the crystal under test is determined by comparing the current reading with the maximum allowable current values listed in the condensed summary of operating instructions inside the cover of the test set and in paragraph 31.** The d-c resistance of the meter should be 100 ohms ±2 percent.

8. Differences in Models

* * * * * * *

b. (Superseded) *Dehydrator.* Crystal Rectifier Test Sets TS–268/U, TS–268D/U, and TS–268E/U are not equipped with a dehydrator.

c. Crystal Holder. Crystal Rectifier Test Set TS–268/U has a snap-in type crystal holder. Crystal Rectifier Test Sets TS–268B/U, TS–268C/U and TS–268D/U have insert type crystal holders. **Crystal Rectifier Test Set TS–268E/U has two crystal holders. One holder is a snap-in type equipped with a trip lever to facilitate removal of crystals. The other holder is a coaxial type holder for testing 1N26 crystals only (fig. 9.1).**

d. Meter Scales. Crystal Rectifier Test * * * good and poor crystals. **There are no colored scales on Crystal Rectifier Test Set TS–268E/U. Maximum allowable current values are listed in the operating instructions in the cover of the test set and in paragraph 31.**

e. Selector Switch. The front panel selector switch on the TS–268/U

is a six-position rotary switch, selecting OFF, MTR ADJ, FWD RES, BKWD RES, MTR ADJ, and BACK CUR positions. The front panel selector switch on **the TS–268A/U,** TS–268B/U, TS–268C/U, TS–268D/U, **and TS–268E/U** is a five-position rotary switch, **used to select** ADJ. METER, FRONT RES, BACK RES ADJ. METER, and BACK CURRENT positions.

f. (Superseded) *Circuit Changes.* The following table lists the differences in reference symbols and resistance values of corresponding parts in Crystal Rectifier Test Set TS–268/U as compared to all later models.

TS-268/U		TS-268A/U, TS-268B/U, TS-268C/U, TS-268D/U, TS-268E/U		Function
Ref symbol	Resistance (ohms)	Ref symbol	Resistance (ohms)	
R101	100	R102	100	Current limiter.
R102	500	R103	1,500	Meter adjusting rheostat.
R103	900	R101	900	Meter multiplier.
R104	100	R105	100	Current limiter.
R105	300	R104	200	Meter shunt.
R106	600	(1)	(1)	Current limiter.
BT101		E101		1.5-volt power supply.

[1] Not used.

* * * * * * *

g.1. (Added) *Testing 1N26 Crystal.* Only Crystal Rectifier Test Set TS–268E/U has a crystal holder that will accommodate coaxial type 1N26 crystals. For resistance and current values for the 1N26 crystal, refer to the table in paragraph 31.

* * * * * * *

13. Controls

The following table lists the controls of Crystal Rectifier Test Set TS–268(*)/U and their functions. **Differences in switch and control designations for the TS–268/U are explained in the Remarks column.**

Control	Function	Remarks
* *	* * *	* *
ADJ METER (position 1).	Enables adjustment of the ADJUST METER control for full-scale deflection of meter pointer prior to forward and reverse resistance measurements.	First MTR ADJ position in the TS-268/U (on right-hand side of knob (fig. 4)).
FRONT RES (position 2).	Indicates * * * of crystal.	FWD RES in the TS-268/U.
BACK RES (position 3)...	Indicates reverse resistance of crystal.	BKWD RES in the TS-268/U.
ADJ METER (position 4).	Enables adjustment of the ADJUST METER control for full-scale deflection of meter pointer prior to measurement of reverse current.	Second MTR ADJ position in the TS-268/U (on left-hand side of knob (fig. 4)).
BACK CURRENT (position 5).	Measures reverse current.	BACK CUR in the TS-268/U.
* *	* * *	* *
ADJUST METER control.	Adjusts the meter for full-scale deflection when the selector switch is in either ADJ METER position.	MTR ADJ in the TS-268/U.
OFF position of ADJUST METER control.	Disconnects battery from circuit.	Used in the TS-268A/U, TS-268B/U, and TS-268C/U only.
PUSH TO OPERATE switch.	Normally * * * depressed.	Used only in the TS-268D/U and TS-268E/U.

14. Preliminary Starting Procedure

a. Preliminary. Set the meter * * * (zero ohm) position. Then set the selector switch to the **second** ADJ. METER position (position 4). Vary the ADJUST METER control until the needle is at the extreme right (zero ohm) position.

Caution: Keep the cyrstal * * * charge on it.

* * * * * * *

15. Operation

To test crystal * * * step-by-step procedure below.

* * * * * * *

*e. **Reverse** Current.* Turn the selector switch clockwise to the BACK CURRENT position and read the current value on the MA scale of the meter. **On Crystal Rectifier Test Sets TS–268/U, TS–268A/U, TS–268B/U, TS–268C/U, and TS–268D/U, a** defective crystal rectifier is indicated if a reading is obtained in the POOR (green) portion of the colored scale corresponding to the type of crystal rectifier being tested. **For the TS–268E/U, however, which has no colored scales, the maximum allowable current values are listed in the operating instructions in the cover of the test set and the table in paragraph 31.**

Caution: When returning * * * *in its socket.*

f. Testing Crystals of Opposite Polarity. Crystal rectifiers of opposite polarity (British type) may be tested on Crystal Rectifier Test Set TS–268(*)/U in the following manner:

* * * * * * *

(2) ***Reverse** current.* It is not practical to measure the BACK CURRENT of crystal rectifiers of opposite polarity under normal circuit conditions.

Caution: (Added) On the TS–268D/U and TS–268E/U, turn the ADJUST METER control fully counterclockwise after completing tests on each crystal. Failure to do this will cause the meter needle to swing beyond full scale when the meter is adjusted for tests on the next crystal.

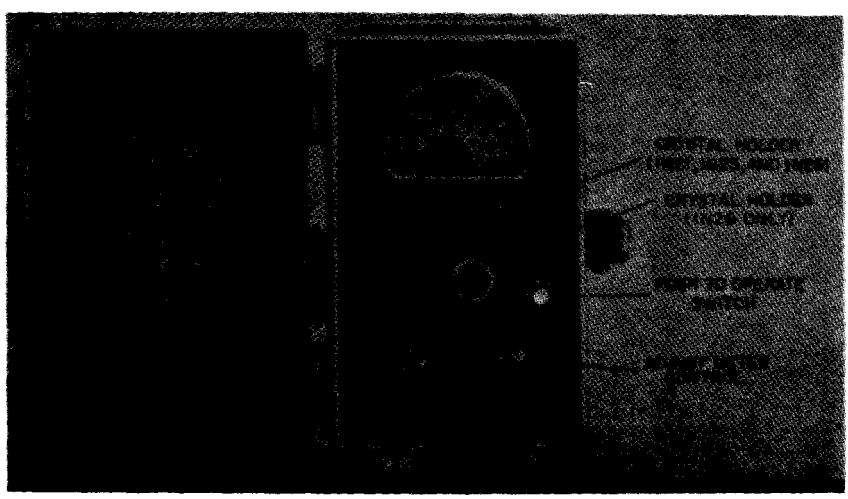


Figure 9.1. (Added) *Crystal Rectifier Test Set TS–268E/U, front panel.*

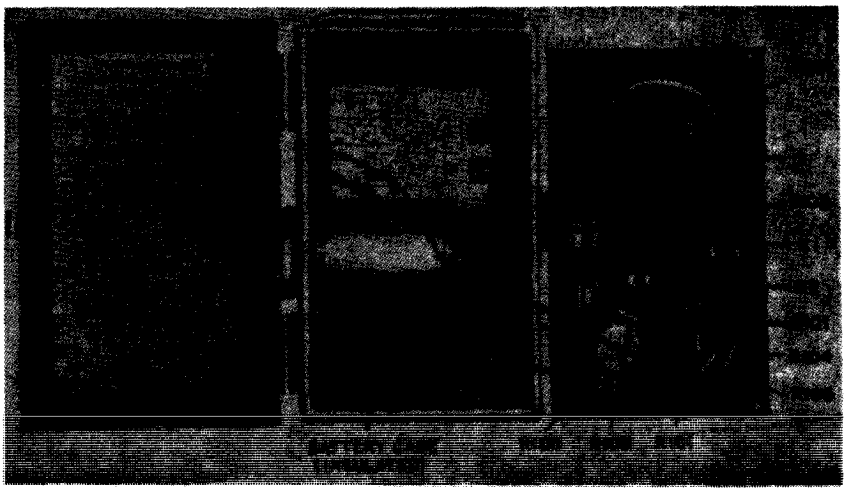


Figure 10.1. (Added) *Crystal Rectifier Test Set TS–268E/U, rear of front panel and interior of case.*

24. Performing Preventive Maintenance

The following preventive maintenance operations should be performed at the intervals indicated, unless these intervals are reduced by the local commander.

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.

DA Form 11-238 item No.	DA Form 11-239 item No.	
*	* *	* * * *
6		Check for normal operation (**par. 30**).
*	* *	* * * *
	26	Clean and tighten switches **S101** and **S102**, chassis, and **interior of case.**
	31	Clean and tighten connections and mountings for rheostat.
*	* *	* * * *

Note. To perform * * * connections or parts.

30. Equipment Performance Checklist

Note. (Added) When testing the TS–268E/U, perform the equipment performance test twice, once with a crystal inserted in the snap-in type crystal holder, and again with a 1N26 crystal inserted in the coaxial type crystal holder.

* * * * * * *

31. General

Crystal Rectifier Test * * * the following table.

Allowable Crystal Limits (at 71° F, 22° C)

Crystal type	Foward resistance (max allowable in ohms)	Ratio, reverse to forward resistance (min allowable)	Reverse current at 1 volt (max allowable in ma)
* * *	*	* *	*
1N25	500	10 to 1	.250
1N26 (WE)[a]	500	10 to 1	.110
1N26 (SYL)[b]	500	10 to 1	.230

[a] Western Electric.

[b] Sylvania.

Note. Figure 13 represents the allowable crystal limits for all the crystal rectifiers at different ambient temperatures ranging from −4° F. to +120° F.

32. Circuit Details

(fig. 14, **14.1, and 14.2**)

The circuit of the test set actually consists of several individual circuits which may be interconnected to perform the desired functions by operation of a multicontact rotary selector switch. Each position of * * * a clockwise direction.

a. OFF Position (TS–268/U Only). When the selector switch is turned to OFF, the battery circuit is open and no current will flow in the circuit.

Note. (Added) Reference symbols in subparagraphs *b* through *f* below apply only to the TS–268/U. To make the theory applicable to the TS–268A/U, TS–268B/U, TS–268C/U, TS–268D/U, and TS–268E/U, refer to the changes in reference symbols and resistance values indicated in paragraph 8*f*.

* * * * * * *

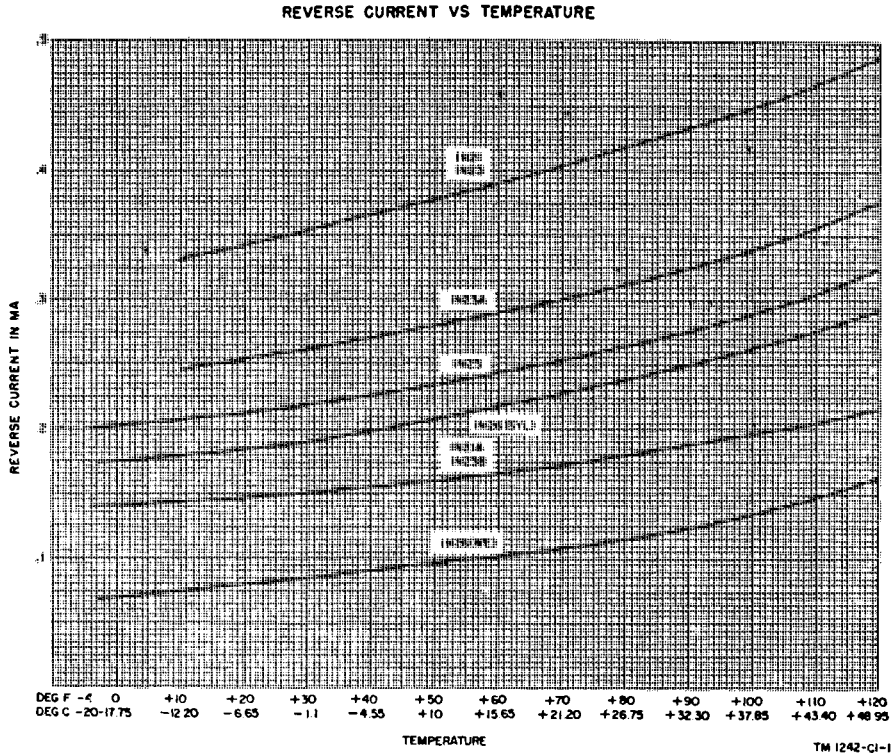
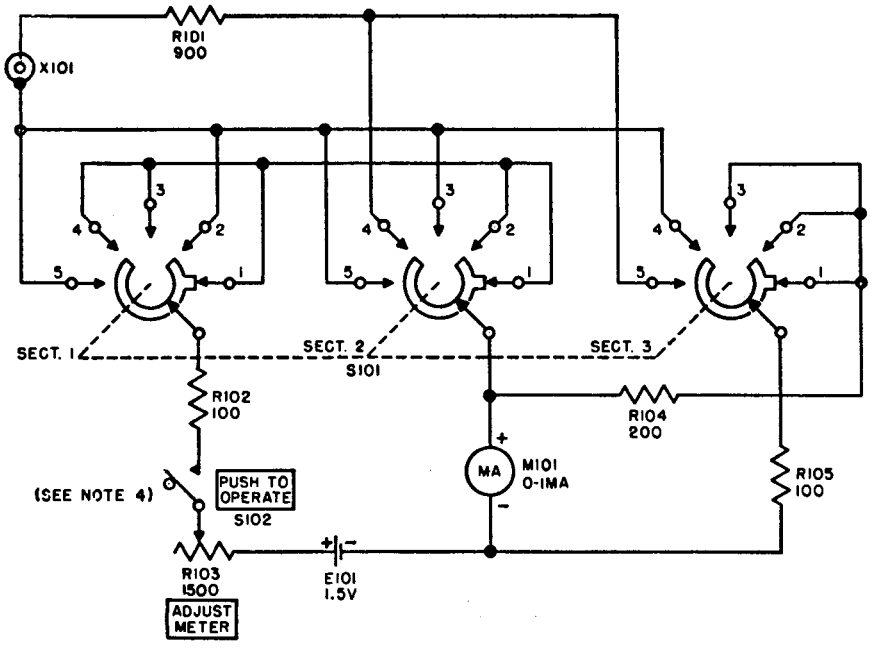


Figure 13. (Superseded) *Reverse current versus temperature chart, showing allowable crystal limits of reverse current through the cryst*

Figure 14. Crystal Rectifier Test Set TS-268/U, schematic diagram.



NOTES:

1. ALL RESISTOR VALUES ARE IN OHMS.
2. SWITCH S101 IS VIEWED FROM REAR IN EXTREME COUNTER-CLOCKWISE POSITION.
3. S101 POSITIONS:

POS	DESIGNATION
1	ADJ METER
2	FRONT RES
3	BACK RES
4	ADJ METER
5	BACK CURRENT

4. SCHEMATIC IS SHOWN FOR THE TS-268D/U. FOR THE TS-268B/U AND TS-268C/U, SWITCH S102 IS A TOGGLE SWITCH AND THE PANEL MARKING IS [OFF].

TM1242-CI-5

Figure 14.1 (Added). *Crystal Rectifier Test Sets TS-268B/U, TS-268C/U, and TS-268D/U, schematic diagram.*

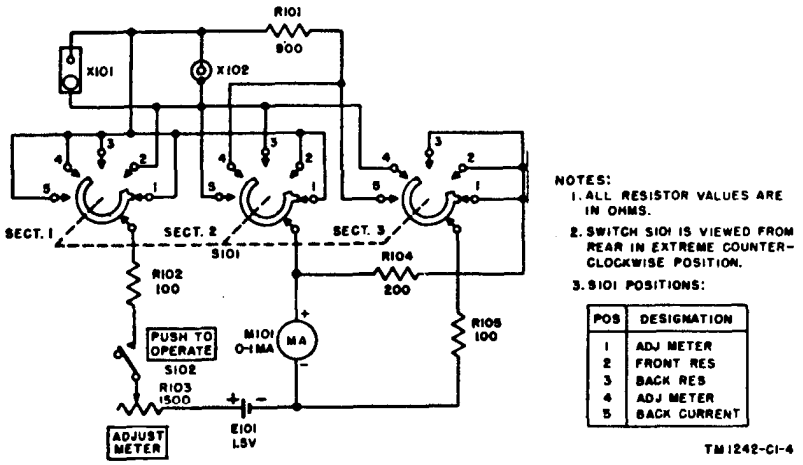


Figure 14.2 (Added). *Crystal Rectifier Test Set TS-268E/U, schematic diagram.*

Figures 15, 16, 17, 18, and 19. The parts in figures 15, 16, 17, 18, and 19 that read R101, R102, R103, R104, R105, and R106 are changed to read as indicated in the table in paragraph 8*f* to make these illustrations applicable to the TS-268A/U, TS-268B/U, TS-268C/U, TS-268D/U, and TS-268E/U.

35. Troubleshooting Chart

The following chart * * * few simple tests.

Symptom	Probable trouble	Correction
1. Selector switch in first ADJ METER position. Meter * * * deflection.	1. Weak * * * switch.	1. Change * * * circuit.
* *	* * *	* *
3. Second ADJ METER position. No indication on meter **or cannot be adjusted to full-scale deflection.**	3. Defective resistor R103 **(TS-268/U) or R101 (all other models).**	3. Replace * * * switch.
* *	* * *	* *

36. Replacement of Parts

a. Replace 1.5-volt battery BT101 **(TS-268/U) or E101 (all other models)** when the meter pointer cannot be adjusted to full-scale deflection with the selector switch in **either** ADJ METER position. Remove the instrument panel and replace the battery as described in paragraph 10.

* * * * * * *

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For explanation of abbreviations used, see SR 320-50-1.

TM 11-1242 / TO 16-35TS268-15

This manual supersedes TM 11-215, 1 July 1947, including C1, 3 October 1951, and TM 11-1242, 7 June 1945

CRYSTAL RECTIFIER TEST SET TS-268(*)/U

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CONTENTS

	Paragraph	Page
CHAPTER 1. INTRODUCTION		
Section I. General		
Scope	1	1
Forms and records	2	2
II. Description and Data		
Purpose and use	3	3
Technical characteristics	4	3
Packaging data	5	4
Description of Crystal Rectifier Test Set TS-268(*)/U.	6	5
Additional equipment required	7	6
Differences in models	8	6
CHAPTER 2. OPERATING INSTRUCTIONS		
Section I. Service Upon Receipt of Matériel		
Uncrating, unpacking, and checking new equipment.	9	8
Connection	10	10
Service upon receipt of used or reconditioned equipment.	11	10
II. Controls and Instruments		
General	12	11
Controls	13	11
III. Operation Under Usual Conditions		
Preliminary starting procedure	14	12
Types of operation	15	13
Stopping procedure	16	15
IV. Operation Under Unusual Conditions		
General	17	15
Operation in arctic climates	18	16
Operation in tropical climates	19	16
Operation in desert climates	20	16
CHAPTER 3. ORGANIZATIONAL MAINTENANCE INSTRUCTIONS		
Section I. Preventive Maintenance Services		
Definition of preventive maintenance	21	17
General preventive maintenance techniques	22	17
Use of preventive maintenance forms	23	17
Performing preventive maintenance	24	18

		Paragraph	Page
CHAPTER 3.	**ORGANIZATIONAL MAINTENANCE INSTRUCTIONS - Continued**		
Section II.	Weatherproofing		
	Weatherproofing	25	19
	Rustproofing and painting	26	19
III.	Trouble Shooting at Organizational Maintenance Level		
	Scope	27	20
	Visual inspection	28	20
	Trouble shooting, using equipment performance checklist.	29	21
	Equipment performance checklist	30	22
CHAPTER 4.	**THEORY OF CRYSTAL RECTIFIER TEST SET TS-268(*)/U**		
	General	31	24
	Circuit details	32	24
CHAPTER 5.	**FIELD MAINTENANCE INSTRUCTIONS**		
Section I.	Trouble Shooting at Field Maintenance Level		
	Trouble shooting procedure	33	30
	Test equipment required for trouble shooting.	34	30
	Trouble shooting chart	35	30
II.	Repairs		
	Replacement of parts	36	31
	Refinishing	37	31
CHAPTER 6.	**SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE**		
Section I.	Shipment and Limited Storage		
	Disassembly	38	32
	Repacking for shipment or limited storage	39	32
II.	Demolition of Matériel to Prevent Enemy Use		
	General	40	32
	Methods of destruction	41	32
APPENDIX I.	**REFERENCES**		33
II.	**IDENTIFICATION TABLE OF PARTS**		36

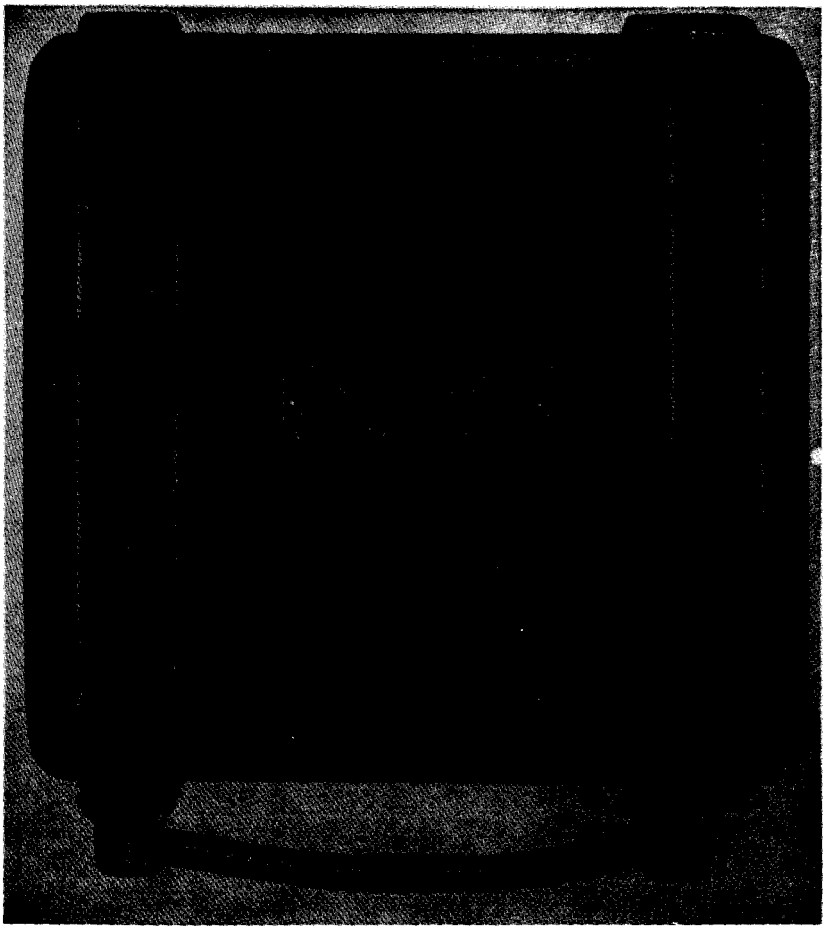


Figure 1. Crystal Rectifier Test Set TS-268/U.

This manual supersedes TM 11-215, 1 July 1947, including C1, 3 October 1951, and TM 11-1242, 7 June 1945.

CHAPTER 1
INTRODUCTION

Section 1. GENERAL

1. Scope

a. This technical manual contains instructions for the operation, maintenance and repair of Crystal Rectifier Test Set TS-268 (*)/U. In addition to these instructions, there are two appendixes covering a list of references and an identification table of parts.

b. Official nomenclature followed by (*) is used to indicate all models of the item of equipment included in this manual. Thus, Crystal Rectifier Test Set TS-268 (*)/U represents Crystal Recti-

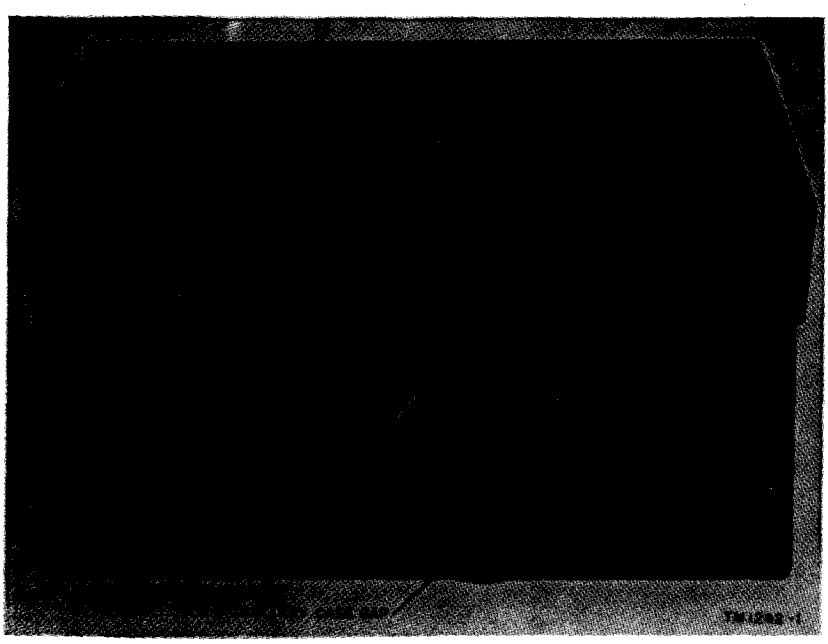


Figure 2. Crystal Rectifier Test Set TS-268B/U case, showing battery cap.



Figure 3. Crystal Rectifier Test Sets TS-268C/U and TS-268D/U case, showing battery cap.

fier Test Sets TS-268/U (fig. 1), TS-268B/U (fig. 2), TS-268C/U, and TS-268D/U (fig. 3). Where differences in equipment exist, and are described in the text or on the figures, the exact type number will be used.

2. Forms and Records

The following forms will be used for reporting unsatisfactory conditions of Army matériel and equipment.

a. DD Form 6, Report of Damaged or Improper Shipment, will be filled out and forwarded as prescribed in SR 745-45-5 (Army) and AFR 71-4 (Air Force).

b. DA Form 468, Unsatisfactory Equipment Report, will be filled out and forwarded to the Office of the Chief Signal Officer as prescribed in SR 700-45-5.

c. AF Form 54, Unsatisfactory Report, will be filled out and forwarded to Commanding General, Air Matériel Command, Wright-Patterson Air Force Base, Dayton, Ohio, as prescribed in SR 700-45-5 and AFR 65–26.

d. DA AGO Form 11–238, Operator First Echelon Maintenance Check List for Signal Corps Equipment (Radio Communication,

Direction Finding, Carrier, Radar), will be prepared in accordance with instructions on the back of the form.

e. DA AGO Form 11-239, Second and Third Echelon Maintenance Check List for Signal Corps Equipment (Radio Communication, Direction Finding, Carrier, Radar), will be prepared in accordance with instructions on the back of the form.

f. Use other forms and records as authorized.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. Crystal Rectifier Test Set TS-268(*)/U (fig. 4) is a combination ohmmeter-ammeter, designed to permit rapid qualitative tests on specific types of r-f (radio-frequency) crystal rectifiers. Measurements of the front resistance, back resistance, and back current may be made with this equipment. The condition of the crystal rectifier under test can be determined by comparing the results obtained to typical values for each type of crystal rectifier.

b. This test set is intended for field use in determining the condition of crystal rectifiers used in various microwave radio and radar equipments. It is normally used during the regular maintenance procedures associated with these radio and radar equipments.

4. Technical Characteristics

a. Crystal Rectifier Test Set TS-268 (*)/U (fig. 5) is powered from a 1.5-volt dry battery mounted within the case. It has a 0- to 1-ma (milliampere) d-c (direct-current) meter for indications of good or poor crystals. It has a rotary selector switch, meter adjust potentiometer, and crystal socket holder on the front panel. All circuit components are mounted beneath this panel.

b. Crystal rectifiers that can be tested with the TS-268 (*)/U test set are listed in the following table:

Crystal	Recommended frequency	Calibrated scales on
1N21	S band	TS–268(*)/U
1N21A	S band	TS–268(*)/U
1N21B	S band	TS–268(*)/U
1N23	X band	TS–268(*)/U
1N23A	X band	TS–268(*)/U
1N23B	X band	TS–268(*)/U
1N25	L band	TS–268C/U, TS–268D/U

Note. Crystal rectifiers with similar characteristics, but of opposite polarity (British type), may be tested with this equipment by following the instructions in paragraph 15*f*.

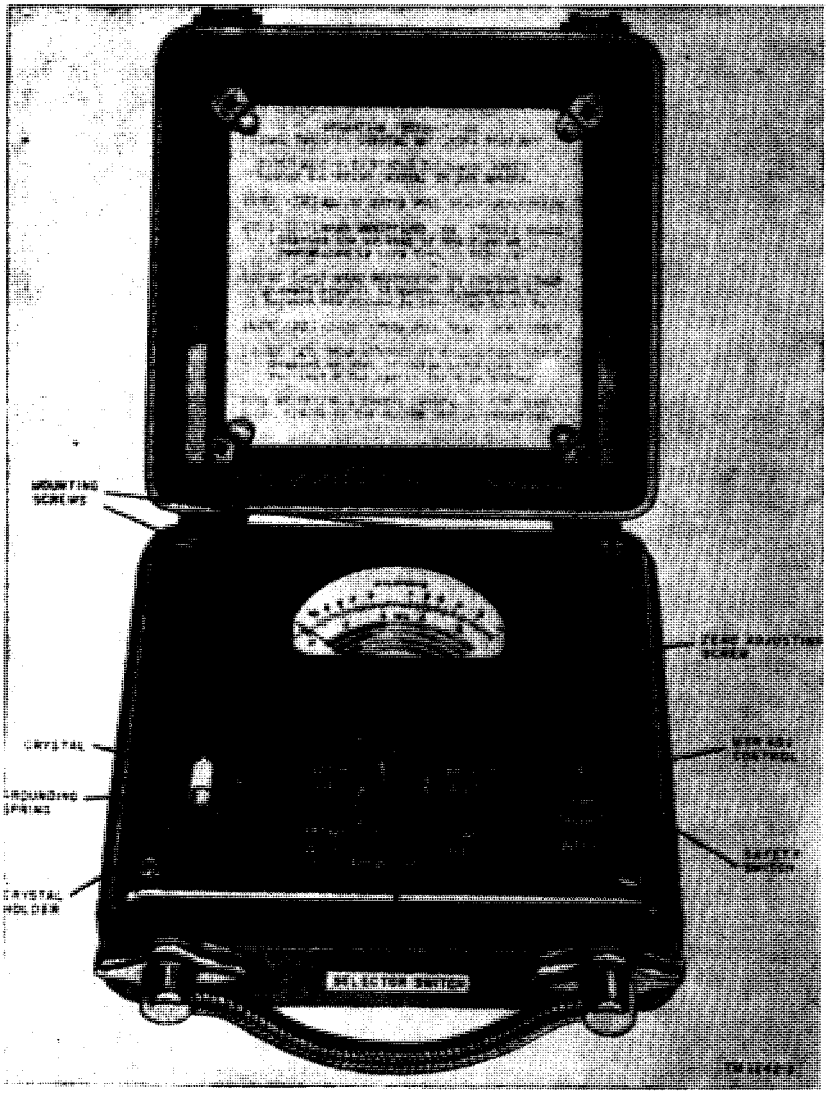


Figure 4. Crystal Rectifier Test Set TS–268/U, front panel view.

5. Packaging Data

When packaged for export shipment, Crystal Rectifier Test Set TS-268 (*)/U is placed in a moisture-vaporproof container (fig. 6). When packed, the dimensions are 6½ inches high by 10½ inches deep by 8 inches wide; the volume is 3.2 cubic feet, and the weight is 8 pounds.

Note. Items may be packaged in a manner different from that shown, depending on supply channel.

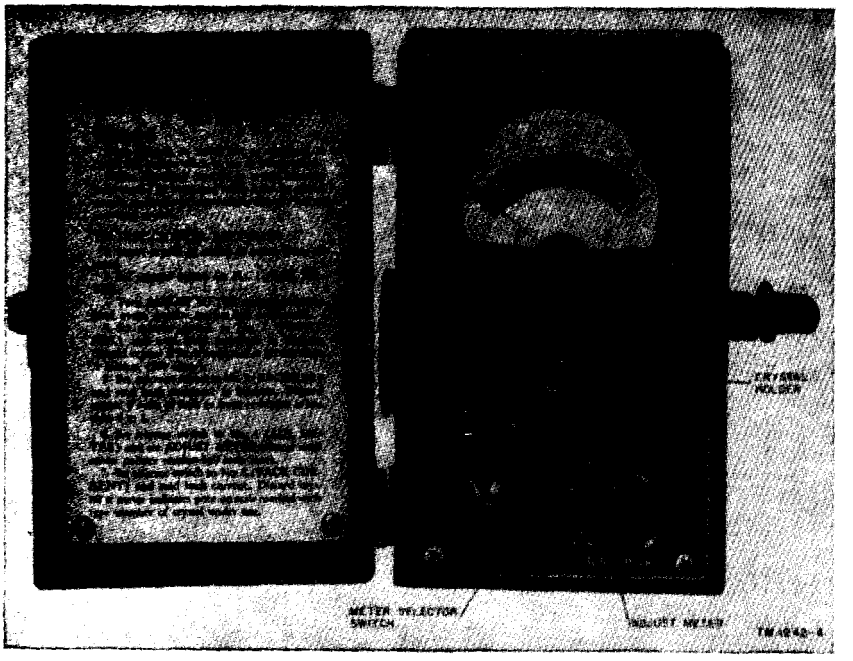


Figure 5. Crystal Rectifier Test Set TS–268B/U, front panel view.

6. Description of Crystal Rectifier Test Set TS-268 (*)/U

a. Crystal Rectifier Test Set TS–268 (*) /U is a completely self-contained portable unit, in a waterproof aluminum case. It is shipped complete in one container and weighs approximately 4 pounds.

b. The front panel components and their functions are as follows :

(1) *Crystal holder.* Provides a simple accessible method of mounting the crystal under test. Provisions are included for grounding the body of the crystal rectifier during insertion.

(2) *Test circuit selector switch.* Provides a method for sequentially selecting the circuit required for each of the three recommended tests and the two meter adjustments that are necessary for these tests.

(3) *Meter adjustment potentiometer.* Provides a method of varying the resistance in series with the battery in order to compensate for battery voltage variation and to adjust that voltage for the specific test.

(4) *Meter.* Provides a direct reading indication of the for-

f. Circuit Changes.

Component	TS-268/U	TS-268B/U	TS-268C/U	TS-268D/U
ADJUST METER control (ohms).	500	1,500	1,500	1,500
R104 (ohms)	100	200	200	200
R105 (ohms)	300	100	100	100
R106 (ohms)	600			

g. Testing the 1N25 Crystal. Crystal Rectifier Test Sets TS-268C/U and TS-268D/U have scales that are calibrated to make direct readings of 1N25 crystal rectifiers. 1N25 crystals may be tested in TS-268/U and TS-268B/U by measuring the forward resistance, the backward resistance, and the back current. A back current reading exceeding .25 ma is an indication of a poor 1N25 crystal rectifier.

h. Battery Access. In order to remove or inspect the battery on Crystal Rectifier Test Set TS-268/U, it is necessary to remove the front panel. In models TS-268B/U, TS-268C/U, and TS-268D/U the battery is accessible by unscrewing a cap on the left side of the case.

CHAPTER 2

OPERATING INSTRUCTIONS

Section 1. SERVICE UPON RECEIPT OF MATÉRIEL

9. Uncrating, Unpacking, and Checking New Equipment

Note. For used or reconditioned equipment, refer to paragraph 11.

a. General. Equipment may be shipped in oversea packing cases *(b* below) or in domestic packing cases *(f* below). When new equipment is received, select a location where the equipment may be unpacked without exposure to the elements and which is convenient to the permanent or semipermanent installation of the equipment. Aside from checking to see that the equipment and packing cases are undamaged, no special unpacking or uncrating procedures are necessary for equipment shipped in carrying cases.

Caution: Be careful in uncrating, unpacking, and handling the equipment; it is damaged easily. If it becomes damaged or exposed, a complete overhaul might be required or the equipment might be rendered useless.

b. Step-by-Step Instructions for Uncrating and Unpacking Export Shipments (fig. 6).

(1) Place the packing case as near the operating position as convenient.
(2) Cut and fold back the steel straps.
(3) Remove the nails with a nail puller. Remove the top and one side of the packing case. Do not attempt to pry off the sides and the top; the equipment may become damaged.
(4) Remove the waterproof container or moistureproof barrier and any excelsior or corrugated paper covering the equipment inside the case. See d below for instructions on removing the metal container.
(5) Remove the equipment from its inner case and place it on the workbench, or near its final location.
(6) Inspect the equipment for possible damage incurred during shipment.
(7) Check the contents of the packing case against the master packing slip.

c. Opening Cardboard Carton and Waterproof Barrier. No special instructions are needed for opening the waterproof barrier and removing the equipment from the cardboard carton.

d. Instructions for Opening Metal Containers. The top of the metal container is soldered to the sides. To open, break the soldered seam by prying the side of the container away from the soldered seam as follows:

(1) Wipe off the excess solder with a soldering iron. Never use a torch because the contents of the container are inflammable.

(2) With a wooden block or a screw driver, pry the sides from the soldered seam.

(3) When the seam is completely open, pry off the cover.

(4) Remove the bags of desiccant and the protective cardboard packing, and lift or draw out the packages within.

e. Checking. Check the contents against the master packing slip.

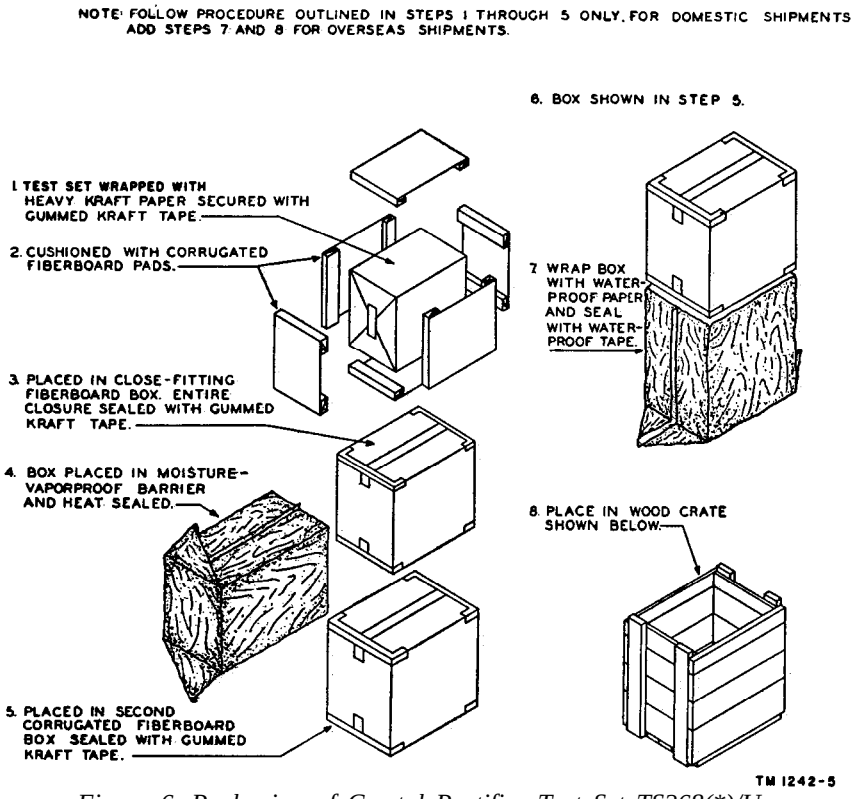


Figure 6. Packaging of Crystal Rectifier Test Set TS268(*)/U.

f. Unpacking Domestic Packing Cases. Radio equipment may be received in domestic packing cases. The instructions given in *b* above apply also to unpacking domestic shipments. Cut the metal bands. Open the cartons that protect the equipment; or, if heavy wrapping paper has been used, remove it carefully and take out the components. Check the contents of the packing case against the master packing slip.

Note. Save the original packing cases and containers for both export and domestic shipments. They can be used again when the equipment is repacked for storage or shipment.

10. Connection

Upon receipt of the equipment, it is necessary to insert Battery BA-30, or equivalent, in the test set as follows:

a. Crystal Rectifier Test Set TS-268/U. Loosen the mounting screws in the four corners of the instrument panel, and lift the panel from the case. All circuit parts are mounted on the rear of the panel. The battery-mounting receptacle is located on one side of the meter (fig. 7). Release the holding clip on the battery receptacle, and insert the battery in the receptacle with the positive pole facing toward the lower section of the panel. The positive polarity usually will be marked on the battery receptacle. Fasten the holding clip firmly in place and return the instrument panel to the case.

b. Crystal Rectifier Test Sets TS-268B/U, TS-268C/U, and TS-268D/U. Unscrew the protective cap from the side of the case. Insert the battery with the positive pole first, and replace the cap.

11. Service Upon Receipt of Used or Reconditioned Equipment

a. Follow the instructions in paragraph 9 for uncrating, unpacking, and checking the equipment.

b. Check the used or reconditioned equipment for tags or other indications pertaining to changes in the wiring of the equipment. If any changes in wiring have been made, note the change in this manual, preferably on the schematic diagram.

c. Check the operating controls for ease of rotation.

d. Insert Battery BA-30 as described in paragraph 10.

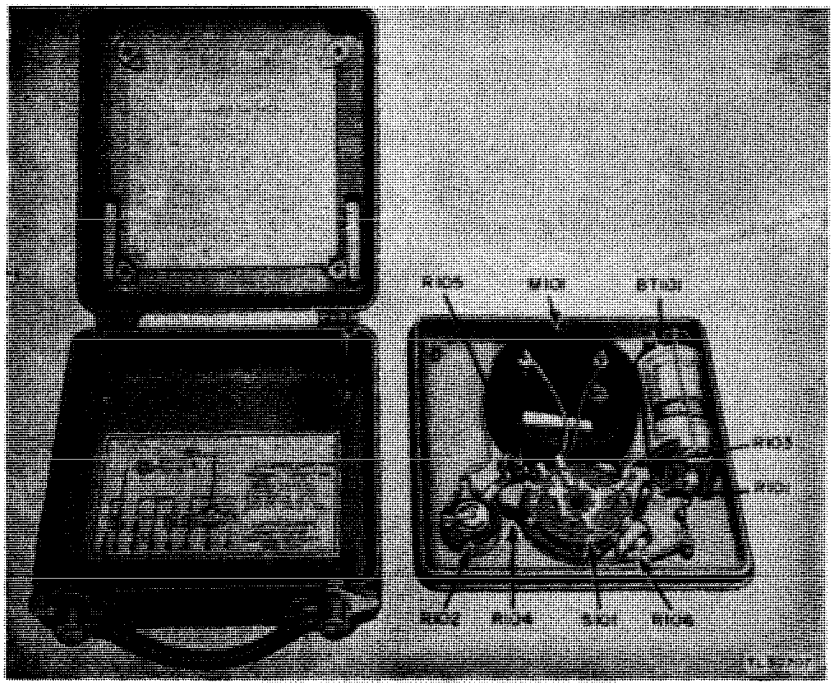


Figure 7. Crystal Rectifier Test Set TS-268/U, under panel view.

Section II. CONTROLS AND INSTRUMENTS

12. General

Haphazard operation or improper setting of the controls can cause damage to electronic equipment. For this reason it is important to know the function of every control. The actual operation of this equipment is discussed in the next section of this manual.

13. Controls

The following table lists the controls of Crystal Rectifier Test Set TS-268 (*)/U and their functions.

Control	Function	Remarks
Selector switch OFF	Disconnects battery from circuit.	Used only in the TS-268/U.
ADJ METER (position 1).	Enables adjustment of the ADJUST METER control for full-scale deflection of meter pointer.	

Control	Function	Remarks
FRONT RES (position 2).	Indicates forward resistance of crystal.	
BACK RES (position 3).	Indicates backward resistance of crystal.	
ADJ METER (position 4).	Enables adjustment of the ADJUST METER control for full-scale deflection of meter scale.	
BACK CURRENT (position 5).	Measures current in the back position of the crystal.	
Safety switch	Disconnects battery from the circuit when the cover is closed.	Used only in the TS–268/U.
ADJUST METER control.	Adjusts the meter for full-scale deflection when the selector switch is in the ADJ METER position.	
OFF position	Disconnect battery from circuit.	Used in TS–268B/U and TS–268C/U only.
PUSH TO OPERATE.	Normally open (off). When reading or adjusting meter, this switch is kept depressed.	Used only in the TS–268D/U.

Section III. OPERATION UNDER USUAL CONDITIONS

14. Preliminary Starting Procedure

a. Preliminary. Set the meter selector switch (fig. 8) to the first ADJ. METER position (position 1) in a clockwise direction. Vary the ADJUST METER control until the needle is at the extreme right (zero ohm) position. Then set the selector switch to the ADJ. METER position (position 4). Vary the ADJUST METER control until the needle is at the extreme right (zero ohm) position.

Caution: Keep the crystal rectifiers in a metal box or wrapped in metal foil when not in use, to avoid damage. *Before inserting a crystal rectifier into the test set socket, hold the crystal by the body, and touch one finger of the hand that is holding the crystal to the ground section on the socket to discharge any electrostatic charges that may be present.* This procedure is necessary in order to prevent damage to the crystal by the presence of a charge on it.

b. Starting. After all preliminary adjustments have been made, turn the meter off, insert the crystal in its holder, and proceed to take measurements.

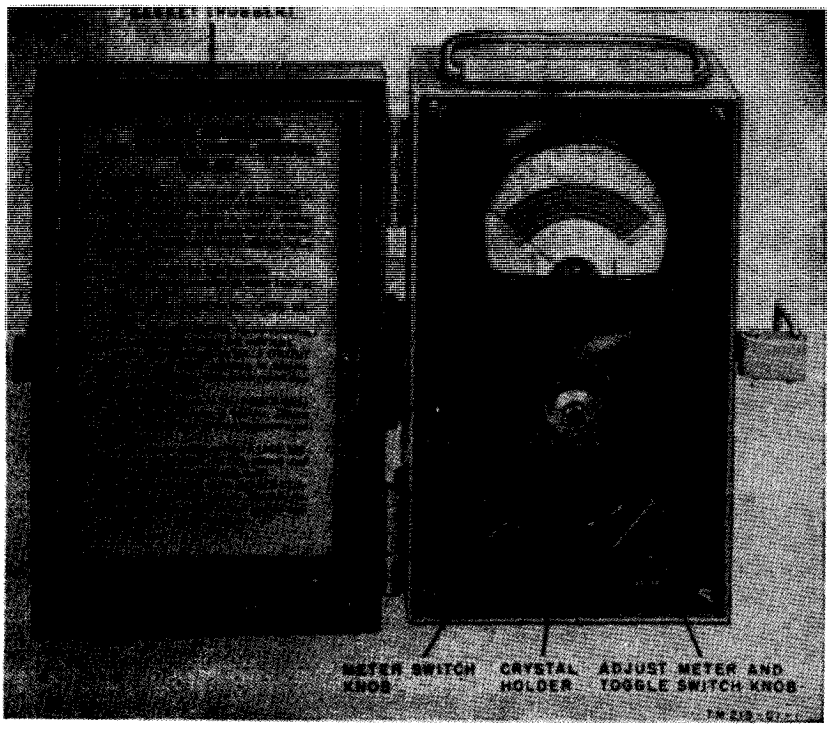


Figure 8. Crystal Rectifier Test Set TS-268C/U, front panel view.

15. Types of Operation

To test crystal rectifiers of normal polarity, rotate the selector switch clockwise to the positions shown on the front panel (fig. 9). (See *f* below for testing crystals of reverse polarity.) Follow the step-by-step procedure below.

a. ADJ Meter (Position 1). In TS-268/U, turn the selector switch clockwise one step from the OFF position to the MTR ADJ position. Turn the MTR ADJ control to give full-scale deflection of the meter pointer. In TS-268B/U and TS-268C/U, the selector switch should be in the ADJ METER position (position 1). In TS-268D/U, the PUSH TO OPERATE switch must be depressed and the selector switch must be in the ADJ METER position (position 1). Then follow the above procedure to obtain full-scale deflection of the meter pointer.

b. Forward Resistance. Turn the selector switch to FWD RES (TS-268/U) or FRONT RES (TS-268B/U, TS-268C/U, and TS-268D/U), and read the forward resistance of the rectifier in kilohms on the upper scale of the meter. The forward resistance should not be greater than .5 kilohm (500 ohms) for a good crystal rectifier.

c. Backward Resistance. Turn the selector switch to the BACK RES position and read the backward resistance of the crystal in kilohms on the upper scale of the meter. For a good crystal rectifier, the ratio of the backward resistance to the forward resistance should be greater than 10 to 1.

d. ADJ Meter (Position 4). Turn the selector switch clockwise to the next ADJ METER position (position 4) and adjust the ADJUST METER control to give full-scale deflection of the pointer.

e. Back Current. Turn the selector switch clockwise to the BACK CURRENT position and read the current value on the MA scale of the meter. A defective crystal rectifier is indicated if a reading is obtained in the POOR (green) portion of the colored scale corresponding to the type of crystal rectifier being tested.

Caution: When returning the crystal rectifier to the radio equipment, *hold the crystal by the body and touch one finger to the radio chassis before placing the crystal in its socket.*

f. Testing Crystals of Opposite Polarity. Crystal rectifiers of opposite polarity (British type) may be tested on Crystal Rectifier Test Set TS–268 (*)/U in the following manner:

(1) *Forward and backward resistance.* Follow the procedure in *b* and *c* above. The reading obtained in the FRONT RES position of the meter represents the *back-*

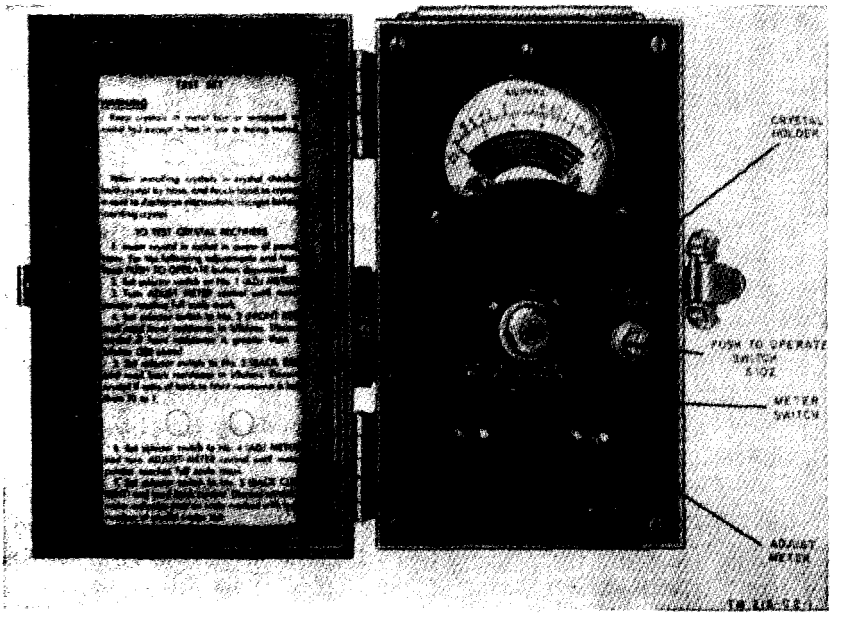


Figure 9. Crystal Rectifier Test Set TS–268D/U, front panel.

ward resistance and the reading obtained in the BACK RES position of the meter represents the *forward* resistance. Basis for rejection of the crystal rectifier is the same as described above.

(2) *Backward current.* It is not practical to measure the BACK CURRENT of crystal rectifiers of opposite polarity under normal circuit conditions.

16. Stopping Procedure

a. After all tests have been made, turn off the crystal rectifier test set in the following manner:

Test set	*Procedure*
TS–268/U	Turn selector switch to the OFF position.
TS–268B/U	Turn ADJUST METER control to extreme counterclockwise (OFF) position.
TS–268C/U	Turn ADJUST METER control to extreme counterclockwise (OFF) position.
TS–268D/U	Release PUSH TO OPERATE switch S102 (fig. 10).

b. Remove crystal from its holder.

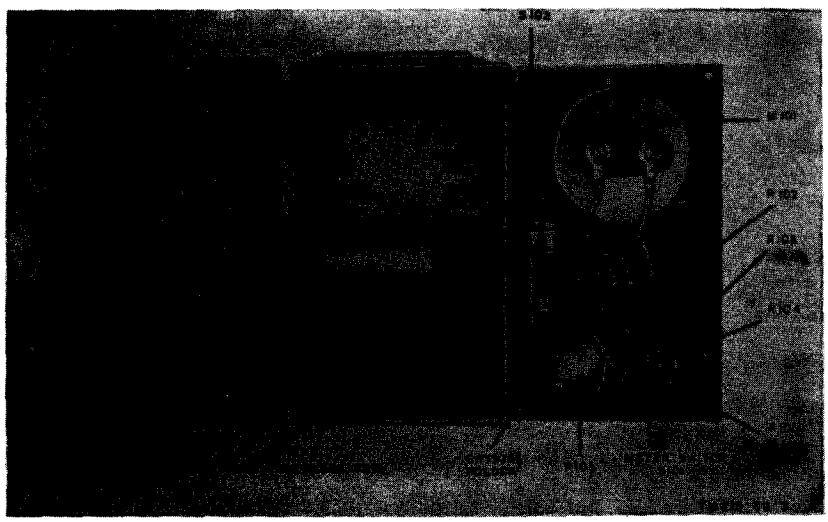


Figure 10. Crystal Rectifier Test Set TS-268D/U, under panel view.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

17. General

The operation of Crystal Rectifier Test Set TS-268(*)/U may be difficult in regions where extreme cold, heat, humidity and

moisture, sand conditions, etc., prevail. In the following paragraphs, instructions are given on procedures for minimizing the effect of these unusual operating conditions.

18. Operation in Arctic Climates

Subzero temperatures and climatic conditions associated with cold weather affect the efficient operation of the equipment. Instructions and precautions for operation under such adverse conditions follow:

a. Handle the equipment carefully.

b. Keep the equipment warm and dry. If not in a heated inclosure, construct an insulated box for the equipment.

c. When equipment which has been exposed to the cold is brought into a warm room, it will start to sweat and will continue to do so until it reaches room temperature. When the equipment has reached room temperature, dry it thoroughly. This condition also arises when equipment warms up during the day after exposure during a cold night.

d. Use any improvised means to protect dry batteries, since they will fail if not protected against the cold. Preheat the batteries. To prevent heat loss, place them in bags lined with kapok, spun glass fiber materials, animal skins, or woolen clothing.

19. Operation in Tropical Climates

When operated in tropical climates, radio equipment may be installed in tents, huts, or, when necessary, in underground dugouts. When equipment is installed below ground and when it is set up in swampy areas, moisture conditions are more acute than normal in the tropics. Ventilation is usually very poor, and the high relative humidity causes condensation of moisture on the equipment whenever the temperature of the equipment becomes lower than the ambient air. To minimize this condition, place the equipment in a box which contains lighted electric bulbs.

20. Operation in Desert Climates

a. Conditions similar to those encountered in tropical areas often prevail in desert areas. Use the same measures to insure proper operation of the equipment.

b. Take care to keep the equipment as free from dust as possible. Make frequent preventive maintenance checks.

CHAPTER 3

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. PREVENTIVE MAINTENANCE SERVICES

21. Definition of Preventive Maintenance

Preventive maintenance is work performed on equipment (usually when the equipment is not in use) to keep it in good working order so that breakdowns and needless interruptions in service will be kept to a minimum. Preventive maintenance differs from trouble shooting and repair, since its object is to prevent certain troubles from occurring. See AR–750–5.

22. General Preventive Maintenance Techniques

a. Use No. 0000 sandpaper to remove corrosion.

b. Use a clean, dry, lint-free cloth or a dry brush for cleaning.

(1) If necessary, except for electrical contacts, moisten the cloth or brush with solvent, dry-cleaning (SD); then wipe the parts dry with a cloth.

(2) Clean electrical contacts with a cloth moistened with carbon tetrachloride ; then wipe them dry with a dry cloth.

Caution: Repeated contact of carbon tetrachloride with the skin or prolonged breathing of the fumes is dangerous. Make sure adequate ventilation is provided.

c. If available, dry compressed air may be used at a line pressure not exceeding 60 pounds per square inch to remove dust from inaccessible places ; be careful, however, or mechanical damage from the air blast may result.

d. For further information on preventive maintenance techniques, refer to TB SIG 178.

23. Use of Preventive Maintenance Forms

a. The information in paragraph 24 is presented as a guide to the individual making an inspection of equipment in accordance with instructions on DA AGO Forms 11-238 and 11-239. The

decision as to which items on the forms are applicable to this equipment is a tactical decision to be made in the case of First Echelon maintenance by the Communications Officer/Chief or his designated representative, and in the cases of Second and Third Echelon maintenance, by the individual making the inspection. Instructions for the use of this form appear on the reverse side of the form.

b. The first two columns in the table in paragraph 24 serve as a cross reference between the item numbers of DA AGO Forms 11-238 and 11-239 and the preventive maintenance information in this manual.

24. Performing Preventive Maintenance

The following preventive maintenance operations should be performed at the intervals indicated, unless these intervals are reduced by the local commander.

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.

DA AGO Form 11-238 item No.	DA AGO Form 11-239 item No.	
		DAILY
3		Remove dirt and dust from meter face and crystal rectifier holder.
6		Check for normal operation.
		WEEKLY
8		Inspect case for rust, corrosion, and moisture.
12		Inspect for looseness of accessible items: switches, knobs, crystal rectifier holder.
15		Inspect meter for damaged glass or needle.
		MONTHLY
	24	Inspect resistors, bushings, and insulators for cracks, chippings, blistering, discoloration, and moisture.
	26	Clean and tighten switches S1 and S2, terminal blocks, relay case, and interiors of chassis and cases not readily accessible.
	31	Clean and tighten connections and mountings for transformers, chokes, potentiometers, and rheostats.
	33	Remove batteries before shipping or storing.
	36	Inspect for leaking waterproof gaskets, and worn or loose parts.
	38	If deficiencies noted are not corrected during inspection, indicate the action taken to correct the deficiencies.

Note. To perform preventive maintenance on the under side of the instrument panel, remove the panel from the instrument case by unscrewing four mounting screws from the corners of the panel, and lift the panel from the case. Use care to avoid damaging connections or parts.

Section II. WEATHERPROOFING

25. Weatherproofing

a. General. Signal Corps equipment, when operated under severe climatic conditions such as prevail in tropical, arctic, and desert regions, requires special treatment and maintenance. Fungus growth, insects, dust, corrosion, salt spray, excessive moisture, and extreme temperatures are harmful to most materials.

b. Tropical Maintenance. A special moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection. This treatment is explained in TB SIG 13 and TB SIG 72.

c. Winter Maintenance. Special precautions necessary to prevent poor performance or total operational failure of equipment in extremely low temperatures are explained in TB SIG 66 and TB SIG 219.

d. Desert Maintenance. Special precautions necessary to prevent equipment failure in areas subject to extremely high temperatures, low humidity, and excessive sand and dust are explained in TB SIG 75.

e. Lubrication. Lubrication of this equipment is not required.

26. Rustproofing and Painting

a. When the finish on the case has been badly scarred or damaged, touch up the exposed surface, using No. 00 or No. 000 sandpaper, to prevent rust and corrosion. Clean the surface down to the bare metal; obtain a bright smooth finish.

Caution: Do not use steel wool. Minute particles frequently enter the case and cause harmful internal shorting or grounding of circuits.

b. When a touch-up job is necessary, apply paint with a small brush. Remove rust from the case by cleaning corroded metal with solvent (SD). In severe cases it may be necessary to use solvent (SD) to soften the rust, and to use sandpaper to complete the preparation for painting. Paint used will be authorized and consistent with existing regulations.

Section III. TROUBLE SHOOTING AT ORGANIZATIONAL MAINTENANCE LEVEL

27. Scope

The trouble shooting and repair that can be performed at the organizational level (operators and repairmen) necessarily are limited in scope by the tools, test equipment, and replaceable parts issued, and by the existing tactical situation. Accordingly, trouble shooting is based on the performance of the equipment and the use of the senses in determining troubles.

28. Visual Inspection

(figs. 11 and 12)

a. Check the battery for any signs of swelling or corrosion.

b. Check the wiring to see that it is not frayed or broken.

c. Inspect the crystal socket to see that the holder will contact the crystal securely.

d. Check the meter pointer to see that it is not bent.

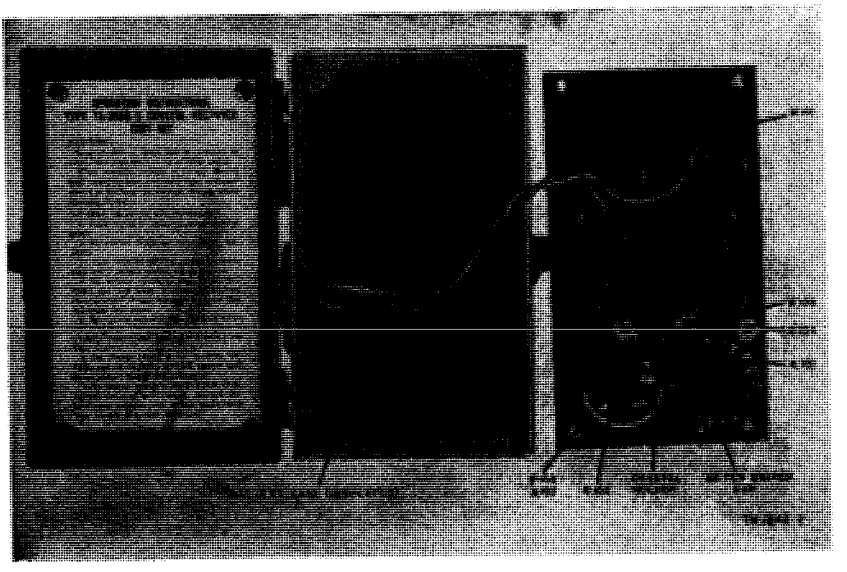


Figure 11. Crystal Rectifier Test Set TS-268B/U, under panel view.



Figure 12. Crystal Rectifier Test Set TS-268C/U, under panel view.

29. Trouble Shooting, Using Equipment Performance Checklist

a. General. The equipment performance checklist (par. 30) should be followed in numerical sequence. It gives the item to be checked, the conditions under which the item is checked, the normal indications, and the corrective measures to be taken.

b. Action or Condition. This column indicates the action that must be taken to check the control or part listed in the item column.

c. Normal Indications. The normal indications listed include the visible signs the operator should perceive when checking the item. If indications are not normal, the operator should apply the recommended corrective measures.

d. Corrective measures. Corrective measures listed are those which the operator can make without turning the equipment in for repairs. If recommended corrective measures do not yield results, trouble shooting is necessary.

30. Equipment Performance Checklist

	Item No.	Item	Action or condition	Normal indications	Corrective measures
PREPARATORY	1	Battery.	Place battery in correct position in battery holder.		
	2	Meter.	Zero meter.	Zero.	Adjust screw on front of meter (TS–268/U model).
EQUIPMENT	3	Crystal.	Insert in holder.		
	4	Selector switch ADJ. METER (position 1).	Turn selector switch. Set the meter control for full scale deflection.	Full scale deflection.	Change battery. Check switches. Check for open circuit.
	5	Selector switch ADJ. METER (position 4).	Turn selector switch. Set the meter control for full scale deflection.	Full scale deflection.	Defective resistor in series with the meter. Check contacts or selector switch.

PERFORMANCE	6	Selector switch FRONT RES and BACK RES positions.	Switch to each position.	Meter pointer moves to left.	Defective socket. Faulty contacts on selector switch.
	7	Selector switch BACK CURRENT position.	Switch to the position.	Meter reads GOOD or POOR.	Faulty contacts on selector switch.
OFF	8	Switch.	Switch to OFF position.	Meter at zero (on the left).	

CHAPTER 4

THEORY OF CRYSTAL RECTIFIER TEST SET TS-268(*)/U

31. General

Crystal Rectifier Test Set TS-268(*)/U provides a means of testing crystal rectifiers in the field quickly and with sufficient accuracy to determine whether they are satisfactory for use. The testing is accomplished by measurement of the forward and backward resistance and the measurement of the back current at a potential of 1 volt. The crystal rectifiers may be accepted or rejected on the basis of the values obtained, in accordance with the allowable limits as listed in the following table.

Allowable Crystal Limits (at 71° F., 22° C.)

Crystal type	Front resistance (max allowable in ohms)	Ratio, back to front resistance (min allowable)	Back current at 1 volt (max allowable in ma)
1N21	500	10 to 1	.400
1N21A	500	10 to 1	.175
1N21B	500	10 to 1	.125
1N23	500	10 to 1	.400
1N23A	500	10 to 1	.300
1N23B	500	10 to 1	.175
1N25	500	10 to 1	.250

Note. Figure 13 represents the allowable crystal limits for all the crystal rectifiers at different ambient temperatures ranging from —4° F. to +120° F.

32. Circuit Details

(fig. 14)

The circuit of the test set actually consists of several individual circuits which may be interconnected, to perform the desired functions, by operation of a multicontact rotary selector switch (S101). Each position of this switch selects a different combination of terminal connections; the various positions are described in the following subparagraphs. In operation, the switch is rotated in a clockwise direction.

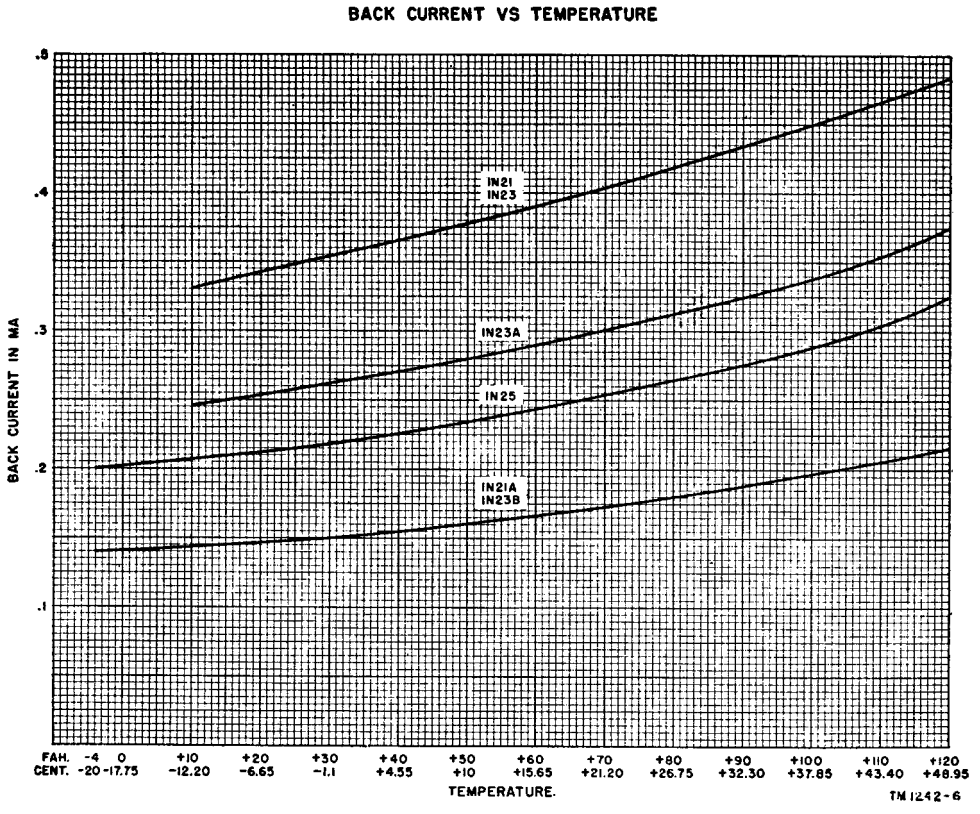


Figure 13. Allowable crystal limits.

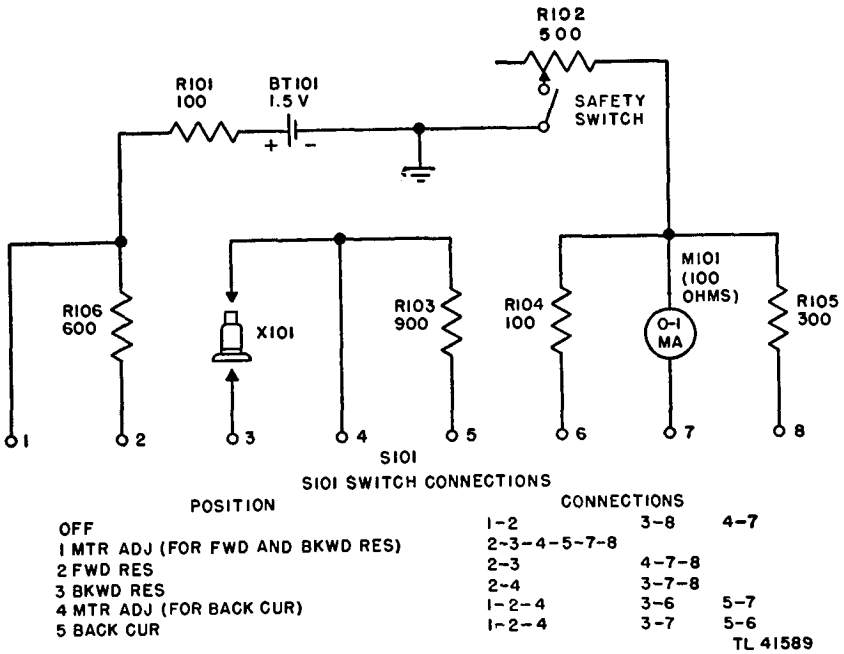


Figure 14. Crystal Rectifier Test Set TS-268(*)/U, schematic diagram.

a. OFF Position (TS-268/U Only). When the selector switch is turned to OFF, the battery circuit is open and no current will flow in the circuit.

b. ADJ METER Position (fig. 15). With the selector switch in this position (position 1), battery BT101, current limiting resistors R101 and R106 (TS-268/U only), meter M101, and current adjusting resistor R102 (ADJUST METER control) are connected in series. This circuit is used to adjust the meter pointer to full-scale deflection before resistance measurements are made on crystal rectifiers. The adjustment is made by means of variable resistor R102 until sufficient current flows in the circuit to give full-scale deflection of the meter pointer. In this position of the switch, the terminals of the crystal rectifier holder are shorted, thus giving the effect of zero resistance. The meter is shunted with resistor R105 to provide the correct sensitivity for the resistance range.

c. FRONT RES Position (fig. 16). When the selector switch is rotated clockwise to this position (position 2), the crystal rectifier under test is inserted into the series circuit described in b above, and the short is removed from the crystal socket holder. The increased resistance in the series circuit, introduced by the crystal rectifier, causes a decrease in the current flow, and the meter will

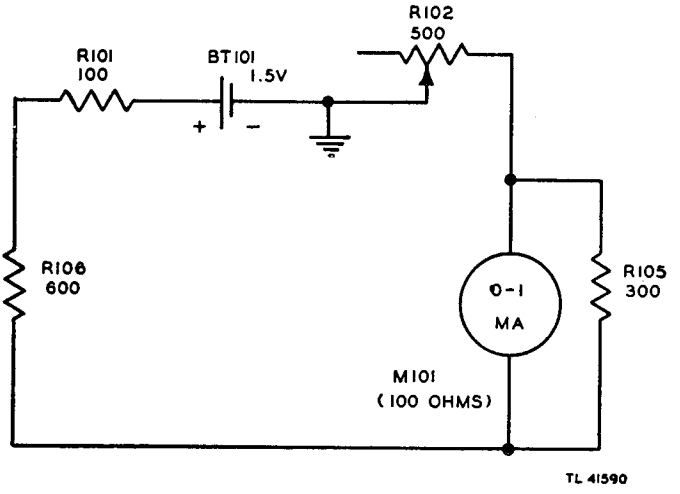


Figure 15. Meter adjusting circuit, schematic diagram.

indicate somewhere other than the full-scale deflection. Since the upper scale of the meter is calibrated to express resistance in terms of current flowing through the meter coil, the forward resistance of the crystal rectifier (in kilohms) is read directly. from the scale.

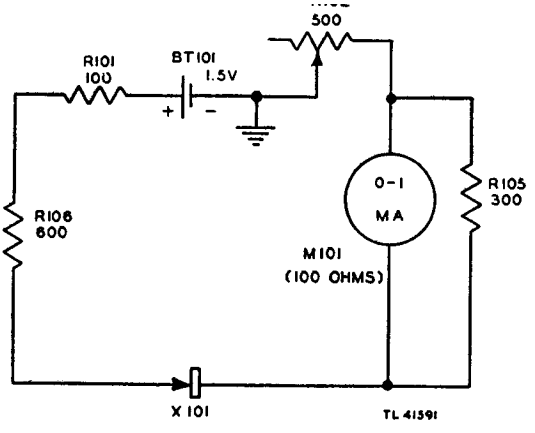


Figure 16. Circuit for forward resistance measurements, schematic diagram.

d. BACK RES Position (fig. 17). When the selector switch is in this position (position 3), the same connections are made as in *c* above, except that the connections to the crystal rectifier are reversed. The subsequent reading obtained on the meter then represents the backward resistance of the crystal rectifier.

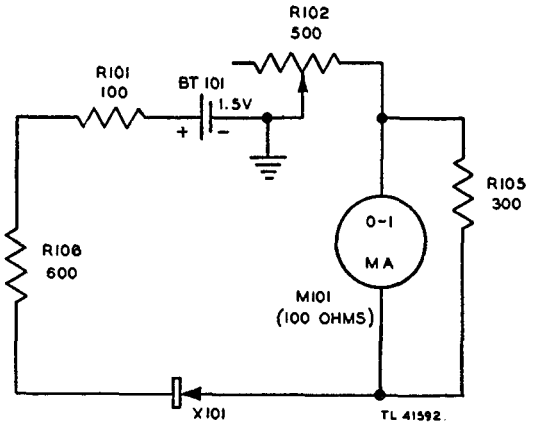


Figure 17. Circuit for backward resistance measurements, schematic diagram.

e. ADJ METER Position (fig. 18). When the selector switch is in this position (position 4) battery BT101, fixed resistor R101, and variable resistor R102 are connected in series with a two-branch parallel circuit, consisting of the crystal rectifier and resistor R104 in one branch, and meter M101 and resistor R103 in the other branch. The crystal rectifier holder terminals are connected so that the backward resistance of the crystal is in the circuit. Since the backward resistance of the crystal rectifier is quite high, the effective resistance of the parallel circuit is essentially that of the branch containing the meter and resistor R103, or 1,000 ohms. This circuit is used to adjust the meter pointer to full-scale deflection before measuring the current in the reverse direction

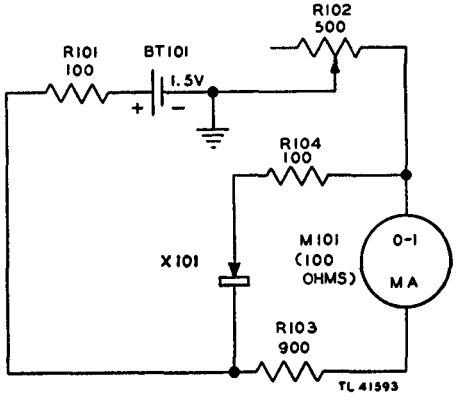


Figure 18. Circuit for second MTR ADJ position, schematic diagram.

through the crystal rectifier. Since the sensitivity of the meter is 1 ma, adjustment of resistor R102 to give full-scale deflection of the meter pointer causes a potential of 1 volt to be applied across the parallel circuit. (This is the second ADJ METER position as the selector switch is rotated in the clockwise direction.)

f. BACK CURRENT Position (fig. 19). When the selector switch is rotated to this position (position 5), the circuit selected is the same as in *e* above except that the positions of the crystal rectifier and resistor R103 are reversed in the parallel circuit. The crystal rectifier now is connected in series with the meter and, with 1 volt impressed across this circuit, the meter pointer will indicate the current flowing through the crystal rectifier in the backward direction. The magnitude of this current, which is read on the MA scale of the meter, will be inversely proportional to the backward resistance of the crystal rectifier.

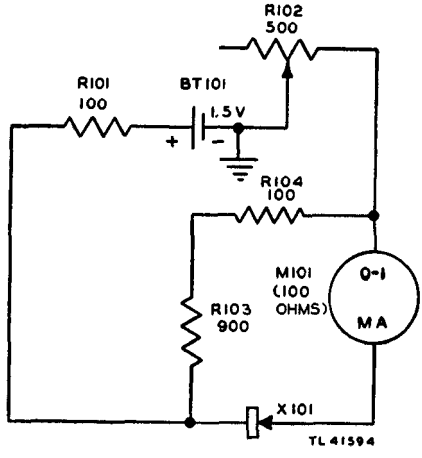


Figure 19. Circuit for back current measurements, schematic diagram.

CHAPTER 5

FIELD MAINTENANCE INSTRUCTIONS

Note. This chapter contains information for field maintenance. The amount of repair that can be performed by units having field maintenance responsibility is limited only by the tools and test equipment available, and by the skill of the repairman.

Section I. TROUBLE SHOOTING AT FIELD MAINTENANCE LEVEL

33. Trouble Shooting Procedure

Check to see that all leads and components are in the proper places, and that there are no frayed or broken leads or parts.

34. Test Equipment Required for Trouble Shooting

The only test equipment required for trouble shooting Crystal Rectifier Test Set TS-268(*)/U, is Multimeter TS-352/U, or equivalent. The technical manual associated with this test equipment is TM 11-5527. Tool equipment TE-41 also is required.

35. Trouble Shooting Chart

The following chart is supplied as an aid in locating trouble in the crystal rectifier test set. This chart lists the symptoms which the repairman observes while making a few simple tests.

Symptom	Probable trouble	
1. Selector switch in ADJ METER position. Meter pointer does not indicate or can not be adjusted to full-scale deflection.	1. Weak battery. Faulty contacts on selector switch.	1. Change battery. Check all parts in this circuit (fig. 15) for an open circuit.
2. FRONT RES and BACK RES positions. No indication on meter.	2. Defective socket assembly or faulty contacts on selector switch.	2. Replace socket or selector switch.

Symptom	Probable trouble	Correction
3. Second ADJ METER position. No indication on meter.	3. Defective resistor R103. Fault y contacts on selector switch.	3. Replace resistor. Replace selector switch.
4. BACK CURRENT position. No indication obtained on meter.	4. Faulty contacts on selector switch.	4. Replace selector switch.

Section II. REPAIRS

36. Replacement of Parts

a. Replace the 1.5-volt battery, BT101, when the meter pointer cannot be adjusted to full-scale deflection with the selector switch in the ADJ METER position. Remove the instrument panel and replace the battery as described in paragraph 10.

b. Replace the crystal rectifier socket when the contact springs no longer make satisfactory contact with the crystal rectifier inserted in the socket. To remove the socket, disconnect the wires from the terminals and remove the flathead mounting screw, the nut, and the lockwasher that mount the socket assembly on the panel (TS-268/U).

c. If the meter becomes defective replace it with an exact replacement. When the resistance of the meter is less than 100 ohms, a suitable resistor must be connected in series to bring the total resistance to 100 ohms.

d. Should any other part, such as a resistor, control, or switch, become defective, follow standard operating procedure in replacement of the part.

37. Refinishing

Instructions for refinishing badly marred panels on exterior cabinets are given in TM 9-2851.

CHAPTER 6

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

38. Disassembly

Remove the battery from the case before packing equipment, Refer to paragraph 10 and reverse the procedure.

39. Repacking for Shipment or Limited Storage

Whenever practicable, place a dehydrating agent, such as silica gel, inside the chest. Protect the chest with a waterproof paper barrier. Seal the seams of the paper barrier with waterproof sealing compound or tape. Pack the chest in a padded wooden case, providing at least 3 inches of excelsior padding or some similar material between the paper barrier and the packing case.

Section II. DEMOLITION OF MATÉRIEL TO PREVENT ENEMY USE

40. General

The demolition procedures outlined in paragraph 41 will be used to prevent the enemy from using or salvaging this equipment. Demolition of this equipment will be accomplished only upon order of the commander.

41. Methods of Destruction

a. Smash. Smash the controls, switches, and meter, using sledges, axes, hammers, crowbars, or other heavy tools.

b. Cut. Cut wiring, using axes and machetes.

c. *Burn.* Burn resistors, wiring, and technical manuals, using gasoline, kerosene, oil, flame throwers, or incendiary grenades.

d. Bend. Bend cabinet and chassis.

e. Explosives. If explosives are necessary, use firearms, grenades, or TNT.

f. Disposal. Bury or scatter the destroyed parts in slit trenches, fox holes, or other holes, or throw them into streams.

g. Other. Destroy everything.

APPENDIX I

REFERENCES

Note. For availability of items listed, check SR 310–20-3 and SR-310-20-4. Check Department of the Army Supply Catalog SIG 1 for Signal Corps supply catalogs.

1. Army Regulations

AR 380-5	Military Security (Safeguarding Military Information).
AR 750-5	Maintenance of Supplies and Equipment (Maintenance Responsibilities and Shop Operation).

2. Supply Publications

SIG 1	Introduction and Index.
SIG 3	List of Items for Troop Issue.
SIG 5	Stock List of All Items.
SIG 6	Sets of Equipment.
SIG 7&8	Organizational Maintenance Allowances and Field and Depot Maintenance Stockage Guide.
SB 11-6	Dry Battery Supply Data.
SB 11-47	Preparation and Submission of Requisitions for Signal Corps Supplies.
SB 11-76	Signal Corps Kit and Materials for Moisture- and Fungi-Resistant Treatment.

3. Publications on Auxiliary Equipment and Test Equipment

TM 11-4700	Electrical Indicating and Measuring Instruments, Repair Instructions.
TM 11-5527	Multimeter TS-352/U.

4. Painting, Preserving, and Lubrication

TB SIG 13	Moistureproofing and Fungiproofing Signal Corps Equipment.
TM 9-2851	Painting Instructions for Field Use.

5. Camouflage

FM 5-20	Camouflage, Basic Principles.

6. Decontamination

TM 3-220	Decontamination.

7. Demolition

FM 5-25	Explosives and Demolition.

8. Other Publications

SR 310-20-3	Index of Training Publications.
SR 310-20-4	Index of Technical Manuals, Technical Regulations, Technical Bulletins, Supply Bulletins, Lubrication Orders, and Modification Work Orders.
SR 310-20-7	Index to Tables of Organization and Equipment, Reduction Tables, Tables of Organization, Tables of Equipment, and Tables of Allowances.
SR 700-45-5	Unsatisfactory Equipment Report (Reports Control Symbol CSGLD-247).
SR 745-45-5 AFR 71-4	Report of Damaged or Improper Shipment (Reports Control Symbols CSGLD-66 (Army) and AF-MC-U2 (Air Force)).
TB SIG 66	Winter Maintenance of Signal Equipment.
TB SIG 72	Tropical Maintenance of Ground Signal Equipment.
TB SIG 75	Desert Maintenance of Ground Signal Equipment.
TB SIG 123	Preventive Maintenance Practices for Ground Signal Equipment.
TB SIG 178	Preventive Maintenance Guide for Radio Communication Equipment.
TB SIG 219	Operation of Signal Equipment at Low Temperatures.

TM 11-415	Dry Batteries.
TM 11-662	Basic Theory and Application of Electron Tubes.
TM 11-663	Electronic Power Supplies.
TM 11-665	C-W and A-M Radio Transmitters and Receivers.
TM 11-668	F-M Transmitters and Receivers.
TM 11-466	Radar Electronic Fundamentals.
TM 11-486	Electrical Communication Systems Engineering.
TM 11-660	Introduction to Electronics.
TM 11-661	Electrical Fundamentals (Direct Current).
TM 11-681	Electrical Fundamentals (Alternating Current).
TM 11-4000	Trouble Shooting and Repair of Radio Equipment.

APPENDIX II
IDENTIFICATION TABLE OF PARTS

1. Requisitioning Parts

The fact that a part is listed in this table is not sufficient basis for requisitioning the item. Requisitions must cite an authorized basis, such as a specific T/O&E, T/A, SIG 7 & 8, list of allowances of expendable material, or other authorized supply basis. The Department of the Army Supply Catalog applicable to the equipment covered in this manual is SIG 7 & 8 TS–268/U. For an index of available supply catalogs in the Signal portion of the Department of the Army Supply Catalog, see the latest issue of SIG 1.

2. Identification Table of Parts for Crystal Rectifier Test Set TS–268(*)/U

Ref. Symbol	Model				Name of part and description	Function of part	Signal Corps stock No.
	TS–268/U	TS–268B/U	TS–268C/U	TS–268D/U			
			(*)	(*)	GASKET: case cover sealing; neoprene wp; 1 opening; rect $7\frac{11}{16}$" lg x $4\frac{11}{16}$" wd x $\frac{1}{4}$" thk o/a.	Seals the case cover	2Z4867.590
			(*)	(*)	GASKET: case bottom sealing; neoprene wp; 4 mtg holes, 1 opening; rect $7\frac{11}{32}$" lg x $4\frac{11}{32}$" wd x $\frac{3}{32}$" thk o/a.	Seals the bottom of the case	2Z4867.589
		(*)			GASKET: cover sealing; rubber; rect $7\frac{1}{8}$" lg x $4\frac{5}{16}$" wd x $\frac{3}{16}$" thk o/a.	Seals the cover	2Z4868.241
		(*)	(*)	(*)	GASKET: rubber wp; $1\frac{7}{8}$" OD x $1\frac{7}{16}$" ID x $\frac{1}{16}$" thk.		2Z4868.242

	(*)				GASKET: bottom sealing; rubber; rect 6" OD x 5¼" ID x 1/32" thk o/a.		2Z4868.289
	(*)				KNOB: rd; black phenolic; for ¼" dia shaft; 1 #8–32 set screw; 9/16" lg x ¾" dia o/a.	Meter adjust potentiometer knob	2Z5842–12
	(*)	(*)	(*)	(*)	KNOB: bar; black plastic; ¼" dia shaft; 1 7/32" lg x ¾" wd x 37/64" thk o/a.	Metal selector switch knob	2Z5848
M101	(*)				MULTIMETER: d-c; 0 to 1 ma in 1 step; 0–1 meg in 1 step; body 2¾" dia x .97" d, fl 3" wd x 3⅛" lg; 100 ohms resistance.	Indicates condition of crystal rectifier under test.	3F4325–268.1
M101		(*)	(*)	(*)	MULTIMETER: d-c; .1 through .8 and 1 through 10 ccw; body 2.80" dia x 1.56" d; fl 3½" dia; 100 ohms resistance.	Indicates condition of crystal rectifier under test.	3F891–77
R101	(*)				RESISTOR, fixed: WW; 100 ohms ±5%; ½ w; .625" lg x .1875" dia o/a.	Current limiter	3Z6010–59
R104	(*)						
R102	(*)				RESISTOR, variable: WW; 500 ohms ±10%; 2 w; body 1.031" dia x .4375" d.	Meter adjustment potentiometer	3Z7250–30
R103	(*)				RESISTOR, fixed: comp; 900 ohms ±1%; ½ w; .655" lg x .249" dia.	Meter multiplier	3Z6090–32
R101		(*)	(*)	(*)			
R105	(*)				RESISTOR, fixed: comp; 300 ohms ±5%; ½ w; .655" lg x .249" dia.	Meter shunt	3RC21BF301J
R106	(*)				RESISTOR, fixed: comp; 600 ohms ±5%; ½ w; 5/8" lg x 3/16" dia.	Crystal current limiter	3Z6060–2
R102			(*)	(*)	RESISTOR, fixed: comp; 100 ohms ±1%; ½ w; ½" lg x .150" dia.	Crystal current limiter	3Z6010–215
R105							
R103		(*)			RESISTOR, variable: WW; 1500 ohms; 1 w; body 1⅜" dia x 1 3/16" d.	Meter adjustment potentiometer	3Z7315–5
R103			(*)		RESISTOR, variable: WW; 1500 ohms ±10%; 2 w.	Meter adjustment potentiometer	3RA6008
R103				(*)	RESISTOR, variable: WW; 1500 ohms ±10%; 2 w.	Meter adjustment potentiometer	3RV31505

Ref. Symbol	Model TS-268/U	Model TS-268B/U	Model TS-268C/U	Model TS-268D/U	Name of part and description	Function of part	Signal Corps stock No.
R104		(*)			RESISTOR, fixed: WW; 200 ohms ±1%; 1 w; ½" lg x 7/16" dia.	Meter shunt	3Z6020–233
R104			(*)	(*)	RESISTOR, fixed: comp; 200 ohms ±1%; ½ w; ½" lg x .150" dia.	Meter shunt	3Z6020–253
R102		(*)			RESISTOR, fixed: WW; 100 ohms ±1%; 1 w; ½" lg x 7/16" dia.	Crystal current limiter	3Z6010–188
X101	(*)				SOCKET, crystal: min; two spring type cont; 1" lg x 9/16" wd x 13/16" d o/a.	Crystal holder	2Z5042–27
X101		(*)			SOCKET, crystal: min; one pin type cont; ¾" lg x 5/8" dia.	Crystal holder	2Z8761–42
X101			(*)		SOCKET, crystal: min; one pin type cont; 1" lg x 7/8" dia o/a.	Crystal holder	2Z8761–51
X101				(*)	SOCKET, crystal: accom .093" dia pin and .250" dia cont ring; min; .937" lg x .875" dia.	Crystal holder	2Z8761–69
			(*)		SPRING: flat type; 6" lg x 1¼" wd x .030" thk	For holding air drier unit	2Z8877.180
S101	(*)				SWITCH, rotary: 4 pole, 6 position; shaft ¾" lg x ¼" dia.	Selector switch	3Z9826–76
S101		(*)			SWITCH, rotary: 1 sect.; 3 pole; 5 position; 1 31/32" lg x 1 11/16" dia o/a.	Selector switch	3Z9825–55.80
S101			(*)		SWITCH, rotary: 1 sect.; 3 pole; 5 position; 1¼" dia x 7/16" d.	Selector switch	3Z9825–55.104
S101				(*)	SWITCH, rotary: 3 pole, 5 position; ¾" lg x ¼" dia shaft.	Selector switch	3Z9825–55.133
S102				(*)	SWITCH: sensitive; SPDT; plunger type	Safety switch	3Z9558–39.13

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