

# TUBE TESTER I-177



WAR DEPARTMENT

3 AUGUST 1944

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**RESTRICTED.** *DISSEMINATION OF RESTRICTED MATTER.*

The information contained in restricted documents and the essential characteristics of restricted materiel may be given to any person known to be in the service of the United States and to persons of undoubted loyalty and discretion who are cooperating in Government work, but will not be communicated to the public or the press except by authorized military public relations agencies. (See also par. 28, AR 280-5, 15 Mar. 1944.)

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TECHNICAL MANUAL  
TUBE TESTER I-177

CHANGES  
No. 1

WAR DEPARTMENT  
WASHINGTON 25, D. C., 24 October 1945

TM 11-2627, 3 August 1944, is changed as follows:

The classification RESTRICTED is removed from the manual by Section IX, War Department Circular 186, 1945.

Figure 1.—Tube Tester I-177 in wooden case, with cover raised.



Figure 1.1.—Tube Tester I-177 in metal case, with cover raised.

**1. PURPOSE.** Tube Tester I-177 \* \* \* of vacuum tube. Later equipments are inclosed in metal cases instead of the original

\*This change supersedes TB 11-2627-1, June 1945.

wooden cases but all operate the same. The purpose of \* \* \* of this instrument.

## 2. TUBE TESTER I-177 (figs. 1 and 1.1).

a. (Superseded.) This instrument is furnished either as an individual unit or as part of Test Set I-56-K. As a part of Test Set I-56-K it fits into a compartment of Carrying Case CS-130 (fig. 1.2). The weights and dimensions of the tube tester and other components of the test set are given below.

Equipment	Dimensions (in.)			Volume (cu. ft.)	Weight (lb)	
	Height	Width	Depth		Wooden case	Metal case
Voltohmmeter I-166-----	5.5	6.0	7.0	0.13	4.75	5.5
Test Unit I-176-----	5.5	11.5	8.5	0.31	9.0	10.0
Tube Tester I-177-----	5.75	15.5	8.5	0.44	15.75	16.5
Case CS-130-----	14.75	20.5	9.75	1.76	-----	25.6

The following table gives the dimensions and approximate weight of the packed units:

Equipment	Dimensions (in.)			Volume (cu. ft.)	Weight (lb)
	Height	Width	Depth		
Tube Tester I-177 (packed for domestic shipment)-----	8	17.9	10.5	0.87	17
Tube Tester I-177, two in carton (packed for domestic shipment)-----	13.5	17	10.5	1.39	37
Test Set I-56-K, one in a wooden case-----	15	21	11	2.01	73
Test Set I-56-K, three in a wooden case-----	17.5	23.5	35	8.33	215

b. Tube Tester I-177 \* \* \* and 0-15,000 microohms. **Most tube testers operate on 105- to 125-volt, 60-cycle alternating current. Some equipments on Orders No. 12139-Phila-45-10 and 28948-Phila-45-10 may be operated on 105 to 125 volts or on 210 to 250 volts, the range being determined by the setting of the switch mounted to the right of the SHORTS indicator. Tube testing data \* \* \* of the cover.**

## 4. SHORTS TEST.

\* \* \* \* \*

c. Determine the type \* \* \* of the instrument. If the tube is marked with Signal Corps nomenclature, use the table in section V of this manual or the table on the back of the first card in the tester to determine the commercial equivalent.

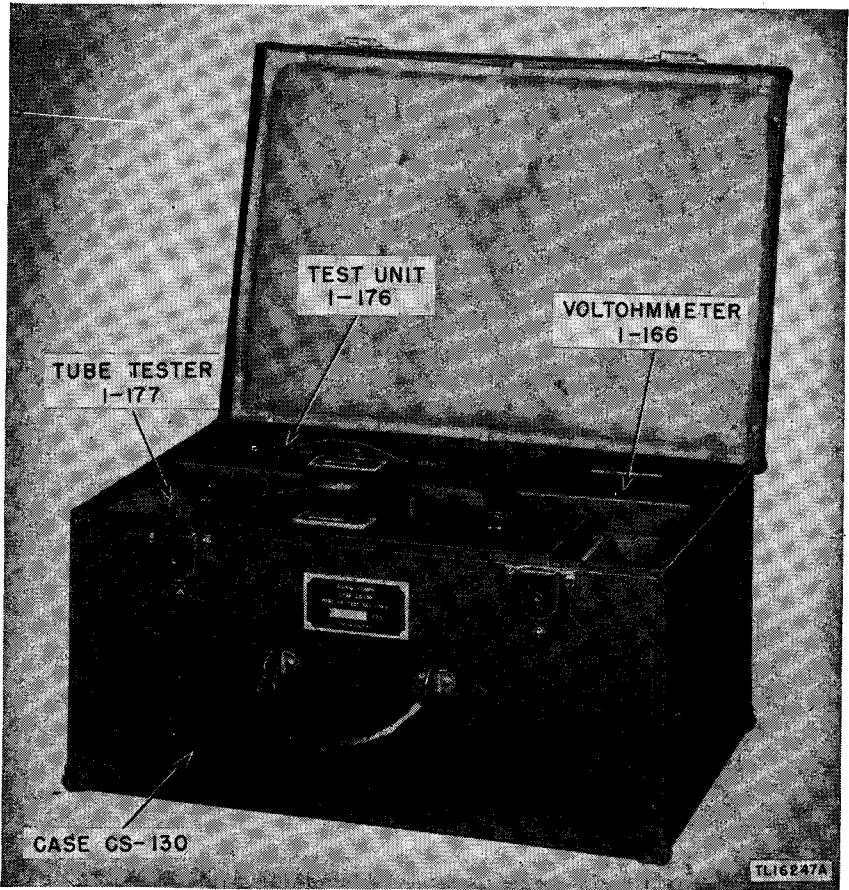


Figure 1.2.—Test Set I-56-K.

\* \* \* \* \*

g. Insert the tube \* \* \* headed Socket Letter. If the column headed Notations of the tube test data indicates the use of Adapter M-418\* plug the adapter into the octal socket of the tester, and the tube into the adapter. Connect the left-hand lead to the left-hand plate pin and the right-hand lead to the right-hand plate pin. Proceed with the test in the normal manner.

\* \* \* \* \*

## 7. GAS TEST.

\* \* \* \* \*

\* Adapter, Tube Socket: Signal Corps Adapter M-418. Signal Corps Stock No. 2Z299-418.

a. Carry out the shorts test procedure given in paragraph 4, then set the **SHORT-TUBE TEST** switch to **TUBE TEST**. If dealing with \* \* \* or to rectifiers.

\* \* \* \* \*

e. While holding down \* \* \* free from gas.

**NOTE:** If the pointer cannot be brought down to **100** microohms by adjusting potentiometer R with the **GAS NO. 1** button pressed, set R at 82, note the position of the pointer, and press GAS NO. 2 button to see if the pointer moves upward more than one scale division. In some cases \* \* \* period of time.

12. **GENERAL.** Individual circuits of \* \* \* for unauthorized repairs.

**NOTE** (Added): The complete schematic diagram of Tube Tester I-177 appears in figure 13. Some tube testers are provided with a power transformer having a single primary winding designed to function only from 105- to 125-volt a-c source. Others have a power transformer with a two-section primary which may be connected in series for 210- to 250-volt a-c operation, or in parallel for 105- to 125-volt a-c operation.

## SECTION IV

### MAINTENANCE

**NOTE** (Superseded): Failure or unsatisfactory performance of equipment used by Army Ground Forces and Army Service Forces will be reported on **WD AGO Form 468 (Unsatisfactory Equipment Report)**; by Army Air Forces, on **Army Air Forces Form 54 (Unsatisfactory Report)**. If either form is not available, prepare letter containing the data elicited by the sample form shown in figure 8.1 without reproducing copies of the form.

26. (Superseded) **PREVENTIVE MAINTENANCE TECHNIQUES.**

a. *Meaning of Preventive Maintenance.* Preventive maintenance is a systematic series of operations performed at regular intervals on equipment, when turned off, to eliminate major break-downs, unwanted interruptions in service, and to keep equipment operating at top efficiency. To understand what is meant by preventive maintenance, it is necessary to distinguish between preventive maintenance, trouble shooting, and repair. The prime function of preventive maintenance is to *prevent break-downs* and, therefore, the need for

WAR DEPARTMENT UNSATISFACTORY EQUIPMENT REPORT			
FOR	TECHNICAL SERVICE Signal Corps	MATÉRIEL	DATE 1 Feb 45
FROM	ORGANIZATION 175 Signal Repair Co	STATION APO 102	
TO	NEXT SUPERIOR HEADQUARTERS Supply Sec, Hq Fourth Army Sig Sv	STATION APO 110	TECHNICAL SERVICE Signal Corps
COMPLETE MAJOR ITEM			
NONNOMENCLATURE Radio Transmitter	TYPE Ground, vehicular	MODEL A	
BC-123-A	U. S. A. - SPEC. NO. Order No. 1234-Phila-45	SERIAL NO. 12345	DATE RECEIVED 5 Jan 45
MANUFACTURER American Radio Corp	EQUIPMENT WITH WHICH USED (if applicable) Radio Set SCR-456-A in Tank, Medium, M4		
DEFECTIVE COMPONENT—DESCRIPTION AND CAUSE OF TROUBLE			DATE INSTALLED When manufactured
PART NO. Sig C	TYPE Capacitor C20; fixed;	MANUFACTURER American Radio Corp	
Stk No. 3E47-2	1-mf; 500 vdcw		
DESCRIPTION OF FAILURE AND PROBABLE CAUSE (If additional space is required, use back of form)			
Capacitor C20 shorts out due to humid operating conditions			
DATE OF INITIAL TROUBLE		TOTAL PERIOD OF OPERATION BEFORE FAILURE	
15 Jan 45			
TOTAL TIME INSTALLED		TOTAL PERIOD OF OPERATION BEFORE FAILURE	
YEARS	MONTHS	YEARS	MONTHS
—	—	0	5
BRIEF DESCRIPTION OF UNUSUAL SERVICE CONDITIONS AND ANY REMEDIAL ACTION TAKEN			
Operation in tropics; heavy rainfall. Was replaced and set given moistureproofing and fungiproofing treatment, 20 Jan 45.			
TRAINING OR SKILL OF USING PERSONNEL		RECOMMENDATIONS (If additional space is required, use back of form)	
POOR	FAIR	GOOD	X
		Substitute capacitor designed for tropical operation	
TYPED NAME, GRADE, AND ORGANIZATION			SIGNATURE
E. A. Wilson, 1st Lt, Sig C 175 Signal Repair Co			<i>E. A. Wilson</i>
ORIGINATING OFFICER			
FIRST ENDORSEMENT			
TO CHIEF	TECHNICAL SERVICE	OFFICE	DATE
NAME, GRADE, AND STATION			
Instructions			
<ol style="list-style-type: none"> <li>It is imperative that the chief of technical service concerned be advised at the earliest practical moment of any constructional, design, or operational defect in material. This form is designed to facilitate such reports and to provide a uniform method of submitting the required data.</li> <li>This form will be used for reporting manufacturing, design, or operational defects in material, petroleum fuels, lubricants, and preserving materials with a view to improving and correcting such defects, and for use in recommending modifications of material resulting from hit-and-run and accidental damage not for the replacement, repair or the issue of parts and equipment. It does not include currently authorized operational or performance records.</li> <li>Reports of malfunctions and accidents involving ammunition will continue to be submitted as directed in the manner described in A.R. 710-10 (change No. 2).</li> <li>It will not be practicable or desirable in all cases to fill all blank spaces of the report. However, the report should be as complete as possible in order to expedite necessary corrective action. Additional pertinent information not provided for in the blank spaces should be submitted as footnotes to the form. Photographs, sketches, or other illustrative material are highly desirable.</li> <li>When cases arise where it is necessary to communicate with a chief of service in order to secure safety to personnel, more expeditious means of communication are indicated. This form should be used to confirm reports made by more expeditious means.</li> <li>This form will be made out in triplicate by using or service organization. Two copies will be forwarded to the technical service; one copy will be forwarded through command channels.</li> <li>Necessity for using this form will be determined by the using or service troops.</li> </ol>			
W. D. - A. G. O. Form No. 468 28 August 1944			This form supersedes W. D. - A. G. O. Form No. 466, 1 December 1944, which may be used until existing stocks are exhausted.
U. S. GOVERNMENT PRINTING OFFICE 16-52849-1			TL19589C

Figure 8.1. WD AGO Form 468, with sample entries.

repair. On the other hand, the prime function of trouble shooting and repair is to locate and correct *existing* defects. The importance of preventive maintenance cannot be overemphasized. The entire system of communications depends upon the readiness and operating efficiency of each item of equipment when it is needed. In a similar manner, the test equipment by which this condition of readiness in

communications equipment is realized must be kept in excellent operating condition at all times.

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

*b. Description of Preventive Maintenance Techniques.*

(1) **GENERAL.** Most of the electrical parts used in Tube Tester I-177 require routine preventive maintenance. This preventive maintenance varies. Some require a different kind of maintenance than others. Some require more, some less. Definite and specific instructions must be followed. Hit-or-miss techniques cannot be applied. This change contains specific instructions to guide personnel assigned to perform the six basic maintenance operations: Feel, Inspect, Tighten, Clean, Adjust, and Lubricate. Throughout this change the lettering system for the six operations will be as follows:

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

The first two operations show if the other four are needed. Selection of operations is based on a knowledge of field needs. For example, dust encountered on dirt roads during cross-country travel filters into equipment no matter how much care is taken to prevent it. Rapid changes in weather (such as heavy rain followed by blistering heat), excessive dampness, snow, and ice tend to cause corrosion of exposed surfaces and parts. Without frequent inspections and the necessary tightening, cleaning, and lubricating operations, equipment becomes undependable and subject to break-down when it is needed most.

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

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

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\*The Feel operation does not apply to Tube Tester I-177.

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

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

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

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

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

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

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

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

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

## **26.1. ITEMIZED PREVENTIVE MAINTENANCE (Added).**

*a. Introduction.* For ease and efficiency of performance, preventive maintenance on Tube Tester I-177 will be broken down into operations that can be performed at different time intervals. In this section the preventive maintenance work to be performed on the tube tester at the specified time intervals is broken down into units



of work called items. The general techniques involved and the application of the FITCAL operations in performing preventive maintenance on individual parts are discussed in this paragraph. When performing preventive maintenance, refer to *c* through *f* below. Perform all work with the power removed from the equipment. After preventive maintenance has been performed on a given day, put the equipment into operation and check it for satisfactory performance.

*b. Preventive Maintenance Tools and Materials.* The following materials will be needed in performing preventive maintenance: common hand tools, #0000 sandpaper, Solvent, Dry-cleaning.

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

*c. Item 1, Exterior of Case.*

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

(2) **TIGHTEN (T).** If the hinges, the snap fastener, or the carrying handle are loose and cannot be tightened by the using personnel, return the tube tester to a higher echelon as soon as possible; otherwise, damage to controls on the panel may result.

(3) **CLEAN (C).** Do not allow dust, grease, mud, etc., to accumulate on the case. The tester contains small sliding contact switches and a delicately pivoted meter; thus, every effort must be made to keep the instrument free of foreign matter.

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

*d. Item 2, Panel.*

(1) **INSPECT (I).** Check the tube sockets and pin jacks for proper tension of contact surfaces. Check all switches for smooth and positive action. (See **CAUTION**, par. 21, before doing any work on the equipment.) Check neon lamp and fuse lamp for tightness. See that all parts mounted on the panel are secure.

(2) **TIGHTEN (T).** Loose parts which can be tightened from the outside are to be taken care of by using personnel, otherwise the work is to be done by a higher echelon.

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

*e. Item 3, Meter.*

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

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

(3) ADJUST (A). The meter in Tube Tester I-177 should indicate zero when the tester is not connected to the line or when the POWER ON-OFF switch is in the OFF position. The procedure for setting a meter to zero is not difficult. The tool required is the thinnest bladed screw driver available. Before deciding that a meter needs readjusting, tap the meter case *lightly* with the tip of one finger. This will help the meter to overcome the slight friction existing at the bearings which may prevent an otherwise normal unit from coming to rest at zero. If readjustment is needed, insert the tip of the screw driver in the slotted screw head located below the meter glass and *slowly* turn the adjusting screw until the pointer is at zero. Lightly tap the meter case again and view the meter face and pointer *full on* and not from either side. Avoid turning the screw too far, because the needle may be bent or the hairspring damaged.

*f. Item 4, Cords.*

(1) INSPECT (I). Inspect the length of the a-c cord and the short leads for cracked or worn insulation. Check a-c plug to see that the prongs are secure and clean. Check clips for cleanliness and proper tension.

(2) TIGHTEN (T). Any loose connections should be tightened.

(3) CLEAN (C). Corroded connections should be cleaned before tightening. Clips and prongs may be cleaned with #0000 sandpaper. Sand only enough to remove the corrosion.

**26.2. PREVENTIVE MAINTENANCE CHECK LIST.** The following check list is a summary of the preventive maintenance operations to be performed on Tube Tester I-177. The time intervals shown on the check list may be reduced at any time by the local commander. For best performance of the equipment, perform operations at least as frequently as called for in the check list. Operations are indicated by the letters of the word FITCAL. For example, if the letters ITCA appear in the "Operations" column, the item to be treated must be inspected (I), tightened (T), cleaned (C), and adjusted (A).

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

Note: X indicates when operations are to be performed.

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

## 27. MOISTUREPROOFING AND FUNGIPROOFING.

\*                    \*                    \*                    \*                    \*                    \*

### c. Step-by-step Instructions.

\*                    \*                    \*                    \*                    \*                    \*

### (5) VARNISHING.

(a) Apply three coats of moistureproofing and fungiproofing varnish (**Lacquer, Fungus-resistant, Signal Corps stock No. 6G1005.3, or equal**) to all equipment to be treated, including inside of cases, allowing a 15- to 20-minute drying period after each coat.

\*                    \*                    \*                    \*                    \*                    \*

### (6) REASSEMBLY.

\*                    \*                    \*                    \*                    \*                    \*

(c) (Superseded.) Mark the letters MFP and the date of treatment on the case, just above the nameplate.

EXAMPLE: MFP—30 May 45.

\*                    \*                    \*                    \*                    \*                    \*

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

On figure 12.3, delete the tube-base diagrams for 8BH and 8BO.

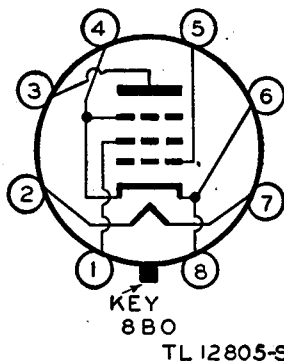
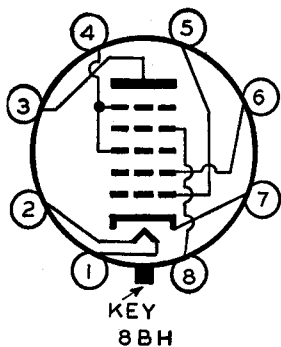
Figure 12.3. Tube-base diagrams, 7AT to 8BU except 8BH and 8BO.

## 31. TUBE TEST DATA.

**NOTE 1:** A star (★) appearing \* \* \* for that purpose.

**NOTE 2** (Added): The values listed in the MUT. COND. column

\*The Feel operation does not apply to Tube Tester I-177.



TL 12805-5

Figure 12.4—Tube-base diagrams, 8BH and 8BO.

of this tube test data differ from those appearing in Specification JAN-1A because the voltages applied to the tube under test are not the same as the voltages applied for mutual conductance values under Specification JAN-1A. *Disregard MUT. COND. values when checking tube quality.*

Tube Type	Socket Letter	Select. A	Select. B	Fil. Volts	Potent. L	Potent. R	Mut. Cond.	Press	Notations
OC3/VR-105	G	7	1	Off	30	0	*	Gas No. 1	Shorts on 4-5
OD3/VR-150	G	7	1	Off	30	0	*	Gas No. 1	Shorts on 4-5
3B7/1291	F	6	6	2.5	35	25		Diode	Shorts on 4-5 Plate No. 1 Reads in Green
3B7/1291	F	1	6	2.5	35	25		Diode	Shorts on 4-5 Plate No. 2 Reads in Green
3B24	A	7	1	2.5	5	0		Rect. Std.	Shorts on 4-5
3D6/1299	F	6	2	2.5	55	30	2000	Ampl.	Shorts on 1
3E29	E	7	2	12.6	70	14		Ampl.	Plate No. 1 Use Adapter M-418
3E29	E	4	2	12.6	70	14		Ampl.	Plate No. 2 Use Adapter M-418
3Q4	H	4	6	2.5	40	82		Press diode	Short on 3-4-5 But Reads in Green
*	*	*	*	*	*	*	*	*	*
6AC7	E	4	2	6.3	40	24		Ampl.	*
*	*	*	*	*	*	*	*	*	*
6AG5	K	1	9	6.3	53	22		Ampl.	Shorts on 4-5
*	*	*	*	*	*	*	*	*	*
6AK5	K	1	9	6.3	44	23		Ampl.	Shorts on 4-5
6AL5	K	9	2	6.3	60	0		Diode	Shorts on 2-3
6AL5	K	4	2	6.3	60	0		Diode	Shorts on 2-3
*	*	*	*	*	*	*	*	*	*
6AS6	K	1	9	6.3	42	15		Ampl.	*
*	*	*	*	*	*	*	*	*	*

Tube Type	Socket Letter	Select.		Fil. Volts	Potent.		Mut. Cond.	Press	Notations
		A	B		L	R			
7F7	F	12	5	6.3	50	0	1600	Ampl.	No. 1 Plate
7F7	F	2	9	6.3	50	0	1600	Ampl.	No. 2 plate, Short on 1-4-5
7F8	E	12	5	6.3	72	0		Ampl.	Adapter No. 2 described below
7F8	E	2	9	6.3	72	0		Ampl.	Adapter No. 2 described below
*	*	*	*	*	*	*	*	*	*
12AH7GT	E	11	9	12.6	60	35	2000	Press Gas No. 1	Plate No. 1
12AH7GT	E	7	9	12.6	60	35	2000	Press Gas No. 1	Plate No. 2
*	*	*	*	*	*	*	*	*	*
12L8GT	E	11	6	12.6	58	15		Ampl.	Plate No. 1 (Use Adapter No. 1 Described Below)
12L8GT	E	8	8	12.6	58	15		Ampl.	Plate No. 2 (Use Adapter No. 1 Described Below)
*	*	*	*	*	*	*	*	*	*
12SF5	E	7	4	12.6	62	13	1600	Ampl.	
*	*	*	*	*	*	*	*	*	*
12SL7	G	10	4	12.6	49	0	1400	Ampl.	Short on 2-3 Plate No. 1
12SL7	G	4	1	12.6	49	0	1400	Ampl.	Plate No. 2
*	*	*	*	*	*	*	*	*	*
117P7GT	E	8	10	117	70	25	4000	Ampl.	
117P7GT	E	4	3	117	40	0		Rect. Std	Also Press 117N7 but Shorts on 2-3
*	*	*	*	*	*	*	*	*	*
811	A	9	4	6.3	17	15	700	Ampl.	
*	*	*	*	*	*	*	*	*	*
829/829B	E	7	2	12.6	70	14		Ampl.	Plate No. 1 (Use Adapter M-418)
829/829B	E	4	2	12.6	70	14		Ampl.	Plate No. 2 (Use Adapter M-418)
832	E	7	2	12.6	67	14	3000	Ampl.	Plate No. 1 (Use Adapter M-418)
832	E	4	2	12.6	67	14	3000	Ampl.	Plate No. 2 (Use Adapter M-418)
*	*	*	*	*	*	*	*	*	*
885	B	1	6	2.5	40	*		Rect. Std.	Strikes between 60-65 on R
*	*	*	*	*	*	*	*	*	*
1006	A	2	7	1.5	68	0		OZ4 Button	

Tube Type	Socket Letter	Select.		Fil. Volts	Potent.		Mut. Cond.	Press	Notations
		A	B		L	R			
1008	A	3	7	1.5	68	0		OZ4 Button	*
1291	F	6	6	2.5	35	25		Diode	Short on 4-5 Reads in Green, PIt. No. 1
1291	F	1	6	2.5	35	25		Diode	Shorts on 4-5 Reads in Green, PIt. No. 2
1299	F	6	2	2.5	55	30	2000	Ampl.	Short on 1

**31.1 CONSTRUCTION OF ADAPTER NO. 1** (Added). Adapter No. 1 for use in testing Tube Type 12L8GT can be fabricated from an octal (8-pin) socket and an octal (8-pin) plug or tube base. (Adapter No. 2 is used when testing Tube Type 7F8. This is fabricated from an octal (8-pin) socket and an octal plug or tube base). Connections made between socket lugs and plug pins in each case are indicated in the table below:

Socket lug No.	Plug pin No.	
	Adapter No. 1	Adapter No. 2
1	5	4
2	1	2
3	4	3
4	3	8
5	8	1
6	2	6
7	7	7
8	6	5

### 32. MAINTENANCE PARTS LIST FOR TUBE TESTER I-177.

**NOTE:** (Superseded) This list is for reference only. When ordering parts, refer to paragraph 33.

\* \* \* \* \*

### 33. MAINTENANCE PARTS FOR TUBE TESTER I-177 (Added).

The following information was compiled on 22 June 1945. The appropriate pamphlets of the ASF Signal Supply Catalog for Tube Tester I-177 are:

*Organizational Spare Parts*

SIG 7-I-56

*Higher Echelon Spare Parts*

SIG 8-I-177

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

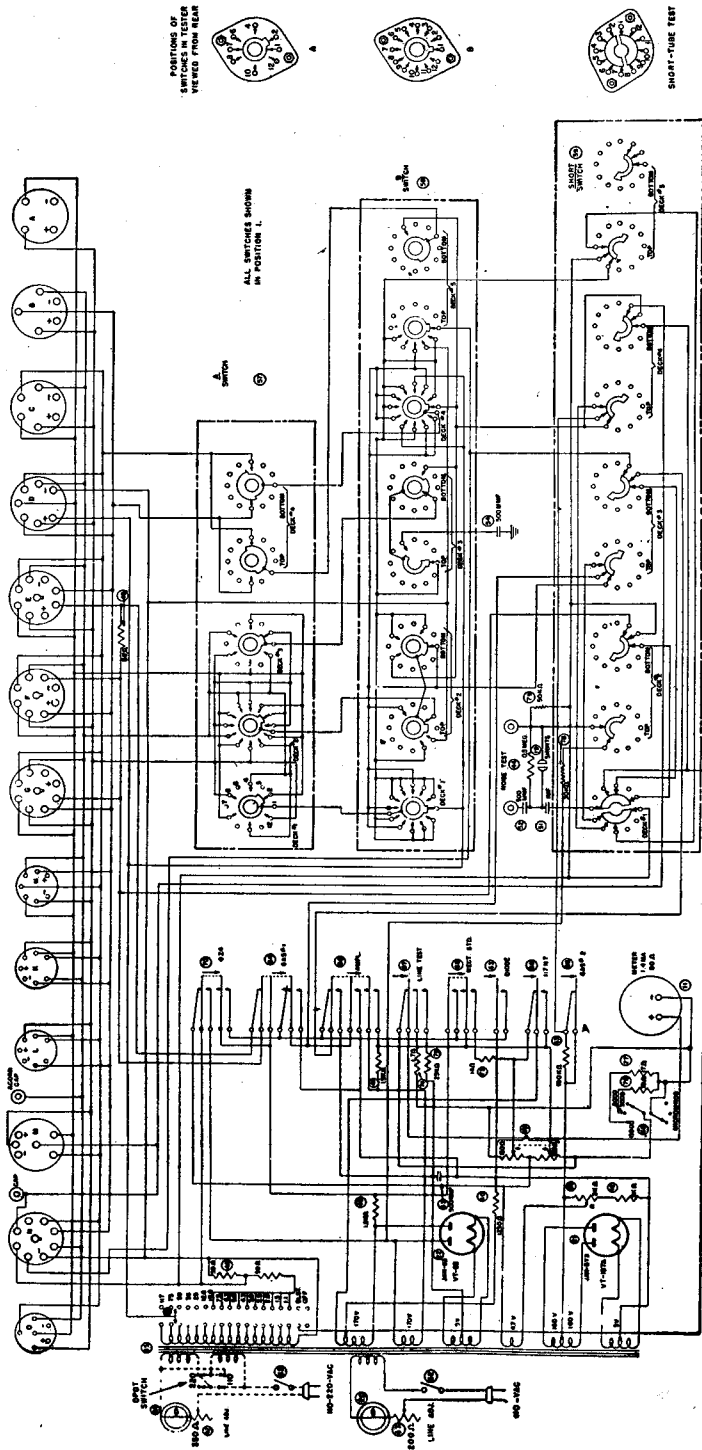


Figure 13. Tube Tester I-177, schematic diagram.

BY ORDER OF THE SECRETARY OF WAR:

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*Acting the Adjutant General*

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



TECHNICAL MANUAL  
TUBE TESTERS I-177, I-177-A, AND I-177-B

CHANGE }  
No. 3 }

DEPARTMENT OF THE ARMY  
WASHINGTON 25, D. C., 5 March 1954

TM 11-2627, 3 August 1944, is changed as follows:

The title of the manual is changed to read—TUBE TESTERS  
I-177, I-177-A, AND I-177-B

SECTION I  
DESCRIPTION

*Note 1.* Tube Tester I-177-A \* \* \* in this change.

*Note 2.* (Added) Tube Tester I-177-B is similar to Tube Testers I-177 and I-177-A except for the following: On the I-177-B, the two latches on the carrying case are of the spring-loaded type with retainer bracket. The tube clamps are of the overhead type, which fit style ST-16 and T-9 tubes. The tube cap test leads are fitted with improved type insulated clips. The power cable connector (U-120/U) is detachable.

**10. Testing Pilot Lamps**

\* \* \* \* \*

*d.* On Tube Testers I-177, I-177-A, and I-177-B, hold the lamp in the center of socket D after adjusting the line voltage. If the lamp lights with normal brilliancy, the lamp is good; if it does not light the lamp is bad.

**32. Maintenance Parts List for Tube Tester I-177**

Rescinded

**33. Maintenance Parts for Tube Tester I-177**

Rescinded

**Appendix**

(As added by C 2)

Rescinded

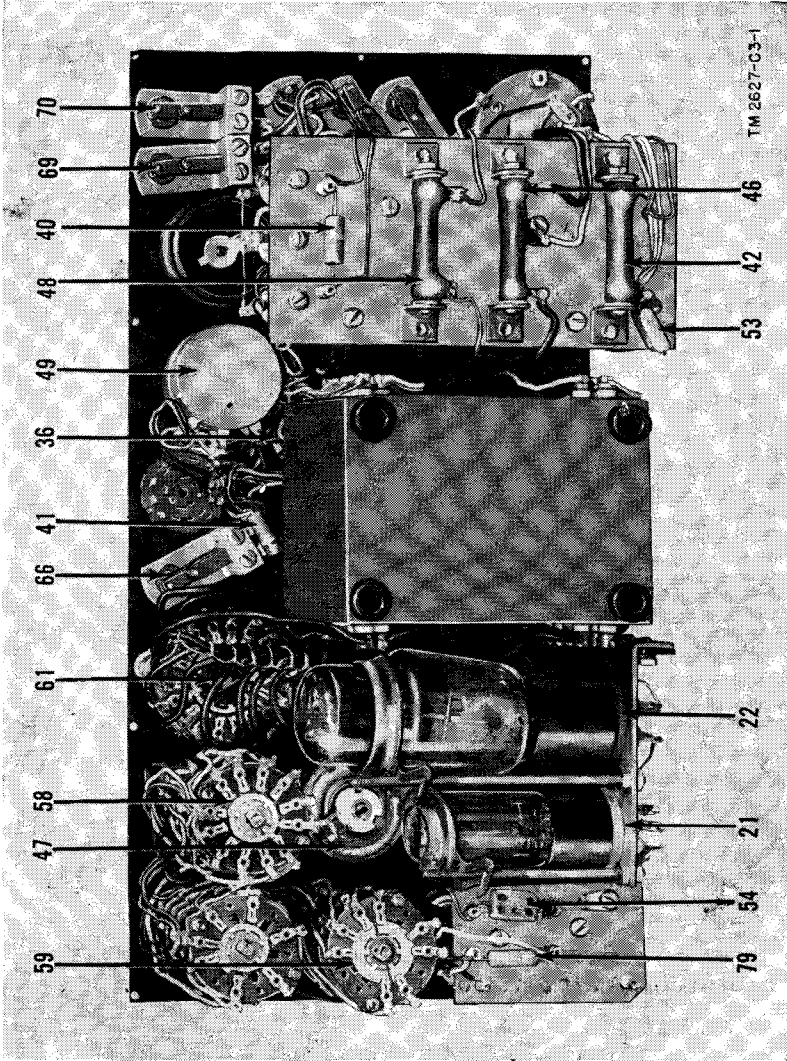


Figure 9.4 (Added) Bottom view of chassis of Tube Tester I-177-B.

- 21 Electron tube 5Y3GT
- 22 Electron tube 83
- 36 Tube socket O
- 40 Resistor, 1,200 ohms
- 41 Resistor, 15,000 ohms
- 42 Resistor, 6,000 ohms
- 46 Resistor, 100 ohms
- 47 Resistor, LINE ADJ rheostat, 200 ohms
- 48 Resistor, 1,800 ohms
- 49 Resistor, L potentiometer, 2 sections, 150 ohms each section
- 53 Capacitor, 510  $\mu\text{f}$
- 54 Capacitor, 510  $\mu\text{f}$
- 58 Switch B
- 59 Switch, SHORTS
- 61 Switch, FIL
- 66 Switch, AMPL TEST
- 69 Switch, RECTIFIER TEST STD
- 70 Switch, RECTIFIER TEST OZ4
- 79 Resistor, 51,000 ohms

*Figure 9.4—Continued*

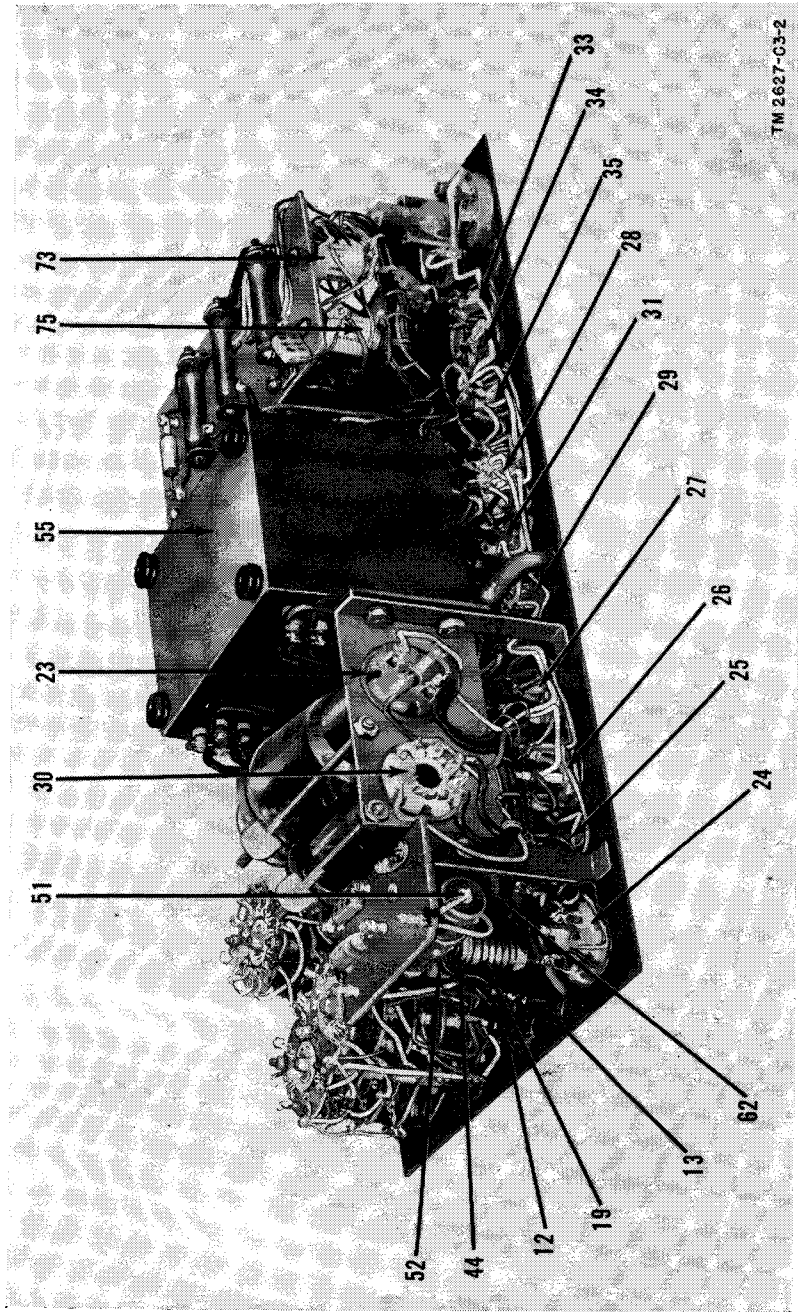
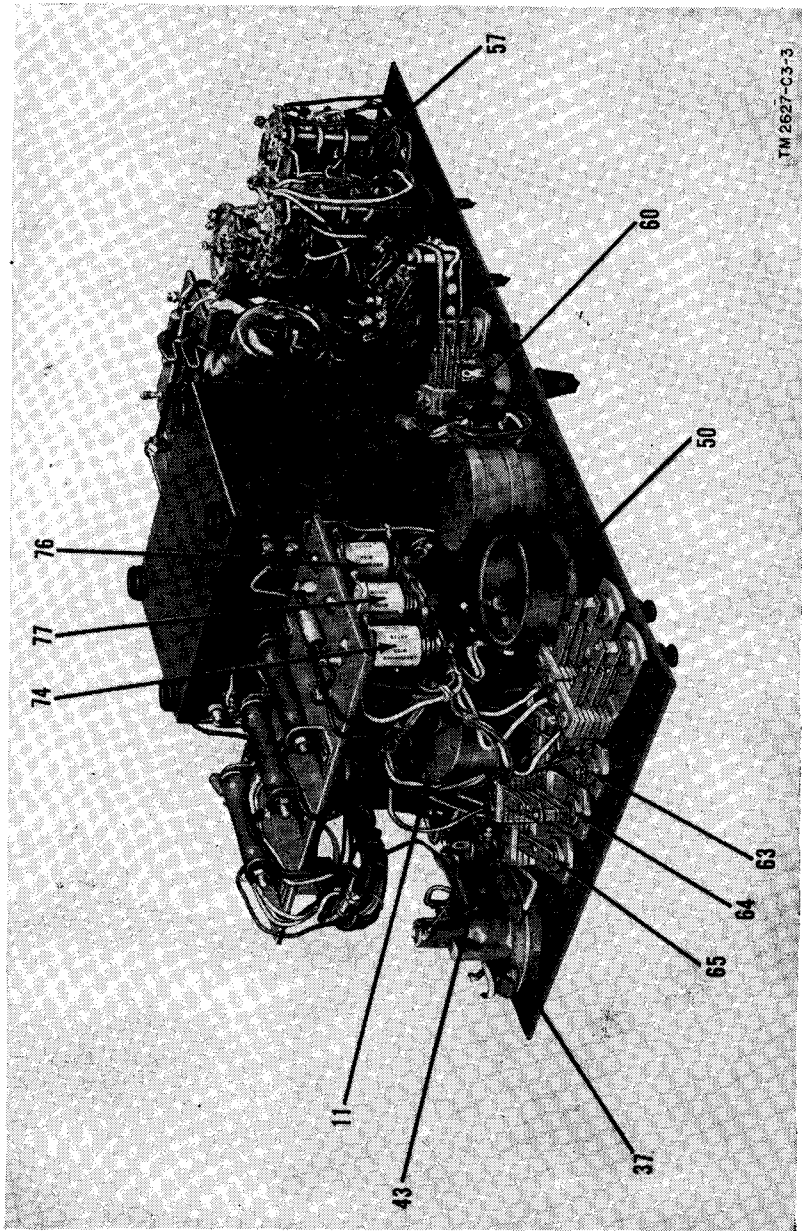


Figure 9.5 (Added) Bottom left view of chassis of Tube Tester I-177-B.

- 12 Binding post, NOISE TEST
- 13 Binding post, NOISE TEST
- 19 Indicator lamp, SHORTS
- 23 Tube socket, 4 contacts
- 24 Tube socket A
- 25 Tube socket B
- 26 Tube socket C
- 27 Tube socket D
- 28 Tube socket G
- 29 Tube socket E
- 30 Tube socket, 8 contacts
- 31 Tube socket F
- 33 Tube socket L
- 34 Tube socket K
- 35 Tube socket H
- 44 Resistor, 510,000 ohms
- 51 Capacitor, 100,000  $\mu\mu\text{f}$
- 52 Capacitor, 510  $\mu\mu\text{f}$
- 55 Power transformer
- 62 Switch, ON-OFF
- 73 Resistor, 14 ohms
- 75 Resistor, 25,000 ohms

*Figure 9.5—Continued*



TM 2627-C3-3

Figure 9.6 (Added) Bottom right view of chassis of Tube Tester I-177-B.

- 11 Meter
- 37 Tube socket M
- 43 Resistor, 180,000 ohms
- 50 Resistor, R potentiometer, 3,000 ohms
- 57 Switch A
- 60 Switch, MICROMHOS
- 63 Switch, DIODE TEST
- 64 Switch, GAS NO. 1
- 65 Switch, GAS NO. 2
- 74 Resistor, 17 ohms
- 76 Resistor, 70 ohms
- 77 Resistor, 17 ohms

*Figure 9.6—Continued*

BY ORDER OF THE SECRETARY OF THE ARMY:

M. B. RIDGWAY,  
*General, United States Army,*  
*Chief of Staff.*

OFFICIAL:

WM. E. BERGIN,  
*Major General, United States Army,*  
*The Adjutant General.*

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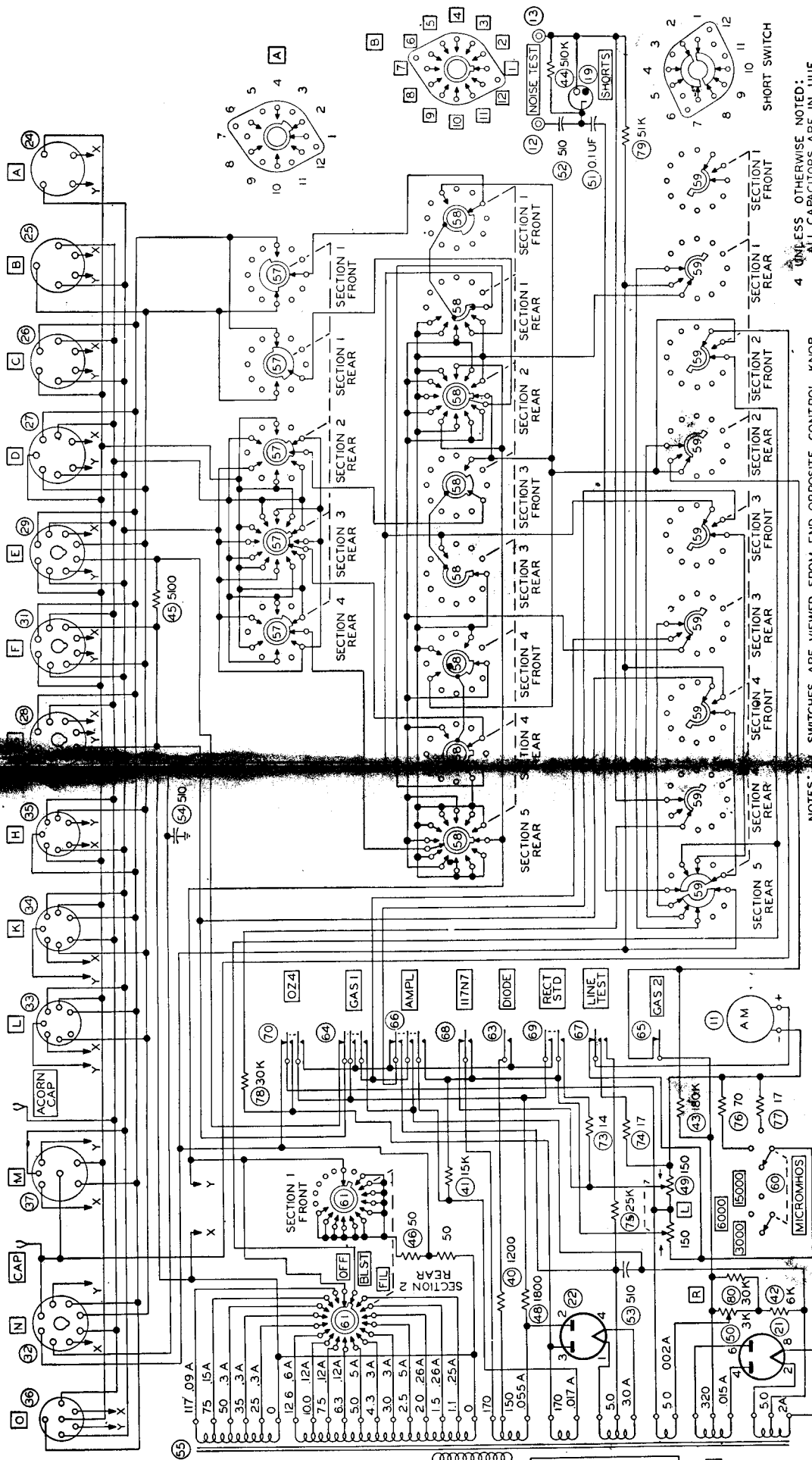
Tech Svc (1); Tech Svc Bd (1); AFF Bd (ea Svc Test Sec) (1); AFF (5); AA Comd (2); OS Maj Comd (5); Base Comd (5); MDW (2); Log Comd (5); A (5); CHQ (2); FT (2); Sch (5) except 11 (25); Gen Dep (2); Dep 11 (20) except Sig Sec, Gen Dep (10); Tng Div (2); POE (2), OSD (2); Lab 11 (5); Mil Dist (1); Field Maint Shops 11 (3); Mil Mis (2); Two (2) copies to each of the following T/O&E's: 5-415A; 5-500A; AA-AC; 9-500A AA-AC; 11-107; 11-127; 11-128; 11-500A, GA-GP, KA, KB, KC; 11-587; 11-592; 11-597; 12-17; 19-55A; 19-56A; 19-57A; 19-500A AA-AC; 32-500A AA-AC; 55-68; 55-116.

NG: Same as Active Army except one copy to each unit.

USAR: None.

For explanation of distribution formula, see SR 310-90-1.





4 UNLESS OTHERWISE NOTED:  
 ALL CAPACITORS ARE IN μUF.  
 ALL RESISTORS ARE IN OHMS.

NOTES:  
 1 SWITCHES ARE VIEWED FROM END OPPOSITE CONTROL KNOB.  
 2 SECTIONS DESIGNATED NO.1 ARE NEAREST THE KNOB END.  
 3 SWITCHES SHOWN ARE IN NO.1 POSITION

Figure 13.9 (Added) Schematic Diagram of Tube Tester I-177-B.

WAR DEPARTMENT,  
WASHINGTON 25, D. C., 3 AUGUST 1944.

TM 11-2627, Tube Tester I-177, is published for the information and guidance of all concerned.

[A. G. 300.7 (20 June 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
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*Major General,*  
*The Adjutant General.*

DISTRIBUTION:

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(For explanation of symbols see FM 21-6.)

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## ***DESTRUCTION NOTICE***

**WHY** —To prevent the enemy from using or salvaging this equipment for his benefit.

**WHEN**—When ordered by your commander.

**HOW** —1. *Smash*—Use sledges, axes, handaxes, pickaxes, hammers, crow-bars, heavy tools.

2. *Cut*—Use axes, handaxes, machetes.

3. *Burn*—Use gasoline, kerosene, oil, flame throwers, incendiary grenades.

4. *Explosives*—Use firearms, grenades, TNT.

5. *Disposal*—Bury in slit trenches, fox holes, other holes. Throw in streams. Scatter.

**USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT**

**WHAT**—1. *Smash*—Meters, controls, panels.

2. *Cut*—Cables and all wiring.

3. *Burn*—Resistors, capacitors, all technical manuals, instruction books, tube charts.

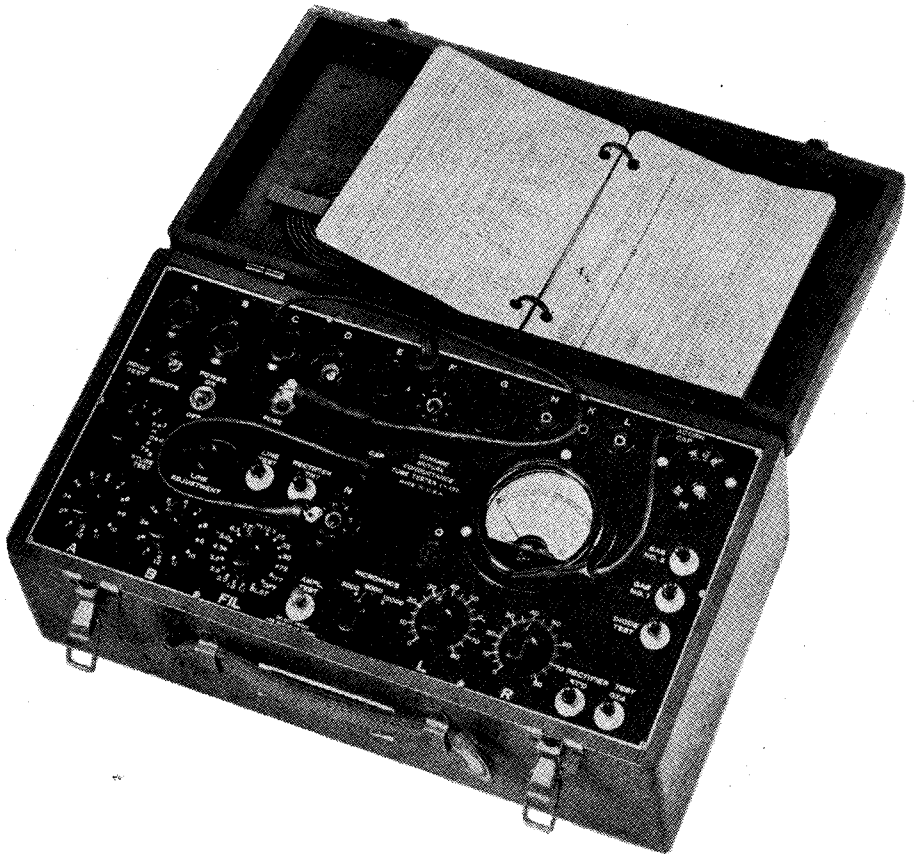
4. *Bury or scatter*—Any or all of the above pieces after destroying their usefulness.

## **D E S T R O Y     E V E R Y T H I N G**

---

## ***SAFETY NOTICE***

**THE PRESENCE OF HIGH VOLTAGES IN THIS EQUIPMENT IS DANGEROUS TO LIFE. OPERATING PERSONNEL MUST EXERCISE EXTREME CARE. SAFETY REGULATIONS AND CAUTION NOTICES WHICH APPEAR THROUGHOUT THIS MANUAL MUST BE OBSERVED AT ALL TIMES. MAKE TESTS EXACTLY AS DIRECTED. PERSONNEL NOT FAMILIAR WITH THE SERVICING OF HIGH-VOLTAGE CIRCUITS SHOULD NEVER MAKE TESTS INVOLVING SUCH CIRCUITS.**



TL-14593

*Figure 1. Tube Tester I-177 with cover raised.*

# RESTRICTED

## SECTION I

### DESCRIPTION

---

**1. PURPOSE.** Tube Tester I-177 is an instrument used to test and measure mutual conductance values of vacuum tubes. The purpose of this manual is to acquaint the repairman with the construction, operating principles, maintenance, and use of this instrument.

**2. TUBE TESTER I-177 (fig. 1).**

*a.* This instrument is furnished both as an individual unit or as a part of Test Set I-56-K. As a part of Test Set I-56-K it fits into a compartment of Carrying Case CS-130. The weights and dimensions of the tube tester and carrying case are given below.

<i>Equipment</i>	<i>Height</i>	<i>Dimension (in.)</i>		<i>Weight (lb.)</i>
		<i>Width</i>	<i>Depth</i>	
Tube Tester I-177	5¾	15½	8½	15.75
Carrying Case CS-130	14¾	20½	9¾	25.6

*b.* Tube Tester I-177 is fundamentally a dynamic mutual conductance tube tester designed to provide either REPLACE-GOOD readings or mutual conductance values in micromhos for Signal Corps and commercial receiving tubes and small transmitting tubes. Noise tests of tubes can be made by connecting the input of a radio receiver to two NOISE TEST jacks. An extra topcap lead permits testing of transmitting tubes having plate connections to envelope topcaps. Special switches are provided for making gas tests of tubes. Mutual conductance values of tubes can be measured in three ranges: 0-3,000 micromhos, 0-6,000 micromhos and 0-15,000 micromhos. The tube tester operates on 105- to 125-volt, 60-cycle alternating current. Tube testing data is given in a loose-leaf booklet attached to the inside of the cover of the instrument. The power cord is wound on brackets on the inside of the cover.

## SECTION II

# OPERATION

---

**3. PRELIMINARY INSTRUCTIONS.** Before handling Tube Tester I-177, read the operating instructions carefully. This is a delicate electrical instrument containing a meter and parts that can easily be damaged by mishandling. Pay particular attention to caution notices.

**CAUTION:** After testing tubes *always* set all controls to off or safety positions as indicated in the following table. Tubes may be burned out if inserted in test sockets before the controls have been properly set.

<i>Control</i>	<i>Safety position</i>
POWER	OFF
SHORT-TUBE TEST	1
LINE ADJUSTMENT	Extreme counterclockwise
A	1
B	1
FIL	OFF
MICROMHOS	15,000
L	80
R	80

#### 4. SHORTS TEST.

- a. Make sure all controls are in safety positions (par. 3).
- b. Plug the power cord of the tester into a suitable a-c power outlet (105 to 125 volts).
- c. Determine the type number of the tube to be tested, and locate this type number in the column headed Tube Type on the loose-leaf test data cards fastened inside the cover of the instrument. If the tube is marked



with Signal Corps nomenclature, use the table in section V or the table on the back of the first card in the tester to determine the commercial equivalent.

- d. Set selector switch A to the number indicated in column A.
- e. Set selector switch B to the number indicated in column B.
- f. Set selector switch FIL to the number indicated in the column headed Fil. volts.
- g. Insert the tube in the socket indicated in the column headed Socket Letter.

**NOTE:** When inserting or removing a loctal or acorn tube from a socket, handle the tube as gently as possible. Tube pins pass directly through the glass seals and excessive force will crack the glass. A slight sidewise pressure applied to a loctal tube will release the lock and permit easy removal of the tube from the socket.

h. If the tube has a topcap, attach the clip of the CAP lead to the cap. For acorn tubes, use the ACORN CAP lead and clip. For tubes having a star in the Notations column (such as 807, 871, etc.), connect the plate topcap of the tube to the upper left contact of 6-pin socket C with the 12-inch lead having a clip and banana plug.

- i. Set POWER switch to ON position.
- j. To adjust the line voltage, press and hold down the LINE TEST button and turn the LINE ADJUSTMENT knob until the meter pointer is exactly at the LINE TEST position (at 1,500, not at the ? on the scale); then release LINE TEST button.

k. After allowing at least 30 seconds for the tube to warm up, turn the SHORT-TUBE TEST switch slowly from position 1 to positions 2, 3, 4, and 5 successively while tapping the tube with a finger and watching the SHORTS neon lamp. If the neon lamp burns continuously or glows during tapping in any of the five positions, the tube contains shorted electrodes and should be discarded without further testing (to prevent damage to the meter) unless an exception is noted on the test data card. Disregard a momentary flash of the neon lamp while the switch is being turned from one position to the next, since this is due to charging of a capacitor in the lamp circuit.

**NOTE:** Before discarding the tube, refer to the Notations column on the test data card to see if the tube being tested normally appears to

be shorted on certain positions of the switch. Thus, for the 1LN5, the notation "Short on 4-5" on the card means that the neon lamp will normally glow at positions 4 and 5 for good tubes. This tube has no shorts if the neon lamp stays out for positions 1, 2, and 3.

l. On tubes having several sections, the shorts test need be made only once.

## 5. QUALITY TEST.

a. Test the tube for shorts by following the complete procedure given in paragraph 4. If the tube is shorted, discard it without making further tests.

b. If the tube is not shorted, turn the SHORT-TUBE TEST switch to the TUBE TEST position. Do not change any of the other controls used for the shorts test.

c. Set potentiometer L to the number indicated in column L on the test data card.

d. Set potentiometer R to the number indicated in column R.

e. Set the MICROMHOS range switch at 3,000.

f. Press the button indicated in the Press column on the test data card, and read the meter on the RED-GREEN scale.

g. Normally, if the pointer stops in the GREEN sector the tube is good; if in the RED sector, the tube is defective and should be discarded. If the pointer stops in the ? sector, the tube is usable for a few more hours but should be replaced soon. For tubes in the Notations column having a note such as "OK over 160" (for example, type 40), read the meter on the 0-3,000 micromhos scale. Tubes reading higher than the value given in the Notations column are good. Good diode sections may read in the portion of the RED scale marked DIODES O.K. Only diodes reading to the left of this section (to the left of A in REPLACE on the scale) should be considered defective.

**CAUTION:** Do not press the red AMPL. TEST button while testing rectifier tubes. When testing small diodes, do not press either the AMPL. TEST or a RECTIFIER TEST button, because the high voltage would damage the delicate cathode. Press only the DIODE TEST button as called for on the test data card.

h. If a tube is listed two or more times on the test data card, it has two or more sections requiring individual tests, or has two input grids (for example, 6A8 pentagrid converter) requiring separate dynamic tests.

*Remove the tube from the socket after the first test is completed. Then repeat the quality test in paragraph 5 for each additional listing in turn. The shorts test should be made *only* for the first listing, however. The tube section covered by a listing is identified in the Notations column on the test data cards.*

**6. MEASURING MUTUAL CONDUCTANCE.** This procedure gives a mutual conductance reading in micromhos for an amplifier tube or amplifier section, instead of a RED-GREEN reading.

*a. Test the amplifier tube or section for shorts by following the complete procedure given in paragraph 4. If the tube is shorted, discard it without making further tests.*

*b. If the tube is not shorted, turn the SHORT-TUBE TEST switch to the TUBE TEST position. Do not change any of the other controls used for the shorts test.*

*c. Set potentiometer L at  $G_M$  (replaces 60 on dial).*

*d. Set potentiometer R to the number indicated in column R on the test data card.*

*e. Set the MICROMHOS range switch to an appropriate range for measuring the value given in the Mut. Cond. column on the test data card.*

*f. Press the button called for in the Press column, and read the meter on the scale to which the MICROMHOS switch is set. This reading is the mutual conductance of the tube in micromhos under the element voltage conditions provided by the tube tester.*

*g. If a tube is listed two or more times on the test data card, remove the tube from its socket after the first test. Then repeat all tests except the shorts test for the next listing, as if testing another tube.*

**7. GAS TEST.** This procedure determines whether or not an amplifier tube contains too much gas.

*a. Carry out the shorts test procedure given in paragraph 4. If dealing with a multisection tube, the shorts test and gas test must be made on an amplifier section. The gas test does not apply to diode sections or to rectifiers.*

*b. Set potentiometer L at  $G_M$  (replaces 60 on dial).*

*c. Set the MICROMHOS range switch at 3000.*

*d. Hold down the GAS NO. 1 button and adjust potentiometer R until the meter reads 100 micromhos on the 0-3000 scale.*

*e. While holding down GAS NO. 1 button, press GAS NO. 2 button.*

If the meter pointer moves upward more than one scale division, the tube contains too much gas for satisfactory operation. If the pointer movement is less than one division, the tube can be considered sufficiently free from gas.

**NOTE:** If the pointer cannot be brought down to 1000 micromhos by adjusting potentiometer R, set R at 82, note the position of the pointer, and press GAS NO. 2 button to see if the pointer moves upward more than one scale division. In some cases it may be necessary to let the tube warm up for a few minutes before making the gas test, since the tubes may develop gas only after filament current has been on for a period of time.

**8. NOISE TEST.** This procedure detects intermittent contacts between tube electrodes during the shorts test, even though the shorts are too brief to be detected by the neon SHORTS lamp.

*a.* After completing the conventional shorts test in paragraph 4, connect the NOISE TEST jacks on the panel of Tube Tester I-177 to the antenna and ground terminals of a radio receiver.

*b.* With the radio receiver turned on, with volume advanced, and with the tube tester still set as in paragraph 4*k*, tap the tube while turning the SHORT-TUBE TEST switch slowly from position 1 to 5. Loud static noises coming from the loudspeaker indicate intermittent shorts between electrodes, and mean that the tube is bad.

**9. TESTING CATHODE-RAY INDICATOR TUBES.** Since the function of these tubes is to indicate rather than amplify, conventional mutual conductance or quality tests cannot be made. Test data is therefore given on the last test data card rather than in numerical sequence, and is repeated here in greater detail. No shorts tests are made. The meter and controls L, R, and MICROMHOS are not used in this test. The procedure checks only the opening and closing action of the eye.

*a.* Turn on the tube tester and adjust the line voltage as in paragraph 4*j*.

*b.* Set the FIL switch at the correct filament voltage (2.5 for the 2E5 tube; 6.3 for tube types starting with 6).

*c.* For 2E5, 6AB5, 6E5, 6G5, 6H5, 6N5, and 6U5 tubes, set selector switch A at 12, set selector switch B at 3, and press the red AMPL. TEST button. The eye should open. Release the button, set selector switch B at 2, and again press the AMPL. TEST button. The eye should now close if the tube is good.

*d.* For 6AD6 and 6AF6 tubes, set selector switch B at 8, set selector switch A at 2, and press the red AMPL. TEST button. Eye No. 1 should

open, and eye No. 2 should close. Release the button, set selector switch A at 3, and again press the AMPL. TEST button. Eye No. 2 should open and eye No. 1 should close if the tube is good.

## 10. TESTING PILOT LAMPS.

a. To check a pilot lamp or other type of lamp having a miniature base, set selector switch FIL to the correct voltage for the lamp. This voltage is generally marked on the lamp base.

b. Turn ON the POWER switch, adjust line voltage as instructed in paragraph 4j and hold the lamp in the center of socket D. If the lamp lights with normal brilliancy, it is good; if it does not light, it is bad.

## 11. SERVICING RADIO EQUIPMENT WITH TUBE TESTER I-177.

Almost all receiving tubes and the lower-powered transmitting tubes may be tested with Tube Tester I-177. The repairman should be thoroughly familiar with the operation of the tube tester as outlined in previous paragraphs of this section before attempting to make any tests.

a. *Receiver Tubes.* Test all tubes in the receiver for internal shorts and for quality. Install new tubes in place of those found to be defective. To prevent replacing a tube in the wrong socket, check one tube at a time.

b. *Transmitter Tubes.* Test all tubes that can be handled by Tube Tester I-177 and check the remaining tubes by replacing them one at a time with good tubes of the same type, noting the effect on the transmitter performance.

**WARNING:** Voltages high enough to cause death on contact are used in transmitters. Before touching any part of a transmitter circuit or attempting to remove a tube from the transmitter or its power supply, *turn off all power.* Discharge capacitors and ground exposed circuit components with a tool having a well-insulated handle. Remove shorts and grounds after a repair has been made or a tube replaced, before applying power to the transmitter.

## SECTION III

# FUNCTIONING OF PARTS

**12. GENERAL.** Individual circuits of Tube Tester I-177 are presented and described below as they function for the various types of tests made with this instrument. The circuit diagrams in this section are included primarily for a better understanding of this equipment, and therefore have been simplified in some instances. These diagrams must not be used for unauthorized repairs.

**13. LINE TEST (fig. 2).** Pushing the LINE TEST button connects the meter of the tube tester in series with the type 83 rectifier across a secondary winding of the power transformer, with suitable series and shunt resistors 75 and 74 in this calibrating circuit so the meter will receive a d-c voltage proportional to the a-c voltage across the transformer primary. Factory calibration is such that, when 200-ohm LINE ADJUSTMENT rheostat 47 in series with the power transformer primary is adjusted so the meter pointer is exactly at 1500 (near the center of the scale), the a-c input voltage of the transformer is exactly 93 volts, the value at which the instrument was designed to operate. A small automobile-type lamp 20 is included in the transformer primary circuit as the FUSE LAMP to protect the entire instrument from dangerous overloads. It will burn out during an overload. Setting the FIL. switch to the rated filament voltage value of a tube, followed by the setting of the LINE ADJUSTMENT

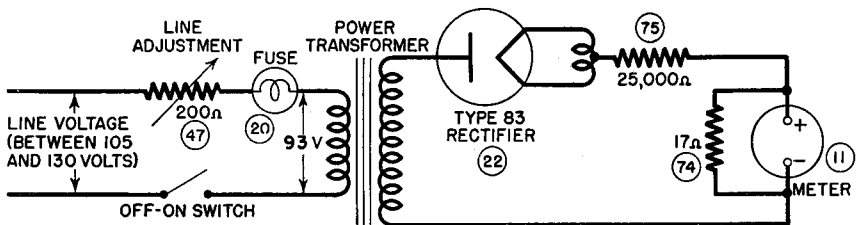


Figure 2. Tube Tester I-177, simplified line test circuit.

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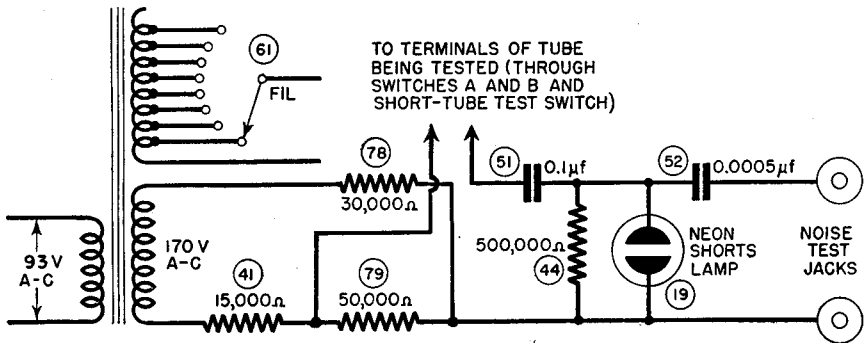


Figure 3. Tube Tester I-177, simplified noise and shorts test circuit.

TL-14595

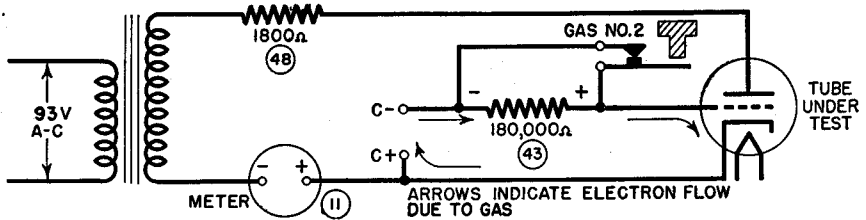


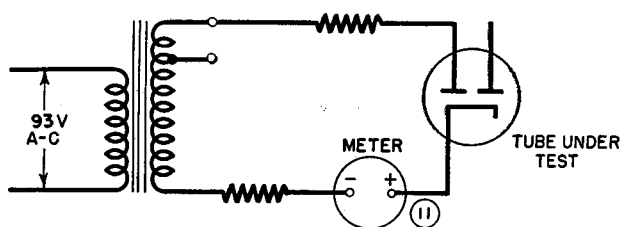
Figure 4. Tube Tester I-177, gas test circuit.

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control, provides the correct filament voltage. For filament voltages of 12.6 volts and less, the switch places a center-tapped resistor in the filament circuit for use as a cathode return terminal.

**14. SHORT TEST (fig. 3).** Turning the SHORT-TUBE TEST switch through positions 1, 2, 3, 4, and 5 connects various pairs of tube electrodes in turn across the test terminals of the circuit. Tubes having shorts between elements complete the circuit and apply transformer voltage to neon SHORTS lamp 19, causing it to glow. Good tubes do not complete the circuit, and the lamp does not glow. Switches A and B (not shown) provide the proper tube socket connections for the tube under test, and the FIL. switch connects the tube filament to the correct tap on the filament winding.

**15. NOISE TEST (fig. 3).** This circuit is also used for making a noise test of vacuum tubes. With the antenna and ground terminals of a radio receiver connected to the NOISE TEST jacks, any intermittent short between tube electrodes momentarily permits alternating voltage from the power transformer to be applied to the neon lamp, causing a brief oscillation that will be reproduced as an audible signal in the receiver speaker.



TL-14597

Figure 5. Tube Tester I-177, simplified rectifier test circuit.

**16. GAS TEST (fig. 4).** Pressing GAS NO. 1 button applies definite values of plate and grid voltages to the tube under test, causing a definite value of plate current to flow. Pressing GAS NO. 2 button inserts 180,000-ohm resistor 43 in the grid circuit. If the grid bias voltage source is sending current through the grid circuit due to gas in the tube, this current develops a voltage drop across resistor 43 that reduces the negative bias, causing a corresponding increase in the plate current being measured by the meter. A tube with negligible gas gives less than a scale division of plate current increase when GAS NO. 2 button is depressed.

**17. RECTIFIER TEST (fig. 5).** This circuit is used for making emission tests of standard full-wave rectifiers, diodes and OZ4 tubes. An a-c voltage of definite value is applied between a cathode and plate of the tube under test, through resistors and the meter. The total resistance and the voltage are set automatically to the correct values for a GOOD-REPLACE meter reading when selector switches A and B are set at the positions specified on the test data card for the tube being tested. As an example, one plate of a four-prong full-wave rectifier is connected into the circuit when selector A is set at position 1. The second plate is connected into the circuit when selector A is set at 3. The special pushbutton for OZ4 rectifier tubes provides a higher plate-cathode voltage than is used for heater or filament-type rectifiers, with a resistor in the circuit to limit the current if the tube elements are shorted. The special pushbutton for diodes provides a lower voltage than for regular tubes. It also provides a protective series resistance.

**18. QUALITY TEST FOR AMPLIFIER TUBES (fig. 6).**

a. The mutual conductance ( $g_m$ ) of an amplifier-type vacuum tube, also called the grid-plate transconductance, is an expression representing the efficiency of performance of a tube as indicated by the *change in plate current* ( $\Delta I_p$ ) divided by the *change in grid voltage* ( $\Delta E_g$ ). The relation is generally written  $g_m = \Delta I_p / \Delta E_g$ . The value is expressed in micromhos



FUNCTIONING OF PARTS

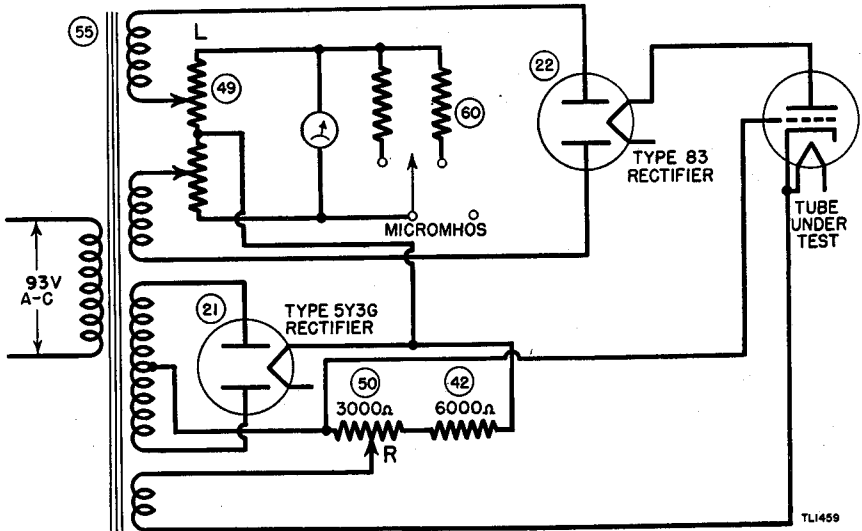


Figure 6. Tube Tester I-177, simplified quality test circuit.

and is a performance indication because it shows how effective a tube is in converting a small change in grid voltage (grid signal) to a large change in plate current. The mutual conductance values given on the test data cards are those supplied by tube manufacturers, and can be checked directly with Tube Tester I-177 by setting its controls for mutual conductance measurements. These values also form the basis for the dynamic quality tests during which the controls are adjusted so that the meter automatically reads GOOD if the mutual conductance is satisfactorily near the rated value for a particular tube.

b. For the RED-GREEN quality test based upon dynamic mutual conductance or for measurement of the mutual conductance value directly, the proper d-c grid voltage for the tube under test is supplied by a full-wave rectifier circuit using a 5Y3G tube. Setting potentiometer R at the value called for on the test data card adjusts this negative bias voltage to the correct value for the particular tube under test.

c. An alternating voltage of 4.7 volts rms, obtained from a separate secondary winding on the power transformer, acts in series with the grid bias as required for this type of test. This voltage alternately swings the grid in positive and negative directions from the d-c bias value, thereby producing the grid-voltage change ( $\Delta E_g$ ) required for a dynamic test.

d. The plate voltage for the tube under test is supplied by another full-wave rectifier circuit, using a type 83 tube. The return lead contains the meter circuit which serves to measure the plate-current change ( $\Delta I_p$ ). The meter circuit consists essentially of dual potentiometer L shunted across the meter. Adjusting control L on the panel adjusts the effective shunt

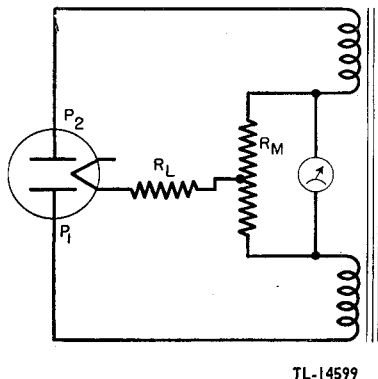


Figure 7. Tube Tester I-177, rectifier diagram illustrating theory.

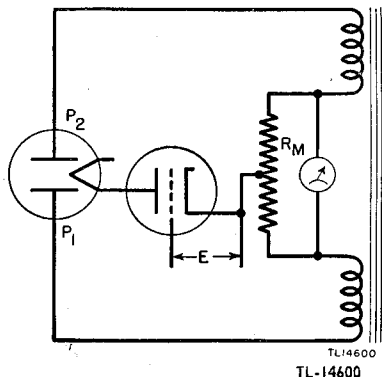


Figure 8. Tube Tester I-177, simplified mutual conductance test circuit.

resistance so the meter pointer will read in the GREEN section of the scale if the tube under test is good. Pressing the AMPL. test button completes the circuit as just outlined, and the meter then reads the quality of the tube.

## 19. THEORY OF OPERATION OF QUALITY TEST CIRCUIT.

a. Examine first the simple full-wave rectifier circuit shown in figure 7. The two power transformer secondary windings have their inner ends connected to a direct-current milliammeter. Across the milliammeter is a center-tapped resistor  $R_M$ . The load is shown as a resistance  $R_L$ , connected between the center tap and the rectifier filament as in any full-wave rectifier circuit. When rectifier plate  $P_2$  is positive, electron flow is through the upper half of  $R_M$ , and the meter tends to deflect in one direction. When  $P_1$  is positive, electron flow is through the lower half of  $R_M$ , and the meter tends to deflect in the other direction. With the load resistance fixed and equal forces acting on the meter in both cases, the meter stays at zero because it cannot follow variations at the power line frequency.

b. If the vacuum tube to be tested is substituted for the fixed load resistance, and a fixed bias  $E$  is applied to the tube as in figure 8, the meter will still read zero because a vacuum tube under steady-state conditions acts like a fixed resistance.

c. If an a-c potential is applied to the grid of the tube under test in addition to the d-c bias, the circuit becomes equivalent to that employed for quality and mutual conductance tests in Tube Tester I-177. When this a-c potential swings the grid positive, the plate current of the tube is increased, and when the plate-cathode resistance is correspondingly lowered, more current flows through  $R_M$  and the deflecting force on the meter is greater

than before. When the grid swings negative on the other half-cycle, the resistance of the tube under test is increased and the deflecting force on the meter is less. With unbalanced currents on adjacent half-cycles and consequent unequal forces on the meter, the meter reading becomes proportional to the difference in currents. Since this difference is created by the a-c grid potential, the meter indicates the plate-current changes produced by the applied grid voltage change, or in other words, the meter indicates mutual conductance.

**20. MUTUAL CONDUCTANCE MEASUREMENTS.** For mutual conductance measurements, the MICRQMHOS switch places additional fixed shunt resistors across the meter as required for the three ranges.

## SECTION IV

# MAINTENANCE

**NOTE:** Unsatisfactory performance of this equipment will be reported immediately on W.D., A.G.O. Form No. 468. If this form is not available, see TM 38-250.

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**21. GENERAL DESCRIPTION.** Tube Tester I-177 contains two tubes, a fuse lamp, a neon lamp, and tube charts, all of which may require replacement. The fuse lamp, neon lamp, and tube charts can be replaced directly without removing the panel. The tubes can be replaced by removing the 10 screws that fasten the panel to the case, then lifting out the panel assembly.

**CAUTION:** The tube tester panel must be opened only to make necessary tube replacements. No other repairs should be attempted except by authorized Signal Corps repair shops or by the manufacturer.

**22. FUSE LAMP REPLACEMENT.** To replace the No. 81 6-8-volt, 6-cp auto bulb used as a fuse, press down on the bulb and twist it counterclockwise, then lift out the bulb. Insert the new bulb so its pins fit into the slots in the socket, then press down and twist clockwise.

**23. NEON LAMP REPLACEMENT.** The  $\frac{1}{4}$ -watt, 105- to 125-volt neon lamp serving as a SHORTS indicator is replaced by unscrewing the lamp from its socket and screwing in a new lamp. This lamp should last indefinitely unless its glass bulb is broken.

**24. TUBE CHART REPLACEMENT.** Test data cards for Tube Tester I-177 may be replaced by opening the binding rings.

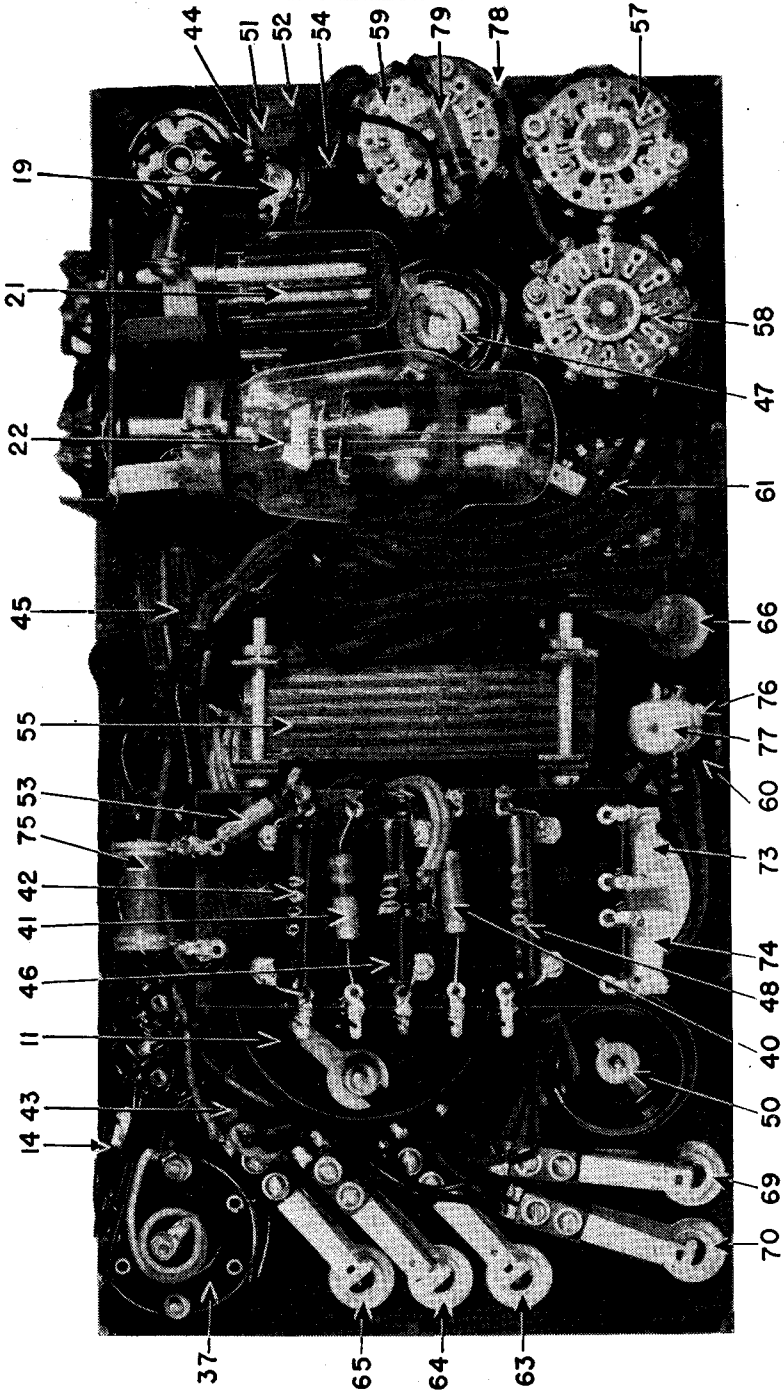


Figure 9 Tube Tester 1-177, bottom view of chassis

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**25. TUBE REPLACEMENT.** To replace either the type 83 or 5Y3GT tubes, remove the panel mounting screws and lift the panel assembly carefully out of the case. Loosen the tube clamp bolt, then carefully pull the tube out of the socket and clamp, rocking the tube from side to side while pulling. Insert the new tube in its clamp and socket, and tighten the tube clamp bolt. Put the panel back in the case and replace all panel screws. If replacement of tubes does not restore correct operation, return the tester as defective. Do not attempt to repair the instrument because considerable damage can be done to the tube tester if the operator is not entirely familiar with the repair of this type of precision instrument.

## 26. PREVENTIVE MAINTENANCE.

*a. General Instructions.* The performance of the items of maintenance outlined in these paragraphs will provide, periodically, an indication of the operational condition of this test equipment and assure proper mechanical and electrical upkeep.

(1) The communication officer should schedule definite times for checks. The operator should take the readings indicated and check in the appropriate columns in the check sheets.

(2) Equipment not in use must be checked once a month for deterioration, rust, broken parts, and general operation.

(3) The maintenance items are listed in subparagraphs 26 *b*, *c*, *d*, and *e*. In paragraphs *b* and *c* the maintenance items are numbered consecutively with an explanation of the appropriate action appearing opposite each item. The items, arranged in the same order in check list form, appear in paragraphs *d* and *e*.

(4) Deficiencies must be reported to the communication officer of the unit.

### *b. Weekly Checks.*

<i>Item</i>	<i>Action</i>
(1) External surfaces.	Remove dust, dirt, grease, and rust. Note under remarks on weekly check list if touch-up painting is necessary.
(2) Meter.	See that the pointer is not bent, operates freely, and always returns to zero.
(3) Leads, clips, and cord.	Check condition of cord, plug, leads, and clips. Look for broken conductors inside insulation at sharp bends.
(4) Tube sockets.	Check contacts in all tube sockets. Note under remarks on weekly check-list if any contacts are loose or broken.
(5) Control knobs, switches, and pushbuttons.	See that all control knobs are tight and that all switches and pushbuttons operate normally.

MAINTENANCE

c. Monthly Checks.

Item	Action
(1) Interior surfaces.	Remove dust and other foreign matter from the interior of the case.
(2) Pushbutton switch contacts.	Without disturbing adjustments, thoroughly clean all pushbutton switch contacts.
(3) Controls.	Check all controls for smoothness of operation. Clean or replace as necessary. Note under remarks in monthly check list.
(4) Paint.	Repaint where necessary.
(5) Wooden case.	Note condition of case. Repair if damaged.

d. Weekly Check List (suggested form).

**PREVENTIVE MAINTENANCE—FIELD TEST  
EQUIPMENT**

Tube Tester I-177

Serial No. ....

Enter a check in the form below if the item has been found satisfactory.

ITEM	1	2	3	4	5	6	7	8	9	10
(1) External surfaces.										
(2) Meter.										
(3) Leads, clips, cord.										
(4) Tube sockets.										
(5) Control knobs, switches.										

Enter a check in the form below if the action has been completed.

ITEM	1	2	3	4	5	6	7	8	9	10
(6) Unsatisfactory items brought to attention of communication officer.										
(7) Previously reported unsatisfactory items completed.										

REMARKS:

Date ..... Through ..... Signature .....

Rating .....

e. *Monthly Check List (suggested form)*

## PREVENTIVE MAINTENANCE—FIELD TEST EQUIPMENT

Tube Tester I-177

Serial No. ....

Enter a check in the form below if the item has been found satisfactory.

ITEM	1	2	3	4	5	6
(1) Interior surfaces.						
(2) Pushbutton switch contacts.						
(3) Controls.						
(4) Paint.						
(5) Wooden case.						

Enter a check in the form below if the action has been completed.

ITEM	1	2	3	4	5	6
(6) Unsatisfactory items brought to attention of communication officer.						
(7) Previously reported unsatisfactory items corrected.						

REMARKS:

Date ..... Through ..... Signature .....

Rating .....

### 27. MOISTUREPROOFING AND FUNGIPROOFING.

a. *General.* Communication failures commonly occur when Signal Corps equipment is operated in tropical areas where temperature and relative humidity are extremely high. The following problems are typical:

- (1) Resistors and capacitors fail.
- (2) Electrolytic action takes place in coils, chokes, transformer windings, etc., causing eventual break-down.
- (3) Hook-up wire and cable insulation break down. Fungus growth accelerates deterioration.



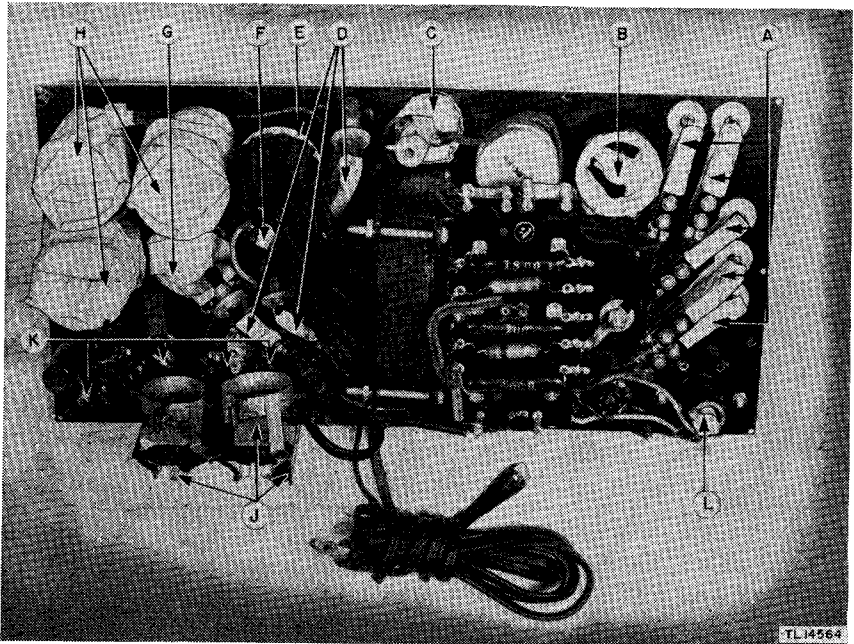


Figure 10. Tube Tester I-177, bottom view, masking for moistureproofing and fungiproofing.

(4) Moisture forms electrical leakage paths on terminal boards and insulating strips, causing flash-overs and crosstalk.

(5) Moisture provides leakage paths between battery terminals.

*b. Treatment.* A moistureproofing and fungiproofing treatment has been devised which, if properly applied, provides a reasonable degree of protection against fungus growth, insects, corrosion, salt spray, and moisture. The treatment involves the use of a moisture-resistant and fungi-resistant varnish applied with a spray gun. A brief description of the method of application follows:

- (1) Make all repairs and adjustments necessary for the proper operation of the equipment.
- (2) Thoroughly clean equipment to be processed of all dirt, dust, rust, fungus, oil, grease, etc.
- (3) Partially disassemble equipment and cover with masking tape certain points, such as relay contacts, open switches, air capacitors, sockets, bearings, etc.
- (4) Thoroughly dry equipment by heat to expel moisture which the circuit elements have absorbed.

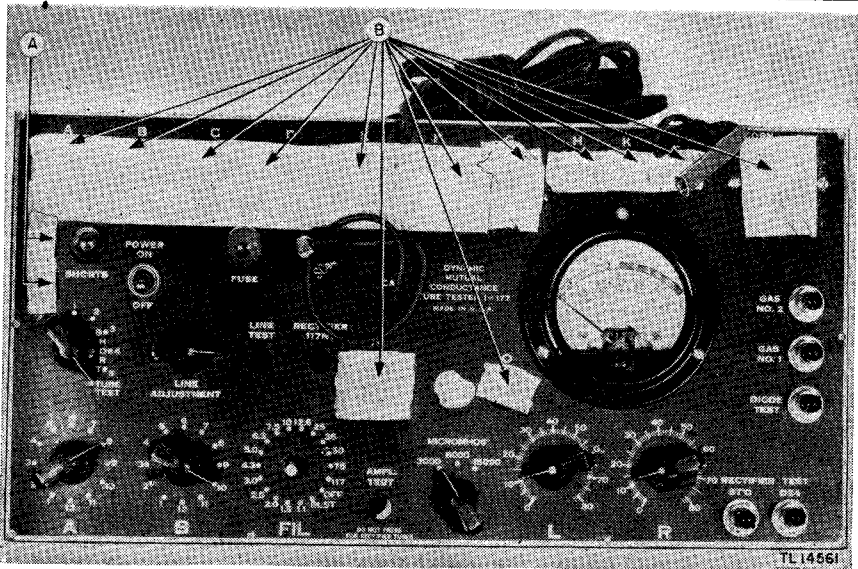


Figure 11. Tube Tester I-177, front view, masking for moistureproofing and fungiproofing.

(5) Spray or paint all circuit elements and all parts of the equipment with three coats of moistureproofing and fungiproofing varnish.

(6) Give the equipment a final operational check.

*c. Step-by-step instructions.*

(1) **DISASSEMBLY:**

(a) Remove cover by disengaging hinges.

(b) Remove 10 screws holding front panel to case. Remove front panel assembly.

(c) Loosen screws and nuts on tube clamps and remove vacuum tubes 83 and 5Y3 from their sockets.

(d) Remove locknuts holding the following pushbutton switches to front panel, allowing LINE TEST switch, RECTIFIER 117N7 Switch, and AMPL. TEST switch to hang freely on wiring.

(e) Loosen setscrew on knob of filament selector switch and remove knob.

(f) Loosen nut on filament switch and push shaft through hole in front panel, allowing switch to hang freely on wiring.

(2) **MASKING:** Cover the following components with masking tape as shown in figures 10 and 11:

- (a) Contacts of 5 pushbutton switches, item A, figure 10.
- (b) Variable rheostat, item B, figure 10.
- (c) Holes in wafer and casing of micromhos selector switch, item C, figure 10.
- (d) Three pushbutton switches, item D, figure 10.
- (e) Holes in case of filament switch, item E, figure 10.
- (f) Switch contacts on rear of filament selector switch, item F, figure 10.
- (g) Line adjustment rheostat, item G, figure 10.
- (h) Three wafer switches (A, B, and SHORT-TUBE TEST), item H, figure 10.
- (i) Contacts of sockets for vacuum tubes 83 and 5Y3, item J, figure 10.
- (j) Contacts on tube sockets A, B, C, and D, item K, figure 10.
- (k) Contact on acorn socket, item L, figure 10.
- (l) Faces of noise test jacks, item A, figure 11.
- (m) Faces of all sockets mounted on front panel, item B, figure 11.

(3) PREPARATION. Thoroughly clean all equipment to be treated by removing all oil, dirt, rust, or fungus adhering to components.

(4) DRYING.

- (a) Place components to be treated in heat chamber.
- (b) Bake for 2 or 3 hours at 160° F. Do not exceed 160° F.
- (c) If wax should begin to melt on any of the components, decrease the temperature and increase the baking time approximately 1 hour for each 10° drop in temperature.

(5) VARNISHING.

- (a) Apply 3 coats of moistureproofing and fungiproofing varnish to all equipment to be treated, including inside of cases, allowing a 15- to 20-minute drying period after each coat.
- (b) Using a brush, apply varnish to those portions not reached by spray gun, making sure that all components are adequately protected by varnish.

(6) REASSEMBLY.

- (a) Remove all masking tape.
- (b) Reassemble unit by following instructions for disassembly in the reverse order.
- (c) Mark cases MFP with date of treatment.
- (d) Check overall performance of equipment.

**CAUTION:** Varnish spray may have toxic effects. Use respirator if available. Otherwise fasten cheesecloth or other cloth material over nose and mouth.

*d. Reference.* For a full description of the varnish spray method of moistureproofing and fungiproofing, refer to TB SIG 13.

## SECTION V

# SUPPLEMENTARY DATA

### 28. TUBE-BASE CHART FOR SIGNAL CORPS AND COMMERCIAL TUBES.

*a. Signal Corps Tubes.* (See tube-base connection diagrams in Fig. 12.)

<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>
VT-7	4D	VT-51	4D	VT-86-A	7R	VT-105	8S
VT-24	4D	VT-52	4D	VT-86-B	7R	VT-107	7AC
VT-25	4D	VT-54	4M	VT-87	7T	VT-107-A	7AC
VT-25-A	4D	VT-56	5A	VT-87-A	7T	VT-107-B	7AC
VT-26	4K	VT-57	6F	VT-88	7V	VT-112	8N
VT-27	4D	VT-58	6F	VT-88-A	7V	VT-114	5T
VT-28	5E	VT-62	4D	VT-89	6F	VT-115	7AC
VT-29	5A	VT-63	5C	VT-90	7Q	VT-115-A	7AC
VT-30	4D	VT-65	6Q	VT-91	7R	VT-116	8N
VT-31	4D	VT-66	7S	VT-91-A	7R	VT-116-B	8N
VT-33	5K	VT-67	4D	VT-92	7V	VT-117	8N
VT-35	5E	VT-68	7D	VT-92-A	7V	VT-119	4AB
VT-36	5E	VT-69	6F	VT-93	8E	VT-120	5BB
VT-37	5A	VT-70	7E	VT-94	6Q	VT-121	5BC
VT-38	5F	VT-72	4D	VT-94-A	6Q	VT-124	6X
VT-40	4D	VT-73	5A	VT-94-D	6Q	VT-125	6X
VT-41	4K	VT-74	5L	VT-95	4D	VT-126	6S
VT-44	4K	VT-75	6G	VT-96	8B	VT-126-A	6S
VT-45	4D	VT-76	5A	VT-97	5T	VT-126-B	6S
VT-46	4P	VT-77	6F	VT-98	6R	VT-131	8N
VT-46-A	4P	VT-78	6F	VT-99	8G	VT-132	8K
VT-47	5B	VT-80	4C	VT-100	5AW	VT-133	8Q
VT-48	6B	VT-83	4C	VT-101	6BM	VT-134	7AC
VT-49	5F	VT-84	5D	VT-103	8Q	VT-135	6Q
VT-50	4D	VT-86	7R	VT-104	8Q	VT-135-A	6Q

SUPPLEMENTARY DATA

Tube	Base	Tube	Base	Tube	Base	Tube	Base
VT-136	5AZ	VT-173	6AR	VT-201	7AC	VT-235	3P
VT-137	6Q	VT-174	7BA	VT-201-C	7AC	VT-237	5BD
VT-138	7AL	VT-175	7S	VT-202	7BS	VT-238	5BB
VT-139	4AJ	VT-176	8N	VT-203	7BD	VT-239	4AA
VT-145	4C	VT-177	5AG	VT-205	8Q	VT-241	8BN
VT-146	5Y	VT-178	7AK	VT-206-A	5L	VT-243	4AH
VT-147	7E	VT-179	7AO	VT-207	8BE	VT-244	5T
VT-148	8AJ	VT-180	6BB	VT-208	8X	VT-245	8BA
VT-149	8AS	VT-181	5AB	VT-209	8BK	VT-247	8Y
VT-150	8R	VT-182	7BE	VT-210	7AV	VT-260	4AJ
VT-151	8A	VT-183	4AH	VT-211	8BK	VT-264	7BA
VT-151-B	8A	VT-184	4AJ	VT-212	5BD	VT-266	4P
VT-152	7S	VT-185	6BB	VT-213-A	6Q	VT-268	8S
VT-153	8E	VT-188	8W	VT-214	7Q	VT-269	8BK
VT-161	8R	VT-189	8AC	VT-215	6R	VT-288	8BK
VT-162	8N	VT-190	8V	VT-216	4P	VT-289	8BD
VT-163	8G	VT-192	5AC	VT-221	7AP		
VT-167	8K	VT-193	8V	VT-223	5Z		
VT-168	7AC	VT-194	8AR	VT-224	7BL		
VT-168-A	7AC	VT-195	5AQ	VT-225	5J		
VT-169	8E	VT-196	6S	VT-227	6BO		
VT-170	5Y	VT-197-A	5T	VT-229	8BD		
VT-171	7AT	VT-198-A	7S	VT-231	8BD		
VT-171-A	7AT	VT-199	8N	VT-233	8Q		
VT-172	6AU	VT-200	4AJ	VT-234	2T		

b. Commercial Tubes. (See tube-base connection diagrams in Fig. 12.)

Tube	Base	Tube	Base	Tube	Base	Tube	Base
AD	4G	PZ	5B	1	4G	1B4	4M
AF	4C	PZH	5B	D-1	4C	1B5/25S	6M
AG	4C	Wnd A	6N	KR-1	4G	1B7-G	7Z
AX	4Q	XXD	8AC	RA-1	4Q	1B8	8AW
B	4E	XXL	5AC	RE-1	4C	1C1	4A
BA	4J	00	4D	SO-1	4Q	1C5-G	6X
BH	4J	00A	4D	1A1	4A	1C6	6L
BR	4H	0A4	4V	1A3	5AP	1C7	7Z
BX	4D	0Z3	5N	1A4-P	4M	1C21	4V
DE	4D	0Z4	4R	1A4-T	4K	1D1	4A
E	4D	01	4D	1A5-G	6X	1D5, 1D5-GP	5Y
G	4D	01A	4D	1A6-GT	6L	1D5-GT	5R
GA	5B	01AA	4D	1A6-S	6L	1D7-G	7Z
H	4D	01B	4D	1A7-G	7Z	1D8-GT	8AJ
LA	5B	D-½	4B	1B1	4A	1E1	4A

<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>
1E4-G .....	5S	1S4 .....	7AV	0A3/VR75 ..	4AJ	6A4/LA .....	5B
1E5-G .....	5R	1S5 .....	6AU	0B3/VR90 ..	4AJ	6A5-G .....	6T
1E5-GP .....	5Y	1SA6 .....	6BD	0C3/VR105 ..	4AJ	6A6 .....	7B
1E7-G .....	8C	1SB6 .....	6BE	0D3/VR150 ..	4AJ	6AB5 .....	6R
1F1 .....	4A	1T1-G .....	4T	3A4 .....	7BB	6AB6 .....	7AU
1F4 .....	5K	1T4 .....	6AR	3A5 .....	7BC	6AB7/1853 ...	8N
1F5-G .....	6X	1T5 .....	6AF	3A8-GT ....	8AS	6AC5-G .....	6Q
1F6 .....	6W	1T5-GT ....	6X	3B5-GT ....	7AP	6AC6-G .....	7W
1F7-G, GH, GV		1-V .....	4G	3B7/1291 ...	7BE	6AC7/1852 ...	8N
	7AD	1V1 .....	4A	3B21 .....	4C	6AD5-G .....	6Q
1G1 .....	4A	1Y1 .....	4A	3B22 .....	4C	6AD6-G ....	7AG
1G4-G .....	5S	1Z1 .....	4A	3B23/RK22 ..	4AN	6AD7-G ....	8AY
1G5-G .....	6X	2 .....	4A	3C5-GT ....	7AQ	6AE5-GT ....	6Q
1G6-G .....	7AB	G-2 .....	5D	3D6/1299 ...	6BB	6AE6-G ....	7AH
1H4-G .....	5S	G-2S .....	5D	3LE4 .....	6BA	6AE7-GT ...	7AX
1H5-G .....	5Z	KR-2 .....	4G	3LF4 .....	6BB	6AF5-G .....	6Q
1H6-G .....	7AA	RE-2 .....	4B	3Q4 .....	7BA	6AF6-G ....	7AG
1J1 .....	4A	SO-2 .....	4D	3Q5-GT ....	7AP	6AF7 .....	8AG
1J5-G .....	6X	2A3 .....	4D	3S4 .....	7BA	6AG5 .....	7BD
1J6-G .....	7AB	2A3-H .....	4Q	4 .....	4A	6AG7 .....	8Y
1K1 .....	4A	2A4-G .....	5S	G-4 .....	5D	6AH5-G ....	6AP
1L1 .....	4T	2A5 .....	6B	G-4 S .....	5D	6AH7-GT ..	8BE
1L4 .....	6AR	2A6 .....	6G	4A6-G .....	8L	6AK5 .....	6BD
1LA4 .....	5AD	2A7 .....	7C	4B24 .....	4C	6AK6 .....	7BK
1LA6 .....	7AK	2B4 .....	5A	4B25 .....	4C	6AL6-G ....	6AM
1LB4 .....	5AD	2B6 .....	7J	4S .....	5D	6A7 .....	7C
1LB6 .....	8AX	2B7 .....	7D	5 .....	4A	6A7-M .....	8A
1LC5 .....	7AO	2C4 .....	5AS	A(5) .....	5H	6A7-S .....	7C
1LC6 .....	7AK	2C21/RK33 ..	7BH	KR5 .....	5B	6A8 .....	8A
1LD5 .....	6AX	2C22 .....	4AM	IN5-GT .....	5Y	6B4-G .....	5S
1LE3 .....	4AA	2C34/RK34 ..	7BL	5R4-GY .....	5T	6B5 .....	6AS
1LH4 .....	5AG	2E5 .....	6R	5T4 .....	5T	6B6-G .....	7V
1LN5 .....	7AO	2E22 .....	5J	5U4-G .....	5T	6B7 .....	7D
1N1 .....	4T	2G5 .....	6R	5V4-G .....	5L	6B8 .....	8E
1N5-G .....	5Y	2S/4S .....	5D	5W4 .....	5T	6C4 .....	6BG
1N6-G .....	7AM	2V3-G .....	4Y	5X3 .....	4C	6C5 .....	6Q
1P1 .....	4T	2W3 .....	4X	5X4G .....	5Q	6C5-G .....	6Q
1P5-G .....	5Y	2X2/879 ....	4AB	5Y3-G .....	5T	6C6 .....	6F
1Q1 .....	4T	2X3 .....	4E	5Y4-G .....	5Q	6C7 .....	7G
1Q5-GT ....	6AF	2Y2 .....	4AB	5Z3 .....	4C	6C8-G .....	8G
1R1-G .....	4T	2Y3 .....	4C	5Z4 .....	5L	6D5 .....	6Q
1R4/1294 ...	4AH	2Y4 .....	5D	6 .....	4A	6D6 .....	6F
1R5 .....	7AT	2Z2 .....	4B	A(6) .....	6N	6D7 .....	7H
1S1-G .....	4T	3 .....	4A	6A3 .....	4D	6D8-G .....	8A

SUPPLEMENTARY DATA

<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>
6E5	6R	6S7-G	7R	7A6	7AJ	12C8	8E
6E6	7B	6SA7	8R	7A7-LM	8V	12E5-GT	6Q
6E7	7H	6SA7-GT	8AD	7A8	8U	12F5-GT	5M
6F5	5M	6SC7	8S	7B4	5AC	12G7	7V
6F5-G	5M	6SD7-GT	8N	7B5	6AE	12H6	7Q
6F6	7S	6SE7-GT	8N	7B6	8W	12J5-GT	6Q
6F7	7E	6SF5	6AB	7B7	8V	12J7-GT	7R
6F7-S	7E	6SF7	7AZ	7B8	8X	12K7-GT	7R
6F8-G	8G	6SG7	8BK	7C4/1203A	4AH	12K8	8K
6G5	6R	6SH7	8BK	7C5	6AA	12L8-GT	8BU
6G6-G	7S	6SJ7	8N	7C6	8W	12Q7-GT	7V
6G7	7N	6SK7	8N	7C7	8V	12SA7	8R
6G7-S	7N	6SL7-GT	8BD	7E5/1201	8BN	12SA7-GT	8AD
6H4-GT	5AF	6SN7-GT	8BD	7E6	8W	12SC7	8S
6H5	6R	6SQ7	8Q	7E7	8AE	12SF5	6AB
6H6	7Q	6SR7	8Q	7F7	8AC	12SF7	7AZ
6H7	7P	6SS7	8N	7G7	8V	12SG7	8BK
6H7-S	7P	6ST7	8Q	7H7	8V	12SH7	8BK
6H8	8F	6T5	6R	7J7	8AR	12SJ7	8N
6J5	6Q	6T7-G	7V	7K7	8BF	12SK7	8N
6J6	7BF	6U5/6G5	6R	7L7	8V	12SL7-GT	8BD
6J7	7R	6U6-GT	7AC	7N7	8AC	12SN7-GT	8BD
6J7-G	7R	6U7-G	7R	7P7	8V	12SQ7	8Q
6J7-GT	7R	6V4	5D	7Q7	8AL	12SR7	8Q
6J8-G	8H	6V6	7AC	7R7	8AE	12Z3	4G
6K5-G	5U	6V7-G	7V	7S7	8BL	12Z5	6K
6K6-G	7S	6W5-G	6S	7T7	8V	14	5E
6K7	7R	6W6-GT	7AC	7V7	8V	14A4	5AC
6K8	8K	6W7-G	7R	7W7	8BJ	14A5	6AA
6L5-G	6Q	6X5	6S	7Y4	5AB	14A7	8V
6L6	7AC	6X6	7AL	7Z4	5AB	14AF7	8AC
6L6-GX	7S	6Y3	4AG	8	4A	14B6	8W
6L7	7T	6Y5	6J	9	4A	14B8	8X
6N5	6R	6Y6-G	7AC	10	4D	14C5	6AA
6N6-G	7AU	6Y7-G	8B	WX-12	4D	14C7	8V
6N7	8B	6Z3	4G	12A	4D	14E6	8W
6P5-G	6Q	6Z4	5D	12A5	7F	14E7	8AE
6P7-G	7U	6Z5	6K	12A6	7AC	14F7	8AC
6Q5	6Q	6Z6	7Q	12A7	7K	14H7	8V
6Q6-G	6Y	6Z7-G	8B	12A8-GT	8A	14J7	8AR
6Q7	7V	6ZY5-G	6S	12AH7-GT	8BE	14N7	8AC
6R6-G	6AW	7	4A	12B6	6V	14Q7	8AL
6R7	7V	7A4	5AC	12B7	8Y	14R7	8AE
6S6-GT	5AK	7A5	6AA	12B8-GT	8T	14S7	8BL

<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>
14W7	8BJ	27S	5A	46	5C	75S	6G
14Y4	5AB	K27	5A	46A1	2S	VR75-30	4AJ
14Z3	4G	A28	4D	46B1	2S	76	5A
15	5F	29	6N	47	5B	77	6F
17	5A	30	4D	RK47	5J	77M	7R
18	6B	A-30	4Q	48	6A	78	6F
19	6C	R-30	4D	A48	4Q	78S	6F
RK19	4AN	31	4D	50	4D	79	6H
20	4D	KR31	4G	VR50	4W	80	4C
KR20	6N	32	4K	50A5	6AA	81	4B
RK21	4AB	A32	4Q	50C6-G	7AC	82V	4L
22	4K	32L7-GT	8Z	50L6-GT	7AC	83	4C
A-22	4D	33	5K	50Y6-GT	7Q	83V	4L
AC22	5E	RK33/2C21	7BH	50Z6-G	7Q	84/6Z4	5D
KR22	6N	34	4M	50Z7-G	8AN	G-84	5D
RK22/3B23	4AN	RK34/2C34	7BL	51	5E	85	6G
K24	5E	35	5E	52	5C	85AS	6G
RK24	4D	35A5-LT	6AA	53	7B	85L7	8AB
24A	5E	35L6-GT	7AC	55	6G	85M	7V
24S	5E	35Y4	5AL	56	5A	85S	6G
25	6M	35Z3-LT	4Z	56AS	5A	86M	6Q
KR25	6B	35Z4-GT	5AA	56S	5A	87S	6F
25A6	7S	35Z5-GT	6AD	57	6F	88	4C
25A7-G	8F	35Z6-G	7Q	57AS	6F	88M	7R
25AC5-GT	6Q	36	5E	57S	6F	88S	6F
25B5	6D	37	5A	58	6F	89	6F
25B6-G	7S	38	5F	58AS	6F	89RS	7N
25B8-GT	8T	39/44	5F	58S	6F	VR105-30	4AJ
25C6-G	7AC	RK-39	5AW	59	7A	112A	4D
25D8-GT	8AF	40	4D	59A	7A	113HY	5K
25L6	7AC	A40	4Q	59S	7A	HY-114B	2T
25N6-G	7W	40Z5	6AD	HY61/807	5AW	115HY	5K
25S	6M	41	6B	RK62	4D	117L7-GT	8AO
25X6-GT	7Q	41M	7S	64	5E	117M7-GT	8AO
25Y4-GT	5AA	42	6B	65	5E	117N7-GT	8AV
25Y5	6E	42A2	3S	67	5A	117P7-GT	8AV
25Z3	4G	42B2	3S	68	5E	117Z4-GT	5AA
25Z4	5AA	43	6B	69	5E	117Z6-GT	7Q
25Z5	6E	43-MG	7S	70	6N	125HY	5K
25Z6	7Q	44	5F	70A7-GT	8AB	VR150-30	4AJ
26	4D	45	4D	70L7-GT	8AA	165R	4A
A26	4D	45 special	4D	71A	4D	165R4	4A
27	5A	45Z3	5AM	75	6G	165R8	4A
27HM	5A	45Z5-GT	6AD	75M	7V	181	4D



## SUPPLEMENTARY DATA

<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>	<i>Tube</i>	<i>Base</i>
182A	4D	310A	6F	840	5J	1299/3D6	6BB
182B	4D	311A	5F	841	4D	1602	4D
183/483	4D	312A	6BK	842	4D	1603	6F
185R	4A	323A	5AU	843	5A	1608	4D
185R4	4A	328	6F	864	4D	1609	5K
185R8	4A	348A	7R	865	4AR	1610	5B
210T	4D	349A	7S	866, 866A	4P	1612	7T
213, 213B	4C	350A, WE 350A		874	4S	1613	7S
216, 216B	4B		5AW	878	4AU	1614	7AC
231D, WE 231D	4D	350B	7S	879	4AB	1616	4P
		351A	6S	884	6Q	1619	7AC
239A	4G	383A	5AT	885	5A	1620	7R
242C	4D	385A	6BL	941	4D	1621	7S
244A	5A	482A, 482B	4D	942	4D	1622	7AC
245A	4D	483	4D	950	5K	1625	5AZ
249B	4AU	484	5A	951	4K	1626	6Q
252A	4D	485	5A	954	5BB	1629	7AL
257	5B	486	5S	955	5BC	1631	7AC
257A, WE 257A		WL578/8020	4P	956	5BB	1632	7AC
	3Q	585	4D	957	5BD	1633	8BD
259A	5E	586	4D	958	5BD	1634	8S
264	4D	HY-615B	3P	959	5BE	1635	8B
271A	5A	713, 713A, WE-		985	5D	1642	7BH
274-A	4C	713A	8BK	986	4C	1851	7R
274-B	5T	717, 717A, WE-		1005, CK1005	5AQ	1852	8N
275-A	4D	717A	8BK	1201/7E5	8BN	1853	8N
282-A	4AR	801, 801A	4D	1203	4AH	2050	8BA
283-A	5A	802	6BM	1203/7C4	4AH	7184, KR 7184	6BO
287A	5AU	803	5J	1204	8BO	8005	3O
291	5G	804	5J	1221	6F	8013A	4P
293	5G	807	5AW	1223	7R	8020/WL578	4P
295	5G	811	3O	1231	8V	9001	7BD
WE 300A	4D	812	3O	1232	8V	9002	7BS
WE 300B	4D	813	5BA	1284	8V	9003	7BD
301A	4C	814	5J	1291/3B7	7BE	9004	4BJ
307A, WE 307-A	5J	816	4P	1293	4AA	9005	5BG
310	4D	837	6BM	1294	4AH	9006	6BH

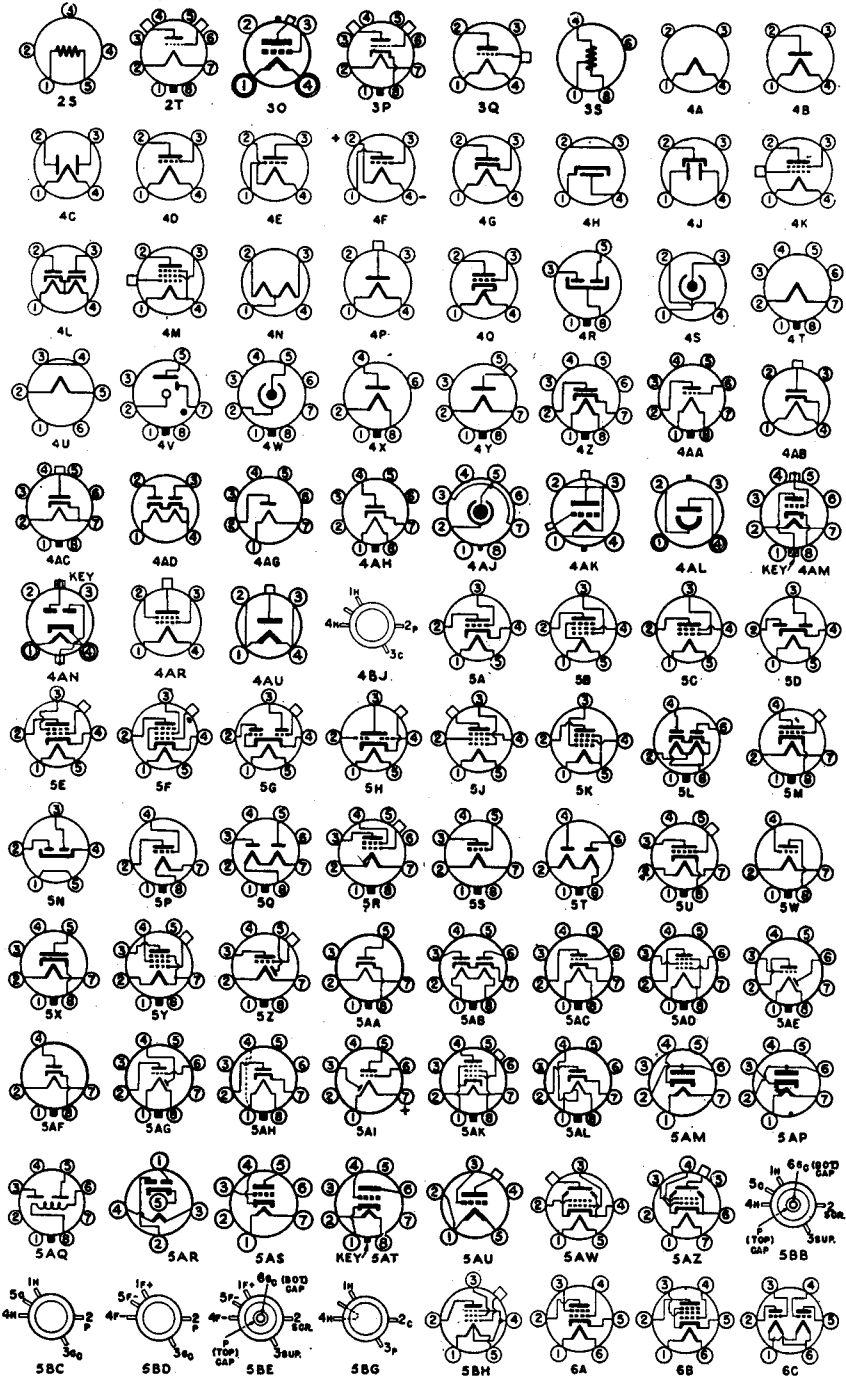
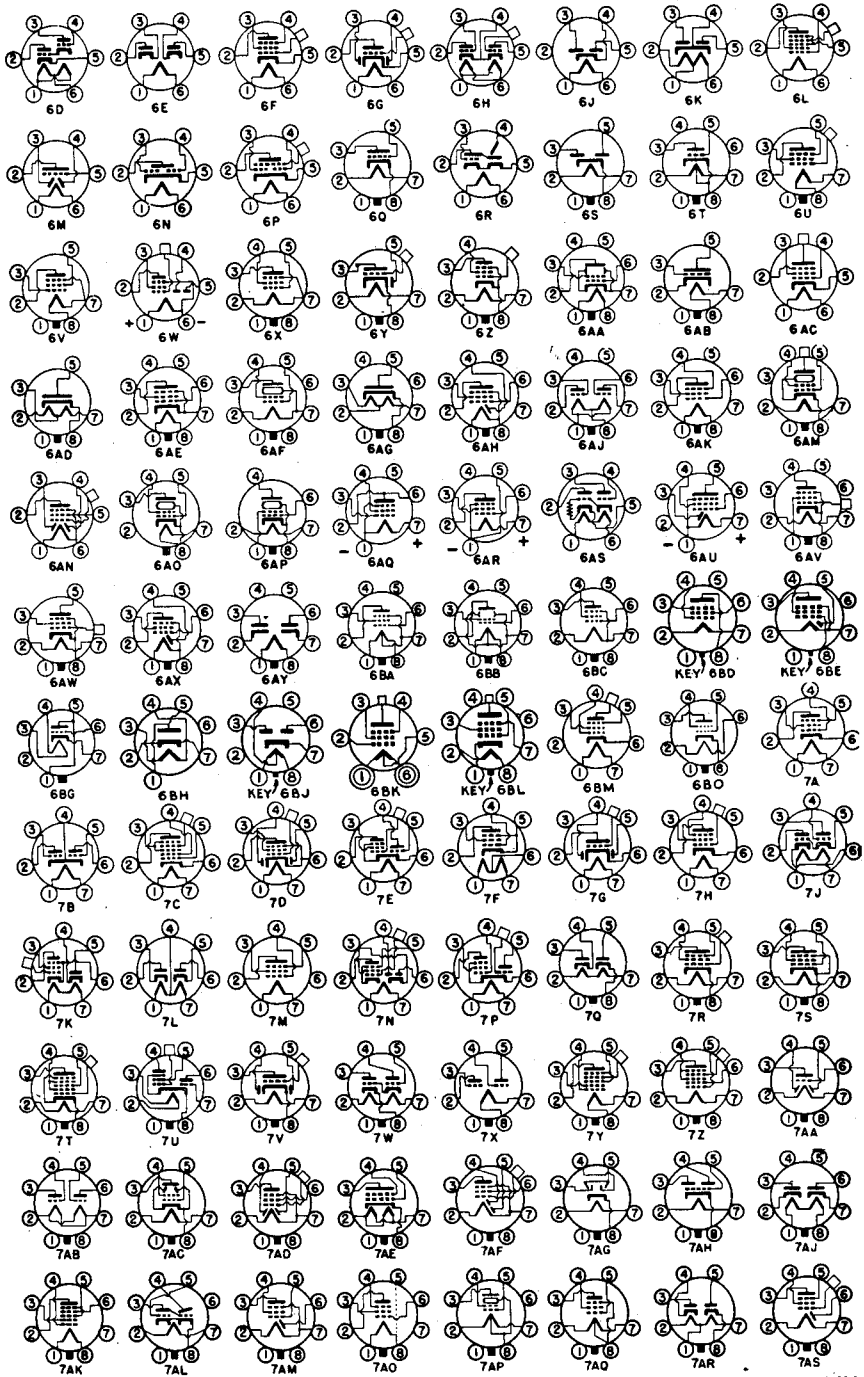


Figure 12.1. Tube base diagrams, 2S to 6C.

TL-7493a



TL-7494a

Figure 12.2. Tube base diagrams, 6D to 7AS.

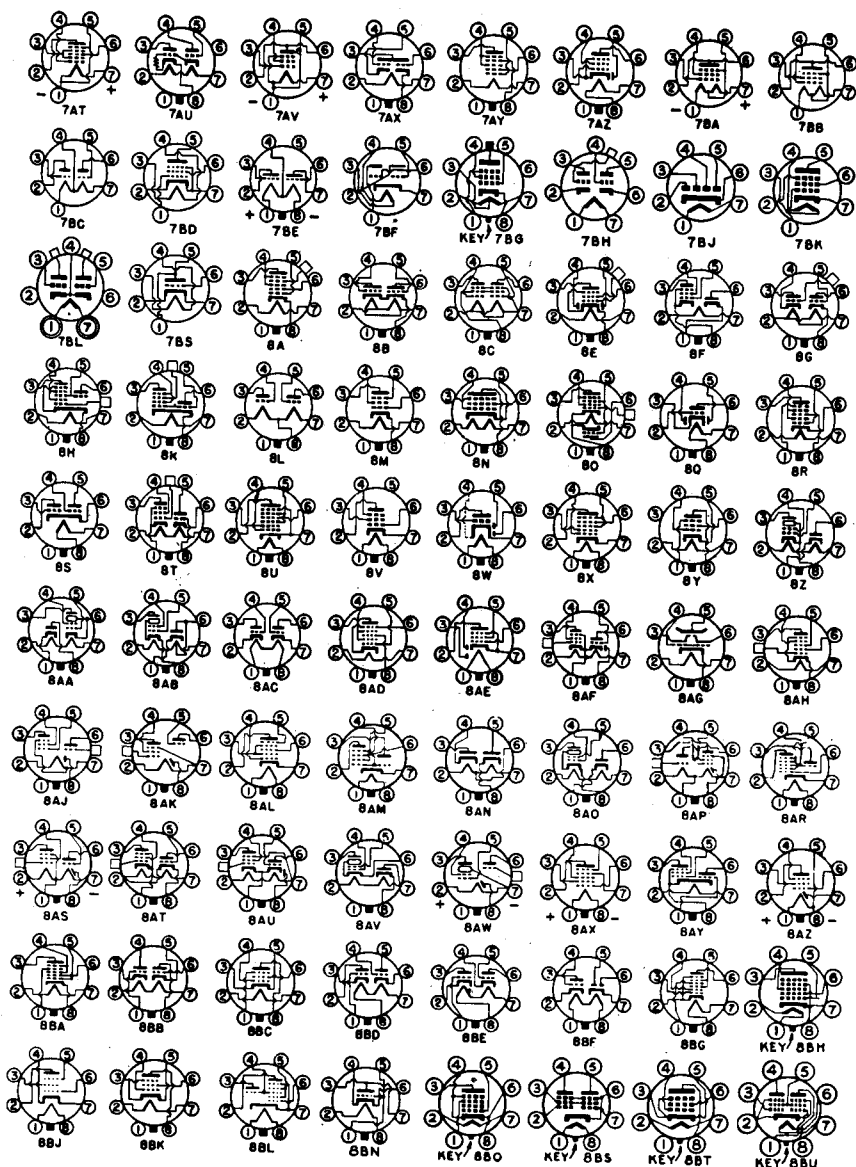


Figure 12.3. Tube base diagrams, 7AT to 8BU

TL-7495a

**29. COMMERCIAL EQUIVALENTS OF SIGNAL CORPS TUBES.**

<i>Signal Corps tube</i>	<i>Commercial tube equivalent</i>	<i>Signal Corps tube</i>	<i>Commercial tube equivalent</i>	<i>Signal Corps tube</i>	<i>Commercial tube equivalent</i>
VT-2	WE205B	VT-51	841, PT841, 941	VT-90-A	
VT-4-B	211, 242A, 311	VT-52	45 Special		6H6GT, 6H6GT/G
VT-4-C	211 Special	VT-54	34	VT-91	6J7
VT-5	WE215A, 215A	VT-55	865	VT-91-A	6J7GT
VT-7	WX12	VT-56	56	VT-92	6Q7
VT-17	860	VT 57	57	VT-92-A	6Q7G
VT-19	861	VT-58	58	VT-93	6B8
VT-22	204A	VT-60	850	VT-93-A	6B8G
VT-24	864	VT-62	801, 801A, 310	VT-94	6J5
VT-25	10	VT-63	46	VT-94-A	6J5G
VT-25-A	10 Special, 10Y	VT-64	800, RK30	VT-94-D	6J5GT
VT-26	22	VT-65	6C5	VT-95	2A3
VT-27	30	VT-65-A	6C5G	VT-96	6N7
VT-28	24, 24A	VT-66	6F6	VT-97	5W4
VT-29	27	VT-66-A	6F6G		
VT-30	01A, 01	VT-67	30 Special	VT-98	
VT-31	31	VT-68	6B7		6U5/6G5, 6G5, 6U5
VT-33	33	VT-69	6D6	VT-99	6F8G
VT-34	207, F307	VT-70	6F7	VT-100	807, RK39, HY61, HY61/807
VT-35	35/51	VT-72	842, 942	VT-100-A	
VT-36	36, 36A	VT-73	843		807, 807A, Modified
VT-37	37, 37A	VT-74	5Z4	VT-101	837, RK44
VT-38	38, 38A	VT-75	75	VT-103	6SQ7
VT-39	869	VT-76	76	VT-104	12SQ7
VT-39-A	869A, F369B	VT-77	77		
VT-40	40	VT-78	78	VT-105	6SC7
VT-41	851, 951	VT-80	80	VT-106	
VT-42	872, F-353A	VT-83	83		803, RKE8A, WE322A
VT-42-A	872 Special filament	VT-84	84/6Z4	VT-107	6V6
		VT-86	6K7		
VT-43	A45, 845, 945, WE284D, 384D	VT-86-A	6K7G	VT-107-A	
VT-44	32	VT-86-B	6K7GT		6V6GT, 6V6GT/G
VT-45	45	VT-87	6L7	VT-107-B	6V6G
VT-46	866, 966	VT-87-A	6L7G	VT-108	450TH, WL450, HK854H
		VT-88	6R7		
VT-46-A	866A, 966A	VT-88-A	6R7G	VT-109	2051, WL630
VT-47	47	VT-88-B	6R7GT	VT-111	2525D5, 5BP4/1808P4, 1802P4
VT-48	41	VT-89	89	VT-112	6AC7/1852, 1852
VT-49	39/44	VT-90	6H6	VT-114	5T4
VT-50	50, 585, 586				

<i>Signal Corps tube</i>	<i>Commercial tube equivalent</i>	<i>Signal Corps tube</i>	<i>Commercial tube equivalent</i>	<i>Signal Corps tube</i>	<i>Commercial tube equivalent</i>
VT-115	6L6	VT-141	53L, WL531	VT-178	1LC6
VT-115-A	6L6G, 6L6GA	VT-142	WE31DY1	VT-179	1LN5
VT-116, VT-116-B...	6SJ7	VT-143	805, WE331A, 905, RK57	VT-180	3LF4
VT-116A	6SJ7GT	VT-144	813	VT-181	7Z4
VT-116-B	6SJ7Y, 6SJ7 special (micanol or ceramic base)	VT-145	5Z3	VT-182	3E7/1291, 3B7, 1291
VT-117	6SK7	VT-146	IN5GT, IN5GT/G	VT-183	1R4/1294, 1294, 1R4
VT-117-A	6SK7GT	VT-147	1A7GT	VT-184	VR90-30, OB3/VR90, VR90
VT-118	832	VT-148	1D8GT	VT-185	3D6/1299, 3D6, 1299
VT-119	2X2/879	VT-149	3A8GT	VT-187	575A, F375A, 975A, GL512
VT-120	954	VT-150	6SA7	VT-188	7E6
VT-121	955	VT-150-A	6SA7GT	VT-189	7F7
VT-122	WL530, 530	VT-151	6A8G	VT-190	7H7
VT-124	1A5GT, 1A5GT/G	VT-151-B	6A8GT	VT-191	316A
VT-125	1C5GT, 1C5GT/G	VT-152	6K6GT, 6K6GT/G	VT-192	7A4
VT-126	6X5	VT-152-A	6K6G	VT-193	7C7
VT-126-A	6X5G	VT-153	12C8 special	VT-194	7J7
VT-126-B	6X5GT, 6X5GT/G	VT-154	814, 12C8Y, RK47	VT-195	CK1005, 1005
VT-127	100TS	VT-161	814(GL), 12SA7	VT-196	6W5C
VT-127-A	100TS modified	VT-162	12SJ7	VT-197-A	5Y3GT/G, 5Y3GT
VT-128	1630, A5588	VT-163	6C8G	VT-198-A	6G6G
VT-129	304TL, WL525, HK304L	VT-164	1619	VT-199	6SS7
VT-130	250TL, HK454L	VT-165	1624	VT-200	VR105-30, VR105
VT-131	12SK7	VT-166	371A, Amperex 221A, WE371A	VT-201	25L6
VT-132	12K8 special, 12K8	VT-167	6K8	VT-201-C	25L6GT, 25L6GT/G
VT-133	12SR7	VT-167-A	6K8G	VT-202	9002
VT-134	12A6	VT-168-A	6Y6G	VT-203	9003
VT-135	12J5GT	VT-169	12C8	VT-204	3C24, HK24G
VT-135-A	12J5	VT-170	1E5GP	VT-205	6ST7
VT-136	1625	VT-171	1R5	VT-206-A	5V4G, 274B
VT-137	1626	VT-171-A	1R5 loctal	VT-207	12AH7GT
VT-138	1629	VT-172	1S5	VT-208	7B8
VT-139	OD3/VR150, VR150-30, VA150	VT-173	1T4	VT-209	12SG7
		VT-174	3S4	VT-210	1S4
		VT-175	1613, 6L6GX	VT-211	6SG7
		VT-176	6AB7/1853, 6AB7, 1853		
		VT-177	1LH4		

SUPPLEMENTARY DATA

<i>Signal Corps tube</i>	<i>Commercial tube equivalent</i>	<i>Signal Corps tube</i>	<i>Commercial tube *</i> <i>equivalent</i>	<i>Signal Corps tube</i>	<i>Commercial tube equivalent</i>
VT-212	958	VT-232		VT-251	WL441 series, 2J30 to 2J34S "K" series
VT-213-A	6L5G	1148, E1148, HYE1148		VT-252	923
VT-214	12H6	VT-233	6SR7	VT-254	304TH, WL535, HK304M
VT-215	6E5	VT-234			
VT-216	.816, 866JR, 2B26		HY/114B, NU114B		
VT-217	811	VT-235	HY615, NU615	VT-255	
VT-218	100TH, RK38	VT-236	836	705A, 8021, WE705A	
VT-219	8007	VT-237	957	VT-256	GL486, ZP486
VT-220		VT-238	956	VT-257	K-7
	250TH, RK63, HK454	VT-239	1LE3	VT-259	829
VT-221		VT-240	710A, WL538, 8011, WE710A	VT-260	VR75-30
	3Q5GT, 3Q5GT/G	VT-241		VT-264	3Q4
VT-222	884		7E5/1201, 7E5, 1201	VT-266	.1616, 866JR, 660
VT-223		VT-243		VT-267	578, WL578
	1H5GT, 1H5GT/G		7C4/1203A, 7C4, 1203	VT-268	12SC7
VT-224	RK34	VT-244	5U4G	VT-269	.717A, WE717A
VT-225	WE307A, 307A	VT-245	2050	VT-277	417, WL417
VT-226	3EP1/1806P1, 3EP1, 1806P1	VT-246	.918, CE1, PJ23	VT-279	GY2, D161831
VT-227	7184, KR7184	VT-247	6AG7	VT-282	ZG489
VT-228	8012	VT-248	3CP1/1808P1, 3CP1-S1, 3CP1, 1808P1	VT-286	832A
VT-229	6SL7GT	VT-249	CK1006, 1006	VT-287	815
VT-230	350A	VT-250	EF50	VT-288	12SH7
VT-231	6SN7GT			VT-289	12SL7GT

**30. SIGNAL CORPS EQUIVALENTS OF COMMERCIAL TUBES.**

<i>Commercial type</i>	<i>Signal Corps equivalent</i>	<i>Commercial type</i>	<i>Signal Corps equivalent</i>	<i>Commercial type</i>	<i>Signal Corps equivalent</i>
01, 01A	VT-30	1LE3	VT-239	2A3	VT-95
CE1	VT-246	1LH4	VT-177	2B26	VT-46-A
1A5GT, 1A5GT/G		1LN5	VT-179	2J30 to 2J34 "K" series	VT-251
	VT-124	1N5GT, 1N5GT/G		2X2/879, 2X2	VT-119
1A7GT	VT-147		VT-146		
1C5GT, 1C5GT/G		1R4, 1R4/1294	VT-183	OA3/VR75	VT-260
	VT-125	1R5	VT-171	OB3/VR90	VT-184
1D8GT	VT-148	1R5 (loctal)	VT-171-A	OC3/VR105	VT-200
1E5GP	VT-170	1S4	VT-210	OD3/VR150	VT-139
1H5GT, 1H5GT/B		1S5	VT-172	3A8GT	VT-149
	VT-223	1T4	VT-173	3B7, 3B7/1291	VT-182
1LC6	VT-178	GY2	VT-279	3C24	VT-204

<i>Commercial type</i>	<i>Signal Corps equivalent</i>	<i>Commercial type</i>	<i>Signal Corps equivalent</i>	<i>Commercial type</i>	<i>Signal Corps equivalent</i>
3CP1, 3CP1/1808P1, 3CP1-S1 .....	VT-248	6G6G .....	VT-198-A	6U5, 6U5/6G5 ..	VT-98
3D6, 3D6/1299 ..	VT-185	6H6 .....	VT-90	6V6 .....	VT-107
3EP1, 3EP1/1806P1 VT-226		6H6GT, 6H6GT/G VT-90-A		6V6GT, 6V6GT/G VT-107-A	
3LF4 .....	VT-180	6J5 .....	VT-94	6V6G .....	VT-107-B
3Q4 .....	VT-264	6J5G .....	VT-94-A	6W5-6 .....	VT-196
3Q5GT, 3Q5GT/G ....	VT-221	6J6GT .....	VT-94-D	6X5 .....	VT-126
3S4 .....	VT-174	6J7 .....	VT-91	6X5G .....	VT-126-A
		6J7GT .....	VT-91-A	6X5GT, 6X5GT/G VT-126-B	
		6K6G .....	VT-152-A		
5BP4, 5BP4/1802P4 VT-111		6K6GT, 6K6GT/G VT-152		6Y6G .....	VT-168-A
5T4 .....	VT-114	6K7 .....	VT-86	6Z4, 6Z4/84 .....	VT-84
5U4G .....	VT-244	6K7G .....	VT-86-A	K-7 .....	VT-257
5V4G .....	VT-206-A	6K7G Γ .....	VT-86-B	7A4 .....	VT-192
				7B8 .....	VT-208
5W4 .....	VT-97	6K8 .....	VT-167	7C4, 7C4/1203A .	VT-243
5Y3-GT, 5YGT/G VT-197-A		6K8G .....	VT-167-A	7C7 .....	VT-193
5Z3 .....	VT-145	6L5G .....	VT-213-A	7E5, 7E5/1201 ..	VT-241
5Z4 .....	VT-74	6L6 .....	VT-115	7E6 .....	VT-188
		6L6G, 6L6GA..	VT-115-A	7F7 .....	VT-189
6A8G .....	VT-151	6L6GX .....	VT-175	7H7 .....	VT-190
6A8GT .....	VT-151-B	6L7 .....	VT-87	7J7 .....	VT-194
6AB7, 6AB7/1853 VT-176		6Q7 .....	VT-92	7Z4 .....	VT-181
6AC7, 6AC7/1852 VT-112		6Q7G .....	VT-92-A	10 .....	VT-25
		6R7 .....	VT-88	10Y, 10 special..	VT-25-A
		6R7GT .....	VT-88-B	WX12 .....	VT-7
6AG7 .....	VT-247	6SA7 .....	VT-150	12A6 .....	VT-134
6B7 .....	VT-68	6SA7GT ....	VT-150-A	12AH7GT .....	VT-207
6B8 .....	VT-93	6SC7 .....	VT-105	12C8 .....	VT-169
6B8G .....	VT-93-A	6SG7 .....	VT-211	12C8Y, 12C8 special VT-153	
6C5 .....	VT-65	6SJ7 .....	VT-116		
6C5G .....	VT-65-A	6SJ7GT ....	VT-116-A	12H6 .....	VT-214
6C8G .....	VT-163	6SJ7Y, 6SJ7 special VT-116-B		12J5 .....	VT-135-A
6D6 .....	VT-69			12J5-GT .....	VT-135
6E5 .....	VT-215	6SK7 .....	VT-117	12K8, 12K8 special VT-132	
6F6 .....	VT-66	6SK7GT, 6SK7GT/G VT-117-A			
6F6G .....	VT-66-A	6SL7GT .....	VT-229	12SA7 .....	VT-161
6F7 .....	VT-70	6SN7GT .....	VT-231	12SC7 .....	VT-268
6F8G .....	VT-99	6SQ7 .....	VT-103	12SG7 .....	VT-209
6L7G .....	VT-87-A	6SR7 .....	VT-233	12SH7 .....	VT-288
6N7 .....	VT-96	6SS7 .....	VT-199	12SJ7 .....	VT-162
				12SK7 .....	VT-131
6G5 .....	VT-98	6ST7 .....	VT-205	12SL7-GT .....	VT-289



SUPPLEMENTARY DATA

<i>Commercial type</i>	<i>Signal Corps equivalent</i>	<i>Commercial type</i>	<i>Signal Corps equivalent</i>	<i>Commercial type</i>	<i>Signal Corps equivalent</i>
12SQ7	VT-104	57	VT-57	310	VT-62
12SR7	VT-133	58	VT-58	311	VT-4-B
22	VT-26	HY61, HY61/807	VT-100	WE316A	VT-191
PJ23	VT-246	RK63	VT-220	WE322A	VT-106
24, 24A	VT-28	75	VT-75	WE331A	VT-143
HK24G	VT-204	VR75-30	VT-260	WE350A	VT-230
25L6	VT-201	76	VT-76	F353A	VT-42
25L6GT, 25L6GT/G	VT-201-C	77	VT-77	F369B	VT-39-A
27	VT-29	78	VT-78	371A, WE371A	VT-166
		80	VT-80	F375A	VT-187
RK28A	VT-106	83	VT-83	384D	VT-43
30	VT-27	84, 84/6Z4	VT-84	417, WL417	VT-277
30 special	VT-67	89	VT-89	WL441 series	VT-251
RK30	VT-64	VR90, VR90-30	VT-184	450TH, WL450	VT-108
31	VT-31	98	VT-84	HK454H	VT-220
32	VT-44	100TH	VT-218	HK454L	VT-130
33	VT-33	100TS	VT-127	ZP486, GL486	VT-256
34	VT-54	100TS modified	VT-127-A	ZG489	VT-282
RK34	VT-224			GL512	VT-187
35, 35/51	VT-35	VR105, VR105-30	VT-200	WL525	VT-129
36, 36A	VT-36	HY114B, NU114B	VT-234	530, WL530	VT-122
37, 37A	VT-37			531, WL531	VT-141
38, 38A	VT-38	VR150, VR150-30	VT-139	WL535	VT-254
RK38	VT-218			WL538	VT-240
39, 39/44	VT-49	204A	VT-22	575A	VT-187
WE39DY1	VT-142	WE205B	VT-2	578, WL578	VT-267
RK39	VT-100	207	VT-34	585, 586	VT-50
40	VT-40	211	VT-4-B	HY615, NU615	VT-235
41	VT-48	211 special	VT-4-C	WL630	VT-109
44	VT-49	215A, WE215A	VT-5	WE705A	VT-255
RK44	VT-101	Amperex 221A	VT-166	710A, WE710A	VT-240
45	VT-45	242A	VT-4-B	WE717A	VT-269
A45	VT-43	250TH	VT-220	800	VT-64
45 special	VT-52	250TL	VT-130	801, 801A	VT-62
46	VT-63	274B	VT-206-A	803	VT-106
47	VT-47	WE284D	VT-43	805	VT-143
RK47	VT-154	HK304L	VT-129	807	VT-100
50	VT-50	304TH, HK304M	VT-254	807A, 807 modified	VT-100-A
EF50	VT-250			811	VT-217
51	VT-35	304TL	VT-129	813	VT-144
56	VT-56	F307	VT-34	814, 814 (GL)	VT-154
RK57	VT-143	307A, WE307A	VT-225		

<i>Commercial type</i>	<i>Signal Corps equivalent</i>	<i>Commercial type</i>	<i>Signal Corps equivalent</i>	<i>Commercial type</i>	<i>Signal Corps equivalent</i>
815 .....	VT-287	905 .....	VT-143	1613 .....	VT-175
816 .....	VT-216	918 .....	VT-246	1616 .....	VT-266
829 .....	VT-259	923 .....	VT-252	1619 .....	VT-164
832 .....	VT-118	CW931 .....	VT-2	1624 .....	VT-165
832A .....	VT-286	941 .....	VT-51	1625 .....	VT-136
836 .....	VT-236	942 .....	VT-72	1626 .....	VT-137
837 .....	VT-101	945 .....	VT-43	1629 .....	VT-138
841, PT841 .....	VT-51	951 .....	VT-41	1630 .....	VT-128
842 .....	VT-72	954 .....	VT-120	1802P4 .....	VT-111
843 .....	VT-73	955 .....	VT-121	1806P1 .....	VT-226
845 .....	VT-43	956 .....	VT-238	1808P1 .....	VT-248
850 .....	VT-60	957 .....	VT-237	1852 .....	VT-112
851 .....	VT-41	958 .....	VT-212	1853 .....	VT-176
HK854H .....	VT-108	966 .....	VT-46	2050 .....	VT-245
860 .....	VT-17	966A .....	VT-46-A	2051 .....	VT-109
861 .....	VT-19	972 .....	VT-42	2525D5 .....	VT-111
864, 864 special ..	VT-24	975A .....	VT-187	A5586 .....	VT-123
865 .....	VT-55	1005, CK1005 ..	VT-195	A5588 .....	VT-128
866 .....	VT-46	1006, CK1006 ..	VT-249	7184, KR7184 ..	VT-227
866A, 866JR ...	VT-46-A	1148, E1148, HY-		8007 .....	VT-219
869 .....	VT-39	E1148 .....	• VT-232	8011 .....	VT-240
869A .....	VT-39-A	1201 .....	VT-241	8012 .....	VT-228
872 .....	VT-42	1203A .....	VT-243	8021 .....	VT-255
872A .....	VT-42-A	1291 .....	VT-182	9002 .....	VT-202
879 .....	VT-119	1294 .....	VT-183	9003 .....	VT-203
884 .....	VT-222	1299 .....	VT-185	D161831 .....	VT-279

### 31. TUBE TEST DATA.

**NOTE:** A Star (★) appearing in Notations Column indicates that the PLATE CAP of the tube should be connected to the UPPER LEFT CONTACT of the 6-pin socket. A 12-inch lead with clip and banana plug is provided for that purpose.

<i>Tube Type</i>	<i>Socket Letter</i>	<i>Select.</i>		<i>Fil. Volts</i>	<i>Potent.</i>		<i>Mut.</i>		<i>Notations</i>
		<i>A</i>	<i>B</i>		<i>L</i>	<i>R</i>	<i>Cond.</i>	<i>Press</i>	
00A	A	2	10	5	23	27	666	Ampl.	
0A4G	E	10	2	†	15	0	....	Diode †Tube strikes at 50V.	
01A	A	2	10	5	26	39	725	Ampl.	
0Z4	E	4	8	...	...	...	....	Check for Shorts	
0Z4	E	2	9	...	60	0	....	0Z4 Button	
0Z4	E	10	2	...	60	0	....	0Z4 Button	
1A3	H	10	5	1.5	0	0	....	Diode Also Press 117N7 But.	
1A4	A	2	5	1	27	24	750	Ampl.	
1A5G	E	8	5	1.5	32	35	800	Ampl.	
1A6	C	1	5	2	0	29	500	Ampl. Section	
1A6	C	9	7	2	60	29	150	Ampl. Osc. Sec. OK over 120	
1A7G	E	7	7	1.5	32	20	800	Ampl. Pent. Section	
1A7G	E	12	7	1.5	60	38	300	Ampl. Osc. Sec. OK over 240	
1B4	A	2	5	2	18	29	640	Ampl.	
1B5	C	7	8	2	60	23	475	Ampl. Sec. OK over 380	
1B5	C	10	8	2	0	0	....	Diode But.	
1B5	C	12	3	2	0	0	....	Diode But.	
1B7G	E	7	7	1.5	32	20	800	Ampl. Pent. Section	
1B7G	E	12	7	1.5	60	38	300	Ampl. Osc. Sec. OK over 240	
1C5G	E	8	5	1.5	55	36	1550	Ampl.	
1C6	C	1	5	2	20	24	560	Ampl. Section	
1C6	C	9	7	2	60	41	300	Ampl. Osc. Sec. OK over 240	
1C7G	E	2	5	2	20	24	650	Ampl. Section	
1C7G	E	12	7	2	60	41	300	Ampl. Osc. Sec. OK over 240	
1D5G	E	2	5	2	27	24	750	Ampl.	
1D7G	E	2	5	2	0	29	500	Ampl. Section	
1D7G	F	12	7	2	60	35	200	Ampl. Osc. Sec. OK over 160	
1D8GT	F	8	5	1.5	35	41	925	Ampl. Pent. Section	
1D8GT	F	11	5	1.5	11	9	575	Ampl. Triode Section	
1D8GT	E	5	1	1.5	0	0	....	Diode Section	
1E4G	E	7	5	1.5	32	30	825	Ampl.	
1E5G	E	2	5	2	18	29	640	Ampl.	
1E7G	E	8	8	2	45	17	1150	Ampl. No. 1 Plate	
1E7G	E	11	6	2	45	17	1150	Ampl. No. 2 Plate	
1F4	B	1	5	2	51	19	1400	Ampl.	
1F5G	E	8	5	2	51	19	1400	Ampl.	
1F6	C	1	7	2	20	21	650	Ampl. Section	
1F6	C	11	1	2	0	0	....	Diode But. OK over 500	
1F6	C	5	5	2	0	0	....	Diode But. OK over 500	

Tube Type	Socket Letter	Select.		Fil. Volts	Potent.		Mut.		Notations
		A	B		L	R	Cond.	Press	
1F7G	E	1	5	2	20	21	650	Ampl. Pentode Sec.	
1F7G	E	4	5	2	0	0	....	Diode Button	
1F7G	E	7	1	2	0	0	....	Diode Button	
1G4G	E	7	5	1.5	33	40	825	Ampl.	
1G5G	E	8	5	2	54	30	1500	Ampl.	
1G6G	E	2	9	1.5	22	13	675	Ampl. No. 1 Plate	
1G6G	E	12	5	1.5	22	13	675	Ampl. No. 2 Plate	
1H4G	E	7	5	2	36	33	900	Ampl.	
1H5G	E	8	5	1.5	60	13	275	Ampl. OK over 220	
1H5G	E	8	1	1.5	0	0	....	Diode Button	
1H6G	E	7	8	2	60	23	475	Ampl. Section	
1H6G	E	10	8	2	0	0	....	Diode Button	
1H6G	E	11	3	2	0	0	....	Diode Button	
1J5G	E	8	5	2	37	37	950	Ampl.	
1J6G	E	8	8	2	42	12	1000	Ampl. No. 1 Plate	
1J6G	E	11	6	2	42	12	1000	Ampl. No. 2 Plate	
1L4	H	1	7	1.5	43	16	1025	Ampl. Short on 4-5	
1LA4	F	6	2	1.5	32	35	800	Ampl.	
1LA6	F	6	3	1.5	32	20	800	Ampl. Pent. Section	
1LA6	F	2	8	1.5	60	38	300	Ampl. Osc. Sec. OK over 240	
1LB4	F	6	2	1.5	38	42	925	Ampl.	
1LC5	F	6	2	1.5	30	24	775	Ampl. Short on 4-5	
1LC6	F	6	3	1.5	41	19	1000	Ampl. Pent. Sect.	
1LC6	F	2	8	1.5	10	19	550	Ampl. Osc. Sect.	
1LD5	F	6	2	1.5	14	23	600	Ampl. Pent. Sec.	
1LD5	F	4	9	1.5	0	0	....	Diode	
1LE3	F	6	2	1.5	50	0	1300	Ampl.	
1LH4	F	6	3	1.5	60	13	275	Ampl. Sec. OK over 220	
1LH4	F	10	10	1.5	0	0	....	Diode Section	
1LN5	F	6	2	1.5	28	9	750	Ampl. Short on 4-5	
1N5G	E	8	5	1.5	28	9	750	Ampl.	
1N6G	E	8	5	1.5	31	35	800	Ampl.	
1P5G	E	8	5	1.5	31	9	800	Ampl.	
1Q5G	E	8	5	1.5	61	30	2100	Ampl.	
1R4	F	10	5	1.5	0	0	....	Diode	
1R5	H	7	7	1.5	19	29	650	Ampl. No. 1 Grid, Short on 4-5	
1R5	H	1	7	1.5	0	29	500	Ampl. No. 2 Grid	
1S4	H	4	6	1.5	34	82	850	Diode Button, Short on 3-4-5	
1S5	H	6	6	1.5	9	28	525	Ampl. Pent. Section	
1S5	H	3	6	1.5	0	0	....	Diode	
1SA6GT	E	3	4	1.5	39	19	950	Ampl.	
1SB6GT	E	2	5	1.5	20	22	650	Ampl.	
1T4	H	1	7	1.5	28	28	750	Ampl. Short on 4-5	
1T5GT	E	8	5	1.5	46	37	1150	Ampl.	
1V	A	1	5	6.3	40	0	....	Rect. St.	
2A3	A	2	10	2.5	67	55	3000	Ampl.	
2A4G	E	7	5	2.5	76	*	....	Press Rect. Std. But. Tube strikes at about 60	
2A5	C	8	5	2.5	60	24	2000	Ampl.	

## SUPPLEMENTARY DATA

Tube Type	Socket Letter	Select.		Fil. Volts	Potent.		Mut. Cond.	Press	Notations
		A	B		L	R			
2A6	C	7	6	2.5	28	9	750	Ampl. Section	
2A6	C	10	6	2.5	0	0	....	Diode Button	
2A6	C	10	3	2.5	0	0	....	Diode Button	
2A7	D	7	6	2.5	41	18	1000	Ampl. Section	
2A7	D	10	6	2.5	60	25	400	Ampl. Osc. OK over 320	
2B6	D	3	2	2.5	15	30	600	Ampl. Input Section	
2B6	D	7	6	2.5	64	12	2500	Ampl. Output Sec. Short on 3	
2B7	D	7	6	2.5	41	25	1000	Ampl. Pentode Section	
2B7	D	10	6	2.5	0	0	....	Diode Button	
2B7	D	10	3	2.5	0	0	....	Diode Button	
2C21	D	10	3	6.3	51	14	1375	Ampl. Plate No. 1	
2C21	D	3	3	6.3	51	14	1375	Ampl. Plate No. 2	
2C22	E	7	2	6.3	67	11	3000	Ampl. NOTE A	
2V3G	E	7	1	2.5	0	0	....	Rect. Std. OK over 1000	
2W3	E	4	11	2.5	33	0	....	Rect. Std. Button	
2X2	A	7	1	2.5	0	0	....	Rect. Std. OK over 1000 ★	
2Z2	A	2	7	2.5	35	0	....	Rect. Std. Button	
3A4	H	11	2	1.1	0	0	....	Diode Short on 3-4-5	
3A5	H	8	8	3	60	12	2000	Ampl. Plt. No. 1 Short on 4-5	
3A5	H	6	2	3	60	18	2000	Ampl. Plt. No. 2 Short on 4-5	
3A8GT	E	8	5	2.5	28	10	750	Ampl. Pent. Sec. Short on 1	
3A8GT	E	11	5	2.5	0	10	500	Ampl. Triode Section	
3A8GT	E	5	1	2.5	0	0	....	Diode Section	
3B5GT	E	8	5	2.5	54	49	1500	Ampl. Short on 4-5	
3D6	F	6	2	1.5	61	30	2100	Ampl. Short on 1	
3Q4	H	4	6	1.5	34	82	850	Press Diode But Short on 3-4-5	
3Q5GT	E	8	5	3	58	31	1800	Ampl. Short on 4-5	
3S4	H	4	6	2.5	28	82	750	Press Diode But Short on 3-4-5	
4A6G	E	2	9	3	41	0	1000	Ampl. No. 1 Plate	
4A6G	E	12	5	3	41	13	1000	Ampl. No. 2 Plate	
5R4GY	E	4	11	5	40	0	....	Rect. Std. Plt. No. 1	
5R4GY	E	5	11	5	40	0	....	Rect. Std. Plt. No. 2	
5T4	E	4	11	5	40	0	....	Rect. Std.	
5T4	E	5	11	5	40	0	....	Rect. Std.	
5U4G	E	4	11	5	40	0	....	Rect. Std.	
5U4G	E	5	11	5	40	0	....	Rect. Std.	
5V4G	E	4	11	5	40	0	....	Rect. Std.	
5V4G	E	5	11	5	40	0	....	Rect. Std.	
5W4	E	4	11	5	33	0	....	Rect. Std.	
5W4	E	5	11	5	33	0	....	Rect. Std.	
5X4G	E	7	9	5	40	0	....	Rect. Std.	
5X4G	E	12	4	5	40	0	....	Rect. Std.	
5Y3	E	4	11	5	40	0	....	Rect. Std.	
5Y3	E	5	11	5	40	0	....	Rect. Std.	
5Y4G	E	7	9	5	35	0	....	Rect. Std.	
5Y4G	E	12	4	5	35	0	....	Rect. Std.	
5Z3	A	2	7	5	40	0	....	Rect. Std.	
5Z3	A	3	7	5	40	0	....	Rect. Std.	

Tube Type	Socket Letter	Select.		Fil. Volts	Potent.		Mut. Cond.	Press	Notations
		A	B		L	R			
5Z4	E	4	11	5	40	0	....		Rect. Std.
5Z4	E	5	11	5	40	0	....		Rect. Std.
6A3	A	2	10	6.3	67	55	3000		Ampl.
6A4	B	1	5	6.3	60	23	2000		Ampl.
6A5G	E	7	5	6.3	67	55	3000		Ampl.
6A6	D	1	5	6.3	53	10	1500		Ampl. No. 1 Plate
6A6	D	12	5	6.3	53	10	1500		Ampl. No. 2 Plate
6A7	D	7	6	6.3	41	18	1000		Ampl. Pent. Section
6A7	D	10	6	6.3	60	25	400		Ampl. Osc. Sec. OK over 320
6A8	E	7	7	6.3	41	18	1000		Ampl. Pent. Section
6A8	E	12	7	6.3	60	30	300		Ampl. Osc. Sec. OK over 240
6AB6G	E	8	5	6.3	53	0	1450		Ampl.
6AB7	E	4	2	6.3	69	0	3500		Ampl.
6AC5G	E	8	5	6.3	40	0	1000		Ampl.
6AC6G	E	8	5	6.3	63	0	2400		Ampl.
6AC7	E	4	2	6.3	71	0	3500		Ampl.
6AD7G	E	8	5	6.3	60	24	2000		Ampl. Pent. Sect.
6AD7G	E	5	5	6.3	60	65	325		Diode Triode Sec. OK over 260
6AE5G	E	7	5	6.3	47	56	1200		Ampl.
6AE6G	E	7	5	6.3	34	0	850		Ampl. No. 1 Plate
6AE6G	E	10	5	6.3	28	0	750		Ampl. No. 2 Plate
6AE7GT	E	1	8	6.3	54	27	1500		Ampl. No. 1 Cathode
6AE7GT	E	8	8	6.3	54	27	1500		Ampl. No. 2 Cathode
6AF5G	E	8	5	6.3	53	42	1500		Ampl.
6AG7	E	4	2	6.3	72	15	5000		Ampl.
6AH7GT	E	7	9	6.3	60	35	2000		Press Gas No. 1 Short on 2-3
6AH7GT	E	11	9	6.3	60	35	2000		Press Gas No. 1 Short on 3-4-5
6AK5	K	1	9	6.3	71	0	4500		Ampl. Short on 4-5
6AL6G	E	8	5	6.3	73	19	5000		Ampl. Connect Cap to Plate Contact of 5 Pin Socket
6B4G	E	7	5	6.3	67	55	3000		Ampl.
6B5	C	8	5	6.3	52	0	1500		Ampl.
6B6	E	7	5	6.3	28	9	750		Ampl. Section
6B6	E	10	5	6.3	0	0	....		Diode Button
6B6	E	10	2	6.3	0	0	....		Diode Button
6B7	D	7	6	6.3	41	25	1000		Ampl. Pent. Section
6B7	D	10	6	6.3	0	0	....		Diode Button
6B7	D	10	3	6.3	0	0	....		Diode Button
6B8	E	7	5	6.3	42	25	1000		Ampl. Pent. Section
6B8	E	10	5	6.3	0	0	....		Diode Button
6B8	E	10	2	6.3	0	0	....		Diode Button
6C4	L	2	9	6.3	67	20	3000		Ampl.
6C5	E	7	5	6.3	60	17	2000		Ampl.
6C6	C	1	7	6.3	49	17	1225		Ampl.
6C7	D	7	6	6.3	49	24	1250		Ampl. Section
6C7	D	10	6	6.3	0	0	....		Diode Button
6C7	D	10	3	6.3	0	0	....		Diode Button

## SUPPLEMENTARY DATA

Tube Type	Socket Letter	Select. A	Select. B	Fil. Volts	Potent. L	Potent. R	Mut. Cond.	Press	Notations
6C8G	E	8	7	6.3	42	14	1000	Ampl.	No. 1 Plate
6C8G	E	11	7	6.3	42	14	1000	Ampl.	No. 2 Plate
6D5	E	7	5	6.3	60	47	2000	Ampl.	
6D6	C	1	7	6.3	56	17	1600	Ampl.	
6D7	D	7	6	6.3	48	20	1225	Ampl.	
6D8G	E	7	7	6.3	41	22	1000	Ampl.	Pentode Section
6D8G	E	12	7	6.3	60	20	300	Ampl.	Osc. Sec. OK over 240
6E6	D	1	5	6.3	52	23	1400	Ampl.	No. 1 Plate
6E6	D	12	5	6.3	52	23	1400	Ampl.	No. 2 Plate
6E7	D	7	6	6.3	55	20	1500	Ampl.	
6F5	E	10	5	6.3	43	10	1000	Ampl.	
6F6	E	8	5	6.3	60	24	2000	Ampl.	
6F7	D	7	6	6.3	45	23	1100	Ampl.	Pent. Section
6F7	D	10	6	6.3	60	23	450	Ampl.	Tri. Sec. OK over 360
6F8G	E	8	7	6.3	60	13	2000	Ampl.	No. 1 Plate
6F8G	E	11	7	6.3	60	13	2000	Ampl.	No. 2 Plate
6G6G	E	8	5	6.3	61	19	2100	Ampl.	
6H4GT	E	4	8	6.3	50	0	....	Diode	Section
6H6	E	7	2	6.3	50	0	....	Diode	Button
6H6	E	7	5	6.3	50	0	....	Diode	Button
6J5G	E	7	5	6.3	60	24	2000	Ampl.	
6J6	K	1	2	6.3	72	0	5000	Ampl.	Plt. No. 1
6J6	K	11	8	6.3	72	0	5000	Ampl.	Plt. No. 2
6J7	E	1	9	6.3	48	18	1225	Ampl.	
6J8G	E	8	5	6.3	41	15	1000	Ampl.	Heptode Section
6J8G	E	11	5	6.3	0	25	500	Ampl.	Triode Section
6K5G	E	7	5	6.3	40	17	1000	Ampl.	
6K6G	E	8	5	6.3	55	28	1600	Ampl.	
6K7	E	8	5	6.3	54	16	1450	Ampl.	
6K8	E	8	5	6.3	41	9	1000	Ampl.	Hexode Section
6K8	E	11	5	6.3	63	9	2400	Ampl.	Triode Section
6L5G	E	7	5	6.3	56	22	1500	Ampl.	
6L6	E	8	5	6.3	73	19	5000	Ampl.	
6L7	E	1	9	6.3	20	19	650	Ampl.	Cap Grid
6L7	E	8	5	6.3	20	22	650	Ampl.	Pin Grid
6N6MG	E	8	5	6.3	52	0	1500	Ampl.	
6N7	E	2	9	6.3	53	10	1500	Ampl.	No. 1 Plate
6N7	E	12	5	6.3	53	10	1500	Ampl.	No. 2 Plate
6P5G	E	7	5	6.3	53	24	1450	Ampl.	
6P7	E	3	12	6.3	45	23	1100	Ampl.	Pent. Section
6P7	E	6	12	6.3	60	23	450	Ampl.	Tri. Sec. OK over 360
6Q6G	E	7	5	6.3	40	14	1000	Ampl.	Section
6Q6G	E	7	2	6.3	0	0	....	Diode	Button
6Q7	E	7	5	6.3	33	14	800	Ampl.	Section
6Q7	E	10	5	6.3	0	0	....	Diode	Button
6Q7	E	10	2	6.3	0	0	....	Diode	Button

Tube Type	Socket Letter	Select.		Fil. Volts	Potent.		Mut. Cond.	Press	Notations
		A	B		L	R			
6R7	E	7	5	6.3	60	17	1900		Ampl. Section
6R7	E	10	5	6.3	0	0	....		Diode Button
6R7	E	10	2	6.3	0	0	....		Diode Button
6S7G	E	8	5	6.3	57	22	1750		Ampl.
6SA7	E	1	7	6.3	28	17	750		Ampl. Section
6SA7	E	7	7	6.3	28	17	750		Ampl. Osc. Section
6SC7	G	10	3	6.3	42	0	1000		Ampl.
6SC7	G	1	3	6.3	42	0	1000		Ampl.
6SD7GT	E	4	2	6.3	64	13	2500		Ampl.
6SF5	E	7	4	6.3	56	13	1600		Ampl.
6SF7	E	6	7	6.3	60	0	2000		Ampl.
6SF7	E	8	1	6.3	0	0	....		Diode
6SG7	E	4	2	6.3	68	10	3300		Ampl.
6SH7	E	4	2	6.3	69	0	3400		Ampl.
6SJ7	E	4	2	6.3	56	18	1575		Ampl.
6SK7	E	4	2	6.3	59	18	1900		Ampl.
6SL7	G	4	1	6.3	36	0	900		Ampl.
6SL7	G	10	4	6.3	53	0	1400		Ampl. Short on 2-3
6SN7	G	4	1	6.3	56	24	1650		Ampl. Plt. No. 1
6SN7	G	10	4	6.3	56	24	1650		Ampl. Plt. No. 2 Short on 2-3
6SQ7	G	6	6	6.3	42	0	1000		Ampl. Triode Sec.
6SQ7	G	3	7	6.3	0	0	....		Diode Diode No. 1
6SQ7	G	7	1	6.3	0	0	....		Diode Diode No. 2
6SR7	G	6	6	6.3	59	15	1900		Ampl. Triode Sect.
6SR7	G	3	7	6.3	0	0	....		Diode Diode No. 1
6SR7	G	7	1	6.3	0	0	....		Diode Diode No. 2
6SS7	E	4	2	6.3	58	16	1850		Ampl.
6ST7	G	6	7	6.3	59	12	1900		Ampl. Triode Section
6ST7	G	3	7	6.3	0	0	....		Diode Diode No. 1
6ST7	G	7	1	6.3	0	0	....		Diode Diode No. 2
6T7G	E	7	5	6.3	40	14	1000		Ampl. Triode Section
6T7G	E	10	5	6.3	0	0	....		Diode Button
6T7G	E	10	2	6.3	0	0	....		Diode Button
6U6GT	E	8	5	6.3	73	27	6200		Ampl.
6U7G	E	8	5	6.3	56	17	1600		Ampl.
6V6G	E	8	5	6.3	67	25	3000		Ampl.
6V7G	E	7	5	6.3	40	32	975		Ampl. Section
6V7G	E	10	5	6.3	0	0	....		Diode Button
6V7G	E	10	2	6.3	0	0	....		Diode Button
6W5	E	2	9	6.3	40	0	....		Rect. Std.
6W5	E	10	2	6.3	40	0	....		Rect. Std.
6W6GT	E	8	5	6.3	67	46	3000		Ampl.
6W7G	E	1	9	6.3	41	20	1000		Ampl.
6X5	E	2	9	6.3	40	0	....		Rect. Std.
6X5	E	10	2	6.3	40	0	....		Rect. Std.
6Y5	C	9	8	6.3	40	0	....		Rect. Std.
6Y5	C	12	8	6.3	40	0	....		Rect. Std.
6Y6G	E	8	5	6.3	74	36	7000		Ampl.
6Y7G	E	2	9	6.3	39	12	1000		Ampl. No. 1 Plate
6Y7G	E	12	5	6.3	39	12	1000		Ampl. No. 2 Plate



## SUPPLEMENTARY DATA

Tube Type	Socket Letter	Select. A	Select. B	Fil. Volts	Potent. L	Potent. R	Mut. Cond.	Press	Notations
6Z3	A	1	5	6.3	40	0	....		Rect. Std.
6Z4-84	B	7	7	6.3	40	0	....		Rect. Std.
6Z4-80	B	5	1	6.3	40	0	....		Rect. Std.
6Z5	C	9	12	6.3	40	0	....		Rect. Std.
6Z5	C	12	12	6.3	40	0	....		Rect. Std.
6Z7G	E	2	9	6.3	45	0	1200		Ampl. No. 1 Plate
6Z7G	E	12	5	6.3	45	0	1200		Ampl. No. 2 Plate
6ZY5G	E	7	2	6.3	40	0	....		Rect. Std.
6ZY5G	E	7	5	6.3	40	0	....		Rect. Std.
7A4	F	6	2	6.3	66	14	2600		Ampl.
7A5	F	6	2	6.3	71	23	6000		Ampl.
7A6	F	8	5	6.3	40	0	....		Diode Short 1-4-5
7A6	F	11	5	6.3	40	0	....		Diode
7A7	F	6	2	6.3	58	22	1750		Ampl.
7A8	F	5	3	6.3	41	20	1000		Ampl. Section
7A8	F	8	10	6.3	0	21	500		Ampl. Osc. Section
7B4	F	6	2	6.3	43	10	1000		Ampl.
7B5	F	6	2	6.3	56	28	1600		Ampl.
7B6	F	2	3	6.3	28	9	750		Ampl. Sec. Short 1-4-5
7B6	F	8	3	6.3	0	0	....		Diode
7B6	F	6	10	6.3	0	0	....		Diode
7B7	F	5	4	6.3	57	22	1700		Ampl.
7B8	F	5	3	6.3	40	22	1000		Ampl. Pentode Section
7B8	F	8	10	6.3	0	15	500		Ampl. Osc. Section
7C4	F	9	5	6.3	25	0	....		Diode
7C5	F	6	2	6.3	67	25	3000		Ampl.
7C6	F	2	3	6.3	15	8	600		Ampl. Sec. Short 1-4-5
7C6	F	8	3	6.3	0	0	....		Diode
7C6	F	6	10	6.3	0	0	....		Diode
7C7	F	6	2	6.3	49	18	1300		Ampl. Section
7E5	N	12	4	6.3	67	0	3000		Ampl. Short on 1-2-5
7E6	F	2	3	6.3	59	15	1900		Ampl. Sec. Short 1-4-5
7E6	F	8	3	6.3	0	0	....		Diode
7E6	F	12	10	6.3	0	0	....		Diode
7E7	F	6	3	6.3	49	18	1300		Ampl. Pent. Section
7E7	F	1	8	6.3	0	0	....		Diode
7E7	F	4	8	6.3	0	0	....		Diode
7F7	F	2	9	6.3	56	0	1600		Ampl. No. 1 Plate Short on 1
7F7	F	12	5	6.3	56	0	1600		Ampl. No. 2 Plate
7H7	F	6	2	6.3	67	0	3000		Ampl.
7J7	F	6	3	6.3	31	15	800		Ampl. Hexode Section
7J7	F	2	8	6.3	42	15	1000		Ampl. Triode Section
7K7	F	2	8	6.3	41	0	1000		Ampl. Triode Short on 1-4-5
7K7	F	9	2	6.3	0	0	....		Diode Diode No. 1
7K7	F	5	9	6.3	0	0	....		Diode Diode No. 2
7L7	F	6	2	6.3	60	10	2000		Ampl.
7N7	F	2	9	6.3	60	13	2000		Ampl. Plate No. 1 Short on 1-4-5
7N7	F	12	5	6.3	60	13	2000		Ampl. Plate No. 2

Tube Type	Socket Letter	Select. A	Select. B	Fil. Volts	Potent. L	Potent. R	Mut. Cond.	Press	Notations
7Q7	F	6	2	6.3	33	17	800		Ampl.
7R7	F	6	3	6.3	67	8	3000		Ampl. Pentode Section
7R7	F	1	8	6.3	0	0	....		Diode Diode No. 1
7R7	F	4	8	6.3	0	0	....		Diode Diode No. 2
7S7	F	6	3	6.3	15	53	1500		Ampl. Hexode
7S7	F	2	8	6.3	0	53	1500		Ampl. Triode
7V7	F	6	2	6.3	72	5	4400		Ampl.
7W7	F	6	2	6.3	67	9	3000		Ampl. Short on 1-4-5
7Y4	F	1	6	6.3	40	0	....		Rect. Std.
7Y4	F	6	6	6.3	40	0	....		Rect. Std.
7Z4	F	1	6	6.3	40	0	....		Rect. Std.
7Z4	F	6	6	6.3	40	0	....		Rect. Std.
10	A	2	10	7.5	50	32	1250		Ampl.
10Y	A	2	10	7.5	53	10	1500		Ampl. (Also 10 special)
12A	A	2	10	5	57	36	1650		Ampl.
12A5	D	1	12	6.3	....	....	....		Check for Shorts
12A5	D	2	10	12.6	58	42	1800		Ampl.
12A6	E	8	5	12.6	67	10	3000		Ampl.
12A7	D	7	6	12.6	39	39	975		Ampl. Pent. Section
12A7	D	7	3	12.6	40	0	....		Rect. Std.
12A8GT	E	7	7	12.6	41	18	1000		Ampl. Pent. Section
12A8GT	E	12	7	12.6	60	30	300		Ampl. Osc. Sec. OK over 240
12AH7GT	E	7	9	12.6	60	35	2000		Press Gas No. 1 Short on 2-3
12AH7GT	E	11	9	12.6	60	35	2000		Press Gas No. 1 Short on 3-4-5
12B7	F	6	2	12.6	59	18	1900		Ampl.
12B8GT	E	7	7	12.6	0	0	....		Test for Shorts
12B8GT	E	1	7	12.6	58	18	1800		Ampl. Pent. Section
12B8GT	E	11	1	12.6	60	0	2000		Ampl. Triode Section
12C8	E	7	5	12.6	45	20	1150		Ampl. Pent. Section
12C8	E	10	5	12.6	0	0	....		Diode
12C8	E	10	2	12.6	0	0	....		Diode
12F5GT	E	10	5	12.6	41	10	1000		Ampl.
12H6	E	7	2	12.6	50	0	....		Diode
12H6	E	7	5	12.6	50	0	....		Diode
12J5GT	E	7	5	12.6	60	24	2000		Ampl.
12J7GT	E	1	9	12.6	48	18	1225		Ampl.
12K7GT	E	8	5	12.6	54	20	1450		Ampl.
12K8	E	8	5	12.6	41	9	1000		Ampl. Hex. Sec.
12K8	E	11	5	12.6	63	9	2400		Ampl. Triode Sec.
12Q7GT	E	7	5	12.6	33	14	800		Ampl. Triode Sec.
12Q7GT	E	10	5	12.6	0	0	....		Diode
12Q7GT	E	10	2	12.6	0	0	....		Diode
12SA7	E	1	7	12.6	28	17	750		Ampl. No. 1 Grid
12SA7	E	7	7	12.6	28	17	750		Ampl. No. 2 Grid
12SC7	G	10	3	12.6	42	0	1000		Ampl.
12SC7	G	1	3	12.6	42	0	1000		Ampl.
12SF5	E	7	4	12.6	56	13	1600		Ampl.

## SUPPLEMENTARY DATA

Tube Type	Socket Letter	Select.		Fil. Volts	Potent.		Mut. Cond.	Press	Notations
		A	B		L	R			
12SF7	G	6	7	12.6	60	0	2000	Ampl.	
12SF7	G	8	1	12.6	0	0	....	Diode	
12SG7	7	4	2	12.6	68	10	3300	Ampl.	
12SH7	E	4	2	12.6	69	0	3400	Ampl.	
12SJ7	E	4	2	12.6	56	18	1575	Ampl.	
12SK7	E	4	2	12.6	59	18	1900	Ampl.	
12SL7	G	4	1	12.6	53	0	1400	Ampl.	Short on 2-3
12SL7	G	10	4	12.6	53	0	1400	Ampl.	Short on 2-3
12SN7	G	4	1	12.6	67	0	3000	Ampl.	Plt. No. 1
12SN7	G	10	4	12.6	67	0	3000	Ampl.	Plt. No. 2 Short on 2-3
12SQ7	G	6	6	12.6	42	0	1125	Ampl.	Triode Sect.
12SQ7	G	3	7	12.6	0	0	....	Diode	Diode No. 1
12SQ7	G	7	1	12.6	0	0	....	Diode	Diode No. 2
12SR7	G	6	6	12.6	59	15	1900	Ampl.	Triode Sect.
12SR7	G	3	7	12.6	0	0	....	Diode	Diode No. 1
12SR7	G	7	1	12.6	0	0	....	Diode	Diode No. 2
12Z3	A	1	5	12.6	40	0	....	Rect.	Std.
12Z5	D	6	1	6.3	40	0	....	Check for	Shorts
12Z5	D	1	8	12.6	40	0	....	Rect.	Std.
12Z5	D	12	8	12.6	40	0	....	Rect.	Std.
14A4	F	6	2	12.6	66	14	2600	Ampl.	
14A7	F	6	2	12.6	59	18	1900	Ampl.	
14B6	F	2	3	12.6	44	0	1100	Ampl.	Triode Sec. Short on 1-4-5
14B6	F	8	3	12.6	0	0	....	Diode	No. 1
14B6	F	12	10	12.6	0	0	....	Diode	No. 2
14B8	F	5	3	12.6	40	22	1000	Ampl.	Pentode Section
14B8	F	8	10	12.6	0	15	500	Ampl.	Osc. Section
14C5	F	6	2	12.6	69	19	3700	Ampl.	
14C7	F	6	2	12.6	63	9	2275	Ampl.	
14E6	F	2	3	12.6	58	10	1800	Ampl.	Triode Sect. Short on 1-4-5
14E6	F	8	3	12.6	0	0	....	Diode	Diode No. 1
14E6	F	6	10	12.6	0	0	....	Diode	Diode No. 2
14E7	F	6	3	12.6	50	20	1300	Ampl.	
14E7	F	1	8	12.6	0	0	....	Diode	
14E7	F	10	10	12.6	0	0	....	Diode	
14F7	F	2	9	12.6	56	0	1600	Ampl.	Plate 1
14F7	F	12	5	12.6	56	0	1600	Ampl.	Plate 2
14H7	F	6	2	12.6	67	0	3000	Ampl.	
14J7	F	6	3	12.6	31	15	800	Ampl.	Hex. Sec.
14J7	F	2	8	12.6	42	15	1000	Ampl.	Triode Sec.
14N7	F	2	9	12.6	60	13	2000	Ampl.	Short on 1-4-5 Plt. 1
14N7	F	12	5	12.6	60	13	2000	Ampl.	Plt. 3
14Q7	F	6	2	12.6	31	14	800	Ampl.	
14R7	F	6	3	12.6	67	8	3000	Ampl.	Pentode Section
14R7	F	1	8	12.6	0	0	....	Diode	Diode No. 1
14R7	F	4	8	12.6	0	0	....	Diode	Diode No. 2
14S7	F	6	3	12.6	53	15	1500	Ampl.	Heptode Section
14S7	F	2	8	12.6	53	0	1500	Ampl.	Triode Section

Tube Type	Socket Letter	Select. A B		Fil. Volts	Potent. L R		Mut. Cond.	Press	Notations
14W7	F	6	2	12.6	67	9	3000		Ampl.
14Y4	F	1	6	12.6	40	0	....		Rect. Std.
14Y4	F	6	6	12.6	40	0	....		Rect. Std.
14Z3	A	1	5	12.6	40	0	....		Rect. Std.
15	B	7	6	2	16	18	625		Ampl.
19	C	8	8	2	42	12	1000		Ampl.
19	C	11	6	2	42	12	1000		Ampl.
22	Å	2	5	3	0	37	500		Ampl.
24	B	7	6	2.5	42	10	1000		Ampl. Also 24A
25A6	E	8	5	25	62	35	2300		Ampl.
25A7	E	11	5	25	40	0	....		Check for Shorts
25A7	E	11	5	25	40	0	....		Rect. Std.
25A7	E	8	5	25	58	35	1800		Ampl.
25AC5	E	7	5	25	52	0	1500		Ampl.
25B5	C	8	5	25	64	0	2500		Ampl.
25B6G	E	8	5	25	71	43	4000		Ampl.
25B8GT	E	1	7	25	60	18	2000		Ampl. Pentode Section
25B8GT	E	11	1	25	54	8	1500		Ampl. Triode Section
25C6G	E	8	5	25	74	36	7000		Ampl.
25D8GT	E	8	5	25	59	15	1900		Ampl. Pent. Section
25D8GT	E	11	5	25	45	0	1100		Ampl. Triode Section
25D8GT	E	5	1	25	0	0	....		Diode
25L6	E	8	5	25	75	15	8000		Ampl.
25N6G	E	8	5	25	64	0	2500		Ampl.
25X6	E	7	2	25	40	0	....		Rect. Std. Plate No. 1
25X6	E	7	5	25	40	0	....		Rect. Std. Plate No. 2
25Y5	C	7	8	25	40	0	....		Rect. Std.
25Y5	C	12	8	25	40	0	....		Rect. Std.
25Z3	A	1	5	25	40	0	....		Rect. Std.
25Z4	E	7	2	25	35	0	....		Rect. Std.
25Z5	C	7	8	25	40	0	....		Rect. Std.
25Z5	C	12	8	25	40	0	....		Rect. Std.
25Z5MG	E	7	2	25	40	0	....		Rect. Std.
25Z5MG	E	7	5	25	40	0	....		Rect. Std.
25Z6	E	7	2	25	40	0	....		Rect. Std.
25Z6	E	7	5	25	40	0	....		Rect. Std.
26	A	2	10	1.5	46	35	1150		Ampl.
27	B	1	6	2.5	40	34	1000		Ampl. Also 27S
28D7	F	8	1	25	60	12	2000		Diode Plt. No. 1
28D7	F	3	6	25	60	12	2000		Ampl. Plt. No. 2
30	A	2	10	2	36	33	900		Ampl.
30 special	A	2	10	2	43	30	1025		Ampl.
31	A	2	10	2	35	53	925		Ampl.
32	A	2	5	2	19	30	640		Ampl.
32L7GT	E	11	5	35	0	0	....		Test for Shorts
32L7GT	E	8	5	35	71	18	4800		Ampl.
32L7GT	E	11	5	35	40	0	....		Rect. Std.
33	B	1	5	2	50	29	1450		Ampl.

SUPPLEMENTARY DATA

Tube Type	Socket Letter	Select.		Fil. Volts	Potent.		Mut. Cond.	Press	Notations
		A	B		L	R			
RK33	D	3	3	6.3	42	28	1000	Ampl.	
RK33	D	9	3	6.3	42	28	1000	Ampl.	
34	A	2	5	2	14	27	600	Ampl.	
35	B	7	6	2.5	42	20	1020	Ampl.	Also 35S
35A5'	F	6	2	35	74	27	5900	Ampl.	
35L6GT	E	8	5	35	71	32	5800	Ampl.	
35Z3	F	1	1	35	35	0	....	Rect. Std.	
35Z4GT	E	10	2	35	40	0	....	Rect. Std.	
35Z5GT	E	1	3	BLST	40	0	....	Short Test—Should light on 1-2-3-4-5	
35Z5GT	E	11	1	35	40	0	....	Rect. Std.	
35Z6G	E	7	2	35	40	0	....	Rect. Std. Plate No. 1	
35Z6G	E	7	5	35	40	0	....	Rect. Std. Plate No. 2	
36	B	7	6	6.3	43	20	1050	Ampl.	
37	B	1	6	6.3	36	34	900	Ampl.	
38	B	7	6	6.3	41	32	1050	Ampl.	
39-44	B	7	6	6.3	41	23	1000	Ampl.	
40	A	2	10	5	60	26	200	Ampl.	OK over 160
41	C	8	5	6.3	55	28	1600	Ampl.	
42	C	8	5	6.3	60	24	2000	Ampl.	
43	C	8	5	25	62	35	2300	Ampl.	
45	A	2	10	2.5	59	50	1850	Ampl.	
45Z3	H	10	2	35	35	0	....	Rect. Std. also Press 117N7	
45Z5GT	E	11	1	35	40	0	....	Rect. Std.	
45Z5GT	E	1	3	BLST	40	0	....	Short Test—Should light on 1-2-3-4-5	
46	B	1	5	2.5	60	25	2000	Ampl.	
47	B	1	5	2.5	60	18	2000	Ampl.	
48	C	8	5	25	60	48	2000	Ampl.	
49	B	1	5	2	45	40	1125	Ampl.	
50	A	2	10	7.5	53	50	1500	Ampl.	
50A5	F	6	2	50	74	25	7500	Ampl.	
50C6G	E	8	5	50	74	36	7000	Ampl.	
50L6GT	E	8	5	50	74	25	7500	Ampl.	
50Y6GT	E	7	2	50	40	0	....	Rect. Std. Plate No. 1	
50Y6GT	E	7	5	50	40	0	....	Rect. Std. Plate No. 2	
50Z7G	E	7	6	50	40	0	....	Rect. Std. Plate No. 1	
50Z7G	E	10	2	50	40	0	....	Short on 4-5	
50Z7G	E	10	2	50	40	0	....	Rect. Std. Plate No. 2	
51	B	7	6	2.5	42	20	1020	Ampl.	Also 51S
52	B	1	5	6.3	63	27	2400	Ampl.	
53	D	1	5	2.5	53	10	1500	Ampl. No. 1 Plate	
53	D	12	5	2.5	53	10	1500	Ampl. No. 2 Plate	
55	C	7	6	2.5	40	32	975	Ampl.	
55	C	10	6	2.5	0	0	....	Diode OK over 500	
55	C	10	3	2.5	0	0	....	Diode OK over 500	
56	B	1	6	2.5	53	26	1450	Ampl.	
57	C	2	5	2.5	48	17	1225	Ampl.	Also 57S

Tube Type	Socket Letter	Select.		Fil. Volts	Potent.		Mut. Cond.	Press	Notations
		A	B		L	R			
57A	A	2	5	6.3	48	17	1225	Ampl.	Also 57AS
58	C	2	5	2.5	54	20	1450	Ampl.	Also 58S
58A	C	2	5	6.3	54	20	1450	Ampl.	Also 58AS
59	D	8	8	2.5	60	18	2000	Ampl.	
70A7GT	E	8	5	75	71	17	5800	Ampl.	Short on 1-4-5
70A7GT	E	11	5	75	0	0	....	Diode	OK over 300
70L7GT	E	6	12	75	71	34	....	Check for	Shorts
70L7GT	E	7	7	75	71	34	5000	Ampl.	
70L7GT	E	5	1	75	40	0	....	Rect. Std.	
71A	A	2	10	5	56	60	1650	Ampl.	
75	C	7	6	6.3	28	9	750	Ampl.	Section
75	C	10	6	6.3	0	0	....	Diode	
75	C	10	3	6.3	0	0	....	Diode	
75MG	E	9	5	6.3	28	9	750	Ampl.	Section
75MG	E	12	2	6.3	0	0	....	Diode	
75MG	E	12	5	6.3	0	0	....	Diode	
76	B	1	6	6.3	53	24	1450	Ampl.	
77	C	2	5	6.3	48	17	1225	Ampl.	
78	C	2	5	6.3	54	20	1450	Ampl.	
79	C	2	10	6.3	39	12	1000	Ampl.	No. 1 Plate
79	C	5	10	6.3	39	12	1000	Ampl.	No. 2 Plate
80	A	2	7	5	35	0	....	Rect. Std.	
80	A	3	7	5	35	0	....	Rect. Std.	
81	A	2	7	7.5	33	0	....	Rect. Std.	
82	A	2	7	2.5	40	0	....	Rect. Std.	
82	A	3	7	2.5	40	0	....	Rect. Std.	
82V	A	2	7	2.5	40	0	....	Rect. Std.	
82V	A	2	7	2.5	40	0	....	Rect. Std.	
83	A	2	7	5	40	0	....	Rect. Std.	
83	A	3	7	5	40	0	....	Rect. Std.	
83V	A	2	7	5	40	0	....	Rect. Std.	
83V	A	3	7	5	40	0	....	Rect. Std.	
84-6Z4	B	7	7	6.3	40	0	....	Rect. Std.	
84-6Z4	B	5	1	6.3	40	0	....	Rect. Std.	
85	C	7	6	6.3	40	32	975	Ampl.	Section
85	C	10	6	6.3	0	0	....	Diode	
85	C	10	3	6.3	0	0	....	Diode	
89	C	2	5	6.3	54	30	1550	Ampl.	
99	A	2	10	3	60	45	425	Ampl.	OK over 340
112A	A	2	10	5	57	36	1650	Ampl.	
117L7GT	E	2	8	117	72	30	4000	Ampl.	Short on 1-4-5
117L7GT	E	5	8	117	40	0	....	Rect. Std.	
117M7GT	E	2	8	117	73	28	6000	Ampl.	Short on 1-4-5
117M7GT	E	5	8	117	40	0	....	Rect. Std.	
117N7GT	E	8	10	117	74	25	7000	Ampl.	
117N7GT	E	4	3	117	40	0	....	Rect. Std.	Also Press 117N7 But.

## SUPPLEMENTARY DATA

Tube Type	Socket Letter	Select. A	Select. B	Fil. Volts	Potent. L	Potent. R	Mut. Cond. Press	Notations
117P7GT	E	8	10	117	70	25	4000	Ampl.
117P7GT	E	4	3	117	40	0	....	Rect. Std. Also Press 117N7
117Z4GT	E	10	2	117	40	0	....	Rect. Std.
117Z6G	E	2	7	117	75	0	....	Press Gas No. 1
117Z6G	E	10	2	117	75	0	....	Press Gas No. 1 Early Tubes Short 1-3 Late Tubes Short 3
717A	E	4	2	6.3	69	0	3500	Ampl.
801A	A	2	10	7.5	53	0	1500	Ampl.
802	D	10	3	6.3	60	18	2000	Ampl. ★
807	B	12	1	6.3	70	27	3800	Ampl. ★
816	A	7	1	2.5	20	0	....	Rect. Std. ★
837	D	10	3	12.6	71	0	4000	Ampl. ★
841	A	2	10	7.5	42	0	1000	Ampl.
842	A	2	10	7.5	46	50	1150	Ampl.
843	B	1	6	2.5	56	10	1625	Ampl.
864	A	2	10	1.5	18	37	650	Ampl.
865	A	10	4	7.5	16	28	625	Ampl. ★
866A	A	7	1	2.5	40	0	....	Rect. Std. ★
871	A	7	1	2.5	20	0	....	Rect. Std. ★
XXB	F	2	10	2.5	30	30	800	Ampl.
XXB	F	12	6	2.5	31	60	400	Ampl. OK over 320
XXD	F	12	5	12.6	64	0	2500	Ampl. Plt. No. 1 Short on 1-4-5
XXD	F	2	9	12.6	64	0	2500	Ampl. Plt. No. 2
XXFM	F	1	2	6.3	30	0	900	Ampl. Short 1-4-5
XXFM	F	12	8	6.3	0	0	....	Diode
XXFM	F	7	3	6.3	0	0	....	Diode
XXL	F	6	2	6.3	67	0	3000	Ampl.
879	A	7	1	2.5	0	0	....	Rect. Std. OK over 1000 ★
884	E	7	5	6.3	40	*	....	Rect. Std. Strikes at 60 on R
885	B	1	6	2.5	40	*	....	Rect. Std. Strikes at 60 on R
950	B	1	5	2	37	37	950	Ampl.
951	A	2	5	2	18	29	640	Ampl.
954	M	6	7	6.3	44	17	1100	Ampl.
955	M	9	7	6.3	59	18	1900	Ampl.
956	M	6	7	6.3	53	14	1500	Ampl.
957	M	9	7	1.1	19	23	650	Ampl. Short on 4-5
958	M	9	7	1.1	47	34	1200	Ampl. Short on 4-5
959	M	6	7	1.1	14	23	600	Ampl. Short on 4-5
1201	N	12	4	6.3	67	0	3000	Ampl. Short on 1-2-5
1203	F	9	5	6.3	25	0	....	Diode
1204	N	3	9	6.3	58	0	1800	Ampl. Short on 4-5
1231	F	5	4	6.3	71	10	4000	Ampl.
1232	F	5	4	6.3	60	15	2000	Ampl.
1284	F	6	2	12.6	60	23	2000	Ampl.
1291	F	1	6	1.5	0	15	2000	Diode Short on 4-5 Reads in Green Plt. No. 1
1291	F	6	6	1.5	0	15	2000	Diode Reads in Green Plt. No. 2
1293	F	6	2	1.5	50	25	1300	Ampl.

<i>Tube Type</i>	<i>Socket Letter</i>	<i>Select.</i>		<i>Fil. Volts</i>	<i>Potent.</i>		<i>Mut. Cond.</i>	<i>Press</i>	<i>Notations</i>
		<i>A</i>	<i>B</i>		<i>L</i>	<i>R</i>			
1294	F	10	5	1.5	0	0	....		Diode
1299	F	6	2	1.5	61	30	2100		Ampl. Short on 1
1609	B	1	5	1.5	26	18	725		Ampl.
1612	E	1	9	6.3	20	19	650		Ampl. Cap Grid
1612	E	8	5	6.3	20	22	650		Ampl. Pin Grid
1613	E	8	5	6.3	62	0	2250		Ampl.
1616	A	7	1	2.5	35	0	....		Rect. Std. ★
1619	E	8	5	2.5	69	10	3400		Ampl.
1620	E	1	9	6.3	48	18	1225		Ampl.
1621	E	8	5	6.3	60	24	2000		Ampl.
1622	E	8	5	6.3	73	19	5000		Ampl.
1624	B	12	1	2.5	71	14	4000		Ampl. ★
1625	D	10	3	12.6	70	27	3800		Ampl. ★
1626	E	8	5	12.6	61	43	2100		Ampl.
1631	E	8	5	12.6	73	19	5000		Ampl.
1632	E	8	5	12.6	75	15	8000		Ampl.
1633	G	4	1	25	75	0	8500		Ampl. Plt. No. 1
1633	G	10	4	25	69	0	3400		Ampl. Plt. No. 2 Short on 2-3
1634	G	10	3	12.6	42	0	1000		Ampl. Plt. No. 1
1634	G	1	3	12.6	42	0	1000		Ampl. Plt. No. 2
1851	E	8	5	6.3	71	10	4000		Ampl.
1852	G	4	2	6.3	71	0	3500		Ampl.
1853	E	4	2	6.3	71	10	3500		Ampl.
HY113	O	7	5	1.5	0	40	500		Ampl.
HY115	O	7	5	1.5	60	32	370		Ampl. OK over 290
HY125	O	7	5	1.5	60	45	450		Ampl. OK over 360
HY145	O	7	5	1.5	60	32	370		Ampl. OK over 290
HY155	O	7	5	1.5	60	45	450		Ampl. OK over 360
2050	E	8	5	6.3	40	*	....		Rect. Std. Strikes at 32 on R
2051	E	8	5	6.3	40	*	....		Rect. Std. Strikes at 32 on R
7193	E	7	2	6.3	67	0	3000		Ampl. ★
9001	K	1	9	6.3	44	17	1100		Ampl. Short on 4-5
9002	L	2	9	6.3	59	18	1900		Ampl. Short on 4-5
9003	K	1	9	6.3	54	14	1500		Ampl. Short on 4-5
9006	L	2	9	6.3	20	0	....		Diode Short on 4-5
38142	A	2	10	7.5	62	30	2200		Ampl.

TO TEST MAGIC EYE TUBES: Insert in Socket C. Set proper Filament Voltage.  
Press "Amp." Button

2E5-6AB5-6E5-6G5-6H5-6N5-6T5-6U5

A	B	
12	3	Eye Open.
12	2	Eye Closed.

6AD6-6AF6.

A	B	
2	8	Eye No. 1 Open, No. 2 Closed.
3	8	Eye No. 2 Open, No. 1 Closed.



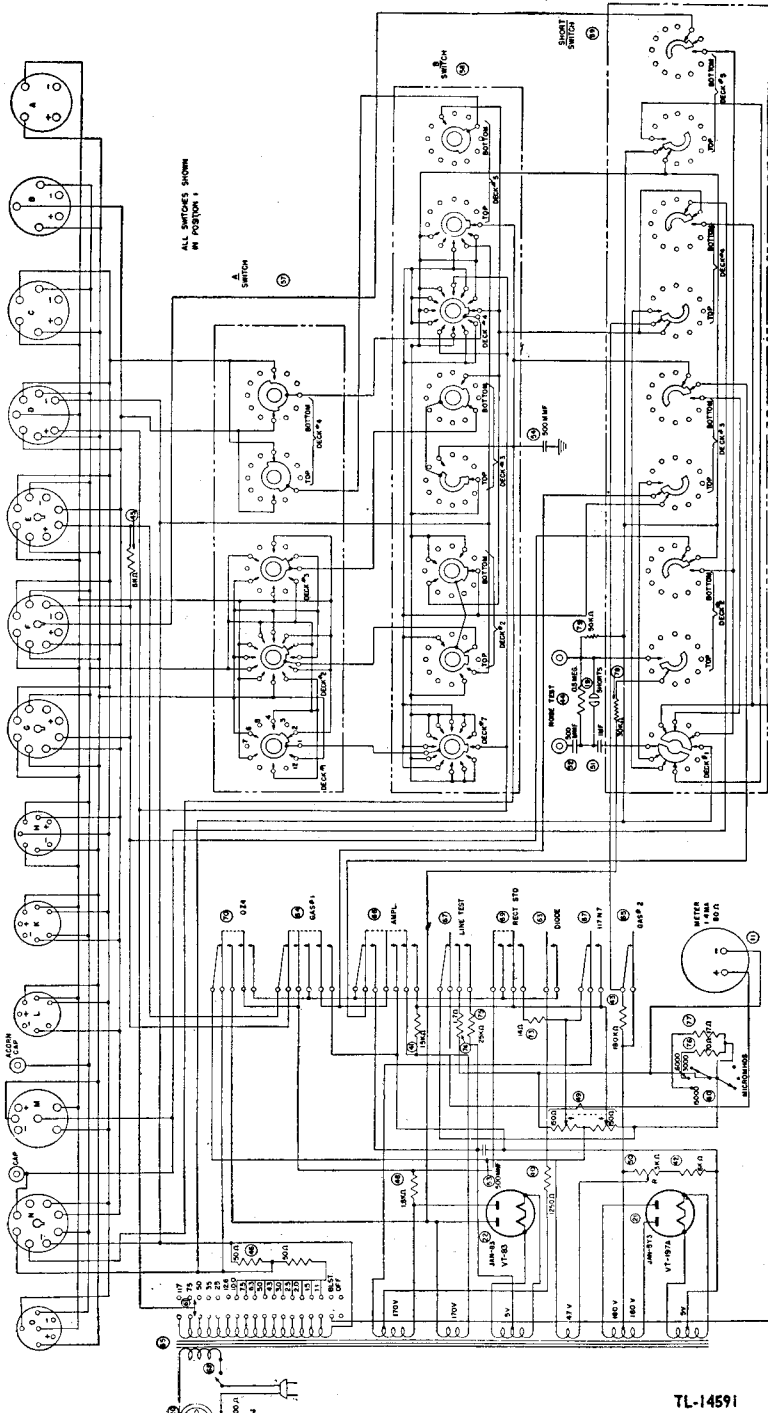


Figure 13. Tube Tester I-177, schematic diagram.

### 32. MAINTENANCE PARTS LIST FOR TUBE TESTER I-177.

**NOTE:** Order maintenance parts by stock number, name, and description.  
Only maintenance parts can be requisitioned.

Ref. symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
71	3Z9824-56	BUTTON: plunger type; red bakelite; $\frac{1}{4}$ " diam; $1\frac{1}{4}$ " long.	1			*	*	*	*
72	3Z9824-56.1	BUTTON: plunger type; black bakelite; $\frac{1}{4}$ " diam; $1\frac{1}{4}$ " long.	7			*	*	*	*
52, 53, 54	3DK9500-106	CAPACITOR: moulded mica; 500-mm $\mu$ f $\pm$ 20%; 400 v dc (working); wire leads.	3				*	*	*
51	3DA100-250	CAPACITOR: tubular; paper; 100,000-mm $\mu$ f $\pm$ 15%; 400 v dc (working).	1				*	*	*
56	3E7197	CORD: line; with 2 No. 18 rubber-covered conductors 8 ft. long; with rubber plug.	1			*	*	*	*
12, 13, 14, 15	2Z5581-5	JACK: pin; black bakelite.	4			*	*	*	*
3, 4, 5, 6, 7, 8, 9, 10	2Z5948	KNOB: bar; $1\frac{1}{4}$ " $\times$ $\frac{5}{8}$ "; moulded black bakelite with white index line; for $\frac{1}{4}$ " shaft.	8		*	*	*	*	*

SUPPLEMENTARY DATA

TM 11-2627  
Par. 32

11	3F1350	METER: 0-1.4-ma d-c milliammeter; resistance 80 ohms.	1	*	*	*
49	2Z7284.44	POTENTIOMETER: dual; wire-wound; 150 ohms per section; ¼" shaft.	1	*	*	*
50	2Z7280-32	POTENTIOMETER: wire-wound; 3,000-ohm; tapered; ¼" shaft.	1	*	*	*
73	3Z6001D4-9	RESISTOR: fixed; wire-wound; 14-ohm $\pm$ ½ ohm; 1-watt.	1	*	*	*
74	3Z6001G7-4	RESISTOR: fixed; wire-wound; 17-ohm $\pm$ ½ ohm; 1-watt.	1	*	*	*
77	3Z6001G7-4	RESISTOR: fixed; wire-wound; 17-ohm $\pm$ ½ ohm; 1-watt; calibrated resistor for 15,000-mi-cromho range; special.	1	*	*	*
76	3Z6007-6	RESISTOR: fixed; wire-wound; 70-ohm $\pm$ 1 ohm; 1-watt.	1	*	*	*
46	3Z6010-110	RESISTOR: fixed; wire-wound; 2-section; 50-ohms each $\pm$ 2%; 10-watt.	1	*	*	*
40	3Z6125-2	RESISTOR: fixed; carbon; 1,250-ohm $\pm$ 10%; 1-watt.	1	*	*	*
48	3Z6180-14	RESISTOR: fixed; wire-wound; 1,800-ohm $\pm$ 10%; 10-watt.	1	*	*	*

\* Indicates stock available.

32. MAINTENANCE PARTS LIST FOR TUBE TESTER I-177. (continued)

Ref. symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
45	3Z6500-176	RESISTOR: fixed; carbon; 5,000-ohm $\pm$ 15%; 1/2-watt.	1				*	*	*
75	3Z6625-118	RESISTOR: fixed; wire-wound; 12,500-ohm; two in series to give 25,000 ohms.	2				*	*	*
41	3Z6615-27	RESISTOR: fixed; carbon; 15,000-ohm $\pm$ 5%; 1-watt.	1				*	*	*
78	3Z6630-72	RESISTOR: 30,000-ohm $\pm$ 15%.	1				*	*	*
79	3Z6650-137	RESISTOR: 50,000-ohm $\pm$ 15%; 1-watt.	1				*	*	*
43	3Z6718-14	RESISTOR: carbon; 180,000-ohm $\pm$ 15%; 1-watt.	1				*	*	*
44	3Z6700-91	RESISTOR: carbon; 500,000-ohm $\pm$ 15%; 1/2-watt.	1				*	*	*
47	3Z7200-5	RHEOSTAT: wire-wound; 200-ohm $\pm$ 15%; 25-watt; 1/4" shaft.	1				*	*	*
23, 24	2Z8674-8	SOCKET: tube; 4-pin; bakelite.	2				*	*	*
25	2Z8687	SOCKET: tube; 5-pin; bakelite.	1				*	*	*

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26	2Z8688	SOCKET: tube; 6-pin; bakelite.	1	*	*	*
27	2Z8677.6	SOCKET: tube; 7-pin; bakelite.	1	*	*	*
28, 29, 30	2Z8678.62	SOCKET: tube; 8-pin; octal; bakelite.	3	*	*	*
31, 32	2Z8678.21	SOCKET: receiver tube; standard loctal.	2	*	*	*
33, 34, 35	2Z8677.5	SOCKET: receiver tube; miniature; 7-prong; bakelite.	3	*	*	*
36	2Z8676.2	SOCKET: receiver tube; bantam; 5-prong; bakelite.	1	*	*	*
37	2Z8676.22	SOCKET: receiver tube; acorn; 5-prong; bakelite.	1	*	*	*
38	2Z5884-47	SOCKET: candelabra.	1	*	*	*
39	6Z8332	SOCKET: lamp; bayonet; single-contact.	1	*	*	*
63	3Z9826-11.1	SWITCH: pushbutton; 2-blade, 1-make.	1	*	*	*
65	3Z9826-11	SWITCH: pushbutton; 2-blade, 1-break.	1	*	*	*
68	3Z9826-11.2	SWITCH: pushbutton; 3-blade, 1-make, 1-break.	1	*	*	*
69	3Z9826-11.3	SWITCH: pushbutton; 4-blade, 2-make.	1	*	*	*
67	3Z9826-11.4	SWITCH: pushbutton; 4-blade, 2-make, 1-break.	1	*	*	*

\*Indicates stock available.

32. MAINTENANCE PARTS LIST FOR TUBE TESTER I-177. (continued)

Ref. symbol	Signal Corps stock No.	Name of part and description	Quan per unit	Run-ning spares	Orgn stock	3d ech	4th ech	5th ech	Depot stock
70	3Z9826-11.5	SWITCH: pushbutton; 5-blade, 2-make, 1-break.	1				*	*	*
64	3Z9826-11.6	SWITCH: pushbutton; 6-blade, 2-make, 1-break.	1				*	*	*
66	3Z9826-11.7	SWITCH: pushbutton; 7-blade; 1 SPDT section, 1 DPST section.	1				*	*	*
60	3Z9825-55.11	SWITCH: selector; rotary; 3-position; 2-pole.	1				*	*	*
59	3Z9825-62.49	SWITCH: selector; rotary; 5-deck; 6-position; special contacts.	1				*	*	*
57	3Z9825-62.47	SWITCH: selector; rotary; 4-deck; 12-position; special multicontact.	1				*	*	*
58	3Z9825-62.48	SWITCH: selector; rotary; 5-deck; 12-position; special contacts.	1				*	*	*
61	3Z9580-9	SWITCH: selector; rotary; 18-position.	1				*	*	*
62	3Z9858-8.1	SWITCH: toggle; SPST; 3-amp; 250-volt; barrel $\frac{1}{2}$ " diam; $\frac{3}{8}$ " long.	1				*	*	*

18	3F5700-177/L2	TEST LEAD: rubber covered; black; approx. 16" overall length with banana plug at one end.	1	*	*	*	*	*	*
55	2Z9611.67	TRANSFORMER: filament and plate; primary 93-v ac, 60 cycle, 2 170-volt secondaries, 1 320-volt center-tapped secondary, 2 5-volt secondaries; 1 18-tap universal filament winding.	1	*	*	*	*	*	*
19	3F4056A/L2	LAMP: neon; ¼-watt; candelabra base; 105-125 volts.	1	*	*	*	*	*	*
20	2Z5929-2	LAMP: auto; 6-candlepower; 6.3 volt.	1	*	*	*	*	*	*
21	2T197A	TUBE JAN 5Y3GT/G: VT-197A.	1	*	*	*	*	*	*
22	2T183	TUBE JAN 83: VT-83.	1	*	*	*	*	*	*

\*Indicates stock available.

Orders No. 6397-Phila.-44, 24475-Phila.-44 and 27612-Phila.-44; 14000; August 44.