

TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL

INCLUDING REPAIR PARTS AND SPECIAL TOOLS LISTS

**TELEPHONE
TEST SET
TS-716/U**

HEADQUARTERS, DEPARTMENT OF THE ARMY

MAY 1971

WARNING

DANGEROUS VOLTAGES EXIST IN THIS EQUIPMENT

Be careful when working on the 115/230-volt ac line connections and TEL LINE terminals L1 and L2. Serious injury or death may result from contact with these terminals.

DO NOT TAKE CHANCES

**Operator's and Organizational Maintenance Manual
Including Repair Parts and Special Tools Lists
TELEPHONE TEST SET TS-716/U**

CHAPTER			Paragraph	Page
1.		INTRODUCTION		
		Scope	1-1	1-1
		Indexes of equipment publications	1-2	1-1
Section	I.	General		
		Forms and records	1-3	1-1
	II.	Description and data.....		
		Purpose and use	1-4	1-2
		Technical characteristics	1-5	1-2
		Components and running spares of Telephone Test Set TS-7 16/U	1-6	1-3
		Description of TS-716/U	1-7	1-3
		Description of assemblies	1-8	1-3
CHAPTER	2.	OPERATION		
Section	I.	Service upon receipt of equipment		
		Unpacking.....	2-1	2-1
		Checking unpacked equipment	2-2	2-1
		Tools and test equipment required for installation.....	2-3	2-2
		Installation of fuses.....	2-4	2-3
		Connections.....	2-5	2-3
		Adjustments.....	2-6	2-3
		Damage from improper settings	2-7	2-4
	II.	Operator's controls and indicators		
		Telephone Test Set TS-716/U operating controls and indicators.	2-8	2-4
		Types of operation.....	2-9	2-7
	III.	Operation of Telephone Test Set TS716/U		
		Operating procedure.....	2-10	2-7
		Efficiency tests of complete telephone sets	2-11	2-8
		Telephone dial tests	2-12	2-9
		Line-Level and click suppression varistor tests	2-13	2-9
		Ringer tests	2-14	2-10
		Telephone hand generator test	2-15	2-10

			Paragraph	Page
		Frequency response and sensitivity tests.....	2-16	2-10
		Insulation resistance test.....	2-17	2-11
		Continuity test.....	2-18	2-11
		Stopping procedure.....	2-19	2-11
		Operation at low temperatures.....	2-20	2-12
SECTION	IV.	Operation under unusual conditions		
		Operation under tropical conditions.....	2-21	2-12
		Operation in desert climates.....	2-22	2-12
		Scope of operator maintenance.....	3-1	3-1
CHAPTER	3.	OPERATOR MAINTENANCE		
		Operator preventive maintenance.....	3-2	3-1
		Preventive maintenance checks and service periods.....	3-3	3-1
		Daily preventive maintenance checks and services chart.....	3-4	3-1
		Cleaning.....	3-5	3-4
		Scope of organizational maintenance.....	4-1	4-1
CHAPTER	4.	ORGANIZATIONAL MAINTENANCE		
		Weekly preventive maintenance checks and services chart.....	4-2	4-1
		Monthly preventive maintenance checks and services chart.....	4-3	4-3
		Touchup painting instructions.....	4-4	4-4
		Troubleshooting chart.....	4-5	4-4
		Repairs and adjustments.....	4-6	4-7
CHAPTER	5.	SHIPMENT, LIMITED STORAGE, AND DEMOLITION TO PREVENT ENEMY USE		
Section	I.	Shipment and limited storage		
		Disassembly of equipment.....	5-1	5-1
		Repacking for shipment or limited storage.....	5-2	5-1
	II.	Demolition of materiel to prevent enemy use		
		Authority for demolition.....	5-3	5-2
		Methods of destruction.....	5-4	5-2
APPENDIX	A.	REFERENCES.....		A-1
	B.	BASIC ISSUE ITEMS LIST.....		B-1
	C.	MAINTENANCE ALLOCATION.....		C-1
	D.	ORGANIZATIONAL MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST.....		D-1

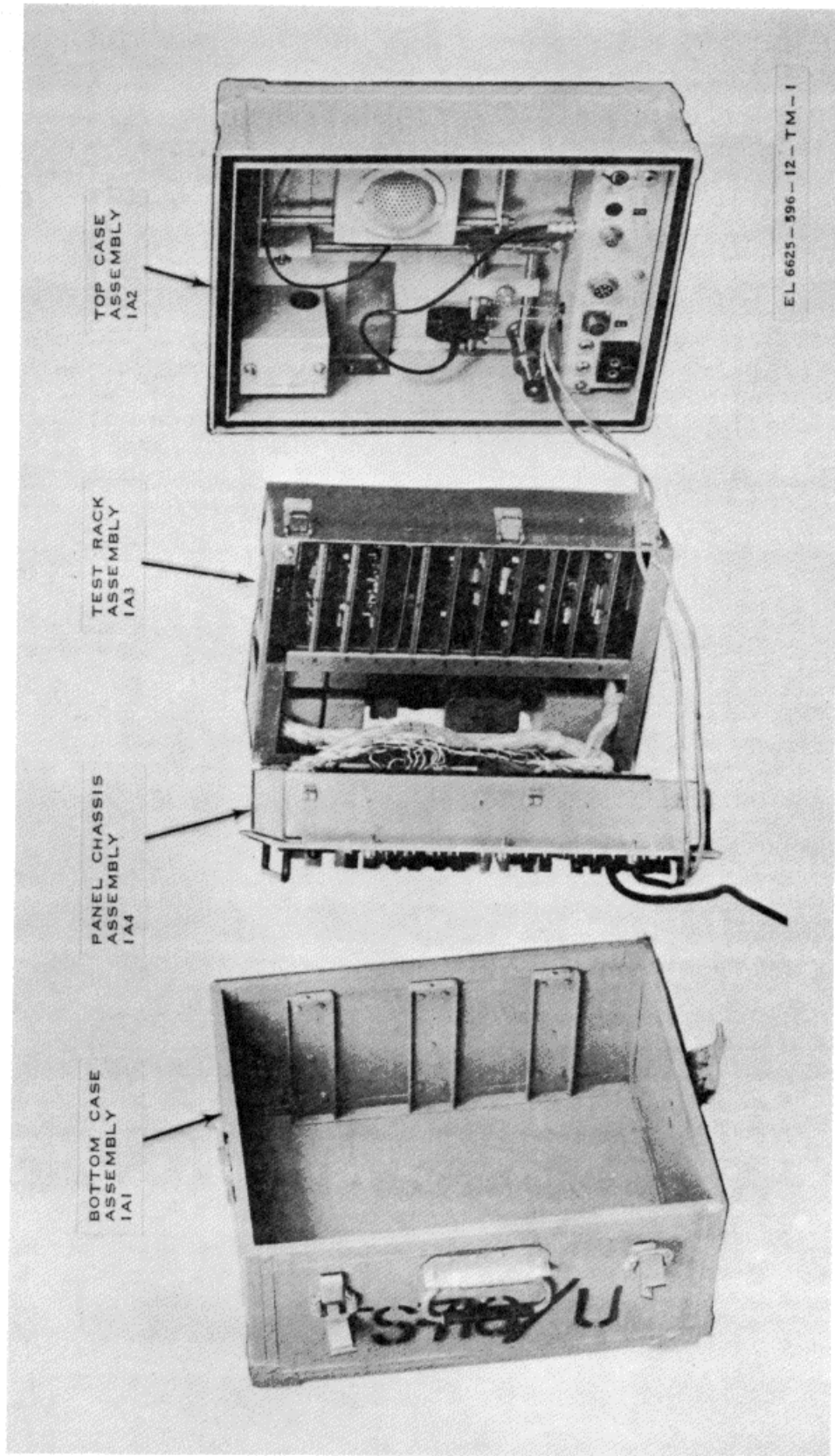


Figure 1-1. Telephone Test Set TS-716/U.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Telephone Test Set TS-716/U (fig. 1-1), hereafter referred to as the TS-716/U, and provides instructions for installation, operation, and operator and organizational maintenance. It includes instructions for operation under usual and unusual conditions, cleaning and inspection of the equipment, and replacement of parts available to the operator and organizational repairman.

b. Other publications pertaining to this equipment are listed in appendix A.

1-2. Indexes of Equipment Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are any new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to the latest issue of DA Pam 310-7 to determine whether there are modification work orders (MWO's) applicable to the equipment.

1-3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use the equipment forms and records in accordance with instructions in TM 38-750. b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army)/NAVSUP Pub 378 (Navy)/ AFR 71-4 (Air Force)/ and MCO P4030.29 (Marine Corps).

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) SF 316 as prescribed in AR 55-38 (Army)/NAVSUP Pub 459 (Navy)/AFM 75-34 (Air Force)/ and MCO P4610.19 (Marine Corps).

d. Reporting of Equipment Publication Improvements. The reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEILME-NMP-EM, Fort Monmouth, N.J., 07703,

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

Telephone Test Set TS-716/U is a portable, self-calibrating, multipurpose instrument used to test and evaluate on a *good-* or *bad-* basis the electrical and acoustical performance of sound transducers. Satisfactory operation of the item being tested is indicated when the meter pointer reads within a good scale reading in the test being performed or listed in the table applicable to the test in TB 11-6625-596-12/1. Any other meter reading indicates unsatisfactory operation of the equipment under test. All tests are evaluated on a good or bad basis, except the tests for ringers, hand generators, insulation resistance, and continuity. The TS-716/U performs the following tests:

- a. Transmit and receive efficiency tests of complete telephone sets.
- b. Speed and percent break of telephone dials.
- c. Test of line-level and click suppression varistors.
- d. Test of ringers.
- e. Test of telephone hand generators.
- f. Frequency response and sensitivity tests of earphones, carbon and dynamic microphones, sound-powered telephones, and special-purpose narrow-band transducers.
- g. Test of insulation resistance.
- H Continuity checks of circuit wiring.

1-5. Technical Characteristics

a. Electrical

Inputs:

- Telephone line..... Common battery.
- Common battery signal.
- Local battery.

- Earphone 15-, 125-, 300-, 1,000-, and 8,000-ohm loads.
- Microphone 4-, 20-, 40-, 100-, 150-, 1,000-, and 50,000-ohm loads.

Outputs:

- Continuity test terminals 6 volts ac open circuit.
- Telephone line terminals 24 volts dc (common battery-common battery signal only).
20 hertz up to 100 volts peak-to-peak for ringer and insulation resistance tests.
Test signal, white noise, +3 db, 100 to 8,000 hertz.
- Carbon microphone terminals 0-24 volts dc.
- Noise generator terminals Test signal, 0-8 volts rms, depending on setting of NOISE GENERATOR control, with 35-ohm load across terminals.
- Line-voltage input 115 or 230 volts, 60 hertz.
- Power consumption 35 watts

b. Acoustical.

Test microphone:

- Impedance 7 ohms.
- Sensitivity 7.5 Mv/dyne/cm²
- Frequency response 300 to 5,100 hertz ±3 db.

Test loudspeaker:

- Impedance 25 ohms.
- Sensitivity 90 db referred to 0.0002 dyne/cm² with 10 mw input at 1,000 hertz.

- Frequency response..... 300 to 5,100 hertz i3 db.
- Output..... 20 dynes/cm², with NOISE GENERATOR control adjusted for midscale deflection of meter.
- A',
- c. Physical
- Weight (including carrying case 85 pounds.
- Operating temperature range 32° to 160° F (0° to 55° C).

1-6. Components and Running Spares of Telephone Test Set TS-716/U

- a. Components. This equipment consists of the TS-716 only. The dimensions are 18 9/16 inches high by 14 11/16 inches wide by 15 3/8 inches deep.
- b. Running Spares. Refer to appendix B for the basic issue items list.

1-7. Description of TS-716/U
(fig. 1-1)

The TS-716/U is housed in a plastic waterproof carrying case. Bottom case assembly 1A1 contains test rack assembly 1A3 and panel chassis assembly 1A4. Assemblies 1A3 and 1A4 which contain the electronic circuitry, indicators and controls are physically connected by a piano hinge and electrically connected by laced, hard-wired cabling. Top case assembly 1A2 contains a test loud-speaker, a test microphone, electrical and mechanical coupling facilities, and a spare parts compartment.

1-8. Description of Assemblies

- a. Bottom Case Assembly 1A1 (fig 1-1). Assembly 1A1 (the bottom of the carrying case) is a plastic protective container for assemblies 1A3 (c below) and 1A4 (d below).
- b. Top Case Assembly 1A2. (fig 1-2) Assembly 1A2 (the top of the carrying case) contains the following items.
 - (1) Loudspeaker 1A2A2. Loudspeaker 1A2A2 is a permanent magnet test loudspeaker mounted in a metal case with a perforated metal

dome over its diaphragm. The test loudspeaker is movable on two support rods. The loudspeaker cable mates with connector 1A2A14J13 ((4), below).

(2) Spare Parts Assembly 1A2A3. Assembly 1A2A3 provides storage space for the spare fuses and lamps listed in appendix B. A three-contact receptacle which mates with the TS-716/U power plug is mounted on the cover of 1A2A3. When the TS-716/U is prepared for storage or shipment, the power plug is inserted in the receptacle to prevent movement of the power plug.

(3) Microphone Stand Assembly 1A2A4. Assembly 1A2A4 includes a test microphone and an acoustical coupler which are shown in figure 1-2 clamped for shipment or storage and are shown in figure 1-3 in the operating position. The test microphone is mounted on a support arm such that the microphone can be rotated 360° on the support arm. The support arm may be raised, lowered, or rotated on the coupler support bar as required. The microphone holding fixture can be moved horizontally on its support arm and, by means of a spring-loaded cylinder, can be moved vertically to exert pressure on any item that is to be held over the loudspeaker, microphone, or both (fig. 1-3). The test microphone cable mates with connector 1A2A14J12 ((4), below).

(4) Electrical Test Panel 1A2A14. Panel 1A2A14 contains various types of receptacles for connecting transducers to be tested, one receptacle for connecting the test microphone, and one receptacle for connecting the test loudspeaker. The following chart lists the reference designations of the 1A2A14 receptacles and indicates what each mates with. The location of the 1A2A14 receptacles is illustrated on figures 1-2 and 2-2.

Reference designation ^a	Mates with
J1	Carbon microphone plug.
J2	Microphone and earphone plug.
J3	Earphone plug.
J4	Microphone and earphone plug.
J5	Carbon microphone plug.
J6	Microphone and earphone plug.
J7	Dynamic microphone plug.
J8	Microphone and earphone plug.
J9	Dynamic microphone plug
J10	Dynamic microphone plug.
J11	Dynamic microphone plug.
J12	TS-716/U test microphone plug.
J13	TS-716/U test loudspeaker plug.

^aprefix reference designation with 1A2A14.

c. *Test Rack Assembly 1A3.* (fig. 1-4). Assembly 1A3 contains the TS716/U electronic circuitry including ten plug-in modules. Assembly 1A3 is permanently attached to panel chassis assembly 1A4 via a piano hinge and laced cabling.

d. *Panel Chassis Assembly 1A4.* (fig. 1-5). Assembly 1A4 contains the controls and indicators required for operation of the TS-716/U. The front panel also contains four fuses, 15 test terminals, and the power cable.

e. *Adapter Plate and Cables.*

(1) *Adaptor plate.* A 5" x 3 7/8" x 1/8" aluminum plate with a 7/8" diameter hole in the center is provided for testing Headset-Microphones

H-157A/AIC and H-182/PT and Headset, Electrical H-158/AIC.

(2) *Cables.* The following 36-inch cables are required for interconnecting the unit to be tested to the TS-716/U. The specific cable required for the unit to be tested is indicated in TB 11-6625-596-12/1.

Cable	Qty	Terminations	
		A	B
A	1	PJ-292.....	General Radio 274MB
B	1	Amphenol UG-89 ...	General Radio 274MB
C	1	PJ-292 connectors .	General Radio 274MB
D	1	JJ-065	General Radio 274MB
E	3	Alligator clips	General Radio 274MB
F	1	Cannon XLR-3-12C	General Radio 274MB
G	1	Banana plugs	Amphenol U-183/U
H	1	Amphenol U-78/U...	General Radio 274MB

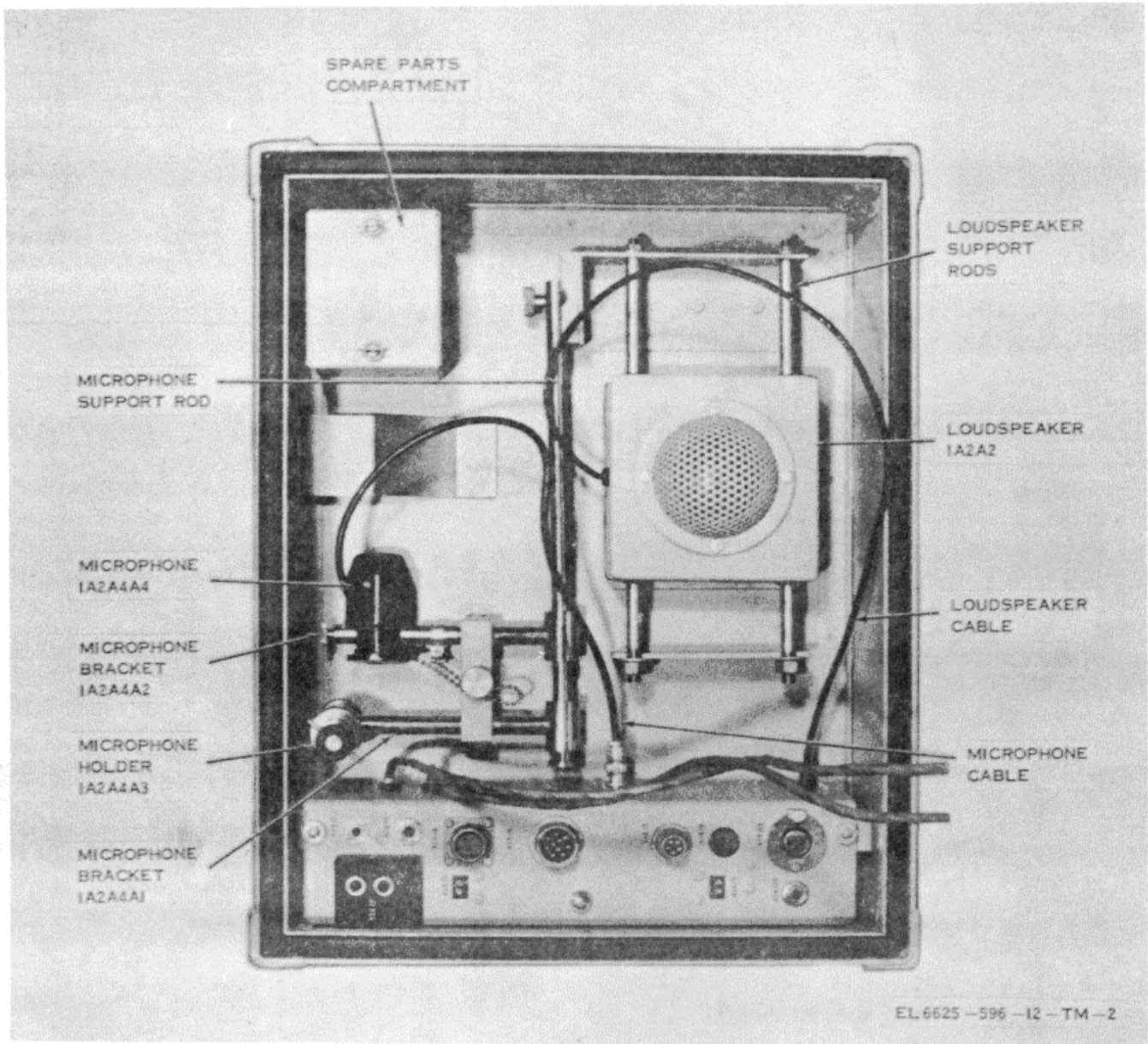


Figure 1-2. Top case assembly 1A2

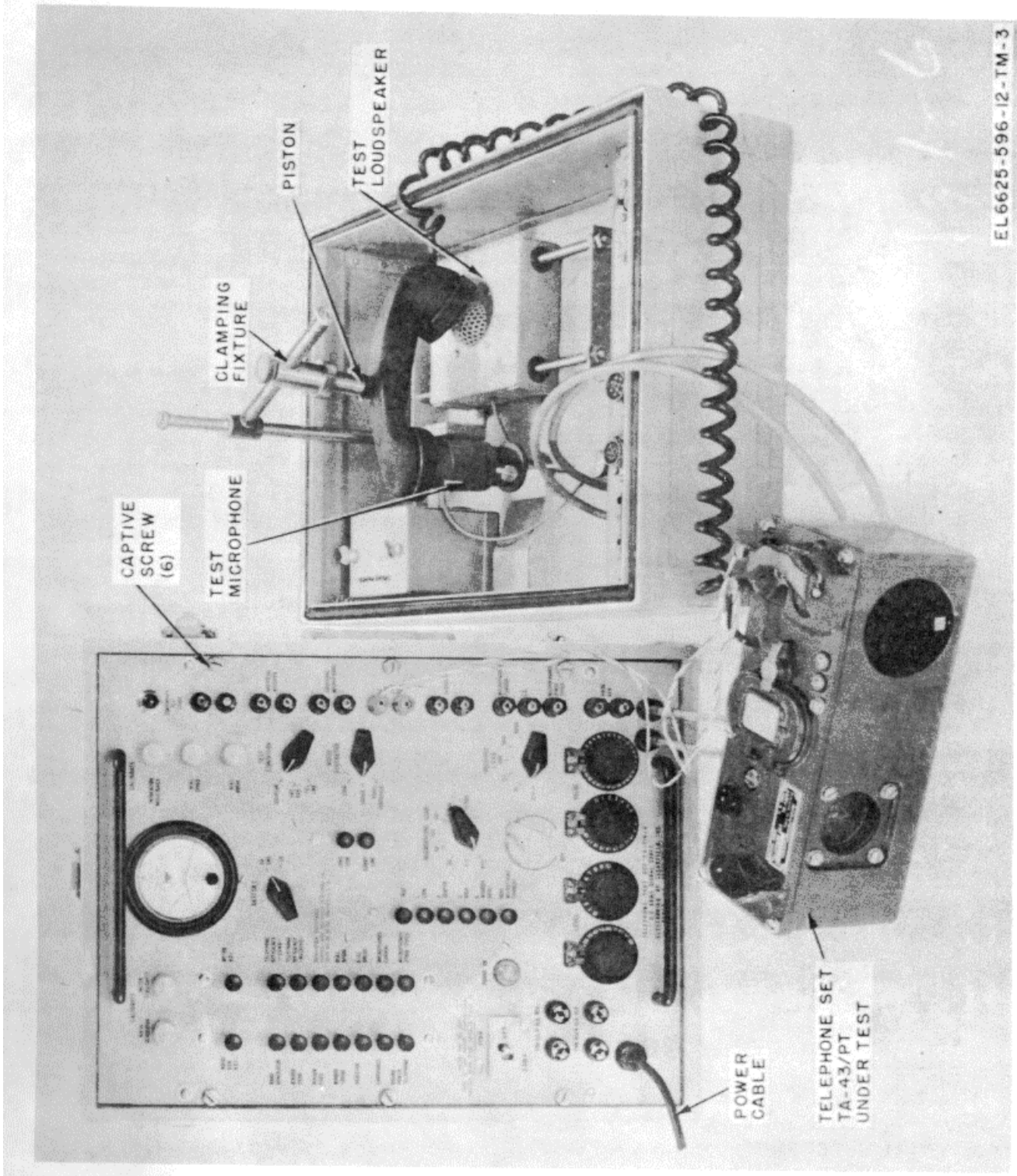


Figure 1-3. Telephone test set TS-716/U, typical test setup.

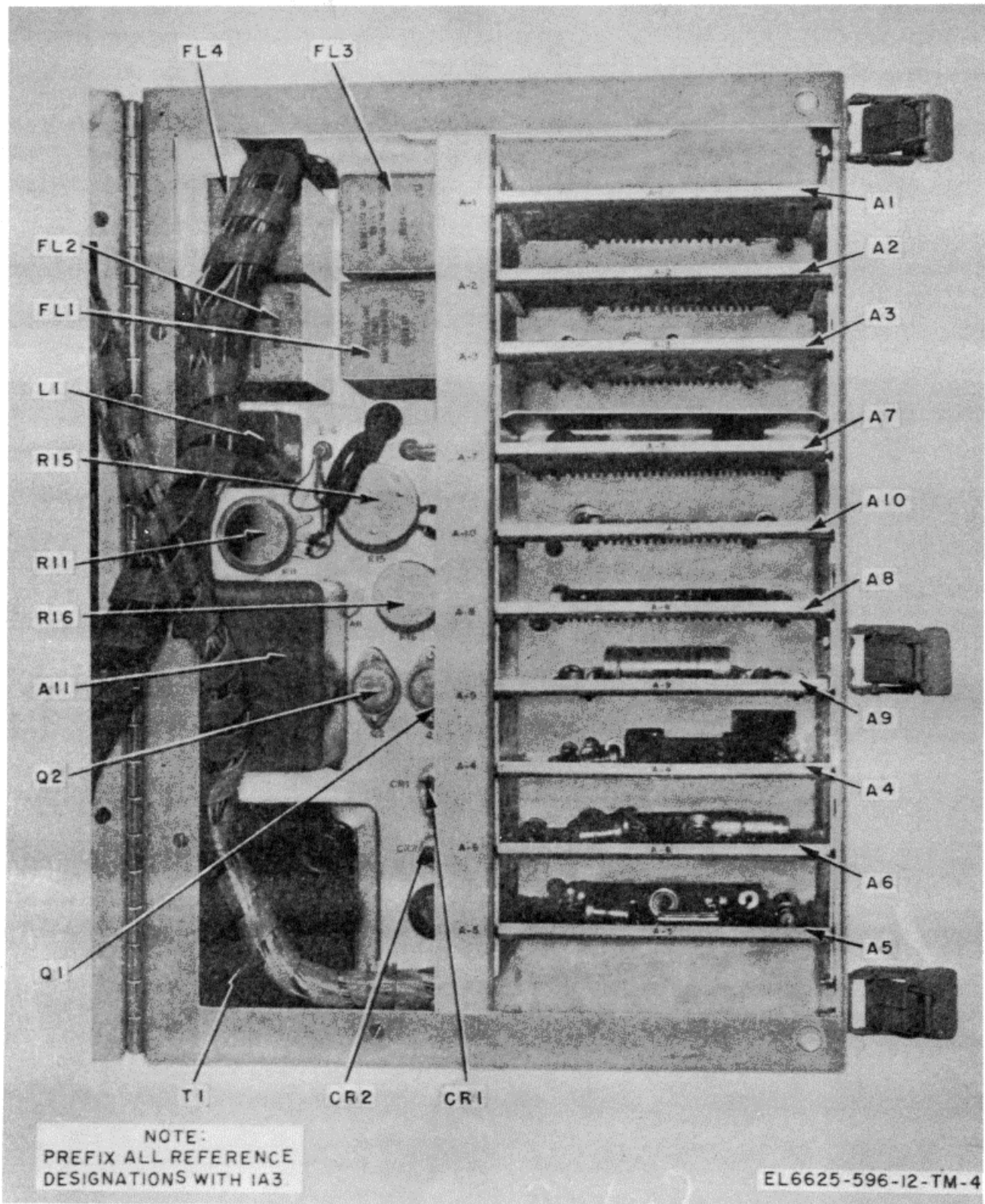


Figure 1-4. Test rack assembly 1A3, front view.

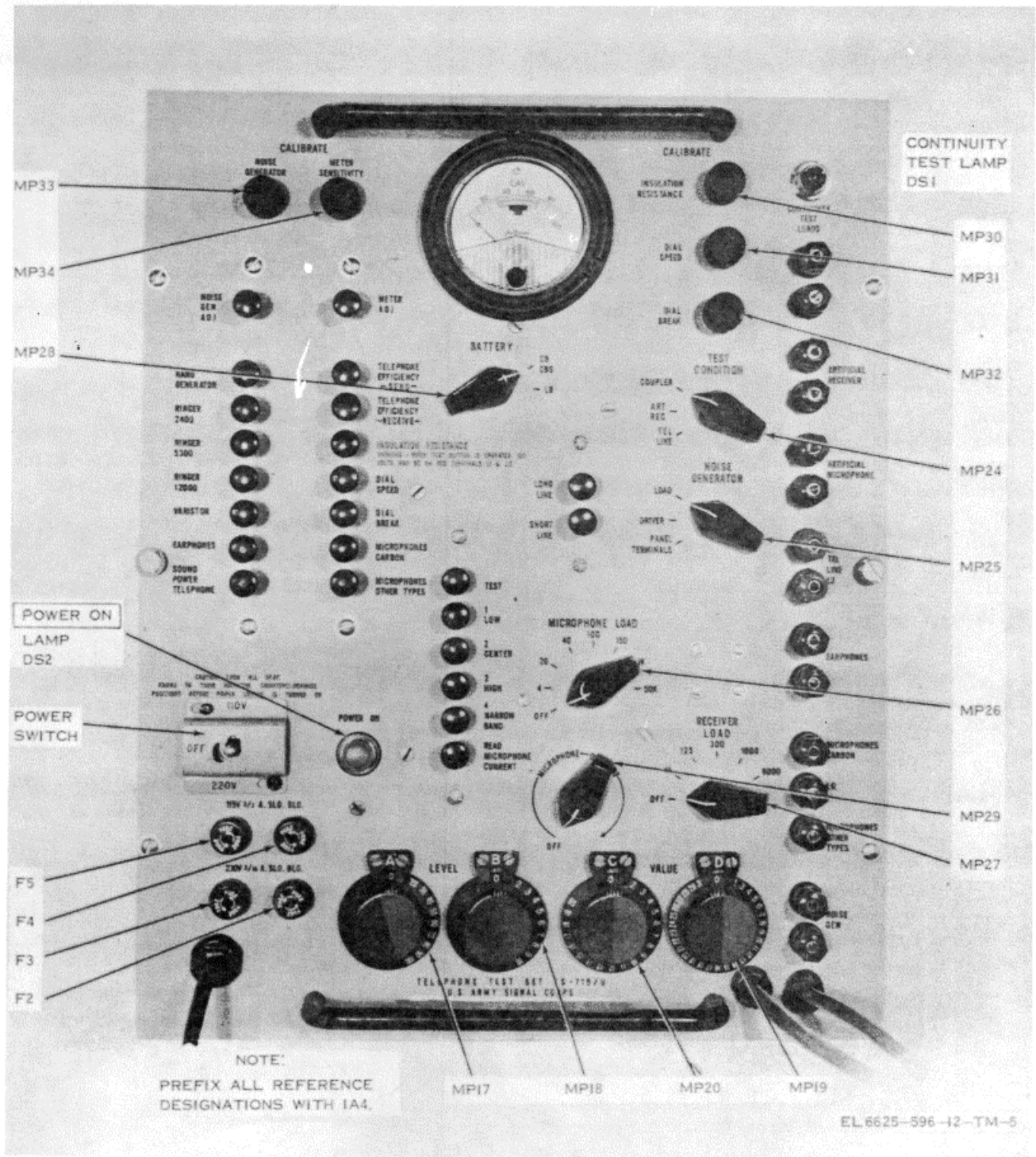


Figure 1-5. Panel chassis assembly 1A4, front view

**CHAPTER 2
OPERATION**

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Unpacking

a. *Packaging Data.* The TS-716 is packaged in two shipping boxes. The first box contains the test set and the second box contains an adaptor and cables required to connect the equipment under test to the test set. A typical shipping box is illustrated in figure 2-1.

(1) *Box 1.* The test set is placed in a corrugated carton and packed in a wooden shipping box. The dimensions, volume, and weight of box 1 are as follows:

Content	Dimensions (in)	Volume Weight	
		(cu ft)	(lb)
Telephone Test Set TS-716/U	18 1/8 x 23 1/2 x 18 3/4	4.6	106

(2) *Box 2.* The adaptor plate and ten cables are packed in a corrugated carton and placed in a wooden shipping box.

b. *Removing Contents.*

- (1) Cut and fold back the metal straps.

CAUTION

Do not attempt to pry off the top and sides; equipment damage may result.

(2) Remove the nails from the top and one side of the box with a nailpuller. Remove the top and side.

- (3) Remove the carton from the wooden box.

(4) Open the carton. Be careful when cutting through the sealing tape; cut only to the depth needed to sever it.

- (5) Remove the envelopes that contain the manuals.

- (6) Remove the pads.

- (7) Remove the equipment.

2-2. Checking Unpacked Equipment

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6 (para 1-3b).

b. See that the equipment is complete as listed on the packing slip. If a packing slip is not available, check the equipment against the basic issue items list (app B). Report all discrepancies in accordance with TM 38750. Shortage of a minor assembly or part that does not affect proper functioning of the equipment should not prevent use of the equipment.

c. If the equipment has been used or reconditioned, see whether it has been changed by a modification work order (MWO). If the equipment has been modified, the MWO number will appear on the front panel, near the nomenclature plate. See that any operational instruction changes resulting from the modification have been entered in the equipment manual.

d. Remove the chassis from the transit case to check for damage.

- (1) Remove the powerline plug from the clip on the side of the spare parts compartment (fig. 1-2).

- (2) If the loudspeaker and microphone cables (fig. 1-2) are connected, remove them from jacks 1A2A14J12 and J13 (fig. 2-2).

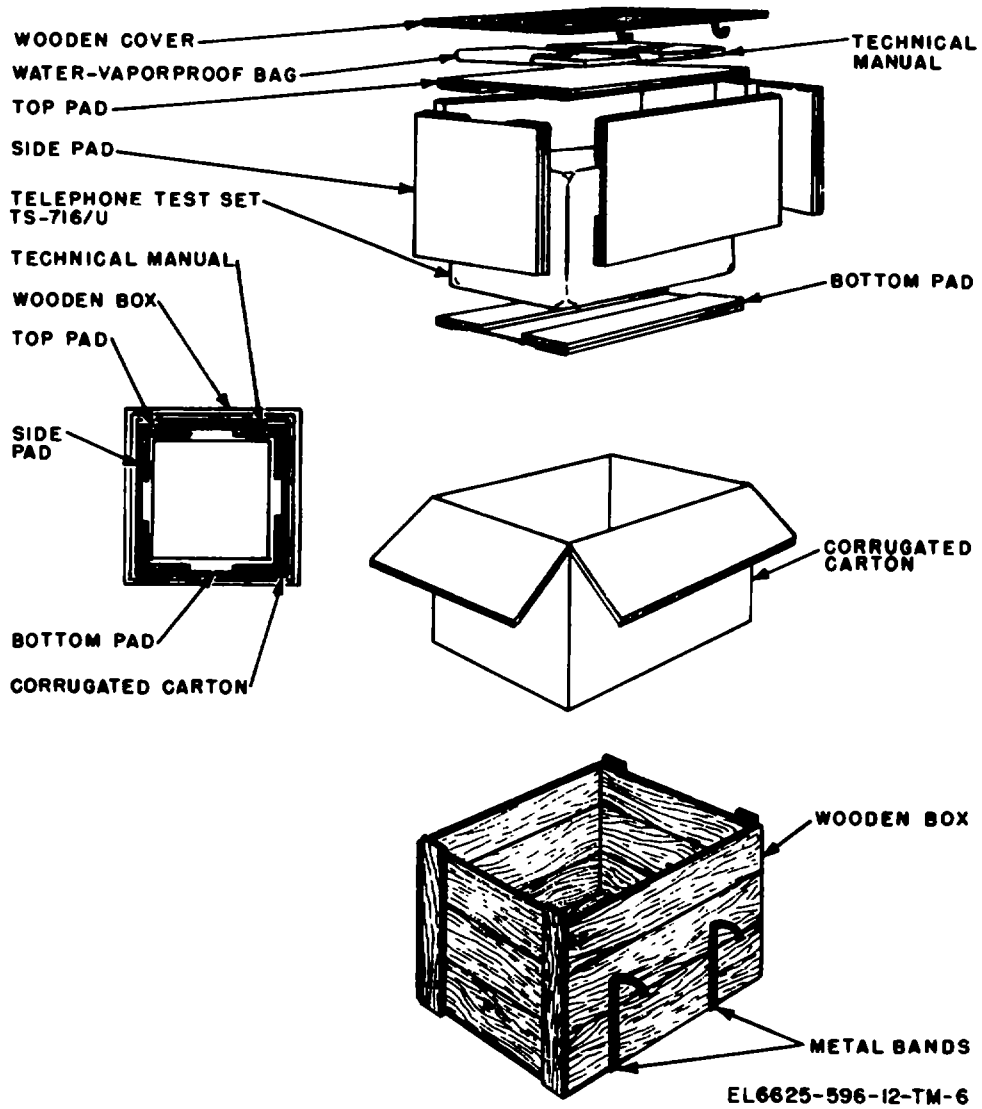


Figure 2-1. Packaging of Telephone Test Set TS-716/U.

(3) Remove the three captive screws (fig. 1-2) that secure electrical test panel 1A2A14 to top case assemble 1A2 and lift out 1A2A14.

(4) Remote the six captive screws (fig. 1-3) that hold test rack assembly 1A3 and panel chassis assembly 1A4 in bottom case assembly 1A1. Lift the dual chassis by the two handles on panel chassis assembly 1A4 and remove the dual chassis from bottom case assembly 1A1.

(5) Unlock the three quick disconnect latches on the side of the dual chassis as shown in figure 1-1. Inspect all wiring for breaks or abrasion. Check the actuation of the pushbutton and rotary switches on panel chassis assembly 1A4. Insure that assemblies 1A3A1 through 1A3A10 (fig. 1-4) are properly seated in their sockets in test rack assembly 1A3.

2-3. Tools and Test Equipment Required for Installation

a. *Tools.* The TS-716/U is completely portable. No tools are required for installation.

b. *Test Equipment.* The TS-716/U has been calibrated, and settings have been sealed at the factory. Installation testing is not required before use.

2-4. Installation of Fuses

The TS-716/U is shipped with the fuses installed. See that the fuses installed in each fuseholder are of the values given adjacent to the fuseholder and as listed in the chart below.

CAUTION

Use only fuses of the correct value when replacing a fuse. Overfusing can result in damage to the equipment.

Reference designation	Fuse		Location	Circuit protected
	Rating			
	Current	Voltage		
A3FI	1/16 amp (slow blow)	250 (fig 4-1)	Test rack assembly 1A3	20ertz inverter
1A4F2 and F3	3/16 amp (slow blow)	250 (fig 1-5).	Panel chassis assembly 1A4	230volt ac input
A4F4sand F5	3/8 amp (slow blow)	250 (fig 1-5).	Panel chassis assembly 1A4	11-volt ac input

2-5. Connections

a. Close the dual chassis assembly (1A3 and 1A4. fig. 1-1), lock the three quick disconnect latches and insert the dual chassis in bottom case assembly,1A1.

b. Insert electrical test panel 1A2A14 in top case assembly 1A2.

c. Connect the test microphone cable to 1A2A14J12 and the test loudspeaker cable to 1A2414J.13 (figs. 2-2).

d. Determine the input line voltage available. Place the power switch in the OFF position. If the test set is to be operated from a 115-volt ac line, loosen the two screws that hold the guardplate over the power switch and move the guardplate all the way to ,the left To use the test, set on a 230,volt ac line move the switch guardplate all the way to the right. Tighten the two screws that-hold the switchplate.

e. The cables that attach electrical test panel 1A2A14 to panel chassis assembly front panel 1A4 are permanently installed; do not attempt to remove them.

f. The connector on the power supply cable is adapted for a grounding connection in the receptacle of the power source. If a grounding connection is not available, the grounding contact should be removed from the power plug by removal of the two screws through the cable clamp. Reverse the contact, so that it projects back along the incoming cable. Replace the two screws through "the ground and into the cable clamp, and tighten 'them.

2-6. Adjustments

The front panel calibrations are performed by the operator as part of the normal 'operational procedure and are described' in T-B 11-6625-596-12/1.

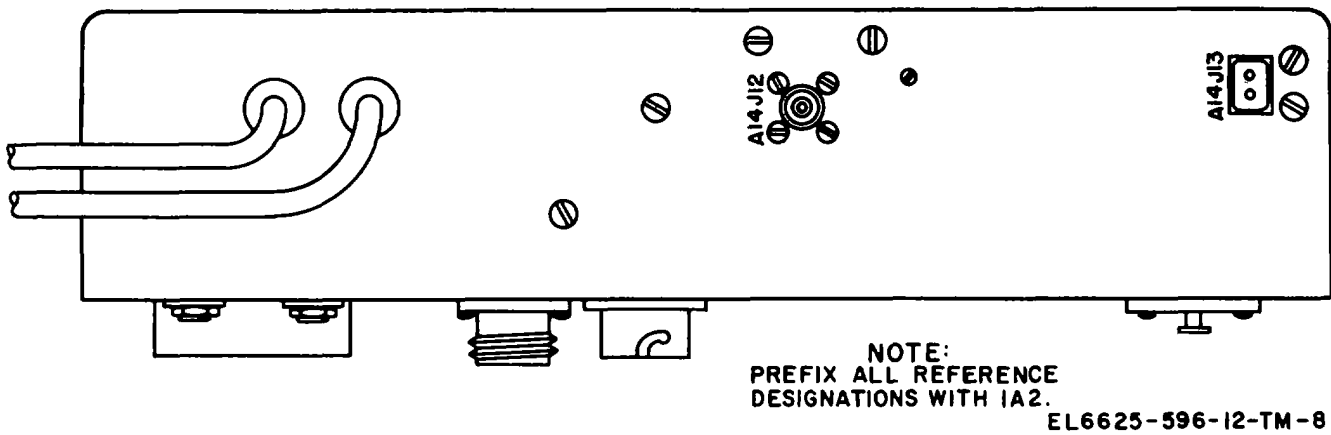


Figure 2-2. Electrical test panel 1A2A14, top view.

Section II. OPERATOR'S CONTROLS AND INDICATORS

2-7. Damage From Improper Settings

(fig. 5-1)

CAUTION

Before applying power to Telephone Test Set TS-716/U, set the front panel controls to the positions indicated below. This will prevent the possibility of overloading the panel meter and damaging the transistor power amplifier.

a. The guardplate on the power switch must be correctly positioned as described in paragraph 2-5. Connecting the TS-716/U to the incorrect line voltage may cause damage to the power transformer.

b. The preliminary control settings are as follows:

Control or switch	Setting
Power	OFF
NOISE GEN ADJ.....	Depressed
CALIBRATE:	
NOISE GENERATOR.....	Fully ccw ^a
METER SENSITIVITY	Fully cw
INSULATION RESISTANCE	Fully ccw
DIAL SPEED	Fully ccw
DIAL BREAK	Fully ccw
NOISE GENERATOR	LOAD
TEST CONDITION	COUPLER
MICROPHONE LOAD.....	OFF
RECEIVER LOAD	OFF
MICROPHONE CURRENT	OFF

^aCounterclockwise

2-8. Telephone Test Set TS-716/U

Operating Controls and Indicators

(fig. 5-1)

a. The pushbutton switches on the left side of the front panel, consisting of two vertical rows of eight buttons each, are of the interlocking type. Fully depressing any button of this switch causes that switch section to lock in its depressed position and automatically releases any other button, in either row, that has been previously depressed. Thus, no two buttons can be simultaneously locked in the depressed position. If it is required that all buttons of these switches be in their released positions, this may be achieved by partially depressing any button in either row that is not depressed. Upon release, both it and the button that was locked in the depressed position will be released.

b. The pushbutton switches located near the center of the panel consist of six buttons in a vertical row and another vertical group of two buttons, of momentary action switches which must be held in the depressed position when they are in use.

c. The operating controls, indicators, and fuses, as well as their functions, are listed in the following chart.

Control, indicator, or fuse	Function
Power switch	Connects TS-716/U to either 115- or 230-volt ac line, depending on position
POWER ON lamp	of switch guardplate In center position, turns TS-716/U off.
Function buttons:	Lights when power switch is in the on position.
NOISE GEN ADJ	16 pushbutton switches, used to set up tests for various sound transducers. Connects output of power amplifier through voltage divider and rectifier network to panel meter Used with NOISE GENERATOR CALIBRATE control.
HAND GENERATOR	Connects TS-716/U to test output of hand generator connected to TEL LINE E terminals L1 and L2.
RINGER 2400	Connects TS-716/U to supply minimum 20-hertz operating current to 2,400-ohm ringer connected to TEL LINE terminals L1 and L2.
RINGER 12000	Connects TS-716/U to supply minimum 20-hertz operating current to 5,300-ohm ringer connected to TEL LINE terminals L1 and L2.
VARISTOR	Connects TS-716/U to supply minimum 20-hertz operating current to 12,000-ohm ringer connected to TEL LINE terminals L1 and L2. connected to ARTIFICIAL RECEIVER terminals Used with LONG LINE and SHORT LINE switches, METER SENSITIVITY control, and VALUE
EARPHONES	Connects TS-716/U to measure efficiency of click suppression varistors controls C and D. Connects TS-716/U for frequency response and sensitivity checks of earphones connected to EARPHONES terminal or appropriate connector
SOUND POWER TELEPHONE switch	on panelboard IA2A14 Used with RECEIVER LOAD switch.
METER ADJ	Connects TS-716/U to check sensitivity of sound-powered telephones Used with test microphone, test loudspeaker, and LEVEL controls A and B. Applies calibrated signal from power amplifier to input of meter amplifier. Used with METER SENSITIVITY CALIBRATE control to set gain of
TELEPHONE EFFICIENCY-SEND and TELEPHONE EFFICIENCY-RECEIVE	meter amplifier Connects TS-716/U for efficiency tests.
INSULATION RESISTANCE	Connects TS-716/U to test insulation resistance of equipment connected between TEL LINE terminals L1 and L2 INSULATION RESISTANCE control is used to set meter pointer to calibrate mark Depressing TEST switch then indicates whether insulation resistance is greater or less than 1
DIAL SPEED	megohm. Connects TS-716/U to measure speed of telephone dial connected to TEL LINE terminals L1 and L2 DIAL SPEED control is used to set meter a pointer to calibrate mark TEST switch is depressed and dial is operated.
DIAL BREAK	Meter indicates whether dial speed is within specifications Connects TS-716/U to measure ratio of make time to break time of dial switch contacts connected to TEL LINE terminals L1 and L2 DIAL BREAK control is used to set meter pointer to calibrate mark When TEST switch is depressed and dial is operated, meter indicates whether ratio of
MICROPHONES CARBON	make-to-break time is within specifications. Connects TS-716/U to test frequency response and sensitivity of carbon microphones connected to MICROPHONES CARBON terminal or to appropriate panelboard connector Connects these terminals to a 24-volt de bias supply; used with MICROPHONE LOAD switch and MICRO-
MICROPHONES OTHER TYPE	Connects TS-716/U for frequency response and sensitivity tests of all types of microphones that do not require a de bias current Used with MICRO-
BATTERY switch	PHONE LOAD switch. Sets up TS-716/U to check cb, ^a cbs, ^b or lb ^c types of telephones At CB-CBS, connects 24-volt dc microphone bias supply to TEL LINE terminals L1
Meter	and L2 during telephone efficiency and varistor test Provides good-bad indication for equipment under test; graduated from 0 to 100 microamperes de
CALIBRATE controls:	Calibrate position for all tests is indicated by red mark and letters CAL at midscale. Used to set meter pointer to midscale (CAL) position when corresponding function button is depressed.

See footnotes at end of table.

Control indicator, or fuse	Function
NOISE GENERATOR	
METER SENSITIVITY	
INSULATION RESISTANCE	
DIAL SPEED	
DIAL BREAK	
TEST button.....	When depressed, changes mode of operation from <i>calibrate to test</i> . Used with DIAL SPEED, DIAL BREAK, INSULATION RESISTANCE, and HAND GENERATOR switches.
.....	
Filter buttons:	Connect bandpass filters between microphone preamplifier output and meter amplifier input for frequency response measurements. Used with EARPHONES, MICROPHONES CARBON, MICROPHONES OTHER TYPES, and SOUND POWER TELEPHONE switches.
.....	Filter frequencies
1 LOW.	1 LOW 300 to 1,100 Hertz
2 CENTER	2 CENTER..... 1,100 to 2,200 Hertz
3 HIGH	3 HIGH 2,200 to 5,100 Hertz
4 NARROW BAND	4 NARROW BAND 97 to 1,02 Hertz
READ MICROPHONE CURRENT button.....	When depressed together with MICROPHONES CARBON button, panel meter indicates bias current to microphone (meter reading is arbitrary and not true current) in amperes
MICROPHONE CURRENT control	Varies de bias current to carbon microphone connected to MICROPHONES CARBON or to panelboard connectors for test.
TEST CONDITION switch	Depending on test being performed, connects measuring circuitry to:
.....	<i>Position</i> <i>Connected to</i>
	COUPLER..... Coupler.
	ART REC..... ARTIFICIAL RECEIVER terminals.
	TEL LINE..... TEL LINE terminals.
NOISE GENERATOR switch	
	Connects output of power amplifier to:
	<i>Position</i> <i>Connected to</i>
	LOAD Resistive load.
	DRIVER..... Test loudspeaker.
	PANEL TERMINALS NOISE GEN panel terminals
RECEIVER LOAD switch.	Selects resistive pad that most nearly matches impedance of earphone being tested.
MICROPHONE LOAD switch.....	Selects tap on input transformer that most nearly matches impedance of microphone being tested.
LONG LINE and SHORT LINE	Simulates long-line and short-line load conditions for telephone to TEL LINE
buttons.	Continuity test lamp terminal L1 and L2. Used in telephone efficiency and varistor tests.
	Lights when resistance less than 10 ohms is placed between CONTINUITY TEST LEADS terminals.
LEVEL controls A and B	Attenuates output of microphone preamplifier before it reaches meter amplifier.
.....	Further attenuates output of microphone preamplifier after it has passed through filters. Attenuator C follows output of center bandpass filter, while attenuator D attenuates output of high bandpass filter. Used primarily to determine frequency response of transducers. Also used in telephone efficiency and varistor tests.
VALUE controls C and D	
11V 318 A. SLO. BLO. fuses	Powerline fuses. Protect equipment from damage caused by short circuits.
230V 3/16 A. SLO. BLO. fuses	Powerline fuses. Protect equipment from damage caused by short circuits.
1/16 amp slo-blo fuse	20-hertz inverter circuit fuse. Protects 20-hertz inverter from damage.
(1A3FI, fuse. 4-1).....	
a. Common battery	
b Common-battery signal.	
c. Local battery.	

Section III. OPERATION OF TELEPHONE TEST SET TS-716/U

2-9. Types of Operation

The test set may be used to perform eight different basic types of tests, as described in paragraph 1-4. Frequently several different tests will be performed on one piece of equipment such as a telephone station set

2-10. Operating Procedure

a. Equipment Starting Procedure. To insure starting of the TS-716/U without damage to any of its components, adhere rigidly to the following procedure:

(1) Connection checks. Make all connections given in paragraph 2-5:

(2) Preliminary settings.

Control	Setting
Power switch	OFF
NOISE GEN ADJ	Depressed
CALIBRATE:	
NOISE GENERATOR .	Fully ccw
METER SENSITIVITY. .	Fully ccw
INSULATION RESISTANCE	Fully ccw
DIAL SPEED	Fully ccw
DIAL BREAK	Fully ccw
NOISE GENERATOR	LOAD
TEST CONDITION	COUPLER
MICROPHONE LOAD	OFF
RECEIVER LOAD	OFF
MICROPHONE CURRENT	OFF
LEVEL A, B,	Any
VALUE C, D,	Any

(3) Starting operations

(a) Turn the power switch on and allow 30 minutes for the equipment to warm up.

(b) Adjust the NOISE GENERATOR CALIBRATE, control until the panel meter pointer moves to the CAL position (red mark at midscale)

NOTE

The panel meter pointer will normally fluctuate slightly. Set the calibrate control so that the pointer swings equally to the left and right of the red CAL line.

(c) Depress the METER ADJ button. Adjust the METER SENSITIVITY CALIBRATE, control until the panel meter pointer again reads on the red midscale line.

(d) Set up the coupler with the test microphone directly over and touching the screen of the test loudspeaker. Turn the NOISE GENERATOR switch to DRIVER. Readjust the METER SENSITIVITY CALIBRATE, control until the panel meter pointer reads on the red midscale line.

(e) Depress the EARPHONES button.

(f) Set the LEVEL and VALUE controls as follows;

A.....	10
B.....	8
C.....	6
D.....	9

(g) Push the 1 LOW, the 2 CENTER, and the 3 HIGH buttons. In each case the panel meter pointer should read in the green region; if it does not, the equipment is not operating properly.

NOTE

If an abnormal indication is obtained during the starting procedure or the tests, refer to the troubleshooting chart (para 4-5) for corrective measures.

b. Control Settings and Operating Pushbutton Switches.

(1) Locate the type of test to be made or the type of equipment to be tested in TB 11-6625-596-12/1.

(2) Set the front panel controls as indicated in TB 11-6625-596-12/1 for the test selected. *For example*, to test a dynamic microphone (ME -30/U), refer to the pertinent paragraph and table in TB 11-6625-596-12/1. The front panel meter and controls are adjusted to the positions listed in (a) below, and the pushbutton switches are depressed as instructed. The pertinent table in TB 11-6625-596-12/1 gives the settings for testing Microphone, Dynamic ME-30/U as shown in (b) below.

(a) Preliminary control settings.

<i>Control</i>	<i>Setting</i>
TEST CONDITION.....	ART REC
NOISE GENERATOR	DRIVER
MICROPHONES OTHER TYPES.....	Depressed

(b) Specific control settings.

<i>Control</i>	<i>Setting</i>
MICROPHONE LOAD.....	160
LEVEL A control	20
LEVEL B control	4
VALUE C control	12
VALUE D control	16

NOTES

1. The other columns in TB 11-6625 596-12/1 give what are considered good scale readings for this microphone in each of the three frequency bands.
2. When the test procedure does not specify a setting for one or more of the controls, these controls are assumed to be in the positions given for them under the starting procedure (para 2-10a(2)).
- (3) Pushbutton switch operation is explained in paragraph 2-8.

2-11. Efficiency Tests of Complete Telephone Sets

This group of four tests checks the sending and receiving efficiency of telephone sets. *Telephone*

efficiency send and *telephone efficiency receive* acoustical tests should be performed on all telephones.

NOTE

All tables referenced below are found m TB 11-6625-596-12/1.

a. Telephone Efficiency Send-Electrical Test. Perform the starting procedures (para 2-10a). Set the front panel controls as instructed in TB 11-6625-596-12/1. The panel meter pointer should read at midscale; if it does not, adjust the METER SENSITIVITY CALIBRATE, control to bring the meter pointer to the red midscale line. Remove the transmitter and the receiver from the hand-set. Connect the ARTIFICIAL MICROPHONE terminals of the TS-716/U to the telephone handset wires that have been removed from the transmitter. Connect the ARTIFICIAL RECEIVER terminals of the TS-716/U to the telephone handset wires removed from the receiver. Connect TEL LINE terminals L1 and L2 to the corresponding terminals on the telephone handset. The first step of the test is to depress the LONG LINE button. Good panel meter indications for various telephone units are listed in the pertinent table. The second step is to reset the TEST CONDITION switch to ART REC. The VALUE C control is reset as listed in the pertinent table for this new setting of the TEST CONDITION switch. Depress the LONG LINE button. Good scale readings for the same telephone units are listed in the pertinent table. Perform the stopping procedure (para. 2-19).

b. Telephone Efficiency Receive-Electrical Test. Perform the starting procedures (para 2-10a). Set the front panel controls as listed in TB 11-6625-596-12/1. The panel meter pointer should read at midscale; if it does not, adjust the METER SENSITIVITY control to bring the meter pointer to the red midscale line. Remove the receiver from the telephone handset. The transmitter should be left connected to the handset. Connect the ARTIFICIAL RECEIVE terminals of the TS-716/U to the telephone handset wires that have been removed from the receiver. Connect TEL LINE terminals L1 and L2 to the corresponding \parterminal on the telephone set. To test, depress the LONG LINE button. Good scale readings are given in the pertinent table in TB 11-6625-596-12/1. Perform the stopping procedure (para 2-19).

c. Telephone Efficiency Send-Acoustical Test.

Perform the starting procedures (para 2-10a). Set the front panel controls as listed in TB 11-6625-596-12/1. The panel meter pointer should read at-midscale; if it does not, adjust the METER SENSITIVITY CALIBRATE, control to bring the pointer to the red midscale line. Place the telex phone handset in the coupler (fig. 1-3). The receiver must fit squarely over the test microphone, and the transmitter over the test loudspeaker. *Be sure to tape the handset switch to on while testing.* Connect TEL LINE terminals L1 and L2 to the corresponding terminals on the telephone set. For the first test, depress the LONG LINE button. Good scale readings are given in the pertinent table in TB 11-6625-596-12/1. For the second part of this test, the TEST CONDITION switch is set at TEL LINE, and VALUE C control as listed in the pertinent table. Depress the LONG LINE button. Good scale readings are listed in the table in TB 11-6625-596-12/1. Perform the stopping procedure (para 2-19).

d. Telephone Efficiency Receive-Electrical In-put, Acoustical Readout.

Perform the starting procedure (para 2-10a). Set the front panel controls as listed in TB 11-6625-596-12/1. The panel meter pointer should read at midscale; if it does not, adjust the METER SENSITIVITY CALIBRATE, control to bring the pointer to the red midscale line. Place the telephone handset in the coupler (fig. 1-3). The receiver must fit squarely over the test microphone, and the transmitter over the test loudspeaker. *Tape the handset switch to on while testing.* Connect TEL LINE terminals L1 and L2 to the corresponding terminals on the telephone set. To test, depress the LONG LINE button. Good scale readings are listed in the pertinent table. Perform the stopping procedure (par 2-19).

2-12. Telephone Dial Tests

a. Dual Speed Test. Perform the starting procedure (para 2-10a). Depress the DIAL SPEED switch. Adjust the DIAL SPEED CALIBRATE, control until the panel meter pointer reads on the red midscale line. If a dial has been installed in a telephone set, connect TEL LINE terminals L1 and L2 to the corresponding terminals of the telephone set, and lift the handset off the cradle switch. Connect TEL LINE terminals L1 and L2 to the dial. To test, depress the TEST button and, with the free hand, dial the number 0 (operator). The

panel meter pointer should read between 40 and 60. Performing the stopping procedure (para 2-19).

b. Dial Percent Break Test. Perform the starting procedure (para 2-10a). Depress the DIAL BREAK button. Adjust the DIAL BREAK CALIBRATE control until the panel meter pointer reads on the red midscale line. If a dial has been installed in a telephone set, connect TEL LINE terminals, L1 and L2 to the corresponding terminals on the telephone set, and lift the handset off the cradle switch, Connect TEL LINE terminals L1 and L2 to the dial. To test, depress the TEST button and, with the free hand, dial 0 (operator). The panel meter pointer should read between 40 and 60. Perform the stopping procedure (para 2-19). 2-13. Line-Level and Click Suppression Varistor Tests

2-13. Line-Level and click suppression varistor test

a. Click Suppression Varistor Test. Perform the starting procedures (para 2-10a). Set the front panel controls as listed in TB 11-6625-596-12/1. Remove the varistor from the telephone set and connect it to the ARTIFICIAL RECEIVER terminals. Press the LONG LINE button and adjust the METER SENSITIVITY CALIBRATE, control so that the panel meter pointer reads on the red midscale line. To test, depress the SHORT LINE button. The panel meter pointer should read on the green scale. Perform the stopping procedures (para 2-19).

b. Transmit Varistor Test. Perform the starting procedures (para 2-10a). Set the front panel controls as listed in TB 11-6625-596-12/1. Remove the transmitter and receiver from the telephone handset. Connect the ARTIFICIAL RECEIVER terminals to the telephone handset wires that have been removed from the receiver. Connect the ARTIFICIAL MICROPHONE terminals to the telephone handset wires that have been removed from the transmitter. Connect TEL LINE terminals L1 and L2 to the corresponding terminals on the telephone set. Depress the LONG LINE button and adjust the METER SENSITIVITY CALIBRATE, control until the panel meter pointer reads on the red midscale fine. For the first part of the test, depress tn SHORT-LINE button. The panel meter pointer should read on the green scale. Next, set the TEST COINDITION switch to ART REC, and VALUI controls C and D to the values given in the table in TB 11-6625-596-12/1 pertinent for this setting of the TEST CONDITION switch. Depress the LONG LINE button and adjust the METER SENSITIVITY CALIBRATE, control so that the

panel meter pointer reads on the red midscale line. The second part of the test is to depress the SHORT LINE button. The panel meter pointer should read between 40 and 60. Perform the stopping procedure (para 2-19).

c. *Receive Varistor Test.* Perform the starting procedure (para 2-10a). Set the front panel controls as listed in TB 11-6625-596-12/1. Remove the receiver from the telephone handset. Leave the transmitter connected in the handset. Connect the ARTIFICIAL RECEIVER terminals to the telephone handset wires that have been removed from the receiver. Connect TEL LINE terminals L1 and L2 to the corresponding terminals on the telephone set. Depress the LONG LINE button and adjust the METER SENSITIVITY CALIBRATE control so that the panel meter pointer reads on the red midscale line. To test, depress the SHORT LINE button. The panel meter pointer should read on the green scale. Perform the stopping procedure (para 2-19).

2-14. Ringer Tests

Perform the starting procedure (para 2-10a). Connect TEL LINE terminals L1 and L2 to the ringer. If the ringer is installed in a telephone set, connect TEL LINE terminals L1 and L2 to the corresponding terminals of the telephone set. Depress the proper RINGER button (2400, 5300, or 12000) according to the instructions in TB 11-662-596-12/1 or in the technical manual of the telephone set. The ringer should ring with satisfactory loudness. Perform the stopping procedure (para 2-19).

2-15. Telephone Hand Generator Test

Perform the starting procedures (para 2-10a). Depress the HAND GENERATOR button. The panel meter pointer should read 0. Connect TEL LINE terminals L1 and L2 to the generator. If a generator is installed in a telephone set, connect TEL LINE terminals L1 and L2 to the corresponding terminals of the telephone set. Crank the generator at approximately 200 revolutions per minute (normal rate). The *panel* meter pointer should read 30 or above. For Hand Generator TA-1/PT, depress the HANP GENERATOR button and make the connections as given above; then depress the TEST button and squeeze the hand generator handle at the normal rate. The panel meter pointer should read 30 or above. Perform the stopping procedure (para 2-19).

2-16. Frequency Response and Sensitivity Tests

a. *Dynamic Microphones.* Perform the starting procedures (para 2-10a). Set the front panel controls as listed in TB 11-6625-596-12/1. The panel meter pointer should read on the red midscale line; if it does not, adjust the METER SENSITIVITY CALIBRATE control to bring the pointer to midscale. Insert the microphone plug-in jack IA2A14J7, J9, or J11 on electrical test panel 1A2A14 (fig. 5-1). If the plug does not fit, or if there is no plug, connect the microphone with leads to the MICROPHONES OTHER TYPES terminal. Position the microphone unit squarely over the screen of the test loudspeaker. *Tape the microphone switch on while testing* Secure the microphone with the clamping fixture. To test, depress the 1 LOW button, the 2 CENTER button, and the 3 HIGH button, in turn. The meter pointer should read on the good scale for the particular frequency band used for testing the microphone as indicated in the pertinent table. Perform the stopping procedures (para 2-19).

b. *Carbon Microphones.* Perform the starting procedures (para 2-10a). Set the front panel controls as listed in TB 11-6625-596-12/1. The panel meter pointer should read on the red midscale line; if it does not, adjust the METER SENSITIVITY CALIBRATE control to bring the pointer to midscale. Insert the microphone plug-in receptacle IA2A14J1, J5, or J6 on electrical test panel IA2A14 (fig. 5-1). If the plug does not fit, or if there is no plug, connect the microphone with leads to the MICROPHONES CARBON terminals. *Tape the microphone switch on while testing.* Shake the microphone vigorously. Position the microphone unit squarely over the screen of the test loudspeaker, and hold it in place by using the clamping fixture. Depress the READ MICROPHONE CURRENT button and adjust the MICROPHONE CURRENT control until the panel meter pointer reads midscale. Depress the READ MICROPHONE CURRENT button two or three times until the current stabilizes. To test, depress the 1 LOW button, the 2 CENTER button, and the 3 HIGH button, in turn. The panel meter pointer should read on the good scale indicated in the pertinent table for the particular microphone being tested and for the frequency band applicable. If the microphone fails the test, repeat the test. Some carbon microphones fluctuate considerably. Return the MICROPHONE CURRENT control to OFF and perform the stopping procedure (para 2-19).

c. Earphones, Receivers, and Headsets. Perform the starting procedures (para 2-10a). Set the front panel controls as listed in TB 11-6625-596-12/1. The panel meter pointer should read at midscale; if it does not, adjust the METER SENSITIVITY CALIBRATE control to bring the panel meter pointer to the red midscale line. Insert the earphone plug-in jack 1A2A14J6, J7, or J8 on electrical test panel 1A2A14 (fig. 5-1). If the plug does not fit or there is none, connect the earphone leads to the EARPHONES terminals. Square the earphone unit over the screen of the test microphone, and secure it in place with the clamping fixture. To test, depress the 1 LOW button, the 2 CENTER button, and the 3 HIGH button, in turn. The panel meter pointer should read on the good scale. Perform the stopping procedure (para 2-19).

d. Microphone-Earphone Combinations. Handsets, headset-microphones, chest sets, handset-headset, head and chest sets, etc., are tested as follows: Test the transducers in a handset by testing the individual items as set forth in *a*, *b*, and *c* above. Refer to the pertinent tables in TB 11-6625-596-12/1 for the LEVEL and VALUE control setting and the good scale readings in each frequency band for the units listed.

NOTE

Tape the microphone switch on while testing.

e. Narrow-Band Earphones, Receivers, and Headsets. Perform the starting procedure (para 2-10a). Set the front panel controls as listed in TB 11-6625-596-12/1. The panel meter pointer should read on the red midscale line; if it does not, adjust the METER SENSITIVITY CALIBRATE control to bring the meter pointer to midscale. Insert the earphone plug-in jack 1A2A14J3 on electrical test panel 1A2A14 (fig. 5-1). If the plug does not fit, or there is none, connect the earphone leads to the EARPHONES terminals. Square the earphone unit over the test microphone. Secure it in place with the clamping fixture. To test, depress the 4 NARROW BAND button. The panel meter pointer should read in the good scale indicated in the pertinent table for the unit being tested. Perform the stopping procedure (para 2-19).

f. Sound-Powered Telephones. Perform the starting procedures (para 2-10a). Set the front

panel controls as listed in TB 11-6625-596-12/1. The panel meter pointer should read on the red midscale line; if it does not, adjust the METER SENSITIVITY CALIBRATE control to bring it to midscale. Place the sound-powered telephone in the coupler (fig. 1-3), with the receiver unit of the telephone squarely over the test microphone and the microphone squarely over the test loudspeaker. It is important that the receiver is squarely positioned over the test microphone. *Tape the microphone switch on while testing.* To test, depress the 1 LOW button. The panel meter pointer should read on the good scale, given in the pertinent table for the transducer being tested. Perform the stopping procedure (Para 2-19).

2-17. Insulation Resistance Test

WARNING

When the INSULATION RESISTANCE switch is depressed, up to 100 volts may be present on TEL LINE terminals L1 and L2.

Perform the starting procedure (para 2-10a). Connect TEL LINE terminals L1 and L2 to the insulation to be tested. Depress the INSULATION RESISTANCE button. Adjust the INSULATION RESISTANCE CALIBRATE control so that the panel meter pointer reads on the red midscale line. To test, depress the TEST button. The panel pointer should read at midscale or below. Perform the stopping procedure (para 2-19).

2-18. Continuity Test

Perform the starting procedure (para 2-10a). Connect the CONTINUITY TEST LEADS terminals to the circuit under test. If the circuit has a dc resistance of 10 ohms or less, the buzzer will sound and the continuity test lamp will light. Perform the stopping procedure (para 2-19).

2-19. Stopping Procedure

a. To stop the TS-716/U, turn the power switch to OFF.

b. Return the front panel controls to the positions listed below. This will prevent possible damage to the TS-716/U if the power is turned on without observing the proper starting procedure.

<i>Control</i>	<i>Setting</i>
NOISE GEN ADJ.....	Depressed
CALIBRATE:.....	
NOISE GENERATOR	Fully ccw
METER SENSITIVITY	Fully ccw
INSULATION RESISTANCE	Fully ccw
DIAL SPEED.....	Fully ccw
DIAL BREAK.....	Fully ccw

<i>Control</i>	<i>Setting</i>
NOISE GENERATOR	LOAD
TEST CONDITION	COUPLER
MICROPHONE LOAD	OFF
RECEIVER LOAD	OFF
MICROPHONE CURRENT	OFF
LEVEL A and B.....	Any
VALUE C and D.....	Any

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-20. Operation at Low Temperatures

a. At low temperatures, certain electronic components begin to change values rapidly. For this reason, the values of some circuits of the TS-716/U, particularly the dial speed test and the dial break test circuits, will not be accurate when the temperature falls below 32°F. In cold weather, the TS-716/U should be operated inside a heated vehicle or a shelter where the temperature can be kept above freezing.

b. The TS-716/U can be stored at -25°F. without damage to the components. However, at such low temperatures both the electrical and mechanical parts are more easily damaged by shock and vibration. If the TS-716/U must be moved in an open vehicle, it should be wrapped in soft material to cushion the shocks and vibrations.

2-21. Operation Under Tropical Conditions

The high relative humidity in tropical areas causes moisture to condense on the equipment whenever the temperature of the equipment

becomes lower than that of the surrounding air. This moisture may combine with dirt inside the TS-716/U to form a thin, insulating film on the switch contacts and the pins of the connectors. Keep the TS-716/U as clean and dry as possible. If the TS-716/U does not operate properly, clean the connectors before returning it to a higher category of maintenance for repair.

2-22. Operation in Desert Climates

a. The test microphone and test loudspeaker mounted in the lid of the case are easily damaged by sand and grit. If the TS-716/U must be operated in desert climates, it should always be set up in an inclosed area. Be sure that the equipment to be tested is cleaned before it is placed in the coupler. Keep the case closed and latched when the set is not in use.

b. If dirt or dust does fall on the microphone or loudspeaker, it should be removed by gentle shaking and light brushing with a soft brush. Never clean the microphone and/or loudspeaker with compressed air.

**CHAPTER 3
OPERATOR MAINTENANCE**

3-1. Scope of Operator Maintenance

The maintenance duties assigned to the operator of Telephone Test Set TS-716/U are listed below, together with references to the paragraphs covering the specific maintenance functions. These duties do not require special tools or test equipment.

- a. Daily preventive maintenance checks and services (para 3-4).
- b. Cleaning (para 3-5).

3-2. Operator Preventive Maintenance

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

a. *Systematic Care.* The procedures given in paragraphs 3-3 through 3-5 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. *Preventive Maintenance Checks and Services.* The preventive maintenance checks and services charts (para 3-4, 4-2, and 4-3) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat-serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist operators in

maintaining combat serviceability, the charts indicate what to check, how to check, and what the normal conditions are; the Reference column lists the illustrations, paragraphs, or manuals that contain detailed repair or replacement procedures. If the defect cannot be remedied by performing the corrective action indicated, higher level of maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38750.

3-3. Preventive Maintenance Checks and Services Periods

a. Preventive maintenance checks and services of Telephone Test Set TS-716/U are required daily, weekly, and monthly.

b. Paragraph 3-4 specifies checks and services that must be accomplished daily and under the following special conditions:

- (1) When the equipment is initially put in operation.
- (2) Immediately before going on a mission.
- (3) Immediately after return from a mission.
- (4) At least once a week if the equipment is maintained in a standby condition.

3-4. Daily Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	Reference
1	Completeness	See that the equipment is complete	App B
2	Exterior surfaces	See that the case and all exposed surfaces of the opened	Para 3-5.
3	Meter window and indicator lenses.	TS-716/U are clean, and free from moisture. Check the meter window and indicator lenses for cracks.	

Sequence	Item	Procedure	Reference
4	Fuses	Check to see that the fuses are of correct value.	App B
5	Power switch guardplate.	See that the power switch guardplate is so positioned that only the correct voltage will be applied when equipment is turned on.	Par0 2-5.
6	Coupler assembly	Check the housing of the test loudspeaker and test microphone for cracks, other damage, and dirt	Para 3-5.
7	Cables and connectors.	Check to see that all cables are connected securely All connectors must be firmly seated in their receptacles.	Fig 1-1.
8		Controls and indicators While making the operating checks (sequence No. 9 through 32), observe that the mechanical action of each knob, pushbutton, and switch is smooth, and free of external or internal binding, and that no excessive looseness is apparent.	
9	Preliminary settings	Set the controls to the following positions <i>before</i> applying power to the TS-716/U a Power switch b NOISE GEN ADJ button c CALIBRATE controls. (1) NOISE GENERATOR (2) METER SENSITIVITY (3) INSULATION RESISTANCE (4) DIAL SPEED (5) DIAL BREAK d NOISE GENERATOR switch e. TEST CONDITION switch f. MICROPHONE LOAD switch g RECEIVER LOAD switch h. MICROPHONE CURRENT switch	Fig. 5-1. OFF Depressed. fully ccw fully ccw. fully ccw. fully ccw. fully ccw LOAD. COUPLER. OFF OFF. OFF.
10	Coupler assembly	Set up the coupler with the test microphone directly over and touching the screen of the test loudspeaker.	
11	LEVEL and VALUE controls.	Set the LEVEL and VALUE controls as follows A 10 B 8 C 6 D 9	
12	Power switch	Turn on. Note that the POWER ON indicator lamp lights.	
13	NOISE GENERATOR CALIBRATE control	Adjust control until meter pointer moves to CAL position (red mark at midscale)	
NOTE			
The meter pointer will fluctuate slightly. Set the control so that the meter pointer swings equally to both sides of the red CAL mark.			
14	METER ADJ button and METER SENSITIVITY CALIBRATE control.	Depress METER ADJ button Adjust METER SENSITIVITY control until meter pointer can be set to red CAL mark	

Seq No.	Item	Procedure	Reference
15	HAND GENERATOR button.	Depress	Observe that panel meter pointer reads 0.
16	RINGER 2400, RINGER 5300, RINGER 12000 buttons.	Depress each switch in sequence	In each case, the meter reads 30 or above and the inverter buzzes.
17	VARISTOR button	Depress	Panel meter pointer reads on green scale.
18	EARPHONES button	Depress	Panel meter pointer reads on green scale.
19	SOUND POWER TELEPHONE button	Depress.	Panel meter pointer reads on green scale.
20	MIC ROPHON ES OTHER	Depress	Panel meter pointer reads on green scale.
21	EARPHONES button (repeat)	Depress	Panel meter pointer reads on green scale.
22	NOISE GENERATOR switch	Set at DRIVER	Panel meter pointer reads on green scale.
23	1 LOW button, 2 CENTER pushbutton, and 3 HIGH button.	Depress in sequence	Panel meter pointer reads on green scale in each case.
24	MICROPHONES OTHER TYPES button.	Depress	Panel meter pointer reads on green scale.
25	MICROPHINES CARBON	Depress	Panel meter pointer reads on green scale.
26	DIAL BREAK button and DIAL BREAK CALIBRATE control	Depress DIAL BREAK button and rotate DIAL BREAK CALIBRATE control	Panel meter pointer can be moved to red CAL mark.
27	DIAL SPEED button and CALIBRATE control	Depress DIAL SPEED button and rotate DIAL SPEED CALIBRATE control	Panel meter pointer fluctuates slightly and can be moved to red CAL mark.
28	INSULATION RESISTANCE button and INSULATION RESISTANCE CALIBRATE control.	Depress INSULATION RESISTANCE button and rotate INSULATION RESISTANCE CALIBRATE control.	Panel meter pointer can be moved to red CAL mark.
29	TELEPHONE EFFICIENCY-SEND- button.	Depress	Panel meter pointer reads on green scale.
30	TELEPHONE EFFICIENCY-RECEIVE-button.	Depress	Panel meter pointer reads on green scale.
31	CONTINUITY TEST LEADS terminals,	Place shorting bar across the binding posts	Continuity lamp lights and buzzer sounds.

Seq No.	Item	Procedure	Reference
32	Stopping procedure	Set power switch to OFF.	

CAUTION

Return the front panel controls to the following positions

- a NOISE GEN ADJ button..... depressed
- b CALIBRATE controls
 - (1) NOISE GENERATOR fully ccw.
 - (2) METER SENSITIVITY fully ccw
 - (3) INSULATION RESIST- ANCE fully ccw.
 - (4) DIAL SPEED..... fully ccw.
 - (5) DIAL BREAK..... fully ccw.
- c NOISE GENERATOR switch. LOAD
- d TEST CONDITION switch COUPLER.
- e MICROPHONE LOAD switch..... OFF
- f RECEIVER LOAD switch OFF
- g MICROPHONE..... CURRENT control..... OFF

3-5. Cleaning

Inspect the exterior surface of Telephone Test Set TS-716/U, including the front panel of panel chassis assembly 1A4 and top case assembly 1A2 which are exposed when the test set is ready for use. All surfaces should be clean, and free of dust, dirt, grease, fungus, and moisture.

- a. Use a soft cloth to remove dust, loose dirt, and moisture. Use a soft brush to remove dirt from the screen of the test microphone. If dirt is difficult to remove from the front panel, panelboard, meter, and knobs, dampen the cloth with water; use mild soap if necessary. Use only a dry cloth on the test loudspeaker and test microphone.

CAUTION

Do not use compressed air to clean either the test microphone or the test loudspeaker.

WARNING

The fumes of trichloroethane are toxic. Provide thorough ventilation whenever used. DO NOT use near an open flame. Trichloroethane is not flammable, but exposure to an open flame converts the fumes to highly toxic, dangerous gases.

- b. Remove grease, fungus, and ground-in dirt from the case; use a cloth dampened (not wet) with trichloroethane (Federal Stock No. 6810-664-0387). Wipe the parts with a clean, dry cloth.

- c. Remove dust and dirt from plugs and jacks with a brush.

**CHAPTER 4
ORGANIZATIONAL MAINTENANCE**

4-1. Scope of Organizational Maintenance

The assigned maintenance duties for organizational maintenance are listed below, together with references to the paragraphs covering the specific maintenance functions. These duties do not require special tools or test equipment.

- a. Weekly preventive maintenance checks and services (para 4-2).
- b. Monthly preventive maintenance checks and services (para 4-3).
- c. Troubleshooting (para 4-5).
- d. Repairs and adjustments as follows:
 - (1) Replacement of indicator lamps (para 4-6a).
 - (2) Replacement of fuses (para 4-6b).
 - (3) Replacement of front panel knobs and dial indicators (para 4-6c).
 - (4) Replacement of indicator lamp lens (para 4-6e).

4-2. Weekly Preventive Maintenance Checks and Services Chart

Seq No.	Item	Procedure	Reference
1	Cable	Inspect the cords, cables, and wires for chafed, cracked, or frayed insulation. Cuts in the power cord insulation can be repaired by being covered with rubber tape and then with friction tape. Replace connectors that are broken, arced, stripped, or worn excessively.	Para 2-5.
2	Handles, latches, and hinge	Inspect handles, latches, and hinge for looseness. Replace or tighten as necessary.	
3	Pushbutton switches	Inspect for proper action. If contacts do not make and break correctly, or are otherwise defective, return to higher category maintenance for repair.	Para 2-2.
4	Clamping fixture plunger	Check pressure exerted by plunger when pressed.	
5	Instrument transit case gasket	Inspect for seating. If it has been cut or broken, the whole gasket must be replaced. If necessary, send to higher category maintenance for repair.	
6	Dust and moisture gaskets on pushbutton	Check for cracks and breaks. If necessary, send to higher category maintenance for repair.	
7	Shock mounts on 20-Hertz inverter 1A3All (fig4-1)	Inspect for cuts or cracks or evidence of deterioration. If necessary, send to higher category maintenance for repair.	
8	Metal surfaces	Inspect for rust and corrosion. Replace rusted or corroded hardware.	

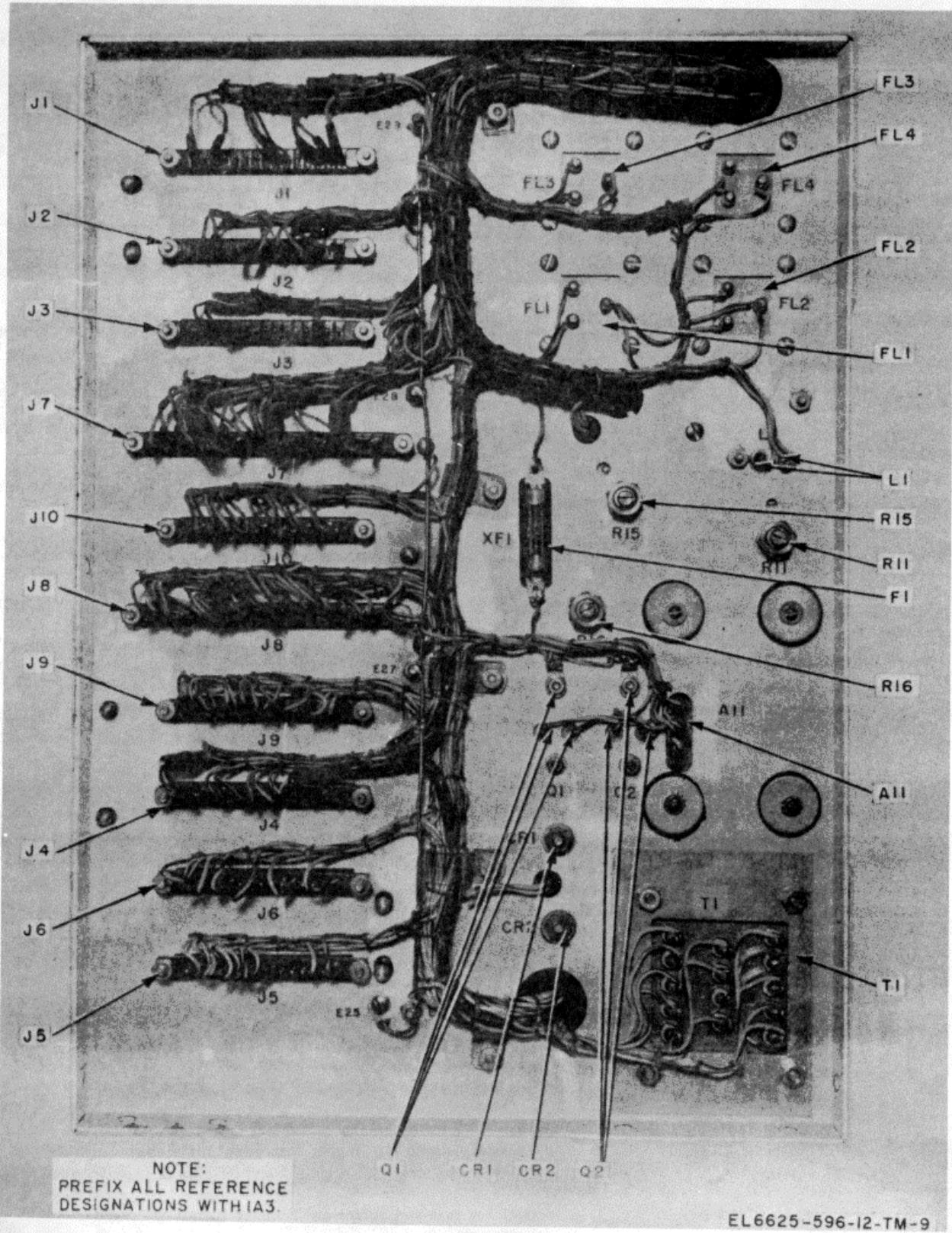


Figure 4-1. Test rack assembly 1A3, rear view

4-3. Monthly Preventive Maintenance Checks and Services Chart

Seq No.	Item	Procedure	Reference
1	Preservation	Inspect the equipment to see that it is free of bare spots, rust, and corrosion.	Para 4-4.
2	Pluckout items	Inspect the seating of assemblies IA3AI through IA3A10, fuses 1A3F1 and 1A4F2 through F5, and lamps 1A4DSI and DS2	Fig 1-4, 1-5, 4-1.
3	Assemblies 1A3AI through IA3A10 and terminal boards.	Inspect for loose connections, cracks, and breaks Return to higher category maintenance for repair.	Fig 1-4.
4	Resistors and capacitors	Inspect for cracks, blistering, burn discoloration, loose terminals, or any detrimental defects Return to higher category maintenance for repair.	
5	Receptacles and connectors	Do not remove, rock, or twist to inspect Use only direct pressure to insure the item is fully seated Inspect for snug fit and good contact.	
6	Test lead sockets (binding posts) and receptacles	Inspect for dirt, corrosion, chipping, and other damage; clean or replace as applicable.	
7	Screw-type terminals	Inspect binding posts, buzzer, and meter for corrosion, dirt, and loose contacts Clean and/or tighten.	
8	Rubber strip	Check for breaks Reattach or replace as necessary Cement in place.	
9	Bushings, gaskets, insulation	Inspect for cracks, chipping, loose sleeves, or excessive sleeves, and insulators wear.	
10	Shock mounts, 1A3CR1 and CR2, and transistors 1A3Q1 and Q2 mountings.	diodes Inspect for cleanliness and tightness Clean and/or tighten.	
11	Hardware	Inspect all exterior and interior hardware for looseness and damage Screws and bolts must be tight and not damaged.	
12	Interior of chassis and case	Check interior of case for moisture due to condensation Clean both items.	Para 3-5.
13	Publications	See that all publications are complete, serviceable, and current 3104.	DA Pam
14	Modifications	Check DA Pam 310-7 to determine whether new applicable MWO's have been published All URGENT MWO's must be applied immediately All NORMAL MWO's must be scheduled 310-7.	TM 38-750 and DA Pam
15	Spare parts	Check all spare parts (operator and organizational) for general condition and method of storage No overstock should be evident and all shortages must be on valid requisitions.	App B.
16	Operating check	Perform operating check listed in paragraph 3-4 (items 8-32).	

4-4. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion.

4-5. Troubleshooting Chart

Troubleshooting this equipment is based on the operational check contained in the daily preventive maintenance checks and services chart. To troubleshoot the equipment, perform all functions starting with sequence No. 9 in the daily preventive

maintenance checks and services chart (para 3-4) and proceed through the items until an abnormal condition or result is observed. When an abnormal result is observed, note the item number and turn to the corresponding item number in the troubleshooting chart below. Perform the checks and corrective actions indicated in the troubleshooting chart. Figures 1-4, 4-1, and 4-2 may be used to locate items designated in the chart by reference symbol, and which are mounted behind the front panel or on the chassis. If the corrective measures indicated do not result in correction of the trouble, higher category maintenance is required.

Item No.	Trouble symptom	Probable trouble	Corrective measure
12	POWER ON indicator does not light.	<ul style="list-style-type: none"> a POWER ON indicator defective- b. Line fuse defective. c Powerline cable has loose or broken conductor from terminal of plug. d No line voltage. 	<ul style="list-style-type: none"> a Replace lamp 1A4DS2 (para 46a). b. Replace fuse 1A4F2, F3, F4, or F5, c. Check attachment of cable wires to plug terminals; attach and tighten. Return to higher category maintenance for repair. d Check voltage at outlet receptacle
13	Meter pointer cannot be set to red mark at midscale.	<ul style="list-style-type: none"> a. Printed-circuit boards 1A3A3, A4, A6, and A8 not properly mounted. b Pushbutton switches 1A4S6 and S5 defective for repair. 	<ul style="list-style-type: none"> a Check setting of connector P1 on each printed-circuit board with mating receptacle. b. Return to higher category maintenance
14	Meter pointer cannot be set to red mark at midscale.	<ul style="list-style-type: none"> a. Printed-circuit board 1A3A2 not properly mounted. b. Pushbutton switch defective. 	<ul style="list-style-type: none"> a. Check seating of connector J1 printed-circuit board A2 with mating receptacle. b. Same as for item 13b.
15	Meter reads other than zero.	Pushbutton switch defective.	Same as for item 13b.
16	Meter reads less than 30, and buzz.	<ul style="list-style-type: none"> a Assemblies 1A3A6 and A8 inverter IA3A11 does not b. Pushbutton switch defective. 	<ul style="list-style-type: none"> a Same as for item 13a not properly mounted. b. Same as for item 1b.
17	Meter will not read on green	<ul style="list-style-type: none"> a. Assemblies 1A3A7 and A8 scale. b. Pushbutton switch defective. 	<ul style="list-style-type: none"> a. Same as for item 13a not properly mounted. b. Same as for item 13b.
18	Meter will not read on green	Pushbutton switch defective.	Same as for item 13b.
19	Meter will not read on green	Pushbutton switch defective.	Same as for item 13b.
20	Meter will not read on green scale	Pushbutton switch defective.	Same as for item 13b.
21	Meter will not read on green	Pushbutton switch defective.	Same as for item 13b.
22	Meter will not read on green loudspeaker scale.	<ul style="list-style-type: none"> a. Loose or corroded connections to loudspeaker. 	<ul style="list-style-type: none"> a. Check all connections of cable; if loose, tighten. Return to higher maintenance category for further repair.

Item No.	Trouble symptom	Probable trouble	Corrective measure
contacts	No noise heard from loud speaker	b. NOISE GENERATOR button	b. Check switch contacts. Clean
	speaker.	No noise heard from loud contacts not seating, or broken.	with brush or cleaning compound. Return to higher maintenance category for repair.
23	a. No meter reading.	a. Assembly 1A3A1	a. Same as for item 13a and b.
	b. Off-scale meter reading	b. Faulty component in meter circuit	b. Same as for item 13b level.
24	Meter will not read on green scale	Pushbutton switch defective.	Same as for item 13b.
25	Meter does not read on green scale	Pushbutton switch defective	Same as for item 13b.
26	Meter pointer cannot be set on red CAL mark.	a. Assembly 1A3A9 not properly mounted.	a. Same as for item 13a.
		b. Pushbutton switch defective.	b. Same as for item 13b.
27	a. No reading on meter.	a. Assembly 1A3A9 and A10 not properly mounted. Push button switch defective.	a. Same as for item 13a.
		b. Faulty component in circuit.	B. Same as for item 13b.
29	a. Meter does not read on Green scale.	a. Assembly 1A3A7 not properly mounted. Pushbutton switch defective.	a. Same as for items 13a and b.
	b. Low reading or oscillation heard in loudspeaker.	b. Electrostatic shield between 1A3A3 and A7 not making good contact with chassis.	b. Remove shield. Clean contacting face of shield and chassis with cleaning compound. Replace, checking to see that shield exerts light pressure on chassis.
30	Meter does not read on green scale	a. Assembly 1A3A7 not properly mounted.	a. Same as for item 13a.
		b. Pushbutton switch defective.	b. Same as for item 13b.
31	Continuity indicator lamp does not light. Buzzer does not sound.	a. Continuity test lamp burned	a. Replace lamp DS1 (para 4-6a).
		b. Wires loose on buzzer terminals.	b. Check wires attached to buzzer 1A4A1. Tighten nuts on buzzer

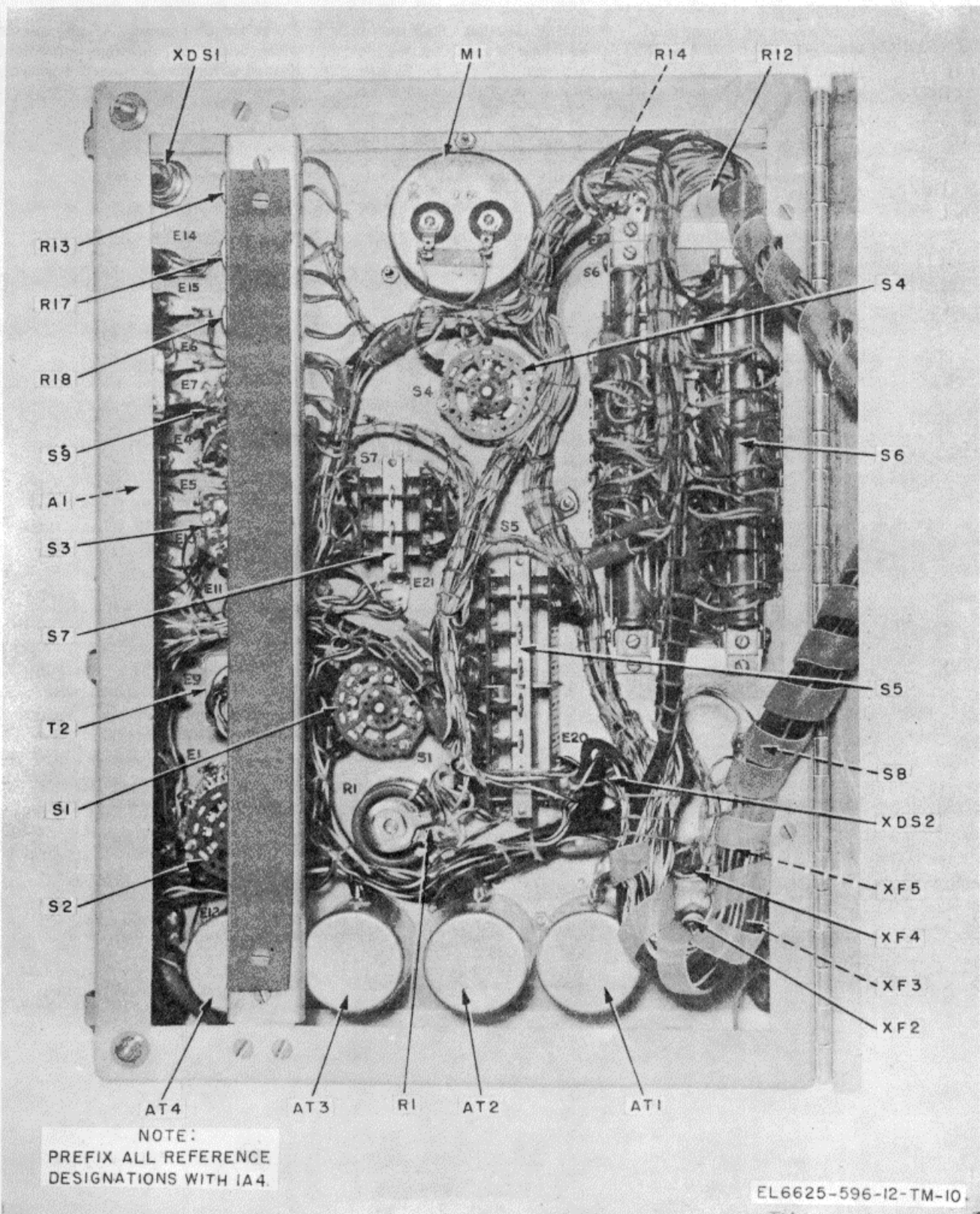


Figure 4-2. Panel chassis assembly 1A4, rear view.

4-6. Repairs and Adjustments

a. Replacement of POWER ON and Continuity Test Indicators. The POWER ON indicator 1A4D52 is located on the lower left quadrant of the front panel of panel chassis assembly 1A4 (fig. 1-5). The continuity test indicator is located directly above the words CONTINUITY TEST LEADS on the upper right corner of the front panel.

(1) Turn the glass jewel of either indicator counterclockwise and remove it to expose the defective lamp.

(2) Press in on the lamp and turn it counter-clockwise to unlock it.

(3) Pull the defective lamp out and replace it with a new one. Push the lamp in and twist it clockwise to lock it.

(4) Replace the glass jewel.

b. Replacement of Front Panel Fuses. The fuseholders are located on the lower left quadrant of the front panel of panel chassis assembly 1A4 (fig. 1-5). The knobs are marked with the word FUSE.

(1) Press the fuseholder cap in and turn it counterclockwise.

(2) Pull the cap out; this will withdraw the fuse with it from the fuseholder body.

(3) Pull the blown fuse from the cap and replace it with a new one.

(4) Replace the cap with the new fuse, press in, and turn clockwise to lock.

c. Replacement of Knobs.

(1) For pointer knobs and those with index marks, turn the switch or control to the maximum counterclockwise position.

(2) Use the proper Allen wrench to loosen the two setscrews; then remove the knob.

(3) Install a new knob with the index in the correct position, and tighten both setscrews.

(4) Before removing the knobs on the LEVEL and VALUE controls, first remove the dial indicators by removing the two No. 4-40 flathead screws in the face of the indicator.

CAUTION

Do not attempt to remove the clinch nuts that hold these screws to the front panel.

d. Replacement of Electrical Caps for Fuseholders. Follow the same procedure as in b above, but place a new cap on the fuseholder instead of replacing the cap removed.

e. Replacement of Indicator Lamp Lens.

(1) Turn the indicator lamp lens of either indicator with its threaded metal retainer counterclockwise until it can be removed from its socket.

(2) Replace the indicator lamp lens and the retainer by screwing clockwise into the socket.

**CHAPTER 5
SHIPMENT, LIMITED STORAGE, AND**

DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

5-1. Disassembly of Equipment

To prepare Telephone Test Set TS-716/U for shipment and storage, proceed as follows:

- a. Place the coupler in the position shown in figure 1-2. Tighten all thumbscrews.
- b. Place the cover on the spare parts compartment, locking the two quick-disconnect fasteners.
- c. Secure the power plug in the receptacle in the side of the spare parts compartment.
- d. Close the dual chassis assembly (1A3 and 1A4, fig. 1-1), lock the three quick-disconnect latches, insert the dual chassis in bottom case assembly 1A1 and tighten the six captive screws (fig. 1-3).
- e. Place top case assembly 1A2 on bottom case assembly 1A1 and lock the latches.

5-2. Repacking for Shipment or Limited Storage

The exact procedure for repacking depends on the material available and the conditions under which the TS-716/U is to be shipped or stored. Adapt the

procedures outlined below whenever circumstances permit. The information concerning the original packaging (para 2-i and fig. 2-1) will also be helpful.

a. *Material Requirements.* The following materials are required for packaging the TS-716/U. For stock numbers of materials, refer to SB 38-100.

Material	Quantity
Tape, cloth-backed, waterproof	15 ft.
Adhesive, water-resistant.....	1/4 pint
Fiberboard, corrugated	30 sq. ft.
Corrugated carton	1

b. *Packaging.* Form pads of corrugated material on the top, bottom, two ends, and two sides, as shown in figure 2-1. Cement together the bottom flaps on the corrugated carton. Place the bottom pad in the carton and set the TS-716/U on it. Place the side pads and then the top pad in the carton. Cement together the top flaps of the carton. Seal all carton seams, end edges, and the manufacturer's joint with waterproof tape.

c. *Packing.* Pack each packaged TS-716/U in a nailed wooden box.

Section II. DEMOLITION OF MATERIAL TO PREVENT ENEMY USE

5-3. Authority for Demolition

The demolition procedures given in paragraph 5-4 will be used to prevent the enemy from using or salvaging this equipment. Demolition of the equipment will be accomplished only upon the order of the commander.

5-4. Methods of Destruction

Any or all of the methods of destruction given below may be used. The tactical situation and the time available will determine the method to be used when destruction of equipment is ordered. In most cases, it is preferable to demolish completely some portions of the equipment rather than partially destroy all the equipment.

a. **Smash.** Use sledges, axes, hammers, and crowbars to smash the interior parts of the set.

(1) Remove the chassis from the set. Use the heaviest tool on hand to smash the connectors, meter, knobs, switches, inverter, and printed-circuit boards.

(2) Smash the panelboard, loudspeaker, microphone, and spare parts.

b. **Cut.** Use axes, wirecutters, machetes, and similar tools to cut the cabling, cording, and

wiring. Use a heavy axe or machete to cut the power cable. Cut all cords and cables in a number of places.

WARNING

Be extremely careful with explosives and incendiary devices. Use these items only when the need is urgent.

c. **Burn.** Burn the technical manuals first. Burn as much of the equipment as is flammable; use gasoline, oil, flame-throwers, and similar materials. Pour gasoline on the cut cables and internal wiring, and ignite it. Use incendiary grenades to complete the destruction of the unit.

d. **Explode.** Use explosives to complete the demolition or to cause maximum damage, before burning, when time does not permit complete demolition by other means. Powder charges, fragmentation grenades, or incendiary grenades may be used. Incendiary grenades will be most effective since destruction of small parts and wiring is desired. For quick destruction of the TS-716/U, open the chassis and drop an incendiary grenade into the interior. Get away from the unit after the grenade is placed.

e. **Dispose.** Bury or scatter the destroyed parts, or throw them into nearby waterways. This is particularly important if a number of parts have not been completely destroyed.

**APPENDIX A
REFERENCES**

Following is a list of applicable references available to the operator and organizational repairman of Telephone Test Set TS-716/U.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7, 8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	U.S. Army Equipment Index of Modification Work Orders.
SB 38-100	Preservation, Packaging, Packing and Marking Materials, Supplies and Equipment Used by the Army.
TB 11-6625-596-12/1	Telephone Test Set TS-716/U Norms and Testing Procedures.
TM 3&8750	The Army Maintenance Management System (TAMMS).

APPENDIX B

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

B-1. Scope

This appendix lists items which accompany the TS-716/U or are required for installation, operation, or operator's maintenance.

B-2. General

This Basic Issue Items List is divided into the following sections:

- a. *Basic Issue Items-Section II.* A list of items which accompany the TS-716/U and are required by the operator/crew for installation, operation, or maintenance.
- b. *Maintenance and Operating Supplies-Section III.* Not applicable.

B-3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items, Section II.

- a. Source, Maintenance, and Recoverability Codes (SMR), Column 1.

(1) Source code indicates the selection status and source for the listed item. Source codes are-

Code	Explanation
A-	Assemblies which are not procured or stocked as such, but are made up of two or more units. Such component units carry individual stock numbers and descriptions, are procured and stocked separately, and can be assembled to form the required assembly at indicated maintenance categories.

Code	Explanation
X --	Parts and assemblies which are not procured or stocked and the mortality of which normally is below that of the applicable end item or component. The failure of such part or assembly should result in retirement of the end item from the supply system.
X1-	Repair parts which are not procured or stocked. The requirement for such items will be filled by use of the next higher assembly or component.
X2-	Repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain same through cannibalization. Where such repair parts are not obtainable through cannibalization, requirements will be requisitioned, with accompanying justification, through normal supply channels.
P-	Repair parts which are stocked in or supplied from the GSA/DSA, or Army supply system, and authorized for use at indicated maintenance categories.
P2-	Repair parts which are procured and stocked for insurance purposes because the combat or military essentiality of the end item dictates that a minimum quantity be available in the supply system.
P9-	Assigned to items which are NSA design controlled: unique repair parts, special tools, test, measuring and diagnostic equipment, which are stocked and supplied by the Army COMSEC logistic system, and which are not subject to the provisions of AR 380-41.

Code	Explanation
P10-	Assigned to items which are NSA de- sign controlled: special tools, test, measuring and diagnostic equipment for COMSEC support, which are ac- countable under the provisions of AR 380-41, and which are stocked and supplied by the Army COMSEC logistic system.
M--	Repair parts which are not procured or stocked, but are to be manufactured in indicated maintenance levels.
G-	Major assemblies that are procured with PEMA funds for initial issue only as exchange assemblies at DSU and GSU level. These assemblies will not be stocked above DS and GS level or returned to depot supply level.

(2) Maintenance code indicates the lowest category of maintenance authorized to install the listed item. The maintenance level codes are-

Code	Explanation
C	Operator/crew
O	Organizational maintenance

(3) Recoverability code indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are expendable. Recoverability codes are-

Code	Explanation
R-	Repair parts and assemblies that are economically repairable at DSU and GSU activities and are normally furnished by supply on an exchange basis.
S-	Repair parts and assemblies which are economically repairable at DSU and GSU activities and which normally are furnished by supply on an ex- change basis. When items are deter- mined by a GSU to be uneconomically repairable, they will be evacuated to a depot for evaluation and analysis before final disposition.
T-	High dollar value recoverable repair parts which are subject to special

Code	Explanation
	handling and are issued on an exchange basis. Such repair parts normally are repaired or overhauled at depot maintenance activities.
U-	Repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, or high dollar value re- usable casings or castings.
	<i>b. Federal Stock Number, Column 2.</i> This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.
	<i>c. Description, Column 3.</i> This column indicates the Federal item name and any additional description of the item required. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturers in parentheses.
	<i>d. Unit of Measure (U/M), Column 4.</i> A two-character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based; e.g., ft, ea, pr, etc.
	<i>e. Quantity Incorporated in Unit, Column 5.</i> This column indicates the quantity of the item used in the TS-716/U.
	<i>f. Quantity Furnished With Equipment, Column 6.</i> This column indicates the quantity of an item furnished with the equipment.
	<i>g. Illustration, Column 7.</i> This column is divided as follows:

(1) *Figure number, Column 7a.* This column indicates the figure number of the illustration in which the item is shown.

(2) *Item number or reference designation, column 7b.* This column indicates the reference designation used to identify the item in the illustration.

B-4. Explanation of Columns in the Tabular List of Maintenance and Operating Supplies- Section III

Not applicable.

Section II. BASIC ISSUE ITEMS

(1) SMR Code	(2) Federal Stock Number	(3) Description Usable on code	(4) Unit of Meas	(5) Qty INC in Unit	(6) Qty furn with equip	(7) Illustration (A) (B) Fig Item no. No.	
	6625-965-1433	<p>TEST SET, TELEPHONE TS-716/U (This item is nonexpendable)</p> <p>CONSISTING OF THE FOLLOWING ITEMS REQUIRED TO HAVE A COMPLETE OPERABLE EQUIPMENT: ADAPTER, PLATE: 78687 (81134) (1 ea)</p> <p>CABLE "A", ASSEMBLY: 78686 (81134) (1 ea) CABLE "B", ASSEMBLY: 78687 (81134) (1 ea) CABLE "C", ASSEMBLY: 78688 (81134) (1 ea) CABLE "D", ASSEMBLY: 78689 (81134) (1 ea) CABLE "E", ASSEMBLY: 78690 (81134) (1 ea) CABLE "F", ASSEMBLY: 78691 (81134) (1 ea) CABLE "G", ASSEMBLY: 78692 (81134) (1 ea) CABLE "H", ASSEMBLY: 78693 (81134) (1 ea) LOUDSPEAKER, PERMANENT MAGNET: SM-D-380223 (80063) (1 ea) MICROPHONE, DYNAMIC: SM-D-380223 (80063) (1 ea) TM 11-6625-596-12 (1 ea)</p> <p>Requisition through pinpoint account number if assigned: otherwise through nearest Adjutant General facility.</p> <p>A quantity of 1 technical manual is packed with each equipment. Where a valid need exists, additional copies may be requisitioned and kept on hand.</p> <p>OPERATOR/CREW REPAIR PARTS, ACCESORIES, TOOLS AND TEST EQUIPMENT</p>				1-1	
					1-2	1A2A2	
					1-2	1A2A4A4	
P-C--	5920-229-1312	FUSE, CARTRIDGE SLO-BLO 1/16A: FO2B250V1/16A (96906)					
P-C--	5920-280-3167	FUSE, CARTRIDGE SLO-BLO 3/16: 313.187 (75915)	EA	1	5	4-1	1A3F1
P-C--	5920-229-1317	FUSE, CARTRIDGE SLO-BLO 3/8A: SM-D-380242 (80063)	EA	2	5	1-5	1A4F2,1A4F3
P-C—6240	057-2887	LAMP, GLO (TEST LAMP): M815571-1 (81349)	EA	2	5	1-5	1A4F4, 1A4F5
P-C--	6240-223-9100	LAMP, NEON, NE-51 (POWER LAMP):	EA	1	1	1-5	1A4DS2
		NO BASIC ISSUE ITEMS ARE MOUNTED IN OR ON THE EQUIPMENT					
		B-3					

APPENDIX C MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature for the TS-716 ()/U. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C-2. Maintenance Functions

Maintenance functions will be limited to and defined as follows:

a. INSPECT. To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

b. TEST. To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc. This is accomplished with external test equipment and does not include operation of the equipment and operator type tests using internal meters or indicating devices.

c. SERVICE. To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents, and air. If it is desired that elements, such as painting and lubricating, be defined separately, they may be so listed.

d. ADJUST. To rectify to the extent necessary to bring into proper operating range.

e. ALIGN. To adjust two or more components or assemblies of an electrical or mechanical system so that their functions are properly synchronized. This does not include setting the frequency control knob of radio receivers or transmitters to the desired frequency.

f. CALIBRATE. To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of

the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

g. INSTALL. To set up for use in an operational environment such as an encampment, site, or vehicle.

h. REPLACE. To replace unserviceable items with serviceable like items.

i. REPAIR. To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This function includes, but is not limited to welding, grinding, riveting, straightening, and replacement of parts other than the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. OVERHAUL. Normally, the highest degree of maintenance performed by the Army in order to minimize time work in process is consistent with quality and economy of operation. It consists of that maintenance necessary to restore an item to completely serviceable condition as prescribed by maintenance standards in technical publications for each item of equipment. Overhaul normally does not return an item to like new, zero mileage, or zero hour condition.

k. REBUILD. The highest degree of materiel maintenance. It consists of restoring equipment as nearly as possible to new condition in accordance with original manufacturing standards. Rebuild is performed only when required by operational considerations or other paramount factors and

then only at the depot maintenance category. Rebuild reduces to zero the hours or miles the equipment, or component thereof, has been in use.

I. SYMBOLS. The uppercase letter placed in the appropriate column indicates the lowest level at which that particular maintenance function is to be performed.

C-3. Explanation of Format

- a. Column 1, Group Number. Not applicable.
- b. Column 2, Functional Group. Column 2 lists the noun names of components, assemblies, sub-assemblies and modules on which maintenance is authorized.
- c. Column 3, Maintenance Functions. Column 3 lists the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform that function at higher categories. The codes used represent the various maintenance categories as follows:

Code	Maintenance category
C	Operator/crew
O	Organizational maintenance
F	Direct support maintenance
H	General support maintenance
D	Depot maintenance

d. Column 4, Tools and Equipment. Column 4 specifies, by code, those tools and test equipment required to perform the designated function. The numbers appearing in this column refer to specific tools and test equipment which are identified in table I.

e. Column 5, Remarks.

C-4. Explanation of Format of Table I (Tool and Test Equipment Requirements)

The columns in table I are as follows:

a. Tools and Equipment. The numbers in this column coincide with the numbers used in the tools and equipment column of the Maintenance Allocation Chart. The numbers indicate the applicable tool for the maintenance function.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.

c. Nomenclature. This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

d. Federal Stock Number. This column lists the Federal stock number of the specific tool or test equipment.

e. Tool Number. Not used.

SECTION II. MAINTENANCE ALLOCATION CHART

MAINTENANCE ALLOCATION CHART														
(1) GROUP NUMBER	(2) FUNCTIONAL GROUP COMPONENT ASSEMBLY	(3) MAINTENANCE FUNCTIONS										(4) TOLS AND EQUIPMENT	(5) REMARKS	
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL			REBUILD
Repair. printed precision	TELEPHONE TEST SET TS-716()/U	0	0	0				0					1.2.3	Preventive maintenance and operational tests in accordance with maintenance service and inspection chart. Continuity tests, replacement of fuses, panel lamps, cables.
			H		H	H	H		H	H	H		1 thru 18	Connecting cables. All tests, adjustments and calibration. Replacement of all parts which require major dis-assembly. Replacement of
												D	1 thru 8	circuit boards. Restore equipment as near as possible to original condition using manufacturers tolerances and standards. Includes testing, calibration and replacement or parts; rebuilding of printed circuit modules.

C-3

TABLE I. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND TEST EQUIPMENT REQUIREMENTS				
TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
		TS ()/u (continued)		
1	0	TOOL KIT, RADIO REPAIRMAN TK-115 ()/U	5180-856-1578	
2	0	MULTIMETER AN/URM-105 ()	6625-581-2036	
3	0	GROUNDMAN's EQUIPMENT TE-23	5180-408-1242	
4	F,H,D	TOOL KIT, SUPPLEMENTARY, RADAR AND RADIO REPAIR TK-88/U	5180-813-1389	
5	F,H,D	TOOL KIT, RADIO AND RADAR REPAIRMAN TK-87/U	5180-690-4552	
6	F,H,D	MULTIMETER TS-352B/U	6625-553-0142	
7	F,H,D	VACUUM TUBE VOLTMETER ME-30 ()/u	6625-669-0742	
8	H,D	MULTIMETER ME-77 ()/u	6625-284-0854	
9	H,D	SIGNAL GENERATOR TS-382 ()/U	6625-151-7479	
10	H,D	OSCILLOSCOPE AN/USM-140()	6625-987-6603	
11	H,D	SOUND LEVEL METER GENERAL RADIO MODEL 1551C	6625-969-4136	
12	H,D	VARIABLE POWER TRANSFORMER (VARIAC) TF-523/U	5950-926-0742	
13	H,D	RESISTOR, DECADE ZM-16 ()/u	6625-669-0266	
14	H,D	TELEPHONE SET TA-236 ()/FT	5805-603-2774	
15	H,D	TEST SET, SEMICONDUCTOR DEVICE TS-1836B	6625-893-2628	
16	H,D	SPECTRUM ANALYZER TS-723 ()/U	6625-668-9418	
17	D	MICROPHONE RECIPROCITY CALIBRATOR GENERAL RADIO MODEL 1559-A		
18	D	CALIBRATED DRIVER UNIT - STANDARD MICROPHONE PREVIOUSLY CALIBRATED BY CONDENSER MICROPHONE SUCH AS WESTERN ELECTRIC COMPANY 640AA OR EQUAL. CALIBRATION IN ACCORDANCE WITH ASA STANDARD Z24.4, "PRESSURE CALIBRATION OF LABORATORY STANDARD PRESSURE MICROPHONES".		

**APPENDIX D
ORGANIZATIONAL MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST**

Section 1, INTRODUCTION

D-1. Scope

This manual lists repair parts and special tools required for the performance of organizational maintenance of the TS-716/U.

D-2. General

This repair parts and special tools list is divided into the following sections:

a. *Prescribed Load Allowance (PLA) - Section II.* A composite listing of the repair parts, special tools, test and support equipment having quantitative allowances for initial stockage at the organizational level.

b. *Repair Parts - Section III.* A list of repair parts authorized for the performance of maintenance at the organizational level.

c. *Special Tools, Test and Support Equipment -Section IV.* Not Applicable.

d. *Index - Federal Stock Number Cross Referenced Figure and Item Number or Reference Designation - Section V.* A list of Federal stock numbers in ascending numerical sequence followed by a list of reference numbers in ascending alpha-numeric sequence, cross-referenced to the illustration figure number and reference designation.

e. *Index -- Reference Designation Cross Reference to Page Number Section VI.* A list of reference designations cross-referenced to page number.

D-3. Explanation of Columns

The following provides an explanation of columns in the tabular lists.

a. *Source, Maintenance, and Recoverability Codes (SMR), Column 1.*

(1) Source code indicates the selection status and source for the listed item. Source codes are-

Code	Explanation
F-	Applies to repair parts that are stocked in or supplied from the GSAIDSA, or Army Supply System, and authorized for use at indicated maintenance categories.
P2-	Repair parts which are procured and stocked for insurance purposes because the combat or military essentiality of the end item dictates that a minimum quantity be available in the supply system.
P9--	Assigned to items which are NSA design controlled: unique repair parts, special tools, test measuring and diagnostic equipment, which are stocked and supplied by the Army COM- SEC logistic system, and which are not subject to the provisions of AR 380-41.
P10-	Assigned to items which are NSA design controlled: special tools test, measuring and diagnostic equipment for COMSEC support, which are accountable under the provisions of AR 380-41, and which are stocked and supplied by the Army COMSEC logistic system. Repair parts which are not procured or stocked, but are to be manufactured in indicated maintenance levels.
A-	Assemblies which are not procured or stocked as such, but are made up of two or more units. Such component units carry individual stock numbers and descriptions, are procured and stocked separately, and can be assembled to form the required assembly to indicated maintenance categories.
X-	Parts and assemblies which are not procured or stocked and the mortality of which normally is below that of the applicable end item or component. The failure of such part or assembly should result in retirement of the end item from the supply system.
X1-	Repair parts which are not procured or stocked. The requirement for such items will be filled by use of the next higher assembly or component.

Code	Explanation
X2-	Repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain same through cannibalization. Where such repair parts are not obtainable through cannibalization, requirements will be requisitioned, with accompanying justification, through normal supply channels
G-	Major assemblies that are procured with PEMA funds for initial issue only as exchange assemblies at DSU and GSU level. These assemblies will not be stocked above DS and OS level or returned to depot supply level.

(2) Maintenance code indicates the lowest category of maintenance authorized to install the listed item. The maintenance level codes are-

Code	Explanation
C.....	Operator/crew
0.....	Organizational maintenance

(3) Recoverability code indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are expendable. Recoverability codes are-

Code	Explanation
R-	Applies to repair parts and assemblies which are economically repairable at DSU and GSU activities and normally are furnished by supply on an exchange basis.
S-	Repair parts and assemblies which are economically repairable at DSU and GSU activities and which normally are furnished by supply on an exchange basis. When items are determined by a GSU to be uneconomically repairable, they will be evacuated to a depot for evaluation and analysis before final disposition.
T-	High dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts normally are repaired or overhauled at depot maintenance activities.
U-	Repair parts specifically selected for salvage by reclamation units because of precious metal content, critical material, or high dollar value reusable casings or castings.

b. Federal Stock Number, Column 2, This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description, Column 3. This column indicates the Federal item name and any additional

description of the item required. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturers in parentheses.

d. Unit of Measure, Column 4. A two-character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based; e.g., ft., ea., pr., etc.

e. Quantity Incorporated in Unit, Column 5. This column indicates the quantity of the item used in the TS-716/U. Subsequent appearances of the same item in the same assembly are indicated by the letters' "REF".

f. 15-Day Organizational Maintenance Allowances, Column 3 of Section II and Column 6 of Section III.

(1) The allowance columns are divided into four subcolumns. Indicated in each subcolumn opposite the first appearance of each item is the total quantity of items authorized for the number of equipments supported. Subsequent appearances of the same item will have the letters "REF" in the allowance columns. Items authorized for use as required, but not for initial stockage, are identified with an asterisk in the allowance column.

(2) The quantitative allowances for organizational level of maintenance represents one initial prescribed load for a 15-day period for the number of equipments supported. Units and organizations authorized additional prescribed loads will multiply the number of prescribed loads authorized by the quantity of repair parts reflected in the density column applicable to the number of items supported to obtain the total quantity of repair parts authorized.

(3) Organizational units providing maintenance for more than 100 of these equipments shall determine the total quantity of parts required by converting the equipment quantity to a decimal factor by placing a decimal point before the next to last digit of the number to indicate hundredths, and multiplying * the decimal factor by the parts quantity authorized in the 51-100 allowance column. Example, authorized allowance for 51-100 equipments is 40; for 150 equipments multiply 40 by 1.50 or 60 parts required.

(4) Subsequent changes to allowances will be limited as follows: No change in the range of items is authorized. If additional items are considered necessary, recommendation should be forwarded to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-ME-NMP-EM, Fort Monmouth, N.J., 07703, for exception or revision to the allowance list. Revisions to the range of items authorized will be made by the USA ECOM National Maintenance Point based upon engineering experience, demand data, or TAERS information.

g. Illustration, Column 7. This column is divided as follows:

(1) Figure number, column 7A. Indicates the figure number of the illustration in which the item is shown.

(2) Item number or reference designation, column 7b. Indicates the reference designation number used to identify the item in the illustration.

D-4. Special Information

Repair parts mortality is computed from failure rates derived from experience factors with the individual parts in a variety of equipments. Variations in the specific application and periods of use of electronics equipment, the fragility of electronic piece parts, plus intangible material and quality factors intrinsic to the manufacture of electronic parts, do not permit mortality to be based on hours of end item used. However, long periods of continuous use under adverse conditions are likely to increase repair parts mortality.

D-5. Location of Repair Parts

a. This appendix contains two cross-reference indexes (sec. V and sec. VI) to be used to locate a repair part when either the Federal stock number, reference number (manufacturer's part number), or reference designation is known. The first column in each index is prepared in numerical and/or alpha-numeric sequence in ascending order. Where a Federal

stock number is not listed, refer to the reference number (manufacturer's part number) immediately following the Federal stock number. b. When the Federal stock number is known, follow the procedures given in (1) and (2) below.

(1) Refer to the index of Federal stock numbers (sec. V) and locate the Federal Stock' number. The FSN is cross-referenced to the applicable figure and reference designation.

(2) When the reference designation is determined, refer to the reference designation index (sec. VI). The reference designations are listed in numeric-alpha ascending order and are cross-referenced to the page number on which they appear in the repair parts list (sec. III). Refer to the page number noted in the index and locate the reference designation (col. 7b). If the word "REF" appears in the allowance column for the repair part, note the Federal stock number (col. 2) or manufacturer's part number (col. 3). Refer to the FSN index and note the reference designation for that FSN or part number. Refer to the reference designation index and note the page number given for the reference designation. Refer to the page noted in the RPSTL (sec. III) and locate the reference designation in column 7b of the repair parts list.

c. When the reference designation is known, follow the procedures given in b(2) above.

d. When neither the FSN nor reference designation is known, identify the part in the illustration and follow directions given in c above or scrutinize column 3 of the repair parts list., D-6. Federal Supply Codes for Manufacturers

<i>Code</i>	<i>Manufacturer's Name</i>
Code.....	Manufacturer's Name
75915	Littelfuse Inc.
80063	Army Electronics Command
81349	Military Specifications
96906	Military Standards

(Page D-4 is next page)

SECTION II. PRESCRIBED LOAD ALLOWANCE

(1) FEDERAL STOCK	(2) DESCRIPTION	(3) 15-DAY ORG. MAINT. ALLOWANCE			
		(a) 1-5	(b) 6-20	(c) 21-50	(d) 51-100
5920-229-1312	FUSE, CARTRIDGE: F02B25OV1/16A (96906)	1	2	,3	6
5920-280-3167	FUSE, CARTIDGE: 313.187 (75915)	1	2	3	6
5920-229-1317	FUSE, CARTRIDGE: MD-380242 (80063)	1	2	3	6
5355-160-5910	KNOB: NS90120-2BOI (81349)			2	2
5355-081-4572	KNOB: M890120-2GO01 (81349)			2	2
5355-753-5281	KNOB: MS91528-1N29 (81349)			2	2
6240-057-2887	LAMP, GL: M15571-1 (81349)	1	2	3	6
	D-4				

SECTION III. REPAIR PARTS FOR ORGANIZATIONAL MAINTENANCE

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION USABLE ON CODE	(4) UNIT OF MEAS	(5) QTY INC IN UNIT	(6) 15-DAY ORGANIZATIONAL MAINTENANCE ALLOWANCE				(7) ILLUSTRATION		
					(a)	(b)	(c)	(d)	(a)	(b)	
					1-5	6-20	21-50	51-100	FIG NO.	ITEM NO. OR REFERENCE DESIGNATION	
G-c-s	6625-965-1433	TEST SET, TLEPONE, TS-716/U								1-1	
P-O--		DIAL, CONTROL: SM0380205-1 (80063)	ea	1	*	*	*	*		1-5	1A4MP17
P-O--		DIAL, CONTROL: SMB380205-2 (80C63)	ea	1	*	*	*	*		1-5	IA4MP18
P-O--		DIAL, CONTROL: SLE380205-3 (80063)	ea	1	*	*	*	*		1-5	IA4MP19
P-O--		DIAL, CONTROL: SEM380205-4 (80063)	ea	1	*	*	*	*		1-5	IA4MP20
P-C--	5920-229-1312	FUSE, CARTRIDGE: 1/16A F02B250V1/16A (96906)	ea	1	1	2	3	6		4-1	1A3F1
P-C--	5920-280-3167	FUSE, CARTRIDGE: 3/6A 313.187 (75915)	ea	2	1	2	3	6		1-5	1A4F2
P-C--	5920-280-3167	FUSE, CARTRIDGE: 3/6A 313.187 (75915)	ea	REF	RE	REF	REF	REF		1-5	1A4F3
P-C--	5920-229-1317	FUSE, CARTRIDGE: SM2380242 (80063)	ea	2	1	2	3	6		1-5	1A4F4
P-C--	5920-229-1317	FUSE, CARTRIDGE: SMD380242 (80063)	ea	REF	REF	REF	REF	REF		1-5	1A4F5
P-O--	5355-081-4572	KBNB: MS90120-2vOI (81349)	ea	1	*	*	2	2		1-5	1A4MP29
P-O--	5355-160-5910	KNOB: MS90120-2P01 (81349)	ea	5	*	*	2	2		1-5	1A416MP24
P-O--	5355-160-5910	ENOB: M90120-2B01 (81349)	ea	REF	REF	REF	REF	REF		1-5	IA4MP25
P-O--	5355-160-5910	NOB: 1MS90120-2P01 (81349)	e	REF	REF	REF	REP	REF		1-5	IA4MP26
P-O--	5355-160-5910	DOB: MS90120-2B01 (81349)	ea	REF	REF	REF	REF	REF		1-5	IA4MP27
P-O--	5355-160-5910	KNOB: M950120-2B01 (81349)	ea	REF	RBEF	REF	REF	REF		1-5	1A4MP28
P-O--	5355-753-5281	ROB: M591528-1N2v (81349)	ea	5	*	2	2	1-5		1A4MP30	
P-O--	5355-753-5281	KNOB: MS91528-1N2G (81349)	ea	REF	REF	REF	REF	REF		1-5	1A4NP31
P-c--	5355-753-5281	KNOB: MS91528-52G (81349)	ea	REF	BEF	RE	REF	REF		1-5	1A44132
P-O--	5355-753-5281	IRIOB: M591528-320 (81349)	ea	REF	REF	REF	REF	1-5		1A4MP33	
P-O--	5355-753-5281	NOB: MS91528-1IN2Ga (81349)	ea	REF	REF	REF	REF	REF		1-5	1A4MP34
P-C--	6240-057-2887	LAMP: MS15571-1 (81349)	ea	1	1	2	3	6		1-5	1A4DsIEI
P-C-	6240-223-9100	LAMP NEON NE5	ea	1	1	2	3	6		1-5	IA4D2E11

**SECTION v. INDEX-FEDERAL STOCK NUMBER CROSS REFERENCE
TO FIGURE AND ITEM NUMBER OR REFERENCE DESIGNATION**

FEDERAL STOCK NUMBER	FIGURE NUMBER	ITEM NUMBER OR REF. DESIGNATION	FEDERAL STOCK	FIGURE NUMBER	ITEM NUMBER OR REF. DESIGNATION
5355-o081-4572	1-5	IA4P29			
5355-160-5910	1-5	IA 24-			
5355-160-5910	1-5	141P25			
5355-160-5910	1-5	i4W6			
5355-160-5910	1-5	LA4P27			
5355-160-5910	1-5	IA4P28			
5355-753-5281	1-5	L4LNP30			
5355-753-15281	1-5	lah31			
5355-753-5281	1-5	1A4e32			
5355-753-5281	1-5	LAK133			
5355-753-5281	1-5	IAhP34			
5920-229-1312	4-1	I31			
5920-2291317	1-5	A4h4			
5920-229-1317	1-5	LA415			
5920-28o-3167	1-5	IIA4n			
5920-28-3167	1-5	IA4F3			
6240-057-2687	1-5	IA4DSz11			
6240-223-9100	1-5	A4DS81			

REFERENCE NO	MFR. CODE	FIG. NO.	ITEM NO. OR REF. DESIGNATION
SMB380205-1	80063	1-5	1A4MP17
SMB380205-2	80063	1-5	1A4MP18
SMB380205-3	80063	1-5	1A4MP19
SMB380205-4	80063	1-5	1A4MP20

**SECTION VI. INDEX- REFERENCE DESIGNATION
CROSS REFERENCE TO PAGE NUMBER**

REFERENCE DESIGNATION	PAGE NUMBER	REFERENCE DESIGNATION	PAGE NUMBER	REFERENCE DESIGNATION	PAGE NUMBER
1A3F1	D-5				
1A4DSIE1	D-5				
1A4DS2E1	D-5				
1A4F2	D-5				
1A4F3	D-5				
1A4F4	D-5				
1A4F5	D-5				
1A4MP17	D-5				
1A4MP18	D-5				
1A4Mp19	D-5				
1A4m20	D-5				
1A4MP24	D-5				
1A4MP25	D-5				
1A4MP26	D-5				
1A4mp27	D-5				
1A4MP28	D-5				
1A4MP29	D-5				
1A4mp30	D-5				
1A4MP31	D-5				
1A4MP32	D-5				
1A4mP33	D-5				
1A4IP34	D-5				

D-7

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 USAARMS (2)
 USAIS (2)
 USAES (2)
 USAINTS3
 WRAMC (1)
 USACDCEC (10)
 Edgewood Arsenal (5)
 CONARC (5)

Instl (2) except
 Fort Gordon (10)
 Fort Huachuca (10)
 Fort Carson (10)
 WSMR (3)
 Army Dep (2) except
 LBAD (14)
 SAAD (30)
 TOAD (14)
 LEAD (7)
 NAAD (5)
 SVAD (5)
 ATAD (10)
 ANAD (5)
 Gen Dep (2)
 Sig Sec Den Dep (5)
 Sig Dep (10)
 Sig FLDMS (2)
 ATS (1)
 USAERDAA (2)
 USAERDAW (5)
 USACRREL (1)
 MAAG (1)
 USARMIS (1)
 Units org under fol TOE
 (2 cys each unit):
 11-15
 11-16
 11-85
 11-95
 11-96
 11-117
 11-158
 11-225
 11-302
 11-500 (AA-AC)
 29-134
 29-136
 29-500
 55-458

NG: None

USAR: None.

For explanation of abbreviations used, see AR 310-50.

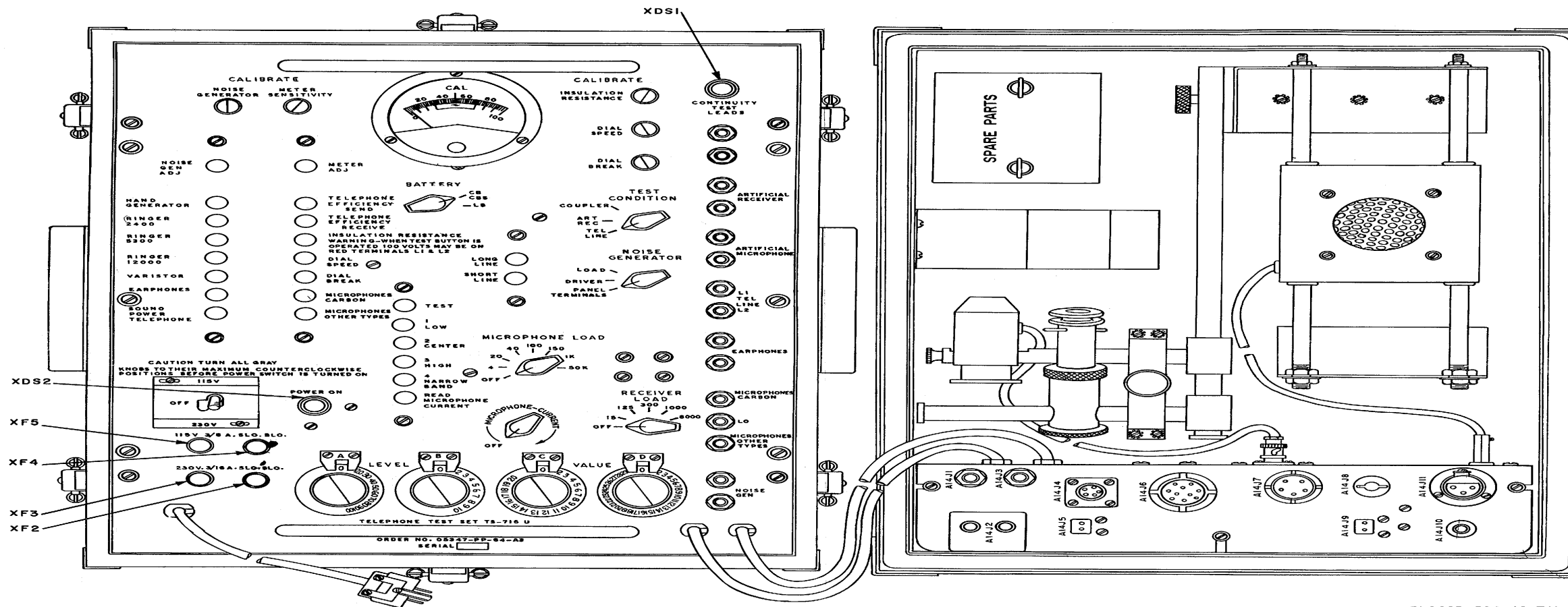



Figure 5-1. Telephone Test Set TS-716-U, controls indicator, and connectors.

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