DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL, TEST SET, TELEPHONE AN/ USM-181

Headquarters, Dopartment of the Army, Washington, D.C. 20315
28 September 1964

WARNING

Be careful when working with the 115-volt ac line connection. Serious injury or death may result from contact with these terminals.

DON'T TAKE CHANCES!

This reprint includes all changes in effect at the time of publication; changes 2, 4 and 5.

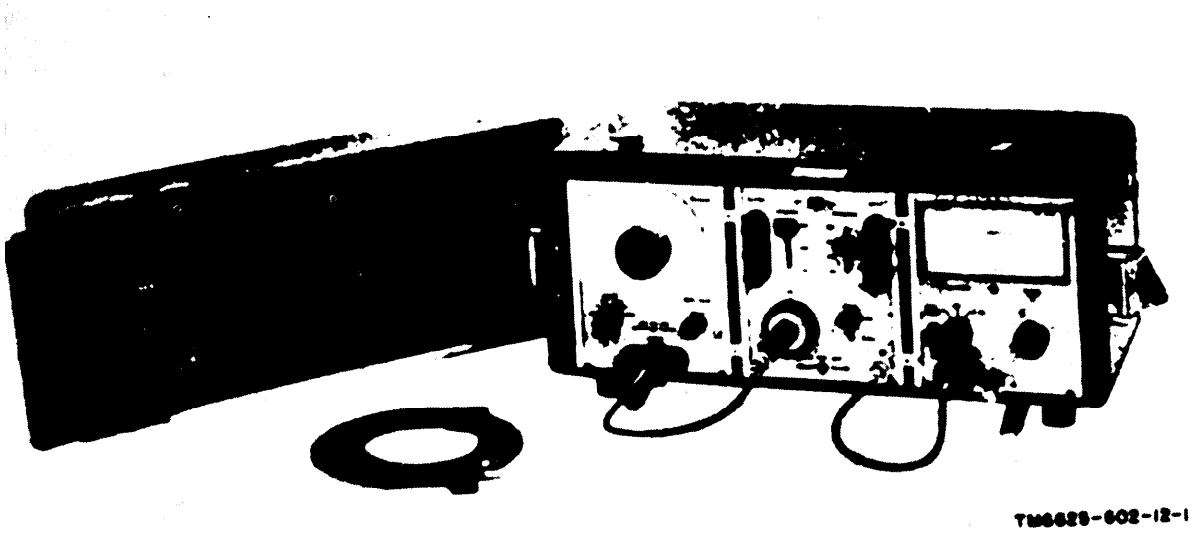

Figure 1. Test Set, Telephone AN/USM-181 (front view).

TM 11-6625-602-12
C 2

CHANGE
No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 17 December 1965

Organizational Maintenance Manual Including Repair Parts and Special Tools List

TEST SET, TELEPHONE AN/USM 181

TM 11-6625-602-12, 26 September 1964, is changed as follows:

The title of the manual is changed as shown above.

Page 3, paragraph 3. Delete subparagraph c and substitute:

c. Reporting of Equipment Manual Improve ments The direct reporting by the individual user, of errors, omissions, and recommendations for improving this manual is authorized and encouraged. DA Form 2028 (Recommended Changes to DA publications) will be used for reporting these improvement. This form will be completed using pencil, pen, or typewriter and forwarded direct to Commanding General, U.S. Army Electronics Command, ATTN: AMSEL-MR-(NMP)-MA, Fort Monmouth, N. J., 07703.

Page 32. Add appendix IV after appendix III.

APPENDIX IV
ORGANIZATIONAL REPAIR PARTS LIST

Section I. INTRODUCTION

1. General

a. This appendix lists the quantities of repair parts authorized for organizational maintenance and constitutes a basis of requisitioning when the major item of equipment is authorized to the organization. These equipments are issued on the basis of allowances prescribed in equipment authorization tables and other documents which are a basis of requisitioning.

b. Columns are as follows:

(1) *Federal stock number.* This column lists the 1l-digit Federal stock number.

(2) *Designation by model.* Not used.

(3) *Description.* Nomenclature or the standard item name and brief identifying data for each item are listed in this column. When requisitioning, enter the nomenclature and description.

(4) *Unit of issue.* The unit of issue is each unless otherwise indicated and is the supply term by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

(5) *Expendability.* Nonexpendable items are indicated by NX. Expendable items are not annotated.

(6) *Quantity incorporated in unit.* This column lists the quantity of each part found in a given assembly, component, or equipment.

(7) *Organizational.* The quantities indicated in this column are maximum levels of repair parts authorized to be kept on hand by units performing organizational maintenance. The quantities are based on 100 equipments to be maintained for a 15-day period. An asterisk (*) indicates that an item is not authorized for stockage but if required, may be requisitioned for immediate use only.

(8) *Illustration.* The "Item No." column lists the reference designations that appear on the part in the equipment. These same designations are also used on any illustrations of the equipment. The numbers in the "Figure No." column refer to the illustrations where the part is shown.

2. Parts for Maintenance

When this equipment is used by signal service organizations organic to theater headquarters or communication zones to provide theater communications, those repair parts authorized up to and including general support are authorized for stockage by the organization operating this equipment

3. Serial Numbers

Components bearing serial numbers 1 through 60, Order No. FR–36–039–L4–05379 (E) are identified by Hewlett-Packard Model numbers. Serial numbers 101 and above are identified by JCENS nomenclatures.

4. Requisitioning Information

a. The allowance factors are based on 100 equipments. In order to determine the number of parts authorized for the specific number of equipments supported, the following formula will be used and carried out to two decimal places.

$$\text{Specific number of equipments supported} \times \frac{\text{allowance factor}}{100} = \text{Number of parts authorized.}$$

b. Fractional values obtained from above computation will be rounded to whole numbers as follows :

(1) When the total number of parts authorized is less than one, the quantity authorized will be one.

(2) For all values above one, fractional values below 0.5 will revert to the next lower number, fractional values of 0.5 or larger will advance to the next higher whole number.

c. The number of parts authorized, determined after application of *a* and *b* above, represent one prescribed load for a 15-day period. The items and computed quantities thereof must be on hand or on order at all times.

d. Major commanders will determine the number of prescribed loads organizational units will carry. Units and organizations authorized additional prescribed loads will utilize the formula explained in a above but will multiply the number of equipments supported by the number of authorized prescribed loads before completing the formula. Fractional values will be rounded to whole numbers as described above.

SECTION II. FUNCTIONAL PARTS LIST

FEDERAL STOCK NUMBER	DESIGNATION BY MODEL	DESCRIPTION	UNIT OF ISSUE	EXP	QTY IN UNIT	MAINT OBG ALLOW.	ILLUSTRATION	
							FIGURE NO.	ITEM NO.
		NOTE: Components bearing serial numbers 1 through 60, order FR-36-039-LA-05379(E) are identified by Hewlett-Packard model numbers, serial numbers 61 and above are identified by JCENS						
		TEST SET, TELEPHONE AN/USM-181						
6625-740-0344		TEST SET, TELEPHONE AN/USM-181: Used to measure transmission line and system characteristics such as attenuation, frequency response and gain in multi-channel communication systems;		NX			1	
		GROUP 1 ATTENUATOR, IMPEDANCE MATCHING CN-947/USM-81						
6625-763-2390		ATTENUATOR, IMPEDANCE MATCHING CN-947/USM-181 (Hewlett-Packard Model 353A)		NX	1	•	5	
		GROUP 2 CASE, TEST EQUIPMENT CY-4071/USM-181						
		NOTE: No parts authorized for organizational maintenance.						
		GROUP 3 SIGNAL GENERATOR SG-543/U						
6625-965-1532		GENERATOR, SIGNAL SG-543/U (Hewlett-Packard model H20-204B) formerly model H07-204B		NX	1	•	3	
		GROUP 4 VOLTMETER, ELECTRONIC ME-260/U						
6625-965-1534		VOLTMETER, ELECTRONIC ME-260/U (Hewlett-Packard model 403B-DB)		NX	1	•	4	
5920-142-4837		FUSE, CARTRIDGE: Littelfuse p/n 312.062 NOTE: Fuse mtd inside of cabinet.			1	20.0	7	F1

By Order of the Secretary of the Army:

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

Official:

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

Distribution:

Active Army :

USASA (2)
CNGB (1)
CC-E (7)
Dir of Trans (1)
CofEngr (1)
TSG (1)
CofSptS (1)
USAAESWBD (6)
IJSACDCEA (1)
USACDCCBRA (1)
USACDCCEA (1)
USACDCOA (1)
USACDCQMA (1)
USACDCTA (1)
USACDCADA (1)
USACDCARMA (1)
USACDCAVNA (1)
USACDCARTYA (1)
USACDCSWA (1)
USACDCCEA, Ft Huachuca (1)
USACDCEC (10)
LTSAMC (6)
USCONARC (5)
ARADCOM (5)
ARADCOM Rgn (2)
OS Maj Cored (4)
USAMERCC (S)
LOGCOMD (2)
USAMICOM (4)
USASMC (2)
USASCC (4)
MDW (1)
Armies (2) except
EUSA (S)
Corps (2)
USAC (3)
llth Air Aslt Div (3)
Svc Colleges (2)
Br Svc Sch (2) l xcept
USASCS (10)
USATC AD (2)
USATC Armor (2)
USATC Engr *(2)*
USATC Inf (2)
USASTC (2)
WRAMC (1)
Army Pic Cen (2)
Instl (2) except
Fort Monmouth (70)
Fort Hancock (4)
Fort Gordon (10)
Ft Huachuca (26)
WSMR (6)
Fort Carson (26)
Fort Knox (12)
Army Dep (2) except
SAAD (30)
TOAD (14)
FTWOAD (10)
LEAD (7)
SHAD (3)
NAAD (S)
SVAD (6)
CHAD (3)
ATAD (10)
LBAD (14)
GENDEP (OS) (2)
Sig See, GENDEP (0S) (S)
Sig Dep (OS) (12)
Sig Fld Maint Shops (2)
AMS (1)
USAERDAA (2)
USAERDAW (13)
USASETAF (6)
Unite org under fol TOE:
7 (2)
11-66 (2)
11-67 (2)
11-97 (2)
11-98 (2)
11-117 (2)
11-127 (2)
11-156 (2)
11-157 (2)
11-158 (2)
11-500 AA-AC (2)
11-587 (2)
11-692 (2)
11-597 (2)
17 (2)
29-1 (2)
29-11 (2)
29-15 (2)
29-16 (2)
29-21 (2)
29-25 (2)
28-26 (2)
29-35 (2)
29-36 (2)
37 (2)

NG: State AG (3) ; units-same as Active Army except allowance is one copy to each unit.
USAR: None.
For explanation of abbreviations used see AR 320-60.

*TM 11-6625-602-12
C 4

Change
No. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 26 February 1973

Organizational Maintenance Manual Including Repair Parts And Special Tools List TEST SET, TELEPHONE AN/USM-181 AND HP MODEL 3550B

TM 11-6625-602-12,28 September 1964, is changed as follows:

This manual is changed to apply to Hewlett-Packard Model 3550B portable test set which consists of the 204C Oscillator, the 402B AC Voltmeter, the 353A Patch Panel, and the 3550A 45A Carrying Case.

The title of the manual is changed as shown above.

Page 3, paragraph, line 2. Change "Test Set, Telephone AN/USM-181" to "Test Set, Telephone AN/USM-181 and HP Model 3550B (test set)."

Change "AN/USM-181" to "test set" in the following places:

Page 19, paragraph 31, line 2.

Page 20, paragraph 33, line 1.

Page 21, paragraph 36, line 1.

Page 36, paragraph 46d(1), line 2.

Subparagraph (2), line 2.

Subparagraph (3), line 1.

Change "Test Set, Telephone AN/USM-181" to "test set" in the following places:

Page 19, paragraph 32, Sequence No. 1.

Page 20, paragraph 34a line 2.

Subparagraph *b,* line 1.

Paragraph 35a line 13.

Page 25, paragraph 44a, line 2.

Page 3. Delete paragraph 2 and substitute the following

2. Indexes of Publications

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

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWOs) pertaining to the equipment.

Page 3. Delete paragraph 3 and substitute the following

3. Maintenance Forms and Records

Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

3.1. 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 Commander, US Army Electronics Command, ATITN: AMSEL-MA-C, Fort Monmouth, NJ 07703.

3.2. Administrative Storage

For administrative storage procedures, refer to TM 740-90-1.

Paragraph 4, line 1, change "Test Set, Telephone AN/USM-181 is a portable" to "Test, Telephone AN/USM-181 and HP Model 3550B are both a portable."

Page 4, paragraph 5. Make the following changes:

*This change supersedes C 1, 21 May 1965,a nd C 3, 4 May 1967.

Subparagraph *a*, line 13, across from "Maximum Level". Change" ± 10 dbm (2.5 volts rms at 600 ohms)" to " + 22 dbm (10 volts rms at 600 ohms). "

Line 22, across from "Maximum Level."

Make the following changes:

Change" ± 10 dbm" to" + 22dbm."

Change "2.5 volts" to "10 VOIts"

Subparagraph c, line 1. After "Frequency range", add 5 Hz to 1.2 MHz 5 range settings (Model *204 C).*

Subparagraph d, line 5. Change "20° C" to" + 20° C(+68°F)."

Paragraph 6. Delete paragraph 6 and substitute:

6. Items Comprising Test Set, Telephone AN/USM-181

FSN	Quantity	l-m	Dimensions (in.)			Weight (lb)	Fig No
			Height	Depth	Width		
6625-965-1533	1	Case, Test Set CY-4071/USM-181	8 3/8	13 1/4	19 1/4	14 1/2	2
6625-965-1534	1	Voltmeter, Electronic ME-260/U	6 3/32	8	5 1/8	6 1/2	4
6625-763-2390	1	Attenuator, Impedance Matching CN-947/USM-181	6 3/32	8	5 1/8	6 1/2	5
6625-965-1532	1	Generator, Signal SG-543/U	6 3/32	8	5 1/8	6	3
	1	Shoulder Strap Adjustable					2
5995-995-9822	1	Cable Assembly, Power Electrical CX-9031/USM-181					2
5995-985-8160	2	Cable Assembly, Radio Frequency CG-2723/U (12 in long)					2

6.1. Common Names

A list of nomenclature assignments for the components of Test Set, Telephone AN/USM-181 is given below. A common name is indicated after each item.

Nomenclature	Common Name
Test Set, Telephone AN/USM-181	Test Set.
Generator, Signal SG-543/U	Oscillator
Voltmeter, Electronic ME-260/U	Voltmeter,
Attenuator Impedance Matching, CN-947/USM-181	Patch panel
Cable Assembly, Power Electrical CX-9031/lJSM-181	Power cord.
Cable Assembly, Radio Frequency CG-2723/U	Patch cable.
Case. Test Set CY-4071/USM-181	Carrying case.

Paragraph 7, heading. Change heading to: Description of AN/USM-181 and HP Model 3550B.

Paragraph 8. Delete paragraph 8 and substitute:

8. Description of Oscillator

The SG-543/U Oscillator and the Mode! 204C Oscillator (fig. 3.1) are basically the same, except that Model 204C has a higher frequency range. (Refer to paragraph 5 for technical characteristics). Each oscillator has a five-range setting and an amplitude adjustment to 10 millivolts (rev) maximum. All signal connectors and controls are on the front panel. The ac source connection and line voltage selection switch are at the rear of the oscillator assembly.

Page 6, figure 2. Delete figure 2 and substitute new figure 2:

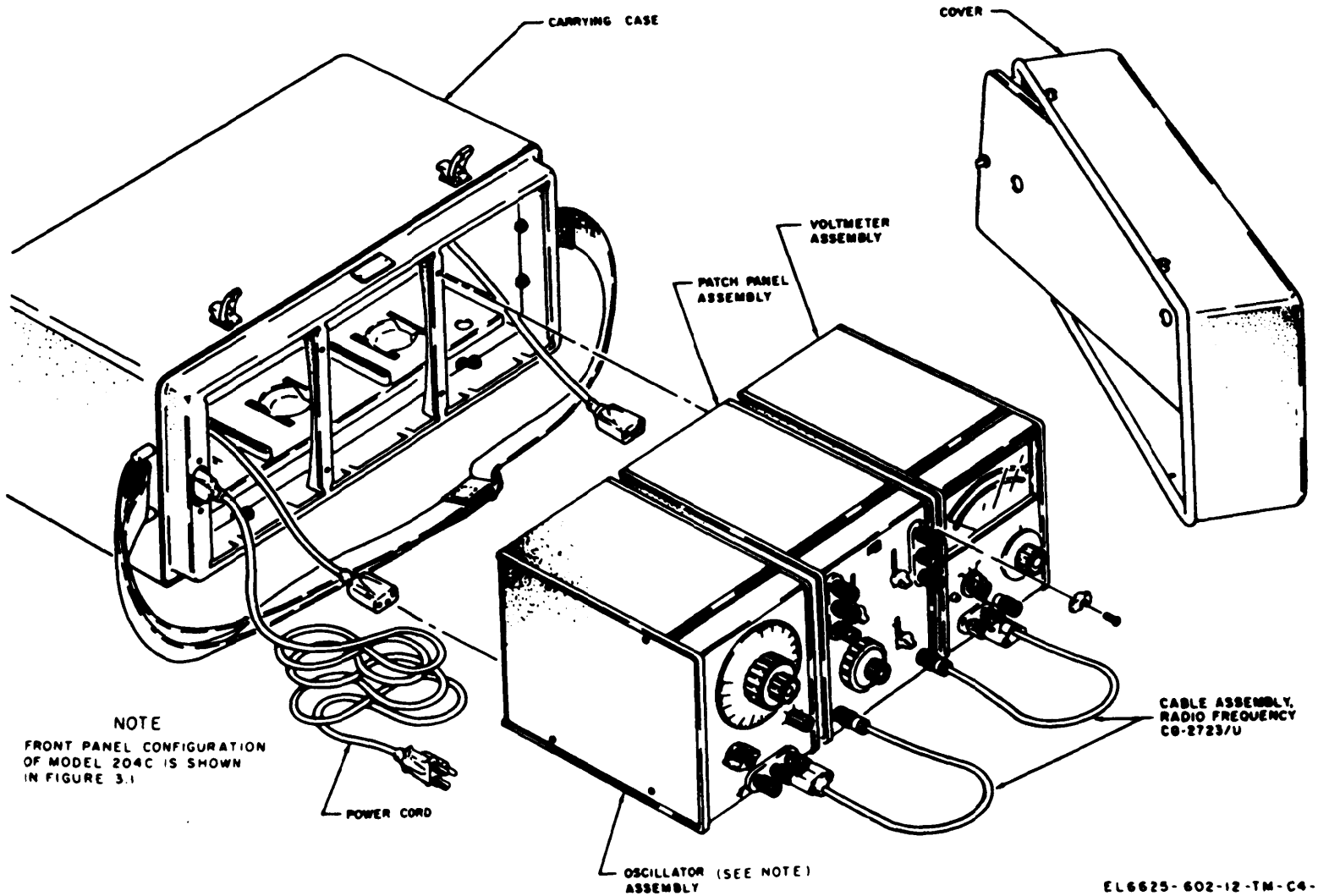

Figure 2. Test Set, Telephone AN/USM-181, assembly diagram.

Page 7. Add figure 3.1 after figure 3:

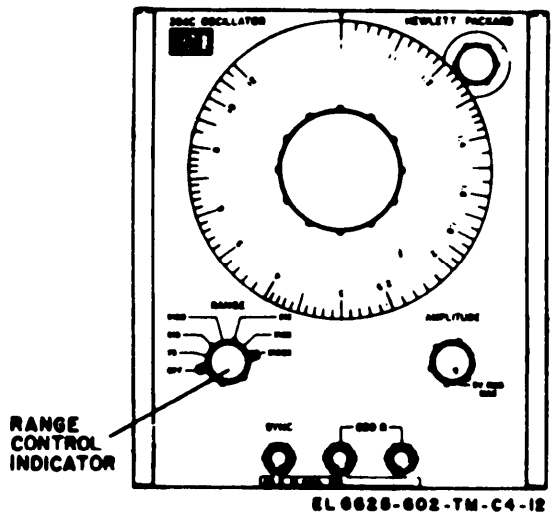

Figure 3.1 *Oscillator controls, connectors, and indica Model 204C, front view.*

Page 9, paragraph 12. Make the following changes:

Subparagraph a, line 6. Change ‘6,800 cubic inches” to "4 cubic feet.”

Subparagraph b(6), line 2. Change “manual” to “manuals.”

Page 12, paragraph 18, chart. After the last item, add:

SYNC	Provides an input for an external synch signal Provides all output synch signal of 17 volts rms,

Note SYNC available on oscillator Model 204C only (fig 3.1)

Page 29. Paragraph 29, line 2, After AN/USM-181, add “and HP Model 3550B”.

Page 25, paragraph 44. Make the following changes:

Subparagraph a, chart, “Quantity” column. Change “6,800 cubic inches” to "4 cubic feet.”

Subparagraph *b(4),* line 2. Change “manual” to “manuals.”

Page 27, Appendix I. Delete Appendix I and substitute:

APPENDIX I
REFERENCES

DA Pam 3104	Index of Technical Manuals, Technical Bulletins, Supply Manuals (types 7,8, and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	US Army Equipment Index *of* Modification Work Orders.
SB 38-100	Preservation, Packaging, Packing and Marking Materials, Supplies and Equipment used by the Army.
TB 746-10	Field Instructions for Painting and Preserving Electronics Command Equipment.
TM 38-750	The Army Maintenance Management Systems (TAMMS).
TM 740-90-10	Administrative Storage of Equipment

Page 32, section III, next to last item. Change “2005” to: 200S.

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
chief of staff

Official:
VERNE L. BOWERS
Major General, United States Armv
The Adjutant General

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Active Army:

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CNGB(l)
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AMC(l)
TECOM (2)
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USACDCCEA (1)
USACDCCEA (Ft Huachuca) (1)
ARADCOM(l)
OS Maj Comd (3)
USARPAC (3)
USARYIS(3)
USASTRATCOM (5)
USASTRATCOM Sig Gp Okinawa
USASTRATCOM Sig Gp Taiwan (10)
USASTRATCOM Sig GPT (2)
USASTRATCOM-PAC (3)
USASCS (50)
USASESS(5)
USAINTS(3)
Army Dep (l) except
SAAD (20)
TOAD(14)
LBAD(5)
LEAD(5)
Gen Dep (2)
Sig See, Gen Dep (2)
Sig Dep(2)
MAAG, Republic of China (2)
USACSA (3)
Sig FLDMS (2)
Units org under fol TOE: 1 ea.
11-158
11-302
29-134
29-136

ARNG & USAR: None.
For l xplanation of abbreviations wed, see AR 310-50.

TM 11-6625-602-12
C 5

CHANCE
No. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, *16 October 19 75*

Operator's and Organizational Maintenance Manual including Repair Parts and Special Tools List
TEST SET, TELEPHONE AWSM-181 AND HEWLETT-PACKARD MODEL 3550B

TM 11-6625-602-12, 28 September 1964 is changed as follows :

The title of the manual is changed as shown above.

Page 2. Delete chapter 4.

Page 3. Delete paragraph 3 and substitute the following:

3. Forms and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Maintenance forms, records, and *reports* which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

b. Report of Packaging and Handling Deficienties. Fill out and forward DD Form 6 (Packaging Improvement Report) as prescribed in AR 700-58/NAVSUPINST 4030.29/AFR 71-13/MCO P4030.29A, and DSAR 4145.8.

c. *Discrepancy* in *Shipment Report (DISREP) (SF 361).* Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as pre scribed in AR 55-38/NAVSUPINST 4610.33A/ AFR 75-18MC0 P4610.19B, and DSAR 4500.15.

3.1. Reporting of Errors

The reporting of errors, omissions, and recommendations for improving this publication is authorized and encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-Q, Fort Monmouth, NJ 07703.

3.2. Administrative Storage

For procedures, forms, and records, and inspections required during administrative storage of this equipment, refer to TM 740-90-1.

3.3 Destruction of Army Material

Demolition and destruction of electronic equip ment will be under the direction of the commander and in accordance with TM 750-244-2.

Page 23, *paragraph* 42. Add paragraphs 42.1 through 42.5 after paragraph 42

42.1 Voltmeter, Electronic ME-260/U, Battery-Charging Rate Calibration

The battery-charging rate is set at the factory and will not normally need readjustment. When the ME-26/U is used in the field, a fast-charging rate may be necessary. When the ME-260/U is used for bench work, a slow-charging rate is used to prolong battery life.

a. Hold the FUNCTION switch on BATT. TEST and observe the indication on the meter. If the voltage is below 2.4 volts recharge the batteries.

NOTE

To charge the voltmeter batteries connect the voltmeter to an ac source and turn the FUNCTION switch to ON.

b. Remove the voltmeter from the carrying case.

c. Connect the voltmeter power cord to the ac power source.

d. Set the FUNCTION switch to ON snd allow a 2-minute warmup.

e. Clip the dc milliammeter probe to the violet battery lead.

f. Adjust R39 for a 6.2-ma indication on the dc milliammeter.

g. Remove the dc milliammster probe and replace the voltmeter in the carrying case.

NOTE

If the indication is in a negative direction, reverse the clip-on probe. Resistor R39 maybe adjusted for a charging rate of n-ma indication on the milliammeter

(fast charge) when the equipment is used primarily in the field, where an ac charging source is not readily available. When the equipment is used primarily for bench work and connected to an ac source, do not adjust R39 for the fast charge rate. If the equipment is adjusted for the fast charge, attach a tag to the front of the equipment stating that the equipment is adjusted for fast charge, and the prolonged charging will shorten the battery life.

42.2 Generator, Signal SG-543/U Battery-Charging Rate Calibration

a. The battery charger is set at the factory and will not normally need radjustment Use a clip-on dc milliammeter for this adjustment.

b. Adust R102 as follows:

(1) Refer to paragraph 16 and check batteries for full charge. If not fully charged, recharge batteries. After the batteries are fully charged, Proceed with (2) below.

NOTE

To charge the signal generator batteries, connect the signal generator to an ac source.

(2) Set the RANGE switch to OFF.

(3) Remove the signal generator from the carrying case.

(4) Connect the signal generator power cord to a proper ac outlet.

(5) Clip the dc milliammeter probe to the violet lead on the batteries.

(6) Adjust R102 for a milliammeter indication of 5.5 ma ±0.5.

(7) Remove the milliammeter probe and replace and signal generator in the carrying case.

NOTE

Resistor R102 may be adjusted for not more than 15-ma indication on the milliarnmeter (fast charge) when the equipment is used primarily in the field where an ac charging source is not readily available when the equipment is used primarily for bench work and is connected to an ac source, do not adjust R102 for the fast charge rate. If the equipment is adjusted for the fast charge, attach a tag to the front of the

42.3. Battery Operation

a. It is recommended that the power cord be connected to a power source whenever possible. This will prevent seIf-discharge of the battery cells and will assure a fully charged battery whenever portable operation is required. Turn the equip ment OFF when not in use, particularly when operating with the power cord disconnected.

b. When fully charged the batteties will power the oscillator for approximately 35 hours of continuous or intermittent operation provided they are at a temperature of 81°F +/-10%. If the batteries are operated at higher or lower temperatures their capacity is reduced as the temperature extremes are approached; approximately 28 hours at 122°F (50°C) or approximately 20 hours at -4°F (-20C) At temperatures beyond these ex tremes the batteries are not capable of supplying their characteristic stable discharge voltage.

c. The + 122°F to -4°F temperature range is adequate for most users, however, keep these limits in mind when operating under field conditions. Internal temperatures in excess of 122°F are easily obtained if the instrument is left in the sun, even with a moderate ambient temperature. Good practice would be to avoid storing, transporting, or operating in direct sunlight other than for a very short period.

CAUTION

The hermetically sealed cells in these batteries may be permaneritly damaged or their life drastically reduced if exposed to extremely high temperatures. This danger increases under prolonged conditions.

42.4. Recharging Nickel-Cadmium Batteries

a. To recharge the batteries connect power cord to a suitable power source. The equipment can be used during recharging since the charge rate is the same whether the equipment is off or operating.

b. The FAST charge rate should be used only when a quick charge is necessary. Repeated charging at a FAST rate will shorten battery life.

CAUTION

The four Nickel-Cadmium are hermetically sealed and can be damaged if charged at a fast rate at temperatures above 104 F (40 C), Do not charge at the fast rate for more than 15 hours.

42.5 Cycle-life of Nickel-Cadmium BATtories

a. As extremes in temperature are approached, the cycle-life (complete charge-discharge cycles) of the batteries is reduced. Storage at high temperatures will increase the selfdischarge rate and also decrease the cycle-life. Permanent battery damage may result if the batteries am stored at a high temperature for a prolonged period.

b. Battery cycle-life can be extended by recharge ing before the batteries are completely dis chage, by charging at the SLOW rate, and by not overcharging.

c. The cycle-life of the batteries is based, by the manufacturer, on an end point of 80% of the rated 225 milliampere-hour capacity. This is with a ten hour charge and discharge current of 22.5 milliamperes with discharge carried to the normal Ten-hour end voltage (1.10 volts/cell x 5 = 5.50 volts/battay) on every cycle, Under these conditions a cycle-life in excess of 100 cycles can be expected

d When used to power the equipment the batteries are discharged at approximately a 35 hour rate. The batteries are not fully discharged if they are recharged as recommended in paragraph 42.4.

e. Optimum battery life can be obtained by following these precautions:

(1) Prevent complete bat&y discharge.

(2) Keep FAST charges to a minimum,

(3) operate at moderate temperatures when possible.

(4) Disconnect power cord after 60 hours of continuous charging with oscillator turned OFF (16 hours if charging batteries at a FAST rate)

Page 25. Delete chapter 4.

By Order of the secretary of the Army:

FRED C, WEYAND
General, *United States Army*
Chief of Staff

Official:

PAUL T. SMITH
Major General, United States Army
The Adnutant General

Distribution:

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USAINTCS (3)
USASESS (5)
HISA (Ft Monmouth) (33)
Depots (1) except
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USA Dep (PAC) (2)
Sig Sec USA Dep (PAC) (2)
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USACSA (3)
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JUSMAG, Korea (1)
USA Ascom Depot (2)
USA Camp Carroll Depot (2)
Units org under fol TOE:
(1 copy each unit)
11-302
29-134
29-136

NG: None

USAR: None

For explanation of abbreviation Used see AR 310-50.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Scope

This manual describes Test Set, Telephone AN/USM-181 (fig. 1) 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 repairmen.

2. Index of Equipment Publications

Refer to the latest issue of DA Pam 3104 to determine whether there are new editions, changes. or additional publications pertaining to the equipment. Department of the Army Pamphlet No. 30-4 is an index of current technical manuals, technical bulletins, supply manuals (types 4, 6, 7, 8, and 9), supply catalogs (type GL), supply bulletins, lubrication orders, and modification work orders available through publications supply channels. The index lists the individual parts (-10, -20, 35P, etc) and the latest changeas to and revisions *of* each equipment publication.

3. Forms and Records

a. Reports of Maintenance and *Unsatisfactory Equipment.* Use equipment forms and records in accordance with instructions in TM 38-750.

b. Report of Damaged or Improper Shipment. Fill out and forward DD Form 6 (report of Damaged or Improper Shipment) as prescribed in AR 700-58 (Army), NAVSANDA Publication 378 (Navy), and AFR 71-4 (Air Force).

c. *Reporting of Equipment Manual Improvements. The* direct reporting of errors, omissions, and recommmendations for improving this equipment manual by the individual user is authorized and encouraged. DA Form 2028 will be used for reporting thse imprements. This form may be completd by using pencil, pen, or typewriter. DA Forms 2028 will be completed in triplicate and forwarded by the individual using the manual. The original and one copy will be forwardt direct to: Commanding General, U.S. Army Electronics Command, ATT'N: AMSE-MR-MOC; Fort Monmouth N. J. 0770S. One information copy will be provided to the individual's immediate supervisor (officer, noncommissioned officer, suprvisor, etc).

Section II DESCRIPTION AND DATA

4. Purpose and Use

Test Set, Telephone AN/USM-181 is a portable oscillator, voltmeter, and patch panel combination fur measuring gain and attenuation in relation to frequency, crosstalk, noise, and power levels in telephone transmission lines, carinner circuit, filters, amplifiers, and attenuators It covers both the audiofrequency and carrier frequency range and is suitable for direct and general support and depot maintenance use. It operates on both alternating current (ac *or* on storage batteries within the test get. The oscillator supplies a test signal through an impedance matching transformer and attenuator in the patch panel to the external circuit under test. The voltmeter receives the test signal from the circuit under teat through an impedance matching transformer in the patch panel and indicates the test signal level in decibels (referred to 1 milliwatt (row) in 600 ohms) (dbm), in decibels (db) above or below the level of the test signal applied to the circuit, and in root mean square (rms) volts. The term. inais on the patch panel can be connected to

grounded, ungrounded, balanced, . *or* single ended circuits. The patch panel permits measurements on systems termminated in 135, 600, and 900 ohms, and bridging measurements on a 600-ohm basis. In the bridging mode the input impedance is 10,000 ohms.

5. Technical Characteristics

Freuency range -- ----5 cps to 560 kc.
Line-voltage input -----115 or 230 volts, 50 to 1000 Cps.
Weight:
In carrying case - ---30-1/2 pounds.
In shipping carton ---44-1/2 pounds.

a. *Patch Panel.*

Input:
Frequency range -----50 cps to 560 kc.
Frequency response .-. ± 1/2 db, 50 cps. to 560 kc.
Balance -- -------- Better than 40 db.
impedance --- ---- ---- l35, 600, 900, and bridging (10K) ohms, center tapped.
Insertion loss _ _____ Less than 3/4 db at 1 kc.
Maximum level -------- 10 dlbm (2.5 Volts rms at 600 ohms).

Output :
Frequency range ---50 cps to 560 kc.
Frequency response --- ± 1/2 db, 50 cps to 560 kc.
Balance ------ Better thaner than 40 db.
Impedance ---------- 135, 600, and 900 ohms, center tapped.
Insertion loss -- ----- Less than 3/4 db at 1 *kc.*
Distortion ---------- Less than 1%; 50cps to 560 kc.
Maximum level ----------±10 dbm (2.5 volts rms at 600 ohms).
Attenuation ____ _____ ± to 110 db.
Accuracy:
10-db section __ ___ Error is less than ± 0.25 db.
100-db section ____ Error is less than ±0.5 db.
Connections ___ _ Bindinff posts, whitch a c-cept *banana plugs on* 3/4-inch centers end BNC Connectors

Ac *Voltmeter.*

.
0.001 to 300 Volts rms 12 range Settings.
-72 dbm to +52 dbm ----12 *range* settings.
Frequency -_---------S cps to 2 mc.
Accuracy and *temperature range:*

Temperature	Accuracy		
	5 to 10 cps	10 cps to 1 mc	1 to 2 mc
0 to +50° C	±5%	±2%	±5%
–20 to 0° C	±8%	±8%	±8%

Nominal input impedance:
2 megohms shunted by approximately 40 uuf on 0.001-volt to 0.03-volt ranges, 25 uuf on 0.1-volt to 300-volt ranges.
Signal overload protection:
Fuse protected, l/16 amp.
Dc isolation:
Signal ground may be ±500 volts dc from the test set case.

C. *Oscillator.*

Frequency range:
5 cps to 560 kc -----5 range settings.
Dial accuracy ----------±3%
Frequency response ------ ± 3% into rated load.
Output impedance --- --- --600 ohms.
Output level:
10 milliwatts (2.5 volts rms) maximum 600 ohms; 5 volts rms into open circuit; ungrounded, continuously adjustable O to 20 db.
Distortion ----------Less than 1%.
Hum and noise ----------Less than 0.05%.

d. *Power Supply (Oscillator and Voltsmeter).* Identical characteristics in both oscillator and voltmeter power supplies. Four rechargeable nickel cadmium batteries. Forty hour operation per recharge (20 hours at -20° *C),* up to 500 recharging cycles. The recharging circuit operates on 115 or 230 volts ± 10 percent, *50* to 1,000 cps.

6. Components of AN/USM-l81 TEST Set

Quantity	Item	Height (In.)	Depth (in.)	Width (In.)	Weight (lb.)	Fig. No.
1	Carrying case (with cover)	8–3/8	13–1/4	19–1/4	14–1/2	2
1	Ac voltmeter	6–3/32	8	5–1/8	6–1/2	4
1	Patch panel	6–3/32	8	5–1/8	6–1/2	5
1	Oscillator	6–3/32	8	5–1/8	6	3

Quantity	Item	Height (in.)	Depth (in.)	Width (in.)	Weight (lb.)	Fig. No.
1	Shoulder strap, adjustable					2
1	Power cord					2
2	Patch cables (12 inches long)					2
1	Fuse, spare (inside right side panel of ac voltmeter).					7

7. Description of AN/USM-l81 Test Set

a. The test set includes an oscillator, a patch panel, a voltmeter, patch cables, a power cable, and a carrying case. Figure 1 shows the major components of the test set assembled.

b. The oscillator, patch panel, and voltmeter are assembled in a carrying case (fig. 2). Power for the oscillator and voltmeter is supplied by rechargeable batteries contained in each assembly. When the test set is connected to an ac source (115 or 230 volts ac), the power sup plies in the oscillator and in the voltmeter (FUNCTION switch set to ON) supplies operatiing power and recharges the batteries.

c. The output of the oscillator and the input of the voltmeter are connected to the patch panel by the two patch cables (fig. 8). The voltmeter is adjusted to indicate the output *of the* patch panel. The input and output terminals of the patch panel are connected to the transmission line under test to measure insertion leas and frequency response ox, the voltmeter (fig. 9).

8. Description of Oscillator

The oscillator (fig. 3) produces a frequency of 5 cycles per second (CPS) to 560 kilocycles (kc) in five ranges, It has an amplitude adjustment to 10 millivolts (rev) maximum. All signal connectors and controls are located on the front panel. The ac source connection and line voltage selection switch are located at the rear of the oscillator assembiy.

9. Descripition of Ac Voltmeter

The voltmeter (fig. 4) measures voltages at frequencies from 5 cps to 2 megacycles (mc). The meter indicates voltages of 0.001 to 300 volts rms full scale, and db levels of —72 to +52 dbm in 12 ranges (1, 3, 10 sequence). All signal connectors and controls are located on the front panel. The ac powerline connection and line voltage selector switch are located at the rear of the voltmeter assembly. The self-contained power supply functions automatically when the ac powerline is connected and the FUNCTION switch is set to ON.

10. Description of Patch Pad

The patch panel (fig. 5) requires no operating power. Operating frequencies are 50 cps to 560 kc. Attenuations developed are 1 db to 110 db in steps of J db or 10 db. The patch panel also provides matching impedances for input and output connections of 135, 600, and 900 ohms. All connectors and controls are on the front panel.

11. Description of Minor Components

The minor component of the tat set are shown in figure 2 and consist of a detachable ac power cord and two patch cables for attaching the voltmeter and oscillator to the patch panel. The patch cables are terminated on one end by a BNC-type connectorr, and on the other and by a banana plug with 3/4-inch centers. The cables and power cord are stored in the cover of the instrument for transit, storage, or shipment.

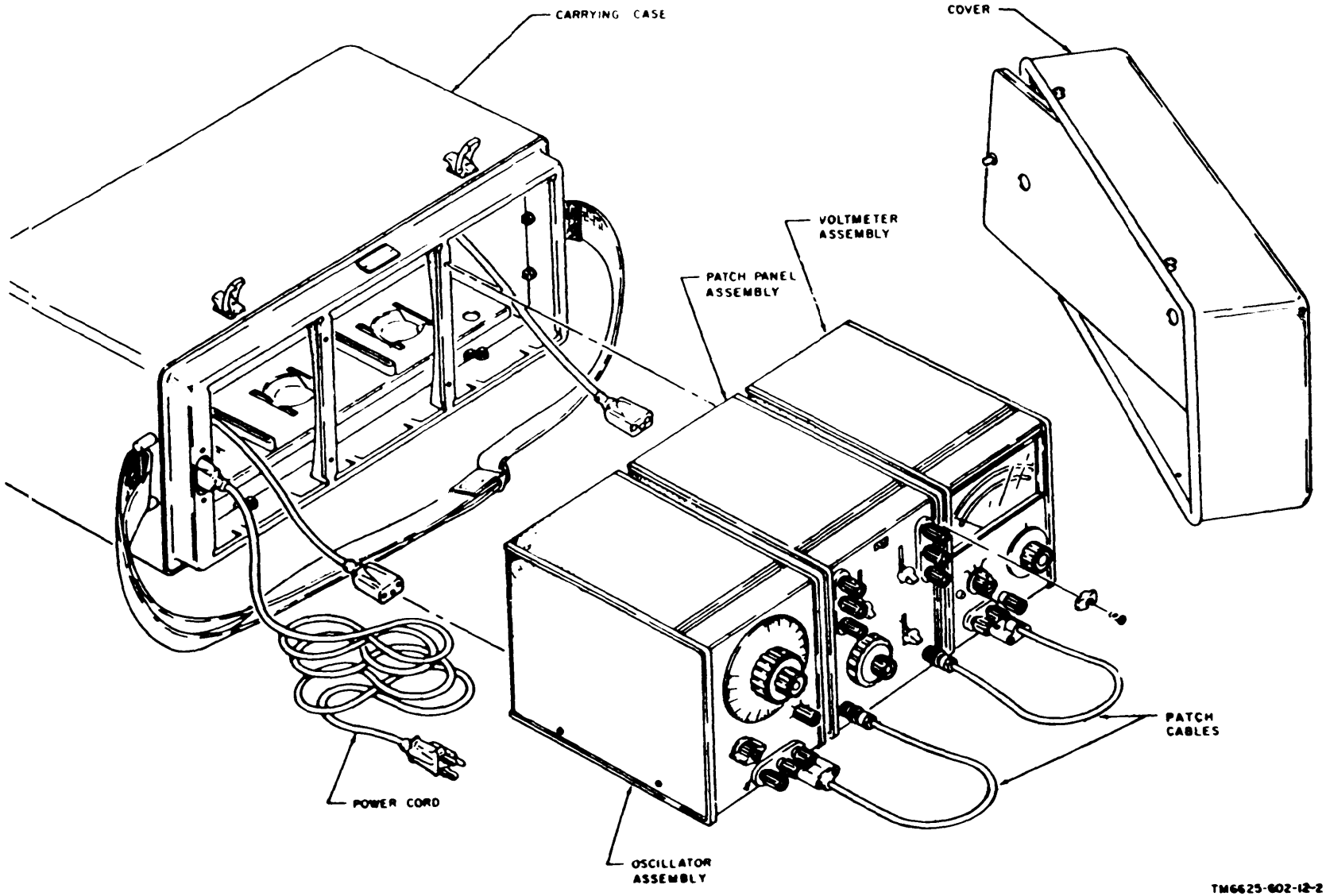

Figure 2. Test Set, Telephone AN/USM-181 (assembly diagram).

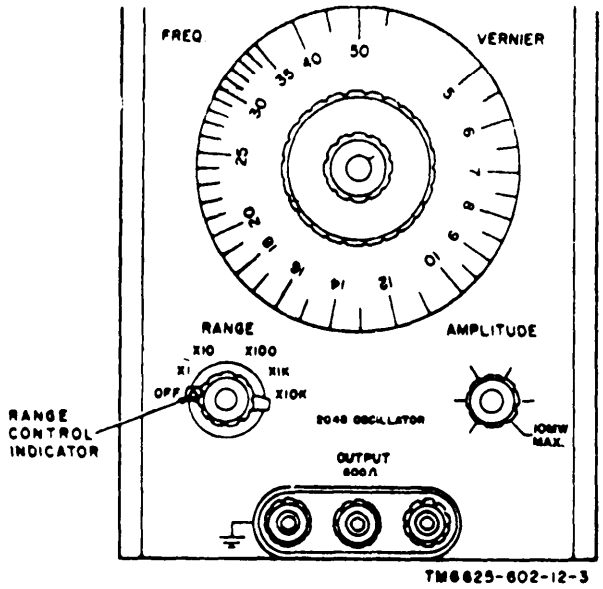

Figure 3. Oscillator controls, connectors, and indicator (front panel)

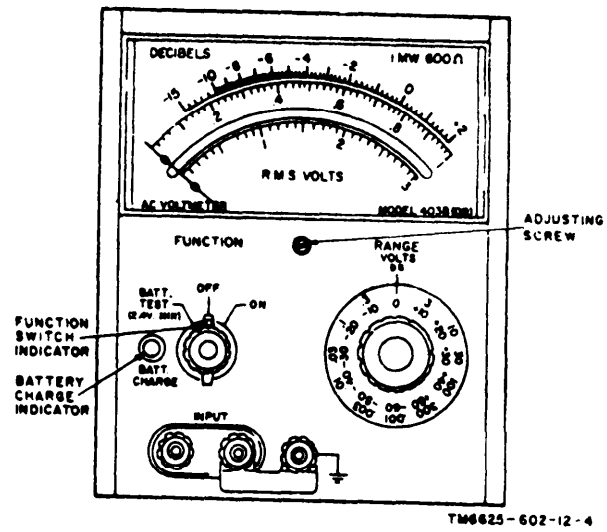

Figure 4. Voltmeter controls, connectors, and indicators (front panel).

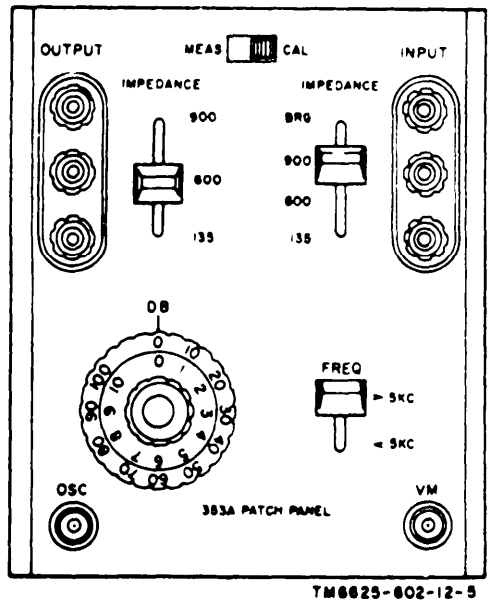

Figure 5. Patch controls and connectors (front panel).

CHAPTER 2

OPERATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

12. Unpacking

a. Packaging Data. When packed for ship ment, the entire unit is Packed in one carton. A typical shipping carton and its contents are shown in figure 6. The dimensions of the ship ping carton are 15-1/8 inches by 18-3/4 inches by 24-7/8 inches. The volume is 6,800 cubic inches and the shipping weight (with test set included) is 44-1/2 pounds.

b, Removing Contents.

(1) Cut the tape on top of the carton and fold back the *flaps.*

(2) Cut the steel strapping and the tape on top of the inner carton and fold back the flape.

(3) Open the barrier bag.

(4) Cut the tape on top of the instrument carton and fold back the flaps.

(5) Remove the desiccant and the corrugated pad.

(6) Remove the envelope that contains the manual.

(7) Remove the instrument from the instrument carton.

(8) Remove the four post pales from the instrument.

(9) Remove the equipment cover.

(10) Remove the inside panel of the cover by pressing the two buttons on each end of the panel and lift out the panel.

(11) Remove the cables and power cord from the inside cover.

13. Checking Unpackod Equipment

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

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 (appx III). Report all discrepancies in accordance with TM 38-750. Shortages of 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. If modified, see that any operational instruction changes resulting from the modification have been entered in the equipment manual.

Note: Current MWO's applicable to equipment are listed in DA Pam 310-4.

14. Overload Fuse

Caution: We *only fuses of correct* value when replacing a fuse. overfusing can result in damage to the equipment.

Test Set, Telephone AN/USM–181 is shipped with a signal-overload fuse (fig. 7) installed in the voltmeter. The test set contains no power line fuses.

15. *Connections*

After the equipment has been unpacked and all components are present, make connections as showm in figure 8. The power cord is used only for ac operation or for charging the batteries, and need not be connected unless the battery voltages are low.

16. Initial Adjustment of Equipment

a. Set voltmeter FUNCTION switch to OFF.

b. Rotate meter adjusting screw (below cen*ter* of meter) clockwise until pointer is below

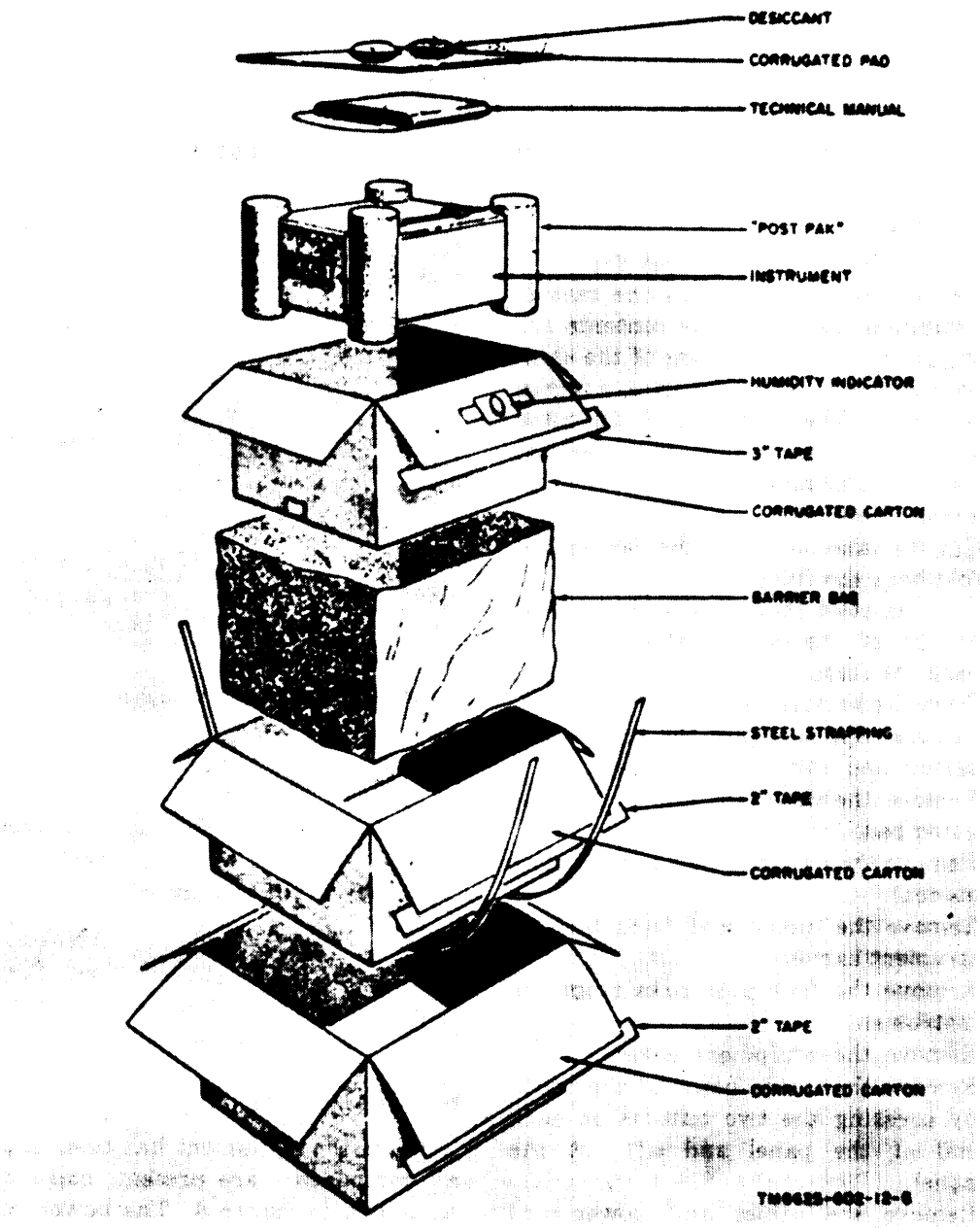

Figure 6. Test Set Telephone AN /USM-181(packaging diagram)

zero. Continue clockwise rotation until pointer is exactly *on* zero.

c. If pointer passes zero, repeat *b* above

d. Rotate meter adjusting screw approximately 15° counterolockwise to disconnect adjusting *screw* from meter movement.

e. If pointer moves off zero, repeat *b, c,* and d above.

f.. Set RANGE control on oscillator to OFF.

g. Set and hold voltmeter FUNCTION switch on BATT. TEST.

h. The voltmeter must indicate 2.4 volts on 0-3 range. If less than *2.4* volts. connect the test set to ac power line and set FUNCTION switch to ON (pare 17).

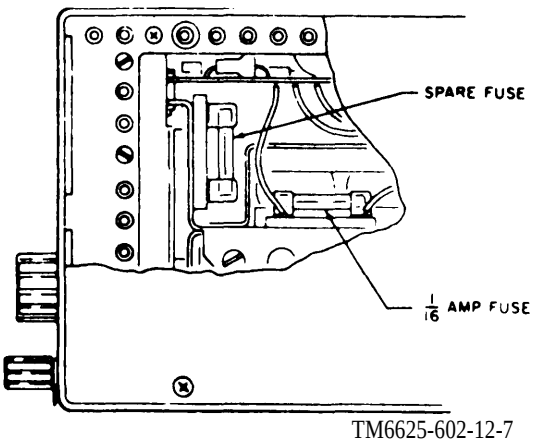

Figure 7. Overload fuse (location diagram).

i. Set *oscillator* RANGE control to X100, REQ. dial to 5, and AMPLITUDE control to AX.

j. Set INPUT and OUTPUT IMPEDANCE control of patch panel to 600.

k. Set patch panel MEAS-CAL. switch to CAL.

1. Set patch panel DB control to O.

m. Set patch panel FREQ switch to 5KC (less than'5 kc).

n. Set voltmeter RANGE switch to 3 and set FUNCTION switch to ON.

o. With the ac power cord disconnected from the power source, the voltmeter must indicate more than 2.3 volts on the 0–3 range. If the indication is less than 2.3 volts, recharge the batteries by connecting the power cord to the ac power source (para 17). The test set may be used while the batteries are being recharged.

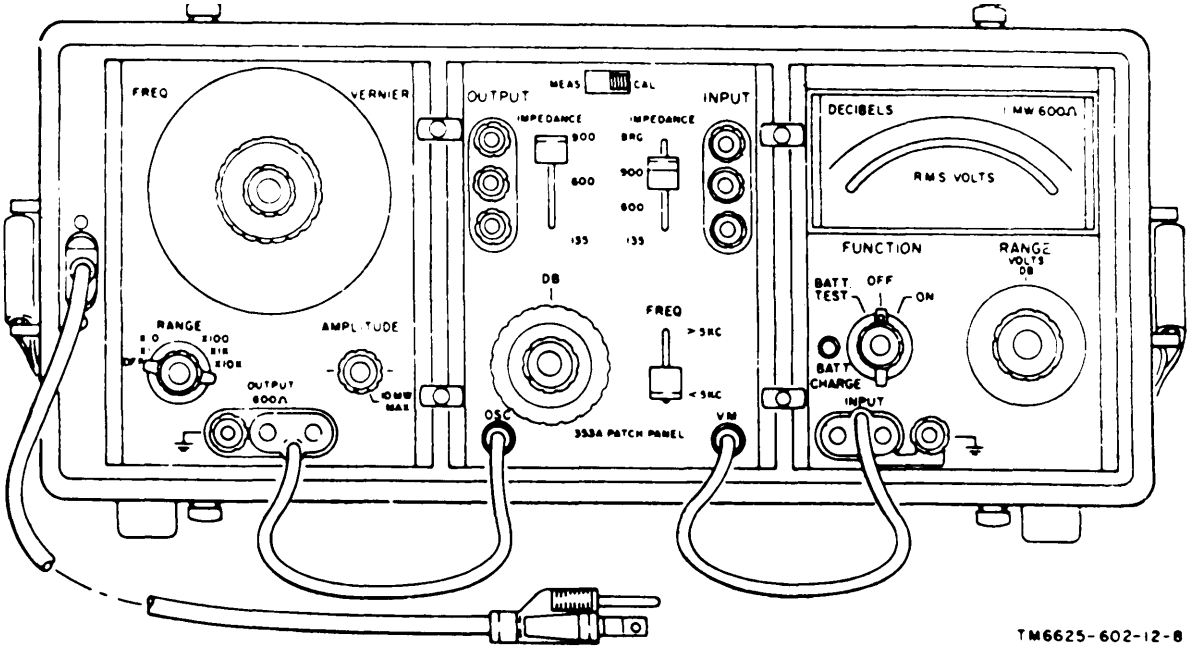

Figure 8. Test Set, Telephone AN/USM-181 (connection diagram).

Section II OPERATOR'S CONTROLS, INDICATORS, AND CONNECTORS

17. Damage from Improper Settings

The following precautions should be taken:

a. Before connecting equipment to an ac source, check the voltage selection switches at the rear of the oscillator and voltmeter for Proper setting (115 or 230 volts).

b. Do not connect the test set to an ac power source when the ambient temperature is above 50° C (122° F). To do so will damage the batteriy.

c. Do not connect the oscillator output terminals to a direct current (dc) voltage of reverse polarity and do not connect the output

terminals to dc voltages greater than 25 volts. To do so may damage the output blocking capacitor.

d. Do not connect the patch panel INPUT and OUTPUT terminals to a dc voltage source. To do so may damage the transformed.

e. Limit the ac power to the INPUT and OUTPUT terminals of the patch panel to 10 milliwatts. More than 10 milliwatts may damage the transfomners.

18. Oscillator Operating Controls, Indicators, and Connectors

Control, Indicator, or connector	Function
Voltage selection switch .	Permits operation from either 115 or 290 volts ac.
FREQ. control ----------	Selects resired frequency within range selected by RANGE control.
VERNIER control ------	Provides fine adjustment *of* frequency. The FREQ. dial is calibrated when the pointer is straight up.
RANGE control ---------	Selects range "containing desired frequency l nd indicatas the multiplying factor to be applied to the FREQ. dial reading to give output fre quency.
RANGE control indicator.	Glows in all positions of the RANGE switch except OFF.
AMPLITUDE control __	Adjust output amplttude level from 0 volt to 2.5 volts maximum into 600 Ohms.
OUTPUT terminals -----	Provides output connection and cabinet ground connection.
At source voltage connection.	Connects Oscillator charging circuit to power receptacle on test set cabinet.

19. Patch Pond Operating Controls and Connectors

Control or connector	Function
OSC connector ------- ----Receives the test signal from the oscillator.	
VM connector ---. --------. Supplies test signal for connection to the voltmeter.	
DB control -------- ------ provides attenuation of 0 db to 110 db between the OSC terminal and the output terminals in steps of 1 db or 10 db.	
FREQ switih ----------Limits frequency response to the range from 50 cps to 5 kc or from 5 kc to 560 kc.	
OUTPUT terminals ---- --. Provide output connections to the transmission line being tested.	
IMPEDANCE control (OUTPUT).	Selects output impedances of 135, 600, or 900 ohms to match impedance *of* transmission line being tested.
INPUT terminals -------- .Provide input connections from the transmission line being tested.	
IMPEDANCE control (INPUT)	Selects input impedances to terminate the transmission line in 135, 600, 900, or 10,000 ohms.
MEAS-CAL switch ----- --Selects measurement of the test set signal from the transmission line under test on MEAS, or measurement of the test signal from the oscillator on CAL.	

20. Voltmeter Operating Controls, Indicators, and Connectors

Control. Indicator. or connector	Function
Voltage Selection switch (at rear of voltmeter).	Permits operation from 115 volts or 230 volts ac.
RANGE VOLTS DB control.	Selects range containing voltages to be measured. volts from 0.001 to 200, and from -72 to + 52 db in 12 range. (1, 3. and 10 sequence.)
FUNCTION switch ------	Provides for battery test, l nd turning the volt" meter *off* or on.
FUNCTION switch indicator.	Glows when FUNCTION switch is at ON.

Control, indicator, or connector	Function
BATT. CHARGE indicator.	Lights red when the FUNCTION switch is at ON l nd the test set is connected to l n ac power source.
INPUT terminals .-------.	Provide input connections and chassis ground.
DECIBELS RMS VOLTS meter.	Indicates voltages or decibels within the range selected by the RANGE VOLTS DB control.
Adjusting screw --- ------	Provides a means *of set*-ting the meter pointer to zero.
Ac source voltage connec- tion (at rear *of* volt-meter).	Connects the voltmeter to the power line receptacle on the test set cabinet.

Section III. OPERATION UNDER USUAL CONDITIONS

21. Types of Operation

a. The test set may be operated as a general telephone circuit measuring device to measure frequency response, attenuation, or insertion loss. The individual components may also be used independently as a voltmeter or oscillator for general purpose testing.

b. For types of operation using the test set, perform the following:

(1) Starting procedure (para 22).

(2) Procedure for the desired type of op eration (pare 23 through 27).

(3) Stopping procedure (para 28)

22. Starting Procedure

Make sure that the connations and initial adjustments described in paragraphs 15 and 16 have been performed before this procedure is started.

a. *Preliminary. Set* the controls as follows:

Control	Position
Oscillator:	
FREQ. control ------	Any
VERNIER control ---	Pointer straight up
RANGE switch ------	OFF
AMPLITUDE control	Any
Patch panel:	
DB control --- ------	0
FREQ switch -- -- ----	To correspond to oscillator frquency.
OUTPUT IMPED. ANCE switch.	Any
INPUT IMPED- ANCE switch.	Any
MEAS-CAL switch -- .	CAL
Voltmeter:	
FUNCTION switch --	OFF
RANGE VOLTS DB control.	A range higher than voltage to be messured.

b. Starting.

(1) Set the oscillator RANGE switch to desired range of frequency to be used and allow 20 seconds for oscillator to stabilize.

(2) Set the voltmeter FUNCTION switch to *ON* and allow 20 seconds for volt-meter to stabilize.

Caution: **If the transmission line to be tested has de volt- applied to It, connect a dc holding coil to each end of the line. This allows for a de path and erables the signal to enter and leave the trammission line. No de should he allowed to flow through the patch panel *(fig.* 10).**

23. Measurements of Filters, Amplifiers, or Attenuators

Start the equipment as instructed in paragraph 22 and perform the following for measuring characteristics of filters, amplifier, or attenuators (fig. 9).

a. Set the oscillator RANGE switch and FREQ. dial to testing frequency.

b. Set the oscillator AMPLITUDE control to testing power level.

c. Set the patch panel IMPEDANCE switches (input and output) to match impedance of the equipment under test.

d. Set the patch panel FREQ switch to correspond to testing frequency less than 5KC (less than 5 kc) or more than 5KC (more than 5 kc).

e. Set the voltmeter RANGE switch to the 3-volt range and the FUNCTION switch to ON.

f. Varicus tests may be performed by varying the frequency of the oscillator with the FREQ. dial and RANGE switch, the amount of attenuation with the DB control on the patch panel, and the power output of the oscillator with the AMPLITUDE control.

24. Measurements of Transmission lines

a. To perform measurements on telephone transmission lines, a teat set is required at each end of the line. The test set connected to the distant end of the line supplies the test signal. The test set connected to the local end of the line measures the amplitude of the test signal.

b. Start the equipment as instructed in paragraph 22 and perform the following:

(1) Distant test set.

(a) Set the oscillator FREQ. dial and RANGE switch to the tinting frequency.

(b) Set the patch panel MEAS-CAL switch to CAL and the OUTPUT IMPEDANCE switch to match the impedance of the telephone line under test

(c) If the telephone line has a dc potential, install a holding coil and blocking capacitor assembly to isolate the patch panel and to complete the dc path for common battery circuits.

(d) Connect the patch panel OUTPUT terminals to the tilephone line.

(e) Adjust oscillator AMPLITUDE control to the OUTPUT level specifid for the system.

(f) Set the patch panel MEAS-CAL switch to MEAS.

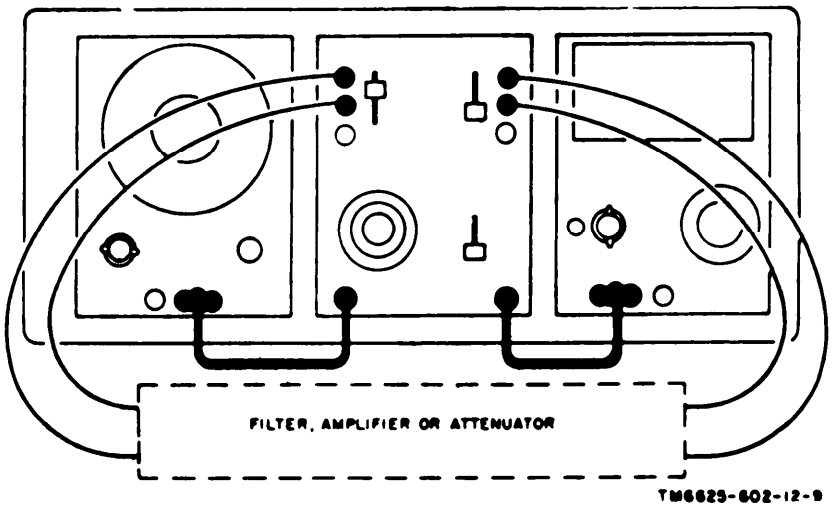

Figure 9. Filter, amplifier, and attenuator tests (connection diagram).

Figure 9. Filtter amplifier and attenuator tests (connection diagram

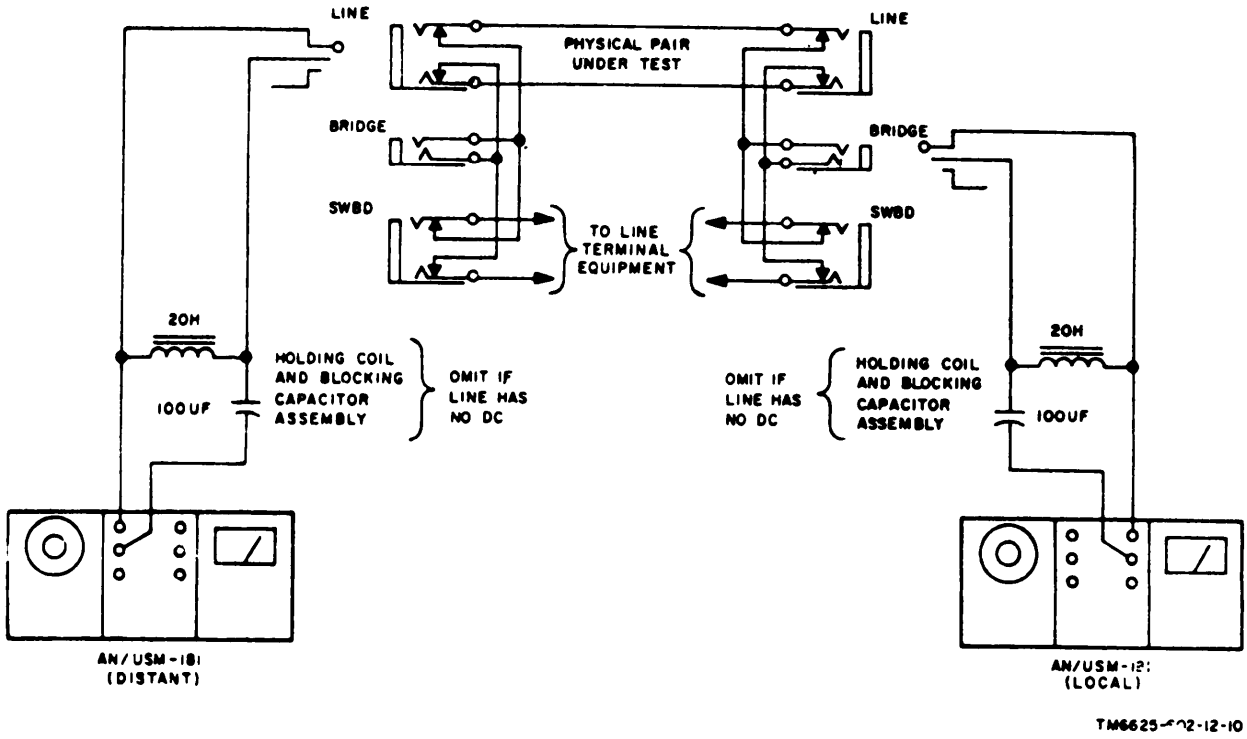

Figure 10. Transmission line tests (connection diagram)

(2) Local tosgt set.

(a) Set the voltmeter RANGE switch to power level specified for the system,

(b) Set the patch panel MEAS-CAL switch to MEAS and the FREQ switch to correspond to testing frequency.

(c) Set the patch panel INPUT IMPEDANCE switch to match the impedance of the telephone line under test, or to BRG if the line power is to be measured while remaining connected to its normal load.

(d) If the telephone line has a dc potential, install a holding coil and blocking capacitor assembly to isolate the patch panel and to complete the dc path for common battery circuits.

(e) Connect the patch panel INPUT terminals to the LINE jack when the line is to be terminated and tested, to the BRIDGE jack when the line to be tested is terminated by terminal equipment, *or to* the SWBD jack when the terminal equipment is to be tested (fig. 10).

(f) Read power levels on the voltmeter.

25. Voltage Measurements

a. Disconnect the voltmeter from the patch panel.

b. Set FUNCTION switch to ON and allow a 20-second warmup period.

c. Set RANGE VOLTS DB control to approximate level of voltage to be measured.

d. Connect the voltage to be measured to the input terminals of the voltmeter.

Note: When measuring voltages *from a* high imped. ance source, hum pickup can *affect* the meter indications. The use of shielded leads will reduce pickup but may cause excessive circuit loading (at frequences of 1 to 2 mc in the 300-volt range, the accuracy is. reduced to ±10 percent).

26. Decibel Measurements

a. Disconnect the voltmeter from the patch panel.

b. Set FUNCTION switch to ON and allow a 20-second warmup period.

c. Set RANGE VOLTS DB control to approximate decibel level to be measured.

d. Connect the signal voltage to be measured to the input terminals of the voltmeter.

e. The db level is the algebraic sum of the db scale indication and the RANGE VOLTS DB position.

Note: To measure *power* directly in dbm (0 dbm = 1 milliwatt into 600 ohms), the measurement must be made across 600 ohms. Measurements in differences of db may be obtained by direct indications of the meter and RANGE VOLTS DB control if each measurement is *made across the same* impedance value.

f. To compute dbm signal level on transmision lines having impedances other than 600 ohms, use the impedance correction graph (fig. 11) to convert the voltmeter db indication to dbm. Locate the transmission line impedance at the bottom of the graph and follow that impedance line up to the diagonal line. The dbm level is the algebraic sum of the level indicated on the meter and the correction shown on the graph. For example: If the indication on the DECIBELS scale is +2, the RANGE selector switch is in the +30 position, and the measurement is *made* across an impedance of 135 ohms, the corrected level is +39 dbm and is obtained as follows:

+ 2	(meter indication)
+30	(range switch position)
+32	‘(sum)
+ 7	(correction factor **from graph)**
+39 dbm	

27. Use of Oscillator With Other Equipment

Caution: **To prevent damage to the test set, install a blocking capacitor in series with the patch panel output when it is to be connected to a circuit on which there is a dc potential. The capacitor-voltage product (microfarad x volts) should be leas than 200.**

Example; For a 20-volt potential difference (200 20 = 10), use a 10-microfarad (uf) *or* smaller capacitor.

Do not connect the oscillator output across loads which are off ground by more than ±25 Volta.

a. Disconnect the oscillator from the patch panel.

b. Set oscillator RANGE switch and FREQ. control to desired frequency output. Allow 10 seconds for oscillator to stabilize.

C. Set AMPLITUDE control to desired level.

d. Connect OUTPUT terminals to 600-ohm load.

Note: If connected to loads other than 600 ohms, an instrucment for impedance matching must be installed between the oscillator **and** the load. The patch may be used to match impedances *of* 135 or 900 ohms.

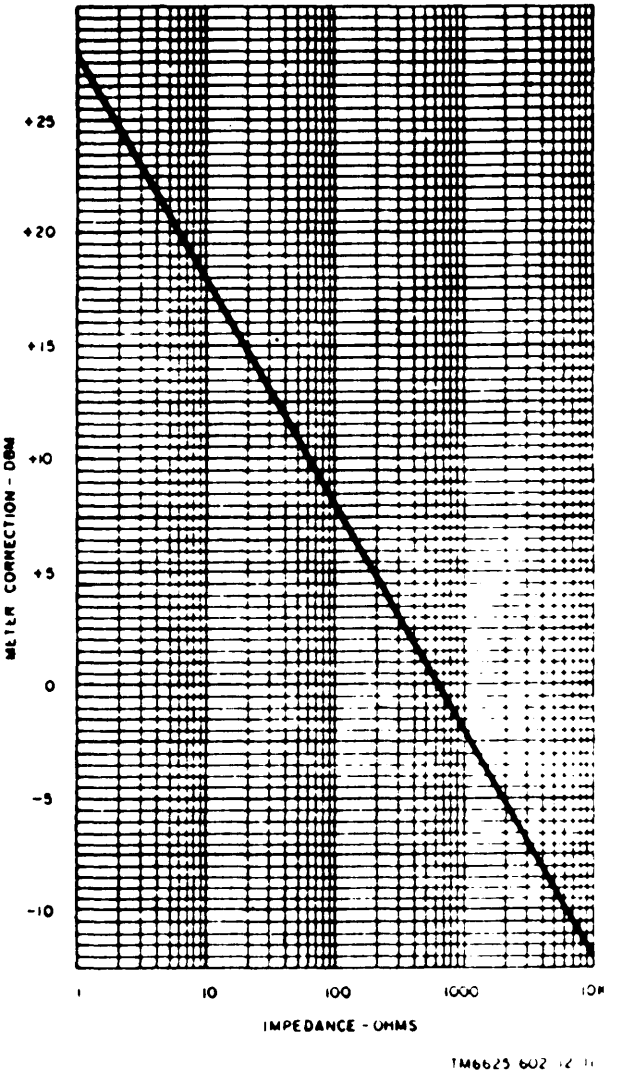

Figure 11. Impedance correction graph.

28. Stopping Procedure

a. Set the asccillator, RANGE switch to OFF, and disconnect the patch cable from the patch panel.

b. Set the voltmeter, FUNCTION switch to OFF, and disconnect the patch cable from the patch panel.

Note: *If* equipment is to be *carried* discconect power cord from equipmmt and ac source (if Connected) . Store power cord and patch cables in cover and install cover on equipment carrying case.

CHAPTER 3

MAINTENANCE

Section I. OPERATOR'S MAINTENANCE

29. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of Test Set, Telephone AN/USM-181 are listed below, together with a reference to the paragraphs covering the specific maintenance function. These duties do not require special tools or test equipment.

a. Daily preventive maintenance checks and services (para 32).

b. Cleaning (para 33).

30. 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 32 and 33 cover routine systematic cat-e and cleaning essential to proper upkeep and operation of the equipment.

*b. Preventive Maintenance Checks and Serv*ices. The preventive maintenance checks and services charts (para 32, 37, and 38) outline functions to be performed at specific intervals. Three 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 the normal conditions; the Ref*erences* column list 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 maintenance or repair is required. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38.-750.

31. Preventive Maintenance Checks and Services Periods

Preventive maintenance checks and services of the AN/USM-181 are required daily, weekly, and monthly.

a. Paragraph 32 specifies checks and services that must be accomplished daily or under the special conditions listed below:

(1) Before operating equipment.
(2) When the equipment is initially installed.
(3) When the equipment is reinstalled aftar removal for any reason.
(4) At least once each week if the equipment is maintained in standby condition.

b. Paragraphs 37 and 38 specify additional checks and services that must be performed weekly and monthly.

32. Daily Preventive Maintenance Checks and Services Chart

Suquence No.	item	Procedure	References
1	Test Set, Telephone AN/USM-181	Inspect equipment for completeness and satisfactory condition.	Appx III,
2	Exterior surfaces ----	Remove dirt, dust, grease, moisture, and fungus from the exterior of the case, front pane], controls, and meter. Inspect painted surfaces for bare spots, rust, and corrosion. Inspect meter glass and indicator lens for cracks and breaks.	Para 33.

No. Sequence	item	Procedure	Refences
3	Line cord and connectors.	Inspect the line cord *for* breaks, deteroration, and loose connections. Check tightness of all connecters.	
4	Controls and Indicators.	While making operational checks (item 5), observe that mechanical action of each knob, dial, and switch is smooth and *free* of external and internal binding, and that there is no excessive looseness. Check meter for sticking or bent pointer.	Para 18, 19, and 20.
5	Operation ----------	Operate the equipment according to the procedures outlined in paragraph 22 through 28. Be alert *for* any unusual indications and conditions.	Para 22 through 28.

33. Cleaning

Inspect the exterior surfaces of the AN/USM-181. The exterior surfaces should be free of dust, dirt, grease, and fungus.

a. Remove dust and loose dirt with a clean. soft cloth.

Warning: Cleaning Compound (FSN 7390 395-9542) is flammable and its fumes are toxic. Provide adequate ventilation. DO NOT use near a flame.

b. Remove grease, fungus, and ground-in dirt from the case. Use a cloth dampend (not wet) with cleaning compound.

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

Caution: Do not press on meter face (glass) **when cleaning; the meter may be damaged.**

d. Clean the front panels, meter, and control knobs with a soft, clean cloth. If neces-sary, use mild soap.

Section II. ORGANIZATIONAL MAINTENANCE

34. Scope of Organizational Maintenance

a. This section contains instructions covering organizational maintenance *of* TESt Set, Telephone AN/USM-181. It includes instructions for performing preventive and periodic maintenance services, and repair fUnctions tO be accomplished by the organizational repairman.

b. Organizational maintenance of Test Set, Telephone AN/USM-181 includes:

(1) Weekly preventive maintenance checks and services (para 37).
(2) Monthly preventive maintenance checks and services (para 38).
(3) Touchup painting (para 39).
(4) Troubleshooting (para 40 and 41).
(5) Replacement of easily accessible items (pare 42).

35. Organizational Preventive Maintenance

a. Preventive maintenance is the systematic care, inspection, and servicing of equipment to maintain it in serviceable condition, prevent breakdowns, and assure maximum operational capability. Preventive maintenance is the respotibility of all categories of maintenace concerned with the equipment and includes the inspection, testing, and repair or replacement of parts, subassemblies, or units that ininspection and tests indicate would probably fail before the next scheduled periodic service. Preventive maintenance checks and services of Teast Set, Telephone AN/USM-181 at the organizatioml level are made weekly and monthly unless otherwise directed by the commanding officer. The preventive main-ante checks and services should be scheduled concurrently with the periodic service schedule of the carrying vehicle for all vehicular inatallations.

b. Maintenance forma and records to be used and maintained on this equipment are specifid in TM 38-750.

36. Weekly and Monthly Preventive Maintenance

Perform the maintenance function indicated in the weekly and monthly preventive maintenance Checks and service charts (para 37 and

38) on the AN/USM-181 at the intervals specified and in the sequence list. Whenever an abnormal condition or result is observed, take corrective action in accordance with the paragraph listed under Reference. All deficiencies and shortcoming will be recorded, and those deficiencies not corrected during the pre ventive maintenance checks and services test will be reported to higher level maintenance as specified in TM 38-750. Equipment which has deficiencies which cannot be corrected at the organizatitional level will he deadlined in accordance with TM 88-750. Equipment maintained in a standby condition (ready for immediate operation) must have monthly maintenance checks and services Equipment in limited storage (requires services before operation) does not require monthly preventive maintenance.

Note: *A* month is defined as approximately 30 calendar days of 8-hour-per-day operation. For 16-hour-a-day operation, the monthly preventive mainteance checks and services will be performed at 15-day intervals. Adjustment *of the* maintenance interval must be made to compensatee for any unusual operating conditions

37. Weekly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Cables	Inspect cables for chafed, cracked, or frayed insulation. Replace connectors that are broken, stripped, or worn excessively.	Para 42.
2	Latches	Inspect latches for looseness. Replace or tighten as necessary.	Para 42.
3	Metal surfaces	Inspect exposed metal surfaces for corrosion, scratches, and pitting. Clean and touch up paint as required.	Para 39.
4	Panel mounting screws.	Check all panel screws and retainers for tightness or breakage. Replace or tighten as necessary.	Para 42.

38. Monthly Preventive Maintenance Checks and Services Chart

Sequence No.	Item	Procedure	References
1	Publications	See that all publications are complete, serviceable, and current.	DA Pam 310–4.
2	Modifications	Check DA Pam 310–4 to determine if new applicable MWO's have been published. All URGENT MWO's must be applied immediately. All NORMAL MWO's must be scheduled.	TM 38–750 and DA Pam 310–4
3	Spare parts	Check all spare parts (operational and organizational) for general condition and method of storage. No overstock should be evident, and all shortages must be on valid requisitions.	Appx III.
4	Jacks	Inspect jacks for snug fit and good contact.	
5	Terminals	Inspect all terminals for tightness and good contact.	
6	Carrying strap	Inspect carrying strap for wear or cuts.	Para 42.
7	Batteries	Check the batteries in oscillator and voltmeter assemblies.	Para 16.

39. Touchup hinting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on bare metal to protect it from further corrosion. Refer to applicable cleaning and refinishing practices spcified in TM 9-213.

40. General Troubleshooting lnformation

Troubleshooting this equipment is based on the operational check (item 5) in the daily preventive maintenance checks and service chart. To troubleshoot the equipment, perform all functions given in the daily preventive maintenance checks and service chart (para 32) and proceed through the items until an abnormal condition or result is observed. Check the abnormal condition against the *Trouble sysmptom* column in the troubleshooting chart (para 41), and perform the checks and corrective actions indicated. If the corrective measures indicated do not result in correction of the trouble, higher level maintenance is required.

41. Troubleshooting Chart

Item No.	Trouble symptom	Probable trouble	Checks and corrective-measure
1	*Meter* indicates less than 2.4 volts under test conditions outlined in paragraph 16 f l nd g.	Low battery voltage in voltmeter.	Charge voltmeter batteries.
2	Meter indicates less than 2.9 volts under test conditions outlined in paragraph 16i through *n.*	Low battery voltage in oscillator.	Charge oscillator batteries.
3	Meter indicates zero under test conditions outlined in 1 and 2 l bove.	Defective fuse *or loose* connections.	Check Connections.

42. Replacemont of Easily Acrosssible Items

a. Replacement of Plastic Retainer.

(1) Remove the screw holding the broken *or* cracked retainer.

(2) Replace with new retainer and screw.

b. Replacement of Shoulder Strap.

(1) Remove the four screws and plastic retainers holding the assemblies in the carrying case.

(2) Remove the assemblies from the carrying case and disconnect the ac pow*er* cords from the voltmeter and the oscillator.

(3) Remove the nuts and washers holding the strap loop to the carrying cairn

(4) Remove the strap from the strap loops.

(5) Replace the new strap on the strap loops.

[6) Replace the strap loops, nuts, and washer.

(7) Connect the ac power cords to the oscillator and the voltmeter.

(8) Replace the assemblies in the carrying Case.

(9) Install the retainers and the screws holding the assemblies in the carrying case.

c. *replacement of Cover Latch.*

(1) Remove the four screws and plastic retainer holding the assemblies in the carrying case.

(2) Remove the assemblies from the carrying case and disconnect the ac power cords from the voltmeter and oscillator.

(3) Remove the two nuts and washers holding the latch.

(4) Install the new latch, using the two nuts and washers.

(5) Connect the ac power cords to the voltmeter and oscillator.

(6) Replace the aasemblies in the carrying caae.

(7) Replace the four screws and plastic retainers.

d. Replacement of lnternal Ac Power *Cords.*

(1) Remove the four screws and plastic retainers that hold the assemblies in the carrying case.

(2) Remove the assemblies from the carrying case and disconnect the ac power cords from the rear of the voltmeter and oscillator.

(9) Remove the two screw holding the external ac connector to the carrying

case and remove internal ac power *cords.*

(4) Install the new internal ac power cords and replace the two screws holding the external ac connector to the carrying case.

(5) Connect the internal ac power cords to the rear of the voltmeter and oscillator.

(6) Replace assemblies in carryiug case.

(7) Replace the four screws and plastic retainers.

CHAPTER 4

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

43. Disassembly of Equipment

To prepare the test set for shipment and storage:

a. Disconnect the two cables and the power cord

b. Replace cables and power cord in cover of carrying case and install panel in oover.

c. Install carrying case cover on test set and secure with the latches.

44. Repackaing for Shipment or Limited Storamge

The exact procedure for repackaging depends on the material available and the conditions under which the equipment is to be shipped or stored. Adapt the procedures outlined below whenever circumstances permit. The information concerning the original packaging (para 12) will also be helpful.

a. Material Requirements. The following materials are required for packaging Test Set, Telephone AN/USM-181. For stink numbers of materials, consult SB 38-100.

Material	Quantity
Cardboard carton	6,800 cubic inches.
Gummed tape	10 feet.
Filler material	3.5 cubic feet.
Padded paper	10 feet.

b. Packaging, Package the testt set as outlined below:

(1) Wrap instrument in padded paper.

(2) Place approximately 4 inches of filler material in bottom of carton.

(3) Place instrument in center of carton.

(4) Replace the envelope containing the manual.

(5) Pack at least 4 inches of filler material around and on top of instrument.

(6) Fold flaps closed on carton and seal with gummed tape.

45. Authority for Demolition

The demolition procedures given in paragraph 46 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.

46. Methods of Desstruction

The tactical situation and time available will determine the method to be used when destrution of equipment is ordered.

a. *Smash. Use* sledges, axes, hammers, crowbars, and any other heavy tools available to smash the interior assemblies of the set.

(1) Use the heaviest tool on hand to smash the connections, meter, knobs, and dials.

(2) Remove the assemblies from the carrying case. With a heavy hammer or bar, smash as many of the exposed parts of the various assemblies as possible.

b. Cut. Use axes, handaxes, machetes, and similar tools to cut cabling and wiring. Use a heavy axe or machete to cut power cables.

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

c. Burn. Bum the technical manual first. Bum as much of the equipment as is flammable; use gasoline, oil, flamethrowers, and similar materials. Pour gasoline on the cut cables, cords, and internal wiring and ignite the gasoline. Use incendiary grenades to complete the destruction of the set.

d. Explode. Use explosives to complete demolition or to cause maximum damage, before burning, when time does not permit complete demolition by other means. Powder charges, fragmentation grenadeas or incendiary grenades may be used. Incendiary grenad= usually are most effective if destruction of small parts and wiring is desired.

(1) Use a fragmentation grenade to destroy the interior of the AN/USM-181. Slide the center assembly out of carrying case, drop the grenade into the carrying case, and drop the center assembly back into place.

[2) Use a powder charge to destroy the AN/USM-181, Lift the center assembly out of carrying case and install the charge.

(3) For quick destruction of the AN USM-181 place an incendiary grenade on top of the set. Get away from the set after the grenade is placed.

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

APPENDIX I

REFERENCES

Following is a list of applicable publications available to the operator and organizational repairman of Test Set, Telephone AN/USM-181.

DA Pam 310-4	Index to Technical Manuals, Technical Bulletins, Supply Manuals (Types 4,6,7,8, and 9). (Supply Catalogs type CL), Supply Bulletins. Lubrication Orders, and Modification Work Orders.
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army.
TM 9-213	Painting Instructions for Field Use.
TM 33-750	Army Equipment Record Procedures.

APPENDIX II

MAINTENANCE AllOCATION

Section I INTRODUCTION

1. General

a. This appendix assigns maintenance functions to be performed on components, assemblies, and subassemblies by the lowest appropriate maintenance category.

b. Columns in the maintenance allocation chart are as follows:

(1) Part or componet. This column shows only the nomenclature or standard item name. Additional descriptive data are included only where clarification is nessary to identify the component. Components, assemblies, and subassemblies are listed in top-down- order. That is, the assemblies which are part of a component are listed immediately below that component, and the subassemblies which are part of an assembly am listed immediately below that assembly. Each generation breakdown (components, assemblies, or subassemblies) is listed in diassembly order or alphabetical order.

(2) Maintence function. This column indicates the various maintenance functions allocated to the categories

(a) Service. To clean, to preserve, and to replenish lubricants.

(b) *Adjust.* To regulate periodically to prevent malfunction.

(c) lnspect. To verify serviceability and to detect incipient electrical or mechanical failure by scrutiny.

(d) Test. To verify serviceability and to detect incipient electrical or mechanical failure by use of special equipment such as gages, meters, etc.

(e) Replace. To substitute serviceable components, assemblies, or subassemblies, for unserviceable comp nents, assemblies, or subassemblies.

(f) *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 ,

(9) *Align.* To adjust two or more components *of* an electrical system so that their functions are properly synchronizd.

(h) Calibrate. To determine, check, or rectify the graduation of an instrument, weapon, or weapons system, or component of a weapons system.

(i) *Overhaul* To restore an item to completely serviceable condition as prescribed by serviceability standards developed and published by heads of technical services. This is accomplished through employment of the technique of "Inspect and Repair Only as Necessary" (IROAN). Maximum utilization of diagnostic and test equipment is combined with minimum disassembly of the item during the overhaul process.

(j) *Rebuild.* To restore an item to *a* standard as near as possible to original or new condition is appearance, performance, and life expectancy. This is accomplish through the maintenance technique of complete disasaembly of the item, inspection of all parts or components repair or replacement of worn or

unservicable elements using original manufacturing tolerance and/ or specifications and subsequent rewassembly of the item.

(3) *Operator, organization, direct support, general support, and depot.* The symbol X indictes the categories responaible for performing that particular maintenance operation, but does not necessily indicate that repair parts will be stroked at that level. Categories higher than those marked by X are authorized to perform the indicated operation.

(4) Tools required. This column indicates codes assigned to each individual tool equipment test equipment and maintenarme equipment referenced. The grouping of codes in this column of the maintenance allocation chart indicates the tool test and maintenance equipment required to perform the maintenance function.

(5) Remarks. Entries in this column will be utilized when necessary to clarify any of the data cited in the preceding column.

c. Columns in the allocation of tools for maintenance functions are as follows:

(1) *Tools required for maintenance functions* This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

(2) *Operator, organization, direct* support, *general* support, *and depot.* The dagger (t) indicates the categories normally allocated the facility.

(8) *Tool code.* This column lists the tool code assigned

2. Maintenance by USING Organizations

When this equipment is used by signal services organization organic to theater headquarter or communication zones to provide theater communications those maintenance functions allocated up to and including general support are authorized to the organimtion operating this equipment

SECTION II. MAINTENANCE ALLOCATION CHART

PART OR COMPONENT	MAINTENANCE FUNCTION	ECHELON O/C	O	DS	GS	D	TOOLS REQUIRED	REMARKS
TEST SET, TELEPHONE AN/USM-181	service	X						
	adjust				X		2,3,5,6,7,9,10,11,12, 13,14,16	Voltage, current, distortion
	inspect	X						
	test		X				17	Operational, continuity of cords & cables
					X		1 thru 16	
	repair		X				17	Replacement of easily replaced items
					X		17	
	align				X		1,11	Frequency, Tracking
	overhaul					X	1 thru 16	
ATTENUATOR, IMPEDANCE MATCHING CN-947( )/USM-181	replace		X				17	
	repair		X				17	Replacement of easily replaced parts
					X		11	
VOLTMETER, ELECTRONIC ME-260( )/U	replace		X				17	
	repair		X				17	Replacement of easily replaced parts
					X		11	
GENERATOR, SIGNAL SG-543( )/U	replace		X				17	
	repair		X				17	Replacement of easily replaced parts
					X		11	
RADIO FREQUENCY CG-2723/U(-FT-IN)	repair		X				17	
CASE, TEST SET CY-4071( )/USM-181	repair		X				17	
CABLE ASSEMBLY, POWER, ELECTRICAL CX-9031( )/USM-181	repair		X				17	

SECTION III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	ECHELON O/C	O	DS	GS	D	TOOL CODE	REMARKS
AN/USM-181 (continued)							
OSCILLOSCOPE AN/USM-140A				†	†	1	Note: Items 14, 15, and 16 are commercial items
METER TEST SET, TS-682A/GSM-1				†	†	2	
FREQUENCY CALIBRATOR SET AN/URM-18				†	†	3	
FREQUENCY METER AN/USM-26				†	†	4	
ANALYZER, SPECTRUM TS-723A/U				†	†	5	
ELECTRONIC VOLTMETER ME-30/U				†	†	6	
GENERATOR SIGNAL SG-239A/FQQ				†	†	7	
MULTIMETER TS-352/U				†	†	8	
MULTIMETER AN/USM-183				†	†	9	
TEST SET, TRANSISTOR TS-1836/U				†	†	10	
TOOL KIT, ELECTRONIC EQUIPMENT TK-100/G				†	†	11	
TRANSFORMER, VARIABLE CN-16B/U				†	†	12	
VOLTMETER, ELECTRONIC ME-207/U				†	†	13	
CLIP-ON DC MILLIAMMETER HEWLETT-PACKARD 428A				†	†	14	
OSCILLATOR HP MODEL 200S				†	†	15	
WAVE ANALYZER H.P. MODEL 310A				†	†	16	Plus shop support
						17	Note: Tools assigned to organizational repairman by virtue of his assigned mission.

END

By Order of the Secretary of the Army:

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United States Army,
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Sig Dep (OS) (12)	Sig Fld Maint Shops (3)	

NG: State AG (3); Units—Same as Active Army except allowance is one copy.

USAR: None.

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

☆U. S. GOVERNMENT PRINTING OFFICE : 1987 0 - 181-421 (70518)

PIN : 020896-005