This copy is a reprint which includes current pages from Changes 4 and 5

TM 11-6130-227-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

CHARGER, BATTERY PP-1660/G

Departments of the Army and the Air Force, Washington 25, D.C.

27 June 1962

Changes in Force: C4 and (5

TM 11-6130-227-12
*C 5

Change No. 5

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 23 *November 1982*

Operator's and Organizational Maintenance Manual

CHARGERS, BATTERY PP-16WG, PP-1660A/G AND PP-1660B/G

(NSN 6130-00-669-6659)

TM 11-6130-227-12,27 June 1962, is changed as follows

Change the title of the manual as shown above.

Inside the front cover, add the following warnings:

WARNINGS

Adequate ventilation should be provided while using TRICHROTRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flamc; the products of decomposition are toxic and irritating. Since TRICHLOROTRIFLUOROETHANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician.

Compressed air shall not be used for cleaning purposes except where reduced to less than 29 psi and then only with effective chip guarding and personnel protective equipment. Do no use compressed air to dry parts when TRICHLOROTRIFLUOROETHANE has been used. Compressed air is dangerous and can cause serious bodily harm if protective means or methods are not observed to prevent chip or particle (or whatever size) from being blown into the eyes or unbroken skin of the operator or other personnel.

***This change supersedes C1 dated 6 May 1963, C2 dated 16 March 1964 and C3 dated 11 October 1973.**

5 SAFETY STEPS TO FOLLOW IF SOMEONE IS THE VICTIM OF ELECTRICAL SHOCK

1. DO NOT TRY TO PULL OR GRAB THE INDIVIDUAL
2. IF POSSIBLE, TURN OFF THE ELECTRICAL POWER
3. IF YOU CANNOT TURN OFF THE ELECTRICAL POWER, PULL, PUSH, OR LIFT THE PERSON TO SAFETY USING A WOODEN POLE OR A ROPE OR SOME OTHER INSULATING MATERIAL
4. SEND FOR HELP AS SOON AS POSSIBLE
5. AFTER THE INJURED PERSON IS FREE OF CONTACT WITH THE SOURCE OF ELECTRICAL SHOCK, MOVE THE PERSON A SHORT DISTANCE AWAY AND IMMEDIATELY START ARTIFICIAL RESUSCITATION

Paragraph 1 and 2 are superseded as follows:

1. Scope.

a This manual describes Battery Chargers PP-1660/G, PP-1660A/G, and PP-1660B/G and covers the installation operation, operator's maintenance, and organizational maintenance of this equipment. Appendix II contains the maintenance allocation chart.

b. All references to the PP-1660/G shall also pertain to the PP-1660A/G and PP-1660B/G unless otherwise noted.

1.1 Index of Technical Publications.

Refer to the latest issue of DA Pam 310-1 to determine *whether there are* new editions, changes or additional publications pertaining to the equipment.

2. Maintenance Forms, Records, and Reports.

a. Reports of Maintenance and Unsatisfactory Equipment. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750. The Army Maintenance System.

b. Report of Packaging and Handling Deficiencies. Fill out and forward SF 364 (Report of Discrepancy (ROD) as prescribed in AR 735-11-2/DLAR 4140.55 NAVMATINST 4355.73/AFR 400-54/MCO 4430.3E.)

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55.38 / NAVSUPINST 4610.33B/AFR 75-18/MCO P4610.19C DLAR 4500.15.

2.1 Reporting Equipment Improvement Recommendations (EIR)

If your Battery Charger needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications-Electronics Command, ATTN: DRSEL-ME-MQ, Fort Monmouth NJ 07703. We'll send you a reply.

2.2 Administrative Storage

Administrative Storage of Equipment issued to and used by Army activities will have preventive maintenance performed in accordance with the PMCS charts before storing. When removing the equipment from administrative storage the PMCS should be performed to assure operational readiness. Disassembly and repacking of equipment for shipment or limited storage is covered in Chapter 4.

2.3 Instruction of Army Electronics Materiel.

Destruction of Army electronics materiel to prevent enemy use shall be in accordance with TM 750-244-2.

2.4 Reporting Errors and Recommending Improvements.

You can help improve this manual. If you find any mistakes of if you know of a way to improve the procedures, please let us know. Mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms) direct to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, NJ 07703. In either case, a reply will be furnished direct to you.

Paragraph 4 after Ammeter add the following NOTE:

NOTE

On the PP-1660B/G, the ammeter range is 0 to 100 amperes, Calibrated in 5-ampere increments.

Add figure 1.2 after page 4.

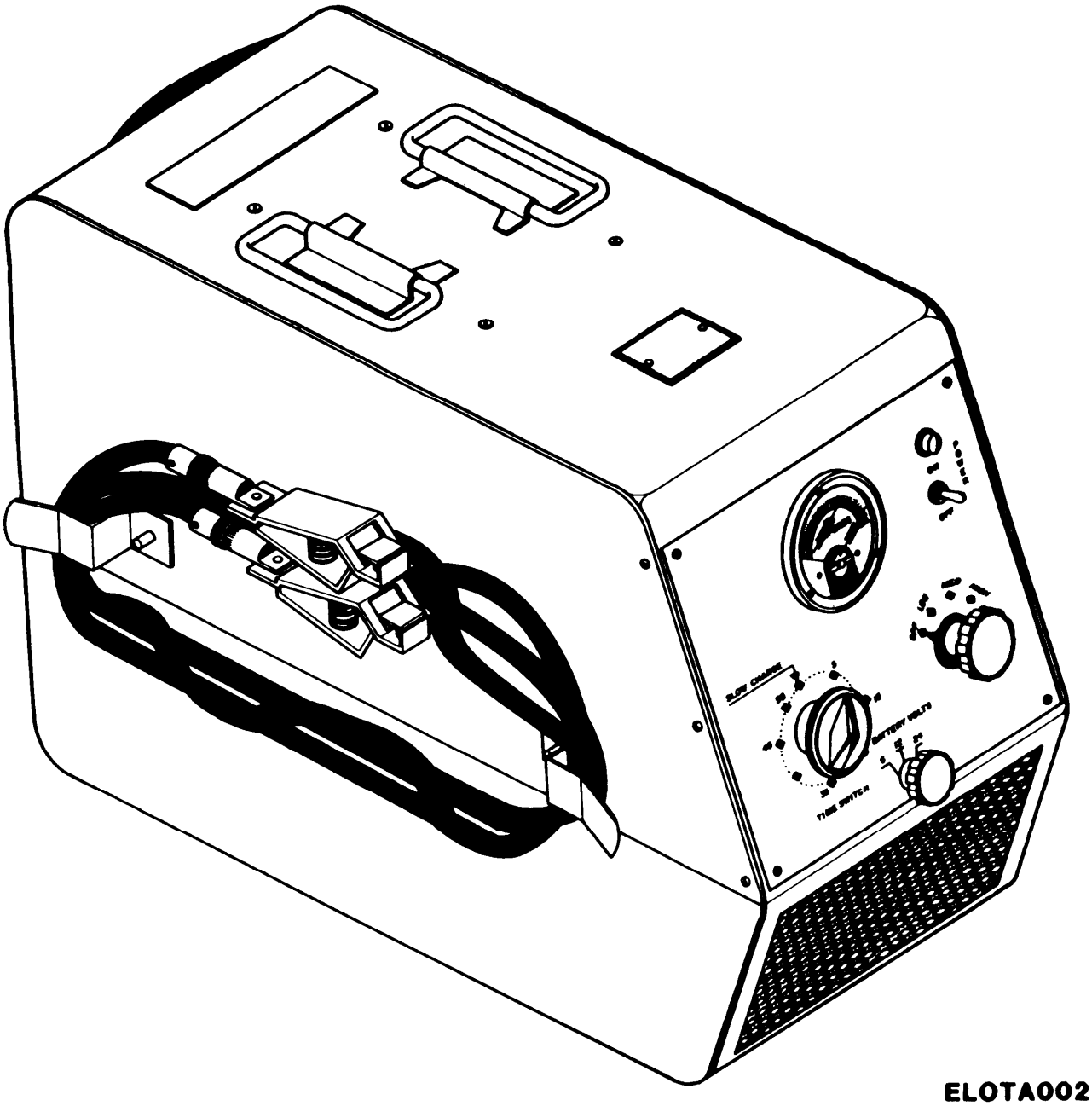

Figure 1.2 Chargeer, Battery PP-1660B/G.

Section II. OPERATING INSTRUCTIONS is superseded as follows:

Section II. OPERATING INSTRUCTIONS

10. Operator's Controls, Indicator, and Connectors

Control, indicator, or connector	Function
BATTERY VOLTS switch	Selects the proper dc output voltage for charging 6-, 12, or 24-volt batteries.
TIME SWITCH	Selects either slow-charge range (SLOW CHARGE position) or fast-charge range and desired time of fast charge in minutes from 1 to 55. Also switches charging rate to slow-charge range automatically at expiration of selected time of fast charge.
CHARGE SWITCH	In OFF position, opens the ac input circuit of the battery charger. In LOW, either of two MED (medium), or HIGH position, adjusts the rate of charge in both fast-charge and slow-charge rates.
POWER ON/OFF switch	Controls operation of battery charger. In ON position, power is applied and blower operates. In OFF position power is off and blower does not operate.
Power indicator (PP-1660B/G only)	Lights when POWER ON/OFF switch is set to ON position.
Ammeter	Indicates charging rate (output current) in dc amperes. Dial is calibrated in amperes from 0 to 90 in 5-ampere increments. Dial also has two color-coded scales that indicate the ranges and limits of fast- and slow-charging rates for 6- and 12-volt batteries and for 24-volt batteries, respectively. The slow-charging range is yellow and the fast-charging range is green; charging rates beyond the safe operating ranges are indicated by red.
NOTE On PP-1660A/G and PP-1660B/G Ammeter is calibrated in amperes from 1 to 100 in 5-ampere increments.	
Plug connector (fig.1)	Connects battery charger to ac supply.
Color-coded connectors (fig. 1)	Provide means of connecting battery clips to dc output cables of battery charger and identify the polarity of the dc output to which each dc output cable is connected (red to positive dc output, black to negative ouput). Also provide a means of connecting the dc output cables of the battery charger to the slave connections of 24-volt battery circuits of military vehicles.
Battery clips (figs.1,1.1 and 1.2)	Connect dc output cables to battery to be charged.

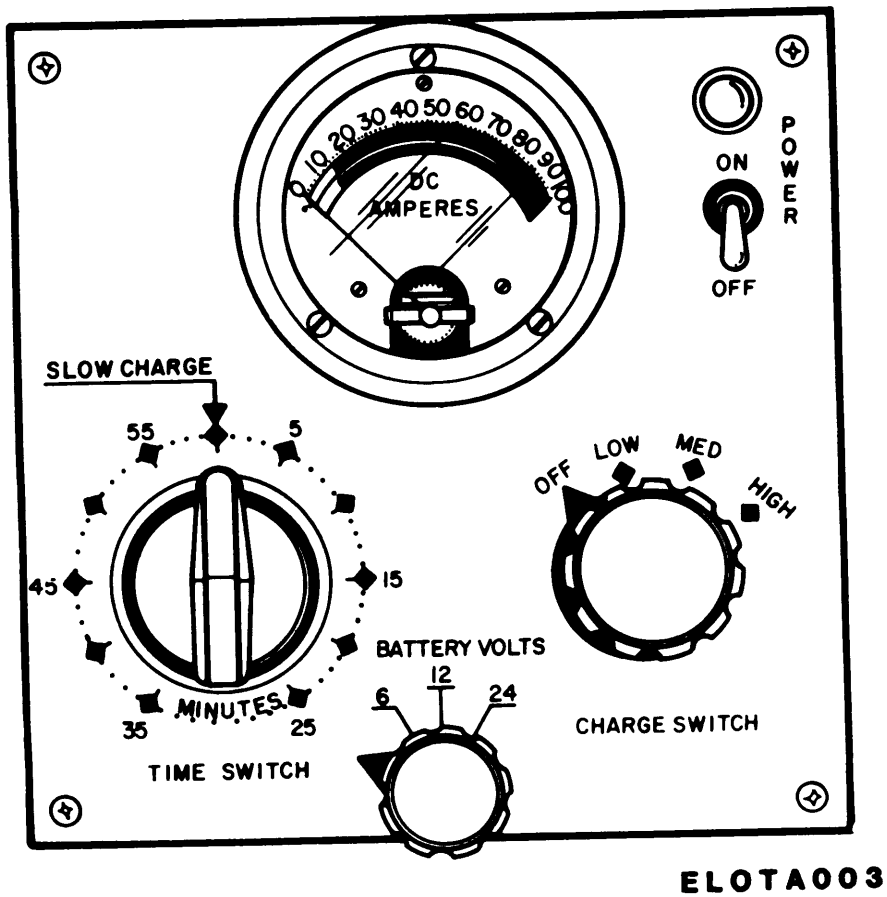

Figure 3.1. PP-1660B/G Operator's Controls and Indicators.

Add the following step at the end of paragraph 11.g.:

h. On the PP-1660B/G set POWER ON/OFF switch to ON. Power indicator should light (stays on during operation) and blower should operate. Chapter 3, Section I is superseded as follows.

CHAPTER 3

MAINTENANCE INSTRUCTIONS

Section I. OPERATOR MAINTENANCE

15. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of the PP-1660/G, together with a reference to the paragraph covering the specific maintenance function are listed below.

a. Preventive maintenance checks and services (para. 16).

b. Troubleshooting, consisting of

(1) Visual inspection (para. 17).

(2) performance check (para. 18).

15.1 Tools, Materials, and Test Equipment

No tools or test equipment are required to perform operator maintenance. The following materials are required:

a. Cloth, Textile, Lintless (NSN 8305-00-170-3015) or equal.

b. Cleaning Compound (NSN 7930-00-395-9542).

c. Two 6-volt lead-acid storage batteries, know to be discharged but otherwise in good condition.

16. Operator's Preventive Maintenance

Operator's Preventive Maintenance Checks and Services (PMCS) is the required before, during and after inspection and care of your equipment necessary to keep it in good operation condition.

NOTE

If your battery charger must be in USE ALL THE TIME, check and service those items that can be checked and serviced without stopping its operation. Make COMPLETE checks and services ONLY when the battery charger is SHUTDOWN.

a. *Routine Checks.* Routine checks like equipment inventory, cleaning, dusting, washing, checking for frayed cables, stowing items not in use, covering unused receptacles, and checking for 1oose nuts and bolts are not listed. If YOU find routine check listed it's because other operators reported problems with this item.

b. Explanation of INTERVAL column of PMCS Chart.

NOTE

Always keep in mind all CAUTIONS and WARNINGS when PMCS are performed.

BEFORE OPERATION –Do your Before (B) PMCS to be sure the battery charger is ready to use.

DURING OPERATION –Do your During (D) PMCS while you operate the battery charger to help spot small problems before they become big problems.

AFTER OPERATION –Do your After (A) PMCS to ensure that the battery charger is ready for storage.

NOTE

ALL PMCS must be done as regularly scheduled and also under the following conditions:

Ž Before the battery charger is used on a mission.

Ž When the unit is first installed.

Ž When the unit is re-installed after being removed for any reason.

c. Explanation of EQUIPMENT IS NOT READY IF: Column of PMCS Chart.

Ž This column tells why your equipment cannot be used.

• Why there is a. problem with any item that was inspected.

• What the problem is with a PROCEDURE.

NOTE

The procedures column in your PMCS chart tells you how to perform the required checks and services. Carefully

follow these instructions. If tills are needed, or the chart instructions tell you, get organiztional maintenance to do the necessary work.

NOTE

If the battery charger fails to operate, refer to Troublshooting for possible problems. Report any malfunctions or failures on the proper Form DA-2404 or refer to TM 38-750.

16.1 Operator's Preventive Maintenance Checks and Servcies Chart

B-Before Operation D-During Operation A-After Operation

ITEM NO.	INTERVAL B	D	A	ITEM TO BE INSPECTED PROCEDURE	EQUIPMENT IS NOT READY/AVAILABLE IF:
1	•			Blower Ventilation Grilles Inspect the grilles to be sure they are free of obstructions.	Blower ventillating grilles are blocked.
2		•		Blower Set POWER ON/OFF switch to ON on PP-1660B/G.	Blower does not operate.
3		•		Operation Perform the operating procedures in paragraph 13.	Equipment fails to operate per the instructions in paragraph 13.
4			•	Cables and Battery Clips Make sure cables are wound on hangers and battery clips are attached to dc ouput cables or stored on clips.	

16.2 Cleaning

All exterior surfaces of the battery charger must be clean, free of dust, dirt, moisture, grease, and fungus.

a. Remove dust, lose dirt, and moisture from the exterior surfaces of the case and cables with a clean, soft cloth.

WARNING

Adequate ventilation should be provided while using TRICHLORO-TRIFLUOROETHANE. Prolonged breathing of vapor should be avoided. The solvent should not be used near heat or open flame; the products Of decomposition are toxic and irritating. Since TRICHLOROTRIFLUORO-EHTANE dissolves natural oils, prolonged contact with skin should be avoided. When necessary, use gloves which the solvent cannot penetrate. If the solvent is taken internally, consult a physician immediately.

b. Use a cloth dampened (not wet) with tri-chlorotrifluoroethane to remove ground-in dirt, grease, and fungus.

CAUTION

Do not use TRICHLOROTRI-FLUOROETHANE to clean the cables because it may damage the jacksets.

CAUTION

Do not press on ammeter glass, as this may damage the equipment.

c. Use a soft clean cloth to clean the front panel, the controls knobs, and the ammeter glass.

17. Visual Inspection

When the battery charger fails to perform properly, turn the CHARGE SWITCH to OFF and check for the following
(on PP-1660B/G also set Blower ON/OFF switch to OFF)

a Incorrect settings of controls.

b. Ac input cable disconnected or poorly connected.

c. Dc output cable disconnected or poorly connected.

d. Dc output cable improperly connected.

e. Jumper cables disconnected or improperly connected for multiple-battery charging.

18. Equipment Performance Checklist

a. General. Use the checklist in *b* below to check equipment performance systematically. All corrective measures that the operator can perform are given in the Corrective measure column. Start with Step No. 1 and perform each. step in sequence. If the action taken by the operator does not correct the fault, maintenance

by higher level maintenance personnnel is required.

b. Check list.

Step No.	Item	Action condition	Normal indication	Corrective measure
1	Interunit connections	Prepare the battery charger for charging two 6-volt batteries (para 11).		
2	TIME SWITCH	Set to 5 (minutes).....		
3	BATTERY VOLTS switch.....	Set to 12.....		
	NOTE Step 4 applies to PP-1160B/G only.			
4	POWER ON/OFF switch	Set to ON.....	Blower operates and Blower indicator lights.	Check ac input cables and connections to the ac supply. Check ventillating grilles for obstructions.
5	CHARGE SWITCH	Set to LOW	a. Blower operates and air is drawn through the front and bottom ventilation grilles and exhausted through the back grille.	a. Check ac input cable and connections to the ac supply. Check ventilating grilles for obstructions.
			b. Ammeter indicates some low-charging rate (current value) in the FAST CHARGE range (green portion of ammeter scale) for 6- and 12-volt batteries.	b. Check switch settings. Check dc output cable connectors and connections to batteries. Check battery inter-connections.
6	CHARGE SWITCH	Turn clockwise one position (to low MED position).	Ammeter indicates a slighly higher charging rate than before (b, step No. 5).	Notify organizational Maintenance.
7	CHARGE SWITCH	Turn clockwise one position (to high MED position).	Ammeter indicates a higher charging rate than in step No. 6.	Notify organizational Maintenance.
8	CHARGE SWITCH	Turn to HIGH.....	Ammeter indicates a charging rate of 75 amperes or more. CAUTION If the ammeter indicates charging rate in the red portion of the ammeter scale, immediately turn the CHARGE SWITCH counterclockwise until the ammeter reading is in the green portion of the ammeter scale.	Notify organizational Maintenance.
9	TIME SWITCH	Pointer moves counterclockwise and stops at SLOW CHARGE.	When pointer reaches SLOW CHARGE, charging rate decreases suddenly to some high value in the SLOW range (yellow portion of ammeter scale) for 6- and 12-batteries.	Notify organizational Maintenance.

Step No.	Item	Action or condition	Normal indication	Corrective measure
10	CHARGE SWITCH	Turn counterclockwise one position (to high MED position).	Ammeter indicates a slightly lower charging rate than before (step 9).	Notify organizational Maintenance.
11	CHARGE SWITCH	Turn counterclockwise one position (to low MED position).	Ammeter indicates a lower charging rate than before (step 10.).	Notify organiztional Maintenance.
12	CHARGE SWITCH	Turn to LOW	Ammeter indicates a lower charging rate than before (step 11.).	Notify organizational Maintenance.
13	CHARGE SWITCH	Turn to OFF	Ammeter reading drops to 0 and blower stops.	Notify organizational Maintenance.

Section II. ORGANIZATIONAL MAINTENANCE

Section II of Chapter 3, paragraphs 19 through 21 are superseded as follows:

19. Scope of Organizational Maintenance.

Organizational maintenance consists of the following.

a Preventive maintenance (para 21).
b. Zero-adjustment of ammeter (para 21 b).
c. Troubleshooting (para 22).
d. Replacement of authorized parts.

20. Tools and Materials for Organizational Maintenance.

The following tools and materials are required for organizational maintenance of the battery charger:

a Tool Kit TK-101/G.

b. Two 6-volt, lead acid storage batteries, known to be discharged but otherwise in good condition.

c. One 24-volt, lead-acid storage battery, known to be discharged but otherwise in good condition.

d. Materials for repainting (required only if retouching is necessary (para. 23. 1).

21. Preventive Maintenance

Perform the procedures in the following chart monthly to ensure proper operation of the battery charger.

Item	Organizational Monthly PMCS Procedure
1	See that there are no loose or missing screws and that the cover is fastened securely to the bottom section of the case. Tighten loose screws and replace any that are missing.
2	Remove corrosion from battery clips with abrasive paper or cloth. Replace battery clips that cannot be cleaned properly or have poor spring tension. 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.
3	Repair minor damage (such as cuts and cracks) in the insulation of the ac input cable and dc output cables by covering the damaged area with rubber tape and then with friction tape.
4	Inspect the ammeter to see whether the needle rests exactly at 0. If it does not, adjust the position of the needle by rotating the zero-adjust screw left or right, as appropriate, until the needle rests exactly at 0.

Add the following information after paragraph 23.

23.1 Touchup Painting.

a. Remove rust and corrosion from painted surfaces by lightly sanding with fine sandpaper.

b. Brush two thin coats of paint on the bare metal to protect it from further corrosion.

c. Refer to TM 746-10 for painting and preservation instructions. Appendix I is superseded as follows:

APPENDIX I

REFERENCES

DA Pam 310-1	Index of Technical Manual, Technical Bulletins, Supply Manuals (types 7, 8 and 9), Supply Bulletins, and Lubrication Orders.
SB11-573	Painting and Preservation Supplies Available for Field Use for Electronics Command Equipment.
TM11-6130-227-20P	Organizational Maintenance Repair Parts and Special Tools List, Battery Chargers PP-1660/G
TM 11-6130-227-20P-1	Organizational Maintenance Repair Parts and Special Tools List, Battery Chargers PP-16601G, PP-1660A/G, and PP-1660B/G.
TM746-10	Field instructions for Painting and Preserving Electronics Command Equipment.
TM740-90-1	Administrative Storage of Equipment.
TM38-750	The Army Maintenance Management System (TAMMS).

Appendix II, Sections II and III (change 4) title is changed to read as follows:
CHARGER, BATTERY PP-16601G, PP-1660A/G and PP-1660BIG.

By Order of the Secretary of the Army:

E. C. MEYER
General United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General United States Army
The Adjutant General

Distribution:
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TM11-6130-227-12

C4

CHANGE
NO. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 27 *August 1976*

Operator and Organizational Maintenance Manual CHARGER, BATTERY PP-1660/G AND PP91660A/G (NSN 61 30-00-669-6659)

TM 11-6130-227-12, 27 June 1962, is changed as follows:

The title of the manual is changed as indicated above.

Page 2. Paragraph 1 is superseded as follows:

1. Scope.

u. This manual describes Charger, Batteries PP-1660/G and PP-1660A/G and covers the installation, operation, operator's maintenance, and organizational maintenance of this equipment. Appendix 111 contains the basic issue items list and appendix II the maintenance allocation chart.

b. All references to the PP-1660/G shall also pertain to the PP-1660A/G unless otherwise noted.

Page 4. Add figure 1.1 after figure 1:

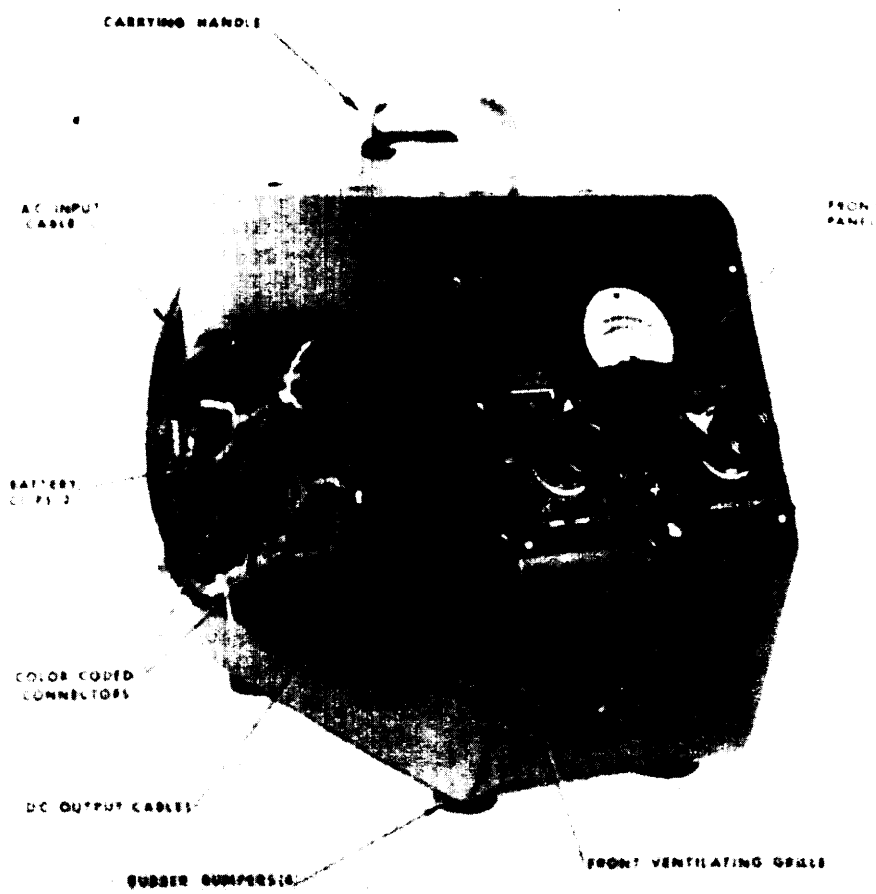

Figure 1.1. Charger, *Battery PP-1660A/G.*

Page 7. Add the following note to figure 3:

NOTE
For PP-1660A/G MODEL, METER SHAPE IS ROUND WITH A 100 AMP SCALE RANGE.

Page 18, paragraph 22a(4). Add after last line of warning notice: SELENIUM RECTIFIERS ARE NOT PROVIDED IN MODEL PP-1660A/C (PROCURED UNDER CONTRACT DAAB07-75-C-1355).

Page 23. Appendix 11 is superseded as follows:

APPENDIX II
MAINTENANCE ALLOCATION

Section I. INTRODUCTION

II-1. General

This appendix provides a summary of the maintenance operations for PP-1660/G and PP-1660A/G. 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 and in planning maintenance operations.

II-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

a. inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and to detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service, Operations required periodically to keep an item in proper operating condition, i.e., to clean, preserve drain, paint, or to replenish fuel/lubricants/hydraulic fluids or compressed air supplies.

d. .Adjust. Maintain within prescribed limits by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision 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.

g. Install. The act of emplacing, seating, or fixing into position an item, part, module (component. or assembly) in a manner to allow the proper functioning of the equipment/system.

h. Replace. The act of substituting a serviceable like-type part, subassembly, model (component or assembly for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item correcting specific damage, fault, malfunction, or failure in a part, subassembly, module/component/-assembly, end item or system. This function does not include the trial and error replacement of running spare type items such as fuses, lamps, or electron tubes.

j. Overhaul. That periodic maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e. g., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours, miles, etc.) considered **in classifying Army equipment/components.**

II-3. Column Entries

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify

components, assemblies, subassemblies and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the noun names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in column 2. When items are listed without maintenance functions, it is solely for purpose of having the group numbers in the MAC and RPSTL coincide.

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a "worktime" figure in the appropriate subcolumn(s), the lowest level of Maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category' of maintenance. If the number or complexity of the tasks within the listed maintenance function varies at different maintenance categories, appropriate "worktirne" figures will be shown for each category. The number of task = hours specified by the "worktime" figure represents the average time required to restore an item (assembly, subassembly, component, module, end item or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

C . . . . . Operator/Crew
O . . . . . Organizational
F . . . . . Direct Support
H . . . . . General Support
D . . . . . Depot

e. Column 5, Tools and Equipment. Column 5 specifies by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

II-4. Tool and Test Equipment Requirements (Table 1)

a. Tool or Test Equipment Reference Code. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool or test equipment for the maintenance functions.

b. Maintenance Category. The codes in this column indicate the maintenance category allocated the tool or test equipment.

c. Nomenclature. This column lists the noun name and nomenclature of the tools and test equipment required to perform the maintenance functions.

d. National/NATO STOCK Number. This column lists the National/NATO stock number of the specific tool or test equipment.

e. Tool Number. This column lists the manufacturer's part number of the tool followed by the Federal Supply Code for manufacturers (5-digit) in parentheses.

SECTION II MAINTENANCE ALLOCATION CHART FOR

CHARGER, BATTERY PP-1660/G AND PP-1660A/G

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIPMENT
			C	O	F	H	D	
00	CHARGER, BATTERY PP-1660/G	Inspect	0.1					
		Service[1]	0.1					
		Adjust	0.1					
		Repair[2]		0.2				1
		Service[3]				0.5		2
		Test				1.0		2,3
		Repair				1.0		2
		Overhaul					13	2 thru 7

(1) Exterior.
(2) Connectors, knobs.
(3) Interior.

TABLE 1. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR

CHARGER, BATTERY PP-1660/G AND PP-1660A/G

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1	O	TOOL KIT, ELECTRONIC EQUIPMENT TK-101/G	5180-00-064-5178	
2	H,D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-00-610-8177	
3	H,D	MULTIMETER, AN/USM-223/U (RS 352/U)	6625-00-999-7465	
4	D	AMMETER ME-65( )/U	6625-00-985-5251	
5	D	AMMETER AN/USM-69		
6	D	OHMMETER ZM-21( )/U	6625-00-581-2466	
7	D	DUMMY LOAD, ELECTRICAL	6625-00-422-2111	

Page 28. Appendix III, section II, "FUNCTIONAL PARTS LIST," Description column. Add below description for "CHARGER, BATTERY, PP-1660/G":

DESCRIPTION: CHARGER, BATTERY PP- 1660A/G: Silicon rectifier type; 6 v to 24 v charging; 10 amp continuous charging; 105 v to 125 v ac, 60 Hz, 1 ph, oper requirements; 6 v and 12 v dc at 75 amp, 24 v dc at 38 amp max output; approx 22 in lg x 9 in w x 17 in h o/a dim; Astra Products Co., Inc. of Tampa P/N 2800011

By Order of the Secretary of the Army):

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Ft Huachuca (1)
Ft Carson (5)
SAAD (30)
LBAD (14)
TOAD (14)
SHAD (3)
HISA (Ft Monmouth) (33)
Ft Richardson (ECOM Oft) (2)
Svc Colleges(1)
USASESS (5)
USAICS (3)
USAADS (2)
USAFAS (2)
USAARMS (2)
USAIS (2)
USAES (2)
MAAG (1)
USARMIS (1)
USAERDAA (1)
USAERDAW (1)
Sig FLDMS (1)
Units org under fol TOE:
1 1-500 (AA-AC) (1)
29-134(1)
29-136(1)

ARNG & USAR: None.

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

CHAPTER 1

INTRODUCTION

Section 1. GENERAL

1. Scope

This manual describes Charger, Battery PP-1660/G and covers the installation, operation, operator's (first echelon) maintenance, and organizational (second echelon) maintenance of this equipment. It also contains the Basic Issue Items List and covers maintenance allocation for the PP-1660/G.

2. Forms and Records

a. Unsatisfactory Equipment Report. Fill out and forward DA Form 468 (Unsatisfactory Equipment Report) as prescribed in AR 700-38.

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).

c. *Preventive Maintenance Forms. Prepare* DA Form 11-238 (fig. 5 through 8) (Maintenance Checklist for Signal Equipment (Sound Equipment, Radio, Direction Finding, Radar, Carrier, Radiosonde and Television)) in accordance with instructions on the form.

d. Parts List Form. Forward DA Form 2028 (Recommended Changes to DA Technical Manual Parts Lists or Supply Manual 7, 8, or 9) direct to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-ML, Fort Monmouth, N. J., to recommend changes in, or to comment on the Basic Issue Items List (appx III).

e. Index of Equip m e n t Publications. Refer to DA Pamphlet 310-4 to determine what Changes to or revisions of this publication are current.

f. Comments on Annual. Forward all other comments on this publication direct to the Commanding Officer, U. S. Army Signal Materiel Support Agency, ATTN: SIGMS-MPP-4, Fort Monmouth, N. J.

Section II. DESCRIPTION AND DATA

3. Purpose and Use

a. *Purpose. C* h a r g e r, Battery pp-1660/G converts nominal 115-volt alternating current (at) to pulsating direct current (de) suitable for charging lead-acid type storage batteries either in the shop or in the field.

b. Use. The PP-1660/G is used to charge 6-, 12-, or 24-volt vehicular storage batteries. One, two, or four 6-volt batteries, one or two 12-volt batteries, or one 24-volt battery can be charged at one time. It may be used, also, as a booster to crank the engine of a military vehicle when the vehicle battery is in an advanced condition of discharge.

4. Technical Characteristics

Ac input:	
voltage	105 to 125 volts, 50 to 60 cps.
Current.	18 ±2 amperes max.
Dc output voltage . .	6.5, 12.5, or 26 volts (approx) with BATTERY VOLTS switch in 6, 12, or 24 position, respectively.

Charging rate:

Note: The charging rates given below are the recommended maximum safe limits for initial fast and slow charging without danger of damage to the battery. Depending on the condition of discharge of the

battery, the battery charger may be capable of delivering charging rates in excess of the values shown when the CHARGE SWITCH is set for maximum output.

Fast charging:
- 6- and 12-volt batteries . . 75 amperes, max (depends on CHARGE SWITCH setting).
- 24-volt batteries . . . . 40 amperes, max (depends on CHARGE SWITCH setting).

Slow charging:
- 6- and 12-volt batteries . . 20 amperes, max (depends on CHARGE SWITCH setting).
- 24-volt batteries . . . . 10 amperes, max (depends on CHARGE SWITCH setting).

Number of batteries that can be charged at one time. . . . . One, two, or four 6-volt batteries; one or two 12-volt batteries; or one 24-volt battery.

Ammeter:
- Type, ...Dc.
- Range . . . . . 0 to 90 amperes.
- Calibration . . . 0 to 90 amperes in 5-ampere increments.

Environmental conditions:
- Temperature:
  - Maximum . . . 125° F for 4 hours a day with full solar radiation.
  - Minimum . . . -65° F for 3 days with no solar radiation.
- Relative humidity. . . . . 100 percent.
- Elevation . . . . 15,000 feet, max.

5. Components

(fig. 1)

Charger, Battery PP-1660/G is a single, self-contained unit furnished completely assembled except for two removable battery clips, which are stored on posts on the side of the case. The PP-1660/G is 15-3/4 inches high, by 18-3/4 inches deep, by 7-1/4 inches wide, and weighs 73 pounds .

6. Description

(fig. 1)

All functional parts of Charger, Battery PP-1660/G are mounted within a steel case. The case consists of a bottom section and a removable cover with an attached carrying handle. The bottom section includes the front panel and has ventilating grilles at the front, rear, and bottom. All operating controls and a dc ammeter are mounted on the front panel. A 14-foot ac input cable and two 1 l-foot dc output cables are connected internally and brought out of the case at the rear. Hangers are provided on the back of the case for storing the ac input cable, and on the left side of the case for storing the dc output cables. Two posts for storing the detachable, spring-type battery clips also are provided on the left side of the case. Color-coded connectors (positive red and negative black) attached to the dc output cables fit the slave connections of the battery circuit of military vehicles with 24-volt electrical systems.

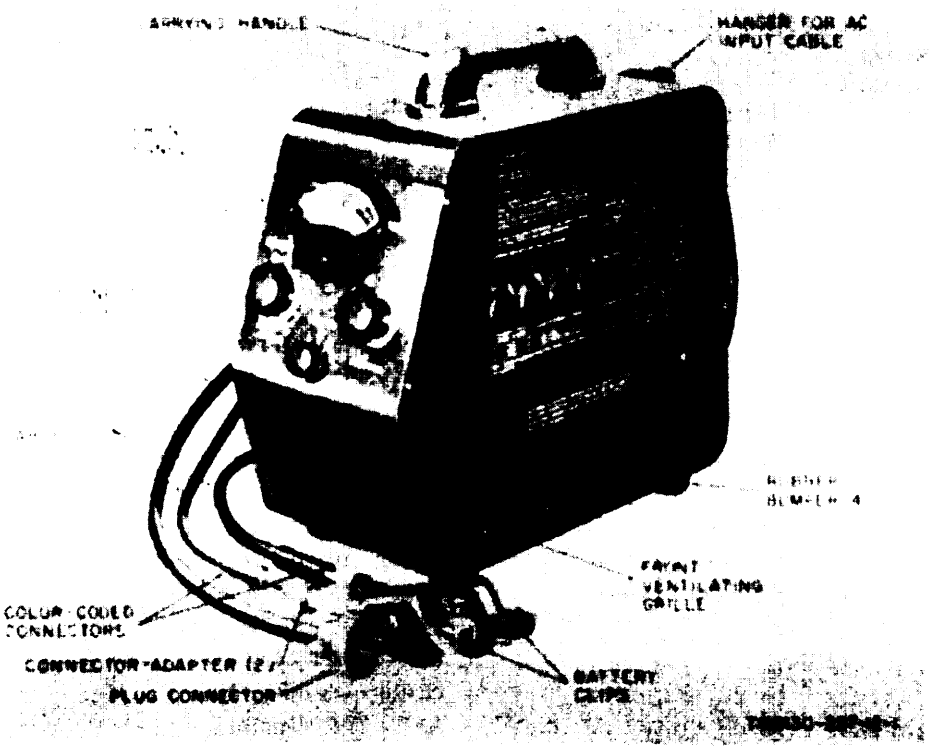

Figure 1. Charger, Battery PP-1660/G.

CHAPTER 2

INSTALLATION AND OPERATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

7. Unpacking

a. Packaging Data. For shipment, the PP-1660/G is packed in a corrugated fiberboard carton with protective corrugated fiberboard pads and spacers. Figure 2 shows the typical packaging arrangement. Packed for shipment, the PP-1660/G measures 23-1/2 by 17-1/2 by 11 inches, has a volume of 2.7 cubic feet, and weighs 80 pounds.

b. Removal Contents.

Caution: **Unpack the equipment carefully. Do not thrust tools into the shipping carton.**

(1) Remove the staples that fasten down the top flaps of the corrugated fiberboard carton and fold back the flaps.

(2) Remove the technical manuals and the corrugated fiberboard top spacers and pad.

(3) Lift the battery charger out of the carton.

8. Checking Unpacked Equipment

a. Inspect the equipment for damage that may have been incurred during shipment.

b. Check the equipment against the patting list; if no packing list accompanies the equipment, refer to paragraph 5.

c. If the equipment is damaged or does not check with the packing list, refer to paragraph *2b.*

9. Placement of Equipment

The PP-1660/G may be used in any convenient place near the battery to be charged and within reach of a suitable ac supply (para 4). The ac input cable is 14 feet long and the dc output cables are each 11 feet long. Observe the following precautions:

a. The area immediately around the battery charger must be free from excessive dirt or debris to prevent foreign matter from being drawn into the interior of the equipment or blocking the ventilating grilles.

b. If the battery charger is used in an enclosed area, make sure the area is well-ventilated to prevent the accumulation of fumes generated during charging.

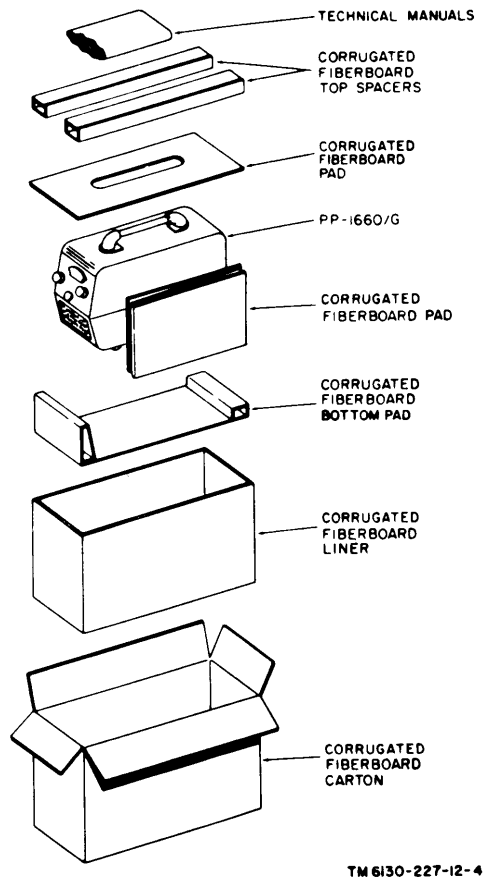

Figure 2. Charger, Battery PP-1660/G, typical packaging arrangement.

Section II. OPERATING INSTRUCTIONS

10. Operator's Controls, Indicator, and Connectors (fig. 3)

Control, indiostor, or connector	Function
BATTERY VOLTS switch	Selects the proper dc output voltage for charging 6-, 12-, or 24-volt batteries.
TIME SWITCH	Selects either slow-charge range (SLOW CHARGE position) or fast-charge range and desired time of fast charge in minutes from 1 to 55. Also switches charging rate to slow-charge range automatically at expiration of selected time of fast charge.
CHARGE SWITCH	In OFF position, opens the ac input circuit of the battery charger. In LOW, either of two MED (medium), or HIGH position, adjusts the rate of charge in both fast-charge and slow-charge ranges.
Ammeter	Indicates charging rate (output current) in dc amperes. Dial is calibrated in amperes from O to 90 in 5-ampere increments. Dial also has two color-coded scales that indicate the ranges and Iimits of fast- and slow-charging rates for 6- and 12-volt batteries and for 24-volt batteries, respectively. The slow-charging range is yellow and the fast charging range is green; charging rates beyond the safe operating ranges are indicated by red.
Plug connector (fig. 1)	connects battery charger to ac supply.
Color-coded connectors (fig. 1) . . .	Provide means of connecting battery clips to dc output cables of battery charger and identify the polarity of the dc output to which each dc output cable is connected (red to positive dc output, black to negative dc output). Also provide a means of connecting the dc output cables of the battery charger to the slave connections of 24-volt battery circuits of military vehicles.
Battery clips (fig. 1)	Connect dc output cables to battery to be charged.

11. Preliminary Procedures

Note: One, two, or four 6-volt batteries, one or two 12-volt batteries, or one 24-volt battery can be charged at one time.

a. Determine the voltage and the rating in ampere-hours of the battery or batteries to be charged.

b. Determine the existing condition of charge of the battery or batteries to be charged. When more than one battery is to be charged at one time, all batteries must be in about the same condition. Refer to TM 9-6140-200-15 for information on determining the condition of charge of lead-acid type storage batteries.

Note: Batteries with shorted or open cells cannot be charged.

c. When more than one battery is to be charged at one time, connect the batteries in series; use short jumper cables. Be sure the battery terminals are clean and tighten connections securely. Connect the batteries as follows:

Caution: When two or more batteries are to be charged in series, be sure their existing condition of charge is approximately the same. Do not connect a battery in a good condition of charge in series with a battery in a poor or discharged condition, because a battery in good condition will be damaged seriously if it is fast charged.

(1) If two 6-volt or two 12-volt batteries are to be charged, connect the two batteries as shown in A, figure 4.

(2) If four 6-volt batteries are to be charged, connect the four batteries as shown in B.

d. Install the spring-type battery clips (fig. 1) on the dc output cables of the PP-1660/G by slipping the battery clip connector-adapters onto the color-coded connectors of the dc output cables and tighten the locking nuts on the connector-adapters. Install the battery clip with the

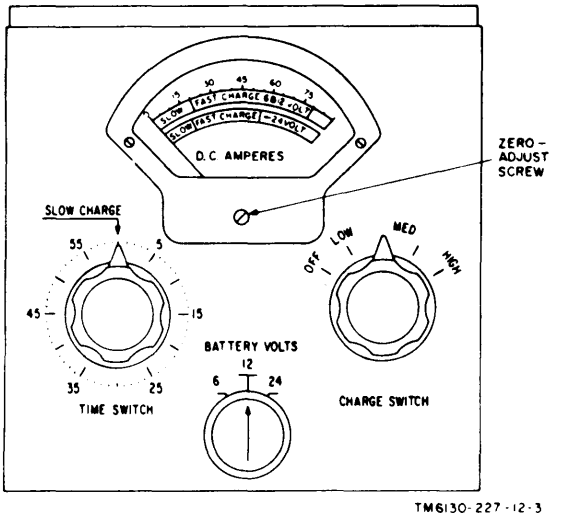

Figure 3. PP-1 660/G, operator's controls and indicator.

red band on the red color-coded connector and the battery clip with the black band on the black color-coded connector.

e. Place the CHARGE SWITCH (fig. 3) at OFF.

f. Connect the de output cables of the PP-1660/G to the battery or batteries to be charged as follows:

Caution: Be sure to observe correct polarity. The positive (+) dc output cable has a and connector; the negative (-) de output cable has a black connector.

(1) If one battery is to be charged, connect the positive de output cable to the positive (+) terminal of the battery and connect the negative dc output cable to the negative (-) terminal of the battery.

(2) If two batteries are to be charged, connect the dc output cables to the batteries as shown in A, figure 4.

(3) If four batteries are to be charged, connect the de output cables to the batteries as shown in B.

g. Connect the ac input cable of the PP-1660/G to a source of 105- to 125-volt, 50- to 60-cycle-per-second (cps) ac.

12. Selecting Fast- or Slow-Charging Rate

a. If the existing condition of charge (para 11b) of the battery is good (75 percent of full charge or more), the battery should be slow-charged only.

Caution: Never fast-charge a battery when its existing condition of charge is good. When two or more batteries are to be charged in series, be sure that a battery that should be slow-charged only is not intermixed with batteries that can be fast-charged.

b. To determine whether batteries whose existing condition of charge is less than good should be fast-or slow-charged, proceed as follows:

(1) Set the TIME SWITCH (fig. 3) to 3 (minutes).

Note: When setting the TIME SWITCH, turn the control about five divisions beyond 3 and then set it at 3.

(2) Set the BATTERY VOLTS switch as indicated in the chart below.

Batteries to be charged		BATTERY VOLTS switch setting
Voltage	Quantity	
6 volts	1	6
6 volts	2	12
6 volts	4	24
12 volts	1	12
12 volts	2	24
24 volts	1	24

(3) Rotate the CHARGE SWITCH clockwise, one position at a time, until the ammeter indicates 40 amperes (12 - and 24-volt batteries with a rating of 40 to 60 ampere-hours) or 75 amperes (6- and 12-volt batteries with a rating of 80 ampere-hours or greater).

(4) Watch the ammeter and note whether the reading decreases or remains about constant during the next 3 minutes (approximately).

(5) When the TIME SWITCH returns to SLOW CHARGE and the ammeter reading decreases suddenly to some value in the SLOW CHARGE range (yellow portion of ammeter scale), place the CHARGE SWITCH at OFF.

(6) If, during the 3-minute period ((4) above), the ammeter reading decreased by 6 amperes or more

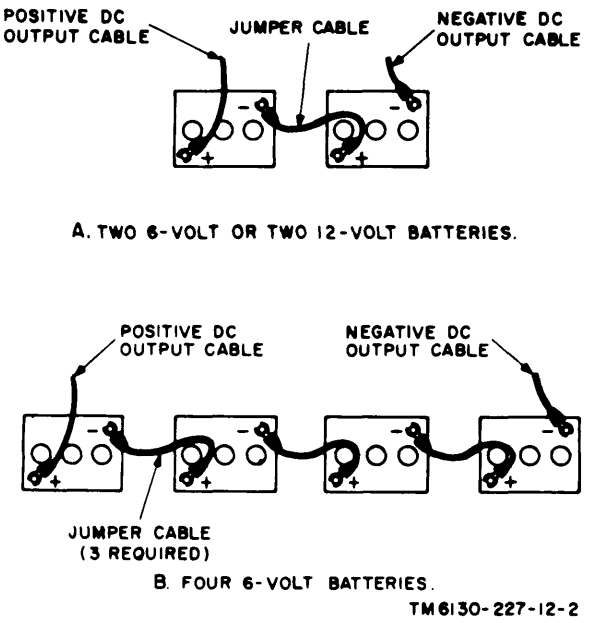

Figure 4. Connections for charging *two or four batteries simultaneously.*

from the 40-ampere reading ((3) above), or by 10 amperes or more from the 75-ampere reading, the batteries should be slow-charged *only.*

(7) If, during the 3-minute period, the ammeter reading remained practically constant or decreased by less than 6 amperes from the 40-ampere reading or by less than 10 amperes from the 75-ampere reading, the batteries should be fast-charged for a length of time and at a charging rate recommended by the battery manufacturer for batteries in the existing condition of charge (para 11b).

13. Charging Procedures

Warning: Batteries undergoing Charge give off hydrogen gas. A mixture of hydrogen and air can be a dangerous explosive. Keep the charging area well-ventilated and do not allow flame or sparks near a battery that is being charged.

a. Be sure all the preliminary procedures (para 11) have been performed correctly.

b. Slow Charging.

(1) Set the TIME SWITCH to SLOW CHARGE.

(2) Set the BATTERY VOLTS switch as indicated in the chart in paragraph 12b(2).

(3) Adjust the CHARGE SWITCH to provide the desired rate of charge. This must be some value within the SLOW range indicated by the yellow portion of the scale on the ammeter dial for 6- and 12-volt batteries or for 24-volt batteries, as appropriate.

(4) If violent gassing occurs (electrolyte appears to boil) when charging is begun, the charging rate is too high. Reduce the charging rate immediately.

Note: Steady gassing later on indicates that the battery is approaching full charge.

(5) As charging progresses, the charging rate (ammeter reading) should decrease gradually until it approaches 0 when the battery is fully charged.

c. *Fast Charging.*

(1) Set the TIME SWITCH at the position corresponding to the desired number of minutes of fast charge as determined by the condition of the battery and the battery manufacturer's recommendation (para 12b).

Note: When setting the TIME SWITCH, turn the control about five divisions beyond the desired setting and then set it at the desired setting.

(2) Set the BATTERY VOLTS switch as indicated in the chart in paragraph 12b(2).

(3) Adjust the CHARGE SWITCH to provide the desired rate of charge. This must be some value within the FAST CHARGE range indicated by the green portion of the scale on the ammeter dial for 6- and 12-volt batteries or for 24-volt batteries, as appropriate.

Caution: Do not charge 6- or 12-volt batteries with an 80 or higher ampere-hour rating at more

than 75 amperes, nor 12- or 24-volt batteries wit h a 40 to 60 ampere-hour rating at more than 40 amperes. Charging rates in excess of these values are indicated by the red portions of the scales on the ammeter dial.

(4) If violent gassing occurs (electrolyte appears to boil) when charging is begun, the charging rate is too high. Reduce the charging rate immediately.

Note: Steady gassing later on indicates that the battery is approaching full charge.

(5) When the time for which the TIME SWITCH is set ((1) above) has expired (TIME SWITCH has returned to SLOW CHARGE position), the charging rate should decrease suddenly to some value (depending on the condition of charge of the battery after fast charging) within the SLOW range indicated by the yellow portion of the appropriate scale on the ammeter. The battery then will be on slow charge.

(6) As charging progresses, the charging rate (ammeter reading) should decrease gradually until it approaches 0 when the battery is fully charged.

d. Stopping.

(1) When the battery is fully charged, turn the CHARGE SWITCH to OFF.

(2) Disconnect the dc output cables of the battery charger from the terminals of the battery and store the cables on the hangers provided on the left side of the case.

Note: The battery clips may be left attached to the dc output cables.

(3) Disconnect the ac input cable of the battery charger from the ac supply and store the cable on the hangers provided on the back of the case.

14. Cranking Vehicle Engines

Use the PP-1660/G as a booster to crank the engine of a motor vehicle as follows :

a. Place the PP-1660/G on a firm, reasonably level surface near the battery of the vehicle and within reach of a 105- to 125-volt, 50- to 60-cps ac supply.

b. Place the CHARGE SWITCH of the battery charger at OFF.

c. Determine whether the vehicle has a 6-, 12-, or 24-volt electrical system, and place the BATTERY VOLTS switch of the battery charger in the position (6, 12, or 24) that corresponds to the voltage of the vehicle battery.

d. If the vehicle has a 6- or a 12-volt battery, install the battery clips on the dc output cables of the battery charger (para 11d) and connect the dc output cables to the terminals of the vehicle battery (para 11f(l)).

e. If the vehicle has a 24-volt battery, connect the dc output cables of the battery charger to the slave connections of the vehicle battery circuit by means of the color-coded connectors (fig. 1).

Caution: Be sure to observe polarity. The color-coded connector on the positive dc output cable is red; the color-coded connector on the negative dc output cable is black.

f. Set the TIME SWITCH to 8 or 10 (minutes) and adjust the CHARGE SWITCH to provide a charging rate of 75 amperes if the vehicle has a 6- or a 12-volt battery, or a charging rate of 40 amperes if the vehicle has a 24-volt battery.

g. Fast-charge *(f* above) the vehicle battery for 2 to 5 minutes; then, with the battery charger still charging at 75 or 40 amperes, as appropriate, start the vehicle engine in the normal manner.

Caution: The battery charger must be charging at the fast-charge rate while the vehicle engine is being started.

h. If the TIME SWITCH returns to SLOW CHARGE so that the battery charger is charging only at the slow-charge rate before the vehicle engine starts, repeat the procedures outlined in *f* and g above.

i. When the vehicle engine is running satisfactorily, turn the CHARGE SWITCH of the battery charger to OFF and complete the normal stopping procedure (para 13d).

CHAPTER 3
MAINTENANCE INSTRUCTIONS

Section I. FIRST ECHELON MAINTENANCE

15. General

a. Scope of Operator's Maintenance. The maintenance duties normally performed by the operator (first echelon maintenance) are listed in (l), (2), and (3) below.

(1) Preventive maintenance (para 16).
(2) Visual inspection (para 17).
(3) Performance check (para 18).

b. Tools, Materials, and Test Epuipment. No tools or test equipment are required to perform first echelon maintenance. The following materials are required:

(1) Cloth, Textile, Lintless (FSN 8305-170-5062).
(2) Cleaning Compound (FSN 7930-395-9542).
(3) Two 6-volt, lead-acid storage batteries, known to be discharged but otherwise in good condition.

16. Operator's Preventive Maintenance

a. DA Form 11-238. DA Form 11-238 (fig. 5 and 6) is a preventive maintenance checklist to be used by the operator. Items that are not applicable to the equipment, or are to be performed at higher echelon, are lined out in figures 5 and 6. References in the ITEM block of figure 6 are to paragraphs in this manual that contain additional maintenance information pertinent to the particular item. Instructions far the use of the form appear on the form.

b. Items. The information in this subparagraph supplements DA Form 11-238. The item numbers correspond to the ITEM numbers on the form.

Item	Maintenance function
2,5	***Warning:*** **Cleaning compound is flammable and its fumes are toxic. Do not use near flame; provide adequate ventilation.** Use a clean, dry cloth to remove dust, dirt, and moisture. A clean cloth moistened with cleaning compound may be used to remove grease and dirt otherwise difficult to remove.
3	Operate the CHARGE SWITCH and the BATTERY VOLTS switch each through its entire range. Check for free operation without binding and positive action in each position. Place the TIME SWITCH at 5 (minutes) and observe whether the pointer returns to SLOW CHARGE in approximately 5 minutes.
6	Inspect the battery clips for rust and corrosion. See that the spring tension is good and that the connnector adapters are in good condition and are attached securely.
10	See that the carrying handle, the rubber bumpers, the hangers for storing the ac input cable and the dc output cables, and the posts for storing the battery clips are mounted securely.
11	Inspect the ventilating grilles in the front, rear, and bottom of the case. Remove dust and dirt and see that the openings are not obstructed by foreign matter.

17. Visual Inspection

When the battery charger fails to perform properly, turn the CHARGE SWITCH to OFF and check for the following:

a. Incorrect settings of controls.
b. Ac input cable disconnected or poorly connected.
c. Dc output cables disconnected or poorly connected.
d. Dc output cable improperly connected.
e. Jumper cables disconnected or improperly connected for multiple-battery charging.

18. Equipment Performance Checklist

a. General. Use the checklist in *b* below to check equipment performance systematically. All corrective measures that the

operator can perform are given in the Corrective measures column. Start with step No. 1 and Perform each step in sequece. If the action taken by the operator does not correct the fault, maintenance by higher echelon maintenance personnel is required.

b. Checklist.

Step No.	Item	Action or condition	Normal indication	Corrective measure
1	Interunit connections	Prepare the battery charger for charging two 6-volt batteries (para 11).		
2	TIME SWITCH	Set to 5 (minutes)		
3	BATTERY VOLTS switch.	Set to 12		
4	CHARGE SWITCH	Set to LOW	*a.* Blower operates and air is drawn in through the front and bottom ventilation grilles and exhausted through the back grille.	*a.* Check ac input cable and connections to the ac supply. Check ventilating grilles for obstructions.
			b. Ammeter indicates some low-charging rate (current value) in the FAST CHARGE range (green portion of ammeter scale) for 6- and 12-volt batteries.	*b.* Check switch settings. Check dc output cable connectors and connections to batteries. Check battery interconnections.
5	CHARGE SWITCH	Turn clockwise one position (to low MED position).	Ammeter indicates a slightly higher charging rate than before (*b*, step No. 4).	Higher echelon repair required.
6	CHARGE SWITCH	Turn clockwise one position (to high MED position).	Ammeter indicates a higher charging rate than in step No. 5.	Higher echelon repair required.
7	CHARGE SWITCH	Turn to HIGH	Ammeter indicates a charging rate of 75 amperes or more. ***Caution:* If the ammeter indicates charging rate in the red portion of the ammeter scale, immediately turn the CHARGE SWITCH counterclockwise until the ammeter reading is in the green portion of the ammeter scale.**	Higher echelon repair required.
8	TIME SWITCH	Pointer moves counterclockwise and stops at SLOW CHARGE.	When pointer reaches SLOW CHARGE, charging rate decreases suddenly to some high value in the SLOW range (yellow portion of ammeter scale) for 6- and 12-batteries.	Higher echelon repair required.
9	CHARGE SWITCH	Turn counterclockwise one position (to high MED position).	Ammeter indicates a slightly lower charging rate than before (step 8).	Higher echelon repair required.

Step No.	Item	Action or condition	Normal Indication	Corrective measure
10	CHARGE SWITCH	Turn counterclockwise one position (to low MED position).	Ammeter indicates a lower charging rate than before (step No. 9).	Higher echelon repair required.
11	CHARGE SWITCH	Turn to LOW	Ammeter indicates a lower charging rate than before (step No. 10).	Higher echelon repair required.
12	CHARGE SWITCH	Turn to OFF	Ammeter reading drops to 0 and blower stops.	Higher echelon repair required.

~~ADDITIONAL ITEMS FOR 3D AND 3D ECHELON INSPECTIONS~~	~~CONDITION~~
26. ~~INSPECT ANTENNA FOR CONCENTRICITY, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS~~	
27. ~~CHECK FOR NORMAL OPERATION~~	
28. ~~BEFORE SHIPPING OR STORING, REMOVE BATTERIES~~	

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.

ITEM 6 BATTERY CLIPS EXCESSIVELY CORRODED AND SPRING TENSION POOR REPORTED TO 2D ECHELON FOR REPAIR

FOLD

MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
SOUND EQUIPMENT, RADIO, DIRECTION FINDING
RADAR, CARRIER, RADIOSONDE AND TELEVISION
(AR 750-625)

EQUIPMENT NOMENCLATURE: CHARGER, BATTERY PP-1660/G

EQUIPMENT SERIAL NUMBER: 00

INSTRUCTIONS

This form may be used for a period of one month by using the correct dates and weeks of the month. It is to be used as a Preventive Maintenance check list for Signal equipment in actual use, or for a check on equipment prior to issue.

1. For detailed Preventive Maintenance instructions see:
   a. The Technical Manual *(in TM 11 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   b. The Supply Bulletin *(SB 11-100 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   c. The Department of the Army Lubrication Order. *(See DA Pamphlet Number 310-4)*

2. The following action will be taken by either the Communications Officer/ Chief for 1st echelon, or the Inspector for higher echelon:
   a. Enter Equipment Nomenclature and Serial Number.
   b. Strike out items that do not apply to the equipment.

3. Operator/Inspector will enter in the columns entitled CONDITION, on the proper line, a notation regarding the condition, using symbols specified under LEGEND.

4. After operator completes each daily inspection he will initial over the appropriate dates under "Daily Condition for Month", then return form to his supervisor.

TYPE OF INSPECTION: 1ST ECHELON

OPERATOR	~~2 ECHELON~~	DATE	SIGNATURE
✓		8 JUNE 1962	John Bennett

DA FORM 1 MAY 57 11-238

REPLACES DA FORMS 11-238, 1 NOV 55; 11-239, 11-244, 11-245, 11-248, 11-249, 11-250, AND 11-281; WHICH ARE OBSOLETE.

TM6130-227-12-5

Figure 5. DA Form 11-I238, pages 1 and 4 (as used at first echelon).

LEGEND for marking conditions:
Satisfactory, ✓
Adjustment, Repair or Replacement required, X.
Defect corrected, ⓧ

DAILY CONDITION FOR MONTH OF JUNE 1962

NO	DAILY ITEM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	2D 3D SCH ECHON
		17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1.	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT. (Ammunition, receiver, carrying cases, [illegible] cables, microphones, tubes, spare parts, technical manuals).	✓	✓	✓	✓	✓	✓	✓	✓									
2.	CLEAN DIRT AND MOISTURE FROM ANTENNA, MICRO-PHONES, HEADSETS, KEYS, JACKS, PLUGS, COMPONENT PANELS. PARA 16b	✓	✓	✓	✓	✓	✓	✓	✓									
3.	INSPECT CONTROLS FOR NORMAL OPERATION. TAP CONTROLS LIGHTLY FOR EVIDENCE OF CUT-OUT FROM LOOSE CONTACTS. PARA 16b	✓	✓	✓	✓	✓	✓	✓	✓									
4.	CHECK FOR NORMAL OPERATION OF EQUIPMENT. BE ALERT FOR UNUSUAL OPERATION OR CONDITION.	✓	✓	✓	✓	✓	✓	✓	✓									

WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D 3D SCH ECHON
5. CLEAN AND TIGHTEN EXTERIORS OF CASES, RACKS, MOUNTS, TRANSMISSION LINES. PARA 16b	✓					
6. INSPECT CASES, MOUNTS, ANTENNA TOWERS AND EXPOSED METAL SURFACES FOR RUST, CORROSION. PARA 16b	X					
7. INSPECT CORDS, CABLE, WIRE, SHOCK MOUNTS FOR CUTS, KINKS, BREAKS, FRAYING, UNDUE STRAIN	✓					
8. CHECK ANTENNA GUY WIRES FOR PROPER TENSION OR DAMAGE.						
9. INSPECT CANVAS AND LEATHER ITEMS FOR MILDEW, TEARS, FRAYING.						
10. INSPECT ACCESSIBLE ITEMS FOR LOOSENESS: SWITCHES, KNOBS, JACKS, CONNECTORS, RELAYS, TRANSFORMERS, MOTORS, PILOT LIGHTS, BLOWERS, ETC. PARA 16b	✓					
11. CLEAN AND OR INSPECT AIR FILTERS, BRASSY NAME PLATES, DIAL AND METER WINDOWS PARA 16b	✓					
12. INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, SPECIFIC GRAVITY, DAMAGED CASES. INSPECT DRY BATTERIES FOR LEAKAGE.						

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
13. INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHER PROOFING, TEARS, FRAYING.	
14. CHECK TERMINAL BOX COVERS FOR CRACKS, DIRT, LEAKS, DAMAGED GASKETS, GREASE.	

ADDITIONAL ITEMS FOR 2D AND 3D ECHELON INSPECTIONS	CONDITION
15. INSPECT SEATING OF READILY ACCESSIBLE PLUG-IN ITEMS: TUBES, LAMPS, FUSES, CRYSTALS, CONNECTORS, VIBRATORS, PLUG-IN COILS.	
16. INSPECT RELAYS AND CIRCUIT BREAKERS FOR LOOSE MOUNTINGS, DIRTY CONTACTS, MIS-ALINEMENT OF CONTACTS AND SPRINGS, PROPER SPRING TENSION.	
17. INSPECT VARIABLE CAPACITORS FOR DIRT, MIS-ALINEMENT OF PLATES, LOOSE MOUNTINGS, MOISTURE.	
18. INSPECT RESISTORS, BUSHINGS AND INSULATORS FOR CRACKS, CHIPPING, BLISTERING, MOISTURE, DISCOLORATION.	
19. CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, RELAY CASES AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE.	
20. INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS.	
21. INSPECT TERMINALS OF LARGE FIXED CAPACITORS AND RESISTORS FOR DIRT, CORROSION, LOOSE CONTACTS.	
22. INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS AND RHEOSTATS FOR OVERHEATING AND OIL LEAKAGE.	
23. INSPECT GENERATORS, AMPLIDYNES, DYNAMOTORS FOR BRUSH WEAR, SPRING TENSION, ARCING AND FITTING OF COMMUTATOR.	
24. INSPECT CATHODE RAY TUBES FOR BURNT SCREEN SPOTS.	
25. INSPECT WATERPROOF GASKETS FOR TEARS, WORN OR LOOSE PARTS.	

CONTINUED ON PAGE 4

2 3

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Figure 6. DA Form 11-238, pages 2 and 3 (as used at first echelon).

Section II. SECOND ECHELON MAINTENANCE

19. Scope of Organizational Maintenance

Organizational (second echelon) maintenance consists of the following:

a. Preventive maintenance (para 21).

b. Zero-adjustment of ammeter (para 21b).

c. Troubleshooting (para 22).

d. Replacement of authorized maintenance (para 23).

20. Tools and Materials for Organizational Maintenance

The following tools and materials are required for organizational maintenance of the battery charger:

a. Radio Repair Tool Kit TK-115/G.

b. Two 6-volt, lead acid storage batteries, known to be discharged but otherwise in good condition.

c. one 24-Volt, lead-acid storage battery, known to be discharged but otherwise in good condition.

d. Materials for cleaning and repainting (required only if retouching is necessary (para 21b)). Refer to TM 9-2851 for information on the materials required for touchup painting.

21. Second Echelon Preventive Maintenance

a. DA Form 11-238. DA Form 11-238 (fig. 7 and 8) is a preventive maintenance checklist to be used by the organizational (second echelon) repairman. Items that are not applicable to the equipment are lined out in figures 7 and 8. References in the ITEM block of figure 8 are to paragraphs in this manual that contain additional maintenance information applicable to the particular item. Additional preventive maintenance information concerning items 2, 3, 5, 6, 10, and 11 on DA Form 11-238 will be found in the operator's preventive maintenance instructions (para 16). Instructions for the use of the form appear on the form.

b. Items. The information in this subparagraph supplements DA Form 11-238 as used at second echelon. The item numbers correspond to the ITEM numbers on the form.

Item	Maintenance procedure
5	See that there are no loose or missing screws and that the cover is fastened securely to the bottom section of the case. Tighten loose screws and replace any that are missing.
6	Remove corrosion from battery clips with abrasive paper or cloth. Replace battery clips that cannot be cleaned properly or have poor spring tension. 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. Refer to applicable cleaning and refinishing practices specified in TM 9-2851.
7	Repair minor damage (such as cuts and cracks) in the insulation of the ac input cable and dc output cables by covering the damaged area with rubber tape and then with friction tape.
11	Inspect the ammeter to see whether the needle rests exactly at 0. If it does not, adjust the position of the needle by rotating the zero-adjust screw (fig. 3) left or right, as appropriate, until the needle rests exactly at 0.

22. Troubleshooting

Troubleshooting at second echelon consists of visual inspection *(a* below) and a thorough check of the performance of the equipment (b below) to sectionalize the difficulty.

a. Visual Inspection. Before operating the equipment (b below), inspect it. Inspection will save repair time and may prevent further damage to the equipment. Inspect the battery charger thoroughly for obvious defect such as the following:

(1) Loose, broken, or missing external parts.

(2) Serious damage to the case that may have resulted in damage to interior parts.

(3) Sounds, w h e n the equipment is rocked back and forth, that indicate loose or broken internaI parts.

(4) Smell of burned insulation or other

ADDITIONAL ITEMS FOR 2D ~~AND 3D~~ ECHELON INSPECTIONS	CONDITION
26. ~~INSPECT ANTENNA FOR ECCENTRICITIES, CORROSION, LOOSE FIT, DAMAGED INSULATORS AND REFLECTORS.~~	
27. CHECK FOR NORMAL OPERATION. PARA 18	✓
28. ~~BEFORE SHIPPING OR STORING- REMOVE BATTERIES~~	

IF DEFICIENCIES NOTED ARE NOT CORRECTED DURING THE INSPECTION, INDICATE ACTION TAKEN FOR CORRECTION.

ITEM 11. AMMETER WINDOW CRACKED.
REPORTED TO HIGHER ECHELON
FOR REPAIR.

FOLD

MAINTENANCE CHECK LIST FOR SIGNAL EQUIPMENT
SOUND EQUIPMENT, RADIO, DIRECTION FINDING
RADAR, CARRIER, RADIOSONDE, AND TELEVISION
(AR 750-625)

EQUIPMENT NOMENCLATURE
CHARGER, BATTERY PP-1660/G

EQUIPMENT SERIAL NUMBER
00

INSTRUCTIONS

This form may be used for a period of one month by using the correct dates and weeks of the month. It is to be used as a Preventive Maintenance check list for Signal equipment in actual use, or for a check on equipment prior to issue.

1. For detailed Preventive Maintenance instructions see:
   a. The Technical Manual *(in TM 11 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   b. The Supply Bulletin *(SB 11-100 series)* for the equipment. *(See DA Pamphlet Number 310-4)*
   c. The Department of the Army Lubrication Order. *(See DA Pamphlet Number 310-4)*

2. The following action will be taken by either the Communications Officer/Chief for 1st echelon, or the Inspector for higher echelon:
   a. Enter Equipment Nomenclature and Serial Number.
   b. Strike out items that do not apply to the equipment.

3. Operator/Inspector will enter in the columns entitled CONDITION, on the proper line, a notation regarding the condition, using symbols specified under LEGEND.

4. After operator completes each daily inspection he will initial over the appropriate dates under "Daily Condition for Month", then return form to his supervisor.

TYPE OF INSPECTION
2D ECHELON

~~OPERATOR~~	2/~~4~~ ECHELON	DATE	SIGNATURE
	✓	8 JUNE 1962	Lewis Strong

4

DA FORM 1 MAY 57 11-238 — REPLACES DA FORMS 11-238, 1 NOV 55; 11-239, 11-244, 11-245, 11-246, 11-249, 11-250, AND 11-251; WHICH ARE OBSOLETE.

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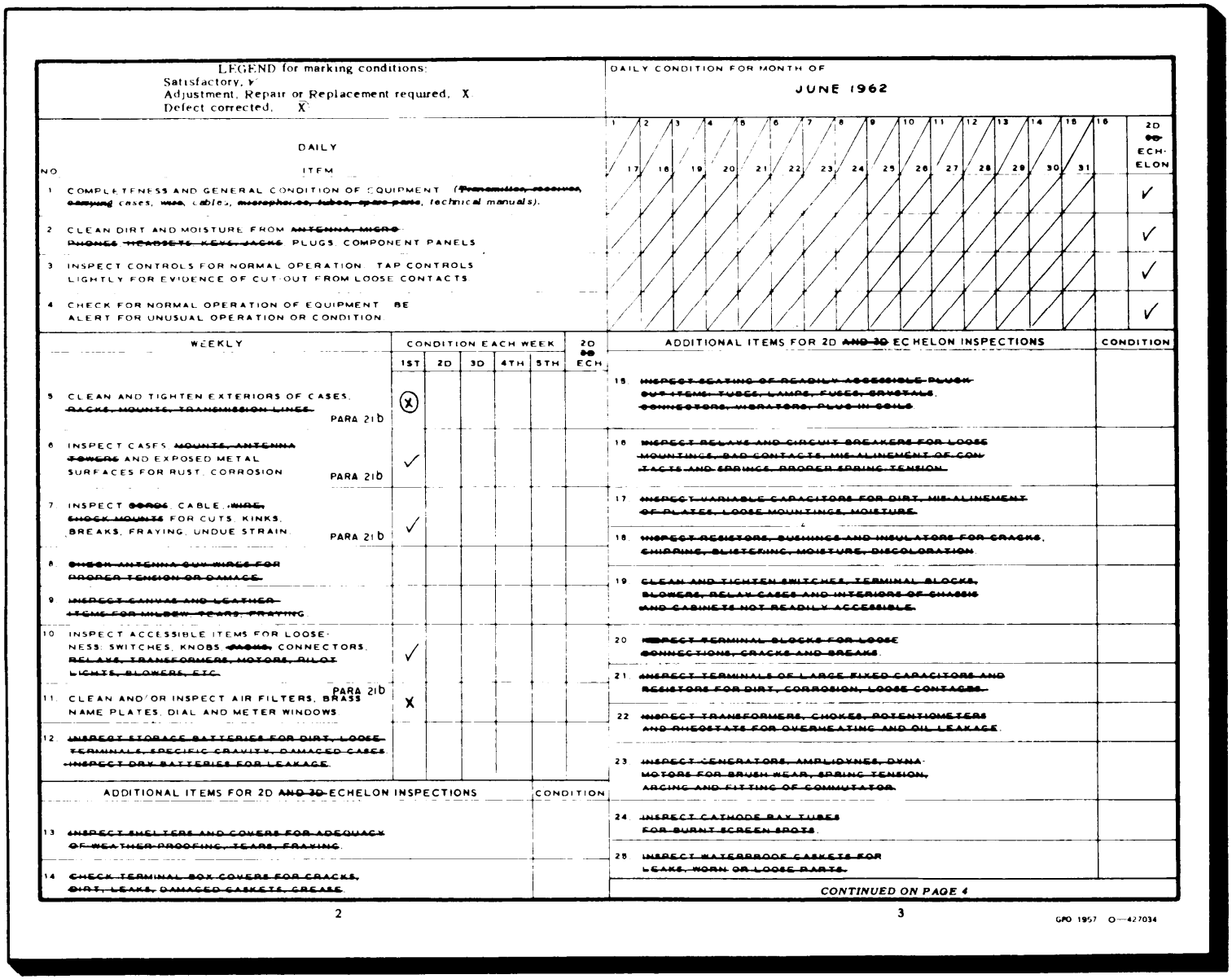
Figure 7. DA Form 11-238, pages 1 and 4 (as used at second echelon).



LEGEND for marking conditions:
Satisfactory, ✓
Adjustment, Repair or Replacement required, X
Defect corrected, ⊗

DAILY CONDITION FOR MONTH OF JUNE 1962

NO.	DAILY ITEM	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	2D ECHELON
1	COMPLETENESS AND GENERAL CONDITION OF EQUIPMENT (~~Transmitter, receiver, carrying~~ cases, ~~mast~~, cables, ~~microphones, tubes, spare parts~~, technical manuals).		✓
2	CLEAN DIRT AND MOISTURE FROM ~~ANTENNA, MICRO PHONES HEADSETS KEYS, JACKS~~ PLUGS, COMPONENT PANELS.		✓
3	INSPECT CONTROLS FOR NORMAL OPERATION. TAP CONTROLS LIGHTLY FOR EVIDENCE OF CUT-OUT FROM LOOSE CONTACTS.		✓
4	CHECK FOR NORMAL OPERATION OF EQUIPMENT. BE ALERT FOR UNUSUAL OPERATION OR CONDITION.		✓

WEEKLY	CONDITION EACH WEEK 1ST	2D	3D	4TH	5TH	2D ECH.
5 CLEAN AND TIGHTEN EXTERIORS OF CASES, ~~RACKS, MOUNTS, TRANSMISSION LINES~~. PARA 21b	⊗					
6 INSPECT CASES, ~~MOUNTS, ANTENNA TOWERS~~ AND EXPOSED METAL SURFACES FOR RUST, CORROSION. PARA 21b	✓					
7 INSPECT ~~CORDS~~, CABLE, ~~WIRE, SHOCK MOUNTS~~ FOR CUTS, KINKS, BREAKS, FRAYING, UNDUE STRAIN. PARA 21b	✓					
8 ~~CHECK ANTENNA GUY WIRES FOR PROPER TENSION OR DAMAGE~~.						
9 ~~INSPECT CANVAS AND LEATHER ITEMS FOR MILDEW, TEARS, FRAYING~~.						
10 INSPECT ACCESSIBLE ITEMS FOR LOOSENESS: SWITCHES, KNOBS ~~GAUGES~~, CONNECTORS, ~~RELAYS, TRANSFORMERS, MOTORS, PILOT LIGHTS, BLOWERS, ETC~~.	✓					
11 CLEAN AND/OR INSPECT AIR FILTERS, BRASS NAME PLATES, DIAL AND METER WINDOWS. PARA 21b	X					
12 ~~INSPECT STORAGE BATTERIES FOR DIRT, LOOSE TERMINALS, SPECIFIC GRAVITY, DAMAGED CASES. INSPECT DRY BATTERIES FOR LEAKAGE~~.						

ADDITIONAL ITEMS FOR 2D ~~AND 3D~~ ECHELON INSPECTIONS	CONDITION
13 ~~INSPECT SHELTERS AND COVERS FOR ADEQUACY OF WEATHER-PROOFING, TEARS, FRAYING~~.	
14 ~~CHECK TERMINAL BOX COVERS FOR CRACKS, DIRT, LEAKS, DAMAGED GASKETS, GREASE~~.	

ADDITIONAL ITEMS FOR 2D ~~AND 3D~~ ECHELON INSPECTIONS	CONDITION
15 ~~INSPECT SEATING OF READILY ACCESSIBLE PLUG-IN ITEMS: TUBES, LAMPS, FUSES, CRYSTALS, CONNECTORS, VIBRATORS, PLUG-IN COILS~~.	
16 ~~INSPECT RELAYS AND CIRCUIT BREAKERS FOR LOOSE MOUNTINGS, BAD CONTACTS, MIS-ALINEMENT OF CONTACTS AND ARMINGS, PROPER SPRING TENSION~~.	
17 ~~INSPECT VARIABLE CAPACITORS FOR DIRT, MIS-ALINEMENT OF PLATES, LOOSE MOUNTINGS, MOISTURE~~.	
18 ~~INSPECT RESISTORS, BUSHINGS AND INSULATORS FOR CRACKS, CHIPPING, BLISTERING, MOISTURE, DISCOLORATION~~.	
19 ~~CLEAN AND TIGHTEN SWITCHES, TERMINAL BLOCKS, BLOWERS, RELAY CASES AND INTERIORS OF CHASSIS AND CABINETS NOT READILY ACCESSIBLE~~.	
20 ~~INSPECT TERMINAL BLOCKS FOR LOOSE CONNECTIONS, CRACKS AND BREAKS~~.	
21 ~~INSPECT TERMINALS OF LARGE FIXED CAPACITORS AND RESISTORS FOR DIRT, CORROSION, LOOSE CONTACTS~~.	
22 ~~INSPECT TRANSFORMERS, CHOKES, POTENTIOMETERS AND RHEOSTATS FOR OVERHEATING AND OIL LEAKAGE~~.	
23 ~~INSPECT GENERATORS, AMPLIDYNES, DYNA-MOTORS FOR BRUSH WEAR, SPRING TENSION, ARCING AND FITTING OF COMMUTATOR~~.	
24 ~~INSPECT CATHODE RAY TUBES FOR BURNT SCREEN SPOTS~~.	
25 ~~INSPECT WATERPROOF GASKETS FOR LEAKS, WORN OR LOOSE PARTS~~.	

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2 3

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Figure 8. DA Fern. 11-238, pages 2 and 3 (as used at second echelon).

strong odor that indicates overheating.

Warning: The failure of selenium rectifiers can result in the liberatlon of poisonous fumes. When a rectifier burns out or arcs over, the odor is strong. Provide maximum ventilation immediately and *avoid inhaling the fumes. Do* not touch the damaged rectifier until it has cooled.

b. Performance Checks.

(1) Check the performance of the battery charger in accordance with the procedure outlined in paragraph 18.

(2) Repeat the performance check (para 18) with the following differences:

(a) In step No. 1, *Action or condition* column, use one 6-volt battery instead of two 6-volt batteries.

(b) In step No. 3, *Action or condition* column, set the BATTERY VOLTS switch at 6 instead of at 12.

(3) Repeat the performance check (para 18) with the following differences:

(a) In step No. 1, *Action or condition* column, use one 24-volt battery instead of two 6-volt batteries.

(b) In step No. **3** *Action or condition* column, set the BATTERY VOLTS switch at 24 instead of at 12.

(c) In steps No. 4b through 11, Nor*mal indication* column, ammeter indications should be in the green or yellow portions of the ammeter scale for 2A-volt batteries instead of for 6- and 12-volt batteries.

(d) In step No. 7, Action or condition column, the ammeter should indicate a charging rate of 40 amperes or more instead of 75 amperes.

23. Replacement of Parts

a. TIME SWITCH and CHARGE SWITCH Knobs.

Note: The TMIE knob and the CHARGE SWITCH knob are identical.

(1) If the TIME SWITCH knob is being replaced, set the TIME SWITCH fully counterclockwise to SLOW CHARGE. If the CHARGE SWITCH is being replaced, set the CHARGE SWITCH fully counterclockwise to OFF.

(2) Loosen the two setscrews in the shank of the knob and pull the knob off the shaft.

(3) If the TIME SWITCH knob is being replaced, place the new knob on the shaft with the pointer of the knob at SLOW CHARGE and the stop at the left of the pointer. If the CHARGE SWITCH knob is being replaced, place the new knob on the shaft with the pointer of the knob at OFF.

(4) Tighten the two setscrews in the new knob.

b. BATTERY VOLTS Switch Knob.

(1) Set the BATTERY VOLTS switch fully counterclockwise to 6.

(2) Pull the knob straight off the shaft.

(3) Press the new knob onto the shaft so that the arrow on the knob points precisely to 6.

c. *Ac Input Cable Plug Connector.*

(1) Remove the fiber insulator from the plug connector and note carefully the color of the cable lead connected to each terminal of the plug connector.

(2) Disconnect the cable leads, remove the nuts and screws that fasten the collar of the plug connector, and pull the plug connector off the ac input cable.

(3) Slide the new plug connector onto the ac input cable and connect each cable lead to the terminal of the new plug connector that corresponds, respectively, to the terminal of the plug connector from which it was disconnected.

(4) Tighten the screws and nuts in the collar of the plug connector and install the fiber insulator.

d. Battery Clips and Connector-Adapters.

(1) If the battery clip is installed on the dc output cable, loosen the

locking nut that secures the connector-adapter to the color-coded connector on the dc output cable and remove the assembled connector-adapter and battery clip.

(2) Remove the nut, flat washer, and screw that secure the battery clip and the connector-adapter together and separate the battery clip from the connector-adapter.

(3) Assemble the new connector-adapter and battery clip and fasten them together with the original screw, flat washer, and nut.

Caution Be sure the color-code band on the new connector-adapter or battery clip is the same as that of the one it replaces.

CHAPTER 4

SHIPMENT AND LIMITED STORAGE AND DEMOLITION TO PREVENT ENEMY USE

Section I. SHIPMENT AND LIMITED STORAGE

24. Preparation for Shipment or Limited Storage

a. Wind the ac input cable neatly on the hangers provided on the back of the case and tie the cable in place with cotton twine.

b. Remove the battery clips from the dc output cables and wind the cables neatly on the hangers provided on the left side of the case. Tie the dc output cables in place with cotton twine.

c. Mount the battery clips on the posts provided on the left side of the case.

25. Repackaging for Shipment or Limited Storage

The exact procedure for repackaging the PP-1660/G depends upon the materials available and the conditions under which the equipment is to be shipped or stored. Whenever possible, adapt the procedure outlined in a and b below. The information concerning the original packaging (para 8) also will be helpful.

a. Materials Required. The materials and the approximate quantity of each required for repackaging the PP-1660\G are listed in the chart below. For stock numhers of materials, refer to SB 38-100.

Item	Quantity
Corrugated fiberboard (wrapping and cushioning)	24 sq ft
Gummed paper tape	12 ft
Waterproof barrier material	2.5 sq ft
Pressure-sensitive tape	20 ft
Cotton twine	6 ft
Filler material	As required
Fiberboard box, approximately 23-1/2 by 11 by 17-1/2 inches	1 each

b. Packing.

(1) Pad the front panel of the battery charger with filler material and then wrap the equipment tightly in corrugated firberboard and seal with gummed paper tape.

(2) Wrap the technical manuals in waterproof barrier material and seal with pressure-sensitive tape.

(3) Place the packaged battery charger in a fiberboard box and place the packaged technical manuals on top of the equipment.

(4) Fill all voids with filler material and pads of corrugated fiberboard to prevent all movement of the equipment within the box.

(5) Fold down the flaps of the fiberboard box and seal all seams and closures with pressure-sensitive tape.

(6) Mark the outside of the fiberboard box as prescribed in MIL-STD 129B and pertinent instructions in the movement directive.

Section II. DESTRUCTION OF MATERIEL TO PREVENT ENEMY USE

26. Authority for Demolition

The demolition procedures given in paragraph 27 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.

27. Methods of Destruction

Any or all of the methods of destruction given below may be used.

a. Smash. Smash the front panel, the cable connectors, and as many of the internal parts as possible; use sledges, axes, handaxes, pickaxes, hammers, crowbars, or other heavy tools.

b. Cut. Cut all cables and internal wiring; use axes, handaxes, machetes, or similar tools.

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

c. Burn. Burn the technical literature and as much of the equipment as is flammable; use gasoline, kerosene, oil, flamethrowers, or incendiary grenades.

d. Explode. If explosives are necessary, use firearms, grenades, or TNT.

e. Dispose. Bury or scatter the destroyed parts in slit trenches, foxholes, or other holes, or throw them into streams.

APPENDIX I

REFERENCES

DA Pamphlet No. 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals, Lubrication Orders, and Modification Work Orders
MIL-STD 129B	Marking for Shipment and Storage
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army
TM 9-2851	Painting Instructions for Field Use
TM 9-6140-200-15	Operation and Organizational, Field, and Depot Maintenance: Storage Batteries, Lead-Acid Type
TM 11-6130-227-20P	Organizational Maintenance Repair Parts and Special Tools List, Charger, Battery PP-1660/G

APPENDIX II

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

1. General

a. This appendix assigns maintenance functions and repair operations to be performed by the lowest appropriate maintenance echelon. It also specifies the tool and test equipments authorized at each echelon to perform the assigned maintenance functions.

b. The maintenance allocation chart columns are as follows:

(1) *Part or component.* This column shows only the nomenclature or standard item name.

(2) *Maintenance function.* This column indicates the various maintenance functions allocated to the echelon capable of performing the operations. These functions are as follows :

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

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

(c) Inspect. 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 and meters.

(e) Repair. To restore an item to serviceable condition by correcting a specific failure or unserviceable condition. This function includes, but is not limited to welding, grinding, riveting, straightening, and replacement of parts.

(f) 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 by means 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.

(3) *1st, 2d, 3d, 4th, 5th echelon.* The symbol X indicates the echelon responsible for performing that particular maintenance operation, but does not necessarily indicate that repair parts will be stocked at that level. Echelons higher than the echelon designated by X are authorized to perform the indicated operation.

(4) *Tools required.* The numbers in this column represent tool and test equipments required tc perform the related maintenance functions. These numbers are identified in section III, Allocation of Tools for Maintenance Functions.

(5) *Remarks.* Notations in this column clarify the data cited in the preceding columns.

c. The allocation of tools for maintenance functions columns are as follows:

(1) *Tools required for maintenance functions.* This column lists tool and test equipments required to perform the assigned maintenance functions.

(2) *lst, 2d, 3d, 4th, 5th echelon.* A dagger (†) indicates that the tool or test equipment normally is allocated to that echelon.

(3) *Tool code.* The numbers in this column represent the associated tool or test equipment and are used in section II, Maintenance Allocations Chart, to refer to the item.

2. Maintenance by Using Organizations

When this equipment is used by signal services organizations organic to the theater headquarters or communication zone to provide theater communications, those maintenance functions allocated up to and including fourth echelon are authorized to the organization operating this equipment.

Section II. MAINTENANCE ALLOCATION CHART

(1) PART OR COMPONENT	(2) MAINTENANCE FUNCTION	(3) 1ST ECH	(4) 2ND ECH	(5) 3RD ECH	(6) 4TH ECH	(7) 5TH ECH	(8) TOOLS REQUIRED	(9) REMARKS
CHARGER, BATTERY PP-1660/G	service	X						Cleans Exterior, Cables and Connectors
					X		6	Cleans Interior Components, Tightens Screws and Bolts
	adjust	X						Output Voltage
	inspect	X						Visual
	test				X		1,2,3,4,5,6	Conducts all tests to insure equipment returned to user-meets minimum mechanical, visual electrical and operational requirements.
	repair		X				5	Replacement of commectors and knobs only.
					X		6	
	overhaul				X		6	

Section III. ALLOCATION OF TOOLS FOR MAINTENANCE FUNCTIONS

(1) TOOLS REQUIRED FOR MAINTENANCE FUNCTIONS	(2) 1ST	(3) 2ND	(4) 3RD	(5) 4TH	(6) 5TH	(7)	(8) REMARKS
PP-1660 G (continued)							
AMMETER AN USM-69					+	1	
MULTIMETER TS-352 U				+	+	2	
OHMMETER ZM-21 U				+	+	3	
*TEST SET (TV-100)				+	+	4	Test Set, Generator and low voltage regulator *Commercial Designation.
TOOL KIT, TK 115 G		+				5	
TOOL KIT, TK-87				+	+	6	

APPENDIX III

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. General

This appendix lists all items supplied for initial operation of the equipment. End items of equipment are issued on the basis of allowances prescribed in equipment authorization tables and other documents that are a basis for requisitioning.

2. Columns

The columns of section II areas follows:

a. Source, Maintenance and Recoverability Code. Not used.

b. Federal Stock Number. This column lists the 11-digit Federal stock number.

c. Designation by Model. Not used.

d. 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.

e. Unit of Issue. The unit of issue is each unless otherwise indicated. It is the supply term applied to the smallest quantity by which the individual item is counted for procurement, storage, requisitioning, allowances, and issue purposes.

f. Expendability. Nonexpendable items are indicated by NX. For expendable items, the column is left blank.

g. Quantity Authorized. For "Items Comprising an Operable Equipment", the column lists the quantity of each item supplied for the initial operation of the equipment.

h. Illustrations. Not used.

Section II. FUNCTIONAL PARTS LIST

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE	(2) FEDERAL STOCK NUMBER	(3) DESIGNATION BY MODEL	(4) DESCRIPTION	(5) UNIT OF ISSUE	(6) EXPENDABILITY	(7) QUANTITY AUTHORIZED	(8) ILLUSTRATIONS FIGURE NO	(9) ILLUSTRATIONS ITEM NO
	6130-669-6659		CHARGER, BATTERY, PP-1660/G: Mettallic rectifier type; 6 v to 24 v charging; 10 amp continous charging; 105 v to 125 v ac, 60 cyc, 1 ph, oper requirements; 6 v and 12 v dc at 75 amp, 24 v dc at 38 amp, max, output; approx 22 in lg x 9 in w x 17 in h o/a dim; Sun Elec part No. FBC-20					
			ITEMS COMPRISING AN OPERABLE EQUIPMENT					
	Ord thru AGC		TECHNICAL MANUAL TM 11-6130-227-12			2		
			CHARGER, BATTERY PP-1660/G: (Basic Component)		NX	1		
			RUNNING SPARES AND ACCESSORY ITEMS					
			"NO PARTS AUTHORIZED FOR STOCKAGE AT 1ST ECHELON"					

By Order of Secretary of the Army:

G. H. DECKER,
General, United States Army,
Chief of Staff.

Official:

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

Distribution:

Active Army:

DASA (6)
IJSASA (2)
CNGB (1)
Tech Stf, DA (1) except
CSigO (14)
Tech Stf Bd (1)
USCONARC (5)
USAARTYBD (1)
USAARMBD (2)
USAIB (1)
USARADBD (2)
USAAVNBD (1)
USA Abn, Elct & SPWAR Bd (1)
USAATBD (1)
ARADCOM (2)
ARADCOM Rgn (2)
OS Maj Cored (3)
OS Base Cored (2)
LOGCOMD (2)
MDW (1)
Armies (2)
Corps (2)
Instls (2)
Ft Monmouth (63)
USATC AD (2)
USATC Engr (2)
USATC Inf (2)
USATC FA (2)
USATC Armor (2)
USAOMC (2)
Svc College (2)
Br Svc Sch (2)
GENDEP (2) except
Atlanta GENDEP (None)
Sig Sec, GENDEP (5)
Sig Dep (12) except
Sacramento Sig Dep (17)
WRAMC (1)
USA Trans Tml Cored (1)
Army Tml (1)
POE (1)
OSA (1)
USAEPG (2)
AFIP (1)
AMS (l)
Army Pictorial Cen (2)
EMC (1)
Yuma Test Sta (2)
USA Strat Comm Cored (4)
USASSA (25)
USASSAMRO (1)
USARCARIB Sig Agcy (1)
USA Sig Msl Spt Agcy (13)
Sig Fld Maint Shops (3)
Def Log Svc Cen (1)
USA Corps (,3)
JBUSMC (2)
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11-597

NC: None.
USAR. None.
For explanation of abbreviations used, see AR 320-50.

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