

TM 9-1220-242-12&P

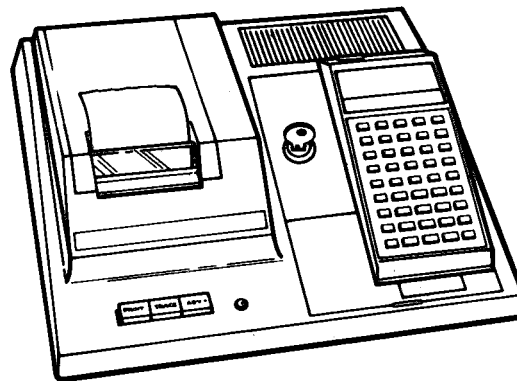
**OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)**

FOR

COMPUTER SET, FIELD ARTILLERY,

A N D

**COMPUTER SET, FIELD ARTILLERY, MISSILE
(1220-01-082-1647)**



HEADQUARTERS, DEPARTMENT OF THE ARMY
MAY 1983

WARNING

Do not allow metal objects to short the battery pack terminals because the battery pack may burst open violently. DO NOT burn or smash the battery pack.

Lead-acid storage batteries can produce explosive gases during operation that can be ignited by sparks or open flame and cause an explosion that can throw corrosive battery acid into the air. Make sure that the area directly above the battery vent caps is adequately ventilated and do not allow sparks or open flame near them.

Lead-acid storage batteries can deliver extremely high currents if the battery terminals are shorted by metal objects. Do not lay tools or other metal objects on top of these batteries, as they can get hot enough to cause burns. Remove jewelry, such as watches and rings, when working with lead-acid storage batteries.

Exposed electrical wiring could cause shock upon contact.

FIRST AID

For first aid information, refer to FM 21-11.

Operator's and Organizational Maintenance Manual
(Including Repair parts and Special Tools List)

COMPUTER SET, FIELD ARTILLERY, GENERAL
(1220-01-082-1646)

COMPUTER SET, FIELD ARTILLERY, MISSILE
(1220-01-082-1647)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2, located in the back of this manual, direct to: Commander, US Army Armament Materiel Readiness Command, ATTN: DRSAR-MAS, Rock Island, IL 61299. A reply will be furnished to you.

	Page	Illus Figure
HOW TO USE THIS MANUAL	iii	
CHAPTER 1. INTRODUCTION		
Section I. General Information	1-1	
II. Equipment Description and Data	1-3	
CHAPTER 2. OPERATING INSTRUCTIONS		
Section I. Description and Use of Operator's Controls and Indicators	2-1	
II. Preventive Maintenance Checks and Services (PMCS)	2-4	
III. Operation Under Usual Conditions	2-19	
IV. Operation Under Unusual Conditions	2-32	

		Page	Illustration Figure
CHAPTER	3. OPERATOR MAINTENANCE		
Section	I. Lubrication Instructions	3-1	
	11. Troubleshooting Procedures	3-1	
	111. Maintenance Procedures	3-12	
CHAPTER	4. ORGANIZATIONAL MAINTENANCE		
Section	I. Repair Parts, Special Tools, TMDE, and Support Equipment	4-1	
	II. Service Upon Receipt of Material	4-1	
	III. Preventive Maintenance Checks and Services (PMCS)	4-4	
	IV. Troubleshooting Procedures	4-14	
	v. Maintenance Procedures	4-22	
APPENDIX	A. REFERENCES	A-1	
APPENDIX	B. MAINTENANCE ALLOCATION CHART		
Section	I. Introduction	B-1	
	II. Maintenance Allocation Chart For Computer Sets	B-4	
	III. Remarks	B-4	
APPENDIX	c. COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS		
Section	I. Introduction	C-1	
	II. Components of End Item	C-2	
	III. Basic Issue Items	C-4	
APPENDIX	D. ADDITIONAL AUTHORIZATION LIST		
Section	I. Introduction	D-1	
	II. Additional Authorization List	D-1	
APPENDIX	E. EXPENDABLE SUPPLIES AND MATERIALS LIST		
Section	I. Introduction	E-1	
	II. Expendable Supplies and Materials	E-2	

	Page	Illustration
APPENDIX F. ORGANIZATIONAL REPAIR PARTS AND SPECIAL TOOLS LIST		
Section I. Introduction	F-1	
Section II. Repair Parts List	F-8	
Group 00. Computer Set, Field Artillery, General, 11784958, and Computer Set, Field Artillery, Missile, 11748959	F-8	1
Group 00. Computer Set, Field Artillery, General, 11784958, and Computer Set, Field Artillery, Missile, 11748959--Printer	F-10	2
Group 01. Computer, Hand Held 9331195	F-12	3
Group 02. Printer-Plotter, with Accessories 9331173	F-14	4
Group 03. Charger-Adapter, DC 9331180	F-16	5
Section III. National Stock Number and Part Number Index	F-18	
ALPHABETICAL INDEX	Index	1

HOW TO USE THIS MANUAL

MANUAL OVERVIEW

This manual contains illustrated maintenance procedures for the computer sets. All references in this manual are to pages or other publications.

INDEXES

This manual is organized to quickly find the information needed. There are several useful indexes.

a. Table of Contents. Lists in order all chapters, sections, and appendices. Gives page references.

b. Nomenclature Cross-Reference List. Gives an alphabetical list of common names and official nomenclature used in the manual.

c. List of Abbreviations. Is an alphabetical list of uncommon abbreviations used in the manual.

d. Symptom Indexes. Located just before the troubleshooting tables in maintenance chapters 3 and 4. List in alphabetical order parts of the computer sets with possible malfunctions. Reference pages of the troubleshooting tables.

e. Alphabetical Index. Located at the end of the manual. An extensive subject index for everything in the manual. Gives page references.

MAINTENANCE PROCEDURES

Maintenance instructions for components of the computer sets are illustrated step by step as authorized in the MAC, appendix B.

REPAIR PARTS AND SPECIAL TOOLS LIST

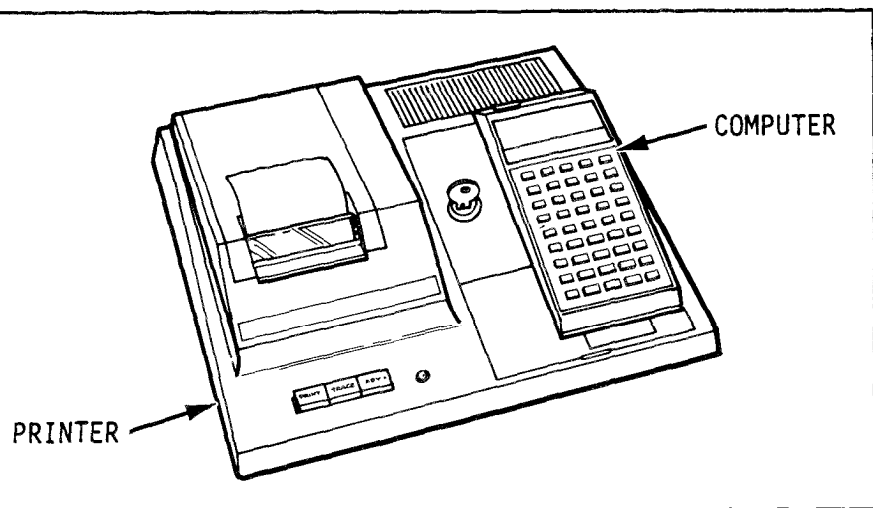
The RPSTL is composed of functional groups, following MAC order. Parts in each group are illustrated and listed in figure and item number sequence.

CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE



a. Type of Manual. Operator's and organizational maintenance (including repair parts and special tools list (RPSTL)).

b. Equipment Name. Computer set, field artillery, general, and computer set, field artillery, missile.

c. Purpose of Equipment. The general set supplements the existing FADAC/manual fire direction system by simplifying gunnery computational procedures. When FADAC is not available or is down, the computer can provide a source of firing data. It also speeds and

simplifies HB/MPI registration procedures and any METRL applications. Upon fielding of the battery computer system (BCS), the general set will be a component part of the manual emergency FDC kit. The capability to fire artillery independent of BCS/TACFIRE computer systems can, therefore, be maintained. The missile set performs the same functions in the missile firing application as the general set does in the cannon application.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS

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

1-3. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

WARNING

Do not allow metal objects to short the battery pack terminals because the battery pack may burst open violently. DO NOT burn or smash the battery pack.

Only your commanding officer can give the order to destroy materiel to prevent enemy use. Refer to TM 750-244-6.

1-4. PREPARATION FOR STORAGE OR SHIPMENT

Refer to TM 740-90-1 for instructions on placing the equipment in administrative storage.

to remember that both computer sets are commercial

ment. All equipment should be stored in a cool, dry location, if possible.

1-5. NOMENCLATURE CROSS-REFERENCE LIST

Common Name	Official Nomenclature
Battery pack	Battery set, rechargeable
Card holder	Card holder, magnetic
Cleaning card set	Card set, cleaning, calculator
Cloth	Cloth, cheesecloth
Computer	Computer, hand-held
Cotton swab	Swab, small arms
Ethyl alcohol	Alcohol, denatured
Liquid soap	Soap, toilet
Magnetic card	Card, magnetic, data recording
1/4 amp fuse	Fuse, slo-blow, 1/4 amp
Plug connector	Connector, plug, electrical
Printer	Printer-plotter, with accessories
Printer paper	Tape, paper, with card set, cleaning
Vehicle cable assembly	Cable assembly, special purpose, electrical

1-6. LIST OF ABBREVIATIONS

Abbreviation	Definition
BCS	Battery Computer System
CPC	Command Post Carrier
FADAC	Field Artillery Digital Automatic Computer
FDC	Fire Direction Center
HB/MPI	High Burst/Mean Point of Impact
Hz	Hertz (cycles per second)
METRL	Meteorological

1-7. HAND RECEIPT (-HR) MANUALS

This manual has a companion document with a TM number followed by "-HR" (which stands for Hand Receipt). The TM 9-1220-242-12-HR consists of preprinted hand receipts (DA Form 2062) that list end item related equipment (i.e., COEI, BII, and AAL) you must account for. As an aid to property accountability, additional -HR manuals may be requisitioned from the following source in accordance with procedures in chapter 3, AR 310-2:

The US Army Adjutant General Publications Center
2800 Eastern Blvd
Baltimore, MD 21220

1-8. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your computer 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 or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at Commander, US Army Armament

Material Readiness Command, ATTN: DRSAR-MAO, Rock Island, IL 61299. We'll send you a reply.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-9. EQUIPMENT CHARACTERISTICS, CAPABILITIES AND FEATURES

CHARACTERISTICS OF COMPUTER SETS

- Contain small, lightweight, portable computers.

Ž Differ in that missile set includes a printer to provide a printed copy output in addition to the computer's lighted display.

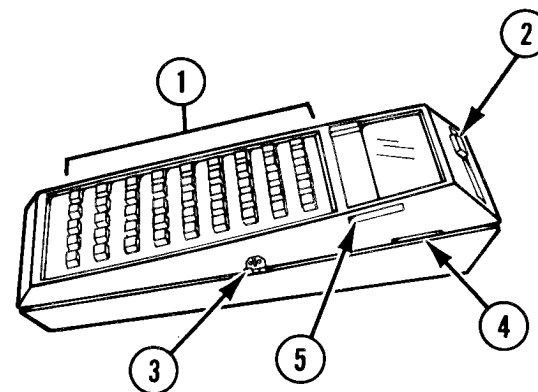
CAPABILITIES AND FEATURES OF COMPUTER

- Operates on self-contained battery pack or from a 12-V dc or 120-240-V ac power source by using the dc or ac charger-adapters.
- Computes special programs for artillery fire control, sound/flash ranging, and survey using firmware modules programmed for individual applications.
- Displays ten numeric digits, a minus sign, and a decimal point.

1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

a. Computer.

Ž The computer contains 45 keys (1) (referred to in parentheses throughout the manual) used to program and compute the solution to firing problems, sound/flash ranging computations, and survey computations. A detailed explanation of the function of each is in the personal programming manual supplied with each computer set.



Ž A computer switch (2) turns power on and off.

- An auxiliary computer receptacle (3) is on the center of the right side. It connects the ac and dc charger-adapters.

- A card read/write slot (4) is in the right side. The diagnostic card, head cleaning card, drive roller cleaning card, and the magnetic cards are inserted here. A drive roller (inside) draws the cards through and exits them through a slot in the left side.

Ž Cue cards are inserted in the cue card slot (5).

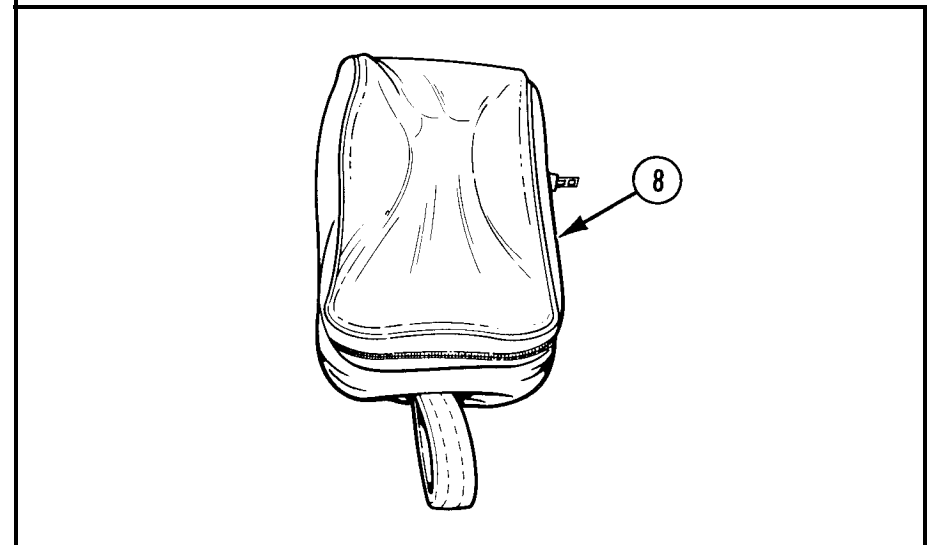
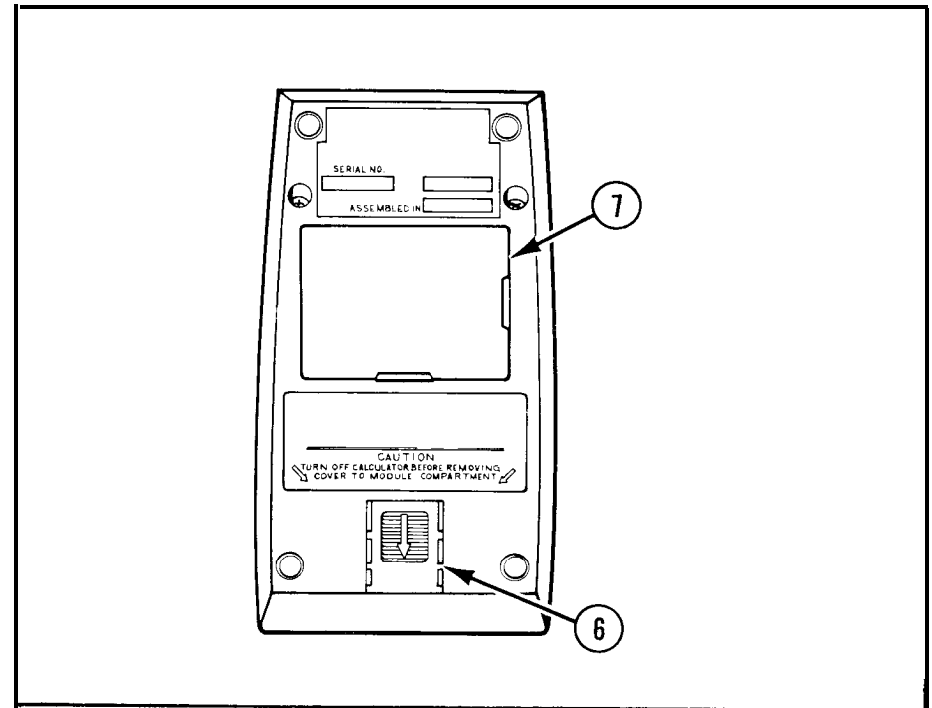
1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS
(cont)

a. Computer. (cont)

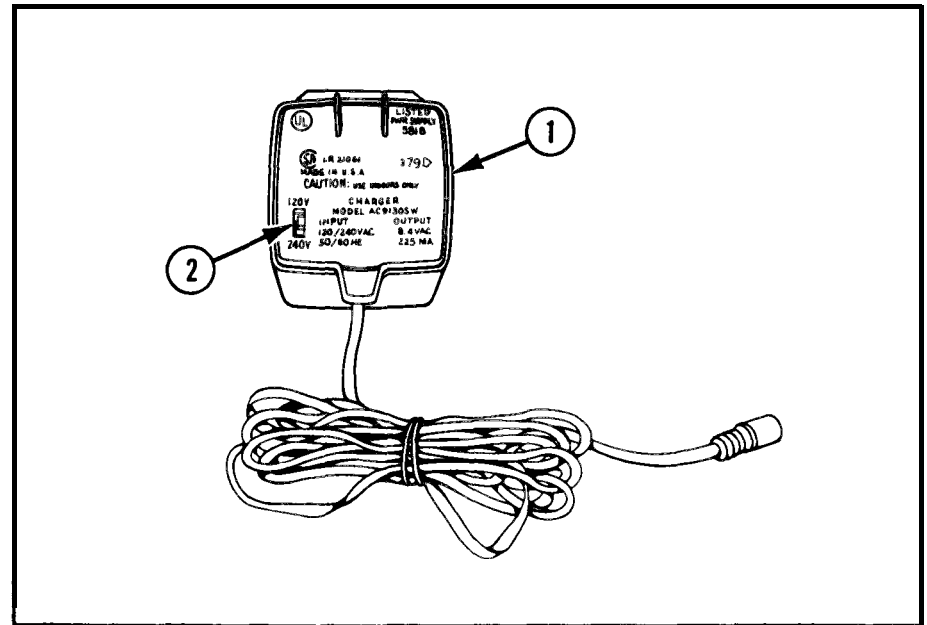
Ž A firmware module compartment (6) is on the back. It houses 5000-program-step modules that contain special programming information for several applications of the computer sets.

Ž The computer, using the ac and dc charger-adapters, can operate from four different power sources: internal battery power, external battery power, 110-120 V ac, and 220-240 V ac. Operated with the printer it can operate from a 24-V dc source using an inverter-vibrator to convert it to 110-120 V ac. The battery pack (7), in the back, supplies approximately 4 V dc to operate the computer circuitry and illuminate the light emitting diode (LED) segments of the display. Under normal use, it has a 2- to 3-year lifespan, or about 500 to 1000 cycles of recharging. When it is fully charged, the computer will operate for 2 to 3 hours.

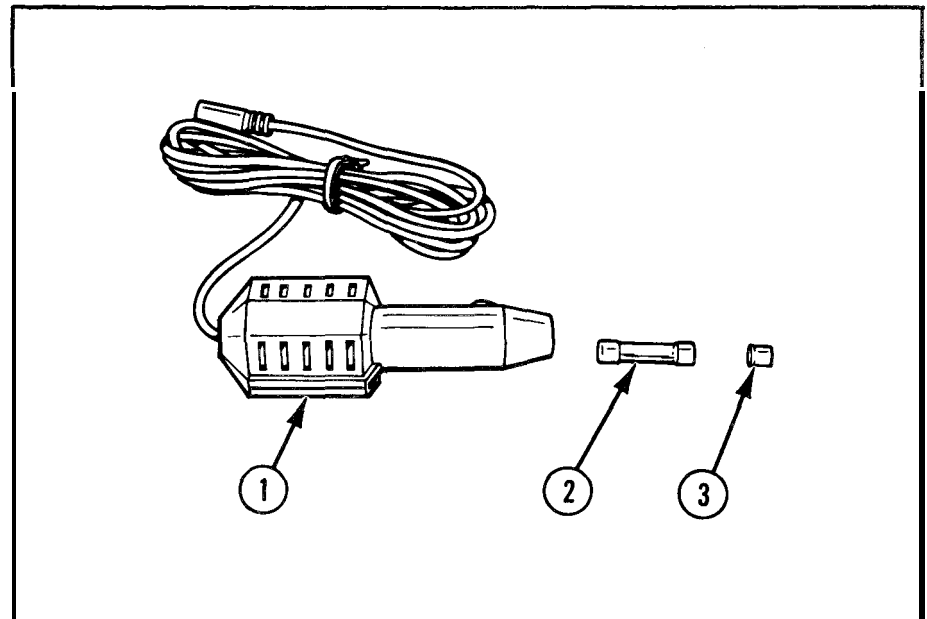
- A vinyl computer case (8) comes with the computer. A pocket inside the front holds the card holder.



b. AC Charger-Adapter. The ac charger-adapter (1) provides a continuous source of power for operating the computer and charging the battery pack. It converts 110-120 V ac or 220-240 V ac, 50-60 Hz (standard wall circuit) to 8.4 V ac. The operator must select the input voltage manually by use of the 120V/240V switch (2).



c. DC Charger-Adapter. The dc charger-adapter (1) converts 12-15 V dc to 5.5 V dc to operate the computer and recharge the battery pack. It adapts to other power sources by use of the plug connector. The dc charger-adapter is protected by a 1/2 amp fuse (2) located behind the tip (3).

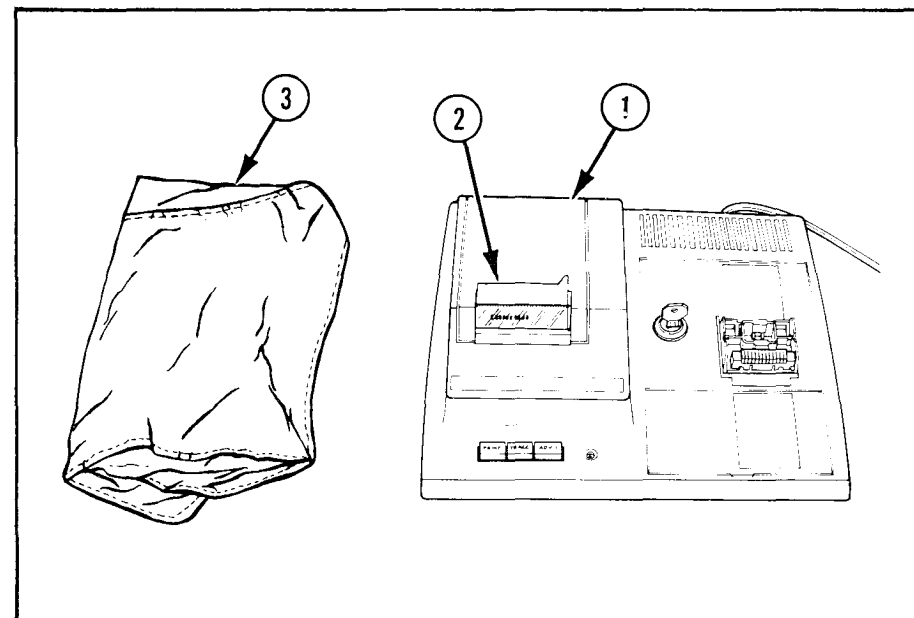


1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS
(cont)

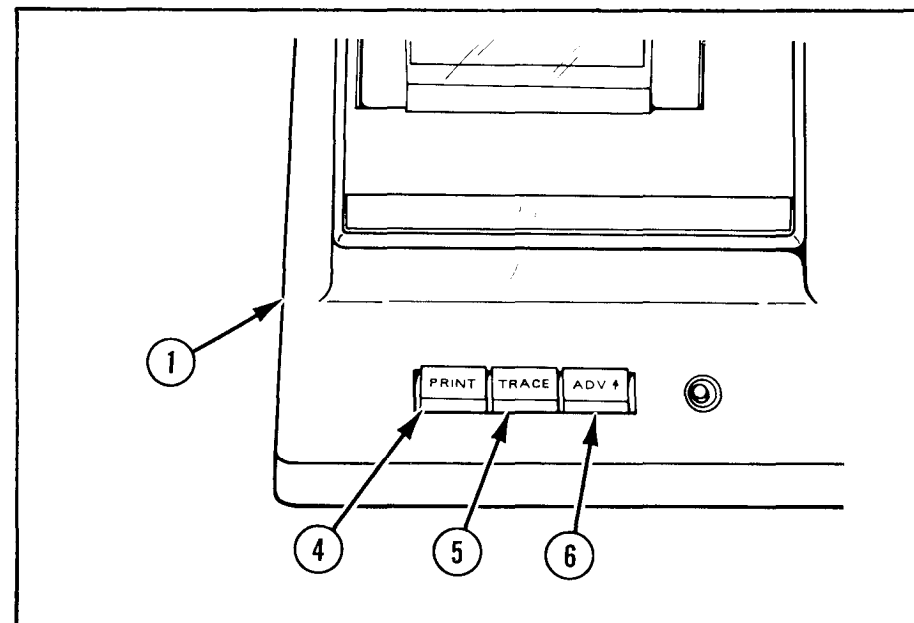
d. Printer.

The printer (1), supplied with the missile set, records information on heat-sensitive printer paper (2) during a missile firing mission.

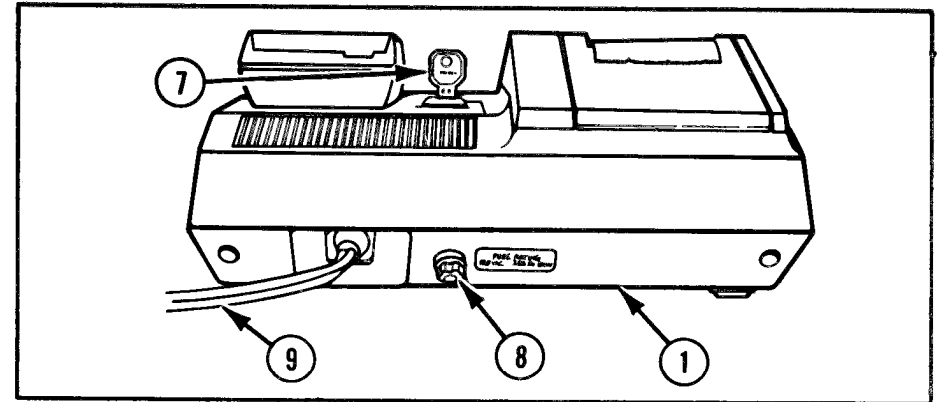
- A dust cover (3) comes with the printer to protect it when not in use.



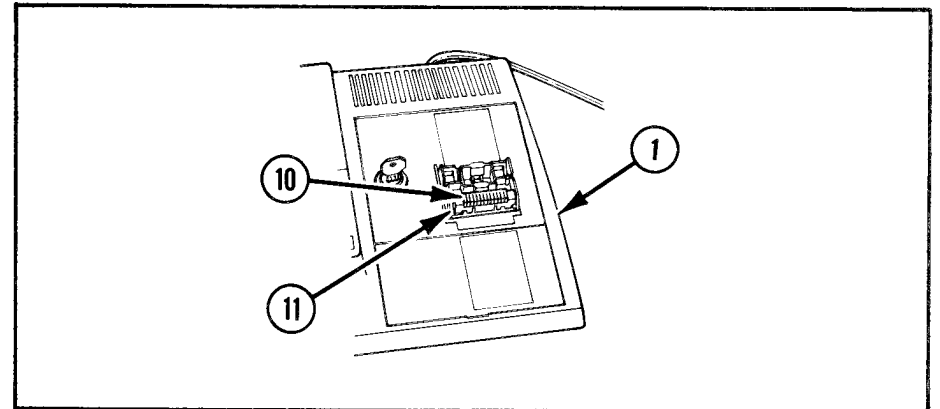
- There are three buttons on the printer (1). Pressing the PRINT button (4) causes whatever is in the display to be printed. Pressing the TRACE button (5) causes every step of the computation to be printed. The button latches in the down position when pressed once. Pressing the button again releases it and stops the trace function. Pressing the ADV (advance) button (6) feeds the printer paper through the printer to provide space before, during, and after printing operations.



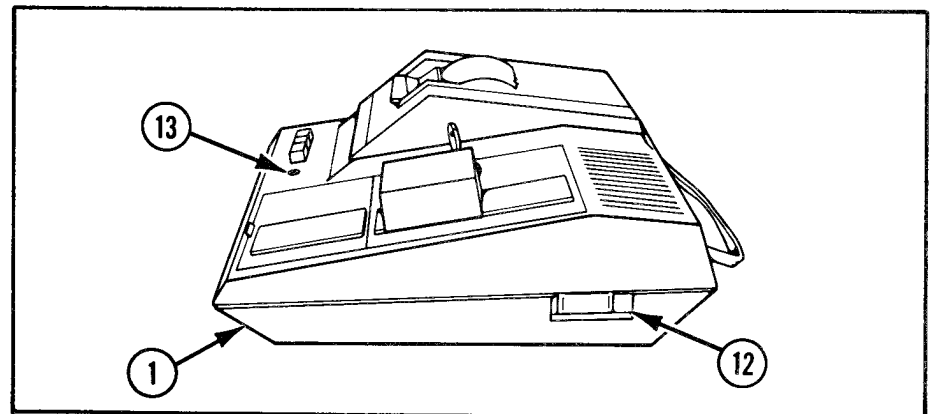
Ž A locking key (7) locks the computer in place on the printer (1).



• The printer is protected by a 1/4 amp fuse (8) located beside the power cord (9). The printer (1) supplies power to the computer through an interface connector (10) on the locking cradle (11). The battery pack is removed from the computer and installed in the printer (1) where it is maintained in a charged condition.



. A printer switch (12), on the right side, provides power to the printer (1) and the computer (when installed). A LED (13) lights when the power is on.



1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS
(cont).

e. Card Holder.

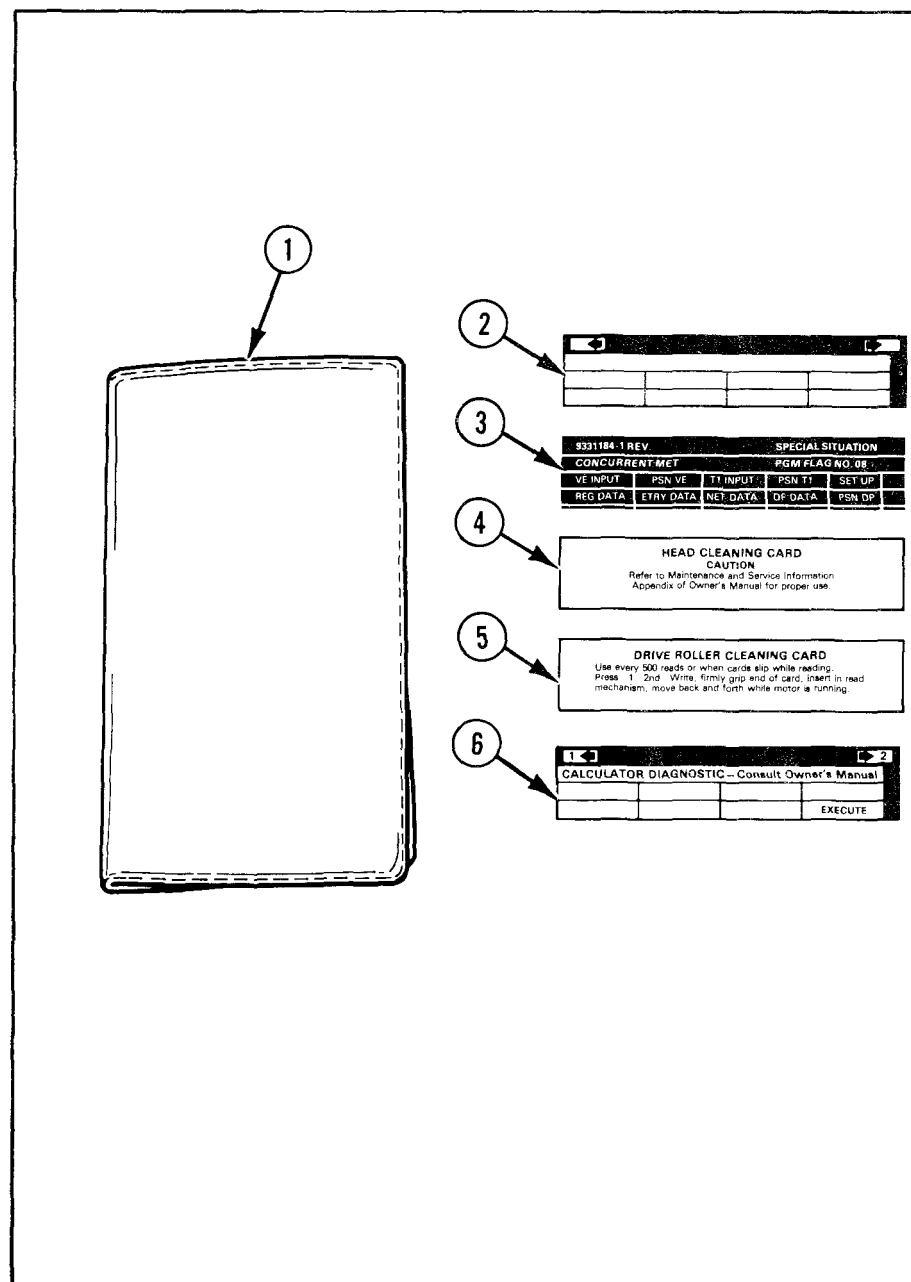
- The card holder (1) stores the magnetic cards (2), cue cards (3), and card cleaning set used with the computer sets. A firmware module may also be stored in the recess provided.

- The head cleaning card (4) contained in the card holder has an abrasive coating in place of the usual magnetic oxide. This card removes buildup of oxide or foreign materials from the read/write heads in the computer.

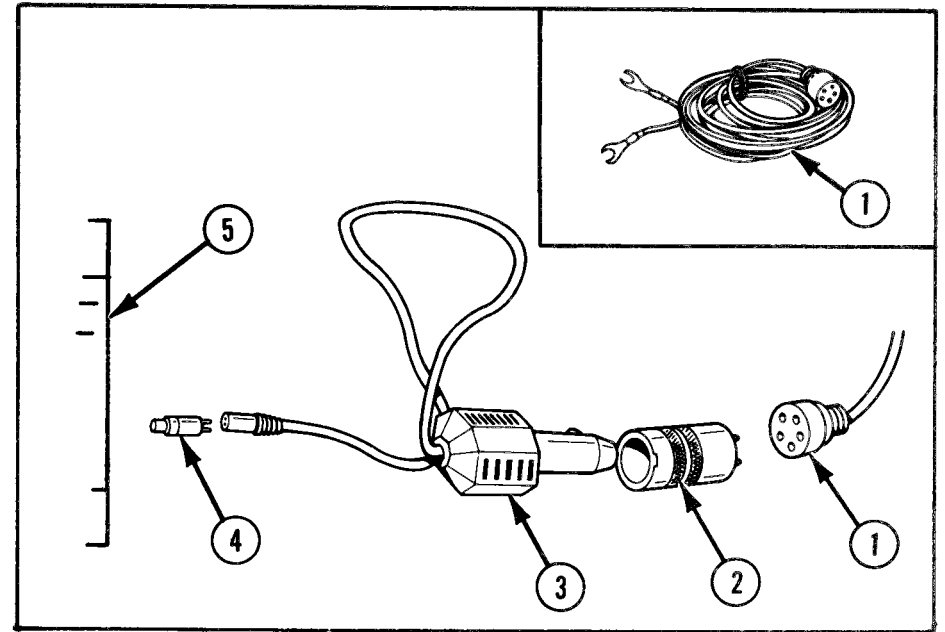
- The drive roller cleaning card (5) contained in the card holder should be used about every 500 reads or whenever a magnetic card begins to slip or move at a nonuniform rate through the computer.

- The diagnostic card (6) contained in the card holder verifies the correct operation of the computer before a mission or any time a malfunction is suspected.

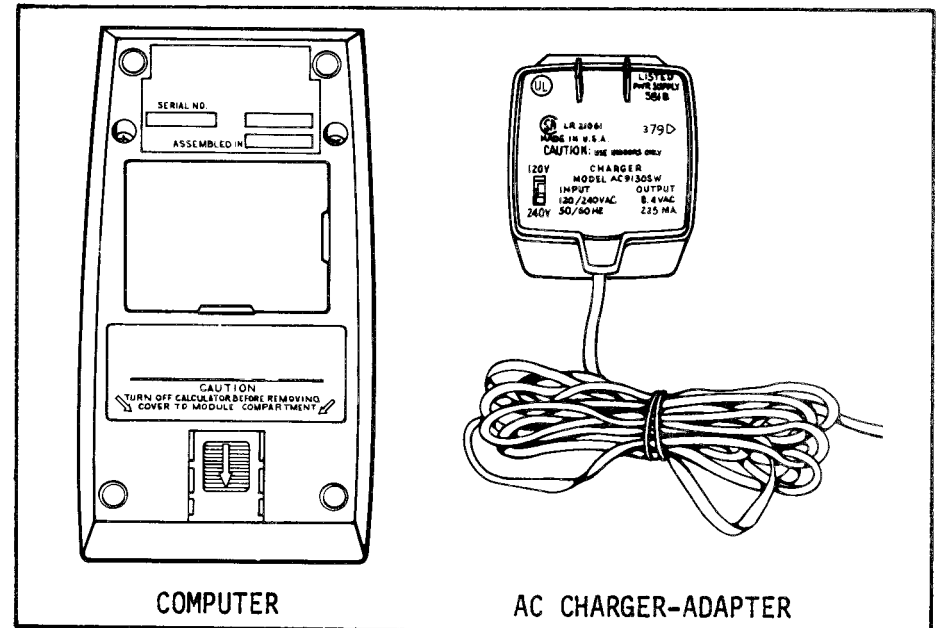
- The magnetic cards contained in the card holder store data indefinitely for future use. If not recorded on magnetic cards, the information in the computer's memory bank is erased when the power is turned off.



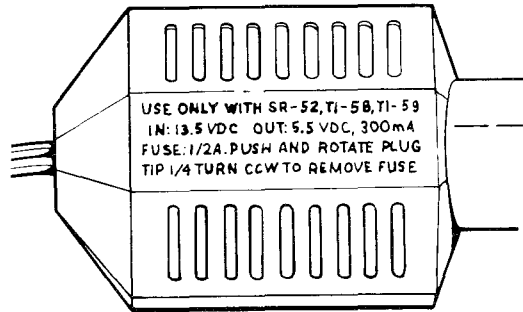
f. Vehicle Cable Assembly. The vehicle cable assembly (1), used with the plug connector (2), dc charger-adaptor (3), and the adapter plug (4), connects the computer to a vehicle battery, providing a constant source of power to operate the computer (5) and charge the battery pack.



g. Identification Plates. Data is stamped on, stenciled on, or printed on labels or plates on the backs of the computer, ac charger-adaptor, dc charger-adaptor, and printer. Other data is on the dc charger-adaptor cord, battery pack, and under the top cover and hinged flap of the printer.

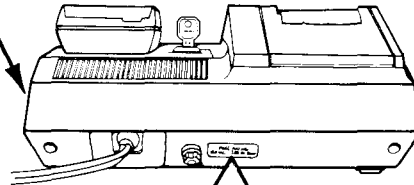


1-10. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (cont)

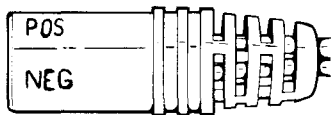
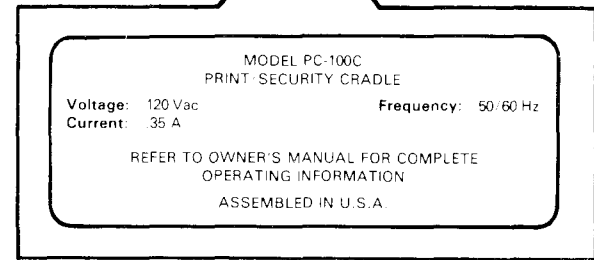
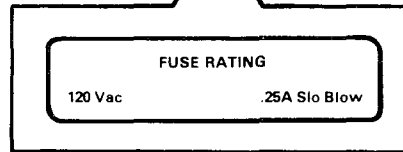
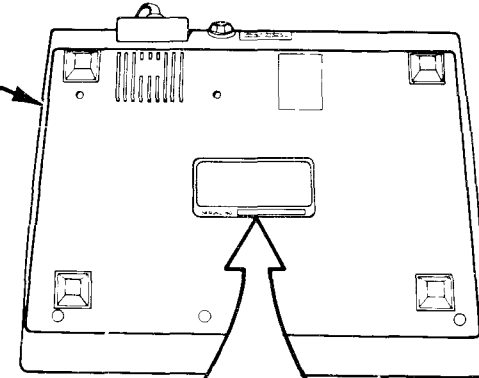


DC CHARGER-ADAPTER

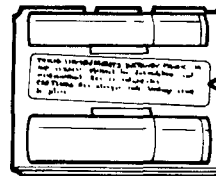
PRINTER
SIDE VIEW



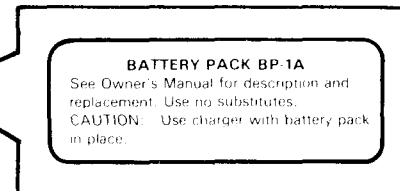
PRINTER
BOTTOM VIEW

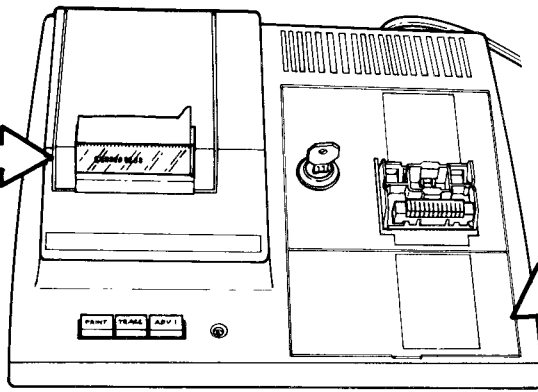
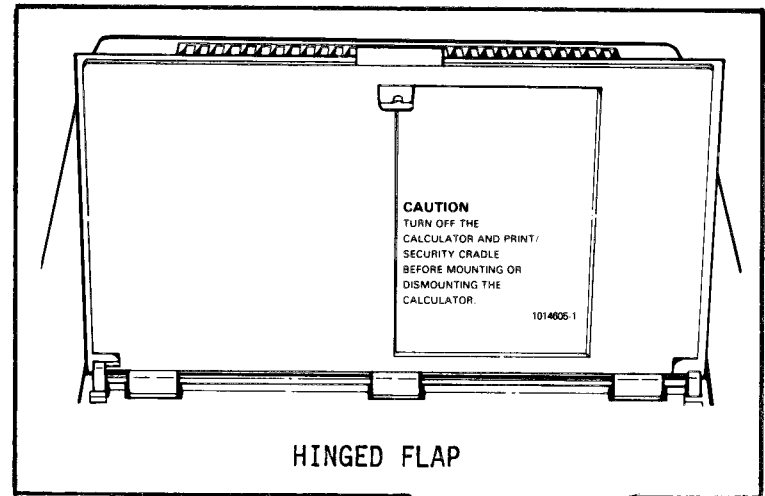
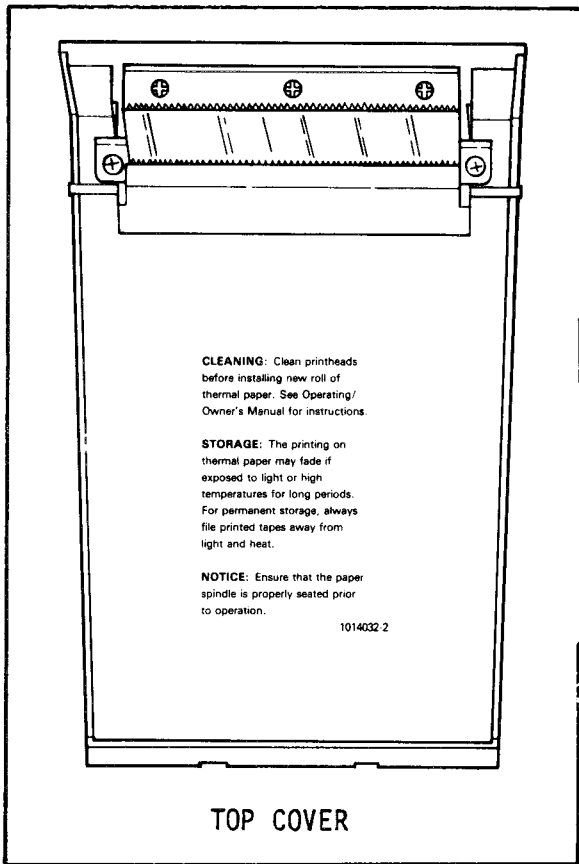


DC CHARGER-ADAPTER CORD



BATTERY PACK





1-11. EQUIPMENT DATA

The table below lists specifications for the computer sets.

Specifications for General Set and Missile Set

Item	Specification	Item	Specification
Computer:		Size	6.43 X 3.24 X 1.44 inches (16.33 X 8.23 X 3.66 cm)
Display	Red LED, 12-character	Type	Solid-state programable with firmware modules; magnetic card data storage
Internal Power		Weight	10.74 ounces (304.5 grams)
Source	Rechargeable nickel-cadmium battery pack	Printer:	
Operating		Operating	
Temperature		Temperature	
Range	10°F to 140°F (-12.2°C to 60°C)	Range	-29°F to 104°F (-34.4°C to 40°C)
Power Input:		Power Input	110-120 V ac, 50-60 Hz
AC	110-120 and 220-240 V (se- lectable), 50-60 Hz with ac charger-adapter (output 8.4 V ac)	Type	Thermal, with lockable mount and built-in power supply for computer
DC	12-15 V with dc charger- adapter (output 5.5 V dc)		

CHAPTER 2
OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. GENERAL

Instructions on using the computer sets and program kits to solve particular fire control, sound/flash ranging, and survey problems are provided in reference note publications published by the US Army Field Artillery School, Fort Sill, Oklahoma. Table 2-1 lists the applicable reference notes for various applications of the computer sets.

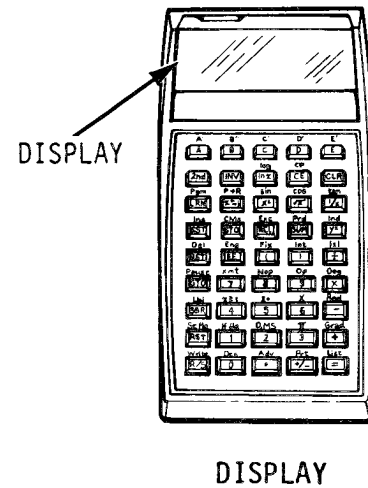
Table 2-1. Applicable Instructions for Computer Sets and Program Kits

Reference note designation	Title
GD 05HC	Computer Set, Field Artillery, General; for Cannon Gunnery Applications
WL**TL GP	Computer Set, Field Artillery, Missile; Guidance Package
JPA AS**EZ	Computer Set, Field Artillery, General; with Program Kit, Computer Set, Field Artillery; for Survey
JPA AT**TI	Computer Set, Field Artillery, General; with Program Kit, Computer Set, Field Artillery; for Sound and Flash Ranging

These publications may be obtained from the following address: Commandant, US Army Field Artillery School, ATTN: ATSF-CD, Fort Sill, OK 73503. Comments concerning the publications should be forwarded to the above address on DA Form 2028, Recommended Changes to Publications and Blank Forms. Additional publications on field artillery techniques are listed in appendix A.

2-2. CONTROLS AND INDICATORS

The controls and indicators used in the operation of the computer sets are described and illustrated below.



Registers any number key pressed and solutions to computations.

2-2. CONTROLS AND INDICATORS (cont)

KEYS

Program and compute the solution to firing problems, sound/flash ranging computations, and survey computations. Detailed explanation of each is in the personal programming manual supplied with each computer set.

COMPUTER SWITCH

Turns computer power on and off.

PRINT BUTTON

Prints whatever is in display.

TRACE BUTTON

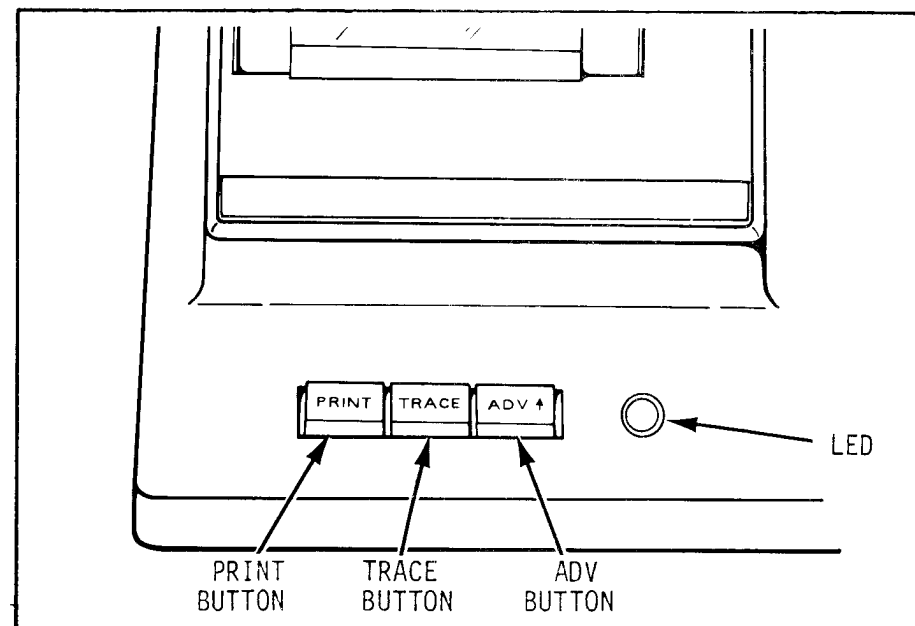
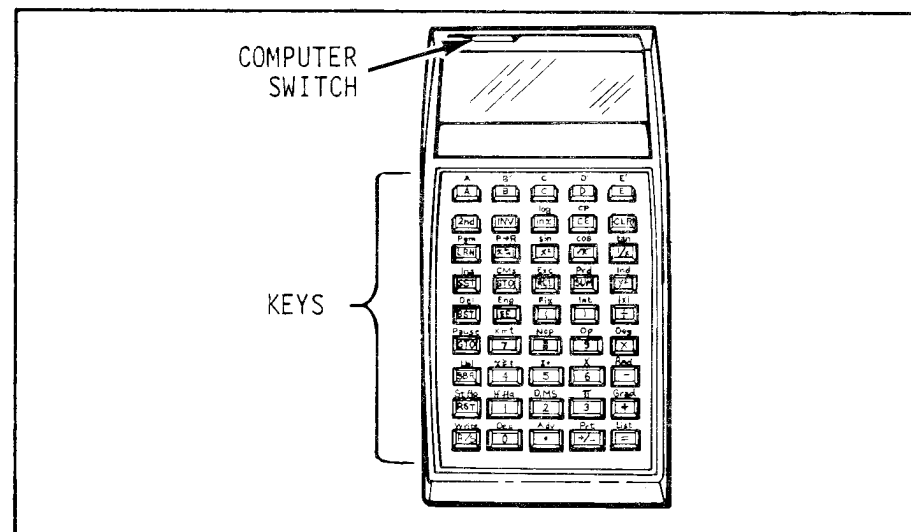
Prints every step of computation. Latches in down position when pressed once. Releases and stops trace function when presses again.

ADV BUTTON

Feeds printer paper through printer to provide space before, during, and after printing operations.

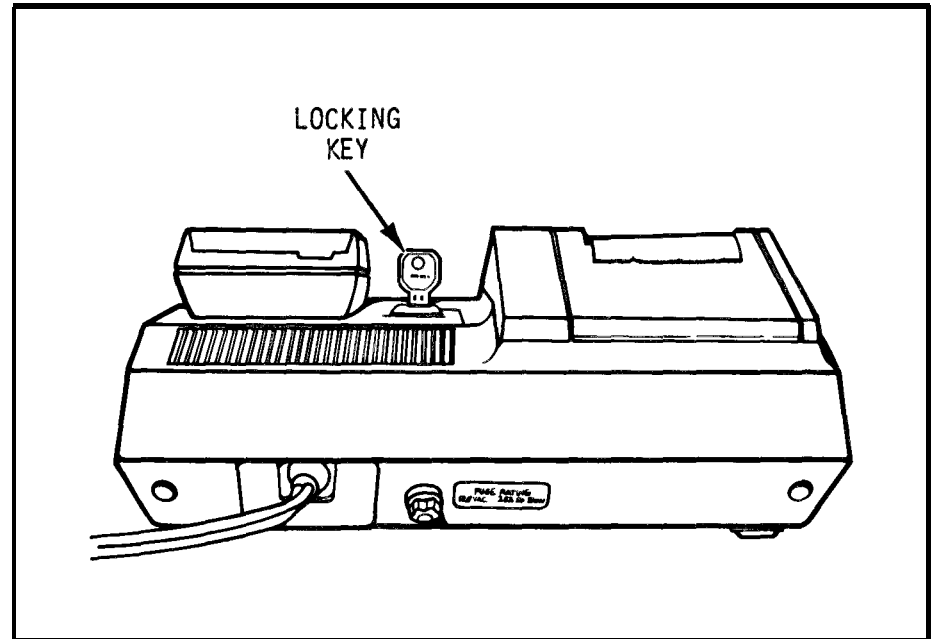
LED

Lights when power is on.



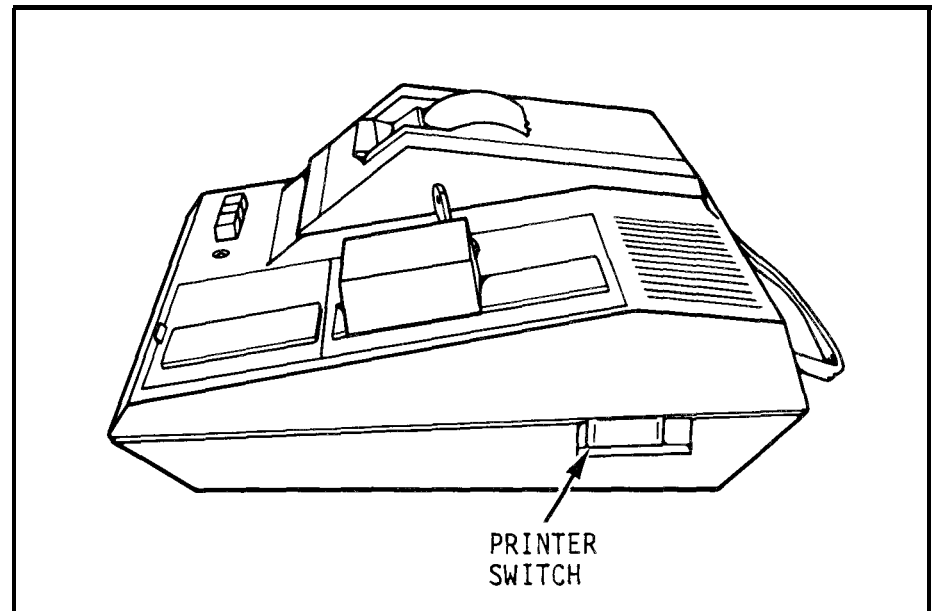
LOCKING KEY

Locks computer in place on printer.



PRINTER SWITCH

Provides power to the printer (and computer, when installed).



Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-3. GENERAL

a. Before You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS.

b. While You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS.

After You Operate. Be sure to perform your after (A) PMCS.

d. If Your Equipment Fails to Operate. Troubleshoot with proper equipment. To remove components or parts or to correct deficiencies, follow applicable maintenance procedures (beginning on p 3-12). Report any deficiencies, using the proper forms. (See TM 38-750.)

2-4. PMCS PROCEDURES

a. The PMCS table lists those required checks and services to be performed by personnel who operate the computer sets. The item number column shall be used as a source of item numbers for the TM number column on DA form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS. The services are divided as follows:

(1) Before Operation Service. This is a brief service to make sure the computer sets are ready for operation.

(2) During Operation Service. This service consists of detecting unsatisfactory performance while operating the computer sets. The operator or crew should be alert for any unusual noises, odors, or any other malfunctions.

b. Before you begin to check specific items, remember that there are some things to be checked that are common in all areas on the computer sets. Always keep the items listed below in mind as you make your inspection and perform your PMCS.

(1) Loose Screws. While a loose screw is sometimes difficult to spot without actually applying a screwdriver, you can often tell by a bright area around the base of the screw or by attempting to insert a fingernail under the screw head.

WARNING

Exposed electrical wiring could cause shock upon contact.

(2) Damaged Wires. The nylon coating on the electrical wiring is easily damaged and may be stripped away, presenting a possible hazardous condition. Make sure that the electrical wiring, especially on the printer and ac charger-adaptor, is not exposed.

c* Spare parts and equipment are issued to the using personnel for operating the computer sets. Equipment should not be used for nonprescribed purposes and should be properly stored when not in use.

d. The equipment is not ready/available if: column shall contain the criteria that will cause the equipment to be classified as not ready/available because of inability to perform its primary combat mission. An entry in this column will:

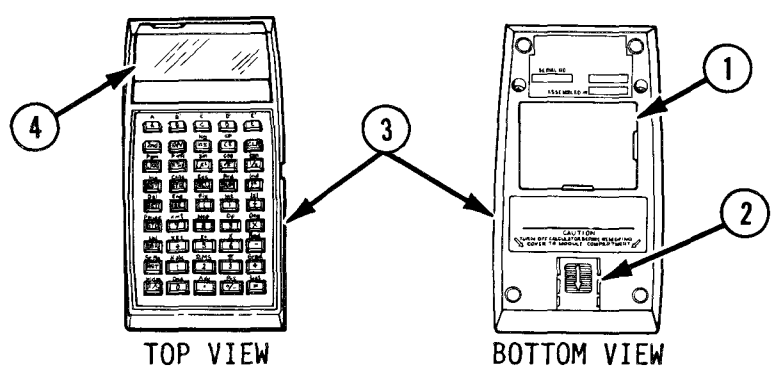
(1) Identify conditions that make the equipment not ready/available for readiness reporting purposes.

(2) Deny use of the equipment until corrective maintenance has been performed.

Table 2-2. Preventive Maintenance Checks and Services

B--Before Operation

D--During Operation

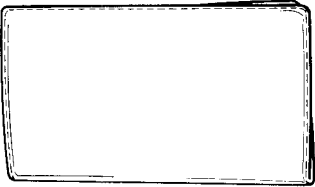
Item no.	Interval		ITEM TO BE INSPECTED PROCEDURE	Equipment is not ready/available if:
	B	D		
1	•		 <p>COMPUTER</p> <p>Check for external damage.</p> <p>Check that battery pack (1) and appropriate firmware module (2) are inserted correctly.</p> <p>Turn computer (3) on. A single zero should be readable on the extreme right side of the display (4). This shows that battery pack is charged and computer is ready for use.</p>	<p>Case is cracked or keys will not operate.</p> <p>Battery pack or firmware module is not in place.</p> <p>Single zero is not visible as described.</p>

2-4. PMCS PROCEDURES (cont)

Table 2-2. Preventive Maintenance Checks and Services (cont)

B--Before Operation

D--During Operation

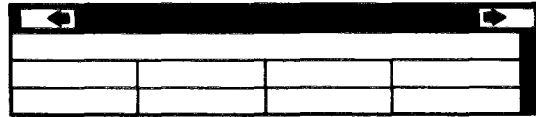
Item no.	Interval		ITEM TO BE INSPECTED PROCEDURE	Equipment is not ready/ available if:
	B	D		
1	•		<p>COMPUTER (cont)</p> <p>Press and hold one of the number keys. Only one digit at a time should appear in the display as the key is pressed. Release the key. No additional digits should appear in the display as the key is released. Perform this test on three different number keys.</p> <p>Press (.) and (+/-). Press (8) repeatedly to fill display. The decimal point and minus sign should move to the left each time an entry is made.</p> <p>Cause computer to exceed its capability by pressing (÷), (0), and (=). Display should flash -9.999999 99. Press (CE) to stop display flashing.</p> 	<p>Multiple digits appear when a number key is pressed and held, or digits appear as a number key is released.</p> <p>Decimal point and minus sign do not move as described or any parts of display do not light.</p> <p>Computer display does not flash as described or flashing does not stop after pressing (CE).</p>
2	•		<p>CARD HOLDER</p> <p>Check for rips, tears, and cleanness. Card holder should securely hold magnetic cards in place.</p>	

3



MAGNETIC CARDS

Inspect for damage (mars, creases, or dents). Inspect oxide coating on back for scratches or contamination.



Magnetic cards are damaged or oxide coating is scratched or contaminated.

4



CUE CARDS

Check to see that labeling is legible; that cue cards are not marred, creased, or dented; and that cue cards remain in position on computer.

Labeling is not legible or cue card will not fit into slot.

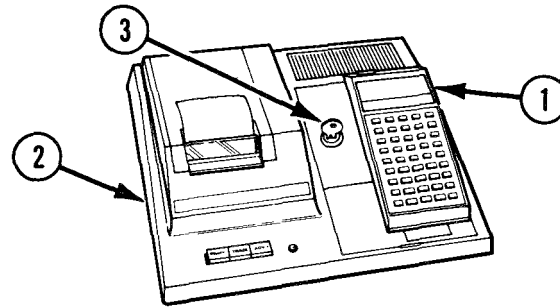
5



OVERLAYS

Check to see that labeling is legible; that they are not marred, creased, torn, or dented; and that each one remains in position on computer.

Labeling is not legible or overlay will not remain in position on computer.



6



PRINTER

Attach computer (1) to printer (2) and lock into position with locking key (3).

Computer cannot be locked into position on printer

With computer in position, turn printer on. Check that PRINT and ADV functions work.

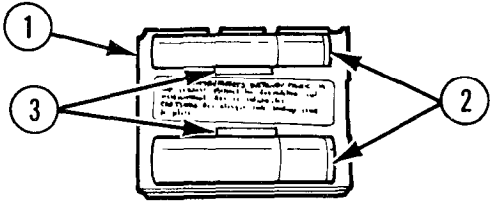
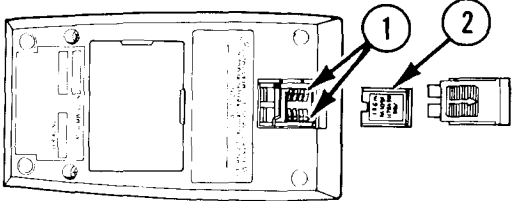
PRINT and ADV functions do not work properly.

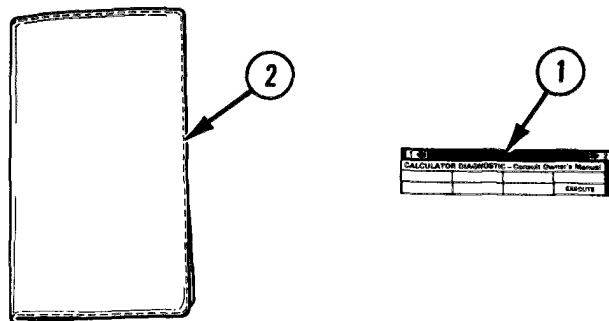
2-4. PMCS PROCEDURES (cont)

Table 2-2. Preventive Maintenance Checks and Services (cont)

B--Before Operation

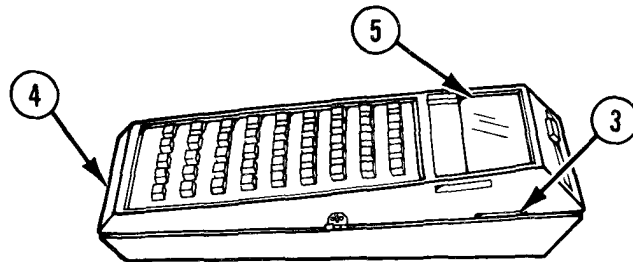
D--During Operation

Item no.	Interval		ITEM TO BE INSPECTED PROCEDURE	Equipment is not ready/ available if:
	B	D		
7	•		 <p>BATTERY PACK</p> <p>Check that battery pack (1) is not cracked, broken, or dirty. Check that cells (2) are not dented, punctured, or leaking. Check that terminals (3) are not bent or corroded.</p>	Battery pack is cracked or broken; cells are dented, punctured, or leaking; or terminals are bent or corroded.
8	•		 <p>FIRMWARE MODULES</p> <p>Inspect for cleanness and damage. Check contacts to make sure they are clean and bright.</p> <p>Check to ensure that computer contacts (1) make proper contact with firmware module (2).</p>	Firmware module is cracked or broken; there is any dirt, oil, or corrosion on contacts; or contacts are not properly aligned.



● COMPUTER--GENERAL OPERATION (diagnostic)

Remove diagnostic card (1) from card holder (2). Diagnostic card is peach-colored and labeled diagnostic.



Read side 1 of diagnostic card by momentarily pressing (CLR) and inserting diagnostic card into card read/write slot (3) in computer (4). Display (5) should show 1.

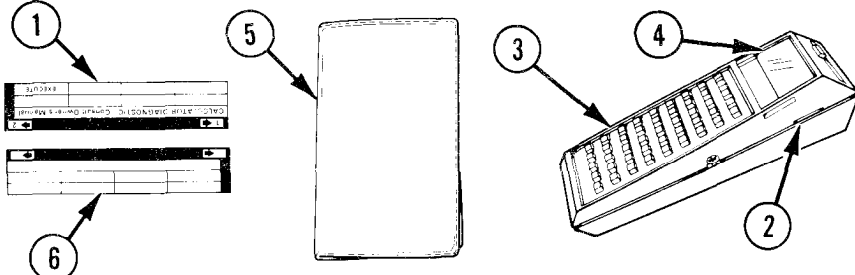
Press (E). A display of -.8888888888 indicates computer passed the test. A flashing display indicates computer failed the test. Repeat check once to verify problem.

2-4. PMCS PROCEDURES (cont)

Table 2-2. Preventive Maintenance Checks and Services (cont)

B--Before Operation

D--During Operation

Item no.	Interval		ITEM TO BE INSPECTED PROCEDURE	Equipment is not ready/ available if:
	B	D		
9		•	<p>COMPUTER--GENERAL OPERATION (diagnostic) (cont)</p> <p>If problem persists, perform checks under item no. 10 to determine whether card reader is at fault.</p> <p>Remove diagnostic card from left side of computer.</p> 	Computer fails to pass diagnostic routine.
10		•	<p>COMPUTER--CARD/WRITE FUNCTION (without printer)</p> <p>Turn diagnostic card (1) so that label is upside down.</p> <p>Read side 2 of diagnostic card by momentarily pressing (CLR) and inserting diagnostic card into card read/write slot (2) in computer (3). After card is read, display (4) should show 2.</p> <p>Press (CLR), (2), (2nd), and (WRITE).</p> <p>Remove diagnostic card and place in card holder (5).</p> <p>Insert a blank magnetic card (6) into card read/write slot in computer.</p>	

Remove magnetic card.

Press (2nd), (CP), and (CLR). Reinsert magnetic card just recorded into the computer. Computer should display 2.

Press (GTO), (2), (4), (0), and (LRN). Computer should display 240 77.

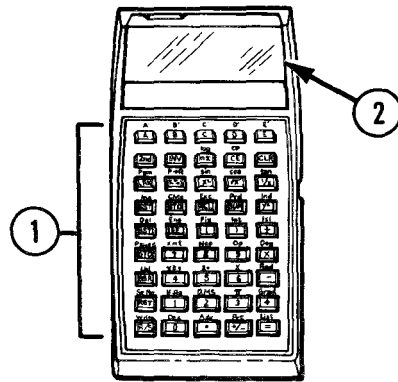
Press (SST) to step computer manually and check that key code 77 is in locations 240 thru 479.

If an error is found, press (LRN) and (CLR) and repeat 2nd thru 9th steps above once to verify problem.

Press (LRN) and (CLR); computer will display 0.

Remove magnetic card from left side of computer and place in card holder.

Computer fails card/write functional test.



COMPUTER--BASIC KEYBOARD AND DISPLAY FUNCTIONS

Keyboard entry (1)

Display (2)

(CLR)
(+/-)
(.) (9) (8) (7)
(6) (5) (4)

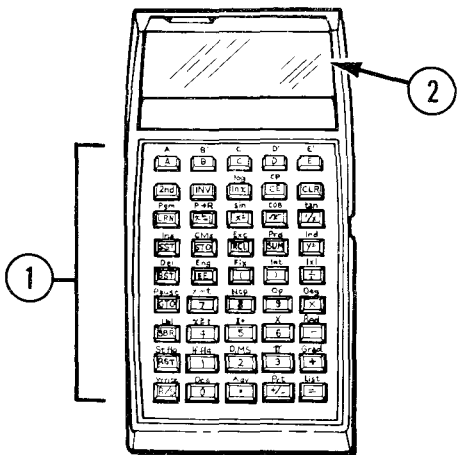
0
-0

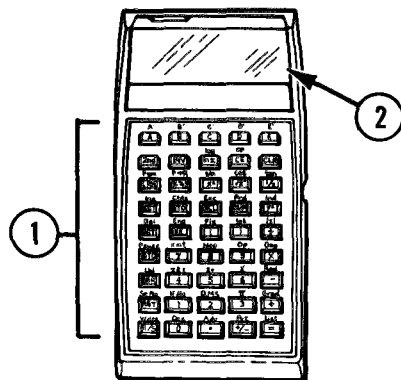
2-4. PMCS PROCEDURES (cont)

Table 2-2. Preventive Maintenance Checks and Services (cont)

B--Before Operation

D--During Operation

Item no.	Interval		ITEM TO BE INSPECTED PROCEDURE	Equipment is not ready/ available if:
	B	D		
11	•	•	<p>COMPUTER--BASIC KEYBOARD AND DISPLAY FUNCTIONS (cont)</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>Keyboard entry (1)</p> <p>(3) (2) (0) (9)</p> <p>(X)</p> <p>(9)</p> <p>(=)</p> </div> <div style="text-align: center;">  <p>Display (2)</p> <p>-.9876543209</p> <p>-.9876543209</p> <p>9</p> <p>-8.888888888</p> </div> </div>	<p>Any number pressed fails to register in display or solution displayed is incorrect.</p>



● COMPUTER--GENERAL KEYBOARD FUNCTION

Keyboard
entry (1)

(CLR) (2nd) (CP)
 (LRN)
 (A) (2nd) (LRN) (SST)
 (BST) (GTO) (SBR)
 (RST) (R/S) (0) (1)
 (4) (7) (EE)
 (STO) (x \square t) (INV) (B)
 (C) (Inx) (x²)
 (RCL) (() (8) (5)
 (2) (.) (+/-)
 (3) (6) (9) ()
 (SUM) (\sqrt{x}) (CE)
 (D) (E) (CLR) (1/x)
 (Y^x) (\div) (X)
 (-) (+) (=)

Display (2)

0
 000 00
 NOTE

From this point com-
 puter (3) should reg-
 ister one digit change
 with every key pressed
 until the final
 display of 042 00
 is registered.

042 00

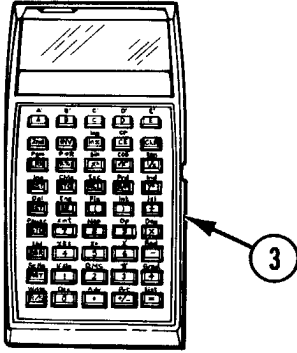
Computer does not register a
 one-digit change when a key is
 pressed or does not register
 042 00 as result.

2-4. PMCS PROCEDURES (cont)

Table 2-2. Preventive Maintenance Checks and Services (cont)

B--Before Operation

D--During Operation

Item no.	Interval		ITEM TO BE INSPECTED PROCEDURE	Equipment is not ready/ available if:																		
	B	D																				
12			 <p>• COMPUTER--GENERAL KEYBOARD FUNCTION (cont)</p> <p>Press (LRN) to remove computer (3) from program mode.</p> <table border="0"> <thead> <tr> <th><u>Keyboard entry</u></th> <th><u>Display</u></th> </tr> </thead> <tbody> <tr> <td>Press (RST), (LRN), and (SST).</td> <td>000 11</td> </tr> <tr> <td>(Continue pressing (SST) to</td> <td>001 36</td> </tr> <tr> <td>step computer until 042 00</td> <td>002 61</td> </tr> <tr> <td>is displayed. Each time (SST)</td> <td>003 71</td> </tr> <tr> <td>is pressed, display should</td> <td>004 81</td> </tr> <tr> <td>change as illustrated.)</td> <td>005 91</td> </tr> <tr> <td></td> <td>006 00</td> </tr> <tr> <td></td> <td>007 01</td> </tr> </tbody> </table>	<u>Keyboard entry</u>	<u>Display</u>	Press (RST), (LRN), and (SST).	000 11	(Continue pressing (SST) to	001 36	step computer until 042 00	002 61	is displayed. Each time (SST)	003 71	is pressed, display should	004 81	change as illustrated.)	005 91		006 00		007 01	
<u>Keyboard entry</u>	<u>Display</u>																					
Press (RST), (LRN), and (SST).	000 11																					
(Continue pressing (SST) to	001 36																					
step computer until 042 00	002 61																					
is displayed. Each time (SST)	003 71																					
is pressed, display should	004 81																					
change as illustrated.)	005 91																					
	006 00																					
	007 01																					

(LRN) (CLR)

008 04
009 07
010 52
011 42
012 32
013 22
014 12
015 13
016 23
017 33
018 43
019 53
020 08
021 05
022 02
023 93
024 94
025 03
026 06
027 09
028 54
029 44
030 34
031 24
032 14
033 15
034 25
035 35
036 45
037 55
038 65
039 75
040 85
041 95
042 00
0

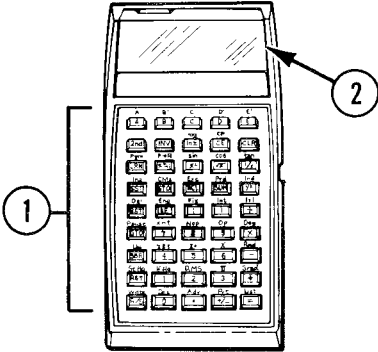
Di spl ays are i ncorrect.

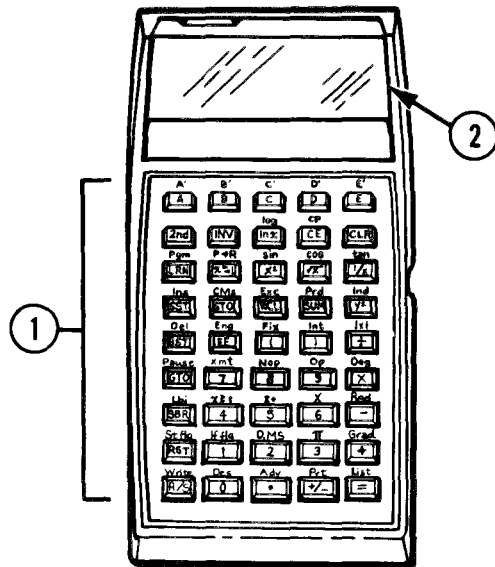
2-4. PMCS PROCEDURES (cont)

Table 2-2. Preventive Maintenance Checks and Services (cont)

B--Before Operation

D--During Operation

Item no.	Interval		ITEM TO BE INSPECTED PROCEDURE	Equipment is not ready/ available if:												
	B	D														
13			 <p>COMPUTER--MEMCRY PARTITIONING CAPABILITY</p> <table> <thead> <tr> <th><u>Keyboard entry (1)</u></th> <th><u>Display (2)</u></th> </tr> </thead> <tbody> <tr> <td>(CLR)</td> <td>0</td> </tr> <tr> <td>(6)</td> <td>6</td> </tr> <tr> <td>(2nd) (Op)</td> <td>6</td> </tr> <tr> <td>(1) (7)</td> <td>479.59</td> </tr> <tr> <td>(CLR)</td> <td>0</td> </tr> </tbody> </table>	<u>Keyboard entry (1)</u>	<u>Display (2)</u>	(CLR)	0	(6)	6	(2nd) (Op)	6	(1) (7)	479.59	(CLR)	0	Display indicated is incorrect.
<u>Keyboard entry (1)</u>	<u>Display (2)</u>															
(CLR)	0															
(6)	6															
(2nd) (Op)	6															
(1) (7)	479.59															
(CLR)	0															



• COMPUTER--MEMORY STORAGE AND RECALL CAPABILITY

Keyboard entry (1)

Display (2)

(CLR)
 (7) (7) (7) (7)
 (7) (7) (7) (7)
 (7) (7)
 (STO) (0) (0)
 (STO) (5) (9)
 (CLR)
 (RCL) (5) (9)
 (RCL) (0) (0)
 (CLR)

0
 7777777777
 7777777777
 7777777777
 0
 7777777777
 7777777777
 0

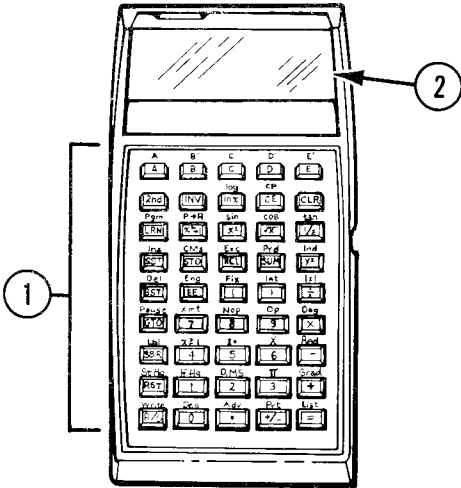
Information stored cannot be recalled.

2-4. PMCS PROCEDURES (cont)

Table 2-2. Preventive Maintenance Checks and Services (cont)

B--Before Operation

D--During Operation

Item no.	Interval		ITEM TO BE INSPECTED PROCEDURE	Equipment is not ready/ available if:										
	B	D												
15			 <p>COMPUTER--RECTANGULAR TO POLAR COORDINATE CONVERSION CAPABILITY</p> <p>Keyboard entry (1)</p> <p>Display (2)</p> <table border="0"> <tr> <td>(CLR) (2nd) (Deg)</td> <td>0</td> </tr> <tr> <td>(5) (0)</td> <td>50</td> </tr> <tr> <td>(x■t)</td> <td>0.</td> </tr> <tr> <td>(5) (0)</td> <td>50</td> </tr> <tr> <td>(INV) (2nd) (P→R)</td> <td>45.</td> </tr> </table>	(CLR) (2nd) (Deg)	0	(5) (0)	50	(x ■ t)	0.	(5) (0)	50	(INV) (2nd) (P→R)	45.	
(CLR) (2nd) (Deg)	0													
(5) (0)	50													
(x ■ t)	0.													
(5) (0)	50													
(INV) (2nd) (P→R)	45.													

(x \square t)
 (CLR)
 (x \square t)
 (CLR)
 (2) (x²)
 (\sqrt{x})
 (1/x)
 (CLR)

70.71067812
 0
 45.
 0
 4
 2
 0.5
 0

Display is incorrect.

Section III. OPERATION UNDER USUAL CONDITIONS

2-5. GENERAL

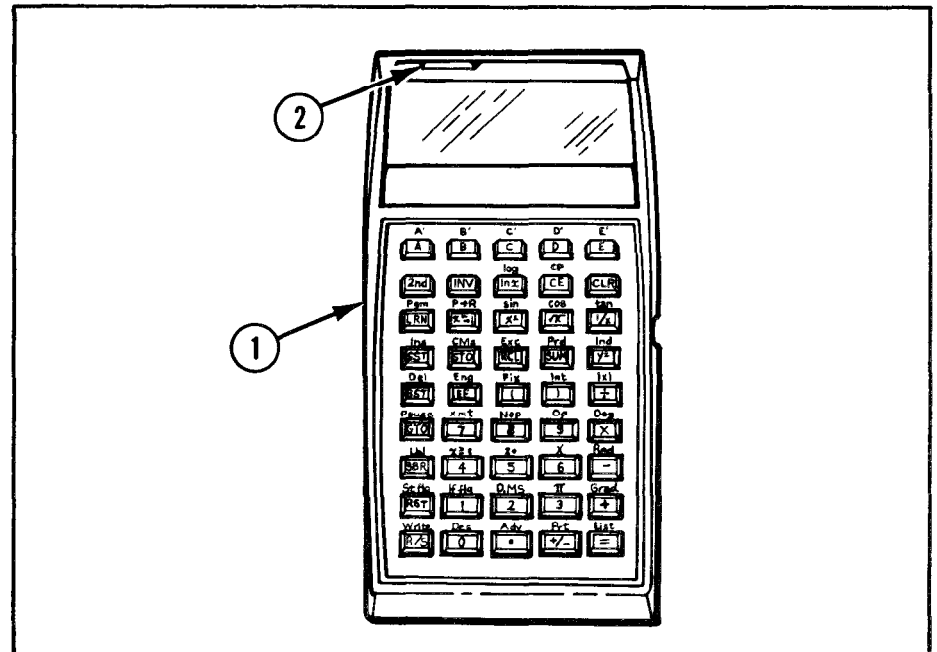
This section contains instructions for operating the computer sets under usual conditions. Instructions for operating the computer sets under unusual conditions are found in section IV (p 2-32).

2-6. PLACING THE COMPUTER SETS IN OPERATION

NOTE

All data in the 100 working registers is erased whenever the power is turned off or lost, but data stored in the firmware modules is not affected.

Turn the computer (1) on by sliding the computer switch (2) to the right. Slide it to the left to turn the computer off.



2-7. OPERATING THE COMPUTER WITHOUT PRINTER"

OPERATING THE COMPUTER ON INTERNAL BATTERY PACK

NOTE

Power source connectors and adapters continuously charge the internal battery pack. The computer can be operated for extended periods of time when connected to an external power source.

The battery pack will take longer to recharge, the more it has been discharged. It recharges at the same rate with the computer turned on or off. Instructions on how to recharge the battery pack are given on pages 2-21 thru 2-26.

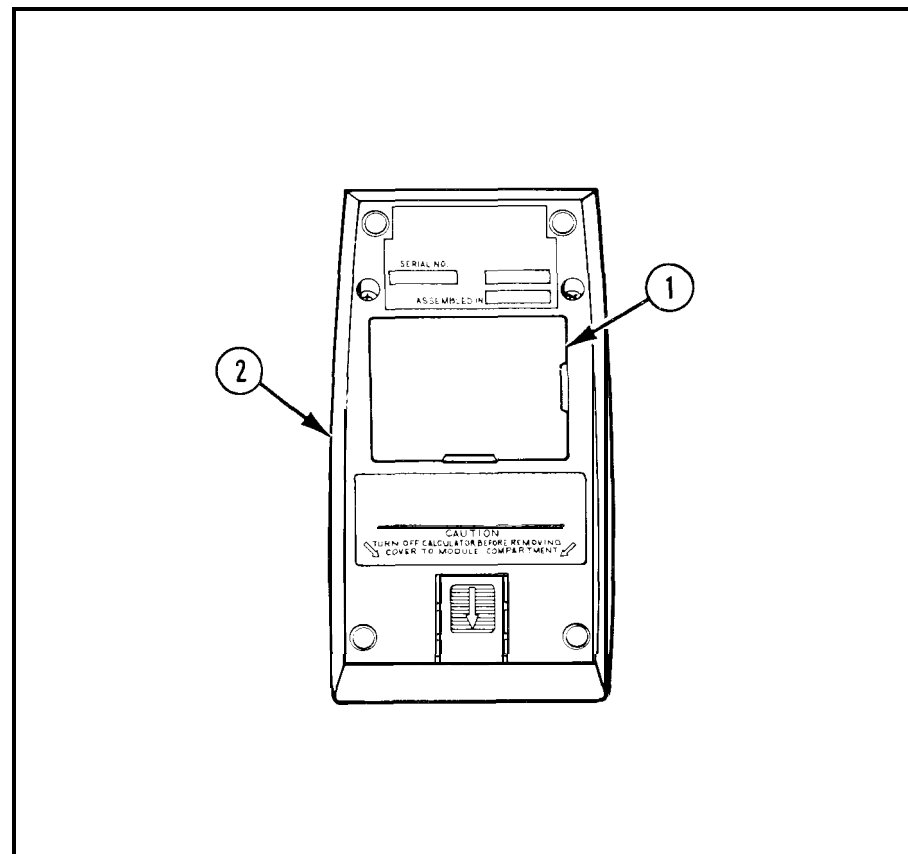
If the display is blinking while conducting a mission, consult your reference note or job aid to be sure the flashing is not a programed error code.

- 1 Recharge the battery pack (1) when the computer (2) produces errors, produces unusual displays such as blinking on and off or irregular lighting, or does not properly respond to keypunches.

CAUTION

The battery pack can lose its storage capability if it is not allowed to completely discharge occasionally. However, repeated battery discharging will permanently damage the battery pack.

- 2 Leave the computer on intentionally to discharge the battery pack almost completely if, over a period of 2 or more weeks, the computer is used frequently but not enough to completely discharge the battery pack.



- 3 Recharge the battery pack at least 24 hours with the computer turned off, if the computer has been left on for an extended period after the battery pack was discharged (for example, accidentally left on overnight).
- 4 Replace the battery pack (p 3-13) if previous step does not restore normal operation.
- 5 Recharge the battery pack if it needs it because the computer has been in storage or not in use for 1 or more months.

OPERATING THE COMPUTER FROM 120-240 V AC

CAUTION

The computer can be damaged if the ac charger-adapter is connected without the battery pack being installed.

NOTE

In the United States, 120-V, 60-Hz power is almost always used; however, in many parts of Europe, 240-V ac, 50-Hz power is used. Battery pack is recharging in this procedure, also.

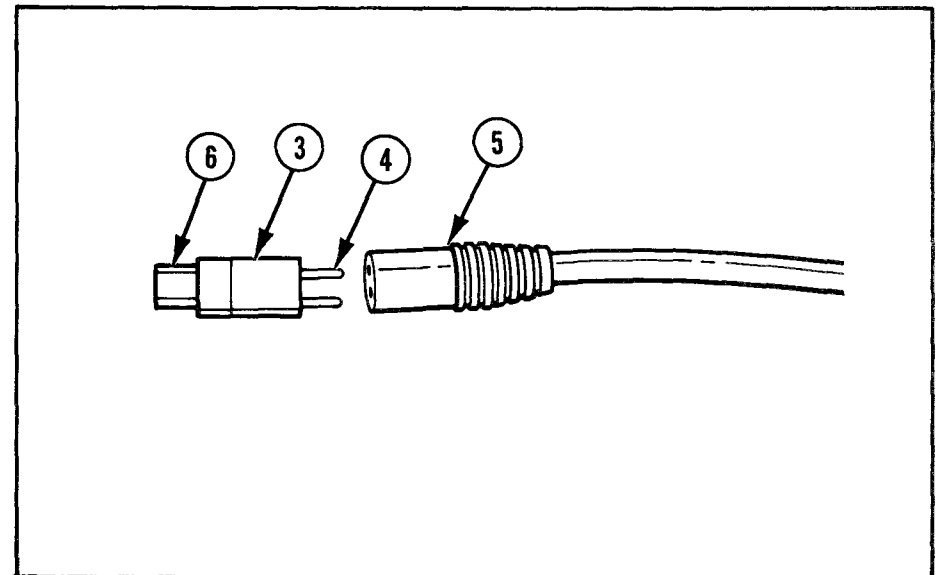
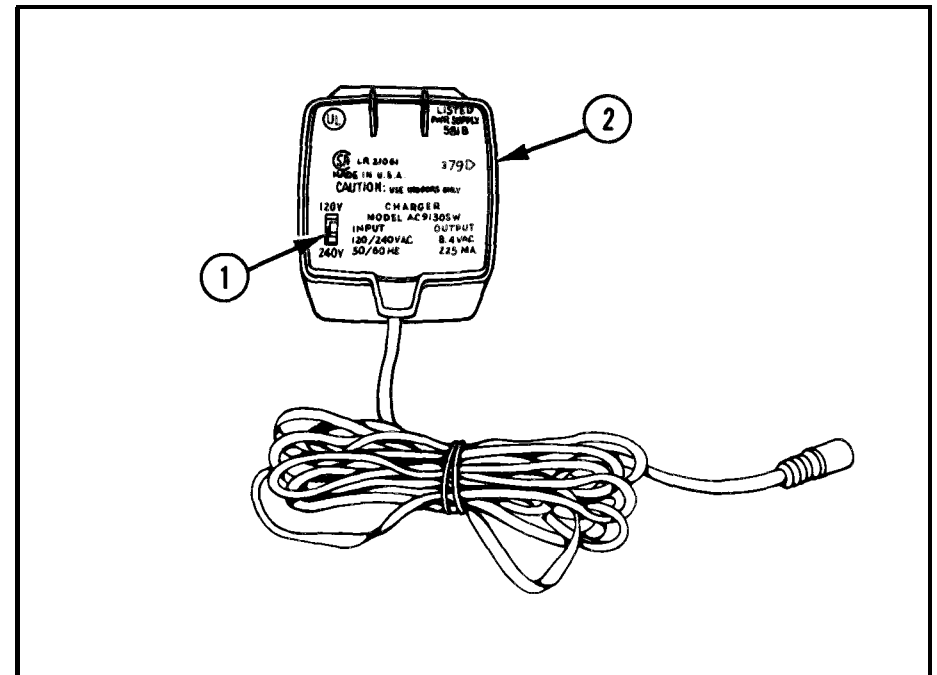
- 1 Measure the voltage at the wall outlet with a multimeter having the capability to measure 240 V ac if there is any question as to which voltage is being used.
- 2 Slide the 120V/240V switch (1) to the proper voltage position; then plug in the ac charger-adapter (2).

NOTE

The computer comes with two adapter plugs. One should be discarded because it has a male connector on both ends and will not work on the computer. The correct adapter plug (3) has a male connector (4) that plugs into the ac charger-adapter cord (5) and a female connector (6) on the other end that mates with the computer.

The adapter plug and the ac charger-adapter cord plug both have a patent label stamped on them. These labels should be on the same side when they are plugged together.

- 3 Plug the adapter plug (3) into the ac charger-adapter-cord (5).



2-7. OPERATING THE COMPUTER WITHOUT PRINTER (cont)

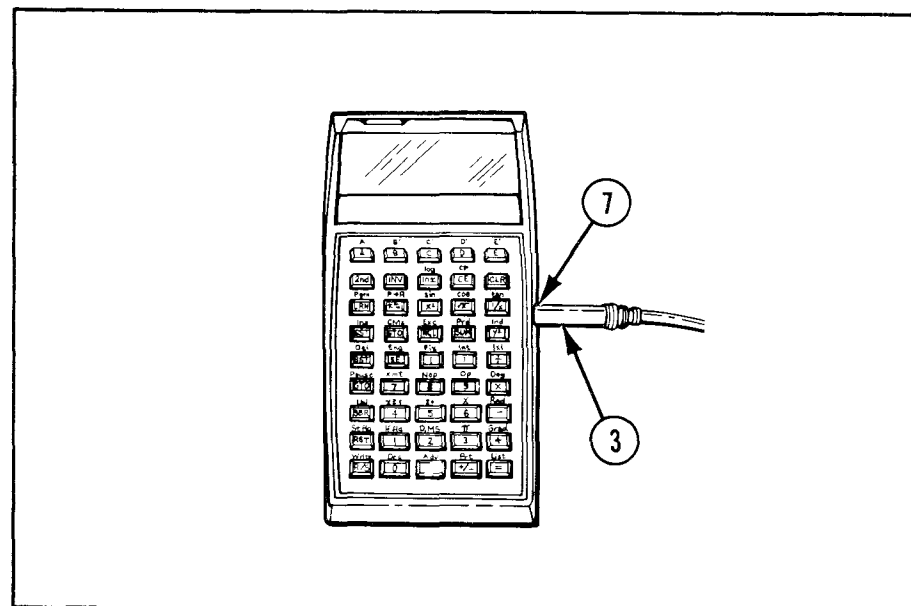
OPERATING THE COMPUTER FROM 120-240 V AC (cont)

4 Make sure the computer is turned off.

NOTE

It is normal for the ac charger-adapter and battery pack to become warm when used on ac power.

5 To energize the computer, insert the adapter plug (3) into the computer receptacle (7), matching the alignment bar on the adapter plug to the guide slot in the computer receptacle.



OPERATING THE COMPUTER FROM THE BA-4386/PRC-25 DRY BATTERY

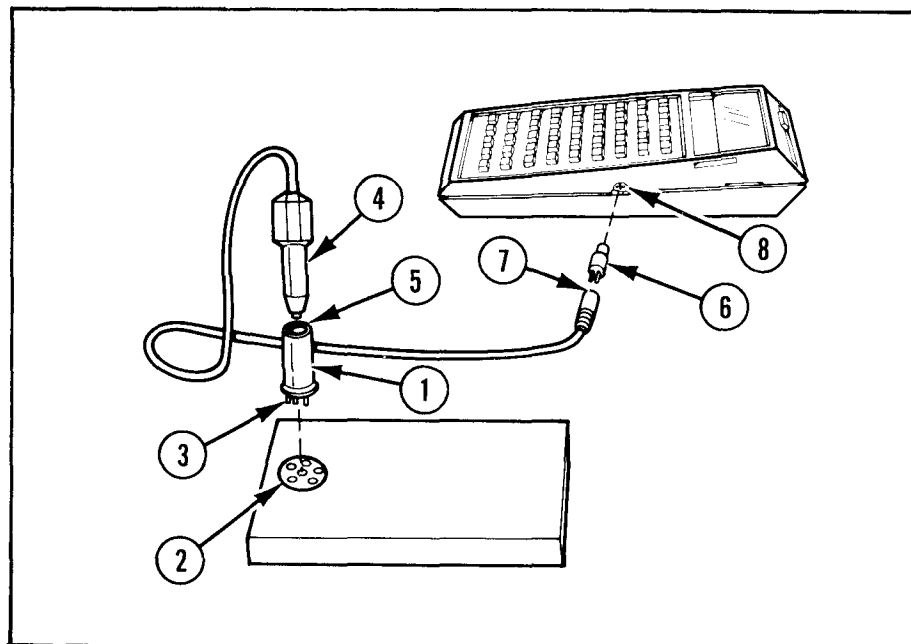
CAUTION

The dc charger-adapter cannot be used on voltages higher than approximately 14 V.

NOTE

When the dc charger-adapter is in use, the computer can be operated only with the battery pack installed. Following procedures below, the battery pack will recharge at the same rate with the computer turned on or off.

1 Turn the computer off.



2 Plug the pronged end of the plug connector (1) into the dry battery socket (2). Make *sure the pins* (3) are properly aligned with the dry battery socket.

3 Plug the dc charger-adapter (4) into the plug connector receptacle (5).

NOTE

Make sure the pat. pend. labels on the adapter plug and dc charger-adapter are on the same side when they are connected.

4 Plug the adapter plug (6) into the dc charger-adapter receptacle (7) and the computer receptacle (8), matching the alignment bar on the adapter plug (6) to the guide slot in the computer receptacle(8).

OPERATING THE COMPUTER FROM VEHICULAR POWER

WARNING

Lead-acid storage batteries can produce explosive gases during operation that can be ignited by sparks or open flame and cause an explosion. The explosion can throw corrosive battery acid into the air. Make sure the area directly above the battery vent caps is adequately ventilated and do not allow sparks or open flame near them.

Lead-acid storage batteries can deliver extremely high currents when the battery terminals are shorted by metal objects. Do not lay tools or other metal objects on top of these batteries as they can get hot enough to cause burns. Remove jewelry, such as watches and rings, when working with lead-acid storage batteries.

CAUTION

Sudden voltage surges can occur in the electrical systems of vehicles during startup. These voltage surges can damage the computer circuits and/or cause the computer to produce incorrect results. Make sure that the dc charger-adapter is unplugged from the plug connector during startup.

Connection to a 12-V vehicle battery should be performed by a qualified supervisor.

Do not operate the computer from 24 V dc.

NOTE

When operating from vehicular power, the battery pack must be in place in the computer. When the computer is plugged into a vehicular power source, the battery pack will be recharged at the same rate with the computer turned on or off. Follow procedures below for recharging.

- 1 Operate the computer from 12-V vehicular storage batteries, using the dc charger-adapter, adapter plug, plug connector, and vehicle cable assembly.
- 2 Connect the computer to a vehicular power source in the same manner regardless of which of these, or other, vehicles you may use: M561 gamma goat, M151A1 and M151A2 1/4-ton utility truck, M577 CPC 2-1/2-ton truck and 5-ton truck. Refer to pages 2-24 and 2-25 for connection illustrations on these representative vehicles.
- 3 Take power for the computer across only ONE of the vehicle batteries.

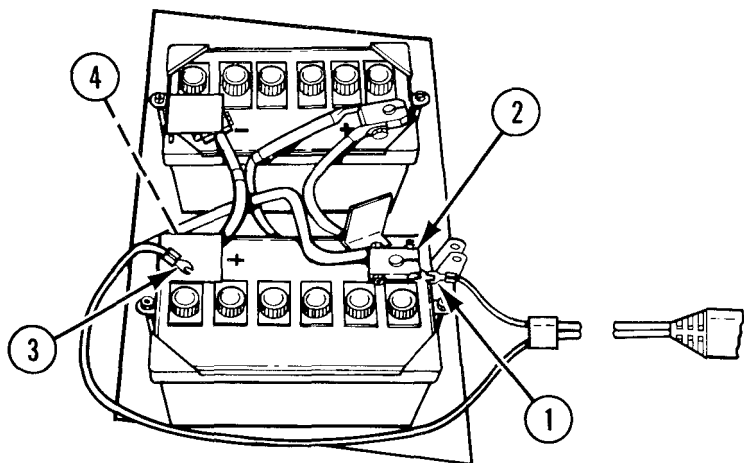
2-7. OPERATING THE COMPUTER WITHOUT PRINTER (cont)

OPERATING THE COMPUTER FROM VEHICULAR POWER (cont)

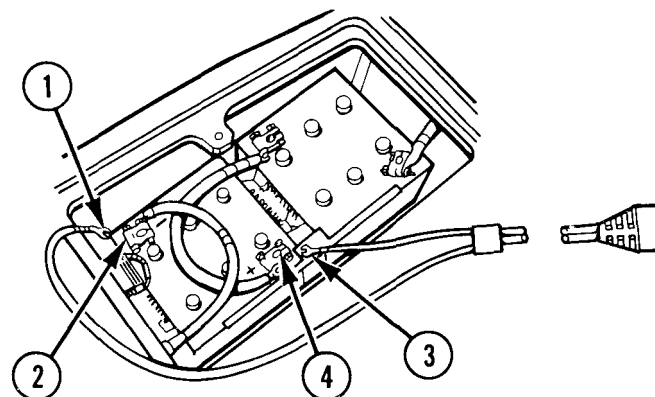
CAUTION

Do not use the battery which has its negative terminal (-) connected to the positive terminal (+) of the other battery.

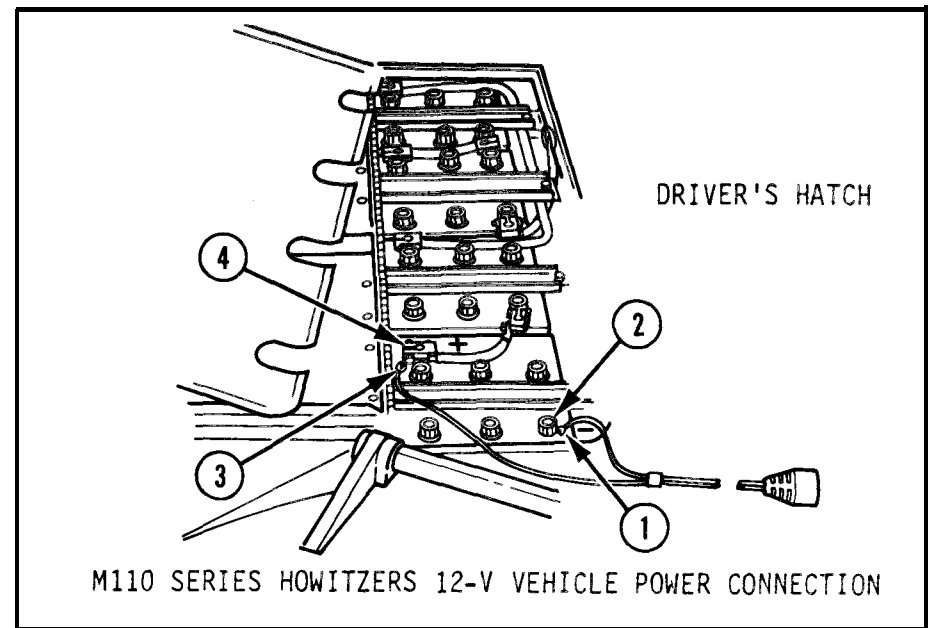
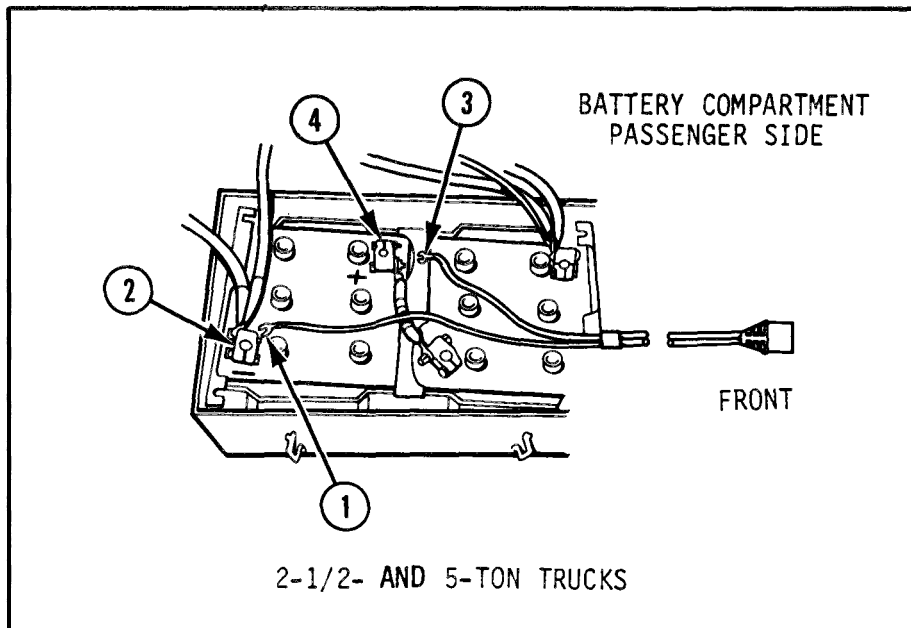
- 4 Power the computer by the battery which has its negative terminal (-) connected to the vehicle chassis.
- 5 Measure the voltage between the positive (+) battery terminal and the vehicle chassis using a multimeter, if there is any doubt about which battery to hook up to.
- 6 Turn the computer off.



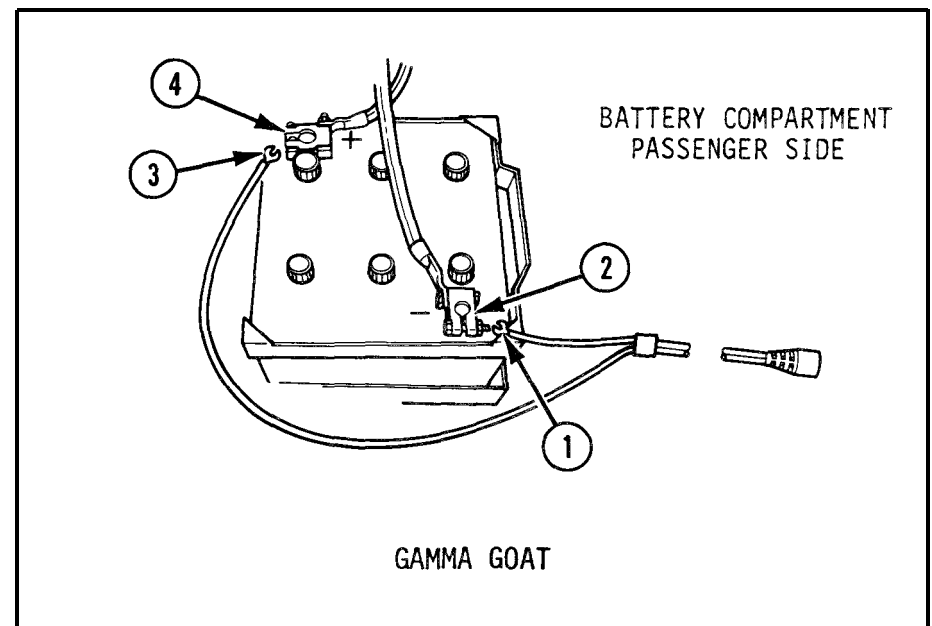
1/4-TON UTILITY TRUCK



M577 COMMAND POST VEHICLES



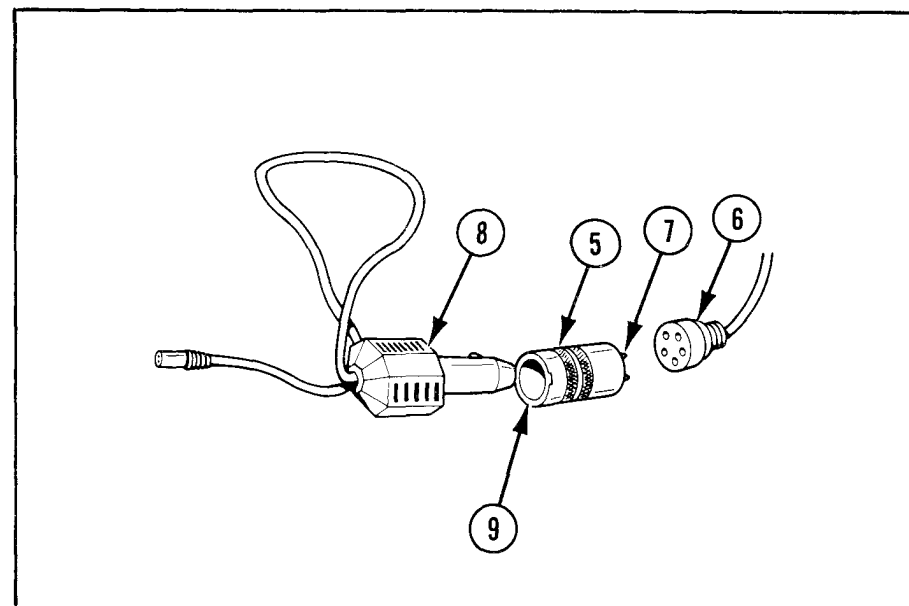
- 7 Attach the spade lug of the all black (negative (-)) wire (1) of the cable assembly to the negative grounded terminal (2) of the 12-V vehicle battery.
- 8 Attach the spade lug of the black-with-white-stripe (positive (+)) wire (3) of the cable assembly to the positive terminal (4) of the same 12-V vehicle battery.



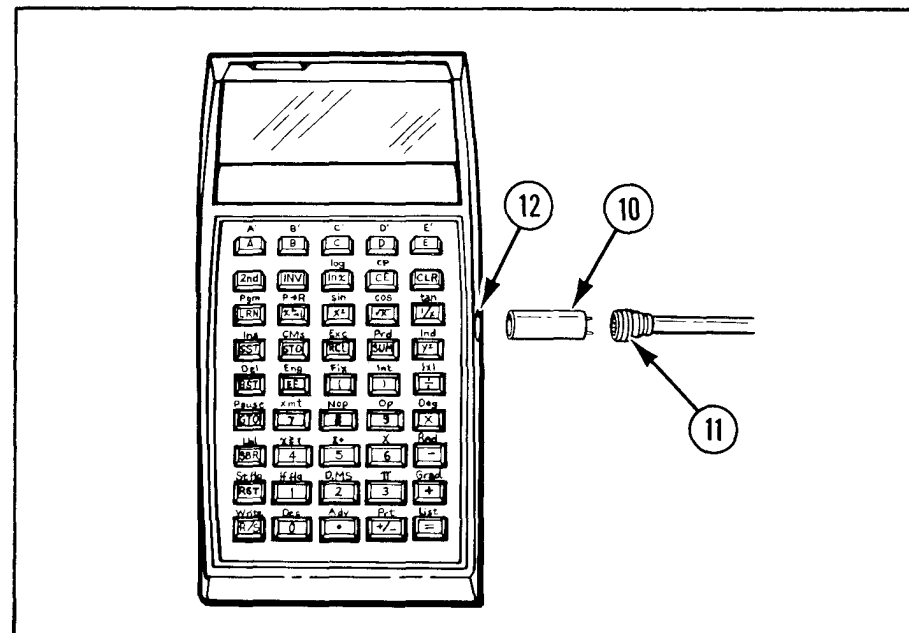
2-7. OPERATING THE COMPUTER WITHOUT PRINTER (cont.)

OPERATING THE COMPUTER FROM VEHICULAR POWER (cont.)

- 9 Plug the pronged end of the plug connector (5) into the cable assembly socket (6). Make sure that the pins (7) are properly aligned with the cable assembly socket.
- 10 Plug the dc charger-adaptor (8) into the plug connector receptacle (9).



- 11 Plug the adapter plug (10) into the dc charger-adaptor receptacle (11) and into the computer receptacle (12), aligning the guide bar on the adapter plug with the guide slot in the computer receptacle.
- 12 Turn the computer on and begin normal operation.



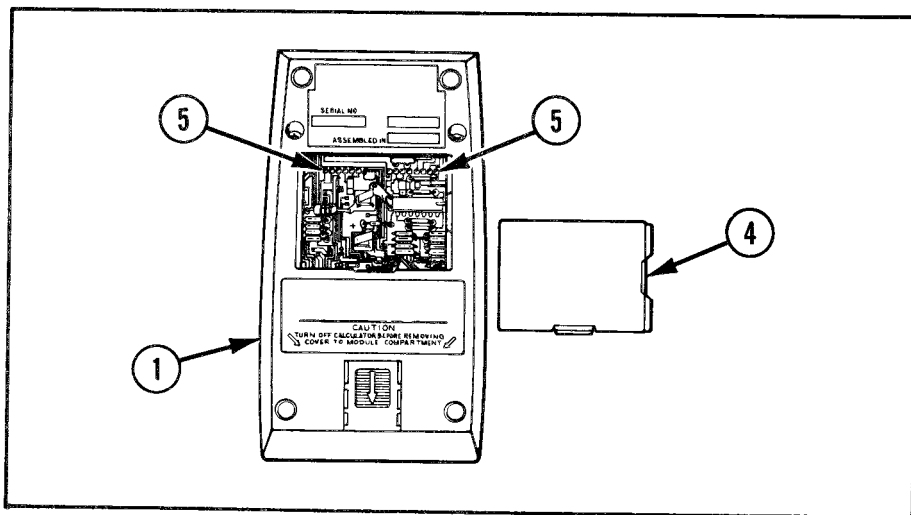
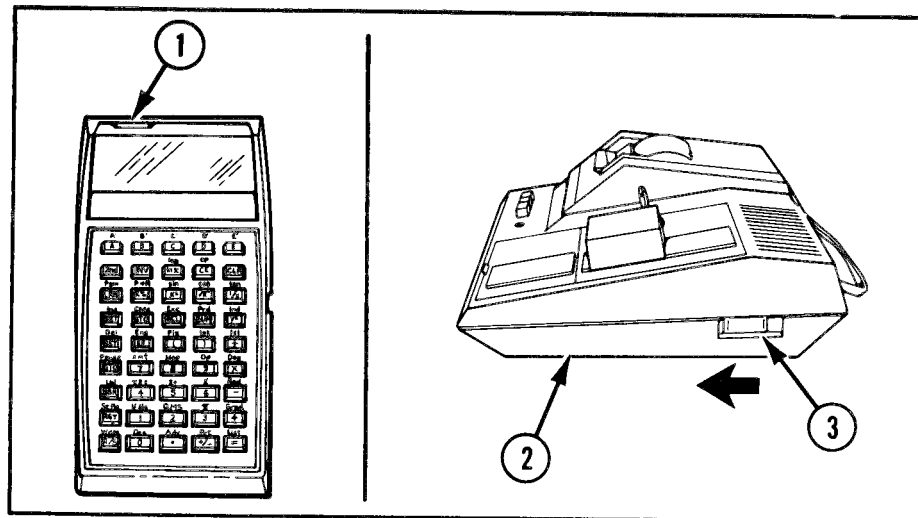
2-8. OPERATING THE COMPUTER WITH THE PRINTER

OPERATING THE COMPUTER AND PRINTER FROM 110-120 V AC

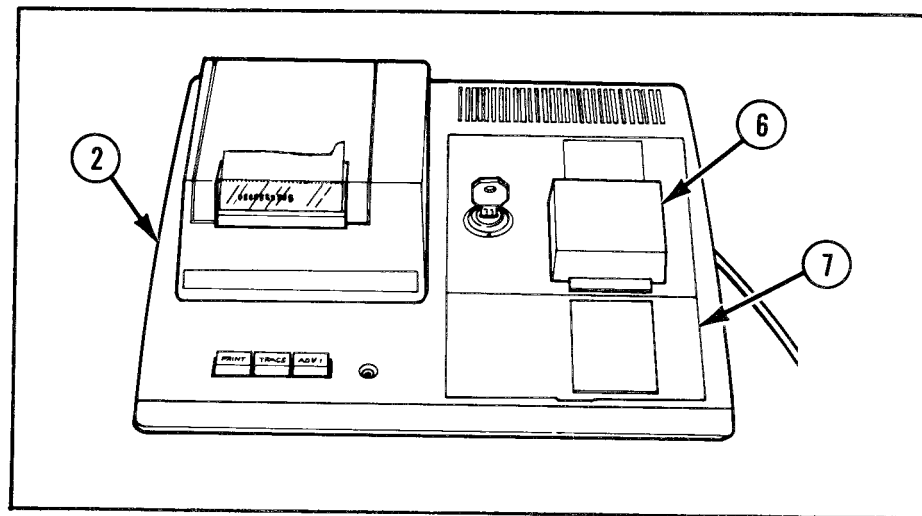
- 1 Turn the computer (1) off.
- 2 Turn the printer (2) off by sliding the printer switch (3) toward you.

WARNING

Do not allow metal objects to short the battery pack terminals because the battery pack may burst open violently.



- 3 Remove the battery pack (4) from the computer (1) (p 3-13) to expose the interface connectors (5).

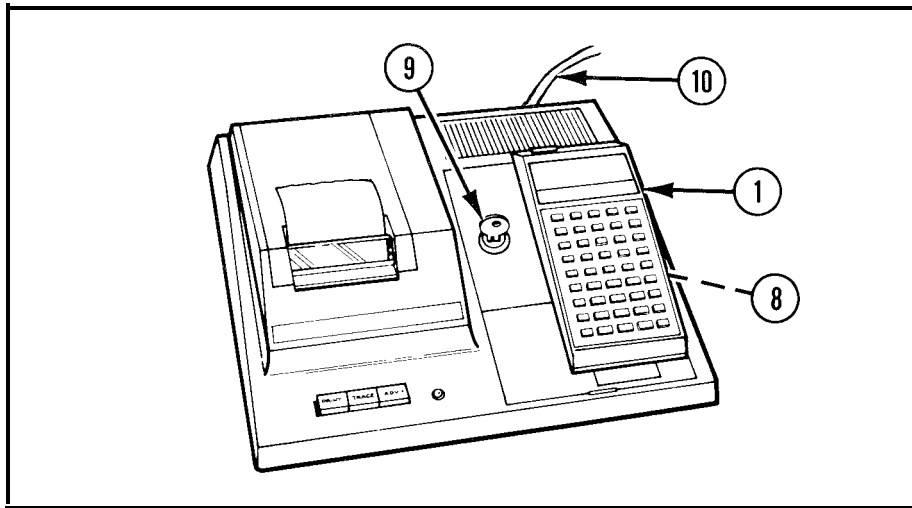


- 4 Lift the plastic cover (6) off of the printer (2) and store it in the right side compartment under the hinged flap (7).

2-8. OPERATING THE COMPUTER WITH THE PRINTER (cont)

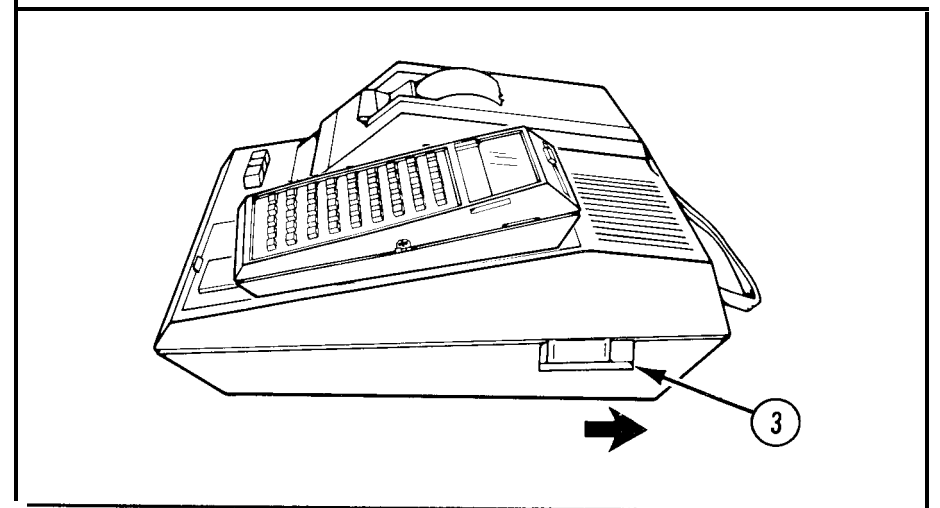
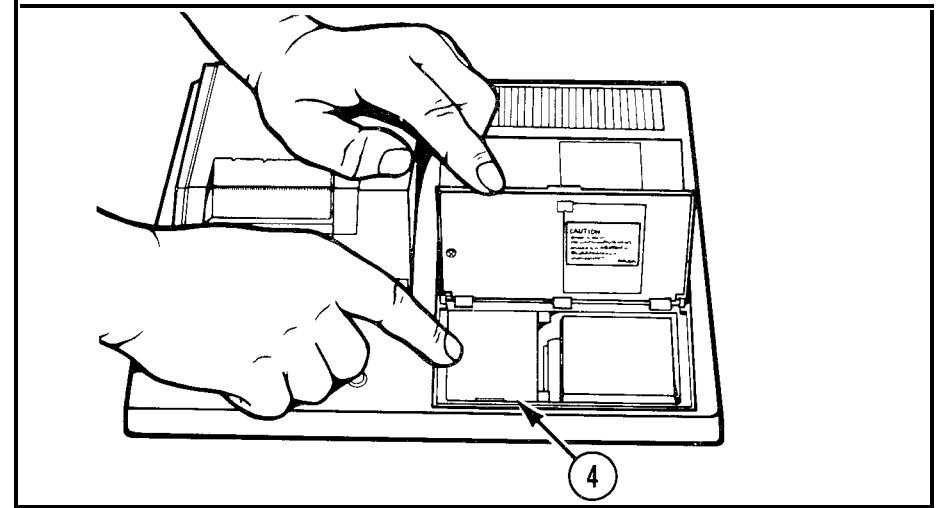
OPERATING THE COMPUTER AND PRINTER FROM 110-120 V AC (cont)

- 5 Install the battery pack (4) in the left side compartment in the same manner as it is installed in the computer.



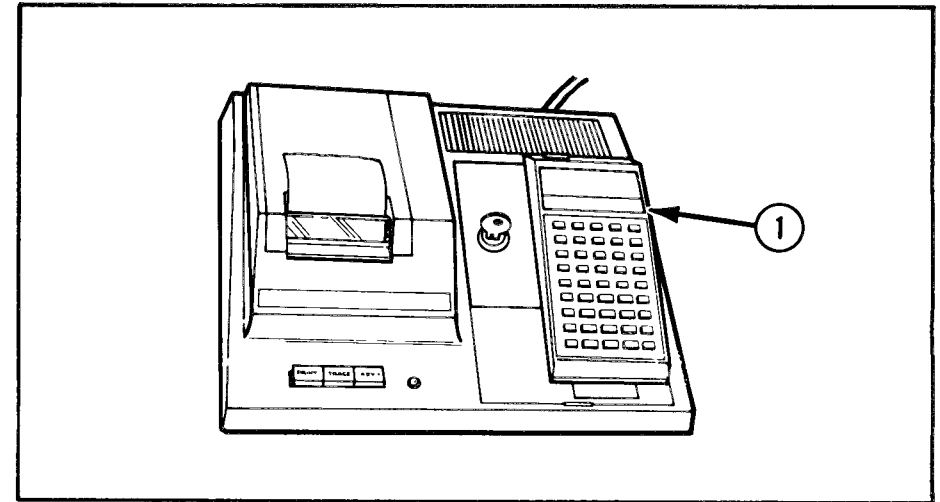
- 6 Lock the computer (1) in position on the locking cradle (8) by turning the locking key (9) 1/2 turn clockwise.

- 7 Plug the power cord (10) into the power outlet.



- 8 Slide the printer switch (3) away from you to turn the printer on.

9 Turn the computer (1) on and begin normal operations.



OPERATING THE COMPUTER AND PRINTER FROM 24 V DC

WARNING

Lead-acid storage batteries can produce explosive gases during operation that can be ignited by sparks or open flame and cause an explosion. The explosion can throw corrosive battery acid into the air. Make sure that the area directly above the battery vent caps is adequately ventilated and do not allow sparks or open flame near them.

Lead-acid storage batteries can deliver extremely high currents when the battery terminals are shorted by metal objects. Do not lay tools or other metal objects on top of these batteries, as they can get hot enough to cause burns. Remove jewelry, such as watches and rings, when working with lead-acid storage batteries.

NOTE

The PP-1703/U inverter-vibrator will provide the proper voltage to operate the computer and printer from 24 V dc. Instructions to operate the PP-1703/U inverter-vibrator are contained in TM 11-6125-238-12.

Connect the inverter-vibrator per instructions in TM 11-6125-238-12 and connect the computer and printer per instructions on page 2-27.

2-9. HANDLING OF MAGNETIC CARDS

HANDLING

CAUTION

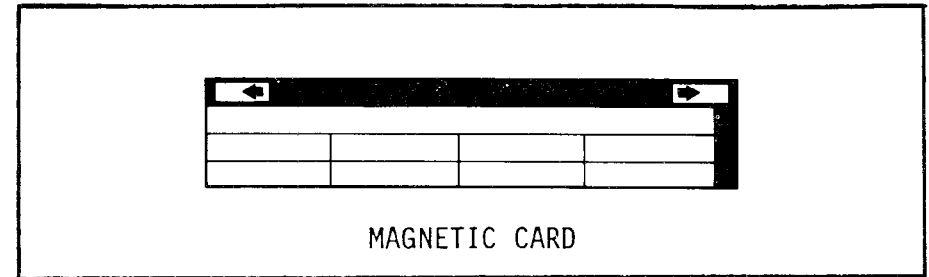
Using one contaminated magnetic card in the computer may contaminate not only the card-reader but also other magnetic cards which are used later. In some cases of extreme contamination by oily materials, the card-reader can be made inoperable.

NOTE

Be sure you know the difference between a magnetic card and a cue card. They are similar in size and shape. A magnetic card is gold with a black border and has nothing printed on the back. A cue card is usually printed on front and back and is black with gold printing.

While the data will not deteriorate, a magnetic card which is marred, curved, or dented may be useless. Damage to a magnetic card generally results from poor handling.

- 1 Develop good habits in the handling of magnetic cards. Guard against common contaminants such as ashes, food particles, drinks, dust, and oily liquids. Do not place a magnetic card directly on a contaminated surface or touch the magnetic part with your fingers. Handle a magnetic card by its edges whenever possible.



NOTE

The recorded information may be actively altered by an external magnetic field.

- 2 Keep the magnetic card away from magnets, transformers, motors, and similar equipment that could erase or alter the data stored on the magnetic card. Do not allow the oxide coating on the magnetic card to become scratched. Be sure to keep the magnetic card in the card holder or other protective container while the magnetic card is not in use. Do not attempt to insert visibly damaged or contaminated magnetic cards into the computer.

MARKING

NOTE

The blank magnetic cards furnished with the computer have areas designed to write numbers, symbols, and abbreviated titles for various programs.

Write temporary information with a soft fine-lead pencil or a fine-point, felt-tip pen with washable ink, as a nonwashable/permanent ink will permanently mark the magnetic cards.

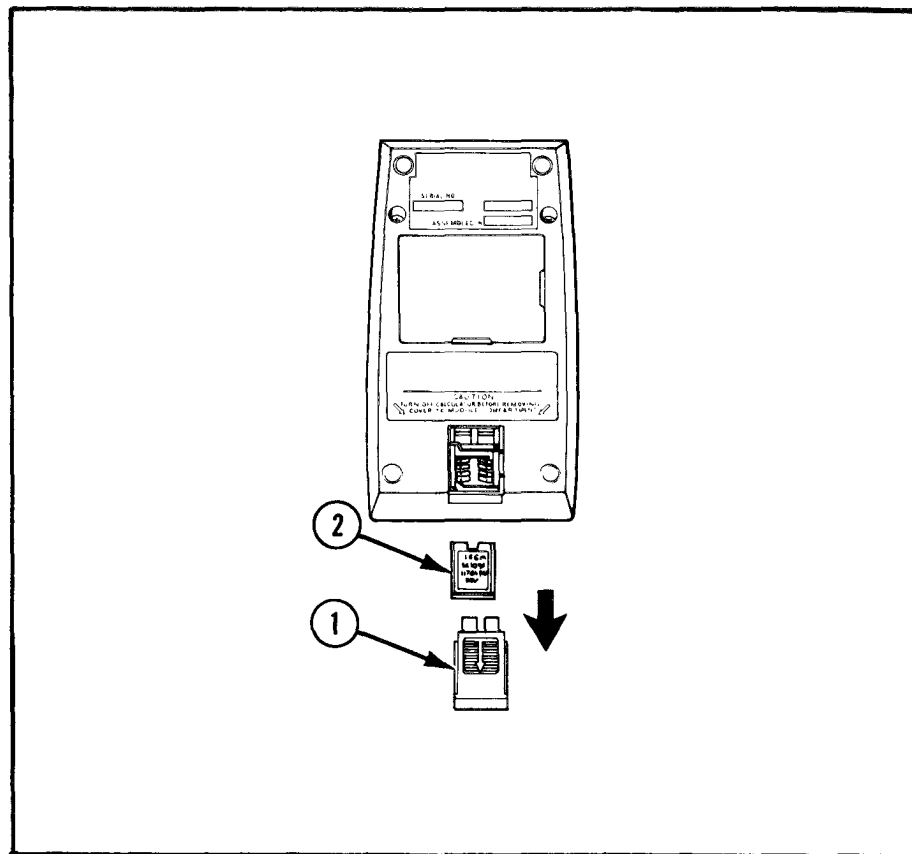
2-10. INSTALLING/CHANGING FIRMWARE MODULES

CAUTION

Discharges of static electricity from the computer or your body can change or erase the programming in the firmware modules. This is likely to occur when the dc or ac charger-adapters are connected or when the computer is being used with the printer. Be sure your body is free of static electricity before handling any firmware module. Shorting the computer contacts can damage the computer. Avoid any action that could bend, contaminate, or otherwise damage the computer contacts.

NOTE

The programs of each library are stored in firmware modules. It is a good practice to leave a firmware module in place in the computer unless it is being replaced. They are durable but should be handled with care for long life. Refer to appendix D for applicable firmware modules.



- 3 Touch a grounded metal object before handling firmware module to remove any static electricity.
- 4 Slide cover panel (1) out in direction of arrow.
- 5 Turn computer over and allow firmware module (2) to fall into your hand.

REMOVING

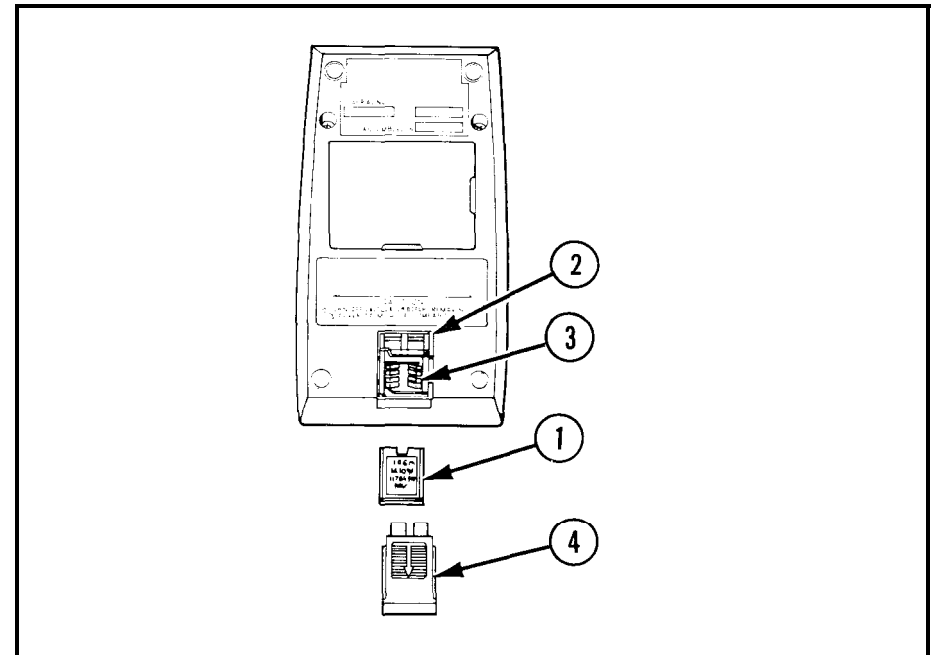
1 Turn the computer off before loading or unloading a firmware module so the keyboard or display will not lock out.

2 Lay computer down on its keys.

2-10. INSTALLING/CHANGING FIRMWARE MODULES (cont)

REPLACING

- 1 Touch grounded metal object before handling firmware module to remove any static electricity.
- 2 Insert firmware module (1), notched end first, label side up, into compartment (2). (It should slip easily into place.)
- 3 Be sure that all computer contacts (3) touch firmware module contacts. Bend computer contacts slightly, if needed, to make proper contact.
- 4 Lightly press down on firmware module and slide cover panel (4) over it.



Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-11. GENERAL

This section contains special instructions for operating and servicing the computer sets under unusual conditions. Special care must be taken in cleaning and handling when extremes in temperature, humidity, and terrain conditions are present or anticipated, in addition to performing all normal preventive maintenance services. Proper cleaning, storage, and handling not only ensure proper operation and functioning, but also guard against excessive wear of the working parts and deterioration of the materiel.

2-12. OPERATION IN EXTREME COLD WEATHER CONDITIONS

CAUTION

It is important that the approved practices and precautions be followed. FM 9-207 contains general cold weather information applicable to the computer sets and must be considered an essential part of this technical manual.

a. General Problems. Extensive preparation of materiel scheduled for operation in extreme cold weather is necessary. Generally, extreme cold weather will cause clouding of the optical components of the computer sets and moisture on the metallic components. For description of operation in extreme cold weather, refer to FM 9-207.

CAUTION

The battery pack can be damaged if it is allowed to freeze or reach low temperatures.

b. Operating Under Unusual Conditions. FM 21-305 provides special instructions for operating under unusual conditions. Do not expose the computer and printer below their operating temperature range. (See table, p 1-12.) Store the computer sets near room temperature if possible.

2-13. OPERATION IN EXTREME HOT WEATHER CONDITIONS

Do not leave the computer sets in direct sunlight. Operate the computer sets under shade and store in a cool, dry location if possible.

2-14. OPERATION IN HOT, DAMP, OR SALTY ATMOSPHERE

Inspect materiel daily when operating in hot, moist, or salty areas. Keep the computer sets dry. If they get wet, wipe them off with a clean, dry cloth (item 2, app E). Be sure that the computer sets are protected during deep-water fording operations. Store them in an airtight container if necessary.

2-15. OPERATION IN DUSTY OR SANDY CONDITIONS

Keep the computer sets covered when not in use. Wipe off any dust, dirt, or sand from the computer sets. Store in a covered location.

CHAPTER 3
OPERATOR MAINTENANCE

Section I. LUBRICATION INSTRUCTIONS

3-1. LUBRICATION

Lubrication and painting are not required or authorized for the computer sets.

Section II. TROUBLESHOOTING PROCEDURES

3-2. TROUBLESHOOTING

a. Troubleshooting means finding the problem in the equipment, what causes the problem, and then fixing it or getting the next level of maintenance to fix it.

b. The symptom index can be used as a quick guide to troubleshooting. Common malfunctions are listed in alphabetical order with a page number reference to the troubleshooting table where a test or inspection and corrective action are provided.

SYMPTOM INDEX

Troubleshooting
Procedure
Page

COMPUTER

Display flashes:

After reading or recording a magnetic card	3-7
Each time a firmware module program is called	3-4
While performing keyboard operations	3-3

Display flashes or produces incorrect results:

When running a firmware module program	3-5
When running a program in program memory	3-6

3-2. TROUBLESHOOTING (cont)

SYMPTOM INDEX (cont)

Troubleshooting Procedure Page

COMPUTER (cont)

Display "locks up" or does not appear 3-8

Display shows erroneous results, flashes erratic numbers, grows dim, goes blank, or the card reader runs continuously 3-3

Display shows multiple digits when a number key is pressed and released once 3-3

Will riot go into learn mode, single step, list, or record a magnetic card 3-7

PRINTER

No printed digits appear when using printer 3-11

Printed numbers have a continuous faded streak in the same position on each printed line 3-11

Rubber roller in printer chatters and does not rotate 3-11

Will not operate 3-9

c. The table lists the common malfunctions which you may find during the operation or maintenance of the computer sets or their components. You should perform the tests/inspections and corrective actions in the order listed.

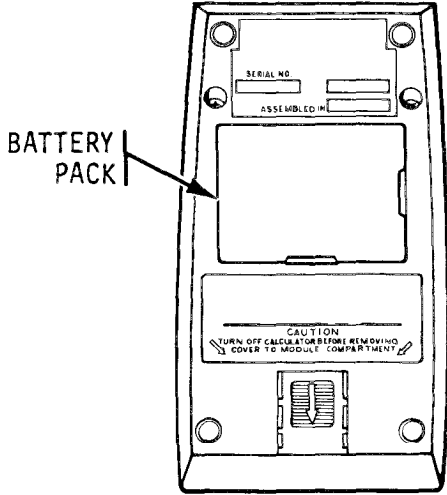
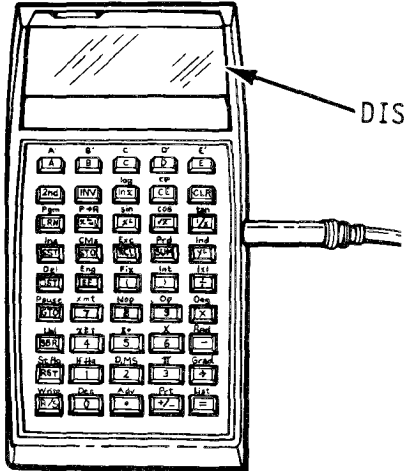
d. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not

corrected by listed corrective actions, notify your supervisor.

NOTE

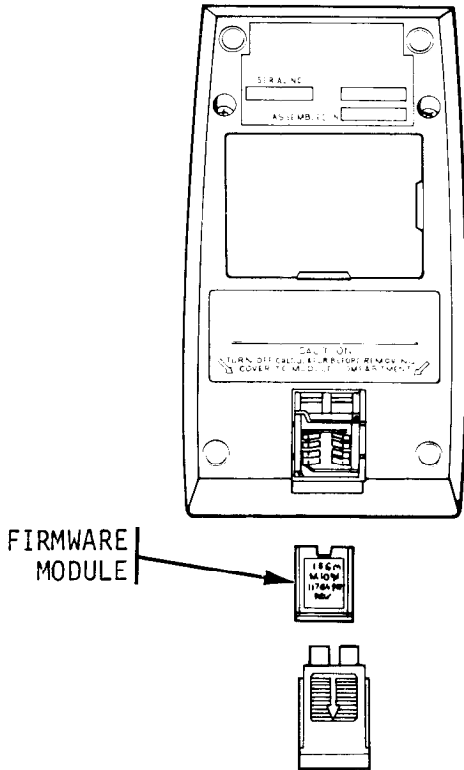
Any time a malfunction includes a flashing display, the applicable reference note (table 2-1, p 2-1) should be consulted to make sure that the flashing display is not an error code.

TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
COMPUTER	
<p>1. DISPLAY SHOWS ERRONEOUS RESULTS, FLASHES ERRATIC NUMBERS, GROWS DIM, GOES BLANK, OR THE CARD READER RUNS CONTINUOUSLY.</p> <p style="padding-left: 40px;">Check to see that battery pack is properly installed. If so, it is probably discharged.</p> <p style="padding-left: 80px;">Connect ac or dc charger-adapter to recharge battery pack (p 2-21 thru 2-26) or, if portable operation is required, replace battery pack (p 3-13).</p>	
<p>2. DISPLAY SHOWS MULTIPLE DIGITS WHEN A NUMBER KEY IS PRESSED AND RELEASED ONCE.</p> <p style="padding-left: 40px;">Computer is defective.</p> <p style="padding-left: 80px;">Replace computer.</p>	
<p>3. DISPLAY FLASHES WHILE PERFORMING KEYBOARD OPERATIONS.</p> <p style="padding-left: 40px;">An involved operation or key sequence has been pressed or the limits of the computer have been exceeded.</p> <ol style="list-style-type: none"> a. Press (CE) to stop the flashing only. Calculations may be continued undisturbed. b. Press (CLR) to stop the flashing and clear the display and all pending operations. 	

3-2. TROUBLESHOOTING (cont)

TROUBLESHOOTING (cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
<p style="text-align: center;">COMPUTER (cont)</p> <p>4. DISPLAY FLASHES EACH TIME A FIRMWARE MODULE PROGRAM IS CALLED.</p> <p>Step 1. Firmware module program number does not exist. Consult applicable reference note (table 2-1, p 2-1).</p> <p>Step 2. Firmware module is not properly installed. See page 2-31 for installation.</p>	 <p style="text-align: center;">FIRMWARE MODULE</p>

5. DISPLAY FLASHES OR PRODUCES INCORRECT RESULTS WHEN RUNNING A FIRMWARE MODULE PROGRAM.

Step 1. Wrong program is called.

Refer to applicable reference note (table 2-1, p 2-1).

Step 2. Operating procedures are improper.

Refer to applicable reference note (table 2-1, p 2-1).

Step 3. Partitioning is set for too few data registers to run the program.

Check and correct partitioning (table 2-2, item 13, p 2-16).

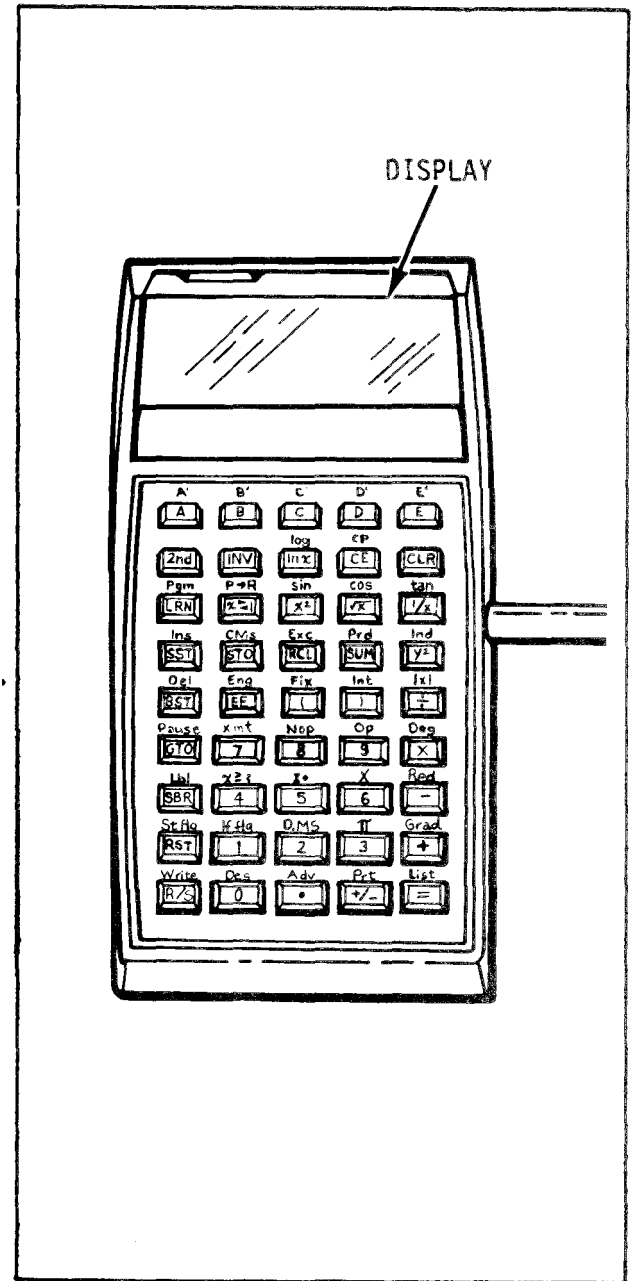
Step 4. Computer is operating in Fix-Decimal display format.

a. Press (INV), (2nd), and (FIX).

b. Turn computer off and on and try program again.

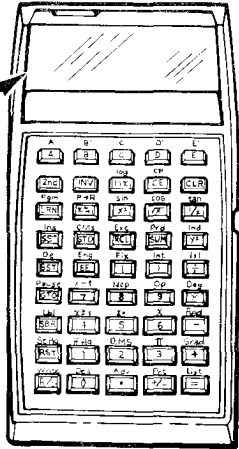
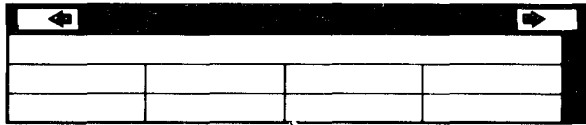
Step 5. One of the preprogrammed error codes has been triggered.

Refer to the applicable reference note (table 2-1, p 2-1).



3-2. TROUBLESHOOTING (cont)

TROUBLESHOOTING (cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
<p style="text-align: center;">COMPUTER (cont)</p> <p>6. DISPLAY FLASHES OR PRODUCES INCORRECT RESULTS WHEN RUNNING A PROGRAM IN PROGRAM MEMORY.</p> <p>Step 1. An illegal operation, overflow, or underflow occurred while the program was running.</p> <p style="padding-left: 40px;">Refer to applicable reference note (table 2-1, p 2-1).</p> <p>Step 2. One of the firmware module programs has been called.</p> <p style="padding-left: 40px;">Press (RST) and try again.</p> <p>Step 3. If program has been read from a magnetic card, perform the checks in table 2-2, item 10 (p 2-10).</p> <p style="padding-left: 40px;">If test results are good, check the magnetic card with your program for defects or contamination. Notify organizational maintenance if they are contaminated or have defects.</p>	<p style="text-align: center;">DISPLAY</p>  <p style="text-align: center;">MAGNETIC CARD</p> 

7. DISPLAY FLASHES AFTER READING OR RECORDING A MAGNETIC CARD.

Step 1. Procedure is improper.

Refer to applicable reference note (table 2-1, p 2-1).

Step 2. Incorrect partitioning was selected.

Check and correct partitioning (table 2-2, item 13, p 2-16).

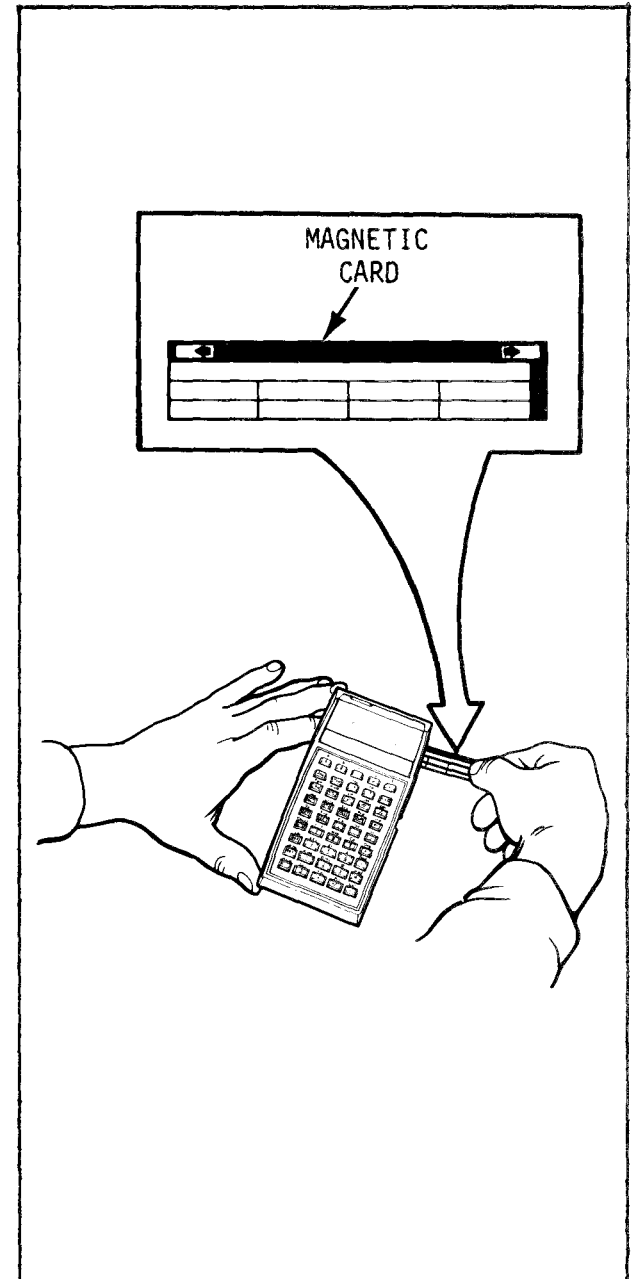
Step 3. Magnetic card is defective.

If other magnetic cards read properly, check the first one for defects or contamination. If it was contaminated or had defects, notify organizational maintenance.

8. COMPUTER WILL NOT GO INTO LEARN MODE, SINGLE STEP, LIST, OR RECORD A MAGNETIC CARD.

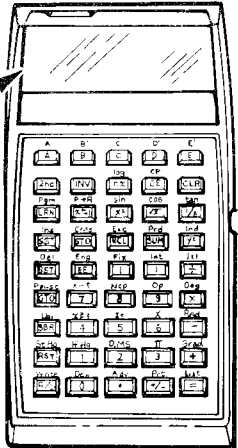
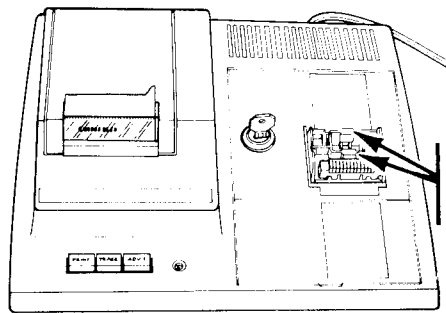
The program in the program memory is protected.

Refer to applicable reference note (table 2-1, p 2-1).



3-2. TROUBLESHOOTING (cont)

TROUBLESHOOTING (cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
<p style="text-align: center;">COMPUTER (cont)</p> <p>9. DISPLAY "LOCKS UP" OR DOES NOT APPEAR.</p> <p style="padding-left: 40px;">Step 1. Power-up sequence is improper.</p> <ul style="list-style-type: none"> a. Turn computer off and then on. b. Press (CLR). <p style="padding-left: 40px;">Step 2. Interface connector contacts (on printer) are contaminated.</p> <p style="padding-left: 80px;">Notify organizational maintenance.</p>	<div style="text-align: center;">  <p>DISPLAY</p> </div> <div style="text-align: center;">  <p>INTERFACE CONNECTOR CONTACTS</p> </div>

PRINTER

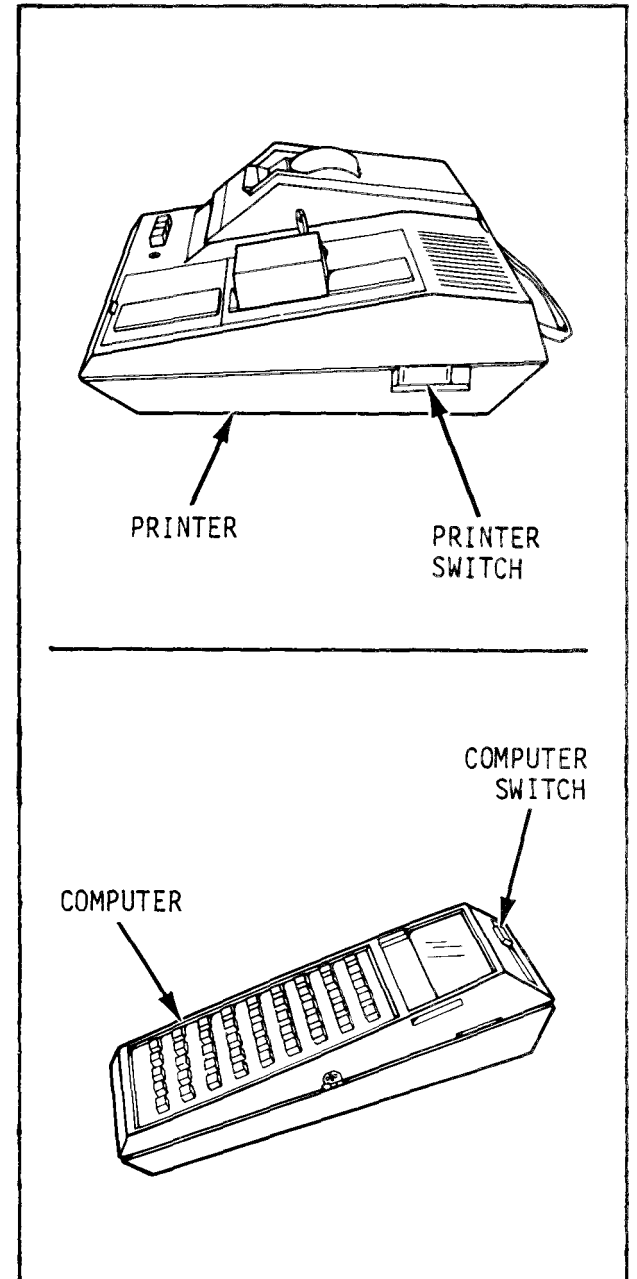
10. PRINTER WILL NOT OPERATE.

Step 1. Make sure that printer and computer are turned on.

If not, turn power on.

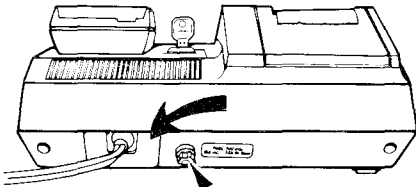
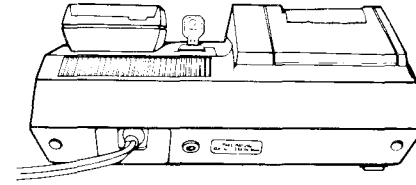
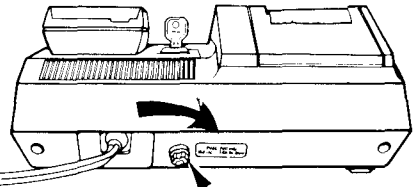
Step 2. Make sure that printer is plugged into a live outlet.

If not, plug printer into a live outlet.



3-2. TROUBLESHOOTING (cont)

TROUBLESHOOTING (cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
<p style="text-align: center;">PRINTER (cont)</p> <p>Step 3. Check 1/4 amp fuse.</p> <p>a. Replace if necessary, following b thru e below.</p> <p>b. Remove the fuseholder by pressing it in and rotating 1/4 turn counterclockwise, then pulling it out.</p>	 <p style="text-align: center;">FUSEHOLDER</p>
<p>c. Pull 1/4 amp fuse out of fuseholder.</p> <p>d. Insert new 1/4 amp fuse into fuseholder.</p>	 <p style="text-align: center;">1/4 AMP FUSE FUSE-HOLDER</p>
<p>e. Insert fuseholder and fuse into printer and rotate 1/4 turn clockwise to lock it in place.</p>	 <p style="text-align: center;">FUSEHOLDER</p>

11. RUBBER ROLLER IN PRINTER CHATTERS AND DOES NOT ROTATE.

Printer paper not installed or improperly installed.

Install, or remove and properly reinstall printer paper (p 3-15).

12. NO PRINTED DIGITS APPEAR WHEN USING PRINTER.

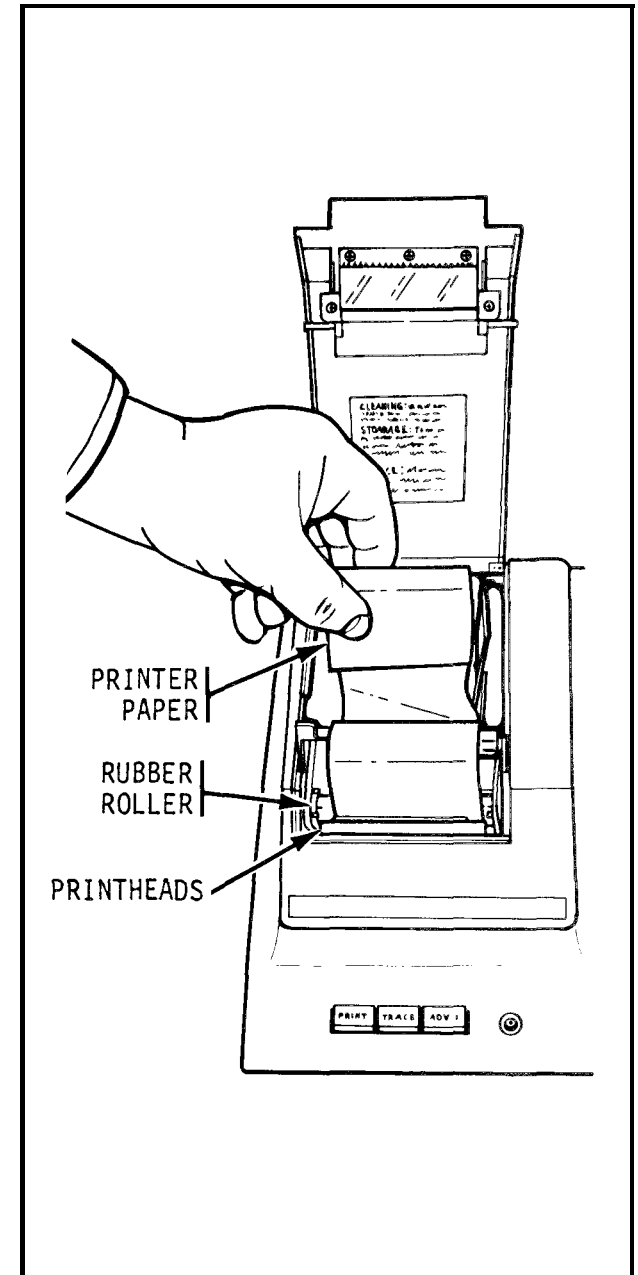
Printer paper installed with wrong side against the printheads.

Remove and properly reinstall printer paper (p 3-15).

13. PRINTED NUMBERS HAVE A CONTINUOUS FADED STREAK IN THE SAME POSITION ON EACH PRINTED LINE.

Printheads are dirty.

Notify organizational maintenance.



Section III. MAINTENANCE PROCEDURES

3-3. GENERAL

- a. Responsibility. The operator must make sure that the computer sets are clean, in good operating condition, and maintenance personnel are aware of any problems with the equipment.
- b. Repairs. Repairs by the operator will be limited to those described in this section.

c. Repair Parts. Repair parts needed by the operator are listed in appendix F, repair parts and special tools list. No special tools are required for operator maintenance.

d. Tests and Inspections. The only tests and inspections required by the operator are those listed in the operator's preventive maintenance checks and services (table 2-2, p 2-5).

3-4. COMPUTER--MAINTENANCE INSTRUCTIONS

THIS TASK COVERS:

- a. Repair by replacing battery pack
b. Maintenance of battery pack

INITIAL SETUP

Troubleshooting Reference

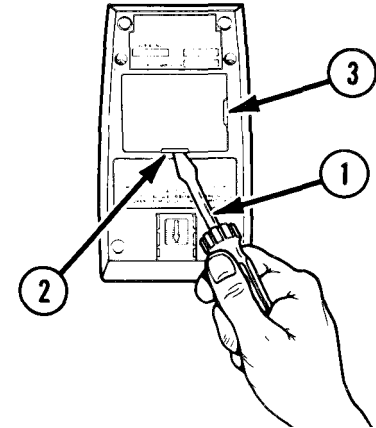
- p 3-3 Display shows erroneous results, flashes erratic numbers, grows dim, goes blank, or the card reader runs continuously.

REPAIR BY REPLACING BATTERY PACK

WARNING

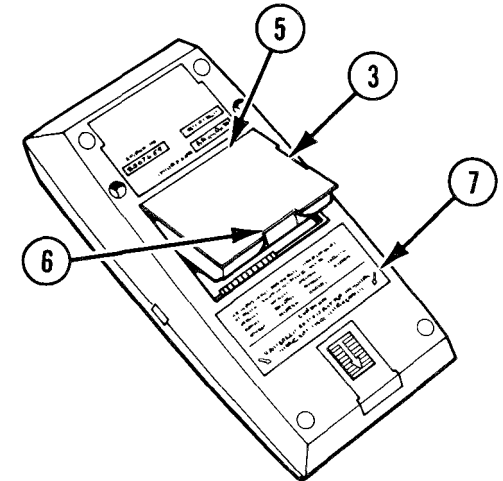
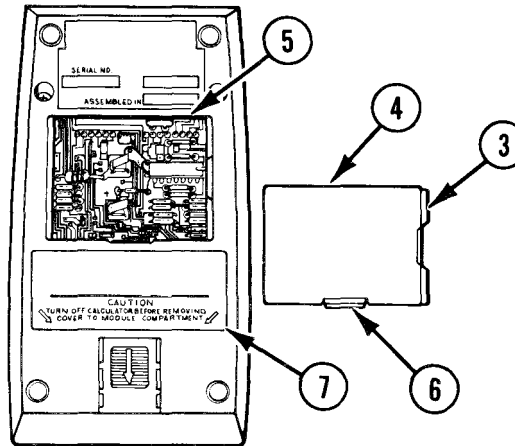
Do not allow metal objects to short the battery pack terminals, because the battery pack may burst open violently.

- 1 To remove battery pack, first, lay computer down on its keys.
- 2 Place a screwdriver (1) in slot (2) at bottom of battery pack (3).
- 3 Gently pry upward on edge of battery pack until it pops out of computer.



- 4 To replace battery pack (3), place rounded part into opening so that small step (4) on end of battery pack fits under edge (5) of computer bottom. Slotted end (6) of battery pack will then be next to caution instruction (7).

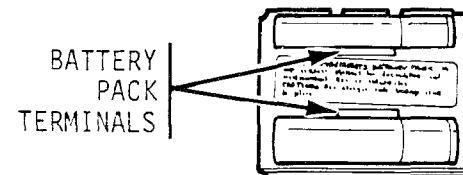
- 5 Press on battery pack to snap it into position.



3-4. COMPUTER--MAINTENANCE INSTRUCTIONS (cont)

MAINTENANCE OF BATTERY PACK

Clean battery pack terminals as needed, by rubbing them with a clean pencil eraser to remove any corrosion that may have accumulated. Do not use extreme pressure. If computer is stored or unused for several weeks, the battery pack will probably need recharging before portable use. It is safe to store computer with battery pack installed, as it will not leak corrosive material.



3-5. PRINTER--MAINTENANCE INSTRUCTIONS

THIS TASK COVERS:

- a. Removal/replacement of printer paper
- b. Repair by replacing 1/4 amp fuse

INITIAL SETUP

Materials/Parts

Printer paper (item 5, app E)
1/4 amp **fuse** (app F)

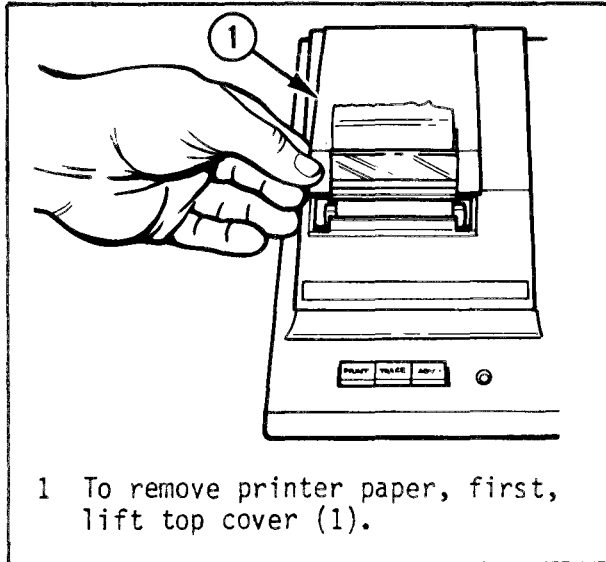
References

Appendix E
Appendix F

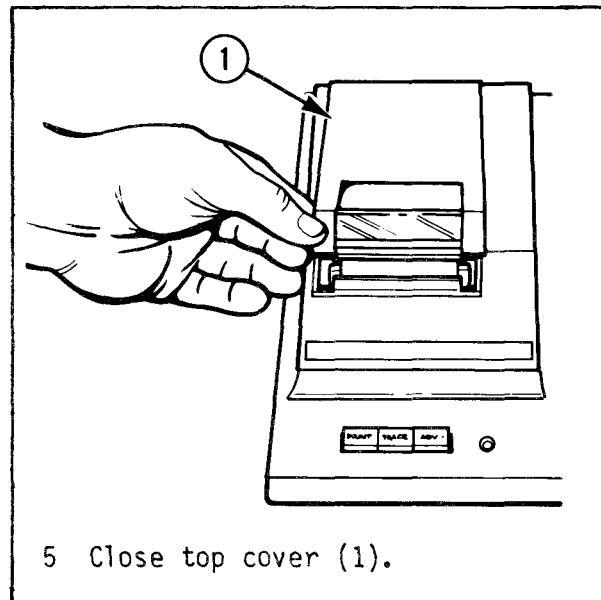
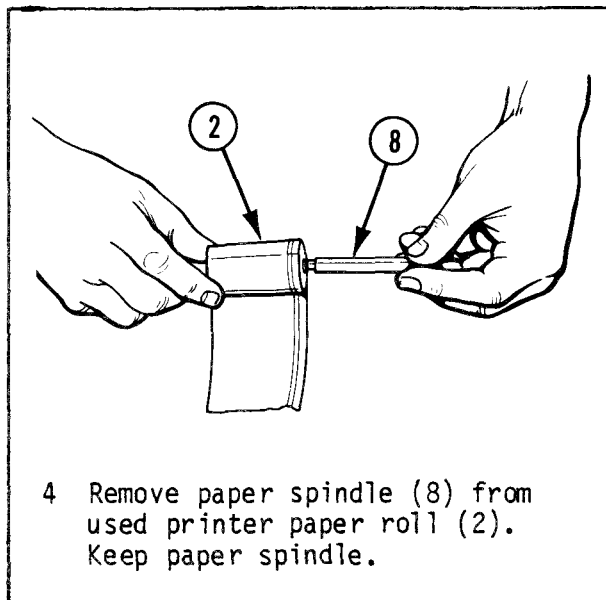
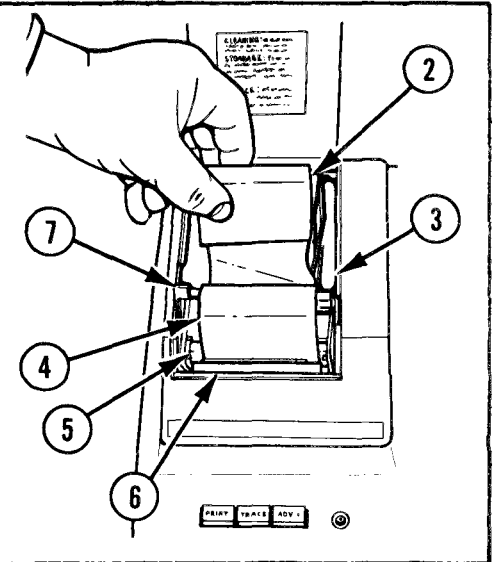
Troubleshooting References

- p 3-11 No printed digits appear when using printer.
p 3-11 Rubber roller in printer chatters and does not rotate.

REMOVAL/REPLACEMENT OF PRINTER PAPER



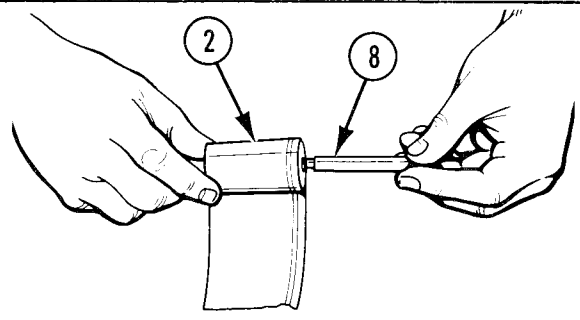
- 2 Lift printer paper roll (2) out of printer paper compartment (3).
- 3 If printer paper (4) is engaged by the rubber roller (5) and printheads (6), pull paper-release lever (7) to release position (toward you). Gently pull printer paper from printing unit.



CAUTION
Use only thermal-type printer paper, as other types may damage the printheads.

3-5. PRINTER--MAINTENANCE INSTRUCTIONS (cont)

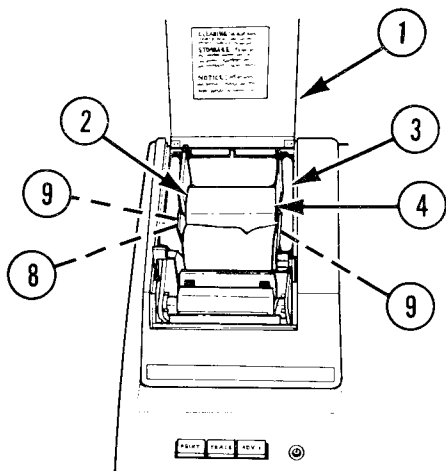
REMOVAL/REPLACEMENT OF PRINTER PAPER (cont)



6 To replace printer paper (item 5, app E), first, insert paper spindle (8) into new printer paper roll (2).

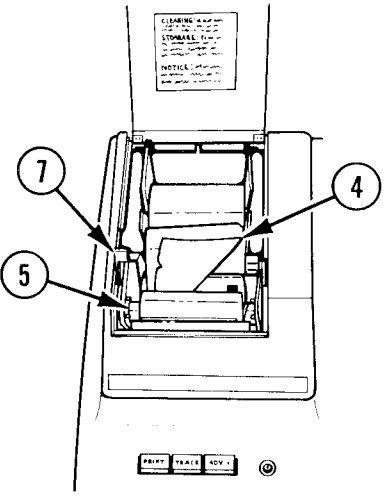
7 Lift top cover (1).

8 Lower new printer paper roll (2) into printer paper compartment (3) so that printer paper (4) will unroll from the bottom, and guide ends of paper spindle (8) into slots (9).



9 Fold end of printer paper (4) at 45-degree angle from one edge to form point.

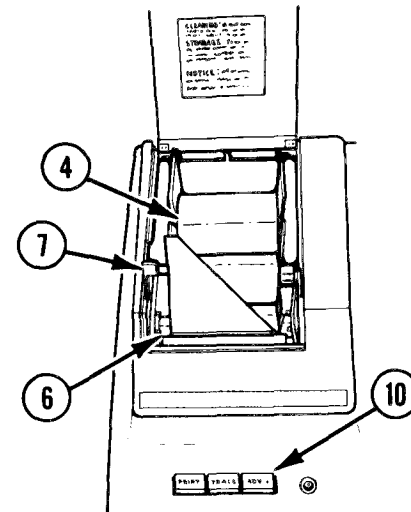
10 Hold paper-release lever (7) in release position and insert point of folded printer paper under rubber roller (5).



NOTE
The computer must be locked into position and turned on for steps 11 and 12.

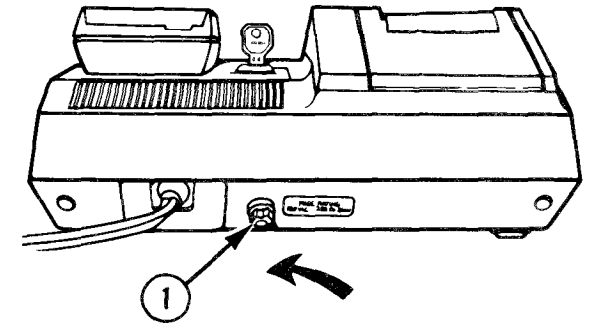
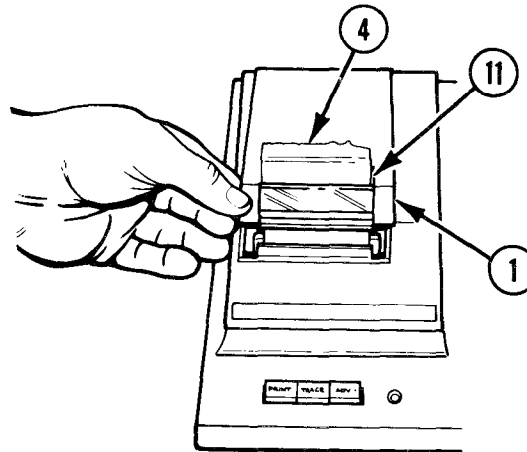
11 Press ADV button (10) to advance printer paper (4) through printing unit. When point of printer paper appears above printheads (6), return paper-release lever (7) to normal position.

12 Hold ADV button (10) down until folded portion of printer paper is completely through printing unit.



REPAIR BY REPLACING 1/4 AMP FUSE

13 Hold end of printer paper (4) slightly forward and guide it through top cover slot (11) while closing top cover (1). Printer is now ready for normal operation.



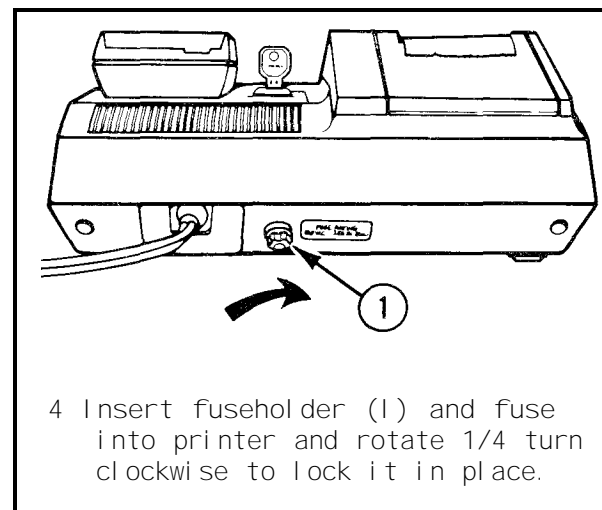
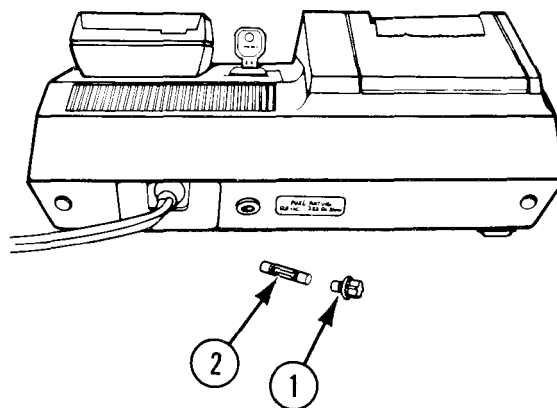
1 Remove fuseholder (1) by pressing it in and rotating 1/4 turn counterclockwise, then pulling it out.

3-5. PRINTER--MAINTENANCE INSTRUCTIONS (cont)

REPAIR BY REPLACING 1/4 AMP FUSE (cont)

Pull 1/4 amp fuse (2) out of fuseholder (1).

Insert new 1/4 amp fuse (2) into fuseholder (1).



4 Insert fuseholder (1) and fuse into printer and rotate 1/4 turn clockwise to lock it in place.

3-6. DC CHARGER-ADAPTER--MAINTENANCE INSTRUCTIONS

THIS TASK COVERS:

Repair by replacing 1/2 amp fuse

INITIAL SETUP

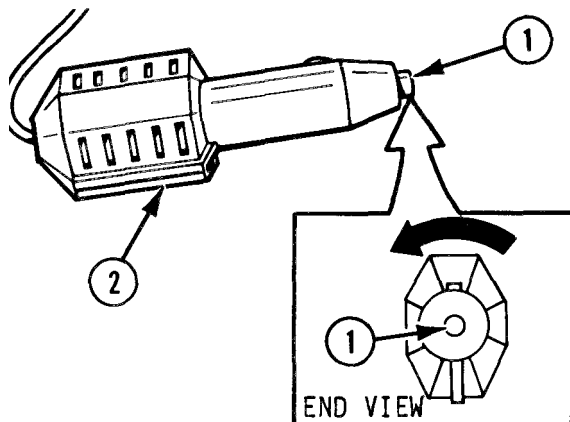
Materials/Parts

1/2 amp fuse (app F)

References

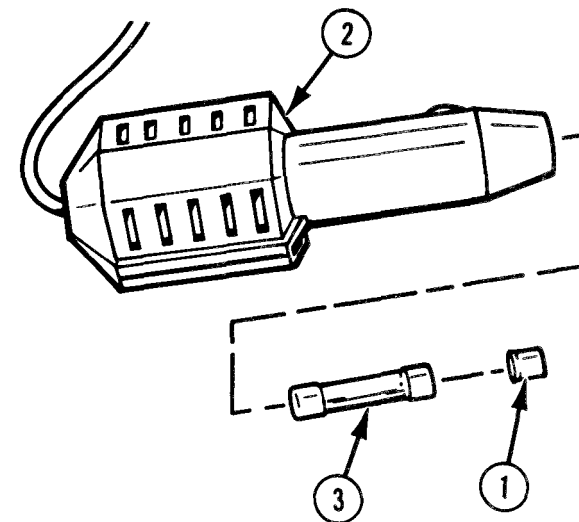
Appendix F

REPAIR BY REPLACING 1/2 AMP FUSE

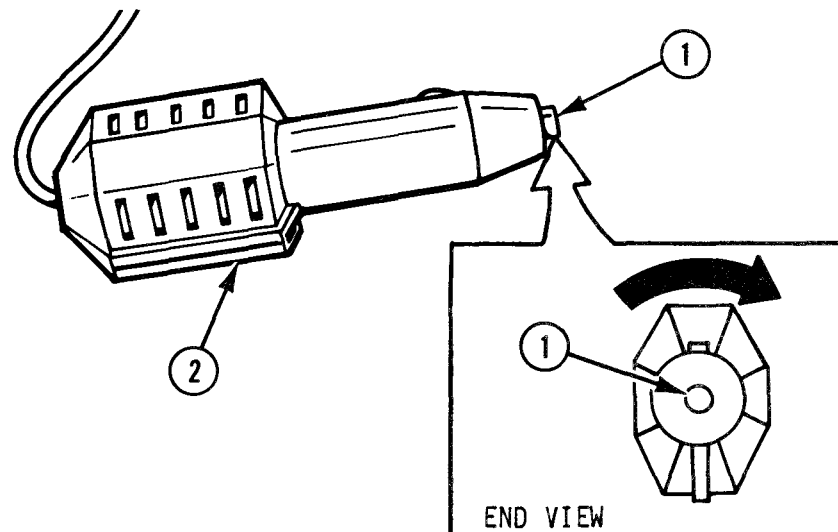


- 1 Grasp tip (1) of dc charger-adaptor (2), press in, and rotate 1/4 turn counterclockwise.

- 2 Gently release spring tension on 1/2 amp fuse (3) by moving tip (1) slowly away from dc charger-adaptor (2).
- 3 Pull 1/2 amp fuse out of dc charger-adaptor.
- 4 Place new 1/2 amp fuse (app F) in dc charger-adaptor.



- 5 Place tip (1) on end of new 1/2 amp fuse and press in until tip is almost flush with end of dc charger-adaptor (2).
- 6 Rotate tip 1/4 turn clockwise to lock it in place.



CHAPTER 4

ORGANIZATIONAL MAINTENANCE

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

4-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Table of Organization and Equipment (TOE) or the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

4-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

a. Special Tools. There are no special tools authorized for the computer sets.

b. Support Equipment. All support equipment that can be used with the computer sets is described in chapter 2, section III, operating under usual conditions (p 2-19).

4-3. REPAIR PARTS

Repair parts are listed and illustrated in appendix F of this manual.

Section II. SERVICE UPON RECEIPT OF MATERIEL

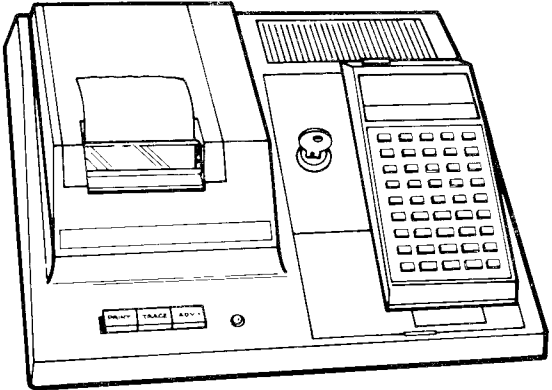
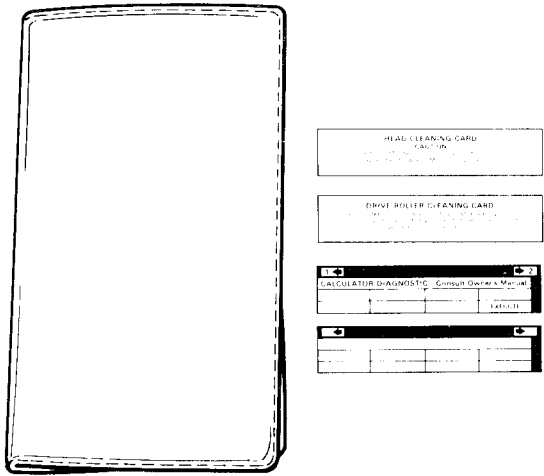
4-4. GENERAL

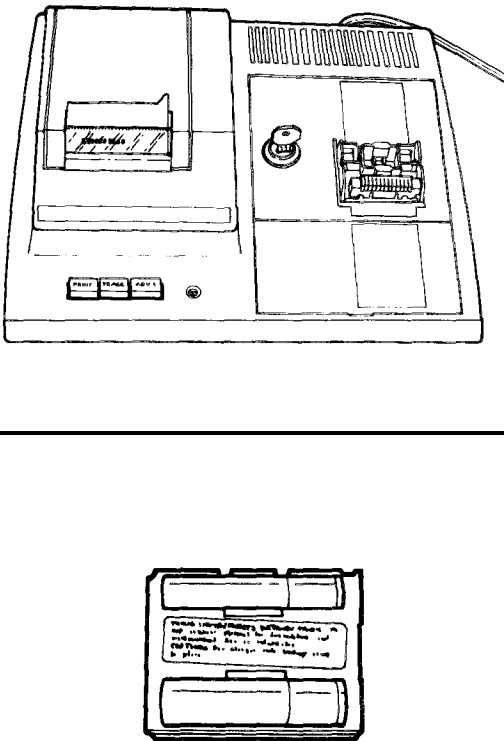
For maximum operational readiness, equipment must be systematically inspected at regular intervals so defects may be discovered and corrected before they result in serious damage or failure. Preventive maintenance for these systems includes inspecting, cleaning, and component item replacement only.

4-5. RECORDS AND FORMS

Deficiencies noted before, during, or after operation that cannot be corrected by the equipment operator will be reported on DA Form 2407, Maintenance Request. For instructions on filling out this form, see TM 38-750. For instructions on filling out DOD Form 1348-1, refer to AR 710-2.

4-6. SERVICE UPON RECEIPT OF MATERIEL

Location	Item	Action	Remarks
1. Computer sets	Components	<ul style="list-style-type: none"> a. Inspect to be sure each item is present, in good condition, clean, and properly mounted or stowed. b. Replace missing items as authorized (app F). 	
2. Card holder	Components	<ul style="list-style-type: none"> a. Pay special attention to these items, as they are relatively small. b. Do not lose, misplace, or damage. c. Do not contaminate magnetic cards. d. Replace missing items as authorized (app F). 	

<p>3. Printer</p>	<p>Locking keys</p>	<p>a. Be sure that at least one of the two original locking keys for securing the computer to the printer is safeguarded at organizational level and is not loaned/given to operator personnel.</p> <p>b. Organizational maintenance personnel are authorized to make a sufficient number of additional locking keys so that they will be available when needed.</p> <p style="text-align: center;">NOTE</p> <p>Self-discharging (common in all batteries) may occur, even though the battery pack was factory-charged prior to shipment.</p>	
<p>4. Computer</p>	<p>Battery pack</p>	<p>If display is dim or erratic the first time the computer is used, the battery pack needs to be charged. Refer to page 2-21 thru 2-26 for instructions on charging the battery pack.</p>	

4-7. CHECKING UNPACKED EQUIPMENT

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF Form 364, Report of Discrepancy (ROD).

b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of TM 38-750.

c. Check to see whether the equipment has been modified.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

4-8. GENERAL

To check the functional status of the computer, its magnetic card read/write operation, and the printer, perform the preventive maintenance checks and services given in table 4-1. If the computer or printer cannot pass any one of these tests, replace parts as required (app F), and/or correct problem as indicated. If the equipment fails to operate, troubleshoot in accordance with table 4-2. Report any deficiencies using CIA Form 2404. (See TM 38-750.)

4-9. PMCS

a. Item Number Column. Checks and services are numbered in logical order of performance. This column

shall be used as a source of item numbers for the TM Number Column on DA Form 2404, Equipment Inspection and Maintenance *Worksheet*, in recording results of PMCS.

b. Item to be inspected Column. The items listed in this column are divided into groups indicating the portion of the equipment of which they are a part. Under these groupings, the item to be inspected is identified by its common name.

c. Procedures Column. This column contains a brief description of the procedure by which the check is to be performed. This column contains all the information required to accomplish the checks and services.

Table 4-1. Organizational Preventive Maintenance Checks and Services Monthly Schedule

Item no.	Item to be inspected	Procedures	
1	COMPUTER	<p>Check for external damage.</p> <p>Check to see that keys (1) operate.</p> <p>Check that battery pack (2) and appropriate firmware module (3) are inserted correctly.</p> <p>Turn computer (4) on. A single zero should be readable on the extreme right side of the display (5). This shows battery pack is charged and computer is ready for use,</p>	<p>The diagram illustrates the physical components of the computer. The 'BOTTOM' view shows the battery pack (2) and the firmware module (3) being inserted into the device body (4). The 'TOP' view shows the display (5) and the keyboard (1).</p>

2

DC CHARGER-ADAPTER

Press (.) and (+/-). Press (8) repeatedly to fill the display. The decimal point and minus sign should move to the left each time an entry is made.

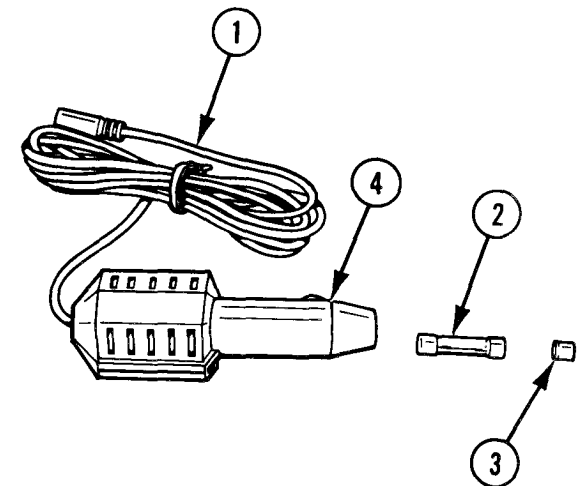
Check to see that all parts of the display light.

Cause the computer to exceed its capability by pressing (+), (0), and (=). Display should flash -9.999999 99. Press (CE) to stop display flashing.

Check for cleanness, exterior damage, contact corrosion, and spring tension of contacts.

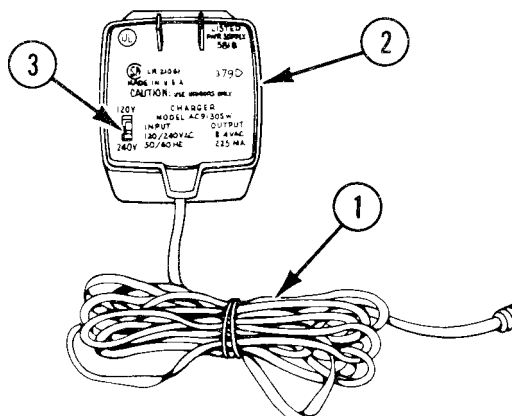
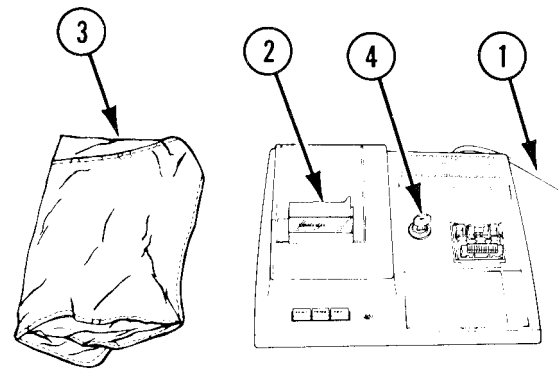
Check dc power cord (1) for breaks in the insulation cover.

Check the 1/2 amp fuse (2) in tip (3) of dc charger-adaptor (4) (p 3-19) before rejecting it if no output is present.



4-9. PMCS (cont)

Table 4-1. Organizational Preventive Maintenance Checks and Services Monthly Schedule (cont)

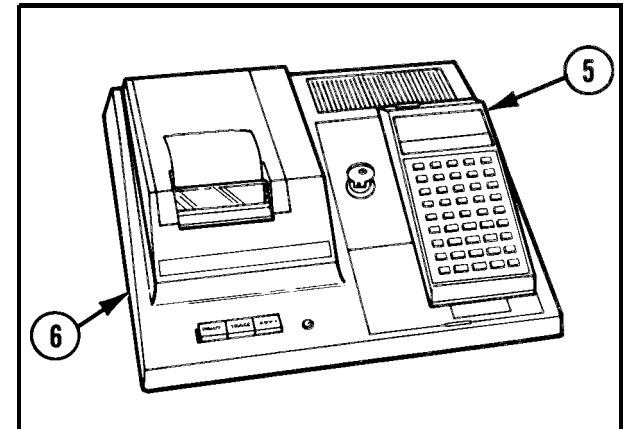
Item no.	Item to be inspected	Procedures	
3	AC CHARGER-ADAPTER	<p>Check for cleanness, exterior damage, and damage to contact prongs.</p> <p>Check ac power cord (1) for breaks in insulation cover.</p>	
4	PRINTER	<p>Check exterior for cleanness and damage.</p> <p>Check power cord (1) for breaks in insulation cover. Check for bent, broken, smashed, or corroded plug.</p> <p>Check that printer paper (2) is clean and in place.</p> <p>Check that dust cover (3) is not cut, torn, or dirty.</p> <p>Check that enough locking keys (4) are available for all personnel who need them.</p>	

5

BATTERY PACK

Attach computer (5) to printer (6) and lock into position with locking key (p 2-27).

With computer in position, turn printer on. Check that PRINT and ADV functions work.

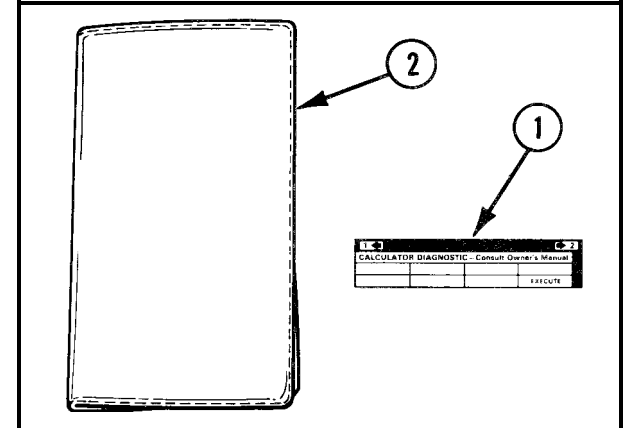
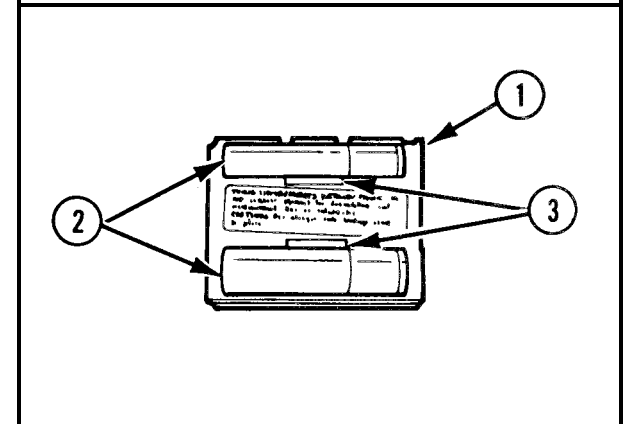


6

COMPUTER--GENERAL OPERATION (di agnostic)

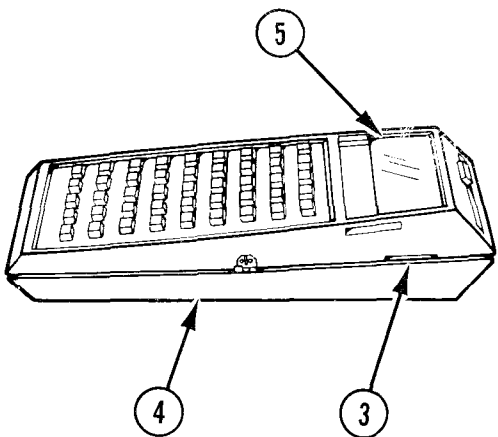
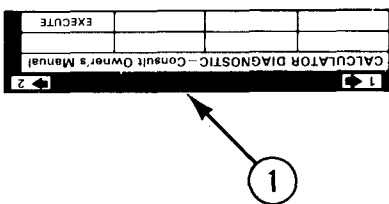
Check that battery pack (1) is not cracked, broken, or dirty. Check that cells (2) are not dented, punctured, or leaking. Check that contacts (3) are not bent or corroded.

Remove diagnostic card (1) from card holder (2). The diagnostic card is peach-colored and labeled diagnostic.



4-9. PMCS (cont)

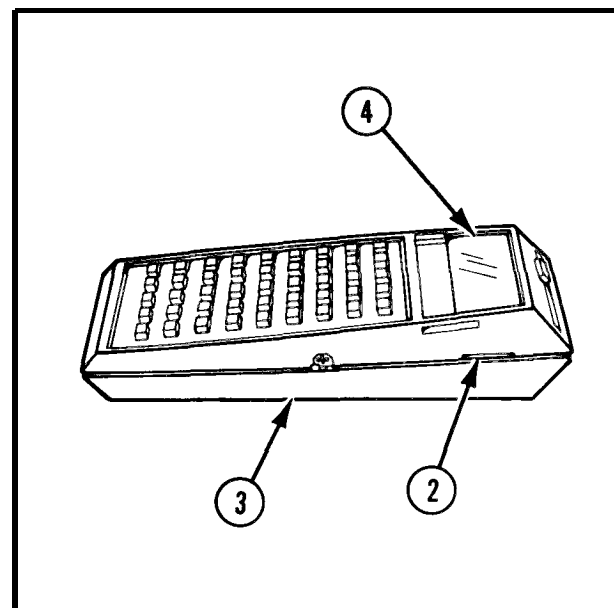
Table 4-1. Organizational Preventive Maintenance Checks and Services Monthly Schedule (cont)

Item no.	Item to be inspected	Procedures	
6	COMPUTER--GENERAL OPERATION (diagnostic) (cont)	<p>Read side 1 of diagnostic card by momentarily pressing (CLR) and inserting diagnostic card into card read/write slot (3) on computer (4). Display (5) should show 1.</p> <p>Press (E). Display of -.8888888888 indicates the computer passed the test. Flashing display indicates computer failed the test. Repeat check once to verify problem.</p> <p>If problem persists, perform checks under item no. 7 below to determine whether card reader is at fault.</p> <p>Remove diagnostic card from left side of computer.</p>	
7	COMPUTER--CARD/WRITE FUNCTION (with printer)	Turn diagnostic card (1) so that label is upside down.	

Read side 2 of diagnostic card by momentarily pressing (CLR) and then inserting diagnostic card into card read/write slot (2) on computer (3). After card is read, display (4) should show 2.

Press (CLR), (2), (2nd), and (WRITE).

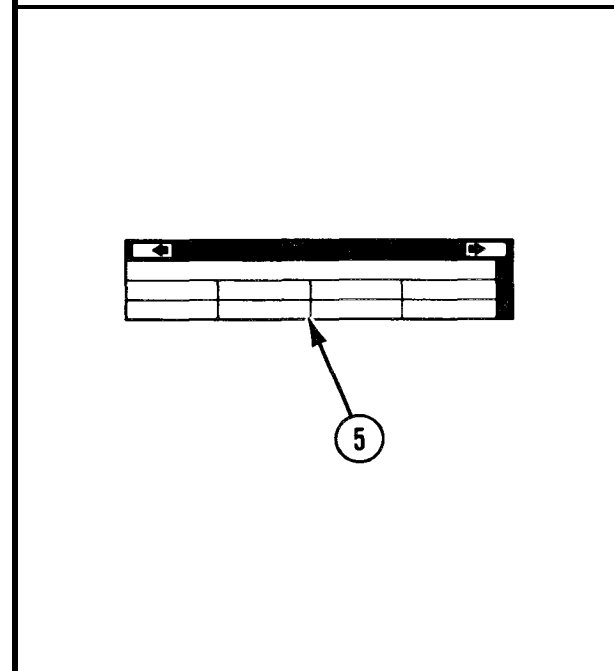
Remove diagnostic card.



Insert a blank magnetic card (5) into card read/write slot on computer. Press (2nd) and (CP) and reinsert the previously blank card into computer. Press (GT0), (2), (4), (0), (2nd), and (LIST) and verify that computer contains key code 77 in locations 240 thru 479. Printer will print each location.

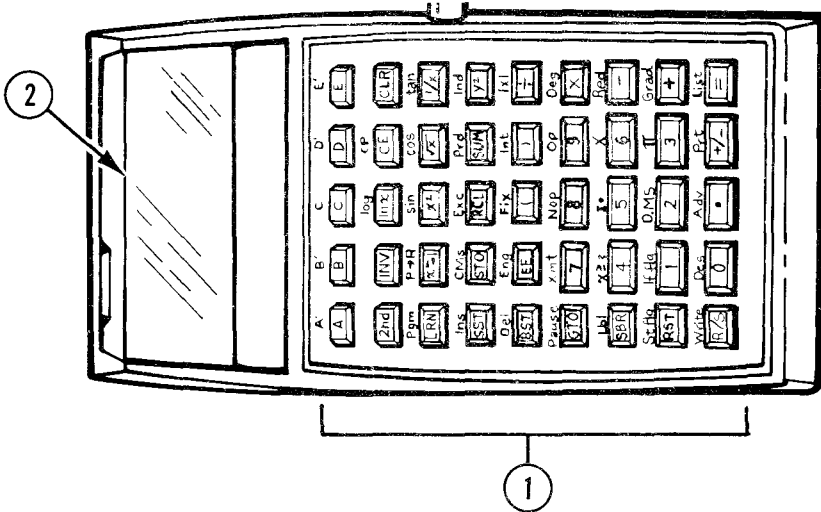
If an error is found, repeat 2nd thru 5th steps above once to verify problem.

Remove magnetic card from left side of computer.



4-9. PMCS (cont)

Table 4-1. Organizational Preventive Maintenance Checks and Services Monthly Schedule (cont)

Item no.	Item to be inspected	Procedures																
8	COMPUTER--BASIC KEYBOARD AND DISPLAY FUNCTIONS	<div style="text-align: center;">  </div> <p>Keyboard entry (1)</p> <p>Display (2)</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">(CLR)</td> <td style="width: 50%; text-align: right;">0</td> </tr> <tr> <td>(+/-)</td> <td style="text-align: right;">-0</td> </tr> <tr> <td>(.) (9) (8) (7)</td> <td></td> </tr> <tr> <td>(6) (5) (4)</td> <td></td> </tr> <tr> <td>(3) (2) (0) (9)</td> <td style="text-align: right;">-.9876543209</td> </tr> <tr> <td>(X)</td> <td style="text-align: right;">-.9876543209</td> </tr> <tr> <td>(9)</td> <td style="text-align: right;">9</td> </tr> <tr> <td>(=)</td> <td style="text-align: right;">-8.88888888</td> </tr> </table> <p>Be sure that any number pressed registers in display and that solution is correct.</p>	(CLR)	0	(+/-)	-0	(.) (9) (8) (7)		(6) (5) (4)		(3) (2) (0) (9)	-.9876543209	(X)	-.9876543209	(9)	9	(=)	-8.88888888
(CLR)	0																	
(+/-)	-0																	
(.) (9) (8) (7)																		
(6) (5) (4)																		
(3) (2) (0) (9)	-.9876543209																	
(X)	-.9876543209																	
(9)	9																	
(=)	-8.88888888																	

**COMPUTER--GENERAL
KEYBOARD FUNCTION**
Keyboard
entry
Display

(CLR) (2nd) (CP)
 (LRN)
 (A) (2nd) (LRN) (SST)
 (BST) (GTO) (SBR)
 (RST) (R/S) (0) (1)
 (4) (7) (EE)
 (STO) (x \square t)₂ (INV) (B)
 (C) (Inx) (x²)
 (RCL) (() (8) (5)
 (2) (.) (+/-)
 (3) (6) (9) ()
 (SUM) (\sqrt{x}) (CE)
 (D) (E) (CLR) (1/x) (Y^X) (\div)
 (X) (-) (+) (=)

0.
 000 00

NOTE

From this point
 computer should
 register one dig-
 it change with
 every key pressed
 until final dis-
 play of 042 00 is
 registered.

042 00

Press (LRN) to remove computer from program mode.

Keyboard
entry
Display

Press (RST), (LRN), and (SST)
 (Continue pressing (SST) to
 step computer until 042 00 is
 displayed. Each time (SST) is
 pressed display should change
 as illustrated.)

000 11
 001 36
 002 61
 003 71
 004 81
 005 91
 006 00
 007 01
 008 04
 009 07
 010 52
 011 42
 012 32
 013 22
 014 12
 015 13
 016 23

4-9. PMCS (cont)

Table 4-1. Organizational Preventive Maintenance Checks and Services Monthly Schedule (cont)

Item no.	Item to be inspected	Procedures
9	COMPUTER--GENERAL KEYBOARD FUNCTION (cont)	<p data-bbox="851 432 969 491"><u>Keyboard entry</u></p> <p data-bbox="1365 461 1483 491"><u>Display</u></p> <p data-bbox="1365 507 1462 1299">017 33 018 43 019 53 020 08 021 05 022 02 023 93 024 94 025 03 026 06 027 09 028 54 029 44 030 34 031 24 032 14 033 15 034 25 035 35 036 45 037 55 038 65 039 75 040 85 041 95 042 00</p> <p data-bbox="851 1299 1011 1329">(LRN) (CLR)</p> <p data-bbox="1411 1299 1431 1329">0</p> <p data-bbox="851 1361 1328 1391">Be sure each display is correct.</p>

10 COMPUTER--MEMORY
PARTITIONING
CAPABILITY

Keyboard
entry

Display

(CLR) 0
 (6) 6
 (2nd) (Op) 6.
 (1) (7) 479.59
 (CLR) 0

Be sure display is correct.

11 COMPUTER--MEMORY
STORAGE AND RECALL
CAPABILITY

Keyboard
entry

Display

(CLR) 0
 (7) (7) (7) (7) 77777777
 (7) (7) (7) (7) (7) (7) 77777777
 (STO) (0) (0) 77777777
 (STO) (5) (9) 77777777
 (CLR) 0
 (RCL) (5) (9) 77777777
 (RCL) (0) (0) 77777777
 (CLR) 0

Be sure stored information can be recalled.

12 COMPUTER--RECTANGULAR
TO POLAR COORDINATE
CONVERSION CAPABILITY

Keyboard
entry

Display

(CLR) (2nd) (Deg) 0
 (5) (0) 50
 (x \square t) 0.
 (5) (0) 50
 (INV) (2nd) (P \rightarrow R) 45.
 (x \square t) 70.71067812
 (CLR) 0
 (x \square t) 45.
 (CLR) 0
 (2) (x²) 4
 (\sqrt{x}) 2
 (1/x) 0.5
 (CLR) 0

Be sure display is correct.

Section IV. TROUBLESHOOTING PROCEDURES

4-10. GENERAL

Troubleshooting procedures are limited to those listed in the table. Other malfunctions or unusual conditions noted but not authorized require replacement of the equipment.

b. In the event difficulty is experienced with the computer sets, the instructions given on page 4-15

will help analyze the problem. If the recommended remedy is not successful, complete DA Form 2404, Equipment Inspection and Maintenance Worksheet, with detailed symptoms of the unit and process for turn-in.

c. The symptom index can be used as a quick guide to troubleshooting. Common malfunctions are listed in alphabetical order with a page number reference to the troubleshooting table where a test or inspection and corrective action are provided.

SYMPTOM INDEX

	Troubleshooting Procedure Page
COMPUTER	
Display flashes:	
After reading or recording a magnetic card	4-18
Each time a firmware module program is called	4-16
While performing keyboard operations	4-16
Display flashes or produces incorrect results:	
When running a firmware module program	4-17
When running a program in program memory	4-17
Display "locks up" or does not appear	4-19
Display shows erroneous results, flashes erratic numbers, grows dim, goes blank, or the card reader runs continuously	4-15
Will not go into learn mode, single step, list, or record a magnetic card	4-19
PRINTER	
No printed digits appear when using printer	4-22
Printed numbers have a continuous faded streak in the same position on each printed line	4-22
Rubber roller in printer chatters and does not rotate	4-22
Will not operate	4-20

4-11. TROUBLESHOOTING TABLE

In the event of a malfunction of one or more components of the computer sets, consult the table for any possible corrective action. You should perform the test/inspections and corrective actions in the order listed. If a malfunction cannot be corrected at organizational level, replace the equipment.

NOTE

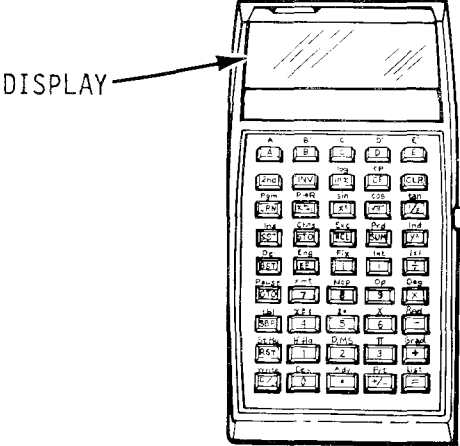
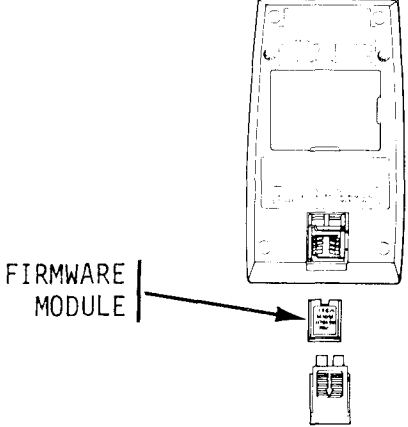
Any time a malfunction includes a flashing display, the applicable reference note (table 2-1, p 2-1) should be consulted to make sure that the flashing display is not an error code.

Table 4-2. TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
<p style="text-align: center;">COMPUTER</p> <p>1. DISPLAY SHOWS ERRONEOUS RESULTS, FLASHES ERRATIC NUMBERS, GROWS DIM, GOES BLANK, OR THE CARD READER RUNS CONTINUOUSLY.</p> <p>Check to see that battery pack is properly installed. If so, it is probably discharged.</p> <p>Connect ac or dc charger-adapter to recharge battery pack (p 2-21thru 2-26) or, if portable operation is required, replace battery pack (p 3-13).</p>	

4-11. TROUBLESHOOTING TABLE (cont)

Table 4-2. TROUBLESHOOTING (cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
COMPUTER (cont)	
<p>2. DISPLAY FLASHES WHILE PERFORMING KEYBOARD OPERATIONS.</p> <p>An involved operation or key sequence has been pressed or the limits of the computer have been exceeded.</p> <ul style="list-style-type: none"> a. Press (CE) to stop the flashing only. Calculations may be continued undisturbed. b. Press (CLR) to stop the flashing and clear the display and all pending operations. 	
<p>3. DISPLAY FLASHES EACH TIME A FIRMWARE MODULE PROGRAM IS CALLED.</p> <p>Step 1. Firmware module program number does not exist.</p> <p style="padding-left: 40px;">Consult applicable reference note (table 2-1, p 2-1).</p> <p>Step 2. Firmware module is not properly installed.</p> <p style="padding-left: 40px;">See page 2-31 for installation.</p>	

4. DISPLAY FLASHES OR PRODUCES INCORRECT RESULTS WHEN RUNNING A FIRMWARE MODULE PROGRAM.

Step 1. Wrong program is called.

Refer to applicable reference note (table 2-1, p2-1).

Step 2. Operating procedures are improper.

Refer to applicable reference note (table 2-1, p 2-1).

Step 3. Partitioning is set for too few data registers to run the program.

Check and correct partitioning (table 4-1, item 10, p 4-13).

Step 4. Computer is operating in Fix-Decimal display format.

a. Press (INV), (2nd), and (FIX).

b. Turn computer off and on and try program again.

Step 5. One of the preprogrammed error codes has been triggered.

Refer to the applicable reference note (table 2-1, p 2-1).

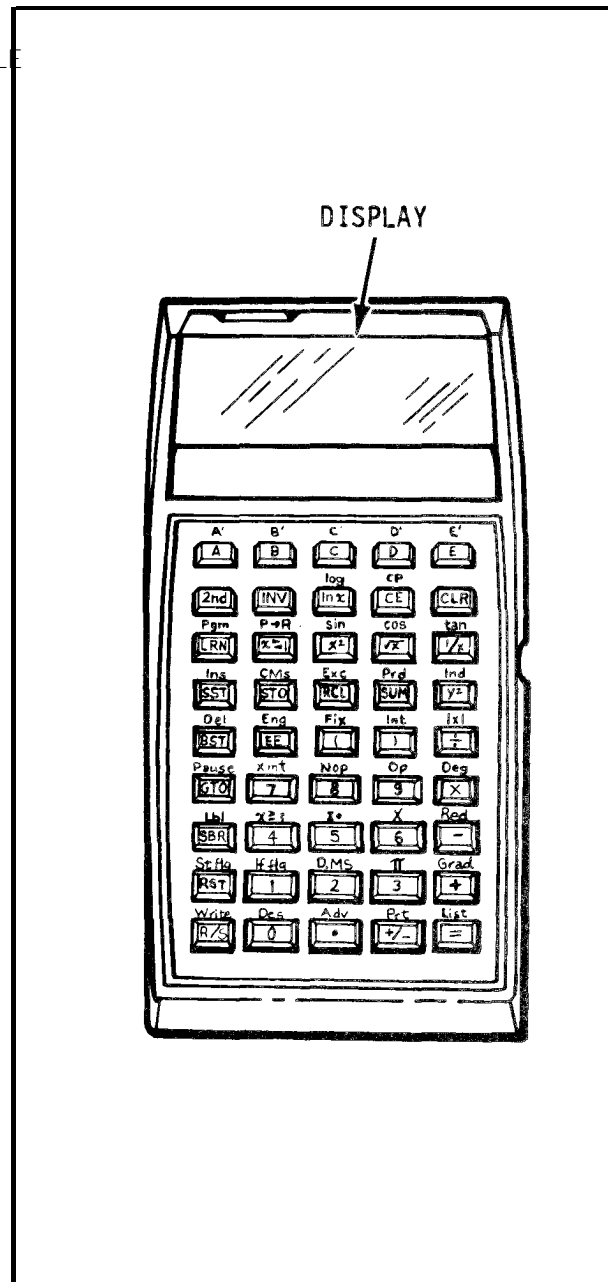
5. DISPLAY FLASHES OR PRODUCES INCORRECT RESULTS WHEN RUNNING A PROGRAM IN PROGRAM MEMORY.

Step 1. An illegal operation, overflow, or underflow occurred while the program was running.

Refer to applicable reference note (table 2-1, p 2-1).

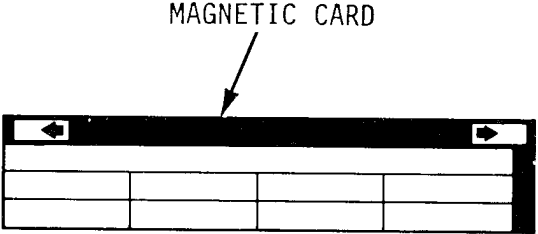
Step 2. One of the firmware module programs has been called.

Press (RST) and try again.



4-11. TROUBLESHOOTING TABLE (cont)

Table 4-2. TROUBLESHOOTING (cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
COMPUTER (cont)	
<p>5. DISPLAY FLASHES OR PRODUCES INCORRECT RESULTS WHEN RUNNING A PROGRAM IN PROGRAM MEMORY. (cont)</p> <p>Step 3. If program has been read from a magnetic card, perform the checks in table 4-1, items 6 and 7 (p 4-7 and 4-8).</p> <p style="padding-left: 40px;">If test results are good, check the magnetic card with your program for defects or contamination. Clean contaminated cards (p 4-24).</p> <p>6. DISPLAY FLASHES AFTER READING OR RECORDING A MAGNETIC CARD.</p> <p>Step 1. Procedure is improper.</p> <p style="padding-left: 40px;">Refer to applicable reference note (table 2-1, p 2-1).</p> <p>Step 2. Incorrect partitioning was selected.</p> <p style="padding-left: 40px;">Check and correct partitioning (table 4-1, item 10, p 4-13).</p> <p>Step 3. Magnetic card is defective.</p> <p style="padding-left: 40px;">If other magnetic cards read properly, check the first one for defects or contamination and clean (p 4-24) or replace as necessary.</p>	<p style="text-align: center;">MAGNETIC CARD</p>  <p>The diagram shows a magnetic card reader with a card inserted. An arrow labeled 'MAGNETIC CARD' points to the card. The card has two arrows on its top edge, one pointing left and one pointing right. Below the card is a grid representing the data tracks, with three rows and four columns.</p>

7. COMPUTER WILL NOT GO INTO LEARN MODE, SINGLE STEP, LIST, OR RECORD A MAGNETIC CARD .

The program in the program memory is protected.

Refer to applicable reference note (table 2-1, p 2-1).

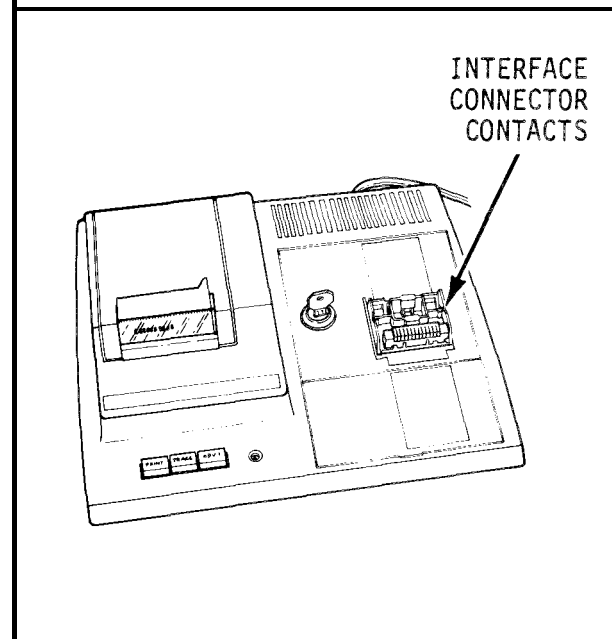
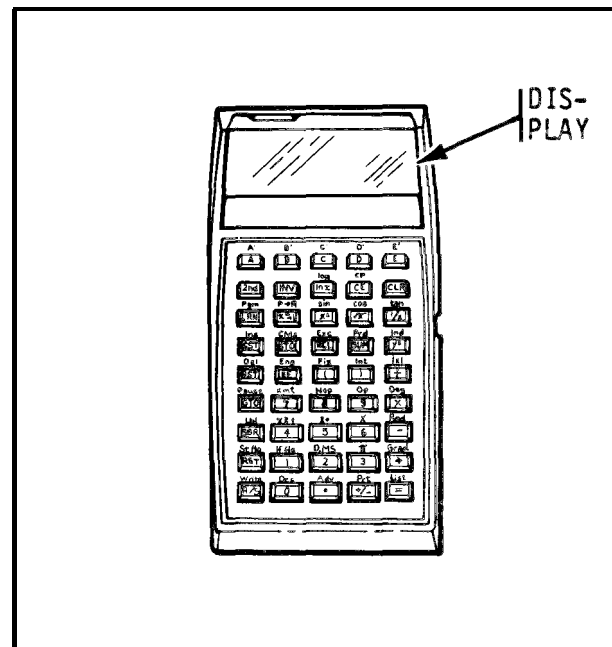
8. DISPLAY "LOCKS UP" OR DOES NOT APPEAR.

Step 1. Power-up sequence is improper.

- a. Turn computer off and then on.
- b. Press (CLR).

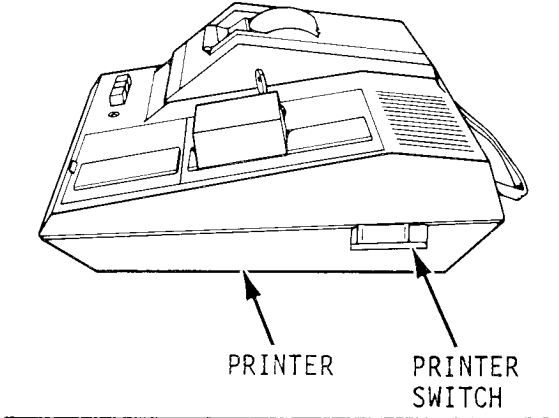
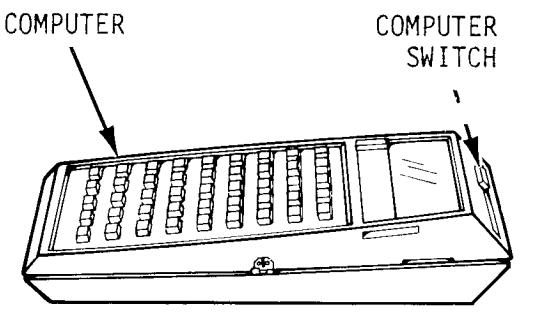
Step 2. Interface connector contacts (on printer) are contaminated.

Clean interface connector contacts (p 4-30).



4-11. TROUBLESHOOTING TABLE (cont)

Table 4-2. TROUBLESHOOTING (cont)

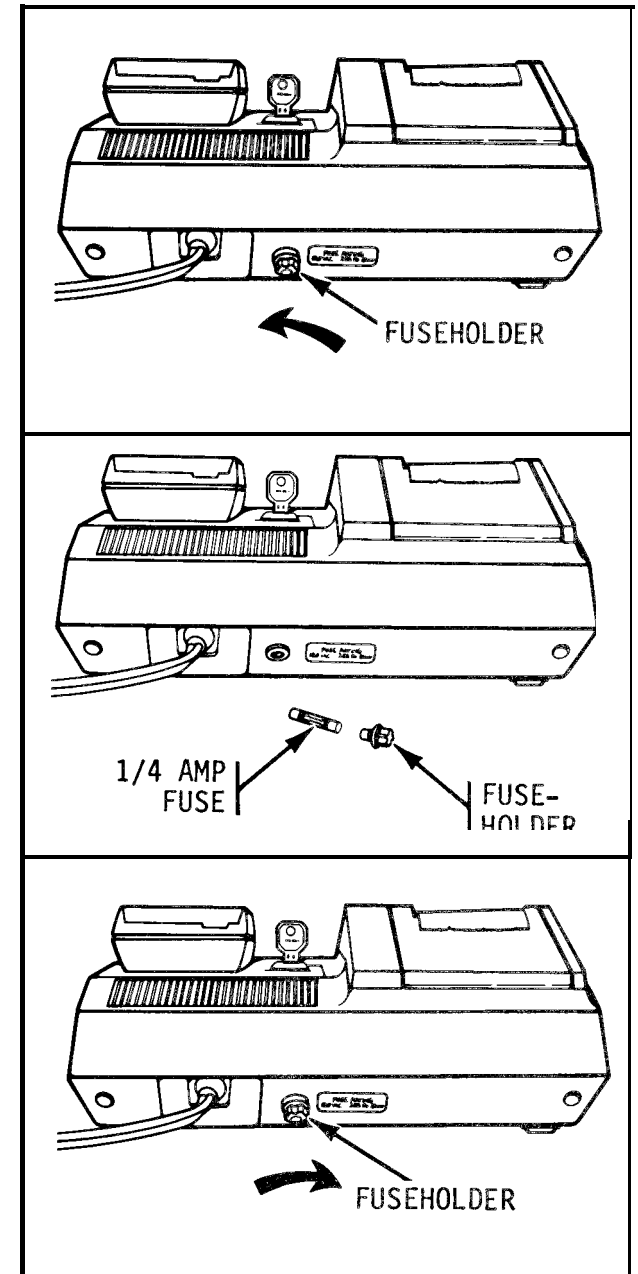
MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
<p style="text-align: center;">PRINTER</p> <p>9. PRINTER WILL NOT OPERATE.</p> <p style="padding-left: 40px;">Step 1. Make sure that printer and computer are turned on. If not, turn power on.</p> <p style="padding-left: 40px;">Step 2. Make sure that printer is plugged into a live outlet. If not, plug printer into a live outlet.</p>	 <hr/> 

Step 3. Check 1/4 amp fuse.

- a. Replace if necessary, following b thru e below.
- b. Remove the fuseholder by pressing it in and rotating 1/4 turn counterclockwise, then pulling it out.

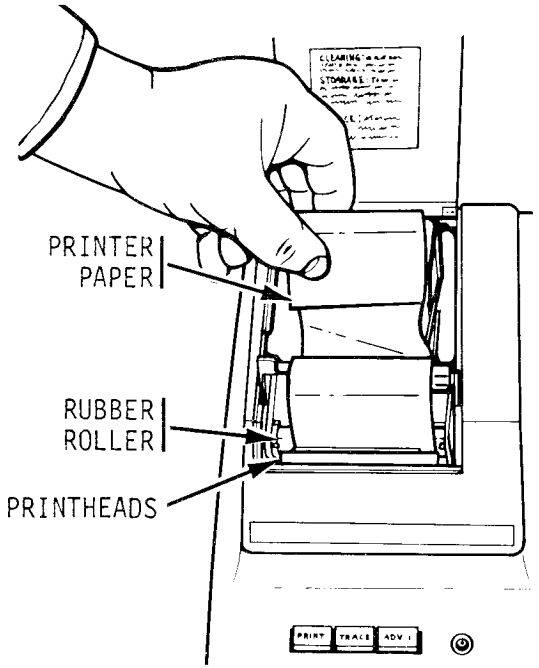
- c. Pull 1/4 amp fuse out of fuseholder.
- d. Insert new 1/4 amp fuse into fuseholder.

- e. Insert fuseholder and fuse into printer and rotate 1/4 turn clockwise to lock it in place.



4-11. TROUBLESHOOTING TABLE (cont)

Table 4-2. TROUBLESHOOTING (cont)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
PRINTER (cont)	
<p>10. RUBBER ROLLER IN PRINTER CHATTERS AND DOES NOT ROTATE.</p> <p>Printer paper not installed or improperly installed.</p> <p>Install, or remove and properly reinstall, printer paper (p 3-15).</p>	
<p>11. NO PRINTED DIGITS APPEAR WHEN USING PRINTER.</p> <p>Printer paper installed with wrong side against the printheads.</p> <p>Remove and properly reinstall printer paper (p 3-15).</p>	
<p>12. PRINTED NUMBERS HAVE A CONTINUOUS FADED STREAK IN THE SAME POSITION ON EACH PRINTED LINE.</p> <p>Printheads are dirty.</p> <p>Clean printheads (p 4-28).</p>	

Section V. MAINTENANCE PROCEDURES

4-12. SCOPE

Maintenance procedures covered in this section are limited to replacement of the components of the com-

puter sets (app F) and the 1/4 amp fuse in the printer, and testing and cleaning components of the computer sets.

4-13. COMPUTER SETS--MAINTENANCE INSTRUCTIONS

THIS TASK COVERS:

- a. Testing ac charger-adapter
- b. Cleaning magnetic cards

- c. Repairing computer sets

INITIAL SETUP

Materials/Parts

- Cloth (item 2, app E)
- Liquid soap (item 3, app E)

References

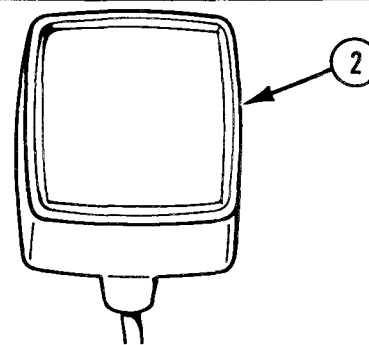
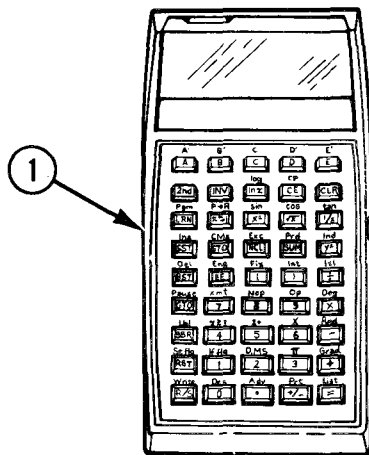
- p 2-21 Connecting ac charger-adapter
- Appendix E
- Appendix F

Troubleshooting References

- p 4-18 Display flashes or produces incorrect results when running a program in program memory.
- p 4-18 Display flashes after reading or recording a magnetic card.

TESTING AC CHARGER-ADAPTER

- 1 Obtain a computer (1) known to be in good working order, but with a discharged battery pack.



- 2 Connect ac charger-adapter (2) to a 110-120-V or 220-240-V ac source known to be in good working order, and to the computer (p 2-21).

14-13. COMPUTER SETS--MAINTENANCE INSTRUCTIONS (cont)

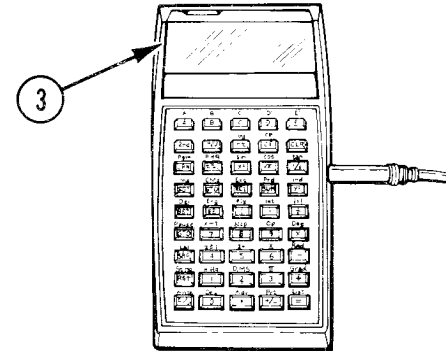
TESTING AC CHARGER-ADAPTER (cont)

3 Turn computer on.

NOTE

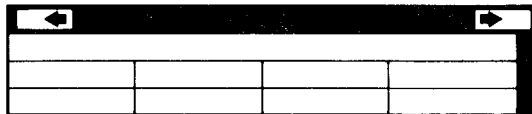
The ac charger-adapter alone cannot power the card drive unit when the battery pack is discharged.

4 Try several mathematical functions. They should operate normally and display (3) should show normal brightness with no flickering or other unusual effects.



CLEANING MAGNETIC CARDS

5 If the computer still does not function properly, replace ac charger-adapter (app F).



1 Remove dust and foreign particles using soft, dry, lint-free cloth (item 2, app E).

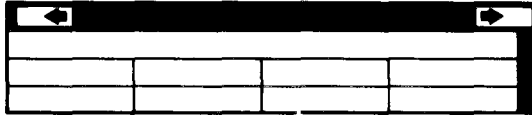
CAUTION

DO NOT use solvents (such as alcohol and naphtha) or other special cleaners to clean magnetic cards because they can damage magnetic cards.

REPAIRING COMPUTER SETS

2 Wash other forms of contamination from magnetic cards with warm water and small amount of mild liquid soap (item 3, app E).

3 Rinse magnetic card with clear water and dry with soft, lint-free cloth (item 2, app E).



Repair by replacing the computer, computer case, cleaning card set, card holder, magnetic cards, ac charger-adaptor, and dc charger-adaptor (app F).

4-14. COMPUTER--MAINTENANCE INSTRUCTIONS

THIS TASK COVERS:

- a. Cleaning read/write head
- b. Cleaning drive roller
- c. Replacement

INITIAL SETUP

Reference
Appendix F

4-14. COMPUTER--MAINTENANCE INSTRUCTIONS (cont)

CLEANING READ/WRITE HEAD

CAUTION

Use head cleaning card only one time per difficulty. It is abrasive, and incorrect use can change the characteristics of the read/write head. Use it if the display flashes or produces incorrect results when you are running a program which has been read from a magnetic card or when reading or recording a magnetic card. To use the head cleaning card, use the following procedure:

HEAD CLEANING CARD

CAUTION

Refer to Maintenance and Service Information Appendix of Owner's Manual for proper use.

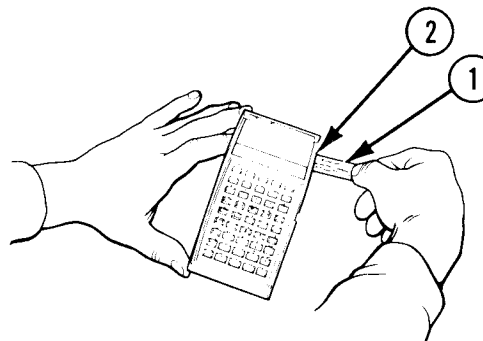
1

1 Make sure that head cleaning card (1) is clean before you use it.

CLEANING DRIVE ROLLER

2 Turn computer on, insert head cleaning card (1) into card read/write slot (2) as illustrated and let the motor pull it through.

3 Press (CLR) if display flashes after using head cleaning card.



NOTE

A drive roller cleaning card is included with the card holder. The drive roller cleaning card should be used about every 500 reads or whenever a magnetic card begins to slip or move at a nonuniform rate through the computer.

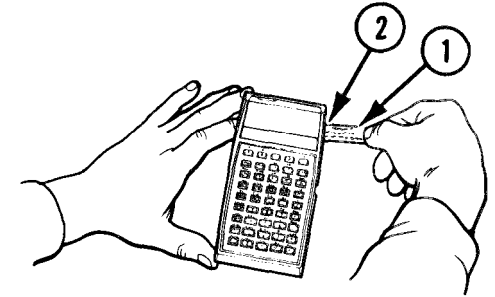
1 Turn computer on.

CAUTION

Excessive use of the drive roller cleaning card could damage the magnetic card reading unit. Use the drive roller cleaning card only when necessary and not on a routine or scheduled basis.

2 Press (1), (2nd), and (WRITE).

3 Insert drive roller cleaning card (1) into card read/write slot (2) and hold onto trailing end of it.



DRIVE ROLLER CLEANING CARD

Use every 500 reads or when cards slip while reading.
Press 1 2nd Write, firmly grip end of card, insert in read mechanism, move back and forth while motor is running.

1

4 Move drive roller cleaning card (1) back and forth for approximately 3 to 4 seconds while drive roller is in motion.

5 Withdraw drive roller cleaning card and press (R/S).

6 If drive motor continues to run after pressing (R/S), turn computer off.

Replace computer as needed (app F).

4-15. PRINTER--MAINTENANCE INSTRUCTIONS

THIS TASK COVERS:

- a. Cleaning printheads
- b. Cleaning interface connector
- c. Replacement

INITIAL SETUP

Materials/Parts

- Cotton swab (item 4, app E)
- Ethyl alcohol (item 1, app E)

References

- p 3-15 Printer paper installation
- Appendix E
- Appendix F

Troubleshooting References

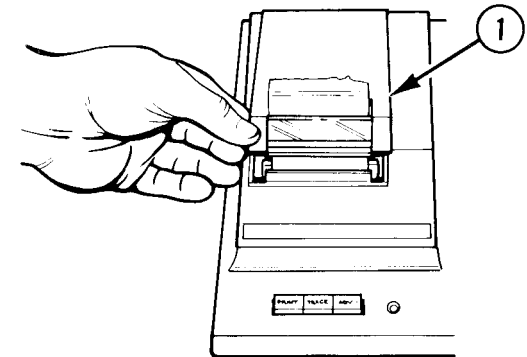
- p 4-19 Display "locks up" or does not appear.
- p 4-22 Printed numbers have a continuous faded streak in the same position on each printed line.

CLEANING PRINTHEADS

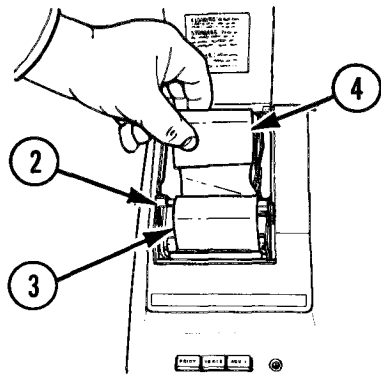
NOTE

Foreign particles may collect on the printheads causing digits or parts of digits to be faded on the printout. This is evident by a continuous faded streak in the same position on each printed line. To clean the printheads:

- 1 Obtain printhead cleaning card, furnished with each printer paper roll. If it is worn or missing, make a new one by cutting a piece of standard bond paper 8 by 2-1/2 in. (20.32 by 6.35 cm).

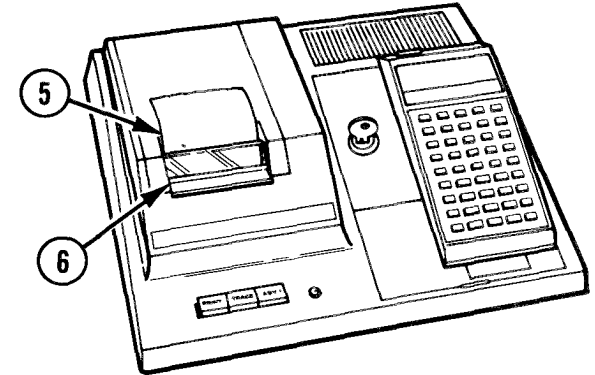


- 2 Lift top cover (1).



3 Move paper-release lever (2) to release position (toward you) and gently pull printer paper (3) out of printing unit by manually turning printer paper roll (4).

- 4 Install printhead cleaning card (5) in place of normal printer paper (p 3-15) and return paper-release lever to normal position.
- 5 Perform program given in step 6 below until most of the printhead cleaning card has passed through printing unit. Abrasive action of printhead cleaning card cleans printheads (6) as shown by faint printing trailing printhead cleaning card.



NOTE
The printer should not be in the TRACE mode during the following steps.

6 Key in following program:

Key Sequence

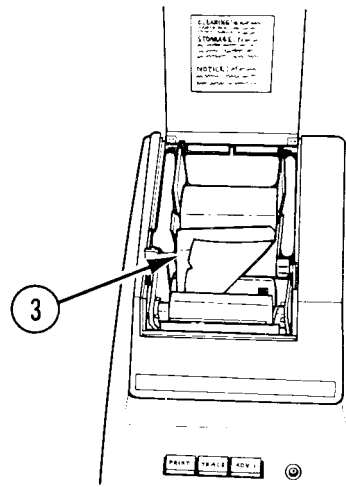
```
(RST) (LRN) (4) (STO)
(0) (0) (9)
(STO) (6) (EE) (1)
(0) (+/-) (INV)
(EE) (1/x) (2nd) (Lb1)
(2nd) (IND) (0) (2nd)
(A) (2nd) (Op)
(2nd) (IND) (0) (2nd)
(Dsz) (0) (A)
(2nd) (Lb1) (B) (2nd)
(Op) (5) (2nd)
(Dsz) (6) (B)
(R/S) (LRN)
```

7 Run this sequence by pressing (RST) and (R/S). Wait approximately 3 minutes and observe program and printing unit operation. Repeat this process if necessary to assure proper cleaning.

4-15. PRINTER--MAINTENANCE INSTRUCTIONS (cont)

CLEANING PRINTHEADS (cont)

- 8 Remove printhead cleaning card from printing unit and reinstall printer paper (3) (p 3-15).
- 9 Perform program given in step 6 above and examine printout for improved printing.

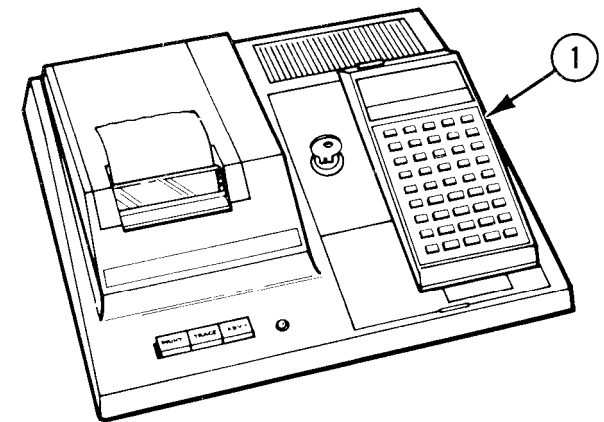


CLEANING INTERFACE CONNECTOR

CAUTION
Cleaners and solvents other than ethyl alcohol can damage the printer.

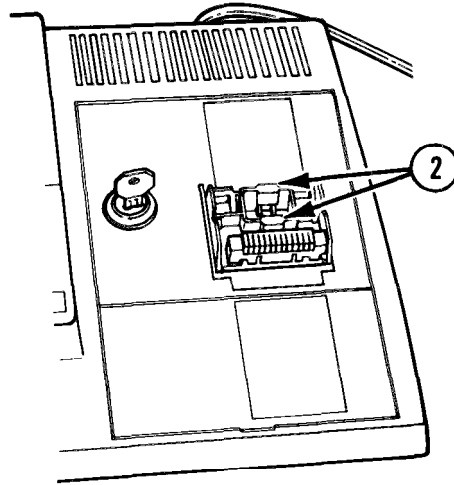
NOTE
Contamination will sometimes build up on the interface connector, especially if the plastic cover is left off when not in use. Cleaning should occur as needed and not during a scheduled maintenance procedure.

- 1 Turn printer off.
- 2 Unlock and remove computer



REPLACEMENT

- 3 Clean interface connector contacts (2) with a cotton swab (item 4, app E) moistened with ethyl alcohol (item 1, app E).



replace printer as needed (app F).

4-16. DC CHARGER-ADAPTER--MAINTENANCE INSTRUCTIONS

THIS TASK COVERS:

- a. Testing of dc charger-adapter using a computer
- b. Replacement

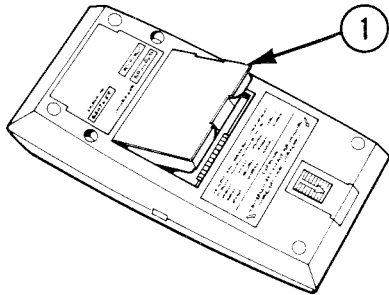
INITIAL SETUP

References

- p 3-13 Battery pack removal
- p 2-22 Connecting dc charger-adapter
- Appendix F

4-16. DC CHARGER-ADAPTER--MAINTENANCE INSTRUCTIONS (cont)

TESTING OF DC CHARGER-ADAPTER USING A COMPUTER

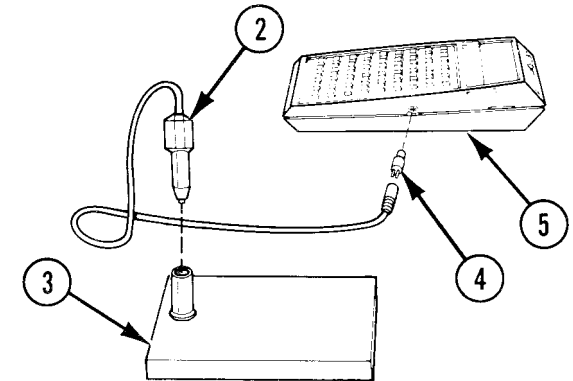


- 1 Obtain a computer known to be in good working order.
- 2 Remove battery pack (1) (p 3-13).

- 3 Connect dc charger-adapter (2) to a 12-vdc power source (3) (p 2-22) known to be in good working order and plug adapter plug (4) into computer (5).

- 4 Turn computer on.

- 5 If display does not light, check, and if necessary replace 1/2 amp fuse (p 3-19).



REPLACEMENT

NOTE
The dc charger-adapter alone cannot power the card drive unit.

- 6 Try several mathematical functions. They should operate normally and display should show normal brightness with no flickering or unusual effects.
- 7 If computer still does not function properly, replace dc charger-adapter.

Replace dc charger-adapter as needed (app F).

APPENDIX A

REFERENCES

A-1. SCOPE

This appendix lists all forms, field manuals, technical manuals, and miscellaneous publications referenced in this manual.

A-2. FORMS

DOD Single Line Item Release/
Receipt Document DOD Form 1348-1
Equipment Inspection and
Maintenance Worksheet DA Form 2404
Hand Receipt/Annex No. DA Form 2062
Maintenance Request DA Form 2407
Quality Deficiency Report SF 368
Recommended Changes to DA
Publications DA Form 2028-2
Recommended Changes to Publi-
cations and Blank Forms DA Form 2028
Report of Discrepancy (ROD) SF Form 364

A-3. FIELD MANUALS

Artillery Sound Ranging and
Flash Ranging FM 6-122

Field Artillery Battery,
Lance FM 6-42
The Field Artillery Cannon
Battery FM 6-50
Field Artillery Cannon Gunnery FM 6-40
Field Artillery Survey FM 6-2

Field Artillery Target Acquisition FM 6-121
Field Artillery Target Acquisition
Battalion and Batteries FM 6-121
First Aid for Soldiers FM 21-11 (Test)
Operating Under Unusual Conditions FM 21-305
Operation and Maintenance of
Ordnance Materiel in Cold
Weather (0° to -65°F) FM 9-207

A-4. TECHNICAL MANUALS

Administrative Storage of
Equipment TM 740-90-1
The Army Maintenance Management
System (TAMMS) TM 38-750
Hand Receipt Covering Contents
of Components of End Item
(COEI), Basic Issue Items
(BII), and Additional Au-
thorization List (AAL) for
Computer Set, Field Artillery,
General, 1220-01-082-1646,
and Computer Set, Field
Artillery, Missile, 1220-01-
082-1647 TM 9-1220-242-12-HR
Operator and Organizational
Maintenance Manual: In-
verter-Vibrator PP-1703/U TM 11-6125-238-12
Procedures for Destruction
of Tank-Automotive Equip-
ment to Prevent Enemy Use
(US Army Tank-Automotive
Command) TM 750-244-6

A-5. MISCELLANEOUS PUBLICATIONS

Classification, Reclassification,
 Maintenance, Issuance and
 Reporting of Maintenance
 Training Aircraft AR 700-42

Computer Set, Field Artillery,
 General; for Cannon Gunnery
 Applications RN GD 05HC

Computer Set, Field Artillery,
 General; with Program Kit,
 Computer Set, Field Artillery;
 for Sound and Flash Ranging JPA AT**TI

Computer Set, Field Artillery,
 General; with Program Kit,
 Computer Set, Field Artillery;
 for Survey JPAAS*EZ

Computer Set, Field Artillery,
 Missile; Guidance Package WL**TL GP

Expendable Items (except Medical,
 Class V, Repair Parts, and
 Heraldic Items) CTA 50-970

Federal Supply Code for Manu-
 facturers: United States
 and Canada--Name to Code
 and Code to Name (GSA-FSS
 H4-1/H4-2) SB 708-42

Identification and Distribution
 of DA Publications and Issue
 of Agency and Command Admin-
 istrative Publications AR 310-2

Material Management for Using
 Units, Support Units, and
 Installations AR 710-2

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B1. GENERAL

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows: (except for ammunition MAC¹).

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or

electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, 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 (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to 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 equipments used in precision

¹Exception is authorized for ammunition MAC to permit the redesignation/redefinition of maintenance function headings to more adequately identify ammunition maintenance functions. The heading designations and definitions will be included in the appropriate technical manual for each category of ammunition.

B-2. MAINTENANCE FUNCTIONS (cont)

measurement. Consists of comparisons 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. Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3d position code of the SMR code.

i. Repair. The application of maintenance services², including fault location/troubleshooting³, removal/installation, and disassembly/assembly⁴ procedures and maintenance actions⁵ to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. Overhaul. That maintenance effort (services/actions) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). 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 materiel 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.

B-3 . EXPLANATION OF COLUMNS IN THE MAC, SECTION II

a. Column 1, Group Number. Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00".

²Services - Inspect, test, service, adjust, align, calibrate, and/or replace.

³Fault locate/troubleshoot - The process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

⁴Disassemble/assemble - Encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least component identified as maintenance significant (i.e., assigned an SMR code) for the category of maintenance under consideration.

⁵Actions - Welding, grinding, riveting, straightening, facing, remachining, and/or resurfacing.

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

c. Column 3, Maintenance Function. Column 3 lists the functions to be performed on the item listed in column 2. (For detailed explanation of these functions, see para B-2.)

d. Column 4, Maintenance Category. Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category 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 work time figures will be shown for each category. The work time 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 (including any necessary disassembly/assembly time), troubleshooting/fault location 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. The symbol designations for the various maintenance categories are as follows:

- c Operator or crew
- o Organizational maintenance
- F Direct support maintenance
- H General support maintenance
- L Specialized repair activity (SRA)⁶
- D Depot maintenance

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

f. Column 6, Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section III.

B-4. EXPLANATION OF COLUMNS IN REMARKS, SECTION III

a. Column 1, Reference Code. The code recorded in column 6, section II.

b. Column 2, Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC, section II.

⁶This maintenance category is not included in section II, column (4) of the Maintenance Allocation Chart. To identify functions to this category of maintenance, enter a work time figure in the "H" column of section III, column (4), and use an associated reference code in the Remarks column (6). Key the code to section 111, Remarks, and explain the SRA complete repair application there. The explanatory remark(s) shall reference the specific Repair Parts and Special Tools List (RPSTL) TM which contains additional SRA criteria and the authorized spare/repair parts.

Section II. MAINTENANCE ALLOCATION CHART
FOR
COMPUTER SETS

(1) Group number	(2) Component/ assembly	(3) Maintenance function	(4) Maintenance category					(5) Tools and eqpt	(6) Remarks
			C	O	F	H	D		
00	COMPUTER SET, FIELD ARTILLERY, GENERAL, 11784958, AND COMPUTER SET, FIELD ARTILLERY, MISSILE, 11784959	Inspect Test Repair	0.1	0.1 0.5 0.1					
01	COMPUTER, HAND-HELD, 9331195	Inspect Test Replace Repair	0.1 0.5 0.1	0.1 0.5 0.1					
02	PRINTER-PLOTTER, WITH ACCESSORIES, 9331173	Inspect Test Replace Repair	0.1 0.3 0.2	0.1 0.3 0.1				A	
03	CHARGER-ADAPTER, DC, 9331180	Inspect Test Replace Repair		0.1 0.2 0.1					

Section III. REMARKS

Reference code	Remarks
A	Printing unit used with missile field artillery computer set only

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

C-1. SCOPE

This appendix lists components of end item and basic issue items for the computer sets to help you inventory items required for safe and efficient operation.

C-2. GENERAL

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the computer sets in operation, to operate them, and to perform emergency repairs. Although shipped separately packaged, BII must be with the computer sets during operation and whenever they are transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

C-3. EXPLANATION OF COLUMNS

The following provides an explanation of columns found in the tabular listings:

a. Column (1) - Illustration Number (illus number). This column indicates the number of the illustration in which the item is shown.

b. Column (2) - National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number. If item needed differs for different models of this equipment, the model is shown under the "Usable on code" heading in this column. These codes are identified as:

Code	Used On
L09	General field artillery computer set
L10	Missile field artillery computer set

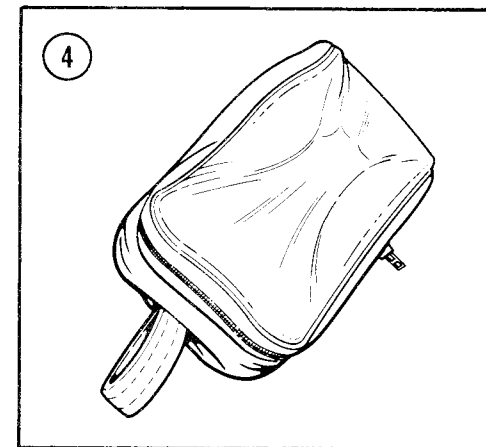
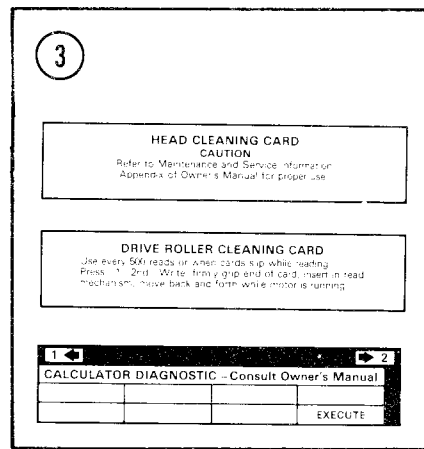
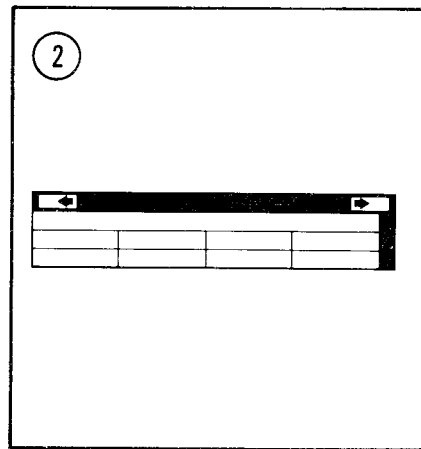
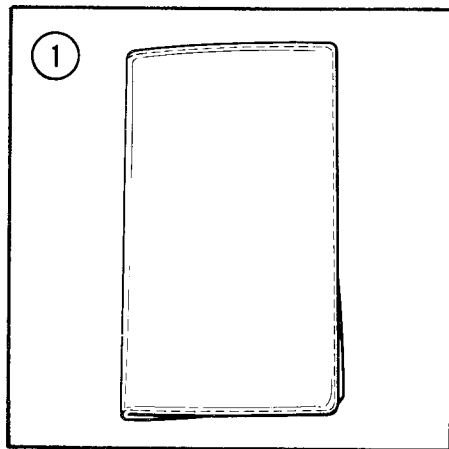
d. Column (4) - Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a

C-3. EXPLANATION OF COLUMNS (cont)

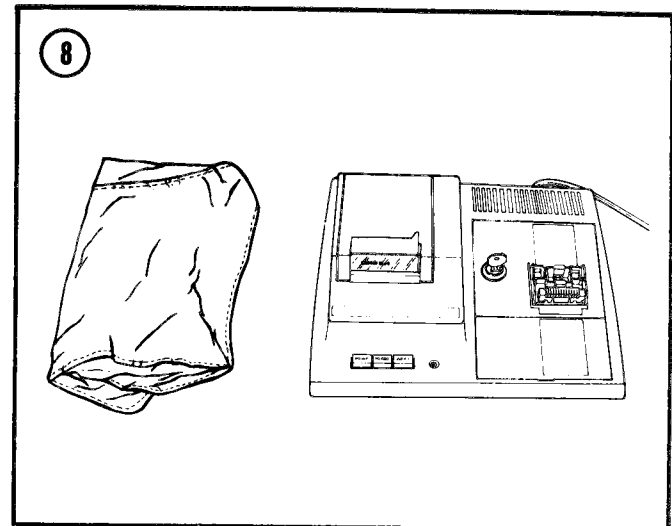
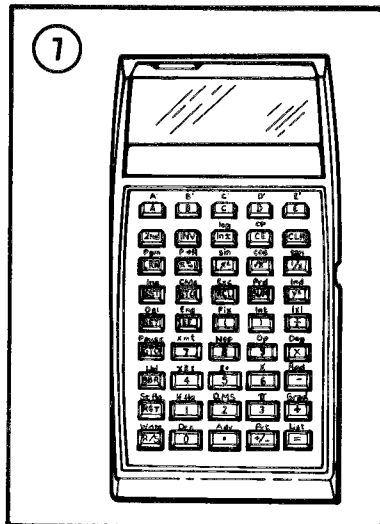
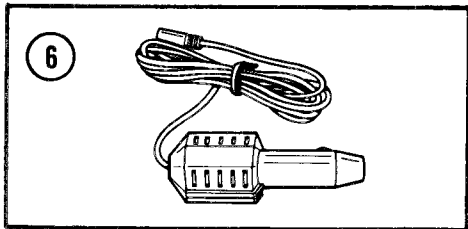
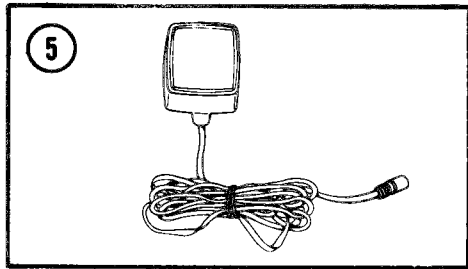
two-character alphabetical abbreviation (e.g., ea, in., pr).

e. Column (5) - Quantity Required (Qty rqr). Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM

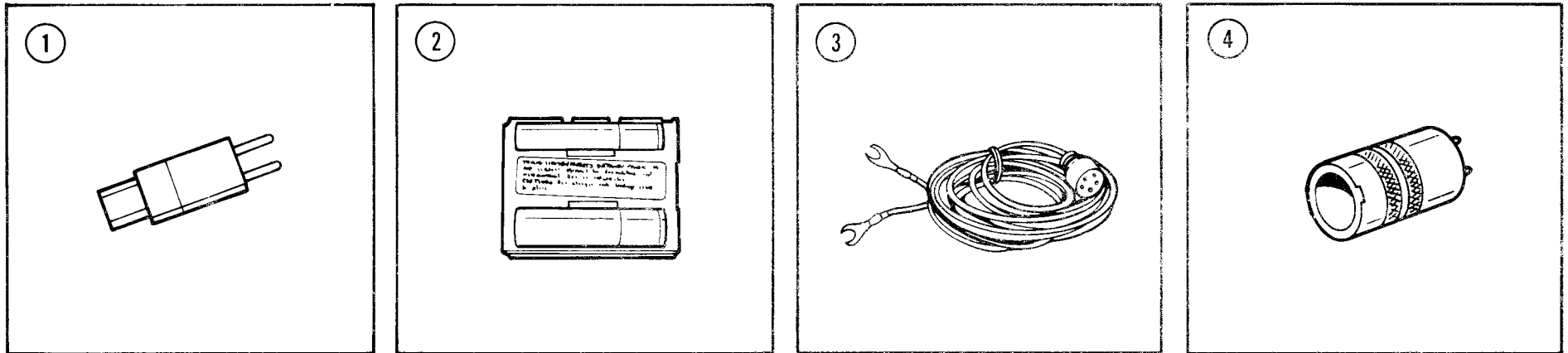


(1) Illus number	(2) National stock number	(3) Description FSCM and part number	Usable on code	(4) U/M	(5) Qty rqr
1	1220-01-082-1626	CARD HOLDER, MAGNETIC (19200) 9331177	L09, L10	EA	1
2	7530-01-082-1645	CARD, MAGNETIC, DATA RECORDING (19200) 9331179	L09, L10	EA	1
3	1220-01-084-0447	CARD SET, CLEANING, CALCULATOR (19200) 9331178	L09, L10	EA	1
4	1220-01-082-1642	CASE, COMPUTER (19200) 9331176	L09, L10	EA	1



(1) Illus number	(2) National stock number	(3) Description FSCM and part number	Usable on code	(4) U/M	(5) Qty rqr
5	1220-01-082-1621	CHARGER-ADAPTER, AC (19200) 9331182	L09, L10	EA	1
6	1220-01-082-1622	CHARGER-ADAPTER, DC (19200) 9331180	L09, L10	EA	1
7	1220-01-106-9743	COMPUTER, HAND-HELD (19200) 9331195	L09, L10	EA	1
8	1220-01-106-9744	PRINTER-PLOTTER, WITH ACCESSORIES (19200) 9331173	L10	EA	1

Section III. BASIC ISSUE ITEMS



(1) Illus number	(2) National stock number	(3) Description FSCM and part number	Usable on code	(4) U/M	(5) Qty rqr
1	5935-01-123-4979	ADAPTER PLUG (19200) 11785357	L09, L10	EA	2
2	1220-01-082-1629	BATTERY SET, RECHARGEABLE (19200) 9331175	L09, L10	EA	1
3	1220-01-082-1637	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL (19200) 9331189	L09, L10	EA	1
4	5935-01-082-1638	CONNECTOR, PLUG, ELECTRICAL (19200) 9331190	L09, L10	EA	1

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

D-1. SCOPE

This appendix lists additional items you are authorized for the support of the computer sets.

D-2. GENERAL

This list identifies items that do not have to accompany the computer sets and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

additional items you require to support this equipment. The items are listed *in* alphabetical sequence by item name under the type document (i.e., CTA, MTOE, TDA, or JTA) which authorizes the item(s) to you. If item required differs for different models of this equipment, the model is shown under the "Usable on code" heading in the description column. These codes are identified as:

Code	Used On
L09	General field artillery computer set
L10	Missile field artillery computer set

D-3. EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are provided to help you identify and request the

Section II. ADDITIONAL AUTHORIZATION LIST

(1) National Stock number	(2) Description FSCM & part number	Usable on code	(3) U/M	(4) Qty auth*
<u>MTOE AUTHORIZED ITEMS</u>				
1220-01-082-1624	PROGRAM KIT, COMPUTER, M101A1/M102 (19200) 9331239	L09	EA	2 (Note 1) 3 (Note 2)

*Note: 1 Per Cannon Battery Fire Direction Center
2 Per Cannon Battalion Fire Direction Center

(1) NATIONAL STOCK NUMBER	ADDITIONAL AUTHORIZATION LIST (CONT) (2) DESCRIPTION FSCM & PART NUMBER	(3) USABLE ON CODE U/M	(4) QTY AUTH*
MTOE AUTHORIZED ITEMS (CONT)			
1220-01-082-1617	PROGRAM KIT, COMPUTER, M109A 1/A2/A3 (19200) 9331237	L09 EA	2 (NOTE 1) 3 (NOTE 2)
1220-01-082-1618	PROGRAM KIT, COMPUTER, M110A2 (19200) 9331238	L09 EA	2 (NOTE 1) 3 (NOTE 2)
1220-01-082-1625	PROGRAM KIT, COMPUTER, M114A1 (19200) 9331241	L09 EA	2 (NOTE 1) 3 (NOTE 2)
1220-01-082-1623	PROGRAM KIT, COMPUTER, M114A2/M109 (19200) 9331240	L09 EA	2 (NOTE 1) 3 (NOTE 2)
1220-01-082-1619	PROGRAM KIT, COMPUTER, LANCE (19200) 9331244	L10 EA	4 (NOTE 3) 6 (NOTE 4)
1220-01-110-3397	PROGRAM KIT, COMPUTER, FOR 81MM MORTAR, M29A1 (19200) 11785348	L09 EA	2 (NOTE 5)
1220-01-110-7618	PROGRAM KIT, COMPUTER, FOR 4.2-INCH MORTAR, M30 (19200) 11785349	L09 EA	2 (NOTE 6) 1 (NOTE 7)
1220-01-082-1627	PROGRAM KIT, COMPUTER, SOUND/FLASH RANGING (19200) 9331243	L09 EA	2 (NOTE 8)
1220-01-082-1628	PROGRAM KIT, COMPUTER, SPECIAL SITUATION (19200) 9331245	L09 EA	2 (NOTE 1) 3 (NOTE 2)
1220-01-082-1620	PROGRAM KIT, COMPUTER, SURVEY (19200) 9331242	L09,L10 EA	2 (NOTES 9 THRU 14)

*NOTE: 1 PER CANNON BATTERY FIRE DIRECTION CENTER
 2 PER CANNON BATTALION FIRE DIRECTION CENTER
 3 PER LANCE BATTERY FIRE DIRECTION CENTER
 4 PER LANCE BATTALION FIRE DIRECTION CENTER
 5 PER COMPANY MORTAR FIRE DIRECTION CENTER
 6 PER BATTALION MORTAR FIRE DIRECTION CENTER
 7 PER CAVALRY MORTAR TUBE

8 PER TARGET ACQUISITION SOUND/FLASH PLATOON
 9 PER CANNON UNIT 4TH ORDER SURVEY PARTY
 10 PER LANCE UNIT 4TH ORDER SURVEY PARTY
 11 PER TARGET ACQUISITION 4TH ORDER SURVEY PARTY
 12 PER DIVARITY HH BATTERY 4TH ORDER SURVEY PARTY
 13 PER PERSHING UNIT 4TH ORDER SURVEY UNIT
 14 PER SURVEY INFORMATION CENTER

APPENDIX E

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the computer sets. These items are authorized to you by CTA 50-970, Expendable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

E-2. EXPLANATION OF COLUMNS

- a. Column (1) - Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, app E.").
- b. Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item.
 - c - Operator/crew
 - 0 - Organizational maintenance

co Column (3) - National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses, followed by the part number.

e. Column (5) - Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

SECTION II. EXPENDABLE SUPPLIES AND MATERIALS				
(1)	(2)	(3)	(4)	(5)
ITEM NUMBER	LEVEL	NATIONAL STOCK NUMBER	DESCRIPTION	U/M
1	O	6810-00-201-0906	ALCOHOL, DENATURED (81348) OE760	PT
2	C	8305-00-267-3015	CLOTH, CHEESECLOTH (81348) CCCC440	YD
3	O	8520-00-228-0598	SOAP, TOILET (81348) P-S-624	GL
4	O	1005-00-288-3565	SWAB, SMALL ARMS CLEANING (19204) 5019316	EA
5	C	7530-01-083-8007	TAPE, PAPER, WITH CARD SET, CLEANING, FOR REPLACEMENT PROCURE PN TP30250 (19200) 9331181	EA

APPENDIX F
ORGANIZATIONAL
REPAIR PARTS AND SPECIAL TOOLS LIST

Current as of 9 December 1982

Section I. INTRODUCTION

F-1. SCOPE

This appendix lists spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE), and other special support equipment required for performance of organizational maintenance of the computer sets. It authorizes the requisitioning and issue of spares and repair parts as indicated by the source and maintenance codes.

F-2. GENERAL

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

- a. Section II. Repair Parts List. A list of spares and repair parts authorized for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in numeric sequence, with the parts in each group listed in figure and item number sequence. Bulk materials are listed in NSN sequence.
- b. Section III. National Stock Number and Part Number Index. A list, in National item identification number (NIIN) sequence, of all National stock numbers

(NSN) appearing in the listings, followed by a list in alphabetic sequence of all part numbers appearing in the listings. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance. This index is followed by a cross-reference list of reference designators to figure and item numbers.

F-3. EXPLANATION OF COLUMNS

Illustration. This column is divided as follows:

(1) Figure Number. Indicates the figure number of the illustration on which the item is shown.

(2) Item Number. The number used to identify item called out in the illustration.

b. Source, Maintenance, and Recoverability (SMR) Codes.

(1) Source Code. Source codes indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the uniform SMR code format as follows:

F-3. EXPLANATION OF COLUMNS (cont)

Code	Definition
PA	Item procured and stocked for anticipated or known usage.
PB	Item procured and stocked for insurance purpose because essentiality dictates that a minimum quantity be available in the supply system.
PC	Item procured and stocked and which otherwise would be coded PA except that it is deteriorative in nature.
PD	Support item, excluding support equipment, procured for initial issue or outfitting and stocked only for subsequent or additional initial issues or outfittings. Not subject to automatic replenishment.
PE	Support equipment procured and stocked for initial issue or outfitting to specified maintenance repair activities.
PF	Support equipment which will not be stocked but which will be centrally procured on demand.

Code	Definition
PG	Item procured and stocked to provide for sustained support for the life of the equipment. It is applied to an item peculiar to the equipment which, because of probable discontinuance or shutdown of production facilities, would prove uneconomical to reproduce at a later time.
KD	An item of a depot overhaul/repair kit and not purchased separately. Depot kit defined as a kit that provides items required at the time of overhaul or repair.
KF	An item of a maintenance kit and not purchased separately. Maintenance kit defined as a kit that provides an item that can be replaced at organizational or intermediate levels of maintenance.
KB	Item included in both a depot overhaul/repair kit and a maintenance kit.
MO	Item to be manufactured or fabricated at organizational level.

code	Defini ti on
MF	Item to be manufactured or fabricated at the direct support maintenance level.
MH	Item to be manufactured or fabricated at the general support maintenance level.
MD	Item to be manufactured or fabricated at the depot maintenance level.
AO	Item to be assembled at organizational level.
AF	Item to be assembled at direct support maintenance level.
AH	Item to be assembled at general support maintenance level.
AD.....	Item to be assembled at depot maintenance level.
XA	Item is not procured or stocked because the requirements for the item will result in the replacement of the next higher assembly.
XB	Item is not procured or stocked. If not available through salvage, requisition.

Code	Def ini tion
xc	Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.
XD	A support item that is not stocked. When required, item will be procured through normal supply channels.

NOTE

Cannibalization or salvage may be used as a source of supply for any items coded above except those coded XA and aircraft support items as restricted by AR 700-42.

(2) Maintenance Code. Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the uniform SMR code format as follows:

(a) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace, and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance:

Code	Appl i cati on/Expl anati on
C	Crew or operator maintenance performed within organizational maintenance.

F-3. EXPLANATION OF COLUMNS (cont)

Code	Application/Explanation
O	Support item is removed, replaced, used at the organizational level.
F	Support item is removed, replaced, used at the direct support level.
H	Support item is removed, replaced, used at the general support level.
D	Support items that are removed, replaced, used at depot, mobile depot, or specialized repair activity only.

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions). This position will contain one of the following maintenance codes.

Code	Application/Explanation
O	The lowest maintenance level capable of complete repair of the support item is the organizational level.
F	The lowest maintenance level capable of complete repair of the support item is the direct support level.

Code	Application/Explanation
H	The lowest maintenance level capable of complete repair of the support item is the general support level.
D	The lowest maintenance level capable of complete repair of the support item is the depot level.
L	Repair restricted to applicable designated specialized repair activity.
Z	Nonreparable. No repair is authorized.
B	No repair is authorized. The item may be reconditioned by adjusting, lubricating, etc, at the user level. No parts or special tools are procured for the maintenance of this item.

(3) Recoverability Code. Recoverability codes are assigned to support items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the uniform SMR code format as follows:

Recoverability Codes	Definition
Z	Nonreparable item. When unserviceable, condemn and dispose at the level indicated in position 3.

Recoverability Codes

Definition

- O Reparable item. When uneconomically repairable, condemn and dispose at organizational level.
- F Reparable item. When uneconomically repairable, condemn and dispose at the direct support level.
- H Reparable item. When uneconomically repairable, condemn and dispose at the general support level.
- D Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal not authorized below depot level.
- L Reparable item. Repair, condemnation, and disposal not authorized below depot/specialized repair activity level.
- A Item requires special handling or condemnation procedures because of specific reasons (i. e., precious metal content, high dollar value, critical material or hazardous material). Refer to appropriate manuals/directives For specific instructions.

c. National Stock Number. Indicates the National stock number assigned to the item and which will be used for requisitioning.

d. Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc.

Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

NOTE

When a stock numbered item is requisitioned, the item received may have a different part number than the part being replaced.

f. Description. Indicates the Federal item name and, if required, a minimum description to identify the item. The physical security classification of the item is indicated by the parenthetical entry of applicable physical security classification abbreviation e.g., Phy Sec C1 (C)-Confidential, Phy Sec C1 (S)-Secret, Phy Sec C1 (T)-Top Secret. Items that are included in kits and sets are listed below the name of the kit or set with the quantity of each item in the kit or set indicated in the quantity incorporated in unit column. When the part to be used differs between serial numbers of the same model, the effective serial numbers are shown as the last line of the description. In the special tools list, the initial basis of issue (BOI) appears as the last line in the entry for each special tool, special TMDE, and other support equipment. When density of equipments supported exceeds density spread indicated in the basis of issue, the total authorization is increased accordingly.

F-3. EXPLANATION OF COLUMNS (cont)

g. Unit of Measure (U/M). Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e. g., ea, in., pr, etc). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

h. Quantity Incorporated in Unit. Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable, (e. g., shims, spacers, etc).

F-4. SPECIAL INFORMATION

Usable on codes are shown in the description column. Uncoded items are applicable to all models. Identification of the usable codes used in this publication are:

Code	Used on
L09	General field artillery computer set
L10	Missile field artillery computer set

F-5. HOW TO LOCATE REPAIR PARTS

a. When National Stock Number or Part Number Is Unknown:

(1) First. Using the table of contents, determine the applicable functional group or subgroup within which the item belongs. This is necessary since illustrations are prepared for applicable functional groups or subgroups, and listings are divided into the same groups.

(2) Second. Find the illustration covering the applicable functional group or subgroup to which the item belongs.

(3) Third. Identify the item on the illustration and note the illustration figure and item number of the item.

(4) Fourth. Using the repair parts list, find the figure and item number noted on the illustration.

b. When National Stock Number or Part Number Is Known:

(1) First. Using the index of National stock numbers and part numbers, find the pertinent National stock number or part number. This index is in NIIN sequence followed by a list of part numbers in alpha-

merit sequence, cross-referenced to the illustration figure number and item number.

(2) Second. After finding the figure and item number, locate the figure and item number in the repair parts list.

Section II. REPAIR PARTS LIST

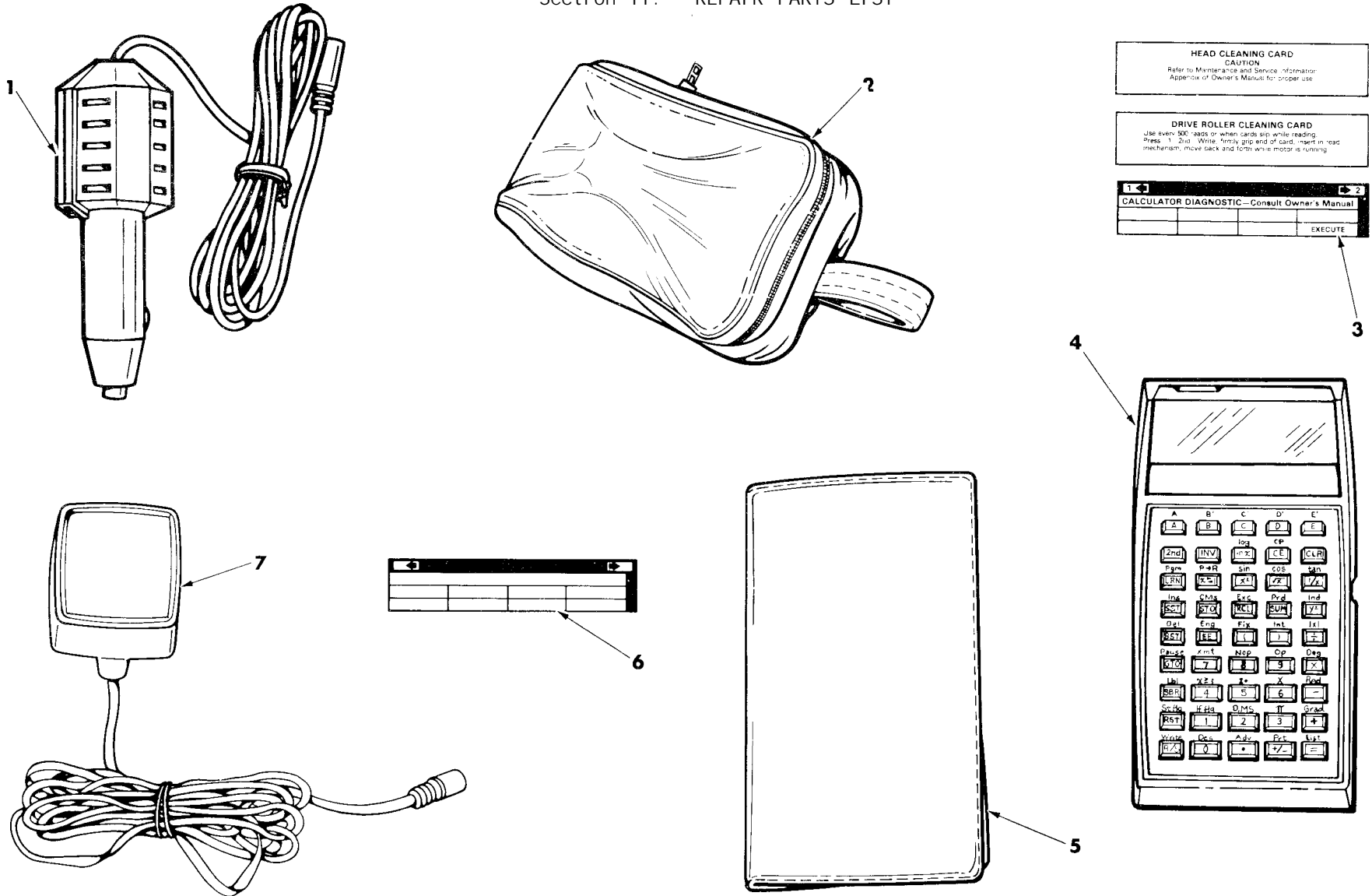
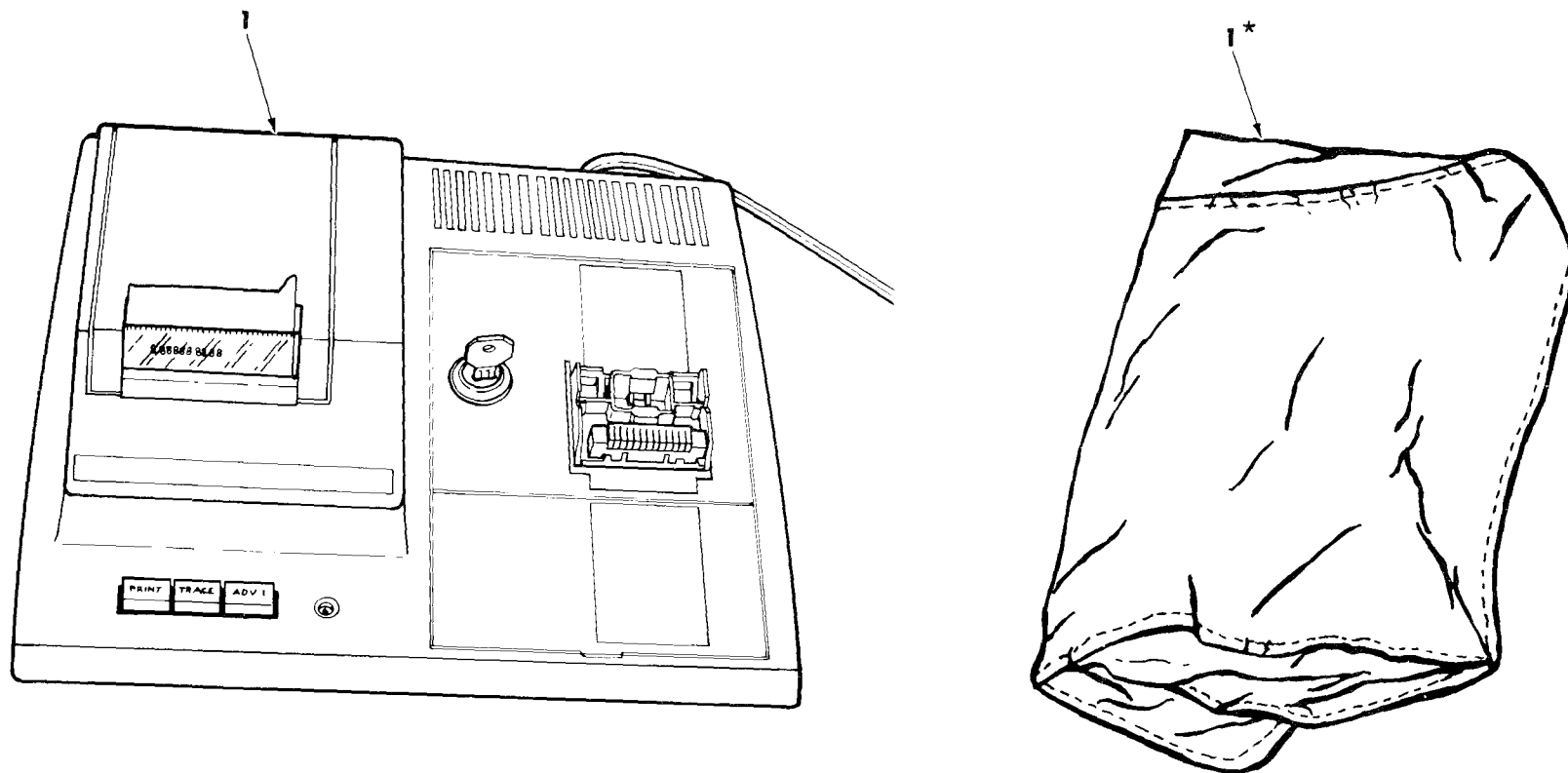


Figure 1. Computer Set, Field Artillery, General 11784958 and Computer Set, Field Artillery, Missile 11784959

ARR 81-1168

(1) ILLUSTRATION (A) FIG NO		(2) SMR CODE	(3) NATIONAL STOCK NUMBER	TM9-1220-242-12&P (4) (5) FSCM PART NUMBER		DESCRIPTION	(7) USABLE ON CODE	(8) QTY INC IN UNIT
						GROUP 00 COMPUTER SET, FIELD ARTILLERY, GENERAL 11784958, AND COMPUTER SET, FIELD ARTILLERY, MISSILE 11784959		
1	1	PAOOO	1220-01-082-1622	19200	9331180	CHARGER-ADAPTER, DC	L09,L10	EA 1
1	2	PAOZZ	1220-01-082-1642	19200	9331176	CASE, COMPUTER	L09,L10	EA 1
1	3	PAOZZ	1220-01-084-0447	19200	9331178	..CARD SET, CLEANING, CALCULATOR	L09,L10	EA 1
1	4	PAOOO	1220-01-106-9743	19200	9331195	COMPUTER, HAND-HELD	L09,L10	EA 1
1	5	PAOZZ	1220-01-082-1626	19200	9331177	CARD HOLDER, MAGNETIC	L09,L10	EA 1
1	6	PAOZZ	7530-01-082-1645	19200	9331179	CARD, MAGNETIC, DATA RECORDING	L09,L10	EA 20
1	7	PAOZZ	1220-01-082-1621	19200	9331182	CHARGER-ADAPTER, AC	L09,L10	EA 1



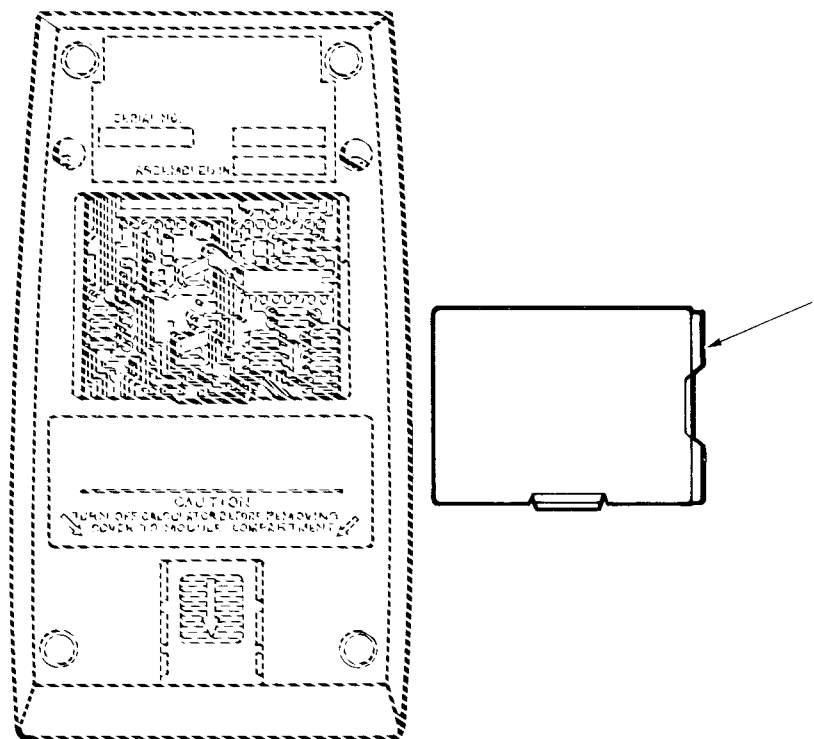
NOTE: *SUPPLIED WITH IDENTICALLY NUMBERED PART.

ARR 81-1169

Figure 2. Computer Set, Field Artillery, General 1178498 and
Computer Set, Field Artillery, Missile 1178495--
Printer

(1) ILLUSTRATION (A) FIG NO	(2) (B) ITEM NO	(3) SMR CODE	(4) NATIONAL STOCK NUMBER	TM9-1220-242-12&P (5) PART NUMBER	DESCRIPTION	(7) USABLE ON CODE	U/M	(8) QTY INC IN UNIT
2	1	PA000	1220-01-106-9744	19200 9331173	GROUP 00 COMPUTER SET, FIELD ARTILLERY, GENERAL 11784958, AND COMPUTER SET, FIELD ARTILLERY MISSILE 11784959--PRINTER PRINTER-PLOTTER, WITH ACCESSORIES, FOR REPLACEMENT PROCURE P/N PC-100C	L10	EA	1

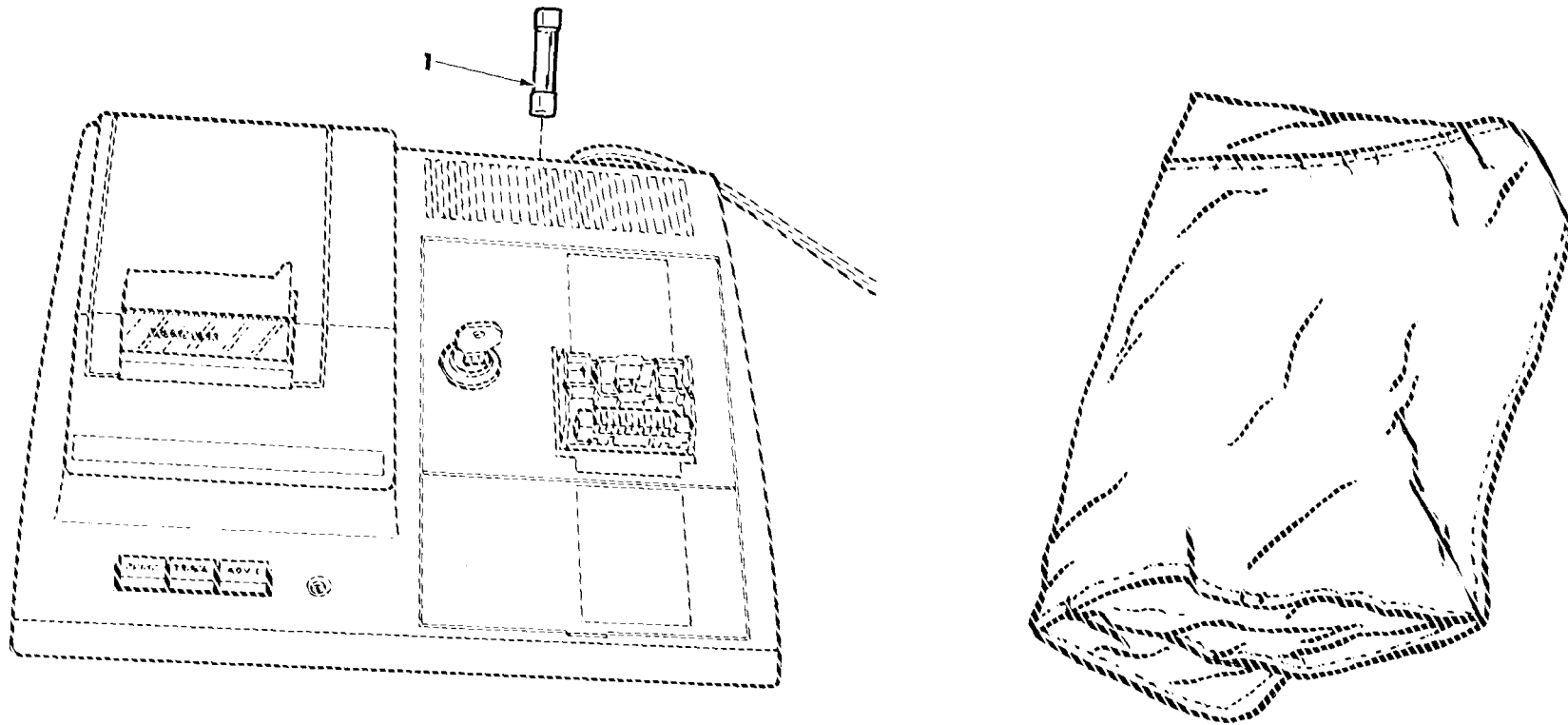
REPAIR PARTS LIST (cont)



ARR 81-1170

Figure 3. Computer, Hand-Held 9331195

(1) ILLUSTRATION (A) FIG NO		(2) SMR CODE	(3) NATIONAL STOCK NUMBER	TM9-1220-242-12&P (4) (5) FSCM PART NUMBER		DESCRIPTION	(7) USABLE ON CODE	U/M	(8) QTY INC IN UNIT
3	1	PACZZ	1220-01-082-1629	19200	9331175	GROUP 01 COMPUTER, HAND-HELD 9331195 BATTERY SET, RECHARGEABLE	L09,L10	EA	1



ARR 81-1171

Figure 4. Printer-Plotter, with Accessories 9331173

(1) ILLUSTRATION (A) FIG NO	(2) (B) ITEM NO	(3) SMR CODE	(4) TM9-1220-242-12&P (4) NATIONAL STOCK NUMBER	(5) PART NUMBER	DESCRIPTION	(7) USABLE ON CODE	(8) QTY INC IN UNIT
4	1	PACZZ	5920-01-038-3543	52078 5180011	GROUP 02 PRINTER-PLOTTER, WITH ACCESSORIES 9331173 FUSE, SLO-BLOW, 1/4 AMP	L10	EA 1

REPAIR PARTS LIST (cont)

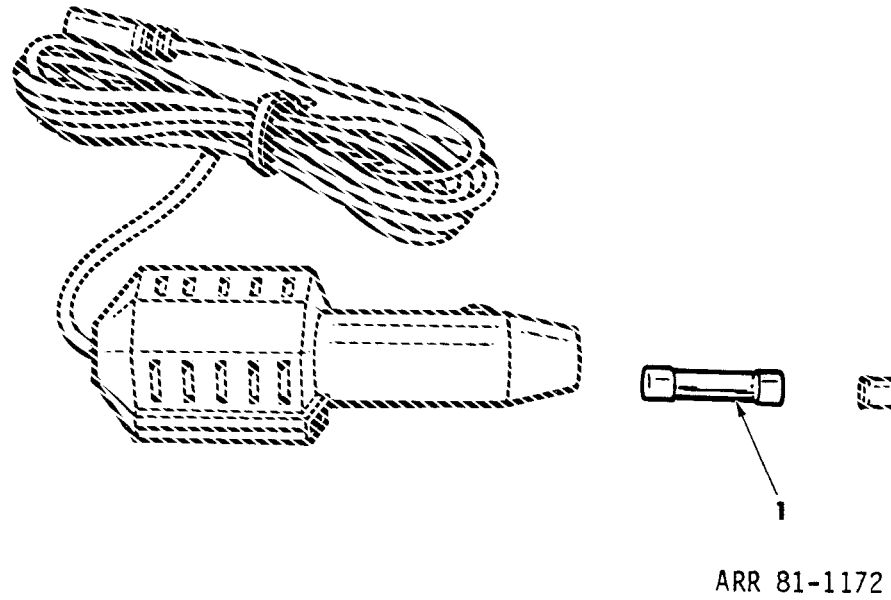


Figure 5. Charger-Adapter, DC 9331180

(1) ILLUSTRATION (A) FIG NO	(2) (B) ITEM NO	(3) SMR CODE	(4) TM9-1220-242-12&P (5) NATIONAL STOCK NUMBER	(5) PART NUMBER	DESCRIPTION	(7) USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
					GROUP 03 CHARGER-ADAPTER, DC 9331180			
5	1	PACZZ	5920-00-669-8979	81349	FO1A250V1-2AS FUSE, 1/2 AMP	L09,L10	EA	1

SECTION III. NATIONAL STOCK NUMBER AND PART NUMBER INDEX

STOCK NUMBER	FIGURE NO.	ITEM NO.	FSCM	PART NUMBER	FIGURE NO.	ITEM NO.
5920-00-669-8979	5	1	81349	FO1A250V1-2AS	5	1
5920-01-038-3543	4	1	52078	5180011	4	1
1220-01-082-1621	1	7	19200	9331173	2	1
1220-01-082-1622	1	1	19200	9331175	3	1
1220-01-082-1626	1	5	19200	9331176	1	2
1220-01-082-1629	3	1	19200	9331177	1	5
1220-01-082-1642	1	2	19200	9331178	1	3
7530-01-082-1645	1	6	19200	9331179	1	6
1220-01-084-0447	1	3	19200	9331180	1	1
1220-01-106-9743	1	4	19200	9331182	1	7
1220-01-106-9744	2	1	19200	9331195	1	4

ALPHABETICAL INDEX

Subject	Page*		Subject	Page*	
	OP	ORG		OP	ORG
A			C		
Abbreviations, list of	1-2	1-2	Cable assembly (See Vehicle cable assembly)		
AC charger-adaptor:			Capabilities and features of computer	1-3	1-3
Location and description	1-5		Card holder:		
PMCS		4-6	Location and description	1-8	1-8
Testing		4-23	PMCS	2-6	
Additional authorization list (AAL)			Card read/write slot, location and		
(app D)	D-1	D-1	description of	1-3	1-3
Advance button (See ADV button)			Card/write function (with printer)		4-8
ADV button:			Card/write function (without printer)	2-10	
As control	2-2	2-2	Case, computer (See Computer case)		
Location and description of	1-6	1-6	Characteristics of computer sets	1-3	1-3
Applicable instructions for computer			Charger-adaptor:		
sets and program kits	2-1	2-1	AC (See AC charger-adaptor)		
			DC (See DC charger-adaptor)		
B			Checking unpacked equipment		4-3
Basic issue items (BII) (app C)	C-1	C-1	Common tools and equipment		4-1
Batteries, storage, lead-acid	2-23	2-23	Components, major, location and		
Battery pack:			description of	1-3	1-3
Location and description	1-4	1-4			
Maintenance	3-14				
PMCS	2-8	4-7			
Replacing, repair by	3-13				

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ALPHABETICAL INDEX (cont)

Subject	Page*		Subject	Page*	
	OP	ORG		OP	ORG
C					
Components of end item (COEI) and basic issue items list (BII) (app C)	C-1	C-1	Computer receptacle, location and description of	1-3	1-3
Computer:			Computer sets:		
Basic keyboard and display functions	2-11	4-10	Characteristics	1-3	1-3
Capabilities and features	1-3	1-3	Cleaning magnetic cards		4-24
Card/write function (with printer)		4-8	Initial setup		4-23
Card/write function (without printer)	2-10		Maintenance instructions		4-23
Cleaning drive roller		4-26	Repairing computer sets		4-25
Cleaning read/write head		4-26	Testing ac charger-adaptor		4-23
General keyboard function	2-13	4-11	Computer switch:		
General operation (diagnostic)	2-9	4-7	As control	2-2	2-2
Initial setup	3-12	4-25	Location and description of	1-3	1-3
Location and description	1-3	1-3	Control sand indicators	2-1	2-1
Maintenance instructions	3-12	4-25	Conversion capability, rectangular to polar coordinate, computer	2-18	4-13
Maintenance of battery pack	3-14		Cord, power (See Power cord)		
Memory participation capability	2-16	4-13	Cover, dust, description of	1-6	1-6
Memory storage and recall capability	2-17	4-13	Cue card slot, location and description of	1-3	1-3
Operation (See Operating the computer)			Cue cards, PMCS	2-7	
PMCS	2-5	4-4			
Rectangular to polar coordinate conversion capability	2-18	4-13			
Repair by replacing battery pack	3-13				
Replacement		4-27			
Symptom index (troubleshooting)	3-1	4-14			
Troubleshooting	3-3	4-15			
Computer case, location and description of	1-4	1-4			

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Subject	Page*	
	OP	ORG
D		
Data, equipment (See Equipment data)		
DC charger-adapter:		
Initial setup	3-18	4-31
Location and description	1-5	1-5
Maintenance instructions	3-18	4-31
PMCS		4-5
Repair by replacing 1/2 amp fuse	3-19	
Replacement		4-32
Testing, using a computer		4-32
Description and use of operator's controls and indicators	2-1	2-1
Description, equipment	1-3	1-3
Description of major components	1-3	1-3
Destruction of Army materiel to prevent enemy use	1-1	1-1
Diagnostic card, location and description of	1-8	1-8
Display, as indicator	2-1	2-1
Drive roller, cleaning		4-26
Drive roller cleaning card, location and description of	1-8	1-8
Dust cover, description of	1-6	1-6

Subject	Page*	
	OP	ORG
E		
EIR, reporting	1-2	1-2
Electricity, static	2-31	2-31
Equipment:		
Characteristics, capabilities, and features	1-3	1-3
Data	1-12	1-12
Description and data	1-3	1-3
Purpose	1-1	1-1
Equipment, unpacked, checking		4-3
Equipment improvement recommendations (EIR)	1-2	1-2
Equipment, support		4-1
Expendable supplies and materials list (ESML) (app E)	E-1	E-1
F		
Features of computer	1-3	1-3
Firmware module compartment, location and description	1-4	1-4
Firmware modules:		
Installing/changing	2-31	2-31
PMCS	2-8	
Removing	2-31	2-31
Replacing	2-32	2-32

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ALPHABETICAL INDEX (cont)

Subject	Page*	
	OP	ORG
F		
Forms, maintenance	1-1	1-1
Fuse:		
1/4 amp (See 1/4 amp fuse)		
1/2 amp (See 1/2 amp fuse)		
G		
General information	1-1	1-1
H		
Handling of magnetic cards	2-30	2-30
Hand receipt (-HR) manuals	1-2	1-2
Head cleaning card, location and description of	1-8	1-8
How to use this manual	iii	iii
I		
Identification plates, location and description of	1-9	1-9
Indicators (See Controls and indicators)		

Subject	Page*	
	OP	ORG
Installing/changing firmware modules	2-31	2-31
Interface connectors, location of	1-7	1-7
Introduction	1-1	1-1
Inverter-vibrator, connecting the	2-29	2-29
K		
Keyboard and display functions, basic, computer	2-11	4-10
Keyboard function, general, computer	2-13	4-11
Key, locking (See Locking key)		
Keys:		
As controls	2-2	2-2
Location and description	1-3	1-3
L		
Lead-acid storage batteries	2-23	2-23
LED:		
As indicator	2-2	2-2
Location and description	1-7	1-7

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Subject	Page*	
	OP	ORG
Light emitting diode (See LED)		
List of abbreviations	1-2	1-2
Location and description of major components	1-3	1-3
Locking cradle, location of	1-7	1-7
Locking key:		
As control	2-3	2-3
Location and description	1-7	1-7
Lubrication instructions	3-1	

M

MAC	8-1	B-1
Magnetic cards:		
Cleaning		4-24
Handling	2-30	2-30
Location and description	1-8	1-8
Marking	2-30	2-30
PMCS	2-7	
Maintenance al location chart (MAC) (app B)	B-1	B-1
Maintenance forms, records, and reports	1-1	1-1
Maintenance functions	B-1	B-1

Subject	Page*	
	OP	ORG
Maintenance instructions (See individual items)		
Maintenance procedures	3-12	4-22
Major components, location and description of	1-3	1-3
Manual, how to use	iii	iii
Marking of magnetic cards	2-30	2-30
Materials, expendable	E-1	E-1
Memory participation capability, computer	2-16	4-13
Memory storage and recall capability, computer	2-17	4-13

N

Name:		
Common	1-2	1-2
Official	1-2	1-2
Nomenclature cross-reference list	1-2	1-2

O

1/4 amp fuse, location and description of	1-7	1-7
---	-----	-----

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ALPHABETICAL INDEX (cont)

Subject	Page*		Subject	Page*	
	OP	ORG		OP	ORG
0			Operator maintenance instructions	3-1	
1/2 amp fuse:			Organizational maintenance		
Location	1-5	1-5	instructions		4-1
Replacing, repair by	3-19		Organizational preventive maintenance		
120V/240V switch, location and			checks and services monthly schedule		4-4
description of	1-5	1-5	Organizational repair parts		
Operating instructions	2-1	2-1	and special tools list		
Operating the computer:			(RPSTL) (app F)	F-1	F-1
And printer from 110-120 V ac	2-27	2-27	Overlays (PMCS)	2-7	
And printer from 24 V dc	2-29	2-29			
From 120-240 Vac	2-21	2-21			
From the BA-4386/PRC-25					
dry battery	2-22	2-22			
From vehicular power	2-23	2-23			
On internal battery pack	2-20	2-20			
Without printer	2-20	2-20			
With the printer	2-27	2-27			
Operation in:					
Dusty or sandy conditions	2-33	2-33	Placing the computer sets in		
Extreme cold weather conditions	2-32	2-32	operation	2-19	2-19
Extreme hot weather conditions	2-33	2-33	PMCS	2-4	4-4
Hot, damp, or salty atmosphere	2-33	2-33	Power cord, location and		
Operation under unusual conditions	2-32	2-32	description of	1-7	1-7
Operation under usual conditions	2-19	2-19	Preparation for storage or shipment	1-2	1-2
			Preventive maintenance checks and		
			services (PMCS)	2-4	4-4

P

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	Page*	
	OP	ORG
PRINT button:		
As control	2-2	2-2
Location and description	1-6	1-6
Printer:		
Cleaning interface connector		4-30
Cleaning printheads		4-28
Initial setup	3-14	4-28
Location and description	1-6	
Maintenance instructions	3-14	4-28
PMCS	2-7	4-6
Repair by replacing 1/4 amp fuse	3-17	
Removal/replacement of printer paper	3-15	
Replacement		4-31
Symptom index (troubleshooting)	3-2	4-14
Troubleshooting	3-9	4-20
Printer paper, location and description of	1-6	1-6
Printer switch:		
As Control	2-3	2-3
Location and description	1-7	1-7
Purpose of equipment	1-1	1-1
R		
Read/write head, cleaning		4-26
Read/write slot, card (See Card read/ write slot)		

	Page*	
Subject	OP	ORG
Receptacle, computer, location and description of	1-3	1-3
Records, maintenance	1-1	1-1
References (app A)	A-1	A-1
Repair parts and special tools list (RPSTL) (app F).....	F-1	F-1
Repair parts, special tools, TMDE, and support equipment		4-1
Reporting equipment improvement recommendations (EIR)	¶	1-2
Reporting errors and recommending improvements	i	i
Reports, maintenance	1-1	1-1
RPSTL	F-1	F-1
S		
Scope	1-1	1-1
Service upon receipt of materiel		4-1
Shipment, preparation for	1-2	1-2

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ALPHABETICAL INDEX (cont)

Subject	Page*	
	OP	ORG
s		
Slot:		
Card read/write, location and description of	1-3	1-3
Cue card, location and description of	1-3	1-3
Special tools		4-1
Stat electricity	2-31	2-31
Storage batteries, lead-acid	2-23	2-23
Storage preparation for	1-2	1-2
Supplies, expendable	E-1	E-1
Support equipment		4-1
Switch:		
Computer (See Computer switch)		
120V/240 V (See 120V/240V switch)		
Printer (See printer switch)		

Subject	Page*	
	OP	ORG
Symptom index (troubleshooting)	3-1	4-14
T		
Table of contents	i	i
TMDE		4-1
TRACE button:		
As control	2-2	2-2
Location and description	1-6	1-6
Troubleshooting	3-3	4-15
V		
Vehicle cable assembly, location and description of	1-9	1-9

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When units of length, distance, temperature, weight, torque, or volume are used in this manual, both US customary and metric units are shown. US customary units are shown first with the equal metric units shown in parentheses. Units of time and angle are the same for US customary and metric systems. No equal units are shown for seconds, minutes, hours, degrees

of angle, or mils. When units identify weapon or ammunition, they stand alone. Also, when units describe tools or parts which are not interchangeable, only one kind of unit is used. The list below shows the difference between US customary and metric units. It also shows the symbols used for the units.

US CUSTOMARY

METRIC

LENGTH AND DISTANCE

inch: 1 in.	2.54 cm: centimeters
foot: 1 ft	0.3048 m: meter
yard: 1 yd	0.9144 m: meter

TEMPERATURE

degree Fahrenheit: °F (F° -32°) x 5/9 = °C: degree Celsius

WEIGHT

pound: 1 lb 0.4536 kg: kilogram

TORQUE

inch-pound: 1 in.-lb 0.113 N-m: Newton/meter
foot-pound: 1 ft-lb 1.356 N-m: Newton/meters

VOLUME

ounce: 1 oz 0.02957 l: liter
pint: 1 pt 0.4732 l: liter
quart: 1 qt 0.9463 l: liter
gallon: 1 gal. 3.785 l: liters

TM 9-1220-242-12&P COMPUTER SET—1983