

**GENERAL SUPPORT  
MAINTENANCE MANUAL**

**FOR**

**TEST SET,  
DIGITAL CARD TESTER  
AN/USM-465A  
PRINTED CIRCUIT BOARDS**

PANEL BOARD 0100-2701	(NSN 6625-01-131-1255)
DISPLAY BOARD 0100-2702	(NSN 6625-01-124-8854)
DRIVER/SENSOR BOARD 0100-2703	(NSN 6625-01-124-1553)
PIN PROCESSOR BOARD 0100-2704	(NSN 6625-01-124-1554)
PROCESSOR BOARD 0100-2705	(NSN 6625-01-133-6602)
REFERENCE BOARD 0100-2708	(NSN 6625-01-124-8853)
PRINTER DRIVER BOARD 0100-2723	(NSN 6625-01-124-8852)
PERIPHERAL BOARD 0100-2724	(NSN 6625-01-124-1555)
TAPE DRIVE INTERFACE BOARD 0100-2736	(NSN 6625-01-132-2657)
MEMORY BOARD 0100-3754	(NSN 6625-01-124-1556)
REFERENCE IEEE BOARD 2225-2703	

**HOW TO USE THIS  
MANUAL**  
Page iv

**INTRODUCTION**  
Page 1-1

**MAINTENANCE  
INSTRUCTIONS**  
Page 2-1

**CARD TESTING AND  
TROUBLESHOOTING**  
Page 2-2

**MAINTENANCE  
PROCEDURES**  
Page 2-110

**UUT SCHEMATIC  
DRAWINGS**  
Page B-1

**UUT ASSEMBLY  
DRAWINGS**  
Page C-1

**SUBJECT INDEX**  
Page INDEX-1

**This copy is a reprint which includes  
current pages from Change 1.**

**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**3 JUNE 1985**

**General Support Maintenance Manual  
For**

**TEST SET,  
DIGITAL CARD TESTER  
AN/USM-465A  
PRINTED CIRCUIT BOARDS**

<b>PANEL BOARD 0100-2701</b>	<b>(NSN 6625-01-131-1255)</b>
<b>DISPLAY BOARD 0100-2702</b>	<b>(NSN 6625-01-124-8854)</b>
<b>DRIVER/SENSOR BOARD 0100-2703</b>	<b>(NSN 6625-01-124-1553)</b>
<b>PIN PROCESSOR BOARD 0100-2704</b>	<b>(NSN 6625-01-124-1554)</b>
<b>PROCESSOR BOARD 0100-2705</b>	<b>(NSN 6625-01-133-6602)</b>
<b>REFERENCE BOARD 0100-2708</b>	<b>[NSN 6625-01-124-8853]</b>
<b>PRINTER DRIVER BOARD 0100-2723</b>	<b>[NSN 6625-01-124-8852]</b>
<b>PERIPHERAL BOARD 0100-2724</b>	<b>(NSN 6625-01-124-1555)</b>
<b>TAPE DRIVE INTERFACE BOARD 0100-2736</b>	<b>(NSN 6625-01-132-2657)</b>
<b>MEMORY BOARD 0100-3754</b>	<b>(NSN 6625-01-124-1556)</b>
<b>REFERENCE IEEE BOARD 2225-2703</b>	
<b>512K MEMORY BOARD 2235-2706</b>	

**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 Equipment Publications and Blank Forms), or DA Form 2028-2 located at the back of this manual direct to: Commander, U.S. Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-ME-MP, Fort Monmouth, New Jersey 07703-5000. A reply will be furnished to you.

**TABLE OF CONTENTS**

**Page**

	<b>HOW TO USE THIS MANUAL</b> .....	iv
CHAPTER 1	<b>INTRODUCTION</b> .....	1-1
	1-1. Scope .....	1-1
	1-2. Consolidated Index of Army Publications and Blank Forms.....	1-1
	1-3. Maintenance Forms, Records, and Reports.....	1-1
	1-4. Destruction of Army Materiel to Prevent Enemy Use.....	1-1
	1-5. Preparation for Storage or Shipment .....	1-1
	1-6. Reporting Equipment Improvement Recommendations (EIRs).....	1-1
	1-7. Nomenclature Cross-Reference List.....	1-2
	1-8. List of Abbreviations .....	1-2
CHAPTER 2	<b>MAINTENANCE INSTRUCTIONS</b> .....	2-1
Section I	Repair Parts, Special Tools, TMDE, and Support Equipment .....	2-1
	2-1. Common Tools and Equipment .....	2-1
	2-2. Special Tools, TMDE, and Support Equipment.....	2-1
	2-3. Repair Parts .....	2-2
II	Service Upon Receipt.....	2-2

TABLE OF CONTENTS (Continued)

	Page
Section III	
<u>Card Testing and Troubleshooting</u> .....	2-2
2-4. Introduction .....	2-2
2-5. Equipment Required .....	2-2
2-6. Use of Cable Sets.....	2-4
2-7. Software Loading Procedure.....	2-5
2-8. Panel Board 0100-2701.....	2-7
2-9. Display Board 0100-2702.....	2-15
2-10. Driver/Sensor Board 0100-2703.....	2-24
2-11. Pin Processor Board 0100-2704.....	2-35
2-12. Processor Board 0100-2705.....	2-44
2-13. Reference Board 0100-2708.....	2-52
2-14. Printer Driver Board 0100-2723.....	2-59
2-15. Peripheral Board 0100-2724.....	2-67
2-16. Tape Drive Interface Board 0100-2736.....	2-76
2-17. Memory Board 0100-3754.....	2-83
2-18. Reference IEEE Board 2225-2703 .....	2-97
2-19. 512K Memory Board 2235-2706 .....	2-111
IV <u>Maintenance Procedures</u> .....	2-119
APPENDIX A REFERENCES.....	A-1
B <u>UUT SCHEMATIC DRAWINGS</u> .....	B-1
C <u>UUT ASSEMBLY DRAWINGS</u> .....	C-1
GLOSSARY.....	GLOSSARY-1
<u>SUBJECT INDEX</u> .....	INDEX-1

LIST OF ILLUSTRATIONS

Number	Title	Page
Figure 2-1.	Cable Connection Points and Components Used During Panel Board Test.....	2-9
Figure 2-2.	Cable Connection Points and Components Used During Display Board Test.....	2-18
Figure 2-3.	Driver/Sensor Component Layout .....	2-30
Figure 2-4.	Cable Connection Points and Components Used During Pin Processor Board Test .....	2-37
Figure 2-5.	Cable Connection Points and Components Used During Processor Board Test .....	2-46
Figure 2-6.	Components Used During Reference Board Test.....	2-56
Figure 2-7.	Cable Connection Points and Components Used During Printer Drive Board Test.....	2-62
Figure 2-8.	Cable Connection Points for Peripheral Board Test.....	2-70
Figure 2-9.	Cable Connection Points for Tape Drive Interface Board Test.....	2-78
Figure 2-10.	Cable Connection Points for Memory Board Test.....	2-85
Figure 2-11.	Cable Connection Points and Components Used During Reference IEEE Board Test .....	2-99
Figure 2-12.	Reference IEEE Board Circuit Schematic A.....	2-105
Figure 2-13.	Reference IEEE Board Circuit Schematic B.....	2-106
Figure 2-14.	Reference IEEE Board Circuit Schematic C.....	2-106
Figure 2-15.	Reference IEEE Board Circuit Schematic D.....	2-107
Figure 2-16.	Reference IEEE Board Circuit Schematic E.....	2-107
Figure 2-17.	Reference IEEE Board Circuit Schematic F.....	2-108
Figure 2-18.	Cable Connection Points for 512K Memory Board.....	2-113
Figure B-1.	Panel Board 0100-2701 Schematic Drawing.....	FP-1
Figure B-2.	Display Board 0100-2702 Schematic Drawing.....	FP-9
Figure B-3.	Driver/Sensor Board 0100-2703 Schematic Drawing .....	FP-15

## LIST OF ILLUSTRATIONS (Continued)


Number	Title	Page
Figure B-4.	Pin Processor Board 0100-2704 Schematic Drawing.....	FP-21
Figure B-5.	Processor Board 0100-2705 Schematic Drawing.....	FP-41
Figure B-6.	Reference Board 0100-2708 Schematic Drawing.....	FP-51
Figure B-7.	Printer Driver Board 0100-2723 Schematic Drawing.....	FP-61
Figure B-8.	Peripheral Board 0100-2724 Schematic Drawing.....	FP-63
Figure B-9.	Tape Drive Interface Board 0100-2736 Schematic Drawing.....	FP-77
Figure B-10.	Memory Board 0100-3754 Schematic Drawing.....	FP-81
Figure B-11.	Reference IEEE Board 2225-2703 Schematic Drawing.....	FP-93
Figure B-12.	512K Memory Board 2235-2706 Schematic Drawing.....	FP-105A
Figure C-1.	Panel Board 0100-2701 Assembly Drawing.....	FP-107
Figure C-2.	Display Board 0100-2702 Assembly Drawing.....	FP-109
Figure C-3.	Driver/Sensor Board 0100-2703 Assembly Drawing.....	FP-111
Figure C-4.	Pin Processor Board 0100-2704 Assembly Drawing.....	FP-113
Figure C-5.	Processor Board 0100-2705 Assembly Drawing.....	FP-115
Figure C-6.	Reference Board 0100-2708 Assembly Drawing.....	FP-117
Figure C-7.	Printer Drawer Board 0100-2723 Assembly Drawing.....	FP-119
Figure C-8.	Peripheral Board 0100-2724 Assembly Drawing.....	FP-121
Figure C-9.	Tape Drive Interface Board 0100-2736 Assembly Drawing.....	FP-123
Figure C-10.	Memory Board 0100-3754 Assembly Drawing.....	FP-125
Figure C-11.	Reference IEEE Board 2225-2703 Assembly Drawing.....	FP-127
Figure C-12.	512K Memory Board 2235-2706 Assembly Drawing.....	FP-129


## LIST OF TABLES


Number	Title	Page
Table 2-1.	Test Equipment and Accessories.....	2-3
Table 2-2.	Panel Board Pin Cross-Reference List.....	2-15
Table 2-3.	Display Board Pin Cross-Reference List.....	2-23
Table 2-4.	Driver/Sensor Board Pin Cross-Reference List.....	2-34
Table 2-5.	Pin Processor Board Pin Cross-Reference List.....	2-42
Table 2-6.	Processor Board Pin Cross-Reference List.....	2-51
Table 2-7.	Reference Board Pin Cross-Reference List.....	2-59
Table 2-8.	Printer Drawer Board Pin Cross-Reference List.....	2-67
Table 2-9.	Peripheral Board Pin Cross-Reference List.....	2-75
Table 2-10.	Tape Drive Interface Board Pin Cross-Reference List.....	2-82
Table 2-11.	RAM Chip Connections.....	2-91
Table 2-12.	RAM Fault Table.....	2-95
Table 2-13.	Memory Board Pin Cross-Reference List.....	2-96
Table 2-14.	Reference IEEE Board Pin Cross-Reference List.....	2-109
Table 2-15.	512K Memory Board, Pin Cross Reference List.....	2-118

**HOW TO USE THIS MANUAL**

- This manual covers testing procedures for printed circuit boards within the AN/USM-465A Digital Card Tester. Be sure this manual is the latest version. Refer to DA Pam 25-30.
- Paragraphs are numbered in order. Use the table of contents at the front of this manual to locate the paragraph that covers the printed circuit board (PCB) you are testing. Table 2-1 lists all test equipment and accessories needed to test each PCB.
- Use the list of abbreviations on page 1-2. It will help you understand the manual.
- Illustrations guide you through most procedures. Use the illustrations, but don't forget to read the text.
- In this manual, you will be given the instruction "Enter" followed by the outline of a key. This means that you should press and release that key. For example:



Enter  means: press and release the DELetion key.





Enter  means: press and release the EXECUTE key.




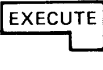




Enter  means press and release the C key.

- You will notice that some of the keys on your DCT have blue-printed commands on them. You will be instructed to use these commands as shown in the following example:

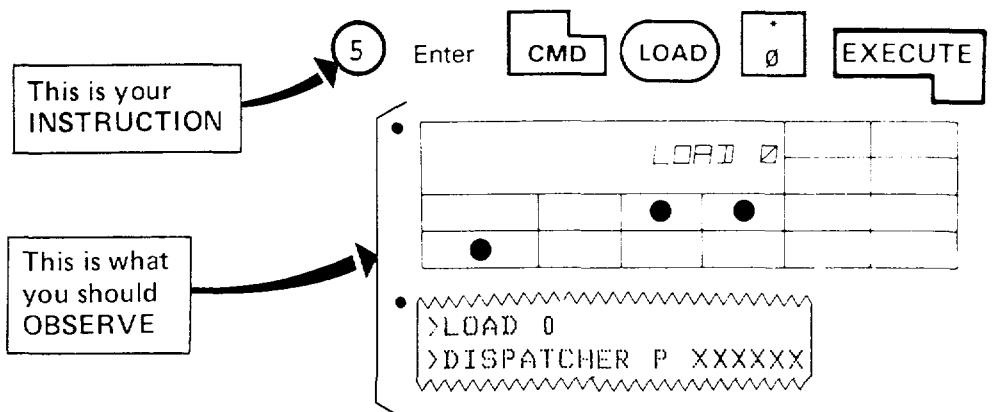
Enter   

When you see an instruction like the one above, use the  and  keys as follows:

Hold down the CMD key and press the  key (the key that shows "REWIND" printed in blue). Then release the  and  keys. Enter 

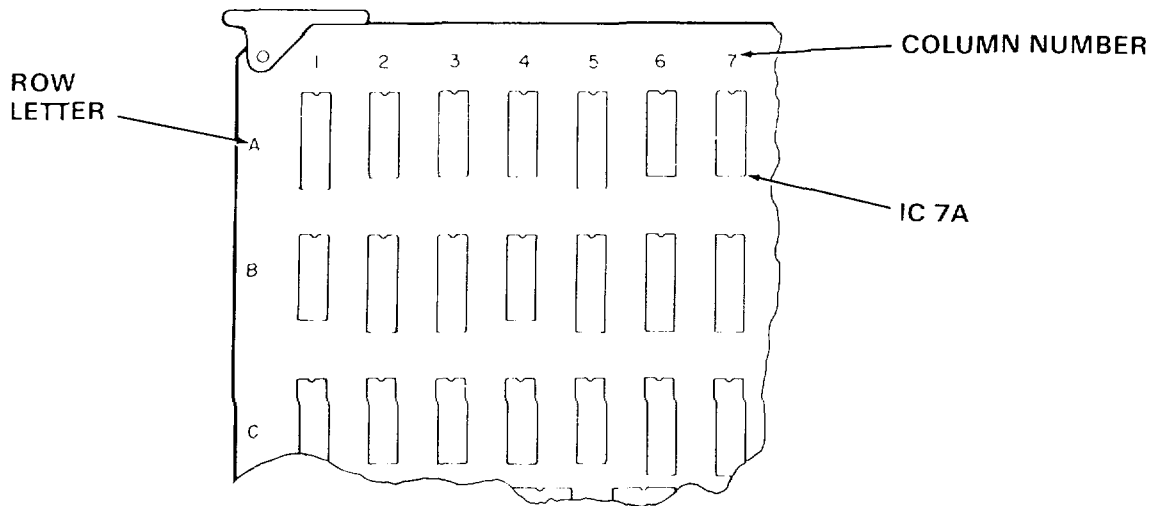
- When you see an instruction like "Enter     " enter  after releasing the  and  keys, before entering 

- In procedural steps in this manual, you are given instructions which are followed by heavy dots. The information following the heavy dots tells you what you should observe. For example:



- In the text, you will see instructions like: "see step (6) below" or "see paragraph 2-7, above". This does not always mean that the referenced item is directly above or below what you are reading. You may have to turn a page (or more) to locate the information you'll need.
- Printed circuit boards (PCBs) tested in this manual are identified by a part number of the form "XXXX-XXXX." Part numbers are printed on the component side of each board. A revision letter follows each part number to identify the board version. For example the panel board has the identification "0100-2701 -L" printed on its component side.
- The two ICD circuit card assemblies used in this manual are called ICD NO. 1 and ICD NO. 2 in the test procedures. This nomenclature is printed on the ICDs, just above the edge connector designations PA or PB. The procedures use an edge connector designation in conjunction with the ICD nomenclature to tell you which side of the specified board should be inserted in the DCT fold-down adapter (for example, "ICD NO. 1 SIDE PA").
- Adapter boards and cable sets are identified by the UUT for which they are used (for example, "ADAPTER FOR 0100-2702" or "CABLE SET FOR 0100-2705").
- All ICDs used in this manual carry a part number of the form "AXXXXXXX." These part numbers are printed on circuit card assemblies or on cable clamps. An extra digit may follow each part number to further identify the device. For example, the cable sets used with ICD NO. 2 are numbered A3038037-1 through A3038037-4.

- The test programs identify PCB components by reference designator or by assembly grid location. Grid locations consist of a column number and a row letter. For example, "7A" denotes the IC chip in column 7, row A.



- Number suffixes following IC chip locations denote pin numbers. For example, "7A.9" means pin 9 of chip 7A.
- Letter suffixes L, R, T, and B denote left, right, top, and bottom connections for components such as diodes, resistors, and capacitors. For example, "R28.L" means the connection at the left end of resistor R28.
- Suffixes L, M, and R denote left, middle, and right connections for transistors that are positioned horizontally. Suffixes T, M, and B denote top, middle, and bottom connections for transistors that are positioned vertically.

## CHAPTER 1

### INTRODUCTION

#### 1-1. SCOPE.

This manual contains general support maintenance instructions to test and repair the printed circuit boards (PCBs) contained in the AN/USM-465A Digital Card Tester. An operational AN/USM-465A Digital Card Tester is used to test the PCBs from other AN/USM-465A Digital Card Testers.

#### 1-2. CONSOLIDATED INDEX OF ARMY PUBLICATIONS AND BLANK FORMS.

Refer to the latest issue of DA Pam 25-30 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

#### 1-3. MAINTENANCE FORMS, RECORDS, AND REPORTS.

a. **Reports of Maintenance and Unsatisfactory Equipment.** Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750 as contained in Maintenance Management Update.

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

c. **Discrepancy in Shipment Report (DISREP) (SF 361).** Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.33C/AFR 75-18/MCO P4610.19D/DLAR 4500.15.

#### 1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

Destruction of Army electronics materiel to prevent enemy use is described in TM 750-244-2

#### 1-5. PREPARATION FOR STORAGE OR SHIPMENT.

Preparation for storage or shipment is described in TB 43-0127

#### 1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIRs).

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about the design. Put in on an SF 368 (Quality Deficiency Report). Mail it to: Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: AMSEL-PA-MA-D, Fort Monmouth, New Jersey 07703-5000. We'll send you a reply.