

TECHNICAL MANUAL

OPERATOR'S AND ORGANIZATIONAL

MAINTENANCE MANUAL

CRT TERMINAL SYSTEMATICS

GENERAL MODEL T-5145G

(HEWLETT-PACKARD GRAPHICS

TERMINAL 2648A)

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TM 11-7440-306-12-1

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HEADQUARTERS
 DEPARTMENT OF THE ARMY
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OPERATOR'S AND ORGANIZATIONAL MAINTENANCE MANUAL
CRT TERMINAL SYSTEMATICS GENERAL MODEL T-5145G
 (
HEWLETT-PACKARD GRAPHICS TERMINAL 2648A)

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 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in back of this manual direct to Commander, US Army Communications-Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, NJ 07703. In either case, a reply will be sent directly to you.

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SECTION I

INTRODUCTION

1. Scope

a. This manual, together with TM 11-7440-306-12-2, TM 11-7440-306-12-3 and TM 11-7440-306-12-4, covers the operation of the CRT Terminal Systematics General Model T-5145G (Hewlett-Packard Graphics Terminal 2648A (referred to as HP-2648A)). Figure E-1 and E-2 in this manual show electrical modifications made by Systematics General Corporation to the Hewlett-Packard Graphics Terminal HP-2648A. TM 11-7440-306-12-2 is a quick reference guide, TM 11-7440-306-12-3 covers regular operation and TM 11-7440-306-12-4 covers operation of the graphics portion. TM 11-7440-306-34 covers direct support and general support maintenance of the equipment.

b. This manual includes:

- (1) References (appendix A).
- (2) Components of End Item List (COEIL) (appendix B).
- (3) Maintenance Allocation Chart (MAC) (appendix D).
- (4) Electrical Modifications to Hewlett-Packard Graphics Terminal HP-2648A (appendix E).

c. TM 11-7440-360-24P covers all repair parts and special tools required for the modified HP-2648A and also includes:

- (1) Repair Parts and Special Tools List (RPSTL).
- (2) Depot Repair Parts and Special Tools List.

2. Consolidated Index of Army Publications and Blank Forms

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

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 TM 38-750. The Army Maintenance Management System.

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

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38/NAVSUPINST 4610.388/AFR 75-18/MCO 4610.19C/DLAR 4500.15.

4. Reporting Equipment Improvement Recommendations (EIR)

If your CRT Terminal Systematics General Model T5145G (HP-2648A) needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to Commander, US Army Communications Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, NJ 07703. We'll send you a reply.

5. Destruction of Army Electronics Materiel

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

APPENDIX A

REFERENCES

DA Pam 310-4	Index of Technical Publications: Technical Manuals, Technical Bulletins, Supply Manuals, (Types 7, 8 and 9), Supply Bulletins, and Lubrication Orders.
DA Pam 310-7	US Army Equipment Index of Modification Work Orders.
*TM 11-7440-306-12-2	Operator's and Organizational Maintenance Manual for Hewlett-Packard Graphics Terminal 2648A.
*TM 11-7440-306-12-3	Operator's and Organizational Maintenance Manual for Hewlett-Packard Graphics Terminal 2648A.
*TM 11-7440-306-12-4	Operator's and Organizational Maintenance Manual for Hewlett-Packard Graphics Terminal 2648A.
TM 11-7440-306-24P	Organizational Direct Support and General Support Repair Parts and Special Tools List (Including Depot Repair Parts and Special Tools List) for CRT Terminal Systematics General Model T-5145 (Hewlett-Packard Graphics Terminal 2648A).
TM 38-750	The Army Maintenance Management System (TAMMS).
TM 740-90-1	Administrative Storage of Equipment.
TM 750-244-2	Procedures for Destruction of Electronics Materiel to Prevent Enemy Use (Electronics Command).

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APPENDIX B

COMPONENTS OF END ITEM LIST

Section I. INTRODUCTION

B-1. Scope

This appendix lists integral components of and basic issue items for the T-5145G to help you inventory items required for safe and efficient operation.

B-2. General

This Components of End Item List is divided into the following sections:

a. Section II. Integral Components of the End item. These items, when assembled, comprise the T-5145G and must accompany it whenever it is transferred or turned in. The illustrations will help you identify these items.

b. Section III. Basic Issue Items. Not applicable.

B-3. Explanation of Columns

a. 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. National Stock Number. Indicates the national stock number assigned to the item and

which will be used for requisitioning.

c. Description. Indicates the Federal item name and, if required, a minimum description to identify the item. The part number indicates the primary number used by the manufacturer, 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. Following the part number, the Federal Supply Code for Manufacturers (FSCM) is shown in parentheses.

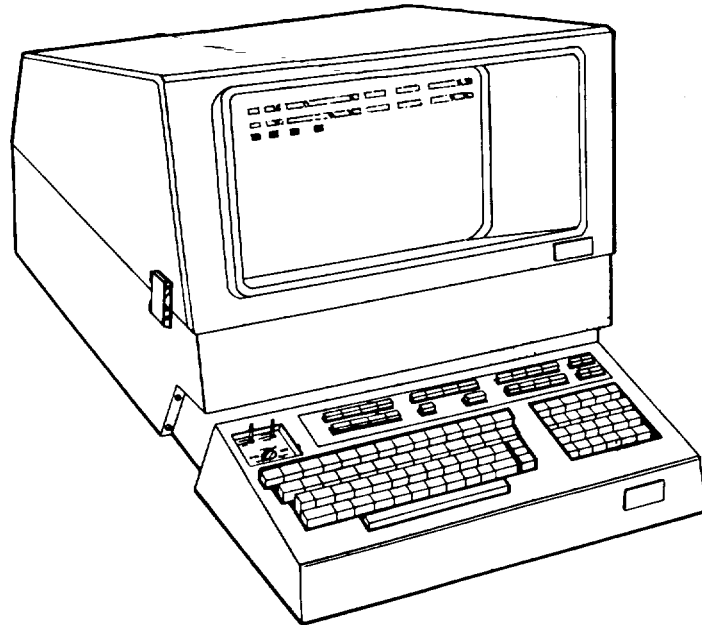
d. Location. The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area.

e. Usable on Code. Not applicable.

f. Quantity Required (Qty Reqd). This column lists the quantity of each item required for a complete major item.

g. Quantity. This column is left blank for use during an inventory. Under the Rcvd column, list the quantity you actually receive on your major item. The Date columns are for your use when you inventory the major item.

(Next printed page is B-2)



SECTION II. COMPONENTS OF END ITEM

(1) ILLUS NO	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION (FSCM) AND PART NUMBER	(4) U/M REQD	(5) QTY
		Systematics General Model T-5145G (Modified HP 2648A)		

APPENDIX D

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

D-1. General

This appendix provides a summary of the maintenance operations for T-5145G. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

D-2. Maintenance Function

Maintenance functions will be limited to and defined as follows:

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

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

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

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

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

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision 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. Install. The act of emplacing, seating, or fixing into position an item, part, module (component or assembly) in a manner to allow the proper functioning of the equipment or system.

h. Replace. The act of substituting a serviceable

like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate, replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item 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 (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of 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 equipments/components.

D-3. Column Entries.

a. Column 1, Group Number. Column 1 lists group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

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

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

d. Column 4, Maintenance Category. Column 4

specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "work time" figures will be shown for each category. The number of task-hours specified by 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, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. Subcolumns of column 4 are as follows:

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

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

f. Column 6, Remarks. Column 6 contains an

alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

D-4. Tool and Test Equipment Requirements (Sect. III)

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

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

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

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

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

D-5. Remarks (Sect. IV)

a. Reference Code. This code refers to the appropriate item in section II, column 6.

b. Remarks. This column provides the required explanatory information necessary to clarify items appearing in section II.

**SECTION II. MAINTENANCE ALLOCATION CHART
FOR
CRT TERMINAL SYSTEMATICS GENERAL MODEL T5145G (HP-2648A)**

(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY FUNCTION	(3) MAINTENANCE	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
00	Terminal, Video Display, Systematics General Model T-514G	Inspect		0.2					
		Test		0.5	A				
		Adjust			0.3			2,4,5	B
		Align			0.4			2,4,5	C
		Replace		0.2				1	
01	Display Unit, Hewlett- Packard Model 2648A, AI	Repair			1.0			2.3	D
		Repair					1.0		E
		Inspect			0.2				
		Test			0.3			2,3,4,5	F
		Replace			0.2			2	
0101	Backplane Assembly, A1AI	Repair			2.5			2,3,4	G
		Repair					2.5		E
		Inspect			0.2				
		Test			0.4			2,3	
		Replace			1.0			2	
0102	Circuit Card Assembly, 8K Bottom RAM, AIA2	Repair			0.1			2,3	
		Replace			1.5		1.0	2	E
0103	Circuit Card Assembly, Control Memory 1, AIA3	Replace			0.1			2	E
0104	Circuit Card Assembly, Control Memory 2, AIA4	Replace			0.1			2	E
0105	Circuit Card Assembly, Processor, AIAS	Replace			0.1			2	E
0106	Circuit Card Assembly, Graphics Controller, AIA6	Replace			0.1			2	E
0107	Circuit Card Assembly, Graphics Display, AIA7	Replace			0.1			2	E
0108	Circuit Card Assembly, Display Control, AIA8	Replace			0.1			2	E
0109	Circuit Card Assembly, Display Memory Access, AIA9	Replace			0.1			2	E
0110	Circuit Card Assembly, Display Timing, AIA10	Replace			0.1			2	E
0111	Circuit Card Assembly Asynchronous Timing, AIA11	Replace			0.1			2	E
0112	Circuit Card Assembly, Keyboard, Interface	Replace			0.1			2	E
0113	Circuit Card Assembly, Sweep, AIA13	Replace			0.2			2	E
0114	CRT/Yoke Assembly, A1A14	Repair					1.5		
		Inspect			0.1				
		Test			0.5			2,3,5	
		Replace			0.5			2	
		Repair			1.0			2,3	
	Adjust			0.5			2.5	H	

**SECTION II MAINTENANCE ALLOCATION CHART
FOR
CRT TERMINAL SYSTEMATICS GENERAL MODEL T-5145G (HP-2648A)**

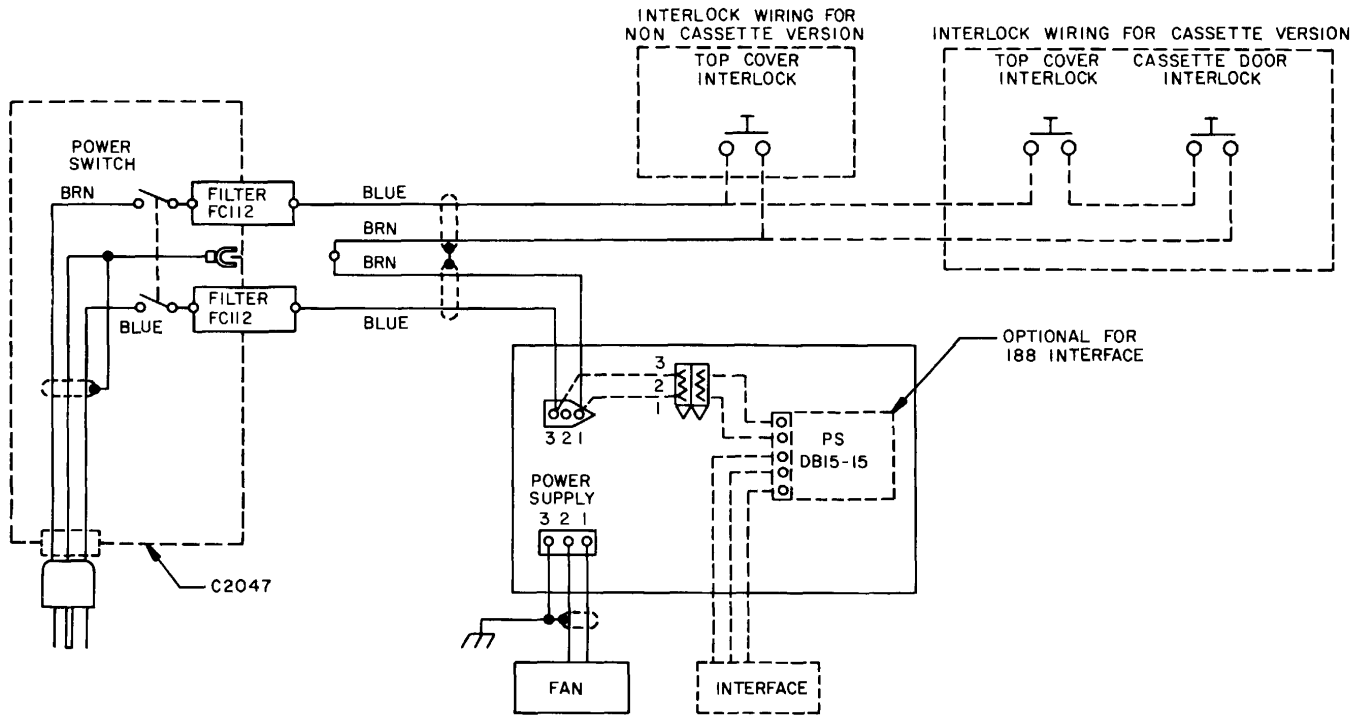
(1) GROUP NUMBER	(2) COMPONENT/ASSEMBLY FUNCTION	(3) MAINTENANCE	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQPT.	(6) REMARKS
			C	O	F	H	D		
0115	Power Supply Assembly, ALPSI	Inspect Test Replace Repair Repair			0.1 0.5 0.5 0.5			2,3,4 2 2,3,4	1 J
011501 02	Circuit Card Assembly, Power Supply, A1PS1A1 Keyboard Assembly, A2	Replace Repair Inspect Test Replace Repair Repair			0.1 0.2 1.0 1.0 1.0		1.0 2.0	2 2,3,4,5 2 2,3,4,5	E K E
0201	Circuit Card Assembly, Keyboard, A2AI	Replace Repair			1.0		1.5 2.0	2	E E

**SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS
FOR
CRT TERMINAL SYSTEMATICS GENERAL MODEL T-5145G (HP-2648A)**

TOOL OR TEST EQUIPMENT REF CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
1 2 3 4 5	0 F O,F F F	Tool Kit, Electronic Equipment, TK-IO1/G Tool Kit, Electronic Equipment, TK-IO5/G Multimeter, AN/USM-223A Voltmeter, Digital, AN/GSM-64B Display Test Module, HP 02640-60063	5180-00-064-5178 5180-00-610-8177 6625-00-999-7465 6625-00-022-7894 None	

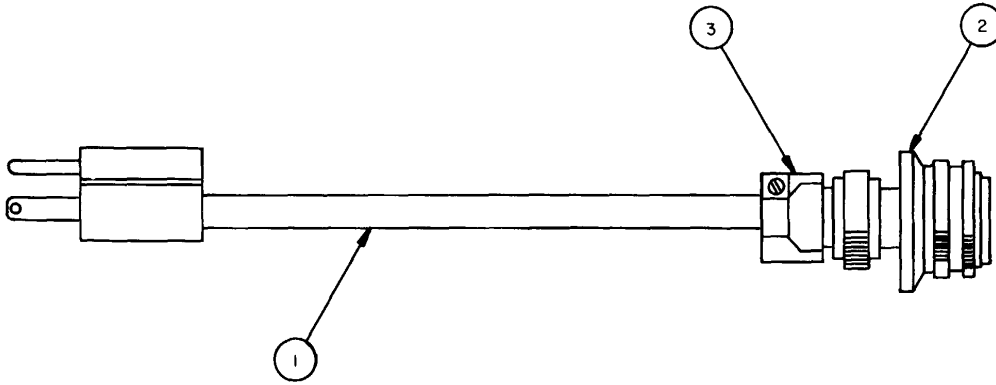
SECTION IV. REMARKS
REMARKS

REFERENC CODE	REMARKS
A	Test using built-in self test functions.
B	Adjustment of Power Supply module, Sweep CCA, and Display Timing CCA.
C	Alignment of Display Roster.
D	Repair is by replacement of Display Unit, Keyboard Assembly, Filter Assembly, Interlock Switch and Connectors. (NOTE: Filter Assembly, Interlock Switch and Connectors are throwaway items and only appear in the MAC note.)
E	Depot repair will be accomplished by the contractor.
F	Those tests required to locate faulty circuit cards (CCA), modules, chassis mounted components, wiring and cable problems.
G	Repair is by replacement of CCAS, Power Supply module, fan, fuses, chassis mounted parts, Backplane Assembly, and wiring. (NOTE: Fan and fuse are throwaway items and only appear in this MAC note.)
H	Repair is replacement of CRT or repair or replacement of Yoke Assembly (NOTE: The CRT is a throwaway item and only appears in this MAC note.)
I	Those tests required to locate a faulty CCA, mechanical or wiring problem.
J	Repair is by replacement of a CCA or corrective maintenance of mechanical or wiring problem.
K	Repair is by replacement of CCA, switches, LEDs, or loudspeaker (NOTE: Switches, LEDs, and loudspeakers are throwaway items and only appear in this MAC note.)



EL60J001

Figure E-1. Wiring Diagram, Primary Power. E-1



4	REF		C2077	WIRING DIAGRAM
3	1		MS3057-6	CABLE CLAMP
2	1		MS3106A14-15	CONNECTOR, CABLE
1	1		17612	POWER CORD (BELDON)
ITEM NO.		CODE IDENT NO.	PART OR IDENT NO.	NOMENCLATURE OR DESCRIPTION
	QTY REQ.			PARTS LIST

EL60J002

Figure E-2. Power Card Assembly. E-2

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