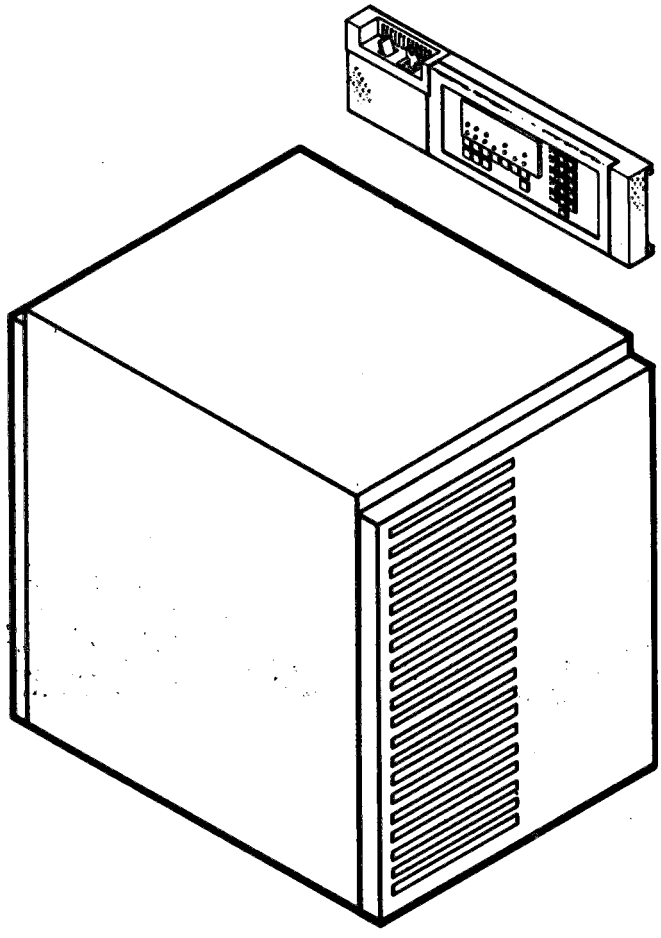
TM 11-7021-200-23

ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE MANUAL

DATA PROCESSING UNIT

CP-1435/MYQ-4



(NSN 7010-01-092-2549)

HEADQUARTERS DEPARTMENT OF THE ARMY

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

8 MARCH 1984

WARNING

HIGH VOLTAGE

is used in the operation of this equipment

ELECTROCUTION

may result if personnel fail to observe safety precautions.

Never work on electronic equipment unless there is another person nearby. He/she should be familiar with the operation and hazards of the equipment. He/she should also be competent in giving first aid. When you are helped by operators, you must warn them about dangerous areas.

Whenever possible, the power supply to the equipment must be shut off before beginning work on the equipment. Take special care to ground every capacitor likely to hold a dangerous potential. When working inside the equipment, after the power has been turned off, always ground every part before touching it.

Be careful not to contact high-voltage connections when installing or operating this equipment.

Whenever possible, keep one hand away from the equipment to reduce the hazard of current flowing through vital organs of the body.

WARNING

Do not be misled by the term “low voltage”. Voltages as low as 50 volts may cause death.

For artificial respiration, refer to FM 21-11.

WARNING

Remove rings, bracelets, wristwatches, and neck chains before working around electronic equipment. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.

WARNING

Isopropyl alcohol is flammable. Keep away from heat and open flame.

TECHNICAL MANUAL

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC, 2 May 1985

ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE MANUAL

DATA PROCESSING UNIT CP-1435/MYQ-4 AND CP-1435A/MYO4

(NSN 7010-01-092-2549) and (NSN 7040-01-181-7045)

TM 11-7021-200-23, 8 March 1984, is changed as follows:

1. Title of manual is changed as shown above.

2. New or changed illustrations are indicated by a miniature pointing hand. New or changed text is indicated by a vertical bar in the margin.

3. Remove old pages and insert new pages as indicated below.

Remove	Insert
iii/(iv blank)	iii/(iv blank)
v and 1-0	v and 1-0
1-1 thru 1-6	1-1 thru 1-13/(1-14 blank)
2-1 thru 2-3/(2-4 blank)	2-1 thru 2-4
4-1 thru 4-22	4-1 thru 4-22
4-27 and 4-28	4-27 and 4-28
4-31 thru 4-40	4-31 thru 4-40
4-43 thru 4-46	4-43 thru 4-46.3/(4-46.4 blank)
4-49 and 4-50	4-49 and 4-50
4-53 and 4-54	4-53 and 4-54
4-57 and 4-58	4-57 and 4-58
4-65 thru 4-70	4-65 thru 4-70
4-75 thru 4-94	4-75 thru 4-94
	B-1 thru B-7/(B-8 blank)
D-1 thru D-7/(D-8 blank)	D-1 thru D-16
Index-1 thru Index-3/(Index-4 blank)	Index-1 thru Index-3/(Index-4 blank)

4. File this change sheet in front of the publication for reference purposes.

Change 1 covers the CP-1435A model of the Data Processing Unit. This model incorporates additional memory and communications capability. It also features a switch on the real time clock.

By Order of the Secretary of the Army:

JOHN A. WICKHAM JR.
General, United States Army
Chief of Staff

Official:

DONALD J. DELANDRO
Brigadiar General, United States Army
The Adjutant General

DISTRIBUTION:

To be distributed in accordance with DA Form 12-51 literature requirements for AN/MYQ-4.

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

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

TECHNICAL MANUAL

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 8 March 1984

ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE MANUAL

DATA PROCESSING UNIT CP-1435/MYQ-4 AND CP-1435A/MYQ-4

REPORTING OF 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 back of this manual, direct to: Commander, US Army Communications and Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, New Jersey 07703. A reply will be furnished to you.

HOW TO USE THIS MANUAL

This manual tells you how to troubleshoot and maintain Data Processing Unit CP-1435/MYQ-4 and CP-1435A/MYQ-4.

LOCATION OF SUBJECTS IN MANUAL

In this manual, paragraphs are numbered in order by chapter. For example, paragraph 2-3 is the third paragraph in chapter 2. Pages are also numbered this way. Using this numbering system, there are three easy ways to locate the information you need in this manual.

- Front cover locators
- Alphabetical index
- Index of maintenance procedures

Use the front cover locators and marked pages to quickly find the parts of the manual shown on the cover. These locators mark portions of the manual which are used often. If the information you need is not listed on the front cover, use the alphabetical index at the back of this manual. It lists all subjects covered in the manual and directs you to the subject by paragraph number. When you need a specific maintenance procedure, use the index at the start of chapter 3 or 4. This index lists all the maintenance procedures in the chapter and directs you to each procedure by page number.

MAINTENANCE PROCEDURES

Maintenance procedures in this manual have two features which help you perform them more easily:

- Initial setup boxes
- First-time performance aids

An initial setup box is used at the start of any procedure which requires setup items before you perform it. This box lists items needed to perform the procedure. If the box does not appear at the start of a procedure, no setup items are needed.

If you are using this manual to perform a procedure for the first time, always read through the entire procedure before you start. Always perform the task steps in the order given. This will help assure correct performance. Use the illustrations beside the tasks steps to find the parts of the equipment called out in the steps. Some steps include a reference to another paragraph. Go to that paragraph if you are not sure how the step is done.

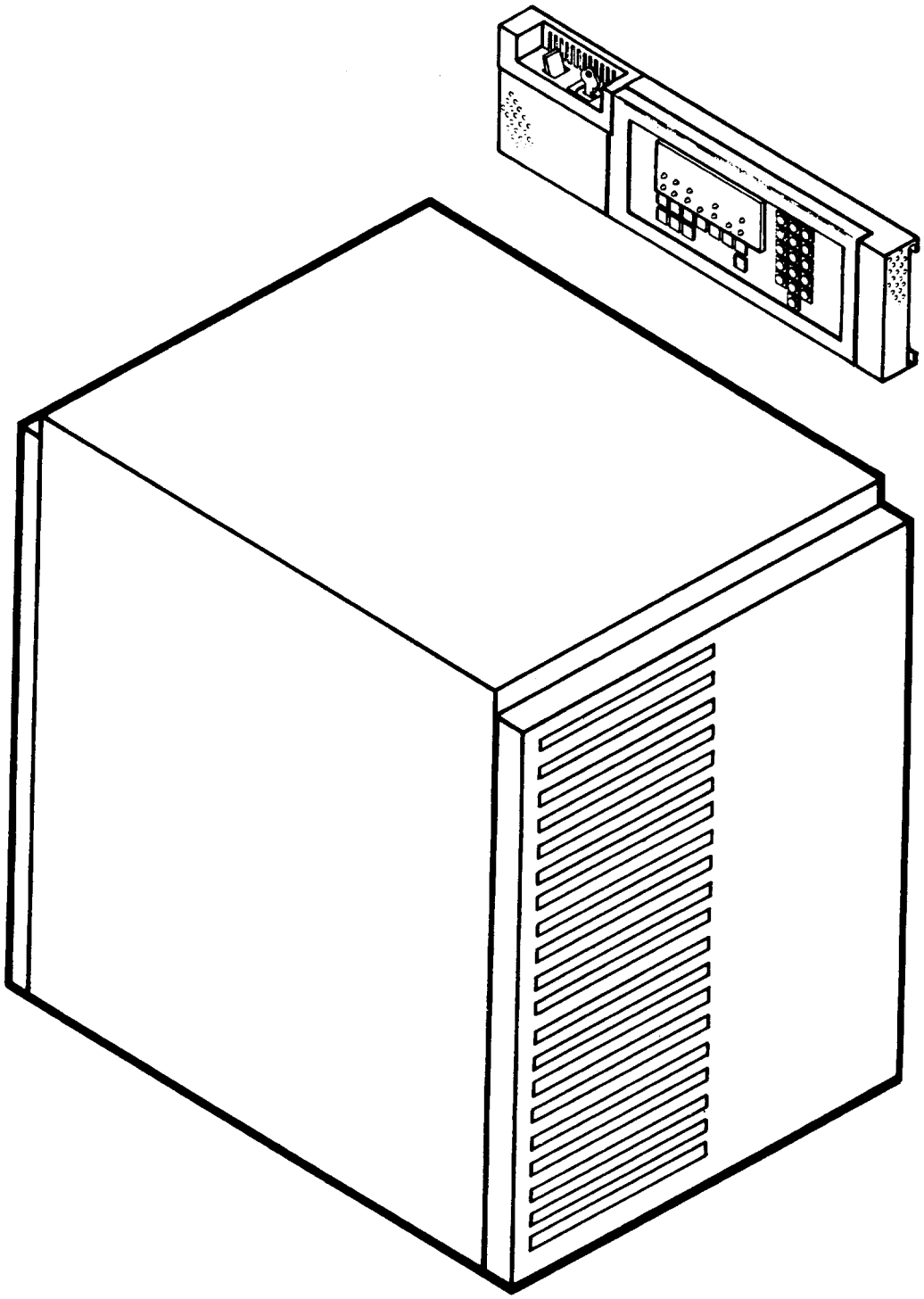


Figure 1-0. Data Processing Unit CP-1435/MYQ-4 and CP-1435A/MYQ-4

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE

Data Processing Unit CP-1435/MYQ-4 and CP-1435A/MYQ-4 (fig. l-O) are general purpose minicomputers. In the rest of this manual each will be called the CPU. Use this manual for organizational and/or direct support maintenance of the CPU.

1-2. INDEX OF PUBLICATIONS

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

1-3. 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 (TAMMS).

1-4. DESTRUCTION OF ARMY ELECTRONICS MATERIEL

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

1-5. ADMINISTRATIVE STORAGE

Administrative storage of equipment issued to and used by Army activities will have Preventive Maintenance Checks and Services (PMCS) performed before storing. When removing the equipment from administrative storage, the PMCS checks should be performed to assure operational readiness. Disassembly and repacking of equipment for limited storage are covered in TM 740-90-1.

1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your CPU assembly 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, U. S. Army Communications and Electronics Command and Fort Monmouth, ATTN: DRSEL-ME-MP, Fort Monmouth, NJ 07703. We'll send you a reply.

1-7. REFERENCE INFORMATION

This listing includes the nomenclature cross reference list, the list of abbreviations and an explanation of terms (glossary) used in this manual.

1-8. NOMENCLATURE CROSS REFERENCE LIST

Common Name	Official Nomenclature
CPU (central processor unit)	Data Processing Unit CP-1435/MYQ-4
CPU (central processor unit)	Data Processing Unit CP-1435A/MYQ-4

1-9. LIST OF ABBREVIATIONS

ADP	Automated data processing
CIP	Commercial instruction processor
CPU	Central processor unit
EDAC	Error detection and correction
GRD	Ground
HEX	Hexadecimal
I/0	Input/Output
LAF	Long address format
MDC	Multiple device controller
MLCP	Multiple line communications processor
MMU	Memory management unit
MSC	Mass storage controller
MTC	Magnetic tape controller
NRZI	Nonreturn to zero inverted
PDU	Power distribution unit
QLT	Quality logic test
RTC	Real time clock
SAF	Short address format

1-10. GLOSSARY

A complete glossary of unusual terms is given in the back of this manual. (Glossary-1)

Section II. EQUIPMENT DESCRIPTION AND DATA

1-11. EQUIPMENT PURPOSE, CAPABILITIES, AND FEATURES

The CPU receives, processes, stores, and outputs data according to the instructions of a stored program. It can:

- Receive data from devices in your ADP system
- Process data put into it
- Store data in its memory or other memories
- Retrieve data from its memory or other memories
- Control the operation of peripheral equipment

1-12. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Figure 1-1 illustrates the major components of CP-1435/MYQ-4. Figure 1-3 illustrates board location by megabus slot number.

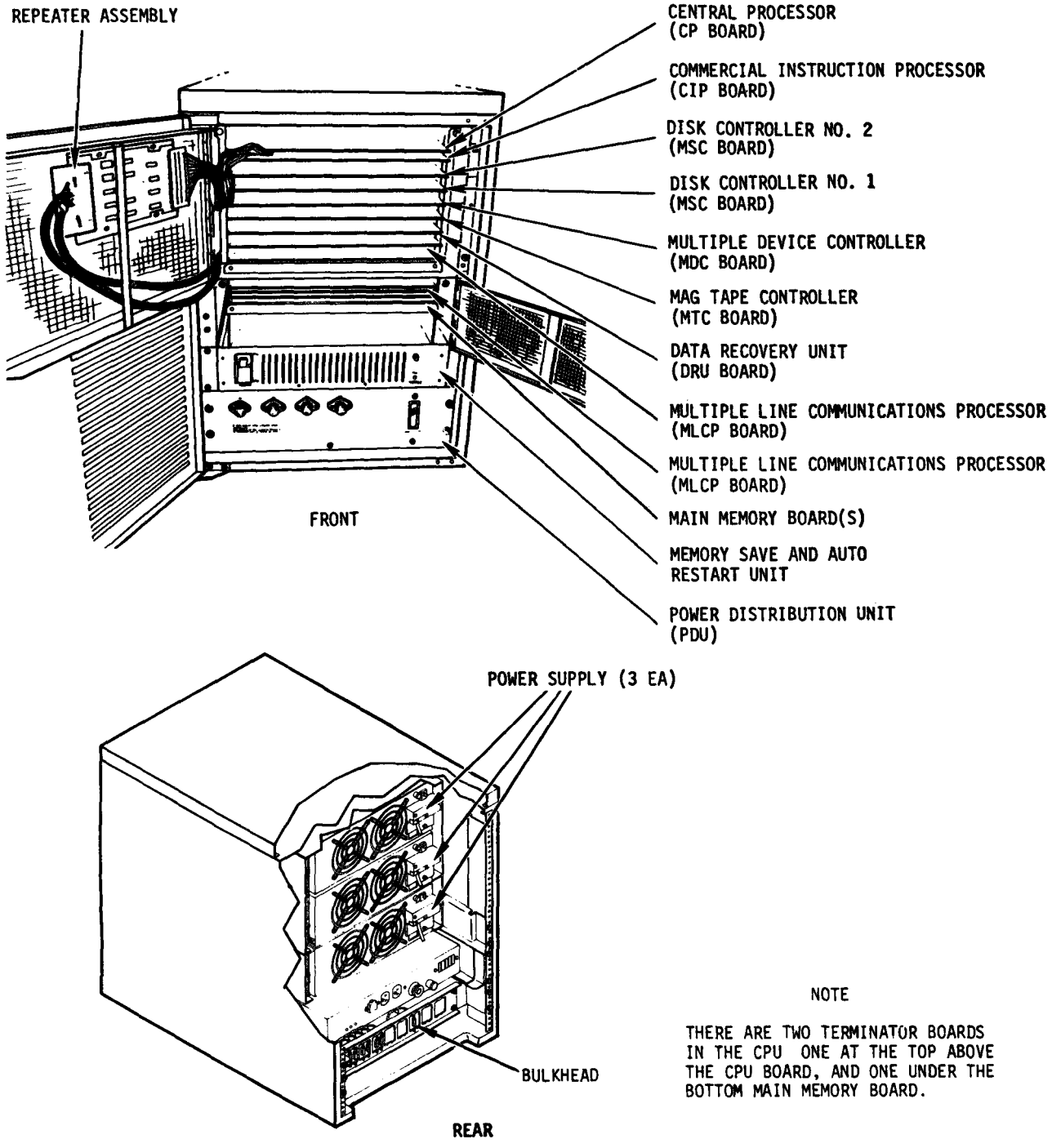


Figure 1-1. Location of Major Components for CP-1435/MYQ-4

Fiqure 1-2 illustrates the major components of CP-1435A/MYQ-4. Figure 1-4 illustrates board location by megabus slot number.

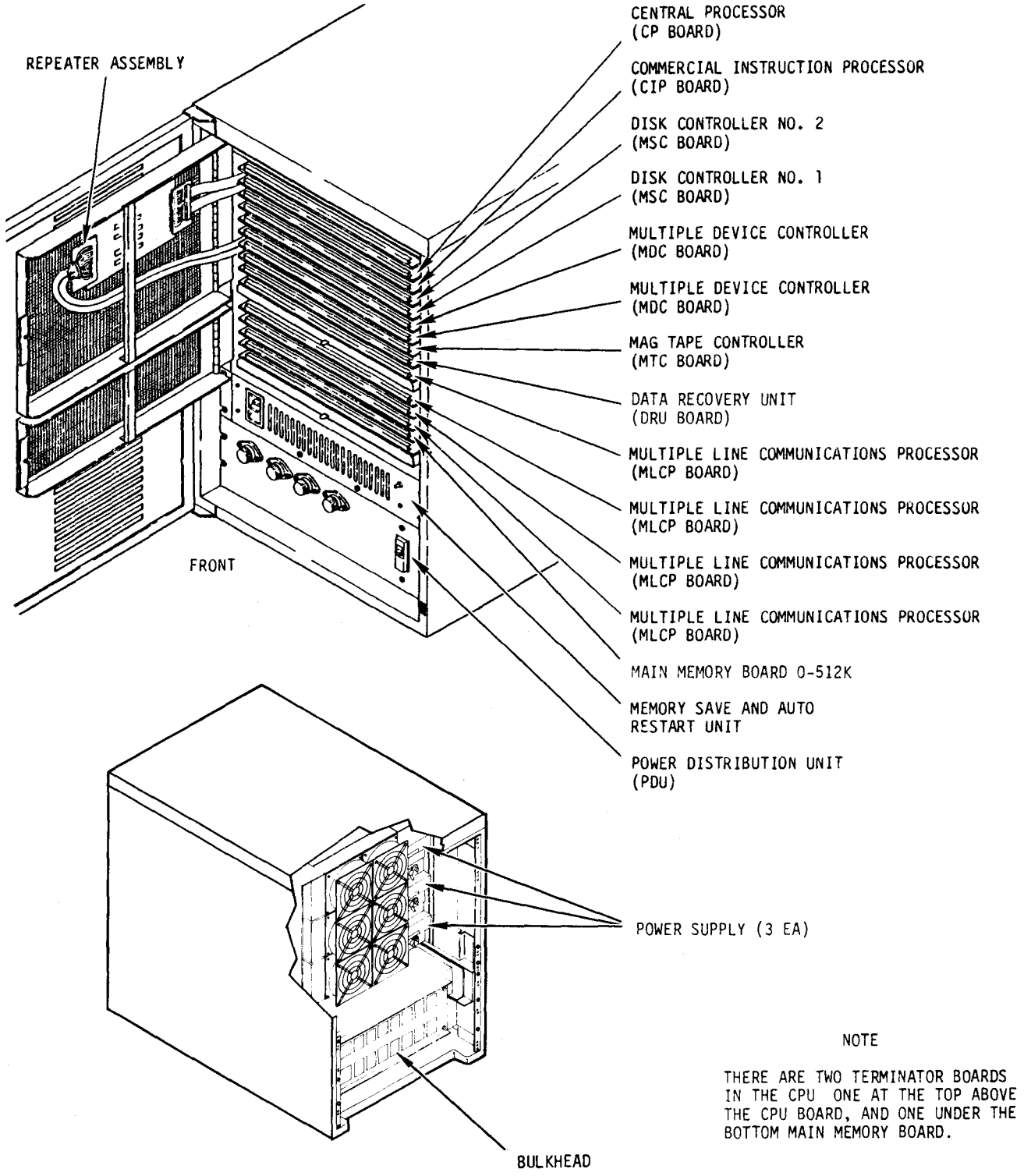


Figure 1-2. Location of Major Components for CP-1435A/MYQ-4

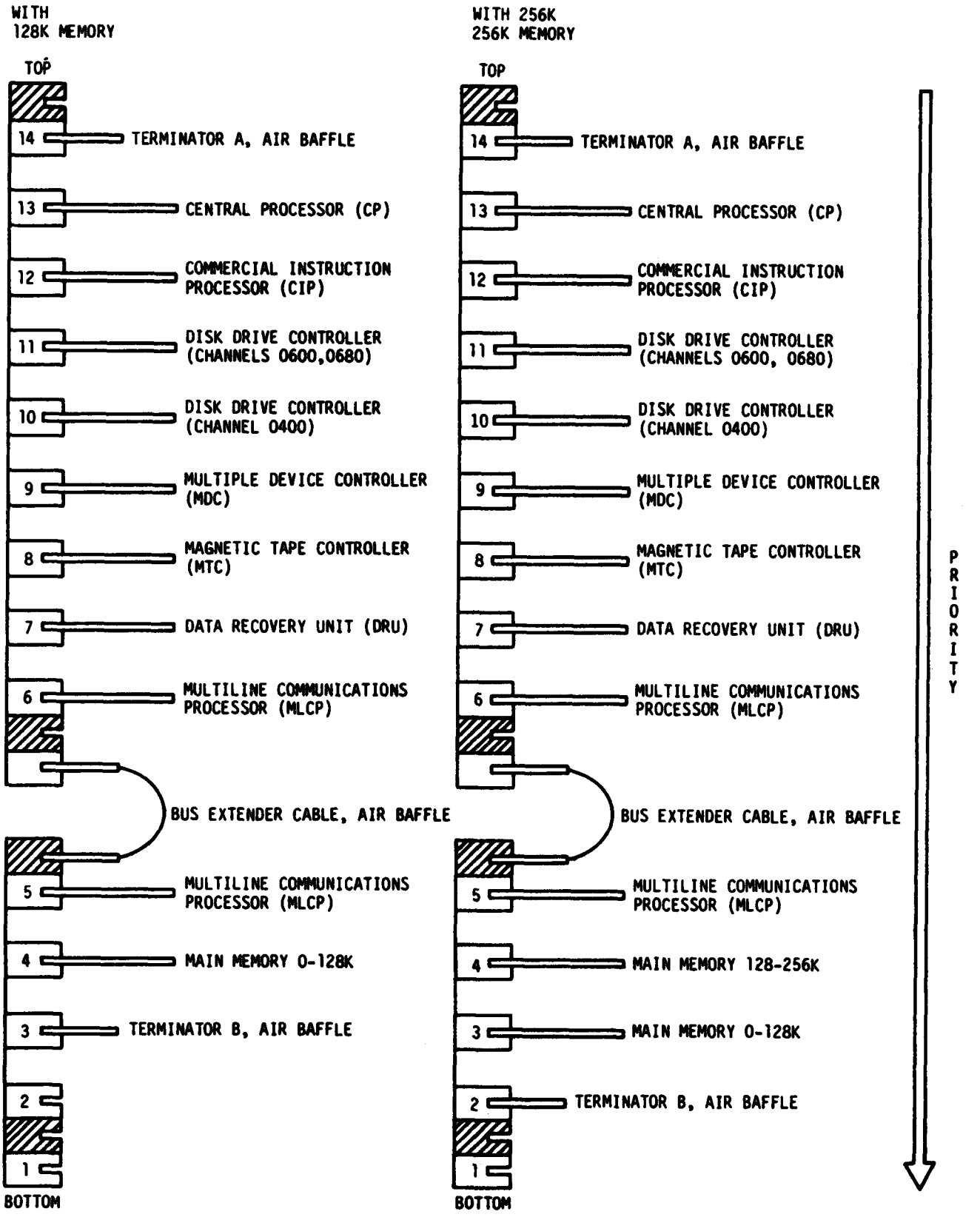


Figure 1-3. Megabus Slot/Board Location for CP-1435/MYQ-4

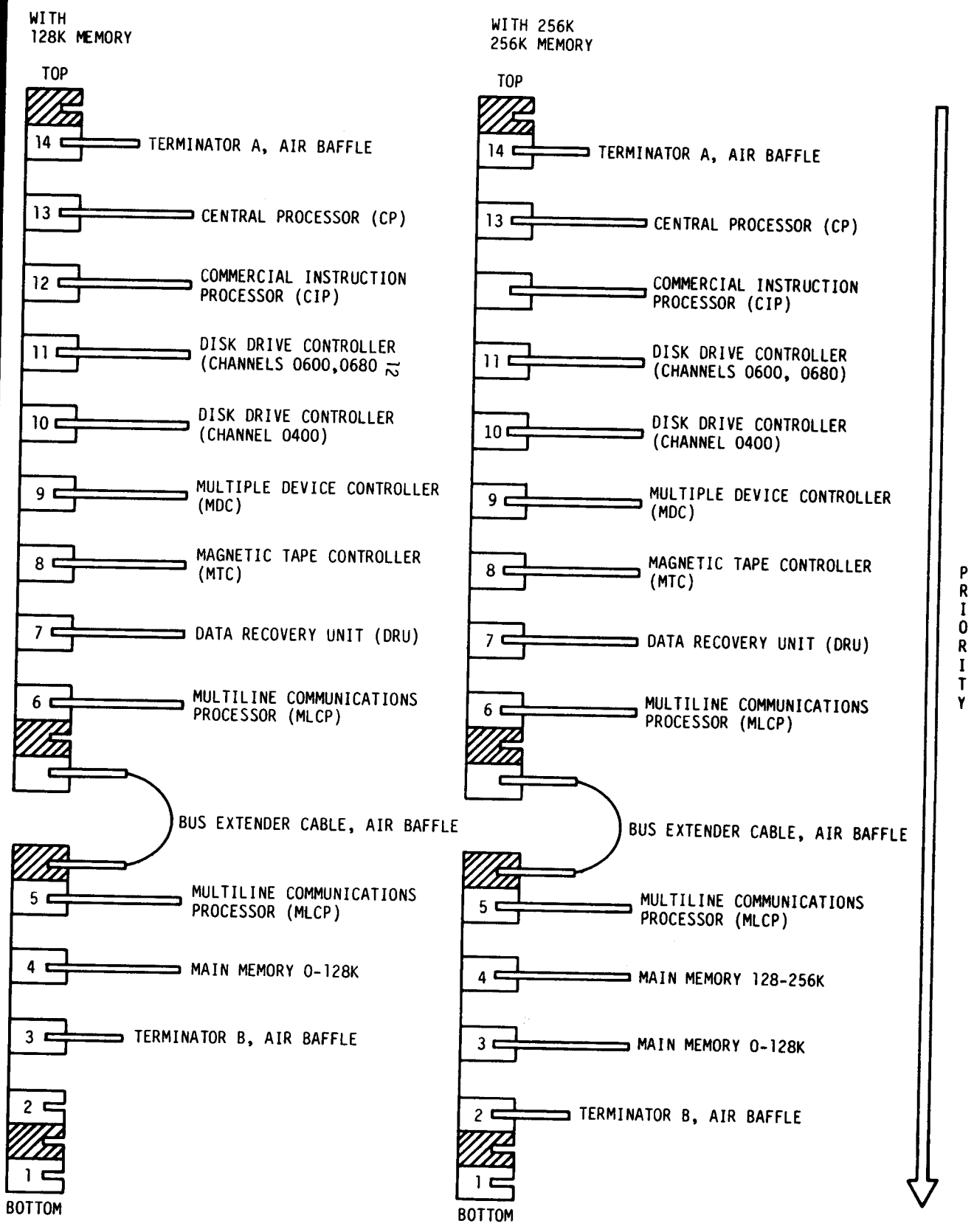


Figure 1-4 Megabus Slot/Board Location for CP-1435A/MYQ-4

1-13. ADDRESSING EQUIPMENT

The CPU comes completely assembled and all CPU addressing dipswitches and/or pin jumpers are set in the proper positions at the factory.

You must be familiar with these settings in order to replace a printed wiring board PWB) during maintenance. The boards occupy specific positions in their respective backplanes. Addressing switches and jumpers enable the computer to recognize a particular device or line of communications and determine if it is functioning properly.

When a replacement PWB is shipped to you from the supply depot or warehouse, it may or may not have the jumpers installed and the switches set properly. You must make sure the board is addressed before installing it in the backplane. See your system manual for required settings.

1-14. Address Switches. You will find four types of configuration or address switches on the devices and their PWBs:

- Dipswitches
- Slide switches
- Hexadecimal rotary switches
- Socket (18/Jumper) switches

Dipswitches and slide switches are generally used to select a device or PWB function or option.

Hexadecimal rotary and jumper switches are also used to set various PWB functions but are primarily used to set the bus address in a PWB.

This type assembly (fig. 1-5) consists of from 2 to 10 0N/OFF switches. To set this kind of switch, you use a small jeweler's-type, flat-bladed screwdriver to push down on the function end of a rocker-arm dipswitch. Some switches have a colored strip that comes up flush with the top of the case on the opposite end to indicate that the dipswitch is set. Others are marked 0 and 1. Remember, you push down the end indicating the desired function or option. You may hear or feel a small click as the switch changes position.

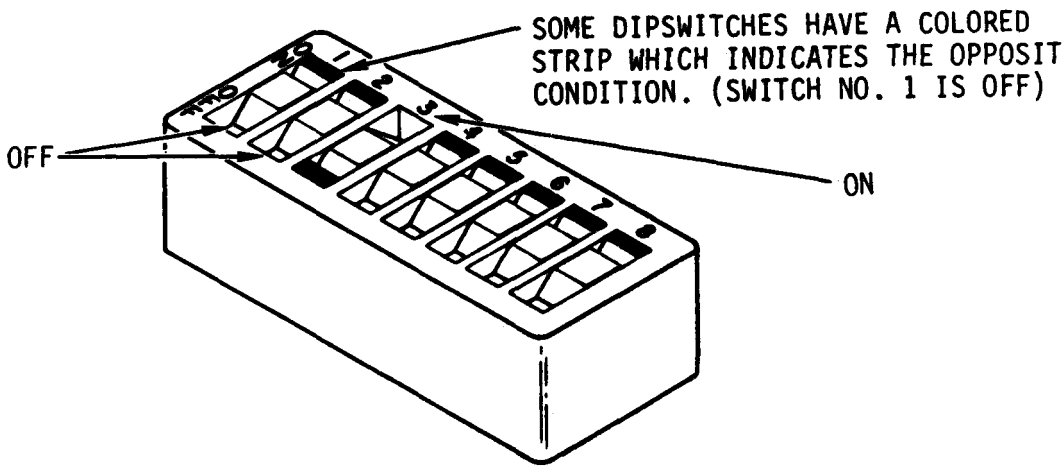


Figure 1-5. Dipswitch Operation

b. Slide Switches. These assemblies (fig. 1-6) are made up of metal or plastic tabbed slides set individually or ganged together in a non-conductive housing.

(1) Typically, the plastic tab switch indicates ON when a dot is visible and OFF when the dot is not visible.

(2) A typical metal tab switch is ON when the tab is at the numbered side of the assembly, and OFF when the tab is at the zero (0) side.

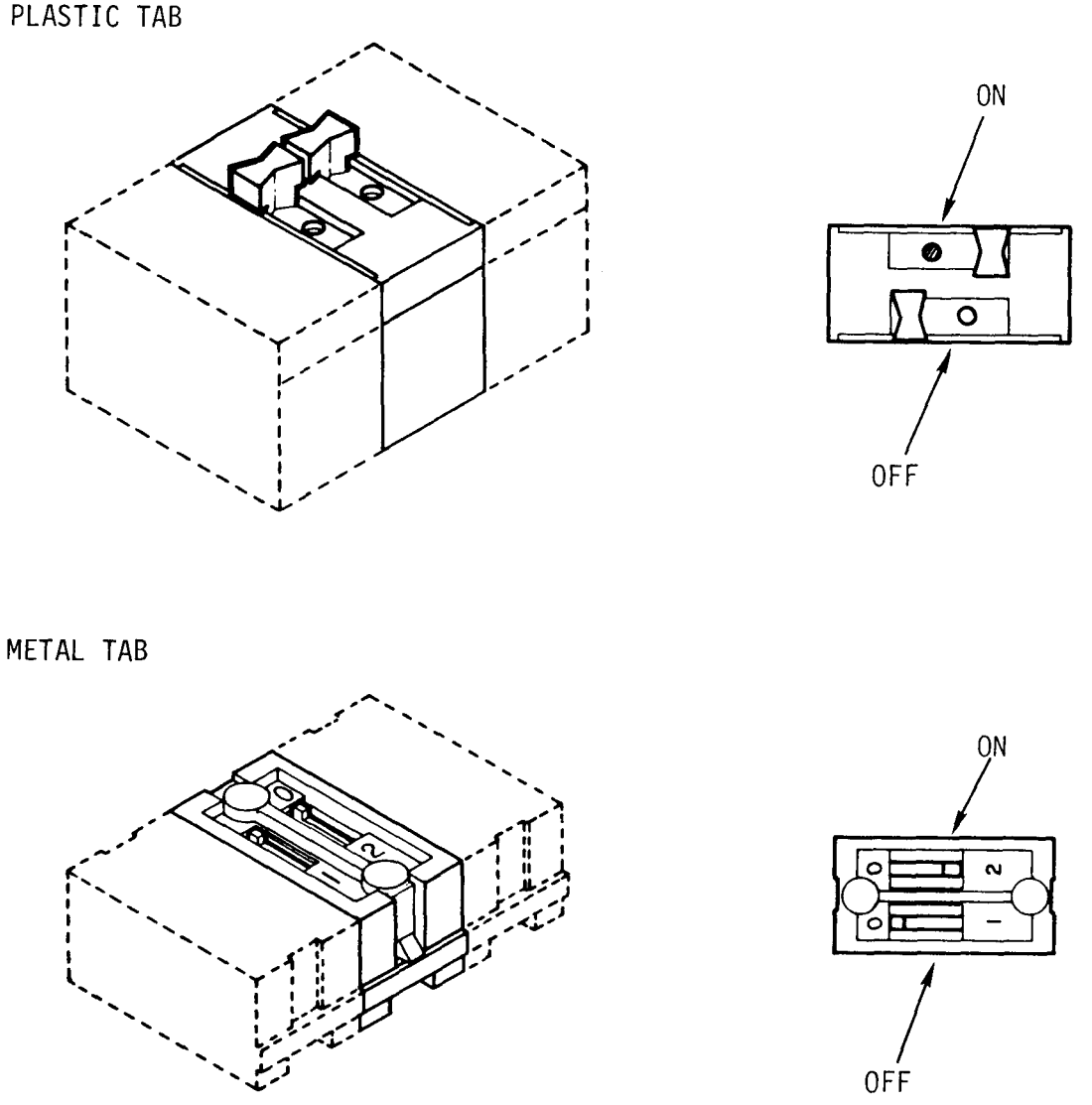


Figure 1-6. Slide Switch Operation

c. Hexadecimal Rotary Switches. The face of a hexadecimal rotary switch has alphanumeric characters and hashmarks circled around an arrow-type-pointer dial (fig. 1-7). The hashmarks between the characters represent the missing values. The dial or selector always rotates clockwise. To select a hexidecimal value of

5, turn the selector to the right until the pointer lines up with the hashmark between 4 and 6. If you wish to change the setting to E, turn the selector to the right again until the pointer lines up with E.

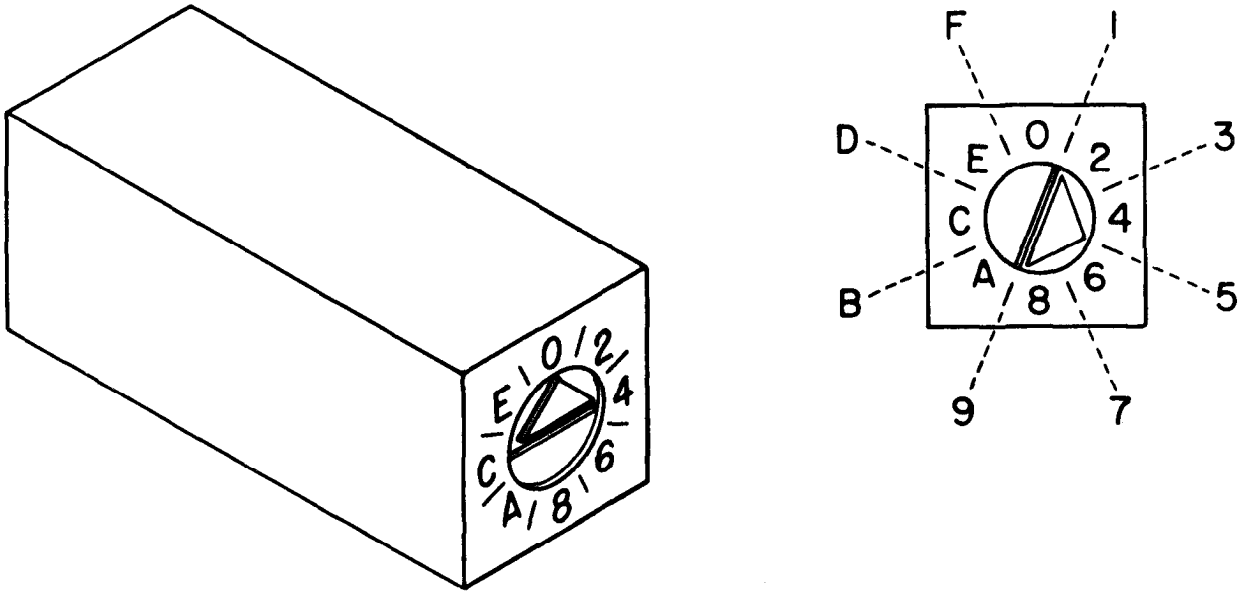


Figure 1-7. Hexadecimal Rotary Switch Operation

1-15. Address Jumpers. The pin or wire jumpers used on the PWBs are also found in three basic types:

- Wire or staple type
- Strap or canister type
- Plug type(s)

These three kinds of jumpers (fig. 1-7) or any combination of the three are to be found on the PWBs in the CPU. The jumpers are installed on the PWBs by pressing them gently but firmly into the holes provided. They are removed by prying them off carefully with a small flat-bladed screwdriver. The address jumpers (plug-type jumpers are sometimes called wiring harnesses) must be put back on a replacement PWB in exactly the same position as the original. Study the PWB and make a sketch of jumper positions before you remove them. Double check your completed work against the sketch before you reinstall the PWB.

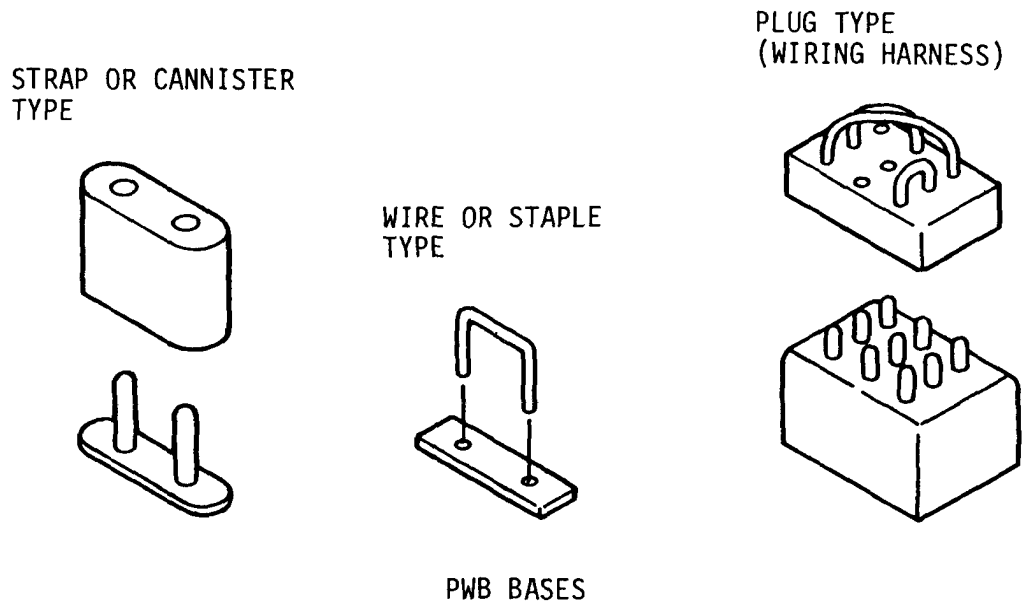


Figure 1-8. Address Jumpers and Wiring Harnesses

1-16. Socket (18/Jumper) Switches. This type switch is used on some configurations of the CPU controller board and adapter pac. These switches are replacing the earlier model hexidecimal rotary switches. Each switch consists of 16 sockets (eight jumper positions) which are used to set the hexidecimal address specified for that particular PWB. Figure 1-9 illustrates and defines the various jumper positions for each hexidecimal number or character.

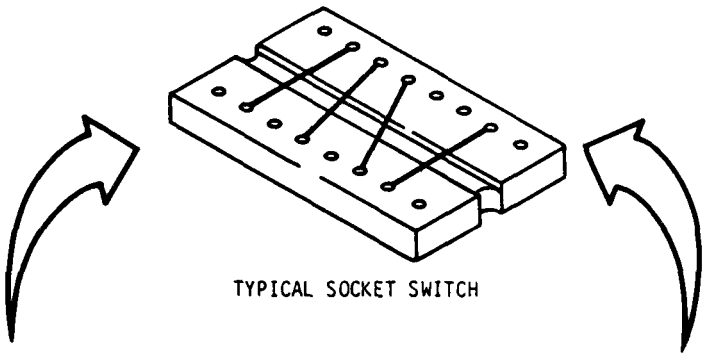
CHART 1

Applies to all boards and board locations except these board/ locations listed on chart #2

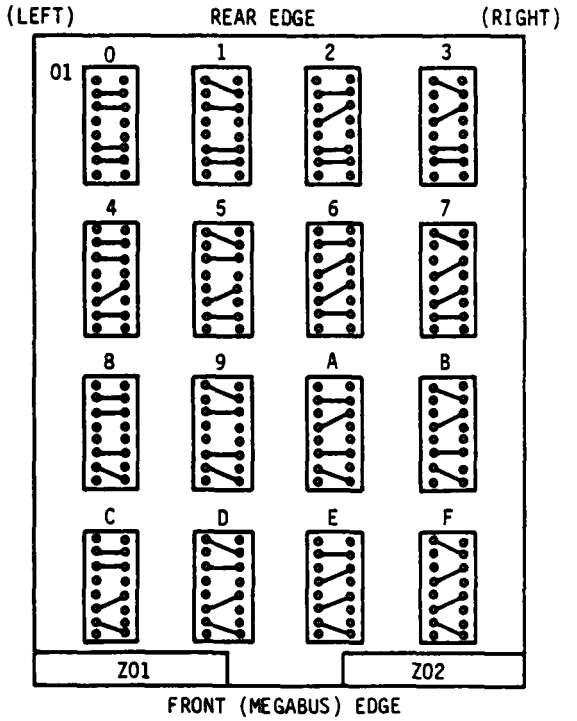
CHART 2

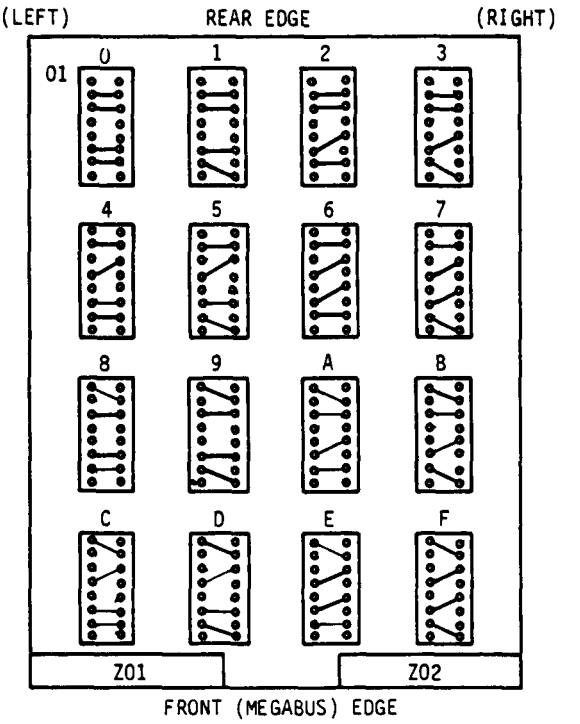
Applies only to:

BD2CSL	Loc	B03
BF4150	Loc	D16
BFM150	Loc	D16
BF4MDC	Loc	C16 & C17
BF4DC1	Loc	C16 & C17



TYPICAL SOCKET SWITCH





NOTE

For all mother boards and daughter (adapter) boards assume pin 01 of socket to be closest to left rear (non-magabus) edge of board (same orientation as the IC's). The only exception is the BF415C Loc. P20 on which pin 01 is closest to the right rear edge of board.

Figure 1-9. Socket (18/Jumper) Switch Hexidecimal Jumper Configurations

1-17. EQUIPMENT IDENTIFICATION PLATE

An equipment identification plate (fig. 1-10) is located on the side of the CPU cabinet.

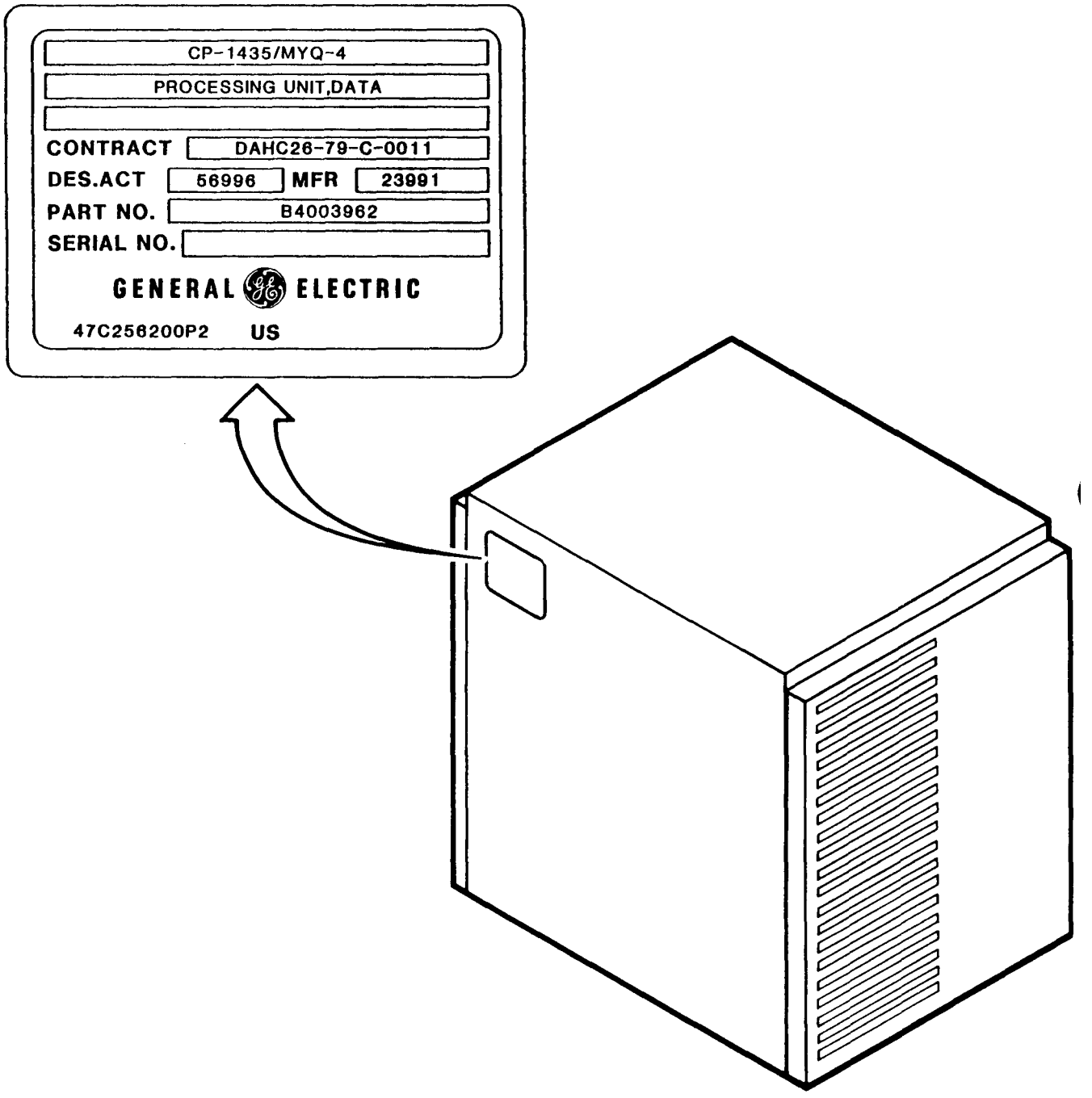


Figure 1-10. Equipment Identification Plate

1-18. DIFFERENCE BETWEEN MODELS

Board complement and meagabus slot locations vary between the CPU models covered in this manual. Figures 1-3 and 1-4 illustrate the basic configuration difference for SP435/MYQ-4 and CP-1435A/MYQ-4 respectively.

1-19. EQUIPMENT DATA

Weight and dimensions:

Weight	374 lb (170.0 kg)
Height	27.5 in. (69. 85 cm)
Width	24.0 in. (60.96 cm)
Depth	33.0 in. (83.82 cm)

Operating environment:

Temperature range	60°F to 90°F (15°C to 32°C)
Relative humidity	20% to 80% (noncondensing)

Electrical requirements:

Voltage 110 V ac to 125 V ac
Frequency 60 Hz

Functional characteristics:

8-, 16-, or 32- bit data
128, 256, or 512 kilobytes main memory or 1 megabyte
Real-time clock and watchdog timer
Power failure detection
Memory save and automatic restart

CHAPTER 2
TECHNICAL PRINCIPLES OF OPERATION

2-1. GENERAL

This chapter provides an overview of CPU operation. However, specific operating principles depend on the way the CPU is utilized in a data processing system. Your system manual explains how the CPU functions in your system. The functional description which follows below is only a general description.

2-2. FUNCTIONAL DESCRIPTION

The CPU is a general purpose minicomputer housed in a single cabinet with power supplies and a power distribution unit. The CPU (fig. 2-1 and 2-2) is comprised of a central processor (CP), commercial instruction processor (CIP), memory management unit (MMU), memory controller and peripheral device controllers. All of these units are printed circuit boards installed in a 15-slot backplane (fig. 1-3 and 1-4). Additionally, the CPU contains a memory save and automatic restart unit.

The central processor, commercial instruction processor, memories, and peripheral controllers are full-size (15 by 16 inch) printed circuit boards. The controller boards plug directly into the backplane slots. Peripheral devices attach to the system through device cables connected to smaller-size printed circuit boards mounted in a piggy-back manner on the controller boards. Any smaller-size board attached to a controller board is hereafter referred to as an adapter pat. Main memory boards also plug directly into the backplane and each memory board can support up to four separate adapter pacs containing main memory storage space. A control panel connects directly to the central processor to provide an operator interface in the system.

A self initializing bootload capability is provided in the CPU. It is a firmware controlled process that is stored in a central processor read-only memory. The initialization/bootload process is activated when power is applied to the system or manually initiated from the control panel. The initialize sequence causes the central processor and all other controllers configured in the system to perform self-contained Quality Logic Tests (QLTs). These tests verify the integrity of the hardware before loading the software. When all units successfully complete their QLT, the bootload sequence is entered causing software to be loaded from a boot device into main memory. The CPU then branches to and executes the software. Firmware sequences stored in the central processor read-only memory, control the step-by-step actions necessary for central processor execution of each software instruction.

System operations are controlled by the central processor execution of software programs stored in main memory. The CPU communicates with other system components primarily through the backplane. A combination of firmware and hardware controls the communications. Hardware switches are used to assign a unique 1/0 channel address to each unit attached to the backplane. Software uses these addresses to direct instructions to the proper peripheral controllers. The controllers direct

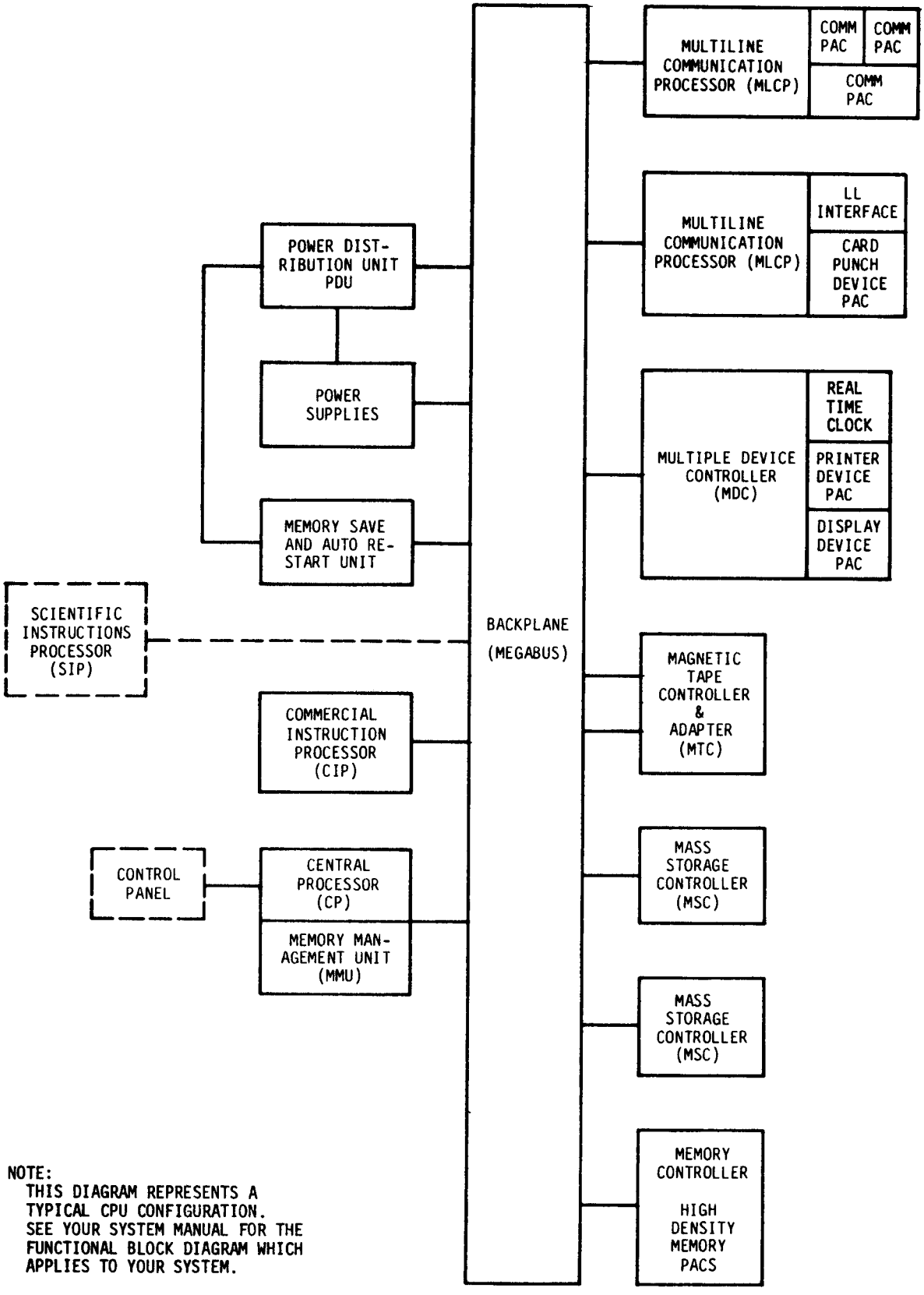


Figure 2-1. Functional Block Diagram for CP-1435/MYQ-4

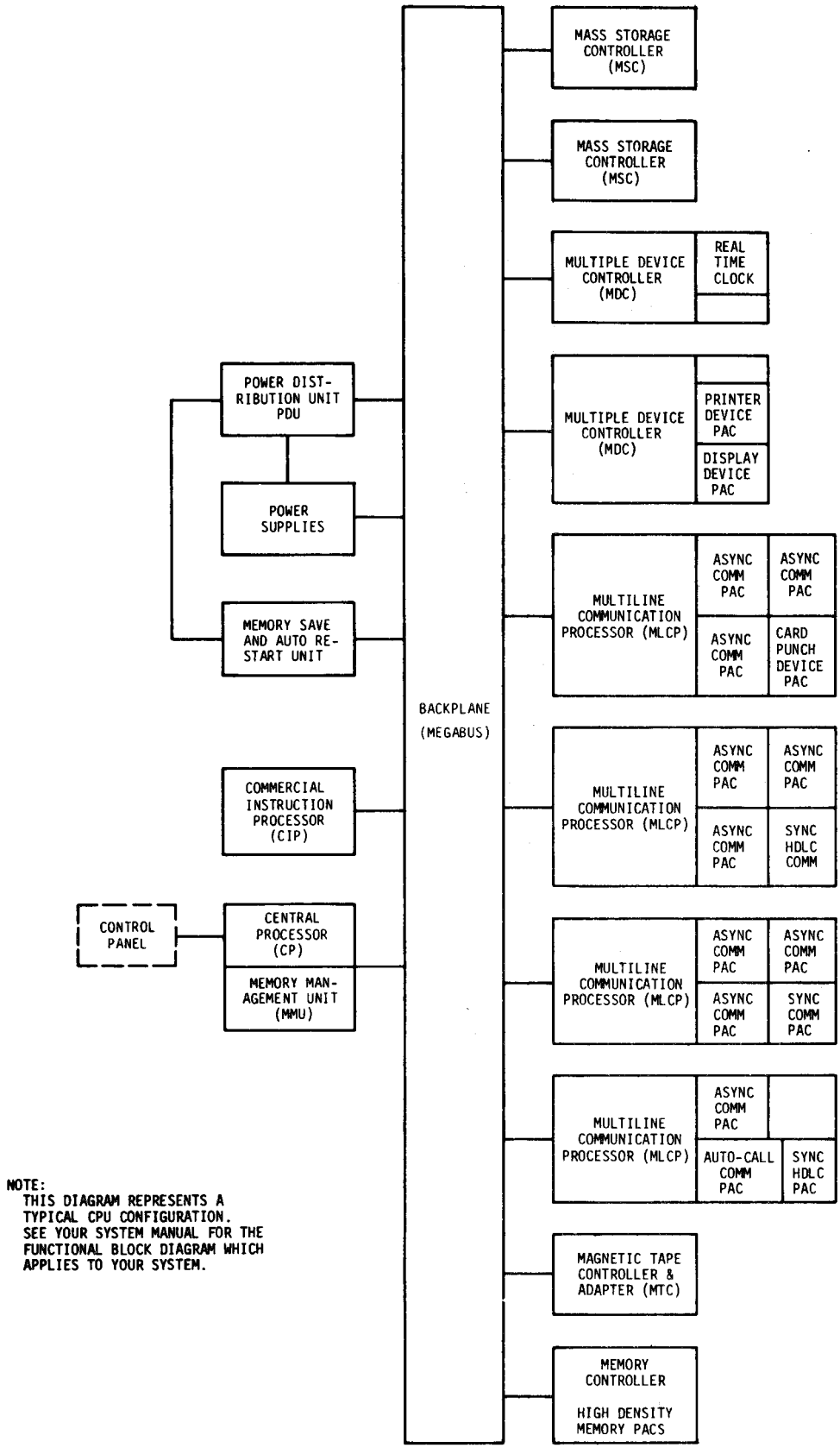


Figure 2-2 Functional Block Diagram for CP-1435A/MYQ-4

and control their associated peripheral devices accordingly. Execution of an 1/0 instruction causes the central processor firmware to transfer the channel address and function command specified in the instruction to the backplane. Only the controller assigned to the corresponding channel address can decode the command. Dependent on the command, the controller may communicate with the central processor, perform some controller or device specific action, or initiate and control data transfers between main memory and peripheral devices.

When a commercial instruction is encountered during program execution, the CP interprets it as an 1/0 instruction to the CIP. CP firmware transfers the instruction specifics over the backplane to the CIP. The CIP then proceeds to independently execute the commercial instruction.

All controller activities, once initiated by the CP are executed independently and asynchronously. However, software is kept informed when controller data transfers are completed. The controllers issue interrupts to the CP over the backplane. The CP processes the interrupts on a priority basis according to established procedures.

CHAPTER 3
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

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

3-1. COMMON TOOLS AND EQUIPMENT

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

3-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Refer to TM 11-701O-2O3-23P for a complete listing and description of special tools, TMDE and support equipment required by organizational maintenance. Also refer to appendix B for a list of tools pertaining to the CPU.

3-3. SPARES AND REPAIR PARTS

Refer to TM 11-701O-2O3-23P for a complete listing and description of spares and repair parts required for organizational maintenance of this equipment.

Section II. SERVICE UPON RECEIPT

3-4. UNPACKING

Upon receipt of new equipment, check packing list and instructions for any precautions or specific unpacking procedures.

3-5. CHECKING UNPACKED EQUIPMENT

Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 364, Discrepancy in Shipment Report.

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.

Check the equipment to ensure that required Modification Work Orders have been applied in accordance with DA PAM 310-1.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

3-6. GENERAL

Organizational maintenance PMCS is the required inspection and care of the equipment necessary to keep it in good operating condition. Routine checks like equipment inventory, cleaning, dusting, washing, checking for frayed cables, storing items not in use, covering unused receptacles and checking for loose ruts and bolts are not listed in your PMCS. They are things you should do anytime you see they must be done. If you find a routine check like one of these listed in your PMCS, it was listed because operators reported problems with this item.

3-7. PMCS PROCEDURES

PMCS procedures are done at fixed intervals for the following purposes:

- Make sure that the equipment is operable
- Prevent equipment problems in future operation
- Identify and resolve minor problems in the equipment before they become major problems
- Scheduled cleaning of the equipment

3-8. ITEM NUMBER COLUMN

The checks/services in the PMCS table are numbered in order of performance. Use this ITEM number when filling out DA Form 2404 (Equipment Inspection and Maintenance Worksheet).

3-9. ITEM TO BE INSPECTED COLUMN

The items listed in this column are based on the major components of the equipment and use common names of these components.

3-10. PROCEDURE COLUMN

This column gives you the check or service procedure which you must perform on the item.

3-11. EQUIPMENT WILL BE REPORTED NOT READY/AVAILABLE IF COLUMN

This column tells you under what conditions the equipment will be unable to perform its primary mission. When you notice this condition during PMCS you must report it on the proper form and tell your supervisor.

Table 3-1. Organizational Preventive Maintenance Checks and Services

Legend

W - Weekly M - Monthly S - Semiannualy

Item No.	Interval W	Interval M	Interval S	Item To Be Inspected	Procedures	Equipment Will Be Reported Not Ready/ Available If:
1	•			Cooling Fans	Check operation of cooling fans as follows: 1. Power up CPU. 2. Observe fans during power up. Note any fan that is noticeably slow in coming up to speed. 3. Check for full airflow from each fan during operation. 4. Power off CPU. Note any fan which stops abnormally fast.	Fan not operating or not operating properly.
2		•		CPU	Check CPU operation as follows: 1. Power up CPU. 2. Run QLT. 3. Run extended QLTs. 4. Power off CPU.	QLTs will not run properly. CHECK indicator remains on.
3			•	CPU Interior	Clean interior of CPU as follows: 1. Power off CPU and PDU. CAUTION Work carefully while cleaning. Clean thoroughly but do not damage components or wiring.	

Table 3-1. Organizational Preventive Maintenance Checks and Services -- Continued

Legend

W - Weekly M - Monthly S - Semiannualy

Item No.	Interval W	Interval M	Interval S	Item To Be Inspected	Procedures	Equipment Will Be Reported Not Ready/ Available If:
					2. Open CPU door and remove rear panel. 3. Vacuum metal surfaces, wiring and components using soft-bristled, brush-type nozzle. 4. Loosen dust and lint in corners, crevices and between components using a small, soft-bristled brush. Vacuum up loosened dust and dirt. WARNING Isopropyl alcohol is flammable. Keep away from heat and open flame. CAUTION Use isopropyl alcohol sparingly. Alcohol can damage some components and cause corrosion on connector contacts. NOTE If oily film is found on chassis surface, take action to correct cause. Inspect for damaged (leaking) component.	

Table 3-1. Organizational Preventive Maintenance Checks and Services -- Continued

Legend

W - Weekly M - Monthly S - Semiannualy

Item No.	Interval W	Interval M	Interval S	Item To Be Inspected	Procedures	Equipment Will Be Reported Not Ready/ Available If:
					5. Remove oily film with a soft, lint-free cloth dampened with isopropyl alcohol. If a run or drip occurs, wipe up immediately.	
4			●	Fan blades	Clean fan blades as follows: 1. Remove fan guard. 2. Vacuum both sides of fan blade using soft-bristled, brush-type nozzle. 3. Wipe residue from fan blades with a clean, lint-free cloth dampened with isopropyl alcohol. If run or drip occurs, wipe up immediately. 4. Replace fan guard.	Fan blade bent, broken or missing.

CHAPTER 4
DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

Index of Maintenance Procedures

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 Modified Table of Organization and Equipment (MTOE) applicable to your unit.

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

Refer to TM 11-701O-2O3-23P for a complete listing and description of special tools, TMDE and support equipment required by direct support maintenance. Also refer to appendix B for a list of tools pertaining to the CPU.

4-3. SPARES AND REPAIR PARTS

Refer to TM 11-701O-2O3-23P for a complete listing and description of spares and repair parts required for direct support maintenance of this equipment.

Section II. TROUBLESHOOTING

Overall troubleshooting of the CPU is best accomplished in a system configuration since the CPU is system interdependent. Refer to your system manual.

Off-line troubleshooting can be performed by running the extended Quality Logic Tests (QLTs). Readouts on the CPU control panel register and lights on the edge of the memory controller boards indicate source of malfunctions.

4-5. ALTERNATIVE TROUBLESHOOTING TECHNIQUES

When a failure causes a symptom which is not corrected by the troubleshooting procedure in this manual, you must try alternative techniques.

a. Understand Principles of Operation. Sometimes the symptom may have no specific procedure given to troubleshoot it. When this happens, remember that the equipment always operates the same way. By comparing the faulty operation with expected or normal operation you may find the cause of the failure and be able to fix it.

b. Check the Circuits. All electronic equipment uses circuits to route power through he components. Any break in continuity will cause some type of failure. By running continuity checks on suspect circuits you may find the cause of the failure. Use schematic diagram FO-1 to check the circuits in this equipment.

c. Check Past Maintenance Records. If the unusual failure occurred before, it should appear in the maintenance records for the equipment. The records should also tell you how the failure was corrected. Use the same fix this time.

d. Trial and Error Repair. Usually trial and error repairs should be avoided. They are costly and can induce additional symptoms. However, when your experience with the equipment leads you to suspect a definite cause, you should try he repair as a last resort before shipping the equipment to depot for maintenance.

4-6. TROUBLESHOOTING PROCEDURES

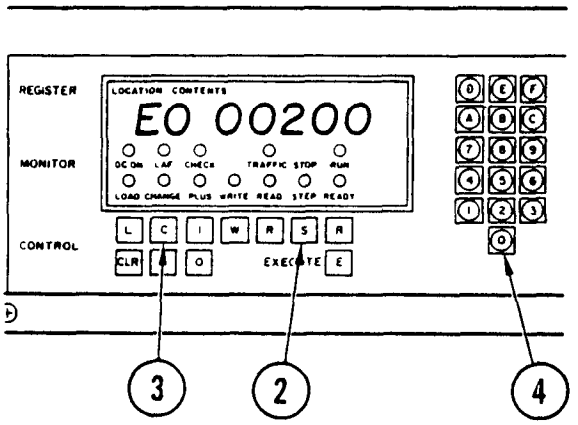
Run the extended QLTs and refer to table 4-1 for register noted errors or to paragraph 4-8 for memory controller board errors.

4-7. RUN EXTENDED QLT

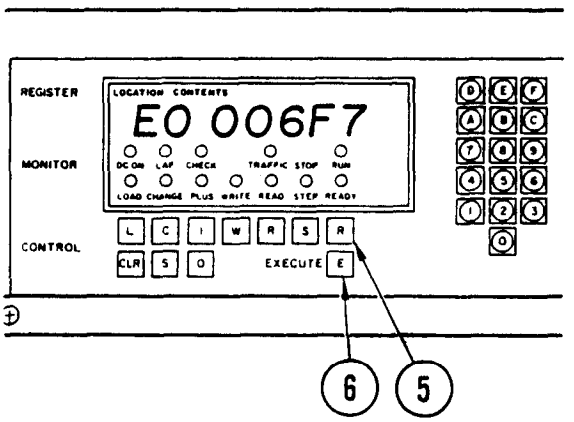
INITIAL SETUP

Common Tools
- TORX offset driver (CP-1435A/MYQ-4 only)

Personnel Required
- Two

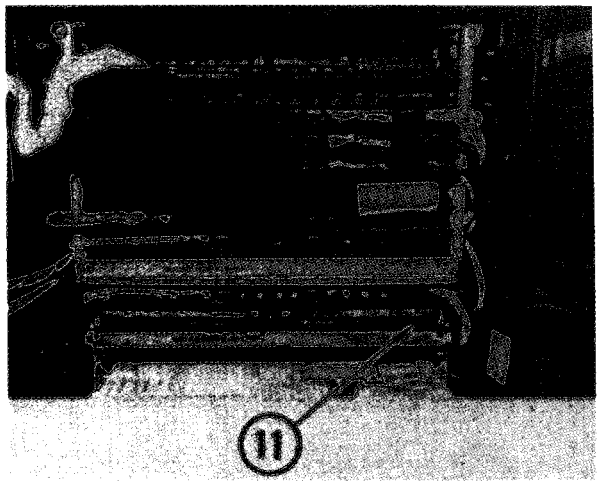


1. Run QLTs.
2. When REGISTER displays E0 00002, press STOP.
3. Press CHANGE.
4. Press 0 twice. REGISTER should display E0 00200.



5. Press READY.
6. Press EXECUTE. REGISTER should display either E0 006F7 or E0 006FB within one minute. This completes extended QLTs except for EDAC Memory Test.

4-7. RUN EXTENDED QLT (CONT)



NOTE

More than one memory controller board may be installed. Refer to para 1-14 for difference between models.

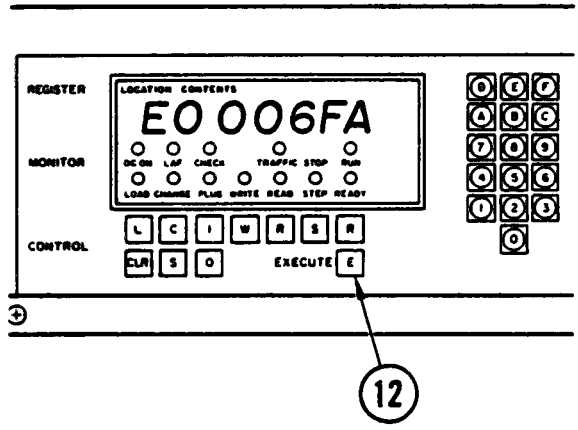
7. Open CPU door.

8. Open top grill.

9. Using TORX offset driver, remove bottom grill.

10. Locate bottom memory board.

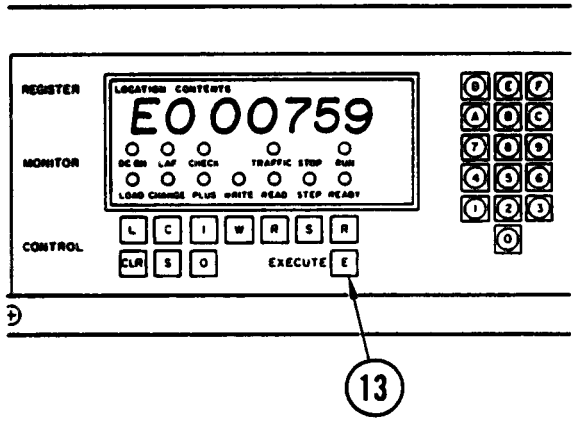
11. Push memory toggle switch to left and hold as shown.



12. Have partner press EXECUTE. The register should display either E0 006FA or E0 006FE.

NOTE

If REGISTER does not display any of the following, refer to table 4-1 for error data.



13. Release the toggle switch. Press EXECUTE. REGISTER should display E0 00759, E0 0074F or E0007FF. This completes EDAC Memory Test.

14. Using TORX offset driver, replace bottom grill.

15. Close top grill. Close CPU door and move CPU back against wall.

Table 4-1. Extended QLT Register Error Data

* REGISTER E0			HALT CONDITION	SUSPECTED CAUSE
REV 2	REV 1	REV 0		
609	609	609	CPU PROM DATA Incorrect	CP board
61B	61B	631	Yellow Memory Conditions Received	Look for Red Error's in Future; indicating bad Memory.
626	626	621	CP I Register Incorrect	CP
631	631	62C	CP I Register Incorrect	CP board
63F	63F	63F	Level Change Error	CP or Defective Power Supply
653	653	653	RTC in Error	CP
658	658	658	Level Change Error	CP
669	669	669	Trap on Monitor Call	CP
66C	66C	66C	Trap on Monitor Call	CP board
672	672	672	Trap on Monitor Call	CP
675	675	675	Trap on Monitor Call	CP
68E	68C	68C	I/O Data Path in Error	
696	694	694	I/O Address of Buffer in Error	
69F	69D	69D	I/O Upper Address Incorrect	** When first halt occurs, load D1 with a different MDC controller address and rerun the QLT. If the same halt occurs, change CP board; otherwise, the old MDC was bad.
6A1	69F	69F	I/O Lower Address Incorrect	
6CC	6CA	6CA	BDC did not go to Correct CP Level	
6D1	6CF	6CF	CP did not go to Correct I/O Level	
6D7	6D5	6D5	ID Code of ISA Incorrect	
6EE	6EC	6EC	Right Half of Byte Mode Incorrect	Suspect CP, but press Execute and do memory test. If 702/70A or 706/703 halts occur, change memory. If 6FA or 6FE halt, change CP board (para 4-12).
6F6	6F4	6F4	Left Half of Byte Mode Incorrect	
6FB	6F7	6F7	Set and Hold 1st Memory Switch and Execute	Normal Halt for Memory Test Start.
6FE	6FA	6FA	Release Switch and Execute	Normal Halt for Memory Test Finish.
706	702	702	No Red Errors Received	Change memory if previous 6EC/6F4 or 6EE/6F6 halts occurred. If errors continue after memory change, change CP board (para 4-11).
70E	70A	70A	No Yellow Errors Received	
71E	718	64	End of Test, no MMU Option Detected	MMU if available; if not, halt E0 = 64 or 718 or 71E will occur.
727	721	717	Validate Bit did not Test Correctly	
73D	72A	720	Byte Size did not Test	
730	737	72D	Read Access Error	
744	73E	734	Read but no Write Access	
747	741	737	Read/Write Access Error	
1001	1001	1001	Execute Access Error	
7FF	759	74F	Good Completed Run	

* Register indication will depend on model used. Refer to para 1-14 for difference between models.

** I/O tests are run on channel D1. Preload is 400. If 400 is assigned to an MLCP with any REV. or an MPDC using Rev 0., then a halt will occur at 6CA/6CF or 6CC/6D1. To complete tests, load D1 with channel # of an MDC or MPDC (Rev. 1 or 2) and rerun QLT.

4-8. INTERPRETING MEMORY CONTROLLER BOARD INDICATORS

If the extended QLTs do not pass, use the following information to determine which board might be causing the problem.

a. Open up the door of the CPU cabinet and look at the bottom boards mounted in the chassis. During on-line operation memory controller board-edge indicators as yellow or red error.

b. A yellow error is a non-fatal (correctable) error and does not indicate any action, you do not need to replace boards. The EDAC will correct itself. Yellow errors are not detected by software and will not appear as a code or message at the console terminal.

c. A red error is fatal. Red errors are not correctable. They indicate system failure and mean that either an adapter pac is faulty or that the controller board needs to be replaced.

d. Different combinations of indicators lit on the front edge of the memory board (fig. 4-1) indicate the adapter pac status and the type of error (fatal or nonfatal).

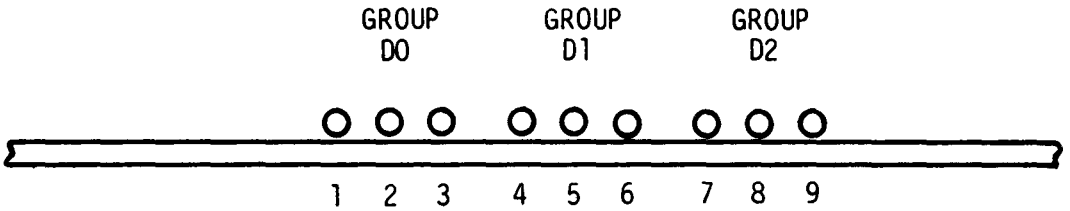


Figure 4-1. Memory Controller Board Group Error Indicators

e. Combinations of indicators lit in group DO will tell you which adapter pac is faulty. Eight possible combinations of lights 1, 2, and 3, and the location of each adapter pac on the memory controller board is shown (fig. 4-2).

f. When the total number of indicators lit in groups D1 and D2 equals an EVEN number, it means a double-bit memory red error combination (fig. 4-3).

g. Red errors are not correctable. The adapter pac indicated by the light combinations shown in figure 4-3 should first be replaced by a known good board to make sure that you have isolated the correct fault, and to avoid replacing the controller board if possible. There are only two exceptions (fig. 4-4) to the EVEN number rule.

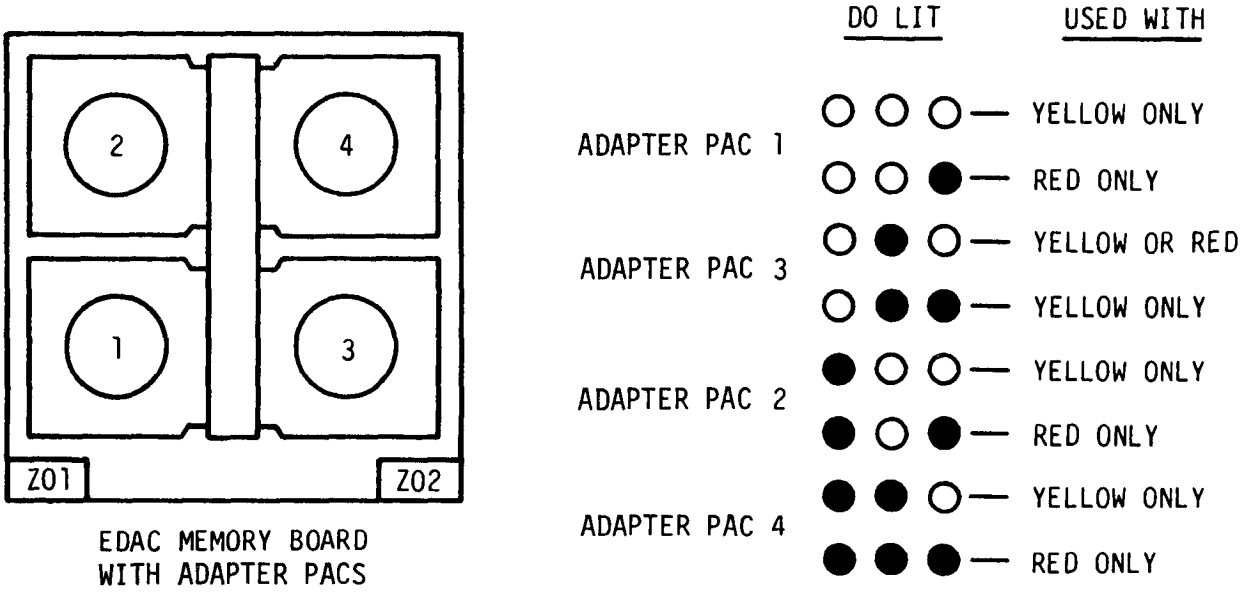


Figure 4-2. Group DO Light Combinations

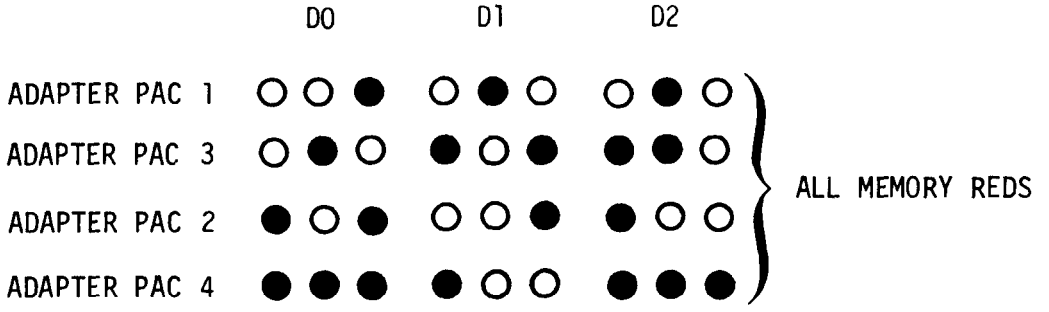


Figure 4-3. Red Error Indications

(1) When lights 4 and 5 are ON, 6, 7, 8, and 9 are OFF

EXAMPLE:

(2) When lights 5, 4, 8, and 9 are ON, 6 and 7 are OFF

Figure 4-4. Exceptions to EVEN Combination Rule

h. In these examples of exceptions (fig. 4-4) the probable cause for red errors is usually bus parity check failure. This can mean that any board in the system has failed or that the megabus (backplane) is faulty.

i. The most likely suspect is usually the main memory board. In some cases, both the adapter pac and the controller boards need to be replaced in order to isolate the fault.

CAUTION

Do not attempt to replace an EDAC memory adapter pac with a parity memory pac, EDAC memory pacs can be used to replace parity memory pacs but parity memory pacs cannot be used to replace EDAC'S.

Section III. MAINTENANCE PROCEDURES

4-9. GENERAL

The individual maintenance procedures in this section contain the corrective actions required to fix a failure which was isolated during troubleshooting.

4-10. EQUIPMENT HANDLING PRECAUTIONS

As with most data processing equipment, the CPU is very sensitive to dirt, dust, and even smoke. Follow the rules below to avoid damage to the equipment.

a. Always identify the board and its slot location before you remove it from the CPU. Boards and slot locations will vary dependent upon CPU model. New boards must be installed and configured exactly as the old board or the CPU may fail.

b. Make sure hands, hair, clothing, and shoes are clean before working on the CPU . Do not touch board connector terminals with any tool, bare hands, or a dirty cloth. Tools will damage the fragile connector. Dirt or body sweat will cause corrosion.

c. Hold boards by their edges whenever you lift them.

d. If a board is to be transported, place it in its original shipping container. If it is unavailable, pack it carefully with clean packing material that will prevent physical damage and will not cause corrosion.

e. Ground your body to discharge static electricity by touching a metal chassis or cabinet before touching a board. A static discharge from you to a board can destroy integrated circuits on the board.

f. Store and ship spare boards in static-free bags.

g. Do not put beverages on or near boards. An accidental spill can cause corrosion and chemical damage.

h. Never leave boards lying around unprotected.

i. Do not use masking tape labels.

j. Store boards in a humidity controlled environment.

k. Do not smoke in an area where boards are used or stored.

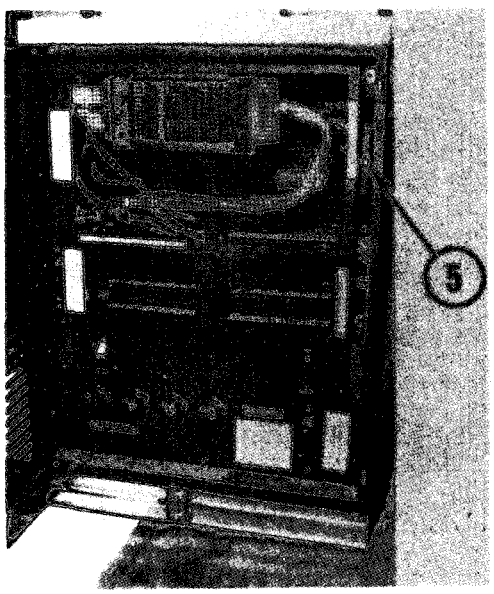
4-11. MAINTENANCE PROCEDURES

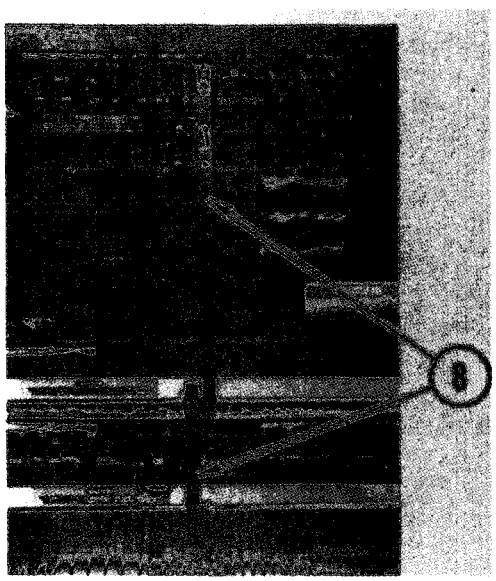
Before you start a corrective maintenance procedure, you should gather all the items or help listed in the initial setup box for that procedure. Read the procedure carefully and do only what each step tells you to do. Some steps are followed by a reference. Use the reference any time you are not sure what you must do for that step. Always do the steps in the order they are given unless the procedure requires decision steps. When decision steps are involved, go in the order indicated by the decision.

4-11.1. REMOVE/REPLACE CIRCUIT BOARD SUPPORT STRIPS

INITIAL SETUP

Common Tools
- Tool kit
- TORX offset driver (CP-1435A/MYQ-4 only)





Remove

1. Power off.

NOTE

In some installations you cannot open CPU door without pulling CPU into aisle.

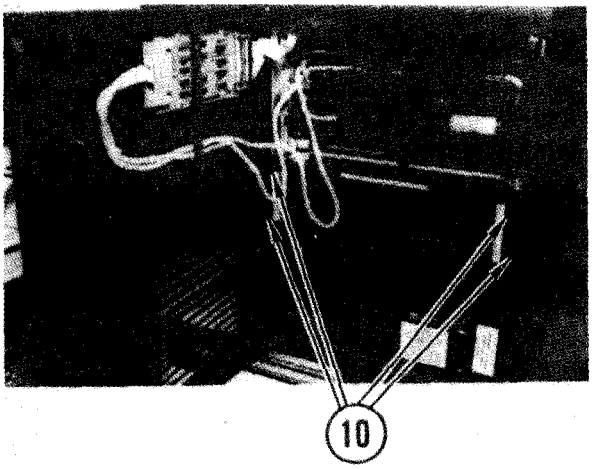
2. Unlock and pull ac power plug from outlet.
3. If installed, remove screws.
4. Open door.
5. Loosen captive screw.
6. Open top grill.

NOTE

For CP-1435/MYQ-4 do steps 7 thru 9. For CP-1435A/MYQ-4 do steps 10 thru 17.

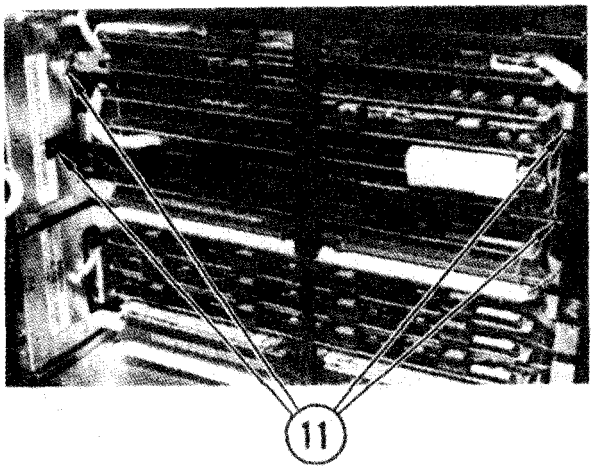
7. Loosen two captive screws and open bottom grill.
8. Remove support strips from boards in both 5-card and 10-card chassis.
9. Close grills, tighten captive screws, then go to steps 16-17.

4-11.1. REMOVE/REPLACE CIRCUIT BOARD SUPPORT STRIPS (CONT)



10. Using TORX offset driver, remove four mounting screws. Remove bottom grill.

11. Using TORX offset driver, remove mounting screws securing upper support holding bracket. Remove bracket.



12. Remove support strips from boards in both 5-card and 10-card chassis.

13. Replace bottom grill and secure in position with four mounting screws.

14. Close top grill.

15. Tighten captive screw.

16. Close door.

17. Plug AC power cord into outlet.

Replace

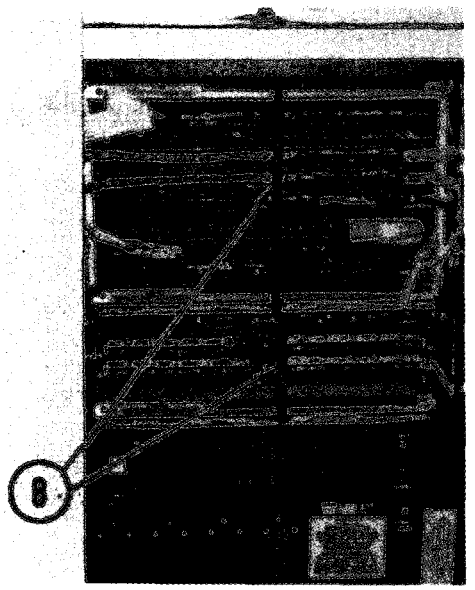
1. Power off.

NOTE

In some installations you cannot open CPU door without pulling CPU into aisle.

2. Unlock and pull AC power plug from outlet.

4-11.1. REM0VE/REPLACE CIRCUIT BOARD SUPPORT STRIPS (CONT)

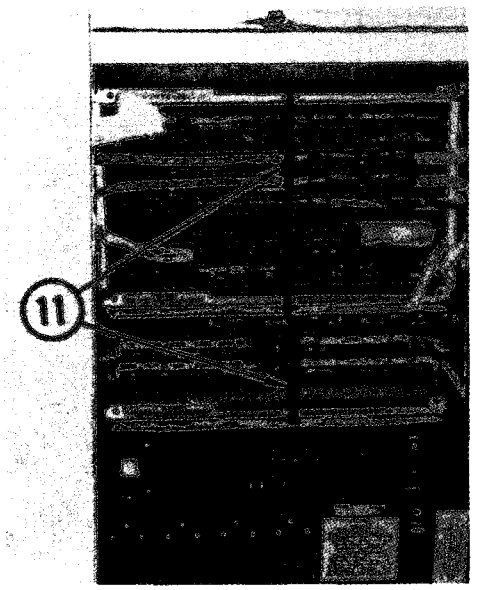


3. If installed, remove screws.
4. Open door.
5. Loosen captive screw.
6. Open top grill.

NOTE

For CP-1435/MYQ-4 do steps 7 thru 9. For CP-1435A/MYQ-4 do steps 10 thru 17.

7. Loosen two captive screws and open bottom grill.
8. Get support strips from bulk storage cabinet. Snap supports into place as shown.
9. Close grills, tighten captive screws, then go to steps 16-17.
10. Using TORX offset driver, remove mounting screws and remove bottom grill.



11. Get support strips from bulk storage cabinet. Snap supports into place as shown.
12. Place metal support rods in place over plastic strips and secure into position with four mounting screws.
13. Place bottom grill in position. Install and tighten four screws using TORX offset driver.
14. Close top grill.
15. Tighten captive screw.
16. Close door.
17. Plug AC power cord into outlet.

4-12. REMOVE/REPLACE CP BOARD

INITIAL SETUP

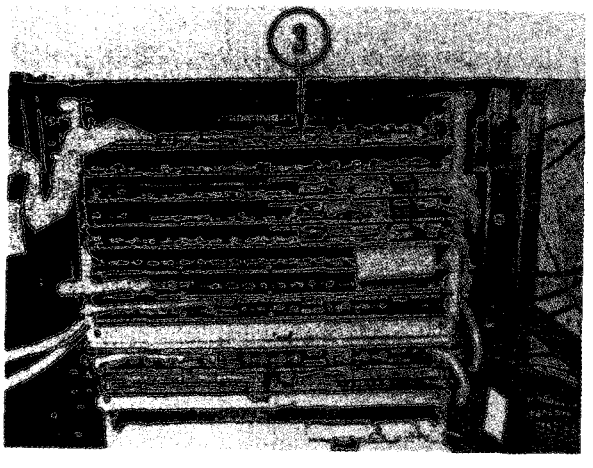
Common Tools
- Tool kit

Remove

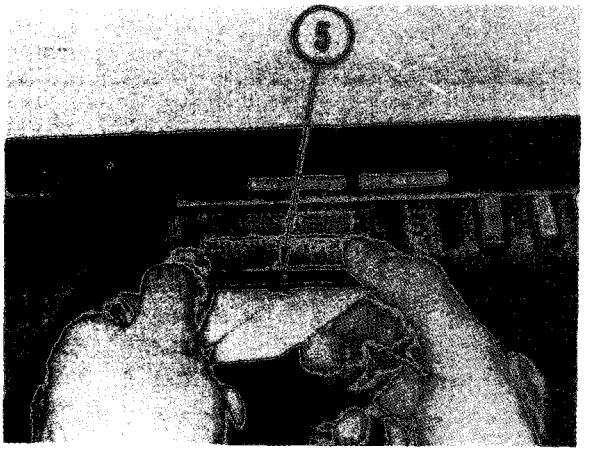
1. Power off.

NOTE

In some installations you cannot open CPU door without pulling CPU out into aisle.

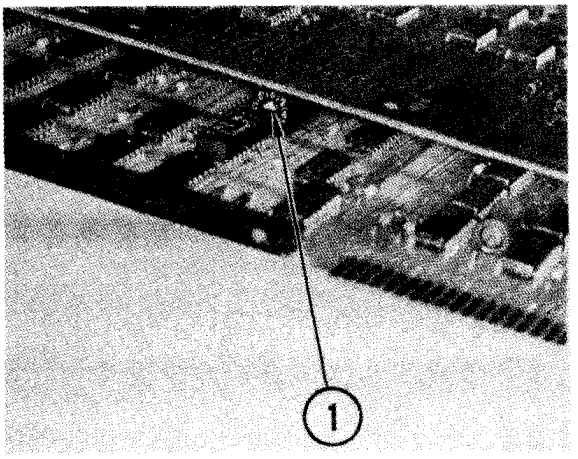


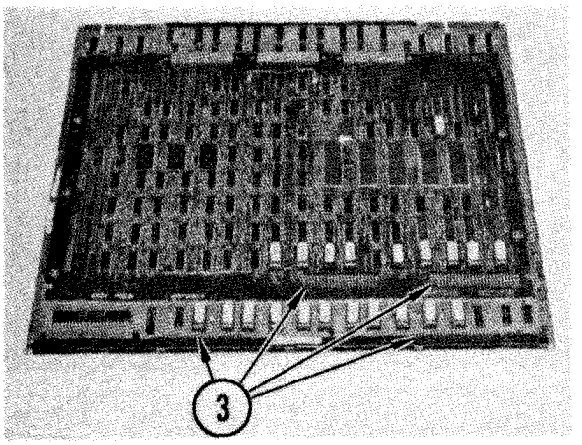
2. Open CPU door and top grill.
3. Locate CP board.
4. Wiggle board loose. Slide board out two or three inches.

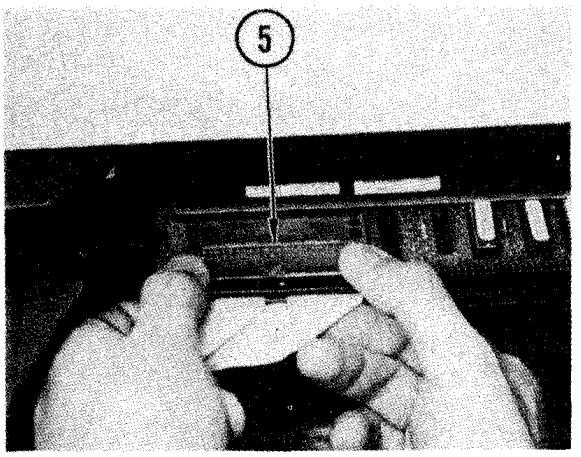


5. Disconnect ribbon cable.
6. Slide board out of slot.

4-12. REMOVE/REPLACE CP BOARD (CONT)







Replace

1. Locate address switch at rear of new board.

NOTE

The CP board may have a socket switch instead of the rotary switch illustrated.

2. Using small screwdriver, set switch to position required for system. (Refer to Appendix D in your system manual.)

3. Make sure pins are not bent or broken.

4. Slide new board most of way into slot. (Let it stick out two or three inches.)

5. Connect ribbon cable.

6. Put thumbs on ends of board. Push in board until snug.

7. Close top grill.

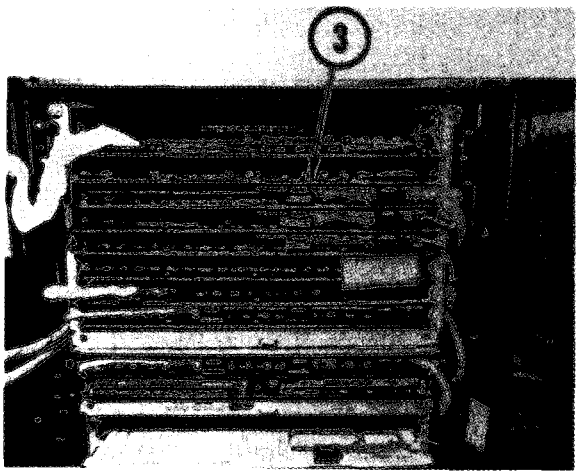
8. Close door.

9. Power ON.

4-13. REMOVE/REPLACE CIP BOARD

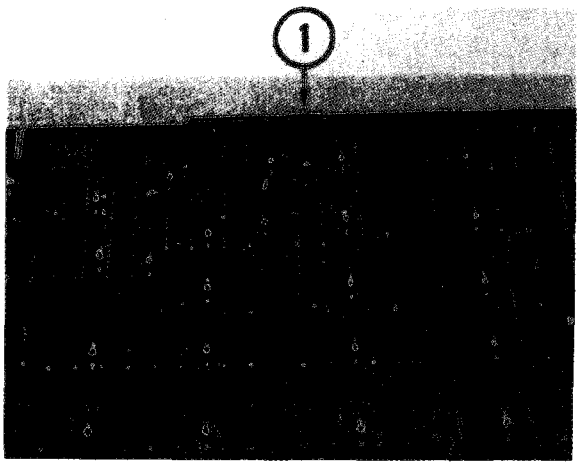
INITIAL SETUP

Common Tools
- Tool kit



Remove

1. Power off.
2. Open door and top grill.
3. Find CIP board.
4. Wiggle board free.
5. Slide board out of slot.



Replace

1. Make sure address switch on new board is set to position required for system. (See Appendix D in your system manual.)

NOTE

The CIP board may have a socket switch instead of the rotary switch illustrated.

2. Slide CIP board into slot.
3. Push board until snug.
4. Close top grill.
5. Close door. Power on.

4-14. REMOVE/REPLACE 10-CARD CHASSIS ASSEMBLY

INITIAL SETUP

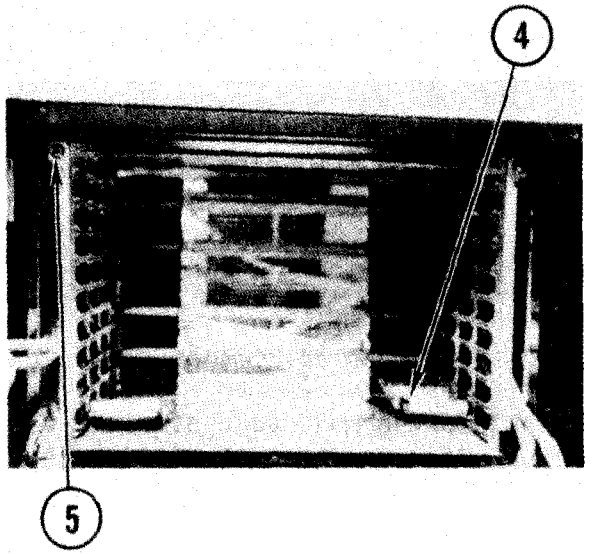
Common Tools	Materials/Spare Parts	Applicable Models
• Tool kit	• Tags • Pen or pencil	• CP-1435/MYQ-4

Remove

1. Power off. Unlock and pull ac power plug from outlet.
2. Open door and top grill.

NOTE

Tag and identify all circuit boards and paddle boards.

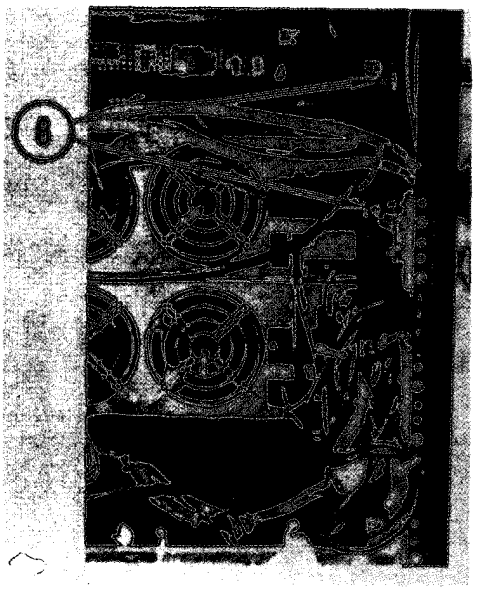


NOTE

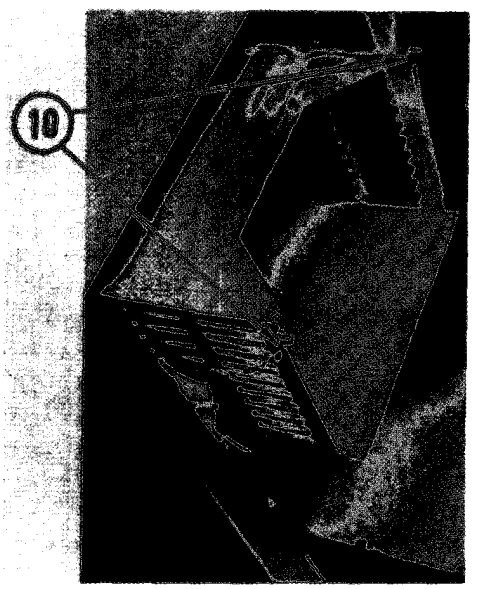
Board complement may vary dependent upon CPU model used. Refer to para 1-14 for difference between models.

3. Remove CP board (para 4-12, steps 3-6), CIP board (para 4-13, steps 3-5), both disk controller boards (para 4-27, steps 3-8), MDC board (para 4-30, steps 3-9), PE Mag tape controller (para 4-29, steps 3-7), data recovery unit controller (para 4-28, steps 3-9), MLCP controller board (para 4-36, steps 3-9) and top terminator board (para 4-16, step 5).
4. Unplug bus extender cables to chassis assembly.
5. Loosen bolts at top of chassis assembly.

4-14. REMOVE/REPLACE 10-CARD CHASSIS ASSEMBLY (CONT)

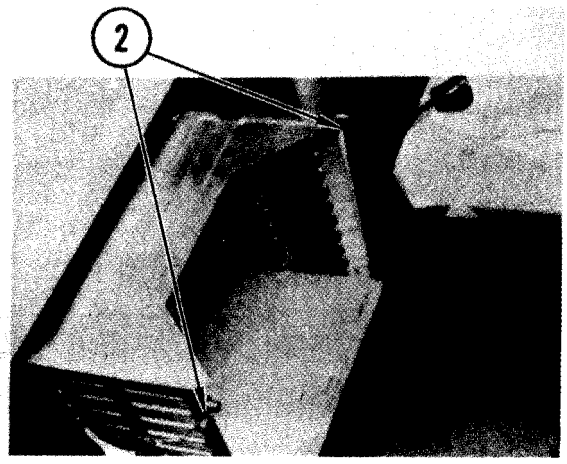


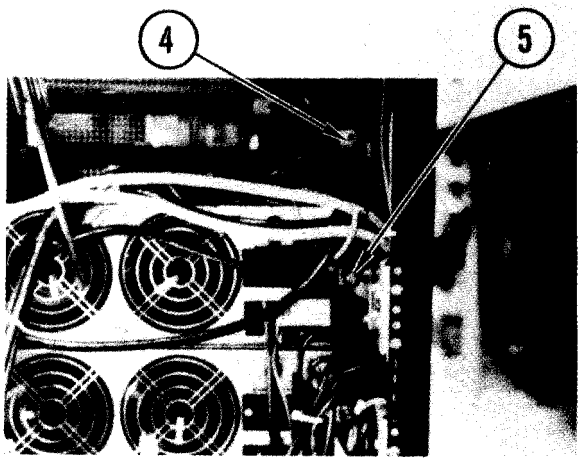
6. Remove screws holding bracket to power supply and mounting bolts from bracket. (Two brackets per power supply):
7. Remove both 10-card chassis assembly power supplies (para 4-18).
8. Remove 5-card assembly circuit boards (para 4-21, steps 2-4).
9. Pull chassis assembly approximately 4 inches out.

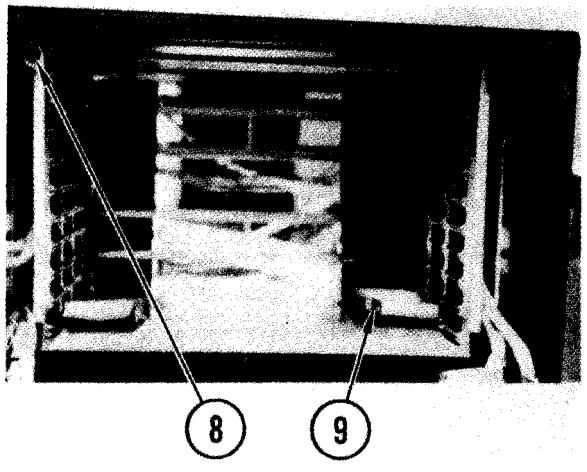


10. Remove washer and locking nut to disconnect two ground wires from each side of chassis.
11. Pull chassis assembly clear of CPU.

4-14. REMOVE/REPLACE 10-CARD CHASSIS ASSEMBLY (CONT)







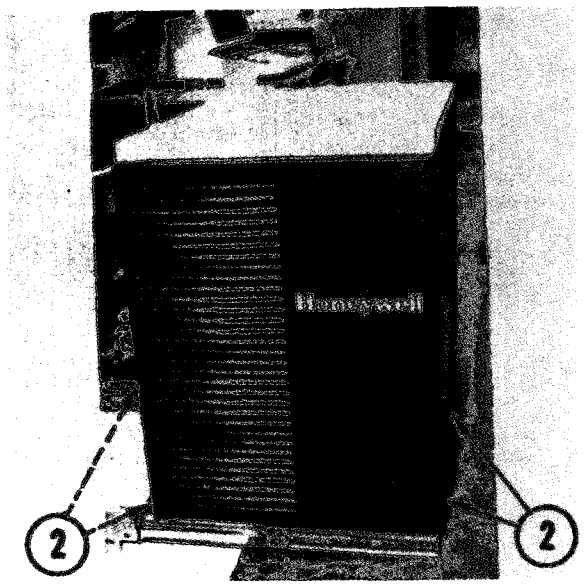
Replace

1. Slide chassis assembly into CPU except for four inches.
2. Connect two ground wires to each side of chassis assembly by installing washer and locking nut.
3. Slide chassis assembly completely into CPU.
4. Insert screws holding bracket to power supply mounts.
5. Install both 10-card chassis assembly power supplies (para 4-18) and tighten mounting bolts.
7. Replace 5-card assembly circuit boards (para 4-21, steps 5 and 8).
8. Tighten bolts at top of chassis assembly.
9. Connect bus extender cables into chassis.
10. Replace top terminator board (para 4-16, step 1), MLCP controller board (para 4-36, steps 6-10), data recovery unit controller (para 4-28, steps 8-13), PE mag tape controller (para 4-29, steps 10-13), MDC board (para 4-30, steps 6-10), both disk controller boards (para 4-27. steps 2-5), CIP board (para 4-13, steps 2-3 and CP board (para 4-12, steps 4-6).
11. Close top grill. Close door.

4-14.1 REMOVE/REPLACE 10-CARD CHASSIS ASSEMBLY

INITIAL SETUP

Common Tools	Materials/Spare Parts	Applicable Model
• Tool kit • TORX offset driver	• Tags • Pen or pencil • Tie wraps	• CP-1435A/MYQ-4



Remove

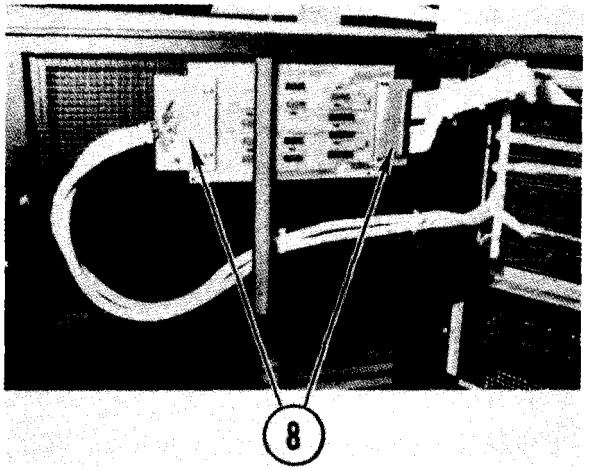
1. Power off. Unlock and pull ac power plug from outlet.
2. Remove two screws from bottom of each side panel.
3. Remove side panels.
4. Open door and top grill.
5. Tag and identify all circuit boards and paddle boards.

NOTE

As paddleboards are removed from CPU boards, note their location and push them through slots on side panels to clear CPU.

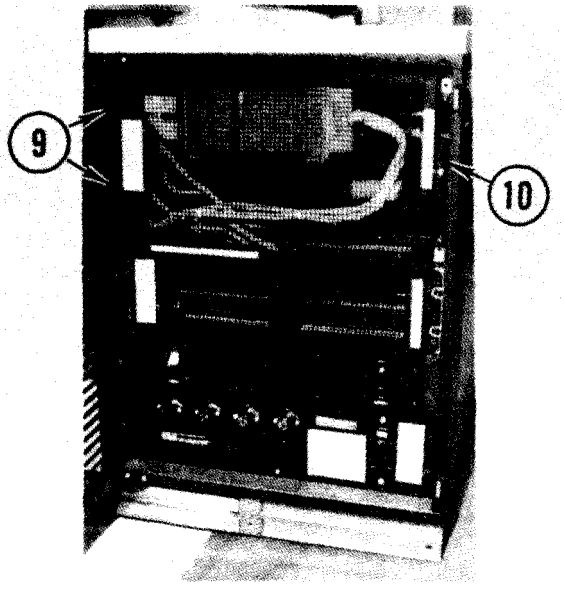
6. Remove CP board (para 4-12, steps 3-6), CIP board (para 4-13, steps 3-5), both disk controller boards (para 4-27, steps 3-8), MDC board(s) (para 4-30, steps 3-9), PE Mag tape controller (para 4-29, steps 3-7), data recovery unit controller (para 4-28, steps 3-9), MLCP controller board (para 4-36, steps 3-9) and top terminator board (para 4-16, step 5).

4-14.1 REMOVE/REPLACE 10-CARD CHASSIS ASSEMBLY (CONT)



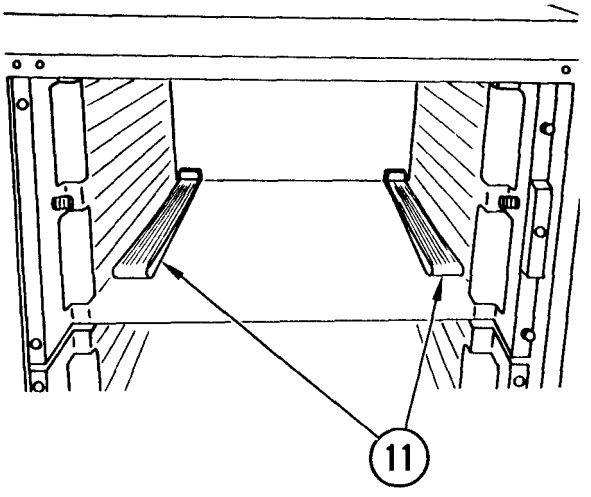
7. Cut tie wraps from repeater board connector cables.

8. Tag and remove repeater board connectors (para 4-15, step 3).



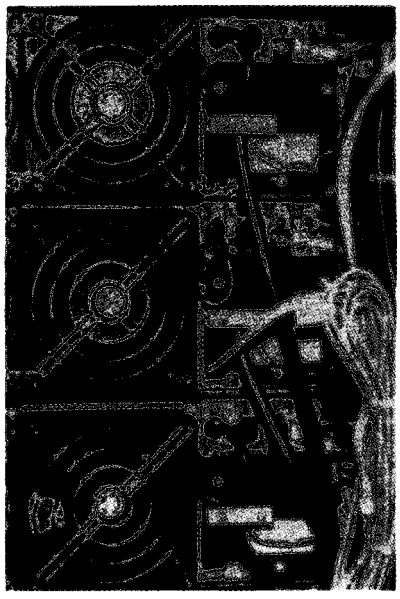
9. Close upper grill, remove two screws on grill door and set door aside.

10. Remove upper grill door bracket from right side of chassis.



11. Unplug bus extender cables to chassis assembly.

4-14.1 REM0VE/REPLACE 10-CARD CHASSIS ASSEMBLY (CONT)



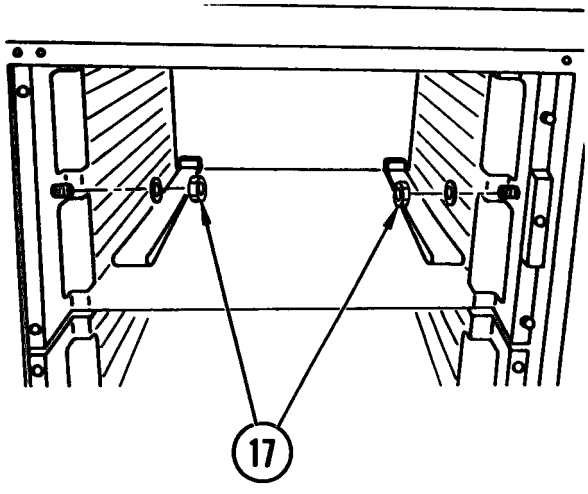
12. Remove both 10-card chassis assembly power supplies (para 4-18).

13. Remove screws holding backing plate to power supply. (Two plates per power supply.)

4. Remove bottom grill on front of CPU.

5. Remove baffle board and top board in 5-card chassis to provide room to remove bus extender cables.

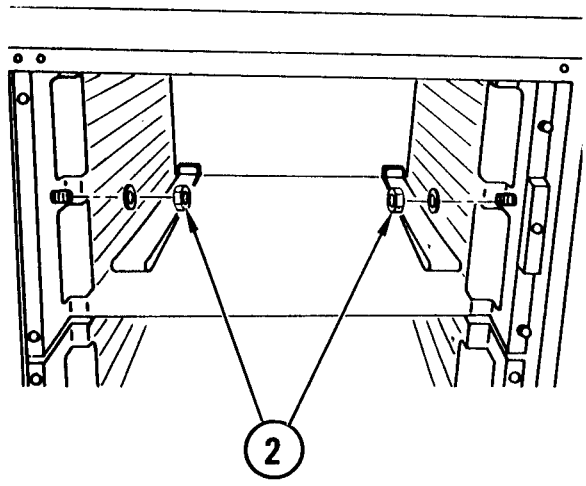
6. Unplug bus extender cables from 5-card chassis assembly and push up through cable opening into 10-card chassis assembly to remove.

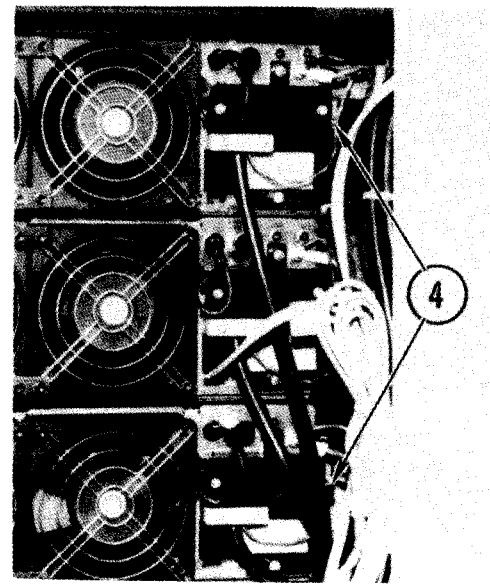


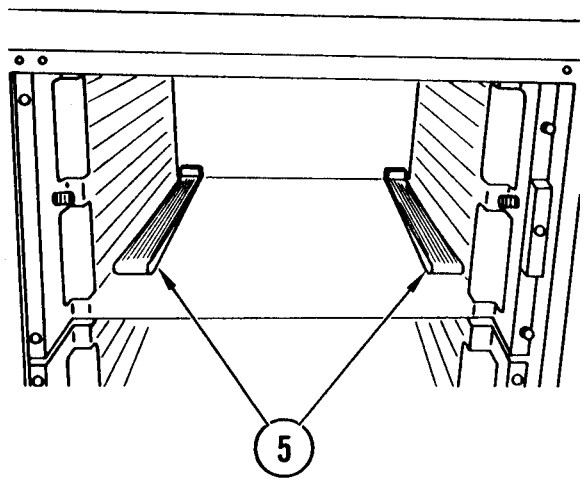
17. Remove washers and locking nuts to disconnect ground wire on each side of chassis.

18. Pull chassis assembly clear of CPU.

4-14.1 REMOVE/REPLACE 10-CARD CHASSIS ASSEMBLY (CONT)







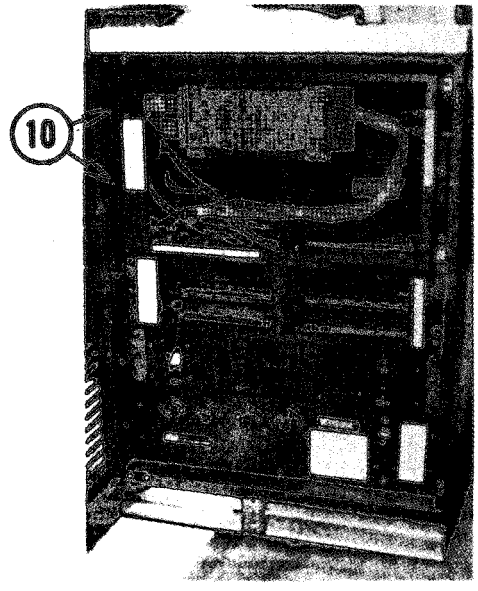
Replace

1. Slide chassis assembly into CPU.
2. Connect ground wires on inside of chassis assembly by installing washers and locking nuts.
3. At rear of CPU, install backing plates.
4. Install both 10-card chassis assembly power supplies (para 4-18) and tighten screws holding backing plates.
5. Push bus extender cables through opening in 10-card chassis to 5-card chassis and reconnect.
6. Replace top card in 5-card chassis and baffle board.
7. Replace lower grill.

4-14.1 REMOVE/REPLACE 10-CARD CHASSIS ASSEMBLY (CONT)

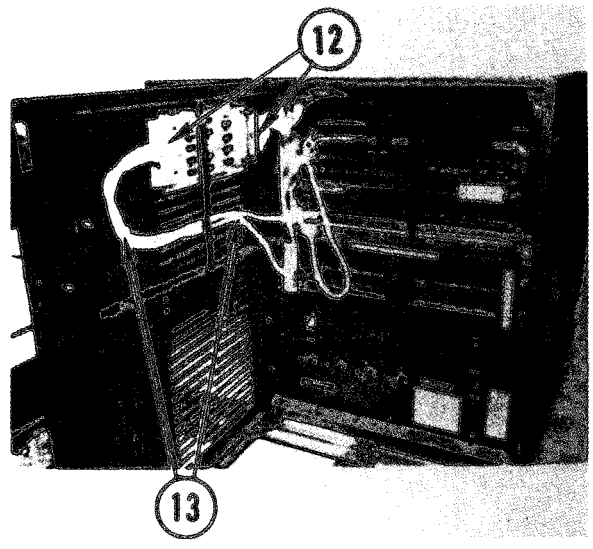
8. Ease paddleboards through slots on each side of chassis.

9. Replace top terminator board (para 4-16, step 1), MLCP controller board (para 4-36, steps 6-10), data recovery unit controller (para 4-28, steps 8-13), PE mag tape controller (para 4-29, steps 10-13) MDC board(s) (para 4-30, steps 6-10), both disk controller boards (para 4-27, steps 2-5), CIP board (para 4-13, steps 2-3, and CP board (para 4-12, steps 4-6).



10. Replace upper grill door and tighten screws.

11. Replace upper grill door bracket.



12. Install repeater board connectors.

13. Secure repeater board connector cable to CPU upper grill with tie wraps.

14. Close upper grill and CPU door.

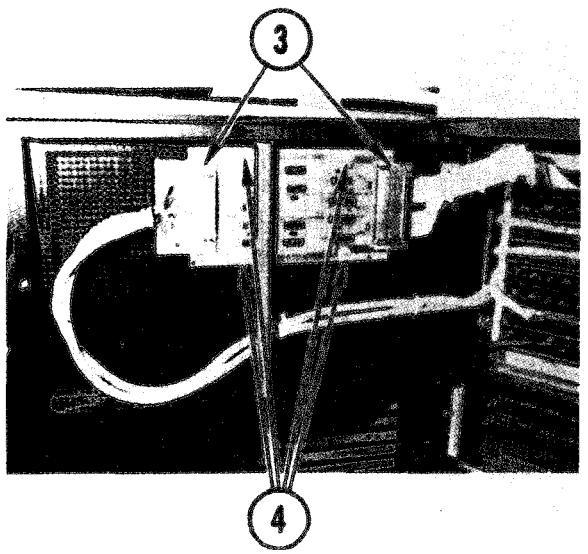
15. Install side panels and rear panel.

16. Replace ac plug in outlet and power on.

4-15. REMOVE/REPLACE REPEATER BOARD

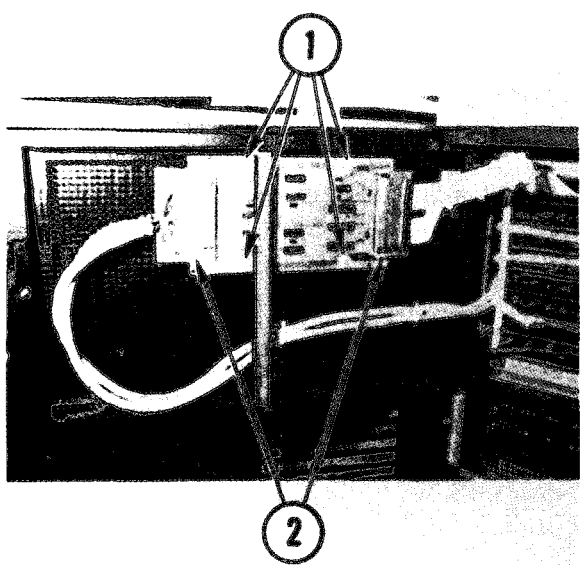
INITIAL SETUP

Common Tools	Materials/Spare Parts
• Tool kit	• Tags • Pen or pencil



Remove

1. Power off.
2. Open door. Open top grill.
3. Tag and remove connectors
4. Remove four screws and washers and lift repeater board clear of grill.



Replace

1. Hold repeater board in place on top grill and attach with four screws and washers.
2. Push connectors on repeater board.
3. Close grill. Close door.

4-16. REMOVE/REPLACE TERMINATOR BOARD(S)

INITIAL SETUP

Common Tools
- Tool kit

CAUTION

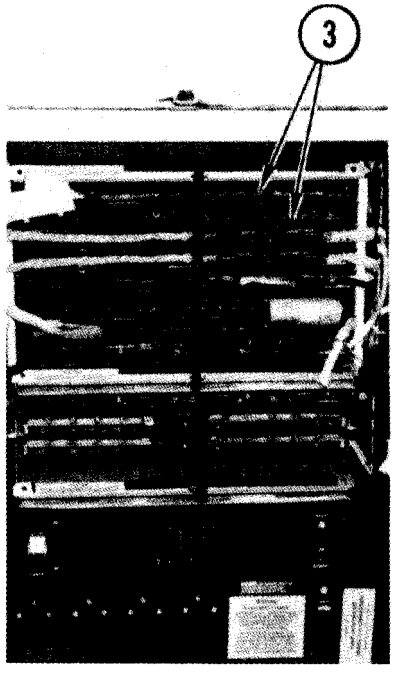
Top and bottom terminator boards are not interchangeable. Make sure part number of replacement board matches part number of board removed.

Remove

1. Power off. Unlock and pull ac power plug from outlet. Open door.

NOTE

To remove top terminator board, perform steps 2-5. To remove bottom terminator board, perform steps 6-8.



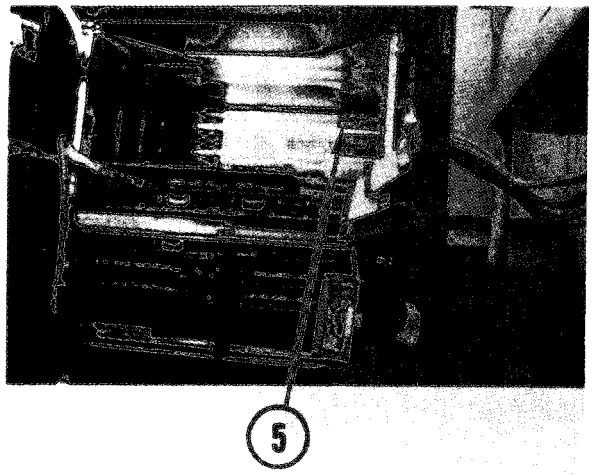
2. Open top grill.
3. Remove CP board (para 4-12) and CIP board (para 4-13).

NOTE

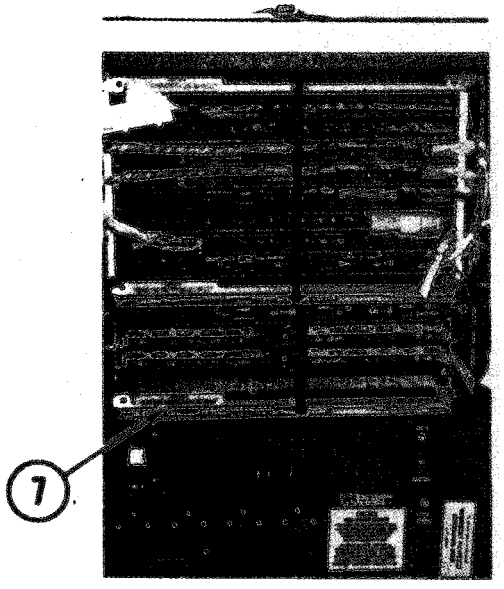
Some models have a baffle board; if so, go to step 4, if not, go to step 5.

4. Pull out baffle board.

4-16. REMOVE/REPLACE TERMINATOR BOARD(S) (CONT)

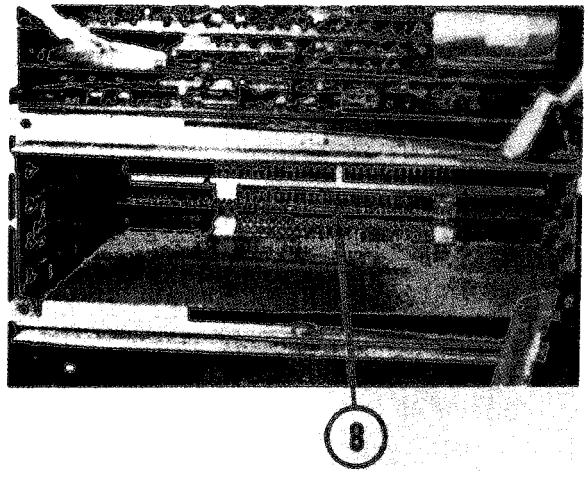


5. Reach in with both hands and grasp terminator board. Wiggle board loose and slide out of slot.



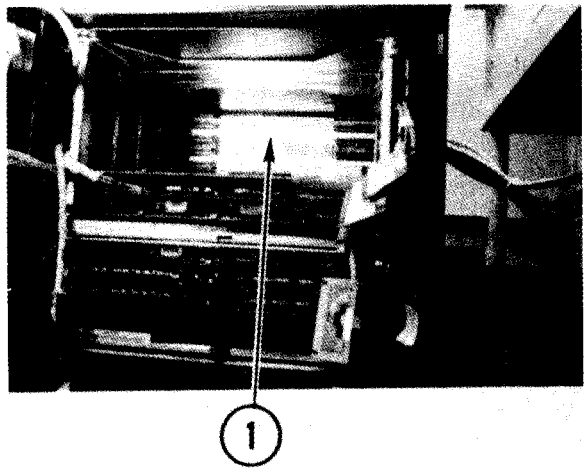
6. Open bottom grill.

7. Pull out baffle board and additional circuit board(s) as necessary to gain access to terminator board.



8. Reach in with both hands and grasp terminator board. Wiggle board loose and slide out of slot.

4-16. REMOVE/REPLACE TERMINATOR BOARD(S) (CONT)

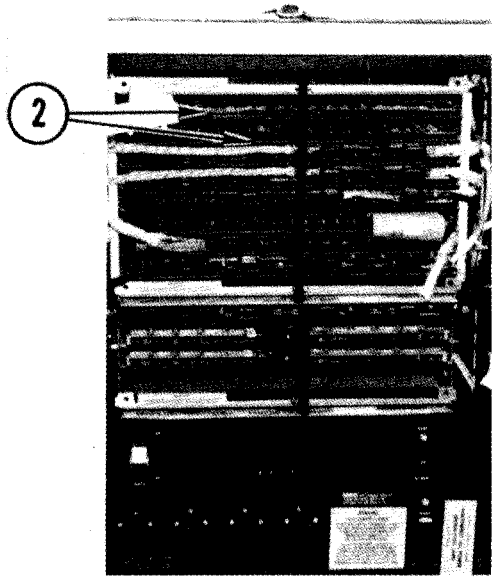


Replace

NOTE

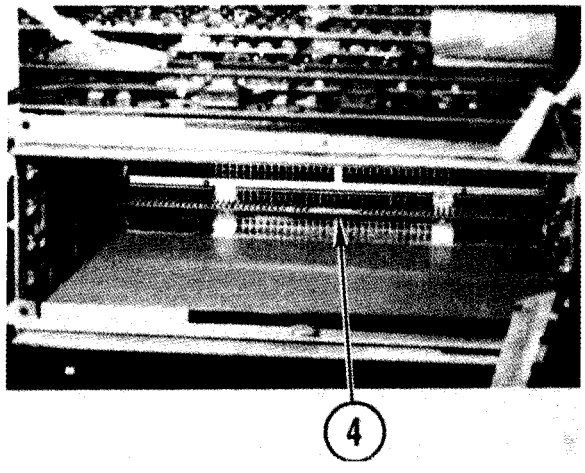
To replace top terminator board, perform steps 1-3. To replace bottom terminator board, perform steps 4-6.

1. Using both hands, slide board into slot. Push board in until snug.



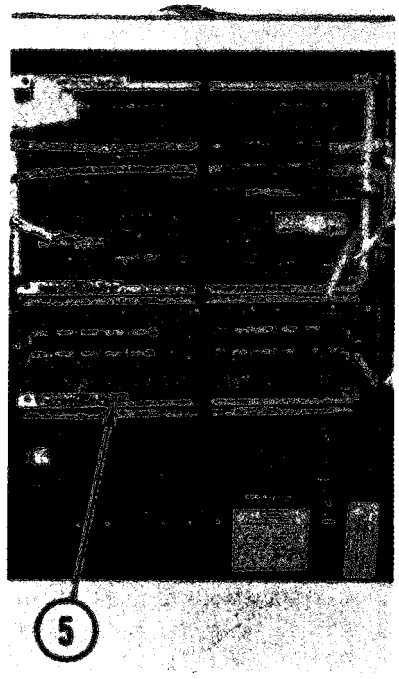
2. Replace baffle board (if removed), CIP board (para 4-13) and CP board (para 4-12).

3. Close top grill.



4. Using both hands, slide terminator board into slot. Push board in until snug.

4-16. REMOVE/REPLACE TERMINATOR BOARD(S) (CONT)



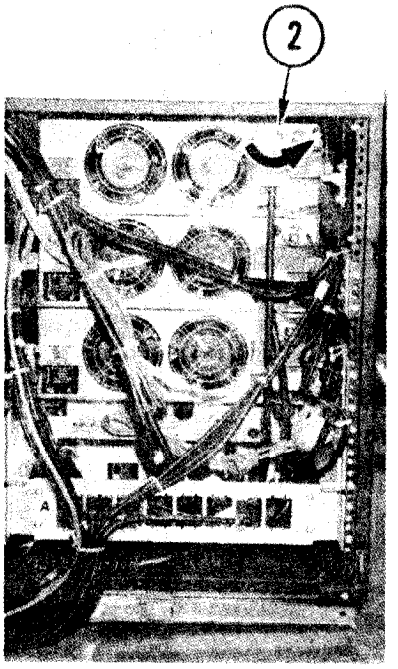
5. Replace baffle board.
6. Close bottom grill. Close door.
7. Push and lock in ac power plug.

4-17. REMOVE/REPLACE POWER SUPPLY FUSE

INITIAL SETUP

Common Tools
- Tool kit

Materials/Spare Parts
- Fuse

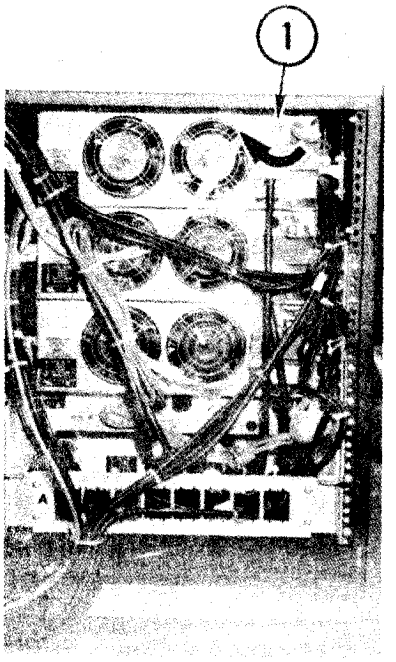


NOTE

Each power supply contains one fuse. Follow these steps to replace fuse in any power supply.

Remove

1. Power off. Remove rear panel.
2. Turn fuse cap as shown. Pull out fuse cap and remove fuse.



Replace

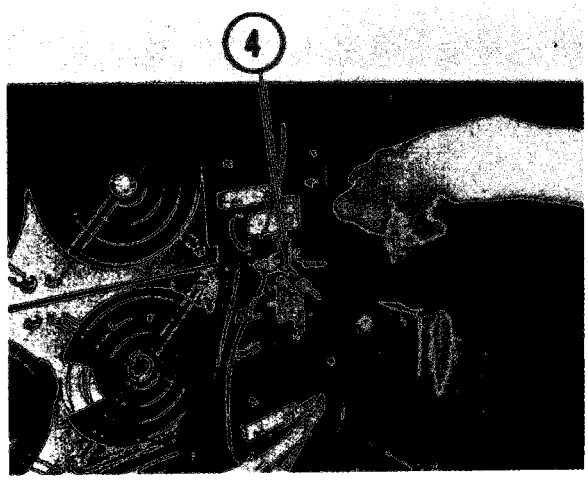
1. Set new fuse in cap. Push in cap and turn as shown.
2. Install rear panel.

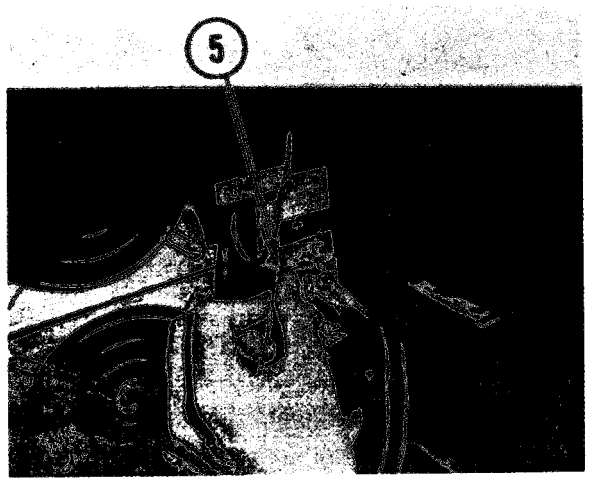
4-18. REMOVE/REPLACE CPU POWER SUPPLIES

INITIAL SETUP

Common Tools
- Tool kit

Materials/Spare Parts
- Tie wraps

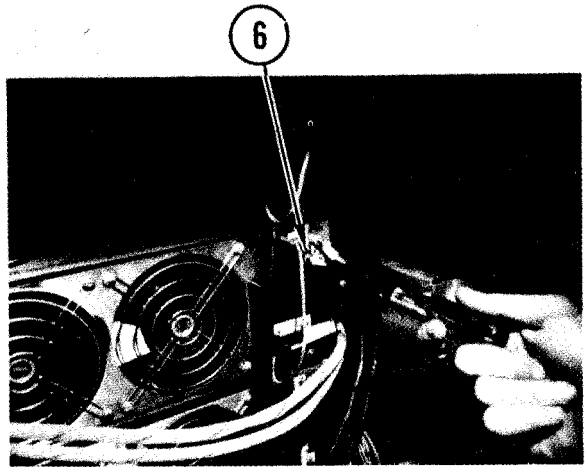




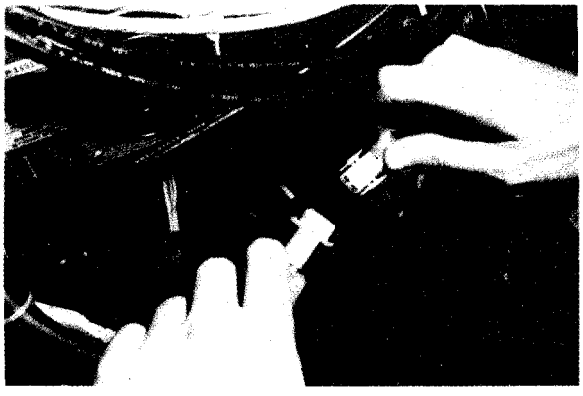
Remove

1. Power off. Unlock and pull ac power plug from outlet.
2. Remove rear panel.
3. Find power supply you will remove.
4. Remove nut holding AC GRD leads. Cut tie wraps.
5. Pull off AC GRD leads.

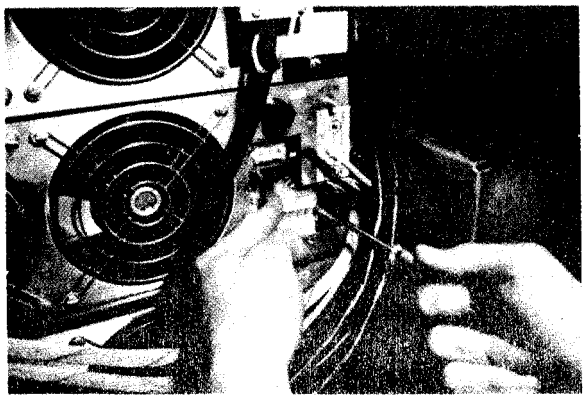
4-18. REMOVE/REPLACE POWER SUPPLIES (CONT)



6. Loosen and remove two power connector screws. Remove power connector. Cut tie wraps.

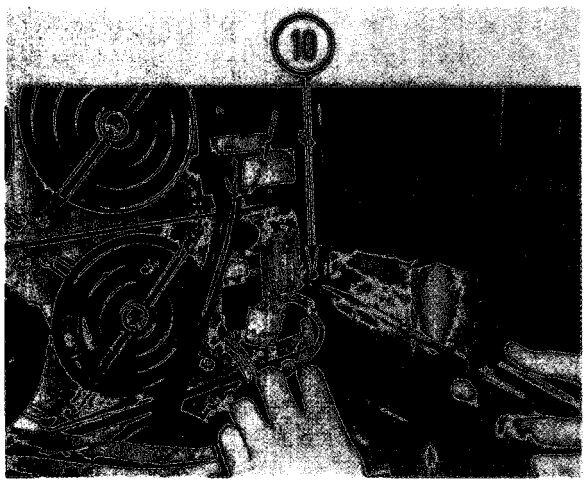


7. If removing control panel power supply, disconnect cable as shown.



8. Wedge out plastic 12-pin connector.

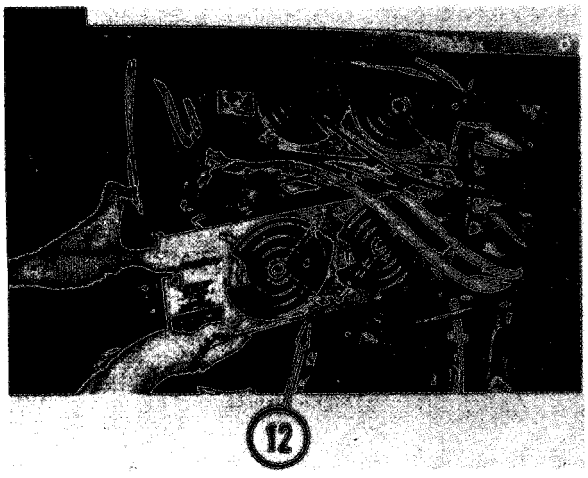
4-18. REMOVE/REPLACE POWER SUPPLIES (CONT)



9. Pull cable out of way.

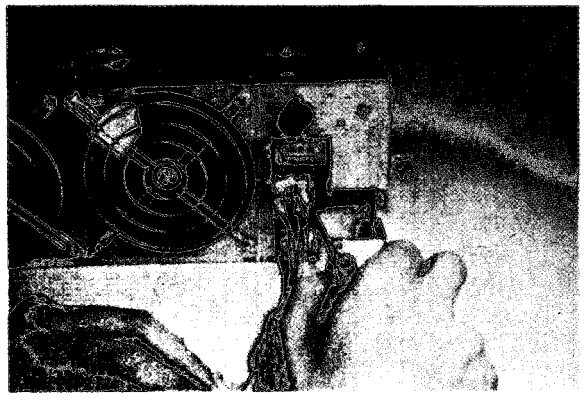
10. Loosen captive screws at both sides of power supply.

11. Pull out power supply. (You should feel it come free.)



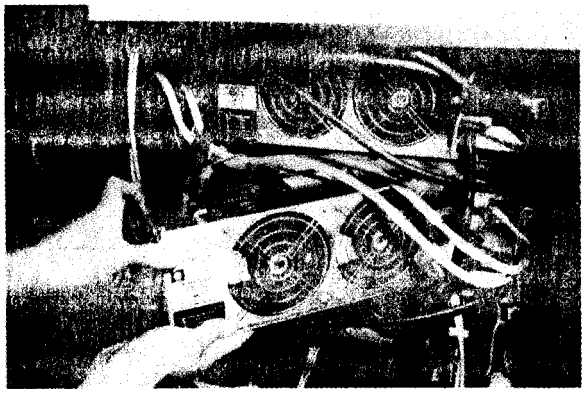
12. Pull power supply through cables.

Replace



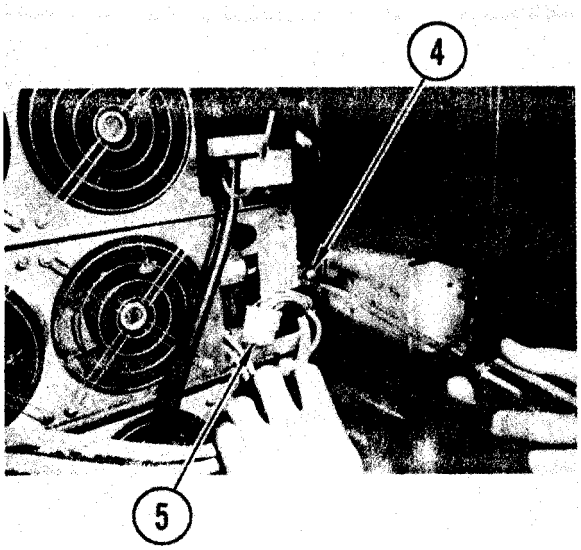
1. If replacing control panel power supply, remove cables W0201 and WO1O1 from old supply. Connect cables on new supply.

4-18. REMOVE/REPLACE POWER SUPPLIES (CONT)



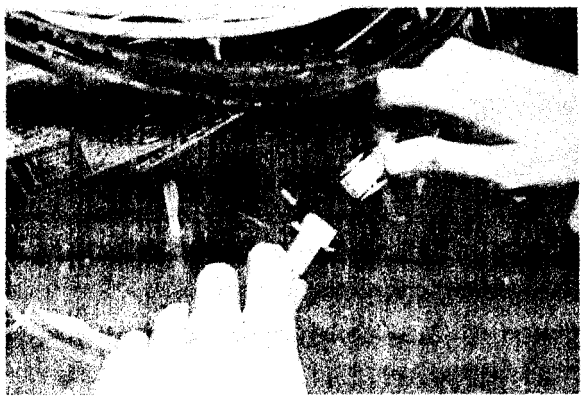
2. Insert power supply through cables.

3. Push power supply in. (You should feel it connect.)



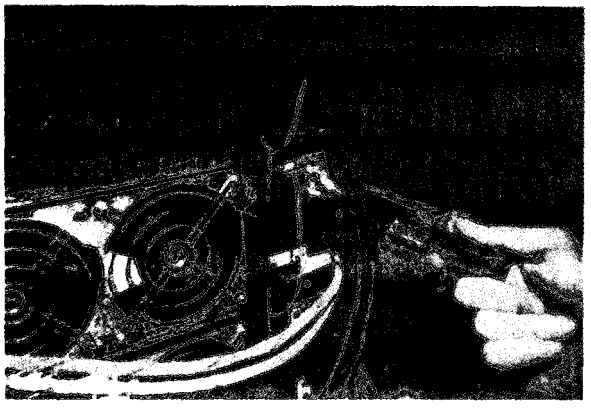
4. Tighten captive screws at both sides of power supply.

5. Connect 12-pin connector.

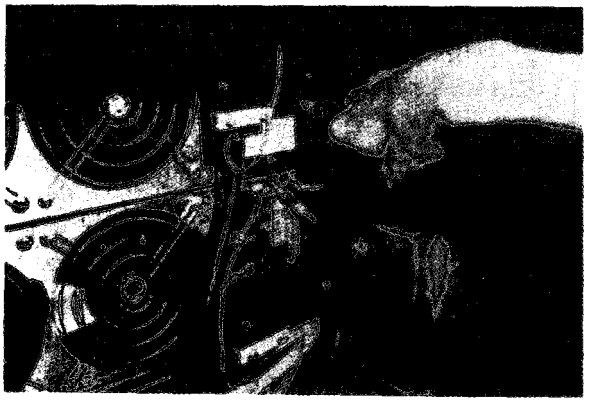


6. If replacing control panel power supply, connect cable as shown. Replace tie wraps.

4-18. REMOVE/REPLACE POWER SUPPLIES (CONT)



7. Replace power connector and tighten screws.



8. Replace AC GRD leads and tie wraps.
9. Push and lock in ac power plug.
10. Observe power supply. Make sure fan is turning and red light is on.
11. Install rear panel.

4-19. REMOVE/REPLACE POWER SUPPLY FAN(S)

INITIAL SETUP

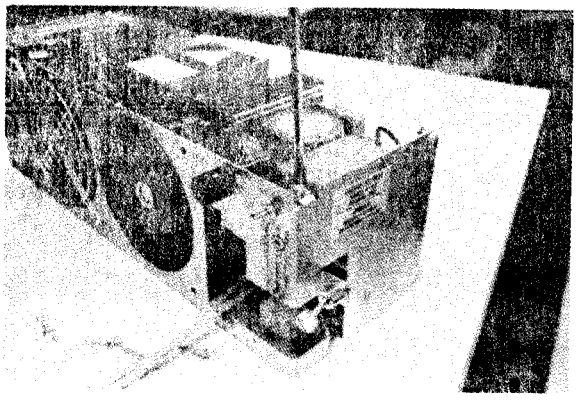
Common Tools	Applicable Model
• Tool kit	• CP-1435/MYQ-4

NOTE

Each power supply has two fans. Follow these steps to remove/replace either of them.

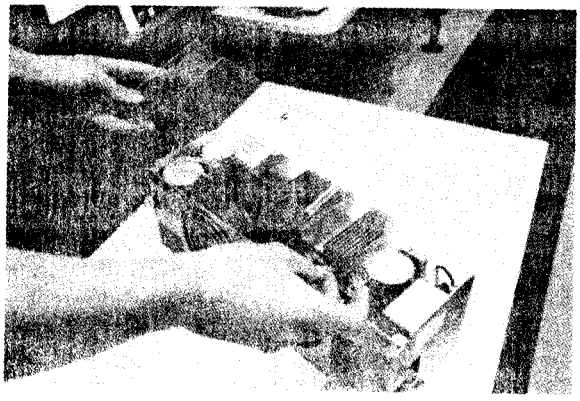
Remove

1. Remove power supply (para 4-18).



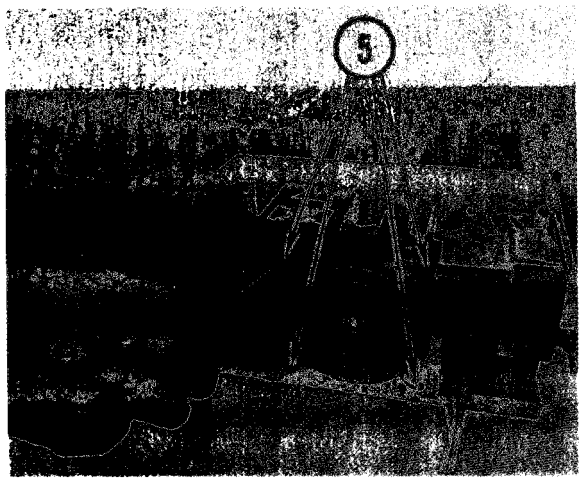
2. Place power supply on flat surface.

3. Remove plastic cover screws.



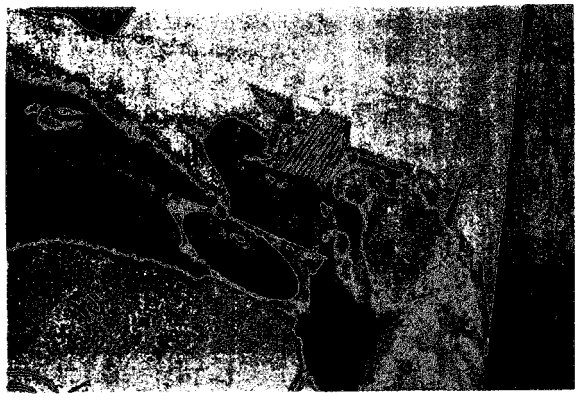
4. Lift off cover.

4-19. REMOVE/REPLACE POWER SUPPLY FAN(S) (CONT)



5. Remove grill screws and screw clips.

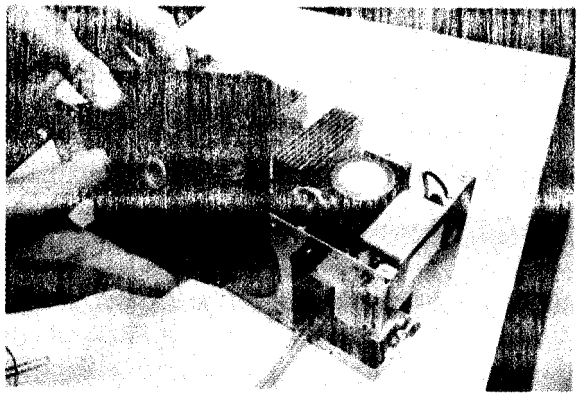
6. Lift off grill. Remove cable clamp.



7. Lift up fan slightly.

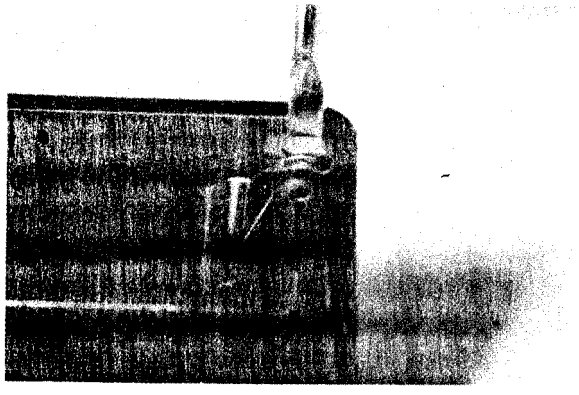
8. Work off wires.

4-19. REMOVE/REPLACE POWER SUPPLY FAN(S) (CONT)

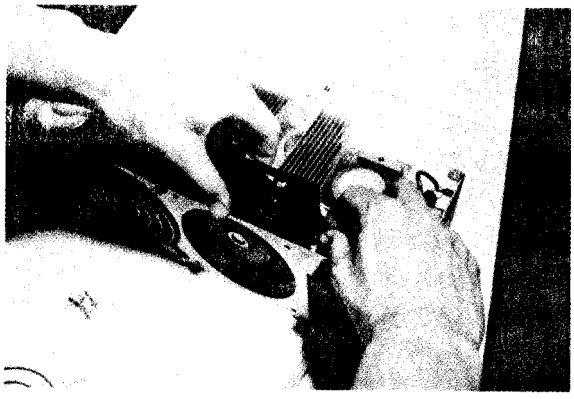


9. Lift out fan.

Replace

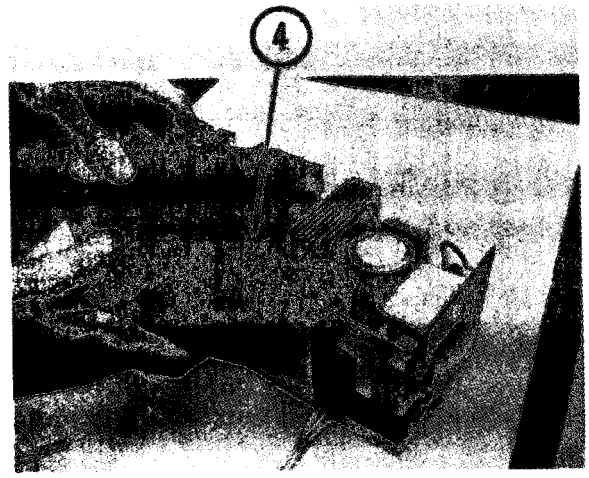


1. Pry off clips from old fan.
2. Push clips on new fan.

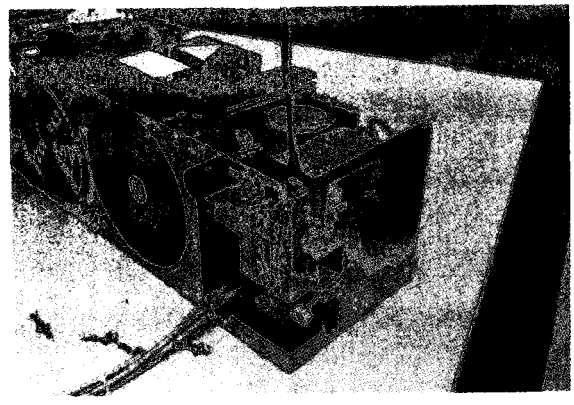


3. Push on wires. Set screw clips over screw holes.

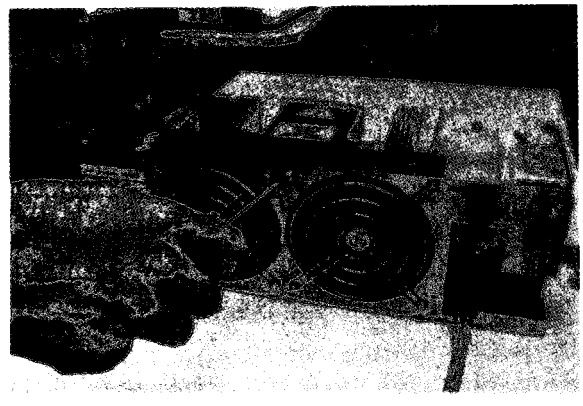
4-19. REMOVE/REPLACE POWER SUPPLY FAN(S) (CONT)



4. Put fan in power supply with air flow arrow pointing out. Replace cable clamps.



5. Replace plastic cover.



6. Replace grill.

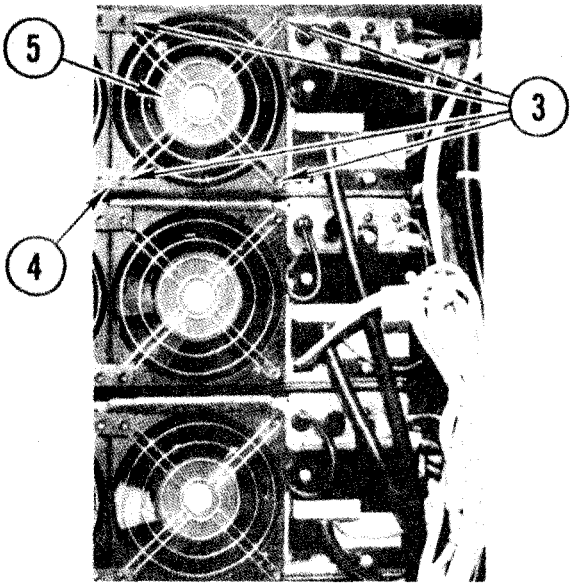
7. Replace power supply (para 4-18).

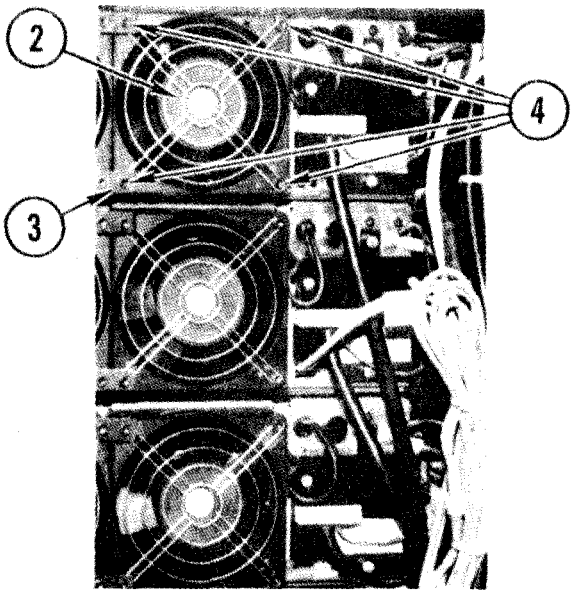
4-19.1 REMOVE/REPLACE POWER SUPPLY FAN(S)

INITIAL SETUP

Common Tools
- Tool kit.

Applicable Model
- CP-1435A/MYQ-4





NOTE

Each power supply has two fans. Follow these steps to remove/replace either of them.

Remove

1. Power off CPU.
2. Remove rear panel.
3. Remove four bolts holding fan assembly to power supply and loosen top and bottom bolts on fan assembly next to it to free metal tab.
4. Swing tabs clear of fan assembly.
5. Pull fan assembly from power supply unit.
6. Disconnect ac power cord from power supply.

Replace

1. Connect ac power cord on fan assembly to power supply.
2. Push fan assembly into rear of power supply.
3. Swing metal tab until it locks over new fan assembly and tighten bolts.
4. Install and tighten bolts holding fan assembly to power supply.
5. Replace rear panel.
6. Power on.

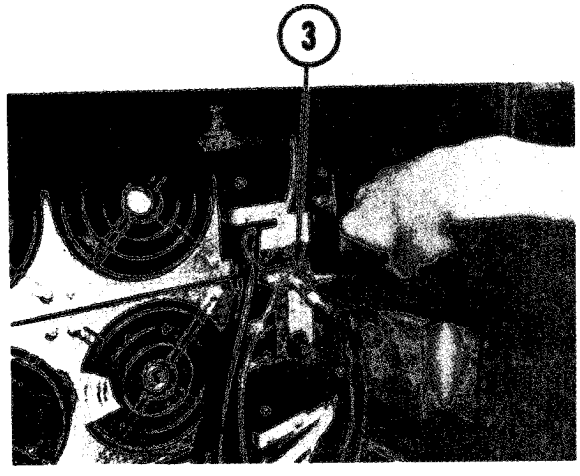
4-20. REMOVE/REPLACE POWER SUPPLY CABLE ASSEMBLY

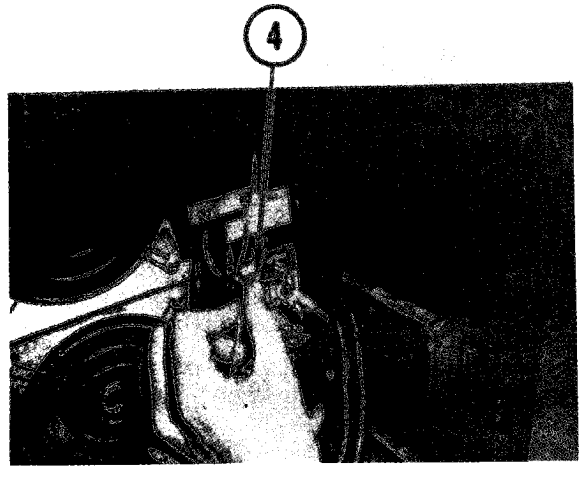
INITIAL SETUP

Common Tools
- Tool kit
- TORX offset driver (CP-1435A/MYQ-4 only)

Remove

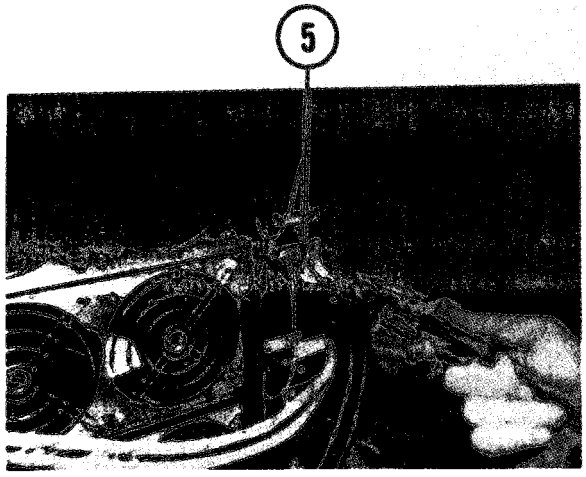
1. Power off. Unlock and pull ac power plug from outlet. Remove rear panel.
2. Find power supply cable assembly you will remove.
3. Remove nut holding AC GRD leads.





4. Pull off ac ground lead from power supply.

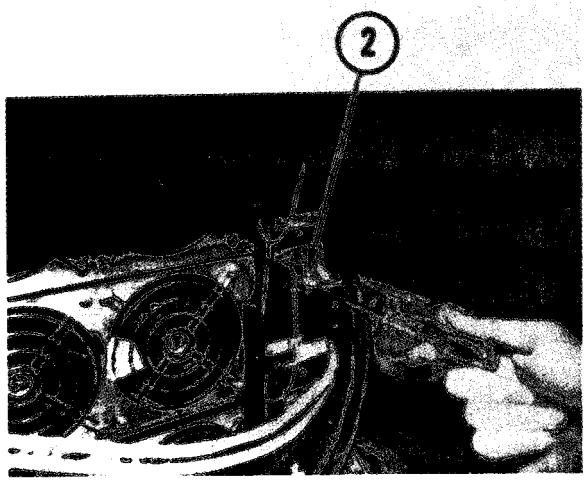
4-20. REMOVE/REPLACE POWER SUPPLY CABLE ASSEMBLY (CONT)



5. Loosen and remove two power connector screws. Remove power connector. (On CP-1435A/MYQ-4 remove four screws and set communications bulkhead aside.)

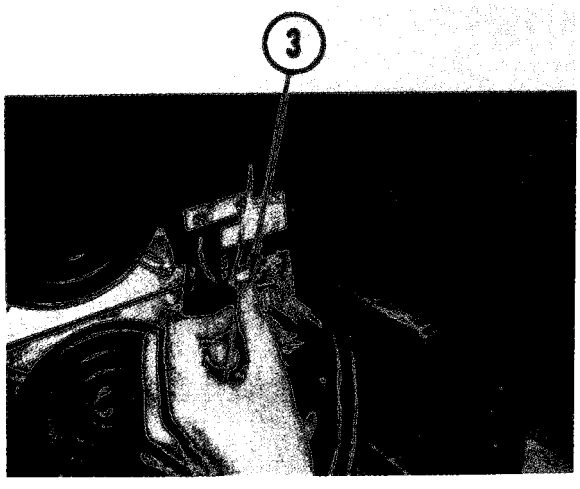
6. Unplug other end of power cable assembly from PDU. Remove cable assembly.

Replace



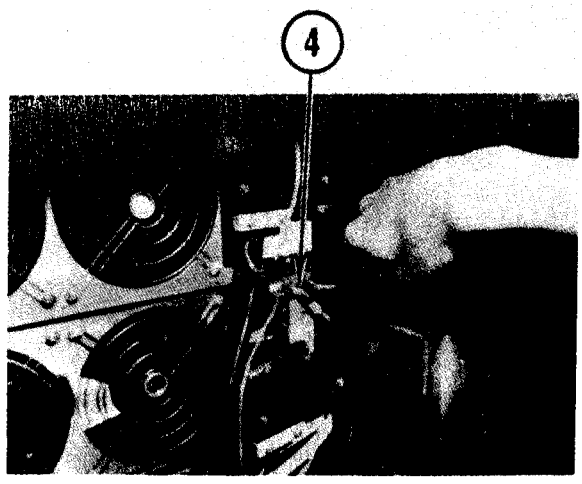
1. Plug power cable assembly connector into PDU. Run cable up to rear of power supply.

2. Install power connector. Tighten screws.



3. Attach lead to AC GRD stud.

4-20. REMOVE/REPLACE POWER SUPPLY CABLE ASSEMBLY (CONT)



4. Install and tighten nut.

5. On CP-1435A/MYQ-4 install communications bulkhead.

6. Install rear panel.

7. Push and lock in ac power plug. Power ON.

4-21. REMOVE/REPLACE 5-CARD CHASSIS ASSEMBLY

INITIAL SETUP

Common Tools
- Tool kit

Applicable Model
- CP-1435/MYQ-4

NOTE

More than one memory controller and MLCP controller may be installed. Refer to para 1-14 for difference between models.

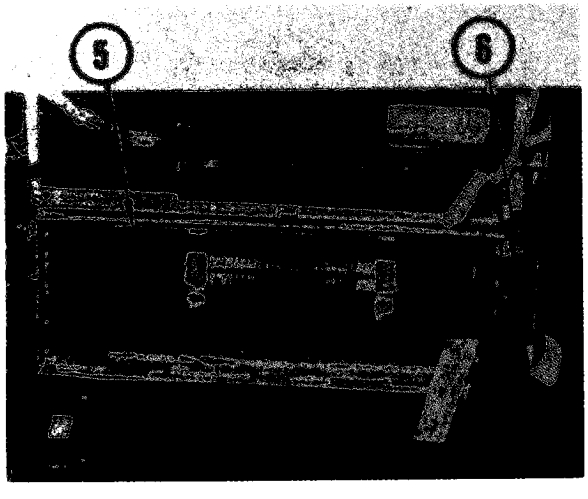
Remove

1. Power off. Unlock and pull ac power plug from outlet.
2. Open door and bottom grill.

NOTE

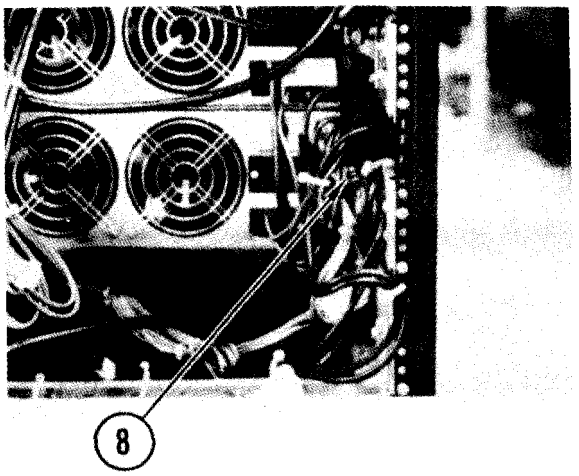
Tag and identify all circuit boards and paddle boards.

3. Remove MLCP controller board(s) (para 4-34, steps 4-9), main memory board(s) (para 4-26, steps 3-4) and bottom terminator board (para 4-16, steps 7-8).



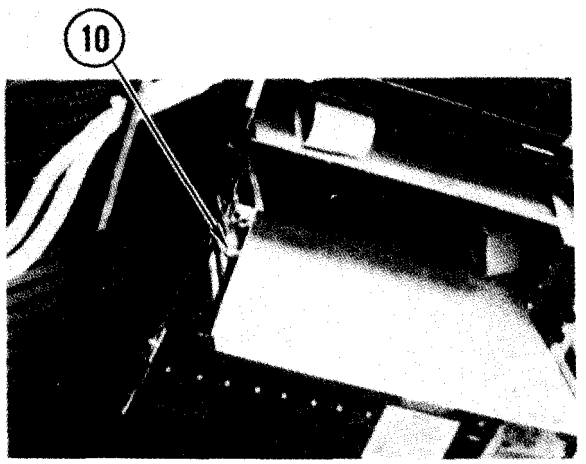
4. Open top grill and remove MLCP controller board (para 4-36, steps 4-9) and bottom baffle board to provide room for bus extender cable plugs.
5. Unplug bus extender cables from chassis assembly and push up through cable opening into ten-card chassis assembly.
6. Loosen bolts at top of chassis assembly.

4-21. REMOVE/REPLACE 5-CARD CHASSIS ASSEMBLY (CONT)



7. Remove 5-card chassis assembly power supply (para 4-18).

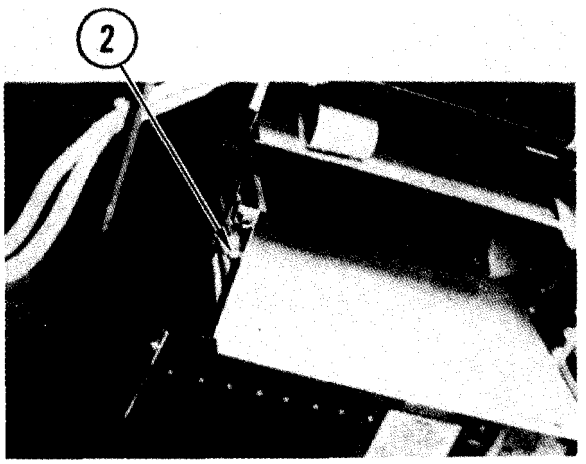
8. Remove screws holding bracket to power supply and mounting bolts from bracket (two brackets per power supply).



9. Pull out chassis assembly approximately 4 inches.

10. Remove washer and locking nut to disconnect two ground wires from side of chassis.

11. Pull chassis assembly clear of CPU.

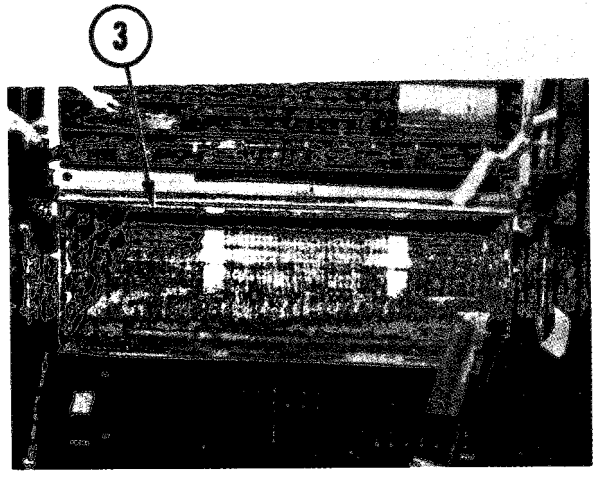


Replace

1. Slide chassis assembly into CPU except for four inches.

2. Connect two ground wires to side of chassis assembly by installing washer and locking nut.

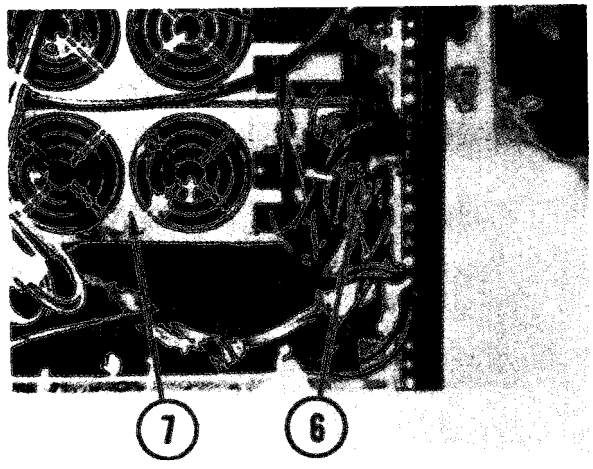
4-21. REMOVE/REPLACE 5-CARD ASSEMBLY (CONT)



3. Slide chassis assembly completely into CPU and tighten bolts on chassis assembly.

4. Connect bus extender cables into chassis by pushing down through cable opening in 5-card chassis assembly.

5. Replace MLCP controller board (para 4-36, steps 6-10) and bottom baffle board. Close top grill.



6. Insert screws holding bracket to power supply mounts and tighten mounting bolts.

7. Replace 5-card chassis assembly power supply (para 4-18).

8. Replace bottom terminator board (para 4-16, steps 4-5), main memory board(s) (para 4-26, steps 7-8), and MLCP controller board (para 4-36, steps 6-10).

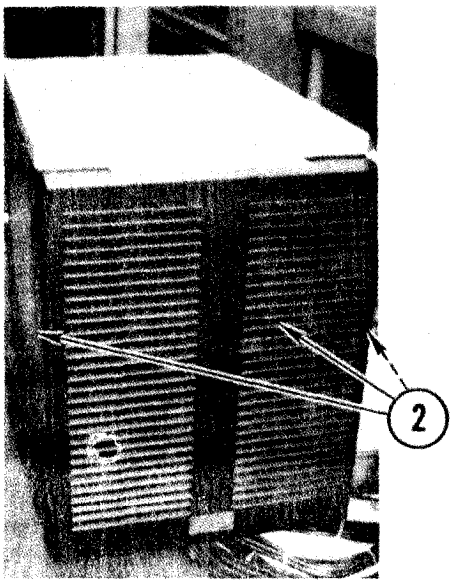
9. Close bottom grill and door.

4-21.1 REMOVE/REPLACE 5-CARD CHASSIS ASSEMBLY

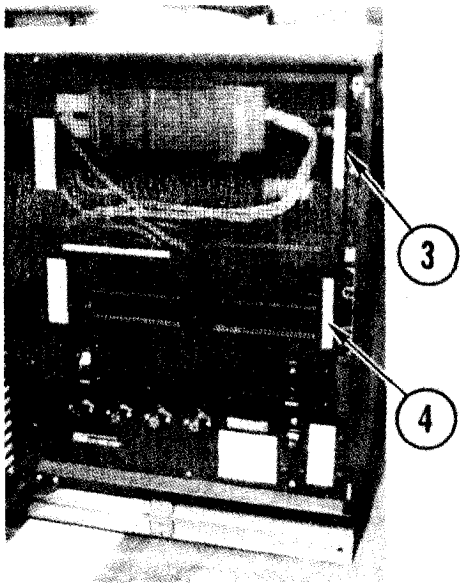
INITIAL SETUP

Common Tools	Materials/Spare Parts	Applicable Model
● Tool kit ● TORX offset driver	● Paper ● Pen or pencil	● CP1435A/MYQ-4

Remove



1. Power off CPU.
2. Remove rear panel and two side panels, then set them aside.



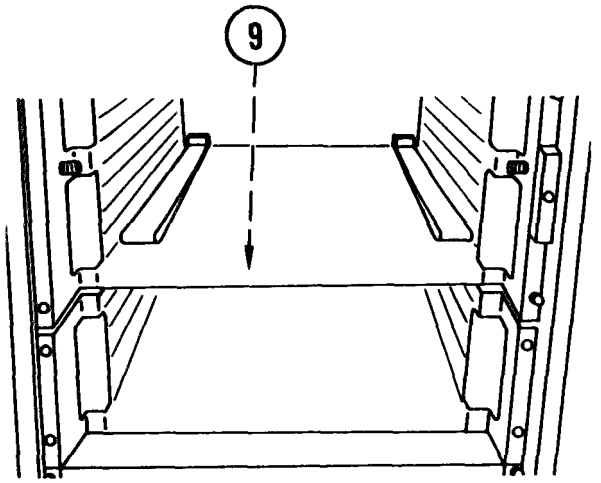
3. Open door and top grill.
4. Remove lower grill.
5. Tag and identify all circuit boards and paddleboards.

NOTE

As paddleboards are removed from CPU boards, note their location so that you can push them through the slots on each side during the removal procedures.

6. Push paddleboards through slots on either side of CPU.

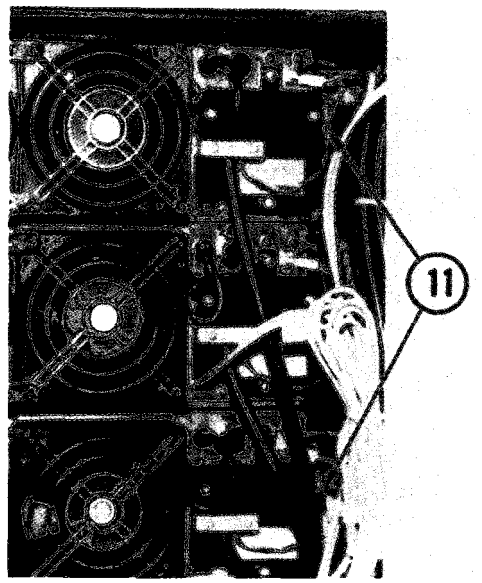
4-21.1 REMOVE/REPLACE 5-CARD CHASSIS ASSEMBLY (CONT)



7. Remove MLCP controller board(s) (para 4-34, pages 4-9), main memory board(s) (para 4-26, steps 3-4) and bottom terminator board (para 4-16, steps 7-8).

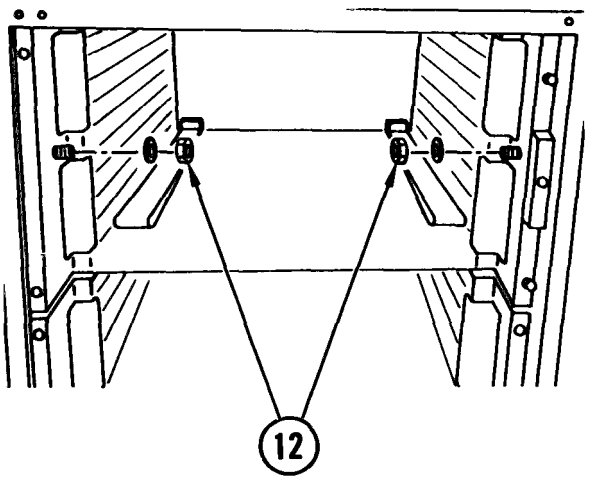
8. Remove MLCP controller board (para 4-36, steps 4-9) and bottom baffle board to provide room for bus extender cable plugs.

9. Unplug bus extender cables from chassis assembly and push up through cable opening into 10-card chassis assembly.



10. Remove 5-card chassis assembly power supply (para 4-18).

11. Remove screws holding backing plate to power supply and mounting bolts from plate (two plates per power supply).



12. Remove washer and locking nut to disconnect two ground wires from side of chassis.

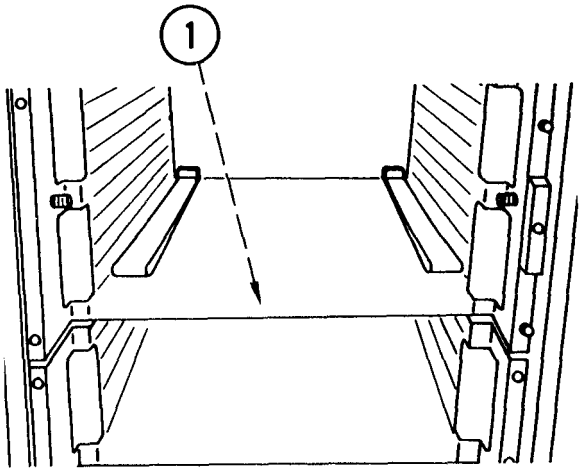
13. Remove two screws on each side of chassis.

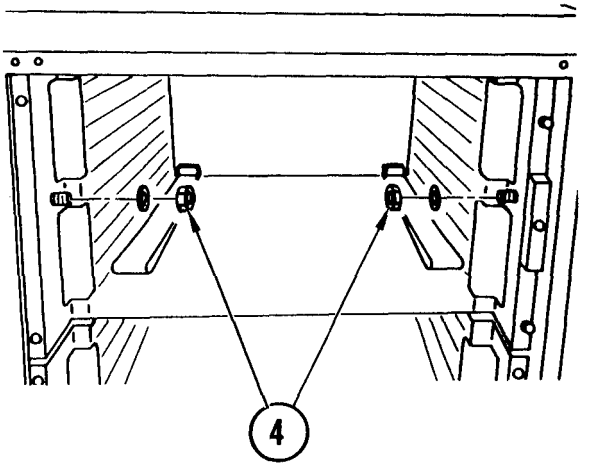
14. Pull chassis assembly forward about three inches.

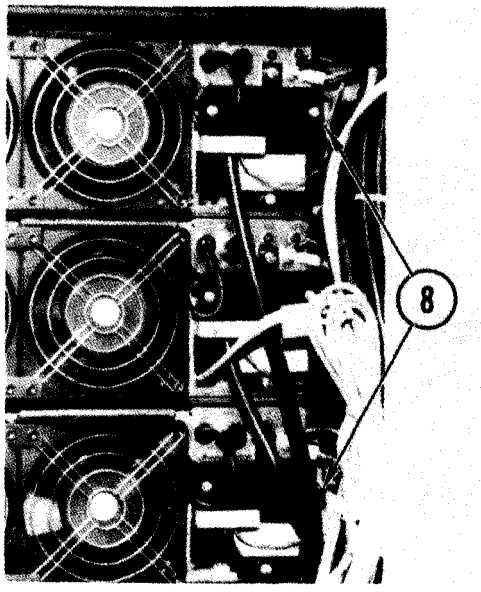
15. From rear, reach under the chassis and disconnect 12-pin connector from memory save unit.

16. Pull chassis assembly clear of CPU.

4-21.1 REMOVE/REPLACE 5-CARD CHASSIS ASSEMBLY (CONT)







Replace

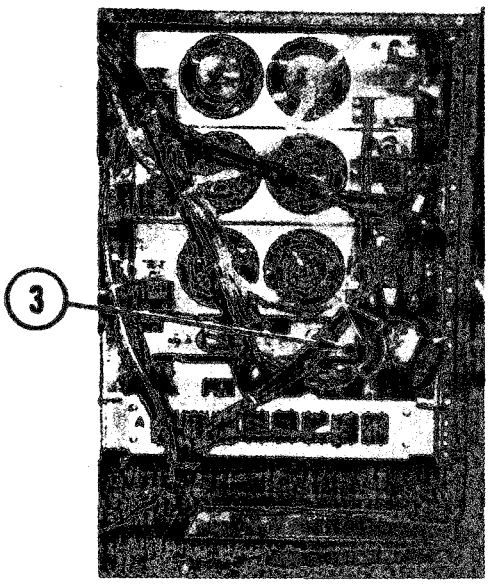
1. Slide chassis assembly into CPU, letting it extend outward about three inches.
2. From rear, reach under chassis and connect 12-pin assembly to memory save unit.
3. Tighten bolts on chassis assembly.
4. Connect ground wire to side of chassis assembly by installing washer and locking nut.
5. Connect bus extender cables into chassis by pushing down through cable opening in 5-card chassis assembly.
6. Ease paddleboards through slots on each side of chassis.
7. Replace MLCP controller board(s) (para 4-34, Replace, steps 6-10 and bottom baffle board. Close top grill.
8. Insert screws holding bracket to power supply mounts and tighten mounting bolts.
9. Replace 5-card chassis assembly power supply (para 4-18).
10. Replace bottom terminator board (para 4-16, steps 4-5), main memory board(s) (para 4-26, steps 7-8), and MLCP controller board(s) (para 4-37, Replace, steps 6-10).
11. Install bottom grill.
12. Close top grill.
13. Install rear and side panels and close CPU door.
14. Power on.

4-22. REMOVE/REPLACE MEMORY SAVE AND AUTO RESTART UNIT FUSE

INITIAL SETUP

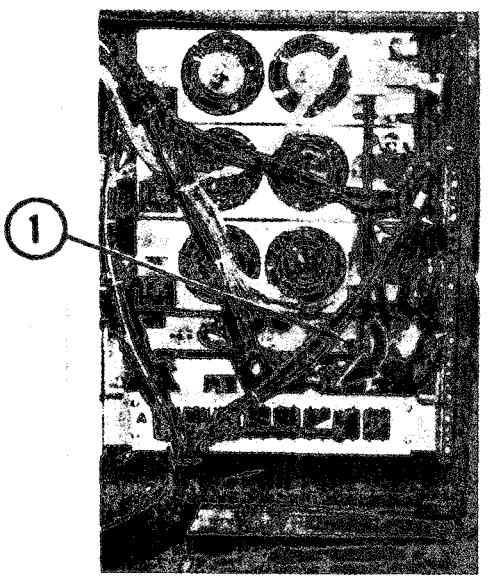
Common Tools
- Tool kit
- TORX offset driver (CP-1435A/MYQ-4 only)

Materials/Spare Parts
- Fuse



Remove

1. Power OFF. Remove CPU rear panel.
2. On CP-1435A/MYQ-4, remove four screws and set communications bulkhead aside.
3. Turn fuse cap as shown. Pull out fuse cap and remove fuse.



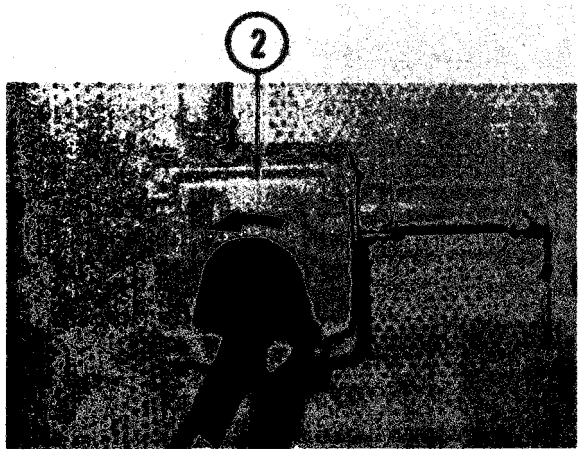
Replace

1. Set new fuse in cap. Push in cap and turn as shown.
2. On CP-1435A/MYQ-4, install communications bulkhead.
3. Install CPU rear panel.

4-23. REMOVE/REPLACE MEMORY SAVE AND AUTO RESTART UNIT

INITIAL SETUP

Common Tools
- Tool kit
- TORX offset driver (CP-1435A/MYQ-4)

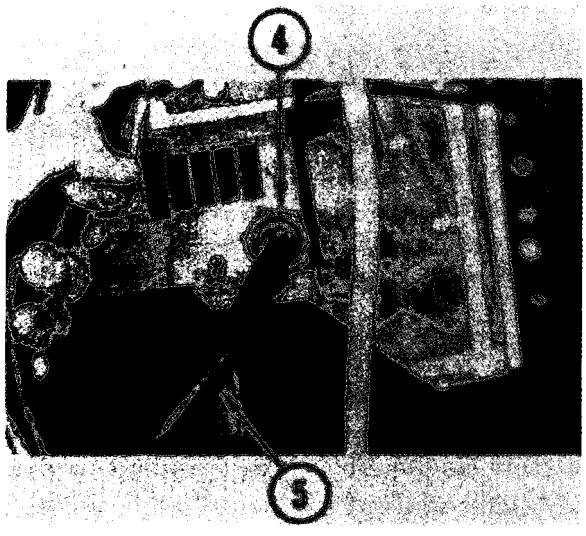


Remove

1. Power off.
2. Turn CPU power plug as shown and pull from outlet.
3. Remove rear panel.

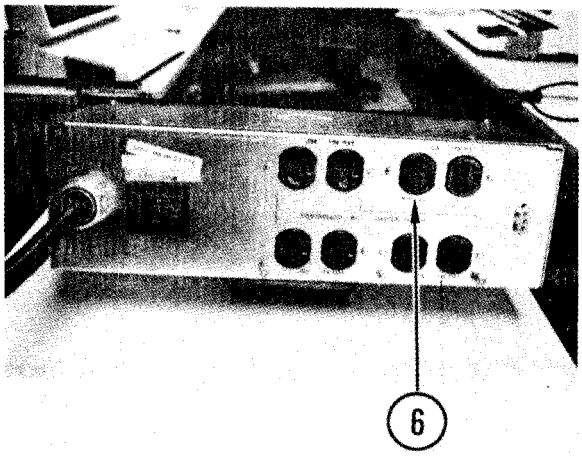
NOTE

On CP-1435A/MYQ-4, remove four screws at communications bulkhead and set it aside.

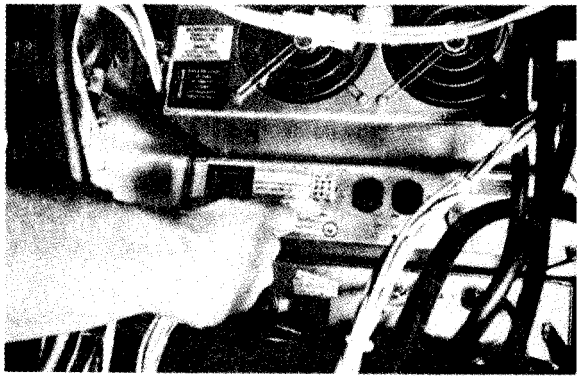


4. At rear of memory save unit, find memory save power cable.
5. Follow the cable with your hand down to PDU. It should be connected to MEM SAV PS receptacle.

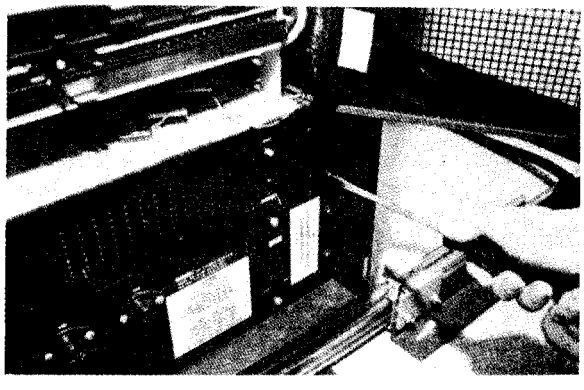
4-23. REMOVE/REPLACE MEMORY SAVE AND AUTO RESTART UNIT (CONT)



6. Pull ac power plug from PDU outlet.

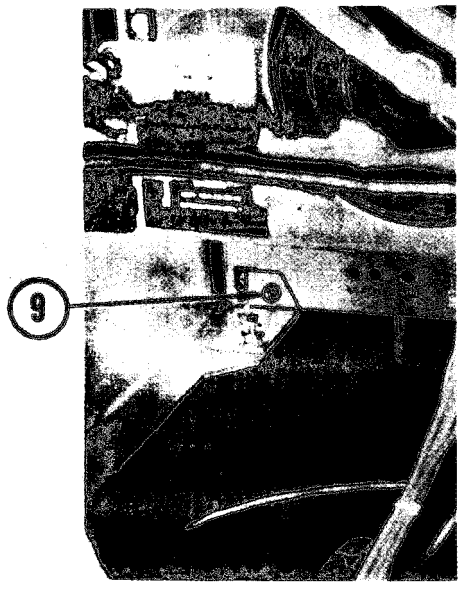


7. Pull out plug P02.



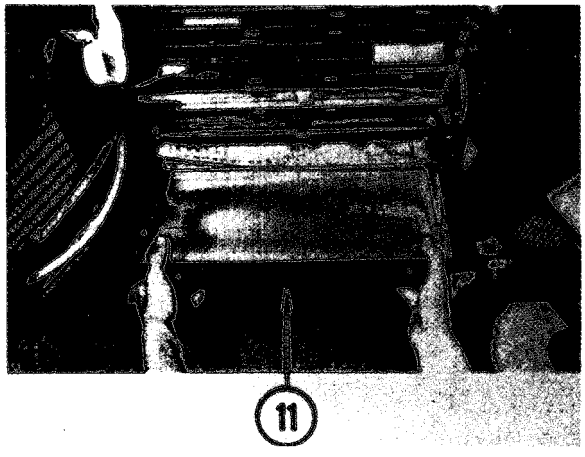
8. At front of unit, remove screws at each side of unit.

4-23. REMOVE/REPLACE MEMORY SAVE AND AUTO RESTART UNIT (CONT)



9. Remove screw at each side of memory save unit.

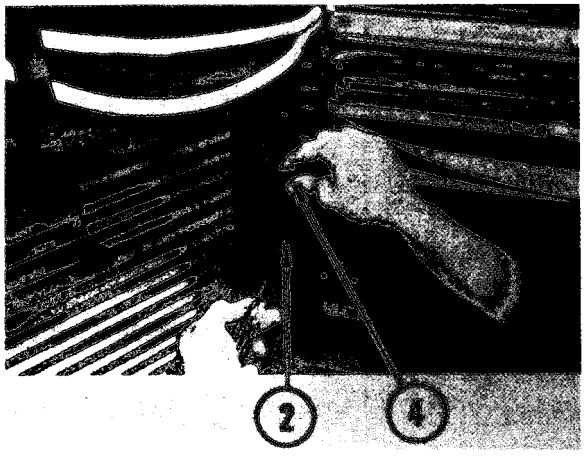
10. At rear, push unit to start it forward.



11. At front, pull unit out. Make sure power cable doesn't snag.

Replace

1. Slide in unit. Make sure power cable runs through the back of CPU.



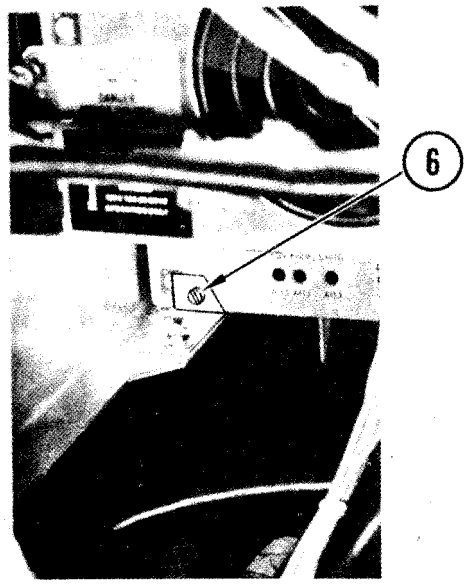
2. To replace first screw, put screwdriver in bottom hole.

3. Lift up the screwdriver.

4. Put screw in top hole. Hand tighten screw.

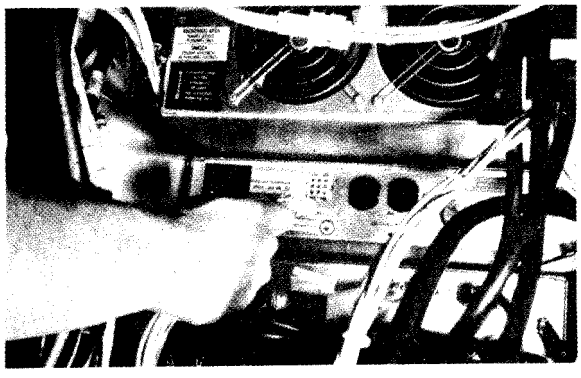
5. Repeat steps 2-4 on other side of unit.

4-23. REMOVE/REPLACE MEMORY SAVE AND AUTO RESTART UNIT (CONT)

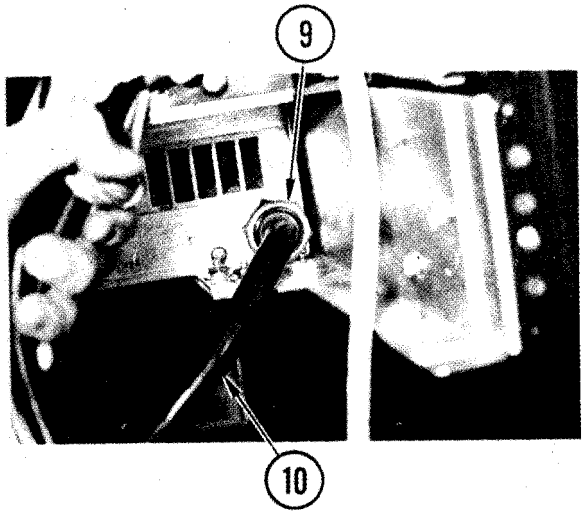


6. At rear, replace screws at each side.

7. Replace and tighten bottom screws. Tighten top screws.



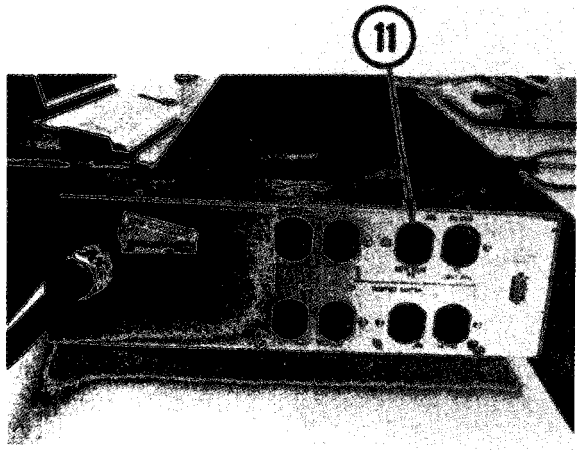
8. Push in plug P02.



9. Find memory save power cable.

10. Follow the cable down to its other end.

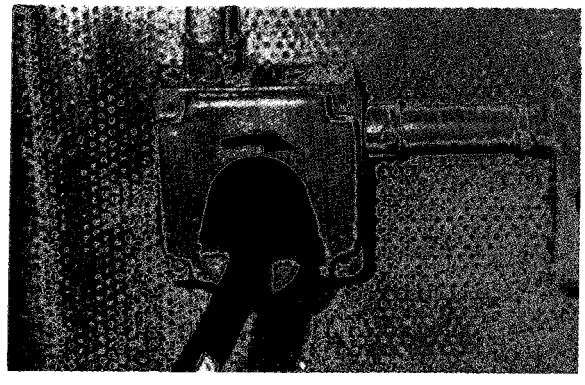
4-23. REMOVE/REPLACE MEMORY SAVE AND AUTO RESTART UNIT (CONT)



11. Plug cable into MEM SAV PS receptacle on PDU.

NOTE

On CP-1435A/MYQ-4, install communications bulkhead.

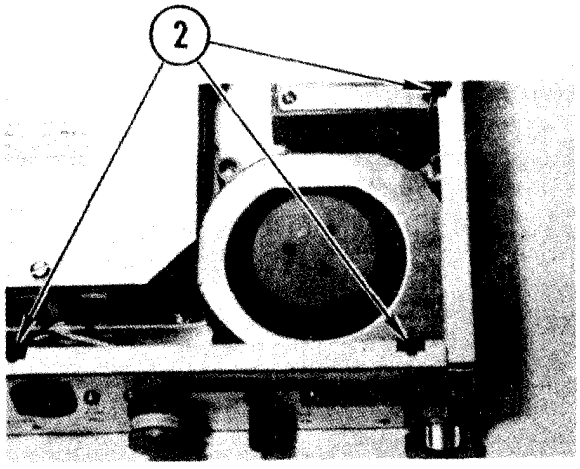


12. Push CPU power plug into outlet. Turn as shown to lock in place.
13. Install rear panel.
14. Power on.

4-24. REMOVE/REPLACE MEMORY SAVE AND AUTO RESTART UNIT FAN

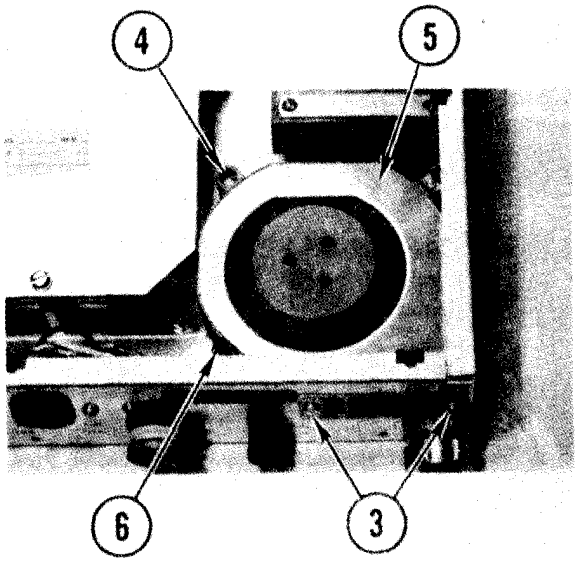
INITIAL SETUP

Common Tools
- Tool kit



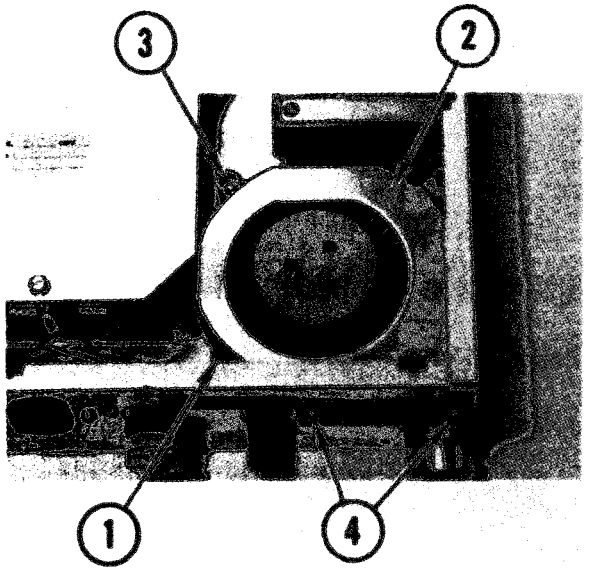
Remove

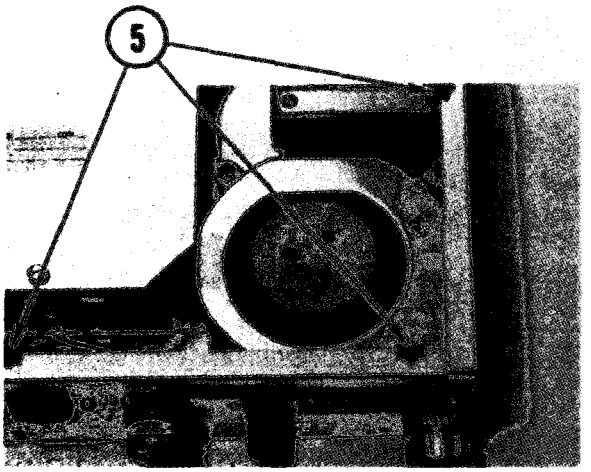
1. Remove memory save and auto restart unit (para 4-23).
2. Remove seven screws and lift off top cover.



3. Remove two screws and grill.
4. Remove screw.
5. Lift out fan.
6. Pull out plug to fan.

4-24. REMOVE/REPLACE MEMORY SAVE AND AUTO RESTART UNIT FAN (CONT)





Replace

1. Push plug into fan.
2. Position fan in unit.
3. Install screw. Do not tighten completely.
4. Position grill in place. Install and tighten screws. Tighten screw intalled in step 3.

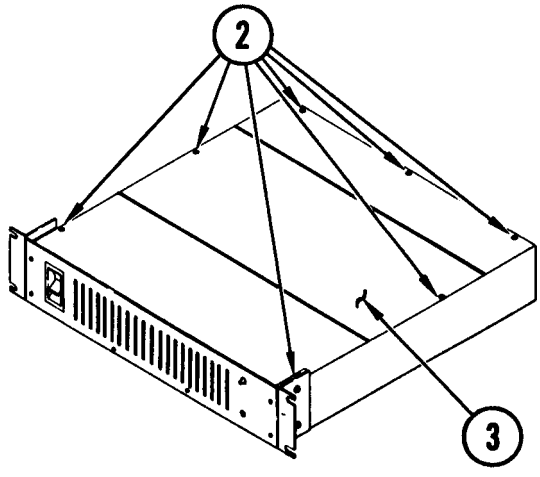
4-24.1. REMOVE/REPLACE MEMORY SAVE AND AUTO RESTART BATTERIES

INITIAL SETUP

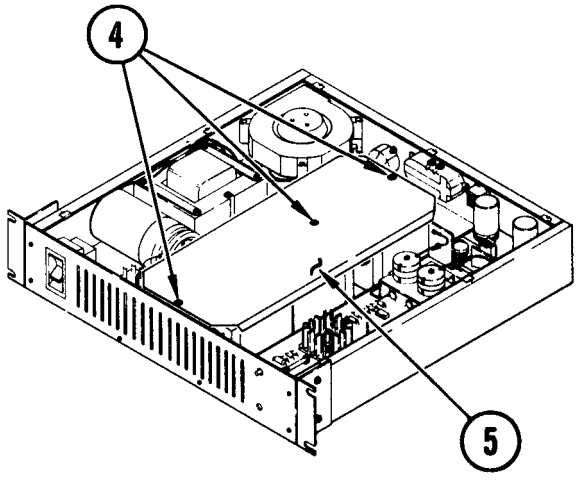
Common Tools
- Tool kit

Materials/Spare Parts
- Paper
- Pen or pencil
- Batteries

Remove

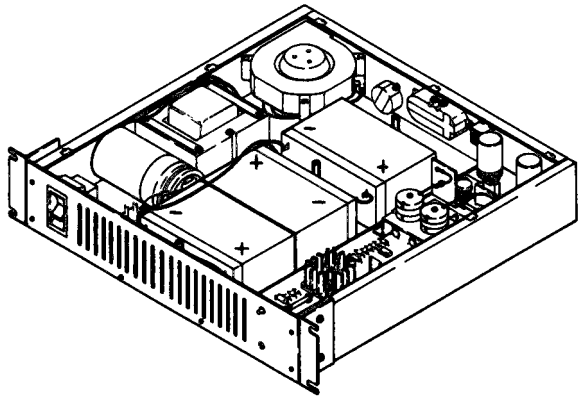


1. Remove memory save and auto restart unit (para 4-23).
2. Remove screws from unit cover.
3. Lift cover off.



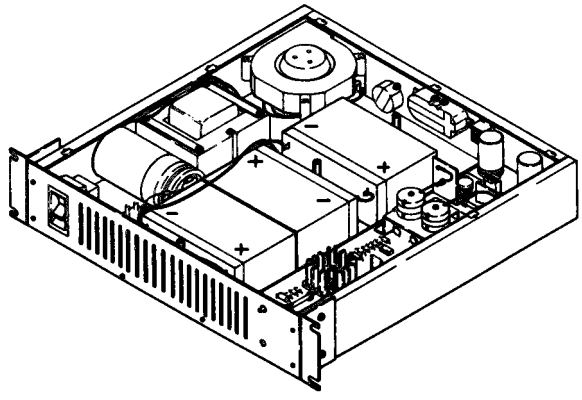
4. Remove screws from battery cover.
5. Remove battery cover.

4-24.1. REMOVE/REPLACE MEMORY SAVE AND AUTO RESTART BATTERIES (CONT)

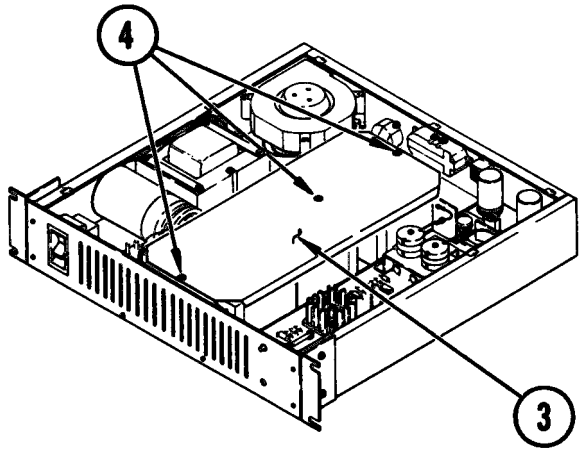


6. Make a drawing showing:
   - batteries
   - + and - terminals on each battery
   - wires connected to each terminal
7. Unsolder wires from terminals.
8. Remove batteries.

Replace

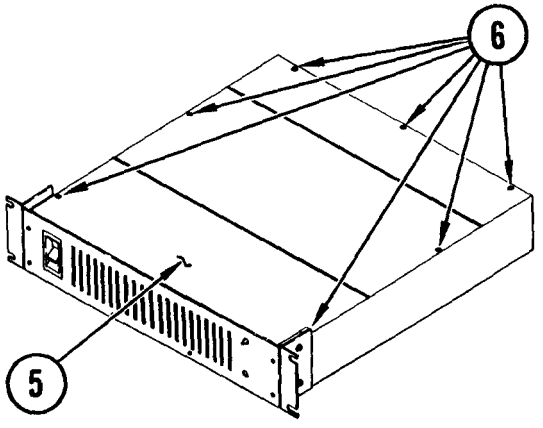


1. Following drawing made during removal, place batteries in proper position on tray.
2. Following drawing, connect and solder wires to terminals.



3. Replace battery cover.
4. Install battery cover screws.

4-24.1. REMOVE/REPLACE MEMORY SAVE AND AUT0 RESTART BATTERIES (CONT)



5. Replace unit cover.

6. Install screws.

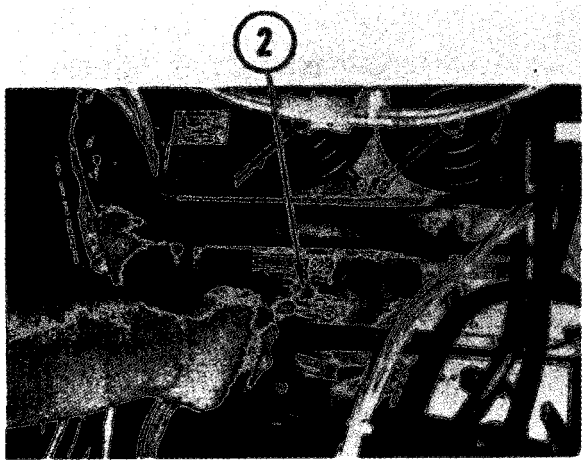
7. Replace memory save and auto restart unit (para 4-23).

4-25. CHECK/ADJUST MEMORY SAVE/AUTO RESTART UNIT OUTPUT VOLTAGES

INITIAL SETUP

Common Tools
- Tool kit
- TORX offset driver (CP-1435A/MYQ-4)

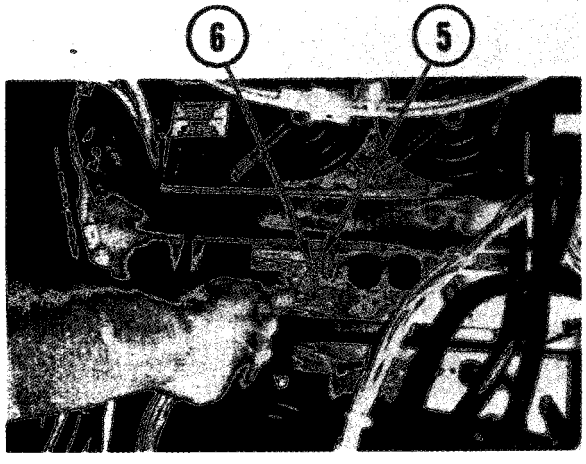
Test, Measurement and Diagnostic Equipment
- Multimeter



1. Power OFF. Remove CPU rear panel. (On CP-1435A/MYQ-4, remove screws on bulkhead so it can be moved aside for access.)

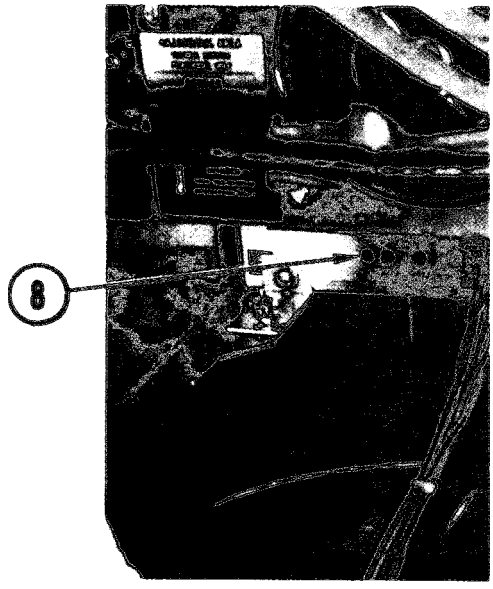
+5 V dc Check/Adjustment

2. Pull plug P02 from rear of memory save and auto restart unit.
3. Power on memory save and auto restart unit.

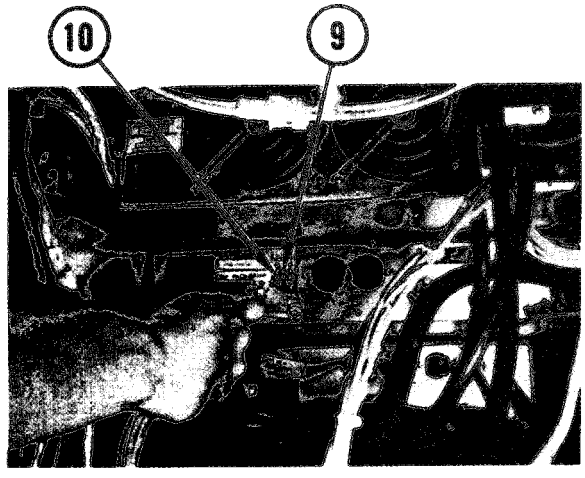


4. Set multimeter to 20 V dc range.
5. Connect positive lead of multimeter to pin 4 of J02.
6. Connect negative lead to pin 2.
7. Check readout on multimeter.
   - If 4.75 to 5.25, go to step 9
   - If not, go to step 8

4-25. CHECK/ADJUST MEMORY SAVE AND AUTO RESTART UNIT OUTPUT VOLTAGES (CONT)



8. Turn 5 V ADJ potentiometer until readout is 4.75 to 5.25 V dc.



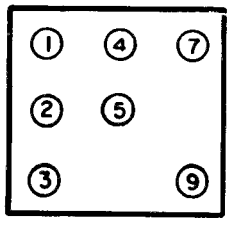
+12 V dc Check/Adjustment

9. Connect positive lead of multimeter to pin 5 of J02.

10. Connect negative lead to pin 3.

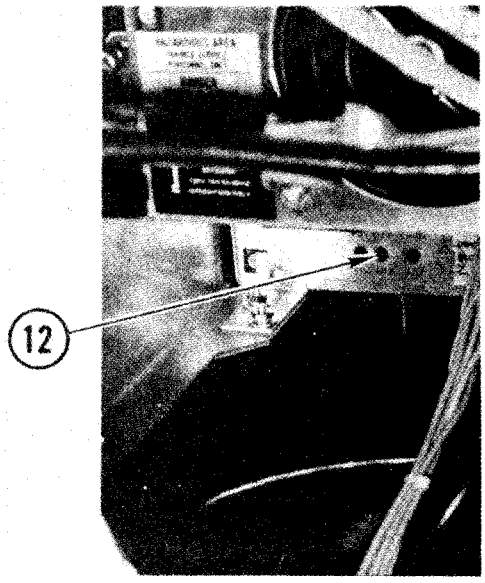
11. Check readout.

- If 11.40 to 12.60 V dc, go to step 13
- If not, go to step 12

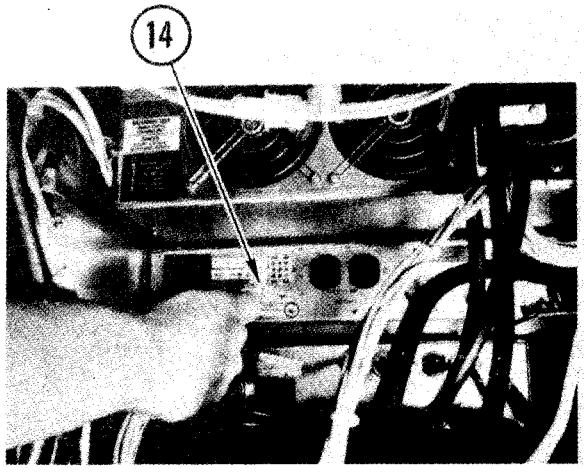


J02 CONNECTOR
PIN CONFIGURATION

4-25. CHECK/ADJUST MEMORY SAVE AND AUTO RESTART UNIT OUTPUT VOLTAGES (CONT)



12. Turn +12 V ADJ potentiometer until readout is 11.40 to 12.60 V dc.



13. Power OFF unit.

14. Push on plug P02.

15. Install CPU rear panel.

4-26. REMOVE/REPLACE MAIN MEMORY BOARD AND MEMORY PACS

INITIAL SETUP

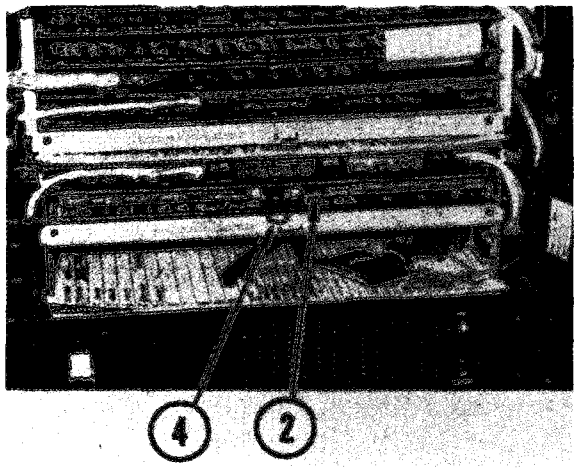
Common Tools
- Tool kit
- TORX offset driver (CP-1435A/MYQ-4)

Materials/Spare Parts
- Paper
- Pen or pencil

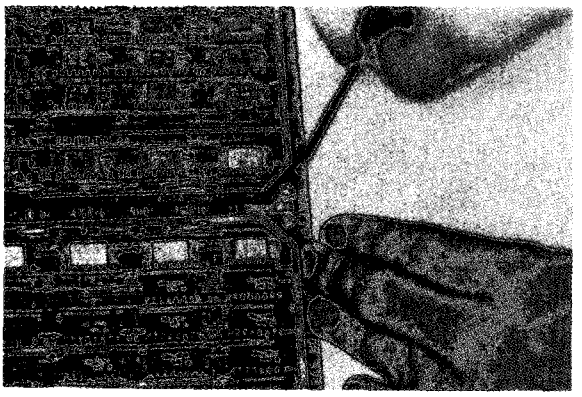
NOTE

More than one main memory board may be installed. Refer to para 1-14 for difference between models.

Remove

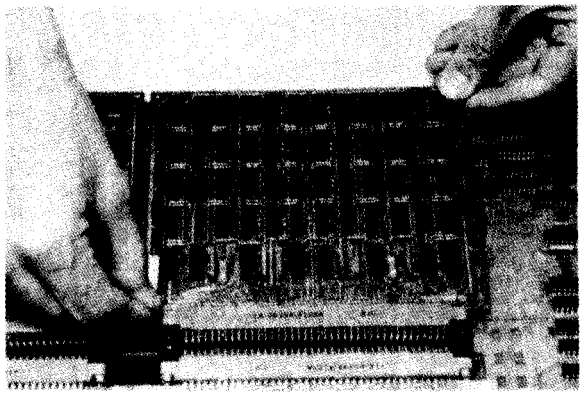


1. Power off. Open door.
2. Open bottom grill and locate main memory board.
3. Hold board at each end. Wiggle board free.
4. Using handle, slide board out of slot.



5. Place board on flat surface.
6. To remove any memory pac, remove screws from two corners of pac.

4-26. REMOVE/REPLACE MAIN MEMORY BOARD AND MEMORY PACS (CONT)



CAUTION

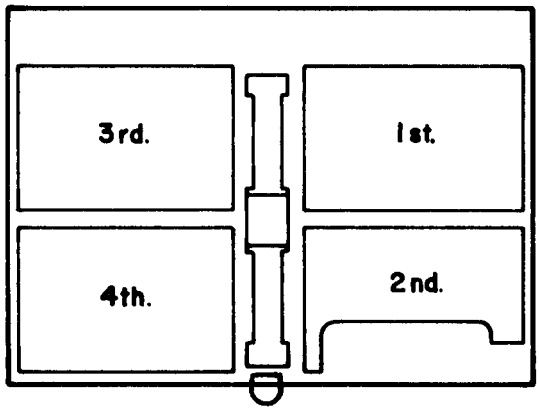
When removing pac, don't lift it up. You could break pins.

7. Pull pac straight out.

8. If you're only replacing pac, go to Replace, step 1.

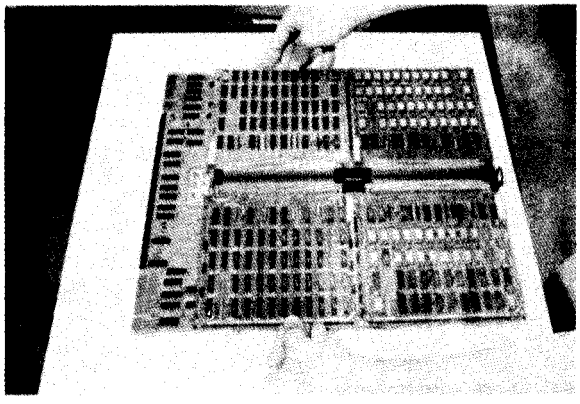
NOTE

If you're replacing main memory board, write down position of each pac as you remove it.



9. Remove all four pacs. Go to Replace, step 3.

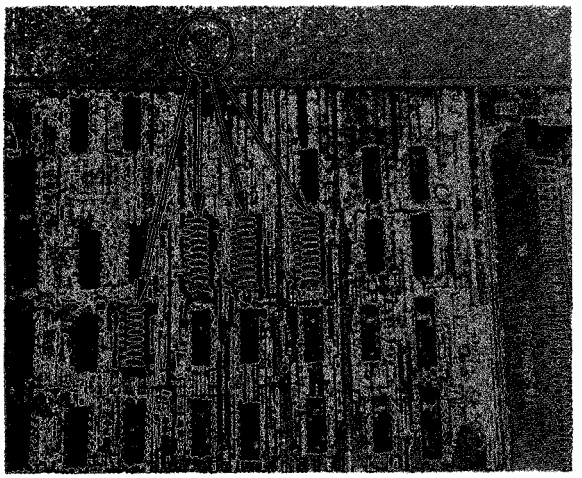
Replace



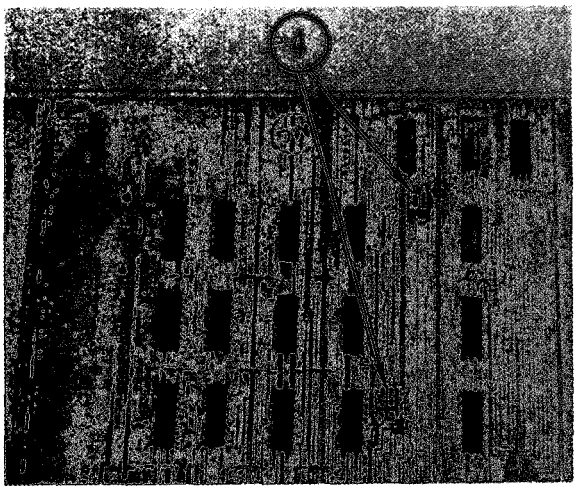
1. If you're only replacing a pac, push new pac in.

4-26. REMOVE/REPLACE MAIN MEMORY BOARD AND MEMORY PACS (CONT)

2. Replace screws. Go the Replace, step 7.

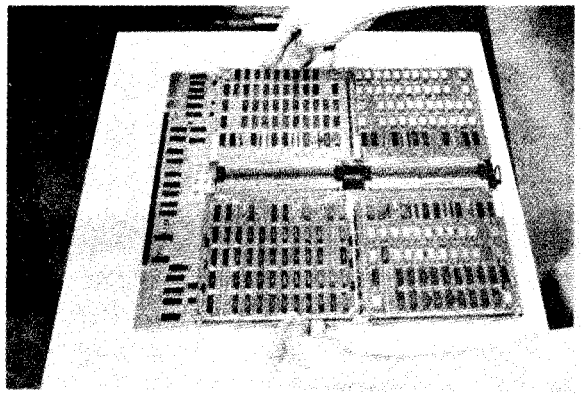


3. On new main memory board, set switches to position required for system. (See Appendix D of your system manual).

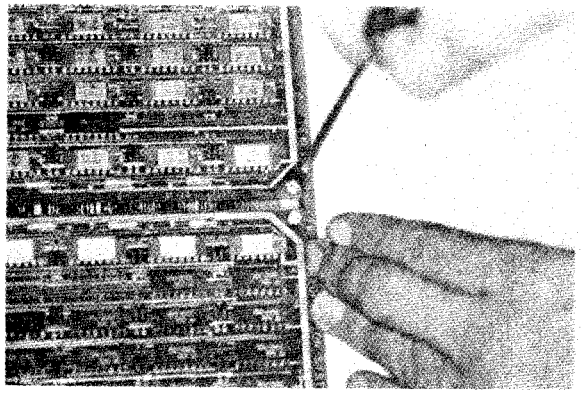


4. On new main memory board, set switches to position required for system. (See Appendix D of your system manual).

4-26. REMOVE/REPLACE MAIN MEMORY BOARD AND MEMORY PACS (CONT)



5. Push in each pac in same position as in old controller board. Use your notes.



6. Replace screws.

7. Slide main memory board into slot.

8. Push in board until snug. Close bottom grill.

9. Close door.

4-27. REMOVE/REPLACE DISK CONTROLLER BOARD

INITIAL SETUP

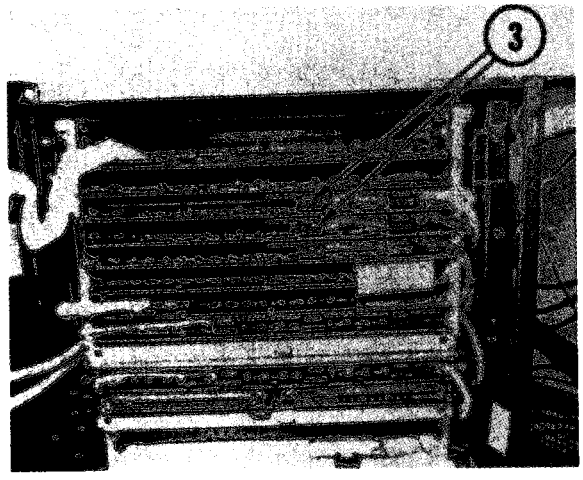
Common Tools
- Tool kit

Materials/Spare Parts
- Tags
- Pen or pencil

NOTE

There are two disk controller boards. Follow these steps to remove/replace either board.

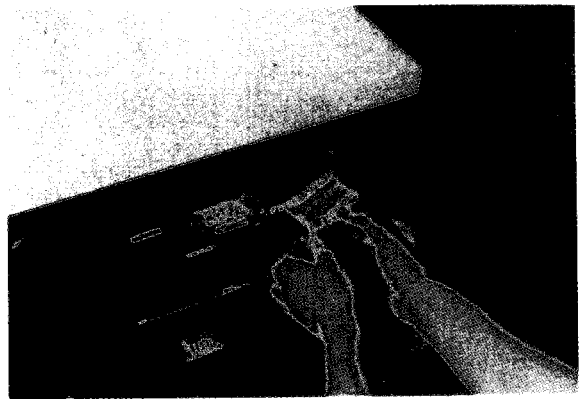
Remove



1. Power off. Open CPU door.
2. Open top grill.
3. Find controller board you will remove.
4. Wiggle board loose.
5. Slide board out about two inches.

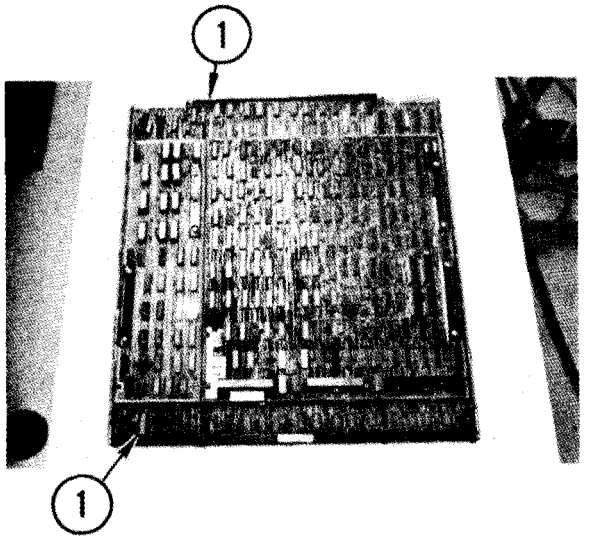
NOTE

Quantity of paddleboard connections may vary dependent upon number of disk drives used in system (see appendix D).



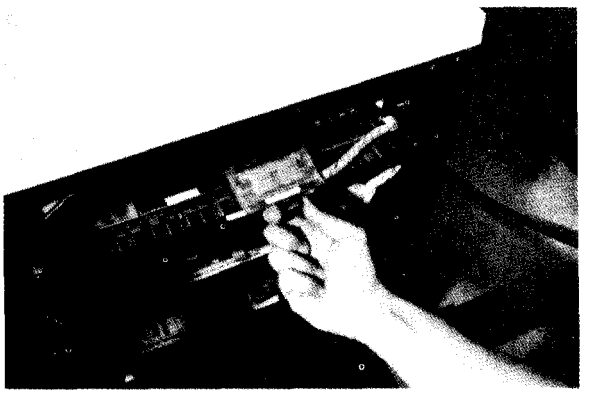
6. Tag all paddleboards.
7. Remove paddleboards from left to right.
8. Slide controller board out of slot.

4-27. REMOVE/REPLACE DISK CONTROLLER BOARD (CONT)



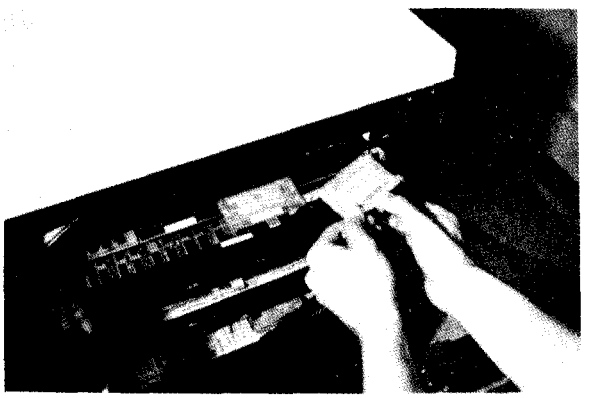
Replace

1. On new controller boards set switches to position required for system. (See Appendix D of your system manual.)



2. Slide new controller board into slot. Let it extend two or three inches from slot.

3. Check paddleboard tags.



4. Connect paddleboards from right to left.

5. Push controller board in until snug.

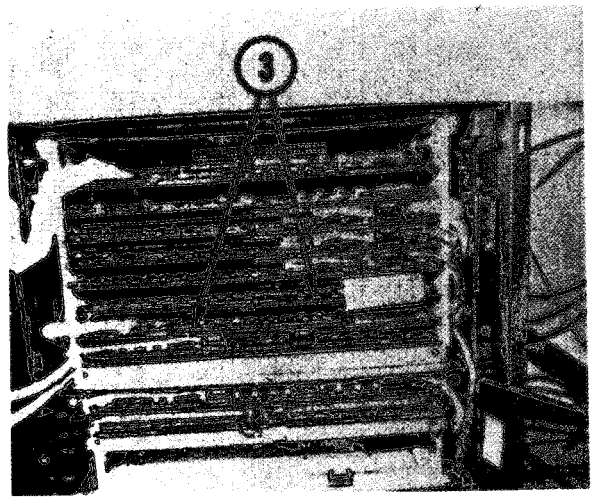
6. Close top grill.

7. Close door and power on.

4-28. REMOVE/REPLACE DATA RECOVERY UNIT CONTROLLER AND ANALOG CLOCK ADAPTER PACS

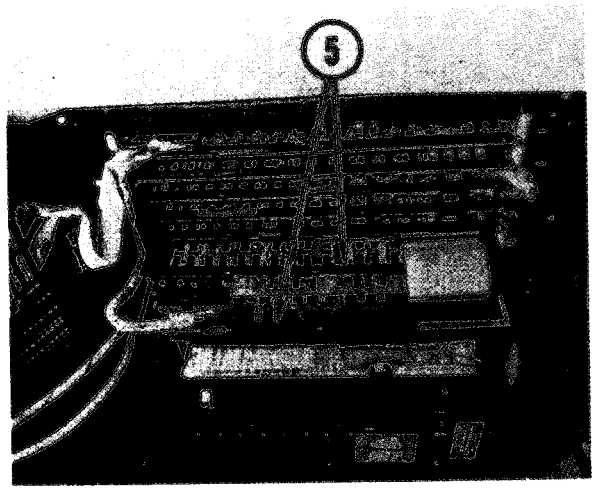
INITIAL SETUP

Common Tools
- Tool kit



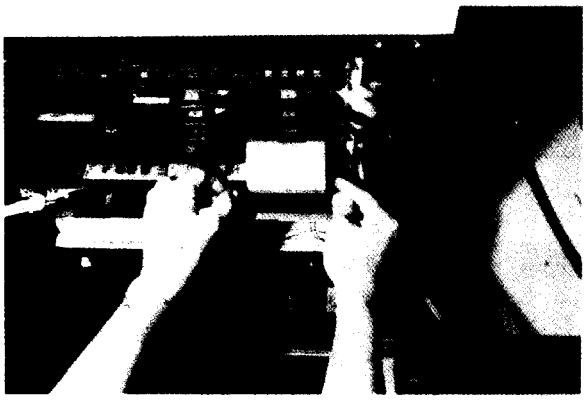
Remove

1. Power off.
2. Open door and top grill.
3. Find tape controller board and data recovery unit controller board.

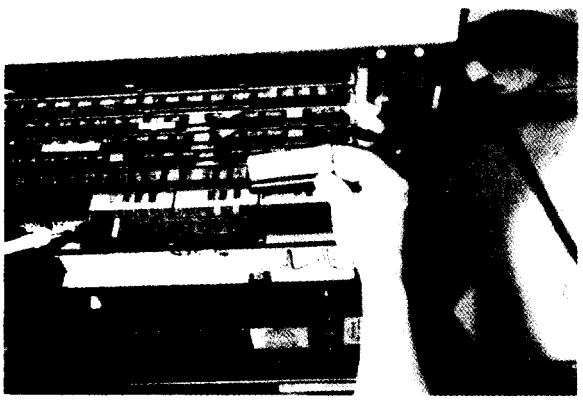


4. Loosen both boards.
5. Pull out both boards three or four inches.

4-28. REMOVE/REPLACE DATA RECOVERY UNIT CONTROLLER AND ANALOG CLOCK ADAPTER PACS (CONT)



6. To free cable to lower board, pull away levers.



7. Pull off cable.

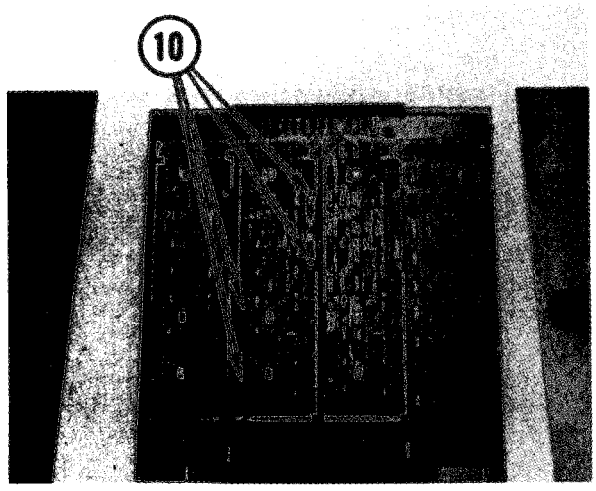
8. To free second cable, pull away levers.

4-28. REMOVE/REPLACE DATA RECOVERY UNIT CONTROLLER AND ANALOG CLOCK ADAPTER PACS (CONT)

9. Pull off connector. Slide out board.

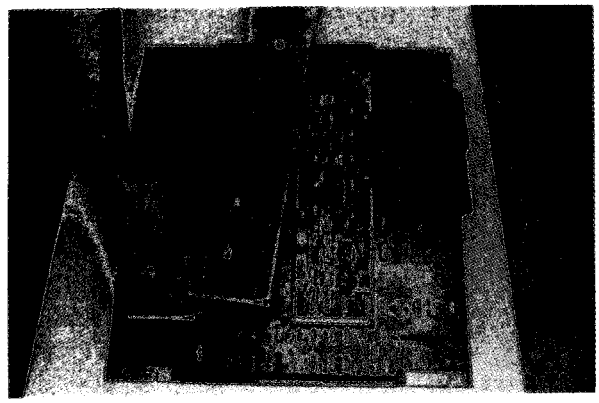
NOTE

There are three analog clock adapter pacs. Use steps 10-12 to remove any of them.



10. Loosen captive screws.

11. Pull off top stiffeners.



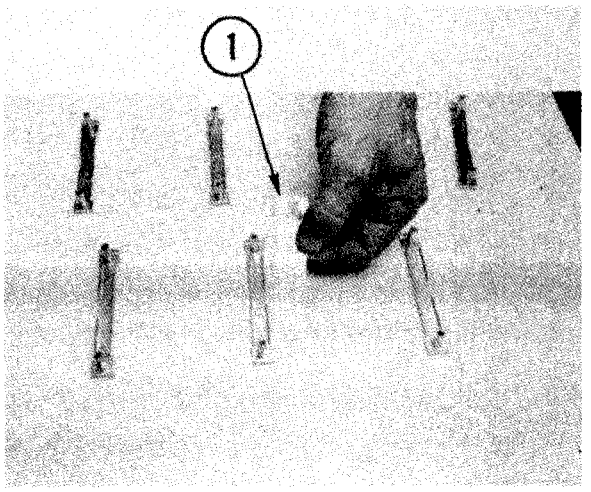
12. Pull adapter pac off corner pegs. Pegs should remain in controller. If you're just removing adapter, go to Replace, step 4.

13. If you're replacing controller board, remove all adapters and corner pegs.

14. Pull off standoffs.

15. At bottom of board, pull out bottom stiffeners and insulating strips.

4-28. REMOVE/REPLACE DATA RECOVERY UNIT CONTROLLER AND ANALOG CLOCK ADAPTER PACS (CONT)

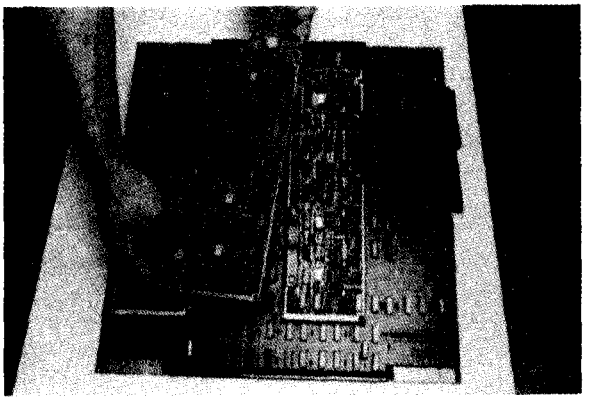


Replace

1. Make sure each bottom stiffener has insulating strip.
2. Put bottom stiffeners through board.
3. Place standoffs on bottom stiffeners. Place corner pegs in board.

NOTE

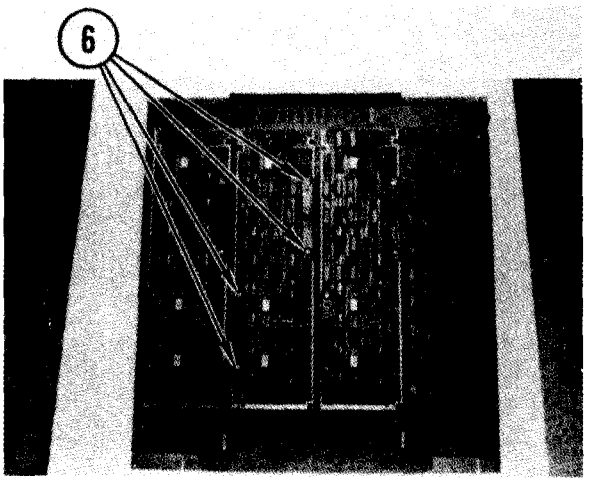
Either three or four adapter pacs are used. Use steps 4-6 to replace any or all of them.



CAUTION

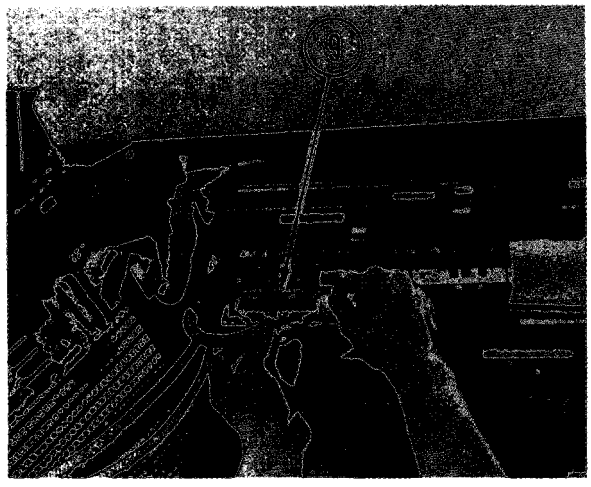
Make sure connector end of adapter pac is at the front of the controller board.

4. Place adapter pac on standoffs and corner pegs.



5. Place top stiffeners on adapter pac.
6. Screw stiffeners down.
7. If replacing controller board, repeat steps 4-6 for other two adapter pacs.

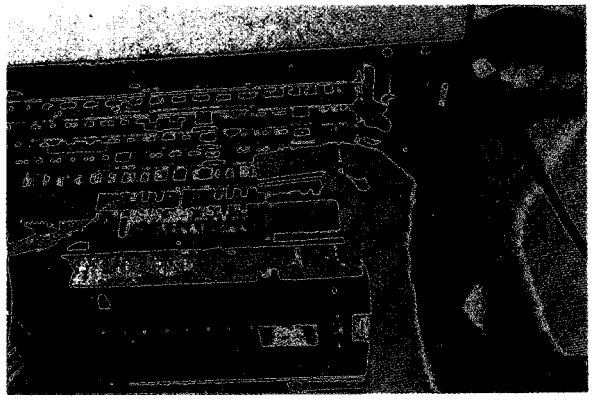
4-28. REMOVE/REPLACE DATA RECOVERY UNIT CONTROLLER AND ANALOG CLOCK ADAPTER PACS (CONT)



8. Slide board into slot. Leave it three or four inches out.

9. Push connector on pins.

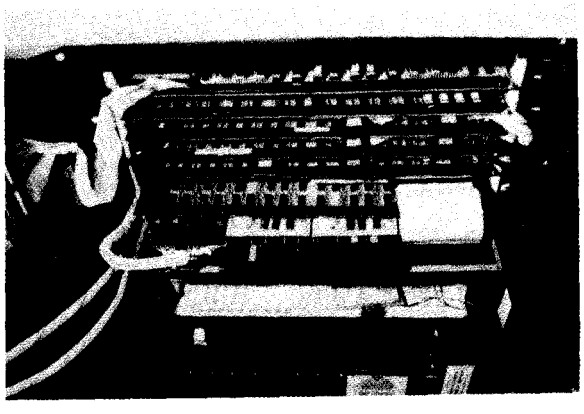
10. Close levers. Make sure they hold cable in place.



11. Push cable on pins.

4-28. REMOVE/REPLACE DATA RECOVERY UNIT CONTROLLER AND ANALOG CLOCK ADAPTER PAC (CONT)

12. Close levers. Make sure they hold cable in place.



13. Slide in both controller boards. Push in boards until they are snug.

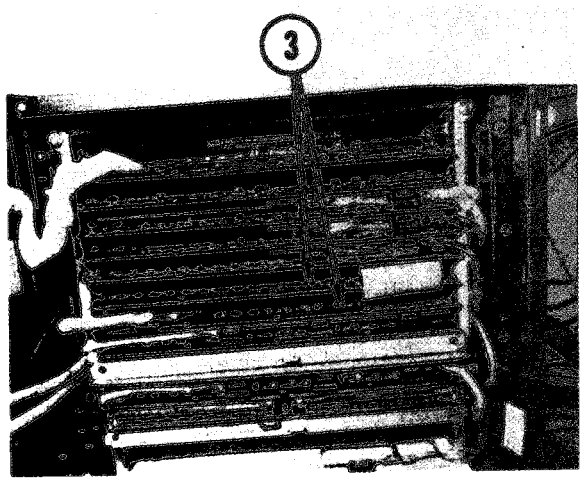
14. Close top grill.

15. Close door.

4-29. REMOVE/REPLACE PE MAG TAPE CONTROLLER BOARD AND NINE CHANNEL ADAPTER PAC

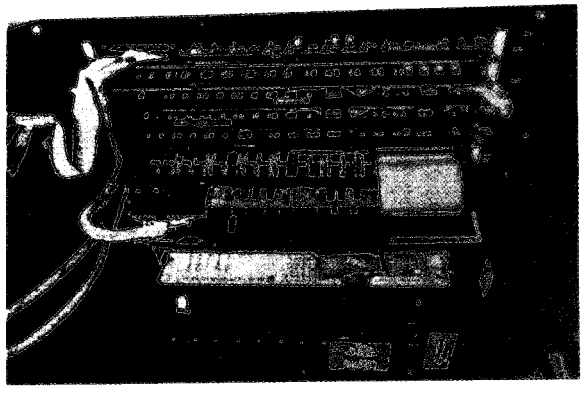
INITIAL SETUP

Common Tools
- Tool kit



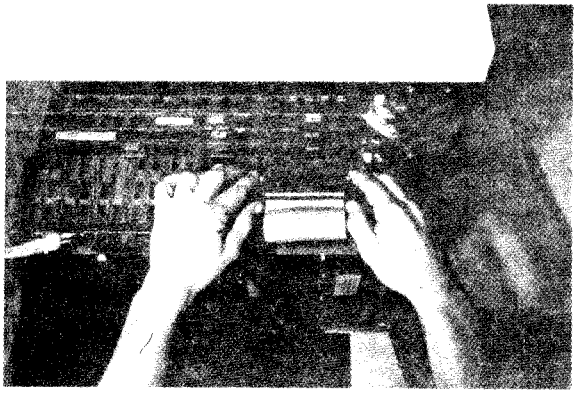
Remove

1. Power off. Open door.
2. Open top grill.
3. Find tape drive controller boards and data recovery unit controller board.

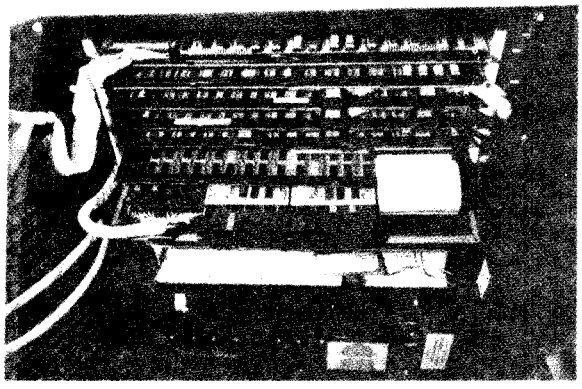


4. Pull both boards out three or four inches.

4-29. REMOVE/REPLACE PE MAG TAPE CONTROLLER BOARD AND NINE CHANNEL ADAPTER PAC (CONT)

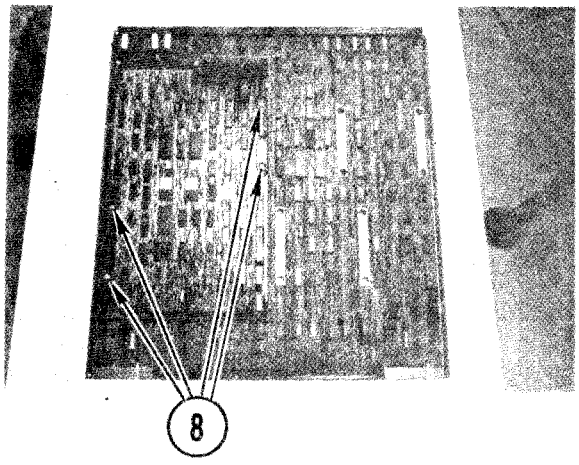


5. To free cable at top board, pull out on snaps.



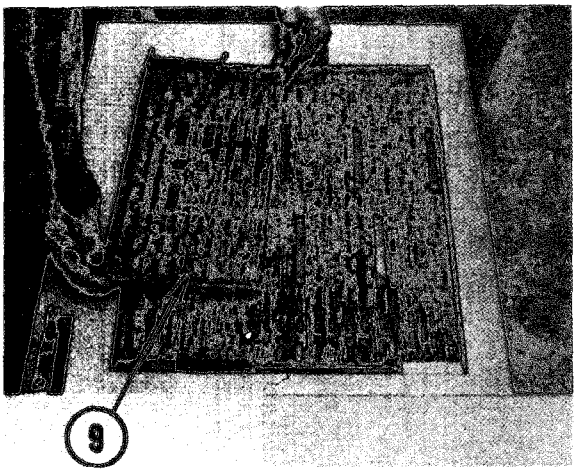
6. Pull away cable.

7. Slide top board out of slot. Set board on flat surface.



8. Loosen captive screws until you can lift off top stiffeners.

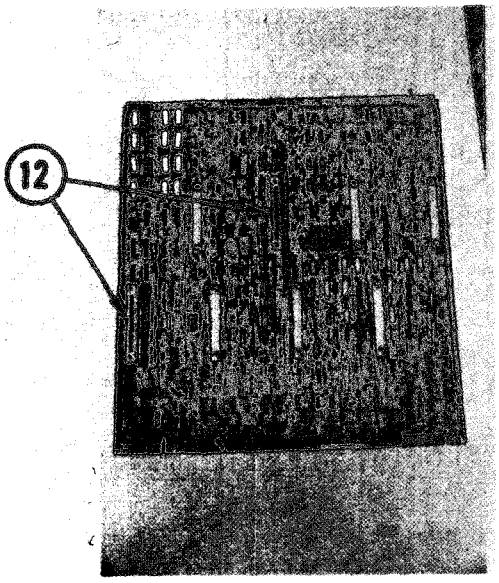
4-29. REMOVE/REPLACE PE MAG TAPE CONTROLLER BOARD AND NINE CHANNEL ADAPTER PAC (CONT)



9. Lift nine channel adapter pac off corner pegs. Pegs should remain in controller board.

10. If you're just replacing adapter, go to Replace step 5.

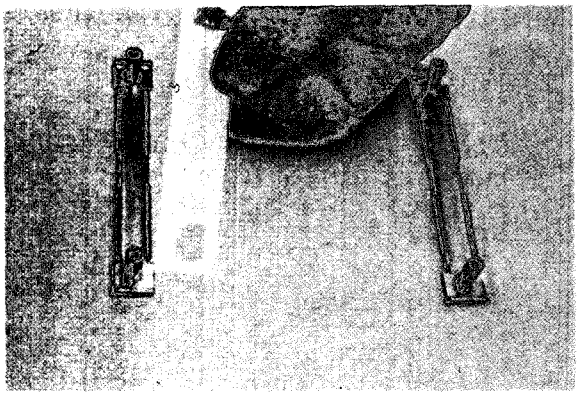
11. If you're replacing controller, remove corner pegs from controller.



12. Remove standoffs

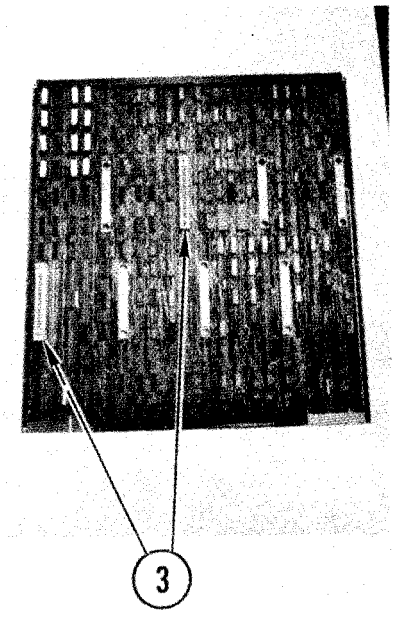
13. On bottom of board, remove bottom stiffeners and insulator strips.

Replace



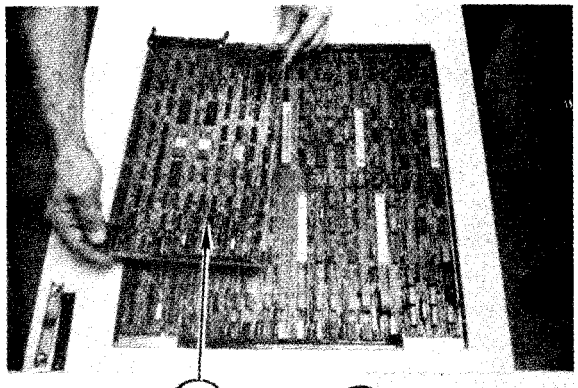
1. Make sure insulator strip is over each bottom stiffener.

4-29. REMOVE/REPLACE PE MAG TAPE CONTROLLER BOARD AND NINE CHANNEL ADAPTER PAC (CONT)



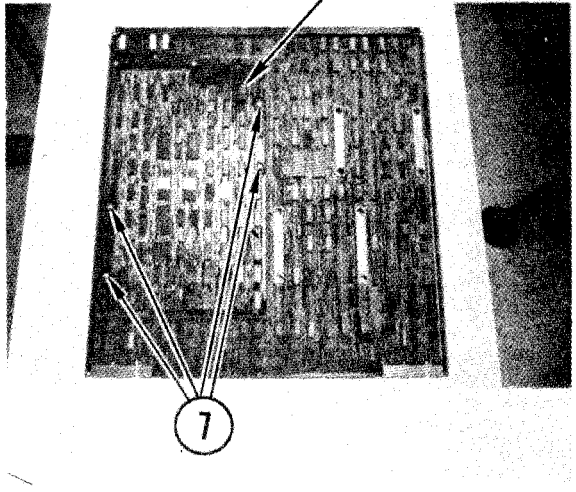
2. Insert stiffeners through bottom of new controller.

3. At top of board, place standoffs over bottom stiffeners.



4. Place corner pegs into controller board.

5. Seat nine channel adapter pac on pegs.

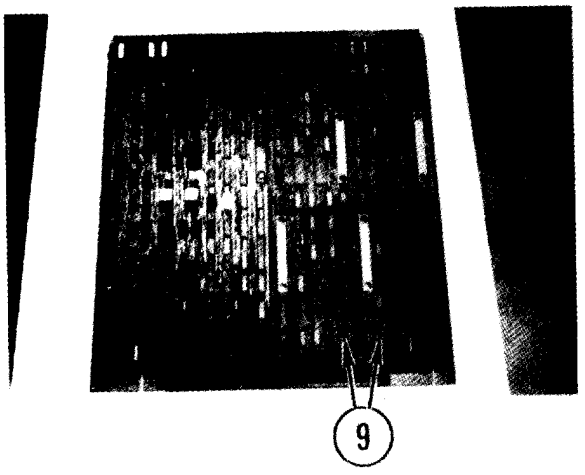


6. Place top stiffeners on adapter pac.

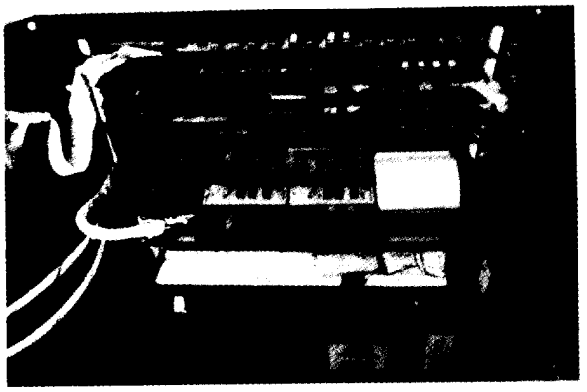
7. Tighten captive screws.

8. On new controller board, set switches to position required for system. (See Appendix D of your system manual.)

4-29. REMOVE/REPLACE PE MAG TAPE CONTROLLER BOARD AND NINE CHANNEL ADAPTER PAC (CONT)

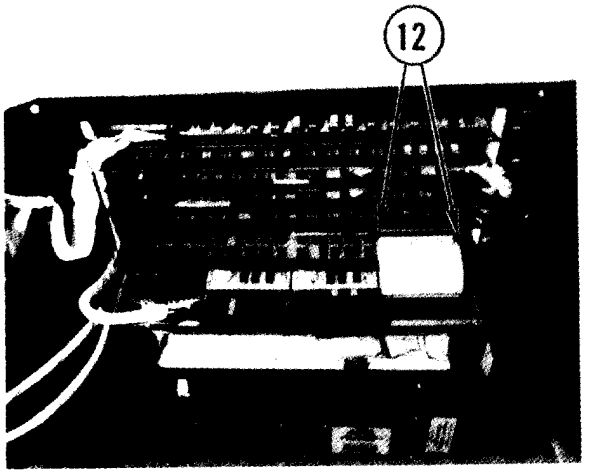


9. On new controller board, set switches to position required for system. (See Appendix D of your system manual.)



10. Slide controller board into slot.

11. Connect cable.



12. To lock cable in place, close snaps.

13. Push in both controller boards until snug.

14. Close top grill.

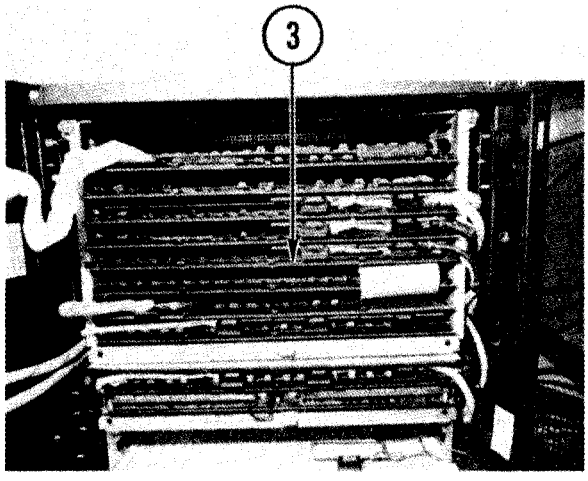
15. Close door.

4-30. REMOVE/REPLACE MDC BOARD

INITIAL SETUP

Common Tools
- Tool kit

Materials/Spare Parts
- Tags
- Pen or pencil



Remove

1. Power off. Open door.
2. Open top grill.

NOTE

CP-1435/MYQ-4 has one MDC board located in slot 9 as shown, CP-1435A/MYQ-4 has two MDC boards located in slots 10 and 11.

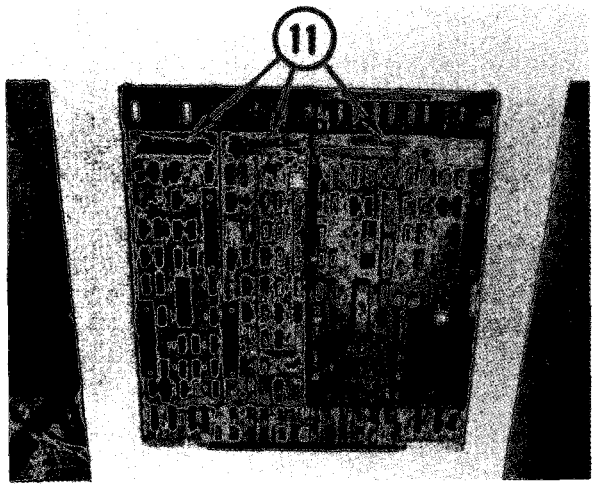
3. Locate MDC board.
4. Wiggle board loose.
5. Slide out three or four inches.

NOTE

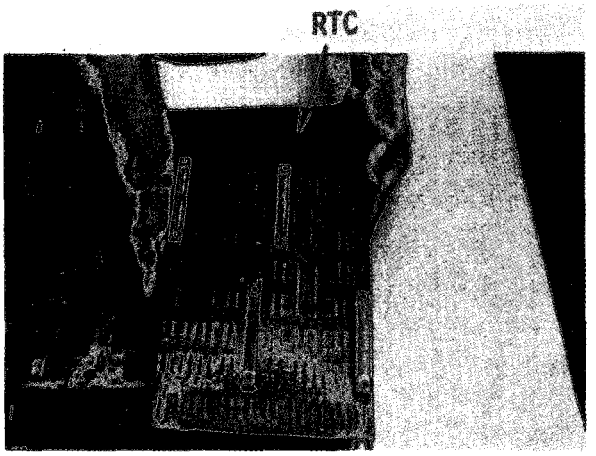
The number of paddleboard connectors may vary dependent upon MDC board used. Refer to Appendix D for difference data.

6. Tag all paddleboards.
7. Disconnect paddleboards from left to right.
8. Set paddleboards aside carefully.
9. Slide MDC board out of slot.
10. Place board on flat surface.

4-30. REMOVE/REPLACE MDC BOARD (CONT)

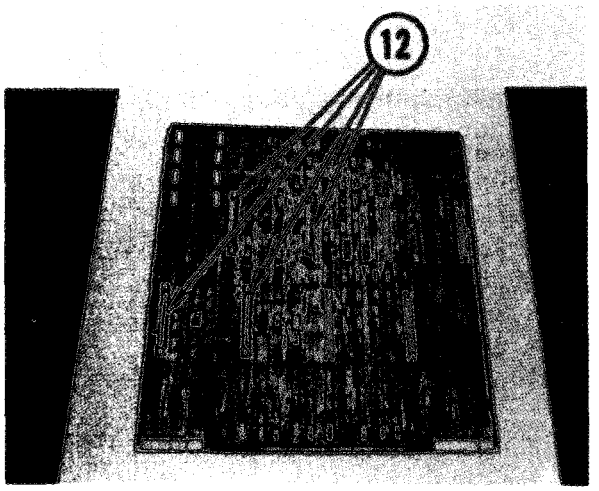


11. Remove adapter pacs. (para 4-31, 4-32, and 4-33, or 4-33.2 removal steps only).



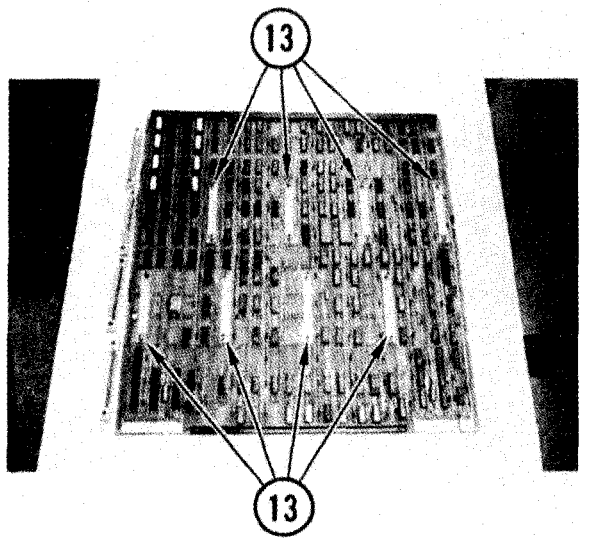
NOTE

Standoff connectors are soldered to RTC. They cannot be removed.



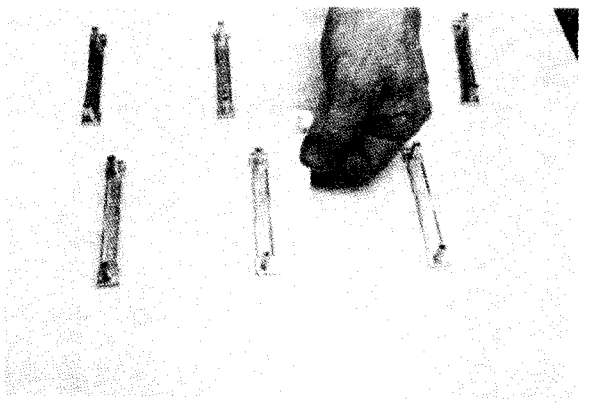
12. Remove standoff connectors and corner pegs from controller board.

4-30. REMOVE/REPLACE MDC BOARD (CONT)

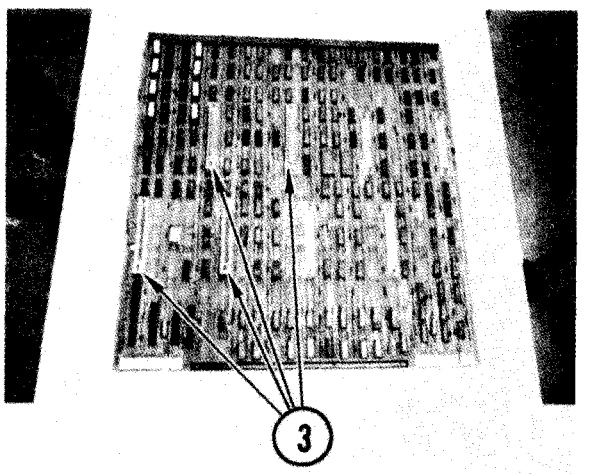


13. Remove bottom stiffeners.

Replace

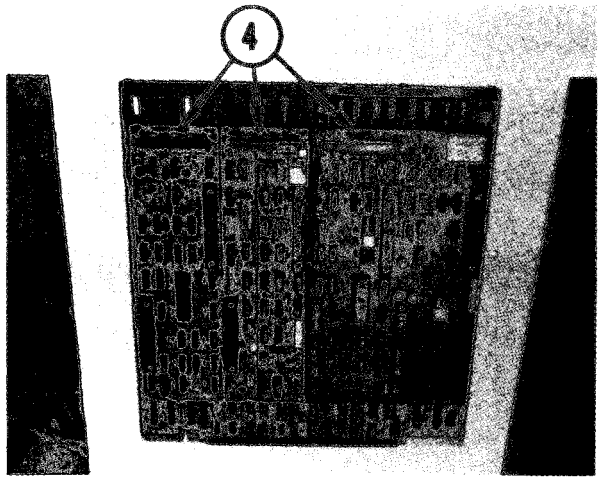


1. Make sure each bottom stiffener has insulating strip.
2. Replace bottom stiffeners.

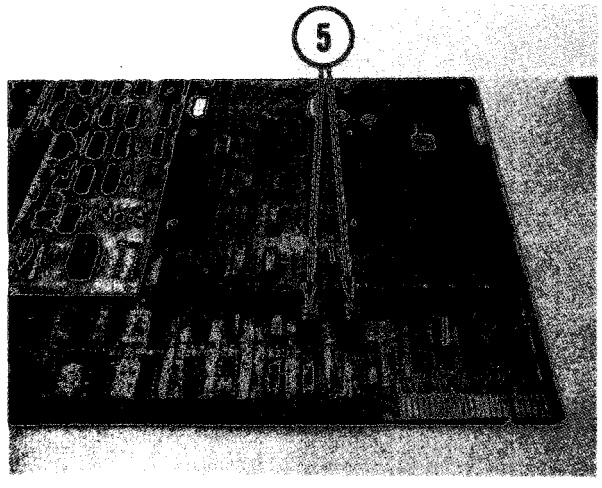


3. Replace standoff connectors and corner pegs on controller board.

4-30. REMOVE/REPLACE MDC BOARD (CONT)



4. Replace adapter pacs (para 4-31, 4-32, 4-33 or 4-33.2).



5. On new MDC board, set hex rotary switches to position required for system. (See your system manual.)

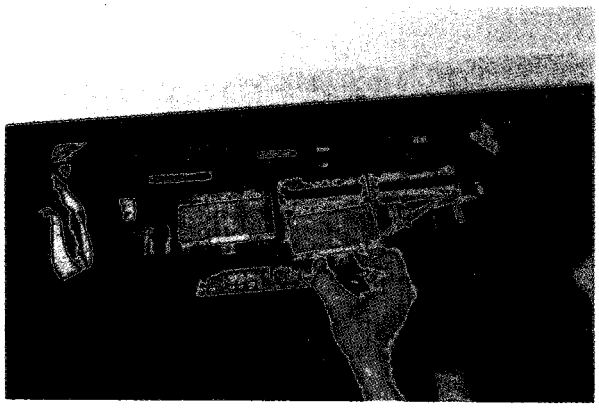
NOTE

The MDC board may have socket switches instead of the rotary switches illustrated.

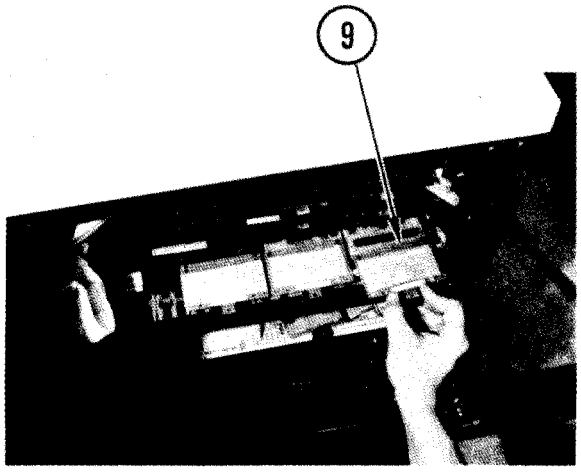
6. Slide controller board into slot. Leave it out three or four inches.

7. Connect right paddleboard.

8. Connect middle paddleboard(s).



4-30. REMOVE/REPLACE MDC BOARD (CONT)



9. Connect left paddleboard.
10. Push controller in until snug.
11. Close top grill.
12. Close door and power on.

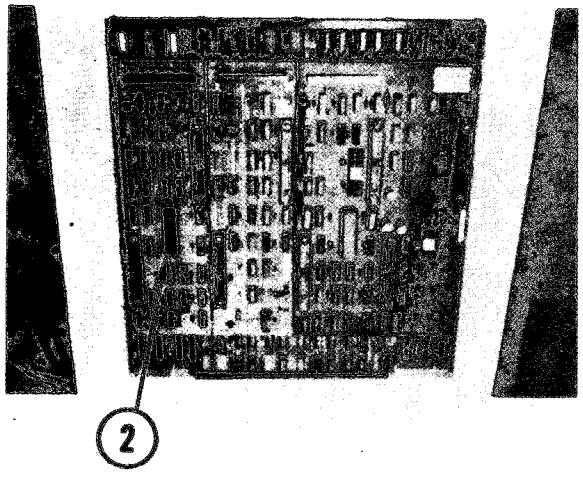
4-31. REMOVE/REPLACE DISPLAY DEVICE PAC

INITIAL SETUP

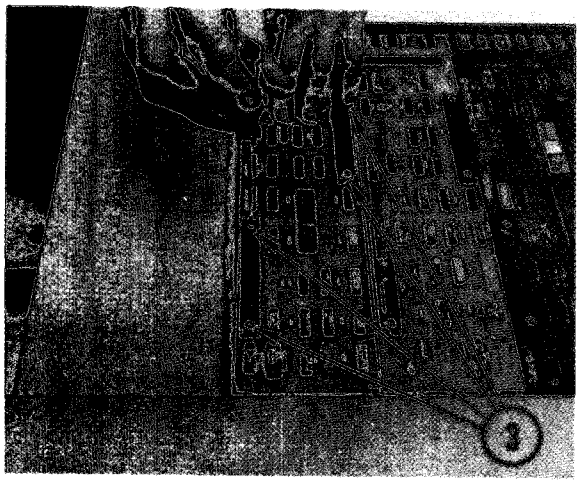
Common Tools
- Tool kit

Remove

1. Remove MDC board (para 4-30, Remove, steps 1-10).

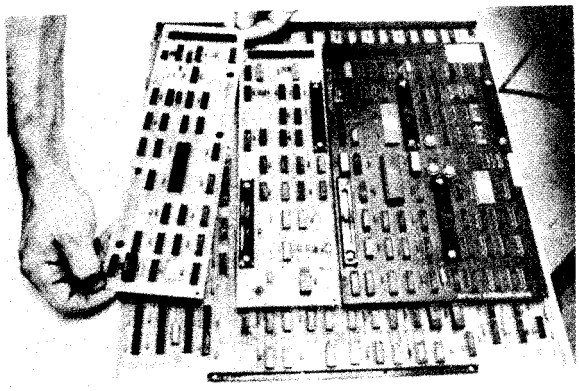


2. Find display device pac.



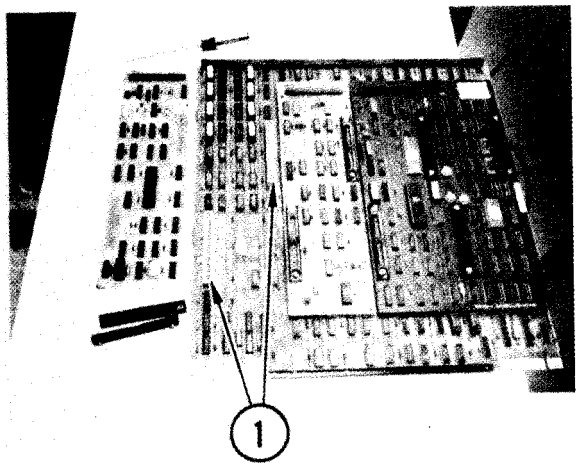
3. Remove top stiffeners.

4-31. REMOVE/REPLACE DISPLAY DEVICE PAC (CONT)

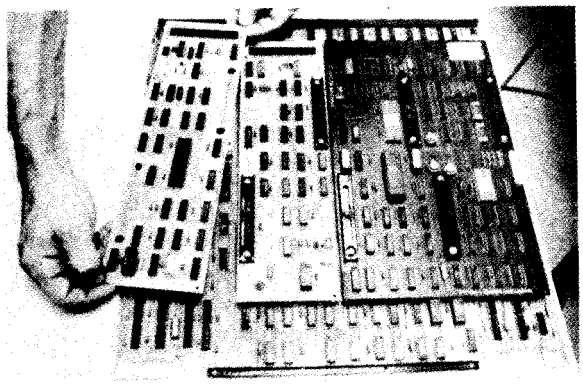


4. Lift pac off standoff connectors and corner pegs. Corner pegs should remain in controller board.

Replace



1. Locate standoff connectors.



2. Place display device pac on standoff connectors and corner pegs.

4-31. REMOVE/REPLACE DISPLAY DEVICE PAC (CONT)

3. Replace top stiffeners.

4. On new display device pat, set switches to position required for system. (See Appendix D of your system manual.)

5. Replace MDC board (para 4-30 Replace, steps 5-11).

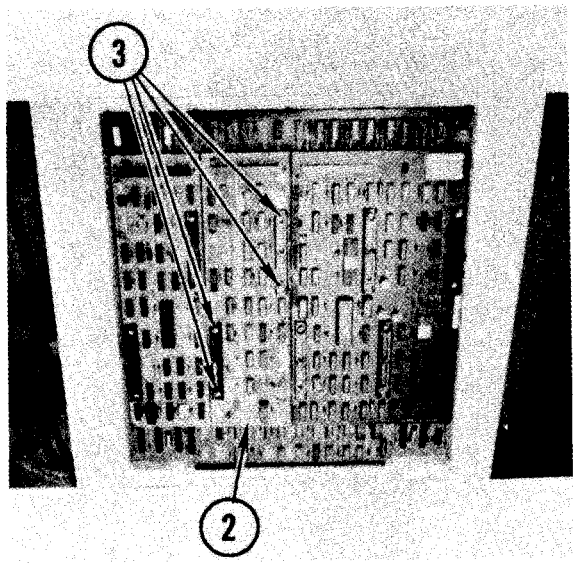
6. Close CPU door.

4-32. REMOVE/REPLACE PRINTER DEVICE PAC

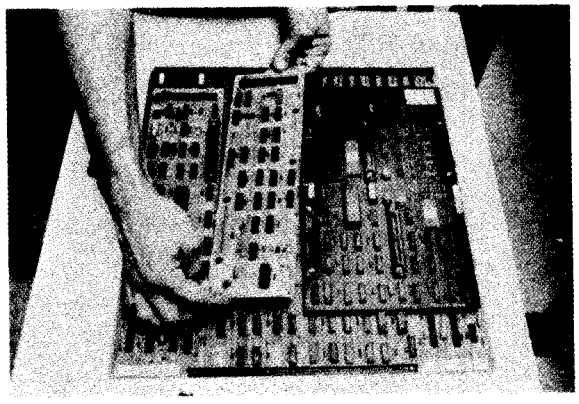
INITIAL SETUP

Common Tools
- Tool kit

Remove

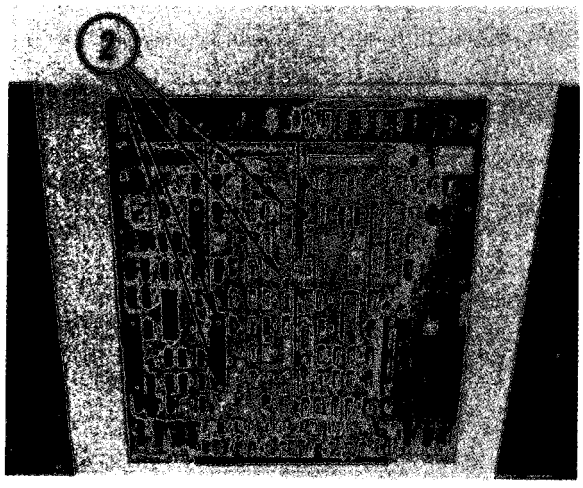


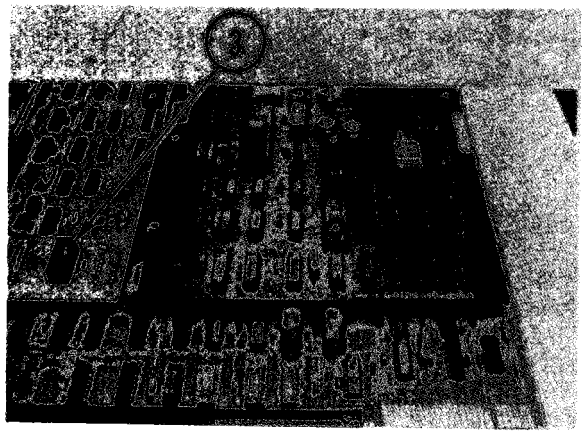
1. Remove MDC board (para 4-30, Remove, steps 1-10).
2. Find pac.
3. Remove top stiffeners.



4. Lift pac off. Corner pegs and standoff connectors should remain on controller board.

4-32. REMOVE/REPLACE PRINTER DEVICE PAC (CONT)





Replace

1. Place pac on standoff connectors and corner pegs.
2. Replace top stiffeners.
3. On new printer device pac, set switches to position required for system. (See Appendix D of your system manual.)
4. Replace MDC board (para 4-30, Replace, steps 5-11).
5. Close door.

4-33. REMOVE/REPLACE REAL TIME (CRYSTAL) CLOCK PAC

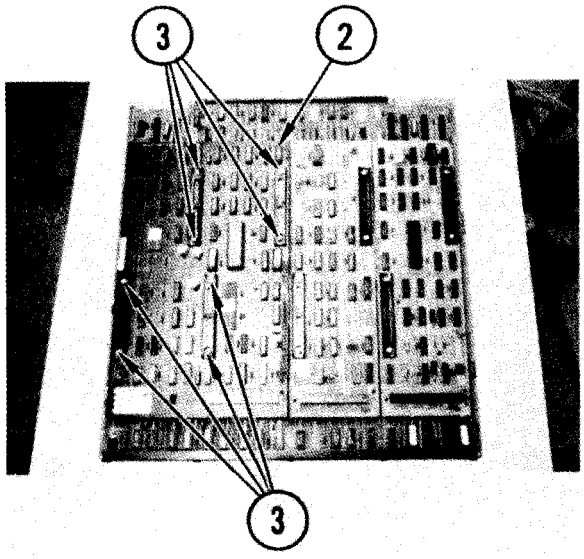
INITIAL SETUP

Common Tools
- Tool kit

Applicable Models
- CP-1435/MYQ-4

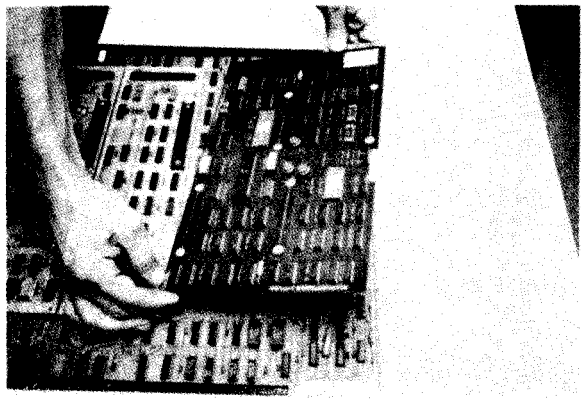
CAUTION

Real time clock contains batteries. Do not allow pac to contact metal surfaces.



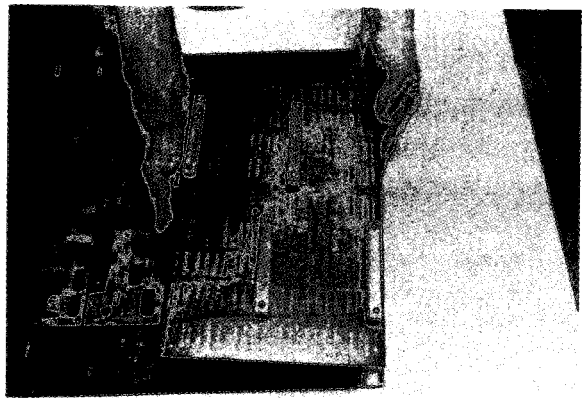
Remove

1. Remove MDC board (para 4-30, Remove, steps 1-10).
2. Find real time clock on controller board.
3. Remove top stiffeners.



4. Lift clock off. Corner pegs should remain in controller board.

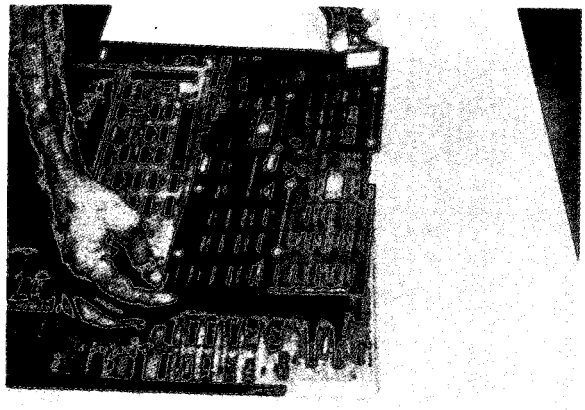
4-33. REMOVE/REPLACE REAL TIME (CRYSTAL) CLOCK PAC (CONT)



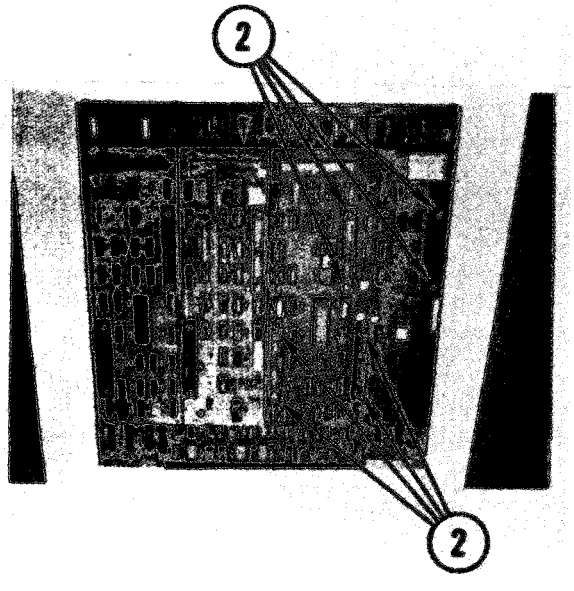
NOTE

Standoff connectors are soldered to real time clock. They cannot be removed.

Replace



1. Place real time clock on corner pegs.



2. Replace top stiffeners.
3. Replace MDC board (para 4-30, Replace, steps 5-11).
4. Close door.

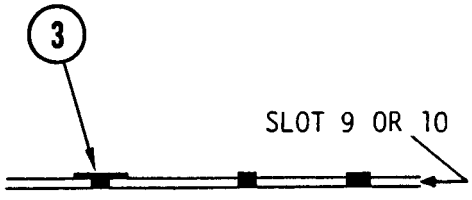
NOTE

Real time clock batteries must be recharged. Power on CPU and allow a 24-hour recharge period before resuming normal operation.

4-33.1. REMOVE/REPLACE REAL TIME CLOCK BATTERIES

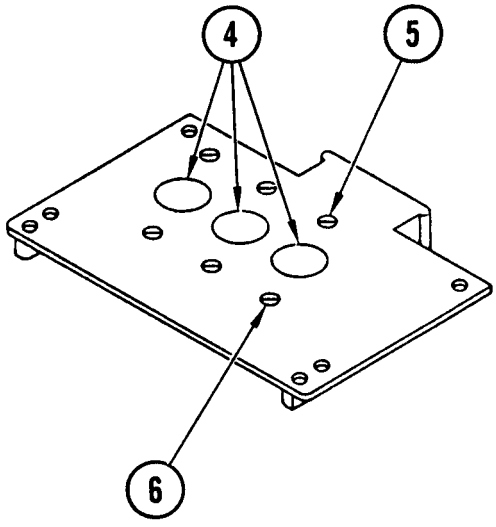
INITIAL SETUP

Common Tools	Materials/Spare Parts
• Tool kit	• RTC batteries (3)



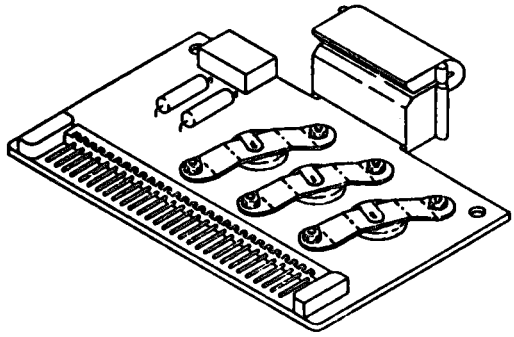
Remove

1. Power OFF CPU.
2. Open door and top grill.
3. In slot 9, 10, or 11, find and pull off connector for real time clock adapter.

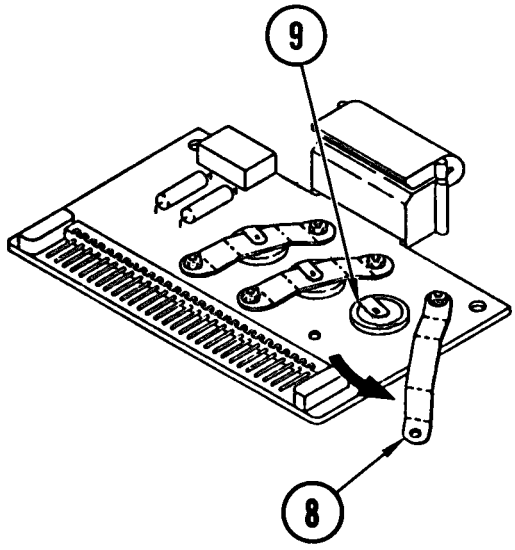


4. Find three batteries in connector.
5. Remove one screw, hex nut, and washers from one side of battery to be replaced.
6. Loosen other screw.

4-33.1. REMOVE/REPLACE REAL TIME CLOCK BATTERIES (CONT)



7. Turn connector over.



8. Swing bracket aside.

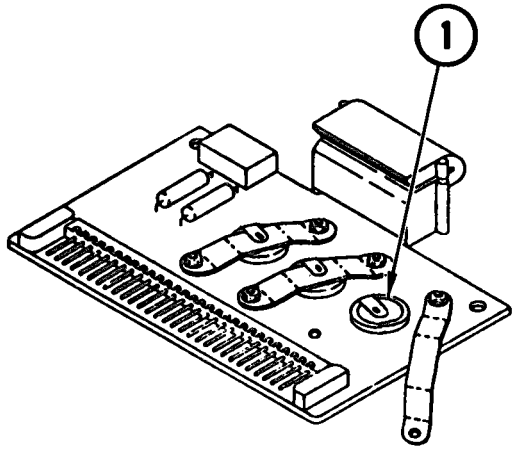
9. Lift battery from connector and throw it away.

10. Repeat steps 5 thru 9 for other two batteries.

Replace

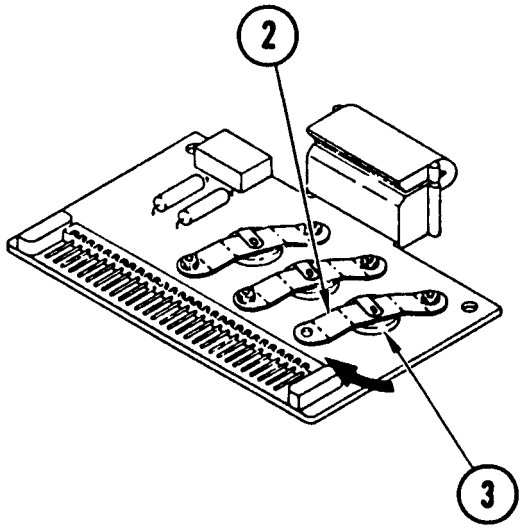
NOTE

When replacing a battery, it is a recommended practice to replace all batteries at the same time.

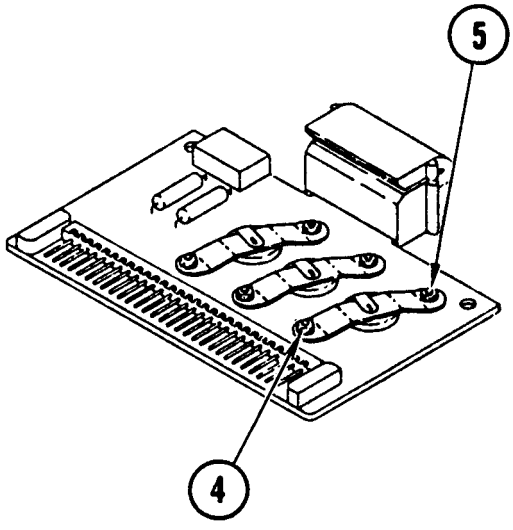


1. Insert new battery with black ring and tab positioned as shown.

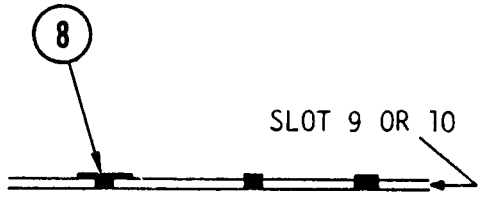
4-33.1 REMOVE/REPLACE REAL TIME CLOCK BATTERIES (CONT)



2. Slide bracket between tab and battery.
3. Press tab down onto bracket.



4. Install screw, washers, and hex nut.
5. Tighten other screw.
6. Repeat steps 1 thru 5 for other two batteries.



7. Turn connector over.
8. Push connector onto real time clock adapter in CPU slot 9 or 10.
9. Close grill and door.
10. Power ON CPU.

4-33.2. REMOVE/REPLACE REAL TIME (CRYSTAL) CLOCK PAC

INITIAL SETUP

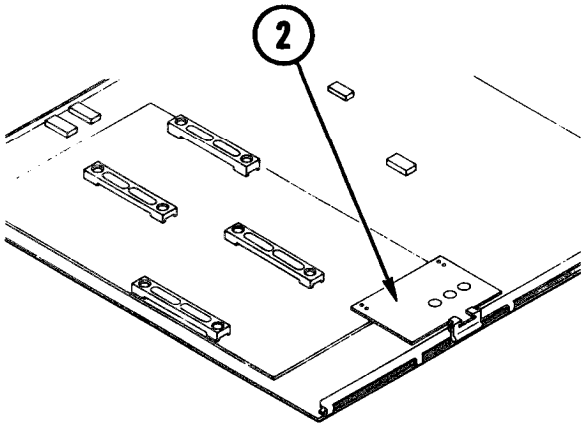
Common Tools	Materials/Spare Parts	Applicable Models
• Tool kit	• RTC batteries	• CP-1435A/MYQ-4

CAUTION

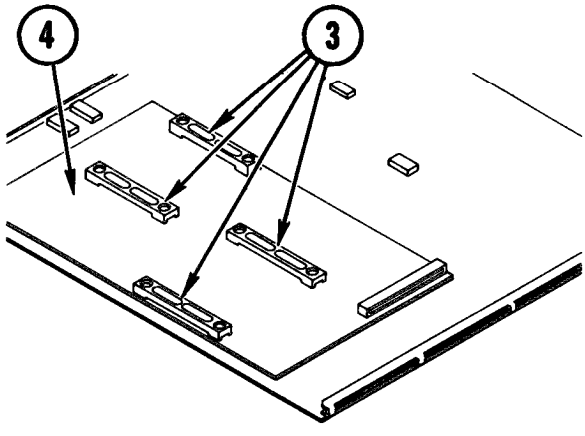
Real time clock contains batteries. Do not allow pac to contact metal surfaces.

Remove

1. Remove MDC board in slot 11 containing real time clock pac (para 4-30, Remove, steps 1-10).



2. Remove real time clock adapter.



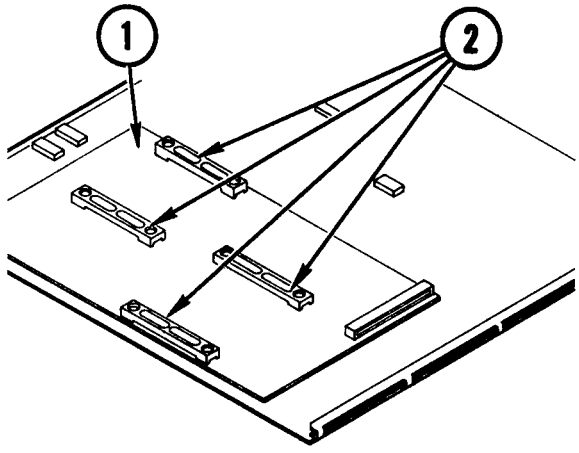
3. Remove top stiffeners.

4. Lift pac off. Corner pegs should remain on controller board.

NOTE

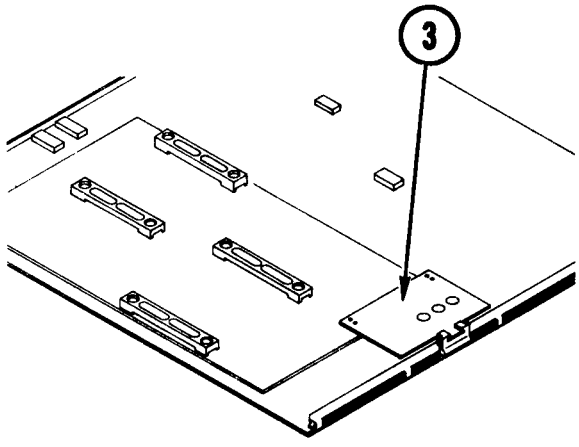
Standoff connectors are soldered to real time clock. They cannot be removed.

4-33.2. REMOVE/REPLACE REAL TIME (CRYSTAL) CLOCK PAC (CONT)



Replace

1. Place real time pac on corner pegs.
2. Replace top stiffeners.



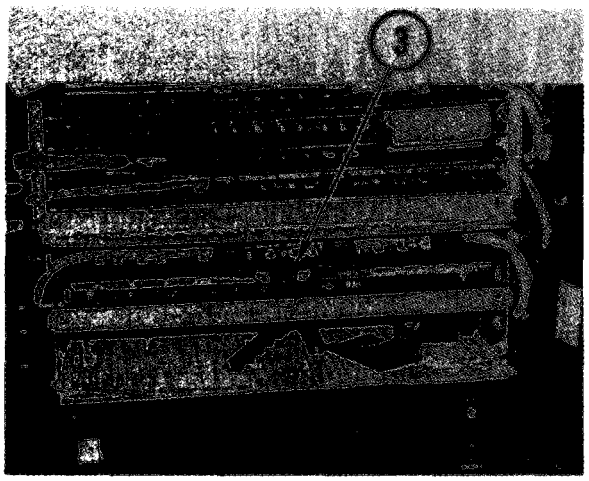
3. Replace real time clock adapter.
4. Replace MDC board (para 4-30, Replace, steps 6-12).

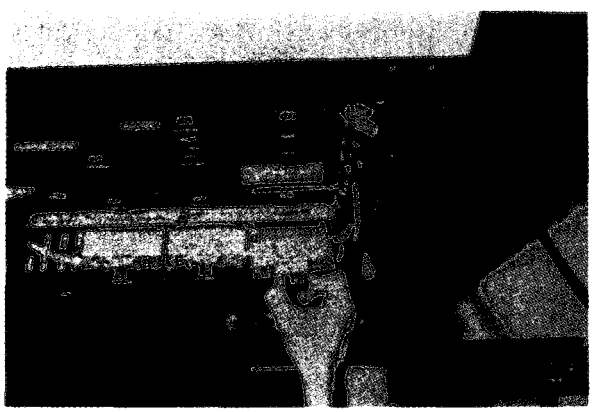
4-34. REMOVE/REPLACE MLCP CONTROLLER BOARD FOR COMMUNICATION PACS

INITIAL SETUP

Common Tools
- Tool kit
- TORX offset driver (CP-1435A/MYQ-4 only)

Materials/Spare Parts
- Tags
- Pen or pencil





Remove

1. Power off. Open door.
2. Open bottom grill.

NOTE

More than one MLCP controller board may be installed. Refer to para 1-14 for difference between models.

3. Find controller board.
4. Wiggle board loose.
5. Slide it out three or four inches.

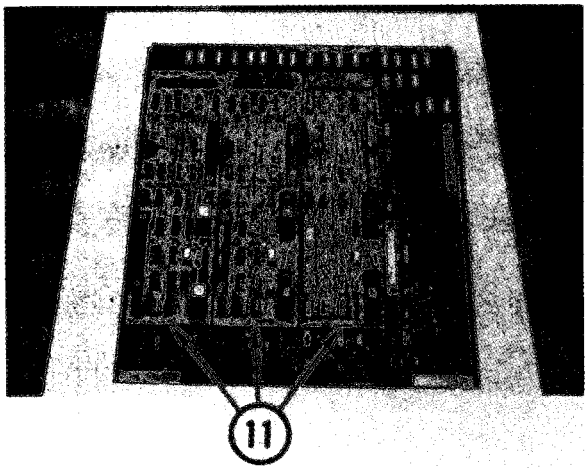
NOTE

The number of paddleboard connectors may vary dependent upon MLCP controller boards used. Refer to Appendix D for difference data.

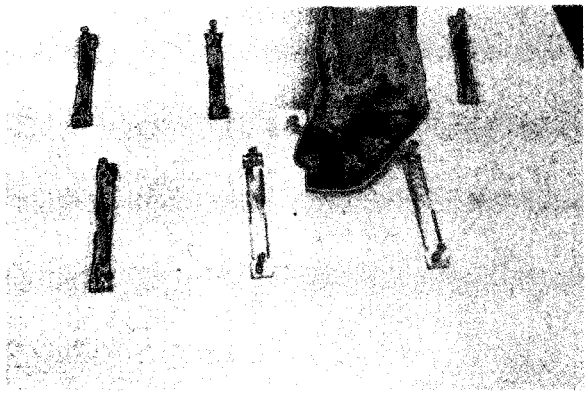
6. Tag paddleboards.
7. Disconnect outside paddleboards.

4-34. REMOVE/REPLACE MLCP CONTROLLER BOARD FOR COMMUNICATION PACS (CONT)

8. Disconnect inside paddleboards.
9. Pull controller board out of slot.
10. Place board on flat surface.



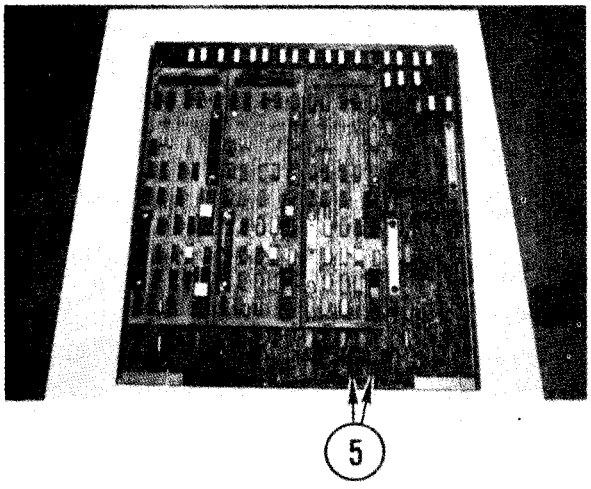
11. Remove communication pacs (para 4-35).
12. Remove standoff connectors and corner pegs.
13. Remove bottom stiffeners.



Replace

1. Make sure each bottom stiffener has insulator strip.
2. Insert bottom stiffeners into new board.
3. Place standoff connectors and corner pegs in new board.

4-34. REMOVE/REPLACE MLCP CONTROLLER BOARD FOR COMMUNICATION PACS (CONT)

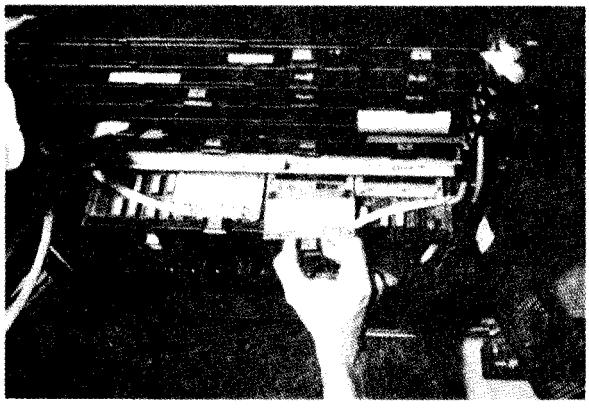


4. Replace communication pacs (para 4-35).

5. Make sure device address switches are set to position required for system. (See Appendix D of your system manual.)

6. Slide controller board into slot. Leave it out three or four inches.

7. Check tags on paddleboards.



8. Replace inside paddleboards.

4-34. REMOVE/REPLACE MLCP CONTROLLER BOARD FOR COMMUNICATION PACS (CONT)

9. Replace outside paddleboards.
10. Push controller board in until snug.
11. Close bottom grill.
12. Close door and power on.

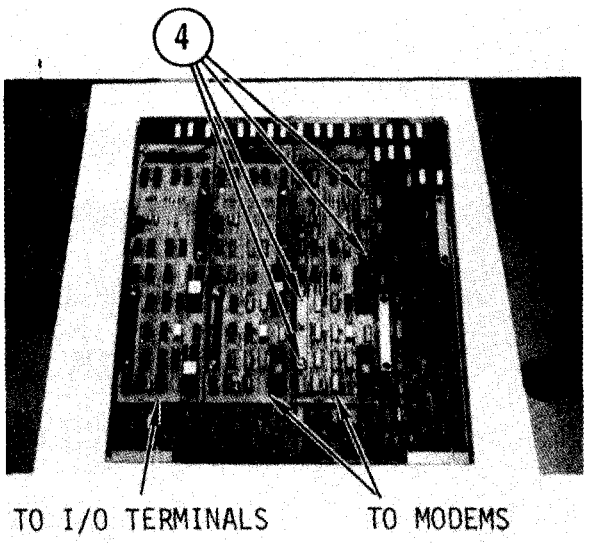
4-35. REMOVE/REPLACE COMMUNICATION PACS

INITIAL SETUP

Common Tools
- Tool kit

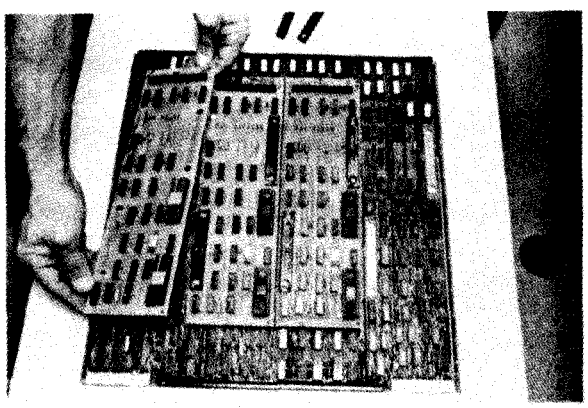
NOTE

The number of communication pacs used may vary dependent upon CPU model used. Refer to para 1-14 and Appendix D for differences between models. Use these steps to remove any of them.



Remove

1. Power off.
2. Remove MLCP controller board (para 4-34.)
3. Locate pac you want to remove.
4. Remove top stiffeners on pac.



5. Lift pac off corner pegs. Corner pegs and standoff connectors should remain in controller board.

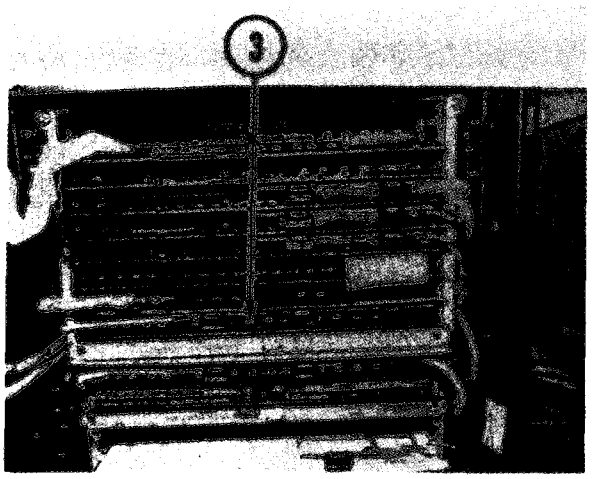
Replace

1. Fit pac on corner pegs and stand-off connectors.
2. Replace top stiffeners.
3. Replace MLCP controller (para 4-34, Replace, steps 5-12).

4-36. REMOVE/REPLACE MLCP CONTROLLER BOARD

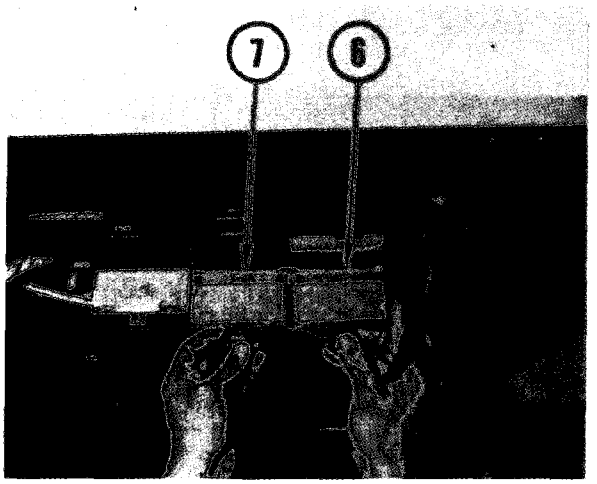
INITIAL SETUP

Common Tools	Materials/Spares Parts
• Tool kit	• Tags • Pen or Pencil



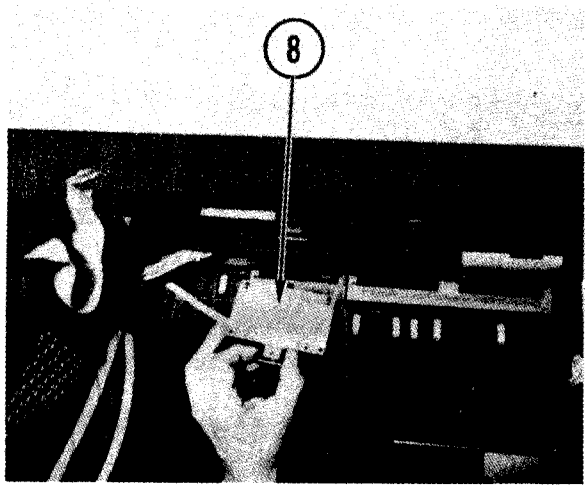
Remove

1. Power off. Open CPU door.
2. Open top grill.
3. Locate MLCP controller board.
4. Wiggle board loose.
5. Slide it out 3 or 4 inches.

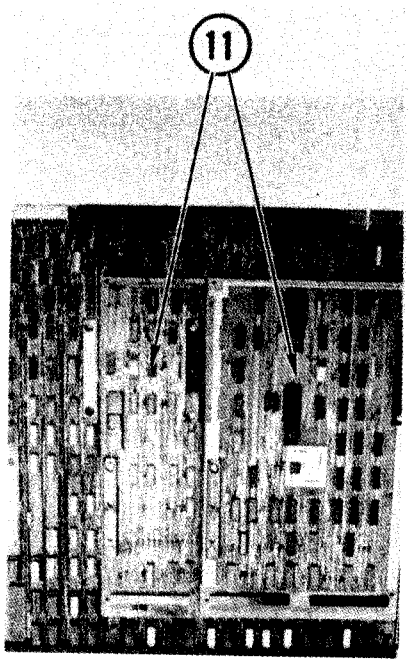


6. Tag and disconnect right paddleboard.
7. Tag and disconnect middle paddleboard.

4-36. REMOVE/REPLACE MLCP CONTROLLER BOARD (CONT)

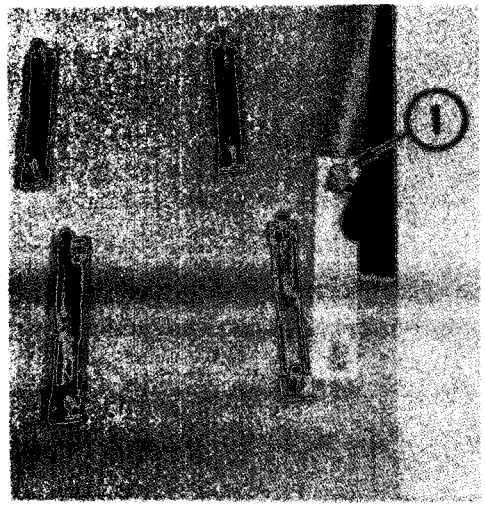


8. Tag and disconnect left paddleboard.
9. Slide controller board out of slot.
10. Put board on flat surface.



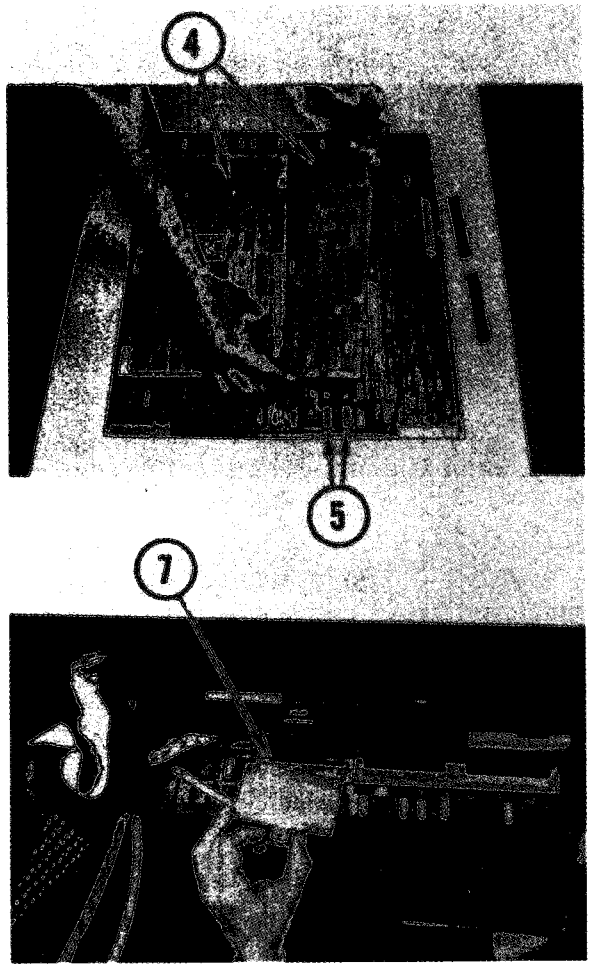
11. Remove adapter pacs (on CP-1435/MYQ-4 para 4-37 and 4-38, on CP-1435A/MYQ-4 para 4-37 and 4-38.1.)
12. Remove standoff connectors and corner pegs.
13. Remove bottom stiffeners.

4-36. REMOVE/REPLACE MLCP CONTROLLER BOARD (CONT)



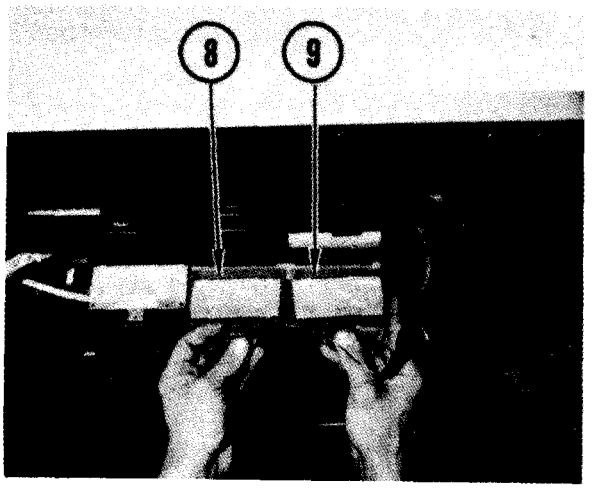
Replace

1. Make sure each bottom stiffener has insulator strip.
2. Insert bottom stiffeners into new board.
3. Place standoff connectors and corner pegs in new board.



4. Replace adapter pacs (on CP-1435/MYQ-4 para 4-37 and 4-38, on CP-1435A/MYQ-4 para 4-37 and 4-38.1).
5. Make sure device address switches are set to position required for system. (See Appendix D of your system manual.)
6. Slide controller board into slot. Leave it out 3 or 4 inches.
7. Push on left paddleboard.

4-36. REMOVE/REPLACE MLCP CONTROLLER BOARD (CONT)



8. Push on middle paddleboard.
9. Push on right paddleboard.
10. Push controller board in until snug.
11. Close top grill.
12. Close door.

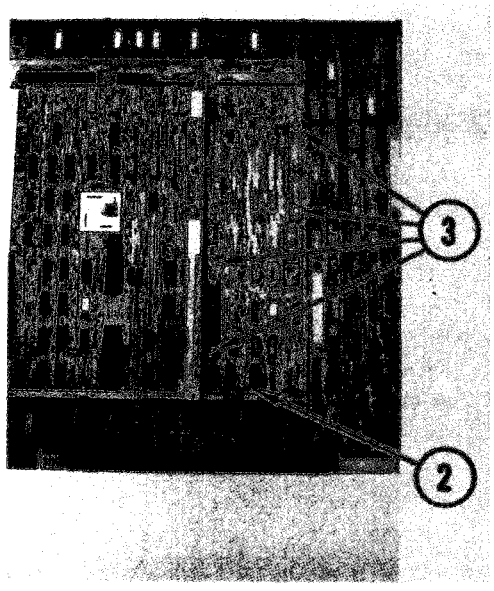
4-37. REMOVE/REPLACE CARD PUNCH DEVICE PAC

INITIAL SETUP

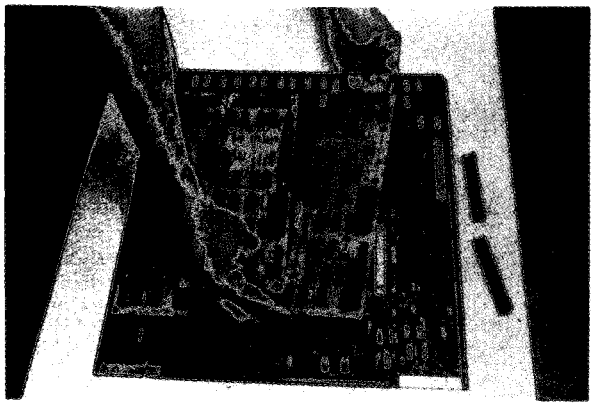
Common Tools	Applicable Model
• Tool kit	• CP-1435/MYQ-4

Remove

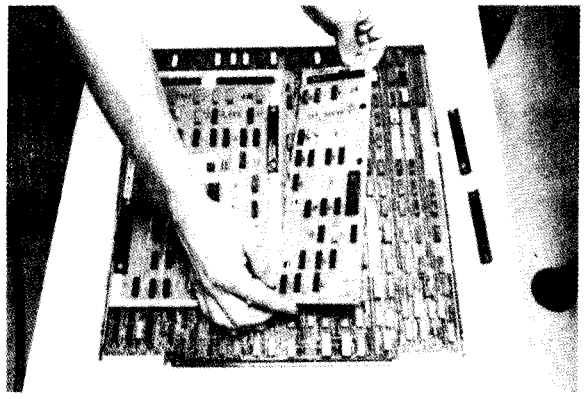
1. Remove MLCP controller board. (para 4-36, Remove, steps 1-10).
2. Find card punch device pac.
3. Remove top stiffeners.



4. Lift off pac. Leave pegs and standoff connectors on controller board.



4-37. REMOVE/REPLACE CARD PUNCH DEVICE PAC (CONT)

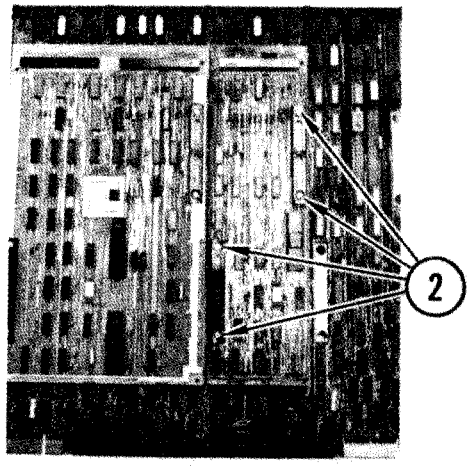


Replace

1. Fit new pac on corner pegs and standoff connectors.

2. Replace top stiffeners.

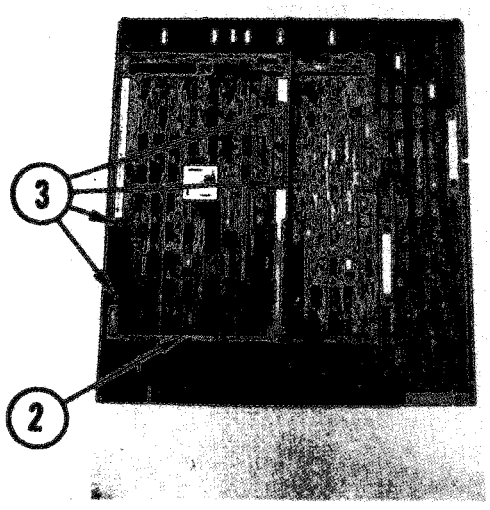
3. Replace MLCP controller board (para 4-36, Replace, steps 5-12).



4-38. REMOVE/REPLACE LOW LEVEL REMOTE INTERFACE PAC

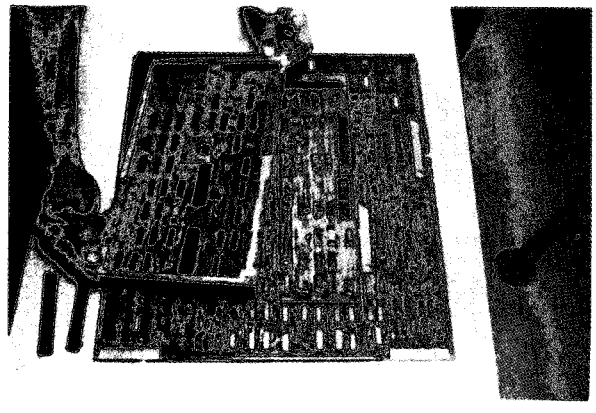
INITIAL SETUP

Common Tools	Applicable Models
• Tool kit	• CP-1435/MYQ-4



Remove

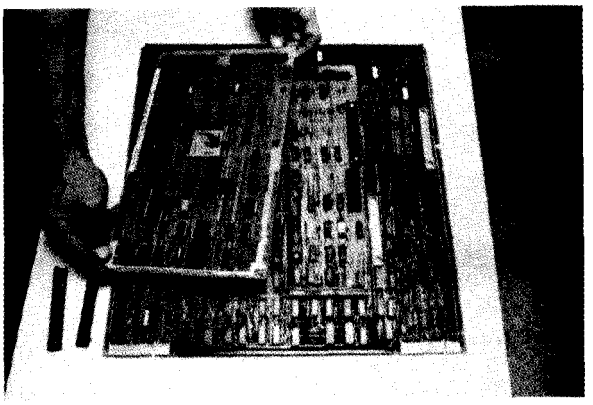
1. Remove MLCP controller (para 4-36, Remove, steps 1-10).
2. Find interface.
3. Remove top stiffeners.



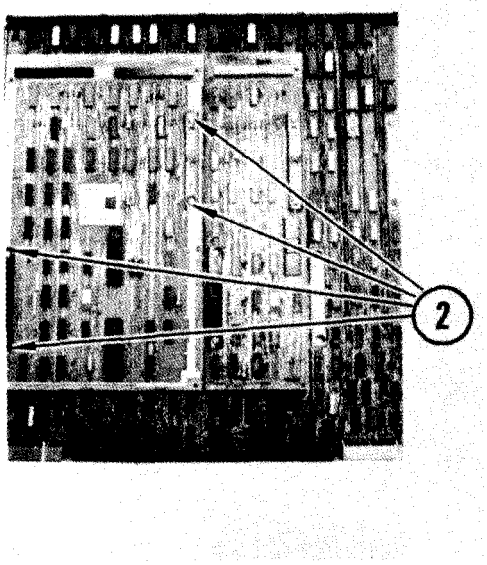
4. Lift off interface pac. Leave pegs and standoff connectors in controller board.

4-38 REMOVE/REPLACE LOW LEVEL REMOTE INTERFACE PAC (CONT)

Replace



1. Fit interface pac on corner pegs and standoff connectors.



2. Replace top stiffeners.

3. Replace MLCP controller board (para 4-36, Replace, steps 5-12).

4-38.1 REMOVE/REPLACE AUTO-CALL, SYNCHRONOUS HDLC, AND ASYNCHRONOUS COMMUNICATION ADAPTER PACS

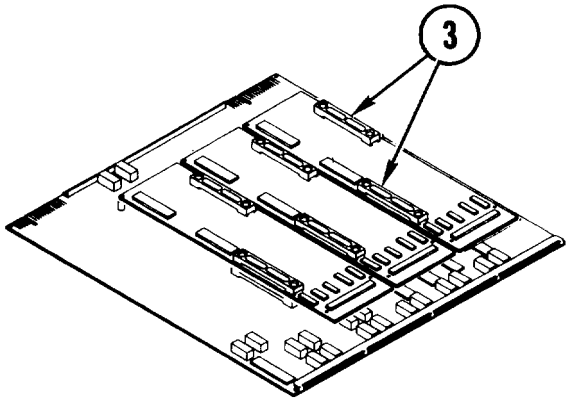
INITIAL SETUP

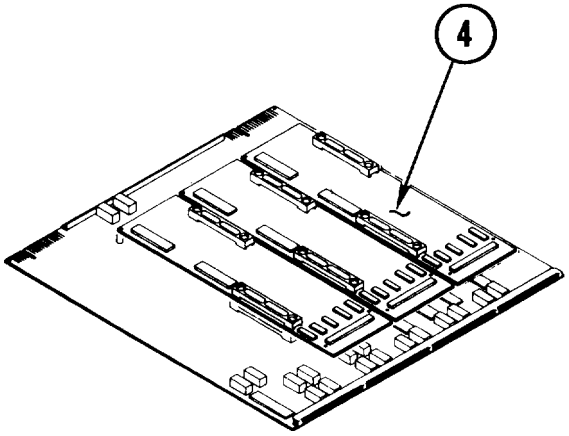
Common Tools
- Tool kit

Applicable Models
- CP-1435A/MYQ-4

Remove

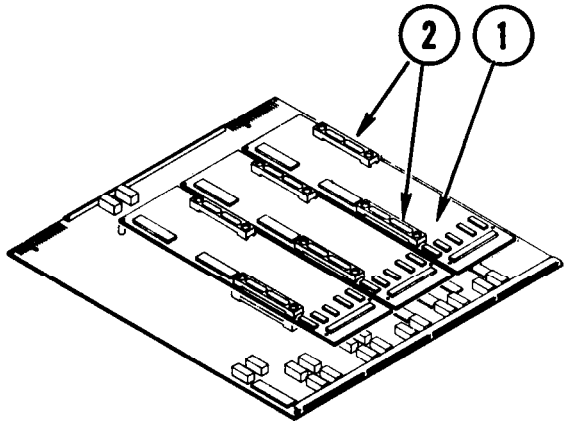
1. Remove MLCP controller (para 4-36, Remove, steps 1-5).
2. Locate pac to be removed.
3. Remove top stiffeners.





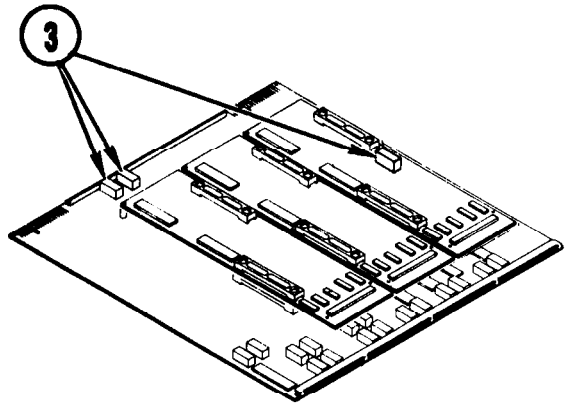
4. Lift pac off. Corner pegs and standoff connectors should remain on controller board.

4-38.1 REMOVE/REPLACE AUTO-CALL, SYNCHRONOUS HDLC, AND ASYNCHRONOUS COMMUNICATION ADAPTER PACS (CONT)



Replace

1. Place pac on standoff connectors and corner pegs.
2. Replace top stiffeners.



3. Make sure device address switches are set to position required for system (See Appendix D of your system manual.)
4. Replace MLCP board (para 4-36, Replace steps 6-12).

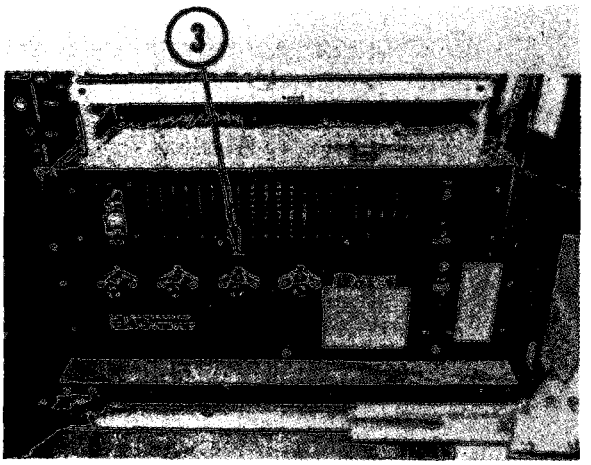
4-39. REMOVE/REPLACE PDU FUSES

INITIAL SETUP

Materials/Spare Parts
- PDU Fuses

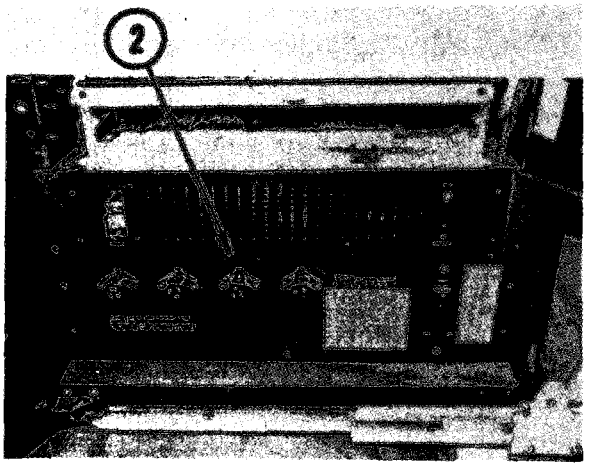
NOTE

There are four PDU fuses. Follow these steps to remove/replace any of them.



Remove

1. Power off CPU. Open CPU door.
2. Locate PDU.
3. Turn PDU fuse cap as shown. Pull free.
4. Remove fuse from cap.



Replace

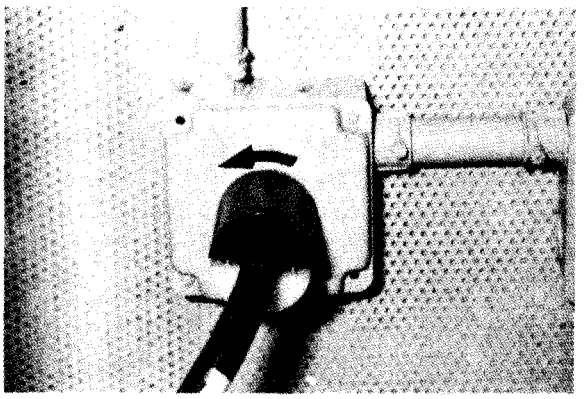
1. Place fuse in cap.
2. Screw down cap as shown.
3. If required, power on CPU.
4. Close door.

4-40. REMOVE/REPLACE CPU POWER DISTRIBUTION UNIT

INITIAL SETUP

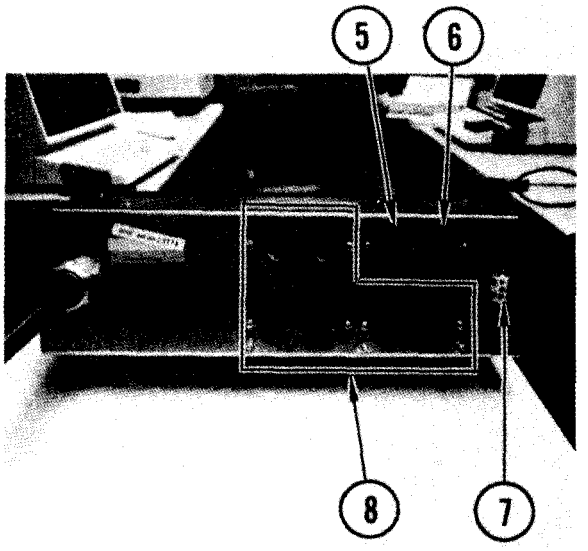
Common Tools
- Tool kit
- TORX offset driver (CP-1435A/MYQ-4)

Materials/Spare Parts
- Tape
- Tags
- Pen or pencil
- Tie wraps



Remove

1. Power off.
2. Turn power cable plug as shown and pull from outlet.
3. Remove rear panel of CPU. (On CP-1435/MYQ-4, remove screws from bulkhead so it can be moved for access.)

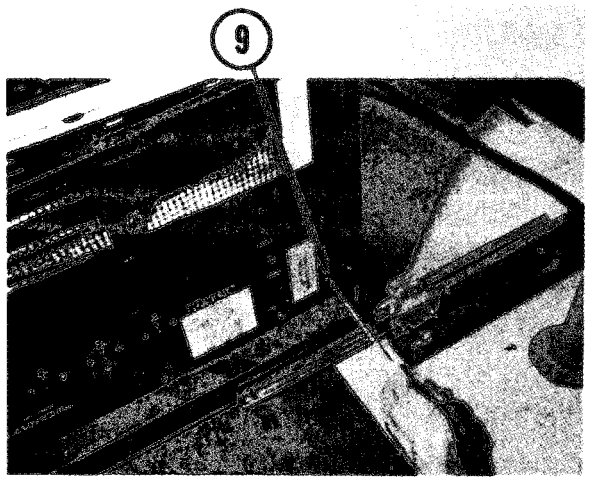


NOTE

Power distribution unit (PDU) is shown out of CPU cabinet for reference only.

4. Find PDU at bottom of cabinet.
5. Tag and remove MEM SAV PS cable.
6. Tag and remove TO CONT PNL cable.
7. Tag and remove FROM CONTROL PANEL connector.
8. Tag and remove four cables.

4-40. REMOVE/REPLACE CPU POWER DISTRIBUTION UNIT (CONT)



9. At front of PDU, remove four screws.

NOTE

Have an adjustable wrench ready before you start step 13.

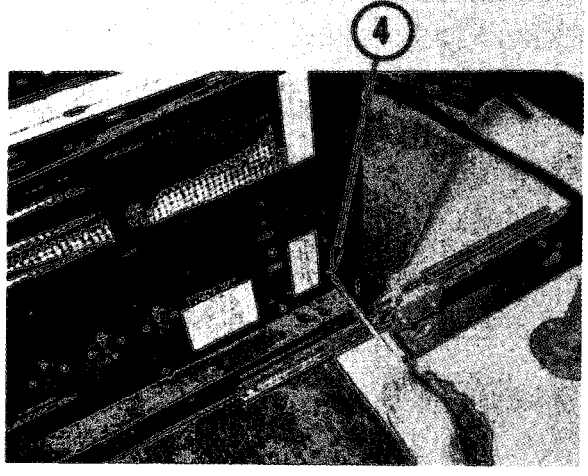
10. Remove nut.

11. Free strap and cut tie wraps.

12. From rear of CPU, push PDU forward about three inches.

13. At front of PDU, pull out unit until you can reach ground strap.

14. Slide out PDU. Make sure power cable does not snag.



Replace

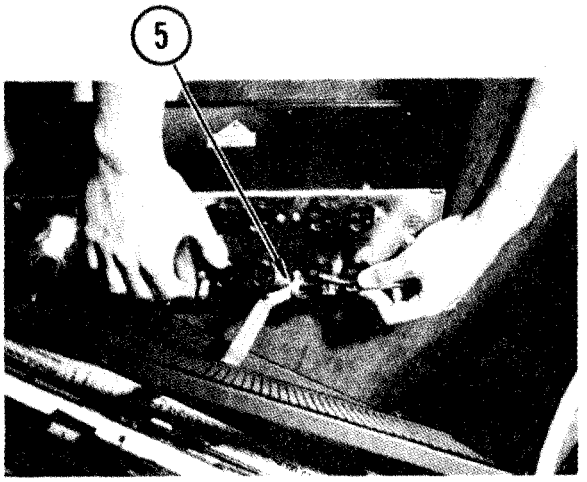
1. Place new PDU as shown.

2. Make sure power cable runs through to back of CPU.

3. Push PDU in.

4. Replace front screws.

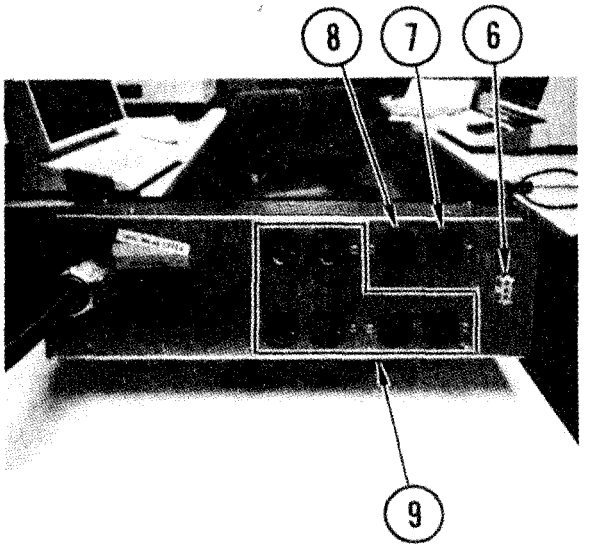
4-40. REMOVE/REPLACE CPU POWER DISTRIBUTION UNIT (CONT)



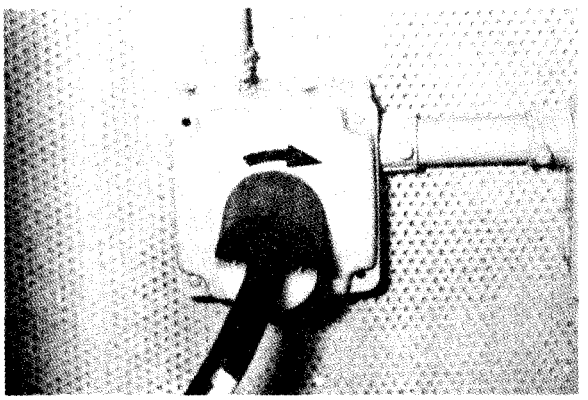
5. Attach ground strap and replace tie wraps.

NOTE

PDU is shown out of cabinet for reference only.



6. At rear of unit, attach FROM CONTROL PANEL connector.
7. Attach TO CONT PNL cable.
8. Attach MEM SAV PS cable.
9. Attach four remaining cables in any order. Use any available receptacle.



10. Push in power cable plug. Turn as shown. (On CP-1435A/MYQ-4, replace bulkhead.)
11. Replace rear panel and power on.

APPENDIX A

REFERENCES

A-1. INTRODUCTION

This appendix lists all forms, field manuals and technical manuals referenced in, or required for use with, this technical manual.

A-2. FORMS

Equipment Inspection and Maintenance Worksheet . . . . . DA Form 2404
Quality Deficiency Report . . . . . Form SF 368
Discrepancy in Shipment Report . . . . . Form SF 364
Recommended Changes to Equipment Technical Manuals . . . . . DA Form 2028-2
Recommended Changes to Publications and Blank Forms . . . . . DD Form 2028
Maintenance Request . . . . . DA Form2407

A-3. TECHNICAL MANUALS

Operator's Manual: Data Processing Unit CP-1435/MYQ-4 . . . . . TM 11-7021-200-10
Procedures for Destruction of Electronic Materiel to Prevent Enemy Use (Electronics Command) . . . . . TM 750-244-2
The Army Maintenance Management System (TAMMS)..... TM 38-750
Administrative Storage of Equipment . . . . . TM 740-90-1

A-4. MISCELLANEOUS PUBLICATIONS

Consolidated Index of Army Publications and Blank Forms . . . . . DA PAM 310-1

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL

This Maintenance Allocation Chart (MAC) provides a summary of maintenance operations for the Data Processing Unit CP-1435A/MYQ-4. This document assigns categories of maintenance for specific maintenance functions on repairable items and identifies tools and equipment required to perform each function. Each maintenance function is assigned to the lowest level of maintenance prepared to perform that function. It should be understood that each maintenance function can also be performed at all higher levels of maintenance. The higher levels of maintenance will have tools and test equipment to perform the maintenance functions assigned to and normally performed by lower levels of maintenance.

B-2. MAINTENANCE FUNCTION DEFINITIONS

Maintenance Functions are limited to and defined as follows:

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

b. Test. Verification of serviceability and detection of beginning failure by measuring mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Performance of operations required periodically to keep an item in proper operating condition. Such operations would include cleaning, preservation, draining, painting, or replenishment of fuel/lubricants/hydraulic fluids or compressed air supplies.

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

e. Aline. Adjustment of specified variable elements of an item to the maximum or desired performance.

f. Calibrate. Determination and cause corrections to or adjustments to instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparing two instruments, one a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

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

h. Replace. Substitution of a serviceable like-type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. Application of maintenance services (inspect, test, service, adjust, aline, 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/assembly, and item or system. This function does not include trial and error replacement of consumable spare type items such as fuses, lamps, or electronic tubes.

j. Overhaul. Periodic maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (e.g., DWR) 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. Restoration of unserviceable equipment to a like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hour, miles etc.) considered in classifying Army equipment/components.

B-3. EXPLANATION OF MAC COLUMN ENTRIES

a. Group Number. This column lists group numbers, the purpose of which is to identify components, assemblies, subassemblies and modules with the next highest assembly.

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

c. Maintenance Function. This column lists the functions to be performed on the item listed in the Component/Assembly column.

d. Maintenance Category. This column specifies, by the listing of a “worktime” figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in the Maintenance Function column. 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 “worktime” figures will be shown for each category. The number of man-hours specified by the “worktime” figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the MAC.

Subcolumns of the Maintenance category Column are:

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

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

B-4. EXPLANATION OF SECTION III COLUMN ENTRIES

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 tools and test equipment required to perform the maintenance functions.

d. National/NATO Stock Number. This column presents the National/NATO Stock number of the specific tool or test equipment when these numbers are assigned.

e. Tool Number. This column lists the manufacturer's part number of the tool, followed by the Federal supply code for the manufacturer (5 digit) in parentheses, when these numbers are fully identified.

B-5. EXPLANATION OF SECTION IV COLUMN ENTRIES

a. Reference Code. The letters in this column coincide with the letters used in column 6 of the maintenance allocation chart.

b. Remarks. This column lists the remarks which correspond with the reference code 1etters.

Section II.

MAINTENANCE ALLOCATION CHART

(DARCOM-P 750-15)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	F	H	D	(5) TOOLS AND EQPT.	(6) REMARKS
01	PROCESSING UNIT,DAT	TEST	.0	.0	.2	.0	.0	0003	
		REPLACE	.0	.0	1.0	.0	.0	0002 0004 0005 0006	
		REPAIR	.0	.0	.5	.0	.0	0002 0005 0006	
		OVERHAUL	.0	.0	.0	.0	40.0		A
0101	PROCESSOR,MEMORY UN	REPLACE	.0	.0	.1	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	1.0		A
0102	PROCESSOR,INSTRUCT	REPLACE	.0	.0	.1	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	1.0		A
0103	10 CARD CHASSIS	TEST	.0	.0	.5	.0	.0	0001	
		REPLACE	.0	.0	1.0	.0	.0	0002 0004	
		OVERHAUL	.0	.0	.0	.0	1.0		A
0104	CIRCUIT CARD ASSY	REPLACE	.0	.0	.1	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	.5		A
0105	TERMINATOR BOARD	REPLACE	.0	.0	.1	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	.5		A
0106	TERMINATOR BOARD	REPLACE	.0	.0	.1	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	.5		A
0107	POWER SUPPLY	TEST	.0	.0	.1	.0	.0	0001	
		REPLACE	.0	.0	.2	.0	.0	0001 0002	
		REPAIR	.0	.0	.2	.0	.0	0001 0002	B
		OVERHAUL	.0	.0	.0	.0	1.0		A
0108	5 CARD EXP CHASSIS	TEST	.0	.0	.5	.0	.0	0001	
		REPLACE	.0	.0	.8	.0	.0	0002 0004	
		OVERHAUL	.0	.0	.0	.0	1.0		A
0109	MEMORY RESTART	TEST	.0	.0	.1	.0	.0	0001	
		REPLACE	.0	.0	.3	.0	.0	0001 0002	
		REPAIR	.0	.0	.7	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	.7		A
0110	PCB MEMORY CONT	REPLACE	.0	.0	.1	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	1.5		A
0111	PCB 128KW MEMORY	REPLACE	.0	.0	.2	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	.5		A
0112	CONTROLLER,MASS STO	REPLACE	.0	.0	.1	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	1.5		A
0113	MOTHERBOARD	REPLACE	.0	.0	.1	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	1.0		A
0114	ADAPTER,NINE CHANNE	REPLACE	.0	.0	.2	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	.8		A
0115	MOTHERBOARD	REPLACE	.0	.0	.1	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	1.0		A
0116	CLOCK,ANALOG	REPLACE	.0	.0	.2	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	.5		A
0117	DISPLAY,DEVICE PAC	REPLACE	.0	.0	.2	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	.5		A
0118	PRINTER,DEVICE PAC	REPLACE	.0	.0	.2	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	.5		A
0119	PROCESSOR-VERIFIER	REPLACE	.0	.0	.1	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.0	1.0		A

Section II.

MAINTENANCE ALLOCATION CHART

(DARCOM-P 750-16)

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY C	F	H	D	(5) TOOLS AND EQPT	(6) REMARKS
0120	PCB REAL TIME CLOCK	REPLACE	.0	.2	.0	.0	0002	
		REPAIR	.0	.2	.0	.0	0002	C
		OVERHAUL	.0	.0	.0	.5		A
0121	COMMUNICATIONS PAC	REPLACE	.0	.2	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.5		A
0122	PCB DISKETTE	REPLACE	.0	.1	.0	.0	0002	
		OVERHAUL	.0	.0	.0	1.0		A
0123	PCB HDLC COMM PAC	REPLACE	.0	.2	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.5		A
0124	PCB SYNC COMM PAC	REPLACE	.0	.2	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.5		A
0125	PCB CALL COMM PAC	REPLACE	.0	.2	.0	.0	0002	
		OVERHAUL	.0	.0	.0	.5		A
0126	POWER DISTRIBUTION	REPLACE	.0	.4	.0	.0	0002	
		REPAIR	.0	.5	.0	.0	0001 0002 0004	D
		OVERHAUL	.0	.0	.0	1.0		A
0127	CPU CABINET	REPLACE	.0	1.0	.0	.0	0002	
		OVERHAUL	.0	.0	.0	2.0		A

Section III.

END ITEM: CP-1435A/MYQ-4

TOOL AND TEST EQUIPMENT REQUIREMENTS
(DARCOM-F 750-16)

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
0001	F	MULTIMETER, DIGITAL	6625-01-139-2512	AN/PSM-45
0002	F	TOOL KIT,ELECTRONIC	5180-01-023-4982	JTK-17LMLD
0003	F	T&V PACK-SMU PACK	- - -	SHU901J
0004	F	WRENCH SET, SOCKET	5120-00-247-0748	213-SFS
0005	F	TORX OFFSET DRIVER	- - -	71TX20S
0006	F	TORX OFFSET DRIVER	- - -	71TX40S

Section IV. REMARKS

Reference Code	Remarks
A.	Overhaul by contractor.
B.	DS repair limited to replacement of fan, fuses, and power cable.
C.	DS repair limited to replacement of batteries.
D.	DS repair limited to replacement of fuses, circuit breakers, and power cable.

APPENDIX C

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

C-1 . SCOPE

This appendix lists expendable supplies and materials you are authorized for the support of the CPU.

C-2 . GENERAL

This list identifies items that do not have to accompany CPU and that do not have to be turned in with it.

C-3. EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment.

Section II. EXPENDABLE SUPPLIES AND MATERIALS

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
		7530-00-285-5836	Paper, Writing VU-P-121	PG
		7510-00-281-5234	Pencil, General Writing SS-P-166	DZ
		7520-00-904-1265	Marker, Tube Type, Fine Tip	DZ

APPENDIX D

SCHEMATIC DIAGRAMS

Index of Diagrams

Figures D-1 through D-15 show CPU controller board layout and interconnection to typical peripheral devices.

Figure FO-1 shows the interconnection between the backplane and the power supplies and memory save and auto restart unit.

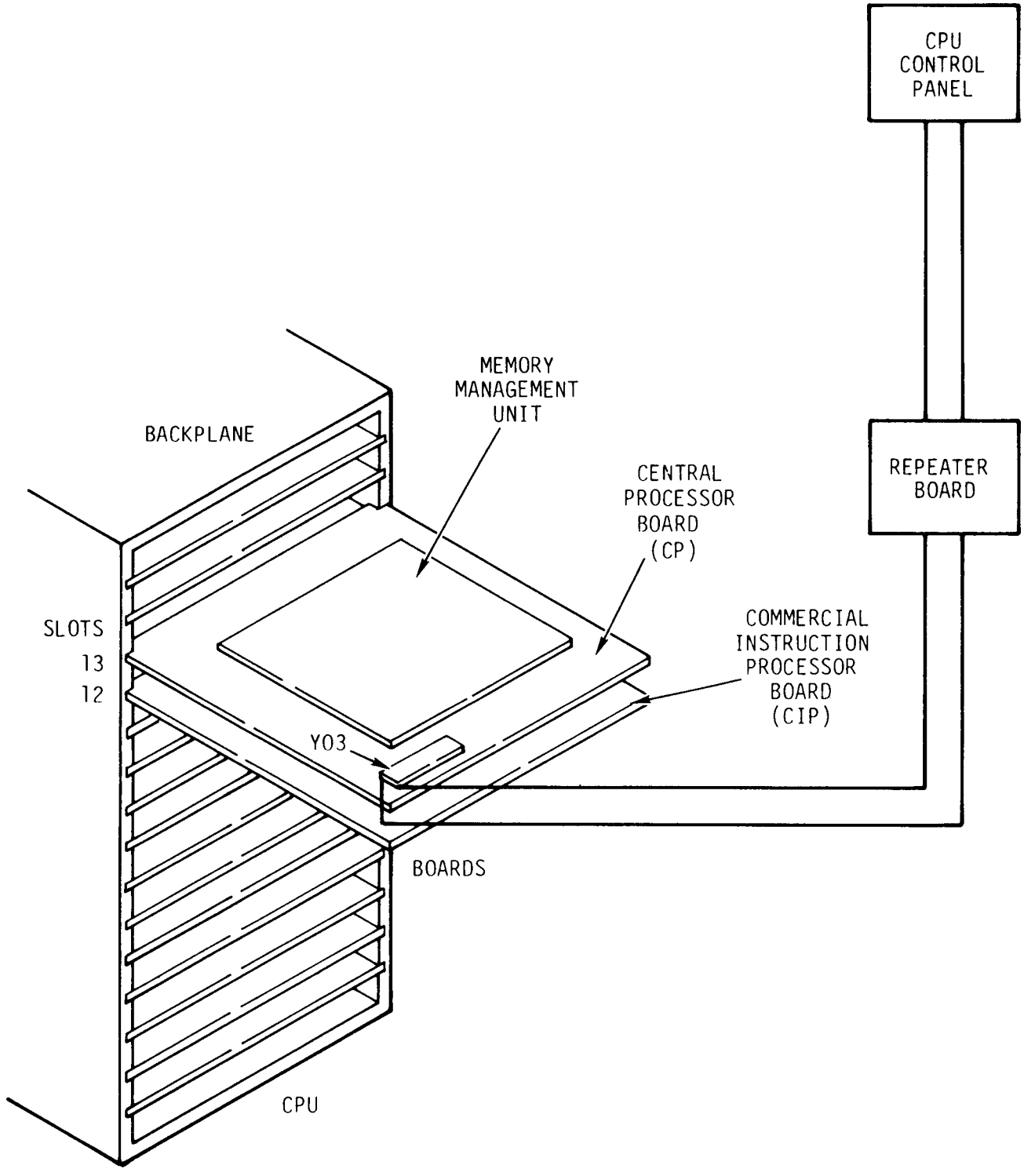


Figure D-1. CPU and Control Panel Configuration for CP-1435/MYQ-4

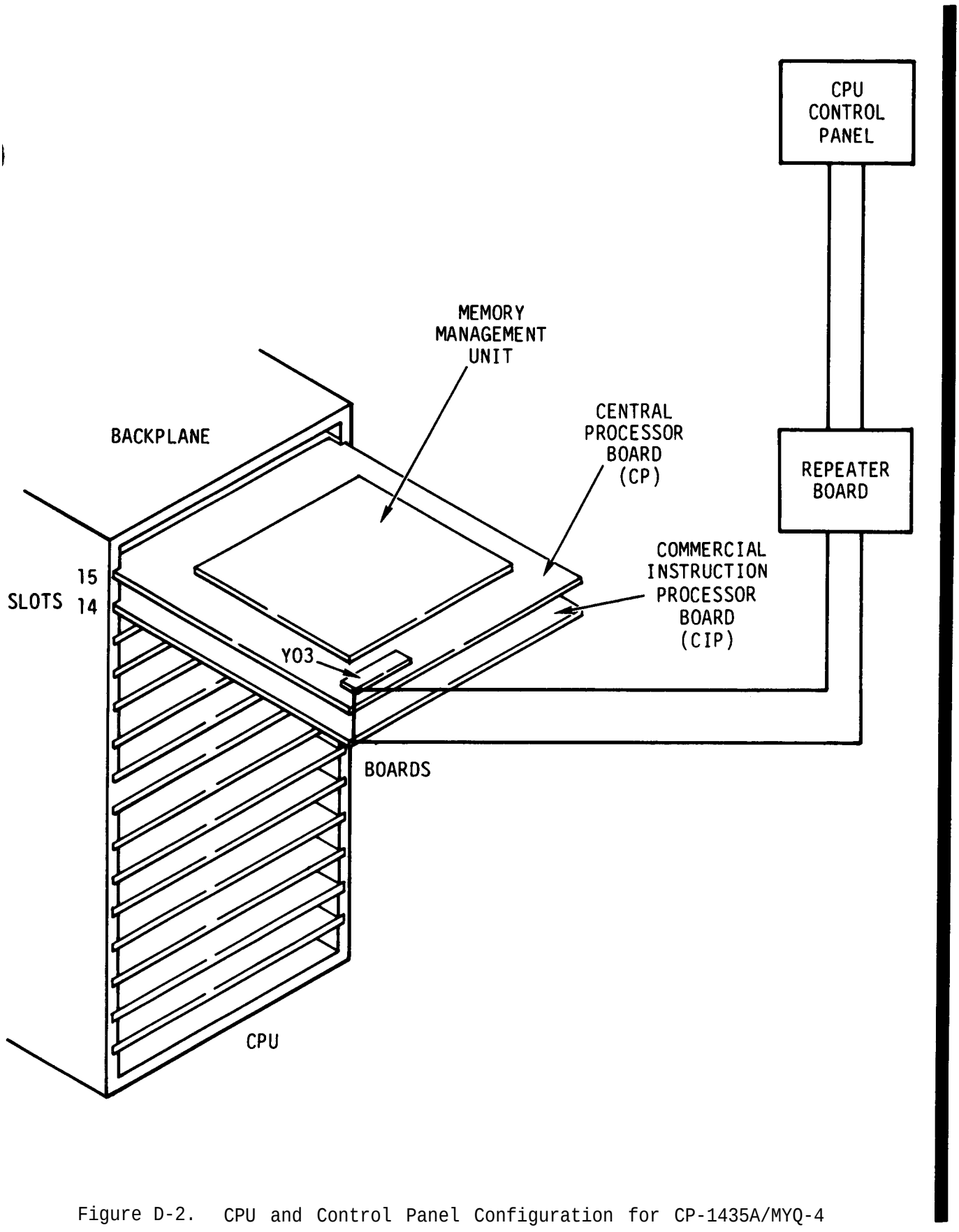


Figure D-2. CPU and Control Panel Configuration for CP-1435A/MYQ-4

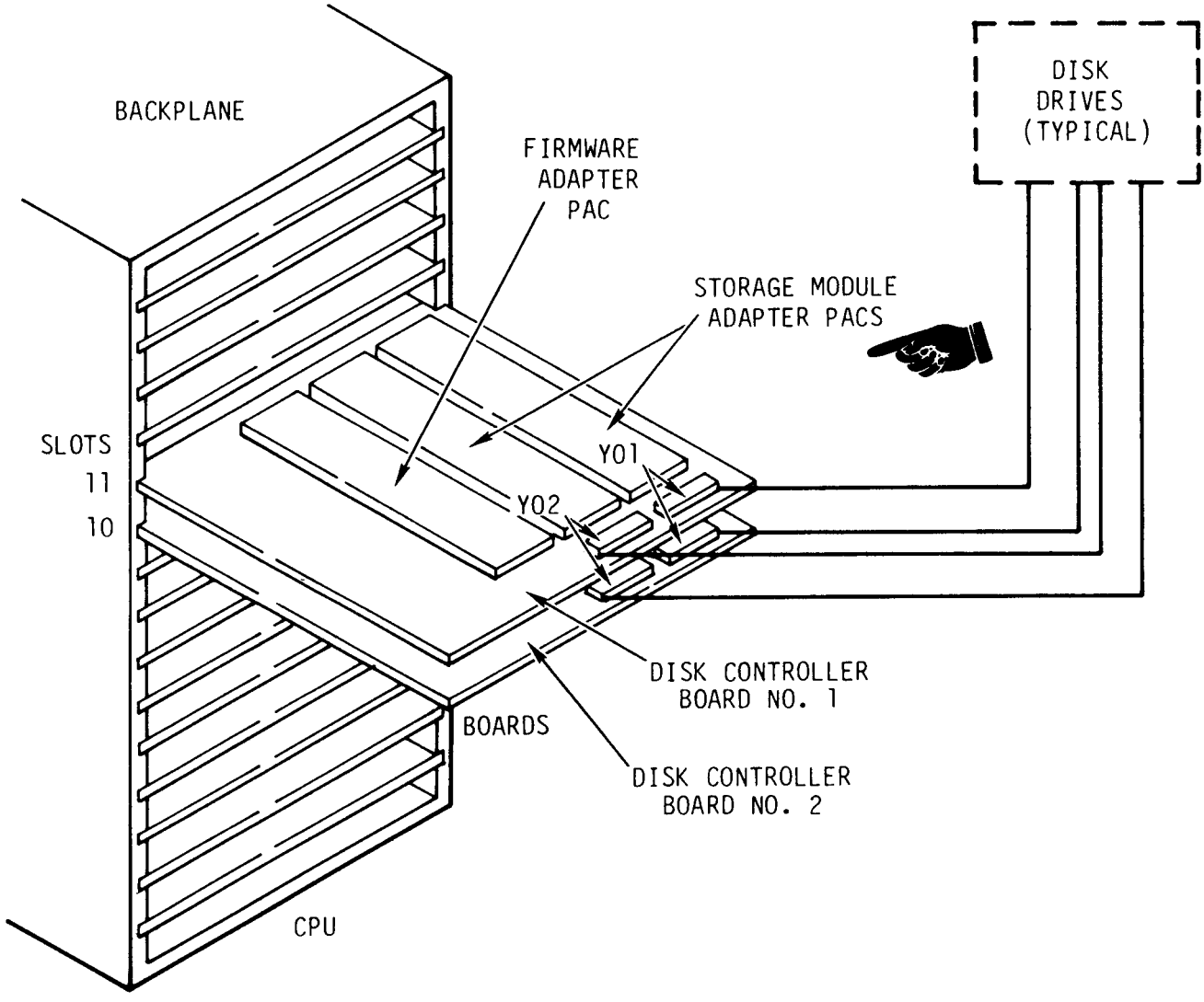


Figure D-3. Disk Controller Boards Configuration for CP-1435/MYQ-4

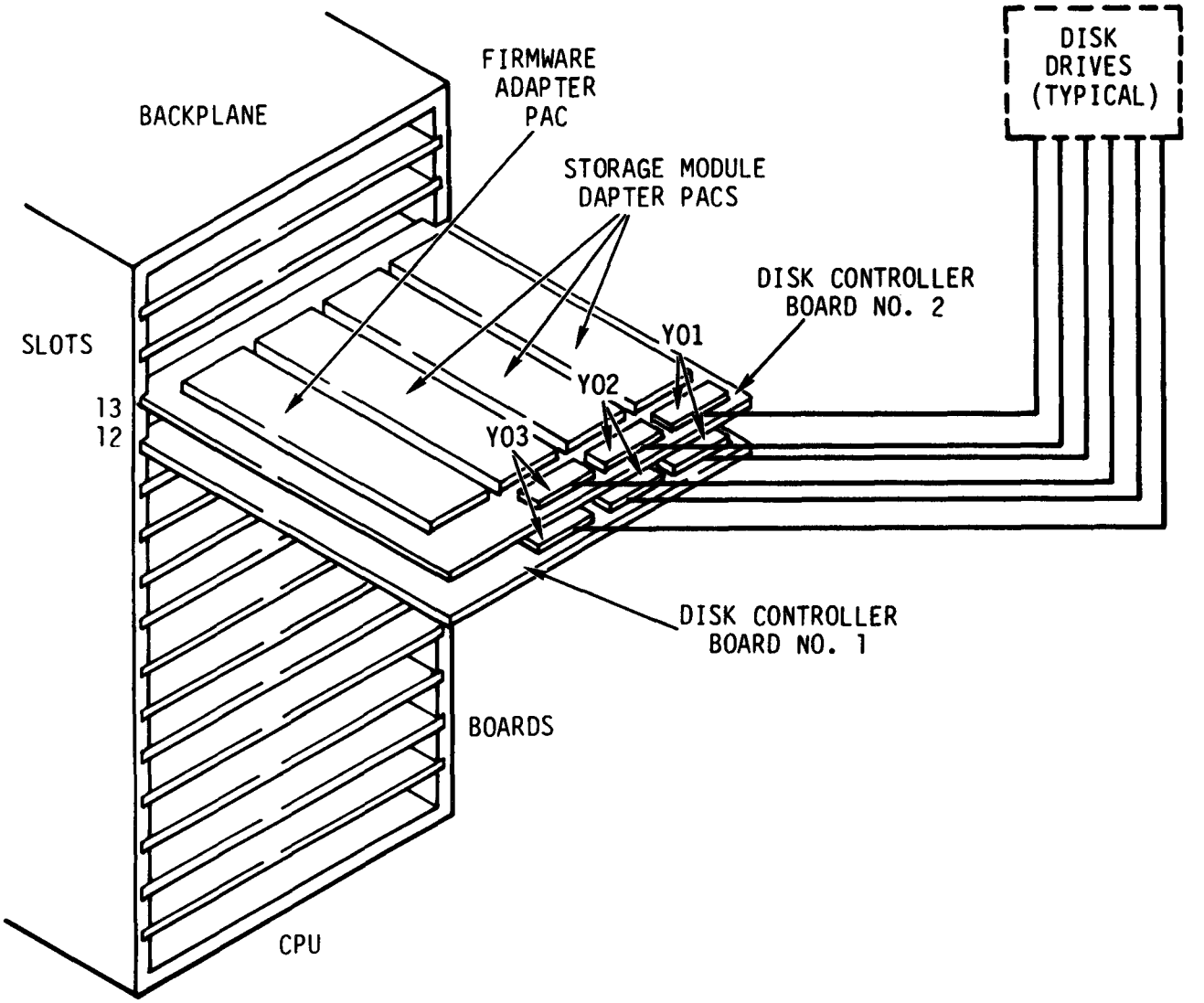


Figure D-4. Disk Controller Board Configuration for CP-1435A/MYQ-4

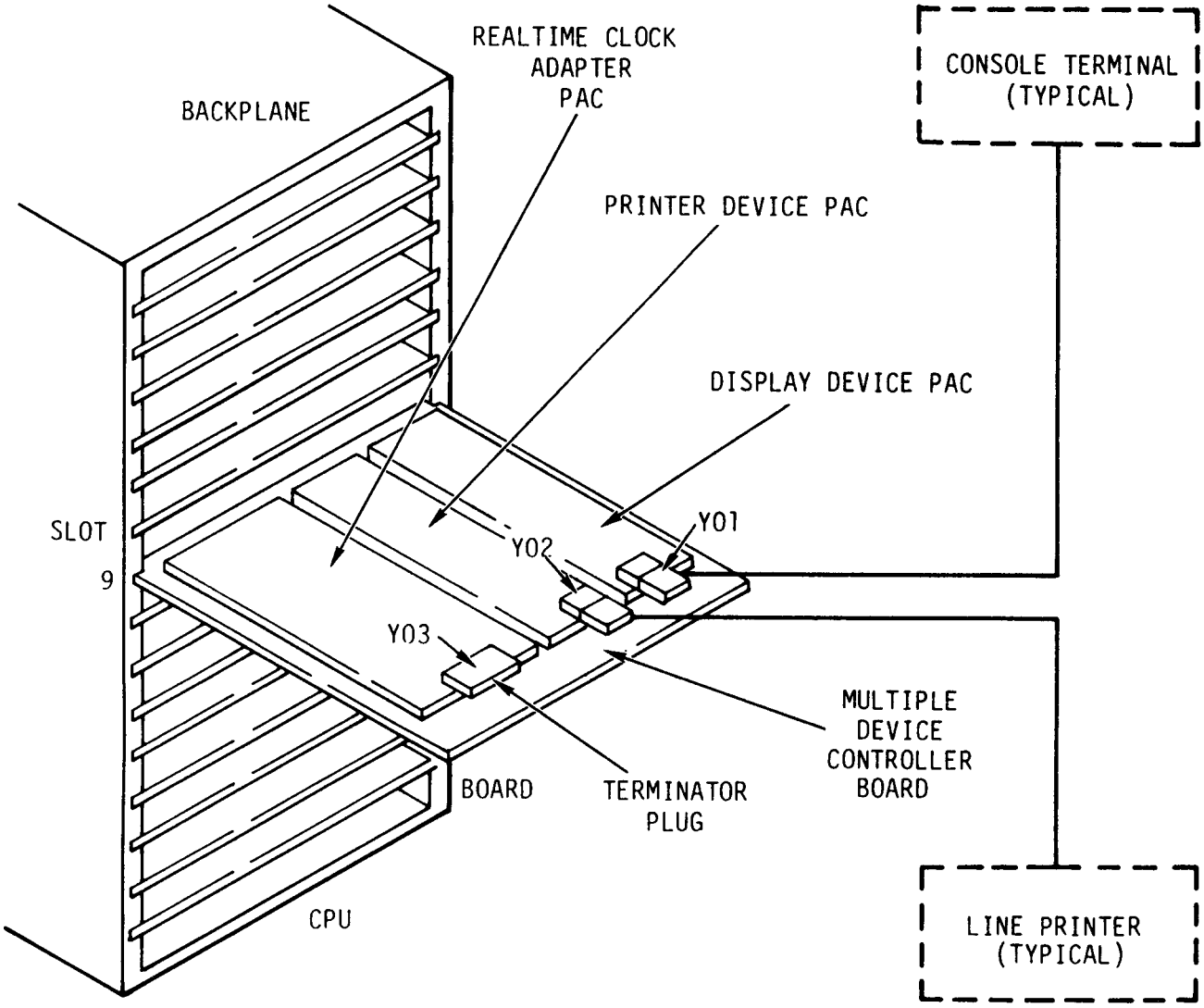


Figure D-5. Slot 9 Multiple Device Controller Board Configuration for CP-1435/MYQ-4

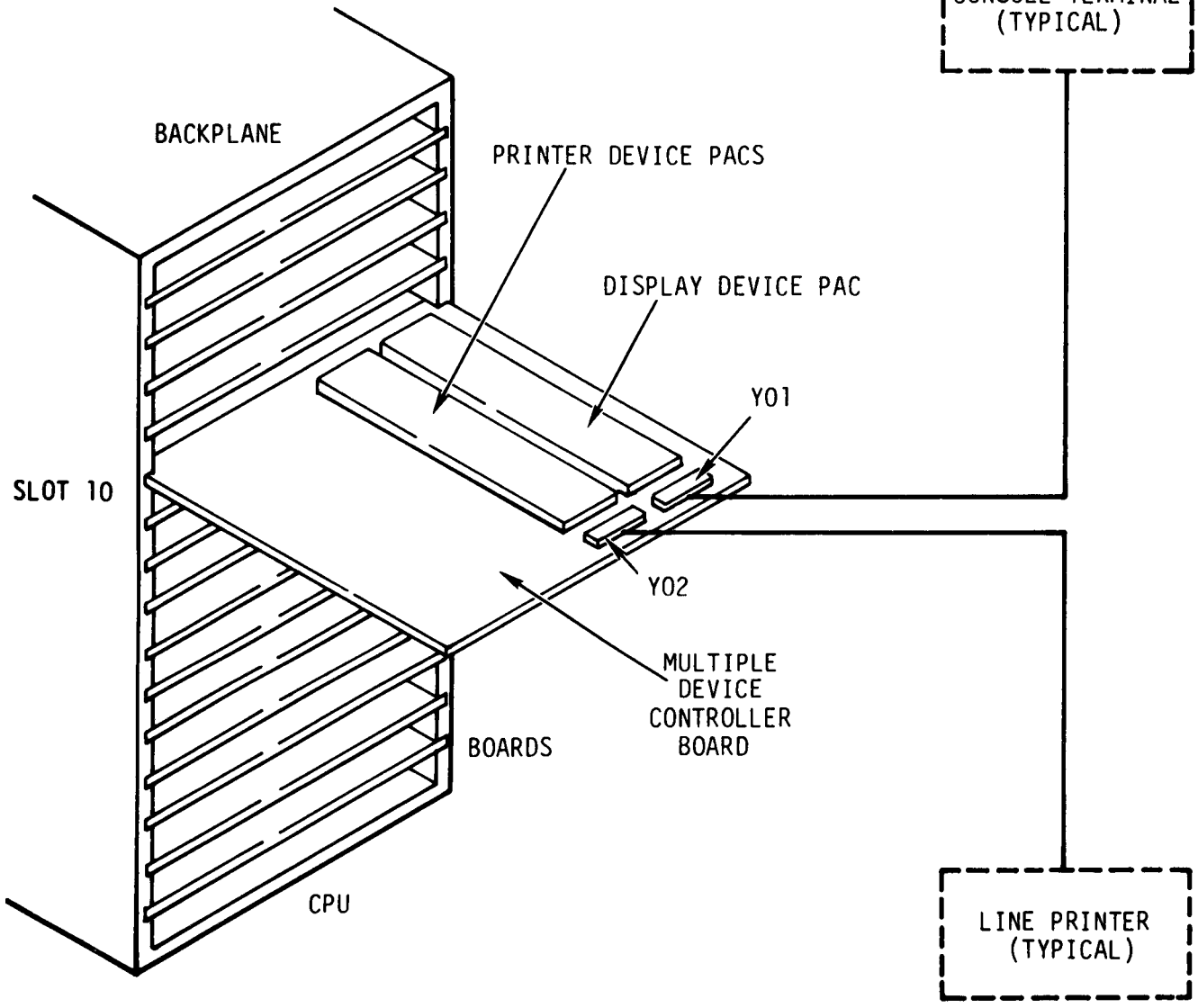


Figure D-6. Slot 10 Multiple Device Controller Board Configuration for CP-1435A/MYQ-4

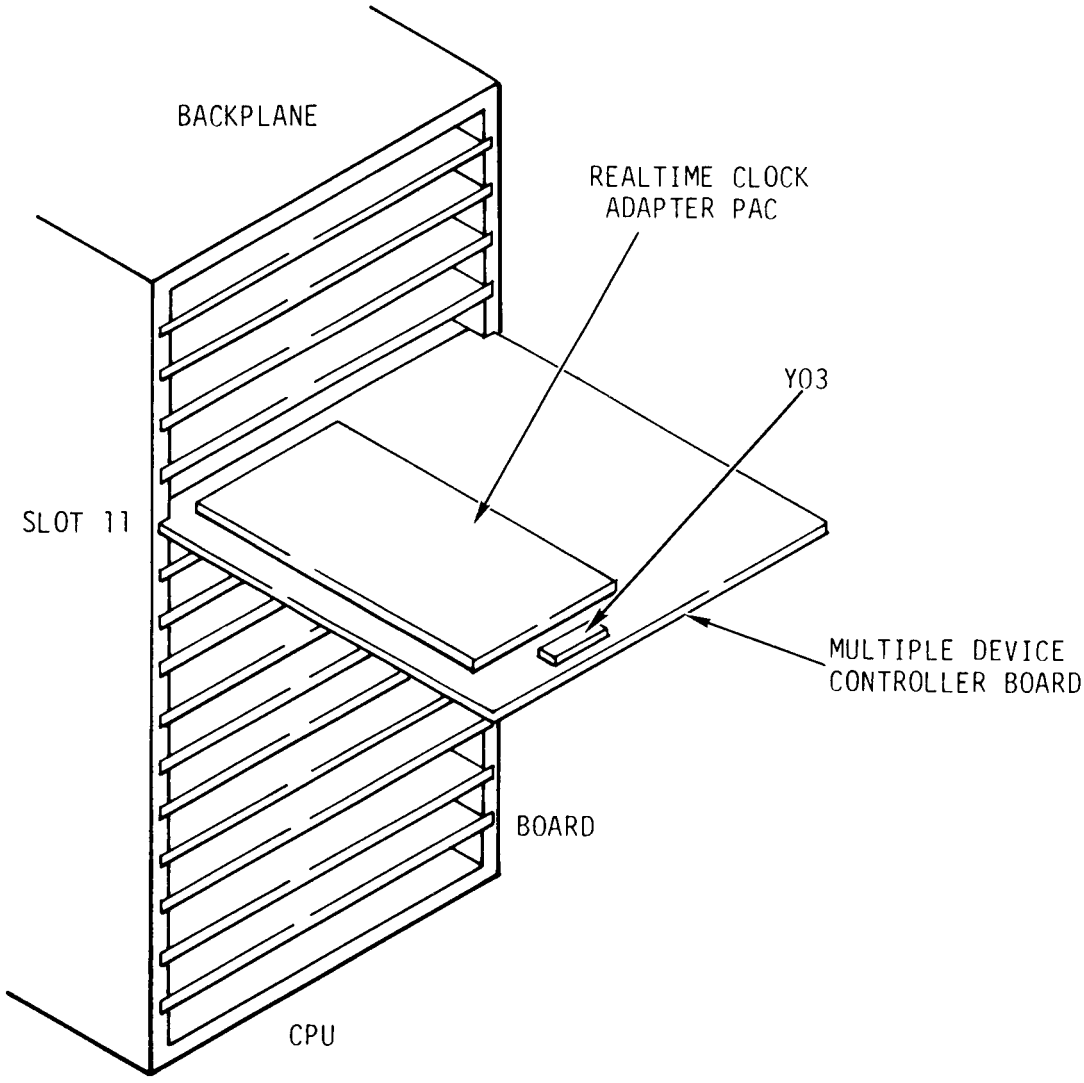


Figure D-7. Slot 11 Multiple Device Controller Board Configuration for CP-1435A/MYQ-4

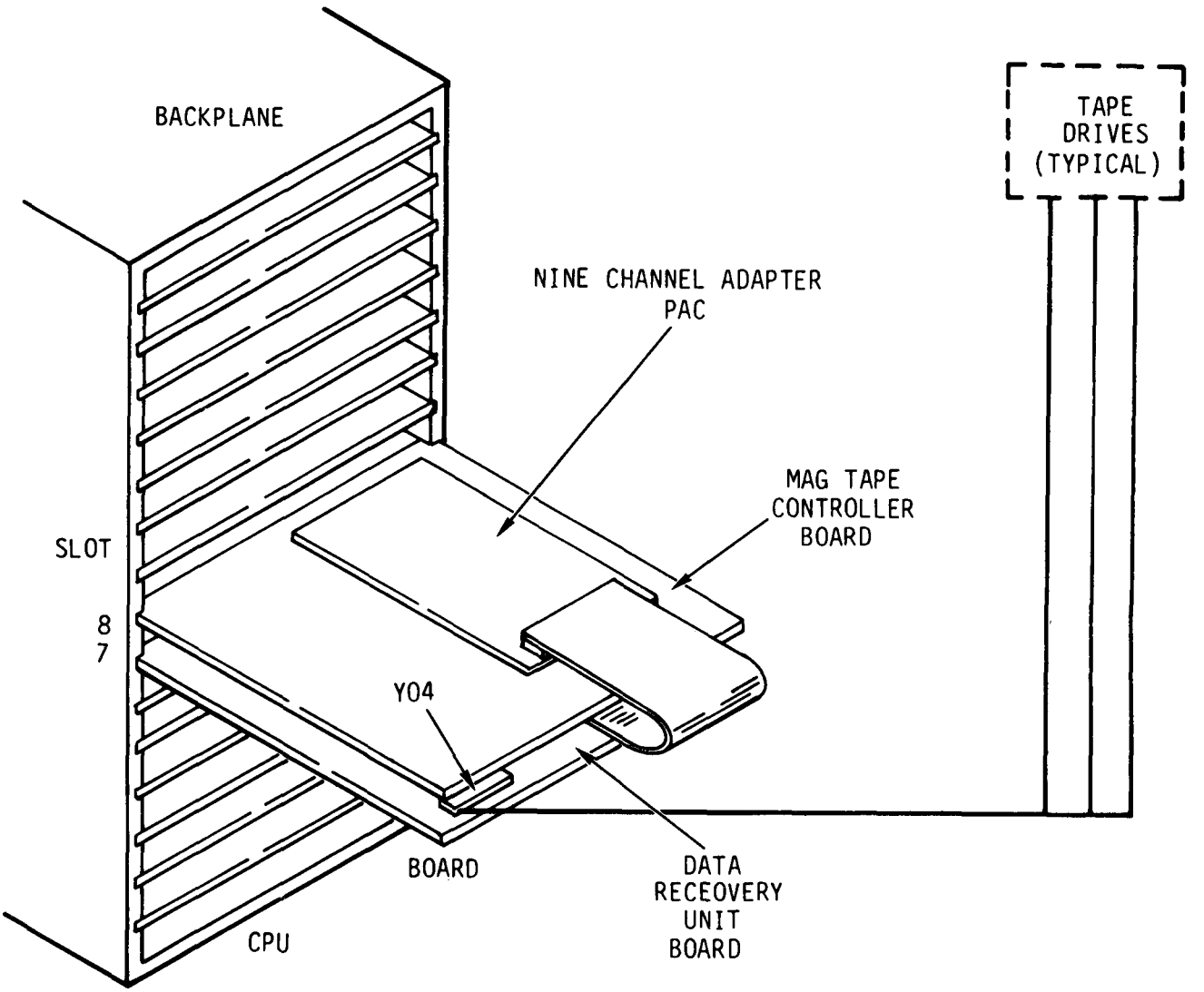


Figure D-8. Tape Controller and Data Recovery Unit Boards Configuration for CP-1435/MYQ-4

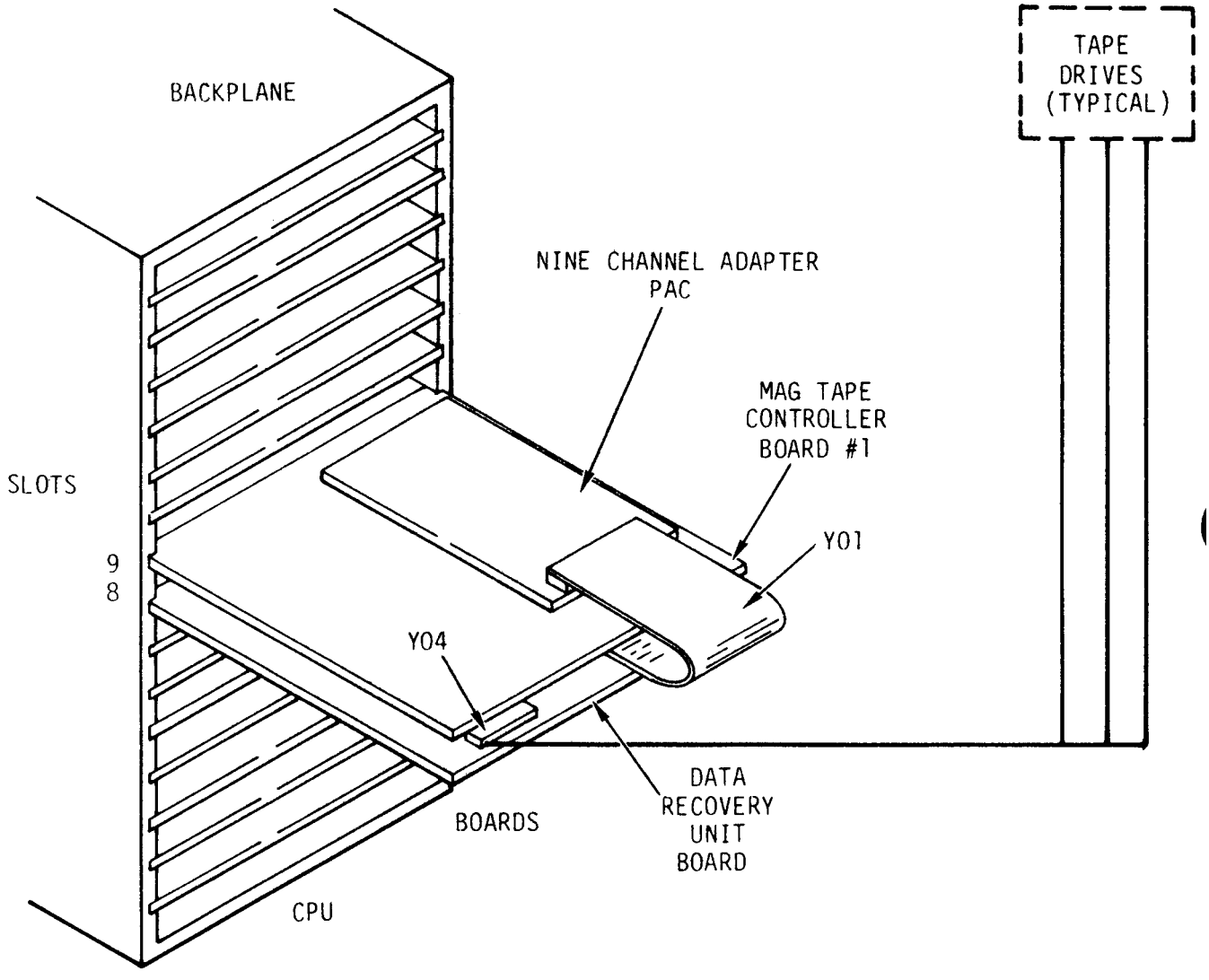


Figure D-9. Tape Controller and Data Recovery Unit Boards Configuration for CP-1435A/MYQ-4

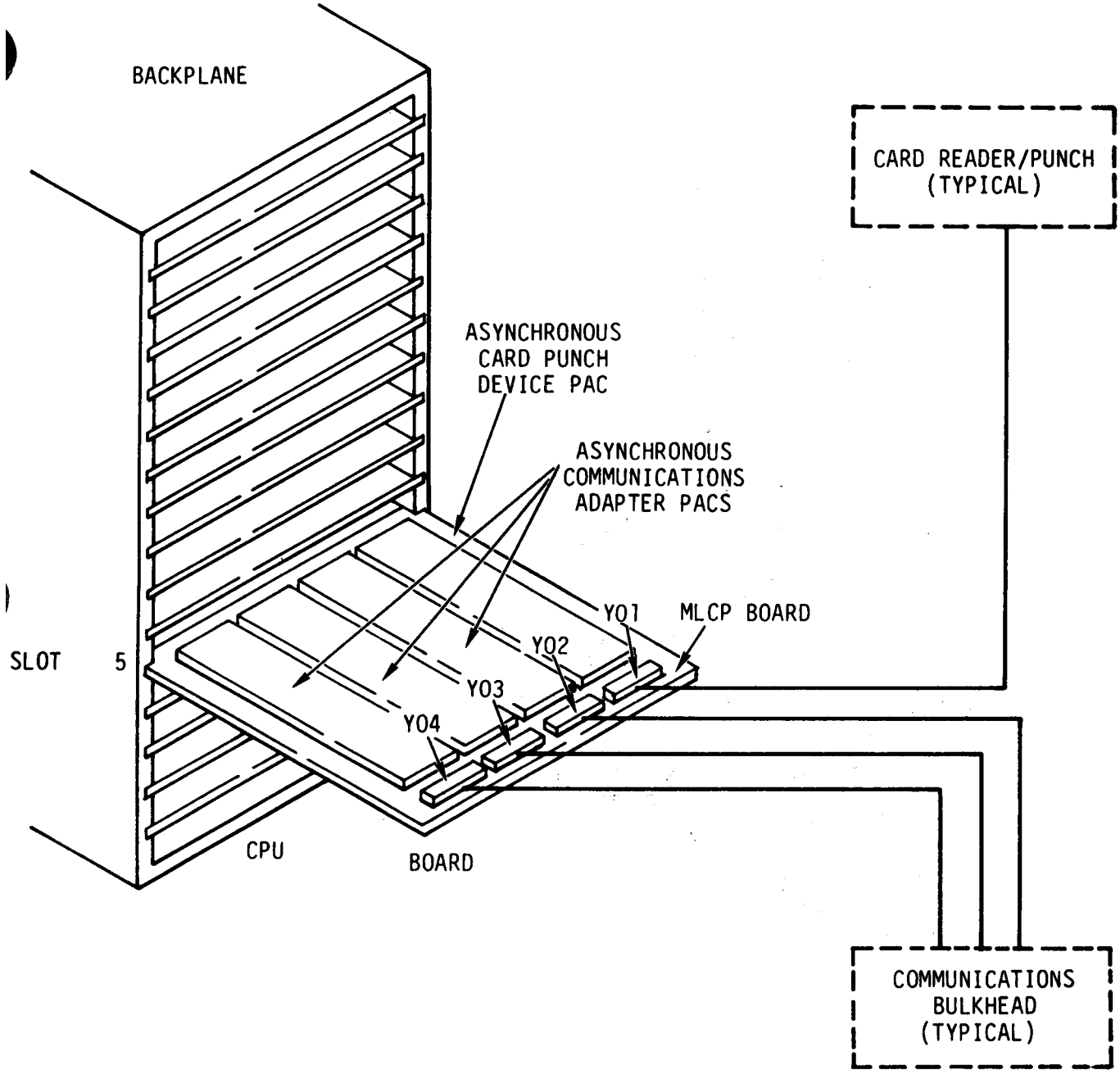


Figure D-10. Slot 6 Multiline Communications Processor Board Configuration for CP-1435/MYQ-4

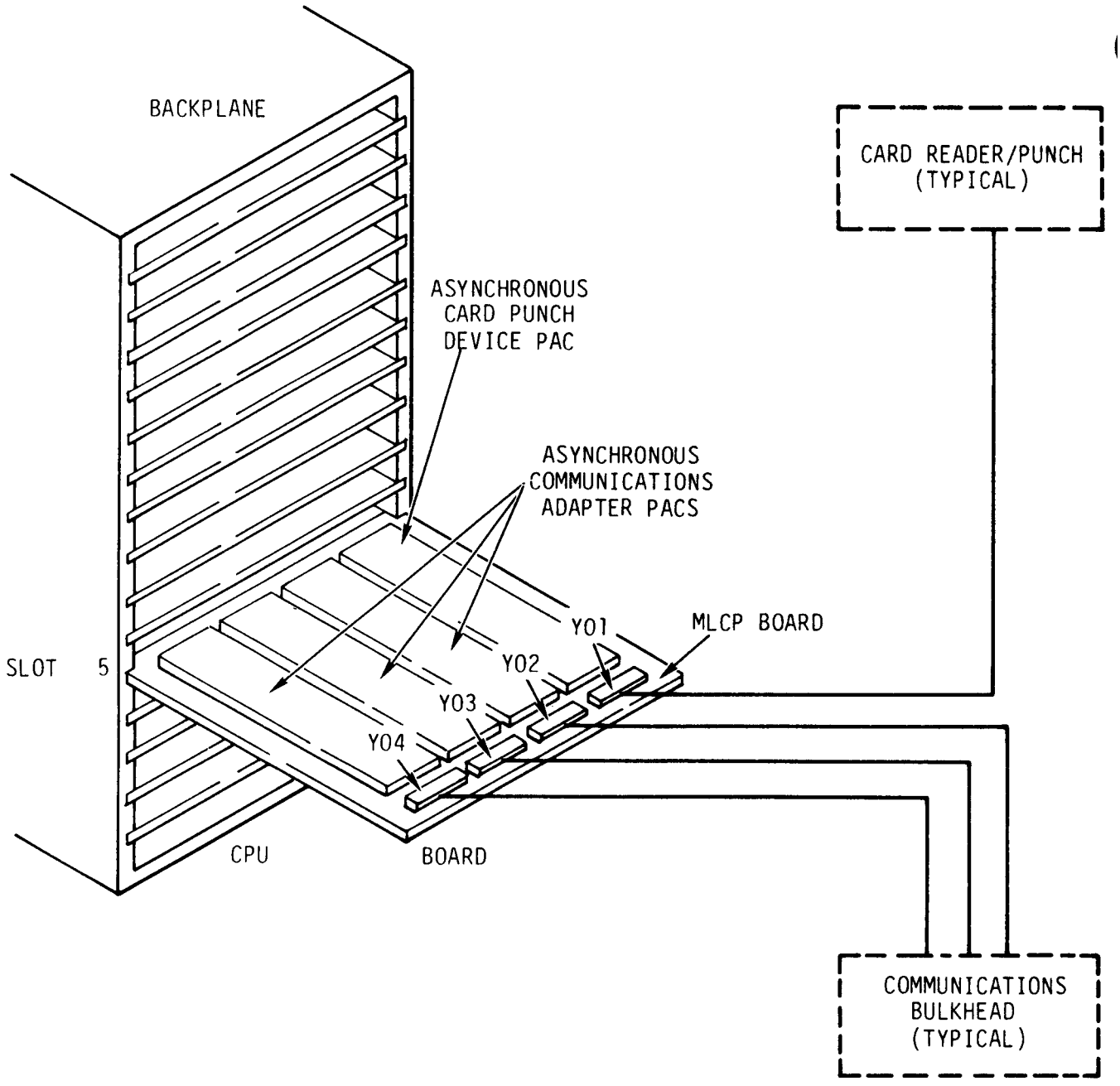


Figure D-11. Slot 5 Multiline Communications Processor Board Configuration for CP-1435A/MYQ-4

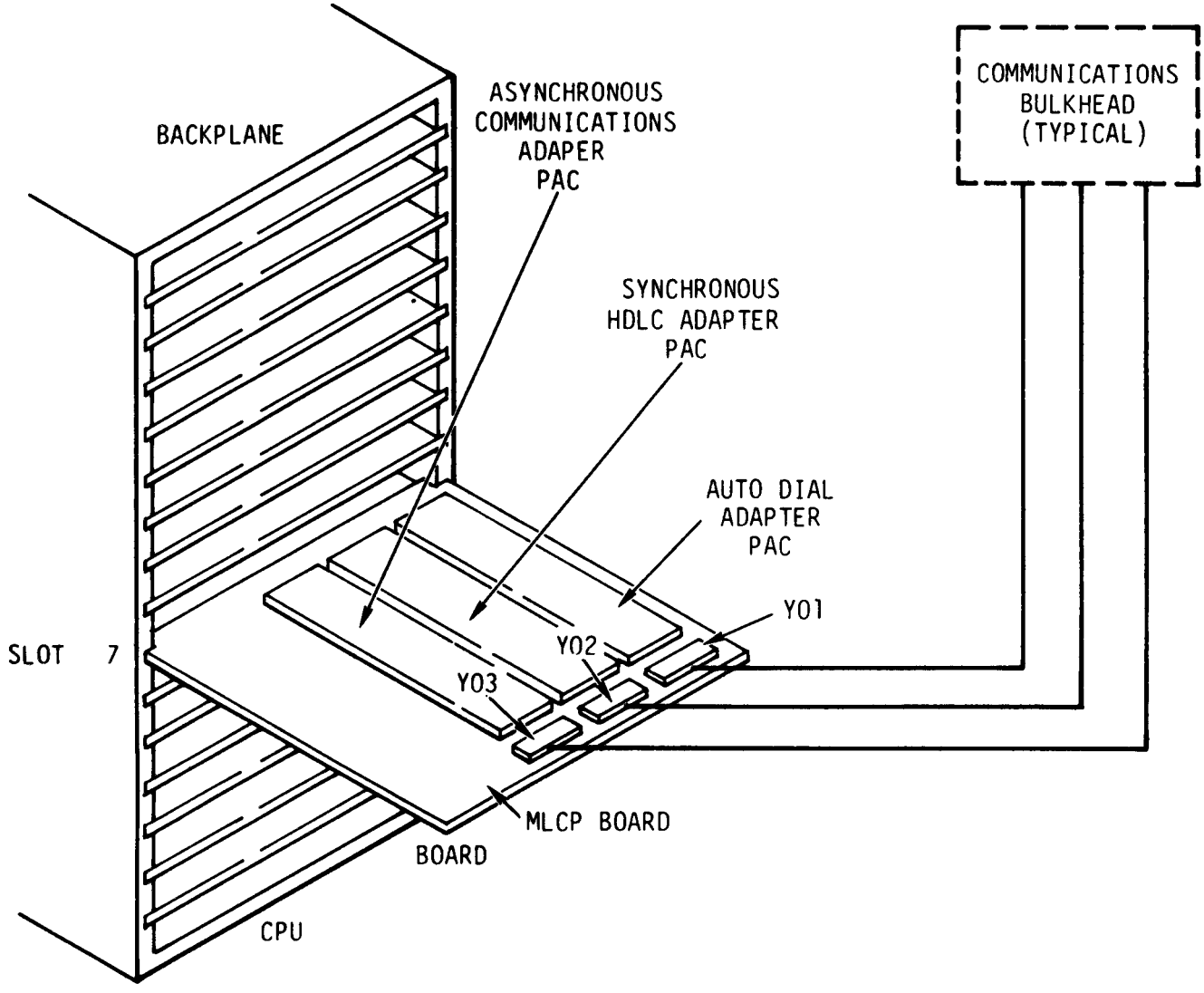


Figure D-12. Slot 7 Multiline Communications Processor Board Configuration for CP-1435A/MYQ-4

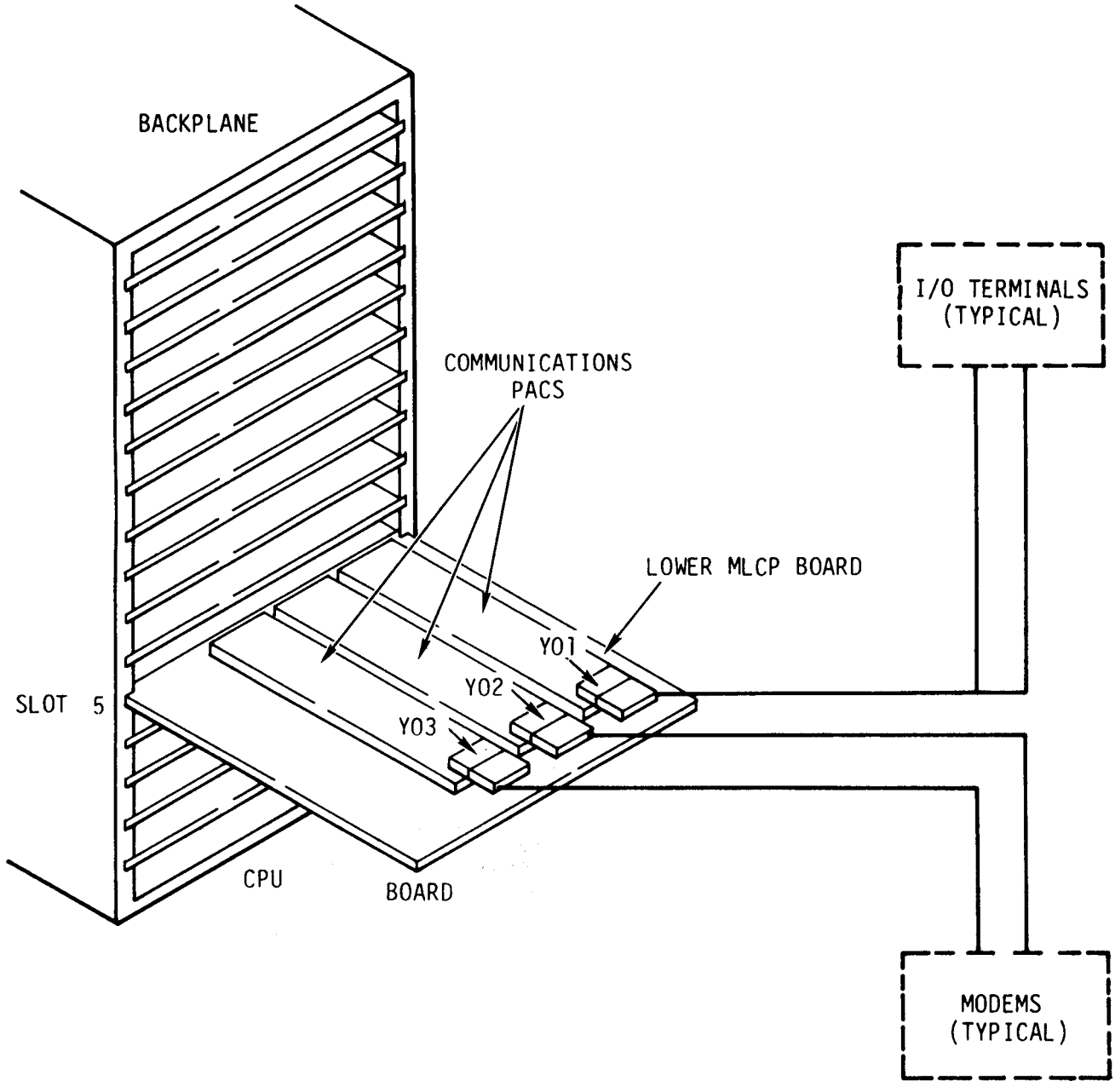


Figure D-13. Slot 5 Multiline Communications Processor Board Configuration for CP-1435/MYQ-4

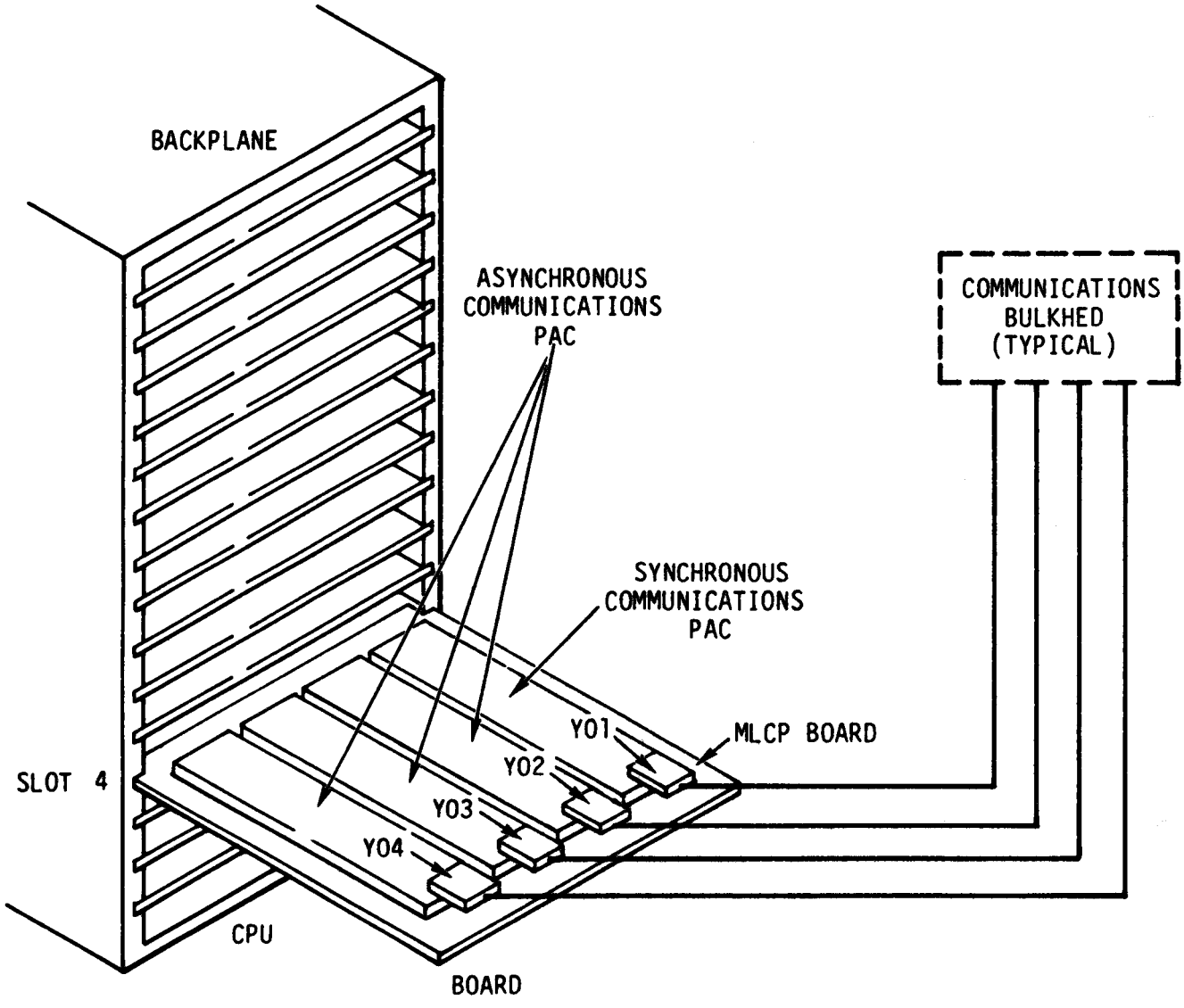


Figure D-14. Slot 4 Multiline Communications Processor Board Configuration for CP-1435A/MYQ-4

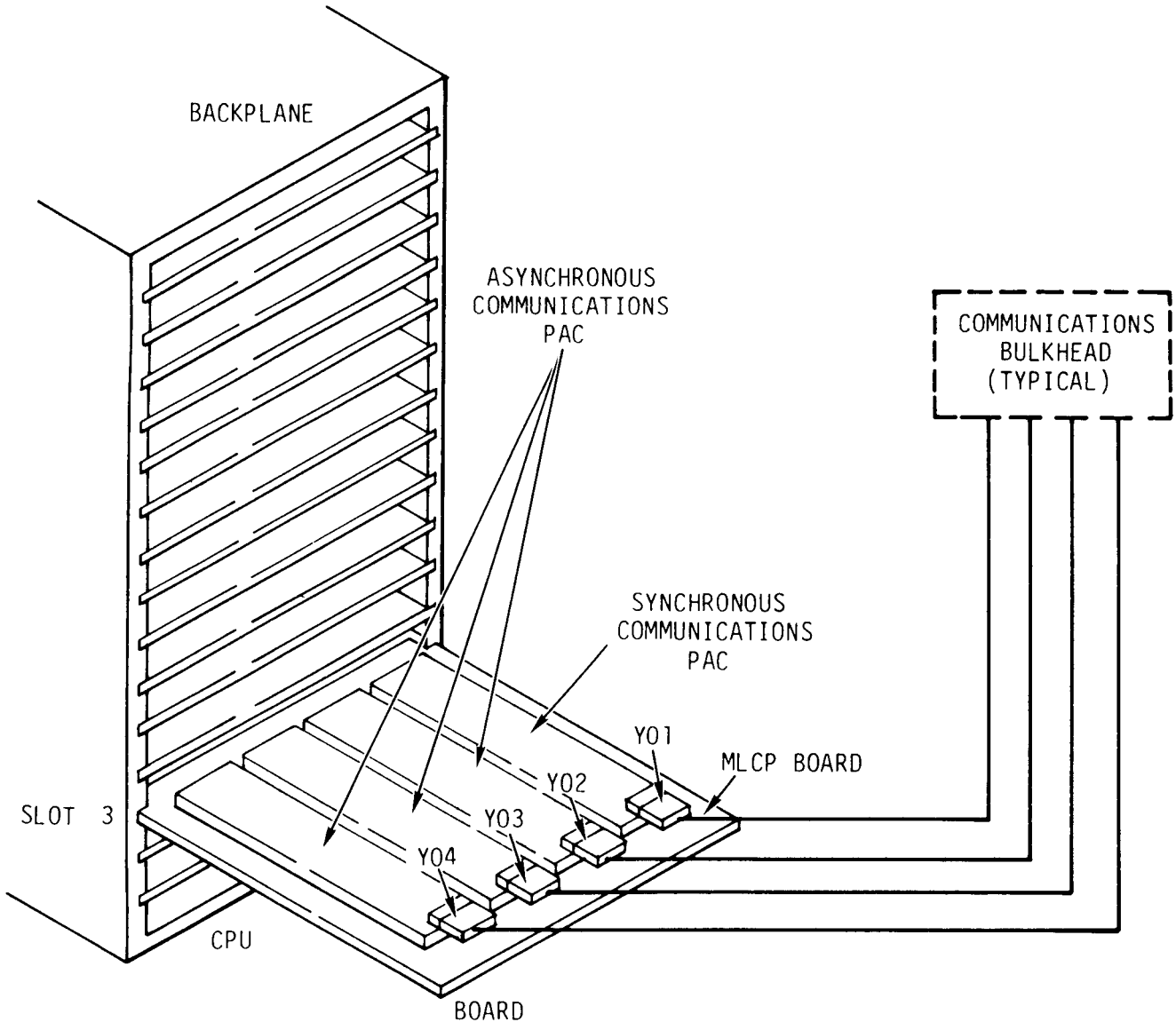


Figure D-15. Slot 3 Multiline Communications Processor Board Configuration for CP-1435A/MYQ-4

G L O S S A R Y

ADAPTER. A printed circuit board which is attached to a controller board. Used as an interface control between the computer and a peripheral device. Also called daughter board or pat.

ASYNCHRONOUS. Data communications which is not time related. Uses stop and start bits instead of time pulses to organize data for transmission.

BACKPANEL. See bus.

BACKPLANE. See bus.

BAUD. A unit of measure for data transmission. One baud equals one bit per second.

BAUD RATE. Rate of data transmission expressed in bauds.

BOOTSTRAP. A procedure used by a computer operator to load a software program into the computer from an input device. Procedure may also call up program for use.

BOOTSTRAP ROUTINE. A routine, contained in a single record that is read into memory by a ROM bootstrap loader, which reads the-operating system into memory. (See ROM bootstrap loader.)

BUFFER, I/0. A storage area used to compensate for the differences in the flow rates of data transmitted between peripheral devices and memory.

BUFFER MEMORY. An electronic memory which stores data column by column until all 80 columns are accounted for; and from which cards are punched and printed.

BUS. An assembly used to join several logic boards into one working component. For example, the bus in a minicomputer may join device controller boards, memory boards and a compiler into one working unit. Also called backpanel, backplane, or megabus.

BYTE. A sequence of eight consecutive binary digits operated upon as a unit.

CLOCK MANAGER. A monitor component that handles all requests to control tasks based on real-time considerations, and requests for the time-of-day and date in ASCII format.

COMM PAC. Adapter board used for communications interface.

COMMUNICATIONS DEVICE. A device that transfers data over communications lines and is connected through the MLCP.

CONTROL INTERVAL. The unit of transfer between main memory and the storage medium (primarily disk devices). Is comparable to a “block” for tapes. The size is specified by the user and remains constant for a file. For disk files, the size of the CI Must be a multiple of 256 bytes. A UFAS file is composed of CI’s which are numbered starting at one. The control interval also determines the buffer size.

DAUGHTER BOARD. See adapter.

DEVICE PAC. An adapter used as the interface between the CPU and peripheral devices.

DIPSWITCH. Miniature rocker switch used to select configurations of circuit boards.

DUAL-LINE COMMUNICATIONS PROCESSOR. A programmable interface between a central processor and communications devices consisting of two lines.

ECHO. Communications mode in which a data signal must pass through the computer before it is displayed at the terminal. Also called echoplex.

EDAC. Error Detection and Correction. Memory circuit which automatically corrects hardware-caused single bit data errors.

ERROR LOGGING. Collection of memory and/or hardware-related error statistics for selected peripheral devices.

FIRMWARE. Programs or instructions stored in read-only memories. Software stored in hardware form.

HALT. Automatic interruption in data processing caused by software or hardware fault.

HEXADECIMAL. A base 16 number system using O, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F as numerical symbols.

INITIALIZE. Operator action required to ready a computer system for operation. Includes power ON and bootstrapping procedures.

INPUT/OUTPUT DEVICE. A peripheral or communications device such as a keyboard video display terminal.

INTERFACE BOARD. An electronic printed circuit board that enables a computer to communicate with a peripheral device such as the card reader/punch.

INTERRUPT. Signal which tells computer to stop current processing to begin program having a higher priority.

LAF . Long Address Format. 20-bit main memory addressing.

MDC. Multiple Device Controller for peripheral devices other than cartridge disk, storage module, and magnetic tape.

MEGABUS. See bus.

MEMORY MANAGEMENT UNIT. A hardware feature which intercepts all addresses generated by the CPU (virtual addresses) and transforms them to real memory addresses via its mapping array.

MEMORY PAC. Memory adapter board mounted on the memory controller.

MEM0RY SAVE AND AUTORESTART UNIT. A hardware feature that can preserve the memory image during a power failure lasting up to two hours.

MOTHER BOARD, See controller.

MSC. Mass Storage Controller for disk packs.

MTC. Magnetic Tape Controller for magnetic tapes.

MULTILINE COMMUNICATIONS PROCESSOR (MLCP). A programmable interface between a central processor and one or more communications devices. Can be programmed to handle specific communications devices.

NRZ. Non Return to Zero. A method of recording data on magnetic tape.

NRZI . Non Return to Zero Inverted. An inverted form of the NRZ recording method.

PAC. Any adapter or device board which plugs into a controller board. Also called daughter board.

PARITY INHIBIT. Process of preventing parity bit additions and parity checks.

PARITY (BITS). A common technique for error detection in data transmission. Parity check bits are added to the data so that each group of bits adds up to an even number for even parity and an odd number for odd parity.

PE . Phase Encoded. A method of recording data on magnetic tape.

PERIPHERAL. Any component of a data processing system such as terminal, printer, tape drive, or disk drive.

PROM. Programmable Read Only Memory. A high speed permanently codes metal oxide semiconductor memory can be erased and reprogrammed.

QLT. Quality Logic Test. A hardware verification routine stored in the firmware of the CPU.

RAM. Random Access Memory. A high speed, semiconductor memory commonly used for registers.

RED ERROR. Error code indicating probable hardware failure. Usually given after a series of yellow errors.

RESIDUAL RANGE. The difference between the number of bytes requested and the number of bytes transferred during an I/O operation.

ROM BOOTSTRAP LOADER. A firmware routine (activated by pushing the Load key on the control panel) that reads the first record from a designated disk into memory.

RS-232-C INTERFACE. An EIA standard interface used to connect printers, terminals and modems to a computer system.

SAF. Short address format. 16-bit main memory addressing.

SOFTWARE. Programs, routines and codes which instruct a computer to perform its function in a data processing system.

STANDARD I/O FILES. The command-in, user-in, user-out, operator-out, and error-out files.

SYNCHRONOUS. Data communications which operates at one baud rate and does not need stop and start bits for transmission.

TERMINATOR. Board used to provide circuit continuity at either end of a bus.

WORD. A sequence of 16 consecutive binary digits operated upon as a unit; two consecutive bytes.

YELLOW ERROR. An error code which tells the operator the EDAC memory has found and corrected a bit error during processing.

INDEX

SUBJECT R (CONT) PARAGRAPH

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

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Stateside Army Depot
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Stateside, N.J. 07703

DATE SENT
10 July 1975

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 11-5840-340-12	23 Jan 74	Radar Set AN/PRC-76

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
2-25	2-28			Recommend that the installation antenna alignment procedure be changed throughout to specify a 2^{o} IFF antenna lag rather than 1^{o}. REASON: Experience has shown that with only a 1^{o} lag, the antenna servo system is too sensitive to wind gusting in excess of 25 knots, and has a tendency to rapidly accelerate and decelerate as it hunts, causing strain to the drive train. Hunting is minimized by adjusting the lag to 2^{o} without degradation of operation.
3-10	3-3		3-1	Item 5, Function column. Change "2 db" to "3db." REASON: The adjustment procedure for the TRANS POWER FAULT indicator calls for a 3 db (500 watts) adjustment to light the TRANS POWER FAULT indicator.
5-6	5-8			Add new step f.1 to read, "Replace cover plate removed in step e.1, above." REASON: To replace the cover plate.
		F03		Zone C 3. On J1-2, change "+24 VDC to "+5 VDC." REASON: This is the output line of the 5 VDC power supply. +24 VDC is the input voltage.

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TM 11-7021-200-23	8 Mar 84	DATA PROCESSING UNIT CP-1435/MYQ-4

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