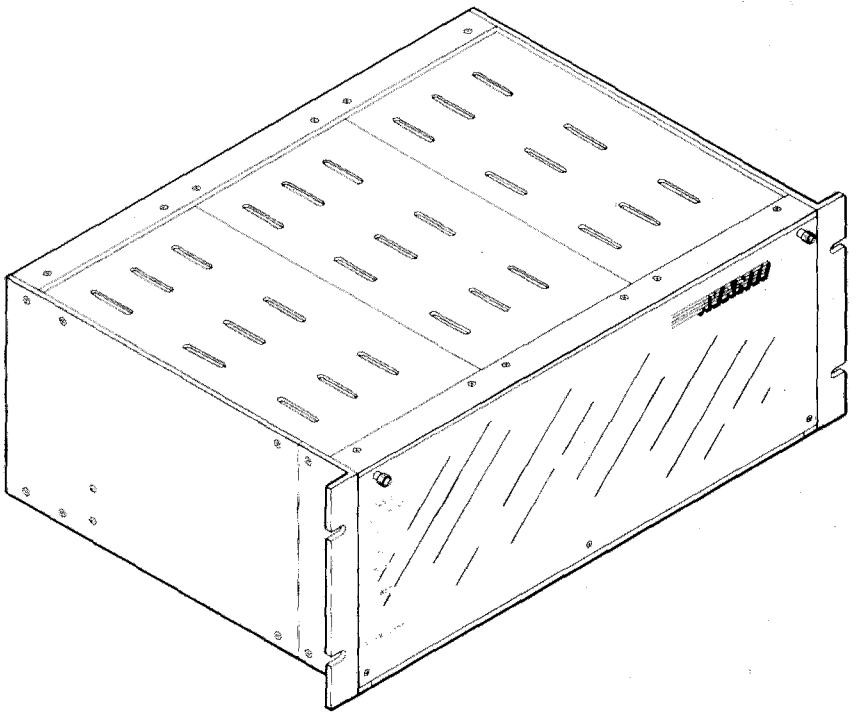
TM 11-7010-207-23

ORGANIZATIONAL AND DIRECT SUPPORT

MAINTENANCE MANUAL

CONVERTER UNIT

CV-3787/MYQ-4A



(NSN7010-01-153-0757)

HEADQUARTERS DEPARTMENT OF THE ARMY

13 MAY 1985

W A R N I N G

HIGH VOLTAGE

is used in the operation of this equipment

ELECTROCUTION

may result if you fail to observe these 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 artif cial 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.

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,13 May 1985

ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE MANUAL

CONVERTER UNIT CV-3787/MYQ-4A

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in 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 Converter Unit CV-3787/MYQ-4A.

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.

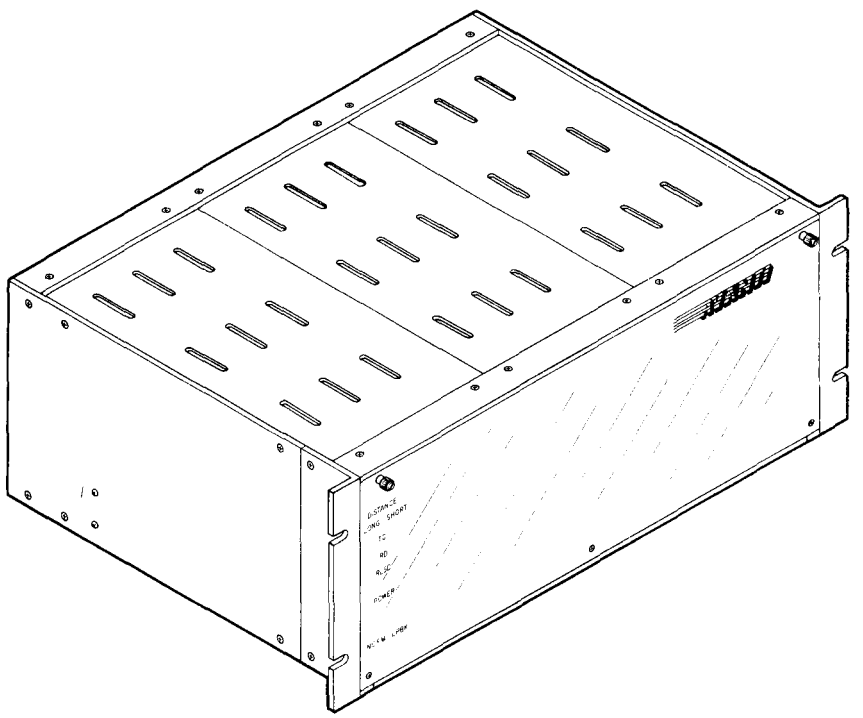


Figure 1-O. Converter Unit CV-3787/MYQ-4A

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE

Converter Unit CV-3787/MYQ-4A (fig l-O), hereafter referred to as the 600GR converter, provides signal conversion capacity to connect the CPU with remote terminals. Use this manual for organizational and direct support maintenance of the 600GR converter.

1-2. INDEX OF PUBLICATIONS

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

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 converter unit 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 names are used throughout this manual, but you must use the official nomenclature when filling out report forms, sending an EIR, or finding referenced technical manuals.

Common Name	Official Nomenclature
600GR converter or converter	Converter Unit CV-3787/MYQ-4A

1-9. LIST OF ABBREVIATIONS

ADP	Automated data processing
CPU	Central processing unit
CTS	Clear to send
DAA	Data access arrangement
DCE	Data communications equipment
DIP	Dual in line switch
DSR	Data set ready
DTE	Data terminal equipment
EIA	Electronic Industries Association
LDM	Limited distance modem
LED	Light emitting diode
LPBK	Loopback
MODEM	Modulator-demodulator
RD	Receive data
RLSD	Received line signal detector
RTS	Request to send
TD	Transmit data

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 600GR converter consists of a 19-inch equipment rack which contains 12 individual converter boards, each with its own power supply. Each converter board consists of a transmit and receive section. The transmit section generates a dc level carrier signal which is sent to the receive section of an identical converter board at the other end of the communications line. The transmit section also accepts digital data from a computer or data processing terminal. Each converter board converts this digital data from the terminal into bipolar dc level pulses which are suitable for transmission over metallic wire. An identical converter board at a remote receiving location translates these pulses back to digital form. The converter can:

- Receive and transmit data at rates up to 9600 bps between your ADP system and other ADP system(s) or remote terminal(s). Transmission must be over unloaded telephone metallic lines or dedicated metallic circuits up to 2 km in distance
- Operate point-to-point, four-wire, full or half duplex mode
- Provide fault isolation during checkout and installation using front panel diagnostic LEDs and loopback test switch
- Help you monitor operation of each individual power supply by lighting power LED indicator on the front panel of each converter board

1-12. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Major operating components (fig. 1-1) are located at the front of the converter assembly. Ac power is provided by an ac power cord with grounded three-wire plug, The ac line is fused at the rear of the unit. When power is on, lighted indicators show the operating status of each converter board.

1-12. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT)

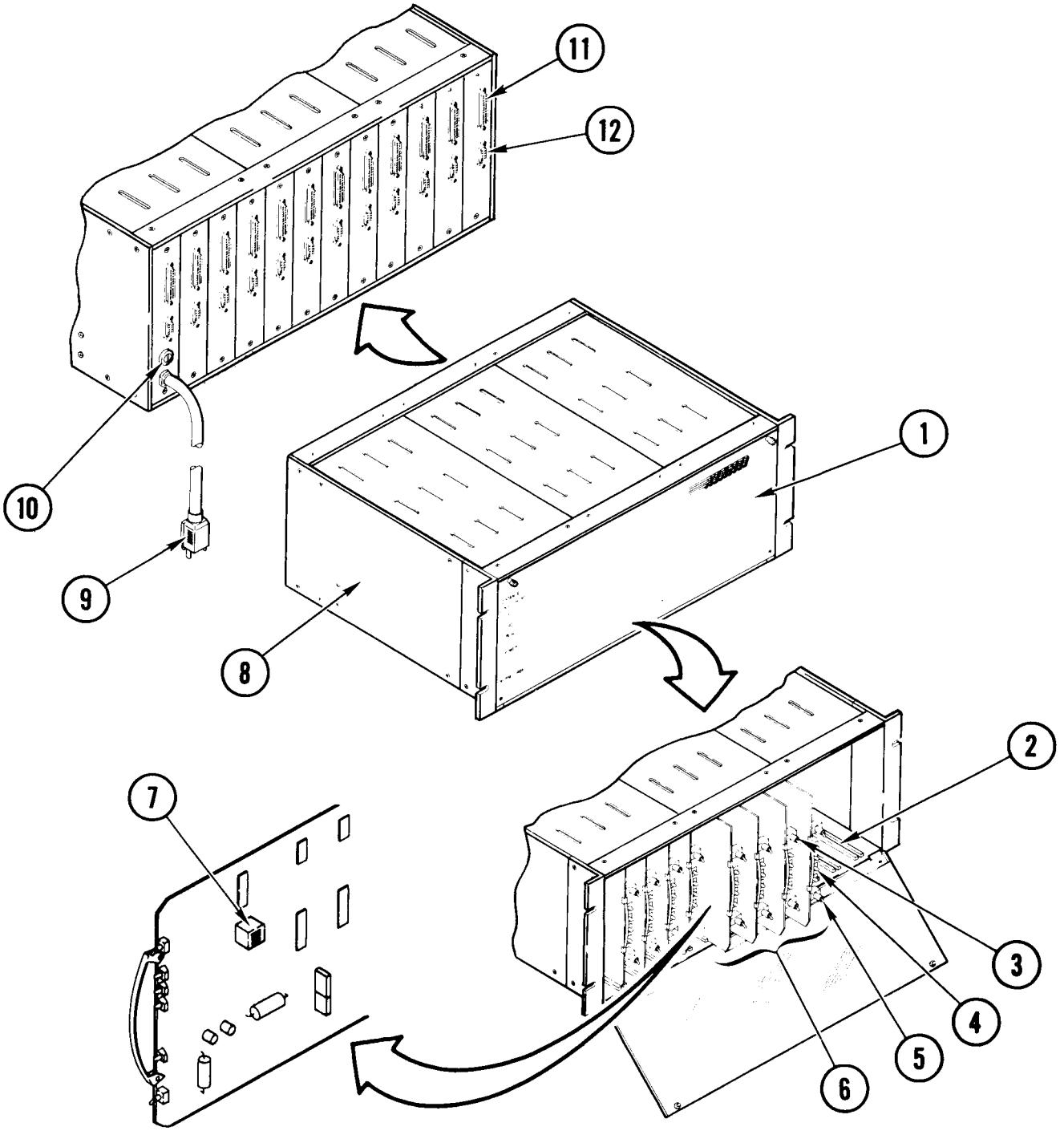


Figure 1-1. 600GR Converter Major Components (1 of 2)

(1) Front Panel - Hinged translucent plastic panel which provides access to converter boards and switches. When the panel is closed (normal) position, indicator lamps are visible but switches are not accessible, preventing accidental activation of switches.

(2) Card Mounting Slots - Provisions for plugging in up to 12 converter boards.

(3) Distance Short/Long Switch - Two position toggle switch. Short position used for distances less than 2 km. LONG position for distances greater than 1.8 km. The distances which are common indicate an equal performance in either position.

(4) Front Panel Indicators - TD - Transmit data indicator is lit whenever a space is transmitted. RD - When lit, indicates signal activity on the Receive Data Line. Indicator is not lit when circuit is in continuous marking state. Intensity of display varies with data transmission activity on the line. RLSD - When lit, indicates a signal is being received. POWER - When lit, indicates presence of power supply voltage when it is within acceptable operational limits.

(5) LpBK/NORM - Two position toggle switch selects loopback feature which assists in quick fault isolation during checkout and installation. In LBPK position, the local unit is tested by internally connecting the transmitter to the receiver. In this position, the transmit data (TD) will exercise the unit and will be returned as receive data (RD) if the unit is operating correctly. If a remote unit is connected to the system, the transmit data from the remote terminal goes to the local modem's receive amplifier and is looped directly to the modem's transmit amplifier and back to the remote terminal, testing both converters and the transmission lines.

(6) Channel Modems - Each 6006R converter printed wiring board is a plug-in module with individual power supply. Each functions as a interface between your system computer and signal lines to a remote terminal or computer.

(7) S2 - Three-section DIP switch used in selecting straps in order to accommodate various configurations.

(8) Cabinet and Mother Board Connectors - 19-inch cabinet equipped with a 12-connector mother board and board mounting slots. The cabinet is designed for mounting in a 19-inch equipment rack.

(9) Ac Power Cord - Standard three-prong power cord which connects assembly to power distribution unit of rack in which converter is mounted,

(10) Ac Power Fuse - Removable ac power 3-amp, 250V cartridge fuse. Protects converter power supplies.

(11) TERMINAL Connectors - Data terminal equipment (DTE) connectors which mate converter assembly to cables for data terminal equipment, one for each of 12 channels.

(12) LINE Connectors - Nine pin connectors used for interconnection of converters and transmission lines to remote terminals.

Figure 1-1. 600GR Converter Major Components (2 of 2)

1-13. EQUIPMENT IDENTIFICATION PLATE

The equipment identification plate is located on the left side of the 600GR converter (fig. 1-3).

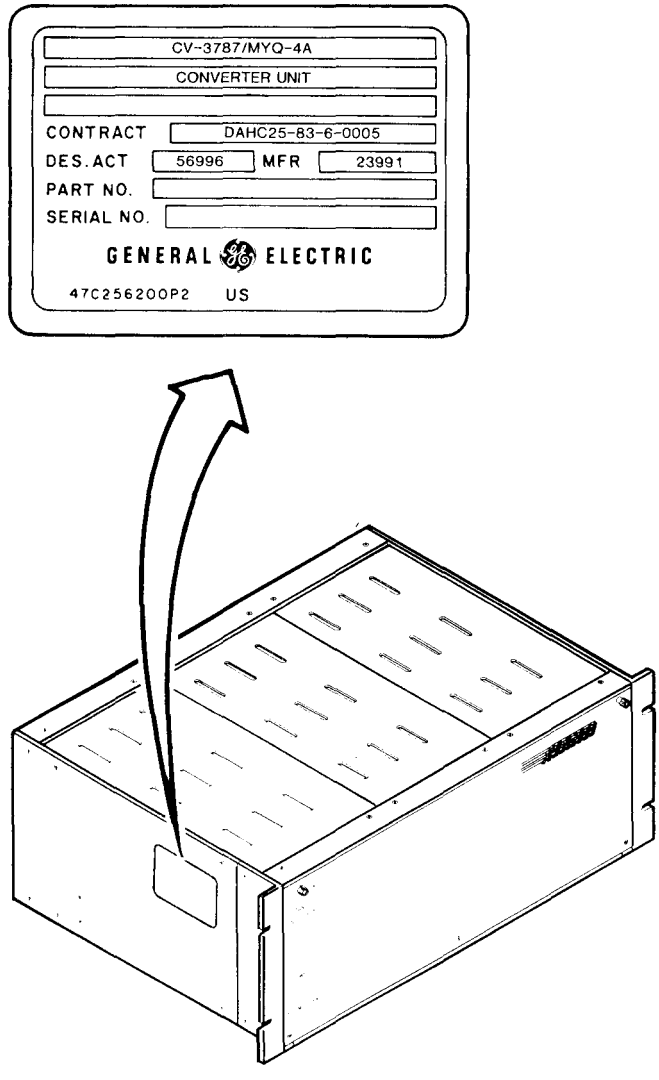


Figure 1-3. Equipment Identification Plate

1-14. EQUIPMENT DATA

Weight and dimensions:

Weight	28.5 lb (13.0 kg)
Height	7.0 in. (17.8 cm)
Width	19.0 in. (48.2 cm)
Depth	12.0 in. (30.5 cm)

Operating environment:

Temperature: 32°F to 122°F (O°C to 50°C)
Relative humidity: O% to 90% (noncondensing)

Converter assembly electrical requirements:
Voltage: 92 V ac to 130 V ac
Frequency: 50 to 400 Hz

Interface circuit requirements:
RS-232-C and MIL-188-114

Line Requirements:
Unloaded dedicated metallic pairs, 19 to 26 gauge

1-15. EQUIPMENT CONFIGURATION

When the mechanical installation has been completed, various strap-selectable configurations must be set before the electrical installation can be completed. Strapping is accomplished by setting DIP switch S2 (fig. 1-4). Switch S2 is on the right center section of each rack-mounted converter board. See your system manual for the switch position settings required for your system. An explanation of each switch position is as follows:

a. RTS/RTS ON(S2-1). Switch S2-1 determines if Clear-to-Send (CTS) is controlled by Request-to-send (RTS) or is on continuously. In the RTS ON position, CTS is ON and the converter board is placed into the Constant Carri er Mode, and CTS is on continuously. The RTS ON position is used when the attached terminal does not supply an RTS signal. In the RTS position CTS is controlled by Request-to-Send.

b. Constant/Switched Carrier (S2-2). In the CONSTANT CARRIER position, S2-2 configures the converter board to operate in a constant carrier mode. In this mode the converter's transmitter is always on. In the SWITCHED CARRIER position, S2-2 configures the converter board to operate in a Switched carrier mode. In this mode the converter's transmitter is controlled by RTS. The SWITCHED CARRIER position is over-ridden when S2-1 is in the RTS ON position.

c. RTS/CTS Delay (S2-3). Switch S2-3 selects either a 16 or 50 msec delay between the time that RTS goes on and CTS is turned on.

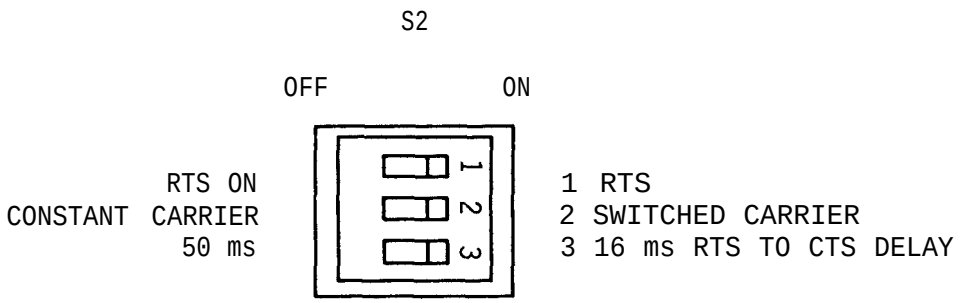


Figure 1-4. Configuration DIP Switch S2

CHAPTER 2
TECHNICAL PRINCIPLES OF OPERATION

2-1. GENERAL

This chapter explains how the 600GR converter operates and how it interfaces with various transmission lines to send and receive data.

2-2. FUNCTIONAL DESCRIPTION

Two converters of the same type are required for data transmission between two data terminals. The two terminals can be central processors, or a central processor and a remote terminal. The communications link between the two converters must be dedicated metallic circuits or direct connected phone lines. Interface connections to DTE and DCE are povided bv the line and terminal connectors on the rear panel of each unit. Figure 2-1 illustrates the interface cabling. The interface 'is compatible with RS-232-C and MIL-188-114 low level input/output interface and interface exchange requirements. Table 2-1 lists and describes each interface signal.

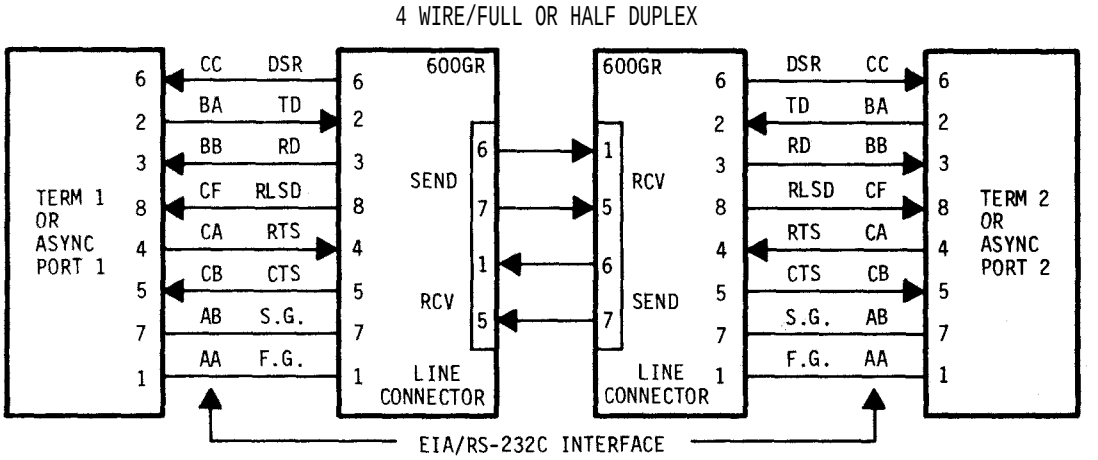


Figure 2-1. DTE, DCE Interface

The transmit portion of each converter begins carrier transmission when Request to Send (RTS) turns on. Transmit data from the terminal or data communications equipment is inhibited in a mark state until the converter has timed out the Clear to Send (CTS) delay. After CTS turns on, the terminal may begin transmitting the normal rate. When a converter is operating in a full-duplex mode, the transmitter is controlled by RTS and the received data is controlled by Received Line Signal Detector (RLSD). When transmitting in half-duplex mode, the transmitter and receiver are controlled by logical combinations of RTS and RLSD. While transmitting, receive data to the terminal is inhibited. If there is an attempt to transmit and receive simultaneously, the first function to occur will inhibit the other.

Table 2-1. Interface Signal Descriptions

RS-232-C	Signal Name	Description
AA	F.G. (Protective Ground or Earth)	Chassis ground. Isolated from signal ground or common return.
AB	S.G. (Signal Ground or Common Return)	Common signal and dc power ground. Isolated from protective ground.
CB	CTS (Clear to Send)	A positive level from the converter with a selectable delay, after receipt of Request to Send and when the converter is ready to transmit.
CA	RTS (Request to Send)	A positive level to the converter when data transmission is desired.
CF	RLSD (Received Line Signal Detector)	A positive level from the DCE or DTE that is used to indicate that the terminal is active.
BB	RD (Receive Data)	Serial digital data at the output of the converter receiver. Circuit BB is held in the mark condition whenever circuit CF (RLSD) is in the OFF (negative voltage) condition.
BA	TD (Transmitted Data)	Serial digital data from a data terminal or other digital data source. The terminal equipment shall hold circuit BA in the mark (negative voltage) condition during non-data intervals.
CC	DSR (Data Set Ready)	A positive level from the converter when power is on. Circuit CC will be in the OFF condition if the DCE is in a self-test mode (loopback).

2-3. ASYNCHRONOUS TRANSMISSION

The 600GR converter is an asynchronous limited-distance modem designed to transmit digital data between terminals and/or computers up to 2 kilometers apart. Asynchronous transmission is sometimes called start-stop transmission. Each transmitted character begins with a one bit start element. Start sense is binary O (space). The 7-bit character and parity bit is followed by a stop element having binary 1 (mark sense). The interval between the stop element of a character and the start element of the next character may be of any duration. During this interval, the converter maintains the stop element sense (mark). It operates at any data rate up to 9600 bps to meet the characteristics of the transmitted data stream.

2-4. TRANSMISSION MODE

Communication between converters can be in either of the following modes:

a. 4-Wire Full Duplex. Simultaneous two-way transmission using a 4-wire circuit.

b. 4-Wire Half Duplex. Alternating two-way transmission using a 4-wire circuit.

2-5. CARRIER CONTROL

The 600GR converter can be switched by means of the configuration switch (S2) to operate in a Constant Carrier mode or in a Switched Carrier mode.

a. Constant Carrier Operation. When a converter board is switched to a constant carrier mode, the transmitter is always on. The CLEAR TO SEND (CTS) signal is always on. When data is received from the associated DTE, transmission of data takes place. The Transmitter Data (TO) indicator lights until data transmission stops. At the receiving end, the Receive Data (RD) indicator lights to show that data being transmitted from the distant end converter is being received. Transmitted spaces cause the TD and RD indicators to flicker during data transmission.

b. Switched Carrier Operation. When a converter board is switched to a switched carrier mode, the functioning of the transmitter is controlled by Request-to-Send (RTS). If the attached terminal does not supply an RTS, signal switch S2 must be switched to the RTS ON position.

2-6. POWER SUPPLY

Each converter board has a self-contained power supply which supplies the required +5v, -5V, +12V, and -12V logic voltages. Primary power is supplied through the rear panel. Primary power is supplied through the board connector by way of a 12-connector strip. The unit is protected by a slow blow fuse accessible from the rear.

2-7. FUNCTIONAL TESTING

Transmitter and receiver operation can be partially checked by means of the two position NORM/LPBK switch on the front panel. For a self-test check the NORM/LPBK switch is placed in the LPBK position. Transmit data from the local terminal goes to the converter's transmitter (TX) as shown in figure 2-2, and is looped back to the receiver (RX). At the same time, if data is being transmitted from the distant end, data from the remote terminal goes to the local converter's receive amplifier and is looped directly back to the converter's transmit amplifier, testing both converters and the transmission lines.

In the NORM position, the converters receive and transmit data over the communication lines.

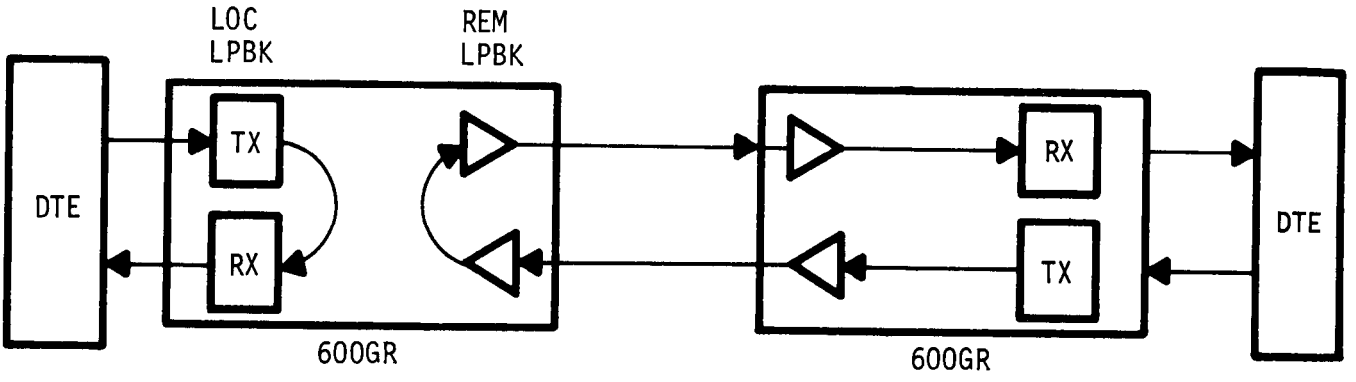


Figure 2-2. Loopback Testing

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 11-7010-205-23P 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 modem assembly.

3-3. SPARES AND REPAIR PARTS

Refer to TM 11-701O-2O5-23P 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 nuts 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

M - Monthly S - Semiannual

Item No.	Interval M	Interval S	Item To Be Inspected	Procedures	Equipment Will Be Reported Not Ready/ Available If:
1	•		Converter Board	Run loopback self test.	Self test fails
2		Ž	600GR Converter Assembly	Clean and inspect converter assembly as follows: 1. Make sure ac power is off. 2. Remove converter boards. 3. Clean case and converter board(s) as follows: CAUTION Work carefully when cleaning converter boards and inside the case. Do not bump or bend components. Do not force wires aside. Clean thoroughly but do not damage components, wiring or brackets. a. Put a soft brush type nozzle on vacuum cleaner hose. Turn on vacuum cleaner. b. Rub brush gently over metal surfaces, wires and components of converter boards. c. Rub brush gently in all parts of the converter assembly case. d. Use a small, soft, hand-held brush to loosen dust and debris around connector and terminals. Vacuum any dust or debris that is not dislodged by brush. e. Wipe all external surfaces of case with a clean cloth dampened with window cleaning solution.	

3-12. RUN LOOPBACK SELF TEST

NOTE

The NORM/LPBK switch enables either a Local/ Remote loopback test or normal operation. To perform a local loopback test, do steps 1 thru 4 and 8. To perform a remote loopback test, do steps 1 and 5 thru 8.

Local Loopback

1. Power on converter. Power indicator should light.
   - If indicator does not light, begin troubleshooting (CU-TS-01)
2. Set NORM/LPBK switch to LPBK position.
3. Have system send data.
   - RLSD indicator should light
   - RD and TD indicators should be flickering
   - If indicators are not lit, begin troubleshooting (CU-TS-03)
4. Repeat steps 1 thru 3 for remote end of the link.

Remote Loopback

5. Set local converter’s NORM/LPBK to NORM.
6. Set remote converter’s NORM/LPBK to LPBK.
7. Have system send data for each converter.
   - RLSD indicator on each converter should light
   - RD and TD indicators on each converter should be flickering
   - If any or all of these indicators are not lit, begin troubleshooting (CU-TS-00)
8. Place NORM/LPBK switch on local converter to NORM position.

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-2O5-23P 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 modem assembly.

4-3. SPARES AND REPAIR PARTS

Refer to TM 11-701O-2O5-23P for a complete listing and description of spares and repair parts required for direct support maintenance of this equipment.

Section II. TROUBLESHOOTING

The most effective way to find a fault in this equipment is to follow a routine which guides you through the five phases of troubleshooting (fig. 4-l). By followinq this routine you assure accurate use of fault isolation and fix procedures. You also improve your troubleshooting skills.

4-5. TROUBLESHOOTING PHASES

Each of the five phases in this routine is designed to accomplish a specific goal.

a. Fault Discovery. Usually, the operators or supervisor will notice faulty performance first. They must report the fault on the proper form so you will have the facts you need for the next phase.

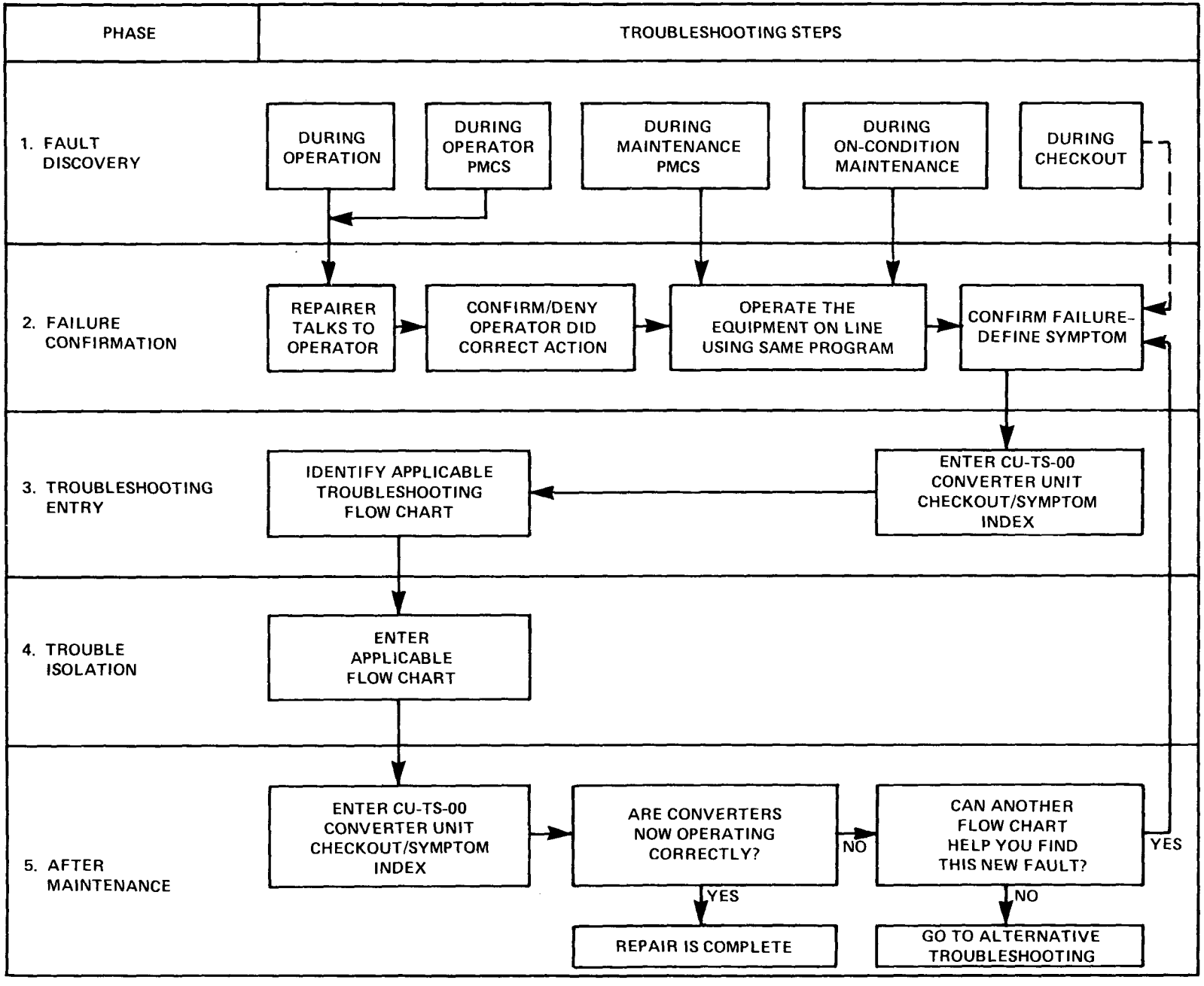


Figure 4-1. Troubleshooting Phases

b. Failure Confirmation. Based on the facts provided, you must confirm the failure and define the symptom. The symptom is the first clue you will use in the troubleshooting process.

c. Troubleshooting Entry. Using the symptom defined during phase two, find the troubleshooting flow chart which will help you isolate the fault in the equipment. The checkout and symptom index chart (chart-00) will help you do this.

d. Trouble Isolation. Follow the step-by-step procedures in the flow chart to isolate and correct the cause of the equipment failure.

e. After Maintenance. When you have made the fix recommended in the trouble-shooting procedure, You must check your work. Go back to the chart titled Converter Unit Checkout/Symptom Index. It tells you how to test your repair and make sure the equipment now work as it should.

4-6. ALTERNATIVE TROUBLESHOOTING TECHNIQUES

When a failure causes a symptom which is not covered in the symptom index or not corrected by the troubleshooting procedure in the flow chart, 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 the 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 the foldout schematic diagram at the rear of this manual to check the circuits in this equipment.

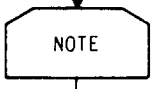
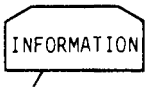
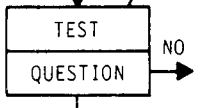
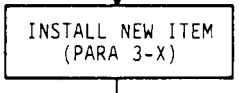
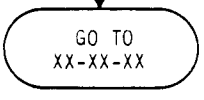
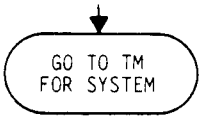
c. Check Past Maintenance Records. If the unusual failure occurred before, it should appear in the maintenance records for the equipment. The records should also tell you how the failure was corrected. Use the same fix this time.

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 the repair as a last resort before shipping the equipment to depot for maintenance.

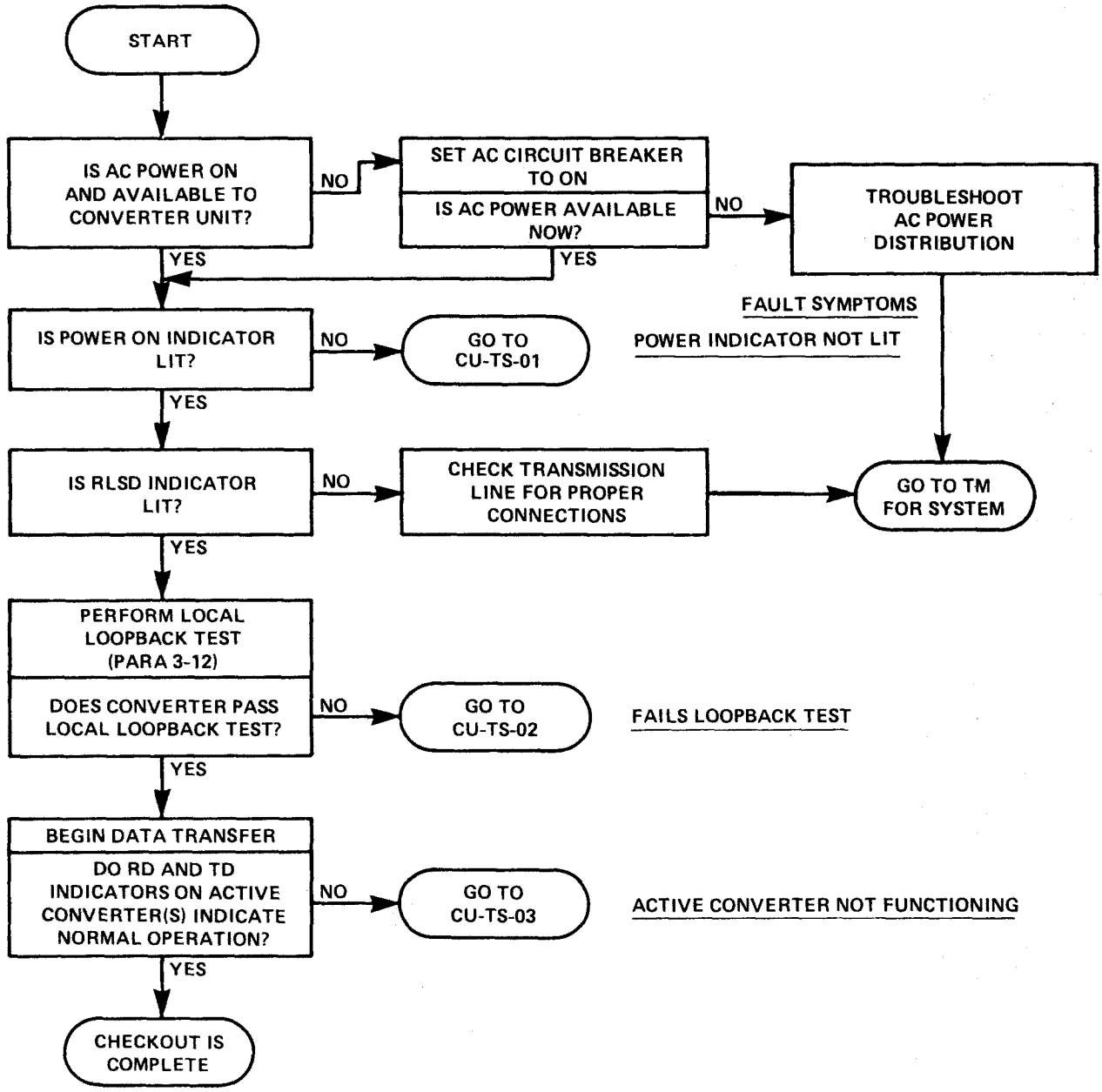
4-7. TROUBLESHOOTING PROCEDURES

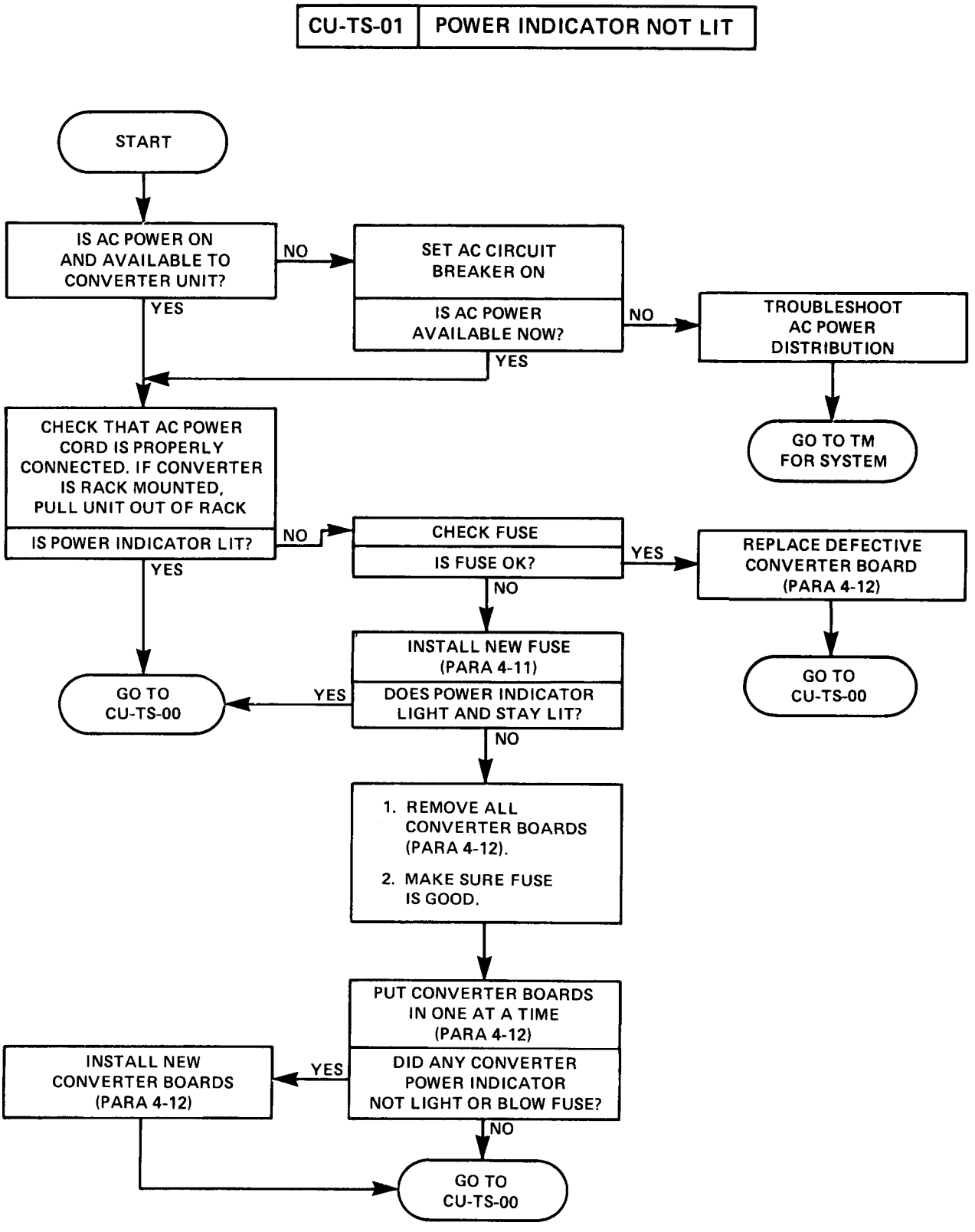
The troubleshooting procedures are arranged as flow charts. The charts consist of background information, specific instructions and decision points. Symbols (table 4-1) are used to organize the charts and guide you through a step-by-step trouble isolation procedure for each known failure symptom.

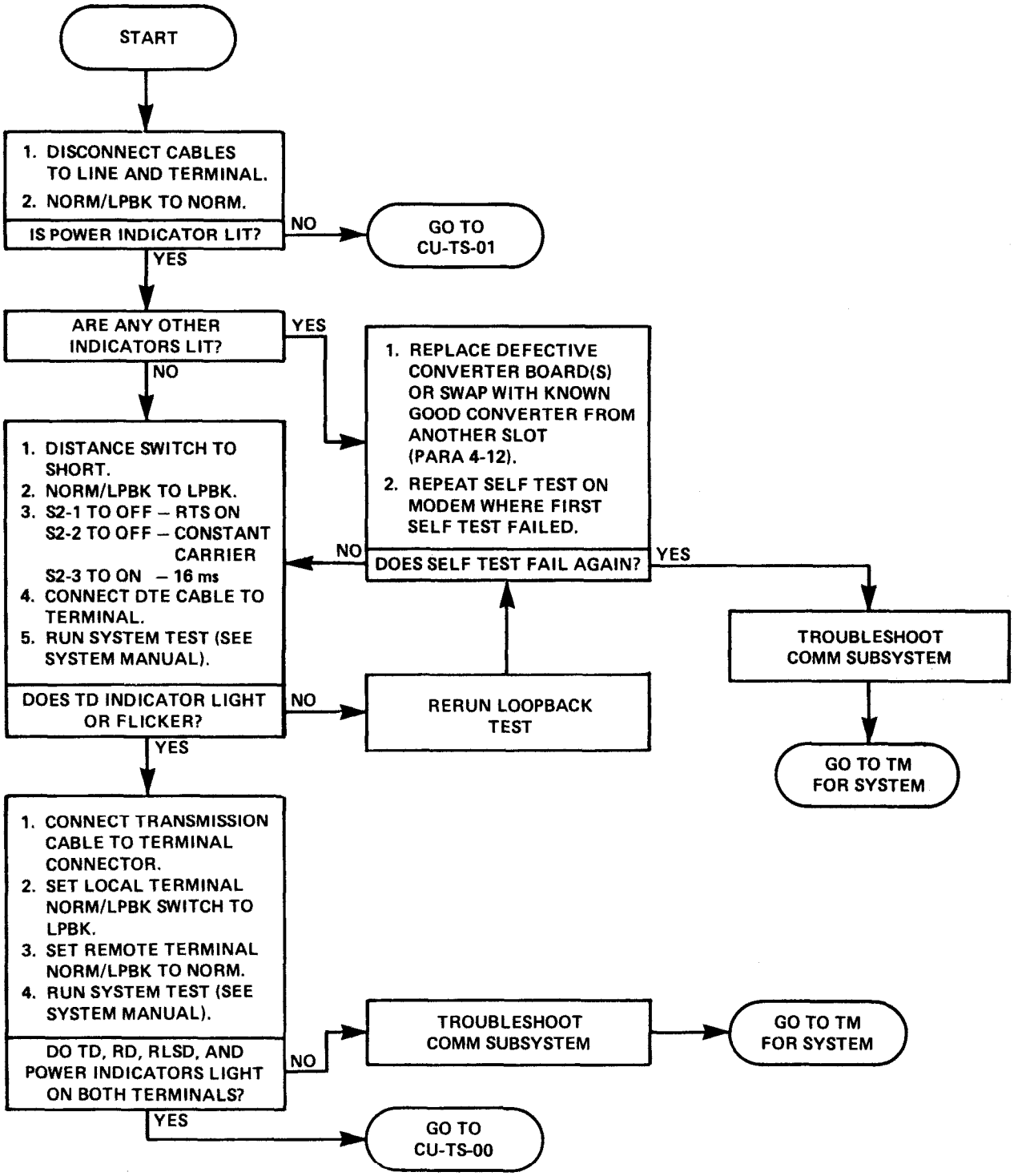
Table 4-1. Flow Chart Symbols

SYMBOL	MEANING
	This is a STARTING POINT symbol. This is where you enter a troubleshooting flow chart.
	This is a NOTE symbol. It contains information you need to do your work, but which is not a procedural step.
	This is a CAUTION symbol. It alerts you to the possible danger of breaking equipment in the steps that follow.
	This is a WARNING symbol. It alerts you to possible danger in the steps that follow.
	This is an INFORMATION symbol. It contains information that helps YOU make a test Or understand the troubleshooting process.
	This is a TEST/DECISION SYMBOL. It contains a test you must do and a question you must answer. If the results of a test tell you the answer is YES, you will follow the YES arrow to the next symbol. If your answer is NO, you will follow the NO arrow.
	These are CONNECTING POINT symbols. They are used in pairs. If the arrow points to the circle, it is the point where you leave a branch of the flow chart. If the arrow points away from the circle, it is the point where you go back into the flow chart. For example, you would go on one page to on the next page.
	This is a CORRECTIVE ACTION symbol. It tells you what to do to correct the problem. It will also refer you to the paragraph that contains the needed repair or adjustment procedure.
	This is a GO TO symbol. It tells you to go to another flow The X's in the symbol at the left stand for a chart
	Other forms for GO TO symbol : This symbol tells you to go to the system Technical Manual for further troubleshooting, such as running a T&V program.
	This symbol tells you to go back to the START point of the same flow chart.

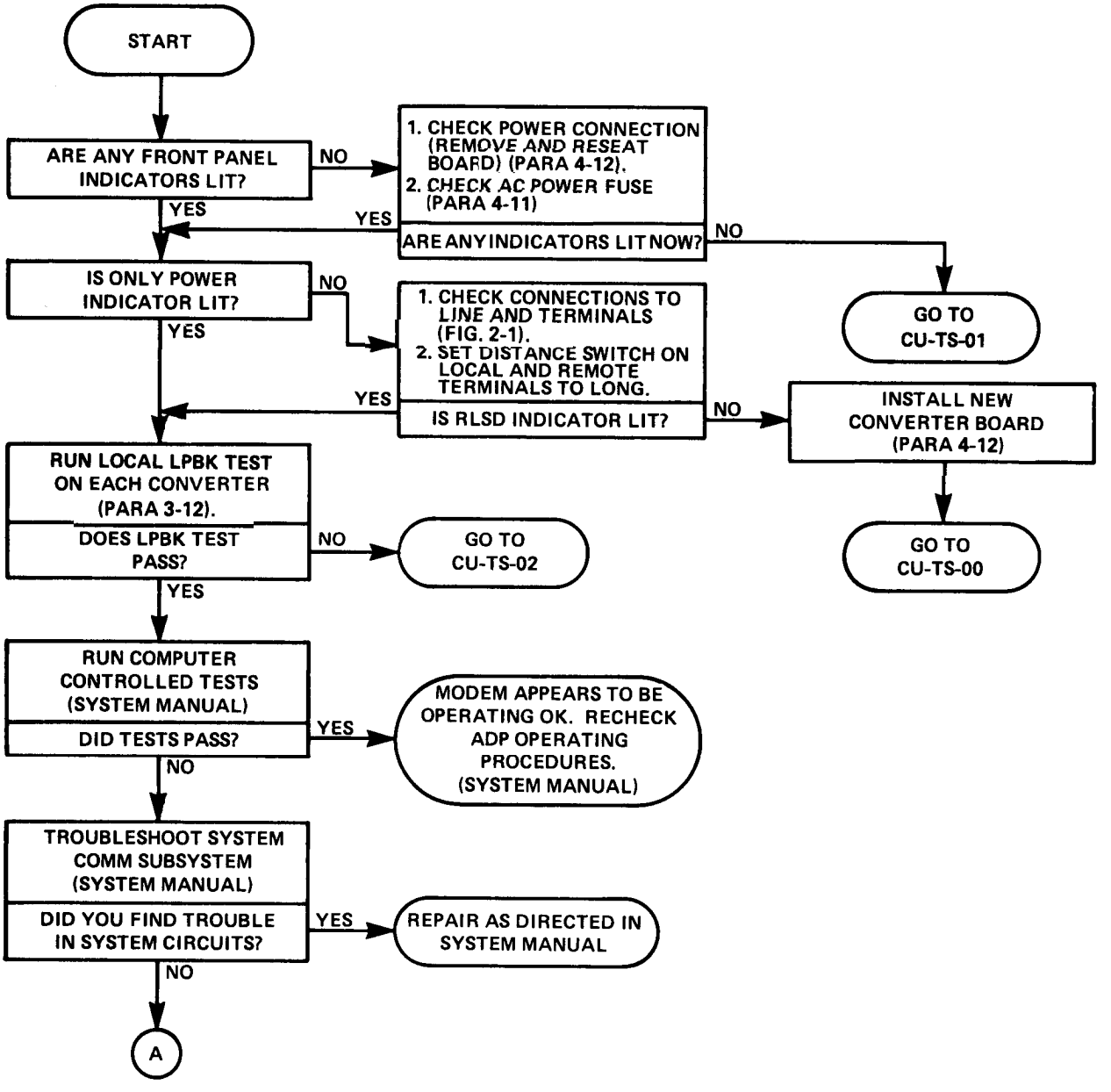
CU-TS-00	CONVERTER UNIT CHECKOUT/SYMPTOM INDEX

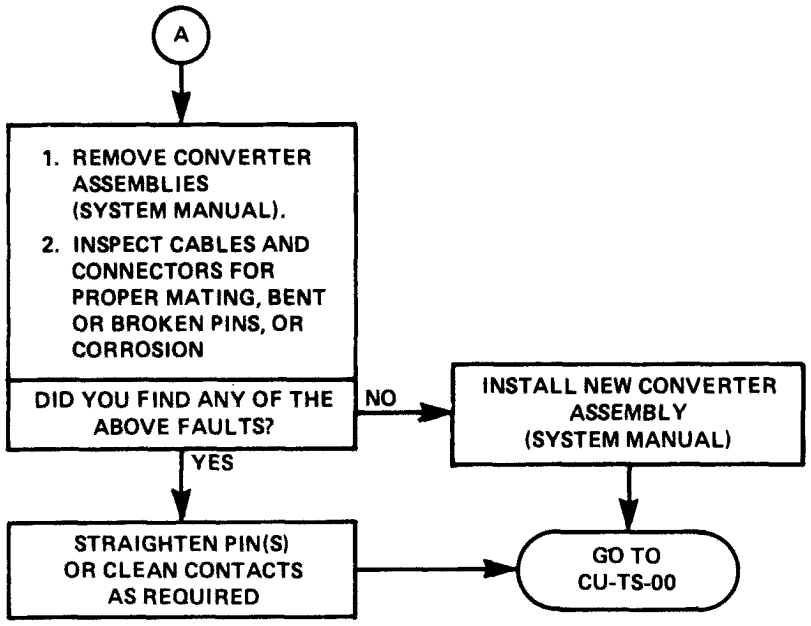



CU-TS-01
POWER INDICATOR NOT LIT
START
IS AC POWER ON AND AVAILABLE TO CONVERTER UNIT?
NO
SET AC CIRCUIT BREAKER ON
IS AC POWER AVAILABLE NOW?
NO
TROUBLESHOOT AC POWER DISTRIBUTION
GO TO TM FOR SYSTEM
YES
YES
CHECK THAT AC POWER CORD IS PROPERLY CONNECTED. IF CONVERTER IS RACK MOUNTED, PULL UNIT OUT OF RACK
IS POWER INDICATOR LIT?
NO
CHECK FUSE
IS FUSE OK?
YES
REPLACE DEFECTIVE CONVERTER BOARD (PARA 4-12)
GO TO CU-TS-00
YES
NO
INSTALL NEW FUSE (PARA 4-11)
DOES POWER INDICATOR LIGHT AND STAY LIT?
GO TO CU-TS-00
YES
NO
1. REMOVE ALL CONVERTER BOARDS (PARA 4-12).
2. MAKE SURE FUSE IS GOOD.
PUT CONVERTER BOARDS IN ONE AT A TIME (PARA 4-12)
DID ANY CONVERTER POWER INDICATOR NOT LIGHT OR BLOW FUSE?
YES
INSTALL NEW CONVERTER BOARDS (PARA 4-12)
NO
GO TO CU-TS-00


START
1. DISCONNECT CABLES TO LINE AND TERMINAL.
2. NORM/LPBK TO NORM.
IS POWER INDICATOR LIT?
NO
GO TO CU-TS-01
YES
ARE ANY OTHER INDICATORS LIT?
YES
1. REPLACE DEFECTIVE CONVERTER BOARD(S) OR SWAP WITH KNOWN GOOD CONVERTER FROM ANOTHER SLOT (PARA 4-12).
2. REPEAT SELF TEST ON MODEM WHERE FIRST SELF TEST FAILED.
NO
1. DISTANCE SWITCH TO SHORT.
2. NORM/LPBK TO LPBK.
3. S2-1 TO OFF – RTS ON
S2-2 TO OFF – CONSTANT CARRIER
S2-3 TO ON – 16 ms
4. CONNECT DTE CABLE TO TERMINAL.
5. RUN SYSTEM TEST (SEE SYSTEM MANUAL).
DOES SELF TEST FAIL AGAIN?
NO
YES
TROUBLESHOOT COMM SUBSYSTEM
GO TO TM FOR SYSTEM
DOES TD INDICATOR LIGHT OR FLICKER?
NO
RERUN LOOPBACK TEST
YES
1. CONNECT TRANSMISSION CABLE TO TERMINAL CONNECTOR.
2. SET LOCAL TERMINAL NORM/LPBK SWITCH TO LPBK.
3. SET REMOTE TERMINAL NORM/LPBK TO NORM.
4. RUN SYSTEM TEST (SEE SYSTEM MANUAL).
DO TD, RD, RLSD, AND POWER INDICATORS LIGHT ON BOTH TERMINALS?
NO
TROUBLESHOOT COMM SUBSYSTEM
GO TO TM FOR SYSTEM
YES
GO TO CU-TS-00

CU-TS-03	ACTIVE CONVERTER NOT FUNCTIONING	1 OF 2




A
1. REMOVE CONVERTER ASSEMBLIES (SYSTEM MANUAL).
2. INSPECT CABLES AND CONNECTORS FOR PROPER MATING, BENT OR BROKEN PINS, OR CORROSION
DID YOU FIND ANY OF THE ABOVE FAULTS?
NO
INSTALL NEW CONVERTER ASSEMBLY (SYSTEM MANUAL)
YES
STRAIGHTEN PIN(S) OR CLEAN CONTACTS AS REQUIRED
GO TO CU-TS-00

Section III. MAINTENANCE PROCEDURES

4-8. GENERAL

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

4-9. EQUIPMENT HANDLING PRECAUTIONS

Converter boards are sensitive to dirt, smoke and humidty. Follow the rules below to avoid damage to the equipment.

a. Make sure hands, hair, clothing, and shoes are clean before working on the modem assembly.

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

d. Do not use masking tape labels.

e. Hold boards by their edges whenever you handle them.

f. Store and ship boards in static free bags.

g. Store boards in a humidity controlled environment.

h. Do not smoke in the area where boards are used or stored.

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

j. Never leave boards lying around unprotected.

4-10. 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. REMOVE/REPLACE FUSE

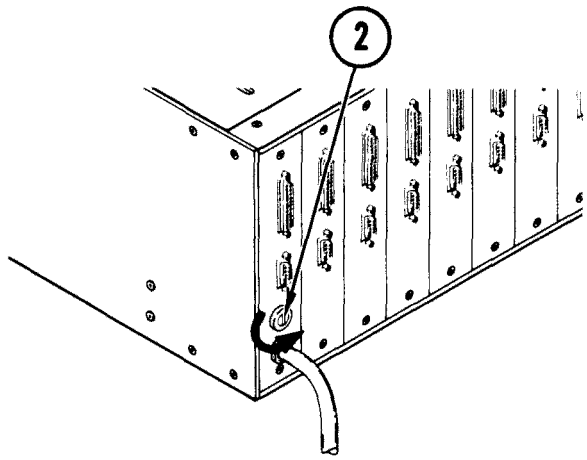
INITIAL SETUP

Common Tools	Materials/Spare Parts
●Tool kit	● Fuse (3 amp, 250V slow blow)

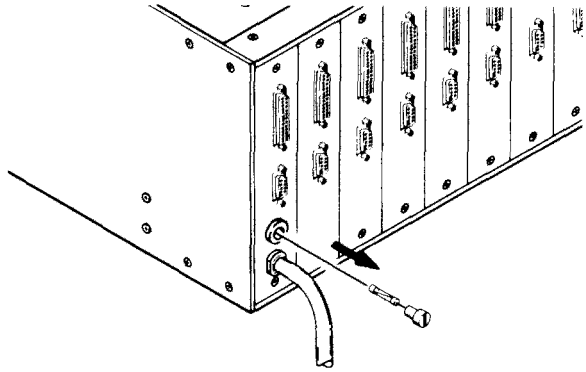
NOTE

The 600GR converter is a rack mounted device. See your system manual for removal instructions.

Remove

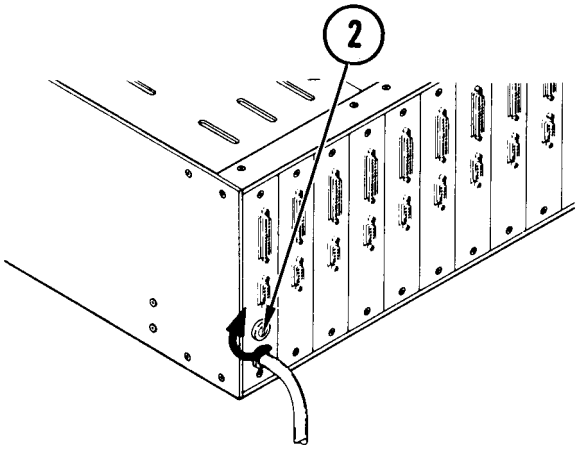


1. Power off.
2. Using screwdriver, turn fuseholder cap as shown.
3. Remove fuse cap together with fuse.



4. Pull fuse from cap.

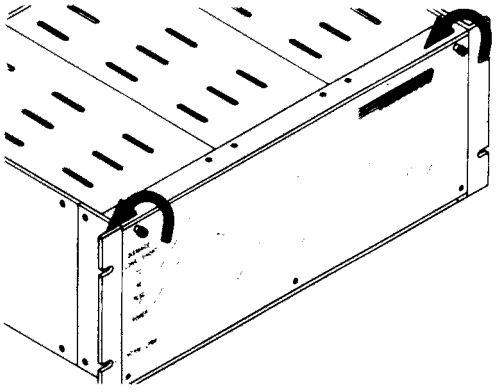
4-11. REMOVE/REPLACE FUSE (CONT)



Replace

1. Put fuse in cap.
2. Put fuse cap in position. Using screwdriver, push in and turn as shown, until fuse cap locks in place.
3. If the 600GR is rack-mounted, refer to system manual for replacement.

4-12. REMOVE/REPLACE CONVERTER BOARDS

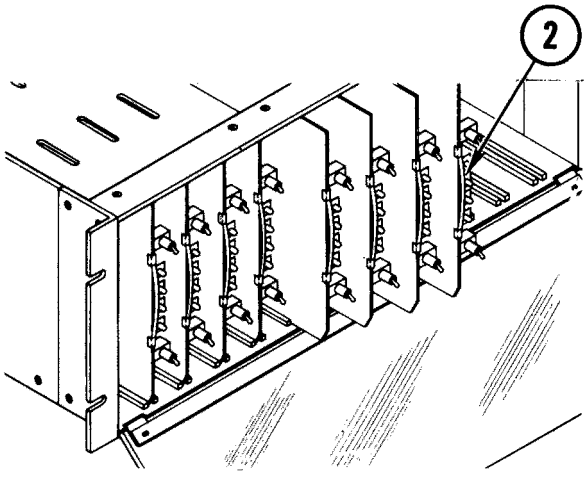


NOTE

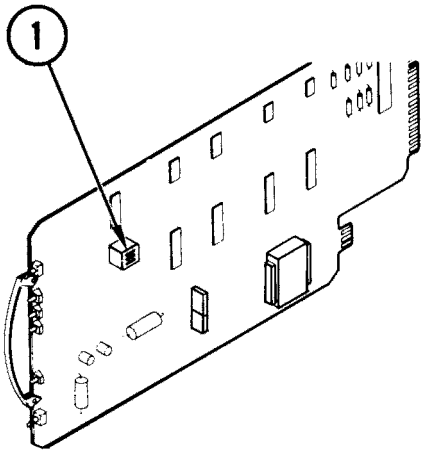
A converter board may be removed while the converter assembly is powered on or off. Follow these steps to remove/replace any converter board.

Remove

1. Turn knurled locking knobs as shown. Lower front panel.



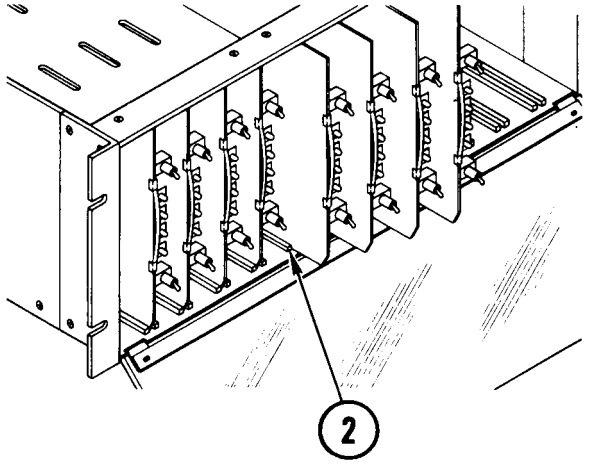
2. Grasp board puller strap and carefully pull converter board out of assembly.



Replace

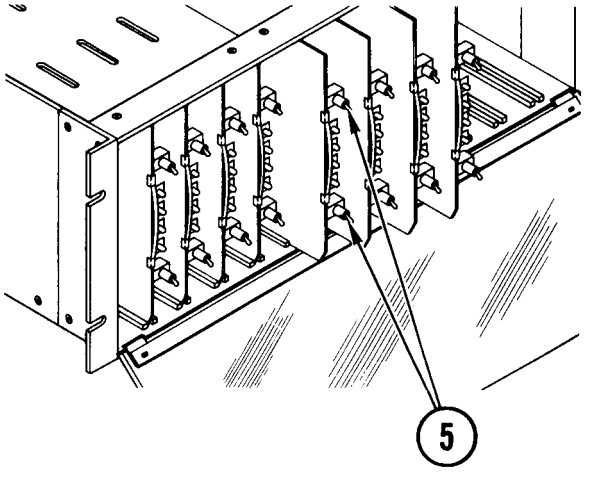
1. Check/set configuration switch S2 as required for your system (see your system manual).

4-12. REMOVE/REPLACE CONVERTER BOARDS (CONT)



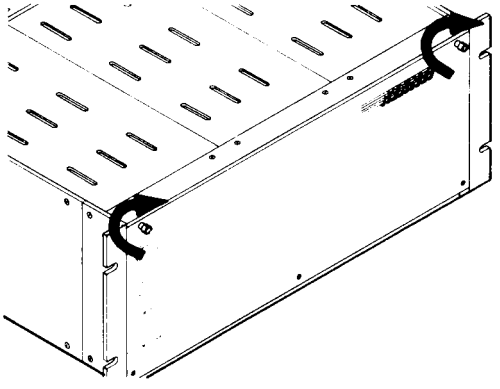
2. Position converter board in center mounting slot.

3. Press board at top and bottom until board snaps into connectors at back.



4. Run self test to check board (para 3-12).

5. Set LPBK/NORM to NORM position and DISTANCE switch to SHORT or LONG as required.



6. Close front panel and secure in position by turning knurled locking knobs in direction shown.

4-13. REMOVE/REPLACE CONVERTER LINE/TERMINAL CONNECTOR PANEL

INITIAL SETUP

Common Tools
- Tool kit

NOTE

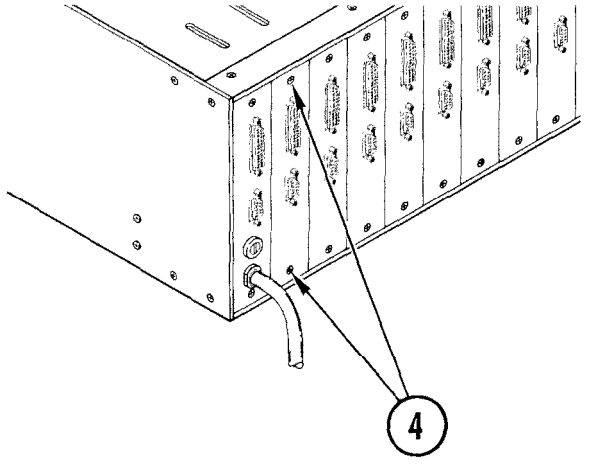
The 600GR converter is a rack-mounted device. See your system manual for removal instructions.

Remove

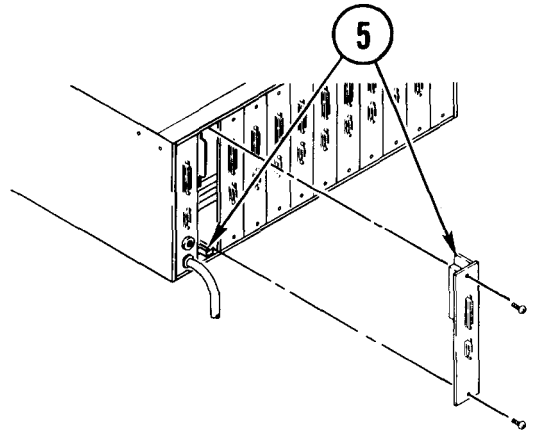
NOTE

There are two types of connector panels used. For standard connector panel use steps 1 thru 5, for fused power panel use steps 1 thru 6.

1. Power off.
2. Locate defective connector panel to be removed.
3. Remove converter board connected to defective connector panel (para 4-12, Remove, steps 1 and 2).
4. At rear of unit loosen and remove two cross recessed mounting screws which secure panel to mounting rack.



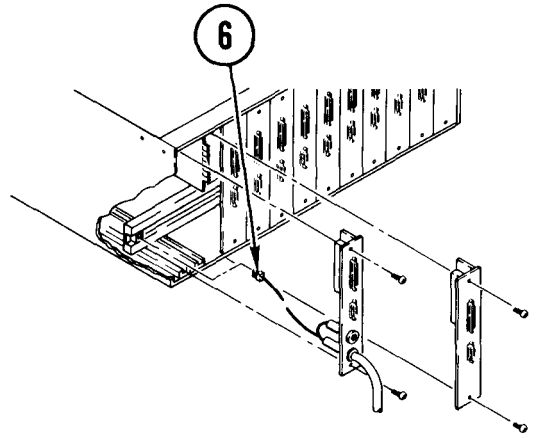
4-13. REMOVE/REPLACE CONVERTER LINE/TERMI NAL CONNECTOR PANEL (CONT)



5. Carefully pull connector panel out of rack mounting slots.

NOTE

For easy access in performing step 6, it may be necessary to remove the adjacent connector panel.

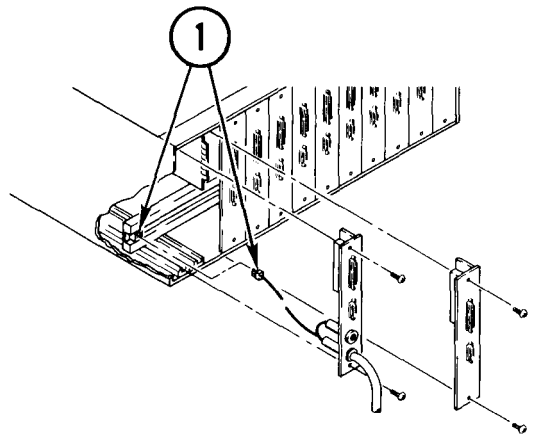


6. On fused power panel, disconnect three-prong power plug attached to connector strip.

Replace

NOTE

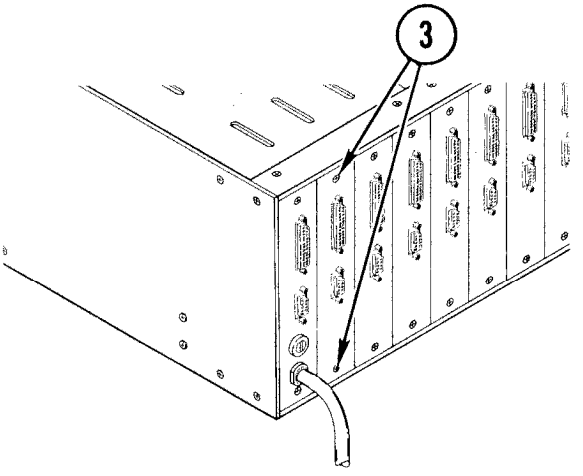
For fused power panel use steps 1 thru 5. For standard connector panel use steps 2 thru 5.



1. Connect three-prong plug to connector strip.

2. Carefully position connector panel in rack mounting slots.

4-13. REMOVE/REPLACE CONVERTER LINE/TERMINAL CONNECTOR PANEL (CONT)



3. Install and tighten two cross recessed mounting screws securing panel in position.

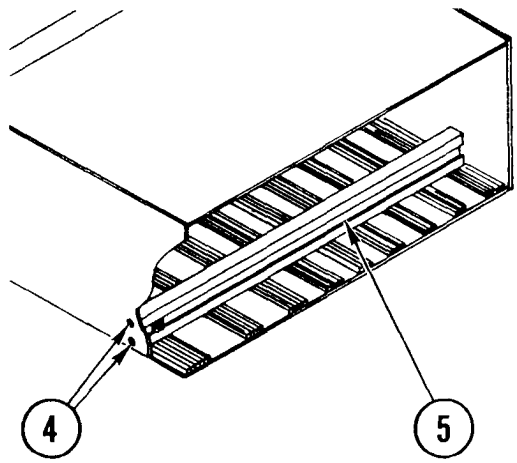
4. Replace any converter boards removed (para 4-12, Replace, steps 2-6).

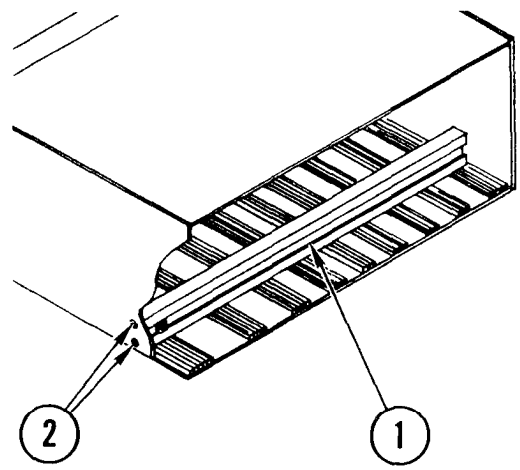
5. If removed from rack mount, replace converter in rack. (See your system manual.)

4-14. REMOVE/REPLACE MOUNTING RACK POWER CONNECTOR STRIP

INITIAL SETUP

Common Tool
- Tool kit





NOTE

The 600GR converter is a rack-mounted device. See your system manual for removal instructions.

Remove

1. Power off.
2. Remove all converter boards (para 4-12, Remove, steps 1 and 2).
3. Remove fused and adjacent line/terminal connector panels (para 4-13, Remove, steps 4-6).
4. Remove four cross-recessed mounting screws (two on each side panel).
5. Carefully remove connector strip from front of rack.

Replace

1. Replace connector strip in position in mounting rack. Make certain that power connector is at left side (facing rear of rack).
2. Install and tighten four mounting screws securing connector strip in position. (Two on each side panel.)
3. Replace fused and adjacent line/terminal connector panels (para 4-13, Replace, steps 1-3).
4. Replace all converter boards (para 4-12, Replace, steps 1-3 and 6).
5. If removed from rack mount, replace converter in rack. (See your system manual.)

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
Packaging Improvement Report	DD Form 6
Quality Deficiency Report	Form SF 368
Recommended Changes to Equipment Technical Manuals	DA Form 2028-2
Recommended Changes to Publications and Blank Forms	DA Form 2028
Maintenance Request	DA Form 2407

A-3. TECHNICAL MANUALS

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 Converter Unit CV-3787/MYQ-4A. 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 s 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 norma lly 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., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. Rebuild. 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 equired 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 111 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 letters.

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
28	CONVERTER UNIT	TEST	.0	.0	.1	.0	.0	0001 0002	
		REPLACE	.0	.0	.3	.0	.0	0001 0002	
		OVERHAUL	.0	.0	.0	.0	1.0		

Section III.

ITEM: CY-3848/MYQ-4A

TOOL AND TEST EQUIPMENT REQUIREMENTS
(D ARCOM-P 750-16

TOOL OR TEST EQUIPMENT REFERENCE CODE	MAINTENANCE CATEGORY	NOMENCLATURE	NATIONAL/NATO STOCK NUMBER	TOOL NUMBER
0001	F	MU LTIMETER, DIGITAL	6625-01-139-2512	AN/P SM-45
0002	F	TOOL KIT, EL E CTRONIC	5180-01-023-4982	JT K-17LMLD

SECTION IV MAINTENANCE ALLOCATION CHART
FOR CONVERTER UNIT CV-3787/MYQ-4A

Reference Code	Remarks
A.	Overhaul by Contractor

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 Converter Unit CV-3787/MYQ-4A.

C-2. GENERAL

This list identifies items that do not have to accompany Converter Unit CV-3787/MYQ-4A 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 LIST

(NOT APPLICABLE)

APPENDIX D

SCHEMATIC DIAGRAMS

Index of Diagrams

Appendix D provides cabling and schematic diagrams for use in installation and troubleshooting of the converter units.

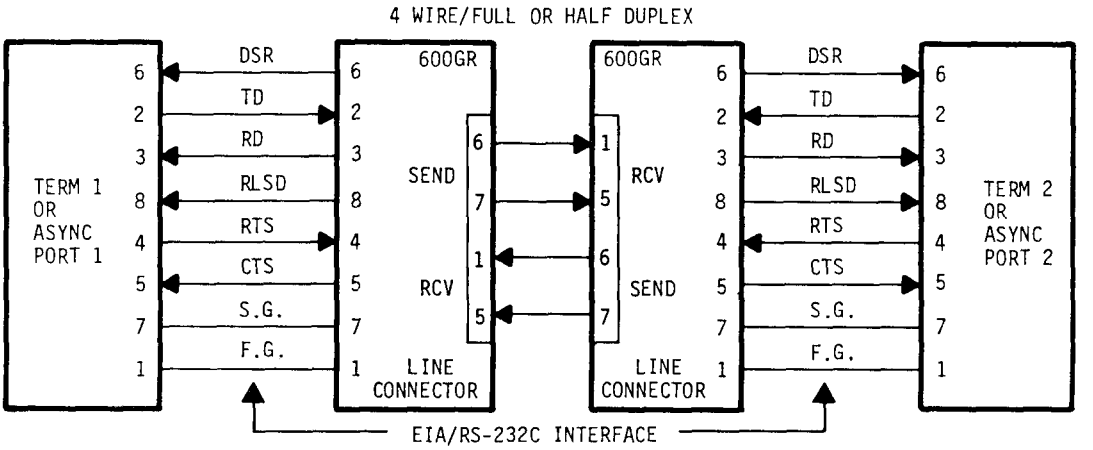


Figure D-1. DTE, DCE Interface

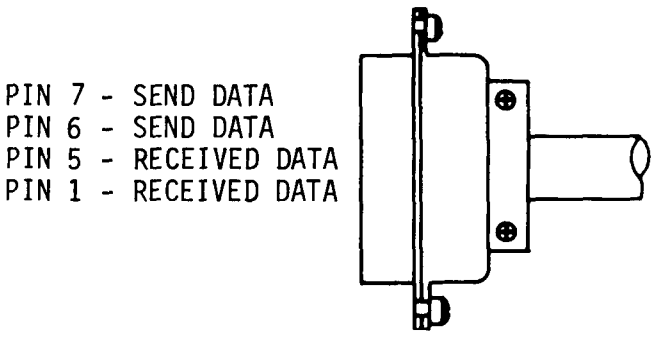


Figure D-2. Line Interface Cable

G L O S S A R Y

Baud	A unit of measure for rate of data transmission. One baud equals one bit per second.
Bit	A single occurrence of a symbol in a language employing two distinct kind of symbols.
Converter	A device which converts digital data to a dc level signal form so it can be transmitted. Also receives dc level signals and converts them to digital data so that data can be processed by a computer system.
Dip Switch	Miniature rocker type switch used to modify configuration of circuit boards.
Full Duplex	Duplex 4-wire transmission that permits simultaneous communication between two devices in both directions.
Half Duplex	A duplex operation which can operate in either direction, but not simultaneously.
Interface	A point or device at which a transition between media, power levels, modes of operation, etc., is made.
Mark	A mark is the opposite state of space.
RS-232C	An EIA standard for wiring interface to connect printers, terminals and modems to a computer system.
Software	Programs, routines, codes and other written information used to provide instructions to a computer.
Space	A space is the opposite state of mark.
Unloaded Lines	Metallic lines which have no inductance (loading coils) to reduce transmission loss. Loading is not used on open wire, since it tends to decrease transmission stability of this type of circuit.

I N D E X

INDEX (CONT)

INDEX (CONT)

INDEX (CONT)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
Commander
Stateside Army Depot
ATTN: AMSTA-US
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° IFF antenna lag rather than 1°. REASON: Experience has shown that with only a 1° 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° 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.
		FO3		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.

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER
SSG I. M. DeSpiritof 999-1776

SIGN HERE
I. M. DeSpiritof

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PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

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