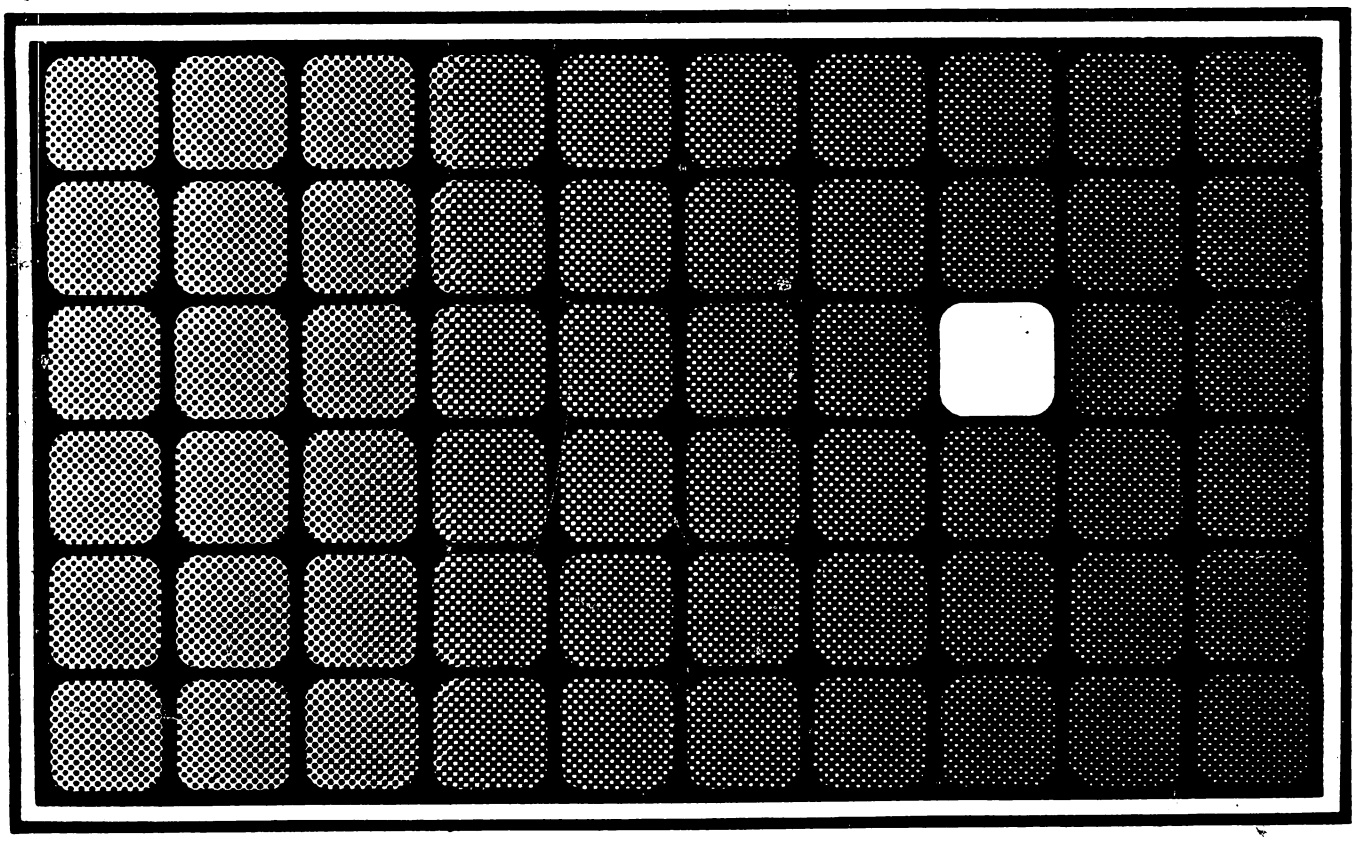
digital

REMOTE DIAGNOSIS



KBD01 OPTIONS TECHNICAL MANUAL

EK-KBD01-TM-001

KBD01

REMOTE DIAGNOSIS OPTION
TECHNICAL MANUAL

COMPANY CONFIDENTIAL

digital equipment corporation • maynard, massachusetts

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CONTENTS

TABLES

CHAPTER 1
INTRODUCTION

1.1 GENERAL

The KBDØ1 is a standalone option which adds remote diagnosis capability to a PDP-11/44 system. This option can control the operation of a PDP-11/44 system by means of an ASCII serial communication line connected to the Console Interface Module (CIM) in the PDP-11/44 CPU. The KBDØ1 also controls a modem which is connected to the switched lines telecommunications network. The option is a link between the DDC/RDC host computer and the PDP-11/44; it gives the remote operator the same console terminal capabilities that are available at the local console terminal.

As with all DIGITAL remote diagnosis options, the KBDØ1 includes a manually operated keyswitch and indicator lights which give site personnel direct control over access to the PDP-11/44 system. Communications between the DDC/RDC host computer and the KBDØ1 include message protocols which also control access to the system. These features of DIGITAL remote diagnosis provide customers with a high level of system and data security. Figure 1-1 illustrates a typical KBDØ1 installation. The KBDØ1 and the modem standalone units are usually placed together on a table or desk surface near the CPU or console terminal.

1.2 SCOPE

This manual provides information for DIGITAL Field Service personnel who install, test, and maintain KBDØ1 remote diagnosis equipment. The material presented is in agreement with the option maintenance philosophy which is microcode-aided module replacement. It provides the information needed to service the option at that level.

Chapter 1 is an introduction to the KBDØ1 and includes a listing of supporting and related documentation. KBDØ1 specifications and references to modem specifications are also provided.

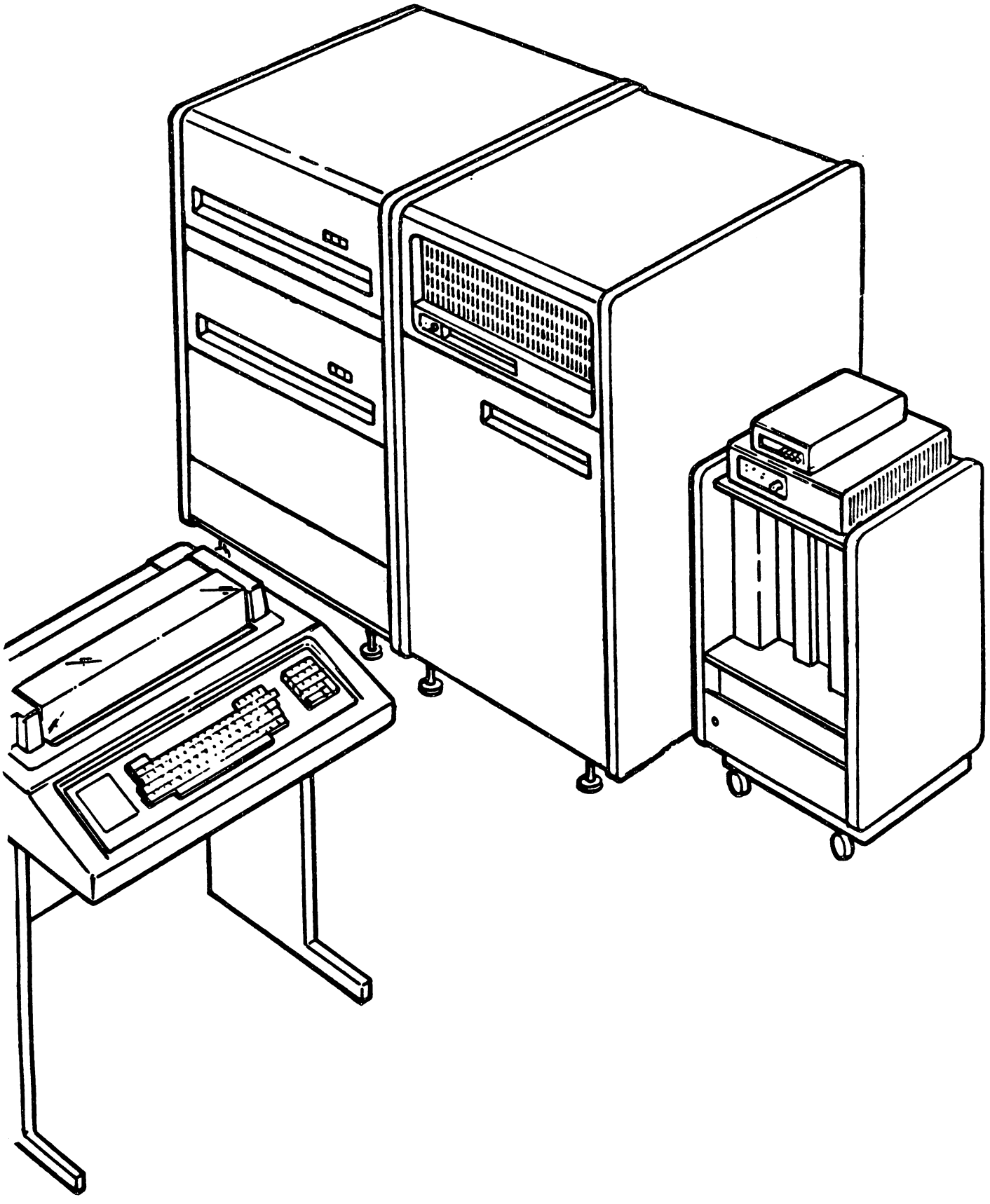


FIGURE 1-1 A Typical KBD01 Installation

Chapter 2 provides a general description of the KBDØ1, its CPU, Memory, and I/O modules and its target system and modem interfaces. Note that modem operation is covered in more detail in Appendix A.

Chapter 3 identifies the KBDØ1 controls and indicators. It describes typical KBDØ1 operation and operator responsibility when remote diagnosis is used to solve a system malfunction. This chapter is primarily for use in customer instruction following option installation.

Chapter 4 includes information that may be useful in site preparation. It provides step-by-step instructions for installation and testing of the option.

Chapter 5 describes maintenance and troubleshooting procedures for the KBDØ1 option.

Appendix A is a compilation of modem information which is specifically relative to remote diagnosis. Included also are excerpts of government regulations that users of remote diagnosis equipment in the U.S.A. should be familiar with.

Appendix B includes a reproduction of the KBDØ1 User Guide which is available on-site for customer use. That document is reproduced in this manual so that, if it is not available otherwise, a photocopy may be made for that purpose.

1.3 RELATED DOCUMENTATION

The user of this manual will find remote diagnosis related information in the following documents:

- KBDØ1 Field Maintenance Print Sets

  KBDØ1-ØØ MP-Ø1Ø64

KBDØ1-AA MP-Ø1224
KBDØ1-BA MP-Ø1226

- DFØ2 Modem User Guide
  EK-ØDFØ2-UG
  Provides information about the DIGITAL-manufactured DFØ2 standalone modem.

- Terminals and Communications Handbook
  EB18251-2Ø/8Ø
  Includes basic concepts of data communications.

- Each KBDØ1 kit that includes a vendor manufactured modem also includes a vendor-published manual that describes modem installation and operation.

1.4 KBDØ1 SPECIFICATIONS

The following specifications and particulars are for informational purposes only and are subject to change without notice.

Physical Characteristics

The KBDØ1 enclosure is a modified BA11V mounting box. The H7833 power supply (+5 Vdc and +12 Vdc outputs only) is used to supply dc voltage. The KBDØ1 contains three dual height modules that plug into a horizontally oriented backplane:

- M7366 CPU Module
- M7365 I/O Module
- M7364 Memory Module

There is also a printed circuit board on which the LED indicator lights are mounted.

The KBDØ1-AA kits for installation in the United States include a modem for direct connection to the switched lines telecommunications network. Modems installed outside the United

States must be provided by the local telecommunications authority.

The KDBØ1 is mounted in a standalone enclosure 11.7 inches deep by 13.38 inches wide by 3.62 inches high (29.71 cm X 33.98 cm X 9.19 cm). (Standalone here means not to be mounted in a chassis or rack.) The base of the unit is equipped with rubber feet which allow it to be placed on a table or desk top.

The KBDØ1 is supplied with a standard BCØ5D-Ø6 EIA modem cable. Any standard BCØ5D cable may be used to extend the separation of the two units to 25 feet (7.8 m) maximum.

A detachable ac power cord is provided for 115 Vac operation in the United States. It is 6 feet, 3 inches (1.9 m) in length and plugs into a NEMA 5-15P or equivalent receptacle.

Electrical Characteristics

Voltage Ranges

Switch Selectable	90--128 Vrms 180--256 Vrms
Maximum AC Input Power	115 Vac, 50/60 Hz @ 3 A 230 Vac, 50 Hz @ 1.6 A

54-13343 Power Supply

Fuse Rating	3A, 250 V
Maximum DC Power Available	+5 Vdc @ 5.6 A +12 Vdc @ 1.6 A +24 Vdc @ 2 A (Not Used) -5 Vdc @ 270 mA (Not Used)

M7366

CPU Control Module Power Requirements	+5 Vdc @ 0.84 A (Typical) +12 Vdc @ 0.04 A (Typical) -12 Vdc @ 0.04 A (Typical) (from DC/DC Converter)

M7364

Memory Module Power Requirements	+5 Vdc @ 1.32 A (Typical)

M7365

I/O Logic Module Power Requirements	+5 Vdc @ 0.75 A (Typical) +12 Vdc @ 0.18 A (Typical) -12 Vdc @ 0.04 A (Typical) (from DC/DC Converter)

LED front panel indicator lights draw negligible current.

Environmental Characteristics

The KBØ1 meets the requirements of DIGITAL Standard 1Ø2, for a Class C device.

1.5 MODEM SPECIFICATIONS

All DIGITAL-supplied, vendor-manufactured modems in the KBDØ1-AA kit are accompanied by vendor-published manuals. Those manuals are an appropriate source of specification details for those modems; they are identified by Digital part number 3Ø-15949. Specifications for vendor-supplied modems are also available in Digital Purchase Specification, A-PS-3Ø15949-Ø-Ø.

The DIGITAL manufactured modem, model DFØ2, is also accompanied by a manual, EK-ØDFØ2-UG, DFØ2 User Guide, which provides specification details.

CHAPTER 2
GENERAL DESCRIPTION

2.1 OVERVIEW

The KBDØ1 option, installed on a PDP-11/44 system, gives the DDC/RDC remote diagnosis access to the system. A PDP-11/44 is controlled from an ASCII serial terminal such as an LA12Ø DECwriter III, VT1ØØ, or similar terminal device. The console terminal provides all functions necessary to operate the system except for the main power and panel lock functions. These latter functions remain under the control of manually operated switches in order to give the responsible on-site operator the ability to control access to the system.

From the console terminal,the operator can perform normal system start-up and power-fail recovery, control instruction execution (i.e., halt, continue, restart the CPU), system initialization, memory data manipulation, etc. In addition, Field Service personnel can start and control diagnostic programs and perform some other troubleshooting tasks (Figure 2-1 is a block diagram of the KBDØ1 option).

In order to provide this same level of control at the DDC/RDC remote terminal, the target system provides a parallel connector with equivalent functionality. This connector is J3 on the M7Ø9Ø Console Interface Module shown in Figure 2-2. It is through this connector that the KBDØ1 gains access to the target system. This connector also provides the capability by which the option may assert remote control over the target system. That is, sufficient functionality is present to permit the KBDØ1 to intercept the serial data between the target system and the local console terminal. The KBDØ1 switches the serial data paths to either pass through the KBDØ1 for processing, or to pass directly and transparently to their intended destinations.

The KBDØ1 may have power left on or it may be turned off when not

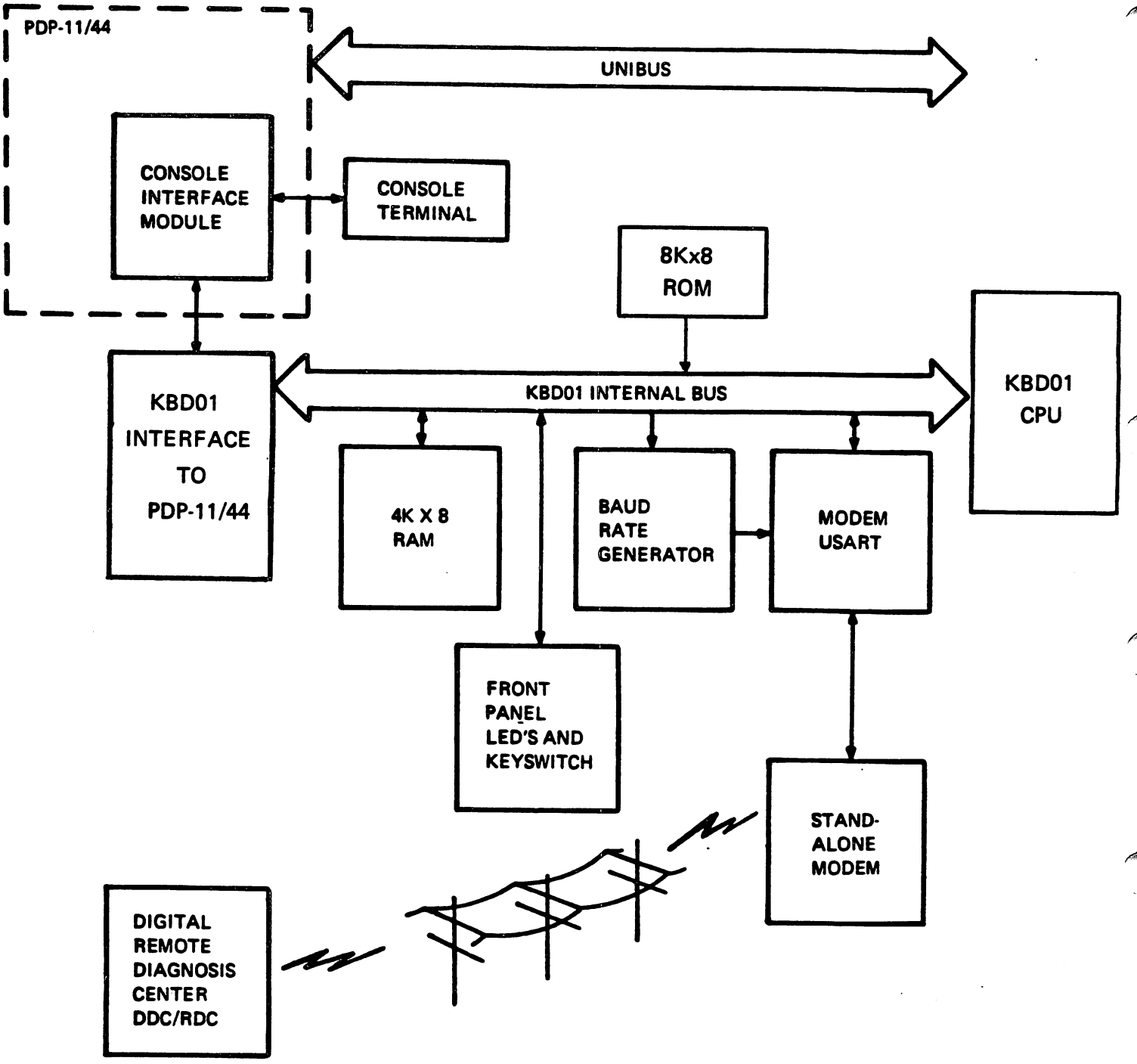


FIGURE 2-1 KBD01 Block Diagram

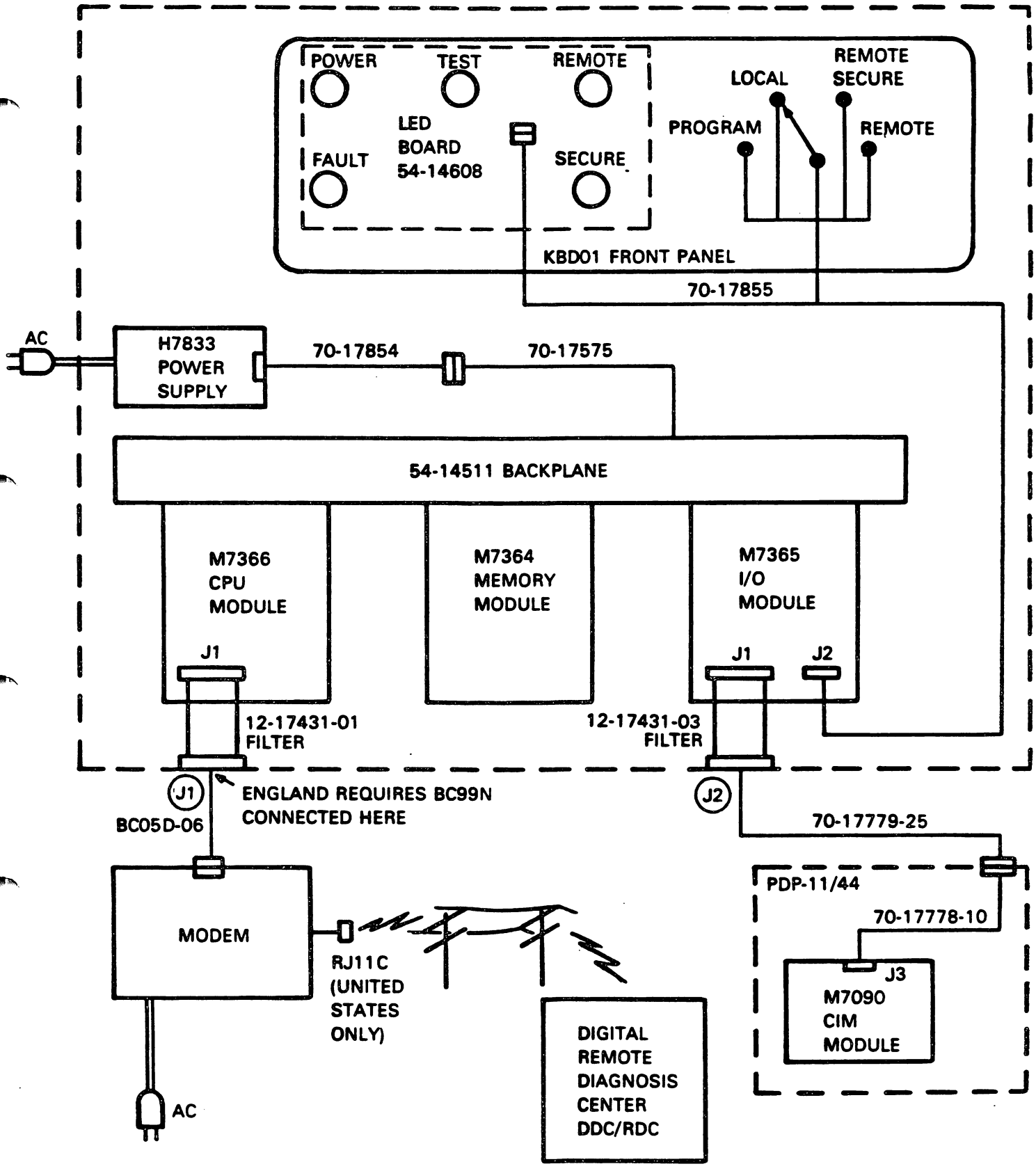


FIGURE 2-2 KBD01 Overview

being used for remote diagnosis. If the KBDØ1 power is turned off, the PDP-11/44 will operate logically as though the KBDØ1 is disconnected from it. The KBDØ1 can logically access the PDP-11/44 only when its keyswitch is in REMOTE or REMOTE SECURE and ac power is turned on.

2.2 MAINTENANCE

There is no requirement for preventive maintenance for the KBDØ1 beyond the running of its ROM-resident self-test diagnostic programs. These are performed automatically at power-up, by keyswitch selection (PROGRAM), or when corrective maintenance is to be performed. These self-tests are described in detail in Paragraph 5.2. Corrective maintenance is simplified by these diagnostic tests which identify the probable failing component when a failure is detected. These tests involve KBDØ1 logic only and can be run with the unit either connected to the PDP-11/44 or not.

2.3 LOGIC COMPONENTS

In addition to the microprocessor, there are a number of other logic elements in the KBDØ1. These are:

a. Read Only Memory (ROM)
   This non-volatile memory contains the permanent operating program and self-test diagnostics for the KBDØ1

b. Random Access Memory (RAM)
   This is used by the ROM-resident program as scratchpad, data buffer, dynamic status, etc.

c. Serial I/O devices
   These devices, 8251A USARTs, accomplish the serial-to-parallel and parallel-to-serial data conversion necessary to communicate with the target system, the console terminal, and the remote telephone interface.

d. Line drivers/receivers

These level-shifting devices translate between TTL level logic signals internal to the KBDØ1 and EIA level signals that are used to communicate with the PDP-11/44. EIA standard RS-449 is observed for these signals. This interface standard provides for compatibility with standards RS-232C, RS-422 and RS-423. Standard RS-422 specifies balanced differential voltage circuits, and is not compatible with RS-232C, which does not specify differential circuits. Standard RS-423 specifies unbalanced differential circuits, and is compatible with both RS-422 and RS-232C. Line receivers for RS-423 are also compatible with line drivers for RS-422 and RS-232C.

e. Parallel I/O devices

These microprocessor support devices are buffered, bidirectional, tristate latches that allow the microprocessor to communicate with the various steady-state control and status signals that are necessary to properly operate the interface with the PDP-11/44. These types of signals are present in the interfaces to the target system, the remote port, and the front panel.

f. Baud rate generators

These programmable devices appear on the microprocessor bus, and are used to control selectable baud rates for the various serial data paths. The telephone interface will most probably be operated at 3ØØ baud, but the capability for higher baud rates has been incorporated for possible future use. The baud rate generators provide DIP switch-selectable baud rates from 5Ø to 19,2ØØ baud.

2.4 HARDWARE CONFIGURATION

The sub-assemblies of the KBDØ1 are shown in Figures 2-3, 2-4,

2-5, and 2-6. Those components which are field replaceable are shown in Figure 5-3.

2.5 STANDALONE MODEM

The KBDØ1 option includes a standalone modem. It may be supplied by DIGITAL or by the customer, depending upon local regulations. Operating characteristics of external modems must comply with DIGITAL Purchase Specification A-PS-3Ø15949-Ø-Ø for vendor-supplied standalone modems. The logic voltages at this interface must be EIA levels. Additional information relative to modems, including a description of operating characteristics, is provided in Appendix A.

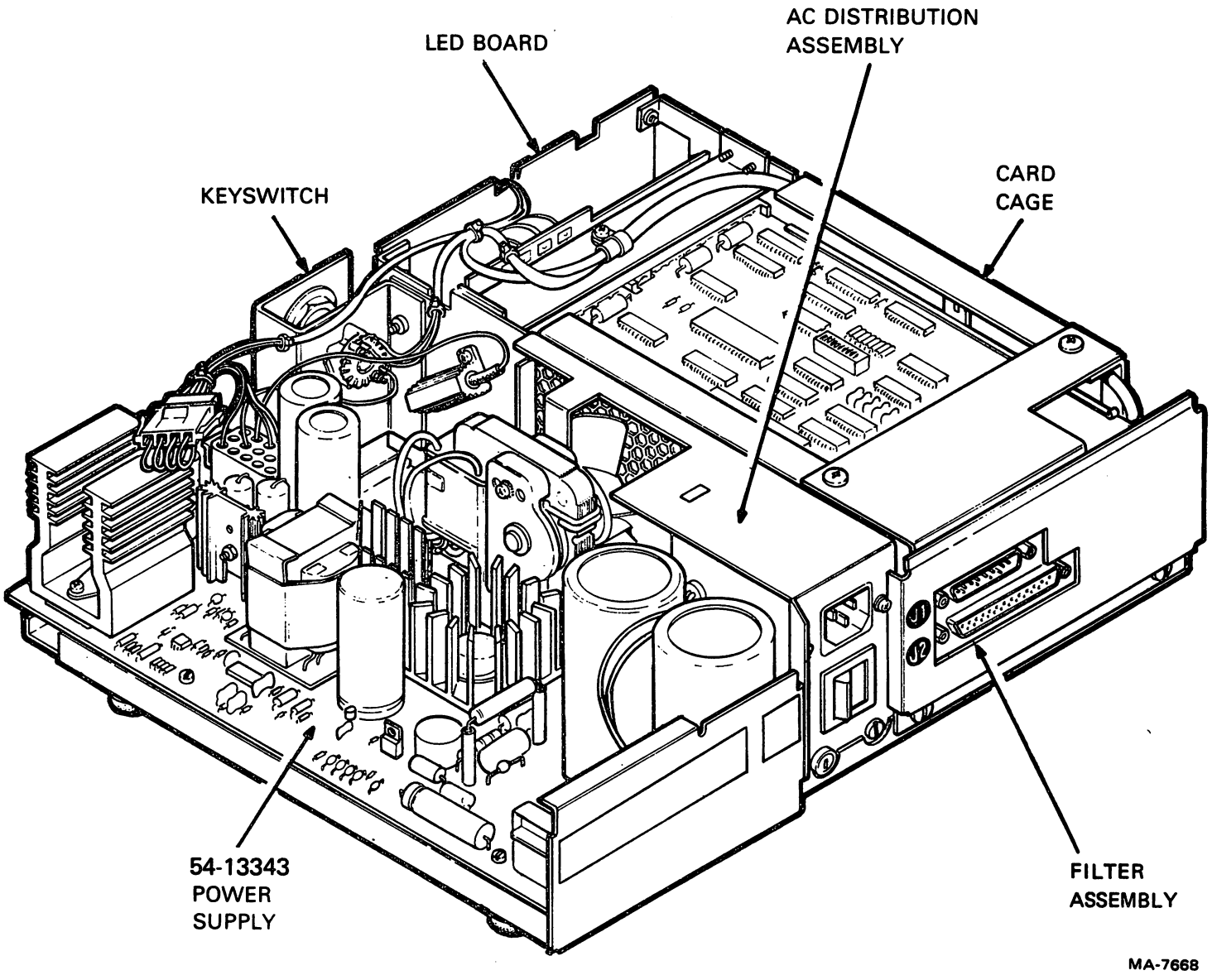
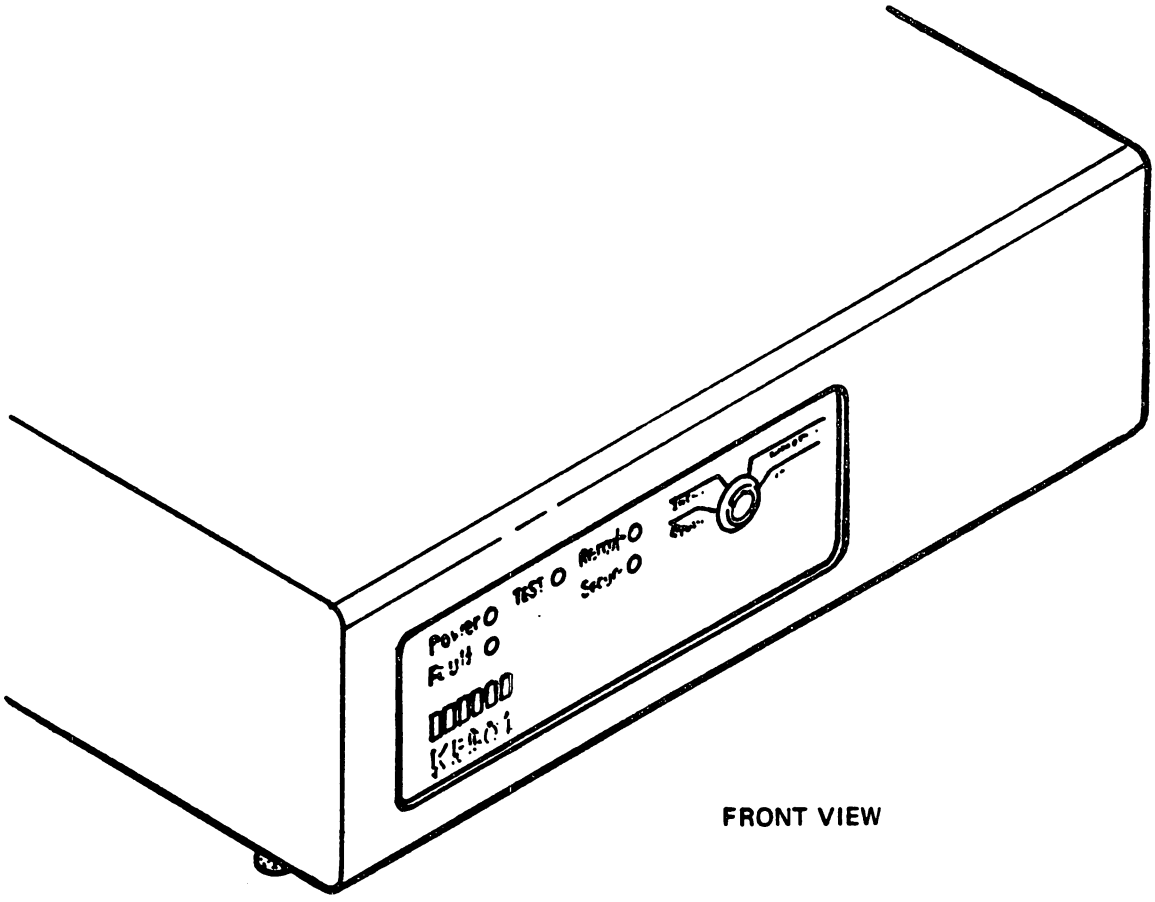


FIGURE 2-3 KBD01 With Cover Removed



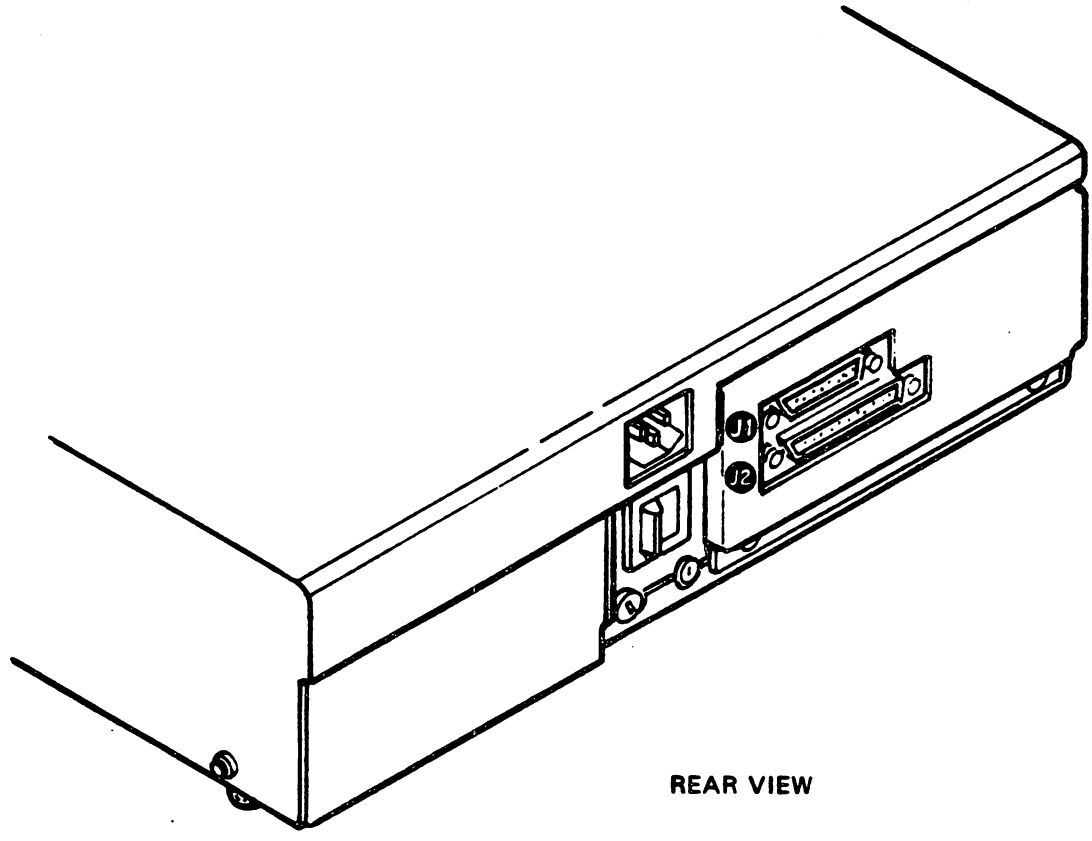


FIGURE 2-4 KBD01 Front and Rear Views

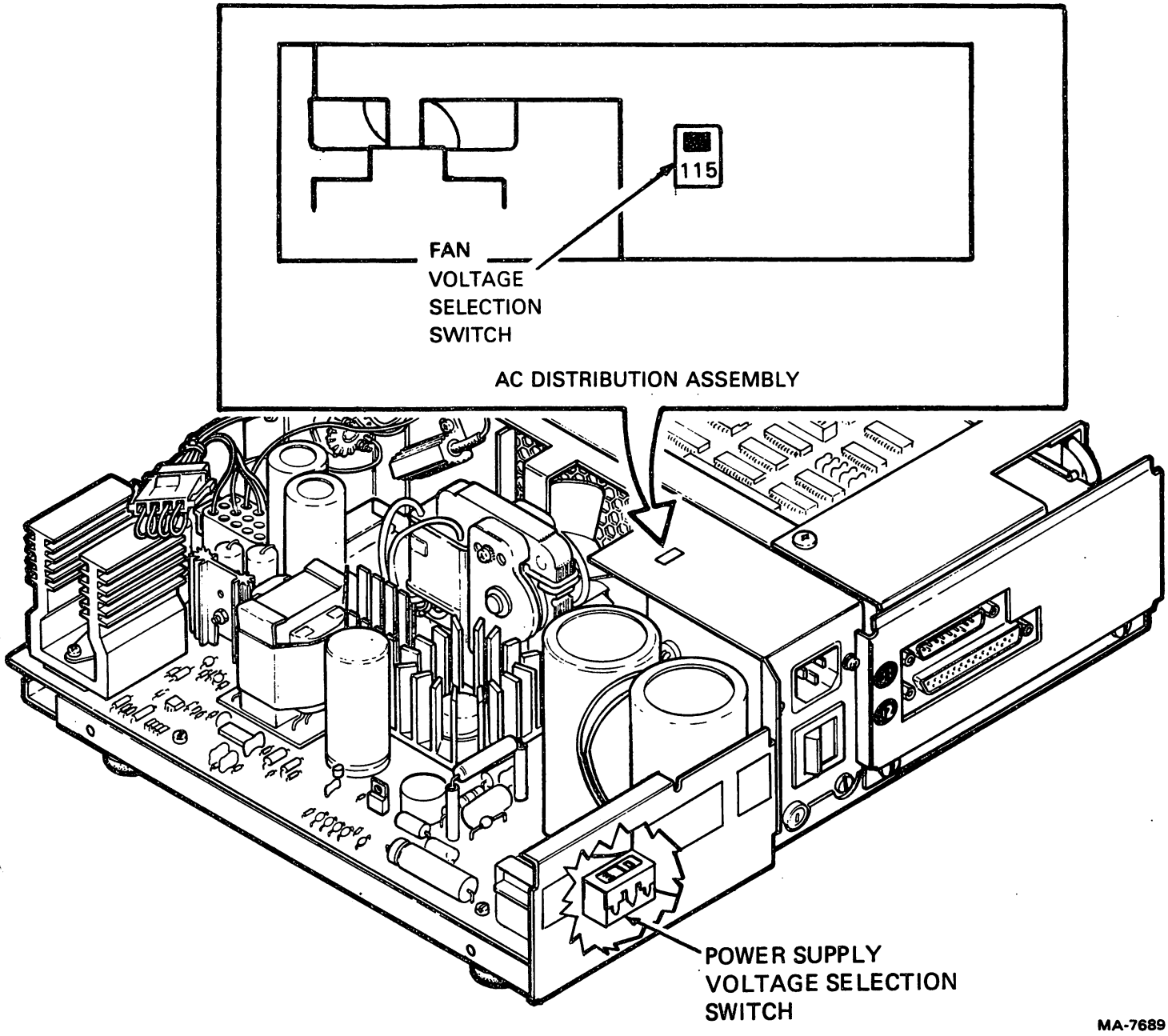


FIGURE 2-5 70-17800 AC Distribution Assembly

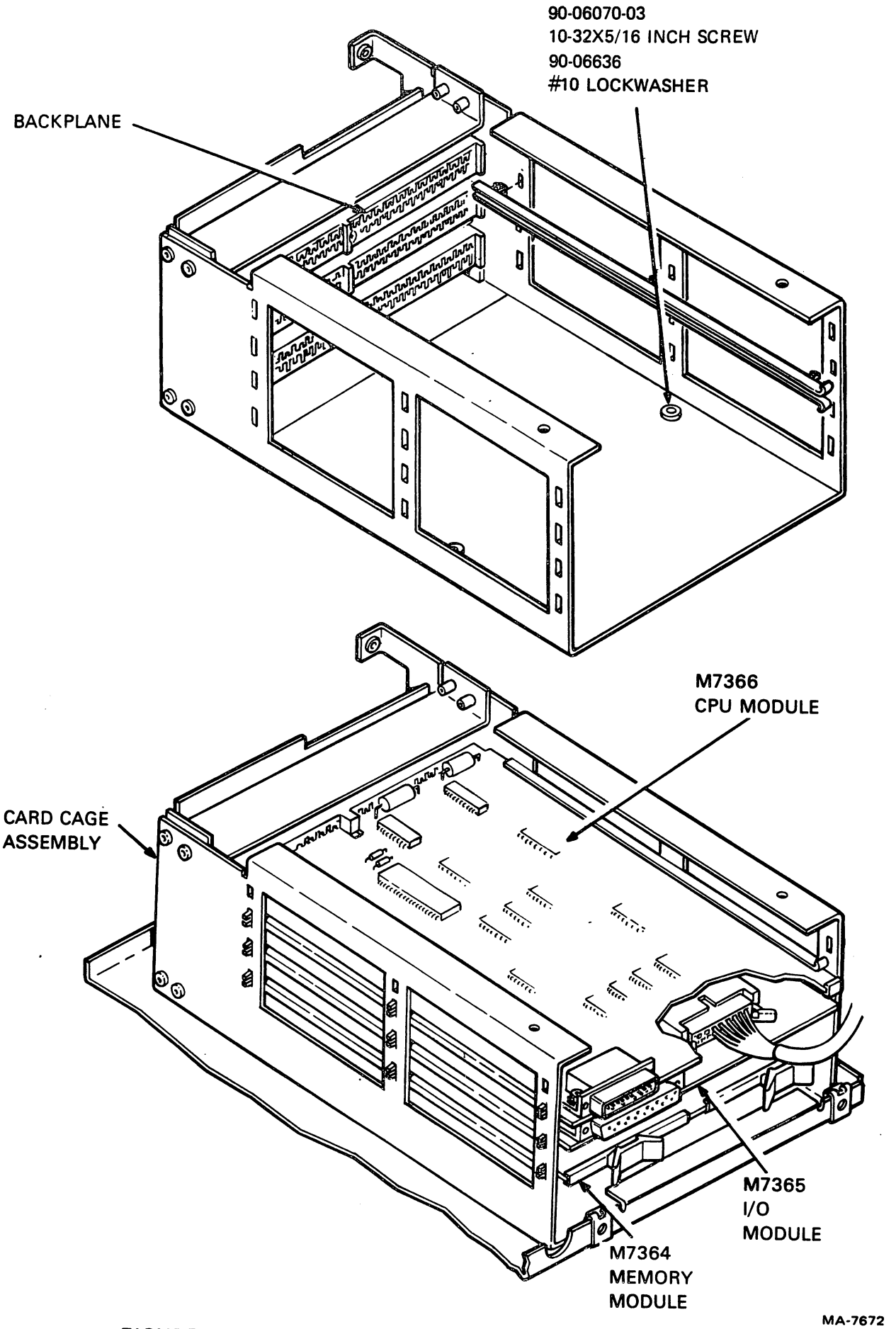


FIGURE 2-6 Backplane and Card Cage Assembly

CHAPTER 3
OPERATION

3.1 INTRODUCTION

Normal PDP-11/44 system operation is unaffected by addition of the KBDØ1 remote diagnosis option. Operating procedures performed by the user are also unaffected when the system is operating normally. Since remote access to the system is enabled only when the KBDO1 keyswitch is in either the REMOTE or REMOTE SECURE position, the user must understand the use of the KBDØ1 keyswitch and recognize both the normal and abnormal states of the indicator lights. Figure 3-1 shows the KBDØ1 front panel. The availability of remote diagnosis also requires that the user be prepared to work with the DDC/RDC in the event of a system malfunction. A user who is familiar with the remote diagnosis procedures can contribute to prompt and effective restoration of the system to normal operation. This chapter provides sufficient information about those procedures to permit user instruction by the DIGITAL Field Service Engineer following KBDØ1 installation. The "User Guide," Figure B-1, should be made available to the user for reference purposes during, and following, that instruction.

3.2 KBDØ1 CONTROLS AND INDICATORS

All switches and indicators involved in user operation of the KBDØ1 are accessible externally. (The internal baud rate switches are set during installation so the KBDØ1 operates at the same rate as the PDP-11/44 and its console terminal.)

NOTE

The KBDØ1 must be set for 115 or 230 Vac operation. Two switches located inside the enclosure must be set to the correct voltage range when the option is installed. Internal baud rate switches must also be set during installation. Those procedures are provided in

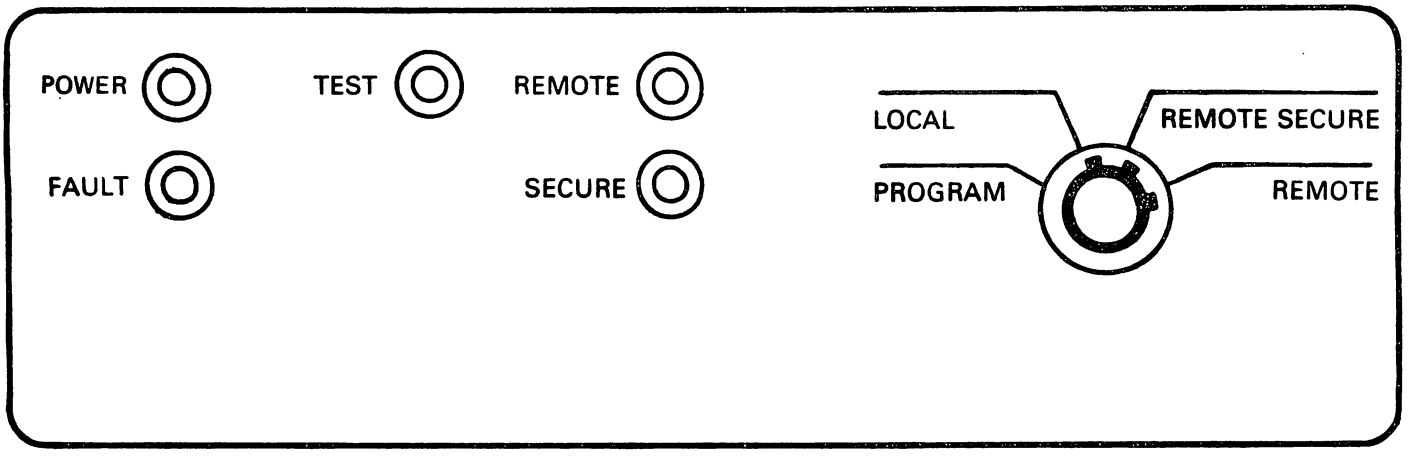


FIGURE 3-1 KBD01 Front Panel

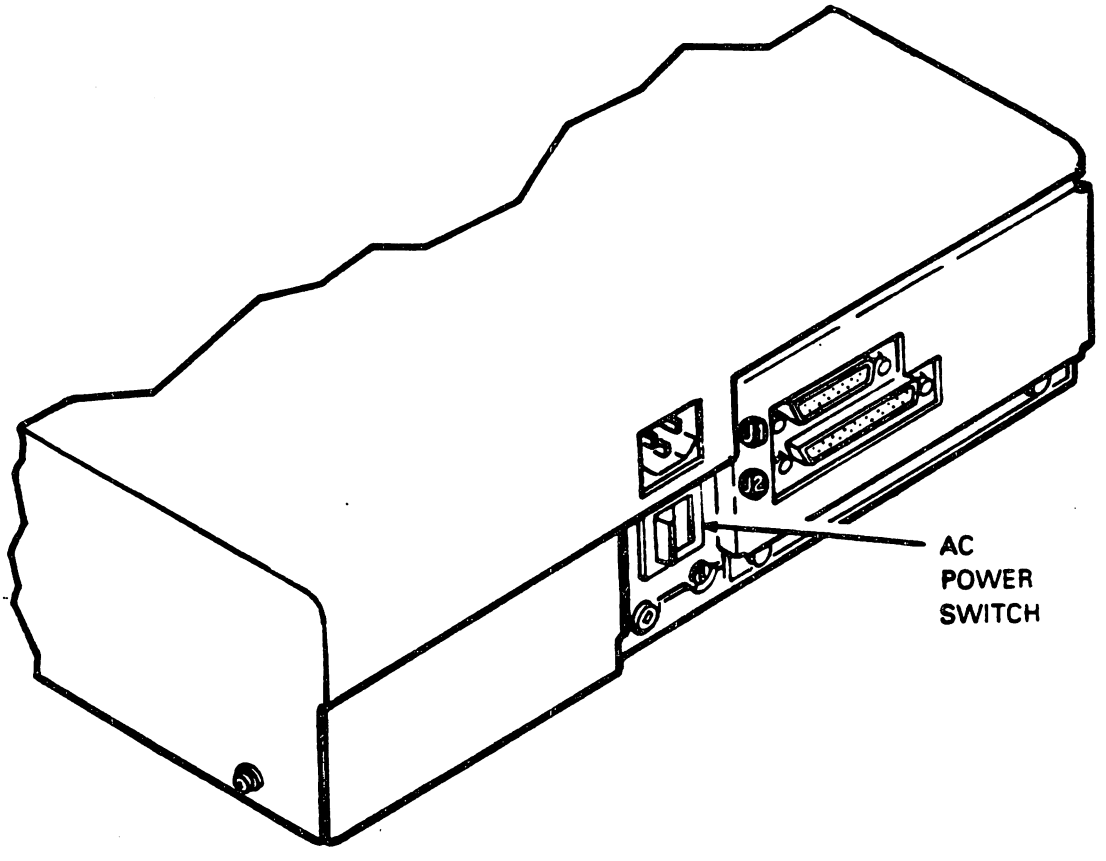


FIGURE 3-2 KBD01 Power Switch Location

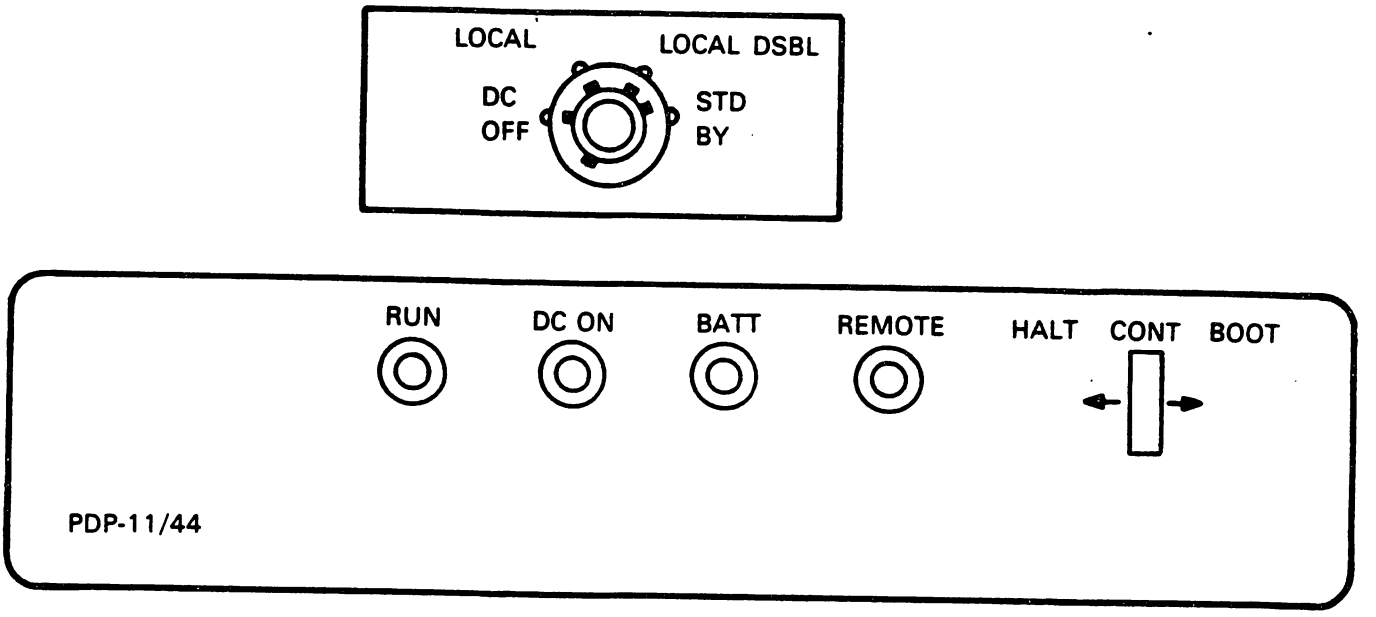


FIGURE 3-3 PDP-11/44 Keyswitch and Indicators

Paragraph 4.4, Step 3.

3.2.1 AC Power Switch

A single switch labeled "POWER" on the back of the KBDØ1 enclosure controls power to the option (Figure 3.2). In the OFF (Ø) position, all power is removed from the option. It will appear to be logically disconnected from the PDP-11/44 to which it is attached. In the ON (1) position, the integral KBDØ1 power supply provides the needed voltage levels. This condition is shown by the indicator light on the KBDØ1 front panel.

If the KBDØ1 is operating properly, the indicator lights show the operational status of the unit whenever power is on.

3.2.2 Keyswitch

The KBDØ1 keyswitch controls all possible modes of KBDØ1 operations when power is on. The switch functions are as follows:

- LOCAL

  If KBDØ1 power is left on, the keyswitch should be left in the LOCAL position which is off-line. The KBDØ1 performs no operation in this mode.

- REMOTE

  Setting the keyswitch to REMOTE enables the DDC/RDC host computer or Response Specialist to take control of the PDP-11/44 system remotely. This setting is used when the DDC/RDC is given control of the system for diagnostic testing. The red REMOTE indicator lights on both the KBDØ1 and PDP-11/44 are on when the KBDØ1 keyswitch is in REMOTE (The PDP-11/44 console panel is shown in Figure 3-3). The system console terminal will print the message (RD) REMOTE PORT ENABLED. The KBDØ1 REMOTE indicator light will be blinking to warn the operator that remote access is enabled. When the telephone connection is completed from the DDC/RDC, the REMOTE indicator light

will stop blinking; it will be on.

- REMOTE SECURE

  Setting the keyswitch to REMOTE SECURE gives the DDC/RDC remote access to the "panel-locked" system only as a logged in account. This mode is used when the failure diagnosis requires access to the operating system, usually because MAINDEC's (DIGITAL diagnostic programs) have not detected the fault. When this mode is selected, both the red REMOTE and the orange SECURE indicator lights are on (the REMOTE indicator will stop blinking, it will stay ON, when the DDC/RDC connection is completed).

- PROGRAM

  Setting the keyswitch to PROGRAM invokes a ROM-resident self-test program which runs continously in a loop. It takes control of the system console terminal to display test status and failure events. This mode is explained in detail in Paragraph 5.2.2.

3.2.3 Indicator Lights

As mentioned previously, the on/off state of the POWER indicator light is controlled by the presence of correct dc voltages. The REMOTE and SECURE indicator lights show the logic state in effect as a result of keyswitch position. The other two indicator lights are:

- FAULT

  The red fault indicator light is on whenever the KBDØ1 detects an internal failure. This can occur during a self-test, in LOCAL or any other operating mode, and during any remote operation. The scope of this failure indication is limited to the KBDØ1 itself; the PDP-11/44 will not be affected. In normal operation, the FAULT indicator light is turned on for about ten seconds during

the running of the power-up self-test, then is turned off if the test is successful.

- TEST
  The green test indicator light is turned on during remote diagnosis only by the DDC/RDC when it has established a logical connection to the KBDØ1 and PDP-11/44. The DDC/RDC may start diagnostics running, "hang-up" (leaving the test indicator light on), and call back later and establish the logical connection again to evaluate test results. The DDC/RDC will turn off the TEST indicator light when they finish the testing procedures.

When the KBDØ1 is operated in extensive self-test mode, the indicator lights are assigned a different set of meanings and are used in failure reporting patterns.

3.3 A TYPICAL REMOTE DIAGNOSIS SESSION

A typical remote diagnosis session consists of some or all of the following procedures. If the reported failure can be isolated to a particular device, the session may be limited to those steps required to test that device.

1. When a hardware failure occurs, call the DDC/RDC.

2. You may want to read the general instructions provided by the KBDØ1 User Guide, part number EK-KBDØ1-UG. It is a kit item which is left on site when the hardware is installed. It will be found as a standalone document and will also be filed in the Site Management Guide behind a tab titled "XI. Remote Diagnostic Console (RDC)."

3. Wait for the DDC/RDC to tell you how to prepare the system for testing. Important failure data may be lost unless their instructions are followed.

You MAY be asked to perform the following steps:

4. Remove any media containing sensitive data from the system or ensure that they are otherwise protected.

5. Mount the diagnostic volume on the load device. Also, mount CPU Diagnostic Tape #1 and #2 on the TU58.

6. Mount scratch media on units to be tested; they must be on-line, write enabled.

7. Set the PDP-11/44 HALT-CONT-BOOT switch to CONT (Figure 3-3).

8. Set the PDP-11/44 keyswitch to LOCAL.

9. The KBDØ1 may, or may not, have power on all the time. Regardless, it should be tested whenever a remote diagnosis session is to be run. At this time the KBDØ1 is tested as follows:

   a. Set the KBDØ1 keyswitch to LOCAL.

   b. Turn the power switch (located on the back of the KBDØ1) to OFF, then to ON, Figure 3-2 shows the power switch location. The FAULT indicator light will come on, and remain on for ten seconds while the power-up self-test runs. The FAULT indicator light will then go off if no failure is detected.

1Ø. Set the KBDØ1 keyswitch to REMOTE. The REMOTE indicator light will come on, blinking. The system console terminal will print the message (RD) REMOTE PORT ENABLED.

11. Watch the KBDØ1 indicator lights; the REMOTE light will stop blinking (it will be on) when the host computer

telephone connection to the KBDØ1 is completed. When protocol messages have been exchanged and a logical connection established, the TEST indicator light will come on.

12. The DDC/RDC takes control of the target PDP-11/44. The remote operator can boot the system, can invoke Console I/O or Program I/O modes, and enter the TALK state to print messages on the console terminal *and solicit* response from the on-site operator.

13. PDP-11/44 diagnostics are run, controlled by the DDC/RDC.

14. As testing is in progress, there may be activity in modem indicator lights TXD and RXD if the modem is so equipped.

In certain test situations the DDC/RDC may initiate a test, then "hang-up" as the test continues unattended. The green TEST indicator light will remain on; the system console terminal will print the message (RD) CARRIER LOST to indicate the disconnection then the message (RD) REMOTE PORT ENABLED to indicate that DDC/RDC access is enabled. The REMOTE indicator will be blinking, showing that there is no telephone connection. A call is re-initiated later to read the test results and continue the session. During the period of unattended testing there will be no modem activity. DDC/RDC access to be system should not be interrupted until there are specific instructions from the DDC/RDC to do so. An interrupt would occur, for example, if the keyswitch were turned away from REMOTE or REMOTE SECURE while testing is in progress.

15. The DDC/RDC reports test results and/or failure analysis to the on-site operator or the local Digital Field Service office. Control of the system is returned to the operator.

16. Following repair by local Field Service personnel, the

DDC/RDC may be requested to run verification tests on the system.

17. Following verification, system control is returned to the local operator.

3.4 INTERMITTENT FAILURE

Although the procedure described in Paragraph 3.3 usually resolves intermittent hardware failure, they may not be exercised or detected by diagnostics. System software may aggravate marginal hardware components or may itself produce ambiguous error symptoms. There is often great difficulty in re-creating those symptoms which, in turn, makes analysis more complex.

Upon completion of diagnostic testing, it may be determined that the reported system fault is intermittent and/or operating system related. Software specialists are available for DDC/RDC support either at the DDC/RDC or at other DIGITAL facilities. Depending upon the system software, and the expertise available to the DDC/RDC, a team effort may be applied in an attempt to duplicate and analyze the failure symptoms. Any procedure to isolate system failures using the operating system is attempted only with the customers' authorization.

If a procedure of that type is agreed upon, the DDC/RDC will typically instruct the user to perform the following steps:

1. Turn the KBDØ1 keyswitch to LOCAL. (The REMOTE indicator will go off.)

2. Remove scratch media and mount operating system software media.

3. Boot the system.

4. Turn the keyswitch to REMOTE SECURE. (The REMOTE and

SECURE indicators will light.)

5. Notify the DDC/RDC that the system is ready for testing.

6. Supply the DDC/RDC with a system account number and password.

7. The DDC/RDC logs into the system. The terminal dialog is echoed at the local system terminal, however, the keyboard is disabled to prevent operator intervention.

8. When testing is completed by the DDC/RDC, they log off of the system and notify the local operator to take control of the system by turning the keyswitch to LOCAL.

9. The DDC/RDC contacts the local DIGITAL office to advise them of the results of their testing and the repair required.

10. Local branch office personnel determine the repair procedure that will best serve the customer's needs and then contact the customer to schedule the service.

3.5 EXTENDED MONITORING

If test results indicate an intermittent failure condition, the DDC/RDC, in agreement with the local branch office and the customer, can schedule extended testing and monitoring of system operation. This procedure can include off-hours diagnostic runs and other testing designed to isolate such faults.

CHAPTER 4
INSTALLATION

4.1 INTRODUCTION

This chapter provides information needed by Field Service personnel for the following activities related to installation.

Preparing the site
Ordering the dedicated telephone line (by the customer)
Installing the option hardware
Connecting and testing the modem
Monitoring the initial DDC/RDC test of the system
Making user information available

The KBDØ1 option is installed only within the terms and conditions of a maintenance contract; it will always belong to Digital Equipment Corporation; it is not for sale. If the contract is terminated, the KBDØ1 will be removed.

The modem information provided in this chapter is limited to specific details needed for site preparation and KBDØ1 installation. Appendix A includes general modem information. That appendix will be especially useful in areas other than the United States for the connection of the KBDØ1 to modems that are provided by local telecommunications authorities.

4.2 SITE PREPARATION REQUIREMENTS

Because the KBDØ1 is an add-on standalone option for the PDP-11/44 system, only those prerequisites for installation of the option itself are defined in this manual. These preparation steps are important to successful installation and should be started as soon as possible after it is known that the option will be installed.

4.2.1 System Configuration Requirements

Before installation, significant technical details about the customer system must be sent to the DDC/RDC. These include such

items as ECO and FCO status, option configuration, power supplies and controllers, cables, baud rates, and the presence of non-Digital equipment connected to the system. The System Configuration Charts, document number EK-SMGDE-SC, which are part of the Site Management Guide, are an easy to find source of these details. They are to be photocopied and sent to the DDC/RDC.

When the system configuration package is received at the DDC/RDC, engineering personnel check it for technical details and missing information; all details needed by the host computer must be present. When the package is approved, the host computer data base is updated, making remote diagnosis possible for that system.

4.2.2 Option Location

It is recommended that locations for the KBDØ1 and modem units, telephone company equipment, and the connecting cables be determined before installation. Telling telephone company personnel where their equipment is to be installed can prevent their installing it in a bad location.

Additional floor space will usually be required for KBDØ1 installation. System appearance will be enhanced by a carefully planned installation.

The most serious hardware installation limitations usually are these:

a. Access

   Both the KBDØ1 and the modem must be accessible for maintenance purposes. The KBDØ1 power switch is on the rear of the unit. Many modems have test switches on the back which must be used at times. Maintenance procedures require disconnecting cables and connecting adapters for test purposes. A special test module must be connected at the rear of the KBDØ1 for running the Extensive Self-Test.

NOTE

The KBDØ1 has a fan for cooling which circulates air through louvers on each side of the enclosure. The unit must be positioned to provide sufficient clearance on each side for air flow.

b. Seeing the Front Panel

When a DDC/RDC test session is in progress, activity in the modem panel lights is a primary indication of successful host computer connection through the KBDØ1. Although such monitoring of a diagnostic session is not necessary, it is recommended that the modem indicators be visible.

c. Power Cables

Both the KBDØ1 and the modem usually have three conductor power cables which are about 6 feet (1.9 m) long as measured from the power plug to the cabinet.

CAUTION

Neither unit may be plugged into the system power controller. Separate ac receptacles must be provided.

d. Analog Interface Cable

The modem usually has a telephone cable which is about 14 feet (4.2 m) long as measured from the connector plug to the modem cabinet. In the United States, the cable is terminated in a miniature six-pin data plug which is approved for connecting to an RJ11C Standard Voice Jack.

e. Digital Interface Cable

Both the KBDØ1 and the modem have 25 pin subminiature type D connectors. The KBDØ1 option kit includes a BCØ5D-Ø6 (6 feet (1.8 m) in length) cable for connecting the modem to the KBDØ1.

NOTE

In England, a BC99N cable (which includes protective diodes) must be attached at the KBDØ1 instead of the BCØ5D-Ø6 cable. The BCØ5D-Ø6 may be connected to the modem in series with the BC99N to permit the modem to be put at a longer distance from the CPU.

4.2.3 RJ11C Standard Voice Jack (U.S.A.)

The 3Ø-15949 or DFØ2 standalone modems, included in the KBDØ1-AA kit, must be connected to the telephone network through a telephone company installed RJ11C direct connect type standard voice jack. All arrangements for, and costs for, the installation and maintenance of the RJ11C and the dedicated line are the responsibility of the customer. FCC regulations state that the customer must provide to the telephone company certain information about the data communications equipment (modem) to be connected to the RJ11C:

a. Manufacturer's name
b. Model Number
c. Registration Number
d. Ringer equivalence
e. Baud rate

When the District Console Allocation Coordinator has determined which modem will be sent for the specific system, those details are communicated to the branch office. The branch office must then give that information to the customer to be used in ordering the RJ11C installation. Table 4-1 provides those details for the modems which are being included in KBDØ1-AA option kits as of the publication date of this manual.

Table 4-1 Modem Specifications For RJ11C

Modem Manufacturer	Model Number	FCC Registration Number	Ringer Equivalence	Baud Rate
GDC	103A3	AG697J-62418-DM-E	0.6, Type B	300
RACAL-VADIC	VA355P	AJ496M-70263-DM-N	1.0, Type B	300
DIGITAL	DF02	A0994Q-67693-DM-R	0.3, TYPE A	300

4.2.4 KBDØ1-BA Installation in Canada

The KBDØ1-BA kit, for installation in Canada, does not include a modem. The option must be connected through a telephone company installed modem such as a Bell 1Ø3J, or one with corresponding characteristics.

All arrangements for, and costs for, the installation and maintenance of telephone company equipment are the responsibility of the customer.

4.2.5 KBDØ1-BA Installation in Europe

The KBDØ1-BA kit, for installation in England and the rest of Europe, does not include a modem. The KBDØ1 operating characteristics agree with CCITT V.24, V.21, and V.28 recommendation. B.P.O. approval in the U.K. and F.T.Z. approval in Germany have been applied for.

Appendix A provides KBDØ1-to-modem interface specifications which will be useful when connection is to be made to modems other than those provided by DIGITAL. The BC99N modem cable, with protective diodes as must be used in the U.K., is not provided in the KBDØ1-BA kit, but is added to the kit by the RDC before shipment to the customer site.

4.3 THE KBDØ1 KIT

There are two variant KBDØ1 option kits available:

- KBDØ1-AA for installation in the United States
- KBDØ1-BA for installation in England and the rest of Europe and in Canada.

The two kits are identical except that the -BA kit does not include a modem. Figure 4-1 provides an illustration of each part and gives part number identification.

NOTE

The KBDØ1 option is always the property of Digital Equipment Corporation; it is not for sale. A Digital Asset Tag is attached to the bottom of the KBDØ1 during installation. The asset number on that tag is used for capital equipment inventory purposes.

4.3.1 Opening the Kit

Carefully open and remove the KBDØ1 option components from the shipping container. Check each component for possible damage. If damage is present, or if the kit is not complete, it should be reported to the branch office supervisor; if there are indications of shipping damage, that should be reported to the responsible carrier also. Determine that the kit is complete by verifying it against Figure 4-1.

4.4 STEP-BY-STEP INSTALLATION PROCEDURE

This procedure provides instructions for the installation of the KBDØ1-AA in the United States and the KBDØ1-BA in England and the rest of Europe and in Canada. Figure 4-2 may be used, before beginning installation, as an overview of a typical installation.

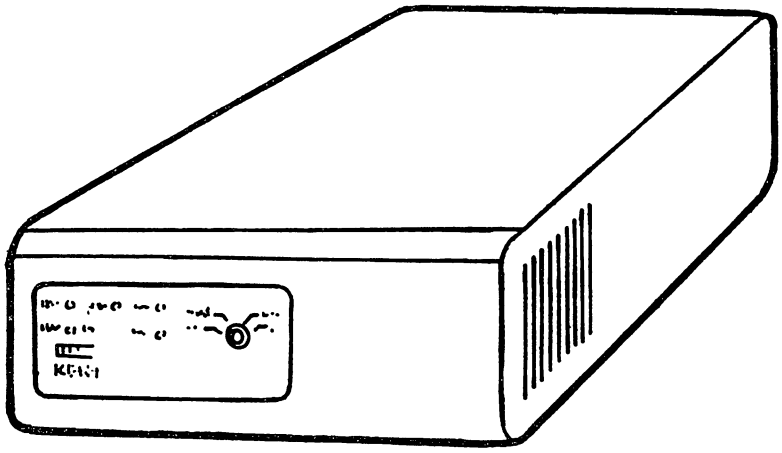
STEP 1 Preparation

Start option installation only after:

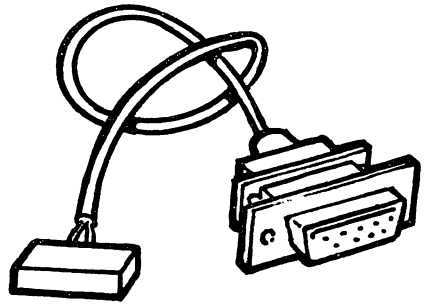
1. All items of site preparation have been done (as described in Paragraph 4.2).

2. Kit contents have been checked as described in Paragraph 4.3.

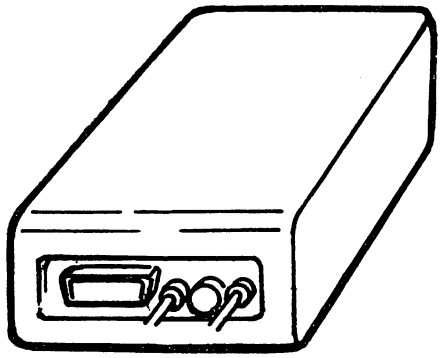
3. Diagnostics have been run to verify correct system operation.



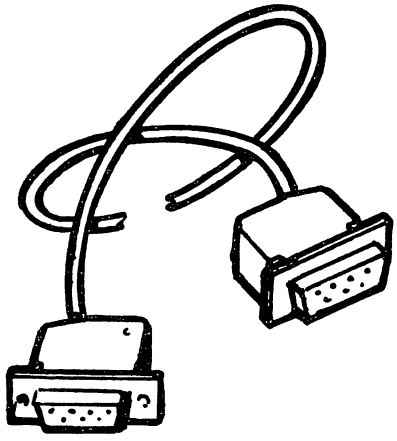
KBD01



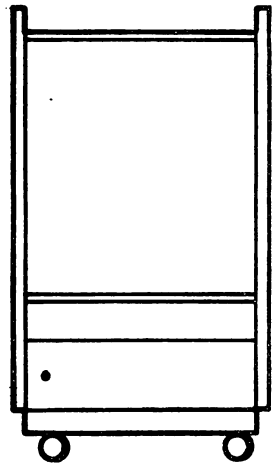
70-17778-10 CABLE
PDP-11/44 I/O CONNECTOR PANEL
TO M7090 CIM MODULE



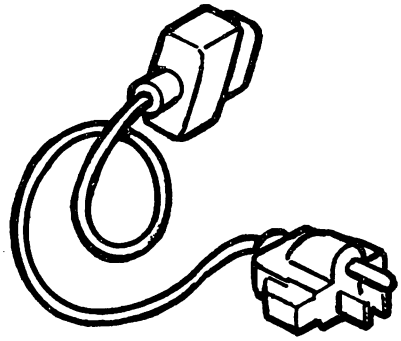
DF02-AA OR 30-15949 MODEM
(NOT INCLUDED IN KBD01-BA OPTION)



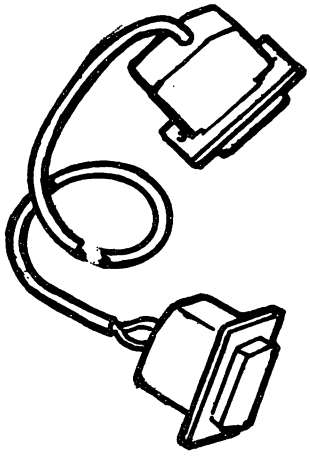
70-17779-25 CABLE
KBD01 TO PDP-11/44



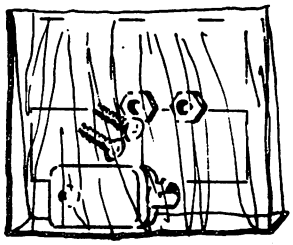
34-16104
MEDIA-MATE
CABINET



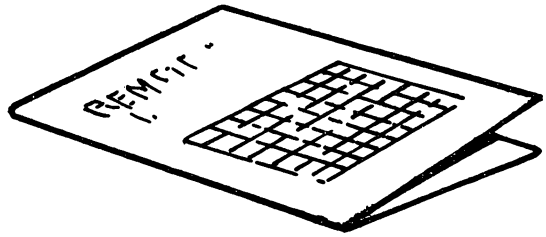
17-00083-09
AC POWER CABLE
(115 VAC - TO BE USED IN U.S.A. ONLY)



BC05D-06 CABLE
KBD01 TO MODEM



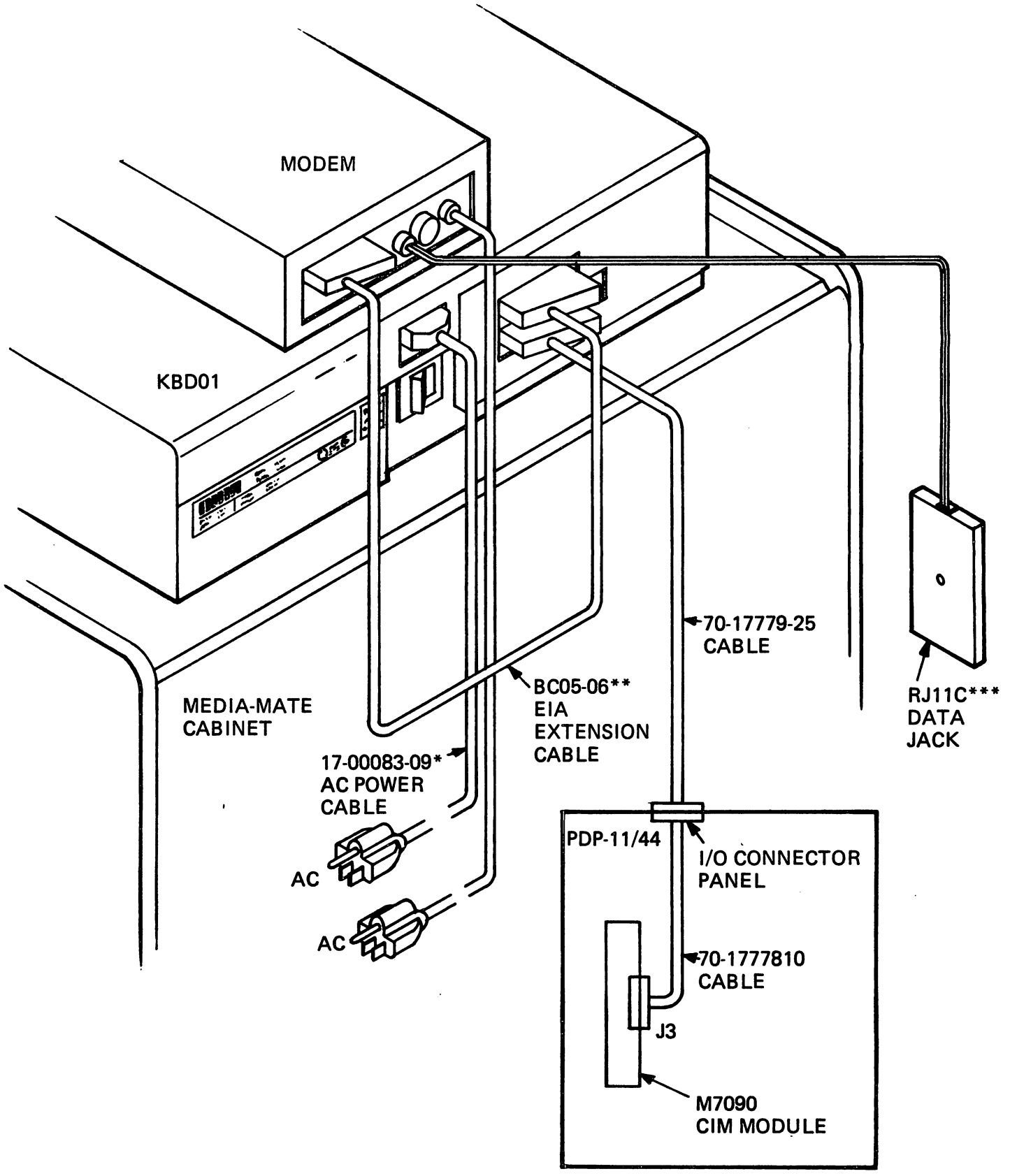
70-17889
KEY KIT



EK-KBD01-UG
USER GUIDE

MA-7691

FIGURE 4-1 KBD01 Option Kit Components



* The 17-00083-09 cable is included in the KBD01-BA kit but will not be used. A suitable power cable will be added to the kit before it is shipped to a non-U.S.A. customer site.

** In England, a BC99N cable must be attached to the KBD01; it may be connected directly to the modem or may be connected in series with the BC05D-06 EIA extension cable.

*** RJ11C data jack used in United States only.

FIGURE 4-2 KBD01 Installation Overview

4. Place the Media Mate cabinet in the selected location. If you perform the following steps using the top of the cabinet as a work surface, protect it from being scratched or dented.

STEP 2 Initial DDC/RDC Contact

Call The DDC/RDC and confirm that the System Configuration Package (described in Paragraph 4.2.1) has been received and processed. They want to know that the option installation is in progress and that a system test (Paragraph 4.7) and/or a customer demonstration (Paragraph 4.8) will be asked for.

STEP 3 Setting Line Voltage and Baud Rate Switches

This step references Paragraph 5.3 of this manual which provides removal and replacement procedures for each field replaceable unit (FRU) in the KBDØ1.

a. Remove the KBDØ1 top cover and module access plate as described in Paragraph 5.3, Steps 1 and 2.

b. Remove the filter bracket assembly as described in Paragraph 5.3.1.1, Steps 1 and 2.

c. Locate the 115/23Ø Vac fan voltage selection switch on the AC Distribution Assembly (Figure 4-3). Change the switch setting to the required position or confirm that it is set correctly.

d. Locate the 54-13343 power supply 115/23Ø Vac selection switch (Figure 4-4). Change the switch setting to the required position or confirm that it is set correctly.

e. Remove the M7366 CPU module; this will make it possible to check the DIP switch settings on the M7365 I/O module without removing it.

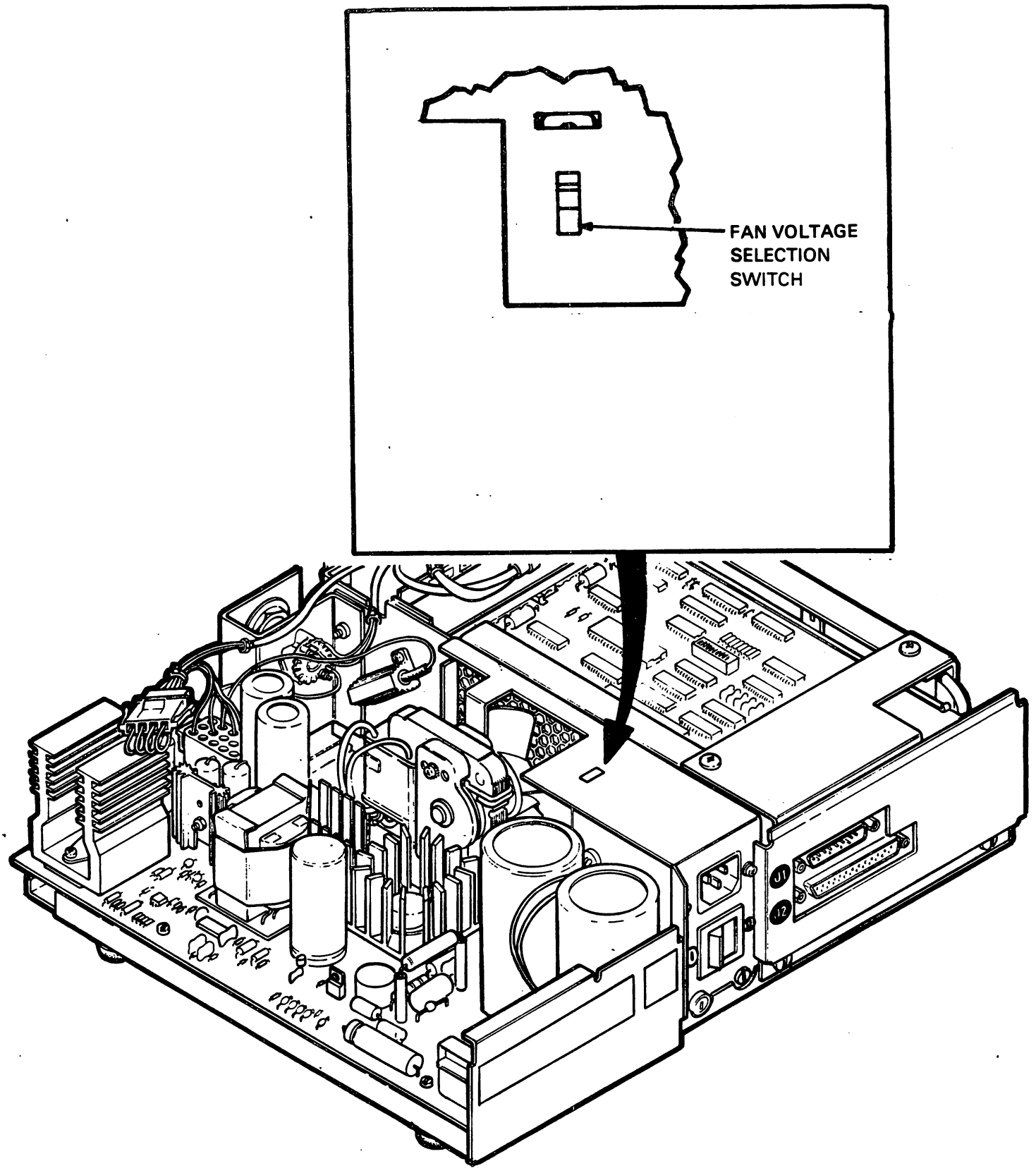


FIGURE 4-3 Fan Voltage Selection Switch

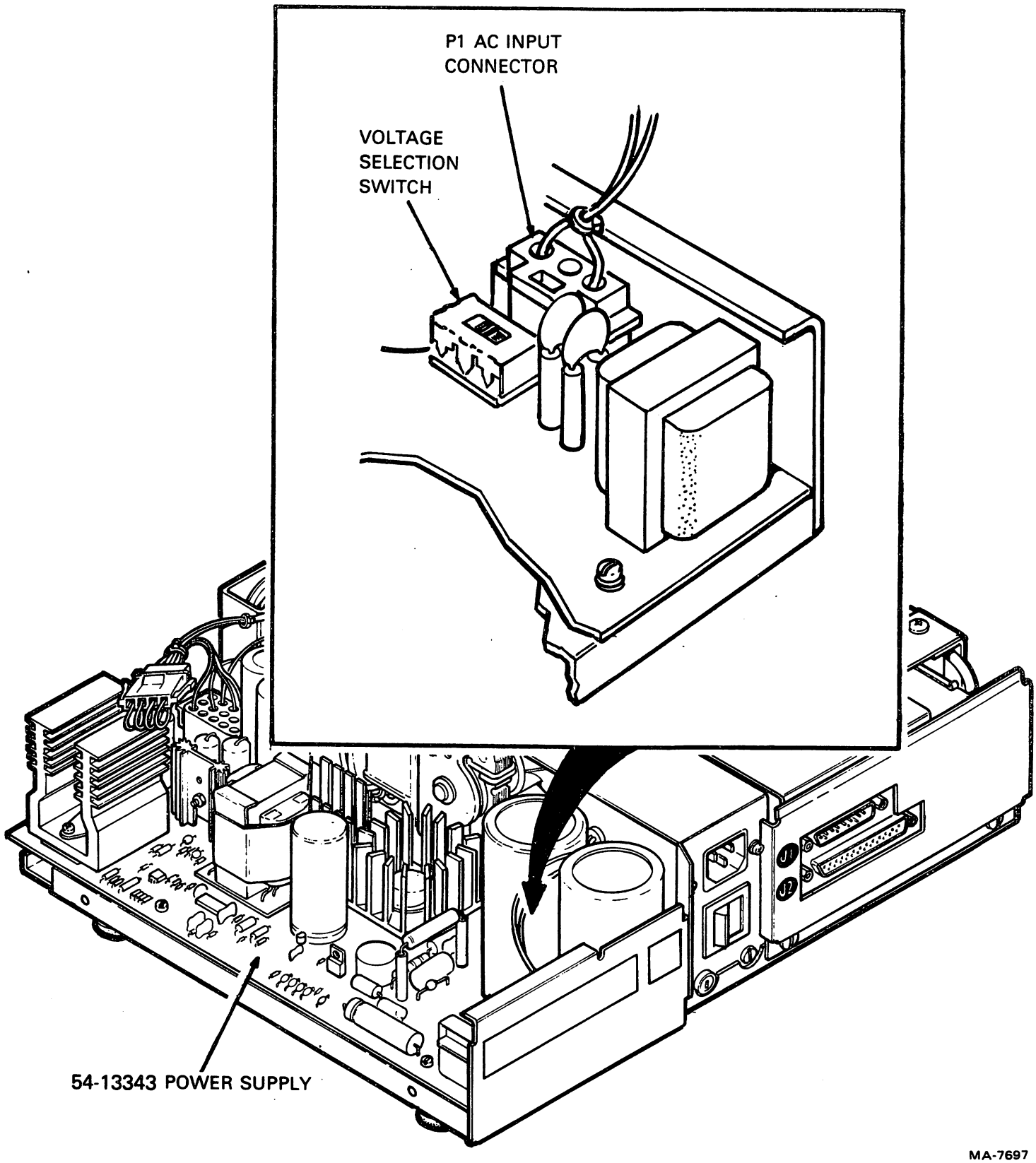


FIGURE 4-4 54-13343 Voltage Selection Switch

f. Determine the transmit and receive baud rates at which the PDP-11/44 console terminal is operating. Use Table 4-2 and set SW2 switches on the M7365 I/O module to the corresponding rates.

NOTE

You may discover an ambiguity if you are setting flush rocker type DIP switches for the first time. The switch is set to the "ON" position by pushing downward on the "ON" side of the rocker and "OFF" by pushing downward on the "OFF" side. When either state is selected, the colored marking (called a bard) or other indicator on that side of the rocker disappears into the switch body. The bard or indicator on the other side of the rocker becomes visible. Thus, the bard or other indicator marking shows the false state of each switch.

g. Check to see that SW1 switches on the M7365 I/O module are set for 19,200 baud operation, both transmit and receive.

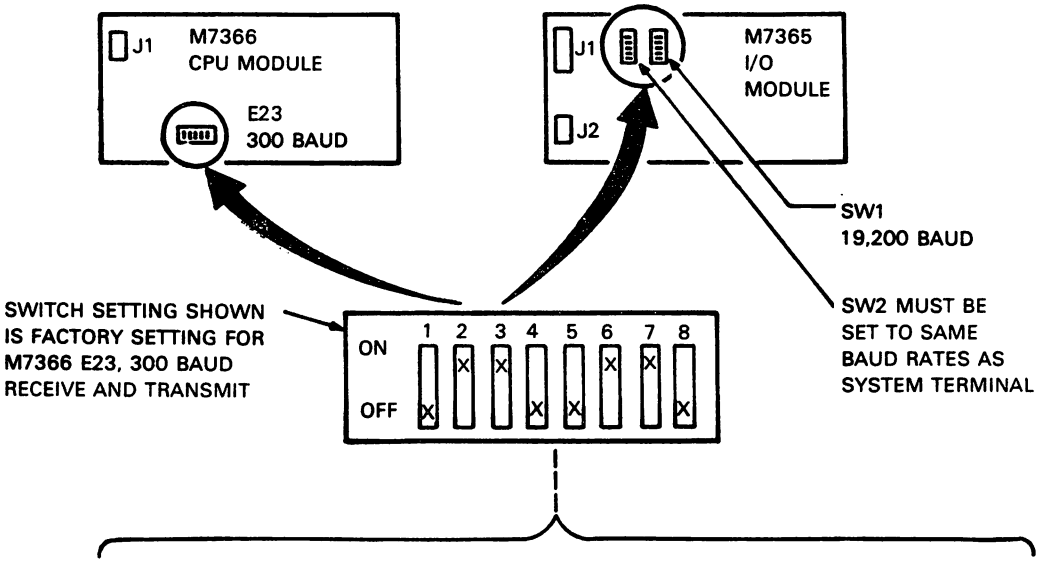
h. Check to see that E23 switches on the M7366 CPU module are set for 300 baud operation, both transmit and receive.

i. Re-insert the M7366 CPU module.

j. Examine the unit and correct any connections or mechanical components which may have been disturbed.

k. Re-install the filter bracket assembly, module access

TABLE 4-2 Baud Rate Switch Settings



BAUD RATE	RECEIVER SWITCHES				TRANSMITTER SWITCHES			
	1	2	3	4	5	6	7	8
50	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
75	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
110	OFF	OFF	ON	OFF	OFF	OFF	ON	OFF
134.5	OFF	OFF	ON	ON	OFF	OFF	ON	ON
150	OFF	ON	OFF	OFF	OFF	ON	OFF	OFF
200	OFF	ON	OFF	ON	OFF	ON	OFF	ON
300	OFF	ON	ON	OFF	OFF	ON	ON	OFF
600	OFF	ON	ON	ON	OFF	ON	ON	ON
1200	ON	OFF	OFF	OFF	ON	OFF	OFF	OFF
1800	ON	OFF	OFF	ON	ON	OFF	OFF	ON
2000	ON	OFF	ON	OFF	ON	OFF	ON	OFF
2400	ON	OFF	ON	ON	ON	OFF	ON	ON
3600	ON	ON	OFF	OFF	ON	ON	OFF	OFF
4800	ON	ON	OFF	ON	ON	ON	OFF	ON
9600	ON	ON	ON	OFF	ON	ON	ON	OFF
19200	ON	ON	ON	ON	ON	ON	ON	ON

MA-7701

plate, and top cover.

l. If you have configured the KBDØ1 for 23Ø Vac operation, mount the separate 23Ø Vac decal to cover the existing 115 Vac decal on the rear of the unit (Figure 4-5).

STEP 4 KBDØ1 Self-Test

At this step you will run the extensive self-test to verify that the KBDØ1 is working correctly.

a. Set the keyswitch to PROGRAM.

b. Set the ac power switch to OFF (Ø) (Figure 4-5).

c. For 115 Vac operation, connect the 17-ØØØ83-Ø9 ac power cable to the receptacle above the ac power switch.

d. For 23Ø Vac operation, connect the appropriate locally-obtained ac power cable to the receptacle above the ac power switch.

e. Connect the 54-14693 Extensive Self-Test Module between receptacles J1 and J2 on the rear of the unit as shown in Figure 4-6.

f. Plug the ac power cable into an ac source and turn the KBDØ1 ac power switch ON. Extensive self-test should run as described in Paragraph 5.2.3.

g. Turn off ac power. Disconnect the extensive self-test module from the KBDØ1.

h. Refer to Figure 4-6 as you proceed. Connect the 70-17779-25 (KBDØ1 to PDP-11/44) cable to J2 on the KBDØ1. Connect the other end of the cable to the extensive self-test module.

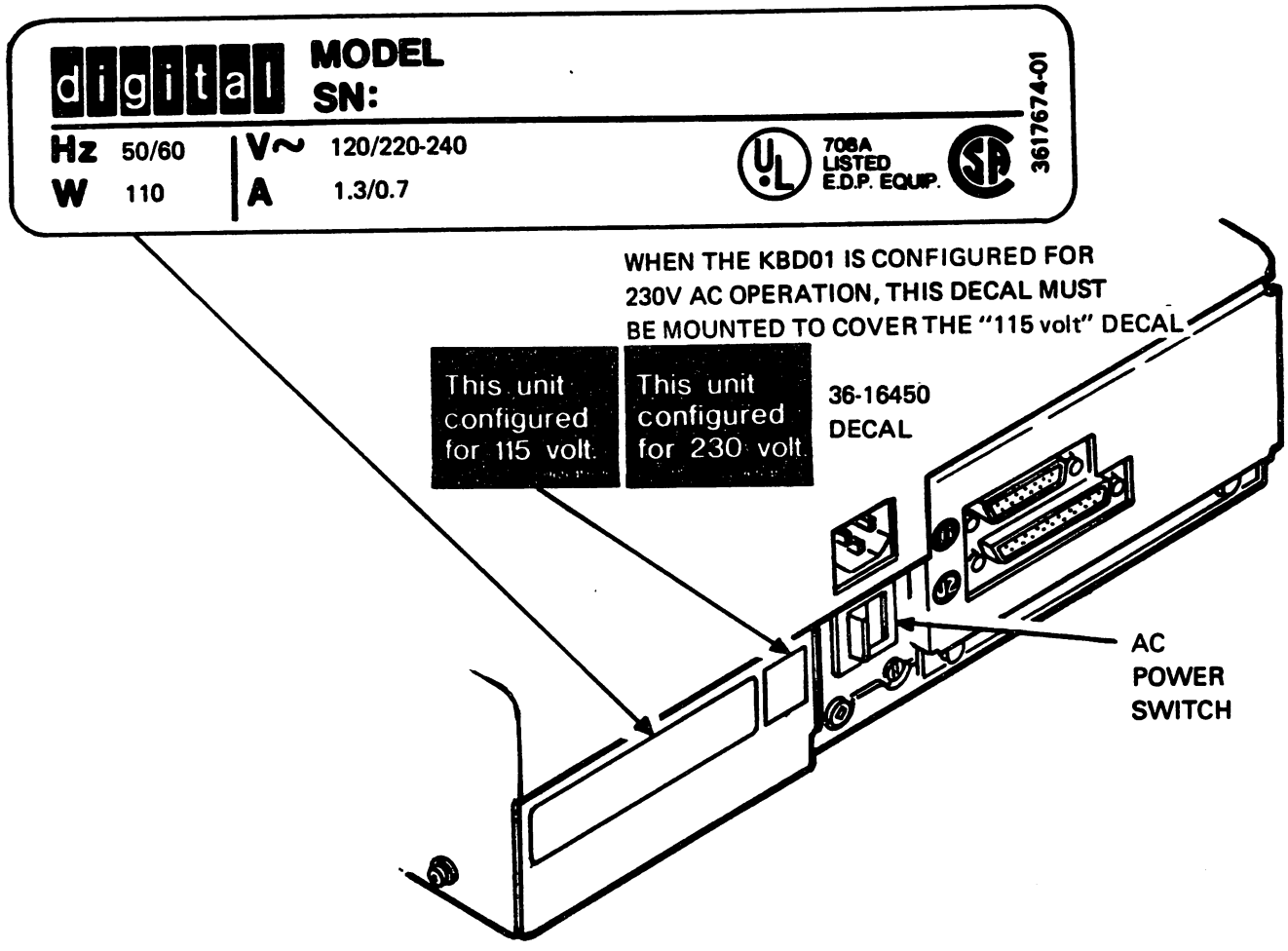


FIGURE 4-5 AC Power ON/OFF Switch

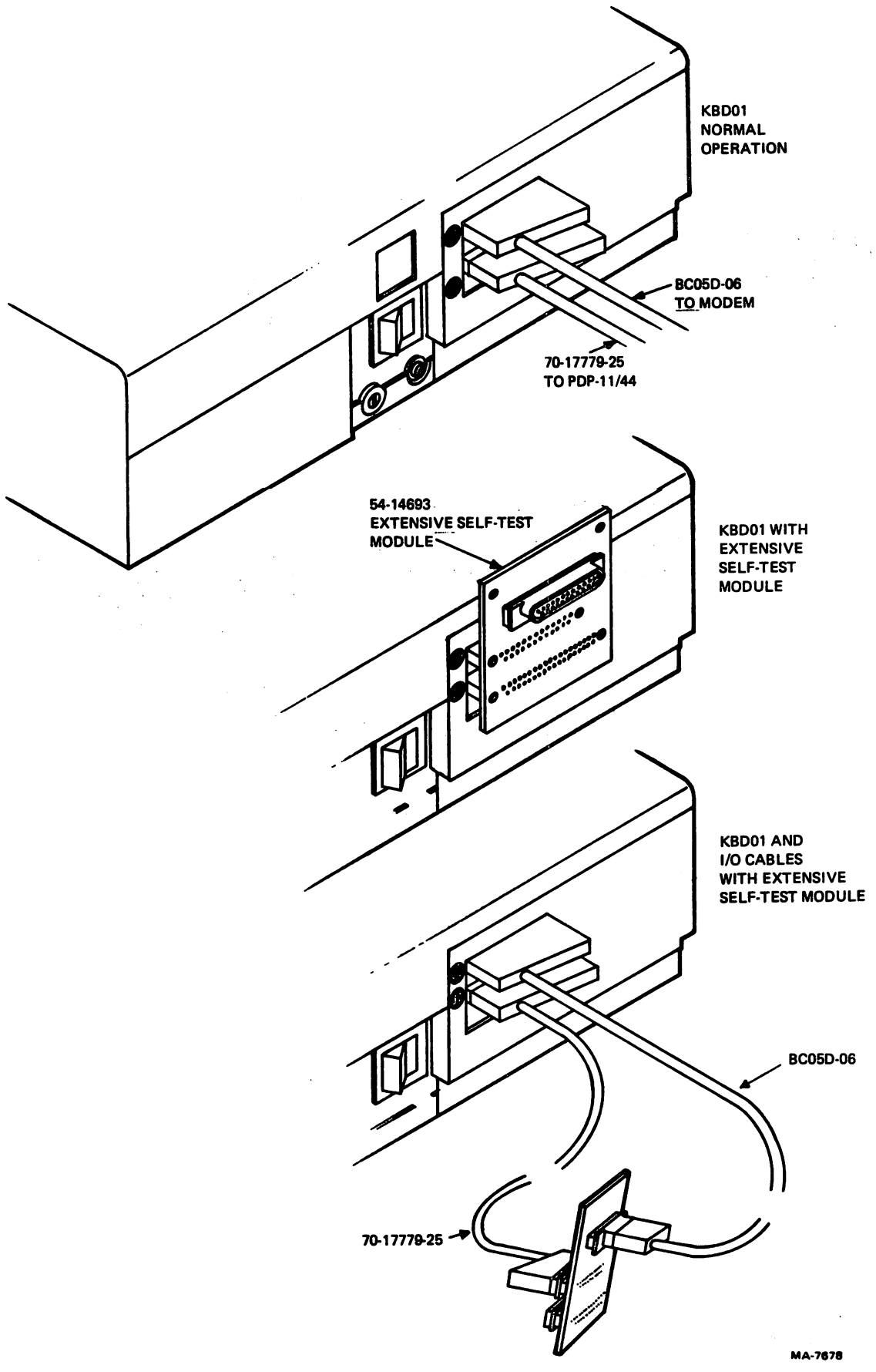


FIGURE 4-6 Extensive Self-Test Module

i. Connect the BC05D-06 (KBD01 to modem) cable to J1 on the KBD01. Connect the other end of the cable to the extensive self-test module.

j. Turn on ac power. Extensive self-test should run as described in Paragraph 5.2.3. In this self-test mode, both the KBD01 and the I/O cables are being tested.

k. If the test runs correctly, it should be left running while the installation proceeds.

l. If the test fails, proceed with testing and repair as described in Chapter 5 of this manual.

STEP 5 Racal-Vadic or GDC Modem Preparation (KBD01-AA only)

If the modem in the kit is either a model VA355P, made by Racal-Vadic, or a model 103A3, made by General Data Comm Industries, Inc., the proper option states will have been set at the factory. Figure A-3, Figure A-4, and Table A-1 show the functions and required states of the option jumpers and switches. Both the VA355P and 103A3 User Guides (shipped with the modem) and Appendix A of this manual provide additional information.

STEP 6 DIGITAL DF02 Modem Preparation (KBD01-AA only)

If the modem in the kit is a model DF02, made by DIGITAL, the proper option states will have been set at the factory. Figure A-4, Figure A-5, and Table A-1 show the functions and required states of the option selection jumpers. Both the DF02 User Guide (shipped with the modem) and Appendix A of this manual provide additional information.

STEP 7 PDP-11/44 Internal Cable Installaton

Without disconnecting the cables which are connected to it, remove the M7090 Console Interface Module (CIM) part way.

a. Using Figure 4-7, determine the location of jumper W21. Confirm that W21 is OUT (or remove it). When W21 is IN, KBD01 access to the PDP-11/44 is disabled.

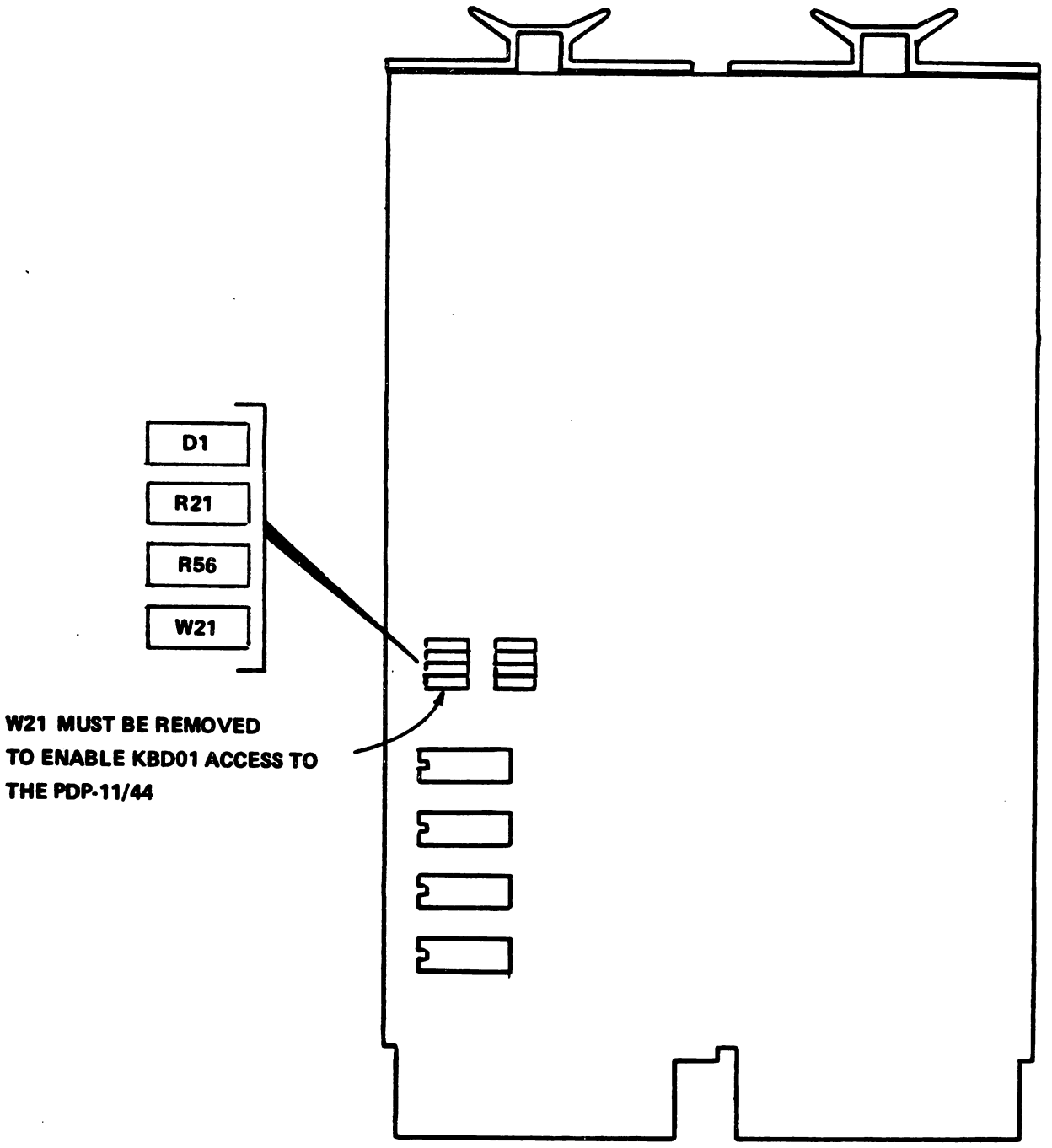


FIGURE 4-7 M7090 PDP-11/44 Console Interface Module

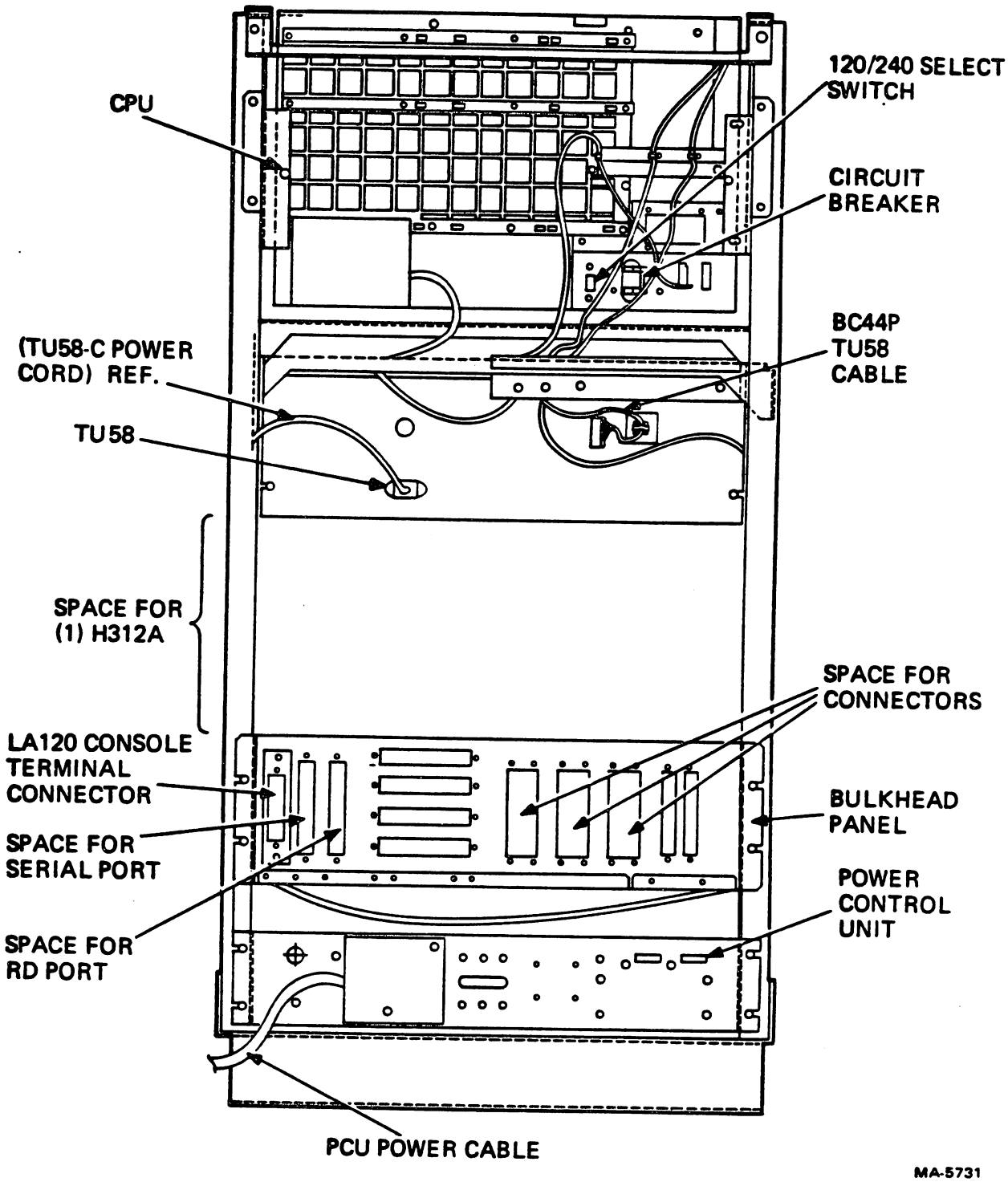


FIGURE 4-8 PDP-11/44 I/O Connector Panel

b. Connect the 70-17778-10 cable to J3 on the M7090 with the "THIS SIDE UP" label away from the board surface. Dress the cable along the same route as the console terminal cable. Secure it to the I/O connector panel with the two screws and nuts provided in the KBD01 option kit. Figure 4-8 shows the space reserved for the RD port.

STEP 8 PDP-11/44 to KBDØ1 Cabling

Connect the 7Ø-17779-25 cable to the PDP-11/44 I/Ø connector panel and dress it to the location selected for the KBDØ1.

STEP 9 Local Testing of Option/System

At this step the PDP-11/44 and the modem will be added to the KBDØ1 system and tested.

a. Turn the KBDØ1 power switch to OFF (Ø).

b. Disconnect the 54-14693 Test Adapter from the KBDØ1.

c. Connect the BCØ5D-Ø6 from the KBDØ1 (J2) to the modem.

NOTE

In England a BC99N cable must be connected at J2 of the KBDØ1; the BCØ5D-Ø6 may be used in series as an extension cable.

d. Connect the 7Ø-17779-25 cable from the PDP-11/44 to the KBDØ1 at J1.

e. Apply ac power to the modem and set the modem switches for loopback testing. Refer to modem documentation for instructions.

f. Power up the PDP-11/44 with the console terminal on-line. Set the PDP-11/44 keyswitch to LOCAL and the HALT-CONT-BOOT switch to CONT.

g. Set the KBDØ1 keyswitch to LOCAL and turn the ac power switch to ON (1). The power-up self-test should run as described in Paragraph 5.2.1.

h. Turn the keyswitch to PROGRAM. PROGRAM self-test should run as described in Paragraph 5.2.2 with results displayed at the system terminal. If the modem is a DF02, the KBD01 will log and display a Test 12 modem error. Paragraph 5.2.2.1 provides the test steps which are unique to the DF02. If there are other indications of modem failure, Appendix A provides general modem information which can be helpful.

NOTE

The KBDØ1 has a fan for cooling which circulates air through louvers on each side of the enclosure. The unit should be positioned to provide sufficient clearance on each side for air flow.

STEP 1Ø Modem Connection to Telephone Network

Connect the analog output cable from the modem to the telephone data jack (RJ11C in the United States).

STEP 11 Local Modem and Remote Port Testing

At this step all KBDØ1 hardware has been connected and tested. You can now test the telephone circuit through the data jack to the modem.

a. Set the modem switches for normal operation. (If the modem is set for loopback test operation, the system console terminal will print the message (RD) MODEM ERROR when the keyswitch is turned to REMOTE in the following step.)

b. Turn the KBDØ1 keyswitch to REMOTE. The REMOTE indicator light on the PDP-11/44 panel will come on; the REMOTE indicator light on the KBDØ1 will come on blinking.

c. From a local telephone, dial the number of the dedicated telephone line. A ringing signal should be heard, the call answered, a carrier tone should be heard and the KBDØ1 REMOTE indicator should stop blinking (it will be on).

d. Hang-up. A "CARRIER LOST" message will be printed on the console terminal.

e. If the test fails after several attempts, a telephone circuit fault can be suspected. Appendix A of this manual together with the vendor manuals shipped with the kit modems can help in troubleshooting the problem.

STEP 12 Mounting the Hardware on Media Mate

At this step the KBDØ1 and the modem will be configured on the Media Mate cabinet. Figure 4-2 shows how the installation will look if the modem is a DFØ2.

a. Position the KBDØ1 in the center of the top surface of the cabinet.

b. Position the modem on top of the KBDØ1 if their size relationship makes this feasible. (In some instances the modem may be located on another surface or beneath the computer room floor.)

c. Dress the cables to the ac receptacles, the PDP-11/44, and the telephone jack as required.

CAUTION

Note that the Media Mate cabinet is on casters and the KBDØ1 is not secured to it. Unless the cabinet and the cables are moved together, the modem or KBDØ1 could be pulled off of the cabinet. The

cabinet should be placed away from aisles or traffic areas. The cables should be dressed (and secured if necessary) so that they do not become a traffic hazard.

4.5 DDC/RDC SYSTEM TEST

Following option installation, system operation should be tested by the DDC/RDC. Call the DDC/RDC and perform the procedure in the KBDØ1 User Guide, Figure B-1, "When Maintenance Diagnostics are to be Run by the DDC/RDC" or in Paragraph 3.3 of this manual. Once the host computer connection has been successfully completed and the testing session has started, you may want to ask site personnel to see the terminal communications and help in test related activities.

4.6 CUSTOMER INSTRUCTION

Following installation of the KBDØ1 option, site personnel will need to be instructed in the use of the added remote diagnosis capability. The instruction includes the following:

1. Inform the user that usual system operation is not affected (Reference Paragraph 4.6.4) and describe the added functions and hardware.

2. Review with the user the contents of the User Guide, then add it to the Site Management Guide behind the RDC tab (reference Paragraph 4.6.2).

3. Have customer site personnel call the DDC/RDC and help with a remote diagnosis demonstration session (reference Paragraph 4.6.3).

4.6.1 Usual Operation Not Affected

The first step in site personnel instruction is to inform them that their day-to-day system operation is not affected by the

KBDØ1 addition. For usual operation, there is no procedural change. PDP-11/44 switch positions DC OFF, LOCAL, LOCAL DISABLE, and STD BY, will continue to be used exactly as before.

4.6.2 The User Guide

The Remote Diagnosis User Guide, EK-KBDØ1-UG, reproduced in this manual as Figure B-1, is a summary of all the information that customer personnel must know about remote diagnosis procedures. Review the document with the users, type in the DDC/RDC telephone number, then file it in the Site Management Guide behind the RDC tab.

The guide will help users with different levels of experience with remote diagnosis:

a. The user with little remote diagnosis experience or knowledge can call the DDC/RDC and be led step-by-step through the procedure.

b. The user may expect the basic DDC/RDC interrogation listed on page 1, Steps 1 and 2, and be prepared to respond.

c. The user may read the information on page 2 and be prepared for an easier interaction with DDC/RDC personnel and the remote diagnosis procedure.

4.6.3 DDC/RDC Demonstration Session

The most effective instruction, a live demonstration, should be considered an important step in each KBDØ1 installation. If site personnel were included in the initial DDC/RDC system test (Paragraph 4.5), that may have provided enough user instruction. If not, request that they help in a demonstration which you will have previously scheduled with the DDC/RDC.

Before a demonstration is started, see that site personnel

digital

DIGITAL EQUIPMENT CORPORATION

11/44 REMOTE DIAGNOSIS INSTALLATION ACKNOWLEDGEMENT

I, the undersigned, acknowledge receipt of Remote Diagnosis Kit (KBDC1).

Asset No. . . . . For use on 11/44.

Serial No. . . . . .

I recognize that this Remote Diagnosis Kit always remains the property of Digital Equipment Corporation, and agree not to remove or tamper with any part of it, nor to disclose or make any part of it available to a third party.

I further acknowledge that I will allow Digital full and free access for the purpose of removal of the Diagnosis Kit and restoration of the system to its original condition if for any reason the Field Service Agreement should be terminated.

Computer System to be located at: _____

Company _____

Address _____

City _____ *State* _____ *Zip Code* _____

By Authorized Representative _____ *Date* _____

Title _____

EN-01633-07-0000-725)

FIGURE 4-9. Installation Acknowledgement Form

understand operation of front panel controls, and where to find information about calling the DDC/RDC. They should be allowed to place the call to the DDC/RDC, monitor the terminal, and perform other steps which are part of the remote diagnosis procedure. You may want to explain the activity in the modem indicators, but the modem does not need user attention except possibly turning power on or off.

Site personnel who have received this instruction will be more confident about the remote diagnosis process. However, the DDC/RDC expects calls from users with little experience and will provide help as necessary. This is shown in the User Guide, page 1, in which each of the five steps of the procedure says "The DDC/RDC will . . . ."

4.6.4 Installation Acknowledgement Form

As the final step in a KBDØ1 installation, an authorized customer representative must sign a receipt for the hardware. In this form the customer acknowledges that the hardware will always be the property of Digital Equipment Corporation and guarantees to give DIGITAL access to it. An Installation Acknowledgement Form, (form number EN-Ø1633-Ø7-ØØØØ(725) in the United States) is included in each KBDØ1 option kit for that purpose. The form is to be sent to the DDC/RDC after it has been filled-out and signed.

4.7 REMOVING THE KBDØ1 OPTION

If the KBDØ1 is to be removed from an existing installation, the step-by-step procedure for installation may be used in reverse order. Because the option kit is a capital equipment item, its disposition will be determined by the local branch office.

CHAPTER 5
MAINTENANCE

5.1 FIELD MAINTENANCE PHILOSOPHY

KBDØ1 field maintenance philosphy is based on the ability of internal diagnostics to report failure errors and to identify the failing module. The modules and other field replaceable units (FRUs) are arranged so that it is easy to measure voltages, trace wiring, and to remove and replace parts as necessary. As a result, KBDØ1 troubleshooting will include the running of internal diagnostics to show module failures and/or checking the power supply, front panel circuits, and cabling. Modem troubleshooting information is provided in Appendix A.

An additional factor is the availability of DDC/RDC assistance. Their remote indications may help to identify a failing part or circuit. Their continuing work with the KBDØ1 will generate a depth of knowledge which can be valuable in maintenance circumstances. KBDØ1 failures will often be discovered when a remote diagnosis connection is attempted and their involvement is therefore routine.

5.2 KBDØ1 SELF-TEST DIAGNOSTICS

ROM-resident diagnostic programs provide three modes of KBDØ1 self-testing:

- Power-up self-test; invoked automatically
- PROGRAM mode self-test; selectable by the operator
- Extensive self-test; intended for DIGITAL use only

Test results are shown either in the KBDØ1 front panel indicator lights or as printed messages on the system console terminal, or both. A FAULT indicator light is provided on the front panel to show the operator when a KBDØ1 failure has been detected.

The three self-test modes provide different levels of failure identification:

1. The Power-up self-test provides a single indication of failure, a FAULT light.

2. PROGRAM self-test mode lights the FAULT indicator and also reports failing tests by number and counts each failure as the program loops.

3. The Extensive self-test uses a test module that connects KBDØ1 input and output circuits in a loopback configuration. The I/O cables can also be tested by installing the test module at the far end of the cables. Test failures are reported in a pattern of flashing indicator lights.

Tables 5-1, 5-2, 5-3, and 5-4 show both normal and failure patterns of front panel lights and which operating or failure condition each pattern represents. Also, Table 5-3 identifies specific tests by number, the KBDØ1 logic being tested, and, as an aid to field personnel, suggests the module which is most probably at fault plus a second and third most probable module failure.

5.2.1 Power-Up Self-Test

When KBDØ1 power is turned on, the self-test diagnostic program is started automatically. The operator will usually see the following sequence of events if the keyswitch is in the LOCAL position (also see Table 5-1):

1. The POWER indicator light will come on.

2. The FAULT indicator light will come on. It will remain on for about ten seconds while the self-test program runs.

3. The FAULT indicator light will go off to show successful completion of the self-test.

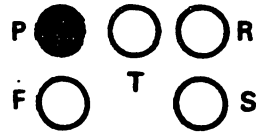
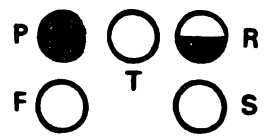
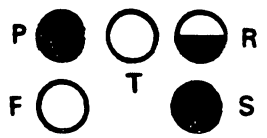
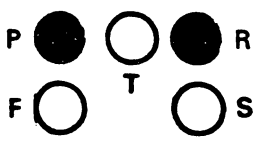
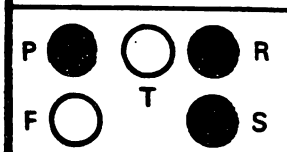
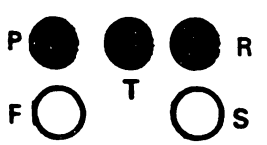
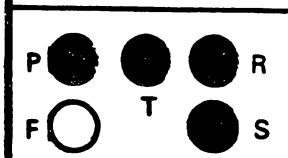
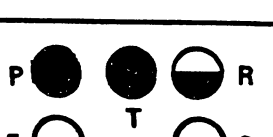
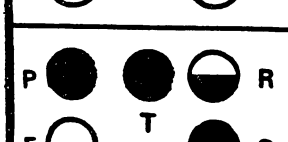
The program does not halt when an error is detected, but, if possible, will run to completion. When the program pass is completed, it leaves the FAULT indicator light on to show the operator that the KBDØ1 has failed. The FAULT indicator light relates to the KBDØ1 only and cannot be activated by any PDP-11/44 or modem failure.

If the FAULT indicator remains lighted, PROGRAM self-test should be run. That diagnostic program identifies any test which fails so that Table 5-3 can be used to help identify the failing component.

5.2.2 PROGRAM Mode Self-Test

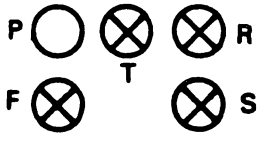
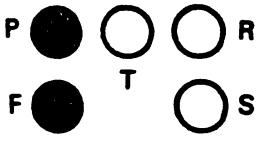
When the KBDØ1 keyswitch is set to the PROGRAM position, a self-test program is started and runs continuously in a loop. Note that when the keyswitch is in PROGRAM position, the key cannot be removed from the lock. This eliminates any possibility of the system being "locked" in a maintenance mode unintentionally. The KBDØ1 controls the system console terminal to print test results and error status. If a failure is detected, failure data is printed on the terminal, the FAULT indicator light is turned on, and, if possible, the program loop continues to run. Figure 5-1 is an example of the terminal display for PROGRAM self-test. In this example the tests were identified (Ø1 through 15), then a count field was set-up for each test (to count test failures as the program loops), the ROM test was run, the RAM test failed, and the program ran to "TESTS COMPLETE". The error status display shows the failure of RAM test #6. Reference to Table 5-3 indicates that the M7364 memory module is the most probable cause of the Test #6 failure, the M7366 CPU module is second most probable and the M7365 I/Ø module is the third most probable. Using the results of PROGRAM Test with Table 5-3 will usually identify the failing module. PROGRAM self-test runs a series of tests in which each test is logically more critical then the one which follows it.

TABLE 5-1 Normal Operation Light Patterns

LIGHT PATTERN	CONDITION
	KEYSWITCH IN LOCAL OR PROGRAM POSITION
	KEYSWITCH IN REMOTE POSITION NO DDC/RDC REMOTE CONNECTION
	KEYSWITCH IN SECURE POSITION NO DDC/RDC REMOTE CONNECTION
	KEYSWITCH IN REMOTE POSITION DDC/RDC REMOTE TELEPHONE CONNECTION ESTABLISHED
	KEYSWITCH IN SECURE POSITION DDC/RDC REMOTE TELEPHONE CONNECTION ESTABLISHED
	KEYSWITCH IN REMOTE POSITION. DDC/RDC HOST COMPUTER REMOTE LOGICAL CONNECTION ESTABLISHED
	KEYSWITCH IN SECURE POSITION. DDC/RDC HOST COMPUTER REMOTE LOGICAL CONNECTION ESTABLISHED
	DDC/RDC INITIATED TESTING IN PROGRESS NO REMOTE TELEPHONE CONNECTION TO THE DDC/RDC KEYSWITCH IN REMOTE POSITION
	DDC/RDC INITIATED TESTING IN PROGRESS NO REMOTE TELEPHONE CONNECTION TO THE DDC/RDC KEYSWITCH IN SECURE POSITION

 = LIGHT ON  = LIGHT OFF  = LIGHT FLASHING

TABLE 5-2 Failure Operation Light Patterns

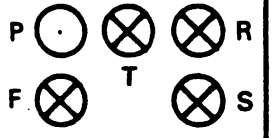
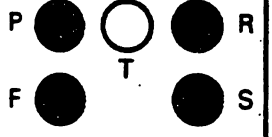
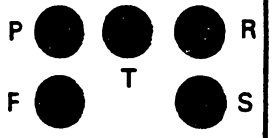
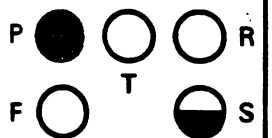
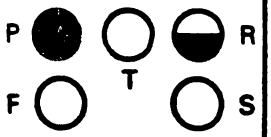
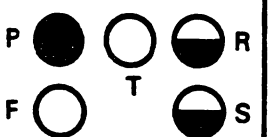
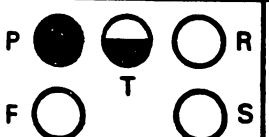
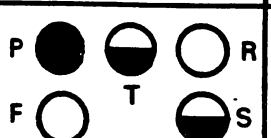
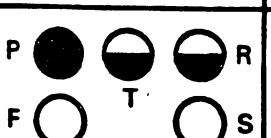
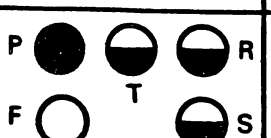
LIGHT PATTERN	FAULT CONDITION
	INCORRECT DC VOLTAGE IN KBD01. POWER SUPPLY DEFECT PROBABLE.
	NORMAL OPERATION DURING FIRST TEN SECONDS AFTER POWER UP. INDICATES A KBD01 FAILURE IF IT OCCURS OTHERWISE. USE PROGRAM SELF-TEST OR EXTENSIVE SELF-TEST AND TABLE 5-3, TO IDENTIFY THE FAILING COMPONENT.

● = LIGHT ON

○ = LIGHT OFF

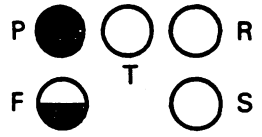
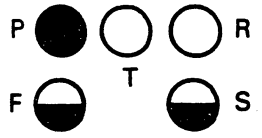
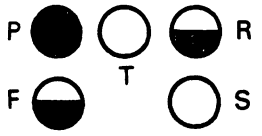
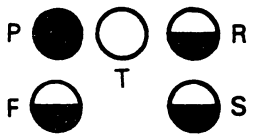
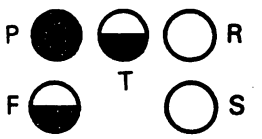
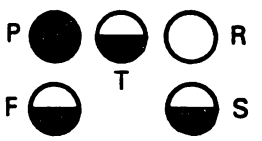
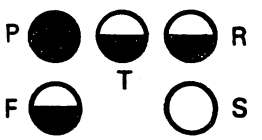
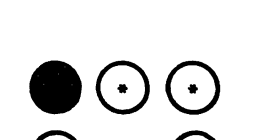
⊗ = LIGHT ON, OR OFF, OR FLASHING ("DON'T CARE")

TABLE 5-3 Extensive Self-Test Failure Light Patterns (Sheet 1 of 2)

LIGHT PATTERN	TEST NO.	FAILURE CONDITION	MOST PROBABLE CAUSE		
			FIRST	SECOND	THIRD
		INCORRECT DC VOLTAGE IN KBD01 POWER SUPPLY DEFECT OR NO AC PROBABLE			
		CPU HALTED ON ERROR DURING TEST	M7366 CPU	M7364 MEM	M7365 I/O
		CPU HALTED ON ERROR DURING TEST	M7366 CPU	M7364 MEM	M7365 I/O
	1	CPU ERROR	M7366 CPU	M7364 MEM	M7365 I/O
	2	ROM OR ADDRESSING LOGIC	M7366 CPU	M7364 MEM	M7365 I/O
	3	RAM ERROR RAM OR ADDRESSING LOGIC	M7364 MEM	M7366 CPU	M7365 I/O
	4	RAM ERROR RAM OR ADDRESSING LOGIC	M7364 MEM	M7366 CPU	M7365 I/O
	5	CPU STACK ERROR	M7366 CPU	M7364 MEM	M7365 I/O
	6	RAM ERROR RAM CHIP	M7364 MEM	M7366 CPU	M7365 I/O
	7	CLOCK TIMING ERROR CLOCK OR CLOCK INTERRUPT	M7366 CPU	M7364 MEM	M7365 I/O

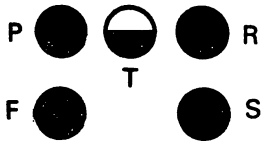
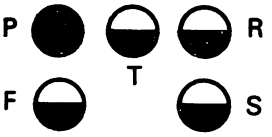
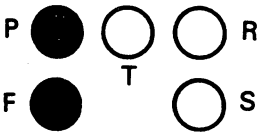
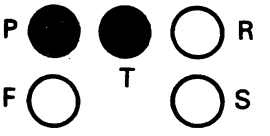
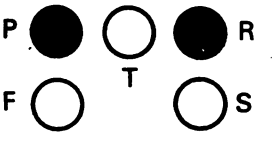
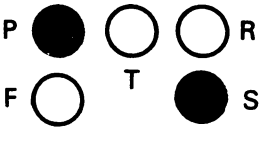
● = LIGHT ON ○ = LIGHT OFF ◒ = LIGHT FLASHING ⊗ = ON, OFF, OR FLASHING

TABLE 5-3 Extensive Self-Test Failure Light Patterns (Sheet 2 of 2)

LIGHT PATTERN	TEST NO.	FAILURE CONDITION	MOST PROBABLE CAUSE		
			FIRST	SECOND	THIRD
	8	PORT BAUD RATE GENERATOR ERROR	M7365 I/O	M7366 CPU	M7364 MEM
	9 15	PORT USART ERROR TRANSMIT INTERRUPT ERROR	M7365 I/O	M7366 CPU	M7364 MEM
	10	REMOTE LINE BAUD RATE GENERATOR ERROR	M7366 CPU	M7364 MEM	M7365 I/O
	11	REMOTE LINE USART ERROR	M7366 CPU	M7364 MEM	M7365 I/O
	12	STATIC LINE ERROR	M7365 I/O	M7366 CPU	M7364 MEM
	13	REMOTE LINE INTERRUPT ERROR	M7366 CPU	M7365 I/O	M7364 MEM
	14	PORT INTERRUPT ERROR	M7365 I/O	M7366 CPU	M7364 MEM
		* WHEN THE EXTENSIVE SELF-TEST MODULE IS ATTACHED, ANY LIGHT PATTERN OTHER THAN THOSE SPECIFIED IN THIS TABLE INDICATES THAT THE SELF-TEST MODULE IS NOT RECOGNIZED.	M7366 CPU	M7365 I/O	M7364 MEM

MA-7684

TABLE 5-4 Extensive Self-Test Normal Light Patterns

LIGHT PATTERN	CONDITION
	EXTENSIVE SELF-TEST IN PROGRESS. TEST LIGHT FLASHES EVERY ONE TO TWO SECONDS.
	INDICATES SUCCESSFUL COMPLETION OF EXTENSIVE SELF-TEST WHEN KEYSWITCH IS TURNED FROM PROGRAM POSITION TO LOCAL POSITION TO INVOKE KEYSWITCH AND INDICATOR TEST.
	KEYSWITCH AND INDICATOR TEST WITH KEYSWITCH IN PROGRAM POSITION
	KEYSWITCH AND INDICATOR TEST WITH KEYSWITCH IN LOCAL POSITION
	KEYSWITCH AND INDICATOR TEST WITH KEYSWITCH IN REMOTE POSITION
	KEYSWITCH AND INDICATOR TEST WITH KEYSWITCH IN SECURE POSITION

● = LIGHT ON

○ = LIGHT OFF

◒ = LIGHT FLASHING

MA-7700

```
(RD) KBD01 V01-00 STATUS

(RD) ERROR 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15
(RD) COUNT 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

(RD) ROM TEST STARTED
(RD) ROM TEST ENDED

(RD) RAM TEST STARTED
(RD) RAM TEST ERROR 06 - LOC 40F0
(RD) RAM TEST ENDED

(RD) TIMING TEST STARTED
(RD) TIMING TEST ENDED

(RD) I/O TEST STARTED
(RD) I/O TEST ENDED

(RD) MODEM TEST STARTED
(RD) NOTE: MODEM LOOPBACK MUST BE SET
(RD) MODEM TEST ENDED

(RD) TESTS COMPLETE

(RD) KBD01 V01-00 STATUS

(RD) ERROR 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15
(RD) COUNT 00 00 00 00 00 01 00 00 00 00 00 00 00 00 00
```

FIGURE 5-1 Example of PROGRAM Self-Test Display

When the program reports the failure of more than one test, Table 5.3 should be used for the test with the highest priority (the lowest Test Number).

5.2.2.1 **PROGRAM Mode Modem Test** -- In Test #12 the KBDØ1 asserts Data Terminal Ready (DTR) and Request To Send (RTS) for twenty seconds. It expects the modem to respond by asserting Clear To Send (CTS), Data Set Ready (DSR), and Carrier Detect (CD); these signals are asserted when the modem is in loopback mode. The terminal display for the modem test includes the reminder "NOTE: MODEM LOOPBACK MUST BE SET." If the modem is set for loopback operation the test should run without error. If there is a test error it will be logged and displayed and the test sequence will continue. Since the FAULT indicator light is meant to show that a KBDØ1 failure has occurred, it is not turned on when the modem test fails. It is possible that the failure is within the KBDØ1 but it may be in the modem or the cable.

NOTE

The test procedure for the model DF02 modem involves the following unique steps:
Press in and latch both the DTL/ANL and OPER/TEST switches.
Then, each time the DTR indicator light comes on during each test pass, press the momentary contact ANS switch and hold it in for about one second. When this is done, the modem test should be completed successfully. If this is not done, the KBD01 will log and display a Test 12 modem error message.

When testing is complete, reset (press in and release) both the DTL/ANL and OPER/TEST switches to return the DF02 to normal operation.

5.2.3 Extensive Self-Test

DIGITAL Field Service personnel will use extensive self-test when neither power-up self-test nor PROGRAM self-test has identified a failure or when more thorough KBDØ1 testing is needed. A test module must be connected to the KBDØ1 to enable Extensive self-test mode. The procedure is as follows:

1. Power down the KBDØ1

2. Disconnect (from the KBDØ1) the BCØ5D-Ø6 cable which goes to the modem.

3. Disconnect (from the KBDØ1) the 7Ø-17779 cable which goes to the PDP-11/44.

4. Connect the 54-14693 Extensive Self-Test Module to the KBDØ1 as shown in Figure 4-6. This test module connects output signals to input circuits in a loopback configuration.

5. Set the keyswitch to PROGRAM.

6. Power up the KBDØ1.

7. The Extensive self-test program begins running the series of internal KBDØ1 diagnostics continuously in a loop. Figure 5-2 is a flow diagram of the program loop and its test status reporting.

8. If a test fails, the program halts with a pattern flashing in the indicator lights that represents the failing test number. Table 5-3 can be used to determine which test each pattern represents and which module/s is probably causing the failure indication.

9. Turn the keyswitch to LOCAL and allow the program test loop to run to completion (about 3Ø seconds). Using Table 5-4, turn the keyswitch to each of its four positions and check to see that each light pattern is correct.

1Ø. Power down the KBDØ1.

The previous testing steps involved only the KBDØ1. The following steps tell you how to test the KBDØ1 and the I/O cables.

11. Disconnect (from the modem) the BCØ5D-Ø6 cable.

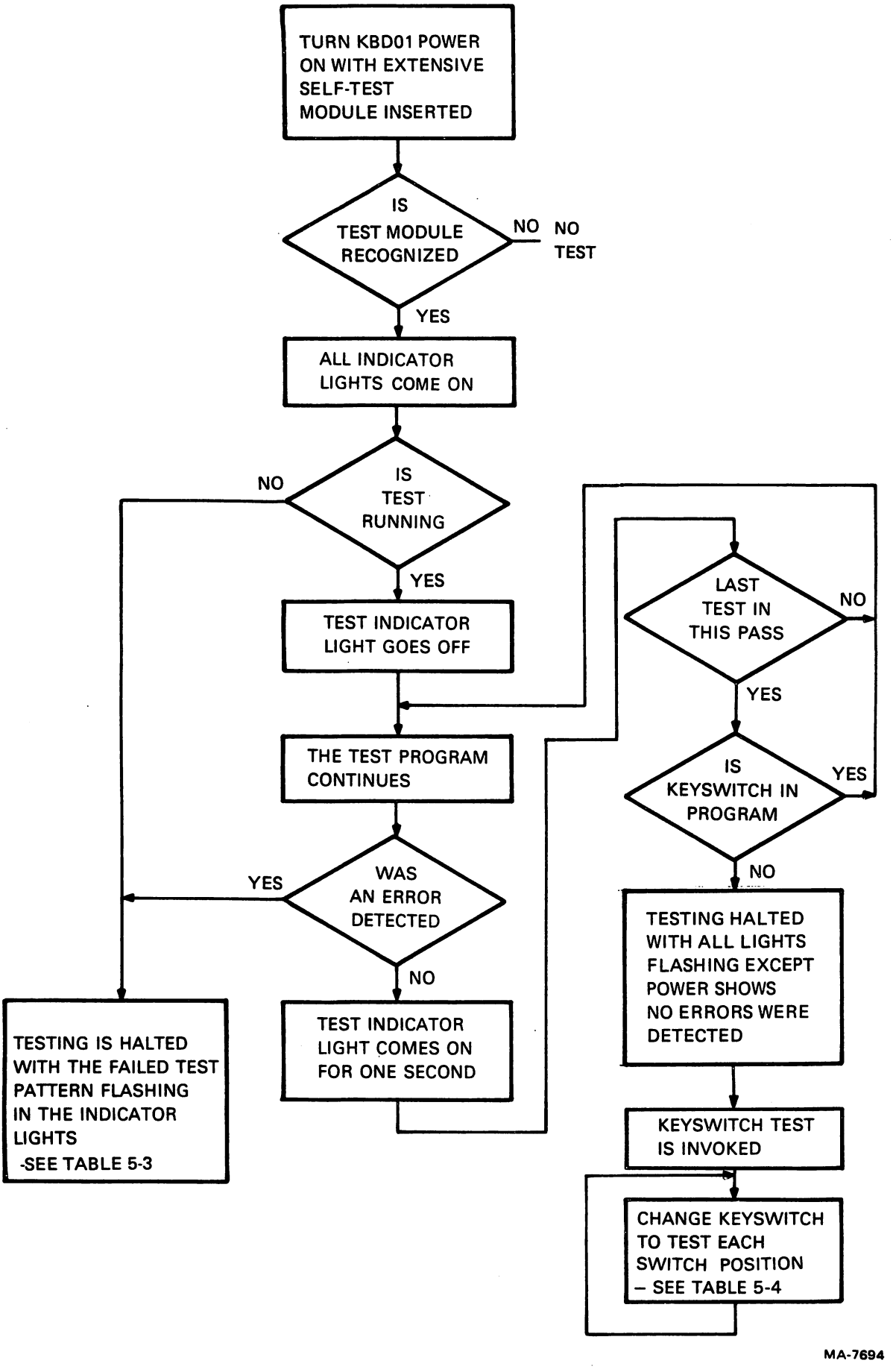


FIGURE 5-2 Extensive Self-Test Flow Diagram

12. Disconnect (from the PDP-11/44) the 70-17779 cable.

13. Connect the two cables to the 54-14693 Extensive Self-Test Module as shown in Figure 4-6.

14. Set the keyswitch to PROGRAM.

15. Power-up the KBD01. The test program runs as described in Steps 7, 8, and 9. It runs indefinitely and you can power-down the KBD01 when sufficient testing time has passed.

5.2.4 Console Terminal Messages

In addition to the console terminal display produced by the PROGRAM self-test (described in Paragraph 5.2.2), there are three terminal messages. Table 5-5 identifies those messages and their significance.

5.3 FIELD REPLACEABLE UNITS (FRUs)

Figure 5-3 shows the KBD01 components which are field replaceable.

After disconnecting ac power and the two external I/O cables, perform the following procedure to access the internal components:

1. Remove the two screws at the lower edge of each side of the top cover. Lift off the cover, pulling upward along the rear edge; there will be some resistance as the cover is stressed over the ac distribution assembly.

2. Loosen the two quarter-turn captive fasteners at the lower edge of the module access plate which is mounted behind the modules and remove the plate.

The following procedures for removal and replacement of field replaceable units assume that the top cover has been removed for

Table 5-5 Console Terminal Messages

Terminal Message	Indication	Cause
(RD) REMOTE PORT ENABLED	KBDØ1 is enabled to respond to DDC/RDC phone connection	The keyswitch is set to REMOTE or REMOTE SECURE. (Paragraph 3.3, step 1Ø) The DDC/RDC "hangs up" and the keyswitch is still in REMOTE or REMOTE SECURE. (Paragraph 3.3, step 14)
(RD) CARRIER LOST	The asserted modem-to-KBDØ1 Carrier Detect signal was just cleared	The DDC/RDC "hangs up" after having established a logical connection. (Paragraph 3.3, step 14) The keyswitch is changed from REMOTE or REMOTE SECURE to LOCAL or PROGRAM when a DDC/RDC logical connection is in effect Any modem, cable, or KBDØ1 failure in the Carrier Detect logic. (Paragraph A-1)
(RD) MODEM ERROR	The modem-to-KBDØ1 signals CTS, DSR, RI, and CD are asserted when they should not be	The keyswitch is set to REMOTE or REMOTE SECURE when the modem is set for loopback test operation. Any modem, cable, or KBDØ1 failure involving CTS, DSR, RI, or CD logic. (Paragraph A-1)

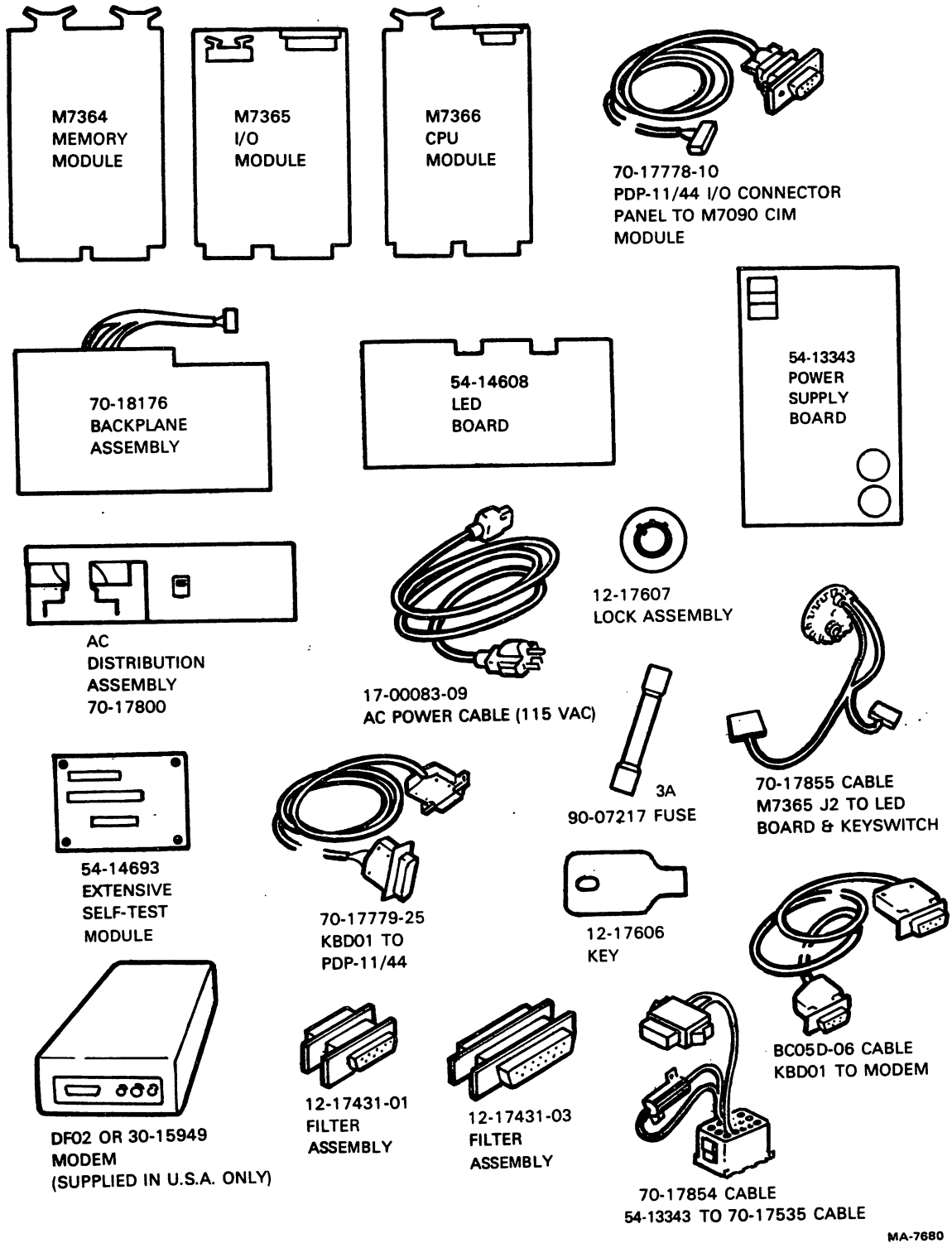


FIGURE 5-3 Field Replaceable Units (FRU's)

access to those components.

5.3.1 Modules

Removal and replacement of the KBDØ1 modules is a routine procedure except that the M7365 I/O module and M7366 CPU module have baud rate switches which must be set correctly. PROGRAM self-test or extensive self-test results, compared against Table 5-3, will usually indicate which module is defective.

5.3.1.1 Removal and Replacement Procedure -- Part number reference in this procedure are keyed to Figure 5-4.

1. Remove the two 9Ø-Ø6Ø7Ø 1Ø-32 X 5/16 inch screws and 9Ø-Ø6636 #1Ø lock washers which secure the 7Ø-17861 filter bracket assembly to the card cage.

2. Pull backward, keeping the filter adapters in correct alignment with the modules as the filters are disconnected from the boards. Push forward on the two upper modules to prevent their coming out with the filter assembly.

3. Modules can now be removed and replaced. When installing replacement M7365 I/O or M7366 CPU modules, be sure that the baud rate DIP switches are set the same way they were on the original module (Table 4-2).

4. When plugging the 7Ø-17855 cable from the LED board into J2 on the M7365 I/O module, see that the "THIS SIDE UP" label is away from the surface of the board.

5. When installing the filter bracket assembly, keep the filters and modules in correct alignment as the assembly is pushed forward.

6. Secure the filter bracket assembly using the two 1Ø-32

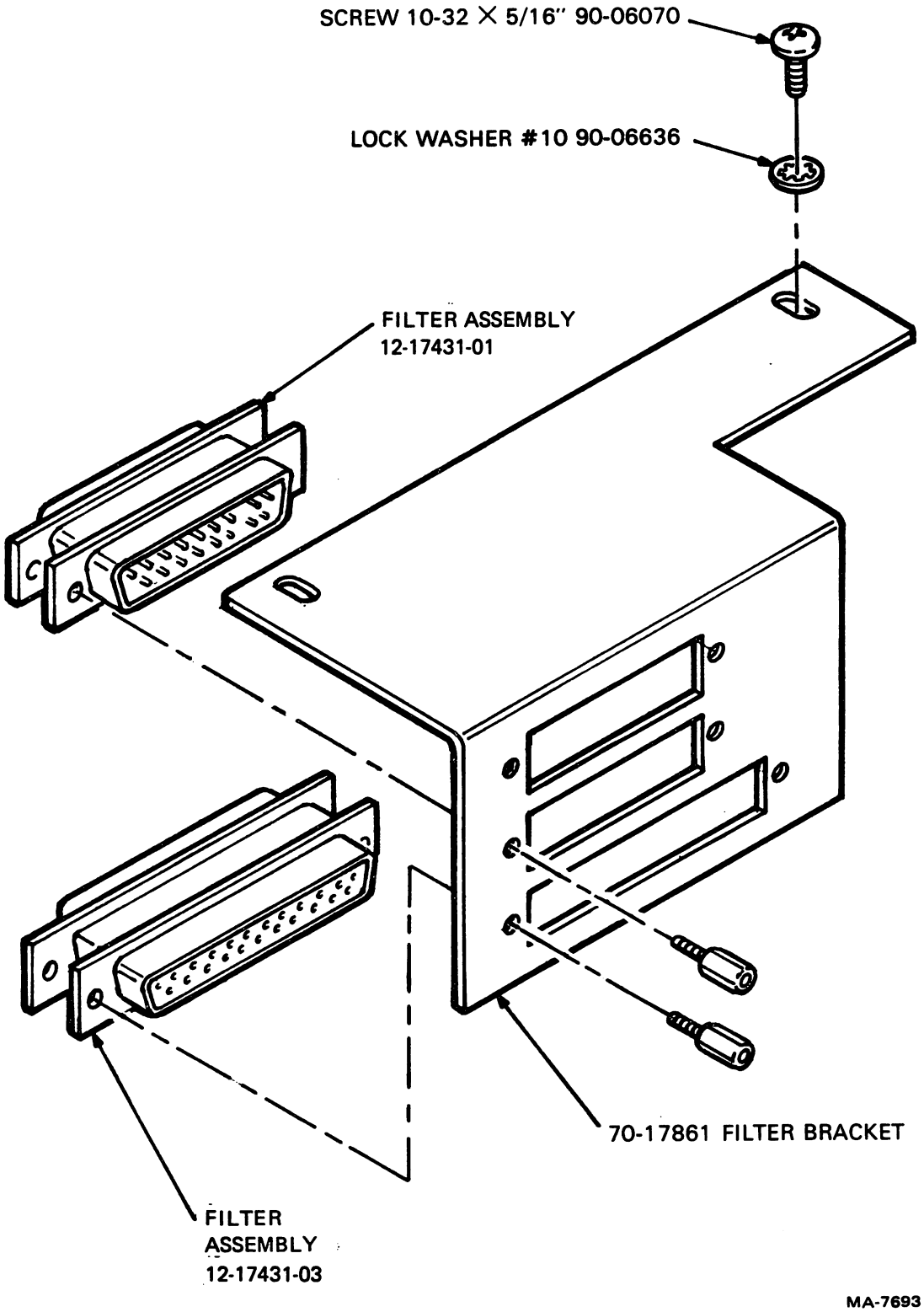


FIGURE 5-4 Filter Bracket Assembly

screws and lock washers removed in step 1.

5.3.2 AC Distribution Assembly

The AC Distribution Assembly, 70-17800 is a mechanically modified version of the 70-16749 assembly used in the BA11V Box Assembly. It includes the ac input filter, ac power switch, fuse holder and fuse, fan, and the fan voltage selector switch. Figure 5-5 is a wiring diagram of the assembly.

5.3.2.1 Removal and Replacement Procedure -- Part number references in this procedure are keyed to Figure 5-6.

1. Remove the 90-09238 self tapping screw which is located at the left of the fuse.

2. Disconnect the 70-17855 cable connector from J1 on the 54-14608 LED board; remove the four 90-06020-01 6-32 X 1/4 inch screws and 90-06633 #6 lockwashers at the corners of the board (Figure 5-8); remove the board.

3. Unplug the two cables which connect to the H7833 power supply board.

4. If the pin extensions on the backplane assembly have not been cut away, they will make it very difficult to proceed with the next step. If the pins have not been cut, the cardcage must be removed. Remove the two 90-06070-03 10-32 X 5/16 inch screws and 90-06636 #10 lockwashers (Figure 2-6) which secure the cardcage to the KBD01 base. This will allow you to move the backplane pins aside and proceed.

5. Remove the two 90-06037-01 8-32 X 3/8 inch screws and 90-06634 #8 lockwashers which secure the keyswitch bracket to the chassis. The removal of these screws releases the LED board support bracket (shown in Figure

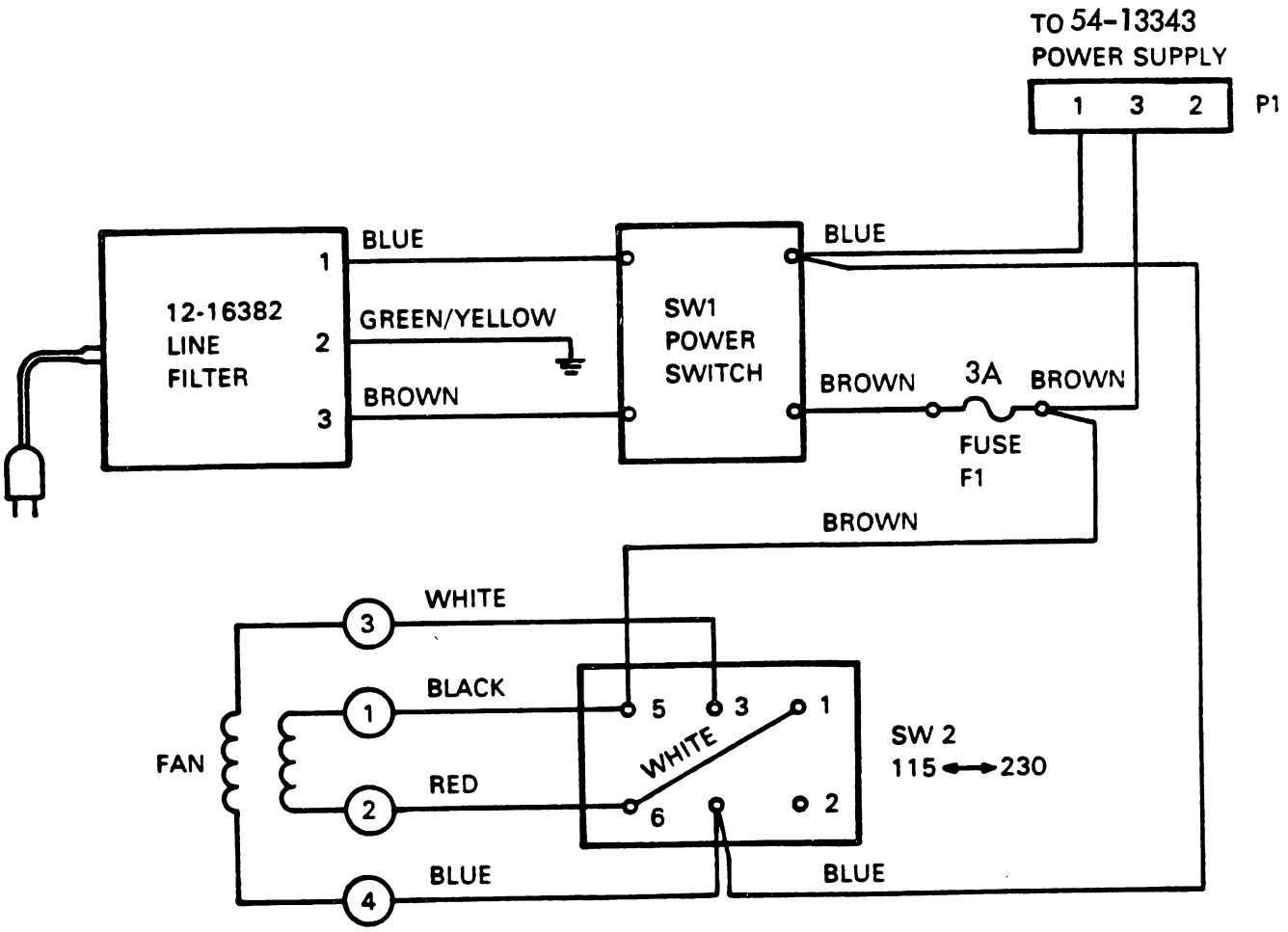


FIGURE 5-5 AC Distribution Assembly Wiring Diagram

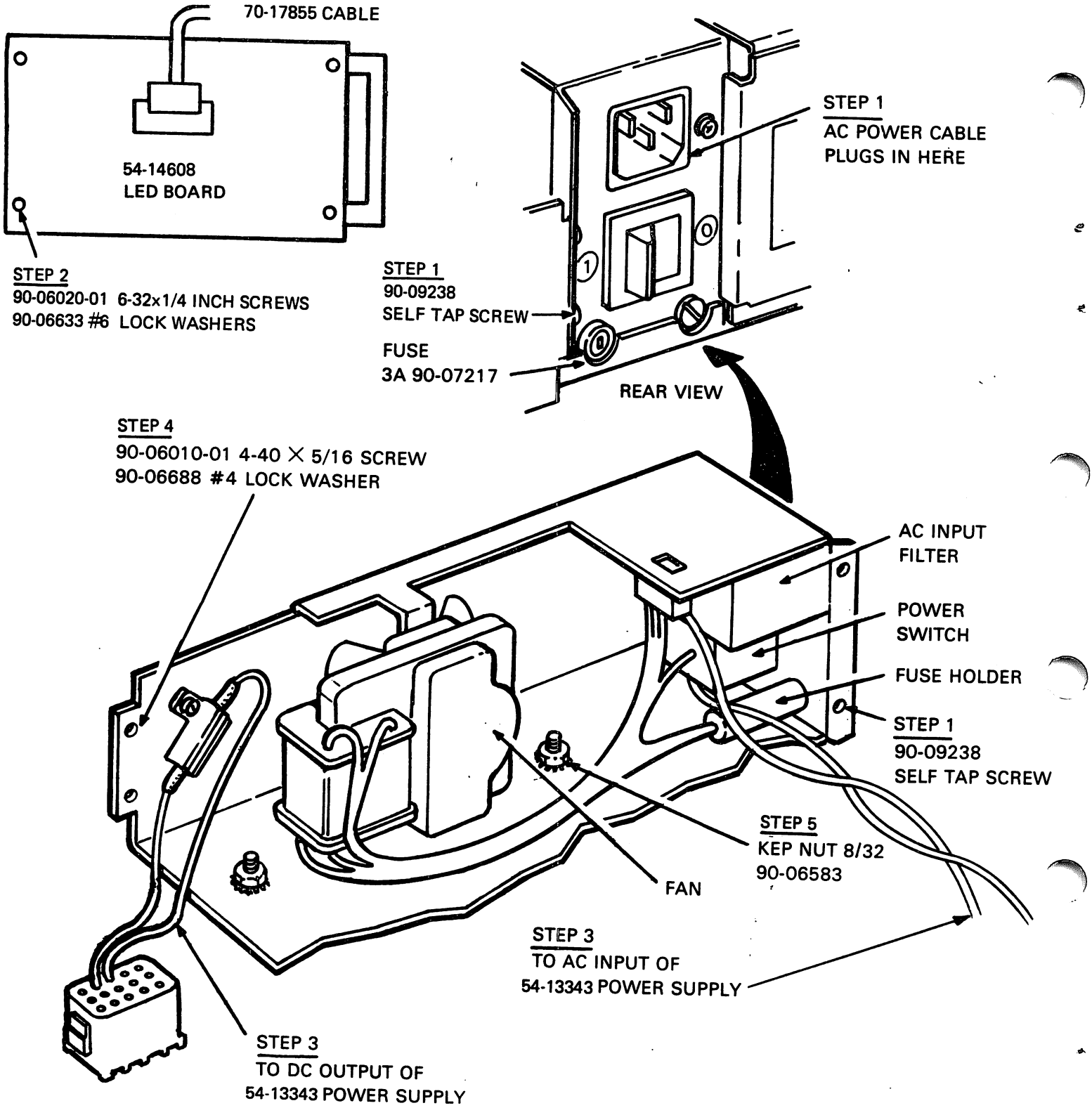


FIGURE 5-6 AC Distribution Assembly

5-8) and allows you to move the keyswitch/bracket out of the way.

6. Remove the two 90-06583 8-32 kep nuts which secure the AC Distribution Assembly chassis to the box base plate.

7. Lift the complete assembly and place it on top of the card cage with the fan blade facing down. Remove the two 90-06010 4-40 X 5/16 inch screws and 90-06698 #4 lock washers which secure the 25 watt resistor which is part of the 70-17854 dc power cable assembly. The AC Distribution Assembly is now completely released from the KBD01.

8. A replacement assembly can be installed using this procedure in reverse.

9. CAUTION-When connecting the cable plug at J1, see that the "THIS SIDE UP" label is away from the surface of the board.

5.3.3 Power Supply

The KBD01 power supply is contained on one 54-13343 board which supplies +5 Vdc and +12 Vdc. The board also supplies +24 Vdc and -5 Vdc output voltages which are not used in the KBD01. The power supply operates from 115 Vac or 230 Vac as determined by the setting of the ac input voltage selection switch which is mounted on the board.

5.3.3.1 Removal and Replacement Procedure -- Part number reference in this procedure are keyed to Figure 5-7.

1. Unplug the ac input and dc output connectors, P1 and P2, from the board.

2. Remove the 90-065574-40 kep nut and the four 90-09702

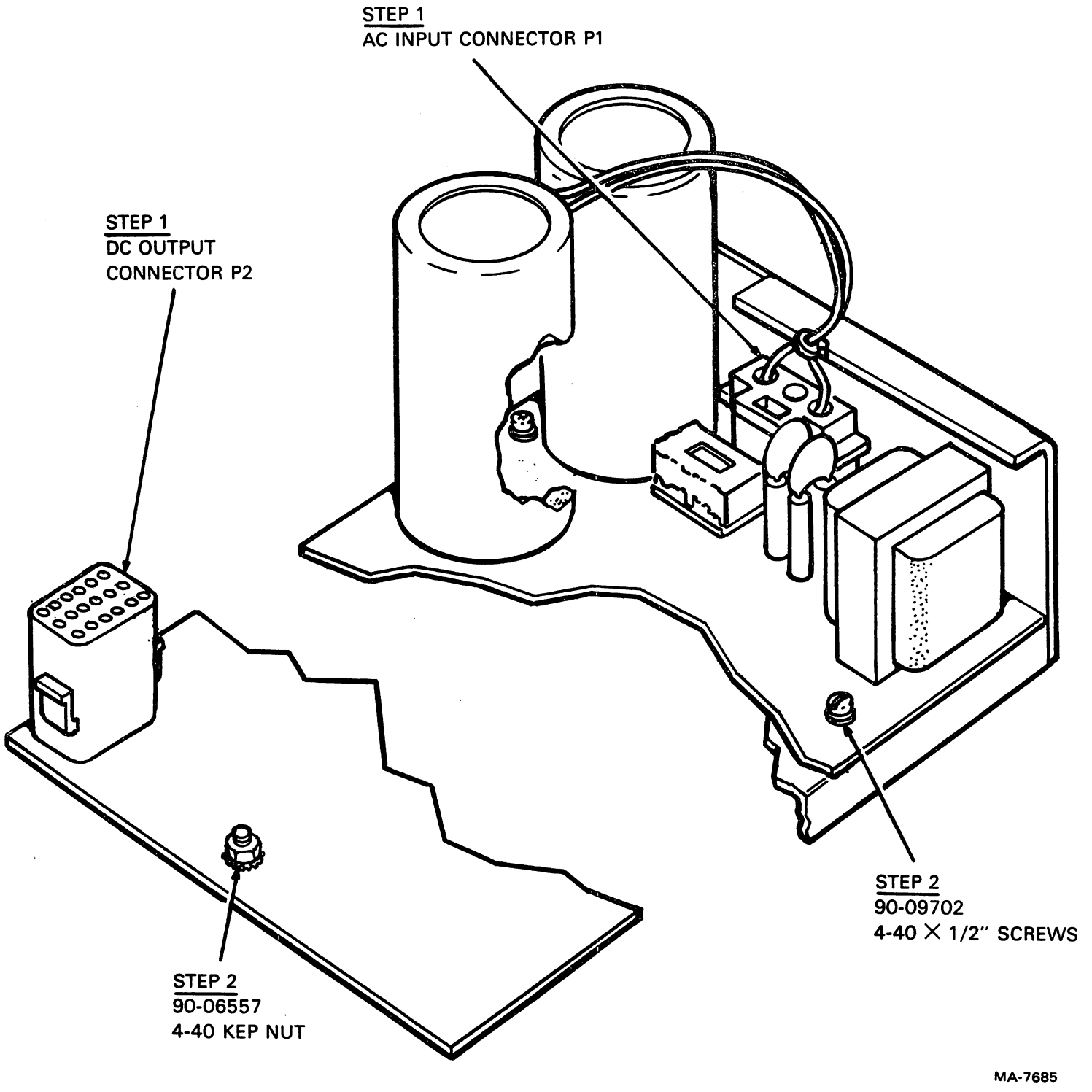


FIGURE 5-7 54-13343 Power Supply Board

4-40 X 1/2 inch screws which secure the board to the KBD01 base plate.

3. The board can now be lifted away from the chassis.

4. CAUTION -- When a replacement board is installed, be certain that the ac voltage selection switch is set for the correct line voltage.

5. The above procedure can be used in reverse for board replacement.

5.3.4 54-14608 LED Board

- The FAULT indicator light is tested for ten seconds each time power is applied to the KBD01 (during power-up self-test).

- The POWER indicator is on whenever correct dc voltages are present in the KBD01.

- REMOTE and SECURE indicators can be tested, at any time, by turning the KBD01 keyswitch to the corresponding position.

- The TEST indicator is only turned on in normal operation when a logical connection is in effect between the DDC/RDC host computer and the KBD01 as explained in Paragraph 3.2.3.

- The extensive self-test mode includes a test for LED indicator light operation.

A defective LED indicator light or other failure on the LED board will result in one or more indicators not lighting as expected. Normal KBD01 operation may not be affected by such a defect.

5.3.4.1 Removal and Replacement Procedure -- Part number references in this procedure are keyed to Figure 5-8.

1. Disconnect the 70-17855 cable connector from J1 on the 54-14608 LED board.

2. Remove the four 90-06020-01 6-32 X 1/4 inch screws and 90-06633 #6 lock washers at the corners of the board to release the board.

3. When installing the cable plug at J1, see that the "THIS SIDE UP" label is away from the surface of the board.

5.3.5 Keyswitch/Cable Assembly

The 70-17855 keyswitch/cable assembly wiring diagram is Figure 5-12. The mechanical assembly is shown in Figure 5-9. The keyswitch is an integral part of the cable assembly and is not expected to be replaced separately.

5.3.5.1 Removal and Replacement Procedure

1. Remove the 90-06036-01 8-32 X 5/16 inch screw and 90-06634 #8 lock washer that secures the 90-07081 cable clamp.

2. Cut the 90-07031 cable tie and dispose of it.

3. Release the nut and lock washer which secure the keyswitch to the mounting bracket. Pull the switch backward, out of its mounting hole.

4. When installing the switch, rotate the lock mechanism until it is aligned with the switch shaft; when tightening the mounting nut, see that the alignment peg on the switch body is seated.

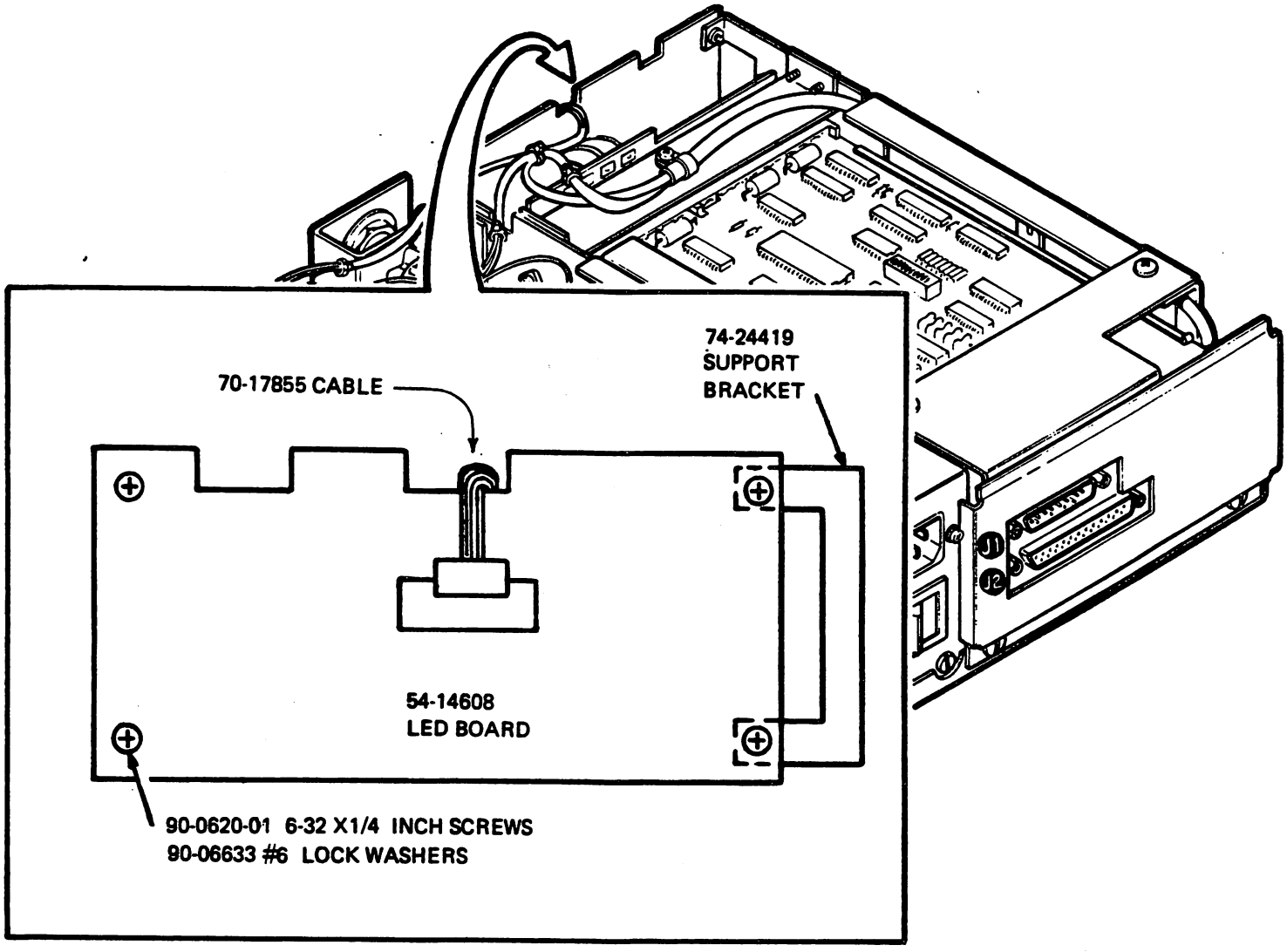


FIGURE 5-8 54-14608 LED Board

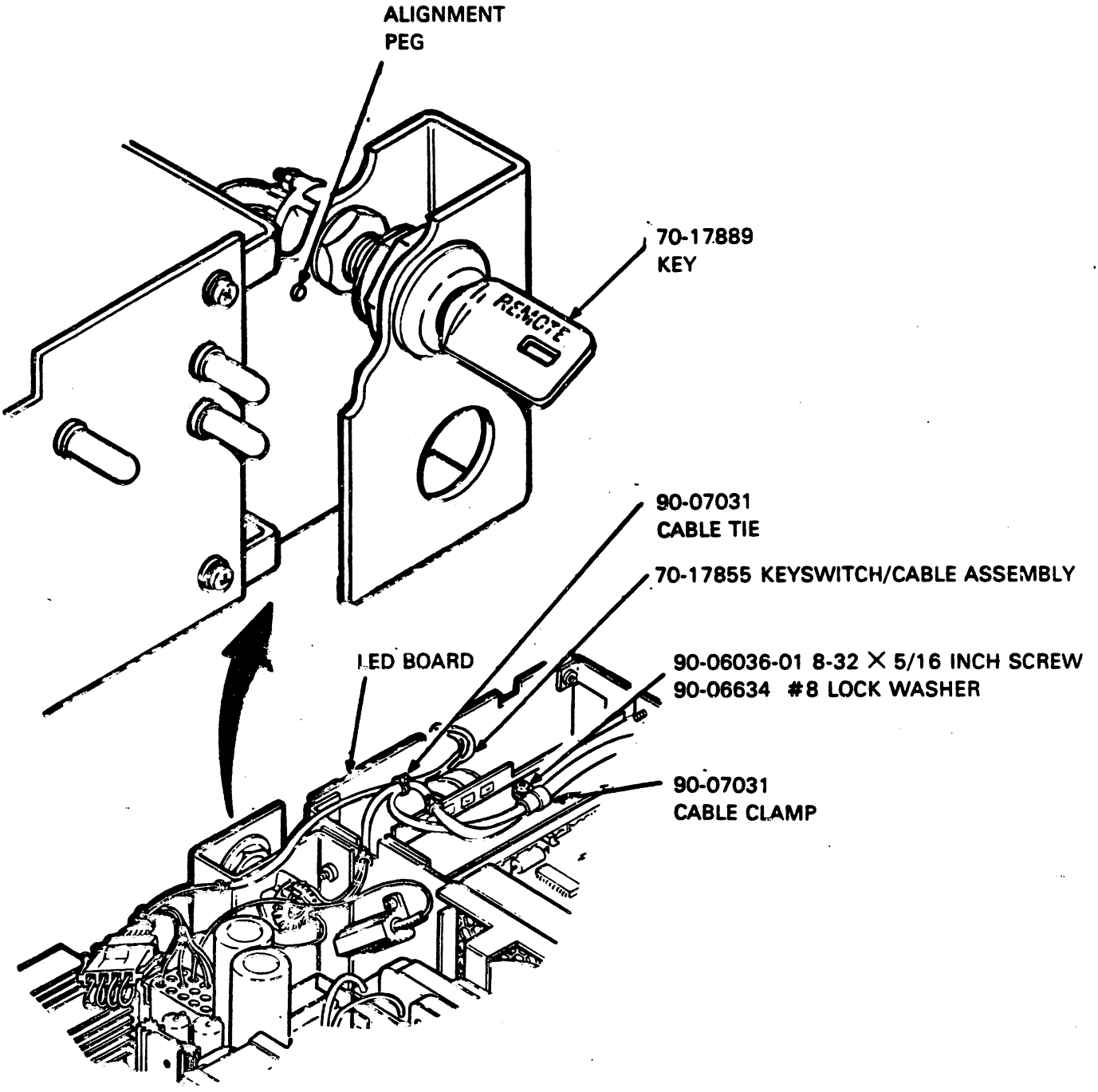


FIGURE 5-9 Keyswitch/Cable and Lock Assembly

5. Install the screw and lock washer removed in Step 1 and secure the cables with a cable tie.

5.3.6 Lock Mechanism and Key

The 12-17607 lock assembly is similiar to locks used on other DIGITAL equipment. However, the 70-17889 key is required for the KBD01; when the keyswitch is in PROGRAM position the key cannot be removed. This eliminates any possibility of the system being unintentionally "locked" in a maintenance mode.

The lock is secured to its mounting bracket with a nut and a 90-00037-04 lock washer (Figure 5-9). Removal of the lock mechanism requires only that the nut and washer be removed, there is no need to disassemble any other parts. Installation of the lock mechanism is done by aligning the lock slot to accept the switch shaft and tightening the nut.

5.3.7 Backplane Assembly

The 70-18176 backplane and power cable assembly includes a 54-14511 printed circuit board. It is an integral part of the card cage assembly.

5.3.7.1 Removal and Replacement Procedure -- Part number references in this procedure are keyed to Figure 5-10.

1. Remove the filter bracket and modules as described in Paragraph 5.3.1.1.

2. Cut the cable tie which secures the cables above the backplane.

3. Remove the 90-06036-01 8-32 X 5/16 inch screw and 90-06634 #8 lock washer which secure the 70-17855 cable assembly and the top center of the backplane. Move the cable aside.

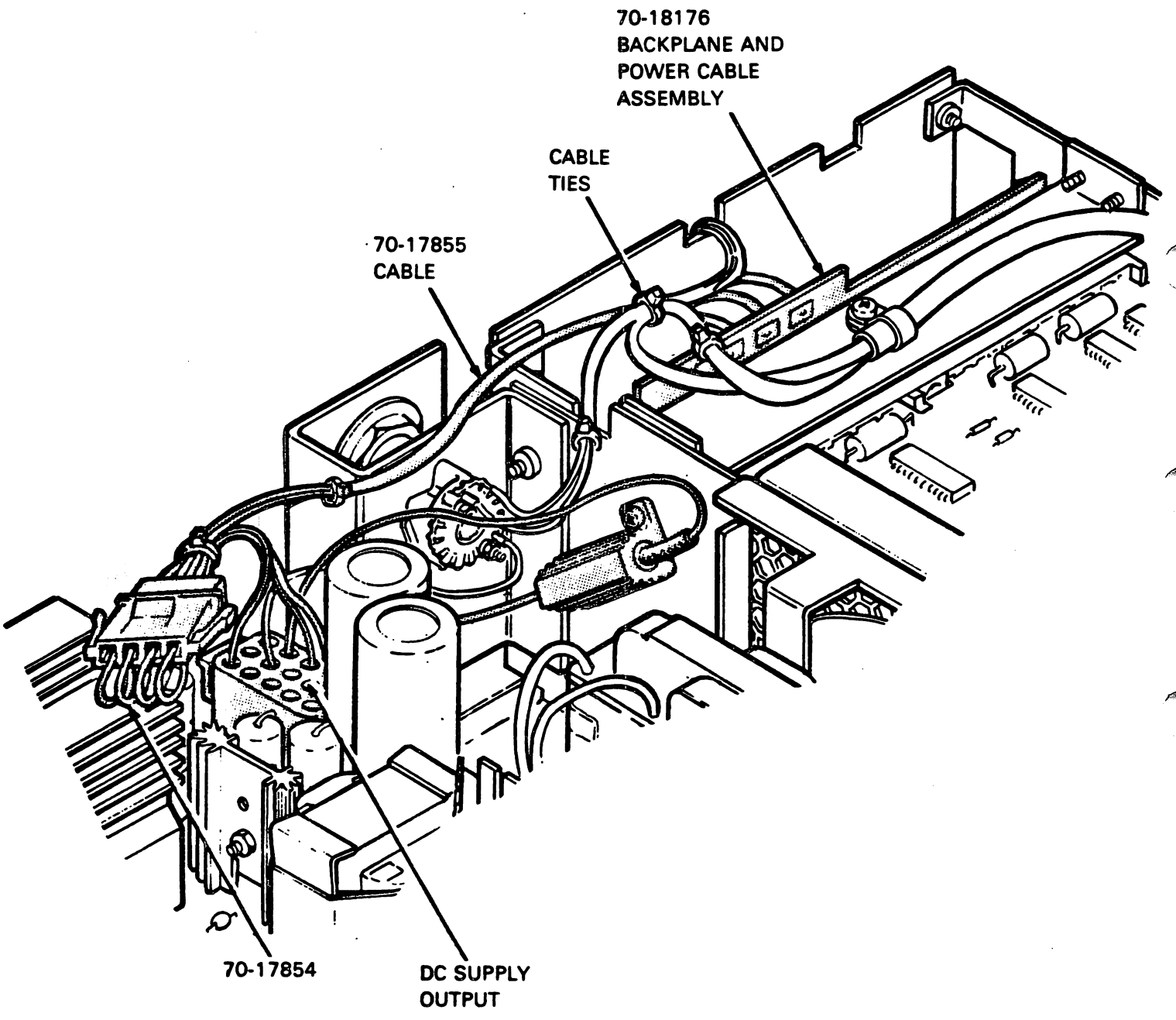


FIGURE 5-10 70-18176 Backplane and Power Cable Assembly

4. Cut the cable tie which secures the loop formed by the two cables. Separate the 70-17574 backplane cable from the 70-17854 dc power cable.

5. Remove the two 90-06070-03 10-32 X 5/16 inch screws and 90-06636 #10 lock washers which secure the card cage assembly to the KBD01 base. Lift the card cage away from the chassis.

6. Remove the 90-06036-01 8-32 X 5/16 inch screw and 90-06634 #8 lock washer which secure the bottom center of the backplane. The backplane can be removed.

7. Installation is done by using this procedure in reverse order.

5.3.8 Modem Failure

Information about modem operation, testing, selectable options, repair, and replacement can be found in Appendix A. Paragraph A-5, Modem Troubleshooting, may be useful when a modem failure is suspected.

5.3.9 KBD01 Cables

The KBD01 EIA interface at connector J1 on the M7366 CPU board is connected to the modem through a BC05D-06 cable. Those circuits, with pin number assignments and signal names, are shown in Figure A-1. The other KBD01 cables can be identified from Figure 2-2 or Figure 5-3. The wiring configurations for those cables are shown in Figures 5-11, 5-12, and 5-13.

5.4 INTERFACE SIGNALS

The following paragraphs describe the interface signals. All signals coming into the KBD01 are provided with two conductors. This permits operation with RS-422 balanced differential line drivers at the signal source, as well as RS-232C and RS-423

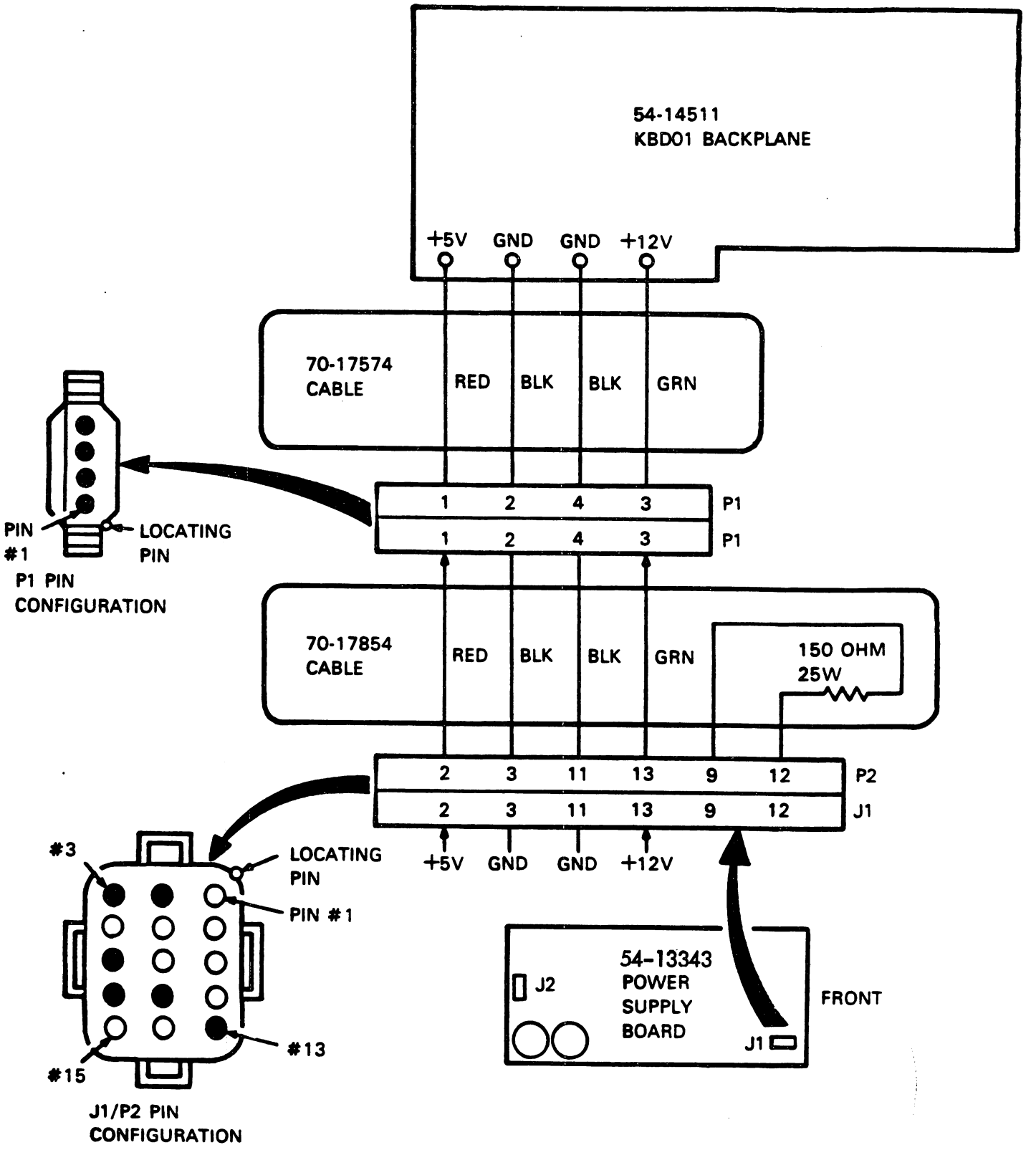


FIGURE 5-11 Power Supply to Backplane Cabling

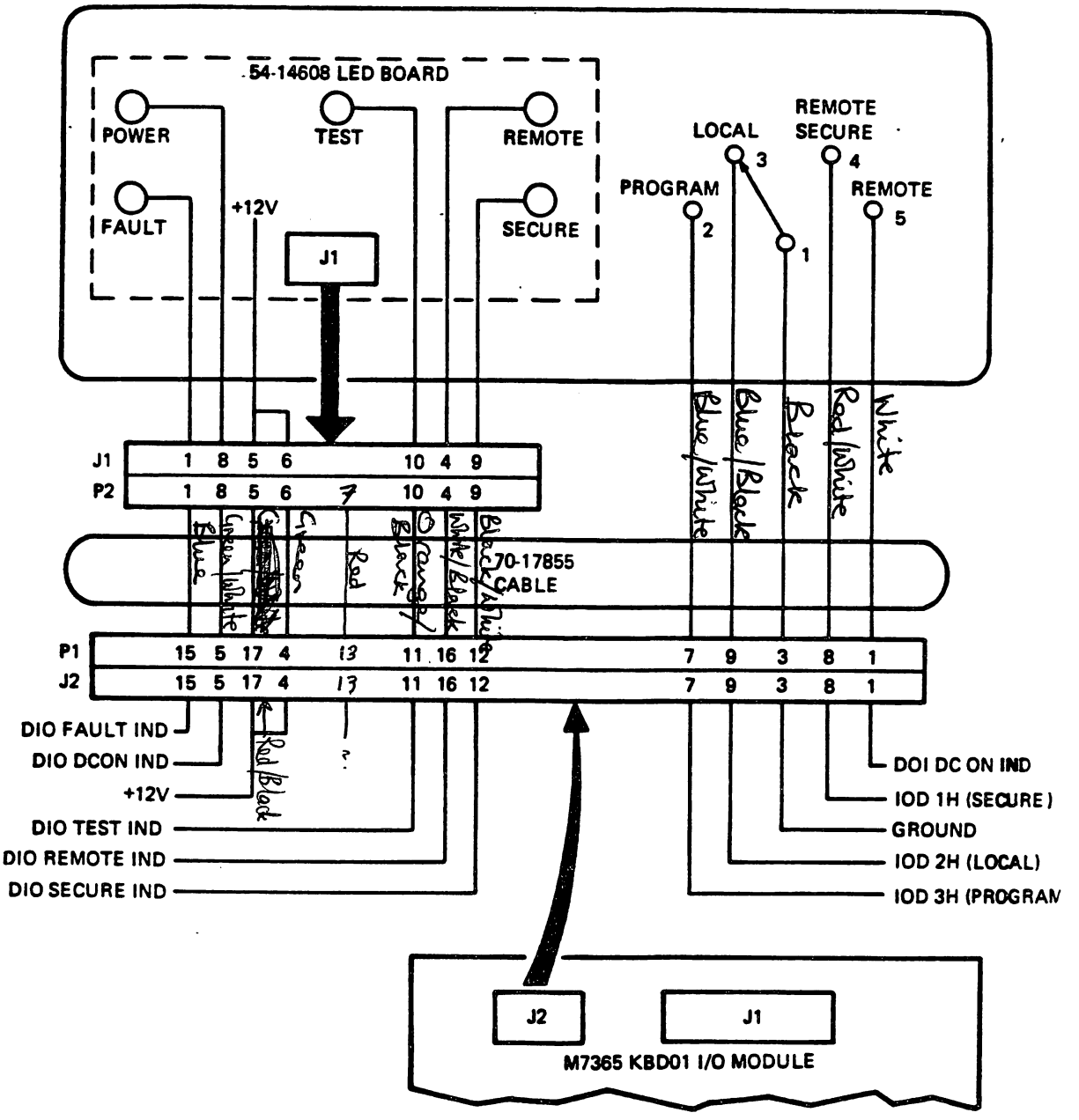


FIGURE 5-12 70-17855 Cable Wiring Diagram

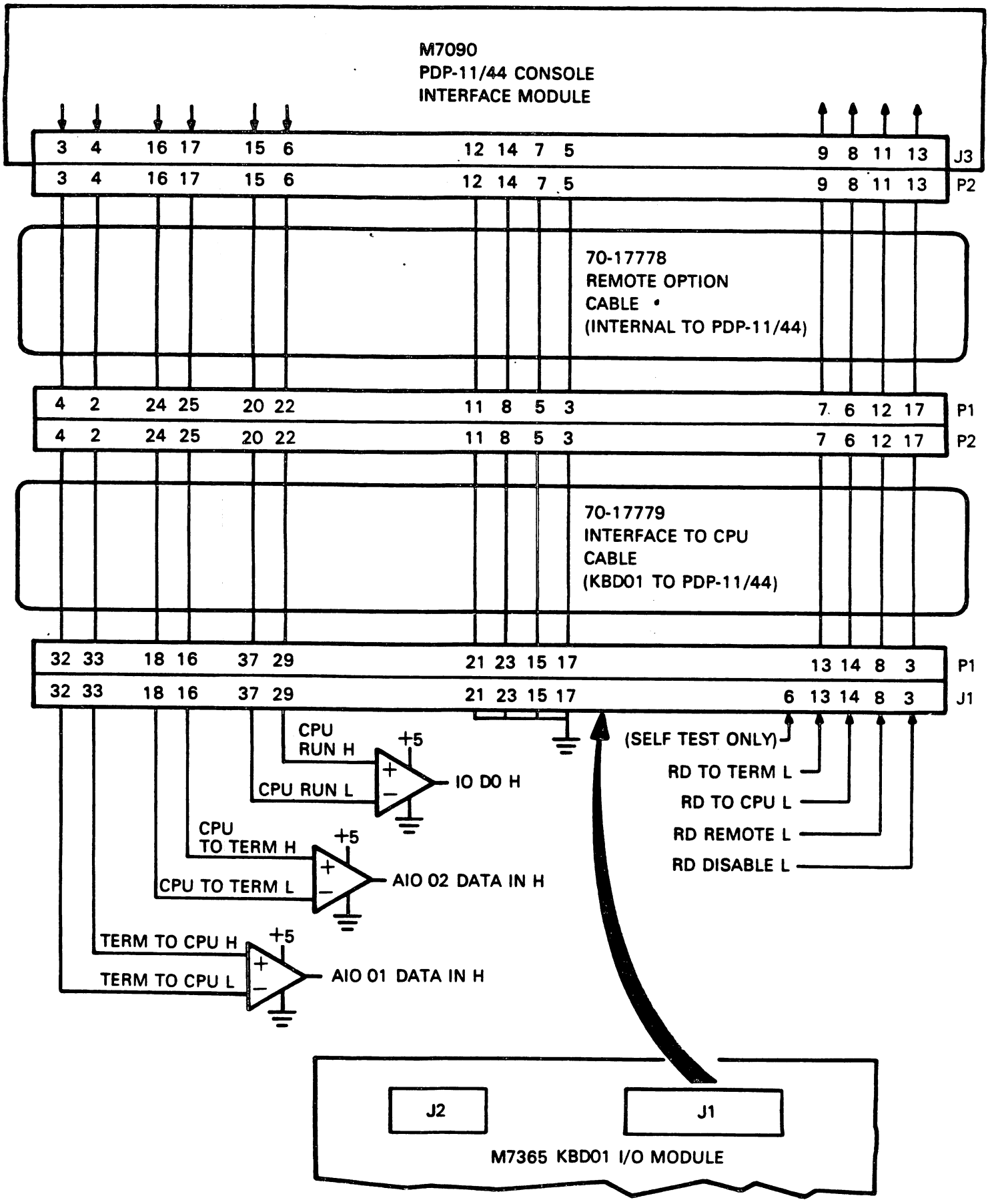


FIGURE 5-13 KBD01 to PDP-11/44 Interconnection

unbalanced line drivers. All signals going out of the KBDØ1 are carried on a single conductor. An outgoing signal common is provided for these signals. This implementation allows for compatibility with line receivers at the destination which conform to any of RS-232C, RS-423.

The meaning of the data paths named in Figure 5-13 are defined as follows:

CPU TO TERM
This is the serial data path that would normally flow from the CPU to the local terminal device. It carries data to be displayed at the terminal. The KBDØ1 intercepts this data path when the target system is placed in a remote access condition. The baud rate for this serial data path is normally variable by a user in order to permit selection of different terminal baud rates. When a remote access condition is in effect, however, the CPU forces this data path to the highest baud rate possible for the CPU's terminal interface.

RD TO CPU (TERM)
This is a serial data path from the KBDØ1 to the CPU which displaces the TERM TO CPU data path at the CPU when a remote access condition is in effect. As with the CPU TO TERM data path, the baud rate on this signal is forced to its highest value when a remote access condition is in effect.

RD REMOTE L
This discrete signal is asserted by the KBDØ1 to the CPU to indicate that a remote access condition is in effect. The PDP-11/44 reponds to this signal by relinquishing control of the panel lock/unlock function to the KBDØ1, and switching the appropriate serial data paths to the KBDØ1 for processing.

RD DISABLE L
This discrete signal is asserted by the KBDØ1 to the CPU when the

keyswitch is in the REMOTE SECURE position. Its purpose is to force a panel lock condition. The PDP-11/44 recognizes this signal as forcing panel lock when it is in a remote access condition, otherwise, this signal is ignored.

CPU RUN

This signal from the CPU to the KBDØ1 indicates that the CPU is executing instructions; i.e., is not in a halted state.

RD TO TERM

This is a serial data path from the KBDØ1 to the local terminal. When a remote access condition is in effect from the target system, this data path displaces the CPU TO TERM data path which would normally be connected to the local terminal. The baud rates which the KBDØ1 supports on this signal path are the full range of baud rates that may be selected by the DIP switches (5Ø to 96ØØ baud).

TERM TO CPU

This is the serial data path from the local terminal to the CPU. During normal operation, this carries data from the local terminal keyboard to the CPU. It is intercepted by the KBDØ1 when a remote access condition is in effect. Just as for the RD TO TERM data path, the full range of terminal baud rates is supported by the KBDØ1. The KBDØ1 ia capable of operating the RD TO TERM and TERM TO CPU baud rates at split speeds and so provides full compatability with all DIGITAL terminals.

RD GROUND

This signal provides a connection between the logic references on the KBDØ1, the PDP-11/44, the console terminal, and the modem. It conforms to the RS-449 SIGNAL GROUND circuit. It should not be tied to any of the differential line receiver inputs on the destination devices.

APPENDIX A
MODEM INFORMATION

A.1 INTERFACE TO COMMON CARRIER NETWORK

All the KBDØ1 installations are dependent on telephone lines for their remote diagnosis function. There are many possible telephone hardware configurations, all controlled by government regulations which are not the same from country to country.

All KBDØ1 remote diagnosis option kits are identical in their fuctions with the exception of their modems and their modem signal controlling capabilities. Paragraph A.8 describes the necessary functional characteristics of modems that are used with DIGITAL remote diagnosis devices.

Figure A-1 shows the KBDØ1/modem interface and identifies connector pin numbers and their signals.

The KBDØ1 remote port is connected to the modem by a BCØ5D-Ø6 cable.

When the KBDØ1 is installed in England, use of the BCØ5D-Ø6 EIA extension cable is optional. It may be used to extend the distance between the modem and the KBDØ1 by 6 feet. The BCØ5D-Ø6 must be connected to the modem. GPO regulations state that the cable connected to the digital output must include protective diodes. The BC99N cable, which includes protective diodes, must be connected at the KBDØ1. The BC99N is not included in the KBDØ1-BA kit, but is added by the U.K. RDC before shipment.

A.2 MODEMS -- CANADA

The KBDØ1-BA kit is for installation in Canada. It is different from the KBDØ1-AA kit (U.S.A.) only in that it does not include a modem. In Canada, the customer must provide a voice grade telephone line and Bell 1Ø3J modem (or one with corresponding characteristics). All arrangements for, and costs for, the

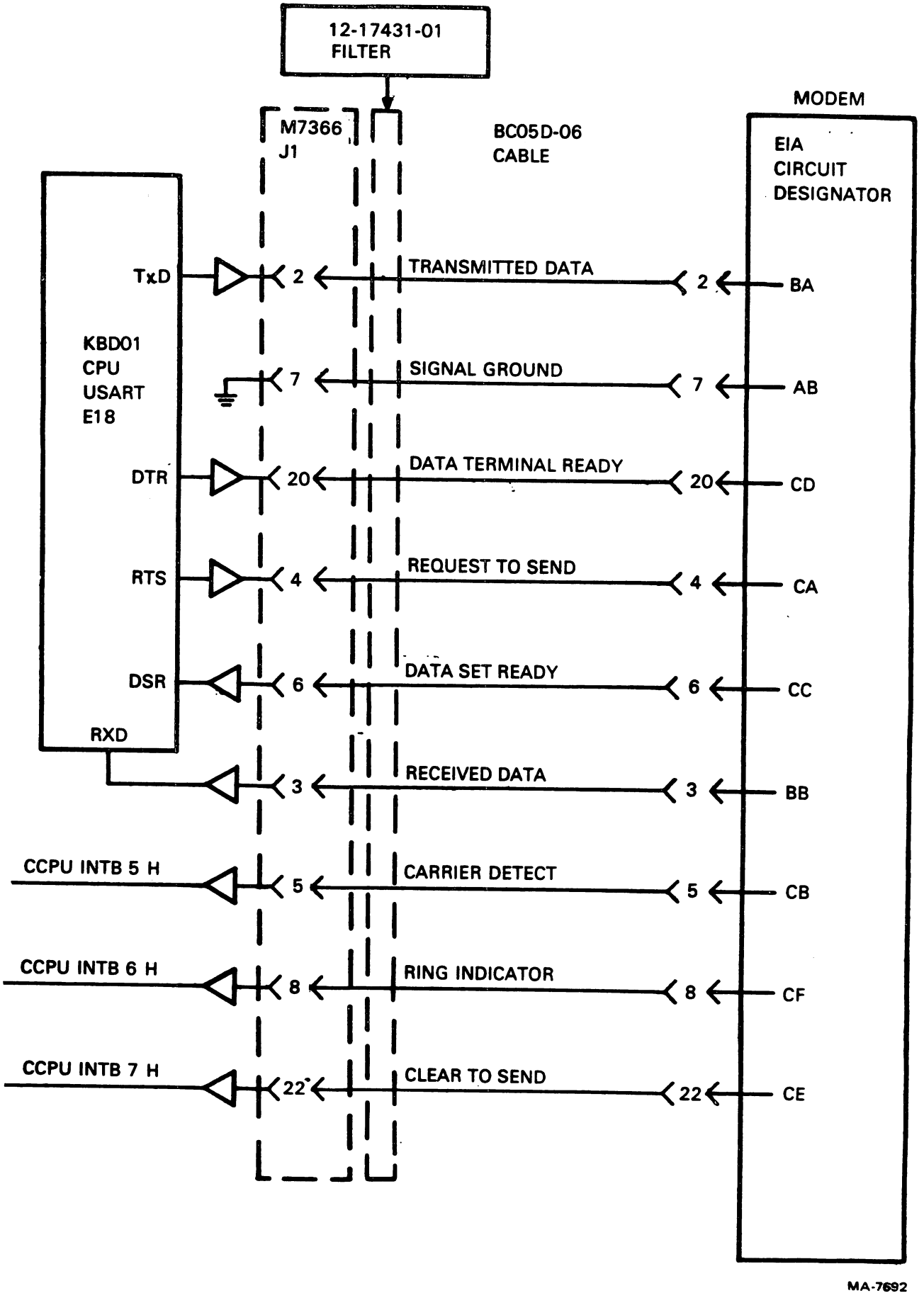


FIGURE A-1 KBD01-to-Modem Signal Flow Diagram

installation and maintenance of the line and modem are the reposibility of the customer.

Option state needed for the KBDØ1-BA are shown in Table A-1.

A.3 MODEMS -- ENGLAND AND THE REST OF EUROPE

England and Germany have stringent regulations controlling the connection of data communications equipment to the telephone network. Connection approval must be obtained from their telecommunications authorities which are the BPO in England and the FTZ in Germany. The KBDØ1 option agrees with CCITT .V24 and .V21 recommendations for interface sequences and CCITT .V28 recommendations for the electrical characteristics of binary interfaces and has been given both BPO and FTZ approval.

The KBDØ1-BA kit does not include a modem; the modem must be provided by the telecommunications authority of the country in which installation is made. This manual, and this appendix specifically, describes KBDØ1 logic detail to help in the installation of any compatible modem. Option state needed for the KBDØ1-BA are shown in Table A-1.

A.4 MODEMS -- UNITED STATES

The KBDØ1-AA remote diagnosis option kit, for installation in the U.S.A., includes a 3Ø-15949 (made by a vendor) or DFØ2 (made by DIGITAL) standalone modem. Standalone here means not designed to be installed in a rack or other chassis.

These modems are factory configured for remote diagnosis operation as defined by Digital Purchase Specifications A-PS-3Ø15949-Ø-Ø. The modem option states are shown in Table A-1. Paragraph A.8 provides a signal level description of remote diagnosis modem operation, including call answering, establishing a logical connection, and call termination. In addition, each modem included in a kit comes with a manual which has specific operating detail. Paragraphs A.4.1, A.4.2, and A.4.3 provide information which is

specific to each of the three types of modems.

A.4.1 RACAL-VADIC MODEM

The KBD01-AA option kit may include a Racal-Vadic modem, model VA355P, FCC registration number AJ496M-70263-DM-N. Field installation of this stand-alone unit requires only that its cables be connected to ac power and to the RJ11C data jack, and that the BC05D-06 digital I/O cable be connected to it. Figure A-2 shows the required IN/OUT, ON/OFF states of option jumpers and switches and shows their locations on the board. The option jumpers and switches are set at the factory for operation with the KBD01. Additional information about Racal-Vadic option jumpers and switches can be found in the vendor manual which is shipped with the modem.

A.4.2 GDC MODEM

The KBD01-AA kit may include a GDC modem, model 103A3, FCC registration number AG697J-62418-DM-E. Field installation of this stand-alone unit requires only that its cables be connected to ac power and to the RJ11C data jack and that the BC05D-06 digital I/O cable be connected to it. Figure A-3 shows the required IN/OUT, ON/OFF states of option jumpers and switches and shows their locations on the board. The option jumpers and switches are set at the factory for operation with the KBD01. Additional information about GDC option jumpers and switches can be found in the vendor manual which is shipped with the modem.

A.4.3 DIGITAL DF02 MODEM

The KBD01-AA option kit may include a DF02 modem which is made by DIGITAL. Its FCC registration number is A0994Q-67693-DM-R. Field installation of this stand-alone unit requires only that its cables be connected to ac power and to the RJ11C data jack and that the BC05D-06 digital I/O cable be connected to it.
Figures A-4 and A-5 show the required states and the locations of jumpers on the DF02 interface board and on the modem board respectively.

Table A-1 Modem Option States

DESCRIPTION	PREDETERMINED STATE		
	ON STATE	OFF STATE	CONDITION
Originate/Answer	X		
Automatic/Answer	X		
Data Set Ready (CC) in Analog Loop	X		
Loss of Carrier Disconnect (LCD)		X	
Abort Timer (ABT): Shall allow Data Set Disconnects when handshaking does not take place. Delay Time: 17.0 Sec. minimum 30.0 Sec. maximum	X		
Receive Space Disconnect (RSD)		X	
Send Space Disconnect (Immediate)		X	
Transmit Reversals in Manual Analog Loop		X	
Answer Mode Indication (CE)		X	
Early Data Set Ready (CC) Indication: Shall cause Data Set Ready (CC) to be asserted when the "Modem" is connected to the switched network rather than when the called station's carrier is detected.	X		
Make Busy (CN Circuit)		X	
Fail safe State of CN		X	
Common Ringer		X	
RTS Control			DTE Mode
DTR Control			DTE Mode
Analog Loop			DTE Mode
Disconnect (Unattended)			DTE Mode
CB–CF (Com/Sep)			Shall be Separate
Grounding AA/AB COM/SEP			Shall be Common
Remote Telephone Operation (REM OPR)			Remote

The option jumpers are set at the factory for operation with the KBD01. Additional information about DF02 option jumper configuration can be found in the DF02 Modem User Guide, EK-ODF02-UG, which is shipped with the modem.

A.5 MODEM TROUBLESHOOTING

Instruction manuals which are included with modems have troubleshooting and testing information. These provide specific instructions for setting-up test modes and explain test procedures. The information provided here is for modems of many types used with the KBDØ1 remote diagnosis option.

The basic modem test is to call the telephone number of the line dedicated to the KBDØ1, hear the ringing signal followed by the carrier signal which indicates that the modem has answered the call, then hang up.

The basic procedure may produce failure indications:

a. If a busy signal is heard, incorrect jumper or switch configuration of the modem is a probable cause. This appendix provides modem set-up information. If the modem was not provided by DIGITAL, determine that the correct type modem was installed.

b. If the ringing signal continues and the modem does not answer with a carrier tone, that could indicate a modem with no power. This indication could also result from any failure of the KBDØ1 to assert DTR to the modem or from not having the keyswitch in a REMOTE position.

DESCRIPTIONS OF PROGRAM AND EXTENSIVE SELF-TEST MODEM TESTS

A.6 MODEM REPAIR

Modem repair is also regulated by government. A defective modem

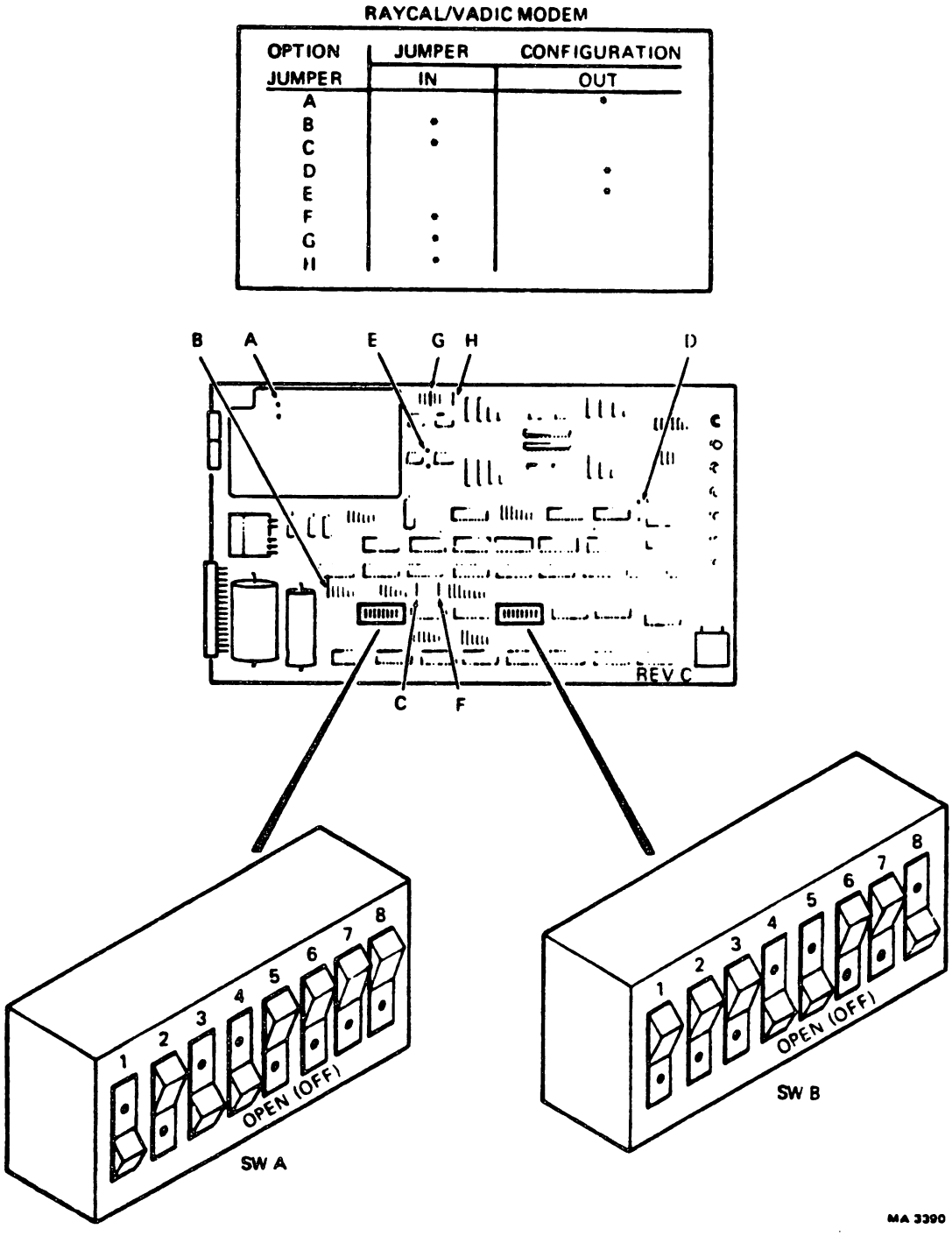


FIGURE A-2 Vadic Jumper Configuration and Switch Settings

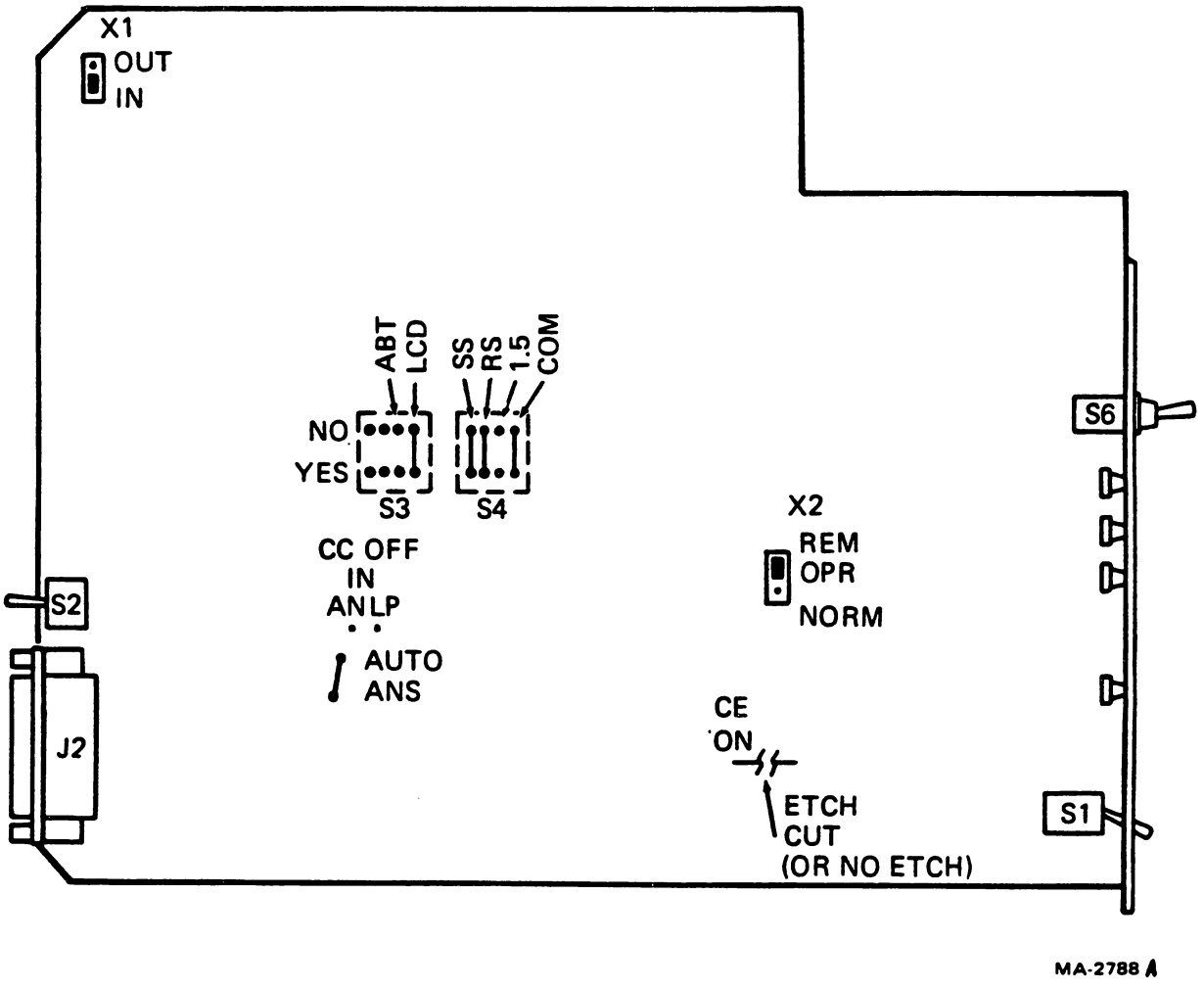


FIGURE A-3 GDC Jumper Configuration and Switch Setting

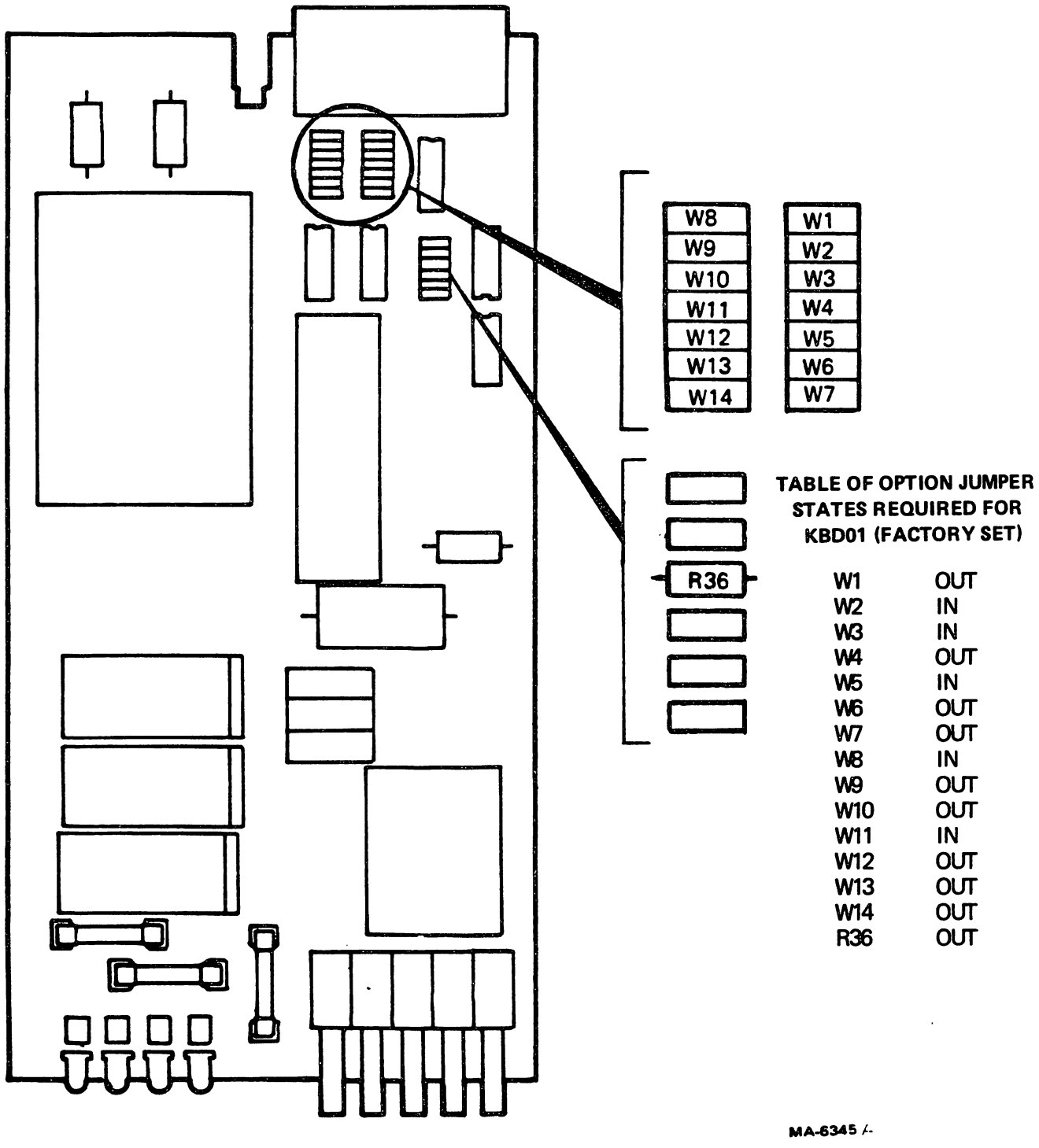


FIGURE A-4 DF02 Interface Board Jumpers

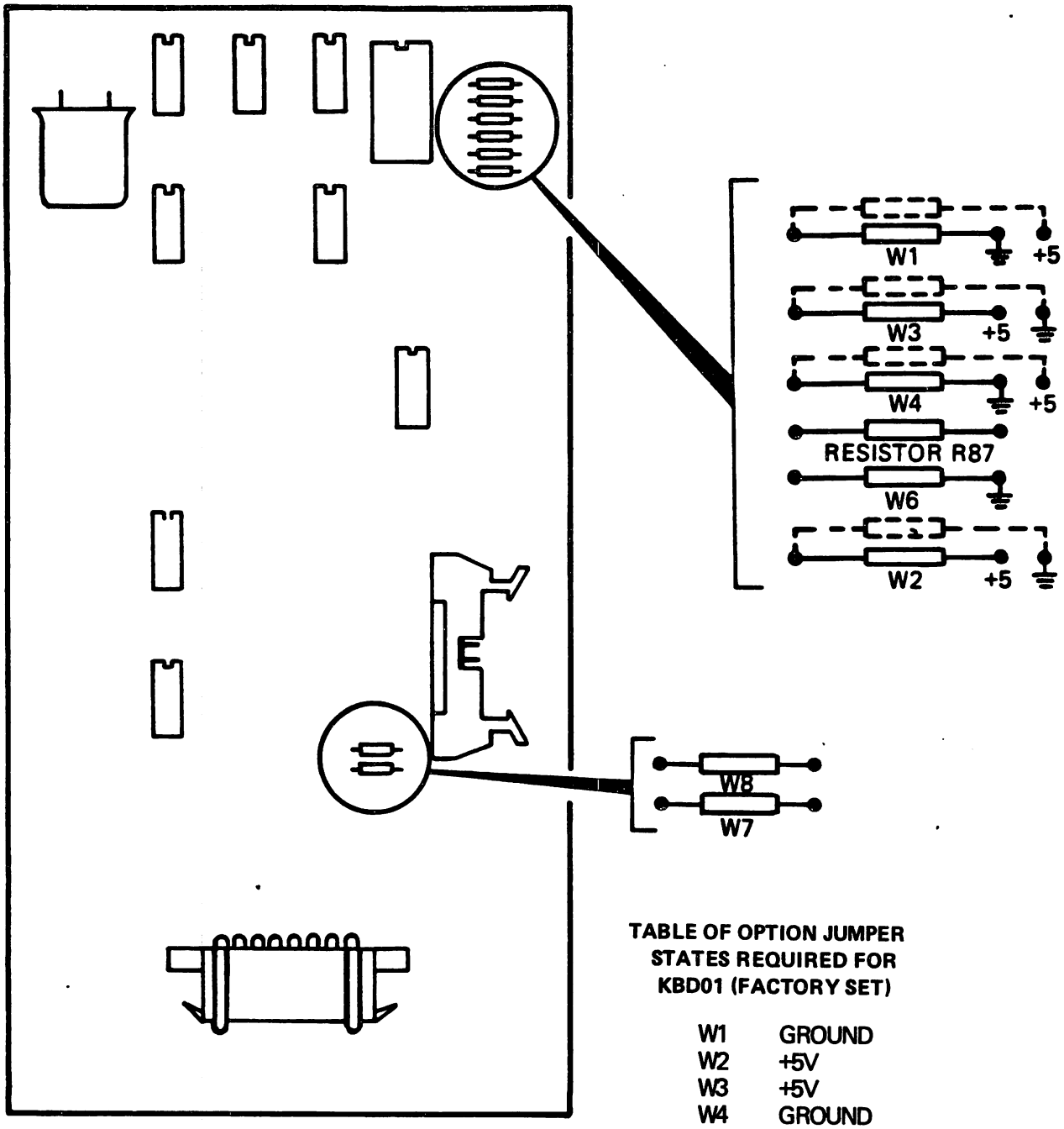


TABLE OF OPTION JUMPER STATES REQUIRED FOR KBD01 (FACTORY SET)

W1	GROUND
W2	+5V
W3	+5V
W4	GROUND
W6	IN
W7	IN
W8	IN

FIGURE A-5 DF02 Modem Board Jumpers

which is connected to a telephone line may not be repaired except by the manufacturer or an authorized agent. As a result, unit swapping is routine when a modem which was provided by DIGITAL fails. It is important that both DIGITAL and customer personnel know that the telephone company must be told if an installed modem is replaced by a unit which has a different F.C.C. (U.S.A.) registration number. The on-site Field Service Engineer is responsible for telling customer personnel about any such change and providing them with the information which they must have for the telephone company. Table 4-1 is a source of that information.

A.7 FCC REGULATIONS (U.S.A.)

Vendor modems which are provided by DIGITAL come with a manual that includes excerpts of government (F.C.C.) regulations which apply to users of that equipment. Excerpts that apply to KBDØ1 users are included here. The customer is responsible for compliance with these regulations. Site personnel should be advised that they may have to perform specific actions in the event of modem or telephone line problems.

FCC RULES SECTION 68.1Ø4 -- MEANS OF CONNECTION

a. General

Except for telephone company-provided ringers and except as provided in subsection (c), all connections to the telephone network shall be made through the standard plugs and standard telephone company-provided jacks, or equivalent, described in Subpart F, in such a manner as to allow for easy and immediate disconnection of the terminal equipment. Standard jacks shall be so arranged that, if the plug connected thereto is withdrawn, no interference to the operation of equipment at the customer's premises which remains connected to the telephone network, shall occur by reason of such withdrawal.

b. Data Equipment

Where a customer desires to connect data equipment which has been registered in accordance with Section 68.308 (a) (4) (i) or (ii), he shall notify the telephone company of each telephone line to which he intends to connect such equipment. The telephone company, after determining the attenuation of such telephone line between the interface and the telephone company central office, will make such connections as are necessary in each standard data jack which it will install, so as to allow the maximum signal power delivered by such data equipment to the telephone company central office to reach but not exceed the maximum allowable signal power permitted at the telephone company central office.

STANDARD DATA JACKS

The Standard Data Jacks with which the FCC-registered model(s) of the data set covered in the attached technical manual will connect are listed and briefly described in the manual.

FCC RULES SECTION 68.106 -- NOTIFICATION TO TELEPHONE COMPANY

"Customers connecting terminal equipment to the telephone network shall, before such connection is made, give notice to the telephone company of the particular line(s) to which such connection is to be made and shall provide to the telephone company the F.C.C. Registration Number and the Ringer Equivalence Number of the registered terminal equipment or registered protective circuitry."

FCC REGISTRATION NUMBER AND RINGER EQUIVALENCE NUMBER

The FCC registration Number and Ringer Equivalence Number are

contained on the label on the registered equipment.

FCC RULES SECTION 68.1Ø8 -- INCIDENCE OF HARM

"Should terminal equipment cause harm to the telephone network, the telephone company shall, where practicable, notify the customer that temporary discontinuance of service may be required; however, where prior notice is not practicable, the telephone company may temporarily discontinue service forthwith, if such action is reasonable in the circumstances. In case of such temporary discontinuance, the telephone company shall (1) promptly notify the customer of such temporary discontinuance, (2) afford the customer the opportunity to correct the situation which gave rise to the temporary discontinuance, and (3) inform the customer of his right to bring a complaint to the Commission pursuant to the procedures set out in Subpart E of this part."

FCC RULES SECTION 68-11Ø -- COMPATABILITY OF THE TELPHONE NETWORK AND TERMINAL EQUIPMENT

b. Changes in Telephone Company Facilities, Equipment, Operations or Procedures

The telephone company may make changes in its communications facilities, equipment, operations or procedures, where such action is reasonably required in the operation of its business and is not inconsistent with the rules and regulations in the Part. If such changes can be reasonably expected to render any customer's terminal equipment incompatible with telephone company communications facilities, or require modification or alternation of such terminal equipment, or otherwise materially affect its use or performance, the customer shall be given adequate notice in writing, to allow the customer an opportunity to maintain uninterrupted service.

FCC RULES, SECTION 68.218 (b) -- INSTRUCTION TO USER

2....registered terminal equipment or protective circuitry may not be used with party lines or coin lines.

3....when trouble is experienced the customer shall disconnect the registered equipment from the telephone line to determine if the registered equipment is determined to be malfunctioning, the use of such equipment shall be discontinued until the problem has been corrected.

4....the user must give notice to the telephone company in accordance with the requirements of Section 68.1Ø6.

A.8 MODEM OPERATION CHARACTERISTICS

The following paragraphs define the required functional characteristics of modems used with DIGITAL remote diagnosis devices. Those devices operate with the following characteristics:

- o 3ØØ baud serial data communication
- o Asynchronous (start/stop) character framing (one start bit, eight data bits, no parity bits, one stop bit)
- o Full duplex
- o Automatic Answer
- o Automatic disconnect

A.8.1 DEFINITIONS

Table A-2 defines the signals recognized by the remote diagnosis device and modem. The table lists the signal name, followed by the EIA RS-232C circuit name, the CCITT V.24 circuit number, the position on a 25-pin D-type connector, and the signal definition.

Table A-2 Signal Definitions

Name	RS-232C	V.24	25-pin	Definition
GND	AA	101	1	Protective ground. This signal provides a path between the remote diagnosis device and the modem for the discharge of spurious potentials, such as static electricity.
GND	AB	102	7	Signal ground. This signal provides a reference level for the data and control signals that follow in this table.
TxD	BA	103	2	Transmit data (KBD01 to modem). This signal contains the serial bit stream to be sent from the KBD01 to the calling station.
RxD	BB	104	3	Receive Data (modem to KBD01). This signal contains the serial bit stream received by the modem from the calling station.
RTS	CA	105	4	Request To Send (KBD01 to modem). This signal is asserted by the KBD01, causing the carrier signal to be placed on the line. Called the station's answer mode carrier.
CTS	CB	106	5	Clear To send (modem to KBD01). This signal is asserted by the modem to indicate that it has successfully placed its carrier signal on the line.
DSR	CC	107	6	Data Set Ready (modem to KBD01). This signal indicates to the KBD01 that the telephone has been answered (the telephone is "off hook").
DTR	CD	108/2	20	Data Terminal Ready (KBD01 to modem). This signal is asserted by the KBD01, enabling telephone answering when a ring occurs.
RI	CE	125	22	Ring Indicator (modem to KBD01). This signal is monitored by the KBD01 to determine when a ring occurs (when a DDC host is attempting to call the system).
CD	CF	109	8	Carrier Detect (modem to KBD01). This signal is asserted by the modem to indicate that the calling station's carrier signal has been detected.

A.8.2 CALL REQUIREMENTS

The following paragraphs detail the procedure for sucessful completion of call answering and termination.

A.8.2.1 AUTOMATIC CALL ANSWERING

Automatic call answering is enabled as follows (Figures A-6 and A-8).

Set the front-panel keyswitch to either the REMOTE/DISABLE or REMOTE position. All KBDØ1 signals (DTR, RTS) are cleared and data line TxD inhibited (held at binary 1). All modem signals (RI, DSR, CTS, CD) are cleared and line RxD inhibited (held at binary 1). The Data Terminal Ready (DTR) signal is now asserted by the KBDØ1 and call answering enabled.

When the KBDØ1 asserts data terminal ready, the modem attempts to answer the phone when it detects at least one Ring Indicator (RI) signal. When the phone is answered, the modem asserts Data Set Ready (DSR). Once the KBDØ1 detects DSR, DTR may not be deasserted for five seconds, unless the KBDØ1 has also detected CD. When DSR is detected, the KBDØ1 asserts the Request To Send (RTS) signal.

The modem responds to the assertion of RTS by placing its carrier signal or answer tone on the line. When a carrier signal is received from the calling station, the modem responds by asserting the Carrier Detect (CD) signal and then asserting the Clear To Send (CTS) signal (7ØØ $\pm$ -3ØØ ms later). Note, however, that whenever CD is OFF, RXD is held at binary 1. The CD and CTS signals must be detected by the KBDØ1 within 2Ø seconds of the assertion of RTS, or the call is terminated.

Once the KBDØ1 receives CD and CTS, a dialogue between the KBDØ1 and calling station is initiated. This dialogue, or logical connection, (described more fully Paragraph A.8.2.2) consists of a series of data transfers via RxD and TxD, and must be successfully

completed before diagnostic operations can begin. TxD and RxD are subject to the following restrictions and conditions.

With signals RTS, CTS, DSR, and DTR on, data may be transmitted on TxD until any of these four signals goes off. While these signals are on, TxD is held in a binary 1 condition if there is no data being transmitted. If any of signals RTS, CTS, DSR, or DTR go off, data flow is inhibited and TxD returned to a binary 1 state.

A logical connection must be completed within 20 seconds after CD and CTS are detected or the call is terminated. During a logical connection, loss of any one of signals DSR, CTS or CD, or the receipt of a SPACE condition (binary 0) on RxD for more than one second also will terminate the call.

Once a logical connection is completed, call answering is considered complete and a valid connection in effect. At this point, the diagnostic process may proceed.

Note, that during call answering, but before logical connection, loss of any one of signals DSR, CD, or CTS for more than 500 ms results in call termination. Signal glitches less than 500 ms are ignored until a logical connection is established.

A.8.2.2 ESTABLISHING A LOGICAL CONNECTION

Once the modem asserts CD and CTS, the KBD01 recognizes data received on RxD only if these data are in the form of a protocol message. The protocol is a modified subset of the DIGITAL Data Communication Protocol (DDCMP) for ASCII serial communications. A logical connection is in effect if a valid protocol message packet is received from the calling station.

Successful completion of this transaction within 20 seconds after the modem asserts CD and CTS constitues the establishment of a logical connection.

A.8.2.3 CALL TERMINATION (ABORT SEQUENCE)

A call is terminated if during a call answering routine, key signals are not detected within the established time frame, or are lost. Call termination can also be accomplished by the DDC host (by removing its carrier signal, which results in the loss of CD) or by a local operator (setting the keyswitch to LOCAL) via the KBDØ1. Refer to Figures A-7 and A-9).

Once termination is initiated, the KBDØ1 inhibits the data flow on TxD and deasserts DTR and RTS. A "CARRIER LOST" message is printed on the system console terminal. The modem then monitors the states of signals RI, DSR, CTS, CD, and RxD. These must be detected as cleared to successfully complete the call termination.

DTR remains deasserted for two seconds following termination, before being reasserted to enable call answering. In addition, during this two second delay period RTS must remain cleared, and data cannot be placed on TxD. Note, that DSR and CTS must be cleared by the modem before DTR and RTS can be reasserted.

If the call termination was initiated by placing the KBDØ1 keyswitch in the LOCAL position, DTR and RTS are automatically cleared (as described above) but remain deasserted. Call answering is not enabled until the switch is returned to the REMOTE/SECURE or REMOTE position, where DTR can be asserted.

It is assumed that, an entry, the KBDØ1 keyswitch is in a REMOTE position and that RI, DSR, CD, CTS, and RxD are clear.

It is assumed that the KBDØ1 keyswitch is in a REMOTE position.

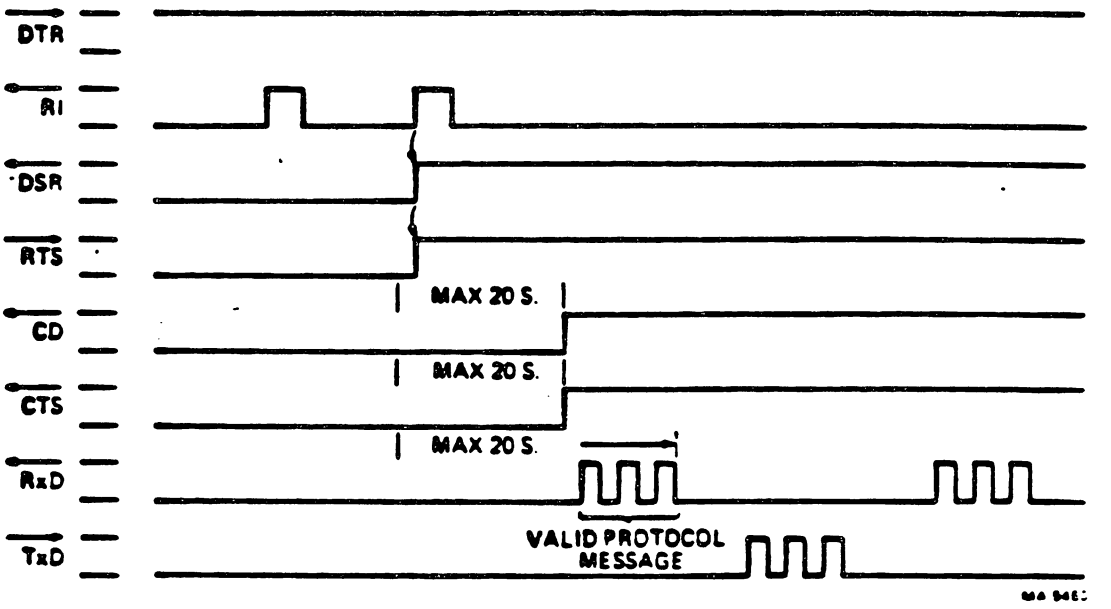


Figure A-6 Automatic Call Answering Sequence

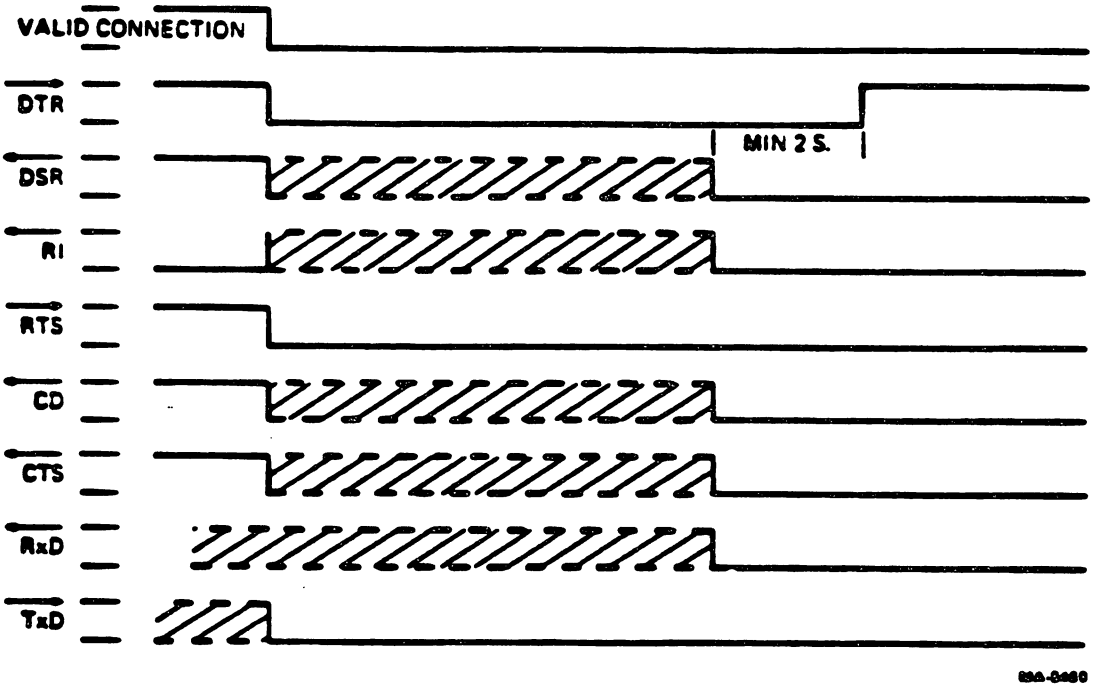
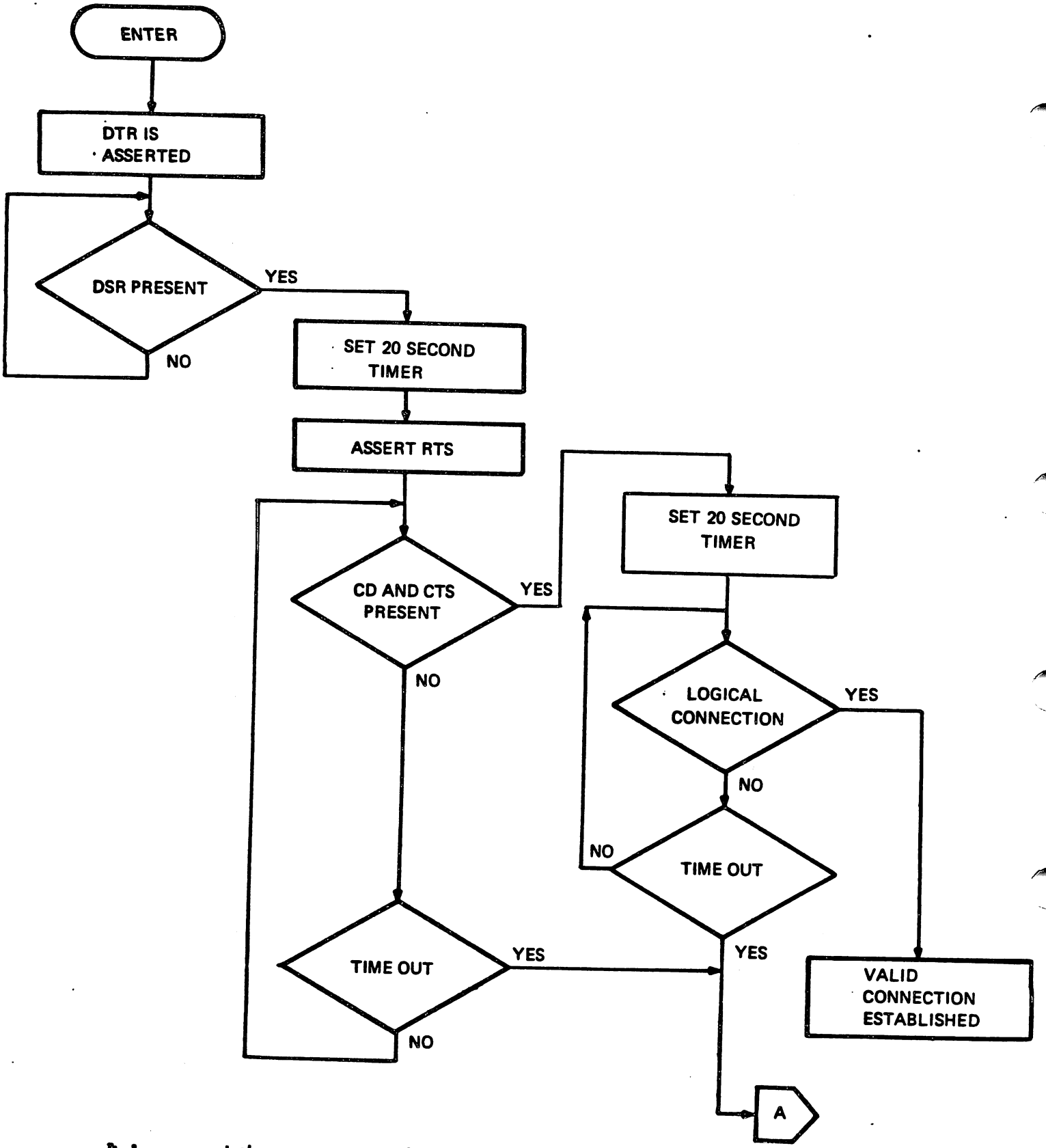


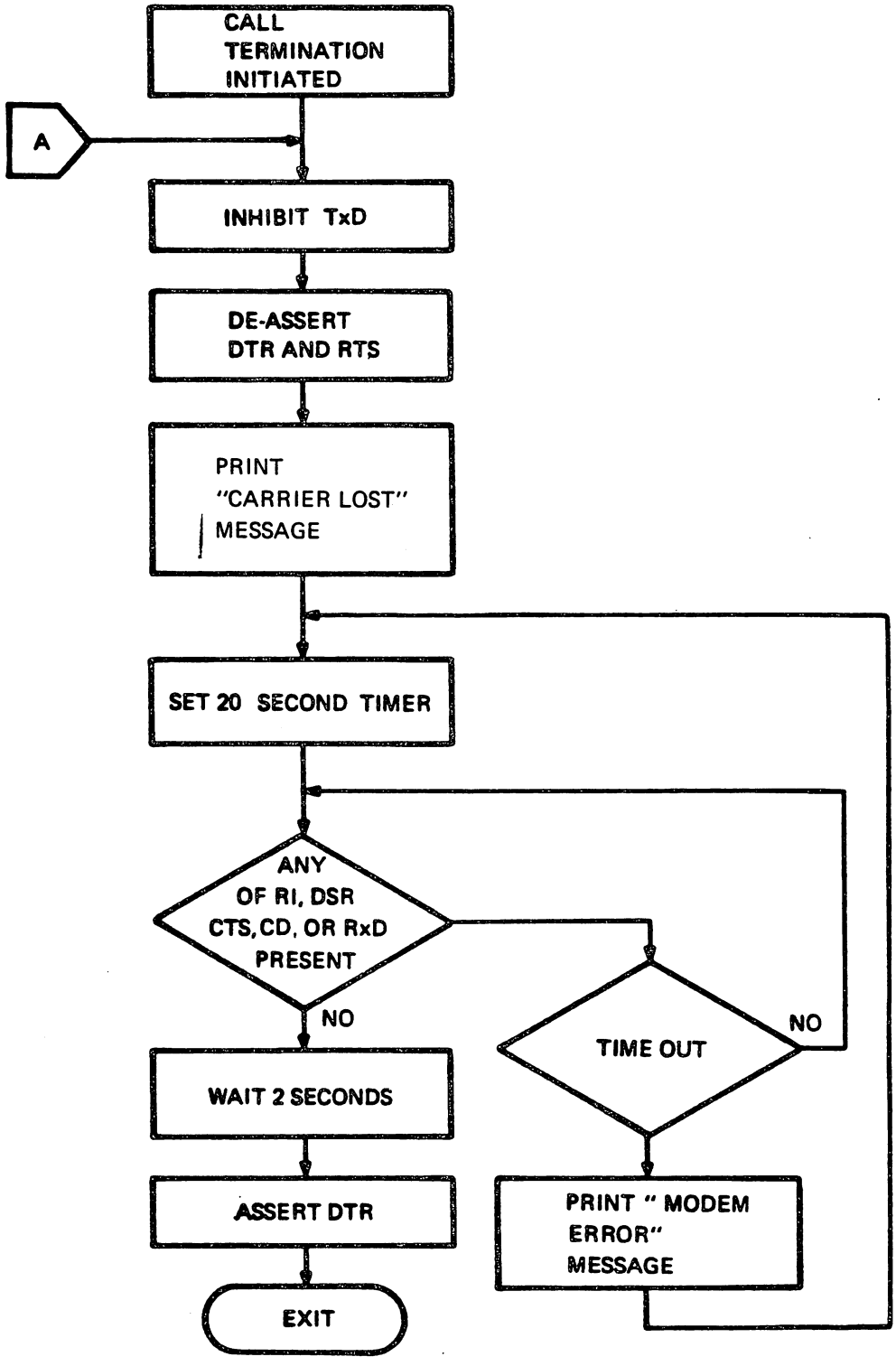
Figure A-7 Call Abort or Termination Sequence

Signal direction assumes KBD01 on left, modem on right. It is assumed throught that the KBD01 keyswitch is in a REMOTE position.



It is assumed that, on entry, the KBD01 keyswitch is in a REMOTE position and that RI, DSR, CD, CTS, and RxD are clear.

FIGURE A-8 Call Initialization Flow Diagram



It is assumed that the KBD01 keyswitch is in a REMOTE position.

FIGURE A-9 Call Abort or Termination Flow Diagram

APPENDIX B
USER GUIDE

The customer user of DIGITAL remote diagnosis needs only a few instructions to work with the DDC/RDC successfully. The DDC/RDC is always ready to give the customer any instruction needed.

As a result, the KBDØ1 User Guide is a two page document; It is reproduced in this manual as Figure B-1. The option kit includes it as part number EK-KBDØ1-UG and it is stocked by Printing and Circulation Services in Northboro. After calling it to the customer's attention, the guide may be posted, used as a standalone document, or may be filed in the Site Management Guide behind the tab titled "XI. Remote Diagnostic Console (RDC)."

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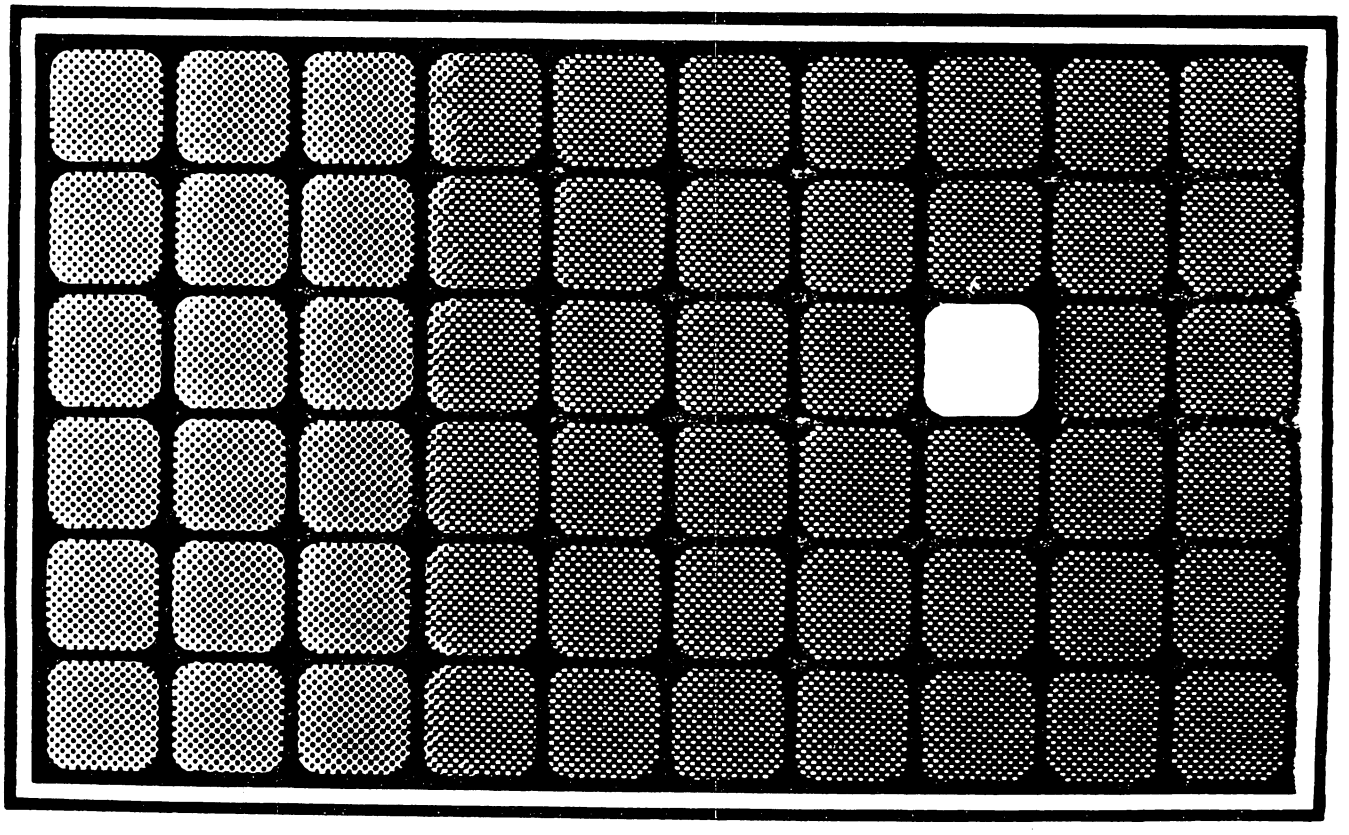
REMOTE DIAGNOSIS



KBD01 OPTIONS USER GUIDE

TO REQUEST REPAIR SERVICE CALL:

DDC/RDC TELEPHONE NUMBER

THE DIGITAL REMOTE DIAGNOSIS CENTER

provides remote diagnosis service 24 hours a day, 7 days a week, for all RD contract systems.

You should report all types of hardware failure:

Processor or Peripheral
Identified or Suspected
Hard or Intermittent

WHEN YOU CALL:

1. The DDC/RDC will ask you to identify:
   - Yourself
   - Your company
   - The site address
   - A phone number where you can be reached
   - The system type and serial number

   (System Type _____ Serial Number _____)
2. The DDC/RDC will ask you about the problem:
   - What symptoms were (or are) present?
   - What error messages were printed on the terminal?
3. The DDC/RDC will tell you:
   - How to prepare the system for remote diagnosis.
   - For additional details, see next page.
4. The DDC/RDC will:
   - Begin the appropriate test procedure almost immediately.
   - Notify the local DIGITAL Field Service office that your system is under test.
5. The DDC/RDC will inform the local DIGITAL Field Service Representative of test results.
   The local DIGITAL office will complete the repair on site.
   The DDC/RDC will verify that the system has been repaired if requested to do so by the local DIGITAL Field Service Representative.

- **IF THE KBD01 FAULT LIGHT IS ON**

  The failure is within the remote diagnosis hardware.

  Remote test procedures are not applicable and the DDC/RDC will notify the local DIGITAL Field Service office that on-site service is required.
- **THE DDC/RDC MAY REMIND YOU THAT:**

  It is possible for an operating system to run normally and be unaffected by a light FAULT indicator.

  If the failure was transient, a power-down/power-up sequence may clear the FAULT indicator.

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WAIT FOR THE DDC/RDC TO TELL YOU HOW TO PREPARE THE SYSTEM FOR TESTING

Important failure data may be lost if their instructions are not followed. Although the DDC/RDC will guide you through the various testing procedures, the following descriptions of typical sequences may be helpful.

WHEN MAINTENANCE DIAGNOSTICS ARE TO BE RUN BY THE DDC/RDC:

The DDC/RDC may ask you to:

See that the modem has power and is set for normal operation.

Dismount or protect media containing sensitive data.

Load the diagnostic volume. Mount PDP-11/44 CPU Diagnostic Tapes 1 and 2 on the TU58.

Mount scratch media on units to be tested.

Set the PDP-11/44 HALT-CONT-BOOT switch to CONT.

Set the PDP-11/44 keyswitch to LOCAL.

Test KBD01 operation:

Set the KBD01 keyswitch to LOCAL.

Turn the power switch (located on the rear of the unit) to OFF, then to ON. The FAULT light will come on and remain on for ten seconds while the KBD01 self test runs. The FAULT light will go off if no failure is detected.

Set the modem for normal operation.

Set the KBD01 keyswitch to REMOTE. The console terminal will print "REMOTE PORT ENABLED." The REMOTE indicator will come on, blinking. When the DDC/RDC host computer completes a telephone connection, the REMOTE indicator will cease blinking (it will be on). When protocol messages have been exchanged and a logical connection established, the TEST light will come on.

Modem indicator lights may be active as testing proceeds.

The system terminal may echo DDC/RDC and CPU dialog.

The DDC/RDC may "talk" to you at the system terminal.

After testing, the local DIGITAL Field Service Representative will complete the repair.

The local DIGITAL Field Service Representative may request the DDC/RDC to verify normal operation.

WHEN DDC/RDC ACCESS TO THE OPERATING SYSTEM IS PERMITTED

The DDC/RDC may ask you to:

Mount operating system media and boot the system. Set the PDP-11/44 keyswitch to LOCAL DSBL.

Set the KBD01 keyswitch to the REMOTE SECURE position; the DDC/RDC may ask that the REMOTE position be selected to permit them to do crash dumps and other operating system related data testing. The keyswitch position should not be changed until requested by the DDC/RDC.

Provide the DDC/RDC with an account number and password.

The DDC/RDC will log-in and begin testing.

The system terminal will echo DDC/RDC and CPU dialogue in REMOTE SECURE. (Echo mode may be enabled in REMOTE)

The system terminal keyboard will be disabled.

The DDC/RDC may "talk" to you at the system terminal in REMOTE.

After testing, the local DIGITAL Field Service Representative will complete the repair.

The local DIGITAL Field Service Representative may request the DDC/RDC to verify normal operation.

PREVENTIVE MAINTENANCE

Preventive maintenance diagnostic sessions which will include DDC/RDC testing (also extended monitoring for intermittent failure) will be scheduled by the local DIGITAL office subject to customer approval.

DIGITAL-SUPPLIED MODEM's

The remote diagnosis hardware may include a DIGITAL supplied MODEM. The direct connection of these devices to a dedicated telephone line is regulated by governmental authority.

THE CUSTOMER IS ULTIMATELY RESPONSIBLE FOR COMPLIANCE WITH APPLICABLE REGULATIONS

DIGITAL-supplied MODEM's which fail are usually exchanged, not field repaired. Only the manufacturer or authorized agents may repair such equipment. The customer is responsible to ensure that the telephone company is notified when an exchange involves units which are electrically different and/or have differing registration numbers.

FOR ADDITIONAL INFORMATION, SEE:

The RDC section of the Site Management Guide

EK-KBD01-TM
KBD01 PDP-11/44 Remote Diagnosis Technical Manual
AGK7

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