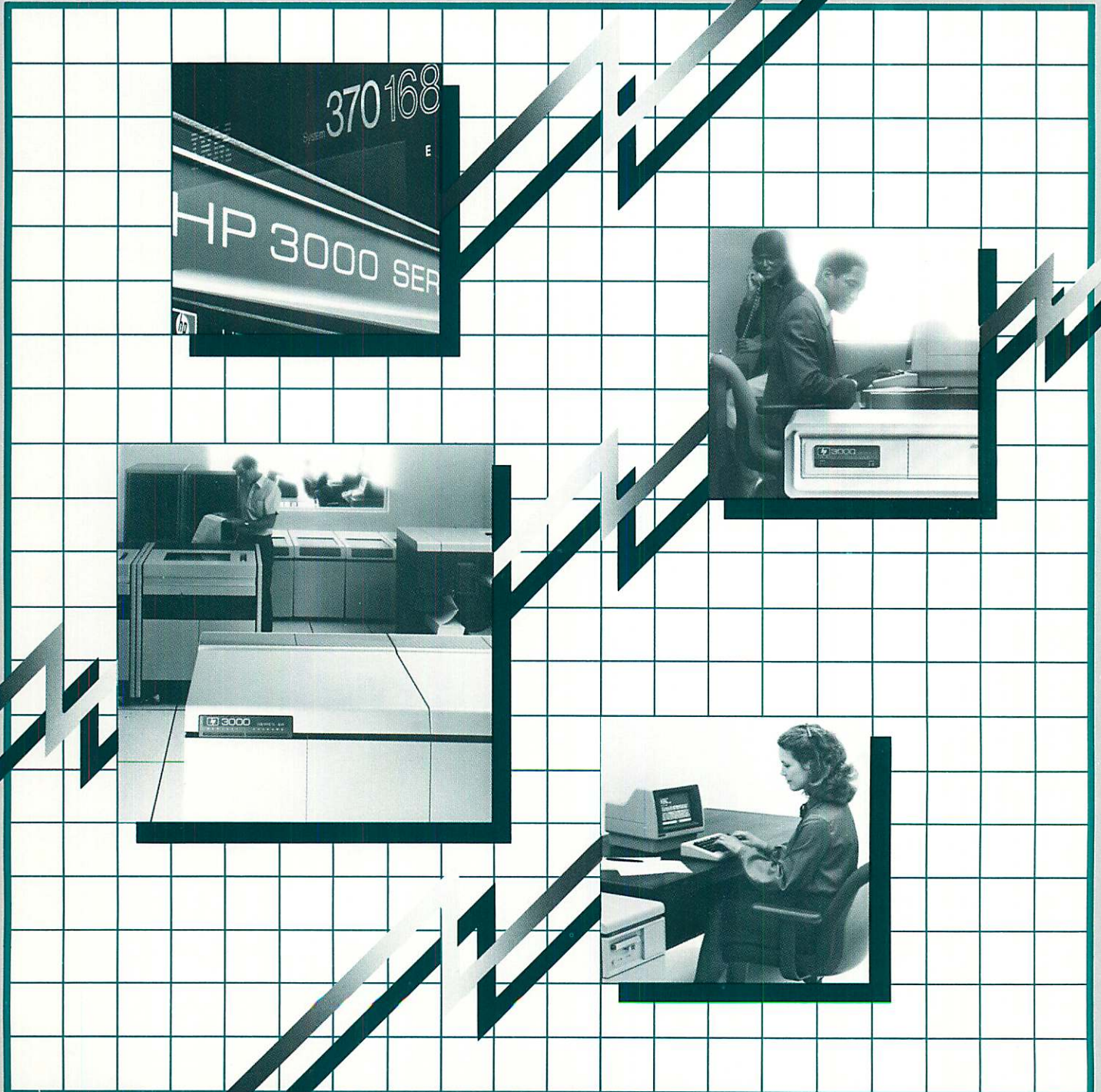


HP AdvanceNet



HP 30244M Intelligent Network Processor (INP)

Installation and Service Manual



HP AdvanceNet

HP 30244M INTELLIGENT NETWORK PROCESSOR (INP)

Installation and Service Manual



19420 HOMESTEAD ROAD, CUPERTINO, CA 95014

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PRINTING HISTORY

New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition or a new update is published. No information is incorporated into a reprinting unless it appears as a prior update; the edition does not change when an update is incorporated.

The software code printed alongside the date indicates the version level of the software product at the time the manual or update was issued. Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one to one correspondence between product updates and manual updates.

First Edition..... Oct 1984

LIST OF EFFECTIVE PAGES

The List of Effective Pages gives the date of the most recent version of each page in the manual. To verify that your manual contains the most current information, check the dates printed at the bottom of each page with those listed below. The date on the bottom of each page reflects the edition or subsequent update in which that page was printed.

Effective Pages	Date
all.....	Oct 1984

PREFACE

This manual contains installation and servicing information for the HP 30244M Intelligent Network Processor (INP). The INP is a functionally flexible, single-channel data processor that provides I/O capability between the HP 3000 Series 37 Computer System and other computer systems via either modulator/demodulators (modems) and telephone lines or direct connection.

This manual was written with the assumption that the reader has a thorough knowledge of the HP 3000 Series 37 I/O system and is familiar with the latest data communications techniques.

This manual is organized as follows:

Section 1, **General Information**, briefly describes the main features of the INP and how it operates. This section also describes how the INP is configured in the computer system, lists the equipment supplied with the INP, and lists its specifications.

Section 2, **Installation**, contains instructions for installing the INP printed circuit assembly (PCA) and its interconnecting cabling into an HP 3000 Series 37 Computer System.

Section 3, **Programming Information**, states the fact that the INP is preprogrammed and requires no field programming.

Section 4, **Principles of Operation**, is a description of the hardware operation of the INP and its associated communication channels. Since this is a brief overview, intended only to give the user a better understanding of how the INP does its job, some minor operational details have been omitted.

Section 5, **Maintenance**, contains general servicing information, troubleshooting procedures, repair instructions, and a description of applicable maintenance aids.

This manual should be retained and used with related documentation for the HP 3000 Series 37 Computer System and the INP. Related documents include the following technical manuals:

HP 30010A/30020A/30020B/30244M Intelligent Network Processor (INP) Diagnostic Procedures Manual, part no. 30010-90002

HP 3000 Series 37 Customer Installation Manual, part no. 30457-90001

HP 3000 Series 37 Site Planning and Preparation Guide, part no. 30457-90008

HP 3000 Series 37 CE Installation Manual, part no. 30457-90009

HP 3000 Series 37 Software Installation Manual, part no. 30457-90012

MPE V System Operation and Resource Management Reference Manual, part no. 32033-90005

HP 3000 Guide for the New User, part no. 32033-90009

HP 3000 Guide for the New Operator, part no. 32033-90021

HP 3000 MPE V Quick Reference Guide, part no. 32033-90023

HP 30244M Intelligent Network Processor (INP) Customer Engineer Handbook,
part no. 30244-90001

HP 3000 HP-IB Version Computer Systems, Customer Engineer Handbook,
part no. 30070-90010

HP 3000 HP-IB Diagnostic Manual Set (Volume III), part no. 30457-60007

HP 3000 Computer Systems, Fundamental Data Communications Handbook,
part no. 5957-4634 (supersedes 30000-90105)

CONVENTIONS USED IN THIS MANUAL

NOTATION	DESCRIPTION
nonitalics	Words in syntax statements which are not in italics must be entered exactly as shown. Punctuation characters other than brackets, braces and ellipses must also be entered exactly as shown. For example: EXIT;
<i>italics</i>	Words in syntax statements which are in italics denote a parameter which must be replaced by a user-supplied variable. For example: CLOSE <i>filename</i>
[]	An element inside brackets in a syntax statement is optional. Several elements stacked inside brackets means the user may select any one or none of these elements. For example: $\left[\begin{array}{l} A \\ B \end{array} \right]$ User <i>may</i> select A or B or neither.
{ }	When several elements are stacked within braces in a syntax statement, the user must select one of those elements. For example: $\left\{ \begin{array}{l} A \\ B \\ C \end{array} \right\}$ User <i>must</i> select A or B or C.
...	A horizontal ellipsis in a syntax statement indicates that a previous element may be repeated. For example: [, <i>itemname</i>]...;
	In addition, vertical and horizontal ellipses may be used in examples to indicate that portions of the example have been omitted.
☐	A shaded delimiter preceding a parameter in a syntax statement indicates that the delimiter <i>must</i> be supplied whenever (a) that parameter is included or (b) that parameter is omitted and any <i>other</i> parameter which follows is included. For example: <i>itema</i> [☐ <i>itemb</i>] [☐ <i>itemc</i>]
	means that the following are allowed: <i>itema</i> <i>itema, itemb</i> <i>itema, itemb, itemc</i> <i>itema,, itemc</i>

CONVENTIONS (continued)

Δ When necessary for clarity, the symbol Δ may be used in a syntax statement to indicate a required blank or an exact number of blanks. For example:

```
SET[(modifier)] $\Delta$ (variable);
```

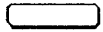
underlining When necessary for clarity in an example, user input may be underlined. For example:


```
NEW NAME? ALPHA
```

In addition, brackets, braces or ellipses appearing in syntax or format statements which must be entered as shown will be underlined. For example:

```
LET var[[subscript]] = value
```

shading Shading represents inverse video on the terminal's screen. In addition, it is used to emphasize key portions of an example.



The symbol  may be used to indicate a key on the terminal's keyboard. For example, **RETURN** indicates the carriage return key.

CONTROL *char*

Control characters are indicated by **CONTROL** followed by the character. For example, **CONTROL**Y means the user presses the control key and the character Y simultaneously.

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INTRODUCTION

This section describes the functional and physical characteristics of the HP 30244M Intelligent Network Processor (INP) shown in Figures 1-1 and 1-2. Related publications that may be required for operation and service of the INP are listed in the Preface.

GENERAL DESCRIPTION

The HP 30244M Intelligent Network Processor (frequently referred to hereafter as the INP) provides the HP 3000 Series 37 Computer System with data communication capabilities in high-speed as well as low-speed modem environments.

A microprocessor within the INP performs the communications protocol management, thus relieving the HP 3000 processor of that task. As power is applied, the INP initializes itself, runs a mini-diagnostic routine, reports to the system that it is functionally operational, and requests configuration parameters. When a request for data communication is made (for example, when a user at a terminal opens a DS line), the system loads the appropriate protocol driver onto the INP. The INP then transfers control to the driver from its background loader program. The driver opens the communication channel and passes buffered data back and forth between the HP 3000 CPU and the data communication channel.

Serialization, protocol management, frame/block management, modem management, and data buffering are all performed by the INP. The CPU must still process message formats and higher level link procedures. While the INP is transferring the last correctly received block of data to the CPU, the INP is also processing and buffering the next block of data coming from the communication channel.

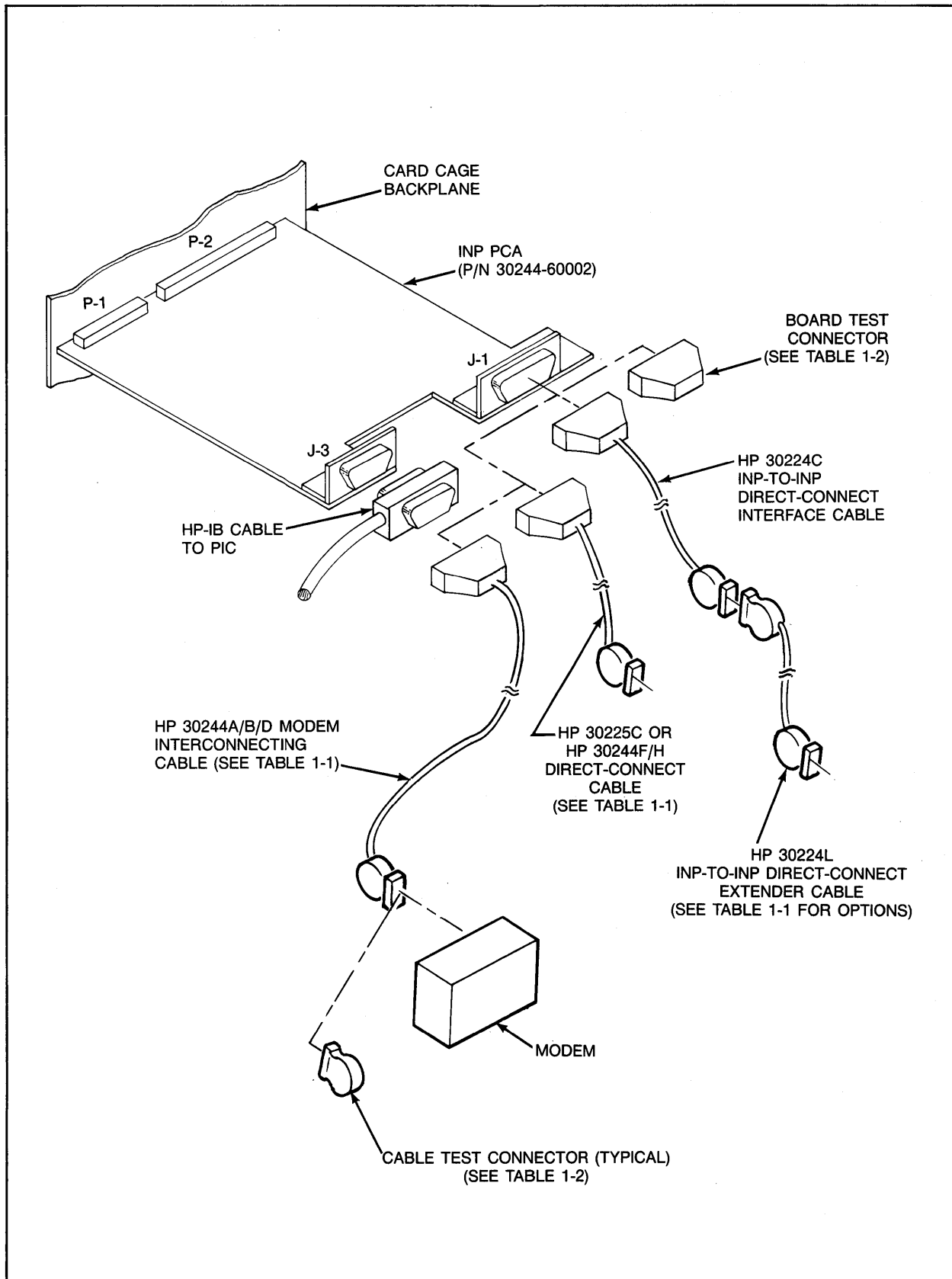


Figure 1-1. HP 30244M Intelligent Network Processor and Related Cabling

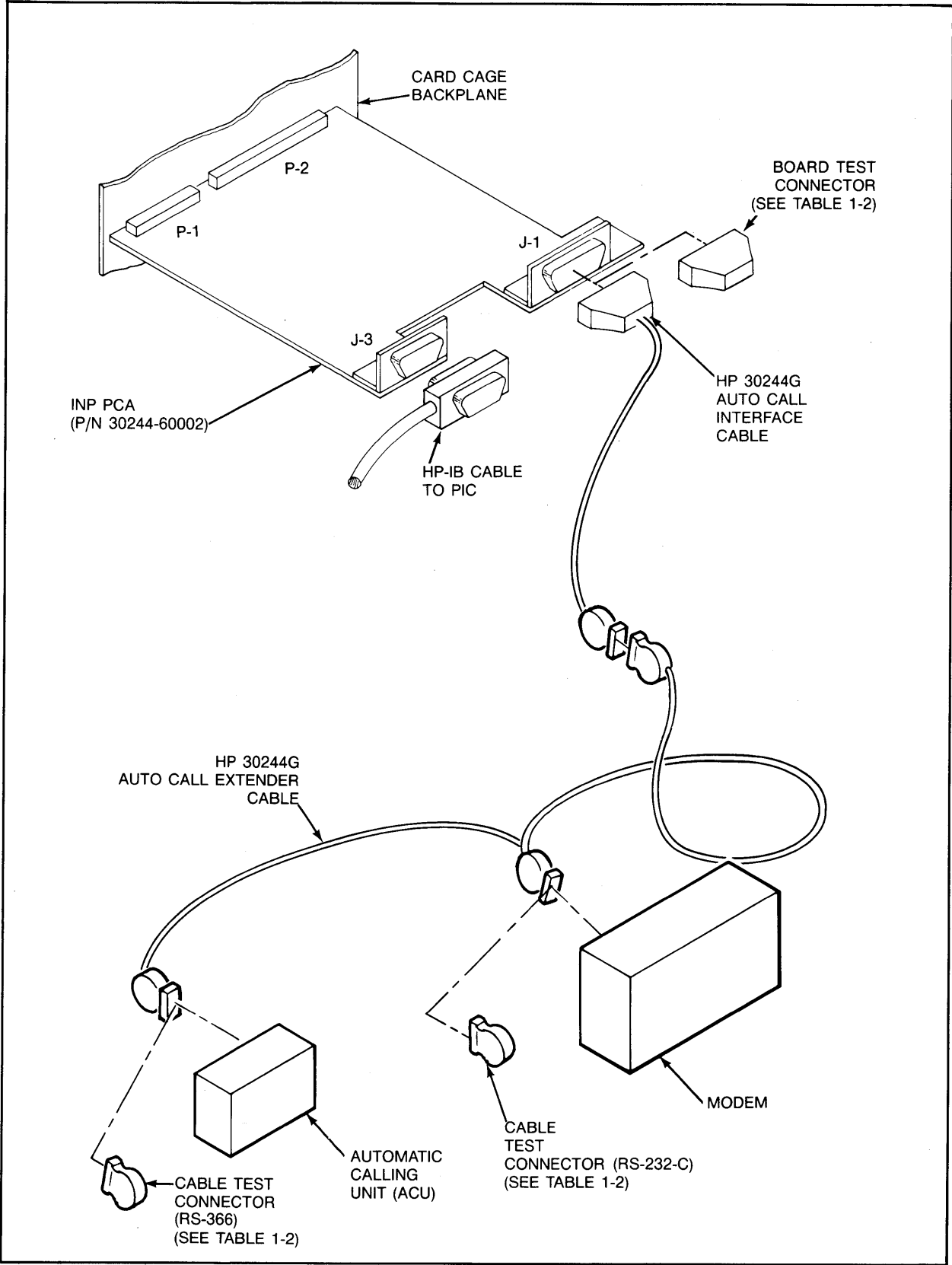


Figure 1-2. HP 30244M Intelligent Network Processor and Auto Call Unit Cabling

Equipment Supplied

Although the Intelligent Network Processor (INP) is identified by its own product number (HP 30244M), this number is used only for internal identification. The INP is marketed as a component part of a hardware/software package called a Network Link. There are five Network Link products available for the HP 3000/37:

- HP 30246A SNA Link
- HP 30251A BSC Link
- HP 30270A Point-to-Point (DS) Hardwired Link
- HP 30271A Point-to-Point (DS) Modem Link
- HP 32187A X.25 Link

The HP 30244M Intelligent Network Processor consists of the following:

- One Intelligent Network Processor (INP) printed circuit assembly (PCA), part no. 30244-60002.
- One HP-IB Cable (1 foot), product no. HP 92220R.
- One *HP 30244M Intelligent Network Processor (INP) Installation and Service Manual*, part no. 30244-90002.

Although a complete INP hardware subsystem must include one or more INP-to-modem cables, INP-to-INP direct-connect cables, or INP-to-SSLC direct-connect cables, these cables are *not* included under the HP 30244M product number. Each interconnecting cable (or set of cables) required for the various configurations is identified separately under its own product number and is included under the appropriate option number when one of the Network Link products is ordered. See Table 1-1 for a list of the available cables.

CAUTION

Use of the longer lengths of the external interconnect cables requires special precautions. Long cables are very susceptible to induced transients. Do NOT run cables outdoors or near electrically "noisy" equipment.

Table 1-1. Interconnecting Cable Assemblies

Product No.	Option	Description	Part No.
HP 30244A		RS-232-C Synchronous Interface Cable RS-232-C 10-meter Extender Cable	30244-63001 5061-4958
HP 30244B		RS-232-C Asynchronous Interface Cable RS-232-C 10-meter Extender Cable	30244-63002 5061-4958
HP 30244D		V.35 High-speed Synchronous Cable	30244-63004
HP 30244F		HP 3000-to-1000 Direct-Connect Cable	30244-63006
HP 30244G		Auto Call Interface Cable Auto Call Extender Cable	30244-63007 5061-4959
HP 30244H	Std.	X.21 Digital Network Direct-Connect Interface Cable X.21 10-meter Extender Cable	30244-63008 5061-4950
	001	X.21 20-meter Extender Cable	5061-4951
HP 30224C		INP-to-INP Direct-Connect Interface Cable	30244-63009
HP 30224L	Std.	INP-to-INP Direct-Connect 10-meter Extender Cable	30224-63001
HP 30224L	001	INP-to-INP Direct-Connect 25-meter Extender Cable	30224-63002
HP 30224L	002	INP-to-INP Direct-Connect 50-meter Extender Cable	30224-63003
HP 30224L	003	INP-to-INP Direct-Connect 100-meter Extender Cable	30224-63004
HP 30224L	004	INP-to-INP Direct-Connect 250-meter Extender Cable	30224-63005
HP 30224L	005	INP-to-INP Direct-Connect 500-meter Extender Cable	30224-63006
HP 30224L	006	INP-to-INP Direct-Connect 1000-meter Extender Cable	30224-63007
HP 30225C		INP-to-SSLC Direct-Connect (Modem Eliminator) Interface Cable INP-to-SSLC 5-meter Extender Cable	30244-63001 30225-60007

General Information

The following test equipment is used to verify the proper operation of the INP while troubleshooting the data communications network:

- Cable test connector.
- Board test connector.

These items of test equipment are supplied by the HP Customer Engineer (contained in the INP Product Support Package, part no. 30010-67801). Different part numbers of cable test connectors and board test connectors are required for different cable connection configurations. Table 1-2 shows which test items are compatible with each set of interconnecting cables.

Table 1-2. Test Equipment Compatibility

Description	Part No.	Used With Cable Product No.
Board Test Connector	30244-67001	HP 30225C HP 30244A HP 30244B HP 30244G
	30244-67002	HP 30224C HP 30244F
Cable Test Connector	5061-2507	HP 30244A HP 30244B
		HP 30224L
	5061-2512	HP 30224L
	5061-2533	HP 30224C
	5061-2536	HP 30244F
	30020-60013	HP 30244G
30225-60004	HP 30225C	

Features

Important features of the INP are:

- Hardware data transfer rates to 56,000 bits per second.
- 48 K bytes of random access memory (RAM) for driver and support program storage and for character and message buffering.
- 8 K bytes of read-only memory (ROM).
- Protocol and link processing without computer system intervention.
- High-speed, silicon-on-sapphire (SOS) microprocessor.
- Compatible with IBM Binary Synchronous Communications protocol.
- EIA RS-232-C, CCITT V. 24/V. 28 and V. 35, and X. 21 compatibility.
- Full- or half-duplex operation.
- Compatible with Bell 201C, 208, and 209 modems.
- Direct-connect capability between two HP 3000 computers, or between HP 3000 and HP 1000 computers.
- Retention of buffered data during power fail/restore periods.
- Stand-alone, user-initiated, self-test capability.
- Auto Call Interface which allows automatic dial-up of telephone lines. HP supports the Bell 801C auto call unit used with the Bell 201C or 208B modems.

Interface to System

The HP 30244M INP consists of one PCA board that is backplane compatible with the HP 3000 Series 37 Computer System. The INP PCA is installed in the main card cage or in the card cage of the optional Extender Box. The INP communicates with the Peripheral Interface Channel (PIC) through the HP-IB Cable via connector J3, and with the modem via connector J1. (See Figure 1-3.)

The INP receives power from the system through connector P2. Connector P1 is used only for test signals during the manufacturing process and is *not* to be used during normal operation.

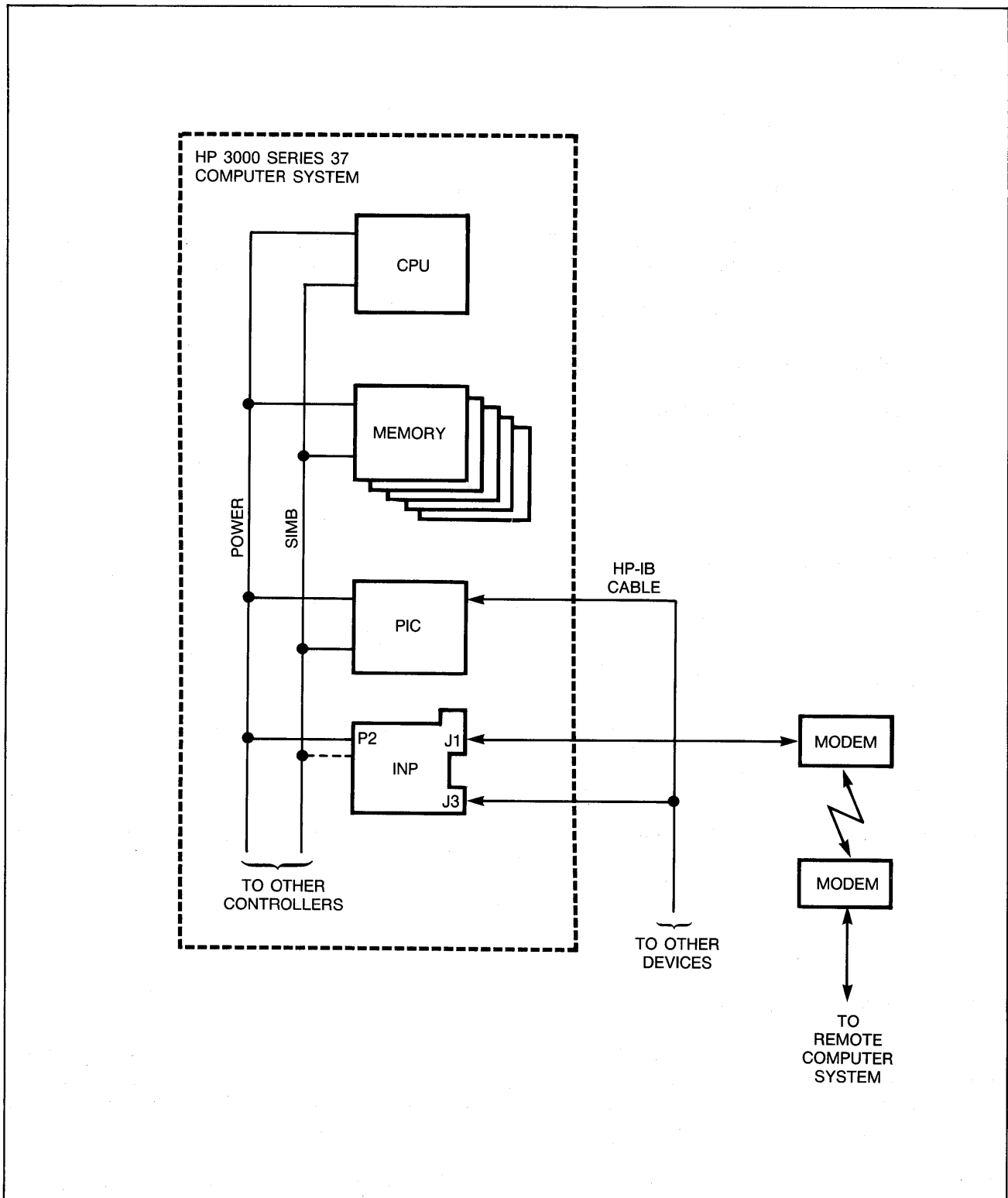


Figure 1-3. Typical Interface to System

SPECIFICATIONS

The specifications for the HP 30244M Intelligent Network Processor are presented in Table 1-3.

Table 1-3. Specifications

Model:	HP 30244M Intelligent Network Processor
PCA Part No.:	30244-60002
Interface:	EIA RS-232-C, CCITT V.24/V.28 and V.35, X.21, or hardwired.
Data Rate:	<p>Modem - Up to 19,200 bits per second in half- or full-duplex mode for RS-232-C.</p> <p>Up to 56,000 bits per second in half- or full-duplex mode for V.35.</p> <p>Hardwired - Up to 56,000 bits per second for INP-to-INP.</p> <p>Up to 9600 bits per second for INP-to-SSLC.</p>
Data Buffer:	Greater than 2 K bytes.
Modem Compatibility:	Bell 201, 208, 209, and Data Service Units.
ACU Compatibility:	Bell 801C with Bell 201C or 208B modems.
Maximum Number of INPs per HP 3000/37:	3
Power Fail Protection:	Buffered data can be restored after a single power failure.

INSTALLATION

SECTION

2

This section contains information for unpacking, inspecting, installing, and initially testing an HP 30244M Intelligent Network Processor (INP) that is to be added to an existing HP 3000 Series 37 Computer System.

UNPACKING AND INITIAL INSPECTION

If the INP printed circuit assembly (PCA) and associated cable assemblies are received separately from the computer system, inspect the carton containing the items before opening. If there is evidence of external damage to the carton, notify the nearest HP Sales and Service Office and request that the carrier's agent be present when the carton is opened.

Inspect each item as the carton is unpacked. If the INP PCA or cable assemblies are damaged or fail to meet specifications, notify the carrier and the nearest HP Sales and Service Office immediately. Retain the shipping carton and packing material for the carrier's inspection. The HP Sales and Service Office will arrange for repair or replacement of the damaged item without waiting for any claims against the carrier to be settled.

PREPARATION FOR INSTALLATION

Before beginning any INP installation activities, ensure that the system operator has backed up the system files. This precaution will prevent the possible inadvertent loss of the data residing on the disk.

Power Requirements

The voltages provided from the HP 3000 backplane through the INP's P2 connector are +5V, +12V, -12V, and a special +5 battery voltage (+5VB). The battery voltage is necessary to preserve the contents of the INP's on-board RAM when AC power to the computer system is interrupted.

Current drawn at the supply voltages is as follows:

Supply	Current (amps)
+ 5V	2.5
+12V	0.11
-12V	0.20
+ 5VB	0.55 / 0.26 (backup)

Installation

The INP PCA obtains its operating power directly from the computer system power supply. All HP 3000 Series 37 Computer Systems have an adequate power supply to accommodate the addition of an INP or multiple INPs (up to three INP subsystems in the same HP 3000/37 with the optional Extender Box) without the need for any power supply modification.

PCA Jumpers and Switches

The jumpers used on the INP PCA board have all been preset during board calibration at the factory, and no field alterations are required. There is, however, the device address switch (a single rotary switch labelled "DEVICE ADDR") that must be manually set to configure the INP for your specific system and application. Figure 2-1 shows the location of this switch. Set the device address (DEVICE ADDR) switch *before* installing the PCA board in the computer card cage.

The device address switch is a thumbwheel switch with eight numbered positions (0 through 7). The setting of this switch identifies the device number assigned to this INP and is read by the processor. Rotate the switch to display the appropriate number, as follows:

1. Determine the number of devices allowed and the mix requirements for the Peripheral Interface Channel (PIC) to be used. For configuration details and limitations, refer to the *Configuration Guide* for your system.
2. Identify the number of devices attached to the PIC and the highest device number used.
3. Set the INP device number (not to exceed 7) by rotating the DEVICE ADDR switch to the next higher available device number.
4. Make a note of the number you set into the DEVICE ADDR switch (in step 3), as it will be used in the MPE configuration dialogue (described in Appendix A).

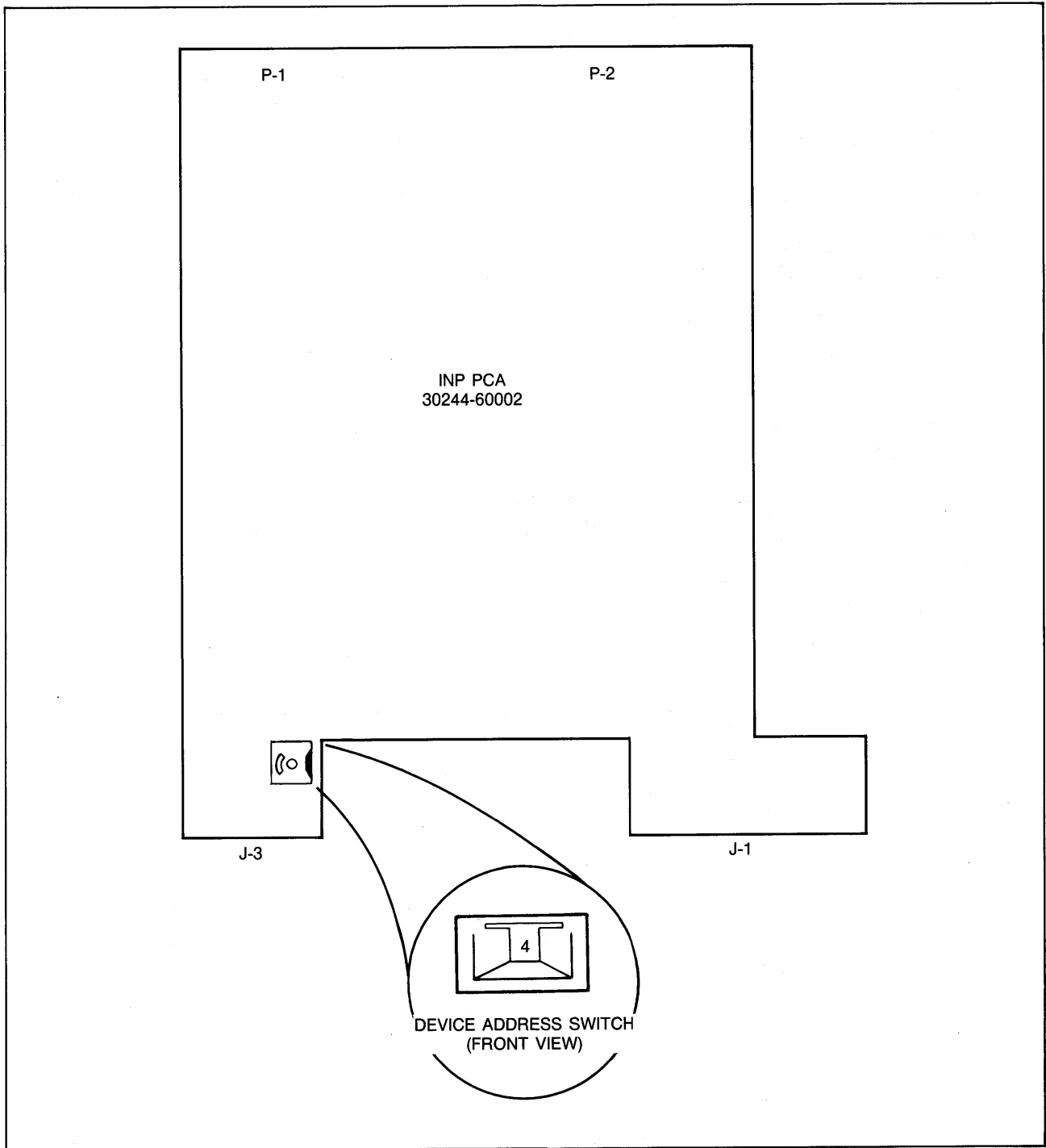


Figure 2-1. Location of PCA Switch

HARDWARE INSTALLATION PROCEDURES

Installation of the INP PCA

Install the INP PCA as follows:

1. Ensure that the device address switch on the PCA is properly configured. (Refer to the paragraph entitled "PCA Jumpers and Switches".)
2. Turn off the DC power by setting the key-operated switch (located on the front of the HP 3000/37 mainframe, as shown in Figure 2-2) to the 0 position. (The "DC" indicator light on the front panel will go off.)
3. Turn off the AC power by disconnecting the line-power cord (located on the back of the HP 3000/37 mainframe). (The "AC" indicator light will go off.)

WARNING

All power must be off when inserting or removing any device or card in the system.

4. Remove all interconnecting cables from the board connectors on the back of the mainframe card cage (or the Extender Box card cage) where the INP will be installed.

NOTE

It would be advisable to tag each cable as you remove the connectors to ensure proper reinstallation.

5. Unfasten the captive-screw camlocks that secure the back panel, and lift off the back panel (containing the fan).

NOTE

If the back panel is to be completely removed, reach inside and unplug the fan cord.

6. Insert the INP PCA board into a vacant card cage slot in the main card cage or in the optional Extender Box.

On a one-box HP 3000/37, the recommended slot for the INP in a typical installation is slot 3. (If slot 3 is not available, use any vacant slot.)

On a two-box HP 3000/37, the INP can be installed in any available slot, except the slot directly above a Terminal Interface Controller (TIC). (The TIC uses the connectors for two contiguous slots; so the slot above the TIC board is not available.)

7. Record the location of the INP PCA in the Configuration section of the *System Support Log*.
8. Reinstall the back panel.

NOTE

Reconnect the fan if it was unplugged in step 5.

9. Connect the INP to the Peripheral Interface Channel (PIC) by attaching the HP-IB Cable (product no. HP 92220R) to the INP PCA connector J3 and to the PIC.

NOTE

Multiple HP-IB Cable connections to the same PIC must be accomplished in accordance with the "Configuration Restriction" paragraph below.

- 10 . Reconnect all of the cables removed in step 4.
- 11 . Reconnect the line-power cord to restore AC power.

Configuration Restriction

Although multiple INPs (up to three) can share the same Peripheral Interface Channel (PIC) with one high-speed device, the devices *cannot* all have their HP-IB Cables connected directly to the same PIC connector (sometimes called a "star" configuration).

A maximum of two HP-IB Cables can be physically coupled to any one PIC or INP PCA board.

Therefore, the recommended way of cabling multiple INPs to the same PIC is in the "daisychain" configuration. "Daisychaining" is accomplished by attaching the HP-IB Cable of the first INP from the INP to the PIC. Then, the HP-IB Cable from the second INP is coupled to the first INP. Likewise, if there is a third INP, the HP-IB Cable from the third INP is coupled to the connector on the second INP.

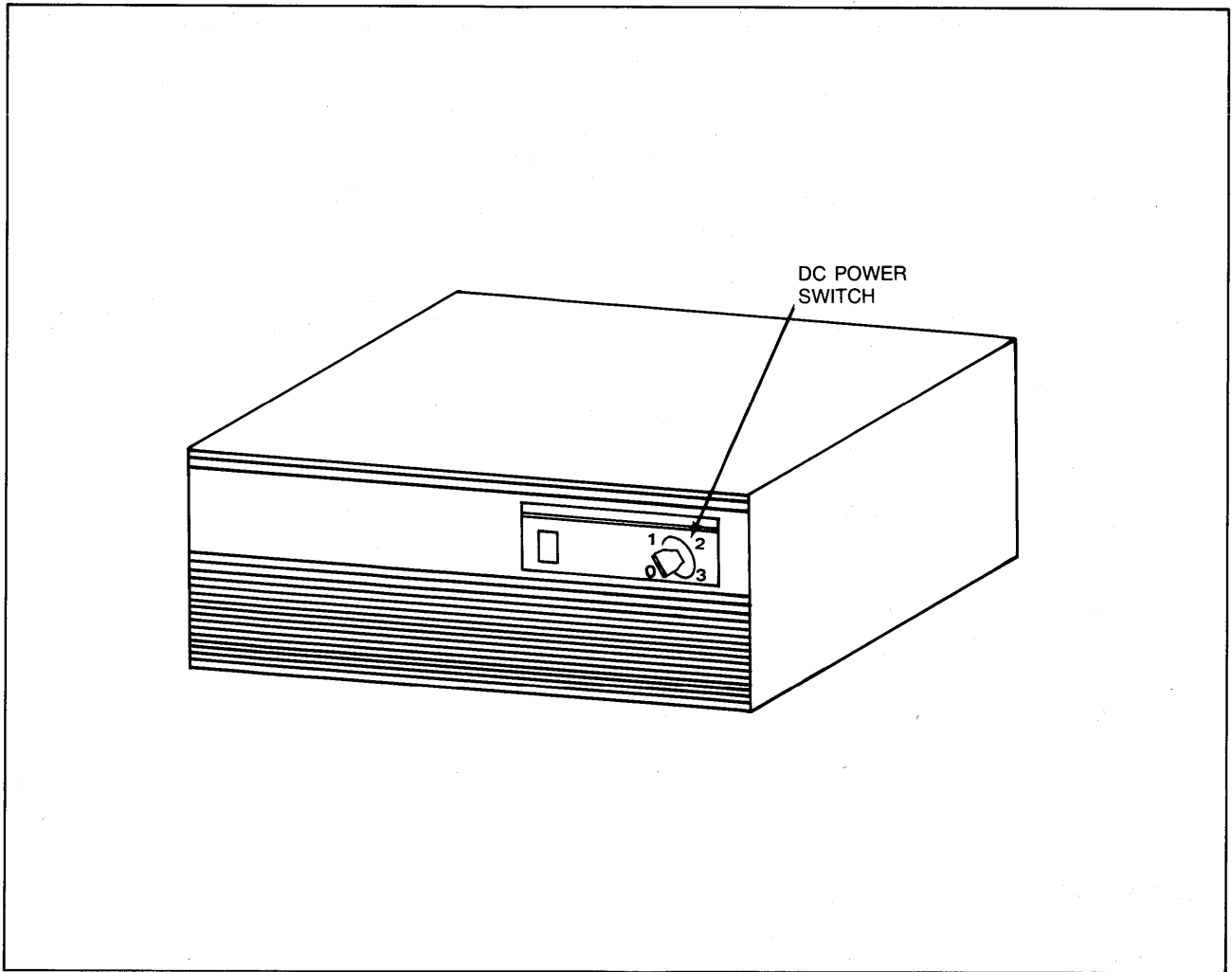


Figure 2-2. Location of DC Power Switch on HP 3000/37

Installation of the Communication Cables

Install the INP communication interconnecting cable assemblies as follows:

1. Connect the board connector of the appropriate interface cable (sometimes called "internal" cable) to connector J1 of the INP PCA board. Refer to Table 1-1 for a list of the available INP-to-modem cables, INP-to-INP direct-connect cables, and INP-to-SSLC direct-connect cables. Also refer to Figure 1-1 as an aid in visualizing the relationship of the hardware components of the INP subsystem.

NOTE

The use of the terms "internal" and "external" in the nomenclature of the INP communication interconnecting cable assemblies was established when a different model of the INP was developed for use in another series of the HP 3000 family of computer systems. In that application, the internal cable was installed inside of the computer cabinet to connect the INP to the inside of a junction panel. The external cable was then joined to the internal cable by attaching the external cable to the outside of the junction panel. Although that previous usage of the terms "internal" and "external" occasionally still prevails, both segments of the cables used with the HP 30244M INP are installed outside of the HP 3000/37 computer cabinet. In an effort to reduce any confusion that might be caused by this nomenclature, the newer cables are being called "interface" (instead of "internal") and "extender" (instead of "external").

2. Route the interface cable (which you already attached to the INP PCA in step 1) to the point where it will mate with the extender cable.
3. Attach the extender cable to the interface cable. (On the HP 3000/37, the two cables are joined with their connectors outside of the computer cabinet.)
4. If an INP-to-modem connection is being made, route the extender segment of the data communication cable assembly directly to the local modem and attach the connector to the modem.
5. If a direct INP-to-INP connection is being made (bypassing all modems), route the interconnect extender cable (one of the HP 30224L-series of cables listed in Table 1-1) directly to the other computer in your data communications network. The other end of the interconnect extender cable connects to another INP-to-INP direct-connect interface (or internal) cable for the remote computer.
6. If a direct INP-to-SSLC connection is being made (from your local computer with its INP to a remote computer with an SSLC), route the INP-to-SSLC direct-connect extender cable (part no. 30225-60007) directly to the remote computer. Connect the other end of the direct-connect extender cable to the remote computer's modem interconnecting cable (completely bypassing all modems).

SOFTWARE INSTALLATION

The INP has been preprogrammed at the factory and requires no field programming. All INP software, including the self test, is contained within the circuitry of the INP PCA board. Therefore, no separate software installation procedure is required.

The diagnostic software (DSM) used for troubleshooting INP problems is separate from the INP's own software. This diagnostic program is included with your updated operating system and, likewise, requires no separate software installation procedure.

INSTALLATION VERIFICATION

Verify that the INP has been properly installed and that it now functions accordingly as follows:

1. Determine that AC power is being supplied to the system. When the line-power cord is plugged in, the presence of AC power is indicated by the letters "AC" lighted on the front panel of the HP 3000/37 processor.
2. Power up the system in accordance with the instructions in the *HP 3000 Guide for the New Operator*. This procedure automatically initiates the INP self test.
3. Observe the eight self-test light-emitting-diode (LED) indicators (Figure 2-3) through the fan in the back of the HP 3000/37. Upon completion of the self test (approximately 2 seconds in duration), the LEDs will stop blinking and will display a steady pattern. If the LEDs at each end (0 and 7) are lighted while all the others (1 through 6) are off, the INP is working properly. If any other pattern of lighted LEDs is being displayed, the INP is malfunctioning.
4. If a properly functioning INP is indicated, the system is now ready for operation.
5. If a malfunctioning INP is indicated, refer to Section 5, Maintenance, for troubleshooting information.

MULTIPLE INP INSTALLATIONS

For additional data communication capability, more than one INP can be installed in the same HP 3000 Series 37 Computer System. To accommodate more than one INP, however, the HP 3000/37 must have the optional Extender Box. The maximum number of INPs that one HP 3000/37 can accommodate is three.

After the first INP has been installed, subsequent INPs are installed by following the same procedures as outlined in the previous paragraphs in this section. Any available card slot within the specified range can be used, since the device sequence is determined by the setting of each INP's device address switch, rather than by the card slot it occupies.

When multiple INPs are installed in an HP 3000/37, no more than one INP can be located in the first card cage (the top section of the HP 3000/37 mainframe). The second and third INPs must be located in

the second card cage (in the optional Extender Box); or, alternatively, *all* INPs (from one to three) can be located in the second card cage.

When multiple INPs are installed and connected to the same Peripheral Interface Channel (PIC), the HP-IB Cable connections must be made in accordance with the requirements of the "Configuration Restriction" paragraph under "Hardware Installation Procedures".

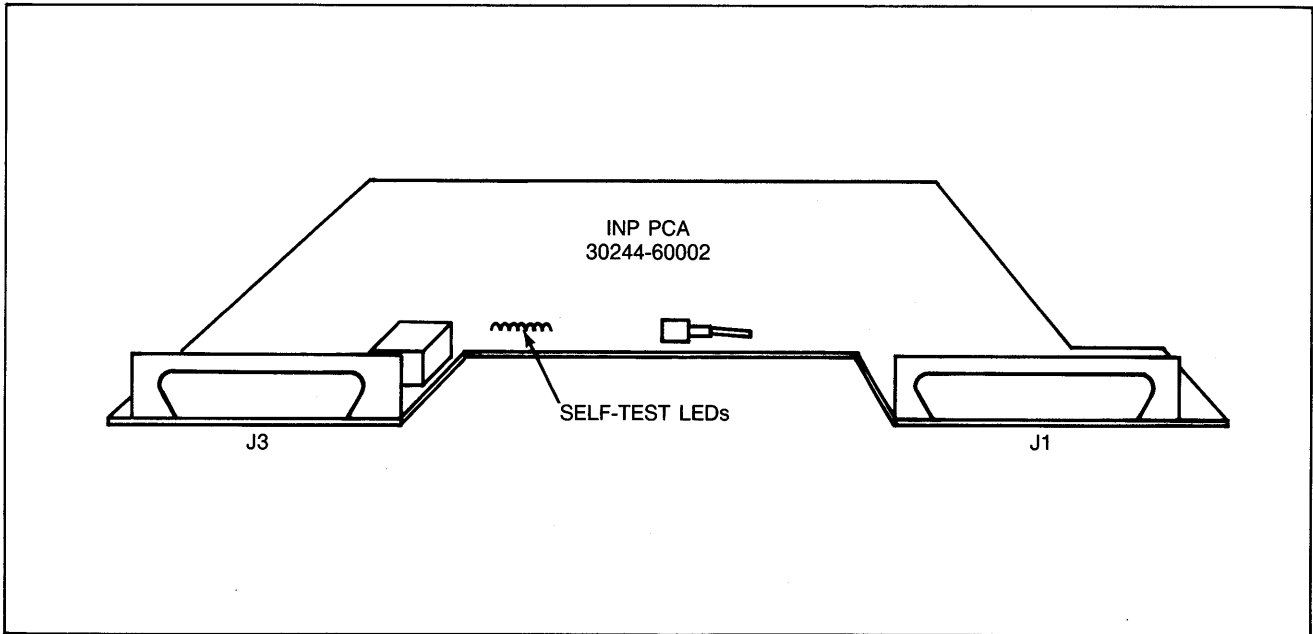


Figure 2-3. Location of Self-test LED Indicators

PROGRAMMING INFORMATION

SECTION

3

The HP 30244M Intelligent Network Processor (INP) is preprogrammed at the factory and requires no field programming for installation or operation. Furthermore, the use of the built-in self-test feature and the Diagnostic/Support Monitor (DSM) for verification testing and troubleshooting eliminates the need for field programming during these activities, as well.

This section contains functional-level and system-level descriptions of the HP 30244M Intelligent Network Processor (INP). The functional description lists the major functional areas and briefly describes each of them. An example of a typical functional-level operation follows, which serves to summarize the functional description. Then, an overview of the system-level operation briefly discusses INP operations in relation to the HP 3000 Series 37 Computer System.

FUNCTIONAL DESCRIPTION

The HP 30244M Intelligent Network Processor includes the following major functional areas:

- INP Microprocessor
- Read-Only Memory (ROM)
- Random Access Memory (RAM)
- Direct Memory Access (DMA)
- SDLC and BISYNC Datacomm
- Communication Line Interfaces

A block diagram of INP organization of the major functional areas is shown in figure 4-1. The solid interconnecting lines in the block diagram represent data paths while the broken lines indicate service request paths.

INP Microprocessor

The Complementary-Metal-Oxide-Semiconductor / Silicon-on-Sapphire (CMOS/SOS) Microprocessor is the heart of the INP. It is a high-performance, low-power-consumption microprocessor primarily used in controller applications. It offers a one-microsecond typical instruction cycle time to execute any of the fixed-width, 16-bit instructions. These instructions can process one-, four-, eight-, or sixteen-bit fields. The fast instruction cycle time requires the use of internal logic buffers that convert CMOS/SOS levels to the more conventional TTL signal levels. The INP Microprocessor instruction set has been optimized for efficient operations performed directly on the I/O registers.

The INP Microprocessor is designed to facilitate functions such as logical decision making, indexed branches, and external event synchronization. These capabilities allow the INP Microprocessor to efficiently perform the functions required of an intelligent network processor.

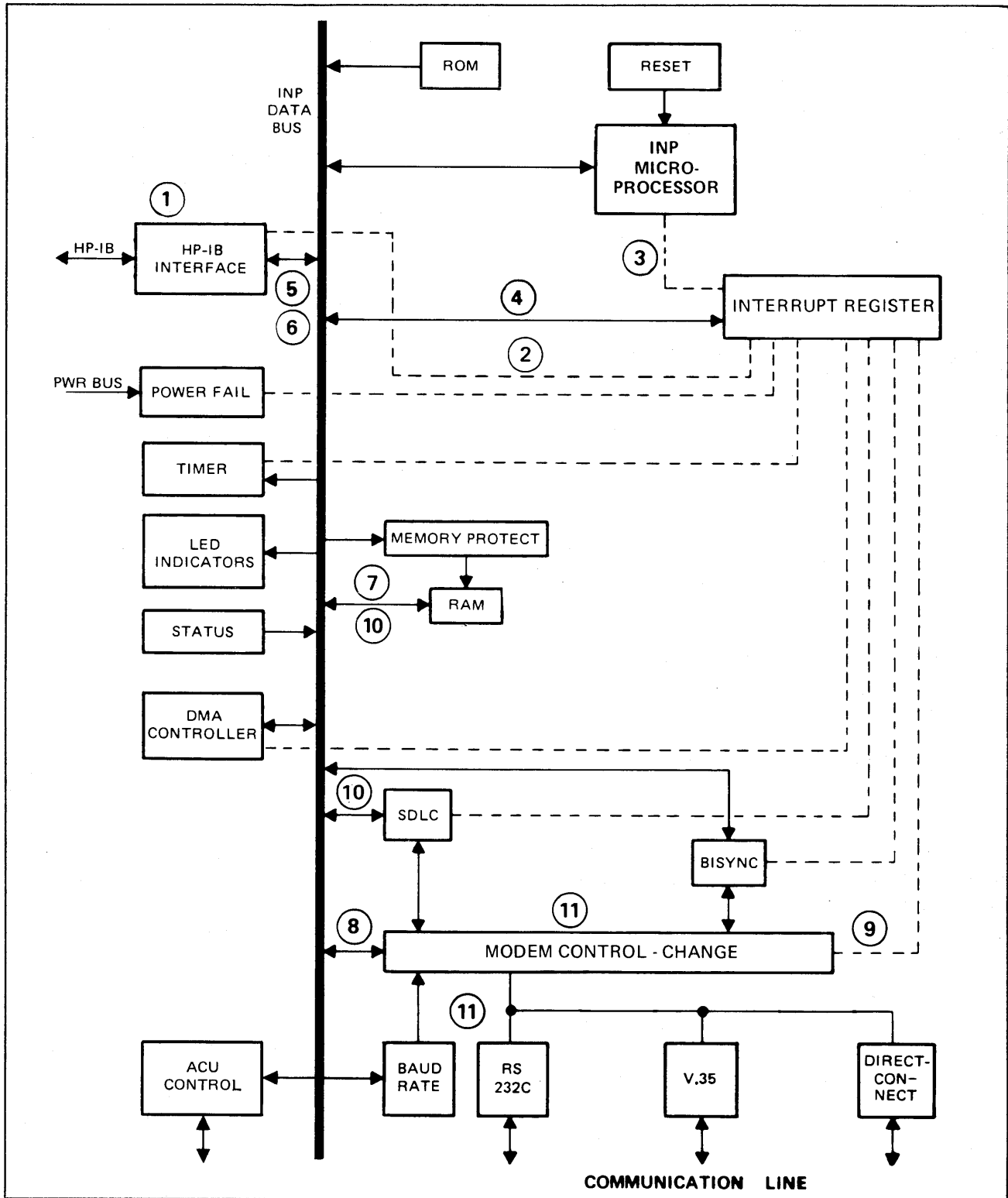


Figure 4-1. HP 30244M INP Block Diagram

Read-Only Memory (ROM)

The INP has a 4K word, high-speed NMOS ROM. The ROM contains power-on and reset programs, functional diagnostics, loader/dumper routines, and RAM fault location code.

Random Access Memory (RAM)

The INP has 24K words of static RAM that store the protocol driver in use (such as BISYNC point-to-point), the INP's control program, the HP 3000 interface driver, and data buffers for the communication channel.

Memory-protect circuitry and separate power supply lines are provided for the RAM and other associated support circuitry to assure that no data will be lost in the event of a power failure or "brownout".

Direct Memory Access (DMA)

The INP uses an LSI DMA-controller chip to provide three high-speed channels between data buffers in RAM and the HP-IB Interface, as well as between RAM and datacomm LSI devices. The function of the DMA logic is to move bytes between external devices and RAM in such a way that they will be transparent to the INP Microprocessor software. This ability to transfer data concurrently with instruction execution enables the INP to achieve high throughput rates.

SDLC and BISYNC Data Communication

The INP uses LSI datacomm devices that are programmed by the INP Microprocessor to operate with BISYNC and SDLC protocols. When transmitting, these devices receive data and control bytes in parallel from the INP Microprocessor and convert them into a continuous serial stream for transmission. Simultaneously, they can receive a serial stream of data and control information and assemble it into a series of parallel data bytes for the INP Microprocessor.

Communication Line Interfaces

The communication line interfaces, such as RS-232-C, Bell DDS, Direct-connect, etc., translate data and control lines into signals that are electrically and mechanically compatible with the respective standards.

FUNCTIONAL-LEVEL OPERATION

In the following typical message transmission sequence, a modem telephone line is assumed as the communications medium. References are made to the functional areas, data paths, and service request paths within the block diagram in figure 4-1. The data paths and service request paths being referenced are identified in the diagram by circled numbers.

Initially, the HP 3000 has been powered up, and the previously attached communication line is not yet operational. The process of powering up invokes the ROM-resident control program. The control program both resets the INP logic and verifies INP operation. The results of the operation verification are available to the HP 3000 on request.

To initiate transmission, the system issues a control parameter over the Hewlett-Packard Interface Bus (HP-IB) to the HP-IB Interface of the INP, (1). This action causes an interrupt bit to be set, (2), which interrupts the INP Microprocessor, (3). The INP Microprocessor then reads the interrupt register, (4), to determine which device is requesting service. Next, the INP Microprocessor interrogates the HP-IB Interface, (5), to determine the nature of the service being requested (new control word, new data word, etc.).

In this example, the control word read in (5) tells the INP microprocessor to start transferring data words from the HP-IB Interface to the INP RAM for local buffering. Typically, the INP reads a whole buffer or block from the HP 3000 before beginning to transfer data over the data communication line.

The flows from the HP 3000 into memory are represented by (6) and (7) in figure 4-1. Upon receiving a full block, the INP Microprocessor raises RTS, (8), and sets up an interrupt for when the modem returns CTS. When CTS becomes active, an interrupt is generated to the INP Microprocessor, (9). The INP Microprocessor then sends data from the INP RAM to the datacomm LSI devices, (10). The datacomm device that is being used serializes the data and sends it over the line, (11), effectively completing the initialization of data transmission.

The INP initiates the data reception function by initializing the modem control lines to indicate that data can be received. It then begins monitoring the communication line for a start-of-message sequence.

Having initialized the transmission and reception of data, the INP Microprocessor now performs functions such as managing special characters in the data stream, calculating and comparing CRCs, transferring blocks to and from the HP 3000, and managing modem signals.

When an end-of-message sequence is detected, the CRC is calculated and checked. If there is no error, the message is accepted and transferred to the HP 3000. The INP returns to its task of monitoring the line for the next start-of-message sequence.

Terminating the transmission sequence involves sending the necessary end-of-message information and changing the appropriate modem control lines to indicate the end of transmission.

SYSTEM-LEVEL OPERATION

The following discussion demonstrates the functioning of an INP at the system level. A very basic DS/3000 example is given here, but INP usage with other data communications subsystems (such as RJE, MRJE, etc.) can easily be construed.

INP operation begins with the system operator opening the DSLINE (by means of the :DSCONTROL console command). At this time, the INP hardware logic is reset and the ROM-resident verification test (SELF TEST) is invoked. Upon the successful completion of the SELF TEST, the respective communications line protocol software is downloaded to the INP RAM. The HP 3000 then commands the INP software to begin execution.

The software initializes itself to conform to the DSLINE as configured on the mainframe. At this time, a read command is issued to the INP, so that messages coming from the remote computer through the data communications line can be received. When a message is received from the remote computer, the local HP 3000 is notified (and data is moved to the mainframe RAM) only at successful completion of the read.

Closing the DSLINE causes any current INP-to-HP 3000 messages to be completed. The INP then becomes dormant until the next :DSCONTROL command.

This section contains general servicing information for the HP 30244M Intelligent Network Processor (INP). This information includes safety precautions, repair philosophy, maintenance aids, use of the self-test capability, troubleshooting, and field-level repair.

SAFETY PRECAUTIONS

WARNING

Whenever the INP printed circuit assembly (PCA) is being installed or removed, ensure that the computer system's power is turned off by disconnecting its power cord.

CAUTION

Whenever the INP PCA is being connected or disconnected to a modem (by attaching or removing the INP-to-modem interconnecting cable), ensure that the key-operated processor power switch is set to 0 and that the modem power is also turned off.

CAUTION

Be particularly cautious when selecting the routing for the longer lengths of the interconnecting data cables. Do NOT run these cables outdoors! Lightning induced transients can have a devastating effect on data communication links; and a more direct lightning strike can, of course, be a very real safety hazard to personnel as well as to the equipment. Indoor routing must be planned to avoid sources of electrical "noise", such as arc welders.

Failure to observe these precautions could result in damage to the components of the computer system, the INP, and/or the modem.

REPAIR PHILOSOPHY

Any malfunction of the INP PCA is remedied on a board exchange basis. To exchange the INP PCA, remove it from the system and prepare it for reshipment to Hewlett-Packard in accordance with the instructions in the paragraph entitled "Reshipment Instructions" which appears near the end of this section.

MAINTENANCE AIDS

The INP consists of more than just the apparent hardware. It is actually a sophisticated system of both hardware and software. To support such a system, a support package has been provided for verification and troubleshooting. This support package consists of the following:

- INP Self Test
- Diagnostic/Support Monitor
- CS/Trace
- INP Dump

The INP hardware self test can be implemented by the customer user or by the HP Customer Engineer. Light-emitting-diode (LED) indicators give status information which can be used as an initial verification/troubleshooting procedure.

The Diagnostic/Support Monitor (DSM) is available for on-line diagnostic support purposes. (Off-line diagnostics are not available for field use.) DSM provides comprehensive and flexible testing capability and allows problems to be checked in an operational environment. Since the operation of the INP is closely integrated with the computer system software, a more meaningful and effective check of the INP is accomplished by using the system itself. DSM begins by verifying the INP hardware and then extends its testing as far into the communications network as possible. If modems with local and/or remote loopback are installed, DSM uses these facilities to test that portion of the link. DSM operates interactively with either a customer user or an HP support user, offering appropriate tests and replies for each level of user. The use of the Diagnostic/Support Monitor is described in detail in the *HP 30010A/30020A/30020B/30244M Intelligent Network Processor (INP) Diagnostic Procedures Manual*. (Refer to the Preface for manual part numbers for ordering.)

CS/Trace is a software fault-isolation tool that can be used in the field by HP support personnel. It builds disc records that contain all transactions that have occurred over the transmission facility. Upon termination of an operation, a utility program is run to format and output the individually accumulated trace records for analysis.

The INP Dump facility is used only as a factory-level support tool. It dumps the contents of the INP memory for analyzing the exact state of the INP. The INP Dump facility is described further in Appendix B.

SELF TEST

A self-test capability is included in the read-only memory (ROM) of the INP. A small set of routines, diagnostics, and checkpoints are included. The intention of the self-test feature is to provide a quick indication of whether the communications board is functioning properly, without either shutting down the system or changing the hardware components. This self test can be actuated by a software command from the host computer system. Results of the test are available to the host system as a status word or to the operator visually through an LED indicator bank located on the edge of the INP printed circuit assembly (PCA) board. This LED display can be seen through the cooling fan on the back of the processor.

When the self test is initiated, a series of tests or checks is set into operation. The tests that comprise the self-test program include the following:

- Basic Instruction Set Test
- ROM Test
- Timer Interrupt Test
- RAM Test
- BISYNC Chip Test
- SDLC Chip Test

As each test is successfully completed, the next test in the sequence is started, until the self-test cycle has been completed. The red LED indicators (located on the edge of the INP PCA board, as shown in Figure 5-1) wink on and off during the test cycle (approximately 2 seconds in duration) and stop in a pattern that shows the test results. If LEDs 0 and 7 (the ones at each end of the array) are the only ones lighted, all tests have been completed successfully. Any other pattern indicates a failure.

The following paragraphs briefly describe each test in the self-test program.

Basic Instruction Set Test

The first portion of the INP microprocessor self-test program is a basic instruction set test. Most of the instructions are tested. LED 7 is lighted before the start of the test. If the test is successful, LED 7 is extinguished and LED 6 is lighted. If the test fails, LED 7 remains lighted.

ROM Test

The second portion of the self-test program tests a calculated checksum. The ROM contains a "burned-in" constant that is used in the calculation of the current ROM checksum. A net result of zero should result when the old and new checksums are compared. This is the only test conducted on the ROM. LED indicator 6 is lighted at the start of this test. If the test is successful, LED indicators 5 and 6 are lighted. If the test fails, indicator 6 stays lit.

Timer Interrupt Test

The third portion of the self-test program checks to determine that a timer interrupt occurs. This test includes a timing routine that executes in 12 milliseconds. During that interval, a timer interrupt should have occurred. This test does not check the accuracy of the timer, but rather it verifies that the interrupt has actually occurred. At the start of the test, LEDs 5 and 6 are lighted. At the successful completion of the test, LED 3 is lighted and LEDs 5 and 6 are turned off. If the test fails, LEDs 5 and 6 are left on.

RAM Test

The fourth portion of the self-test program is the RAM Test, which consists of two routines. In the first routine, each memory location has its address written into it and then read from it, starting at location 0001 and progressing to 3FFF. The second routine fills memory downward with the complement of the address and reads it upward. LED indicator 3 is lighted at the start of the test. If the test is successful, LED indicator 4 is lighted and indicator 3 is turned off. If it fails, LED indicator 3 stays lit.

Chip Tests

The fifth portion of the self-test program performs tests on the remaining portions of the PCA board, namely the communication chips and the I/O controllers. LED indicator 4 is lighted at the start of these tests. As each individual test in this group is completed, the LEDs are incremented. If all of the tests are successful, LEDs 0 and 7 are lighted. If any one fails, the tests are not halted, but the appropriate LEDs are lighted.

BISYNC TEST. The first part of the Universal Synchronous/Asynchronous Receiver/Transmitter (BISYNC) Test sets up the communications interface and then transmits and receives 100 data characters. Errors detected will be data overruns, data parity errors, and any differences between data transmitted and data received.

The second part of the BISYNC Test takes the data written in low memory and transmits it to higher memory via the BISYNC chip and DMA. At the successful completion of this test, LED indicator 5 is lighted.

SDLC TEST. The first part of the Universal Synchronous Receive and Transmit (SDLC) Test sets up the communication interface and then transmits and receives 100 data characters. Errors detected will be receive errors, receive overruns, and receive aborts.

The second part of the SDLC Test takes the data written in low memory and transmits it to higher memory via the SDLC chip and DMA. At the successful completion of this test, LED indicator 5 is turned off. If it fails, LED indicator 5 is left on.

TROUBLESHOOTING

Customer-user Troubleshooting Procedures

If a malfunction is suspected, the customer user can verify proper operation of the INP by initiating the self-test program described in the previous paragraphs.

CAUTION

Before manually initiating a self test, be sure that no other computer operations are in progress that may be destroyed by the self-testing process.

There are two ways of manually initiating the self test. One way is by using the INP Diagnostic/Support Monitor (DSM) to invoke the Standard Test Sequence. (The self test is included in this set of tests.) This technique requires a simple interactive dialogue on a computer terminal between the customer user and DSM. The customer-user/DSM operations are described in the *HP 30010A/30020A/30020B/30244M Intelligent Network Processor (INP) Diagnostic Procedures Manual*.

The other way of initiating the INP self test is to turn off the HP 3000/37 and restart it. (Refer to the Installation Verification instructions in Section 2 for details on this method of initiating the self test. Also, the exact location of the INP within the card cage can be obtained from the installation notation in the Configuration section of the *System Support Log*.)

The INP self test checks most of the circuitry of the INP PCA board. If, upon completion of the self test, the self-test LED indicator lights (Figure 5-1) are displaying 0 and 7 (only the two lights at each end are lighted), there is no detectable hardware malfunction within the INP PCA board. If any other combination of lights is being displayed or if you still suspect a malfunction beyond the physical limits of the PCA board, call your Hewlett-Packard Customer Engineer (CE).

NOTE

If your HP 3000 Series 37 Computer System includes a printer, the running of the DSM Standard Test Sequence will also result in a Test Result Summary being printed. This printout lists all of the tests that were run and a pass or fail statement for each test. (See Appendix A of the *INP Diagnostic Procedures Manual* for an example of the format of this summary.)

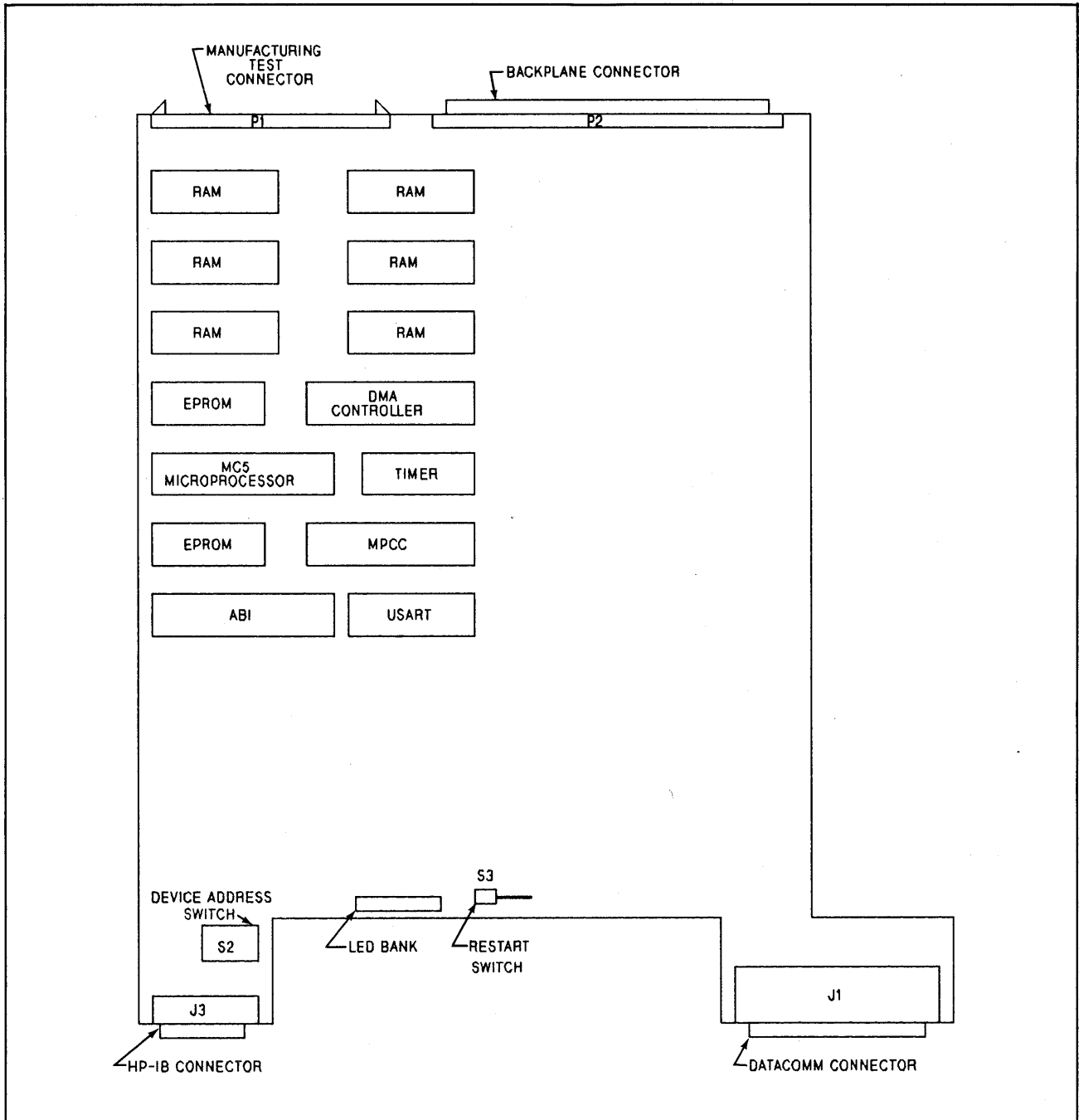


Figure 5-1. Location of Pertinent Components on INP PCA

NOTE

The RESTART switch shown in Figure 5-1 is used at the factory for initial board calibration as part of the manufacturing process, but the RESTART switch is not used in the field after the INP is installed in the HP 3000/37 Computer System.

HP Support Troubleshooting Procedures

More extensive troubleshooting can be done by the HP Customer Engineer by using the support-user interactive dialogue of DSM. When support-user diagnostic testing of the INP identifies a malfunction within the INP PCA board, the malfunction must be remedied on a board exchange basis. (Refer to the paragraph entitled "Repair Philosophy" at the beginning of this section.)

When the HP Customer Engineer arrives at the computer site, the recommended troubleshooting sequence is as follows:

1. Determine that the INP is not currently in use.
2. Before initiating any other action, look into the computer card cage (through the fan) and observe the INP self-test LEDs (see Figure 5-1 for the location of the LEDs). Note whether the LEDs are flickering or a static pattern is being displayed, and make a written record of which LEDs are lighted. This information may be needed later if the problem persists beyond the initial steps of troubleshooting.
3. Disconnect the communication cable (the modem cable or direct-connect cable) from the connector on the INP PCA board to physically isolate the INP subsystem for testing.
4. Run DSM, using the SUPPORT entry point (as described in the *HP 30010A/30020A/30020B/30244M Intelligent Network Processor (INP) Diagnostic Procedures Manual* under the heading "Support User Operation") and specify the Active Mode. Run Test 2.1 (the INP Self Test).
5. If the board fails (any pattern of lighted LEDs other than 0 and 7), replace the INP PCA board (part no. 30244-60002). (See the paragraph entitled "Replacement of the PCA Board".)

NOTE

When sending PCA boards to the factory for replacement, refer to the paragraph entitled "Reshipment Instructions". Include in the package your noted observations from step 2; they may be helpful during factory-level troubleshooting. Also, if a 5-and-0 or a 3-and-0 LED pattern was observed in step 2, an INP dump file may have been created in PUB.SYS (labeled INPLOGnn, where nn is in the range from 00 to 99). If they can be located, these INPLOG files should also be included in the package with the defective equipment. (See Appendix B for further information on the INP dump files.)

6. If the board passes the self test (LEDs 0 and 7 lighted), reconnect the communication cable (that you disconnected in step 3).
7. Again, run Test 2.1 and observe the self-test LEDs.
8. If the INP fails the self test with the communication cable connected, while it passed with the communication cable disconnected, the problem is probably in the communication cable or farther "downstream" in the network.

9. If the INP board passes the self test, but a problem still persists, begin the off-board loopback testing.

Off-board Loopback Testing

When support-user diagnostic testing is required beyond the physical limits of the INP PCA board, certain portions of the data communications network can be synthesized. A board test connector and/or a cable test connector are needed for testing with certain cable options (see Table 1-2 for test equipment compatibility information). These test attachments are used with the off-board loopback tests described in the *HP 30010A/30020A/30020B/30244M Intelligent Network Processor (INP) Diagnostic Procedures Manual*. The board test connector and cable test connector are illustrated in Figure 1-1 and listed by part number in Table 1-2. The test attachments are used as follows:

1. With the data communications cable (direct-connect or modem cable) disconnected from the connector on the edge of the INP PCA board, attach the appropriate board test connector to the PCA board in place of the data communications cable. Run Test Group 6 of DSM.
2. If Test Group 6 passes step 1, this indicates that the problem is originating farther "downstream" on the communications line. Remove the board test connector, and reconnect the data communications cable to the INP PCA board. Disconnect the other end of the cable, and attach the appropriate cable test connector to the data communications cable. Repeat Test Group 6 of DSM. A failing test indicates that the fault is located in the cable.
3. If your data communications network uses the modem cable and if the modems include analog and digital loopback options, testing in Test Group 6 can continue. Connect the modem cable to the modem. Configure the computer and modem for normal operation, but select the analog loopback option on the modem. Run Test Group 6 in DSM. A failing test indicates that the problem lies in the local modem.
4. Disable the loopback option on the local modem, and select the digital loopback option on the remote modem. Run Test Group 6 again. A failure of this test indicates that the problem lies with the telephone line or the remote modem. Repeating steps 1, 2, 3, and 4 on the remote computer system will isolate the problem source.

FIELD REPAIR

Field repair of the INP is limited to the following procedures and is to be accomplished only by Hewlett-Packard support personnel.

Replacement of the PCA Board

When the troubleshooting procedures (outlined earlier in this section) indicate the need for replacement of the INP PCA board, proceed as follows:

1. Ensure that the system operator has backed up the system files before beginning this procedure.
2. Conduct an orderly shutdown of the process in accordance with the procedures described in the *HP 3000 Guide for the New Operator*.

3. Turn off the DC power by setting the key-operated power switch (located on the front of the HP 3000/37 mainframe, as shown in Figure 2-2) to the 0 position.
4. Turn off the AC power by disconnecting the line-power cord (located on the back of the HP 3000/37 mainframe).

WARNING

All power must be off when inserting or removing any device or card in the system.

5. Disconnect the communications cable connector and the HP-IB Cable connector from the INP PCA board.
6. Remove the INP PCA board (part no. 30244-60002) from the computer card cage.
7. Install the factory replacement INP PCA board in the same slot in the computer card cage, using the procedure described under "Hardware Installation Procedures" in Section 2, Installation.
8. Verify that the INP is now working properly as described under "Installation Verification" in Section 2, Installation.

RESHIPMENT INSTRUCTIONS

If the INP PCA and/or the associated cables are to be shipped to Hewlett-Packard for service or repair, attach a tag to each item identifying the owner and indicating the type of service or repair to be accomplished. Include the part number and date code of each item.

Package the item(s) in the original factory packaging material, if available. If the original packaging material is not available, standard factory packaging material can be obtained from the nearest Hewlett-Packard Sales and Service Office. If standard packaging material is not available, wrap the item(s) in suitable cushioning material (Air Cap TH-240 Cushioning or equivalent) and place the item(s) in a corrugated carton (200-pound test material). Seal the carton securely and mark it FRAGILE to ensure careful handling.

This appendix briefly describes how to configure the MPE Operating System to include the HP 30244M Intelligent Network Processor (INP).

CONFIGURATION OVERVIEW

The programs and intrinsics that comprise your data communications subsystems (such as DS, RJE, etc.) are supplied as part of your MPE Operating System. Only the MPE I/O configuration needs to be modified to include the Intelligent Network Processor (INP) and any pseudo devices that may be required for subsystem operation.

Before configuring MPE, install the INP as described in Section 2, Installation. The DRT number configured on the INP PCA board (determined from the device number established in the paragraph entitled "PCA Jumpers and Switches" in Section 2 and set into the device address switch) should be noted because it is requested during the configuration dialogue.

If the I/O configuration is compatible, the same INP can be used for DS, RJE, MRJE, IMF, or X.25 remote activities. Some information provided in the MPE configuration dialogue may be relevant only when the INP is used with one particular subsystem. Any configuration differences or special considerations are noted in the following dialogue.

Besides configuring the INP and subsystem pseudo devices, you must, of course, configure any terminals and line printers that are to be used for the Pass-Through Mode of operation. These are standard MPE I/O configurations as described in the *MPE V System Operation and Resource Management Reference Manual*. (Refer to the Preface for manual part numbers for ordering.)

THE CONFIGURATION DIALOGUE

The following instructions deal only with configuring an INP. The complete configuration dialogue is given in the *MPE V System Operation and Resource Management Reference Manual*.

To begin, log onto the system, define the output files, and initiate a SYSDUMP as shown:

NOTE

Where it is necessary to distinguish user input from computer output in this configuration dialogue, the user input is underlined.

:HELLO MANAGER.SYS

:FILE T;DEV=TAPE

:FILE L;DEV=LP

:SYSDUMP *T,*L

Step No. Prompt and Response

1 ANY CHANGES? YES

2 SYSTEM ID=HP 32002 v.uu.ff? **RETURN**

3 MEMORY SIZE? **RETURN**

4 I/O CONFIGURATION CHANGES? YES

5 LIST I/O DEVICES? YES or NO

6 LIST CS DEVICES? YES or NO

7 HIGHEST DRT = xx.?

 xx is the current highest hardware device address that can be assigned. Press **RETURN**
 if xx is satisfactory. Otherwise, enter a higher DRT number.

Configuration of individual devices begins here.

8 LOGICAL DEVICE #?

 Enter the logical device number of the INP.

Step No.	Prompt and Response
----------	---------------------

After you respond to all the prompts for one device, this LOGICAL DEVICE #? prompt is repeated to allow for configuring additional devices. If I/O configuration is complete, press **RETURN** and the system configuration dialogue continues with step 46.

9	DRT #?	<u>0</u>	Removes the device specified in the previous prompt from the current MPE configuration.
		<u>xx</u>	Enters the hardware DRT number for the INP.

10	UNIT #? <u>0</u>
----	------------------

11	SOFTWARE CHANNEL #? <u>0</u>
----	------------------------------

12	TYPE? <u>17</u>
----	-----------------

13	SUBTYPE?	
	<u>0</u> or <u>1</u>	(RJE and MRJE)
	<u>1</u>	(IMF)
	<u>0</u> , <u>1</u> , or <u>3</u>	(DS)
	<u>0</u> , <u>1</u> , <u>2</u> , or <u>3</u>	(X.25)

0 = Synchronous switched line with a modem
1 = Synchronous nonswitched line with a modem
2 = PAD printer with attached HP2334A
3 = Synchronous nonswitched line, hardwired

(Note: If the INP is hardwired directly to an SSLC, always configure *both* the INP and the SSLC as Subtype 1 and Transmission Mode 1.)

16	RECEIVE TIMEOUT?	(20-second default)
	<u>0-32000</u> or RETURN	(DS, IMF, RJE, and X.25)
	RETURN	(MRJE overrides this option)

17	LOCAL TIMEOUT?	(60-second default)
	<u>0-32000</u> or RETURN	(DS, IMF, and RJE)
	RETURN	(MRJE overrides this option)
		(X.25 does not use this response)

Configuring MPE

Step No. Prompt and Response

18 CONNECT TIMEOUT? (900-second default)
0-32000 or RETURN (DS, IMF, RJE, and X.25)
RETURN (MRJE overrides this option)

Prompts 19 through 21 appear only when subtype 0 was specified in prompt 13. (DS, RJE, MRJE, and X.25)

19 DIAL FACILITY?
NO If no dial facility is required. (DS, RJE, and X.25)
YES If manual dialup is required. (DS, RJE, and X.25)
INP LDEV# If the autodial feature is used. (DS, RJE, and X.25)
RETURN (MRJE and IMF override this option)

20 ANSWER FACILITY?
YES or NO (DS, RJE, and X.25)
RETURN (MRJE and IMF override this option)

21 AUTOMATIC ANSWER?
YES or NO (DS, RJE, X.25)
RETURN (MRJE overrides this option)

22 DUAL SPEED?
YES or NO (DS, RJE, MRJE, and X.25 -- YES for European modems only)
(IMF does not use this response)

23 HALF SPEED?
YES or NO (Asked only if your response to prompt 22 was YES)

24 SPEED CHANGEABLE?
YES or NO (This response overridden if modems providing internal clocking are used)

- | Step No. | Prompt and Response |
|---|--|
| 25 | TRANSMISSION SPEED? (in characters per second)
<u>250, 300, 600, 1200, 2400, 3600, 4800, or 7000</u> (DS and X.25)

<u>250, 300, 600, or 1200</u> (RJE and MRJE)

(Note: The transmission speed you specify is ignored for modems that provide internal clocking signals. This feature allows modems of different speeds to be used without reconfiguring the operating system. It also allows the console operator to change the speed of hardwired lines through the use of the ;SPEED= parameter when the line is opened.) |
| 26 | TRANSMISSION MODE? <u>0</u> or <u>1</u> (DS, RJE, MRJE, and X.25)

0 = Full Duplex
1 = Half Duplex

(Note: Subtype 3 requires full duplex, except when the INP is hardwired to an SSLC. For hardwired INP-to-SSLC, always configure <i>both</i> devices as Subtype 1 and Transmission Mode 1.) |
| 27 | PREFERRED BUFFER SIZE? (in words)
<u>0-1024</u> (DS -- 1024 recommended;

(RJE, MRJE, IMF, and X.25 override this option) |
| 28 | DRIVER CHANGEABLE? <u>NO</u> |
| 29 | DRIVER OPTIONS? <u>0</u> |
| 38 | DRIVER NAME? <u>IOINPO</u> |
| Prompts 39 through 42 appear only when subtype 0 has been specified in prompt 13. (DS, RJE, MRJE, and X.25) | |
| 39 | PHONELIST?
<u>YES</u> or <u>NO</u> (DS, RJE, and X.25)

<u>RETURN</u> (MRJE and IMF) |

Configuring MPE

Step No. Prompt and Response

40 PHONE NUMBER? telephone number or **RETURN**

(Asked only if your response to 39 was YES.)

NOTE

European modems and auto call units require a character to be configured into the telephone number. This delay is achieved by the letter D.

The configurator file will receive only one phone number. The phone number is configured with hyphens (not parentheses):
nnn-nnn-nnnn.

The character set needed for the phone number is:

0 through 9

/ (separator used for ACUs that have a second dial tone detect)

E (end of number)

D (delay of one second)

(defined by the local telephone system)

* (defined by the local telephone system)

41 LOCAL ID SEQUENCE? id sequence or **RETURN**

(MRJE and X.25 ignores your response)

42 REMOTE ID SEQUENCE? id sequence or **RETURN**

(RJE, MRJE, and X.25 ignore your response)

Step No. Prompt and Response

- 43 DEVICE CLASSES?
 `(RETURN)`
 name list
- No class name will be assigned.
- A list of one or more names, separated by commas. A name must begin with a letter and can have no more than eight characters.
- (RJE requires the device class name RJLINE. Additional class names are optional.)
- (MRJE ignores your response)

The dialogue now prints the LOGICAL DEVICE #? prompt described in step 8. If all I/O configuration is complete, press `(RETURN)` and the dialogue continues at step 46. Otherwise, enter a logical device number, and repeat the configuration procedure from step 8.

- 46 MAX # OF OPENED SPOOLFILES = xxx ? `(RETURN)`
- 47 LIST I/O DEVICES? YES
- 48 LIST CS DEVICES? YES
- 57 CLASS CHANGES? `(RETURN)`
- 69 LIST I/O DEVICES? `(RETURN)`

You receive the prompt in step 70 only if a communications device is currently configured in your system, or if additional drivers exist.

- 70 ADDITIONAL DRIVER CHANGES? `(RETURN)`
- 77 SYSTEM TABLE CHANGES? `(RETURN)`
- 97 MISC CONFIGURATION CHANGES? `(RETURN)`
- 112 LOGGING CHANGES? `(RETURN)`
- 119 DISC ALLOCATION CHANGES? `(RETURN)`
- 133 SCHEDULING CHANGES? `(RETURN)`
- 134 SEGMENT LIMIT CHANGES? `(RETURN)`
- 142 SYSTEM PROGRAM CHANGES? `(RETURN)`

Configuring MPE

Step No. Prompt and Response

144 SYSTEM SL CHANGES? **RETURN**

153 ENTER DUMP DATE?
RETURN

Copies the modified MPE. When this copy is used to COLDSTART the system, the account structure and all files remain intact.

mm/dd/yy

where mm/dd/yy is some date in the future. Copies the modified MPE and the current accounting structure (but no files).

mm/dd/yy

where mm/dd/yy is usually the date of the most recent system backup. Copies the modified MPE, the current accounting structure, and any files that were changed on or since the specified date.

0

Copies the entire system (MPE, the current accounting structure, and all files).

154 ENTER DUMP FILE SUBSETS? **RETURN**

155 LIST FILES DUMPED? **RETURN**

The console operator must now use the =REPLY command to assign the tape drive on which a fresh tape reel has been mounted.

INP DUMP FACILITY

APPENDIX

B

The INP Dump facility is used only by factory-level support personnel. It dumps the contents of the INP memory for analyzing the exact state of an INP in use. Invoked by either an INP hardware problem or an INP software problem, the dump data can be returned to the factory either on magnetic tape or in the form of a listing. (Preferably, send the tapes whenever possible.)

Dumping the INP and saving the data is done automatically by the system software. As dumps are completed, the data is stored into files named "INPLOGnn", where nn is a number not greater than the maximum number of dump files for the system. This limit assures that multiple INP dumps cannot adversely affect system storage.

Messages regarding INP dumps are directed to the system console. The initial message announces the dump and specifies which INP is dumping:

```
    DATACOMM ERROR ON LDEV xx
```

where xx is the logical device number. Notification that the data has been saved and identification of the dump file appears next:

```
    INP RAM DUMPED IN INPLOGnn
```

If the creation of this new INP dump file attains the maximum number allowed, another message is generated:

```
    STORE AND PURGE ALL INPLOGnn FILES
```

Any further INP dumps will not be saved until the previous dump files are processed.

As previously mentioned, either of two media can be used for returning the INP dump data to the factory: magnetic tape or listing. The more obvious method is to store the INPLOG files onto a tape and send the tape to the factory. The other alternative is to run the INP Dump Analyzer against each INPLOG file. Each file then generates a listing of approximately 50 pages. These listings can be sent to the factory, thus eliminating the need for shipping magnetic tapes.

The latter method requires only a few simple MPE commands. The first step is to define the list file for the Analyzer. By default, the Analyzer will output to \$STDLIST for job execution or to a device class of LP for session execution. If another output device is desired, a file or device equation to INPLIST will assign the proper file/device.

The required command to identify the dump file is:

```
    FILE INPDUMP = INPLOGnn
```

The command that invokes the Analyzer is:

```
    RUN INPDPAN.PUB.SYS
```

Note that INPDPAN does not purge the dump file; it must be done manually.

I N P Dump Facility

The following is a sample stream job:

```
!JOB INPDUMP,MANAGER/PSWD.INP
!FILE INPDUMP=INPLOG01.PUB.SYS
!RUN INPDPAN.PUB.SYS
!EOJ
```

COMMUNICATIONS CABLING DIAGRAMS

APPENDIX

C

This appendix provides cabling diagrams for the more commonly used INP interconnecting cable assemblies. This information will aid in troubleshooting cable problems associated with the INP.

The following cables are represented in this appendix:

RS-232-C Synchronous Interface Cable, part no. 30244-63001

RS-232-C 10-meter Extender Cable, part no. 5061-4958

RS-232-C Asynchronous Interface Cable, part no. 30244-63002

V. 35 High-speed Synchronous Cable, part no. 30244-63004

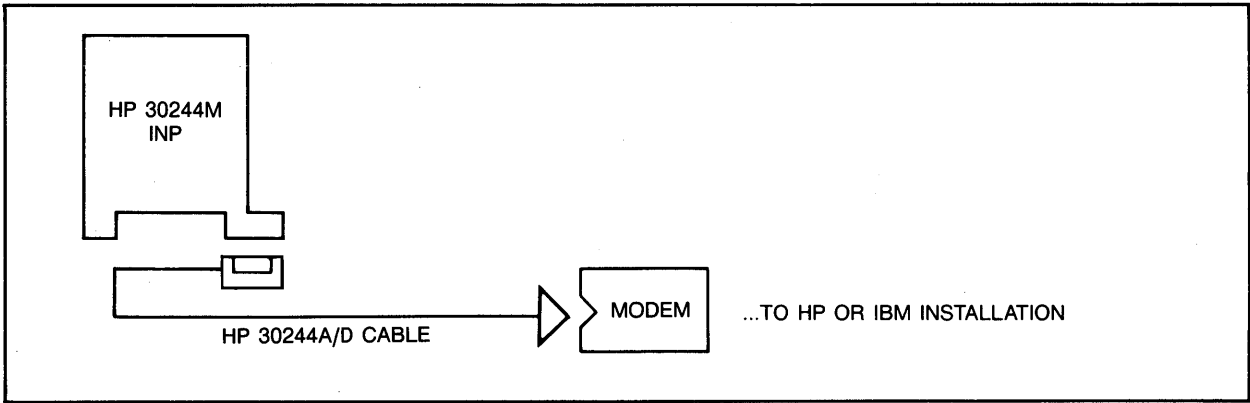
INP-to-INP Direct-Connect Interface Cable, part no. 30244-63009

INP-to-INP Direct-Connect Extender Cable, part no. 30224-63001/7

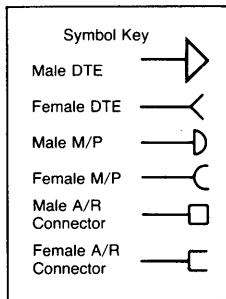
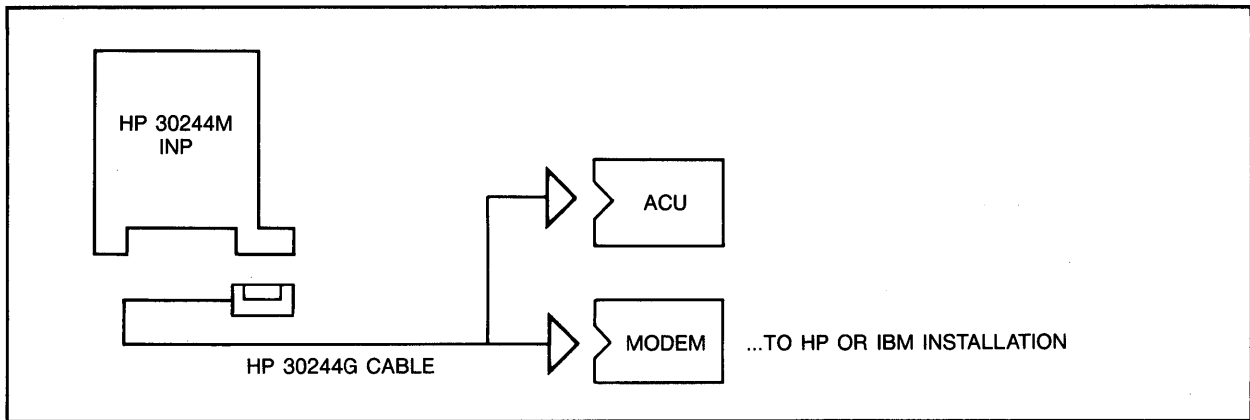
INP-to-SSLC Direct-Connect (Modem Eliminator) Extender Cable, part no. 30225-60007

Communications Cabling Diagrams

INP MODEM CONNECTION

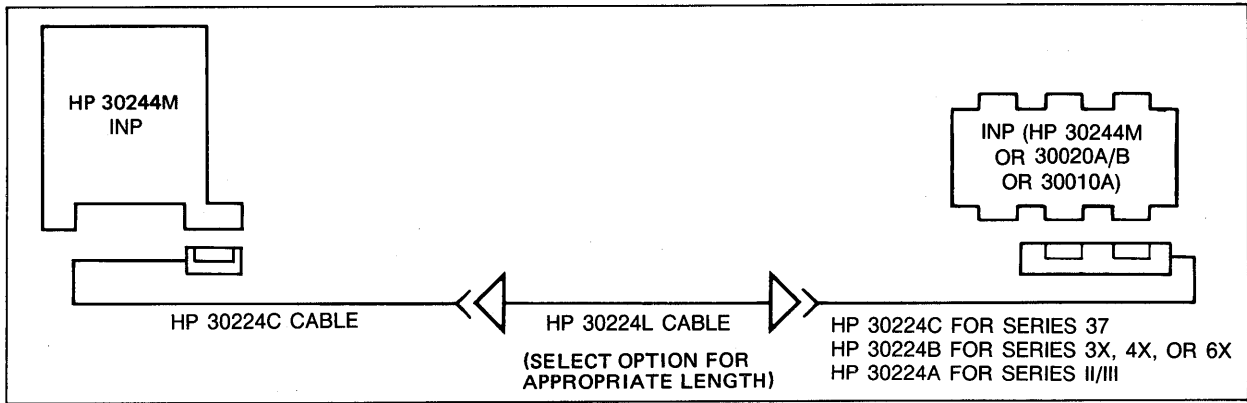


INP MODEM — AUTO CALL UNIT CONNECTION

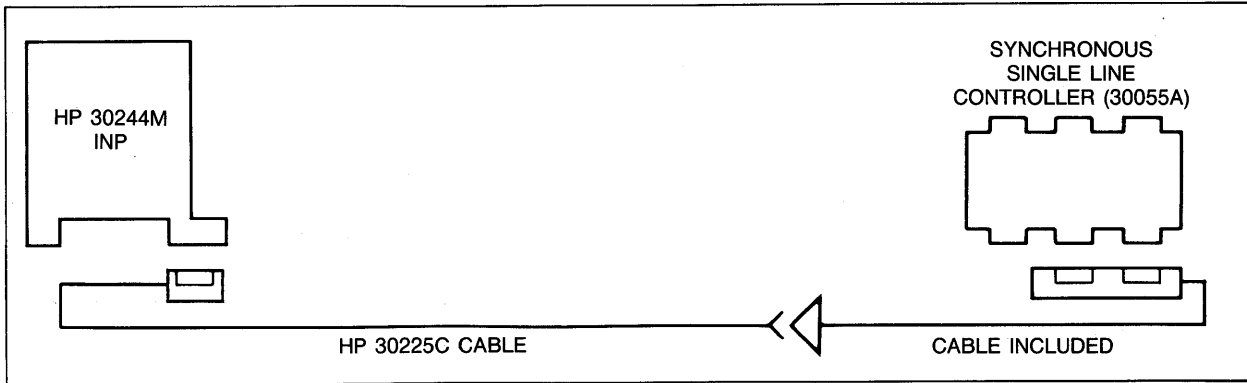


INP Communications Cabling Diagrams

DS/3000 INP-INP DIRECT CONNECTION



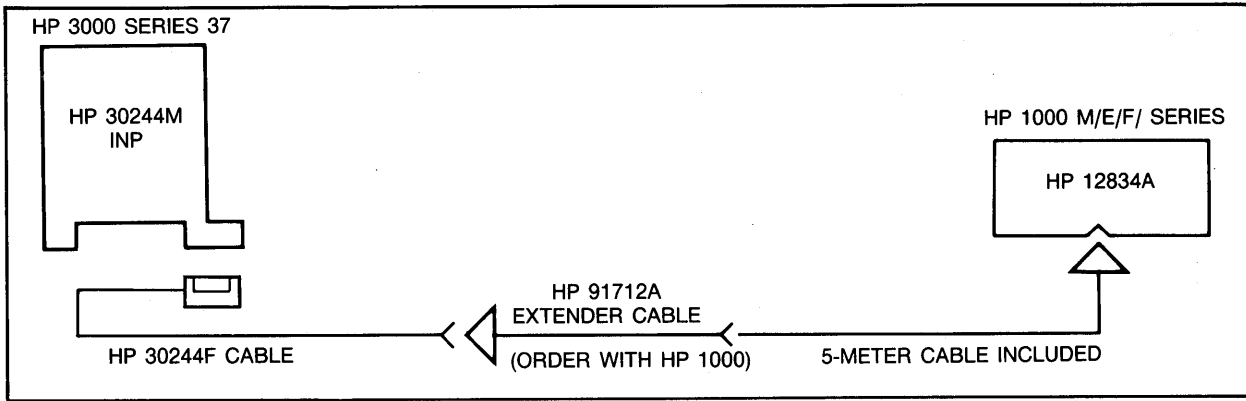
DS/3000 INP-SSLC DIRECT CONNECTION



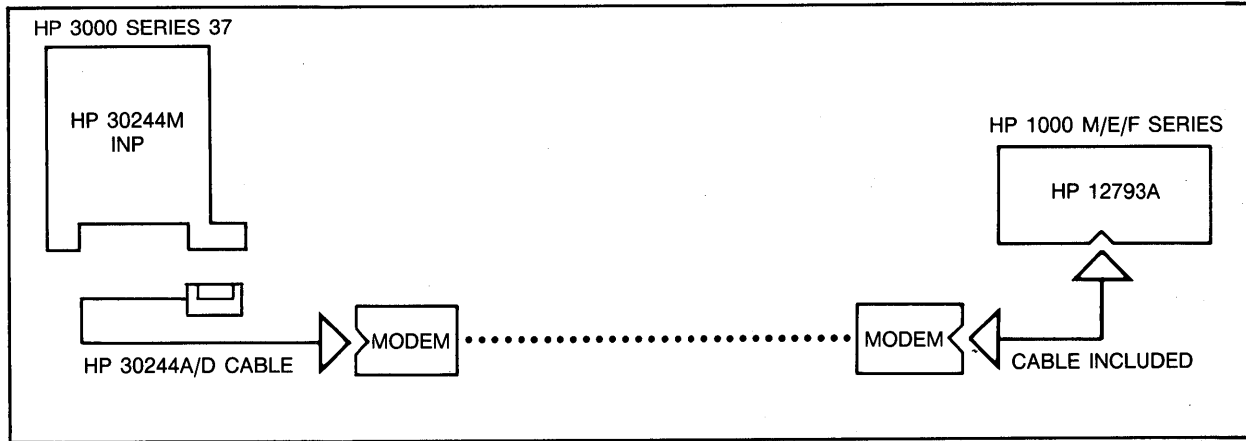
INP Communications Cabling Diagrams (continued)

Communications Cabling Diagrams

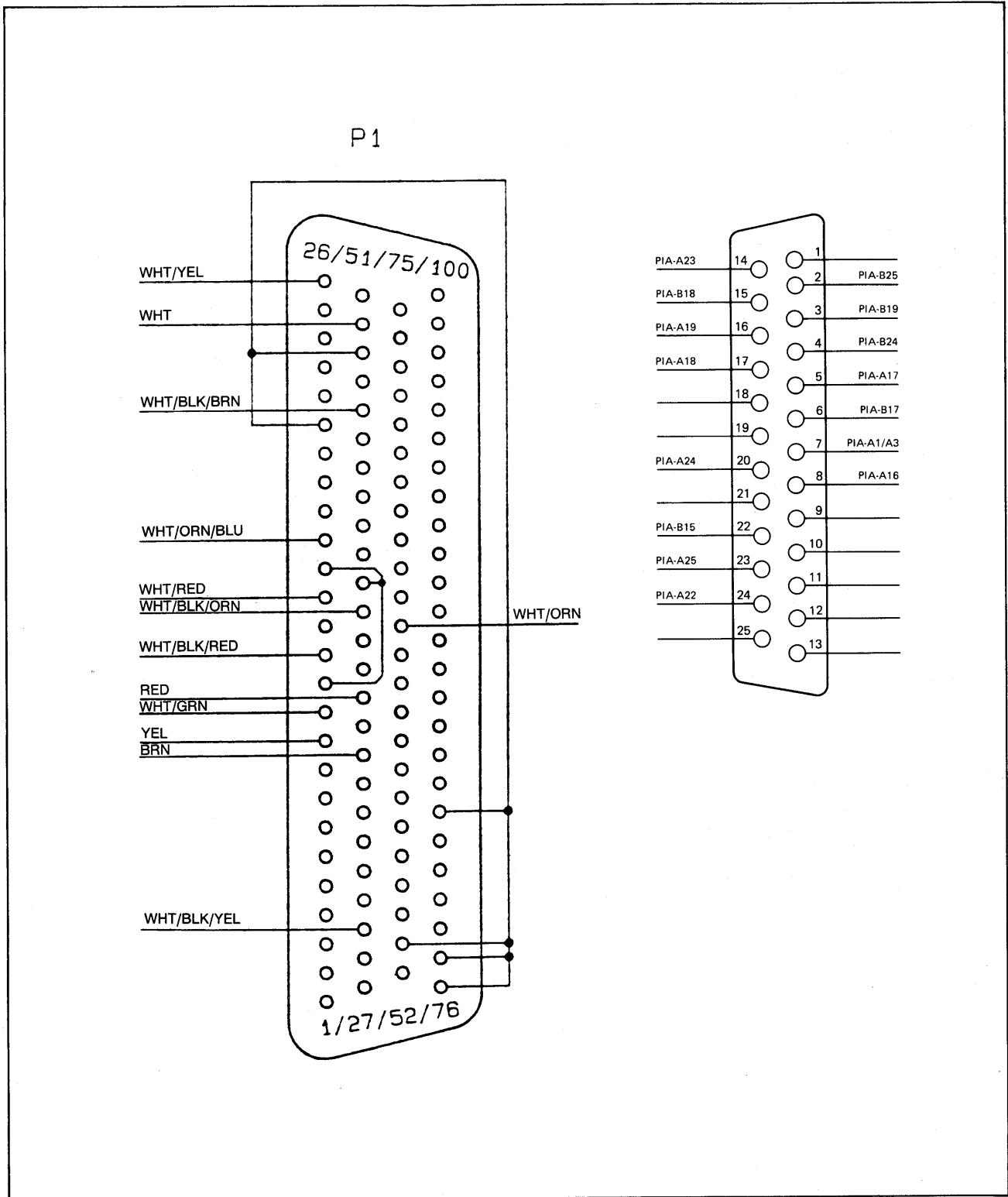
DS/3000-DS/1000 HARDWIRED CONNECTION



DS/3000-DS/1000 MODEM CONNECTION

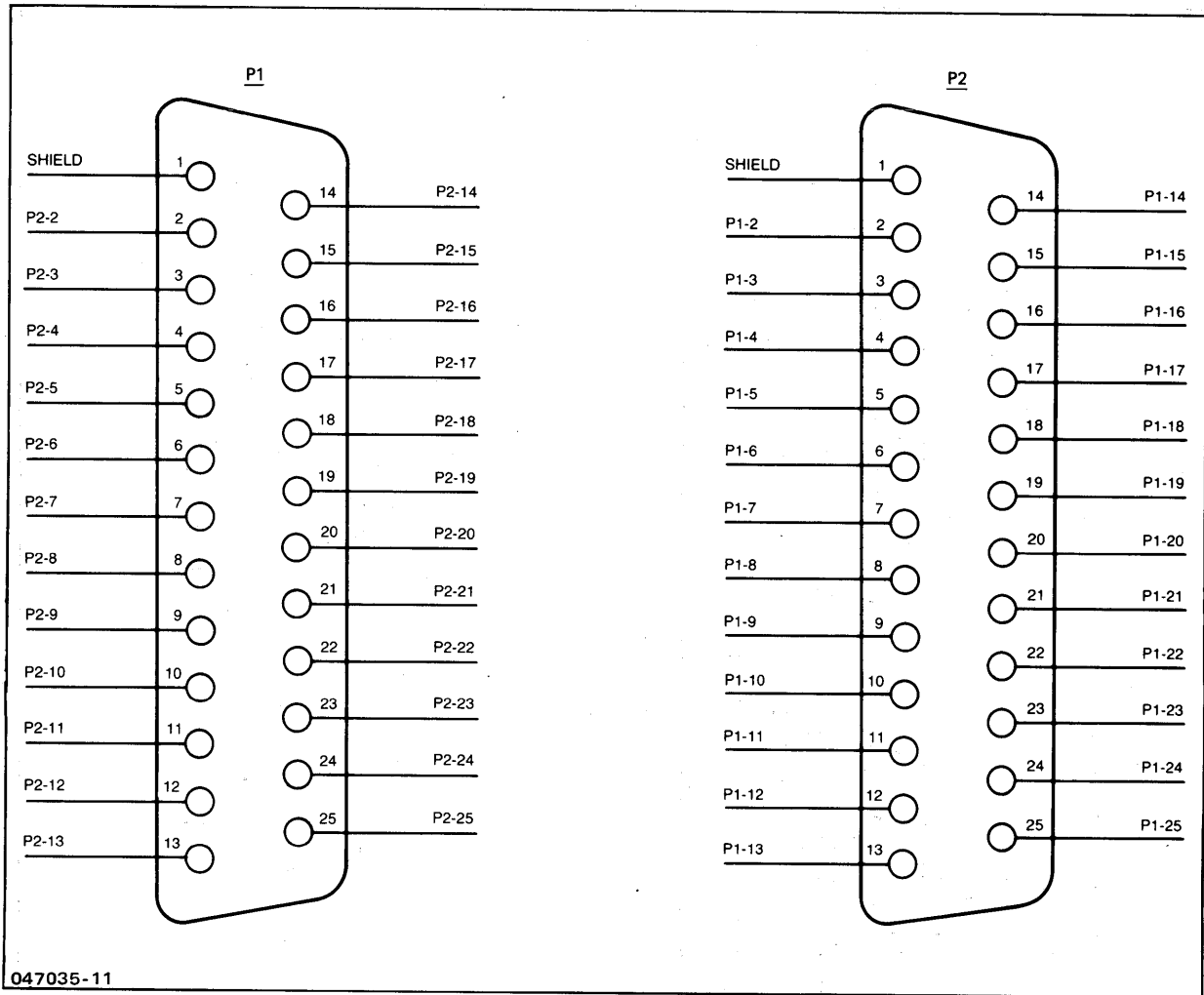


INP Communications Cabling Diagrams (continued)

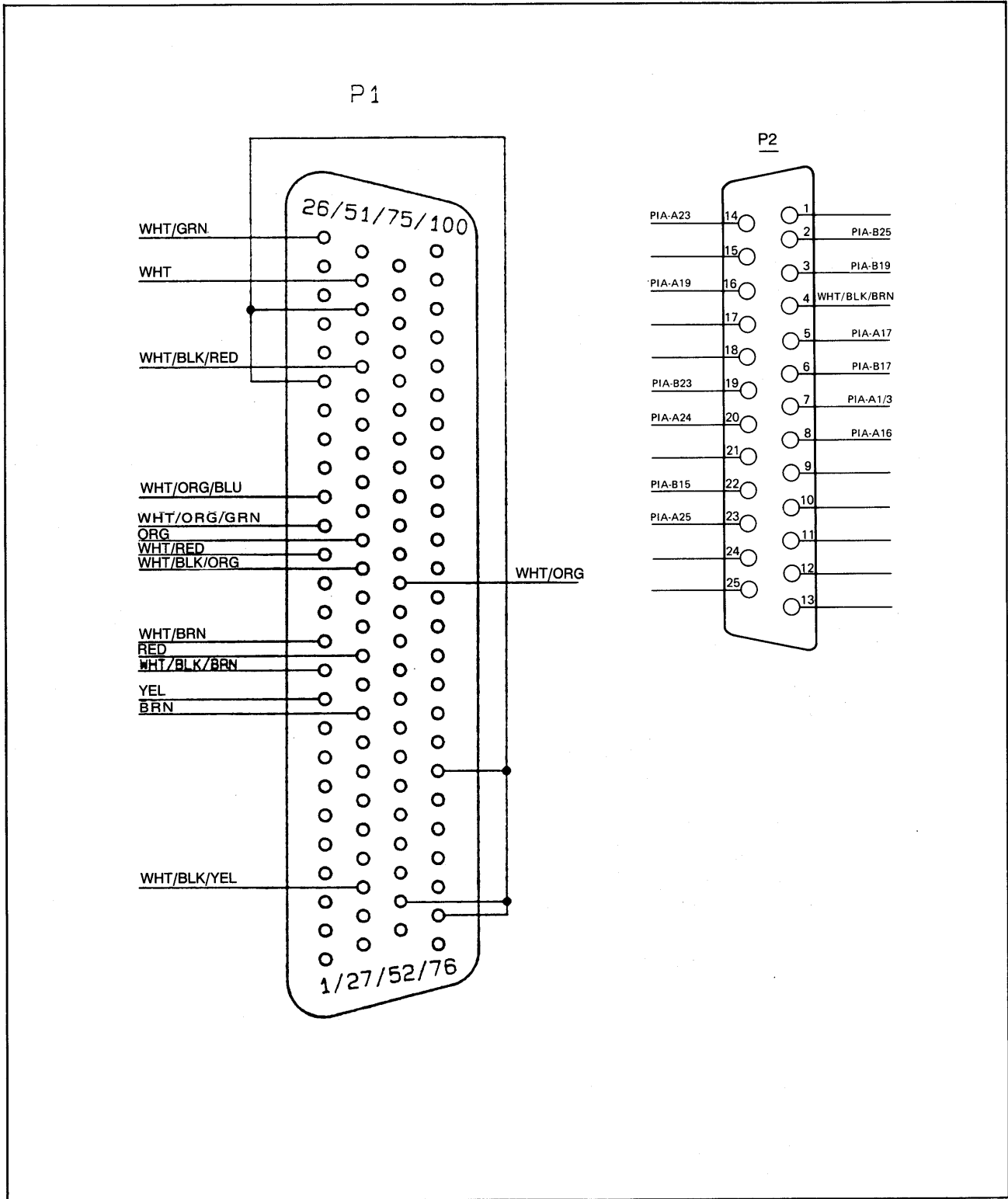


RS-232-C Synchronous Interface Cable, part no. 30244-63001

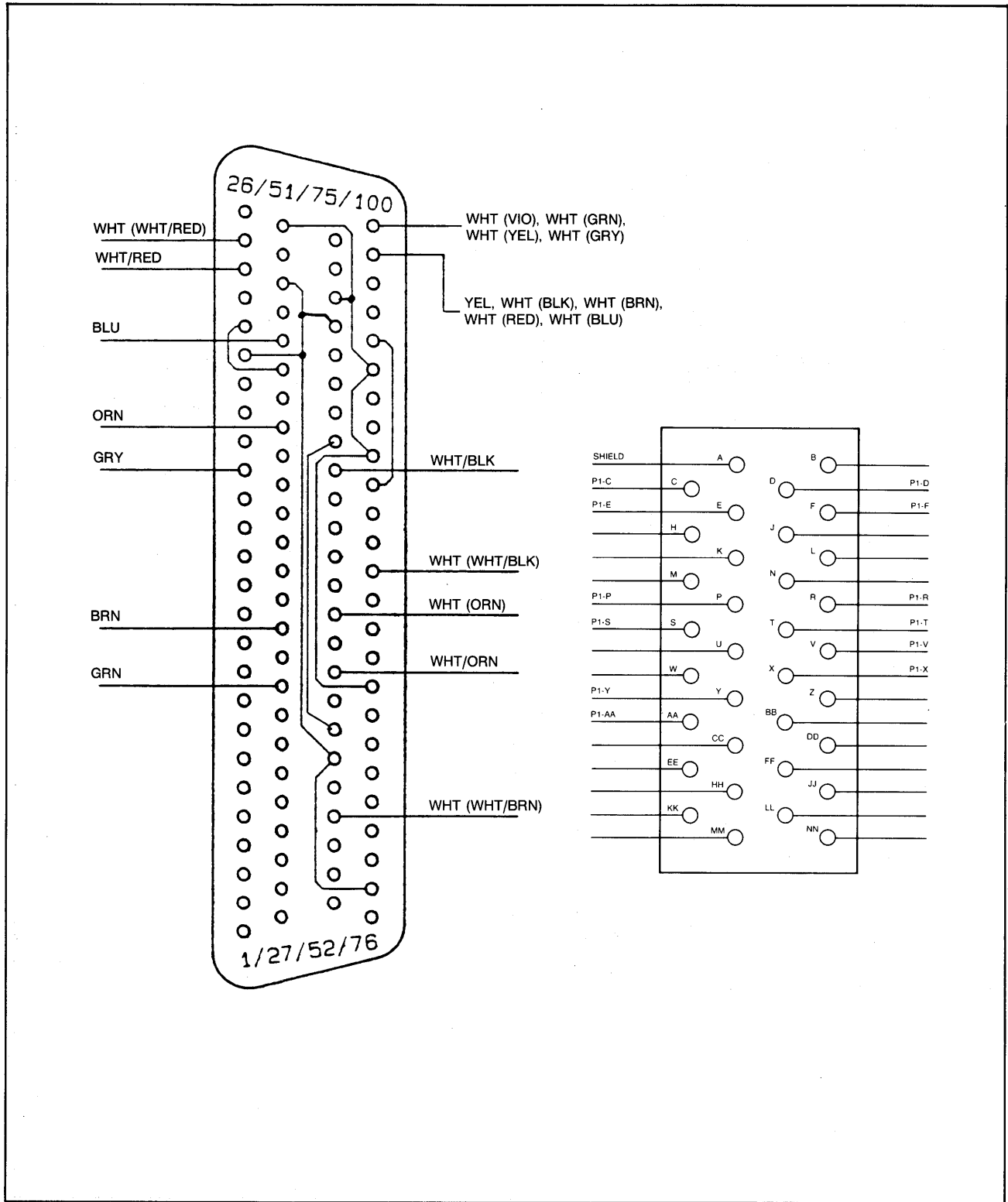
Communications Cabling Diagrams



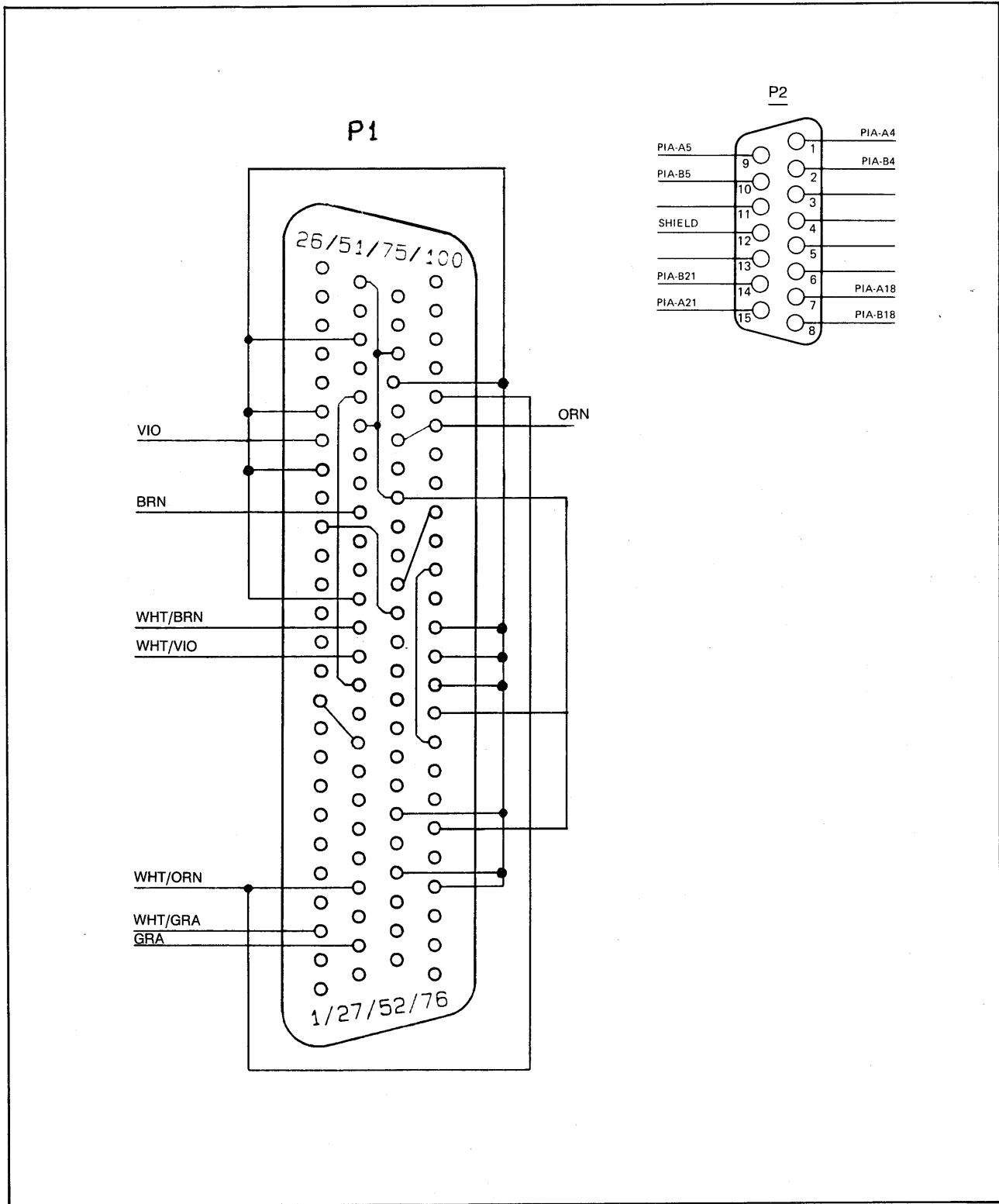
RS-232-C 10-meter Extender Cable, part no. 5061-4958



RS-232-C Asynchronous Interface Cable, part no. 30244-63002

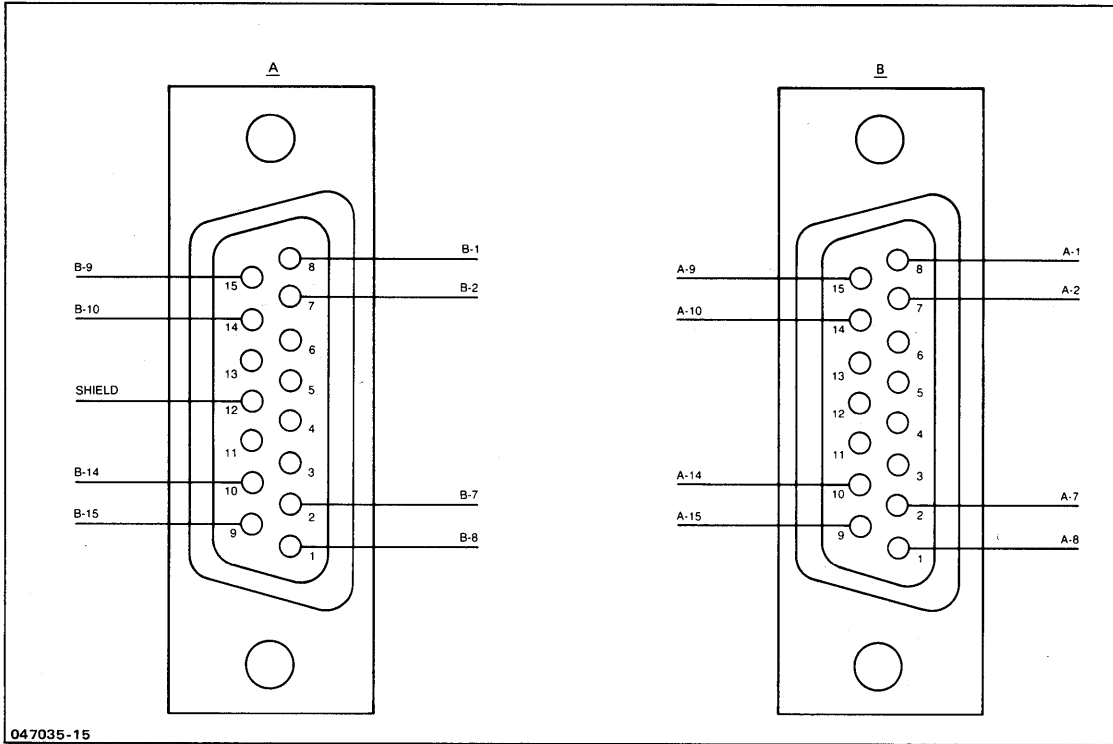


V.35 High-speed Synchronous Cable, part no. 30244-63004

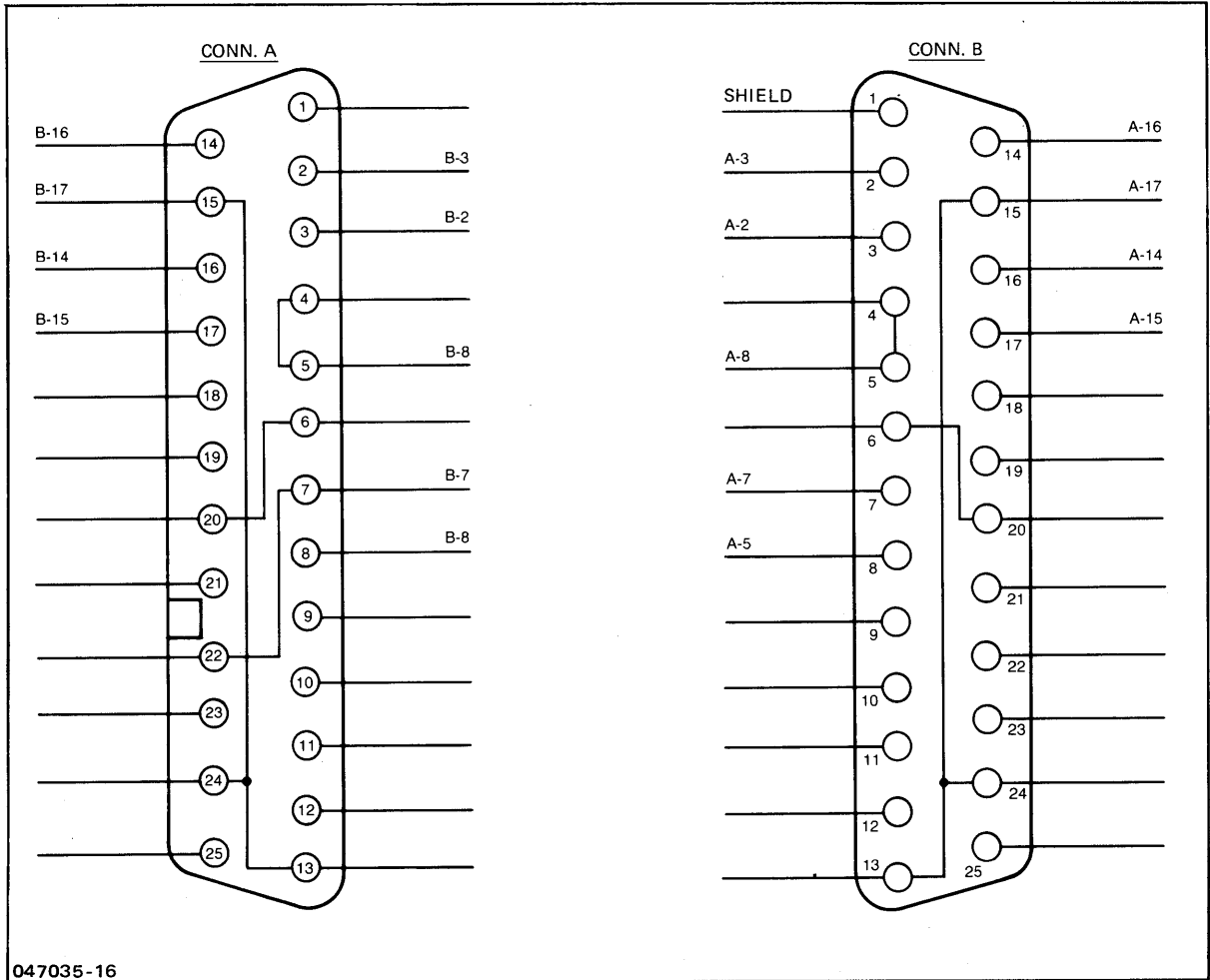


INP-to-INP Direct-Connect Interface Cable, part no. 30244-63009

Communications Cabling Diagrams



INP-to-INP Direct-Connect Extender Cable, part no. 30224-63001/7



**INP-to-SSLC Direct-Connect (Modem Eliminator) Extender Cable,
part no. 30225-60007**

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