

# **1174-65S/90S Communications Servers**

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## **Hardware Reference Manual**

**P/N 707020-002**

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<b>ISSUE/REVISION SCHEDULE</b>		
<b>Comments</b>	<b>Rev. No.</b>	<b>Date</b>
Initial Release	707020-001	7/23/99
Visara Update	707020-002	3/26/01

## ***Read This First***

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**This is the Communications Server Hardware Reference Manual. For information on the LINCS Operating System, please visit our website, [www.visara.com](http://www.visara.com).**

- 1. From your Internet browser type <http://www.visara.com>**
- 2. Select Support**
- 3. Select Manuals**
- 4. Select 1174 LINCS Manual Online**

## Product Safety

The 1174 Communications Servers comply with relevant product safety standards, such as the UL and CSA, and TUV-GS Rules and Regulations.

## FCC and CDC Regulatory Statements

This equipment has been tested and found to comply with the limits for a Class A computing device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by using one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment has been certified to comply with the limits for a Class A computing device, pursuant to FCC Rules. In order to maintain compliance with FCC regulations, shielded cable must be used with this equipment. Operation with nonapproved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of the manufacturer could void the user's authority to operate this equipment. The user may find the following booklet prepared by the Federal Communications Commission helpful:

### *How to Identify and Resolve Radio-TV Interference Problems*

This booklet is available from the U.S. Government Printing Office, Washington DC 20402, Stock No. 004-000-00345-4.

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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# 1. Introduction

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## General Description

The 1174 Communications Server family is a powerful platform for supporting and managing diverse networks. The 1174-90S and the 1174-65S Communications Servers support only LINCS software and are part of the Communications Server hardware family.

Information presented in this manual includes procedures for hardware installation, basic operating instructions, and assembly removal and replacement instructions for the 1174-65S/90S Communications Servers.

## 1174-65S Hardware Components

The following table includes hardware that may be installed in the 1174-65S. Refer to Chapter 2, *Memory Requirements*, to determine the maximum number of each dual-port memory board for installation.

Hardware Item	Max # Installed	Function
ASCII Interface (AIC with ADA assembly)	1	The ASCII Interface Controller (AIC PCB) provides interface support for up to 8 ASCII devices/hosts via the ASCII Device Adapter (ADA) assembly.
Coax Device Adapter (CDA)	2	Provides direct connection for up to 32 Coax-A type devices. CDA available in 9-port and 18-port boards. Also provides interface to coax multiplexers.
Ethernet (ETH)	3*	Provides communication interfacing to 10 Mbps Ethernet networks. No longer offered. Replaced by FET.
Floppy Disk Drive	1	Data storage. Provides means to load new software to hard disk drive.
Fiber Optic Device Adapter (FOA)	1	Provides support for using fiber optic multiplexer links. An FOA also has a single coax to connect a 32-port mux via coax. No longer offered.
Hard Disk Drive	1	Data storage. Mutually exclusive of second floppy disk drive.
High Performance Processor (HPP)	3	Provides additional processing needed by some features. No longer offered. Replaced by VHP.
High Speed Communications (HSC)	3*	High speed remote communications interface to SDLC and Frame Relay networks. Provides up to 4 lines.
Memory (MEM) upgrades	N/A	Up to a maximum of 4MBytes of upgrade memory.
Mother Board	1	Contains circuitry for SCP, MCC, and SHA functions.
Operator Panel	1	Provides local operator interface to the controller.
Power Supply	1	Provides stable power to the controller.
SCSI Host Adapter (SHA function)	N/A	Provides control for one hard disk drive, part of Mother Board circuitry.
Serial Communications Controller (SCC)	3*	Provides serial communication access to 3270 computers.

Hardware Item	Max # Installed	Function
System Control Processor (SCP function)	N/A	Provides all system control and processing, part of Mother Board circuitry.
Token Ring Controller (TRC II)	3*	Provides physical communication interfacing to a token ring network.
Very High Speed Processor (VHP) †	2*	Accelerates data stream processing. Improves networking performance and increases the number of sessions that can be supported.
Fast Ethernet NIC (FET)	3*	Provides physical communication interfacing to 10/100 Mbps ethernet networks

\* A maximum of 3 slots exist for the installation of SCC, HSC, FET, TRCII, ETH, and VHP cards.

† One VHP is required if any of these features are installed: Telnet Host, Print Serving, more than 32 incoming Telnet sessions or Lan printers, or if there are more than 512 3270 Host sessions. Another VHP is required if the APPN feature is installed.

## 1174-90S Hardware Components

The following table includes hardware that may be installed in the 1174-90S. Refer to Chapter 2, *Memory Requirements*, to determine the maximum number of each dual-port memory board for installation.

Hardware Item	Max # Installed	Function
Coax Device Adapter (CDA)	1	Provides direct connection to Coax-A type devices CDA available in 9-port boards only.
Floppy Disk Drive	2	Data storage.
Memory (MEM) upgrades	N/A	No memory upgrades.
Mother Board	1	Contains circuitry for SCP, MCC, and SHA functions.
Operator Panel	1	Provides local operator interface with the Communications Server.
Power Supply	1	Provides stable power to the Communications Server.
SCSI Host Adapter (SHA function)	N/A	Provides control for one hard disk drive, part of Mother Board circuitry.
Serial Communications Controller (SCC)	1	Provides communication access to 3270 computers. (Standard on all 1174-90S)
System Control Processor (SCP function)	N/A	Provides all system control and processing, part of Mother Board circuitry.
Token Ring Controller (TRC II)	1*	Provides physical communication interfacing to a token ring network. LINCS Software is a corequisite. Mutually exclusive with an Ethernet or Fast Ethernet.
Fast Ethernet NIC (FET)	1*	Provides physical communication interfacing to a 100 Mbps or a 10 Mbps ethernet network. Mutually exclusive with an Ethernet or Token Ring network interface controller.

\* A maximum of 1 FET or TRCII is allowed.



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## 2. Installation

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Here are the typical installation procedures.

### Checklist

The following is a brief checklist of typical installation tasks for the 1174.

1. Unpack the Communications Server.
2. Place the Communications Server in an appropriate location. Refer to “Environmental Parameters.”
3. Remove the cardboard protector (if present) from the disk drive. The unit should not be powered on with a cardboard protector in the disk drive or the disk drive may be damaged.
4. Check and ensure memory requirements are met.
5. Connect the Communications Server to the host.
6. Install (if required) and connect ASCII, Token Ring, Ethernet, and/or Twisted Wire or Fiber Optic interface(s).
7. Ensuring that the Power switch on the front of the Communications Server is off, plug the Communications Server into an appropriate AC outlet.
8. Turn the Communications Server on (see Chapter 4, “*Operation*”).
9. Configure the Communications Server for use (see the *Configuration* and *Central Control* manuals).

### Printed Circuit Boards

Some of the optional features require the installation of additional printed circuit boards that you can install without the assistance of a service representative.

### Unpacking Printed Circuit Boards (PCBs)

Follow these steps when you receive the shipment:

1. Inspect the carton for physical damage prior to unpacking.
2. If the exterior package is damaged:
  - Customers in the Continental US should call 1-888-334-4380 and ask for a Customer Service Representative. Other customers should contact their local sales office.
  - Contact the carrier and arrange for examination of the package. The carrier is required to complete and sign a damage report form.

If no damage is noted, carefully remove and unpack the package contents. Install the printed circuit board(s) as described below.

### Installing/Removing Circuit Boards

Replacement or installation of boards and features in the 1174-65S/90S require removal of the unit cover. Qualified service personnel should perform this. Contact your local service representative.

## Location Planning for the 1174

Use the following environmental parameters, power requirements, and cable distance tables to aid in selecting a location for the 1174.

### Environmental Parameters

Communications Servers:		1174-65S	1174-90S
<b>Dimensions:</b>	Width:	17.5 in (44.5 cm)	17.5 in (44.5 cm)
	Depth:	20 in (51cm)	20 in (51cm)
	Height:	8 in (20 cm)	8 in (20 cm)
<b>Weight:</b>		50 lb. (22.7 Kg)	50 lb. (22.7 Kg)
<b>Clearances:</b>	Front:	24 in (61 cm)	24 in (61 cm)
	Rear:	10 - 12 in (25 - 30 cm)	10 - 12 in (25 - 30 cm)
	Top:	0 in (0 cm)	0 in (0 cm)
	Left:	2 in (5 cm)	2 in (5 cm)
	Right:	2 in (5 cm)	2 in (5 cm)
<b>Temperature Range:</b>		50° to 105°F (10° to 40.6°C)	
<b>Relative Humidity:</b>		8% to 80% with no condensation	
<b>Heat Output:</b>	Base Unit:	310 BTU/hr	310 BTU/hr
	Maximum:	600 BTU/hr	600 BTU/hr

### Power Requirements

Communications Servers:		1174-65S	1174-90S
<b>Phases:</b>		1	1
<b>Power:</b>	Base Unit	130 VA 240 VA	130 VA 240 VA
	Maximum		
<b>Current Rating:</b>	115 VAC 60 Hz	3.0A 1.4A	3.0A 1.4A
	230 VAC 50 Hz		
<b>Voltage (+/-10%, +/- 1 Hz):</b>		100 (at 50/60 Hz) 127 (at 60 Hz) 220 (at 50/60 Hz) 110 (at 50/60 Hz) 200 (at 50/60 Hz) 230 (at 50 Hz) 120 (at 60 Hz) 208 (at 60 Hz) 240 (at 50/60 Hz)	

### Maximum Cable Distance

The following table contains typical maximum distance information for some types of cable used with the Communications Server:

Cable Type	Maximum Distance (all models)
Power Cable	15 ft (4.57 m)
EIA and X.21	40 ft (12.2 m), 20 ft (6.1 m) for HSC. Use Visara supplied cable only.
V.35 Cable	25 ft (7.6 m), 20 ft (6.1 m) for HSC. Use Visara supplied cable only.

Cable Type	Maximum Distance (all models)
Token Ring Cable (node to Media Access Unit [MAU])	Refer to the manuals listed below.
Coax Device Cables	See figure 2-1.
ASCII Host/Device Cables	Check the specifications for the cable you are using to determine maximum length.
Fiber Optic Cable	See figure 2-1.

**Notes:**

1. Using fiber optic cable requires installation of a Fiber Optic Device Adapter in the Communications Server.
2. Visara does not supply fiber optic cable. The cable may be ordered from vendors such as AMP, AT&T, and Black Box.
3. Fiber optic cable used should be multimode dual (duplex) fiber with ST connectors such as one of the following types: 62.5/125 micron, IBM Cabling System Type 5 100/140 micron or 50/125 micron.

Use Figure 2-1 and the table on the following page to determine the typical maximum allowable cable distance between the Communications Server and an attached device. If your system has a multiplexer, you can install the maximum length of cable between the Communications Server and the multiplexer and again between the multiplexer and an attached device.

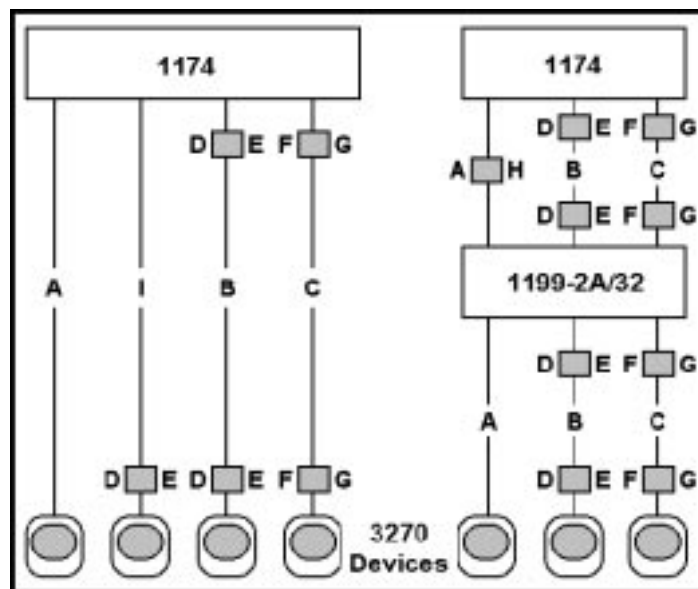
Additional information about cable types and distances is available in the following IBM Publications:

*Using the IBM Cabling System with Communication Products, GA27-3620*

*IBM Cabling System Planning and Installation Guide, GA27-3361*

*IBM System/360 and System/370 I/O Interface Channel to Control Unit Original Equipment Manufacturers' Information, GA22-6974*

*A Building Planning Guide for Communication Wiring, G320-8059*



**Figure 2-1. Coax Device Cable Types and Lengths**

Code	Cable Media and/or Connector	Cable Length
A	Coaxial Cable	4920 ft (1500 m)
B	IBM Type 3 specified Media	100 ft (30.5 m) minimum 900 ft (275 m) maximum
C	IBM Cabling System Types 1, 2, and 9	Types 1 and 2: With 0 baluns - 4920 ft (1500 m) With 1 balun - 3280 ft (1000 m) With 2 baluns - 2000 ft (610 m) Type 9: With 0 baluns - 3280 ft (1000 m) With 1 balun - 2186 ft (667 m) With 2 baluns - 1333 ft (406 m)
D	3270 Coax-to-Twisted-Pair Adapter	18 ft (5.5 m)
E	IBM DPC Type 3 Connector	15 ft (4.5 m)
F	Coax Balun Assembly or Cable-less Coax Balun	8 ft (2.4 m) or 16 ft (4.9 m)
G	Dual Purpose Connector Attachment Cable	8 ft (2.4 m) or 30 ft (9 m)
H	Fiber Optic Cable (must have FDA installed in Communications Server) 62.5/125 micron, IBM Cabling System Type 5 100/140 micron or 50/125 micron	4920 ft (1500 m)
I	Twisted Wire (must have TWA installed in Communications Server)	

When using fiber optic cable, a Fiber Optic Device Adapter must be installed in the Communications Server. Note that when using Type 3 media, a connector with a special actuator and filter (such as IBM's DPC-T3) is required in order to connect devices equipped with a DPC. Otherwise, a Balun assembly is used.

The following limitations apply to the use of these devices:

1. (coax length) + (5 \* twisted pair length) <= 4500 ft (1375 m)
2. (minimum twisted pair length) => 100 ft (30.5 m)

## Power Cable Requirements

For units operating at 100-120V: The power cable required for domestic units is a UL listed, CSA certified, 18/3 AWG, type SJT, cable (15-foot [4.57-meter] maximum). It is terminated on one end by a 125V, 15A grounding type attachment plug. It is terminated at the other end by a 125V, 15A parallel blade, grounding type attachment plug.

For units operating at 200-240V: The power cable required for domestic units is a UL listed, CSA certified, 18/3 AWG, type SJT, cable (15-foot [4.57-meter] maximum). It is terminated on one end by a 250V, 15A grounding type attachment plug. It is terminated at the other end by a 250V, 15A tandem blade, grounding type attachment plug.

The power cable required for international units is an 18/3 AWG, type SJT, cable (15-foot [4.57-meter] maximum). It is terminated on one end by a 250V, 15A grounding type attachment plug body. It is terminated at the other end by a 250V, 15A grounding type cord connector. The cord set is marked HAR to signify appropriate safety approvals. The socket outlet must be nearby and easily accessible, per IEC 950 Sec. 1.7.2.

The installation site must provide a properly wired and grounded power outlet. Circuits connected to air conditioners and devices that generate significant transient electrical noise should be avoided.

Electrostatic discharge in the vicinity of the unit should be minimized by avoiding high resistance floor material and carpeting that does not have antistatic properties, avoiding the use of plastic seats and covers, and avoiding low humidity levels. The unit should be located away from areas that generate electromagnetic interference (for example, transformers, power distribution panels, and motors). The unit should not be installed where the atmosphere contains corrosive elements that may damage the unit.

Cable runs should avoid areas that produce electromagnetic interference (for example, near transformers, switching equipment, power distribution panels, and under carpets where vacuum cleaning is done). Also, heavy equipment should not be moved or rolled over the cable.

## Connections

### 3270 Host Connection

#### Cable Types

On the SCC Board, for each 3270 host-to-control-unit line, you must use one of the following special Visara supplied cables:

Cable	Part Numbers
EIA RS-232	211128-010 - 10 ft (3.05 m) 211128-020 - 20 ft (6.1 m) 211128-030 - 30 ft (9.2 m) 211128-040 - 40 ft (12.2 m)
CCITT V.35	211130-001
X.21	206451-010 - 10 ft (3.05 m) 206451-020 - 20 ft (6.1 m) 206451-030 - 30 ft (9.2 m) 206451-040 - 40 ft (12.2 m)

**Caution:** Failure to use specified cables may result in damage to the SCC board(s).

### Token Ring Connection (TRC)

The Token Ring Interface cable can be attached directly to the Token Ring Media Access Unit (MAU), or can be extended by attaching it to another cable that is attached to the MAU. The Communications Server attachment point is at the TRC board using a 9-pin D connector.

### Ethernet Connection (ETH) - 65S only (No longer offered)

The Ethernet boards have three types of connections available: AUI (10 Base 5) using a 15-pin D connector, 50-ohm Coax (10 Base 2) using a BNC connector, or twisted pair (10 Base T) using RJ45 phone jack connector. Only one interface may be used at a time. A slide switch is used to select the interface for use (see Figure 2-3).

An external MAU (10 Base 2 or 10 Base 5) can be connected to the AUI connector. The MAU must comply with IEEE 802.3 specifications. Any standard 50-ohm Ethernet coax cable can

be connected to the BNC connector. End points of the coax cable must be terminated with a standard 50-ohm impedance. A standard Ethernet twisted pair cable can be connected to the RJ45 phone jack.

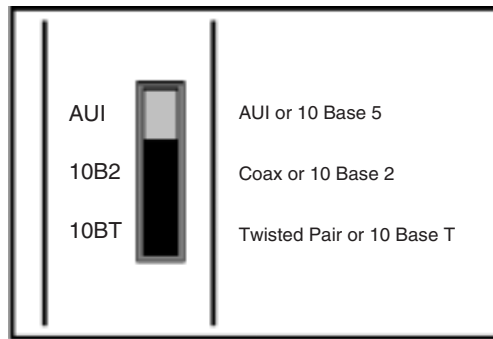


Figure 2-3. Ethernet Interface Select Switch

### 10/100 Mbps Fast Ethernet (FET)

The single RJ-45 connector on the network cable supports 10 Mbps or 100Mbps speeds. NWAY auto-negotiation enables the 10/100Mbps Ethernet NICs to automatically run at the speed that the connected hub supports. The 10/100Mbps Ethernet NICs works with products that comply with IEEE 10BASE-T and 100 BASE-TX specifications.

#### 10BASE-T Operation

10BASE-T is the Institute of Electrical and Electronics Engineers (IEEE) 802.3 standard for Ethernet signaling over unshielded twisted-pair wire at 10 Mbps.

Ethernet, as the most widely used network protocol, uses 10BASE-T as its primary cabling scheme. Ethernet's characteristics include:

- A data rate of 10 Mbps.
- A broadcast architecture.
- A specific media-access control (MAC) scheme.

The 10BASE-T name indicates a signaling speed of 10 Mbps and twisted-pair wiring. Base stands for baseband, which denotes a technique for transmitting signals as direct-current pulses rather than modulating them onto separate carrier frequencies.

A wiring topology using 10BASE-T specifies a wiring hub, cable arranged in a star configuration, and unshielded twisted-pair cable. Each node has a separate cable run that must not exceed 100 meters (328 ft) from the node to the hub.

#### 100BASE-TX Operation

100BASE-TX is the IEEE 802.3u standard for Fast Ethernet signaling over Category 5 UTP or STP wire at 100 Mbps.

Based on an extension to the IEEE 802.3 Ethernet specification, Fast Ethernet's characteristics include:

- A data rate of 100 Mbps.
- A broadcast architecture.
- A specific media-access control (MAC) scheme.

A wiring topology using 100BASE-TX specifies a wiring hub, cable arranged in a star configuration, and Category 5 UTP or STP wiring. Each node has a separate cable run that must not exceed 100 meters (328 ft) from the node to the hub.

Figure 2-4 shows the RJ-45 connector pin assignments for the 10/100 Mbps Ethernet NIC.

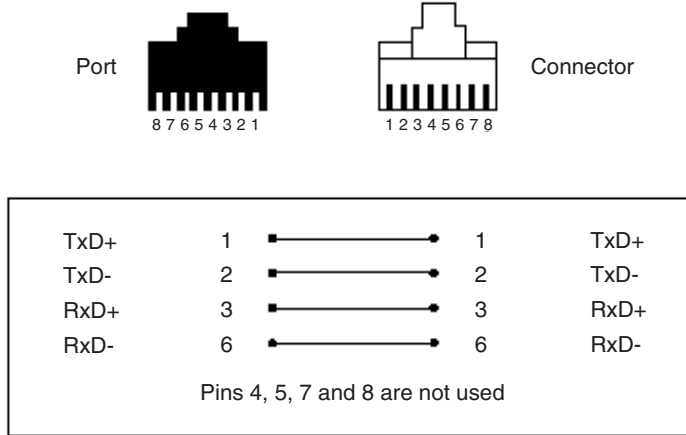


Figure 2-4. RJ-45 Connector Pin Assignments

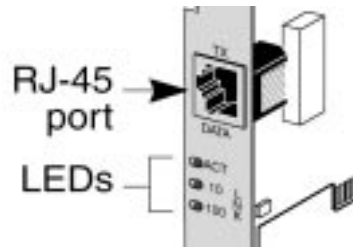


Figure 2-5. LEDS

### LED Descriptions

LED	Description	Flashing	Steady	OFF
10 LNK	Green: LNK integrity	Reversed polarity	Good 10BASE-T connection between NIC and hub	No connection between NIC and hub
100 LNK	Green: LNK integrity	Reversed polarity	Good 100BASE-TX connection between NIC and hub	No connection between NIC and hub
ACT	Yellow: Port traffic for either speed	Network traffic present	Heavy network traffic	No traffic

## ASCII Host/Device Cabling (65S only)

Use a 25 pin RS-232 connector to attach ASCII hosts and/or devices to the receptacles on the back of the 1174 Communications Server. The ASCII feature requires a male connector on the cable to mate properly.

It is recommended that you use one of the following ASCII cables for each host and/or device. Customer provided cabling is also acceptable. Customer is responsible for the correct wiring of customer provided cables.

Part Number	Description
212055-010	Modem cable with male connector at the device end (10 ft [3.05 m])
212055-020	Modem cable with male connector at the device end (20 ft [6.1 m])
212055-030	Modem cable with male connector at the device end (30 ft [9.2 m])
212055-040	Modem cable with male connector at the device end (40 ft [12.2 m])
212055-110	Null modem cable with male connector at the device end (10 ft [3.05 m])
212055-120	Null modem cable with male connector at the device end (20 ft [6.1 m])
212055-130	Null modem cable with male connector at the device end (30 ft [9.2 m])
212055-140	Null modem cable with male connector at the device end (40 ft [12.2 m])
212055-210	Null modem cable with female connector at the device end (10 ft [3.05 m])
212055-220	Null modem cable with female connector at the device end (20 ft [6.1 m])
212055-230	Null modem cable with female connector at the device end (30 ft [9.2 m])
212055-240	Null modem cable with female connector at the device end (40 ft [12.2 m])

For DEC VT320 attachment only:	
212055-310	Null modem cable with female connector at the device end (10 ft [3.05 m])
212055-320	Null modem cable with female connector at the device end (20 ft [6.1 m])
212055-330	Null modem cable with female connector at the device end (30 ft [9.2 m])
212055-340	Null modem cable with female connector at the device end (40 ft [12.2 m])
<b>Notes:</b>	
1.	Attaching a DEC VT320 to an ASCII cable requires an adapter. See the DEC VT320's operator's manual for more information.
2.	Maximum recommended lengths for ASCII host and device cables vary by cable manufacturer. If you do not use Company supplied cables, check with the manufacturer for maximum length information.

## Coax Device Attachment

### Dynamic Multiplexing

Dynamic Multiplexing (see the *Configuration* and *Central Control* manuals) supports:

- 1199-type multiplexers (or direct device connections) on the following physical ports:
  - 1174-65S, Coax Device Adapter (CDA) board ports labeled 0 - 7 (maximum 2 boards)
  - 1174-90S, Ports 0 - 8.
- Configuration of 1 - 8 devices on each multiplexer.
- Assignment of logical port addresses twice so that users can access the same configuration of features from two stations (not at the same time).



If you are using Dynamic Multiplexing, you must enable the feature during configuration and assign port addresses on the Coax Port and Mux Assignments panel described in the *Configuration* and *Central Control* manuals.

If you are not using Dynamic Multiplexing, refer to the following for information about coax port addresses.

## **1174-65S Device Attachment**

Coax devices are attached to the Coax Device Adapter (CDA) board(s) on the back of the Communications Server.

ASCII devices are attached to the ASCII Device Adapter (ADA) board(s) on the back of the Communications Server.

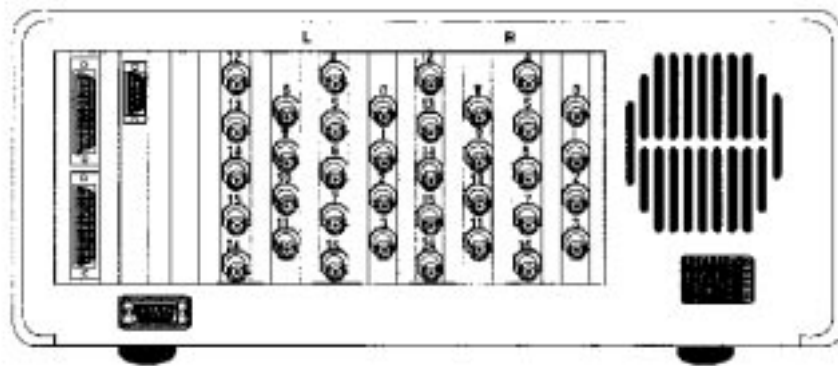
### **Dynamic Multiplexing**

If Dynamic Multiplexing is to be used in your network, you can change logical port assignments by completing the Dynamic Multiplexing Assignments panel described in the *Configuration* manual.

Without Dynamic Multiplexing, the 1174-65S may have one or two 18-port CDAs or a 9-port CDA.

### **18-Port CDA Board Connections (65S only)**

Figure 2-6 shows an 1174-65S with two 18-port CDA boards. They are referred to as the left and right CDAs.



**Figure 2-6. 1174-65S Coax Ports (Two 18-Port Boards)**

The right CDA allows direct attachment to Ports 0 through 15. Ports 0 and 8 permit attachment directly to coax devices or attachment to a multiplexer. Ports 16 and 24 permit attachment only to a multiplexer.

The left CDA (optional) allows only direct attachment to coax devices. Ports 16 and 24 are disabled.

## 9-Port CDA Board Connections

Figure 2-7 illustrates a 9-port CDA board. Ports 0 through 8 support direct attachment of coax devices. Ports 0 and 8 also support attachment to a multiplexer.

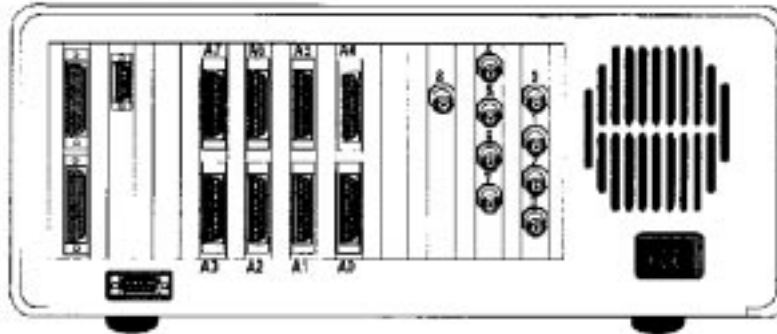


Figure 2-7. 1174-65S Coax and ASCII Ports (9-Port CDA)

### Assigning Logical Ports

Logical ports are assigned in groups of eight devices. These groups are ports:

- 0 through 7
- 8 through 15
- 16 through 23 (not available on 9-port CDA)
- 24 through 31 (not available on 9-port CDA)

### Fiber Optic Device Adapter (FOA) Board (65S only) (No longer offered)

The Fiber Optic Device Adapter (FOA) board is an option that allows the use of fiber optic cabling as the communication link between the 1174 Communications Server and multiplexer. The FOA converts the multiplexed output from the 1174-65S to fiber optic signals. The fiber optic cable can then be attached to a multiplexer device with fiber optic capability such as the 1199-32 Multiplexer. The FOA occupies Slot J3 (the right-most CDA slot, rear view) in the 1174-65S Communications Server. The FOA board provides a single BNC connector for configuring the unit prior to attaching the fiber cable to a multiplexer.

The fiber optic cable is connected to the ST type connectors labeled (transmit signal to the multiplexer) and (receive signal from the multiplexer). Two yellow LEDs labeled (transmit) and (receive) indicate communication between the Communications Server and attached multiplexer.

## 1174-90S Device Attachment

Coax devices are attached to the Coax Device Adapter (CDA) board(s) on the back of the Communications Server.

### Dynamic Multiplexing

If Dynamic Multiplexing is to be used in your network, you can change logical port assignments by completing the Dynamic Multiplexing Assignments panel described in the *Configuration* manual.

Without Dynamic Multiplexing, the 1174-90S will have a 9-port CDA.

## 9-Port CDA Board Connections

Figure 2-8 illustrates a 9-port CDA board. Ports 0 through 8 support direct attachment of coax devices. Ports 0 and 8 also support attachment to a multiplexer.

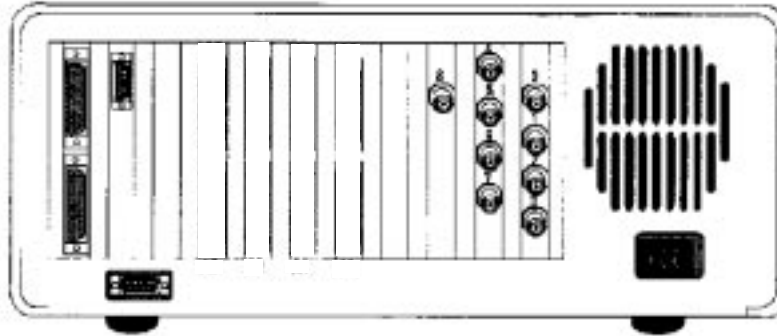


Figure 2-8. 1174-90S Coax Ports (9-Port CDA)

## Assigning Logical Ports

Logical ports are assigned in groups of eight devices. These groups are ports:

- 0 through 7
- 8 through 15

## High Speed Communication Interface (65S only)

The High Speed Communications (HSC) board provides a high speed remote communications interface to SDLC and Frame Relay Networks. Each HSC board provides up to four high speed channels.

## Cabling

The HSC feature includes an HSC Adapter Cable (HAC). One end attaches to the HSC board, the other end splits into four connectors. Each connector provides a communication line capable of operating at full-duplex speeds of up to 8 Mbps.

The physical layer interface type is selected using a physical layer interface module (PLIM) and one of four HSC communication cables. The PLIM1 supports either RS232 or V.35 communication protocol, PLIM2 supports X.21 protocol. The type cable used determines the protocol type. Any combination of PLIMs and/or cables may be connected to the HSC board.

Cables		
968711-020	RS232	DTE
968712-020	RS232	DCE
968713-020	V.35	DTE
968714-020	V.35	DCE
968715-020	X.21	DTE

**Note:** The cable assemblies supplied for use with the HSC board and PLIMs are Visara proprietary cables which may include EMI suppression components. For correct operation and continued agency compliance do not substitute any other cables.

The DCE cables allow direct connection to DTE devices; no modem or modem eliminator is required. When a DCE interface is selected, the HSC should be configured to generate the transmit clock. Baud rates up to 1 Mbps are supported and configured on the HSC line panels.

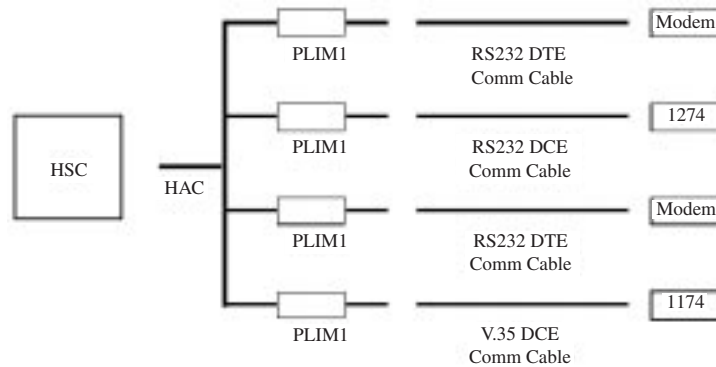


Figure 2-9. Sample HSC Installation

## RS232 Serial Interface

### Serial Port

A serial port is provided with the FET and VHP cards. The serial port on the VHP card is not functional. The serial communications port on the FET provides a full-duplex asynchronous/synchronous receiver and transmitter. The port is used for serial communications. The serial port setting for baud rate, data bits and stop bits are set via a configuration panel.

### Control (CTRL) Connector Pinouts

Pin	Signal	Comment	I/O
1	DCD	Received Line Signal Detector (Data Carrier Detect)	I
2	RxD	Received Data	I
3	TxD	Transmit Data	O
4	DTR	Data Terminal Ready	O
5	GND	Signal Ground	NA
6	DSR	Data Set Ready	I
7	RTS	Request To Send	O
8	CTS	Clear To Send	I
9	RI	Ring Indicator	I

### Serial Port Signal Definitions

The electrical specifications of the serial port are contained in the EIA (Electronics Industry Association) RS232C standard. For more information please consult the EIA RS232-C standard.

The following paragraphs contain a brief description of some of the serial port signals.

#### Transmitter Serial Data Output (TxD)

Serial Data Output.

#### Receiver Serial Data Input (RxD)

Serial Data Input.

**Clear-To-Send (CTS)**

This line indicates that the Modem is ready to exchange data.

**Request-To-Send (RTS)**

This line informs the Modem that the Serial Interface is ready to exchange data.

**Data Carrier Detect (DCD)**

When the modem detects a “Carrier” from the modem at the other end of the phone line, this Line becomes active.

**Ring Indicator (RI)**

Goes active when modem detects a ringing signal. This signal tells the Serial Interface that a phone line is “ringing”. i.e. there is an incoming call.

**Data Set Ready (DSR)**

This tells the Serial Interface that the modem is ready to establish a link.

**Data Terminal Ready (DTR)**

This is the opposite of DSR. This tells the Modem that the Serial Interface is ready to link.



# 3. Board Population

## Introduction

This chapter presents 1174 Communications Server board placement information to provide optimum performance. Information includes board names, identification (ID) descriptions, and slot population information.

## Printed Circuit Board Names

The following lists the names for all the printed circuit boards that can be used in 1174 Communications Servers. Some of the boards are optional, and some can be used only in specific 1174 models. The printed circuit boards are typically referred to by their abbreviated names.

<b>ACP</b>	ASCII Connector Panel	<b>FOA</b>	Fiber Optic Device Adapter (1174-25/65)
<b>ADA</b>	ASCII Device Adapter	<b>FET</b>	Fast Ethernet NIC
<b>AIC</b>	ASCII Interface Controller	<b>HPP</b>	High Performance Processor
<b>CDA</b>	Coax Device Adapter	<b>HSC</b>	High Speed Communication
<b>ETC</b>	Token Ring/Ethernet Controller	<b>SCC (1R)</b>	Serial Communications Controller (RS-232/V.35)
<b>ETH</b>	Ethernet	<b>TRC II</b>	Token Ring Controller
<b>FDA</b>	Fiber Optic Device Adapter (1174-15)	<b>VHP</b>	Very High Speed Processor

## Board Types Used

The following shows the types and names of printed circuit boards that may be used in different models of the 1174.

Type	1174-65S	1174-90S
Processor	SCP* HPP VHP	SCP* HPP VHP
I/O Controller	AIC MCC* TRC II SCC (1R) ETH HSC FET	MCC* TRC II SCC (1R) FET
Memory	MEM*	MEM*
Device Attachment	CDA FOA ADA	CDA
Miscellaneous	Operator Panel	Operator Panel

\* Contained on the Mother board assembly.

## Slot Population

Many of the printed circuit boards for the Communications Server are located in partitions called slots, which are identified with numbers.

Use the following charts to determine the slot(s) in each Communications Server model into which these boards may be installed. Dependent upon configuration parameters, circuit boards may only occupy certain physical slots. Some errors occur because of incorrect slot population.

### 1174-65S

Slot population for the 1174-65S allows most boards to be installed in more than one available slot. Presented herein are slot choices, which the circuit boards may occupy.

Board	first slot choice 1 through last slot choice 5				
	1	2	3	4	5
SCC	4	5	6		
HPP	7	5	6	9	8
TRC II	4	5	6		
HSC	4	5	6		
AIC	9				
ETH/FET	4	5	6		
VHP	4	5	6		

\*Slots 10, 13, and 16 are logical assigned slots for the board circuitry identified. There are no physical connectors. The circuitry is located on the Mother board. The FOA can only be installed in the rightmost CDA slot as viewed from the rear.

### 1174-90S

Slot population for the 1174-90S allows most boards to be installed in any available slot.

Presented herein are slot choices, which the circuit boards may occupy.

Board	first slot choice 1 through last slot choice 5				
	1	2	3	4	5
SCC	4	5	6		
TRC II	4	5	6		
FET	4	5	6		

\*Slots 10, 13, and 16 are logical assigned slots for the board circuitry identified. There are no physical connectors. The circuitry is located on the Mother board.



## Slot Identification

Many of the printed circuit boards for the Communications Servers are located in partitions called slots, which are identified with numbers. These slots are sometimes specified by error messages that permit the easy identification of a failing or incorrectly placed PCB. Figure 3-1 shows the locations of the 1174-65S/90S PCB physical slots.

Rear of Unit

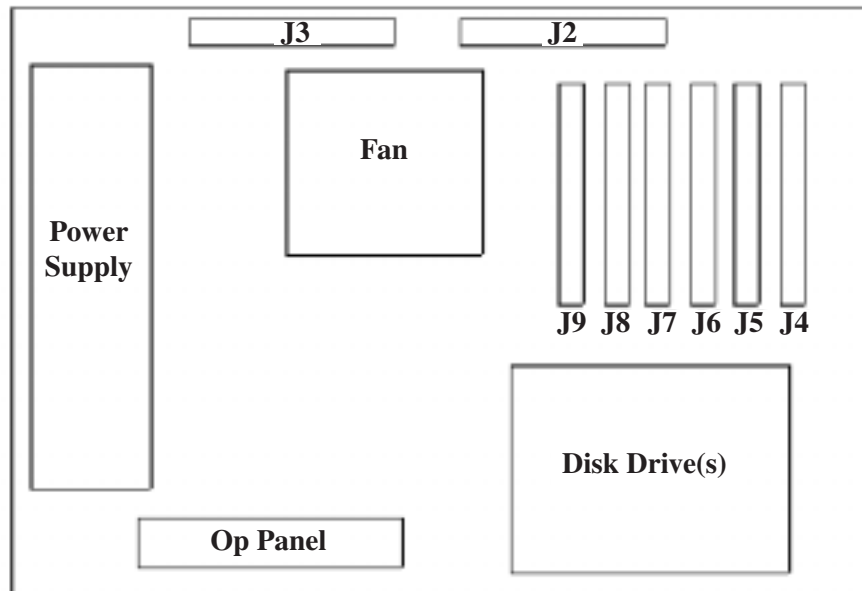


Figure 3-1. 1174-65S/90S Printed Circuit Board Slots

## Slot Numbers

The following chart presents the physical J number slots used in the JSS member of failure messages.

1174-65S		1174-90S	
Slot	Description	Slot	Description
04-09	Main board expansion slots	04-09	Main board SCC
10	Main board RAM	10	Main board RAM
13	Main board MCC	13	Main board MCC
16	Main board SCP	16	Main board SCP
31	Hard Disk	34	Floppy disk 1
34	Floppy disk 1	35	Floppy disk 2
35	Floppy disk 2		

## Logical Identifiers

Either their physical locations (J number) or their logical identifiers (ID) may identify the Communications Server board slots. These numbers are used in identifying boards that failed. The following is a cross reference list between the board slot J numbers and the board slot logical IDs.

1174-65S/90S							
J#	Slot ID		J#	Slot ID		J#	Slot ID
(16)	0D		04	00		07	03
(13)	0A		05	05		08	02
(10)	07		06	04		09	09

**Note:** Slots designated within parentheses ( ) have no physical connectors. These logically assigned slots with circuitry are located on the Mother board.

## Board ID Assignments

The board ID is used in error determination. Each board type or circuit function has a particular identification number assigned. The board IDs have a general format of a 5-bit board type identifier and a 3-bit revision level indicator. To display the 3-bit revision level, execute Utility 16 or Utility 28. The format is as follows:

**7 6 5 4 3 2 1 0**

----- ID ----- --- Rev ---

The following lists the board identification and board name/type.

ID	Rev	Board Name
00		(No board installed)
10	5	SCP (65S only)
30		SCC
38		HSC
40		MCC II
48	0	CDA
50		AIC
68		FET
70	0	TRC II
78		VHP
A8		2-, 4-, or 6-Mb RAM
F8		MBR, Main board RAM
100		Floppy Drive A
110		Floppy Drive B
120		Hard Drive C (65S only)
140		Operator Panel
150		OPL II
160		ADA (65S only)
200		Pseudo ID Common Memory

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# 4. Operation

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## Indicators

### Operator Panel LEDs

Located on the operator panel are LEDs that indicate some of the operational states of the Communications Server. LEDs that may be found on the operator panel include the following:

**Diag** - Lights when the Communications Server is in Extended Diagnostics mode. Customer service representatives use this mode.

**Config** - Lights when the 1174 is IMLed onto the default configuration. It will remain on until the Communications Server is IMLed onto a saved configuration.

**IML** - Lights while the Communications Server is executing Basic Assurance tests and loading its operating program. When the IML light goes off, the operating program is loaded and the Communications Server is ready for service.

**Check** - Lights when an error or failure has occurred that requires corrective action.

**Power** - Lights to indicate that the Communications Server is powered on and that +5 volts are present.

**HD-Act** - Lights to indicate hard disk drive activity (if installed).

**Off-line Indicator** - Serves no purpose on the 1174-65S or 1174-90S.

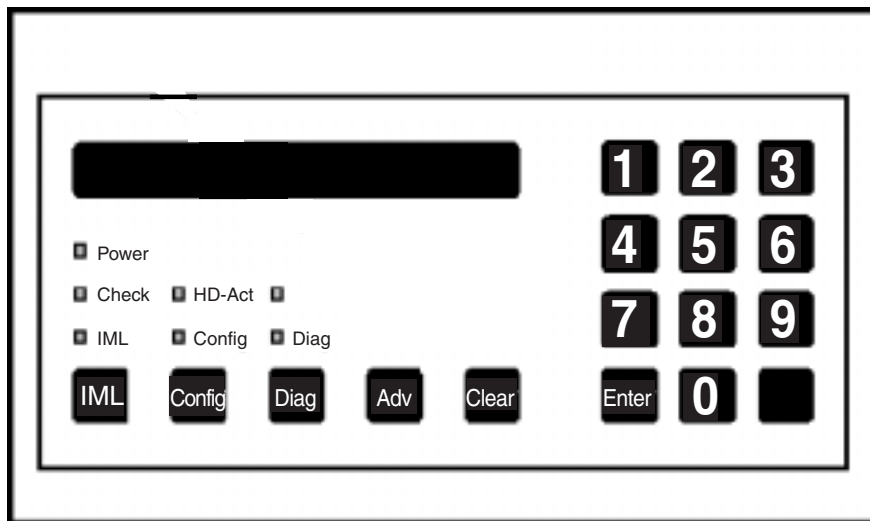


Figure 4-1. Operator Panel

### High Speed Communication Interface

The HSC contains two rows of green LEDs to indicate transmit and receive activity on each of the communication lines.

## Controls

### Power Switch

The 1174-65S/90S Communications Server Power switch is located near the front lower left corner of the unit. Set the switch to the On ( I ) position to turn on power, and set the switch to the Off ( O ) position to turn off power..

### Keypad

**Config** - When IML 500 appears on the display after the 1174 is powered on or the IML key is pressed, press the Config key to IML into the default configuration only. The *Configuration* and *Central Control* manuals contain information about the Configuration mode.

**Diag** - Initiates the diagnostics facility.

**Adv** - The Adv (Advance) key advances the operator panel display while online or during error conditions.

**Clear** - Erases previously entered data, provided that the Enter key has not been pressed in diagnostic mode. Pressing the clear key at State 500 of IML initiates the software merge utility.

**Numbers 0 through 9** - Used to enter parameters and perform other data entry functions.

**Enter** - Used to enter data. Press the Enter key after pressing a string of keys that represent parameters. When pressed at State 500 of IML, it allows entering of additional commands.

**Alt** - Used to initiate basic assurance tests when pressed at IML State 500.

**IML** - Pressing IML (Initial Machine Load) causes the Communications Server to perform a complete reload of software from disk.

The following are valid when IML 500 is displayed:

**Adv** - Continue IML with System Microcode. No extended BATs are executed. If an alternate drive and state have been entered (Enter options), then the specified System Microcode is loaded. Otherwise, the System Microcode in production on the first hard disk containing a System Disk subdirectory is loaded.

**Alt, Adv** - Same as Adv, but execute extended BATs during IML.

**Diag** - Enter Diagnostics mode.

**Config** - Load default Customization Data Objects instead of those defined on the System subdirectory allowing the Communications Server to IML with default customization parameters. This also loads the default configuration allowing entering the Configuration utility without entering a password.

**Alt, Config** - Same as Config, but execute extended BATs during IML.

**Clear** - Clear the System Microcode currently on hard disk and load a new System Microcode from floppy diskette.

**Enter** - Provides for additional selection of required input.

## IML Procedure for 90S and 65S

The following describes the procedure to IML the 90S Communications Server using LINCOS software. Install “LINCOS System 1” diskette in drive A and “LINCOS System 2” diskette in drive B, then power on or press IML.

The “mode prompt” appears on the LCD at state 500: **IML 500 M=**

At this state, the LINCOS node will pause for five seconds waiting for input from the operator keypad illustrated below. If nothing is specified within five seconds, the standard IML will proceed.

- **ADV** – Continue IML with system microcode. No extended BATs are executed.
- **ALT, ADV** – Same as ADV, but executes extended BATs during IML.
- **DIAG** – Enters Diagnostics mode.
- **CONFIG** – Loads default customization data objects instead of the ones defined in the system subdirectory. This option is useful when a problem with the customization data affects the operation of the LINCOS node. This option allows IML with default customization parameters without affecting the ones defined in the system subdirectory. Loading the default configuration also allows you to enter the Configuration utility without entering a password. Once the default customization data objects have been loaded and the LINCOS node has IMLed, the data objects may be modified as desired.
- **ALT, CONFIG** – Same as CONFIG, but executes extended BATs during IML.

Please refer to Visara’s *LINCOS Problem Determination* manual (P/N 707022-001) for an explanation of LINCOS messages.

## Additional IML Options for 65S

The following describes changing the normal IML parameters.

1. Perform a power-on IML. At IML State 500, press the Enter key.
2. Prompts will be displayed for entry of drive from which to IML, level of software, and mode of operation for IML state. The table on the following page describes the parameter entries allowed.

Parameter	Description
d	Selects disk drive from which to IML (A=1, B=2, C=3, D=4).
l	Selects software (level or state) from which to IML. 1 - Production 2 - Back level 3 - Trial If Central Site Change Management is not being used, only production level software is present on the disks.
m	Selects mode of operation for IML. Adv = Normal (normal IML bypassing BAT). Config = Config (IML into Configuration mode). Diag = Diag (IML into Diagnostics mode).

1. The first prompt displayed is IML 500 D=\_. Enter the drive to be used for IML.
2. The second prompt is IML 500 L=\_. Enter the software level.

3. The third prompt is IML 50X M=\_, where X is the drive selected. Enter the type of IML mode.
4. Allow IML to complete.

## Error Types

This chapter describes the types of errors and failures that can occur while the Communications Server is operating.

There are four main types of errors or failures:

- IML errors
- Exception errors
- Hardware failures
- Online errors

Indicators that tell you that one of the above conditions has occurred are some or all of the following:

- Error log
- Status line of attached terminal
- Operator panel display
- Operator panel check light
- Printed circuit board LEDs

### IML Errors (ERR \_\_\_\_)

Initial Machine Load (IML) occurs when the 1174 is turned on or when the IML key on the operator panel is pressed. During IML, the Communications Server executes a series of tests that checks the machine's ability to operate.

An IML error message looks like this on the operator panel:

**ERR XXX\***

where: **ERR** indicates the occurrence of an IML error.

**XXX** is the IML state in which the error occurred.

\* indicates that additional messages are available that describe the error (not always present).

IML errors and possible recovery are described in Problem Determination.

### Exception Errors (XCP \_\_\_\_)

Exception errors are detected by a processor and occur during IML. Exception errors are nonrecoverable and require recording the error information and then IMLing the Communications Server to resume operation.

Exception error messages look like this on the operator panel:

**XCP JSS:BB:EEE\***

where: **XCP** indicates an exception error.

**JSS** indicates the physical slot number of the board where the error occurred.

**BB** shows the board ID in hexadecimal format.

**EEE** shows the type of exception error.

\* indicates additional messages that give more information about the error (not always present).

*Problem Determination* contains additional information about Exception errors.

If unable to correct the problem, prepare a dump disk of the error information, Problem Determination “Utility 20” and then call the next level of technical support.

## Hardware Failures (FAIL \_\_\_\_)

Hardware failures show specific hardware problems. They may occur during IML or testing mode. Code verification errors may also display as a hardware failure.

Error messages display on the operator panel as shown below:

Hardware - **FAIL JSS:BB:TNN\***

Code Verification - **FAIL JSS:BB:MOV\***

where: **FAIL** indicates a hardware error.

**JSS** is the slot number of the failing board.

**BB** shows the board type ID in hexadecimal format.

**T** is the failing test type.

**NN** is the failing test number.

**MOV** indicates that the diagnostic code a processor board moved to its local memory does not match the code from where it was moved.

\* indicates additional messages that give more information about the error.

*Problem Determination, Hardware Failures, and Off-line Testing*, contain additional information about Hardware failures.

## Online Errors

Online errors show problems that occur while the Communications Server is online with its host and attached devices. Online error numbers may appear on the operator panel (some 300- and 500-type errors only), preceded by an indication of which attached host system is involved, and may be displayed on an attached display’s status line preceded by X. *Problem Determination* describes Online errors and recovery procedures.

## Error Indicators

### Event Log

The Communications Server's Event Log records the Online errors as well as many other useful events described in *Problem Determination, Error Log*.

### Status Line of Attached Terminal

The status line of attached terminals shows many of the Online errors and conditions that occur. *Problem Determination* contains additional information about Online errors.

### Operator Panel Display

The 16-character operator panel LCD display indicates a wide variety of Communications Server states and errors. The operator panel LCD display shows all error conditions except:

- An error occurring in IML before the operator panel is initialized.
- Certain Online errors.

### Operator Panel Check Light

The operator panel Check Light is located on the operator panel. When it is lit, an error or failure has occurred that requires corrective action.

## Software Merge (65S only)

This procedure is used to install a new software level onto the 65S.

1. IML the unit.
2. At "IML 500 M=" press the Clr key.
3. At the "Merge s: to d:" prompt (where s=source and d=destination drive), press the Enter key to proceed with the software merge.

**Note:** To abort the merge procedure, press the IML key. The merge procedure will overwrite existing microcode files of the same name, so it is not recommended to press IML once the merge has started.

7. At the "Insert s:SYSn" prompt, insert the requested system diskette (by number n) in the source drive, close the drive door, then press the Enter key. A progress message "nn% Complete" is displayed while files are being copied.
8. At the "Merge Complete" message, press the IML key to initiate the IML process.



During the software merge, warning and failure messages may be displayed indicating problems during the merge.

### Warning Messages

Message	Description
Wrong Disk	The diskette inserted into the source drive is not the requested systems disk. Press the Enter key to return to the Insert Disk message.
Wrong Level	The diskette inserted into the source drive is not of the same level as the previous systems diskettes. Press the Enter key to return to the Insert Disk message.

### Failure Messages

Message	Description
FAIL Floppy	The merge requires a floppy drive as the source.
FAIL Hard	The merge requires a hard drive as the destination.
FAIL Gen-B	The merge will not copy software to a hard drive that has Gen-B software on it.
FAIL Disk x:ee	There was a disk error (x=drive, ee=error value).



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# 5. Assembly Removal/ Replacement

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## Introduction

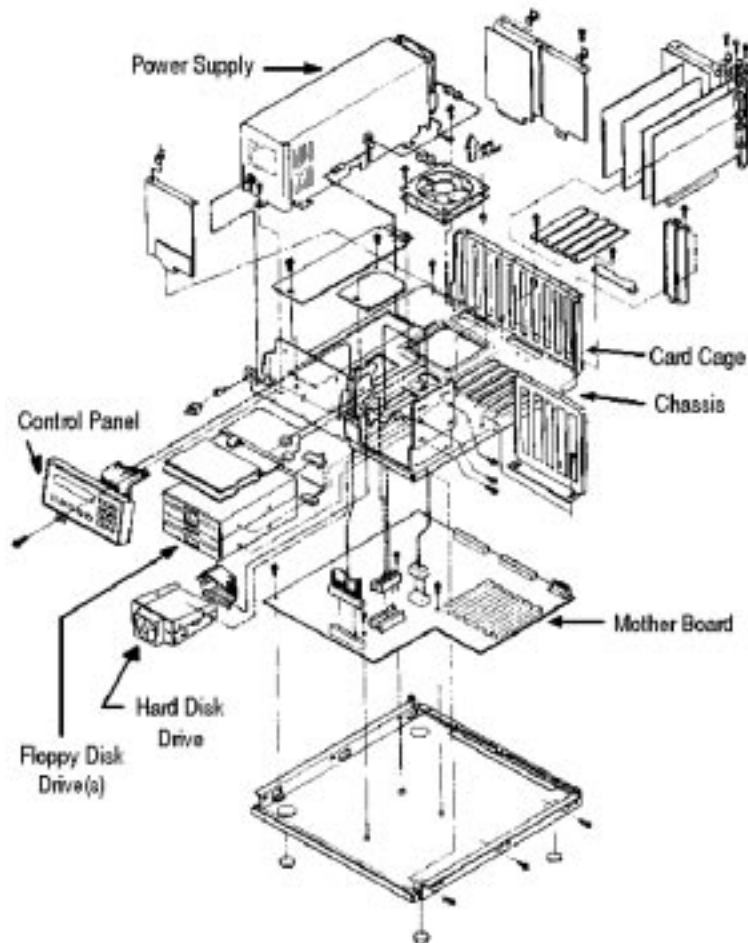
This chapter presents procedures used by service representatives to remove and replace assemblies that may be installed in the Communications Server.

Prior to any removal or replacement procedure, make sure the Communications Server is turned OFF and the power cord is disconnected from the AC wall outlet.

## 1174-65S/90S

Prior to any removal or replacement procedure, make sure the Communications Server is turned OFF and the power cord is disconnected from the AC wall outlet. Ensure all cabling is properly identified and marked before proceeding with any removal procedures.

## Assembly Drawing



## Replaceable Assemblies

Description	Visara P/N	Description	Visara P/N
ADA (65S only)	210561-900/941	HSC (65S only)	220265-906
AIC (65S only)	210560-001/041	HSC Adapter Cable (65S only)	220210-001
CDA, 18-Port (65S only)	210557-912/952	Mother Board	220224-200/240
CDA, 9-Port	210557-911/951	Operator Panel	211700-001
ETH	213430-906/946	PLIM1 (65S only)	968707-001
FET	220273-906	PLIM2 (65S only)	968708-001
Floppy Disk Cable	206467-003	Power Supply	210652-001
Floppy Disk Drive	205140-002	SCC (RS-232/V.35)	210555-906
Hard Disk Drive (65S only)	210674-004	TRC II, 16/4 Mb/s (Gen C)	206617-906
HDD Cable, Signal (65S only)	206421-002	VHP	220271-906
HPP	206614-906		

**Note:** Part numbers listed following “/” indicate the assembly with packaging.

## Covers

The back plate and main covers must be removed to gain internal access to the 1174-65S.

### Removal

1. Ensure power is off.
2. Mark all cables properly for reinstallation before removing covers.
3. Remove all cables from the back of the unit.
4. Remove screws attaching the rear panel metal cover. Remove the rear panel cover.
5. Remove the four screws attaching the main cover to the unit chassis.
6. Slide the main cover toward the front of the unit to remove it from the chassis.

### Replacement

1. Reverse the procedure to replace the covers.
2. Reattach all cables to the proper connectors.

## Circuit Board Assembly

Each Circuit board assembly is held in place by captive fastening screws located at the top of the rear guide bracket.

### Removal

1. Ensure power is off. Remove the main cover.
2. Locate the Circuit board to be removed. For board slots J04-J09, loosen the fastening screws holding the front board guide racket in place. Slide the bracket clear of the boards.
3. Loosen the captive screw attaching the board to the rear bracket (CDA boards have two captive screws).
4. Lift the board from its Mother board connector and slide it clear of the unit.

### Replacement

1. Locate the correct slot the Circuit board is to be located.
2. Align the Circuit board onto its mounting track and slide the board into place. Ensure the board connector is properly seated.
3. Tighten the fastening screw to the board bracket. If loosened, realign and tighten the front board guide bracket.
4. Replace the covers and cables.

### Power Supply Assembly

The Power Supply assembly is held in place by three screws.

#### Removal

1. Ensure power is off. Remove the cover.
2. Remove the screws holding the assembly in place. One is located at the front bracket, one is located near the leftmost CDA board attaching the ground screw to the chassis, and the third is located near the middle of the assembly.
3. Locate and disconnect all cables attached to the Power Supply Cable assembly.
4. Lift the assembly from its mounting.

#### Replacement

1. Align the assembly onto its mounting place.
2. Install the fastening screws.
3. Connect all cables to the assembly and replace the cover.

### Operator Panel

The operator panel is attached to the Communications Server with plastic guides.

#### Removal

1. Ensure power is off. Remove the covers.
2. Disconnect the operator panel cable.
3. Lift the panel clear of its mounting bracket.

#### Replacement

1. Align the assembly guideposts into place on the mounting bracket.
2. Press the operator panel into place.
3. Connect the cable assembly.
4. Replace the covers.

## Floppy Disk Drive

The following procedure describes removing the 3.5-inch diskette drive.

### Removal

1. Ensure power is off. Remove the covers.
2. Locate and disconnect the drive control and power supply cables.
3. Remove the four screws attaching the disk drive to its bracket. There are two screws located on each side of the drive bracket.
4. Carefully slide the drive from its bracket.

### Replacement

1. Align the disk drive into its mounting track.
2. Carefully slide the disk drive into its bracket.
3. Install the screws to attach the drive to the bracket.
4. Connect the drive control and power supply cables.
5. Replace the covers.

## Hard Disk Drive (65S only)

The hard disk drive with bracket is installed in the lower floppy drive bay. The following procedure describes removing the hard disk drive.

### Removal

1. Ensure power is off. Remove the covers.
2. Locate and disconnect the drive control, fan, and power supply cables.
3. Remove the four screws attaching the disk drive to its bracket. There are two screws located on each side of the drive bracket.
4. Carefully slide the drive from its bracket.

### Replacement

1. Align the disk drive into its mounting track.
2. Carefully slide the disk drive into its bracket.
3. Install the screws to attach the drive to the bracket.
4. Connect the drive control and power supply cables and DC fan power cable.  
**Note:** Ensure the drive control cable is properly attached to J12 on the Mother board.
5. Replace the covers.
6. Execute Offline Utility 36 to initialize the drive.

### Memory Module

Local and Common memory upgrades are installed on the Mother board by using custom memory modules.

1. Ensure power is off and power cord unplugged from the AC source.
2. Remove the top cover to gain access to the Mother Board.
3. Install/replace memory module upgrades as shown below.

Local Memory is located at U3, U10, and U18.

Common Memory is located at U6, U11, and U19. A memory control module (U21) must also be replaced with upgrades of common memory.

4. Execute Utility 57 to reconfigure memory installed . DO NOT CONFUSE THIS WITH THE AMOUNT OF COMMON MEMORY INSTALLED! The utility is password protected. When prompted, enter the amount of memory installed.
5. When replacing the memory control module (U21), execute Utility 56 to configure number of floppy drives installed.

### Mother Board Assembly

#### Removal

1. Ensure power is off. Remove the covers.
2. Remove all Circuit boards attached to the board guide from the unit.
3. Disconnect all cables attached to the Mother board.
4. Remove the nine screws attaching the main plate to the chassis. There are three screws on each side and three on the back.
5. Carefully lift the main plate from the chassis.  
**Note:** The power supply, operator panel, and disk drives are attached to the main plate.
5. Remove the five mounting screws attaching the Mother board to the chassis.
6. Lift the Mother board clear of its mounting.

#### Replacement

1. Reverse the procedure to install the Mother board.
2. Execute Offline Utility 04, 08, and 10 to reload the serial number, set the date, and set the time.





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