HIB-IP & HIB-IP 8000
Remote Network Interfaces

MCN
Monitoring and Control Network

Hardware Reference Manual

S2-61173-122

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Revision History

S2-61173-100   Initial Release

S2-61173-105   Added definitions for flashing error codes

S2-61173-106   Corrected Table E2 reference to Option Switch 3

S2-61173-110   Removed references to AUI Connector on rear panel

S2-61173-120   Added configurable UDP Ports for HIB-IP 8000 (Version 400 & up)
                      Added HTTP page Security note
                      Added backup & restore information.

S2-61173-121   Changed default HTTP status page to Disabled.

                      Added pinout for HIB-IP programming cable and warning about using improper cable.

                      Added instructions to remove Ethernet cable from HIB-IP unit before configuring it in MCN Config Server software.

S2-61173-122   Added Information Assurance information.

1. INTRODUCTION

WHAT IS A HIB-IP?

The HIB-IP module is a remote network interface for an MCN (Monitoring & Control Network) system. It is used with the MCNRCD (MCN Remote Comparator Display) software in a PC. The HIB-IP connects to the MCN network on one side and to a PC via an Ethernet connection.
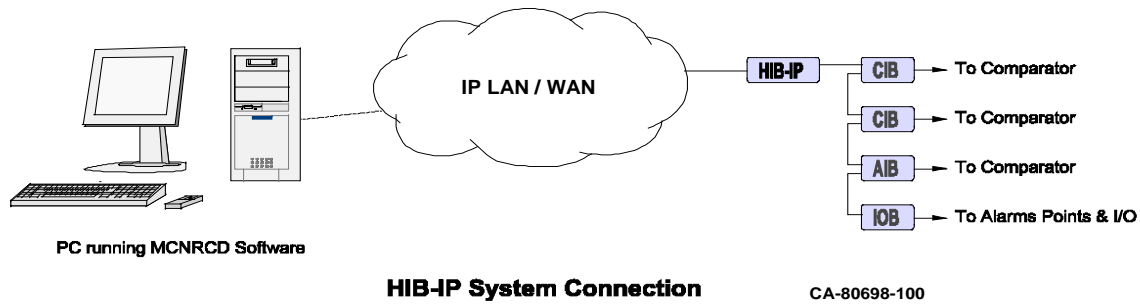
Figure 1 MCN System with HIB-IP

Software compatibility:

MCNRCD (Windows) Version 2.00 & up   Can connect to multiple HIB-IP units

MCN Server Version 2.00 & Up   Can connect to multiple HIB-IP units

MCN Advanced Server Version 2.00 & Up   Can connect to 4 HIB-IP units
(Can expand to 64 unite with additional licenses.)

MCN Server 8000   Can connect to 1 HIB-IP Unit
(Can expand to 64 unite with additional licenses.)

Available Models

The HIB-IP module is identified by the model number and version number found on the rear panel of the module.

Model Number	Version	Brand Name	UDP Port Supported	(WAN Media)	MCN Network Transceiver
S2-61151	100 – 349	HIB-IP (Legacy)	Legacy only	10Base-T & AUI *	78 Kbps
S2-61151	350-399	HIB-IP (Legacy)	Legacy only	10Base-T only	78 Kbps
S2-61151	400 up	HIB-IP 8000	HIB-IP 8000 & Legacy	10Base-T only	78 Kbps

*AUI port not used for HIB-IP application.

HIB-IP 8000 vs. Legacy HIB-IP Units

The Legacy HIB-IP supports only the Legacy UDP Port.

The HIB-IP 8000 supports both the Legacy UDP Port and the HIB-IP 8000 UDP Port.
The HIB-IP 8000 UDP Port may be used in Motorola Solutions Inc. (MSI) Astro25™ Radio Network Infrastructure (RNI) Version 7.13 and up.

In this manual, "HIB-IP" may be used in general to refer to either the HIB-IP Legacy or HIB-IP 8000 version

HIB-IP versus EXB-IP

The HIB-IP is housed in a module similar to the EXB-IP. Although both connect to an MCN network and an Ethernet network, there are some differences:

- EXB-IP modules are used in pairs to link distant MCN networks together over IP.
  HIB-IP modules are used to connect a PC to a remote MCN Network over IP.

- The PC requires an MCN Network Interface to connect to the MCN Network.
  If EXBs are used, the PC still needs an MCN network interface (such as a PCLTA , HIB-IP or HIB-232 to connect to the MCN network.

- Multiple PCs (each with its own MCN Network Interface) can connect to a local network served by EXBs.

  Only one PC can connect to a HIB-IP unit at a time.

HIB-IP 8000 Software Support

Use of the HIB-IP 8000 UDP port requires MCN software Version 6.10 or above.

Use of the HIB-IP 8000 units on a MSI RNI requires MCN Server 8000 Version 6.10 or higher.

REFERENCE DOCUMENTS

The following additional information is available.

Part Number	Document
S2-60425	Monitoring and Control Network Comparator Display System Manual
S2-60426	CIB Comparator Interface Manual
S2-61043	MCNRCD for Windows Manual
S2-61170	MCN Server Software Manual
DDN1290 (S2-61600)	MCN Server 8000 Software Manual

FRONT PANEL

ETH TX LED Indicates when a packet has been
transmitted on the Ethernet port
WINK LED Normally not used.
May be winked during Custom
Configuration to identify a unit.
ETH RX LED Indicates when a packet has been
detected on the Ethernet port

RESET Button

PWR LED Indicates correct input power
ERR LED Indicates an error condition
(see below and Appendix D)
ACT LED Indicates that a PC has
connected to the HIB-IP.

MCN NETWORK Connections
RJ-45 Normal Network connection.
Screw Terminals not normally used.
*** See MCN Network Notes 1 & 2***

**Buttons for use with Custom
Configuration
Press only when requested.**
CSVC Button Identifies Control Processor
RSVC Button Not used

Async Serial Programming Connector
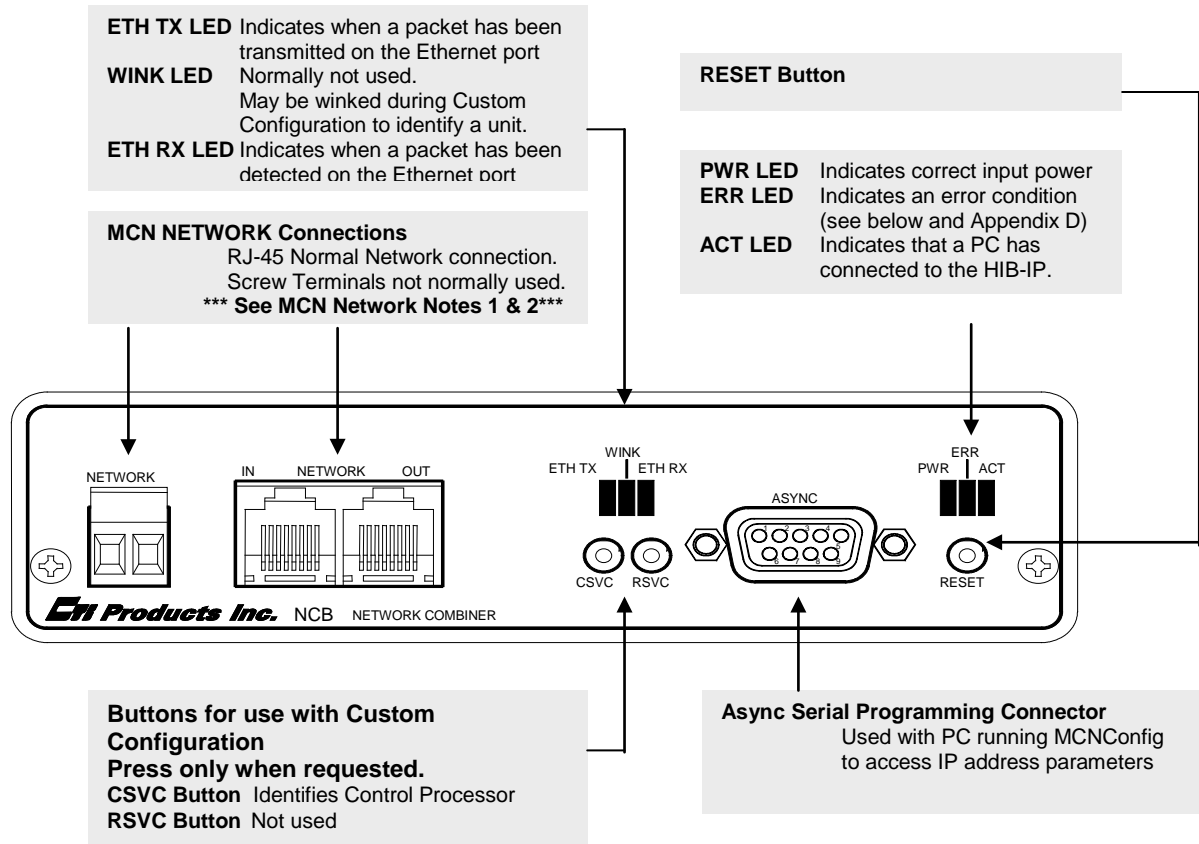Used with PC running MCNConfig
to access IP address parameters

Figure 2 HIB-IP Front Pane

MCN Network Note 1

Unlike most other MCN modules, the HIB-IP does not inject power into the Network Out connector. It also does not use any DC power from the Network In connector. All 8 pins on the Network In & Out connectors are paralleled, so that any power from other modules will be passed through.

MCN Network Note 2

Although the MCN Network connectors are RJ-45s, THEY ARE NOT ETHERNET CONNECTORS. Because the MCN network connectors on the front of the units may have DC power on them from other MCN devices, DO NOT CONNECT THE NETWORK IN OR OUT CONNECTORS TO ETHERNET PORTS. THIS CAN DAMAGE THE ETHERNET DEVICE. The Ethernet cable should be connected to the 10BASE-T connector on the rear of the HIB-IP unit.

Front Panel Indicators – Additional Information

ETH RX LED (Yellow) – Indicates when a packet has been detected on the Ethernet port. NOTE: Flashing of this LED does NOT necessarily mean that a packet addressed to this HIB-IP module has been received, just that a packet has been detected on the Ethernet network.

ERR LED (Red) – Indicates a possible error condition. See Table E2 in Appendix E for a list of Error Code definitions.

REAR PANEL

OPTION Switches
See table below for options.

DC IN   Input Power
This powers only this unit.
Power is not passed to the
Network Out connector.

10BASE-T

OPTION

ON 1 2 3 4 5 6 7 8

DC IN

Ethernet Connector
10Base-T)
*** See 10Base-T Warning ***
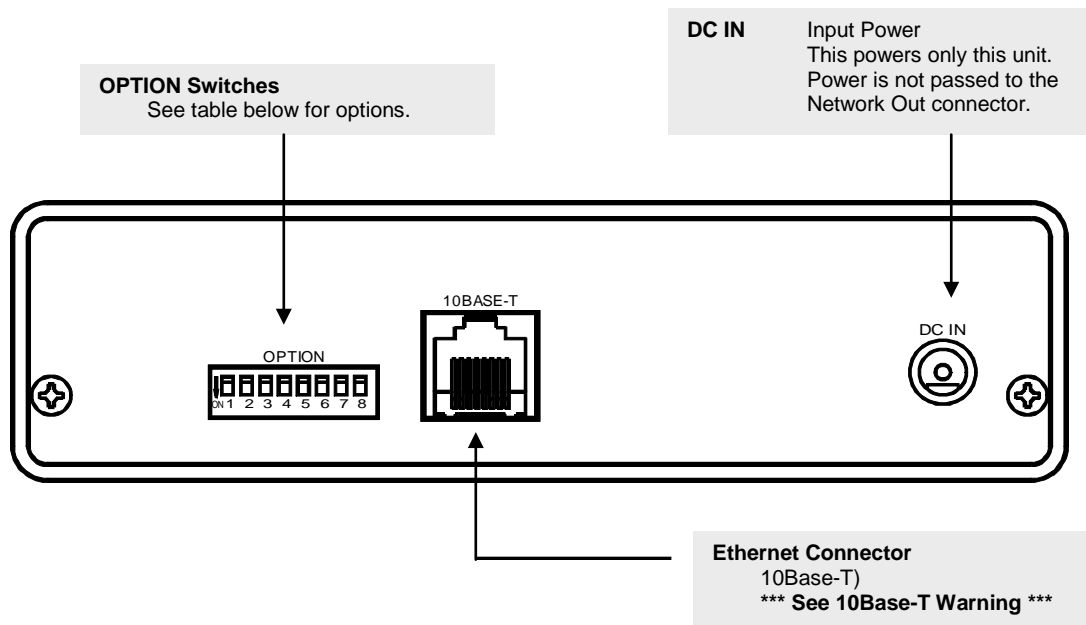
Figure 3 HIB-IP Rear Panel

10Base-T Warning

**Do not connect the 10Base-T connector to an MCN Network connector.
Damage could result.**

Option Switch Settings

	Function	Up	Down	Default
	1. Must be Up			**Up**
	2. HTTP Enable	HTTP On	HTTP Page Off	**Down**
	3. Must be Down			**Down**
	4. Must be Up			**Up**
	5. Must be Up			**Up**
	6. Must be Up			**Up**
	7. Must be Up..			**Up**
	8. Must be Up			**Up**

ON 1 2 3 4 5 6 7 8

Figure 4 Option Switch Settings

HTTP Page Security Note

The HIB-IP and HIB-IP 8000 units have an HTTP page that shows the status of the unit, including the IP parameters programmed into it and its On-Line / Off-Line status. This is useful for system troubleshooting.

This feature is turned off at the factory by default for HIB-IP 8000 units.

If your network security policies allow you to use HTTP pages and you desire to have the HTTP page turned on for troubleshooting, set Switch 2 Up and reset the unit.

If your network security policies mandate against this type of data being accessible through HTTP pages, verify that the HTTP page by setting Switch 2 Down and resetting the unit. For further security, restrict physical access to the unit and the networks to which it connects.

Note: Some networks (including Motorola Solutions, Inc. Radio Network Infrastructure - RNI) have routers and or firewalls that restrict HTTP traffic between certain network segments. If you have such a system, you may not be able to open the HTTP page from a different IP subnet, even if you have the HTTP page enabled on the HIB-IP unit.

2. IP ADDRESS CONFIGURATION

This section describes the IP address parameters that must be set for the HIB-IP unit.

> *NOTE: DO NOT connect the HIB-IP module to a live IP network until it has been reconfigured with new IP addresses. Network-wide problems could arise from connecting devices to a network without coordination of addressing information. For usage with dedicated fiber segments, see the note below.*

Each system is different. Refer to the documentation for your system for the proper IP addresses, subnets, and gateways that are assigned in your system.

MCN CONFIG SOFTWARE

The IP address parameters for the HIB-IP unit are downloaded into the units using the MCNConfig software that comes with the MCNRCD or MCN Server software. The IP parameters are loaded into the unit through the front panel serial programming connector. When used in this manual, MCN Config refers to the version shipped with the MCN software and cold be:

Software	MCN Config
MCNRCD	MCN Config.exe
MCN Server	MCN Config Server.exe
MCN Advanced Server	MCN Config Server.exe
MCN Server 8000	MCN Config Server.exe

The MCN Config software will keep track of all HIB-IP units for a particular system. If you are running the standard MCNRCD or MCN Server software, you will be able to use (1) HIB-IP. If you are running the MCNRCD Advanced Server or MCN Server 8000 software, you may be able to access multiple HIB-IP units, depending upon your license.

The MCNConfig program maintains a list of:

- Addressing parameters for all HIB-IP units in the system (including the MCN Group & Module)

- Authorized PC List

Each HIB-IP unit will be configured with:

- Its own HIB-IP addressing information

- Authorized PC information

- UDP Port
  Fixed for Legacy HIB-IP versions 399 and below

  Configurable for HIB-IP 8000 units (Version 400 & up):
      Choice of: HIB-IP (Legacy) or   HIB-IP 8000*

  * HIG-IP 8000 UDP Port requires MCN Software 6.10 or higher.

Appendix F of this manual provides an overview of IP addressing concepts.

IP SETTINGS WORKSHEET

Gather the following IP information for the system. IP information must be obtained *for each HIB-IP module to be used* (from the network administrator responsible for the IP network to which the HIB-IP module will be attached):

Individual HIB-IP Parameters:

For each HIB-IP in the system, gather the following information:

HIB-IP Number	
Name	
HIB-IP Address (Host IP Address)	_____._____._____._____
Subnet Mask	_____._____._____._____ or _____ Use Global
Gateway IP Address	_____._____._____._____
MCN Group (00-FE)	
MCN Module Number (00-7F)	

Note: the Subnet Mask cannot be less restrictive than the following standard IP Class Subnet Masks

Class	First Octet	Standard Subnet Size	Standard Subnet Mask
A	1-127	16,777,214	255.0.0.0
B	128-191	65,543	255.255.0.0
C	192-223	253	255.255.255.0
D	224-239	Multicast – Do not use.	
E	240-255	Experimental – Do not use.	

The HIB-IP units can accept a subnet mask that is more restrictive (more 1's set in the Subnet Mask), but not less restrictive.

The Gateway address is the address of the router used to communicate with PCs in other subnets. The Gateway subnet must be the same as the HIB-IP unit's subnet. If it is set to Empty, the HIB-IP will not be able to communicate to PCs outside of its subnet.

Authorized PCs:

For each PC in the system that will connect to the HIB-IP, collect the following information:

PC Name	
PC IP Address (Host IP Address)	_____._____._____._____

See the MCN series Software manual for instructions on:
- Entering this data into the configuration files using MCN Config series of software
- Downloading the configuration data into the HIB-IP units.

The configuration is downloaded from the PC to the HIB-IP unit using an 89-11314 Null-Modem serial cable (9-pin female to 9-pin female.).

BACKUP & RESTORE PROCEDURES

The HIB-IP units are not part of any automatic Back-up And Restore (BAR) system.

The HIB-IP configuration information is saved in the configuration files generated by the MCN Config software. It is recommended that you back up those files as part of your standard backup procedures.

See the appropriate MCN Software Manual for your system for additional Backup & Restore information.

SECURITY AND INFORMATION ASSURANCE RECOMMENDATIONS

Review these recommendations before installation and follow them during installation and operation:

1. Software Installation Locations
   Install the MCN Server 8000 software in default program directory recommended by Installshield.

2. Configure the MCN Server 8000 as described in the MCN Server 8000 manual.

3. Use the HIB-IP 8000 UDP ports for MSI RNIs as described in this manual.

4. For all software, network and device configuration, additionally take into consideration commercially accepted practices, industry standards and the standards for your organization.

5. Do not save user files or system configuration files in the program directory.

6. Save system configuration files to a directory that requires Administrator rights so that users cannot delete or edit the configuration files.

7. Always run the configuration software with the lowest permission set possible.
   Note: The MCN Config Server software must be run with Administrator rights.

8. When configuring a system, do not enter Sensitive or Confidential information into the system configuration files.

9. The configuration files generated by MCN Config Server software are not backed up as part of the ASTRO® 25 Back UP & Restore (BAR) solution. Follow the Backup & Recovery procedures as listed in the MCN Server 8000 manual.

10. Follow the applicable Backup & Recovery procedures for your system, PCs, and operating systems as defined by your organization, the hardware and software vendors, and commercially acceptable practices.

11. Limit access to PCs, IP networks and MCN networks, both physically and through appropriate restrictions in routers and switches

12. Use strong passwords where applicable.

13. Follow Motorola's and your organization's recommendations on security and Information Assurance.

14. Use the appropriate Windows Hardening Kits for PCs in your system.

15. Use anti-virus and anti-malware packages on PCs in your system.

16. Install appropriate security patches for installed software and operating system on PCs in your system.

17. Use of multiple NIC cards (Dual-Home systems) is not approved by MSI in ASTRO® 25 RNIs due to Information Assurance (IA) security concerns.

3. INSTALLATION

PHYSICALLY INSTALL HIB-IP UNIT ONTO THE IP NETWORK

A) Set Option Switches:

- Set up the OPTION switches for the desired operation.

Function	Up	Down	Default
1. Must be Up			Up
2. HTTP Enable	HTTP On	HTTP Page Off	Down
3. Must be Down			Down
4. Must be Up			Up
5. Must be Up			Up
6. Must be Up			Up
7. Must be Up...			Up
8. Must be Up..			Up

The default settings should be suitable for most applications.

Less restrictive security:
Some system policies require that the HTTP page be turned off. For systems that allow the HTTP page to be displayed for diagnostic purposes s, you may set Switch 2 Down to disable the HTTP status page.

B) Mount the HIB-IP units (See Appendix B for Mounting Option details):

**Desk, Wall, or Rack Mounting**

- Non-slip rubber feet are included on all HIB-IP modules to allow them to conveniently rest on any horizontal surface. Four 6-32 threaded holes are also available on the bottom of the module to allow bolting of the module in any convenient orientation. **WARNING: Care should be taken to limit protrusion of the screw into the module to no more than 0.125 inch from the module bottom surface!**

- Mounting kits are available as options to allow wall or rack (19" EIA) mounting of the HIB-IP modules.

C) Make electrical connections (See Appendix C for connector details):

Grounding

- When wall or rack mounting the HIB, a suitable safety and protective earth ground should be provided to the metal enclosure. The protective earth ground provides a path to ground for electrostatic discharge (ESD) energy. This connection is most conveniently made directly to the wall mount bracket or rack plate.

DC Power Connection
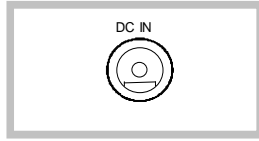
DC power must be attached to the HIB-IP module via the **DC IN** connector. A wall plug-in style power supply designed for the HIB-IP module is an available option.

C) Program IP Parameters:

The IP parameters are downloaded from the PC to the HIB-IP unit using a serial cable.

1. Be sure all the HIB-IP and Authorized PC parameters have been entered into the PC configuration files using MCN Config series software as described in Section: 2. IP Address Configuration.

2. IP traffic can interrupt programming or viewing the data on a HIB-IP unit.
   Remove IP traffic by disconnecting the Ethernet cable from the 10Base-T port on the rear of the HIB-IP unit.

3. Connect a Null Modem cable (CTI # 89-11314) between the PC and the Async Serial Programming connector on the HIB-IP.
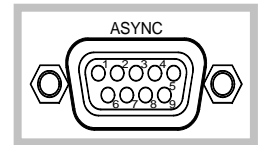

   Use of different cables may result in inconsistent or improper programming and viewing of HIB-IP data.
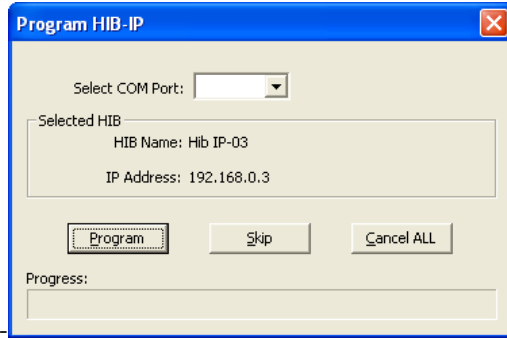
   See Appendix D. HIB-IP Programming Cable Pinout 89-11314 on page 25 for the proper cable pinout.

4. Load the IP parameters to the HIB-IP using the MCNConfig program:
   Go to the Network Interfaces window and select the proper HIB-IP unit.
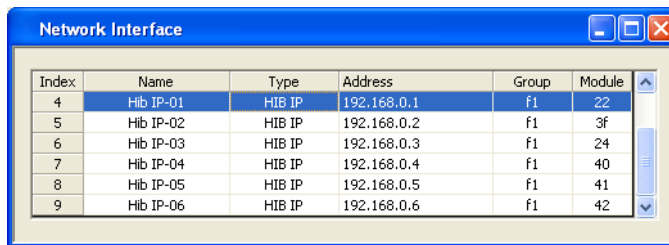
Right-click on the HIB-IP unit and select "Load HIB" from the pop-up window.
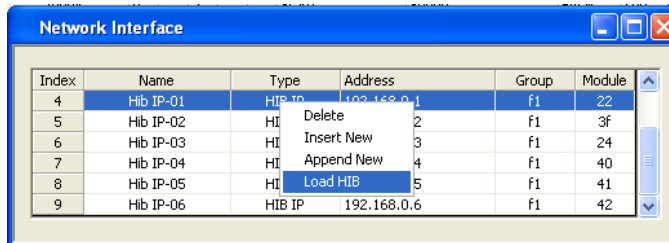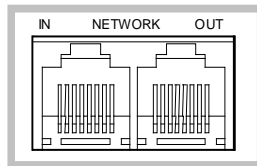
Select the proper COM port and hit "Program".

D) Connect to the MCN & IP networks:

MCN Network Connection

- The local MCN network must be attached to the HIB-IP module via the "NETWORK" connector following standard guidelines as to cable type, cable length, and termination appropriate for the selected transceiver.

The dual RJ45 **NETWORK** connector allows a daisy-chained network connection method, as the network pins of the two RJ45 connectors are directly paralleled. The HIB-IP unit does not inject DC power on the network cable. It does not use any DC power from the cable.
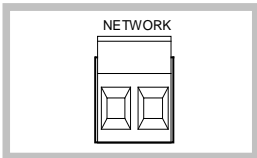
The 2 pin removable terminal strip is wired in parallel with the network connections on the dual RJ45 connector. This connector is normally not used.

Ethernet Connection

- The Ethernet network must be attached to the HIB-IP module via the Ethernet 10Base-T connector on the rear of the unit.

> **WARNING:** *DO NOT connect the HIB-IP module to a live Ethernet network until it has been reconfigured with its IP parameters. Network-wide problems could arise from connecting devices to a network without coordination of addressing information.*
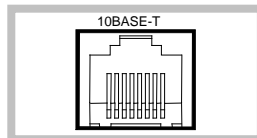
The **10BaseT** port utilizes a standard RJ45 connector. Level 5 unshielded twisted pair cable should be used between the HIB-IP module and the IP switch or hub. The length of this cable should be less than 100 meters (328 feet).
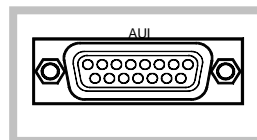
An **AUI** connector was present on early units,
This connector has been removed on later versions.
It was not used for HIB-IP applications.

IP Switch Manual Settings Note

Some IP Switches (Like some HP Switches) that have Auto Speed and Duplex negation may not be able to auto-negotiate with the HIB-IP unit. In those cases, we recommend that you manually configure the Ethernet port in the IP switch that connects to the HIB-IP. See the **IP Switch Configuration – Speed & HDX/FDX Negotiation** section on page **31** for more details.

E. Run the MCNRCD program or the MCN Server program:

The installation of the HIB-IP units is now complete.

4. TESTING

HTTP STATUS PAGE

The HIB-IP and HIB-IP 8000 units have an HTTP page that shows the status of the unit, including the IP parameters programmed into it and its On-Line / Off-Line status. This is useful for system troubleshooting. .

On the HIB-IP 8000 units, this feature is turned off at the factory by default.

Connect your PC to the HIB-IP via a LAN and enter the IP address of the HIB-IP in the address window: Option Switch 2 must be Up for this page to be active.

The HTTP Status Page lists the current configuration for the HIB-IP unit.

Obviously, if the HIB-IP unit's own IP parameters are set wrong, you won't be able to see the Status Page.

Note: Some networks (including Motorola Solutions, Inc. Radio Network Infrastructure - RNI) have routers and/or firewalls that restrict HTTP traffic between certain network segments or subnets. If you have such a system, you may not be able to open the HTTP page from a different IP segment or subnet, even if you have the HTTP page enabled on the HIB-IP unit.
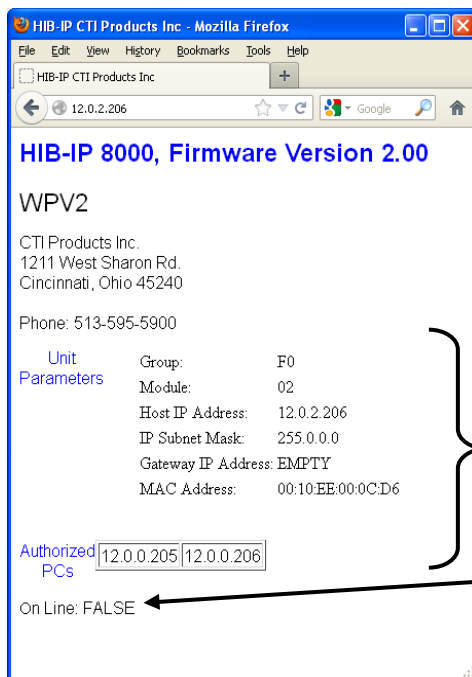
Data entered from MCN Config program
(except for MAC Address)

On-Line Status indicator:
        False: No PC Connected
        True   PC running MCN Software is connected
                         to HIB-IP unit.

Additional System Security & HTTP Page

If your network security policies mandate against this type of data being accessible through HTTP pages, verify that the HTTP page by setting Switch 2 Down and resetting the unit. For further security, restrict physical access to the unit and the networks to which it connects.

If your network security policies allow you to use HTTP pages and you desire to have the HTTP page turned on for troubleshooting, set Switch 2 Up and reset the unit.

Security Notes:
1. You can disable the Status Page by setting Option Switch 2 Down.
    (Remember to reset the unit after changing switch settings.)

2. The Authorized PCs restricts the use of MCNRCD or MCN Server PCs.
    It does not restrict Pings or the ability to access the HTTP page.

3. You can further restrict the HIB-IPs ability to talk to units outside its own subnet by setting its Gateway address to "0.0.0.0".   For this case, the status page will display "EMPTY" for the Gateway address as shown above.

PINGING THE HIB-IP UNIT

The "Ping" function can be run from the PC as a diagnostic tool to determine if a particular IP address can be "seen" by a PC and the network infrastructure is configured to pass ICMP Ping messages and responses. The HIB-IP will respond to IGMP Ping messages from the IP network.

Note: Some networks are configured to block the ICMP Ping messages and/or responses between certain network segments of subnets. The Ping function will not work if the ICMP Ping messages or responses are blocked by the network.

APPENDIX

APPENDIX A. FACTORY DEFAULT CONFIGURATION

Control Processor

Restoring Factory Default Communication Parameters

If the Control Processor communication parameters are overwritten so that the HIB-IP cannot communicate with the MCN Network, they can be restored as follows:

- Press the "RESET" button on the front of the HIB-IP unit
- After the "ERR" LED goes off, press the "RESET" button a second time.

The Control Processor communication parameters are now restored to factory defaults.

IP Address Parameters

The units are factory programmed as follows:

- IP Address: 192.1.1.1
- IP Address Mode: Unicast
- Subnet Mask: 255.255.255.0
- PC IP Address   192.1.1.201

APPENDIX B. MOUNTING OPTIONS

Wall mount and EIA 19" rack mount kits are available as options for the HIB-IP units from CTI Products, Inc. The wall mount kit includes brackets to allow a single HIB-IP module to be mounted to any flat surface. The rack mount kit includes an adapter allowing up to three HIB-IP modules to be mounted in a single rack unit height.

Rack Mount Option

The rack mount option allows up to three HIB-IP modules to be mounted in a one rack unit height (1.75 inches) of a standard 19 inch rack. The modules are mounted in the rack plate by removing its' front bezel and remounting the module into the rack plate. Figure 5 shows an exploded view of the rack mount installation. The top diagram shows the front view of the bracket with one module installed. The bottom two diagrams show a side view of the module installation into the rack adapter and rack adapter installation into the rack, respectively.
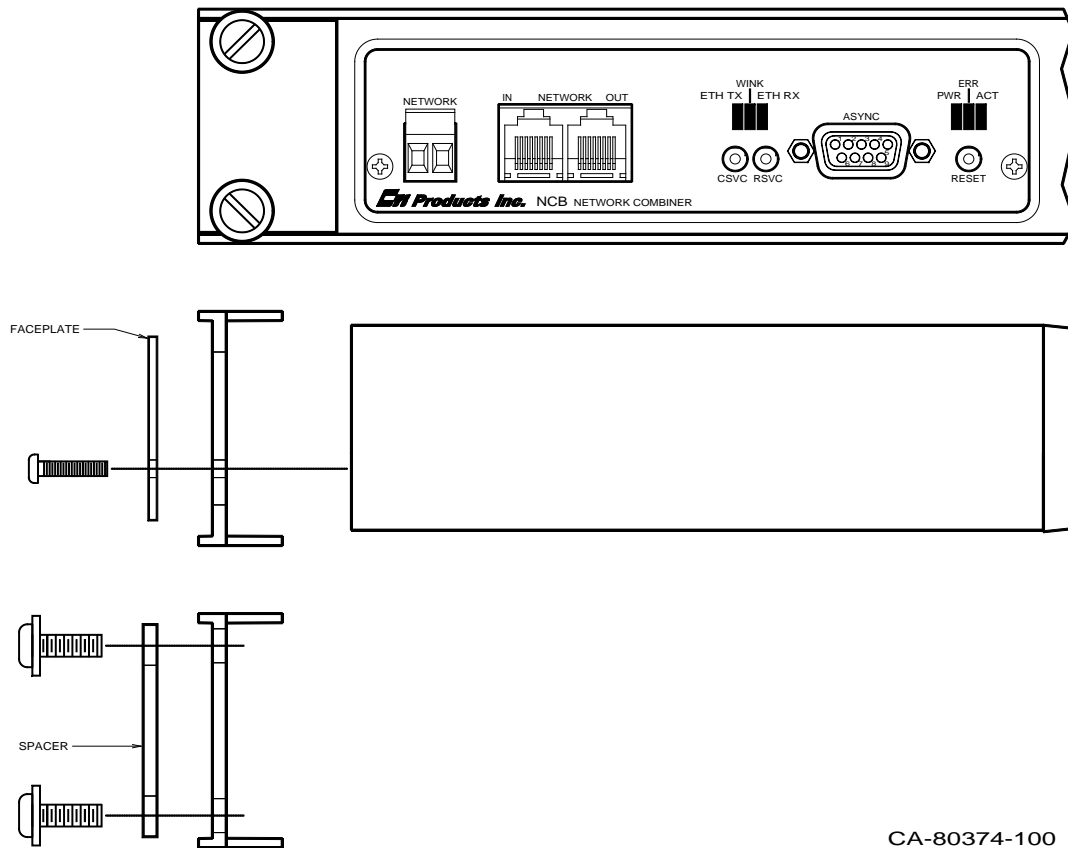
Figure 5 HIB-IP Module Rack Mounting

To attach a module to the rack adapter, and then mount the rack adapter into the rack, follow the steps below.

WARNING

Do not allow the PC board to slide out of the housing when the front panel is removed. If it does, **DO NOT** slide the PC board back into the housing from the front of the module. Doing so may damage the unit, causing the unit to malfunction when powered on. Doing so will void the unit's warranty. Return the PC board to the housing by sliding it only from the rear. (See instructions below.)

Rack Mounting Instructions

Step	Operation
1	Remove the front panel from the module, including the bezel, by removing the two Philips head screws in the faceplate. The bezel is not used when rack mounting the module.
2	Position the module behind the rack adapter, lining up the holes in the rack adapter with the front panel screw holes on the module.
3	Position the front panel in front of the rack adapter, lining up the front panel with the module.
4	Fasten the front panel and module to the rack adapter with the Philips head screws that were previously removed.
5	Position the rack adapter into your rack, lining up the four mounting holes of the rack adapter with mounting holes in the rack frame.
6	Position the two spacers in the front of the rack adapter, aligning the cutouts in the spacers with the holes of the adapter.
7	Install mounting screws (customer provided) into the rack.

When the module's front panel is removed, do not allow the PC board to slide out of the housing. If the PC board does slide out of the housing, you must follow the steps below to replace the PC board in the housing. DO NOT RE-INSTALL THE PC BOARD FROM THE FRONT OF THE HOUSING !

Re-Installing a PC Board in its housing

Step	Operation
1	From the front of the module, slide the PC board out of the housing.
2	Remove the back panel of the module.
3	Attach either bezel and front panel or rack kit and front panel to the housing with two Philips head screws.
3	From the rear of the module, slide the PC board back into the housing (there are markings on the PC board to indicate which edge to insert into the rear of the housing first).
4	Attach bezel and rear panel to the housing with two Philips head screws.

Wall Mount Option

The wall mount option allows an HIB-IP module to be mounted to any flat surface. The HIB-IP module has four screw holes on the bottom. Simply attach the two mounting plates to the bottom of the module using the four flat-head screws provided with the wall mount kit. This assembly is then attached to the flat surface with user-provided fasteners. Figure 6 shows a dimensioned view of the wall mount installation.
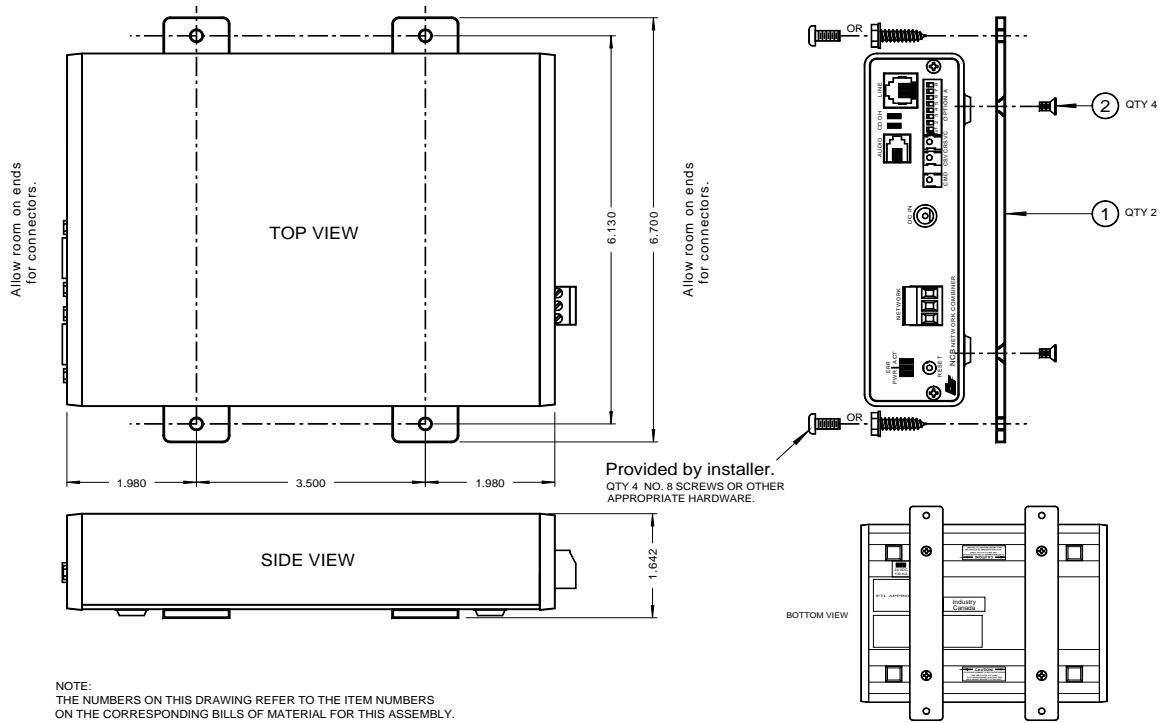
Figure 6 HIB-IP Module Wall Mounting

**CAUTION**

Be sure to use the flat head screws provided with the wall mount kit. If you are not using the wall mount kit from CTI Products, Inc., make sure that the screws do not protrude into the enclosure more than 0.125 inches from the bottom surface of the module.

Using a longer screw that touches the PC board inside the module may damage the module. Doing so will void the unit's warranty.

APPENDIX C. CONNECTOR DETAILS

DC IN Connector

Connector type:	2.5 x 5.5 mm coaxial
Mating Connector:	Switchcraft 760 or equivalent
Connector pinout:	CTI Products, Inc. standard power supply is wired with center pin positive, HIB-IP module can accept either pin positive, polarity routing is provided internal.

DC IN

Front View   Polarity
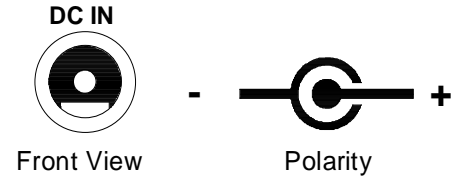
NETWORK Connectors

RJ45 Connectors:

Pins 1 and 2 of both RJ45 connectors as well as the screw-terminal connector are all wired in parallel.

Connector Type: Standard RJ45 telephone connector, 8 position 8 contact.

IN   NETWORK   OUT

8 7 6 5 4 3 2 1
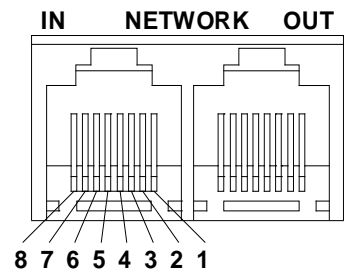
Pin	Function	Notes
1	Network	Network connection is NOT polarity sensitive
2	Network	Pins 1,2 of IN and OUT connectors tied parallel
3	No Connection Note 1	Pin 3 of IN and OUT connectors tied together
4	No Connection	Pin 4 of IN and OUT connectors tied together
5	No Connection	Pin 5 of IN and OUT connectors tied together
6	No Connection Note 2	Pin 6 of IN and OUT connectors tied together
7	No Connection Note 2	Pin 7 of IN and OUT connectors tied together
8	No Connection Note 1	Pin 8 of IN and OUT connectors tied together

Note 1: May have + DC power on this pin from other MCN modules.
Note 2: May have - DC power on this pin from other MCN modules.

2-Position Screw-Terminal:

Mating Connector: Weidmueller 128176

Pin	Function
1	Network
2	Network

NETWORK

1   2

Ethernet Connectors

10BaseT Connector:

Connector type: Standard RJ45 female.

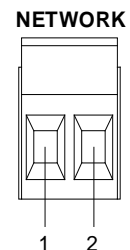| Note: in	Function
1	Ethernet TX
2	Ethernet TX
3	Ethernet RX
4	N/C
5	N/C
6	Ethernet RX
7	N/C
8	N/C

AUI Connector (early versions)
Note: This connector removed on later versions

Connector type: Standard D-Subminiature 15 pin
female.

Pin	Function
1	Chassis Ground
2	Collision
3	Ethernet TX
4	Chassis Ground
5	Ethernet RX
6	Signal Ground
7	N/C
8	N/C
9	Collision
10	Ethernet TX
11	Chassis Ground
12	Ethernet RX
13	+12V
14	Chassis Ground
15	N/C

ASYNC Serial Programming Connector

When this port is connected to a PCs serial port, the MCNConfig program can be used to configure the IP address parameters.

Connector type: Standard D-Subminiature 9 pin male. DTE (Like IBM PC 9 pin)
Null Modem cable (CTI # 89-11314) required for connection to
PC.

Pin	Function
1	Data Carrier Detect
2	RX
3	TX
4	Data Terminal Ready
5	Signal Ground
6	Data Set Ready
7	Clear to Send
8	Request to Send
9	N/C

APPENDIX D. HIB-IP PROGRAMMING CABLE PINOUT 89-11314

Pin	Function			Function	Pin
1	DCD Data Carrier Detect			DCD Data Carrier Detect	1
2	RXD			RXD	2
3	TXD			TXD	3
4	DTR Data Terminal Ready			DTR Data Terminal Ready	4
5	GND Signal Ground			GND Signal Ground	5
6	DSR Data Set Ready			DSR Data Set Ready	6
7	CTS Clear to Send			CTS Clear to Send	7
8	RTS Request to Send			RTS Request to Send	8
	N/C			N/C	9

Programming Cable Warning

Always use the proper cable.

If an improper cable is used, the MCN Config software might not be able to consistently View or Upload the data to the HIB-IP unit.

APPENDIX E. TROUBLESHOOTING

Table E1

If the PWR LED . . .	REASON	CORRECTIVE ACTION
Steadily illuminates	Normal operation indicating that HIB-IP unit is receiving proper DC input power.	Go to next Table.
Occasionally illuminates	Loading of HIB-IB is excessive for the power supply	Check that power supply can deliver 5 watts at 10-32VDC.
Does not illuminate	HIB-IP unit is not receiving DC input power.	Check for proper voltage at "DC IN" connector (10-32VDC).

Table E2

If the ERR LED . . .	REASON	CORRECTIVE ACTION
Does not illuminate	Normal operation indicating no error condition was detected.	Go to next Table.
Occasionally flashes on, then off.	Normal operation when "CSVC" button is pressed.	Go to next Table.
Flashes one time, & repeats	EE Read Fail	Return to CTI Products for repair
Flashes 2 times, & repeats	MAC Address Read Fail	Return to CTI Products for repair
Flashes 3 times, & repeats	Target not configured	Configure IP parameters in MCN Config Program, then "Load HIB" through serial port. (See Section "2. IP Address Configuration" on Page 10, and see MCNRCD Software Manual)
Flashes 4 times, & repeats	Host not configured	Configure IP parameters in MCN Config Program, then "Load HIB" through serial port. (See Section "2. IP Address Configuration" on Page 10, and see MCNRCD Software Manual)
Flashes 6 times, & repeats	One of the following is set to 0: Host IP Address Host IP Mask IP Mode	Configure IP parameters in MCN Config Program, then "Load HIB" through serial port. (See Section "2. IP Address Configuration" on Page 10, and see MCNRCD Software Manual)
Flashes 7 times, & repeats	No Authorized PC List	Configure IP parameters in MCN Config Program, then "Load HIB" through serial port. (See Section "2. IP Address Configuration" on Page 10, and see MCNRCD Software Manual)
Flashes 8 times, & repeats	Multicast IP Address Error: Multicast mode is selected, but Multicast Address = 0.0.0.0	Configure IP parameters in MCN Config Program, then "Load HIB" through serial port. (See Section "2. IP Address Configuration" on Page 10, and see MCNRCD Software Manual)
Flashes 10 times, & repeats	Factory Test Mode: Option Switch 3 is UP	Place in Operating Mode by placing Option Switch 3 DOWN, then Reset the unit.
Is steadily illuminated.	Unit not functioning.	Return to CTI Products for repair

Table E3

If the ETH TX LED . . .	REASON	CORRECTIVE ACTION
Occasionally flashes on, then off.	Normal operation indicating a message packet has been transmitted from the Ethernet port.	Go to next Table.
Never illuminates	IP messages are being transmitted from the HIP-IP	Check the integrity of the IP network and cabling.

Table E4

If the ETH RX LED . . .	REASON	CORRECTIVE ACTION
Occasionally flashes on, then off.	Normal operation indicating a message packet has been detected on the IP network.	Go to next Table.
Never illuminates	IP messages are not being received by the HIP-IP	Check the integrity of the IP network and cabling.

Table E5

If the ACT LED . . .	REASON	CORRECTIVE ACTION
Is steadily illuminated	Normal operation indicating a PC running MCNRCD or MCN Server software is connected to the HIB-IP	None.
Never illuminates	1. PC not running MCNRCD or MCN Server Software	1. Start the software
	2. PC not configured to access HIB-IP	2. Use MCNConfig to Re-configure PC to access HIB-IP. Restart the MCNRCD or MCN Server software.
	3. No IP connection between PC & HIB-IP	3. Check IP cabling. Try to Ping HIB-IP from PC Check PCs IP address Check ETH RX LED for activity Check the Status Page
	4 HIB-IP IP parameters wrong or PC not in Authorized PC list.	4. Re-load the IP parameters & Authorized PC list in the HIB-IP
	5. Ethernet port not enabled	5. Check Option Switch settings: 10BaseT (Default), 7 & 8 UP AUI (Fiber), 7 & 8 DOWN (Reset unit after changing switch settings)

Table E6

Web Page not available . .	REASON	CORRECTIVE ACTION
If the Web page cannot be accessed	HTTP option is disabled	Place Option Switch 2 UP, then Reset the unit.

To request RMA for return of product to CTI Products, call Customer Support at +1-513-595-5900

APPENDIX F. SPECIFICATIONS

HIB-IP

DC Power Input:	10 to 32 VDC, unregulated (10BaseT) 15 to 32 VDC unregulated (AUI - Fiber) 5 watts maximum
Size:	7.5" D x 5.6" W x 1.6" H
Operating Temperature:	0 to 60 °C
Humidity:	10-95% non-condensing
Mounting:	Desktop with integral non-slip feet Wall mount or 19" rack mount with optional adapters
Configuration:	
Ethernet IP Parameters	Using MCN Config program supplied with MCNRCD software.
Transceivers Supported:	
MCN	78K
Ethernet	10Base-T HDX
IP Addressing Modes:	Unicast
IP Transport:	UDP
Status Page	HTTP (may be disabled)

UDP Ports:	*HIB-IP Legacy: Source 1283 (fixed)*
	                Dest: 1100 dest. (fixed)
	
	HIB-IP 8000: Source: *1283 (fixed)*
	                    Dest: *"Legacy" (1100) or*
	                            "HIB-IP 8000" or
	                            1-65,534 (User selectable).
	
	"HIB-IP 8000" UDP Port for use with Motorola Solutions Inc. Astro25™
	Radio Network Infrastructure (RNI) Version 7.13 and up

Operating System:	Proprietary (Non-Windows, Non-Linux, Non-Unix)

APPENDIX G. IP ADDRESSING

Conventions

Any node connected to an IP (Internet Protocol) network must be identified with a unique 32-bit address. These 32-bit addresses are commonly written *in dotted decimal* notation as four decimal numbers (referred to as octets because each decimal number represents 8 bits) separated by decimal points. Each octet can be a number from 1 to 255. For example, 131.9.1.2 is a valid IP address. The IP address assigned to a network device is commonly called the *Host IP Address*. By having unique addresses on a network, individual stations (also called hosts or nodes) can be identified on the network.

IP Address Classes

There are five types of IP addresses. Three are associated with networks – Class A, B, and C.
- **Class A** addresses are for networks that have a large number of hosts, up to a maximum of 16,777,214 on a single IP network. The first octet is between 1 and 126. (127 is reserved for loopback and is used for internal testing on the local machine.)
- **Class B** addresses are for medium-sized networks. The first octet is between 128 and 191.
- **Class C** addresses are for small networks, up to 255 hosts. The first octet is between 192 and 223.
- **Class D** addresses are reserved for multicasting and the first octet is between 224 and 239. These are not used for Host (device) addresses.
- **Class E** addresses (240 to 255) are reserved and should not be used.

An IP address consists of two parts – one part identifies the network, and one part identifies the host (or node). The NetID portion of the IP address identifies the physical network segment. The HostID portion of the IP address identifies the node within the network segment. The following table lists the capacities of each IP address and the bits used as NetID and HostID.

IP Class	Net ID (Beginning Bits)	# of Networks	Host ID (Ending Bits)	# of Hosts or Subnets	1st byte Range
A	8	126	24	16.7 million	1-126
B	16	16,000	16	65,000	128-191
C	24	2 million	8	254	192-293

Subnetting using Subnet Masks

A portion of the host bits can be used to "subnet the network". The subnet mask identifies the "NetID" and "HostID" portions of the IP address in a bitwise fashion. The mask is constructed by placing a "1" in any bit that is part of a subnetwork address. So subnet mask bits that are SET define the NetID, and CLEARED subnet mask bits define the HostID.

A subnet mask of 255.255.255.0 defines the NetID as the first three octets, and the HostID as the last octet. For example, for the address 192.47.73.111 and the subnet mask of 255.255.255.0, the subnetwork can be identified as 192.47.73.0.

Summary of Important Networking Details
- A specific "NetID" can exist on only ONE port of ONE IP router.
- The "NetID" portion of the Host Address and the Gateway Address MUST BE THE SAME.
- If a functioning unit is moved to a different location, its Host IP Address and Default Gateway IP Address MUST BE CHANGED to match the "NetID" at the new location.

MAC Addresses

Whereas IP uses Logical Addresses to identify a host (node), other protocols use Hardware Addresses called Media Access Control addresses, or MAC addresses. MAC addresses are set at the factory at time of manufacture and cannot be changed. (IP addresses can be changed at any time.) A MAC address consists of six octets, in hexadecimal notation, separated by colons. An example would be: 00:10:EE:00:02:34.

The first three octets in a MAC address identify the manufacturer. In the above example, 00:10:EE identifies CTI Products as the manufacturer of this device. The last three octets are sequentially assigned by the manufacturer to form a type of serial number. In this way, no two devices have the same MAC address.

Address Resolution Protocol (ARP)

Since IP uses Logical Addresses at the OSI Network Layer (Layer 3) and Ethernet uses MAC addresses at the OSI Data Link Layer (Layer 2), Address Resolution Protocol is used whenever IP is used over the Ethernet. ARP is needed to convert an IP address to a MAC address. The client then stores this resolved address for a period of time in its ARP cache. An ARP cache is a lookup table, typically in a router, that will store a quantity of resolved addresses for devices that it must communicate with.

When a message is destined for an IP address whose MAC address has not yet been resolved, an ARP REQUEST is sent from the local host as a broadcast message, asking for MAC identification. A remote host with the IP address in question generates an ARP RESPONSE. This ARP RESPONSE contains the requested MAC address. The local host receives the message, and places the IP Address and the matching MAC Address in its ARP Cache. The original message is then sent using the MAC Address found previously. Any additional messages to this remote IP address will be sent using the MAC address found in the local host's ARP cache.

Ethernet 10BaseT Cables

When connecting two IP devices together, either a straight-through cable or a crossover cable may be required.

If interconnecting similar devices, then a crossover cable is needed. Examples would be interconnecting two EXB-IP routers, or two IP routers, or two hubs, or two computers. Generally, if the two devices are both Layer 3 devices, then a crossover cable is required. Routers operate at Layer 3. Similarly, if the two devices are Layer 1 or 2 devices, they would also require a crossover cable. Bridges, switches, and Network Interface Cards (NIC) operate at Layer 2, and hubs, repeaters, and concentrators operate at Layer 1.

If interconnecting dissimilar devices, then a straight-through cable is needed. Dissimilar devices would involve one Layer 3 device and a Layer 1 or Layer 2 device.

The following table summarizes device types in each layer.

Layer 3	Layer 2	Layer 1
IP Router	Bridge	Hub
EXB-IP Network Extender	Switch	Repeater
HIB-IP Unit	NIC	Concentrator

The following table lists the connections for a straight-through cable.

Standard End				Standard End		
Signal Name	Wire Color	Pin		Pin	Wire Color	Signal Name
TD+	White/Orange	1	←→	1	White/Orange	TD+
TD-	Orange	2	←→	2	Orange	TD-
RD+	White/Green	3	←→	3	White/Green	RD+
Not used	Blue	4	←→	4	Blue	Not used
Not used	White/Blue	5	←→	5	White/Blue	Not used
RD-	Green	6	←→	6	Green	RD-
Not used	White/Brown	7	←→	7	White/Brown	Not used
Not used	Brown	8	←→	8	Brown	Not used

The following table lists the connections for a crossover cable.

Standard End				Crossover End		
Signal Name	Wire Color	Pin		Pin	Wire Color	Signal Name
TD+	White/Orange	1	←→	3	White/Green	RD+
TD-	Orange	2	←→	6	Green	RD-
RD+	White/Green	3	←→	1	White/Orange	TD+
Not used	Blue	4	←→	5	Blue	Not used
Not used	White/Blue	5	←→	4	White/Blue	Not used
RD-	Green	6	←→	2	Orange	TD-
Not used	White/Brown	7	←→	8	White/Brown	Not used
Not used	Brown	8	←→	7	Brown	Not used

Auto-MDIX

Note that some newer PCs and IP Switches feature "Auto-MDIX" Ethernet connectors. These Ethernet connections will automatically sense the direction of the connection and do not require cross-over cables.

IP Switch Configuration – Speed & HDX/FDX Negotiation

Some IP Switches (like some HP Pro-Curve Switches) that have Auto Speed and Duplex negation may not be able to auto-negotiate with the HIB-IP unit. This may cause the HIB-IPs units (and their connected MCN modules to cycle off-line and on-line in the MCN software.

In those cases, we recommend that you manually configure the Ethernet port in the IP switch that connects to the HIB-IP.

Manual Configuration:

    Speed: 10 Mbits/sec

    Duplex   HDX

APPENDIX H. HIB-IP FIRMWARE NOTES

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Regents of the University of California License

Portions of the outbound Ping function in the firmware in the HIB-IP and HIB-IP 8000 units are used under license from Regents of the University of California. The following disclosure is required by that license and applies only to portions of the Ping function.

The original license was modified as of July 22, 1999 to delete the requirement for acknowledgement within advertising materials per notice from:
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    Director, Office of Technology Licensing
    University of California, Berkeley
    as stated at:
    ftp://ftp.cs.berkeley.edu/pub/4bsd/README.Impt.License.Change
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APPENDIX I. REGULATORY NOTES

Radio Frequency Emissions and Immunity

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Limits specified in the standards listed below are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

UNITED STATES: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules.

CANADA: This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

EUROPE: This equipment has been tested and found to conform with the following standards: EN60950, EN50082-1, IEC801-2, IEC801-3, IEC801-4, and EN55022. This equipment complies with the requirements of the following directives: Low Voltage Directive 73/23/EEC, EMC Directive 89/336/EEC, and 93/68/EEC Harmonization of CE Marking

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