Lucent Technologies
Bell Labs Innovations

BNS-2000
Access Interface
Module Reference

255-184-107
Issue 3
Release 5.0

Contents

Figures

Tables

Procedures

Preface

The *Access Interface Module Reference* provides the information needed to install, configure, and administer Access Interface (AI) modules in a node for Switched Multimegabit Data Service (SMDS). Procedures for routine operations, maintenance, and troubleshooting are also included.

Document Organization

The *Access Interface Module Reference* includes six chapters that explain module hardware, software, and troubleshooting:

AI Overview	includes a physical description of the AI modules and an overview of their features.
AI Installation	explains how to insert and remove an input/output (I/O) distribution board and a module.
AI Cabling	provides information on the cables required to connect AI modules to SMDS network equipment.
AI Administration	describes the available module and I/O board options, and gives procedures for initial and routine administration on a node.
AI Troubleshooting	provides diagnostic information and the procedures needed to isolate and resolve AI-related problems.
AI Commands	provides a detailed reference source for the commands needed to administer, control, and maintain AI modules in a node. Included are explanations of command syntax and parameter options, examples of command input/output, definitions of report fields, and explanations of system responses

In addition, an **Appendix** provides database entry forms to use as guides for entering information on AIs into the node configuration database.

Related Documentation

A publications brochure describes the set of customer documents for the product line; see the inside front cover for ordering information.

Documents required for use with this reference include:

- *Data Networking Products Planning Guide*
- *SMDS Guide*—before working with AI modules, you should be thoroughly familiar with this guide
- *Data Networking Products Messages Reference*
- *BNS-2000 Node Reference*
- *Session Maintenance Guide*—for systems using automatic alternate routing
- *Data Networking Terminology*—lists and defines many technical terms, including those related to SMDS, used in this document.
- the appropriate *StarKeeper* II NMS documentation for the configuration of the Subscriber Network Interface (SNI) and other SMDS administration related to AI modules

Documentation from other vendors may also be necessary for information on SMDS terminal adapters (TAs) and digital transmission facility (DTF) devices.

For additional information on international applications, consult your account representative.

AI Overview

AI Overview

An Access Interface (AI) module provides access to the node for standard IEEE 802.6 Switched Multimegabit Data Service (SMDS) at T1 or T3 transmission speeds, and at Conference of European Postal and Telecommunications Administrations (CEPT) E1 and E3 speeds for international applications. Each AI module communicates via digital transmission facility (DTF) equipment with a compatible terminal adapter (TA) located on the premises of an SMDS subscriber. A TA is a multiprotocol bridge or router that supports the North American ANSI Data Signal 1 and Data Signal 3 (DS1/DS3) or E1 and E3 SMDS interfaces for user network services.

Communication between an AI and a TA takes place across one or more Subscriber Network Interfaces (SNIs)—the path between the node and the subscriber's site—using the Distributed Queue Dual Bus (DQDB) access protocol as the SMDS Interface Protocol (SIP).

Physical Description

These AI modules are available for SMDS functionality:

- Access Interface–E1 (AI-E1 [CMA5])—this single-board module has three ports that provide IEEE 802.6 SMDS access to node services for international applications. Each port on the AI-E1 can function independently.

  The AI-E1 uses a CMC8 input/output (I/O) distribution board with a built-in data service unit (DSU) function; it supports DQDB and the Physical Layer Convergence Procedure (PLCP).

- Access Interface–T1 (AI-T1 [CMA5])—this single-board module has four ports that provide IEEE 802.6 SMDS access to node services. Each port on the AI-T1 can function independently.

  The AI-T1 uses a CMC5B I/O board with a built-in DSU function; it supports DQDB and the PLCP.

- Access Interface–E3 (AI-E3 [CMA11B])—this single-board module has one port that provides IEEE 802.6 SMDS access to node services for international applications.

  The AI-E3 uses a CMC13 I/O board; it supports DQDB and the PLCP.

- Access Interface–T3 (AI-T3 [CMA11B])—this single-board module has one port that provides IEEE 802.6 SMDS access to node services.

  The AI-T3 uses a CMC6/6B I/O board; it supports DQDB and the PLCP.

NOTE: Functionally, the CMC6B I/O board can be used either as a replacement for the CMC6 I/O board for the AI-T3 module or in conjunction with the CMC14 I/O board for the double-board AI-T3P module. The CMC6 board is used for all non-Interexchange Carrier Interface (ICI) or non-T3P applications; the CMC6B can be used for all applications.

- Access Interface–T3P (AI-T3P [2 CMA17s])—this high-performance, double-board module has one port that provides IEEE 802.6 SMDS access to node services. The AI-T3P has one board dedicated to ingress traffic and one board dedicated to egress traffic. This allows the AI-T3P to achieve a level of performance for full duplex (simultaneous ingress and egress) traffic that is comparable to that of the AI-T3 for one direction only.

  The egress board is a CMA17 circuit pack that uses a CMC6B I/O board. The ingress board is a CMA17 circuit pack that uses a CMC14 I/O board. It supports DQDB and the PLCP.

Features

The AI modules offer an array of features for SMDS network service, interconnection to DTF equipment, diagnostic capabilities, and options that are configurable with the **ai** and **trace** command sets. For a description of the **trace** commands, see the *Data Networking Products Commands Reference*.

Transmission Capabilities

The AI-E1 module supports CEPT E1 data signals at 2.048 Mbps.

The AI-T1 module supports the DS1 standard electrical interface at the full DS1 rate of 1.544 Mbps.

The AI-E3 module supports CEPT E3 data signals and can be configured for an access class of 1, 2, 3, or 4.

The AI-T3 module supports the DS3 standard electrical interface and can be configured for an access class 1, 2, 3, 4, or 5.

The AI-T3P module supports the DS3 standard electrical interface and can be configured for an access class 1, 2, 3, 4, or 5.

Access Class

For DS3 SMDS access, five access classes are defined: access classes 1, 2, 3, 4, and 5, corresponding to the Sustained Information Rate (SIR) of 4, 10, 16, 25, and 34 Mbps, respectively (see Table 1-1). For E3 SMDS access, only access classes 1, 2, 3, and 4 are applicable.

The SMDS access class mechanism, as defined by the Bellcore standards, is intended to prescribe *limits* on the rate of sustained information transfer from the Customer Premises Equipment (CPE)

to the network, and on the burstiness of the information transfer from the CPE to the network. Therefore, from a service provider's perspective, access class is defined for traffic in the ingress direction into the service provider's network. It is not applicable to egress traffic from the network to the CPE.

As defined in the Bellcore standards, access class is designed to be a protection mechanism for the service provider's network. It is *not* intended to be (nor should it be used as) a guarantee of the end-user's throughput. Actual end-to-end throughput for the user is dependent on a variety of factors, including the size of the user messages (in other words, the size of the L3_PDUs), the specific data traffic pattern, the number of nodes and trunks in the network, and the load of the other system resources (for example, trunks) in the network at the time.

Access class for an end-user is determined at subscription time. An end-user can subscribe to a particular access class based on the specific application needs.

TABLE 1-1. Access Class and Sustained Information Rate (SIR)

Access Class Identifier	Sustained Information Rate (Mbps)
1	4
2	10
3	16
4	25
5	34

Both the AI-T3 and AI-T3P modules can be configured for access class 1, 2, 3, 4, or 5. As stated earlier, the actual performance of the module varies depending on, among other factors, the size of the message and the specific mix of the ingress and egress traffic data.

The AI-T3 module is a single-board module which provides DS3 SMDS access. For very large messages with only ingress traffic (for which access is defined), the AI-T3 module can support access class 5 performance.

The AI-T3P module is a high performance, two-board set DS3 SMDS access interface module, with one board dedicated to the handling of ingress traffic and the other board dedicated to the handling of egress traffic. This allows the AI-T3P module to support access class 5 performance even when handling heavy traffic in both the ingress and egress directions simultaneously.

Connectionless Routing

An AI module broadcasts connectionless data segments, equivalent to 53-octet Level 2 Protocol Data Units (L2-PDUs), on the backplane bus of the Series M2 shelves. These data segments are read and routed to other AI modules, which may not be located in the same node, for transmission across SNIs to and from designated sources and destinations.

Connectionless Trace

All AI modules support the connectionless trace feature for tracing a path from the source SNI to the destination SNI for Exchange SMDS. A trace is set for a specific source and destination address pair. This initiates a trace on the AI module associated with the source address. Upon receipt of a *trace* packet, all modules along the path from the source SNI to the destination SNI generate a trace alarm. The path traversed by the *trace* packet can then be derived by looking at the collection of alarms generated by the modules. The trace packet is a customer L3_PDU that is specially marked to be a trace packet by the AI module at ingress, and unmarked by the AI module at egress.

For more details about the connectionless trace feature, refer to the *SMDS Guide*.

Exchange SMDS Billing

In the BNS-2000 switching system architecture, AI modules generate SMDs billing records at the egress SNI for each source and destination pair. In turn, AI modules send usage billing records directly to the Billdats Network Server. They also send audit billing records for each egress SNI to the node controller which, in turn, sends them to the Billdats Network Server.

For more details about SMDS billing, refer to the *SMDS Guide*.

E.164 Addressing for Connectionless Network Services (CLNS)

Each SNI per AI module can be assigned up to 32 E.164 addresses. The BNS-microSwitch, which provides low-speed SMDS access to BNS-2000 nodes, allows multiple SNIs to be connected to a port in an AI module. To support the BNS-microSwitch, an AI module provides support for a maximum of 32 E.164 addresses per SNI.

Address Screening by Source and Destination

For each SNI, individual and group address database tables can be set up by customers to prevent certain subscriber equipment from sending data to certain specified addresses or receiving data from certain specified addresses.

Pre-selected Interexchange Carrier (IC)

To support Exchange Access SMDS (XA-SMDS) and interexchange SMDS service, AI modules also mark PDUs entering the network with the subscriber’s preferred IC and identifies "official" (private interLATA trunk) versus public traffic. AI modules add InterCarrier Interface Protocol (ICIP) encapsulation at ingress and strip it at egress. The ICIP is used in the interface between a Local Exchange Carrier (LEC) and an IC, and the interface between an LEC and an Independent Local Exchange Carrier (ILEC). Individually addressed PDUs are encapsulated if they are destined for an endpoint outside the source network; all group addressed PDUs are encapsulated.

For more details, refer to the *SMDS Guide*.

Multiple Data Unit Transfer

Multiple data units in transit—SMDS data units are transferred across the SNI in slots of fixed length. The SIP allows slots from different data units to be intermingled during transmission across the SNI. Maximum Concurrent Data Unit (MCDU) values per SNI of 1, 16, or 32 are supported.

Transmit Reference Clock

The AI-T1 can be configured to obtain clock synchronization from the facility (data link) or from a Stratum 4 Clock module in the node.

The AI-E1 can obtain its clock synchronization from the facility or from its local clock.

The Stratum 4 Clock provides synchronization for the AI-T1 modules in a node, and can derive its signal from

- a central office (CO) clock (T1/E1 or a 64 Kbps composite clock), or
- the node backplane from the T1 facility via port 1 on an AI-T1 module (8 kHz).

If a port is configured for Stratum 4 Clock timing, it will derive its transmit clock from the Stratum 4 Clock module provided the Stratum 4 module is present, has a Primary Reference Source, and is functioning properly. If a port is configured for Stratum 4 Clock timing and the Stratum 4 Clock module is present but not driving a clock onto the backplane, an onboard oscillator will provide the transmit clock. There is no way to force the use of the onboard oscillator while the Stratum 4 Clock module is present and functioning. This standalone configuration is not recommended since a DS1 network is synchronous; all clocking should be derived from a Primary Reference Source.

If the Stratum 4 Clock is to derive its signal from the backplane, one AI-T1 or FRM-M2 module is needed as the Primary Reference Source (PRS) and/or one as the Secondary Reference Source (SRS). Port 1 of the module(s) designated PRS and/or SRS must be configured as *facility* timing to introduce the synchronization signal to the node backplane. The remaining ports on the module can be configured as either *facility* or *stratum*.

If a port is configured for facility timing, the transmit clock is derived from the recovered clock of that port. If there is a loss of the recovered clock on that port, the transmit clock will be derived from the Stratum 4 Clock module or the onboard oscillator as stated above.

If the reference source that is used to synchronize the timing of transmit and receive data signals across the network is not used (or fails), all ports configured for Stratum 4 Clock timing will maintain accuracy at 1.544 MHz, +/- 32 parts per million.

Refer to the *SMDS Guide* for an explanation of Lucent Technologies Data Communications Network Synchronization and the reference sources for timing.

Source Address Validation

Source address validation checks the source address of the individually addressed PDU (data unit) against the E.164 addresses assigned to the source SNI supported by the AI module in the source network. This feature, which applies to both Exchange SMDS and originating XA-SMDS, prevents the use of fraudulent source addresses.

Individually Addressed Data Unit Transport

This feature applies to both interexchange SMDS and XA-SMDS. On an originating basis, the LEC transmits individually addressed data units from a sender's SNI, supported by an AI module, to an Interexchange Carrier Interface (ICI) of the sender's preferred IC. On a terminating basis, the LEC transmits individually addressed data units from an ICI to the destination SNI.

Source address screening is applied to messages from a remote destination leaving the network (egress), before they are transmitted to the CPE attached to an SNI. Source address screening is also applied to terminating XA-SMDS PDUs.

When an AI module receives a message to send out on a link to the CPE, it looks up the source address (the address of the sender) in its screening table. A source address is always an individual address (never a group address), so the module always uses the individual address screening table for the SNI.

Destination address screening applies to messages entering the network (ingress), before they are accepted from the CPE attached to an SNI and sent to a remote destination. Destination address screening also applies to originating XA-SMDS PDUs.

When an AI module receives a message from the CPE, it looks up the destination address in the appropriate screening table. If the destination address is an individual address, it uses the individual address screening table for that SNI.

For more details about individual addressed data unit transport, refer to the *SMDS Guide*.

Group Addressed Data Unit Transport

This feature applies to both interexchange SMDS and XA-SMDS. Group addressed data unit transport in SMDS allows the source to send a PDU to multiple destinations without explicitly identifying the individual addresses of all the recipients. Members of a group can be in different LATAs served by different networks. If a member of a group address is itself a group address, it is referred to as a nested group address (NGA). The NGA is, in turn, resolved into individual member addresses. A Group Address Agent (GAA) is required in order to support group addressed data unit transport.

If the destination address is a group address, an AI module uses the group address screening table for the SNI.

The group address screening table indicates which group addresses can receive data from the endpoints in an SNI.

For more details about group addressed data unit transport, refer to the *SMDS Guide*.

Interconnection Capabilities

The AI-E1/AI-T1 and the AI-E3/AI-T3/AI-T3P modules, located in a node in a CO, interoperate with a variety of DTF equipment.

For AI-E1 and AI-E3 module interconnection information, consult your account representative.

AI-T1 module to DTF connections include:

- Digital Signal Cross-Connect, Level 1 (DSX-1)
- channel service unit/data service unit (CSU/DSU)
- CSU/DSU connected to a DSX-1
- Lucent Technologies DDM-1000 digital multiplexer
- Lucent Technologies Digital Access Cross-Connect System (DACS)

AI-T3/T3P module to DTF connections include:

- Data Signal Cross-Connect, Level 3 (DSX-3) patch panel
- channel service unit/data service unit (CSU/DSU)
- CSU/DSU connected to a DSX-3
- Lucent Technologies DDM-1000 digital multiplexer
- Lucent Technologies Digital Access Cross-Connect System (DACS)
- Lucent Technologies DDM-2000 digital multiplexer

Via DTF equipment, AI modules connect to TAs, which are viewed as concentration devices and provide bridging and routing services for Ethernet, Fiber Distributed Data Interface (FDDI), Token Ring (TR), and other IEEE 802-based local area networks (LANs).

Diagnostic Capabilities

AI module diagnostic software isolates and segments problems that occur in SMDS transmission. Module diagnostics include boot-up sanity, component, and subsystem tests. Loopback diagnostics test the data path for an AI-T1 port or AI-T3/T3P module (local loopback, remote loopback, and payload loopback); and for an AI-E1 port or AI-E3 module (local loopback and remote loopback).

In addition, alarms indicate the existence of problems, and *StarKeeper*® II NMS offers extensive network monitoring and fault isolation analysis.

Configurable Options

The following parameter options can be configured in the database with the **enter ai** commands.

- module type
- access class identifier (ID)— for the AI-E3/AI-T3/AI-T3P
- download server/software version for AI-T1/E1/T3/E3 single-board modules
- ingress and egress download server/software version for the AI-T3P double-board module
- primary and secondary Billdats Network Server machine for SMDS billing data
- collection of measurements data by *StarKeeper* II NMS for a specified AI module
- threshold profile identifier (ID)
- distance range to DTF equipment from an AI-T1 port (0–655 feet)
- selection of the source of transmit clocking
  - for an AI-T1 from the node to a TA (facility clock or a Stratum 4 clock) and
  - for an AI-E1 from the node to a TA (facility or local clock)

Refer to the *SMDS Guide* for an explanation of AI module clocking options; it is important to prevent inadvertent use of either the 2.048 MHz CEPT option or no clock for the AI-T1. For details on other SMDS-related options, such as configuring the SNIs for AI ports, refer to the *SMDS Guide* and the *StarKeeper II NMS Network Builder Guide.*

AI Installation

AI Installation

Installing the Access Interface (AI) modules in Series M2 node shelves requires taking a few precautions and performing simple procedures:

1. Ensure protection from electrostatic discharge (ESD); see inside front cover. Wear an ESD wrist strap to prevent module damage; see the *Node Reference* for grounding locations and other details
2. Verify that the I/O board(s) to be installed for the AI module is the correct type; refer to the section on I/O Boards:
   - The AI-E1 uses a CMC8 I/O board with six BNC micro-coaxial cable connectors, two (transmit and receive) for each E1 SNI, and three 9-pin D-type connectors, one for each E1 SNI. The connectors used depend on the type of cable: 75 ohm (Ω) coaxial cable or 120 twisted pair (see the table listing the jumper and pin positions).
   - The AI-T1 uses a CMC5B I/O board with four 15-pin D-type (DA15S) connectors, one for each T1 SNI.
   - The AI-E3 uses a CMC13 I/O board with two micro-coaxial cable connectors, one for transmit and one for receive.
   - The AI-T3 uses a CMC6/6B I/O board with two BNC coaxial cable connectors, one for transmit and one for receive.
   - The AI-T3P uses two I/O boards (CMC6B and CMC14) which are plugged into the backplane of adjacent slots at the rear of the Series M2 shelf. The CMC6B board uses two BNC coaxial cable connectors, one for transmit (egress) and one for receive (ingress). Both boards have a 26-pin dual in-line header connector for the ribbon cable that connects the two boards.
3. Ensure that the slot in a Series M2 shelf intended for the module is not being used by another module; refer to the *Planning Guide* and the *Node Reference* for placement of modules in the node:
4. Where appropriate, ensure that all the jumpers are in position on the I/O boards.
5. Insert the correct I/O board; see the section that follows.
6. If the I/O boards for the AI-T3P module have been inserted, attach the ribbon cable to connect the two boards.
7. Check to ensure that the 9 jumpers are installed on the AI module (CMA5 or CMA11B).
8. Insert the AI module; see the section that follows.
9. Cable the I/O board ports to support external devices; see **AI Cabling** for port connections.

The following sections give directions for inserting an I/O board and an AI module and for removing the module and its I/O board from a node shelf.

I/O Boards

The AI-E1 I/O board has 21 jumpers that are factory-installed and require no adjustment. See the table listing the jumper positions and functions.

The AI-T1 I/O board has 8 jumpers that are factory-installed and require no adjustment.

The AI-E3 I/O board has 8 jumpers that are factory installed and require no adjustment. See the table listing the jumper positions and functions.

The AI-T3 I/O board jumpers are factory-installed and require no adjustment. See the table listing the jumper and pin positions.

The AI-T3P CMC6B I/O board has only one jumper position and it is not installed. See the table showing the jumper position. The CMC14 I/O board does not have any jumper positions.

For further details on the AI-E1/AI-E3, consult your account representative.

AI-E1 (CMA5) CMC8 I/O Board

The AI-E1 module uses a CMC8 I/O board. Jumper 1 is not installed and jumpers 2 through 16 are installed. Figure 2-1 indicates the location of pin 1 and the position of the jumpers on the board.

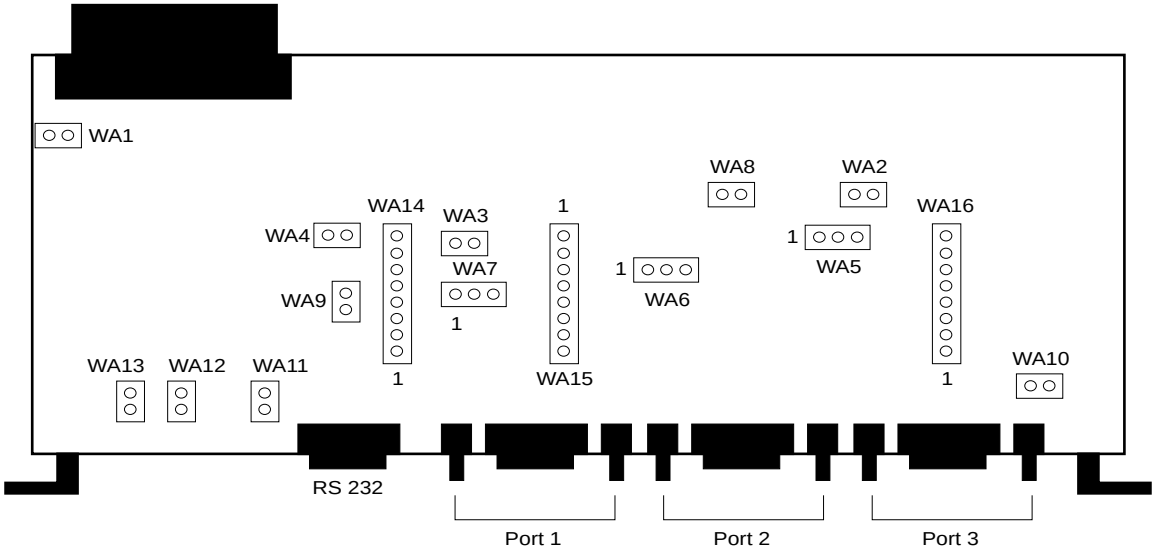

FIGURE 2-1. Jumper Positions on CMC8 I/O Board

TABLE 2-1. Jumper Positions and Functions for CMC8 I/O Board

Jumper	Function	Factory Setting 75 ohm (Ω)	Factory Setting 120 ohm (Ω)
WA1	Pull-up PERENA	OP	OP
WA2	Test 3-2	CL	CL
WA3	Test 3-1	CL	CL
WA4	TSD1 (NRZ TBUS)	CL	CL
WA5	RX-2 75 (Ω	Pos. 1–2 CL	Pos. 2–3 CL
WA6	RX-1 75 Ω	Pos. 1–2 CL	Pos. 2–3 CL
WA7	RX-0 75 Ω	Pos. 1–2 CL	Pos. 2–3 CL
WA8	TSD2 (NRZ TBUS)	CL	CL
WA9	CK-1 16 MHz	CL	CL
WA10	CK-2 16 MHz	CL	CL
WA11	CK-0 16 MHz	CL	CL
WA12	TSD0 (NRZ TBUS)	CL	CL
WA13	Test 3-0	CL	CL
WA14	TX-0 75 Ω	Pos. 1–2 CL Pos. 3–4 CL Pos. 5–6 CL	Pos. 2–3 CL Pos. 4–5 CL Pos. 6–7 CL
WA15	TX-1 75 Ω	Pos. 1–2 CL Pos. 3–4 CL Pos. 5–6 CL	Pos. 2–3 CL Pos. 4–5 CL Pos. 5–8 CL
WA16	TX-2 75 Ω	Pos. 1–2 CL Pos. 3–4 CL Pos. 5–6 CL	Pos. 2–3 CL Pos. 4–5 CL Pos. 6–7 CL

OP = open; CL = closed; Pos. = position

AI-T1 (CMA5) CMC5B I/O Board

The AI-T1 module uses a CMC5B I/O board. Jumper 1 is not installed and jumpers 2 through 9 are installed. Figure 2-2 indicates the location of pin 1 (black square) and the position of the jumpers on the board.

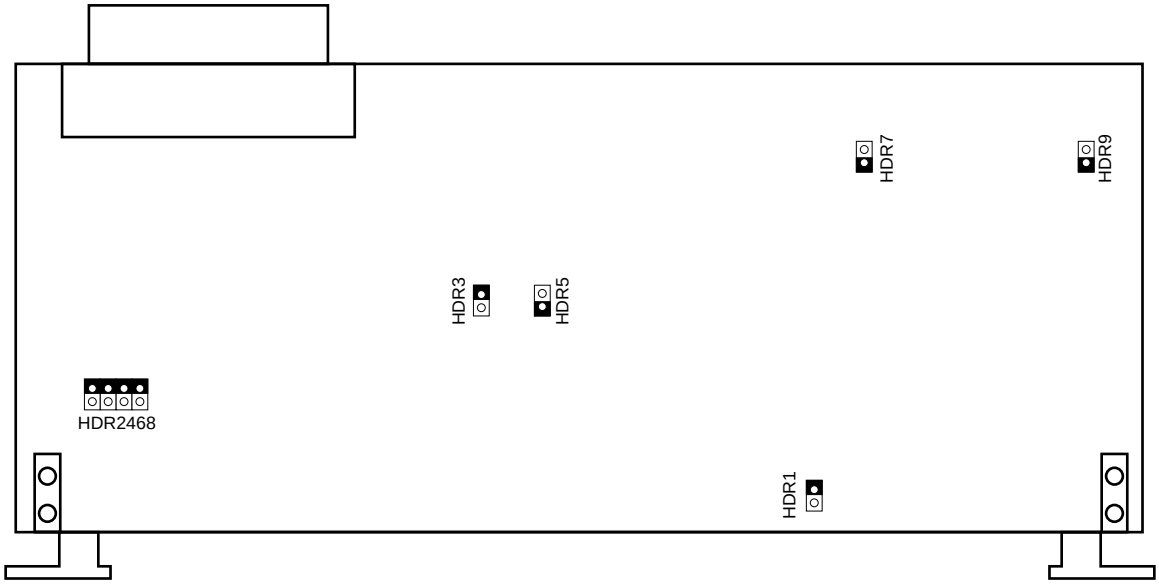

FIGURE 2-2. Jumper Positions on CMC5B I/O Board

TABLE 2-2. Jumper and Pin Positions for CMC5B I/O Board

Position	Jumper	Comment
HDR1	Pins 1 and 2	Not installed
HDR2	Pins 1 and 2	Installed
HDR3	Pins 1 and 2	Installed
HDR4	Pins 1 and 2	Installed
HDR5	Pins 1 and 2	Installed
HDR6	Pins 1 and 2	Installed
HDR7	Pins 1 and 2	Installed
HDR8	Pins 1 and 2	Installed
HDR9	Pins 1 and 2	Installed

AI-E3 (CMA11B) CMC13 I/O Board

The AI-E3 module uses a CMC13 I/O board. Figure 2-3 indicates the location of pin 1 and the position of the jumpers on the board.

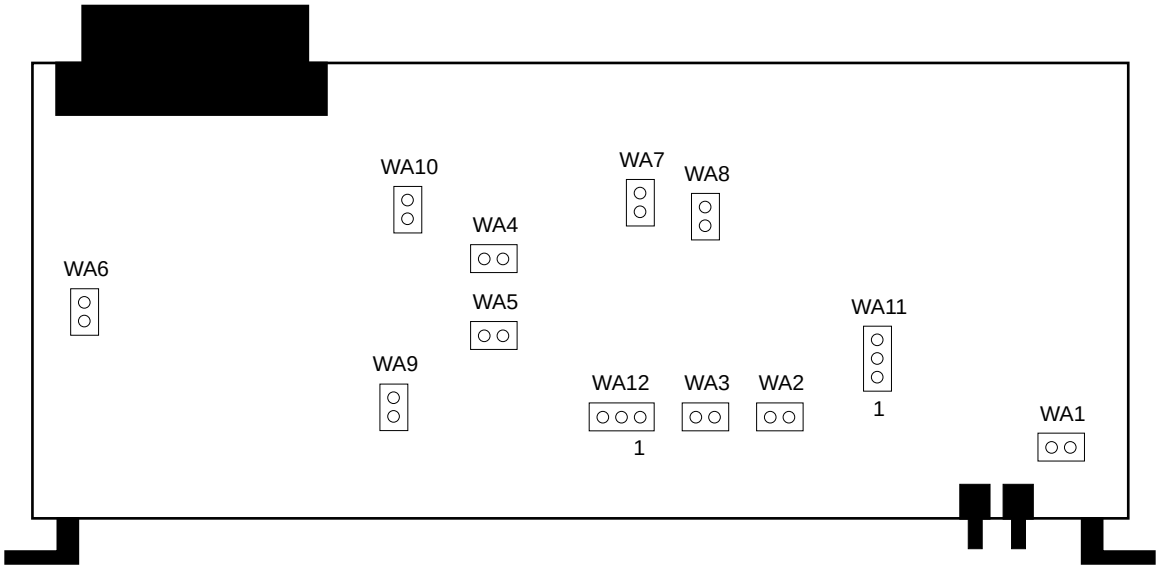

FIGURE 2-3. Jumper Positions on CMC13 I/O Board

TABLE 2-3. Jumper Positions and Functions for CMC13 I/O Board

Jumper	Function	Factory Setting
WA1	FILTRO RX	OP
WA2	BITAL 14	OP
WA3	BITAL 13	OP
WA4	BITAL 16	CL
WA5	BUTAL 15	CL
WA6	Pull-up PERENA	OP
WA7	INIT (Egress)	CL
WA8	TREAD	CL
WA9	INIT (Ingress)	CL
WA10	INIT (OV)	CL
WA11	RLOOP	Pos. 2–3 CL
WA12	LLOOP	Pos. 2–3 CL

OP = open; CL = closed; Pos. = position

AI-T3 (CMA11B) CMC6 I/O Board

The AI-T3 module uses a CMC6 I/O board. Figure 2-4 indicates the location of pin 1 (black square) and the position of the jumpers on the board.

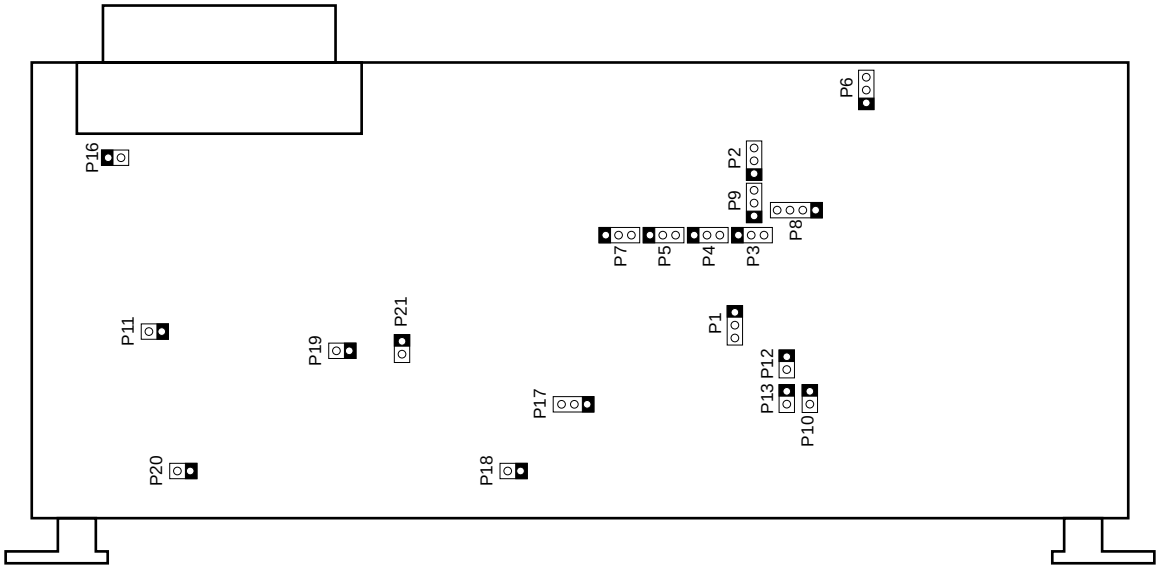

FIGURE 2-4. Jumper Positions on CMC6 I/O Board

TABLE 2-4. Jumper and Pin Positions for CMC6 I/O Board

Position	Jumper	Comment	Position	Jumper	Comment
P1	Pins 1 and 2	Remains installed	P11	Pins 1 and 2	Remains installed
P2	Pins 1 and 2	Remains installed	P12	No jumper	Not installed
P3	Pins 1 and 2	Remains installed	P13	No jumper	Not installed
P4	Pins 1 and 2	Remains installed	P16	No jumper	Remains uninstalled
P5	Pins 1 and 2	Remains installed	P17	Pins 1 and 2	Remains installed
P6	Pins 1 and 2	Remains installed	P18	Pins 1 and 2	Remains installed
P7	Pins 1 and 2	Remains installed	P19	Pins 1 and 2	Remains installed
P8	Pins 2 and 3	Remains installed	P20	Pins 1 and 2	Remains installed
P9	Pins 1 and 2	Remains installed	P21	Pins 1 and 2	Remains installed
P10	No jumper	Not installed			

AI-T3P (CMA17) CMC6B I/O Board

The egress board uses a CMC6B I/O board. Figure 2-5 indicates the sole jumper position on the board.

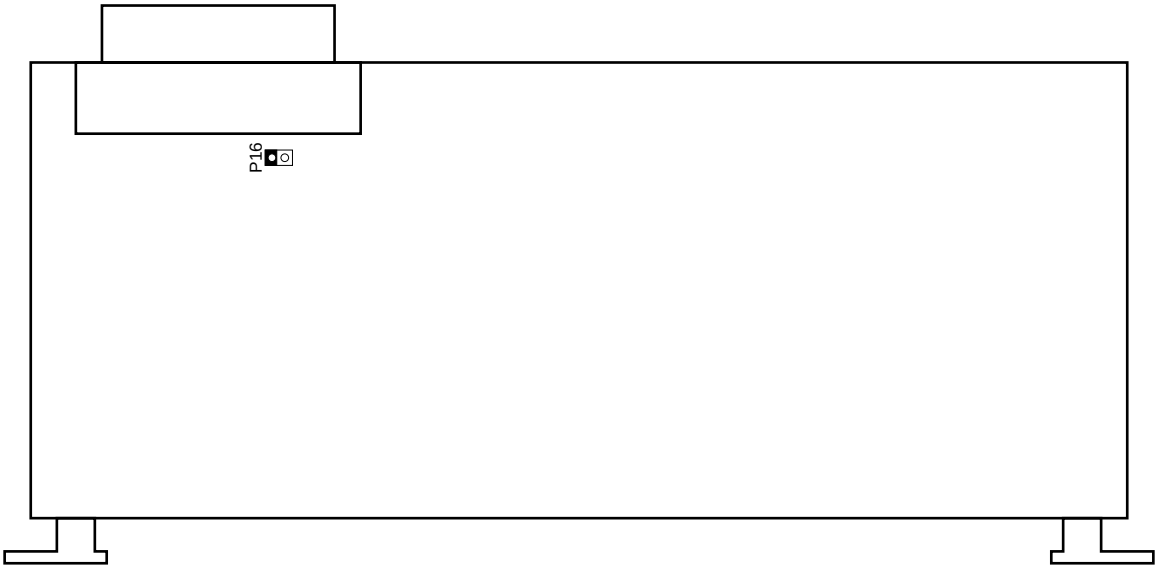

FIGURE 2-5. Jumper Position on CMC6B I/O Board

TABLE 2-5. Jumper and Pin Positions for CMC6B I/O Board

Position	Jumper	Comment
P16	No jumper	Remains uninstalled

AI-T3P (CMA17) CMC14 I/O Board

The ingress board uses a CMC14 I/O board. Figure 2-6 shows an example. There are no jumpers for this board.

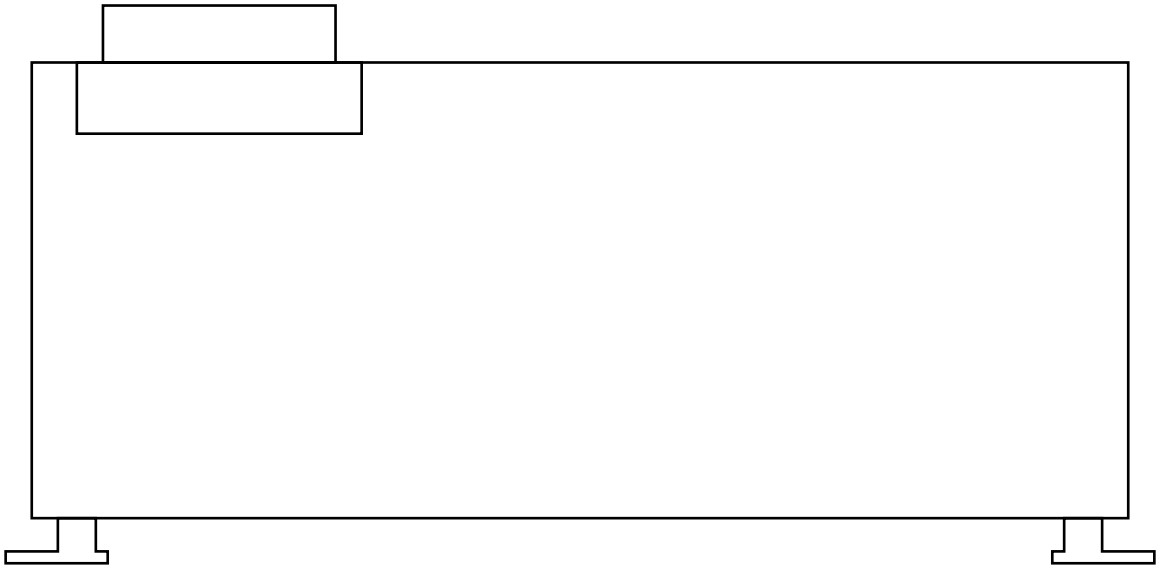

FIGURE 2-6. Sample CMC14 I/O Board

Inserting and Removing an I/O Board

The I/O board plugs into the backplane at the rear of the Series M2 shelf.

Remove the I/O board **only** for relocation or replacement.

PROCEDURE 2-1. Inserting an I/O Board

1. Check the slots intended for the I/O board and its module.

   WARNING: A mismatch between the I/O board and module may cause damage.

2. Slide the I/O board into the intended slot on the backplane, aligning the screw slots with the screw holes.
3. Slip the backplane connector onto the pins.

   The board should seat easily. If seating is difficult, the board may be canted or some pins may be bent.
4. Insert the screws, and tighten them securely.

PROCEDURE 2-2. Removing an I/O Board

1. Disconnect all cabling to I/O board ports, labeling the cable ends if appropriate.
2. Remove the screws holding the I/O board in place.
3. Rock the board gently as you pull it out.

Inserting and Removing an AI Module

An AI module is inserted into a horizontal slot at the front of a Series M2 shelf after its corresponding I/O board is inserted in the backplane at the rear of the shelf. You can remove and replace an AI module in an operating node without damaging the module. Transmission on the AI module being removed is disrupted, but will not be disrupted on other modules.

If it is an AI-T3P module, the two boards must be placed into two consecutive slots in the same shelf. The ingress board must be inserted into the next higher slot. For administration purposes, the module address of an AI-T3P module is the address of the egress board. Neither board can be administered in a reserved slot. Slots 12, 28, 44, and 60 cannot be used for two-board modules. Refer to the *Node Reference* for further details about the BNS-2000 node and Series M2 shelf slot numbering schemes.

PROCEDURE 2-3. Inserting an AI Module

1. Ensure that the I/O board installed is the correct type.

   WARNING: A mismatch between the I/O board and module may cause damage.

2. Set the mode switch on the module faceplate to Disab.
3. With the module latch(es) extended, carefully push the module all the way into the slot. The backplane pins slip into the module receptacle.
4. Close the latch to lock the module into position.
5. Move the mode switch on the module faceplate to Enabl.

PROCEDURE 2-4. Removing an AI Module

1. If the module mode switch is in the Enabl position, move it to Disab.
2. Open the latch(es) on the module faceplate.
3. Pull the module straight out of the slot.

AI Cabling

AI Cabling

This chapter gives cabling information for the AI-E1, AI-T1, AI-E3, AI-T3, and AI-T3P modules.

Each cabling configuration represents the required connections between an AI module and digital transmission facility (DTF) equipment.

Cabling From AI-E1 to DTF

The cabling configuration for the AI-E1 module to the digital transmission facility (DTF) uses the following:

- an AI-E1 module, consisting of a CMA5 circuit pack and a CMC8 I/O distribution board
- cabling that originates on the 9-pin or micro-BNC connectors of the AI-E1 I/O board and is connected via a distribution frame or directly to the network.

  The CMC8 I/O board has 3 E1 ports. Port 1 is at the left of the board when looking at it inserted in the backplane and port 3 is at the right. The relation between port numbers, connector designations, and LED labels (LED labels are on the faceplate of the CMA5) are as follows:

Port Number	Connector	LED
Port 1	J3	L1
Port 2	J4	L2
Port 3	J5	L3

TABLE 3-1. AI-E1 Ordering Information

Cable or Adapter	Description	ED-5P055-31 Group Number
AI-E1 75 Ω	1.0/2.3 LEMO SAA	N11211-S35-B20
AI-E1 120 Ω	CANNON DB9	—

Cabling From AI-T1 to DTF

The cabling configuration for the AI-T1 module to the DTF uses the following:

- an AI-T1 module, consisting of a CMA5 circuit pack and a CMC5B I/O distribution board
- cabling that originates on the 15-pin connectors of the CMC5B I/O board and is connected via a distribution frame or directly to the network.

  The CMC5B I/O board has 4 T1 ports. Port 1 is at the left of the board when looking at it inserted in the backplane and port 4 is at the right. The relation between port numbers, connector designations, and LED labels (LED labels are on the faceplate of the CMA5) are as follows:

Port Number	Connector	LED
Port 1	J2	L1
Port 2	J3	L2
Port 3	J4	L3
Port 4	J5	L4

TABLE 3-2. AI-T1 Ordering Information

Cable or Adapter	Description	ED-5P055-31 Group Number
AI-T1/4	4 × 15-pin M Butt	G238
AU1.5-CSU	15-pin M 15-pin M	G227,G(AN)
AU1.5-PD	15-pin M Butt	G230,G(AN)

Cabling From AI-E3 to DTF

The cabling configuration for the AI-E3 module to the digital transmission facility (DTF) uses the following:

- an AI-E3 module, consisting of a CMA11B circuit pack and a CMC13 I/O distribution board
- cabling that originates on the J2 (receive) and J3 (transmit) connectors of the CMC13 I/O board and is connected via a distribution frame or directly to the network.

TABLE 3-3. AI-E3 Ordering Information

Cable or Adapter	Description	ED-5P055-31 Group Number
AI-E3	1.0/2.3 LEMO SAA	N11221-S35-B20

Cabling From AI-T3 to DTF

The cabling configuration for the AI-T3 module to the digital transmission facility (DTF) uses the following:

- an AI-T3 module, consisting of a CMA11B circuit pack and a CMC6/6B I/O distribution board
- routing equipment used for transmission via private line to the terminating device
- cabling that originates on the J2 (transmit) and J3 (receive) connectors of the CMC6/6B I/O board and is connected to the DTF with a pair of 728B coaxial cables.

TABLE 3-4. AI-T3 Ordering Information

Cable or Adapter	Description	ED5P055-31 Group Number
728B	Coaxial Cable	G(233), G(AV)

Cabling From AI-T3P to DTF

The cabling configuration for the AI-T3P module to the digital transmission facility (DTF) uses the following:

- an AI-T3P module, consisting of a CMA17 circuit pack with a CMC6B I/O board for egress traffic and a CMA17 circuit pack with a CMC14 I/O board for ingress traffic. The CMC6B has a ribbon cable connected to the CMC14 in an adjacent slot for bussing the ingress data path. The ingress data path on the CMC6B is logically connected to both CMA17 circuit packs on the AI-T3P through the backplane connector (for the egress circuit pack) and a ribbon connector (for the ingress circuit pack).
- routing equipment used for SMDS data transmission to the subscriber's LAN at DS3 rates.
- cabling that originates on the J2 (transmit) and J3 (receive) connectors of the CMC6B I/O board and is connected to the DTF with a pair of 728B coaxial cables.

TABLE 3-5. AI-T3P Ordering Information

Cable or Adapter	Description	ED5P055-31 Group Number
728B	Coaxial Cable	G(258), G(AV)
728B-90	Coaxial Cable	G(261), G(AV)

AI Administration

AI Administration

Administration of AI modules takes place on *StarKeeper* II NMS or can be done at node level. Before an AI-E1/AI-T1 port or an AI-E3/AI-T3/AI-T3P module can be placed in service, certain steps of SMDS configuration must be done, including configuration of the Subscriber Network Interface (SNI). Every AI port is an SNI.

StarKeeper II NMS Administration

AI modules are administered via *StarKeeper* II NMS, using the system's cut-through mode. AI commands are entered and executed almost as they would be entered and executed on the direct console connection. *StarKeeper* II NMS does not allow all the same abbreviations that are available on node software. Refer to *StarKeeper* II NMS documentation for information on accessing the cut-through mode for your node.

To administer an SNI for the AI modules, refer to the appropriate *StarKeeper* documentation.

Command Set

AI information is added to the database and, thereafter, manipulated and checked with the **enter ai**, **change ai**, **delete ai**, and **verify ai** commands. These commands are used frequently during initial and routine administration.

The **enter** and **change** commands have a parameter prompting sequence in which configurable options are specified in the database. Once specified, these options can be checked with the **verify** command and removed with the **delete** command. Before deleting an AI module or port information, however, information in the database on the SNI must be deleted.

The **restore ai** and **remove ai** commands control the service state of the module and its ports; these commands, which affect hardware performance and data transmission, are often used with administration and maintenance procedures. The **remove** and **restore** commands can be used with **verify oosmods**, which lists all out-of-service modules, and with **verify oosports**, which lists all out-of-service ports.

The **diagnose ai** command is used for module and port maintenance and troubleshooting, along with other maintenance and status-related commands such as **dstat ai**.

The **dmeas ai** is used to display measurements of an AI port.

If **`ENABLE MODULE MEASUREMENTS:`** is specified *yes*, additional measurements can be collected by *StarKeeper* II NMS.

Information on related command objects, such as **threshold**, can be found in the *Data Networking Products Commands Reference*.

TABLE 4-1. AI Command Set

Administration	Operation	Maintenance	Related Objects	
change ai	**dmeas ai**	**diagnose ai**	**address**	**oosports**
delete ai	**dstat ai**		**connections**	**schedule**
enter ai	**remove ai**		**module**	**traffic**
verify ai	**restore ai**		**oosmods**	
			threshold	
			trace	

Parameter Considerations

Some parameters require special consideration because of hardware configuration or SMDS configuration. These parameters are explained in this section. Certain parameter specifications made during an iteration of **enter ai** or **change ai** have no effect on other parameters or database elements entered, or on the general performance of the node or network.

The Syntax section of **enter ai** in the **AI Commands** chapter and the database entry forms in the **Appendix** give the correct prompting sequence. In addition, the parameter definitions provided in **enter ai** supplement the following sections.

Threshold Profile ID

Threshold profiles tune the limits of the physical layer performance parameters that are used to monitor the data transport error rate from the ports of an AI-E1/AI-T1 module or from the AI-E3/AI-T3/AI-T3P module. In effect, threshold profiles for AIs regulate when and how an error violation on the AI port side (near end) should be reported.

If a threshold profile identifier (ID) will be used with an AI module, it must be configured with the **enter threshold** command *before* administering an AI module; otherwise, select the default when prompted for the threshold profile ID. The **verify threshold** command can be used to display the contents of the default or each defined threshold profile. Refer to the *Data Networking Products Commands Reference* for more information on threshold profile commands.

Download Server/Software Version

Each board of an AI module is a separate downloadable module. The **DOWNLOAD SERVER** parameter allows the user to specify the source of the downloadable software to be the *controller* or a valid service address for a download server. For single-board modules (AI-E1, AI-E3, AI-T1), if the **DOWNLOAD SERVER** is the *controller*, the **SOFTWARE VERSION** is *standard*, by default. If the **DOWNLOAD SERVER** is other than *controller*, the **SOFTWARE VERSION** parameter is used to specify the filename of the executable software to be downloaded to the module.

If it is an AI-T3P, software can be downloaded to the egress and ingress boards independently. The **DOWNLOAD SERVER** must be specified as *controller* or a warning message is issued. The **SOFTWARE VERSION** is *standard*, by default. If *special* is entered, the system prompts for the **EGRESS DOWNLOAD SERVER** and **EGRESS SOFTWARE VERSION**, which specify the server address and filename of the executable software to be downloaded to the egress board, and the **INGRESS DOWNLOAD SERVER** and **INGRESS SOFTWARE VERSION**, which specify the server address and filename of the executable software to be downloaded to the ingress board.

For additional details, refer to the **enter ai** command in Chapter 6, **AI Commands**.

SMDS Billing Destination 1, 2

The SMDS billing feature requires usage data to be collected and formatted over a user-defined aggregation interval. The Billdats Network Server performs aggregation of SMDS usage data by collecting 15 minute aggregation files from each AI module and merging all records with identical source/destination addresses during the user-defined aggregation interval. The Billdats Network Server provides fault-tolerance and redundant processing capabilities by utilizing duplexed computers each having an independent interface to the BNS-2000 node. The duplexed computers function in an active/standby mode where the standby machine (server) is ready to take on the full billing function should the active machine indicate a fault. The active and standby machines exchange status messages over two independent communications channels. In the event of a complete failure of the active machine, the standby machine detects both communications channels as being out-of-service and assumes the active state.

The address of the SMDS Billing Destination 1 (active/primary machine) and SMDS Billing Destination 2 (standby/secondary machine) is given as a 1-72 character address in the form:

[[[<network>/]<area>/]<exchange>/]<local>[.<module/concentrator>.<channel>]

When executing the **change ai** command, a destination with a valid host address cannot be changed to *none* if at least one SNI associated with the AI module has the SMDS billing option turned on.

When administering an AI module, if the SMDS Billing Destination 1 is entered as *none*, SMDS Billing Destination 2 defaults to *none*.

Transmit Reference Clock

If the Stratum 4 Clock is to derive its timing signal from the backplane, then the two AI-T1 or FRM-M2 modules that are to be specified as the Primary Reference Source (PRS) and/or Secondary Reference Source (SRS) should be administered *first* with the **enter ai** command. The primary or secondary reference source applies to the AI-T1 port 1 only.

Further details about configuring the AI-T1 clocking options are provided in the **AI Overview**.

Of the four ports available on the AI-T1 or FRM-M2, port 1 should be configured for *facility* timing; then ports 2, 3, and 4 can be configured for either the *stratum* or *facility*.

After putting the two AI-T1 ports into service, the Stratum 4 Clock can be administered; see the *Node Reference* for the procedure.

Access Class ID

The **`Access Class`** parameter allows the user to specify the prescribed limit on the sustained information rate (SIR) for SMDS traffic (L3_PDUs) from the CPE to the network, and on the burstiness of the information transfer from the CPE to the network. Therefore, from a service provider's perspective, access class is defined for traffic in the ingress direction into the service provider's network. It is not applicable to egress traffic from the network to the CPE. The actual performance of the module varies depending on, among other factors, the size of the message and the specific mix of the ingress and egress traffic. An AI-E3 module can be administered for access classes 1 (4 Mbps), 2 (10 Mbps), 3 (16 Mbps), or 4 (25 Mbps). An AI-T3 or AI-T3P module can be administered for access classes 1 (4 Mbps), 2 (10 Mbps), 3 (16 Mbps), 4 (25 Mbps), or 5 (34 Mbps). The AI-T3 module can support Class 5 (34 Mbps) performance. A compatible IEEE 802.6 TA is required on the customer's premises. The AI-T3P module can support access class 5 performance even when handling heavy traffic in both the ingress and egress directions simultaneously (full duplex).

Although data is transferred at the full E3/T3 rate, SMDS supports ingress to the node only at the rate to which the user subscribes.

Administrative Procedures

Once the database design forms are completed by the network planners and all appropriate information is entered, you can complete the database entry forms provided in the **Appendix** and begin AI administration.

The initial administration of an AI in the database is not hardware-dependent. This means that an AI does not have to be physically installed before its database information is configured. For routine administration and operations procedures, such as removing and restoring modules to service or displaying module hardware status, AI installation is required.

Logical database configuration of an AI module is done from *StarKeeper* II NMS; for example, the SNI must be configured before an AI module or port can be restored to service. Physical

database configuration of an AI module can be done from a local node or through *StarKeeper* II NMS.

To enter an AI module, follow **Procedure 4-1**.

To make database changes, follow **Procedure 4-2**.

To transfer or duplicate module information from one slot to another, follow **Procedure 4-3**.

PROCEDURE 4-1. Entering an AI in the Database

Requirements: Completed database entry forms for AI module.

1. Input **verify threshold** to determine if the appropriate threshold profile IDs have been configured.
2. Input **enter ai** to begin administration. Default values can be specified by pressing Return or +, as shown in the prompted entry examples in **AI Commands**.

   If you are entering an AI-E1/AI-T1 module, information on its ports should also be entered.

   The AI-T3P is a two-board module that is administered as a single-board module using the address of the egress board. Software can be downloaded separately to the ingress and egress boards from different hosts. Refer to the **enter ai** command in **AI Commands** for more details.
3. Input **verify ai** to check your entries.

   NOTE: The address of the egress board must be used for an AI-T3P module.

4. If you made any errors or need to change parameter specifications, input **change ai.**

   NOTE: Certain configuration options cannot be changed using the **change ai** command while the module is being downloaded or is in service. See the **change ai** command description in **AI Commands**.

5. If you need to start over, input **delete ai** to eliminate all entries made; then, begin again with **enter ai.**

   NOTE: If an SNI is already entered through *StarKeeper* II NMS, it needs to be deleted first. An AI module cannot be deleted when there is an SNI assigned to it.

6. Enter the SNI for the AI module through the *StarKeeper* II NMS. Refer to the appropriate *StarKeeper* documentation.
7. If the module has been installed, input **restore ai** to bring it into service.

   NOTE: To restore an AI-E1/AI-T1 port or AI-E3/AI-T3/AI-T3P module, the SNI must be entered in the database.

PROCEDURE 4-1. Entering an AI in the Database (continued)

To successfully restore an AI-T3P module, both ingress/egress boards must be in good working order. If one of the boards is not functioning correctly, both boards will be taken out of service.

PROCEDURE 4-2. Making Database Changes

A minor database change involves only a few parameter options; an extensive database change involves most of the parameter options on one or more modules.

Some changes can be done while the module or ports are in service: for example, you can change the comments, obtain module measurements, and change the threshold profile ID. Not all configuration options can be changed. For more information, refer to the **change ai** command description in the **AI Commands** chapter.

1. Input **verify ai** to get a report of the existing parameters.

   You may need to revise the database entry forms provided in the **Appendix** before proceeding, if the intended configuration changes are extensive.

2. Remove the module or port from service with **remove ai.**
3. To delete a module, check that information on the SNI for the AI-E1/AI-T1 ports or AI-E3/AI-T3/AI-T3P module has been removed.
4. Make the needed changes with the appropriate **change ai** commands.

   NOTE: Certain configuration options cannot be changed using the **change ai** command while the module is being downloaded or is in service. See the **change ai** command description in **AI Commands**.

5. Input **verify ai** to check the additions and modifications.
6. Return the module or port to service with **restore ai.**

   NOTE: To restore an AI port, the SNI must be entered in the database.

PROCEDURE 4-3. Transferring Database Information to Another Module Address

To move an AI module from one slot address to another, follow this procedure.

1. Input **verify ai** to get a report of the existing parameter options specified.

   You may need to copy or revise the database entry forms before continuing.

2. Use *StarKeeper* II NMS Network Builder to obtain SNI information for the AI-E1/AI-T1 ports or AI-E3/AI-T3/AI-T3P to be moved.
3. Use the *StarKeeper* II NMS Network Builder to delete the SNI information for the ports or module to be moved.

PROCEDURE 4-3. Transferring Database Information to Another Module Address (continued)

NOTE: An SNI is unique in a network and must be deleted from one address before it can be re-entered at another address.

4. Eliminate all database information on the module to be moved with **delete ai**.
5. Re-enter all information with **enter ai** for the new address.
6. Check the information entered with **verify ai**.
7. Enter the SNI information of the ports or module at the new address through *StarKeeper* II NMS. Refer to the appropriate *StarKeeper* documentation.
8. Physically move the AI module and I/O board to the new address.
9. Restore the module and ports to service at the new address with **restore ai**.

Reports

Besides the specific procedures associated with routine administration, report gathering plays a vital role in the analysis of module/network performance, accommodating system expansion, or troubleshooting. The following table explains the reports available to assist with these routine tasks.

TABLE 4-2. Available Reports for AI

Report Topic	Command	Description
connection/traffic data	**display connections** **display traffic**	Lists established connections for modules. Lists established connections for modules; segment counts are included. See the *Data Network Products Commands Reference*.
database size	**dbaudit**	Shows where database space expenditures occur. If **dbresize** is used, the database tables are readjusted automatically. See the *Node Reference*.
module data	**dmeas ai**	Supplies on-demand performance measurements data for an in-service module/port. See **AI Commands**.
module data	**dstat module**	Lists hardware module data. Module must be installed. See the *Data Network Products Commands Reference*.
module data	**dstat ai**	Lists hardware/software module data. See the *Data Network Products Commands Reference*.
module data	**smdsmeas**	Lists SMDS measurements data for in-service module/port. See the *StarKeeper II NMS On-Line Help Facility* for details.
module data	**verify ai**	Lists hardware/software module data as it currently appears in the configuration database. Module does not have to be installed. See **AI Commands**.
out-of-service modules	**verify oosmods**	Lists all installed modules that are currently out of service. See the *Data Networking Products Commands Reference*.
out-of-service ports	**verify oosports**	Lists the number of in-service ports, unconfigured ports in the database, and out-of-service ports. See the *Data Networking Products Commands Reference*.
trace connections	**verify trace**	Lists the AI module used as source address, whether there is a carrier failure on the source module port, if an error was detected in data entering the destination port, and source/time if a trace is turned off. See the *Data Networking Products Commands Reference*.

AI Troubleshooting

AI Troubleshooting

The *Node Reference* provides general troubleshooting information and a systematic approach to problem solving. Using methods outlined there, you can determine which problems affect the entire node and isolate problems to specific interface modules.

Once a problem is isolated to an AI module, **AI Troubleshooting** can help identify and solve AI-related problems. This chapter provides problem indicators that are AI module-specific, a checklist of problem areas, and procedures to remedy problems.

For additional information on troubleshooting the AI-E1 and AI-E3 for international applications, consult your account representative.

This chapter does not cover problem indicators such as alarms that are common to all modules, nor problem isolation techniques or procedures for connected SMDS subscriber equipment. Refer to the *Node Reference* and other vendor documents for this information.

Problem Indicators

Module faceplate light-emitting diodes (LEDs) and the output of certain commands are often problem indicators specific to the AI modules.

Module Status LEDs

The module status LEDs on the AI faceplates are green (on-line), yellow (off-line), and red (fault state). When the red light is lit, the module circuitry has detected a fault on the board.

Pressing the reset button clears the module buffers and registers, and then restarts the module application program. The module is taken out of service and connections are terminated.

Carrier Alarm LEDs

In addition to the module status LEDs, the AI modules have alarm LEDs that only light when a carrier failure occurs:

- the AI-E1 faceplate has four line status LEDs, but only three are used, one for each port (labeled L1, L2, L3); the AI-T1 faceplate has four line status LEDs, one for each port (labeled L1, L2, L3, L4).

A lighted LED for a particular AI-E1/AI-T1 port may indicate one of the following conditions:

- cable is not connected
- loss of signal (LOS)
- loss of frame (LOF)
- Physical Layer Convergence Procedure (PLCP) loss of frame (PLOF)
- alarm indication signal (AIS)
- receiving yellow alarm (DS1 layer)
- receiving yellow signal (PLCP layer)

When the failure condition clears on a port line, or when a port is taken out of service, its LED will go off.

- the AI-E3/AI-T3/AI-T3P faceplate has one LED (labeled L1), corresponding to its one implicit port, that lights when a carrier failure occurs.

  The lighted LED may indicate one of the following conditions:

  - cable is not connected
  - loss of signal (LOS)
  - loss of frame (LOF)
  - PLCP loss of frame (PLOF)
  - alarm indication signal (AIS)
  - receiving yellow alarm (DS3 layer)
  - receiving yellow signal (PLCP layer)

  When the failure condition clears, or the module is taken out of service, the LED will go off.

Refer to **Procedure 5-1. Solving General AI Problems** for instructions on how to clear the line trouble LEDs.

Command Output

The output of certain operations commands, such as those listed in the following table, can indicate an existing or potential problem.

In addition, the *StarKeeper* II NMS **smdsmeas** command and various error log files are useful as diagnostic tools, especially for transmission errors.

TABLE 5-1. Command Output

Command	Description	Reference
diagnose ai	Enables execution of hardware logic and loopback tests. Hardware logic tests verify the integrity of the module subsystem. Loopback tests exercise the transmission path between an AI, I/O board, and transmission facility.	See AI Diagnostics at the end of this chapter. See **diagnose ai** in **AI Commands**.
display connections	Shows established connections for modules.	See **Procedure 5-1. Solving General AI Problems**.
display traffic	Shows established connections for modules. Segment counts are included.	See **Procedure 5-1. Solving General AI Problems**.
dmeas ai	Displays measurements reports giving traffic, performance, and utilization measurements for the specified AI module and port.	See **dmeas ai** in **AI Commands**.
dstat ai	Displays fields showing numerical values that are counts of status packets and of errors. Also gives module service state, alarm information, and lead states.	See **dstat ai** in **AI Commands**.
dstat module	Provides hardware troubleshooting information, such as the number of module resets, parity errors, and sanity errors that occurred during a 5-minute interval; and module service state and mode state information as determined by status packet data. Output can be compared to that of **verify ai** and module faceplate LEDs.	See the *Data Networking Products Commands Reference*.
verify ai	Shows all parameter options configured for a specified AI or for all AIs.	See **verify ai** in **AI Commands**.
smdsmeas	Lists SMDS measurements data for in-service module/ports.	See the *StarKeeper II NMS On-Line Help Facility* for details.

Problem Areas

The following table further isolates AI-specific problems into module problems. The first column lists problem "Symptoms/Indicators" that explain what might be happening if there is a lack of or degradation in usual service. The column "Possible Causes" lists areas in which troubleshooting should begin; the column "Actions" refers you to troubleshooting procedures or to other sources. Each suggested action is a point of departure for diagnosing problems.

TABLE 5-2. Module Problems Checklist

√	Symptoms/Indicators	Possible Causes	Actions
____	No transmission in progress or able to take place (shown via alarms or the output of **display connections**, **dstat ai**, **dmeas ai**, **verify ai**, or **display traffic**)	AI is configured to get facility timing, but the facility is not configured to provide timing.	Check timing arrangement.
		DTF connection faulty. DTF connection is in loopback mode at host site.	See vendor documentation for DTF equipment.
		Cables are disconnected or reversed.	Reconnect the cable.
		AI I/O board is in loopback mode.	Run no-loop option of the **diag ai** command.
		Loopback cables still connected after diagnostic testing has completed.	Remove the loopback cable and reconnect the DTF cable.
		Mode switch on AI is in Disab position.	Enable the mode switch.
		AI (module board) is faulty.	Replace the faulty module.
		I/O board is faulty. If it is an AI-T3P, one of its boards has been disabled.	Replace the faulty I/O board.
		AI is not in service. AI port is not in service.	Restore the AI module or port.
____	Line status LED is lit on module.	Cable to facility not connected or faulty.	Reconnect cable or replace faulty cable.
____	End users report data loss (shown via output of **diagnose ai**, **smdsmeas** command through *StarKeeper* II NMS, or **dmeas ai**)	Faulty AI module or I/O board. Faulty DTF equipment. Protocol errors.	See AI diagnostic procedures in this chapter. See vendor documentation for DTF equipment.
____	Output of **dstat ai** indicates alarms or errors.		See AI diagnostic procedures in this chapter.

TABLE 5-2. Module Problems Checklist (continued)

√	Symptoms/Indicators	Possible Causes	Actions
____	Output of **diagnose ai** indicates problems.		See AI diagnostic procedures in this chapter.
____	The **restore ai** process failed.	Module or I/O board is not installed. Mode switch on AI is in Disab position. Faulty module.	See **Procedure 5-1. Solving General AI Problems.**

Procedures

This section gives the procedures that should be followed when troubleshooting and diagnosing an AI module.

- **Procedure 5-1. Solving General AI Problems**
- **Procedure 5-2. Solving AI Port Problems**
- **Procedure 5-3. Responding to Alarm Messages**
- **Procedure 5-4. Correcting Diagnostic Failure**
- **Procedure 5-5. Obtaining AI-E1/AI-T1 Status**
- **Procedure 5-6. Obtaining AI-E3/AI-T3/AI-T3P Status**

For **ai** command details, refer to **AI Commands**. For additional information on AI module features, refer to the **AI Overview**.

The **AI Diagnostics** section contains procedures for running loopback tests.

PROCEDURE 5-1. Solving General AI Problems

Follow steps 1 through 5, if

- lost or garbled data is reported
- a red LED on the AI module is lit
- the green LED is not lit
- an error message appears on the console or the printer
- slow responses are reported by end users

1. Check the connections for both the module and the I/O board, making sure they are properly and securely connected.

PROCEDURE 5-1. Solving General AI Problems (continued)

2. Check all cable connections to the I/O board; see **AI Cabling** for details:
   A. for the AI-E1/AI-T1, make sure cables are connected to the intended ports
   B. for the AI-E3/AI-T3/AI-T3P, make sure cables are not reversed
   C. for the AI-T3P, make sure that the ribbon cable for the egress and ingress I/O boards is connected

   If no cable is connected, remove the module from service and ignore the message.
3. When running loopback diagnostics, take the device out of loopback mode and rerun the test to confirm a failure. This proves that the previous looped data was looped back at the test point.
4. Check the **dstat ai** report to determine if the problem is facility-related; see **Procedures 5-5** and **5-6**.

PROCEDURE 5-2. Solving AI Port Problems

1. Enter **verify ai** to determine whether the module and port are in service.
2. Enter **dstat ai** to check the status of the leads for the port.
3. Run the on-line **diagnose ai** command.
4. Use the **smdsmeas** command through *StarKeeper* II NMS to check physical/protocol errors.
5. Check the physical connections to DTF equipment.
6. Use the **remove ai** and **restore ai** commands to remove and restore the port.
7. If problems persist, contact your local support organization.

PROCEDURE 5-3. Responding to Alarm Messages

1. Refer to the *Data Networking Products Messages Reference* for detailed message explanations and recommended actions for the alarm indicated.
2. Check the activity prior to the alarm message, using the **dmeas** command.
3. Check the LEDs on the module faceplate.
4. Check the cabling.
5. Reseat or replace any AI module or I/O board that fails diagnostics.
6. Enter **verify node** to ensure that a node entry exists in the database for the slot corresponding to the physical position in the Control Computer.

PROCEDURE 5-3. Responding to Alarm Messages (continued)

7. Use the **dstat** command to check present status.

PROCEDURE 5-4. Correcting Diagnostic Failure

1. Check the slot voltage and fuse. Refer to the *Node Reference* for detailed instructions.
2. If this does not correct the problem, replace the failed module.
3. If this does not correct the problem, replace the appropriate I/O board.

PROCEDURE 5-5. Obtaining AI-E1/AI-T1 Status

1. Enter **dstat ai** <**e1/t1**> **port** <**mod addr**> <**port num**> **high** to display a status report for the module indicating a problem.
   A. Report fields that indicate possible facility problems include **LINE** and **FRAME Layer: LOSS OF SIGNAL**, **LOSS OF FRAME**, **ALARM IND SIGNAL**, and **YELLOW ALARM**.
   B. Report fields that indicate possible module problems include **MODULE RESET**, **FIFO RESET**, **FM NODE PARITY**, **FM NODE OVERFLO**, **SANITY ERROR**, **RANGE ERRORS**, and **BAD SEGMENTS**.
   C. Report fields that indicate I/O board status include **IO BOARD** and **IOB TEST**.
   D. Report fields that indicate port status include **LOOPBK MODE**, **ACTUAL SRVC STATE**, and **OPERATING STATE**.

NOTE: **dstat ai** generates a status report only when the AI module completes its power-up self-test. If the test fails or is in progress, **dstat module** should be used instead.

PROCEDURE 5-6. Obtaining AI-E3/AI-T3/AI-T3P Status

1. Enter **dstat ai** <**e3/t3/t3p**> <**mod addr**> **high** to display a status report for the module indicating a problem.
   A. Report fields that indicate possible facility problems include **LINE** and **FRAME Layer: LOSS OF SIGNAL**, **LOSS OF FRAME**, **ALARM IND SIGNAL**, and **YELLOW ALARM**.
   B. Report fields that indicate possible module problems include **MODULE RESET**, **FIFO RESET**, **FM NODE PARITY**, **FM NODE OVERFLO**, **SANITY ERROR**, **RANGE ERRORS**, and **BAD SEGMENTS**.

PROCEDURE 5-6. Obtaining AI-E3/AI-T3/AI-T3P Status (continued)

C. Report fields that indicate I/O board status include **`IO BOARD`**, **`IOB TEST`**, **`LOOPBK MODE`**, **`ACTUAL SRVC STATE`**, and **`OPERATING STATE`**.

NOTE: **dstat ai** generates a status report only when the AI module completes its power-up self-test. If the test fails or is in progress, **dstat module** should be used instead.

AI Diagnostics

The following procedures explain how to run AI module diagnostics and the cables and connectors needed for the tests. There are two levels of diagnostics:

- Module level; for module tests, the AI module must be out of service.

  Module diagnostics test hardware logic.

- Port level (on-line); for port level tests, module must be in service and the port to be tested must be out of service for the AI-E1/AI-T1 module. The AI-E3/AI-T3/AI-T3P module must be out of service.

Warning: These tests affect service on the module or port being tested.

Testing begins with a hardware logic check of the module subsystem, and then progresses to local and remote loopback tests that exercise the transmission path between the module, its I/O board, and the facility.

This section is supplemented by information on **diagnose ai** in the **AI Commands** chapter that explains the diagnostic prompting sequence and the meaning of each parameter and its options. System responses are also included in **AI Commands**.

NOTE: Before starting any AI diagnostic tests, notify the *StarKeeper* II NMS administrator and the facility and the LAN administrators at the customer premises.

The loopback tests require connector and cable manipulation at the local and remote ends during various testing phases:

- For AI-E1 tests, the loopback connector is a piece of micro-coaxial cable (75 ohm [Ω]) with micro-coaxial BNC-type connectors; or see the illustration of the loopback connector using D-type connectors (Fig. 5-1).
- For AI-E3 tests, the loopback connector is a piece of micro-coaxial cable (75 Ω) with micro BNC-type connectors.

- For AI-T1 tests, see the illustration of the loopback connector (Fig. 5-2).
- For AI-T3/AI-T3P tests, the loopback connector is a piece of 728B coaxial cable with BNC-type connectors.

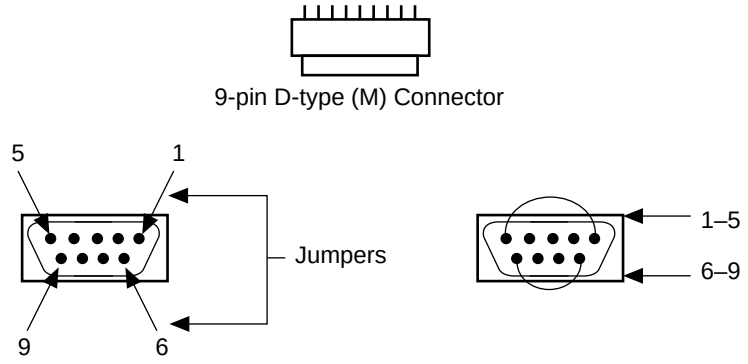

FIGURE 5-1. D-type (M) Loopback Connector for AI-E1 Diagnostics

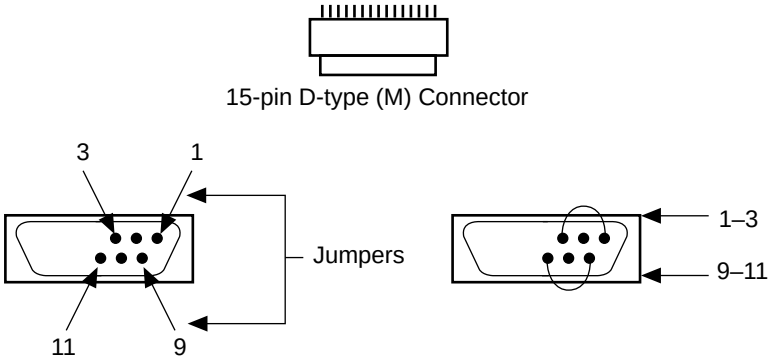

FIGURE 5-2. D-type (M) Loopback Connector for AI-T1 Diagnostics

Figure 5-3 shows the loopback points for each loopback test.

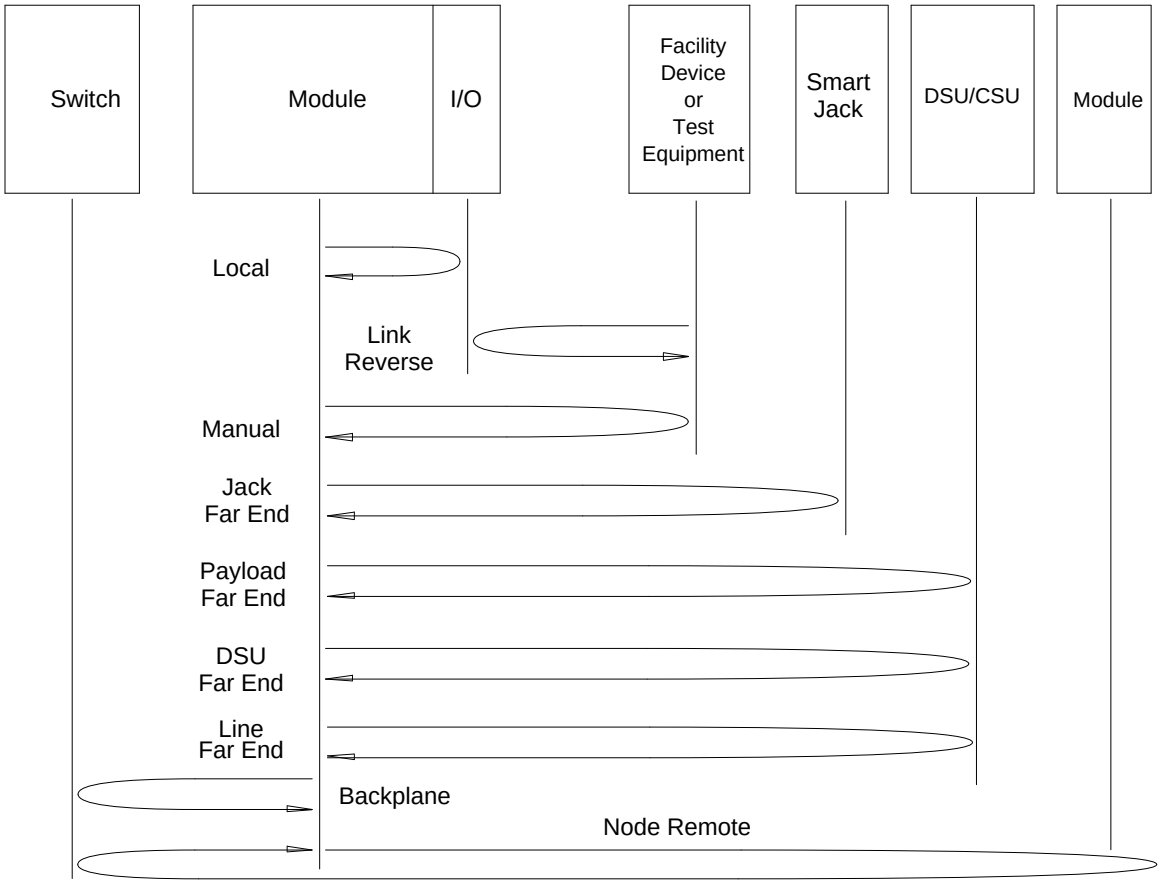

FIGURE 5-3. Diagnostic Loopback Points

Not all loopback tests apply to all of the AI modules. Table 5-3 shows which tests are available for each module.

TABLE 5-3. Loopback Tests by Module

Test Type	Applicability				
	AI-T1	AI-E1	AI-T3	AI-E3	AI-T3P
Local (local_lp)	X	X	X	X	X
Link Reverse (lnkrev)	X	X	X	X	X
Link Reverse Line (line_lpbk)	X				
Link Reverse Payload (payload_lpbk)	X				
No Loop (no_loop)	X	X	X	X	X
Manual (manu_lp)	X	X	X	X	X
Payload Far End (payld_farend)	X				
Smart Jack Far End (jack_farend)	X				
DSU Far End (dsu_farend)	X				
Line Far End (line_farend)			X		X

PROCEDURE 5-7. Running the Module Test on the AI-E1/AI-T1

This test checks the functionality of the components and sub-systems on the main processor board and the associated I/O board. In addition, a backplane loopback test is performed as part of the module test.

Requirements: Module must be removed from service.

1. Enter the following command.

```
CC0> diagnose ai <mod addr>
     mod_test
```

2. If the test passes and an AI problem still exists, run the port local loop test.
3. If the test fails, replace the module circuit pack and repeat the test.

PROCEDURE 5-8. Running the Port Local Loopback Test on the AI-E1/AI-T1

This test puts the AI module I/O board for the port under test in loopback towards the module. If the test fails completely (when, for example, the I/O board is not present), there will be a reason description to indicate why it failed. If the result is not a total failure, error measurements are reported. If there are errors reported, the problem is either the module or the I/O board.

Requirements: Module must be in service and port must be removed from service.

1. Enter the following command.

```
CC0> diagnose ai <mod addr>
     pt_test
     <port num>
     local_lp
```

2. If the test passes, and the AI problem still exists, run the manual loopback test.
3. If the test fails completely, a message explaining the reason for the failure and the location of the problem is displayed; for example, **`I/O board not present in slot`** .
4. If the test continues to fail, replace the module circuit pack.
5. If the test is only a partial failure, error measurements are reported. If errors are reported, the problem involves either the module or the I/O board.
   A. Check the connections for both the module and I/O board and make sure they are properly and securely connected.
   B. Check the I/O board and the module, replacing faulty equipment as needed.
   C. Repeat the test.

PROCEDURE 5-9. Running the Manual Loopback Test on the AI-E1/AI-T1

This test is similar to the "far-end" tests except that it tests the quality of the link between the module and any point on the facility that has been manually put into loopback towards the module.

Requirements: Module must be in service and port must be removed from service. An external loopback connector is required.

1. Place E1/T1 loopback connector on the port to be tested.
2. Enter the following command.

PROCEDURE 5-9. Running the Manual Loopback Test on the AI-E1/AI-T1 (continued)

```
CC0> diagnose ai
     <mod addr>
     pt_test
     <port num>
     manu_lp
```

3. For the AI-T1 module, if the test passes, and the AI problem still exists, reconnect the facilities and run **jack_farend** or **dsu_farend**, as appropriate.

   Skip this step for the AI-E1.

4. If the test fails completely on the AI-E1/AI-T1, the following is the output of the command:

   ```
   Loopback diagnostic being configured
   Diagnostic FAILED: CF Alarms - LOF PLOF
   ```

   Check that the AI-CSU Distance Range value matches the actual loopback distance.

5. If the test is only a partial failure, error measurements are reported.
   A. Check the connections for both the module and I/O board and make sure they are properly and securely connected.
   B. Check the I/O board and the module, replacing faulty equipment as needed.
   C. Repeat the test.

PROCEDURE 5-10. Running Remote Loopback Tests on the AI-T1

The *jack_farend* test checks the quality of the link between the AI module and the far-end network interface (smart jack). The smart jack must be a device that recognizes the ESF DL smart jack loopback command. If the test fails to set up a loopback, there will be a reason description. If the result is not a total failure, error measurements are reported. When this test is completed, it will send a loopback deactivate DL command to take the smart jack out of loopback.

The *dsu_farend* test checks the quality of the link between the AI module and the far-end CPE. The CPE must be a device that recognizes the ESF DL line loopback command. If the test fails to set up a loopback, there will be a reason description. If the result is not a total failure, error measurements are reported. It is recommended that this loopback test be used in conjunction with the *payld_farend* loopback test to determine in which direction (transmit or receive) bit errors occur.

Requirements: Module must be in service and port must be removed from service.

PROCEDURE 5-10. Running Remote Loopback Tests on the AI-T1 (continued)

1. Enter either command.

```
CC0> diagnose ai <mod addr>
     pt_test
     <port num>
     jack_farend

- OR _

CC0> diagnose ai <mod addr>
     pt_test
     <port num>
     dsu_farend
```

2. If the test fails completely, a message explaining the reason for the failure is displayed; for example, **`the far end was not put into loopback mode`**.
3. If the test is only a partial failure, error measurements are reported.
   A. Check the connections for both the module and I/O board and make sure they are properly and securely connected.
   B. Check the I/O board and the module, replacing faulty equipment as needed.
   C. Repeat the test.

PROCEDURE 5-11. Running Link Reverse Tests on the AI-E1/AI-T1

This test puts the module port in remote loopback mode for testing at the far-end equipment. The intent of this test is to have test patterns generated toward the module port by source somewhere near the facility (for example, SMDS CPE, DTF equipment, T1 test gear). For the AI-T1 module, the type of link reverse test is selected: *line_lpbk* or *payload_lpbk*. The *line_lpbk* test puts the AI-T1 module port in loopback *towards the facility*. The *payload_lpbk* test puts the local termination of the facility into loopback mode. The port will stay in loopback mode until it is taken out of loopback via the *no_loop* option.

Requirements: Module must be in service and port must be removed from service.

1. Enter the following command.

PROCEDURE 5-11. Running Link Reverse Tests on the AI-E1/AI-T1 (continued)

```
CC0> diagnose ai <mod addr>
     pt_test
     <port num>
     lnkrev
```

2. For the AI-T1 tests, select either **line_lpbk** or **payload_lpbk**.

   Skip this step for the AI-E1.

3. Initiate testing at the far end.
4. After testing is completed, enter the following commands.

```
CC0> diagnose ai <mod addr>
     pt_test
     <port num>
     no_loop
```

PROCEDURE 5-12. Running the Module Test on the AI-E3/AI-T3/AI-T3P

This test checks the functionality of the components and sub-systems on the main processor board and the associated I/O board. In addition, a backplane loopback test is performed as part of the module test.

Requirements: Module must be removed from service.

1. Enter the following command.

```
CC0> diagnose ai <mod addr>
     mod_test
```

2. If the test passes and an AI problem still exists, run the local loop test.
3. If the test fails, replace the module circuit pack and repeat the test.
4. If the test continues to fail, replace the AI-E3 CMC13 I/O board, the AI-T3 CMC6/6B I/O board, or the AI-T3P CMC6B (egress) or CMC14 (ingress) I/O board.

PROCEDURE 5-13. Running the Local Loopback Test on the AI-E3/AI-T3/AI-T3P

This test puts the AI module I/O board for the port under test in loopback towards the module. If the test fails completely (when, for example, the I/O board is not present), there will be a reason description to indicate why it failed. If the result is not a total failure, error measurements are reported. If there are errors reported, the problem is either the module or the I/O board.
Requirements: Module must be removed from service.

1. Enter the following command.

```
CC0> diagnose ai <mod addr>
     local_lp
```

2. If the test passes, and the AI problem still exists, run the manual loopback test.
3. If the test fails completely, a message is displayed indicating the location of the problem; for example, **`I/O board not present`**.

   Replace the AI-E3 CMC13 I/O board, AI-T3 CMC6/6B, or AI-T3P CMC6B/CMC14 I/O board(s) and repeat the test.
4. If the test continues to fail, replace the CMA11B (for AI-E3/AI-T3) or CMA17 (AI-T3P) module circuit pack(s).
5. If the test is only a partial failure, error measurements are reported. In this case, either the module or the I/O board(s) is causing the problem.
   A. Check the connections for both the module and I/O board and make sure they are properly and securely connected.
   B. Check the I/O board(s) and the module, replacing faulty equipment as needed.
   C. Repeat the test.

PROCEDURE 5-14. Running the Manual Loopback Test on the AI-E3/AI-T3/AI-T3P

This test is similar to the "far-end" tests except that it tests the quality of the link between the module and any point on the facility that has been manually put into loopback towards the module. This test is performed using a coaxial cable to loop back. Loopback from far end equipment is done by performing link reverse at the far end.

Requirements: Module must be removed from service.

1. Use 75 Ω coaxial cable to loop back the AI-E3 CMC13 I/O board, the AI-T3 CMC6/6B I/O board, or the AI-T3P CMC6B I/O board.

PROCEDURE 5-14. Running the Manual Loopback Test on the AI-E3/AI-T3/AI-T3P (continued)

2. Enter the following command.

```
CC0> diagnose ai <mod addr>
     manu_lp
```

3. If the test passes, and the AI problem still exists, reconnect the facilities and continue with step 6.
4. If the test fails completely, the following is the output of the command:

   Loopback diagnostic being configured

   Diagnostic FAILED: CF Alarms - LOF PLOF

   Check that the AI-CSU Distance Range value matches the actual loopback distance.
5. If the test is only a partial failure, error measurements are reported.
   A. Check the connections for both the module and I/O board and make sure they are properly and securely connected.
   B. Check the I/O board and the module, replacing faulty equipment as needed.
   C. Repeat the test.
6. Place the DTF equipment in link reverse.
7. Enter the following command.

```
CC0> diagnose ai <mod addr>
     manu_lp
```

8. If the test fails completely, a message is displayed explaining the reason; for example, **the AI module was not put into loopback mode**.
9. If the test is only a partial failure, error measurements are reported.
   A. Check the connections for both the module and I/O board and make sure they are properly and securely connected.
   B. Check the I/O board and the module, replacing faulty equipment as needed.
   C. Repeat the test.

PROCEDURE 5-14. Running the Manual Loopback Test on the AI-E3/AI-T3/AI-T3P (continued)

10. When testing is completed, remove the DTF from remote loopback mode.

PROCEDURE 5-15. Running the Link Reverse Test on the AI-E3/AI-T3/AI-T3P

This test places the module into remote loopback mode for testing at the far-end equipment. Any data received from the facility will be looped back.

Requirements: Module must removed from service.

1. Enter the following command.

```
CC0> diagnose ai <mod addr>
     lnkrev
```

2. Initiate testing at the far end.
3. After testing is completed, enter the following commands.

```
CC0> diagnose ai <mod addr>
     no_loop
```

PROCEDURE 5-16. Running the Remote Loopback Test on the AI-T3/AI-T3P

This test checks the link quality between the module and a router or other remote device. The module automatically puts the device into remote loopback mode for the testing and returns it to operating mode after the test.

Requirements: Module must be removed from service.

1. Enter the following command.

```
CC0> diagnose ai <mod addr>
     line_farend
```

2. Specify a time period for the test (in 10-second intervals), the number of times the test will be repeated, and whether or not the errored data will be displayed.

PROCEDURE 5-17. Completing AI Tests

1. Ensure that all equipment is taken out of loopback mode.
2. Restore the module to service: **restore ai** <**mod addr**>.
3. Verify that the module has been restored to service: **verify ai** <**mod addr**>.

AI Commands

AI Commands

This chapter describes the commands related to the administration, operation, and maintenance of an AI module. Commands appear in alphabetical order by verb. System responses for all **ai** commands conclude this chapter.

The **enter ai** command shows the full prompting sequence and contains a list of parameter definitions. Additional information on the parameters used in the prompting sequence of **enter ai** and **change ai** is given in **AI Administration**. In addition, the database entry forms in the **Appendix** follow the prompting sequence for each type of module.

Procedures for running diagnostics can be found in **AI Troubleshooting**.

Other command objects that are related to the administration, operation, and maintenance of an AI module are documented in the *Data Networking Products Commands Reference*.

change ai

The **change ai** command modifies AI module and, if appropriate, port information in the database.

Syntax

You can input **change ai** in prompted entry only. The command syntax is similar for **enter ai** and **change ai**; see the Syntax section for **enter ai**. The following command restrictions apply to **change ai**:

- the **AI TYPE** cannot be changed
- For AI-T3P modules, the **MODULE ADDRESS** must be that of the egress board
- the **DOWNLOAD SERVER** and **SOFTWARE VERSION** cannot be changed when the module is in service
- Only one module/port can be changed at a time
- the **AI-CSU DISTANCE RANGE** cannot be changed when the corresponding AI-T1 component (module or port) is in service
- the **TRANSMIT REFERENCE CLOCK** , specified only for an AI-E1/AI-T1 port, cannot be changed when the port is in service
- the **change ai** command cannot be executed if the module is downloading software
- the **THRESHOLD ID** specified must match the type (*e1, e3, t1, t3*) specified for the module or port
- the **CBIT PARITY CODE VIOLATION MODE** can be changed when the AI-T3 module is in service or out of service.
- the **SMDS BILLING DESTINATION 1** or **SMDS BILLING DESTINATION 2** cannot be changed from a valid address to *none* if there is at least one SNI on the AI with the SMDS Billing feature turned on. If the **SMDS BILLING DESTINATION 1** is changed to *none*, the **SMDS BILLING DESTINATION 2** defaults to *none*.
- the **COMMENT** and **MODULE MEASUREMENT** parameters can be changed when the AI is in service

The defaults for **change ai** are those values, conditions, or states that currently exist in the database. They are displayed within parentheses in the parameter prompt.

Parameters

The **MODULE ADDRESS** and **PORT NUMBER** parameter definitions for **change ai** are the same as those for **enter ai**, except that for **change ai** you can specify only a single module address or port number. For the remaining parameters, refer to the definitions supplied in **enter ai**.

Prompted Entry: Changing AI-E1 Module Information

```
CC0> change
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
COMPONENT [module, port]: module
MODULE ADDRESS: 43
COMMENT [up to 60 chars double quoted, none: +(in Rm 303)]: +
DOWNLOAD SERVER [+(controller)]: +
SOFTWARE VERSION [+(standard)]: +
SMDS BILLING DESTINATION 1 [+(none)]: <server1>
SMDS BILLING DESTINATION 2 [+(none)]: <server2>
MODULE MEASUREMENTS [yes, no: +(no)]: yes
MODULE ADDRESS:    Delete
CC0>
```

Prompted Entry: Changing AI-T1 Module Information

```
CC0> change
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t1
COMPONENT [module, port]: module
MODULE ADDRESS: 44
COMMENT [up to 60 chars double quoted, none: +(in Rm 303)]: +
DOWNLOAD SERVER [+(controller)]: +
SOFTWARE VERSION [+(standard)]: +
SMDS BILLING DESTINATION 1 [+(none)]: <server1>
SMDS BILLING DESTINATION 2 [+(none)]: <server2>
MODULE MEASUREMENTS [yes, no: +(no)]: yes
MODULE ADDRESS:    Delete
CC0>
```

Prompted Entry: Changing AI-E1 Port Information

```
CC0> change
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3 t3p]: e1
COMPONENT [module, port]: port
MODULE ADDRESS: 43
PORT NUMBER [1-3]: 1
TRANSMIT REFERENCE CLOCK [facility, local: +(local)]: +
THRESHOLD PROFILE ID [1-16, or "default": +(default)]: 1
PORT NUMBER:    Delete
CC0>
```

Prompted Entry: Changing AI-T1 Port Information

```
CC0> change
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3 t3p]: t1
COMPONENT [module, port]: port
MODULE ADDRESS: 44
PORT NUMBER [1-4]: 1
TRANSMIT REFERENCE CLOCK [facility, stratum: +(stratum)]: +
THRESHOLD PROFILE ID [1-16, or "default": +(default)]: 1
AI-CSU DISTANCE RANGE (FEET) [0-110, 110-220, 220-330, 330-440, 440-550,
                              550-660: +(0-110)]: 110-220
PORT NUMBER:    Delete
CC0>
```

Prompted Entry: Changing AI-E3 Module Information

```
CC0> change
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e3
MODULE ADDRESS: 46
COMMENT [up to 60 chars double quoted, none:
+(in Rm 305)]: +
DOWNLOAD SERVER [+(controller)]: +
SOFTWARE VERSION [+(standard)]: +
SMDS BILLING DESTINATION 1 [+(none)]: <server1>
SMDS BILLING DESTINATION 2 [+(none)]: <server2>
ACCESS CLASS ID [1-4: +(1)]: 1
THRESHOLD PROFILE ID [1-16, or "default": +(default)]: +
MODULE MEASUREMENTS [yes, no: +(no)]: yes
MODULE ADDRESS:    Delete
CC0>
```

Prompted Entry: Changing AI-T3 Module Information

```
CC0> change
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3
MODULE ADDRESS: 45
COMMENT [up to 60 chars double quoted, none:
+(in Rm 305)]: +
DOWNLOAD SERVER [+(controller)]: +
SOFTWARE VERSION [+(standard)]: +
SMDS BILLING DESTINATION 1 [+(none)]: <server1>
SMDS BILLING DESTINATION 2 [+(none)]: <server2>
ACCESS CLASS ID [1-5: +(1)]: 1
THRESHOLD PROFILE ID [1-16, or "default": +(default)]: +
MODULE MEASUREMENTS [yes, no: +(no)]: yes
CBIT PARITY CODE VIOLATION MODE [off, on: +(off)]: +
MODULE ADDRESS:    Delete
CC0>
```

Prompted Entry: Changing AI-T3P Module Information

```
CC0> change
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3p
MODULE ADDRESS: 45
COMMENT [up to 60 chars double quoted, none:
+(in Rm 305)]: +
DOWNLOAD SERVER [+(controller)]: +
SOFTWARE VERSION [+(standard)]: +
SMDS BILLING DESTINATION 1 [+(none)]: <server1>
SMDS BILLING DESTINATION 2 [+(none)]: <server2>
ACCESS CLASS ID [1-5: +(1)]: 1
THRESHOLD PROFILE ID [1-16, or "default": +(default)]: +
MODULE MEASUREMENTS [yes, no: +(no)]: yes
CBIT PARITY CODE VIOLATION MODE [off, on: +(off)]: +
MODULE ADDRESS:    Delete
CC0>
```

delete ai

The **delete ai** command eliminates AI information from the database. The following restrictions apply when deleting database information for AI ports or the module itself:

- Subscriber Network Interface (SNI) information must be deleted before AI port or module information can be deleted.
- A port must be taken out of service before port information can be deleted. If information exists on only one port on the module, both the port and the module must be removed from service to delete information on that port. The last port cannot be deleted while the module is in service.
- The AI module cannot be downloading software and must be removed from service before any information can be deleted.

  AI module information cannot be deleted while port information exists in the database.
- For AI-T3P modules, the **MODULE ADDRESS** specified must be that of the egress board.

Syntax

You can input **delete ai** in prompted or one-line entry.

```
CC0> delete
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]:
```

If AI TYPE is "e1" or "t1":

```
COMPONENT [module, port]:
```

If AI TYPE is "e1", "e3," "t1", "t3", or "t3p":

```
MODULE ADDRESS:
```

If AI TYPE is "e1" and if COMPONENT is "port":

```
PORT NUMBER [1-3]:
```

If AI TYPE is "t1" and if COMPONENT is "port":

```
PORT NUMBER [1-4]:
```

Parameters

Refer to the parameter definitions supplied in **enter ai**.

Prompted Entry: Deleting AI-E1 Port Information

```
CC0> delete
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
COMPONENT [module, port]: port
MODULE ADDRESS: 43
PORT NUMBER [1-3]: 1
CC0>
```

Prompted Entry: Deleting AI-T1 Port Information

```
CC0> delete
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t1
COMPONENT [module, port]: port
MODULE ADDRESS: 44
PORT NUMBER [1-4]: 1
CC0>
```

Prompted Entry: Deleting AI-E1 Module Information

```
CC0> delete
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
COMPONENT [module, port]: module
MODULE ADDRESS: 43
CC0>
```

Prompted Entry: Deleting AI-T1 Module Information

```
CC0> delete
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t1
COMPONENT [module, port]: module
MODULE ADDRESS: 44
CC0>
```

Prompted Entry: Deleting AI-E3 Module Information

```
CC0> delete
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e3
MODULE ADDRESS: 46
CC0>
```

Prompted Entry: Deleting AI-T3 Module Information

```
CC0> delete
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3
MODULE ADDRESS: 45
CC0>
```

Prompted Entry: Deleting AI-T3P Module Information

```
CC0> delete
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3p
MODULE ADDRESS: 45
CC0>
```

One-line Entries: Deleting AI Component Information

```
CC0> delete ai e1 port 43 1
CC0> delete ai e1 module 43
CC0> delete ai t1 port 44 1
CC0> delete ai t1 module 44
CC0> delete ai e3 46
CC0> delete ai t3 45
CC0> delete ai t3p 45
```

diagnose ai

The **diagnose ai** command enables you to run AI module and port-level diagnostics.

The module diagnostics check the integrity of the hardware. These tests include boot-up sanity tests, and component and subsystem tests. To run module diagnostics, the AI module must be out of service.

The loopback diagnostics check the data path for an AI-E1/AI-T1 port or an AI-E3/AI-T3/AI-T3P module. The AI-E1/AI-T1 module must be in service and the port to be tested must be out of service. One port is tested at a time and service is affected on that port only. The AI-E3/AI-T3/AI-T3P module must be out of service.

Syntax

You can input **diagnose ai** in prompted entry only.

```
CC0> diagnose
OBJECT [...ai...]: ai
MODULE ADDRESS:
```

For AI-E1 or AI-T1:

```
DIAGNOSTIC TYPE [pt_test, mod_test: +(pt_test)]:
```

If module is AI-E1 and DIAGNOSTIC TYPE is "pt_test":

```
PORT NUMBER [1-3]:
TEST TYPE [local_lp, lnkrev, no_loop, manu_lp: +(local_lp)]:
```

If module is AI-T1 and DIAGNOSTIC TYPE is "pt_test":

```
PORT NUMBER [1-4]:
TEST TYPE [local_lp, lnkrev, no_loop, jack_farend,
        dsu_farend, payld_farend, manu_lp: +(local_lp)]:
```

If TEST TYPE is "local_lp," "jack_farend," "dsu_farend," "payld_farend," or "manu_lp":

```
DATA FORMAT [transparent, segment: +(transparent)]:
TEST DURATION IN SECONDS [10 - 2400: +(10)]:
```

If module is AI-T1 and TEST TYPE is "lnkrev":

```
LOOPBACK TYPE [line_lpbk, payload_lbpk: +(line_lpbk)]:
```

If DATA FORMAT is "transparent" or "segment":

```
TEST PATTERN [qrs, 1_in_8, all_ones, all_zeroes: +(qrs)]:
```

If TEST TYPE is "local_lp," "jack_farend," "dsu_farend," "payld_farend," or "manu_lp":

```
REPETITIONS [1-1000, or 'c': +(1)]:
```

If TEST TYPE is "manu_lp":

```
INFO: Place remote device in loop-around mode
CONTINUE TESTING? [yes, no: +(yes)]:
```

If DATA FORMAT is "segment":

```
DISPLAY ERRORED DATA? [yes, no: +(no)]:
```

For AI-E3:

```
TEST TYPE [mod_test, local_lp, lnkrev, no_loop,
        manu_lp: +(local_lp)]:
```

If TEST TYPE is "local_lp" or "manu_lp":

```
TEST DURATION IN SECONDS [10 - 2400: +(10)]:
```

Syntax *(continued)*

If TEST TYPE is "manu_lp":

```
INFO: Place the remote device in loop-around mode
CONTINUE TESTING? [yes, no: +(yes)]:
```

If TEST TYPE is "local_lp" or "manu_lp":

```
REPETITIONS [1-1000; 'c' for continuous: +(1)]:
```

If TEST TYPE is "local_lp," "linkrev," or "manu_lp":

```
DISPLAY ERRORED DATA? [yes, no: +(no)]:
```

For AI-T3 or AI-T3P:

```
TEST TYPE [mod_test, local_lp, lnkrev, no_loop, line_farend,
        manu_lp: +(local_lp)]:
```

If TEST TYPE is "local_lp," "line_farend," or "manu_lp":

```
TEST DURATION IN SECONDS [10 - 2400: +(10)]:
```

If TEST TYPE is "manu_lp":

```
INFO: Place the remote device in loop-around mode
CONTINUE TESTING? [yes, no: +(yes)]:
```

If TEST TYPE is "local_lp," "line_farend," or "manu_lp":

```
REPETITIONS [1-1000; 'c' for continuous: +(1)]:
```

If TEST TYPE is "local_lp," "linkrev," "line_farend," or "manu_lp":

```
DISPLAY ERRORED DATA? [yes, no: +(no)]:
```

Parameters

This section explains parameters used in the **diagnose ai** prompting sequence that differ from those used in **enter ai**. Refer to the Syntax section for the prompting sequence of the component or type being entered, the system defaults, and specific parameter options.

AI-CSU

AI loopback tests use the value configured for **AI-CSU DISTANCE RANGE (FEET)** for loopback tests as well as for data transport. If the loopback point distance for the test is different from the CSU distance, the value for **AI-CSU DISTANCE RANGE (FEET)** should be changed to reflect the distance to the loopback point before running the **diagnose ai** command. If this value is not changed, the test may fail. After running diagnostic tests, change the value for this parameter back to its original value.

CONTINUE TESTING

Specifies whether (*yes* or *no*) diagnostic testing should be continued.

DATA FORMAT

Specifies if the format in which data is to be passed to the module is *segment* or *transparent*. The *segment* data format contains a 4-byte segment header, 2-byte Level 2 Protocol Data Unit (L2-PDU) header, 44-byte L2-PDU payload, and 2-byte L2-PDU trailer. This segment is mapped into a Distributed Queue Dual Bus (DQDB) slot in a Physical Layer Convergence Procedure (PLCP) frame. The *transparent* data format is randomly formatted.

DIAGNOSTIC TYPE

For AI-E1 and AI-T1 modules only, specifies if port level (*pt_test*) or module level (*mod_test*) diagnostics are to be run.

DISPLAY ERRORED DATA

If **DATA FORMAT** is *segment*, specifies whether (*yes* or *no*) the errored segment data test report is to be displayed. For more information on errored segment data and an output sample, see Test Results.

LOOPBACK TYPE

Specifies whether the mode that the local device uses to loop data toward the facility is *line_lpbk* or *payload_lpbk*. The *line_lpbk* sets the local termination in line loopback mode. Any data received from the facility is looped back.

For the AI-T1, the *payload_lpbk* sets the local termination in payload loopback mode. All information bits received from the facility are looped back with regenerated framing bits.

MODULE ADDRESS

A single number identifying the node slot that the AI module occupies. Only a single module address can be entered. If the module is an AI-T3P, the address entered must be for the node slot of the egress board.

PORT NUMBER

If **DIAGNOSTIC TYPE** is *pt_test* and the module is an AI-E1, a number from *1* to *3* that identifies a module port; if the module is an AI-T1, a number from *1* to *4* that identifies a module port. Only a single port number can be entered.

TEST DURATION IN MINUTES

Specifies the duration of data transmission to be from *10* seconds to *40* minutes. This information is passed to the module. (The console is unavailable during this test, since it does not run in the background.)

TEST PATTERN

Specifies the test signal bit sequence that is to be passed to the module is a quasi-random sequence (*qrs*), one-in-eight (*1-in-8*, which is 01000000...) pattern, all ones (*all-ones*, which is 11111111...), all zeroes (*all-zeroes*, which is 00000000...).

TEST TYPE

Specifies the type of test to be run. With each loopback test, data originates at the AI module and is looped to the particular test point. If the remote end device (the *far end*) can interpret the facility (or data link [DL] commands), the AI module automatically puts the remote device into loopback mode for the testing and returns it to operating mode after the test. If the remote end device cannot interpret DL commands, the *manu_lp* test—which requires that the remote device be put into loopback mode manually—can be run.

If a test is a total failure, the problem area is indicated after the response **DIAGNOSTICS EXITS**. If a test is a partial failure, error measurements are reported. Refer to the Test Results section.

- *dsu_farend*
  Tests the link quality between the AI-T1 and the remote data service unit/channel service unit (DSU/CSU). The module automatically puts the remote device into loopback mode for the testing and returns it to operating mode after the test.
- *jack_farend*
  Checks link quality between the AI-T1 and the remote T1 interface connector (smart jack). The module automatically puts the remote device into loopback mode for the testing and returns it to operating mode after the test.
- *line_farend*
  Tests the link quality between the AI-T3/AI-T3P and a router or other remote device. The module automatically puts the remote device into loopback mode for the testing and returns it to operating mode after the test.
- *line_lpbk*
  Puts the AI-T1 into remote loopback mode for testing at the far-end equipment. Any data received from the facility will be looped back.
- *lnkrev*
  Puts the AI-E1/AI-T1 or the AI-E3/AI-T3/AI-T3P into remote loopback mode for testing at the far-end equipment. Any data received from the facility will be looped back. For the
  AI-T1, the type of link reverse test is selected: *line_lpbk* or *payload_lpbk.*
- *local_lp*
  Specifies that data is to be looped from the AI-E1/AI-T1/AI-E3/AI-T3/AI-T3P module through its I/O board and back to the AI. Any error implies a local loopback test failure.
- *manu_lp*
  Checks link quality between the AI and any remote facility device that does not support DL commands. The remote device is put into loopback mode manually. When testing is completed, the remote device must be returned to normal mode.
- *mod_test*
  Checks various parts of AI module hardware. It includes boot checks and component and subsystem tests.
- *no_loop*
  Puts the local termination device on the facility into normal mode.
- *payld_farend*
  Verifies link quality between the AI-T1 and the remote end device. The module automatically puts the remote device into loopback mode and returns it to operating mode. This test could be used with other far-end line-loopback tests to determine the direction in which framing bit errors occur.
- *payload_lpbk*
  Puts the AI-T1 into remote loopback mode for testing at the far-end equipment. DS1 payload data received from the line is looped back with regenerated framing bits.

Prompted Entry: Running AI-E1 or AI-T1 Module Diagnostics

```
CC0> diagnose
OBJECT [...ai...]: ai
MODULE ADDRESS: 44
DIAGNOSTIC TYPE [pt_test, mod_test: +(pt_test)]: mod_test
<test results>
```

Prompted Entry: Running AI-E1 Port Diagnostics

```
CC0> diagnose
OBJECT [...ai...]: ai
MODULE ADDRESS: 42
DIAGNOSTIC TYPE [pt_test, mod_test: +(pt_test)]: +
PORT NUMBER [1-3]: 1
TEST TYPE [local_lp, lnkrev, no_loop, manu_lp: +(local_lp)]: +
DATA FORMAT [transparent, segment: +(transparent)]: transparent
TEST DURATION IN SECONDS [10 - 2400: +(10)]: +
TEST PATTERN [qrs, 1-in-8, all_ones, all zeroes: +(qrs)]: +
REPETITIONS [1-1000, or 'c' for continuous: +(1)]: +
<test results>
```

Prompted Entry: Running AI-T1 Port Diagnostics

```
CC0> diagnose
OBJECT [...ai...]: ai
MODULE ADDRESS: 44
DIAGNOSTIC TYPE [pt_test, mod_test: +(pt_test)]: pt_test
PORT NUMBER [1-4]: 1
TEST TYPE [local_lp, lnkrev, no_loop, jack_farend,
        dsu_farend, payld_farend, manu_lp: +(local_lp)]: +
DATA FORMAT [transparent, segment: +(segment)]: transparent
TEST DURATION IN SECONDS [10 - 2400: +(10)]: +
TEST PATTERN [qrs, 1-in-8, all_ones: +(qrs)]: +
REPETITIONS [1-1000, or 'c' for continuous: +(1)]: +
<test results>
```

Prompted Entry: Running AI-E3 Module and Port Diagnostics

```
CC0> diagnose
OBJECT [...ai...]: ai
MODULE ADDRESS: 45
TEST TYPE [mod_test, local_lp, lnkrev, no_loop,
        manu_lp: +(local_lp)]: +
TEST DURATION IN SECONDS [10 - 2400: +(10)]: +
REPETITIONS [1-1000, or 'c' for continuous: +(1)]: +
DISPLAY ERRORED DATA? [yes, no: +(no)]: +
<test results>
```

Prompted Entry: Running AI-T3 Module and Port Diagnostics

```
CC0> diagnose
OBJECT [...ai...]: ai
MODULE ADDRESS: 45
TEST TYPE [mod_test, local_lp, lnkrev, no_loop, line_farend,
        manu_lp: +(local_lp)]: +
TEST DURATION IN SECONDS [10 - 2400: +(10)]: +
REPETITIONS [1-1000, or 'c' for continuous: +(1)]: +
DISPLAY ERRORED DATA? [yes, no: +(no)]: +
<test results>
```

Prompted Entry: Running AI-T3P Module and Port Diagnostics

```
CC0> diagnose
OBJECT [...ai...]: ai
MODULE ADDRESS: 45
TEST TYPE [mod_test, local_lp, lnkrev, no_loop, line_farend,
        manu_lp: +(local_lp)]: +
TEST DURATION IN SECONDS [10 - 2400: +(10)]: +
REPETITIONS [1-1000, or 'c' for continuous: +(1)]: +
DISPLAY ERRORED DATA? [yes, no: +(no)]: +
<test results>
```

Test Results

Loopback test results for an AI port can be a total success, a total failure, or a partial failure. For a total success, system responses indicate that diagnostics were completed with no error count. For a partial failure, system responses indicate that diagnostics were completed with a stated error count. For a total failure, the system responds by exiting the diagnostics with an explanation. If the Delete key is pressed, the diagnostic exits and the **CC0>** prompt reappears.

If a test fails completely, a message such as the following appears:

```
XXX_XXX Diagnostic failed - incorrect I/O board in the slot
```

Refer to System Responses for a complete list of these messages.

To monitor facility performance more fully, error counts are provided for code violations (CV), line code violations (LCV), line errored seconds (LES), line severely errored seconds (LSES), severely errored framing seconds (SEFS), severely errored seconds (SES), and unavailable seconds (US). For E1, LCV, LES, and LSES do not apply.

For a description of these performance threshold parameters, see the *Data Networking Products Commands Reference*. For sample reports, see the Output Samples that follow.

If the **DATA FORMAT** specified is *transparent*, reports are provided for the physical layer only. If the **DATA FORMAT** specified is *segment*, reports are provided for physical and PLCP layers. In addition, if the response to the **DISPLAY ERRORED DATA** prompt is *yes*, the Control Computer prints an optional "Errored Segment Data Report."

The "Errored Segment Data Report" shows transmitted and received error segment data in hexadecimal notation. Each section of four lines, which is 104 bytes, represents one segment with errors. Lines beginning with **X** show *transmitted* data; lines beginning with **R** show *received* data. The *1* or *2* following an **X** or **R** indicates whether it is the first half (*1*) or the second half (*2*) of the segment.

Output Sample: AI-E1 Report Table If Data Format Is Transparent

```
<yy-mm-dd> <hh:mm:ss>   NODE=<name>

                AI-E1 DIAGNOSTIC REPORT
_____________________________________________________

DATA FORMAT:  TRANSPARENT    TEST DURATION: 10 SECONDS

PHYSICAL LAYER
_____________________

TYPE            ERROR
                COUNT
_____________________
CV                0
ES                0
SES               0
SEFS              0
UAS               0
```

Output Sample: AI-T1 Report Table If Data Format Is Transparent

```
<yy-mm-dd> <hh:mm:ss>   NODE=<name>

                AI-T1 DIAGNOSTIC REPORT
_____________________________________________________

DATA FORMAT:  TRANSPARENT    TEST DURATION: 10 SECONDS

PHYSICAL LAYER
_____________________

TYPE            ERROR
                COUNT
_____________________
LCV               0
LES               0
LSES              0
CV                0
ES                0
SES               0
SEFS              0
UAS               0
```

Output Sample: AI-E1 Report Table If Data Format Is Segment

```
<yy-mm-dd> <hh:mm:ss>   NODE=<name>

                AI-E1 DIAGNOSTIC REPORT
_____________________________________________________

DATA FORMAT: SEGMENT      TEST DURATION: 10 SECONDS

PHYSICAL LAYER
_____________________________________________________

TYPE             ERROR
                 COUNT
_____________________

CV               0
ES               0
SES              0
SEFS             0
UAS              0

PLCP LAYER
_____________________

TYPE             ERROR
                 COUNT
_____________________

CV               0
ES               0
SES              0
SEFS             0
UAS              0
```

Output Sample: AI-E3 Report Table If Data Format Is Segment

```
<yy-mm-dd> <hh:mm:ss>   NODE=<name>

                AI-E3 DIAGNOSTIC REPORT
_____________________________________________________

DATA FORMAT: SEGMENT      TEST DURATION: 10 SECONDS

PHYSICAL LAYER
_____________________________________________________

TYPE             ERROR
                 COUNT
_____________________

SEFS             0
UAS              0

PLCP LAYER
_____________________

TYPE             ERROR
                 COUNT
_____________________

CV               0
ES               0
SES              0
SEFS             0
UAS              0
```

Output Sample: AI-T1/T3/T3P Report Table If Data Format Is Segment

```
<yy-mm-dd> <hh:mm:ss>   NODE=<name>

                AI-T1/T3/T3P DIAGNOSTIC REPORT
_____________________________________________________________

DATA FORMAT: SEGMENT      TEST DURATION: 10 SECONDS

PHYSICAL LAYER
_____________________________________________________________

TYPE             ERROR
                 COUNT
_____________________

LCV              0
LES              0
LSES             0
CV               0
ES               0
SES              0
SEFS             0
UAS              0

PLCP LAYER
_____________________

TYPE             ERROR
                 COUNT
_____________________

CV               0
ES               0
SES              0
SEFS             0
UAS              0
```

Output Sample: Error Report If Data Format Is Segment

```
ERRORED SEGMENT DATA REPORT:
----------------------------------------------------------------
X1: 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040
R1: 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040
X2: 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040 4040
R2: 4040 4040 4040 4040 4040 4040 4000 4040 4040 4040 4040 4040 4040

X1: ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff
R1: ffff ffff efff ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff
X2: ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff
R2: ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff ffff

X1: 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242
R1: 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242
X2: 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242 4242
R2: 4242 4242 4242 4242 4243 4242 4242 4242 4242 4242 4242 4242 4242
```

In this sample screen, the second line in the second section beginning **`R1: ffff ffff efff`** shows a single-byte error: one byte in the header of the received data has been changed from **`ff`** to **`ef`** .

Contact your support organization if you receive this kind of error report.

dmeas ai

The **dmeas ai** command enables you to generate on-demand measurements reports for an in-service AI module. These reports contain traffic, performance, and utilization measurements for the module.

Scheduled measurements for an AI module are generated in machine-readable format only through *StarKeeper* II NMS.

Syntax

You can input **dmeas ai** in prompted or one-line entry.

```
CC0> dmeas
OBJECT [ai...]: ai
AI TYPE [e1, e3, t1, t3, or t3p]:
MODULE ADDRESS:
```

If AI TYPE is "e1":

```
PORT NUMBER [1-3] +(1-3)]:
```

If AI TYPE is "t1":

```
PORT NUMBER [1-4: +(1-4)]:
```

If AI TYPE is "e1", "e3," "t1", or "t3", or "t3p":

```
INTERVAL [current, previous: +(current)]:
```

Parameters

This section explains parameters used in the **dmeas ai** prompting sequence that differ from those used in **enter ai**. Refer to the Syntax section for the prompting sequence, system defaults, and parameter options.

INTERVAL

Specifies if the on-demand report is to be printed for the *current* or *previous* reporting interval. The *current* interval includes measurements collected for the portion of the quarter-hour (15-minutes) that is presently elapsing up to the time the report was requested; the *previous* interval includes measurements already collected for the prior quarter-hour; the quarter-hour interval coincides with quarter-hour boundaries. After requesting *current*, you may want to wait until the next quarter-hour period begins and request *previous* to obtain a report of the complete prior quarter-hour interval.

MODULE ADDRESS

A number identifying the node slot that the module occupies. If the module is an AI-T3P, the only valid address is the slot that the module is configured for.

Prompted Entry: Displaying AI-E1 Measurements

```
CC0> dmeas
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
MODULE ADDRESS: 42
PORT NUMBER [1-3: +(1-3)]: 1
INTERVAL [current, previous: +(current)]: +
<report output>
```

Prompted Entry: Displaying AI-T1 Measurements

```
CC0> dmeas
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t1
MODULE ADDRESS: 44
PORT NUMBER [1-4: +(1-4)]: 1
INTERVAL [current, previous: +(current)]: +
<report output>
```

Prompted Entry: Displaying AI-E3 Measurements

```
CC0> dmeas
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e3
MODULE ADDRESS: 46
INTERVAL [current, previous: +(current)]: +
<report output>
```

Prompted Entry: Displaying AI-T3 Measurements

```
CC0> dmeas
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3
MODULE ADDRESS: 45
INTERVAL [current, previous: +(current)]: +
<report output>
```

Prompted Entry: Displaying AI-T3P Measurements

```
CC0> dmeas
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3p
MODULE ADDRESS: 45
INTERVAL [current, previous: +(current)]: +
<report output>
```

One-line Entry/Output: Displaying AI-E1 Measurements for the Current Interval

```
CC0> dmeas aie1 43 1 current
   <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dmeas ai e1 42 1 current
   AI MEASUREMENTS - E1
MODULE ADDRESS:  42      yy-mm-dd  08:45 -----> 08:58
  <-- TO-NODE --->                      <-------- FM-NODE ------->
   BUFFER  BUFFER     CPU   CPU           BUFFER  BUFFER  BP
   UTIL    PEAK       UTIL  PEAK          UTIL    PEAK    PARITY
           UTIL             UTIL                  UTIL    ERROR
   44%     48%        30%   35%           35%     37%     2
MODULE ADDRESS:  42    PORT: 1    SPEED 2.0 Mb/s      (SIR = 1.5 MB/s)
  <--- RECEIVED BY PORT FM LINE ---->    <---- XMITTED FM PORT TO LINE ---->
   LINE  TOTAL     TOTAL      LINE        LINE  TOTAL     TOTAL      LINE
   UTIL  K BYTES   LINE       PEAK        UTIL  K BYTES   LINE       PEAK
                   SEGMENTS   UTIL                       SEGMENTS   UTIL
   15%   86501     14850000   16%         5%    251640    4320000    7%
                                          EGRESS    BUFFER  BUFFER
                                          CRC       UTIL    PEAK
                                          ERROR             UTIL
                                          0         0%      0%
*** FOR ADDITIONAL ON-DEMAND MEASUREMENTS USE STARKEEPER II NMS
CC0>
```

One-line Entry/Output: Displaying AI-T1 Measurements for the Current Interval

```
CC0> dmeas ai t1 44 1 current
   <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dmeas ai t1 8 1 current
   AI MEASUREMENTS - T1
MODULE ADDRESS:  8          91-06-12    17:00 -----> 17:15
  <-- TO-NODE --->                      <-------- FM-NODE ------->
   BUFFER  BUFFER     CPU   CPU           BUFFER  BUFFER  BP
   UTIL    PEAK       UTIL  PEAK          UTIL    PEAK    PARITY
           UTIL              UTIL                  UTIL    ERROR
   44%     48%        30%   35%           35%     37%     2
MODULE ADDRESS:   8    PORT: 1    SPEED 1.5 Mb/s (SIR = 1.2 Mb/s)
  <--- RECEIVED BY PORT FM LINE ---->    <---- XMITTED FM PORT TO LINE ---->
   LINE  TOTAL     TOTAL      LINE        LINE  TOTAL     TOTAL      LINE
   UTIL  K BYTES   LINE       PEAK        UTIL  K BYTES   LINE       PEAK
                   SEGMENTS   UTIL                       SEGMENTS   UTIL
   15%   86501     14850000   16%         5%    251640    4320000    7%
                                          EGRESS    BUFFER  BUFFER
                                          CRC       UTIL    PEAK
                                          ERROR             UTIL
                                          0         0%      0%
*** FOR ADDITIONAL ON-DEMAND MEASUREMENTS USE STARKEEPER II NMS
CC0>
```

One-line Entry/Output: Displaying AI-E3 Measurements for the Current Interval

```
CC0> dmeas ai e3 7 current
    <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dmeas ai e3  7 current
   AI MEASUREMENTS - E3
MODULE ADDRESS:    7          <yy-mm-dd> 14:00 -----> 14:02
 <-- TO-NODE --->                <-------- FM-NODE ------->
  BUFFER  BUFFER    CPU   CPU         BUFFER  BUFFER  BP
  UTIL    PEAK      UTIL  PEAK        UTIL    PEAK    PARITY
        UTIL          UTIL              UTIL    ERROR
    0%     0%       19%   20%         0%     0%    0
MODULE ADDRESS:   7
 RCV SPEED 34 Mb/s (SIR = 25Mb/s)       XMT SPEED 34 Mb/s (SIR = 25 Mb/s)
 <--- RECEIVED BY PORT FM LINE ---->   <---- XMITTED FM PORT TO LINE ---->
  LINE  TOTAL     TOTAL     LINE        LINE  TOTAL     TOTAL     LINE
  UTIL  K BYTES   LINE      PEAK        UTIL  K BYTES   LINE      PEAK
             SEGMENTS   UTIL                  SEGMENTS   UTIL
   13%  61482     1055479    UA        31%  149324    2563500    UA
                          EGRESS
                          CRC
                          ERROR
                          0
*** FOR ADDITIONAL ON-DEMAND MEASUREMENTS USE STARKEEPER II NMS
CC0>
```

One-line Entry/Output: Displaying AI-T3 Measurements for the Current Interval

```
CC0> dmeas ai t3 45 current
   <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dmeas ai t3 7 current
   AI MEASUREMENTS - T3
MODULE ADDRESS:  70       yy-mm-dd  15:30 -----> 15:36
  <-- TO-NODE --->                      <-------- FM-NODE ------->
   BUFFER  BUFFER     CPU   CPU           BUFFER  BUFFER  BP
   UTIL    PEAK       UTIL  PEAK          UTIL    PEAK    PARITY
           UTIL              UTIL                  UTIL    ERROR
     0%      0%       19%   20%             0%      0%    0
MODULE ADDRESS:  7
  RCV SPEED 45 Mb/s (SIR = 34 Mb/s)      XMT SPEED 45 Mb/s (SIR = 34 Mb/s)
  <--- RECEIVED BY PORT FM LINE ---->    <---- XMITTED FM PORT TO LINE ---->
   LINE  TOTAL     TOTAL      LINE        LINE  TOTAL     TOTAL      LINE
   UTIL  K BYTES   LINE       PEAK        UTIL  K BYTES   LINE       PEAK
                   SEGMENTS   UTIL                       SEGMENTS   UTIL
     0%  3702      63548        0%          0%  0         0          0%
                                          EGRESS
                                          CRC
                                          ERROR
                                          0
*** FOR ADDITIONAL ON-DEMAND MEASUREMENTS USE STARKEEPER II NMS
CC0>
```

One-line Entry/Output: Displaying AI-T3P Measurements for the Current Interval

```
CC0> dmeas ai t3p 45 current
   <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dmeas ai t3p 45 current
   AI MEASUREMENTS - T3P
MODULE ADDRESS:  45      yy-mm-dd   16:00 -----> 16:15
  <-- TO-NODE (ingress) --->             <-------- FM-NODE (egress) ------->
   BUFFER  BUFFER     CPU   CPU           BUFFER  BUFFER  CPU  CPU    BP
   UTIL    PEAK       UTIL  PEAK          UTIL    PEAK    UTIL PEAK   PARITY
           UTIL             UTIL                  UTIL         UTIL   ERROR
    40%    48%        55%   63%           60%     62%     54%  70%    5
  RCV SPEED 45 Mb/s (SIR = 34 Mb/s)      XMT SPEED 45 Mb/s (SIR = 34 Mb/s)
  <--- RECEIVED BY PORT FM LINE ---->    <---- XMITTED FM PORT TO LINE ---->
   LINE  TOTAL     TOTAL      LINE        LINE  TOTAL     TOTAL      LINE
   UTIL  K BYTES   LINE       PEAK        UTIL  K BYTES   LINE       PEAK
                   SEGMENTS   UTIL                       SEGMENTS   UTIL
   15%   757575    12340000   16%         5%    252525    567000     6%
                                          EGRESS
                                          CRC
                                          ERROR
                                          0
*** FOR ADDITIONAL ON-DEMAND MEASUREMENTS USE STARKEEPER II NMS
CC0>
```

Report Fields

This section explains report fields shown in the output of **dmeas ai**.

BP PARITY ERROR
The number of times that a backplane parity error was detected within the reported interval.

BUFFER PEAK UTIL
The 1-second peak utilization value for the data transport buffer within the reported interval. The to and from **(TO-NODE/FM-NODE)** values are reported separately.

BUFFER UTIL
The average utilization of the data transport buffer within the reported interval. The to and from **(TO-NODE/FM-NODE)** values are reported separately. On multiport AI modules (AI-E1/AI-T1), the **BUFFER UTIL** in the *from* port *to* line **(XMITTED FM PORT TO LINE)** direction is available for the port level.

CPU PEAK UTIL
The 15-second peak utilization value for the CPU within the reported interval. If the **AI TYPE** is *t3p*, the to and from **(TO-NODE/FM-NODE)** values are reported separately.

CPU UTIL
The average utilization of the CPU within the reported interval. If the **AI TYPE** is *t3p*, the to and from **(TO-NODE/FM-NODE)** values are reported separately.

Report Fields *(continued)*

EGRESS CRC ERROR

The number of times that an egress cyclic redundancy check (CRC) error is detected within the reported interval.

LINE PEAK UTIL

The 5-minute peak count of bytes received on the line within the reported interval. **PEAK** measurement for **LINE UTIL** is the 5-minute maximum value of line utilization within the reported interval. The to and from **(TO-NODE/FM-NODE)** values are reported separately.

The letters *UA* (unavailable) are displayed in two cases: when a module or port is first restored and the line peak utilization will not be calculated until a 5-minute boundary is crossed; and if the time is changed during an interval.

LINE UTIL

The fraction of traffic that occupied the line, compared to the full capacity of the line, expressed as a percent. Line utilization is given for the receive and transmit **("RECEIVED/XMITTED")** directions for the reported interval. To and from **(TO-NODE/FM-NODE)** values are reported separately.

The letters *UA* (unavailable) are displayed in two cases: when a module or port is first restored and the line utilization will not be calculated until a quarter-hour boundary is crossed; and if the time is changed during an interval.

L2_PDU CLNS SEGMENTS

The line segment count of the SMDS Connectionless traffic for the AI-T3P.

MODULE ADDRESS

The node slot number of the module for which measurements are being reported.

PORT

The number of the module port for which measurements are being reported.

RCV SPEED/XMT SPEED

The configured bits-per-second (bps) or speed of the line. For full-duplex lines, the speed is given in each direction. If the receive **(RCV)** and transmit **(XMT)** directions can be individually configured, **RCV SPEED** and **XMT SPEED** are shown. For the AI-E3, AI-T3, and AI-T3P, **RCV SPEED** is configured by selection of access class. The line speed used in the utilization calculation is the **XMT SPEED** .

SIR

The sustained information rate (SIR) is the effective speed of the user data.

Report Fields *(continued)*

TOTAL K BYTES

The number of thousands of 8-bit data units that occupy a line, including all overhead. **TOTAL K BYTES** is used to calculate line utilization; it is the count of bytes within the reported interval. The total is derived from the sum of the 15-minute line segments (each 15-minute interval is divided into three 5-minute line segments) multipled by the bytes per segment, divided by one thousand. In thousandths, the DS1 rate equals 57.9 bytes per segment; the DS3 rate equals 58.25 bytes per segment; the E1 rate equals 60.8 bytes per segment; the E3 rate equals 59.7 bytes per segment. The to and from **(TO-NODE/FM-NODE)** values are reported separately.

TOTAL LINE SEGMENTS

The total segment counts of data traffic on the line within the reported 15-minute interval. Line segment counts are port measurements for the AI-E1/AI-T1 and module measurements for the AI-E3/AI-T3. The to and from **(TO-NODE/FM-NODE)** values are reported separately.

dstat ai

The **dstat ai** command enables you to display the status of AI modules and ports. You can use this command to evaluate problems that may or may not be detected by the alarm system.

All hardware module data output during an iteration of **dstat module** is displayed as well as on-board software information.

No status report is generated by the **dstat ai** command if the AI module fails or its power-up self-test is in progress. Use the **dstat module** command in these cases to generate the hardware status report.

The generation of status packet information is contingent on the switch setting of the module mode switch:

- When an AI module is first installed in a Series M2 shelf and its mode switch is in the Enabl (enable) position (the normal operating mode), it does not generate any status packets until it completes its power-up self-test.
- When the AI module mode switch is in the Diag (diagnose) or Disab (disable) position, the module does not generate any status packets.
- When an AI module is reset or an attempt is made to restore an AI module to service after its mode switch is toggled from Enabl to Diag, it stops generating status packets.

Syntax

You can input **dstat ai** in prompted or one-line entry.

```
CC0> dstat
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]:
```

If AI TYPE is "e1" or "t1":

```
COMPONENT [module, port]:
MODULE ADDRESS:
```

If AI TYPE is "e1" and if COMPONENT is "port":

```
PORT NUMBER [1-3: +(1-3)]:
DETAIL [low, high, (+low)]:
```

If AI TYPE is "t1" and if COMPONENT is "port":

```
PORT NUMBER [1-4: +(1-4)]:
DETAIL [low, high: (+low)]:
```

If AI TYPE is "e3", "t3", or "t3p" or if AI TYPE is "e1" or "t1" and COMPONENT is "module":

```
MODULE ADDRESS:
DETAIL [low, high: (+low)]:
```

Parameters

This section explains parameters used in the **dstat ai** prompting sequence that differ from those used in **enter ai**. Refer to the Syntax section for the prompting sequence, system defaults, and parameter options.

COMPONENT

Specifies whether the component for which a report is to be generated is a *module* or *port*.

DETAIL

Specifies if the command output is to show a limited amount of information (*low* detail) or more information (*high* detail).

MODULE ADDRESS

A number that specifies the node slot that the module occupies. If **AI TYPE** is *t3p*, the module address entered must be the main (egress) board address of the AI-T3P module for which status of both boards is requested. The address of the second (ingress) board is an invalid entry. For **AI TYPEs** other than *t3p*, a single address, a range of addresses (x-y), a series of up to 10 addresses (x,y,z), or combinations (x-y,z) may be specified.

Prompted Entry: Displaying High Detail AI-E1 Module Status

```
CC0> dstat
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
COMPONENT [module, port]: module
MODULE ADDRESS: 43
DETAIL [low, high: +(low)]:
<report output>
```

Prompted Entry: Displaying High Detail AI-T1 Module Status

```
CC0> dstat
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t1
COMPONENT [module, port]: module
MODULE ADDRESS: 44
DETAIL [low, high: +(low)]:
<report output>
```

Prompted Entry: Displaying High Detail AI-E1 Port Status

```
CC0> dstat
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
COMPONENT [module, port]: port
MODULE ADDRESS: 43
PORT NUMBER [1-3: +(1-3)]: 1
DETAIL [low, high: (+low)]: high
<report output>
```

Prompted Entry: Displaying High Detail AI-T1 Port Status

```
CC0> dstat
OBJECT [...ai...]: ai
AI TYPE [e1, t1, t3, t3p]: t1
COMPONENT [module, port]: port
MODULE ADDRESS: 44
PORT NUMBER [1-4: +(1-4)]: 1
DETAIL [low, high: (+low)]: high
<report output>
```

Prompted Entry: Displaying High Detail AI-E3 Module Status

```
CC0> dstat
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e3
MODULE ADDRESS: 47
DETAIL [low, high: (+low)]: high
<report output>
```

Prompted Entry: Displaying High Detail AI-T3 Module Status

```
CC0> dstat
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3
MODULE ADDRESS: 45
DETAIL [low, high: (+low)]: high
<report output>
```

Prompted Entry: Displaying High Detail AI-T3P Module Status

```
CC0> dstat
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3p
MODULE ADDRESS: 45
DETAIL [low, high: (+low)]: high
<report output>
```

One-line Entry/Output: Displaying High Detail AI-E1 Module Status

```
CC0> dstat ai e1 module 43 high
    <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dstat ai e1 module 43 high
****************************** MODULE 43 *********************************
MODULE TYPE     SERVICE STATE   HARDWARE ERROR COUNT  SERIAL NUMBER
aie1            in service      3                     2350
LAST HARDWARE ALARM
Module was reset <yy-mm-dd> <hh:mm:ss>
LAST SOFTWARE ALARM
none
ONLINE  ENABLED  SELFTEST
yes     yes      pass
IO BOARD   IOB TEST   LOOPBK MODE
present    pass       no
---------------------------- HIGH DETAIL ----------------------------
MODULE  FIFO    FM NODE FM NODE SANITY
RESET   RESET   PARITY  OVERFLO ERROR
1       0       0       0       0
EXPECT  FULL    EMPTY
TYPE    PACKETS PACKETS
aie1    913     2
ACTUAL  ACTUAL  ACTUAL  ACTUAL  EXPECT  EXPECT  EXPECT  EXPECT
STAT1   STAT2   STAT3   STAT4   STAT1   STAT2   STAT3   STAT4
0       60      13      34      0       60      13      34
RANGE   BAD
ERRORS  SEGMENTS
0       0
CC0>
```

One-line Entry/Output: Displaying High Detail AI-T1 Module Status

```
CC0> dstat ai t1 module 9 high
    <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dstat ai t1 module 9 high
****************************** MODULE 9 **********************************
MODULE TYPE     SERVICE STATE   HARDWARE ERROR COUNT  SERIAL NUMBER
ait1            in service      3                     2378
LAST HARDWARE ALARM
Module was reset <yy-mm-dd> <hh:mm:ss>
LAST SOFTWARE ALARM
none
ONLINE  ENABLED  SELFTEST
yes     yes      pass
IO BOARD   IOB TEST   LOOPBK MODE
present    pass       no
----------------------------- HIGH DETAIL -----------------------------
MODULE  FIFO    FM NODE FM NODE SANITY
RESET   RESET   PARITY  OVERFLO ERROR
1       0       0       0       0
EXPECT  FULL    EMPTY
TYPE    PACKETS PACKETS
ait1    913     2
ACTUAL  ACTUAL  ACTUAL  ACTUAL  EXPECT  EXPECT  EXPECT  EXPECT
STAT1   STAT2   STAT3   STAT4   STAT1   STAT2   STAT3   STAT4
0       60      13      34      0       60      13      34
RANGE   BAD
ERRORS  SEGMENTS
0       0
CC0>
```

One-line Entry/Output: Displaying High Detail AI-E1 Port Status

```
CC0> dstat ai e1 port 43 1 high
   <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dstat ai e1 port 43 1 high
****************************** MODULE 43 *********************************
MODULE TYPE     SERVICE STATE   HARDWARE ERROR COUNT  SERIAL NUMBER
aie1            in service      3                     2670

LAST HARDWARE ALARM
LAST SOFTWARE ALARM
none

ONLINE  ENABLED  SELFTEST
yes     yes      pass

IO BOARD   IOB TEST   LOOPBK MODE
present    pass       no

----------------------------- HIGH DETAIL ------------------------------
MODULE  FIFO    FM NODE FM NODE SANITY
RESET   RESET   PARITY  OVERFLO ERROR
1       0       0       0       0

EXPECT  FULL    EMPTY
TYPE    PACKETS PACKETS
aie1    930     2

ACTUAL  ACTUAL  ACTUAL  ACTUAL  EXPECT  EXPECT  EXPECT  EXPECT
STAT1   STAT2   STAT3   STAT4   STAT1   STAT2   STAT3   STAT4
0       60      13      34      0       60      13      34

RANGE   BAD
ERRORS  SEGMENTS
0       0

****************************** MODULE 43 PORT 1 ***************************
LOOPBK            EXPECT            ACTUAL            OPERATING
MODE              SRVC STATE        SRVC STATE        STATE
no                in service        in service        up

----------------------------- HIGH DETAIL ------------------------------
LINE and FRAME Layer:
<-----------NEAR END------------>         <-------FAR END------>
LOSS OF     LOSS OF     ALARM IND          YELLOW
SIGNAL      FRAME       SIGNAL             ALARM
no          no          no                 no

PLCP Layer:
<-------NEAR END------>                    <-------FAR END------>
LOSS OF     EGRESS                         YELLOW     INGRESS
FRAME       LSS                            SIGNAL     LSS
no         connected                       no         connected

DQDB Status:
<-------NEAR END------>                    <-------FAR END------>
HEAD OF                                    HEAD OF
BUS                                        BUS
A                                          B

CC0>
```

One-line Entry/Output: Displaying High Detail AI-T1 Port Status

```
CC0> dstat ai t1 port 9 1 high
    <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dstat ai t1 port 9 1 high
****************************** MODULE 9 **********************************
MODULE TYPE     SERVICE STATE   HARDWARE ERROR COUNT  SERIAL NUMBER
ait1            in service      3                     2577
LAST HARDWARE ALARM
LAST SOFTWARE ALARM
none
ONLINE  ENABLED  SELFTEST
yes     yes      pass
IO BOARD   IOB TEST   LOOPBK MODE
present    pass       no
----------------------------- HIGH DETAIL -----------------------------
MODULE  FIFO    FM NODE FM NODE SANITY
RESET   RESET   PARITY  OVERFLO ERROR
1       0       0       0       0
EXPECT  FULL    EMPTY
TYPE    PACKETS PACKETS
ait1    930     2
ACTUAL  ACTUAL  ACTUAL  ACTUAL  EXPECT  EXPECT  EXPECT  EXPECT
STAT1   STAT2   STAT3   STAT4   STAT1   STAT2   STAT3   STAT4
0       60      13      34      0       60      13      34
RANGE   BAD
ERRORS  SEGMENTS
0       0
****************************** MODULE 9 PORT 1 ***************************
LOOPBK            EXPECT            ACTUAL            OPERATING
MODE              SRVC STATE        SRVC STATE        STATE
no                in service        in service        up
----------------------------- HIGH DETAIL -----------------------------
LINE and FRAME Layer:
<-----------NEAR END------------>        <-------FAR END------>
LOSS OF     LOSS OF     ALARM IND         YELLOW
SIGNAL      FRAME       SIGNAL            ALARM
no          no          no                no
PLCP Layer:
<-------NEAR END------>                   <-------FAR END------>
LOSS OF     EGRESS                        YELLOW     INGRESS
FRAME       LSS                           SIGNAL     LSS
no         connected                      no         connected
DQDB Status:
<-------NEAR END------>                   <-------FAR END------>
HEAD OF                                   HEAD OF
BUS                                       BUS
A                                         B
CC0>
```

One-line Entry/Output: Displaying High Detail AI-E3 Module Status

```
CC0> dstat ai e3 47 high
    <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dstat ai e3 47 high
****************************** MODULE 47 **********************************
MODULE TYPE     SERVICE STATE   HARDWARE ERROR COUNT  SERIAL NUMBER
aie3            in service      1                     2577
LAST HARDWARE ALARM
Module was reset  20:52
LAST SOFTWARE ALARM
Quarter-hourly threshold for Near End LCV exceeded    Error <yy-mm-dd> <hh:mm>
ONLINE  ENABLED  SELFTEST
yes     yes      pass
IO BOARD   IOB TEST   LOOPBK MODE
present    pass       no
----------------------------- HIGH DETAIL -----------------------------
MODULE  FIFO    FM NODE FM NODE SANITY
RESET   RESET   PARITY  OVERFLO ERROR
1       0       0       0       0
EXPECT  FULL    EMPTY
TYPE    PACKETS PACKETS
aie3    963     0
ACTUAL  ACTUAL  ACTUAL  ACTUAL  EXPECT  EXPECT  EXPECT  EXPECT
STAT1   STAT2   STAT3   STAT4   STAT1   STAT2   STAT3   STAT4
0       60      20      34      0       60      20      34
RANGE   BAD
ERRORS  SEGMENTS
0       0
****************************** MODULE 47 PORT 1 ******************************
LOOPBK            EXPECT           ACTUAL             OPERATING
MODE              SRVC STATE       SRVC STATE         STATE
no                in service       out of service     down
----------------------------- HIGH DETAIL -----------------------------
LINE and FRAME Layer:
<-----------NEAR END------------>        <-------FAR END------->
LOSS OF     LOSS OF     ALARM IND         YELLOW
SIGNAL      FRAME       SIGNAL            ALARM
no          no          no                no
PLCP Layer:
<-----------NEAR END------------>        <-------FAR END------->
LOSS OF     EGRESS                        YELLOW        INGRESS
FRAME       LSS                           SIGNAL        LSS
yes         down                          no
DQDB Status:
<-------NEAR END------>                   <-------FAR END------>
HEAD OF                                   HEAD OF
BUS                                       BUS
A                                         UA
CC0>
```

One-line Entry/Output: Displaying High Detail AI-T3 Module Status

```
CC0> dstat ai t3 7 high
    <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dstat ai t3 7 high
****************************** MODULE 7 **********************************
MODULE TYPE     SERVICE STATE   HARDWARE ERROR COUNT  SERIAL NUMBER
ait3            in service      1                     2577
LAST HARDWARE ALARM
Module was reset  20:52
LAST SOFTWARE ALARM
Quarter-hourly threshold for Near End LCV exceeded    Error: <yy-mm-dd> <hh:mm>
ONLINE  ENABLED  SELFTEST
yes     yes      pass
IO BOARD   IOB TEST   LOOPBK MODE
present    pass       no
----------------------------- HIGH DETAIL -----------------------------
MODULE  FIFO    FM NODE FM NODE SANITY
RESET   RESET   PARITY  OVERFLO ERROR
1       0       0       0       0
EXPECT  FULL    EMPTY
TYPE    PACKETS PACKETS
ait3    963     0
ACTUAL  ACTUAL  ACTUAL  ACTUAL  EXPECT  EXPECT  EXPECT  EXPECT
STAT1   STAT2   STAT3   STAT4   STAT1   STAT2   STAT3   STAT4
0       60      20      34      0       60      20      34
RANGE   BAD
ERRORS  SEGMENTS
0       0
****************************** MODULE 7 PORT LEVEL **********************
EXPECT           ACTUAL             OPERATING
SRVC STATE       SRVC STATE         STATE
in service       out of service     down
----------------------------- HIGH DETAIL -----------------------------
LINE and FRAME Layer:
<-----------NEAR END------------>         <-------FAR END------->
LOSS OF     LOSS OF     ALARM IND          YELLOW
SIGNAL      FRAME       SIGNAL             ALARM
no          no          no                 no
PLCP Layer:
<-----------NEAR END------------>         <-------FAR END------->
LOSS OF     EGRESS                         YELLOW        INGRESS
FRAME       LSS                            SIGNAL        LSS
yes         down                           no
DQDB Status:
<-------NEAR END------>                    <-------FAR END------>
HEAD OF                                    HEAD OF
BUS                                        BUS
A                                          UA
CC0>
```

One-line Entry/Output: Displaying High Detail AI-T3P Module Status

```
CC0> dstat ai t3p 7 high
    <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  dstat ai t3p 7 high
****************************** MODULE 7 **********************************
MODULE TYPE     SERVICE STATE   HARDWARE ERROR COUNT  SERIAL NUMBER
ait3            in service      1                     2577

LAST HARDWARE ALARM
Module was reset  20:52

LAST SOFTWARE ALARM
Quarter-hourly threshold for Near End LCV exceeded    Error <yy-mm-dd> <hh:mm>

EGRESS                                      INGRESS
ONLINE  ENABLED  SELFTEST                   ONLINE   ENABLED   SELFTEST
yes     yes      pass                       yes      yes       pass

IO BOARD   IOB TEST   LOOPBK MODE           IO BOARD IOB TEST  LOOPBK MODE
present    pass       no                    present  pass      no

------------------------ EGRESS HIGH DETAIL --------------------------
MODULE  FIFO    FM NODE FM NODE SANITY
RESET   RESET   PARITY  OVERFLO ERROR
1       0       0       0       0

EXPECT  FULL    EMPTY
TYPE    PACKETS PACKETS
ait3    963     0

ACTUAL  ACTUAL  ACTUAL  ACTUAL  EXPECT  EXPECT  EXPECT  EXPECT
STAT1   STAT2   STAT3   STAT4   STAT1   STAT2   STAT3   STAT4
0       60      20      34      0       60      20      34

RANGE   BAD
ERRORS  SEGMENTS
0       0

------------------------ INGRESS HIGH DETAIL --------------------------
MODULE  FIFO    FM NODE FM NODE SANITY
RESET   RESET   PARITY  OVERFLO ERROR
1       0       0       0       0

EXPECT  FULL    EMPTY
TYPE    PACKETS PACKETS
ait3    963     0

ACTUAL  ACTUAL  ACTUAL  ACTUAL  EXPECT  EXPECT  EXPECT  EXPECT
STAT1   STAT2   STAT3   STAT4   STAT1   STAT2   STAT3   STAT4
0       60      20      34      0       60      20      34

RANGE   BAD
ERRORS  SEGMENTS
0       0
****************************** MODULE 7 PORT LEVEL **********************
EXPECT           ACTUAL            OPERATING
SRVC STATE       SRVC STATE        STATE
in service       out of service    down
```

One-Line Entry/Output: Displaying High Detail AI-T3P Module Status *(continued)*

```
------------------------------ HIGH DETAIL -----------------------------
LINE and FRAME Layer:
<-----------NEAR END------------>         <-------FAR END------->
LOSS OF     LOSS OF     ALARM IND          YELLOW
SIGNAL      FRAME       SIGNAL             ALARM
no          no          no                 no
PLCP Layer:
<-----------NEAR END------------>         <-------FAR END------->
LOSS OF     EGRESS                         YELLOW        INGRESS
FRAME       LSS                            SIGNAL        LSS
yes         down                           no
DQDB Status:
<-------NEAR END------>                    <-------FAR END------>
HEAD OF                                    HEAD OF
BUS                                        BUS
A                                          UA
CC0>
```

Report Fields

References made to alarms in the following paragraphs refer to alarm messages described in the *Data Networking Products Messages Reference*.

In addition, *near-end equipment* refers to the Switching System Exchange Termination (SET); that is, the AI module residing in the node. *Far-end equipment* refers to the Subscriber Access Termination (SAT), or the other end of the SMDS local access system equipment.

ACTUAL SRVC STATE
The actual current service state of the port.

ACTUAL STAT1
The actual value of the first hardware status byte of the specified module's most currently received status packet. In some cases, the actual and expected values of **STAT1** differ.

ACTUAL STAT2
The actual value of the second software status byte of the most currently received status packet for the specified module. In some cases, the actual and expected values of **STAT2** differ. The processor number changes in each status packet.

ACTUAL STAT3
The actual value of the third hardware status byte of the specified module's most currently received status packet. In some cases, the actual and expected values of **STAT3** differ.

ACTUAL STAT4
The actual value of the fourth hardware status byte of the most currently received status packet for the specified module. In some cases, the actual and expected values of **STAT4** differ.

Report Fields *(continued)*

ALARM IND SIGNAL
Indicates whether (*yes* or *no*) the near-end equipment has output an alarm indication signal (AIS) for the incoming T1/T3 layer signal or whether this information is unavailable (*UA*).

BAD SEGMENTS
The count of segments with envelope parity errors transmitted by the module and detected by the Eswitch module. To determine if the module is defective, run diagnostics.

EGRESS LSS
Indicates whether the link status signal (LSS) of the PLCP path layer sent out by the near-end equipment is *down, up,* or *connected*; or whether this information is unavailable (*UA*). The **EGRESS LSS** becomes *UA* when the near-end equipment declares carrier failure alarms or the I/O board is absent or invalid.

EMPTY PACKETS
The number of empty status packets received. Empty packets are received when a module is not physically present in the specified shelf slot. See **EMPTY SLOT** alarm.

ENABLED
Indicates whether or not (*yes* or *no*) the module mode switch is enabled. The value of this field is determined only from status information. See **MODE SWITCH NOT ENABLED** alarm.

EXPECT SRVC STATE
The expected current service state of the port.

EXPECT STAT1
The expected status of the first hardware status byte for the module.

EXPECT STAT2
The expected status of the second software status byte for the module.

EXPECT STAT3
The expected value of the third hardware status byte for the module.

EXPECT STAT4
The expected value of the fourth hardware status byte for the module.

EXPECT TYPE
The expected hardware type of the module in the shelf slot. For in-service modules, the value of this field is dependent only on information the administrator enters into the database. For out-of-service modules, no status packets are generated.

FIFO RESET
The number of first-in, first-out (FIFO) synchronization problems (hardware problems) on the module. See **FIFO RESET** alarm.

Report Fields *(continued)*

FM NODE OVERFLO
The measure of any imbalance between the rate at which information arrives at a module and the rate at which the subscriber equipment processes that information. Overflow errors occur during typical operation and do not necessarily indicate a problem. See **FROM BUS OVERFLOW** alarm.

FM NODE PARITY
The number of packets going to or coming from the node that had parity errors.

FULL PACKETS
The number of status packets containing data that the Control Computer has received. Full packets are received only when a module is physically present in the specified shelf slot.

HARDWARE ERROR COUNT
An approximate number summarizing module errors detected since its last reboot (that is, error counts in other fields). A count of *3* or *4* indicates a normal level of error. Higher counts usually indicate a problem.

HEAD OF BUS
Indicates whether the *A* or *B* Distributed Queue Dual Bus (DQDB) is used by the near-end/far-end equipment for transmission across the Subscriber Network Interface (SNI) or whether this information is unavailable (*UA*).

The far-end **HEAD OF BUS** becomes *UA* when the near-end equipment declares carrier failure alarms or the I/O board is absent or invalid.

INGRESS LSS
Indicates whether the link status signal (LSS) of the PLCP path layer received from the far-end equipment is *down, up,* or *connected*; or whether this information is unavailable (*UA*).

IO BOARD
The status of the module I/O board is *present*, *absent*, or *invalid*.

IOB TEST
The status of the I/O board according to the module self-test. Status is reported as *pass* if the I/O board has passed the self-test; *fail* if the I/O board has failed the self-test; *n/a* if the I/O board is absent or not the valid type; or *not done* if the I/O board is installed after the module self-test is run. The I/O board self-test is run during power-up and when the module is reset or restored to service.

LAST HARDWARE ALARM
The module's last hardware alarm. This information, which is based on status packet data, is not stored across Control Computer reboots.

Report Fields *(continued)*

LAST SOFTWARE ALARM

The module's last alarm that it issued by itself. This information is not stored across module or Control Computer reboots. See **MODULE WAS RESET** alarm.

LOOPBK MODE

Indicates whether (*yes* or *no*) the module/port was left in remote loopback mode or whether this information is unavailable (*UA*). This field is *yes* if AI diagnostics were run and the *lnkrev* test was chosen but was not followed by a *no_loop* before the diagnostics ended.

LOSS OF FRAME

Indicates whether (*yes* or *no*) the near-end equipment has declared a loss of frame (LOF) or whether this information is unavailable (*UA*).

LOSS OF SIGNAL

Indicates whether (*yes* or *no*) the near-end equipment has declared a loss of signal (LOS) for the incoming T1/T3 layer signal or whether the information is unavailable (*UA*).

MODULE RESET

The number of module resets since the last reboot. For some modules, resets occur during normal operation.

MODULE TYPE

Indicates what module type is present. This field is determined from status packet information only and is independent of information supplied via **enter** and **delete**. This field is initialized to empty.

ONLINE

Indicates whether (*yes* or *no*) the module is on line. A status of *yes* is shown only if the green LED on the module is lit. This field is determined from status information only.

OPERATING STATE

Indicates whether the port is currently *up*, *down*, or *startup*. An AI port is *down* if a carrier failure alarm occurs, the port is manually removed from service, or the far-end link is out of service. If these three conditions do not occur, the operating state of an AI port is *up*. If the state is *startup*, it means that the port is still in startup mode and cannot transport data.

Report Fields *(continued)*

RANGE ERRORS

The count of segments transmitted by the module on a channel that is beyond the limit configured for the module. Bad segment counts might be attributed to a defective module that is corrupting the address field of the segments or to a channel configuration mismatch on the two sides of the trunk. To determine if the module is defective, run module diagnostics; to determine if a configuration mismatch has occurred, review the module configuration.

SANITY ERROR

A status packet flag has indicated that the module sanity timer went off. See **MODULE MALFUNCTION** and **WRONG MODULE TYPE** alarms.

SERIAL NUMBER

The unique factory-encoded number for each module accessing the backplane. Maintaining records with these numbers can help track circuit pack vintages.

SERVICE STATE

The current module service state. When a module is put into service via **restore**, this field is set to *in service*. When a module is taken out of service via **remove**, this field is set to *oos* (manual). If the alarm system takes a module out of service when it detects a problem, this field is set to *oos* (auto, fault).

YELLOW ALARM

Indicates whether (*yes* or *no*) the near-end equipment has received a T1/T3 layer yellow alarm from the far-end equipment or whether this information is unavailable (*UA*). A received yellow alarm implies that the far-end equipment detects an AIS, loss-of-signal, or out-of-frame/loss-of-frame failure.

YELLOW SIGNAL

Indicates whether (*yes* or *no*) the near-end equipment has received a PLCP layer yellow signal from the far-end equipment or whether this information is unavailable (*UA*). A received yellow signal implies that the far-end equipment detects a loss-of-frame failure in the PLCP layer.

enter ai

The **enter ai** command enables you to add AI module and port information into the database for an AI-E1 (*e1*), AI-T1 (*t1*), AI-E3 (*e3*), AI-T3 (*t3*), and AI-T3P (*t3p*).

The AI-E1 is a single-board module with an I/O board that supports three administrable ports. The AI-T1 is a single-board module with an I/O board that has four administrable ports. The AI-E3 and AI-T3 are single-board modules, each with an I/O board that has one port. The AI-T3P is a double-board module with two I/O boards that has one port. Unlike the AI-E1/AI-T1 ports, which are administered with the **enter** command at the **PORT NUMBER** prompt, the single port on the AI-E3/AI-T3/AI-T3P is automatically administered during module administration.

Syntax

You can input **enter ai** in prompted entry only. The sequence of prompts depends on your response to the **AI TYPE** and **COMPONENT** prompts. The defaults are shown in parentheses.

```
CC0> enter
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]:
```

If AI TYPE is "e1" or "t1":

```
COMPONENT [module, port]:

MODULE ADDRESS:
```

If COMPONENT is "module":

```
COMMENT [up to 60 chars double quoted, none: +(none)]:
DOWNLOAD SERVER [+(controller)]:
```

If DOWNLOAD SERVER is "controller" and if AI TYPE is "e1," "e3," "t1," or "t3":

```
SOFTWARE VERSION [+(standard)]:
```

If DOWNLOAD SERVER is "controller" and if AI TYPE is "t3p":

```
SOFTWARE VERSION [special, standard: +(standard)]:
```

If DOWNLOAD SERVER is not "controller" and if AI TYPE is "e1," "e3," "t1," or "t3":

```
SOFTWARE VERSION:
```

If AI TYPE is "t3p" and if SOFTWARE VERSION is "special":

```
EGRESS DOWNLOAD SERVER [+(controller)]:
```

If EGRESS DOWNLOAD SERVER is "controller":

```
EGRESS SOFTWARE VERSION [+(standard)]:
```

If EGRESS DOWNLOAD SERVER is not "controller:

```
EGRESS SOFTWARE VERSION:
```

If AI TYPE is "t3p" and if SOFTWARE VERSION is "special:"

```
INGRESS DOWNLOAD SERVER [+(controller)]:
```

If INGRESS DOWNLOAD SERVER is "controller":

```
INGRESS SOFTWARE VERSION [+(standard)]:
```

If INGRESS DOWNLOAD SERVER is not "controller":

```
INGRESS SOFTWARE VERSION:

SMDS BILLING DESTINATION 1 [+(none)]:
```

If SMDS BILLING DESTINATION 1 is not "none":

```
SMDS BILLING DESTINATION 2:
```

If AI TYPE is "t3" or "t3p":

```
ACCESS CLASS ID [1-5: +(1)]:
```

IF AI TYPE is "e3":

```
ACCESS CLASS ID [1-4: +(1)]:
```

If AI TYPE is "e1" or "t1" and COMPONENT is "module" or if AI TYPE is "e3", "t3", or "t3p":

```
MODULE MEASUREMENTS [yes, no: +(no)]:
```

If AI TYPE is "e3" :

```
THRESHOLD PROFILE ID [1-16, or default: +(default)]:
```

If AI TYPE is "t3" or "t3p":

```
THRESHOLD PROFILE ID [1-16, or default: +(default)]:
CBIT PARITY CODE VIOLATION MODE [off, on: +(off)]:
```

Command loops to MODULE ADDRESS prompt.

If AI TYPE is "e1" and if COMPONENT is "port":

```
PORT NUMBER [1-3]:
TRANSMIT REFERENCE CLOCK [facility, local: +(local)]:
THRESHOLD PROFILE ID [1-16, or default: +(default)]:
```

Command loops to PORT NUMBER prompt.

If AI TYPE is "t1" and if COMPONENT is "port":

```
PORT NUMBER [1-4]:
TRANSMIT REFERENCE CLOCK [facility, stratum: +(stratum)]:
THRESHOLD PROFILE ID [1-16, or default: +(default)]:
AI-CSU DISTANCE RANGE (FEET) [0-110, 110-220, 220-330, 330-440, 440-550,
                              550-660: +(0-110)]:
```

Command loops to PORT NUMBER prompt.

Parameters

This section explains parameters used in the **enter ai** prompting sequence. Refer to the Syntax section for the prompting sequence, system defaults, and parameter options.

ACCESS CLASS ID

If **AI TYPE** is *e3*, a number from *1* to *4*, or if **AI TYPE** is *t3* or *t3p*, a number from *1* to *5*, that specifies the value associated with a particular access class. The value represents the prescribed limit on the rate of sustained information transfer across the Subscriber Network Interface (SNI) from the Customer Premises Equipment (CPE) to the SMDS Switching System (SS) and the burstiness of the information transfer from the CPE to the SS. Class 1 is 4 Mbps, Class 2 is 10 Mbps, Class 3 is 16 Mbps, Class 4 is 25 Mbps, and Class 5 is 34 Mbps. The default value *1* represents the lowest bandwidth.

Parameters (*continued*)

AI-CSU DISTANCE RANGE

If **AI TYPE** is *t1* and if **COMPONENT** is *port*, the distance, expressed in feet, between the AI and the channel service unit (CSU), a device used for line equalization.

AI TYPE

Specifies if the type of AI being added to the database is an AI-E1 (*e1*), AI-T1 (*t1*), AI-E3 (*e3*), AI-T3 (*t3*), or AI-T3P (*t3p*).

CBIT PARITY CODE VIOLATION

If **AI TYPE** is *t3* or *t3p*, specifies if collection of code violations is *on* or *off*.

COMMENT

If **AI TYPE** is *e1* or *t1* and if **COMPONENT** is *module* or if **AI TYPE** is *e3*, *t3*, or *t3p*, an optional string of 1 to 60 characters, enclosed in double quotation marks, that specifies useful administrative information.

COMPONENT

If **AI TYPE** is *e1* or *t1*, specifies whether the hardware component to be entered is a *module* or *port*.

DOWNLOAD SERVER

If **AI TYPE** is *e1* or *t1* and if **COMPONENT** is *module* or if **AI TYPE** is *e3*, *t3*, or *t3p*, specifies the source of the software to be downloaded to the module. It must be a valid service address or the local *controller*. If **AI TYPE** is *t3p*, the **DOWNLOAD SERVER** must be *controller*. The subsequent **SOFTWARE VERSION** prompt is used to choose the actual **DOWNLOAD SERVER**. If **SOfTWARE VERSION** is *special*, the ingress and egress download servers/software versions must be specified.

EGRESS DOWNLOAD SERVER

If **AI TYPE** is *t3p* and the **SOFTWARE VERSION** is *special*, specifies the source of the software to be downloaded to the board handling egress traffic. If the **EGRESS DOWNLOAD SERVER** is *controller*, the default is *standard* for this prompt. Otherwise, enter the filename containing the appropriate software release.

EGRESS SOFTWARE VERSION

If **AI TYPE** is *t3p* and the **SOFTWARE VERSION** is *special*, specifies the software version filename to be downloaded to the board handling egress traffic.

INGRESS DOWNLOAD SERVER

If **AI TYPE** is *t3p* and the **SOFTWARE VERSION** is *special*, specifies the source of the software to be downloaded to the board handling ingress traffic.

INGRESS SOFTWARE VERSION

If **AI TYPE** is *t3p* and the **SOFTWARE VERSION** is *special*, specifies the software version filename to be downloaded to the board handling ingress traffic. If the **EGRESS DOWNLOAD SERVER** is *controller*, the default is *standard* for this prompt. Otherwise, enter the filename containing the appropriate software release.

Parameters (*continued*)

MODULE ADDRESS

A single number or set of numbers identifying the node slot that the AI occupies. Since the AI-T3P is a double-board module, it also occupies the node slot number that is one higher than the specified address. An AI-T3P cannot be administered in slot 12, 28, 64, or 60. If **AI TYPE** is *t3p*, the address entered must be for the lower numbered node slot (the egress board). **AI TYPE** is *e1* or *t1* and if **COMPONENT** is *module* or if **AI TYPE** is *e3*, *t3*, or *t3p*, a series of up to 10 addresses (x,y,z), or combinations (x-y,z) may be specified. If **AI TYPE** is *e1* or *t1* and if **COMPONENT** is *port*, only one module address can be entered.

MODULE MEASUREMENTS

If **AI TYPE** is *e1* or *t1* and if **COMPONENT** is *module* or if **AI TYPE** is *e3*, *t3*, or *t3p*, specifies whether (*yes* or *no*) measurements are sent to *StarKeeper* II NMS for the specified AI module.

PORT NUMBER

If **AI TYPE** is *e1* and if **COMPONENT** is *port*, a number from *1* to *3* that identifies a module port. A single or multiple port number entry is allowed. When entering multiple port numbers, all parameter options selected pertain to the ports specified.

If **AI TYPE** is *t1* and if **COMPONENT** is *port*, a number from *1* to *4* that identifies a module port. A single or multiple port number entry is allowed. When entering multiple port numbers, all parameter options selected pertain to the ports specified.

SMDS BILLING DESTINATION 1

If **AI TYPE** is *e1* or *t1* and if **COMPONENT** is *module* or if **AI TYPE** is *e3*, *t3*, or *t3p*, a string of 1 to 72 characters that specifies the address of the primary Billdats Network Server (a BNS-2000 UNIX® operating system host or hunt group address that is collecting SMDS billing data). A valid host address is one that is associated with a CPM module through a 2-way group. If SMDS billing is not being used, enter *none*. If *none* is entered, the **SMDS BILLING DESTINATION 2** prompt is not displayed.

SMDS BILLING DESTINATION 2

Specifies the address of the secondary Billdats Network Server. The secondary Billdats Network Server functions as a standby machine to maintain accurate SMDS billing data if the primary Billdats machine fails.

SOFTWARE VERSION

A string of 1 to 14 digits or characters specifying the **SOFTWARE VERSION** file name to be downloaded to the module. If **DOWNLOAD SERVER** is *controller*, the default is *standard*. If **DOWNLOAD SERVER** is not *controller*, enter the file name containing the appropriate software release.

THRESHOLD PROFILE ID

Specifies the profile identifier to be a number from *1* to *16* or the word *default* for an SNI. If **AI TYPE** is *e3*, *t3* or *t3p*, a **THRESHOLD PROFILE ID** can be specified for each module. If **AI TYPE** is *e1* or *t1*, a **THRESHOLD PROFILE ID** can be specified for each module port.

Parameters (*continued*)

TRANSMIT REFERENCE CLOCK

If **AI TYPE** is *t1* and if **COMPONENT** is *port*, specifies whether the CMC5B I/O board will derive its clocking from a *facility* clock or a Stratum 4 Clock (*stratum*).

If **AI TYPE** is *e1* and if **COMPONENT** is *port*, specifies whether the CMC8 I/O board will derive its clocking from a *facility* clock or a *local* clock.

Prompted Entry: Entering AI-E1 Module Information

```
CC0> enter
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
COMPONENT [module, port]: module
MODULE ADDRESS: 42
COMMENT [up to 60 chars double quoted, none: +(none)]:
"in Rm 26"
DOWNLOAD SERVER [+(controller)]: +
SOFTWARE VERSION [+(standard)]: +
SMDS BILLING DESTINATION 1 [+(none)]: <server1>
SMDS BILLING DESTINATION 2 [+(none)]: <server2>
MODULE MEASUREMENTS [yes, no: +(no)]: +
MODULE ADDRESS:    Delete
CC0>
```

Prompted Entry: Entering AI-T1 Module Information

```
CC0> enter
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t1
COMPONENT [module, port]: module
MODULE ADDRESS: 44
COMMENT [up to 60 chars double quoted, none: +(none)]:
"in Rm 303"
DOWNLOAD SERVER [+(controller)]: +
SOFTWARE VERSION [+(standard)]: +
SMDS BILLING DESTINATION 1 [+(none)]: <server1>
SMDS BILLING DESTINATION 2 [+(none)]: <server2>
MODULE MEASUREMENTS [yes, no: +(no)]: +
MODULE ADDRESS:    Delete
CC0>
```

Prompted Entry: Entering AI-E1 Port Information

```
CC0> enter
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
COMPONENT [module, port]: port
MODULE ADDRESS: 42
PORT NUMBER [1-3]: 1
TRANSMIT REFERENCE CLOCK [facility, local: +(local)]: +
THRESHOLD PROFILE ID [1-16, or default: +(default)]: +
PORT NUMBER:    Delete
CC0>
```

Prompted Entry: Entering AI-T1 Port Information

```
CC0> enter
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t1
COMPONENT [module, port]: port
MODULE ADDRESS: 44
PORT NUMBER [1-4]: 1
TRANSMIT REFERENCE CLOCK [facility, stratum: +(stratum)]: +
THRESHOLD PROFILE ID [1-16, or default: +(default)]: +
AI-CSU DISTANCE RANGE (FEET) [0-110, 110-220, 220-330, 330-440, 440-550,
                              550-660: +(0-110)]: +
PORT NUMBER:    Delete
CC0>
```

Prompted Entry: Entering AI-E3 Module Information

```
CC0> enter
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e3
MODULE ADDRESS: 47
COMMENT [up to 60 chars double quoted, none: +(none)]:
"in Rm 305"
DOWNLOAD SERVER [+(controller)]: +
SOFTWARE VERSION [+(standard)]: +
SMDS BILLING DESTINATION 1 [+(none)]: <server1>
SMDS BILLING DESTINATION 2 [+(none)]: <server2>
ACCESS CLASS ID [1-4: +(1)]: 2
MODULE MEASUREMENTS [yes, no: +(no)]: +
THRESHOLD PROFILE ID [1-16, or default: +(default)]: +
MODULE ADDRESS:    Delete
CC0>
```

Prompted Entry: Entering AI-T3 Module Information

```
CC0> enter
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3
MODULE ADDRESS: 45
COMMENT [up to 60 chars double quoted, none: +(none)]:
"in Rm 305"
DOWNLOAD SERVER [+(controller)]: +
SOFTWARE VERSION [+(standard)]: +
SMDS BILLING DESTINATION 1 [+(none)]: <server1>
SMDS BILLING DESTINATION 2 [+(none)]: <server2>
ACCESS CLASS ID [1-5: +(1)]: 2
MODULE MEASUREMENTS [yes, no: +(no)]: +
THRESHOLD PROFILE ID [1-16, or default: +(default)]: +
CBIT PARITY CODE VIOLATION MODE [off, on: +(off)]:
MODULE ADDRESS:    Delete
CC0>
```

Prompted Entry: Entering AI-T3P Module Information

```
CC0> enter
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3p
MODULE ADDRESS: 45
COMMENT [up to 60 chars double quoted, none: +(none)]:
"in Rm 305"
DOWNLOAD SERVER [+(controller)]: +
SOFTWARE VERSION [special, standard: +(standard)]: +
SMDS BILLING DESTINATION 1 [+(none)]: <server1>
SMDS BILLING DESTINATION 2 [+(none)]: <server2>
ACCESS CLASS ID [1-5: +(1)]: 2
MODULE MEASUREMENTS [yes, no: +(no)]: +
THRESHOLD PROFILE ID [1-16, or default: +(default)]: +
CBIT PARITY CODE VIOLATION MODE [off, on: +(off)]:
MODULE ADDRESS:    Delete
CC0>
```

remove ai

The **remove ai** command enables you to take an AI-E1/AI-T1 port or module or an AI-E3/AI-T3/AI-T3P module out of service. Removing an AI-E1/AI-T1 module from service with **remove ai** <**module**> automatically puts any in-service ports into the ready-for-service state.

If **COMPONENT** is *module* and the SMDS Billing Option is enabled, at least one port of an AI-E1 or AI-T1 module is enabled.

Syntax

You can input **remove ai** in prompted or one-line entry. If the SMDS Billing option is enabled and the network administrator opts to save the billing data, billing data will be processed in the background automatically. A module must be removed from service before performing any other administrative functions. Pressing Delete during the prompting sequence terminates the command.

```
CC0> remove
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]:
```

If AI TYPE is "e1" or "t1":

```
COMPONENT [module, port]:
```

If AI TYPE is "e1," "e3," "t1," "t3", or "t3p":

```
MODULE ADDRESS:
```

If AI TYPE is "e1" and if COMPONENT is "port":

```
PORT NUMBER [1-3]:
```

If AI TYPE is "t1" and if COMPONENT is "port":

```
PORT NUMBER [1-4]:
```

Parameters

Refer to the parameter definitions supplied in **enter ai**.

Prompted Entry: Removing an AI-T1 Port from Service

```
CC0> remove
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t1
COMPONENT [module, port]: port
MODULE ADDRESS: 44
PORT NUMBER: 1
CC0>
```

Prompted Entry: Removing an AI-E1 Port from Service

```
CC0> remove
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
COMPONENT [module, port]: port
MODULE ADDRESS: 43
PORT NUMBER: 1
```

Prompted Entry: Removing an AI-T1 Module from Service

```
CC0> remove
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t1
COMPONENT [module, port]: module
MODULE ADDRESS: 44
<system responses>
```

Prompted Entry: Removing an AI-E1 Module from Service

```
CC0> remove
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
COMPONENT [module, port]: module
MODULE ADDRESS: 43
<system responses>
```

Prompted Entry: Removing an AI-E3 Module from Service

```
CC0> remove
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e3
MODULE ADDRESS: 47
<system responses>
```

Prompted Entry: Removing an AI-T3 Module from Service

```
CC0> remove
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3
MODULE ADDRESS: 45
<system responses>
```

One-line Entries: Removing AI Modules from Service

```
CC0> remove ai e1 module 43
CC0> remove ai t1 module 44
CC0> remove ai e1 port 43 1
CC0> remove ai t1 port 44 1
CC0> remove ai e3 47
CC0> remove ai t3 45
CCO> remove ai t3p 46
```

restore ai

The **restore ai** command puts an AI module into service initially or after it has been removed from service manually (via **remove ai**) or automatically (by the system). In addition, **restore ai** also puts any out-of-service AI-E1/AI-T1 ports into service.

Once an AI module is restored, ready-for-service ports are automatically brought into service when appropriate. Ready-for-service ports are those ports that were in service before the module was taken out of service.

When the Series M2 Extension Shelf (where AI modules are installed) is out of service, the AI module and ports can only be restored to a ready-for-service (*rfs*) state. When the Extension Shelf is restored to service, any AI modules and ports in an *rfs* state will be restored automatically to full service.

An AI port without an assigned SNI cannot be restored to service.

When restoring multiple AI modules, the maximum number of modules that can be restored with one iteration of the **restore ai** command is *6*.

Syntax

You can input **restore ai** in prompted or one-line entry. To execute downloading of module software as a background process, press Delete only after the download has started. Pressing Delete during the prompting sequence terminates the command.

```
CC0> restore
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]:
```

If AI TYPE is "e1" or "t1":

```
COMPONENT [module, port]:

MODULE ADDRESS:
```

If AI TYPE is "e1" and if COMPONENT is "port":

```
PORT NUMBER [1-3]:
```

If AI TYPE is "t1" and if COMPONENT is "port":

```
PORT NUMBER [1-4]:
```

Parameters

Refer to the parameter definitions supplied in **enter ai**.

Prompted Entry: Restoring an AI-E1 Port to Service

```
CC0> restore
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
COMPONENT [module, port]: port
MODULE ADDRESS: 43
PORT NUMBER: 1
CC0>
```

Prompted Entry: Restoring an AI-T1 Port to Service

```
CC0> restore
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t1
COMPONENT [module, port]: port
MODULE ADDRESS: 44
PORT NUMBER: 1
CC0>
```

Prompted Entry: Restoring an AI-E1 Module to Service

```
CC0> restore
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e1
COMPONENT [module, port]: module
MODULE ADDRESS: 43
<system responses>
```

Prompted Entry: Restoring an AI-T1 Module to Service

```
CC0> restore
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t1
COMPONENT [module, port]: module
MODULE ADDRESS: 44
<system responses>
```

Prompted Entry: Restoring an AI-E3 Module to Service

```
CC0> restore
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: e3
MODULE ADDRESS: 47
<system responses>
```

Prompted Entry: Restoring an AI-T3 Module to Service

```
CC0> restore
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3
MODULE ADDRESS: 45
<system responses>
```

Prompted Entry: Restoring an AI-T3P Module to Service

```
CC0> restore
OBJECT [...ai...]: ai
AI TYPE [e1, e3, t1, t3, t3p]: t3p
MODULE ADDRESS: 45
<system responses>
```

One-line Entry/Output: Restoring an AI-E1 Module to Service

```
CC0> restore ai e1 module 43
Download in progress for module 43.
All downloads in progress.  Hit <DEL> to put process in background.
Download proceeding > > >  [Delete]
All downloads started will proceed in the background.
CC0>
```

One-line Entry/Output: Restoring an AI-T1 Module to Service

```
CC0> restore ai t1 module 44
Download in progress for module 44.
All downloads in progress.  Hit <DEL> to put process in background.
Download proceeding > > >  Delete
All downloads started will proceed in the background.
CC0>
```

One-line Entry/Output: Restoring an AI-E1 Port to Service

```
CC0> restore ai e1 44 4
Download in progress for module 44 port 4.
All downloads in progress.  Hit <DEL> to put process in background.
Download proceeding > > >  Delete
All downloads started will proceed in the background.
CC0>
```

One-line Entry/Output: Restoring an AI-T1 Port to Service

```
CC0> restore ai t1 44 4
Download in progress for module 44 port 4.
All downloads in progress.  Hit <DEL> to put process in background.
Download proceeding > > >  Delete
All downloads started will proceed in the background.
CC0>
```

One-line Entry/Output: Restoring an AI-E3 Module to Service

```
CC0> restore ai e3 47
Download in progress for module 47.
All downloads in progress.  Hit <DEL> to put process in background.
Download proceeding > > >  Delete
All downloads started will proceed in the background.
CC0>
```

One-line Entry/Output: Restoring an AI-T3 Module to Service

```
CC0> restore ai t3 45
Download in progress for module 45.
All downloads in progress.  Hit <DEL> to put process in background.
Download proceeding > > >  Delete
All downloads started will proceed in the background.
CC0>
```

One-line Entry/Output: Restoring an AI-T3P Module to Service

```
CC0> restore ai t3p 45
Download in progress for module 45.
All downloads in progress.  Hit <DEL> to put process in background.
Download proceeding > > >  Delete
All downloads started will proceed in the background.
CC0>
```

verify ai

The output of the **verify ai** command enables you to check existing database information for an AI module and any configured port, or for all AI modules and their configured ports.

Syntax

You can input **verify ai** in prompted or one-line entry.

```
CC0> verify
OBJECT [...ai...]: ai
MODULE ADDRESS [+(all)]:
```

Parameters

The **MODULE ADDRESS** parameter definition for **verify ai** is the same as that for **enter ai** with one exception: you can specify the word *all*, meaning every AI. If it is an AI-T3P module, the address of the lower slot (egress) board must be entered.

Prompted Entry: Verifying AI Information

```
CC0> verify
OBJECT [...ai...]: ai
MODULE ADDRESS [+(all)]: 9
<report output>
```

One-line Entry/Output: Verifying AI-E1 Information

```
CC0> verify ai 9
   <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  verify ai 9

   MODULE ADDRESS: 9 (number of shelf) 01
   MODULE TYPE: e1
   SERVICE STATE: in
   DOWNLOAD SERVER: controller
   VERSION: standard
   SMDS BILLING DESTINATION 1: <server1>
   SMDS BILLING DESTINATION 2: <server2>
   COMMENT: in Rm 303
   ENABLE MODULE MEASUREMENTS: yes

   PORT   TRANSMIT   THRESHOLD  SRVC
          CLOCK        PROF ID
      1   facility     default  out
CC0>
```

One-line Entry/Output: Verifying AI-T1 Information

```
CC0> verify ai 44
   <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  verify ai 44

   MODULE ADDRESS: 44
   MODULE TYPE: t1
   SERVICE STATE: in
   DOWNLOAD SERVER: controller
   VERSION: standard
   SMDS BILLING DESTINATION 1: <server1>
   SMDS BILLING DESTINATION 2: <server2>
   COMMENT: in Rm 303
   ENABLE MODULE MEASUREMENTS: yes

   PORT   TRANSMIT       THRESHOLD    SRVC       AI-CSU
          CLOCK            PROF ID           DISTANCE RANGE
      1   facility               1    out        110-220
CC0>
```

One-line Entry/Output: Verifying AI-E3 Information

```
CC0> verify ai 47
   <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  verify ai 47

   MODULE ADDRESS: 47
   MODULE TYPE: e3
   SERVICE STATE: out (manual)
   DOWNLOAD SERVER: controller
   VERSION: standard
   SMDS BILLING DESTINATION 1: <server1>
   SMDS BILLING DESTINATION 2: <server2>
   COMMENT: in Rm 305
   ENABLE MODULE MEASUREMENTS: no
   ACCESS CLASS ID: 2
   THRESHOLD PROFILE ID: 2
CC0>
```

One-line Entry/Output: Verifying AI-T3 Information

```
CC0> verify ai 45
   <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  verify ai 45

   MODULE ADDRESS: 45
   MODULE TYPE: t3
   SERVICE STATE: out (manual)
   DOWNLOAD SERVER: controller
   VERSION: standard
   SMDS BILLING DESTINATION 1: <server1>
   SMDS BILLING DESTINATION 2: <server2>
   COMMENT: in Rm 305
   ENABLE MODULE MEASUREMENTS: no
   ACCESS CLASS ID: 2
   THRESHOLD PROFILE ID: 2
   CBIT PARITY CODE VIOLATION MODE: off
CC0>
```

One-line Entry/Output: Verifying AI-T3P Information

```
CC0> verify ai 48
   <yy-mm-dd> <hh:mm:ss> NODE=<name>
M  verify ai 48

   MODULE ADDRESS: 48
   MODULE TYPE: t3p
   SERVICE STATE: out (manual)
   DOWNLOAD SERVER: controller
   VERSION: standard
   SMDS BILLING DESTINATION 1: <server1>
   SMDS BILLING DESTINATION 2: <server2>
   COMMENT: in Rm 305
   ENABLE MODULE MEASUREMENTS: no
   ACCESS CLASS ID: 2
   THRESHOLD PROFILE ID: 2
   CBIT PARITY CODE VIOLATION MODE: off
CC0>
```

Report Fields

This table correlates each report field heading shown in the output of **verify ai** to the parameter for which you are prompted in **enter ai** or **change ai**. The information beneath each report field heading reflects the parameter option specified in either command. *None* indicates that the parameter is not applicable or not used.

Report Field Name	Corresponding Parameter Name
ACCESS CLASS ID	ACCESS CLASS ID
AI-CSU DISTANCE RANGE	AI-CSU DISTANCE RANGE (FEET)
CBIT PARITY CODE VIOLATION MODE	CBIT PARITY CODE VIOLATION MODE
COMMENT	COMMENT
DOWNLOAD SERVER	DOWNLOAD SERVER
EGRESS DOWNLOAD SERVER	EGRESS DOWNLOAD SERVER
EGRESS SOFTWARE VERSION	EGRESS SOFTWARE VERSION
INGRESS DOWNLOAD SERVER	INGRESS DOWNLOAD SERVER
INGRESS SOFTWARE VERSION	INGRESS SOFTWARE VERSION
ENABLE MODULE MEASUREMENTS	MODULE MEASUREMENTS
MODULE ADDRESS	MODULE ADDRESS
MODULE TYPE	AI TYPE
PORT	PORT NUMBER
SERVICE STATE	None: module service state
SMDS BILLING DESTINATION 1	SMDS BILLING DESTINATION 1
SMDS BILLING DESTINATION 2	SMDS BILLING DESTINATION 2
SRVC	None: port service state
THRESHOLD PROF ID	THRESHOLD PROFILE ID
TRANSMIT CLOCK	TRANSMIT REFERENCE CLOCK
VERSION	SOFTWARE VERSION

System Responses

This section contains system responses for the **ai** commands. It is organized by the key phrase that prefaces each response: **COMMAND FAILED:, INFO:, INPUT ERROR:, REMOVE/RESTORE FAILED:, DIAGNOSTICS, WARNING:.**

Additional responses are listed under the section heading: **NO KEY PHRASE:** .

COMMAND FAILED:

Cannot obtain module type from DB
The module address specified is for an empty slot.

Link down at source AI.
The specified source address is unavailable because the link is down.

No ai modules are entered.
The specified module has not been administered in the database.

Shelf <num> is not in service, status is not available.
The module or module port status cannot be obtained because the specified shelf is not in service.

Too many parameters.
Re-enter the command with the correct parameter options.

INFO:

Cannot abort; <remove/restore> in progress.
The Delete key was pressed at the system console, but the **remove** or **restore** command process cannot be aborted at this point.

Change SMDS BILLING DESTINATIONs to valid addresses before enabling SNI SMDS billing option.
If one or both billing destinations is set to *none*, change *none* to a valid service address before enabling the SMDS billing option on the module.

Download failed for module <addr>
The specified module is configured in the database but is not physically installed or the specified module is performing a self-test (when the test is complete, retry the download).

INFO:

Download in progress for module <addr>.

To put the download process in the background, press the Delete key.

Process terminated (DEL received): remaining modules will not be restored.

The Delete key was pressed at the system console during the restore operation for an AI module.

Process terminated (DEL received); remaining ports will not be restored.

The Delete key was pressed at the system console during the restore operation for an AI-E1/AI-T1 port.

Both SMDS BILLING DESTINATIONs are set to none.

If **SMDS BILLING DESTINATION 1** is **SMDS BILLING DESTINATION 2** defaults will not be prompted.

SMDS billing data transfer in progress, module will be removed upon completion.

The AI module will be removed when the transfer of billing data is completed. Wait for the "Module removed" alarm to continue on this module.

INPUT ERROR:

AI is not allowed in concentrator.

An AI module can only reside in a Series M2 shelf.

Address <addr> cannot be the same as SMDS BILLING DESTINATION 1

SMDS BILLING DESTINATION 2 must always be a different service address.

Cannot <change/delete> the second board of a two-board module.

The second board of an AI-T3P module cannot be changed or deleted.

Cannot delete AI module <addr> while in service.

Database entries made for the specified AI cannot be deleted while the module is in service. Use **remove ai** to take the module out of service.

Cannot delete last port while module is in service.
Command did not execute.

Information on the last module port cannot be deleted while the module is still in service. Use **remove ai** to take the module out of service.

INPUT ERROR:

Cannot delete module <addr> <port <num>>; referenced by SNI.
Information on the specified module and/or module port cannot be deleted unless the information on its corresponding Subscriber Network Interface (SNI) has been deleted from the database through *StarKeeper* II NMS.

Cannot display status for the second board of a two board module.
The **dstat ai** command does not accept the address of the ingress board of an AI-T3P module as a valid entry.

Cannot verify second board of a two board module
The **verify ai** command does not accept the address of the ingress board of an AI-T3P module as a valid entry.

Destination address <addr> is invalid for source address.
The specified destination address does not correspond to the source address.

Download server <addr> is not a valid service address.
The specified address of the download server is invalid or was entered incorrectly.

Invalid Number: <num>
You entered a number that is incorrect or not allowed (for example: *-1*).

For SMDS BILLING DESTINATION 1/2, the service address must be associated with a CPM-HS module.
For SMDS BILLING DESTINATION 1/2, the service address must be associated with a single group.
For SMDS BILLING DESTINATION 1/2, the service address must be associated with a 2-way group.
For SMDS Billing DESTINATION 1/2, the address(es) entered must be associated with a single 2-way group, which in turn is associated with a CPM-HS module.

INPUT ERROR:

List not allowed: <num>
Only a single number, single address, or a range of numbers, can be entered.

Module address <addr> is empty. AI is expected.
A module is not physically installed in the specified module address.

Module address <addr> is not an <type> <module>.
The specified module address does not contain an AI module.

Module Does Not Exist: <addr>
Information is not entered in the database for the specified module address.

Module <addr> can't be deleted. It is referenced by the Stratum Four Clock
Information on the specified module cannot be deleted unless information on the Stratum 4 Clock is deleted from the database.

Module <addr> does not match AI type.
The module residing at the specified address does not match the AI type *<e1, e3, t1, t3, t3p>* administered in the database. Use **verify module** to check the type.

Module <addr> is a <type> module, ai expected.
The module specified is not an AI; it is the *type* indicated.

Module <addr> is downloading.
The module is downloading software. Wait a few minutes until the download is complete, then re-enter the command.

Module <addr> is in service. Remove before retrying command.
The module at the specified address must be removed from service with **remove ai** before database information can be deleted or changed.

Module <addr> is not an <e1, e3, t1, t3, t3p>.
The module at the specified address is a different type than that being entered.

Module <addr> is not configured. <Command did not execute.>
The module at the specified address is not entered in the database.

INPUT ERROR:

Module <addr> is not entered.
The module at the specified address is not configured in the database.

Module <addr> cannot be the main board address of an AI-T3P.
Module addresses 12, 28, 44, and 60 cannot be used to configure an AI-T3P module.

Module <addr> port <num> cannot be deleted. It is referenced by the Stratum Four.
Information on module ports that use the Stratum 4 Clock for timing cannot be deleted unless the clock information is deleted from the database.

Module <addr> <port <num>> is already entered.
The specified module port has already been configured.

Module <addr> port <num> is currently configured; all ports must be deleted before deleting module.
Information on module ports must be deleted before module information can be deleted.

Module <addr>, port <num> is not configured. <Command did not execute>.
The specified module port cannot be removed/restored to service or diagnosed because it is not administered in the database.

No module in slot <addr>
The specified module address (slot) is empty.

Not an Allowed value: <num>
The value specified is not within the allowed range.

Not unique enough.
The string input must be unique.

Number Expected: <input>
The indicated input is not a number.

Parameter out of Range: <num>
The number specified is not within the allowed range for the particular parameter.

Range not allowed: <num-num>
The numbers specified are not within the allowed range. Enter the correct range numbers and retry the command.

Range Specification Error: <input>
The specified range is not valid.

Slot is reserved: <addr>
The specified slot cannot be used to configure any module. It is reserved by the system.

INPUT ERROR:

SNI billing option is enabled, none is not allowed.
At least one SNI associated with this AI module has the SMDS billing option turned on, so *none* cannot be specified for an SMDS billing destination.

Threshold profile <ID num> does not exist.
The profile specified is not entered in the database.

Threshold profile does not match AI type.
The specified threshold profile does not match the AI type entered in the database.

REMOVE/RESTORE FAILED:

cannot assign ports for module <addr>. Reboot and try again.
If the message **no more ports** appears, the configuration has grown more than 10% since the last reboot. A single reboot allocates 10% more channels. If the same failure occurs after a reboot, the configuration is too large.

cannot assign process to port for module <addr>.
The port is assigned, but the Control Computer was unable to spawn a process for the port.

cannot get text file for module <addr>.
If the message **no such file or directory** appears, the file system on the generic disk is inconsistent. Refer to recovery procedures and use **fsck** to repair the damage or recover using a backup disk. If the message **out of memory** occurs, too many different call processors were active in the configuration. Remove all of one module type (for example, trunk modules, or TY modules) before retrying.

control computer in slot <addr>.
The module address specified is reserved for the Control Computer.

could not send message to config.
The remove/restore operation failed because it was unable to send a message to the configuration process.

inconsistent database entry for module <addr>. Delete and re-enter.
The remove/restore operation failed because the module at the specified address was inconsistently configured.

Module address <addr> contains a <type> module (<ai type> expected)
The remove/restore operation failed because the module at the specified address is not an AI.

REMOVE/RESTORE FAILED:

module <addr> is being downloaded.
The module in the specified address is downloading software. Retry the command later.

module <addr> is in loop-around mode.
The remove/restore operation failed because the module was left in loopback mode after diagnostics.

module <addr> port <num> is in loop-around mode.
The remove/restore operation failed because the module port was left in loopback mode after diagnostics.

module <addr> must have an sni entered.
The remove/restore operation failed because information on the specified module's corresponding Subscriber Network Interface (SNI) is not entered in the database.

module <addr> <port <num>> must have an sni entered.
The specified AI port cannot be removed/restored because information on the module's corresponding Subscriber Network Interface (SNI) is not entered in the database.

no switch memory available. Module <addr> cannot be restored.
The Control Computer cannot allocate the amount of switch memory the module requires. This occurs if all switch memory was allocated or if it was fragmented by removing and restoring several modules. Reboot the node so memory space can be reallocated in a contiguous block.

Port <num> on module <addr> is already in service/out of service.
The restore operation failed either because the specified port has been restored to service or the module is out of service.

Port <num> on module <addr> is already ready for service/out of service.
The restore operation failed because the port is currently in or out of service.

restore ai module <addr> failed
The restore operation failed either because there is no AI module physically installed at the specified address or the AI module in the specified address is running power-up self-tests.

Slot <addr> contains no module or module running power-up self-test. Please wait 60 seconds for self-test to complete before restoring again.
The node slot address is empty or the module is running a power-up self-test. Wait at least 60 seconds for the self-test to complete before attempting to restore module.

REMOVE/RESTORE FAILED:

software inconsistency for slot <module addr>.
The versions of software on the disk are incompatible.

Source address <addr> is not an address on this node.
The address specified is not a valid address on the node.

system too busy. Try again later.
The system is too busy to process any requests from the specified module.

unrecognized error code for module <addr>.
The remove/restore operation failed because it received an unrecognizable error from the specified module.

```
DIAGNOSTICS (occurs after command execution):

Boot tests in progress - . . .
Offline diagnostic boot test: <PASS/FAIL>

Offline module Diagnostics in progress - . . .
MAIN BOARD  <PASS/FAIL>
I/O BOARD   <PASS/FAIL>
             Incorrect I/O board.
             I/O Board failed diagnostics.
             I/O Board not present.
DIAGNOSTIC COMPLETED.
```

The previous responses indicate that the named module-level diagnostic is in progress and whether it passed or failed. If the test failed, additional responses on the status of the I/O board are supplied.

```
Diagnose not completed -
  Command cannot be sent to module <addr>.
  Control computer did not respond.  Try again later.
  DIAGNOSTIC EXIT DUE TO DELETE
  Port <num> must be out-of-service for loop-around diagnostic.
  System too busy to process command.  Try again later.
```

The previous responses indicate that the diagnostic process could not complete because of one of the stated reasons.

```
Diagnostic failed -
  cannot put far end device into loopback mode.
  cannot put far end DSU/CSU into loopback mode.
  cannot put far end into payload loopback mode.
  cannot put far end smart jack into loopback mode.
  CF Alarms - LOF PLOF
```

AI-CSU distance does not match loopback distance.

```
  incorrect I/O board in the slot.
  I/O board failed diagnostic.
  I/O board not present.
  the far end device is not in the loopback mode.
```

The previous responses indicate the reason the loopback diagnostic failed. Most responses reveal an I/O board problem or indicate that the device at the far end of the transmission path could not be put into loopback mode. If the device at the far end cannot interpret data link (DL) commands, the AI module cannot put it into loopback mode automatically. Run the *manu_lp* test for devices that must be put into loopback mode manually.

WARNING:

Download server <addr> is not a valid service address.
The address entered is not valid. Enter the correct service address and re-enter the command.

Must be controller for AI-T3P at this prompt.
The input to the **DOWNLOAD SERVER** prompt for an AI-T3P module must be *controller*. Any other entry is treated as *controller* with this warning. To use any other host machine as the download server, enter *special* at the **SOFTWARE VERSION** prompt, then the egress/ingress download server/software version prompts will be displayed.

Stratum Four is not <entered/enabled>.
The Stratum 4 Clock has not been administered in the database or it is out of service. Use **restore ssm4/str4** to put the clock back into service.

NO KEY PHRASE:

DATABASE BEING MODIFIED - TRY AGAIN LATER
The command process cannot continue because the database is being changed. Wait and then re-enter the command.

Measurements not available for AI <addr>.
Measurements data is not currently available for the specified module.

Module <address> <addr> is not an AI module.
The specified module address does not contain an AI module.

Module <addr> is already <in service/out of service>.
The specified module cannot be removed from or restored to service because it is already in service or out of service.

Port <num> on module <addr> is already <in/out of/ready for> service.
The specified module port cannot be put into the indicated service state because it is currently in that state.

SERIOUS DATABASE TRANSACTION PROBLEM - UPDATE NOT ACCEPTED
The command process cannot continue because of a critical problem in the database. Contact your local support group.

Appendix.
AI Database Entry Forms

This appendix contains sample database entry forms to use when initially entering information on Access Interface (AI) modules in the database or when making any extensive changes. Refer to the **AI Administration** and **AI Commands** chapters for information needed to fill in these forms.

Companion entry forms for the other interface modules placed in the node shelves are in the appendix of each hardware module reference guide.

After configuration information is entered in the database, save these forms for use in troubleshooting.

The sample database entry forms in this appendix are:

Each form lists the prompts that appear when the **enter** command is used, and the values (or range of values) that can be entered in response. Default values are shown in *italics*.

FORM A-1. Entering an AI-E1 Module

AI TYPE [*e1*, e3, t1, t3, t3p]		
COMPONENT [*module*]	module	module
MODULE ADDRESS		
COMMENT [up to 60 chars double quoted, *none*]		
DOWNLOAD SERVER [*controller*]		
SOFTWARE VERSION [*standard*]		
If DOWNLOAD SERVER is not *controller*: **SOFTWARE VERSION**		
SMDS BILLING DESTINATION 1 [*none*]		
If SMDS BILLING DESTINATION 1 is not *none* **SMDS BILLING DESTINATION 2**		
MODULE MEASUREMENTS [yes, *no*]		

FORM A-2. Entering an AI-E1 Port

AI TYPE [*e1*, e3, t1, t3, t3p]		
COMPONENT [module, *port*]	port	port
MODULE ADDRESS		
PORT NUMBER [1-3]		
TRANSMIT REFERENCE CLOCK [facility, *local*]		
THRESHOLD PROFILE ID [1-16, *default*]		

FORM A-3. Entering an AI-E3 Module

AI TYPE [e1, *e3*, t1, t3, t3p]		
MODULE ADDRESS		
COMMENT [up to 60 chars double quoted, *none*]		
DOWNLOAD SERVER [*controller*]		
SOFTWARE VERSION [*standard*]		
If DOWNLOAD SERVER is not *controller* **SOFTWARE VERSION**		
ACCESS CLASS ID [1-4, *1*]		
SMDS BILLING DESTINATION 1 [*none*]		
If SMDS BILLING DESTINATION 1 is not *none* **SMDS BILLING DESTINATION 2**		
MODULE MEASUREMENTS [yes, *no*]		
THRESHOLD PROFILE ID [1-16, *default*]		

FORM A-4. Entering an AI-T1 Module

AI TYPE [e1, e3, *t1*, t3, t3p]		
COMPONENT [*module*]	module	module
MODULE ADDRESS		
COMMENT [up to 60 chars double quoted, *none*]		
DOWNLOAD SERVER [*controller*]		
SOFTWARE VERSION [*standard*]		
If DOWNLOAD SERVER is not *controller*: **SOFTWARE VERSION**		
SMDS BILLING DESTINATION 1 [*none*]		
If SMDS BILLING DESTINATION 1 is not *none* **SMDS BILLING DESTINATION 2**		
MODULE MEASUREMENTS [yes, *no*]		

FORM A-5. Entering an AI-T1 Port

AI TYPE [e1, e3, *t1*, t3, t3p]		
COMPONENT [module, *port*]	port	port
MODULE ADDRESS		
PORT NUMBER [1-4]		
TRANSMIT REFERENCE CLOCK [*facility*, stratum]		
THRESHOLD PROFILE ID [1-16, *default*]		
AI-CSU DISTANCE RANGE (FEET) [*0-110*, 110-220, 220-330, 330-440, 440-550, 550-660]		

FORM A-6. Entering an AI-T3 Module

AI TYPE [e1, e3, t1, *t3*, t3p]		
MODULE ADDRESS		
COMMENT [up to 60 chars double quoted, *none*]		
DOWNLOAD SERVER [*controller*]		
SOFTWARE VERSION [*standard*]		
If DOWNLOAD SERVER is not *controller* **SOFTWARE VERSION**		
SMDS BILLING DESTINATION 1 [*none*]		
If SMDS BILLING DESTINATION 1 is not *none* **SMDS BILLING DESTINATION 2**		
ACCESS CLASS ID [1-5, *1*]		
MODULE MEASUREMENTS [yes, *no*]		
THRESHOLD PROFILE ID [1-16, *default*]		
CBIT PARITY CODE VIOLATION MODE [off, *on*]		

FORM A-7. Entering an AI-T3P Module

AI TYPE [e1, e3, t1, t3, *t3p*]		
MODULE ADDRESS		
COMMENT [up to 60 chars double quoted, *none*]		
DOWNLOAD SERVER [*controller*]		
SOFTWARE VERSION [special, *standard*]		
If SOFTWARE VERSION is *special* **EGRESS DOWNLOAD SERVER** [*controller*]		
EGRESS SOFTWARE VERSION [*standard*]		
If EGRESS DOWNLOAD SERVER is not *controller* **EGRESS SOFTWARE VERSION:**		
INGRESS DOWNLOAD SERVER [*controller*]		
INGRESS SOFTWARE VERSION [*standard*]		
If INGRESS DOWNLOAD SERVER is not *controller* **INGRESS SOFTWARE VERSION**		
SMDS BILLING DESTINATION 1 [*none*]		
If SMDS BILLING DESTINATION 1 is not *none* **SMDS BILLING DESTINATION 2**		
ACCESS CLASS ID [1-5, *1*]		
MODULE MEASUREMENTS [yes, *no*]		

FORM A-7. Entering an AI-T3P Module (continued)

THRESHOLD PROFILE ID [1-16, *default*]		
CBIT PARITY CODE VIOLATION MODE [off, *on*]		

Index

B

C

D

E

F

G

H

I

J

L

M

S

T

U

V

W

Y