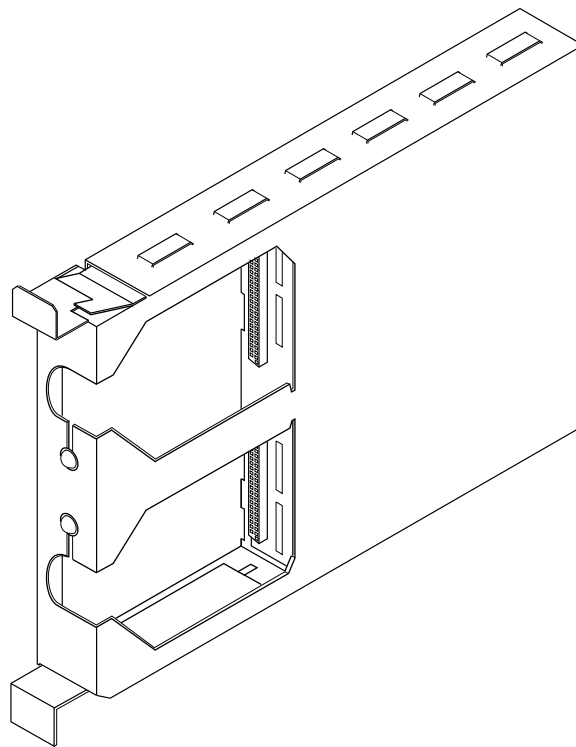


This document describes the 8-bit I/O module (see Figure 1). It explains how to install the I/O module in the BA356 shelf, and how to set the shelf small computer system interface (SCSI) addresses. The basic documentation set for the I/O module is *StorageWorks Solutions, 7 Device, 16-Bit SBB Shelf (BA356-S series) User's Guide* (EK-BA356-UG. B01).

Figure 1 8-Bit I/O Module



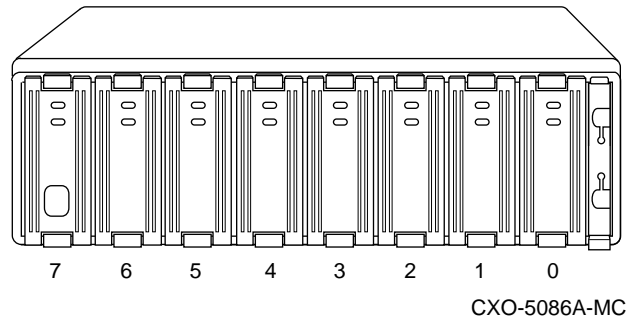
CXO-4821A-MC

The I/O module employs active circuitry to provide the following features to the BA356-S series StorageWorks™ Building Blocks (SBB) shelf:

- Ambient air overtemperature sensing and indication
- 8-bit data bus connections to external units
- Active, automatic bus termination
- Shelf device address assignment
- Blower fault indicators
- Blower speed control

The 8-Bit I/O module is located on the right side of the shelf next to slot 0 (see Figure 2).

Figure 2 BA356 Shelf with 8-Bit I/O Module

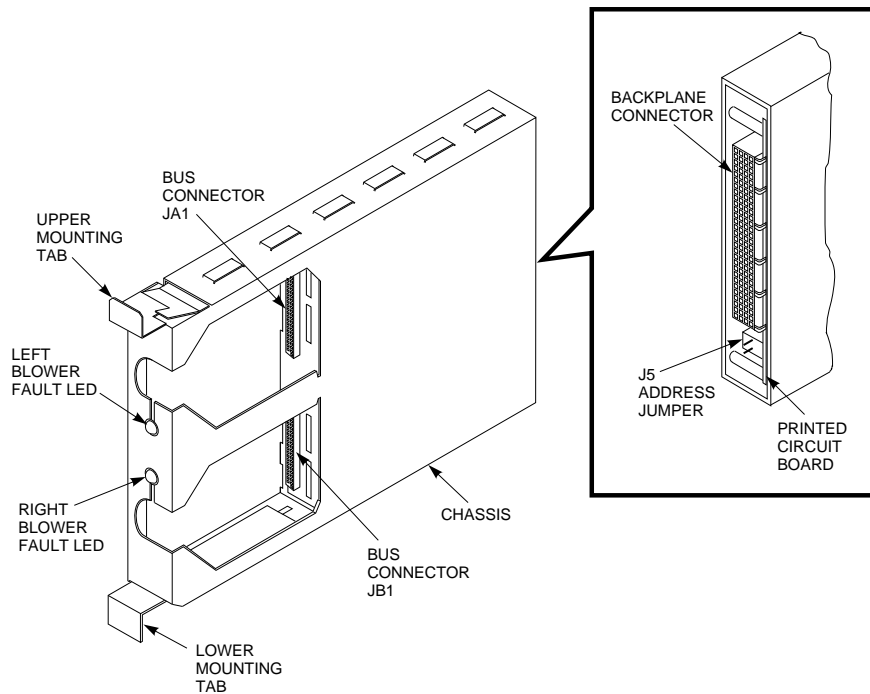


On the front of the I/O module (see Figure 3) are two 50-pin female connectors: bus connector JA1, the data input connector and bus connector JB1, the data output connector.

Guides are embossed on the top and bottom of the I/O module to conform to slots built into the top and bottom of the shelf slot, that permit centering the module in the shelf slot. Two spring-steel mounting tabs lock into ledges molded into the top and bottom of the shelf secure the I/O module. Squeeze the mounting tabs together to pull the I/O module out of the shelf slot

The upper LED indicates that the left (as viewed from the front of the shelf) blower motor has failed. The lower LED indicates that the right blower motor has failed. Fans at the rear of the shelf draw air from the front to cool the I/O module.

Figure 3 I/O Module Features



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The I/O module provides external connection for the two 16-bit shelf buses. The backplane connector on the rear of the I/O module (see Figure 3) routes the bus and control signals from the shelf backplane to the I/O module circuits. These circuits connect the lower eight bits (0 through 7) of bus A to external bus connector JA1 and the lower eight bits of bus B to external bus connector JB1.

The I/O module provides both active and passive bus termination for the two 16-bit shelf buses. The upper eight bits (8 through 15) of each bus are passively terminated by termination resistors. These data lines do not pass to the external bus connectors (JA1 and JB1). The lower eight bits (0 through 7) of SCSI bus B are actively terminated. These data lines are terminated as long as there is no connection to JB1. If JB1 is connected to a SCSI device, the active terminators are disabled and these data lines pass through JB1.

The I/O module determines the SCSI address for each slot in the shelf. This is accomplished by either installing or not installing the address jumper (J5) on the address pins at the rear of the I/O module. The location of J5 is shown in Figure 3. Shelf slot addresses are determined as shown in Table 1.

Table 1 Device Address Configurations

Bus Address Jumper J5	Resultant Device Addresses
	Slot 6 → Slot 0
Not installed	6 5 4 3 2 1 0
Installed	6 5 5 3 3 1 1

The I/O module informs the controller when the I/O module is being removed from or inserted into the shelf, thus allowing a warm swap of the I/O module.

The I/O module regulates the air temperature in the shelf. Air temperature and motor status are indicated by the blower fault LEDs (see Figure 3). An ambient air temperature exceeding a preset value causes both blower fault LEDs to light and the blower motors to run at high speed. This condition does not cause the SHELF_OK LED on the power supply to light.

Bus connectors JA1 and JB1 are used to connect to external SCSI buses. These connectors are 50-pin, high-density, female connectors. The I/O module may be connected as either a single bus or dual bus configuration.

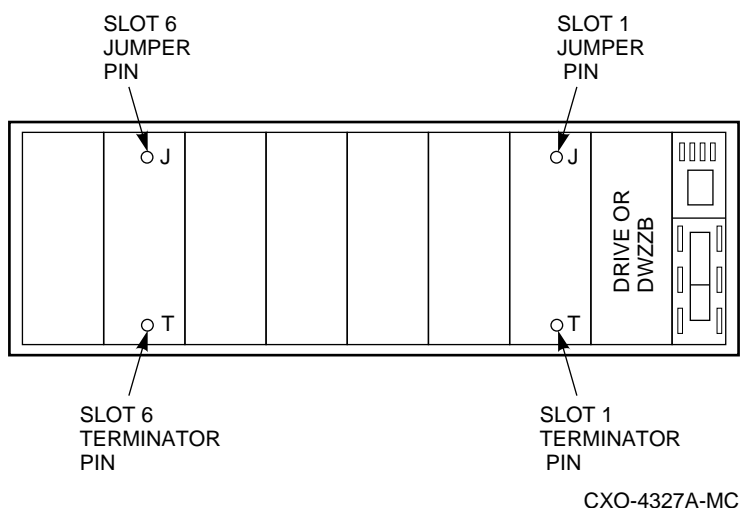
Connector JA1 is the input connector. Connector JB1 is either the output connector to another SCSI device, or it has no connection and the I/O module provides internal bus termination for the shelf.

Connector JA1 is the I/O connector for bus A, which consists of slots 0, 2, 4, and 6 when the jumper is in place. Connector JB1 is the I/O connector for bus B, which consists of slots 1, 3, and 5 when the terminator is installed in slot 6 on the rear of the shelf.

There are three important considerations for all SCSI buses. The first two considerations are the shelf jumper and the terminator. Each bus requires a terminator, whether internal to the I/O module or a separate terminator. Figure 4 shows the backplane location for the jumper (J) and the optional terminator(T). The jumper and terminator connectors are mounted on the rear of the backplane.

The third consideration is to make sure that the host controller is configured to provide term-power for SCSI operation. Either install a jumper on the controller to enable term-power or use the software setup utility to enable term-power. (For further information, refer to the applicable controller installation documentation.)

Figure 4 BA356–SB 16-Bit Backplane Termination



When installed, the terminator or jumper position can be determined from the front of the shelf by removing the StorageWorks™ (SBBs) in slot 1 and 6. An indicator pin protruding through the backplane in the T position in the bottom of the slot indicates a terminator is installed in that position. An indicator pin protruding through the J position in the top of the slot indicates a jumper is installed in that position.

Note

The terminator module is used in a dual bus configuration or when using a DWZZB–VW without a I/O module.

When configured as a single bus, a jumper module is required in slot 6 and the shelf termination is provided in the I/O module at the end of the bus. When configured as a dual bus, the optional terminator module is required in slot 6.

The I/O module terminator is automatically disabled when a cable is connected between the I/O module JB1 and a SCSI controller or second shelf.

Table 2 defines the maximum lengths of StorageWorks SCSI buses as measured between the two bus terminators. All bus lengths are rounded off to the nearest tenth of a unit.

Table 2 SCSI Bus Parameters

Bus Type	Mega Transfer per Second	Mega B/S	Length Meters	Length Feet	Supported Shelves
16-bit, single-ended	10	20	3.0	9.8	2
16-bit, differential with a DWZZB–VW	10	20	25.0	82.0	2*

* Cable connected in front of DWZZB–VW.

The total length of the SCSI bus is critical. The components of bus length are as follows:

- Shelf backplane
- Controller backplane
- SCSI cables connecting the **host**, or **controller**, and the BA356 shelf

The 1 meter length of the SBB shelf SCSI bus is measured from the input connector JA1 to the bus terminator in the I/O module.

Note

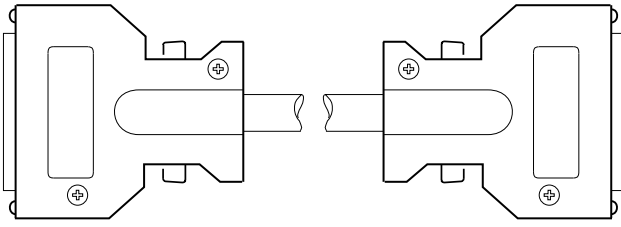
Adding or removing devices to a shelf *does not* change the length of the shelf bus. The only way to change the length of the shelf SCSI bus is to remove the jumper module and reconfigure as a dual bus.

The input and output cables on the SCSI bus connect to the two connectors on the front of the I/O module. The upper connector JA1 is a 50-pin, high-density, female, input connector. The lower connector JB1 is a 50-pin, high-density, female, output connector. In dual bus configurations, JB1 functions as an input connector to the second bus.

The BN21H-Series cables shown and described in Table 3. These cables are typically used to connect SBB shelves to the following:

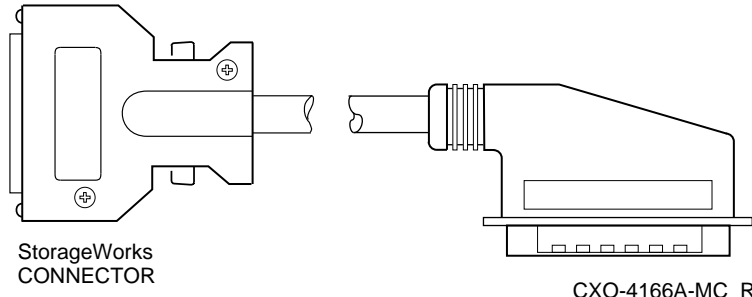
- Other SBB shelves
- SCSI adapters , such as:
 - KZMSA, an XMI to SCSI adapter
 - PMAZ-AA and PMAZ-AB
 - K.scsi

Table 3 BN21H-Series Cables

Cable Description	Meters	Feet	Order No
 <p style="text-align: center;">StorageWorks CONNECTOR</p> <p style="text-align: center;">CXO-4165A-MC_R</p>			
Standard cable, 50-conductor	0.3	1.0	BN21H-0C
Two 50-pin, high-density, male, straight connectors	0.5	1.6	BN21H-0E
with thumb latches	1.0	3.3	BN21H-01
	1.5	4.9	BN21H-1E
	2.0	6.6	BN21H-02
	3.0	9.8	BN21H-03
	5.0	16.4	BN21H-05

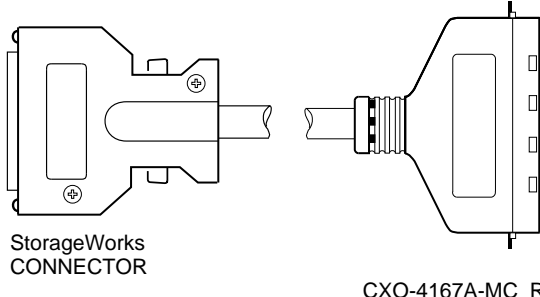
The BN21R-series single-ended cables are shown and described in Table 4. These cables are typically used to connect a StorageWorks shelf to a 50-pin, low zero-density receptacle, such as that used by the DEC 4000™ model 610 Alpha™ distributed/departmental server.

Table 4 BN21R-Series Single-Ended Cables

Cable Description	Meters	Feet	Order No
 <p>StorageWorks CONNECTOR</p> <p>CXO-4166A-MC_R</p>			
Adapter cable, 50-conductor	0.5	1.6	BN21R-0E
One 50-pin, high-density, male, straight connector	1.0	3.3	BN21R-01
with thumb latches	2.0	6.6	BN21R-02
One 50-pin, low-density, male, right-angle connector	3.0	9.8	BN21R-03
	5.0	16.4	BN21R-05

The BN23G-series cables are shown and described in Table 5. These cables allow you to connect SCSI devices that have different density, 50-pin connectors. The BN23G-series cables are typically used to connect SBB shelves to SCSI adapter cards in personal computers and workstations.

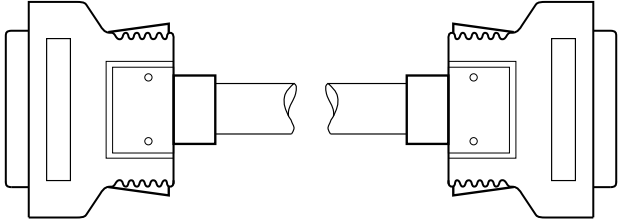
Table 5 BN23G-Series SCSI Single-Ended Cables

Cable Description	Meters	Feet	Order No
 <p>StorageWorks CONNECTOR</p> <p>CXO-4167A-MC_R</p>			
Adapter cable, 50-conductor	0.5	1.66	BN23G-0E
One 50-pin, high-density, straight connector with	1	3.3	BN23G-01
thumb latches	2	6.6	BN23G-02
One 50-pin, low-density, straight connector with bail	3	9.8	BN23G-03
locks	5	16.4	BN23G-05

The BC10U-series single-ended cables are shown and described in Table 6. The BC10U-series cables are used only with Alpha systems with the BA655 SCSI plug-in unit (PIU). Do not use this SCSI cable in any other configuration. These cables are typically used to connect SBB shelves to the following:

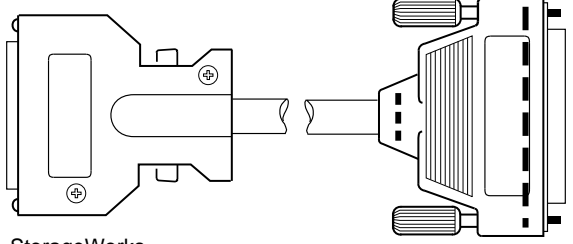
- Other SBB shelves
- KZMSA, an XMI to SCSI adapter

Table 6 BC10U-Series SCSI Single-Ended Cables

Cable Description	Meters	Feet	Order No
 <p>StorageWorks CONNECTOR</p> <p>CXO-4168A-MC_R</p>			
Alpha DEC 7000 and DEC 1000 SCSI cable, 50-conductor	2.0 3.0 5.0	6.6 9.8 16.4	BC10U-02 BC10U-03 BC10U-05
Two 50-pin, high-density, male, straight connectors with thumb latches			

The BN31B-series HSC™ controller singled-ended cable is shown and described in Table 7.

Table 7 BN31B-Series HSC Controller Single-Ended Cables

Cable Description	Meters	Feet	Order No
 <p>StorageWorks CONNECTOR</p> <p>CXO-4170A-MC_R</p>			
HSC controller to StorageWorks shelf cable, 50-conductor	2.0	6.6	BN31B-02
One 50-pin, high-density, male, straight connector with thumb latches	3.0	9.8	BN31B-03
One 50-pin, high-density, male, straight connector with thumb screws			

Use the following procedure to install the I/O module in a shelf (see Figure 5):

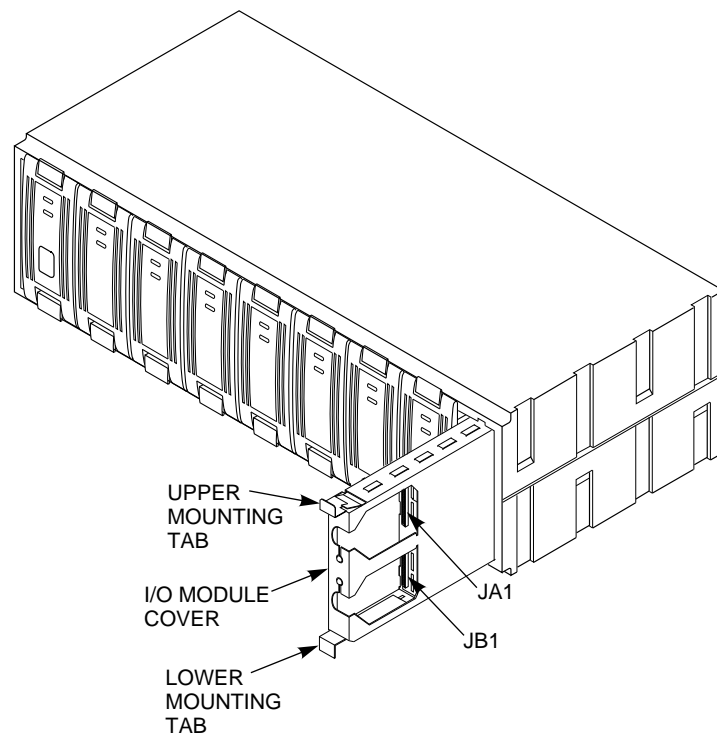
1. If necessary, remove an I/O module using the following procedure:
 - a) Press the two mounting tabs together and pull forward to release the I/O module.
 - b) Pull the I/O module out of the shelf.
 - c) Disconnect the cables from the I/O module.
2. Set the address jumper in one of the following three ways:
 - To match the I/O module removed.
 - For a single bus configuration, do not install the address jumper.
 - For a dual bus configuration, with duplicate addresses on each bus, install the address jumper. You must also install the active terminator in slot six on the rear of the backplane.

CAUTION

To prevent system failure, install the I/O module with the I/O module cover facing to the left (see Figure 5).

3. Insert the 50-pin cable connectors into JA1 and JB1.
4. Push the module into the shelf slot until it is fully seated and both mounting tabs engage the shelf. There is an audible snap when this occurs.
5. When the power is applied, verify that the I/O module status LEDs light and then go off.

Figure 5 Installing the I/O Module



CXO-4822A-MC