

SC008 Star Coupler User's Guide

**Prepared by Educational Services
of
Digital Equipment Corporation**

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CHAPTER 1

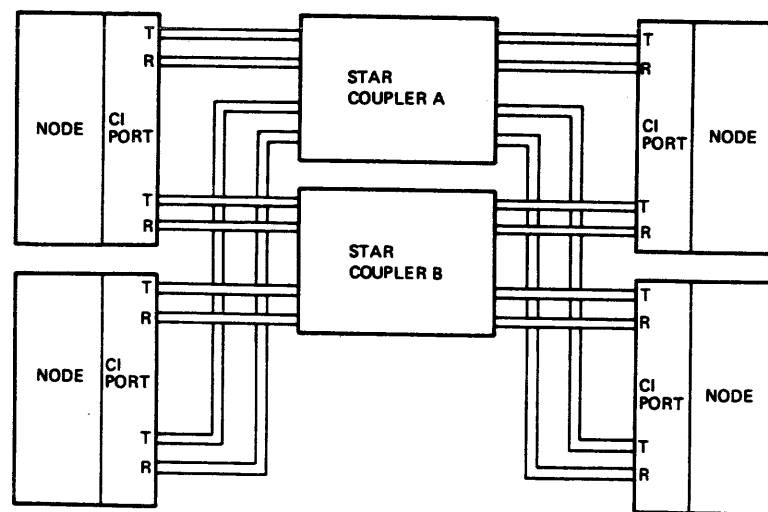
INTRODUCTION

1.1 THE COMPUTER INTERCONNECT

The Computer Interconnect (CI) is a high-speed, serial data bus that is used to link computer subsystems (nodes) together to form a CI cluster. Typically, the cluster is confined to a computer room environment. Nodes may consist of CPUs, memory, and intelligent mass storage, communication, and data acquisition subsystems. Features of the CI include:

- Dual signal paths capable of simultaneous operation
- 70 megabit per second path bandwidth
- Low error rates
- Packet-oriented transmission
- Immediate acknowledgment of the successful receipt of a packet
- Contention arbitration at light loading and round-robin arbitration at heavy loading

A star distribution system is used to connect the nodes of a CI cluster. For each signal path, a pair of CI bus cables (one for transmit, one for receive) connect each node's CI port interface to the central Star Coupler for that path (Figure 1-1). The coupler receives and distributes bus signals transmitted by a node to the other CI nodes along the same signal path.



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Figure 1-1 Four-Node CI Cluster

1.2 THE STAR COUPLER

The SC008 Star Coupler is one of the building blocks of the CI. It is a passive, RF-transformer coupling device that provides the central connection point for up to 16 nodes in a CI cluster. All nodes within the cluster communicate directly via the Star Coupler. Features of the SC008 include:

- High reliability — No power or cooling requirements.
- Individual node/coupler bus cables may be added or removed without affecting cluster communications.
- Failure of a node or its bus cables will not affect other cluster nodes.
- Isolates signals, noise, and faults associated with a single node from the cluster.
- Terminates node bus cables with their proper (50-ohm) impedance.

1.3 SC008 OPTION VARIATIONS

The Star Coupler is designed in a modular way to allow for easy cluster expandability. The basic Star Coupler box allows up to eight nodes (single path) to be connected together. Special modularity connectors on each coupler box allow two couplers to be connected together for cluster expansion (up to 16 nodes). Dual path CI clusters require a minimum of two Star Coupler boxes. Table 1-1 lists the available option variations, and Figure 1-2 shows the SC008-AC Star Coupler.

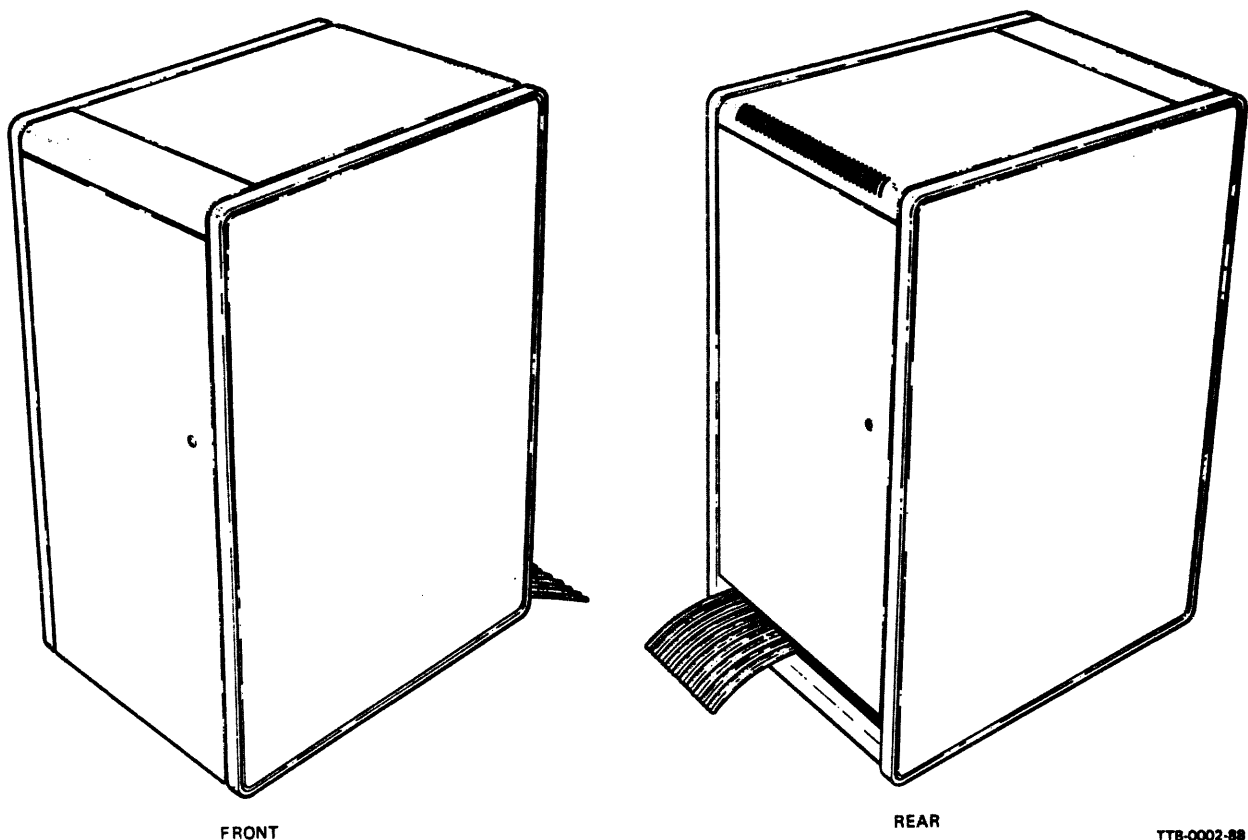


Figure 1-2 SC008-AC Star Coupler

Table 1-1 SC008 Option Variations

Designation	CI Cluster Size	Consists of:
SC008-AC	8 nodes; dual path	Two Star Coupler boxes mounted in a 40-inch (H9642 type) cabinet
SC008-AD	16 nodes; dual path	Two add-on Star Coupler boxes (to be added to an existing SC008-AC configuration)

1.4 SC008 SPECIFICATIONS

The SC008 specifications are outlined in Table 1-2.

Table 1-2 SC008 Specifications

Specification	Description
I/O connectors	Female TNC coaxial
Impedance	50 ohms
Bandwidth	1 to 100 Mhz
Isolation between I/O ports	30 db
Insertion loss (input to output)	20 db
Size	18" × 8.75" × 4" (single coupler)
Weight	9 lbs. 11 oz. (single coupler)
Mounting	19" rack mount with nonconductive brackets
Environmental	MIL-STD-202E
Operating and storage temperature range	-55°C to 100°C (-67°F to 212°F)
Operating humidity	95% maximum

1.5 RELATED DOCUMENTS

The following document is related to this guide:

CI780 User's Guide (EK-CI780-UG)

DIGITAL personnel may order hardcopy documents from:

Digital Equipment Corporation
444 Whitney Street
Northboro, Massachusetts 01532

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CHAPTER 2 INSTALLATION

2.1 PREINSTALLATION PLANNING

Before installing the SC008, consideration should be given to its physical placement relative to the CI nodes that will be connected to it. The coupler must be placed in a location that will allow the bus cables from each node to reach it. Factors to consider when planning a location for the SC008 are:

1. Maximum length of the CI bus cables that will be used to connect each node to the coupler.
2. How the CI bus cables will be routed between the coupler and each node (i.e., overhead, under the floor, etc).

NOTE

Allow approximately six feet (two meters) of cable length for routing inside the SC008 cabinet.

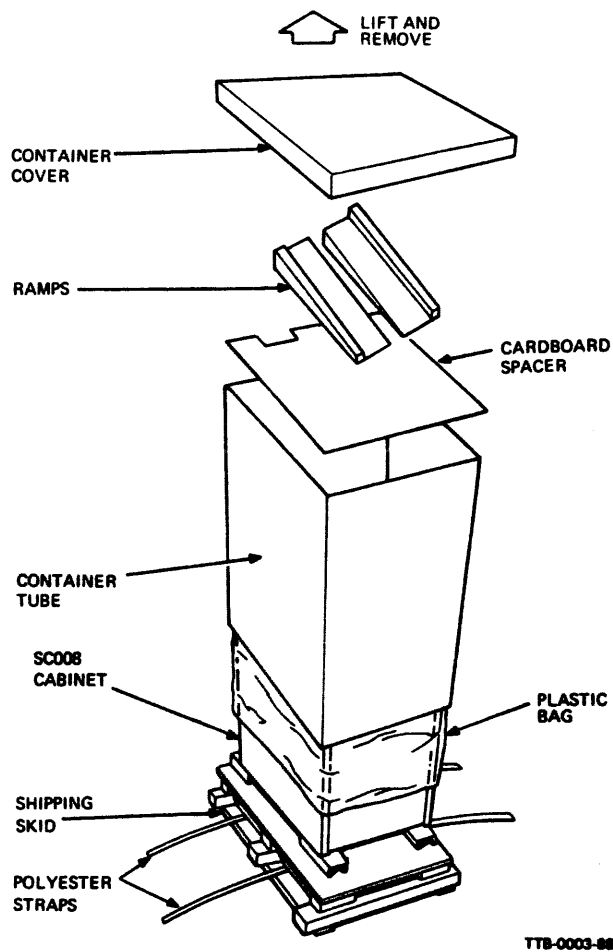
2.2 UNPACKING AND INSPECTION

The SC008-AC is packaged for shipment mounted on a shipping skid and covered with a cardboard container. The container is secured to the skid with two polyester straps. Unloading ramps are provided to aid in removing the cabinet from the skid (Figure 2-1).

1. Check the container for external damage such as dents, holes, or crushed corners.
2. Notify the customer of any damage and list it on the appropriate installation report form.
3. Cut the two polyester shipping straps.
4. Remove the container cover, two ramps, and the cardboard spacer.
5. Lift up and remove the container tube and plastic bag.

NOTE

Allow ten feet (three meters) clearance from the rear of the shipping skid when unloading the cabinet from the skid (deskidding).



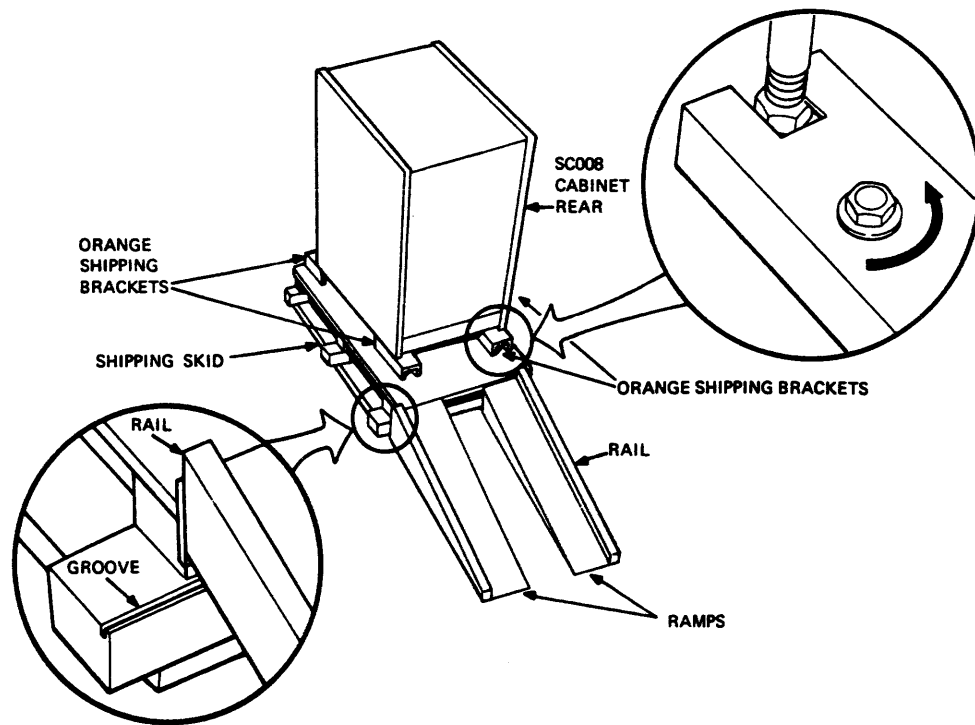
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Figure 2-1 Unpacking the SC008-AC

6. Attach the two ramps to the rear of the shipping skid by sliding the large end of each ramp into the groove of the skid (Figure 2-2). Align the arrows on the skid with the arrows on the ramps.
7. Use a 9/16-inch open-end wrench to unscrew and remove the four orange shipping brackets located at the bottom of each corner of the cabinet (Figure 2-2).
8. Remove the cabinet from the shipping skid by rolling it down the unloading ramps to the floor.

WARNING
EXTREME CARE SHOULD BE TAKEN! The cabinet weighs in excess of 200 pounds. At least two people should be present to assist in deskidding the cabinet.

9. Open the rear door of the cabinet using a 5/32-inch Allen wrench and remove any accessory cartons/packages located inside. An Allen wrench is provided in a plastic bag that is taped to the outside of the cabinet.
10. Open all cartons/packages and inventory their contents against the packing list.
11. Inspect the cabinet and all components for damage such as scratches, dents, or breaks. Report any damage to the customer and record it on the appropriate installation report form.



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Figure 2-2 Deskidding the SC008-AC Cabinet

2.3 CONFIGURATION

The SC008 coupler box contains eight transmit ports (connectors), eight receive ports, and six modularity connectors. The modularity connectors allow two coupler boxes to be cabled together as one 16-port unit. A minimum of two SC008 couplers are required to configure a dual path CI cluster, one for data path A nodes 0 to 7 and the other for data path B nodes 0 to 7. Configure the SC008 for the number of nodes to be connected using the following procedure.

NOTE

For some configurations of the SC008, Steps 1 and 2 will be performed at the factory. Check to see if the data path B label is already on the lower coupler box as shown in Figure 2-3. Skip Steps 1 and 2 if the label is present.

1. Locate the data path B label supplied (P/N 3618845-02) and remove its paper backing.
2. From the rear of the cabinet, place the label on the lower (data path B) coupler box so it covers the silkscreened A label (Figures 2-3 and 2-4).
3. If more than eight nodes are to be connected, install the add-on couplers using the procedure in Section 2.5.

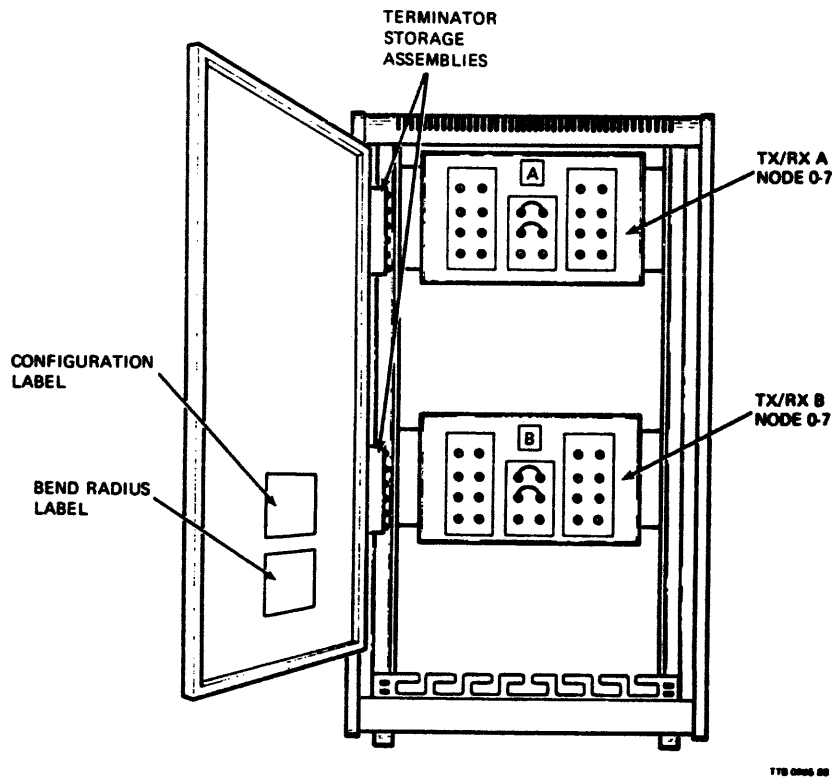


Figure 2-3 SC008-AC Cabinet Internals (Rear View)

4. Remove (unscrew) the terminators from the transmit and receive ports that will have CI bus cables connected (Figure 2-4).

NOTE

Terminators MUST be connected to unused transmit and receive ports to maintain the correct terminating impedance. Unused modularity connectors do not require terminators.

5. Store terminators in the terminator storage assemblies located on the side of the rear cabinet frame (Figure 2-3).
6. Connect the modularity cables supplied (P/N 7018530) to the correct modularity connectors (Figures 2-4 and 2-5).
 - a. For an installation of eight nodes or less:
 - 1) Connect a cable between modularity connectors 1 and 4 on each data path coupler.
 - 2) Store extra cables on remaining modularity connectors, as shipped (Figure 2-4). This will not affect operation.

b. For an installation of nine nodes or more:

- 1) Connect a cable between modularity connectors 1 and 2 on the node 0-7 coupler for each data path.
- 2) Connect a cable between modularity connectors 4 and 5 on the node 0-7 coupler for each data path.
- 3) Connect a cable between modularity connector 3 on the node 0-7 coupler to connector 1 on the node 8-15 coupler for each data path.
- 4) Connect a cable between modularity connector 6 on the node 0-7 coupler to connector 4 on the node 8-15 coupler for each data path.

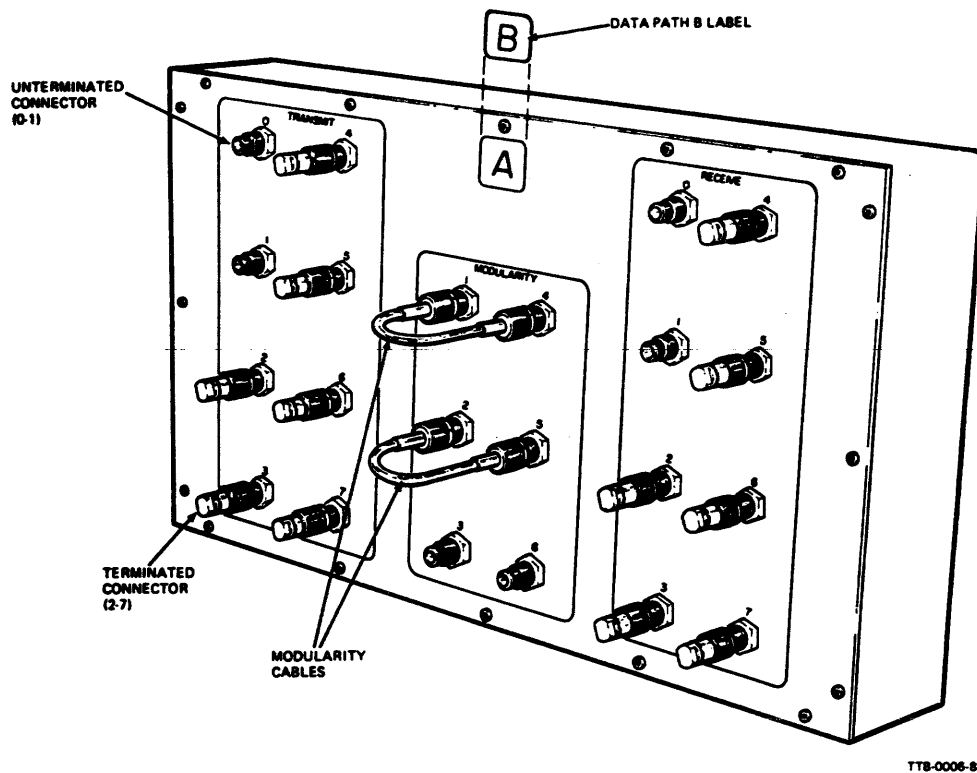
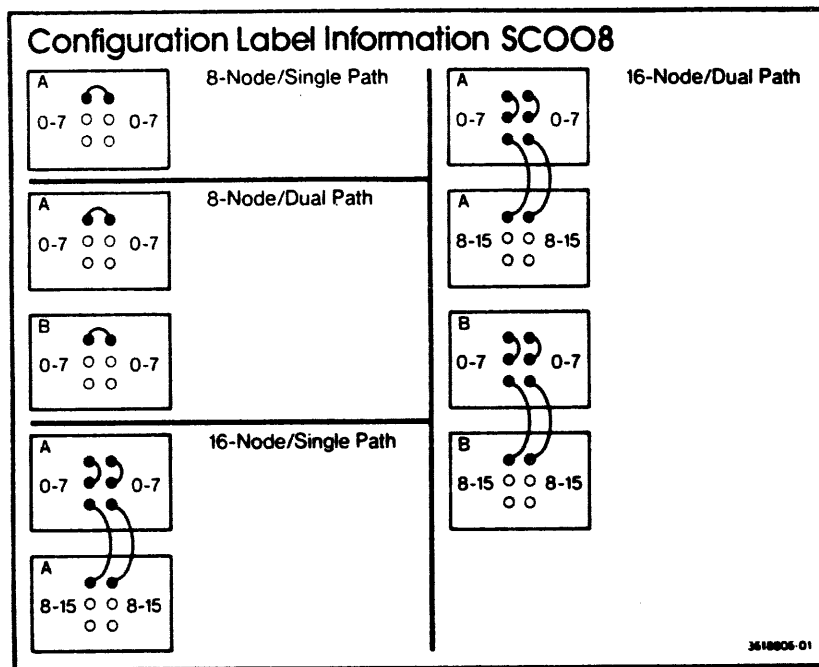


Figure 2-4 SC008 Coupler Box Details



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Figure 2-5 Configuration Path Label

2.4 CABLING

In dual path CI clusters, a set of four CI bus cables (BNCIA-XX) is required for connecting each node to the SC008. Use the following procedure to cable a CI node to the coupler.

1. Carefully unroll and route the CI bus cables between the node and the SC008. Do not exceed the 4-inch bend radius (Figure 2-6) when bending the cables, and take care to avoid any kinks, twists, or cuts in the cables (Figure 2-7).

CAUTION

Accidental grounding of any metal part of the BNCIA cables to cabinet (chassis) ground will seriously degrade performance.

2. Place identification labels on both ends of each CI cable.

NOTE

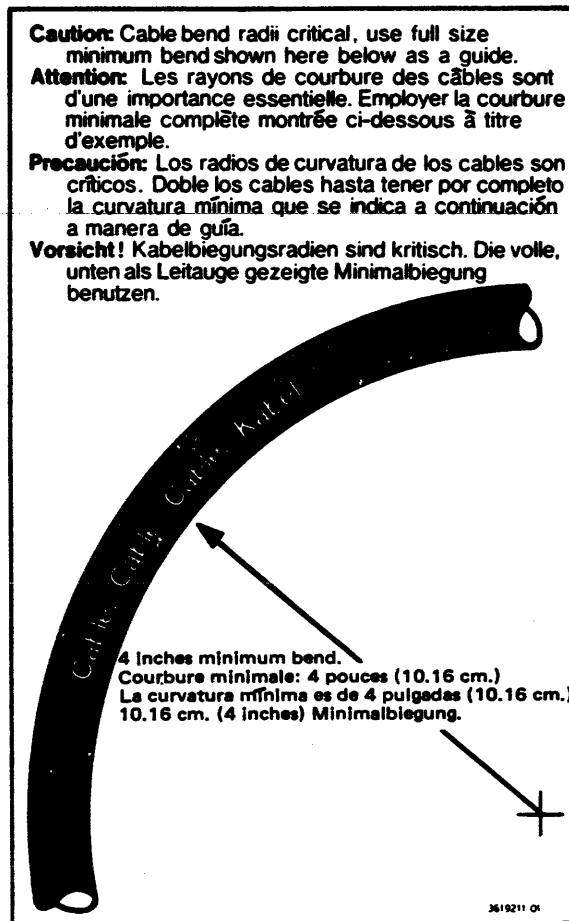
Steps a and b will normally be performed at the factory. Verify that two of the CI cables have red TX labels attached to each end, and the remaining two cables have green RX labels on each end. Skip Steps a and b if the labels are present.

- a. On two of the cables, place a red TX label (P/N 3618808-02) a short distance behind the connector on each end (Figure 2-8). Fold the label in half around the cable and press the two ends of the label together.
- b. On the remaining two cables, place a green RX label (P/N 3618808-01) a short distance behind the connector on each end (Figure 2-9). Fold the label in half around the cable and press the two ends of the label together.
- c. Locate the marker 0-15, A and B label (P/N 3618807-01) shown in Figure 2-10. In the space provided on each TX/RX label, place the correct node number, CI cluster number, and data path letter.

NOTE

Make sure labels do not interfere with cable managers.

3. Using the previously attached labels for identification, screw (clockwise) each cable onto its corresponding bulkhead connector on the node.



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Figure 2-6 Bend Radius Label

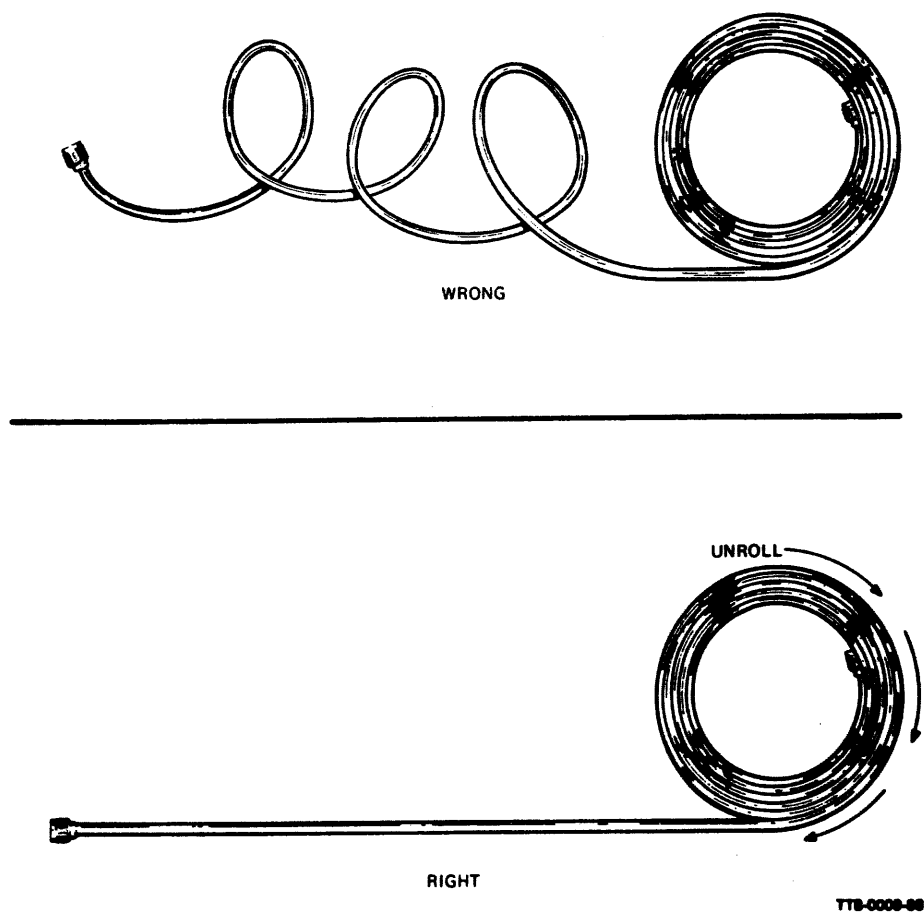


Figure 2-7 Unrolling the CI Cables

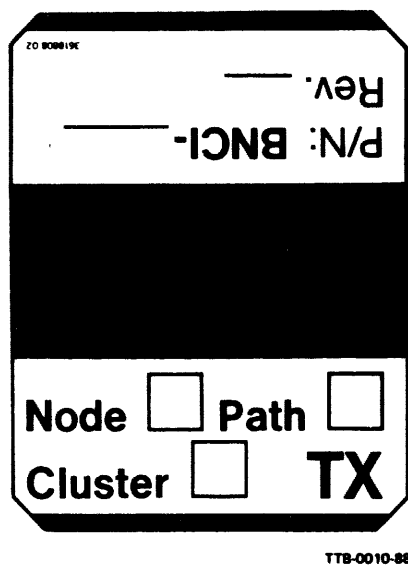


Figure 2-8 Transmit Cable Label (Red)

10 8000196

Rev. _____

P/N: BNCI- _____

Node ☐ Path ☐

Cluster ☐ **RX**

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Figure 2-9 Receive Cable Label (Green)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B

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Figure 2-10 Marker 1-15, A and B Label

4. Check the rear door of the node cabinet that houses the CI interface for a node number label (Figure 2-11). If no label is attached, locate the applicable label (P/N 3619264-17) and place the correct numbered label, at eye level, on the outside of the door.

NOTE

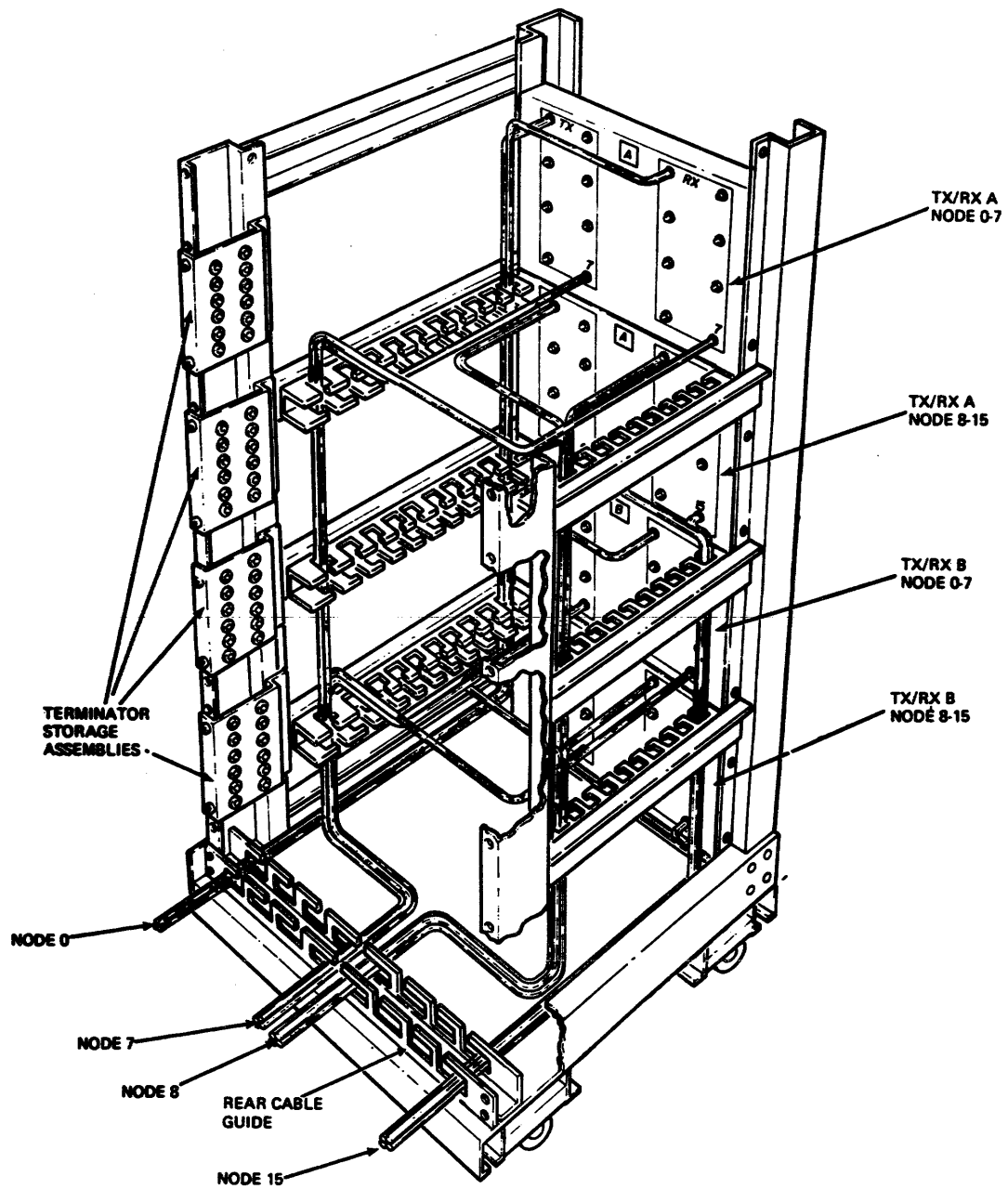
**Refer to the *CI780 User's Guide* (or appropriate)
for information on assignment of node numbers.**

5. Connect the CI bus cables to the SC008 coupler (Figure 2-12). Do not exceed the 4-inch bend radius (Figure 2-6) when bending the cables, and take care to avoid any kinks, twists, or cuts in the cables.
 - a. Using the attached labels for identification, screw each cable onto its corresponding SC008 port (i.e., node 0 TX A cable connects to the data path A coupler transmit 0 port).
 - b. Route the cables down through the side cable guides with node 0-7 cables on the left side and node 8-15 cables on the right side. Follow the cabling sequence of front to rear for nodes 0 to 7 and nodes 8 to 15, respectively.
 - c. Route the cables through the cabinet from the side managers (through the rear cable guide). Follow the cabling sequence of left to right for nodes 0 to 15, respectively.



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Figure 2-11 Node Number Label (Node 3)



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Figure 2-12 SC008 Internal Cable Routing

2.5 ADD-ON COUPLER INSTALLATION

Use the following procedure to install add-on couplers in the SC008 cabinet.

1. Locate the data path B label (P/N 3618845-02) supplied in the accessories package and remove its paper backing.
2. Place the label on one of the couplers so it covers the silkscreened A label (Figure 2-13).
3. Locate the two nodes number 8-15 TX/RX label sets (P/N 3618845-01) and remove their paper backing.
4. Place one of the node 8-15 transmit labels over the silkscreened node 0-7 transmit label on the data path A coupler box (Figure 2-13).
5. Place one of the node 8-15 receive labels over the silkscreened node 0-7 receive label on the data path A coupler box (Figure 2-13).
6. Place node 8-15 transmit and receive labels on the data path B coupler box, following the procedure in Steps 4 and 5.
7. Open the front cabinet door using the 5/32-inch hex Allen wrench provided.
8. From the front of the cabinet, mount the node 8-15 couplers (Figure 2-14).
 - a. Place the coupler mounting brackets right below the node 0-7 data path A coupler and screw the brackets to the cabinet frame using four machine 10-32 screws and washers.
 - b. Loosen and remove the four 10-32 screws and washers on the coupler box.
 - c. Place the coupler inside the cabinet so that its mounting holes line up with the matching slots on the brackets.
 - d. Screw the coupler box to the brackets using the four 10-32 removed screws and the washers.
 - e. Mount the node 8-15 data path B coupler box and brackets underneath the node 0-7 data path B coupler using the same procedure.

NOTE

Remember that for those machines that are being updated, the mounting brackets for the SC008 boxes, nodes 0-7, must also be reversed. (See Figure 2-14.)

9. Close and lock the front cabinet door using the 5/32-inch hex Allen wrench provided.
10. Install the add-on terminator storage assemblies (Figure 2-12).
 - a. Open the rear cabinet door using a 5/32-inch hex Allen wrench.
 - b. From the back of the cabinet, mount the terminator storage assemblies (P/N 7018770-00) to the right side of the cabinet frame. Using four 10 × 32 screws per assembly, secure the data path B assembly at hole locations 12 and 21 and the data path A assembly at hole locations 40 and 49.

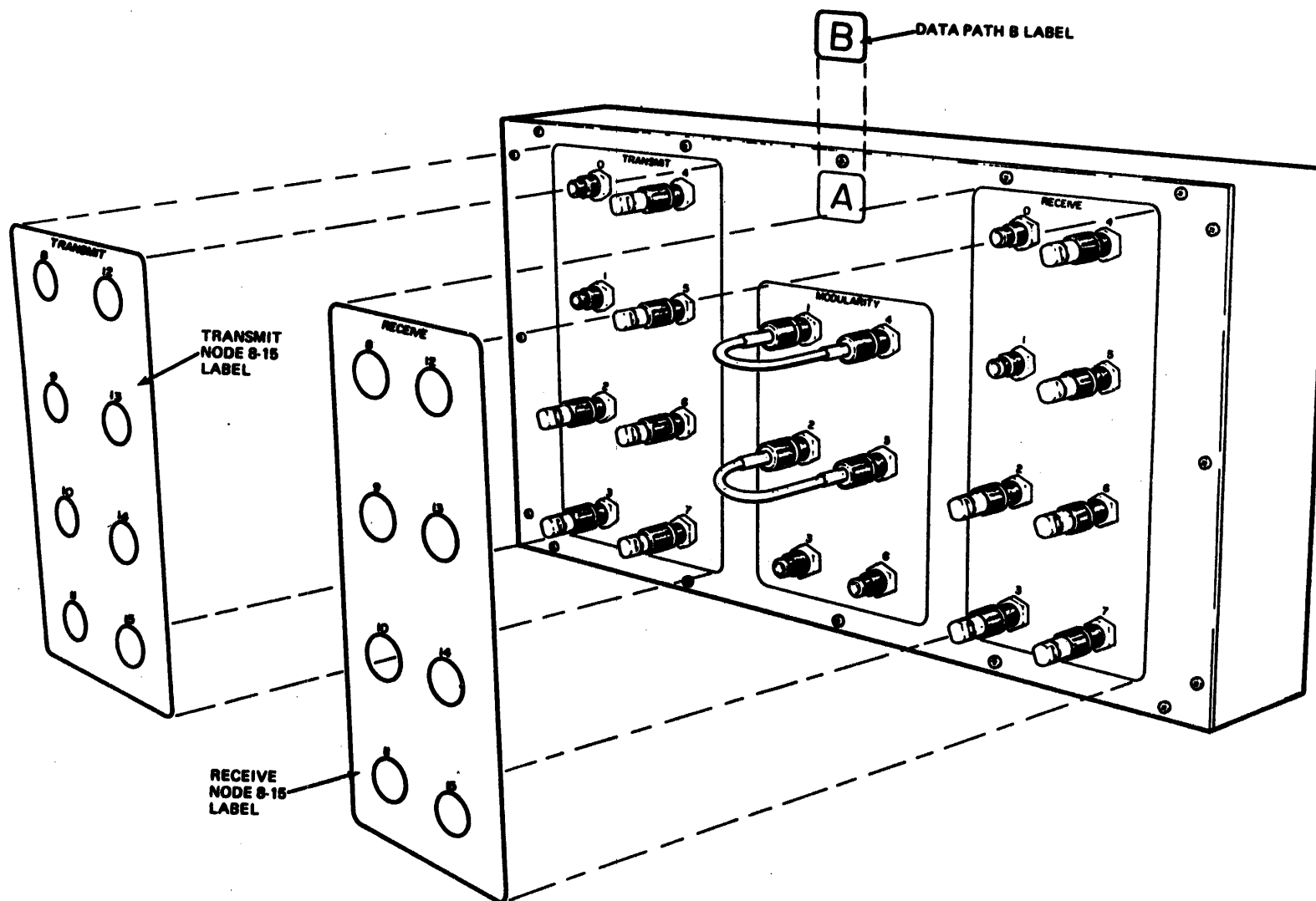


Figure 2-13 SC008 Labeling for Nodes 8 to 15, A and B

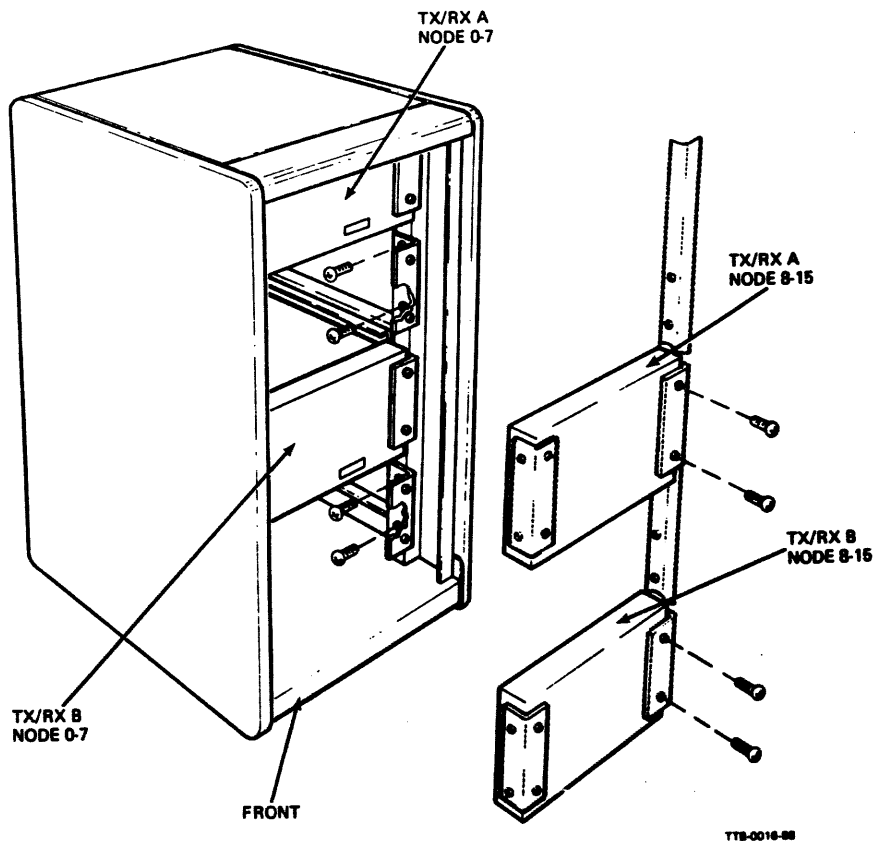


Figure 2-14 Mounting Node 8-15 Couplers

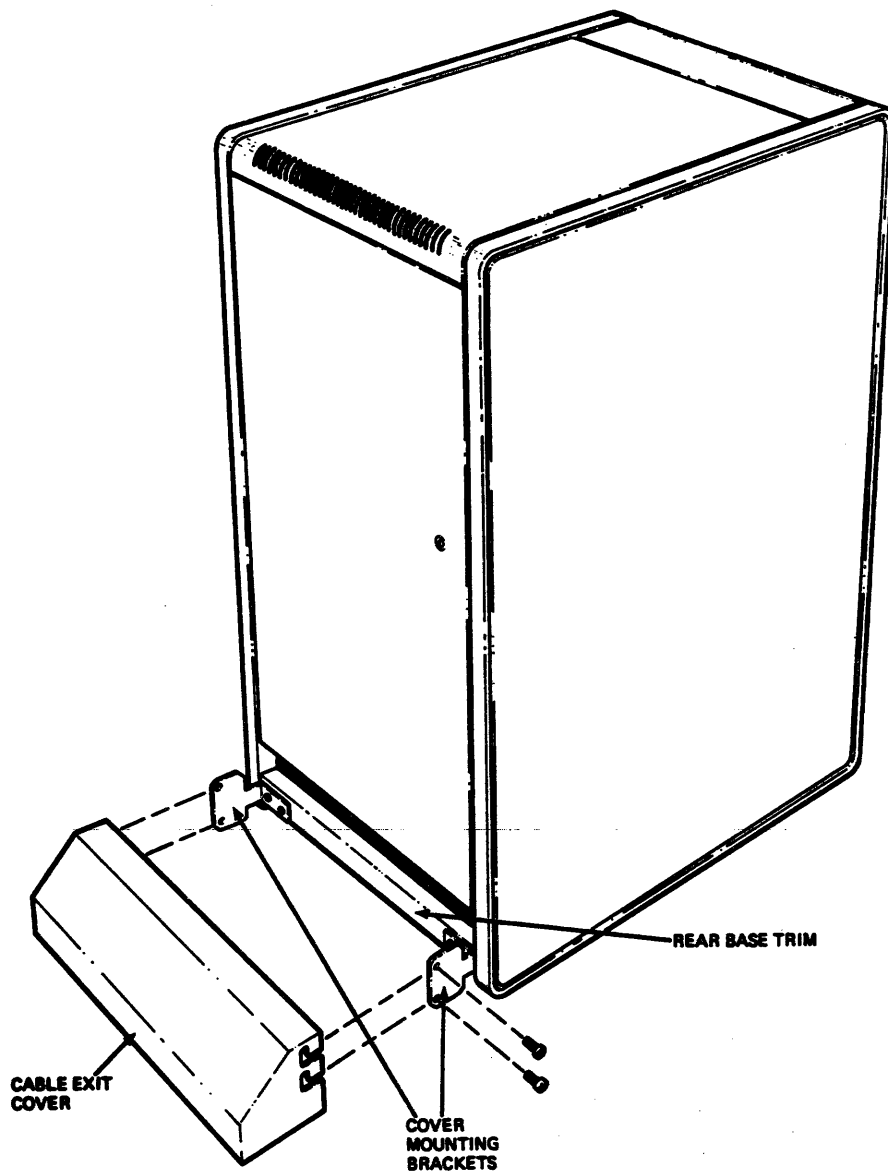
2.6 CABLE EXIT COVER INSTALLATION (OPTIONAL)

A cable exit cover is provided with the SC008-AC for use in those installations where the CI bus cables are to be routed under the floor. The cover serves as a safety feature by providing an enclosure over the floor opening at the point where the CI cables exit the SC008 cabinet and enter the floor opening. Use the following procedure to install the cable exit cover.

NOTE

Refer to Figure 2-15 for details when performing Steps 2 to 7.

1. Locate the two cable cover mounting brackets (P/N 7426225-1).
2. Remove and save the two ¼-inch × 20-inch screws holding the right side of the rear base trim to the cabinet.
3. Place one of the mounting brackets over the trim with the large angle plate toward the outside. Position the bracket so its two large holes are aligned with the screw holes in the trim.
4. Screw the bracket and the rear base trim to the cabinet with the two screws removed in Step 2.



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Figure 2-15 Cable Exit Cover Installation

5. **Attach the second mounting bracket to the left side of the rear base trim using the same procedure. Make sure the large angle plate on the bracket is on the outside.**
6. **Place the cable exit cover (P/N 7426224-1) over the two mounting brackets so the slots on the side of the cover align with the holes in the brackets.**
7. **Screws the cover to the brackets using four 10 × 32 screws.**

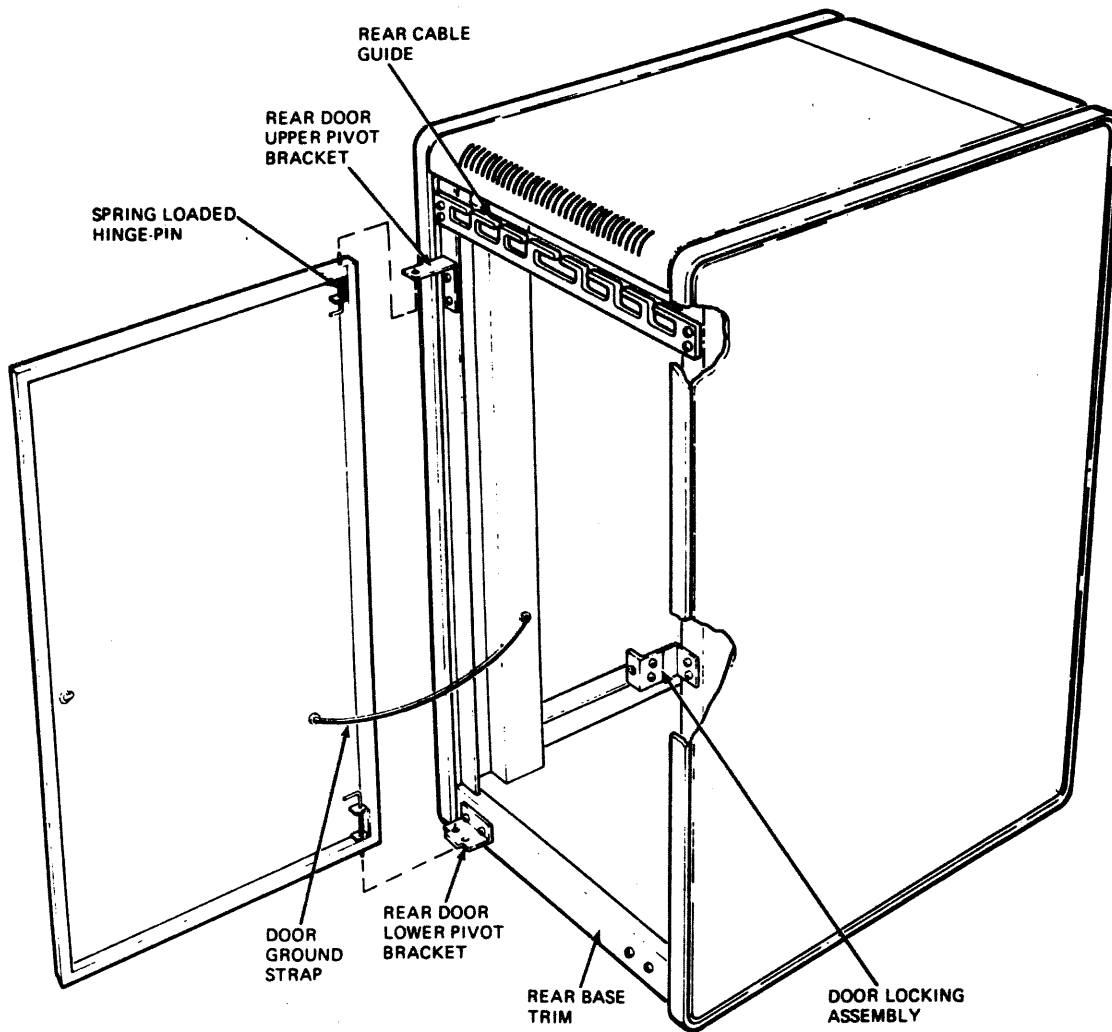
2.7 CABINET CONVERSION FOR UPPER CABLE EXIT (OPTIONAL)

Normal configuration of the SC008 cabinet provides for the CI bus cables to exit the cabinet below the rear door. When the CI cables are to be routed overhead, the cabinet may be configured to allow the cables to exit above the rear door. Use the following procedure to convert the SC008 cabinet for upper cable exit.

NOTE

Refer to Figure 2-16 for details when performing the following steps.

1. Remove the rear cabinet door.
 - a. Unscrew the rear door ground strap (green and yellow wire) from the door and save the screw.
 - b. Pull down on the upper (spring-loaded) hinge-pin to disengage it from the cabinet.
 - c. Disengage the bottom hinge-pin from the lower pivot bracket by lifting the door up and away from the cabinet.



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Figure 2-16 Cabinet Conversion for Upper Cable Exit

2. Remove the lower pivot bracket by unscrewing the two screws holding it to the cabinet. Save these two screws.
3. Mount the pivot bracket supplied in the accessories package (P/N 7422272-01) to the upper part of the rear cabinet frame (holes 51 and 54). Use the two screws saved in Step 2.
4. Remove the rear cable guide from the lower part of the cabinet by unscrewing the four screws (two on each side) holding it to the frame. Save these four screws.
5. Mount the rear cable guide above the newly installed pivot bracket (holes 56 and 57) using the four screws saved in Step 4.
6. Loosen the two $\frac{1}{4} \times 20$ screws holding the right side of the rear base trim to the cabinet.
7. Mount the lower pivot bracket supplied in the accessories package (P/N 7422221-00) to the rear base trim by placing the bracket cutouts over the two loosened screws and tightening the screws.
8. Lower the rear door locking assembly.
 - a. Remove and save the two screws holding the locking assembly to the cabinet.
 - b. Mount the locking assembly on the cabinet at hole locations 28 and 30 using the previously removed screws.
9. Mount the rear door on the cabinet.
 - a. Engage the bottom hinge-pin into the lower pivot bracket.
 - b. Pull down on the upper (spring-loaded) hinge-pin and engage it into the upper pivot bracket.
 - c. Attach the ground strap to the door using the screw saved in Step 1a.
 - d. Check to see that the door lock aligns with the cabinet locking assembly, allowing the door to be locked. Perform Step 10 if alignment is necessary.
10. Align the rear door locking assembly (optional).
 - a. Open the front door and remove the right side panel locking bracket.
 - b. Remove the right side panel.
 - c. Loosen the two screws on the side of the rear door locking assembly.
 - d. Close and lock the rear door.
 - e. Tighten the two loose locking assembly screws.
 - f. Reinstall the side panel and its locking bracket.
 - g. Close and lock the front door.

2.8 UPDATED CABLE MANAGERS

New side cable managers (P/N 74-37051-01) and a new rear cable manager (P/N 74-37052-01) are available.

These managers may be used to replace current side managers with the P/N of 74-25765-00 and a rear manager with the P/N of 74-25764-00. For those ordering the SC008-AD and currently using the above managers (74-25765-00 and 74-25764-00), it is recommended to order the new parts.

To install the new managers:

For the side manager -

1. Loosen and remove all three 10-32 screws.
2. Remove the current side cable manager.
3. Place the new manager in the same place using the removed screws and tighten.

For the rear manager -

1. Loosen and remove all four 10-32 screws.
2. Remove the current rear manager.
3. Place the new manager in the same place and tighten using the removed screws.

NOTE

It is also recommended that with these new managers, the mounting brackets for the SC008 boxes should be reversed. (See Section 2.5.)

**SC008 STAR COUPLER
USER'S GUIDE**

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