Meridian 1

Application Equipment Module

Installation guide

Publication number: 553-3201-200
Document Status: Standard 3.0
Date: April 1993

Contents

List of figures

List of procedures

List of tables

Overview

Application Module hardware is based on Meridian 1 modular packaging. The basic unit of the modular package is the Universal Equipment Module (UEM), which is a modular, self-contained hardware cabinet that houses a card cage with a power supply, backplane, circuit cards, and other basic equipment. When the UEM is equipped, it generally supports a system function and becomes a specific type of module, such as a CPU Module or Intelligent Peripheral Equipment (IPE) Module.

The term “Meridian 1” is used throughout this document, and refers to Meridian 1 and “Meridian 1-ready” systems (such as Meridian SL-1 style cabinets that have been upgraded). See *Applications Module overview guide* (553-3201-110) for further information on Application Module requirements.

In addition, the UEM houses the card cage that supports the Application Equipment Module (AEM). When this card cage is installed, the UEM functionally becomes an AEM. There are two versions of the AEM:

- NT7D18AA for ac-powered systems
- NT7D18AB for dc-powered systems

Application Modules, such as the Meridian Link Module, are housed in the AEM. Each AEM can accommodate up to two Application Modules. (If only one Application Module is installed, a blank panel covers the rest of the AEM to channel air flow for cooling.)

An AEM with a standard Meridian 1 pedestal and top cap can be configured as a stand-alone column. In this configuration, the AEM can interface with:

- Meridian 1 system options 11, 21, 51, 61 or 71.

- Meridian SL-1 systems (upgraded) capable of operating on Generic X11 Release 16, or later, software.

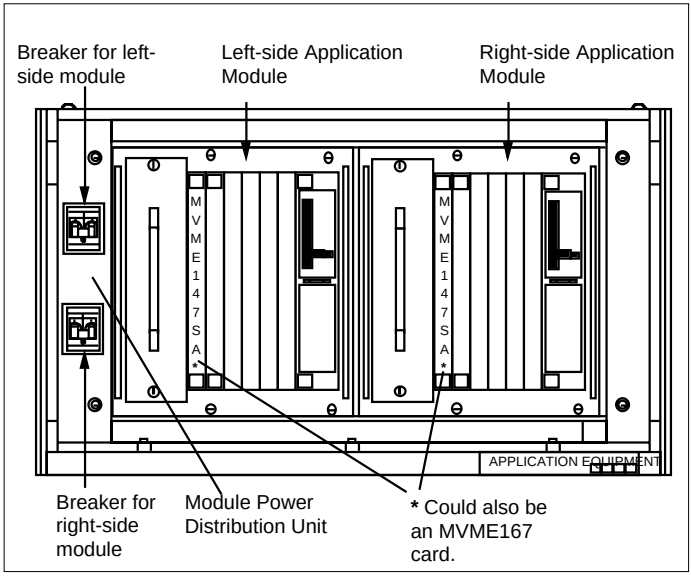
An individual AEM can be placed in a column with other Meridian 1 modules in system options 21, 51, 61 or 71. This document explains how to install a stand-alone AEM and add an AEM to a Meridian 1 column.

AEM components

The AEM is equipped with a Module Power Distribution Unit (MPDU) on the left (looking at the front of the AEM).

The MPDU provides two circuit breakers (see Figure 1). The top breaker controls power to the left Application Module (the one closer to the MPDU). The bottom breaker controls power to the second Application Module (on the right of the AEM).

Figure 1xxx
AEM with Application Modules-front view



Stand-alone components

A stand-alone configuration consists of a pedestal, an AEM, and a top cap.

Pedestal

The pedestal houses a blower unit, an air filter, and the Power Distribution Unit (PDU). The PDU, which distributes power to the entire column, contains the field wiring terminal block, the main circuit breaker (or breakers) for the column, and a slot that houses the system monitor.

The pedestal weighs 13.6 kg (30 lbs) when empty, and the dimensions are:

- 812 mm (32 in.) wide
- 660 mm (26 in.) deep
- 254 mm (10 in.) high

There are two versions of the pedestal:

- NT8D27 for ac-powered systems
- NT7D09 for dc-powered systems

Top cap

The top cap provides airflow exits, input/output (I/O) cable entry and exit, and overhead cable-rack mounting. Thermal sensor assemblies for the column are attached to a perforated panel on top of the highest module in the column, under the top cap.

The top cap weighs 3.6 kg (8 lbs) and the dimensions are:

- 812 mm (32 in.) wide
- 558 mm (22 in.) deep
- 101 mm (4 in.) high

There are two versions of the top cap:

NT7D00AA for ac-powered systems

NT7D00BA for dc-powered systems

Temperature requirements

The recommended ambient temperature differs depending in which tier that the AEM is placed. The following is the maximum ambient temperature for each operating tier:

- 1st tier: 35 degrees C (95 degrees F)
- 2nd tier: 30 degrees C (86 degrees F)
- 3rd tier: 25 degrees C (77 degrees F)
- 4th tier: 20 degrees C (68 degrees F)

The recommended ambient temperature range for an AEM is:

- 10 to 35 degrees C (50-95 degrees F)

The maximum allowable ambient temperature is:

- 45 degrees C (113 degrees F)

CAUTION
Equipment failure
If room temperature remains outside the recommended operating temperature for 72 hours, the disk or tape drive can fail to operate.

If the room temperature frequently drops below or goes above the recommended operating temperature, even though it does so for less than 72 hours each time, the same failure may occur.

Equipment handling precautions

To avoid personal injury and equipment damage, read the following guidelines before handling equipment.

DANGER
Risk of personal injury
A fully loaded module weighs approximately 58.9 kg. (130 lbs). Get help when moving modules.

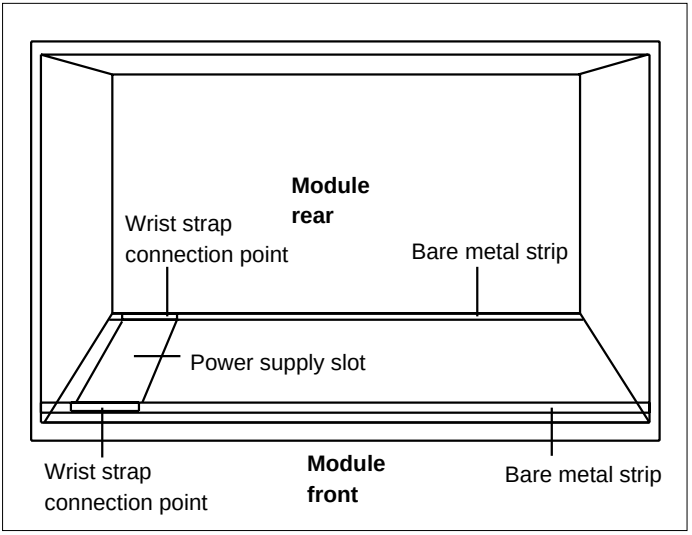
Use the following guidelines to handle circuit cards:

- Do not unpack or handle cards near electric motors, transformers, or similar machinery.
- Handle cards by the card stiffeners and edges only. Do not touch the contacts or components.
- Set cards on a protective antistatic bag. If an antistatic bag is not available, hand-hold the card, or set it, unseated, in a card cage.
- Store cards in protective packing. Do not stack cards on top of each other unless they are packaged.

Figure 2 shows connection points for the wrist strap and the metal strips that you can touch.

CAUTION
Equipment damage
To avoid damage from static discharge, wear an antistatic wrist strap when you work on AEM equipment. If a wrist strap is not available, regularly touch one of the bare metal strips in the AEM.

Figure 2xxx
Static discharge points



Installing a stand-alone AEM

For proper installation, perform the steps in the following procedures in the order given.

Unpack and level the AEM column

1. Remove the AEM column from the shipping pallet; follow the unpacking instructions that come with the packaging material.
2. Remove the front and rear covers from the AEM:
   a. Turn the two locking latches (see Figure 3) clockwise with a standard screwdriver.
   b. Push the latches toward the center of the cover and pull the cover towards you while lifting it away from the module.
   c. Set the covers aside until the installation is complete.

WARNING
Risk of equipment damage
Module covers are not hinged; do not let go of the cover. Lift the cover away from the module and set it out of your work area.

3. Remove the front and rear grills from the pedestal (see Figure 4). Set the grills aside until the installation is complete.
4. Inspect all equipment for physical damage; report any to your supplier.
5. Adjust the feet on the pedestal to level the column (turn the leveling foot clockwise to raise it).

   Note 1: You must leave at least 12.7 mm (1/2 in.) between the floor and the bottom of the pedestal for air flow required by the cooling unit.

Note 2: If the column is to be bolted to the floor for earthquake bracing, follow the procedure for earthquake bracing in *System installation procedures* (553-3001-210).

6 Go to the procedure for "Power connections (ac)" or "Power connections (dc)" as appropriate to connect ground and power wiring.

Figure 3xxx
Locking latches on the AEM

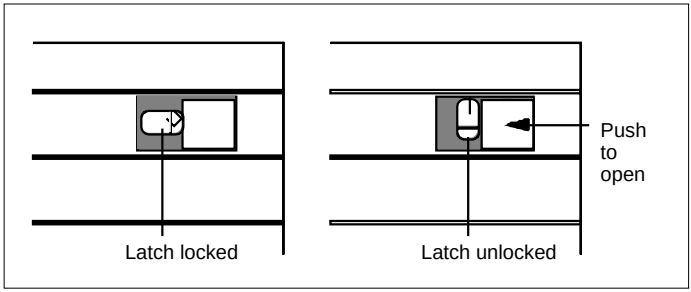
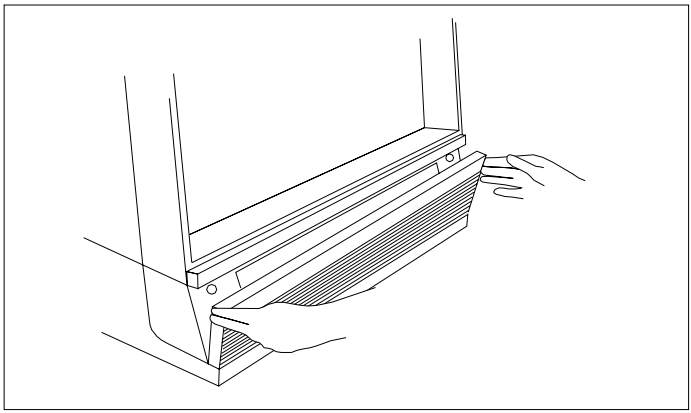


Figure 4xxx
Pedestal grill



Power connections (ac)

One IG-L6-30 or L6-30 receptacle must be within 2.4 m (8 ft) of the pedestal. Instead of using the power plug provided, you can hard-wire the PDU to the power source. In this case, you should use #10 AWG conductors routed through 3/4-inch conduit. Connect the leads to the L1, L2, and GND terminations on the field wiring terminal block on the PDU.

Use a separate safety ground. The safety ground must be #6 AWG or larger and must connect the pedestal to the service panel ground bus. Depending on the distances between columns and the service panel, you may run safety ground wiring independently from the AEM column to the service panel, or you may daisy-chain the safety ground wiring between the AEM column and the Meridian 1.

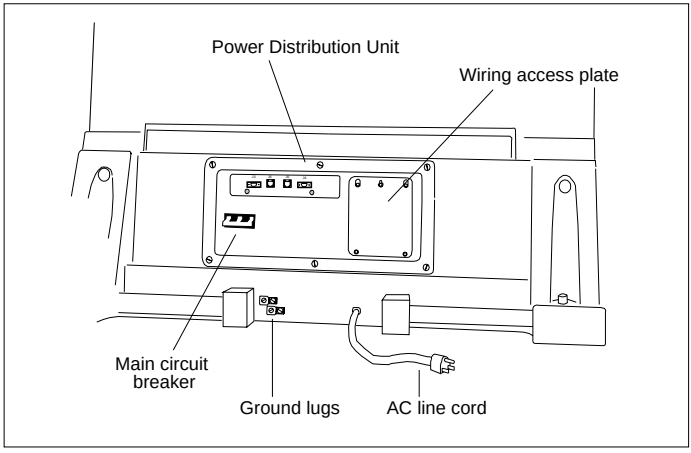
DANGER
Risk of equipment damage
Failure to follow grounding procedures can result in an unsafe or faulty system.

Procedure 1xxx
Power connections (ac)

1. Make sure the power cord is disconnected from the power source.
2. Measure the resistance between the ground pin on the power plug and a ground lug on the rear of the pedestal.

   See Figure 5. The resistance should be zero ohms. If the resistance is greater than .5 ohms, check the power cord connections.

Figure 5xxx
PDU connections



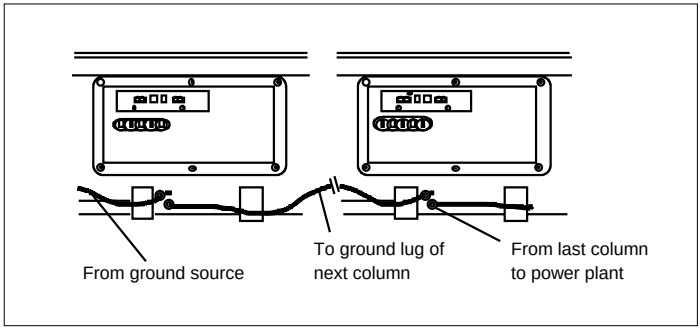
3 Connect the safety ground wire.

Use insulated ground wire for system grounding.

For a direct connection, connect a #6 AWG wire from the ground source in the service panel to a ground lug on the pedestal of the AEM column.

For a daisy-chain connection, connect a #6 AWG wire from a ground lug on the closest Meridian 1 column or cabinet to a ground lug on the pedestal of the AEM column.

Figure 6xxx
Meridian 1/AEM column daisy chain connection



4 Measure the resistance between the ground pin on the power plug and the ground terminal on the power outlet.

The resistance should be zero ohms. If the resistance is greater than .5 ohms, check the power outlet ground and safety ground connections.

5 Remove the field wiring access plate on the PDU.

6 Connect logic return wiring.

For a stand-alone column, make sure the logic return wiring, a 3-inch shorting strap, #10 AWG or larger, connects the LRTN and GND terminals on the field wiring block (see Figure 7).

For a multi-column row, connect a #8 AWG wire from the Logic Return Equalizer (LRE) (used with the Meridian 1) to LRTN on the field wiring block (see Figure 8).

7 Replace the field wiring access plate on the PDU.

8 Go to the appropriate procedure in “Alarm connections” to configure and connect the NT8D22 System Monitor in the AEM column.

Figure 7xxx
AEM Logic return connection-LRTN/GND common connection for stand-alone column

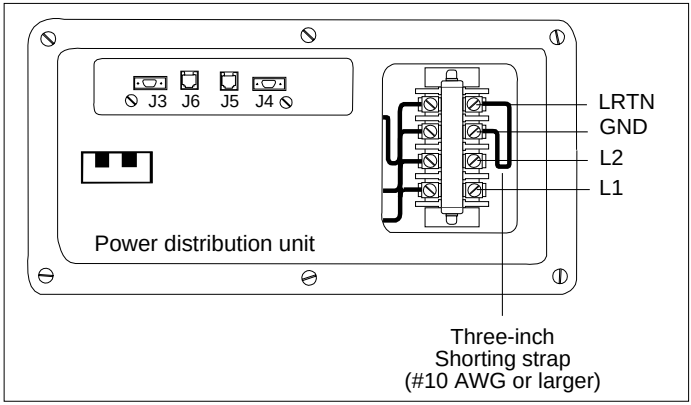
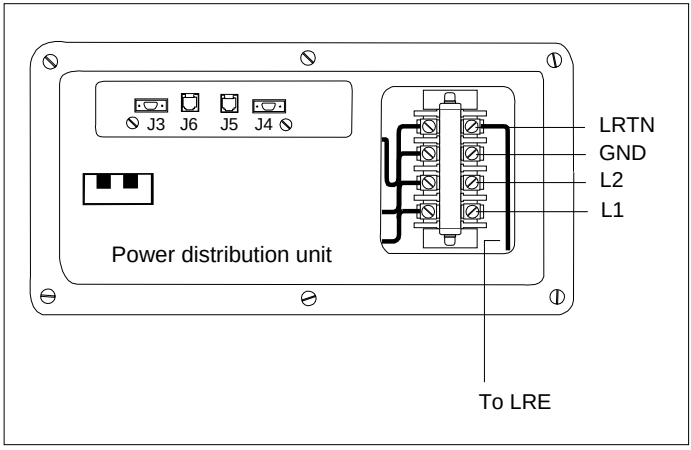


Figure 8xxx
AEM Logic return connection-LRTN isolated star connection for a multi-column row



Power connections (dc)

A stand-alone AEM column can be connected to the dc power plant used with the Meridian 1 system.

Depending on the distances between columns and the service panel, you may run safety ground wiring independently from the AEM column to the service panel, or you may daisy-chain the safety ground wiring between the AEM column and the Meridian 1.

WARNING
Risk of equipment damage
Failure to follow grounding procedures can result in an unsafe or faulty system.

You must run all wiring (except cables to the system monitor) from the external power equipment to the pedestal through flexible metallic conduit. You may route a 3/4-inch conduit through four holes in the top or bottom of the pedestal. The 3/4-inch conduit can contain a maximum of nine #10 AWG wires or five #8 AWG.

A maximum loop drop of two volts is allowed between the pedestal, or a junction box, and the external power equipment. See Table 1 for allowable wire sizes. See *Power engineering* (553-3001-152) for detailed information on calculating wire size.

Table 1xxx
Pedestal wire gauge requirements with two 30-amp 48 V dc feeds (see Note 1)

Length	Single conduit #8 AWG	Dual conduit #6 AWG (Note 2)	Junction box (single #4 AWG) (Note 3)	Junction box (double #4 AWG) (Note 4)
0 - 3 m (10 ft)	Yes	Yes	Yes	Yes
0 - 6 m (20 ft)	Yes	Yes	Yes	Yes
0 - 9 m (30 ft)	Yes	Yes	Yes	Yes
0 - 12 m (40 ft)	Yes	Yes	Yes	Yes
0 - 15 m (50 ft)	Yes	Yes	Yes	Yes
0 - 18 m (60 ft)	No	Yes	Yes	Yes
0 - 21 m (70 ft)	No	Yes	Yes	Yes
0 - 24 m (80 ft)	No	Yes	Yes	Yes
0 - 27 m (90 ft)	No	No	Yes	Yes
0 - 30 m (100 ft)	No	No	Yes	Yes
0 - 60 m (200 ft)	No	No	No	Yes
over 60 m (200 ft)	No	No	No	No

Note 1: Two 30-amp feeds are typically adequate for a column with four modules (five wires total-two 30-amp battery/battery return pairs plus logic return).

Note 2: When using dual conduit, the wires must be run in battery/battery return pairs, with one pair in one conduit and the other pair, plus logic return, in the other conduit.

Note 3: Five single runs of #4 AWG wire are used from the distribution point to the NT6D53 junction box near the pedestal; #10 AWG wire in a single conduit (supplied with the junction box) is run from the junction box to the pedestal.

Note 4: Five double runs of #4 AWG wire are used from the distribution point to the NT6D53 junction box near the pedestal; #10 AWG wire in a single conduit (supplied with the junction box) is run from the junction box to the pedestal.

Legend: Yes = Wire size is adequate for the distance
No = Wire size has too high a voltage drop and is inadequate for the distance.

Procedure 2xxx
Power connections (dc)

1 Connect the safety ground wire.

Use insulated ground wire for system grounding.

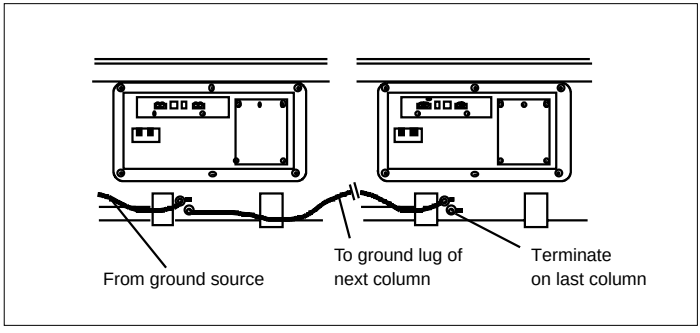
For a direct connection, connect a #6 AWG wire from the ground source in the service panel to a ground lug on the pedestal of the AEM column.

For a daisy-chain connection, connect a #6 AWG wire from a ground lug on the closest Meridian 1 column or cabinet to a ground lug on the pedestal of the AEM column (see Figure 9).

> ***Note:*** If the power plant consists of a QBL12 used with customer-provided power equipment, use a direct connection to the service panel. Do not extend ground wiring from the Meridian 1/SL-1 frame to the power plant.

2 Remove the PDU to access the field wiring terminal block (TB1) in the bottom of the pedestal.

Figure 9xxx
Direct wiring connection-Meridian 1 to AEM



3 Remove the backplane cover on the I/O assembly in the AEM above the pedestal, refer to Figure 10.

4 Disconnect the power plug (J1) and system monitor ribbon cable to the AEM.

Note: To disconnect the power plug, press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.

5 Loosen the retaining screws that secure the PDU.

6 If required, install a junction box near the pedestal of the AEM column. Insert the conduit from the junction box into one of the conduit access holes in the pedestal.

Connect the wires from the junction box to the matching connections on TB1 in the pedestal:

a. Connect the red wires, BAT0 through BAT3.

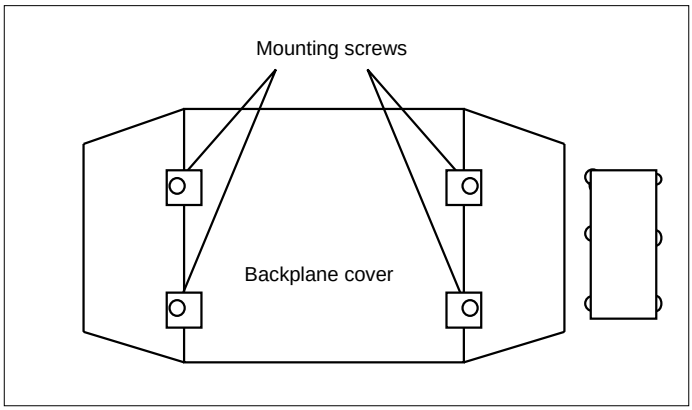
b. Connect the black wires, RTN0 through RTN3.

c. Connect the green wire, FGRD.

d. Connect the remaining wire (which is usually orange), LRTN.

Note: If a junction box is used, the connections described in steps 4 through 7 apply to TB1 in the junction box rather than the pedestal.

Figure 10xxx
Backplane cover



7 Connect red BAT wires from the power equipment to BAT connections on TB1 in the pedestal.

a. Connections at the power equipment:

*For an **NT6D82**, connect wires to the first four circuit breakers in the main control/distribution panel (see Figure 11). (If one wire feeds two modules, connect only the first two breakers.)*

*For a **QBL12**, connect wires to the first four available output connections on the -48V terminal panel (see Figure 12).*

*For a **QBL15**, connect wires to terminals 1, 2, or 3 (DISCHARGE) on TB1 (see Figure 13).*

*For a **QCA13**, connect wires to the first four available output connections on the -48V terminal panel (see Figure 12).*

b. Connections at the pedestal:

If there is only one AEM in the column, remove any straps installed on the terminal block and connect the red wire to BAT0.

If there are multiple AEMs in the column and one wire feeds two modules:

- For modules 0 and 1, connect to BAT0 and add a strap (if not already installed) between BAT0 and BAT1.
- For modules 2 and 3, connect to BAT2 and add a strap (if not already installed) between BAT2 and BAT3.

If there are multiple AEMs in the column and each AEM has a wire, remove straps (if installed) and connect the wire for each AEM:

- For module 0, connect to BAT0
- For module 1, connect to BAT1
- For module 2, connect to BAT2
- For module 3, connect to BAT3

8 Connect black RTN wires from the power equipment to RTN connections on TB1 in the pedestal.

a. Connections at the power equipment:

*For an **NT6D82**, connect wires to the ground bus/LRE.*

*For a **QBL12**, connect wires to the LRE.*

*For a **QBL15**, connect wires to the positive bus.*

*For a **QCA13**, connect wires to the LRE.*

b. Connections at the pedestal:

If there is only one AEM in the column, connect the black wire to RTN0.

If there are multiple AEMs in the column and one wire feeds two modules:

- For modules 0 and 1, connect to RTN0 and add a strap (if not already installed) between RTN0 and RTN1.
- For modules 2 and 3, connect to RTN2 and add a strap (if not already installed) between RTN2 and RTN3.

If there are multiple AEMs in the column and each AEM has a wire, remove straps (if installed) and connect the wire for each AEM:

- For module 0, connect to RTN0
- For module 1, connect to RTN1
- For module 2, connect to RTN2
- For module 3, connect to RTN3

9 Connect LRTN wiring (orange or white #8 AWG) from the power equipment to LRTN on TB1 in the pedestal:

*For an **NT6D82**, connect the wire to the ground bus/LRE.*

*For a **QBL12**, connect the wire to the LRE.*

*For a **QBL15**, connect the wire to the positive bus.*

*For a **QCA13**, connect the wire to the LRE.*

10 Reinstall the PDU:

a. At the front of the pedestal, set the switch on the front of the blower unit to OFF (down). Slide the unit out approximately 75 mm (3 in.).

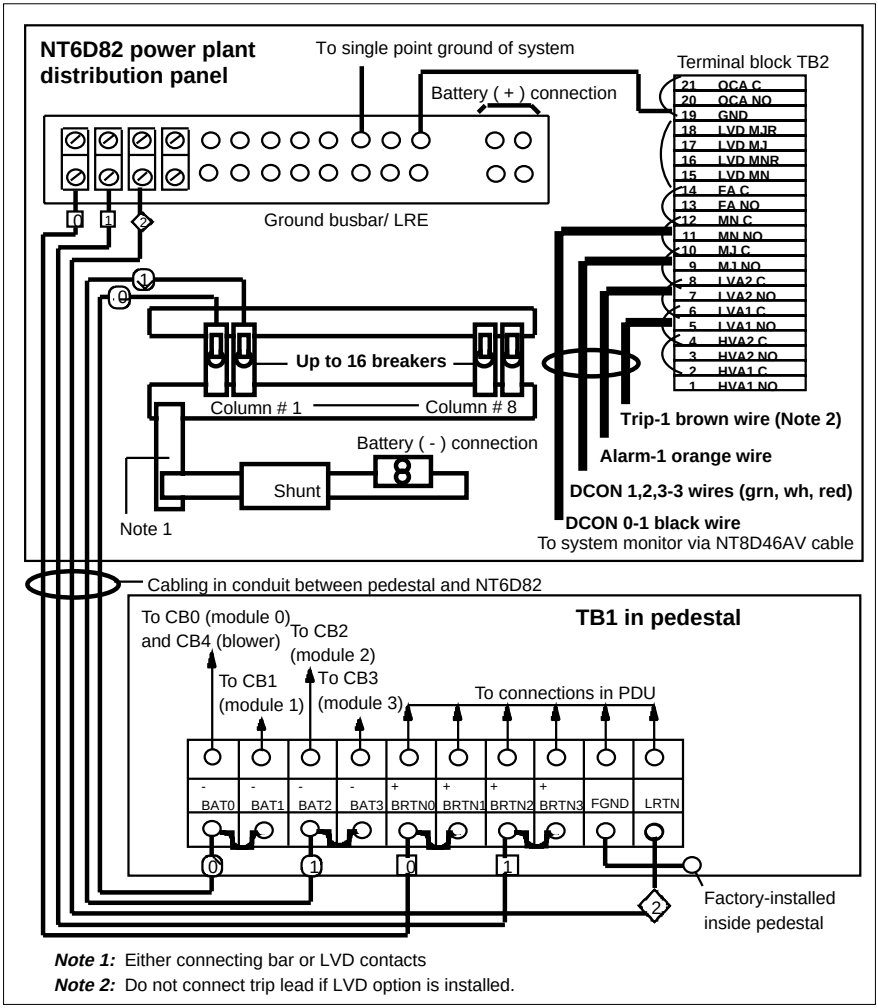
b. Insert the PDU and secure it with its retaining screws.

c. Insert the blower unit until it is securely plugged into the PDU. Set the switch on the blower unit to ON.

d. Reconnect the system monitor and power cables from the pedestal to the AEM above the pedestal.

11 Go to the appropriate procedure in “Alarm connections” to configure and connect the NT8D22 System Monitor in the AEM column.

Figure 11xxx
Pedestal to NT6D82 connections



Note 1: Either connecting bar or LVD contacts
Note 2: Do not connect trip lead if LVD option is installed.

Figure 12
Pedestal to QBL12 or QCA13 connections

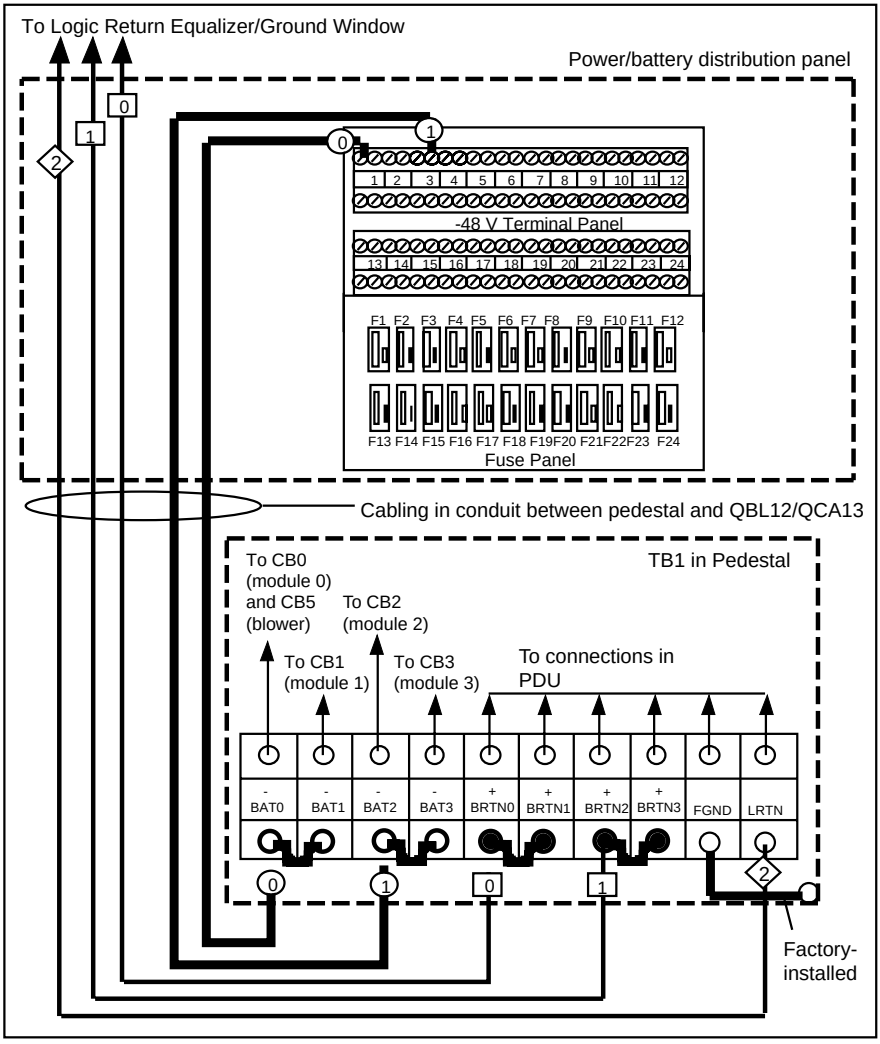
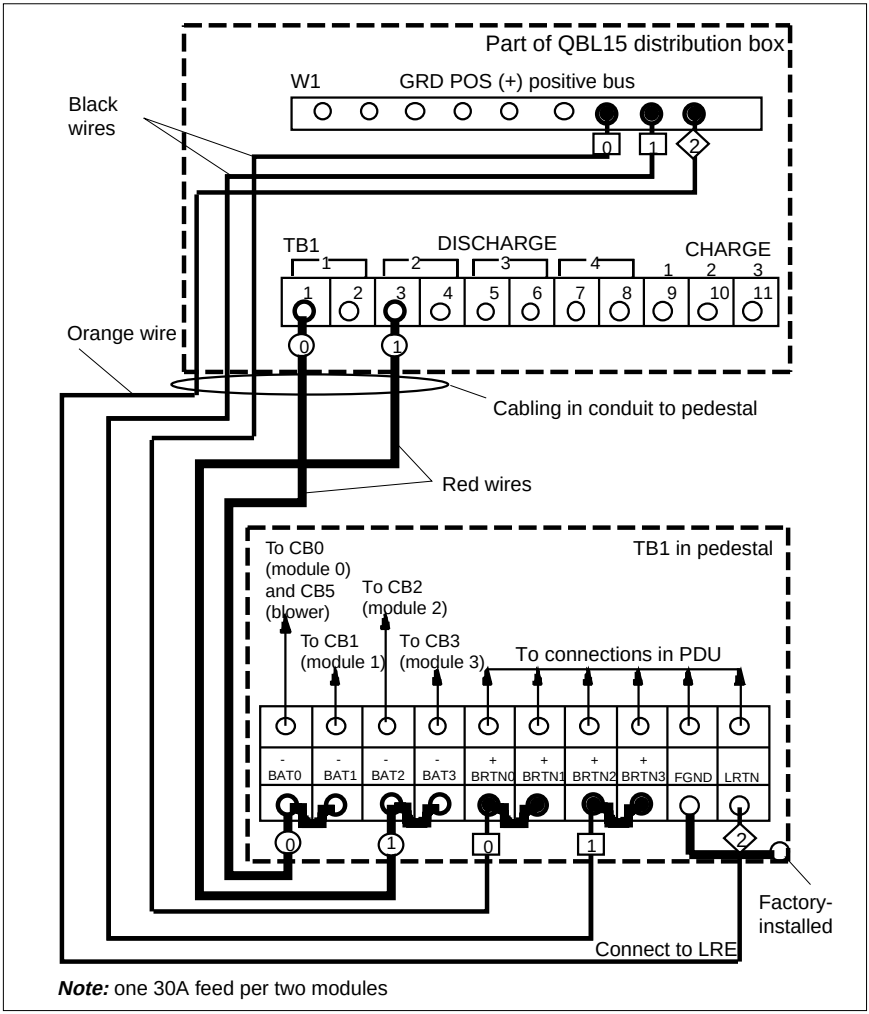


Figure 13
Pedestal to QBL15 connections



Note: one 30A feed per two modules

Alarm connections

When you add a stand-alone AEM to a Meridian 1, you must extend alarm cables from the AEM pedestal to the existing system as described in the following procedures.

Alarm connections with Meridian 1 systems

Use this procedure to configure and connect the NT8D22 system monitor in an AEM column that is connected to other Meridian 1 columns.

Procedure 3xxx
Alarm connections

1 Loosen the two retaining screws on the system monitor in the pedestal of the AEM column and remove it from the PDU.

2 Configure the system monitor as a slave as shown in Table 2.

See Circuit card installation and testing *(553-3001-211)* for a detailed description of the option switch settings.

3 Reinstall the system monitor in the PDU.

Table 2xxx
NT8D22 switch settings (set as slave) for operation with Meridian 1

Switch	1	2	3	4	5	6	7	8
SW1	off	off	*	off	off	off	off	off
SW2	off	off	(to set positions 3 - 8, see Table 3)					
SW3	off	off	off	off				
* Set to off for ac power. Set to on for dc power.								

4 Connect the system monitor to the Meridian 1 columns.

Use an NT8D46AL cable when columns are adjacent. Use an NT8D46AP cable if columns are not adjacent.

Cable the system monitor in series (slave 1-to-slave 2, slave 2-to-slave 3, and so on) with the other columns:

a. Run cables from connector J6 on one system monitor to J5 on the next.

b. Terminate at J5 on the last column in the series.

5. Set all circuit breakers in the rear of the AEM pedestal to OFF (down), then connect the AEM column to the power supply.
6. See the *Application Module installation and upgrade guide* (553-3201-210) for instructions on installing the Application Module and powering up the column.

Table 3xxx
SW2 positions 3 - 8-unit number for the slave

Slave no.	Switch position						Slave no.	Switch position					
	3	**4**	**5**	**6**	**7**	**8**		**3**	**4**	**5**	**6**	**7**	**8**
1	on	on	on	on	on	off	33	off	on	on	on	on	off
2	on	on	on	on	off	on	34	off	on	on	on	off	on
3	on	on	on	on	off	off	35	off	on	on	on	off	off
4	on	on	on	off	on	on	36	off	on	on	off	on	on
5	on	on	on	off	on	off	37	off	on	on	off	on	off
6	on	on	on	off	off	on	38	off	on	on	off	off	on
7	on	on	on	off	off	off	39	off	on	on	off	off	off
8	on	on	off	on	on	on	40	off	on	off	on	on	on
9	on	on	off	on	on	off	41	off	on	off	on	on	off
10	on	on	off	on	off	on	42	off	on	off	on	off	on
11	on	on	off	on	off	off	43	off	on	off	on	off	off
12	on	on	off	off	on	on	44	off	on	off	off	on	on
13	on	on	off	off	on	off	45	off	on	off	off	on	off
14	on	on	off	off	off	on	46	off	on	off	off	off	on
15	on	on	off	off	off	off	47	off	on	off	off	off	off
16	on	off	on	on	on	on	48	off	off	on	on	on	on
17	on	off	on	on	on	off	49	off	off	on	on	on	off
18	on	off	on	on	off	on	50	off	off	on	on	off	on
19	on	off	on	on	off	off	51	off	off	on	on	off	off
20	on	off	on	off	on	on	52	off	off	on	off	on	on
21	on	off	on	off	on	off	53	off	off	on	off	on	off
22	on	off	on	off	off	on	54	off	off	on	off	off	on
23	on	off	on	off	off	off	55	off	off	on	off	off	off
24	on	off	off	on	on	on	56	off	off	off	on	on	on
25	on	off	off	on	on	off	57	off	off	off	on	on	off
26	on	off	off	on	off	on	58	off	off	off	on	off	on
27	on	off	off	on	off	off	59	off	off	off	on	off	off
28	on	off	off	off	on	on	60	off	off	off	off	on	on
29	on	off	off	off	on	off	61	off	off	off	off	on	off
30	on	off	off	off	off	on	62	off	off	off	off	off	on
31	on	off	off	off	off	off	63	off	off	off	off	off	off
32	off	on	on	on	on	on							

Alarm connections with ST or RT systems

Table 4 lists the hardware required for alarm connections between an AEM column and ST or RT systems.

If the AEM column is connected to a Power Fail Transfer Unit (PFTU) or you want an external alarm (such as a light or bell) for the AEM column, connect the system monitor to the main distribution frame (MDF).

Table 4xxx
ST/RT alarm connection hardware requirements

SL-1 system type	Hardware required (one of each)
ST with QCA136 cabinet	NT8D46AY System Monitor Cable NT8D46BF System Monitor Cable (Note 1) NT8D46BH System Monitor Cable (Note 1) QCAD309 Alarm Adapter cable (Note 2) P0678258 Filter Connector (Note 2)
ST with QCA136 and QCA137 cabinets	NT8D46BC System Monitor Cable NT8D46BE System Monitor Cable NT8D46BM System Monitor Cable QCAD310 Ground Cable
RT with QCA147 cabinet	NT8D46AY System Monitor Cable NT8D46BF System Monitor Cable (Note 1) NT8D46BH System Monitor Cable (Note 1)
RT with QCA147 and QCA137 cabinets	NT8D46CH System Monitor Cable NT8D46BF System Monitor Cable (Note 1) NT8D46BH System Monitor Cable (Note 1) QCAD310 Ground Cable
RT with QCA147 and two QCA137 cabinets	NT8D46BC System Monitor Cable NT8D46BE System Monitor Cable NT8D46BL System Monitor Cable NT8D46BF System Monitor Cable (Note1) NT8D46BH System Monitor Cable (Note 1) QCAD310 Ground Cable
Note 1: The NT8D46BF and NT8D46BH cables are only required when extending the alarm connections to the MDF. ***Note 2:*** ST systems consisting of a single QCA136 cabinet require the installation of a QCAD309 Alarm Adapter cable and one P0678258 Filter Connector.	

ST system with a QCA136 cabinet

Use this procedure to configure and connect the NT8D22 system monitor in an AEM column that is connected to a Meridian SL-1 ST equipped with a QCA136 cabinet. Refer to Figure 14 during this procedure.

> ***Note:*** If you are not making alarm connections to the MDF, skip steps 3 through 6 and directly install connector P1 of the NT8D46AY cable into connector J3 of the system monitor.

Procedure 4xxx
ST system with QCA136 cabinet connections

1. Loosen the two retaining screws on the system monitor in the pedestal of the AEM column and remove it from the PDU.
2. Configure the system monitor as the master as shown in Table 5. (See *Circuit card installation and testing* (553-3001-211) for a detailed description of the option switch settings.)

Table 5xxx
NT8D22 switch settings (set as master) for operation with ST

Switch	1	2	3	4	5	6	7	8
SW1	on	off	*	off	on	on	on	on
SW2	on	on	on	on	on	on	on	on
SW3	on	on	on	on				
* Set to off for ac power. Set to on for dc power.								

3. Reinstall the system monitor in the PDU.
4. Install connector P1 of the NT8D46AY cable into connector J1 of the NT8D46BF cable.
5. Install connector P1 of the NT8D46BF cable into connector J3 of the system monitor.
6. Install connector J2 of the NT8D46BF cable into connector P1 of the NT8D46BH cable.
7. Connect the other end of the NT8D46BH cable at the alarm termination area on the MDF.
8. Power down the QCA136 cabinet.

9 Remove the QCA136 rear panels and the EMI back panel.

10 Install the QCAD309 cable and the filter connector (P0678258) according to *ST installation procedures* (553-2431-210).

11 Connect P2 of the NT8D46AY cable into the filter connector at the bottom rear of the QCA136 cabinet.

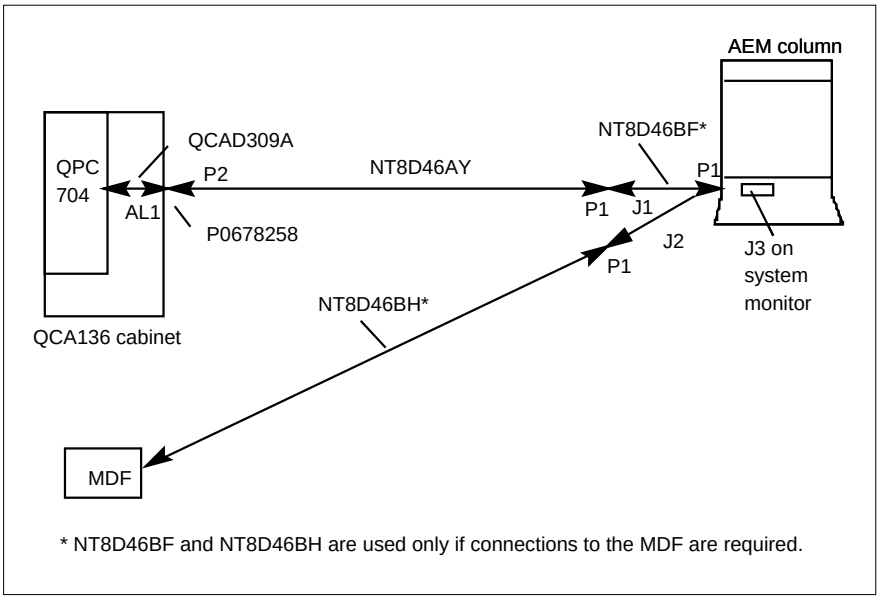
12 Reinstall the QCA136 EMI back panel and the rear panels.

13 Power up the QCA136 cabinet.

14 Set all circuit breakers in the rear of the AEM pedestal to OFF (down), then connect the AEM column to the power supply.

15 See the *Application Module installation and upgrade guide* (553-3201-210) for instructions on installing the Application Module and powering up the column.

Figure 14xxx
Alarm connections to ST with a QCA136 cabinet



* NT8D46BF and NT8D46BH are used only if connections to the MDF are required.

ST system with QCA136 and QCA137 cabinets

Use this procedure to configure and connect the NT8D22 system monitor in an AEM column that is connected to a Meridian SL-1 ST equipped with QCA136 and QCA137 cabinets. Refer to Figure 15 during this procedure.

> ***Note:*** If you are not making alarm connections to the MDF, skip steps 3 through 6 and directly install connector P1 of the NT8D46BE cable into connector J3 of the system monitor.

Procedure 5xxx
ST system with QCA137 cabinet connections

1. Loosen the two retaining screws on the system monitor in the pedestal of the AEM column and remove it from the PDU.
2. Configure the system monitor as the master as shown in Table 6. (See *Circuit card installation and testing* (553-3001-211) for a detailed description of the option switch settings.)

Table 6xxx
NT8D22 switch settings (set as master) for operation with ST

Switch	1	2	3	4	5	6	7	8
SW1	on	off	*	off	on	on	on	on
SW2	on	on	on	on	on	on	on	on
SW3	on	on	on	on				

* Set to off for ac power. Set to on for dc power.

3. Reinstall the system monitor in the PDU.
4. Install connector P1 of the NT8D46BF cable into connector J3 of the system monitor.
5. Install connector P1 of the NT8D46BE cable into connector J1 of the NT8D46BF cable.
6. Install connector P1 of the NT8D46BH cable into connector J2 of the NT8D46BF cable.
7. Connect the other end of the NT8D46BH cable at the alarm termination area on the MDF.
8. Power down the QCA136 cabinet.

9 Remove the rear panels and EMI back panels from the QCA136 and QCA137.

10 Install connector J1 of the NT8D46BM cable into connector AL1 (P0678258 Filter Connector) at the bottom rear of the QCA136 cabinet.

11 Install connector J1 of the NT8D46BE cable into connector P1 of the NT8D46BM cable.

12 Install connector J2 of the NT8D46BC cable into connector P2 of the NT8D46BM cable.

13 Install connector J1 of the NT8D46BC cable into connector AL1 (P0678258 Filter Connector) at the bottom rear of the QCA137 cabinet.

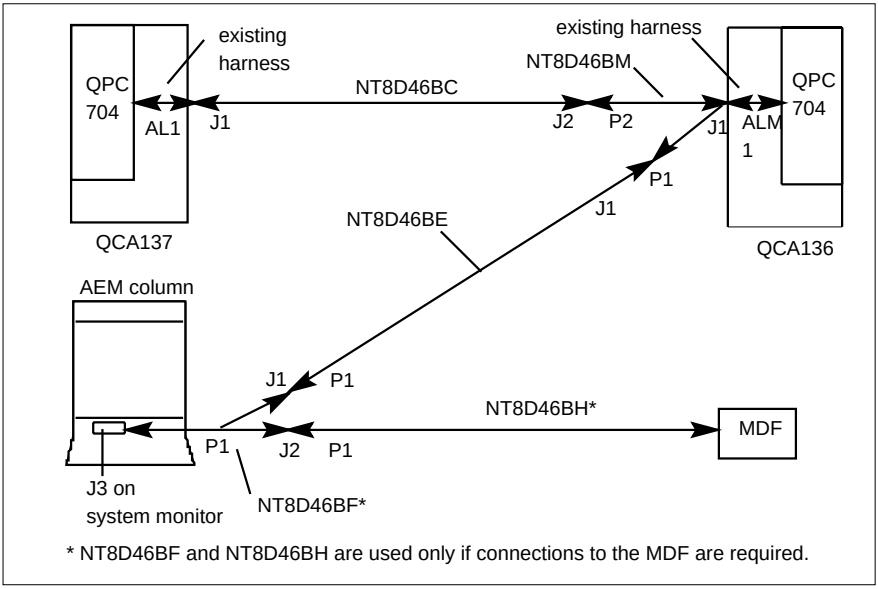
14 Reinstall the EMI back panels and rear panels in the QCA136 and QCA137.

15 Power up the QCA136 and QCA137 cabinets.

16 Set all circuit breakers in the rear of the AEM pedestal to OFF (down), then connect the AEM column to the power supply.

17 See the *Application Module installation and upgrade guide* (553-3201-210) for instructions on installing the Application Module and powering up the column.

Figure 15xxx
Alarm connections to ST with QCA136 and QCA137 cabinets



RT system with a QCA147 cabinet

Use this procedure to configure and connect the NT8D22 system monitor in an AEM column that is connected to a Meridian SL-1 RT equipped with a QCA147 cabinet. Refer to Figure 16 during this procedure.

Note: If you are not making alarm connections to the MDF, skip steps 3 through 6 and directly install connector P1 of the NT8D46AY cable into connector J3 of the system monitor.

Procedure 6xxx
RT system with QCA147 cabinet connections

1. Loosen the two retaining screws on the system monitor in the pedestal of the AEM column and remove it from the PDU.
2. Configure the system monitor as the master as shown in Table 7. (See *Circuit card installation and testing* (553-3001-211) for a detailed description of the option switch settings.)

Table 7xxx
NT8D22 switch settings (set as master) for operation with RT

Switch	1	2	3	4	5	6	7	8
SW1	on	off	*	off	on	on	on	on
SW2	on	on	on	on	on	on	on	on
SW3	on	on	on	on				

* Set to off for ac power. Set to on for dc power.

3. Reinstall the system monitor in the PDU.
4. Install connector P1 of the NT8D46AY cable into connector J1 of the NT8D46BF cable.
5. Install connector P1 of the NT8D46BF cable into connector J3 of the system monitor.
6. Install connector J2 of the NT8D46BF cable into connector P1 of the NT8D46BH cable.
7. Connect the other end of the NT8D46BH cable at the alarm termination area on the MDF.
8. Power down the QCA147 cabinet.

9 Remove the QCA147 rear panels and EMI back panel.

10 Install connector P2 of the NT8D46AY cable into connector AL1 (P0678258 Filter Connector) at the bottom rear of the QCA147 cabinet.

11 Remove the QPF37A Alarm Adapter Plug.

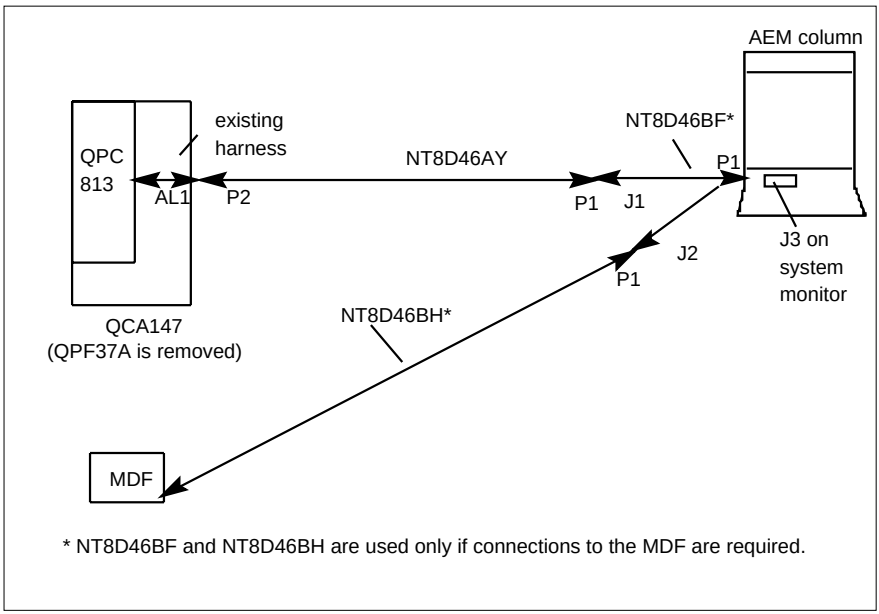
12 Reinstall the QCA147 EMI back panel and rear panels.

13 Power up the QCA147 cabinet.

14 Set all circuit breakers in the rear of the AEM pedestal to OFF (down), then connect the AEM column to the power supply.

15 See the *Application Module installation and upgrade guide* (553-3201-210) for instructions on installing the Application Module and powering up the column.

Figure 16xxx
Alarm connections to RT with a QCA147 cabinet



RT system with QCA147 and QCA137 cabinets

Use this procedure to configure and connect the NT8D22 system monitor in an AEM column that is connected to a Meridian SL-1 RT equipped with QCA147 and QCA137 cabinets. Refer to Figure 17 during this procedure.

> ***Note:*** If you are not making alarm connections to the MDF, skip steps 3 through 6 and directly install connector P1 of the NT8D46CH cable into connector J3 of the system monitor.

Procedure 7xxx
ST system with QCA147 and QCA137 cabinet connections

1. Loosen the two retaining screws on the system monitor in the pedestal of the AEM column and remove it from the PDU.
2. Configure the system monitor as the master as shown in Table 8. (See *Circuit card installation and testing* (553-3001-211) for a detailed description of the option switch settings.)

Table 8xxx
NT8D22 switch settings (set as master) for operation with RT

Switch	1	2	3	4	5	6	7	8
SW1	on	off	*	off	on	on	on	on
SW2	on	on	on	on	on	on	on	on
SW3	on	on	on	on				

* Set to off for ac power. Set to on for dc power.

3. Reinstall the system monitor in the PDU.
4. Install connector P1 of the NT8D46BF cable into connector J3 of the system monitor.
5. Install connector P1 of the NT8D46CH cable into connector J1 of the NT8D46BF cable.
6. Install connector J2 of the NT8D46BF cable into connector P1 of the NT8D46BH cable.
7. Connect the other end of the NT8D46BH cable at the alarm termination area on the MDF.
8. Power down the QCA147 cabinet.
9. Remove the QCA147 rear panels and the EMI back panel.

10 Make sure the existing alarm cable between the QCA147 and QCA137 cabinets is installed.

11 Remove the QPF37A Alarm Adapter Plug.

12 Install connector J1 of the NT8D46CH cable into connector AL1 (P0678258 Filter Connector) at the bottom rear of the QCA147 cabinet.

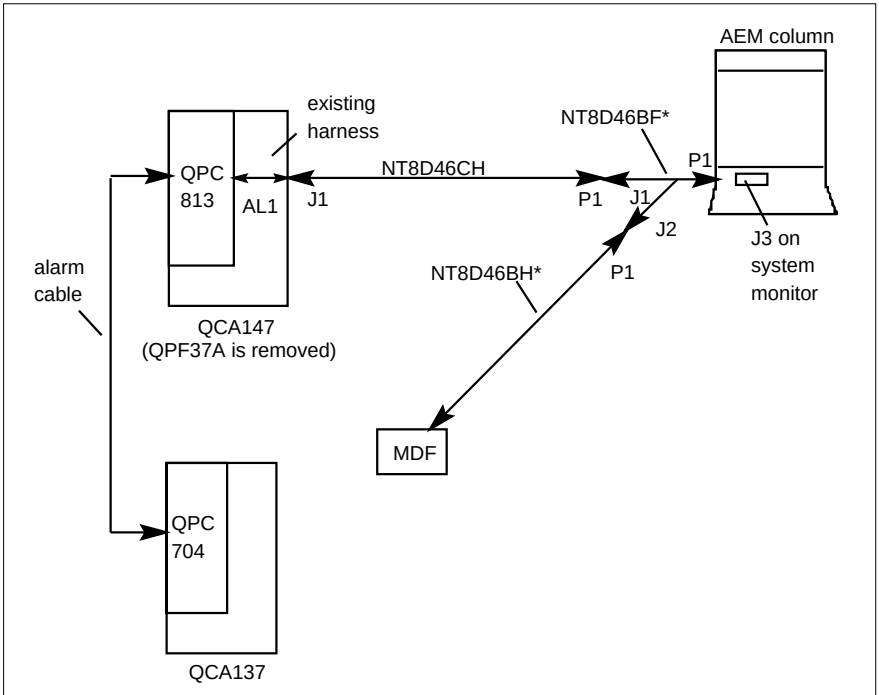
13 Reinstall the QCA147 EMI back panel and the rear panels.

14 Power up the QCA147 cabinet.

15 Set all circuit breakers in the rear of the AEM pedestal to OFF (down), then connect the AEM column to the power supply.

16 See the *Application Module installation and upgrade guide* (553-3201-210) for instructions on installing the Application Module and powering up the column.

Figure 17xxx
Alarm connections to RT with QCA147 and QCA137 cabinets



* NT8D46BF and NT8D46BH are used only if connections to the MDF are required.

RT system with QCA147 and two QCA137 cabinets

Use this procedure to configure and connect the NT8D22 system monitor in an AEM column that is connected to a Meridian SL-1 RT equipped with a QCA147 and two QCA137 cabinets. Refer to Figure 18 during this procedure.

> ***Note:*** If you are not making alarm connections to the MDF, skip steps 3 through 6 and directly install connector P1 of the NT8D46BE cable into connector J3 of the system monitor.

Procedure 8xxx
RT system with QCA147 and two QCA137 cabinet connections

1. Loosen the two retaining screws on the system monitor in the pedestal of the AEM column and remove it from the PDU.
2. Configure the system monitor as the master as shown in Table 9. (See *Circuit card installation and testing* (553-3001-211) for a detailed description of the option switch settings.)

Table 9xxx
NT8D22 switch settings (set as master) for operation with RT

Switch	1	2	3	4	5	6	7	8
SW1	on	off	*	off	on	on	on	on
SW2	on	on	on	on	on	on	on	on
SW3	on	on	on	on				

* Set to off for ac power. Set to on for dc power.

3. Reinstall the system monitor in the PDU.
4. Install connector P1 of the NT8D46BF cable into connector J3 of the system monitor.
5. Install connector P1 of the NT8D46BE cable into connector J1 of the NT8D46BF cable.
6. Install connector J2 of the NT8D46BF cable into connector P1 of the NT8D46BH cable.
7. Connect the other end of the NT8D46BH cable at the alarm termination area on the MDF.

8 Power down the QCA147 cabinet.

9 Remove the QCA147 rear panels and EMI back panel.

10 Remove the QPF37A Alarm Adapter Plug in the QCA147 cabinet.

11 Verify that the alarm cable is installed between the QCA147 and the first QCA137 cabinets.

12 Install connector J1 of the NT8D46BL cable into connector AL1 (P0678258 Filter Connector) of the QCA147 cabinet.

13 Install connector J1 of the NT8D46BE cable into connector P1 of the NT8D46BL cable.

14 Install connector J2 of the NT8D46BC cable into connector P2 of the NT8D46BL cable.

15 Reinstall the QCA147 EMI back panel and rear panels.

16 Power down the second QCA137 cabinet.

17 Remove the second QCA137 rear panels and EMI back panel.

18 Install connector J1 of the NT8D46BC cable into connector AL1 (P0678258 Filter Connector) of the second QCA137 cabinet.

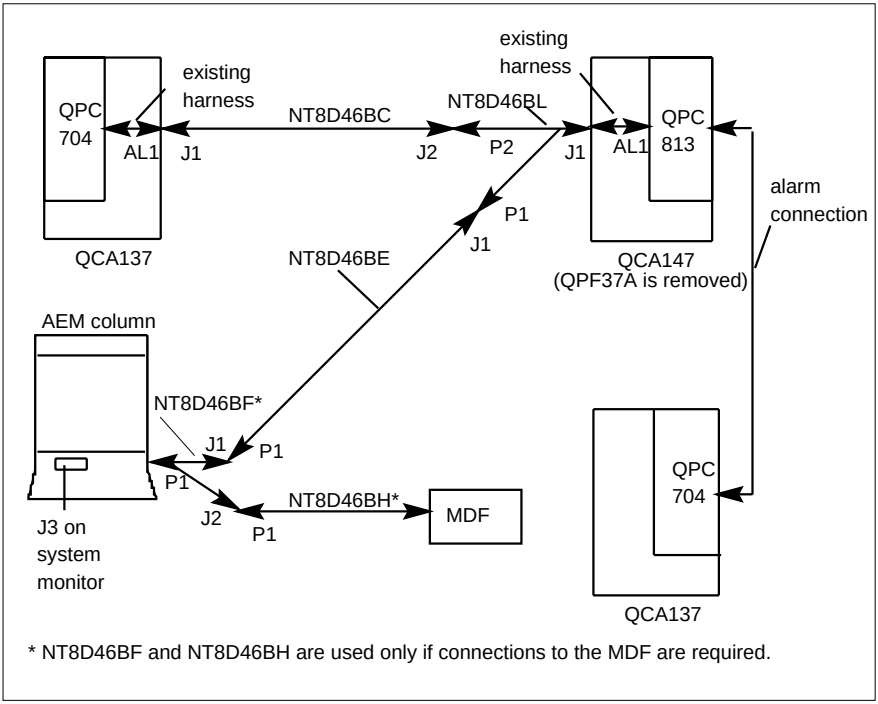
19 Reinstall the second QCA137 EMI back panel and rear panels.

20 Power up the QCA147 and QCA137 cabinets.

21 Set all circuit breakers in the rear of the AEM pedestal to OFF (down), then connect the AEM column to the power supply.

22 See the *Application Module installation and upgrade guide* (553-3201-210) for instructions on installing the Application Module and powering up the column.

Figure 18xxx
Alarm connections to RT with QCA147 and two QCA137 cabinets



* NT8D46BF and NT8D46BH are used only if connections to the MDF are required.

Alarm connections with NT or XT systems

Use this procedure to configure and connect the NT8D22 system monitor in the AEM column when QPC84 or QPC173 Power Monitors are used in a Meridian SL-1 NT or XT.

Note: During this procedure, refer to Figure 19 if the SL-1 is equipped with a QPC84 Power Monitor. Refer to Figure 20 if the SL-1 is equipped with a QPC173 Power Monitor.

Procedure 9xxx
NT or XT system with QPC84 or QPC173 cabinet connections

1. Loosen the two retaining screws on the system monitor in the pedestal of the AEM column and remove it from the PDU.
2. Configure the system monitor as the master as shown in Table 10. (See *Circuit card installation and testing* (553-3001-211) for a detailed description of the option switch settings.)

Table 10xxx
NT8D22 switch settings (set as master) for operation with NT or XT

Switch	1	2	3	4	5	6	7	8
SW1	on	off	*	off	off	off	on	off
SW2	on	off	on	on	on	on	on	on
SW3	on	on	on	on				

* Set to off for ac power. Set to on for dc power.

3. Reinstall the system monitor in the PDU.
4. Connect an NT8D46BH alarm cable from connector J3 on the system monitor to the alarm termination area at the MDF.
5. At the MDF, locate the P10 cable from each NT/XT cabinet:

   Make sure the SYSLTIN connections (OW wire) in all P10 cables are connected together and to the SYSLTOUT connection (WO wire) on the P10 cable from the CE cabinet.

   Make sure the CE-ALARM connections (VBl wire) in all P10 cables are connected together.

6 Locate a -48 V source at the MDF. Connect it to the MDF0-48 connection (green wire) on the NT8D46BH cable.

7 At the MDF, locate the SYSLTIN (blue wire) and CE-SYSLT (white wire) connections on the NT8D46BH cable:

a. Connect the SYSLTIN connection (blue wire) on the NT8D46BH cable to the SYSLTOUT connection (WO wire) on the P10 cable from the CE cabinet.

b. Connect the CE-SYSLT connection (white wire) on the NT8D46BH cable to the CE-ALARM connection (OW wire) on the P10 cable from the CE cabinet.

8 Refer to the installation manual for the NT/XT and install an SDI port. Set the SDI port for 1200 baud in DTE mode and connect it to the system monitor:

a. Install an NT8D46AD cable from connector P1 in the pedestal of the AEM column to J1 on the backplane of the AEM. Mount the SDI connector on the cable in an available opening on the AEM I/O panel.

b. Install an SDI cable from the SDI port on the NT/XT to the SDI connector on the NT8D46AD cable on the AEM I/O panel.

9 Set all circuit breakers in the rear of the AEM pedestal to OFF (down), then connect the AEM column to the power supply.

10 See the *Application Module installation and upgrade guide* (553-3201-210) for instructions on installing the Application Module and powering up the column.

Figure 19xxx
NT8D22 System Monitor connections to a QPC84 Power Monitor

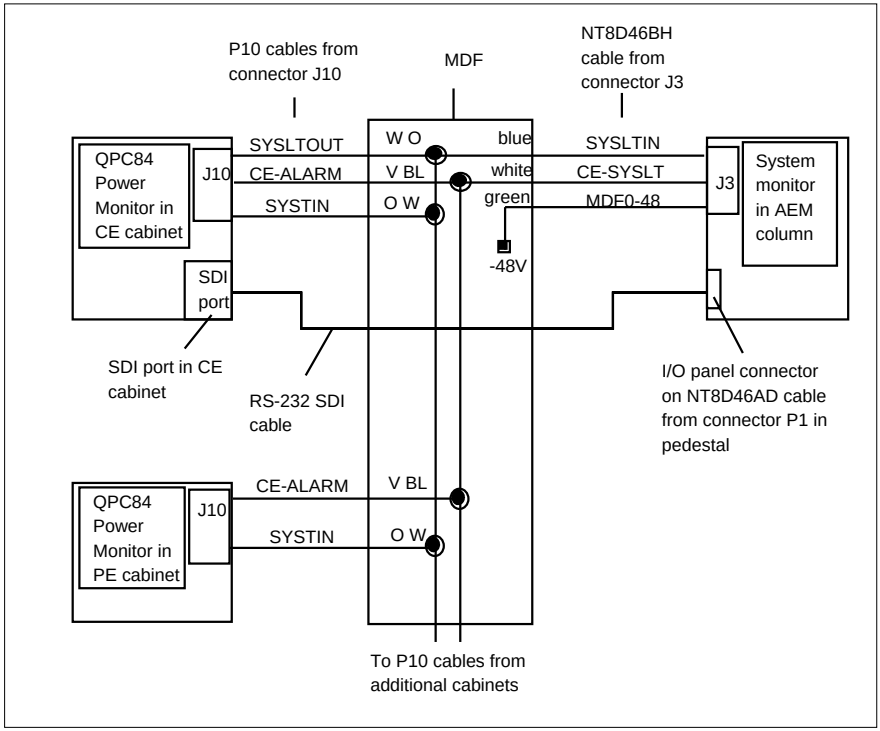
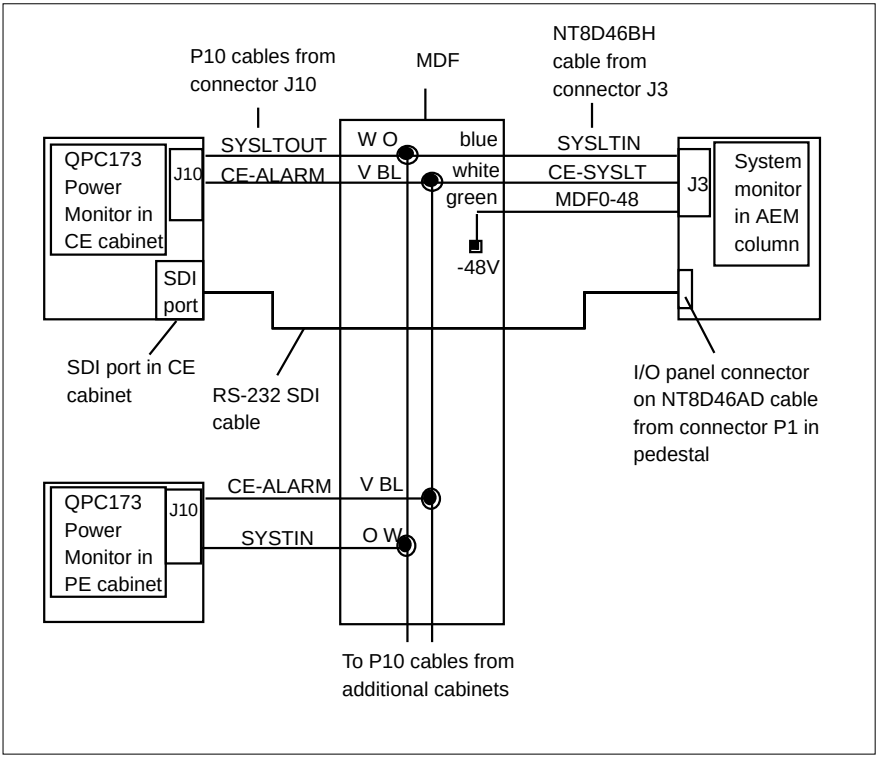


Figure 20
NT8D22 System Monitor connections to a QPC173 Power Monitor



Adding an AEM to a column

An AEM can be added to a Meridian 1 column in one of three positions; a procedure is given for each:

- Adding an AEM to the base of a column
- Adding an AEM between two other modules
- Adding an AEM to the top of a column

There are similarities in the three procedures. Power and system monitor cables between modules must be disconnected, then connected to the AEM and the module must be positioned, then secured with mounting bolts.

Figures 21 through 23 illustrate these tasks.

The AEM is heavy and should be lifted and installed by two people. When you slide the AEM into the shelf, be sure to keep track of the cables and connectors to keep them from getting caught or tangled.

> ***Note:*** If the column is equipped with earthquake bracing, remove the rods and install longer rods after adding the module. See "Earthquake bracing" in *System installation procedures* (553-3001-210) to perform these functions.

WARNING
Risk of equipment damage
Power to the column must be shut down during these procedures.

Figure 21xxx
Module-to-module power and system monitor connections

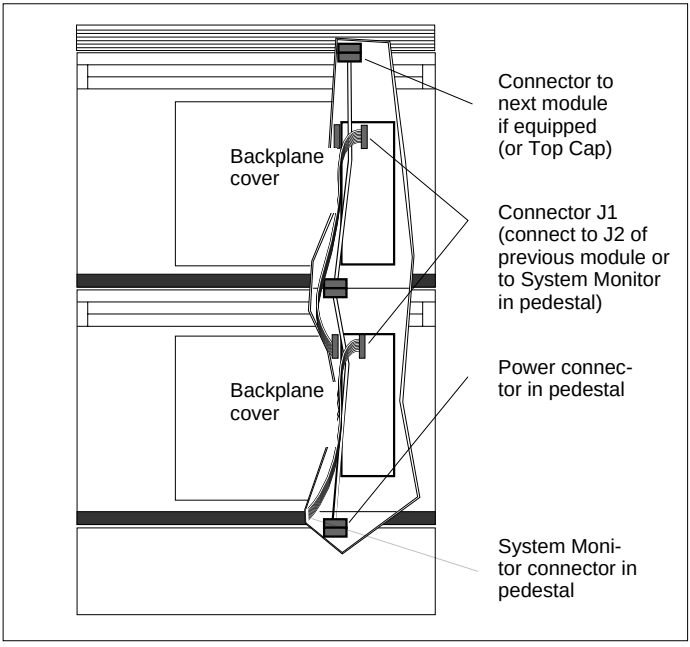


Figure 22xxx
Module mounting bolts

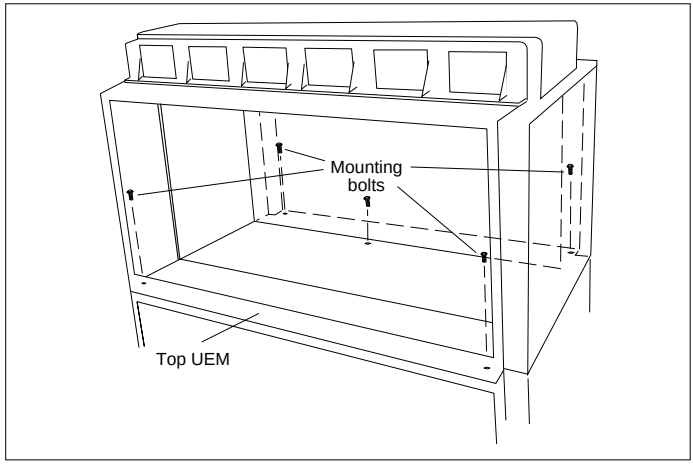
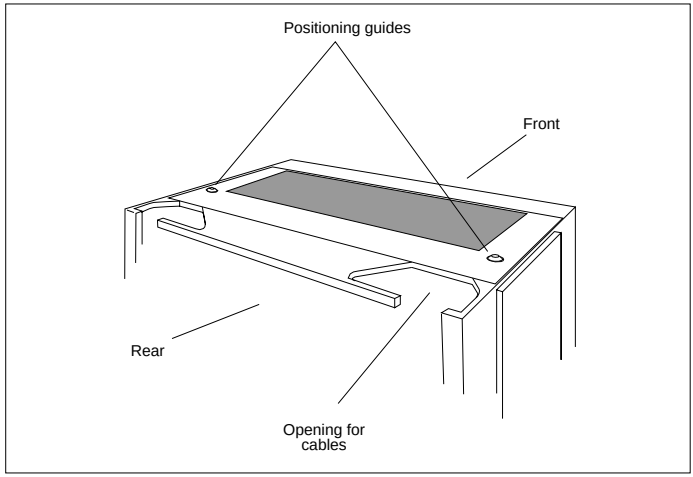


Figure 23xxx
Module positioning guides



Adding an AEM to the base of a column

Procedure 10xxx
Adding an AEM to the base of a column

1. Remove the rear grill on the pedestal and set all circuit breakers to OFF (down).
2. Remove the module above the pedestal:
   a. Remove all the covers on the rear of the module.
   b. Disconnect the power connector to the pedestal (see Figure 21).

      Note: You must press a latch trip on the front and rear of the plug. You may need to use a screwdriver blade against the latch trip on the front of the plug.

   c. Disconnect the system monitor connector to the pedestal (see Figure 21).
   d. Use a 9/16-inch socket wrench to remove the five mounting bolts that secure the module (see Figure 22) and lift it off the column.
3. Position and secure modules:
   a. Locate the positioning guides on the pedestal (see Figure 23). Make sure the AEM is facing the same direction as the column.
   b. Place the AEM on the pedestal and adjust it until it is seated securely on the positioning guides.
   c. Secure the mounting bolts on the AEM.
   d. Place the removed module on top of the AEM and secure it with the mounting bolts.
4. Connect the power and system monitor cables:
   a. Remove all the covers on the rear of the AEM.
   b. Connect the power connectors in the AEM to the pedestal and to the module above (see Figure 21).
   c. Connect the system monitor cable from the pedestal to connector J1 on the AEM.
   d. Connect the system monitor cable from connector J2 in the AEM to J1 in the module above.
5. See the *Application Module installation and upgrade guide* (553-3201-210) for instructions on installing the Application Module and powering up the column.

Adding an AEM between two other modules

Procedure 11xxx
Adding an AEM between two other modules

1. Remove the rear grill on the pedestal and set all circuit breakers to OFF (down).
2. Remove the module that will be above the AEM:
   a. Remove all the covers on the rear of the modules that will be above and below the AEM.
   b. Disconnect the power connectors between the modules (see Figure 21).
   c. Disconnect the system monitor cable from connector J1 in the module that will be above the AEM (see Figure 21).
   d. Use a 9/16” socket wrench to remove the five mounting bolts that secure the module above (see Figure 22) and lift it off the column.
3. Position and secure modules:
   a. Locate the positioning guides on what is now the top module in the column (see Figure 23). Make sure the AEM is facing the same direction as the column.
   b. Place the AEM on top of the column and adjust it until it is seated securely on the positioning guides.
   c. Secure the mounting bolts on the module.
   d. Place the removed module on top of the AEM and secure it with the mounting bolts.
4. Connect the power and system monitor cables between modules:
   a. Remove all the covers on the rear of the AEM.
   b. Connect the power connectors between the AEM and the modules above and below it.
   c. Connect the system monitor cable from connector J2 in the module below to J1 in the AEM.
   d. Connect the system monitor cable from J2 in the AEM to J1 in the module above.
5. See the *Application Module installation and upgrade guide* (553-3201-210) for instructions on installing the Application Module and powering up the column.

Adding an AEM to the top of a column

Procedure 12xxx
Add an AEM to the top of a column

1 Remove the rear grill on the pedestal and set all circuit breakers to OFF (down).

2 Disconnect power to the top cap:

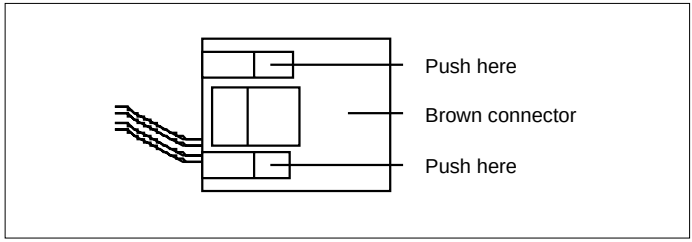
a. Remove the covers on the rear of the module below the top cap.

This includes the outside grey cover and the backplane cover.

b. At the top rear of the module, disconnect the brown power connector marked “J1” from the module power harness.

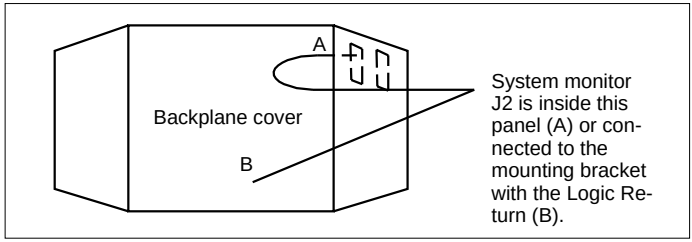
Press the four tabs (two on each side) and let the connector fall loose into the module below. See Figure 24.

Figure 24xxx
Module power harness power connector



c. Disconnect the system monitor cable (flat ribbon cable) at connector J2 on the system monitor. See Figure 25.

Figure 25xxx
System monitor cable at connector J2

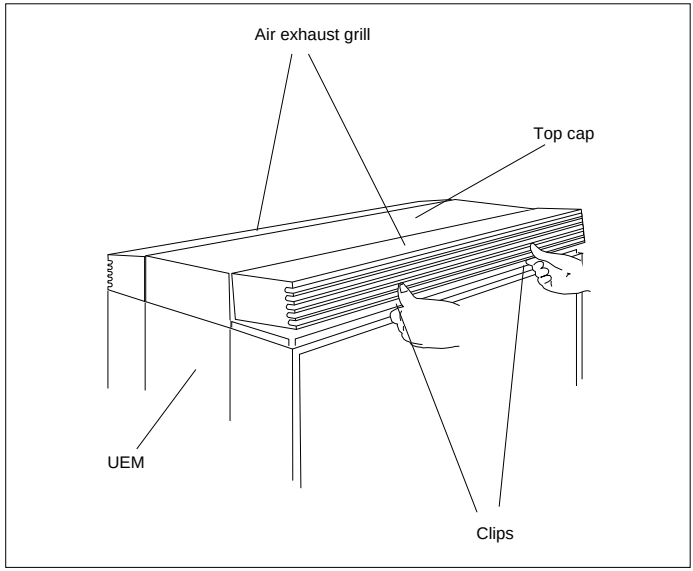


3 Remove the top cap and perforated panel:

a. Pull forward on the clips underneath the front edge of each air exhaust grill on the top cap.

b. Remove the front and rear grills as illustrated in Figure 26.

Figure 26xxx
Removing the air exhaust grill



c. Use a 5/16” socket wrench to remove the six screws that secure the top cap (see Figure 29). Remove the top cap from the column.

d. Remove the screws that secure the perforated panel and LED bracket. Slide the panel slightly to the left (looking at it from the rear of the column) and remove it.

4 Position and secure the AEM:

a. Locate the positioning guides on the module in the column (see Figure 23). Make sure the AEM is facing the same direction as the column.

b. Place the AEM on top of the column and adjust it until it is seated securely on the positioning guides.

c. Use a 9/16” socket wrench to secure the module with five mounting bolts (see Figure 22).

You may have to remove the black junction box (there are four screws attaching it) to secure the bolt in the center of the module. Re-install the junction box once the bolt is secure.

5 Connect the power and system monitor cables between the AEM and the module below it:

a. Remove all the covers on the rear of the AEM.

This includes the outside grey cover and the backplane cover.

b. Connect the power connectors between the AEM and the module below it (see Figure 21).

c. Connect the system monitor cable from connector J2 in the lower module to J1 in the AEM (see Figure 21).

6 Install the perforated panel and top cap on the AEM:

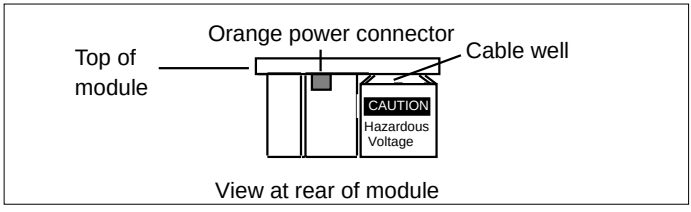
a. Position the perforated panel (removed previously) and slide it slightly to the right (at the rear). Install the screws that secure the panel and LED bracket.

b. Position wiring from the perforated panel so it rests in the cable well (next to the orange power connector at the rear of the module, as shown in Figure 27).

c. Position the top cap and install the screws that secure it.

d. Replace the air exhaust grills at the front and rear of the top cap.

Figure 27xxx
Cable well for wiring



7 Reconnect power to the top cap:

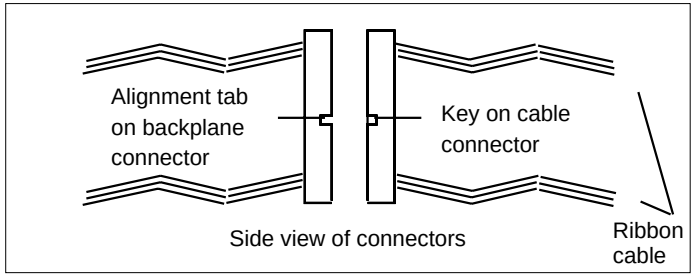
a. Connect the system monitor cable to J2 on the AEM backplane (as shown in Figure 25).

Line up the alignment tab on the connector (as shown in Figure 28) and snap on the pin headers to position the connector correctly.

b. Connect the brown power connector to the module power harness, ensuring that the latches are locked in.

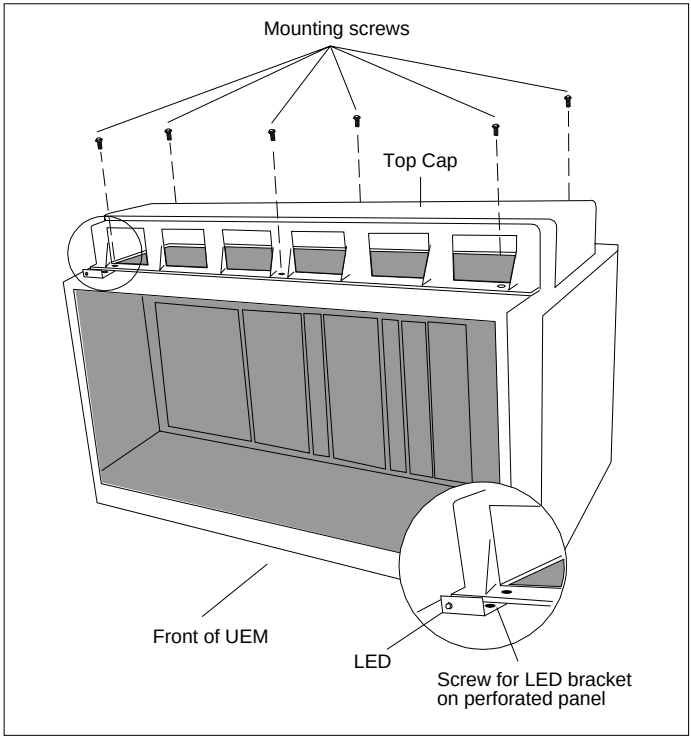
See Figure 21 for power harness connection to the top cap. Instead of plugging straight up to another module, the connector must be installed in a bracket on the perforated panel.

Figure 28xxx
Alignment tab on connector



8 See the *Application Module installation and upgrade guide* (553-3201-210) for instructions on installing the Application Module and powering up the column.

Figure 29xxx
Top cap assembly



Removing an AEM

The steps for removing an AEM from a column are basically the same as for installing the AEM. However, before you remove an AEM, you *must* power down and remove any equipped Application Modules as described in the *Application Module diagnostic and maintenance guide* (553-3201-510).

To replace standard Meridian 1 equipment (the system monitor, PDU, blower unit, or top cap) in a stand-alone configuration, see *Hardware replacement* (553-3001-520).

Ordering

Ordering information

Table 11 lists field replaceable items for the AEM and the quantity required for operation.

Table 11
Field-replaceable items

Part number	Description	Quantity required for ac version	Quantity required for dc version
NT7D00AA	Top cap, ac	1	n/a
NT7D00BA	Top cap, dc	n/a	1
NT7D09AA	Pedestal, dc	n/a	1
NT7D10AA	Power distribution unit, dc	n/a	1
NT7D18AA	Application Equipment Module, ac	1	n/a
NT7D18AB	Application Equipment Module, dc	n/a	1
NTND21AA	Side Panel Kit	as required	as required
NT8D22AC	System monitor	1	1
NT8D27AB	Pedestal, ac	1	n/a
NT8D52AA	Blower unit, ac	1	n/a
NT8D52DC	Blower unit, dc	n/a	1
NT8D53AB	Power distribution unit, ac	1	n/a

Component failure rates

Failure rates for basic AEM components in terms of the number of expected failures in one million hours of operation are listed in Table 11.

Table 12
Component failure rates

Component	Description	Failure rate per million hours
NT7D18AA	Application Equipment Module	1.43
NT7D64AA	Application Module power supply, dc	13.89
NT7D64DC	Application Module power supply, dc	13.89

These failure rates should be used in conjunction with the spares planning section of *Spares planning* (553-3001-153).

Glossary

AEM Application Equipment Module. A module equipped to support Application Modules.

Application Module An application processor module.

backplane A board mounted on a card cage. Circuit cards mount on card pins on the backplane. Printed circuit wiring on the backplane makes connections between circuit cards.

card cage A frame in a UEM for mounting circuit cards, power supply, backplane and other equipment.

column An arrangement of at least one AEM, a standard Meridian 1 pedestal and a top cap. A column can contain as many as three AEMs or a mix of AEMs and other Meridian 1 modules.

daisy-chain connection A method of grounding columns using wiring that connects each column with the preceding column (or ground source) and the succeeding column. The series of connections resembles a daisy chain.

MDF Main Distribution Frame. The main interconnection point in a telephone exchange.

MLM Meridian Link Module. An Application Module that provides a link to a host processor through the Meridian Link interface.

MPDU Module Power Distribution Unit. Part of an AEM. An MPDU provides power to the Application Modules within the AEM.

PDU Power Distribution Unit. Part of a pedestal. A PDU provides power for the entire column. A PDU contains the field wiring terminal block and the main circuit breaker (or breakers).

pedestal The equipment that forms the base of column. A pedestal contains a blower unit, an air filter, and a PDU.

SDI port Serial Data Interface port. Used for the optional sharing features that allow the Application Module console to access Meridian 1 administration and maintenance programs

top cap The equipment that mounts on top of a column. A top cap provides air flow exits, I/O cable entries and exits, and thermal sensing devices.

UEM Universal Equipment Module. The basic unit of Meridian 1 modular packaging. A UEM is a self-contained hardware cabinet housing a card cage, with a power supply, backplane, and circuit cards. If the UEM has the card cage for an AEM installed, it functions as an AEM.

Index

Meridian 1

Application Equipment Module

Installation guide

Documentation Systems,
Northern Telecom
522 University Avenue, 14th Floor
Toronto, Ontario M5G 1W7
(416) 598-0196

Publication number: 553-3201-200
Product release: Standard 1.0
Date: April 1993

Published simultaneously in Canada and the United States by Northern Telecom.