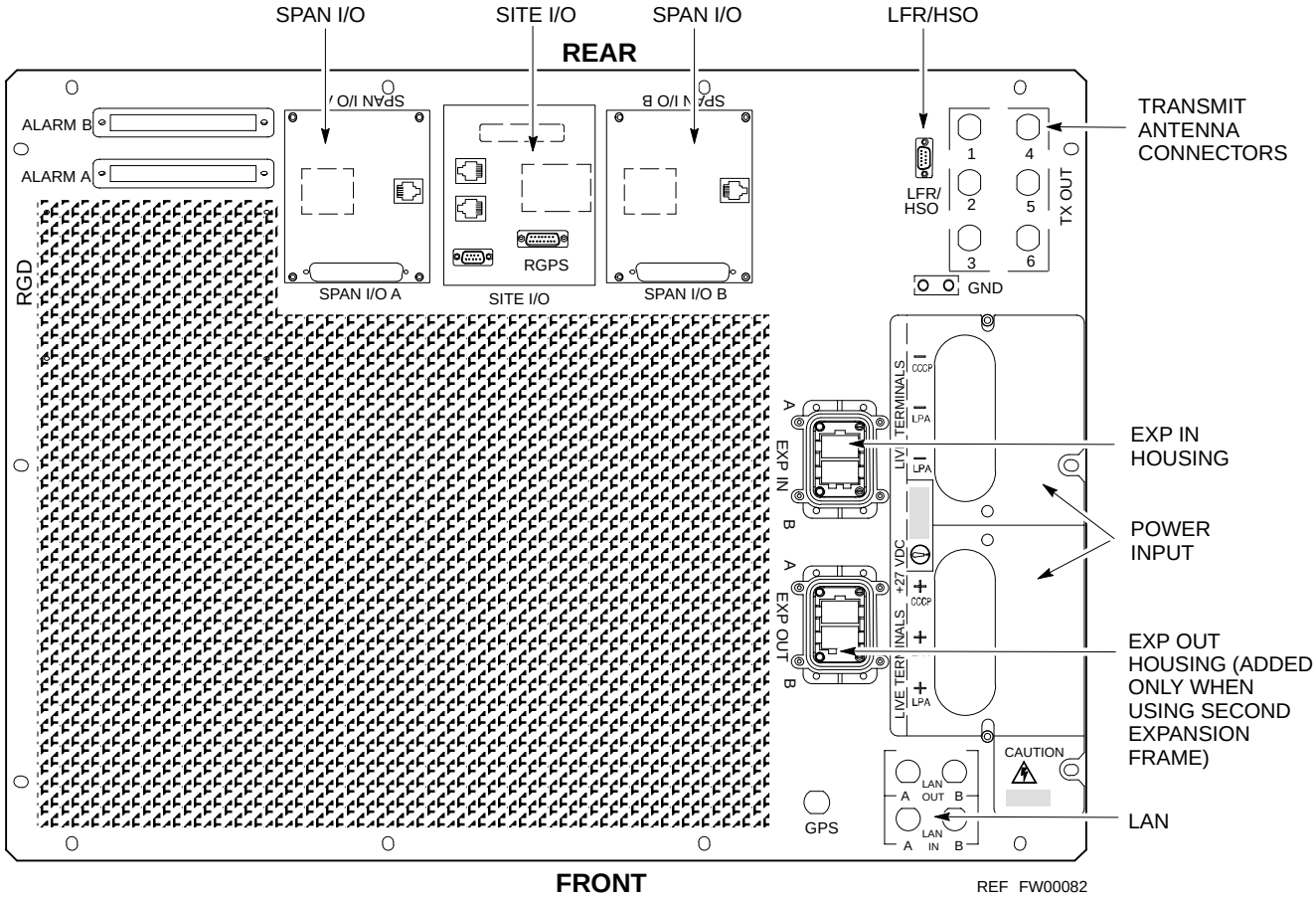
Figure 1-8: +27 V SC 4812T Expansion Frame I/O Plate



Frame Module Location & Identification – continued

Figure 1-9: –48 V SC 4812T Expansion Frame I/O Plate

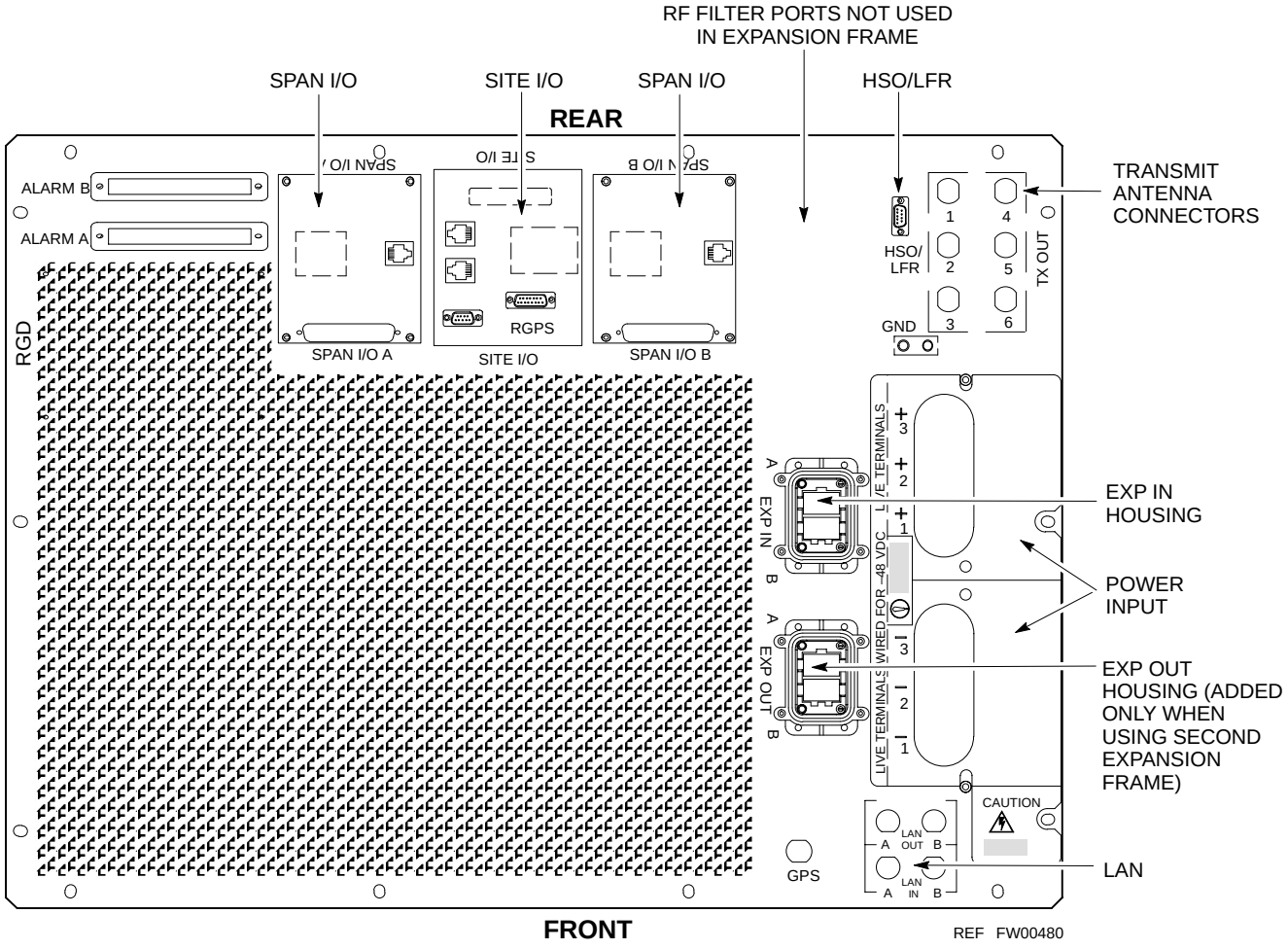
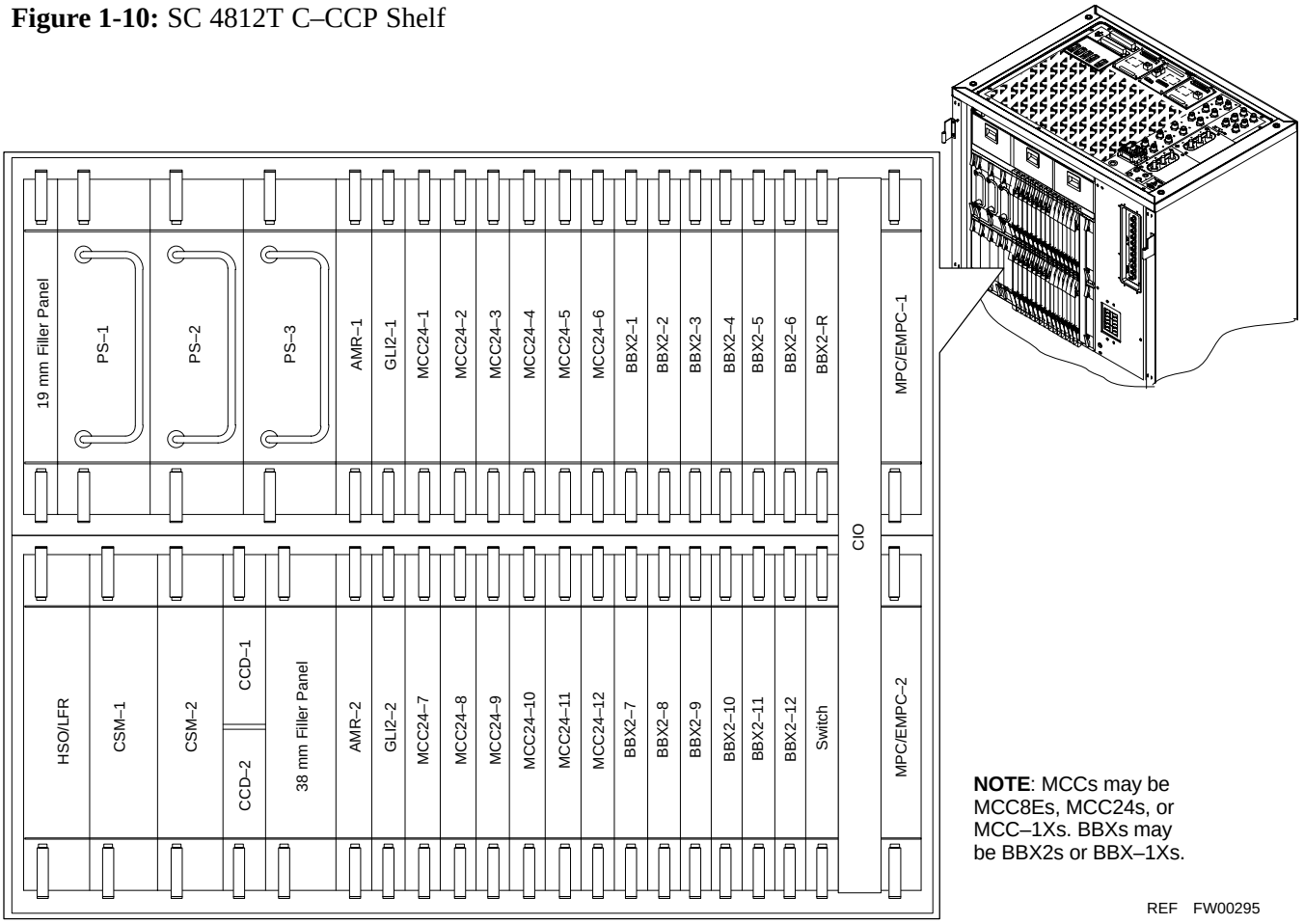


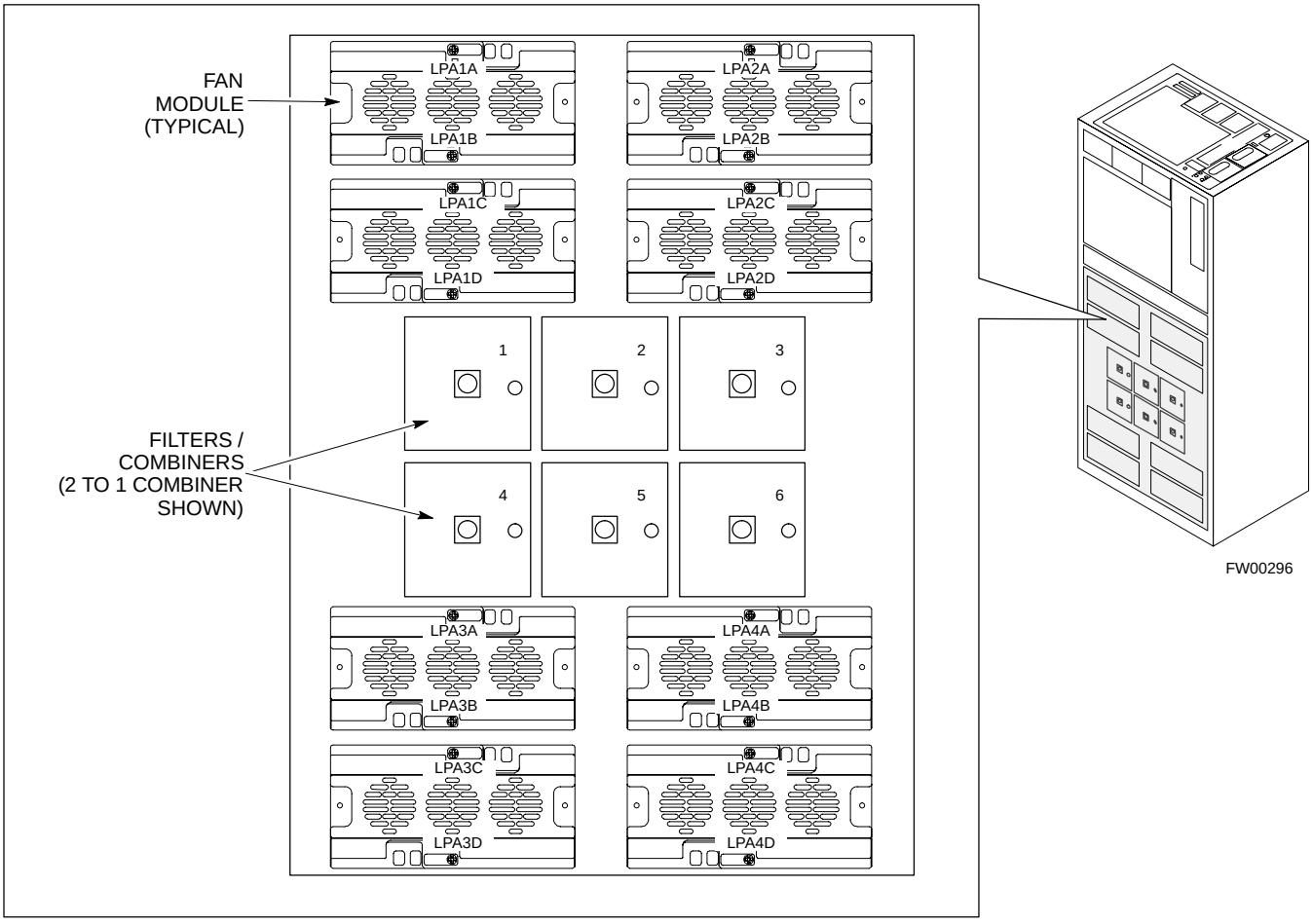
Figure 1-10: SC 4812T C–CCP Shelf



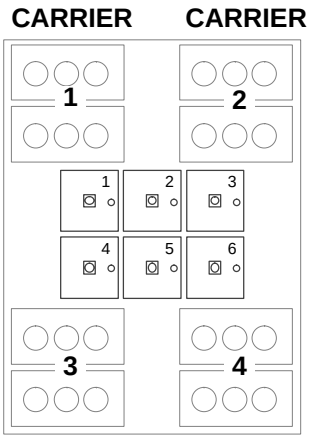
NOTE: MCCs may be MCC8Es, MCC24s, or MCC–1Xs. BBXs may be BBX2s or BBX–1Xs.

REF FW00295

Figure 1-11: +27 V SC 4812T LPA Configuration – 4 Carrier with 2:1 Combiners

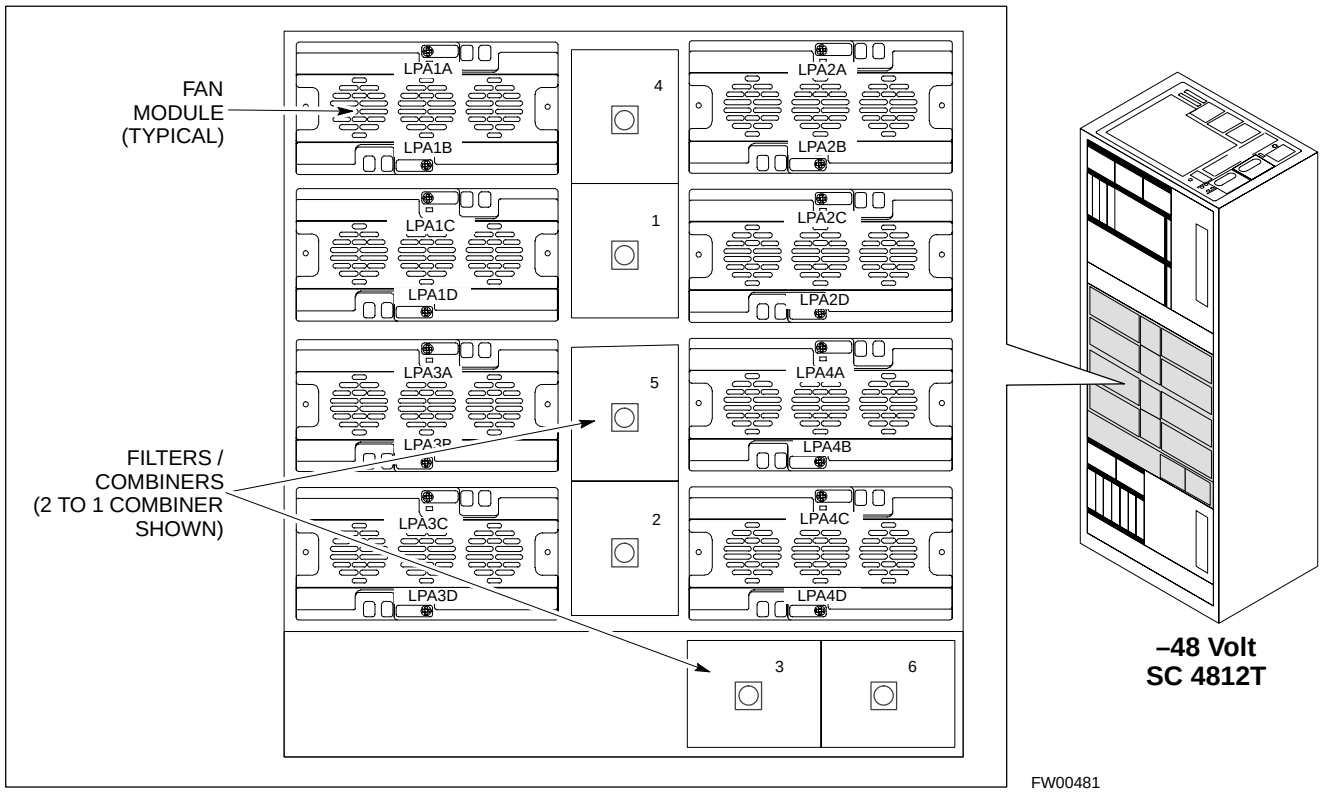


4–CARRIER CONFIGURATION

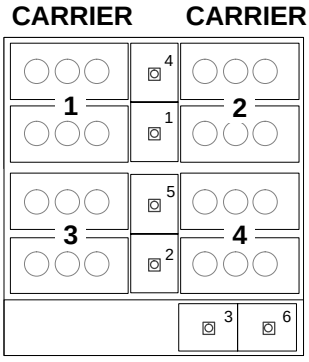


Note
No adjacent carriers may exist within the same TX filter combiner. "Adjacent" is defined as f_{c1} and f_{c2} being 1.25 MHz apart (center–to–center). "Non–adjacent" is defined as f_{c1} and f_{c2} being ≥2.50 MHz apart (center–to–center).

Figure 1-12: –48 V SC 4812T LPA Configuration – 4 Carrier, 3–Sector with 2:1 Combiners



4–CARRIER CONFIGURATION



Note
No adjacent carriers may exist within the same TX filter combiner. "Adjacent" is defined as f_{c1} and f_{c2} being 1.25 MHz apart (center–to–center). "Non–adjacent" is defined as f_{c1} and f_{c2} being ≥2.50 MHz apart (center–to–center).

Sector Configuration

There are a number of ways to configure the BTS frame. Table 1-3 outlines the basic requirements. When carrier capacity is greater than two, a 2:1 or 4:1 cavity combiner must be used. For one or two carriers, bandpass filters or cavity combiners may be used, depending on sectorization and channel sequencing.

Table 1-3: BTS Sector Configuration

Number of carriers	Number of sectors	Channel spacing	Filter requirements
1	3 or 6	N/A	Bandpass Filter, Cavity Combiner (2:1 or 4:1)
2	6	Non–adjacent	Cavity Combiner (2:1 Only)
2	6	Adjacent	**Not supported** in single frame
2	3	Non–adjacent	Cavity Combiner (2:1 or 4:1)
2	3	Adjacent	Bandpass Filter
3,4	3	Non–adjacent	Cavity Combiner (2:1 or 4:1)
3,4	3	Adjacent	Cavity Combiner (2:1 Only)

NOTE

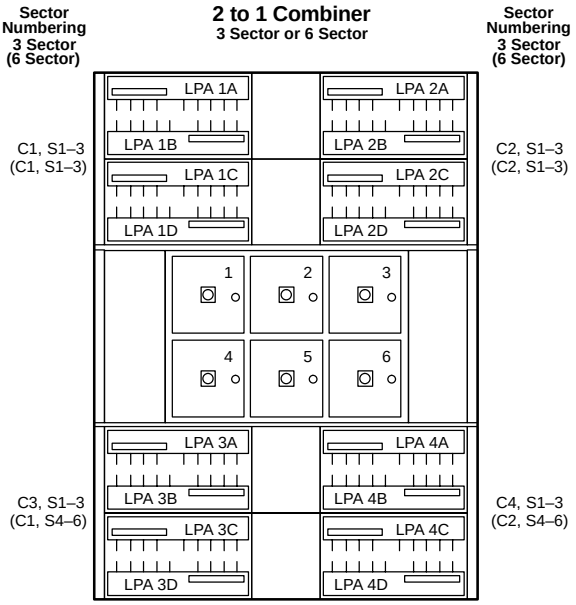
In Table 1-4, BBXs may be BBX2s or BBX–1Xs.

Table 1-4: Sector Configurations

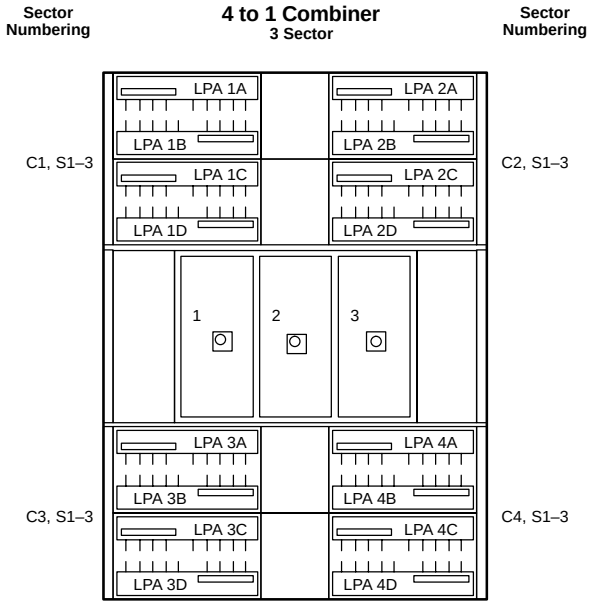
Config Ref. No.	Description						
1	**3–Sector/2–ADJACENT Carriers** – The configuration below maps TX with optional 2:1 cavity combiners for 3 sectors/2 carriers for *adjacent* channels. Note that 2:1 cavity combiners are used (6 total).						
	TX1	**TX2**	**TX3**	**TX4**	**TX5**	**TX6**	**Carrier#**
	BBX–1	BBX–2	BBX–3	N/A	N/A	N/A	1
	N/A	N/A	N/A	BBX–4	BBX–5	BBX–6	2
2	**6–Sector/2–NON–ADJACENT Carriers** – The configuration below maps TX with 2:1 cavity combiners for 6 sectors/2 carriers for *non–adjacent* channels.						
	TX1	**TX2**	**TX3**	**TX4**	**TX5**	**TX6**	**Carrier#**
	BBX–1	BBX–2	BBX–3	BBX–4	BBX–5	BBX–6	1
	BBX–7	BBX–8	BBX–9	BBX–10	BBX–11	BBX–12	2
3	**3–Sector/2–NON–ADJACENT Carriers** – The configuration below maps TX with 2:1 cavity combiners for 3 sectors/2 carriers for *non–adjacent* channels.						
	TX1	**TX2**	**TX3**	**TX4**	**TX5**	**TX6**	**Carrier#**
	BBX–1	BBX–2	BBX–3	N/A	N/A	N/A	1
	BBX–7	BBX–8	BBX–9	N/A	N/A	N/A	2
4	**3–Sector/4–ADJACENT Carriers** – The configuration below maps TX with 2:1 cavity combiners for 3 sector/4 carriers for *adjacent* channels.						
	TX1	**TX2**	**TX3**	**TX4**	**TX5**	**TX6**	**Carrier#**
	BBX–1	BBX–2	BBX–3	N/A	N/A	N/A	1
	BBX–7	BBX–8	BBX–9	N/A	N/A	N/A	2
	N/A	N/A	N/A	BBX–4	BBX–5	BBX–6	3
	N/A	N/A	N/A	BBX–10	BBX–11	BBX–12	4
5	**3–Sector / 2–ADJACENT Carriers** – The configuration below maps TX with bandpass filters for 3 sectors/2 carriers for *adjacent* channels.						
	TX1	**TX2**	**TX3**	**TX4**	**TX5**	**TX6**	**Carrier#**
	BBX–1	BBX–2	BBX–3	N/A	N/A	N/A	1
	N/A	N/A	N/A	BBX–7	BBX–8	BBX–9	2
6	**3–Sector/3 or 4–NON–ADJACENT Carriers** – The configuration below maps TX with 4:1 cavity combiners for 3 sectors/3 or 4 carriers for *non–adjacent* channels.						
	TX1	**TX2**	**TX3**	**TX4**	**TX5**	**TX6**	**Carrier#**
	BBX–1	BBX–2	BBX–3	N/A	N/A	N/A	1
	BBX–7	BBX–8	BBX–9	N/A	N/A	N/A	2
	BBX–4	BBX–5	BBX–6	N/A	N/A	N/A	3
	BBX–10	BBX–11	BBX–12	N/A	N/A	N/A	4
7	**6–Sector/1–Carrier** – The configuration below maps TX with either bandpass filters or 2:1 cavity combiners for 6 sector/1 carrier.						
	TX1	**TX2**	**TX3**	**TX4**	**TX5**	**TX6**	**Carrier#**
	BBX–1	BBX–2	BBX–3	BBX–4	BBX–5	BBX–6	1

Figure 1-13: +27 V SC4812T LPA Configuration with Combiners/Filters

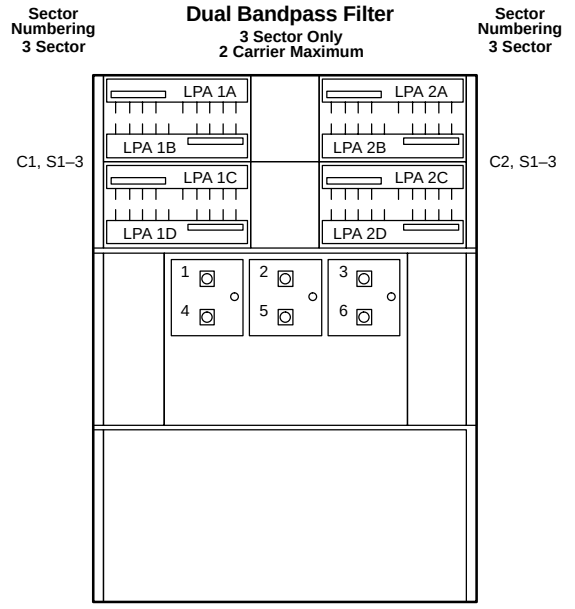
Note: See Table 1-4 Configuration Reference Numbers 1, 2, 3, 4.



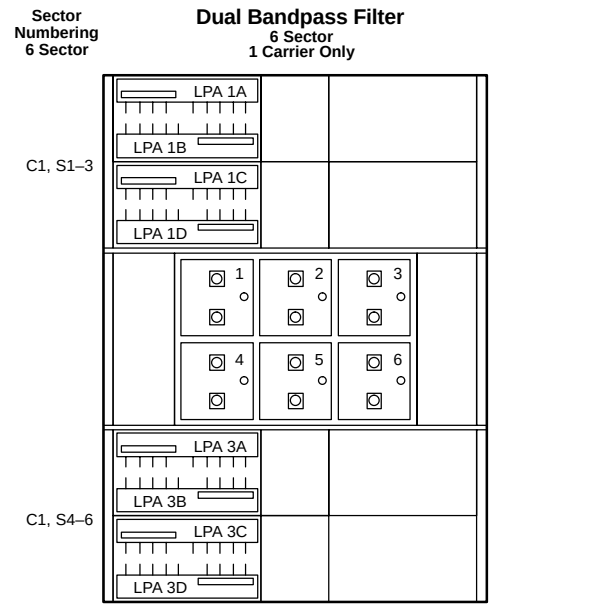
Note: See Table 1-4 Configuration Reference Number 6.



Note: See Table 1-4 Configuration Reference Number 5.



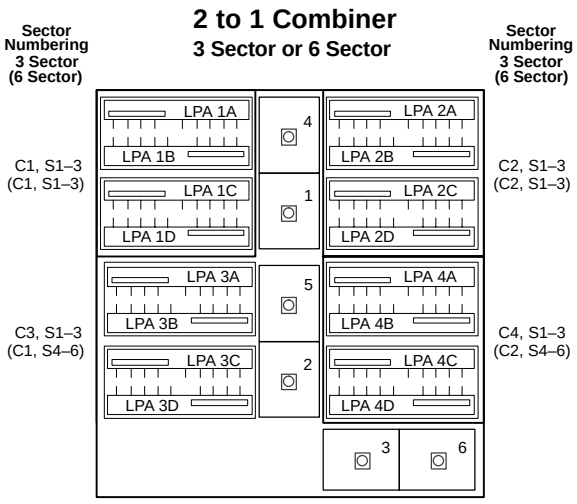
Note: See Table 1-4 Configuration Reference Number 7.



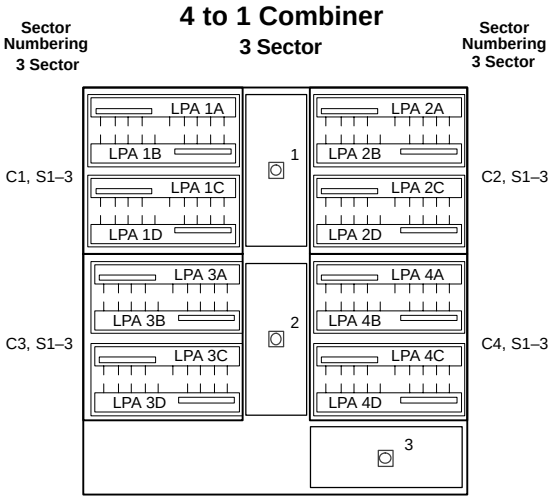
FW00297

Figure 1-14: –48 V SC4812T LPA Configuration with Combiners/Filters

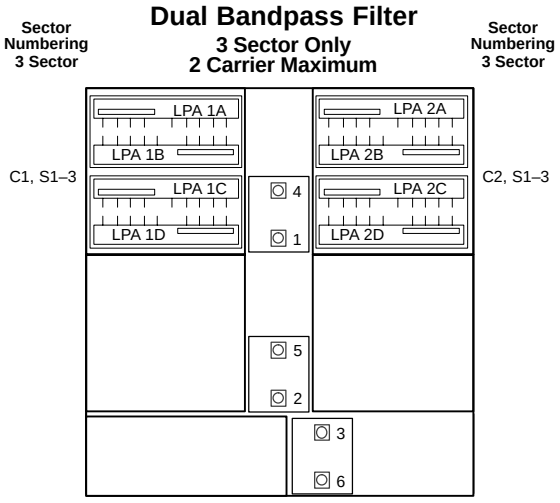
Note: See Table 1-4 Configuration Reference Numbers 1, 2, 3, 4.



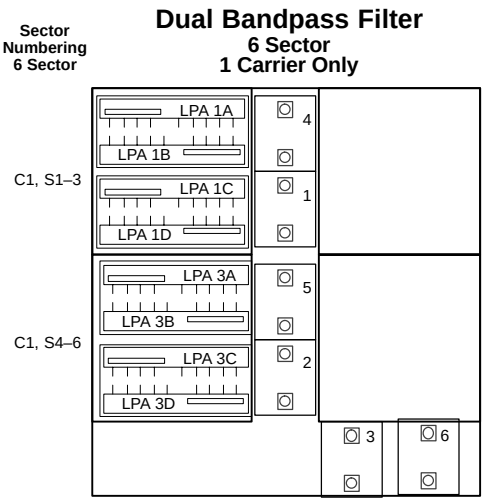
Note: See Table 1-4 Configuration Reference Number 6.



Note: See Table 1-4 Configuration Reference Number 5.



Note: See Table 1-4 Configuration Reference Number 7.



REF FW00482

Figure 1-15: –48 V BTS Power Conversion Shelf

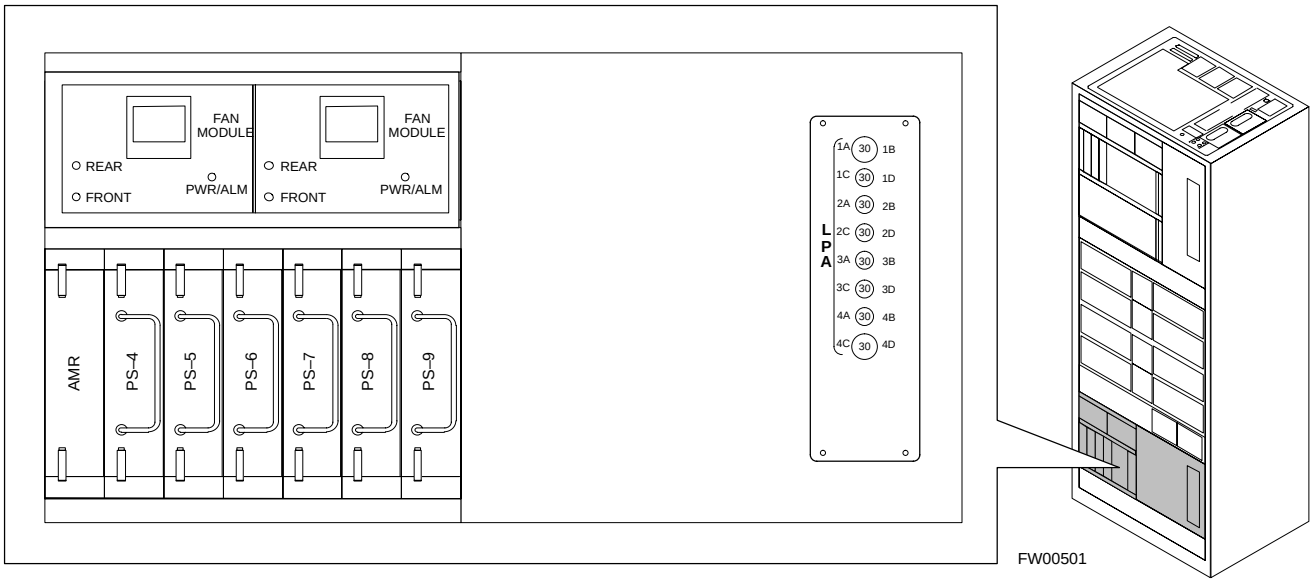
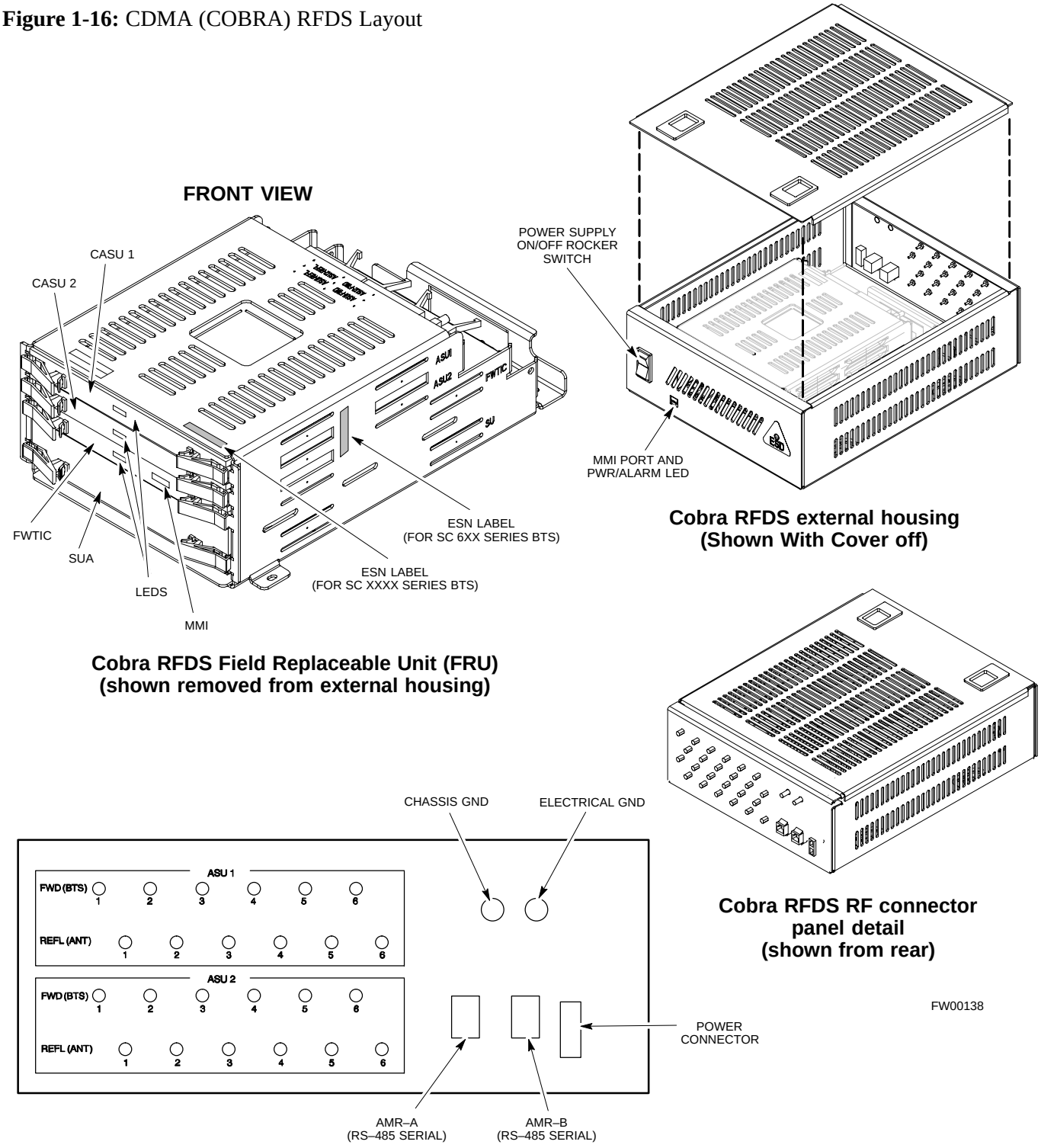


Figure 1-16: CDMA (COBRA) RFDS Layout



Frame Module Location & Identification – continued

Notes

Chapter 2: Preliminary Operations

Table of Contents

Notes

Introduction

This section first verifies proper frame equipage. This includes verifying module placement, jumper, and dual in–line package (DIP) switch settings against the site-specific documentation supplied for each BTS application. Next, pre-power up and initial power-up procedures are presented.

Cell Site Types

Sites are configured as Omni with a maximum of 4 carriers, 3–sectored with a maximum of 4 carriers, and 6–sectored with a maximum of 2 carriers. Each type has unique characteristics and must be optimized accordingly. For more information on the differences in site types, please refer to the *BTS/Modem Frame Hardware Installation* manual.

CDF

The Cell-site Data File (CDF) contains site type and equipage data information and passes it directly to the LMF during optimization. The number of modem frames, C–CCP shelves, BBX boards, MCC boards (per cage), and linear power amplifier assignments are some of the equipage data included in the CDF.

IMPORTANT

Be sure that the correct **bts–#.cdf** and **cbsc–#.cdf** files are used for the BTS. These should be the CDF files that are provided for the BTS by the CBSC. Failure to use the correct CDF files can cause system errors. **Failure to use the correct CDF files to log into a live (traffic carrying) site can shut down the site.**

Site Equipage Verification

Review the site documentation. Match the site engineering equipage data to the actual boards and modules shipped to the site. Physically inspect and verify the equipment provided for the BTS or Modem frame and ancillary equipment frame.

CAUTION

Always wear a conductive, high impedance wrist strap while handling any circuit card/module to prevent damage by ESD. After removal, the card/module should be placed on a conductive surface or back into the anti–static shipping bag.

Initial Installation of Boards/Modules

Follow the procedure in Table 2-1 to verify the initial installation of boards/modules.

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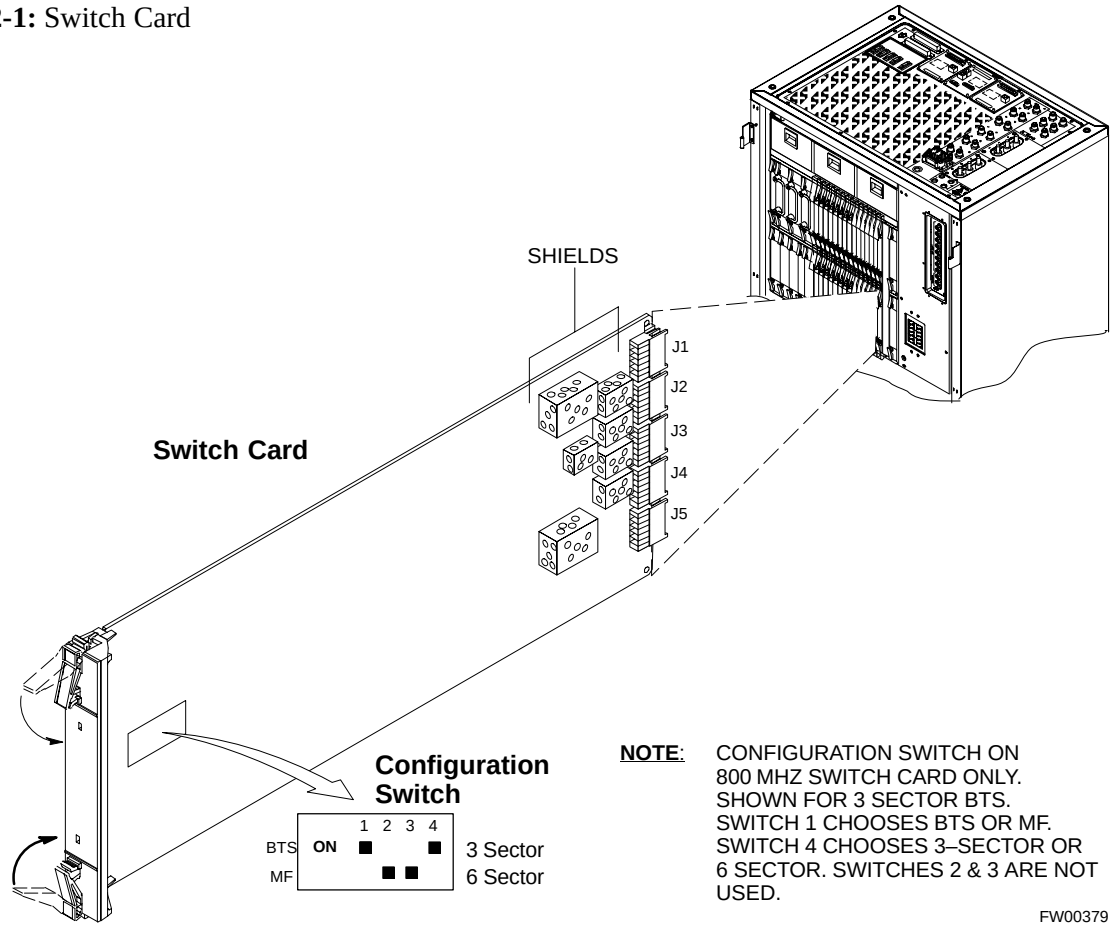
Table 2-1: Initial Installation of Boards/Modules	
Step	**Action**
1	Refer to the site documentation and install all boards and modules into the appropriate shelves as required. **Verify they are NOT SEATED at this time.** **NOTE** On 800 MHz systems, the Switch Card has a configuration switch that must match the site configuration (see Figure 2-1).
2	As the actual site hardware is installed, record the serial number of each module on a "Serial Number Checklist" in the site logbook.

Figure 2-1: Switch Card

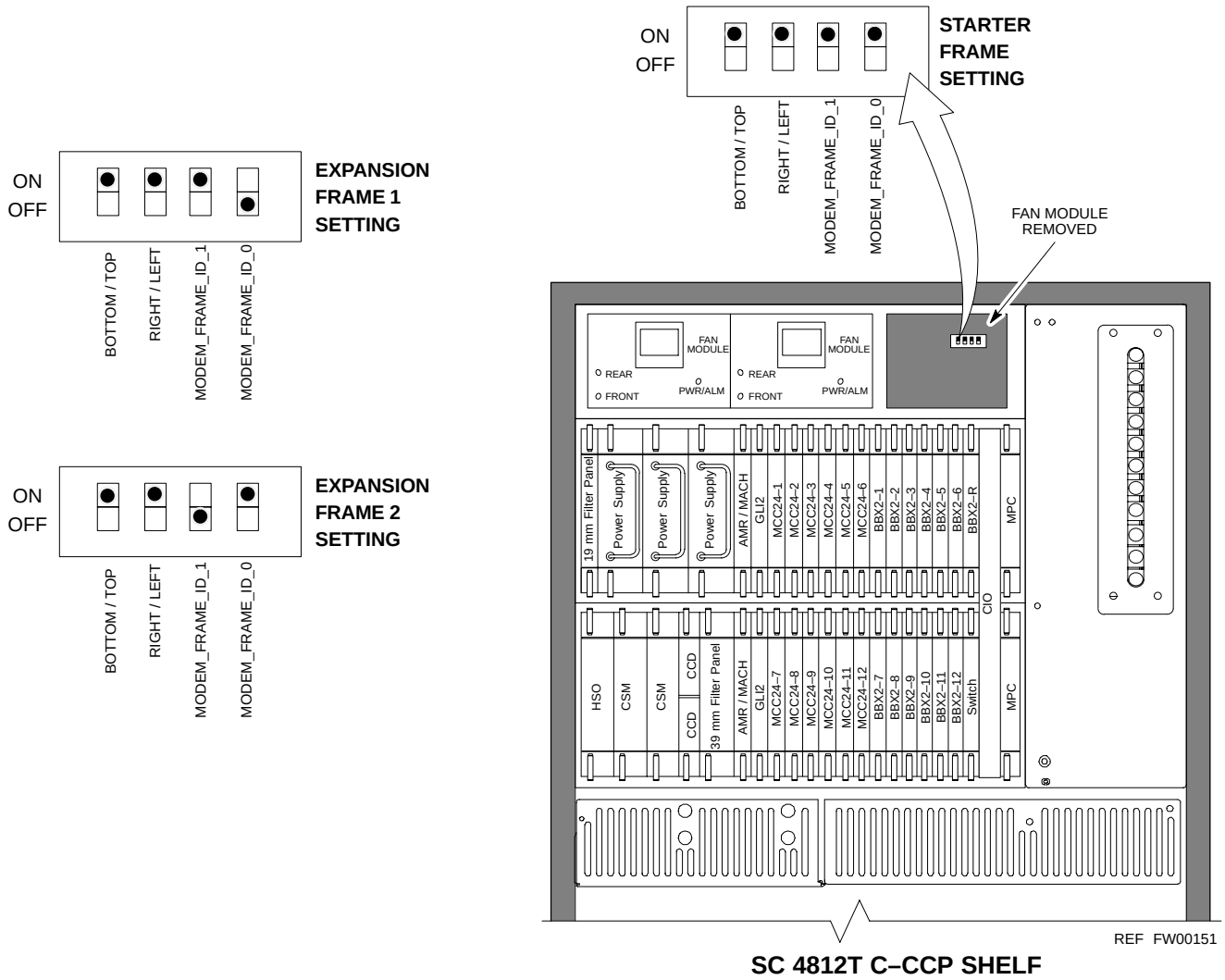


Setting Frame C–CCP Shelf Configuration Switch

The backplane switch settings behind the fan module nearest the breaker panel should be set as shown in Figure 2-2.

The switch setting must be verified and set before power is applied to the BTS equipment.

Figure 2-2: Backplane DIP Switch Settings – SC 4812T



SC 4812T C–CCP SHELF

2

Objective

This procedure checks for any electrical short circuits and verifies the operation and tolerances of the cellsite and BTS power supply units prior to applying power for the first time.

Test Equipment

The following test equipment is required to complete the pre–power–up tests:

- Digital Multimeter (DMM)

CAUTION

Always wear a conductive, high impedance wrist strap while handling the any circuit card/module to prevent damage by ESD.

Cabling Inspection

Using the site-specific documentation generated by Motorola Systems Engineering, verify that the following cable systems are properly connected:

- Receive RF cabling – up to 12 RX cables
- Transmit RF cabling – up to six TX cables
- GPS
- LFR

IMPORTANT

For positive power applications (+27 V):

- The positive power cable is red.
- The negative power cable (ground) is black.

For negative power applications (–48 V):

- The negative power cable is red or blue.
- The positive power cable (ground) is black.

In all cases, the black power cable is at ground potential.

DC Power Pre-test (BTS Frame)

Before applying any power to the BTS frame, follow the procedure in Table 2-2 while referring to Figure 2-3 and Figure 2-4 for +27 V systems or to Figure 2-5 and Figure 2-6 for –48 V systems to verify there are no shorts in the BTS frame DC distribution system.

Table 2-2: DC Power Pre–test (BTS Frame)

Step	Action
1	*Physically verify* that all DC power sources supplying power to the frame are **OFF** or disabled.
2	*On each frame:* • *Unseat* all circuit boards (except CCD and CIO cards) in the C–CCP shelf and LPA shelves, but leave them in their associated slots. • Set C–CCP shelf breakers to the **OFF** position by *pulling out* power distribution breakers (labeled **C–CCP 1, 2, 3** on the +27 V BTS C–CCP power distribution panel and labeled **POWER 1,4,5,2,6,7,3,8,9** on the –48 V C–CCP power distribution panel). • Set LPA breakers to the **OFF** position by *pulling out* the LPA breakers (8 breakers, labeled **1A–1B** through **4C–4D** – located on the C–CCP power distribution panel in the +27 V BTS or on the power conversion shelf power distribution panel in the –48 V BTS).
3	Verify that the resistance from the power (+ or –) feed terminals with respect to the ground terminal on the top of the frame measures $\geq$ **500 Ω** (see Figure 2-3). • If reading is **< 500 Ω**, a short may exist somewhere in the DC distribution path supplied by the breaker. Isolate the problem before proceeding. A reading **> 3 MΩ** could indicate an open (or missing) bleeder resistor (installed across the filter capacitors behind the breaker panel).
4	Set the C–CCP (POWER) breakers to the **ON** position by pushing them IN *one at a time*. Repeat Step 3 after turning on each breaker. *** IMPORTANT** If the ohmmeter stays at **0 Ω** after inserting any board/module, a short probably exists in that board/module. Replace the suspect board/module and repeat the test. If test still fails, isolate the problem before proceeding.
5	Insert and lock the DC/DC converter modules for the C–CCP shelf and into their associated slots *one at a time*. Repeat Step 3 after inserting each module. • A typical response is that the ohmmeter steadily climbs in resistance as capacitors charge, finally indicating approximately **500 Ω**. **! CAUTION** Verify the correct power/converter modules by observing the locking/retracting tabs appear as follows: – STPN4009 PWR CONV CDMA RCVR (in +27 V BTS C–CCP shelf) – STPN4045A PWR CONV CDMA RCVR (in –48 V BTS C–CCP shelf)
6	Insert and lock all remaining circuit boards and modules into their associated slots in the C–CCP shelf. Repeat Step 3 after inserting and locking each board or module. • A typical response is that the ohmmeter steadily climbs in resistance as capacitors charge, stopping at approximately **500 Ω**.

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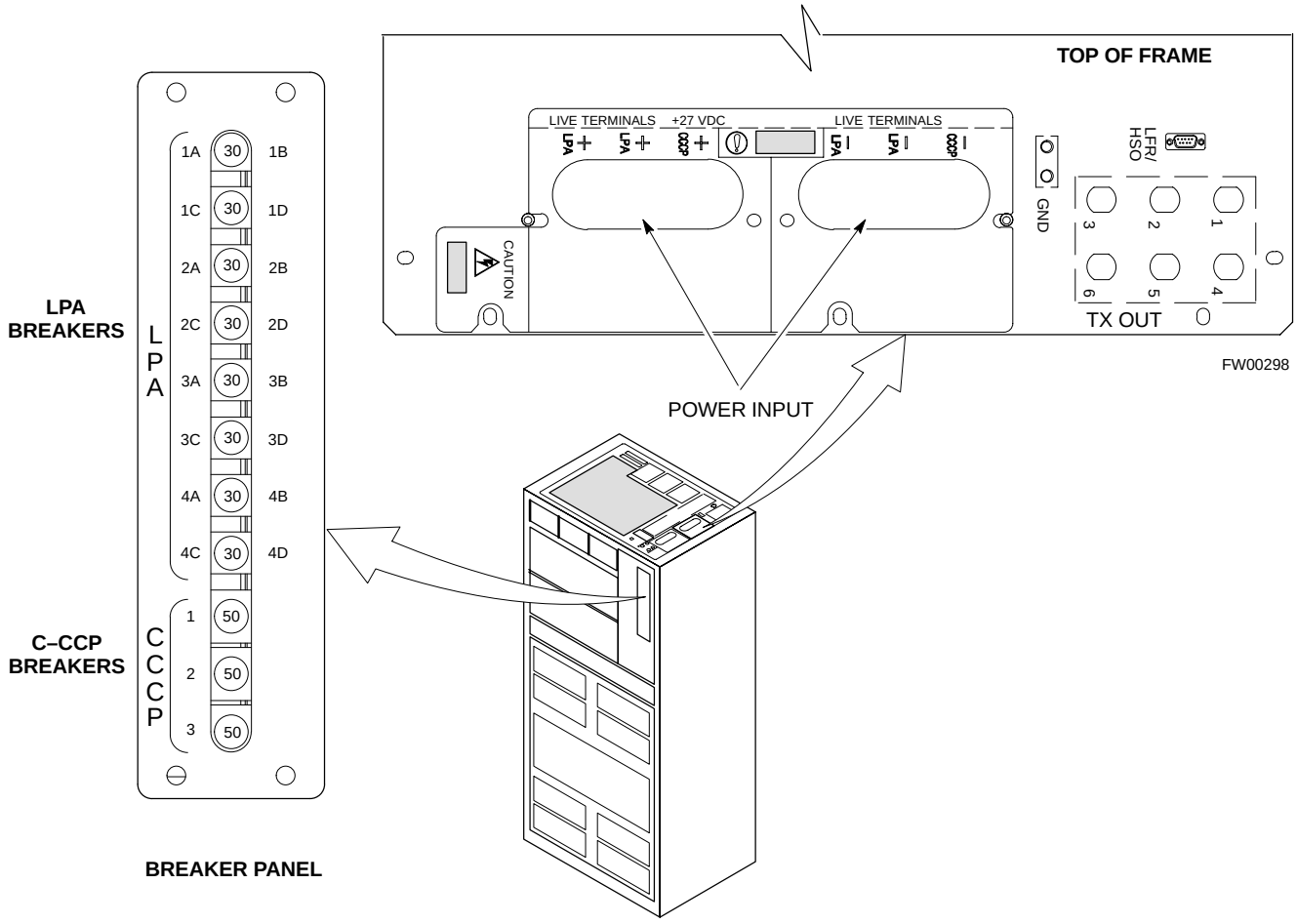
Table 2-2: DC Power Pre–test (BTS Frame)	
Step	**Action**
7	Set the **LPA** breakers **ON** by pushing them IN *one at a time*. Repeat Step 3 after turning on each breaker. • A typical response is that the ohmmeter will steadily climb in resistance as capacitors charge, stopping at approximately **500 Ω**.
8	In the –48 V BTS, insert and lock the DC/DC LPA converter modules into their associated slots *one at a time*. Repeat Step 3 after inserting each module. • A typical response is that the ohmmeter steadily climbs in resistance as capacitors charge, finally indicating approximately **500 Ω** **! CAUTION** Verify the correct power/converter modules by observing the locking/retracting tabs appear as follows: – STPN4044A PWR CONV LPA (in –48 V BTS power conversion shelf)
9	Seat all LPA and associated LPA fan modules into their associated slots in the shelves *one at a time*. Repeat Step 3 after seating each LPA and associated LPA fan module. • A typical response is that the ohmmeter will steadily climb in resistance as capacitors charge, stopping at approximately **500 Ω**.

Figure 2-3: +27 V BTS DC Distribution Pre-test



Breakering:

- Two LPAs on each trunking backplane breakered together
- Designed for peak LPA current of 15 amps (30 amp breakers)
- Unused TX paths do not need to be terminated
- Single feed for C–CCP
- Dual feed for LPA

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Figure 2-4: +27 V SC 4812T BTS Starter Frame

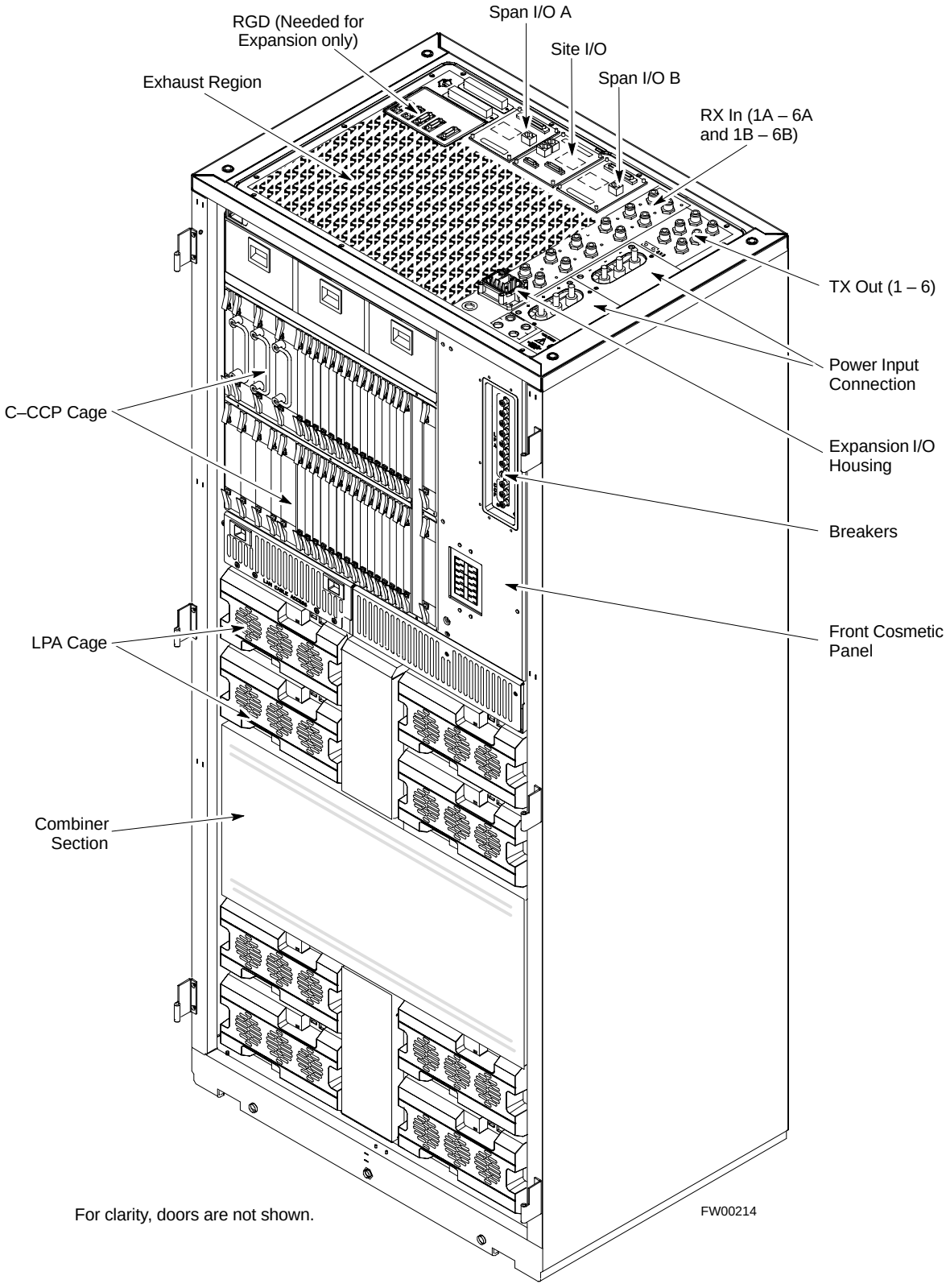
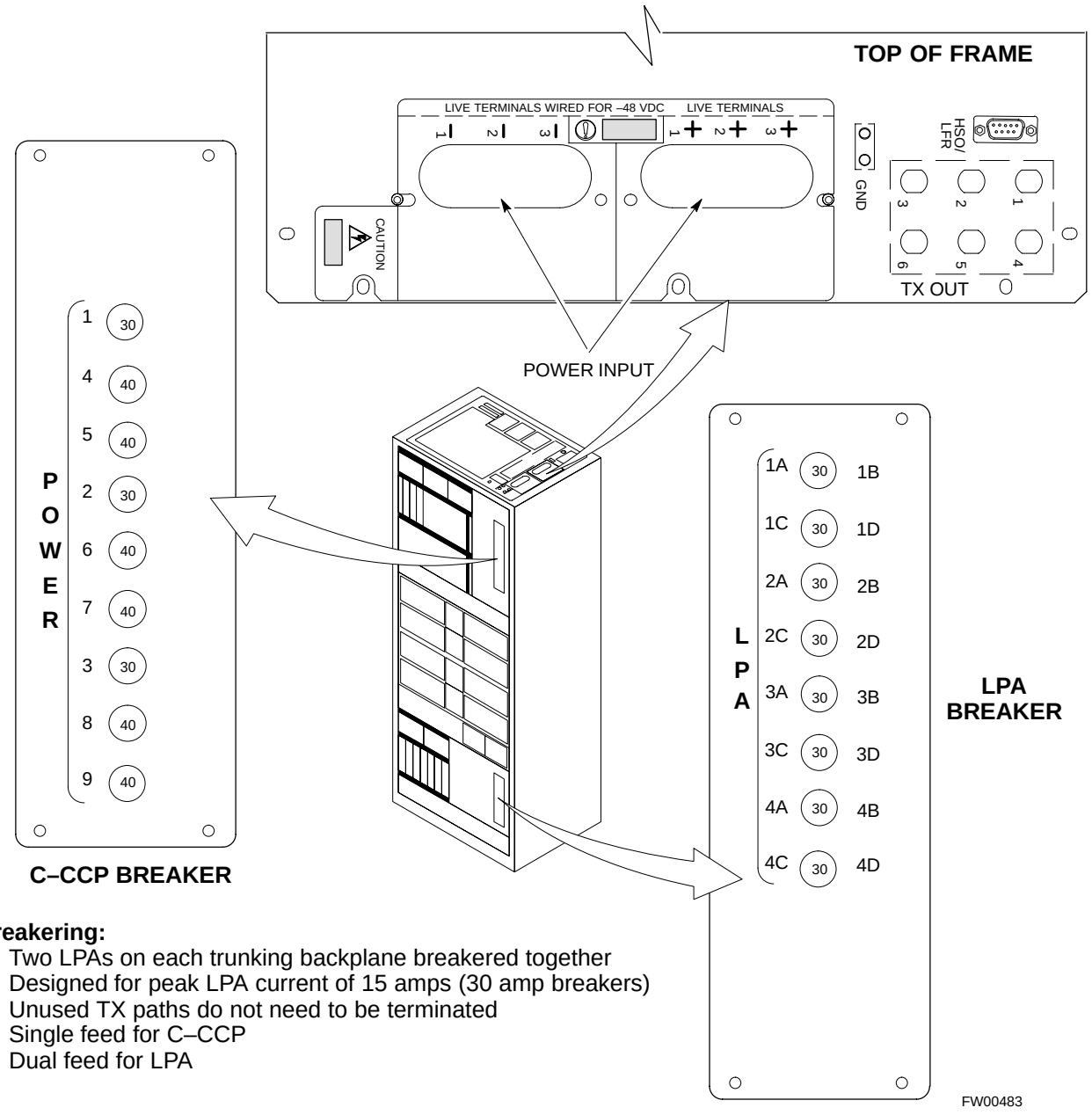


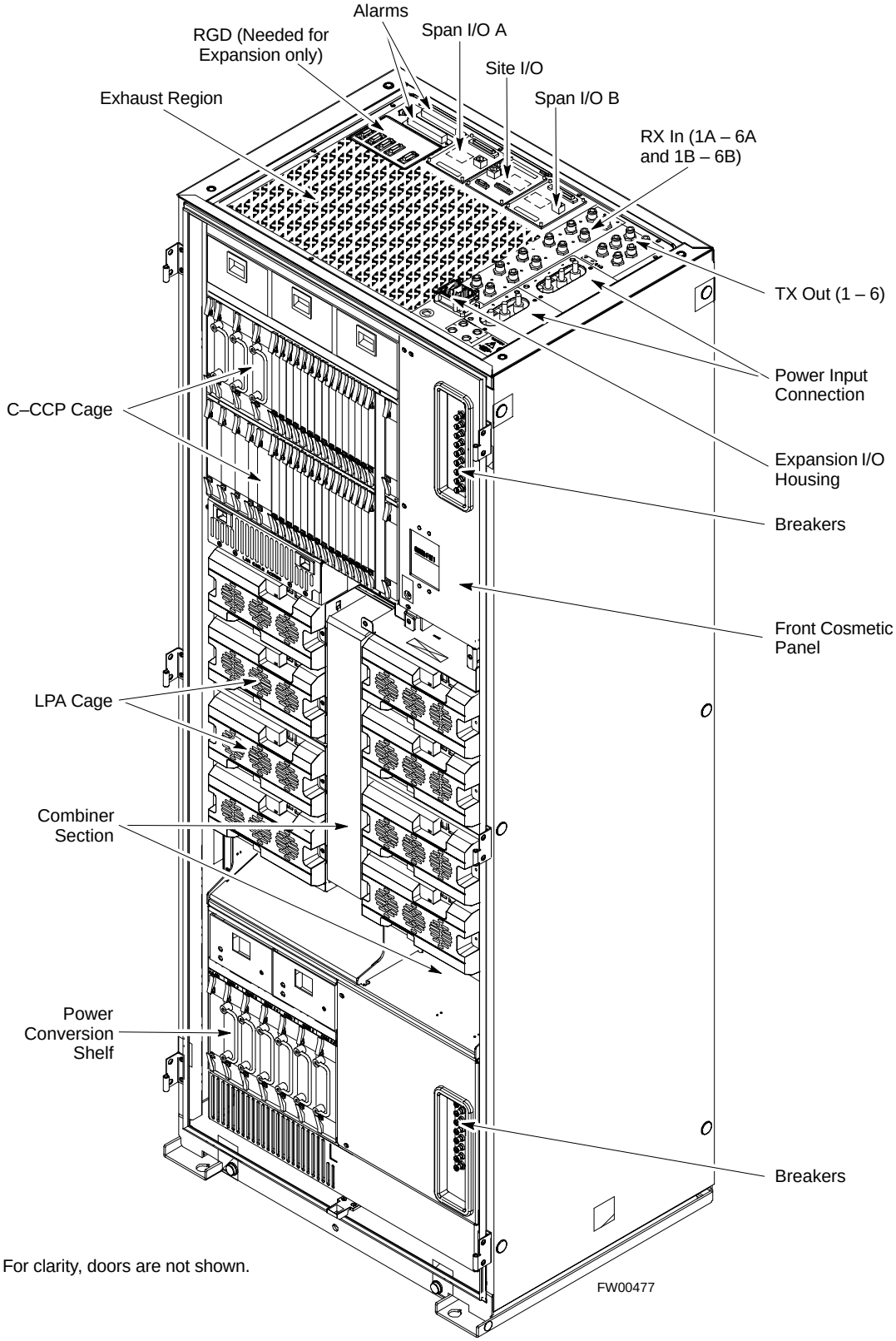
Figure 2-5: –48 V BTS DC Distribution Pre-test



Breakering:

- Two LPAs on each trunking backplane breakered together
- Designed for peak LPA current of 15 amps (30 amp breakers)
- Unused TX paths do not need to be terminated
- Single feed for C–CCP
- Dual feed for LPA

Figure 2-6: –48 V SC 4812T BTS Starter Frame



DC Power Pre-test (RFDS)

Before applying power to the RFDS, follow the steps in Table 2-3, while referring to Figure 2-7, to verify there are no shorts in the RFDS DC distribution system, backplanes, or modules/boards. As of the date of this publication, the RFDS is not used with the –48 V BTS.

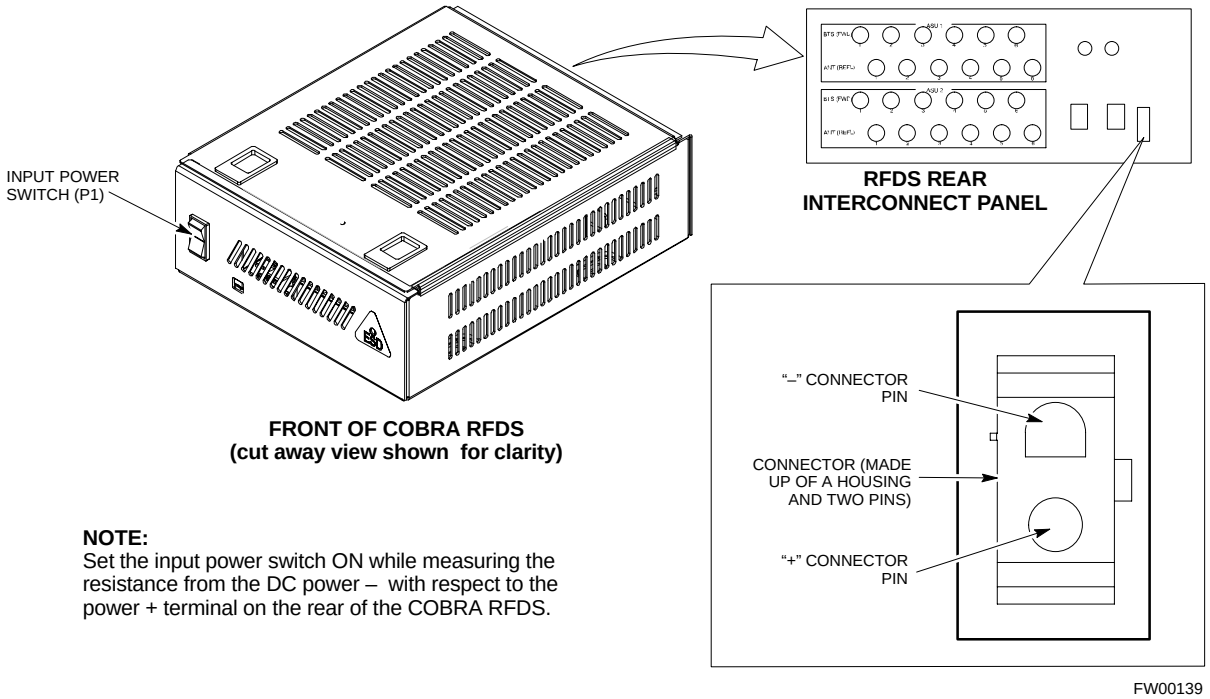
IMPORTANT

Visual inspection of card placement and equipage for each frame vs. site documentation must be completed, as covered in Table 2-1, on page 2-2, before proceeding with this test.

Table 2-3: DC Power Pre-test (RFDS)

Step	Action
1	*Physically verify* that all DC/DC converters supplying the RFDS are **OFF** or disabled.
2	Set the input power rocker switch **P1** to the **OFF** position (see Figure 2-7).
3	Verify the initial resistance from the power (+ or –) feed terminal with respect to ground terminal measures $\geq$ **5 kΩ** , then slowly begins to increase. • If the initial reading is $\leq$ **5 kΩ** and remains constant, a short exists somewhere in the DC distribution path supplied by the breaker. Isolate the problem before proceeding.
4	Set the input power rocker switch **P1** to the **ON** position. Repeat Step 3.

Figure 2-7: DC Distribution Pre-test (COBRA RFDS Detail)



NOTE:
Set the input power switch ON while measuring the resistance from the DC power – with respect to the power + terminal on the rear of the COBRA RFDS.

Power-up Procedures

WARNING

Potentially lethal voltage and current levels are routed to the BTS equipment. This test must be performed with a second person present, acting in a safety role. Remove all rings, jewelry, and wrist watches prior to beginning this test.

DC Input Power

In the tests to follow, power will first be verified at the input to each BTS frame. After power is verified, cards and modules within the frame itself will be powered up and verified one at a time.

Before applying any power, verify the correct power feed and return cables are connected between the power supply breakers and the power connectors at the top of each BTS frame. Verify correct cable position referring to Figure 2-3 on page 2-7 for +27 V systems and Figure 2-5 on page 2-9 for –48 V systems.

CAUTION

Always wear a conductive, high impedance wrist strap while handling any circuit card/module to prevent damage by ESD. Extreme care should be taken during the removal and installation of any card/module. After removal, the card/module should be placed on a conductive surface or back into the anti–static bag in which it was shipped.

IMPORTANT

For positive power applications (+27 V):

- The positive power cable is red.
- The negative power cable (ground) is black.

For negative power applications (–48 V):

- The negative power cable is red or blue.
- The positive power cable (ground) is black.

In all cases, the black power cable is at ground potential.

Motorola recommends that the DC input power cable used to connect the frame to the main DC power source conforms to the guidelines outlined in Table 2-4.

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Table 2-4: DC Input Power Cable Guidelines	
Maximum Cable Length	**Wire Size**
30.38 m (100 ft)	107 mm^2 (AWG #4/0)
54.864 m (180 ft)	185 mm^2 (350 kcmil)
Greater that 54.864 m (180 ft)	Not recommended

IMPORTANT

If Anderson SB350 style power connectors are used, make sure the connector adapters are securely attached to each of the BTS power feeds and returns. Also, make sure the cables have been properly installed into each connector.

Common Power Supply Verification

The procedure in Table 2-5 must be performed on any BTS frame connected to a common power supply at the site *after the common power supply has been installed and verified per the power supply OEM suggested procedures.*

Perform the following steps to verify the power input is within specification *before* powering up the individual cards/modules with the frames themselves.

Table 2-5: Common Power Supply Verification	
Step	**Action**
1	Physically verify that all DC power sources supplying the frame are **OFF** or disabled.
2	On the RFDS (for +27 V systems only), set the input power switch **P1** to the **OFF** position (see Figure 2-7).
3	*On each frame:* • *Unseat* all circuit boards (except CCD and CIO cards) in the C–CCP shelf and LPA shelves, but leave them in their associated slots. • Set breakers to the **OFF** position by *pulling out* C–CCP and LPA breakers (see Figure 2-3 on page 2-7 or Figure 2-5 on page 2-9 for breaker panel layout if required). – C–CCP shelf breakers are labeled **CCCP–1**, **2**, **3** in the +27 V BTS and labeled **POWER 1,4,5,2,6,7,3,8,9** in the –48 V BTS. – LPA breakers are labeled **1A–1B** through **4C–4D.**
4	Inspect input cables, verify correct input power polarity via decal on top of frame (**+27 Vdc** or **–48 Vdc**).
5	Apply power to BTS frames, *one at a time*, by setting the appropriate breaker in the power supply that supplies the frame to the **ON** position.
6	After power is applied to each frame, use a digital voltmeter to verify power supply output voltages at the top of each BTS frame are within specifications: **+27.0 Vdc** or **–48 Vdc** nominal.

Initial Power-up (RFDS)

The procedure in Table 2-6 must be performed on the RFDS after input power from the common power supply has been verified. Perform the following steps to apply initial power to the cards/modules within the frame itself, verifying that each is operating within specification.

IMPORTANT

Visual inspection of card placement and equipage for each frame vs. site documentation **must be completed**, as covered in Table 2-1, on page 2-2, before proceeding with this test.

Table 2-6: Initial Power-up (RFDS)

Step	Action
1	On the RFDS, set the input power rocker switch (**P1**) to the **ON** position (see Figure 2-7).
2	Verify power supply output voltages (at the top of BTS frame), using a digital voltmeter, are within specifications: **+27.0 V** nominal.

Initial Power-up (BTS)

The procedure must be performed on each frame after input power from the common power supply has been verified. Follow the steps in Table 2-7 to apply initial power to the cards/modules within the frame itself, verifying that each is operating within specification.

Table 2-7: Initial Power–up (BTS)

Step	Action
1	At the BTS, set the C–CCP (POWER) power distribution breakers (see Figure 2-3 on page 2-7 or Figure 2-5 on page 2-9) to the **ON** position by *pushing in* the breakers.
2	Insert the C–CCP fan modules. Observe that the fan modules come on line.
3	**! CAUTION** Verify the correct power/converter modules by observing the locking/retracting tabs appear as follows: – STPN4009 PWR CONV CDMA RCVR (in +27 V BTS C–CCP shelf) – STPN 4045A PWR CONV CDMA RCVR (in –48 V BTS C–CCP shelf) – STPN 4044A PWR CONV LPA (in –48 V BTS power conversion shelf) Insert and lock the converter/power supplies into their associated slots *one at a time*. • If no boards have been inserted, all three **PWR/ALM** LEDs would indicate RED to notify the user that there is no load on the power supplies. – If the LED is RED, do not be alarmed. After Step 4 is performed, the LEDs should turn GREEN; if not, then a faulty converter/power supply module is indicated and should be replaced *before proceeding*.
4	Seat and lock all remaining circuit cards and modules in the C–CCP shelf into their associated slots.

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Table 2-7: Initial Power–up (BTS)	
Step	**Action**
5	Seat the first equipped LPA module pair into the assigned slot in the upper LPA shelf including LPA fan. • In +27 V systems, observe that the LPA internal fan comes on line.
6	Repeat step 5 for all remaining LPAs.
7	Set the LPA breakers to the ON position *(per configuration*) by pushing them IN *one at a time.* See Figure 1-13 on page 1-30 or Figure 1-14 on page 1-31 for configurations and Figure 2-3 on page 2-7 or Figure 2-5 on page 2-9 for LPA breaker panel layout. On +27 V frames, engage (push) LPA circuit breakers. • Confirm LEDs on LPAs light. On –48 V frames, engage (push) LPA PS circuit breakers. • Confirm LPA PS fans start. • Confirm LEDs on –48 V power converter boards light. • Confirm LPA fans start. • Confirm LEDs on LPAs light.
8	After all cards/modules have been seated and verified, use a digital voltmeter to verify power supply output voltages at the top of the frame remain within specifications: **+27.0 Vdc** or **–48 Vdc** nominal.
9	Repeat Steps 1 through 8 for additional co–located frames (if equipped).

Notes

Chapter 3: Optimization/Calibration

Table of Contents

Notes

Introduction

This section describes procedures for isolating the BTS from the span lines, preparing and using the LMF, downloading system operating software, CSM reference verification/optimization, set up and calibration of the supported test equipment, transmit/receive path verification, using the RFDS, and verifying the customer defined alarms and relay contacts are functioning properly.

IMPORTANT

Before using the LMF, use an editor to view the ”CAVEATS” section in the ”readme.txt” file in the c:\wlmf folder for any applicable information.

Optimization Process

After a BTS is physically installed and the preliminary operations (power up) have been completed, the LMF is used to calibrate and optimize the BTS. Motorola recommends that the optimization be accomplished as follows:

1. Download MGLI2–1 with code and data and then enable MGLI2–1.
2. Use the status function and verify that all of the installed devices of the following types respond with status information: CSM, BBX, GLI2, MCC, and TSU (if RFDS is installed). If a device is installed and powered up but is not responding and is colored gray in the BTS display, the device is not listed in the CDF file. The CDF file will have to be corrected before the device can be accessed by the LMF.
3. Download code and data to all devices of the following types:
   - CSM
   - BBX (may be BBX2 or BBX–1X)
   - GLI2 (other than MGLI2–1)
   - MCC (may be MCC–8E, MCC24, or MCC–1X)
4. Download the RFDS TSIC (if installed).
5. Verify the operation of the GPS and HSO signals.
6. Enable the following devices (in the order listed):
   - Secondary CSM
   - Primary CSM
   - All MCCs
7. Connect the required test equipment for a full optimization.
8. Select the test equipment.
9. Calibrate the TX and RX test cables if they have not previously been calibrated using the CDMA LMF that is going to be used for the optimization/calibration. The cable calibration values can also be entered manually.

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10. Select all of the BBXs and all of the MCCs, and use the full optimization function. The full optimization function performs TX calibration, BLO download, TX audit, all TX tests, and all RX tests for all selected devices.
11. If the TX calibration fails, repeat the full optimization for any failed paths.
12. If the TX calibration fails again, correct the problem that caused the failure and repeat the full optimization for the failed path.
13. If the TX calibration and audit portion of the full optimization passes for a path but some of the TX or RX tests fail, correct the problem that caused the failure and run the individual tests as required until all TX and RX tests have passed for all paths.

Cell Site Types

Sites are configured as Omni/Omni or Sector/Sector (TX/RX). Each type has unique characteristics and must be optimized accordingly.

NOTE

For more information on the differences in site types, please refer to the applicable *BTS/Modem Frame Hardware Installation and Functional Hardware Description* manuals.

Cell–Site Data File

The Cell–SiteData File (CDF) contains information that defines the BTS and data used to download files to the devices. A CDF file must be placed in the applicable BTS folder before the LMF can be used to log into that BTS. CDF files are normally obtained from the CBSC using a floppy disk. A file transfer protocol (ftp) method can be used if the LMF computer has that capability.

The CDF includes the following information:

- Download instructions and protocol
- Site specific equipage information
- C–CCP shelf allocation plan
  - BBX equipage (based on cell–site type) including redundancy
  - CSM equipage including redundancy
  - MCC (MCC24E, MCC8E, or MCC–1X) channel element allocation plan. This plan indicates how the C–CCP shelf is configured, and how the paging, synchronization, traffic, and access channel elements (and associated gain values) are assigned among the (up to 12) MCCs in the shelf.
- CSM equipage including redundancy

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- Effective Rated Power (ERP) table for all TX channels to antennas respectively. Motorola System Engineering specifies the ERP of a transmit antenna based on site geography, antenna placement, and government regulations. Working from this ERP requirement, the antenna gain, (dependent on the units of measurement specified) and antenna feed line loss can be combined to determine the required power at the top of the BTS frame. The corresponding BBX output level required to achieve that power level on any channel/sector can also be determined.

NOTE

Refer to the *CDMA LMF Operator's Guide, 68P64114A78,* for additional information on the layout of the LMF directory structure (including CDF file locations and formats).

BTS System Software Download

BTS system software must be successfully downloaded to the BTS processor boards before optimization can be performed. BTS operating code is loaded from the LMF computer terminal.

IMPORTANT

Before using the LMF for optimization/ATP, the correct **bts–#.cdf** and **cbsc–#.cdf** files for the BTS must be obtained from the CBSC and put in a **bts–#** folder in the LMF. Failure to use the correct CDF files can cause wrong results. **Failure to use the correct CDF files to log into a live (traffic carrying) site can shut down the site**.

The CDF is normally obtained from the CBSC on a DOS formatted diskette, or through a file transfer protocol (ftp) if the LMF computer has ftp capability. Refer to the *CDMA LMF Operator's Guide*, or the LMF Help screen, for the procedure.

Site Equipage Verification

If you have not already done so, use an editor to view the CDF, and review the site documentation. Verify the site engineering equipage data in the CDF matches the actual site hardware using a CDF conversion table.

CAUTION

Always wear a conductive, high impedance wrist strap while handling any circuit card/module to prevent damage by ESD. Extreme care should be taken during the removal and installation of any card/module. After removal, the card/module should be placed on a conductive surface or back into the anti–static bag in which it was shipped.

Isolate BTS from T1/E1 Spans

IMPORTANT

At active sites, the OMC/CBSC must disable the BTS and place it out of service (OOS). **DO NOT** remove the 50–pin TELCO cable connected to the BTS frame site I/O board **J1** connector until the OMC/CBSC has disabled the BTS!

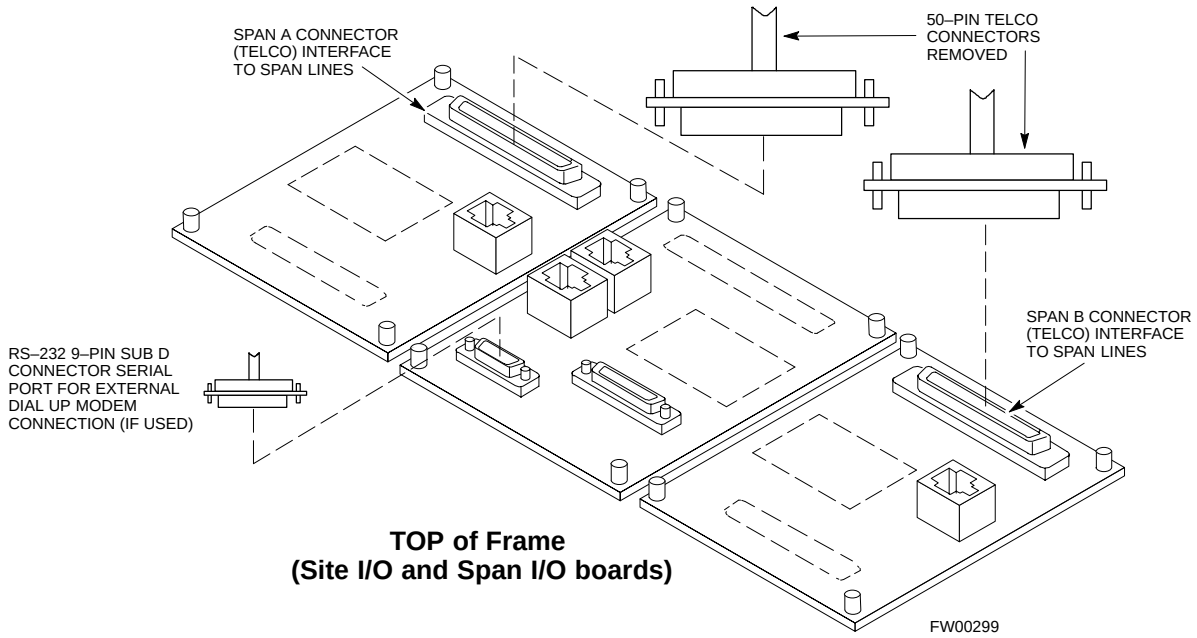
Each frame is equipped with one Site I/O and two Span I/O boards. The Span I/O J1 connector provides connection of 25 pairs of wire. A GLI2 card can support up to six spans. In the SC 4812T configuration, the odd spans (1, 3, and 5) terminate on the Span ”A” I/O; and the even spans (2, 4, and 6) terminate on the Span ”B” I/O.

Before connecting the LMF to the frame LAN, the OMC/CBSC must disable the BTS and place it OOS to allow the LMF to control the CDMA BTS. This prevents the CBSC from inadvertently sending control information to the CDMA BTS during LMF based tests. Refer to Figure 3-1 and Figure 3-2 as required.

Table 3-1: T1/E1 Span Isolation

Step	Action
1	From the OMC/CBSC, disable the BTS and place it OOS. Refer to *SC OMC–R/CBSC System Operator Procedures.* – The T1/E1 span 50–pin TELCO cable connected to the BTS frame SPAN I/O board **J1** connector can be removed from both Span I/O boards, if equipped, to isolate the spans. **NOTE** If a third party is used for span connectivity, the third party must be informed before disconnecting the span line. *** IMPORTANT** Verify that you remove the SPAN cable, *not* the “MODEM/TELCO” connector.

Figure 3-1: Span I/O Board T1 Span Isolation



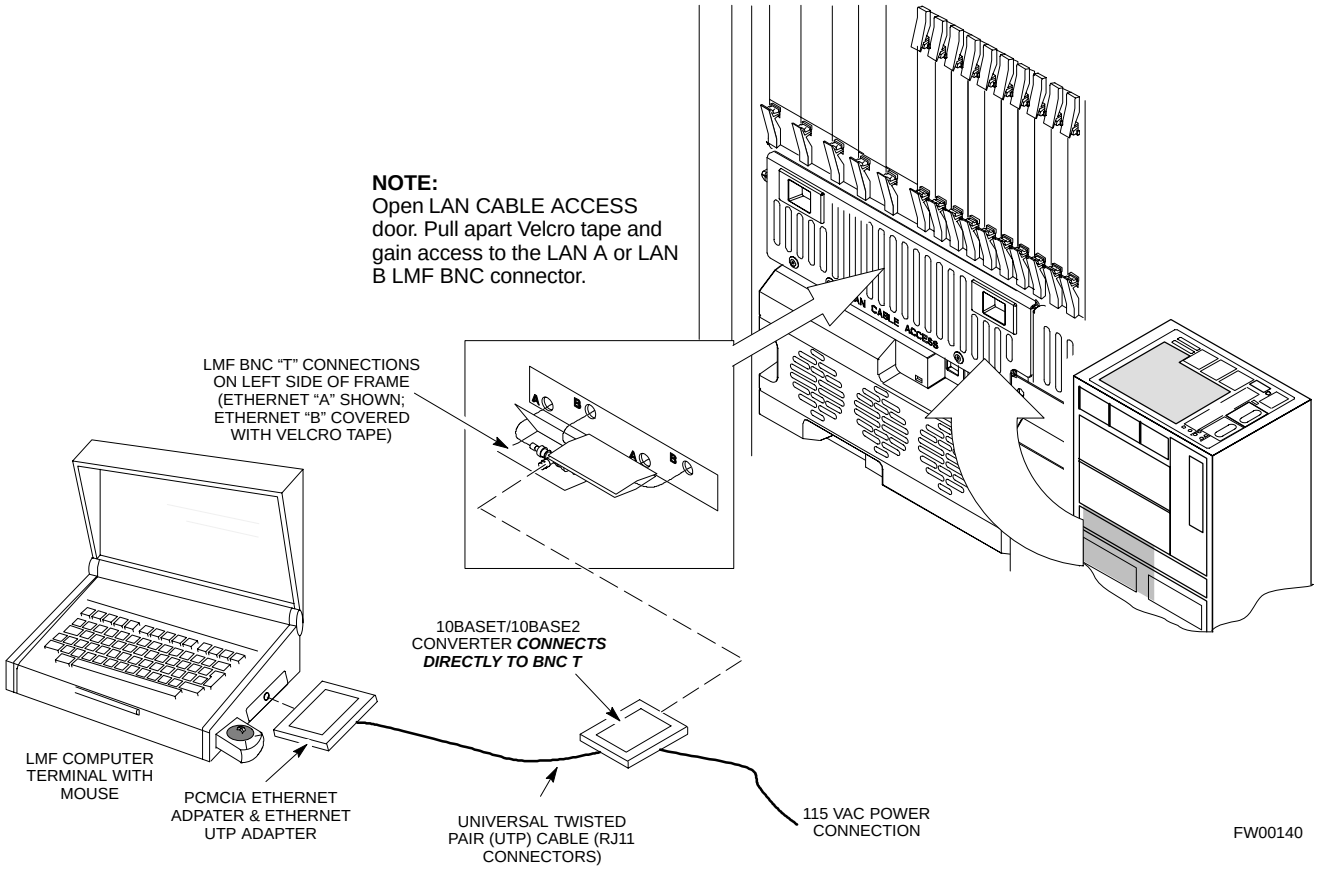
LMF to BTS Connection

The LMF is connected to the LAN A or B connector located on the left side of the frame's lower air intake grill, behind the LAN Cable Access door (see Figure 3-2).

Table 3-2: LMF to BTS Connection

Step	Action
1	To gain access to the connectors on the BTS, open the LAN Cable Access door, then pull apart the Velcro® tape covering the BNC "T" connector (see Figure 3-2).
2	Connect the LMF to the LAN A BNC connector via PCMCIA Ethernet Adapter with an unshielded twisted–pair (UTP) Adapter and 10BaseT/10Base2 converter (powered by an external AC/DC transformer). – If there is no login response, connect the LMF to the LAN B connector. – If there is still no login response, see Table 6-1, Login Failure Troubleshooting Procedures. **NOTE** – Xircom Model PE3–10B2 or equivalent can also be used to interface the LMF Ethernet connection to the frame connected to the PC parallel port, powered by an external AC/DC transformer. In this case, ***the BNC cable must not exceed 91 cm (3 ft) in length***. *** IMPORTANT** – The LAN shield is isolated from chassis ground. The LAN shield (exposed portion of BNC connector) **must not touch the chassis** during optimization.

Figure 3-2: LMF Connection Detail



Overview

Software and files for installation and updating of the LMF are provided on CD ROM disks. The following installation items must be available:

- LMF Program on CD ROM
- LMF Binaries on CD ROM
- CDF for each supported BTS (on diskette or available from the CBSC)
- CBSC File for each supported BTS (on diskette or available from the CBSC)

The following section provides information and instructions for installing and updating the LMF software and files.

IMPORTANT

For the CDMA LMF graphics to display properly, the computer platform must be configured to display more than 256 colors. See the operating system software instructions for verifying and configuring the display settings.

LMF Operating System Installation

Follow the procedure in Table 3-3 to install the LMF operating system.

Table 3-3: LMF Operating System Installation

✓	Step	Action
	1	Insert the LMF Program CD ROM into the LMF CD ROM drive. – If the Setup screen is displayed, go to step 5. – If the Setup screen is not displayed, proceed to step 2.
	2	Click on the **Start** button**.**
	3	Select **Run.**
	4	In the Open box, enter **d:\autorun** and click on the **OK** button. **NOTE** If applicable, replace the letter **d** with the correct CD ROM drive letter.

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Table 3-3: LMF Operating System Installation		
✓	**Step**	**Action**
	5	Follow the instructions displayed on the **Setup** screen. *** IMPORTANT** First Time Installations: – Install U/WIN (**First**) – Install Java Runtime Environment (**Second**) – Install LMF Software (**Third**) – Install BTS Binaries (**Fourth**) – Install/Create BTS Folders (**Fifth**) Any time you install U/WIN, you must install the LMF software because the installation of the LMF modifies some of the files that are installed during the U/Win installation. Installing U/Win over–writes these modifications. **NOTE** There are multiple binary image packages for installation on the CD–ROM. When prompted, choose the load that corresponds to the switch release that you currently have installed. Perform the Device Images install after the WinLMF installation. If applicable, a separate CD ROM of BTS Binaries may be available for binary updates.

Copy CDF Files from CBSC

Before the LMF can execute the optimization/ATP procedures for the BTS, the correct **`bts-#.cdf`** and **`cbsc-#.cdf`** files must be obtained from the CBSC and put in a **`bts-#`** folder in the LMF notebook. This requires copying the CBSC CDF files to a DOS formatted diskette, and using the diskette to install the CDF file in the LMF.

Follow the procedure in Table 3-4 to obtain the CDF files from the CBSC and copy the files to a diskette. For any further information, refer to the CDMA LMF Operator's Guide (Motorola part number 68P64114A78) or the LMF Help screen..

NOTE

If the LMF has ftp capability, the ftp method can be used to copy the CDF files from the CBSC.

On Sun OS workstations, the **unix2dos** command can be used in place of the **cp** command (e.g., unix2dos bts–248.cdf bts–248.cdf). This should be done using a copy of the CBSC CDF file so the original CBSC CDF file is not changed to DOS format.

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IMPORTANT

When copying CDF files, comply with the following to prevent BTS login problems with the LMF:

– The numbers used in the **bts–#.cdf** and **cbsc–#.cdf** filenames must correspond to the locally assigned numbers for each BTS and its controlling CBSC.

– The generic **cbsc–1.cdf** file supplied with the LMF work with locally numbered BTS CDF files. Using this file *does not provide a valid optimization* unless the generic file is edited to replace default parameters (e.g., channel numbers) with the operational parameters used locally.

Table 3-4: Copying CBSC CDF Files to the LMF

✓	Step	Action
AT THE CBSC:		
	1	Login to the CBSC workstation.
	2	Insert a DOS formatted diskette in the workstation drive.
	3	Type **eject –q** and press the **<Enter>** key.
	4	Type **mount** and press the **<Enter>** key. **NOTE** • Look for the "*floppy/no_name"* message on the last line displayed. • If the **eject** command was previously entered, *floppy/no_name* will be appended with a number. Use the explicit *floppy/no_name* reference displayed when performing step 7.
	5	Change to the directory containing the file by typing **cd** <*directory name*> (ex. **cd bts–248**) and pressing **<Enter>**.
	6	Type **ls <Enter>** to display the list of files in the directory.
	7	With *Solaris versions of Unix, create DOS–formatted versions* of the **bts–#.cdf** and **cbsc–#.cdf** files on the diskette by entering the following command: **unix2dos** <*source filename*> **/floppy/no_name/**<*target filename*> *(e.g.,* **unix2dos bts–248.cdf /floppy/no_name/bts–248.cdf**). **NOTE** • Other versions of Unix do not support the unix2dos and dos2unix commands. In these cases, use the Unix **cp** (copy) command. The *copied* files will be difficult to read with a DOS or Windows text editor because Unix files do not contain line feed characters. Editing copied CDF files on the LMF computer is, therefore, not recommended. • Using **cp,** multiple files can be *copied* in one operation by separating each filename to be copied with a space and ensuring the destination directory (*floppy/no_name*) is listed at the end of the command string following a space (e.g., **cp bts–248.cdf cbsc–6.cdf /floppy/na_name**).

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Table 3-4: Copying CBSC CDF Files to the LMF		
✓	**Step**	**Action**
	8	Repeat steps 5 through 7 for each bts–# that must be supported by the LMF.
	9	When all required files have been copied to the diskette, type **eject** and press the **<Enter>** key.
	10	Remove the diskette from the CBSC.
AT THE LMF:		
	11	Start the Windows operating system.
	12	Insert the diskette into the LMF.
	13	Using Windows Explorer (or equivalent program), create a corresponding bts–# folder in the wlmf\cdma directory for each bts–#.cdf/cbsc–#.cdf file pair copied from the CBSC.
	14	Use Windows Explorer (or equivalent program) to transfer the **cbsc–#.cdf** and **bts–#.cdf** files from the diskette to the corresponding **wlmf\cdma\bts–#** folders created in step 13.

Creating a Named HyperTerminal Connection for MMI Connection

Confirming or changing the configuration data of certain BTS Field Replaceable Units (FRUs) requires establishing an MMI communication session between the LMF and the FRU. Using features of the Windows operating system, the connection properties for an MMI session can be saved on the LMF computer as a named Windows HyperTerminal connection. This eliminates the need for setting up connection parameters each time an MMI session is required to support optimization.

Once the named connection is saved, a shortcut for it can be created on the Windows desktop. Double clicking the shortcut icon will start the connection without the need to negotiate multiple menu levels.

Follow the procedure in Table 3-5 to establish a named HyperTerminal connection and create a WIndows desktop shortcut for it.

NOTE

There are differences between Windows NT and Windows 98 in the menus and screens for creating a HyperTerminal connection. In the following procedure, items applicable to:
– Windows NT will be identified with *Win NT*
– Windows 98 will be identified with *Win 98*

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Table 3-5: Creating a Named Hyperlink Connection for MMI Connection

Step	Action
1	From the Windows Start menu, select: **Programs>Accessories**
2	Perform one of the following: • For *Win NT,* select **Hyperterminal a**nd then click on **HyperTerminal** • For *Win 98,* select **Communications,** double click the **Hyperterminal** folder, and then double click on the **Hyperterm.exe** icon in the window that opens. **NOTE** • If a **Location Information Window** appears, enter the required information, then click **Close**. (This is required the first time, even if a modem is not to be used.) • If a **You need to install a modem.....** message appears, click **NO**.
3	When the **Connection Description** box opens: – Type a name for the connection being defined (e.g., MMI Session) in the **Name:** window. – Highlight any icon preferred for the named connection in the **Icon:** chooser window. – Click **OK.**
4	**NOTE** For LMF configurations where COM1 is used by another interface such as test equipment and a physical port is available for COM2, select COM2 to prevent conflicts. From the **Connect using**: pick list in the **Connect To** box displayed, select the RS–232 port to be used for the connection (e.g., **COM1** or **COM2** (*Win NT)* – or **Direct to Com 1** or **Direct to Com 2** (*Win 98*), and click **OK.**
5	In the **Port Settings** tab of the **COM# Properties** window displayed, configure the RS–232 port settings as follows: • Bits per second: 9600 • Data bits: 8 • Parity: None • Stop bits: 1 • Flow control: None
6	Click **OK**.
7	Save the defined connection by selecting: **File>Save**
8	Close the HyperTerminal window by selecting: **File>Exit**
9	Click **Yes** to disconnect when prompted.

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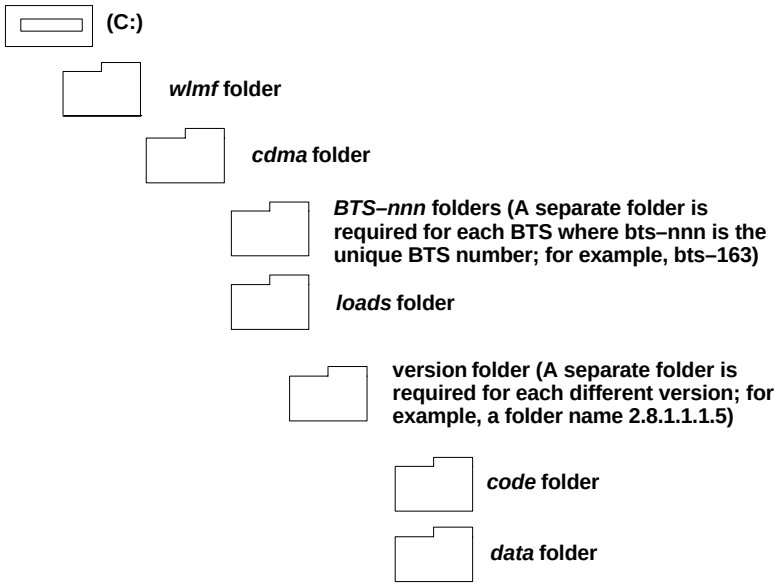
Table 3-5: Creating a Named Hyperlink Connection for MMI Connection	
Step	**Action**
10	Perform one of the following: • If the **Hyperterminal** folder window is still open (*Win 98)* proceed to step 12 • From the Windows Start menu, select **Programs > Accessories**
11	Perform one of the following: • For *Win NT*, select **Hyperterminal** and release any pressed mouse buttons. • For *Win 98*, select **Communications** and double click the **Hyperterminal** folder.
12	Highlight the newly created connection icon by moving the cursor over it (*Win NT*) or clicking on it (*Win 98*).
13	*Right click and drag* the highlighted connection icon to the Windows desktop and release the right mouse button.
14	From the pop–up menu displayed, select **Create Shortcut(s) Here**.
15	If desired, reposition the shortcut icon for the new connection by dragging it to another location on the Windows desktop.

Folder Structure Overview

The LMF uses a *wlmf* folder that contains all of the essential data for installing and maintaining the BTS. The list that follows outlines the folder structure for the LMF. Except for the bts–nnn folders, these folders are created as part of the the LMF installation. Refer to the *CDMA LMF Operator's Guide* for a complete description of the folder structure.

Figure 3-3: LMF Folder Structure

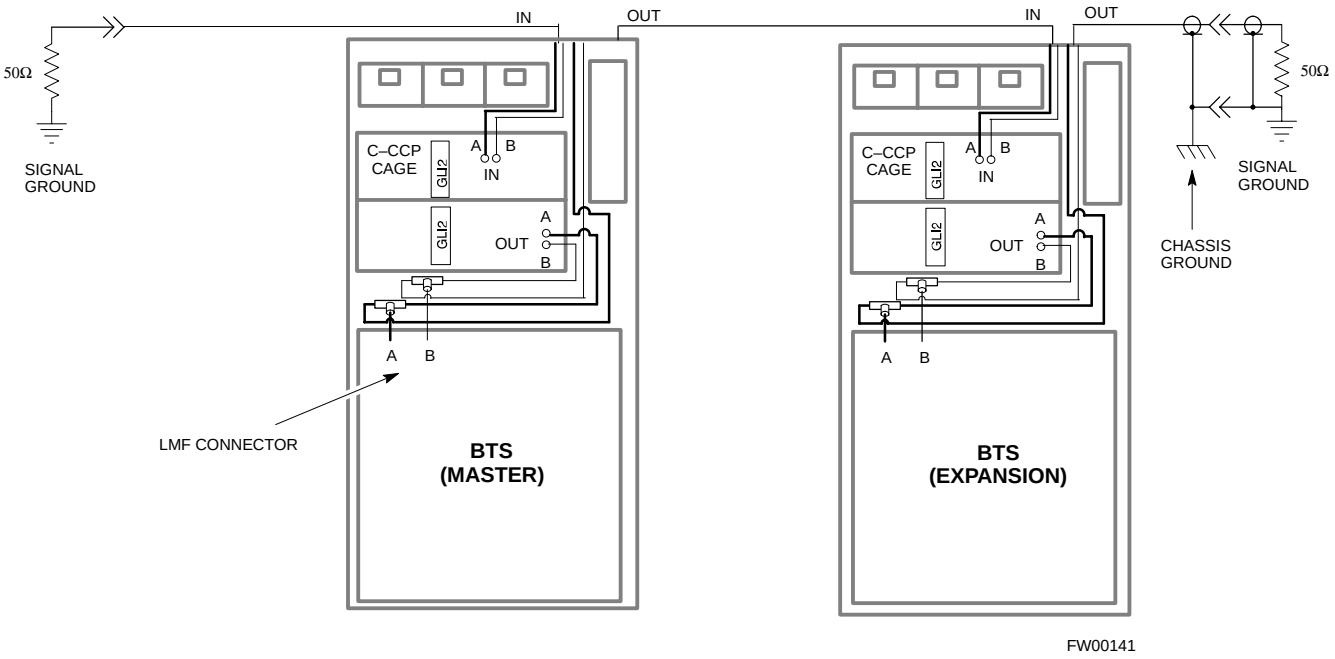


Pinging the Processors

For proper operation, the integrity of the Ethernet LAN A and B links must be be verified. Figure 3-4 represents a typical BTS Ethernet configuration. The drawing depicts one (of two identical) links, A and B.

Ping is a program that routes request packets to the LAN network modules to obtain a response from the specified "targeted" BTS.

Figure 3-4: BTS LAN Interconnect Diagram



Follow the procedure in Table 3-6 and refer to Figure 3-5 or Figure 3-6, as required, to ping each processor (on both LAN A and LAN B) and verify LAN redundancy is operating correctly.

CAUTION

Always wear a conductive, high impedance wrist strap while handling any circuit card/module to prevent damage by ESD.

IMPORTANT

The Ethernet LAN A and B cables must be installed on each frame/enclosure before performing this test. All other processor board LAN connections are made via the backplanes.

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Table 3-6: Pinging the Processors		
✓	**Step**	**Action**
	1	If you have not already done so, connect the LMF to the BTS (see Table 3-2 on page 3-5).
	2	From the Windows desktop, click the **Start** button and select **Run.**
	3	In the **Open** box, type **ping** and the <*MGLI IP address*> (for example, **ping 128.0.0.2**). **NOTE** 128.0.0.2 is the default IP address for MGLI–1 in field BTS units. 128.0.0.1 is the default IP address for MGLI–2.
	4	Click on the **OK** button.

	5	If the connection is successful, text similar to the following is displayed:
		`Reply from 128 128.0.0.2: bytes=32 time=3ms TTL=255`
		If there is no response the following is displayed:
		`Request timed out`
		If the MGLI fails to respond, reset and perform the ping process again. If the MGLI still fails to respond, typical problems are shorted BNC to inter-frame cabling, open cables, crossed A and B link cables, missing 50–Ohm terminators, or the MGLI itself.

Figure 3-5: +27 V SC 4812T Starter Frame I/O Plate