Technical Information

1X SC 4812T-MC BTS Hardware Installation

Software Release R2.16.1.x

800 MHz

CDMA

MOTOROLA
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CONTROLLED INTRODUCTION

ENGLISH
Mar 2003
68P64115A19–4

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Read Me First

SC 4812T-MC vs SC 4812T BTS Read Me First (Comparison)

This *Read-me-first* document describes a summary of changes between the existing SC™ 4812T BTS and the SC 4812T-MC (Multicarrier) BTS. The SC 4812T-MC is based on the existing SC 4812T platform and employs similar hardware and architecture. The differences between these products are briefly described and illustrated below. This section is not intended to replace the SC 4812T-MC manual set.

Multicarrier provides the capability for all PAs in all quadrants to provide trunked power across all sector/carriers. This differs from the previous architecture in which PA modules within a quadrant provided trunked power to only one carrier. Furthermore, in SC 4812T-MC, adjacent channels can be combined onto one antenna versus being transmitted on separate antennas in SC 4812T.

An overview of the BTS differences is illustrated in the following table and in illustrations on the following pages (Figure 1 thru Figure 4).

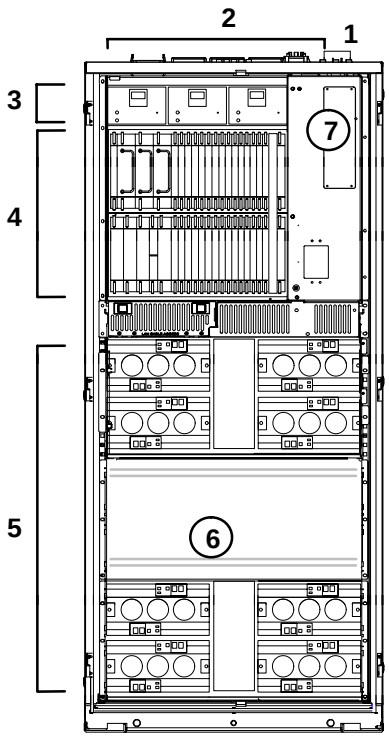
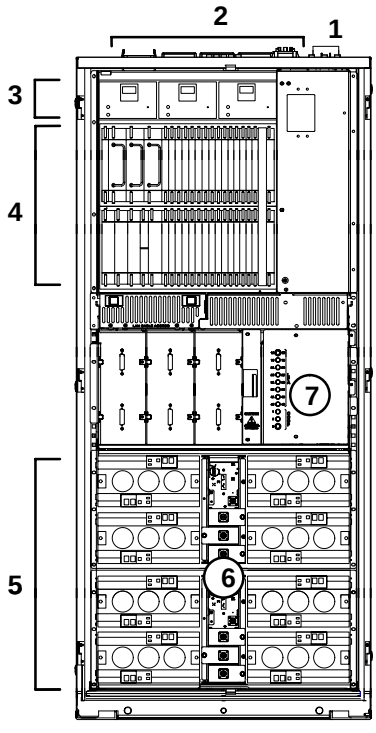
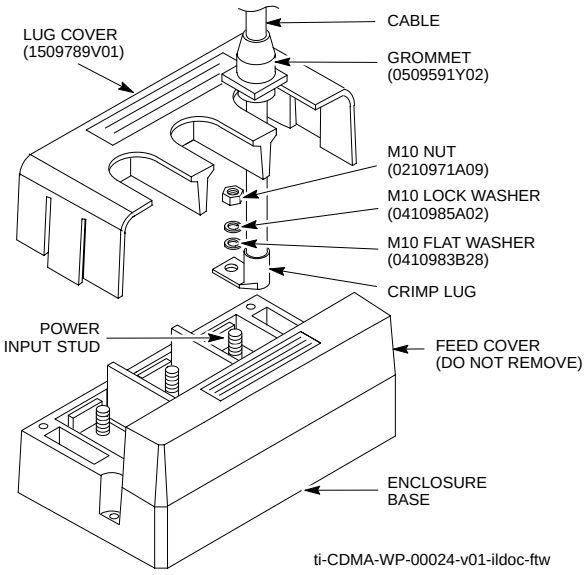
SC 4812T	Description	#	Description	SC 4812T-MC
 ti-CDMA-WP-00098-v01-ildoc-ftw	3x3 DC Power Input (see Figure 1)	1	2x2 DC Power Input (see Figure 1)	 ti-CDMA-WP-00196-v01-ildoc-ftw
	I/O Plate supporting 3x3 DC Power Input (see Figure 2)	2	I/O Plate supporting 2x2 DC Power Input (see Figure 2)	
	CCCP Fan Tray	3	CCCP Speed Controlled Fan Tray	
	C-CCP Cage: • CIO (3- or 6-Sector) • BBX-1X • Switch	4	**C-CCP Cage:** • MCIO (3- or 6-Sector) • High Power BBX-1X • High Power Switch	
	PA Shelves: • SC 4812T LPA • 4x4 TX Backplane • PA Location and Mapping (see Figure 3)	5	**PA Shelves:** • SC 4812T CLPA • Multicarrier module • Parallel PA Combiner • Enhanced Trunking Module • LPA/PLC Filler Panel • PA Location and Mapping (see Figure 3)	
	2:1 or 4:1 Combiners or Dual Bandpass TX Filters	6	TX Bandpass Filters and/or TX Output Terminator	
	PA Breaker Mapping (see Figure 4)	7	PA Breaker Mapping (see Figure 4)	

Figure 1: DC Power Input Connector Comparison

SC 4812T



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SC 4812T–MC

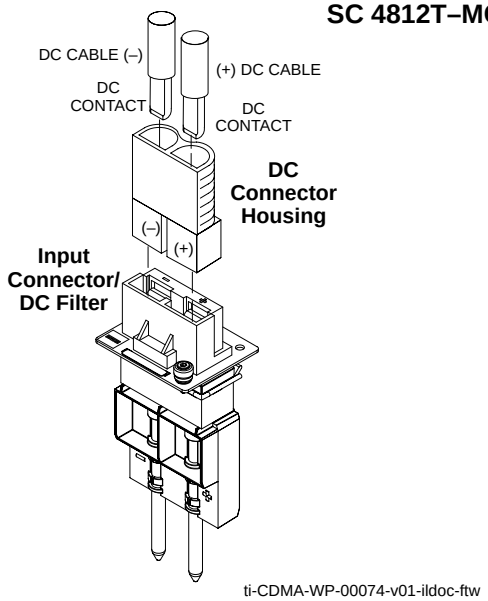

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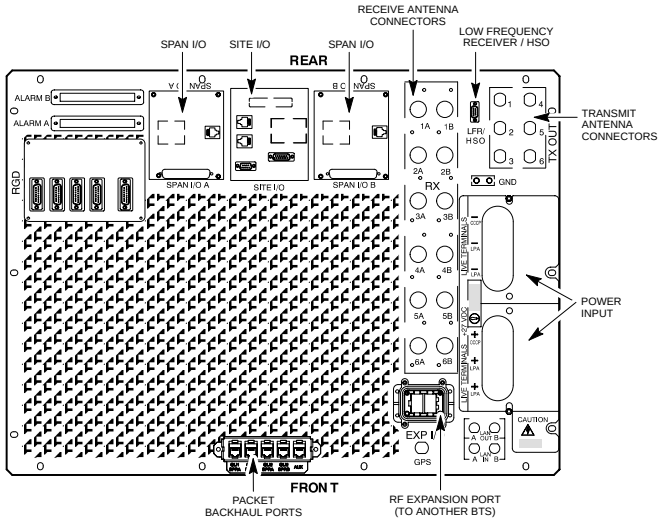
Figure 2: I/O Plate Comparison

SC 4812T



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SC 4812T–MC

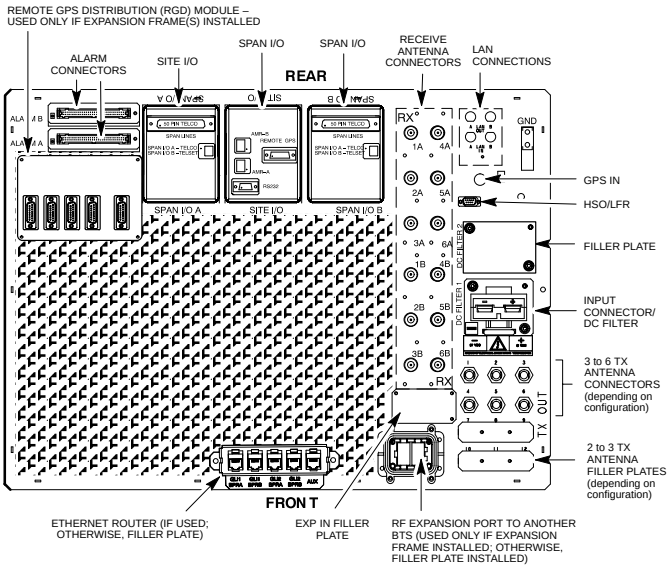

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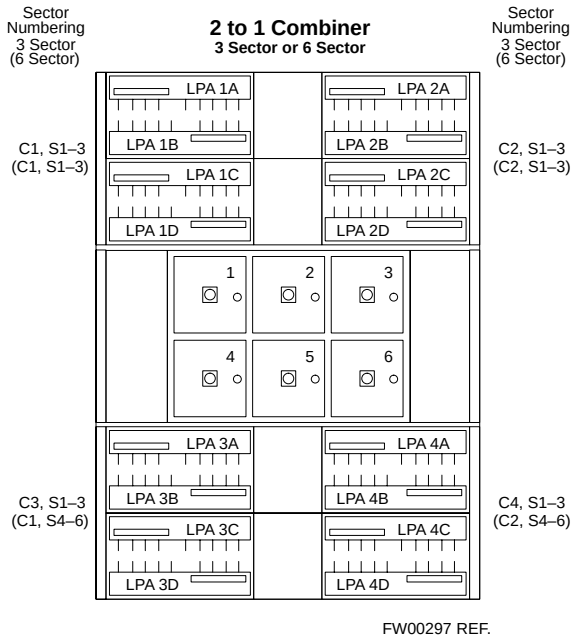
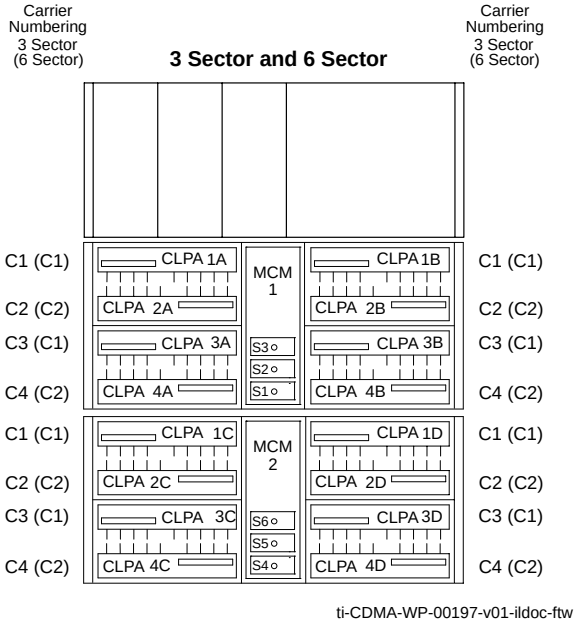
Figure 3: PA Location Comparison

SC 4812T



FW00297 REF.

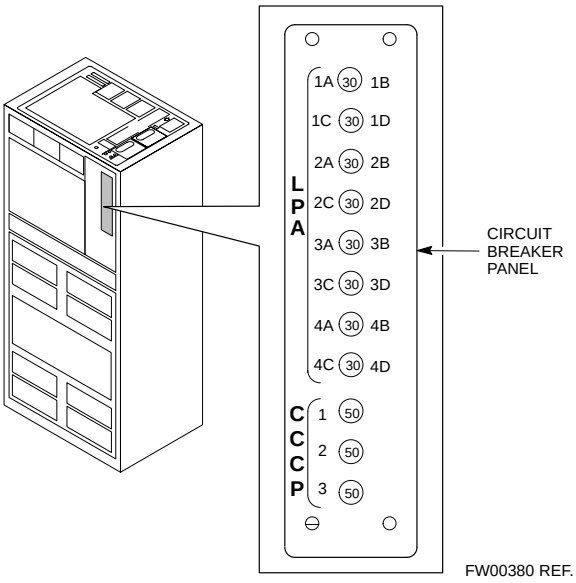
SC 4812T–MC



ti-CDMA-WP-00197-v01-ildoc-ftw

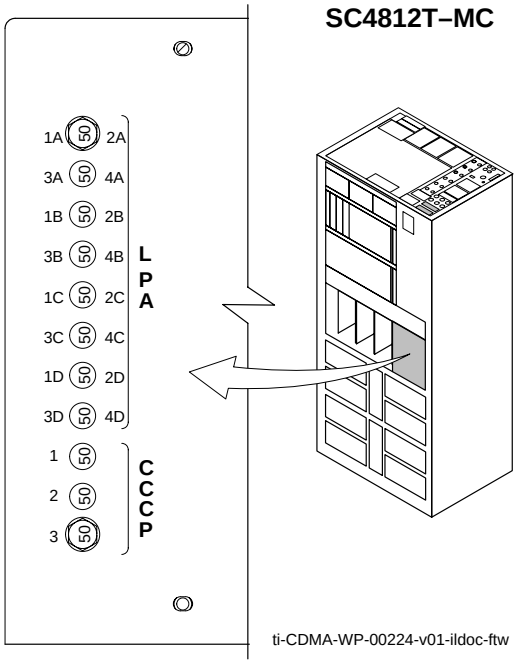
Figure 4: PA Breaker Mapping Comparison

SC 4812T



FW00380 REF.

SC4812T–MC



ti-CDMA-WP-00224-v01-ildoc-ftw

NOTE	**IMPORTANT:** A breaker supports a pair of PAs. In SC4812T–MC, disengaging (pulling) a PA breaker while the BTS is operational will degrade the TX Output power of **ALL** sector–carriers, not just a specific carrier as in SC4812T.

Notes

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Table of Contents

Contents

List of Figures

List of Tables

FCC Requirements

Content

This section presents Federal Communications Commission (FCC) Rules Parts 15 and 68 requirements and compliance information for the SC™4812T/ET/ET Lite series Radio Frequency Base Transceiver Stations.

FCC Part 15 Requirements

Part 15.19a(3) – INFORMATION TO USER

NOTE	This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1. This device may not cause harmful interference, and 2. This device must accept any interference received, including interference that may cause undesired operation.

Part 15.21 – INFORMATION TO USER

CAUTION	Changes or modifications not expressly approved by Motorola could void your authority to operate the equipment.

15.105(b) – INFORMATION TO USER

NOTE	This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment OFF and ON, the user is encouraged to try to correct the interference by one or more of the following measures: • Reorient or relocate the receiving antenna. • Increase the separation between the equipment and receiver. • Connect the equipment into an outlet on a circuit different from that to which the receiver is connected. • Consult the dealer or an experienced radio/TV technician for help.

FCC Part 68 Requirements

This equipment complies with Part 68 of the Federal Communications Commission (FCC) Rules. A label on the GLI board, easily visible with the board removed, contains the FCC Registration Number for this equipment. If requested, this information must be provided to the telephone company.

FCC Part 68 Registered Devices	
Device	**FCC Part 68 ID**
Group Line Interface (GLI2)	US: IHEUSA–32769–XD–E
Group Line Interface (GLI3)	US: IHEXDNANGLI3–1X

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of your T1. If this happens, the telephone company will provide advance notice so that you can modify your equipment as required to maintain uninterrupted service.

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice is not practical, the telephone company will notify you as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

If you experience trouble operating this equipment with the T1, please contact:

Global Customer Network Resolution Center (CNRC)
1501 W. Shure Drive, 3436N
Arlington Heights, Illinois 60004
Phone Number: (847) 632–5390

for repair and/or warranty information. You should not attempt to repair this equipment yourself. This equipment contains no customer or user-serviceable parts.

Changes or modifications not expressly approved by Motorola could void your authority to operate this equipment.

Foreword

Scope of manual

This manual is intended for use by cellular telephone system craftspersons in the day-to-day operation of Motorola cellular system equipment and ancillary devices.

This manual is not intended to replace the system and equipment training offered by Motorola, although it can be used to supplement or enhance the knowledge gained through such training.

Obtaining Manuals

To view, download, order manuals (original or revised), visit the Motorola Lifecycles Customer web page at http://services.motorola.com, or contact your Motorola account representative.

If Motorola changes the content of a manual after the original printing date, Motorola publishes a new version with the same part number but a different revision character.

Text conventions

The following special paragraphs are used in this manual to point out information that must be read. This information may be set-off from the surrounding text, but is always preceded by a bold title in capital letters. The three categories of these special paragraphs are:

NOTE	Presents additional, helpful, non-critical information that you can use. **Bold-text notes indicate information to help you avoid an undesirable situation or provides additional information to help you understand a topic or concept.**

CAUTION	Presents information to identify a situation in which equipment damage could occur, thus avoiding damage to equipment.

WARNING	Presents information to warn you of a potentially hazardous situation in which there is a possibility of personal injury.

The following typographical conventions are used for the presentation of software information:

- In text, sans serif **BOLDFACE CAPITAL** characters (a type style without angular strokes: i.e., SERIF versus SANS SERIF) are used to name a command.
- In text, `typewriter` style characters represent prompts and the system output as displayed on an operator terminal or printer.
- In command definitions, sans serif **boldface** characters represent those parts of the command string that must be entered exactly as shown and `typewriter` style characters represent command output responses as displayed on an operator terminal or printer.
- In the command format of the command definition, `typewriter` style characters represent the command parameters.

Reporting manual errors

To report a documentation error, call the CNRC (Customer Network Resolution Center) and provide the following information to enable CNRC to open an MR (Modification Request):
– the document type
– the manual title, part number, and revision character
– the page number(s) with the error
– a detailed description of the error and if possible the proposed solution
Motorola appreciates feedback from the users of our manuals.

Contact us

Send questions and comments regarding user documentation to the email address below:
cdma.documentation@motorola.com

Motorola appreciates feedback from the users of our information.

Manual banner definitions

A banner (oversized text on the bottom of the page, for example, **PRELIMINARY**) indicates that some information contained in the manual is not yet approved for general customer use.

24-hour support service

If you have problems regarding the operation of your equipment, please contact the Customer Network Resolution Center for immediate assistance. The 24 hour telephone numbers are:

NA CNRC	+1–800–433–5202
EMEA CNRC	+44– (0) 1793–565444
ASPAC CNRC	+86–10–88417733
Japan & Korea CNRC	+81–3–5463–3550
LAC CNRC	+51–1–212–4020

For further CNRC contact information, contact your Motorola account representative.

General Safety

Remember! . . . Safety depends on you!!

The following general safety precautions must be observed during all phases of operation, service, and repair of the equipment described in this manual. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. Motorola, Inc. assumes no liability for the customer's failure to comply with these requirements. The safety precautions listed below represent warnings of certain dangers of which we are aware. You, as the user of this product, should follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

Ground the instrument

To minimize shock hazard, the equipment chassis and enclosure must be connected to an electrical ground. If the equipment is supplied with a three-conductor ac power cable, the power cable must be either plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter. The three-contact to two-contact adapter must have the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable must meet International Electrotechnical Commission (IEC) safety standards.

NOTE	Refer to *Grounding Guideline for Cellular Radio Installations – 68P81150E62.*

Do not operate in an explosive atmosphere

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Keep away from live circuits

Operating personnel must:

- not remove equipment covers. Only Factory Authorized Service Personnel or other qualified maintenance personnel may remove equipment covers for internal subassembly, or component replacement, or any internal adjustment.
- not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed.
- always disconnect power and discharge circuits before touching them.

Do not service or adjust alone

Do not attempt internal service or adjustment, unless another person, capable of rendering first aid and resuscitation, is present.

Use caution when exposing or handling the CRT

Breakage of the Cathode–Ray Tube (CRT) causes a high-velocity scattering of glass fragments (implosion). To prevent CRT implosion, avoid rough handling or jarring of the equipment. The CRT should be handled only by qualified maintenance personnel, using approved safety mask and gloves.

Do not substitute parts or modify equipment

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification of equipment. Contact Motorola Warranty and Repair for service and repair to ensure that safety features are maintained.

Dangerous procedure warnings

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed. You should also employ all other safety precautions that you deem necessary for the operation of the equipment in your operating environment.

WARNING	Dangerous voltages, capable of causing death, are present in this equipment. Use extreme caution when handling, testing, and adjusting.

Revision History

Manual Number

68P64115A19–4

Manual Title

1X SC 4812T-MC BTS Hardware Installation - Software Release R2.16.1.x

Version Information

The following table lists the manual version, date of version, and remarks on the version. Revision bars printed in page margins (as shown to the side) identify material which has changed from the previous release of this publication.

Version Level	Date of Issue	Remarks
1	Jan 2003	DRAFT Manual submitted for engineering markup
2	Feb 2003	Preliminary Manual submitted for engineering review
3	Feb 2003	DV&V Test Review
4	Mar 2003	CONTROLLED INTRODUCTION

Notes

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Chapter 1

Manual Overview and BTS General Information

1

Manual Overview, Abbreviations and Acronyms

Manual Overview

NOTE	This document supports Software Version Release 16.1.

The SC 4812T-MC Base Transceiver Station can be a stand alone BTS, or can be co-located with an SC 4812T for use as an expansion frame. In a single stand alone configuration, the SC4812T-MC system is capable of supporting a maximum of 4 carriers in 3-sector configuration or 2 carriers in 6-sector configuration. With the addition of one expansion frame, the maximum carrier capacity becomes 8 in a 3-sector configuration or 4 in a 6-sector configuration.

This document provides information pertaining to the specific hardware and cable installation of the Motorola 1X SC™ 4812T–MC BTS Multicarrier frame.

The basic frame installation procedure is described in the *SC Product Family Frame Mounting Guide* – 68P09226A18. For detailed installation information on non-Motorola equipment, refer to the vendor manuals provided with such equipment.

Manual Structure

Chapter 1 – Overview

This chapter provides the following information:

- Overview of manual content (including Abbreviations and Acronyms)
- Required documents
- Site layout
- Frame Identification

Chapter 2 – Inter-frame Cabling

This chapter contains procedures for cabling the BTS frame configuration and cabling instruction for optional equipment.

Chapter 3 – Expansion Frame Cabling

This chapter contains procedures for cabling the Expansion frame associated with the configuration of the BTS.

Chapter 4 – Optional Equipment

This chapter provides identification of optional BTS equipment and the procedures to install the equipment.

Chapter 5 – What's Next and Cleanup

This chapter includes site cleanup and a pre-optimization checklist.

Appendix A – Carrier Add

Provides detailed instructions for installing one or more additional carriers to a BTS frame.

Abbreviations and Acronyms

Table 1-1 identifies the equipment related abbreviations and acronyms used in this manual.

Table 1-1: Abbreviations and Acronyms

Acronym	Definition
AMR	Alarm Monitor Reporting
ATP	Acceptance Test Procedure or Plan
BBX	Broadband Transceiver
BLO	Bay Level Offset
BTS	Base Transceiver Station
CBSC	Centralized Base Station Controller
C-CCP	Combined CDMA Channel Processor
CCD	CDMA Clock Distribution
CDMA	Code Division Multiple Access
CE	Channel Element
CLI	Command Line Interface
CLPA	Higher Power Linear Power Amplifier
CM	Channel Module
CMR	Cellular Manual Revision
CSM	Clock Synchronization Manager
DBPF	Dual Bandpass Filter
DBM	Debug Monitor
DDC	Duplexer/Directional Coupler
DSP	Digital Signal Processor
EMPC	Expansion Multicoupler Preselector Card
ETM	Enhanced Trunking Module
FRU	Field Replaceable Unit
FSI	Frame Status Indicator
GLI	Group Line Interface
GPS	Global Positioning System
HSO	High Stability Oscillator
I&Q	In–phase and Quadrature
LAPD	Link Access Protocol “D”
LFR	Low Frequency Receiver
LMF	Local Maintenance Facility
LORAN	Long Range Navigational
LPA	Linear Power Amplifier
MC	Multicarrier
MCC	Multi-channel CDMA
MCIO	Multicarrier Combiner Input/Output

. . . continued on next page

Table 1-1: Abbreviations and Acronyms	
Acronym	**Definition**
MCM	Multicarrier Module
MGLI	Master Group Line Interface
MM	Mobility Manager
MMI	Man Machine Interface
MPC	Multicoupler Preselector Card
MSC	Mobile Switching Center
OMCR	Operations Maintenance Center – Radio
PAC	Power Alarms Card
PCS	Personal Communication System
PLC	Parallel LPA Combiner
PN	Pseudo-random Noise
PSTN	Public Switched Telephone Network
PSM	Power Supply Module
PWM	Pulse Width Monitor
QPSK	Quadrature Phase Shift Keyed
RGD	Remote GPS Distribution Card
RFDS	Radio Frequency Diagnostic Subsystem
RSSI	Received Signal Strength Indicator
SCAP	Super Cell Application Protocol
TCH	Traffic Channel
TSI	Time Slot Interchanger

Required Documentation and Environmental Specifications

Required Documentation

The following documents are required to perform the installation of the cell site equipment:

- *SC Product Family Frame Mounting Guide* (Motorola part number 68P09226A18)

NOTE	The Frame Mounting Guide manual is a generic manual designed to provide specific information needed to install any SC frame at a variety of sites. Instructions for installing certain optional material, (i.e., directional couplers, circulators, etc.) is also contained in the Frame Mounting Guide. If your site includes such options, use the information provided therein. However, some material in the Frame Mounting Guide may **not** apply to your site. The RFDS shown in the Frame Mounting Guide is for analog cell sites. The Frame Mounting Guide will be revised to include new options as they become available. Other optional material, such as duplexers, is contained in this manual. If your site includes the duplexer option, use the information provided later in this manual.

- *1X SC 4812T-MC BTSOptimization/ATP* (Motorola part number 68P64115A21)
- *1X SC 4812T-MC BTS FRU Guide* (Motorola part number 68P64115A20)
- Site Document (generated by Motorola Systems Engineering) which includes:
  - trial specific documentation
  - channel allocation
  - contact list (customer)
  - ancillary/expendable equipment list
  - site wiring lists
  - card placement
  - contact list (Motorola support)
  - job box inventory
- Demarcation Document (Scope of Work agreement)
- *Grounding Guidelines for Cellular Radio Installations* (Motorola part number 68P81150E62)
- Installation manuals for non-Motorola equipment (for reference purposes)

1

Specifications

Table 1-2 describes the environmental specifications for the 1X SC™ 4812T–MC BTS configuration.

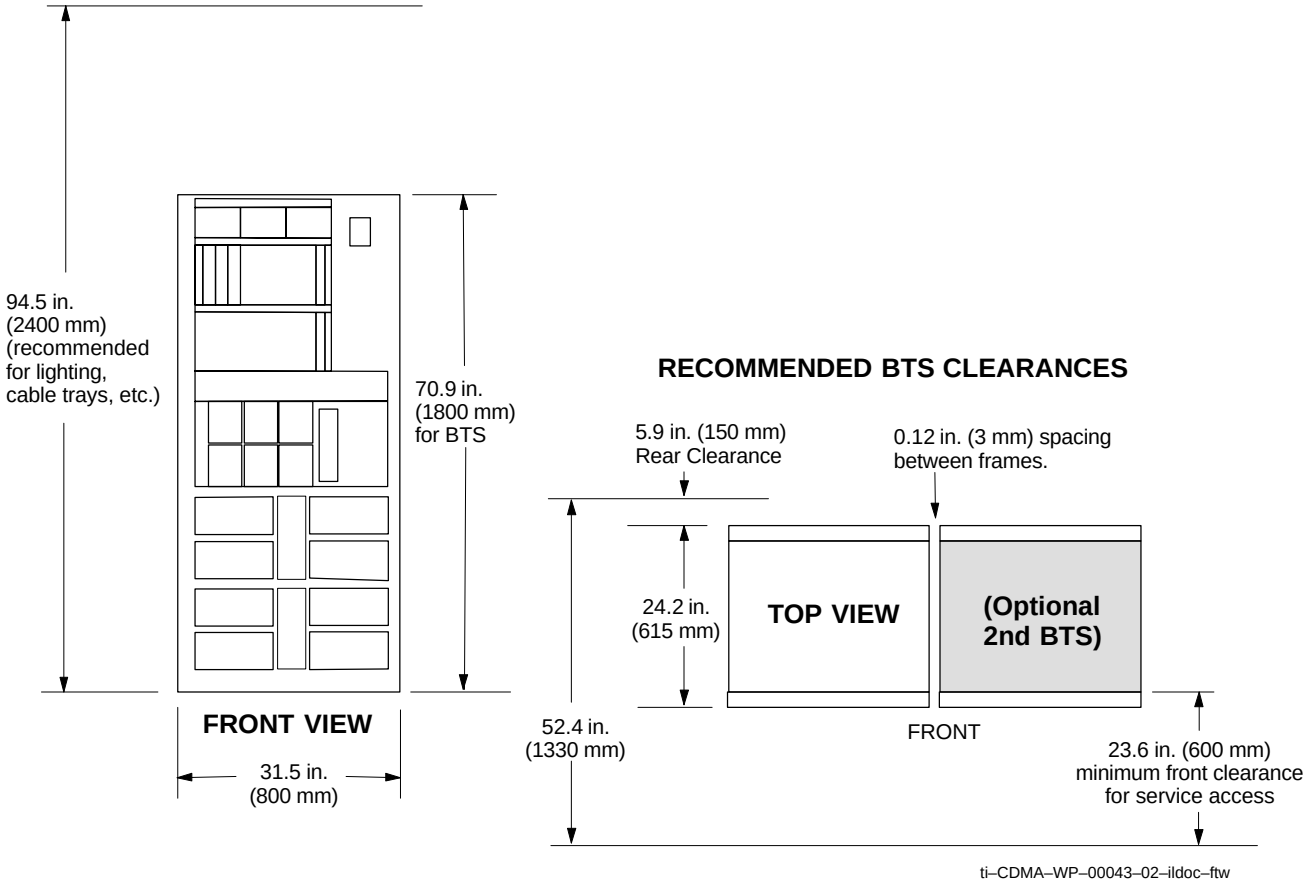
Table 1-2: Environmental Specifications

Specification	Description
Operating Temperature	0 Deg C to +50 Deg C
Humidity: Operating Storage Max Absolute	 0 Deg C to +35 Deg C: 20 to 90 percent relative humidity 35Deg C to +50 Deg C: 20 to 80 percent relative humidity 10 to 95 percent relative humidity non-condensing Operating/storage humidity not to exceed 0.024 gram H_2O/gram dry air
Storage Temperature	–40 Deg C to 60 Deg C
Operating Altitude	–61 to 1524 meters above sea level
Seismic per Bellcore GR-63-CORE	Zone 3 without top bracing Zone 4 with top bracing (HILTIHSL M12/25 anchors, or equivalent; are required for seismic integrity). Note: For raised floor mounting consult a licensed civil engineer regarding site-specific requirements and/or consult the *Frame Mounting Guide*.
Airborne Particulate per Bellcore GR-63-CORE	0 to 25 $\mu g/m^3$ average yearly concentration
Electromagnetic Susceptibility	Withstand an electric field due to AC power, having field strength 5 V/m at 50–60 Hz, measured 1 meter from the frame.
Sound Level per Bellcore GR-63-CORE	75 dBA maximum 56 dBA for 1 carrier/3 sectors at 25 Deg C

BTS Frame Site Layout

Figure 1-1 provides an illustration of the dimensions and clearances for the BTS.

Figure 1-1: Dimensions and Clearances for the BTS



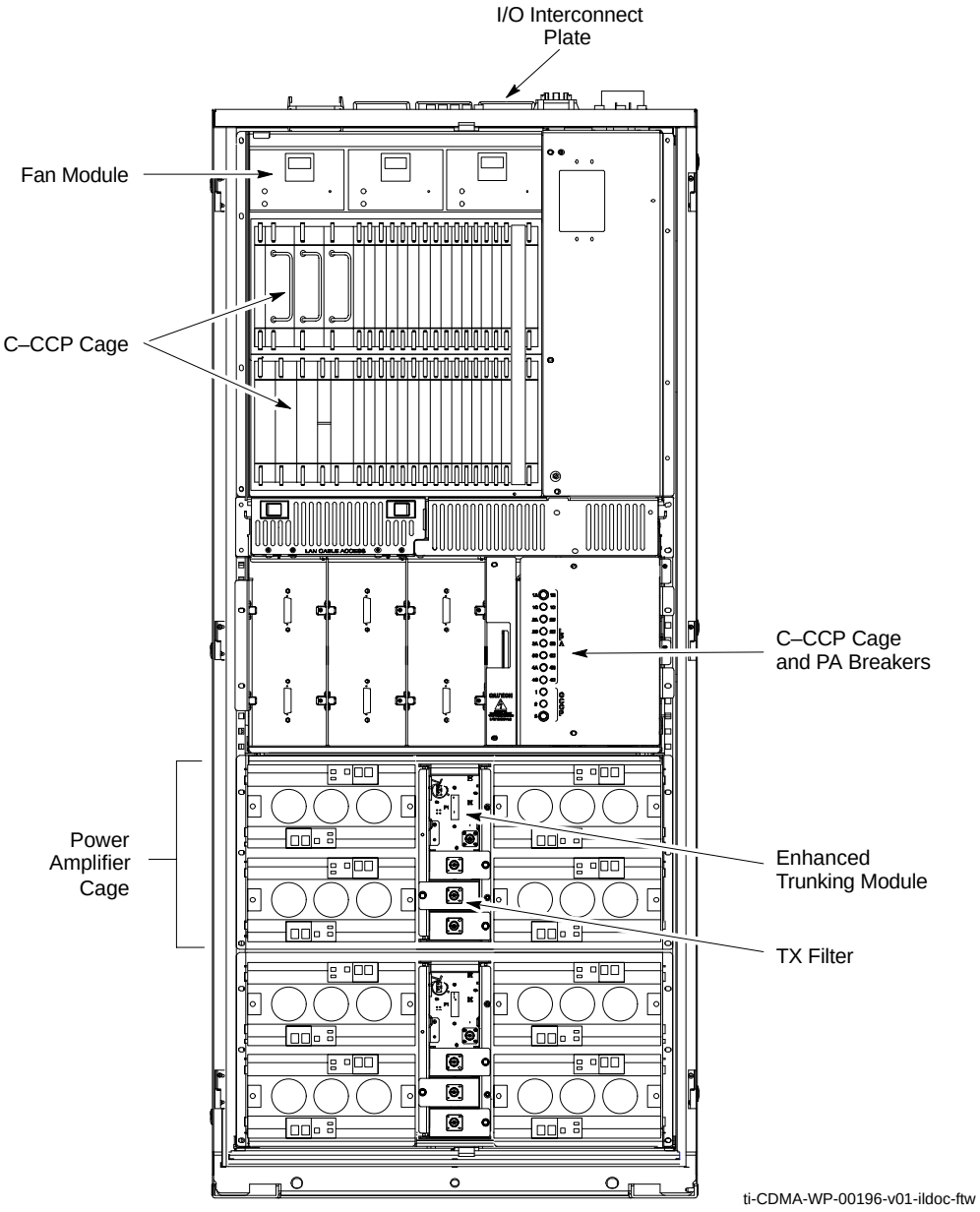
1

Base Transceiver Station (BTS) Frame Identification

BTS Frame

The Motorola SC 4812T–MC BTS (1800 mm) BTS frame contains RX front-end and CLPAs housed in one frame. For increased channel capacity, a second frame (called an “Expansion” frame) may be added to the Starter Frame.

Figure 1-2: SC 4812T–MC BTS Frame



I/O Plate

The I/O plate for the SC4812T–MC BTS Configuration (see Figure 2-1) contains the following:

- Alarm connectors (2)
- Site I/O
- Span I/O (2)
- RX antenna ports (1–12)
- TX antenna ports (1–12)
- Local Area Network (LAN) A and B Out
- LAN A and B In
- Ground (GND) connection
- RF connector for expansion
- DC power inputs
- Global Positioning Satellite (GPS) connector
- Low Frequency Receiver/High Stability Oscillator (LFR/HSO)
- Remote GPS Distribution (RGD) card (required for expansion only)
- Air Exhaust Region

Site I/O

The Site I/O (see Figure 2-3) contains the following:

- Alarm Monitoring and Reporting connectors (AMR A & AMR B)
- Remote Global Positioning Satellite System (RGPS) connector
- Man Machine Interface (MMI) connector

Span I/O

The Span I/O (see Figure 2-3) contains the following:

- Telco interface to network
- POTS line interface to modem

Combined CDMA Channel Processor (C-CCP) Shelf

The C-CCP shelf (see Figure 1-2) contains the following:

- Low Frequency Receiver/High Stability Oscillator (LFR/HSO)
- Clock Synchronization Manager (CSM) and CSM with GPS
- CDMA Clock Distribution (CCD) cards (2)
- Power Supply cards (2 minimum, 3 maximum)
- Multicoupler Preselector Cards (MPC) (2)
- Alarm Monitoring and Reporting (AMR) cards (2)
- Multi Channel CDMA (MCC8E/MCC24E or MCC–1X) cards (up to 12)
- Broadband Transceiver (BBX2 or BBX–1X) cards (up to 13)

NOTE	MC uses only BBX–1X or above. BBX2 or lower cards will not satisfy the Multicarrier requirements.

- Group Line Interface (GLI) cards (2)
- BBX Switch card
- CCP Fans (3)
- Modem (optional)

Power Distribution Cage MC Configuration

The power distribution cage contains:

- Breaker Assembly

MC CLPA Cage

The MC CLPA cage contains:

- Higher Power Linear Power Amplifiers (CLPAs – 8 maximum per cage; 16 maximum per frame)
- Fan Modules (4 maximum per cage; 8 maximum per frame)
- PLC (2 maximum per cage; 4 maximum per frame)
- PLC Fillers Panel (2 maximum per cage; 4 maximum per frame)
  – Only required in 1–Carrier, 3–Sector MC Operation
- Multicarrier Module (1 maximum per cage; 2 maximum per frame)

MC Module

The Multicarrier Module contains:

- Enhanced Trunking Module (1 maximum per module; 2 maximum per frame)
- Transmit Filters (3 maximum per module; 6 maximum per frame)

In-Frame Components

The In-Frame components are:

- Receive Bandpass filters

External Components

The external components are:

- Directional Couplers
- Duplexer Directional Couplers (DDCs)
- Radio Frequency Diagnostic Subsystem (RFDS)

Chapter 2

Inter-Frame Cabling

Inter-Frame Cabling

Overview

This chapter provides the BTS inter-frame cabling procedures for the SC 4812T–MC BTS configuration.

NOTE	Cabling is one of the most noticeable aspects of workmanship. Straight runs and proper turns are critical for a positive evaluation of the work. Power and signal cables should be run with sharp corners, while grounds and antenna lines require gentle corners.

Review the Material

Before installing cables, it is recommended that you become familiar with the equipment and the cable connection locations. Start by reviewing “Connection Locations” topic in this chapter and Table 2-1, BTS Cable Descriptions and part numbers.

Configurations Supported

This chapter supports Inter-Frame cabling installation for a Standalone Base Transceiver Station (BTS) in the following configurations:

- 120 Degree Sector/Sector (3 Sector)
- 60 Degree Sector/Sector (6 Sector)

Cabling Installation Order

To install BTS inter-frame cabling, perform the following procedures in the order shown:

1. Alarm and Span Line
2. Modem/TELCO (optional)
3. GPS and optional LFR
4. Transmit path – perform one of the following based on site specifications:
   - 120 Degree Sector Transmit Path
   - 60 Degree Sector Transmit Path
5. Receive path – Perform one of the following based on site specifications:
   - 120 Degree Sector Receive Path
   - 60 Degree Sector Receive Path
6. Earth ground
7. DC power cables

Cable Labels

The “Overall Cabling Diagrams and Description” area provides generalized cabling diagrams and cable descriptions. The labels used to designate the cables in this area are used throughout this chapter.

Cable Connections

BTS Frame Description

The BTS is the interface between the span lines to/from the Centralized Base Station Controller (CBSC) and the site antennas. This frame is described in three sections:

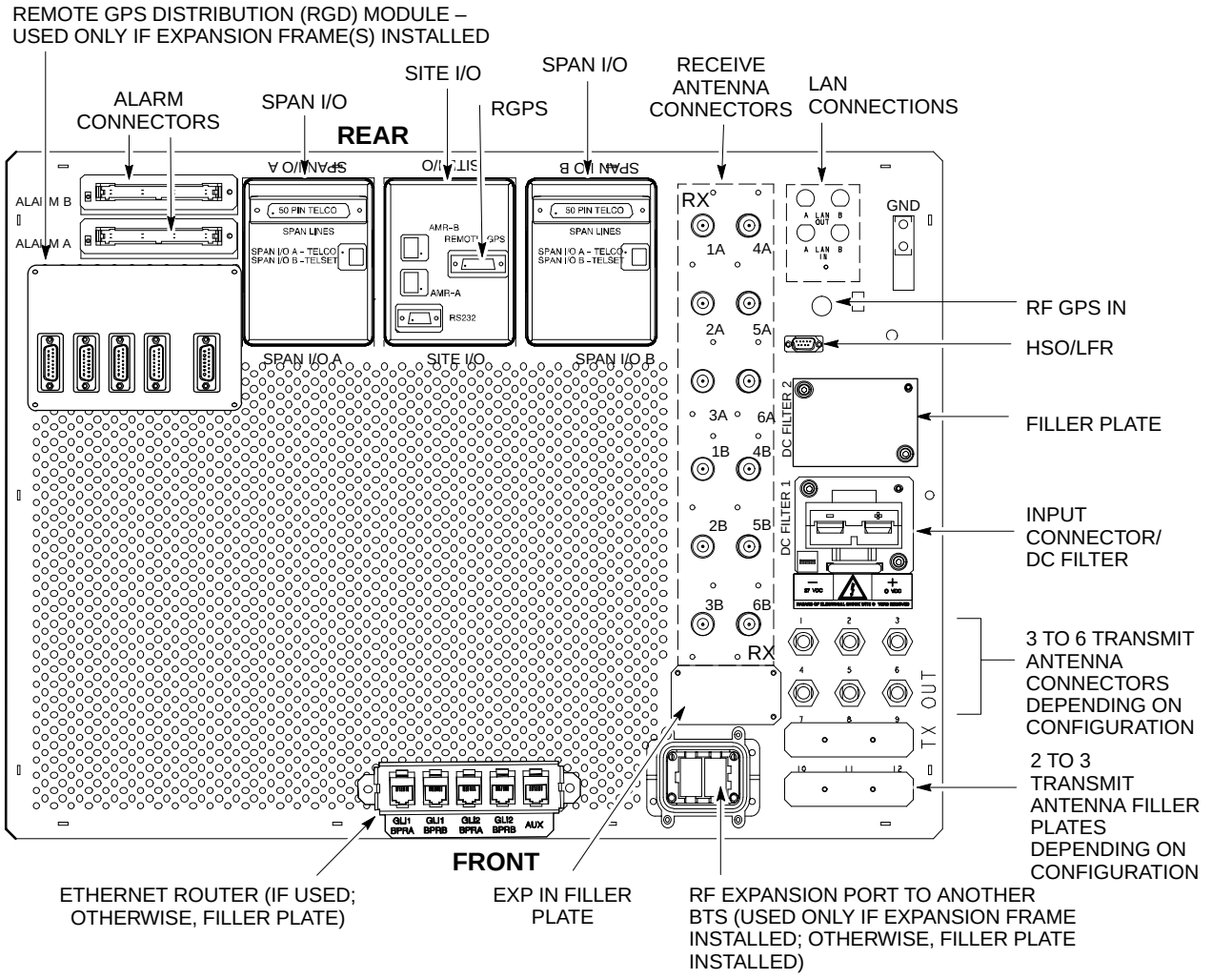
- The top interconnect plate where all connections are made.
- The upper portion of the frame which houses circuit breakers, cooling fans, and the C–CCP shelf.
- The lower portion of the frame which houses the PA fans, PAs, and TX filter.

Top I/O (Interconnect) Plate (Figure 2-1 and Figure 2-2)

All cabling to and from the BTS equipment frames is via the I/O (interconnect) panel on the top of each frame. Connections made here include:

- Span lines
- RX antennas
- TX antenna
- Alarm connections
- Power input
- LAN connections
- GPS input or Remote Global Positioning System (RGPS) on the Site I/O Board
- Remote Global Positioning System Distribution (RGD)
- LORAN–C Low Frequency Receiver (LFR) input
- Expansion frame connection
- Ground connections

Figure 2-1: SC4812T–MC Starter Frame I/O Plate



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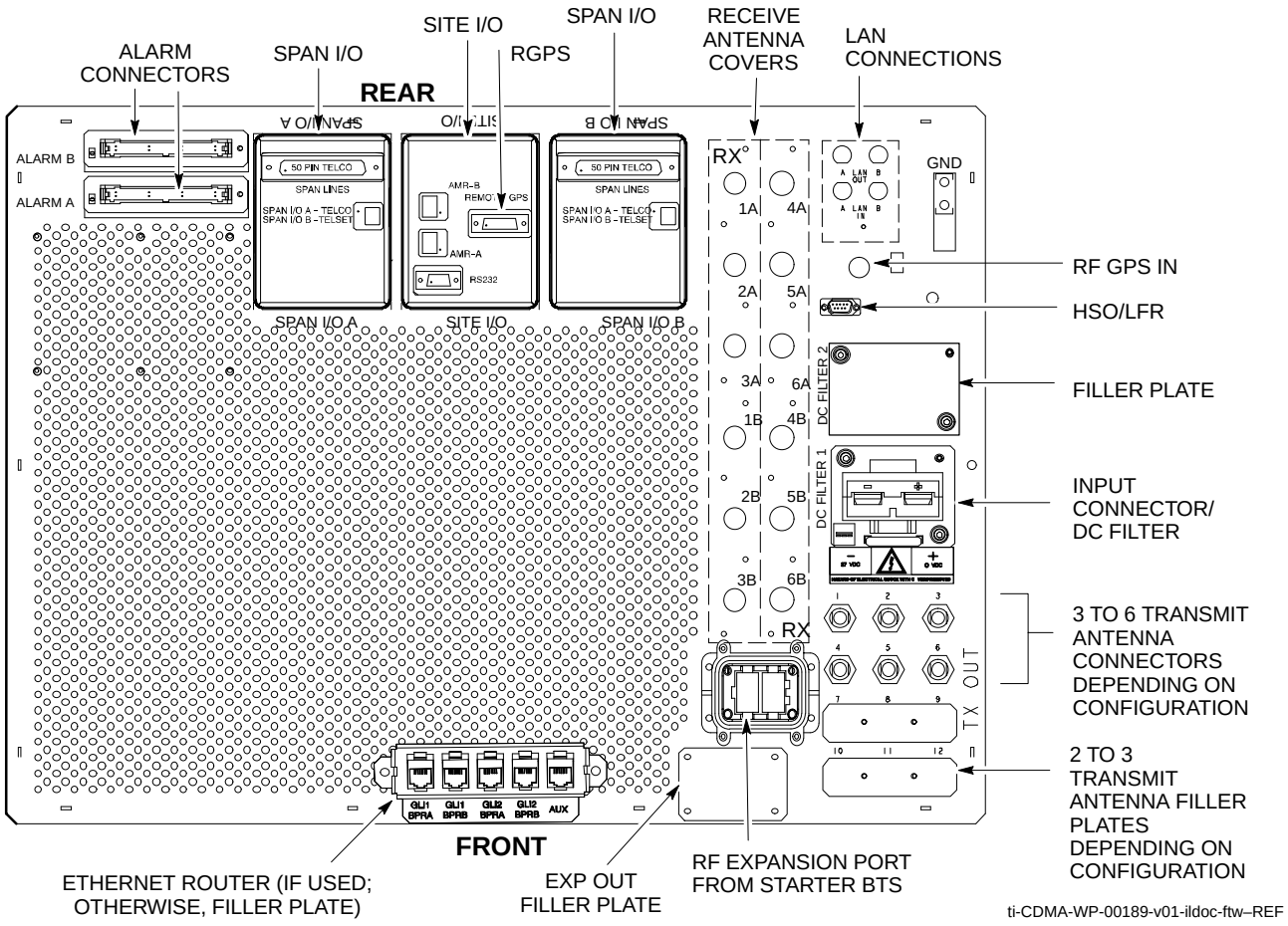
Expansion Frame I/O Plate

Figure 2-2 provides a detailed view of the connections associated with the SC4812T–MC Expansion Frame I/O Plate.

Figure 2-2: SC4812T–MC Expansion Frame I/O Plate



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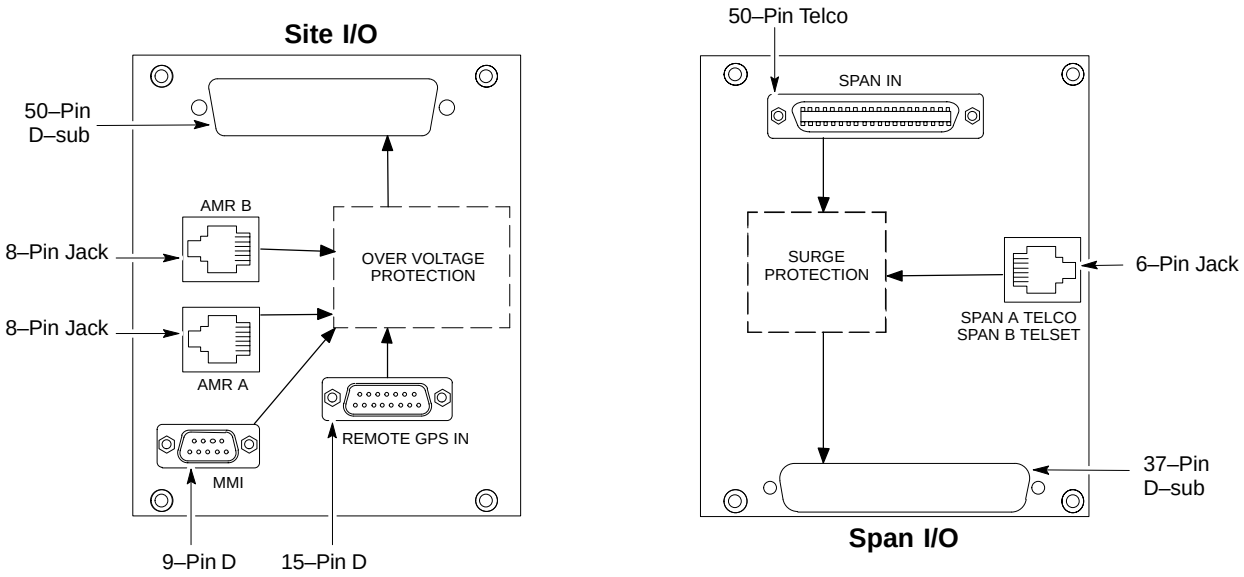
Site I/O and Span I/O Boards

Figure 2-3 provides a detailed view of the Site I/O and Span I/O boards.

Figure 2-3: Site I/O and Span I/O Boards



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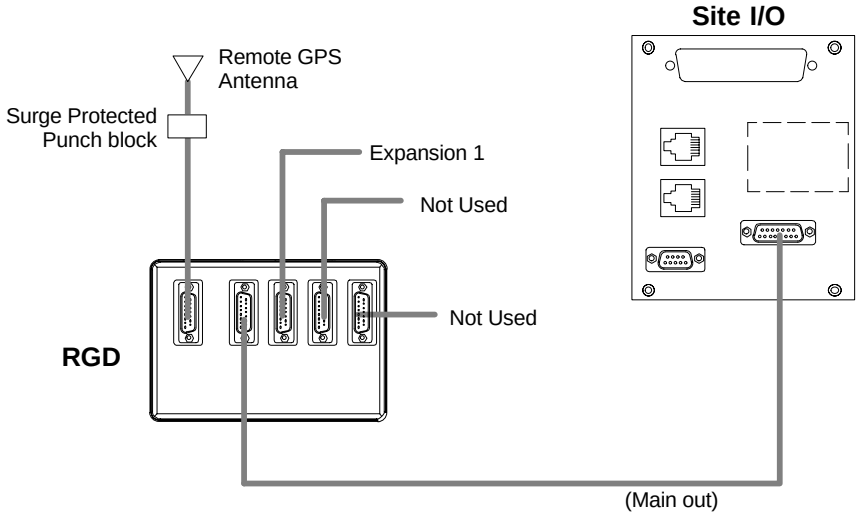
Remote GPS Distribution (RGD) Card

Figure 2-4 provides a detailed view of the Remote GPS Distribution (RGD) card which is used with a Starter BTS to provide signal to the Expansion frame.

Figure 2-4: RGD Board Cables Connection



NOTE:
RGD card is required on the Starter frame only.
It provides Remote GPS signal to the Expansion frame.

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Cabling Diagrams and Descriptions

Cable Descriptions and Part Numbers

Table 2-1 lists the cable descriptions and part numbers. The letter listed under the cable label column is used as a reference for ALL cabling procedures and diagrams in this manual. This information also applies to all system configurations.

Table 2-1: Cable Descriptions and Part Numbers

Cable Label	Part Number	Description
A	CGDS1583461	Cable, 50-wire, shielded twisted 25 pair, 100 ohm, 24-AWG, 7.6 m (25 ft), one male TELCO connector attached. One end of cable has shielded twisted pairs, no connector.
	CGDS1583462	Cable, 50-wire, shielded twisted 25 pair, 100 ohm, 24-AWG, 15.2 m (50 ft), one male TELCO connector attached. One end of cable has shielded twisted pairs, no connector.
B	CGDS1583451	Cable, 60-wire, 100 ohm, 24-AWG, 7.6 m (25 ft), one 60-pin D connector. One end of cable has shielded twisted pairs.
	CGDS1583452	Cable, 60-wire, 100 ohm, 24-AWG, 15.2 m (50 ft), one 60-pin D connector. One end of cable has shielded twisted pairs.
C	CGDSMCXNJACK	Cable, GPS antenna adapter, OSX connector and female N-type connector. Mounts inside antenna assembly (assembly # SGAN4000A)
E	CGDS997264	Coaxial cable (RG-58), 50 ohm, shielded, 26 m (85.3 ft), 18 BNC connectors included.
	CGDS997265	Coaxial cable (RG-58), 50 ohm, shielded, 13 m (42.6 ft), 10 BNC connectors included.
G	CGDS2212602	15 ft. Jumper cable, N/M–N/M (only one end of the cable is terminated with an N connector).
J	CGDSGFEL04MS82	Cable, 4-wire, 26-AWG, 25 m (82 ft), two 4-pin RJ-11 connectors attached to cable.
K	N/A	Cable, 50 ohm coaxial, two male N-type connectors. Maximum Loss: < 4.5 dB at 1575 MHz for all cabling and connections between the GPS antenna and the BTS frame. Cable style and length is determined by the site configuration. Refer to the site specific documentation for information about this cable. The following are maximum suggested cable lengths for three common cable types: • RG-393U – with adapter cable and connectors; will accommodate distances up to 12.5 m (41 ft). • Andrew FT5-50T – Heliax with adapter cable and connectors; will accommodate distances up to 39.6 m (130 ft). • Andrew LDF7-50A – Heliax with adapter cable and connectors; will accommodate distances up to 100.6 m (330 ft).

...continued on next page

Table 2-1: Cable Descriptions and Part Numbers

Cable Label	Part Number	Description
L	CGDS315SA038	Cable, 5-wire, 100 ohm, 24-AWG, shielded twisted pair, 91.5 m (300 ft). One 9-pin sub-miniature D-connector and one 5-pin circular connector.
M	N/A	Power cable – See *Power Cable* section for detailed information on cable termination lugs. Customer supplied cable.
N	N/A	Ground cable, 6-AWG, insulated copper wire, loop connectors. Customer supplied cable.

Overall Cabling Diagram (Single Frame)

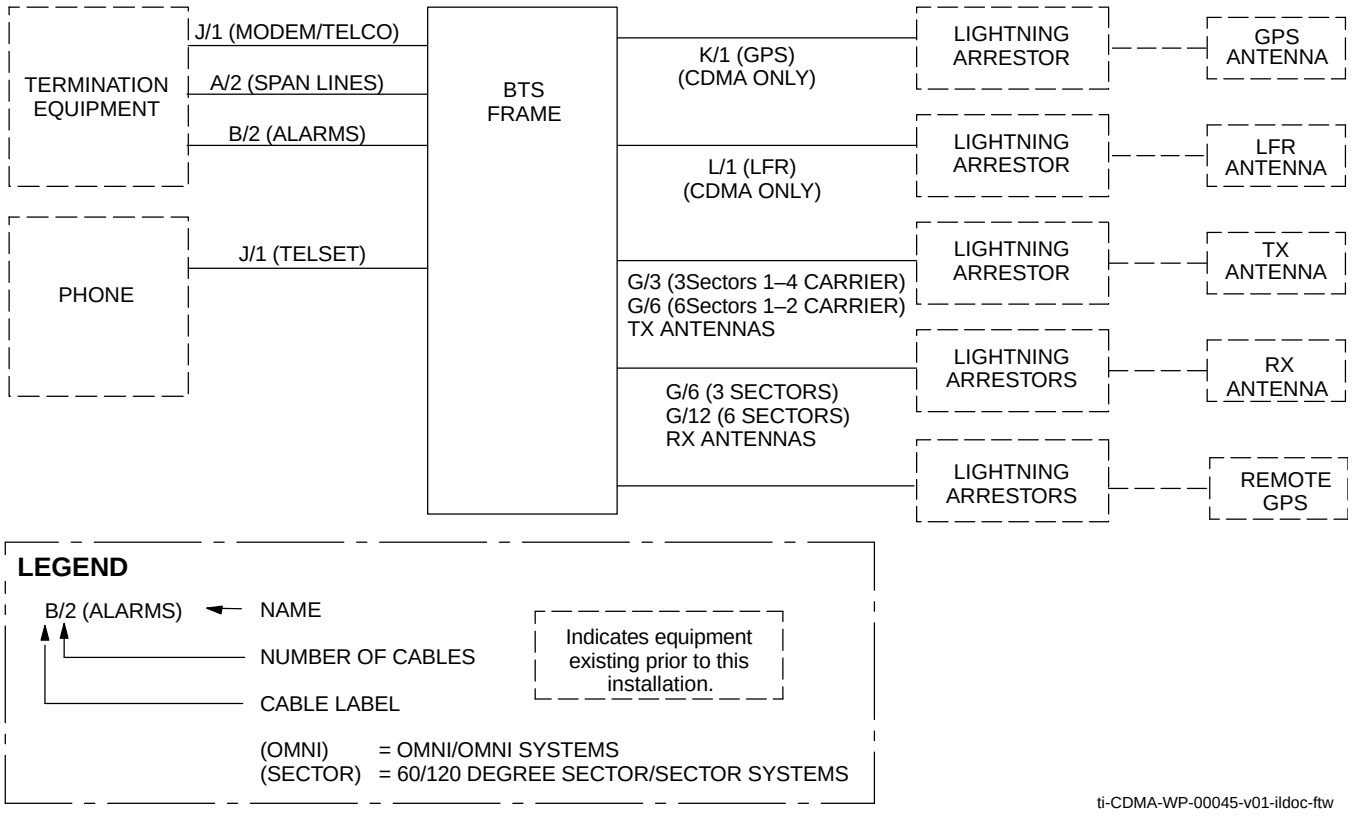
Omni Systems

The following diagram shows the overall BTS cabling (power and ground cables are not shown) for an Omni/Omni system. Table 2-1 contains the detailed cable descriptions.

3 and 6 Sector Systems

Figure 2-5 also represents the overall BTS cabling (power and ground cables are not shown) for a 3 and 6 sector CDMA system. Refer to the legend in the following diagram and Table 2-1 for detailed cable descriptions.

Figure 2-5: Overall Signal Cabling Diagram for CDMA Systems



Alarm / Span Cabling

Objective

The objective of this procedure is to install the BTS alarm and span line cabling.

Cable Labels

The cable designations are referenced to Table 2-1 in the “Overall Cabling Diagrams and Description” area.

Equipment Needed

Table 2-2 lists the quantity and description of the required cables.

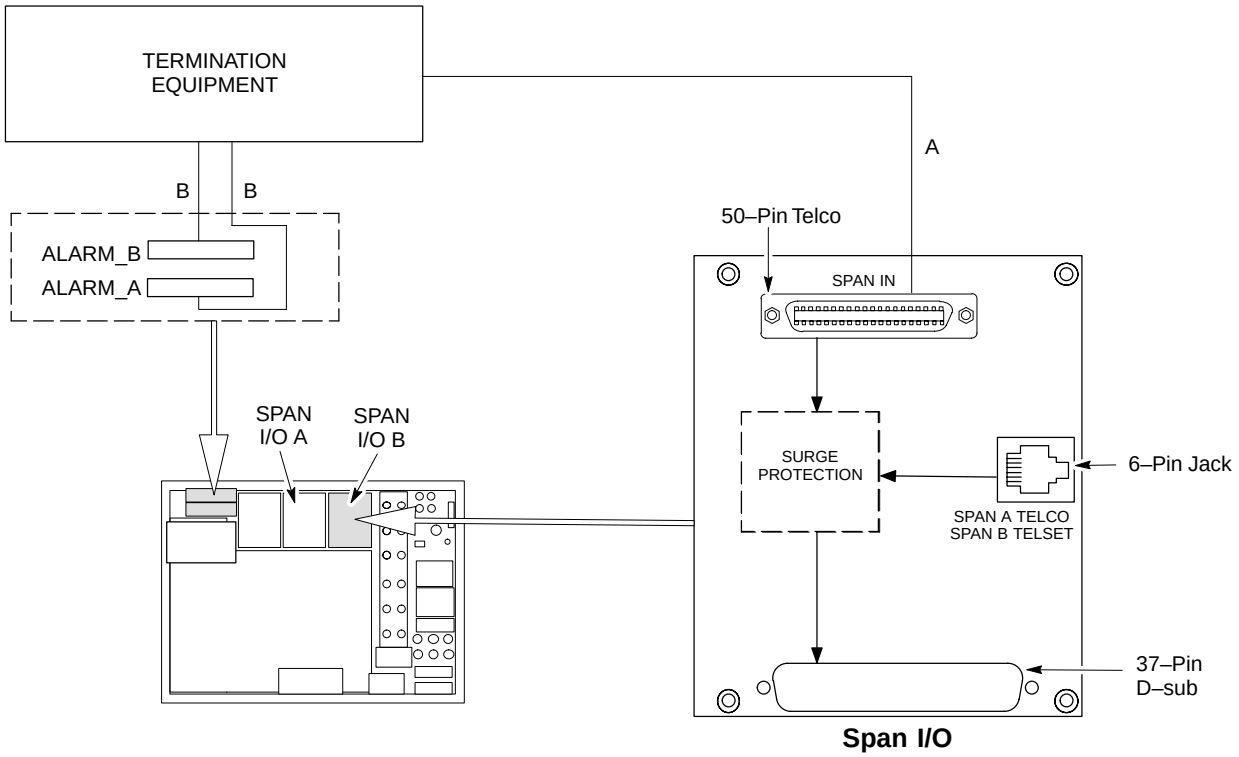
Table 2-2: Cables Needed for Alarm and Span Line Cabling

Cable	Qty.	Part Number	Description
A	1 or 2	CGDS1583461	Cable, 50-wire, shielded twisted 25 pair, 100 ohm, 24-AWG, 7.6 m (25 ft), one male TELCO connector attached. One end of cable has shielded twisted pairs, no connector.
		CGDS1583462	Cable, 50-wire, shielded twisted 25 pair, 10 ohm, 24-AWG, 15.2 m (50 ft), one male TELCO connector attached. One end of cable has shielded twisted pairs, no connector.
B	2	CGDS1583451	Cable, 60-wire, 100 ohm, 24 AWG, 7.6 m (25 ft), one 60-pin connector. One end of cable has shielded twisted pairs.
		CGDS1583452	Cable, 60-wire, 100 ohm, 24 AWG, 15.2 m (50 ft), one 60-pin connector. One end of cable has shielded twisted pairs.

Cabling Diagram

Figure 2-6 illustrates the recommended BTS span and alarm cabling.

Figure 2-6: Alarm and Span Line Cabling Details



SC 4812T–MC

Cable Run List

Table 2-3 provides the cable run list for alarm and span line cabling.

Table 2-3: Cable Run List for Alarm and Span Line Cabling

Cable	From BTS Connector	To
A	SPAN LINE (on Span I/O board)	Termination Equipment
B	ALARM A	Termination Equipment
	ALARM B	

*** IMPORTANT**
Site I/O and Span I/O boards are located on the top of the BTS frame.

Install Span and Alarm Cables

Install the cables by using the cable run list provided in Table 2-3, by referencing Figure 2-6, and by following the procedures in Table 2-4 through Table 2-6.

Span I/O Board (A) Installation

Perform the following procedure to connect cable A, to Span I/O board A.

Table 2-4: Procedure to Install Span Line A Cable

Step	Action
1	Connect the TELCO connector of cable A to the SPAN LINE connector of Span I/O board A.
2	Route the cable to the termination equipment.
3	Cut the cable to length, and connect it to the termination equipment. Refer to Figure 2-7 and Table 2-8 for pin and signal information.

Span I/O Board (B) Installation

Perform the following procedure to connect cable A, to Span I/O board B.

Table 2-5: Procedure to Install Span Line B Cable

Step	Action
1	Connect the TELCO connector of cable A to the SPAN LINE connector of Span I/O board B.
2	Route the cable to the termination equipment.
3	Cut the cable to length, and connect it to the termination equipment. Refer to Figure 2-7 and Table 2-8 for pin and signal information.

Alarm Cable Installation

Perform the following procedure to install the alarm cables.

Table 2-6: Procedure to Install Alarm Cables

Step	Action
1	Connect the 60-pin connector of one cable B to the ALARM A connector.
2	Route the cable to the termination equipment.
3	Cut the cable to length and connect it to the termination equipment. Refer to Figure 2-8, and Table 2-9 for pin and signal information. Alarm signal specifications are described on the following page.
4	Repeat Steps 1 through 3, using the other cable B and the ALARM B connector.

Alarm Signal Specifications

There are two ALARM connectors, A and B. A connector is always functional; B is only functional when an AMR module is equipped in the AMR 2 slot in the Combined CDMA Channel Processing Shelf (C-CCP).

Function

ALARM connectors provide for Customer Defined Alarm Inputs and Outputs. The customer can connect BTS site alarm input sensors and output devices to the BTS, thus providing alarm reporting of active sensors as well controlling output devices.

ALARM A connector provides 18 inputs and 8 outputs. ALARM B connector provides 17 inputs and 8 outputs. If both AMR cards are present, 35 inputs and 16 outputs are available.

Power Alarms Card (PAC)

The PAC combines alarms from five (5) power supply modules in the BTS, generating one alarm output. The alarm signal is output through the Alarm B connector, as follows:

- Major alarm – pin 29
- Major alarm return – pin 30

NOTE	Alarm B pin connections above are for –48V frame application only. These pins ar not used in the +27V application.

CAUTION	These pins are **NOT** to be used as a customer defined input or the PSM alarms will not function correctly.

Internal Connections

Both ALARM A and B connectors are cabled to the C-CCP shelf backplane CUSTOMER I/O connector via a single 120-wire (twisted pair) shielded cable. The inputs/outputs of ALARM A connector are supported by the control interface module AMR 1. The input/outputs of ALARM B connector are supported by the optional control interface module AMR 2. The AMR detects signals from input sensors and provides relay controlled switched contacts to output devices.

External Connections

Table 2-7 describes the characteristics and requirements for the inputs (each of which consists of a wire/pin pair) and outputs (each of which consists of 3-wires/pins–COM, NC, and NO).

2

Table 2-7: External Alarm Connector Characteristics and Requirements

Inputs	Outputs
To ensure proper operation, each pair to be used must be connected to an external sensor that provides a dry-contact closure. The customer sensor output contacts between an optically isolated 9V DC signal and an isolated return. • 10k ohms or greater across the input pair is detected as an *open* contact. • 1k ohms or less across the input pair is detected as a *closed* contact. Either of the above states can be defined by the customer in system software as an alarm condition.	The customer output device control inputs connect between the common (COM) and either the normally closed (NC) or normally open (NO) contacts of a relay. • Relay contacts are load rated for a maximum of 1 A @ 24 Vdc and 0.5 A @ 48 Vdc. The toggling of the relay contacts to the opposite state is controlled by system software.

Span Line Cable Pin Numbering

Figure 2-7 shows the pin numbering for Cable A – CGDS1583461, CGDS1583462. Table 2-8 provides the Telco connector pin out designators on the Span I/O PCB.

Figure 2-7: Cable A (Span Line) Pin Numbering

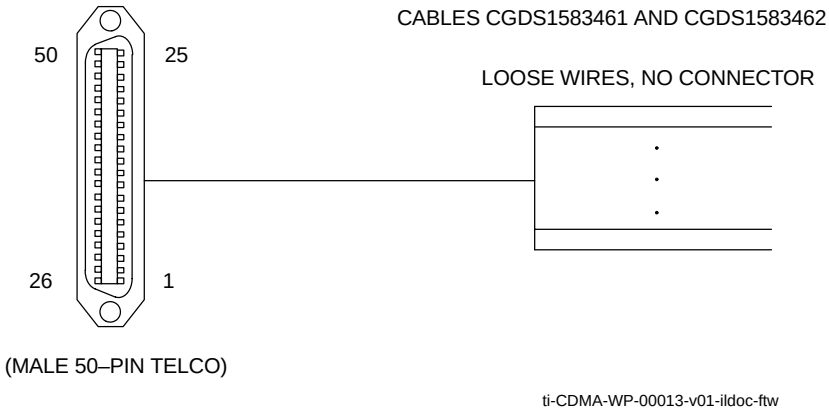


Table 2-8: Span I/O Connector

	Span I/O		T1	Signal Name	Input Pin	Wire Color	Signal Name	Input Pin	Wire Color
	A	**B**							
Span #	1	2	RX1	RX_TIP_1	1	BLU/WHT	RX_RING_1	26	WHT/BLU
			TX1	TX_TIP_1	2	ORG/WHT	TX_RING_1	27	WHT/ORG
Span #	3	4	RX2	RX_TIP_2	3	GRN/WHT	RX_RING_2	28	WHT/GRN
			TX2	TX_TIP_2	4	BRN/WHT	TX_RING_2	29	WHT/BRN
Span #	5	6	RX3	RX_TIP_3	5	SLT/WHT	RX_RING_3	30	WHT/SLT
			TX3	TX_TIP_3	6	BLU/RED	TX_RING_3	31	RED/BLU

Alarm Connectors Pin and Signal Information

Figure 2-8 shows the Alarm A and B pin numbering for Cable B - CGDS1583451, CGDS1583452, respectively. Pin and signal information are described in Table 2-9 for Alarm A and Table 2-10 for Alarm B.

Figure 2-8: Cable B (Alarm) Pin Numbering

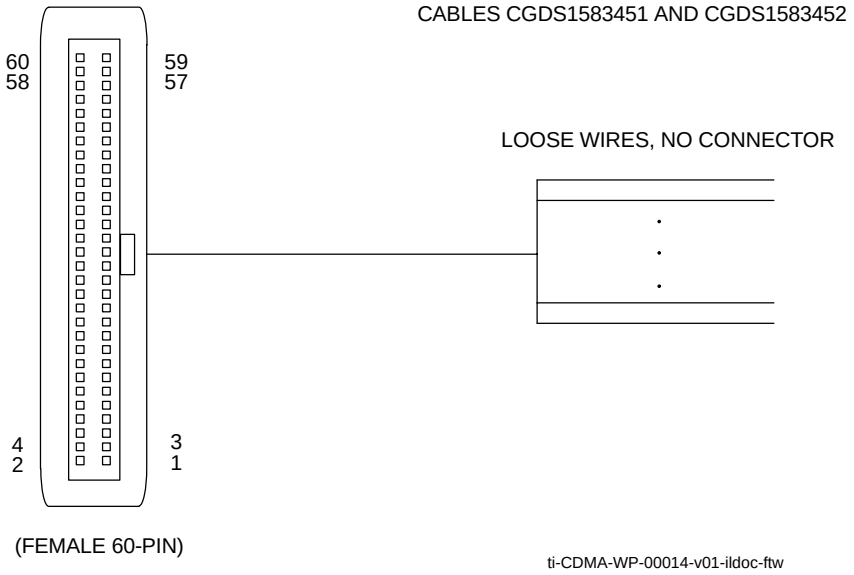


Table 2-9: Pin and Signal Information for **ALARM A** Connectors					
Pin	**Wire Color**	**Signal Name**	**Pin**	**Wire Color**	**Signal Name**
1	BLU/WHT	A CDO1 NC	16	RED/GRN	A CDO6 NC
2	WHT/BLU	A CDO1 COM	17	BRN/RED	A CDO6 COM
3	ORG/WHT	A CDO1 NO	18	RED/BRN	A CDO6 NO
4	WHT/ORG	A CDO2 NC	19	SLT/RED	A CDO7 NC
5	GRN/WHT	A CDO2 COM	20	RED/SLT	A CDO7 COM
6	WHT/GRN	A CDO2 NO	21	BLU/BLK	A CDO7 NO
7	BRN/WHT	A CDO3 NC	22	BLK/BLU	A CDO8 NC
8	WHT/BRN	A CDO3 COM	23	ORG/BLK	A CDO8 COM
9	SLT/WHT	A CDO3 NO	24	BLK/ORG	A CDO8 NO
10	WHT/SLT	A CDO4 NC	25	GRN/BLK	Cust Retn 1
11	BLU/RED	A CDO4 COM	26	BLK/GRN	A CDI 1
12	RED/BLU	A CDO4 NO	27	BRN/BLK	Cust Retn 2
13	ORG/RED	A CDO5 NC	28	BLK/BRN	A CDI 2
14	RED/ORG	A CDO5 COM	29	SLT/BLK	Cust Retn 3
15	GRN/RED	A CDO5 NO	30	BLK/SLT	A CDI 3
Pin	**Wire Color**	**Signal Name**	**Pin**	**Wire Color**	**Signal Name**
31	BLU/YEL	CUST RTRN 4	46	VIO/GRN	A CDI 11
32	YEL/BLU	A CDI 4	47	BRN/VIO	CUST RTRM 12
33	ORG/YEL	CUST RTRN 5	48	VIO/BRN	A CDI 12
34	YEL/ORG	A CDI 5	49	SLT/VIO	CUST RTRM 13
35	GRN/YEL	CUST RTRN 6	50	VIO/SLT	A CDI 13
36	YEL/GRN	A CDI 6	51	RED/WHT	CUST RTRM 14
37	BRN/YEL	CUST RTRN 7	52	WHT/RED	A CDI 14
38	YEL/BRN	A CDI 7	53	BLK/WHT	CUST RTRM 15
39	SLT/YEL	CUST RTRN 8	54	WHT/BLK	A CDI 15
40	YEL/SLT	A CDI 8	55	YEL/WHT	CUST RTRM 16
41	BLU/VIO	CUST RTRN 9	56	WHT/YEL	A CDI 16
42	VIO/BLU	A CDI 9	57	VIO/WHT	CUST RTRM 17
43	ORG/VIO	CUST RTRN 10	58	WHT/VIO	A CDI 17
44	VIO/ORG	A CDI 10	59	BLK/RED	CUST RTRM 18
45	GRN/VIO	CUST RTRN 11	60	RED/BLK	A CDI 18

NC – normally closed, NO – normally open, Com – common, CDO – Customer Defined Output,

CDI – Customer Defined Input

All Cust Rtrm 1–18 are electronically tied together at the RFMF.

The A CDI numbering is from the LMF/OMCR/CBSC perspective. LMF/OMCR/CBSC starts the numbering at 1 (giving 1 – 18). Actual cable hardware starts the numbering at 0 (giving 0–17)

2

Table 2-10: Pin and Signal Information for **ALARM B** Connectors					
Pin	**Wire Color**	**Signal Name**	**Pin**	**Wire Color**	**Signal Name**
1	BLU/WHT	B CDO9 NC	16	RED/GRN	B CDO14 NC
2	WHT/BLU	B CDO9 COM	17	BRN/RED	B CDO14 COM
3	ORG/WHT	B CDO9 NO	18	RED/BRN	B CDO14 NO
4	WHT/ORG	B CDO10 NC	19	SLT/RED	B CDO15 NC
5	GRN/WHT	B CDO10 COM	20	RED/SLT	B CDO15 COM
6	WHT/GRN	B CDO10 NO	21	BLU/BLK	B CDO15 NO
7	BRN/WHT	B CDO11 NC	22	BLK/BLU	B CDO16 NC
8	WHT/BRN	B CDO11 COM	23	ORG/BLK	B CDO16 COM
9	SLT/WHT	B CDO11 NO	24	BLK/ORG	B CDO16 NO
10	WHT/SLT	B CDO12 NC	25	GRN/BLK	B CDI 19
11	BLU/RED	B CDO12 COM	26	BLK/GRN	Cust Retn 19
12	RED/BLU	B CDO12 NO	27	BRN/BLK	B CDI 20
13	ORG/RED	B CDO13 NC	28	BLK/BRN	Cust Retn 20
14	RED/ORG	B CDO13 COM	29	Power Supply Module Alarm*	
15	GRN/RED	B CDO13 NO	30	Power Supply Module Alarm Return*	

Pin	Wire Color	Signal Name	Pin	Wire Color	Signal Name
31	BLU/YEL	B CDI 22	46	VIO/GRN	CUST RTRM 29
32	YEL/BLU	CUST RTRN 22	47	BRN/VIO	B CDI 30
33	ORG/YEL	B CDI 23	48	VIO/BRN	CUST RTRM 30
34	YEL/ORG	CUST RTRN 23	49	SLT/VIO	B CDI 31
35	GRN/YEL	B CDI 24	50	VIO/SLT	CUST RTRM 31
36	YEL/GRN	CUST RTRN 24	51	RED/WHT	B CDI 32
37	BRN/YEL	B CDI 25	52	WHT/RED	CUST RTRM 32
38	YEL/BRN	CUST RTRN 25	53	BLK/WHT	B CDI 33
39	SLT/YEL	B CDI 26	54	WHT/BLK	CUST RTRM 33
40	YEL/SLT	CUST RTRN 26	55	YEL/WHT	B CDI 34
41	BLU/VIO	B CDI 27	56	WHT/YEL	CUST RTRM 34
42	VIO/BLU	CUST RTRN 27	57	VIO/WHT	B CDI 35
43	ORG/VIO	B CDI 28	58	WHT/VIO	CUST RTRM 35
44	VIO/ORG	CUST RTRN 28	59	BLK/RED	B CDI 36
45	GRN/VIO	B CDI 29	60	RED/BLK	CUST RTRM 36

NC – normally closed, NO – normally open, Com – common, CDO – Customer Defined Output,

CDI – Customer Defined Input

All Cust Rtrm 19–36 are electronically tied together at the RFMF.

The A CDI numbering is from the LMF/OMCR/CBSC perspective. LMF/OMCR/CBSC starts the numbering at 19 (giving 19 – 36). Actual cable hardware starts the numbering at 0 (giving 0–17)

***CAUTION**

Reserved for PSM Alarm signal (–48V application ONLY). **DO NOT** use these pins for CDOs or CDIs.

Equipment Compliance

This equipment complies with Part 68 of the Federal communications commission (FCC) Rules and regulations. On the top of the Frame is a label, located inside the cabinet frame on the top, left side, that contains, among other information, the FCC Registration Number and Ringing Equivalence Number (REN) for this equipment. If requested, this information must be provided to the telephone company.

The REN is useful to determine the quantity of the devices which may connect to the telephone line. Excessive REN's on the telephone line may result in the devices not ringing in response to incoming call. In most, but not all areas, the sum of the REN's should not exceed five (5.0). To be certain of the number of devices that may be connected to the line as determined by the total REN's, contact the telephone company to determine the maximum REN for the calling area.

If the dial-in site access modem causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. If advance notice is not practical, the telephone company will notify you of the discontinuance as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation of your dial-in site access modem. If this happens, the telephone company will provide advance notice so that you can modify your equipment as required to maintain uninterrupted service.

If you experience trouble with the dial-in site access modem, contact Motorola Service Center for repair and/or warranty information:

Motorola Cellular Service Center (MCSC)
1501 W. Shure Drive
Arlington Heights, Illinois 60004
Phone Number: (847) 632–5390

If the trouble is causing harm to the telephone network, the telephone company may request you to disconnect the equipment from the network until the problem is solved. You should not attempt to repair this equipment yourself. This equipment contains no customer or user-serviceable parts.

Changes or modifications not expressly approved by Motorola could void your authority to operate this equipment.

BTS System Timing Options

Timing Sources

The BTS is able to receive timing information from the following sources:

- RF Global Positioning Satellite (RF GPS)
- Remote GPS (RGPS)
- Low Frequency Receiver (LFR)
- High Stability Oscillator (HSO)

Customers have the option of installing either an RF GPS or Remote GPS. Site characteristics determine the cabling to be installed (GPS, LFR or HSO, if any).

Timing sources can be used independently. However, in typical applications, sites are outfitted in pairs so that if a failure occurs in the main source, a backup system will provide timing to keep the cell site in operation.

Typical installations include:

- RF GPS with LFR backup
- Remote GPS with LFR backup
- GPS with LFR or HSO backup

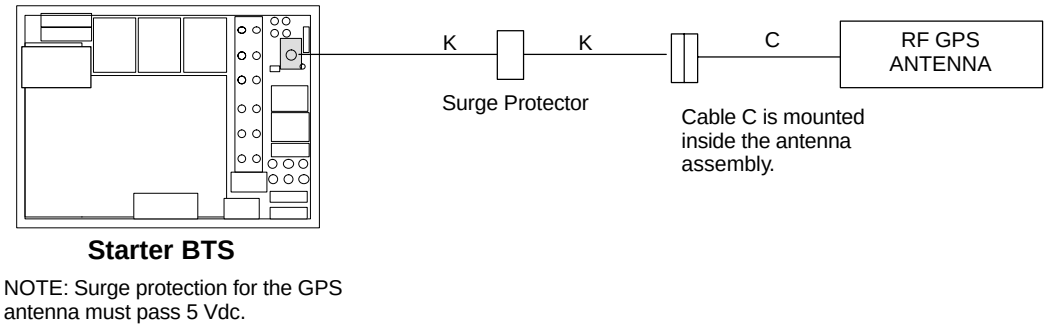
Each of these cabling installations are described in the following sections.

RF Global Positioning Satellite (RF GPS) Cabling

RF GPS Cabling Diagram

Figure 2-9 shows a detailed diagram of RF GPS cabling in the Starter frame. Refer to Table 2-1 for a description of the cables required for installing the RF GPS.

Figure 2-9: RF GPS Cabling Detail



NOTE: Surge protection for the GPS antenna must pass 5 Vdc.

Cable Run List

Table 2-11 lists the cable runs for the BTS GPS and LFR cables. If lightning arrestors are used with the LFR antenna, refer to the site specific documentation for cabling information.

Table 2-11: Cable Run List for GPS and LFR Cabling

Cable	From Connector	To
K	GPS	GPS Antenna

RF GPS Cabling Installation Procedure

Install each cable by referring to the cable run list in Table 2-1, the cabling diagram in Figure 2-9, and the procedure in Table 2-12. If lightning arrestors are used with the RF GPS antenna, refer to the site specific documentation for cabling information.

NOTE Site specific characteristics determine the GPS/LFR cabling that is installed.

Table 2-12: Procedure to Install the RF GPS Cabling

Step	Action
1	Follow the OEM information to disassemble the GPS antenna and gain access to the OSX connector.
2	Connect the the OSX connector of cable C to the antenna.
3	Follow the OEM information to assemble the GPS antenna with cable C attached.
4	Connect one end of cable K to the N-type connector of cable C.
5	Connect the other end of cable K to the GPS connector on the BTS.

Remote Global Positioning Satellite (RGPS) Cabling

RGPS Cabling Diagrams

Figure 2-10 depicts the detail for mounting the RGPS antenna and the cable leading to the BTS. Figure 2-11 shows the detailed remote GPS cabling diagram.

NOTE	The Remote GPS cable is comprised of 6-twisted pairs of wires. For proper Remote GPS operation, each black wire in this cable is unique and **MUST** be paired with its proper mate.

Figure 2-10: Remote GPS Mounting Detail

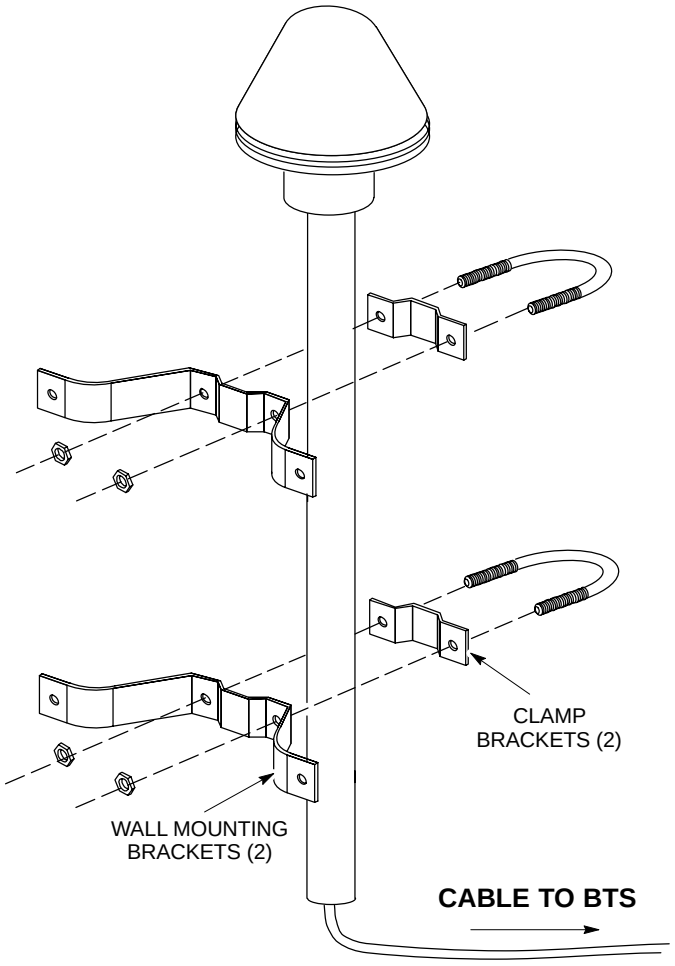
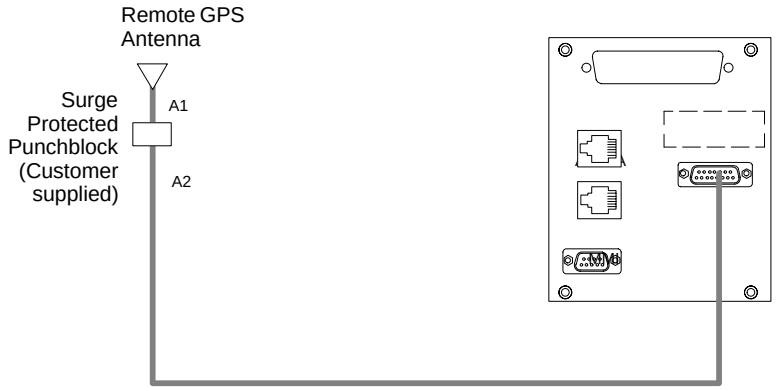


Figure 2-11: Remote GPS Cabling Diagram



Cabling Run List

Table 2-13 provides a listing of the cables need for installing the Remote GPS option.

Table 2-13: Remote GPS Cable Descriptions and Part Numbers

Cable Label	Part Number	Description
A_1	T472Ax	RGD Antenna to Punchblock Cable; x=A–F for different A1 cable length 50 feet to 2000 feet
A_2	3086433H07	Punchblock to Site I/O board

Install RGPS Cable

Install each cable by referring to the cable run list in Table 2-13, the cabling diagram in Figure 2-11, and the procedure in Table 2-14. If lightning arrestors are used with the RGPS, refer to the site specific documentation for cabling information.

NOTE Site specific characteristics determine the GPS/LFR cabling that is installed.

Table 2-14: Installing the RGPS Cabling

Step	Action
1	Connect cables A1 and A2 into the punch block, as if they were part of the same cable, cut in the middle maintaining color code and signal integrity..
2	Connect the same corresponding color on both sides of the punchblock (see Figure 2-11).

Low Frequency Receiver / High Stability Oscillator (LFR/HSO) Cabling

Overview

This section provides the information to install the Low Frequency Receiver/High Stability Oscillator (LFR/HSO) cabling for CDMA systems.

Cable Labels

The cable designations are referenced in Table 2-1 on 2-7 in the “Overall Cabling Diagrams and Description” area.

Cable Run List

Table 2-15 lists the cable runs for the BTS GPS and LFR cables. If lightning arrestors are used with the LFR antenna, refer to the site specific documentation for cabling information.

Table 2-15: Cable Run List for GPS and LFR Cabling

Cable	From Connector	To
L	LFR	LFR Antenna

Procedure

Install each cable by referring to the cable run list in Table 2-15, the cabling diagram in Figure 2-9, and the procedure in Table 2-16. If lightning arrestors are used with the LFR antenna, refer to the site specific documentation for cabling information.

NOTE Site specific characteristics determine the GPS/LFR cabling that is installed.

Table 2-16: Procedure to Install LFR Cabling

Step	Action
1	Attach the 9-pin subminiature connector of cable L to the LFR connector of the BTS.
2	Attach the 5-pin circular connector of cable L to the LFR antenna.

LFR Cable (Cable L) Pin/Signal Information

The pin/signal information for the LFR cable is presented in Table 2-17. This information applies to the standard LFR cable.

Table 2-17: Pin /Signal Information for LFR Cable (Cable C)

Pin Number for Connector Type		Wire Color	Description
9-Pin D Connector	**5-Pin Circular** (for antenna/preamplifier)		
1	D	Red	Antenna + (power and signal)
6	E	Black (paired with red)	Antenna – (power and signal)
5	A	White	Calibrator +
9	B	Black (paired with white)	Calibrator –
3	C	Bare	Drain from shield

BTS Antenna Configuration

Overview

This section provides detail on the antenna configurations supported by the BTS, including:

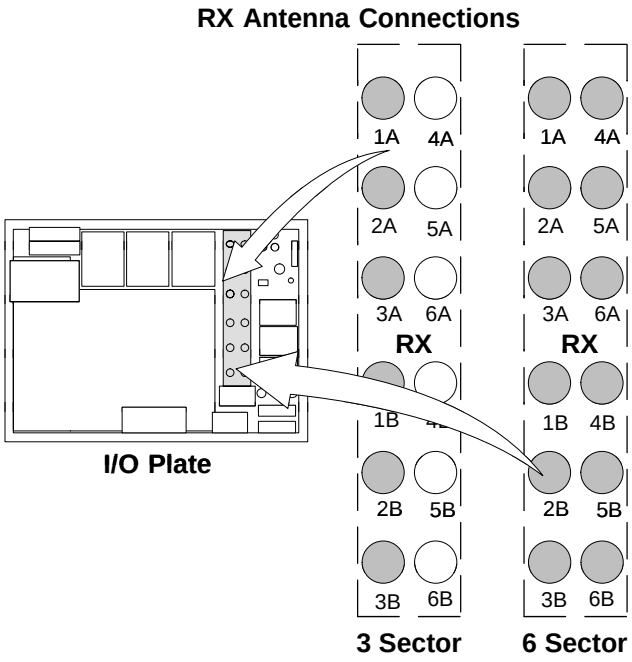
- 3 Sector
- 6 Sector

RX Antenna Configurations

Table 2-18 provides the RX antenna configurations for the BTS.

Table 2-18: RX Antenna Configuration

Configuration	3 Sector	6 Sector
1A	S1 Main	S1 Main
1B	S1 Div	S1 Div
2A	S2 Main	S2 Main
2B	S2 Div	S2 Div
3A	S3 Main	S3 Main
3B	S3 Div	S3 Div
4A		S4 Main
4B		S4 Div
5A		S5 Main
5B		S5 Div
6A		S6 Main
6B		S6 Div



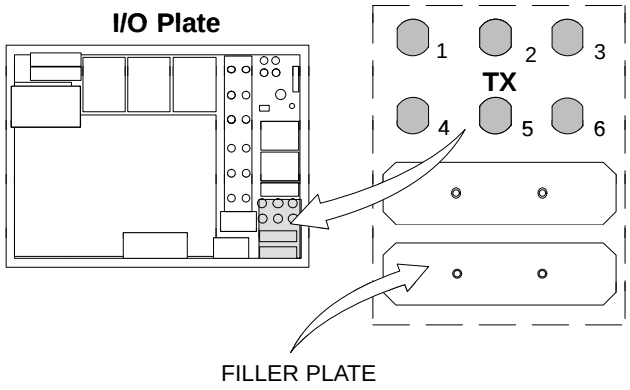
TX Antenna Configurations

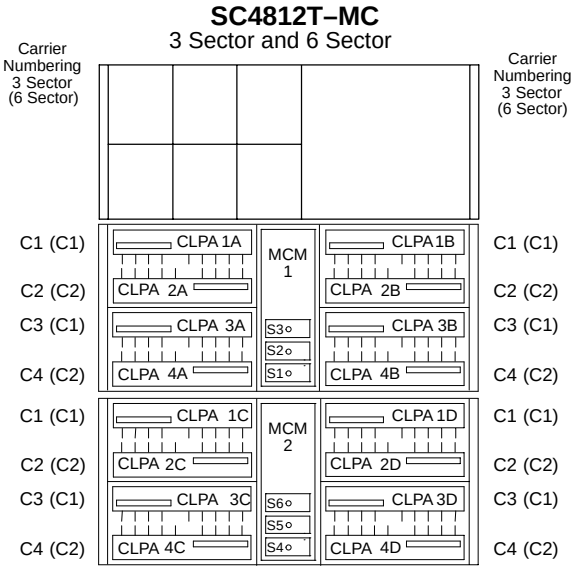
Table 2-19, show configurations for a fully populated SC 4812T–MC frame with 4X4 ETM. For a SC 4812T–MC frame populated with a 3X3 ETM the lower right quadrant will not be populated.

Table 2-19, also displays the I/O plate for 3 to 6 Transmit Antenna Connectors (depending on configuration) and 2 to 3 Transmit Antenna Filler plates (depending on configuration).

Table 2-19: Multicarrier BTS TX Antenna Configuration

BTS TX Ports	TX Filter Sector/Carrier	
	3 Sector	6 Sector
TX 1	S1/C1–C4	S1/C1–C2
TX 2	S2/C1–C4	S2/C1–C2
TX 3	S3/C1–C4	S3/C1–C2
TX 4		S4/C1–C2
TX 5		S5/C1–C2
TX 6		S6/C1–C2
Max No. Carriers	4	2





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NOTES:

1. C1, C2, C3 and C4 denote carriers 1, 2, 3 and 4, respectively.
2. The maximum number of CLPAs for a given carrier is shown.
3. SC 4812T–MC frames with a 3 X 3 ETM, the lower right quadrant will not be populated.
4. SC 4812T–MC frame with a 3 Sector configuration only one MCM is used.

BTS 60 Degree Sector (6 Sector) Transmit Path Cabling

Objective

The objective of this procedure is to install the BTS transmit path cabling.

Cable Labels

The cable designations referenced in Table 2-20, provide the quantities and descriptions of the cables required for the procedure.

Cabling Diagram

Figure 2-12 and Figure 2-13 shows direct connect cable configurations (both inside and outside the BTS frame). Table 2-21 describes the antenna cable connection ports.

Figure 2-12: 60 Degree Sector (6 Sector) Transmit Path Cabling Details (Outside Frame)

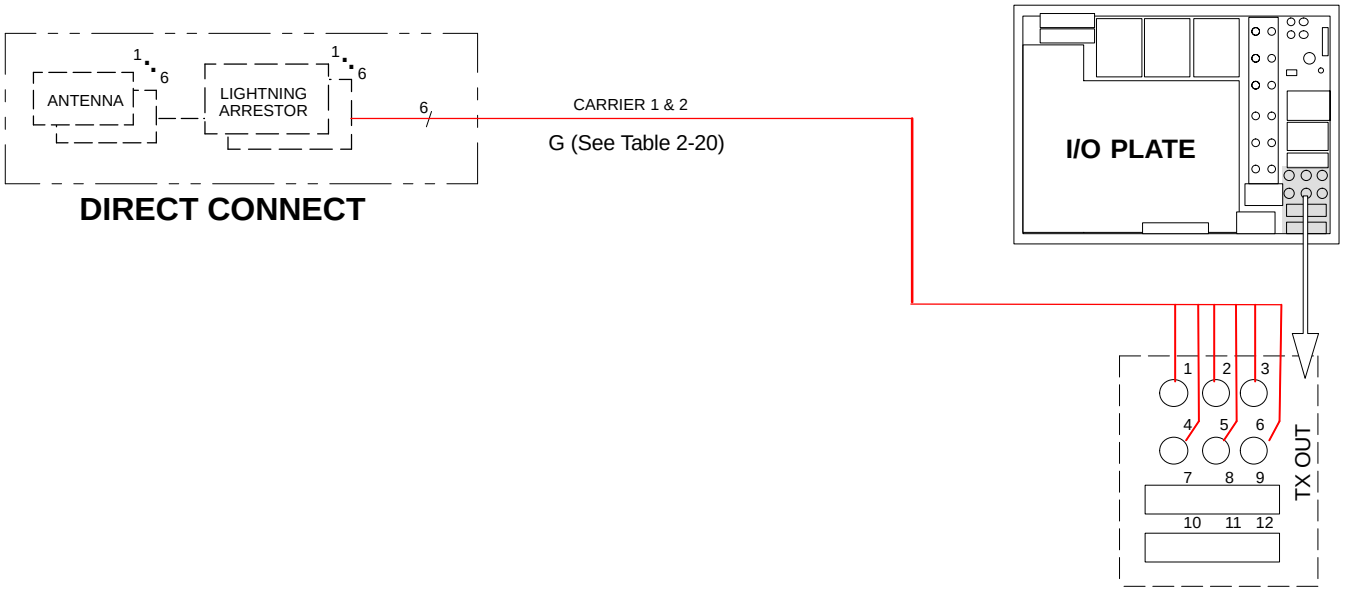

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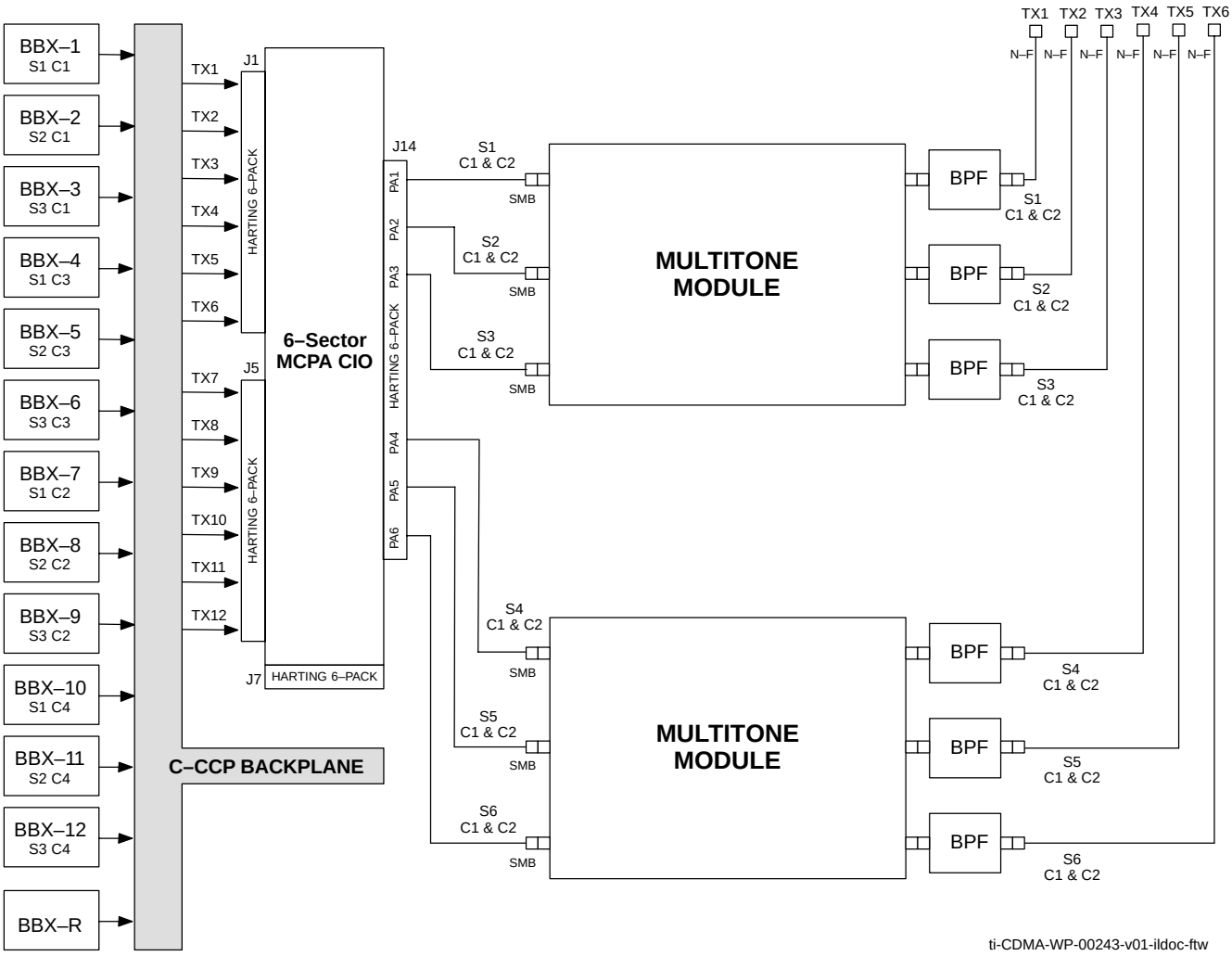
Figure 2-13: 60 Degree Sector (6 Sector) Transmit Path Cabling Details (Inside frame)



60 Degree Sector Configuration

Table 2-20 provides the Cable Run List for 60 degree sector transmit paths.

Table 2-20: Cable Run List for 60 Degree Sector TX Configuration	
Cable	**Cable Parts Connecting Lightning Arrestors To BTS TX Connectors**
G	**Direct**
Quantity	6

TX Ports for 6 Sector Configuration

Table 2-21: Cable Run List for 60 Degree Sector Receive Path Cabling		
Cable	**Cable path connecting Lightning Arrestors to BTS TX connectors**	**TX Ports Used**
Quantity	6	TX 1A–6A

Procedure

Install each cable by using the cable run list in Table 2-20, the cabling diagram in Figure 2-12, and the procedure in Table 2-22. Each cable is installed the same way.

Table 2-22: Installing the 60 Degree Sector TX Path Cables	
Step	**Action**
1	Attach the connector–equipped end of the cables to the BTS **TX** connectors.
2	Route the cables to the lightning arrestors.
3	Cut the cables to length and label them accordingly. Install connectors on the cables and attach the cables to the Lightning Arrestors.

BTS 60 Degree Sector (6 Sector) Receive Path Cabling

Objective

The objective of this procedure is to install the BTS transmit path cabling.

Cable Labels

The cable designations are referenced in Table 2-1 the “Overall Cabling Diagrams and Description” area. Table 2-23, and Table 2-24 provide the quantities and descriptions of the cables required for this procedure.

Cabling Diagram

Figure 2-14 shows RX (Main/Diversity) antenna configurations. Table 2-24 describes the antenna cable connection ports.

Figure 2-14: 60 Degree Sector (6 Sector) Receive Path Cabling Details

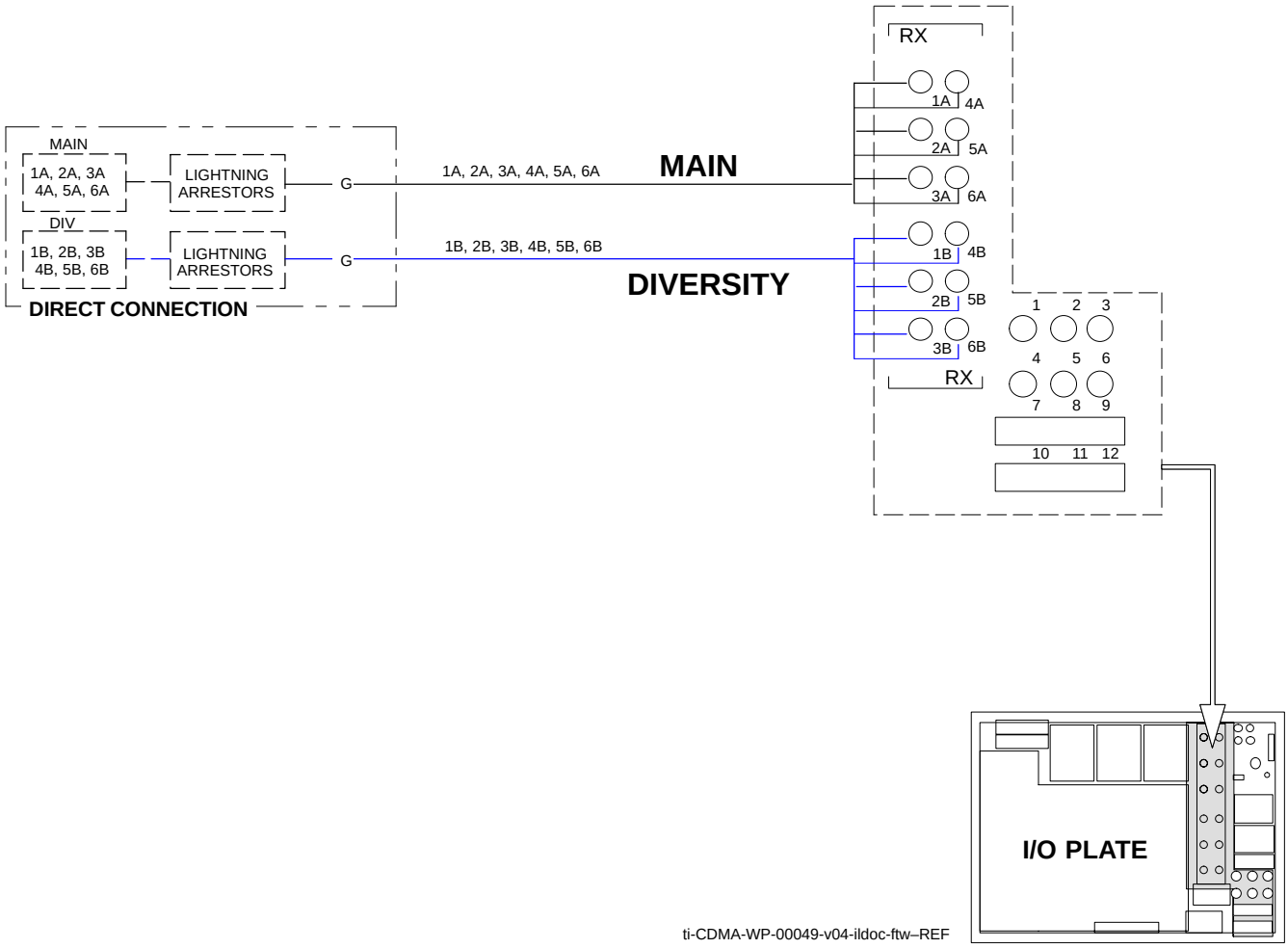


Table 2-23: Cables Needed for 120 Degree Sector Receive Path			
Cable	**Qty.**	**Part Number**	**Description**
G	12	CGDS2212602	15 ft. Jumper Cable, N/M–N/M.

Table 2-24: Cable Run List for 60 Degree Sector Receive Path Cabling			
Cable	**Cable path connecting Lightning Arrestors to BTS RX connectors**	**RX CONNECT**	**RX Ports Used**
Quantity	6	MAIN	RX 1A–6A
	6	DIVERSITY	RX 1B–6B

Procedure

Install each cable by using the cable run list in Table 2-23, the cabling diagram in Figure 2-14, and the procedure in Table 2-25. Each cable is installed the same way.

Table 2-25: Installing the 60 Degree Sector Receive Path Cables	
Step	**Action**
1	Attach the connector–equipped end of the cables to the BTS **RX** connectors.
2	Route the cables to the lightning arrestors.
3	Cut the cables to length and label them accordingly. Install connectors on the cables.

BTS 120 Degree Sector (3 Sector) Transmit Path Cabling

Objective

The objective of this procedure is to install the 120 degree BTS transmit path cabling.

Cable Labels

The cable designations are referenced to Table 2-1 in the “Cabling Diagrams and Description” area. Table 2-26 and Table 2-27 provide the quantities and descriptions of the cables required for this procedure.

Cabling Diagram

Figure 2-15 and Figure 2-16 shows both inside and outside cable connections for 3 Sector direct connect configurations. Table 2-26 and Table 2-27, describes the antenna cable connection ports.

Figure 2-15: 120 Degree Sector (3 Sector) Transmit Path Cabling Details (outside the frame)

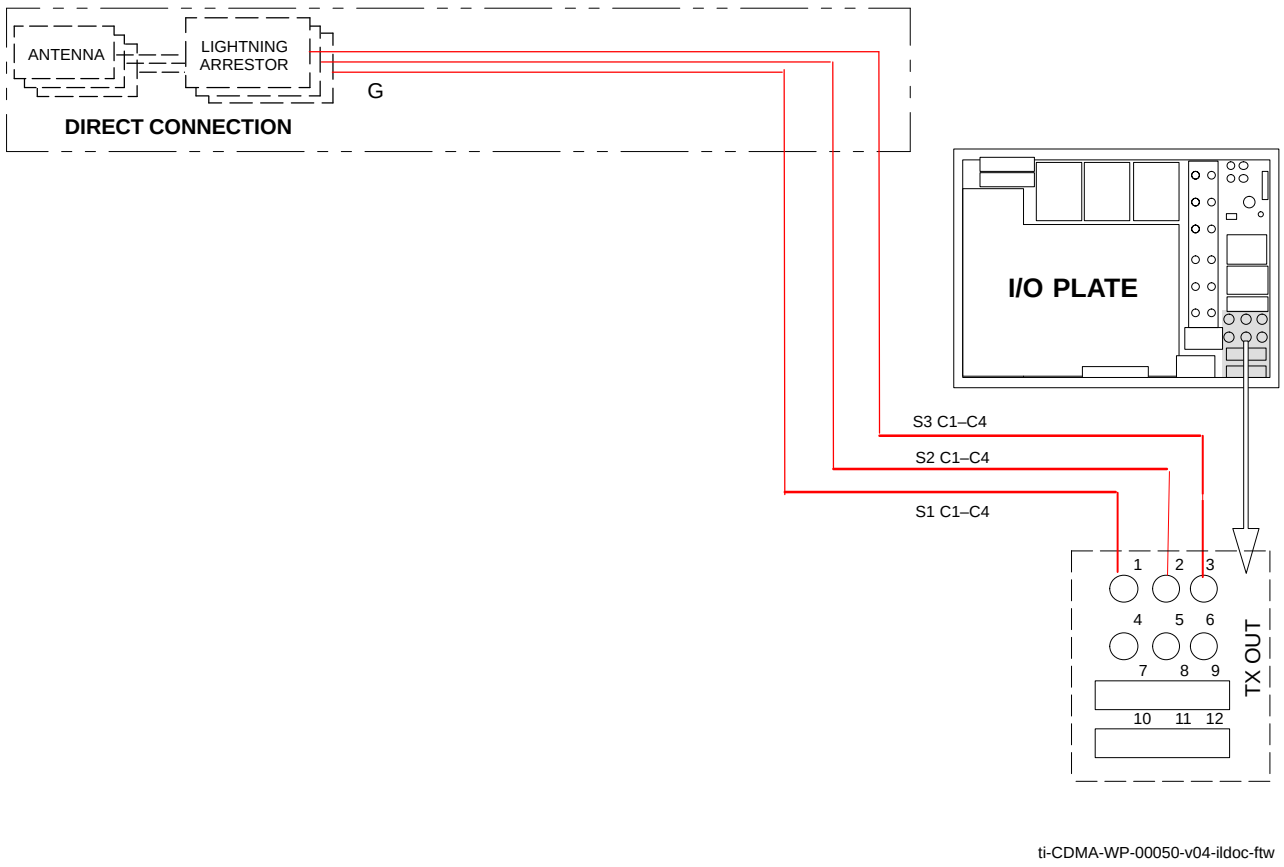


Figure 2-16: 120 Degree Sector (3 Sector) Transmit Path Cabling Details (inside the frame)

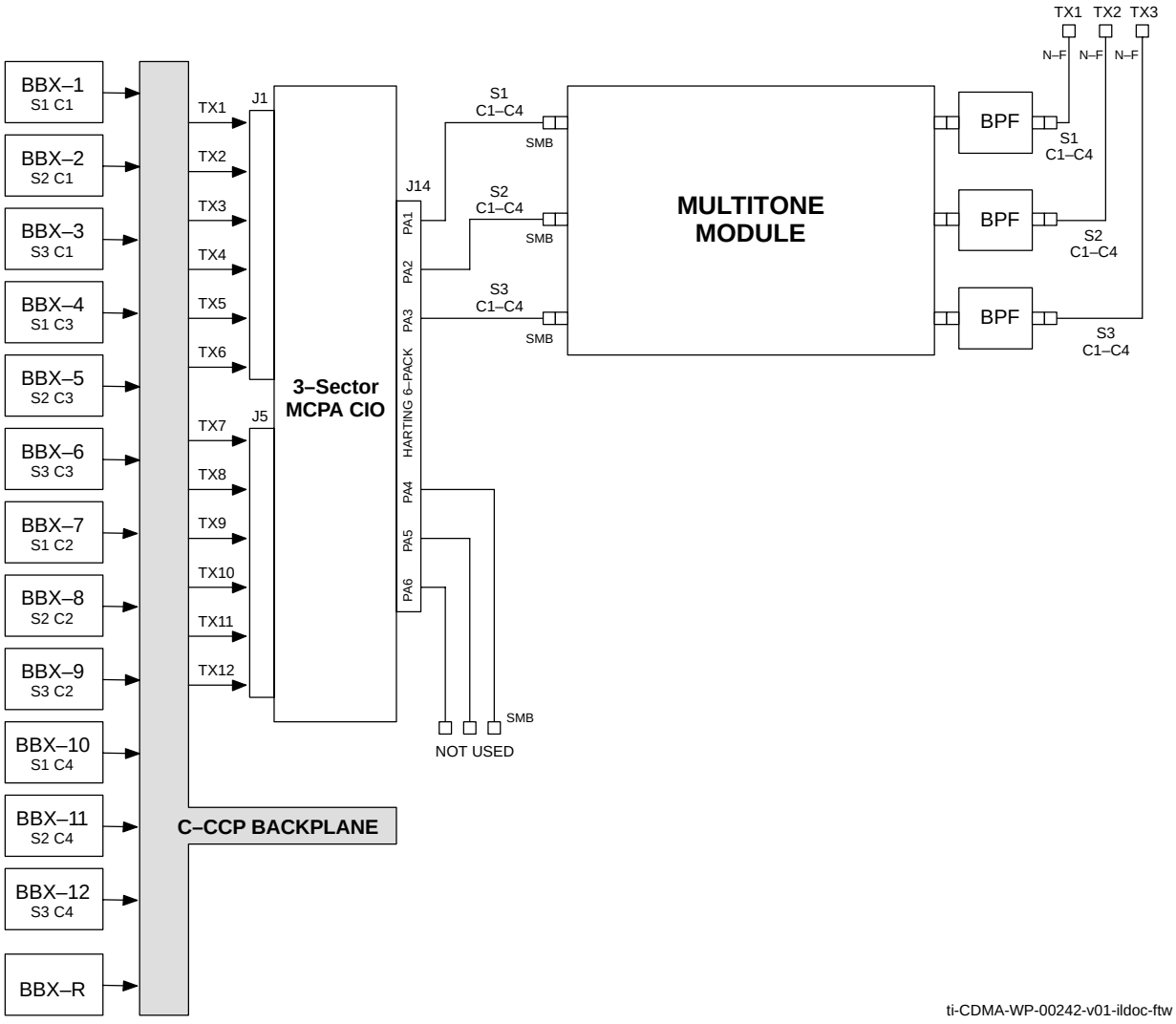


Table 2-26: Cables Needed for 120 Degree Sector Transmit Path			
Cable	**Qty.**	**Part Number**	**Description**
G	(see Table 2-27)	CGDS2212602	15 ft Jumper Cable, N/M–N/M.

Table 2-27: Cable Run List for 120 Degree Sector TX Configuration		
Cable	**Cable Parts Connecting Lightning Arrestors To BTS TX Connectors**	
G	**Direct**	**BTS TX Ports**
Quantity (TX–only path)	3	TX1, TX2, TX3

Procedure

Install each cable by using the cable run list in Table 2-27, the cabling diagram in Figure 2-15, and the procedure in Table 2-28. Each cable is installed the same way.

Table 2-28: Installing the 120 Degree Sector TX Path Cables

Step	Action
1	Attach the connector–equipped end of the cables to the BTS **TX** connectors.
2	Route the cables to the lightning arrestors.
3	Cut the cables to length and label them accordingly. Install connectors on the cables and attach the cables to the Lightning Arrestors.

BTS 120 Degree Sector (3 Sector) Receive Path Cabling

Objective

The objective of this procedure is to install the BTS RX Port receive path cabling. 120-degree sector receive path cabling is used for CDMA systems.

Cable Labels

The cable designations are referenced to Table 2-1 in the "Cabling Diagrams and Description" area. Table 2-29 and Table 2-30 provide the quantities and descriptions of the cables required for this procedure.

Table 2-29: Cables Needed for 120 Degree Sector Receive Path

Cable	Qty.	Part Number	Description
G	(see Table 2-30)	CGDS2212602	15 ft. Jumper Cable, N/M–N/M.

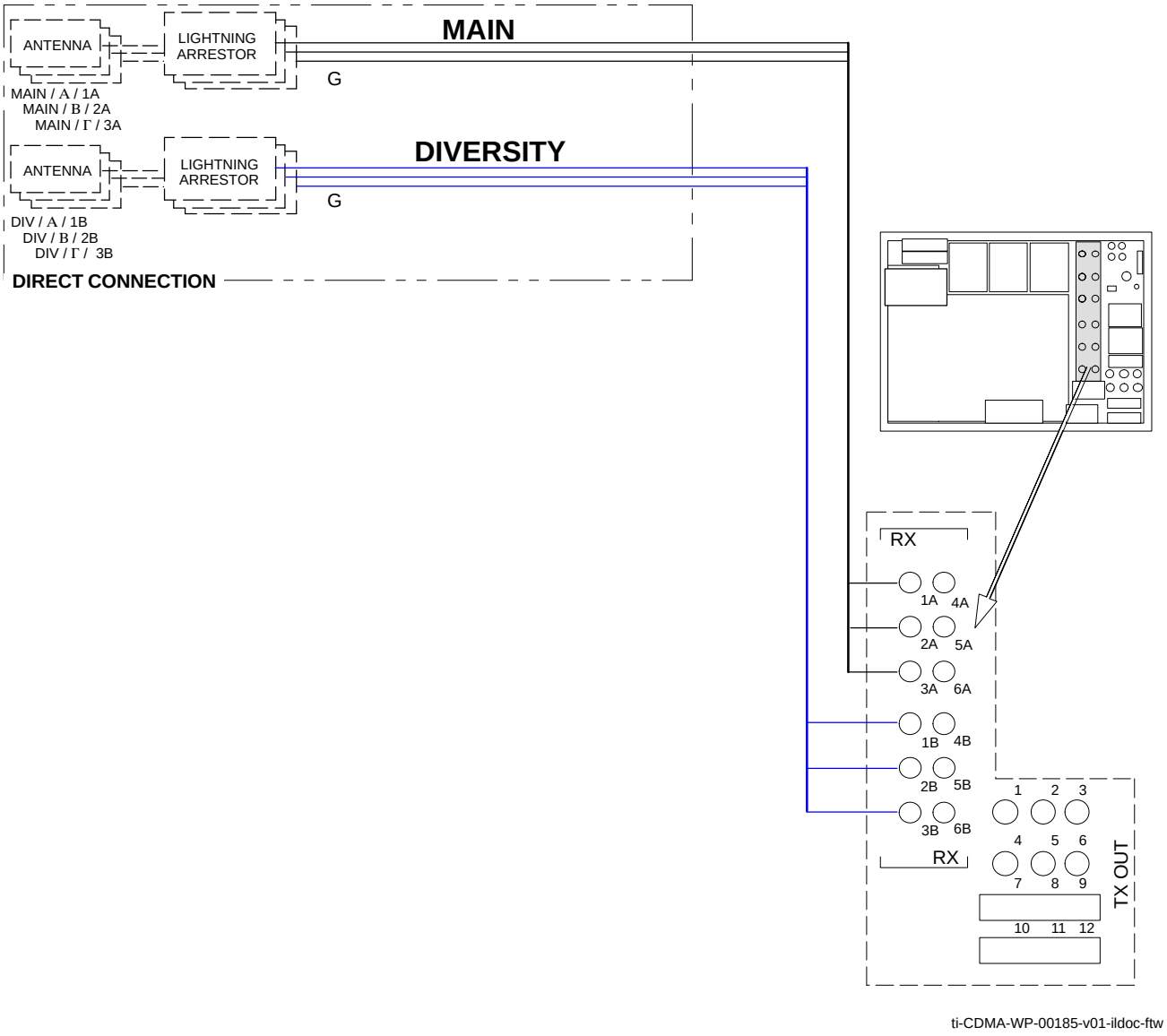
Cabling Diagram

Figure 2-17 shows RX antenna (Direct Connect) configuration. Table 2-30 describes the antenna cable connection ports.

Table 2-30: Cable Run List for 120 Degree Sector Receive Path Cabling

Cable	Cable path connecting Lightning Arrestors to BTS RX connectors	RX Antenna Ports
Quantity	6	RX 1A RX 2A RX 3A
		RX 1B RX 2B RX 3B

Figure 2-17: 120 Degree Sector (3 Sector) Receive Path Cabling Details



Cabling Procedure

Install each cable by referring to the cable run list in Table 2-30, the cabling diagram in Figure 2-17, and the procedure in Table 2-31. Each cable is installed the same way.

Table 2-31: Installing the 120 Degree Sector Receive Path Cables

Step	Action
1	Attach the connector-equipped end of the cables to the BTS **RX** connectors.
2	Route the cables to the lightning arrestors.
3	Cut the cables to length and label them accordingly. Install connectors on the cables, and attach the cables to the lightning arrestors.

Earth Ground Cabling

Objective

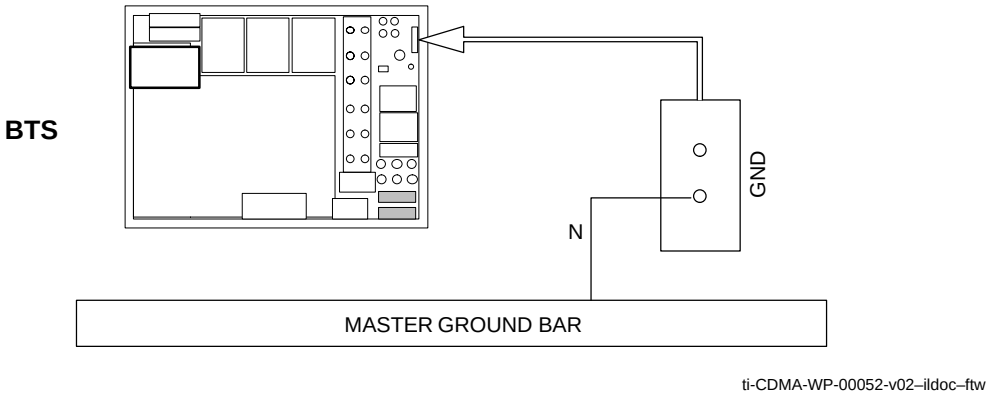
The objective of this procedure is to install the BTS earth ground cables. This manual describes only general procedures for grounding the site. Refer to the *Grounding Guidelines for Cellular Radio Installations, Motorola part no. 68P81150E62*, for detailed grounding information.

WARNING	Each cabinet must be grounded separately and **NOT** daisy chained together!

Earth Grounding Diagram

Figure 2-18 illustrates the earth ground cable.

Figure 2-18: Earth Ground Cabling Details



Cable Labels

The cable designations are referenced in Table 2-1, in the “Cabling Diagrams and Description” section of this manual.

Equipment Needed

Table 2-32 describes the cable and ring lugs required for earth grounding.

NOTE	Two-hole (Thomas & Betts part no. 54207; or equivalent) are recommended.

Table 2-32: Items Required for Earth Grounding

Item	Qty	Description
Cable (N)	1	Ground cable, 6-AWG, insulated copper wire, loop connectors. Customer supplied cable.
Ring Lugs	1	Ring lugs to attach to the BTS end of the cable. Customer supplied item.

Install Earth Grounding Cables

Install the earth ground cables according to the procedures in Table 2-33 (see Figure 2-18).

WARNING

- Do NOT wear a wrist strap when servicing the power supplies or power distribution cabling! Serious personal injury can result.
- Before starting the procedure, ensure that the BTS power cables are not connected to the main DC source.

Table 2-33: Procedure to Install Earth Grounding Cables

Step	Action
1	Route the ground cables (cable N) between the Master Ground Bar (MGB) and the BTS frames. **NOTE** Ground cables must not have sharp bends.
2	Strip insulation from the BTS end of each cable.
3	Attach a ring lug to the BTS end of each cable.
4	Connect a ground cable (cable N) to the ground stud of each BTS frame.
5	Connect the ground lugs to directional coupler bracket, duplexer bracket, and RFDS (if used).
6	Attach the ground cables to the MGB using the appropriate connectors.

BTS Power Cabling

Objective

The objective of this procedure is to define the BTS's site power distribution system requirements, and install the DC power input cabling.

Important Guidelines

Several guidelines must be followed in the design of the site power distribution system. Depending on site requirements and specific guidelines, two different cabling choices are offered in this section, Option A or Option B. Read this entire section before power cabling the BTS.

Inrush Current

When the frame is powered on, there is the potential for an inrush current which exceeds the steady state current draw of the frame. In order to prevent this inrush current from affecting other equipment, power feeds and circuit breakers should **NOT** be shared between the BTS and any other equipment. This BTS is designed to comply with the ETS 300-132-2 standard for DC inrush current.

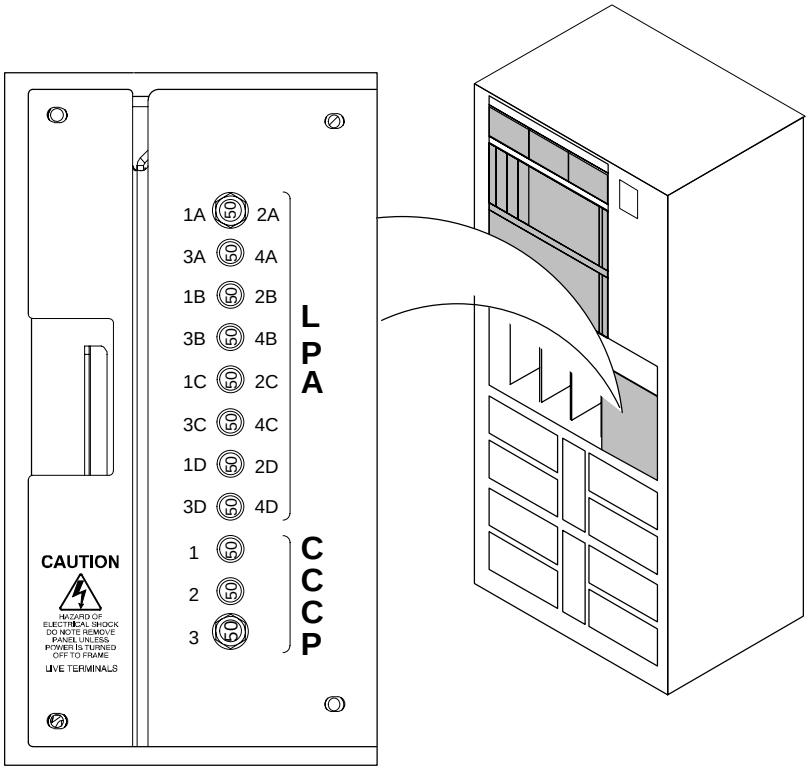
Feeds and Breaker Sizes

Table 2-34 lists different site configurations, depending on the number of carriers. Select a power distribution system configuration that is most appropriate for your site. Figure 2-19 identifies the BTS Breaker Panel.

Table 2-34: DC Filter Power Feed Configurations

Number of Carriers	Number of Feeds Required (+ and – pair)	Breaker Size (per Feed)	Utilize Cable Option
1–2	1	125A	A
3–4	1	250A	A
3–4	2	125A	B

Figure 2-19: Breaker Panel Identification



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Source Impedance

The frame power interface supports AWG 2/0, AWG 3/0, and AWG 4/0 cable sizes.

In order to limit the voltage drop due to cable resistance, the length of the cable runs from power source to BTS must be less than the maximum distance for each cable size shown in the Table 2-35. These values apply for both single feed and two feed configurations.

2

In the + 27 V configuration the power supply input "+" and "–" terminals are isolated from the BTS chassis ground. In order to control the inductance at the BTS power input due to the feed cables, the positive and negative cables (feed and return) must be bound together at intervals of 1 meter or less (see Figure 2-20).

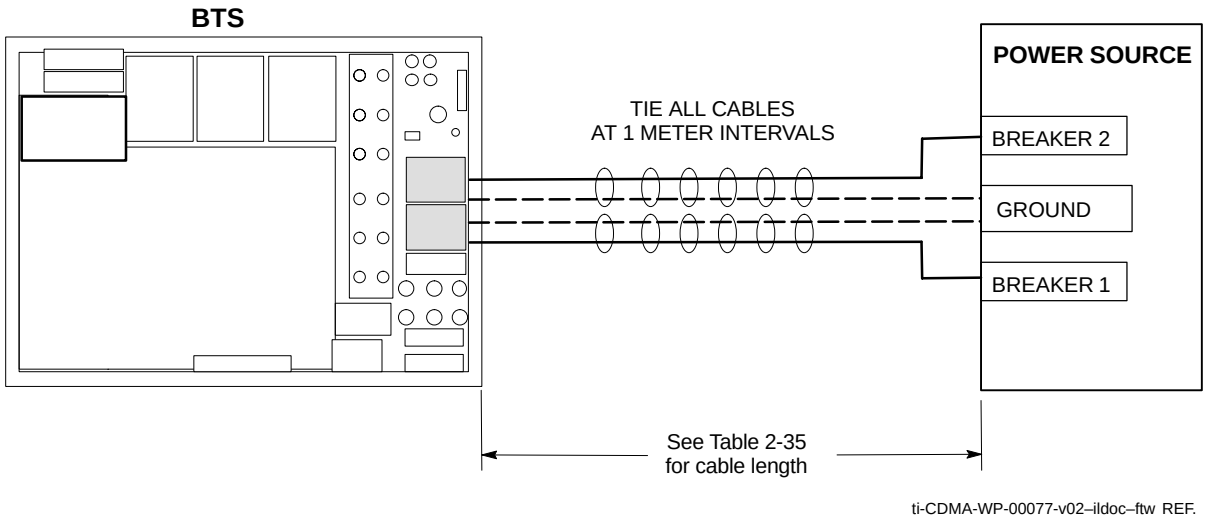
Meeting these limits will ensure a voltage drop of less than 2% due to cable resistance, and will control the source impedance to ensure stability of the power supply.

Table 2-35: Maximum Cable Length

Number of Carriers	Number of Feeds	Cable Type	Maximum Length in meters
1–2	1	AWG 2/0	22
1–2	1	AWG 3/0	28*
1–2	1	AWG 4/0	28*
3–4	1	AWG 2/0	12.2
3–4	1	AWG 3/0	15.4
3–4	1	AWG 4/0	19.4
3–4	2	AWG 2/0	22
3–4	2	AWG 3/0	28
3–4	2	AWG 4/0	28*

* Limited by inductance rather than voltage drop.

Figure 2-20: Length and Tie-Down Requirements for BTS Power Cables



Current Sharing

For installations with one power feed (2 carrier system cabling) use Option A (see Figure 2-21).

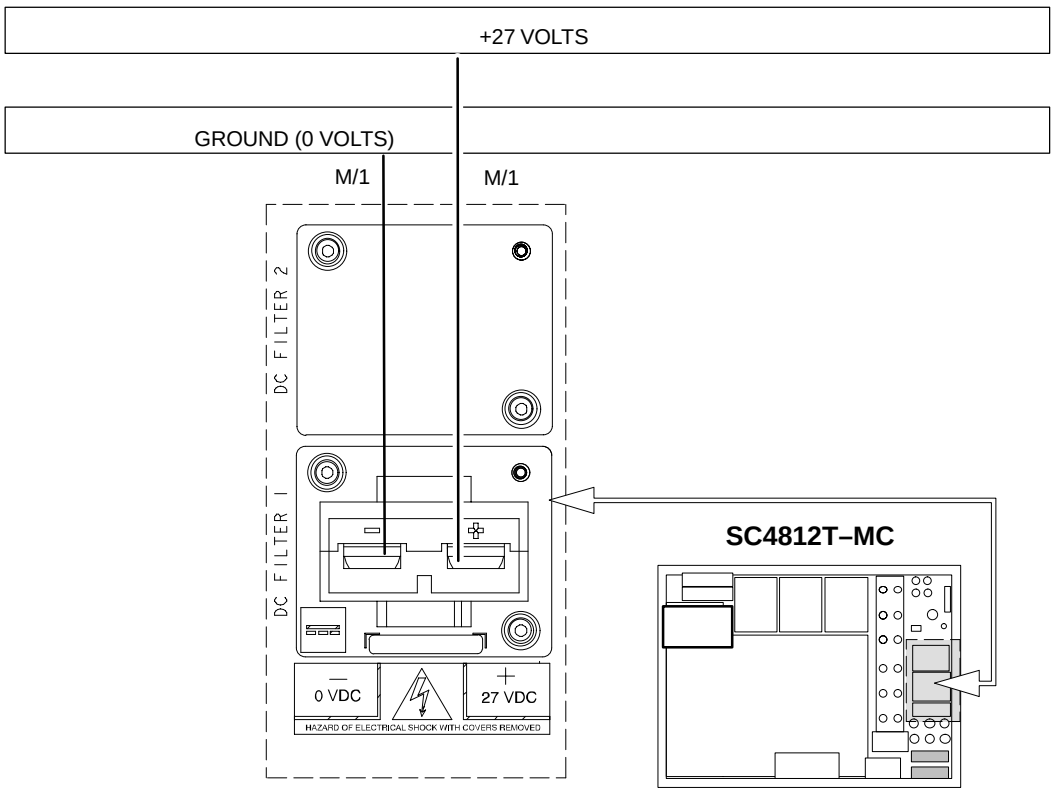
For installations with two feeds (e.g., 3 carrier or 4 carrier systems using cabling Option B, (see Figure 2-22), the total current will be shared between the two feeds. If the current becomes greatly unbalanced between the two feeds, the circuit breaker carrying the greater current may be tripped. In this case, all current will flow in the remaining feed, causing the breaker to be tripped, and the BTS to go out-of-service. In order to minimize the current imbalance between the feeds, it is necessary to:

- ensure the cable lengths and sizes of the cables are the same,
- the breakers on the two feeds are the same (same manufacturer, same part number, etc.), and
- contacts and connectors are identical.

For short cable runs with two feeds, it is recommended that 2/0 cable be used rather than 3/0 or 4/0.

Option A. Power Distribution Cabling for +27 V BTS Configuration with One Power Feed

Figure 2-21: BTS Power Cabling for the +27 V BTS Configuration using One Power Feed



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Option B. Power Distribution Cabling for +27 V BTS Configuration with Two Power Feeds

Figure 2-22: BTS Power Cabling for the + 27 V BTS Configuration using TwoPower Feeds

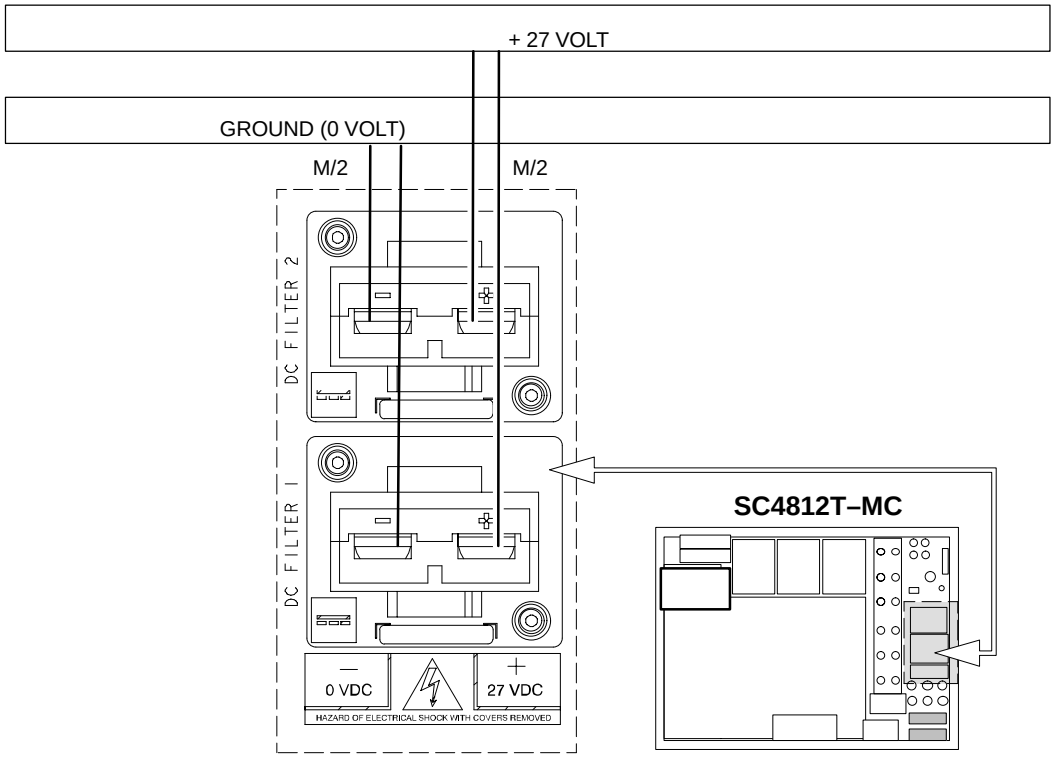

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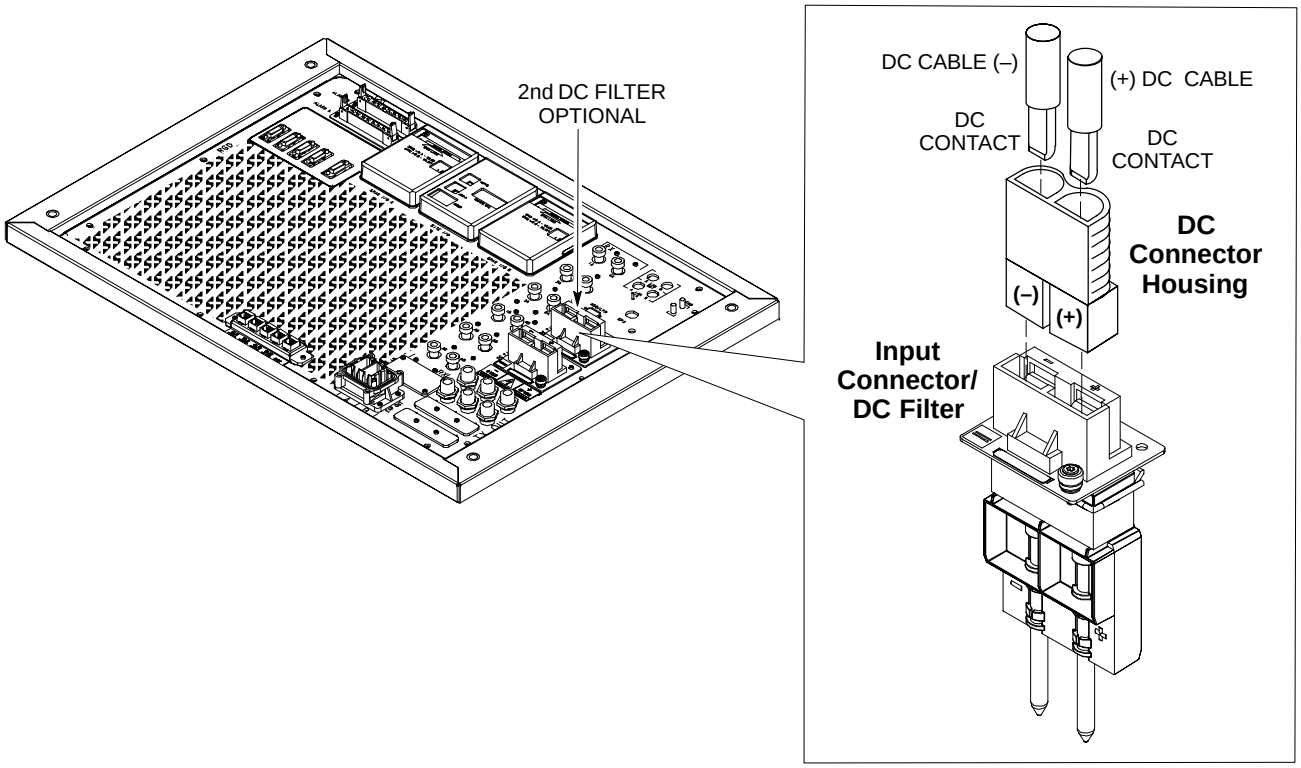
Figure 2-23: DC Power Connector/Filter



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Tools and Equipment Required

The following tools are required to install the power cable on the BTS:

Cable M – The cable diameter and lug style depend on the length of cable required. Appropriate codes and standards must be followed to determine the correct wire size and type (see Table 2-35). A variety of lug sizes are available from Motorola for the various cable sizes and types that may be selected (see Table 2-36).

Table 2-36: Lug Part Numbers

Lug Part Numbers	Cable Type
CGDS6320G1	AWG 2/0
CGDS6320G5	AWG 3/0
CGDS6320G2	AWG 4/0

NOTE The cable diameter and lug style depend on the length of cable required. Appropriate codes and standards MUST be followed to determine the correct wire size and type. A variety of lug sizes are available from Motorola for the various cable sizes and types that may be selected. Lug size is dependent on the gauge and type of cable selected for the frame power feed.

Recommended Crimper Tool – The following three crimper tools are recommended to assemble the customer-side connector for the DC cables. Choose one of the following crimper tools, according to site requirements and preferences.

- AMP 600850 – maximum cable size of #4/0 (mechanical hand tool)
- SMH p/n SY283 – maximum cable size of #4/0 (mechanical hand tool)
- Anderson Power Products (APP) p/n 1368 – can accommodate cable sizes up to 300 MCM (hydralic hand crimp tool).

Pre-connection Checklist

At this point in the installation ensure that the cabinet is NOT already connected to the main dc power source.

Installing Power Cables

Read the Power Cable Installation WARNINGS and CAUTIONS before going to Table 2-37 (+27 V Power Cable Installation) also review Figure 2-23.

WARNING

- Failure to observe these warnings could cause electrical shock to personnel and/or damage to equipment!
- Do NOT wear a wrist strap when servicing the power supplies or power distribution cabling! Serious personal injury can result.
- The external converter supplying the cabinet must have double or reinforced insulation between its primary and secondary circuits, and must conform to Safety Standard EN60 950.
- Ensure the source for the DC voltage is in the OFF position prior to attempting to connect the dc voltage.

CAUTION

- Ensure all frame power supply circuit breakers are OFF.
- Perform any adjustments recommended by the manufacturer on the main power supply equipment before connecting dc power cables to the main dc power source.
- Input to the base station must remain between +34 V and +21 V dc for +27 V dc operation.

BTS Power Cabling for + 27 V Configuration

The cable connections for powering a +27 V BTS are presented in Table 2-37.

Table 2-37: Procedure to Install BTS +27 V Power Cables

Step	Action
1	Ensure the DC power cables are NOT connected to the main DC power source.
2	Remove the components from the dc connector package shipped with the BTS.
3	Strip 35 mm of insulation from the negative (–) and positive (+) power cables.

Table 2-37: Procedure to Install BTS +27 V Power Cables	
Step	**Action**
4	Place a dc contact on the negative (–) and positive (+) dc cables.
5	Using the appropriate crimping tool, crimp the dc contact to the dc cables.
6	Observe the negative (–) and positive (+) cables and insert the dc contacts into the dc connector housing(s) until an audible click is heard.
7	Verify the positive (+) cable is installed in the positive position and the negative (–) cable is installed in the negative (–) position on the connector housing(s).
8	Ensure the cables are firmly fastened to the dc connector housing(s).
9	Connect the DC connector housing to the mating input connector/DC filter on the BTS (see Figure 2-23).
10	Connect the DC connector housing to the mating input connector/DC filter on the BTS for the second dc filter feed, if required (see Figure 2-23).
11	Are there additional frames that require cable installation? – If YES, repeat the above procedure for the additional frame(s). – If NO, this procedure is complete.

Chapter 3

Expansion Frame Cabling and Installation

Expansion Frame (+27 V BTS Configuration)

This chapter provides the procedures for installing an Expansion frame to either a SC4812T or SC 4812T–MC Starter frame.

Installation Procedures

This chapter includes installation and setup procedures for the following:

- RF Cabling (TX & RX)
- RF GPS
- Remote GPS Distribution (RGD)
- HSOX
- Local Area Network (LAN)
- C-CCP Cage Dip Switch Settings

Inter-frame Cables

Sites utilizing Expansion frames require certain procedures to be completed (depending on site requirements) before proper operation can be obtained. The BTS cable description and part numbers for certain different procedures are listed in Table 3-1. The letters, referenced under the Cable Label column in Table 3-1, are used as a reference for all cabling procedures and diagrams in this manual. This information applies to all system configurations.

Table 3-1: Expansion Cable/Hardware Descriptions and Part Numbers

Cable Label	Part Number	Description
A_1	T472Ax	RGD Antenna punch block cable; where x=A–F for different A1 cable lengths (50 to 2000 ft).
A_2	3086433H07	Punch block to RGD Site I/O board cable
B	3086433H02	RGD Expansion cable
C	3086433H01	RGD to Site I/O cable
D	3086458H01	HSOX cable
E	3086412H01	RF Expansion cable
F	1586370H01	Harting; 12 pack
M	N.A.	Power cable – See *Power Cable* section, for detailed information on cable termination lugs. Customer supplied cable.

Before You Begin

Ensure each Starter and/or Expansion frame has been properly powered off before performing any installation procedures.

Expansion Frame and Expansion I/O Plate

Figure 3-1 shows the SC 4812T–MC BTS that can be used as an expansion frame and Figure 3-2 that shows a detailed version of the Expansion I/O plate for the +27 V configuration.

Figure 3-1:BTS MC Expansion Frame (+27 V Configuration)

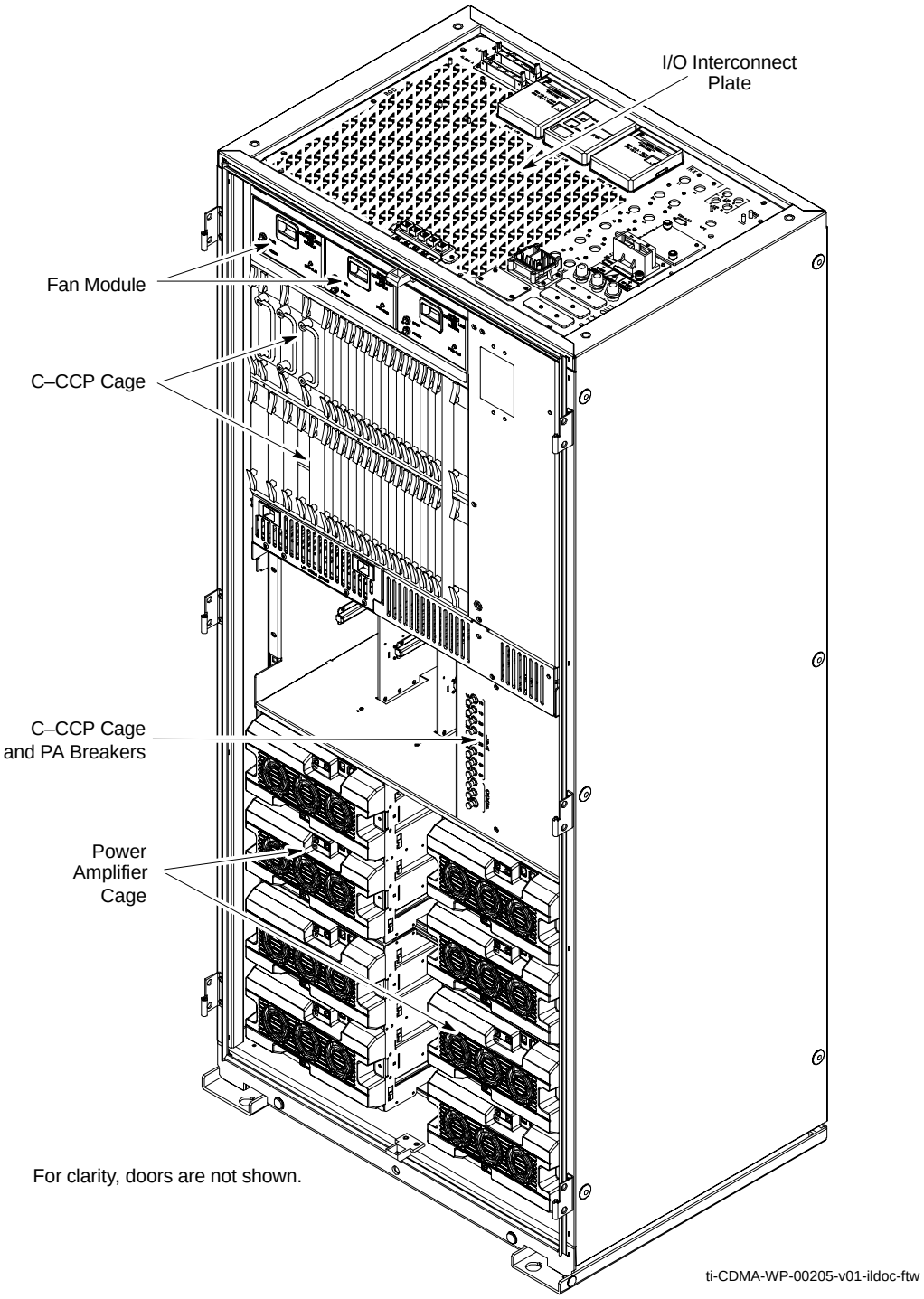

Figure 3-2: Expansion Frame I/O Plate (+27 V Configuration)

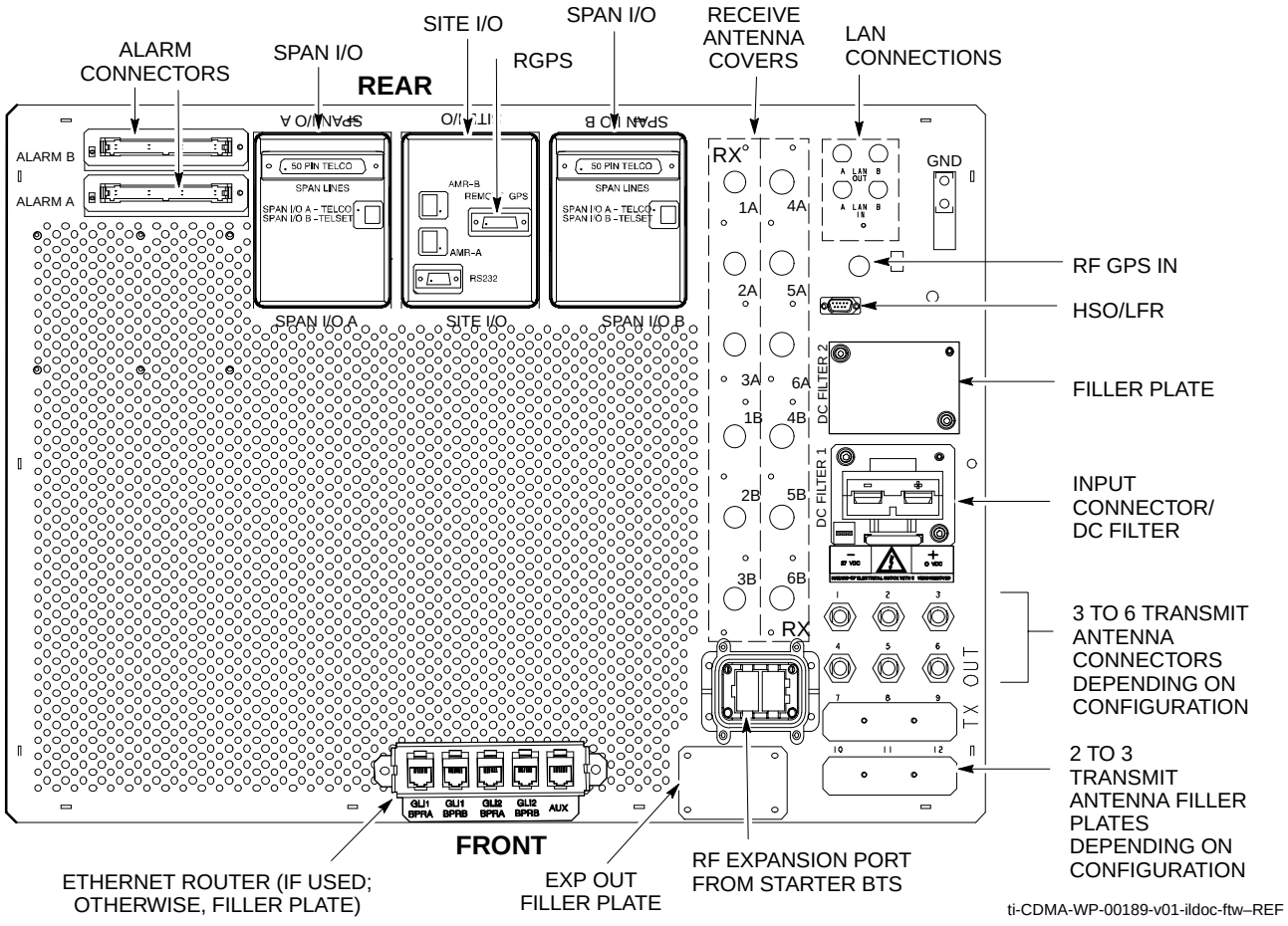

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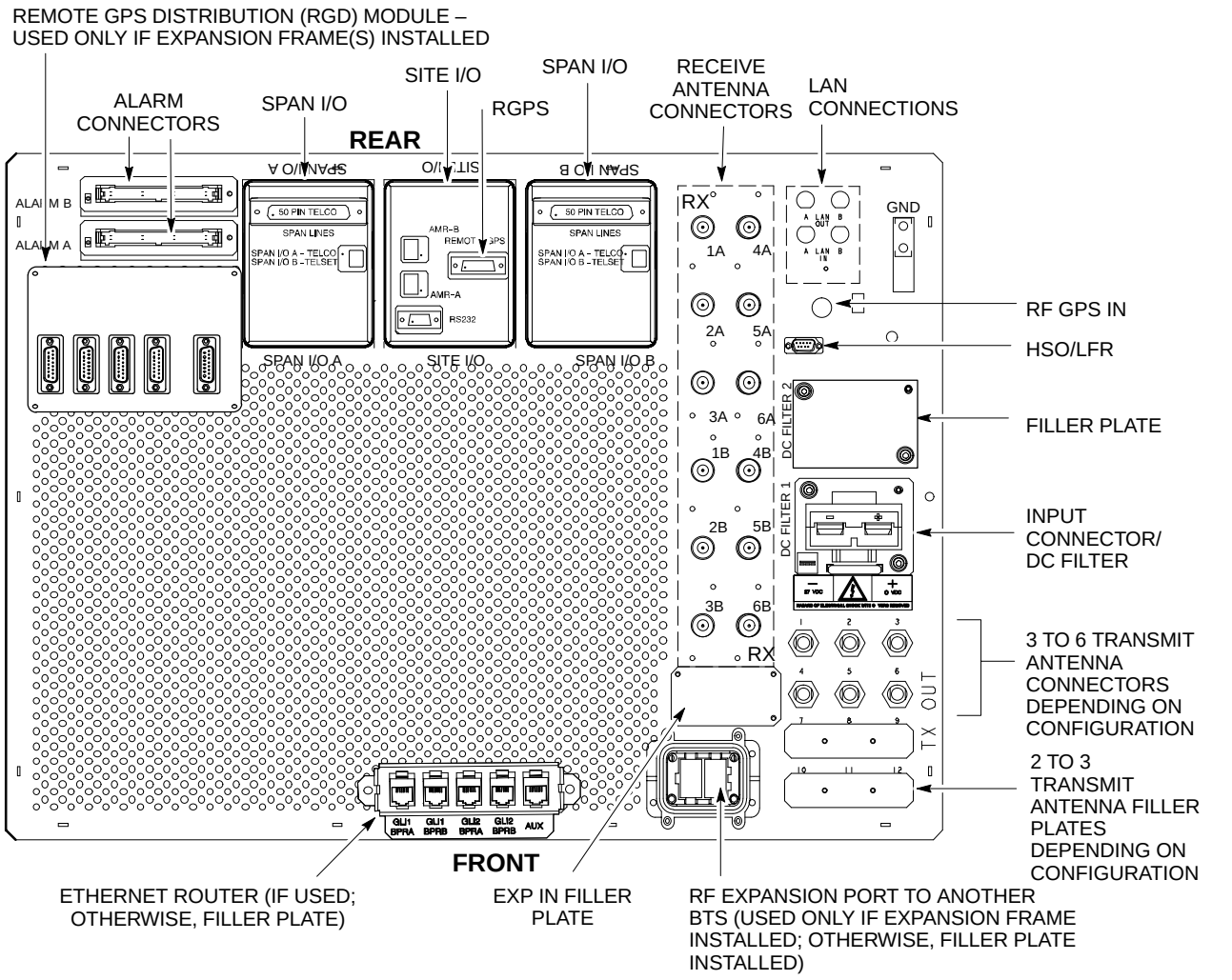
Figure 3-3: Starter Frame I/O Plate



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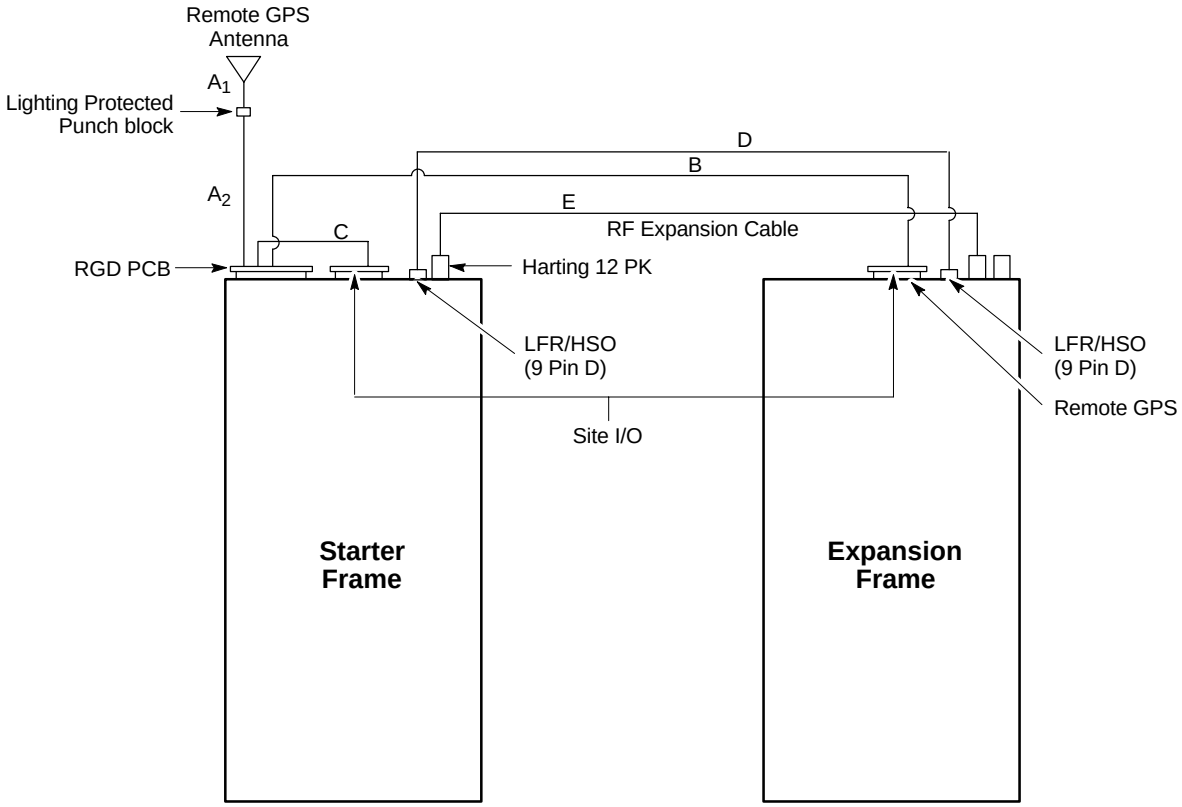
Cable Labels

The cable designations are referenced to Table 2-13 in “Cable Description and Part Numbers”.

Expansion Frame Cabling Diagram

Figure 3-4 illustrates the BTS Expansion Frame cabling details with the RF GPS or Remote GPS option.

Figure 3-4: Expansion Frame Cabling Details



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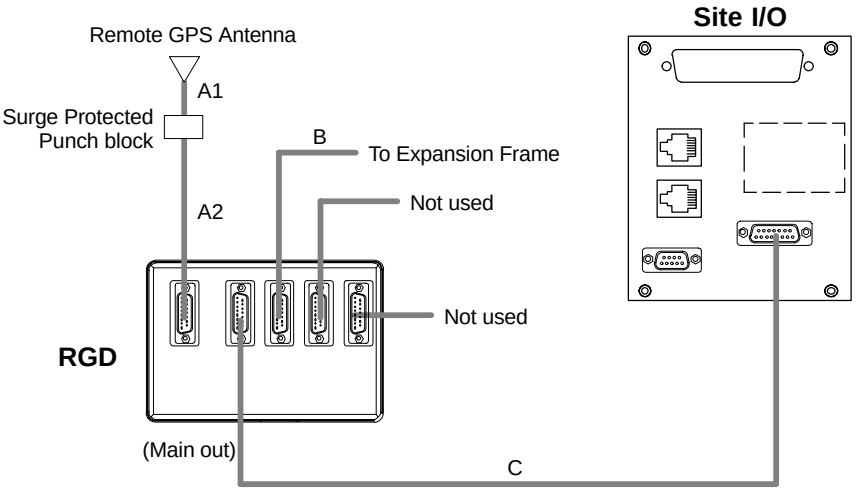
Expansion Frame Inter-Frame Cabling

This section describes the connections between an expansion frame with a starter frame.

Remote GPS Distribution (RGD) Board Diagram

Figure 3-5 shows the RGD board cable connections. Both RGD and Site I/O boards are on the strater BTS. Table 3-1 provides a description of all cables associated with the installation of RGD.

Figure 3-5: RGD Board Cable Connections



NOTE:
RGD card is required on the Starter frame only.
It provides Remote GPS signal to the Expansion frame.

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NOTE	
	• Cables A1 and A2 must be punched into the punch block as if they were part of the same cable, cut in the middle. The same colors must be punched on both sides of the punch block. • Frame MUST be equipped with CSM2 for Remote GPS operations. • Remote GPS is NOT supported in all Motorola 4-digit frames.

Expansion of the +27 V Frame

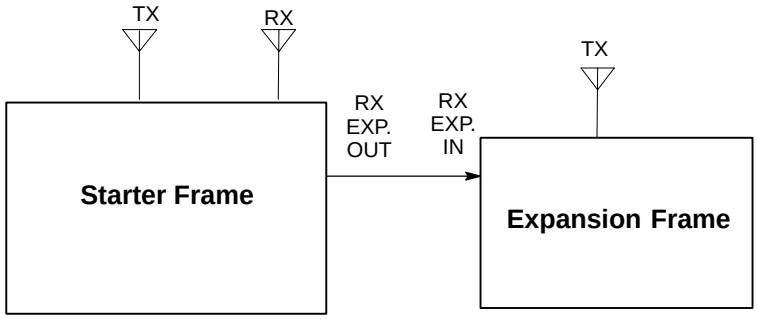
Site configurations can include a +27 V SC 4812T–MC BTS Starter Frame using either a +27 V SC 4812T–MC BTS frame or a +27 V SC 4812T BTS as an Expansion frame.

Another site configuration can include a +27 V SC 4812T BTS Starter Frame using a +27 V SC 4812T–MC BTS frame as an Expansion frame.

Antenna Sharing

Separate TX antennas are used in each frame. One Expansion frame can share RX antennas with the Starter Frame. RX antenna sharing is shown in Figure 3-6.

Figure 3-6: RX Antenna Sharing with an Expansion Frame



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Tools Required

- T10 and T30 Torx bits and driver
- Flat head screwdriver or 5/16” Hex socket
- Torque driver

NOTE	Use the following procedures to add an Expansion frame to a Starter frame. The instructions are identical when connecting a SC 4812T–MC BTS “Expansion” frame to either a SC 4812T or SC4812T–MC BTS “Starter” frame.

Expansion Procedure

Table 3-2 provides the procedures necessary to install a SC 4812T–MC BTS Expansion Frame to a Starter frame.

Table 3-2: Installing an Expansion BTS

Step	Action
1	Confirm the BTS is powered down.
2	Locate the Expansion I/O Filler Plate on the **Starter** Frame I/O plate (see Figure 3-3).
3	Using the Torx T10 bit, remove four M3 screws attaching the Expansion I/O Filler Plate to the I/O plate. (The filler plate can be discarded.)

. . . continued on next page

Table 3-2: Installing an Expansion BTS	
Step	**Action**
4	Install the Expansion I/O Housing on the **Starter** I/O in the same area as the filler plate.
5	Secure the housing to the I/O plate by using four M3x10 screws, T10 Torx bit and torque to 10–12 in-lb. The label **FRONT** on the Expansion I/O housing should face **EXP I/O** text on the I/O plate.
6	Using the T30 bit, remove the eight M6 screws attaching the front cosmetic panel to the cabinet.
7	Locate the two Expansion OUT cables tie-wrapped behind the front cosmetic panel.
8	Remove Harting terminators, if present, on the Expansion out cables.
9	Carefully cut the tie-wrap, *taking care as not to cut cables*, and insert the cables into the Expansion I/O housing from below the I/O plate. Note the cables are keyed, and can only be installed one way in the Expansion I/O housing. Confirm the cables are fully snapped into place in the Expansion I/O housing.
10	Attach the front cosmetic panel to the cabinet using the eight M6 screws torqued to 45 in-lb.
11	Install one end of the RF expansion cable (see Figure 3-4) to the Starter frame by plugging the end of the cable labeled **SC 4812T** into the Expansion I/O housing labeled **EXP I/O**, located on the **Starter** frame I/O plate (see Figure 3-3). The cable is keyed and can only be installed one way.
12	Secure the connection by fastening the four retention screws of the cable into the Expansion I/O housing. The screws should be fastened to 20 in-lb torque using a flat head screwdriver or a 5/16” socket and ratchet.
13	Following the same procedure, install the other end of the RF expansion cable, labeled **SC 4812T EXP** to the expansion housing labeled **EXP I/O** on the +27 V SC 4812T (1800 mm) Expansion frame I/O plate (see Figure 3-2).

RF GPS Expansion Installation

GPS Expansion

The Global Positioning System (GPS) is used by Motorola as the primary means to synchronize all base stations in a CDMA cellular system. The GPS signal is the input to the CSM, which develops the timing references for the Base Transceiver system (BTS). Every BTS at a site requires a GPS input.

On some versions of the SC 4812T product, GPS timing is provided by a built-in dedicated RF GPS receiver module installed on the CSM. On BTSs equipped with redundancy, two (2) CSMs are installed.

On some versions of the SC 4812T product, GPS timing is provided by an optional Remote GPS receiver (RGPS). The RGD card accepts timing information in digital format from the RGPS head and distributes it within the BTS, and to other Expansion cabinets by a small digital cable. The procedure for RGPS is covered in a separate section.

Customer Equipment Considerations and System Constrains

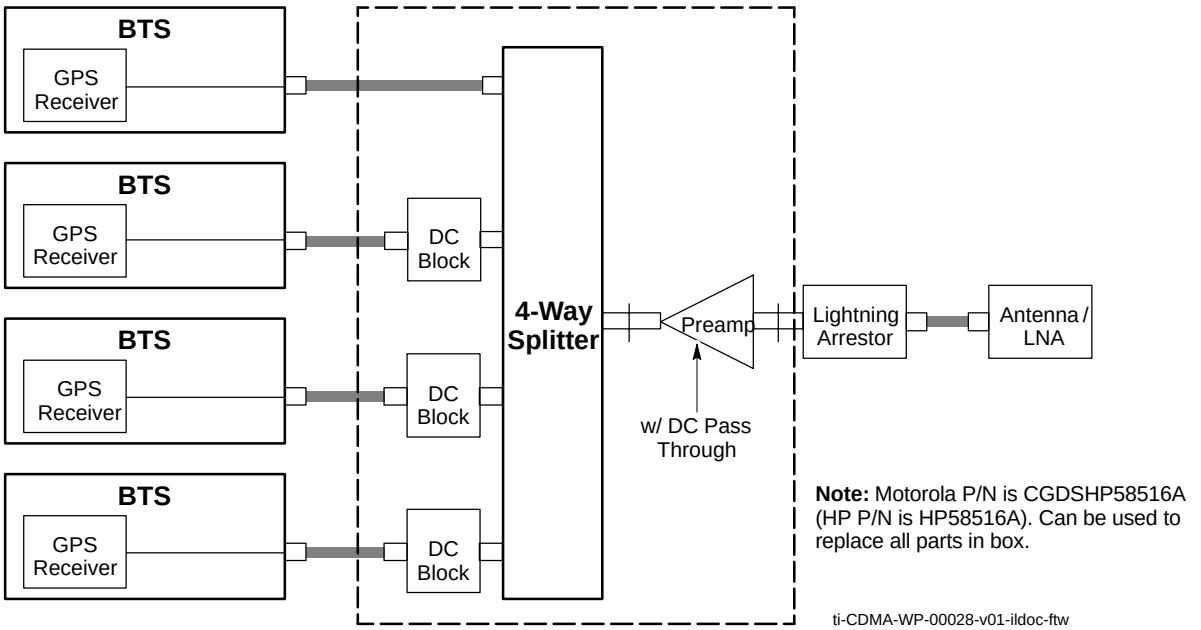
In order to share RF GPS signals, customer equipment external to the BTS must be carefully designed to ensure that overall performance is not degraded. Both the gain and the noise of the complete system affect the performance and the A/D converter in the GPS receiver. A typical diagram of a system to feed multiple BTSs from one GPS antenna is shown in Figure 3-7.

RF RGPS Expansion Installation Considerations

Following are recommendations for the RF GPS distributing amplifier method:

- The maximum GPS system NF is 4 dB, per OnCore Technical Application Note (CSM GPS Vendor).
- GPS distributed amplifier is acceptable, but only with Motorola recommended parts.
- Recommended amplifier model number is HP58516A (4–way).
- Must have surge protection before the distribution amplifier (PolyPhaser number is IS–MR50LNZ–6–MA).
- Maximum cable loss between GPS antenna and BTS is 4.5 dB.
- Maximum cable length difference between the 4:1 splitter to any cabinet is 8 meters.

Figure 3-7: System to Feed Multiple BTS's from One RF GPS Antenna



NOTE	– Maximum cable loss is 4.5 dB with or without 4:1 splitter. – HP58516A replaces all three components (DC Block, Splitter, and Pre-amplifier.

Remote GPS Distribution Expansion

Configuration

RGD and Remote GPS Expansion

Tools Required

- T10 Torx bit
- Flat head screwdriver
- Torque driver

3

Remote GPS (RGD) Expansion Procedure

The Remote GPS Expansion procedure is listed in Table 3-3 and Figure 3-8 shows the RGD board cable connections.

Table 3-3: Installing Remote GPS (RGD) Expansion

Step	Action
1	Install the RGD board on the I/O plate of the MC Starter frame of the cell site. The RGD board mounting area on the frame I/O plate is shown in Figure 2-1 and Figure 2-2. Align the RGD board to the I/O plate using six M3 screws, fastening the screws to 8–10 in-lb (0.9 – 1.1 N-m) using the T10 Torx bit and torque driver.
2	Install the RGD cover over the board. Align the connector ports on the cover with the connectors on the RGD board. The cover will snap into place.
3	Install the Remote GPS IN cable. Plug the 15-pin D-sub end of the cable into the RGD board connector labeled **REMOTE GPS IN**. This cable may have to be unplugged from the Starter frame remote GPS connector on the Site I/O board (see Figure 3-3).
4	Unfasten the cable connector retention screws using the flat head screwdriver to remove the cable.
5	Secure the cable to the RGD board connector by fastening the cable connector retention screws using the flat head screwdriver.
6	Install the RGD to Site I/O cable (15 pin D-sub to 15-pin D-sub short ribbon cable). Plug either end of the cable into the RGD board connector labeled **MAIN OUT**.
7	Fasten the cable connector retention screws to 4–6 in-lbs (0.4 – 0.7 N-m) using the screwdriver.
8	Fasten the other end of the cable to connector labeled **REMOTE GPS** on the Site I/O board (see Figure 3-3).
9	Fasten cable connector retention screws to 4–6 in-lbs (0.4 – 0.7 N-m) using the screwdriver.
10	Install the RGD expansion cable (15 pin D-sub to 15 pin D-sub long ribbon cable). Plug either end of the cable into the RGD board connector labeled **EXP 1** (see Figure 2-1).
11	Fasten cable connector retention screws to 4–6 in-lbs (0.4 – 0.7 N–m) using the screwdriver.
12	Plug the opposite end of the cable into the SC 4812T–MC Expansion Frame Remote GPS connector on the Site I/O board (see Figure 2-2).

High Stability Oscillator Expansion (HSOX)

Configuration

High Stability Oscillator Expansion (HSOX)

Tools Required

- Flat head screwdriver

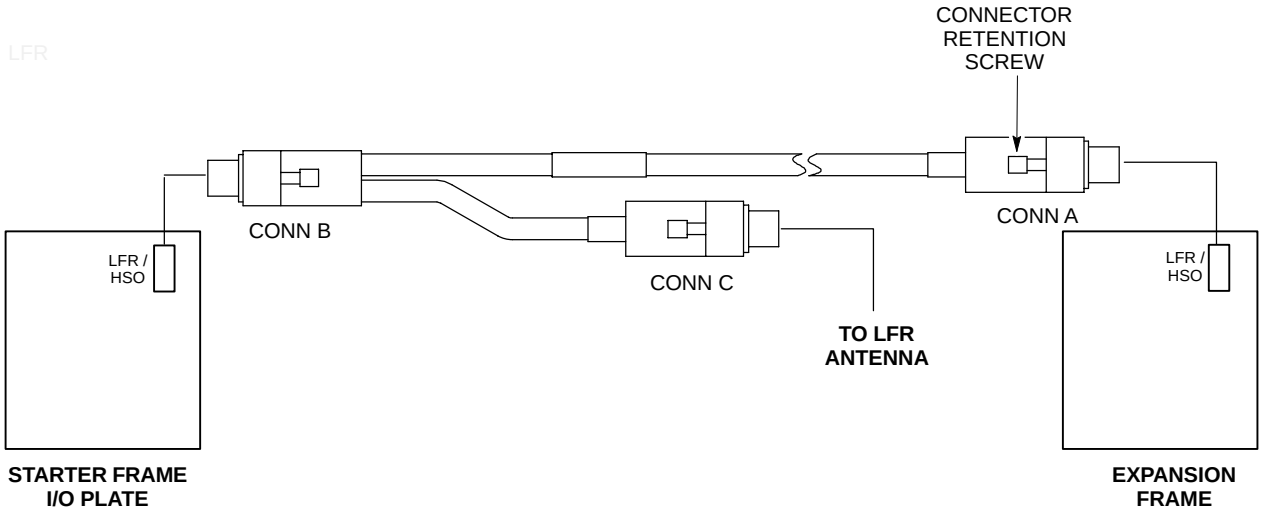
HSO Expansion Procedure

Install the HSOX cable and card per instructions in Table 3-4.

Table 3-4: Installing the HSOX Cable and Card

Step	Action
1	Disconnect the LFR antenna cable from the HSO/LFR connector on the Starter Frame I/O plate, if necessary.
2	Install the HSO expansion cable (9-pin D-sub "Y" ribbon cable). Plug connector "**B**" of the HSO expansion cable (see Figure 3-8) into the Starter Frame HSO/LFR input/output port on the I/O plate (see Figure 2-1).
3	Fasten the cable connector retention screws to 4–6 in-lb (0.4 – 0.7 N-m) using the flat head screwdriver.
4	If an LFR antenna is used, connect the LFR antenna cable to connector "**C**" (see Figure 3-8) of the HSO expansion cable.
5	Plug connector "**A**" of the HSO expansion cable (see Figure 3-8) into the Expansion Frame HSO/LFR input/output port on the I/O plate (see Figure 2-2).
6	Fasten the cable connector retention screws to 4–6 in-lbs (0.4 – 0.7 N-m) using the flat head screwdriver.
7	Attach a static wrist strap to your wrist and to the ESD plug on the BTS.
8	Install the HSO expansion card into the appropriate HSO/LFR slot. Latch the top and bottom latches at the same time to properly seat the card.

Figure 3-8: HSOX Cable (3086458H01) for Expansion Frame



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Local Area Network (LAN) Expansion Installation

Configuration

The LAN is only connected between frames in a BTS if the system is running software revision 2.9 or later, and the site is configured as a logical BTS.

NOTE	C-CCP dip switch changes are required to reflect frame ID (refer to Figure 3-10).

Tools Required

- 5.5 mm Hex socket

Torque Specifications

Terminator grounding stud nut: 10–12 in-lbs (1.1 – 1.3 N-m).

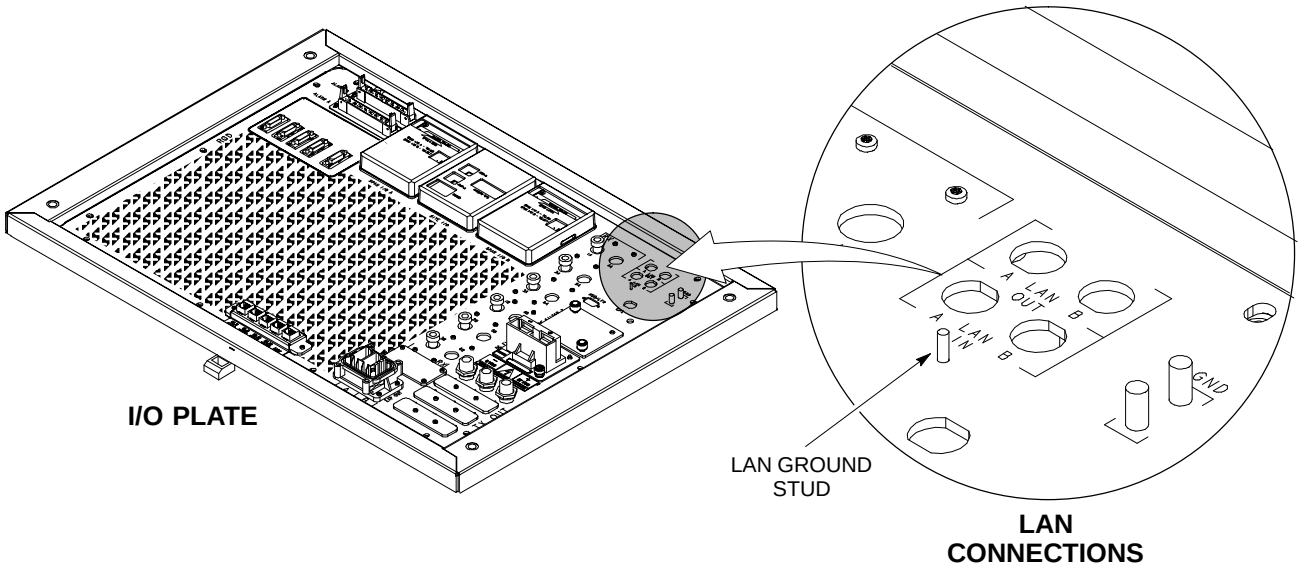
LAN Expansion Installation Procedure

Table 3-5 provides the procedure to install LAN Expansion.

Table 3-5: Installing LAN Expansion

Step	Action
1	Remove the **LAN OUT A** and **LAN OUT B** terminators (BNC) located on the Starter frame I/O plate.
2	Remove the **LAN IN A** and **LAN IN B** terminators (BNC) located on the Expansion frame I/O plate through a conductive tether and lug attached to a grounding stud (see Figure 3-9).
3	To remove the lug of the tether from the grounding stud, remove the nut and washer from the grounding stud using a 5.5 mm hex socket and ratchet. Slide the lug off the stud.
4	Reinstall the nut and washer on the grounding stud, tightening the nut to 8–10 in-lbs using the 5.5 mm hex socket and torque ratchet.
5	Install the frame-to-frame LAN cables by plugging one end of a BNC cable into the **LAN OUT B** connector on the Starter Frame I/O plate. Plug the opposite ends of the cables into the appropriate **LAN IN (A** and **B)** connector on the Expansion Frame I/O plate.

Figure 3-9: LAN Grounding Stud



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Setting Frame C-CCP Shelf Configuration Switch

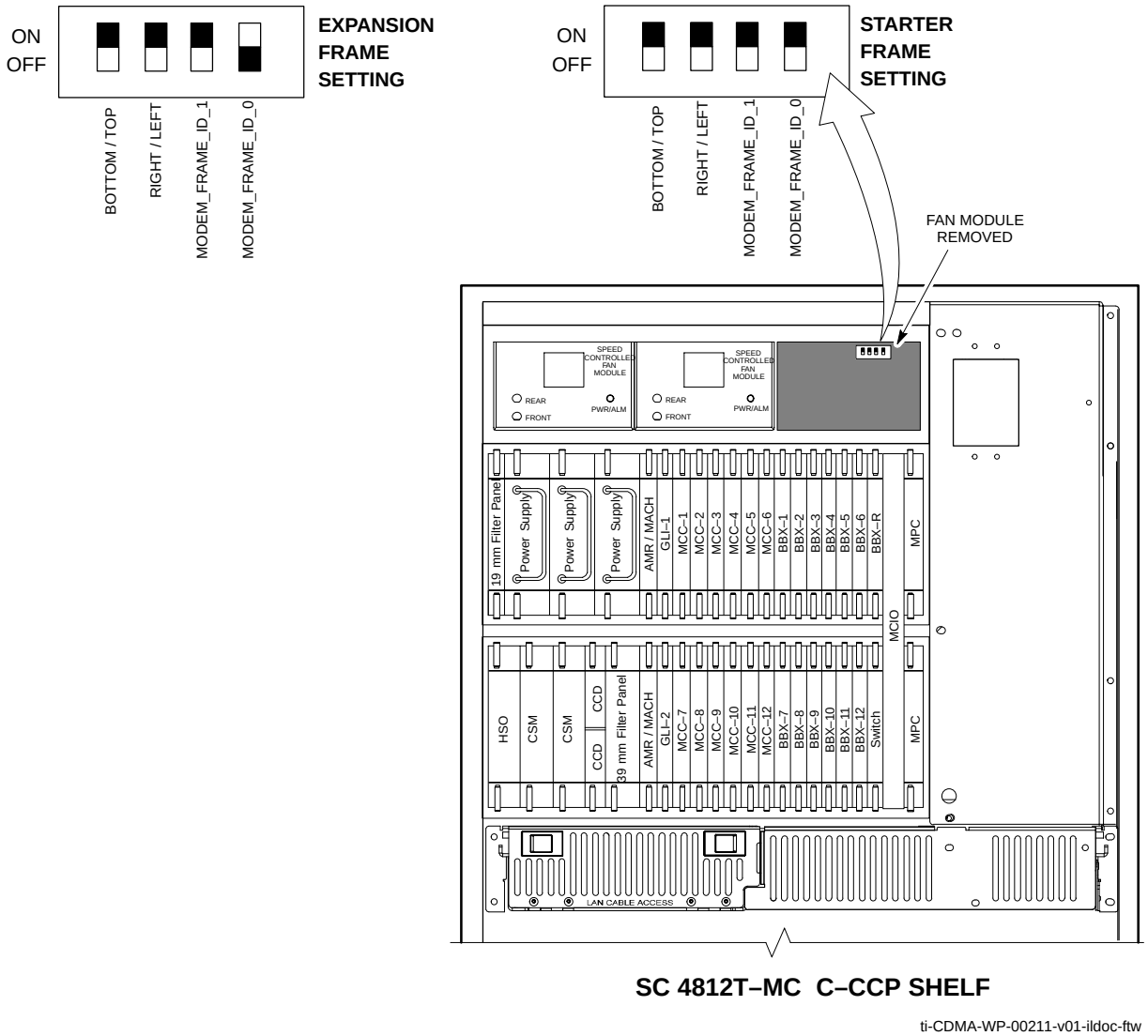
When the frame is a Starter BTS, the backplane switch settings behind the fan module nearest the breaker panel must be set to the ON position (see Figure 3-10).

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

NOTE	Dip switch settings are only changed in the Expansion frame if the system is running software release 2.9 or later, AND the site is configured as a logical BTS.

3

Figure 3-10: Backplane DIP Switch Settings



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MOTOROLA

Chapter 4

Optional Equipment

Optional BTS Equipment Identification

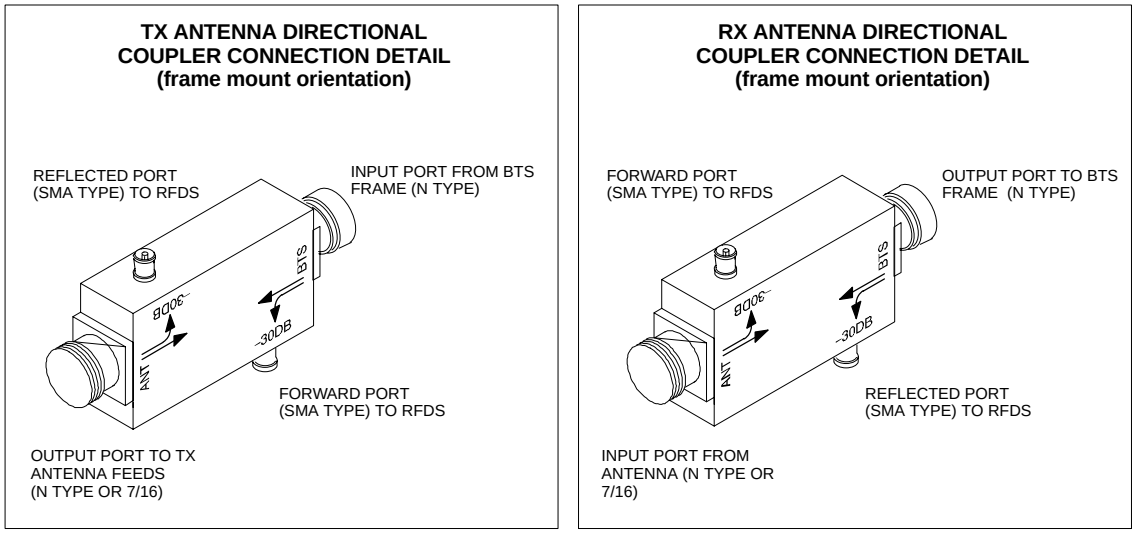
Overview

This section of the manual provides identification of the optional BTS equipment and helpful information when installing the equipment.

Directional Couplers

Directional couplers are used when an external RFDS is used. Directional couplers are not used at sites where duplexed antennas are desired. Figure 4-1 depicts the directional couplers and their identifying connections.

Figure 4-1: Directional Couplers



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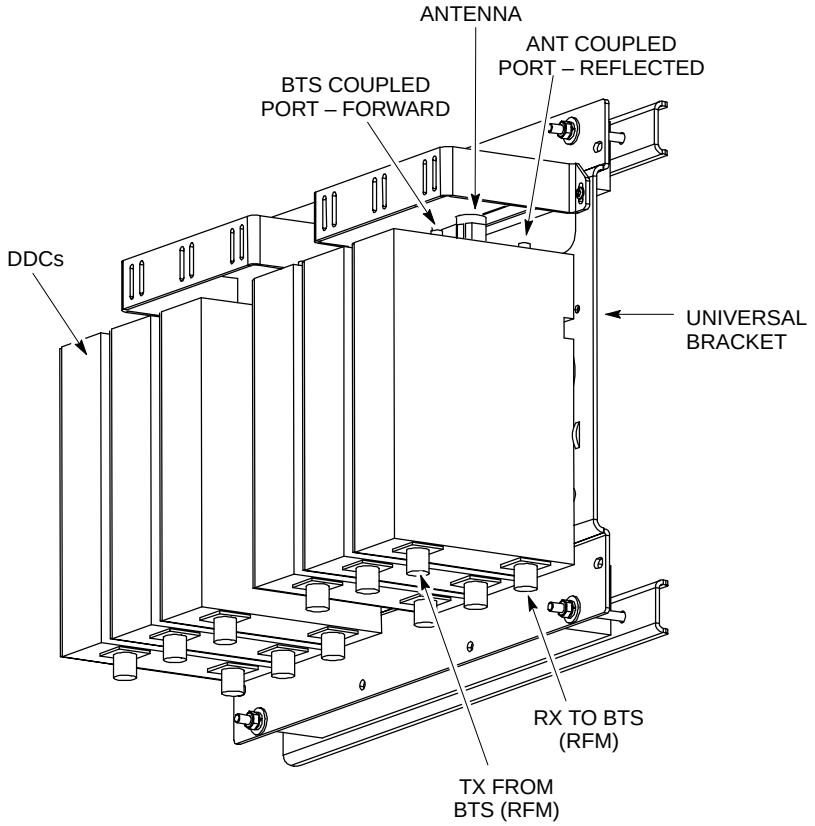
Duplex Directional Couplers (DDC) and Mounting Bracket

Duplex directional couplers (DDCs) are used when it is desired to duplex transmit and receive antennas. This device incorporates directional coupler function so separate directional couplers are not required.

The Universal Bracket is designed for mounting on a 19-inch rack, to the wall, or on a cable ladder. This bracket is 19 X 15 inches and can accommodate up to six sets of DDCs (or directional couplers). After the DDCs are mounted on the Universal Bracket, the whole assembly will extend 6-1/2 inches from the mounting surface.

Figure 4-2 shows the Duplex Directional Couplers (mounted in the universal mounting bracket) and identifies the connections.

Figure 4-2: DDC (Duplexers – Directional Couplers)



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RFDS

The CDMA RFDS equipment operates in the CDMA radio frequency spectrum. Refer to Table 4-1 for the CDMA frequency spectrums.

Table 4-1: CDMA Frequency Spectrum in MHz

Direction	800 MHz Band
Receive	824 – 849
Transmit	869 – 894

RF Interfaces

RFDS interfacing is through directional couplers. The CDMA RFDS equipment connects to coupled ports of directional couplers, cabled into the Base Transceiver Station (BTS) site RX and TX antenna paths. The coupled port connections provide the RF signal interface between the RF diagnostic function and the following:

- Site RX antennas and the site receiver equipment
- Site TX antennas and the site transmitter equipment

RFDS Function

4

The CDMA RFDS equipment, operating under software control, is used to test and verify operation of:

- Site RX and TX antenna path equipment including the antenna, filter, antenna path equipment in the BTS, any RF cabling, etc.
- BTS broadband transceivers (BBXs)
- TX Power amplifiers
- Call paths, including:
  - uplink over the RX antenna path through the BTS
  - downlink over the TX antenna path through the BTS

CDMA RFDS tests can be operated automatically at scheduled times to run a battery of tests, or manually, performing one test at a time. Complete testing covers each antenna path and its associated transceivers.

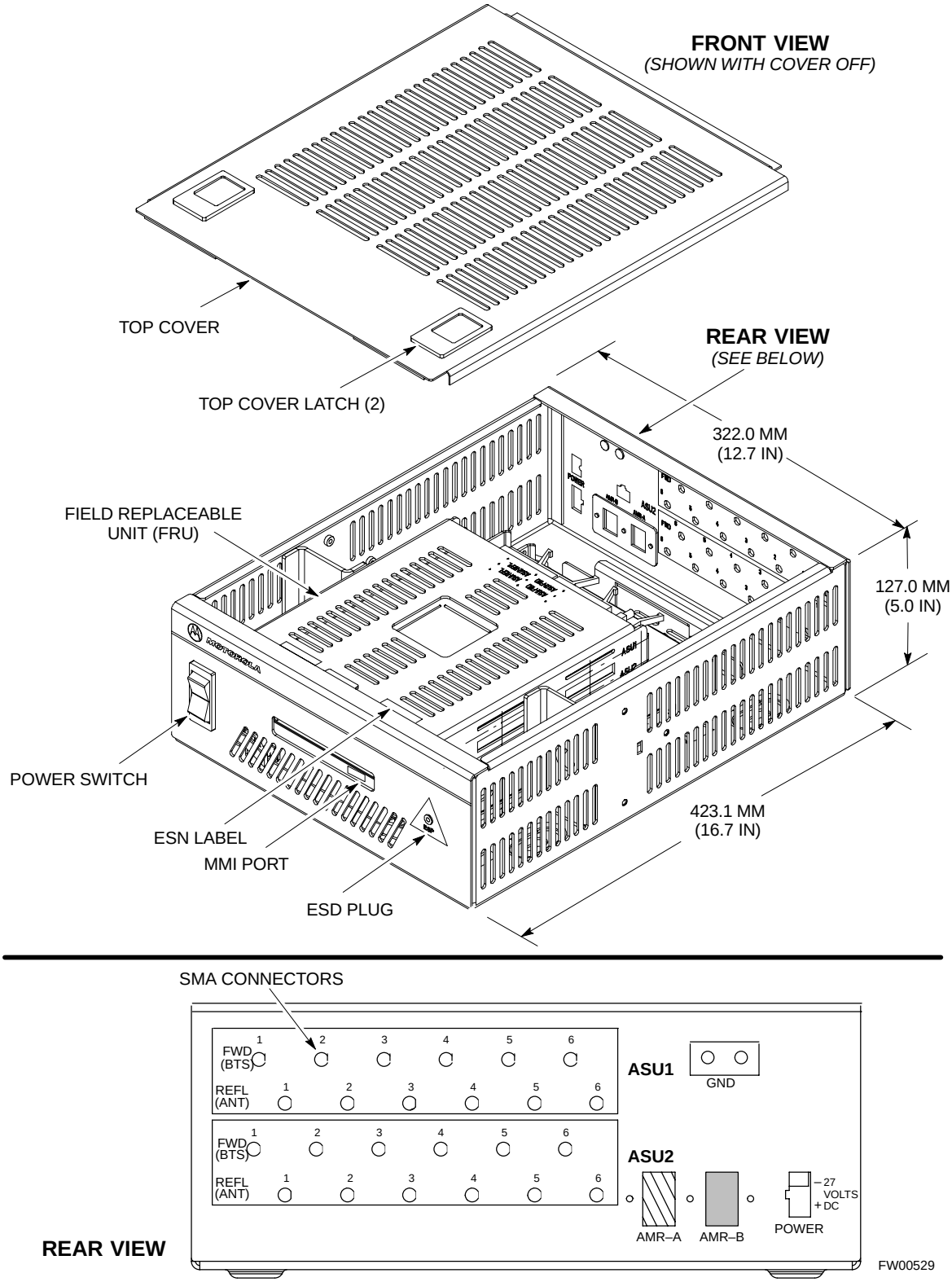
CDMA RFDS testing is controlled from either the Local Maintenance Facility (LMF) computer, or the control entity Operations & Maintenance Center-Radio (OMC-R) for CDMA which evokes the test and displays the results.

The CDMA RFDS equipment essentially monitors a TX antenna path for TX RF signals and generates RX RF signals into an RX antenna path.

For testing accuracy and repeatability, all RF monitoring and signal generation is via conductive paths and not radiated through the air. Therefore, if the site is equipped with an RF Diagnostic Sub-system, each RX and TX antenna path is configured with a directional coupler which is the RF signal interface between the RFDS and the antenna path.

The RFDS (see Figure 4-3) is rack mounted next to the 1X SC 4812T BTS. For detailed information on installation and operation please order the RFDS Users Guide (Motorola part no. *68P64113A37*).

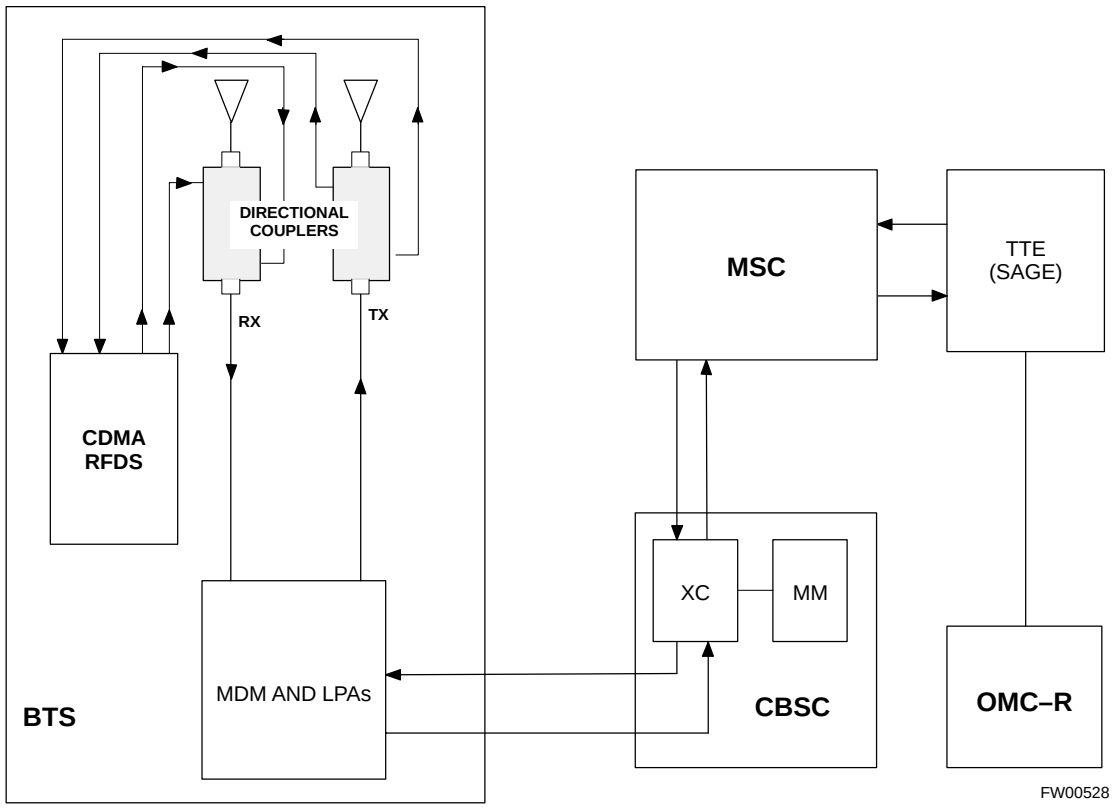
Figure 4-3: RFDS (Rack Mount Unit)



RFDS Cabling to the BTS

This section of the manual will cover the basic cabling connection for the SC 4812T–MC BTS frame. Figure 4-4 showns the connects from the TX and RX BTS antennas to the CDMA RFDS unit.

Figure 4-4: RFDS (Block Diagram)



BTS Antenna Configuration

Overview

This section provides detail on the antenna configurations supported by the BTS, including:

- 3 Sector
- 6 Sector

BTS 60 Degree Sector (6 Sector) Transmit Path Cabling

Objective

The objective of this procedure is to install the BTS transmit path cabling.

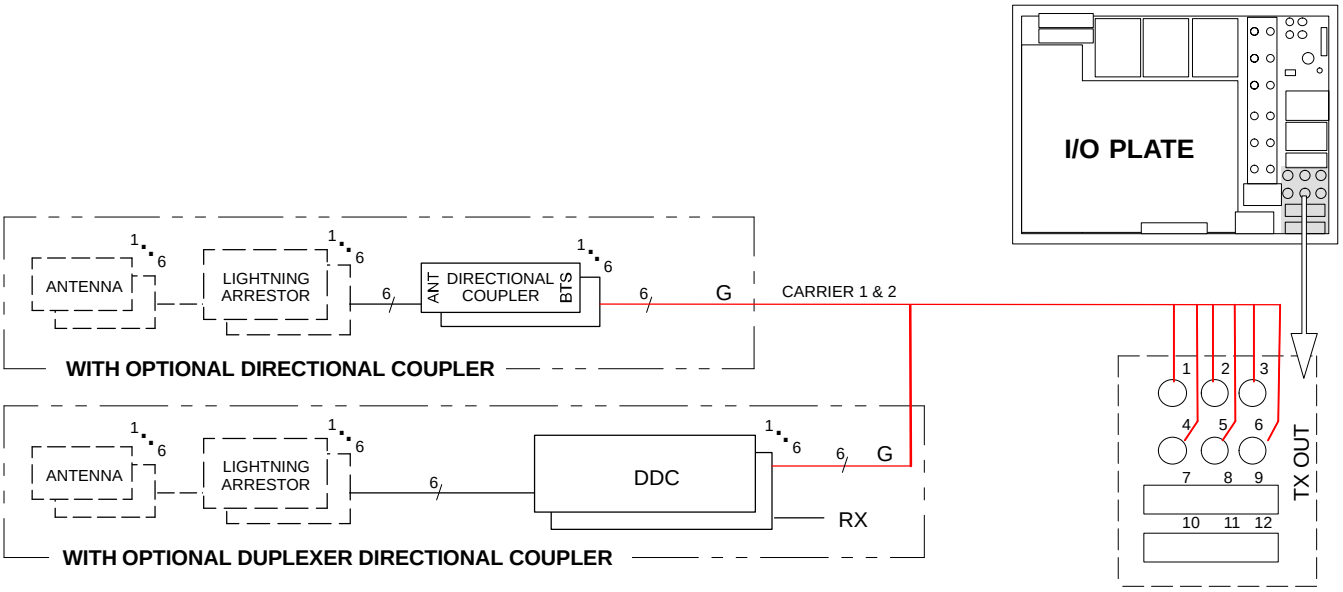
Cable Labels

The cable designations referenced in Table 4-2, provide the quantities and descriptions of the cables required for the procedure.

Cabling Diagram

Figure 4-5 shows two types of configurations. Select the diagram that depicts your site's configuration. Table 4-5 describes the antenna cable connection ports.

Figure 4-5: 60 Degree Sector (6 Sector) Transmit Path Cabling Details



NOTE: Unused TX ports on the DDC must be terminated.

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60 Degree Sector Configuration

Table 4-2 provides the Cable Run List for 60 degree sector transmit paths.

Table 4-2: Cable Run List for 60 Degree Sector TX Configuration

Cable	Cable Parts Connecting Lightning Arrestors To BTS TX Connectors		
G	**via Directional Coupler**	**via DDC**	**BTS TX Ports**
Quantity	12	18	TX1 to TX6

Procedure

Install each cable by using the cable run list in Table 4-2, the cabling diagram in Figure 4-5, and the procedure in Table 4-3. Each cable is installed the same way.

Table 4-3: Installing the 60 Degree Sector TX Path Cables

Step	Action
1	Attach the connector–equipped end of the cables to the BTS **TX** connectors.
2	Route the cables to the DCs or DDCs.
3	Cut the cables to length and label them accordingly. Install connectors on the cables and attach the cables to the DDCs **TX** connector or Directional Couplers **BTS** connectors.
4	Attach the connector-equipped end of additional cables to the DDCs or Directional Couplers **ANT** connectors.
5	Route the cables to the lightning arrestors.

BTS 60 Degree Sector (6 Sector) Receive Path Cabling

Objective

The objective of this procedure is to install the BTS transmit path cabling.

Cable Labels

The cable designations are referenced in Table 2-1 the “Overall Cabling Diagrams and Description” area. Table 4-4, and Table 4-5 provide the quantities and descriptions of the cables required for this procedure.

Cabling Diagram

Figure 4-6 shows two types of configurations. Select the diagram that depicts your site’s configuration. Table 4-5 describes the antenna cable connection ports.

Figure 4-6: 60 Degree Sector (6 Sector) Receive Path Cabling Details

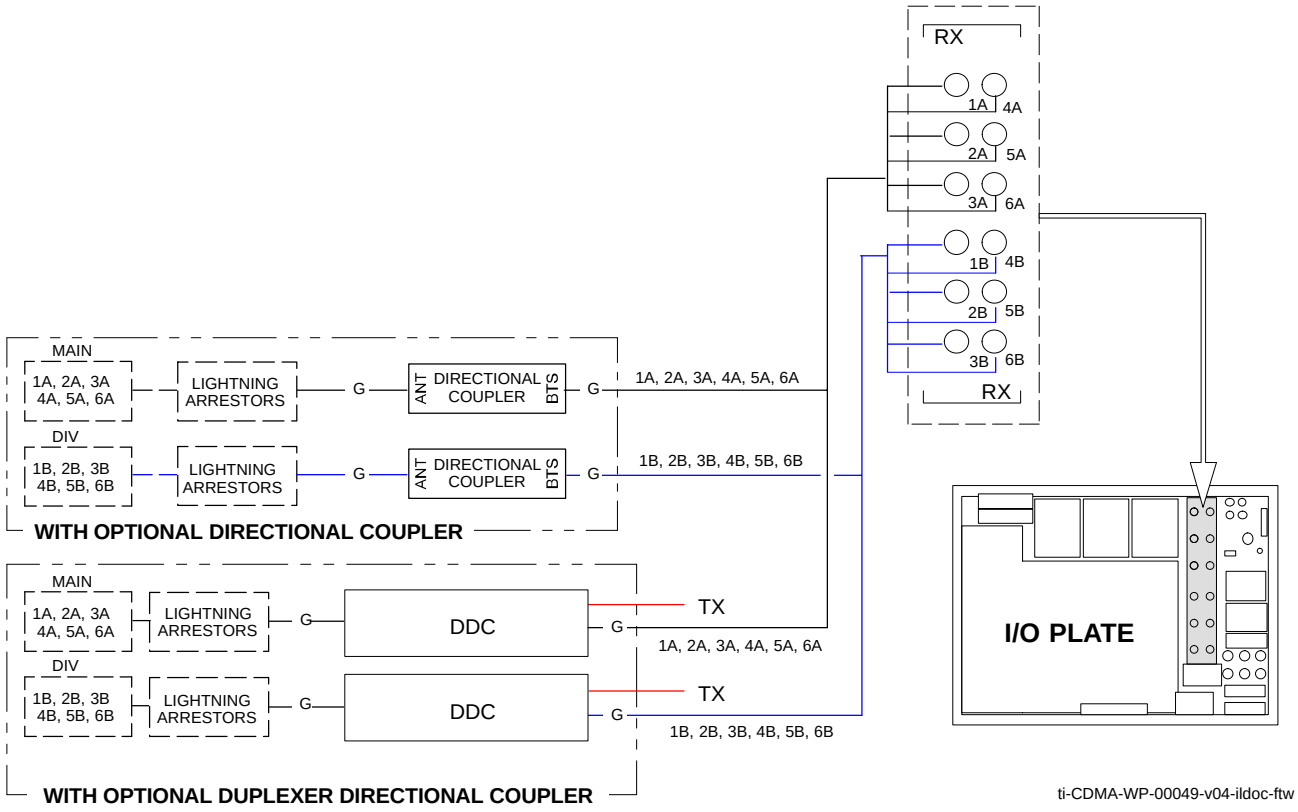


Table 4-4: Cables Needed for 120 Degree Sector Receive Path			
Cable	**Qty.**	**Part Number**	**Description**
G	(see Table 4-11)	CGDS2212602	15 ft. Jumper Cable, N/M–N/M.

Table 4-5: Cable Run List for 60 Degree Sector Receive Path Cabling			
Cable	**Cable path connecting Lightning Arrestors to BTS RX connectors**		**RX Ports Used**
G	via Directional Coupler	via DDC	RX 1A–6A RX 1B–6B
Quantity	24	36	

Procedure

Install each cable by using the cable run list in Table 4-11, the cabling diagram in Figure 4-8, and the procedure in Table 4-12. Each cable is installed the same way.

Table 4-6: Installing the 60 Degree Sector Receive Path Cables	
Step	**Action**
1	Attach the connector–equipped end of the cables to the BTS **RX** connectors.
2	Route the cables to the DDCs.
3	Cut the cables to length and label them accordingly. Install connectors on the cables, and attach the cables to the DDCs **RX** connector or Directional Couplers **BTS** connectors.
4	Attach the connector-equipped end of additional cables to the DDCs or Directional Couplers **ANT** connectors.
5	Route the cables to the lightning arrestors.
6	Cut the cables to length and label them accordingly. Install connectors on the cables.

BTS 120 Degree Sector (3 Sector) Transmit Path Cabling

Objective

The objective of this procedure is to install the 120 degree BTS transmit path cabling.

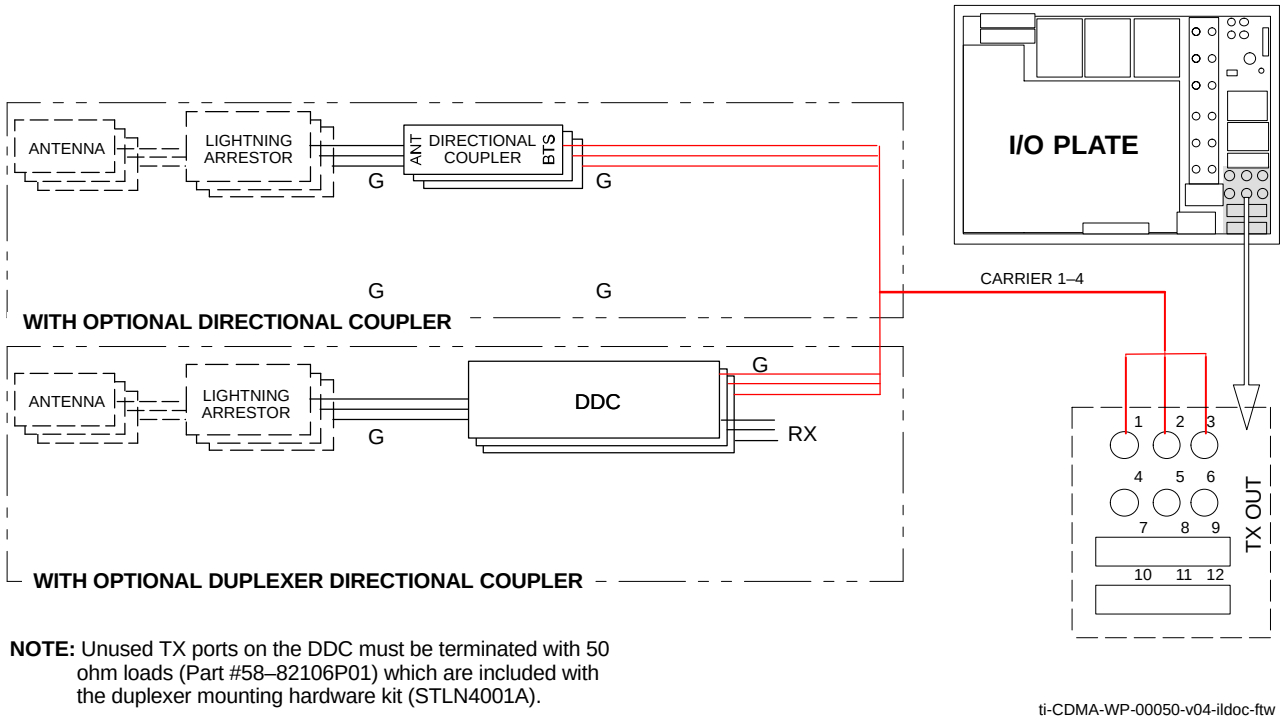
Cable Labels

The cable designations are referenced to Table 2-1 in the "Cabling Diagrams and Description" area. Table 4-7 and Table 4-8 provide the quantities and descriptions of the cables required for this procedure.

Cabling Diagram

Figure 4-7 shows two types of configurations; select the diagram that depicts your site's configuration. Table 4-7 and Table 4-8, on page 4-13, describes the antenna cable connection ports.

Figure 4-7: 120 Degree Sector (3 Sector) Transmit Path Cabling Details



NOTE: Unused TX ports on the DDC must be terminated with 50 ohm loads (Part #58–82106P01) which are included with the duplexer mounting hardware kit (STLN4001A).

Table 4-7: Cables Needed for 120 Degree Sector Transmit Path			
Cable	**Qty.**	**Part Number**	**Description**
G	(see Table 4-8)	CGDS2212602	15 ft Jumper Cable, N/M–N/M.

Table 4-8: Cable Run List for 120 Degree Sector Configuration			
Cable	**Cable Parts Connecting Lightning Arrestors To BTS TX Connectors**		
G	**via Directional Coupler**	**via DDC**	**BTS TX Ports**
Quantity	6	9	TX1, TX2, TX3 (1)
	12	12	TX1, TX2, TX3

Procedure

Install each cable by using the cable run list in Table 4-8, the cabling diagram in Figure 4-7, and the procedure in Table 4-9. Each cable is installed the same way.

Table 4-9: Installing the 120 Degree Sector TX Path Cables	
Step	**Action**
1	Attach the connector–equipped end of the cables to the BTS **TX** connectors.
2	Route the cables to the DCs or DDCs.
3	Cut the cables to length and label them accordingly. Install connectors on the cables and attach the cables to the DDCs **TX** connector or Directional Couplers **BTS** connectors.
4	Attach the connector–equipped end of additional cables to the DDCs **ANT** connectors.
5	Route the cables to the lightning arrestors.
6	Cut the cables to length and label them accordingly. Install connectors on the cables and attach the cables to the Lightning Arrestors.

BTS 120 Degree Sector (3 Sector) Receive Path Cabling

Objective

The objective of this procedure is to install the BTS receive path cabling. 120-degree sector receive path cabling is used for CDMA and analog systems.

Cable Labels

The cable designations are referenced to Table 2-1 in the "Cabling Diagrams and Description" area. Table 4-10 and Table 4-11 provide the quantities and descriptions of the cables required for this procedure.

Table 4-10: Cables Needed for 120 Degree Sector Receive Path

Cable	Qty.	Part Number	Description
G	(see Table 4-11)	CGDS2212602	15 ft. Jumper Cable, N/M–N/M.

Cabling Diagram

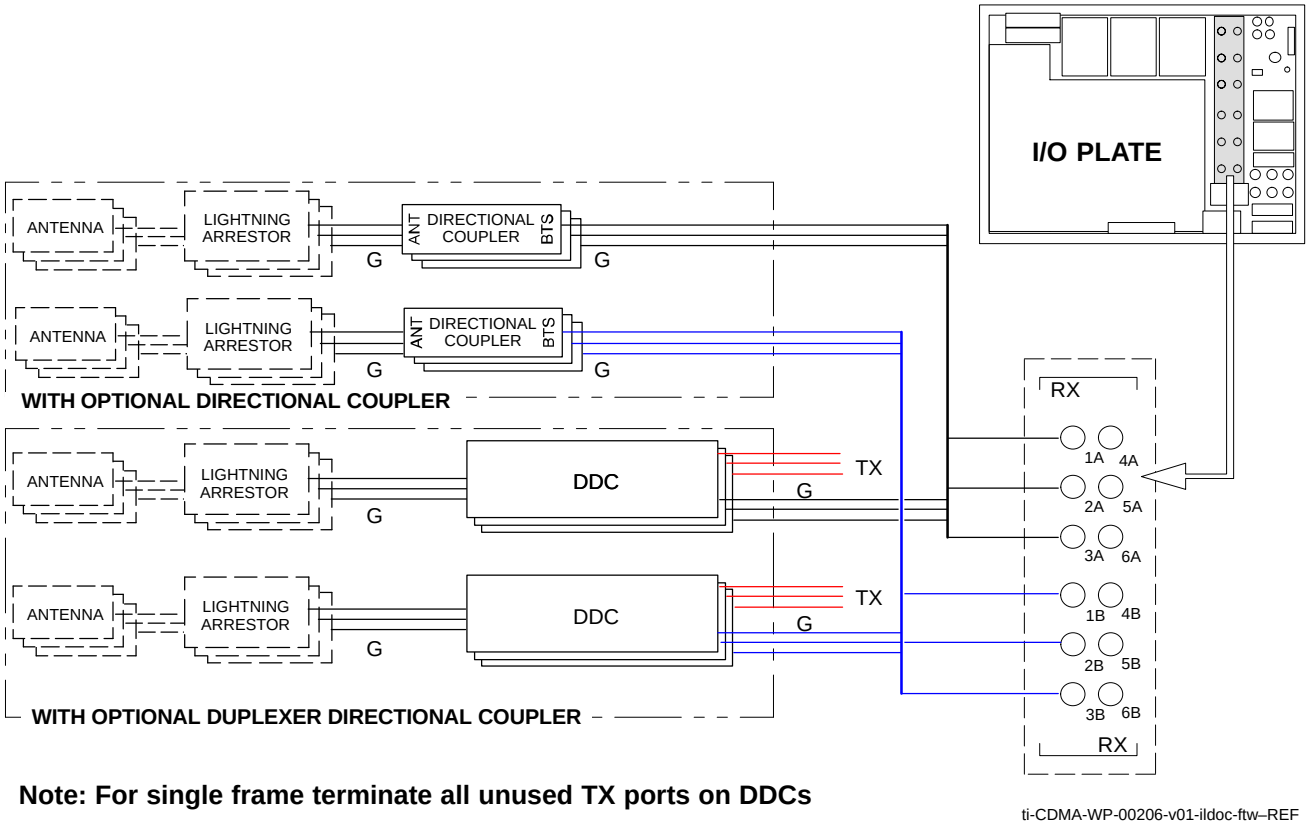
4

Figure 4-8 shows two types of configurations; select the diagram that depicts your site's configuration. Table 4-11 describes the antenna cable connection ports.

Table 4-11: Cable Run List for 120 Degree Sector Receive Path Cabling

Cable	Cable path connecting Lightning Arrestors to BTS RX connectors		RX Antenna Ports
G	**via Directional Coupler**	**via DDC**	RX 1A RX 2A RX 3A
Quantity	12	12	RX 1B RX 2B RX 3B

Figure 4-8: 120 Degree Sector (3 Sector) Receive Path Cabling Details



Note: For single frame terminate all unused TX ports on DDCs

ti-CDMA-WP-00206-v01-ildoc-ftw–REF

Cabling Procedure

Install each cable by referring to the cable run list in Table 4-11, the cabling diagram in Figure 4-8, and the procedure in Table 4-12. Each cable is installed the same way.

Table 4-12: Installing the 120 Degree Sector Receive Path Cables

Step	Action
1	Attach the connector-equipped end of the cables to the BTS **RX** connectors.
2	Use the following step to connect the DDCs to the antenna system. – Cut the cables to length and label them accordingly. Install connectors on the cables and attach the cables to the DDCs **RX** connector or **BTS** connectors. – Attach the connector-equipped end of additional cables to the DDCs' **ANT** connectors.
3	Route the cables to the lightning arrestors.

3 Sector Non–Duplexed Cabling

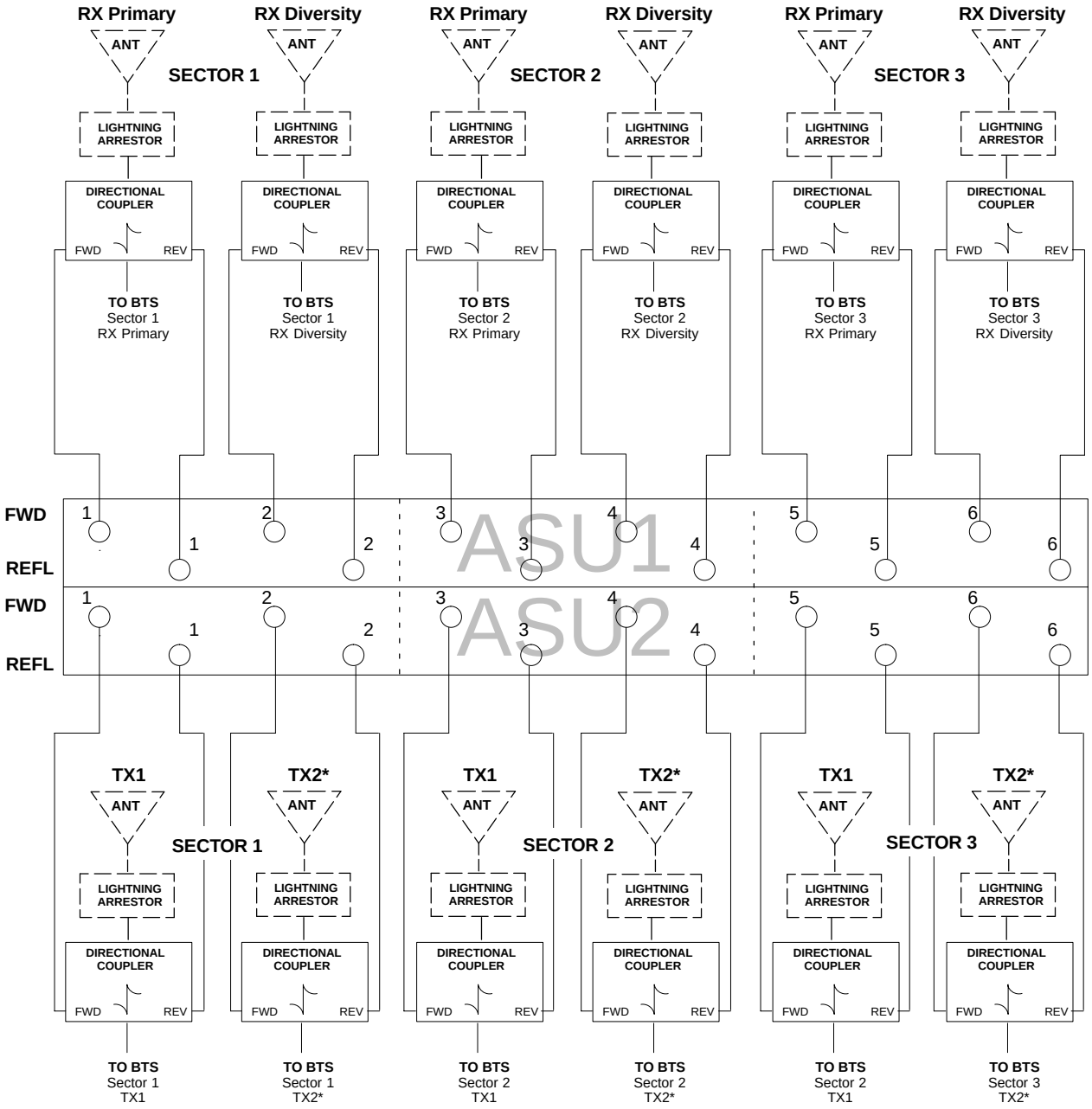
Objective

The objective of this procedure is to cable an external CDMA RFDS into a 3-Sector Non-Duplexed BTS. This configuration covers the SC 4812T–MC BTS.

Cabling Diagram

Figure 4-9 shows the cabling from an RFDS to a 3-Sector Non-Duplexed BTS configuration without regard to BTS type or band. Table 4-13 lists the ports for the Directional Couplers and RFDS, and instructions for installing the RF cables are shown in Table 4-14.

Figure 4-9: 3-Sector Non–Duplexed Cabling Configurations



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* TX2 – FOR SINGLE FRAME UNUSED TX PORTS ON THE DUPLEXER MUST BE TERMINATED WITH A 50 OHM LOAD. FOR EXPANSION CONNECT CABLES HERE

Table 4-13: 3-Sector Non-Duplexed Directional Coupler to RFDS Cabling Table		
Directional Coupler Port (RX)	**Cobra RFDS Port**	**Stand-Alone RFDS Port**
Sector 1 RX Pri FWD	ASU1–1 FWD	ASU1–1
Sector 1 RX Pri REF	ASU1–1 REF	ASU1–8
Sector 1 RX Div FWD	ASU1–2 FWD	ASU1–2
Sector 1 RX Div REF	ASU1–2 REV	ASU1–9
Sector 2 RX Pri FWD	ASU1–3 FWD	ASU1–3
Sector 2 RX Pri REF	ASU1–3 REV	ASU1–10
Sector 2 RX Div FWD	ASU1–4 FWD	ASU1–4
Sector 2 RX Div REF	ASU1–4 REV	ASU1–11
Sector 3 RX Pri FWD	ASU1–5 FWD	ASU1–5
Sector 3 RX Pri REF	ASU1–5 REF	ASU1–12
Sector 3 RX Div FWD	ASU1–6 FWD	ASU1–6
Sector 3 RX Div REF	ASU1–6 REF	ASU1–13
Directional Coupler Port (TX)	**Cobra RFDS Port**	**Stand-Alone RFDS Port**
Sector 1 TX1 FWD	ASU2–1 FWD	ASU2–1
Sector 1 TX1 REF	ASU2–1 REF	ASU2–8
Sector 1 TX2 FWD	ASU2–2 FWD	ASU2–2
Sector 1 TX2 REF	ASU2–2 REF	ASU2–9
Sector 2 TX1 FWD	ASU2–3 FWD	ASU2–3
Sector 2 TX1 REF	ASU2–3 REF	ASU2–10
Sector 2 TX2 FWD	ASU2–4 FWD	ASU2–4
Sector 2 TX2 REF	ASU2–4 REF	ASU2–11
Sector 3 TX1 FWD	ASU2–5 FWD	ASU2–5
Sector 3 TX1 REF	ASU2–5 REF	ASU2–12
Sector 3 TX2 FWD	ASU2–6 FWD	ASU2–6
Sector 3 TX2 REF	ASU2–6 REF	ASU2–13

Table 4-14: Installing RF Cables in a 3-Sector Non-Duplexed System	
Step	**Action**
1	Attach the SMA-type connector cables to the Directional Couplers.
2	Route the cables to the RFDS.
3	Attach the cables to the RFDS according to Figure 4-9, and Table 4-13.
4	Torque all SMA-type RF connectors to 8 in-lb.

3 Sector Duplexed

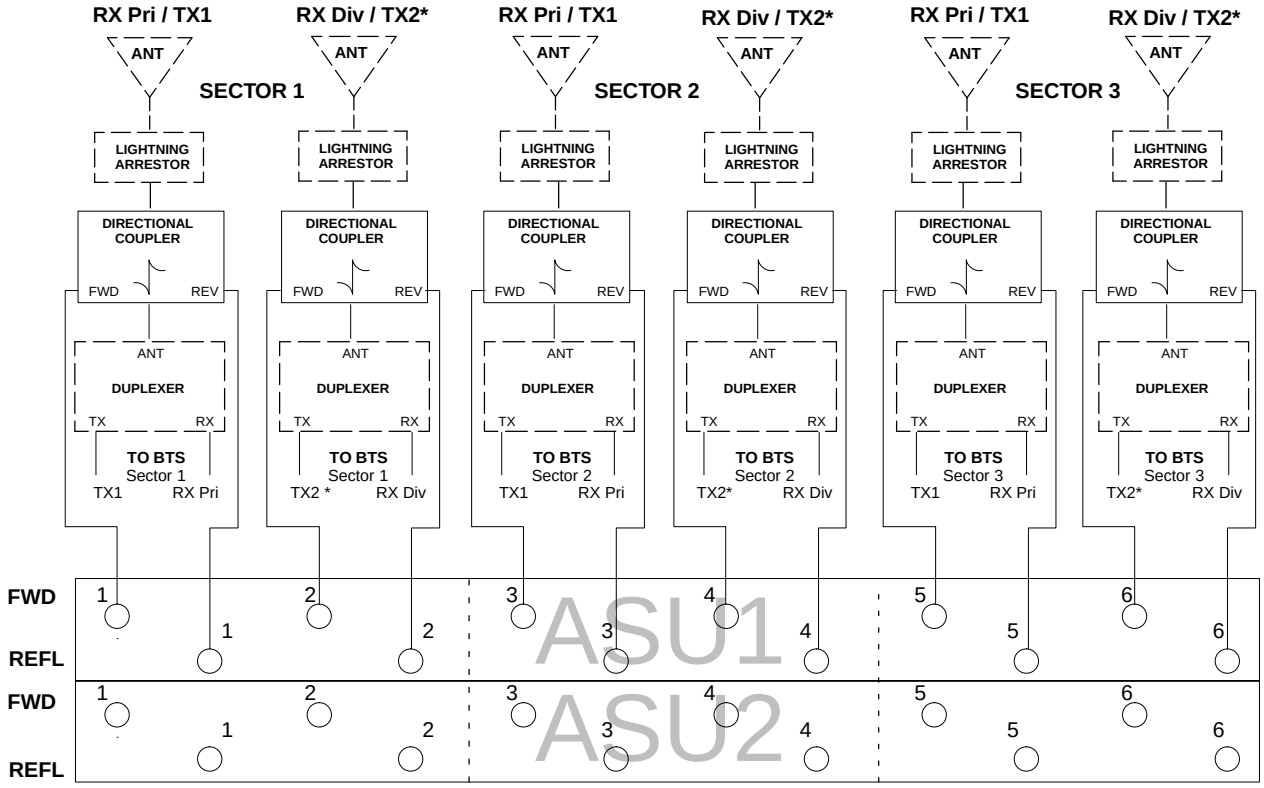
Objective

The objective of this procedure is to install an external CDMA RFDS into a 3-Sector Duplexed site. This configuration covers all indoor BTS types.

Cabling Diagram

Figure 4-10 shows the cabling from an RFDS to a 3-Sector Duplexed BTS configuration without regard to BTS type or band. Table 4-15 lists the ports for the Directional Couplers and RFDS, and instructions for installing the RF cables are shown in Table 4-16.

Figure 4-10: 3–Sector Duplexed Cabling Configurations



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* TX2 – FOR SINGLE FRAME UNUSED TX PORTS ON THE DUPLEXER MUST BE TERMINATED WITH A 50 OHM LOAD. FOR EXPANSION CONNECT CABLES HERE

Table 4-15: 3-Sector Duplexed Directional Coupler to RFDS Cabling Table

Directional Coupler Port	Cobra RFDS Port	Stand-Alone RFDS Port
Sector 1 RX Pri/TX1 Fwd	ASU1–1 FWD	ASU1–1
Sector 1 RX Pri/TX1 Ref	ASU1–1 REF	ASU1–8
Sector 1 RX Div/TX2 Fwd	ASU1–2 FWD	ASU1–2
Sector 1 RX Div/TX2 Ref	ASU1–2 REV	ASU1–9
Sector 2 RX Pri/TX1 Fwd	ASU1–3 FWD	ASU1–3
Sector 2 RX Pri/TX1 Ref	ASU1–3 REV	ASU1–10
Sector 2 RX Div/TX2 Fwd	ASU1–4 FWD	ASU1–4
Sector 2 RX Div/TX2 Ref	ASU1–4 REV	ASU1–11
Sector 3 RX Pri/TX1 Fwd	ASU1–5 FWD	ASU1–5
Sector 3 RX Pri/TX1 Ref	ASU1–5 REF	ASU1–12
Sector 3 RX Div/TX2 Fwd	ASU1–6 FWD	ASU1–6
Sector 3 RX Div/TX2 Ref	ASU1–6 REF	ASU1–13

Table 4-16: Installing RF Cables in a 3-Sector Duplexed System

Step	Action
1	Attach the SMA-type connector cables to the Directional Couplers.
2	Route the cables to the RFDS.
3	Attach the cables to the RFDS according to Figure 4-10, and Table 4-15.
4	Torque all SMA-type RF connectors to 8 in-lb.

6 Sector Duplexed

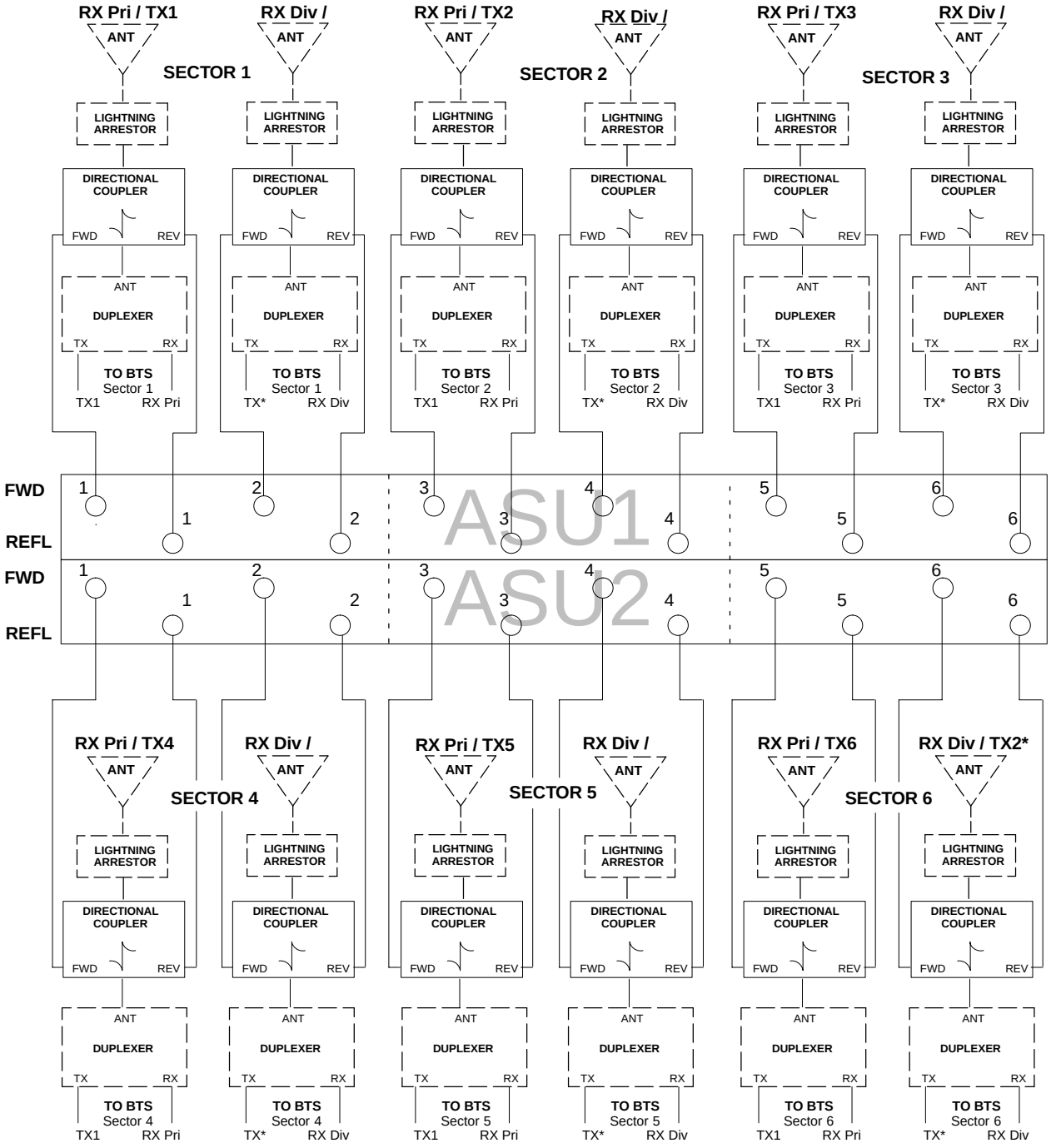
Objective

The objective of this procedure is to cable an external CDMA RFDS into a 6-Sector Duplexed BTS system. This configuration covers the SC 4812T BTS.

Cabling Diagram

Figure 4-11 shows the cabling from an RFDS to a 6–Sector Duplexed BTS configuration without regard to BTS type or band. Table 4-17 lists the ports for the Directional Couplers and RFDS, and instructions for installing the RF cables are shown in Table 4-18.

Figure 4-11: 6-Sector Duplexed Cabling Configurations



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TX* – FOR SINGLE FRAME UNUSED TX PORTS ON THE DUPLEXER MUST BE TERMINATED WITH A 50 OHM LOAD. FOR EXPANSION CONNECT CABLES HERE

Table 4-17: 6-Sector Duplexed Directional Coupler to RFDS Cabling Table		
Directional Coupler Port	**Cobra RFDS Port**	**Stand-Alone RFDS Port**
Sector 1 RX Pri/TX1 Fwd	ASU1–1 FWD	ASU1–1
Sector 1 RX Pri/TX1 Ref	ASU1–1 REF	ASU1–8
Sector 1 RX Div/TX2 Fwd	ASU1–2 FWD	ASU1–2
Sector 1 RX Div/TX2 Ref	ASU1–2 REV	ASU1–9
Sector 2 RX Pri/TX1 Fwd	ASU1–3 FWD	ASU1–3
Sector 2 RX Pri/TX1 Ref	ASU1–3 REV	ASU1–10
Sector 2 RX Div/TX2 Fwd	ASU1–4 FWD	ASU1–4
Sector 2 RX Div/TX2 Ref	ASU1–4 REV	ASU1–11
Sector 3 RX Pri/TX1 Fwd	ASU1–5 FWD	ASU1–5
Sector 3 RX Pri/TX1 Ref	ASU1–5 REF	ASU1–12
Sector 3 RX Div/TX2 Fwd	ASU1–6 FWD	ASU1–6
Sector 3 RX Div/TX2 Ref	ASU1–6 REF	ASU1–13
Sector 4 RX Pri/TX1 Fwd	ASU2–1 FWD	ASU2–1
Sector 4 RX Pri/TX1 Ref	ASU2–1 REF	ASU2–8
Sector 4 RX Div/TX2 Fwd	ASU2–2 FWD	ASU2–2
Sector 4 RX Div/TX2 Ref	ASU2–2 REF	ASU2–9
Sector 5 RX Pri/TX1 Fwd	ASU2–3 FWD	ASU2–3
Sector 5 RX Pri/TX1 Ref	ASU2–3 REF	ASU2–10
Sector 5 RX Div/TX2 Fwd	ASU2–4 FWD	ASU2–4
Sector 5 RX Div/TX2 Ref	ASU2–4 REF	ASU2–11
Sector 6 RX Pri/TX1 Fwd	ASU2–5 FWD	ASU2–5
Sector 6 RX Pri/TX1 Ref	ASU2–5 REF	ASU2–12
Sector 6 RX Div/TX2 Fwd	ASU2–6 FWD	ASU2–6
Sector 6 RX Div/TX2 Ref	ASU2–6 REF	ASU2–13

Table 4-18: Installing RF Cables in a 6-Sector Duplexed System	
Step	**Action**
1	Attach the SMA-type connector cables to the Directional Couplers.
2	Route the cables to the RFDS.
3	Attach the cables to the RFDS according to Figure 4-11, and Table 4-17.
4	Torque all SMA-type RF connectors to 8 in-lb.

MOTOROLA

Chapter 5

What's Next and Site Cleanup

5

What's Next

Introduction

Before beginning the Optimization procedure, there are two things left to do.

- Clean up the site.
- Fill out the installation completion checklist.

Clean Up the Site

Clean up the site by following the information given in the "Site Cleanup" area in this chapter.

Fill Out Checklist

After the site is cleaned up, fill out the installation completion checklist. This checklist is located in the "Installation Completion Checklist" area of this chapter.

Optimize the System

Optimize the system by following the procedures given in the appropriate optimization manual for your site.

The hardware installation manual does not include card placement and turning on power. These procedures are covered in the appropriate optimization manual.

5

Site Cleanup

Remove Protective Covering

Remove any cardboard from the walls used to protect the walls.

Remove any antistatic plastic or cloth sheeting used to cover the equipment.

Lighting Fixtures

Remove any masking tape from the fluorescent light fixtures.

Tools

Place all hand and power tools in the installation tool kit or other appropriate place. Note any tools needing replacement, cleaning, or adjustment.

Materials

Place any leftover materials in a location specified by the site manager.

Remove Debris

Remove any packing material.

Ensure that all scrap materials have been removed from any tables or stands.

Clean/sweep the floor. Ensure all chalk line marks have been removed.

Environment

Check that all covers, frame doors, and fan housings are in place.

Confirm all power connections are tight.

Organize any items (manuals, materials, etc.) left on site and place them in a safe location specified by the site manager.

Installation Completion Checklist

Directions

Fill out the installation completion checklist and make any necessary copies. You may copy this check sheet as needed.

Installation Completion Checklist

Date Hardware Installation Completed: _____

Site: _____

Master BTS Frame Serial Number: _____

Expansion BTS Frame Serial Number(s): _____

Checklist Completed By: _____

Checklist Reviewed By: _____

Table 5-1: Installation Completion Checklist

Status	No.	Item	Notes
	1	Frames are bolted down.	
	2	DC power cabling completed.	
	3	Each frame has its own earth ground.	
	4	RX RF cables installed.	
	5	TX RF cables installed.	
	6	LAN cables installed.	
	7	Span line cables installed.	
	8	Alarm cables installed.	
	9	Modem cables installed.	
	10	GPS antenna installed.	
	11	LFR antenna installed (if required).	
	12	GPS antenna cabling installed.	
	13	LFR antenna cabling installed (if required).	
	14	RF connectors are tight.	
	15	Power connections are tight.	
	16	RF cables are labeled the same at both ends.	
	17	Data cables labeled at both ends.	
	18	Remote GPS (if required).	
	19	Remote GPS cables (if required).	
	20	Ethernet LAN cables and terminators installed.	

. . . continued on next page

Table 5-1: Installation Completion Checklist			
Status	**No.**	**Item**	**Notes**
	21	All cables dressed and tied.	
	22	Cross-connect completed (if applicable).	
	23	Installation and site specific manuals at site.	
	24	Cable racks properly grounded.	
	25	Static wrist straps are present.	
	26	Site cleaned, swept, and trash removed.	
	27	Any deficiencies reported to the appropriate people.	
	28	Correct polarity has been maintained from the DC power source to the frame.	
	29	Power has not been applied to any frame.	

Notes

MOTOROLA

Appendix A

Carrier Add Instructions

A

Carrier Add Instructions

Overview

This section of the manual has been added to provide details instructions for installing one or more additional carriers to a SC 4812T–MC BTS frame.

NOTE	Before you begin the add carrier install, check the Carrier Add T–Option number listed below (*check with a Motorola Account Team representative for any changes to the kit number*).

Tool & Torque Requirements

Tools

- T15 TORX bit
- Torque Driver

Torque Requirements

- 1.1–1.3 N–m (10–12 in.–lb)

T– Options

- **For T–MC frames with 3x3 ETM:**
  - T423AZ Standard Power 3 CLPA Set, (3 x STLF1098)
  - T602AA PA Fan Tray Set for 3 Quadrants, (3 x STLN4500)
- **For T–MC frames with 4x4 ETM:**
  - T423BA High Power 4 CLPA CLPA Set, (4 x STLF1098)
  - T602AB PA Fan Tray Set for 4 Quadrants, (4 x STLN4500)

Carrier Add Matrix (3 Sector)

NOTE	After completing the installation steps for carrier add, calibrate, optimize, and ATP the new carrier. Enable the new carrier at a low power level.

CAUTION	If the ATP is not possible during peak air time, download a default BLO (40 dB) and enable BBX carrier.

NOTE	All PAs for the carrier under test must be INS during testing. For carriers not under test, key one BBX per carrier to a minimum power level.

Table A-1 identifies the number of components needed when adding a carrier. This matrix is for 3 Sector only.

Table A-1: 3 Sector Carrier Add Matrix

Add	Fan Add	BBX Add	PA Add 3X3	PA Add 4X4	MCC Add	PLC Filler Removal	CCCP PS
Carrier 2	None	3	3	4	As Needed	3 or 4	None
Carrier 3	3 or 4	3	3	4	As Needed	None	Add 1
Carrier 4	None	3	3	4	As Needed	None	None

Table A-2: 3 Sector Carrier FRU Matrix

Add	BBX Add	PA Add 3X3	PA Add 4X4	MCC
Carrier 2	BBX 7, BBX 8, BBX 9	CLPA 2A, 2B, 2C	CLPA 2A, 2B, 2C, 2D	As Needed
Carrier 3	BBX 4, BBX 5, BBX6	CLPA 3A, 3B, 3C	CLPA 3A, 3B, 3C, 3D**	As Needed
Carrier 4	BBX 10, BBX 11, BBX 12	CLPA 4A, 4B, 4C	CLPA 4A, 4B, 4C, 4D	As Needed

****** Add C–CCP Power Supply #3 for a 3rd Carrier.

Adding a Carrier (3 Sector)

Follow the step–by–step procedure (Table A-3) to add a carrier to the SC 4812T–MC BTS frame.

Table A-3: Adding a Carrier

Step	Action
1	Remove the PA Fan Trays from the top slots of both PA Cages (see FRU Guide for removal instructions– SC 4812T–MC FRU Guide 68P64115A20).
2	Remove the PLC Filler Panels from the PA Cages using T15 Torx driver. **NOTE** PLC Filler Plate is located in the second CLPA slot in all quadrants (see Figure A-1 and Figure A-2).
3	Follow the instructions in the FRU Guide for installing CLPA modules and PA Fan Trays in the Carrier 2 locations indicated in Figure 22–2. **NOTE** PA Fan Trays are installed over CLPAs. PA Fan trays are not required in locations without CLPAs.
4	Add a 3rd C–CCP Power Suppy Card to the frame. Refer toinstall instructions (see FRU Guide – SC 4812T–MC 68P64115A20
5	Install BBXs and MCCs (see Table A-1) for required number corresponding to carrier of newly installed CLPAs.
6	All PAs for the carrier under test must be INS during testing. For carriers not under test, key one BBX per carrier to a minimum power level.

A

Figure A-1: PLC Filler Plate Location (3X3 Enhanced Trunking Module)

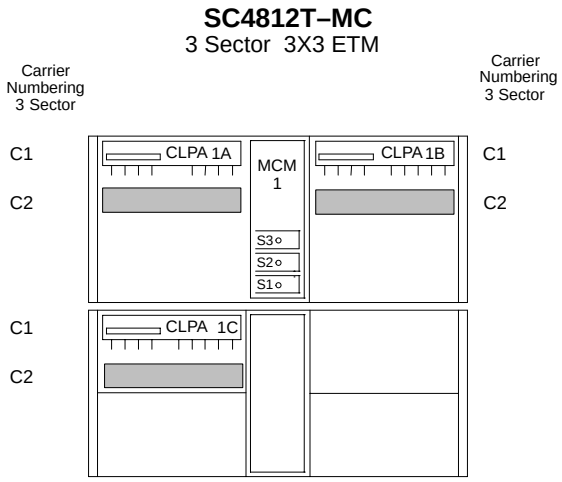
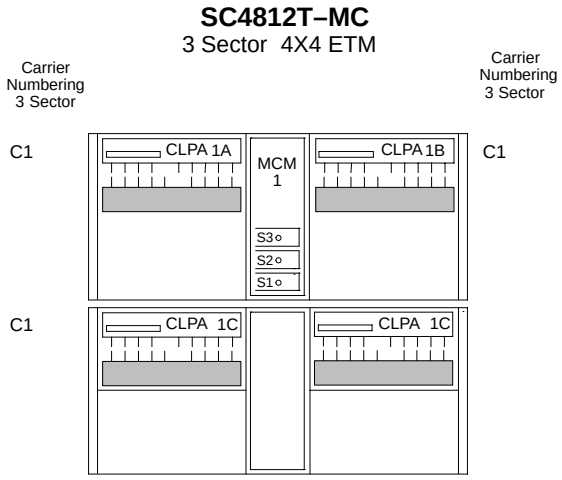


Figure A-2: PLC Filler Plate Location (4X4 Enhanced Trunking Module)



NOTE	Figure A-1 and Figure A-2 show single carrier with CLPA locations plus PLC Filler Plates (shown in gray) to be removed when another carrier is added.

Carrier Add (6 Sector)

NOTE	After completing the installation steps for carrier add, calibrate, optimize, and ATP the new carrier. Enable the new carrier at a low power level

CAUTION	If the ATP is not possible during peak air time, download a default BLO (40 dB) and enable BBX carrier

NOTE	All PAs for the carrier under test must be INS during testing. For carriers not under test, key one BBX per carrier to a minimum power level.

Carrier Add Matrix (6 Sector)

Table A-4 identifies the number of components needed when adding a carrier. This matrix is for 6 Sector only.

Table A-4: Six Sector Carrier Add Matrix

Add	Fan Add	BBX Add	PA Add	MCC Add	PLC Filler Removal	CCCP PS Add
Carrier 2	None	BBX 7 thru BBX 12	6 or 8	As Needed	6 or 8	1**

****** Add C–CCP Power Supply #3 Card for a 2nd Carrier.

Installing a Second Carrier

Follow the step–by–step procedure (Table A-5) to add a second carrier to a 6 sector SC 4812T–MC BTS frame.

Table A-5: Installing a Second Carrier

Step	Action
1	Remove the PA Fan Trays from PA Cages (see FRU Guide for removal instructions– SC 4812T–MC FRU Guide 68P64115A20).
2	Remove the PLC Filler panels from the PA Cage using a T15 Torx driver
3	Follow the instructions in the FRU Guide for installing CLPA modules and PA Fan Trays in the Carrier 2 locations indicated in Figure 22–2. **NOTE** PA Fan Trays are installed over CLPAs. PA Fan trays are not required in locations without CLPAs.
4	Add a 3rd C–CCP Power Suppy Card to the frame. Refer toinstall instructions (see FRU Guide – SC 4812T–MC 68P64115A20
5	Install BBXs and MCCs (see Table A-4, Figure A-3 and Figure A-4) for required number corresponding to carrier of newly installed CLPAs.
6	All PAs for the carrier under test must be INS during testing. For carriers not under test, key one BBX per carrier to a minimum power level.

A

Figure A-3: PLC Filler Plate Locations 6 Sector (3X3 Enhanced Trunking Module)

SC4812T–MC
6 Sector 3X 3 ETM

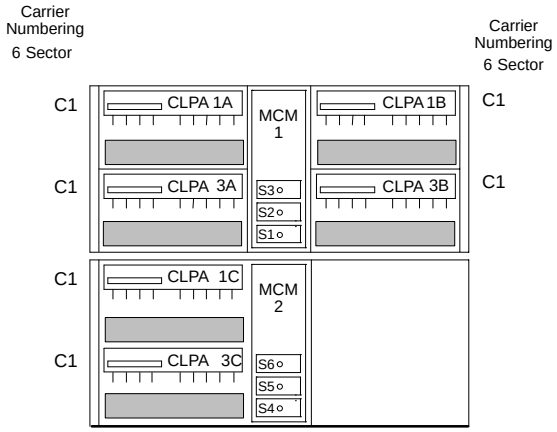
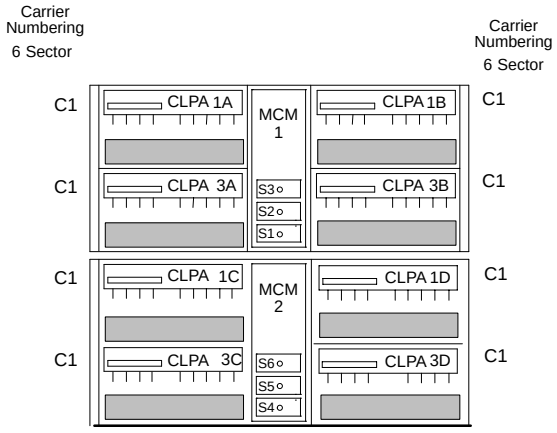


Figure A-4: PLC Filler Plate Locations (4X4 Enhanced Trunking Module)

SC4812T–MC
6 Sector 4 X 4 ETM



NOTE	Figure A-3 and Figure A-4 show single carrier with CLPA locations plus PLC Filler Plates (shown in gray) to be removed when another carrier is added.

Index

Numbers

A

B

C

D

E

F

G

H

I

L

M

O

P

Q

R

S

T

W