MOTOROLA

Cellular Infrastructure Group

FCC ID: IHET5ZR1

USERS MANUAL EXHIBIT

PLEASE NOTE: Manual documentation for the SC4812ET @ 800 MHz CDMA BTS is currently under development and is similar to the manual for SC4812ET @ 1.9 Ghz CDMA BTS with FCC ID #IHET6YZ1. Please refer to the attached manual for this submission.

MOTOROLA

BTS Optimization/ATP

CDMA LMF – Software Release 9.0

SC™ 4812ET
1900 MHz CDMA

TECHNICAL EDUCATION & DOCUMENTATION

PREMIER GLOBAL INFORMATION PROVIDER

PRELIMINARY 2

68P64114A42–2

Notice

While reasonable efforts have been made to assure the accuracy of this document, Motorola, Inc. assumes no liability resulting from any inaccuracies or omissions in this document, or from use of the information obtained herein. The information in this document has been carefully checked and is believed to be entirely reliable. However, no responsibility is assumed for inaccuracies or omissions. Motorola, Inc. reserves the right to make changes to any products described herein and reserves the right to revise this document and to make changes from time to time in content hereof with no obligation to notify any person of revisions or changes. Motorola, Inc. does not assume any liability arising out of the application or use of any product, software, or circuit described herein; neither does it convey license under its patent rights or the rights of others.

It is possible that this publication may contain references to, or information about Motorola products (machines and programs), programming, or services that are not announced in your country. Such references or information must not be construed to mean that Motorola intends to announce such Motorola products, programming, or services in your country.

Copyrights

This instruction manual, and the Motorola products described in this instruction manual may be, include or describe copyrighted Motorola material, such as computer programs stored in semiconductor memories or other media. Laws in the United States and other countries preserve for Motorola certain exclusive rights for copyrighted material, including the exclusive right to copy, reproduce in any form, distribute and make derivative works of the copyrighted material. Accordingly, any copyrighted Motorola material contained herein or in the Motorola products described in this instruction manual may not be copied, reproduced, distributed, merged or modified in any manner without the express written permission of Motorola. Furthermore, the purchase of Motorola products shall not be deemed to grant either directly or by implication, estoppel, or otherwise, any license under the copyrights, patents or patent applications of Motorola, as arises by operation of law in the sale of a product.

Usage and Disclosure Restrictions

License Agreement

The software described in this document is the property of Motorola, Inc. It is furnished by express license agreement only and may be used only in accordance with the terms of such an agreement.

Copyrighted Materials

Software and documentation are copyrighted materials. Making unauthorized copies is prohibited by law. No part of the software or documentation may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means, without prior written permission of Motorola, Inc.

High Risk Activities

Components, units, or third–party products used in the product described herein are NOT fault–tolerant and are NOT designed, manufactured, or intended for use as on–line control equipment in the following hazardous environments requiring fail–safe controls: the operation of Nuclear Facilities, Aircraft Navigation or Aircraft Communication Systems, Air Traffic Control, Life Support, or Weapons Systems ("High Risk Activities"). Motorola and its supplier(s) specifically disclaim any expressed or implied warranty of fitness for such High Risk Activities.

Trademarks

and Motorola are registered trademarks of Motorola, Inc.

Product and service names profiled herein are trademarks of Motorola, Inc. Other manufacturers' products or services profiled herein may be referred to by trademarks of their respective companies.

Copyright

Printed on
Recyclable Paper

REV010598

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

MOTOROLA

Table of Contents

SC 4812ET BTS Optimization/ATP – CDMA LMF

CDMA 1900 MHz

Notes

MOTOROLA

List of Figures

SC 4812ET BTS Optimization/ATP – CDMA LMF

CDMA 1900 MHz

List of Tables

SC 4812ET BTS Optimization/ATP – CDMA LMF

CDMA 1900 MHz

Product Information

Model & Options Charts

Refer to the *SC 4812ET Field Replaceable Units* manual (68P64113A24) for detailed model structure and option information

This document covers only the steps required to verify the functionality of the Base transceiver Subsystem (BTS) equipment prior to system level testing, and is intended to supplement site specific application instructions. It also should be used in conjunction with existing product manuals. Additional steps may be required.

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. It is assumed that the user of this information has a general understanding of telephony, as used in the operation of the Public Switched Telephone Network (PSTN), and is familiar with these concepts as they are applied in the cellular mobile/portable radiotelephone environment. The user, however, is not expected to have any detailed technical knowledge of the internal operation of the equipment.

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.

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 four categories of these special paragraphs are:

NOTE

Presents additional, helpful, non-critical information that you can use.

IMPORTANT

Presents 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.

. . . continued on next page

The following typographical conventions are used for the presentation of software information:In text, `typewriter` style characters represent prompts and the system output as displayed on a Hyperterminal screen.

Changes to manual

Changes that occur after the printing date are incorporated into your manual by Cellular Manual Revisions (CMRs). The information in this manual is updated, as required, by a CMR when new options and procedures become available for general use or when engineering changes occur. The cover sheet(s) that accompany each CMR should be retained for future reference. Refer to the Revision History page for a list of all applicable CMRs contained in this manual.

Receiving updates

Technical Education & Documentation (TED) maintains a customer database that reflects the type and number of manuals ordered or shipped since the original delivery of your *Motorola* equipment. Also identified in this database is a "key" individual (such as Documentation Coordinator or Facility Librarian) designated to receive manual updates from TED as they are released.

To ensure that your facility receives updates to your manuals, it is important that the information in our database is correct and up-to-date. Therefore, if you have corrections or wish to make changes to the information in our database (i.e., to assign a new *"key" individual*), please contact Technical Education & Documentation at:

MOTOROLA, INC.
Technical Education & Documentation
1 Nelson C. White Parkway
Mundelein, Illinois 60060
U.S.A.

Phone:
Within U.S.A. and Canada 800-872-8225
Outside of U.S.A. and Canada . . +1-847-435–5700
FAX: . . . . +1-847-435–5541

Reporting manual errors

In the event that you locate an error or identify a deficiency in your manual, please take time to write to us at the address above. Be sure to include your name and address, the complete manual title and part number (located on the manual spine, cover, or title page), the page number (found at the bottom of each page) where the error is located, and any comments you may have regarding what you have found. We appreciate any comments from the users of our manuals.

24-hour support service

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

Arlington Heights, IL	800–433–5202
Arlington Heights, International .	+1–847–632–5390
Cork, Ireland	44–1793–565444
Swindon, England	44–1793–565444

Material Available from Motorola Infrastructure Group Worldwide Cellular Services

Material available from Motorola Infrastructure Group Worldwide Cellular Services, identified by a Motorola part number can be ordered from your sales account manager or by calling (800) 453–7988.

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.

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

68P64114A42

Manual Title

SC 4812ET BTS Optimization/ATP – CDMA LMF
CDMA 1900 MHz

Version Information

The following table lists the manual version , date of version, and remarks on the version.

Version Level	Date of Issue	Remarks
1	May 1999	Preliminary version
2	July 1999	Preliminary version – 2

Patent Notification

Patent numbers

This product is manufactured and/or operated under one or more of the following patents and other patents pending:

4128740	4661790	4860281	5036515	5119508	5204876	5247544	5301353
4193036	4667172	4866710	5036531	5121414	5204977	5251233	5301365
4237534	4672657	4870686	5038399	5123014	5207491	5255292	5303240
4268722	4694484	4872204	5040127	5127040	5210771	5257398	5303289
4282493	4696027	4873683	5041699	5127100	5212815	5259021	5303407
4301531	4704734	4876740	5047762	5128959	5212826	5261119	5305468
4302845	4709344	4881082	5048116	5130663	5214675	5263047	5307022
4312074	4710724	4885553	5055800	5133010	5214774	5263052	5307512
4350958	4726050	4887050	5055802	5140286	5216692	5263055	5309443
4354248	4729531	4887265	5058136	5142551	5218630	5265122	5309503
4367443	4737978	4893327	5060227	5142696	5220936	5268933	5311143
4369516	4742514	4896361	5060265	5144644	5222078	5271042	5311176
4369520	4751725	4910470	5065408	5146609	5222123	5274844	5311571
4369522	4754450	4914696	5067139	5146610	5222141	5274845	5313489
4375622	4764737	4918732	5068625	5152007	5222251	5276685	5319712
4485486	4764849	4941203	5070310	5155448	5224121	5276707	5321705
4491972	4775998	4945570	5073909	5157693	5224122	5276906	5321737
4517561	4775999	4956854	5073971	5159283	5226058	5276907	5323391
4519096	4797947	4970475	5075651	5159593	5228029	5276911	5325394
4549311	4799253	4972355	5077532	5159608	5230007	5276913	5327575
4550426	4802236	4972432	5077741	5170392	5233633	5276915	5329547
4564821	4803726	4979207	5077757	5170485	5235612	5278871	5329635
4573017	4811377	4984219	5081641	5170492	5235614	5280630	5339337
4581602	4811380	4984290	5083304	5182749	5239294	5285447	D337328
4590473	4811404	4992753	5090051	5184349	5239675	5287544	D342249
4591851	4817157	4998289	5093632	5185739	5241545	5287556	D342250
4616314	4827507	5020076	5095500	5187809	5241548	5289505	D347004
4636791	4829543	5021801	5105435	5187811	5241650	5291475	D349689
4644351	4833701	5022054	5111454	5193102	5241688	5295136	RE31814
4646038	4837800	5023900	5111478	5195108	5243653	5297161	
4649543	4843633	5028885	5113400	5200655	5245611	5299228	
4654655	4847869	5030793	5117441	5203010	5245629	5301056	
4654867	4852090	5031193	5119040	5204874	5245634	5301188	

Chapter 1: Introduction

Table of Contents

Notes

Optimization Overview

Scope of This Document

This document provides information pertaining to the optimization and audit tests of Motorola SC 4812ET Base Transceiver Subsystem (BTS) equipment frames equipped with trunked high–power Linear Power Amplifiers (LPAs) and their associated internal and external interfaces.

This document assumes the following prerequisites: The BTS frames and cabling have been installed per the *BTS Hardware Installation Manual* – 68P64114A22, which covers the physical "bolt down" of all SC series equipment frames, and the specific cabling configurations.

Document Composition

This document covers the following major areas:

- Introduction, consisting of preliminary background information (such as component and subassembly locations and frame layouts) to be considered by the Cell Site Field Engineer (CFE) before optimization or tests are performed.
- Preliminary Operations, consisting of Cabinet Power Up and Power Down Procedures.
- Optimization/calibration, covering topics of LMF connection to the BTS equipment, GPS Verification, Test equipment setup, downloading all BTS processor boards, RF path verification, BLO calibration and calibration audit, and Radio Frequency Diagnostic System (RFDS) calibration.
- Acceptance Test Procedures (ATP) consist of automated ATP tests executed by the LMF, and used to verify all major transmit (TX) and receive (RX) performance characteristics on all BTS equipment. Also generates an ATP report.
- Alarms testing.
- RFDS Optimization.
- Basic troubleshooting
- Preparing to leave the site, presents instructions on how to properly exit customer site and ensure that all equipment is operating properly and all work is complete according to Motorola guidelines.
- Appendices that contain pertinent Pseudorandom Noise (PN) Offset, frequency programming, and output power data tables, along with additional data sheets that are filled out manually by the CFE at the site.

CDMA LMF Product Description

CDMA LMF is a graphical user interface (GUI) based Local Maintenance Facility(LMF). This product is specifically designed to provide cellular communications field personnel the vehicle to support the following CDMA Base Transceiver Stations (BTS) operations:

- Installation
- Maintenance
- Calibration
- Optimization

Online Help

Task oriented online help is available in the LMF by clicking on **Help** from the menu bar.

Why Optimize?

Proper optimization and calibration assures:

- Accurate downlink RF power levels are transmitted from the site.
- Accurate uplink signal strength determinations are made by the site.

What Is Optimization?

Optimization compensates for the site-specific cabling and normal equipment variations. Cables that interconnect the BTS and Duplexer assemblies (if used), for example, are cut and installed at the time of the BTS frame installation at the site. Site optimization guarantees that the combined losses of the new cables and the gain/loss characteristics and built-in tolerances of each BTS frame do not accumulate, causing improper site operation.

Optimization identifies the accumulated loss (or gain) for all receive and transmit paths at the BTS site, and stores that value in a database.

- RX path starts at the ancillary equipment frame RFDS RX directional coupler antenna feedline port, through the RX input port on the rear of the frame, through the DDRCs, Multicoupler Preselector Card (MPC), and additional splitter circuitry, ending at a Code Division Multiple Access (CDMA) Channel Processor (C–CCP) backplane Broad Band Transceiver (BBX2) slot in the C–CCP shelf.
- A transmit path starts at the BBX2, through the C–CCP backplane slot, travels through the LPA/Combiner TX Filter and ends at the rear of the input/output (I/O) Panel. If the RFDS option is added, then the TX path continues and ends at the top of the RFDS TX directional coupler antenna feedline port installed in the ancillary equipment frame.

These values are factored in by the BTS equipment internally, leaving only site specific antenna feed line loss and antenna gain characteristics to be factored in by the CFE when determining site Effective Radiated Power (ERP) output power requirements.

Each C–CCP shelf BBX2 board is optimized to a specific RX and TX antenna port. (One BBX2 board acts in a redundant capacity for BBX2s 1–12, and is optimized to all antenna ports). A single value is generated for each path, thereby eliminating the accumulation of error that would occur from individually measuring and summing the gain and loss of each element in the path.

When to Optimize

New Installations

After the initial site installation, the BTS must be prepared for operation. This preparation includes verifying hardware installation, initial power up, and GPS verification. Basic alarm tests are also addressed.

A calibration audit of all RF transmit paths is performed to verify factory calibration.

A series of ATP CDMA verification tests are covered using the actual equipment set up. An Acceptance Test Procedure (ATP) is also required before the site can be placed in service.

Site Expansion

Optimization is also required after expansion of a site.

Periodic Optimization

Periodic optimization of a site may also be required, depending on the requirements of the overall system.

Repaired Sites

Verify repair(s) made to the BTS by consulting an Optimization/ATP Test Matrix table. This table outlines the specific tests that must be performed *anytime* a BTS subassembly or RF cable associated with it is replaced.

IMPORTANT

Refer to Appendix B for detailed basic guideline tables and detailed Optimization/ATP Test Matrix.

Required Documents

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

- Site Document (generated by Motorola Systems Engineering), which includes:
  - General Site Information
  - Floor Plans
  - Power Levels

  – Site PN
  – Site Paging & Traffic Channel Allocation
  – Board Placement
  – Site Wiring Lists
  – CDF files.
- Demarcation Document (Scope of Work Agreement)
- Equipment Manuals for non-Motorola test equipment.

Additional Information

For other information, refer to the following manuals:

- *CDMA LMF Operators Guide*
  (Motorola part number 68P64114A21)
- *4812ET Field Replacement Units Guide*
  (Motorola part number 68P64114A24)

Test Equipment Overview

CDMA LMF is used in conjunction with Motorola recommended test equipment, and it is a part of a "calibrated test set." To ensure consistent, reliable, and repeatable optimization test results, only recommended test equipment supported by CDMA LMF must be used to optimize the BTS equipment. Table 1-1 outlines the supported test equipment that meets the technical criteria required for BTS optimization.

Table 1-1: CDMA LMF Test Equipment Support Table

Item	Description
Hewlett Packard, Model HP 8921A	Cellular Communications Analyzer (includes 83203B CDMA interface option)
Hewlett Packard, Model HP 8983236A	PCS Interface for PCS Band
Hewlett Packard, Model HP 8935	Cellular Communications Analyzer
Motorola CyberTest	Cellular Communications Analyzer
Advantest R3465 with 3561 CDMA option (Japan–CDMA also uses TX test menu PCMCIA)	Cellular Communications Analyzer
Gigatronix 8541C	Power Meter
HP437B	Power Meter

To ensure consistent, reliable, and repeatable optimization test results, test equipment meeting the following technical criteria should be used to optimize the BTS equipment. You can, of course, substitute test equipment with other test equipment models supported by the local maintenance facility (LMF) *meeting the same technical specifications*.

LMF Hardware Requirements

An LMF computer platform that meets the following requirements (or better) is recommended:

- Notebook computer
- 266 MHz (32 bit CPU) Pentium processor
- 4 Gbyte internal hard disk drive
- Color display with 1024 x 768 (recommended) or 800 x 600 pixel resolution
- 64 MB RAM
- CD ROM drive
- 3 1/2 inch floppy drive
- Serial port (COM 1)
- Parallel port (LPT 1)
- PCMCIA Ethernet interface card (for example, 3COM Etherlink III) with a 10Base–T–to–coax adapter
- Windows 98/NT operating system

NOTE

If 800 x 600 pixel resolution is used, the CDMA LMF window must be maximized after it is displayed.

Required Test Equipment

To ensure consistent, reliable, and repeatable optimization test results, test equipment meeting the following technical criteria should be used to optimize the BTS equipment. You can, of course, substitute test equipment with other test equipment models supported by the LMF *meeting the same technical specifications*.

NOTE

During manual testing, you can substitute test equipment with other test equipment models not supported by the LMF, ***but those models must meet the same technical specifications***.

The customer has the responsibility of accounting for any measurement variances and/or additional losses/inaccuracies that can be introduced as a result of these substitutions. Before beginning optimization or troubleshooting, make sure that the test equipment needed is on hand and operating properly.

Test Equipment Calibration

Optimum system performance and capacity depend on regular equipment service, calibration, and characterization prior to BTS optimization. Follow the original equipment manufacturer (OEM) recommended maintenance and calibration schedules closely.

Test Cable Calibration

Equipment test cables are very important in optimization. Motorola recommends that the cable calibration be run at every BTS with the test cables attached. This method compensates for test cable insertion loss within the test equipment itself. No other allowance for test cable insertion loss needs to be made during the performance of tests.

Another method is to account for the loss by entering it into the LMF during the optimization procedure. This method requires accurate test cable characterization in a shop. The cable should be tagged with the characterization information prior to field optimization.

Equipment Warm–up

After arriving at the a site, the test equipment should be plugged in and turned on to allow warm up and stabilization to occur for as long as possible. The following pieces of test equipment must be warmed–up for *a minimum of 60 minutes* prior to using for BTS optimization or Radio Frequency Diagnostic Subsystem (RFDS) calibration procedures.

- Communications Test Set
- Rubidium Time Base
- Power Meter

Test Equipment List

The following pieces of test equipment are required during the optimization procedure. Common assorted tools like screwdrivers and frame keys are not listed but are still required. Read the owner’s manual on all of the following major pieces of test equipment to understand their individual operation prior to use in optimization.

> **NOTE**
>
> Always refer to specific OEM test equipment documentation for detailed operating instructions.

10BaseT/10Base2 Converter

Ethernet LAN transceiver *(part of CGDSLMFCOMPAQNOV96)*

- PCMCIA Ethernet Adpater + Ethernet UTP Adapter: 3COM Model – Etherlink III 3C589B

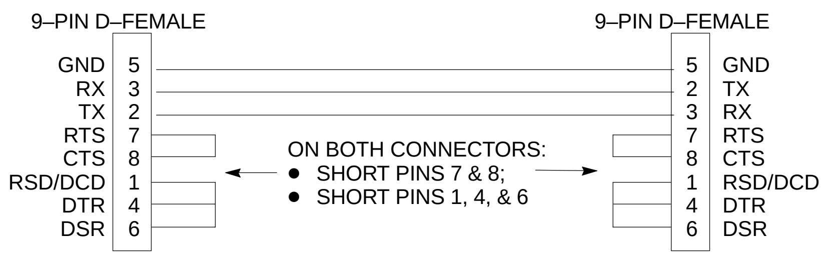
Transition Engineering Model E–CX–TBT–03 10BaseT/10Base2 Converter

NOTE

Xircom Model PE3–10B2 or equivalent can also be used to interface the LMF Ethernet connection to the frame.

RS–232 to GPIB Interface

- National Instruments GPIB–232–CT with Motorola CGDSEDN04X RS232 serial null modem cable or equivalent; used to interface the LMF to the test equipment.
- *Standard RS–232 cable can be used with the following modifications:*
  - This solution passes only the 3 minimum electrical connections between the LMF and the GPIB interface. The control signals are jumpered as enabled on both ends of the RS–232 cable (9–pin D). TX and RX signals are crossed as Null Modem effect. Pin 5 is the ground reference.
  - Short pins 7 and 8 together, and short pins 1, 4, and 6 together on each connector.



Model SLN2006A MMI Interface Kit

- Motorola Model TRN9666A null modem board. Connectors on opposite sides of the board must be used as this performs a null modem transformation between cables. This board can used for 10–pin to 8–pin, 25–pin to 25–pin and 10–pin to 10–pin conversions.
- Motorola 30–09786R01 MMI cable or equivalent ; used to interface the LMF serial port connection to GLI2, CSM and LPA debug serial ports.

Communications System Analyzer

The communication system analyzer is used during optimization and testing of the RF communications portion of BTS equipment and provides the following functions:

(1) Frequency counter
(2) RF power meter (average and code domain)
(3) RF Signal Generator (capable of CDMA modulation)
(4) Spectrum Analyzer
(5) CDMA Code Domain analyzer

Four types of Communication System Analyzer are currently supported by the LMF. They are:

HP8921A/600 Analyzer – Including 83203B CDMA Interface and 83236A/B PCS Interface with manual control system card.

Advantest R3465 Analyzer – Including R3561L Test Source Unit

HP8935 Analyzer

CyberTest Communication Analyzer

GPIB Cables

- Hewlett Packard 10833A or equivalent; 1 to 2 meters (3 to 6 feet) long used to interconnect test equipment and LMF terminal.

Power Meter

- Hewlett Packard Model HP HP437B with HP8481A power sensor
- Gigatronix model 8541C

Timing Reference Cables

- ***Two*** BNC–male to BNC–male RG316 cables; 3 meters (10 ft.) long, used to interconnect the HP8921A/600 or Advantest R3465 Communications Analyzer to the CSM front panel timing references in the BTS.

NOTE

Two Huber & Suhner 16MCX/11BNC/K02252D or equivalent; right angle MCX–male to standard BNC–male RG316 cables; 10 ft. long are required to interconnect the HP8921A/600 Communications Analyzer to SGLN4132A and SGLN1145A CSM board timing references.

- BNC “T” adapter with 50 ohm termination.

NOTE

This BNC “T” adapter (with 50 ohm termination) is required to connect between the HP 8921A/600 (or Advantest R3465) EVEN SECOND/SYNC IN and the BNC cable. The BNC cable leads to the 2–second clock connection on the TIB. Erroneous test results may occur if the “T” adapter with the 50 ohm termination is not connected.

Digital Multimeter

- Fluke Model 8062A with Y8134 test lead kit or equivalent; used for precision DC and AC measurements, requiring 4–1/2 digits.

Directional Coupler

- Narda Model 30661 30 dB (Motorola part no. 58D09732W01) coupler terminated with two Narda Model 375BN–M loads, or equivalent.

RF Attenuators

- 20 dB fixed attenuators, 20 W (Narda 768–20); used with test cable calibrations or during general troubleshooting procedures.

- Narda Model 30445 30 dB (Motorola Part No. 58D09643T01) coupler terminated with two Narda Model 375BN–M loads, or equivalent.

RF Termination/Load

- 100 W non–radiating RF load ; used (as required) to provide dummy RF loading during BTS transmit tests.

Miscellaneous RF Adapters, Loads, etc

- As required to interface test cables and BTS equipment and for various test set ups. Should include at least two 50 Ohm loads (type N) for calibration and one RF short, two N–Type Female–to–Female Adapters.

High–impedance Conductive Wrist Strap

- Motorola Model 42–80385A59; used to prevent damage from Electrostatic Discharge (ESD) when handling or working with modules.

RF Load (At least three (3) for Trunked Cabinets)

- 100 W non–radiating RF load; used (as required) to provide dummy RF loading during BTS transmit tests.

RF Network Box (and calibrated cables)

- Motorola Model SGLN5531A 18:3 Passive Antenna Interface used to interface test equipment to the BTS receive and transmit antenna inputs during optimization/ATP or general troubleshooting procedures.

Optional Equipment

Frequency Counter

- Stanford Research Systems SR620 or equivalent. If direct measurement of the 3 MHz or 19.6608 MHz references is required.

Spectrum Analyzer

- Spectrum Analyzer (HP8594E with CDMA personality card) or equivalent; required for tests other than standard Receive band spectral purity and TX LPA IM reduction verification tests performed by the LMF.

Local Area Network (LAN) Tester

- Model NETcat 800 LAN troubleshooter (or equivalent); used to supplement LAN tests using the ohm meter.

Span Line (T1/E1) Verification Equipment

- As required for local application

RF Test Cable (if not Provided with Test Equipment)

- Motorola Model TKN8231A; used to connect test equipment to the BTS transmitter output during optimization or during general troubleshooting procedures.

Oscilloscope

- Tektronics Model 2445 or equivalent; for waveform viewing, timing, and measurements or during general troubleshooting procedure.

2–way Splitter

- Mini–Circuits Model ZFSC–2–2500 or equivalent; provide the diversity receive input to the BTS

High Stability 10 MHz Rubidium Standard

- Stanford Research Systems SR625 or equivalent. Required for CSM and Low Frequency Receiver/High Stability Oscillator (LFR/HSO) frequency verification.

Alarm Test Box

- Motorola Itasca PN CGDSCMIS00014 can be used to test customer alram inputs.

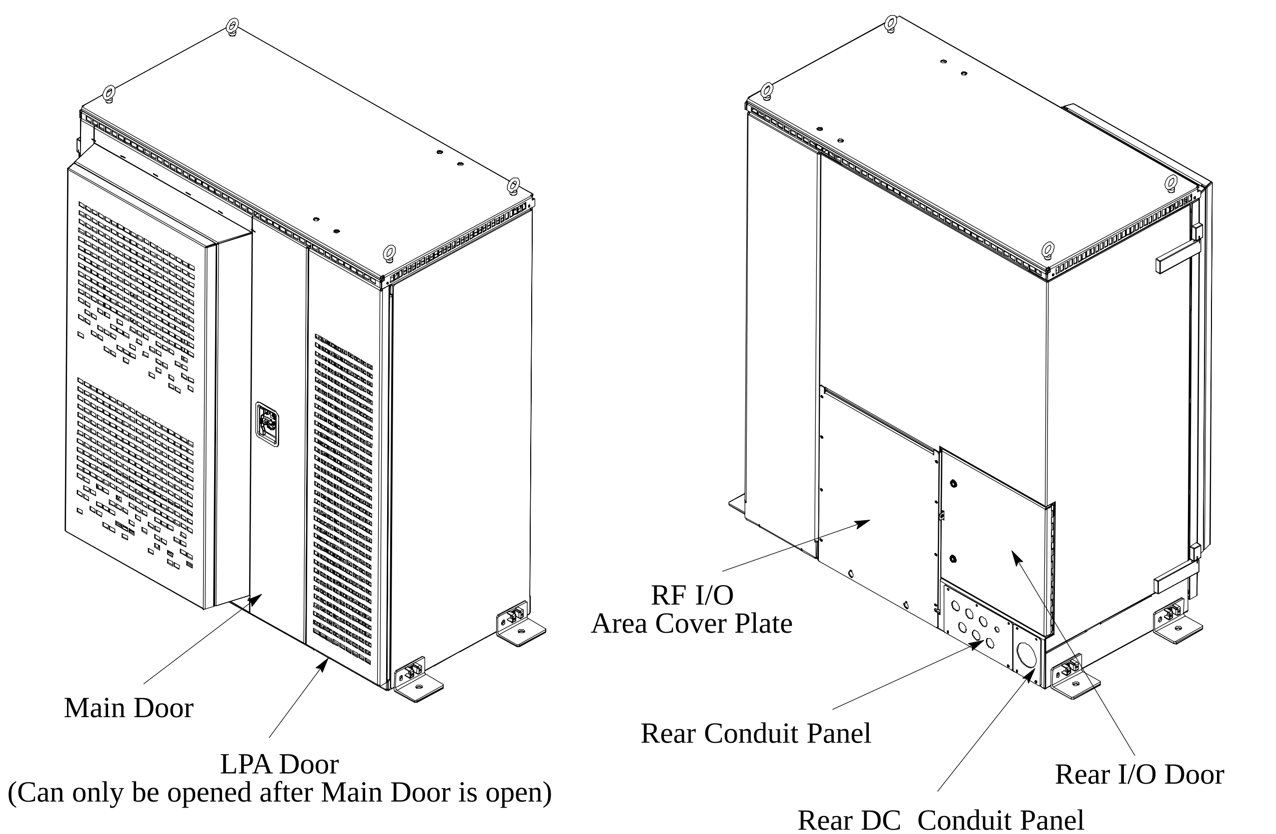
Frames

The SC 4812ET is a stand alone Base Transceiver Subsystem (BTS) which consists of a weatherized outdoor RF cabinet (see Figure 1-1). An optional outdoor, weatherized power cabinet which provides AC/DC rectified power and battery back–up is also available. An air to air heat exchanger is used for cooling/heating each cabinet, except in the LPA area which uses blower fans.

The Motorola SC 4812ET BTS can consist of the following equipment frames:

- At least one BTS starter frame (see Figure 1-2)
- Ancillary equipment frame (or wall mounted equipment)
- Expansion frames

Figure 1-1: SC 4812ET RF Cabinet



BTS Frame Identification

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

- The I/O interconnect plate where all connections are made is located at the back of the BTS.
- The RF section of the frame which houses the circuit breakers, cooling fans, the Combined CDMA Channel Processor (C–CCP) shelf, the duplexors, filters, RFDS and CSU.
- The LPA compartment which houses the LPAs and blower assembly.

Use the illustrations that follow to visually identify the major components, that make up the Motorola SC 4812ET BTS frame.

C–CCP Shelf (Figure 1-3)

- Power supply modules
- CDMA clock distribution (CCD) boards
- CSM and HSO/LFR boards
- Alarm Monitoring and Reporting (AMR) boards
- Group Line Interface II (GLI2) cards
- Multicoupler Preselector (MPC) boards (starter frame only)
- Expansion Multicoupler Preselector (EMPC) boards (expansion frames)
- Switch card
- MCC24 boards
- MCC8E boards
- BBX2 boards
- CIO boards

PA Shelves

- Single Tone Linear Power Amplifier (STLPA, or more commonly referred to as “LPA”) modules
- LPA blower assembly

Interconnect Plate (see Figure 1-4)

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

- Span lines
- RX antennas
- TX antenna
- Alarm connections
- Power input
- LAN connections
- Clock inputs
- Expansion frame connection
- Ground connections

Figure 1-2: SC4812ET RF Cabinet Internal FRUs

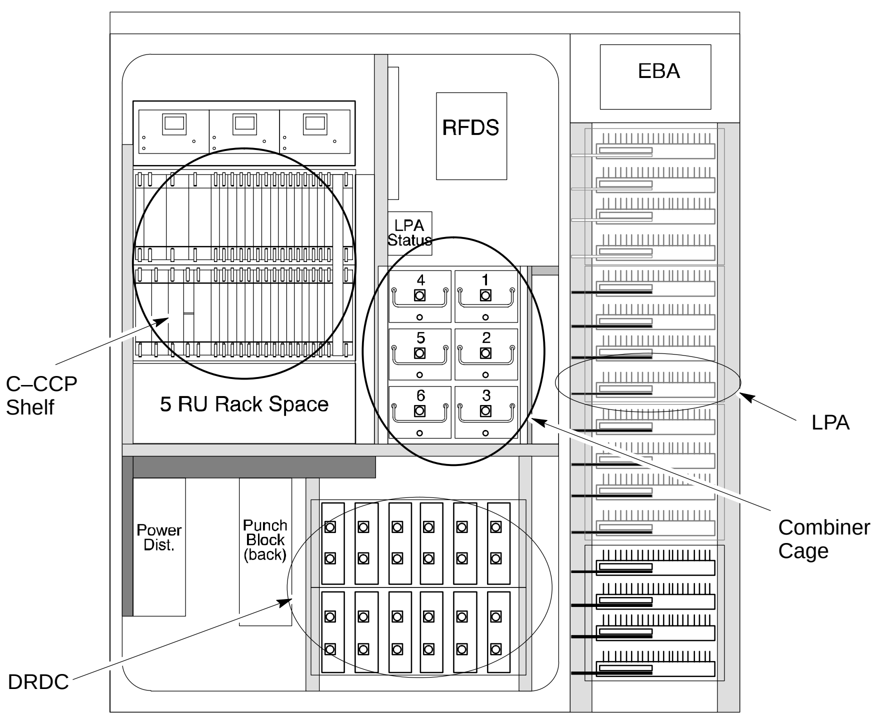


Figure 1-3: C-CCP Shelf Layout

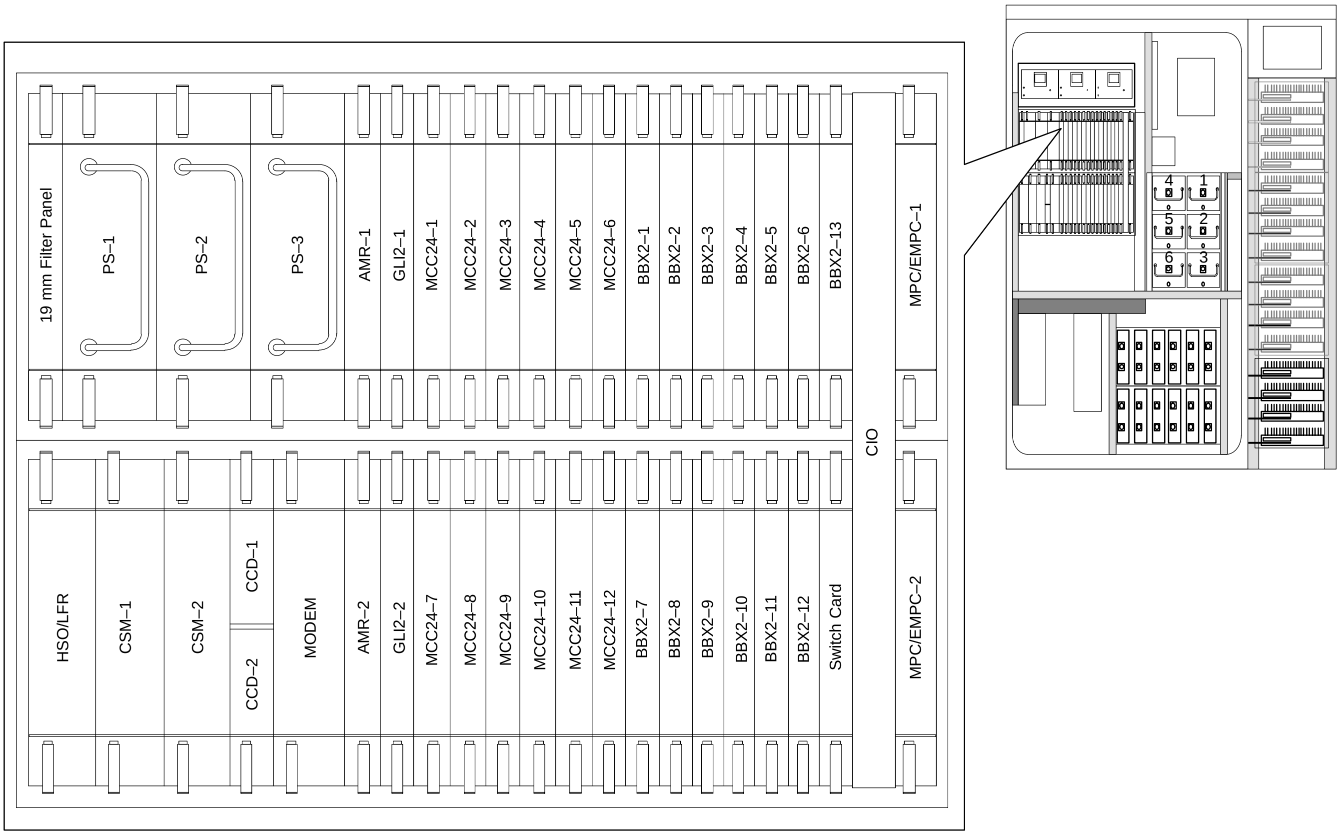
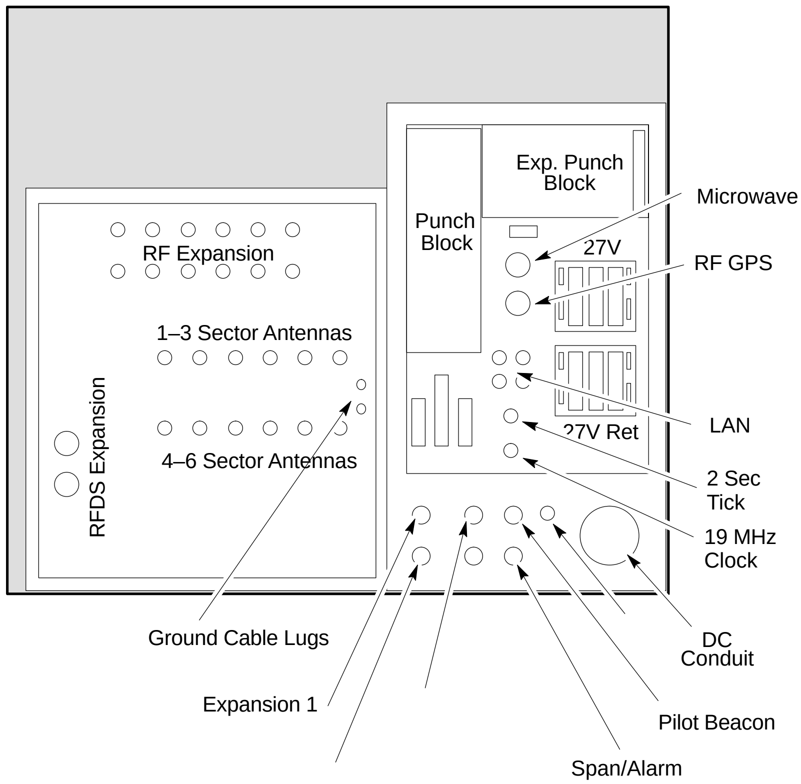


Figure 1-4: SC 4812ET Intercabinet I/O Detail (Rear View)



Sector Configuration

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

Table 1-2: BTS Sector Configuration

Number of carriers	Number of sectors	Channel spacing	Filter requirements
1	3 or 6	N/A	Bandpass Filter, Cavity Combiner (2:1 or 4:1)
2	6	Non–adjacent	Cavity Combiner (2:1 Only)
2	6	Adjacent	Dual Bandpass Filter
2	3	Non–adjacent	Cavity Combiner (2:1 or 4:1)
2	3	Adjacent	Bandpass Filter
3,4	3	Non–adjacent	Cavity Combiner (2:1 or 4:1)
3,4	3	Adjacent	Cavity Combiner (2:1 Only)

Table 1-3: Sector Configurations

Configuation	Description						
1	**3–Sector / 2–ADJACENT Carriers** The configuration below maps RX and TX with optional 2:1 cavity combiners for 3 sectors / 2 carriers for adjacent channels. Note that 2:1 cavity combiners are used (6 total).						
	TX1 / RX1	**TX2 / RX2**	**TX3 / RX3**	**TX4 / RX1**	**TX5 / RX2**	**TX6 / RX3**	**Carrier #**
	BBX2–1	BBX2–2	BBX2–3	N/A	N/A	N/A	1
	N/A	N/A	N/A	BBX2–4	BBX2–5	BBX2–6	2
2	**6–Sector / 2–NON–ADJACENT Carriers** The configuration below maps RX and TX with 2:1 cavity combiners for 6 sectors / 2 carriers for *non–adjacent* channels.						
	TX1 / RX1	**TX2 / RX2**	**TX3 / RX3**	**TX4 / RX4**	**TX5 / RX5**	**TX6 / RX6**	**Carrier #**
	BBX2–1	BBX2–2	BBX2–3	BBX2–4	BBX2–5	BBX2–6	1
	BBX2–7	BBX2–8	BBX2–9	BBX2–10	BBX2–11	BBX2–12	2
3	**3–Sector / 2–NON–ADJACENT Carriers** The configuration below maps RX and TX with 2:1 cavity combiners for 3 sectors / 2 carriers for *non–adjacent* channels. RX ports 4 through 6 are not used						
	TX1 / RX1	**TX2 / RX2**	**TX3 / RX3**	**TX4 / RX1**	**TX5 / RX2**	**TX6 / RX3**	**Carrier #**
	BBX2–1	BBX2–2	BBX2–3	N/A	N/A	N/A	1
	BBX2–7	BBX2–8	BBX2–9	N/A	N/A	N/A	2
4	**.3–Sector / 4–ADJACENT Carriers** The configuration below maps RX and TX with 2:1 cavity combiners for 3 sector / 4 carriers for *adjacent* channels.						
	TX1 / RX1	**TX2 / RX2**	**TX3 / RX3**	**TX4 / RX1**	**TX5 / RX2**	**TX6 / RX3**	**Carrier #**
	BBX2–1	BBX2–2	BBX2–3	N/A	N/A	N/A	1
	BBX2–7	BBX2–8	BBX2–9	N/A	N/A	N/A	2
	N/A	N/A	N/A	BBX2–4	BBX2–5	BBX2–6	3
	N/A	N/A	N/A	BBX2–10	BBX2–11	BBX2–12	4
5	**3–Sector / 2–ADJACENT Carriers** The configuration below maps RX and TX with bandpass filters for 3 sectors / 2 carriers for *adjacent* channels.						
	TX1 / RX1	**TX2 / RX2**	**TX3 / RX3**	**TX4 / RX4**	**TX5 / RX5**	**TX6 / RX6**	**Carrier #**
	BBX2–1	BBX2–2	BBX2–3	N/A	N/A	N/A	1
	N/A	N/A	N/A	BBX2–7	BBX2–8	BBX2–9	2
6	**3–Sector / 3 or 4–NON–ADJACENT Carriers** The configuration below maps RX and TX with 4:1 cavity combiners for 3 sectors / 3 or 4 carriers for *non–adjacent* channels.						
	TX1 / RX1	**TX2 / RX2**	**TX3 / RX3**	**TX4 / RX4**	**TX5 / RX5**	**TX6 / RX6**	**Carrier #**
	BBX2–1	BBX2–2	BBX2–3	N/A	N/A	N/A	1
	BBX2–7	BBX2–8	BBX2–9	N/A	N/A	N/A	2
	BBX2–4	BBX2–5	BBX2–6	N/A	N/A	N/A	3
	BBX2–10	BBX2–11	BBX2–12	N/A	N/A	N/A	4

Table 1-3: Sector Configurations							
7	**6–Sector / 1–Carrier** The configuration below maps RX and TX with either bandpass filters or 2:1 cavity combiners for 6 sector / 1 carrier.						
	TX1 / RX1	**TX2 / RX2**	**TX3 / RX3**	**TX4 / RX4**	**TX5 / RX5**	**TX6 / RX6**	**Carrier #**
	BBX2–1	BBX2–2	BBX2–3	BBX2–4	BBX2–5	BBX2–6	1

Ancillary Equipment Frame identification

NOTE

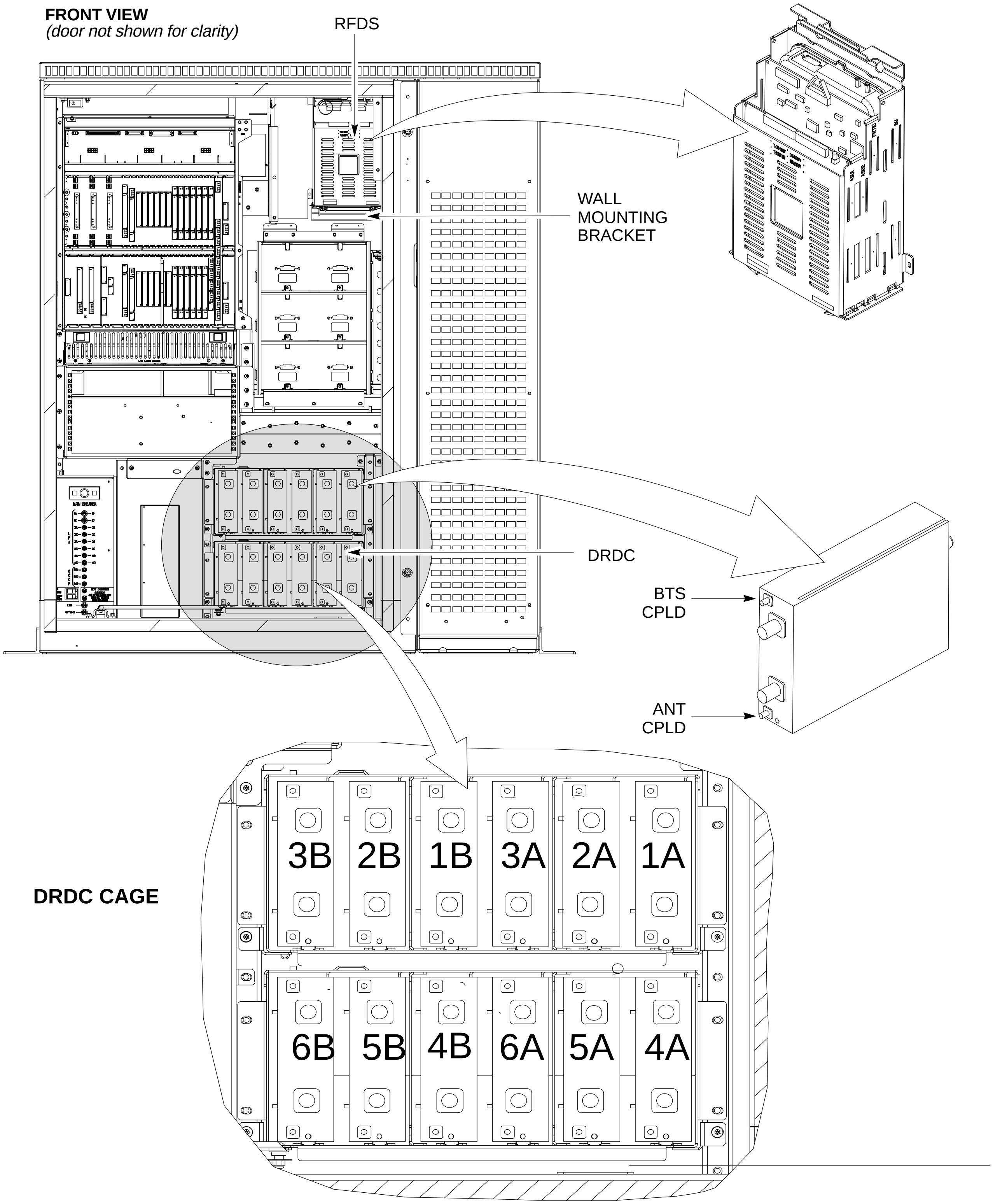
Equipment listed below can be wall mounted or mounted in a standard 19” frame. The description assumes that all equipment is mounted in a frame for clarity.

If equipped with the RF Diagnostic Subsystem (RFDS) option, the RFDS and directional couplers are the interface between the site antennas, and the BTS or Modem frame. The RFDS equipment includes:

- the directional couplers
- the (site receive bandpass/bandreject filters)
- the RF Diagnostic Subsystem (RFDS).

BTS Equipment Identification – continued

Figure 1-5: RFDS Location in an SC 4812ET RF Cabinet



Chapter 2: Preliminary Operations

Table of Contents

Notes

Introduction

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

Cellsite Types

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

CDF

The Cell-site Data File (CDF) contains site type and equipage data information and passes it directly to the LMF during optimization. The number of modem frames, C–CCP shelves, BBX2 and MCC24/MCC8E boards (per cage), and linear power amplifier assignments are some of the equipage data included in the CDF.

Site Equipage Verification

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

CAUTION

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

Initial Installation of Boards/Modules

Table 2-1: Initial Installation of Boards/Modules

Step	Action
1	Refer to the site documentation and install all boards and modules into the appropriate shelves as required. **Verify they are NOT SEATED at this time.**
2	As the actual site hardware is installed, record the serial number of each module on a “Serial Number Checklist” in the site logbook.

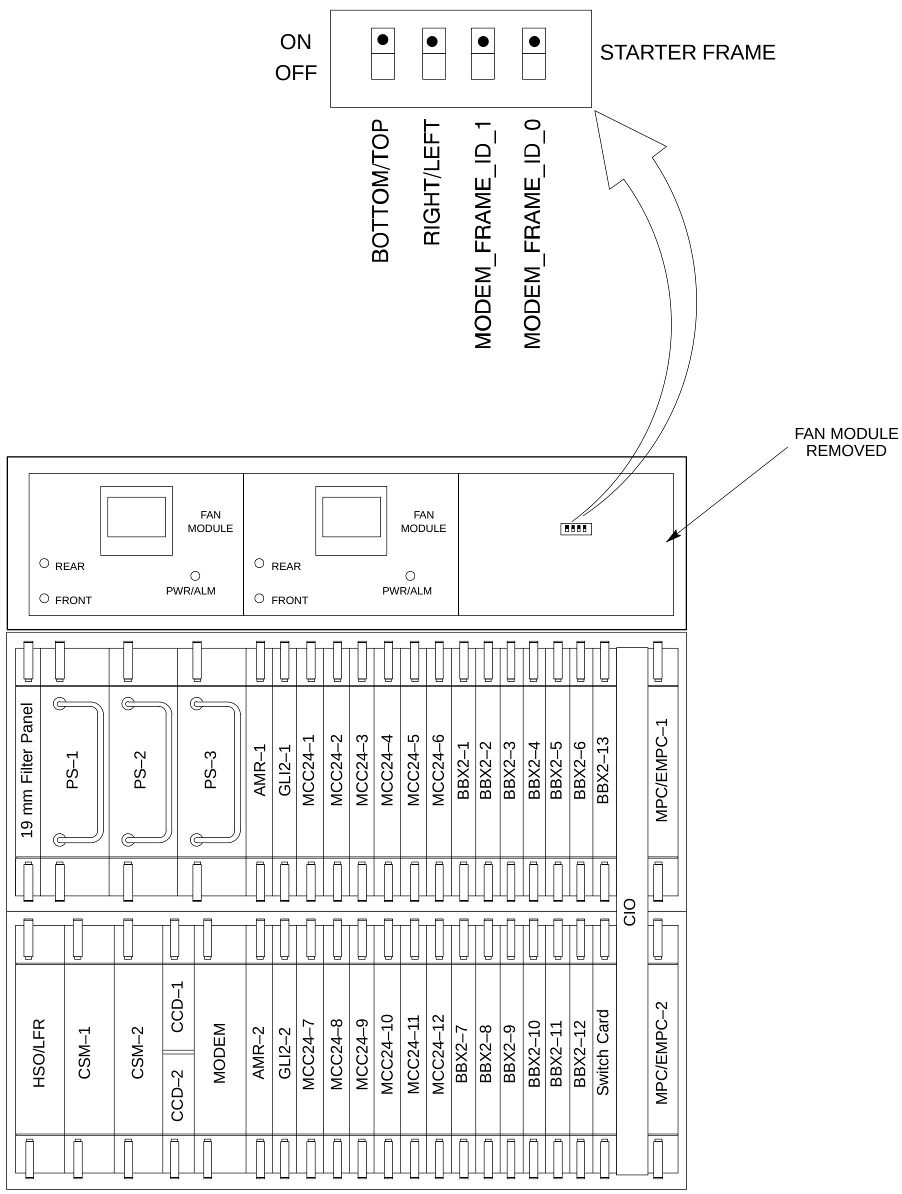
2

Setting Frame C–CCP Shelf Configuration Switch

If the frame is a Starter BTS, the backplane switch settings behind the fan module nearest the breaker panel should be set to the ON position (see Figure 2-1).

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

Figure 2-1: Backplane DIP Switch Settings



SC 4812ET C–CCP SHELF

Power Cabinet Initial Power Up

Introduction

This section of the manual contains instructional information on the proper power up procedure for the SC 4812ET BTS. Also presented in this chapter is the Optimization/ATP tests to be preformed on the Power cabinet. Please pay attention to all Cautions and Warning statements in order to prevent accidental injury to personnel.

The following tools are used in the Power Cabinet Power Up procedures.

Required Tools

- Digital Voltmeter
- DC current clamp (600 Amp capability with jaw size to accommodate 2/0 cable).
- Hot Air Gun – (optional for part of the Alarm Verification)

Initial Inspection and Setup

CAUTION

Ensure all battery breakers for unused battery positions are open (pulled out) during any part of the power up process, and remain in the off position when leaving the site.

Verify that ALL AC and DC breakers are turned OFF in the Power cabinet. Verify all DC circuit breakers are OFF in the RF cabinet. Verify that the DC power cables between the Power and RF cabinets are connected with the correct polarity

The RED cables connect to the uppermost three (3) terminals (marked +) in both cabinets. Confirm that the split phase 240/120 AC supply is correctly connected to the AC load center input.

CAUTION

Failure to connect the proper AC feed will damage the surge protection module inside the AC load center.

Power Up Sequence

The first task in the power up sequence is to apply AC power to the Power cabinet. Once power is applied a series of AC Voltage measurements is required.

Table 2-2: AC Voltage Measurements

Step	Action
1	Measure the AC voltages connected to the AC load center (access the terminals from the rear of the cabinet after removing the AC load center rear panel).
2	Measure the AC voltage from terminal L1 to neutral. This voltage should be in the range of nominally 115 to 120 V AC.

. . . continued on next page

Table 2-2: AC Voltage Measurements

Step	Action
3	Measure the AC voltage from terminal L1 to ground. This voltage should be in the range of nominally 115 to 120 V AC.
4	Measure the AC voltage from terminal L2 to neutral. This voltage should be in the range of nominally 115 to 120 V AC.
5	Measure the AC voltage from terminal L2 to ground. This voltage should be in the range of nominally 115 to 120 V AC.

CAUTION

If the AC voltages are in excess of 120 V (or exceed 200 V) when measuring between terminals L1 or L2 to neutral or ground, **STOP** and Do Not proceed until the cause of the higher voltages are determined. The power cabinet **WILL** be damaged if the Main breaker is turned on with excessive voltage on the inputs.

When the input voltages are verified as correct, turn the Main AC breaker (located on the front of the AC Load Center) ON. Observe that all eight (8) green LEDs on the front of the AC Load Center are illuminated.

Turn Rectifier 1 and Rectifier 2 AC branch breakers (on the AC Load Center) ON. All the installed rectifier modules will start up and should each have two green LEDs (DC and Power) illuminated.

Turn the DMAC (Digital Metering and Alarms Control) module, ON while observing the K2 contact in the PDA assembly. The contact should close. The DMAC voltage meter should read approximately 27.4 $\pm$ 0.2 VDC.

Turn the TCP (Temperature Control Panel) ON, .The DMAC should not be have any alarm LEDs illuminated .

Check the rectifier current bargraph displays. None should be illuminated at this point.

NOTE

If batteries are fitted, turn on the two battery heater AC breakers on the AC Load Center.

Power Up Tests

Table 2-3 lists the step–by–step instructions for Power Up Tests.

Table 2-3: Power Up Tests

Step	Action
1	Probe the output voltage test point on the DMAC while pressing the 25° C set button on the TCP. The voltage should read 27.4 ± 0.2 VDC. Adjust Master Voltage on DMAC if necessary. Release the TCP 25° C set button.
2	Depending on the ambient temperature, the voltage reading may now change by up to ± 1.5 V compared to the reading just measured. If it is cooler than 25°C, the voltage will be higher, and if it is warmer than 25°C, the voltage will be lower.
3	Close the three (3) Main DC breakers on the Power Cabinet ONLY. Close by holding in the reset button on the front of the PDA, and engaging one breaker at a time.
4	Measure the voltage between the + and – terminals at the rear of the Power Cabinet and the RF Cabinet, observing that the polarity is correct. The voltage should be the same as the measurement in step 2.
5	Place the probes across the black and red battery buss bars in each battery compartment. Place the probe at the bottom of the buss bars where the cables are connected. The DC voltage should measure the same as the previous step.

Battery Charge Test

Table 2-4 lists the step–by–step instructions for testing the batteries.

Table 2-4: Battery Charge Test

Step	Action
1	Close the battery compartment breakers for connected batteries ONLY. This process should be completed quickly to avoid individual battery strings with excess charge current **NOTE** If the batteries are sufficiently discharged, the battery circuit breakers may not engage individually due to the surge current. If this condition is observed, turn off the DMAC power switch, and then engage all the connected battery circuit breakers, the DMAC power switch should then be turned on.
2	Using the DC current probe, measure the current in each of the battery string connections to the buss bars in each battery cabinet. The charge current may initially be high but should quickly reduce in a few minutes if the batteries have a typical new battery charge level.
3	The current in each string should be approximately equal (± 5 amps).

. . . continued on next page

Table 2-4: Battery Charge Test	
Step	**Action**
4	The bargraph meters on the rectifier modules can be used as a rough estimate of the total battery charge current. Each rectifier module has eight (8) LEDs to represent the output current. Each illuminated LED indicates that approximately 12.5% (1/8 or 8.75 Amps) of the rectifiers maximum (70 Amps) current is flowing. **EXAMPLE:** **Question:** A system fitted with three (3) rectifier modules each have three bargraph LEDs illuminated. What is the total output current into the batteries? **Answer:** Each bargraph is approximately indicating 12.5% of 70 Amps, therefore, 3 X 8.75 equals 26.25 Amps. As there are three rectifiers, the total charge current is equal to (3 X 26.25 A) 78.75 Amps. This charge current calculation only applies at this part of the start up procedure, when the RF Cabinet is not powered on, and the power cabinet heat exchanger is turned off.
5	Allow a few minutes to ensure that the battery charge current stabilizes before taking any further action. Recheck the battery current in each string. If the batteries had a reasonable charge, the current in each string should reduce to less than 5A.
6	Recheck the DC output voltage. It should remain the same as measured in step 4 of the Power Up Test. **NOTE** If discharged batteries are installed, all bargraphs may be illuminated on the rectifiers during the charge test. This indicates that the rectifiers are at full capacity and are rapidly charging the batteries. It is recommended in this case that the batteries are allowed to charge and stabilize as in the above step before commissioning the site. This could take several hours.

RF Cabinet Power Up

Table 2-5 covers the procedures for properly powering up the RF Cabinet.

Table 2-5: RF Cabinet Power Up	
Step	**Action**
1	Turn the 400 Amp Main DC breaker in the RF Cabinet ON. **NOTE** Ensure that no alarms or voltage change has occurred in the power cabinet, and that the power cabinet Main DC breakers have not tripped. The rectifier bargraph readings should be the same as before the main breaker in the RF cabinet was turned ON.
2	Proceed to RF cabinet power up sequence.
3	The RF Cabinet ATP procedure can now proceed in parallel with the remaining Power Supply Cabinet tests.

. . . continued on next page

Table 2-5: RF Cabinet Power Up

Step	Action
4	Measure the voltage drop between the Power Cabinet meter test point and the 27 V buss bar inside the RF Cabinet PDA while the RF Cabinet is transmitting. **NOTE** For a three (3) sector carrier system, the voltage drop should be less than 0.2 VDC. For a twelve (12) sector carrier system, the voltage drop should be less than 0.3 VDC.
5	Using a DC current probe, measure the current in each of the six (6) DC cables that are connected between the RF and Power Cabinet. The DC current measured should be approximately the same. If there is a wide variation between one cable and the others (>10 A), check the tightness of the connections (torque settings) at each end of the cable.

Battery Discharge Test

The test procedures in Table 2-6 should only be performed when the battery current is less than 5 A per string. Refer to Table 2-4 on the procedures for checking current levels.

Table 2-6: Battery Discharge Test

Step	Action
1	Turn the battery test switch on the DMAC ON. The rectifier output voltage and current should decrease as the batteries assume the load. Alarms for the DMAC may occur.
2	Measure the individual battery string current using the DC current probe. The battery discharge current in each string should be approximately the same (within $\pm$ 5 A).
3	Turn Battery Test Switch OFF.

Heat Exchanger Test

Table 2-7: Heat Exchanger Test

Step	Action
1	Turn the Power Cabinet Heat Exchanger breakers ON.
2	The Heat Exchanger will now go into a 5 minute test sequence. Ensure that the internal and external fans are operating. Place a hand on the internal and external Heat Exchanger grills to feel for air draft.

Alarm Verification

The alarms test should be performed at a convenient point in the RF Cabinet ATP procedure, since an LMF is necessary to ensure that the RF Cabinet is receiving the appropriate alarms from the Power Cabinet.

The SC 4812ET is capable of concurrently monitoring 10 customer defined input signals and four customer defined outputs, which interface to the 50–pin punchblock. All alarms are defaulted to “Not Equipped” during ATP testing. Testing of these inputs is achieved by triggering the alarms and monitoring the LMF for state–transition messages from the active MGLI2.

All customer alarms are routed through the 50 pair punchblock located in the I/O compartment at the back of the frame. Testing is best accomplished by using a specialized connector that interfaces to the 50–pair punchblock. This connector is wired so that customer return 1 (2 for the B side) is connected to every input, CDI 0 through CDI 17.

Alarm Reporting Display

The Alarm Monitor window can be displayed to list alarms that occur after the window is displayed. To access the Alarm Monitor window, select **Util>Alarm Monitor**.

The following buttons are included.

- The **Options** button allows for a severity level (**Warning, Mino**r, and **Major**) selection. The default is all levels. To change the level of alarms reported click on the **Options** button and highlight the desired alarm level(s). To select multiple levels press the Ctrl key (for individual selections) or Shift key (for a range of selections) while clicking on the desired levels.
- The **Pause** button can be used to pause/stop the display of alarms. When the **Pause** button is clicked the name of the button changes to **Continue**. When the **Continue** button is click the display of alarms will continue. Alarms that occur between the time the **Pause** button is clicked and the **Continue** button is clicked will not be displayed.
- The **Clear** button can be used to clear the Alarm Monitor display. New alarms that occur after the **Clear** button is clicked will be displayed.
- The **Dismiss** button is used to dismiss/close the Alarm Monitor display.

Heat Exchanger Alarm Test

Table 2-8 gives instructions on testing the Heat Exchanger alarm.

Table 2-8: Heat Exchanger Alarm	
Step	**Action**
1	Turn circuit breaker “B” of the Heat Exchanger circuit breakers OFF. This will generate a Heat Exchanger alarm, ensure that the LMF reports the correct alarm condition in the RF Cabinet.
2	Alarm condition will be reported as BTS Relay 25 – contact alarm.
3	Turn the circuit breaker “B” ON. Ensure that the alarm condition is now removed. **NOTE** The Heat Exchanger will go through the Start Up sequence.

Door Alarm

Table 2-9 gives instructions on testing the door alarms.

Table 2-9: Door Alarm	
Step	**Action**
1	Close all doors on the Power Cabinet. Ensure that no alarms are reported on the LMF.
2	Alarm condition will be reported as BTS Relay 27 – contact alarm.
3	Individually open and then close each power supply cabinet door. Ensure that the LMF reports an alarm when each door is opened.

AC Fail Alarm

Table 2-10 gives instructions on testing the AC Fail Alarm.

Table 2-10: AC Fail Alarm	
Step	**Action**
1	**NOTE** The batteries should have a stable charge before performing this test. Turn the Main AC breaker on the Power Cabinet OFF. The LMF should report an alarm on an AC Fail (Rectifier Fail, Minor Alarm & Major Alarm) condition.
2	Alarm condition will be reported as BTS–23, BTS–21, BTS–24 and BTS–29 contacts respectively.
3	Turn the Main AC breaker on the Power Cabinet ON. The AC Fail alarm should clear.

Minor Alarm

Table 2-11gives instructions on testing minor alarm.

Table 2-11: Minor Alarm	
Step	**Action**
1	Turn the TCP power switch OFF. This will generate a minor alarm. Verify that the minor alarm LED (amber) is illuminated on the DMAC and the LMF reports this minor alarm.
2	Alarm condition will be reported as BTS–24 contact.
3	Turn the TCP power switch ON. The alarm condition should clear.

Rectifier Alarms

The following series of tests are for single rectifier modules in a multiple rectifier system. The systems include a three rectifier and a six rectifier system.

Single Rectifier Failure

Table 2-11 gives instructions on testing single rectifier failure or minor alarm in a three (3) rectifier system.

Table 2-12: Single Rectifier Fail or Minor Alarm	
Step	**Action**
1	Remove a single rectifier module and place it into the unused rectifier shelf #2.
2	Turn the AC breaker OFF, for this 2nd shelf.
3	Verify that a rectifier fail alarm is generated. The single rectifier module will illuminate two (2) RED fail LED (DC and Power), and the DMAC and LMF will also indicate a minor alarm and rectifier fail status. The RECTIFIER FAIL LED will illuminate.
4	Check that the LMF reports both of these alarm conditions. Alarm condition will be reported as BTS–24 and BTS–21 contacts respectively.
5	Turn the AC breaker for the 2nd shelf ON and verify that Rectifier Fail and minor alarm conditions clear on the DMAC and LMF.

Multiple Rectifier Failure

Table 2-13gives instructions on testing multiple rectifier failure or major alarm in a three (3) rectifier system.

Table 2-13: Multiple Rectifier Failure or Major Alarm	
Step	**Action**
1	With the rectifier module still in the unused shelf position from Table 2-12 test procedures, turn the AC breaker for the 1st shelf OFF.
2	Verify that a rectifier alarm is generated. Each of the two rectifier modules will illuminate two (2) RED fail LED (DC and Power), and the DMAC and LMF will indicate a major alarm (Rectifier Fail and Major Alarm). The RECTIFIER FAIL LED will illuminate.

. . . continued on next page

Table 2-13: Multiple Rectifier Failure or Major Alarm	
Step	**Action**
3	Verify that the LMF reports both alarm conditions. Alarm condition will be reported as BTS–29 and BTS–21 contacts respectively.
4	Turn the AC breaker for the 1st shelf ON. Verify that all alarms have cleared.
5	Return the rectifier module to its original location. This completes the alarm test on the Power Cabinet.

Single Rectifier Failure

Table 2-14 gives instructions on testing single rectifier failure or minor alarm in a six (6) rectifier system.

Table 2-14: Single Rectifier Fail or Minor Alarm	
Step	**Action**
1	Remove two(2) rectifier modules from shelf #2.
2	Turn the AC breaker OFF, for shelf #2.
3	Verify that a rectifier fail alarm is generated. The single rectifier module will illuminate two (2) RED fail LED (DC and Power), and the DMAC and LMF will also indicate a minor alarm and rectifier fail status. The RECTIFIER FAIL LED will illuminate.
4	Check that the LMF reports both of these alarm conditions. Alarm condition will be reported as BTS–24 and BTS–31 contacts respectively.
5	Turn the AC breaker for this shelf ON and verify that Rectifier Fail and Minor Alarm conditions have cleared.

Multiple Rectifier Failure

Table 2-15 gives instructions on testing multiple rectifier failure or major alarm in a six (6) rectifier system.

Table 2-15: Multiple Rectifier Failure or Major Alarm	
Step	**Action**
1	Replace one rectifier module previously removed and turn the AC breaker for this shelf, OFF.
2	Verify that a rectifier alarm is generated. Each of the two rectifier modules will illuminate a RED fail LED, and the DMAC will indicate a major alarm. The RECTIFIER FAIL LED will illuminate.
3	Verify that the LMF reports both alarm conditions. Alarm condition will be reported as BTS–29 contact.

. . . continued on next page

Table 2-15: Multiple Rectifier Failure or Major Alarm	
Step	**Action**
4	Turn the AC breaker for this shelf ON. Verify that all alarms have cleared.
5	Return all rectifier module to their original location. This completes the rectifier alarm tests on the Power Cabinet.

Battery Over Temperature Alarm (Optional ONLY)

CAUTION

Use special care to avoid damaging insulation on cables, or damaging battery cases when using a power heat gun.

Table 2-16 gives instructions on testing the battery over temperature alarm system.

Table 2-16: Battery Over Temperature Alarm	
Step	**Action**
1	Use a low powered heat gun and gently heat the battery over temperature sensor. Do Not hold the hot air gun closer than three (3) inches to the sensor. This will avoid burning the cable insulation.
2	When the sensor is heated to approximately 50° C, a battery Over Temperature alarm is generated. **NOTE** An auditable click will sound as K1 contacts engage and K2 contacts disengage.
3	Visually inspect the K1 and K2 relays to verify state changes. The LMF should be displaying correct alarms. Alarm condition will be reported as BTS–22 contact.
4	Verify that the CHARGE DISABLE LED (amber) on the DMAC and the BATTERY MAIN LED (green) are both illuminated.
5	Switch the hot air gun to cool. Cool the sensor until the K1 and K2 contact return to normal position (K1 open and K2 closed). Using the LMF verify that all alarms have cleared.

Rectifier Over Temperature Alarm

NOTE

This is the J8 on the rear of the DMAC itself, this is not connector J8 on the connector bulkhead at the rear of the cabinet.

Table 2-16 gives instructions on testing the battery over temperature alarm system.

Table 2-17: Rectifier Over Temperature Alarm

Step	Action
1	Remove the J8 link on the rear of the DMAC. **NOTE** This is the J8 on the rear of the DMAC itself, this is not connector J8 on the connector bulkhead at the rear of the cabinet.
2	Verify that RECTIFIER OVERTEMP LED (red) is illuminated. Contacts on K1 and K2 change states (K1 now closed and K2 open).
3	Verify that the LMF has reported an alarm condition. Alarm condition will be reported as BTS–26 contact.
4	Reinstall J8 connector and verify that all alarm conditions have cleared. K1 and K2 should now be in their normal states (K1 open and K2 closed).
5	This completes the system tests of the SC 4812ET Power Cabinet.

Objective

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

Test Equipment

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

- Digital Multimeter (DMM)

CAUTION

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

Cabling Inspection

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

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

IMPORTANT

For positive power applications (+27 V):

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

DC Power Pre-test (BTS Frame)

Before applying any power to the BTS cabinet, follow the steps outlined in Table 2-18 while referring to Figure 2-2 to verify there are no shorts in the RF or Power Cabinet's DC distribution system.

Table 2-18: DC Power Pre–test (RF Cabinet and Power Cabinet)

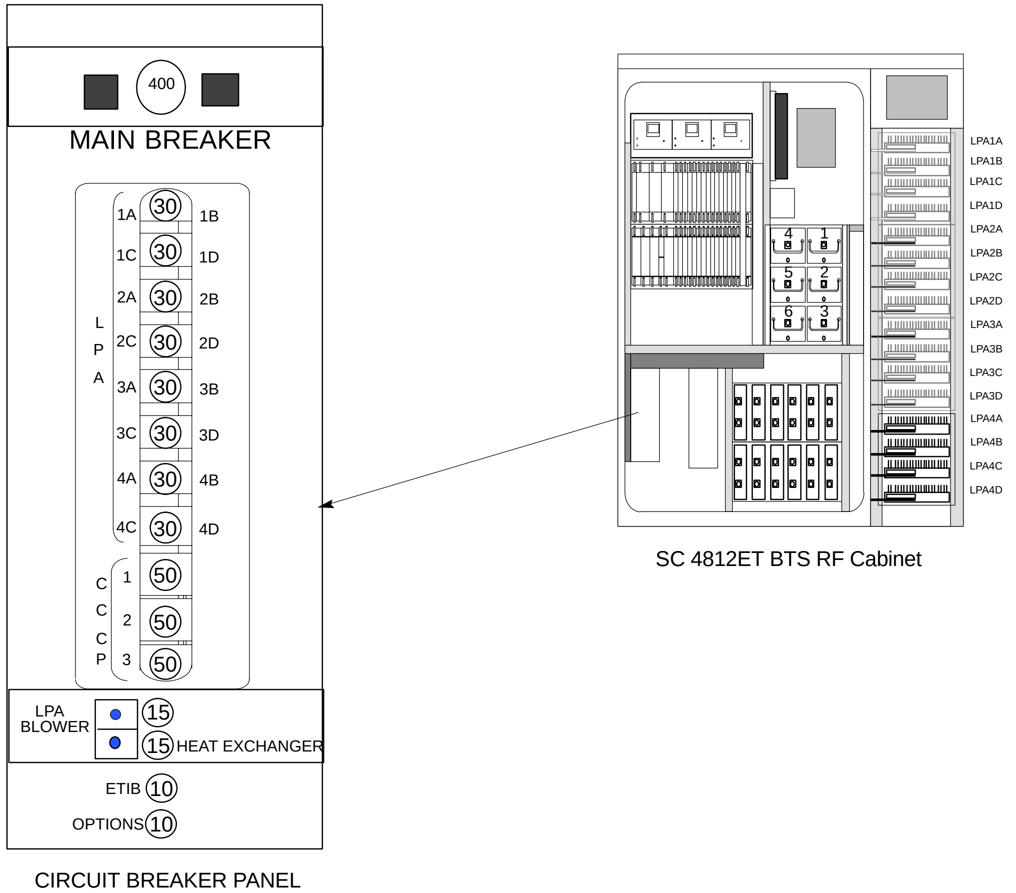
Step	Action
1	*Physically verify* that all DC/DC converters supplying power to the cabinets are **OFF** or disabled.
2	*On each RF cabinet:* • *Unseat* all circuit boards/ modules in the distribution shelf, transceiver shelf, and Single Carrier Linear Power Amplifier (SCLPA) shelves, but leave them in their associated slots. • *Unseat* all circuit boards (except CCD and CIO cards) in the C–CCP shelf and LPA shelves, but leave them in their associated slots. • Set C–CCP shelf breakers to the **OFF** position by *pulling out* power distribution breakers (labeled **C–CCP 1, 2, 3** – located on the power distribution panel). • Set LPA breakers to the **OFF** position by *pulling out* power distribution breakers (8 breakers, labeled **1A–1B** through **4C–4D** – located on the power distribution panel). – **1A** through **3B** – ELPA breakers *(earlier model breaker panel – use breakers **1** through **24**)*
3	Verify that the resistance from the power (+ or –) feed terminals with respect to the ground terminal on the cabinet measures ≥ **500** Ω. • If reading is < **500** Ω, a short may exist somewhere in the DC distribution path supplied by the breaker. Isolate the problem before proceeding. A reading > **3** MΩ could indicate an open (or missing) bleeder resistor (installed across the filter capacitors behind the breaker panel).
4	Set the C–CCP breakers (C–**CCP 1, 2, 3**) to the **ON** position by pushing them IN *one at a time*. Repeat step 3 after turning on each breaker.
	*** IMPORTANT** If, after inserting any board/module, the ohmmeter stays at 0 Ω, a short probably exists in that board/module. Replace the suspect board/module and repeat the test. If test still fails, isolate the problem before proceeding.
5	Insert and lock the DC/DC converter modules into their associated slots *one at a time*. Repeat step 3 after inserting each module. • A typical response is that the ohmmeter will steadily climb in resistance as capacitors charge, finally indicating approximately **500** Ω.
	! CAUTION Verify the correct power/converter modules by observing the locking/retracting tabs appear as follows: – STPN4009 PWR CONV CDMA RCVR (in +27 volt systems)
6	Insert and lock all remaining circuit boards and modules into their associated slots in the C–CCP shelf. Repeat step 3 after inserting and locking each board or module. • A typical response is that the ohmmeter will steadily climb in resistance as capacitors charge, stopping at approximately **500** Ω.

. . . continued on next page

2

Table 2-18: DC Power Pre–test (RF Cabinet and Power Cabinet)	
Step	**Action**
7	Set the 8 **LPA** breakers ON by pushing them IN *one at a time*. Repeat step 3 after turning on each breaker. • A typical response is that the ohmmeter will steadily climb in resistance as capacitors charge, stopping at approximately **500** Ω.
8	Plug all LPAs and EBA fan module into associated plugs in the chassis *one at a time*. Repeat step 3 after connecting each LPA and EBA fan module. • A typical response is that the ohmmeter will steadily climb in resistance as capacitors charge, stopping at approximately **500** Ω. • Disconnect Ohm meter after all tests are successfully completed.
9	Seat the heat exchanger, ETIB, and Options breaker one at a time. Repeat Step 3.

Figure 2-2: DC Distribution Pre-test



Chapter 3: Optimization/Calibration

Table of Contents

3

Notes

Introduction

This section describes procedures for downloading system operating software, set up of the supported test equipment, CSM reference verification/optimization, and transmit/receive path verification.

Cell–site Types

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

NOTE

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

Cell–site Data File (CDF)

The CDF includes the following information:

- Download instructions and protocol
- Site specific equipage information
- C–CCP shelf allocation plan
  - BBX2 equipage (based on cell–site type) including redundancy
  - CSM equipage including redundancy
  - Multi Channel Card 24 (MCC24 or MCC8E) channel element allocation plan. This plan indicates how the C–CCP shelf is configured, and how the paging, synchronization, traffic, and access channel elements (and associated gain values) are assigned among the (up to 12) MCC24s or MCC8Es in the shelf.
- CSM equipage including redundancy
- Effective Rated Power (ERP) table for all TX channels to antennas respectively. Motorola System Engineering specifies the ERP of a transmit antenna based on site geography, antenna placement, and government regulations. Working from this ERP requirement, the antenna gain, (dependent on the units of measurement specified) and antenna feed line loss can be combined to determine the required power at the top of the BTS frame. The corresponding BBX2 output level required to achieve that power level on any channel/sector can also be determined.

NOTE

Refer to the *CDMA Operator's Guide, 68P64114A21*, for additional information on the layout of the LMF directory structure (including CDF file locations and formats).

BTS System Software Download

BTS system software must be successfully downloaded to the BTS processor boards before optimization can be performed. BTS operating code is loaded from the LMF computer terminal. Before you can log into a site, the LMF must have a BTS folder for that site. Whenever there is a new release of BTS system software (binaries), it must first be loaded on the LMF from a CD–ROM before it can be downloaded to the BTS. The CDF is normally obtained from the CBSC on a floppy disk or through a file transfer protocol (ftp) if the LMF computer has the capability.

Site Equipage Verification

If you have not already done so, use an LMF to view the CDF, and review the site documentation. Verify the site engineering equipage data in the CDF to the actual site hardware.

CAUTION

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

Isolate BTS from T1/E1 Spans

IMPORTANT

– **At active sites,** the OMC/CBSC must disable the BTS and place it out of service (OOS). **DO NOT** remove the span surge protectors until the OMC/CBSC has disabled the BTS!

Each frame is equipped with one 50 pair punchblock for spans, customer alarms, remote GPS, and power cabinet alarms (see Figure 3-1 and Table 3-1). To disable the span, pull out the surge protectors for the respective span.

Before connecting the LMF to the frame LAN, the OMC/CBSC must disable the BTS and place it OOS to allow the LMF to control the CDMA BTS. This prevents the CBSC from inadvertently sending control information to the CDMA BTS during LMF based tests.

Alarm and Span Line Cable Pin/Signal Information

Table 3-1 lists the complete pin/signal identification for the 50–pin punch block.

Channel Service Unit

The channel service unit (CSU) contains a modular Eternet jack on its fron panel, allowing Eternet UP access to CSUs installed in the same shelf Each 19 inch rack can support two CSU (M–PATH 538) modules. Each module supports one span connection. Programming of the CSU is accomplished through the DCE 9–pin connector on the front panel.

Figure 3-1: Punch Block for Span I/O

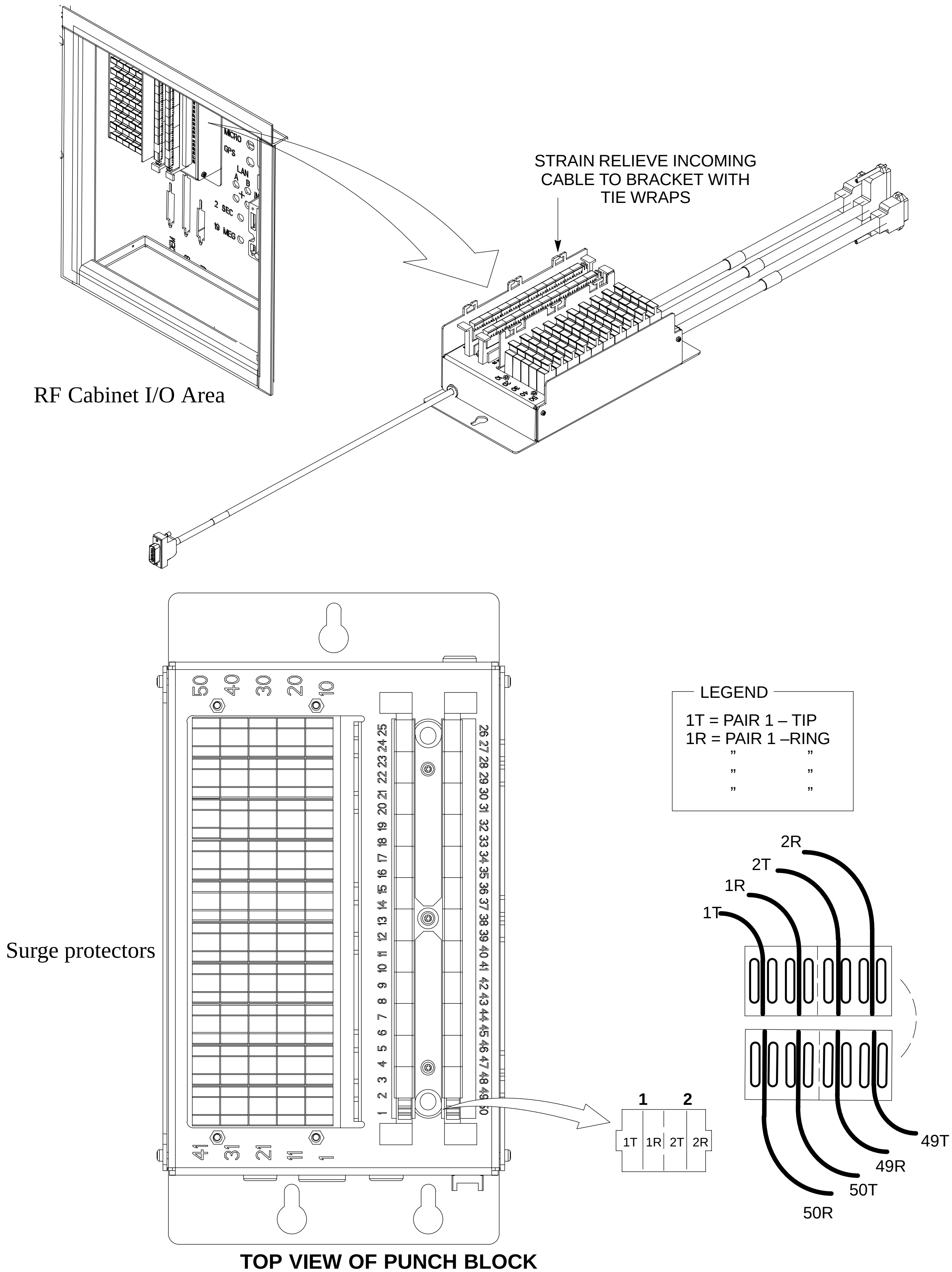


Table 3-1: Pin–Out for 50 Pin Punch Block

Signal Name	Pin	Color		Signal Name	Pin	Color	
Power Cab Control – NC	1T	Blue	P	Customer Outputs 4 – NO	18R		
Power Cab Control – NO	1R	Blk/Blue	O	Customer Outputs 4–COM	19T		I
Power Cab Control – Com	2T	Yellow	W	Customer Outputs 4 – NC	19R		N
Reserved	2R	N/C	E	Customer Inputs 1	20T		P
Rectifier Fail	3T	Blk/Yello	R	Cust_Rtn_A_1	20R		U
AC Fail	3R	Green		Customer Inputs 2	21T		T
Power Cab Exchanger Fail	4T	Blk/Grn	C	Cust_Rtn_A_2	21R		/
Power Cab Door Alarm	4R	White	A	Customer Inputs 3	22T		O
Power Cab Major Alarm	5T	Blk/Whit	B	Cust_Rtn_A_3	22R		U
Battery Over Temp	5R	Red	I	Customer Inputs 4	23T		T
Power Cab Minor Alarm	6T	Blk/Red	N	Cust_Rtn_A_4	23R		P
Reticifier Over Temp	6R	Brown	E	Customer Inputs 5	24T		U
Power Cab Alarm Rtn	7T	Blk/Brn	T	Cust_Rtn_A_5	24R		T
LFR_HSO_GND	7R		L	Customer Inputs 6	25T		
EXT_1PPS_POS	8T		F	Cust_Rtn_A_6	25R		
EXT_1PPS_NEG	8R		R	Customer Inputs 7	26T		
CAL_+	9T		/	Cust_Rtn_A_7	26R		
CAB_–	9R		H	Customer Inputs 8	27T		
LORAN_+	10T		S	Cust_Rtn_A_8	27R		
LORAN_–	10R		O	Customer Inputs 9	28T		
Pilot Beacon Alarm – Minor	11T		B	Cust_Rtn_A_9	28R		
Pilot Beacon Alarm – Rtn	11R		E	Customer Inputs 10	29T		
Pilot Beacon Alarm – Major	12T		A	Cust_Rtn_A_10	29R		
Pilot Beacon Control – NO	12R		C	RVC_TIP_A	30T		
Pilot Beacon Control–COM	13T		O	RVC_RING_A	30R		S
Pilot Beacon Control – NC	13R		N	XMIT_TIP_A	31T		P
Customer Outputs 1 – NO	14T		C	XMIT_RING_A	31R		A
Customer Outputs 1 – COM	14R		U	RVC_TIP_B	32T		N
Customer Outputs 1 – NC	15T		S	RVC_RING_B	32R		
Customer Outputs 2 – NO	15R		T	XMIT_TIP_B	33T		
Customer Outputs 2 – COM	16T		O	XMIT_RING_B	33R		
Customer Outputs 2 – NC	16R		M	RVC_TIP_C	34T		
Customer Outputs 3 – NO	17T		E	RVC_RING_C	34R		
Customer Outputs 3 – COM	17R		R	XMIT_TIP_C	35T		
Customer Outputs 3 – NC	18T						

3

Pin–Out for 50 Pin Punch Block (Continued)							
XMIT_RING_C	35R			GPS_POWER_1+	42T	Blue	
RVC_TIP_D	36T		***S***	GPS_POWER_1–	42R	Bk/Blue	***R***
RVC_RING_D	36R		***P***	GPS_POWER_2+	43T	Yellow	***G***
XMIT_TIP_D	37T		***A***	GPS_POWER_2–	43R	Bk/Yello	***P***
XMIT_RING_D	37R		***N***	GPS_RX+	44T	Green	***S***
RVC_TIP_E	38T			GPS_RX–	44R	Bk/Grn	
RVC_RING_E	38R			GPS_TX+	45T	White	
XMIT_TIP_E	39T			GPS_TX–	45R	Bk/White	
XMIT_RING_E	39R			Signal Ground (TDR+)	46T	Red	
RVC_TIP_F	40T			Master Frame (TDR–)	46R	Bk/Red	
RVC_RING_F	40R			GPS_lpps+	47T	Brown	
XMIT_TIP_F	41T			GPS_lpps–	47R	Bk/Brn	
XMIT_RING_F	41R			Telco_Modem_T	48T		
				Telco_Modem_R	48R		
				Chasis Ground	49T		
				Reserved	49R, 50T, 50R		

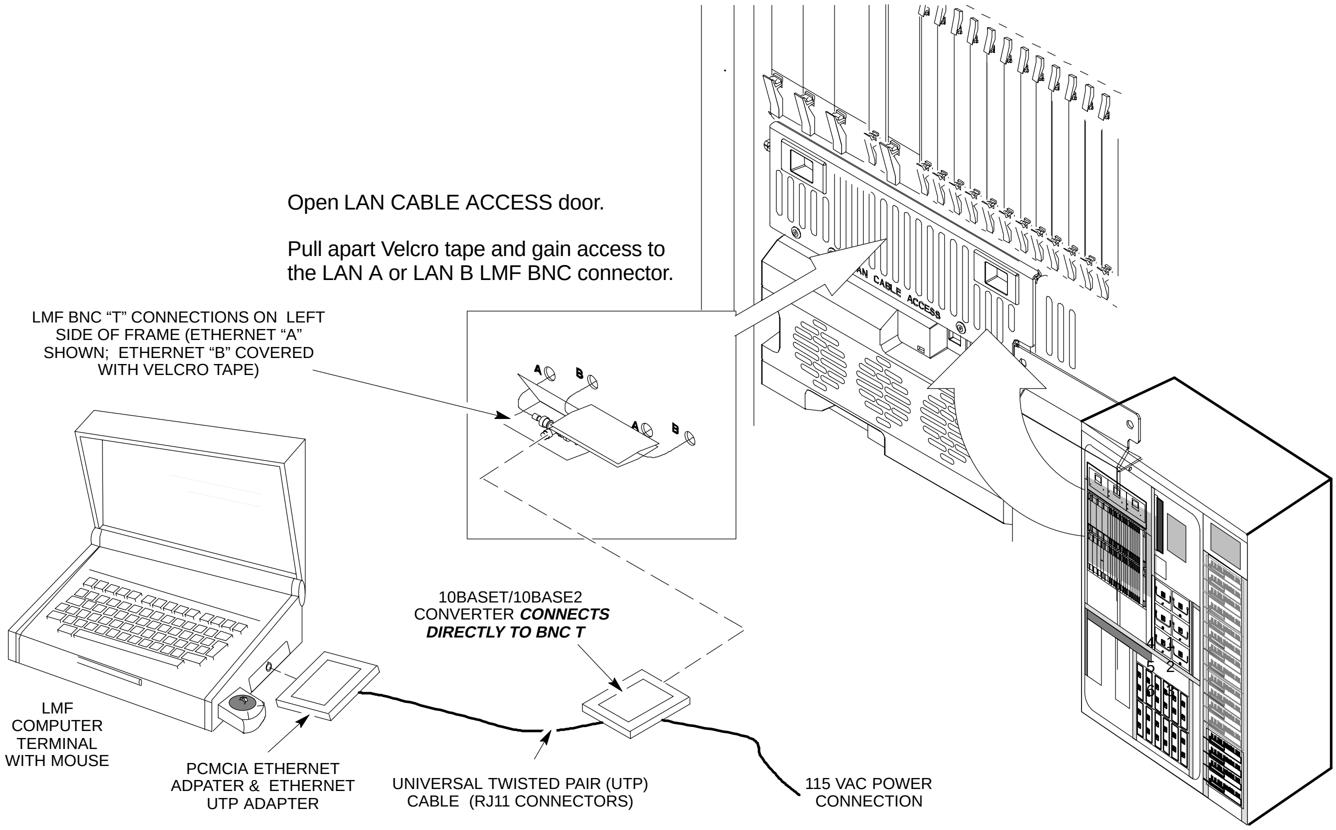
Table 3-2: T1/E1 Span Isolation	
Step	**Action**
1	From the OMC/CBSC, disable the BTS and place it OOS. – The T1/E1 span 50–pin TELCO cable connected to the BTS frame SPAN I/O board **J1** connector can be removed from both Span I/O boards, if equipped, to isolate the spans.
	*** IMPORTANT** Verify that you remove the SPAN cable, *not* the “MODEM/TELCO” connector.

LMF to BTS Connection

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

Table 3-3: LMF to BTS Connection	
Step	**Action**
1	To gain access to the connectors, open the LAN Cable Access door, then *pull apart the Velcro® tape covering the BNC ”T” connector* and slide out the computer service tray, if desired. See Figure 3-2.
2	Connect the LMF to the LAN A BNC connector via PCMCIA Ethernet Adapter with an unshielded twisted–pair (UTP) Adapter and 10BaseT/10Base2 converter (powered by an external AC/DC transformer). **NOTE** – Xircom Model PE3–10B2 or equivalent can also be used to interface the LMF Ethernet connection to the frame connected to the PC parallel port, powered by an external AC/DC transformer. In this case, ***the BNC cable must not exceed 91 cm (3 ft) in length***.
	*** IMPORTANT** The LAN shield is isolated from chassis ground. The LAN shield (exposed portion of BNC connector) **must not touch the chassis** during optimization.

Figure 3-2: LMF Connection Detail



Overview

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

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

The section that follows provides information and instructions for installing and updating LMF software and files.

3

Update Procedure

Follow the procedure in Table 3-4 to update the LMF program and binaries.

- Install the LMF program using the LMF CD ROM and follow the procedure in Table 3-4.
- Install binary files using the LMF CD ROM and follow the procedure in Table 3-4.
- folders in the **wlmf\cdma** folder.
- Move applicable CDF and CBSC files into each BTS folder.

Table 3-4: CD ROM Installation

✓	Step	Action
	1	Insert the LMF Program CD ROM disk into the LMF CD ROM drive. – If the Setup screen is displayed, follow the instructions provided. – If the Setup screen is not displayed, proceed to step 2.
	2	Click on the **Start** button**.**
	3	Select **Run.**
	4	Enter **d:\autorun** in the Open box and click on the OK button. (If applicable, replace the letter **d** with the correct CD ROM drive letter.)
	5	Follow the directions displayed in the **Setup** screen.

3

Updating CBSC LMF Files

After completion of the TX calibration and audit, updated CAL file information must be moved from the LMF Windows environment back to the CBSC, residing in a Unix environment. The following procedures detail moving files from one environment to the other.

Copying CAL files from LMF to a Disk

Follow the procedures in Table 3-5 to copy the CAL files from an LMF computer to a 3.5 diskette.

Table 3-5: Procedures to Copy Files to a Diskette

✓	Step	Action
	1	Insert a disk into Drive A:.
	2	Launch **Windows Explorer** from your **Programs** menu list.
	3	Select the applicable **wlmf/cdma/bts–#** folder.
	4	Drag the **bts–#.cal** file to drive A.
	5	Repeat Steps 3 and 4 as required for other **bts–#** folders.

Copying CAL Files from Diskette to the CBSC

Follow the procedures in Table 3-6 to copy CAL files from a diskette to the CBSC.

Table 3-6: Procedures to Copy CAL Files from Diskette to the CBSC

✓	Step	Action
	1	Log in to the CBSC on the workstation using your account name and password.
	2	Place your diskette containing calibration file(s) in the workstation diskette drive.
	3	Type in the following and press the Enter key. => **eject –q**
	4	Type in the following and press the Enter key. => **mount** **NOTE** Check to see that the message “*floppy/no_name*” is displayed on the last line.
	5	Type in the following and press the Enter key. => **cd /floppy/no_name**
	6	Type in the following and press the Enter key. => **cp /floppy/no_name/bts–#.cal bts–#.cal**
	7	Type in the following and press the Enter key. => **pwd** Verify you are in your home directory

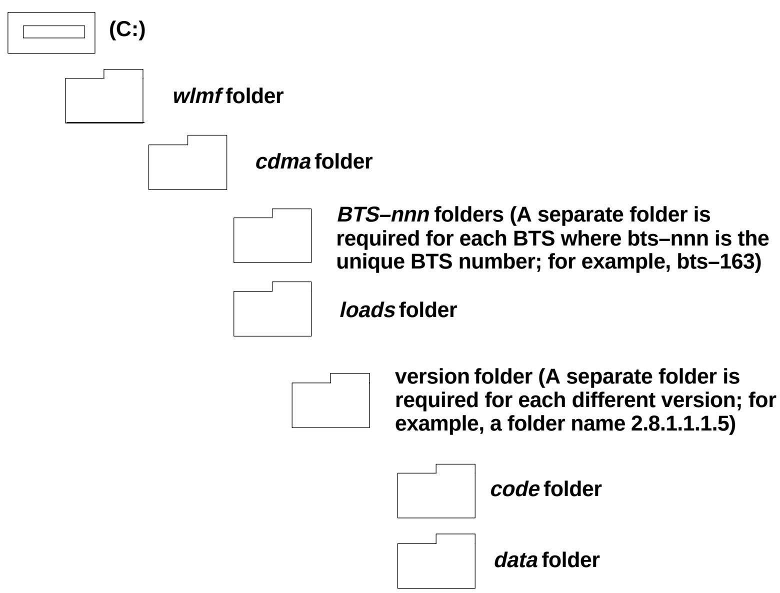
. . . continued on next page

Table 3-6: Procedures to Copy CAL Files from Diskette to the CBSC		
✓	Step	Action
	8	Type in the following and press the Enter key. => **ls –l *.cal** Verify the cal files have been copied.
	9	Type in the following and press the Enter key. => **eject**
	10	Remove the diskette from the workstation.

Folder Structure Overview

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

Figure 3-3: LMF Folder Structure



wlmf Folder

The *wlmf* folder contains the LMF program files.

cdma Folder

The *cdma* folder contains the following:

- *bts–nnn* folders
- *loads* folder

. . . continued on next page

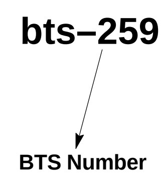
- default *cbsc–1.cdf* file is provided that can be copied to a *bts–nnn* folder for use if one can not be obtained from the CBSC when needed.

bts–nnn Folders

A *bts–nnn* folder must be created for each BTS that is to be accessed. The *bts–nnn* folder must be correctly named (for example: *bts–273)* and placed in the *cdma* folder. Figure 3-4 shows an example of the file naming syntax for a BTS folder. Each *bts–nnn* folder contains the following files for the BTS:

- a CAL file
- a CDF file
- a cbsc file

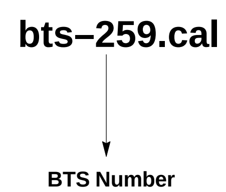
Figure 3-4: BTS Folder Name Syntax Example



bts–nnn.cal File

The CAL file contains the bay level offset data (BLO) that is used for BLO downloads to the BBX devices. The LMF automatically creates and updates the CAL file during TX calibration. Figure 3-5 shows the file name syntax for the CAL file.

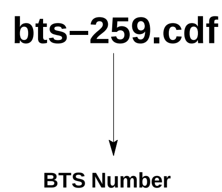
Figure 3-5: CAL File Name Syntax Example



bts–nnn.cdf File

The CDF file contains data that defines the BTS and data that is used to download data to the devices. A CDF file must be placed in the applicable BTS folder before the LMF can be used to log into that BTS. CDF files are normally obtained from the CBSC using a floppy disk. A file transfer protocol (ftp) method can be used if the LMF computer has that capability. Figure 3-6 shows the file name syntax for the CDF file.

Figure 3-6: CDF Name Syntax Example



cbsc File

The *cbsc–1.cdf* file contains data for the BTS. If one is not obtained from the CBSC, a copy of the default *cbsc–1.cdf* file, located in the cdma folder, can be used.

loads folder

The *loads* folder contains the version folder(s), but not contain any files.

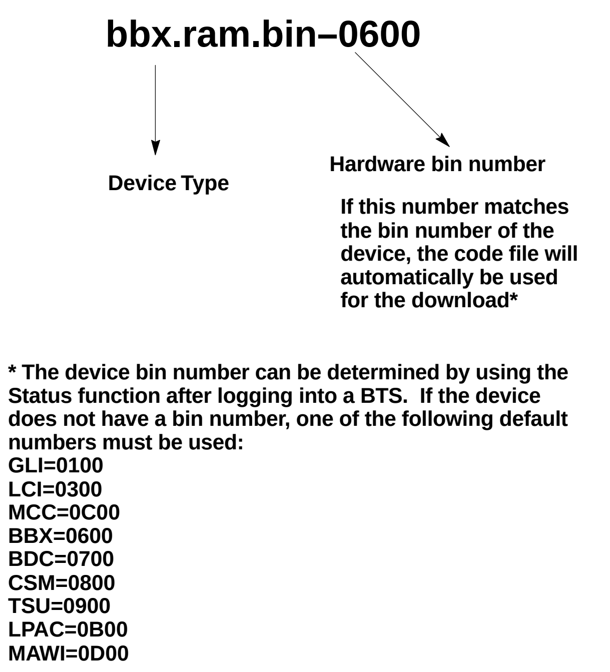
version Folder

The version folder(s) contains the *code* and *data* folders, but does not contain any files. The name of version folders is the software version number of the code files that are included in its code folder. Version folders are created as part of the LMF installation and the LMF updates. Each time the LMF is updated, another version folder is created with the number of the software version for the code files being installed.

code Folder

The code folder contains the binary files used to load code into the devices. A unique binary code file is required for each device type in the BTS to be supported with the LMF. Current version code files for each supported device created in this folder from the LMF *CD ROM as part of the LMF installation/update process. Figure 3-7 shows an example of the file naming syntax for a code load file.*

Figure 3-7: Code Load File Name Syntax Example

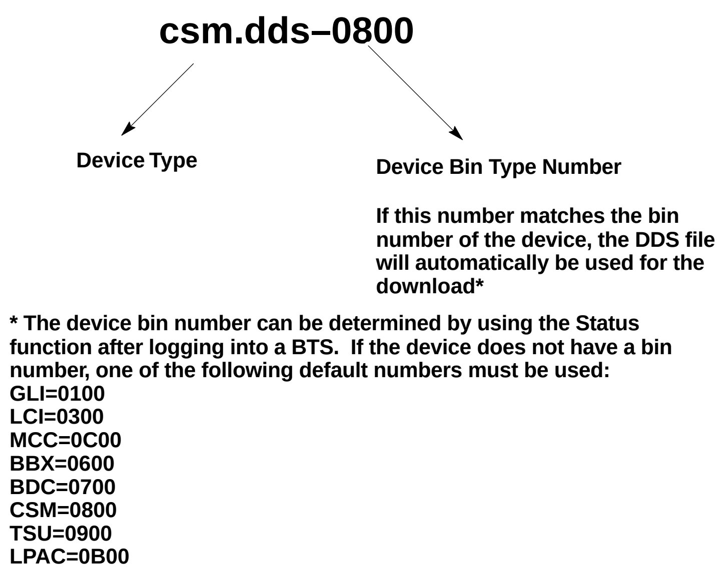


If a code file with the correct version and bin numbers is not found, a file selection window appears.

data Folder

The data folder contains a Device Definition Structure (DDS) data file for each supported device type. The DDS files are used to specify the CDF file data that is used to download data to a device. Current version DDS files for each supported device type are created in this folder from the LMF CD ROM as part of the LMF installation/update process. Figure 3-8 shows an example of the file naming syntax for a code load file.

Figure 3-8: DDS File Name Syntax Example



Logging Into a BTS

Logging into a BTS establishes a communications link between the BTS and the LMF. You may be logged into one or more BTS's at a time, but only one LMF may be logged into each BTS.

Before attempting to log into the BTS, confirm the LMF is properly connected to the BTS (see Figure 3-2). Follow the procedures in Table 3-7 to log into a BTS.

Table 3-7: BTS Login Procedure

✓	Step	Action
		NOTE Confirm a **bts-nnn** folder with the correct CDF and CBSC file exists.
	1	Click on **Login** tab (if not displayed).
	2	Double click on **CDMA** (in the **Available Base Stations** pick list).

. . . continued on next page

Table 3-7: BTS Login Procedure		
✓	Step	Action
	3	Click on the desired BTS number.
	4	Click on the **Network Login** tab (if not already in the forefront).
	5	Enter correct IP address (normally **128.0.0.2** for a field BTS, if not correctly displayed in the **IP Address** box).
	6	Type in the correct IP Port number (normally **9216** if not correctly displayed in the **IP Port** box).
	7	Change the **Multi-Channel Preselector** (from the **Multi-Channel Preselector** pick list), normally **MPC,** corresponding to your BTS configuration, if required.
	8	Click on the **Use a Tower Top Amplifier**, if applicable.
	9	Click on **Login**. (A BTS tab with the BTS is displayed.)
		NOTE • If you attempt to log in to a BTS that is already logged on, all devices will be gray. • There may be instances where the BTS initiates a log out due to a system error (i.e., a device failure). • If the MGLI is OOS_ROM (blue), it will have to be downloaded with code and data, and then enabled before other devices can be seen.

Logging Out

Follow the procedure in Table 3-8 to logout of a BTS.

Table 3-8: Procedures to Logout of a BTS		
✓	Step	Action
	1	Click on **Select** menu.
	2	Click on **Logout** menu item (A **Confirm Logout** pop-up message will appear).
	3	Click on **Yes** (or press the **Enter** key) to confirm logout and return to the **Login** tab.
		NOTE The **Select** menu on either the BTS tab or the **Select** menu on the displayed cage/shelf can be used. In either case you will only be logged out of the displayed BTS. You may also log out of all BTS login sessions and exit the LMF by using the **File –> Exit** menu item. (A **Confirm Logout** pop–up message will appear.)

Pinging the Processors

If the LMF is unable to login to a BTS, the integrity of the Ethernet LAN A & B links must be be verified for proper operation. The cell–site must be powered up first.

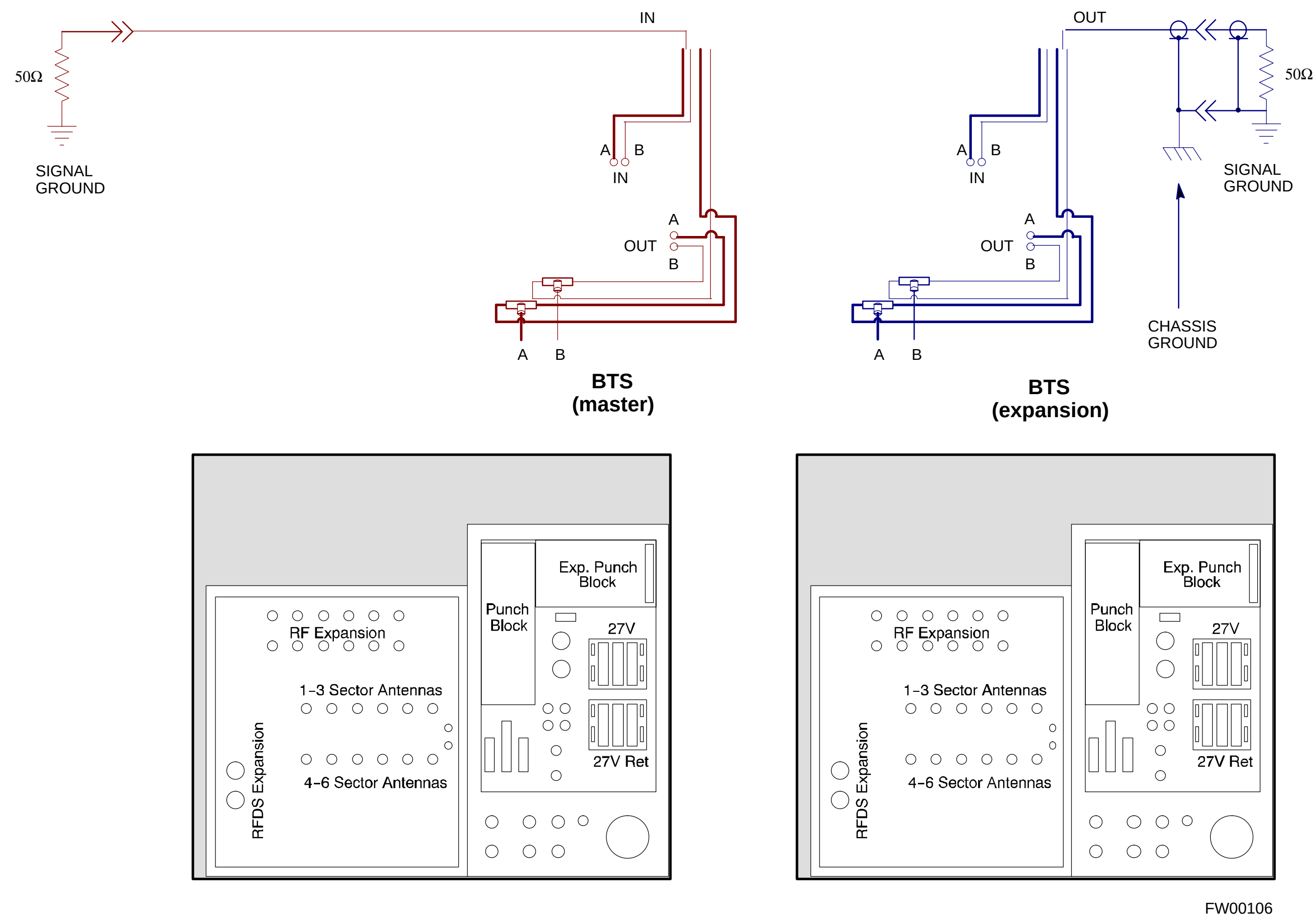
. . . continued on next page

CAUTION

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

Figure 3-9I represents a typical BTS Ethernet configuration. The drawing depicts one (of two identical) links, A and B.

Figure 3-9: BTS Ethernet LAN Interconnect Diagram



What is Ping?

Ping is a program that sends request packets to the LAN network modules to get a response from the specified "target" module.

Follow the steps in Table 3-9 to ping each processor (on both LAN A and LAN B) and verify LAN redundancy is working properly.

. . . continued on next page

IMPORTANT

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

Table 3-9: Pinging the Processors

✓	Step	Action
	1	From the Windows desktop, click the **Start** button and select **Run.**
	2	In the **Open** box, type **`ping`** **a**nd the **GLI2 IP address** (for example, **`ping 128.0.0.2)`**. **NOTE** 128.0.0.2 is the default IP address for the GLI2 in field BTS units.
	3	Click on the **OK** button. **NOTE** 128.0.0.2 is the default IP address for the GLI2 in field BTS units.

	4	If the targeted module responds, text similar to the following is displayed:
		`Reply from 128 128.0.0.2: bytes=32 time=3ms TTL=255`
		If there is no response the following is displayed:
		`Request timed out`
		If the GLI2 fails to respond, it should be reset and re–pinged. If it still fails to respond, typical problems are shorted BNC to inter-frame cabling, open cables, crossed A and B link cables, or the GLI2 itself.

Graphical User Interface Overview

This section provides overview information on using the LMF graphical user interface (GUI). The GUI works as follows:

- Select the device or devices to perform an action on.
- Select the action to apply to the selected device(s).
- While action is in progress, a status report window displays the action taking place and other status information.
- The status report window indicates when the the action is complete, along with other pertinent information displayed.
- Clicking the **OK** button closes the status report window.

The R9 BTS software release implements the virtual BTS capability, also known as Logical BTS. A virtual BTS can consist of up to four four SC 4812ET frames. When the LMF is connected to frame 1 of a virtual BTS, you can access all devices in all of the frames that make up the virtual BTS A virtual BTS CDF file that includes equippage information for all of the virtual BTS frames and their devices is required. A CBSC file that includes channel data for all of the virtual BTS fames is also required. The first frame of a virtual BTS has a **–1** suffix (e.g., **BTS–812–1**) and other frames of the virtual BTS are numbered with suffixed, **–101**, **–201**, and **–301** (e. g. **BTS–812–201**). When you log into a BTS a FRAME tab is displayed for each frame. If there is only one frame for the BTS, there will only be one tab (e.g., **FRAME–282–1**) for BTS–282. If a virtual BTS has more than one frame, there will be a separate **FRAME** tab for each frame (e.g. **FRAME–438–1**, **FRAME–438–101**, and **FRAME–438–202** for a **BTS–438** that has all three frames). If an RFDS is included in the CDF file, an RFDS tab (e.g., RFDS–438–1) will be displayed.

Actions (e.g., ATP tests) can be initiated for selected devices in one or more, frames of a virtual BTS. Refer to the Select devices help screen for information on how to select devices.

Following are visual examples of the BTS tabs for a single–frame BTS with RFDS and a four–frame BTS with RFDS.

Figure 3-10: Single–frame BTS with a RFDS

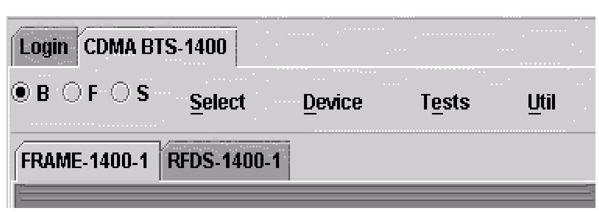
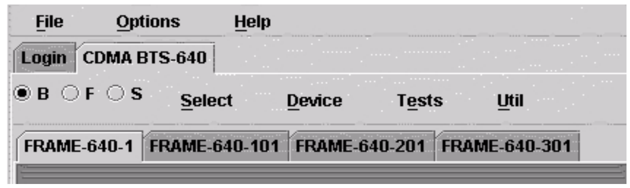


Figure 3-11: Four–frame BTS with an RFDS BTS



Selecting and Deselecting Devices

Devices can be selected by clicking on a device or by using the **Select** menu. Devices can also be deselected by clicking on a device or by using the **Select** menu. Table 3-10 provides the procedure to select or deselect devices from the menu bar. Follow this procedure to select or deselect *all* of the devices of a particular type.

Prerequisite: Device is listed in the CDF file and is responding (not gray or purple).

Table 3-10: Selecting and Deselecting Devices

✓	Step	Action
	1	From the menu bar, click on **Select.**
	2	From the **Select** menu list, make your selection. The device selected will be darkened to indicate your selection.
	3	**NOTE** If the **Select** menu list on the BTS tab is used, all devices in the BTS are selected (based on the selection menu item used). If the **Select** menu list on the cage display is used, only devices in the displayed cage are selected. The LMF allows you to invert the menu list items by clicking on the **Invert Selection** menu item from **Select** on the menu bar.
	4	To deselect devices, from the **Select** menu list, click on **Deselect All**. The color of devices changes to reflect their current state.

NOTE

An alternative way of selecting or deselecting devices is to click on the device displayed. As you place the cursor over the device, the name and number of the device is displayed.

Enabling Devices

Use the **Enable** menu from the **Device** menu to place a device in service (INS). Before a device can be INS, it must be in the disabled (OOS_RAM) state (yellow) with data downloaded to the device. The color of the device changes to green, once it is INS.

Prerequisite: Ensure the data has been downloaded to the device.

NOTE

(1) A CSM device can take up to 20 minutes to enable and Fail may appear in the P/F column of the **Enabling Devices** window. The color of the CSM changes to green when it is enabled.
(2) Some enabled devices can be either in service active (INS_ACT) or in service standby (INS_STB). Bright green indicates that the device is INS_ACT and dark green indicates that the device is INS_STB.

CAUTION

Putting a BBX2 in service keys the BBX2. If the TX is not properly terminated and if incorrect transceiver parameters are provided, the BTS can be damaged.

Follow the procedure in Table 3-11 to change the state of device(s) to Enable.

Table 3-11: Enabling Devices

✓	Step	Action
	1	Select the device(s) you wish to enable. **NOTE** The MGLI and CSM must be INS before an MCC can be put INS.
	2	Click on **Device** from the menu bar.
	3	Click on **Enable** from the **Device** menu. A status report window is displayed.
		NOTE If a BBX2 is selected, a transceiver parameters window is displayed to collect keying information. Do not enable the BBX2.
	4	Click **OK** to close the status report window. The selected devices that successfully change to INS change color to green.

Disabling Devices

Use the **Disable** menu item from the **Device** menu list is to take an INS (green) device out of service and place it in the OOS_RAM state (yellow). The device retains its code load and data load. The device can be put back in service using the **Enable** menu**.**

Follow the procedures in Table 3-12 to disable devices.

Table 3-12: Disable Devices

✓	Step	Action
	1	Select the device(s) you wish to disable.
	2	Click on **Device** from the menu bar.
	3	Click on **Disable** from the **Device** menu list. The selected device(s) that successfully go to OOS_RAM change color to yellow.
	4	Click on **OK** to close the status report window.

Resetting Devices

Use **Reset** to place a device into OOS_ROM. The code and data load for the device are lost. Follow the procedure in Table 3-13 to reset devices.

Table 3-13: Resetting Devices

✓	Step	Action
	1	Select the device(s) to be placed out of service.
	2	From the **Device** menu bar, select **Reset**.
	3	Click on **Reset** from the Device menu list. The selected devices that successfully change status to OOS_ROM change color to blue.
	4	Click on **OK** to close the status report window.

Getting Status of Devices

Use the **Status** menu item from the **Device** menu list to get a status report of the device(s) in your BTS configuration.

Follow the procedures in Table 3-14 to get the status of devices.

Table 3-14: Get Device Status

✓	Step	Action
	1	Click on the device(s) you wish to get status for.
	2	Click on the **Device** from the menu bar.
	3	Click on the **Status** menu item from the **Device** menu.
	4	In the **Status Report** window, if a checked box appears in the **Detail/warnings** column for a row, double click on that row to display additional information.
	5	Click **OK** to close the status report window.

Sorting a Status Report Window

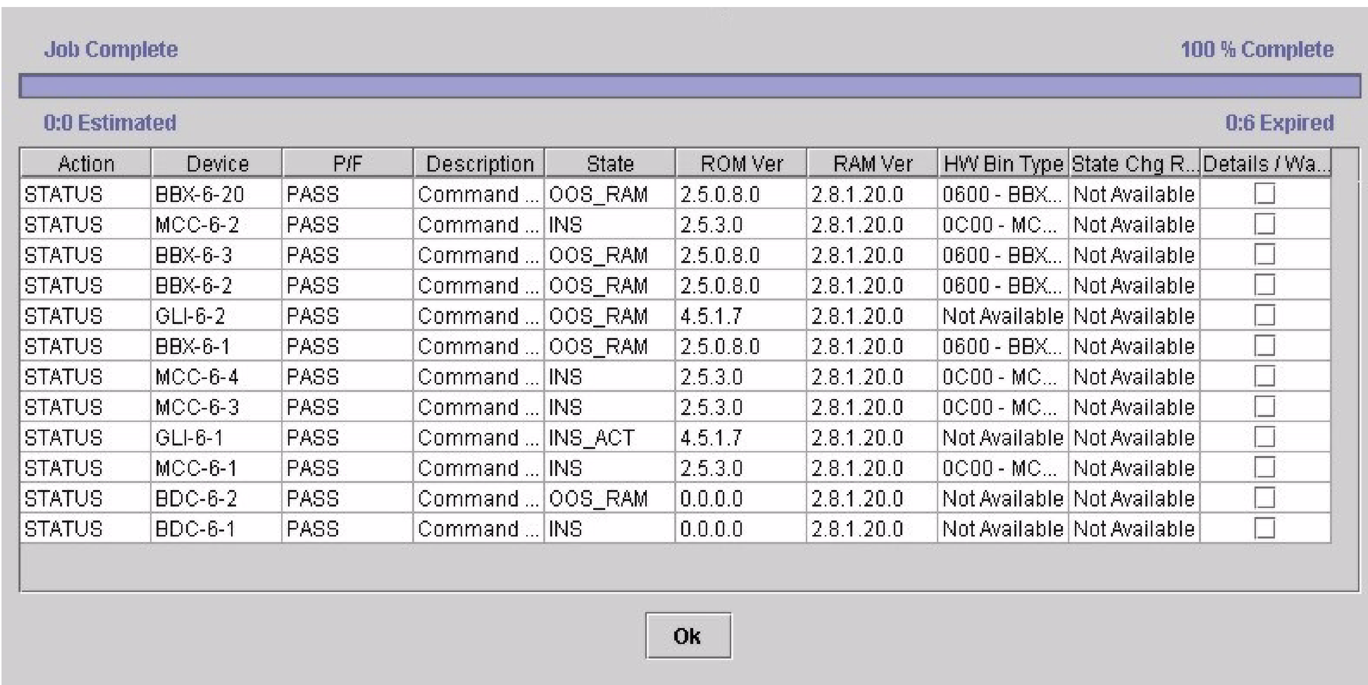
The columns of a status report window can be sorted after the status information is displayed.

Follow the procedure in Table 3-15 to sort a status report window.

Table 3-15: Sorting Status Report Windows

✓	Step	Action
	1	Click on a column heading to sort the displayed data by the column. The first click sorts the data in either ascending or descending order.
	2	Click on the column a second time to sort the data in the opposite order. Refer to Figure 3-12.

Figure 3-12: Sample LMF Status Report



Action	Device	P/F	Description	State	ROM Ver	RAM Ver	HW Bin Type	State Chg R...	Details / Wa...
STATUS	BBX-6-20	PASS	Command ...	OOS_RAM	2.5.0.8.0	2.8.1.20.0	0600 - BBX...	Not Available	☐
STATUS	MCC-6-2	PASS	Command ...	INS	2.5.3.0	2.8.1.20.0	0C00 - MC...	Not Available	☐
STATUS	BBX-6-3	PASS	Command ...	OOS_RAM	2.5.0.8.0	2.8.1.20.0	0600 - BBX...	Not Available	☐
STATUS	BBX-6-2	PASS	Command ...	OOS_RAM	2.5.0.8.0	2.8.1.20.0	0600 - BBX...	Not Available	☐
STATUS	GLI-6-2	PASS	Command ...	OOS_RAM	4.5.1.7	2.8.1.20.0	Not Available	Not Available	☐
STATUS	BBX-6-1	PASS	Command ...	OOS_RAM	2.5.0.8.0	2.8.1.20.0	0600 - BBX...	Not Available	☐
STATUS	MCC-6-4	PASS	Command ...	INS	2.5.3.0	2.8.1.20.0	0C00 - MC...	Not Available	☐
STATUS	MCC-6-3	PASS	Command ...	INS	2.5.3.0	2.8.1.20.0	0C00 - MC...	Not Available	☐
STATUS	GLI-6-1	PASS	Command ...	INS_ACT	4.5.1.7	2.8.1.20.0	Not Available	Not Available	☐
STATUS	MCC-6-1	PASS	Command ...	INS	2.5.3.0	2.8.1.20.0	0C00 - MC...	Not Available	☐
STATUS	BDC-6-2	PASS	Command ...	OOS_RAM	0.0.0.0	2.8.1.20.0	Not Available	Not Available	☐
STATUS	BDC-6-1	PASS	Command ...	INS	0.0.0.0	2.8.1.20.0	Not Available	Not Available	☐

Overview

Code can be downloaded to a device that is in any state. After the download starts, the device being downloaded changes to OOS_ROM (blue). If the download is completed successfully, the device changes to OOS_RAM with code loaded (yellow). Prior to downloading a device, a code file must exist. The code file is selected automatically if the code file is in the */lmf/cdma/n.n.n.n/code* folder (where *n.n.n.n* is the version number of the download code that matches the "NextLoad" parameter in the CDF file). The code file in the code folder must have the correct hardware bin number. Code can be automatically or manually selected.

Data must be downloaded to a device before the device is placed INS. The CSM must be INS before an MCC can be put INS. The devices to be downloaded are as follows:

- Master Group Line Interface (MGLI2)
- Clock Sync Module (CSM)
- Multi Channel Card (MCC)
- Broadband Transceiver (BBX2)

IMPORTANT

The MGLI *must* be successfully downloaded with code and data, and put INS *before* downloading any other device. The download code process for an MGLI automatically downloads data and then enables the MGLI before downloading other devices.

Downloading requires a few minutes. After the download starts, the device being downloaded changes to OOS_ROM (blue). If the download is completed successfully, the device changes to OOS_RAM (yellow) with code loaded (INS_ACT (green) for MGLI).

Download Code

Follow the steps in Table 3-16 to download the firmware application code.

NOTE

When downloading multiple devices, the download may fail for some of the devices (a time out occurs). These devices can be downloaded separately after completing the multiple download.

Table 3-16: Download Code

✓	Step	Action
	1	Download code to all devices.
	2	Select all devices to be downloaded.
	3	From the **Device** pull down menu, select **Download Code**.

Download Data to Non–MGLI Devices

Non–MGLI2 devices can be downloaded individually or all equipped devices can be downloaded with one action. Data is downloaded to the MGLI as part of the download code process.

NOTE

When downloading multiple devices, the download may fail for some of the devices (a time out occurs). These devices can be downloaded separately after completing the multiple download.

Follow the steps in Table 3-17 to download the code and data to the non–MGLI2 devices.

Table 3-17: Download Data to Non–MGLI Devices

✓	Step	Action
	1	Select the target CSM, BBX2 and MCC device(s). From the **Device** pull down menu, select **Download Data**. **NOTE** If the CSM(s) and other shelf devices are selected, the **Device** pull down on the BTS tab must be used (not the one on the shelf). A status report is displayed that shows the result of the download for each selected device.
	2	Click **OK** to close the status report window. **NOTE** After a BBX2, CSM or MCC is successfully downloaded with code and has changed to the OOS–RAM state (yellow), the status LED should be rapidly flashing GREEN.

Enable CSMs

Each BTS CSM system features two CSM boards per site. The GPS receiver (mounted on CSM 1) is used as the primary timing reference and synchronizes the entire cellular system. CSM 2 provides redundancy (but does not have a GPS receiver).

The BTS may be equipped with a LORAN–C Low Frequency Receiver (LFR), or external 10 MHz Rubidium source which the CSM can use as a secondary timing reference. In all cases, the CSM monitors and determines what reference to use at a given time.

IMPORTANT

- Each CSM (of a redundant pair at each BTS) is associated with “partner” MCCs. CSMs must be enabled before the partner MCC can be enabled.
- The CSM(s) and MCC(s) to be enabled must have been downloaded with code (Yellow, OOS–RAM) and have been downloaded with data.
- Verify the CSM configured with the GPS receiver “daughter board” is installed in the frame’s CSM 1 slot before continuing.

Follow the steps outlined in Table 3-18 to enable the CSMs installed in the C–CCP shelves.

Table 3-18: Enable CSMs		
✓	Step	Action
	1	Click on the target CSM. From the **Device** pull down, select **Enable**. **NOTE** If equipped with two CSMs, enable CSM–2 first A status report is displayed confirming change in the device(s) status. Click **OK** to close the status report window. **NOTE** FAIL may be shown in the status table for enable action. If Waiting For Phase Lock is shown in the Description field, the CSM changes to the Enabled state after phase lock is achieved. CSM 1 houses the GPS receiver. The enable sequence can take up to ***one hour*** (see below). *** IMPORTANT** The GPS satellite system satellites are not in a geosynchronous orbit and are maintained and operated by the United States Department of Defense (D.O.D.). The D.O.D. periodically alters satellite orbits; therefore, satellite trajectories are subject to change. A GPS receiver that is INS contains an "almanac" that is updated periodically to take these changes into account. If a GPS receiver has not been updated for a number of weeks, it may take up to an hour for the GPS receiver "almanac" to be updated. Once updated, the GPS receiver must track at least four satellites and obtain (hold) a 3–D position fix for a minimum of 45 seconds before the CSM will come in service. (In some cases, the GPS receiver needs to track only one satellite, depending on accuracy mode set during the data load).
	2	**NOTE** If equipped with two CSMs, CSM–1 should be bright green (INS–ACT) and CSM–2 should be dark green(INS–STB) If more than an hour has passed, refer to CSM Verification, see Figure 3-20 and Table 3-21 to determine the cause.
		NOTE After the CSMs have been successfully enabled, observe the PWR/ALM LEDs are steady green (alternating green/red indicates the card is in an alarm state).

Enable MCCs

This procedure configures the MCC and sets the “tx fine adjust” parameter. The “tx fine adjust” parameter is not a transmit gain setting, but a timing adjustment that compensates for the processing delay in the BTS (approximately 3 μS).

Follow the steps outlined in Table 3-19 to enable the MCCs installed in the C–CCP shelves.

IMPORTANT

The MGLI, and CSM must be downloaded and enabled, prior to downloading and enabling the MCC.

Table 3-19: Enable MCCs

✓	Step	Action
	1	Click on the target MCC(s) or from the **Select** pull down menu choose **All MCC**s.
	2	From the **Device** menu, select **Enable** A status report is displayed confirming change in the device(s) status. Click **OK** to close the status report window.

CSM & LFR Background

The primary function of the Clock Synchronization Manager (CSM) boards (1 & 2) is to maintain CDMA System Time. The master GLI can request and distribute system time to the appropriate modules within a C–CCP shelf. The redundant GLI (slave) obtains system time from the master GLI over the LAN. All boards are mounted in the C–CCP shelf.

Each CSM board features an ovenized, crystal oscillator that provides 19.6608 MHz clock, even second tick reference, and 3 MHz sinewave reference, referenced to the selected synchronization source (GPS, LORAN–C Frequency Receiver (LFR), or High Stability Oscillator (HSO), T1 Span, or external reference oscillator sources). The 3 MHz signals are also routed to the RDM EXP 1A & 1B connectors on the top interconnect panel for distribution to co–located frames at the site.

Fault management has the capability of switching between the CSM 1 and 2 boards in the event of a GPS receiver failure on CSM 1 or a reference oscillator failure on either CSM board. During normal operation, the CSM 1 board oscillator output is selected as the source. The source selection can also be overridden via the LMF or by the GLI card.

Front Panel LEDs

- Steady Green – Master CSM locked to GPS or LFR (INS).
- Rapidly Flashing Green – Standby CSM locked to GPS or LFR (Stby).
- Flashing Green / Rapidly Flashing Red – CSM OOS–RAM attempting to lock on GPS signal.
- Rapidly Flashing Green / Red – Alarm condition exists. Trouble Notifications (TNs) are currently being reported to the GLI.

High Stability Oscillator (HSO)

The High Stability Oscillator (HSO) module is a separate full–size card which resides in a dedicated slot in the lower half of the C–CCP shelf. This is a completely self contained high stability 10 MHz oscillator which interfaces with the CSM via a serial communications link. The CSM handles the overall configuration and status monitoring functions of the HSO. In the event of GPS failure, the HSO is capable of maintaining synchronization initially established by the GPS reference signal for a limited time

The HSO is basically a high stability 10 MHz oscillator with the necessary interface to the CSMs. The HSO is typically installed in those geographical areas not covered by the LORAN–C system and provides the following major functions:

- Reference oscillator temperature and phase lock monitor circuitry
- Internal oscillator generates highly stable 10 MHz sine wave, and routed to reference divider circuitry
- Reference divider circuitry converts 10 MHz sine wave to 10 MHz TTL signal, which is divided to provide a 1 PPS strobe to the CSM

Equipment Warm–up

Allow the **base site and test equipment to warm up for 60 minutes** after any interruption in oscillator power. CSM board warm-up allows the oscillator oven temperature and oscillator frequency to stabilize prior to test. Test equipment warm-up allows the Rubidium standard timebase to stabilize in frequency before any measurements are made.

CSM frequency verification

The objective of this procedure is the initial verification of the Clock Synchronization Module (CSM) boards prior to performing the rf path verification tests. Parts of this procedure will be repeated for final verification *after* the overall optimization has been completed.

Test Equipment Setup (GPS & LFR/HSO Verification)

Follow the steps outlined in Table 3-20 to set up test equipment.

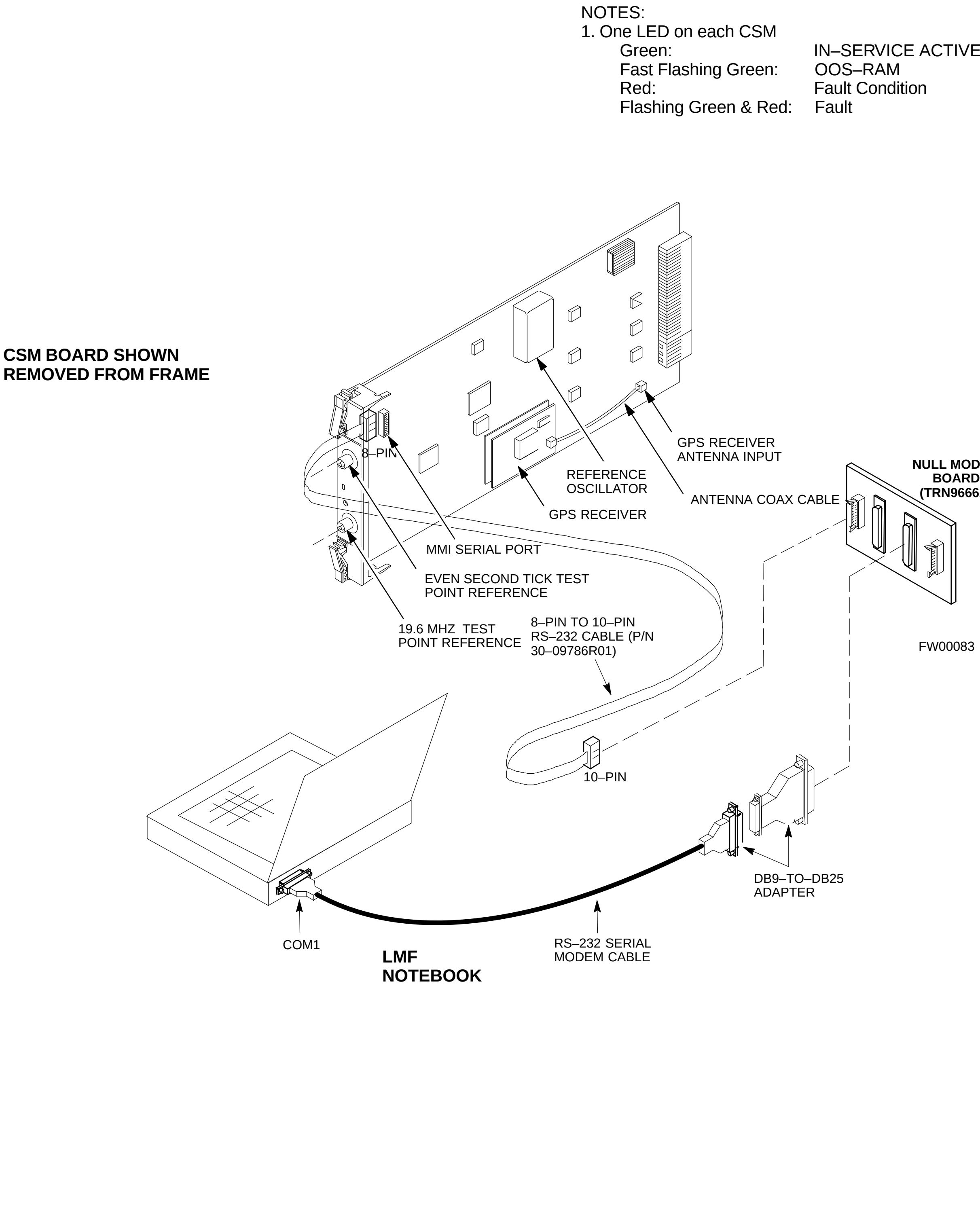
Table 3-20: Test Equipment Setup (GPS & LFR/HSO Verification)

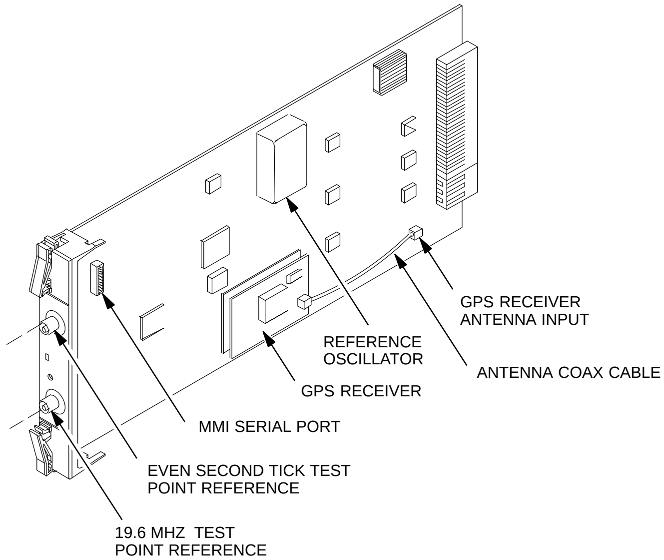
Step	Action
1	Verify a CSM board with a GPS receiver is installed in primary CSM slot 1 and that CSM–1 is INS. **NOTE** This is verified by checking the board ejectors for kit number **SGLN1145** on board in slot 1.
2	Remove CSM–2 (if installed) and connect a serial cable from the LMF COM 1 port (via null modem board) to the MMI port on CSM–1 (see Figure 3-13).
3	Reinstall CSM–2.
4	Open up a hyperterm window. From the Windows **Start** button, select **Programs>Accessories>Communication>Hyperterminal.** Set up a connection as follows: • Connect using= Direct to COM1 • Bps= 9600 • Data bits= 8 • Parity= None • Stop bits= 1 • Flow control= None
5	When the terminal screen appears press the **Enter** key until the **CSM>** prompt appears.

CAUTION

- Connect GPS antenna to the (GPS) RF connector **ONLY**. Damage to the GPS *antenna* and/or *receiver* can result if the GPS antenna is inadvertently connected to any other RF connector.

Figure 3-13: CSM MMI Terminal Connection




GPS RECEIVER
ANTENNA INPUT
REFERENCE
OSCILLATOR
ANTENNA COAX CABLE
GPS RECEIVER
MMI SERIAL PORT
EVEN SECOND TICK TEST
POINT REFERENCE
19.6 MHZ TEST
POINT REFERENCE

GPS Initialization/Verification

Follow the steps outlined in Table 3-21 to connect to CSM–1 installed in the C–CCP shelf, verifying that it is functioning normally.

Table 3-21: GPS Initialization/Verification

Step	Action

1	To verify that `Clock alarms (0000)`, `Dpll is locked and has a reference source`, and `GPS self test passed` messages are displayed within the report, issue the following MMI command
	bstatus
	– Observe the following typical response:
	`CSM Status INS:ACTIVE Slot A Clock MASTER.`
	`BDC_MAP:000, This CSM's BDC Map:0000`
	`Clock Alarms (0000):`
	`DPLL is locked and has a reference source.`
	`GPS receiver self test result: passed`
	`Time since reset 0:33:11, time since power on: 0:33:11`

. . . continued on next page

Table 3-21: GPS Initialization/Verification

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>2</td><td>Enter the following command at the CSM> prompt to display the current status of the Loran and the GPS receivers.

sources

– Observe the following typical response for systems equipped with LFR:

N   Source Name Type   TO Good Status   Last Phase Target Phase Valid
----
0   LocalGPS   Primary   4   YES Good   0   0   Yes
1   LFR CHA   Secondary 4   YES Good   –2013177   –2013177   Yes
2   Not Used
Current reference source number: 0

– Observe the following typical response for systems equipped with HSO:

Num Source Name Type   TO Good   Status Last Phase Target Phase Valid
----
 0   Local GPS   Primary 4   Yes   Good   3   0   Yes
 1   HSO   Backup   4   No   N/A   timed–out* Timed–out* No

*NOTE “Timed–out” should only be displayed while the HSO is warming up. “Not–Present” or “Faulty” should not be displayed. If the HSO does not appear as one of the sources, then configure the HSO as a back–up source by entering the following command at the CSM> prompt:

ss 1 12

After a maximum of 15 minutes, the Rubidium oscillator should reach operational temperature and the LED on the HSO should now have changed from red to green. After the HSO front panel LED has changed to green, enter sources <cr> at the CSM> prompt. Verify that the HSO is now a valid source by confirming that the bold text below matches the response of the “sources” command.

The HSO should be valid within one (1) minute, assuming the DPLL is locked and the HSO rubidium oscillator is fully warmed.

Num Source Name Type   TO Good   Status Last Phase Target Phase Valid
----
 0   Local GPS   Primary 4   Yes   Good   3   0   Yes
 1   HSO   Backup   4   Yes   N/A   xxxxxxxxxx xxxxxxxxxx Yes</td></tr>
<tr><td>3</td><td>HSO information (underlined text above, verified from left to right) is usually the #1 reference source. If this is not the case, have the OMCR determine the correct BTS timing source has been identified in the database by entering the display bts csmgen command and correct as required using the edit csm csmgen refsrc command.</td></tr>
<tr><td></td><td>* IMPORTANT
If any of the above mentioned areas fail, verify:
– If LED is RED, verify that HSO had been powered up for at least 5 minutes. After oscillator temperature is stable, LED should go GREEN Wait for this to occur before continuing !
– If “timed out” is displayed in the Last Phase column, suspect the HSO output buffer or oscillator is defective
– Verify the HSO is FULLY SEATED and LOCKED to prevent any possible board warpage</td></tr>
</table>

. . . continued on next page

<table>
<tr><th colspan="2">Table 3-21: GPS Initialization/Verification</th></tr>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>4</td><td>Verify the following GPS information (underlined text above):
– GPS information is usually the 0 reference source.
– At least one Primary source must indicate “Status = good” and “Valid = yes” to bring site up.</td></tr>
<tr><td>5</td><td>Enter the following command at the <code>CSM></code> prompt to verify that the GPS receiver is in tracking mode.
gstatus
– Observe the following typical response:<pre>
24:06:08 GPS Receiver Control Task State: tracking satellites.
24:06:08 Time since last valid fix: 0 seconds.
24:06:08
24:06:08 Recent Change Data:
24:06:08 Antenna cable delay 0 ns.
24:06:08 Initial position: lat 117650000 msec, lon –350258000 msec, height 0 cm (GPS)
24:06:08 Initial position accuracy (0): estimated.
24:06:08
24:06:08 GPS Receiver Status:
24:06:08 Position hold: lat 118245548 msec, lon –350249750 msec, height 20270 cm
24:06:08 Current position: lat 118245548 msec, lon –350249750 msec, height 20270 cm
(GPS)
24:06:08 8 satellites tracked, receiving 8 satellites, 8 satellites visible.
24:06:08 Current Dilution of Precision (PDOP or HDOP): 0.
24:06:08 Date & Time: 1998:01:13:21:36:11
24:06:08 GPS Receiver Status Byte: 0x08
24:06:08 Chan:0, SVID: 16, Mode: 8, RSSI: 148, Status: 0xa8
24:06:08 Chan:1, SVID: 29, Mode: 8, RSSI: 132, Status: 0xa8
24:06:08 Chan:2, SVID: 18, Mode: 8, RSSI: 121, Status: 0xa8
24:06:08 Chan:3, SVID: 14, Mode: 8, RSSI: 110, Status: 0xa8
24:06:08 Chan:4, SVID: 25, Mode: 8, RSSI: 83, Status: 0xa8
24:06:08 Chan:5, SVID: 3, Mode: 8, RSSI: 49, Status: 0xa8
24:06:08 Chan:6, SVID: 19, Mode: 8, RSSI: 115, Status: 0xa8
24:06:08 Chan:7, SVID: 22, Mode: 8, RSSI: 122, Status: 0xa8
24:06:08
24:06:08 GPS Receiver Identification:
24:06:08 COPYRIGHT 1991–1996 MOTOROLA INC.
24:06:08 SFTW P/N # 98–P36830P
24:06:08 SOFTWARE VER # 8
24:06:08 SOFTWARE REV # 8
24:06:08 SOFTWARE DATE 6 AUG 1996
24:06:08 MODEL #   B3121P1115
24:06:08 HDWR P/N # _
24:06:08 SERIAL #   SSG0217769
24:06:08 MANUFACTUR DATE 6B07
24:06:08 OPTIONS LIST   IB
24:06:08 The receiver has 8 channels and is equipped with TRAIM.
</pre></td></tr>
<tr><td>6</td><td>Verify the following GPS information (shown above in <u>underlined</u> text):
– At least 4 satellites are tracked, and 4 satellites are visible.
– GPS Receiver Control Task State is “tracking satellites”. Do not continue until this occurs!
– Dilution of Precision indication is not more that 30.
Record the current position base site latitude, longitude, height and height reference (height reference to Mean Sea Level (MSL) or GPS height (GPS). (GPS = 0   MSL = 1).</td></tr>
</table>

. . . continued on next page

Table 3-21: GPS Initialization/Verification	
Step	**Action**
7	**If steps 1 through 6 pass, the GPS is good.**
	*** IMPORTANT** If any of the above mentioned areas fail, verify that: – If *Initial position accuracy* is “estimated” (typical), at least 4 satellites must be tracked and visible (1 satellite must be tracked and visible if actual lat, log, and height data for this site has been entered into CDF file). – If *Initial position accuracy* is “surveyed,” position data currently in the CDF file is assumed to be accurate. GPS will not automatically survey and update its position. – The GPS antenna is not obstructed or misaligned. – GPS antenna connector center conductor measureS approximately +5 Vdc with respect to the shield. – There is no more than 4.5 dB of loss between the GPS antenna OSX connector and the BTS frame GPS input. – Any lightning protection installed between GPS antenna and BTS frame is installed correctly.

8	Enter the following commands at the `CSM>` prompt to verify that the CSM is warmed up and that GPS acquisition has taken place.
	debug dpllp
	Observe the following typical response if the CSM is not warmed up (15 minutes from application of power) ***(If warmed–up proceed to step 9)***
	`CSM>DPLL Task Wait. 884 seconds left.`
	`DPLL Task Wait. 882 seconds left.`
	`DPLL Task Wait. 880 seconds left.   ...........etc.`

	NOTE The **warm** command can be issued at the MMI port used to force the CSM into warm–up, but the reference oscillator will be unstable.

9	Observe the following typical response if the CSM is warmed up.
	`c:17486 off: –11, 3, 6 TK SRC:0 S0: 3 S1:–2013175,–2013175`
	`c:17486 off: –11, 3, 6 TK SRC:0 S0: 3 S1:–2013175,–2013175`
	`c:17470 off: –11, 1, 6 TK SRC:0 S0: 1 S1:–2013175,–2013175`
	`c:17486 off: –11, 3, 6 TK SRC:0 S0: 3 S1:–2013175,–2013175`
	`c:17470 off: –11, 1, 6 TK SRC:0 S0: 1 S1:–2013175,–2013175`
	`c:17470 off: –11, 1, 6 TK SRC:0 S0: 1 S1:–2013175,–2013175`

10	Verify the following GPS information (underlined text above, from left to right): – Lower limit offset from tracked source variable is not less than –60 (equates to 3µs limit). – Upper limit offset from tracked source variable is not more than +60 (equates to 3µs limit). – TK SRC: 0 is selected, where SRC 0 = GPS.
11	Enter the following commands at the `CSM>` prompt to exit the debug mode display. **debug dpllp**

LORAN–C Initialization/Verification

Table 3-22: LORAN–C Initialization/Verification

Step	Action	Note

1	At the CSM> prompt, enter **lstatus <cr>** to verify that the LFR is in tracking mode. A typical response is:
	
	`CSM>` **lstatus <cr>**
	`LFR Station Status:`
	`Clock coherence: 512 ————>`
	`5930M  51/60  dB  0  S/N Flag:`
	`5930X  52/64  dn –1  S/N Flag:`
	`5990   47/55  dB –6  S/N Flag:`
	`7980M  62/66  dB 10  S/N Flag:`
	`7980W` `65/69  dB` **`14`** `S/N Flag:` **`. PLL Station .`** `————>`
	`7980X  48/54  dB –4  S/N Flag:`
	`7980Y  46/58  dB –8  S/N Flag:E`
	`7980Z  60/67  dB  8  S/N Flag:`
	`8290M  50/65  dB  0  S/N Flag:`
	`8290W  73/79  dB 20  S/N Flag:`
	`8290W  58/61  dB  6  S/N Flag:`
	`8970M  89/95  dB 29  S/N Flag:`
	`8970W  62/66  dB 10  S/N Flag:`
	`8970X  73/79  dB 22  S/N Flag:`
	`8970Y  73/79  dB 19  S/N Flag:`
	`8970Z  62/65  dB 10  S/N Flag:`
	`9610M  62/65  dB 10  S/N Flag:`
	`9610V  58/61  dB  8  S/N Flag:`
	`9610W  47/49  dB –4  S/N Flag:E`
	`9610X  46/57  dB –5  S/N Flag:E`
	`9610Y  48/54  dB –5  S/N Flag:E`
	`9610Z  65/69  dB 12  S/N Flag:`
	`9940M  50/53  dB –1  S/N Flag:S`
	`9940W  49/56  dB –4  S/N Flag:E`
	`9940Y  46/50  dB–10  S/N Flag:E`
	`9960M  73/79  dB 22  S/N Flag:`
	`9960W  51/60  dB  0  S/N Flag:`
	`9960X  51/63  dB –1  S/N Flag:`
	`9960Y  59/67  dB  8  S/N Flag:`
	`9960Z  89/96  dB 29  S/N Flag:`
	
	`LFR Task State: lfr locked to station 7980W`
	`LFR Recent Change Data:`
	`  Search List: 5930 5990 7980 8290 8970 9940 9610 9960————>`
	`  PLL GRI: 7980W`
	`LFR Master, reset not needed, not the reference source.`
	`CSM>`
		This must be greater than 100 before LFR becomes a valid source.
		
		This shows the LFR is locked to the selected PLL station.
		
		This search list and PLL data must match the configuration for the geographical location of the cell site.

. . . continued on next page

<table>
<tr><th colspan="3">**Table 3-22:** LORAN–C Initialization/Verification</th></tr>
<tr><th>Step</th><th>Action</th><th>Note</th></tr>
<tr><td>2</td><td colspan="2">Verify the following LFR information (highlighted above in **boldface** type):
– Locate the “dot” that indicates the current phase locked station assignment (assigned by MM).
– Verify that the station call letters are as specified in site documentation as well as M X Y Z assignment.
– Verify the S/N ratio of the phase locked station is greater than 8.</td></tr>
<tr><td>3</td><td colspan="2">At the CSM> prompt, enter **sources <cr>** to display the current status of the the LORAN receiver.
– Observe the following typical response.<pre>
Num Source Name Type   TO Good   Status Last Phase Target Phase Valid
----
 0   Local GPS   Primary   4   Yes   Good   -3   0   Yes
 1   LFR ch A   Secondary 4   Yes   Good   -2013177   -2013177   Yes
 2   Not used
Current reference source number: 1
</pre></td></tr>
<tr><td>4</td><td colspan="2">LORAN LFR information (highlighted above in **boldface** type) is usually the #1 reference source (verified from left to right).

*** IMPORTANT**
If any of the above mentioned areas fail, verify:
– The LFR antenna is not obstructed or misaligned.
– The antenna pre–amplifier power and calibration twisted pair connections are intact and < 91.4 m (300 ft) in length.
– A dependable connection to suitable Earth Ground is in place.
– The search list and PLL station for cellsite location are correctly configured .</td></tr>
<tr><td></td><td colspan="2">**NOTE**
LFR functionality should be verified using the “source” command (as shown in Step 3). Use the underlined responses on the LFR row to validate correct LFR operation.</td></tr>
<tr><td>5</td><td colspan="2">At the CSM> close the hyperterminal window.</td></tr>
</table>

3

Connecting Test Equipment to the BTS: Overview

All test equipment is controlled by the LMF via IEEE–488/GPIB bus. The LMF requires each piece of test equipment to have a factory set GPIB address. If there is a communications problem between the LMF and any piece of test equipment, verify that the GPIB addresses have been set correctly (normally 13 for a power meter and 18 for a CDMA analyzer).

CAUTION

This procedure requires working on our around circuitry extremely sensitive to ESD. To prevent damage, wear a conductive, high impedance wrist strap during handling of any circuit board or module.

Follow appropriate safety measures.

Refer to Table 3-23 for an overview of connections for test equipment currently supported by LMF.

NOTE

Typical DIP switch positions and/or configurations are shown in the following procedure and illustrations. If any additional information is required, refer to the test equipment OEM user manuals.

Reading the Test Equipment Setup Chart

Table 3-23 depicts the current test equipment available meeting Motorola standards.

To identify the connection ports, locate the test equipment presently being used in the **TEST SETS** columns, and read down the column. Where a ball appears in the column, connect one end of the test cable to that port. Follow the horizontal line to locate the end connection(s), reading up the column to identify the appropriate equipment/BTS port.

Table 3-23: Test Equipment Setup

SIGNAL	TEST SETS					ADDITIONAL TEST EQUIPMENT				BTS
	Cyber–Test	Ad-vantest	HP 8935	HP 8921A	HP 8921 W/PCS	Power Meter	GPIB Inter-face	LMF	Directional Coupler & Pad*	
EVEN SECOND SYNCHRONIZATION	EVEN SEC REF	EVEN SEC SYNC IN	EVEN SECOND SYNC IN	EVEN SECOND SYNC IN	EVEN SECOND SYNC IN					SYNC MONITOR
	●									●
		●								●
			●							●
				●						●
					●					●
19.6608 MHZ CLOCK	TIME BASE IN	CDMA TIME BASE IN	EXT REF IN	CDMA TIME BASE IN	CDMA TIME BASE IN					FREQ MONITOR
	●									●
		●								●
			●							●
				●						●
					●					●
CONTROL IEEE 488 BUS	IEEE 488	GPIB	HP–IB	HP–IB	HP–IB	HP–IB	GPIB	SERIAL PORT		
	●						●	●		
		●				●	●	●		
			●				●	●		
				●		●	●	●		
					●	●	●	●		
TX TEST CABLES	RF IN/OUT	INPUT 50–OHM	RF IN/OUT	RF IN/OUT	RF IN/OUT				20 DB PAD / BTS PORT	TX1–6
	●								● / ●	●
		●							● / ●	●
			●						● / ●	●
				●					● / ●	●
					●				● / ●	●
RX TEST CABLES	RF GEN OUT	RF OUT 50–OHM	DUPLEX	DUPLEX OUT	RF OUT ONLY					RX1–6
	●									●
		●								●
			●							●
				●						●
					●					●

3

Equipment Warm-up

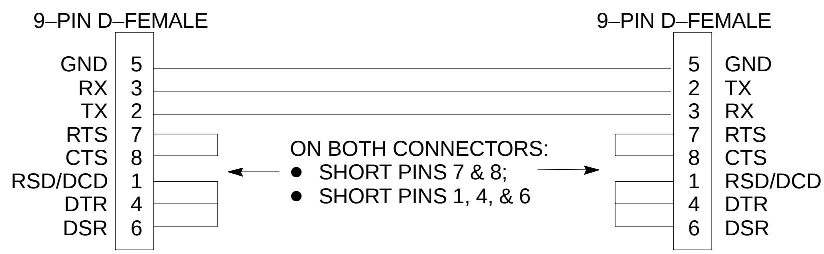
IMPORTANT

Warm-up *BTS equipment for a minimum of 60 minutes* prior to performing the BTS optimization procedure. This assures BTS site stability and contributes to optimization accuracy. (Time spent running initial power-up, hardware/firmware audit, and BTS download counts as warm-up time.)

Null Modem Cable

A null modem cable is required. It is connected between the LMF COM1 port and the RS232–GPIB Interface box. Figure 3-14 shows the wiring detail for the null modem cable.

Figure 3-14: Null Modem Cable Detail



Test Equipment

The following test equipment is required to perform the tests:

- LMF
- CDMA Communications Test Set
- Directional Coupler and Attenuator
- RF Cables and connectors

WARNING

Before installing any test equipment directly to any BTS **TX OUT** connector, verify there are **NO** CDMA BBX channels keyed. At active sites, have the OMC-R/CBSC place the antenna (sector) assigned to the LPA under test OOS. Failure to do so can result in serious personal injury and/or equipment damage.

CAUTION

To prevent damage to the test equipment, all transmit (TX) test connections must be through the 30 dB directional coupler and, for 1.9 GHz BTS, a 20 dB in-line attenuator.

NOTE

Re-calibration of the test equipment *must be performed*, before using to perform the TX Acceptance Tests.

TX Calibration Optimization/ATP tests sets

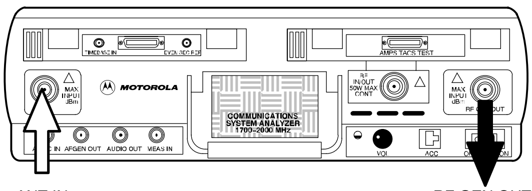
Optimization and ATP testing may be performed using one of the following test sets:

- CyberTest
- Advantest R3465 and HP–437B or Gigatronics Power Meter
- Hewlett–Packard HP 8935
- Hewlett–Packard HP 8921 W/CDMA and PCS Interface (1.7 & 1.9 GHz) and HP–437B or Gigatronics Power Meter
- Spectrum Analyzer (HP8594E) – *optional*
- Rubidium Standard Timebase – *optional*

Figure 3-15: Cable Calibration Test Setup

SUPPORTED TEST SETS

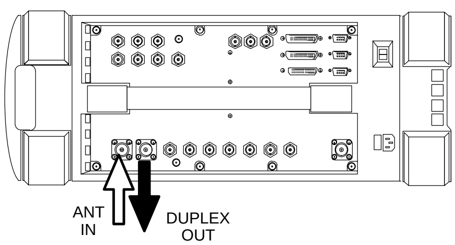
Motorola CyberTest



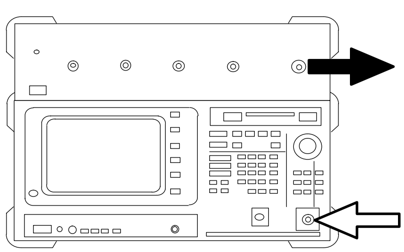
Note: The Directional Coupler is not used with the Cybertest Test Set. The TX cable is connected directly to the Cybertest Test Set.

A 10dB attenuator must be used with the short test cable for cable calibration with the CyberTest Test Set. The 10dB attenuator is used only for the cable calibration procedure, not with the test cables for TX calibration and ATP tests.

Hewlett–Packard Model HP 8935

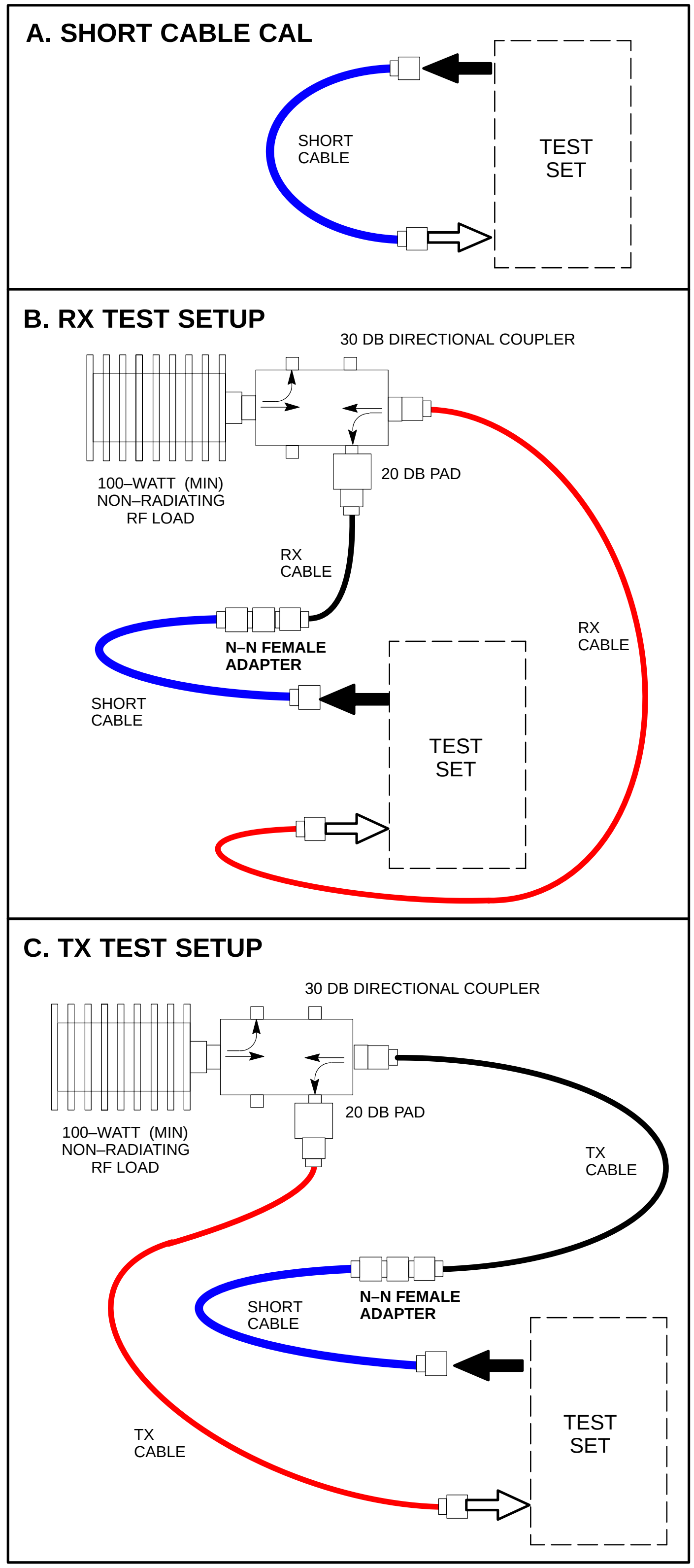


Advantest Model R3465



Note: The HP8921A cannot be used to calibrate cables for PCS frequencies

CALIBRATION SET UP

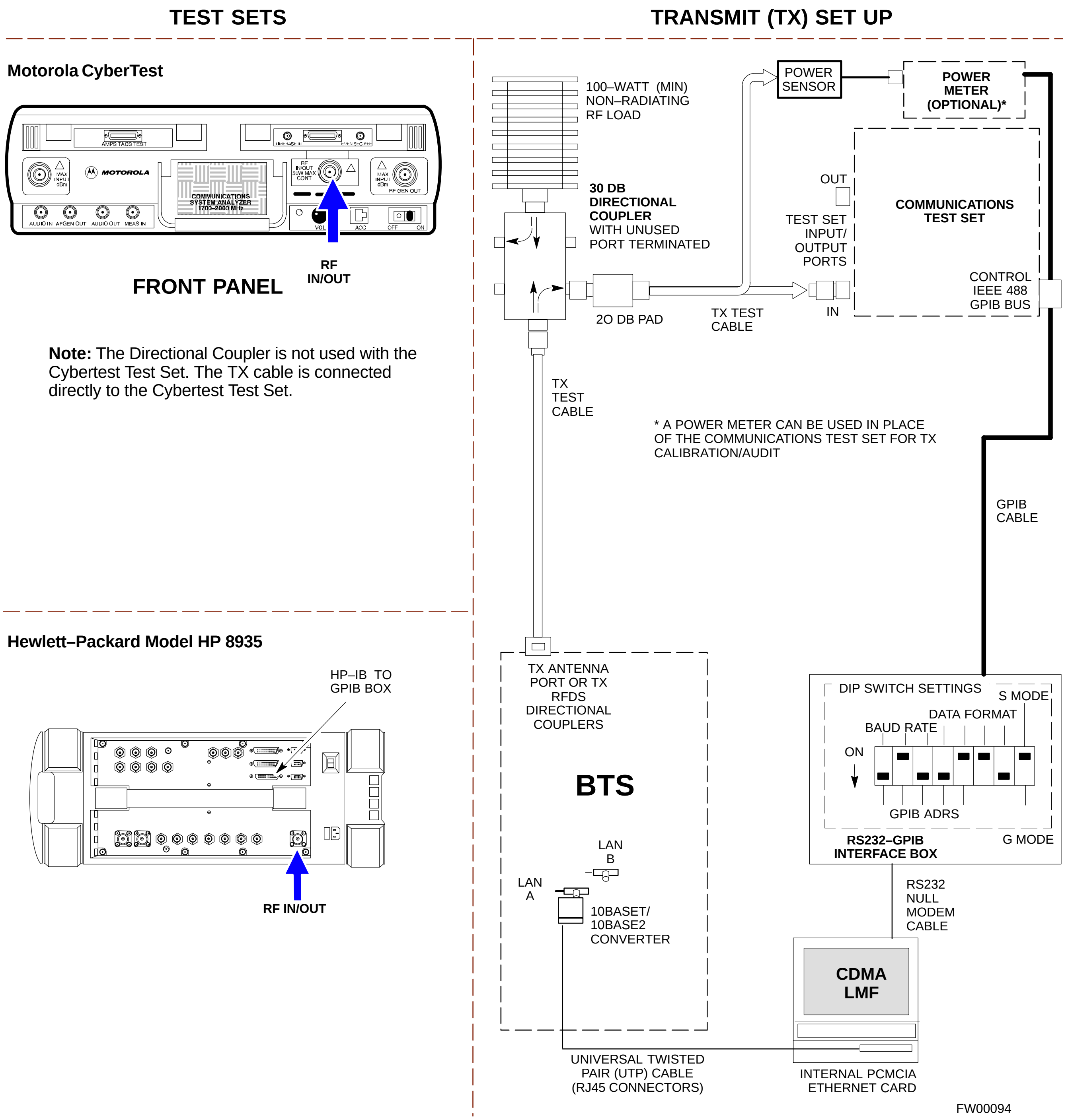


FW00089

Setup for TX Calibration

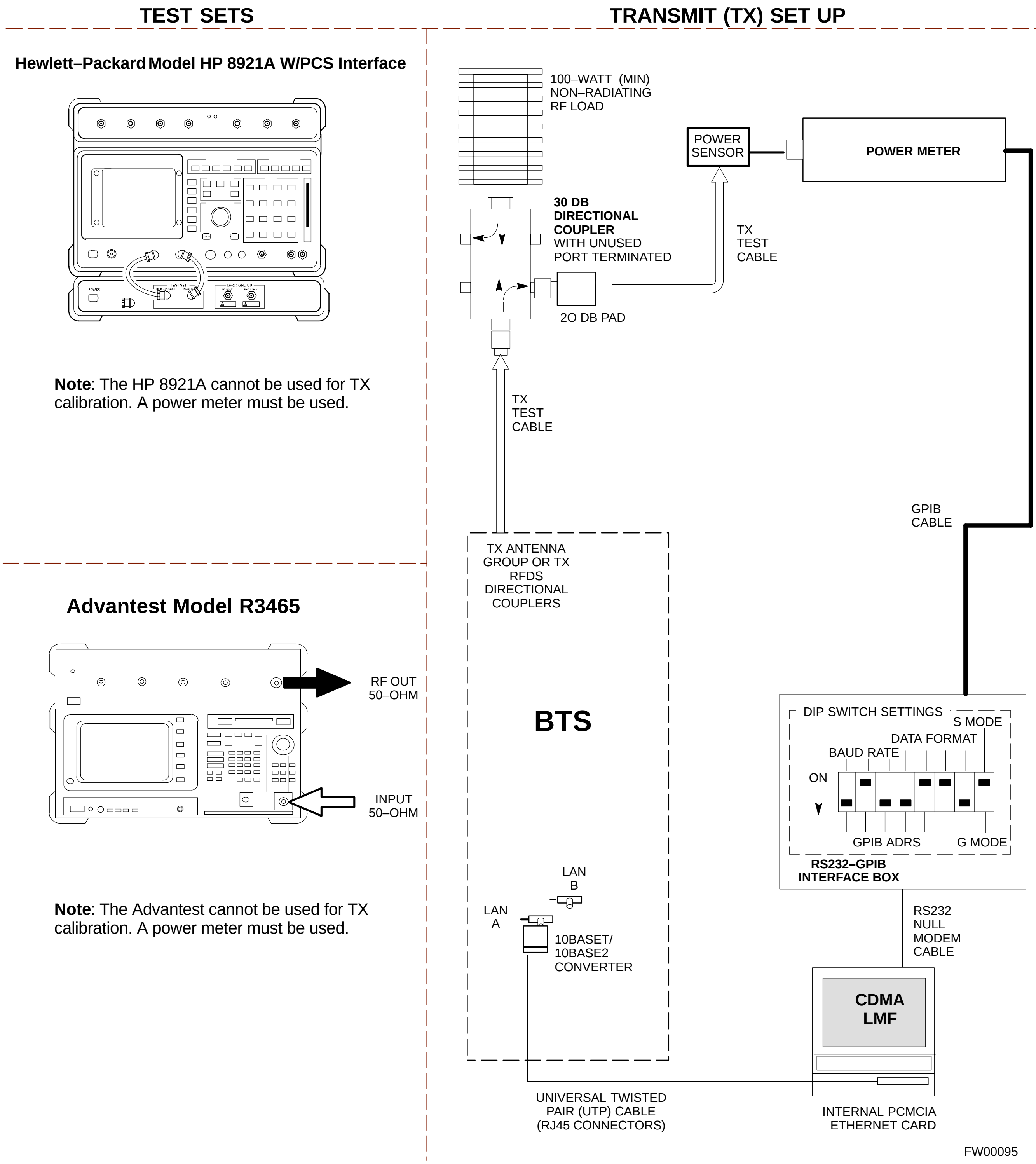
Figure 3-16 andFigure 3-17 show the test set connections for TX calibration.

Figure 3-16: TX calibration test setup (CyberTest and HP 8935)



3

Figure 3-17: TX calibration test setup (Advantest and HP 8921A W/PCS for 1700/1900)



Setup for Optimization/ATP

Figure 3-18 and Figure 3-19 show the test set connections for optimization/ATP tests.

Figure 3-18: Optimization/ATP test setup calibration (CyberTest, HP 8935 and Advantest)

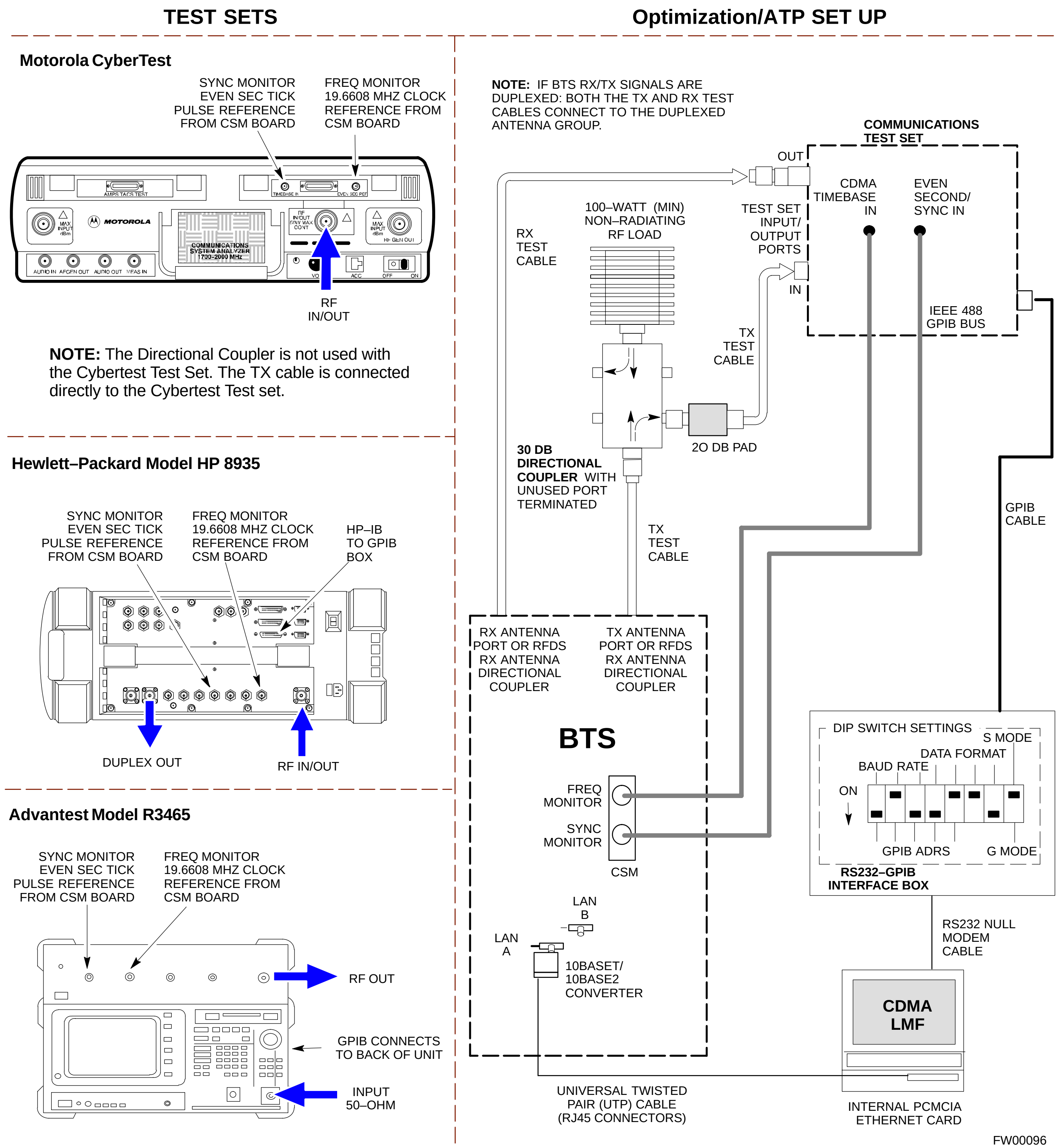


Figure 3-19: Optimization/ATP test setup HP 8921A W/PCS

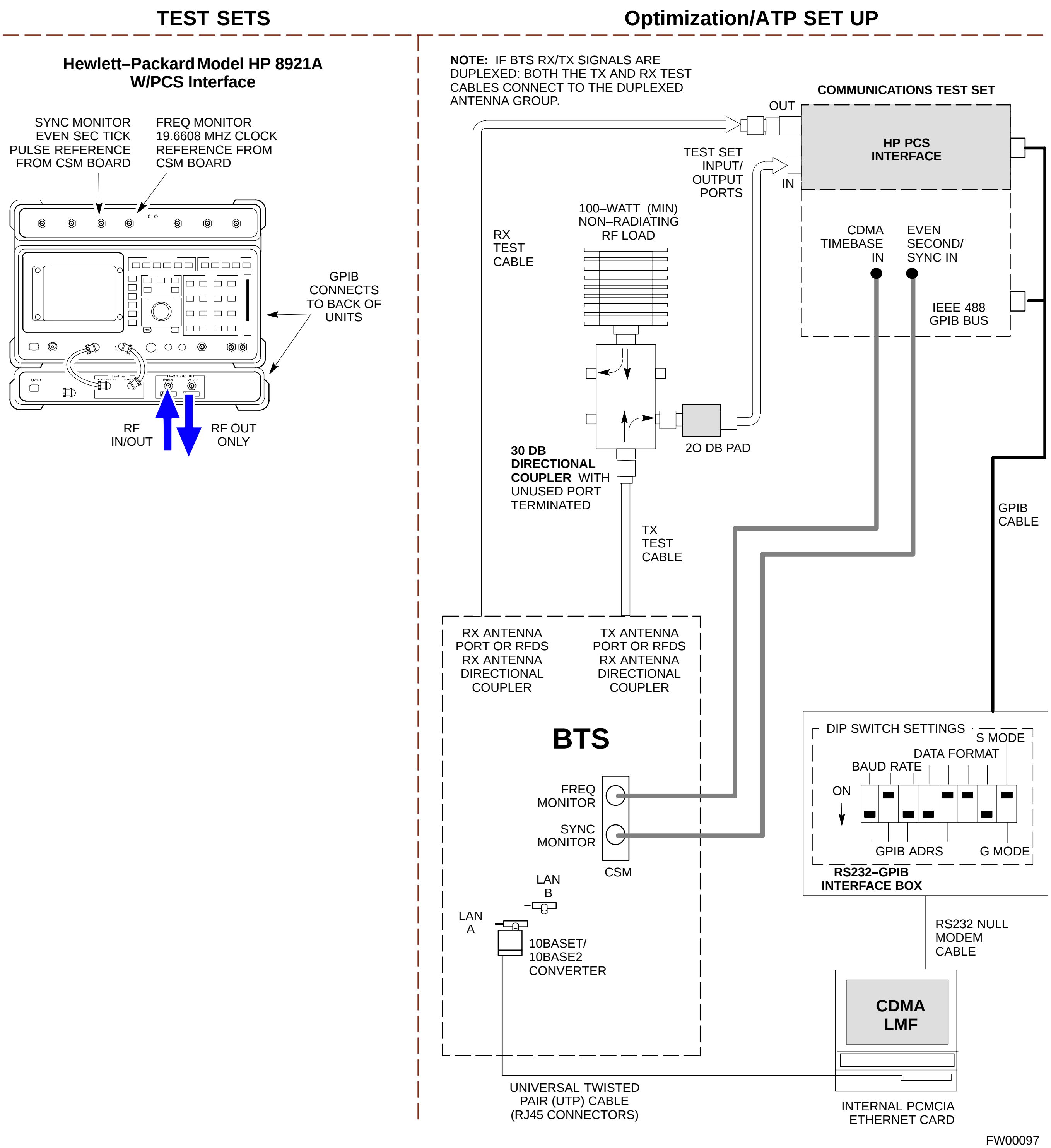
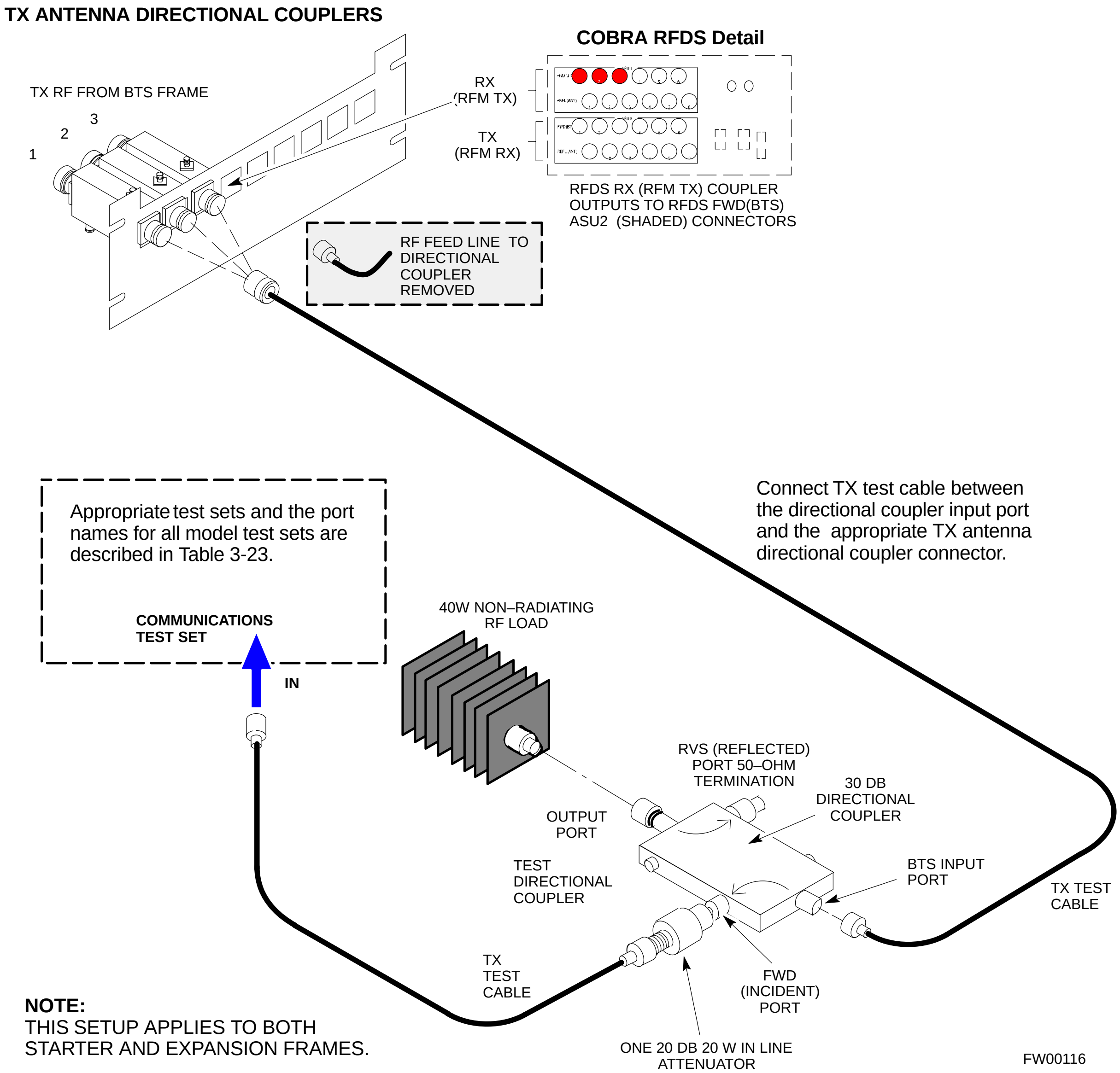
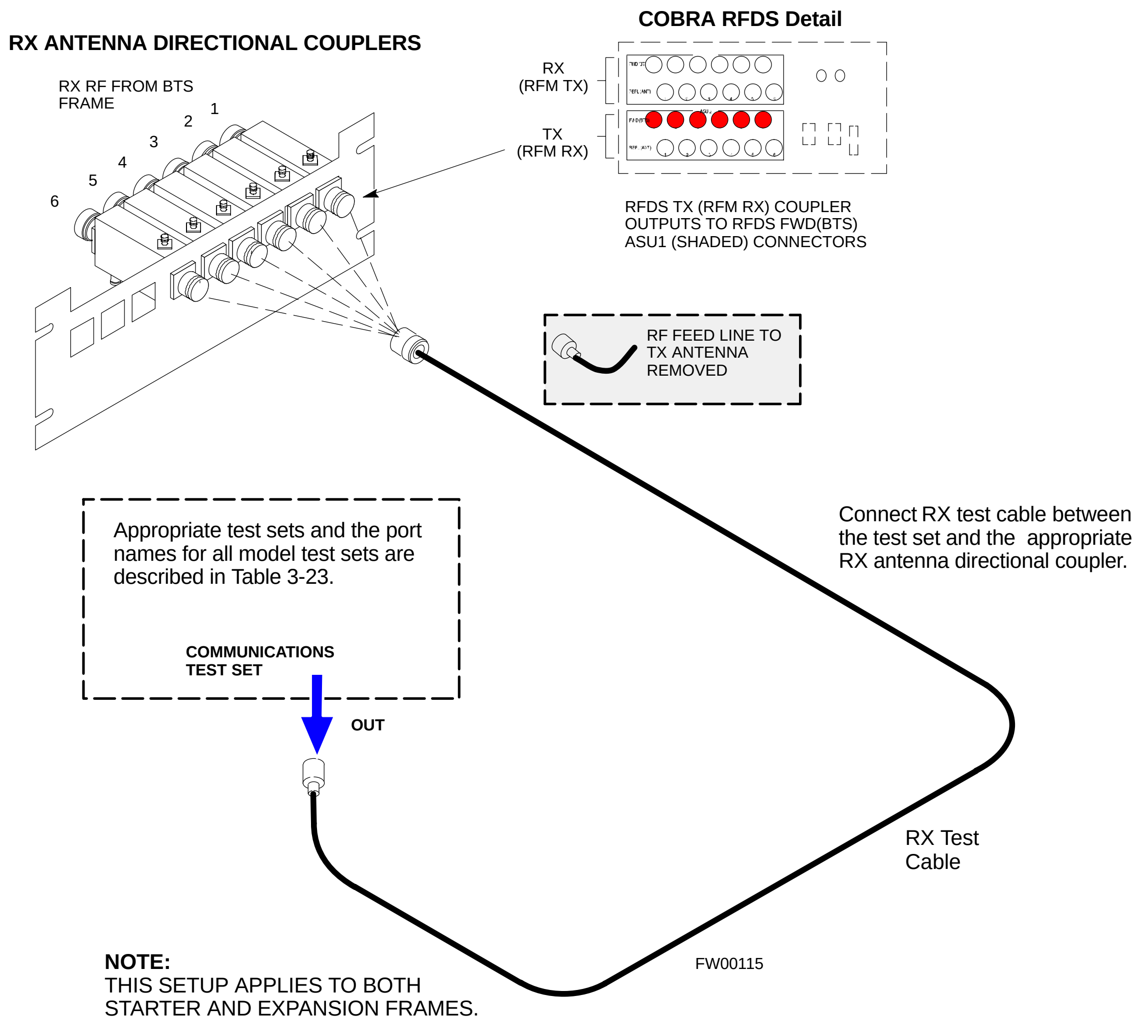


Figure 3-20: Typical TX ATP Setup with Directional Coupler (shown with and without RFDS)



3

Figure 3-21: Typical RX ATP Setup with Directional Coupler (shown with or without RFDS)



Background

Proper test equipment setup ensures that the test equipment and associated test cables do not introduce measurement errors, and that measurements are correct.

NOTE

If the test set being used to interface with the BTS has been calibrated and maintained as a set, this procedure does not need to be performed. (Test Set includes LMF terminal, communications test set, additional test equipment, associated test cables, and adapters).

This procedure must be performed *prior* to beginning the optimization. Verify all test equipment (including all associated test cables and adapters actually used to interface all test equipment and the BTS) has been calibrated and maintained as a set.

CAUTION

If any piece of test equipment, test cable, or RF adapter, that makes up the calibrated test equipment set, has been replaced, re-calibration must be performed. Failure to do so can introduce measurement errors, resulting in incorrect measurements and degradation to system performance.

IMPORTANT

Calibration of the communications test set (or equivalent test equipment) must be performed at the site before calibrating the overall test set. Calibrate the test equipment *after* it has been allowed to warm–up and stabilize for a *minimum of 60 minutes*.

Purpose

These procedures access the CDMA LMF automated calibration routine used to determine the path losses of the supported communications analyzer, power meter, associated test cables, and (if used) antenna switch that make up the overall calibrated test set. After calibration, the gain/loss offset values are stored in a test measurement offset file on the CDMA LMF.

Selecting Test Equipment

Use **LMF Options** from the **Options** menu list to select test equipment automatically (using the autodetect feature) or manually.

Prerequisites

A **Serial Connection** and a **Network Connection** tab are provided for test equipment selection. The **Serial Connection** tab is used when the test equipment items are connected directly to the CDMA LMF computer via a GPIB box (normal setup). The **Network Connection** tab is used when the test equipment is to be connected remotely via a network connection.

Ensure the following has been completed before selecting test equipment:

- Test equipment is correctly connected and turned on.
- CDMA LMF computer serial port and test equipment are connected to the GPIB box.

Manually Selecting Test Equipment in a Serial Connection Tab

Test equipment can be manually specified before, or after, the test equipment is connected. CDMA LMF does not check to see if the test equipment is actually detected for manual specification.

Table 3-24: Selecting Test Equipment Manually in a Serial Connection Tab

✓	Step	Action
	1	From the **Options** menu, select LMF Options. The **LMF Options** window appears.
	2	Click on the **Serial Connection** tab (if not in the forefront).
	3	Select the correct serial port in the **COMM Port** pick list (normally **COM1**).
	4	Select the baud rate in the **Baud Rate** pick list (normally 9600). The baud rate and GPIB box setup must agree.
	5	Click on the **Manual Specification** button (if not enabled).
	6	Click on the check box corresponding to the test item(s) to be used.
	7	Type the GPIB address in the corresponding **GPIB address** box. ***Recommended Addresses*** 13=Power Meter 18=CDMA Analyzer
	8	Click on **Apply**. (The button will darken until the selection has been committed.) **NOTE** With manual selection, CDMA LMF does not detect the test equipment to see if it is connected and communicating with CDMA LMF.
	9	Click on **Dismiss** to close the test equipment window.

Automatically Selecting Test Equipment in a Serial Connection Tab

When using the auto-detection feature to select test equipment, the CDMA LMF examines which test equipment items are actually communicating with CDMA LMF. Follow the procedure in Table 3-25 to use the auto-detect feature.

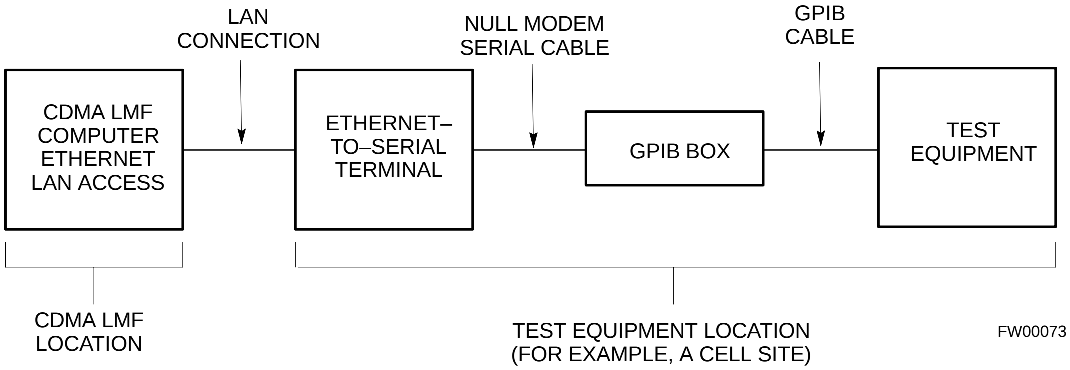
Table 3-25: Selecting Test Equipment Using Auto-Detect

✓	Step	Action
	1	From the **Options** menu, select **LMF Options**. The **LMF Options** window appears.
	2	Click on **Auto–Detection** (if not enabled).
	3	Type in the GPIB addresses in the box labeled **GPIB address to search** (if not already displayed). **NOTE** When both a power meter and analyzer are selected, the first item listed in the **GPIB addresses to search** box will be used for RF power measurements (i.e., TX calibration). The address for a power meter is normally **13** and the address for a CDMA analyzer is normally **18**. If **13,18** is included in the **GPIB addresses to search** box, the power meter (13) will be used for RF power measurements. If the test equipment items are manually selected the CDMA analyzer is used only if a power meter is not selected.
	4	Click **Apply.** The button will darken until the selection has been committed. A check mark will appear in the **Manual Configuration** section for detected test equipment items.
	5	Click **Dismiss** to close the **LMF Options** window.

Network Test Equipment Setup

Test equipment can be remotely detected and used by CDMA LMF. A LAN connection is required between the CDMA LMF location and the test equipment location. A LAN-to-serial interface is required at the test equipment location. A diagram of a typical network test equipment setup is shown in Figure 3-22

Figure 3-22: Typical Network Test Equipment Setup



Manually Selecting Test Equipment Using the Network Tab

Test equipment can be manually specified before, or after test equipment is connected. The CDMA LMF *does not* check to see if the test equipment is actually detected for manual specification. Follow the procedure in Table 3-26 to select the test equipment manually using a network connection tab.

Table 3-26: Selecting Test Equipment Manually Using a Network Connection Tab

✓	Step	Action
	1	From the **Options** menu, select LMF Options. The **LMF Options** window appears.
	2	Click on the **Network Connection** tab (if not in the forefront).
	3	In the IP Address box, enter the IP address number for the serial connection terminal at the test equipment location (for example, Xterm terminal or IP–to–serial terminal).
	4	Click on the **Manual Specification** button (if not enabled).
	5	Click on the check box corresponding to the test item(s) to be used.
	6	Type the GPIB address in the corresponding **GPIB address** box. ***Recommended Addresses*** 13=Power Meter 18=CDMA Analyzer
	7	Click on **Apply**. (The button will darken until the selection has been committed.) **NOTE** With manual selection, CDMA LMF does not detect the test equipment to see if it is connected and communicating with CDMA LMF.
	8	Click on **Dismiss** to close the test equipment window.

Automatically Selecting Test Equipment Using the Network Tab

When the auto-detection feature is used to select test equipment, CDMA LMF checks to determine which test equipment items are actually communicating with CDMA LMF. Follow the procedure in Table 3-27 to select the test equipment using the auto-detection feature.

Table 3-27: Selecting Test Equipment Using Auto-Detect

✓	Step	Action
	1	From the **Options** menu, select **LMF Options**. The **LMF Options** window appears.
	2	Click on the **Network Connection** tab (if not in the forefront).
	3	In the IP Address box, enter the IP address number for the serial connection terminal at the test equipment location (for example, Xterm terminal or IP–to–serial terminal).

. . . continued on next page

Table 3-27: Selecting Test Equipment Using Auto-Detect		
✓	Step	Action
	4	Click on **Auto–Detection** if it is not enabled.
	5	Type in the GPIB addresses in the box labeled **GPIB address to search**, if the GPIB addresses are not already displayed. **NOTE** When both a power meter and analyzer are selected, the first item listed in the **GPIB addresses to search** box will be used for RF power measurements (i.e., TX calibration). The address for a power meter is normally **13** and the address for a CDMA analyzer is normally **18**. If **13,18** is included in the **GPIB addresses to search** box, the power meter (**13**) will be used for RF power measurements.
	6	Click **Apply.** (The button will darken until the selection has been committed.) A check mark will appear in the **Manual Configuration** section for detected test equipment items.
	7	Click **Dismiss** to close the **LMF Options** window.

Calibrating Test Equipment

The calibrate test equipment function zeros the power measurement level of the test equipment item that is to be used for TX calibration and audit. If both a power meter and an analyzer are connected, only the power meter is zeroed.

The **Calibrate Test Equipment** menu item from the **Device** menu list is used to calibrate test equipment. The test equipment must be selected before beginning calibration. Follow the procedure in Table 3-28 to calibrate the test equipment.

Table 3-28: Test Equipment Calibration		
✓	Step	Action
	1	From the **Util** menu, select **Calibrate Test Equipment**. A **Directions** window is displayed. Follow the instructions provided.
	2	Click on **Continue** to close the **Directions** window. A status window is displayed.
	3	Click on **OK** to close the status report window.

Calibrating Cables

The cable calibration function is used to measure the loss (in dB) for the TX and RX cables that are to be used for testing. A CDMA analyzer is used to measure the loss of each cable configuration (TX cable configuration and RX cable configuration). The cable calibration consists of the following steps.

- Measure the loss of a short cable. This is done to compensate for any measurement error of the analyzer. The sort cable, which is used only for the calibration process, is used in series with both the TX and RX cable configuration when they are measured. The measured loss of the short cable is deducted from the measured loss of the TX and RX cable configuration to determine the actual loss of the TX and RX cable configurations. This deduction is done so any error in the analyzer measurement will be adjusted out of both the TX and RX measurements.

- The short cable plus the RX cable configuration loss is measured. The RX cable configuration normally consists only of a coax cable with type–N connectors that is long enough to reach from the BTS RX port the test equipment.
- The short cable plus the TX cable configuration loss is measured. The TX cable configuration normally consists of two coax cables with type–N connectors and a directional coupler, a load, and an additional attenuator if required by the BTS type. The total loss of the path loss of the TX cable configuration must be as required for the BTS (normally 30, 40, or 50 dB). The Motorola Cybertest analyzer is different in that the required attenuation/load is built into the test set so the TX cable configuration consists only of the required length coax cable.

Calibrating Cables with a CDMA Analyzer

The **Cable Calibration** menu item from the **Util** menu list is used to calibrate both TX and RX test cables for use with CDMA LMF.

NOTE

Cable calibration cannot be accomplished with an HP8921 analyzer. A different analyzer type or the signal generator and spectrum analyzer method must be used (refer to Table 3-30 and Figure 3-23). Cable calibration values must be manually entered if the signal generator and spectrum analyzer method is used.

The test equipment must be selected before this procedure can be started. Follow the procedure in Table 3-29 to calibrate the cables. Figure 3-15 illustrates the cable calibration test equipment setup.

Table 3-29: Cable Calibration

✓	Step	Action
	1	From the **Util** menu, select **Cable Calibration**. A **Cable Calibration** window is displayed.
	2	Enter a channel number(s) in the **Channels** box. Multiple channels numbers must be separated with a comma, no space (i.e., 200,800). When two or more channels numbers are entered, the cables will be calibrated for each channel. Interpolation will be accomplished for other channels as required for TX calibration.
	3	Select **TX and RX CABLE CAL**, **TX CABLE CAL** or **RX CABLE CAL** in the **Cable Calibration** picklist.

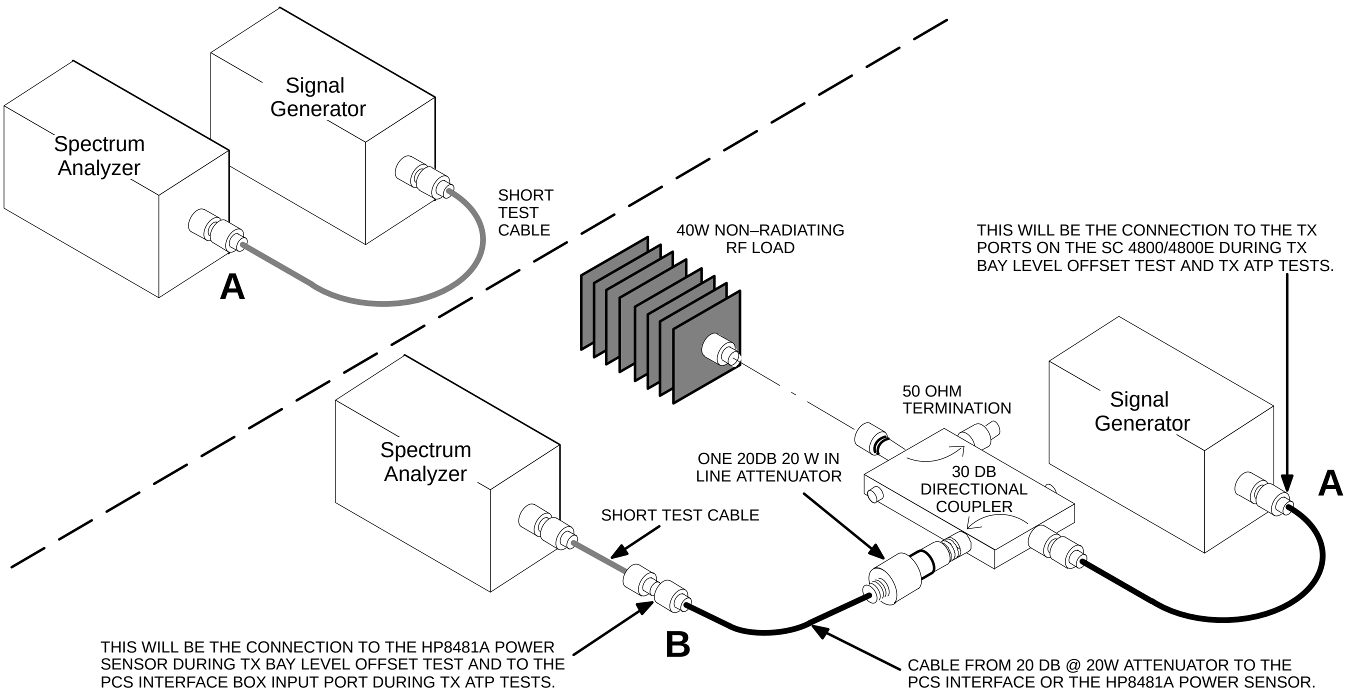
Table 3-29: Cable Calibration		
✓	Step	Action
	4	Click **OK**. Follow the direction displayed for each step. A status report window will be displayed with the results of the cable calibration (refer to Figure 3-15).

Calibrating TX Cables Using a Signal Generator and Spectrum Analyzer

Follow the procedure in Table 3-30 to calibrate the TX cables using the signal generator and spectrum analyzer. Refer to Figure 3-23 for a diagram of the signal generator and spectrum analyzer.

Table 3-30: Calibrating TX Cables Using Signal Generator and Spectrum Analyzer	
Step	Action
1	Connect a short test cable between the spectrum analyzer and the signal generator.
2	Set signal generator to 0 dBm at the customer frequency of 1840–1870 MHz band for Korea PCS and 1930–1990 MHz band for North American PCS.
3	Use spectrum analyzer to measure signal generator output (see Figure 3-23, “A”) and record the value.
4	Connect the spectrum analyzer’s short cable to point “B”, as shown in the lower portion of the diagram, to measure cable output at customer frequency (1840–1870 MHz for Korea PCS and 1930–1990 MHz for North American PCS) and record the value at point “B”.
5	Calibration factor = A – B Example: Cal = –1 dBm – (–53.5 dBm) = 52.5 dB **NOTE** The short cable is used for *calibration only*. It is *not* part of the final test setup. After calibration is completed, *do not* re-arrange any cables. Use the equipment setup, as is, to ensure test procedures use the correct calibration factor.

Figure 3-23: Calibrating Test Equipment Setup for TX BLO and TX ATP Tests (using Signal Generator and Spectrum Analyzer)



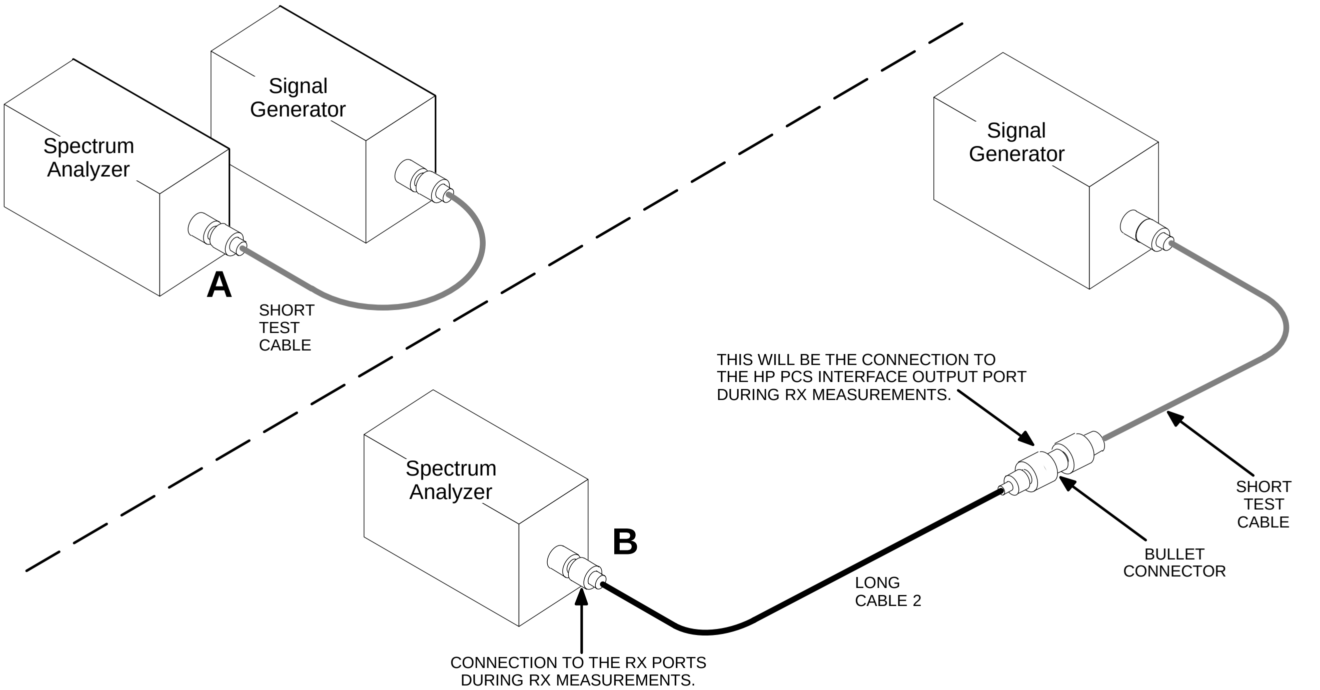
Calibrating RX Cables Using a Signal Generator and Spectrum Analyzer

Follow the procedure in Table 3-31 to calibrate the RX cables using the signal generator and spectrum analyzer. Refer to Figure 3-24, if required.

Table 3-31: Calibrating RX Cables Using a Signal Generator and Spectrum Analyzer

Step	Action
1	Connect a short test cable to the spectrum analyzer and connect the other end to the Signal Generator.
2	Set signal generator to –10 dBm at the customer's RX frequency of 1750–1780 MHz for Korean PCS and 1850–1910 MHz band for North American PCS.
3	Use spectrum analyzer to measure signal generator output (see Figure 3-24, "A") and record the value for "A".
4	Connect the test setup, as shown in the lower portion of the diagram, to measure the output at the customer's RX frequency in the 1850–1910 MHz band. Record the value at point ''B".
5	Calibration factor = A – B Example: Cal = –12 dBm – (–14 dBm) = 2 dB **NOTE** The short test cable is used for test equipment setup calibration *only*. It is not be part of the final test setup. After calibration is completed, *do not* re-arrange any cables. Use the equipment setup, as is, to ensure test procedures use the correct calibration factor.

Figure 3-24: Calibrating Test Equipment Setup for RX ATP Test (using Signal Generator and Spectrum Analyzer)



Setting Cable Loss Values

Cable loss values for the TX and RX test cable configurations are normally set by accomplishing cable calibration with use of the applicable test equipment. The resulting values are stored in the cable loss files. The cable loss values can also be set/changed manually.

Prerequisites

- Exit CDMA LMF.

Table 3-32: Setting Cable Loss Values

Step	Action
1	Click on the **Set RX Cable Loss** or **Set TX Cable Loss** desktop icon.
2	Enter **print** and press the **Enter** key to display the existing cable loss values.
3	Enter **add cn cl** and press the **Enter** key to enter a new cable loss value (where **cn** is the channel number and **cl** is the cable loss value – e.g., **add 385 40.3** for channel 385 and a cable loss of 40.3 dB).
4	Enter **print** and press **Enter** to display the updated cable loss values.
5	Enter **quit** and press **Enter** when the cable loss values are as desired. **NOTE** • If cable loss values exist for two different channels the LMF will interpolate for all other channels. • Enter **help** to display a list of commands. • Enter **get cn** to display the cable loss for a channel number (where **cn** is the channel number). • Enter **save fn** to create a new cable loss file with a different file name in the **wlmf** folder (where **fn** is a file name). The created file is not a readable text file. This can be done to save cable loss values for future use. The saved values can be retrieved with use of the **load** command. • Enter **load fn** to load the cable loss values from a saved cable loss file. (where **fn** is a file name)

Introduction

Calibration compensates for normal equipment variations within the BTS and assures maximum measurement accuracy.

RF Path Bay Level Offset Calibration

Calibration identifies the accumulated gain in every transmit path (BBX2 slot) at the BTS site and stores that value in the CAL file. The BLOs are subsequently downloaded to each BBX2.

Each receive path starts at a BTS RX antenna port and terminates at a backplane BBX2 slot. Each transmit path starts at a BBX2 backplane slot, travels through the LPA, and terminates at a BTS TX antenna port.

Calibration identifies the accumulated gain in every transmit path (BBX2 slot) at the BTS site and stores that value in the CAL file. Each transmit path starts at a C–CCP shelf backplane BBX2 slot, travels through the LPA, and ends at a BTS TX antenna port. When the TX path calibration is performed, the RX path BLO will automatically be set to the default value of 16 dB. This is shown in the bts–*bts#*.cal file as a converted decimal value of 16600.

At omni sites, BBX2 slots 1 and R1 (for 1-carrier) or slots 1, R1, 2, and R2 (for 2-carrier) are tested. At sector sites, BBX2 slots 1 through R1 (for 1-carrier) or slots 1 through R21(for 2-carrier) are tested. Only those slots (sectors) *actually equipped* in the current CDF file are tested, regardless of physical BBX2 board installation in the slot.

When to Re-calibrate BLOs

Calibration of BLOs is required after initial BTS installation.

The BLO data of an operational BTS site must be re-calibrated once each year. Motorola recommends re-calibrating the BLO data for all associated RF paths after replacing any of the following components or associated interconnecting RF cabling:

- BBX2 board
- C–CCP shelf
- CIO card
- CIO to LPA backplane RF cable
- LPA backplane
- LPA
- TX filter / TX filter combiner
- TX thru-port cable to the top of frame

TX Path Calibration

The TX Path Calibration assures correct site installation, cabling, and the first order functionality of all installed equipment. The proper function of each RF path is verified during calibration. The external test equipment is used to validate/calibrate the TX paths of the BTS.

WARNING

Before installing any test equipment directly to any **TX OUT** connector you must ***first verify that there are no CDMA channels keyed***. Have the OMC–R place the sector assigned to the LPA under test OOS. Failure to do so can result in serious personal injury and/or equipment damage.

CAUTION

Always wear a conductive, high impedance wrist strap while handling any circuit card/module. If this is not done, there is a high probability that the card/module could be damaged by ESD.

IMPORTANT

At new site installations, to facilitate the complete test of each CCP shelf (if the shelf is not already fully populated with BBX2 boards), move BBX2 boards from shelves currently not under test and install them into the empty BBX2 slots of the shelf currently being tested to insure that all BBX2 TX paths are tested.

– This procedure can be bypassed on operational sites that are due for periodic optimization.
– Prior to testing, view the CDF file to verify the correct BBX2 slots are equipped. Edit the file as required to include BBX2 slots not currently equipped (per Systems Engineering documentation).

BLO Calibration Data File

During the calibration process, the LMF creates a calibration (BLO) data file. After calibration has been completed, this offset data must be downloaded to the BBX2s using the Download BLO function. An explanation of the file is shown below.

NOTE

Due to the size of the file, Motorola recommends that you print out a hard copy of a bts.cal file and refer to it for the following descriptions.

The CAL file is subdivided into sections organized on a per slot basis (a slot Block).

Slot 1 contains the calibration data for the 12 BBX2 slots. Slot 20 contains the calibration data for the redundant BBX2. Each BBX2 slot header block contains:

- A creation Date and Time – broken down into separate parameters of createMonth, createDay, createYear, createHour, and createMin.
- The number of calibration entries – fixed at 720 entries corresponding to 360 calibration points of the CAL file including the slot header and actual calibration data.
- The calibration data for a BBX2 is organized as a large flat array. The array is organized by branch, sector, and calibration point.
  – The first breakdown of the array indicates which branch the contained calibration points are for. The array covers transmit, main receive and diversity receive offsets as follows:

Table 3-33: BLO BTS.cal file Array Assignments

Range	Assignment
C[1]–C[240]	Transmit
C[241]–C[480]	Receive
C[481]–C[720]	Diversity Receive

– The second breakdown of the array is per sector. Three sectors are allowed.

Table 3-34: BTS.cal file Array (per sector)

Sector	TX	RX	RX Diversity
1 (Omni)	C[1]–C[20]	C[241]–C[260]	C[481]–C[500]
2	C[21]–C[40]	C[261]–C[280]	C[501]–C[520]
3	C[41]–C[60]	C[281]–C[300]	C[521]–C[540]
4	C[61]–[80]	C[301]–C[320]	C[541]–C[560]
5	C[81]–[100]	C[321]–C[340]	C[561]–C[580]
6	C[101]–[120]	C[341]–C[360]	C[581]–C[600]

- Refer to the hard copy of the file. As you can see, 10 calibration points per sector are supported for each branch. Two entries are required for each calibration point.
- The first value (all odd entries) refer to the CDMA channel (frequency) the BLO is measured at. The second value (all even entries) is the power set level. The valid range for PwrLvlAdj is from 2500 to 27500 (2500 corresponds to –125 dBm and 27500 corresponds to +125 dBm).
- The 20 calibration entries for each sector/branch combination must be stored in order of increasing frequency. If less than 10 points (frequencies) are calibrated, the largest frequency that is calibrated is repeated to fill out the 10 points.

Example:
C[1]=384, *odd cal entry*
= *1 "calibration point"*
C[2]=19102, *even cal entry*
C[3]=777,
C[4]=19086,
.
.
C[19]=777,
C[20]=19086, (since only two cal points were calibrated this would be repeated for the next 8 points)

- When the BBX2 is loaded with BLO data, the cal file data for the BBX2 is downloaded to the device in the order it is stored in the CAL file. TxCal data is sent first, C[1] – C[60]. Sector 1's 10 calibration points are sent (C[1] – C[20]), followed by sector 2's 10 calibration points (C[21] – C[40]), etc. The RxCal data is sent next, followed by the RxDCal data.
- Temperature compensation data is also stored in the cal file for each slot.

Test Equipment Setup: RF Path Calibration

Follow the steps outlined in Table 3-35 to set up test equipment.

Table 3-35: Test Equipment Setup (RF Path Calibration)

Step	Action
	NOTE Verify the GPIB is properly connected and turned on.
	! CAUTION To prevent damage to the test equipment, all transmit (TX) test connections must be via the 30 dB directional coupler with a 20 dB in–line attenuator,
1	Connect the LMF computer terminal to the BTS LAN A connector on the BTS (if you have not already done so). Refer to the procedure in Table 3–2 on page 3-8. • If required, calibrate the test equipment per the procedure in Table 3-28. • Connect the test equipment as shown in Figure 3-16 and Figure 3-17.

Transmit (TX) Path Calibration

The assigned channel frequency and power level (as measured at the top of the frame) for transmit calibration is derived from the site CDF file. For each BBX2, the channel frequency is specified in the `ChannelList` CDF file parameter and the power is specified in the `SIFPilotPwr` CDF file parameter for the sector associated with the BBX2 (located under the `ParentSECTOR` field of the `ParentCARRIER` CDF file parameter).

The calibration procedure attempts to adjust power to within ±0.5 dB of the desired power.

Perform the calibration of the transmit paths of all equipped BBX2 slots per the steps in Table 3-36. TX BLO is approximately 40 dB ±3.0 dB. TX BLO = Frame Power Output minus BBX2 output level.

TX Calibration Test

The **Tests** menu item, **TX Calibration**, performs the TX BLO Calibration test for a XCVR(s). All measurements are made through the appropriate TX output connector using the calibrated TX cable setup.

Prerequisites

Before running this test, the following should be done:

- CSM–1,GLI2s, BBX2s have correct code load.
- Primary CSM and MGLI2 are INS.
- All BBX2s are OOS_RAM.
- Test equipment and test cables are calibrated and connected for TX BLO calibration.
- LMF is logged into the BTS.

Connect the test equipment as shown in Figure 3-16 and Figure 3-17 and follow the procedure in Table 3-36 to perform the TX calibration test.

Table 3-36: BTS TX Path Calibration

✓	Step	Action
	1	Select the BBX2(s) to be calibrated. From the **Tests** menu, select **TX Calibration**
	2	Select the appropriate carrier(s) displayed in the **Channels/Carrier** pick list (use the Shift or Ctrl keyboard key to select multiple items).
	3	Type the appropriate channel number in the **Carrier n Channels** box.
	4	Click on **OK**.
	5	Follow the cable connection directions as they are displayed. The test results will be displayed in the status report window.
	6	Click on **OK** to close the status report window.

IMPORTANT

Verify all BBX2 boards removed and repositioned have been returned to their assigned shelves/slots. Any BBX2 boards moved since they were downloaded will have to be downloaded again.

Exception Handling

In the event of a failure, the calibration procedure displays a **FAIL** message in the status report window and provides information in the **Description** field.

Recheck the test setup and connection and re–run the test. If the tests fail again, note specifics about the failure, and refer to Chapter 7, *Troubleshooting*.

Download BLOs to BBX2s

After a successful TX path, download the bay level offset calibration file data to the BBX2s.

Download BLO Procedure

BLO data is extracted from the CAL file for the BTS and downloaded to the selected BBX2 devices. The BBX2s being downloaded must be in the OOS_RAM (yellow) state.

Table 3-37: Download BLO

✓	Step	Action
	1	Select the BBX2(s) to be downloaded.
	2	From the **Device** menu, select **Download BLO.**
	3	Click **OK** to close the status report window.

Calibration Audit Introduction

The BLO calibration audit procedure confirms the successful generation and storage of the BLO calibrations.

The calibration audit procedure measures the path gain or loss of every BBX2 transmit path at the site.

In this test, actual system tolerances are used to determine the success or failure of a test. The same external test equipment set up is used.

IMPORTANT

RF path verification, BLO calibration, and BLO data download to BBX2s must have been successfully completed prior to performing the calibration audit.

Transmit (TX) Path Audit

Perform the calibration audit of the TX paths of all equipped BBX2 slots, per the steps in Table 3-38.

WARNING

Before installing any test equipment directly to any **TX OUT** connector, ***first verify there are no CDMA BBX2 channels keyed***. Failure to do so can result in serious personal injury and/or equipment damage.

CAUTION

To prevent damage to the test equipment, all TX test connections must be via the 30 dB directional coupler and 20 dB in–line attenuator.

TX Audit Test

The **Tests** menu item, **TX Audit**, performs the TX BLO Audit test for a BBX2(s). All measurements are made through the appropriate TX output connector using the calibrated TX cable setup.

Prerequisites: Before running this test, the following should be done:

- CSM–1,GLI2s, BBX2s have correct code load.
- Primary CSM and MGLI2 are INS.
- All BBX2s are OOS_RAM.
- Test equipment and test cables are calibrated and connected for TX BLO calibration.
- LMF is logged into the BTS.
- Primary CSM is INS (CSM clock valid).

Connect the test equipment as shown in Figure 3-16 and Figure 3-17 and follow the procedures in Table 3-38 to perform the BTS TX Path Audit test.

Table 3-38: TX Path Audit

✓	Step	Action
	1	Select the BBX2(s) to be audited. From the **Tests** menu, select **TX Audit.**
	2	Select the appropriate carrier(s) displayed in the **Channels/Carrier** pick list (use the Shift or Ctrl key to select multiple items).
	3	Type the appropriate channel number in the **Carrier n Channels** box.
	4	Click on **OK**.
	5	Follow the cable connection directions as they are displayed. The test results will be displayed in the status report window.
	6	Click on **OK** to close the status report window.

Exception Handling

In the event of a failure, the calibration procedure displays a **FAIL** message in the status report window and provides information in the **Description** field.

Recheck the test setup and connection and re–run the test. If the tests fail again, note specifics about the failure, and refer to Chapter 7, *Troubleshooting*.

All Cal/Audit test

The **Tests** menu item, **All Cal/Audit**, performs the TX BLO Calibration and Audit test for a XCVR(s). All measurements are made through the appropriate TX output connector using the calibrated TX cable setup.

NOTE

If the TX calibration portion of the test passed, the BLO data will automatically be downloaded to the BBX2(s) before the audit portion of the test is run.

Perquisites

Before running this test, the following should be done:

- CSM–1,GLI2s, BBX2s have correct code load.
- Primary CSM and MGLI2 are INS.
- All BBXs are OOS_RAM.
- Test equipment and test cables are calibrated and connected for TX BLO calibration.
- LMF is logged into the BTS.

Follow the procedures in Table 3-39 to perform the All Cal/Audit test.

Table 3-39: All Cal/Audit Test

✓	Step	Action
	1	Select the BBX2(s) to be tested. From the **Tests** menu, select **All Cal/Audit.**
	2	Select the appropriate carrier(s) displayed in the **Channels/Carrier** pick list (use the Shift or Ctrl key to select multiple items).
	3	Type the appropriate channel number in the **Carrier n Channels** box.
	4	Click on **OK**.
	5	Follow the cable connection directions as they are displayed. The test results will be displayed in the status report window.
	6	Click on **OK** to close the status report window.

Create CAL File

The Create Cal File function gets the BLO data from BBXs and creates/updates the CAL file for the BTS. If a CAL file does not exist a new one is created. If a CAL file already exists it is updated. After a BTS has been fully optimized a copy of the CAL file must exist so it can be transferred to the CBSC. If TX calibration has been successfully performed for all BBXs and BLO data has been downloaded, a CAL file will exist. Note the following:

- The Create Cal File function only applies to selected (highlighted) BBXs.
- The user is not encouraged to edit the CAL file as this action can cause interface problems between the BTS and the LMF. To manually edit the CAL file you must first logout of the BTS. If you manually edit the CAL file and then use the Create Cal File function the edited information will be lost.

Prerequisite

Before running this test, the following should be done:

- LMF is logged in to the BTS
- BBX2s are OOS_RAM with BLO downloaded

Table 3-40: Create CAL File

✓	Step	Action
	1	Select the applicable BBX2s. The CAL file will only be updated for the selected BBX2s.
	2	Click on the **Device** menu.
	3	Click on the **Create Cal File** menu item. The status report window is displayed to show the results of the action.
	4	Click **OK**.

RFDS Description

The optional RFDS is a Field Replaceable Unit (FRU) used to perform RF tests of the site from the CBSC or from the LMF. The RFDS contains the following elements:

- Antenna Select Unit (ASU)
- FWT Interface Card (FWTIC)
- Subscriber Unit Assembly (SUA)

For complete information regarding the RFDS, refer to the CDMA RFDS Hardware Installation manual (Motorola part no. 6864113A93) CDMA RFDS User's Guide (Motorola part no. 6864113A37), and the CDMA LMF Operator's Guide (Motorola part no. 6864113A21).

RFDS Parameter Settings

The `bts-#.cdf` file includes RFDS parameter settings that must match the installed RFDS equipment. The paragraphs below describe the editable parameters and their defaults. Table 3-41 explains how to edit the parameter settings.

- **RFDSEquip** – valid inputs are 0 through 2.
  0 = (default) RFDS is not equipped
  1 = Non-Cobra/Patzer box RFDS
  2 = Cobra RFDS
- **TSUEquip** – valid inputs are 0 or 1
  0 = (default) TSU not equipped
  1 = TSU is equipped in the system
- **MC1....4** – valid inputs are 0 or 1
  0 = (default) Not equipped
  1 = Multicouplers equipped in RFDS system
  (9600 system RFDS only)
- **ASU1/2Equip** – valid inputs are 0 or 1
  0 = (default) Not equipped
  1 = Equipped
- **TODN** – valid inputs are ’’’ (default) or a numerical string up to 15 characters. (This is the phone number the RFDS dials when originating a call. A dummy number needs to be set up by the switch, and is to be used in this field.)

NOTE

Any text editor may be used to open the `bts–#.cdf` file to verify, view, or modify data.

Table 3-41: RFDS Parameter Settings	
Step	**Action**
	*** IMPORTANT** Log out of the BTS prior to performing this procedure.

1	Using a text editor, verify the following fields are set correctly in the `bts–#.cdf` file (1 = GLI based RFDS; 2 = Cobra RFDS).
	EXAMPLE:
	`RfdsEquip = 2`
	`TsuEquip = 1`
	`MC1Equip = 0`
	`MC2Equip = 0`
	`MC3Equip = 0`
	`MC4Equip = 0`
	`Asu1Equip = 1`
	`Asu2Equip = 0` (`1` if system is non-duplexed)
	`TODN = ’123456789’’`
	NOTE
	The above is an example of the `bts-#.cdf` file that should have been generated by the OMC and copied to the LMF. These fields will have been set by the OMC if the RFDSPARM database is modified for the RFDS.

2	Save and/or quit the editor. If any changes were made to these fields data will need to be downloaded to the GLI2 (see Step 3, otherwise proceed to Step 4).
3	To download to the GLI2, click on the **Device** menu and select the **Download Data** menu item *(selected devices do not change color when data is downloaded)*. A status report window is displayed showing status of the download. Click *OK* to close the status report window. **! CAUTION** After downloading data to the GLI2 the RFDS LED will slowly begin flashing red and green for approximately 2–3 minutes. **DO NOT** attempt to perform any functions with the RFDS until the LED remains green.
4	Status the RFDS TSU. A status report is displayed showing the software version number for the TSIC and SUA. *** IMPORTANT** If the LMF yields an error message, check the following: • Ensure AMR cable is correctly connected from the BTS to the RFDS. • Verify RFDS has power. • Verify RFDS status LED is green. • Verify fields in the `bts-#.cdf` file are correct (see Step 1). • Status the GLI2 and ensure the device is communicating (via Ethernet) with the LMF, and the device is in the proper state (INS).

RFDS TSU NAM Programming

The NAM (number assignment module) information needs to be programmed into the TSU before it can receive and process test calls, or be used for any type of RFDS test. The RFDS TSU NAM must be programmed with the appropriate system parameters and phone number during hardware installation. The TSU phone and TSU MSI must be recorded for each BTS used for OMC–R RFDS software configuration.

NOTE

The user will only need to program the NAM for the initial install of the RFDS.

Explanation of Parameters used when Programming the TSU NAM

Table 3-42 defines the parameters used when editing the tsu.nam file.

Table 3-42: Definition of Parameters

Access Overload Code Slot Index System ID Network ID	These parameters are obtained from the switch.
Primary Channel A Primary Channel B Secondary Channel A Secondary Channel B	These parameters are the channels which are to be used in operation of the system.
Lock Code Security Code Service Level Station Class Mark	Do ***NOT*** change.
IMSI MCC IMSI 11 12	These fields are obtained at the OMC using the following command: **OMC000>disp bts–# imsi** If the fields are blank, replace the IMSI fields in the NAM file to 0, otherwise use the values displayed by the OMC.
MIN Phone Number	These fields are the phone number assigned to the mobile. The ESN and MIN must be entered into the switch as well. **NOTE:** This field is different from the TODN field in the `bts-#.cdf` file. The MIN is the phone number of the RFDS subscriber, and the TODN is the number the subscriber calls.

Valid NAM Ranges

Table 3-43 provides the valid NAM field ranges. If any of the fields are missing or out-of–range, the RFDS will error out.

Table 3-43: Valid NAM Field Ranges

NAM Field Name	Valid Range	
	Minimum	**Maximum**
Access Overload Code	0	15
Slot Index	0	7
System ID	0	32767
NAM Field Name	**Valid Range**	
	Minimum	**Maximum**
Network ID	0	32767
Primary Channel A	25	1175
Primary Channel B	25	1175
Secondary Channel A	25	1175
Secondary Channel B	25	1175
Lock Code	0	999
Security Code	0	999999
Service Level	0	7
Station Class Mark	0	255
IMSI 11 12	0	99
IMSI MCC	0	999
MIN Phone Number	N/A	N/A

Program TSU NAM

The Program TSU NAM option allows for the entry of TSU programming data.

Prerequisite

Ensure that the following has been completed prior to programming the TSU NAM:

- MGLI is INS.
- TSU is powered up and has a code load.

Program TSU NAM

Follow the procedure in Table 3-44 to program the TSU NAM. The NAM must be programmed before it can receive and process test calls, or be used for any type of RFDS test.

Prerequisites

- MGLI is INS.
- TSU is powered up and has a code load.

Table 3-44: Program NAM Procedure

✓	Step	Action
	1	Select the RFDS.
	2	Select the TSU.
	3	Click on the **TSU** menu.
	4	Click on the **Program TSU NAM** menu item.
	5	Enter the appropriate information in the boxes (see Table 3-42 and Table 3-43) .
	6	Click on the **OK** button to display the status report.
	7	Click on the **OK** button to close the status report window.

RFDS Calibration

The RFDS Calibration option is used to calibrate the RFDS TX and RX paths. For a TX antenna path calibration the BTS XCVR is keyed at a pre–determined power level and the BTS power output level is measured by the RFDS. The power level is then measured at the TX antenna directional coupler by the power measuring test equipment item being used (power meter or analyzer). The difference (offset) between the power level at the RFDS and the power level at the TX antenna directional coupler is used as the TX RFDS calibration offset value.

For an RX antenna path calibration the RFDS is keyed at a pre–determined power level and the power input level is measured by the BTS XCVR. A CDMA signal at the same power level measured by the BTS XCVR is then injected at the RX antenna directional coupler by the CDMA communications analyzer. The difference (offset) between the RFDS keyed power level and power level measured at the BTS XCVR is the RFDS RX calibration offset value.

The TX and RX RFDS calibration offset values are written to the CAL file.

Prerequisites

- BBX2s are is INS_TEST
- Cable calibration has been performed
- TX calibration has been performed and BLO has bee downloaded for the BTS
- Test equipment has been connected correctly for a TX calibration
- Test equipment has been selected and calibrated

Table 3-45: RFDS Calibration

✓	Step	Action
	1	Select the RFDS cage.
	2	Click on the **RFDS** menu.
	3	Click on the **RFDS Calibration** menu item
	4	Select the appropriate direction (TX/RX) in the **Direction** pick list
	5	Enter the appropriate channel number(s) in the **Channels** box. Separate the channel numbers with a comma or a dash if more than one channel number is entered (e.g., 247,585,742 or 385–395 for through).
	6	Select the appropriate carrier(s) in the Carriers pick list (use the Shift or Ctrl keyboard key to select multiple carriers).
	7	Select the appropriate **RX branch** (Both, Main, or Diversity) in the RX Branch pick list.
	8	Select the appropriate baud rate (1=9600, 2=14400) in the **Rate Set** pick list.
	9	Click on the **OK** button. A status report window is displayed, followed by a **Directions** pop–up window.
	10	Follow the cable connection directions as they are displayed. Test results are displayed in the status report window.
	11	Click on the **OK** button to close the status report window.

Purpose

The following procedures will verify that the Voltage Standing Wave Ratio (VSWR) of all antennas and associated feed lines fall within acceptable limits. The tests will be performed on all antennas in a sequential manner (i.e., ANT 1, then ANT 2) until all antennas/feedlines have been verified.

These procedures should be performed periodically by measuring each respective antenna's VSWR (reflected power) to verify that the antenna system is within acceptable limits. This will ensure continued peak system performance.

The antenna VSWR will be calculated at the CDMA carrier frequency assigned to each antenna. Record and verify that they meet the test specification of less than or equal to 1.5:1.

IMPORTANT

It is recommended that the installer be familiar with the following procedure in its entirety before beginning the actual procedure. Ensure that the entire site is currently not in service.

NOTE

This test is used to test RX antennas by substituting RX frequencies for TX frequencies.

Study the site engineering documents and perform the following tests only after **first** verifying that the RF cabling configuration required to interconnect the BTS frames and antennas meet requirements called out in the *BTS Installation Manual.*

Test equipment

The following pieces of test equipment will be required to perform this test:

- Directional coupler
- Communications test set

WARNING

Prior to performing antenna tests, insure that no CDMA BBX channels are keyed. Failure to do so could result in personal injury or serious equipment damage.

Equipment Setup – HP Test Set

3

Follow the steps outlined in Table 3-46 to set up test equipment required to measure and calculate the VSWR for each antenna.

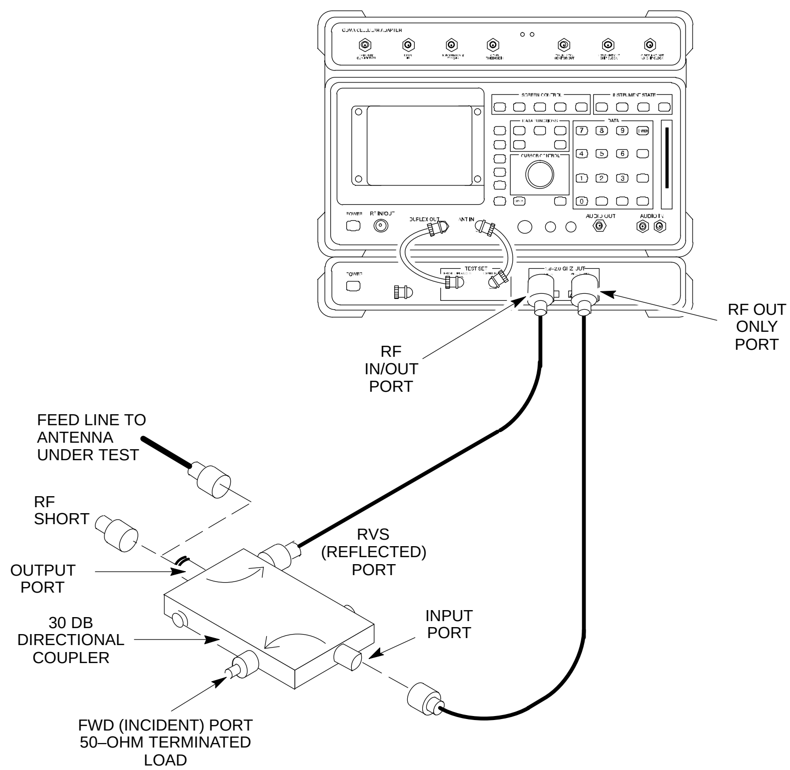
Table 3-46: VSWR Measurement Procedure – HP 8921 Test Set

Step	Action HP TEST SET
1	***For manual VSWR testing,*** using external directional coupler, refer to Figure 3-25. – Connect the communications test set RF OUT ONLY port to the INPUT port of the directional coupler. – Connect the RF IN/OUT port of the communication test set to the reverse (RVS) port on the directional coupler. ***Terminate the forward port with a 50 ohm load.*** – Install the antenna feed line to the output port on the directional coupler.
	NOTE Manual Communications Analyzer test setup (fields not indicated remain at default): • Set screen to **RF GEN**. – Set **RF Gen Freq** to center frequency of actual CDMA carrier between 1930–1990 MHz for TX and 1850–1910 MHz for RX. – Set Amplitude to **–30 dBm**. – Set Output Port to **RF OUT**. – Set AFGen1 & AFGen2 to **OFF**.
2	Remove the antenna feed line and install an “RF short” onto the directional coupler output port.
	NOTE Set–up communication test set as follows (fields not indicated remain at default): • Set screen to **SPEC ANL**. – Under Controls, set input port to **ANT**. – Set Ref Level to **–40 dBm**. – Under Controls, select **Main**, select **Auxiliary**. – Under Controls, select **AVG**. Set Avg = **20**.
3	– Record the reference level on the communications analyzer and ***Note as P_S for reference***. – Replace the short with the antenna feedline. Record the reference level on the communications analyzer and ***Note for as P_A reference***. – Record the difference of the two readings in dB.
4	Calculate the VSWR per the equation shown to the right. *Where:* $R_{L(dB)} = P_{A(dBm)} - P_{S(dBm)}$ P_A = Power reflected from antenna P_S = Power reflected from short $$VSWR = \left(\frac{1 + 10^{\frac{RL}{20}}}{1 - 10^{\frac{RL}{20}}} \right)$$ A calculated value of –13.98 dB equates to VSWR of better than **1.5:1**.

. . . continued on next page

Table 3-46: VSWR Measurement Procedure – HP 8921 Test Set		
Step	**Action**	**HP TEST SET**
5	If the readings indicate a potential problem, verify the physical integrity of all cables (including any in–line components, pads, etc.) and associated connections up to the antenna. If problem still persists, consult antenna OEM documentation for additional performance verification tests or replacement information.	
6	Repeat steps 1 through 5 for all remaining TX sectors/antennas.	
7	Repeat steps 1 through 5 for all remaining RX sectors/antennas.	

Figure 3-25: Manual VSWR Test Setup Using HP8921 Test Set



Equipment Setup – Advantest Test Set

Follow the steps outlined in Table 3-47 to set up test equipment required to measure and calculate the VSWR for each antenna.

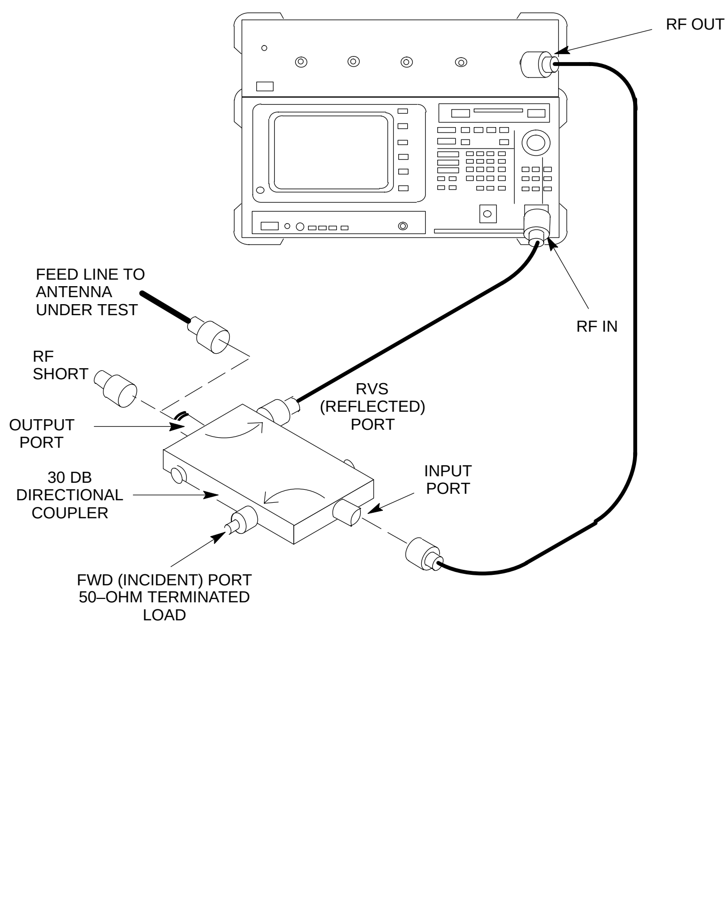
Table 3-47: VSWR Measurement Procedure – Advantest Test Set

Step	Action ADVANTEST
1	***For manual VSWR testing*** using external directional coupler, refer to Figure 3-26. – Connect the communications test set RF OUT port to the input port of the directional coupler. – Connect the INPUT port of the communication test set to the forward port on the directional coupler. ***Terminate the forward port with a 50 ohm load.*** – Connect the RF short to the directional coupler output port.
2	Preform the following to instruct the calibrated test set to generate a CDMA RF carrier (RVL call) with all zero longcode at the assigned RX frequency at –10 dBm. • Push the **ADVANCE** Measurement key. • Push the **CDMA Sig** CRT menu key. • Push the **FREQ** Entry key; set **RF Gen Freq** to center frequency of actual CDMA carrier between 1930–1990 MHz for TX and 1850–1910 MHz for RX. • Push the **LEVEL** Entry key; set to **0 dBm** (by entering **0** and pushing the **–dBm** key). • Verify that **ON** is active in the **Output** CRT menu key. • Verify that **OFF** is active in the **Mod** CRT menu key. • Push the **CW** Measurement key. • Push the **FREQ** Entry key. – Push the **more 1/2** CRT menu key. – Set **Preselect** CRT menu key to **3.0G.** • Push the **Transient** Measurement key. – Push the **Tx Power** CRT menu key. – Push the LEVEL entry key (set to 7 dBm by entering 7 and pushing the the dBm key). – Set **Avg Times** CRT menu key to **ON**. Set to **20** (by entering **20** and pushing the **Hz** ENTER key). • Push the **REPEAT** Start key to take the measurement.
3	Record the Burst Power display on the communications analyzer and ***Note as*** P_S ***for reference.***
4	Install the antenna feedline to the output port of the directional coupler.
5	• Push the **Auto Level Set** CRT menu key. • Push the **REPEAT** Start key to take the measurement.
6	Record the Burst Power on the communications analyzer and ***Note as*** P_A ***level for reference***. Record the difference of the two readings in dBm.

. . . continued on next page

<table>
<tr><th colspan="3">Table 3-47: VSWR Measurement Procedure – Advantest Test Set</th></tr>
<tr><th>Step</th><th>Action</th><th>ADVANTEST</th></tr>
<tr><td>7</td><td colspan="2">Calculate the VSWR per the equation shown to the right.
Where:
$R_{L(dB)}$ = $P_{A(dBm)} - P_{S(dBm)}$
P_A = Power reflected from antenna
P_S = Power reflected from short
$$VSWR = \left[\frac{1 + 10^{\frac{RL}{20}}}{1 - 10^{\frac{RL}{20}}}\right]$$
A calculated value of –13.98 dB equates to VSWR of better than **1.5:1**.</td></tr>
<tr><td>8</td><td colspan="2">If the readings indicate a potential problem, verify the physical integrity of all cables (including any in–line components, pads, etc.) and associated connections up to the antenna. If problem still persists, consult antenna OEM documentation for additional performance verification tests or replacement information.</td></tr>
<tr><td>9</td><td colspan="2">Repeat steps 2 through 9 for all remaining TX sectors/antennas.</td></tr>
<tr><td>10</td><td colspan="2">Repeat steps 2 through 9 for all remaining RX sectors/antennas.</td></tr>
</table>

Figure 3-26: Manual VSWR Test Setup Using Advantest R3465



Notes

Chapter 4: Automated Acceptance Test Procedure (ATP)

Table of Contents

Notes

Introduction

The Automated Acceptance Test Procedure (ATP) allows Motorola Cellular Field Engineers (CFEs) to run automated acceptance tests on all equipped BTS subsystem devices using the Local Maintenance Facility (LMF) and supported test equipment per the current Cell Site Data File (CDF) assignment.

The results of these tests (at the option of the operator) are written to a file that can be printed. All tests are controlled via the LMF platform using the GPIB interface, therefore, only recommended test equipment supported by the LMF can be used.

IMPORTANT

The ATP test is to be performed on out-of-service sectors *only.*

DO NOT substitute test equipment with other modes not supported by the LMF.

NOTE

Refer to Chapter 3 for detailed information on test set connections for calibrating equipment, cables and other test set components, if required.

Customer requirements determine which ATP tests to are to be performed and the field engineer selects the appropriate ATP tests to run.

The tests can be run individually or as one of the following groups:

- **All TX:** TX tests verify the performance of the BTS transmit line up. These include the GLI2, MCC, BBX2, and BIO cards, the LPAs and passive components including splitters, combiners, bandpass filter, and RF cables.
- **All RX:** RX tests verify the performance of the BTS receiver line up. These includes the MPC (for starter frames), EMPC (for expansion frames), BIO, BBX2, MCC, and GLI2 cards and the passive components including RX filter (starter frame only), and RF cables.
- **All TX/RX:** Executes all the TX and RX tests.
- **Full Optimization:** Executes the TX calibration, download BLO and TX audit before running all of the TX and RX tests.

ATP Tests Prerequisites

Before attempting to run* any *ATP tests, ensure the following have been completed:

- CSMs, GLI2s, BBX2s, and MCCs have correct code load and data load
- Primary CSM, GLI2, and MCCs are INS
- BTS has been optimized and calibrated
- BBX2s are OOS-RAM.
- BBX2s are calibrated and BLOs are downloaded
- Test equipment has been warmed up 60 minutes and calibrated
- Test cables are calibrated
- GPIB is on
- LMF is logged into the BTS

TX/RX OUT Connections

IMPORTANT

Many of the acceptance test procedures require taking measurements at the **TX OUT** (BTS/RFDS) connector. At sites with RFDS, all measurements are through the RFDS directional coupler **TX OUT** connector.

Figure 4-1F shows the TX/RX connector configuration for the SC 4812ET frame.

Figure 4-1: TX/RX Connections

All TX ATP Test

Table 4-1 lists the procedure to execute the TX Mask, Rho, PtOffset, and Code Domain Power tests. This procedure eliminates the need to run separate tests and reduces test time.

The LMF **Tests** menu list item, **All TX**, performs all transmit tests for a BBX2(s).

IMPORTANT

If manual testing with the HP analyzer, remove the manual control/system memory card from the card slot before starting the automated testing.

Prerequisites

Before attempting to run **any** ***ATP tests***, ensure the following have been completed:

- CSMs, GLI2s, BBX2s, and MCCs have correct code load and data load
- Primary CSM, GLI2, and MCCs are INS
- BTS has been Optimized/Calibrated
- BBX2s are OOS–RAM
- Test equipment is connected for ATP tests (see Figure 3-16 through Figure 3-19).
- Test equipment is warmed up 60 minutes and calibrated
- Test cables are calibrated
- GPIB is on
- LMF is logged into the BTS

Table 4-1: All TX Acceptance Test

✓	Step	Action
	1	Select the BBX2(s) and MCC(s) to be tested.
	2	From the **Tests** menu, select **All TX**
	3	Select the appropriate carrier(s) (carrier – bts# – sector# – carrier#) displayed in the **Channels/Carrier** pick list (use the Shift or Ctrl keyboard key to select multiple items).
	4	Type the appropriate channel number in the **Carrier n Channels** box.
	5	Click **OK**.
	6	Follow the cable connection directions as they are displayed.
	7	Click **OK** to close the status report window.

All-RX ATP Test

The CDMA LMF Tests menu list item, **All RX**, performs all receive tests for a BBX2(s) and MCC(s). All measurements are made through the appropriate RX output connector using the calibrated RX cable setup.

Refer to Table 4-2 to perform an all-inclusive RX ATP test on selected devices.

Prerequisites

Before attempting to run **any** ***ATP tests***, ensure the following have been completed:

- CSMs, GLI2s, BBX2s, and MCCs have correct code load and data load
- Primary CSM, GLI2, and MCCs are INS
- BTS has been Optimized/Calibrated
- BBX2s are OOS–RAM
- Test equipment is connected for ATP tests (see Figure 3-16 through Figure 3-19).
- Test equipment is warmed up 60 minutes and calibrated
- Test cables are calibrated
- GPIB is on
- LMF is logged into the BTS

Table 4-2: All RX Acceptance Test		
✓	Step	Action
		△ WARNING **Be very careful to not connect an RX test cable to a TX connector. Failure to observe this warning may cause bodily injury and/or equipment damage.**
	1	Select the BBX2(s) and MCC(s) to be tested.
	2	From the **Tests** menu, select **All RX**
	3	Select the appropriate carrier(s) (carrier – *bts# –sector# –carrier#*) displayed in the **Channels/Carrier** pick list (use the Shift or Ctrl keyboard key to select multiple items).
	4	Type the appropriate channel number in the **Carrier n Channels** box.
	5	Select the appropriate receive branch (antenna) in the **RX Branch** pick list. Valid choices are Main, Diversity or Both.
	6	Select the baud rate in the **Rate Set** pick list. 1=9600 bps 2=14400bps Click **OK**.
	7	Follow the cable connection directions as they are displayed.
	8	Click **OK** to close the status report window.

All TX/RX Test

The LMF Tests menu list item, **All TX/RX**, performs all transmit and receive tests for a BBX2(s) and MCC(s). All measurements are made through the appropriate TX and RX output connectors using the calibrated TX and RX cable setups.

Prerequisites

Before attempting to run* any *ATP tests, ensure the following have been completed:

- CSMs, GLI2s, BBX2s, and MCCs have correct code load and data load
- Primary CSM, GLI2, and MCCs are INS
- BTS has been Optimized/Calibrated per Chapters 2 and 3
- BBX2s are OOS–RAM
- Test equipment is connected for ATP tests (see Figure 3-16 through Figure 3-19).
- Test equipment is warmed up 60 minutes and calibrated
- Test cables are calibrated
- GPIB is on
- LMF is logged into the BTS

Table 4-3: All TX/RX ATP

✓	Step	Action
		△ **WARNING** **Be very careful to not connect an RX test cable to a TX connector. Failure to observe this warning may cause bodily injury and/or equipment damage.**
	1	Click on the BBX(s) and MCC(s) to be tested.
	2	From the **Tests m**enu, select **All TX/RX**
	3	Select the appropriate carrier(s) (carrier – *bts# –sector# –carrier#*) displayed in the **Channels/Carrier** pick list (use the Shift or Ctrl keyboard key to select multiple items).
	4	Type the appropriate channel number in the **Carrier n Channels** box.
	5	Select the appropriate receive branch (antenna) in the **RX Branch** pick list. Valid choices are Main, Diversity or Both.
	6	Select the baud rate in the **Rate Set** pick list. 1=9600 bps 2=14400 bps Click **OK**
	7	Follow the cable connection directions as they are displayed.
	8	Click **OK** to close the status report window.

4

Full Optimization Test

The LMF Tests menu list item, **Full Optimization,** performs all optimization tests for all BBX2(s) and MCC(s). All measurements are made through the appropriate TX and RX output connectors using the calibrated TX and RX cable setups.

Tests performed include:

- Calibrate all selected BBX2s
- Load and audit BLO
- Perform All TX ATP on all selected BBX2s and MCCs
- Perform All RX ATP on all selected BBX2s and MCCs

Prerequisites

Before attempting to run **any** ***ATP tests***, ensure the following have been completed:

- CSMs, GLI2s, BBX2s, and MCCs have correct code load and data load
- Primary CSM, GLI, and MCCs are INS
- BTS has been Optimized and Calibrated
- BBX2s are OOS-RAM
- Test equipment is connected for ATP tests (see Figure 3-16 through Figure 3-19).
- Test equipment is warmed up 60 minutes and calibrated
- Test cables are calibrated
- GPIB is on
- LMF is logged into the BTS

Table 4-4: Full Optimization ATP

✓	Step	Action
		△ **WARNING** **Be very careful to not connect an RX test cable to a TX connector. Failure to observe this warning may cause bodily injury and/or equipment damage.**
	1	Select the BBX2(s) and MCC(s) to be tested.
	2	From the **Tests menu,** select **Full Optimization**
	3	Select the appropriate carrier(s) (carrier – *bts# –sector# –carrier#*) displayed in the **Channels/Carrier** pick list (use the Shift or Ctrl keyboard key to select multiple items).
	4	Type the appropriate channel number in the **Carrier n Channels** box.
	5	Select the appropriate receive branch (antenna) in the **RX Branch** pick list. Valid choices are Main, Diversity or Both.
	6	Select the baud rate in the **Rate Set** pick list. 1=9600 bps 2=14400 bps Click **OK**
	7	Follow the cable connection directions as they are displayed.
	8	Click on **OK** to close the status report window.

Individual Acceptance Tests

The followingindividual ATP tests can be used to verify the results of specific tests:

Spectral Purity TX Mask

This test verifies that the transmitted CDMA carrier waveform, generated on each sector, meets the transmit spectral mask specification with respect to the assigned CDF file values.

Waveform Quality (rho)

This test verifies that the transmitted Pilot channel element digital waveform quality (rho) exceeds the minimum specified value in ANSI–J_STD–019. "*Rho*" represents the correlation between actual and perfect CDMA modulation spectrum. A rho value of 1.0000 represents 100% (or perfect correlation).

Pilot Time Offset

The Pilot Time Offset is the difference between the CDMA analyzer measurement interval (based on the BTS system time reference) and the incoming block of transmitted data from the BTS (Pilot only, Pilot Gain = 262, PN Offset = 0).

Code Domain Power

This test verifies the code domain power levels, which have been set for all ODD numbered Walsh channels, using the OCNS command. This is done by verifying that the ratio of PILOT divided by OCNS is equal to **10.2 ± 2 dB**, and, that the noise floor of all EVEN numbered "OFF" Walsh channels measures **≤ –27 dB** (with respect to total CDMA channel power).

Frame Error Rate

The Frame Error Rate (FER) test verifies RX operation of the entire CDMA Reverse Link using all equipped MCCs assigned to all respective sector/antennas. The test verifies the BTS sensitivity on all traffic channel elements currently configured on all equipped MCCs at an RF input level of –119 dBm (or –116 dBm if using TMPC).

TX Spectral Purity Transmit Mask Acceptance Test

Background: Tx Mask Test

This test verifies the spectral purity of each BBX2 carrier keyed up at a specific frequency, *per the current CDF file assignment*. All tests are performed using the external calibrated test set, controlled by the same command. All measurements are through the appropriate **TX OUT** (BTS/RFDS) connector.

The Pilot Gain is set to 541 for each antenna and all channel elements from the MCCs are forward-link disabled. The BBX2 is keyed up, using both bbxlvl and bay level offsets, to generate a CDMA carrier (with pilot channel element only). BBX2 power output is set to obtain +40 dBm as measured at the **TX OUT** connector (on either the BTS or RFDS directional coupler).

NOTE

TX output power is set to +40 dBm by setting BTS power level to +33.5 dBm to compensate for 6.5 dB increase from pilot gain set to 541.

The calibrated communications test set measures and returns the attenuation level of all spurious and IM products in a 30 kHz resolution bandwidth with respect to the mean power of the CDMA channel, measured in a 1.23 MHz bandwidth, in dB, verifying that results meet system tolerances at the following test points:

- at least **–45 dB @ + 900 kHz** from center frequency,
- at least **–45 dB @ – 900 kHz** from center frequency.

The BBX2 then de-keys and the applicable redundant BBX2 is assigned to the current TX antenna path under test. The test is then repeated.

The LMF Tests menu list item, **TX Mask,** performs the Spectral Purity TX Mask test for a XCVR(s). All measurements are made through the appropriate TX output connector using the calibrated TX cable setup.

This test is included in the All TX, All TX/RX and Full Optimization tests.

Prerequisites

Before attempting to run* any *ATP tests, ensure the following have been completed:

- CSMs, GLI2s, BBX2s, and MCCs have correct code load and data load.
- Primary CSM, GLI2, and MCCs are INS.
- BTS has been optimizes/calibrated per Chapters 2 and 3.
- BBX2s are OOS–RAM.
- Test equipment is connected for ATP tests (see Figure 3-16 through Figure 3-19).
- Test equipment is warmed up 60 minutes and calibrated.
- Test cables are calibrated.
- GPIB is on.
- LMF is logged into the BTS.

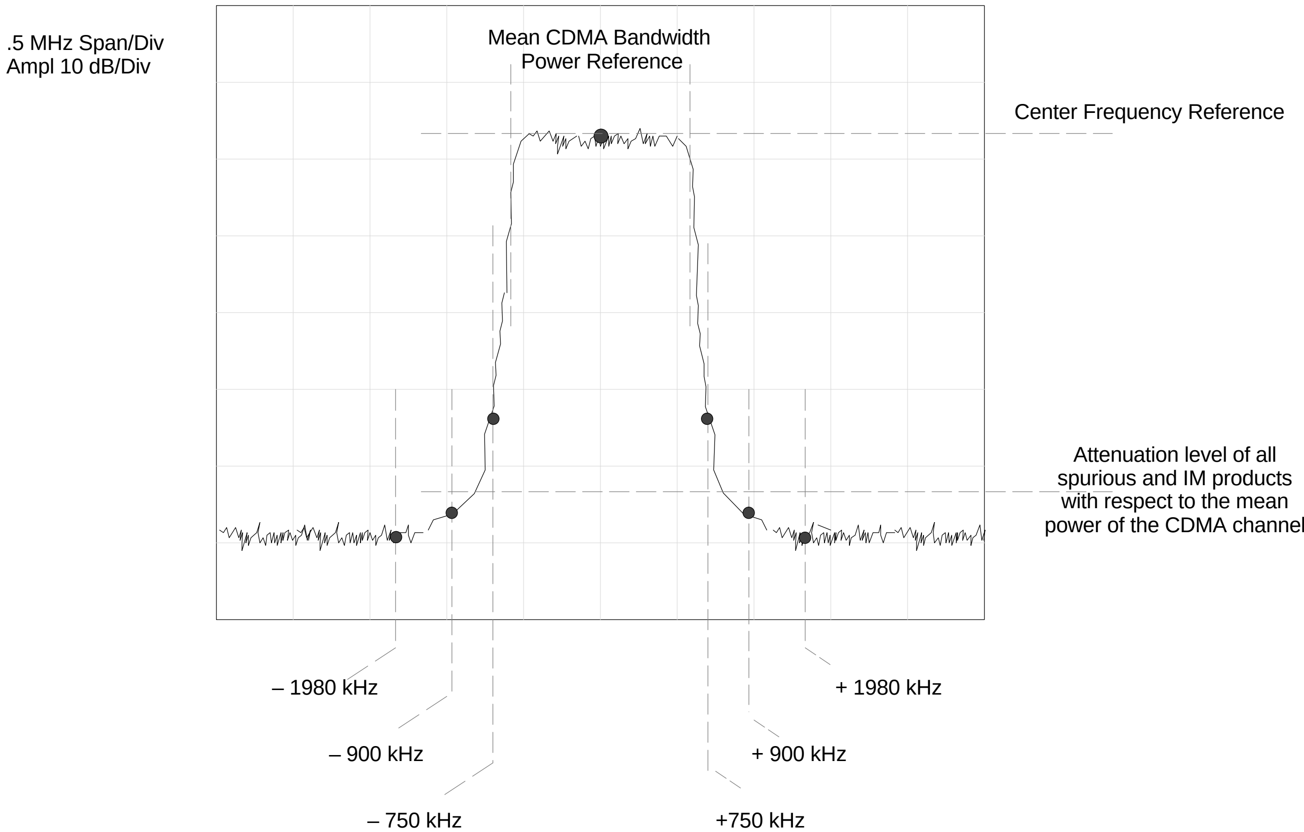
TX Mask Test Procedure

Follow the steps in Table 4-5 to verify the transmit spectral mask specification on all TX antenna paths using all BBX2s equipped at the BTS.

Table 4-5: TX Mask ATP

✓	Step	Action
	1	Select the BBX2(s) to be tested.
	2	From the **Tests** menu, select **TX Mask.**
	3	Select the appropriate carrier(s) (carrier – *bts# –sector# –carrier#*) displayed in the **Channels/Carrier** pick list (use the Shift or Ctrl keyboard key to select multiple items).
	4	Type the appropriate channel number in the **Carrier n Channels** box and click **OK**.
	5	Follow the cable connection directions as they are displayed.
	6	Click on **OK** to close the status report window.
		NOTE The communications test set will measure and return the attenuation level of all spurious and IM products in a 30 kHz resolution bandwidth, with respect to the mean power of the CDMA channel, measured in a 1.23 MHz bandwidth.

Figure 4-2: TX Mask Verification Spectrum Analyzer Display



Background: Rho Test

This test verifies the transmitted Pilot channel element digital waveform quality of each BBX2 carrier keyed up at a specific frequency *per the current CDF file assignment*. All tests are performed using the external calibrated test set controlled by the same command. All measurements are via the appropriate **TX OUT** (BTS/RFDS) connector.

The Pilot Gain is set to 262 for each antenna, and all channel elements from the MCCs will be forward link disabled. The BBX2 is keyed up using both bbxlvl and bay level offsets, to generate a CDMA carrier (with pilot channel element only, Walsh code 0). BBX2 power output is set to 40 dBm as measured at the **TX OUT** connector (on either the BTS or RFDS directional coupler).

4

The calibrated communications test set measures and returns the Pilot channel element digital waveform quality (rho) in dB, verifying that result meets system tolerances Waveform quality (rho) should be **≥ 0.912 (–0.4 dB).**

The BBX2 then de-keys and the applicable redundant BBX2 is assigned to the current TX antenna path under test. The test is then repeated.

The LMF Tests menu list item, **Rho,** performs the waveform quality test for a XCVR(s). All measurements are made through the appropriate TX output connector using the calibrated TX cable setup.

This test is included in the All TX, All TX/RX and Full Optimization tests.

Prerequisites

Before attempting to run* any *ATP tests, ensure the following have been completed:

- CSMs, GLI2s, BBX2s, and MCCs have correct code load and data load
- Primary CSM, GLI2, and MCCs are INS
- BTS has been Optimized/Calibrated per Chapters 2 and 3
- BBX2s are OOS–RAM
- Test equipment is connected for ATP tests (see Figure 3-16 through Figure 3-19).
- Test equipment is warmed up 60 minutes and calibrated
- Test cables are calibrated
- GPIB is on
- LMF is logged into the BTS

Rho ATP

Follow the steps outlined in Table 4-6 to verify the Pilot channel waveform quality (rho) on the specified TX antenna paths using BBXs equipped at the BTS.

Table 4-6: Rho ATP

✓	Step	Action
	1	Select the BBX2(s) to be tested.
	2	From the **Tests** menu, select **Rho.**
	3	Select the appropriate carrier(s) displayed in the **Channels/Carrier** pick list (use the **<Shift>** or **<Ctrl>** key to select multiple items).
	4	Type the appropriate channel number in the **Carrier n Channels** box. Click **OK**.
	5	Follow the cable connection directions as they are displayed.
	6	Click **OK** to close the status report window. **NOTE** The communications test set will measure and return the transmitted Pilot channel element waveform quality (rho). *Rho* represents the correlation between actual and perfect CDMA modulation spectrum (1.0000 represents perfect correlation).

TX Pilot Time Offset Acceptance Test

Background: Pilot Offset Acceptance Test

This test verifies the transmitted Pilot channel element Pilot Time Offset of each BBX2 carrier keyed up at a specific frequency *per the current CDF file assignment*. All tests are performed using the external calibrated test set controlled by the same command. All measurements will be via the appropriate **TX OUT** (BTS/RFDS) connector.

The Pilot Gain is set to 262 for each antenna and all TCH elements from the MCCs are forward link disabled. The BBX is keyed up using both bbxlvl and bay level offsets to generate a CDMA carrier (with pilot channel element only, Walsh code 0). BBX power output is set to 40 dBm as measured at the **TX OUT** connector (on either the BTS or RFDS directional coupler).

The calibrated communications test set measures and returns the Pilot Time Offset in uS, verifying results meet system tolerances: Pilot Time Offset should be within ≤ **3 μs** of the target PT Offset (0 μS).

The BBX2 then de-keys, and the applicable redundant BBX2 is assigned to the current TX antenna path under test. The test is then repeated.

Pilot Time Offset Test

The LMF **Tests** menu list item, **Pilot Time Offset,** performs the Pilot Time Offset test for a XCVR(s). All measurements are made through the appropriate TX output connector using the calibrated TX cable setup.

This test is included in the All TX, All TX/RX and Full Optimization tests.

Prerequisites

Before attempting to run **any** ***ATP tests***, ensure the following have been completed:

- CSMs, GLI2s, BBX2s, and MCCs have correct code load and data load
- Primary CSM, GLI, and MCCs are INS
- BTS has been Optimized/Calibrated
- BBX2s are OOS–RAM
- Test equipment is connected for ATP tests (see Figure 3-16 through Figure 3-19).
- Test equipment is warmed up 60 minutes and calibrated
- Test cables are calibrated
- GPIB is on
- LMF is logged into the BTS

Pilot Time Offset ATP

Follow the steps outlined in Table 4-7, to verify the Pilot Time Offset on the specified TX antenna paths using BBXs equipped at the BTS.

Table 4-7: Pilot Time Offset Test ATP

✓	Step	Action
	1	Click on the BBX2(s) to be tested.
	2	From the **Tests** menu, select **Pilot Time Offest**
	3	Select the appropriate carrier(s) displayed in the **Channels/Carrier** pick list (use the Shift or Ctrl keyboard key to select multiple items).
	4	Type the appropriate channel number in the **Carrier n Channels** box. Click **OK**.
	5	Follow the cable connection directions as they are displayed.
	6	Click **OK** to close the status report window. **NOTE** The communications test set will measure and return the difference between the CDMA analyzer measurement interval (based on the BTS system time reference) and the incoming block of transmitted data from the BTS (Pilot only, Walsh code 0). An ANSI–J–STD–019 compliant BTS typically measures 1–2 us.

Background: Code Domain Power Test

This test verifies the Code Domain Power/Noise of each BBX2 carrier keyed up at a specific frequency *per the current CDF file assignment*. All tests are performed using the external calibrated test set controlled by the same command. All measurements are via the appropriate **TX OUT** (BTS/RFDS) connector.

For each sector/antenna under test, the Pilot Gain is set to 262 and all MCC channel elements under test are configured to generate Orthogonal Channel Noise Source (OCNS) on different odd Walsh codes, and are assigned a full–rate gain of 81. The maximum number of MCC/CEs to be tested an any one time is 32 (32 odd Walsh codes). If more than 32 CEs exist, then multiple sets of measurements are made, so all channel elements are verified on all sectors.

BBX2 power output is set to 40 dBm as measured at the **TX OUT** connector (on either the BTS or RFDS directional coupler).

Code domain power levels, which have been set for all ODD numbered Walsh channels, are verified using the OCNS command. This is done by verifying that Pilot Power (dBm) minus OCNS Power (dBm) is equal to **10.2 ± 2 dB** and that the noise floor of all "OFF" Walsh channels measures ≤ **–27 dB** (with respect to total CDMA channel power).

The BBX2 then de-key and, the applicable redundant BBX2 is assigned to the current TX antenna path under test. The test is then repeated. Upon completion of the test, OCNS is disabled on the specified MCC/CE.

Code Domain Power test

The CDMA LMF Tests menu list item, Code Domain Power, performs the Code Domain Power test for a XCVR(s). All measurements are made through the appropriate TX output connector using the calibrated TX cable setup.

This test is included in the All TX, All TX/RX and Full Optimization tests.

Prerequisites

Before attempting to run* any *ATP tests, ensure the following have been completed:

- CSMs, GLI2s, BBX2s, and MCCs have correct code load and data load
- Primary CSM, GLI, and MCCs are INS
- BTS has been Optimized/Calibrated
- BBX2s are OOS–RAM
- Test equipment is connected for ATP tests (see Figure 3-16 through Figure 3-19).
- Test equipment is warmed up 60 minutes and calibrated
- Test cables are calibrated
- GPIB is on

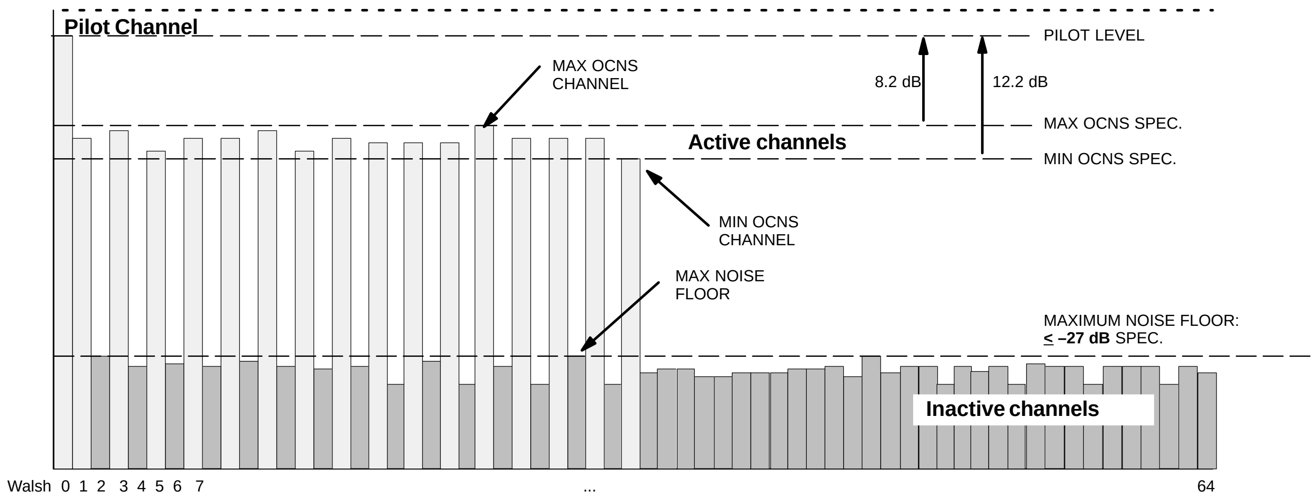
Code Domain Power ATP

Follow the steps outlined in Table 4-8 to verify the Code Domain Power of each BBX carrier keyed up at a specific frequency.

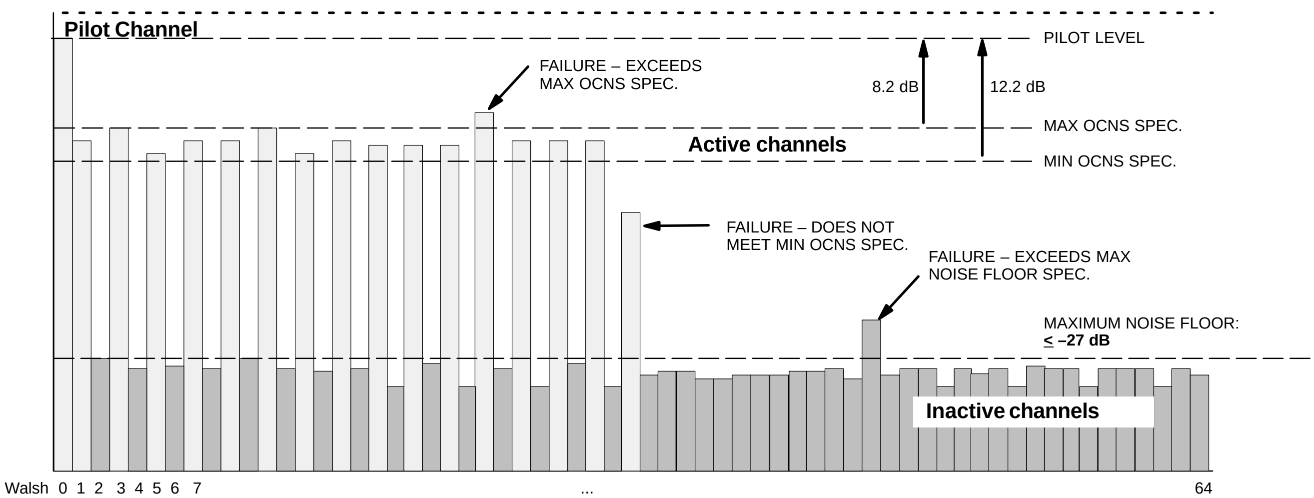
Table 4-8: Code Domain Power Test

✓	Step	Action
	1	Select the BBX2(s) and MCC(s) to be tested.
	2	From the **Tests** menu, select **Code Domain Power**
	3	Select the appropriate carrier(s) displayed in the **Channels/Carrier** pick list (use the Shift or Ctrl keyboard key to select multiple items).
	4	Type the appropriate channel number in the **Carrier n Channels** box. Click **OK**.
	5	Follow the cable connection directions as they are displayed.
	6	Click on **OK** to close the status report window. **NOTE** Verify the active channel code domain power levels, which have been set on ODD numbered Walsh channels, using the OCNS command. This is done by verifying that Pilot Power (dBm) minus OCNS Power (dBm) is equal to **10.2 ± 2 dB** and the noise floor of all inactive "OFF" Walsh channels measures **≤ –27 dB** (with respect to total CDMA channel power).

Figure 4-3: Code Domain Power and Noise Floor Levels



Showing all OCNS Passing



Indicating Failures

RX Frame Error Rate (FER) Acceptance Test

Background: FER Test

This test verifies the BTS Frame Error Rate (FER) on *all* traffic channel elements currently configured on *all* equipped MCCs (full rate at 1% FER) at an RF input level of –119 dBm [or –116 dBm if using Tower Top Amplifier (TMPC)]. All tests are performed using the external calibrated test set as the signal source controlled by the same command. All measurements will be via the LMF.

The pilot gain is set to 262 for each TX antenna and all channel elements from the MCCs are forward-link disabled. The BBX2 is keyed up using only bbxlvl level offsets, to generate a CDMA carrier (with pilot channel element only). BBX2 power output is set to –20 dBm as measured at the **TX OUT** connector (on either the BTS or RFDS directional coupler). The BBX2 must be keyed in order to enable the RX receive circuitry.

4

The LMF prompts the MCC/CE under test to measure all zero longcode and provide the FER report on the selected active MCC on the reverse link for both the main and diversity RX antenna paths, verifying the results meet the following specification: FER returned less than **1%** and total frames measured is **1500**.

All MCC/CEs selected are tested on the specified RX antenna path. The BBX then de-keys and, the applicable redundant BBX2 is assigned to the current RX antenna paths under test. The test is then repeated.

FER test

The CDMA LMF Tests menu list item, FER, performs the Frame Error Rate (FER) test for a XCVR(s). All measurements are made through the appropriate RX output connector using the calibrated RX cable setup.

This test is included in the All TX, All TX/RX and Full Optimization tests.

Prerequisites

Before attempting to run* any *ATP tests, ensure the following have been completed:

- CSMs, GLI2s, BBX2s, and MCCs have correct code load and data load
- Primary CSM, GLI2, and MCCs are INS
- BTS has been Optimized/Calibrated
- BBXs are OOS–RAM
- Test equipment is connected for ATP tests (see Figure 3-16 through Figure 3-19).
- Test equipment is warmed up 60 minutes and calibrated
- Test cables are calibrated and GPIB is on
- LMF is logged into the BTS

Table 4-9: Frame Error Rate (FER) ATP		
✓	Step	Action
		△ **WARNING** **Be very careful to not connect an RX test cable to a TX connector. Failure to observe this warning may cause bodily injury and/or equipment damage.**
	1	Select the BBX2(s) and MCC(s) to be tested.
	2	From the **Tests m**enu, select **FER**
	3	Select the appropriate carrier(s) displayed in the **Channels/Carrier** pick list (use the Shift or Ctrl keyboard key to select multiple items).
	4	Type the appropriate channel number in the **Carrier n Channels** box.
	5	Select the appropriate receive branch in the **RX Branch** pick list.
	6	Select the rate in the **Rate Set** pick list. **1**=9600 bps **2**=14400 bps Click **OK.**
	7	Follow the cable connection directions as they are displayed.
	8	Click **OK** to close the status report window. **NOTE** The CDMA LMF prompts the MCC under test to measure the FER at **–119 dBm**. The FER must be **less than 1%** and total frames is **1500**.

4

Generate an ATP Report

Background

Each time an ATP test is run, an ATP report is updated to include the results of the most recent ATP tests. The ATP report *will not* be updated if the status reports window *is not closed* with use of the **OK** button.

ATP Report

A separate report is created for each BTS and includes the following for each test:

- Test name
- BBX number
- Channel number
- Carrier number
- Sector number
- Upper test limit
- Lower test limit
- Test result
- PASS or FAIL
- Description information (if applicable)
- Time stamp
- Details/Warning information (if applicable)

Follow the procedures in the Table 4-10 to view the ATP report for a BTS.

Table 4-10: Generate an ATP Report

✓	Step	Action
	1	Click on the **Login** tab if it is not in the forefront.
	2	Select the desired BTS from the **Available Base Stations** pick list.
	3	Click on the **Report** button.

Printing an ATP Report

Each time an ATP test is run, the test results are stored in a **wlmf\cdma\bts–#.rpt** file in the BTS folder. The test results are updated each time a test is run so only the latest results are displayed for each test type. The test report for a BTS can be viewed or saved to a file. A saved file can be used to print a hard copy of the report.

NOTE

The test results are not stored if the status report window is closed with use of the **Dismiss** button. Use the **Save Results** button to save the results and exit the status report window.
The **bts–#.rpt** file is not a text file and the contents can not be viewed with use of an editor. Only the files created with use of the save function in the test report window can be viewed with an editor and printed.
The **bts–#.rpt** file becomes corrupted, an error message will appear when the status report window **OK** button is clicked. In this case, the **bts–#.rpt** file will have to be deleted.

Print Test File Procedure

The procedure in Table 4-11 is used for printing a test report.

Table 4-11: Procedure to a Test Report

✓	Step	Action
	1	Open the file with an editor (e.g., Notepad, Wordpad, or Word). If the file contents do not display correctly with Notepad, use Wordpad or Word.
	2	Use **File** > **Page Setup** to change the page layout for a test report as follows: • Top, Bottom, Left, and Right Margin = 0.5 inch • Page = Landscape
	3	Print the file.

NOTE

If additional information is available for a failed test, it is included at the end of the report with a reference to the line number of the failed test.

Chapter 5: Basic Troubleshooting

Table of Contents

5

Basic Troubleshooting Overview

Overview

The information in this section addresses some of the scenarios likely to be encountered by Customer Field Engineering (CFE) team members. This troubleshooting guide was created as an interim reference document for use in the field. It provides basic "what to do if" basic troubleshooting suggestions when the BTS equipment does not perform per the procedure documented in the manual.

Comments are consolidated from inputs provided by CFEs in the field and information gained form experience in Motorola labs and classrooms.

5

Cannot Log into Cell-Site

Table 5-1: Login Failure Troubleshooting Procedures		
✓	Step	Action
	1	If MGLI2 LED is solid RED, it implies a hardware failure. Reset MGLI2 by re-seating it. If this persists, install RGLI2 card in MGLI2 slot and retry. A Red LED may also indicate no Ethernet termination at top of frame.
	2	Verify that T1 is disconnected at the Channel Signaling Unit (CSU). If T1 is still connected, verify the CBSC has disabled the BTS.
	3	Try *'ping'*ing the MGLI2.
	4	Verify the LMF is connected to the **Primary** LMF port (LAN A) in front of the BTS.
	5	Verify the LMF was configured properly.
	6	Verify the BTS-LMF cable is RG-58 (flexible black cable of less than 2.5 feet length).
	7	Verify the Ethernet ports are terminated properly.
	8	Verify a T-adapter is not used on LMF side port if connected to the BTS front LMF primary port.
	9	Try connecting to the I/O panel (top of the Frame or on master ground bar). Use BNC T-adapters at the LMF port for this connection.
	10	Try connecting to the MGLI directly using a cable with BNC T-adapters at each end of cable, and each end terminated with BNC loads.
	11	Re-boot the CDMA LMF and retry.
	12	Re-seat the MGLI2 and retry.

Cannot Communicate to Power Meter

Table 5-2: Troubleshooting a Power Meter Communication Failure		
✓	Step	Action
	1	Verify Power Meter is connected to LMF with GPIB adapter.
	2	Verify cable setup as specified in Chapter 3.
	3	Verify the GP–IB address of the Power Meter is set to *13*. Refer to Test Equipment setup section of Chapter 3 for details.
	4	Verify that Com1 port is not used by another application.

Cannot Communicate to Communications Analyzer

Table 5-3: Troubleshooting a Communications Analyzer Communication Failure

✓	Step	Action
	1	Verify analyzer is connected to LMF with GPIB adapter.
	2	Verify cable setup.
	3	Verify the GPIB address is set to 18.
	4	Verify the GPIB adapter DIP switch settings are correct. Refer to Test Equipment setup section for details.
	5	Verify the GPIB adapter is not locked up. Under normal conditions, only 2 green LEDs must be ‘ON’ (Power and Ready). If any other LED is continuously ‘ON’, then power-cycle the GPIB Box and retry.
	6	If a Hyperterm window is open for MMI, close it.

Cannot Download CODE to Any Device (card)

Before a device can be enabled (placed in-service), it must be in the OOS_RAM state (yellow) with data downloaded to the device. The color of the device changes to green, once it is enabled.

The three states that devices can be changed to are as follows:

- Enabled (green, INS)
- Disabled (yellow, OOS_RAM)
- Reset (blue, OOS_ROM)

Table 5-4: Troubleshooting Code Download Failure

✓	Step	Action
	1	Verify T1 is disconnected from the BTS at CSU.
	2	Verify LMF can communicate with the BTS device using the Status function.
	3	Communication to MGLI2 must first be established before trying to talk to any other BTS device. MGLI2 must be INS_ACT state (green).
	4	Verify the card is physically present in the cage and powered-up.
	5	If card LED is solid RED, it implies hardware failure. Reset card by re-seating it. If this persists, replace card from another slot & retry. **NOTE** Primary & Redundunt CSM cards *CANNOT* be interchanged because only primary CSM is equipped with a GPS receiver.
	6	Re-seat card and try again.
	7	If BBX2 reports a failure message and is OOS_RAM, the code load was OK.

Cannot Download DATA to Any Device (Card)

Table 5-5: Troubleshooting Data Download Failure

✓	Step	Action
	1	Re-seat card and repeat code and data load procedure.

Cannot ENABLE Device

Table 5-6: Troubleshooting Device Enable (INS) Failure		
✓	Step	Action
	1	Re-seat card and repeat code and data load procedure.
	2	If CSM cannot be enabled, verify the CDF file has correct latitude and longitude data for cell site location and GPS sync.
	3	Ensure primary CSM is in INS_ACT state. **NOTE** MCCs will not go INS without the CSM and the BDC being INS.
	4	Verify 19.6608 MHz CSM clock; MCCs will not go INS otherwise.
	5	The BBX should not be enabled for ATP tests.
	6	If MCCs give "invalid or no system time," verify the BDC is enabled. If error persists, verify the CSM is enabled.

Miscellaneous Errors

Table 5-7: Miscellaneous Failures		
✓	Step	Action
	1	If LPAs continue to give alarms, even after cycling power at the circuit breakers, then connect an MMI cable to the LPA and set up a Hyperterminal connection. Enter **ALARMS** in the Hyperterminal window. The resulting LMF display may provide an indication of the problem. (Call Field Support for further assistance.)

Bay Level Offset Calibration Failure

Table 5-8: Troubleshooting BLO Calibration Failure		
✓	Step	Action
	1	Verify the Power Meter is configured correctly (see the test equipment setup section) and connection is made to the proper TX port.
	2	Verify the parameters in the bts–#.cdf file are set correctly for the following bands: For 1900 MHz: Bandclass=1; Freq_Band=16
	3	Verify that no LPA in the sector is in alarm state (flashing red LED). Reset the LPA by pulling the circuit breaker, and after 5 seconds, pushing back in.
	4	Re-calibrate the Power Meter and verify it is calibrated correctly with cal factors from sensor head.
	5	Verify GPIB adapter is not locked up. Under normal conditions, only 2 green LEDs must be 'ON' (Power and Ready). If any other LED is continuously 'ON', power-cycle (turn power off and on) the GPIB Box and retry.
	6	Verify sensor head is functioning properly by checking it with the 1 mW (0 dBm) Power Ref signal.
	7	If communication between the LMF and Power Meter is operational, the Meter display will show "*RES :*"

Cannot Load BLO

For Load BLO failures see Table 5-8.

Calibration Audit Failure

Table 5-9: Troubleshooting Calibration Audit Failure

✓	Step	Action
	1	Verify Power Meter is configured correctly (refer to the test equipment setup section of chapter 3).
	2	Re-calibrate the Power Meter and verify it is calibrated correctly with cal factors from sensor head.
	3	Verify that no LPA is in alarm state (rapidly flashing red LED). Reset the LPA by pulling the circuit breaker, and, after 5 seconds, pushing back in.
	4	Verify that no sensor head is functioning properly by checking it with the 1 mW (0 dBm) Power Ref signal.
	5	After calibration, the BLO data must be re-loaded to the BBX2s before auditing. Click on the BBX(s) and select **Device>Download BLO** Re-try the audit.
	6	Verify GPIB adapter is not locked up. Under normal conditions, only 2 green LEDs must be ‘ON’ (Power and Ready). If any other LED is continuously ‘ON’, power-cycle (turn power off and on) the GP–IB Box and retry.

Cannot Perform Txmask Measurement

Table 5-10: Troubleshooting TX Mask Measurement Failure

✓	Step	Action
	1	Verify that TX audit passes for the BBX2(s).
	2	If performing manual measurement, verify Analyzer setup.
	3	Verify that no LPA in the sector is in alarm state (flashing red LED). Re-set the LPA by pulling the circuit breaker, and, after 5 seconds, pushing it back in.

Cannot Perform Rho or Pilot Time Offset Measurement

Table 5-11: Troubleshooting Rho and Pilot Time Offset Measurement Failure

✓	Step	Action
	1	Verify presence of RF signal by switching to Spectrum analyzer screen.
	2	Verify PN offsets displayed on the analyzer is the same as the PN offset in the CDF file.
	3	Re–load MGLI2 data and repeat the test.
	4	If performing manual measurement, verify Analyzer setup.
	5	Verify that no LPA in the sector is in alarm state (flashing red LED). Reset the LPA by pulling the circuit breaker, and, after 5 seconds, pushing back in.
	6	If Rho value is unstable and varies considerably (e.g. .95,.92,.93), this may indicate that the GPS is still phasing (i.e. trying to reach and maintain 0 freq. error). Go to the freq. bar in the upper right corner of the Rho meter and select Hz. Press <Shift–avg> and enter 10, to obtain an average Rho value. This is an indication the GPS has not stabilized before going *INS* and may need to be re-initialized.

Cannot Perform Code Domain Power and Noise Floor Measurement

Table 5-12: Troubleshooting Code Domain Power and Noise Floor Measurement Failure

✓	Step	Action
	1	Verify presence of RF signal by switching to spectrum analyzer screen.
	2	Verify PN offset displayed on analyzer is same as PN offset being used in the CDF file.
	3	Disable and re-enable MCC (one or more MCCs based on extent of failure).

Cannot Perform Carrier Measurement

Table 5-13: Troubleshooting Carrier Measurement Failure

✓	Step	Action
	1	Perform the test manually, using the spread CDMA signal. Verify High Stability 10 MHz Rubidium Standard is warmed up (60 minutes) and properly connected to test set-up.

Multi–FER Test Failure

Table 5-14: Troubleshooting Multi-FER Failure

✓	Step	Action
	1	Verify test equipment set up is correct for a FER test.
	2	Verify HP8921A is locked to 19.6608 and even second clocks. The yellow LED (REF UNLOCK) must be OFF.
	3	Verify MCCs have been loaded with data and are INS–ACT.
	4	Disable and re-enable the MCC (1 or more based on extent of failure).
	5	Disable, re-load code and data, and re-enable MCC (one or more MCCs based on extent of failure).
	6	Verify antenna connections to frame are correct based on the directions messages.

Problem Description

Many of the Clock Synchronization Manager (CSM) boards may be resolved in the field before sending the boards to the factory for repair. This section describes known CSM problems identified in field returns, some of which are field-repairable. Check these problems before returning suspect CSM boards.

Intermittent 19.6608 MHz Reference Clock / GPS Receiver Operation

If having any problems with CSM board kit numbers, SGLN1145 or SGLN4132, check the suffix with the kit number. If the kit has version "AB," then replace with version ''BC'' or higher, and return model AB to the repair center.

No GPS Reference Source

Check the CSM boards for proper hardware configuration. CSM kit SGLN1145, in Slot l, has an on-board GPS receiver; while kit SGLN4132, in Slot 2, does not have a GPS receiver. Any incorrectly configured board *must* be returned to the repair center. *Do not attempt to change hardware configuration in the field.* Also, verify the GPS antenna is not damaged and is installed per recommended guidelines.

Checksum Failure

The CSM could have corrupted data in its firmware resulting in a non-executable code. The problem is usually caused by either electrical disturbance, or interruption of data during a download. Attempt another download with no interruptions in the data transfer. Return CSM board back to repair center if the attempt to reload fails.

GPS Bad RX Message Type

This is believed to be caused by a later version of CSM software (3.5 or higher) being downloaded, via LMF, followed by an earlier version of CSM software (3.4 or lower), being downloaded from the CBSC. Download again with CSM software code 3.5 or higher. Return CSM board back to repair center if attempt to reload fails.

CSM Reference Source Configuration Error

This is caused by incorrect reference source configuration performed in the field by software download. CSM kit SGLN1145 and SGLN4132 must have proper reference sources configured (as shown below) to function correctly.

CSM Kit No.	Hardware Configuration	CSM Slot No.	Reference Source Configuration
SGLN1145	With GPS Receiver	1	Primary = Local GPS Backup = Either LFR or HSO
SGLN4132	Without GPS Receiver	2	Primary = Remote GPS Backup = Either LFR or HSO

Takes Too Long for CSM to Come INS

This may be caused by a delay in GPS acquisition. Check the accuracy flag status and/or current position. Refer to the GSM system time/GPS and LFR/HSO verification section in Chapter 3. At least 1 satellite should be visible and tracked for the "surveyed" mode and 4 satellites should be visible and tracked for the "estimated" mode. Also, verify correct base site position data used in "surveyed" mode.

C–CCP Backplane Troubleshooting

Introduction

The C–CCP backplane is a multi–layer board that interconnects all the C–CCP modules. The complexity of this board lends itself to possible improper diagnoses when problems occur.

Connector Functionality

The following connector overview describes the major types of backplane connectors along with the functionality of each. This will allow the Cellular Field Engineer (CFE) to:

- Determine which connector(s) is associated with a specific problem type.
- Allow the isolation of problems to a specific cable or connector.

Primary “A” and Redundant “B” ISB (Inter Shelf Bus) connectors

The 40 pin ISB connectors provide an interface bus from the master GLI2 to all other GLI2s in the modem frame. Its basic function is to provide clock synchronization from the master GLI2 to all other GLI2s in the frame.

The ISB is also provides the following functions:

- span line grooming when a single span is used for multiple cages.
- provide MMI connection to/from the master GLI2 to cell site modem.
- provide interface between GLI2s and the AMR (for reporting BTS alarms).

Span Line Connector

The span line input is an 8 pin RJ–45 connector that provides a primary and secondary (if used) span line interface to each GLI2 in the C–CCP shelf. The span line is used for MM/EMX switch control of the Master GLI2 and also all the BBX2 traffic.

Primary “A” and Redundant “B” Reference Distribution Module (RDM) Input/Output

These connectors route the 3 MHz reference signals from the CSMs to the GLI2s and all BBX2s in the backplane. The signals are used to phase lock loop all clock circuits on the GLI2’s and BBX2 boards to produce precise clock and signal frequencies.

Power Input (Return A, B, and C connectors)

Provides a 27 volt input for use by the power supply modules.

Power Supply Module Interface

Each power supply module has a series of three different connectors to provide the needed inputs/outputs to the C–CCP backplane. These include a VCC/Ground input connector, a Harting style multiple pin interface, and a +15V/Analog Ground output connector. The Transceiver Power Module converts 27/48 Volts to a regulated +15, +6.5, +5.0 volts to be used by the C–CCP shelf cards.

GLI2 Connector

This connector consists of a Harting 4SU digital connector and a 6–conductor coaxial connector for RDM distribution. The connectors provide inputs/outputs for the GLI2s in the C–CCP backplane.

GLI2 Ethernet “A” and “B” Connections

These BNC connectors are located on the C–CCP backplane and routed to the GLI2 board. This interface provides all the control and data communications between the master GLI2 and the other GLI2, between gateways, and for the LMF on the LAN.

BBX2 Connector

Each BBX2 connector cnsists of a Harting 2SU/1SU digital connector and two 6–conductor coaxial connectors. These connectors provide DC, digital, and RF inputs/outputs for the BBX2s in the C–CCP backplane.

CIO Connectors

- RX RF antenna path signal inputs are routed through RX Tri–Filters (on the I/O plate), and via coaxial cables to the two MPC modules – the six “A” (main) signals go to one MPC; the six “B” (diversity) to the other. The MPC outputs the low–noise–amplified signals via the C–CCP backplane to the CIO where the signals are split and sent to the appropriate BBX2.
- A digital bus then routes the baseband signal through the BBX2, to the backplane, then on to the MCC24 slots.
- Digital TX antenna path signals originate at the MCC24s. Each output is routed from the MCC24 slot via the backplane appropriate BBX2.
- TX RF path signal originates from the BBX2, through the backplane to the CIO, through the CIO, and via multi-conductor coaxial cabling to the LPAs in the LPA shelf.

C–CCP Backplane Troubleshooting Procedure

The following table provides a standard procedure for troubleshooting problems that appear to be related to a defective C–CCP backplane. The table is broken down into possible problems and steps which should be taken in an attempt to find the root cause.

IMPORTANT

It is important to note that all steps be followed before replacing ANY C–CCP backplane.

Digital Control Problems

No GLI2 Control via LMF (all GLI2s)

Table 5-15: No GLI2 Control via LMF (all GLI2s)

Step	Action
1	Check the ethernet for proper connection, damage, shorts, or opens (refer to page 3-17 of this manual).
2	Verify C–CCP backplane Shelf ID DIP switch is set correctly.
3	Visually check the master GLI2 connector (both board and backplane) for damage.
4	Replace the master GLI2 with a known good GLI2.

No GLI2 Control through Span Line Connection (All GLI2s)

Table 5-16: No GLI2 Control through Span Line Connection (Both GLI2s)

Step	Action
1	Verify C–CCP backplane Shelf ID DIP switch is set correctly.
2	Verify that the BTS and GLI2s are correctly configured in the OMCR/CBSC data base.
3	Visually check the master GLI2 connector (both board and backplane) for damage.
4	Replace the master GLI2 with a known good GLI2.
5	Check the span line inputs from the top of the frame to the master GLI2 for proper connection and damage.

Table 5-17: MGLI2 Control Good – No Control over Co–located GLI2

Step	Action
1	Verify that the BTS and GLI2s are correctly configured in the OMCR CBSC data base.
2	Check the ethernet for proper connection, damage, shorts, or opens (refer to the page 3-18 of this manual).
3	Check the appropriate ISB cables connectors and ISB backplane connectors for proper connection and damage.
4	Visually check all GLI2 connectors (both board and backplane) for damage.
5	Replace the remaining GLI2 with a known good GLI2.
6	Verify ISB terminations are installed. Check connectors (both cable and backplane) for damage. Replace the ISB cable with a known good cable. **NOTE** Externally route the cable to bypass suspect segment.

No AMR Control (MGLI2 good)

Table 5-18: MGLI2 Control Good – No Control over AMR

Step	Action
1	Check the appropriate ISB cables connectors and ISB backplane connectors for proper connection and damage.
2	Visually check the master GLI2 connector (both board and backplane) for damage.
3	Replace the master GLI2 with a known good GLI2.
4	Replace the AMR with a known good AMR.
5	Verify ISB terminations are installed. Check connectors (both cable and backplane) for damage. Replace the ISB cable with a known good cable. **NOTE** Externally route the cable to bypass suspect segment.

No BBX2 Control in the Shelf

Table 5-19: MGLI2 Control Good – No Control over Co–located GLI2s

Step	Action
1	Visually check all GLI2 connectors (both board and backplane) for damage.
2	Replace the remaining GLI2 with a known good GLI2.
3	Visually check BBX2 connectors (both board and backplane) for damage.
4	Replace the BBX2 with a known good BBX2.
5	Verify ISB terminations are installed. Check connectors (both cable and backplane) for damage. Replace the ISB cable with a known good cable. **NOTE** Externally route the cable to bypass suspect segment.

No (or Missing) Span Line Traffic

Table 5-20: BBX2 Control Good – No (or Missing) Span Line Traffic

Step	Action
1	Visually check all GLI2 connectors (both board and backplane) for damage.
2	Replace the remaining GLI2 with a known good GLI2.
3	Visually check all span line distribution (both connectors and cables) for damage.
4	Verify ISB terminations are installed. Check connectors (both cable and backplane) for damage. Replace the ISB cable with a known good cable. **NOTE** Externally route the cable to bypass suspect segment.
5	If the problem seems to be limited to 1 BBX2, replace the BBX2 with a known good BBX2.

No (or Missing) MCC24 Channel Elements

Table 5-21: No MCC24 Channel Elements

Step	Action
1	Verify CEs on a co–located MCC24 (MccType=2)
2	If the problem seems to be limited to 1 MCC24, replace the MCC24 with a known good MCC24. – Check connectors (both board and backplane) for damage.
3	If no CEs on any MCC24: – visually check BDC INS_ACT – replace BDC with known good BDC. Check connectors (both board and backplane) for damage. – Verify clock reference to CIO.
4	Verify ISB terminations are installed. Check connectors (both cable and backplane) for damage. Replace the ISB cable with a known good cable. **NOTE** Externally route the cable to bypass suspect segment.

DC Power Problems

WARNING

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

No DC Input Voltage to Power Supply Module

Table 5-22: No DC Input Voltage to Power Supply Module

Step	Action
1	Verify DC power is applied to the BTS frame. Verify there are no breakers tripped. *** IMPORTANT** If a breaker has tripped, remove all modules from the applicable shelf supplied by the breaker and attempt to reset it. – If breaker trips again, there is probably a cable or breaker problem within the frame. – If breaker does not trip, there is probably a defective module or sub–assembly within the shelf.
2	Verify that the C–CCP shelf breaker on the BTS frame breaker panel is functional.
3	Use a voltmeter to determine if the input voltage is being routed to the C–CCP backplane by measuring the DC voltage level on the PWR_IN cable. – If the voltage is not present, there is probably a cable or breaker problem within the frame. – If the voltage is present at the connector, reconnect and measure the level at the "VCC" power feed clip on the distribution backplane. If the voltage is correct at the power clip, inspect the clip for damage.
4	If everything appears to be correct, visually inspect the power supply module connectors.
5	Replace the power supply module with a known good module.
6	If steps 1 through 4 fail to indicate a problem, the C–CCP backplane failure (possibly an open trace) has occurred.

No DC Voltage (+5, +6.5, or +15 Volts) to a Specific GLI2, BBX2, or Switchboard

Table 5-23: No DC Input Voltage to any C–CCP Shelf Module

Step	Action
1	Verify steps outlined in Table 5-22 have been performed.
2	Inspect the defective board/module (both board and backplane) connector for damage.
3	Replace suspect board/module with known good board/module.

TX and RX Signal Routing Problems

Table 5-24: No DC Input Voltage to any C–CCP Shelf Module

Step	Action
1	Inspect all Harting Cable connectors and back–plane connectors for damage in all the affected board slots.
2	Perform steps outlined in the RF path troubleshooting flowchart in this manual.

Module Status Indicators

Each of the non-passive plug-in modules has a bi-color (green & red) LED status indicator located on the module front panel. The indicator is labeled PWR/ALM. If both colors are turned on, the indicator is yellow.

Each plug-in module, except for the fan module, has its own alarm (fault) detection circuitry that controls the state of the PWR/ALM LED.

The fan TACH signal of each fan module is monitored by the AMR. Based on the status of this signal the AMR controls the state of the PWR/ALM LED on the fan module.

LED Status Combinations for All Modules (except GLI2, CSM, BBX2, MCC24, MCC8E)

PWR/ALM LED

The following list describes the states of the module status indicator.

- Solid GREEN – module operating in a normal (fault free) condition.
- Solid RED – module is operating in a fault (alarm) condition due to electrical hardware failure.

Note that a fault (alarm) indication may or may not be due to a complete module failure and normal service may or may not be reduced or interrupted.

DC/DC Converter LED Status Combinations

The PWR CNVTR has its own alarm (fault) detection circuitry that controls the state of the PWR/ALM LED.

PWR/ALM LED

The following list describes the states of the bi-color LED.

- Solid GREEN – module operating in a normal (fault free) condition.
- Solid RED – module is operating in a fault (alarm) condition due to electrical hardware problem.

CSM LED Status Combinations

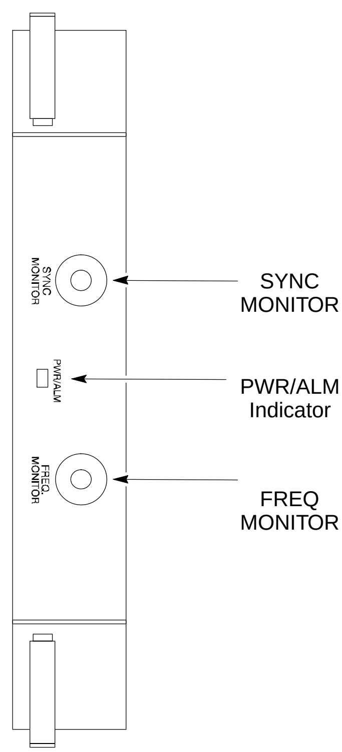
PWR/ALM LED

The CSMs include on-board alarm detection. Hardware and software/firmware alarms are indicated via the front panel indicators.

After the memory tests, the CSM loads OOS–RAM code from the Flash EPROM, if available. If not available, the OOS–ROM code is loaded from the Flash EPROM.

- Solid GREEN – module is INS_ACT or INS_STBY no alarm.
- Solid RED – Initial power up or module is operating in a fault (alarm) condition.
- Slowly Flashing GREEN – OOS_ROM no alarm.
- Long RED/Short GREEN – OOS_ROM alarm.
- Rapidly Flashing GREEN – OOS_RAM no alarm or INS_ACT in DUMB mode.
- Short RED/Short GREEN – OOS_RAM alarm.
- Long GREEN/Short RED – INS_ACT or INS_STBY alarm.
- Off – no DC power or on-board fuse is open.
- Solid YELLOW – After a reset, the CSMs begin to boot. During SRAM test and Flash EPROM code check, the LED is yellow. (If SRAM or Flash EPROM fail, the LED changes to a solid RED and the CSM attempts to reboot.)

Figure 5-1: CSM Front Panel Indicators & Monitor Ports



. . . continued on next page

FREQ Monitor Connector

A test port provided at the CSM front panel via a BNC receptacle allows monitoring of the 19.6608 MHz clock generated by the CSM. When both CSM 1 and CSM 2 are in an in-service (INS) condition, the CSM 2 clock signal frequency is the same as that output by CSM 1.

The clock is a sine wave signal with a minimum amplitude of +2 dBm (800 mVpp) into a 50 Ω load connected to this port.

SYNC Monitor Connector

A test port provided at the CSM front panel via a BNC receptacle allows monitoring of the "Even Second Tick" reference signal generated by the CSMs.

At this port, the reference signal is a TTL active high signal with a pulse width of 153 nanoseconds.

MMI Connector – Only accessible behind front panel. The RS–232 MMI port connector is intended to be used primarily in the development or factory environment, but may be used in the field for debug/maintenance purposes.

GLI2 LED Status Combinations

The GLI2 module has indicators, controls and connectors as described below and shown in Figure 5-2.

The indicators and controls consist of:

- Four LEDs
- One pushbutton

ACTIVE LED

Solid GREEN – GLI2 is active. This means that the GLI2 has shelf control and is providing control of the digital interfaces.

Off – GLI2 is not active (i.e., Standby). The mate GLI2 should be active.

MASTER LED

- Solid GREEN – GLI2 is Master (sometimes referred to as MGLI2).
- Off – GLI2 is non-master (i.e., Slave).

ALARM LED

- Solid RED – GLI2 is in a fault condition or in reset.
- While in reset transition, STATUS LED is OFF while GLI2 is performing ROM boot (about 12 seconds for normal boot).
- While in reset transition, STATUS LED is ON while GLI2 is performing RAM boot (about 4 seconds for normal boot).
- Off – No Alarm.

STATUS LED

- Flashing GREEN– GLI2 is in service (INS), in a stable operating condition.
- On – GLI2 is in OOS RAM state operating downloaded code.
- Off – GLI2 is in OOS ROM state operating boot code.

SPANS LED

- Solid GREEN – Span line is connected and operating.
- Solid RED – Span line is disconnected or a fault condition exists.

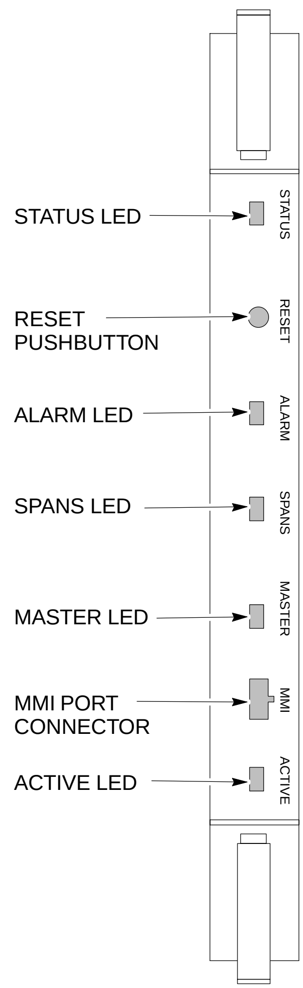
GLI2 Pushbuttons and Connectors

RESET Pushbutton – Depressing the RESET pushbutton causes a partial reset of the CPU and a reset of all board devices. GLI2 will be placed in the OOS_ROM state

MMI Connector – The RS–232MMI port connector is intended to be used primarily in the development or factory environment but may be used in the field for debug/maintenance purposes.

LAN Connectors (A & B) – The two 10BASE2 Ethernet circuit board mounted BNC connectors are located on the bottom front edge of the GLI2; one for each LAN interface, A & B. Ethernet cabling is connected to tee connectors fastened to these BNC connectors.

Figure 5-2: GLI2 Front Panel



GLI2 FRONT PANEL

BBX2 LED Status Combinations

PWR/ALM LED

The BBX module has its own alarm (fault) detection circuitry that controls the state of the PWR/ALM LED.

The following list describes the states of the bi-color LED:

- Solid GREEN – INS_ACT no alarm
- Solid RED Red – initializing or power-up alarm
- Slowly Flashing GREEN – OOS_ROM no alarm
- Long RED/Short GREEN – OOS_ROM alarm
- Rapidly Flashing GREEN – OOS_RAM no alarm
- Short RED/Short GREEN – OOS_RAM alarm
- Long GREEN/Short RED – INS_ACT alarm

MCC24/MCC8E LED Status Combinations

The MCC24/MCC8E module has LED indicators and connectors as described below. See Figure 5-3. Note that the figure does not show the connectors as they are concealed by the removable lens.

The LED indicators and their states are as follows:

PWR/ALM LED

- RED – fault on module

ACTIVE LED

- Off – module is inactive, off-line, or not processing traffic.
- Slowly Flashing GREEN – OOS_ROM no alarm.
- Rapidly Flashing Green – OOS_RAM no alarm.
- Solid GREEN – module is INS_ACT, on-line, processing traffic.

PWR/ALM and ACTIVE LEDs

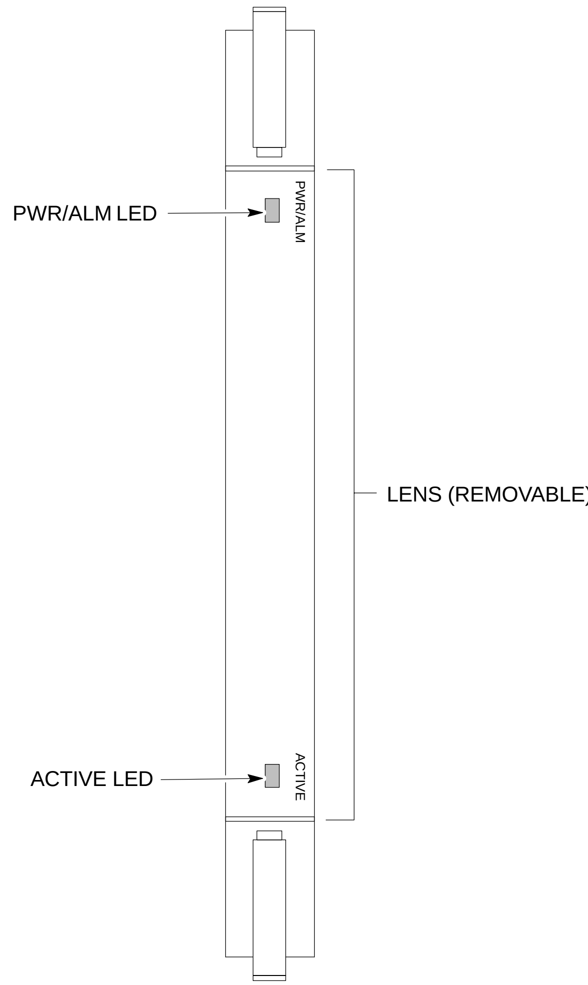
- Solid RED – module is powered but is in reset or the BCP is inactive.

MMI Connectors

- The RS–232 MMI port connector (four-pin) is intended to be used primarily in the development or factory environment but may be used in the field for debugging purposes.
- The RJ–11 ethernet port connector (eight-pin) is intended to be used primarily in the development environment but may be used in the field for high data rate debugging purposes.

. . . continued on next page

Figure 5-3: MCC24 Front Panel



MCC24 FRONT PANEL

LPA Shelf LED Status Combinations

LPA Module LED

Each LPA module contains a bi–color LED just above the MMI connector on the front panel of the module. Interpret this LED as follows:

- GREEN — LPA module is active and is reporting no alarms (Normal condition).
- Flashing GREEN/RED — LPA module is active but is reporting an low input power condition. If no BBX is keyed, this is normal and does not constitute a failure.

Span Problems (No Control Link)

Table 5-25: Troubleshooting Control Link Failure

✓	Step	Action
	1	Verify the span settings using the `span_view` command on the active master GLI2 MMI port. If these are set correctly, verify the edlc parameters using the `show` command. Any alarms conditions indicate that the span is not operating correctly. – Try looping back the span line from the DSX panel back to the Mobility Manager (MM) and verify that the looped signal is good. – Listen for control tone on appropriate timeslot from Base Site and MM.
	2	If no traffic channels in groomed MCC24s (or in whole C–CCP shelf) can process calls, verify that the ISB cabling is correct and that ISB A and ISB B cables are not swapped.

Chapter 6: Leaving the Site

Table of Contents

Notes

6

Prepare to Leave the Site

External Test Equipment Removal

Perform the procedure outlined in Table 6-1 to disconnect the test equipment and configure the BTS for active service.

Table 6-1: External Test Equipment Removal

Step	Action
1	Disconnect all external test equipment from all TX and RX connectors at the rear of the frame.
2	Reconnect and visually inspect all TX and RX antenna feed lines at the rear of the frame.

CAUTION

Verify all sector antenna feed lines are connected to the correct ports on the frame. Crossed antenna cables will cause system degradation of call processing.

Reset All Devices

Reset all devices by cycling power before leaving the site. The CBSC configuration data and code loads could be different from data and code on the LMF. By resetting all devices, the CBSC can load the proper data and code when the span is active again.

Updating CBSC LMF Files

Updated CAL file information must be moved from the CDMA LMF (Windows environment) back to the CBSC (Unix environment). The following procedures detail the moving of files from one environment to the other.

Copying CAL files from CDMA LMF to a Disk

Follow the procedures in Table 3-5 to copy CAL files from a CDMA LMF computer to a 3.5 diskette.

Table 6-2: Procedures to Copy Files to a Diskette using the LMF

✓	Step	Action
	1	Insert a disk into Drive A.
	2	Launch the **Windows Explorer** program from your **Programs** menu list.
	3	Select the applicable **wlmf/cdma/bts–#** folder.
	4	Drag the bts–#.cal file to Drive A.
	5	Repeat Steps 3 and 4, as required, for other **bts–#** folders.

Copying CAL Files from Diskette to the CBSC

Follow the procedures in Table 6-3 to copy CAL files from a diskette to the CBSC.

Table 6-3: Procedures to Copy CAL Files from Diskette to the CBSC

✓	Step	Action
	1	Login to the CBSC on the workstation using your account name and password. **NOTE** Enter the information that appears in **bold t**ext.
	2	Place the diskette, containing calibration file(s), in the workstation diskette drive.
	3	Type in the following and press the Enter key. => **eject –q**
	4	Type in the following and press the Enter key. => **mount** **NOTE** Look at the last line displayed. Check to see that the message "*floppy/no_name*" is displayed.
	5	Type in the following and press the Enter key. => **cd /floppy/no_name**
	6	Type in the following and press the Enter key. => **cp /floppy/no_name/bts–#.cal bts–#.cal**
	7	Type in the following and press the Enter key. => **pwd** Verify you are at your home directory
	8	Type in the following and press the Enter key. => **ls –l *.cal** Verify the cal files have been copied.
	9	Type in the following and press the Enter key. => **eject**
	10	Remove the diskette from the workstation.

LMF Removal

CAUTION

DO NOT power down the CDMA LMF without performing the procedure indicated below. Corrupted/lost data files may result, and in some cases, the CDMA LMF may lock up.

Follow the procedures in Table 6-4 to terminate the LMF session and remove the terminal.

Table 6-4: Procedures to Copy CAL Files from Diskette to the CBSC

✓	Step	Action
	1	From the CDMA window select **File>Exi**t.
	2	From the Windows Task Bar click **Start>Shutdown**. Click **Yes** when the Shut Down Windows message appears.
	3	Disconnect the LMF terminal Ethernet connector from the BTS cabinet.
	4	Disconnect the LMF serial port, the RS-232 to GPIB interface box, and the GPIB cables as required for equipment transport.

Reestablish OMC-R Control/ Verifying T1/E1

IMPORTANT

After all activities at the site have been completed, including disconnecting the LMF, place a phone call to the OMC-R and request the BTS be placed under control of the OMC-R.

Notes

6

Appendix A: Data Sheets

Appendix Content

Notes

Appendix A: Optimization (Pre–ATP) Data Sheets

Verification of Test Equipment Used

Table A-1: Verification of Test Equipment Used

Manufacturer	Model	Serial Number

Comments:____

____

Site Checklist

Table A-2: Site Checklist

OK	Parameter	Specification	Comments
❑	Deliveries	Per established procedures	
❑	Floor Plan	Verified	
	Inter Frame Cables:		
❑	Ethernet	Per procedure	
❑	Frame Ground	Per procedure	
❑	Power	Per procedure	
	Factory Data:		
❑	BBX2	Per procedure	
❑	Test Panel	Per procedure	
❑	RFDS	Per procedure	
❑	Site Temperature		
❑	Dress Covers/Brackets		

Preliminary Operations

Table A-3: Preliminary Operations

OK	Parameter	Specification	Comments
❑	Shelf ID Dip Switches	Per site equipage	
❑	Ethernet LAN verification	Verified per procedure	

Comments:____

Pre–Power and Initial Power Tests

Table A3a: Pre–power Checklist

OK	Parameter	Specification	Comments
❑	Pre–power–up tests	Verify power supply output voltage at the top of each BTS frame is within specifications	
	Internal Cables:		
❑	ISB (all cages)	verified	
❑	CSM (all cages)	verified	
❑	Power (all cages)	verified	
	Ethernet Connectors		
❑	LAN A ohms	verified	
❑	LAN B ohms	verified	
❑	LAN A shield	isolated	
❑	LAN B shield	isolated	
❑	Ethernet Boots	installed	
❑	Air Impedance Cage (single cage)	installed	
❑	Initial power–up tests	Verify power supply output voltage at the top of each BTS frame is within specifications:	

Comments:____

General Optimization Checklist

Table A3b: Pre–power Checklist

OK	Parameter	Specification	Comments
❑	LEDs	illuminated	
❑	Frame fans	operational	
	LMF to BTS Connection		
❑	Preparing the LMF	per procedure	
❑	Log into the LMF PC	per procedure	
❑	Create site specific BTS directory	per procedure	
❑	Download device loads	per procedure	
❑	Ping LAN A	per procedure	
❑	Ping LAN B	per procedure	
❑	Download/Enable MGLI2s	per procedure	
❑	Download/Enable GLI2s	per procedure	
❑	Set Site Span Configuration	per procedure	
❑	Download CSMs	per procedure	
❑	Enable CSMs	per procedure	
❑	Enable CSMs	per procedure	
❑	Download/Enable MCC24s	per procedure	
❑	Download BBX2s	per procedure	
❑	Download TSU (in RFDS)	per procedure	
	Program TSU NAM		
❑	Test Set Calibration	per procedure	

Comments:____

GPS Receiver Operation

Table A-4: GPS Receiver Operation			
OK	**Parameter**	**Specification**	**Comments**
❑	GPS Receiver Control Task State: **tracking satellites**	Verify parameter	
❑	Initial Position Accuracy:	Verify Estimated or Surveyed	
❑	Current Position: **lat** **lon** **height**	RECORD in msec and cm also convert to deg min sec	
❑	Current Position: satellites tracked Estimated: **(>4) satellites tracked,(>4) satellites visible** Surveyed: **(≥1) satellite tracked,(>4) satellites visible**	Verify parameter as appropriate:	
❑	GPS Receiver Status:Current Dilution of Precision (PDOP or HDOP): (<**30)**	Verify parameter	
❑	Current reference source: **Number: 0; Status: Good; Valid: Yes**	Verify parameter	

Comments:____

LFR Receiver Operation

Table A-5: LFR Receiver Operation

OK	Parameter	Specification	Comments
❑	Station call letters M X Y Z assignment.	as specified in site documentation	
❑	SN ratio is > 8 dB		
❑	LFR Task State: 1fr **locked to station xxxx**	Verify parameter	
❑	Current reference source: **Number: 1; Status: Good; Valid: Yes**	Verify parameter	

Comments:____

LPA IM Reduction

Table A-6: LPA IM Reduction

OK	Parameter					Specification	Comments
	LPA #	CARRIER					
		4:1 & 2:1 3–Sector	2:1 6–Sector	Dual BP 3–Sector	Dual BP 6–Sector		
❑	1A	C1	C1	C1	C1	No Alarms	
❑	1B	C1	C1	C1	C1	No Alarms	
❑	2A	C1	C1	C1	C1	No Alarms	
❑	2B	C1	C1	C1	C1	No Alarms	
❑	3A	C1	C1	C1	C1	No Alarms	
❑	3B	C1	C1	C1	C1	No Alarms	
❑	4A	C3	C1		C1	No Alarms	
❑	4B	C3	C1		C1	No Alarms	
❑	5A	C3	C1		C1	No Alarms	
❑	5B	C3	C1		C1	No Alarms	
❑	6A	C3	C1		C1	No Alarms	
❑	6B	C3	C1		C1	No Alarms	
❑	7A	C2	C2	C2		No Alarms	
❑	7B	C2	C2	C2		No Alarms	
❑	8A	C2	C2	C2		No Alarms	
❑	8B	C2	C2	C2		No Alarms	
❑	9A	C2	C2	C2		No Alarms	
❑	9B	C2	C2	C2		No Alarms	
❑	10A	C4	C2			No Alarms	
❑	10B	C4	C2			No Alarms	
❑	11A	C4	C2			No Alarms	
❑	11B	C4	C2			No Alarms	
❑	12A	C4	C2			No Alarms	
❑	12B	C4	C2			No Alarms	

Comments:____

TX Bay Level Offset / Power Output Verification for 3–Sector Configurations

1–Carrier
2–Carrier Non–adjacent Channels
4–Carrier Non–adjacent Channels

Table A-7: TX BLO Calibration (3–Sector: 1–Carrier, 2–Carrier and 4–Carrier Non–adjacent Channels)

OK	Parameter	Specification	Comments
❑	Calibrate carrier 1	TX Bay Level Offset = 42 dB (+4 dB) prior to calibration	BBX2–1, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–2, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–3, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑	Calibrate carrier 2	TX Bay Level Offset = 42 dB (+4 dB) prior to calibration	BBX2–7, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–8, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–9, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑	Calibrate carrier 3	TX Bay Level Offset = 42 dB (+4 dB) prior to calibration	BBX2–4, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–5, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–6, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑	Calibrate carrier 4	TX Bay Level Offset = 42 dB (+4 dB) prior to calibration	BBX2–10, ANT–1 = __dB BBX2–r, ANT–1 = ___dB
❑			BBX2–11, ANT–2 = __dB BBX2–r, ANT–2 = ___dB
❑			BBX2–12, ANT–3 = __dB BBX2–r, ANT–3 = ___dB

. . . continued on next page

Table A-7: TX BLO Calibration (3–Sector: 1–Carrier, 2–Carrier and 4–Carrier Non–adjacent Channels)			
OK	**Parameter**	**Specification**	**Comments**
❑	Calibration Audit carrier 1	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–1, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–2, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–3, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑	Calibration Audit carrier 2	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–7, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–8, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–9, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑	Calibration Audit carrier 3	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–4, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–5, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–6, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑	Calibration Audit carrier 4	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–10, ANT–1 = __dB BBX2–r, ANT–1 = ___dB
❑			BBX2–11, ANT–2 = __dB BBX2–r, ANT–2 = ___dB
❑			BBX2–12, ANT–3 = __dB BBX2–r, ANT–3 = ___dB

Comments:____

____

2–Carrier Adjacent Channel

Table A-8: TX Bay Level Offset Calibration (3–Sector: 2–Carrier Adjacent Channels)

OK	Parameter	Specification	Comments
❑	Calibrate carrier 1	TX Bay Level Offset = 42 dB (typical), 38 dB (minimum) prior to calibration	BBX2–1, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–2, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–3, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑	Calibrate carrier 2	TX Bay Level Offset = 42 dB (typical), 38 dB (minimum) prior to calibration	BBX2–7, ANT–4 = ___dB BBX2–r, ANT–4 = ___dB
❑			BBX2–8, ANT–5 = ___dB BBX2–r, ANT–5 = ___dB
❑			BBX2–9, ANT–6 = ___dB BBX2–r, ANT–6 = ___dB
❑	Calibration Audit carrier 1	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–1, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–2, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–3, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑	Calibration Audit carrier 2	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–7, ANT–4 = ___dB BBX2–r, ANT–4 = ___dB
❑			BBX2–8, ANT–5 = ___dB BBX2–r, ANT–5 = ___dB
❑			BBX2–9, ANT–6 = ___dB BBX2–r, ANT–6 = ___dB

Comments:____

____

3–Carrier Adjacent Channels
4–Carrier Adjacent Channels

Table A-9: TX Bay Level Offset Calibration (3–Sector: 3 or 4–Carrier Adjacent Channels)

OK	Parameter	Specification	Comments
❑	Calibrate carrier 1	TX Bay Level Offset = 42 dB (±4 dB) prior to calibration	BBX2–1, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–2, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–3, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑	Calibrate carrier 2	TX Bay Level Offset = 42 dB (±4 dB) prior to calibration	BBX2–7, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–8, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–9, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑	Calibrate carrier 3	TX Bay Level Offset = 42 dB (±4 dB) prior to calibration	BBX2–4, ANT–4 = ___dB BBX2–r, ANT–4 = ___dB
❑			BBX2–5, ANT–5 = ___dB BBX2–r, ANT–5 = ___dB
❑			BBX2–6, ANT–6 = ___dB BBX2–r, ANT–6 = ___dB
❑	Calibrate carrier 4	TX Bay Level Offset = 42 dB (±4 dB) prior to calibration	BBX2–10, ANT–4 = __dB BBX2–3, ANT–4 = ___dB
❑			BBX2–11, ANT–5 = __dB BBX2–r, ANT–5 = ___dB
❑			BBX2–12, ANT–6 = __dB BBX2–r, ANT–6 = ___dB
❑	Calibration Audit carrier 1	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–1, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–2, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–3, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB

. . . continued on next page

Table A-9: TX Bay Level Offset Calibration (3–Sector: 3 or 4–Carrier Adjacent Channels)			
OK	**Parameter**	**Specification**	**Comments**
❑	Calibration Audit carrier 2	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–7, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–8, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–9, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑	Calibration Audit carrier 3	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–4, ANT–4 = ___dB BBX2–r, ANT–4 = ___dB
❑			BBX2–5, ANT–5 = ___dB BBX2–r, ANT–5 = ___dB
❑			BBX2–6, ANT–6 = ___dB BBX2–r, ANT–6 = ___dB
❑	Calibration Audit carrier 4	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–10, ANT–4 = __dB BBX2–r, ANT–4 = ___dB
❑			BBX2–11, ANT–5 = __dB BBX2–r, ANT–5 = ___dB
❑			BBX2–12, ANT–6 = __dB BBX2–r, ANT–6 = ___dB

Comments:____

____

TX Bay Level Offset / Power Output Verification for 6–Sector Configurations

1–Carrier
2–Carrier Non–adjacent Channels

Table A-10: TX BLO Calibration (6–Sector: 1–Carrier, 2–Carrier Non–adjacent Channels)

OK	Parameter	Specification	Comments
❑	Calibrate carrier 1	TX Bay Level Offset = 42 dB (typical), 38 dB (minimum) prior to calibration	BBX2–1, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–2, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–3, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑			BBX2–4, ANT–4 = ___dB BBX2–r, ANT–4 = ___dB
❑			BBX2–5, ANT–5 = ___dB BBX2–r, ANT–5 = ___dB
❑			BBX2–6, ANT–6 = ___dB BBX2–r, ANT–6 = ___dB
❑	Calibrate carrier 2	TX Bay Level Offset = 42 dB (typical), 38 dB (minimum) prior to calibration	BBX2–7, ANT–1 = ___dB BBX2–r, ANT–1 = ___dB
❑			BBX2–8, ANT–2 = ___dB BBX2–r, ANT–2 = ___dB
❑			BBX2–9, ANT–3 = ___dB BBX2–r, ANT–3 = ___dB
❑			BBX2–10, ANT–4 = __dB BBX2–3, ANT–4 = ___dB
❑			BBX2–11, ANT–5 = __dB BBX2–r, ANT–5 = ___dB
❑			BBX2–12, ANT–6 = __dB BBX2–r, ANT–5 = ___dB

. . . continued on next page

Table A-10: TX BLO Calibration (6–Sector: 1–Carrier, 2–Carrier Non–adjacent Channels)			
OK	**Parameter**	**Specification**	**Comments**
❑	Calibration Audit carrier 1	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–1, ANT–1 = ___dB BBX2–r, ANT–1 = ____dB
❑			BBX2–2, ANT–2 = ___dB BBX2–r, ANT–2 = ____dB
❑			BBX2–3, ANT–3 = ___dB BBX2–r, ANT–3 = ____dB
❑			BBX2–4, ANT–4 = ___dB BBX2–r, ANT–4 = ____dB
❑			BBX2–5, ANT–5 = ___dB BBX2–r, ANT–5 = ____dB
❑			BBX2–6, ANT–6 = ___dB BBX2–r, ANT–6 = ____dB
❑	Calibration Audit carrier 2	0 dB (±0.5 dB) for gain set resolution post calibration	BBX2–7, ANT–1 = ___dB BBX2–r, ANT–1 = ____dB
❑			BBX2–8, ANT–2 = ___dB BBX2–r, ANT–2 = ____dB
❑			BBX2–9, ANT–3 = ___dB BBX2–r, ANT–3 = ____dB
❑			BBX2–10, ANT–4 = __dB BBX2–r, ANT–4 = ____dB
❑			BBX2–11, ANT–5 = __dB BBX2–r, ANT–5 = ____dB
❑			BBX2–12, ANT–6 = __dB BBX2–r, ANT–6 = ____dB

Comments:____

____

TX Antenna VSWR

Table A-11: TX Antenna VSWR

OK	Parameter	Specification	Data
❑	VSWR – Antenna 1	< (1.5 : 1)	
❑	VSWR – Antenna 2	< (1.5 : 1)	
❑	VSWR – Antenna 3	< (1.5 : 1)	
❑	VSWR – Antenna 4	< (1.5 : 1)	
❑	VSWR – Antenna 5	< (1.5 : 1)	
❑	VSWR – Antenna 6	< (1.5 : 1)	

Comments:____

____

RX Antenna VSWR

Table A-12: RX Antenna VSWR

OK	Parameter	Specification	Data
❑	VSWR – Antenna 1	< (1.5 : 1)	
❑	VSWR – Antenna 2	< (1.5 : 1)	
❑	VSWR – Antenna 3	< (1.5 : 1)	
❑	VSWR – Antenna 4	< (1.5 : 1)	
❑	VSWR – Antenna 5	< (1.5 : 1)	
❑	VSWR – Antenna 6	< (1.5 : 1)	

Comments:____

AMR Verification

Table A-13: AMR CDI Alarm Input Verification

OK	Parameter	Specification	Data
❑	Verify CDI alarm input operation (“ALARM A” (numbers 1 –18)	BTS Relay #XX – Contact Alarm Sets/Clears	
❑	Verify CDI alarm input operation (“ALARM B” (numbers 19 –36)	BTS Relay #XX – Contact Alarm Sets/Clears	

Comments:____

Appendix A: Site Serial Number Check List

Date ____________________ Site ____________________

C–CCP Shelf

Site I/O A & B	______________________
C–CCP Shelf	______________________
CSM–1	______________________
CSM–2	______________________
HSO	______________________
CCD–1	______________________
CCD–2	______________________
AMR–1	______________________
AMR–2	______________________
MPC–1	______________________
MPC–2	______________________
Fans 1–3	______________________
GLI2–1	______________________
GLI2–2	______________________
BBX2–1	______________________
BBX2–2	______________________
BBX2–3	______________________
BBX2–4	______________________
BBX2–5	______________________
BBX2–6	______________________
BBX2–7	______________________
BBX2–8	______________________
BBX2–9	______________________
BBX2–10	______________________
BBX2–11	______________________
BBX2–12	______________________
BBX2–r	______________________
MCC24/MCC8E–1	______________________
MCC24/MCC8E–2	______________________
MCC24/MCC8E–3	______________________
MCC24/MCC8E–4	______________________
MCC24/MCC8E–5	______________________
MCC24/MCC8E–6	______________________
MCC24/MCC8E–7	______________________
MCC24/MCC8E–8	______________________
MCC24/MCC8E–9	______________________
MCC24/MCC8E–10	______________________
MCC24/MCC8E–11	______________________

Appendix A: Site Serial Number Check List – continued

MCC24/MCC8E–12	____________
CIO	____________
SWITCH	____________
PS–1	____________
PS–2	____________
PS–3	____________

LPAs

LPA 1A	____________
LPA 1B	____________
LPA 1C	____________
LPA 1D	____________
LPA 2A	____________
LPA 2B	____________
LPA 2C	____________
LPA 2D	____________
LPA 3A	____________
LPA 3B	____________
LPA 3C	____________
LPA 3D	____________
LPA 4A	____________
LPA 4B	____________
LPA 4C	____________
LPA 4D	____________

Appendix B: FRU Optimization/ATP Test Matrix

Appendix Content

Notes

Usage & Background

Periodic maintenance of a site may also may mandate re–optimization of specific portions of the site. An outline of some basic guidelines is included in the following tables.

IMPORTANT

Re–optimization steps listed for any assembly detailed in the tables below must be performed *anytime* a RF cable associated with it is replaced.

BTS Frame

Table B-1: When RF Optimization Is required on the BTS

Item Replaced	Optimize:
C–CCP Shelf	All sector TX and RX paths to all Combined CDMA Channel Processor (C–CCP) shelves.
Multicoupler/ Preselector Card	The three or six affected sector RX paths for the C–CCP shelf in the BTS frames.
Preselector I/O	All sector RX paths.
BBX2 board	RX and TX paths of the affected C–CCP shelf / BBX2 board.
CIO Card	All RX and TX paths of the affected CDMA carrier.
Any LPA Module	The affected sector TX path.
LPA Backplane	The affected sector TX path.
LPA Filter	The affected sector TX path.

Ancillary Frame

Item Replaced	Optimize:
Directional Coupler	All affected sector RX and TX paths to all BTS frame shelves.
Site filter	All affected RX sector paths in all shelves in all BTS frames.
Any RFDS component or TSU.	The RFDS calibration RX & TX paths (MONFWD/GENFWD).

. . . continued on next page

B

Inter-frame Cabling

Optimization must be performed after the replacement of any RF cabling between BTS frames.

Table B-2: When to Optimize Inter–frame Cabling

Item Replaced	Optimize:
Ancillary frame to BTS frame (RX) cables	The affected sector/antenna RX paths.
BTS frame to ancillary frame (TX) cables	The affected sector/antenna TX paths.

Detailed Optimization/ATP Test Matrix

Table B-3 outlines in more detail the tests that would need to be performed if one of the BTS components were to fail and be replaced. It is also assumed that all modules are placed OOS–ROM via the LMF until full redundancy of all applicable modules is implemented.

The following guidelines should also be noted when using this table.

IMPORTANT

Not every procedure required to bring the site back on line is indicated in Table B-3. It is meant to be used as a guideline ONLY. The table assumes that the user is familiar enough with the BTS Optimization/ATP procedure to understand which test equipment set ups, calibrations, and BTS site preparation will be required before performing the Table # procedures referenced.

Various passive BTS components (such as the TX and RX directional couplers, Preselector IO, CIO; etc.) only call for a TX or RX calibration audit to be performed in lieu of a full path calibration. If the RX or TX path calibration audit fails, the entire RF path calibration will need to be repeated. If the RF path calibration fails, further troubleshooting is warranted.

Whenever any C–CCP BACKPLANE is replaced, it is assumed that only power to the C–CCP shelf being replaced is turned off via the breaker supplying that shelf.

Whenever any DISTRIBUTION BACKPLANE is replaced it is assumed that the power to the entire RFM frame is removed and the Preselector I/O is replaced. The modem frame should be brought up as if it were a new installation.

NOTE

If any significant change in signal level results from any component being replaced in the RX or TX signal flow paths, it would be identified by re–running the RX and TX calibration audit command.

When the CIO is replaced, the C–CCP shelf remains powered up. The BBX2 boards may need to be removed, then re–installed into their original slots, and re–downloaded (code and BLO data). RX and TX calibration audits should then be performed.

Table B-3: SC 4812ET BTS Optimization and ATP Test Matrix

Doc Tbl #	Description	Directional Coupler (RX)	Directional Coupler (TX)	RX Filter	RX Cables	TX Cables	Multicoupler/Preselector	CIO	C–CCP Backplane	BBX2	MCC24/MCC8E	CSM	LFR/HSO	GPS	GLI2	LPA	LPA Filter Bandpass	Power Converters (See Note)	SWITCH CARD	LPA Combiner Filter 2:1	LPA Combiner Filter 4:1	LPA Backplane
Table 2-1	Initial Boards/Modules Install, Preliminary Operations, CDF Site Equipage; etc.	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Table 2-18	DC Power Pre-Test			●					●													
Table 2-3	Initial Power-up			●					●													
Table 3-7	Start LMF Session								●	●	●	●			●				●			
Table 3-16	Download Code								●						●							
Table 3-18	Enable CSMs								●			●										
Table 3-21	GPS Initialization / Verification								●			●		●								
Table 3-22	LFR Initialization / Verification								●				●									
Table 3-36	TX Path Calibration								●	●									●			
Table 3-37	Download Offsets to BBX2						●		●	●												
Table 3-38	TX Path Calibration Audit		●			●		●	●	●						●	●		●	●	●	●
Table 4–5	Spectral Purity TX Mask ATP								●	●						●	●		●	●	●	●
Table 4–6	Waveform Quality (rho) ATP							●	●	●		●		●		●	●			●	●	●
Table 4–7	Pilot Time Offset ATP							●	●	●		●		●		●	●			●	●	●
Table 4–8	Code Domain Power / Noise Floor								●	●	●											
Table 4–9	FER Test						●	●	●	●	●											

NOTE

Replace power converters one card at a time so that power to the C–CCP shelf is not lost. If power to the shelf is lost, all cards in the shelf must be downloaded again.

Appendix C: BBX Gain Set Point vs. BTS Output Considerations

Appendix Content

C

Notes

Usage & Background

Table C-1 outlines the relationship between the *total* of all code domain channel element gain settings (digital root sum of the squares) and the BBX2 Gain Set Point between 33.0 dBm and 44.0 dBm. The resultant RF output (as measured at the top of the BTS in dBm) is shown in the table. The table assumes that the BBX2 Bay Level Offset (BLO) values have been calculated.

As an illustration, consider a BBX2 keyed up to produce a CDMA carrier with only the Pilot channel (no MCCs forward link enabled). Pilot gain is set to 262. In this case, the BBX2 Gain Set Point is shown to correlate exactly to the actual RF output anywhere in the 33 to 44 dBm output range. (This is the level used to calibrate the BTS).

Table C-1: BBX2 Gain Set Point vs. Actual BTS Output (in dBm)

dBm➧ Gain⬇	44	43	42	41	40	39	38	37	36	35	34	33
541	–	–	–	–	–	–	–	43.3	42.3	41.3	40.3	39.3
533	–	–	–	–	–	–	–	43.2	42.2	41.2	40.2	39.2
525	–	–	–	–	–	–	–	43	42	41	40	39
517	–	–	–	–	–	–	–	42.9	41.9	40.9	39.9	38.9
509	–	–	–	–	–	–	–	42.8	41.8	40.8	39.8	38.8
501	–	–	–	–	–	–	–	42.6	41.6	40.6	39.6	38.6
493	–	–	–	–	–	–	43.5	42.5	41.5	40.5	39.5	38.5
485	–	–	–	–	–	–	43.4	42.4	41.4	40.4	39.4	38.4
477	–	–	–	–	–	–	43.2	42.2	41.2	40.2	39.2	38.2
469	–	–	–	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1
461	–	–	–	–	–	–	42.9	41.9	40.9	39.9	38.9	37.9
453	–	–	–	–	–	–	42.8	41.8	40.8	39.8	38.8	37.8
445	–	–	–	–	–	43.6	42.6	41.6	40.6	39.6	38.6	37.6
437	–	–	–	–	–	43.4	42.4	41.4	40.4	39.4	38.4	37.4
429	–	–	–	–	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3
421	–	–	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1	37.1
413	–	–	–	–	–	43	42	41	40	39	38	37
405	–	–	–	–	–	42.8	41.8	40.8	39.8	38.8	37.8	36.8
397	–	–	–	–	43.6	42.6	41.6	40.6	39.6	38.6	37.6	36.6
389	–	–	–	–	43.4	42.4	41.4	40.4	39.4	38.4	37.4	36.4

. . . continued on next page

Table C-1: BBX2 Gain Set Point vs. Actual BTS Output (in dBm)

dBm→ Gain↓	44	43	42	41	40	39	38	37	36	35	34	33
381	–	–	–	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3	36.3
374	–	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1	37.1	36.1
366	–	–	–	–	42.9	41.9	40.9	39.9	38.9	37.9	36.9	35.9
358	–	–	–	–	42.7	41.7	40.7	39.7	38.7	37.7	36.7	35.7
350	–	–	–	43.5	42.5	41.5	40.5	39.5	38.5	37.5	36.5	35.5
342	–	–	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3	36.3	35.3
334	–	–	–	43.1	42.1	41.1	40.1	39.1	38.1	37.1	36.1	35.1
326	–	–	–	42.9	41.9	40.9	39.9	38.9	37.9	36.9	35.9	34.9
318	–	–	–	42.7	41.7	40.7	39.7	38.7	37.7	36.7	35.7	34.7
310	–	–	43.5	42.5	41.5	40.5	39.5	38.5	37.5	36.5	35.5	34.5
302	–	–	43.2	42.2	41.2	40.2	39.2	38.2	37.2	36.2	35.2	34.2
294	–	–	43	42	41	40	39	38	37	36	35	34
286	–	–	42.8	41.8	40.8	39.8	38.8	37.8	36.8	35.8	34.8	33.8
278	–	43.5	42.5	41.5	40.5	39.5	38.5	37.5	36.5	35.5	34.5	33.5
270	–	43.3	42.3	41.3	40.3	39.3	38.3	37.3	36.3	35.3	34.3	33.3
262	–	43	42	41	40	39	38	37	36	35	34	33
254	–	42.7	41.7	40.7	39.7	38.7	37.7	36.7	35.7	34.7	33.7	32.7
246	43.4	42.4	41.4	40.4	39.4	38.4	37.4	36.4	35.4	34.4	33.4	32.4
238	43.2	42.2	41.2	40.2	39.2	38.2	37.2	36.2	35.2	34.2	33.2	32.2
230	42.9	41.9	40.9	39.9	38.9	37.9	36.9	35.9	34.9	33.9	32.9	31.9
222	42.6	41.6	40.6	39.6	38.6	37.6	36.6	35.6	34.6	33.6	32.6	31.6
214	42.2	41.2	40.2	39.2	38.2	37.2	36.2	35.2	34.2	33.2	32.2	31.2

Appendix D: CDMA Operating Frequency Information

Appendix Content

D

Notes

D

CDMA Operating Frequency Programming Information – North American PCS Bands

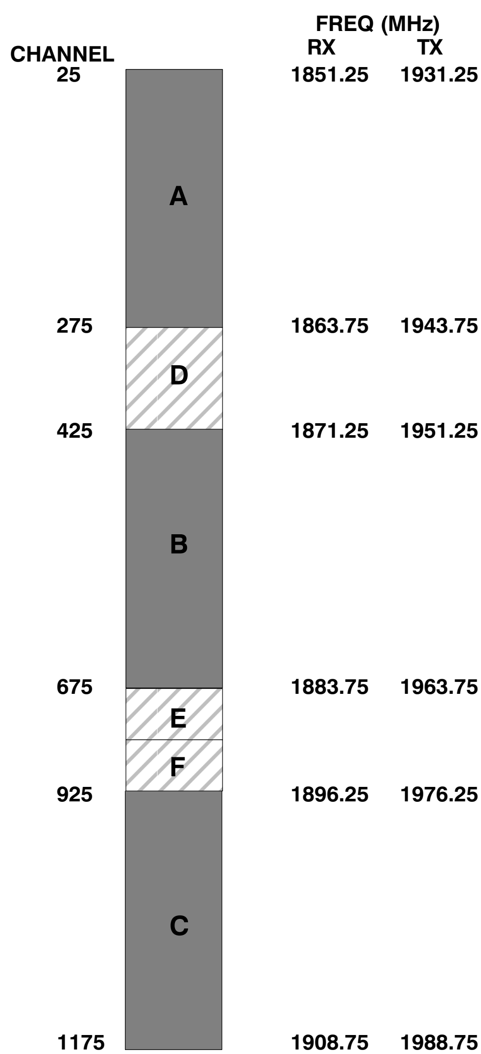
Introduction

Programming of each of the BTS BBX2 synthesizers is performed by the BTS GLIs via the CHI bus. This programming data determines the transmit and receive transceiver operating frequencies (channels) for each BBX2.

PCS Channels

Figure D-1 shows the valid channels for the North American PCS frequency spectrum. There are 10 CDMA wireline or non–wireline band channels used in a CDMA system (unique per customer operating system).

Figure D-1: North American PCS Frequency Spectrum (CDMA Allocation)



D

Calculating Center Frequencies

Table D-1 shows selected CDMA candidate operating channels, listed in both decimal and hexadecimal, and the corresponding transmit, and receive frequencies. Center frequency for channels not shown in the table may be calculated as follows:

Direction	Formula	Example
TX	1930 + (0.05 * Channel#)	Channel 262: 1930 + (0.05*262) = 1943.10
RX	1850 + (0.05 * Channel#)	Channel 237: 1850 + (0.05*237) = 1861.85

– Actual frequencies used depend on customer CDMA system frequency plan.

– Each CDMA channel requires a 1.77 MHz frequency segment. The actual CDMA carrier is 1.23 MHz wide, with a 0.27 MHz guard band on both sides of the carrier

– Minimum frequency separation required between any CDMA carrier and the nearest NAMPS/AMPS carrier is 900 kHz (center-to-center).

Table D-1: TX and RX Frequency vs. Channel				
Block Designator	Channel Number Decimal	Hex	Transmit Frequency (MHz) Center Frequency	Receive Frequency (MHz) Center Frequency
A	25	0019	1931.25	1851.25
	50	0032	1932.50	1852.50
	75	004B	1933.75	1853.75
	100	0064	1935.00	1855.00
	125	007D	1936.25	1856.25
	150	0096	1937.50	1857.50
	175	00AF	1938.75	1858.75
	200	00C8	1940.00	1860.00
	225	00E1	1941.25	1861.25
	250	00FA	1942.50	1862.50
	275	0113	1943.75	1863.75
D	300	012C	1945.00	1865.00
	325	0145	1946.25	1866.25
	350	015E	1947.50	1867.50
	375	0177	1948.75	1868.75
	400	0190	1950.00	1870.00
B	425	01A9	1951.25	1871.25
	450	01C2	1952.50	1872.50
	475	01DB	1953.75	1873.75
	500	01F4	1955.00	1875.00
	525	020D	1956.25	1876.25
	550	0226	1957.50	1877.50
	575	023F	1958.75	1878.75
	600	0258	1960.00	1880.00
	625	0271	1961.25	1881.25
	650	028A	1962.50	1882.50
	675	02A3	1963.75	1883.75
E	700	02BC	1965.00	1885.00
	725	02D5	1966.25	1886.25
	750	02EE	1967.50	1887.50
	775	0307	1968.75	1888.75
	800	0320	1970.00	1890.00
F	825	0339	1971.25	1891.25
	850	0352	1972.50	1892.50
	875	036B	1973.75	1893.75
	900	0384	1975.00	1895.00
C	925	039D	1976.25	1896.25
	950	03B6	1977.50	1897.50
	975	03CF	1978.75	1898.75
	1000	03E8	1980.00	1900.00
	1025	0401	1981.25	1901.25
	1050	041A	1982.50	1902.50
	1075	0433	1983.75	1903.75
	1100	044C	1985.00	1905.00
	1125	0465	1986.25	1906.25
	1150	047E	1987.50	1807.50
	1175	0497	1988.75	1908.75

D

Notes

Appendix E: PN Offset/I & Q Offset Register Programming Information

Appendix Content

Notes

Appendix E: PN Offset Programming Information

PN Offset Background

All channel elements transmitted from a BTS in a particular 1.25 MHz CDMA channel are orthonogonally spread by 1 of 64 possible Walsh code functions; additionally, they are also spread by a quadrature pair of PN sequences unique to each sector.

Overall, the mobile uses this to differentiate multiple signals transmitted from the same BTS (and surrounding BTS) sectors, and to synchronize to the next strongest sector.

The PN offset per sector is stored on the BBX2s, where the corresponding I & Q registers reside.

The PN offset values are determined on a per BTS/per sector(antenna) basis as determined by the appropriate cdf file content. A breakdown of this information is found in Table E-1.

PN Offset Usage

There are three basic RF chip delays currently in use. It is important to determine what RF chip delay is valid to be able to test the BTS functionality. This can be done by ascertaining if the CDF file `FineTxAdj` value was set to “on” when the MCC was downloaded with “image data”. The `FineTxAdj` value is used to compensate for the processing delay (approximately 20 µS) in the BTS using any type of mobile meeting IS–97 specifications.

If the `FineTxAdj` value in the cdf file is 213 (D5 HEX), FineTxAdj has been set for the *14 chip table*.

IMPORTANT

CDF file I and Q values can be represented in DECIMAL or HEX. If using HEX, add 0x before the HEX value. If necessary, convert HEX values in Table E-1 to decimal before comparing them to cdf file I & Q value assignments.

– If you are using a Qualcomm mobile, use the I and Q values from the 13 chip delay table.

– If you are using a mobile that does not have the 1 chip offset problem, (any mobile meeting the IS–97 specification), use the 14 chip delay table.

IMPORTANT

If the wrong I and Q values are used with the wrong `FineTxAdj` parameter, system timing problems will occur. This will cause the energy transmitted to be “smeared” over several Walsh codes (instead of the single Walsh code that it was assigned to), causing erratic operation. Evidence of smearing is usually identified by Walsh channels not at correct levels or present when not selected in the Code Domain Power Test.

Table E-1: PnMaskI and PnMaskQ Values for PilotPn

Pilot PN	14–Chip Delay				13–Chip Delay				0–Chip Delay			
	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
0	17523	23459	4473	5BA3	29673	25581	73E9	63ED	4096	4096	1000	1000
1	32292	32589	7E24	7F4D	16146	29082	3F12	719A	9167	1571	23CF	0623
2	4700	17398	125C	43F6	2350	8699	092E	21FB	22417	7484	5791	1D3C
3	14406	26333	3846	66DD	7203	32082	1C23	7D52	966	6319	03C6	18AF
4	14899	4011	3A33	0FAB	19657	18921	4CC9	49E9	14189	2447	376D	098F
5	17025	2256	4281	08D0	28816	1128	7090	0468	29150	24441	71DE	5F79
6	14745	18651	3999	48DB	19740	27217	4D1C	6A51	18245	27351	4745	6AD7
7	2783	1094	0ADF	0446	21695	547	54BF	0223	1716	23613	06B4	5C3D
8	5832	21202	16C8	52D2	2916	10601	0B64	2969	11915	29008	2E8B	7150
9	12407	13841	3077	3611	18923	21812	49EB	5534	20981	5643	51F5	160B
10	31295	31767	7A3F	7C17	27855	28727	6CCF	7037	24694	28085	6076	6DB5
11	7581	18890	1D9D	49CA	24350	9445	5F1E	24E5	11865	18200	2E59	4718
12	18523	30999	485B	7917	30205	29367	75FD	72B7	6385	21138	18F1	5292
13	29920	22420	74E0	5794	14960	11210	3A70	2BCA	27896	21937	6CF8	55B1
14	25184	20168	6260	4EC8	12592	10084	3130	2764	25240	25222	6298	6286
15	26282	12354	66AA	3042	13141	6177	3355	1821	30877	109	789D	006D
16	30623	11187	779F	2BB3	27167	23525	6A1F	5BE5	30618	6028	779A	178C
17	15540	11834	3CB4	2E3A	7770	5917	1E5A	171D	26373	22034	6705	5612
18	23026	10395	59F2	289B	11513	23153	2CF9	5A71	314	15069	013A	3ADD
19	20019	28035	4E33	6D83	30409	30973	76C9	78FD	17518	4671	446E	123F
20	4050	27399	0FD2	6B07	2025	31679	07E9	7BBF	21927	30434	55A7	76E2
21	1557	22087	0615	5647	21210	25887	52DA	651F	2245	11615	08C5	2D5F
22	30262	2077	7636	081D	15131	18994	3B1B	4A32	18105	19838	46B9	4D7E
23	18000	13758	4650	35BE	9000	6879	2328	1ADF	8792	14713	2258	3979
24	20056	11778	4E58	2E02	10028	5889	272C	1701	21440	241	53C0	00F1
25	12143	3543	2F6F	0DD7	18023	18647	4667	48D7	15493	24083	3C85	5E13
26	17437	7184	441D	1C10	29662	3592	73DE	0E08	26677	7621	6835	1DC5
27	17438	2362	441E	093A	8719	1181	220F	049D	11299	19144	2C23	4AC8
28	5102	25840	13EE	64F0	2551	12920	09F7	3278	12081	1047	2F31	0417
29	9302	12177	2456	2F91	4651	23028	122B	59F4	23833	26152	5D19	6628
30	17154	10402	4302	28A2	8577	5201	2181	1451	20281	22402	4F39	5782
31	5198	1917	144E	077D	2599	19842	0A27	4D82	10676	21255	29B4	5307
32	4606	17708	11FE	452C	2303	8854	08FF	2296	16981	30179	4255	75E3
33	24804	10630	60E4	2986	12402	5315	3072	14C3	31964	7408	7CDC	1CF0
34	17180	6812	431C	1A9C	8590	3406	218E	0D4E	26913	115	6921	0073
35	10507	14350	290B	380E	17749	7175	4555	1C07	14080	1591	3700	0637
36	10157	10999	27AD	2AF7	16902	23367	4206	5B47	23842	1006	5D22	03EE
37	23850	25003	5D2A	61AB	11925	32489	2E95	7EE9	27197	32263	6A3D	7E07
38	31425	2652	7AC1	0A5C	27824	1326	6CB0	052E	22933	1332	5995	0534
39	4075	19898	0FEB	4DBA	22053	9949	5625	26DD	30220	12636	760C	315C
40	10030	2010	272E	07DA	5015	1005	1397	03ED	12443	4099	309B	1003
41	16984	25936	4258	6550	8492	12968	212C	32A8	19854	386	4D8E	0182
42	14225	28531	3791	6F73	18968	31109	4A18	7985	14842	29231	39FA	722F
43	26519	11952	6797	2EB0	25115	5976	621B	1758	15006	25711	3A9E	646F
44	27775	31947	6C7F	7CCB	26607	28761	67EF	7059	702	10913	02BE	2AA1
45	30100	25589	7594	63F5	15050	32710	3ACA	7FC6	21373	8132	537D	1FC4
46	7922	11345	1EF2	2C51	3961	22548	0F79	5814	23874	20844	5D42	516C
47	14199	28198	3777	6E26	19051	14099	4A6B	3713	3468	13150	0D8C	335E
48	17637	13947	44E5	367B	29602	21761	73A2	5501	31323	18184	7A5B	4708
49	23081	8462	5A29	210E	31940	4231	7CC4	1087	29266	19066	7252	4A7A
50	5099	9595	13EB	257B	22565	23681	5825	5C81	16554	29963	40AA	750B

. . . continued on next page

Table E-1: PnMaskI and PnMaskQ Values for PilotPn

Pilot PN	14–Chip Delay				13–Chip Delay				0–Chip Delay			
	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
51	32743	4670	7FE7	123E	28195	2335	6E23	091F	22575	6605	582F	19CD
52	7114	14672	1BCA	3950	3557	7336	0DE5	1CA8	31456	29417	7AE0	72E9
53	7699	29415	1E13	72E7	24281	30543	5ED9	774F	8148	22993	1FD4	59D1
54	19339	20610	4B8B	5082	29717	10305	7415	2841	19043	27657	4A63	6C09
55	28212	6479	6E34	194F	14106	17051	371A	429B	25438	5468	635E	155C
56	29587	10957	7393	2ACD	26649	23386	6819	5B5A	10938	8821	2ABA	2275
57	19715	18426	4D03	47FA	30545	9213	7751	23FD	2311	20773	0907	5125
58	14901	22726	3A35	58C6	19658	11363	4CCA	2C63	7392	4920	1CE0	1338
59	20160	5247	4EC0	147F	10080	17411	2760	4403	30714	5756	77FA	167C
60	22249	29953	56E9	7501	31396	29884	7AA4	74BC	180	28088	00B4	6DB8
61	26582	5796	67D6	16A4	13291	2898	33EB	0B52	8948	740	22F4	02E4
62	7153	16829	1BF1	41BD	23592	28386	5C28	6EE2	16432	23397	4030	5B65
63	15127	4528	3B17	11B0	19547	2264	4C5B	08D8	9622	19492	2596	4C24
64	15274	5415	3BAA	1527	7637	17583	1DD5	44AF	7524	26451	1D64	6753
65	23149	10294	5A6D	2836	31974	5147	7CE6	141B	1443	30666	05A3	77CA
66	16340	17046	3FD4	4296	8170	8523	1FEA	214B	1810	15088	0712	3AF0
67	27052	7846	69AC	1EA6	13526	3923	34D6	0F53	6941	26131	1B1D	6613
68	13519	10762	34CF	2A0A	19383	5381	4BB7	1505	3238	15969	0CA6	3E61
69	10620	13814	297C	35F6	5310	6907	14BE	1AFB	8141	24101	1FCD	5E25
70	15978	16854	3E6A	41D6	7989	8427	1F35	20EB	10408	12762	28A8	31DA
71	27966	795	6D3E	031B	13983	20401	369F	4FB1	18826	19997	498A	4E1D
72	12479	9774	30BF	262E	18831	4887	498F	1317	22705	22971	58B1	59BB
73	1536	24291	0600	5EE3	768	24909	0300	614D	3879	12560	0F27	3110
74	3199	3172	0C7F	0C64	22511	1586	57EF	0632	21359	31213	536F	79ED
75	4549	2229	11C5	08B5	22834	19046	5932	4A66	30853	18780	7885	495C
76	17888	21283	45E0	5323	8944	26541	22F0	67AD	18078	16353	469E	3FE1
77	13117	16905	333D	4209	18510	28472	484E	6F38	15910	12055	3E26	2F17
78	7506	7062	1D52	1B96	3753	3531	0EA9	0DCB	20989	30396	51FD	76BC
79	27626	7532	6BEA	1D6C	13813	3766	35F5	0EB6	28810	24388	708A	5F44
80	31109	25575	7985	63E7	27922	32719	6D12	7FCF	30759	1555	7827	0613
81	29755	14244	743B	37A4	27597	7122	6BCD	1BD2	18899	13316	49D3	3404
82	26711	28053	6857	6D95	26107	30966	65FB	78F6	7739	31073	1E3B	7961
83	20397	30408	4FAD	76C8	30214	15204	7606	3B64	6279	6187	1887	182B
84	18608	5094	48B0	13E6	9304	2547	2458	09F3	9968	21644	26F0	548C
85	7391	16222	1CDF	3F5E	24511	8111	5FBF	1FAF	8571	9289	217B	2449
86	23168	7159	5A80	1BF7	11584	17351	2D40	43C7	4143	4624	102F	1210
87	23466	174	5BAA	00AE	11733	87	2DD5	0057	19637	467	4CB5	01D3
88	15932	25530	3E3C	63BA	7966	12765	1F1E	31DD	11867	18133	2E5B	46D5
89	25798	2320	64C6	0910	12899	1160	3263	0488	7374	1532	1CCE	05FC
90	28134	23113	6DE6	5A49	14067	25368	36F3	6318	10423	1457	28B7	05B1
91	28024	23985	6D78	5DB1	14012	24804	36BC	60E4	9984	9197	2700	23ED
92	6335	2604	18BF	0A2C	23951	1302	5D8F	0516	7445	13451	1D15	348B
93	21508	1826	5404	0722	10754	913	2A02	0391	4133	25785	1025	64B9
94	26338	30853	66E2	7885	13169	29310	3371	727E	22646	4087	5876	0FF7
95	17186	15699	4322	3D53	8593	20629	2191	5095	15466	31190	3C6A	79D6
96	22462	2589	57BE	0A1D	11231	19250	2BDF	4B32	2164	8383	0874	20BF
97	3908	25000	0F44	61A8	1954	12500	07A2	30D4	16380	12995	3FFC	32C3
98	25390	18163	632E	46F3	12695	27973	3197	6D45	15008	27438	3AA0	6B2E
99	27891	12555	6CF3	310B	26537	22201	67A9	56B9	31755	9297	7C0B	2451
100	9620	8670	2594	21DE	4810	4335	12CA	10EF	31636	1676	7B94	068C

. . . continued on next page

Table E-1: PnMaskI and PnMaskQ Values for PilotPn

Pilot PN	14–Chip Delay				13–Chip Delay				0–Chip Delay			
	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
101	6491	1290	195B	050A	23933	645	5D7D	0285	25414	12596	6346	3134
102	16876	4407	41EC	1137	8438	18087	20F6	46A7	7102	19975	1BBE	4E07
103	17034	1163	428A	048B	8517	19577	2145	4C79	20516	20026	5024	4E3A
104	32405	12215	7E95	2FB7	28314	23015	6E9A	59E7	19495	8958	4C27	22FE
105	27417	7253	6B19	1C55	25692	16406	645C	4016	17182	19143	431E	4AC7
106	8382	8978	20BE	2312	4191	4489	105F	1189	11572	17142	2D34	42F6
107	5624	25547	15F8	63CB	2812	32729	0AFC	7FD9	25570	19670	63E2	4CD6
108	1424	3130	0590	0C3A	712	1565	02C8	061D	6322	30191	18B2	75EF
109	13034	31406	32EA	7AAE	6517	15703	1975	3D57	8009	5822	1F49	16BE
110	15682	6222	3D42	184E	7841	3111	1EA1	0C27	26708	22076	6854	563C
111	27101	20340	69DD	4F74	25918	10170	653E	27BA	6237	606	185D	025E
112	8521	25094	2149	6206	16756	12547	4174	3103	32520	9741	7F08	260D
113	30232	23380	7618	5B54	15116	11690	3B0C	2DAA	31627	9116	7B8B	239C
114	6429	10926	191D	2AAE	23902	5463	5D5E	1557	3532	12705	0DCC	31A1
115	27116	22821	69EC	5925	13558	25262	34F6	62AE	24090	17502	5E1A	445E
116	4238	31634	108E	7B92	2119	15817	0847	3DC9	20262	18952	4F26	4A08
117	5128	4403	1408	1133	2564	18085	0A04	46A5	18238	15502	473E	3C8E
118	14846	689	39FE	02B1	7423	20324	1CFF	4F64	2033	17819	07F1	459B
119	13024	27045	32E0	69A5	6512	31470	1970	7AEE	25566	4370	63DE	1112
120	10625	27557	2981	6BA5	17680	31726	4510	7BEE	25144	31955	6238	7CD3
121	31724	16307	7BEC	3FB3	15862	20965	3DF6	51E5	29679	30569	73EF	7769
122	13811	22338	35F3	5742	19241	11169	4B29	2BA1	5064	7350	13C8	1CB6
123	24915	27550	6153	6B9E	24953	13775	6179	35CF	27623	26356	6BE7	66F4
124	1213	22096	04BD	5650	21390	11048	538E	2B28	13000	32189	32C8	7DBD
125	2290	23136	08F2	5A60	1145	11568	0479	2D30	31373	1601	7A8D	0641
126	31551	12199	7B3F	2FA7	27727	23023	6C4F	59EF	13096	19537	3328	4C51
127	12088	1213	2F38	04BD	6044	19554	179C	4C62	26395	25667	671B	6443
128	7722	936	1E2A	03A8	3861	468	0F15	01D4	15487	4415	3C7F	113F
129	27312	6272	6AB0	1880	13656	3136	3558	0C40	29245	2303	723D	08FF
130	23130	32446	5A5A	7EBE	11565	16223	2D2D	3F5F	26729	16362	6869	3FEA
131	594	13555	0252	34F3	297	21573	0129	5445	12568	28620	3118	6FCC
132	25804	8789	64CC	2255	12902	24342	3266	5F16	24665	6736	6059	1A50
133	31013	24821	7925	60F5	27970	32326	6D42	7E46	8923	2777	22DB	0AD9
134	32585	21068	7F49	524C	28276	10534	6E74	2926	19634	24331	4CB2	5F0B
135	3077	31891	0C05	7C93	22482	28789	57D2	7075	29141	9042	71D5	2352
136	17231	5321	434F	14C9	28791	17496	7077	4458	73	107	0049	006B
137	31554	551	7B42	0227	15777	20271	3DA1	4F2F	26482	4779	6772	12AB
138	8764	12115	223C	2F53	4382	22933	111E	5995	6397	13065	18FD	3309
139	15375	4902	3C0F	1326	20439	2451	4FD7	0993	29818	30421	747A	76D5
140	13428	1991	3474	07C7	6714	19935	1A3A	4DDF	8153	20210	1FD9	4EF2
141	17658	14404	44FA	3844	8829	7202	227D	1C22	302	5651	012E	1613
142	13475	17982	34A3	463E	19329	8991	4B81	231F	28136	31017	6DE8	7929
143	22095	19566	564F	4C6E	31479	9783	7AF7	2637	29125	30719	71C5	77FF
144	24805	2970	60E5	0B9A	24994	1485	61A2	05CD	8625	23104	21B1	5A40
145	4307	23055	10D3	5A0F	22969	25403	59B9	633B	26671	7799	682F	1E77
146	23292	15158	5AFC	3B36	11646	7579	2D7E	1D9B	6424	17865	1918	45C9
147	1377	29094	0561	71A6	21344	14547	5360	38D3	12893	26951	325D	6947
148	28654	653	6FEE	028D	14327	20346	37F7	4F7A	18502	25073	4846	61F1
149	6350	19155	18CE	4AD3	3175	27477	0C67	6B55	7765	32381	1E55	7E7D
150	16770	23588	4182	5C24	8385	11794	20C1	2E12	25483	16581	638B	40C5

. . . continued on next page

Table E-1: PnMaskI and PnMaskQ Values for PilotPn

Pilot PN	14–Chip Delay I (Dec.)	14–Chip Delay Q (Dec.)	14–Chip Delay I (Hex.)	14–Chip Delay Q (Hex.)	13–Chip Delay I (Dec.)	13–Chip Delay Q (Dec.)	13–Chip Delay I (Hex.)	13–Chip Delay Q (Hex.)	0–Chip Delay I (Dec.)	0–Chip Delay Q (Dec.)	0–Chip Delay I (Hex.)	0–Chip Delay Q (Hex.)
151	14726	10878	3986	2A7E	7363	5439	1CC3	153F	15408	32087	3C30	7D57
152	25685	31060	6455	7954	25594	15530	63FA	3CAA	6414	97	190E	0061
153	21356	30875	536C	789B	10678	29297	29B6	7271	8164	7618	1FE4	1DC2
154	12149	11496	2F75	2CE8	18026	5748	466A	1674	10347	93	286B	005D
155	28966	24545	7126	5FE1	14483	25036	3893	61CC	29369	16052	72B9	3EB4
156	22898	9586	5972	2572	11449	4793	2CB9	12B9	10389	14300	2895	37DC
157	1713	20984	06B1	51F8	21128	10492	5288	28FC	24783	11129	60CF	2B79
158	30010	30389	753A	76B5	15005	30054	3A9D	7566	18400	6602	47E0	19CA
159	2365	7298	093D	1C82	21838	3649	554E	0E41	22135	14460	5677	387C
160	27179	18934	6A2B	49F6	25797	9467	64C5	24FB	4625	25458	1211	6372
161	29740	23137	742C	5A61	14870	25356	3A16	630C	22346	15869	574A	3DFD
162	5665	24597	1621	6015	23232	32310	5AC0	7E36	2545	27047	09F1	69A7
163	23671	23301	5C77	5B05	32747	25534	7FEB	63BE	7786	26808	1E6A	68B8
164	1680	7764	0690	1E54	840	3882	0348	0F2A	20209	7354	4EF1	1CBA
165	25861	14518	6505	38B6	25426	7259	6352	1C5B	26414	27834	672E	6CBA
166	25712	21634	6470	5482	12856	10817	3238	2A41	1478	11250	05C6	2BF2
167	19245	11546	4B2D	2D1A	29766	5773	7446	168D	15122	552	3B12	0228
168	26887	26454	6907	6756	25939	13227	6553	33AB	24603	27058	601B	69B2
169	30897	15938	78B1	3E42	28040	7969	6D88	1F21	677	14808	02A5	39D8
170	11496	9050	2CE8	235A	5748	4525	1674	11AD	13705	9642	3589	25AA
171	1278	3103	04FE	0C1F	639	18483	027F	4833	13273	32253	33D9	7DFD
172	31555	758	7B43	02F6	27761	379	6C71	017B	14879	26081	3A1F	65E1
173	29171	16528	71F3	4090	26921	8264	6929	2048	6643	21184	19F3	52C0
174	20472	20375	4FF8	4F97	10236	27127	27FC	69F7	23138	11748	5A62	2DE4
175	5816	10208	16B8	27E0	2908	5104	0B5C	13F0	28838	32676	70A6	7FA4
176	30270	17698	763E	4522	15135	8849	3B1F	2291	9045	2425	2355	0979
177	22188	8405	56AC	20D5	11094	24150	2B56	5E56	10792	19455	2A28	4BFF
178	6182	28634	1826	6FDA	3091	14317	0C13	37ED	25666	19889	6442	4DB1
179	32333	1951	7E4D	079F	28406	19955	6EF6	4DF3	11546	18177	2D1A	4701
180	14046	20344	36DE	4F78	7023	10172	1B6F	27BC	15535	2492	3CAF	09BC
181	15873	26696	3E01	6848	20176	13348	4ED0	3424	16134	15086	3F06	3AEE
182	19843	3355	4D83	0D1B	30481	18609	7711	48B1	8360	30632	20A8	77A8
183	29367	11975	72B7	2EC7	26763	22879	688B	595F	14401	27549	3841	6B9D
184	13352	31942	3428	7CC6	6676	15971	1A14	3E63	26045	6911	65BD	1AFF
185	22977	9737	59C1	2609	32048	23864	7D30	5D38	24070	9937	5E06	26D1
186	31691	9638	7BCB	25A6	27701	4819	6C35	12D3	30300	2467	765C	09A3
187	10637	30643	298D	77B3	17686	30181	4516	75E5	13602	25831	3522	64E7
188	25454	13230	636E	33AE	12727	6615	31B7	19D7	32679	32236	7FA7	7DEC
189	18610	22185	48B2	56A9	9305	25960	2459	6568	16267	12987	3F8B	32BB
190	6368	2055	18E0	0807	3184	19007	0C70	4A3F	9063	11714	2367	2DC2
191	7887	8767	1ECF	223F	24247	24355	5EB7	5F23	19487	19283	4C1F	4B53
192	7730	15852	1E32	3DEC	3865	7926	0F19	1EF6	12778	11542	31EA	2D16
193	23476	16125	5BB4	3EFD	11738	20802	2DDA	5142	27309	27928	6AAD	6D18
194	889	6074	0379	17BA	20588	3037	506C	0BDD	12527	26637	30EF	680D
195	21141	31245	5295	7A0D	30874	29498	789A	733A	953	10035	03B9	2733
196	20520	15880	5028	3E08	10260	7940	2814	1F04	15958	10748	3E56	29FC
197	21669	20371	54A5	4F93	31618	27125	7B82	69F5	6068	24429	17B4	5F6D
198	15967	8666	3E5F	21DA	20223	4333	4EFF	10ED	23577	29701	5C19	7405
199	21639	816	5487	0330	31635	408	7B93	0198	32156	14997	7D9C	3A95
200	31120	22309	7990	5725	15560	26030	3CC8	65AE	32709	32235	7FC5	7DEB

. . . continued on next page

Table E-1: PnMaskI and PnMaskQ Values for PilotPn												
	14–Chip Delay				13–Chip Delay				0–Chip Delay			
Pilot PN	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
201	3698	29563	0E72	737B	1849	30593	0739	7781	23557	30766	5C05	782E
202	16322	13078	3FC2	3316	8161	6539	1FE1	198B	17638	5985	44E6	1761
203	17429	10460	4415	28DC	29658	5230	73DA	146E	3545	6823	0DD9	1AA7
204	21730	17590	54E2	44B6	10865	8795	2A71	225B	9299	20973	2453	51ED
205	17808	20277	4590	4F35	8904	27046	22C8	69A6	6323	10197	18B3	27D5
206	30068	19988	7574	4E14	15034	9994	3ABA	270A	19590	9618	4C86	2592
207	12737	6781	31C1	1A7D	18736	17154	4930	4302	7075	22705	1BA3	58B1
208	28241	32501	6E51	7EF5	26360	28998	66F8	7146	14993	5234	3A91	1472
209	20371	6024	4F93	1788	30233	3012	7619	0BC4	19916	12541	4DCC	30FD
210	13829	20520	3605	5028	19154	10260	4AD2	2814	6532	8019	1984	1F53
211	13366	31951	3436	7CCF	6683	28763	1A1B	705B	17317	22568	43A5	5828
212	25732	26063	6484	65CF	12866	31963	3242	7CDB	16562	5221	40B2	1465
213	19864	27203	4D98	6A43	9932	31517	26CC	7B1D	26923	25216	692B	6280
214	5187	6614	1443	19D6	23537	3307	5BF1	0CEB	9155	1354	23C3	054A
215	23219	10970	5AB3	2ADA	31881	5485	7C89	156D	20243	29335	4F13	7297
216	28242	5511	6E52	1587	14121	17663	3729	44FF	32391	6682	7E87	1A1A
217	6243	17119	1863	42DF	24033	28499	5DE1	6F53	20190	26128	4EDE	6610
218	445	16064	01BD	3EC0	20750	8032	510E	1F60	27564	29390	6BAC	72CE
219	21346	31614	5362	7B7E	10673	15807	29B1	3DBF	20869	8852	5185	2294
220	13256	4660	33C8	1234	6628	2330	19E4	091A	9791	6110	263F	17DE
221	18472	13881	4828	3639	9236	21792	2414	5520	714	11847	02CA	2E47
222	25945	16819	6559	41B3	25468	28389	637C	6EE5	7498	10239	1D4A	27FF
223	31051	6371	794B	18E3	28021	16973	6D75	424D	23278	6955	5AEE	1B2B
224	1093	24673	0445	6061	21490	32268	53F2	7E0C	8358	10897	20A6	2A91
225	5829	6055	16C5	17A7	23218	17903	5AB2	45EF	9468	14076	24FC	36FC
226	31546	10009	7B3A	2719	15773	23984	3D9D	5DB0	23731	12450	5CB3	30A2
227	29833	5957	7489	1745	27540	17822	6B94	459E	25133	8954	622D	22FA
228	18146	11597	46E2	2D4D	9073	22682	2371	589A	2470	19709	09A6	4CFD
229	24813	22155	60ED	568B	24998	25977	61A6	6579	17501	1252	445D	04E4
230	47	15050	002F	3ACA	20935	7525	51C7	1D65	24671	15142	605F	3B26
231	3202	16450	0C82	4042	1601	8225	0641	2021	11930	26958	2E9A	694E
232	21571	27899	5443	6CFB	31729	30785	7BF1	7841	9154	8759	23C2	2237
233	7469	2016	1D2D	07E0	24390	1008	5F46	03F0	7388	12696	1CDC	3198
234	25297	17153	62D1	4301	24760	28604	60B8	6FBC	3440	11936	0D70	2EA0
235	8175	15849	1FEF	3DE9	24103	20680	5E27	50C8	27666	25635	6C12	6423
236	28519	30581	6F67	7775	26211	30086	6663	7586	22888	17231	5968	434F
237	4991	3600	137F	0E10	22639	1800	586F	0708	13194	22298	338A	571A
238	7907	4097	1EE3	1001	24225	17980	5EA1	463C	26710	7330	6856	1CA2
239	17728	671	4540	029F	8864	20339	22A0	4F73	7266	30758	1C62	7826
240	14415	20774	384F	5126	19959	10387	4DF7	2893	15175	6933	3B47	1B15
241	30976	24471	7900	5F97	15488	25079	3C80	61F7	15891	2810	3E13	0AFA
242	26376	27341	6708	6ACD	13188	31578	3384	7B5A	26692	8820	6844	2274
243	19063	19388	4A77	4BBC	29931	9694	74EB	25DE	14757	7831	39A5	1E97
244	19160	25278	4AD8	62BE	9580	12639	256C	315F	28757	19584	7055	4C80
245	3800	9505	0ED8	2521	1900	23724	076C	5CAC	31342	2944	7A6E	0B80
246	8307	26143	2073	661F	16873	32051	41E9	7D33	19435	19854	4BEB	4D8E
247	12918	13359	3276	342F	6459	21547	193B	542B	2437	10456	0985	28D8
248	19642	2154	4CBA	086A	9821	1077	265D	0435	20573	17036	505D	428C
249	24873	13747	6129	35B3	24900	21733	6144	54E5	18781	2343	495D	0927
250	22071	27646	5637	6BFE	31435	13823	7ACB	35FF	18948	14820	4A04	39E4

. . . continued on next page

E

Table E-1: PnMaskI and PnMaskQ Values for PilotPn

Pilot PN	14–Chip Delay				13–Chip Delay				0–Chip Delay			
	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
251	13904	1056	3650	0420	6952	528	1B28	0210	23393	1756	5B61	06DC
252	27198	1413	6A3E	0585	13599	19710	351F	4CFE	5619	19068	15F3	4A7C
253	3685	3311	0E65	0CEF	22242	18507	56E2	484B	17052	28716	429C	702C
254	16820	4951	41B4	1357	8410	18327	20DA	4797	21292	31958	532C	7CD6
255	22479	749	57CF	02ED	31287	20298	7A37	4F4A	2868	16097	0B34	3EE1
256	6850	6307	1AC2	18A3	3425	17005	0D61	426D	19538	1308	4C52	051C
257	15434	961	3C4A	03C1	7717	20444	1E25	4FDC	24294	3320	5EE6	0CF8
258	19332	2358	4B84	0936	9666	1179	25C2	049B	22895	16682	596F	412A
259	8518	28350	2146	6EBE	4259	14175	10A3	375F	27652	6388	6C04	18F4
260	14698	31198	396A	79DE	7349	15599	1CB5	3CEF	29905	12828	74D1	321C
261	21476	11467	53E4	2CCB	10738	22617	29F2	5859	21415	3518	53A7	0DBE
262	30475	8862	770B	229E	27221	4431	6A55	114F	1210	3494	04BA	0DA6
263	23984	6327	5DB0	18B7	11992	16999	2ED8	4267	22396	6458	577C	193A
264	1912	7443	0778	1D13	956	16565	03BC	40B5	26552	10717	67B8	29DD
265	26735	28574	686F	6F9E	26087	14287	65E7	37CF	24829	8463	60FD	210F
266	15705	25093	3D59	6205	20348	32574	4F7C	7F3E	8663	27337	21D7	6AC9
267	3881	6139	0F29	17FB	22084	17857	5644	45C1	991	19846	03DF	4D86
268	20434	22047	4FD2	561F	10217	25907	27E9	6533	21926	9388	55A6	24AC
269	16779	32545	418B	7F21	28949	29100	7115	71AC	23306	21201	5B0A	52D1
270	31413	7112	7AB5	1BC8	27786	3556	6C8A	0DE4	13646	31422	354E	7ABE
271	16860	28535	41DC	6F77	8430	31111	20EE	7987	148	166	0094	00A6
272	8322	10378	2082	288A	4161	5189	1041	1445	24836	28622	6104	6FCE
273	28530	15065	6F72	3AD9	14265	21328	37B9	5350	24202	6477	5E8A	194D
274	26934	5125	6936	1405	13467	17470	349B	443E	9820	10704	265C	29D0
275	18806	12528	4976	30F0	9403	6264	24BB	1878	12939	25843	328B	64F3
276	20216	23215	4EF8	5AAF	10108	25451	277C	636B	2364	25406	093C	633E
277	9245	20959	241D	51DF	17374	26323	43DE	66D3	14820	21523	39E4	5413
278	8271	3568	204F	0DF0	16887	1784	41F7	06F8	2011	8569	07DB	2179
279	18684	26453	48FC	6755	9342	32150	247E	7D96	13549	9590	34ED	2576
280	8220	29421	201C	72ED	4110	30538	100E	774A	28339	22466	6EB3	57C2
281	6837	24555	1AB5	5FEB	23690	25033	5C8A	61C9	25759	12455	649F	30A7
282	9613	10779	258D	2A1B	17174	23345	4316	5B31	11116	27506	2B6C	6B72
283	31632	25260	7B90	62AC	15816	12630	3DC8	3156	31448	21847	7AD8	5557
284	27448	16084	6B38	3ED4	13724	8042	359C	1F6A	27936	28392	6D20	6EE8
285	12417	26028	3081	65AC	18832	13014	4990	32D6	3578	1969	0DFA	07B1
286	30901	29852	78B5	749C	28042	14926	6D8A	3A4E	12371	30715	3053	77FB
287	9366	14978	2496	3A82	4683	7489	124B	1D41	12721	23674	31B1	5C7A
288	12225	12182	2FC1	2F96	17968	6091	4630	17CB	10264	22629	2818	5865
289	21458	25143	53D2	6237	10729	32551	29E9	7F27	25344	12857	6300	3239
290	6466	15838	1942	3DDE	3233	7919	0CA1	1EEF	13246	30182	33BE	75E6
291	8999	5336	2327	14D8	16451	2668	4043	0A6C	544	21880	0220	5578
292	26718	21885	685E	557D	13359	25730	342F	6482	9914	6617	26BA	19D9
293	3230	20561	0C9E	5051	1615	26132	064F	6614	4601	27707	11F9	6C3B
294	27961	30097	6D39	7591	26444	29940	674C	74F4	16234	16249	3F6A	3F79
295	28465	21877	6F31	5575	26184	25734	6648	6486	24475	24754	5F9B	60B2
296	6791	23589	1A87	5C25	23699	24622	5C93	602E	26318	31609	66CE	7B79
297	17338	26060	43BA	65CC	8669	13030	21DD	32E6	6224	22689	1850	58A1
298	11832	9964	2E38	26EC	5916	4982	171C	1376	13381	3226	3445	0C9A
299	11407	25959	2C8F	6567	18327	31887	4797	7C8F	30013	4167	753D	1047
300	15553	3294	3CC1	0CDE	20400	1647	4FB0	066F	22195	25624	56B3	6418

. . . continued on next page

	14–Chip Delay				**13–Chip Delay**				**0–Chip Delay**			
Pilot PN	**I (Dec.)**	**Q (Dec.)**	**I (Hex.)**	**Q (Hex.)**	**I (Dec.)**	**Q (Dec.)**	**I (Hex.)**	**Q (Hex.)**	**I (Dec.)**	**Q (Dec.)**	**I (Hex.)**	**Q (Hex.)**
301	17418	30173	440A	75DD	8709	29906	2205	74D2	30380	10924	76AC	2AAC
302	14952	15515	3A68	3C9B	7476	20593	1D34	5071	15337	23096	3BE9	5A38
303	52	5371	0034	14FB	26	17473	001A	4441	10716	22683	29DC	589B
304	27254	10242	6A76	2802	13627	5121	353B	1401	13592	10955	3518	2ACB
305	15064	28052	3AD8	6D94	7532	14026	1D6C	36CA	2412	17117	096C	42DD
306	10942	14714	2ABE	397A	5471	7357	155F	1CBD	15453	15837	3C5D	3DDD
307	377	19550	0179	4C5E	20844	9775	516C	262F	13810	22647	35F2	5877
308	14303	8866	37DF	22A2	19007	4433	4A3F	1151	12956	10700	329C	29CC
309	24427	15297	5F6B	3BC1	32357	21468	7E65	53DC	30538	30293	774A	7655
310	26629	10898	6805	2A92	26066	5449	65D2	1549	10814	5579	2A3E	15CB
311	20011	31315	4E2B	7A53	30405	29461	76C5	7315	18939	11057	49FB	2B31
312	16086	19475	3ED6	4C13	8043	26677	1F6B	6835	19767	30238	4D37	761E
313	24374	1278	5F36	04FE	12187	639	2F9B	027F	20547	14000	5043	36B0
314	9969	11431	26F1	2CA7	17064	22639	42A8	586F	29720	22860	7418	594C
315	29364	31392	72B4	7AA0	14682	15696	395A	3D50	31831	27172	7C57	6A24
316	25560	4381	63D8	111D	12780	18098	31EC	46B2	26287	307	66AF	0133
317	28281	14898	6E79	3A32	26348	7449	66EC	1D19	11310	20380	2C2E	4F9C
318	7327	23959	1C9F	5D97	24479	24823	5F9F	60F7	25724	26427	647C	673B
319	32449	16091	7EC1	3EDB	28336	20817	6EB0	5151	21423	10702	53AF	29CE
320	26334	9037	66DE	234D	13167	24474	336F	5F9A	5190	30024	1446	7548
321	14760	24162	39A8	5E62	7380	12081	1CD4	2F31	258	14018	0102	36C2
322	15128	6383	3B18	18EF	7564	16971	1D8C	424B	13978	4297	369A	10C9
323	29912	27183	74D8	6A2F	14956	31531	3A6C	7B2B	4670	13938	123E	3672
324	4244	16872	1094	41E8	2122	8436	084A	20F4	23496	25288	5BC8	62C8
325	8499	9072	2133	2370	16713	4536	4149	11B8	23986	27294	5DB2	6A9E
326	9362	12966	2492	32A6	4681	6483	1249	1953	839	31835	0347	7C5B
327	10175	28886	27BF	70D6	16911	14443	420F	386B	11296	8228	2C20	2024
328	30957	25118	78ED	621E	28070	12559	6DA6	310F	30913	12745	78C1	31C9
329	12755	20424	31D3	4FC8	18745	10212	4939	27E4	27297	6746	6AA1	1A5A
330	19350	6729	4B96	1A49	9675	17176	25CB	4318	10349	1456	286D	05B0
331	1153	20983	0481	51F7	21392	26311	5390	66C7	32504	27743	7EF8	6C5F
332	29304	12372	7278	3054	14652	6186	393C	182A	18405	27443	47E5	6B33
333	6041	13948	1799	367C	23068	6974	5A1C	1B3E	3526	31045	0DC6	7945
334	21668	27547	54A4	6B9B	10834	31729	2A52	7BF1	19161	12225	4AD9	2FC1
335	28048	8152	6D90	1FD8	14024	4076	36C8	0FEC	23831	21482	5D17	53EA
336	10096	17354	2770	43CA	5048	8677	13B8	21E5	21380	14678	5384	3956
337	23388	17835	5B5C	45AB	11694	27881	2DAE	6CE9	4282	30656	10BA	77C0
338	15542	14378	3CB6	382A	7771	7189	1E5B	1C15	32382	13721	7E7E	3599
339	24013	7453	5DCD	1D1D	32566	16562	7F36	40B2	806	21831	0326	5547
340	2684	26317	0A7C	66CD	1342	32090	053E	7D5A	6238	30208	185E	7600
341	19018	5955	4A4A	1743	9509	17821	2525	459D	10488	9995	28F8	270B
342	25501	10346	639D	286A	24606	5173	601E	1435	19507	3248	4C33	0CB0
343	4489	13200	1189	3390	22804	6600	5914	19C8	27288	12030	6A98	2EFE
344	31011	30402	7923	76C2	27969	15201	6D41	3B61	2390	5688	0956	1638
345	29448	7311	7308	1C8F	14724	16507	3984	407B	19094	2082	4A96	0822
346	25461	3082	6375	0C0A	24682	1541	606A	0605	13860	23143	3624	5A67
347	11846	21398	2E46	5396	5923	10699	1723	29CB	9225	25906	2409	6532
348	30331	31104	767B	7980	27373	15552	6AED	3CC0	2505	15902	09C9	3E1E
349	10588	24272	295C	5ED0	5294	12136	14AE	2F68	27806	21084	6C9E	525C
350	32154	27123	7D9A	69F3	16077	31429	3ECD	7AC5	2408	25723	0968	647B

Table E-1: PnMaskI and PnMaskQ Values for PilotPn

. . . continued on next page

E

Table E-1: PnMaskI and PnMaskQ Values for PilotPn												
	14–Chip Delay				13–Chip Delay				0–Chip Delay			
Pilot PN	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
351	29572	5578	7384	15CA	14786	2789	39C2	0AE5	13347	13427	3423	3473
352	13173	25731	3375	6483	18538	31869	486A	7C7D	7885	31084	1ECD	796C
353	10735	10662	29EF	29A6	17703	5331	4527	14D3	6669	24023	1A0D	5DD7
354	224	11084	00E0	2B4C	112	5542	0070	15A6	8187	23931	1FFB	5D7B
355	12083	31098	2F33	797A	17993	15549	4649	3CBD	18145	15836	46E1	3DDC
356	22822	16408	5926	4018	11411	8204	2C93	200C	14109	6085	371D	17C5
357	2934	6362	0B76	18DA	1467	3181	05BB	0C6D	14231	30324	3797	7674
358	27692	2719	6C2C	0A9F	13846	19315	3616	4B73	27606	27561	6BD6	6BA9
359	10205	14732	27DD	398C	16958	7366	423E	1CC6	783	13821	030F	35FD
360	7011	22744	1B63	58D8	23649	11372	5C61	2C6C	6301	269	189D	010D
361	22098	1476	5652	05C4	11049	738	2B29	02E2	5067	28663	13CB	6FF7
362	2640	8445	0A50	20FD	1320	24130	0528	5E42	15383	29619	3C17	73B3
363	4408	21118	1138	527E	2204	10559	089C	293F	1392	2043	0570	07FB
364	102	22198	0066	56B6	51	11099	0033	2B5B	7641	6962	1DD9	1B32
365	27632	22030	6BF0	560E	13816	11015	35F8	2B07	25700	29119	6464	71BF
366	19646	10363	4CBE	287B	9823	23041	265F	5A01	25259	22947	62AB	59A3
367	26967	25802	6957	64CA	25979	12901	657B	3265	19813	9612	4D65	258C
368	32008	2496	7D08	09C0	16004	1248	3E84	04E0	20933	18698	51C5	490A
369	7873	31288	1EC1	7A38	24240	15644	5EB0	3D1C	638	16782	027E	418E
370	655	24248	028F	5EB8	20631	12124	5097	2F5C	16318	29735	3FBE	7427
371	25274	14327	62BA	37F7	12637	21959	315D	55C7	6878	2136	1ADE	0858
372	16210	23154	3F52	5A72	8105	11577	1FA9	2D39	1328	8086	0530	1F96
373	11631	13394	2D6F	3452	18279	6697	4767	1A29	14744	10553	3998	2939
374	8535	1806	2157	070E	16763	903	417B	0387	22800	11900	5910	2E7C
375	19293	17179	4B5D	431B	29822	28593	747E	6FB1	25919	19996	653F	4E1C
376	12110	10856	2F4E	2A68	6055	5428	17A7	1534	4795	5641	12BB	1609
377	21538	25755	5422	649B	10769	31857	2A11	7C71	18683	28328	48FB	6EA8
378	10579	15674	2953	3D3A	17785	7837	4579	1E9D	32658	25617	7F92	6411
379	13032	7083	32E8	1BAB	6516	17385	1974	43E9	1586	26986	0632	696A
380	14717	29096	397D	71A8	19822	14548	4D6E	38D4	27208	5597	6A48	15DD
381	11666	3038	2D92	0BDE	5833	1519	16C9	05EF	17517	14078	446D	36FE
382	25809	16277	64D1	3F95	25528	20982	63B8	51F6	599	13247	0257	33BF
383	5008	25525	1390	63B5	2504	32742	09C8	7FE6	16253	499	3F7D	01F3
384	32418	20465	7EA2	4FF1	16209	27076	3F51	69C4	8685	30469	21ED	7705
385	22175	28855	569F	70B7	31391	30311	7A9F	7667	29972	17544	7514	4488
386	11742	32732	2DDE	7FDC	5871	16366	16EF	3FEE	22128	28510	5670	6F5E
387	22546	20373	5812	4F95	11273	27126	2C09	69F6	19871	23196	4D9F	5A9C
388	21413	9469	53A5	24FD	30722	23618	7802	5C42	19405	13384	4BCD	3448
389	133	26155	0085	662B	20882	32041	5192	7D29	17972	4239	4634	108F
390	4915	6957	1333	1B2D	22601	17322	5849	43AA	8599	20725	2197	50F5
391	8736	12214	2220	2FB6	4368	6107	1110	17DB	10142	6466	279E	1942
392	1397	21479	0575	53E7	21354	26575	536A	67CF	26834	28465	68D2	6F31
393	18024	31914	4668	7CAA	9012	15957	2334	3E55	23710	19981	5C9E	4E0D
394	15532	32311	3CAC	7E37	7766	28967	1E56	7127	27280	16723	6A90	4153
395	26870	11276	68F6	2C0C	13435	5638	347B	1606	6570	4522	19AA	11AA
396	5904	20626	1710	5092	2952	10313	0B88	2849	7400	678	1CE8	02A6
397	24341	423	5F15	01A7	32346	20207	7E5A	4EEF	26374	15320	6706	3BD8
398	13041	2679	32F1	0A77	18600	19207	48A8	4B07	22218	29116	56CA	71BC
399	23478	15537	5BB6	3CB1	11739	20580	2DDB	5064	29654	5388	73D6	150C
400	1862	10818	0746	2A42	931	5409	03A3	1521	13043	22845	32F3	593D

. . . continued on next page

Table E-1: PnMaskI and PnMaskQ Values for PilotPn

Pilot PN	14–Chip Delay				13–Chip Delay				0–Chip Delay			
	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
401	5850	23074	16DA	5A22	2925	11537	0B6D	2D11	24457	28430	5F89	6F0E
402	5552	20250	15B0	4F1A	2776	10125	0AD8	278D	17161	8660	4309	21D4
403	12589	14629	312D	3925	18758	21166	4946	52AE	21314	2659	5342	0A63
404	23008	29175	59E0	71F7	11504	30407	2CF0	76C7	28728	8803	7038	2263
405	27636	13943	6BF4	3677	13818	21767	35FA	5507	22162	19690	5692	4CEA
406	17600	11072	44C0	2B40	8800	5536	2260	15A0	26259	22169	6693	5699
407	17000	29492	4268	7334	8500	14746	2134	399A	22180	8511	56A4	213F
408	21913	5719	5599	1657	31516	17687	7B1C	4517	2266	17393	08DA	43F1
409	30320	7347	7670	1CB3	15160	16485	3B38	4065	10291	11336	2833	2C48
410	28240	12156	6E50	2F7C	14120	6078	3728	17BE	26620	13576	67FC	3508
411	7260	25623	1C5C	6417	3630	31799	0E2E	7C37	19650	22820	4CC2	5924
412	17906	27725	45F2	6C4D	8953	30746	22F9	781A	14236	13344	379C	3420
413	5882	28870	16FA	70C6	2941	14435	0B7D	3863	11482	20107	2CDA	4E8B
414	22080	31478	5640	7AF6	11040	15739	2B20	3D7B	25289	8013	62C9	1F4D
415	12183	28530	2F97	6F72	17947	14265	461B	37B9	12011	18835	2EEB	4993
416	23082	24834	5A2A	6102	11541	12417	2D15	3081	13892	16793	3644	4199
417	17435	9075	441B	2373	29661	24453	73DD	5F85	17336	9818	43B8	265A
418	18527	32265	485F	7E09	30207	28984	75FF	7138	10759	4673	2A07	1241
419	31902	3175	7C9E	0C67	15951	18447	3E4F	480F	26816	13609	68C0	3529
420	18783	17434	495F	441A	30079	8717	757F	220D	31065	10054	7959	2746
421	20027	12178	4E3B	2F92	30413	6089	76CD	17C9	8578	10988	2182	2AEC
422	7982	25613	1F2E	640D	3991	31802	0F97	7C3A	24023	14744	5DD7	3998
423	20587	31692	506B	7BCC	31205	15846	79E5	3DE6	16199	17930	3F47	460A
424	10004	25384	2714	6328	5002	12692	138A	3194	22310	25452	5726	636C
425	13459	18908	3493	49DC	19353	9454	4B99	24EE	30402	11334	76C2	2C46
426	13383	25816	3447	64D8	19443	12908	4BF3	326C	16613	15451	40E5	3C5B
427	28930	4661	7102	1235	14465	18214	3881	4726	13084	11362	331C	2C62
428	4860	31115	12FC	798B	2430	29433	097E	72F9	3437	2993	0D6D	0BB1
429	13108	7691	3334	1E0B	6554	16697	199A	4139	1703	11012	06A7	2B04
430	24161	1311	5E61	051F	32480	19635	7EE0	4CB3	22659	5806	5883	16AE
431	20067	16471	4E63	4057	30433	28183	76E1	6E17	26896	20180	6910	4ED4
432	2667	15771	0A6B	3D9B	21733	20721	54E5	50F1	1735	8932	06C7	22E4
433	13372	16112	343C	3EF0	6686	8056	1A1E	1F78	16178	23878	3F32	5D46
434	28743	21062	7047	5246	27123	10531	69F3	2923	19166	20760	4ADE	5118
435	24489	29690	5FA9	73FA	32260	14845	7E04	39FD	665	32764	0299	7FFC
436	249	10141	00F9	279D	20908	24050	51AC	5DF2	20227	32325	4F03	7E45
437	19960	19014	4DF8	4A46	9980	9507	26FC	2523	24447	25993	5F7F	6589
438	29682	22141	73F2	567D	14841	25858	39F9	6502	16771	3268	4183	0CC4
439	31101	11852	797D	2E4C	28014	5926	6D6E	1726	27209	25180	6A49	625C
440	27148	26404	6A0C	6724	13574	13202	3506	3392	6050	12149	17A2	2F75
441	26706	30663	6852	77C7	13353	30175	3429	75DF	29088	10193	71A0	27D1
442	5148	32524	141C	7F0C	2574	16262	0A0E	3F86	7601	9128	1DB1	23A8
443	4216	28644	1078	6FE4	2108	14322	083C	37F2	4905	7843	1329	1EA3
444	5762	10228	1682	27F4	2881	5114	0B41	13FA	5915	25474	171B	6382
445	245	23536	00F5	5BF0	20906	11768	51AA	2DF8	6169	11356	1819	2C5C
446	21882	18045	557A	467D	10941	27906	2ABD	6D02	21303	11226	5337	2BDA
447	3763	25441	0EB3	6361	22153	32652	5689	7F8C	28096	16268	6DC0	3F8C
448	206	27066	00CE	69BA	103	13533	0067	34DD	8905	14491	22C9	389B
449	28798	13740	707E	35AC	14399	6870	383F	1AD6	26997	8366	6975	20AE
450	32402	13815	7E92	35F7	16201	21703	3F49	54C7	15047	26009	3AC7	6599

. . . continued on next page

Table E-1: PnMaskI and PnMaskQ Values for PilotPn

Pilot PN	14–Chip Delay				13–Chip Delay				0–Chip Delay			
	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)	I (Dec.)	Q (Dec.)	I (Hex.)	Q (Hex.)
451	13463	3684	3497	0E64	19355	1842	4B9B	0732	17460	5164	4434	142C
452	15417	23715	3C39	5CA3	20428	24685	4FCC	606D	17629	17126	44DD	42E6
453	23101	15314	5A3D	3BD2	31950	7657	7CCE	1DE9	10461	21566	28DD	543E
454	14957	32469	3A6D	7ED5	19686	29014	4CE6	7156	21618	21845	5472	5555
455	23429	9816	5B85	2658	31762	4908	7C12	132C	11498	28149	2CEA	6DF5
456	12990	4444	32BE	115C	6495	2222	195F	08AE	193	9400	00C1	24B8
457	12421	5664	3085	1620	18834	2832	4992	0B10	16140	19459	3F0C	4C03
458	28875	7358	70CB	1CBE	27061	3679	69B5	0E5F	13419	7190	346B	1C16
459	4009	27264	0FA9	6A80	22020	13632	5604	3540	10864	3101	2A70	0C1D
460	1872	28128	0750	6DE0	936	14064	03A8	36F0	28935	491	7107	01EB
461	15203	30168	3B63	75D8	19553	15084	4C61	3AEC	18765	25497	494D	6399
462	30109	29971	759D	7513	27422	29877	6B1E	74B5	27644	29807	6BFC	746F
463	24001	3409	5DC1	0D51	32560	18580	7F30	4894	21564	26508	543C	678C
464	4862	16910	12FE	420E	2431	8455	097F	2107	5142	4442	1416	115A
465	14091	20739	370B	5103	19029	26301	4A55	66BD	1211	4871	04BB	1307
466	6702	10191	1A2E	27CF	3351	24027	0D17	5DDB	1203	31141	04B3	79A5
467	3067	12819	0BFB	3213	21549	22325	542D	5735	5199	9864	144F	2688
468	28643	19295	6FE3	4B5F	26145	27539	6621	6B93	16945	12589	4231	312D
469	21379	10072	5383	2758	30737	5036	7811	13AC	4883	5417	1313	1529
470	20276	15191	4F34	3B57	10138	21399	279A	5397	25040	8549	61D0	2165
471	25337	27748	62F9	6C64	24748	13874	60AC	3632	7119	14288	1BCF	37D0
472	19683	720	4CE3	02D0	30625	360	77A1	0168	17826	8503	45A2	2137
473	10147	29799	27A3	7467	16897	29711	4201	740F	4931	20357	1343	4F85
474	16791	27640	4197	6BF8	28955	13820	711B	35FC	25705	15381	6469	3C15
475	17359	263	43CF	0107	28727	20159	7037	4EBF	10726	18065	29E6	4691
476	13248	24734	33C0	609E	6624	12367	19E0	304F	17363	24678	43D3	6066
477	22740	16615	58D4	40E7	11370	28239	2C6A	6E4F	2746	23858	0ABA	5D32
478	13095	20378	3327	4F9A	18499	10189	4843	27CD	10952	7610	2AC8	1DBA
479	10345	25116	2869	621C	17892	12558	45E4	310E	19313	18097	4B71	46B1
480	30342	19669	7686	4CD5	15171	26710	3B43	6856	29756	20918	743C	51B6
481	27866	14656	6CDA	3940	13933	7328	366D	1CA0	14297	7238	37D9	1C46
482	9559	27151	2557	6A0F	17275	31547	437B	7B3B	21290	30549	532A	7755
483	8808	28728	2268	7038	4404	14364	1134	381C	1909	16320	0775	3FC0
484	12744	25092	31C8	6204	6372	12546	18E4	3102	8994	20853	2322	5175
485	11618	22601	2D62	5849	5809	25112	16B1	6218	13295	26736	33EF	6870
486	27162	2471	6A1A	09A7	13581	19183	350D	4AEF	21590	10327	5456	2857
487	17899	25309	45EB	62DD	29477	32594	7325	7F52	26468	24404	6764	5F54
488	29745	15358	7431	3BFE	27592	7679	6BC8	1DFF	13636	7931	3544	1EFB
489	31892	17739	7C94	454B	15946	27801	3E4A	6C99	5207	5310	1457	14BE
490	23964	12643	5D9C	3163	11982	22157	2ECE	568D	29493	554	7335	022A
491	23562	32730	5C0A	7FDA	11781	16365	2E05	3FED	18992	27311	4A30	6AAF
492	2964	19122	0B94	4AB2	1482	9561	05CA	2559	12567	6865	3117	1AD1
493	18208	16870	4720	41E6	9104	8435	2390	20F3	12075	7762	2F2B	1E52
494	15028	10787	3AB4	2A23	7514	23341	1D5A	5B2D	26658	15761	6822	3D91
495	21901	18400	558D	47E0	31510	9200	7B16	23F0	21077	12697	5255	3199
496	24566	20295	5FF6	4F47	12283	27039	2FFB	699F	15595	24850	3CEB	6112
497	18994	1937	4A32	0791	9497	19956	2519	4DF4	4921	15259	1339	3B9B
498	13608	17963	3528	462B	6804	27945	1A94	6D29	14051	24243	36E3	5EB3
499	27492	7438	6B64	1D0E	13746	3719	35B2	0E87	5956	30508	1744	772C
500	11706	12938	2DBA	328A	5853	6469	16DD	1945	21202	13982	52D2	369E

. . . continued on next page

Table E-1: PnMaskI and PnMaskQ Values for PilotPn

Pilot PN	14–Chip Delay I (Dec.)	14–Chip Delay Q (Dec.)	14–Chip Delay I (Hex.)	14–Chip Delay Q (Hex.)	13–Chip Delay I (Dec.)	13–Chip Delay Q (Dec.)	13–Chip Delay I (Hex.)	13–Chip Delay Q (Hex.)	0–Chip Delay I (Dec.)	0–Chip Delay Q (Dec.)	0–Chip Delay I (Hex.)	0–Chip Delay Q (Hex.)
501	14301	19272	37DD	4B48	19006	9636	4A3E	25A4	11239	25039	2BE7	61CF
502	23380	29989	5B54	7525	11690	29870	2DAA	74AE	30038	24086	7556	5E16
503	11338	8526	2C4A	214E	5669	4263	1625	10A7	30222	21581	760E	544D
504	2995	18139	0BB3	46DB	21513	27985	5409	6D51	13476	21346	34A4	5362
505	23390	3247	5B5E	0CAF	11695	18539	2DAF	486B	2497	28187	09C1	6E1B
506	14473	28919	3889	70F7	19860	30279	4D94	7647	31842	23231	7C62	5ABF
507	6530	7292	1982	1C7C	3265	3646	0CC1	0E3E	24342	18743	5F16	4937
508	20452	20740	4FE4	5104	10226	10370	27F2	2882	25857	11594	6501	2D4A
509	12226	27994	2FC2	6D5A	6113	13997	17E1	36AD	27662	7198	6C0E	1C1E
510	1058	2224	0422	08B0	529	1112	0211	0458	24594	105	6012	0069
511	12026	6827	2EFA	1AAB	6013	17257	177D	4369	16790	4534	4196	11B6

Appendix E: PN Offset Programming Information

PN Offset Background

All channel elements transmitted from a BTS in a particular 1.25 MHz CDMA channel are orthonogonally spread by 1 of 64 possible Walsh code functions; additionally, they are also spread by a quadrature pair of PN sequences unique to each sector.

Overall, the mobile uses this to differentiate multiple signals transmitted from the same BTS (and surrounding BTS) sectors, and to synchronize to the next strongest sector.

The PN offset per sector is stored on the BBX2s, where the corresponding I & Q registers reside.

The PN offset values are determined on a per BTS/per sector(antenna) basis as determined by the appropriate cdf file content. A breakdown of this information is found in Table E-2.

PN Offset Usage

There are three basic RF chip delays currently in use. It is important to determine what RF chip delay is valid to be able to test the BTS functionality. This can be done by ascertaining if the CDF file `FineTxAdj` value was set to “on” when the MCC was downloaded with “image data”. The `FineTxAdj` value is used to compensate for the processing delay (approximately 20 μS) in the BTS using any type of mobile meeting IS–97 specifications.

Observe the following guidelines:

- If the `FineTxAdj` value in the cdf file is 101 (65 HEX), the FineTxAdj has not been set. The I and Q values from the 0 table MUST be used.

If the `FineTxAdj` value in the cdf file is 213 (D5 HEX), FineTxAdj has been set for the *14 chip table*.

- If the `FineTxAdj` value in the cdf file is 197 (C5 HEX), FineTxAdj has been set for the *13 chip table*.

IMPORTANT

CDF file I and Q values can be represented in DECIMAL or HEX. If using HEX, add 0x before the HEX value. If necessary, convert HEX values in Table E-2 to decimal before comparing them to cdf file I & Q value assignments.

  – If you are using a Qualcomm mobile, use the I and Q values from the 13 chip delay table.
  – If you are using a mobile that does not have the 1 chip offset problem, (any mobile meeting the IS–97 specification), use the 14 chip delay table.

IMPORTANT

If the wrong I and Q values are used with the wrong `FineTxAdj` parameter, system timing problems will occur. This will cause the energy transmitted to be “smeared” over several Walsh codes (instead of the single Walsh code that it was assigned to), causing erratic operation. Evidence of smearing is usually identified by Walsh channels not at correct levels or present when not selected in the Code Domain Power Test.

E

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips

PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 0	0	I = 4473	Q = 5BA3
Offset 1	1	I = 7E24	Q = 7F4D
Offset 2	2	I = 125C	Q = 43F6
Offset 3	3	I = 3846	Q = 66DD
Offset 4	4	I = 3A33	Q = FAB
Offset 5	5	I = 4281	Q = 8D0
Offset 6	6	I = 3999	Q = 48DB
Offset 7	7	I = ADF	Q = 446
Offset 8	8	I = 16C8	Q = 52D2
Offset 9	9	I = 3077	Q = 3611
Offset 10	a	I = 7A3F	Q = 7C17
Offset 11	b	I = 1D9D	Q = 49CA
Offset 12	c	I = 485B	Q = 7917
Offset 13	d	I = 74E0	Q = 5794
Offset 14	e	I = 6260	Q = 4EC8
Offset 15	f	I = 66AA	Q = 3042
Offset 16	10	I = 779F	Q = 2BB3
Offset 17	11	I = 3CB4	Q = 2E3A
Offset 18	12	I = 59F2	Q = 289B
Offset 19	13	I = 4E33	Q = 6D83
Offset 20	14	I = FD2	Q = 6B07
Offset 21	15	I = 615	Q = 5647
Offset 22	16	I = 7636	Q = 81D
Offset 23	17	I = 4650	Q = 35BE
Offset 24	18	I = 4E58	Q = 2E02
Offset 25	19	I = 2F6F	Q = DD7
Offset 26	1a	I = 441D	Q = 1C10
Offset 27	1b	I = 441E	Q = 93A
Offset 28	1c	I = 13EE	Q = 64F0
Offset 29	1d	I = 2456	Q = 2F91
Offset 30	1e	I = 4302	Q = 28A2
Offset 31	1f	I = 144E	Q = 77D
Offset 32	20	I = 11FE	Q = 452C
Offset 33	21	I = 60E4	Q = 2986
Offset 34	22	I = 431C	Q = 1A9C

E

PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 35	23	I = 290B	Q = 380E
Offset 36	24	I = 27AD	Q = 2AF7
Offset 37	25	I = 5D2A	Q = 61AB
Offset 38	26	I = 7AC1	Q = A5C
Offset 39	27	I = FEB	Q = 4DBA
Offset 40	28	I = 272E	Q = 7DA
Offset 41	29	I = 4258	Q = 6550
Offset 42	2a	I = 3791	Q = 6F73
Offset 43	2b	I = 6797	Q = 2EB0
Offset 44	2c	I = 6C7F	Q = 7CCB
Offset 45	2d	I = 7594	Q = 63F5
Offset 46	2e	I = 1EF2	Q = 2C51
Offset 47	2f	I = 3777	Q = 6E26
Offset 48	30	I = 44E5	Q = 367B
Offset 49	31	I = 5A29	Q = 210E
Offset 50	32	I = 13EB	Q = 257B
Offset 51	33	I = 7FE7	Q = 123E
Offset 52	34	I = 1BCA	Q = 3950
Offset 53	35	I = 1E13	Q = 72E7
Offset 54	36	I = 4B8B	Q = 5082
Offset 55	37	I = 6E34	Q = 194F
Offset 56	38	I = 7393	Q = 2ACD
Offset 57	39	I = 4D03	Q = 47FA
Offset 58	3a	I = 3A35	Q = 58C6
Offset 59	3b	I = 4EC0	Q = 147F
Offset 60	3c	I = 56E9	Q = 7501
Offset 61	3d	I = 67D6	Q = 16A4
Offset 62	3e	I = 1BF1	Q = 41BD
Offset 63	3f	I = 3B17	Q = 11B0
Offset 64	40	I = 3BAA	Q = 1527
Offset 65	41	I = 5A6D	Q = 2836
Offset 66	42	I = 3FD4	Q = 4296
Offset 67	43	I = 69AC	Q = 1EA6
Offset 68	44	I = 34CF	Q = 2A0A
Offset 69	45	I = 297C	Q = 35F6

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips

E

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips			
PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 70	46	I = 3E6A	Q = 41D6
Offset 71	47	I = 6D3E	Q = 31B
Offset 72	48	I = 30BF	Q = 262E
Offset 73	49	I = 600	Q = 5EE3
Offset 74	4a	I = C7F	Q = C64
Offset 75	4b	I = 11C5	Q = 8B5
Offset 76	4c	I = 45E0	Q = 5323
Offset 77	4d	I = 333D	Q = 4209
Offset 78	4e	I = 1D52	Q = 1B96
Offset 79	4f	I = 6BEA	Q = 1D6C
Offset 80	50	I = 7985	Q = 63E7
Offset 81	51	I = 743B	Q = 37A4
Offset 82	52	I = 6857	Q = 6D95
Offset 83	53	I = 4FAD	Q = 76C8
Offset 84	54	I = 48B0	Q = 13E6
Offset 85	55	I = 1CDF	Q = 3F5E
Offset 86	56	I = 5A80	Q = 1BF7
Offset 87	57	I = 5BAA	Q = AE
Offset 88	58	I = 3E3C	Q = 63BA
Offset 89	59	I = 64C6	Q = 910
Offset 90	5a	I = 6DE6	Q = 5A49
Offset 91	5b	I = 6D78	Q = 5DB1
Offset 92	5c	I = 18BF	Q = A2C
Offset 93	5d	I = 5404	Q = 722
Offset 94	5e	I = 66E2	Q = 7885
Offset 95	5f	I = 4322	Q = 3D53
Offset 96	60	I = 57BE	Q = A1D
Offset 97	61	I = F44	Q = 61A8
Offset 98	62	I = 632E	Q = 46F3
Offset 99	63	I = 6CF3	Q = 310B
Offset 100	64	I = 2594	Q = 21DE
Offset 101	65	I = 195B	Q = 50A
Offset 102	66	I = 41EC	Q = 1137
Offset 103	67	I = 428A	Q = 48B
Offset 104	68	I = 7E95	Q = 2FB7

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips			
PN Offset	**HEX Equiv**	**I values (14 chips)**	**Q values (14 chips)**
Offset 105	69	I = 6B19	Q = 1C55
Offset 106	6a	I = 20BE	Q = 2312
Offset 107	6b	I = 15F8	Q = 63CB
Offset 108	6c	I = 590	Q = C3A
Offset 109	6d	I = 32EA	Q = 7AAE
Offset 110	6e	I = 3D42	Q = 184E
Offset 111	6f	I = 69DD	Q = 4F74
Offset 112	70	I = 2149	Q = 6206
Offset 113	71	I = 7618	Q = 5B54
Offset 114	72	I = 191D	Q = 2AAE
Offset 115	73	I = 69EC	Q = 5925
Offset 116	74	I = 108E	Q = 7B92
Offset 117	75	I = 1408	Q = 1133
Offset 118	76	I = 39FE	Q = 2B1
Offset 119	77	I = 32E0	Q = 69A5
Offset 120	78	I = 2981	Q = 6BA5
Offset 121	79	I = 7BEC	Q = 3FB3
Offset 122	7a	I = 35F3	Q = 5742
Offset 123	7b	I = 6153	Q = 6B9E
Offset 124	7c	I = 4BD	Q = 5650
Offset 125	7d	I = 8F2	Q = 5A60
Offset 126	7e	I = 7B3F	Q = 2FA7
Offset 127	7f	I = 2F38	Q = 4BD
Offset 128	80	I = 1E2A	Q = 3A8
Offset 129	81	I = 6AB0	Q = 1880
Offset 130	82	I = 5A5A	Q = 7EBE
Offset 131	83	I = 252	Q = 34F3
Offset 132	84	I = 64CC	Q = 2255
Offset 133	85	I = 7925	Q = 60F5
Offset 134	86	I = 7F49	Q = 524C
Offset 135	87	I = C05	Q = 7C93
Offset 136	88	I = 434F	Q = 14C9
Offset 137	89	I = 7B42	Q = 227
Offset 138	8a	I = 223C	Q = 2F53
Offset 139	8b	I = 3C0F	Q = 1326

E

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips			
PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 140	8c	I = 3474	Q = 7C7
Offset 141	8d	I = 44FA	Q = 3844
Offset 142	8e	I = 34A3	Q = 463E
Offset 143	8f	I = 564F	Q = 4C6E
Offset 144	90	I = 60E5	Q = B9A
Offset 145	91	I = 10D3	Q = 5A0F
Offset 146	92	I = 5AFC	Q = 3B36
Offset 147	93	I = 561	Q = 71A6
Offset 148	94	I = 6FEE	Q = 28D
Offset 149	95	I = 18CE	Q = 4AD3
Offset 150	96	I = 4182	Q = 5C24
Offset 151	97	I = 3986	Q = 2A7E
Offset 152	98	I = 6455	Q = 7954
Offset 153	99	I = 536C	Q = 789B
Offset 154	9a	I = 2F75	Q = 2CE8
Offset 155	9b	I = 7126	Q = 5FE1
Offset 156	9c	I = 5972	Q = 2572
Offset 157	9d	I = 6B1	Q = 51F8
Offset 158	9e	I = 753A	Q = 76B5
Offset 159	9f	I = 93D	Q = 1C82
Offset 160	a0	I = 6A2B	Q = 49F6
Offset 161	a1	I = 742C	Q = 5A61
Offset 162	a2	I = 1621	Q = 6015
Offset 163	a3	I = 5C77	Q = 5B05
Offset 164	a4	I = 690	Q = 1E54
Offset 165	a5	I = 6505	Q = 38B6
Offset 166	a6	I = 6470	Q = 5482
Offset 167	a7	I = 4B2D	Q = 2D1A
Offset 168	a8	I = 6907	Q = 6756
Offset 169	a9	I = 78B1	Q = 3E42
Offset 170	aa	I = 2CE8	Q = 235A
Offset 171	ab	I = 4FE	Q = C1F
Offset 172	ac	I = 7B43	Q = 2F6
Offset 173	ad	I = 71F3	Q = 4090
Offset 174	ae	I = 4FF8	Q = 4F97

E

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips			
PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 175	af	I = 16B8	Q = 27E0
Offset 176	b0	I = 763E	Q = 4522
Offset 177	b1	I = 56AC	Q = 20D5
Offset 178	b2	I = 1826	Q = 6FDA
Offset 179	b3	I = 7E4D	Q = 79F
Offset 180	b4	I = 36DE	Q = 4F78
Offset 181	b5	I = 3E01	Q = 6848
Offset 182	b6	I = 4D83	Q = D1B
Offset 183	b7	I = 72B7	Q = 2EC7
Offset 184	b8	I = 3428	Q = 7CC6
Offset 185	b9	I = 59C1	Q = 2609
Offset 186	ba	I = 7BCB	Q = 25A6
Offset 187	bb	I = 298D	Q = 77B3
Offset 188	bc	I = 636E	Q = 33AE
Offset 189	bd	I = 48B2	Q = 56A9
Offset 190	be	I = 18E0	Q = 807
Offset 191	bf	I = 1ECF	Q = 223F
Offset 192	c0	I = 1E32	Q = 3DEC
Offset 193	c1	I = 5BB4	Q = 3EFD
Offset 194	c2	I = 379	Q = 17BA
Offset 195	c3	I = 5295	Q = 7A0D
Offset 196	c4	I = 5028	Q = 3E08
Offset 197	c5	I = 54A5	Q = 4F93
Offset 198	c6	I = 3E5F	Q = 21DA
Offset 199	c7	I = 5487	Q = 330
Offset 200	c8	I = 7990	Q = 5725
Offset 201	c9	I = E72	Q = 737B
Offset 202	ca	I = 3FC2	Q = 3316
Offset 203	cb	I = 4415	Q = 28DC
Offset 204	cc	I = 54E2	Q = 44B6
Offset 205	cd	I = 4590	Q = 4F35
Offset 206	ce	I = 7574	Q = 4E14
Offset 207	cf	I = 31C1	Q = 1A7D
Offset 208	d0	I = 6E51	Q = 7EF5
Offset 209	d1	I = 4F93	Q = 1788

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips			
PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 210	d2	I = 3605	Q = 5028
Offset 211	d3	I = 3436	Q = 7CCF
Offset 212	d4	I = 6484	Q = 65CF
Offset 213	d5	I = 4D98	Q = 6A43
Offset 214	d6	I = 1443	Q = 19D6
Offset 215	d7	I = 5AB3	Q = 2ADA
Offset 216	d8	I = 6E52	Q = 1587
Offset 217	d9	I = 1863	Q = 42DF
Offset 218	da	I = 1BD	Q = 3EC0
Offset 219	db	I = 5362	Q = 7B7E
Offset 220	dc	I = 33C8	Q = 1234
Offset 221	dd	I = 4828	Q = 3639
Offset 222	de	I = 6559	Q = 41B3
Offset 223	df	I = 794B	Q = 18E3
Offset 224	e0	I = 445	Q = 6061
Offset 225	e1	I = 16C5	Q = 17A7
Offset 226	e2	I = 7B3A	Q = 2719
Offset 227	e3	I = 7489	Q = 1745
Offset 228	e4	I = 46E2	Q = 2D4D
Offset 229	e5	I = 60ED	Q = 568B
Offset 230	e6	I = 2F	Q = 3ACA
Offset 231	e7	I = C82	Q = 4042
Offset 232	e8	I = 5443	Q = 6CFB
Offset 233	e9	I = 1D2D	Q = 7E0
Offset 234	ea	I = 62D1	Q = 4301
Offset 235	eb	I = 1FEF	Q = 3DE9
Offset 236	ec	I = 6F67	Q = 7775
Offset 237	ed	I = 137F	Q = E10
Offset 238	ee	I = 1EE3	Q = 1001
Offset 239	ef	I = 4540	Q = 29F
Offset 240	f0	I = 384F	Q = 5126
Offset 241	f1	I = 7900	Q = 5F97
Offset 242	f2	I = 6708	Q = 6ACD
Offset 243	f3	I = 4A77	Q = 4BBC
Offset 244	f4	I = 4AD8	Q = 62BE

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips			
PN Offset	**HEX Equiv**	**I values (14 chips)**	**Q values (14 chips)**
Offset 245	f5	I = ED8	Q = 2521
Offset 246	f6	I = 2073	Q = 661F
Offset 247	f7	I = 3276	Q = 342F
Offset 248	f8	I = 4CBA	Q = 86A
Offset 249	f9	I = 6129	Q = 35B3
Offset 250	fa	I = 5637	Q = 6BFE
Offset 251	fb	I = 3650	Q = 420
Offset 252	fc	I = 6A3E	Q = 585
Offset 253	fd	I = E65	Q = CEF
Offset 254	fe	I = 41B4	Q = 1357
Offset 255	ff	I = 57CF	Q = 2ED
Offset 256	100	I = 1AC2	Q = 18A3
Offset 257	101	I = 3C4A	Q = 3C1
Offset 258	102	I = 4B84	Q = 936
Offset 259	103	I = 2146	Q = 6EBE
Offset 260	104	I = 396A	Q = 79DE
Offset 261	105	I = 53E4	Q = 2CCB
Offset 262	106	I = 770B	Q = 229E
Offset 263	107	I = 5DB0	Q = 18B7
Offset 264	108	I = 778	Q = 1D13
Offset 265	109	I = 686F	Q = 6F9E
Offset 266	10a	I = 3D59	Q = 6205
Offset 267	10b	I = F29	Q = 17FB
Offset 268	10c	I = 4FD2	Q = 561F
Offset 269	10d	I = 418B	Q = 7F21
Offset 270	10e	I = 7AB5	Q = 1BC8
Offset 271	10f	I = 41DC	Q = 6F77
Offset 272	110	I = 2082	Q = 288A
Offset 273	111	I = 6F72	Q = 3AD9
Offset 274	112	I = 6936	Q = 1405
Offset 275	113	I = 4976	Q = 30F0
Offset 276	114	I = 4EF8	Q = 5AAF
Offset 277	115	I = 241D	Q = 51DF
Offset 278	116	I = 204F	Q = DF0
Offset 279	117	I = 48FC	Q = 6755

E

PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 280	118	I = 201C	Q = 72ED
Offset 281	119	I = 1AB5	Q = 5FEB
Offset 282	11a	I = 258D	Q = 2A1B
Offset 283	11b	I = 7B90	Q = 62AC
Offset 284	11c	I = 6B38	Q = 3ED4
Offset 285	11d	I = 3081	Q = 65AC
Offset 286	11e	I = 78B5	Q = 749C
Offset 287	11f	I = 2496	Q = 3A82
Offset 288	120	I = 2FC1	Q = 2F96
Offset 289	121	I = 53D2	Q = 6237
Offset 290	122	I = 1942	Q = 3DDE
Offset 291	123	I = 2327	Q = 14D8
Offset 292	124	I = 685E	Q = 557D
Offset 293	125	I = C9E	Q = 5051
Offset 294	126	I = 6D39	Q = 7591
Offset 295	127	I = 6F31	Q = 5575
Offset 296	128	I = 1A87	Q = 5C25
Offset 297	129	I = 43BA	Q = 65CC
Offset 298	12a	I = 2E38	Q = 26EC
Offset 299	12b	I = 2C8F	Q = 6567
Offset 300	12c	I = 3CC1	Q = CDE
Offset 301	12d	I = 440A	Q = 75DD
Offset 302	12e	I = 3A68	Q = 3C9B
Offset 303	12f	I = 34	Q = 14FB
Offset 304	130	I = 6A76	Q = 2802
Offset 305	131	I = 3AD8	Q = 6D94
Offset 306	132	I = 2ABE	Q = 397A
Offset 307	133	I = 179	Q = 4C5E
Offset 308	134	I = 37DF	Q = 22A2
Offset 309	135	I = 5F6B	Q = 3BC1
Offset 310	136	I = 6805	Q = 2A92
Offset 311	137	I = 4E2B	Q = 7A53
Offset 312	138	I = 3ED6	Q = 4C13
Offset 313	139	I = 5F36	Q = 4FE
Offset 314	13a	I = 26F1	Q = 2CA7

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips

E

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips			
PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 315	13b	I = 72B4	Q = 7AA0
Offset 316	13c	I = 63D8	Q = 111D
Offset 317	13d	I = 6E79	Q = 3A32
Offset 318	13e	I = 1C9F	Q = 5D97
Offset 319	13f	I = 7EC1	Q = 3EDB
Offset 320	140	I = 66DE	Q = 234D
Offset 321	141	I = 39A8	Q = 5E62
Offset 322	142	I = 3B18	Q = 18EF
Offset 323	143	I = 74D8	Q = 6A2F
Offset 324	144	I = 1094	Q = 41E8
Offset 325	145	I = 2133	Q = 2370
Offset 326	146	I = 2492	Q = 32A6
Offset 327	147	I = 27BF	Q = 70D6
Offset 328	148	I = 78ED	Q = 621E
Offset 329	149	I = 31D3	Q = 4FC8
Offset 330	14a	I = 4B96	Q = 1A49
Offset 331	14b	I = 481	Q = 51F7
Offset 332	14c	I = 7278	Q = 3054
Offset 333	14d	I = 1799	Q = 367C
Offset 334	14e	I = 54A4	Q = 6B9B
Offset 335	14f	I = 6D90	Q = 1FD8
Offset 336	150	I = 2770	Q = 43CA
Offset 337	151	I = 5B5C	Q = 45AB
Offset 338	152	I = 3CB6	Q = 382A
Offset 339	153	I = 5DCD	Q = 1D1D
Offset 340	154	I = A7C	Q = 66CD
Offset 341	155	I = 4A4A	Q = 1743
Offset 342	156	I = 639D	Q = 286A
Offset 343	157	I = 1189	Q = 3390
Offset 344	158	I = 7923	Q = 76C2
Offset 345	159	I = 7308	Q = 1C8F
Offset 346	15a	I = 6375	Q = C0A
Offset 347	15b	I = 2E46	Q = 5396
Offset 348	15c	I = 767B	Q = 7980
Offset 349	15d	I = 295C	Q = 5ED0

E

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips			
PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 350	15e	I = 7D9A	Q = 69F3
Offset 351	15f	I = 7384	Q = 15CA
Offset 352	160	I = 3375	Q = 6483
Offset 353	161	I = 29EF	Q = 29A6
Offset 354	162	I = E0	Q = 2B4C
Offset 355	163	I = 2F33	Q = 797A
Offset 356	164	I = 5926	Q = 4018
Offset 357	165	I = B76	Q = 18DA
Offset 358	166	I = 6C2C	Q = A9F
Offset 359	167	I = 27DD	Q = 398C
Offset 360	168	I = 1B63	Q = 58D8
Offset 361	169	I = 5652	Q = 5C4
Offset 362	16a	I = A50	Q = 20FD
Offset 363	16b	I = 1138	Q = 527E
Offset 364	16c	I = 66	Q = 56B6
Offset 365	16d	I = 6BF0	Q = 560E
Offset 366	16e	I = 4CBE	Q = 287B
Offset 367	16f	I = 6957	Q = 64CA
Offset 368	170	I = 7D08	Q = 9C0
Offset 369	171	I = 1EC1	Q = 7A38
Offset 370	172	I = 28F	Q = 5EB8
Offset 371	173	I = 62BA	Q = 37F7
Offset 372	174	I = 3F52	Q = 5A72
Offset 373	175	I = 2D6F	Q = 3452
Offset 374	176	I = 2157	Q = 70E
Offset 375	177	I = 4B5D	Q = 431B
Offset 376	178	I = 2F4E	Q = 2A68
Offset 377	179	I = 5422	Q = 649B
Offset 378	17a	I = 2953	Q = 3D3A
Offset 379	17b	I = 32E8	Q = 1BAB
Offset 380	17c	I = 397D	Q = 71A8
Offset 381	17d	I = 2D92	Q = BDE
Offset 382	17e	I = 64D1	Q = 3F95
Offset 383	17f	I = 1390	Q = 63B5
Offset 384	180	I = 7EA2	Q = 4FF1

E

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips			
PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 385	181	I = 569F	Q = 70B7
Offset 386	182	I = 2DDE	Q = 7FDC
Offset 387	183	I = 5812	Q = 4F95
Offset 388	184	I = 53A5	Q = 24FD
Offset 389	185	I = 85	Q = 662B
Offset 390	186	I = 1333	Q = 1B2D
Offset 391	187	I = 2220	Q = 2FB6
Offset 392	188	I = 575	Q = 53E7
Offset 393	189	I = 4668	Q = 7CAA
Offset 394	18a	I = 3CAC	Q = 7E37
Offset 395	18b	I = 68F6	Q = 2C0C
Offset 396	18c	I = 1710	Q = 5092
Offset 397	18d	I = 5F15	Q = 1A7
Offset 398	18e	I = 32F1	Q = A77
Offset 399	18f	I = 5BB6	Q = 3CB1
Offset 400	190	I = 746	Q = 2A42
Offset 401	191	I = 16DA	Q = 5A22
Offset 402	192	I = 15B0	Q = 4F1A
Offset 403	193	I = 312D	Q = 3925
Offset 404	194	I = 59E0	Q = 71F7
Offset 405	195	I = 6BF4	Q = 3677
Offset 406	196	I = 44C0	Q = 2B40
Offset 407	197	I = 4268	Q = 7334
Offset 408	198	I = 5599	Q = 1657
Offset 409	199	I = 7670	Q = 1CB3
Offset 410	19a	I = 6E50	Q = 2F7C
Offset 411	19b	I = 1C5C	Q = 6417
Offset 412	19c	I = 45F2	Q = 6C4D
Offset 413	19d	I = 16FA	Q = 70C6
Offset 414	19e	I = 5640	Q = 7AF6
Offset 415	19f	I = 2F97	Q = 6F72
Offset 416	1a0	I = 5A2A	Q = 6102
Offset 417	1a1	I = 441B	Q = 2373
Offset 418	1a2	I = 485F	Q = 7E09
Offset 419	1a3	I = 7C9E	Q = C67

E

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips			
PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 420	1a4	I = 495F	Q = 441A
Offset 421	1a5	I = 4E3B	Q = 2F92
Offset 422	1a6	I = 1F2E	Q = 640D
Offset 423	1a7	I = 506B	Q = 7BCC
Offset 424	1a8	I = 2714	Q = 6328
Offset 425	1a9	I = 3493	Q = 49DC
Offset 426	1aa	I = 3447	Q = 64D8
Offset 427	1ab	I = 7102	Q = 1235
Offset 428	1ac	I = 12FC	Q = 798B
Offset 429	1ad	I = 3334	Q = 1E0B
Offset 430	1ae	I = 5E61	Q = 51F
Offset 431	1af	I = 4E63	Q = 4057
Offset 432	1b0	I = A6B	Q = 3D9B
Offset 433	1b1	I = 343C	Q = 3EF0
Offset 434	1b2	I = 7047	Q = 5246
Offset 435	1b3	I = 5FA9	Q = 73FA
Offset 436	1b4	I = F9	Q = 279D
Offset 437	1b5	I = 4DF8	Q = 4A46
Offset 438	1b6	I = 73F2	Q = 567D
Offset 439	1b7	I = 797D	Q = 2E4C
Offset 440	1b8	I = 6A0C	Q = 6724
Offset 441	1b9	I = 6852	Q = 77C7
Offset 442	1ba	I = 141C	Q = 7F0C
Offset 443	1bb	I = 1078	Q = 6FE4
Offset 444	1bc	I = 1682	Q = 27F4
Offset 445	1bd	I = F5	Q = 5BF0
Offset 446	1be	I = 557A	Q = 467D
Offset 447	1bf	I = EB3	Q = 6361
Offset 448	1c0	I = CE	Q = 69BA
Offset 449	1c1	I = 707E	Q = 35AC
Offset 450	1c2	I = 7E92	Q = 35F7
Offset 451	1c3	I = 3497	Q = E64
Offset 452	1c4	I = 3C39	Q = 5CA3
Offset 453	1c5	I = 5A3D	Q = 3BD2
Offset 454	1c6	I = 3A6D	Q = 7ED5

E

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips

PN Offset	HEX Equiv	I values (14 chips)	Q values (14 chips)
Offset 455	1c7	I = 5B85	Q = 2658
Offset 456	1c8	I = 32BE	Q = 115C
Offset 457	1c9	I = 3085	Q = 1620
Offset 458	1ca	I = 70CB	Q = 1CBE
Offset 459	1cb	I = FA9	Q = 6A80
Offset 460	1cc	I = 750	Q = 6DE0
Offset 461	1cd	I = 3B63	Q = 75D8
Offset 462	1ce	I = 759D	Q = 7513
Offset 463	1cf	I = 5DC1	Q = D51
Offset 464	1d0	I = 12FE	Q = 420E
Offset 465	1d1	I = 370B	Q = 5103
Offset 466	1d2	I = 1A2E	Q = 27CF
Offset 467	1d3	I = BFB	Q = 3213
Offset 468	1d4	I = 6FE3	Q = 4B5F
Offset 469	1d5	I = 5383	Q = 2758
Offset 470	1d6	I = 4F34	Q = 3B57
Offset 471	1d7	I = 62F9	Q = 6C64
Offset 472	1d8	I = 4CE3	Q = 2D0
Offset 473	1d9	I = 27A3	Q = 7467
Offset 474	1da	I = 4197	Q = 6BF8
Offset 475	1db	I = 43CF	Q = 107
Offset 476	1dc	I = 33C0	Q = 609E
Offset 477	1dd	I = 58D4	Q = 40E7
Offset 478	1de	I = 3327	Q = 4F9A
Offset 479	1df	I = 2869	Q = 621C
Offset 480	1e0	I = 7686	Q = 4CD5
Offset 481	1e1	I = 6CDA	Q = 3940
Offset 482	1e2	I = 2557	Q = 6A0F
Offset 483	1e3	I = 2268	Q = 7038
Offset 484	1e4	I = 31C8	Q = 6204
Offset 485	1e5	I = 2D62	Q = 5849
Offset 486	1e6	I = 6A1A	Q = 9A7
Offset 487	1e7	I = 45EB	Q = 62DD
Offset 488	1e8	I = 7431	Q = 3BFE
Offset 489	1e9	I = 7C94	Q = 454B

E

Table E-2: I/Q PN initialization values for RF delay of 0, 13, & 14 Chips			
PN Offset	**HEX Equiv**	**I values (14 chips)**	**Q values (14 chips)**
Offset 490	1ea	I = 5D9C	Q = 3163
Offset 491	1eb	I = 5C0A	Q = 7FDA
Offset 492	1ec	I = B94	Q = 4AB2
Offset 493	1ed	I = 4720	Q = 41E6
Offset 494	1ee	I = 3AB4	Q = 2A23
Offset 495	1ef	I = 558D	Q = 47E0
Offset 496	1f0	I = 5FF6	Q = 4F47
Offset 497	1f1	I = 4A32	Q = 791
Offset 498	1f2	I = 3528	Q = 462B
Offset 499	1f3	I = 6B64	Q = 1D0E
Offset 500	1f4	I = 2DBA	Q = 328A
Offset 501	1f5	I = 37DD	Q = 4B48
Offset 502	1f6	I = 5B54	Q = 7525
Offset 503	1f7	I = 2C4A	Q = 214E
Offset 504	1f8	I = BB3	Q = 46DB
Offset 505	1f9	I = 5B5E	Q = CAF
Offset 506	1fa	I = 3889	Q = 70F7
Offset 507	1fb	I = 1982	Q = 1C7C
Offset 508	1fc	I = 4FE4	Q = 5104
Offset 509	1fd	I = 2FC2	Q = 6D5A
Offset 510	1fe	I = 422	Q = 8B0
Offset 511	1ff	I = 2EFA	Q = 1AAB

E

Notes

E

Index

Numbers

A

B

C

D

E

F

G

H

I

L

M

R

S

T

U

V

W

X