MDR-8000

Microwave Digital Radios
Users Manual

Alcatel Part Number 3EM11931AA
Issue 9, December, 2007

3400 West Plano Parkway
Plano, Texas 75075-5813 U.S.A.

NORTH AMERICA CUSTOMER SERVICE CENTER
24 HOURS PER DAY, 7 DAYS PER WEEK

PHONE the Call Center at
888-252-2832 (US and Canada)
or
613-784-6100 (International)

The Call Center Agent (CSA)
Will help connect you with Technical Assistance (TAC)
Or assist you with a Repair and Return

TAC

- Phone-based technical support
- After-hour emergencies
- On-site technical support
- E-mail support ml-tac.support@alcatel-lucent.com
- Software and hardware upgrades

Repair and Return

- Module repair

Other Services Offered

- **Training** http://www.alcatel-lucent.com>support
  - Technical Training
- **Field Services**
  - Installation and test
- Registration http://www.alcatel-lucent.com>MyAccess
  - Once registered
    - From "MyAlcatel" go to "Alcatel Support Documentation"
    - Register for access to Documentation and e-mail Update notifications For Product Change Notices (PCN), Product Documentations, etc.
  - Software and Hardware upgrade documentation
- **Customized and Comprehensive Service Agreements**

ALCATEL-LUCENT'S PRIMARY MISSION IS SATISFYING OUR CUSTOMERS' QUALITY EXPECTATIONS.

TAC
Technical Assistance Center

Telephone Assistance, Normal Working Hours (CST 8am 5pm M-F)
TAC supports all Alcatel North America Microwave products. This includes routine questions and emergency service.

Telephone Assistance, Emergency After-Hours
- Defined as loss of traffic, standby equipment, or network visibility on traffic-bearing systems.
- Available through our Customer Service Agents (CSA).

Contact Information Ask the Customer Service Agent (CSA) for a Microwave (MW) or a Network Management Service engineer (NMS).

Creating a TAC Action Request (AR)

Please provide the following information to the Customer Service Agent (CSA):

- Last and First name
- Company name
- Telephone number
- City and state (Street address if applicable) or Site Name and Location
- Equipment type
- A brief description of the problem affecting their equipment
- **Customer Priority:** *High, Medium,* or *Low.*
- TL-9000 Severity as described below.

TL-9000 Severities Defined

Critical	Problems severely affecting service, traffic, capacity, or network management. They require **immediate corrective action**. (Ex. Loss of network management capability, loss of traffic imminent or existing).
Major	Conditions **seriously affecting** system operation. They require **immediate attention**. (Ex. processor outage, loss of standby equipment, loss of remote access, or network managers).
Minor	Problems not classified as critical or major.

Table of Contents

Page

Section 5 Maintenance

Note

The information contained in this section is a summary of the section with the same title, but not the same section number, on the enclosed CD. "Refer to Cd" is used throughout this section to refer the reader to the detail information on the CD. Go to this section on the CD for interactive links to the detail information referred to in this section.

4 INITIAL TURNUP

4.1 SECTION INTRODUCTION

This section describes the procedures required to turn up the MDR-8000 Microwave Digital Radios after installation.

This provisioning part of the section describes provisioning options available with the MDR-8000 software application. Provisioning allows for the definition, editing, and storing of specific functions. The MDR-8000 provides the ability to provision equipment and facilities through a series of Windows™-based screens and messages. The Provisioning menu lists equipment and functions which may be provisioned. You should use only those provisioning screens that are applicable to your radio.

4.2 RECOMMENDED SEQUENCE

Perform the following initial turnup procedures in sequence:

A. Install software on PC.

Note

Software installed at the factory before delivery should not be overwritten by downloading to the radio controller at initial turnup. Refer to Maintenance section on the attached CD for procedure to upgrade existing software.

B. Turn on the radio.

C. Establish communication between radio and USI computer.

Note

Saving provisioning on disk provides a reference for any future provisioning changes.

D. Provision radio.

4.3 SECURITY MANAGEMENT

Note

A password is not required to operate the MDR-8000. The radio is shipped without a password and if a password is desired, it must be entered using the Change Password screen. Once entered initially, the password must be entered each time the user wants to access the provisioning screens (level 1 password required) or download software (level 2 password required).

The MDR-8000 application software offers user password security management using two different levels of passwords. User security deals with access level assigned to specific users. The level of user security affects the type and number of commands an individual user may execute. This prevents an unqualified user's access to high-level commands.

Level 1 password allows the user to perform all tasks except downloading software. Level 2 password allows access to all functions and is the highest level.

4.4 LOAD MDR-8000 SOFTWARE ON PC

Before operating the user system interface (USI) for the first time, the programs contained on the CD ROM must be installed on the PC. The installation process configures the PC for its unique requirements and prepares it to run the program.

A. Insert CD ROM disk into PC.

B. On Windows desktop, double click on **My Computer** icon. **My Computer** window displays.

C. In **My Computer** window, click on **CD ROM** icon. Files window displays

D. See Figure 4-1. Follow directions and load USI software on PC.

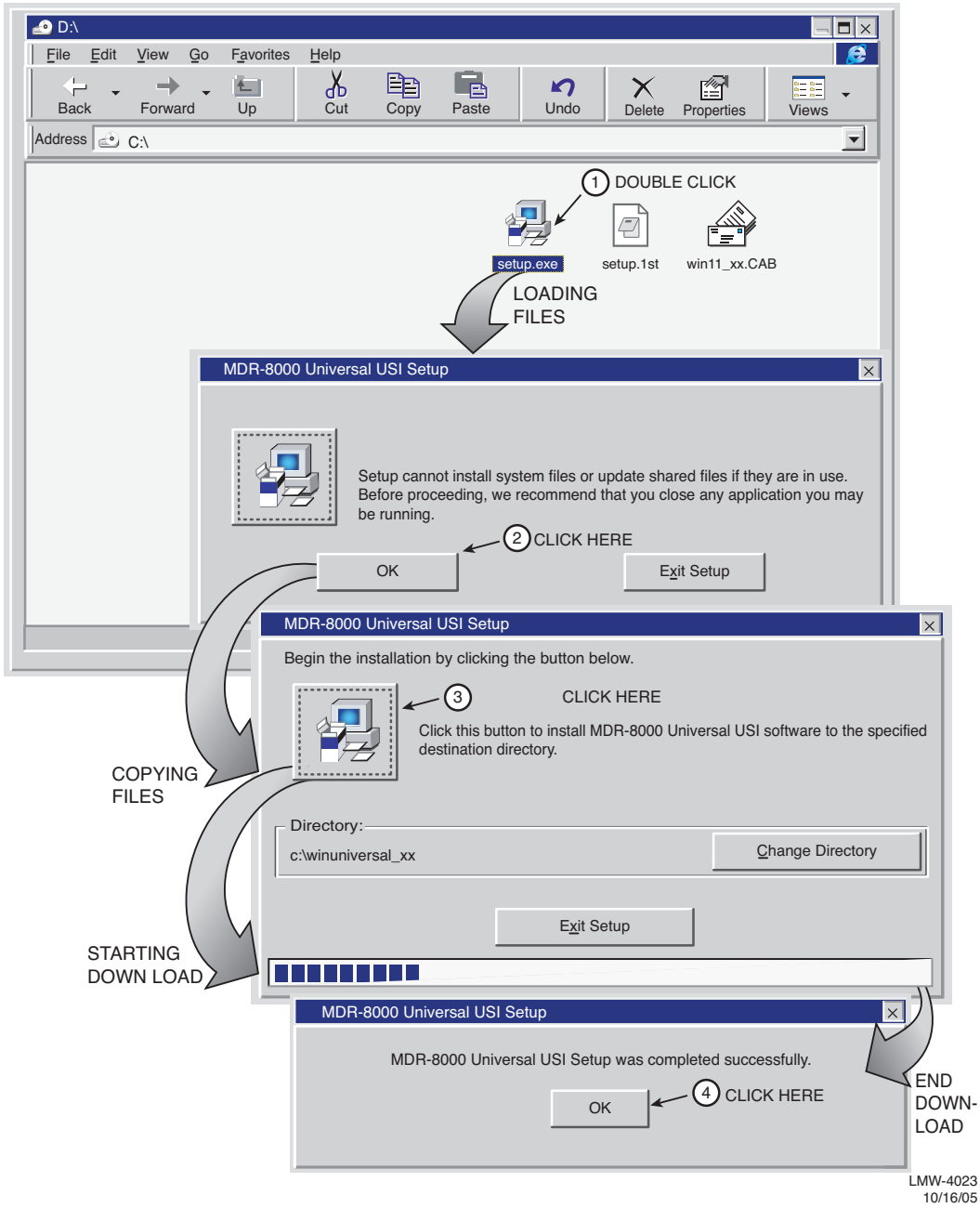


Figure 4-1 Load USI Software on PC

4.5 TURN-ON PROCEDURE

Note

For user safety, user should become familiar with locations of power distribution units and circuit breakers associated with the MDR-8000 radio.

Perform the following procedure to turn on the radio.

A. On power supply module, set **PA ON/OFF** switch to **OFF**. Yellow **PA OFF** indicator will light.

B. On power supply module, set **POWER ON 1/OFF 0** switch to **ON 1**.

C. On power supply module, set **PA ON/OFF** switch to **ON**. Yellow **PA OFF** indicator will turn off.

Note

Until both the local and farend radios in the hop are turned on and operating properly and the RF path has been established, alarm conditions will exist.

D. Observe CHAN ALM indicator on RCVR module is lit.

E. Wait for RCVR to lock on frequency. When RCVR is locked on frequency (approximately 5 to 30 seconds), CHAN ALM indicator on RCVR module will turn off.

F. Verify all front panel alarm indicators on radio shelf are off. If not, refer to Maintenance section for troubleshooting.

4.6 ESTABLISH COM PORT

Establish communication between the USI computer and the controller in the radio.

Note

Disable infrared option on laptop (if equipped) to prevent disrupting communication on com port.

A. Connect RS-232 interface cable between USI connector on controller and PC. See Figure 4-2.

B. On Windows desktop, click on **Start** icon. Program menu displays.

Note

Only one COM port can be used at a time.

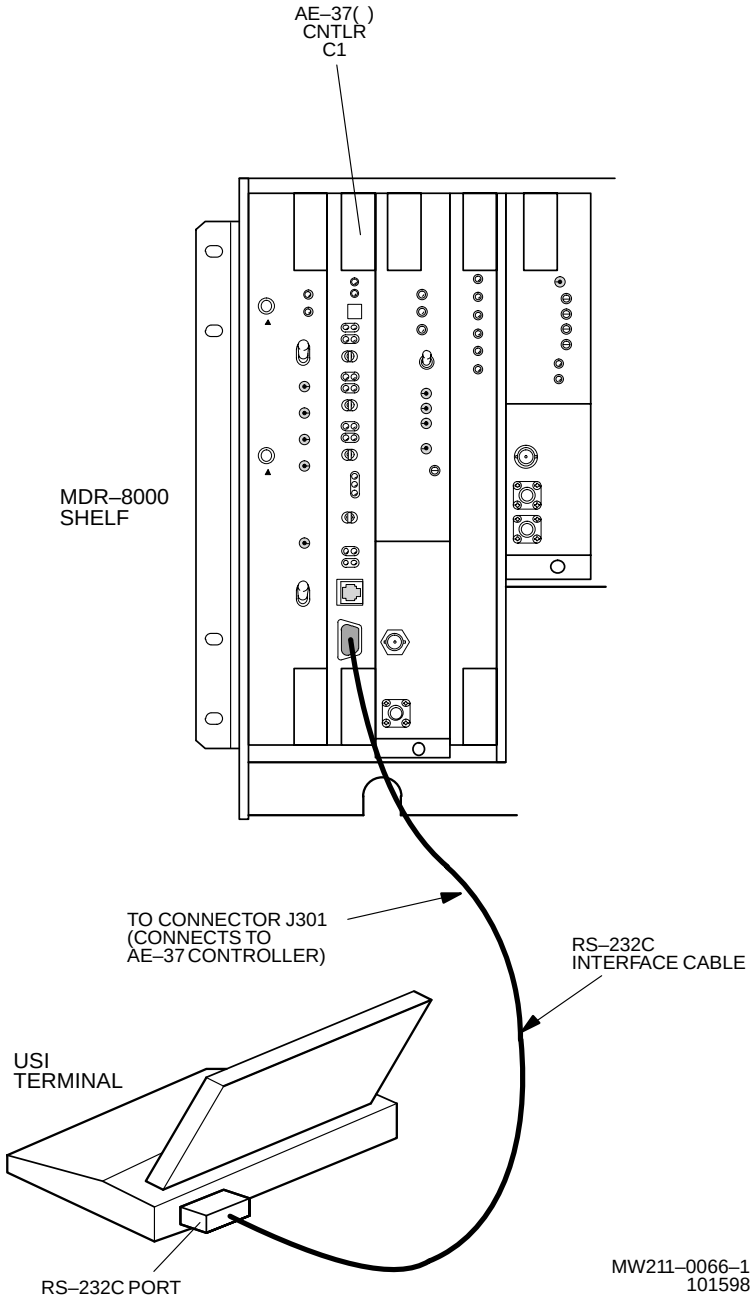


Figure 4-2 USI Computer Hookup

C. On Program menu, click on Win USI program. Win USI screen displays with message COMMUNICATING to indicate PC is communicating with the radio controller. If COMMUNICATION DOWN message is displayed, perform procedure shown on Figure 4-3 to change COM port.

D. STOP. This procedure is complete.

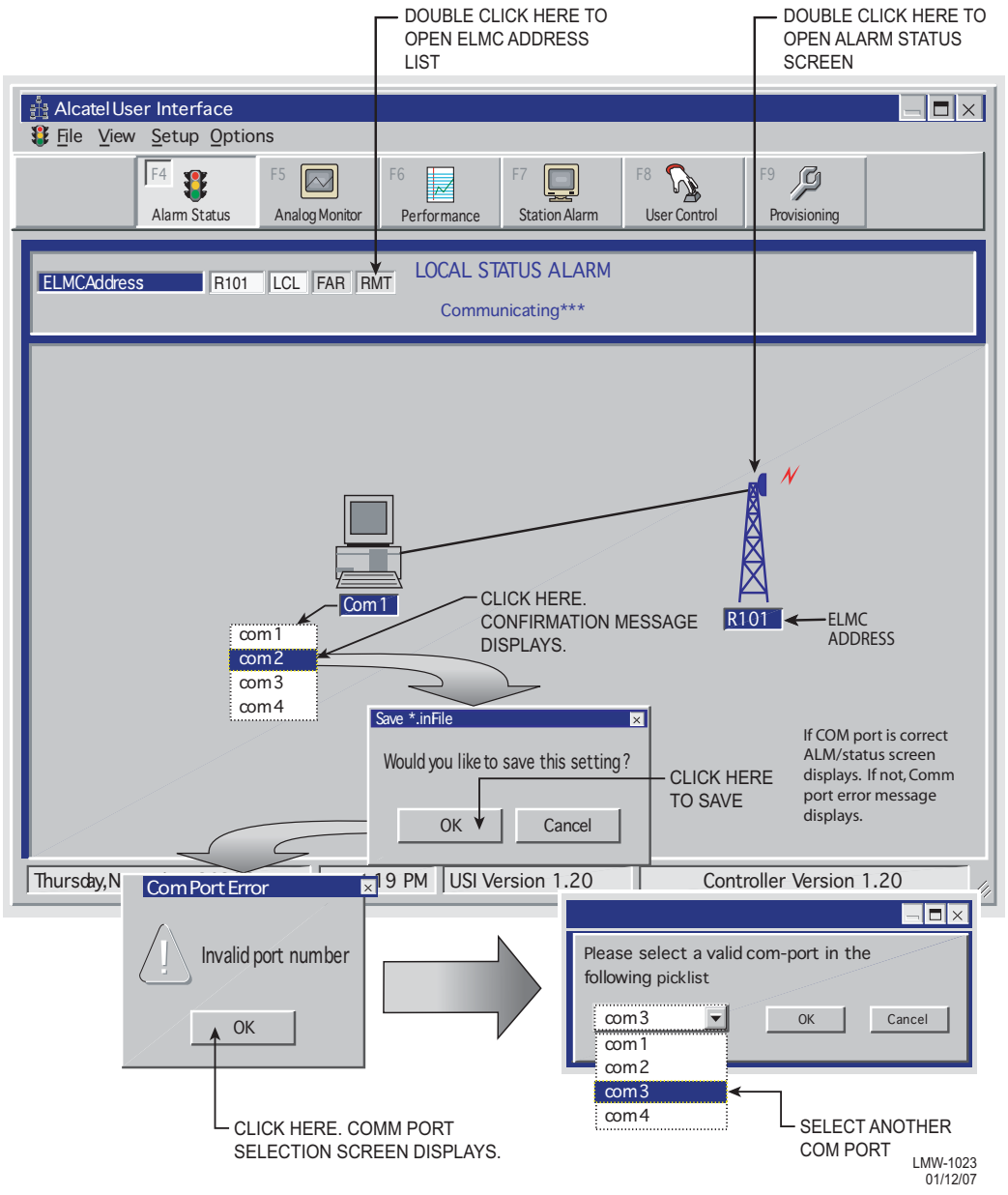


Figure 4-3 Communications Port Setup

4.7 TEST PROCEDURES

The radio has been properly aligned and tested at the factory before shipment eliminating the need for testing after initial turn-up. The only time testing and/or adjustment is required is after a maintenance action such as removal and replacement procedure and/or constant alarms requiring corrective maintenance action. The completed maintenance action procedure(s) will reference any required test procedure(s).

4.8 PROVISIONING RADIO

Note

Changes to provisioning do not have to be made in any particular order.

Open radio provisioning screens. On main screen, double click on tower icon. Status and alarm screen displays. Click on Provisioning. Check current provisioning and change as required. See Figure 4-4 for recommended sequence.

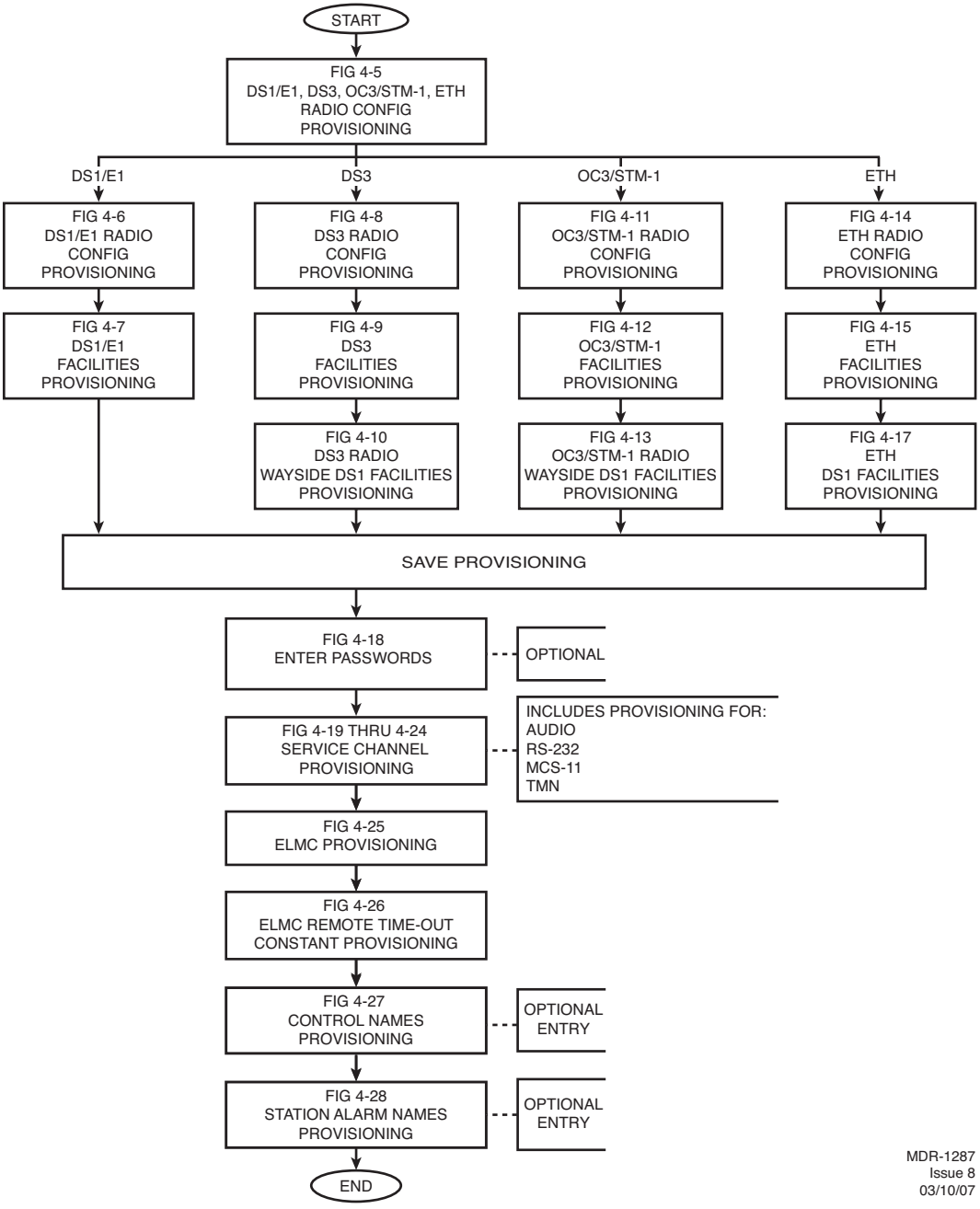


Figure 4-4 Provisioning Sequence

Note

Screen for OC3 radio is shown. DS1/E1, DS3, SNMP, and ETH radio configuration is similar.

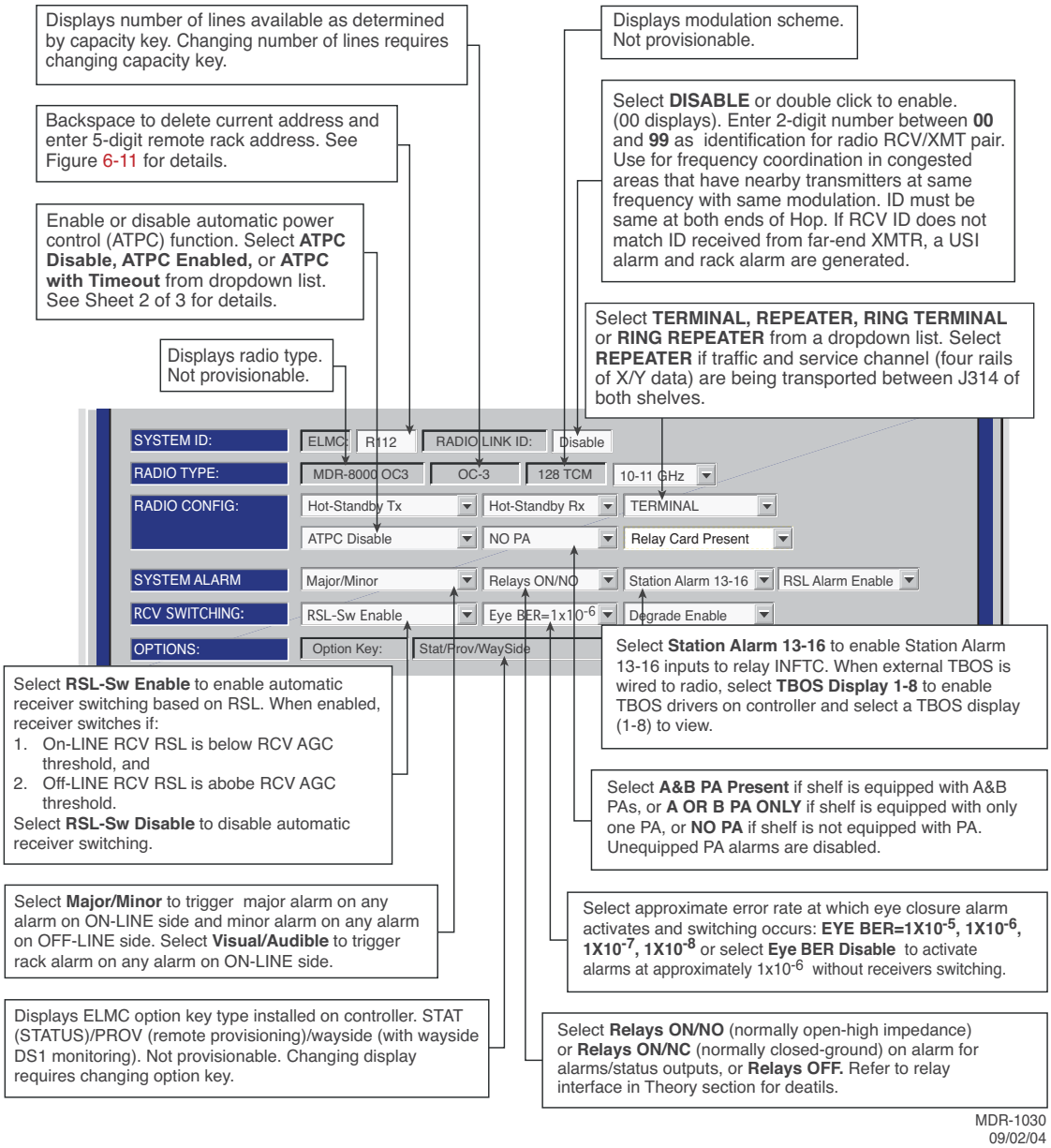


Figure 4-5 DS1/E1, DS3, OC3/STM-1, ETH Radio Configuration Provisioning (Sheet 1 of 2)

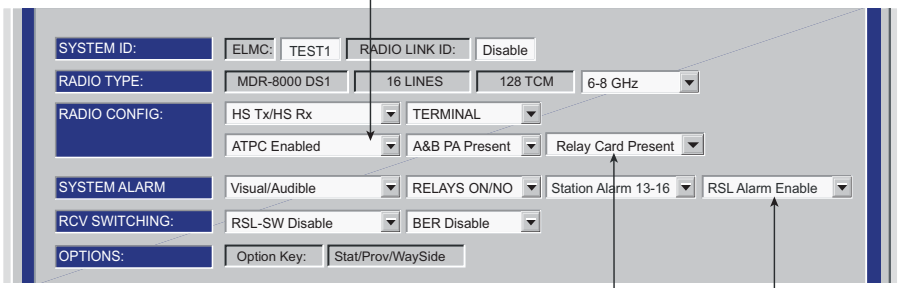
Note

Screen shown is for DS1 Radio. E1, DS3, OC3/STM-1, and ETH radio configuration provisioning is similar. Changes to provisioning do not have to be made in any particular order.

NOTES

1. ATPC T/O IS A CMD PATH FUNCTION PERFORMED AT XMTR.
2. ATPC TRACKS RCVR WITH HIGHEST LEVEL.
3. LOW POWER ATPC IS 10dB DOWN FROM HIGH POWER.

SELECT **ATPC** OR **ATPC T/O** ENABLE AUTOMATIC XMT POWER CONTROL (ATPC) FUNCTION. WHEN PROVISIONED **ATPC** OR **ATPC T/0**, ONE RCVR OUT-OF-LOCK CAUSES HIGH POWER ATPC FOR 10 SECONDS EVERY ONE MINUTE. IF BOTH RCVRS ARE OUT-OF-LOCK, ATPC GOES TO HIGH POWER AND STAYS AT HIGH POWER UNTIL ONE RCVR (REVERTS TO ONE RCVR OUT-OF-LOCK MODE) OR BOTH RCVRS LOCK. WHEN PROVISIONED **ATPC T/O** (TIMEOUT), IF CMD PATH IS LOST, ATPC GOES TO HIGH POWER FOR FIVE MINUTES THEN GOES TO LOW POWER. THEN, EVERY HOUR, ATPC GOES HIGH FOR 10 SECONDS AND THEN GOES TO LOW POWER. THIS CONTINUES UNTIL THE CMD PATH IS RESTORED. SELECT **DISABLE** TO DISABLE ATPC FUNCTION.

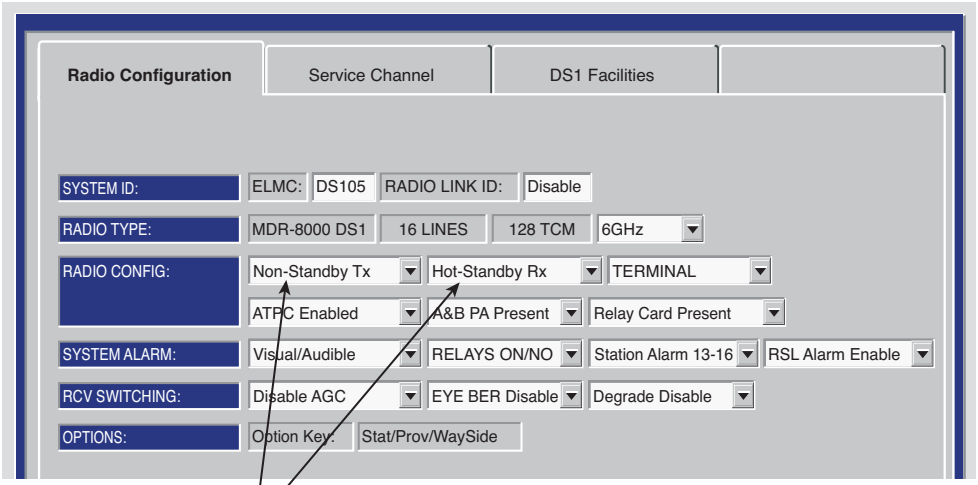


SELECT **Relay Card Present** IF SHELF IS EQUIPPED WITH A RELAY INTFC MODULE. SELECT **Relay Card Not Present** IF SHELF IS NOT EQUIPPED WITH A RELAY INTFC CARD.

SELECT **RSL Alarm Enable** TO ENABLE ALARM ON USI ALARM AND STATUS SCREEN WHEN RSL DROPS BELOW THRESHOLD. SELECT **RSL Alarm Disable** TO INHIBIT ALARM.

MDR-1031
12/06/07

Figure 4-5 DS1/E1, DS3, OC3/STM-1, ETH Radio Configuration Provisioning (Sheet 2 of 2)



SELECT ONE ON EACH

None Non-Standby Tx Hot-Standby Tx Freq-Diversity Tx	+	None Non-Standby Rx Hot-Standby Rx Space-Diversity Rx Freq-Diversity Rx	=	Resulting Configurations NS Tx/NS Rx NS Tx/HS Rx } (Refer to CD) NS Tx/SD Rx HS Tx/HS Rx (See Example 1) HS Tx/SD Rx (See Example 2) FREQ DIV (Refer to CD).

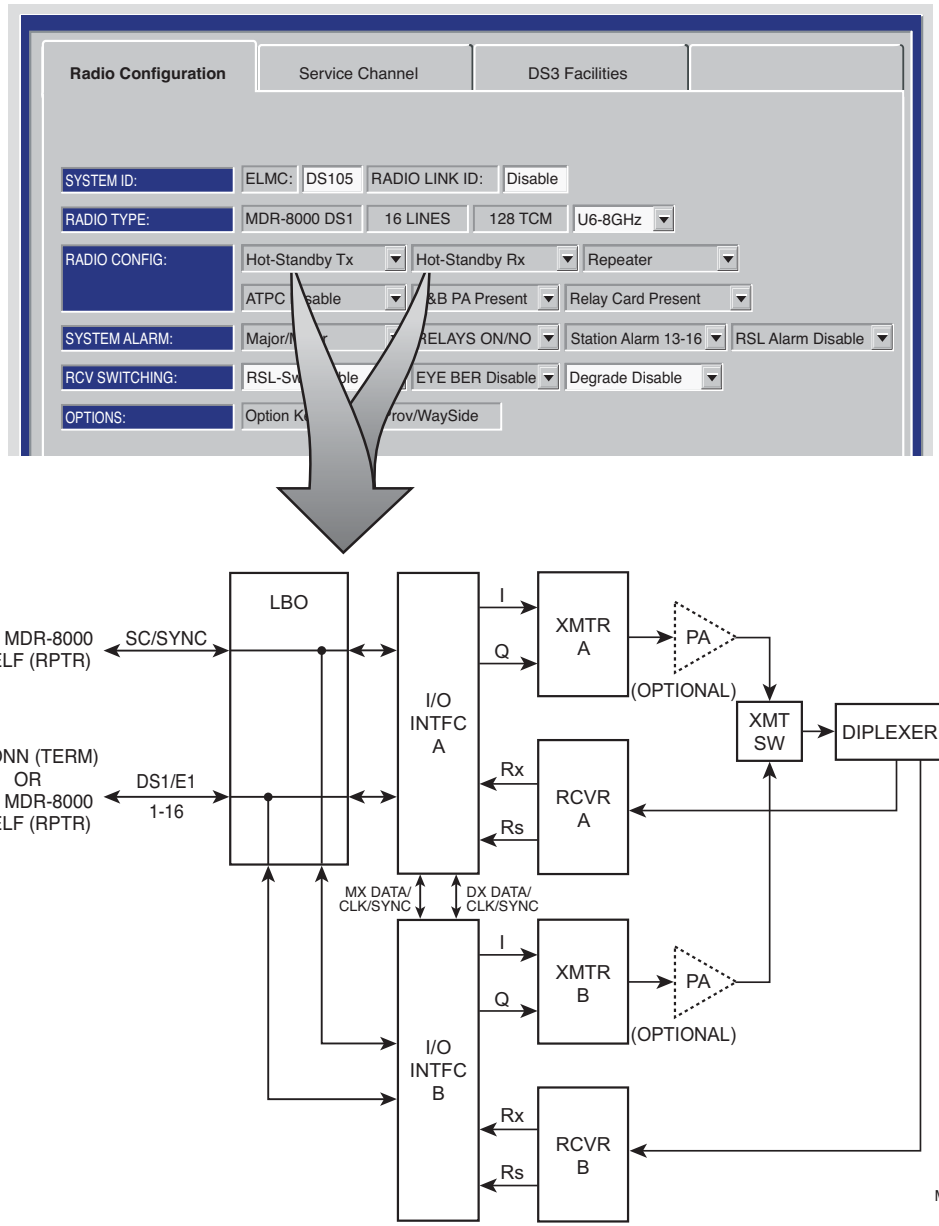
NS = Non-Standby
HS = Hot-Standby
SD = Space Diversity

Note

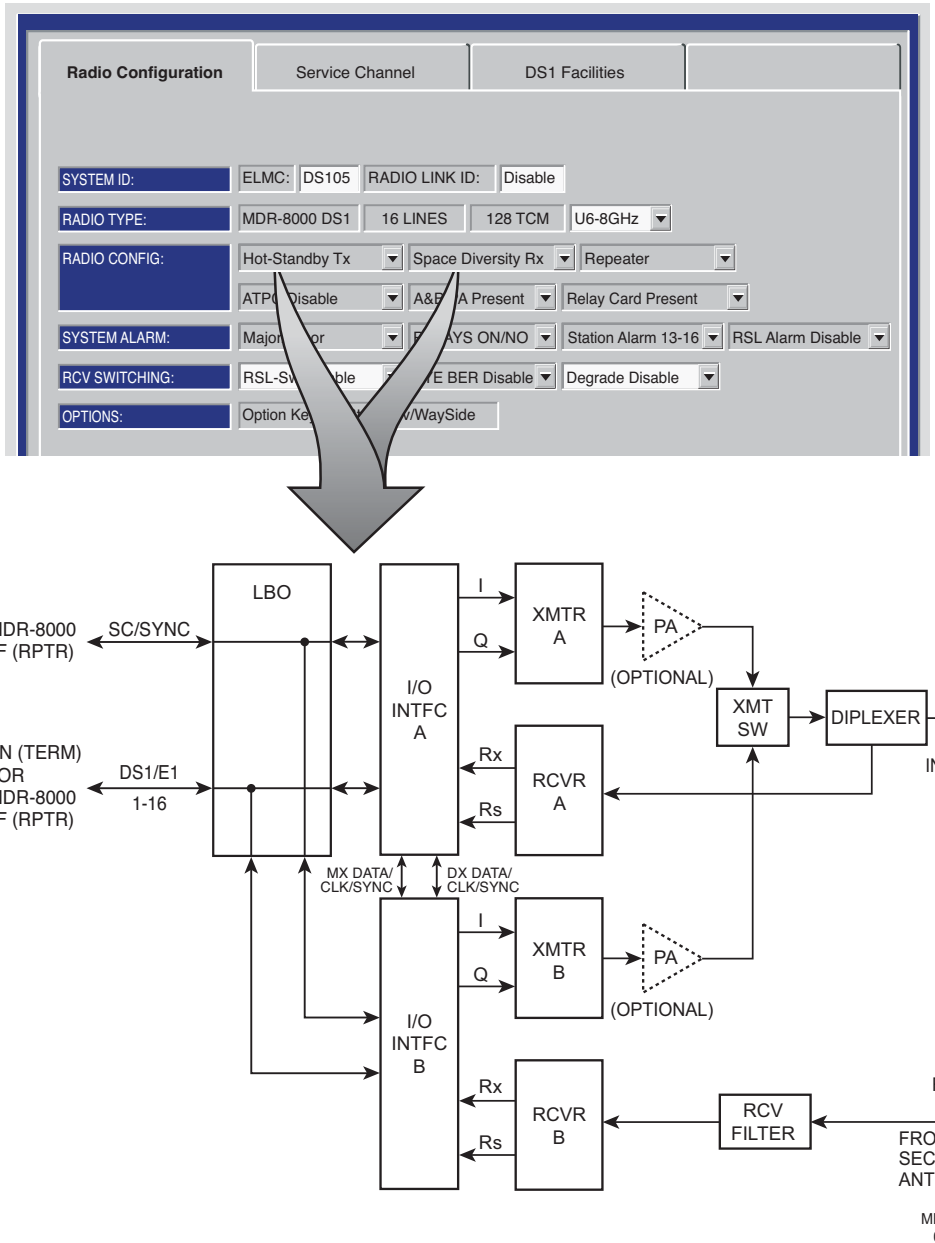
Any combination can be selected. Select **Prov Save** *and an Invalid Configuration box/message displays if combination selected results in an invalid configuration.*

MDR-1157
03/10/07

Figure 4-6 DS1/E1 Radio Configuration Provisioning



DS1/E1 PROVISIONING EXAMPLE 1: HS Tx/HS Rx



DS1/E1 PROVISIONING EXAMPLE 2: HS Tx/SD Rx

Note

If installation at both ends of a hop are complete except for connecting to customer inputs/outputs and it is desirable to have an alarm-free system, alarm reporting on the incomplete connections can be disabled temporarily through provisioning. You can communicate over the hop even if you do not have the radio connected to customer DS1 inputs; however, you will alarm unless you select **OFF** *to disable* **INSERT CHANNEL** *(located on the USI DS1 Facilities screen) for all equipped lines. Disabling the DS1 insert function disables both the lines and alarm reporting for the lines. After all customer connections are complete, alarm reporting can be restored to normal. To restore alarm reporting to normal, set* **INSERT CHANNEL** *on DS1 Facilities screen to* **ON**.

SELECTING *ON* INSERTS LOCAL DATA AND TURNS ON THE SELECTED CHANNEL.
SELECTING **OFF** TURNS OFF LOCAL DATA INSERT AND TURNS OFF LINE INPUT ALARM REPORTING ON THE SELECTED CHANNEL.
SELECTING **NM** INSERTS AN AIS SIGNAL AND TURNS OFF LINE INPUT ALARMS ON THE SELECTED CHANNEL.

- ALWAYS SELECT ON WHEN LOCAL DATA IS INSERTED.
- ALWAYS SELECT OFF AT EITHER A TERMINAL OR A NON-PROTECTED REPEATER WHEN LOCAL DATA IS NOT INSERTED.
- ONLY SELECT **NM** ON UNUSED CHANNELS AT PROTECTED REPEATERS.

UNUSED CHANNELS ARE DEFINED AS CHANNELS THAT HAVE NEITHER LOCALLY INSERTED DATA NOR PASS-THRU DATA ACROSS THE REPEATER CABLE. SELECT OFF IF LOCAL DATA IS NOT INSERTED AND THE CHANNEL HAS PASS-THRU DATA ACROSS THE REPEATER CABLE (NOTE: SELECTING NM IN THIS CASE WILL CAUSE THE DATA FROM THE REPEATER TO BE OVERWRITTEN WITH AN AIS SIGNAL PRIOR TO TRANSMISSION).

USING THE REPEATER CABLE TO PASS DS1 DATA ON CHANNELS 5-16 IS NOT RECOMMENDED ON MDR-8000 RADIOS. PASSING THE DATA THROUGH ON THESE CHANNELS WILL PREVENT INDEPENDENT SWITCHING BETWEEN THE DS1 I/O AND THE RADIO TRANSMITTERS. THE DATA SHOULD BE DROPPED AND REINSERTED AT EACH REPEATER NODE.

Note

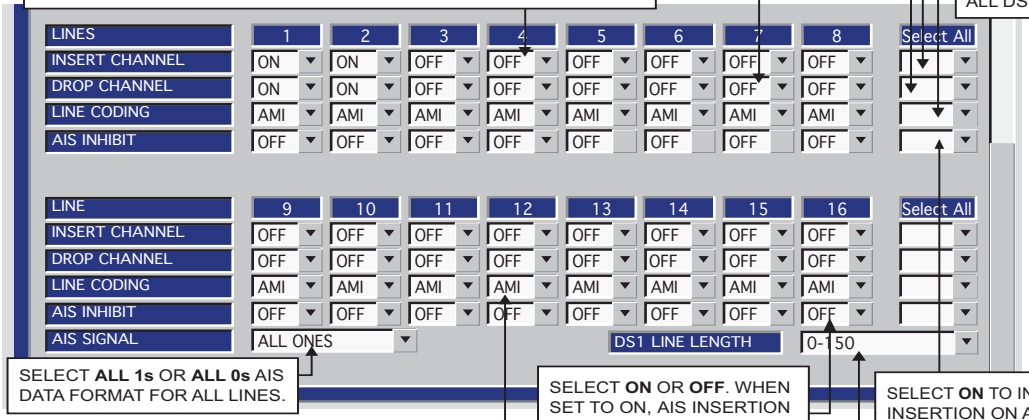
The term "LINE" is used to describe an input/output signal at DS1/E1 rate (1.544 MB/S 2.043 MB/S). The term "CHANNEL" is used to describe a multiplexed signal, at a higher rate than DS1/E1. The inserted channel is output of multiplexer circuit. The dropped channel is input to demultiplexer circuit. The multiplexer and demultiplexer circuits are located on I/O interface module.

SELECT **ON** TO DROP ALL LINES OR **OFF** TO DISABLE ALL LINES AND ALARMS.

SELECT **ON** TO INSERT ALL LINES OR **OFF** TO DISABLE ALL LINES AND ALARMS.

FOR EACH LINE, SELECT **ON** TO DROP LINE OR **OFF** TO DISABLE LINE AND ALARMS.

SELECT **AMI** OR **B8ZS** CODING FOR ALL DSI LINES



SELECT **ALL 1s** OR **ALL 0s** AIS DATA FORMAT FOR ALL LINES.

SELECT **ON** OR **OFF**. WHEN SET TO ON, AIS INSERTION IS INHIBITED ON SELECTED DS1/E1.

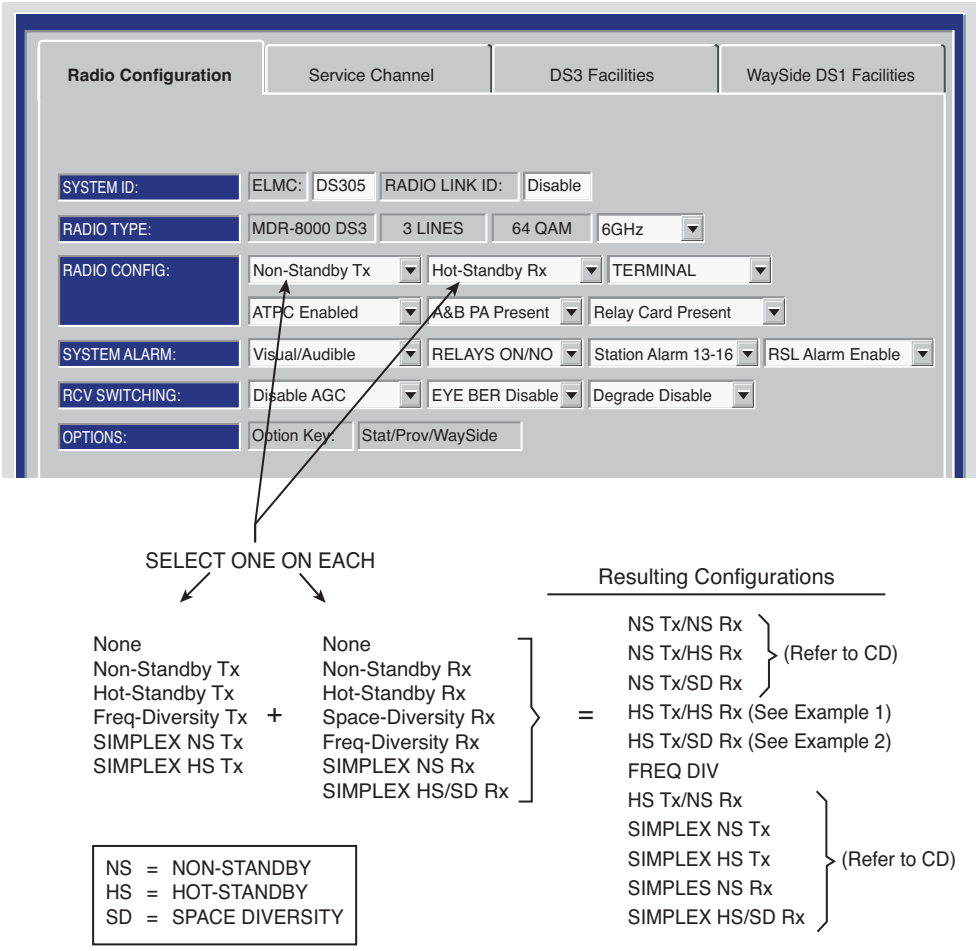
SELECT **ON** TO INHIBIT AIS INSERTION ON ALL LINES. SELECT **OFF** TO ENABLE AIS INSERTION ON ALL LINES.

SELECT **AMI** OR **B8ZS** CODING FOR EACH DS1 LINE. E1 LINE CODING IS ALWAYS HDB3.

FOR ALL DS1 LINES, SELECT RANGE THAT MATCHES ACTUAL DISTANCE TO CROSS-CONNECT **0-150 (TEO OFF), 150-330 (TEO ON), 330-480 (TEO OFF)** OR **480-660 (TEO ON)** FT. FOR E1, NO DISTANCE IS DISPLAYED.

LMW-3020
04/04/07

Figure 4-7 DS1/E1 Facilities Provisioning

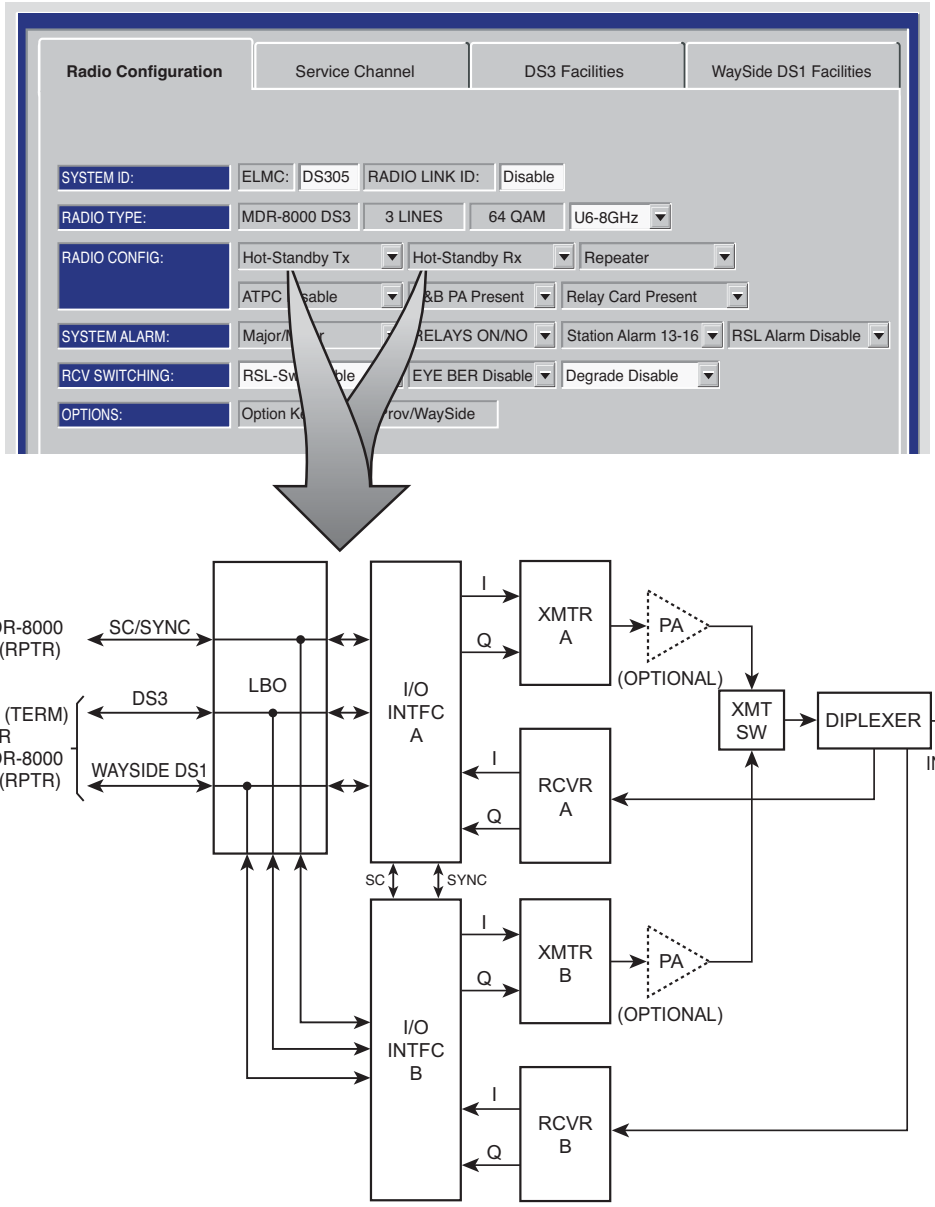


Note

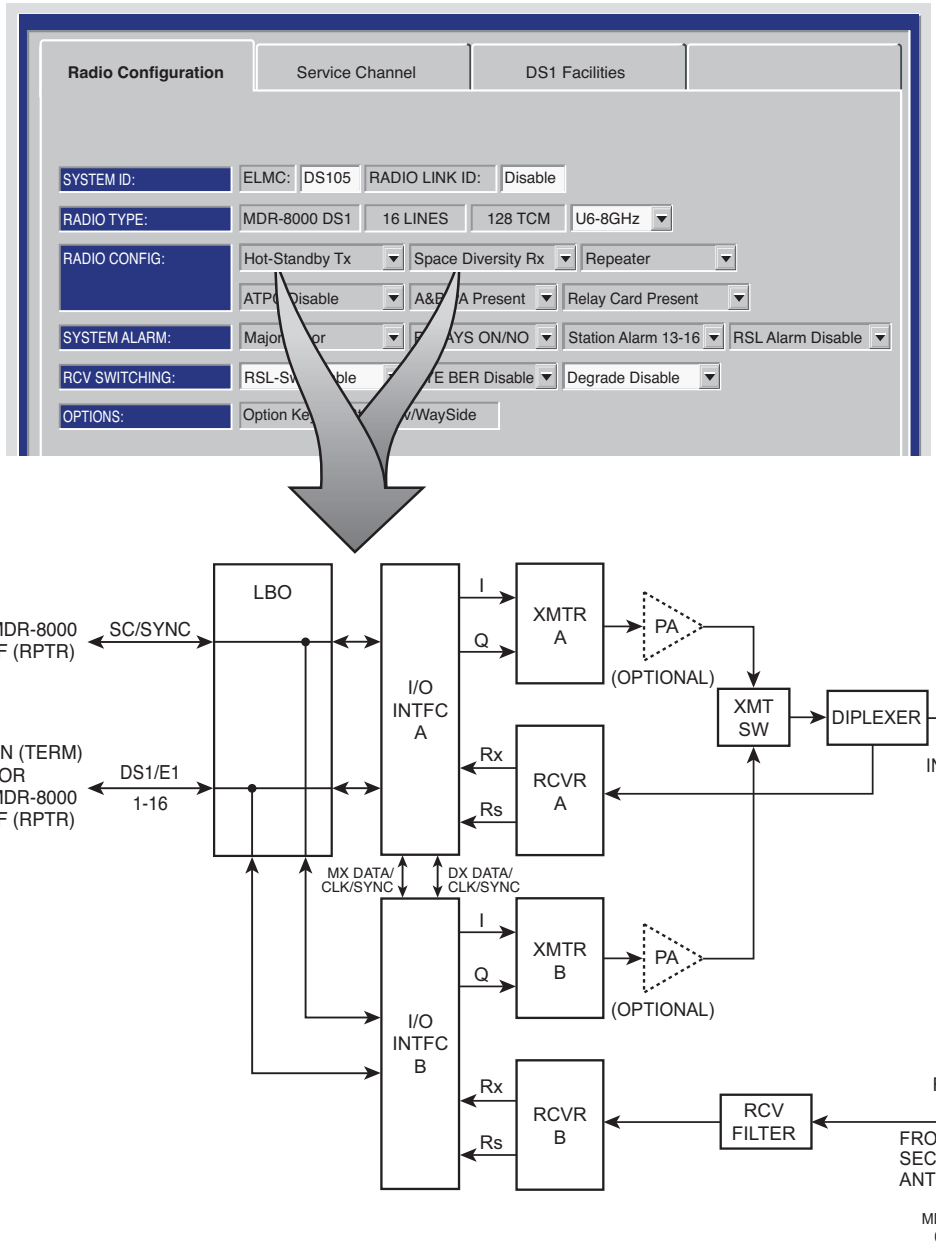
Any combination can be selected. Select **Prov Save** *and an Invalid Configuration box/message displays if combination selected results in an invalid configuration.*

MDR-1129
03/10/07

Figure 4-8 DS3 Radio Configuration Provisioning



DS3 PROVISIONING EXAMPLE 1: HS Tx/HS Rx



DS3 PROVISIONING EXAMPLE 2: HS Tx/SD Rx

Note

If installation at both ends of a hop are complete except for connecting to customer inputs/outputs and it is desirable to have an alarm-free system, alarm reporting on the incomplete connections can be disabled temporarily through provisioning. You can communicate over the hop even if you do not have the radio connected to customer DS3 and wayside DS1 inputs; however, you will alarm. On the DS3 Facilities screen, set **XMT ALARM DISABLE** *and* **RCV ALARM DISABLE** *to* **ON** *to disable DS3 alarm reporting on the wayside DS1 Facilities screen, set ALARM Lockout to ON to disable alarm reporting for all equipped wayside DS1 lines. After all customer connections are complete, alarm reporting can be restored to normal.*

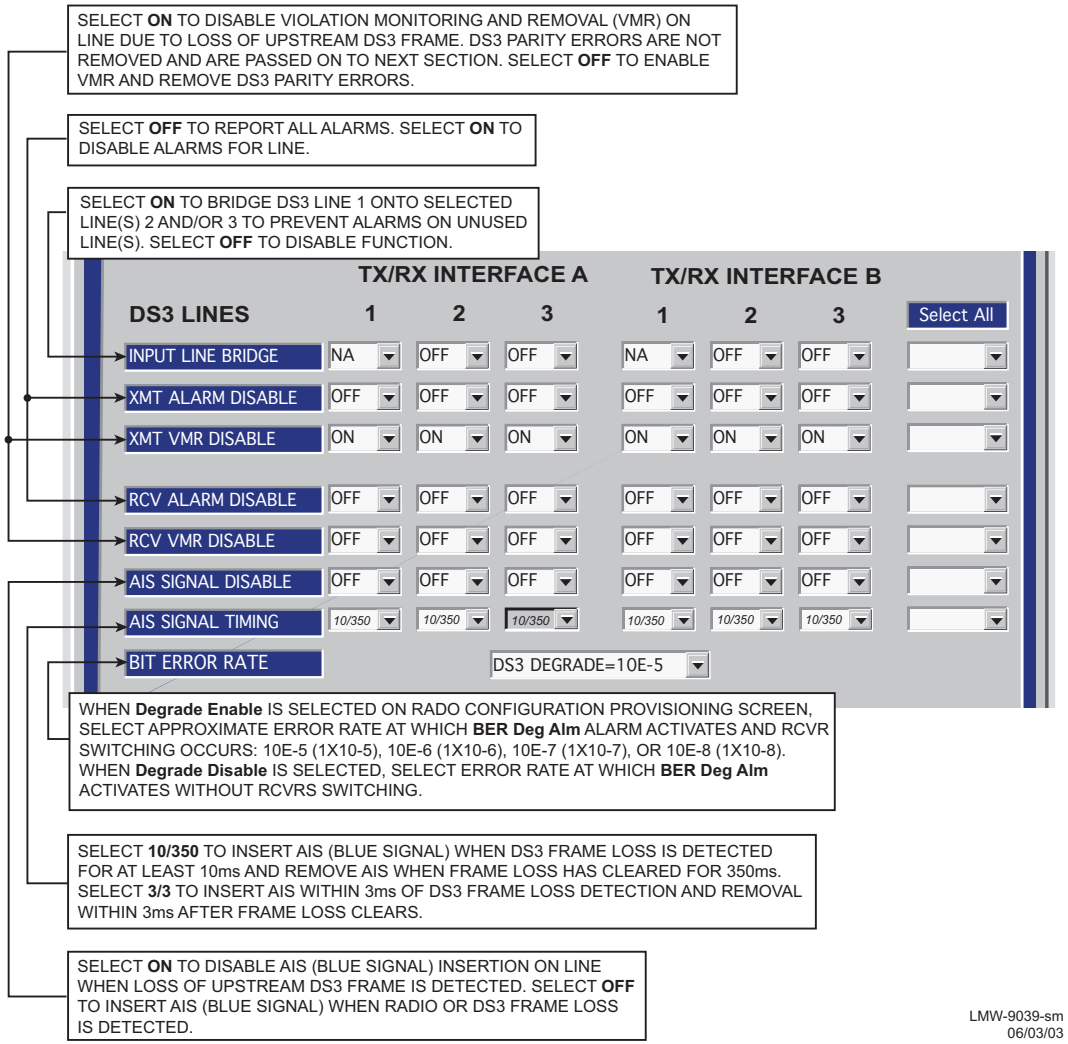


Figure 4-9 DS3 Facilities Provisioning

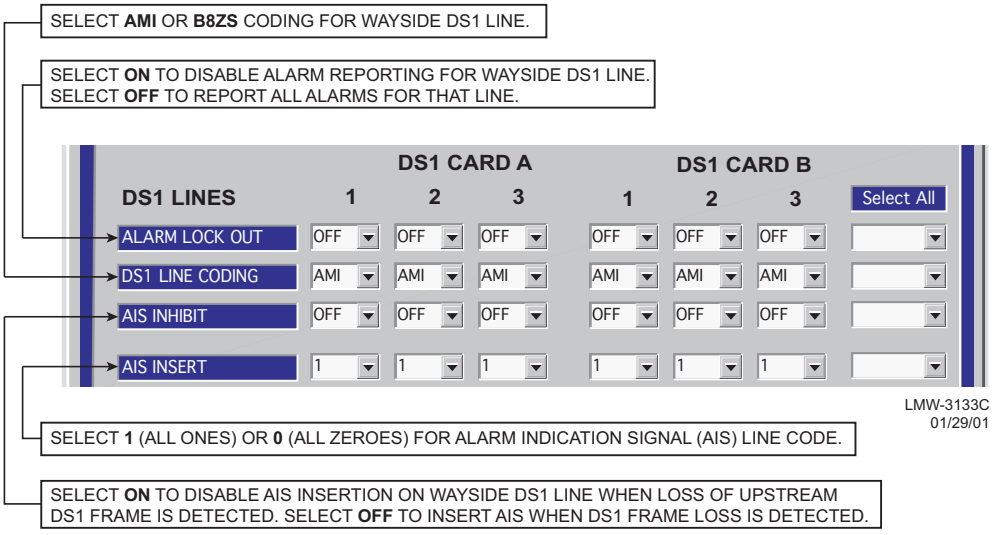
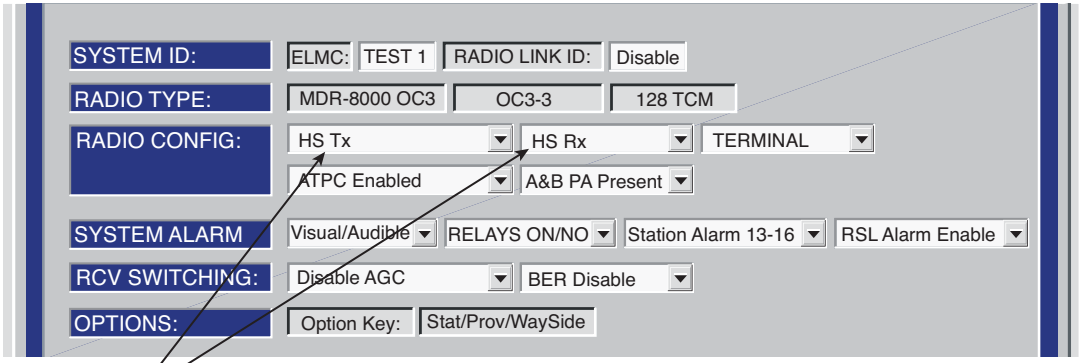


Figure 4-10 DS3 Radio Wayside DS1 Facilities Provisioning



SELECT ONE ON EACH

None
NS Tx
HS Tx
FD Tx

+

None
NS Rx
HS Rx
SD Rx
FD Rx

+

SELECT FIBER CONFIGURATION

2 Fiber
2 Fiber Switched
4 Fiber
4Fiber Switched

FIBER CONFIGURATION IS SELECTED ON OC3 FACILITIES PROVISIONING SCREEN (FIG 7-6).

TO =

NS = NON-STANDBY
HS = HOT-STANDBY
SD = SPACE DIVERSITY
SW = SWITCHED

Resulting Configurations

None/ NS Rx/2 Fiber
None/HS Rx/2 Fiber
None/HS Rx/2 Fiber SW
None/HS Rx/4 Fiber SW
None/SD Rx/2 Fiber
None/SD Rx/2 Fiber SW
None/SD Rx/4 Fiber SW
None/FD Rx/2 Fiber
None/FD Rx/2 Fiber SW
None/FD Rx/4 Fiber
NS Tx/None/2 Fiber
NS Tx/NS Rx/2 Fiber
NS Tx/HS Rx/2 Fiber
NS Tx/HS Rx/2 Fiber SW
NS Tx/HS Rx/4 Fiber SW
NS Tx/SD Rx/2 Fiber
NS Tx/SD Rx/2 Fiber SW
NS Tx/SD Rx/4 Fiber SW
HS Tx/None/2 Fiber
HS Tx/None/2 Fiber SW
HS Tx/Hs Rx/2 Fiber
HS Tx/HS Rx/2 Fiber SW
* HS Tx/HS Rx/4 Fiber SW
HS Tx/SD Rx/2 Fiber
* HS Tx/SD Rx/2 Fiber SW
HS Tx/SD Rx/4 Fiber SW
FD Tx/None/2 Fiber
FD Tx/None/2 Fiber SW
FD Tx/None/4 Fiber
FD Tx/None/4 Fiber SW
FD Tx/FD Rx/2 Fiber
FD Tx/FD Rx/2 Fiber SW
FD Tx/FD Rx/4 Fiber
FD Tx/FD Rx/4 Fiber SW

* There are a total of 34 configurations available. Only 2 examples are illustrated. Refer to CD for examples of all configurations.

LMW-7033-sm
03/10/07

Figure 4-11 OC3/STM-1 Radio Configuration Provisioning

Note

If installation at both ends of a hop are complete except for connecting to customer inputs/outputs and it is desirable to have an alarm-free system, alarm reporting on the incomplete connections can be disabled temporarily through provisioning. You can communicate over the hop even if you do not have the radio connected to customer OC3 and wayside DS1 inputs; however, you will alarm. On the OC3 Facilities screen, set **Alarm Disable TRANSMITTER (IN) A** *and/or* **B** *and* **RECEIVER (OUT) A** *and/or* **B** *to* **ON** *to disable OC3 alarm reporting for all equipped wayside DS1 lines. After all customer connections are complete, alarm reporting can be restored to normal.*

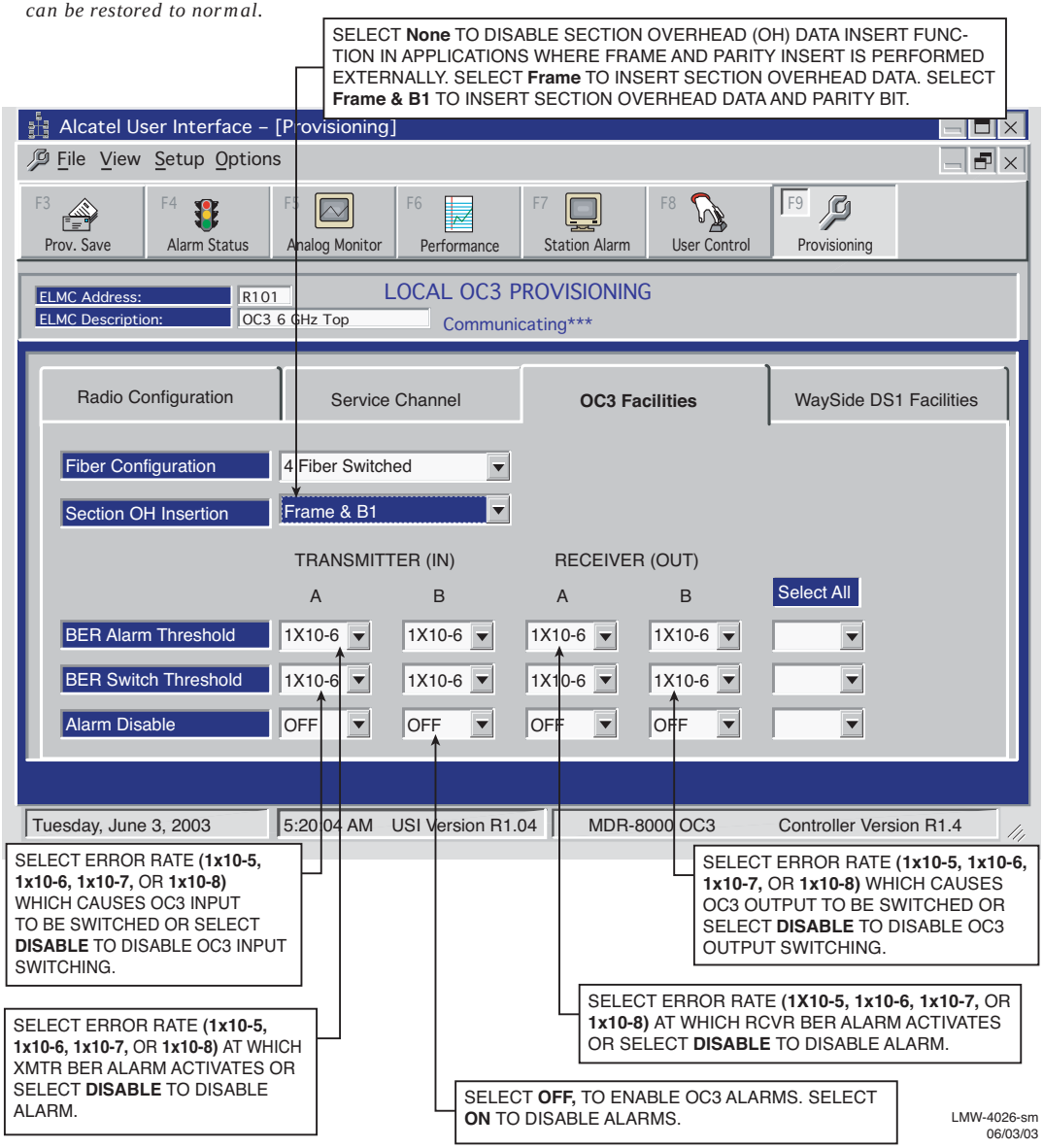
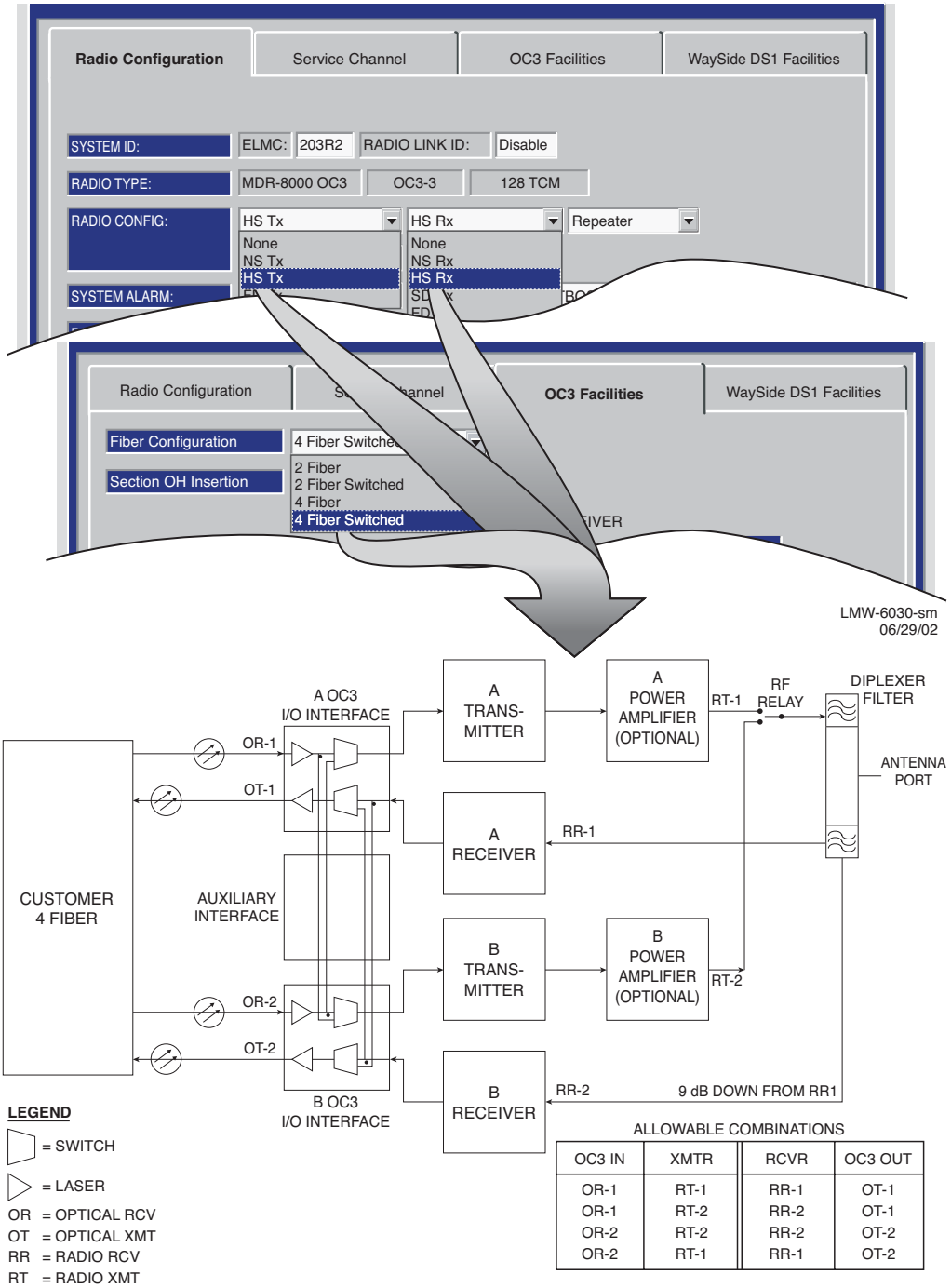
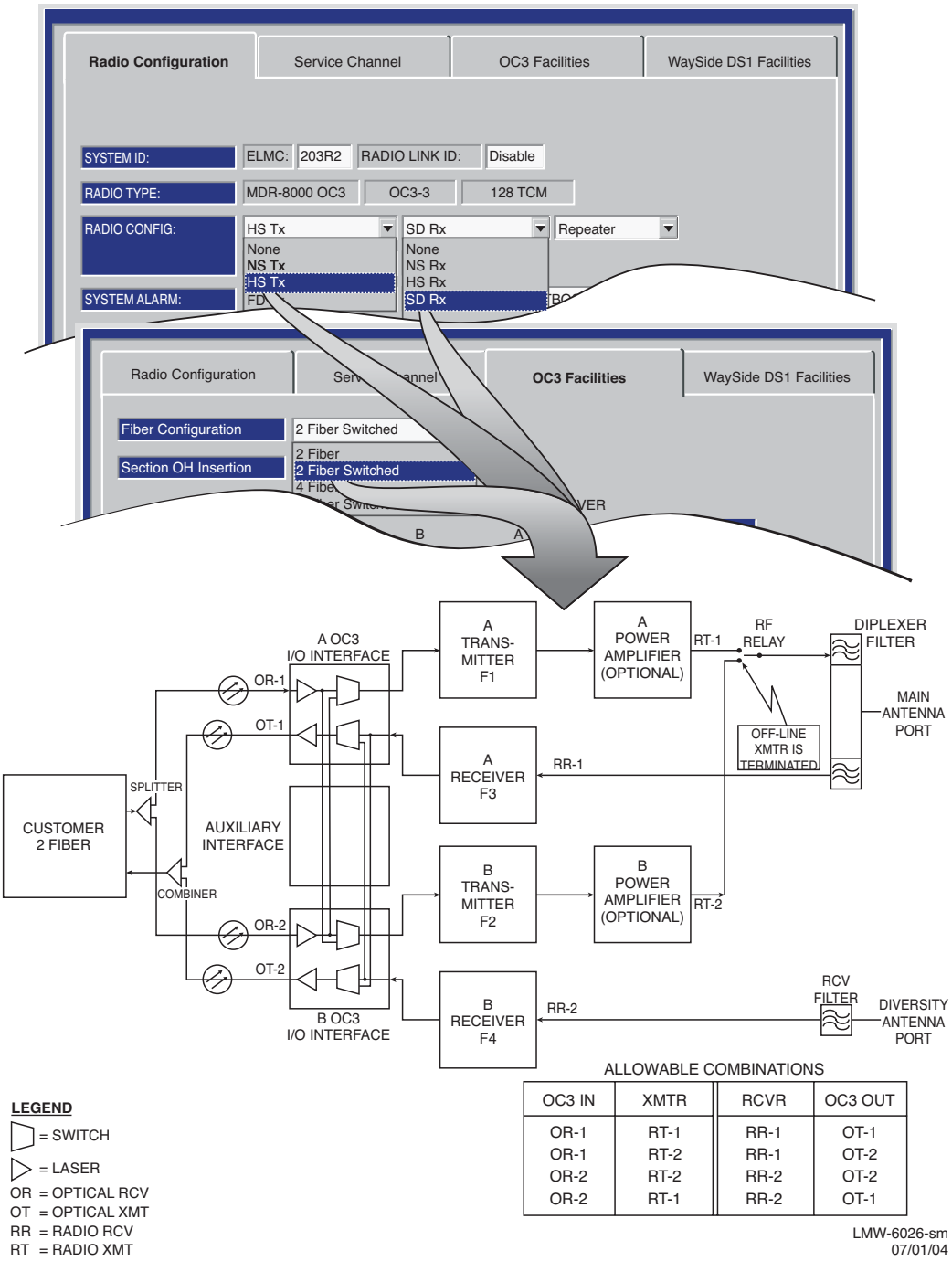


Figure 4-12 OC3/STM-1 Facilities Provisioning



OC3 PROVISIONING EXAMPLE 1: HS Tx/HS Rx/4 Fiber Switched



ALLOWABLE COMBINATIONS

OC3 IN	XMTR	RCVR	OC3 OUT
OR-1	RT-1	RR-1	OT-1
OR-1	RT-2	RR-1	OT-2
OR-2	RT-2	RR-2	OT-2
OR-2	RT-1	RR-2	OT-1

LEGEND

= SWITCH

= LASER

OR = OPTICAL RCV
OT = OPTICAL XMT
RR = RADIO RCV
RT = RADIO XMT

LMW-6026-sm
07/01/04

OC3 PROVISIONING EXAMPLE 2: HS Tx/SD Rx/2 Fiber Switched

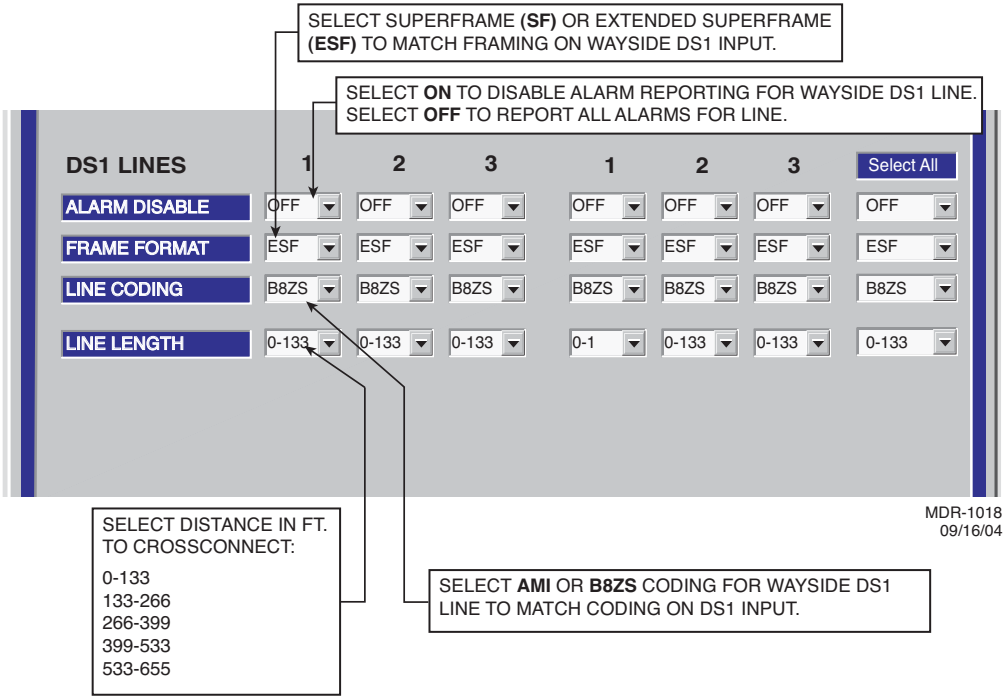
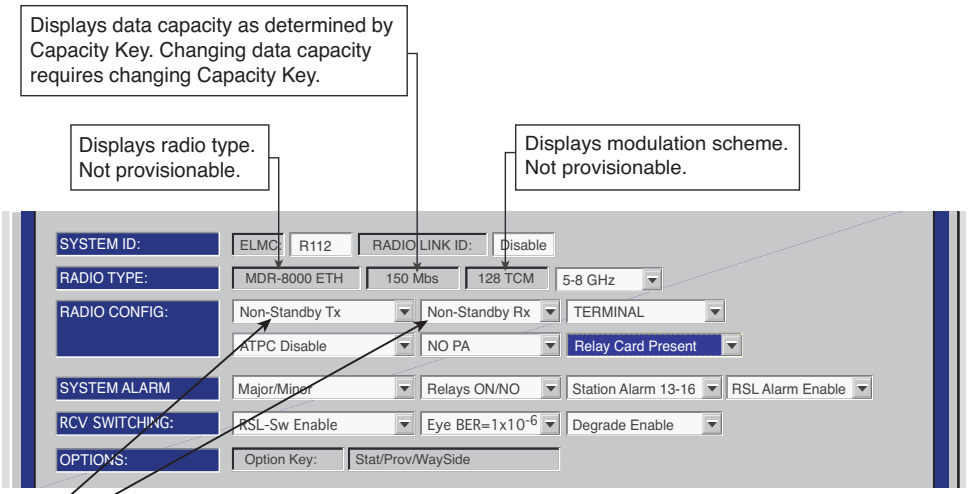


Figure 4-13 OC3/STM-1 Radio Wayside DS1 Facilities Provisioning

Note

A password is not required to operate the MDR-8000. The radio is shipped without a password and if a password is desired, it must be entered using the Change Password screen. Once entered initially, the password must be entered each time the user wants to access the provisioning screens (level 1 password required), or download software (level 2 password required).



SELECT ONE ON EACH (SHELF W/SINGLE RCVRs)

No Tx Non-Standby Tx Hot-Standby Tx Freq Diversity Tx Dual Channel Tx	+	No Rx Non-Standby Rx Hot-Standby Rx Frequency Diversity Rx Space Diversity Rx Dual Channel Rx

OR

SELECT ONE ON EACH (SHELF W/DUAL RCVRs)

No Tx Non-Standby Tx Hot-Standby Tx Freq Diversity Tx Dual Channel Tx	+	No Rx Non-Standby Dual Rx Hot-Standby Dual Rx Frequency Diversity Dual Rx Space Diversity Dual Rx Dual Channel Dual Rx

SELECT PORT CONFIGURATION

A Only
A & B Switched
A & B Separate
A & B Summed

+ Port configuration is selected on Ethernet Facilities Provisioning Screen (FIG 5-2).

To =

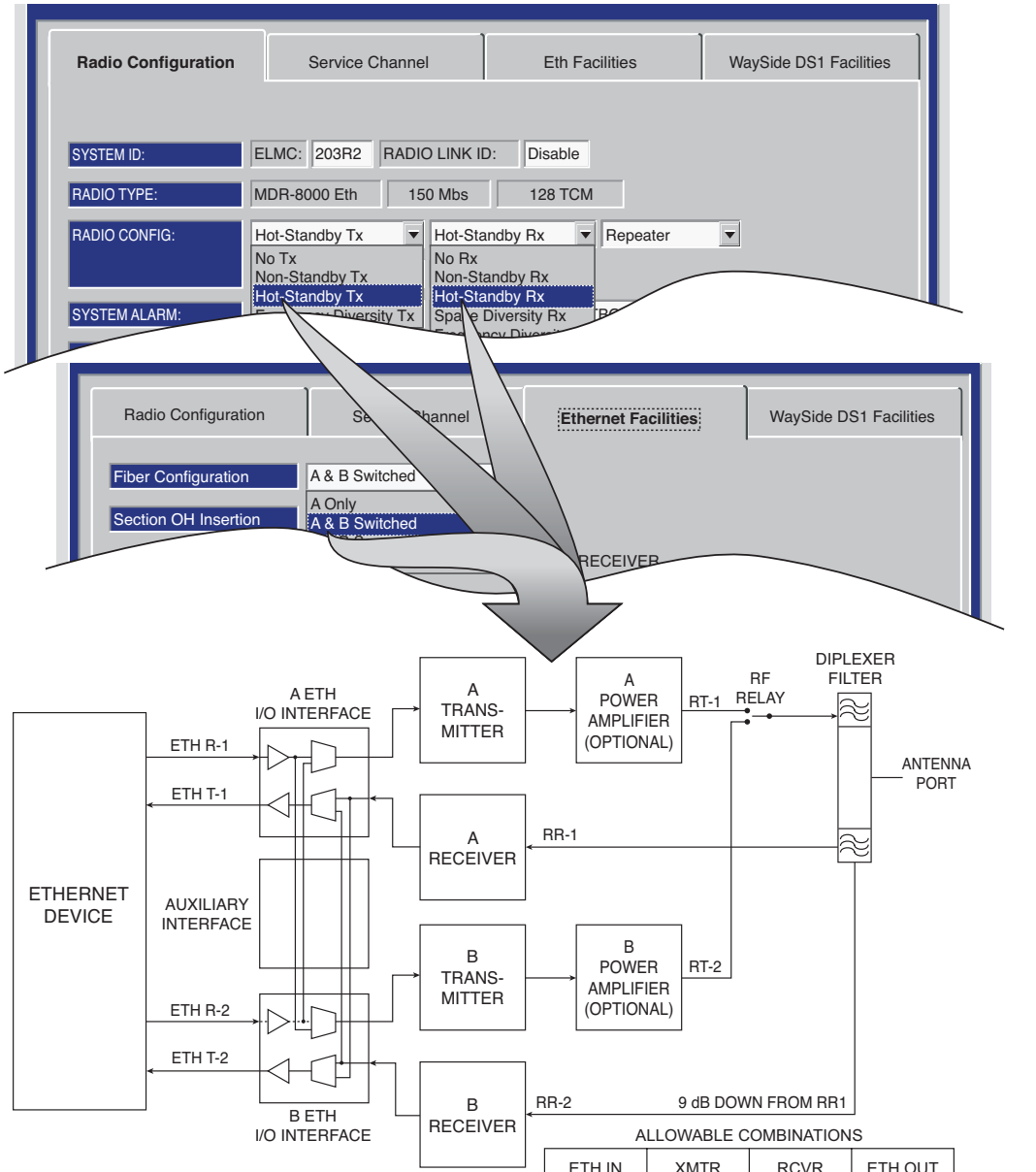
Resulting Configurations

No Tx/NS Rx/A Only
No Tx/HS Rx/A Only
No Tx/HS Rx/A & B Switched
No Tx/HS Rx/A & B Summed
No Tx/SD Rx/A Only
No Tx/SD Rx/A & B Switched
No Tx/SD Rx/A & B Summed
No Tx/FD Rx/A Only
No Tx/FD Rx/A & B Switched
No Tx/Dual Chan Rx/ A & B Separate
NS Tx/ No Rx/A Only
Ns Tx/ NS Rx/A Only
NS Tx/HS Rx/A Only
NS Tx/HS Rx/A & B Switched
NS Tx/HS Rx/A & B Summed
NS Tx/SD Rx/A Only
NS Tx/SD Rx/A & B Switched
NS Tx/SD Rx/A & B Summed
HS Tx/No Rx/A Only
HS Tx/No Rx/A & B Switched
HS Tx/HS Rx/A Only
* HS Tx/HS Rx/A & B Switched
* HS Tx/HS Rx/A & B Summed
HS Tx/SD Rx/A Only
* HS Tx/SD Rx/A & B Switched
HS Tx/SD Rx/A & B Summed
FD Tx/No Rx/A Only
FD Tx/No Rx/A & B Switched
FD Tx/No Rx/A & B Separate
FD Tx/No Rx/A & B Summed
FD Tx/FD Rx/A Only
FD Tx/FD Rx/A & B Switched
Dual Chan Tx/Dual Chan Rx/ A & B Separate
Dual Chan Tx/Dual Chan Rx/ A & B Summed
HS Tx/No Rx/A & B Summed

* There are a total of 35 configurations available. Only 3 examples are illustrated. Refer to CD for examples of all configurations.

Eth-1000
04/03/07

Figure 4-14 Ethernet Radio Configuration Provisioning



ALLOWABLE COMBINATIONS

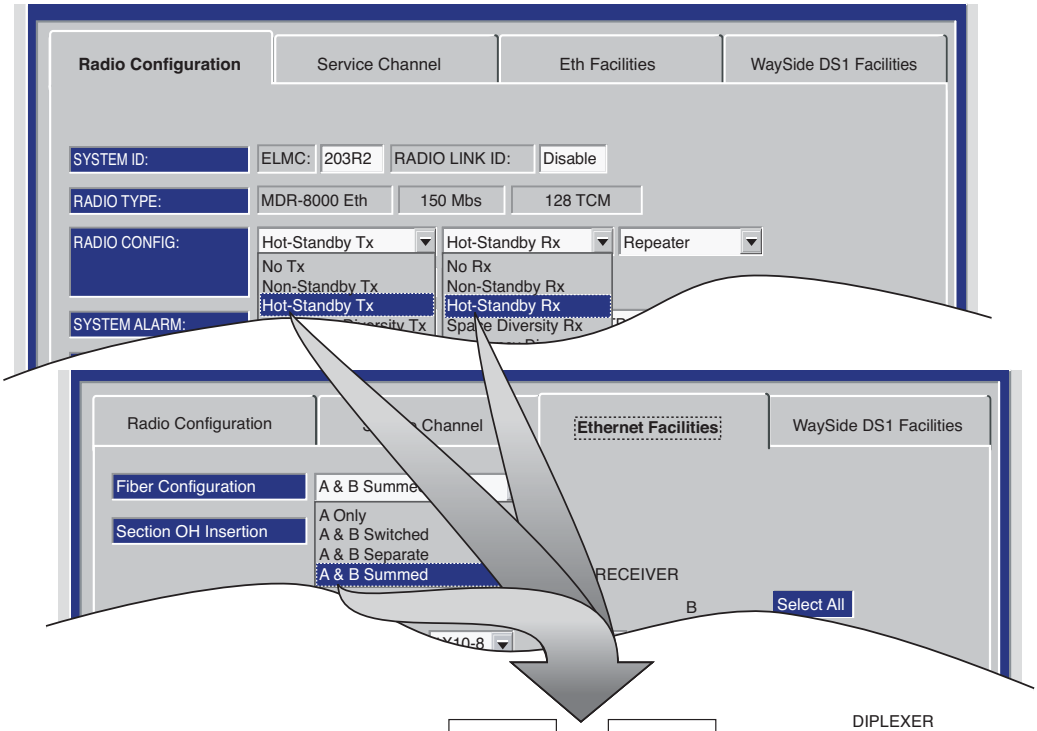
ETH IN	XMTR	RCVR	ETH OUT
ETH R-1	RT-1	RR-1	ETH T-1
ETH R-1	RT-1	RR-2	ETH T-1
ETH R-1	RT-2	RR-1	ETH T-1
ETH R-1	RT-2	RR-2	ETH T-1
ETH R-2	RT-1	RR-1	ETH T-2
ETH R-2	RT-1	RR-2	ETH T-2
ETH R-2	RT-2	RR-1	ETH T-2
ETH R-2	RT-2	RR-2	ETH T-2

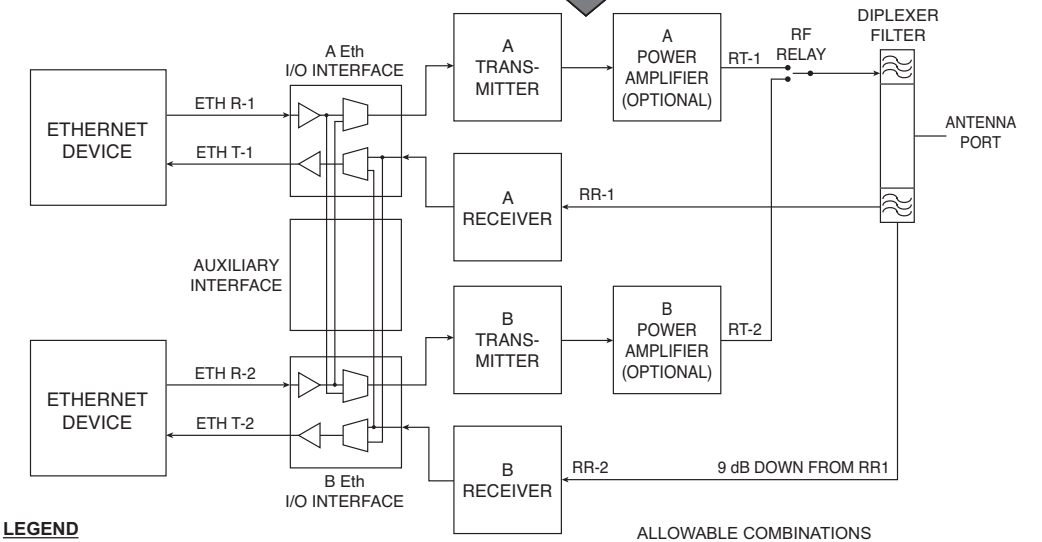
LEGEND

= SWITCH
ETH R = Ethernet RCV
ETH T = Ethernet XMT
RR = Radio RCV
RT = Radio XMT

ETH-1022
Issue 8
03/02/07

ETH PROVISIONING EXAMPLE 1: HS Tx/HS Rx/A and B Switched





LEGEND

= SWITCH

ETH R = Ethernet RCV

ETH T = Ethernet XMT

RR = Radio RCV

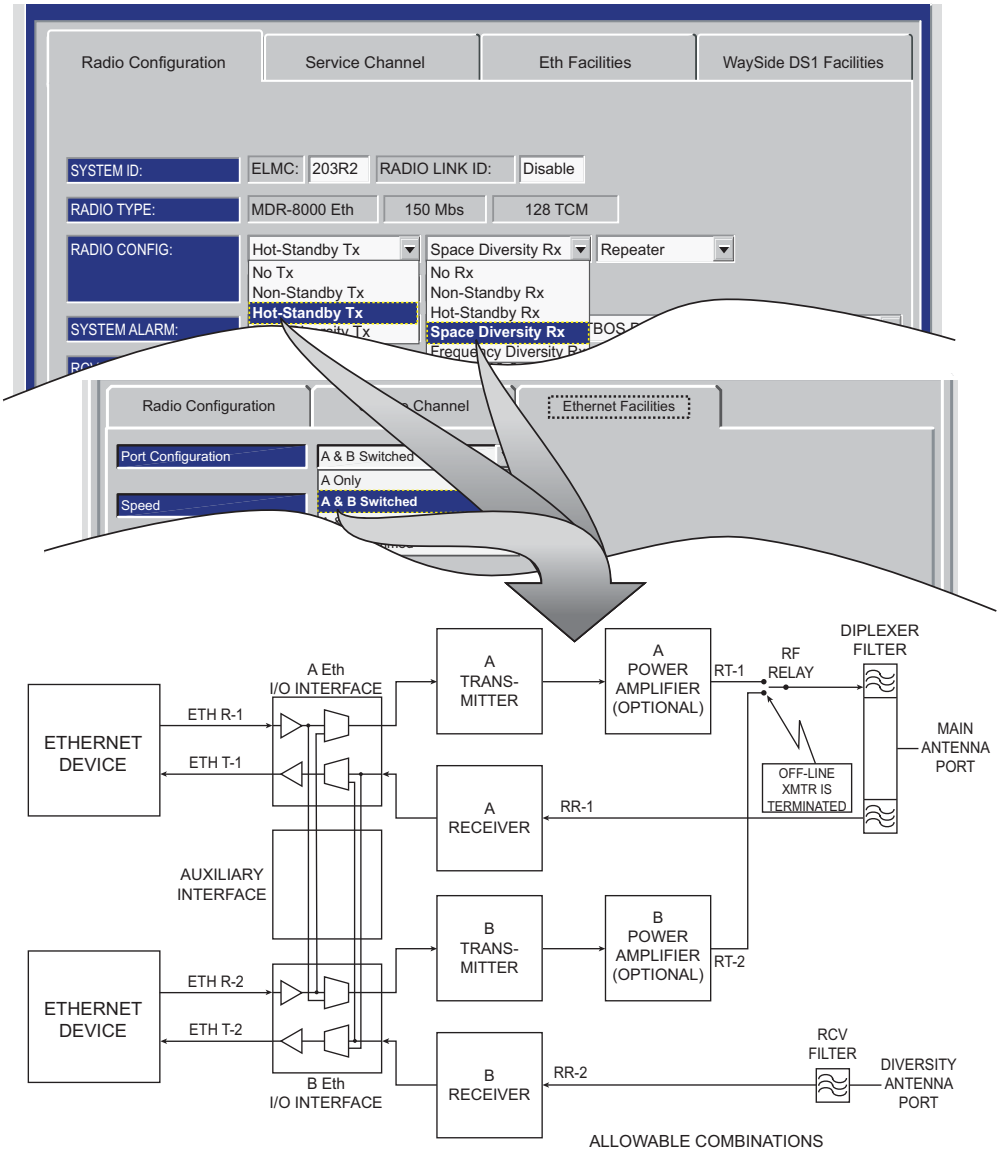
RT = Radio XMT

ALLOWABLE COMBINATIONS

ETH IN	XMTR	RCVR	ETH OUT
ETH R-1,2	RT-1	RR-1	ETH T-1,2
ETH R-1,2	RT-1	RR-2	ETH T-1,2
ETH R-1,2	RT-2	RR-1	ETH T-1,2
ETH R-1,2	RT-2	RR-2	ETH T-1,2

ETH-1023
Issue 8
03/02/07

ETH PROVISIONING EXAMPLE 2: HS Tx/HS Rx/A and B Summed



ALLOWABLE COMBINATIONS

ETH IN	XMTR	RCVR	ETH OUT
ETH R-1	RT-1	RR-1	ETH T-1
ETH R-1	RT-2	RR-1	ETH T-1
ETH R-2	RT-2	RR-2	ETH T-2
ETH R-2	RT-1	RR-2	ETH T-2
ETH R-1	RT-1	RR-2	ETH T-1
ETH R-1	RT-2	RR-2	ETH T-1
ETH R-2	RT-2	RR-1	ETH T-2
ETH R-2	RT-1	RR-1	ETH T-2

LEGEND

= SWITCH
ETH R = Ethernet RCV
ETH T = Ethernet XMT
RR = Radio RCV
RT = Radio XMT

ETH-1025
Issue 8
03/02/07

ETH PROVISIONING EXAMPLE 3: HS Tx/SD Rx/A and B Switched

4.9 PROVISION ETHERNET FACILITY

See Figure 4-15 to provision the Ethernet radio.

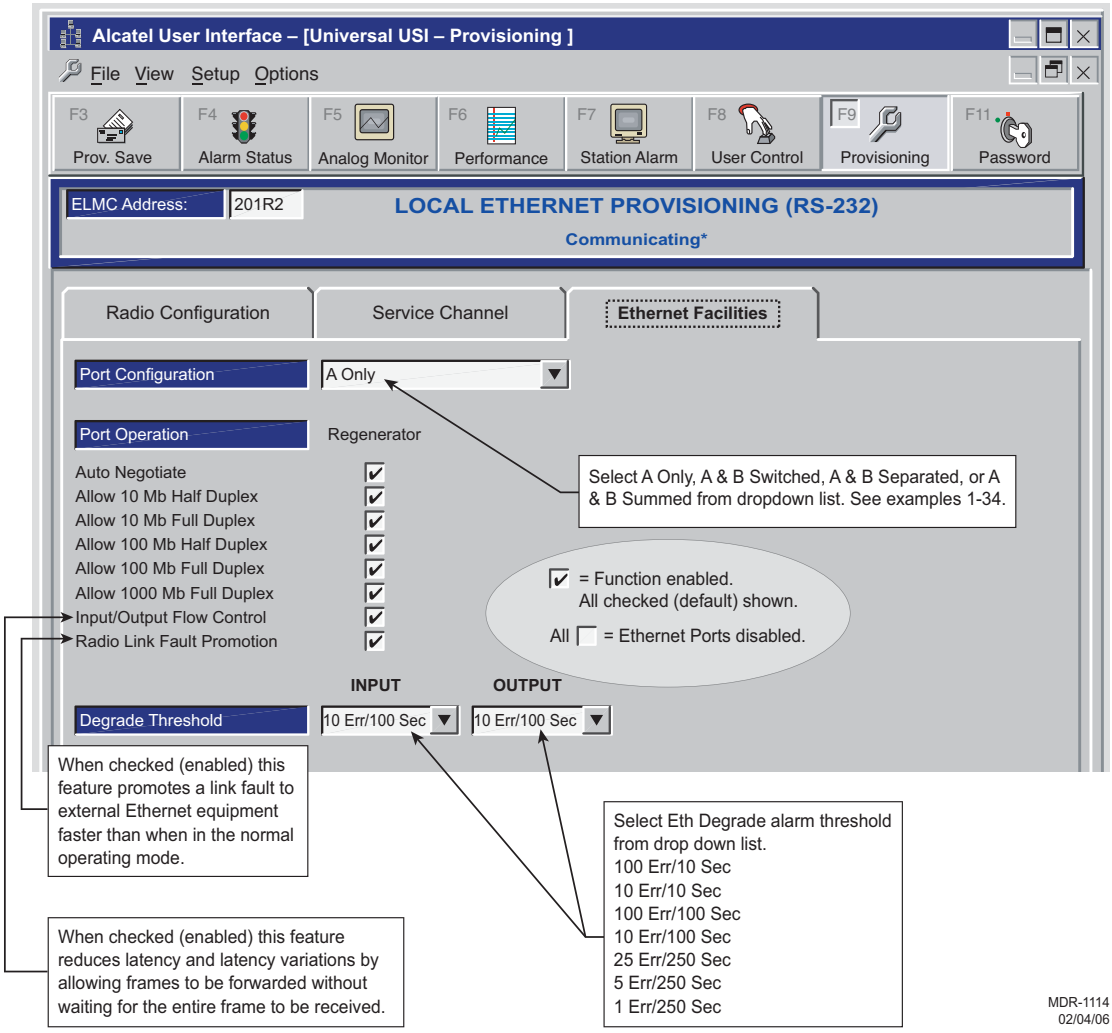


Figure 4-15 Ethernet Facilities Provisioning

4.9.1 Auto-Negotiation

MDR-8000E auto-negotiation is not a stand-alone function, and proper operation and use of all available functions depends on the capabilities of the external customer equipment that is connected to the radio. Just because an autonegotiation function is checked for provisioning does not automatically mean that function is fully operable. The device on the other end of the cable must also have the capability and be provisioned with a matching function.

4.9.1.1 Auto-Negotiate

Auto-Negotiate details are beyond the scope of this supplement. The rule of thumb to follow when unsure of what functions to check or change from factory default provisioning is leave at default (all autonegotiation functions are checked). Full autonegotiation capability is becoming standard for manufacturers of Ethernet devices.

4.9.1.2 Allow 10, 100, and/or 1000 Mb Half and Full Duplex

If in doubt as to the link speed and mode of the external device connecting Ethernet to the radio, check all boxes for speeds and modes. If you know the external Ethernet device has speed and/or mode limitations, check only the boxes that apply.

Auto-Negotiate is automatically enabled when Allow 1000 Mb Full Duplex is enabled. Auto-Negotiate must be enabled (checked) when more than one link speed is selected.

4.9.1.3 Input/Output Flow Control Features

Checking the box next to Input/Output Flow Control enables input and output pause functions and the forward errored or large frame function. These flow control functions are described in the following paragraphs.

4.9.1.3.1 Input Pause Feature

See Figure 4-16. This feature makes the auto-negotiation function willing to stop receiving traffic. When the radio input buffers approach overflow, the function sends a pause message to the link partner that is transmitting data to the radio, telling the device to temporarily stop sending data. The link partner will stop sending data if the device has and is provisioned with the Allow Option Pause function.

If the link partner is either not equipped with or is not provisioned for input pause, data overflowing the registers in the radio will be lost, regardless of the provisioning for input pause in the radio. Any time there is an overflow, the radio will alarm and indicate Dropped Frames on the Performance Monitor screens.

4.9.1.3.2 Pause Feature

This feature auto-negotiation function willing to stop sending traffic. When the input buffers on the link partner approach overflow, the link partner sends a pause message to the radio telling the radio to temporarily stop sending data. If the Input/Output Flow Control function is checked, the radio will stop sending out data.

4.9.1.4 Input Pause Feature

See Figure 4-16. Checking the box next to ***Allow Input Pause*** makes the auto-negotiation function willing to stop receiving traffic. When the radio input buffers approach overflow, the function sends a pause message to the ink partner that is transmitting data to the radio, telling the device to temporarily stop sending data. The link partner will stop sending data if the device has and is provisioned with the Allow Option Pause function.

If the link partner is either not equipped with or is not provisioned for input pause, data overflowing the registers in the radio will be lost, regardless of the provisioning for input pause in the radio. Any time there is an overflow, the radio will alarm and indicate Dropped Frames on the Performance Monitor screens.

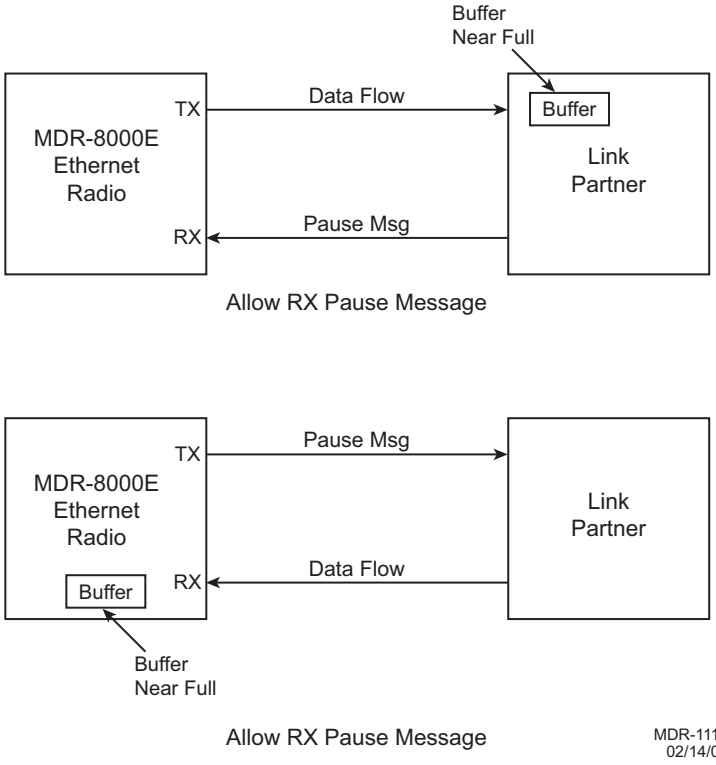


Figure 4-16 Input/Output Pause Messaging

4.9.1.5 Allow Output Pause

Checking the box next to ***Allow Output Pause*** makes the radio auto-negotiation function willing to stop sending traffic. When the input buffers on the link partner approach overflow, the link partner sends a pause message to the radio, telling the radio to temporarily stop sending data. If the ***Allow Output Pause*** function is checked, the radio will stop sending out data.

4.10 PROVISION DS1 FACILITY

See Figure 4-17 to provision the DS1 lines (if equipped).

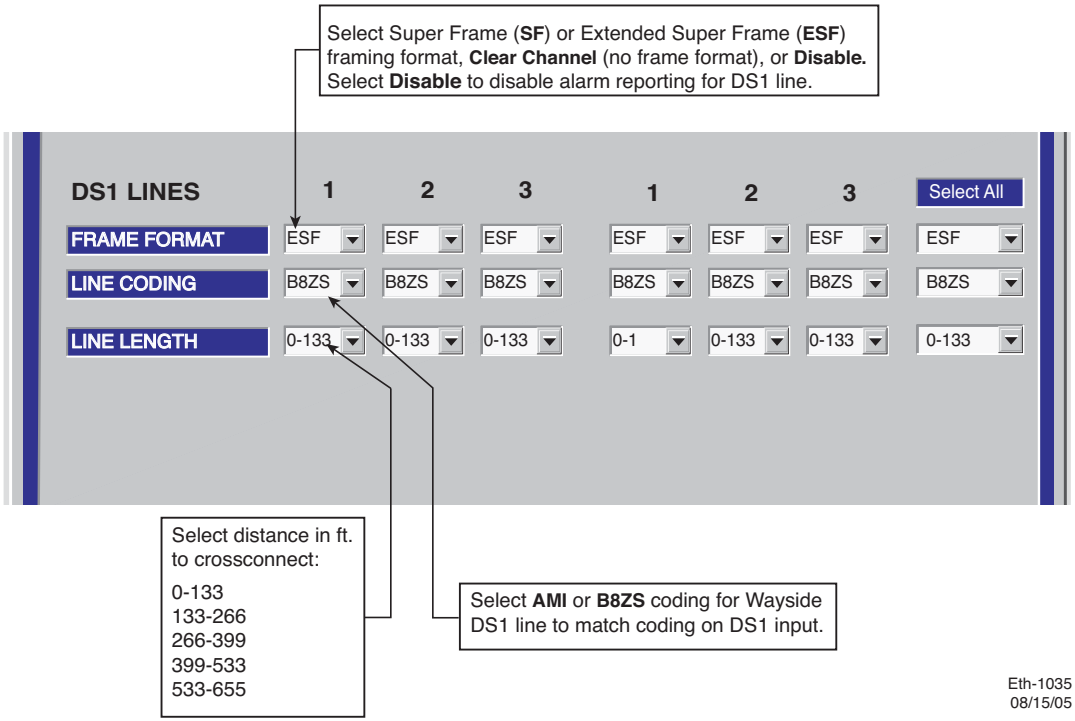
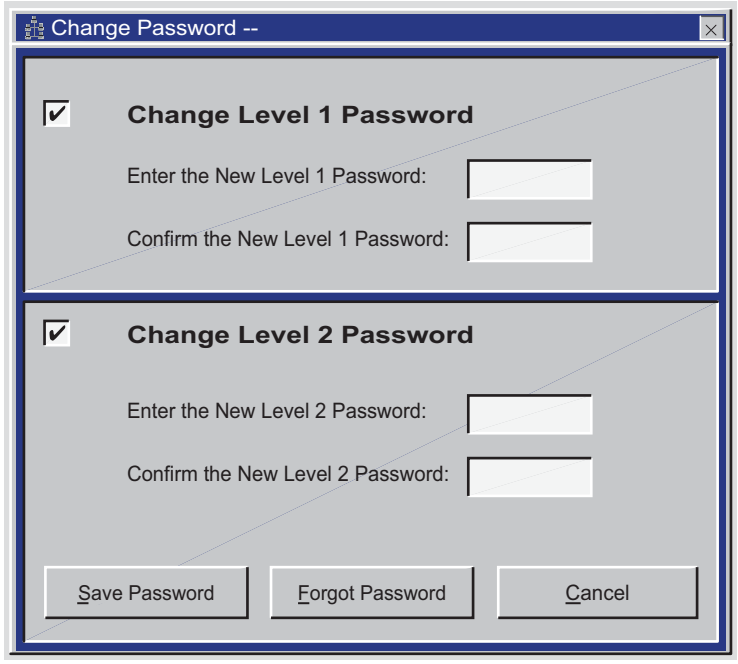
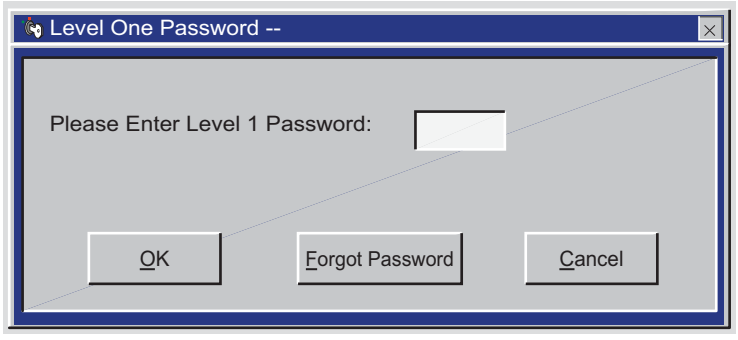


Figure 4-17 Ethernet Radio DS1 Facilities Provisioning

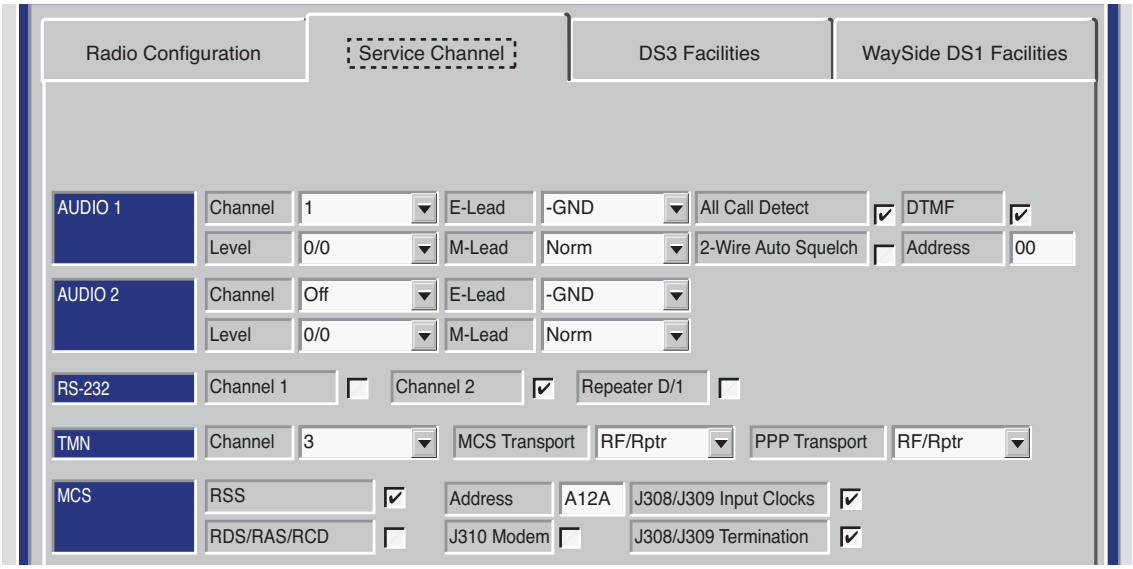


MDR-1033
09/02/04



MDR-1032
09/02/04

Figure 4-18 Password Screens



MDR-1034
09/16/04

Figure 4-19 Service Channel Provisioning

Note

The 2-wire handset is transported over Audio 1 only.

Note

Audio provisioning is required only if 4-wire audio equipment (external equipment not part of the radio) is supplied and the external audio equipment is connected to audio port 1 J316 or audio port 2 J317 on the radio backplane. These provisionable 4-wire audio functions should not be confused with the 2-wire audio handset. The handset is fully operational after it is connected to the TEL jack on the radio controller module, provided the radio is provisioned Audio 1.

The most common audio provisioning is: 1:, 2:, or 3: AUDIO 1 0/0 Norm.

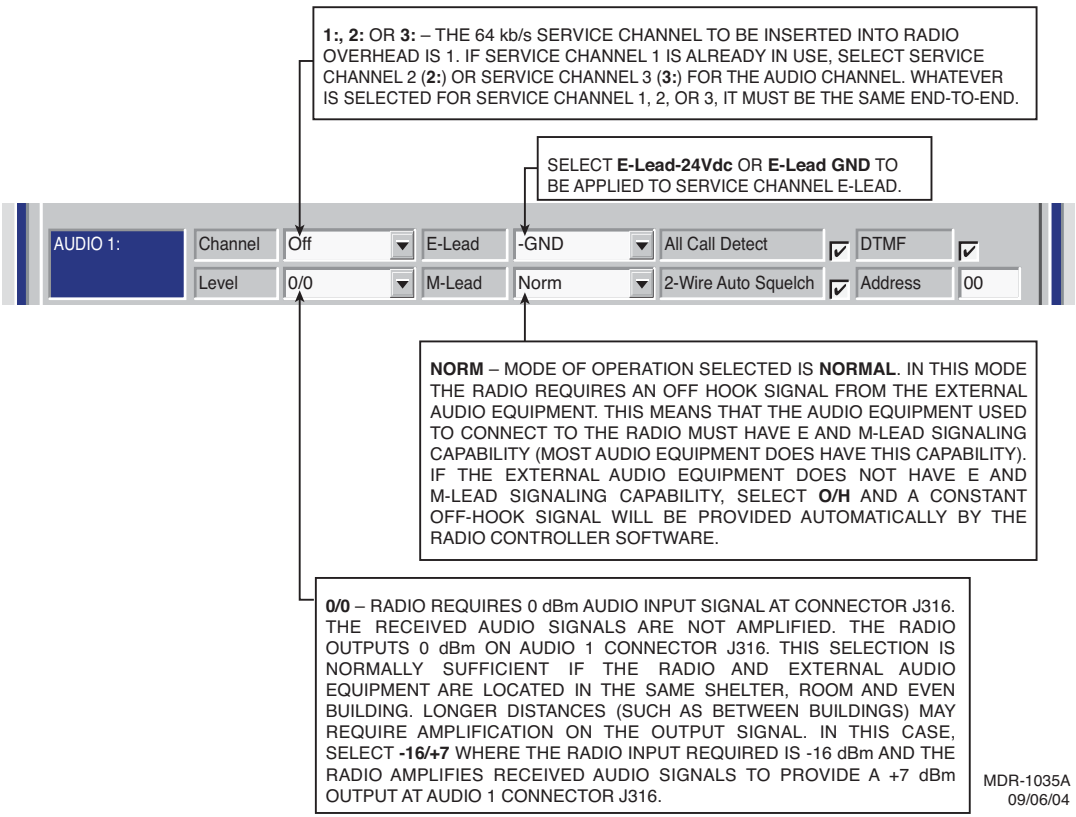


Figure 4-20 Audio 1 Provisioning (Sheet 1 of 2)

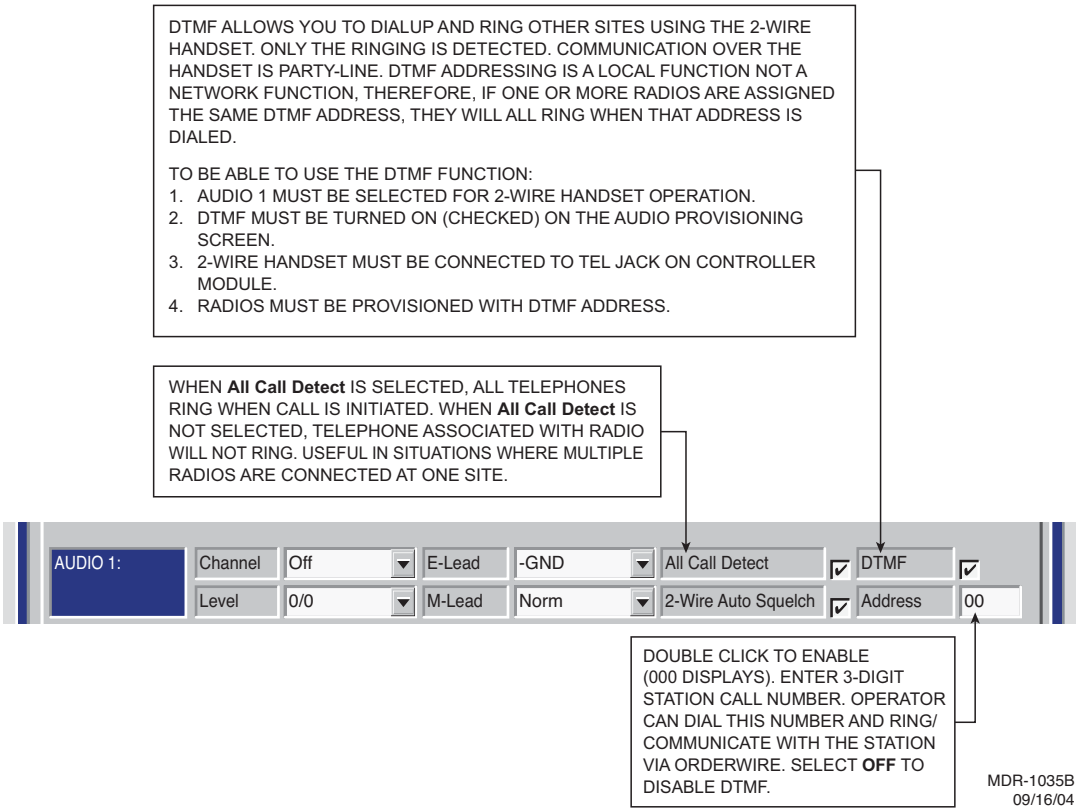


Figure 4-20 Audio 1 Provisioning (Sheet 2 of 2)

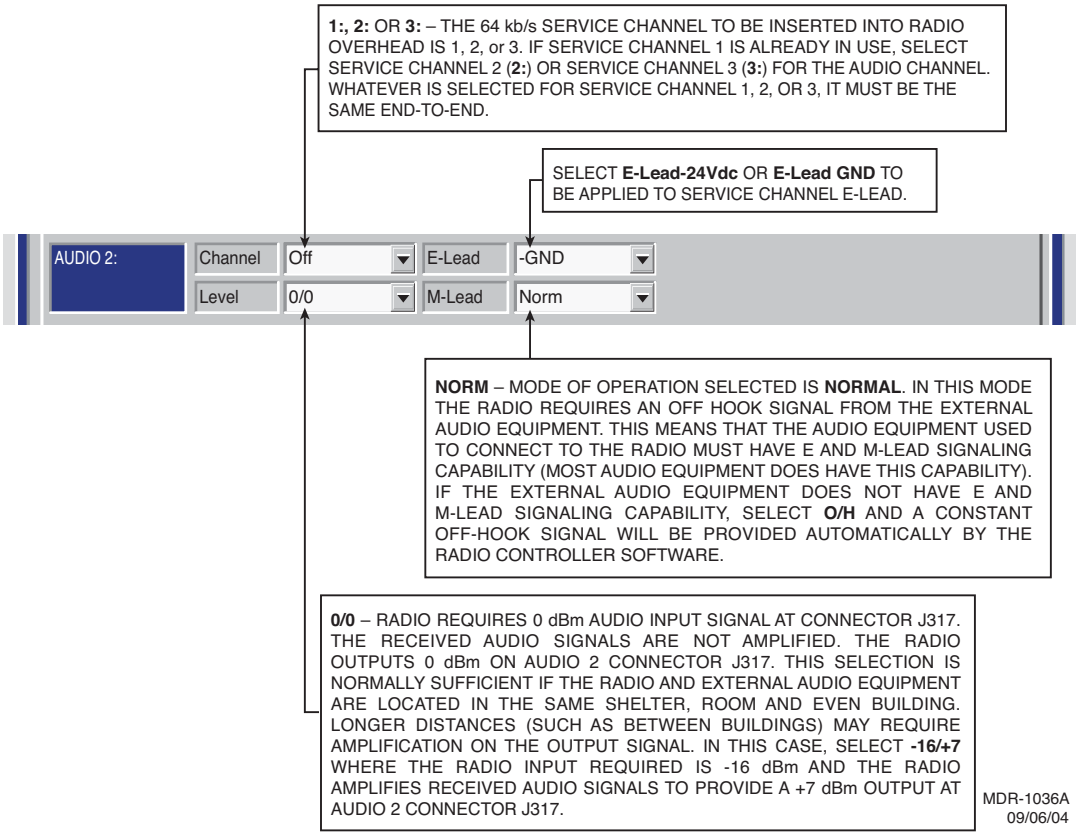


Figure 4-21 Audio 2 Provisioning

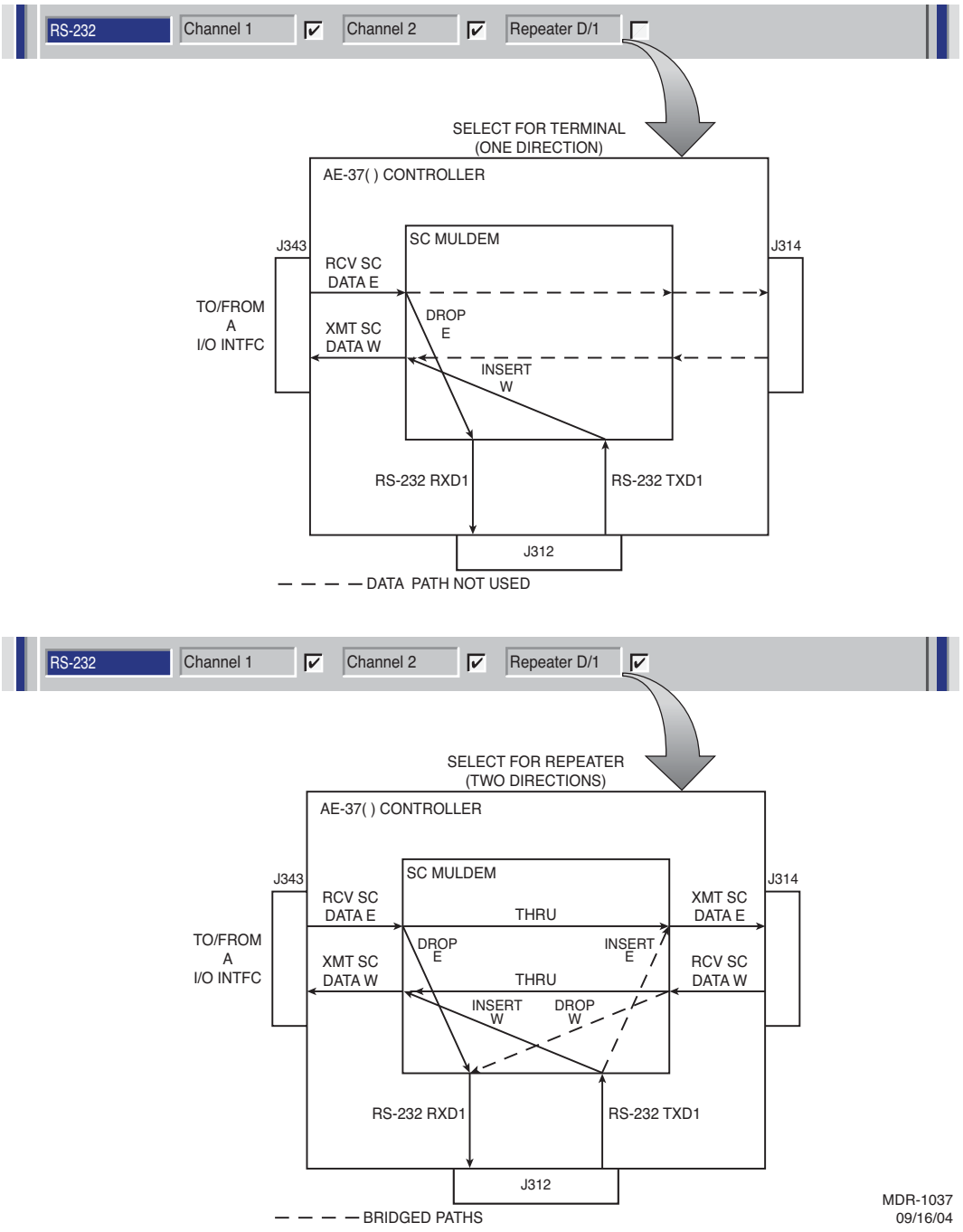
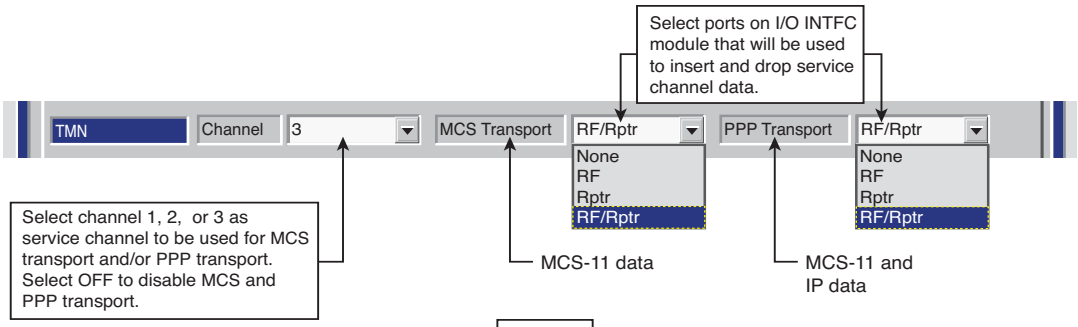


Figure 4-22 RS-232 Provisioning



Note

For MCS-11 to operate properly, all radio controllers in a system inter- connected by RF or RPTR must have the same PPP transport provisioning on facing (interconnecting) interfaces. The valid transport combinations (for terminal or repeater) are shown. The combination chosen from MCS TRANSPORT and PPP TRANSPORT determines the RPTR PORT and RF PORT PROTOCOLS supported.

Note

MCS-11 must be enabled even if it is unused and TMN (only) is used for alarm monitoring and controls. For specific TMN Initial Turnup requirements, refer to CD.

MDR-1056
04/03/07

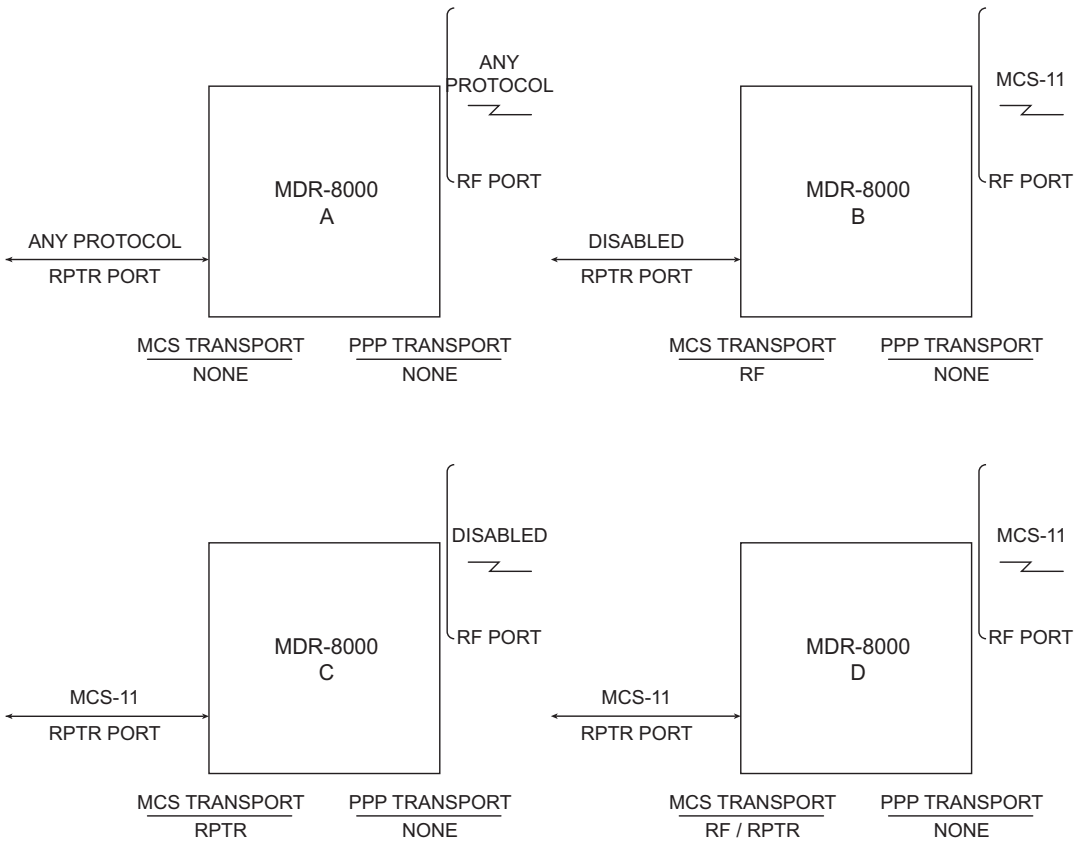
Figure 4-23 MCS/TMN Transport Provisioning (Sheet 1 of 5)

PPP TRANSPORT SETTING = NONE

DRAWING REFERENCE	RADIO TRANSPORT SETTING		RADIO PORT	
	MCS	PPP	RF	RPTR
A	NONE	NONE	PASS-THROUGH MODE. NO LOCAL INSERT CAPABILITY.	
B	RF	NONE	MCS-11	DISABLED
C	RPTR	NONE	DISABLED	MCS-11
D	RF/RPTR	NONE	MCS-11	MCS-11

Notes:

1) Set PPP Transport to NONE if the repeater and RF ports interface with radios not TMN compatible.
2) RF at both ends of the hop must be provisioned for the same PPP Transport selection.
3) RPTR at both ends must be provisioned for the same PPP Transport selection.
4) MCS-11 = Non TMN compatible
   MCS-11 + PPP = TMN compatible
5) TMN compatibility is determined by the radio controller software and radio provisioning.



MDR-1255
12/05/06

Figure 4-23 MCS/TMN Transport Provisioning (Sheet 2 of 5)

PPP TRANSPORT SETTING = RF

DRAWING REFERENCE	RADIO TRANSPORT SETTING		RADIO PORT	
	MCS	**PPP**	**RF**	**RPTR**
A	NONE	RF	MCS-11 + PPP	DISABLED
B	RF	RF	MCS-11 + PPP	DISABLED
C	RPTR	RF	MCS-11 + PPP	MCS-11
D	RF/RPTR	RF	MCS-11 + PPP	MCS-11

Notes:

1) Set PPP Transport to RF when the farend radio is TMN compatible, but the radio connected via the repeater cable is not.
2) RF at both ends of the hop must be provisioned for the same PPP Transport selection.
3) RPTR at both ends must be provisioned for the same PPP Transport selection.
4) MCS-11 = Non TMN compatible
   MCS-11 + PPP = TMN compatible
5) TMN compatibility is determined by the radio controller software and radio provisioning.

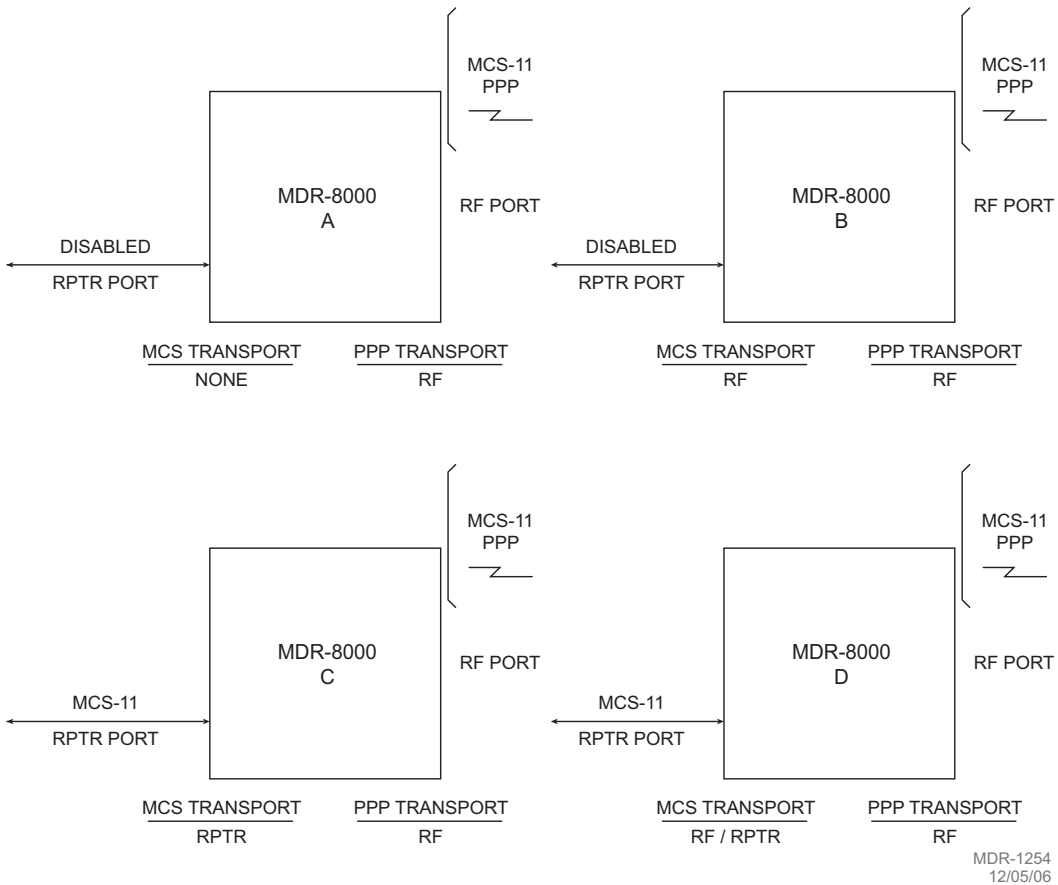


Figure 4-23 MCS/TMN Transport Provisioning (Sheet 3 of 5)

PPP TRANSPORT SETTING = RPTR

DRAWING REFERENCE	RADIO TRANSPORT SETTING		RADIO PORT	
	MCS	**PPP**	**RF**	**RPTR**
A	NONE	RPTR	DISABLED	MCS-11 + PPP
B	RF	RPTR	MCS-11	MCS-11 + PPP
C	RPTR	RPTR	DISABLED	MCS-11 + PPP
D	RF/RPTR	RPTR	MCS-11	MCS-11 + PPP

Notes:
1) RF at both ends of the hop must be provisioned for the same PPP Transport selection.
2) RPTR at both ends must be provisioned for the same PPP Transport selection.
3) MCS-11 = Non TMN compatible
   MCS-11 + PPP = TMN compatible
4) TMN compatibility is determined by the radio controller software and radio provisioning.

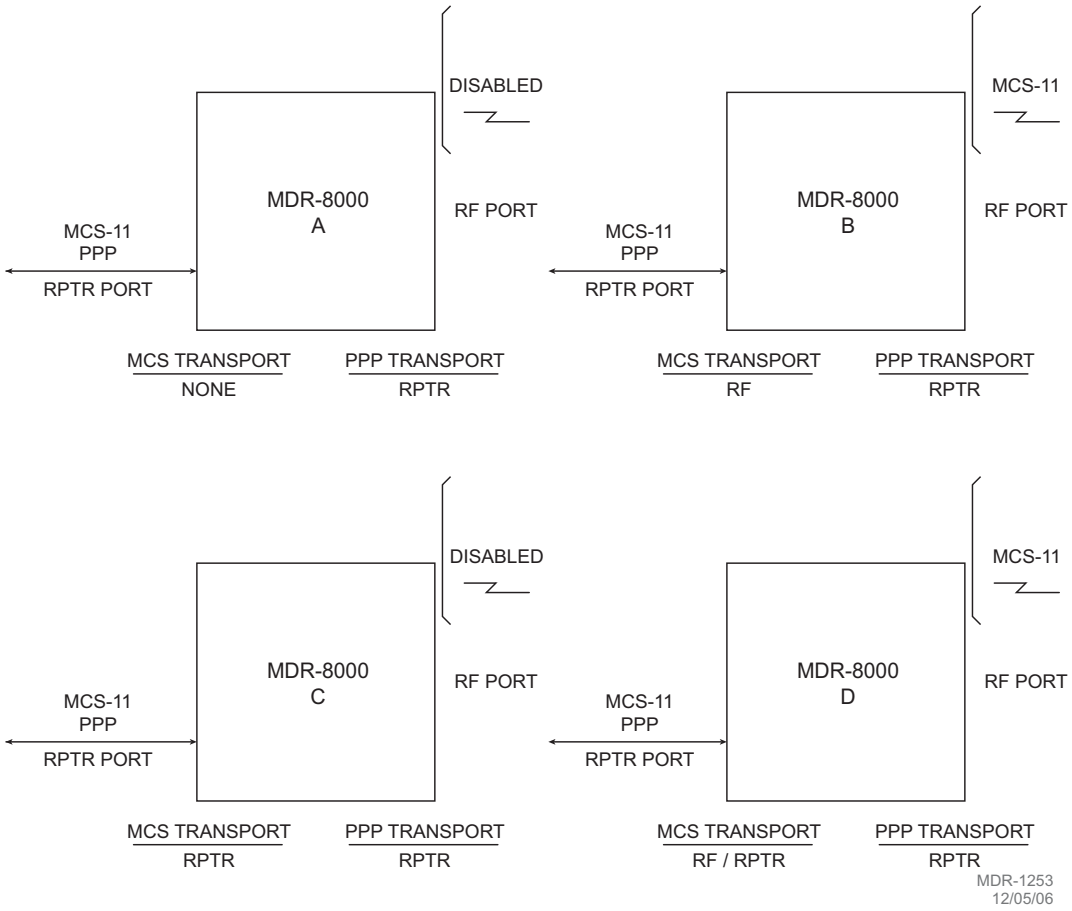


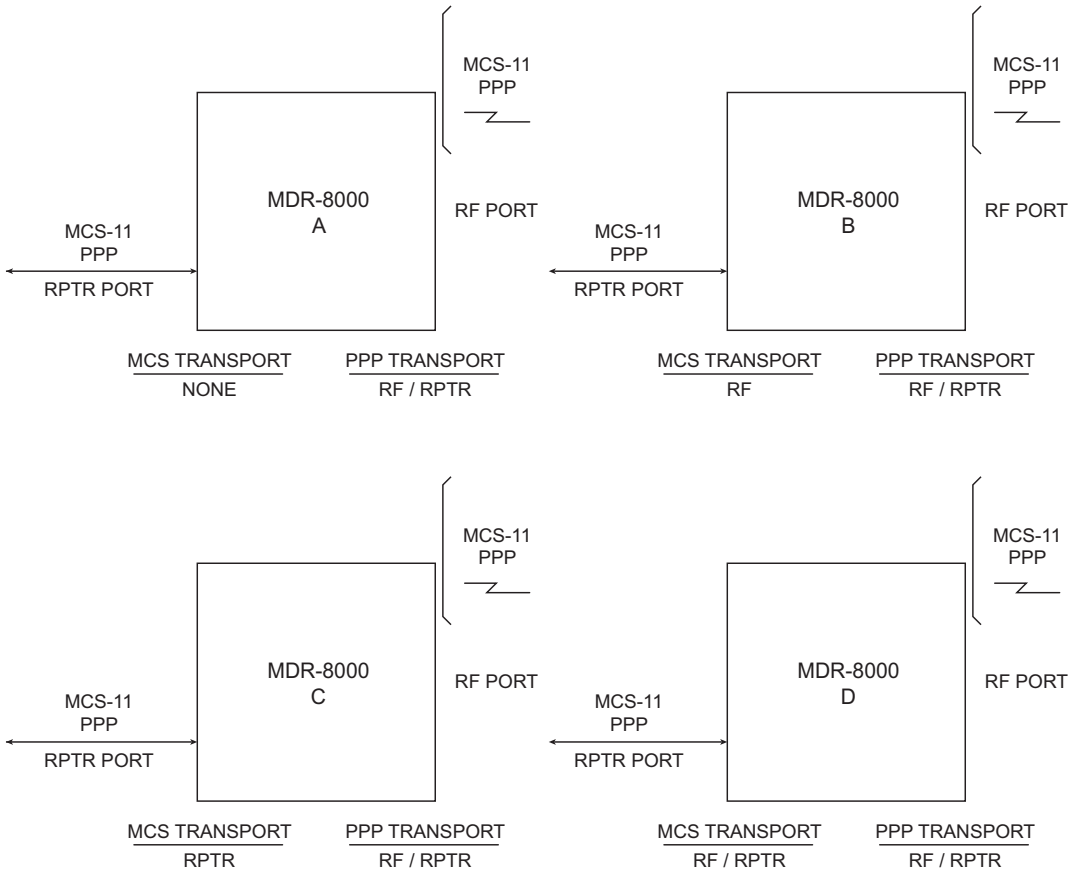
Figure 4-23 MCS/TMN Transport Provisioning (Sheet 4 of 5)

PPP TRANSPORT SETTING = RF/RPTR

DRAWING REFERENCE	RADIO TRANSPORT SETTING		RADIO PORT	
	MCS	**PPP**	**RF**	**RPTR**
A	NONE	RF/RPTR	MCS-11 + PPP	MCS-11 + PPP
B	RF	RF/RPTR	MCS-11 + PPP	MCS-11 + PPP
C	RPTR	RF/RPTR	MCS-11 + PPP	MCS-11 + PPP
D	RF/RPTR	RF/RPTR	MCS-11 + PPP	MCS-11 + PPP

Notes:

1) RF at both ends of the hop must be provisioned for the same PPP Transport selection.
2) RPTR at both ends must be provisioned for the same PPP Transport selection.
3) MCS-11 = Non TMN compatible
   MCS-11 + PPP = TMN compatible
4) TMN compatibility is determined by the radio controller software and radio provisioning.



MDR-1252
12/05/06

Figure 4-23 MCS/TMN Transport Provisioning (Sheet 5 of 5)

Note

*A default MCS-11 address **(A1A)** is assigned automatically. A different unique address must be entered for each radio to prevent concurrent responses to poll from more than one radio with the same address. If multiple responses are received, the response data is invalid.*

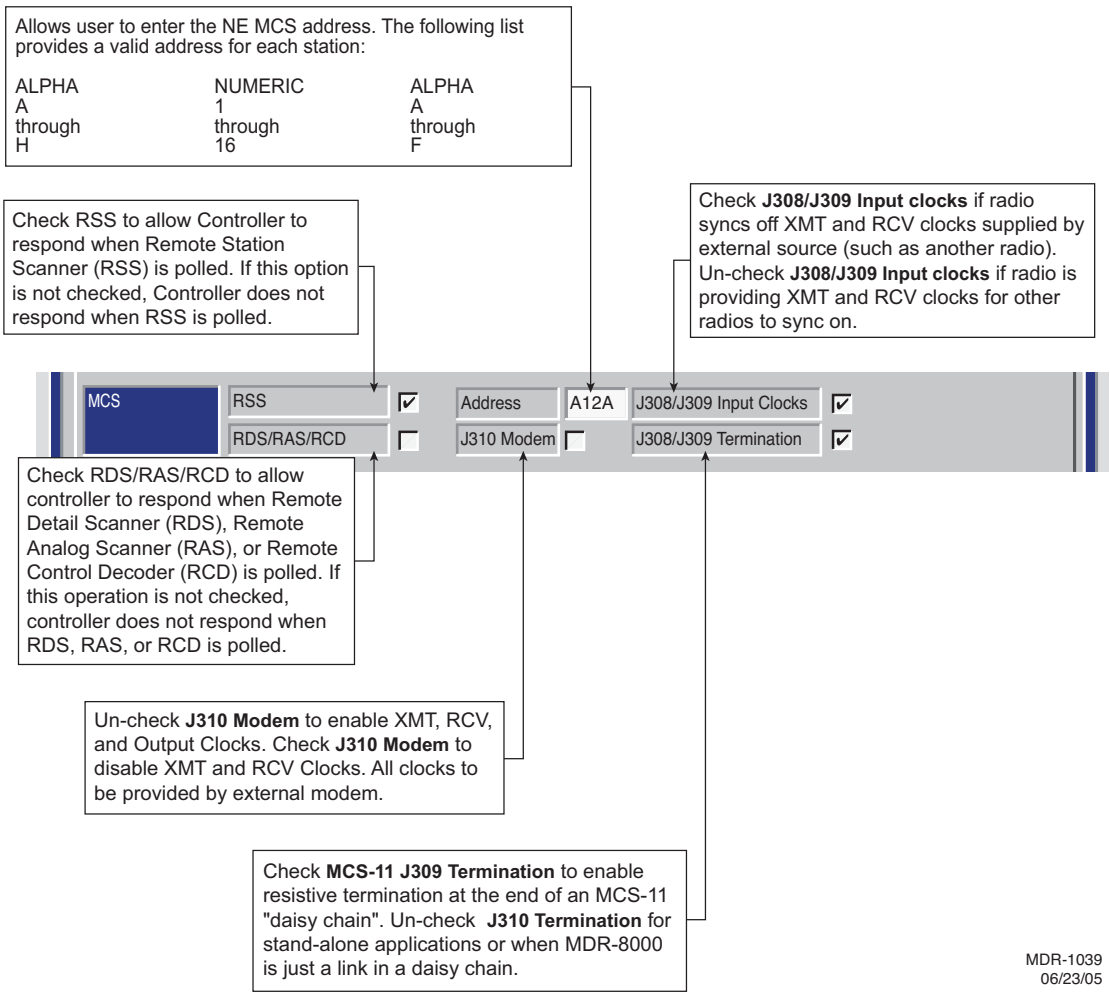
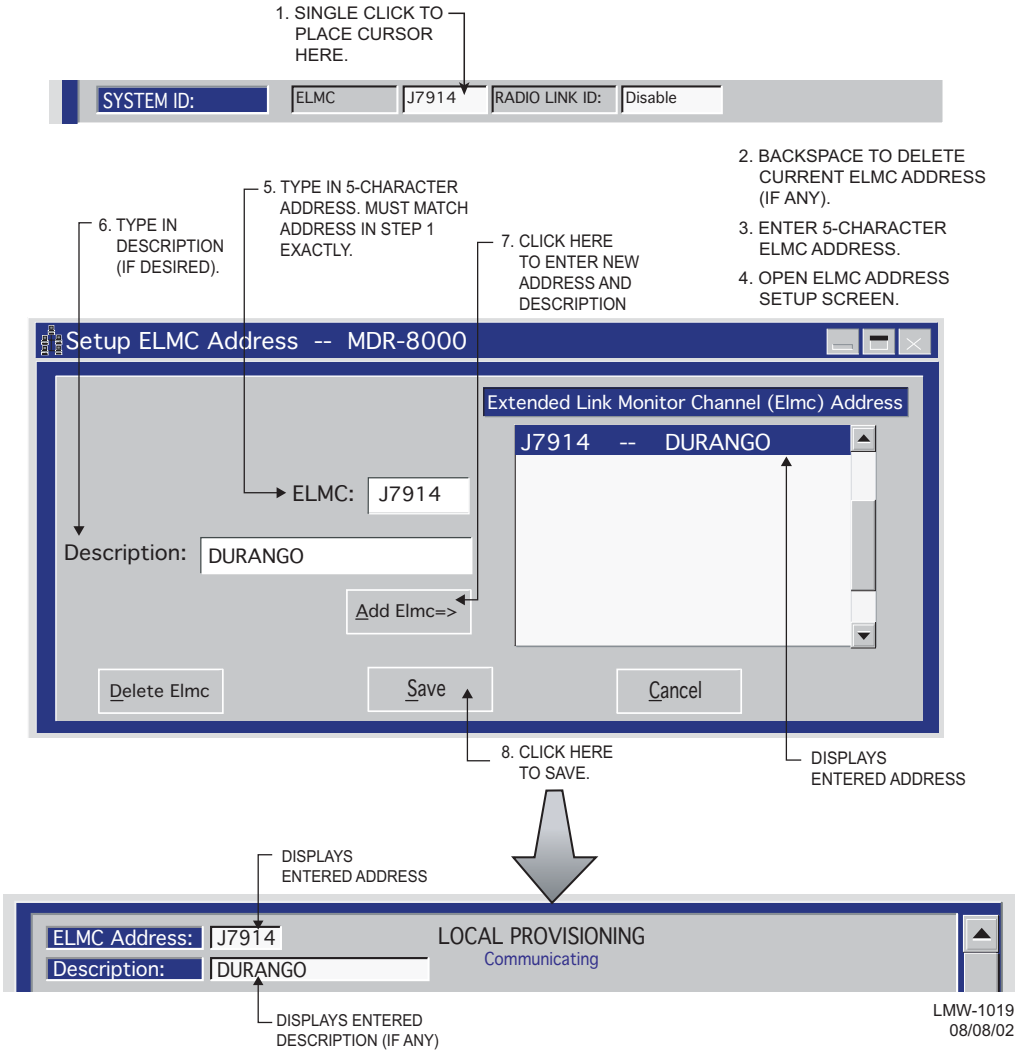


Figure 4-24 MCS-11 Provisioning

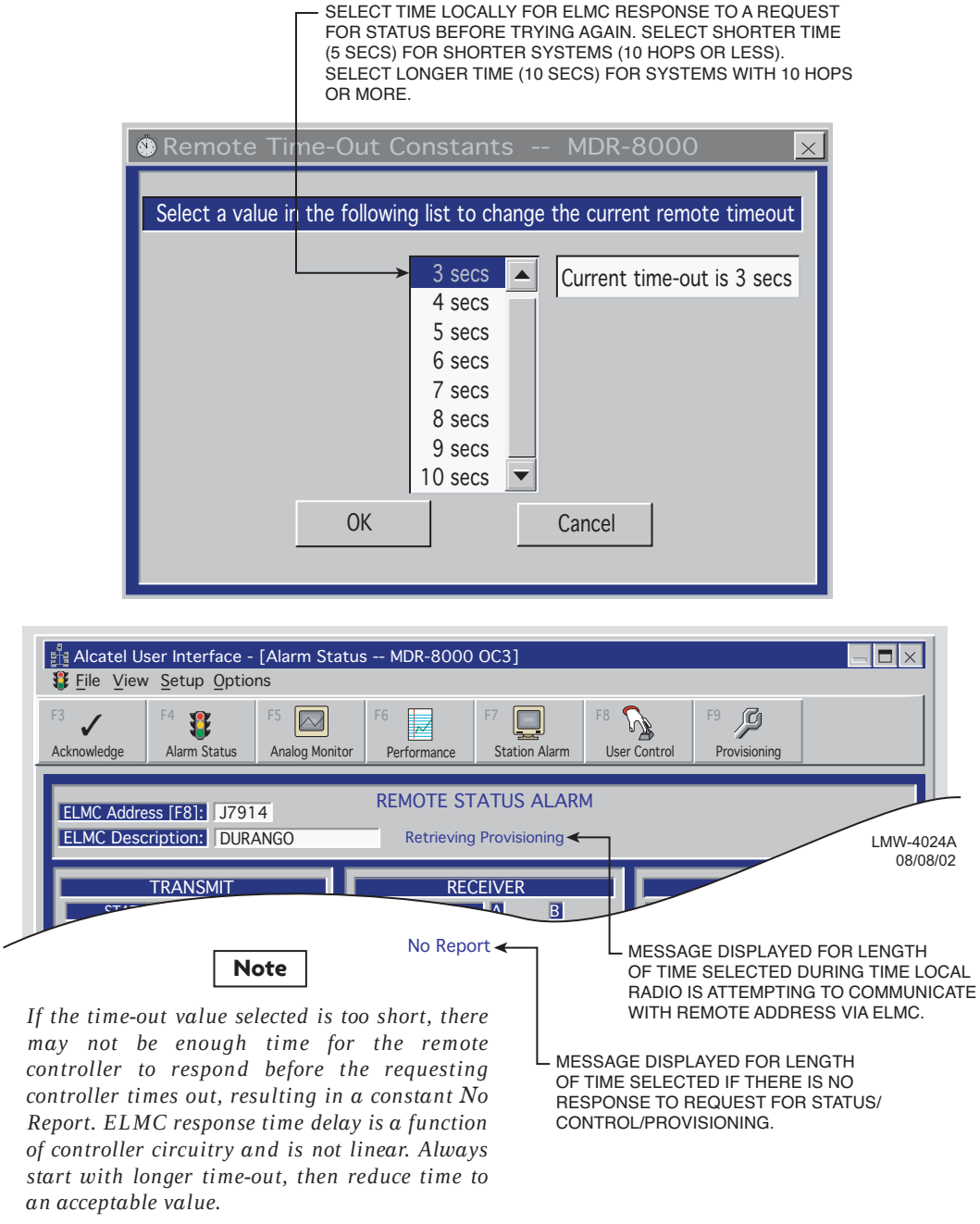
PROVISION ANY ONE OR ALL RADIOS AT A SITE, LOCALLY, USING FOLLOWING PROCEDURE:



Note

Each network element controller with ELMC must first be locally provisioned with a unique ELMC or remote address. The ELMC address is not related to MCS-11. Any name can be entered as long as the name is a 5-character, alphanumeric word. The address is case sensitive. Space, dash, slash, asterisk, and underscored characters are not allowed. If small numbers are used as addresses, then it is necessary to fill higher order digits with zeros. For example, if the address is the value 1, then the address must be entered as 00001. No address, or the same address used on multiple network elements, prevents ELMC access to that/those network elements. The remote address can only be pro-visioned and changed locally. Service-affecting functions, including operation mode, radio configuration, and remote address, cannot be provisioned or changed remotely.

Figure 4-25 ELMC Provisioning



Note

If the time-out value selected is too short, there may not be enough time for the remote controller to respond before the requesting controller times out, resulting in a constant No Report. ELMC response time delay is a function of controller circuitry and is not linear. Always start with longer time-out, then reduce time to an acceptable value.

Figure 4-26 ELMC Remote Time-Out Constant Provisioning

NOTE: DEFAULT CONTROL NAMES ARE USER CONTROL 1-6

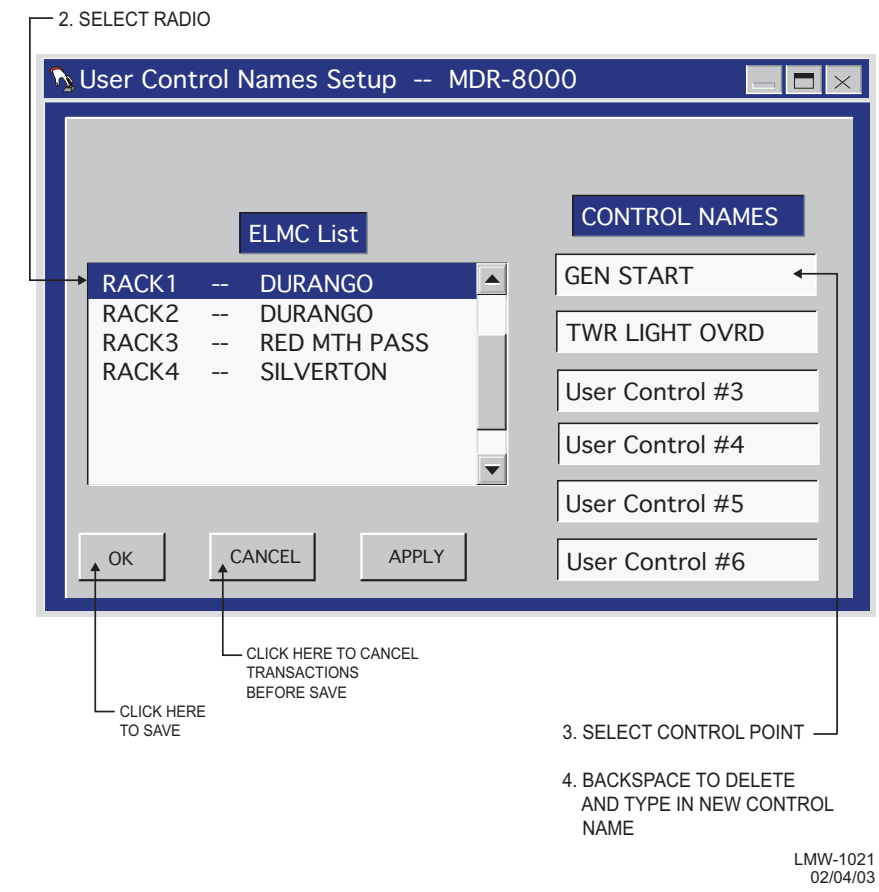


Figure 4-27 Control Names Provisioning

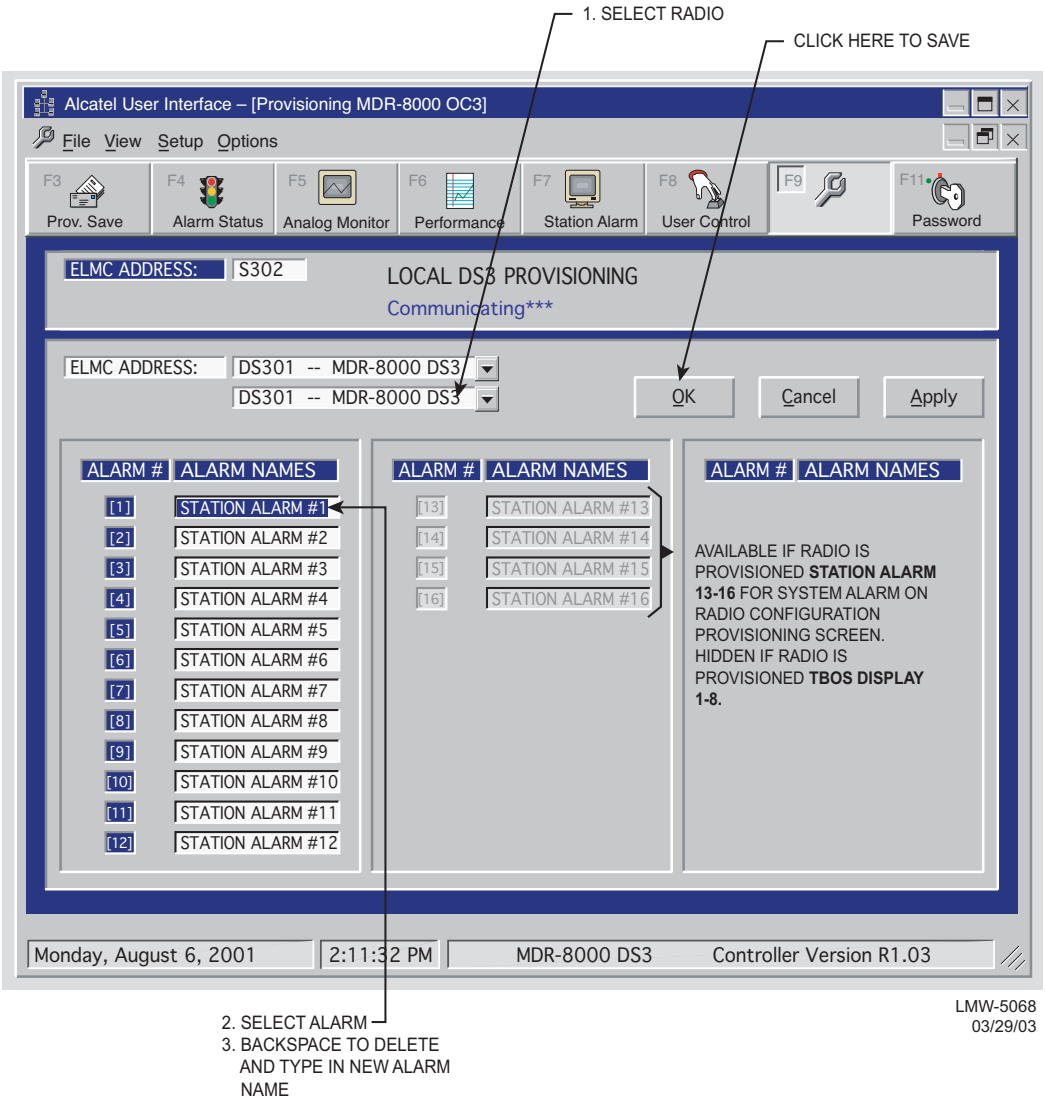


Figure 4-28 Alarm Names Provisioning

Note

DS3 screen is shown. DS1/E1 and OC3/STM-1 alarm names provisioning is similar.

Note

The information contained in this section is a summary of the section with the same title, but not the same section number, on the enclosed CD. "Refer to CD" is used throughout this section to refer the reader to the detail information on the CD. Go to this section on the CD for interactive links to the detail information referred to in this section.

5 MAINTENANCE

5.1 INTRODUCTION

This section contains information and procedures to aid in restoring the equipment to its proper operating condition after it has been determined that a problem exists.

The following warnings and cautions apply while operating, performance testing, troubleshooting, or repairing the MDR-8000 series radios.

Short circuits in low-voltage, low-impedance dc circuits can cause severe arcing that may result in burns or eye injury. Remove rings, watches, and other metal jewelry while working with primary circuits. Exercise caution to avoid shorting power input terminals.

XMTR Crystals should never be shipped as replacements without being soldered and tuned up in an oscillator assembly board at the factory.

Units with the electrostatic-sensitive (ESS) symbol contain ESS devices. Store these units in an antistatic container when not in use, and anyone handling a unit should observe antistatic precautions. Refer to the Special Precautions pages in the front of the instruction book for detailed handling information.

CAUTION

Possibility of Service Interruption

RF flex coaxial cable requires special consideration. The electrical characteristics of the coax can be affected if it is accidentally twisted or bent. Provide mechanical support to prevent any weight or strain to the coax and connector when connecting or disconnecting equipment. Loosen the connectors at both ends of a coax section if one end must be moved even slightly. SMA connectors should be secured in place fingertight, and then gently tightened using a torque wrench with a 5/16 in. head set for 7 to 9 inch-pounds. The connectors should not be left fingertight.

Note

Ensure that all antennas are properly aligned and waveguide is in good physical condition.

Note

Before performing procedures that might in any way affect transmission, it is recommended that the person performing the procedure understand the FCC Rules and Regulations pertaining to the equipment and be properly authorized to operate the equipment.

5.2 MAINTENANCE PHILOSOPHY

This section provides information and procedures for equipment maintenance down to the module level. Module repair is not covered in this manual. A replacement procedure for the crystal oscillator subboard on the transmitter and receiver modules is provided to enable future use of the local oscillator at a different frequency in another application or at another location. Use the drawings in the appendix and those in the station drawing package to support the procedures in this section

The use of maintenance procedures in this section may result from failure of a periodic check, an alarm indication, or unacceptable performance. These problems should normally be resolved as shown in the maintenance philosophy flow chart (Figure 5-1).

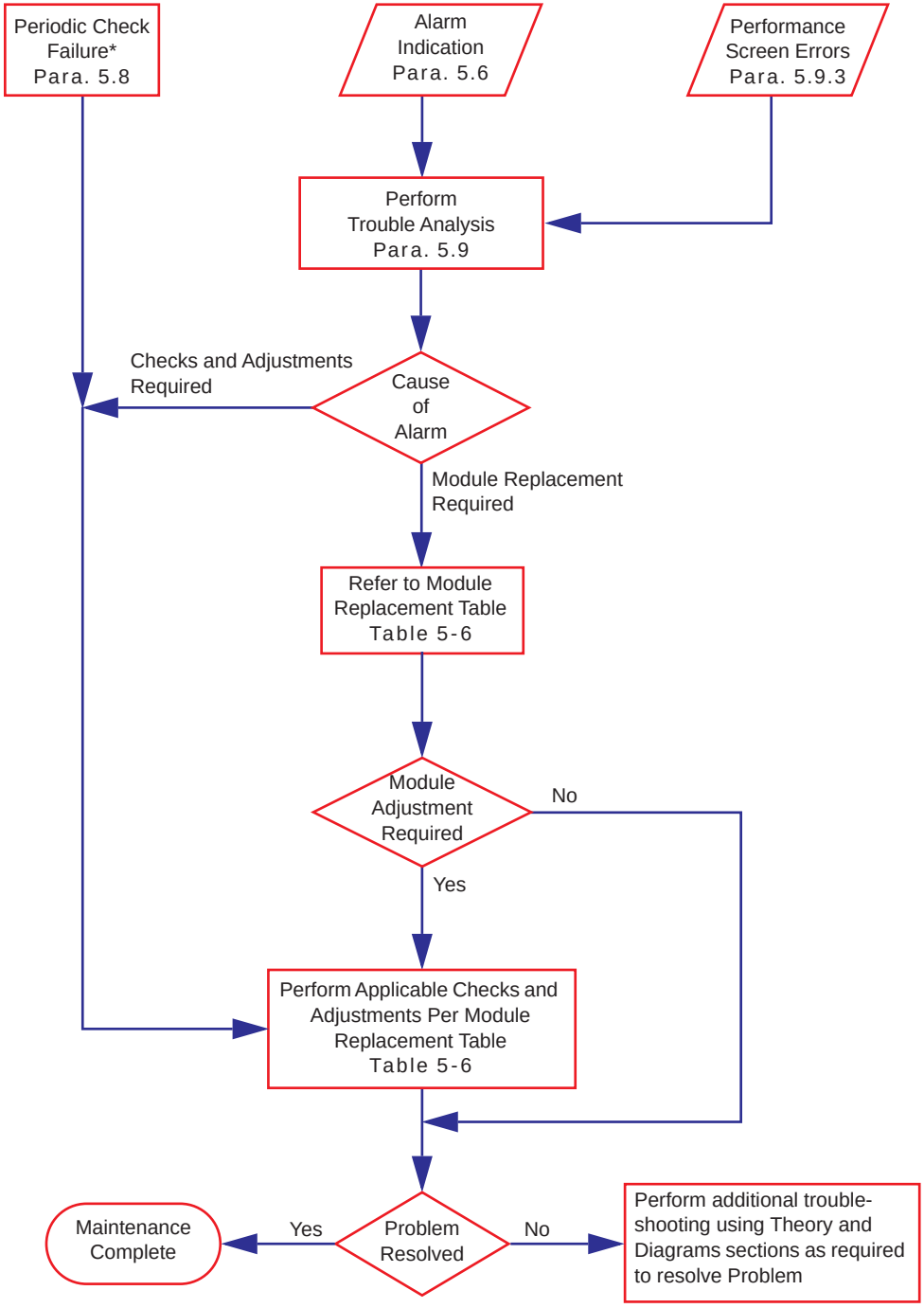


Figure 5-1 Maintenance Philosophy Flow Chart

5.3 RECOMMENDED TEST EQUIPMENT

Refer to Table 5-1 for the list of recommended test equipment. Alcatel recommends this test equipment to properly maintain the radio.

Table 5-1 Recommended Test Equipment

Test Equipment / Function	Essential Characteristics	Used On
Digital Volt Meter (DVM) Fluke 75		Out-of-Service Carrier Null Adjustment Using DVM (Refer to CD).
Frequency Counter, Agilent 5315A	106 to 150 MHz	Para. 5.18, XMT Crystal Oscillator Frequency Correction Para. 5.23, RCV Crystal Oscillator Frequency Correction
Power Meter, Agilent E4418A with E4418B Power Sensor E9300A	-60 to +20 dBm, 10 MHz to 18 GHz, 50 ohms	Para. 5.21, XMTR Output Level Calibration (No PA) Para. 5.25, PA Output Level Calibration
Test Lead and Tool Kit	PN 695-0675-003	As Required

5.4 OPTIONAL TEST EQUIPMENT

Refer to Table 5-2 for a list of optional test equipment to support alternate test procedures in this section and the over-the-hop test procedure (Refer to CD).

Table 5-2 Optional Test Equipment

Test Equipment / Function	Essential Characteristics	Used On
Adapter Type N Male Interface Adapter (Qty. 2 Required) Tyco Electronics 1048789-1		Flexible RF Test Cable
Attenuator Narda 768-30	30 dB, 50 Ohms, 20 Watts	Para. 5.25, PA Output Level Calibration (Alternate Procedure)
Bit Error Rate Test Set Acterna ANT-5 Data Rate Modulation Scheme	 2.048 Mb/s, HDB3	Over-The-Hop E1 BER Threshold Test

Table 5-2 Optional Test Equipment (Cont.)

Test Equipment/Function	Essential Characteristics	Used On
Communications Analyzer w/DS1 Package Acterna TB 2310-P4 D1 Data Rate DS1 Modulation Scheme	1.544 Mb/s, B8ZS or AMI	Over-The-Hop DS1 BER Threshold Test
Communications Analyzer w/DS3 Package Acterna TB 2310-P5 DS3 Data Rate DS3 Modulation Scheme	44.736 Mb/s, 64 QAM	Over-The-Hop DS3 BER Threshold Test
Communications Analyzer w/OC3 Package Acterna TB 2310-P2	155.52 Mb/s	Over-The-Hop OC3/STM-1 BER Threshold Test
Flexible RF Test Cable, 6 Ft. Tyco Electronics 1049982-5		Spectrum Analyzer
Optical Power Meter RIFOCS 555B with SC and FC SOC Power Wavelength	-8 to -28 dBM, 1310/1550 nm	Over-The-Hop Optical Power Test
Oscilloscope, Tektronix TDS3052B		DS3 Radio DADE DS3 Line DADE
Spectrum Analyzer, Agilent E4408B	1.7 to 11.7 GHz	Para. 5.20, In-Service XMTR Carrier Null Adjustment Using Spectrum Analyzer
Variable Attenuator, Narda 791	1.7 to 11.7 GHz, 0 to 37.5 dB	Over-The-Hop DS1 BER Threshold Test, Over-The-Hop E1 BER Threshold Test, Over-The-Hop DS3 BER Threshold Test, Over-The-Hop OC3/STM-1 BER Threshold Test, OC3/STM-1/ETH I/O Interface Removal and Replacement, Over-The-Hop OC3/STM-1 Fade Margin Test (to the 10-6/10-3 BER Level)

5.5 PERSONAL COMPUTER (PC)/LAPTOP

The PC is an on-line maintenance and troubleshooting tool. Refer to the General Section for PC guidelines. See Figure 5-2. Connect the RS-232 Interface cable between USI connector on controller and the PC.

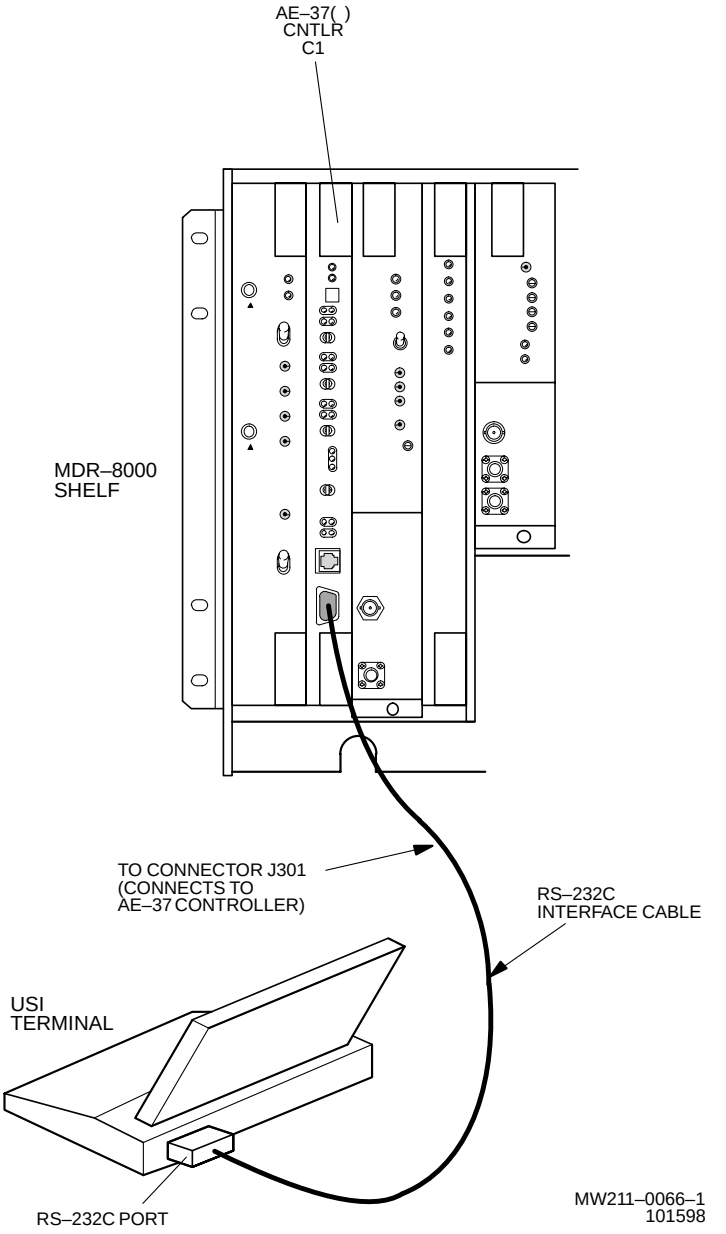


Figure 5-2 USI Computer to Controller Interconnection

5.6 MDR-8000 ALARMS

MDR-8000 Alarms are displayed on:

1. USI Alarm and Status screen
2. Alcatel MCS-11 Monitor and Control System
3. SNMP MIB browser
4. TBOS foreign alarm system
5. External relay interface
6. Module front panel indicators

Alarm names are radio/alarm equipment dependent. The Alarm List found under NOC Alarm Troubleshooting on the enclosed CD, identifies every alarm name indicated by the above alarm display equipment, in alphabetic order. By clicking on the alarm name, the user can go straight to the description, cause, effect, and action for that alarm, regardless of where the alarm is displayed. The alarm list is a summary of alarms designed for use by NOC personnel. Refer to the detail troubleshooting later in this section for more information.

5.7 ALARM MONITORING AND INSPECTION

Perform the following checks whenever a station is entered:

1. Verify that no alarms are lighted; only the green status indicators should be lighted.
2. Momentarily press LAMP TEST switch. Verify all indicators light.

Note

Keeping records of errors and alarm history can be an aid to system troubleshooting.

Note

The local status alarms screen displays the alarms of the radio to which the USI is connected, either physically or addressed via the ELMC.

3. Using the USI computer, check local alarms on the Local Status Alarms screen.

5.8 RECOMMENDED PERIODIC CHECKS

Perform XMTR local oscillator frequency verification (Para. 5.18) and XMTR output check (Para. 5.19) 1 year after initial setting and at 5-year intervals thereafter to correct possible drift caused by aging.

5.9 RADIO TROUBLESHOOTING

The digital radio system is equipped with alarm circuitry and automatic switching (in hot-standby, frequency diversity, and space diversity configurations) to provide protection against loss of traffic. This automatic switching, coupled with adaptive equalization of multipath distortion, provides protection against equipment outage and propagation variations. Because of the finite life of electronic equipment, failures occur.

5.9.1 Troubleshooting USI Alarms

First alert for an alarm is normally the USI Status Alarm Screen. See Figure 5-3 through Figure 5-12 for detailed alarm information and troubleshooting guidelines. After isolating the fault to the most probable cause, replace module or repair as directed.

5.9.2 Troubleshooting RCVR Lockup Problems

The radio is operational when the RCVR is locked onto the associated farend XMTR frequency. Normally lockup occurs within minutes after power is applied. Successful lockup is indicated by not having the channel alarm (Chan Alm) lit on the RCVR front panel.

5.9.2.1 Slow Lockup At Initial Turnup

Slow lockup at initial turnup is defined as lockup occurring five minutes or more after powerup. If the radio is non-standby/no space diversity (one RCVR in A side), replace the RCVR. If radio is non-standby space diversity or hot-standby (two RCVRs, A and B sides) problem is probably the XMTR at the farend of the hop. The most common cause of slow lockup is incorrect carrier null. First try switching XMTRs. If this clears the problem, perform carrier null (Para. 5.20) and XMTR/PA output level calibration procedure (Para. 5.21) on the off-line XMTR. If the problem is not cleared, replace the XMTR.

5.9.2.2 Slow Lockup During Normal Operation

Slow lockup after a bad fade or other temporary interruption is defined as lockup occurring less than a second after RSL is restored. Troubleshooting this type of slow lockup requires knowing what the RSL is. Check RSL using the procedure in Appendix G on attached CD.

If the RSL is at least 4 to 5 dB above RCV threshold, the two most probable causes are carrier leakage and the RCVR local oscillator. Perform carrier null test (Para. 5.20) on the farend XMTR. If slow lockup continues, remove and replace the RCVR crystal oscillator subboard.

If the RSL is below or 1 to 3 dB above RCVR threshold, wait until RSL improves to at least 4 to 5 dB above RCVR threshold before starting troubleshooting.

5.9.3 Troubleshooting Performance Screen Errors

Path and intermod problems can occur that cause errors to be indicated on the Performance monitor screens that are not severe enough to generate an alarm on the USI Alarm and Status screen. Errors of this type fall into two categories: burst and dribbling errors.

The performance screens can be a useful tool in troubleshooting a radio with and without alarms being indicated on the Status Alarm screen.

5.9.3.1 Troubleshooting Burst Errors

Burst errors are defined as multiple errors in a very short time. Burst errors can be caused by many things, including loose connections on cable or waveguide at either end of the hop. An aging oscillator can cause burst type errors. Burst errors can be identified by a high number of **Errors** and low number of **Error Seconds** on the Performance screens. The most probable cause of burst errors is a loose connection. Check/repair all shelf and external cables and check all waveguide connections The next most probable cause is the crystal on the crystal oscillator subboard at either end of the hop.If the radio has both A and B XMTRS and RCVRS and both A and B are indicating burst errors, the fault is at the XMT end of the hop. If only A is equipped and indicates burst errors, remove and replace the crystal oscillator subboard on the on-line RCVR.

5.9.3.2 Troubleshooting Dribbling Errors

Dribbling errors are defined as small number of errors over long period of time (no frame errors). Dribbling errors can be caused by a path problem, such as interference or fading, or by a hardware problem such as a XMTR or PA that is being over driven, or high phase noise in the XMTR or RCVR oscillator. Dribbling errors can be identified by observing the **Radio CRC Errors** (DS1), **Radio Errors** (DS3), **Receiver Errors** (OC3), or **RF Receiver Errors** (ETH) fields on the radio Performance screen. Typically, less than five Errors to one Error Second identifies the fault as dribbling errors. Try isolating the transmitter by switching transmitters in a protected system. You can further isolate a transmitter by changing output levels using ATPC and or dropping the output power out of the XMTR to the PA by one or two dB.

The DS1 radio performance screen has a Repeater CRC Error Sec field that indicates errors over the repeater cable.

Two troubleshooting tips: 1) errors are displayed on the USI at the receive end in which they are detected, and 2) these specific type of radio errors are not propagated down the path.

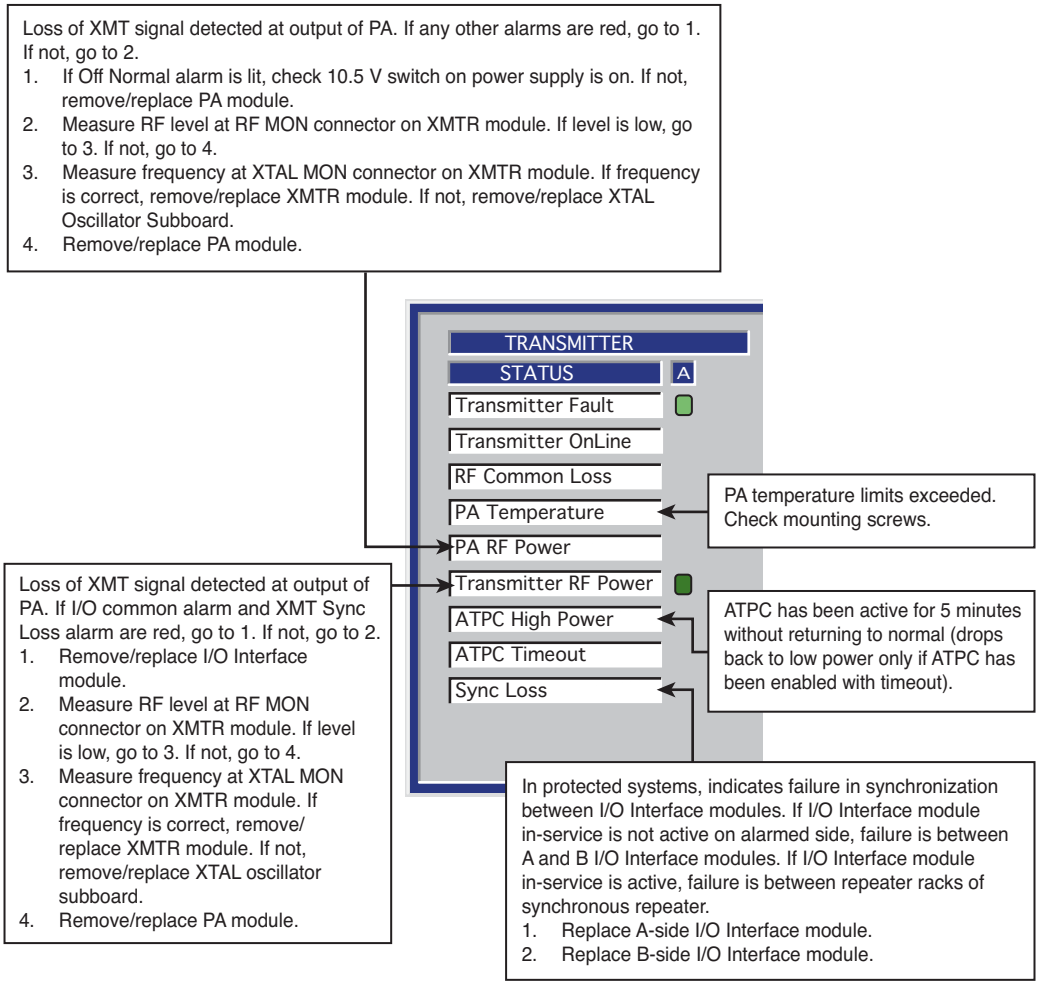


Figure 5-3 Troubleshooting Radio XMT Alarms (Sheet 1 of 2)

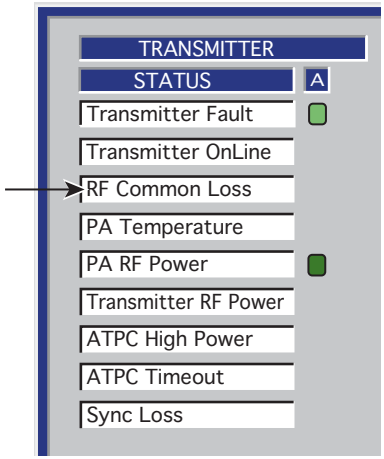
Both RCVRs at the other end have a problem and have switched the XMTRs to try and clear it. If the RCVRs clear within a defined time frame (which we will hereafter call the CLA window) after switching, the CLA appears. if the RCVRs clear by switching or any other way outside of the CLA window, the CLA does not activate, but switching continues.

Switching times vary, depending on RSL.

If RSL is above alarm threshold, the first XMT switch occurs 5 seconds after the problem at the RCVRs is detected. The 5 seconds following the first XMT switch is the "CLA window". If the RCVR alarms clear during the 5-second CLA window, the CLA will activate at the XMT end.

Since the RSL at the RCVRs is ok, equipment failure at the farend XMTR is the most probable cause of the RCVRs failing.

If RSL is below alarm threshold, the first XMTR switch occurs 30 seconds after the problem at the RCVRs is detected. The CLA window is the first 5 seconds of the second 30 seconds. If the RCVR alarms clear during the 5-second CLA window, the CLA will activate at the XMT end.



In DS1 and OC3/STM-1 2-fiber switched and 4-fiber switched radios, if the RCVR alarms do not clear within the CLA window, after ten 30-second periods (10 switches) the controller switches the I/O Interface modules and another 5-second CLA window is opened. If the RCVR alarms clear during the 5-second CLA window following the I/O switch, the CLA will activate at the XMT end.

Since this is a silent alarm at the XMT end, no other alarm should show up at the XMTR.

Clearing the RCVR problem does not automatically clear the CLA at the XMT end. The CLA can be cleared using the ACO switch on the controller module or by rolling the mouse over RF Common Loss on the screen and double clicking.

CLA can be caused by many things. Troubleshooting is RSL dependent. Problems that can cause a CLA follow.

1. Path problems, such as fading, refraction, interference
2. Frequency problems due to aging or bad crystal oscillator
3. Bad capacity key on XMTR
4. Bad RF cable
5. Bad RF switch
6. Bad I/O Interface

If RSL is normal, look for a digital signal problem at the XMT end. The RCV end will probably have Eye Closure and Frame Loss alarms, **but not an RSL alarm**. Since the RCVRs are receiving a strong signal (but not a good signal) from the farend XMTR, the RCVRs will probably be locked on frequency.

Is RSL above or below alarm threshold?

Above, go to 1.
Below, go to 2.

1. If RSL is ok, look for a digital signal problem at the farend XMTR:
   a. Check XMTR capacity key.
   b. Remove/replace XMTR.
   c. Remove/replace I/O Interface.
2. If RSL is low, there will be a RCVR RSL alarm along with any others:
   a. Check for prolonged fade. Use USI RSL screen and check history. Worst fading times are early in the morning and late in the evening.
   b. Look for equipment failure at XMT end:
      Check for bad XMTR/PA. Verify correct output power out of XMTR/PA. Is output power correct?
      Yes, check for bad cable or RF switch at the XMT end.
      No, remove and replace XMTR, PA, I/O Interface, in that order.

MDR-1092
12/06/07

Figure 5-3 Troubleshooting Radio XMT Alarms (Sheet 2 of 2)

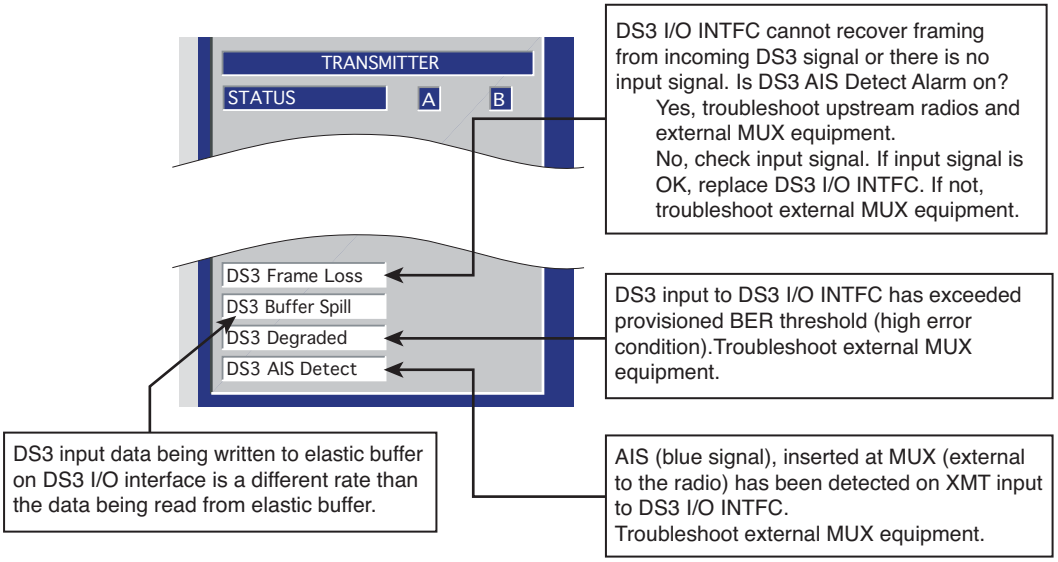


Figure 5-4 Troubleshooting DS3 Radio XMT Alarms

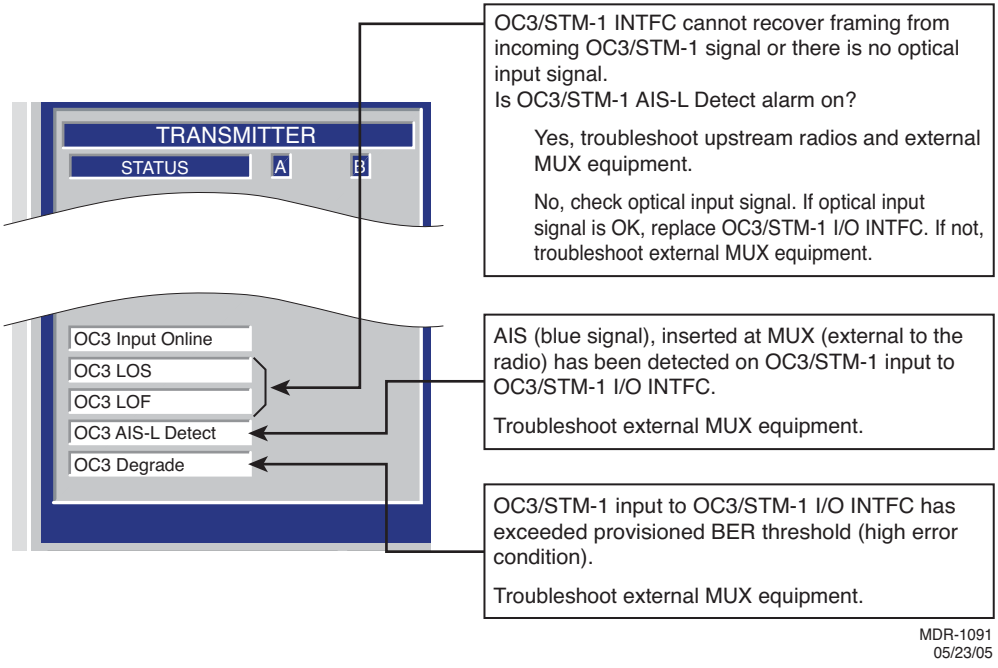
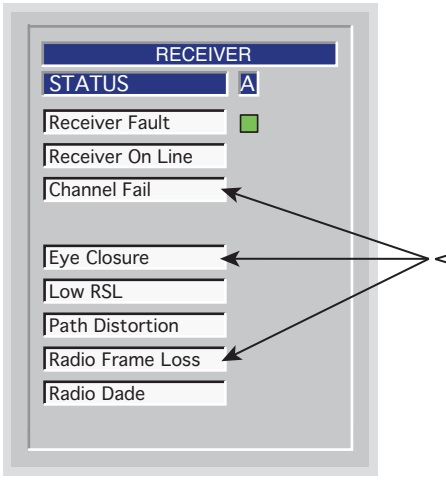


Figure 5-5 Troubleshooting OC3/STM-1 Radio XMT Alarm

Note

Always troubleshoot and clear the most severe alarm first. Channel Fail is the most severe, followed by Radio Frame Loss and Eye Closure.

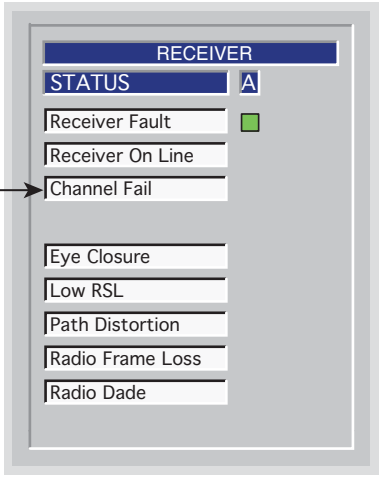


The Eye Closure alarm, Radio Frame Loss alarm, and Channel Fail alarm all work together to form effective 3-level troubleshooting tools. If the radio is provsioned correctly, Eye Closure (the first level) should be the first indication that there is a steady stream of errors (more than dribbling errors) being detected by the RCV circuit in the I/O Interface module. The second level is the Radio Frame Loss alarm. This alarm indicates that the errors have increased to the point that complete frames are being lost. The third level, the Channel Fail alarm, is the most severe level. This alarm indicates that the RCVR can no longer lock on the farend XMTR. Even worse, the overhead with command path and Service Channel is lost, inhibiting communication with the farend, making troubleshooting more difficult.

MDR-1081
05/20/05

Figure 5-6 Troubleshooting Radio RCV Alarms (Sheet 1 of 5)

A **Channel Fail** alarm occurs when RCVR(s) have lost lock and are not locked on the signal from the farend XMTR(s). Loss of signal also means loss of CMD path. The most effective method of troubleshooting this type alarm is to have a technician at both ends of the hop. Farend status viewing and controls must be performed at the farend site. This alarm can be caused by a failure at the farend XMTR, RF path/antenna/waveguide problems, or a failure in the local RCVR or I/O Interface.



Start by isolating the fault to one end of the hop or the RF path/antenna/waveguide. If the farend XMTR is protected, switch XMTRs and see if alarms at the RCVR end clear. If so, the problem is at the XMT end and the path and RCV end are ok. If the RCVR alarms do not clear (and/or the XMTR is not protected) proceed as follows:

1. Observe **RX (RSL 1) dbm** on the analog monitor screen and compare the RSL level with the **TYPICAL RCVR THRESHOLD (DBM) BER = 10^{-6}**, for the type and capacity of radio, listed on Tabe 1-3, Physical, Environmental, and Electrical Characteristics, in the General section of this instruction book. If the RSL is too low (below the RCVR threshold), the RCVR will not lock to the farend XMTR. The problem is in the farend XMTR, is an RF path problem, or is a farend or local antenna/waveguide problem.

2. Troubleshoot farend XMTR.
   If the RSL is above the listed threshold, troubleshoot the local RCVR. Start by isolating the fault to the RCVR module or I/O Interface module.
   a. Observe **RX (AFC MON)** voltage on the analog monitor screen. This is the correction voltage for the crystal oscillator. The voltage should be -3.0 ±0.5 Vdc, indicating that the crystal oscillator is on center frequency. If not, remove and replace crystal oscillator subboard on RCVR. If the **RX (AFC MON)** voltage is correct, the failure could still be the RCVR or the RCVR circuits in the I/O Interface module. The most probable cause is the RCVR.
   b. Remove and replace RCVR. The crystal oscillator subboard and capacity key must be removed from the suspected RCVR and installed on the spare RCVR. If the alarm is stil not cleared, remove and replace the I/O Interface module.

MDR-1084
11/29/04

Figure 5-6 Troubleshooting Radio RCV Alarms (Sheet 2 of 5)

Note

Always troubleshoot and clear the most severe alarm first. **Channel Fail** *is the most severe, followed by Radio Frame Loss and Eye Closure.*

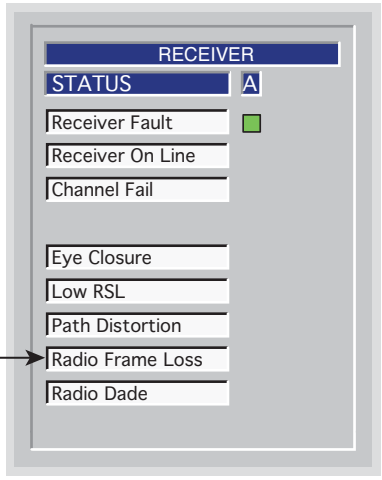
Loss of radio frame from RCVR in I/O Interface RCVR circuits. Before starting, check USI for receiver **Channel Fail** alarms and **Common Command Path** alarm. If there is a **Channel Fail** alarm, troubleshoot and clear that alarm first. If there is a **Command Path** alarm, troubleshoot and clear that alarm second.

1. Verify farend radio configuration. Is farend radio hot-standby?
   Yes, go to 2.
   No, go to 4.

2. Check for Radio Frame Loss alarms on both A and B.
Are there Radio Frame Loss radio frame loss alarms on both A and B?
   Yes, go to 3.
   No, only A or B has a frame loss alarm, go to 4.

3. Switch farend XMTRs. Do alarms clear?
   Yes, replace farend off-line XMTR.
   No, replace local I/O Interface on alarmed side. Do alarms clear?
      Yes, stop. Procedure is complete.
      No, replace local RCVR on alarmed side.

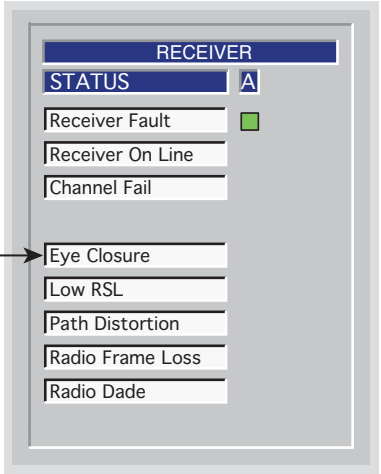
4. Replace local I/O Interface on alarmed side. Do alarms clear?
      Yes, stop. Procedure is complete.
      No, replace local RCVR on alarmed side.



MDR-1083
05/20/05

Figure 5-6 Troubleshooting Radio RCV Alarms (Sheet 3 of 5)

Errors are being received by the RCVR at a rate exceeding the Eye BER threshold error rate provisioned on the radio configuration screen. This alarm could be caused by a faulty XMTR (farend), radio interference on the RF path (RFI), antenna/waveguide problem, or a faulty antenna/waveguide problem, or a faulty RCVR/RCVR local oscillator failure. Troubleshooting is configuration dependent.



1. Check for **Eye Closure** alarms on both A and B RCVRs.
Are there **Eye Closure** alarms on both A and B RCVRs?
Yes, go to 2.
No, only A or B has an Eye Closure alarm. The failure is on the RCVR end. Go to 3.

2. The problem is in the farend XMTR, is an RF path problem, or is a farend or local antenna/waveguide problem. Start by isolating the fault to one end of the hop or the RF path/antenna/waveguide.
a. Check farend for XMTR alarms. Troubleshoot and clear alarms (if any) at far end as required. Go to b.
b. Check farend radio XMTR configuration as follows:
Hot-standby XMTRs? Go to c.
Frequency diversity? Go to 4.
Space diversity? Troubleshoot farend XMTR.
c. If the farend XMTR is hot-standby, switch XMTRs and see if alarms at the RCVR end clear.
Do RCVR alarms clear?
Yes, the problem is at the XMT end and the path and RCV end are ok. Replace farend off-line XMTR.
No, the problem is a path problem or a problem at the RCVR. Go to d to isolate the path.
d. The problem may be RF interference (RFI) on the path. While observing the RSL on the RCV end Analog screen, disable the farend XMTRs.
Does RSL drop at least 25 dB?
No, there is high RFI on the path. Eliminate the RFI source.
Yes, RSL drops 25 dB or more. The problem is a path problem, such as an obstruction in the path, or a problem with the antenna or waveguide, or is a RCVR problem. Go to 3.

3. Isolate failure to RCVR crystal oscillator subboard or the RCVR module as follows:
a. At RCV end, observe **RX (AFC MON)** voltage on the analog monitor screen. This is the correction voltage for the crystal oscillator. The voltage should be -3.0 ±0.5 Vdc, indicating that the crystal oscillator is on center frequency.
If not, remove and replace crystal oscil lator subboard on RCVR.
If the **RX (AFC MON)** voltage is correct, replace RCVR module.
Do RCVR alarms clear?
Yes, stop. Procedure is complete.
No, go to 4.

4. Problem is in path (not RFI) or antenna/waveguide. Sweep waveguide at both ends of hop. Repair or replace as required.

MDR-1082
11/29/04

Figure 5-6 Troubleshooting Radio RCV Alarms (Sheet 4 of 5)

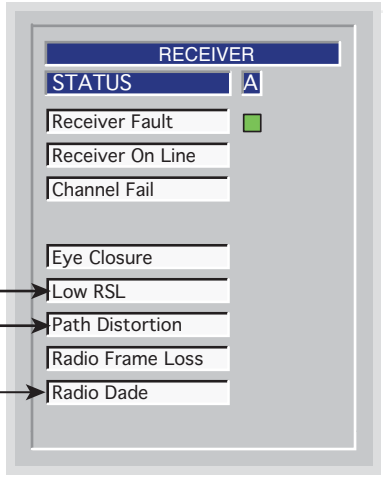
Note

Radio Dade *is displayed on DS1 USI Status and Alarm screen only.*

Low RSL on alarmed RCVR. Alarm only functions if AGC switching threshold is provisioned active.

1. Check for path fading.
2. Check upstream XMTR.

High level of distortion in TDE due to excessive multipath activity. Check path for interference.



More delay in system than elastic buffers on DS1 I/O Interface can correct.

1. Isolate the delay to local or farend. Delay in the farend XMTR is a possible cause in frequency diversity configurations. Is the farend radio frequency diversity?
   Yes, go to 2.
   No, delay is probably a local problem. Go to 3.
2. Verify there are no farend XMTR alarms. Troubleshoot and clear farend XMTR alarms first.
3. Check/repair waveguide/path.
4. Isolate delay to A-side or B-side I/O Interface. On local controller front panel, observe **I/O ALM** indicators. The **A** or **B I/O ALM** will be lit for the side with the excessive delay.
5. Remove/replace RCVR on alarmed side.
6. Remove/replace I/O Interface module on alarmed side.

MDR-1085
11/29/04

Figure 5-6 Troubleshooting Radio RCV Alarms (Sheet 5 of 5)

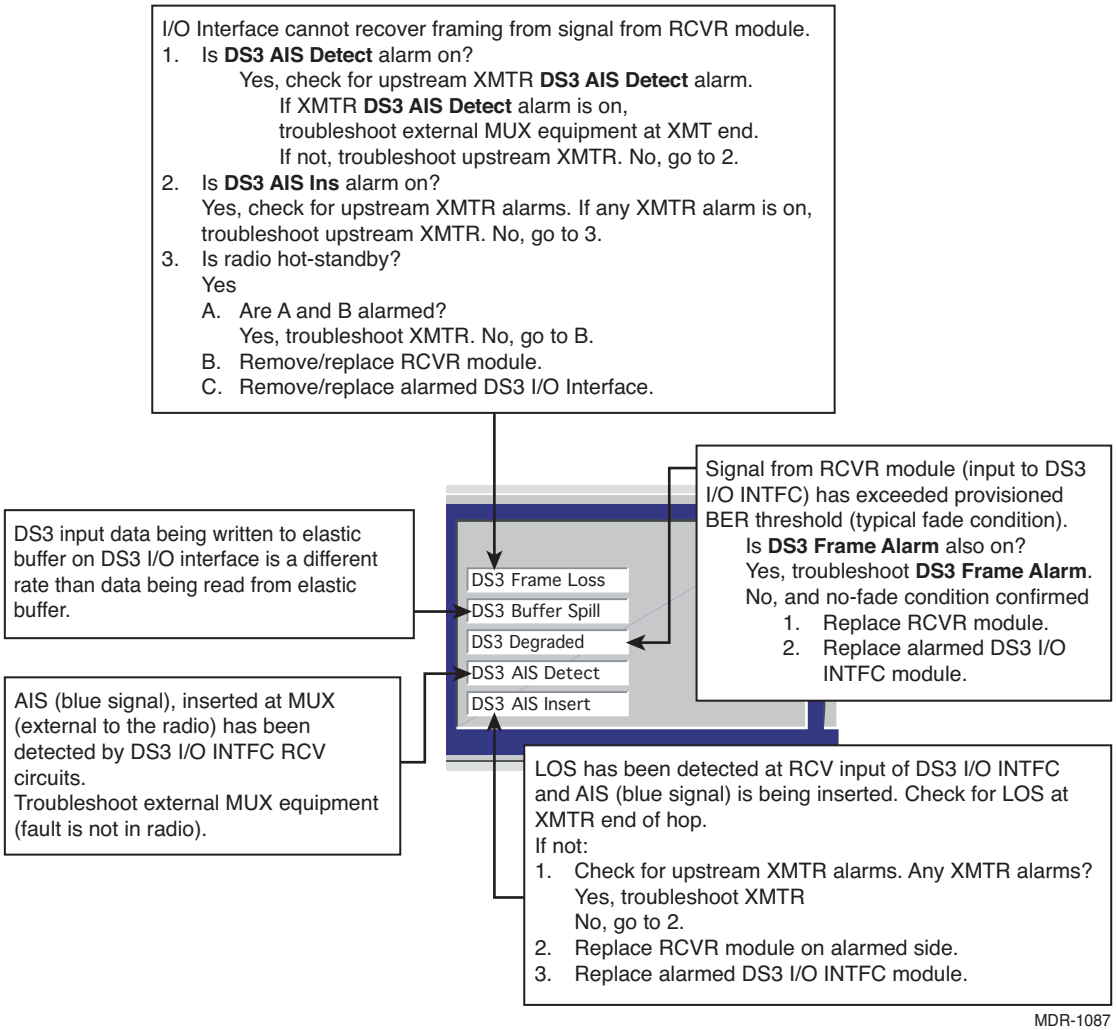


Figure 5-7 Troubleshooting DS3 Radio RCV Alarms

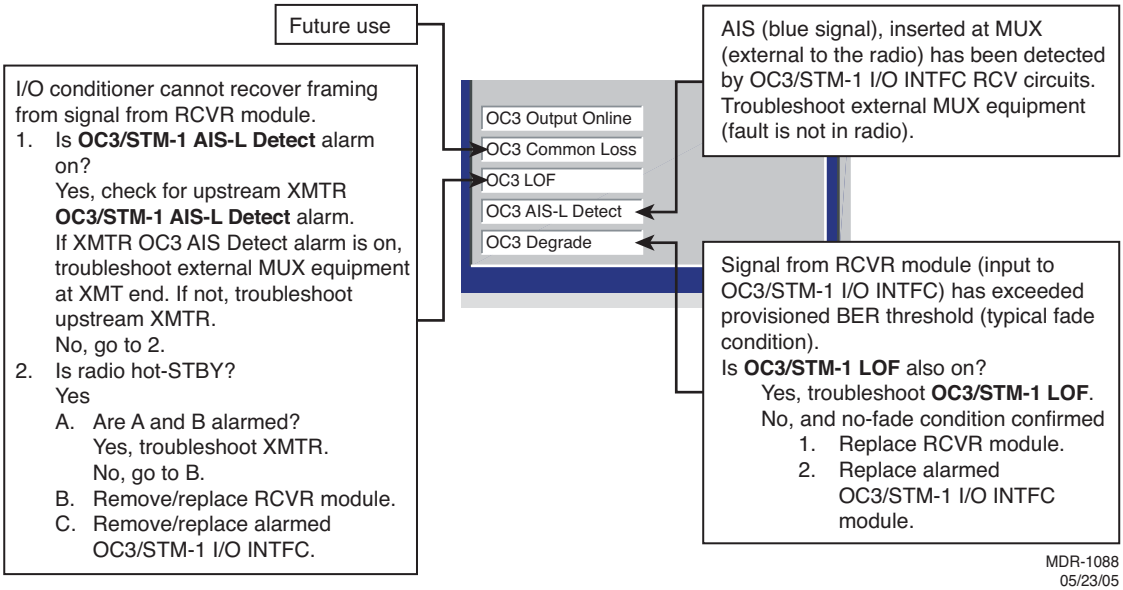


Figure 5-8 Troubleshooting OC3/STM-1 Radio RCV Alarms

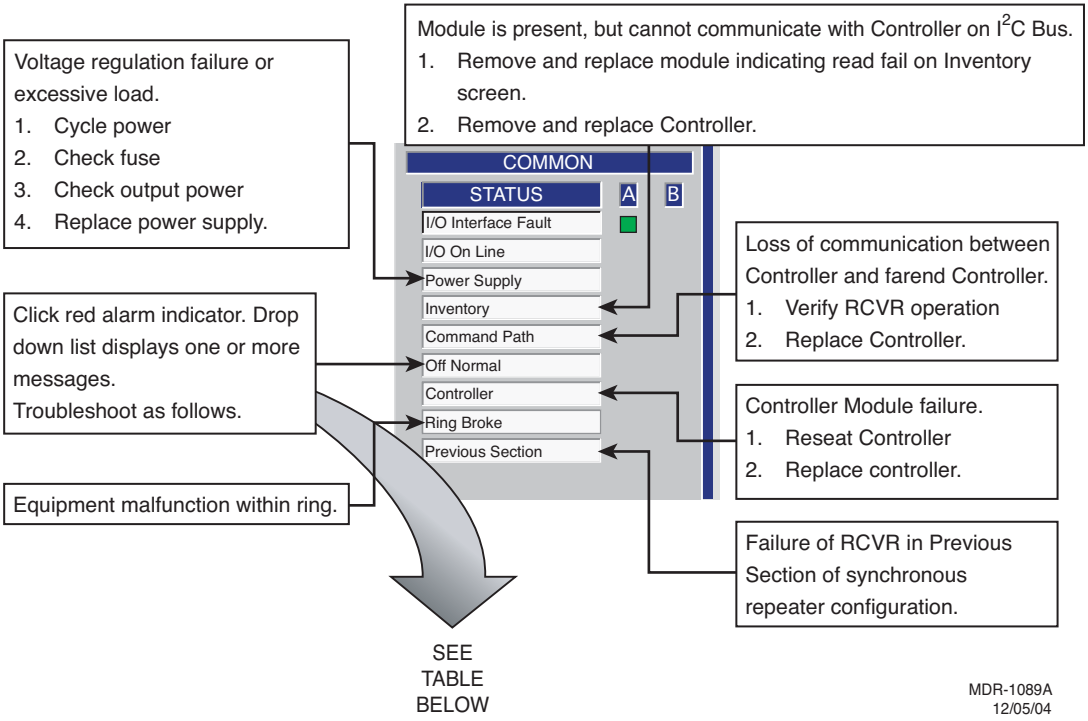
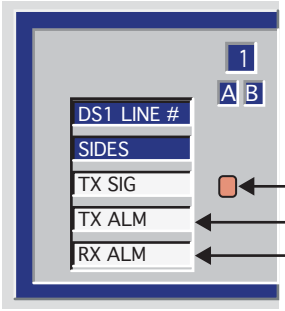


Figure 5-9 Troubleshooting Radio Common Alarms

MESSAGE	MEANING	ACTIONS
Fan Alarm	Fan or fan control module failed.	Remove/replace fan/fan assembly.
A ATPC High Power Lock	***A ATPC High Power Lock*** function is enabled on USI control screen locking A-side XMTR/PA at highest power.	Disable ***A ATPC High Power Lock*** function on USI control screen.
B ATPC High Power Lock	***B ATPC High Power Lock*** function is enabled on USI control screen locking B-side XMTR/PA at highest power.	Disable ***B ATPC High Power Lock*** function on USI control screen.
A ATPC Low Power Lock	Locks A-side XMTR/PA output power 10 dB down from highest power.	Disable ***A ATPC Low Power Lock*** function on USI control screen.
B ATPC Low Power Lock	Locks B-side XMTR/PA output power 10 dB down from highest power.	Disable ***B ATPC Low Power Lock*** function on USI control screen.

MESSAGE	MEANING	ACTIONS
A Tx Override	Override function is enabled on controller module locking A-side XMTR/PA in-service. Switching is disabled regardless of alarms.	Disable override function on controller module front panel.
B Tx Override	Override function is enabled on controller module locking B-side XMTR/PA in-service. Switching is disabled regardless of alarms.	Disable override function on controller module front panel.
A Rx Override	Override function is enabled on controller module locking A-side RCVR in-service. Switching is disabled regardless of alarms.	Disable override function on controller module front panel.
B Rx Override	Override function is enabled on controller module locking B-side RCVR in-service. Switching is disabled regardless of alarms.	Disable override function on controller module front panel.
A I/O Override	Override function is enabled on controller module locking A-side I/O interface in-service. Switching is disabled regardless of alarms.	Disable override function on controller module front panel.
B I/O Override	Override function is enabled on controller module locking B-side I/O interface in-service. Switching is disabled regardless of alarms.	Disable override function on controller module front panel.
Calibrating A Side	A-side XMTR/PA output level calibration procedure has been initiated.	Complete or cancel A-side XMTR/PA output level calibration procedure.
Calibrating B Side	B-side XMTR/PA output level calibration procedure has been initiated.	Complete or cancel B-side XMTR/PA output level calibration procedure.
Pedestal Switch Activated	***PED/AC/NORM*** switch on front panel of original/older style RCVR is set to ***PED***.	Set ***PED/AC/NORM*** switch to ***NORM***.
DS1 Loopback On	DS1/wayside DS1 line and/or facility loopback function is enabled on USI control screen.	Disable loopback functions on USI control screen.
A Side PA OFF	***PA ON/OFF*** switch on A-side power supply is set to ***OFF***.	Set ***PA ON/OFF*** switch on A-side power supply to ***OFF***.

MESSAGE	MEANING	ACTIONS
B Side PA OFF	***PA ON/OFF*** switch on B-side power supply is set to ***OFF***.	Set ***PA ON/OFF*** switch on B-side power supply to ***OFF***.
Prov. Mismatch	Provisioning on the controller does not match the provisioning screen.	Provision to match system requirements.
Controller/Power Supply Prov. Mismatch	Provisioning data stored in memory on the controller does not match provisioning data stored in memory on the A-side power supply.	Check for correct provisioning. Reprovision as required. Save provisioning.
Could Not Write/Read Power Supply Prov.	Cannot download provisioning data from controller to A-side power supply.	Remove/replace: 1. A-side power supply 2. Controller.
Capkey Mismatch	Capacity key on A-side XMTR has different part number than capacity key n B-side XMTR.	Instal correct capacity keys on XMTRs.
Radio ID Mismatch	Radio IDs provisioned on the radio configuration screen are not the same at both ends of the hop.	Provision both ends of hop with same radio ID number.



Loss of input signal to I/O Interface, inability to recover clock on alarmed line, or bipolar violation detection

1. Check presence and quality of DS1/E1 input to radio
2. Enable **DS1 I/O Loopback** on USI control screen for continuity check for DS1 signal through LBO and I/O interface module.

   Continuity?

   Yes – replace I/O interface

   No – check LBO connectors for open or bent pins. Repair as required.

Transmit hardware failure or buffer spills on alarmed line.

1. Verify quality of TX input data.
2. Replace I/O Interface module.

Loss of receive clock, buffer spills, or alarm insertion signal on the alarmed line. May also be caused by DS1 driver failure.
Replace I/O Interface module.

LMW-1030
04/07/05

Figure 5-10 Troubleshooting DS1/E1 Radio Alarms

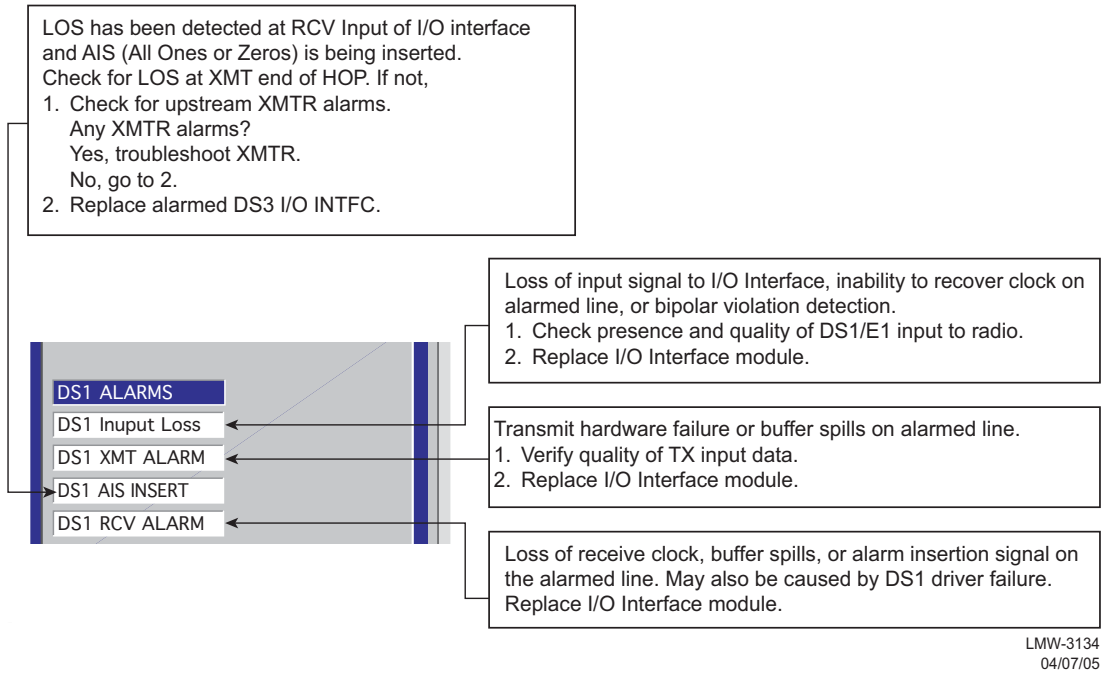


Figure 5-11 Troubleshooting DS3 Radio Wayside DS1 Alarms

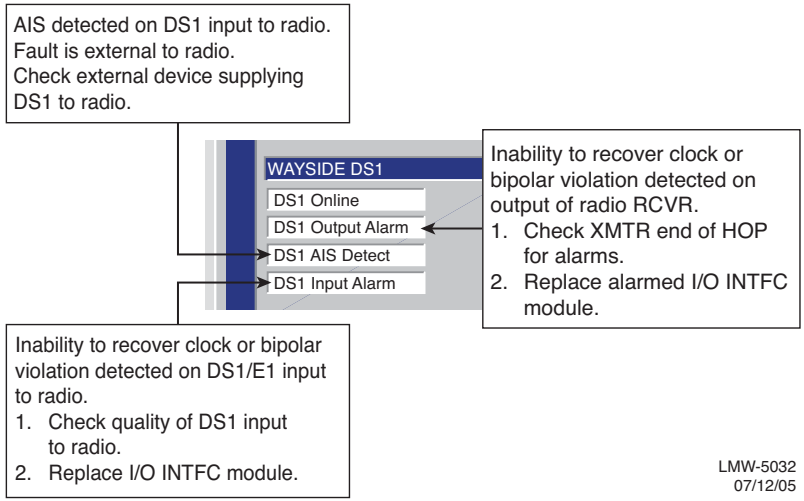


Figure 5-12 Troubleshooting OC3/STM-1 Radio Wayside DS1 Alarms

5.10 ETHERNET-SPECIFIC TROUBLESHOOTING

The LEDs on the front panel of the Ethernet I/O Interface module and the alarms on the radio USI status and alarm screen are the first indication of a fault. Troubleshoot radio XMT and RCV alarms using the procedures in the MDR-8000 Instruction Book/Users Manual. Troubleshoot Ethernet alarms as follows:

5.10.1 Troubleshooting Using Ethernet I/O Interface Module Front Panel Indicators

Refer to Table 5-3. In this analysis, troubleshoot using Table 5-3 to isolate the most probable cause. Replace modules or repair as directed.

Table 5-3 Troubleshoot Using Ethernet I/O Interface Module Indicators

LED	Indication	Probable Cause	Corrective Action
ALM	Steady Red LED	1. Module failure	1. Replace Ethernet I/O Interface module
WYSD ALM	Yellow LED Lit	1. Loss of DS1 radio XMT input to I/O Interface	Check presence of DS1 input to radio. Is DS1 Present? Yes - Replace Ethernet I/O module. No - Check/repair cables to customer interface.
		2. I/O Interface cannot recover clock, or there are errors on DS1 output of radio RCVR (RCV input to I/O Interface).	Check XMTR end of hop for alarms. Farend XMTR alarmed? Yes - Troubleshoot farend XMTR No - 1. Replace local alarmed I/O Interface module. 2. Replace local radio RCVR module.
		3. AIS has been detected on DS1 output of radio RCVR (RCV input to I/O Interface). RCVR fault is not in this radio.	Check upstream XMTR/hops for alarms.

Table 5-3 Troubleshoot Using Ethernet I/O Interface Module Indicators (Cont.)

LED	Indication	Probable Cause	Corrective Action
ETH IN	Green LED Not Lit	Loss of Ethernet RCV/radio XMT signal in. Most probable causes:	
		1. Cable between link partner and radio is disconnected/broken.	Connect/repair cable.
		2. Speed/Mode provisioning mismatch between link partner and radio	1. Check local Ethernet facility provisioning screen. 2. Check link partner provisioning.
ETH ALM	Yellow LED Lit	Summary alarm, could be caused by XMT or RCV Ethernet degrade	Use USI to determine if degradation is in the input or output side.
ETH OUT	Green LED Not Lit	Loss of Ethernet XMT/radio RCV signal out. Most probable causes:	
		1. Loss of RF input to radio RCVR	Check local RSL screen on USI. Is RSL ok? Yes - Check farend for Ethernet alarm. No - Check farend XMTR output. Is farend XMTR Out ok? Yes - Check path, antenna, waveguide/cabling No - Check/replace farend XMTR.
		2. Loss of Ethernet input to radio RCVR	Check farend for Ethernet alarms. Are any alarms indicated? Yes - Troubleshoot farend alarms No - Check farend Ethernet status. Is only abnormal status indicated? Yes - Troubleshoot farend Ethernet status. No - 1. Replace local alarmed Ethernet I/O Interface module. 2. Replace local RCVR module.

5.11 TMN-SPECIFIC TROUBLESHOOTING

Refer to Table 5-4. The red ALM LED on the front panel of the TMN Interface module and the alarm on the radio USI status and alarm screen are the first indication of a fault. The ALM LED on the front panel of the TMN Interface module lights for any module fault. The LED remains lit during module reboot and also after reboot if reboot is not completed satisfactorily.

Table 5-4 Troubleshooting Using TMN Interface Module Indicators

LED	Indication	Probable Cause	Corrective Action
ALM	Steady Red	1. Module failure 2. Module reboot in progress (several seconds to reboot) 3. Module reboot failed.	1. Replace module 2. Wait several seconds for reboot to complete. 3. Attempt reboot.
Ethernet 1, 2, and/or 3	Blinking Yellow	Network with too much traffic (collisions occurring). Some collisions are normal in any network.	Wait for situation to clear. If collisions continue (severe occurrence), troubleshoot network.
Ethernet 1, 2, and/or 3	Not Steady Green When First Connected	1. Cable is disconnected/broken 2. Cable/port mismatch 3. Rate mismatch. Far end equipment does not support 10Base/T.	1. Connect/repair cable. 2. Check application matches cable. Straight cable instead of crossover cable, etc. 3. Check far end equipment supports 10Base/T.
PPP	Not Steady Green When First Connected	1. Cable is disconnected/broken. 2. Cable/port mismatch	1. Connect/repair cable. 2. Check application matches cable. Straight cable instead of crossover cable, etc.
PPP	Yellow	Local end is receiving data but PPP disabled locally	Check local provisioning for PPP port enabled.

Table 5-5 TMN Network Troubleshooting

Problem	Possible Cause	Possible Solution
Unusually slow communication in radio network	1. Normal network management traffic is saturating the communications channel.	1. There may be too many radios being managed within a single region. Split the radio network management into different regions and backhaul the traffic for each region through separate channels.
	2. Polling radios for PM data or missed alarms too rapidly	2. Poll the radios more slowly.
	3. Multiple remote software downloads in process	3. Download to fewer radios at a time.
	4. IP traffic other than network management traffic being routed through radio network	4 Configure external routers to allow only network management related traffic through the Management network of the radios. Dynamic route updates (OSPF, RIP) may attempt to reroute high speed traffic through the TMN network if a high speed ink fails.
Unable to operate controls using SNMP	To perform control operations, the Manager must be registered as a craft device.	Register the Manager as a craft device. Manager registration type can be changed as needed to type 'ct' to allow control operation and then be changed back to 'nml' for normal operation.
Can Read SNMP objects but cannot Write to SNMP objects	1. Incorrect community string	1. Use the correct community string.
	2. Insufficient SNMPv3 privileges	2. Use the correct privileges: a) The TMN Interface supports 4 view levels. Use a SNMPv3 user account that supports write access to the selected SNMP object. b) Use the correct Authentication mode. c) Use the correct Privacy passphrase.
	3. If the TMN Interface is configured for SNMPv2, the write community string is probably wrong.	3 Use the correct write community string.

Table 5-5 TMN Network Troubleshooting (Cont.)

Problem	Possible Cause	Possible Solution
No traps being received from NE	1. Manager not registered in NE to receive traps	1. Register Manager with NE.
	2. Communication failure in network	2. Check network connectivity. Check redundant network paths and routing. Traceroute (tracert) is useful for locating path or routing faults.
Unable to communicate with the NE through the radio network (unable to 'ping' the NE)	Possible communication path failure or routing failure within the radio network	Use traceroute (tracert) to help locate for communication path or routing problems.
Can 'ping' the TMN Interface but cannot communicate with the NE using SNMP, or can only see a few SNMP objects (mib-2) in the NE.	1. Using incorrect SNMP version at manager	1. Note the TMN card ships in SNMPv3 mode. If SNMPv2 operation is desired, it must be provisioned for SNMPv2 using the TUI.
	2. If using SNMPv2, using the wrong community string. If using SNMPv3 using wrong username/passphrase pair	2. Verify community string or username/passphrase.
	3. A corrupt SNMPv3 security configuration file may have caused the module to revert to the previous copy of the security configuration or to factory defaults.	3. Check to see if another username/passphrase combination works. Check to see if the previous passphrase works. Check the Default username/passphrase combination. It may be necessary to re-initialize the security configuration using the TUI. Reprovision accounts as required, and after the changes have been committed, force a reboot to copy the new security configuration into the backup configuration.

WARNING

Possibility of Damage to Equipment

Modules screwed to heat sink must be screwed securely before power is turned on.

WARNING

Possibility of Damage to Equipment

Units with the electrostatic-sensitive (ESS) symbol contain ESS devices. Store these units in an antistatic container when not in use, and anyone handling a unit should observe antistatic precautions. Damage to the unit may result if antistatic protection is not maintained. Refer to the Special Precautions pages in the front of the instruction book for detailed handling information.

WARNING

Possibility of Damage to Equipment

RF flex coaxial cable requires special consideration. The electrical characteristics of the coax can be affected if it is accidentally twisted or bent. Provide mechanical support to prevent any weight or strain to the coax and connector when connecting or disconnecting equipment. Loosen the connectors at both ends of a coax section if one end must be moved even slightly. SMA connectors should be secured fingertight, and then gently tightened using a torque wrench with a 5/16 in. head set for 7 to 9 inch-pounds. The connectors should not be left fingertight.

CAUTION

Possibility of Service Interruption

XMTR Crystals are soldered and tuned up in an oscillator assembly board at the factory.

CAUTION

Possibility of Service Interruption

Modules may be removed or installed with shelf power applied. However, exercise reasonable care to prevent contacting adjacent modules. If clearances are narrow, consider setting the power supply to OFF while the module is being removed or replaced. (Before setting any switch to OFF, verify that traffic has been protected.)

Before replacing any module, refer to Table 5-6 to determine the actions, other than physical replacement, required. If the module has any options (switches, subboards, etc.), refer to the removed module so that the replacement module can be set up the same way.

Any module installed in the card cage, except those having front-panel cable connections, can be removed by grasping the module handle(s) and pulling firmly outward. Modules with front-panel interconnects can be removed in the same manner after disconnecting the cable from the module being removed and moving the cable out of the way.

To install a module in the card cage, insert the module card connector edge into the appropriate card slot. Engage module handles in card cage and press on module handles until they are latched and the card is fully seated. After installing a module with front-panel interconnections, reconnect the cable(s) to the front-panel connector(s).

Table 5-6 Module Replacement Matrix

MODULE/UNIT	REMOVAL/REPLACEMENT PROCEDURE	CHECKS/ADJUSTMENTS PROCEDURE
AE-27AF Relay Interface	No Special Procedure Required	None Required
AE-37Y Controller	Para. 5.14	None Required
CE-16BB Power Supply	Para. 5.13	None Required
Fuse	No Special Procedure Required. Refer to Operations Section for Location.	
DX-35M DS1/E1 I/O Interface	No special procedure required.	None Required
DX-35N DS3 I/O Interface (Early Versions)	Para. 5.15	Para. 5.15 and Table 5-9
DX-35P OC3/STM-1 I/O Interface	Para. 5.16	None Required
DX-35R/S ETH I/O Interface	Para. 5.16	None Required
UD-35( ) Transmitter	Para. 5.17	Para. 5.18, Para. 5.19, Para. 5.20, and Para. 5.21
Crystal Oscillator Subboard	Figure 5-15	The Crystal Oscillator Subboard and crystal part numbers define this unit. The crystal is soldered to the oscillator subboard and factory tuned to the customers requirements.
Capacity Key	Figure 5-16	
UD-36( ) Receiver	Para. 5.22	Para. 5.23[2]
Crystal Oscillator Subboard	Figure 5-22	The Crystal Oscillator Subboard and crystal part numbers define this unit. The crystal is soldered to the oscillator subboard and factory tuned to the customers requirements.
Capacity Key	Figure 5-23	
UD-51( ) Power Amplifier Hot-Standby Shelf CommPak Indoor Shelf	 Para. 5.24 Appendix A on enclosed CD	 Para. 5.25
LBO/AUX/Line Interface Hot-Standby Shelf CommPak Indoor Shelf	 Maintenance Section on enclosed CD Appendix H on enclosed CD	 No Special Procedure Required No Special Procedure Required
RF Switch	Maintenance Section on enclosed CD	No Special Procedure Required

(1) If ATPC is in use, it must be provisioned disabled or locked high before removing controller.

(2) Applicable to older versions of RCVR with Freq Cont on front panel.

5.13 POWER SUPPLY REMOVAL AND REPLACEMENT

See Figure 5-13 and follow the procedure to remove and replace CE-16BB Power Supply.

CAUTION

Possibility of Service Interruption

This is an out-of-service procedure when on a nonstandby (unprotected) system. On a hot-standby or frequency diversity system, switch traffic on the channel under test to protect. Use front panel OVRD controls on AE-37( ) Controller to switch and lock on-line opposite side XMTR, RCVR, and I/O to opposite side from failed power supply.

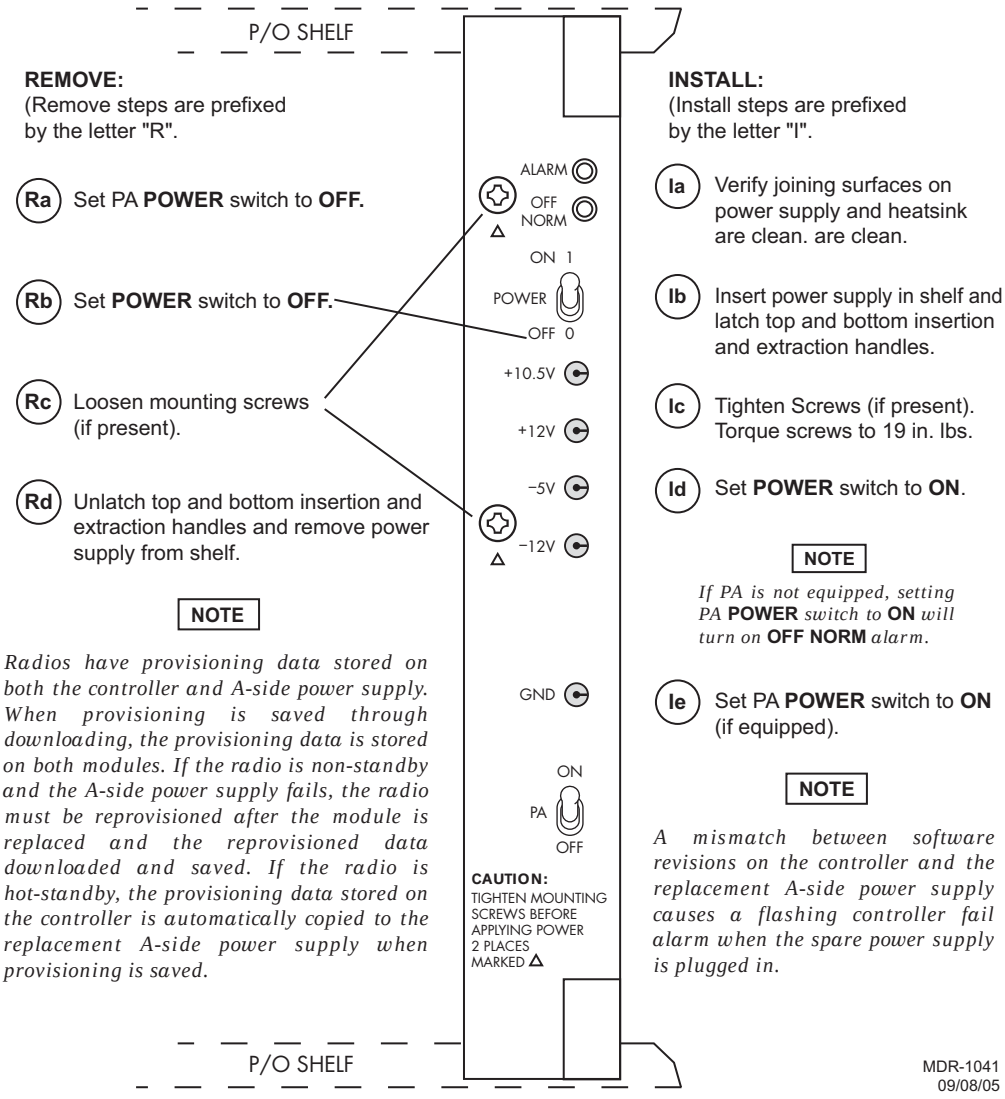


Figure 5-13 Power Supply Removal/Installation

5.14 CONTROLLER REMOVAL AND REPLACEMENT

See Figure 5-14 and follow the procedure to remove and replace AE-37Y Controller.

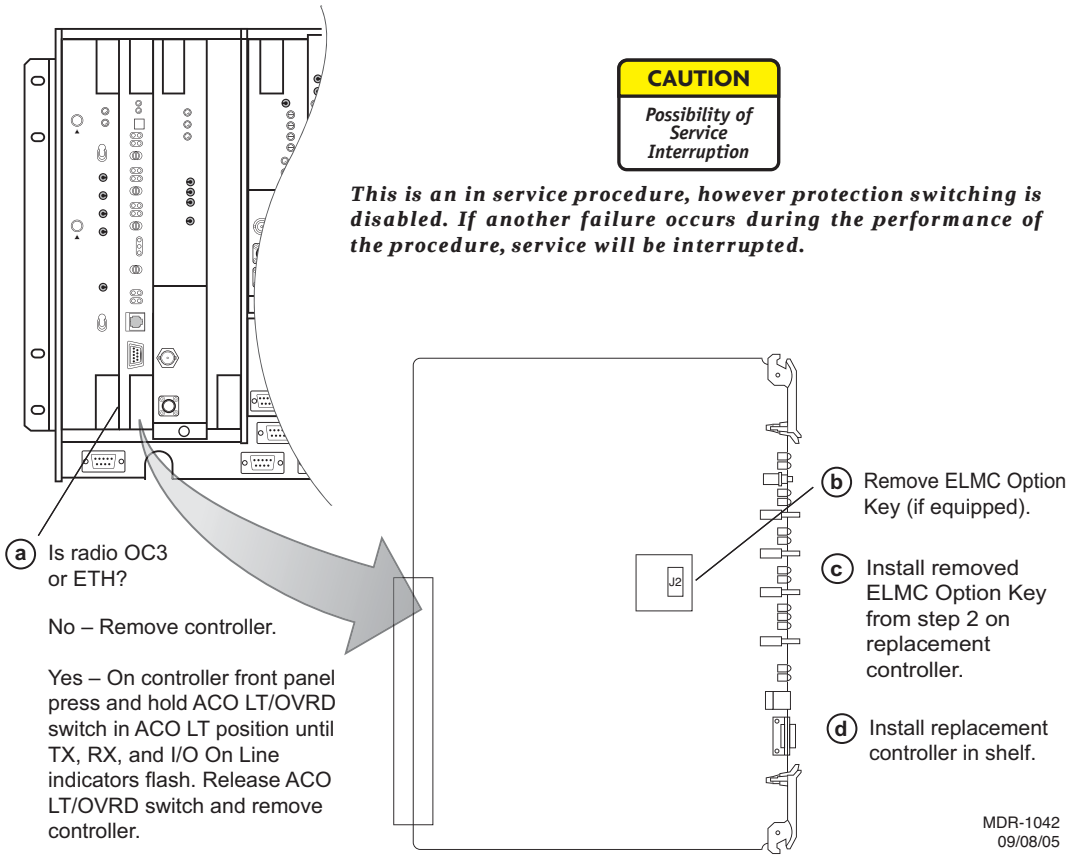
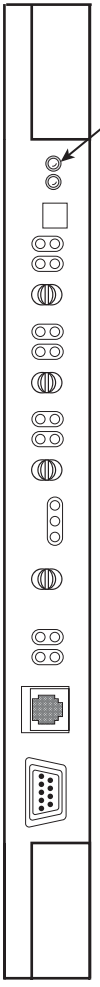


Figure 5-14 Controller Module Installation (Sheet 1 of 4)

Note

A replacement controller that is loaded with the same firmware load as the controller that is being replaced (i.e.: controller for DS3 radio is replacing a DS3 radio controller) is automatically rebooted and provisioned to match the module it is replacing. If the replacement controller is for a different type of radio (i.e.; controller for a DS3 radio is being used to replace a controller in a DS1 or OC3 radio), the controller alarm will flash when the replacement module is installed in the shelf. The flashing alarm prompts the user that the wrong firmware is installed.



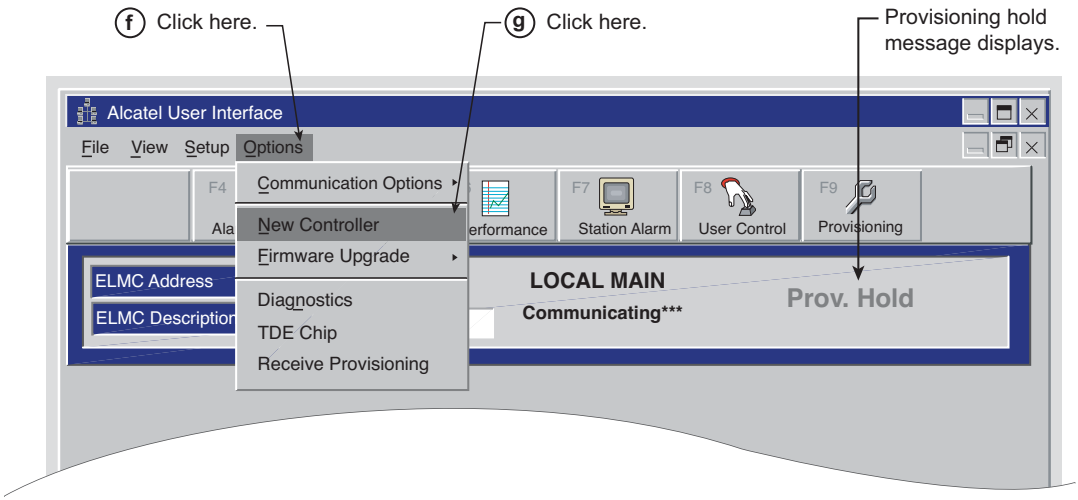
(e) Verify alarm LED is not flashing and reboot is in progress. (reboot is indicated by all LEDs flashing in progression.

Is controller alarm flashing?
- Yes – Go to Step (f).
- No – Is reboot in progress?
  - Yes – Verify **Controller Version** on bottom of USI screen is latest.

Is latest version of firmware displayed?
- Yes – STOP. This procedure is complete.
- No – Do you want to upgrade to the latest version?
  - Yes – Go to step (h).
  - No – Stop. This procedure is complete.

LMW-5063
10/11/05

Figure 5-14 Controller Module Installation (Sheet 2 of 4)

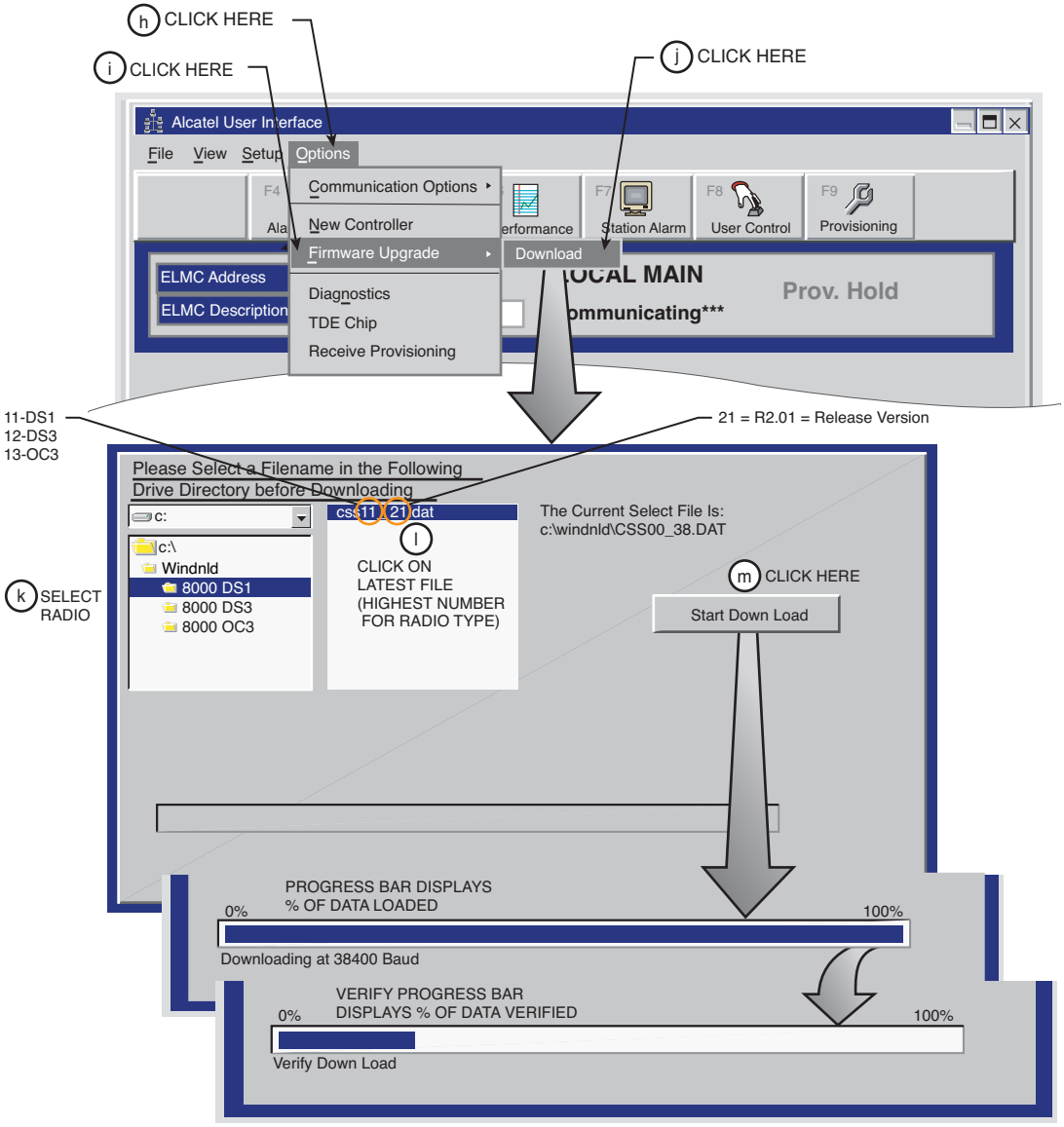


Note

Provisioning hold message is displayed on all screens. The message is removed when provisioning is saved.

MDR-1044
09/08/05

Figure 5-14 Controller Module Installation (Sheet 3 of 4)



NOTE
AFTER AUTOMATICALLY REBOOTING, THE CONTROLLER WILL START RUNNING, PROVISIONING PREVIOUSLY STORED IN THE CONTROLLER WILL BE LEFT UNCHANGED BY THE DOWNLOAD PROGRAM.

n GO TO THE INITIAL TURNUP SECTION AND CHECK PROVISIONING/REPROVISIONING AS REQUIRED.

NOTE
AFTER PROVISIONING IS SAVED, THE CONTROLLER WILL BOOT UP WITHIN 20 SECONDS.

o STOP. THIS PROCEDURE IS COMPLETE.

LMW-5064-SM
10/11/05

Figure 5-14 Controller Module Installation (Sheet 4 of 4)

5.15 DS3 I/O INTERFACE REMOVAL AND REPLACEMENT

Follow procedure to remove and replace DX-35N DS3 I/O Interface module. Refer to Table 5-7 and Table 5-8 for configuration functions.

Table 5-7 1- or 3-Line I/O Interface Module

PN 3DH03169XX Variant XX =	System Application	Auto Radio DADE	Auto Line DADE	Front Panel Controls
AA	Linear/Ring			X
AB	Ring			X
AG	Linear/Ring			X
AH	Linear/Ring		X	X
AK	Linear/Ring	X	X	X
AM	Linear/Ring	X	X	

Note:
X indicates function is applicable.

Table 5-8 2-Line I/O Interface Module

PN 3DH03169XX Variant XX =	System Application	Auto Radio DADE	Auto Line DADE	Front Panel Controls
AJ	Linear/Ring	X	X	X
AN	Linear/Ring	X	X	

Note:
X indicates function is applicable.

a Remove I/O interface module from shelf.

b Install I/O interface module in shelf.

c Refer to Table 5-9 or Table 5-10 and perform required procedures (if any).

d STOP. This procedure is complete.

Table 5-9 1- or 3-Line Matrix, Valid Combinations/Procedures

I/O Interface Module PN 3DH03169AAXX Configuration in Shelf Position A3, B3, Variant XX =		Radio Configuration	Radio DADE (Refer to CD)	Line DADE (Refer to CD)
AA	AA	HS, FD, SD	X	X
AA	AB	HS, FD, SD	X	X
AA	AG	HS, FD, SD	X	X
AA	AH	HS, FD, SD	X	X
AA	AK	HS, FD, SD	X	X
AB	AB	HS, FD, SD	X	X
AB	AG	HS, FD, SD	X	X
AB	AH	HS, FD, SD	X	X
AB	AK	HS, FD, SD	X	X
AG	AG	HS, FD, SD	X	X
AG	AH	HS, FD, SD	X	X
AG	AK	HS, FD, SD	X	X
AH	AH	HS, FD, SD	X	
AH	AK	HS, FD, SD	X	
AK	AK	HS, FD		
AK	AK	SD	X	
AK	AM	HS, FD, SD		
AM	AM	HS, FD, SD		

Notes:
1. Module locations are reversible.
2. Perform procedure indicated by X for specific module and radio configuration.

Table 5-10 Line Matrix, Valid Combinations/Procedures

I/O Interface Module PN3DH03169XX Configuration In Shelf Position A3, B3, VARIANT XX =		Radio Configuration	Radio DADE (Refer to CD)	Line DADE (Refer to CD)
AJ	AJ	HS, FD, SD	X	X
AJ	AL	HS, FD, SD	X	X
AL	AL	HS, FD		
AL	AL	SD	X	
AL	AN	HS, FD, SD		
AN	AN	HS, FD, SD		

NOTES:
1. Module locations are reversible.
2. Perform procedure indicated by X for specific module and radio configuration.

5.16 OC3/STM-1/ETH I/O INTERFACE REMOVAL AND REPLACEMENT

Use this procedure to remove and replace DX-35P OC3/STM-1 or DX-35R/S ETH I/O Interface module.

a If radio is protected (hot-standby, space diversity, or frequency diversity, use front panel **OVRD** controls on AE-37( ) Controller to lock on-line XMTR, RCVR, and I/O (opposite side from failed I/O) on line.

b On front panel of controller module, press and hold **ACO LT/OVRD** switch in **ACO LT** (lamp test) position until **TX, RX**, and **I/O On LINE** LEDs on front of controller flash (approximately 5 seconds wait).

c Release **ACO LT/OVRD** switch.

d Disconnect cables.

e Remove I/O Interface module from shelf.

f Install replacement I/O Interface module in shelf.

g Connect cables.

h On AE-37( ) Controller, toggle OVRD switch to disable override (unlocks on-line XMTR and restores automatic switching functions).

i STOP. This procedure is complete.

5.17 XMTR REMOVAL AND REPLACEMENT

Use this procedure to remove and replace the UD-35( ) XMTR and/or Capacity Key and Crystal Oscillator Subboards on the XMTR.

Note

Spare XMTRs and XMTRs repaired at the factory normally do not contain Crystal Oscillator Subboards or Capacity Keys. The user must retain the crystal Oscillator Subboard and the Capacity Key from the module being replaced before sending the module back to the factory for repair.

a On power supply, on same side as failed XMTR, set PA ON/OFF switch to OFF (if shelf is equipped with PA on that side).

b On XMTR module, disconnect cable from RF OUT connector.

c Remove XMTR module from card cage.

d On XMTR module being replaced, remove XMTR crystal oscillator subboard. See Figure 5-15. Retain for installation on replacement module.

e On XMTR module being replaced, remove XMTR capacity key. See Figure 5-16. Retain for installation on replacement module.

f On replacement XMTR module, install XMTR crystal oscillator subboard. See Figure 5-15.

g On replacement XMTR module, install XMTR capacity key. See Figure 5-16.

h Reconnect cable to RF OUT connector.

i Install replacement XMTR module in card cage.

j Perform XMT Crystal Oscillator Frequency Checks and Adjustment procedure. Refer to Para. 5.18.

k On power supply, set PA ON/OFF switch to ON (if turned off in Step a).

Note

Output level calibration is required for the last amplification stage in the chain of XMT amplifiers leading to the antenna, only. If the radio is equipped with a PA and a transmitter fails, the replacement transmitter must be adjusted to return the radio to the original PA output power. It is not necessary to calibrate the transmitter.

l Is radio equipped with optional PA?

If no, Perform XMTR Output Level Calibration (No PA) procedure. Refer to Para. 5.21.

If yes, restore PA output level. See applicable Figure 5-17 or Figure 5-18 for procedure.

m Perform one of the following XMTR Carrier Null Adjustment procedures:

In-Service XMTR Carrier Null Adjustment Using spectrum Analyzer, Para. 5.20

XMTR Carrier Null Adjustment Using Spectrum Analyzer, (Refer to CD).

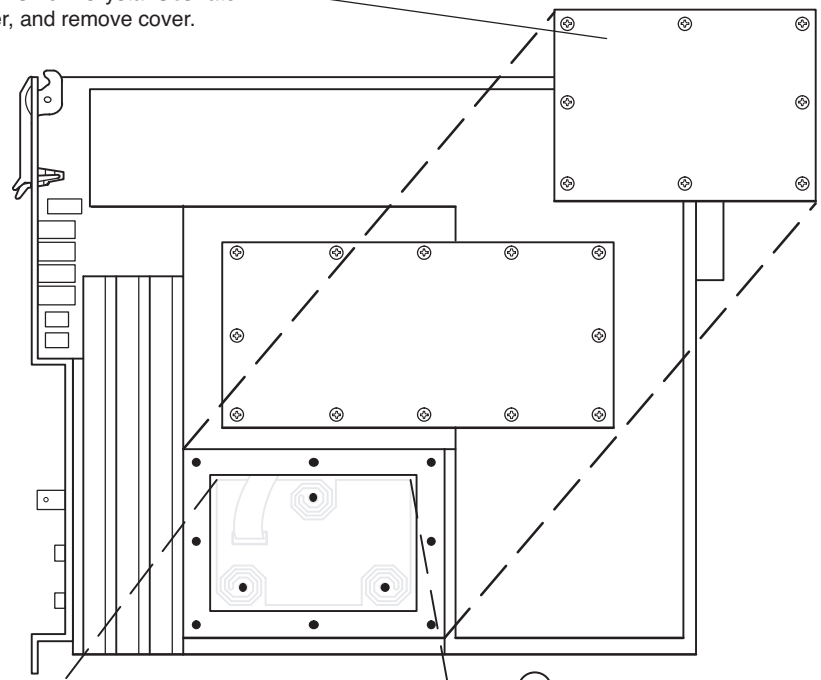
XMTR Carrier Null Adjustment Using DVM, (Refer to CD).

n STOP. This procedure is complete.

Remove:

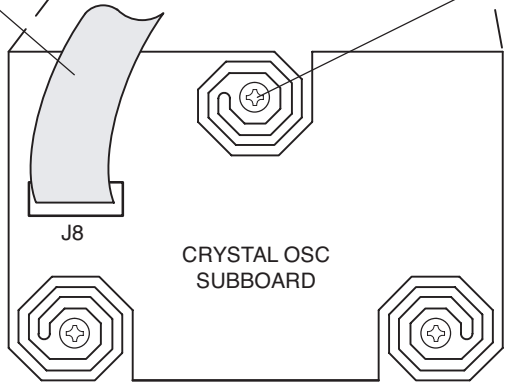
(a) Remove transmitter from card cage.

(b) Remove 8 screws from Crystal Ocsillator Subboard cover, and remove cover.



XMTR–RIGHTSIDE VIEW

(c) Disconnect ribbon cable from J8.



(d) Remove 3 mounting screws, and remove Crystal Oscillator Subboard.

Install:

(e) Place Crystal Oscillator Subboard in mounting cavity.

(f) Install 3 mounting screws.

(g) Connect ribbon cable to connector J8.

(h) Install cover with 8 screws.

(i) Install XMTR in card cage.

Note

Ensure board edge does not make contact with chassis wall.

MDR-1021
09/08/05

Figure 5-15 XMTR Crystal Oscillator Subboard Removal/Installation

CAUTION

Possibility of Service Interruption

This is an out-of-service procedure when on a nonstandby (unprotected) system. On a hot-standby or frequency diversity system, switch traffic on the channel under test to protect.

Remove:

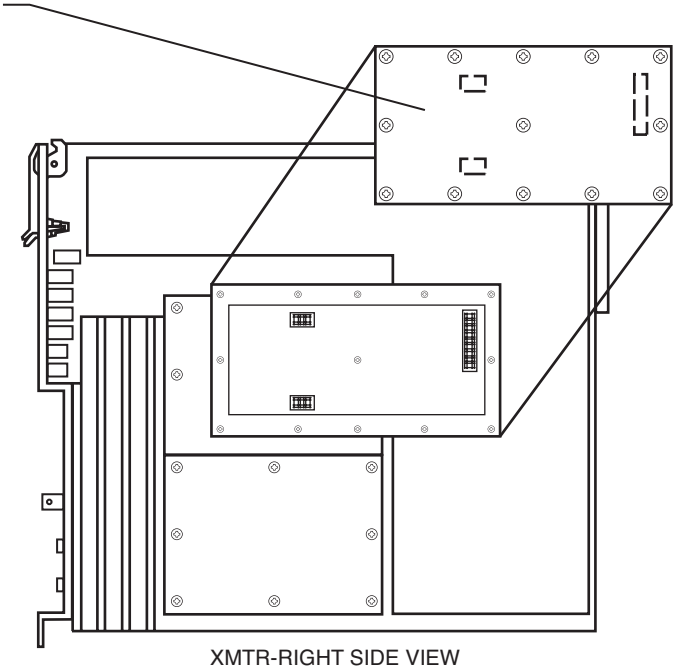
(a) Remove transmitter from card cage.

(b) Remove 13 screws from Capacity Key and remove Capacity Key.

Install:

(c) Install Capacity Key on three connectors.

(d) Install 13 screws.



XMTR-RIGHT SIDE VIEW

LMW-6016-SM
09/08/05

Figure 5-16 XMTR Capacity Key Removal/Installation

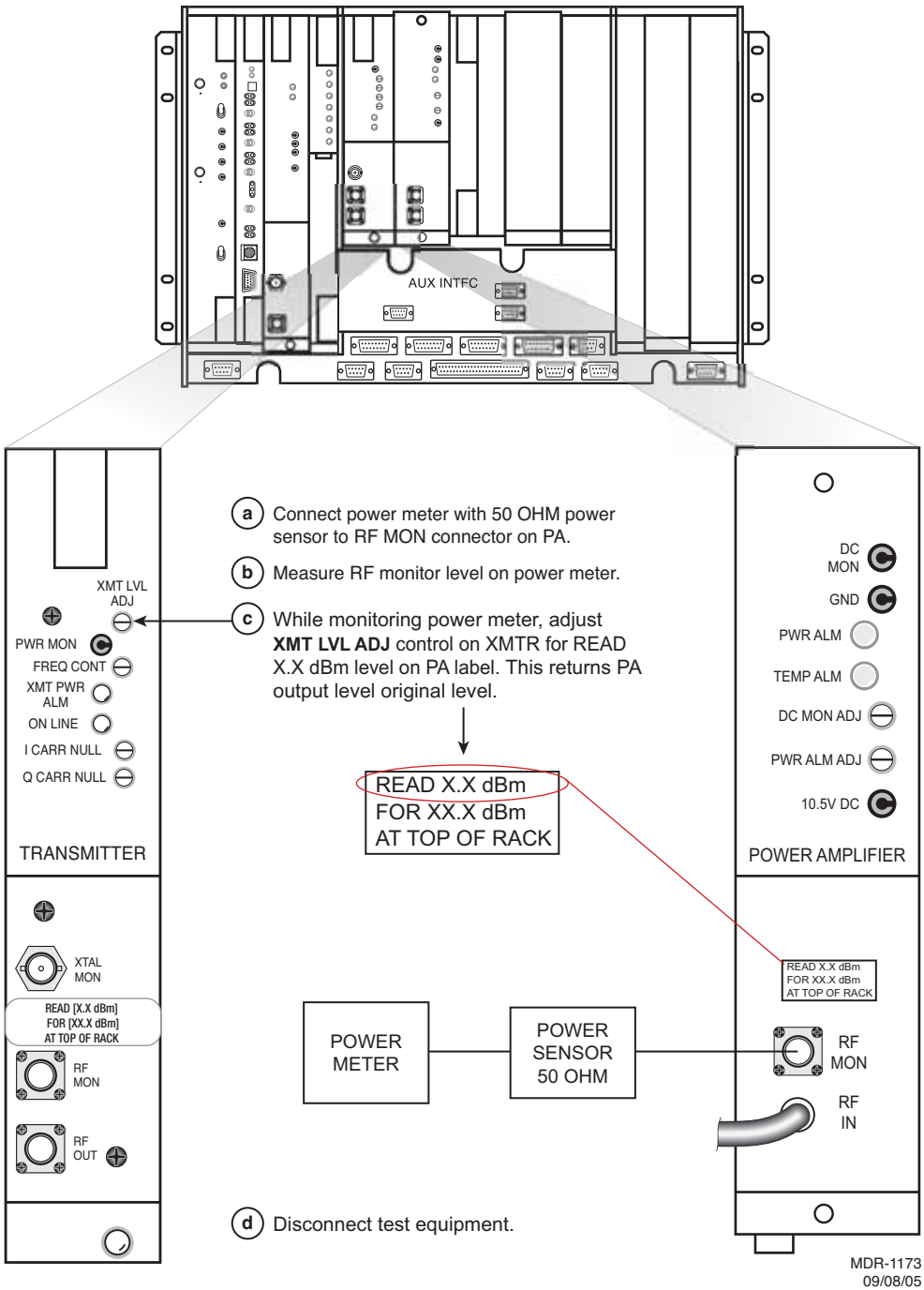


Figure 5-17 Restoring PA Output Power Using Power Meter

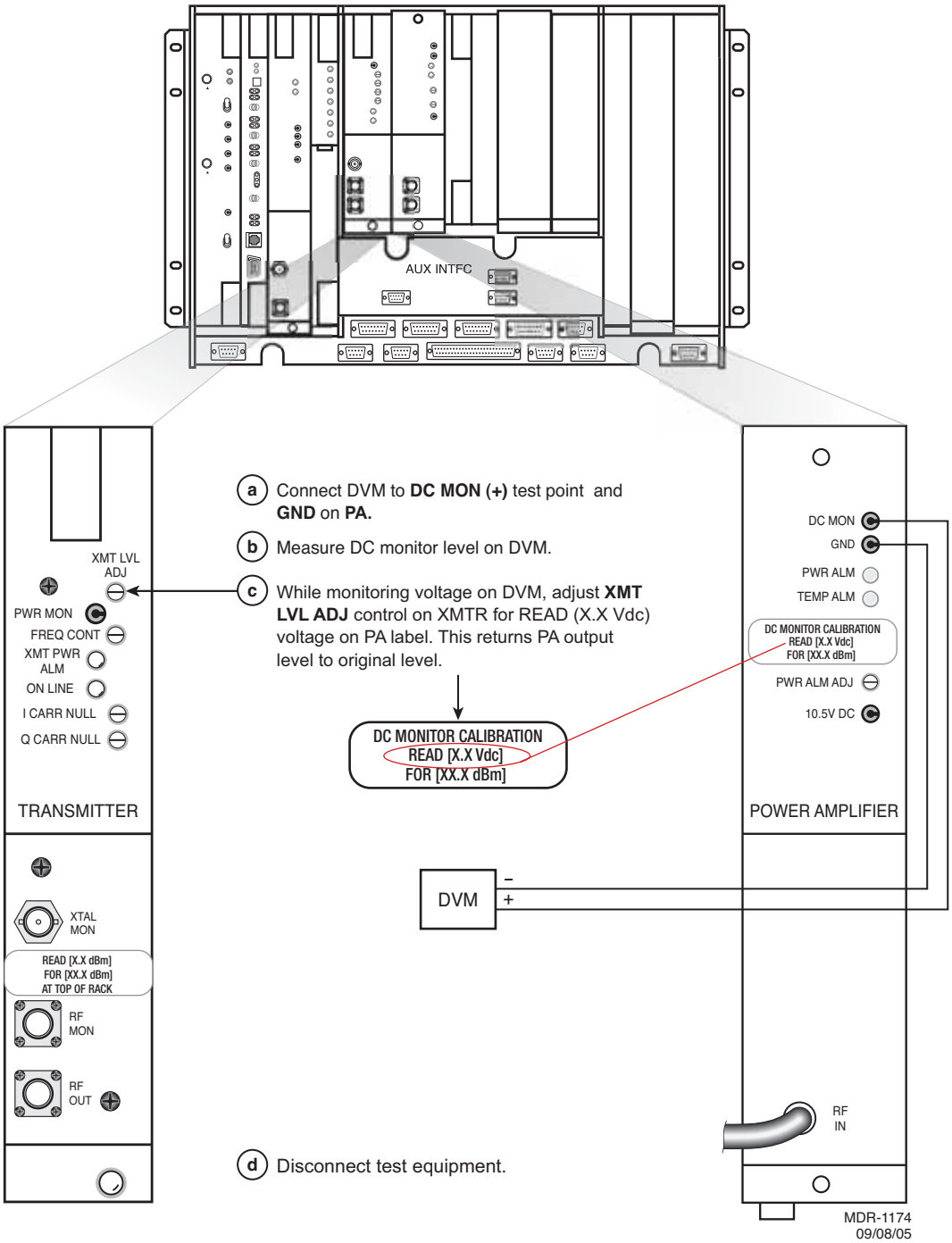


Figure 5-18 Restoring PA Output Power Using DVM

5.18 XMT CRYSTAL OSCILLATOR FREQUENCY CORRECTION

PURPOSE

See Figure 5-19 and follow the procedure to correct the transmit frequency of the crystal oscillator on the UD-35() Transmitter module.

Allow a 1-hour warm-up period for radio and test equipment before starting applicable tests or improper frequency adjustment can result. If waiting for initial alignment is impractical, it may be performed after a warm-up period of 5 minutes minimum; however, crystal frequency should be rechecked after full warmup.

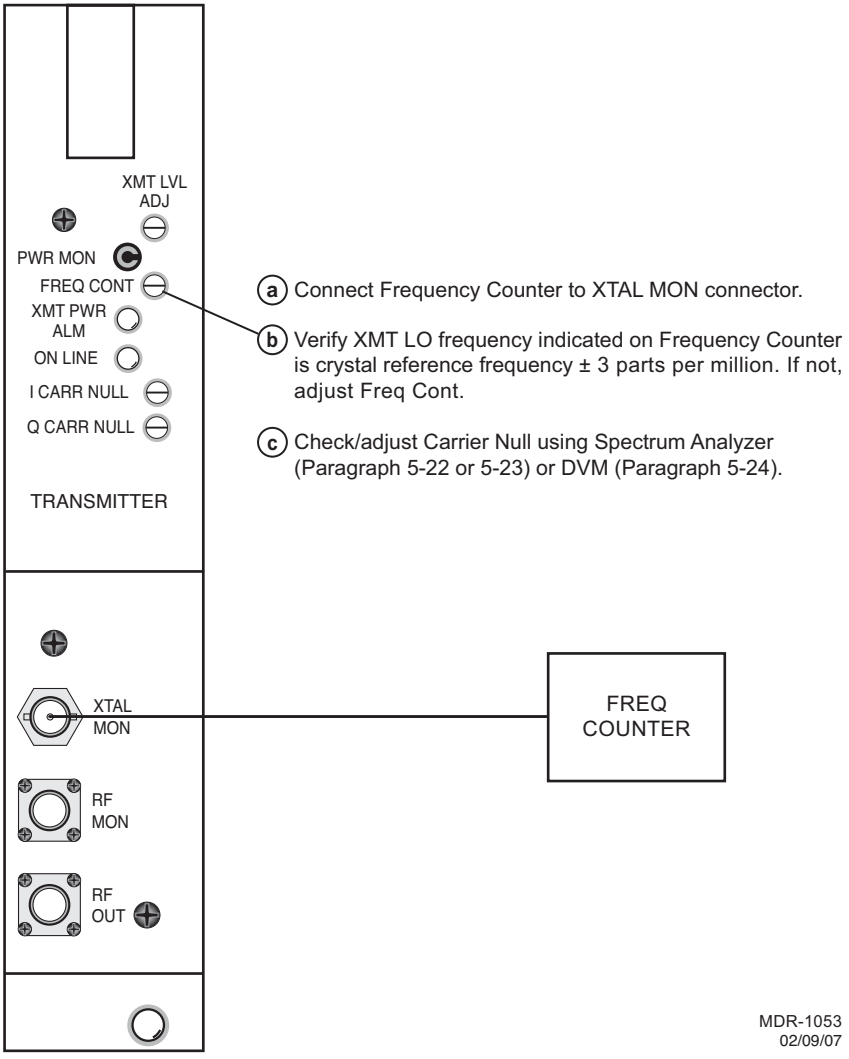


Figure 5-19 XMT Crystal Oscillator Frequency Check

5.19 XMTR OUTPUT LEVEL CHECK (NO PA)

See Figure 5-20 and follow the procedure to check the RF output of the UD-35( ) Transmitter in radio configuration that is not equipped with the optional PA.

CAUTION

Possibility of Service Interruption

This is an out-of-service procedure when on a nonstandby (unprotected) system. On a hot-standby or frequency diversity system, switch traffic on the channel under test off line.

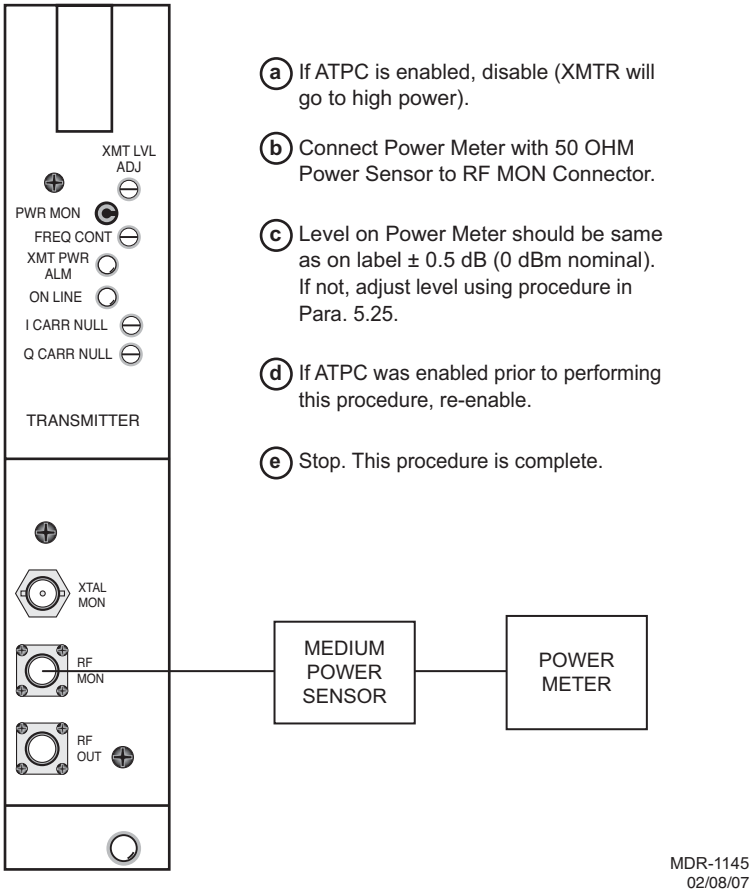


Figure 5-20 XMTR Output Level Check (No PA)

5.20 IN-SERVICE XMTR CARRIER NULL ADJUSTMENT USING SPECTRUM ANALYZER

See the following figures and follow the procedure to adjust carrier null on the UD-35A() Transmitter, in service. For out-of-service carrier null procedures, refer to CD.

Note

Carrier leakage can be nulled in the MDR-8000 using any one of three methods. Method 1 (the preferred method) uses a spectrum analyzer to determine if carrier leakage is present while a modulated signal is being transmitted (in service) and then nulling any carrier present. Methods 2 and 3 require that modulation be removed and the carrier is nulled while the transmitter is out of service. Method 2 uses a DVM to measure carrier leakage. Method 3 uses a spectrum analyzer.

Using the spectrum analyzer Span controls, reduce the frequency span until the Resolution Bandwidth (**Res BW**) reaches the value defined as the **Res BW for measuring carrier**. At this **Res BW**, observe the spectrum trace for a carrier signal. If a carrier signal, rising above the spectrum floor, 3 dB or more is visible, use the procedure to null the carrier. If no carrier is visible, the carrier is sufficiently nulled.

CAUTION

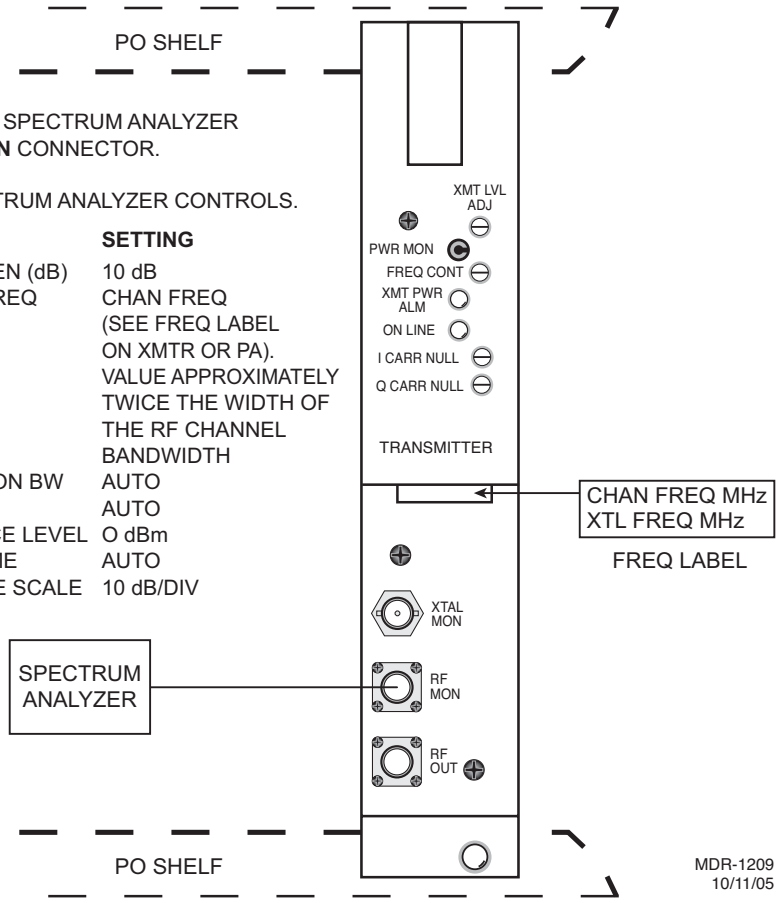
Possibility of Service Interruption

Ensure that the radio, and specifically the transmitter unit, is allowed to warm up for at least one hour operating in the radio before performing carrier null adjustments.

a. CONNECT SPECTRUM ANALYZER TO **RF MON** CONNECTOR.

b. SET SPECTRUM ANALYZER CONTROLS.

CONTROL	**SETTING**
INPUT ATTEN (dB)	10 dB
CENTER FREQ	CHAN FREQ (SEE FREQ LABEL ON XMTR OR PA).
FREQ SPAN	VALUE APPROXIMATELY TWICE THE WIDTH OF THE RF CHANNEL BANDWIDTH
RESOLUTION BW	AUTO
VIDEO BW	AUTO
REFERENCE LEVEL	O dBm
SWEEP TIME	AUTO
AMPLITUDE SCALE	10 dB/DIV



c Carefully adjust the spectrum analyzer to center the transmitter spectrum.

Note

As the spectrum analyzer's frequency span is reduced and the flat top of the spectrum fills the spectrum analyzer display, it is extremely important to keep the spectrum display (with carrier signal if any) centered so that the carrier signal (if any) will remain visible as the span is reduced.

d Reduce the frequency span on the spectrum analyzer display while keeping the spectrum centered on the spectrum analyzer display.

e Continue to reduce the spectrum analyzer span while observing the **Res BW** field in the bottom left corner of the spectrum analyzer display.

f Continue reducing the frequency span until the correct **Res BW** for measuring carrier for the Radio Capacity/Modulation is displayed. Refer to the following table for the **Res BW** for measuring carrier required for the radio under test.

Carrier Threshold Resolution Bandwidth

Radio Capacity / Modulation	Res BW For Measuring Carrier	Res BW For Nulling Carrier
OC3 / 128 TCM	30 kHz	1 kHz
1 STS-1 / 128 TCM	10 kHz	300 Hz
3 DS3 / 64 QAM	100 kHz	3 kHz
2 DS3 / 32 TCM	100 kHz	3 kHz
1 DS3 / 64 QAM	30 kHz	1 kHz
16 DS1 / 32 TCM	10 kHz	1 kHz
16 DS1 / 128 TCM	3 kHz	100 Hz
12 DS1 / 32 TCM	10 kHz	300 Hz
12 DS1 / 128 TCM	3 kHz	100 Hz
8 DS1 / 32 TCM	10 kHz	300 Hz
8 DS1 / 128 TCM	1 kHz	100 Hz
4 DS1 / 32 TCM	3 kHz	100 Hz
4 DS1 / 128 TCM	1 kHz	30 Hz
2 DS1 / 32 TCM	3 kHz	100 Hz
2 DS1 / 128 TCM	300 Hz	30 Hz

CAUTION

Possibility of Service Interruption

Adjustment of the carrier signal for minimum amplitude is critical. Do not attempt to null the carrier signal until the correct Res BW is reached. Incorrect adjustment can result in loss of traffic due to slow RCVR lock.

g Observe the display at the correct **Res BW** for measuring carrier for a carrier signal rising above the floor of the spectrum. Is a carrier signal rising 3 dB or more above the spectrum visible?

No. STOP. This procedure is complete. Carrier is nulled to an acceptable level.

Yes.

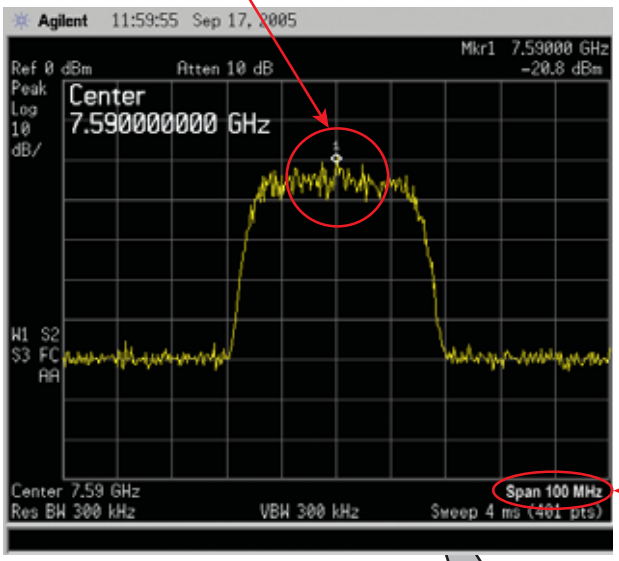
1) Continue to reduce the frequency span until the spectrum analyzer shows a Res BW equal to or lower than the **Res BW For Nulling Carrier** value shown in the table.

2) Alternately adjust the I Carr and Q Carr controls on the XMTR module for minimum carrier amplitude. Refer to the following typical scenario for adjustment tips/problems.

TYPICAL ADJUSTMENT SCENARIO

Refer to the following step-by-step adjustment of 3 DS3/64 QAM radio. In this scenario, carrier null adjustment is required due to slow RCVR lockup following a deep fade. The **Res BW** for nulling carrier for the 3 DS3/64 QAM radio is 3 kHz as listed in the table.

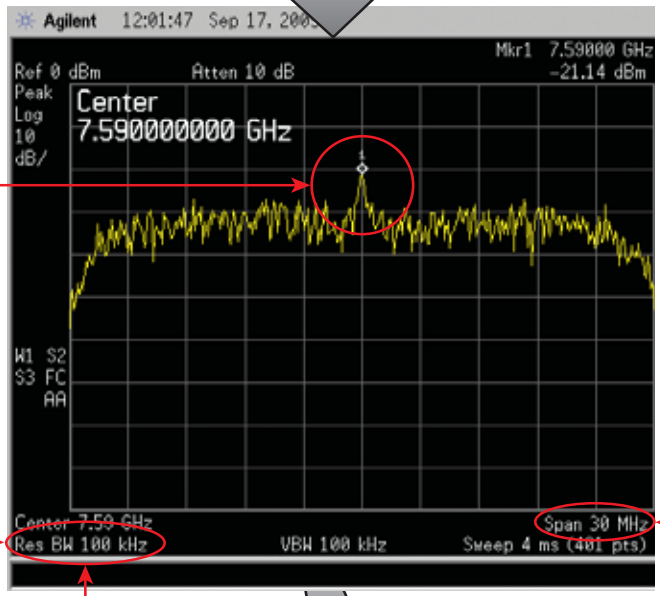
a. Center carrier on screen.



b. Reduce Span to 30 mHz.

Note

It is extremely important to keep the carrier signal centered in the display so that the carrier will become visible as the span is reduced.



c. Center carrier on screen.

10 dB above spectrum floor

Res BW for measuring carrier

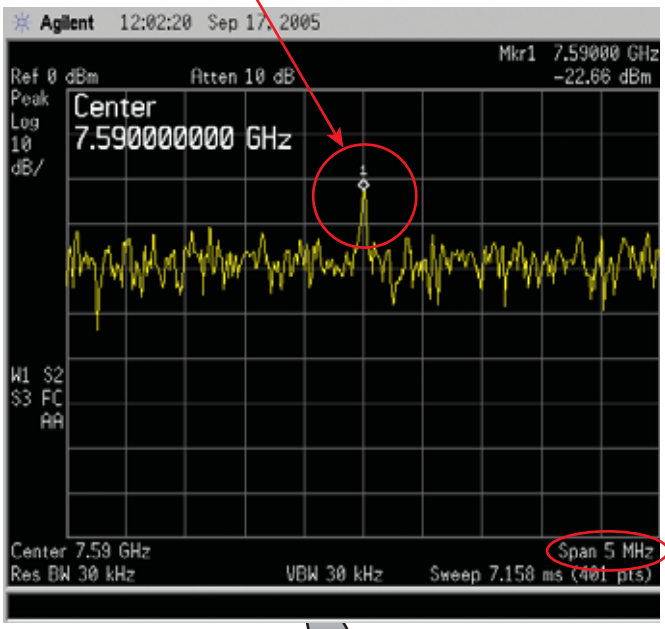
d. Reduce Span to 5 mHz.

Note

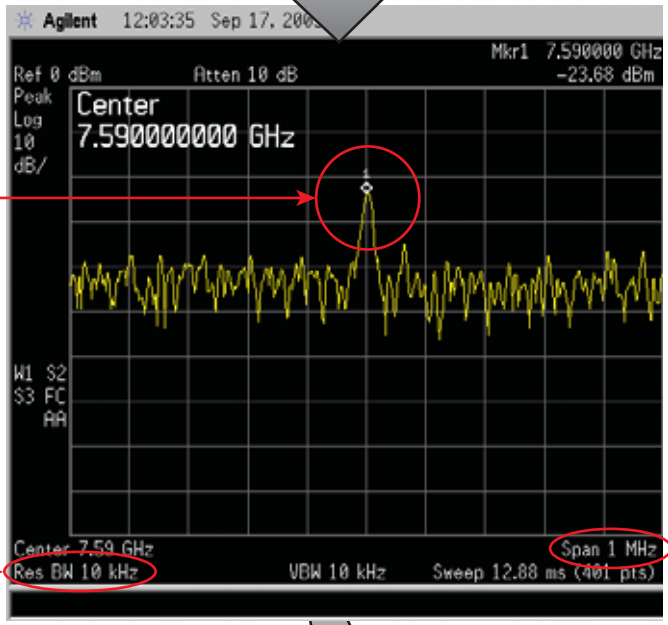
Res BW automatically decreases as Span decreases.

MDR-1216
09/20/05

e. Center carrier on screen.



f. Reduce Span to 1 mHz.



g. Center carrier on screen.

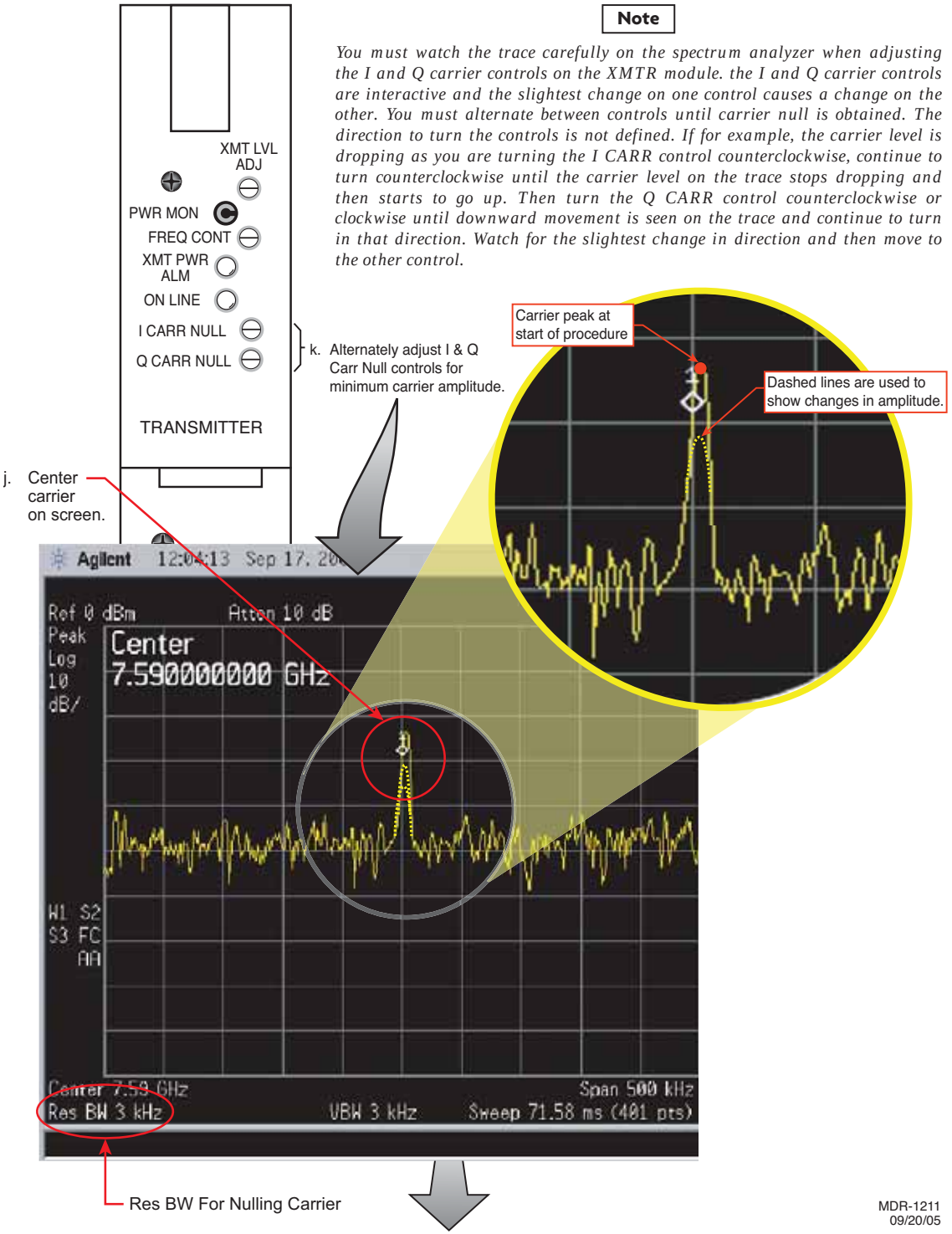
h. Observe Res BW

i. Reduce Span to 500 kHz.

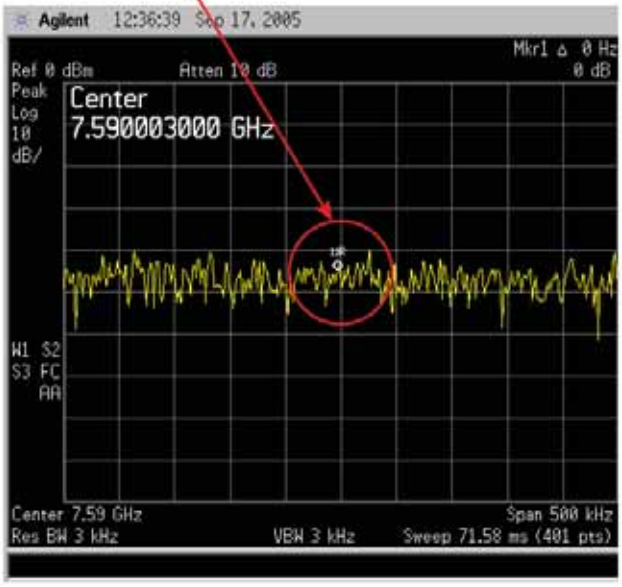
MDR-1217
09/20/05

Note

You must watch the trace carefully on the spectrum analyzer when adjusting the I and Q carrier controls on the XMTR module. the I and Q carrier controls are interactive and the slightest change on one control causes a change on the other. You must alternate between controls until carrier null is obtained. The direction to turn the controls is not defined. If for example, the carrier level is dropping as you are turning the I CARR control counterclockwise, continue to turn counterclockwise until the carrier level on the trace stops dropping and then starts to go up. Then turn the Q CARR control counterclockwise or clockwise until downward movement is seen on the trace and continue to turn in that direction. Watch for the slightest change in direction and then move to the other control.



l. Stop. Carrier is at minimum (null) value.



5.21 XMTR OUTPUT LEVEL CALIBRATION

See Figure 5-21 and follow the procedure to check, and if necessary adjust, the RF output of the UD-35() Transmitter in radio configuration that is not equipped with the optional PA.

CAUTION

Possibility of Service Interruption

This is an out-of-service procedure when on a nonstandby (unprotected) system. On a hot-standby or frequency diversity system, switch traffic on the channel under test to protect.

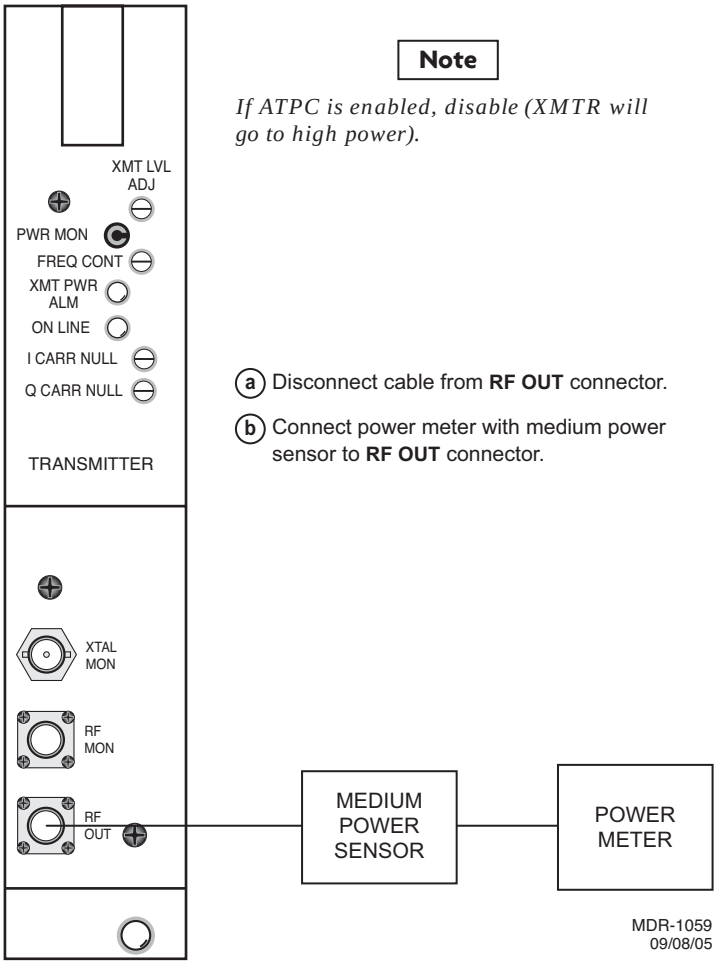


Figure 5-21 XMTR Output Level Calibration (Sheet 1 of 5)

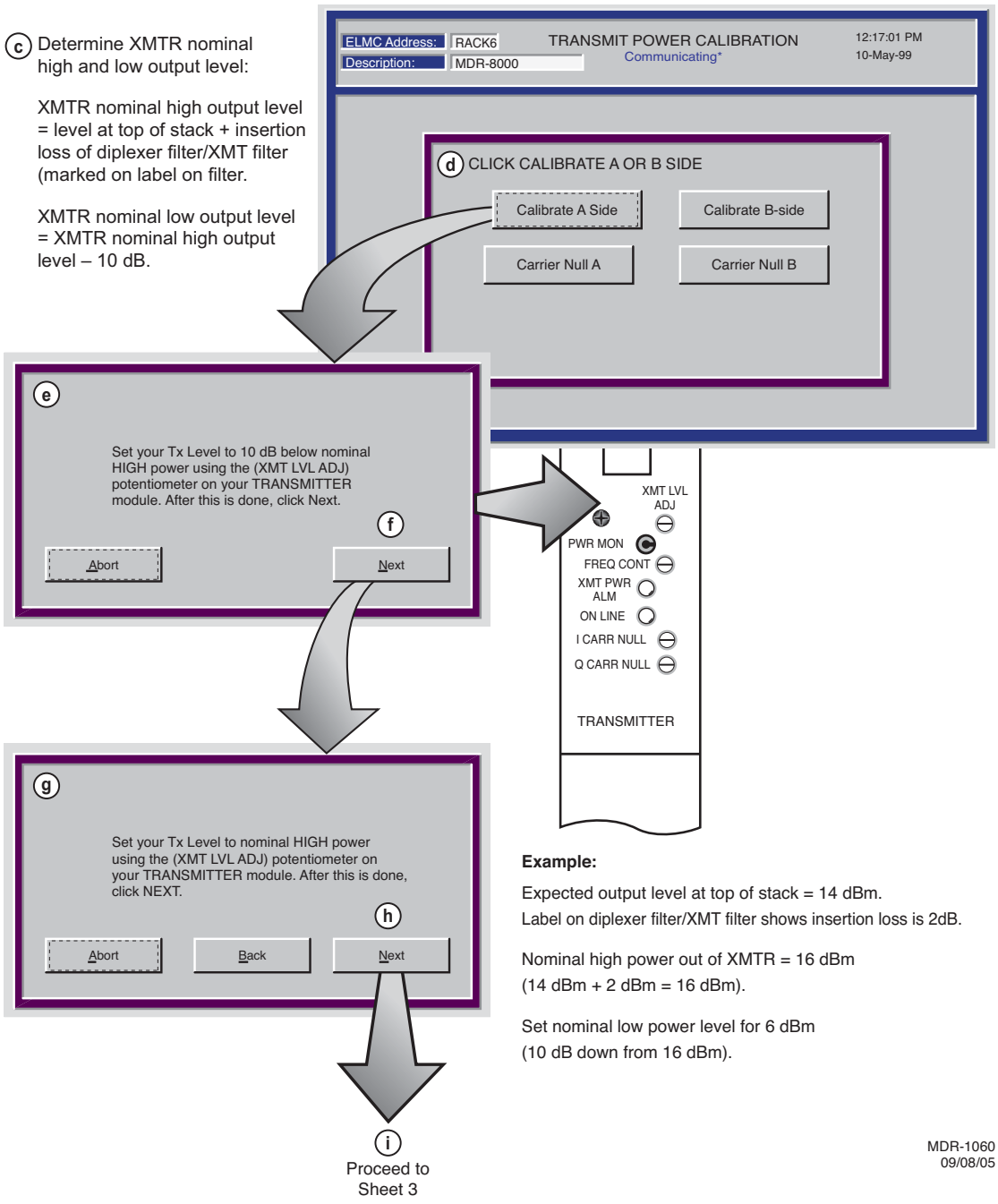
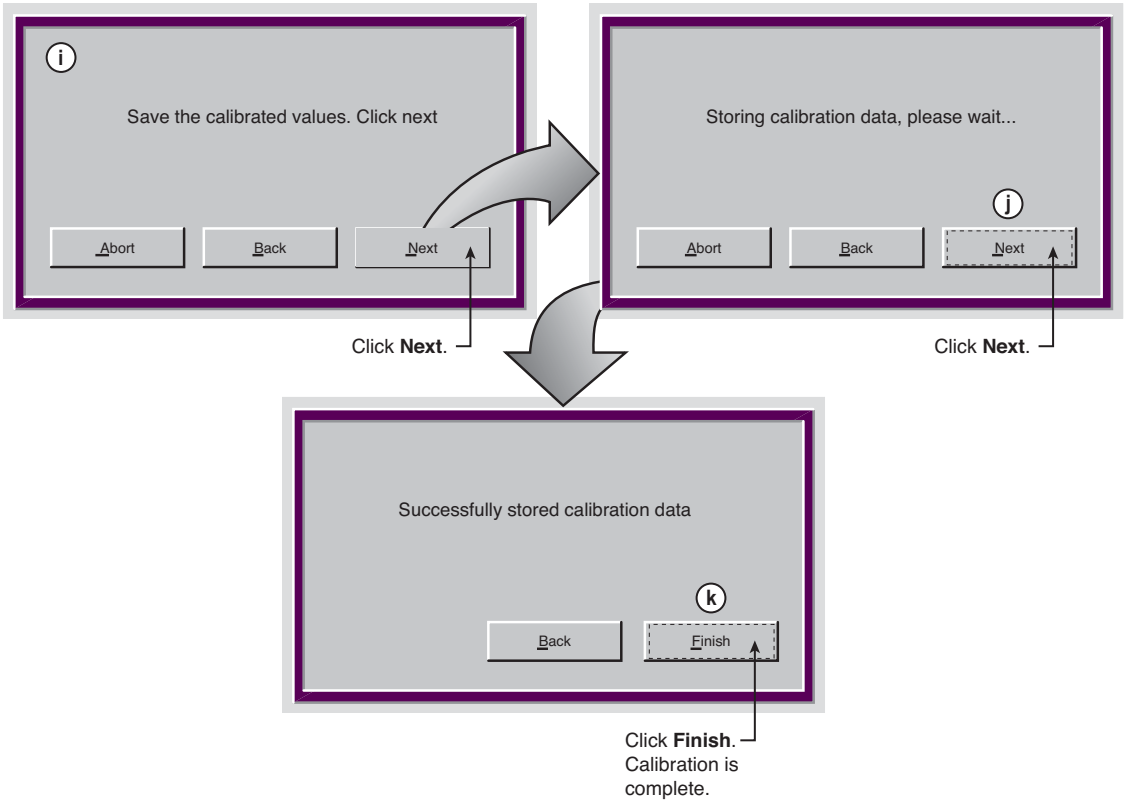


Figure 5-21 XMTR Output Level Calibration (Sheet 2 of 5)

Note

Ensure ATPC is disabled.



(l) Disconnect power meter and sensor from **RF OUT** connector.

(m) Reconnect cable to **RF OUT** connector.

(n) Observe RF MON label on XMTR front panel. On label, is the measured READ level in dBm or Vdc?

If labeled READ X.X dBm, go to step o.
If labeled READ X.X Vdc, go to step s.

MDR-6061
09/08/05

Figure 5-21 XMTR Output Level Calibration (Sheet 3 of 5)

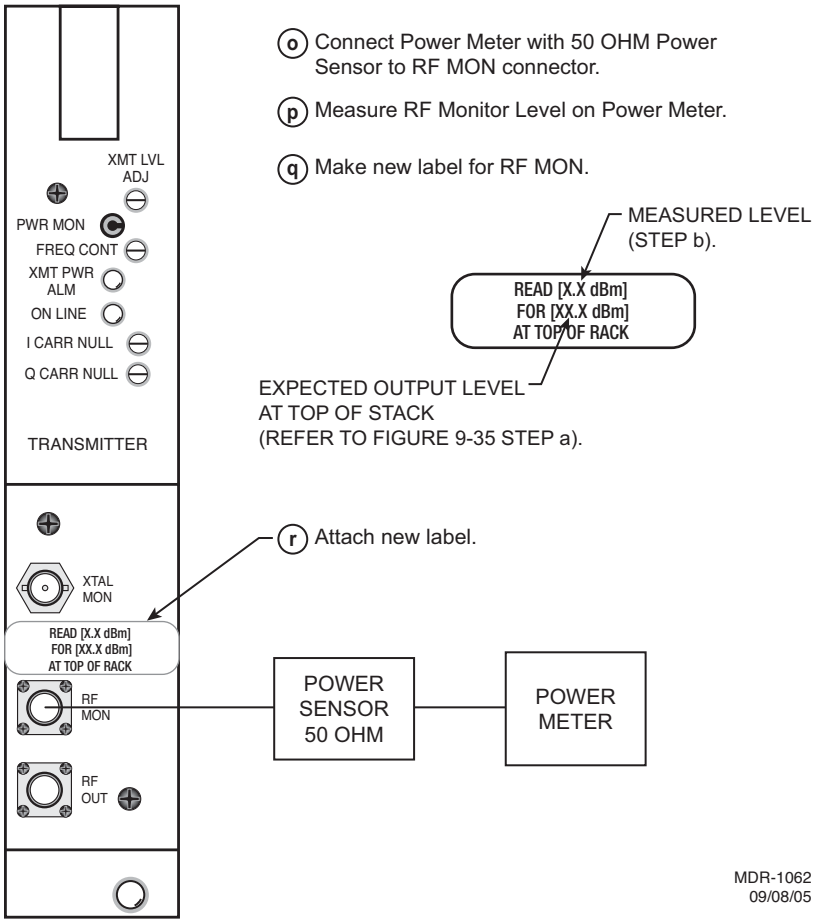


Figure 5-21 XMTR Output Level Calibration (Sheet 4 of 5)

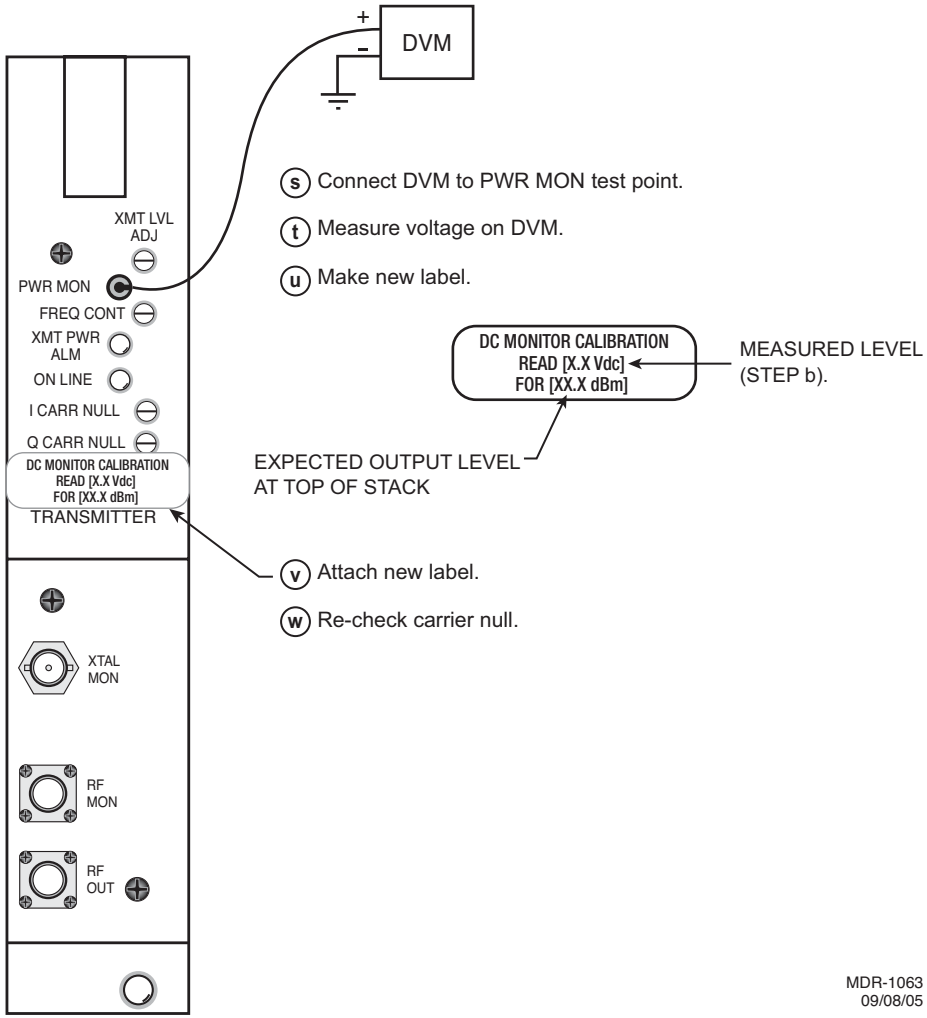


Figure 5-21 XMTR Output Level Calibration (Sheet 5 of 5)

5.22 RCVR REMOVAL AND REPLACEMENT

Use this procedure to remove and replace UD-36() RCVR.

CAUTION

Possibility of Service Interruption

This is an out-of-service procedure when on a nonstandby (unprotected) system. On a hot-standby, space diversity, or frequency diversity system, switch traffic on the channel under test to protect. Use front panel OVRD controls on AE-37() Controller to switch and lock opposite side RCVR (opposite side from failed RCVR) on line.

a On RCVR module, disconnect cable from RF In connector.

b Remove RCVR module from card cage.

c On RCVR module being replaced, remove RCVR Crystal Oscillator Subboard. See Figure 5-22. Retain for installation on replacement module.

d On RCVR module being replaced, remove RCVR Capacity Key. See Figure 5-23. Retain for installation on replacement module.

e On replacement RCVR module, install RCVR Crystal Oscillator Subboard. See Figure 5-22.

f On replacement RCVR module, install RCVR Capacity Key. See Figure 5-23.

g Install replacement RCVR module in card cage.

h Is RCVR equipped with front panel Freq Cont.?

If yes, go to step i

If no, go to step j.

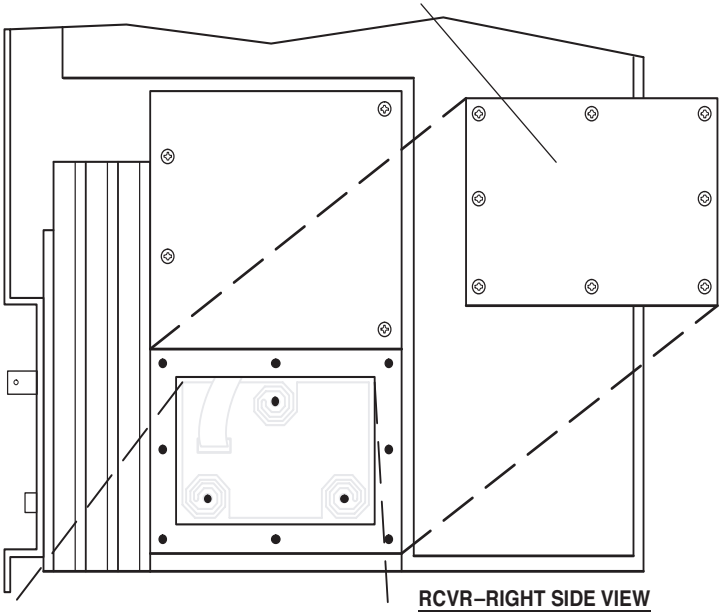
i Perform RCV Crystal Oscillator Frequency checks and adjustment procedure. Refer to Para. 5.23.

j Stop. This procedure is complete.

Remove:

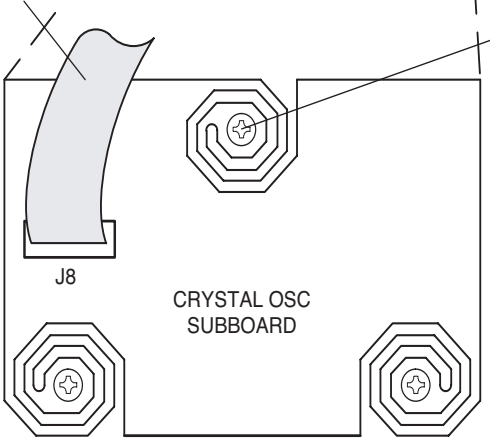
(a) Remove Receiver from card cage.

(b) Remove 8 screws from Crystal OSC Subboard cover, and remove cover.



RCVR–RIGHT SIDE VIEW

(c) Disconnect ribbon cable from J8.



(d) Remove 3 mounting screws, and remove Crystal OSC Subboard.

Install:

(e) Place Crystal OSC Subboard in mounting cavity.

Note

Ensure board edge does not make contact with chassis wall.

(f) Install 3 mounting screws.

(g) Connect ribbon cable to Connector J8.

(h) Install cover with 8 screws.

(i) Install Receiver in card cage.

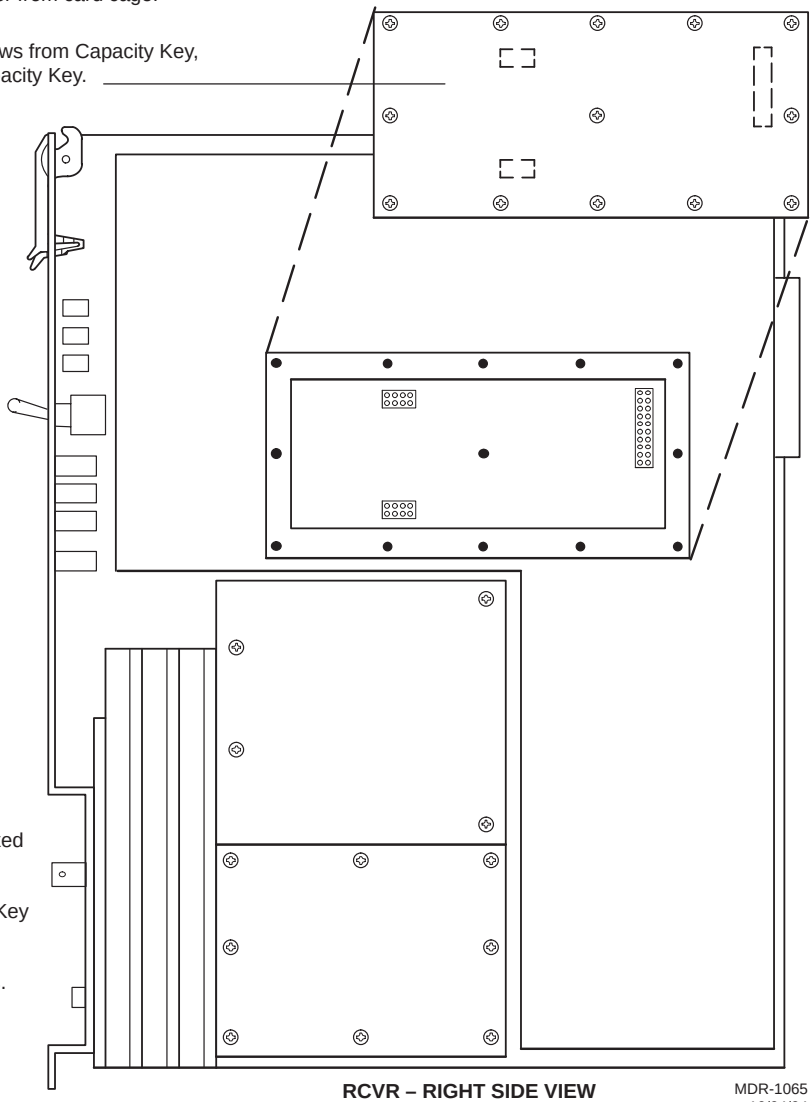
MDR-1064
10/04/04

Figure 5-22 RCVR Crystal Oscillator Subboard Removal/Installation

REMOVE:
(Remove steps are prefixed by the letter "R".

(R1) Remove Receiver from card cage.

(R2) Remove 13 screws from Capacity Key, and remove Capacity Key.



INSTALL:
(Install steps are prefixed by the letter "I".

(I1) Install Capacity Key on 3 connectors.

(I2) Install 13 screws.

RCVR – RIGHT SIDE VIEW

MDR-1065
10/04/04

Figure 5-23 RCVR Capacity Key Removal/Installation

5.23 RCV CRYSTAL OSCILLATOR FREQUENCY CORRECTION

See Figure 5-24 and follow the procedure to correct the receive frequency of the crystal oscillator on older versions of the UD-36 ( ) receiver module.

Allow a 1-hour warm-up period for radio and test equipment before starting procedure or improper frequency adjustment can result.

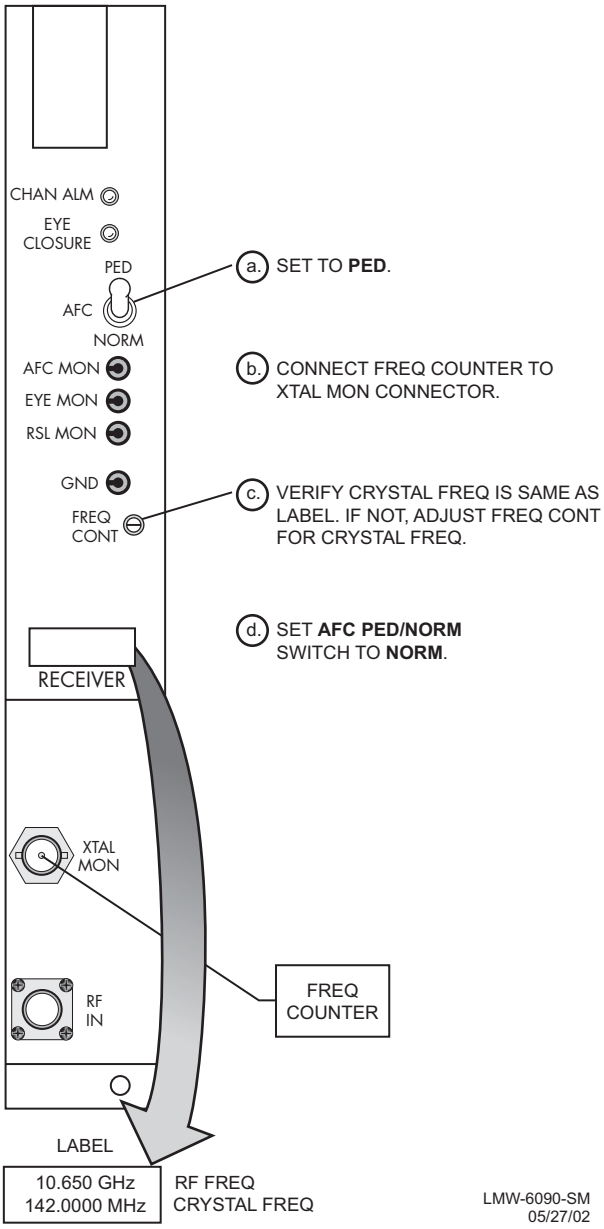


Figure 5-24 RCV LO Adjustment

5.24 PA REMOVAL AND REPLACEMENT

See Figure 5-25 and follow the procedure to remove and replace UD-51() PA.

CAUTION

Possibility of Service Interruption

This is an out-of-service procedure when on a nonstandby (unprotected) system. On a hot-standby or frequency diversity system, switch traffic on the channel under test to protect. Use front panel OVRD controls on AE-37() Controller to lock on-line XMTR (opposite side from failed XMTR) on line.

WARNING

Possibility of Damage to Equipment

To prevent monitor point errors, use caution to ensure that the front panel removed from the PA is replaced on that same PA. No two monitor point levels labeled on PAs are the same. Erroneous output levels can result from installing the wrong front panel and calibrating the PA to the level labeled on that front panel.

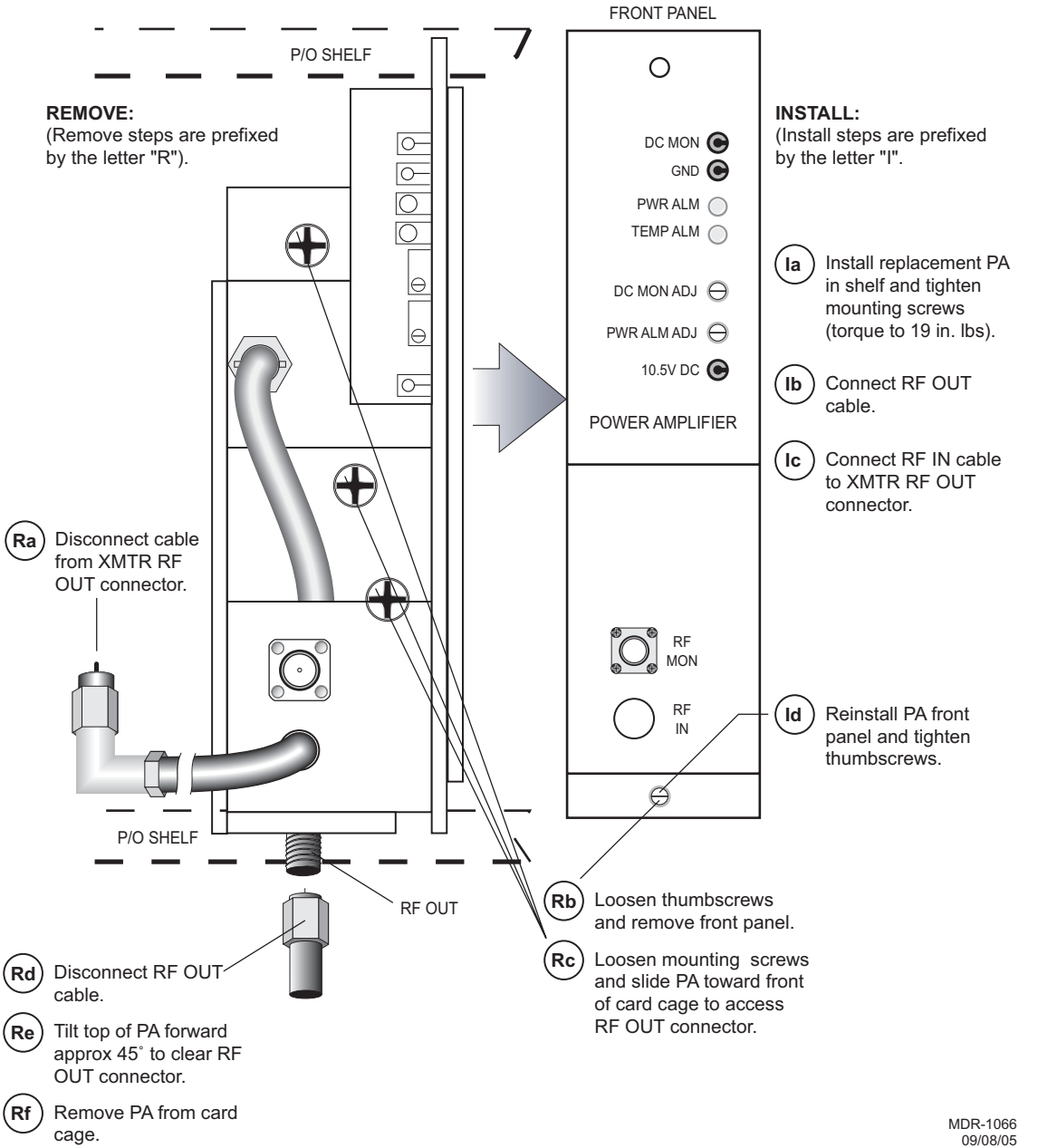


Figure 5-25 UD-51( ) Power Amplifier Removal and Replacement

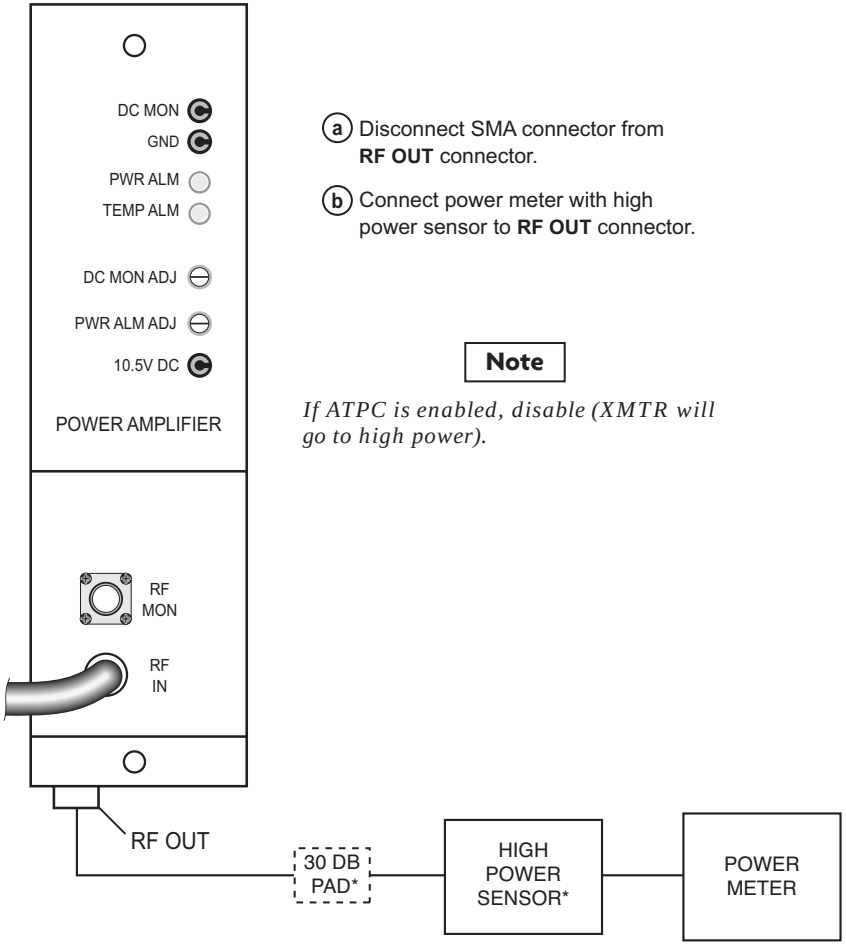
5.25 PA OUTPUT LEVEL CALIBRATION

See Figure 5-26 and follow procedure to check, and if necessary, adjust the UD-51( ) Power Amplifier (PA) output in radio configuration that is equipped with the optional PA.

CAUTION

Possibility of Service Interruption

This is an out-of-service procedure when on a nonstandby (unprotected) system. On a hot-standby or frequency diversity system, switch traffic on the channel under test to protect.



(a) Disconnect SMA connector from **RF OUT** connector.

(b) Connect power meter with high power sensor to **RF OUT** connector.

Note

If ATPC is enabled, disable (XMTR will go to high power).

* As an alternative procedure, replace high power sensor with a medium power sensor and install in-line 30 dB attenuator. ***Attenuator must be properly calibrated for 30 dB.***

MDR-1067
10/11/05

Figure 5-26 PA Output Level Calibration (Sheet 1 of 5)

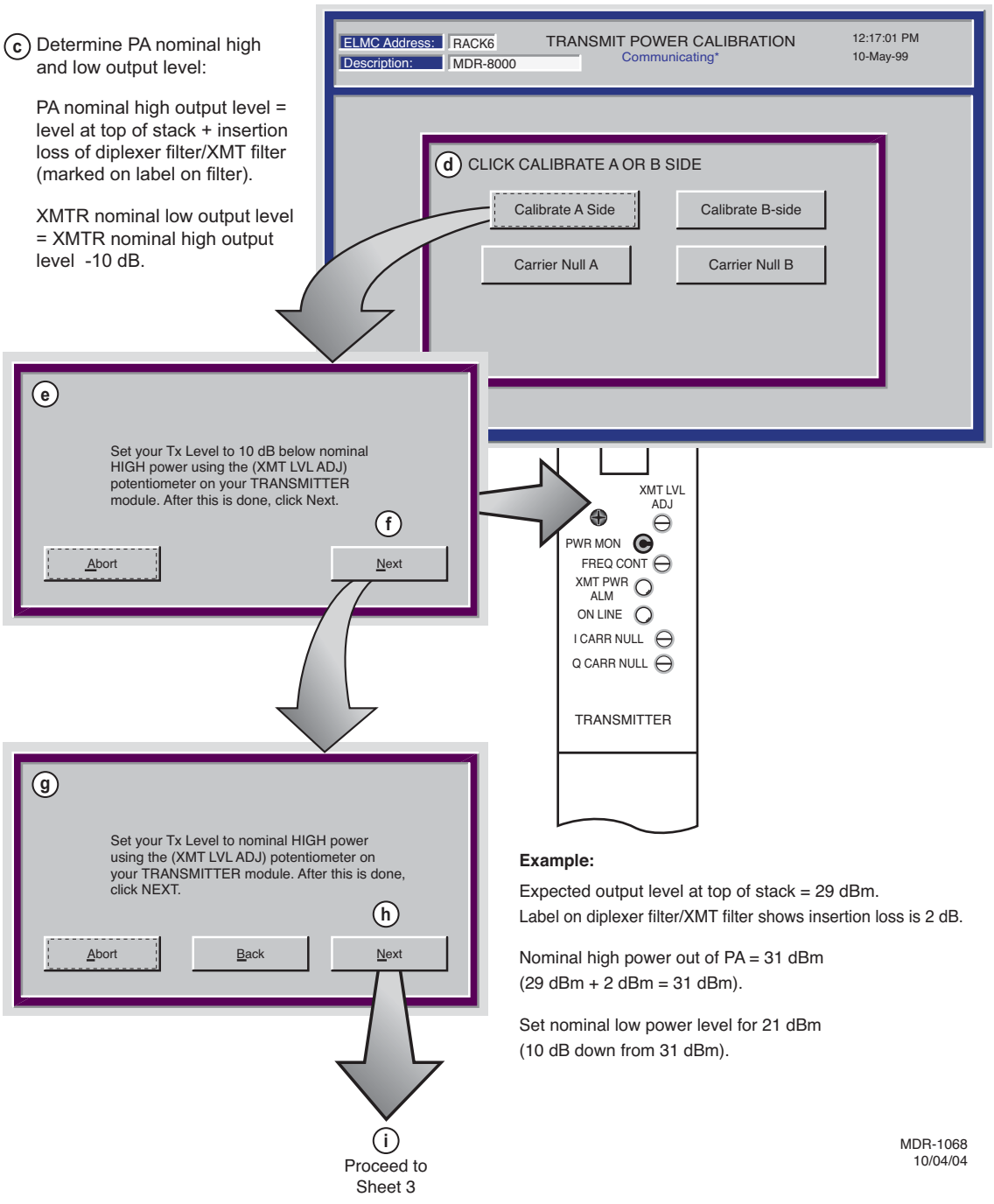
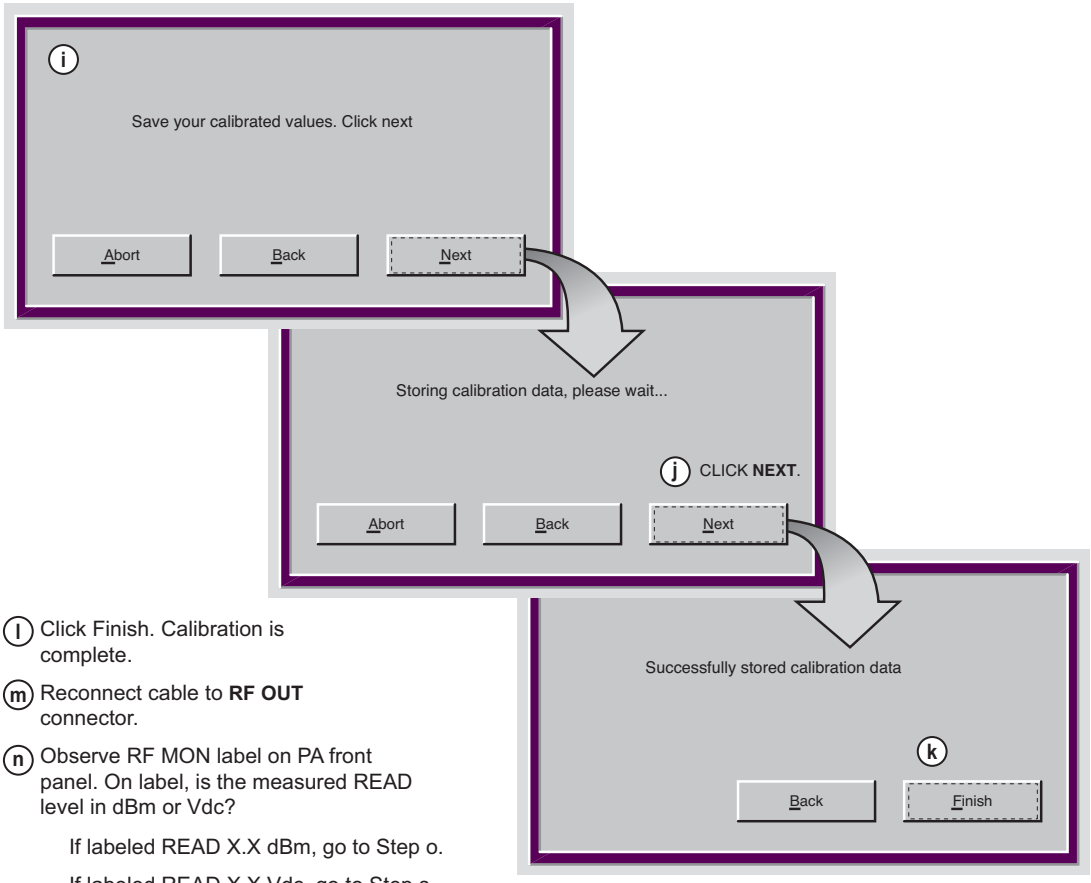


Figure 5-26 PA Output Level Calibration (Sheet 2 of 5)



(l) Click Finish. Calibration is complete.

(m) Reconnect cable to **RF OUT** connector.

(n) Observe RF MON label on PA front panel. On label, is the measured READ level in dBm or Vdc?

If labeled READ X.X dBm, go to Step o.

If labeled READ X.X Vdc, go to Step s.

MDR-1069
09/08/05

Figure 5-26 PA Output Level Calibration (Sheet 3 of 5)

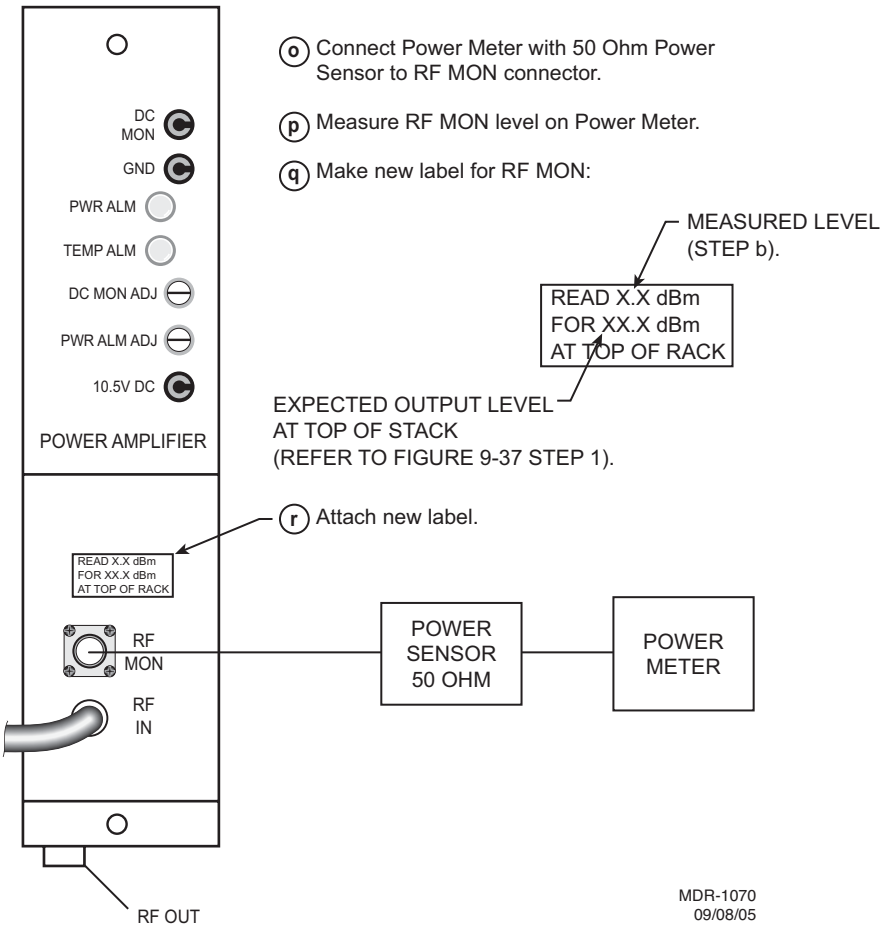


Figure 5-26 PA Output Level Calibration (Sheet 4 of 5)

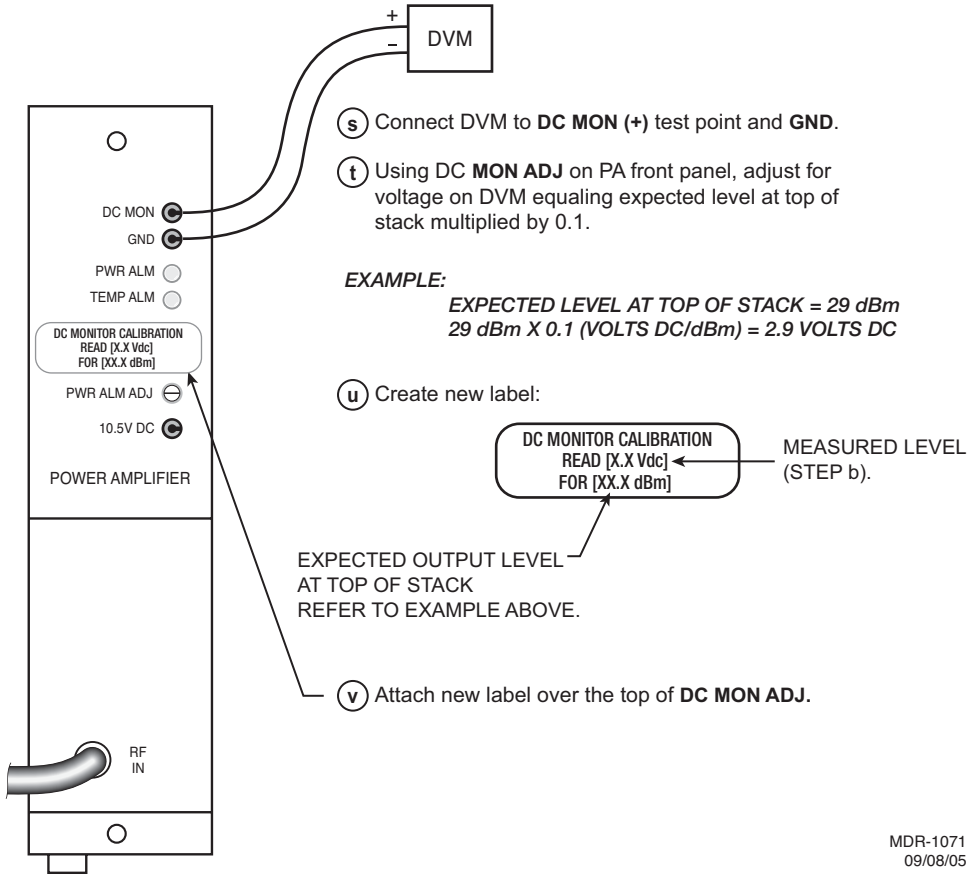


Figure 5-26 PA Output Level Calibration (Sheet 5 of 5)

5.26 CHANGING FREQUENCY

Crystals are soldered and tuned up in a crystal oscillator subboard at the factory.

Changing frequencies requires changing the crystal on the crystal oscillator subboard in the transmitter and receiver modules. Changing out the crystal requires tuning the crystal oscillator subboard. Tuning the crystal oscillator subboard is a factory procedure.

An RF frequency change may require re-tuning the diplexer. Re-tuning the diplexer is a factory procedure.

5.27 CLEANING

Do not use acid, alcohol, or brushes to clean modules because damage to the silkscreen labeling and antistatic coating can result. Cleaning should be confined to the removal of dust and dirt using a damp cloth.

Cleaning should normally be confined to the removal of dust and dirt using a soft bristled (natural fiber) brush and a low velocity blower (such as a vacuum cleaner with a plastic blower nozzle). Do not use acid or synthetic bristled brushes to clean modules that contain electrostatic-sensitive components.