

section 6

DS3 initial turnup

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6 DS3 INITIAL TURNUP

6.1 GENERAL

This section describes the procedures required to turn up the DS3 MDR-8000/i Microwave Digital Radios after installation.

6.2 SEQUENCE OF EVENTS

Perform the following initial turnup procedures in sequence:

- 1 Install software on PC (Chart 1).

Note

Software installed at the factory before delivery should not be overwritten by downloading to the radio controller at initial turnup. Refer to Section 10, Maintenance for procedure to upgrade existing software.

- 2 Establish communication between radio and USI computer (Chart 2).
- 3 Provision radio (Chart 3).

Note

Before troubleshooting a radio that is not performing correctly, check that the antenna has been aligned by contacting the program manager, project engineer, or appropriate customer representative.

- 4 Perform applicable test procedures (Chart 4 through Chart 10).
- 5 Log test results on field test data sheet.

6.3 PROVISIONING OVERVIEW

This 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. Use only those provisioning screens that are applicable to your radio. Refer to on-line help for context-sensitive description of the screens and step-by-step procedures to accomplish other Provisioning tasks.

Chart 1 Load MDR-8000 Software on PC

PURPOSE

Provides procedures to load the Windows user interface (WINUSI) software supplied on CD ROM into the user's PC.

Radio controller software is loaded at the factory and therefore the procedure to load initial software onto the controller is not included in this section. The procedure for upgrading software is provided in the Section 10, Maintenance.

PREREQUISITES

Windows 95, 98, 2000, or NT software loaded onto PC

EQUIPMENT REQUIRED

PC – 100 Mhz @ 32 RAM minimum, Pentium or equivalent

MDR-8000 DS3 Software Kit, PN 695-9406-022

GENERAL

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. For additional information to set up and operate the PC, refer to Section 9, User's Guide.

STEP	PROCEDURE
☐ 1	Insert CD ROM disk into PC.
☐ 2	On Windows desktop, double click on My Computer icon. My Computer window displays.
☐ 3	In My Computer window, click on CD ROM icon. Files window displays.
☐ 4	See Figure 6-1. Follow directions and load setup.exe file (containing both USI and download software) on PC.
☐ 5	STOP. This procedure is complete. Proceed to Chart 2.

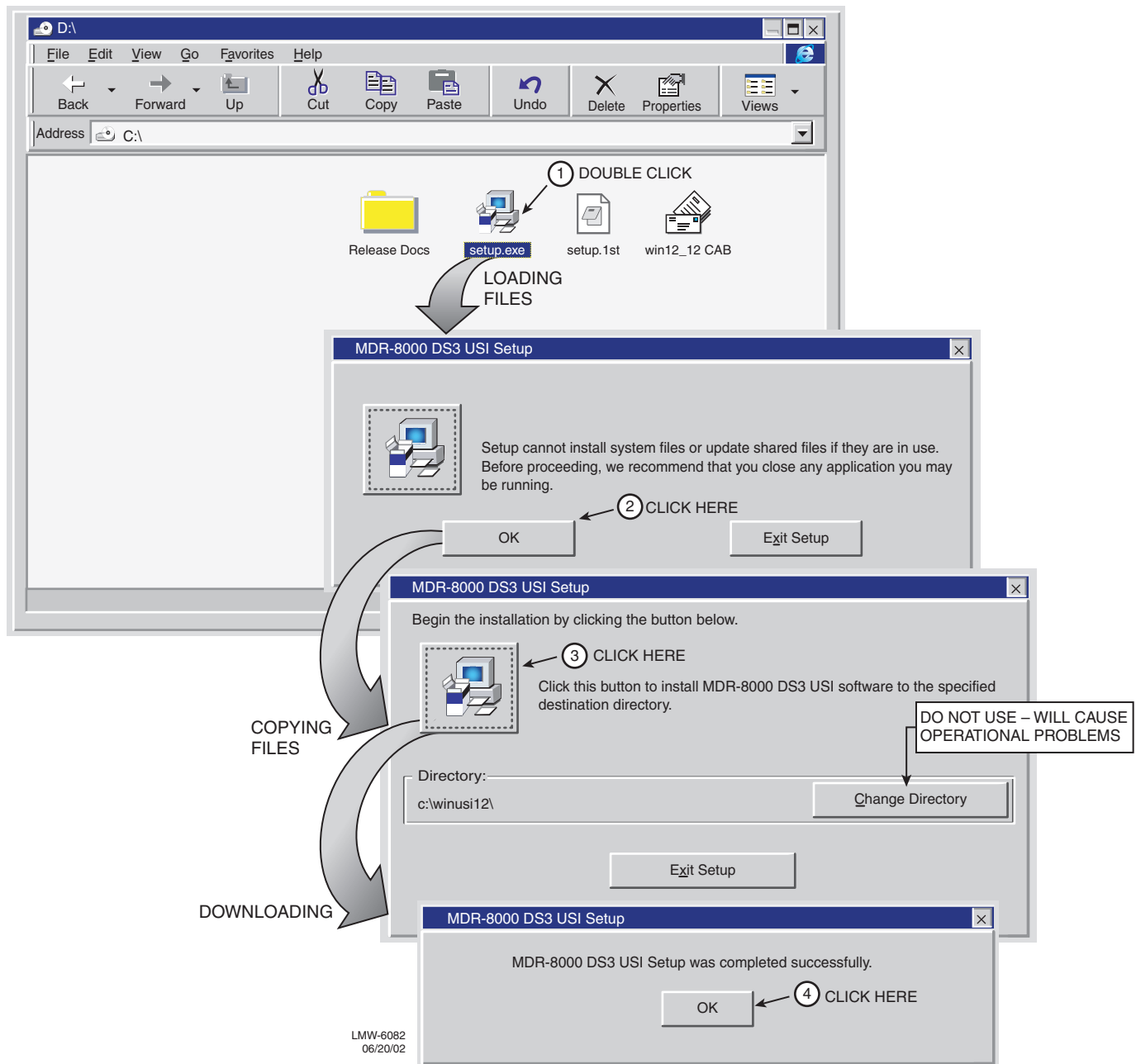


Figure 6-1 Load USI Software on PC

Chart 2 Establish COM Port

PURPOSE

Provides procedures to establish communication between the USI computer and the controller in the radio.

PREREQUISITES

Software loaded into USI computer (Chart 1)

TEST EQUIPMENT REQUIRED

PC – 100 Mhz @ 32 RAM minimum, Pentium or equivalent

RS-232 Interface Cable Alcatel PN 695-7848

STEP	PROCEDURE
------	-----------

Note

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

- | | |
|----------------------------|--|
| ☐ 1 | Connect RS-232 interface cable between USI connector on controller and PC. See Figure 6-2. |
| ☐ 2 | On Windows desktop, click on Start icon. Program menu displays. |

Note

Only one COM port can be used at a time.

- | | |
|----------------------------|---|
| ☐ 3 | 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 6-3 to change COM port. |
| ☐ 4 | STOP. This procedure is complete. Do not close Win USI screen. Proceed to Chart 3. |

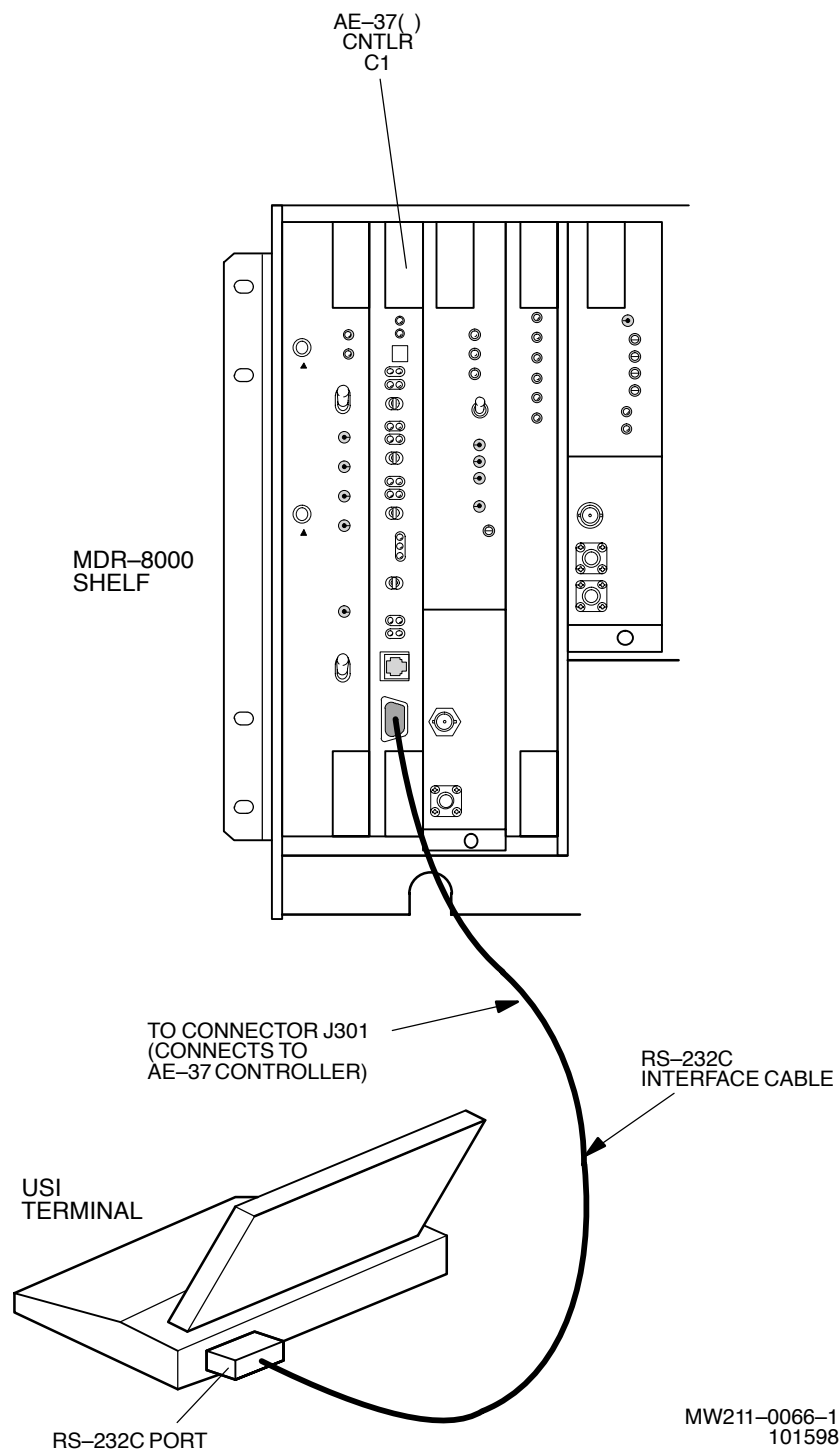
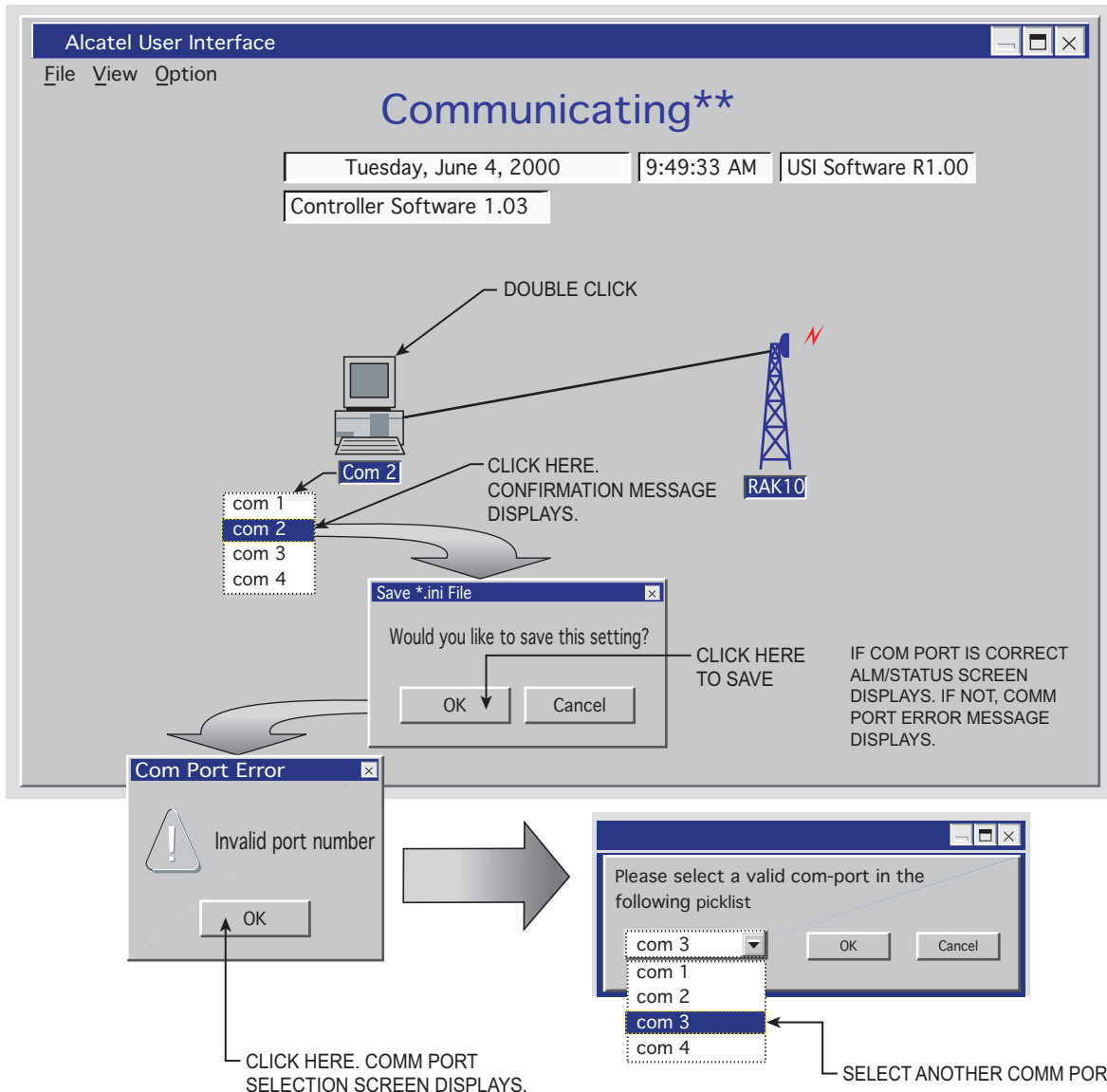


Figure 6-2 USI Computer Hookup



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Figure 6-3 Communications Port Setup

Chart 3 Provisioning

PURPOSE

Provides procedures to provision the radio. Check factory provisioning against actual system requirements. If the provisioning checks find differences in provisioned parameters, change the provisionable parameter(s) as required.

PREREQUISITES

Software loaded into radio (Chart 1).

Communication established between PC and radio controller (Chart 2).

TEST EQUIPMENT REQUIRED

PC

RS-232 Interface Cable Alcatel PN 695-7848

GENERAL

This turn-up procedure serves as a guide to configure and provision the radio system using the PC.

At initial turn-up, the MDR-8000 radios at each site must be provisioned on site using local provisioning menus on the USI computer. Radio configuration, mode of operation, and equipment configuration provisioning can only be performed locally. After the remote addresses have been set locally, if ELMC option key on controller has remote provisioning capability, the user can change transmit switching, and receive switching functions and change DS3 and fault alarm provisioning.

STEP	PROCEDURE
------	-----------

Note

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

- ☐ 1 Display Local Provisioning screen (Double click tower icon on Win USI screen).
- ☐ 2 Check factory provisioning and reprovision parameters as necessary for DS3 radio. See Figure 6-4 for sequence.
- ☐ 3 Click on **Prov. Save** on tool bar to store new provisioning information on controller.
- ☐ 4 STOP. This procedure is complete. Proceed to Chart 4.

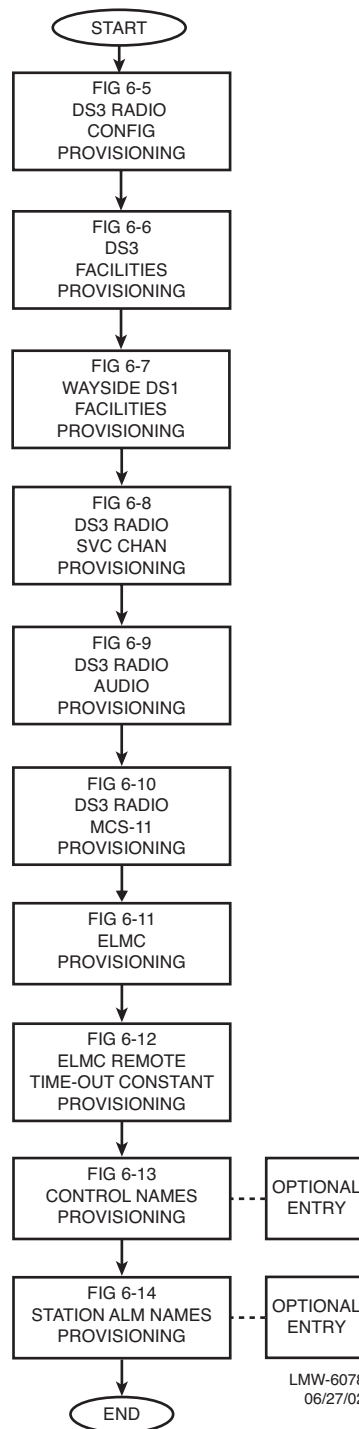
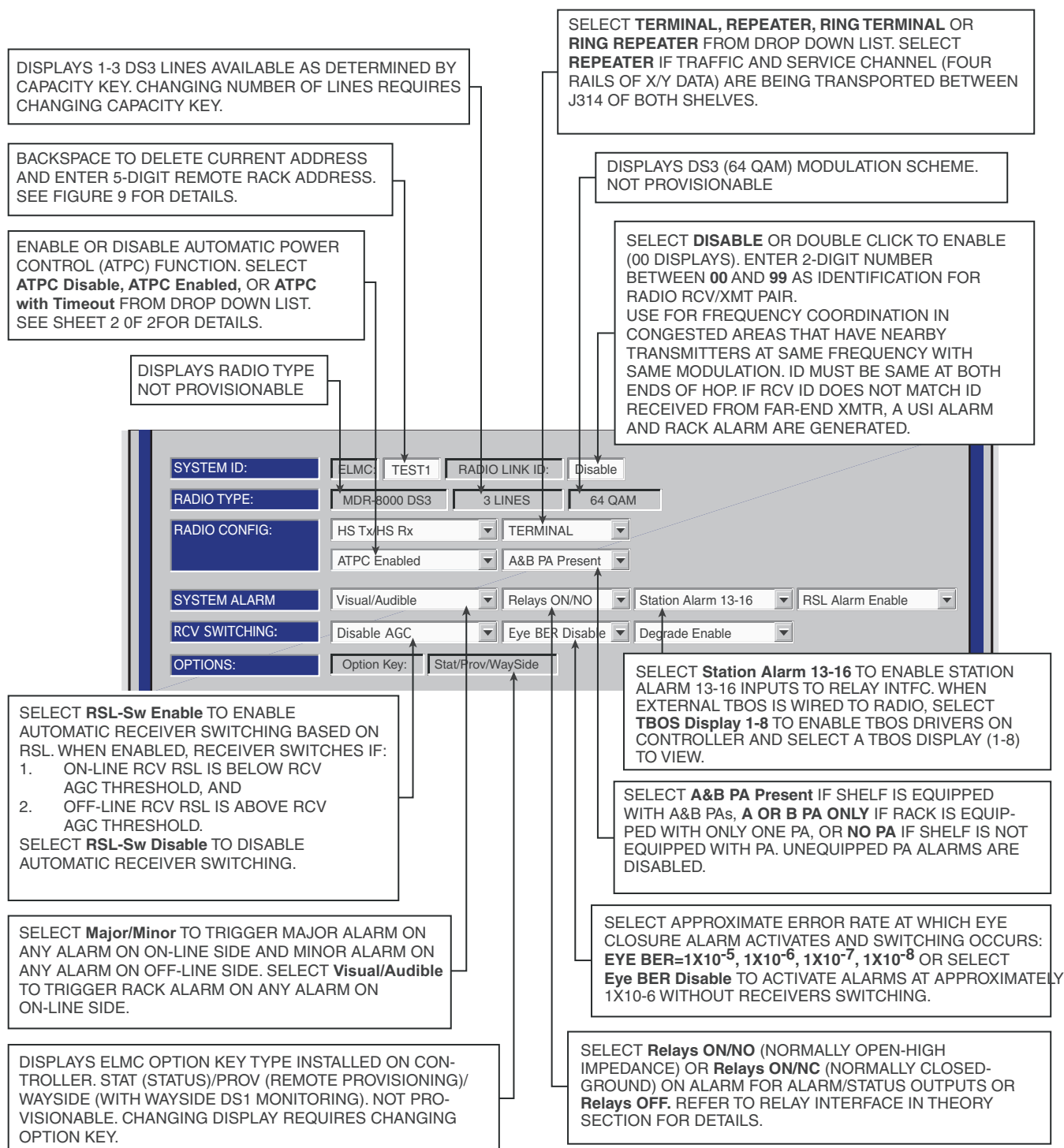


Figure 6-4 Provisioning Sequence



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Sheet 1 of 2
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Figure 6-5 DS3 Radio Configuration Provisioning (Sheet 1 of 3)

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) FUNTION. WHEN PROVISIONED **ATPC** OR **ATPC T/O**, 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.

SYSTEM ID: ELMC: TEST1 RADIO LINK ID: Disable

RADIO TYPE: MDR-8000 DS3 3 LINES 64 QAM

RADIO CONFIG: HS Tx/HS Rx TERMINAL

ATPC Enabled A&B PA Present

SYSTEM ALARM Visual/Audible RELAYS ON/NO Station Alarm 13-1 RSL Alarm Enable

RCV SWITCHING: Disable AGC BER Disable Degrade Enable

OPTIONS: Option Key: Stat/Prov/WaySide

SELECT **Degrade Enable** TO SWITCH RCVRs WHEN RCV SIGNAL DEGRADES PAST POINT THAT CAUSES BER ERROR (ERROR RATE IS SELECTED ON DS3 FACILITIES PROVISIONING SCREEN). SELECT **Degrade Disable** TO DISABLE SWITCHING.

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.

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Figure 6-5 DS3 Radio Configuration Provisioning (Sheet 2 of 3)

SELECT **Degrade Enable** TO ACTIVATE APPROXIMATE ERROR RATE AT WHICH **BER Deg Alm** ALARM ACTIVATES AND SWITCHING OCCURS: 1X10-5, 1X10-6, 1X10-8. 1X10-8 ON DS3 FACILITIES PROVISIONING SCREEN. SELECT **Degrade Disable** TO ACTIVATE **BER Deg Alm** AT SELECTED ERROR RATE WITHOUT RCVRS SWITCHING.

SYSTEM ID:	ELMC: TEST1	RADIO LINK ID:	Disable
RADIO TYPE:	MDR-8000 DS3	3 LINES	64 QAM
RADIO CONFIG:	HS Tx/HS Rx	TERMINAL	
	ATPC Enabled	A&B PA Present	
SYSTEM ALARM	Visual/Audible	RELAYS ON/NO	Station Alarm 13-16
			RSL Alarm Enable
RCV SWITCHING:	Disable AGC	Eye BER Disable	Degrade Enable
OPTIONS:	Option Key:	Stat/Prov/WaySide	

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SELECT ONE:

NS Tx/NS Rx
NS Tx/HS Rx
NS Tx/SD Rx
HS Tx/HS Rx
HS Tx/SD Rx
FREQ DIV
HS Tx/NS Rx
SIMPLEX NS Tx
SIMPLEX HS Tx
SIMPLEX NS Rx
SIMPLEX HS/SD Rx

REFER TO APPLICATIONS SECTION
FOR SIMPLIFIED BLOCK DIAGRAM AND
DESCRIPTION OF RADIO CONFIGURATIONS.

NS = NON-STANDBY
HS = HOT-STANDBY
SD = SPACE DIVERSITY
FQ = FREQUENCY DIVERSITY

Figure 6-5 DS3 Radio Configuration Provisioning (Sheet 3 of 3)

SELECT **ON** TO DISABLE VIOLATION MONITORING AND REMOVAL (VMR) ON LINE DUE TO LOSS OF UPSTREAM DS3 FRAME. DS3 PARITY ERRORS ARE NOT REMOVED AND ARE PASSED ON TO NEXT SECTION. SELECT **OFF** TO ENABLE VMR AND REMOVE DS3 PARITY ERRORS.

SELECT **OFF** TO REPORT ALL ALARMS. SELECT **ON** TO DISABLE ALARMS FOR LINE.

SELECT **ON** TO BRIDGE DS3 LINE 1 ONTO SELECTED LINE(S) 2 AND/OR 3 TO PREVENT ALARMS ON UNUSED LINE(S). SELECT **OFF** TO DISABLE FUNCTION.

	TX/RX INTERFACE A			TX/RX INTERFACE B			
DS3 LINES	1	2	3	1	2	3	Select All
INPUT LINE BRIDGE	NA	OFF	OFF	NA	OFF	OFF	
XMT ALARM DISABLE	OFF	OFF	OFF	OFF	OFF	OFF	
XMT VMR DISABLE	ON	ON	ON	ON	ON	ON	
RCV ALARM DISABLE	OFF	OFF	OFF	OFF	OFF	OFF	
RCV VMR DISABLE	OFF	OFF	OFF	OFF	OFF	OFF	
AIS SIGNAL DISABLE	OFF	OFF	OFF	OFF	OFF	OFF	
AIS SIGNAL TIMING	10/350	10/350	10/350	10/350	10/350	10/350	
BIT ERROR RATE	DS3 DEGRADE=10E-5						

WHEN **Degrade Enable** IS SELECTED ON RADO CONFIGURATION PROVISIONING SCREEN, SELECT APPROXIMATE ERROR RATE AT WHICH **BER Deg Alm** ALARM ACTIVATES AND RCVR SWITCHING OCCURS: 10E-5 (1X10-5), 10E-6 (1X10-6), 10E-7 (1X10-7), OR 10E-8 (1X10-8). WHEN **Degrade Disable** IS SELECTED, SELECT ERROR RATE AT WHICH **BER Deg Alm** ACTIVATES WITHOUT RCVR SWITCHING.

SELECT **10/350** TO INSERT AIS (BLUE SIGNAL) WHEN DS3 FRAME LOSS IS DETECTED FOR AT LEAST 10ms AND REMOVE AIS WHEN FRAME LOSS HAS CLEARED FOR 350ms. SELECT **3/3** TO INSERT AIS WITHIN 3ms OF DS3 FRAME LOSS DETECTION AND REMOVAL WITHIN 3ms AFTER FRAME LOSS CLEARS.

SELECT **ON** TO DISABLE AIS (BLUE SIGNAL) INSERTION ON LINE WHEN LOSS OF UPSTREAM DS3 FRAME IS DETECTED. SELECT **OFF** TO INSERT AIS (BLUE SIGNAL) WHEN RADIO OR DS3 FRAME LOSS IS DETECTED.

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Figure 6-6 DS3 Facilities Provisioning

SELECT **AMI** OR **B8ZS** CODING FOR WAYSIDE DS1 LINE.

SELECT **ON** TO DISABLE ALARM REPORTING FOR WAYSIDE DS1 LINE.
SELECT **OFF** TO REPORT ALL ALARMS FOR LINE.

DS1 LINES	DS1 CARD A			DS1 CARD B			Select All
	1	2	3	1	2	3	
ALARM LOCK OUT	OFF	OFF	OFF	OFF	OFF	OFF	
DS1 LINE CODING	AMI	AMI	AMI	AMI	AMI	AMI	
AIS INHIBIT	OFF	OFF	OFF	OFF	OFF	OFF	
AIS INSERT	1	1	1	1	1	1	

SELECT 1 (ALL ONES) OR 0 (ALL ZEROES) FOR ALARM INDICATION SIGNAL (AIS) LINE CODE.

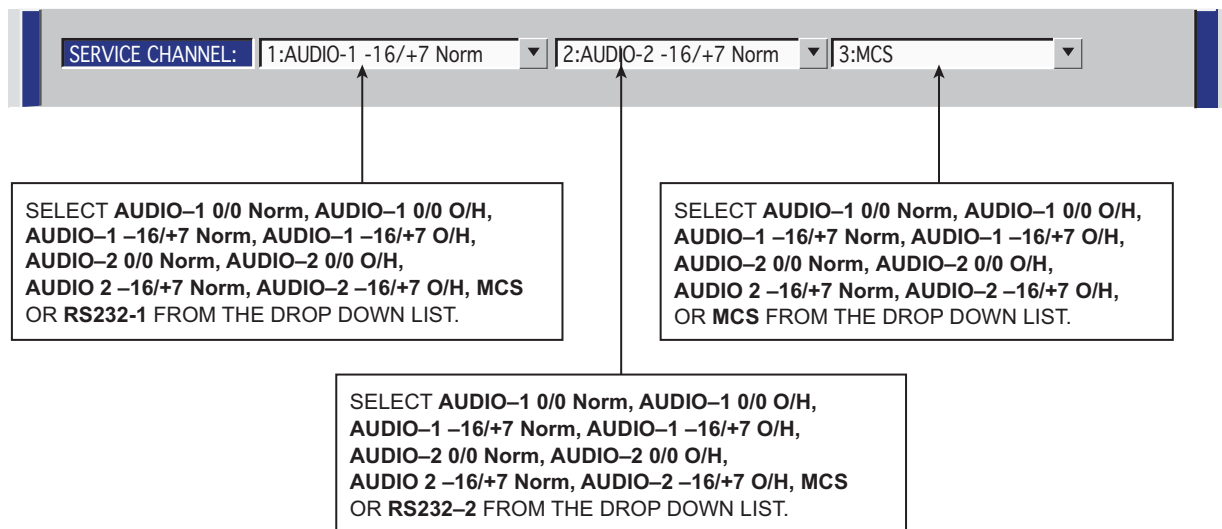
SELECT **ON** TO DISABLE AIS INSERTION ON WAYSIDE DS1 LINE WHEN LOSS OF UPSTREAM DS1 FRAME IS DETECTED. SELECT **OFF** TO INSERT AIS WHEN DS1 FRAME LOSS IS DETECTED.

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Figure 6-7 Wayside DS1 Facilities Provisioning

NOTE:

THERE ARE FIVE CONNECTORS ON THE BACKPLANE TO INTERFACE THE THREE SERVICE CHANNELS. CONNECTORS ON BACKPLANE INTERFACE THREE FUNCTIONS: AUDIO, RS232, AND MCS. EACH SERVICE CHANNEL IS PROVISIONED FOR A SPECIFIC FUNCTION. AUDIO AND MCS CAN BE PUT ON ANY OPEN SERVICE CHANNEL. RS232-1 DATA CAN BE PUT ON SERVICE CHANNEL 1 AND RS232-2 DATA CAN BE PUT ON SERVICE CHANNEL 2. RS232 DATA CANNOT BE PUT ON SERVICE CHANNEL 3.



NOTE:

SELECT **AUDIO-1/2 -16/+7 OR 0/0 Norm** FOR NORMAL AUDIO OPERATION WHERE RADIO REQUIRES AN EXTERNAL OFF HOOK SIGNAL (BATTERY) ON M-LEAD INPUT. SELECT **AUDIO-1/2 -16/+7 OR 0/0 O/H** FOR RADIO TO ALWAYS BE OFF HOOK (CONTROLLED BY SOFTWARE).

SELECT **AUDIO-1/2 0/0** FOR 0 DBM IN AND 0 DBM OUT (UNITY GAIN). SELECT **AUDIO-1/2 -16/+7**, -16 DBM IN AND +7 DBM OUT, FOR LONGER DISTANCES BETWEEN AUDIO EQUIPMENT AND RADIO.

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Figure 6-8 DS3 Radio Service Channel Provisioning

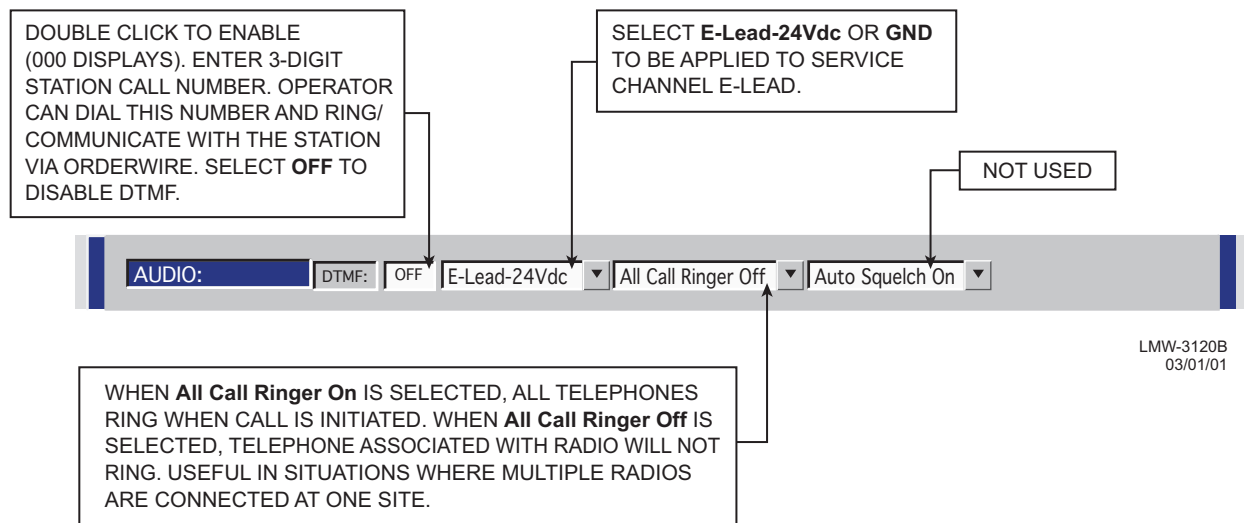


Figure 6-9 DS3 Radio Audio Provisioning

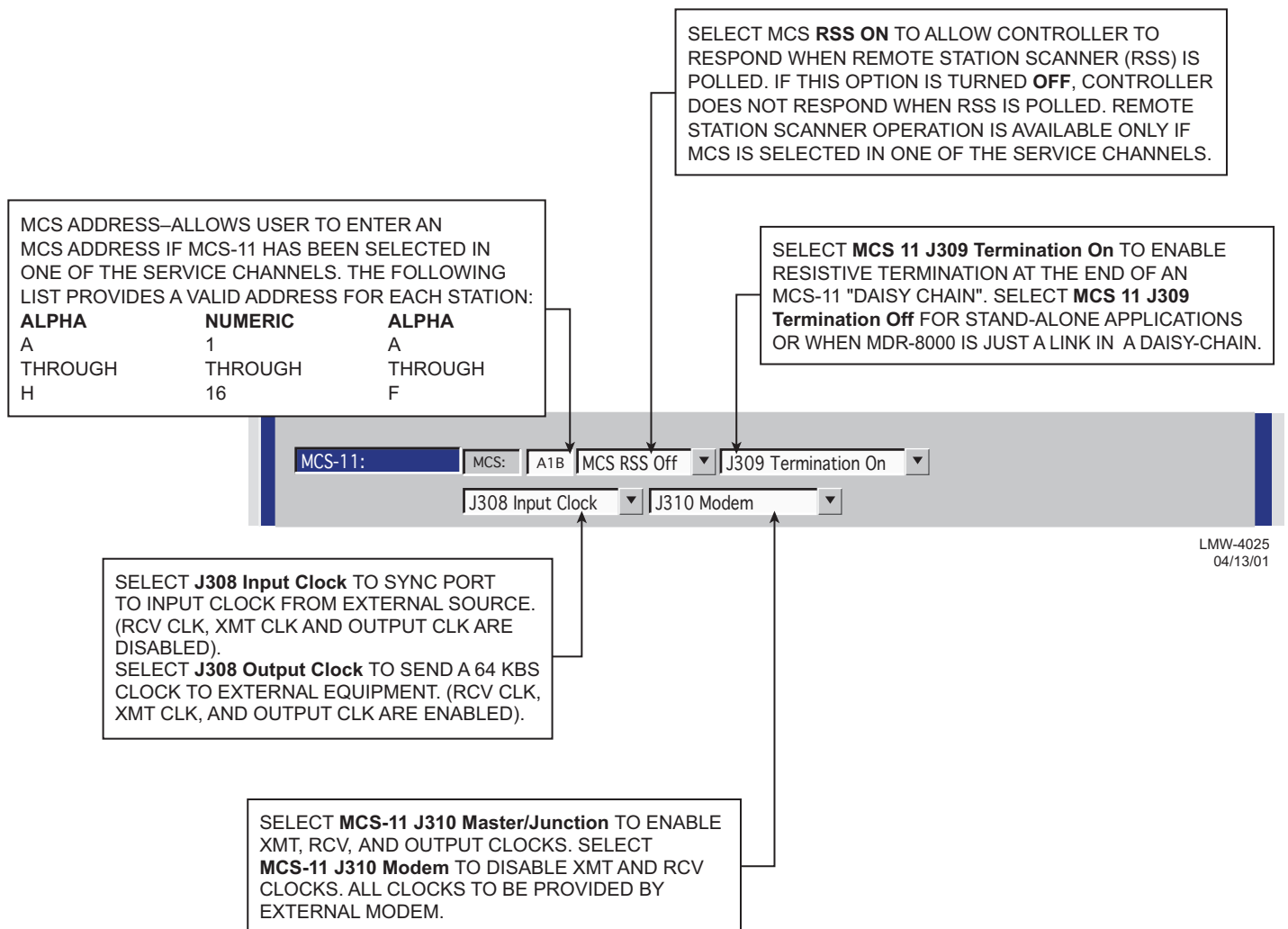


Figure 6-10 DS3 Radio MCS-11 Provisioning

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

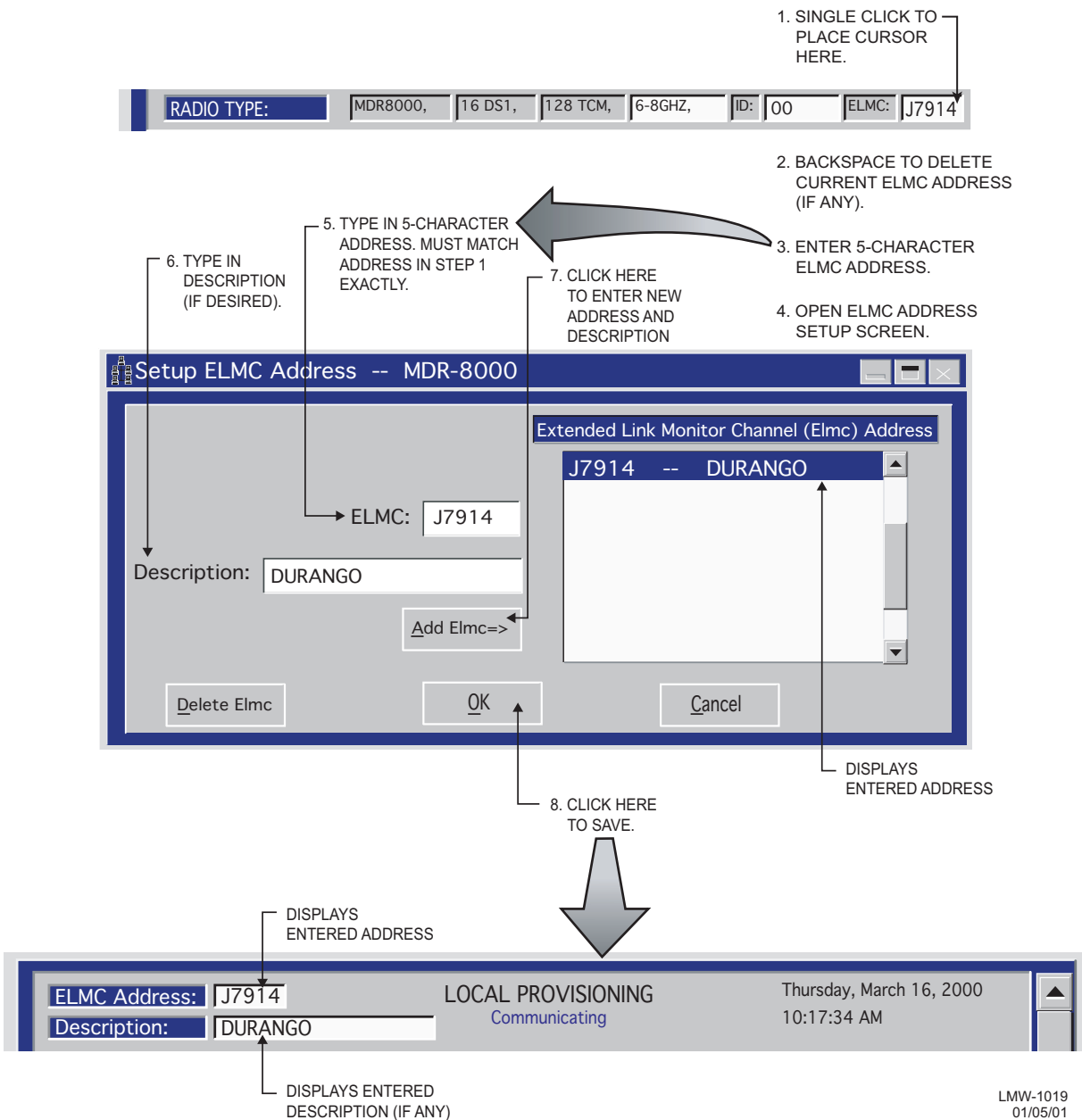


Figure 6-11 ELMC Provisioning

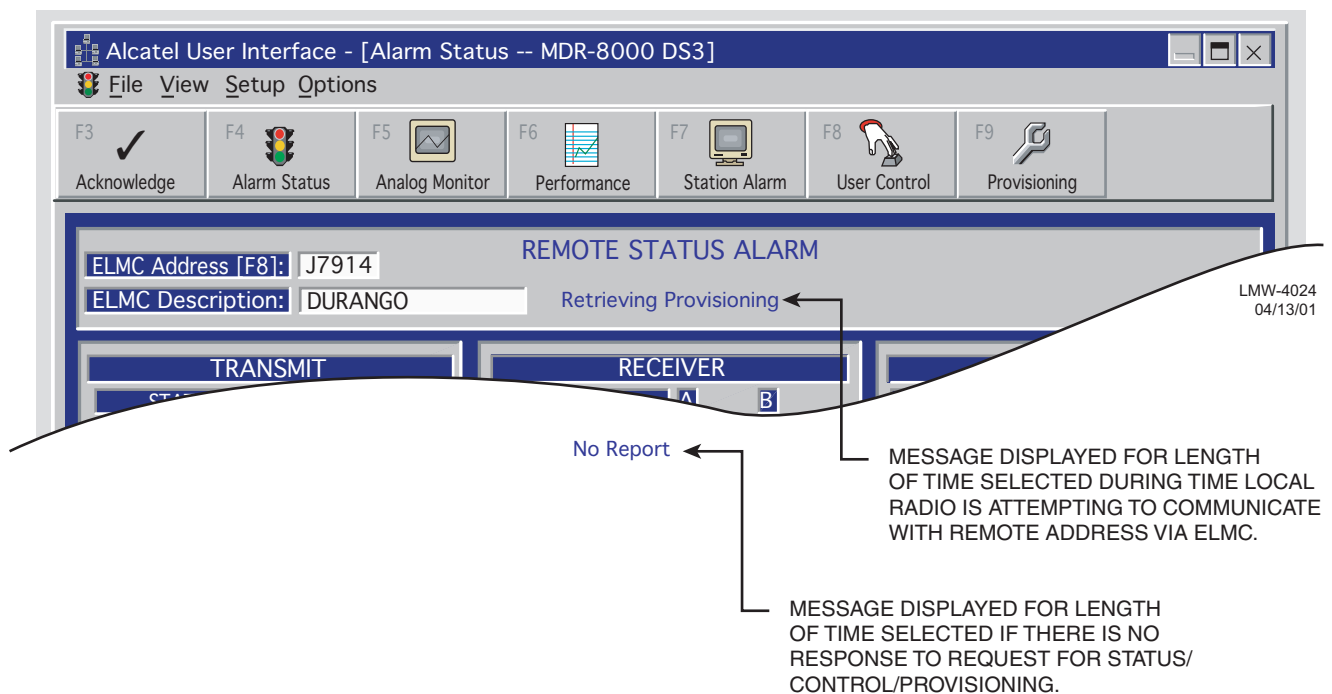
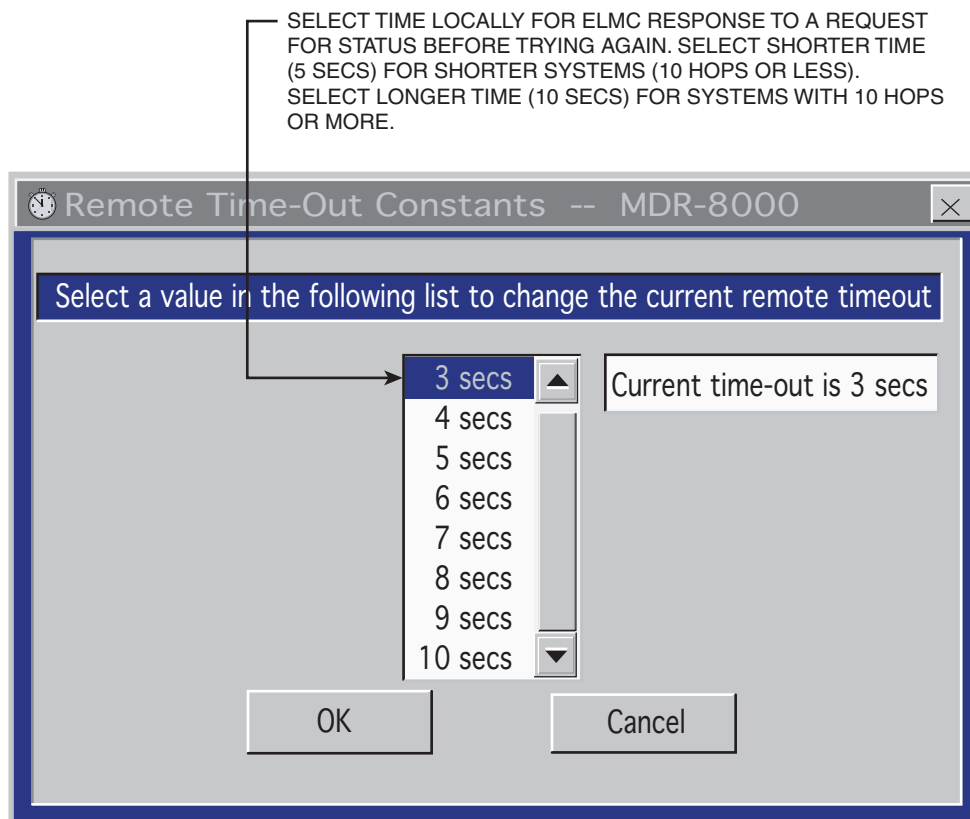


Figure 6-12 ELMC Remote Time-Out Constant Provisioning

NOTE: DEFAULT CONTROL NAMES ARE USER CONTROL 1-6

1. OPEN USER CONTROL NAMES SETUP SCREEN

2. SELECT RADIO

User Control Names Setup -- MDR-8000

Elmc List

RACK1	--	DURANGO
RACK2	--	DURANGO
RACK3	--	RED MTH PASS
RACK4	--	SILVERTON

CONTROL NAME

GEN START

TWR LIGHT OVRD

User Control #3

User Control #4

User Control #5

User Control #6

Load Default Names OK CANCEL

SELECT TO LOAD NAMES
USER CONTROL 1-6

CLICK HERE
TO SAVE

CLICK HERE TO CANCEL
TRANSACTIONS
BEFORE SAVE

3. SELECT CONTROL POINT

4. BACKSPACE TO DELETE
AND TYPE IN NEW CONTROL
NAME

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Figure 6-13 Control Names Provisioning

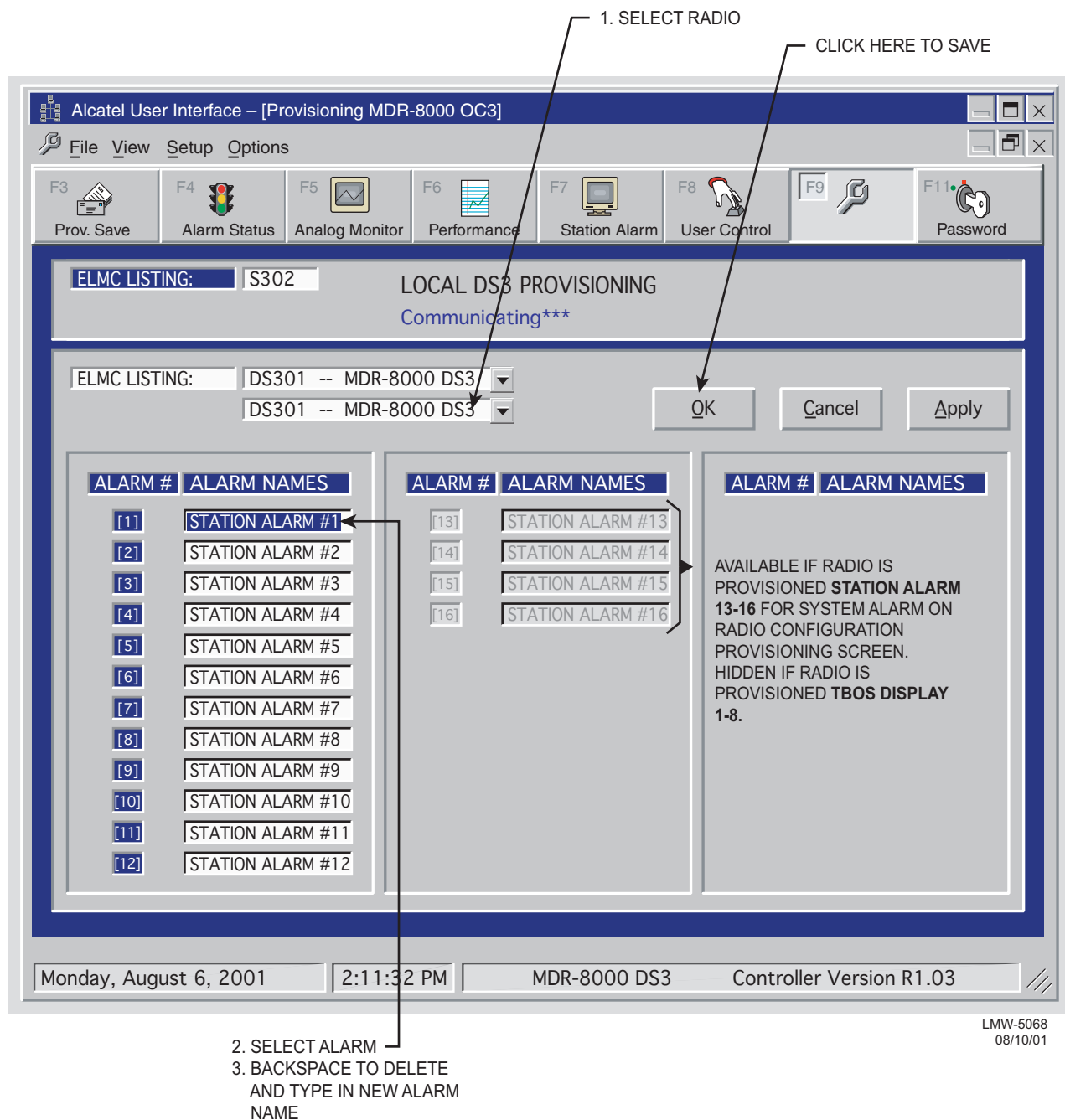


Figure 6-14 DS3 Station Alarm Names Provisioning

6.4 TEST PROCEDURES

Note

Ensure that all antennas are properly aligned and waveguide is in good physical condition before attempting radio turn-up.

This section describes the procedures required to turn up the DS3 MDR-8000/i Microwave Digital Radios after installation.

These procedures are for equipment that is properly aligned and tested at the factory before shipment. The only adjustments included are those that are normally made during installation. If any of the required measurements are not within the specified tolerance, take corrective action in accordance with Section 10, Maintenance.

6.5 TESTING SEQUENCE

See Figure 6-15 for flowchart showing testing sequence. Follow the path for your radio and perform tests in the that order.

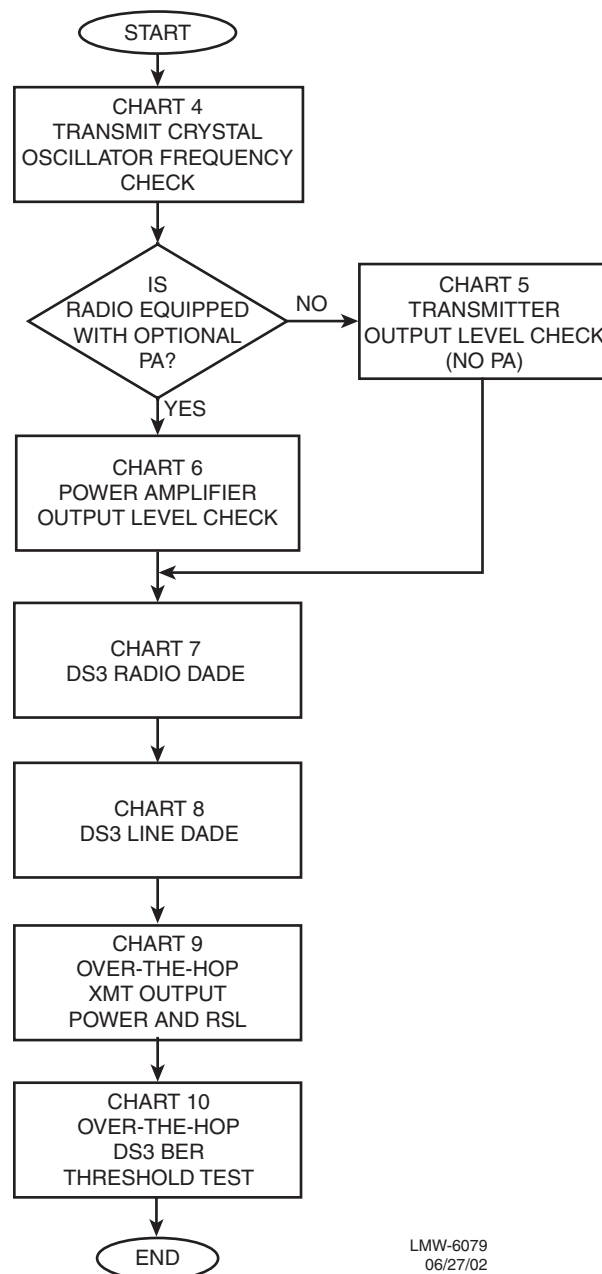


Figure 6-15 Testing Sequence

6.6 TEST EQUIPMENT REQUIRED

Refer to Table 6-1 for a list of test equipment required for initial turn-up. Similar test equipment can be substituted for that recommended, but before substitution, check the parameters for minimum requirements. If the characteristics of the test equipment being considered are not within required parameters and result in a change of any procedure, note the details of the procedure change. Become familiar with the operation of any test equipment before using it. Operating instructions for test equipment are not included in this instruction book, except for precautionary notes or special instrument settings required in performing a test procedure. When further information regarding test equipment is required, refer to the equipment manufacturer's instructional data.

Table 6-1 Test Equipment Required

TEST EQUIPMENT/FUNCTION	ESSENTIAL CHARACTERISTICS
Bit Error Rate Test Set T-Berd 305-3-10830 or Acterna TB 2310-P4 Data Rate Modulation Scheme	44.736Mb/s, 1.544 Mb/s, B8ZS or AMI
Frequency Counter, Hewlett-Packard 5350B w/Option 001 or Agilent 53181A w/Options 001 and 124 Frequency Range Impedance	1.7 to 11.7 GHz. 50 ohms, nominal
MDR-8000 DS3 Software Kit	PN 695-9406-022
Oscilloscope, Tektronix TDS520 or TDS724D	
Personal Computer (PC)	Refer to Table 1-2 in Section 1, General
Power Meter, Agilent 436A, 435B, or E4418A with Power Sensor:	
8481D Low Power Sensor	-70 to -20 dBm, 10 MHz to 18 GHz, 50 ohms,
8481A Medium Power Sensor 8481A High Power Sensor	-30 to +20 dBm, 10 MHz to 18 GHz, 50 ohms,
RS-232 Interface Cable	Alcatel -10 to +35 dBm, PN 695-7848 (for use with PC)
Step Attenuator, Trilithic SA-78	0 to 82.5 dB, 75 ohms
Test Lead and Tool Kit	PN 695-0675-003

Chart 4 Transmit Crystal Oscillator Frequency Check

PURPOSE

Provides procedures to check (and adjust if necessary) the transmit frequency of the crystal oscillator on the UD-35() Transmitter module.

For a list of local oscillator transmit and crystal frequencies, refer to the appropriate application drawing in the appendix.

PREREQUISITES

Software loaded (Chart 1)

Radio provisioned (Chart 3)

TEST EQUIPMENT REQUIRED

Frequency Counter HP-5340B

Test Lead and Tool Kit

Allow a 1-hour warmup 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 warmup period of 5 minutes minimum; however, crystal frequency should be rechecked after full warmup.

STEP	PROCEDURE
☐ 1	Verify that carrier frequencies from station license or construction permit conform to labels on UD-35() Transmitter.
☐ 2	Perform procedure shown on Figure 6-16.
☐ 3	If rack is equipped with B-side equipment, repeat for B side.
☐ 4	STOP. This procedure is complete. If radio is equipped with optional PA, proceed to Chart 6. If not, proceed to Chart 5.

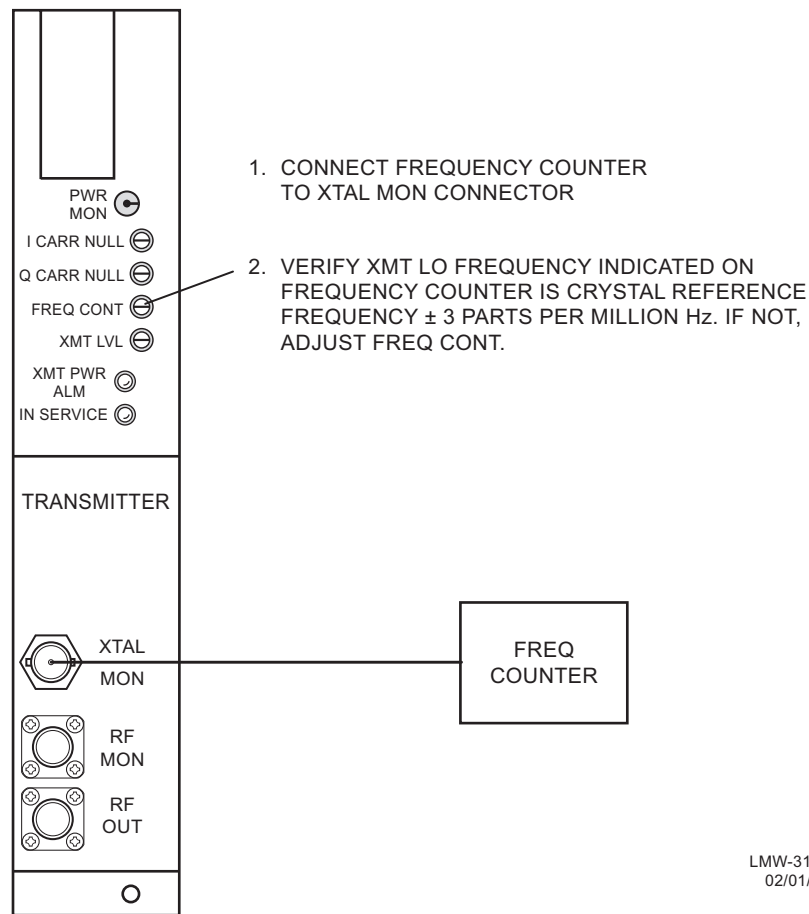


Figure 6-16 Transmit Crystal Oscillator Frequency Check

Chart 5 Transmitter Output Level Check (No PA)

PURPOSE

Use this procedure to check the RF output of the UD-35() Transmitter in radio configuration that is not equipped with the optional PA. Adjustments are made in Section 10, Maintenance.

PREREQUISITE

Software loaded (Chart 2)

Radio provisioned (Chart 3)

XMT crystal oscillator frequency adjusted (Chart 4)

TOOLS REQUIRED

Power Meter with Medium Power Sensor

Test Lead and Tool Kit

STEP	PROCEDURE
------	-----------



Exposure to energy radiated at microwave frequencies can cause eye injury and eventual blindness. Do not operate the system with a waveguide port unterminated.



Wear ground straps according to local office procedures.

STEP	PROCEDURE, CONTINUED
------	----------------------

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.

- ☐ 1 Perform procedure shown on Figure 6-17.
- ☐ 2 If rack is equipped with B-side equipment, repeat for B-side.
- ☐ 3 STOP. This procedure is complete. Proceed to Chart 7.

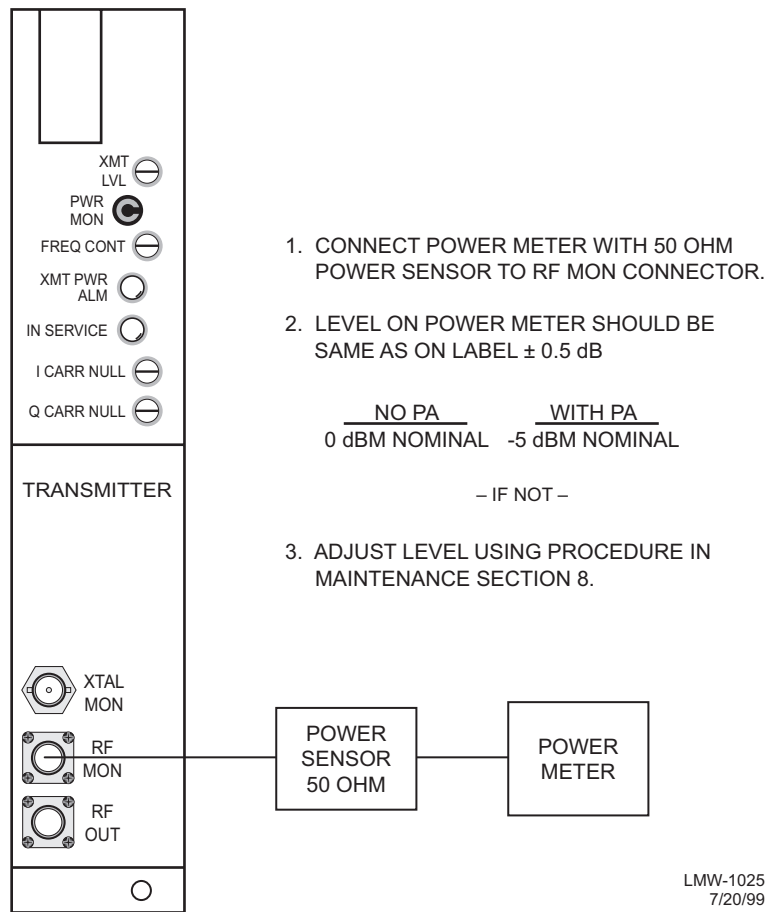


Figure 6-17 Transmitter Output Level Check (No PA)

Chart 6 Power Amplifier Output Level Check

PURPOSE

Use this procedure to check the UD-51() Power Amplifier (PA) output in radio configuration that is equipped with the optional PA. Adjustments are made in Section 10, Maintenance.

PREREQUISITES

Software loaded (Chart 2)

Radio provisioned (Chart 3)

XMT crystal oscillator frequency adjusted (Chart 4)

TOOLS REQUIRED

Power Meter With Medium Power Sensor

Test Lead and Tool Kit

PC With Software PN 695-9406-022

RS232 Interface Cable PN 695-7848

STEP	PROCEDURE
------	-----------



Exposure to energy radiated at microwave frequencies can cause eye injury and eventual blindness. Do not operate the system with a waveguide port unterminated.

STEP	PROCEDURE, CONTINUED
------	----------------------

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.

CAUTION

*Possibility of
Service
Interruption*

Wear ground straps according to local office procedures.

Note

Allow minimum of 30 minutes of PA warmup time before proceeding.

- ☐ 1 Connect USI computer to USI connector J301 on AE-37Y Controller.
- ☐ 2 On USI computer, Open Provisioning screen.
- ☐ 3 Observe status of ATPC under OPERATION MODE .

If ATPC ENABLED, go to step 4.

If ATPC DISABLED, go to step 6.

LOCK ATPC HIGH

- ☐ 4 On USI computer, Open **Local Control** screen.
- ☐ 5 On Local Control menu, click on **A or B ATPC High Pwr Lock** to lock transmitter in high power.

STEP	PROCEDURE, CONTINUED
------	----------------------

CAUTION

*Possibility of
Service
Interruption*

Do not operate a power amplifier unterminated. Set power supply PA POWER switch to DISABLE before connecting/disconnecting power meter.

CAUTION

*Possibility of
Service
Interruption*

To ensure accurate readings, serial number on power sensor head and attenuator must match. If the HP 8481B power sensor head is used, the matching attenuator must be attached.

- ☐ **6** Perform procedure shown on Figure 6-18.
- ☐ **7** If rack is equipped with B-side equipment, repeat for B-side.
- ☐ **8** STOP. This procedure is complete. Go to Chart 7.

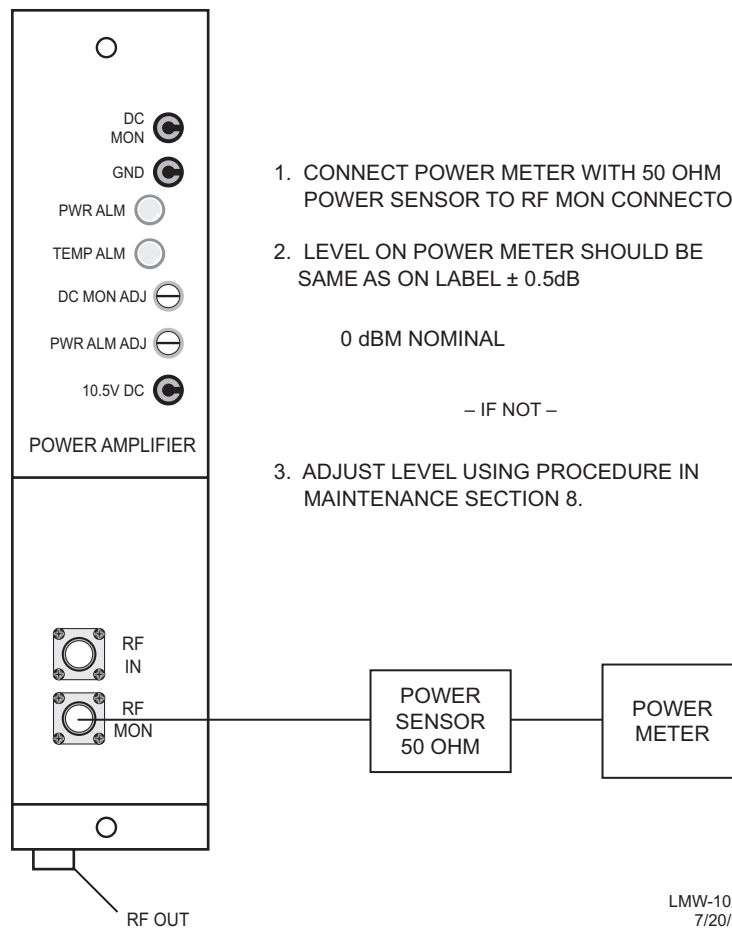


Figure 6-18 PA Output Level Check

Chart 7 DS3 Radio DADE

PURPOSE

Provides procedures to check, and if necessary adjust the differential absolute delay between the main and diversity paths to the antennas in a space diversity configuration. Also, this procedure must be performed following the replacement of a DS3 I/O interface module in a protected system.

PREREQUISITES

XMTR and RCVR initial alignment (applicable Chart 5 through Chart 10) satisfactorily completed at both ends of hop

Normal path conditions

TEST EQUIPMENT REQUIRED

Oscilloscope, Tektronix TDS520 (or equivalent)

GENERAL

Radio Differential Absolute Delay Equalization (DADE) is performed during initial turn-up to equalize path delays in the A and B radios, and it should be rechecked any time the main or diversity XMT/RCV modules are replaced.

STEP	PROCEDURE
------	-----------

Note

If the A pulse trails the B pulse, the A-side of the radio has more delay than the B-side. If the B pulse trails the A pulse, the B-side of the radio has more delay than the A-side.

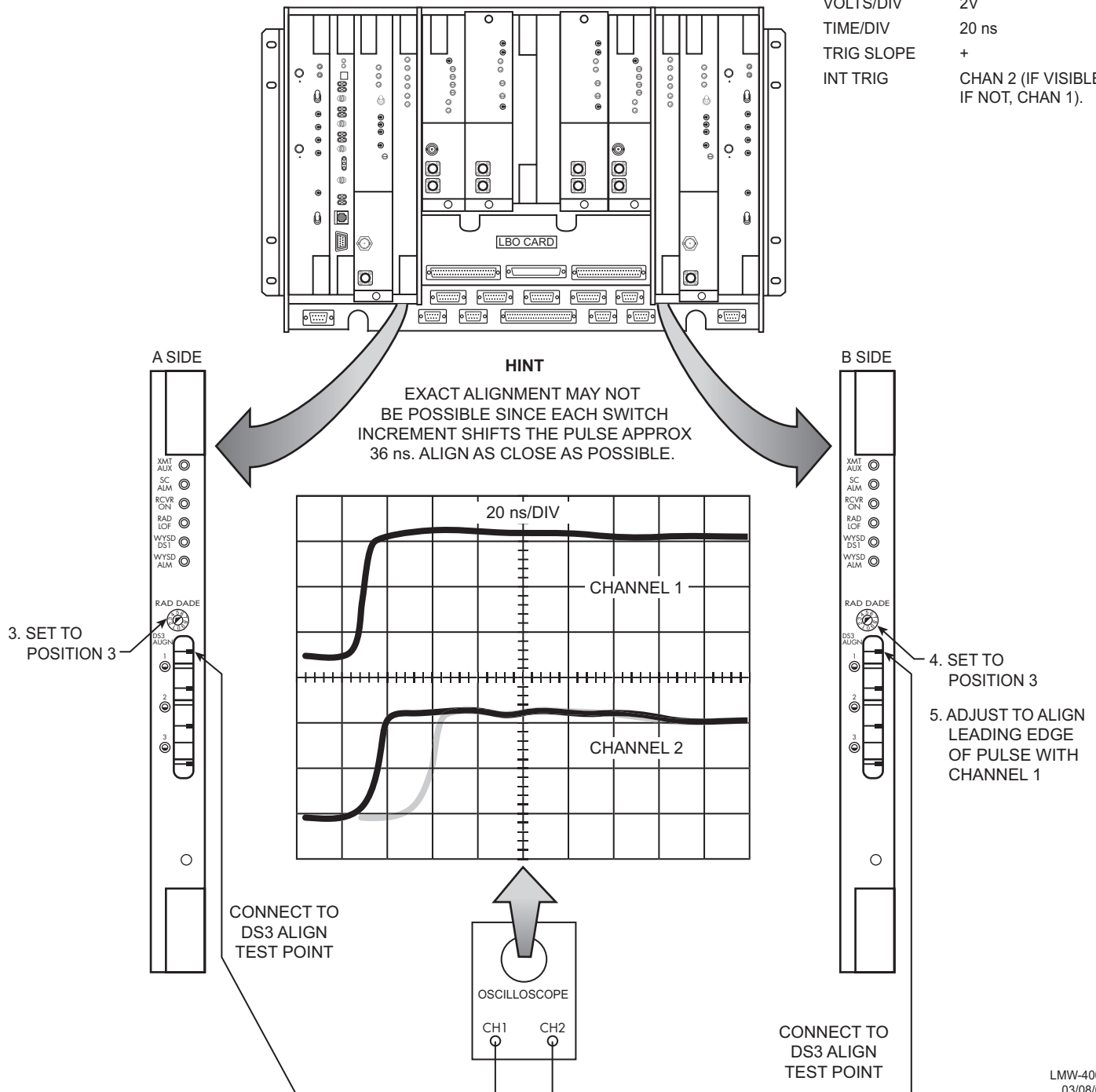
- | | | |
|--------------------------|----------|--|
| ☐ | 1 | Perform procedure shown on Figure 6-19. |
| ☐ | 2 | Disconnect test equipment. |
| ☐ | 3 | STOP. This procedure is complete. Go to Chart 8. |

RADIO DADE

1. CONNECT OSCILLOSCOPE AS SHOWN.

2. SET OSCILLOSCOPE CONTROLS:

CONTROL	SETTING
VOLTS/DIV	2V
TIME/DIV	20 ns
TRIG SLOPE	+
INT TRIG	CHAN 2 (IF VISIBLE. IF NOT, CHAN 1).



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Figure 6-19 DS3 Radio DADE Adjustment

Chart 8 DS3 Line DADE

PURPOSE

Provides procedures to check, and if necessary adjust the differential absolute delay between A and B frame sync pulses. Perform this procedure for space diversity configurations and any time radio DADE is performed, such as following replacement of a DS3 I/O Interface module in a protected system.

PREREQUISITES

DS3 Radio DADE (Chart 7)

TEST EQUIPMENT REQUIRED

Oscilloscope, Tektronix TDS520 (or equivalent)

Test Lead and Tool Kit

STEP	PROCEDURE
------	-----------

Note

DS3 Radio DADE must have been properly set (Chart 7) before starting this DS3 Line DADE procedure.

Note

If the A pulse trails the B pulse, the A-side of the radio has more delay than the B-side. If the B pulse trails the A pulse, the B-side of the radio has more delay than the A-side.

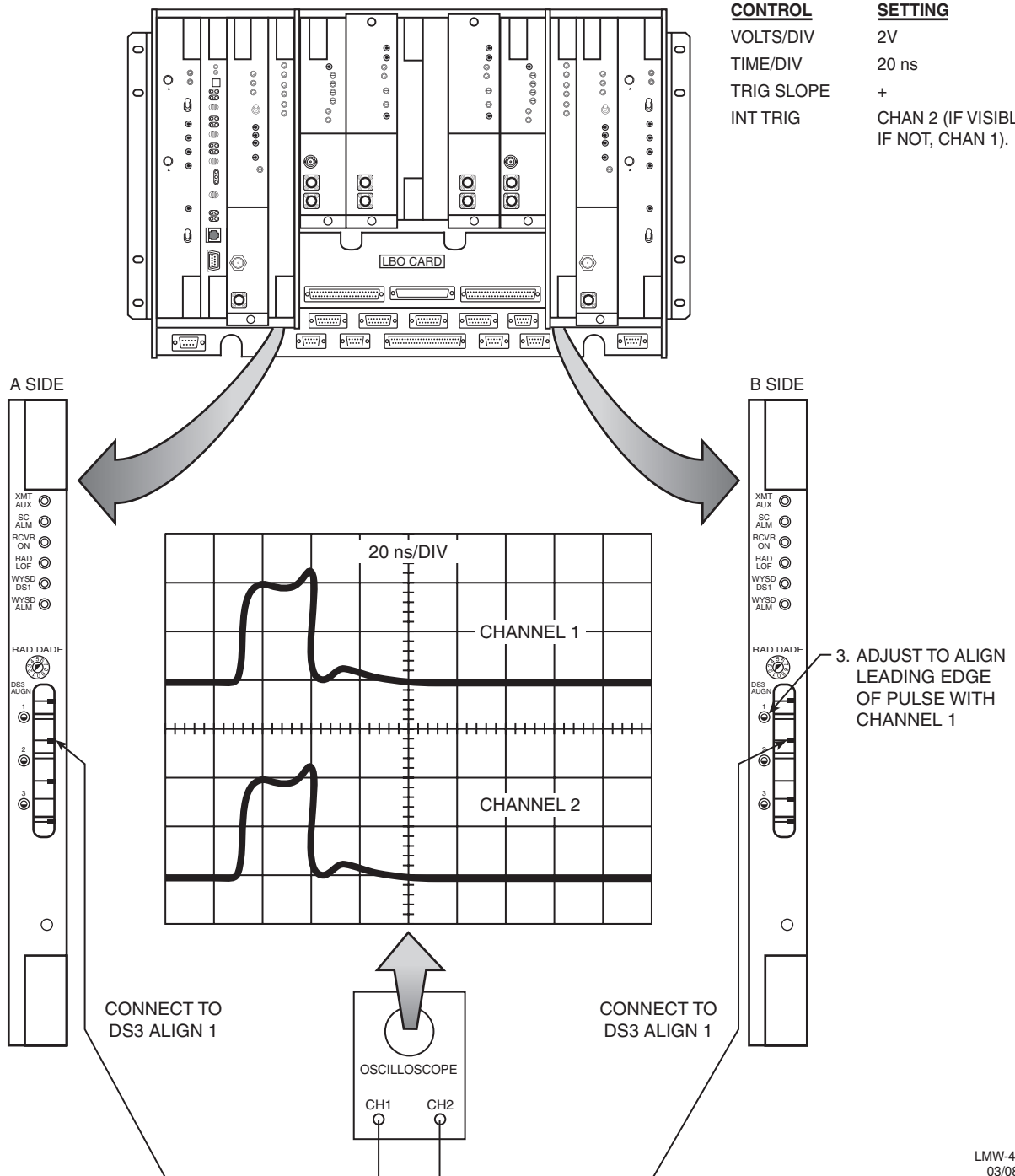
- ☐ 1 Perform procedure shown on Figure 6-20.

DS3/E3 LINE DADE

1. CONNECT OSCILLOSCOPE AS SHOWN.

2. SET OSCILLOSCOPE CONTROLS:

CONTROL	SETTING
VOLTS/DIV	2V
TIME/DIV	20 ns
TRIG SLOPE	+
INT TRIG	CHAN 2 (IF VISIBLE. IF NOT, CHAN 1).



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Figure 6-20 DS3 Line DADE Adjustment

STEP	PROCEDURE, CONTINUED
------	----------------------

CAUTION

*Possibility of
Service
Interruption*

A difference of 5 ns or more between leading edges on channels 1 and 2 can cause bit errors when switching.

- ☐ **2** On oscilloscope, change TIME/DIV control to 5 ns/division.

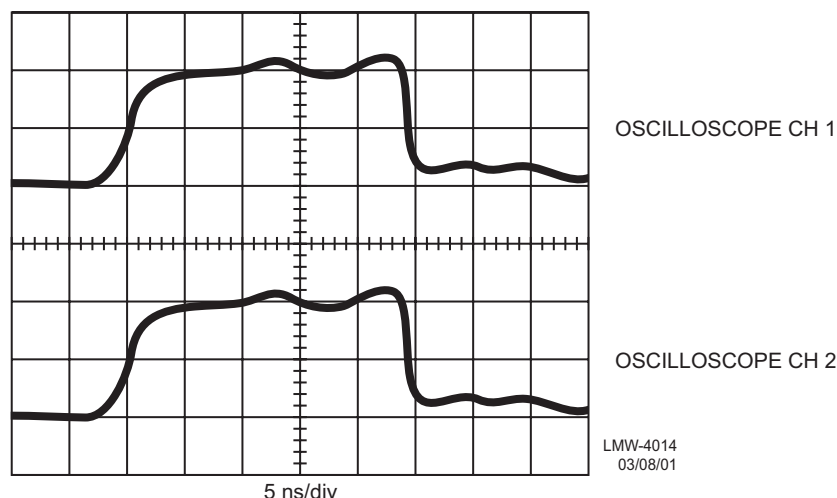


Figure 6-21 DADE Fine Tuning

- ☐ **3** Set receiver in service to B-side. See Figure 6-21 for DADE pulse comparison. On A-side DX-35N, adjust DS3 ALIGN1 control to provide closest alignment between pulses.
- ☐ **4** Switch in-service receiver to A-side. On B-side DX-35N, adjust DS3 ALIGN1 control for closest alignment between pulses.
- ☐ **5** For second DS3 line, repeat steps 3 and 4, observing frame sync pulses from DS3 ALIGN 2 test points and adjusting DS3 ALIGN 2 controls.
- ☐ **6** For third DS3 line, repeat steps 3 and 4, observing frame sync pulses from DS3 ALIGN 3 test points and adjusting DS3 ALIGN 3 controls.
- ☐ **7** STOP. This procedure is complete. Disconnect test equipment.

Chart 9 Over-The-Hop XMTR Output Power and RCVR RSL

PURPOSE

Use this procedure to check XMTR output power and RCVR receive signal level (RSL) end-to-end in both directions over the hop. Refer to Section 10, Maintenance for any alarms or corrective maintenance.

PREREQUISITES

All previous applicable initial turnup procedures (Chart 1 through Chart 8) completed

Correct antenna alignment

TOOLS REQUIRED

BER Test Set/Communications Analyzer

Power Meter

Test Lead and Tool Kit

STEP	PROCEDURE
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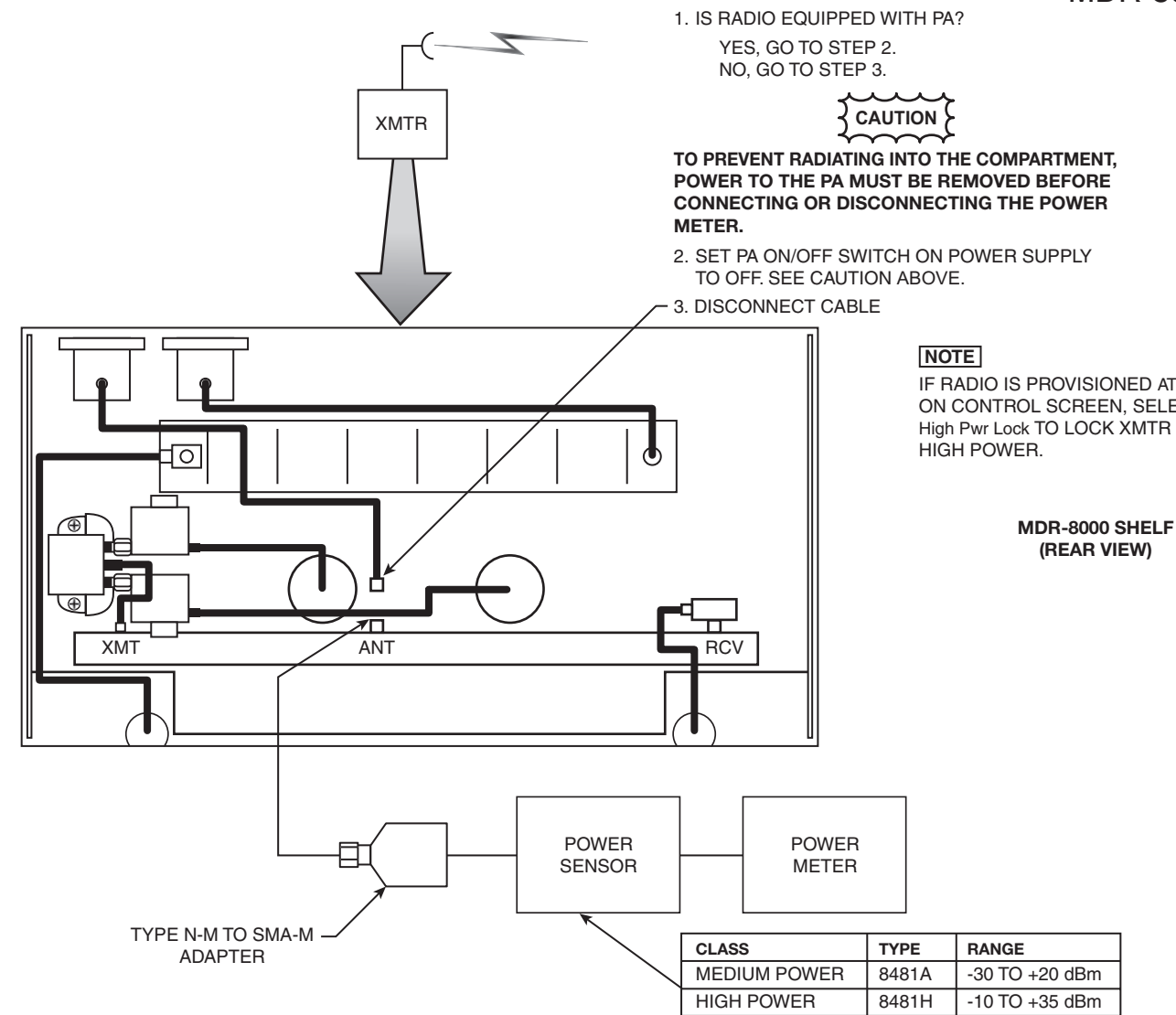
Exposure to energy radiated at microwave frequencies can cause eye injury and eventual blindness. Do not operate the system with a waveguide port unterminated.



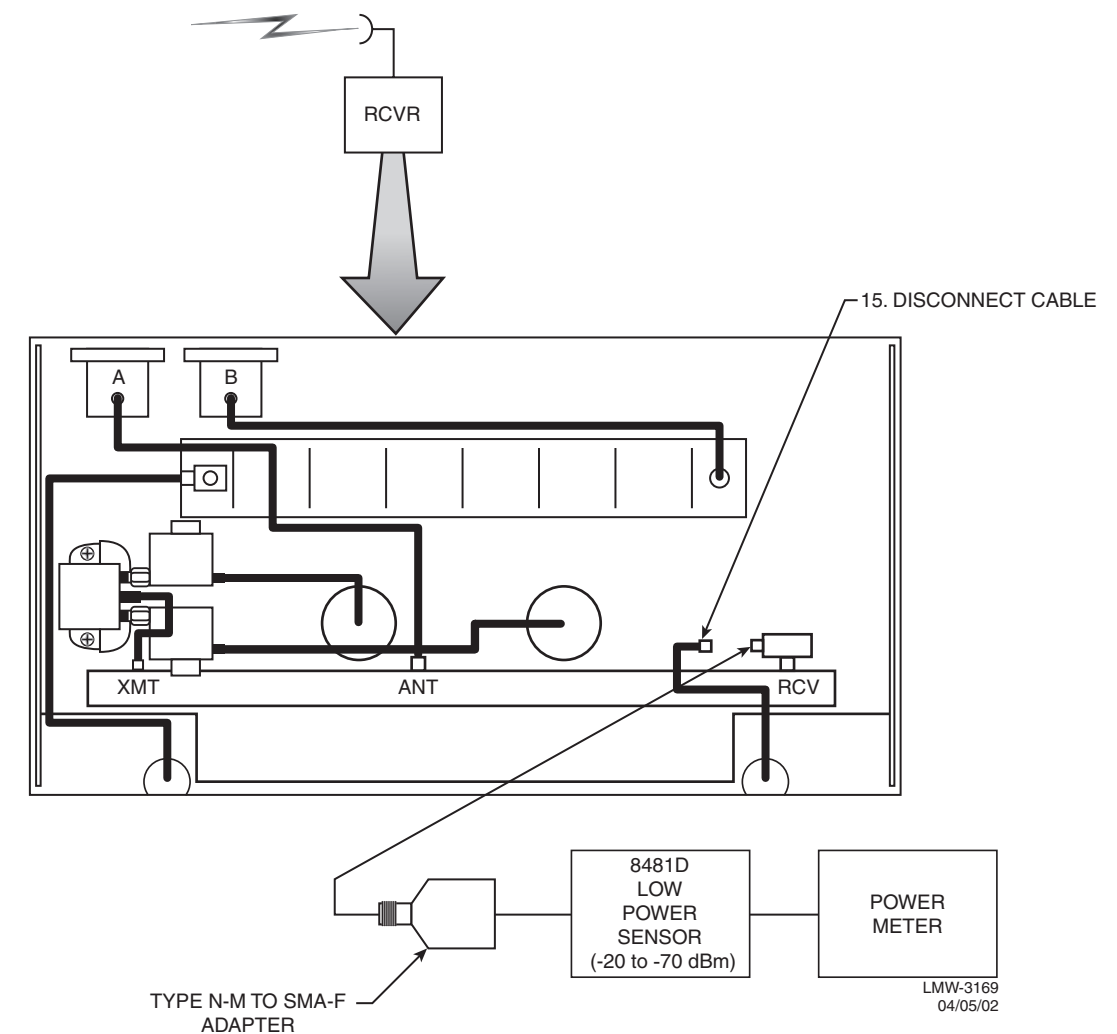
This is an out-of-service procedure.

- ☐ 1 Perform procedure shown on Figure 6-22.
- ☐ 2 STOP. This procedure is complete. Go to Chart 10.

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CLASS	TYPE	RANGE
MEDIUM POWER	8481A	-30 TO +20 dBm
HIGH POWER	8481H	-10 TO +35 dBm



- | | | |
|--|--|---|
| 4. CONNECT PWR METER
TO ANT CONNECTOR ON DIPLEXER | 8. RECORD XMT OUTPUT PWR
ON FIELD TEST DATA SHEET | 12. RECONNECT CABLE TO ANT SMA
CONNECTOR ON DIPLEXER |
| 5. IS RADIO EQUIPPED WITH PA?
YES, GO TO STEP 6.
NO, GO TO STEP 7. | 9. IS RADIO EQUIPPED WITH PA?
YES, GO TO STEP 10.
NO, GO TO STEP 11. | 13. IS RADIO EQUIPPED WITH PA?
YES, GO TO STEP 14.
NO, GO TO STEP 15. |
| 6. SET PA ON/OFF SWITCH ON
POWER SUPPLY TO ON | 10. SET PA ON/OFF SWITCH ON POWER
SUPPLY TO OFF. SEE CAUTION 2. | 14. SET PA ON/OFF SWITCH ON
POWER SUPPLY TO ON. |
| 7. MEASURE XMT OUTPUT PWR
ON PWR METER | 11. DISCONNECT TEST EQUIPMENT | |

16. CONNECT PWR METER SENSOR TO ISOLATOR
 17. MEASURE RSL ON PWR METER.
CALCULATE RSL AT ANTENNA PORT ON DIPLEXER,
BASED ON MEASURED RSL AT RCV ISOLATOR OUTPUT:

RSL = MEASURED RSL + INSERTION LOSS OF RCV ISOLATOR
(0.2 dB NOMINAL) + INSERTION LOSS OF DIPLEXER FILTER/RCV
FILTER (MARKED ON LABEL ON FILTER)

EXAMPLE:
MEASURED RSL AT OUTPUT OF ISOLATOR = -37 dBm
LABEL ON DIPLEXER FILTER/RCV FILTER SHOWS
INSERTION LOSS = 2 dB
RSL AT ANTENNA INPUT = -37 dBm + 2 dB + 0.2 dB = -34.8 dBm
 18. RECORD RSL ON FIELD
TEST DATA SHEET AT END
OF THIS SECTION
 19. DISCONNECT TEST
EQUIPMENT
 20. RECONNECT CABLE TO
ISOLATOR
 21. REPEAT STEPS 15-20
FOR THE B-SIDE RSL
 22. REPEAT STEPS 1-21
FOR OPPOSITE DIRECTION
OVER HOP

Figure 6-22 XMT Output Power and RSL Test

Chart 10 Over-The-Hop DS3 BER Threshold Test

PURPOSE

Use this procedure to check RCVR threshold end-to-end in both directions over the hop. Refer to Section 10, Maintenance for any alarms or corrective maintenance.

PREREQUISITES

Correct antenna alignment

TOOLS REQUIRED

BER Test Set/Communications Analyzer

Test Lead and Tool Kit

STEP	PROCEDURE
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Exposure to energy radiated at microwave frequencies can cause eye injury and eventual blindness. Do not operate the system with a waveguide port unterminated.



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.

- ☐ 1 Perform procedure shown on Figure 6-23.
- ☐ 2 STOP. Initial turnup procedures for DS3 radio are complete.

MDR-8000 HOP

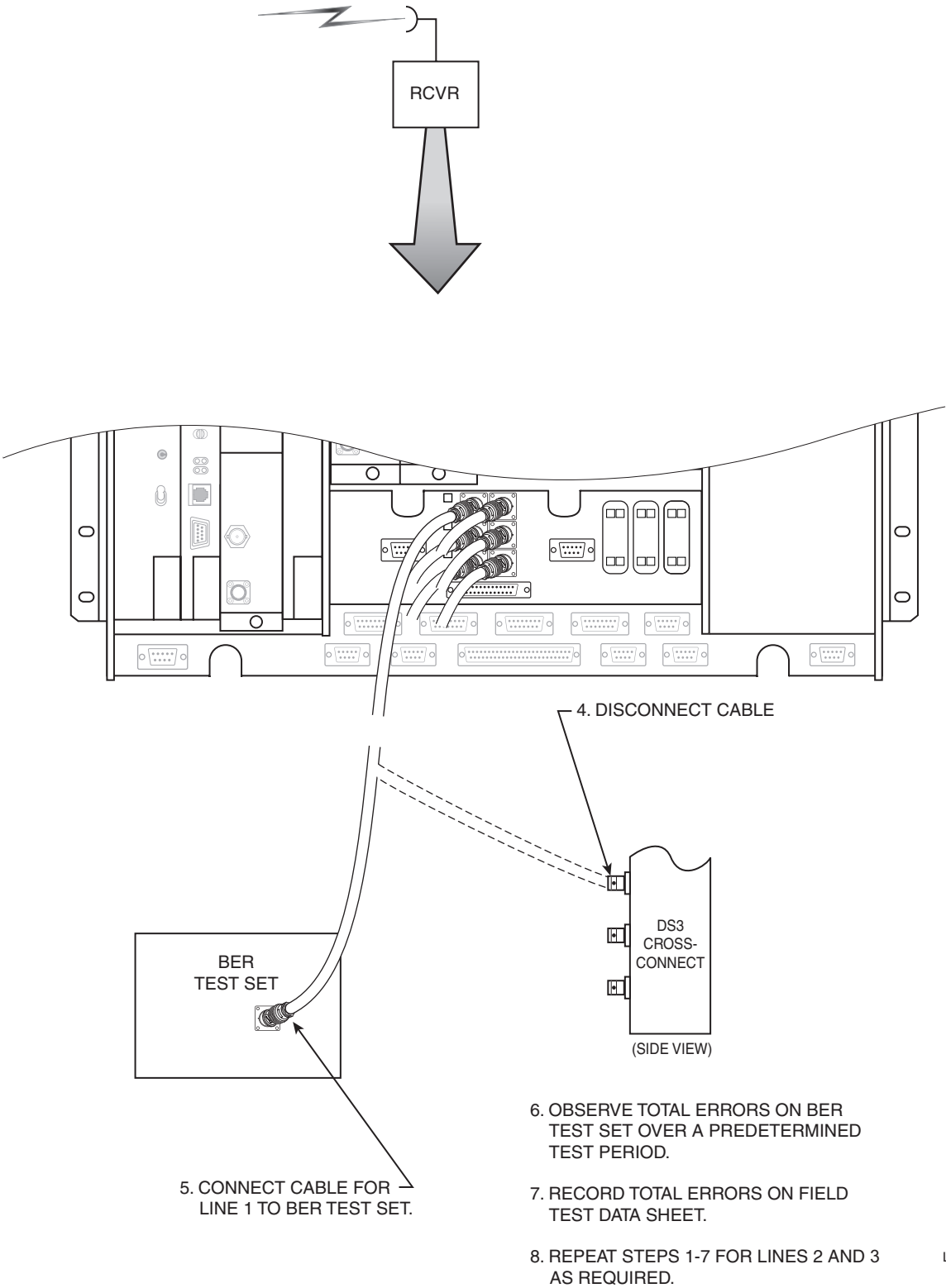
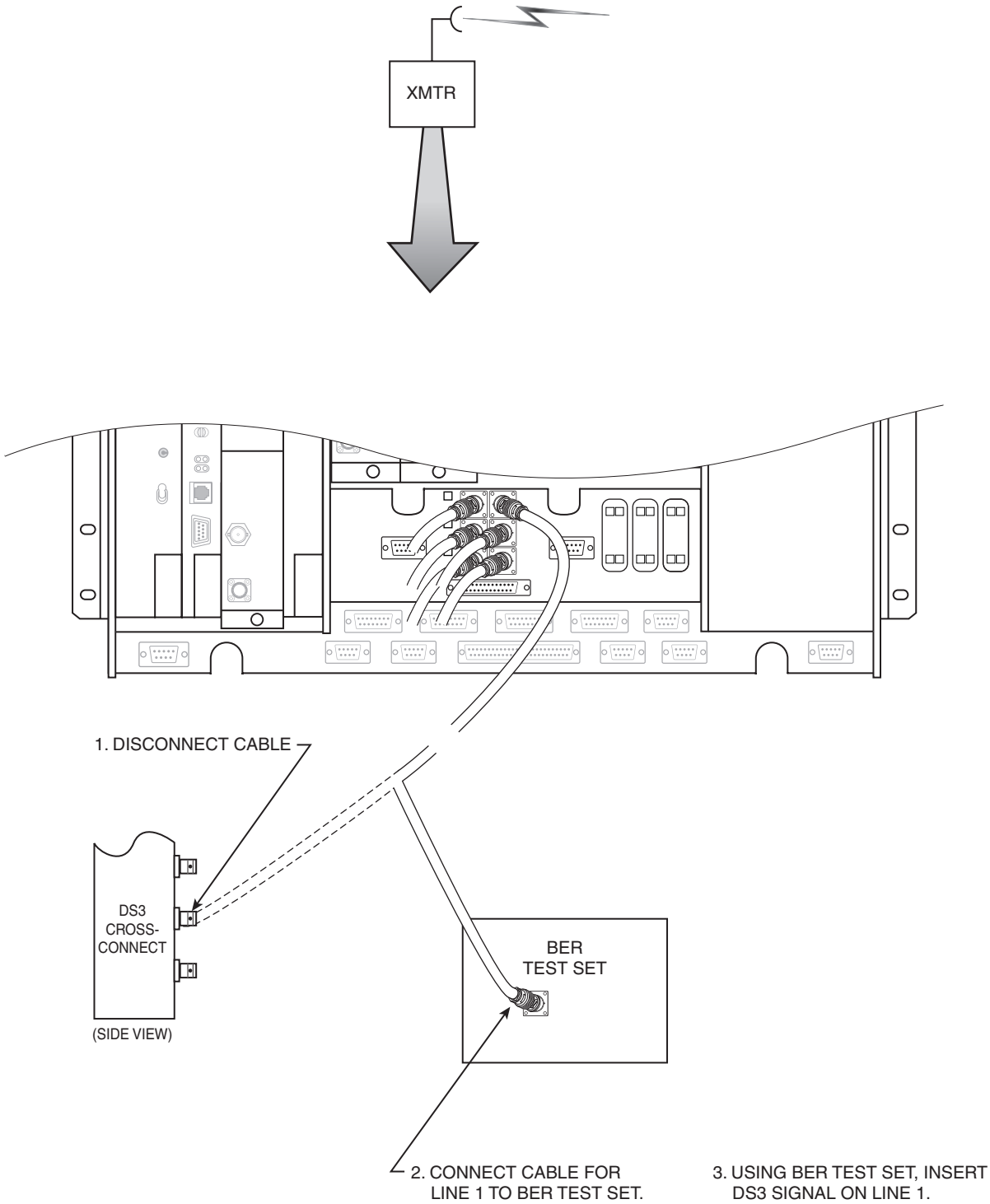
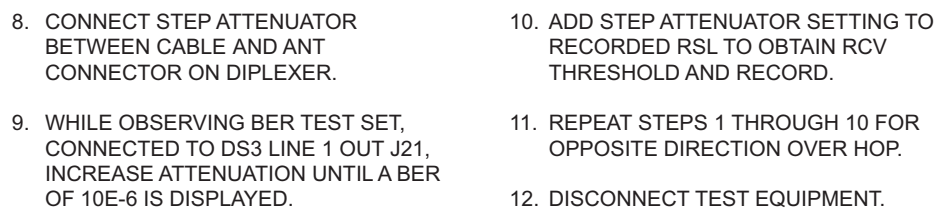


Figure 6-23 DS3 BER Threshold Test (Sheet 1 of 2)



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Figure 6-23 DS3 BER Threshold Test (Sheet 2 of 2)

FIELD TEST DATA SHEET
MDR-8000/i SERIES RADIOS
Configuration

Site Name: _____

1. Radio Configuration

☐ NS TX/NS TX	☐ FD
☐ NS TX/HS RX	☐ HS TX/NS RX
☐ NS TX/SD RX	☐ SIMPLEX HS TX
☐ HS TX/SD RX	☐ SIMPLE NS RX
☐ SIMPLEX HS/SD RX	
2. Terminal/Repeater? ☐ Terminal ☐ Repeater ☐ Spur
3. Number of DS3 lines ☐ 1 ☐ 3
4. Hop Go/Return Frequency Go _____ MHz Return _____ MHz
5. PA Equipped? ☐ Yes ☐ No
6. Transmitter Crystal Oscillator Frequency (Chart 4)
 - a. A-side Crystal Oscillator Frequency _____ MHz
 - b. B-side Crystal Oscillator Frequency _____ MHz
7. Transmitter or PA RF MON Output Level (Chart 5 or Chart 6)
 - a. A-side XMT Output Level _____ dBm
 - b. B-side XMT Output Level _____ dBm
8. Calculated RSL (taken from customer's path calculation data) _____ dBm
9. XMT Output Power Measurement (output of diplexer/filter) (Chart 9)

☐ A XMTR Online	☐ B XMTR Online
a. A-side XMT Output Level	_____ dBm
b. B-side XMT Output Level	_____ dBm

10. RSL Measurement (Chart 9)

a. A-side RSL _____dBm

b. B-side RSL _____dBm

11. BER Threshold (Optional Test) (Chart 10)

a. A-side _____dBm

b. B-side _____dBm