MDR-8000

Microwave Digital Radios
Users Manual

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- TL-9000 Severity as described below.

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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.

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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.

6 USER GUIDE

6.1 INTRODUCTION

This section contains descriptions of screens not used or described in other sections. Where there are operational differences, DS1/E1, DS3, and OC3/STM-1 and/or ETH screens are shown separately.

6.2 ANALOG SCREEN

See Figure 6-1 and Figure 6-2. The Analog screen is used to display real-time analog voltages and radio performance monitors for the ELMC address. Analog voltages are updated automatically every second. Reset performance parameters to zero using the Error Reset button (or hotkey F3) on the toolbar. TIME SINCE LAST RESET displays the time in days, hours, minutes, and seconds since the last error reset.

6.2.1 PA (DC MON)

Indicates PA RF output level (Vdc).

6.2.2 TX (PWR MON)

Indicates XMTR module RF output level (Vdc).

6.2.3 ATPC Voltage

Indicates ATPC CONTROL signal output from controller to XMTR module(s) (Vdc).

6.2.4 RX (RSL 1) dBm

Indicates AGC MON output level from RCVR module (dBm).

6.2.5 RX (EYE MON)

Relative measure of noise level of receive signal (Vdc).

6.2.6 RX (AFC MON)

Indicates AFC MON output from single RCVR module (-3 Vdc = nominal frequency). (The AFC MON signal is developed from the correction voltage applied to the crystal oscillator on the single RCVR module.) Not provided by design and replaced with Path Distortion on dual RCVR module.

6.2.7 Battery Voltage

Indicates battery power input (Vdc).

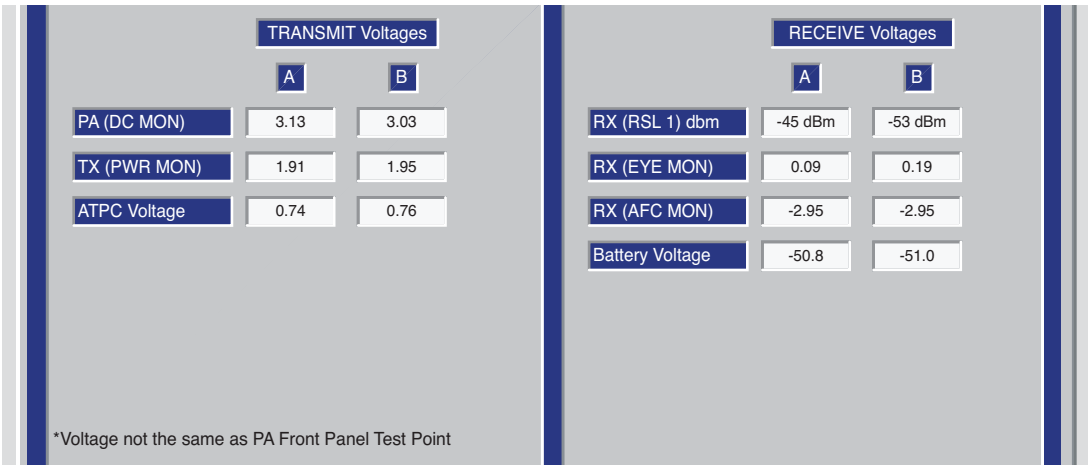

Figure 6-1 Analog Screen (Single RCVR)

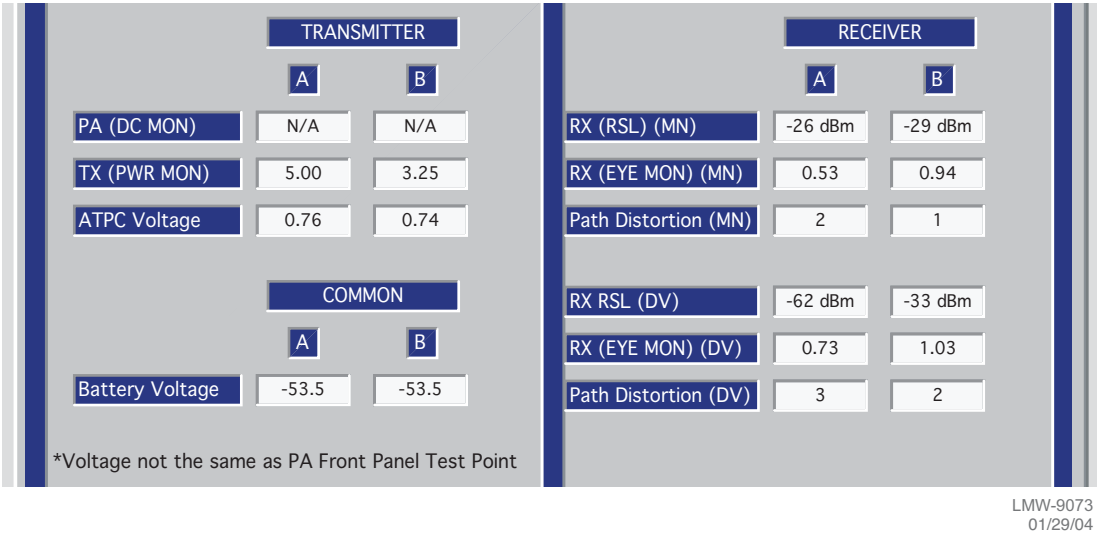

Figure 6-2 Analog Screen (Dual RCVR)

6.3 DS1/E1 RADIO PERFORMANCE SCREEN

See Figure 6-3. The Analog Monitor screen is used to display real-time analog voltages and radio performance monitors for the ELMC address. Analog voltages are updated automatically every second. Reset performance parameters to zero using the Error Reset button (or hotkey F3) on the toolbar. TIME SINCE LAST RESET displays the time in days, hours, minutes, and seconds since the last error reset.

6.3.1 Repeater CRC Err Sec

Repeater CRC Errored Seconds, indicates number of seconds that contain coding violations, slips, or frame losses in the data over the repeater cable.

6.3.2 Radio Severe Err Sec

Radio Severe Errored Seconds, indicates number of seconds that contain a predetermined number (N) of coding violations in the data over the RF path.

6.3.3 Radio Outage Sec

Radio Outage Seconds, indicates on-line RCVR errored seconds (number of seconds that contain coding violations, slips, or frame losses in the data over the RF path).

6.3.4 Radio A and B Outage Sec

Radio A and B Outage Seconds, indicates on-line and off-line RCVR errored in the same second.

6.3.5 Radio CRC Err Sec

Radio CRC Errored Seconds, indicates number of seconds that contain coding violations, slips, or frame losses in the data over the RF path.

6.3.6 Radio CRC Errors

Indicates number of errors in the data over the RF path.

6.3.7 Radio Internal BER

Indicates current BER of the data over the RF path.

6.3.8 Radio Average BER

Indicates average BER of the data over the RF path since last reset.

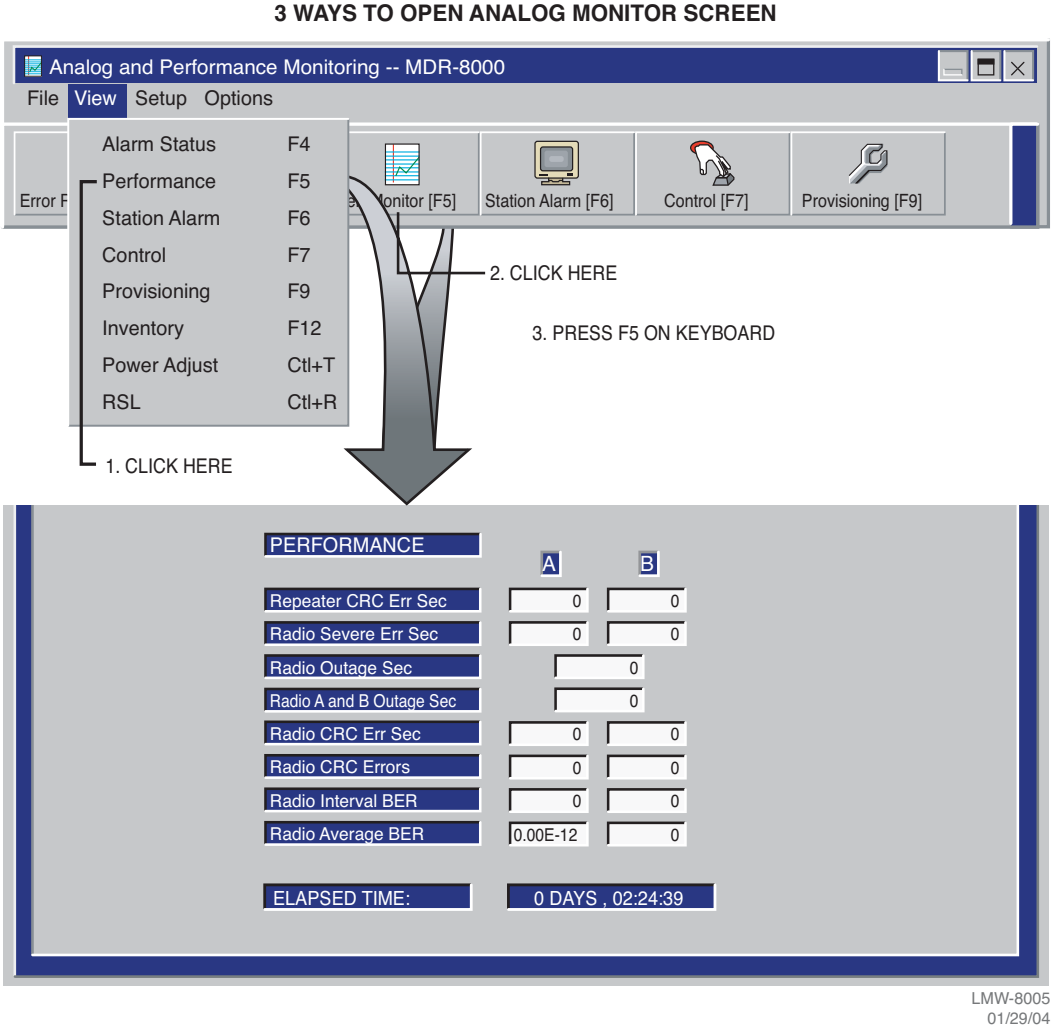

Figure 6-3 DS1/E1 Radio Performance Monitor Screen

6.4 DS3 RADIO PERFORMANCE MONITORING SCREEN

See Figure 6-4. Reset performance parameters to zero using the Error Reset button (or hotkey F3) on the toolbar. TIME SINCE LAST RESET displays the time in days, hours, minutes, and seconds since the last error reset.

6.4.1 Line 1-3 DS3 Errors

Indicates total number of coding violations, slips, or frame losses in the DS3 line data.

6.4.2 Line 1-3 DS3 BER

Calculated from code violation count and data rate.

6.4.3 Radio Errors

Indicates number of coding violations, slips, or frame losses in the data over the RF path.

6.4.4 Radio Error Seconds

Any second during which a code violation was detected.

6.4.5 Radio Severe Error

Any second during which the code violation count exceeds the number of errors that could occur in one second at 1 X 10^{-6} error rate.

6.4.6 Radio BER

Calculated from code violation count and data rate.

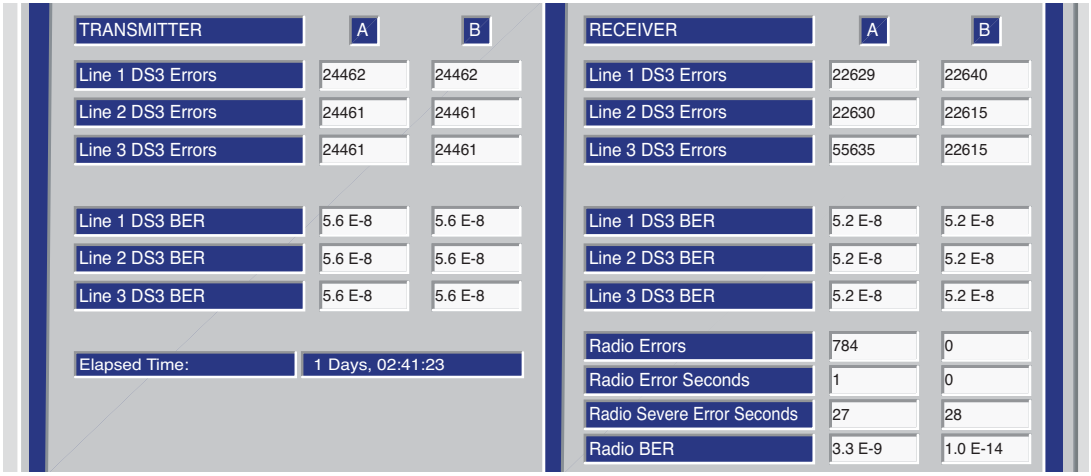

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Figure 6-4 DS3 Radio Performance Screen

6.5 OC3/STM-1 RADIO PERFORMANCE MONITORING SCREENS

See Figure 6-5, Figure 6-6, and Figure 6-7. Reset performance parameters to zero using the Error Reset button (or hotkey F3) on the toolbar. TIME SINCE LAST RESET displays the time in days, hours, minutes, and seconds since the last error reset.

6.5.1 OC3/STM-1 Errors

Indicates total number of coding violations, slips, or frame losses in the OC3/STM-1 data.

6.5.2 OC3/STM-1 Error Seconds

Any second during which a code violation was detected. Count is initiated during any second that qualifies as Unavailable Second.

6.5.3 OC3/STM-1 Severe Error Seconds

Any second during which the code violation count exceeds the number of errors that could occur in one second at 1 X 10^{-6} error rate. Count is inhibited during any second that qualifies as Unavailable Second.

6.5.4 OC3/STM-1 Severe Error Frame

Any second during which there is no start of frame for at least four consecutive frames.

6.5.5 OC3/STM-1 BER

Calculated from code violation count and data rate.

6.5.6 Line 1-3 DS1 Error Seconds

Any second during which a code violation was detected on the wayside DS1 line.

6.5.7 Radio Errors

Indicates number of coding violations, slips, or frame losses in the data over the RF path.

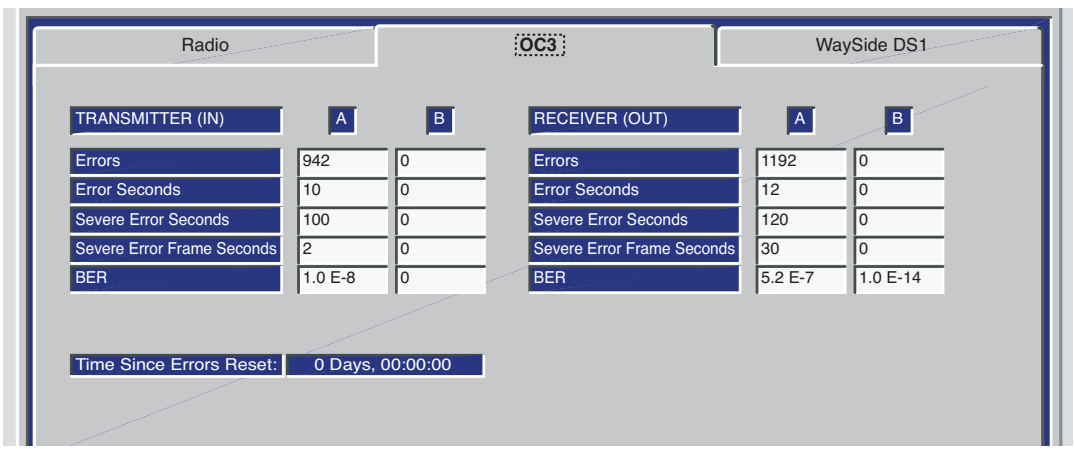

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Figure 6-5 OC3/STM-1 Radio, OC3/STM-1 Facilities Performance Screen

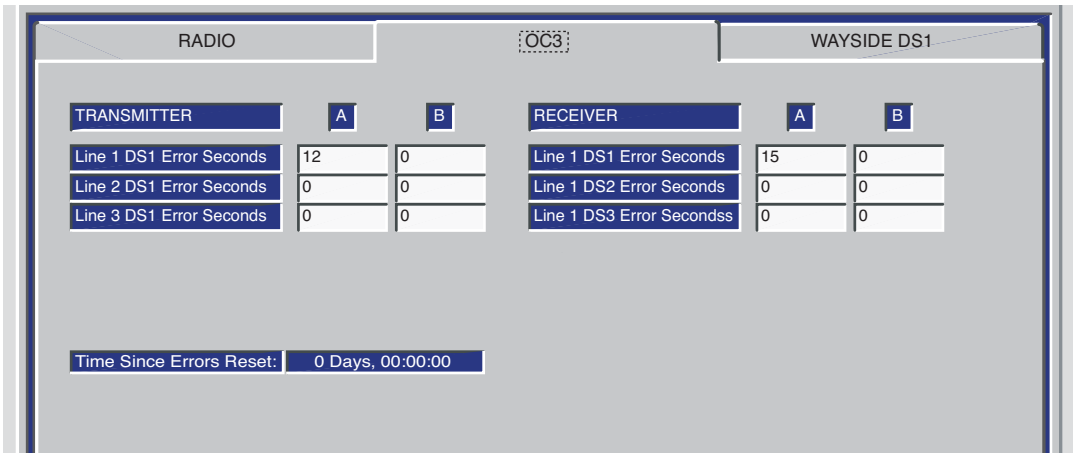

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Figure 6-6 OC3/STM-1 Radio, Wayside DS1 Facilities Performance Screen

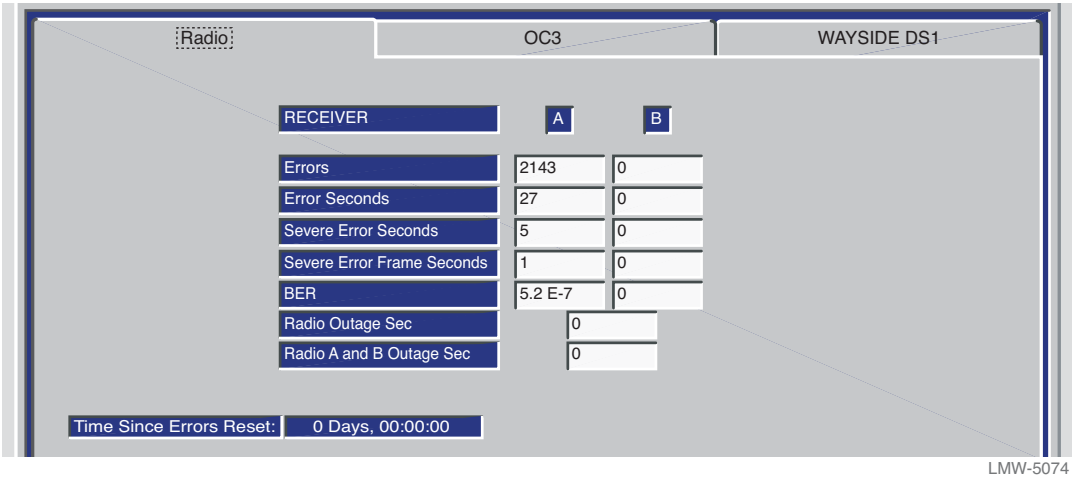

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Figure 6-7 OC3/STM-1 Radio, Radio Performance Screen

6.5.8 Radio Error Seconds

Any second during which a code violation was detected. Count is initiated during any second that qualifies as Unavailable Second.

6.5.9 Radio Severe Error

Any second during which the code violation count exceeds the number of errors that could occur in one second at 1 X 10^{-6} error rate. Count is inhibited during any second that qualifies as Unavailable Second.

6.5.10 Radio BER

Calculated from code violation count and data rate.

6.6 ETHERNET RADIO PERFORMANCE MONITORING SCREEN

See Figure 6-8. Reset performance parameters to zero using the Error reset button on the toolbar. TIME SINCE LAST RESET displays the time in days, hours, minutes and seconds, since the last error reset.

6.6.1 RF Receive

6.6.1.1 Errors

Indicates total number of coding violations, slips, or frame losses in the Ethernet data.

6.6.1.2 Error Seconds

Any second during which a code violation was detected. Count is initiated during any second that qualifies as Unavailable Second.

6.6.1.3 Severe Error Seconds

Any second during which the code violation count exceeds the number of errors that could occur in one second at 1x 10^{-6} error rate. Count is inhibited during any second that qualifies as Unavailable Second.

6.6.1.4 Severe Error Frame Seconds

Any second during which there is no start of frame for at least four consecutive frames.

6.6.1.5 BER

Calculated from code violation count and data rate.

6.6.1.6 Radio Outage Sec

Radio Outage Seconds, indicates on-line RCVR errored seconds (number of seconds that contain coding violations, slips, or frame losses in the data over the RF path).

6.6.1.7 Radio A and B Outage Sec

Radio A and B Outage Seconds, indicates on-line and off-line RCVR errored in the same second.

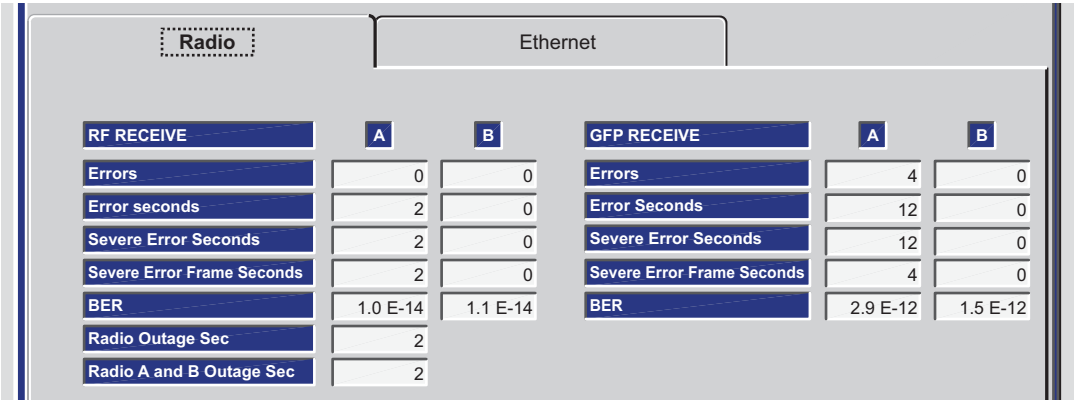

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Figure 6-8 Ethernet Radio, Radio Performance Screen

6.6.2 GPF Receive

6.6.2.1 Errors

Indicates total number of coding violations, slips, or frame losses in the Ethernet data.

6.6.2.2 Error Seconds

Any second during which a code violation was detected. Count is initiated during any second that qualifies as Unavailable Second.

6.6.2.3 Severe Error Seconds

Any second during which the code violation count exceeds the number of errors that could occur in one second at 1 x 10^{-6} error rate. Count is inhibited during any second that qualifies as Unavailable Second.

6.6.2.4 Severe Error Frame Seconds

Any second during which there is no start of frame for at least four consecutive frames.

6.7 ETHERNET PERFORMANCE MONITORING SCREEN

See Figure 6-9. Reset performance parameters to zero using the Error reset button on the toolbar. TIME SINCE LAST RESET displays the time in days, hours, minutes, and seconds since the last error reset.

6.7.1 IN (To RF Transmit)

6.7.1.1 Average Bytes/Sec

Indicates average number of frame bytes per second in the Ethernet RCV/radio XMT data.

6.7.1.2 Total Frames

Indicates number of valid Ethernet frames in the Ethernet RCV/radio XMT data.

6.7.1.3 Error Frames

Frame Check Sequence (FCS) error count indicates the number of Ethernet frames with errors in the Ethernet RCV/radio XMT data.

6.7.1.4 Dropped Frames

Indicates number of Ethernet frames dropped due to errors in the Ethernet RCV/radio XMT data or lack of buffer space.

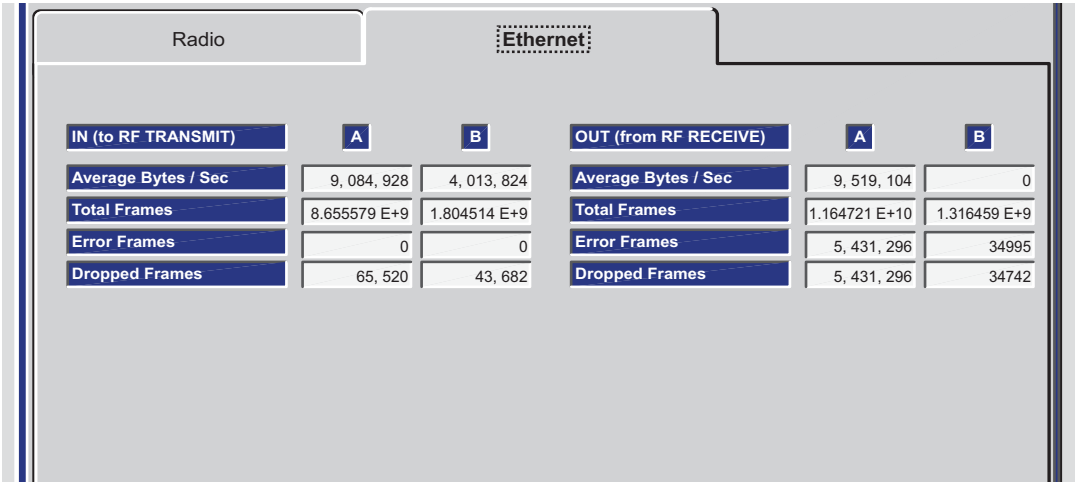

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Figure 6-9 Ethernet Radio, Ethernet Performance Screen

6.7.2 OUT (From RF Receive)

6.7.2.1 Average Bytes/Sec

Indicates average number of frame bytes per second in the Ethernet XMT/radio RCV data.

6.7.2.2 Total Frames

Indicates number of valid Ethernet frames in the Ethernet XMT/radio RCV data.

6.7.2.3 Error Frames

Frame Check Sequence (FCS) error count indicates the number of Ethernet frames with errors in the Ethernet XMT/radio RCV data.

6.7.2.4 Dropped Frames

Indicates number of Ethernet frames dropped due to errors in the Ethernet XMT/radio RCV data, or lack of buffer space.

6.8 DS1/E1 RADIO CONTROL SCREEN

See Figure 6-10. The Control screen is used to enable or disable and display the status of manual controls. Manual controls include equipment and function in-service controls, system loopback controls, user controls, and DS1/E1 loopback controls. The green square indicates control is enabled. Highlight and click on control name to change state.

6.8.1 In-Service Controls

IN-SERVICE controls are used to force A or B transmitter, receiver, and I/O interface modules on -or off-line. IN-SERVICE manual controls are also used to lock the A or B transmitter ATPC function high (ATPC High Pwr Lock) or low (ATPC Low Pwr Lock).

6.8.2 System Loopback Controls

When enabled, SYSTEM LOOPBACK manual controls loop I/O receiver to I/O transmitter (I/O LOOPBACK). I/O LOOPBACK is a local loopback function that can be used to test the performance of a standalone radio.

6.8.3 User Controls

USER CONTROLS, defined by the customer and named on the User Control Names Setup screen, are displayed and can be enabled or disabled if the optional AE-37( ) Relay Interface module is installed.

6.8.4 DS1 Line Loopback Controls

See Figure 6-11. When enabled, DS1 LINE LOOPBACK RCV to XMT manual controls loop DS1/E1 lines individually (Line 1-16 loopback). DS1 LINE LOOPBACK RCV to XMT is a far-end loopback function that can be used to test over-the-hop.

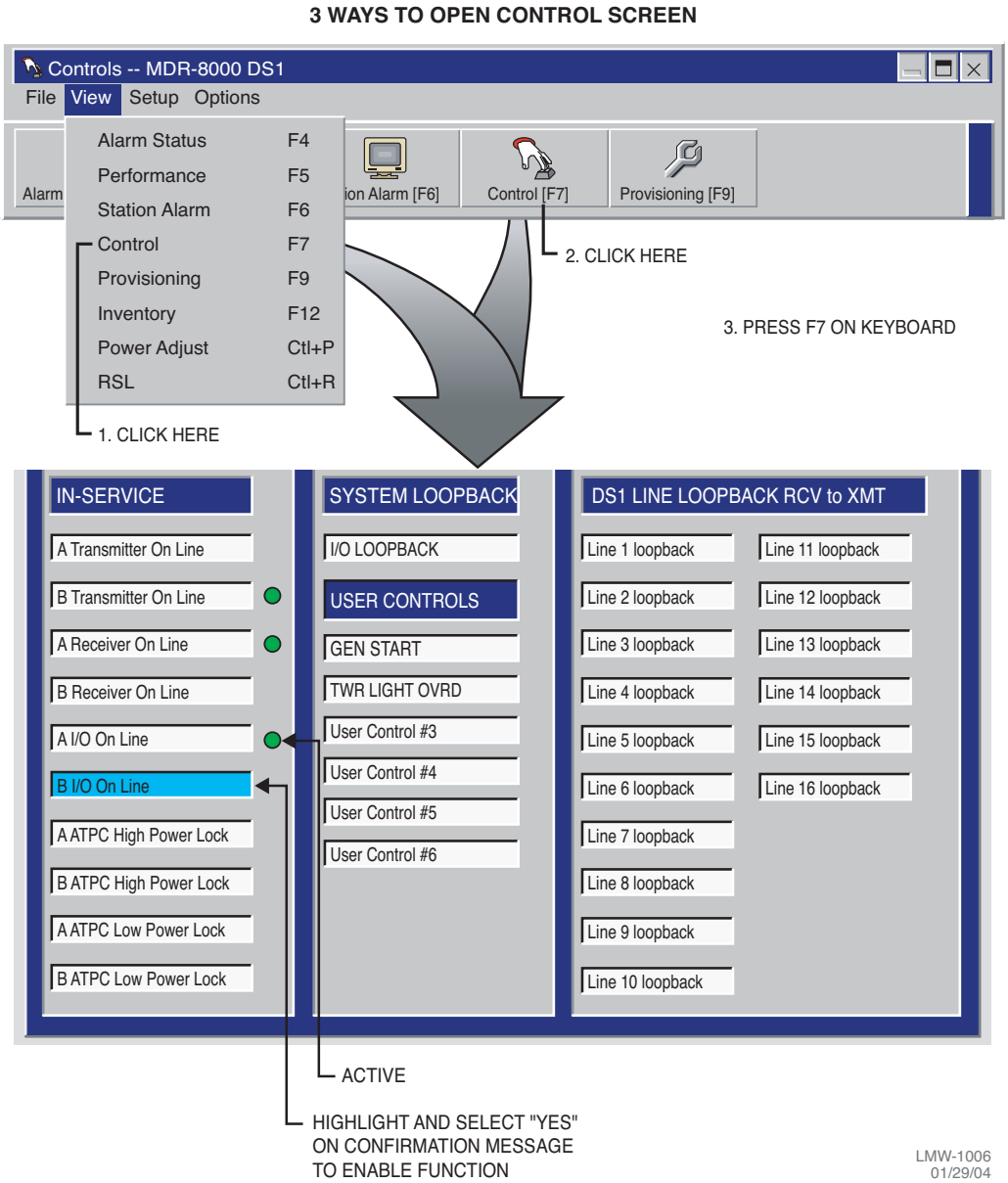

Figure 6-10 DS1/E1 Radio Control Screen

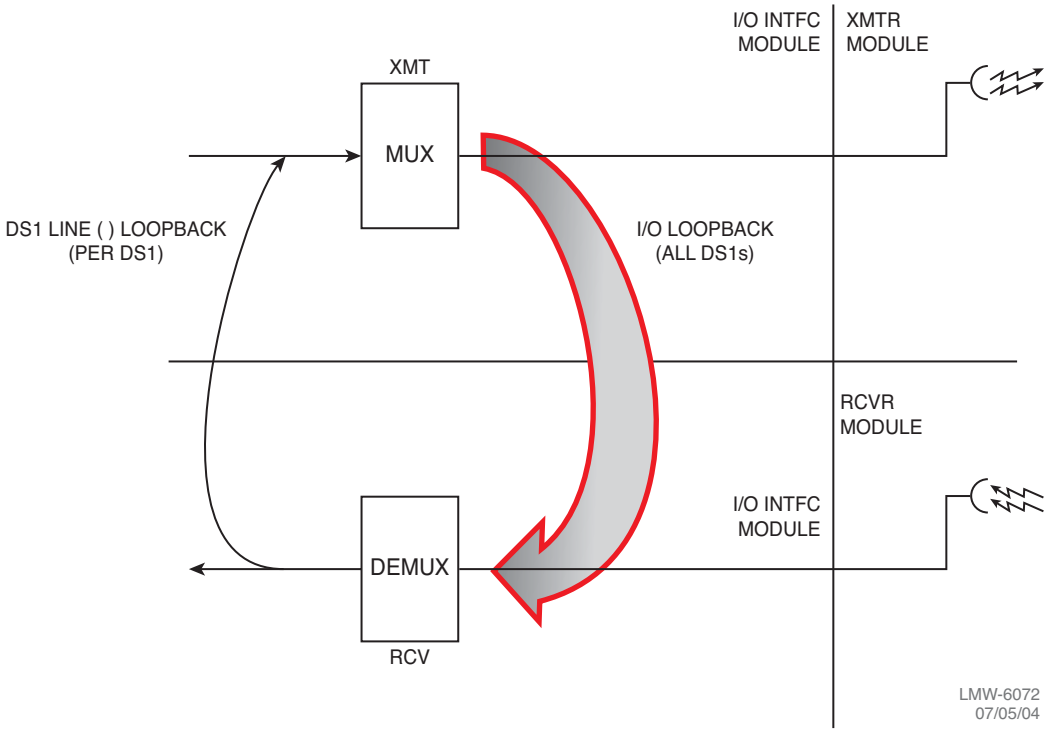

Figure 6-11 DS1/E1 Loopback

6.9 DS3 RADIO CONTROL SCREEN

See Figure 6-12. The Control screen is used to enable or disable and display the status of manual controls. Manual controls include equipment and function in-service controls, system loopback controls, user controls, and DS1/E1 loopback controls. The green square indicates control is enabled. Highlight and click on control name to change state.

6.9.1 In-Service Controls

IN-SERVICE controls are used to force A or B transmitter, receiver, and I/O interface modules on-or off-line. IN-SERVICE manual controls are also used to lock the A or B transmitter ATPC function high (APC High Pwr Lock) or low (APC Low Pwr Lock).

6.9.2 System Loopback Controls

See Figure 6-13.When enabled, SYSTEM LOOPBACK manual controls loop I/O receiver to I/O transmitter (I/O LOOPBACK). I/O LOOPBACK is a local loopback function that can be used to test the performance of a standalone radio.

6.9.3 User Controls

USER CONTROLS, defined by the customer and named on the User Control Names Setup screen, are displayed and can be enabled or disabled if the optional AE-27() Relay Interface module is installed.

6.9.4 Wayside DS1 Line Loopback Controls

See Figure 6-13. When enabled, DS1 LINE LOOPBACK RCV to XMT manual controls loop DS1/E1 lines, individually (Line 1-16 loopback). DS1 LINE LOOPBACK RCV to XMT is a far-end loopback function that can be used to test over-the-hop.

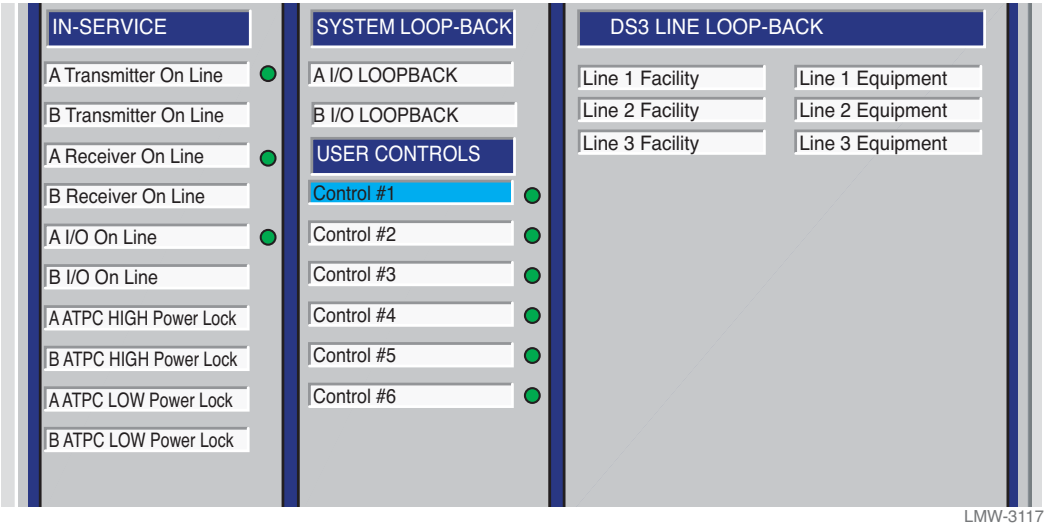

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Figure 6-12 DS3 Radio Control Screen

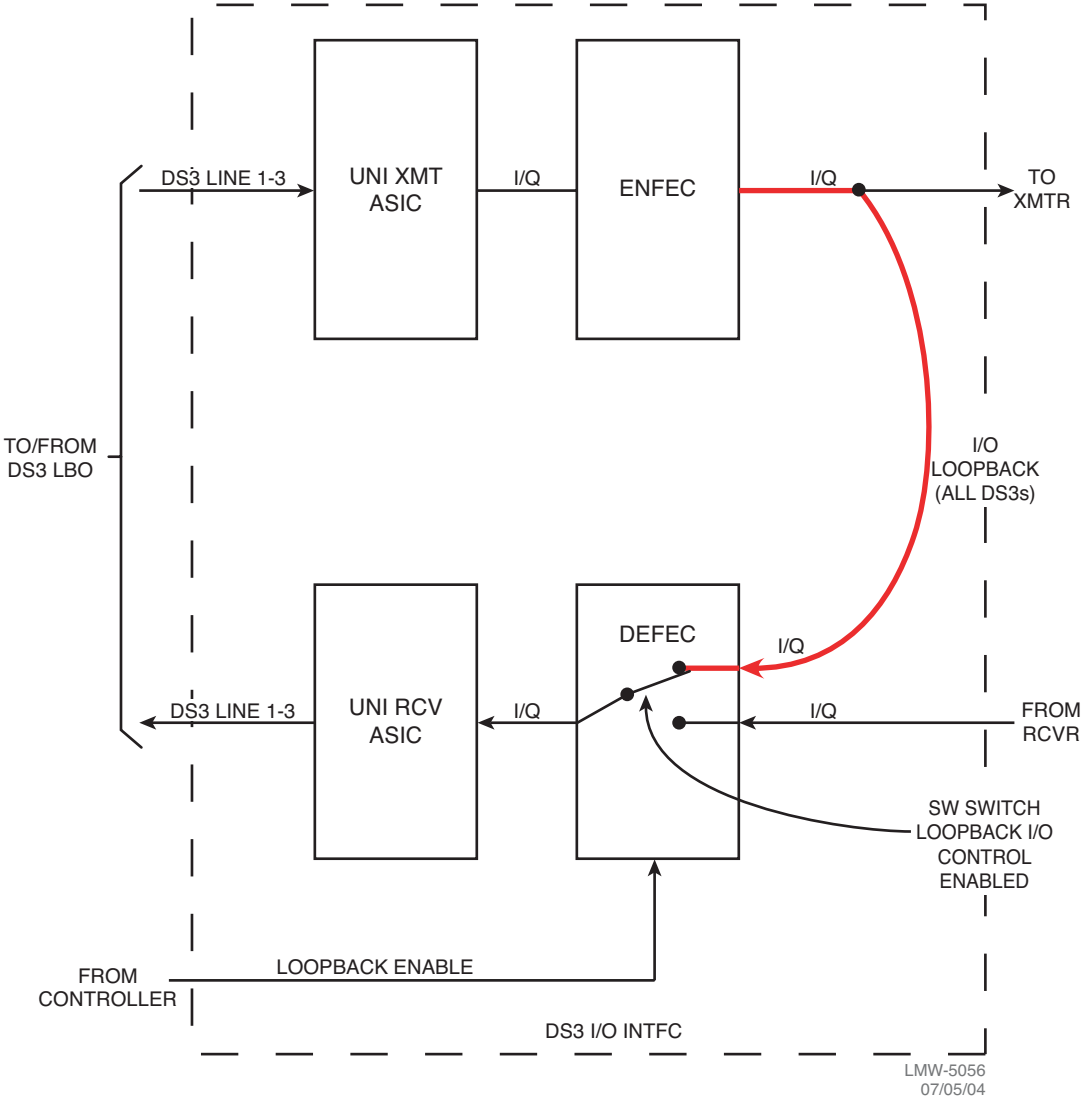

Figure 6-13 DS3 System Loopback

6.10 OC3/STM-1 RADIO CONTROL SCREEN

See Figure 6-14. and Figure 6-15 The Control screen is used to enable or disable and display the status of manual controls. Manual controls include equipment and function in-service controls, system loopback controls, user controls, and DS1/E1 loopback controls. The green square indicates control is enabled. Highlight and click on control name to change state.

6.10.1 In-Service Controls

IN-SERVICE controls are used to force A or B transmitter, receiver, and I/O interface (OC3/STM-1) modules on-or off-line. IN-SERVICE manual controls are also used to lock the A or B transmitter ATPC function high (ATPC High Power Lock) or low (ATPC Low Power Lock).

6.10.2 System Loopback Controls

See Figure 6-16 for SYSTEM LOOP-BACK. All loopbacks occur in the SMCRA on the I/O interface module. Loopback functions in both directions are bridged type functions. Data both loops back and continues. Loopbacks are named by facility in the direction of the loop. When enabled, **A/B OC3/STM-1 Facility** loops the optical RCV/radio XMT input to the radio RCV/optical XMT output. When enabled, **A/B OC3/STM-1 Equipment** loops the demultiplexed RCV output of the DEMUX circuit into the input to the MUX circuit.When enabled, **A/B RC3 Equipment** loops the output of the MUX circuit into the input of the DEMUX circuit.

6.10.3 User Controls

USER CONTROLS, defined by the customer and named on the User Control Names Setup screen, are displayed and can be enabled or disabled if the optional AE-27( ) Relay Interface module is installed.

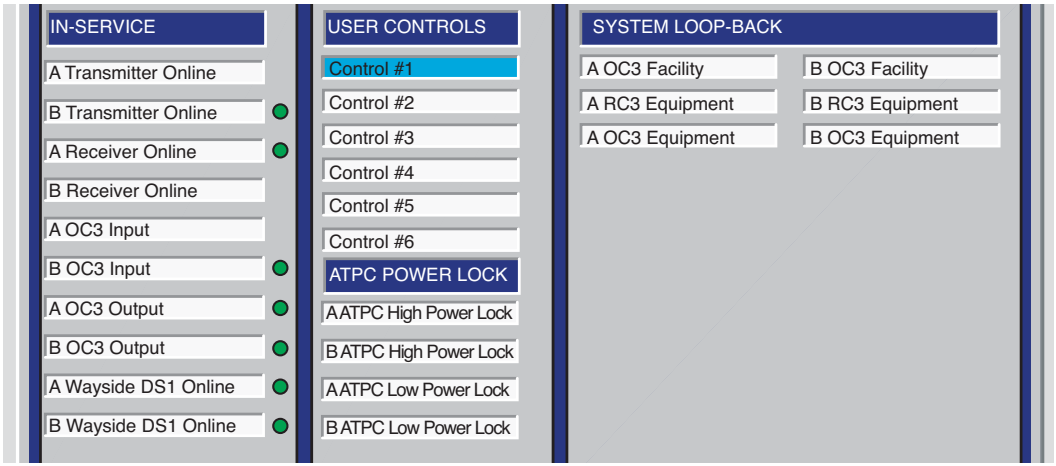

Figure 6-14 OC3/STM-1 Radio Control Screen (Single RCVR)

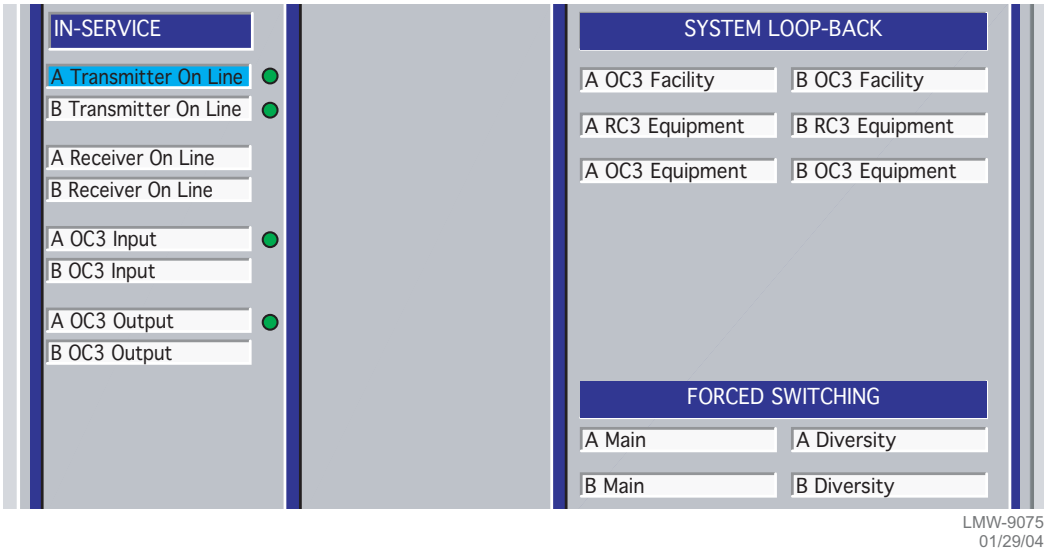

Figure 6-15 OC3/STM-1 Radio Control Screen (Dual RCVR)

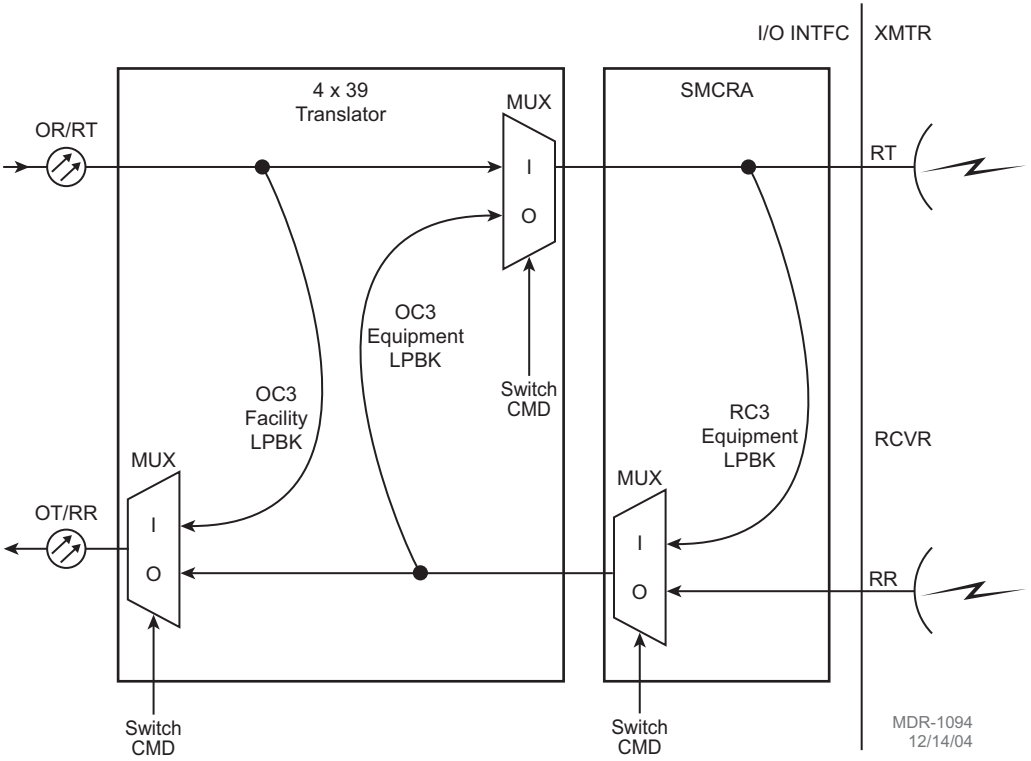

Figure 6-16 OC3/STM-1 Loopbacks

6.11 ETHERNET RADIO CONTROL SCREEN

See Figure 6-17. The Control screen is used to enable or disable and display the status of manual controls. Manual controls include equipment and function in-service controls, system loopback controls, user controls, and DS1 loopback controls. The green square indicates control is enabled. Highlight and click on control name to change state.

6.11.1 In-Service Controls

In service controls are used to force A or B transmitter, receiver, and I/O interface modules on-or off-line. IN-SERVICE manual controls are also used to lock the A or B transmitter ATPC function high (ATPC High Power Lock) or low (ATPC Low Power Lock).

6.11.2 User Controls

USER CONTROLS, defined by the customer and named on the User Control Names Setup screen, are displayed and can be enabled or disabled if the optional AE-27( ) Relay Interface module is installed.

6.11.3 System Loopback

See Figure 6-18 for the system loopback functions. There are three system loopback functions available on the Ethernet radio; Eth facility loopback, RC3 equipment loopback, and Eth equipment loopback. All loopbacks occur on the Ethernet I/O interface module. The loopback functions are controlled by software via the SYSTEM LOOPBACK controls on the USI Control screen.

6.11.3.1 Eth Facility Loopback

Eth facility loopback is a local loopback function that can be used to test the performance of a standalone radio. Eth Facility loopback is enabled by selecting A Eth Facility under SYSTEM LOOPBACK on the USI Control screen. This function loops the Ethernet RCV/radio XMT (EthR/RT) input back into the Ethernet XMT/radio RCV (EthT/RR) output. The actual loopback occurs in the PHY circuits on the I/O interface. When enabled, the EthR/RT input is switched through the MUX to the EthT/RR output. The Eth/R/RT input also continues through the MUX to the ETHRA FPGA.

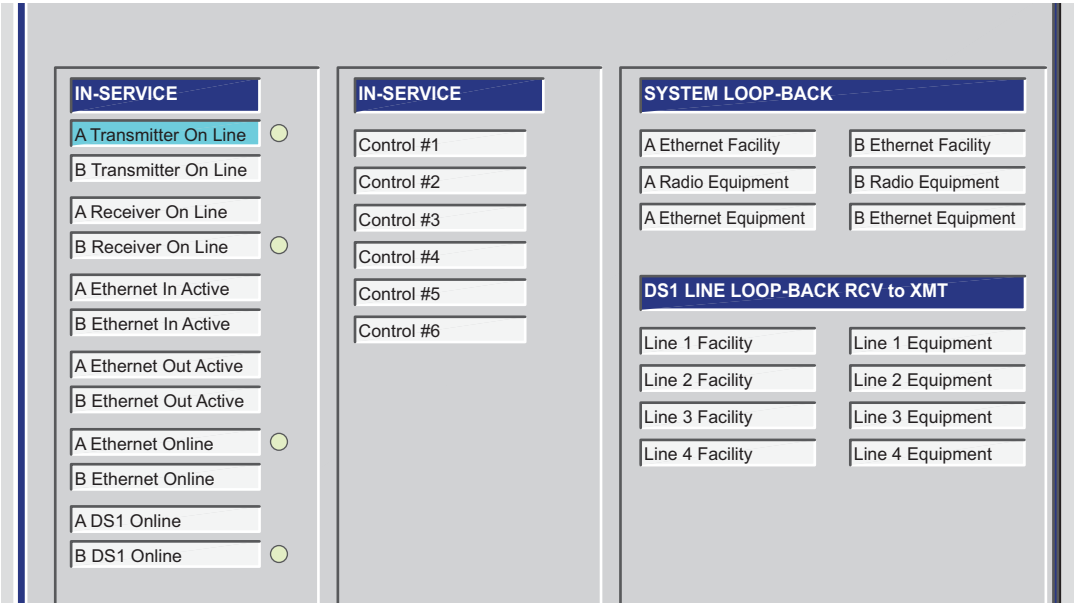

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Figure 6-17 Ethernet Radio, Ethernet Control Screen

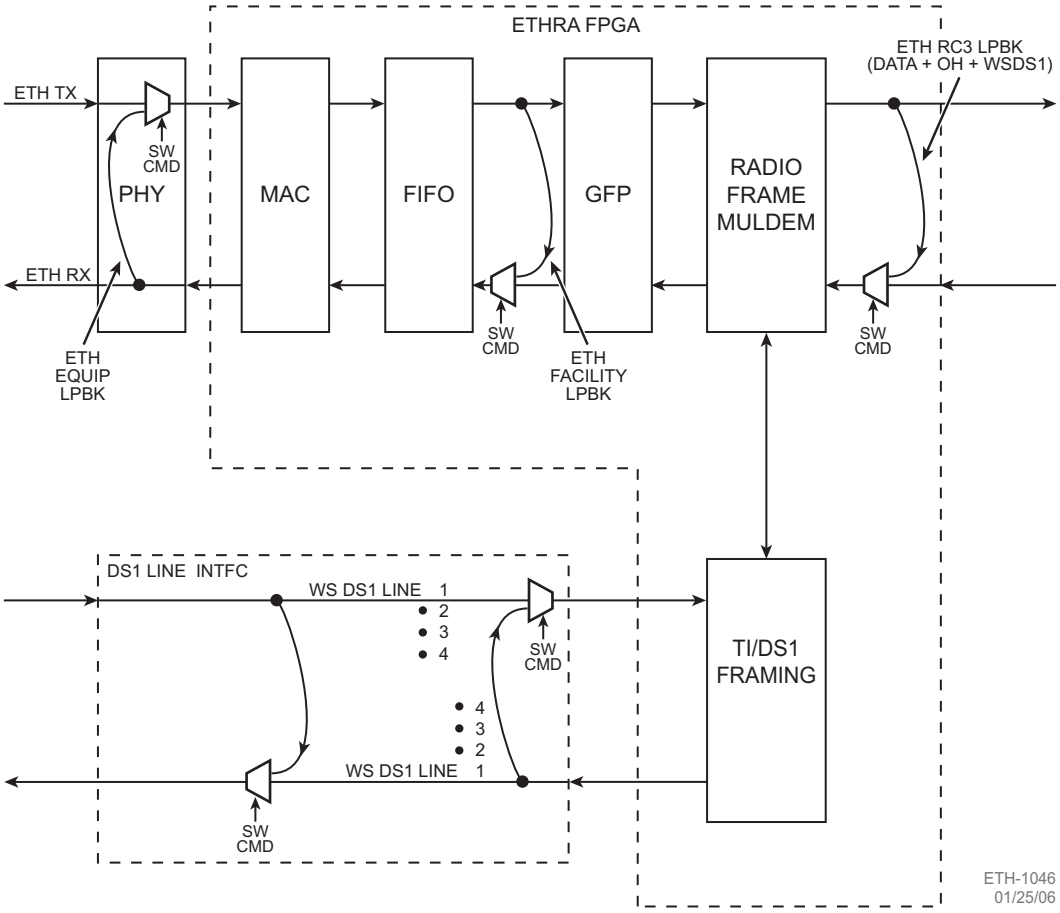


Figure 6-18 Ethernet Loopbacks

6.11.3.2 RC3 Equipment Loopback

RC3 equipment loopback is a local loopback function that can be used to test the performance of a standalone radio. RC3 Equipment loopback is enabled by selecting **A RC3 Equipment** under **SYSTEM LOOPBACK** on the USI Control screen. This function loops the Eth RCV/radio XMT (EthR/RT) input back into the EthXMT/radio RCV (EthT/RR) output. The actual loopback occurs in the ETHRA FPGA on the I/O interface. When enabled, the radio XMT (RT) output is switched through the MUX in the ETHRA, replacing the radio RC (RR) input. The radio XMT (RT) output also continues to the XMTR RT output.

6.11.3.3 Eth Equipment Loopback

Eth equipment Loopback is a farend loopback function that can be used to test the over-the-hop performance of radios. Eth Equipment loopback is enabled by selecting A Eth Equipment under SYSTEM LOOPBACK on the USI Control screen. This function loops the radio RCV (RR) input into the radio XMT output. The actual loopback occurs in the PHY circuits on the I/O interface. When enabled, the radio RCV (RR) input is switched through the MUX in the ETHRA and through the MUX in the PHY, replacing the Eth RCV/radio XMT (EthR/RT) output to the ETHRA. The radio RCV (RR) input also continues through the MUX in the PHY to the EthT/RR output.

6.11.4 DS1 Line Loopback

There are two individual DS1 line loopback functions available on the Ethernet radio Control screen; Line facility Loopback and Line Equipment Loopback. All loopbacks occur on the Ethernet I/O interface module. The DS1 line loopback functions are controlled by software via the DS1 LINE LOOPBACK controls on the USI Control screen.

6.11.4.1 DS1 Line Facility Loopback

See Figure 6-19 for functional block diagram. DS1 facility loopback is a local loopback function that can be used to test the performance of a standalone radio. Individual DS1 line facility loopback is enabled by selecting **Line 1, 2, 3, or 4 Facility** under **DS1 LINE LOOPBACK** on the USI Control screen. This function loops the DS1 RX1, 2, 3, or 4 Tip and Ring inputs to the DS1 TX1, 2, 3, or 4 Tip and Ring outputs. The actual loopback occurs in the QuadFalc FPGA on the I/O interface. When enabled, the DS1, RX1, 2, 3, or 4 Tip and Ring inputs are switched through the MUX in the QuadFalc, replacing the radio inputs from the ETHRA. The radio DS1 Rx1, 2, 3, or 4 Tip and Ring output of the QuadFalc also continues to the ETHRA FPGA.

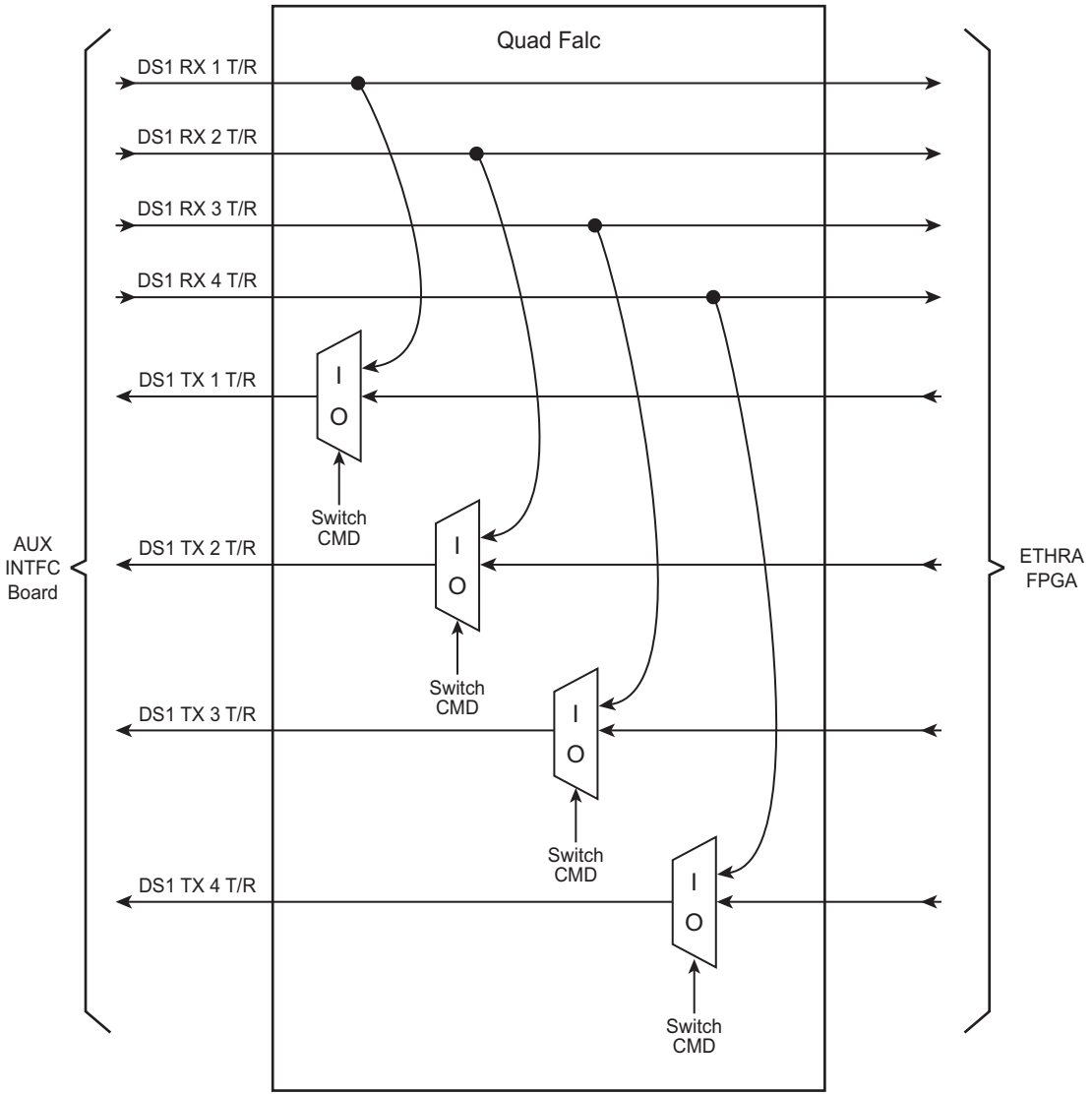
6.11.4.2 DS1 Line Equipment Loopback

See Figure 6-20 for a functional block diagram. DS1 Equipment Loopback is a farend loopback function that can be used to test the performance of radios over the hop. Individual Line Equipment facility loopback is enabled by selecting **Line 1, 2, 3, or 4 Equipment** under **DS1 LINE LOOPBACK** on the USI Control screen. This function loops the DS1 TX1, 2, 3, or 4 Tip and Ring inputs from the RCV circuits on the ETHRA to the DS1 RX1, 2, 3, or 4 Tip and Ring outputs of the QuadFalc to the XMT circuits in the ETHRA. The loopback occurs in the QuadFalc FPGA on the I/O interface. When enabled by the switch command, the DS1 TX1, 2, 3, or 4 Tip and Ring inputs are switched through the MUX in the QuadFalc, replacing the radio DS1 inputs from the AUX interface. The radio DS1 TX1, 2, 3, or 4 output of the QuadFalc continues to the AUX interface board.

CAUTION

Possibility of Service Interruption

Loopbacks cause loss of traffic on DS1 outputs to X-connect.



Note

Line 4 available in Terminal configuration.
Not available in Repeater configuration.

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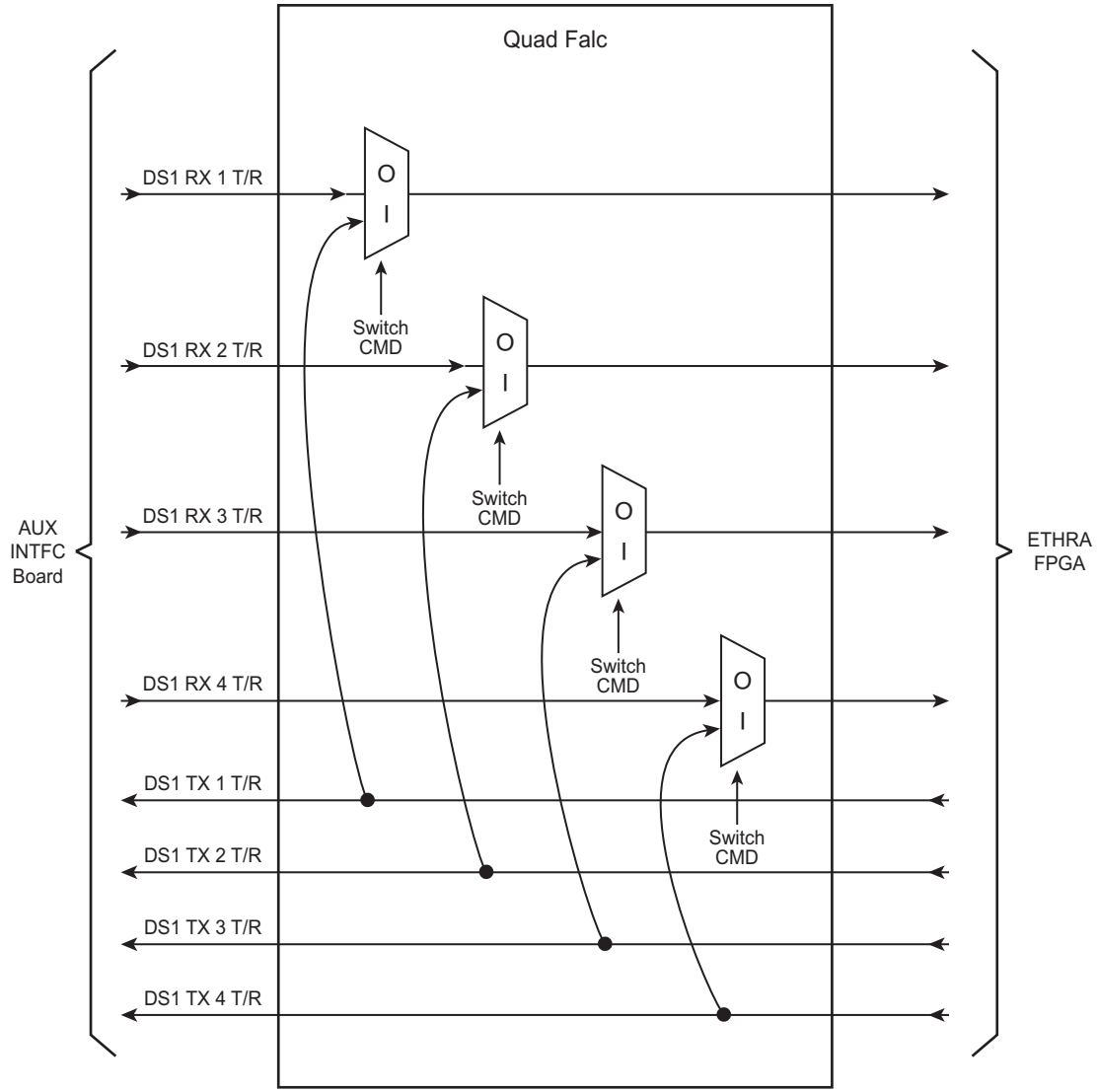
Figure 6-19 DS1 Facility Loopback – Ethernet

CAUTION

Possibility of Service Interruption

Loopbacks cause loss of traffic on DS1 inputs to ETHRA FPGA.



Note

Line 4 available in Terminal configuration.
Not available in Repeater configuration.

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Figure 6-20 DS1 Equipment Loopback – Ethernet

6.11.5 Inventory Screen

See Figure 6-21 for Inventory Screen. The inventory screen is used to display current shelf inventory, including module type number, module part number, hardware revision, software revision (if applicable), serial number, and remarks (if any).

Inventory is automatically updated if modules are replaced. Manual changes to the inventory list on the screen are performed only in the factory.

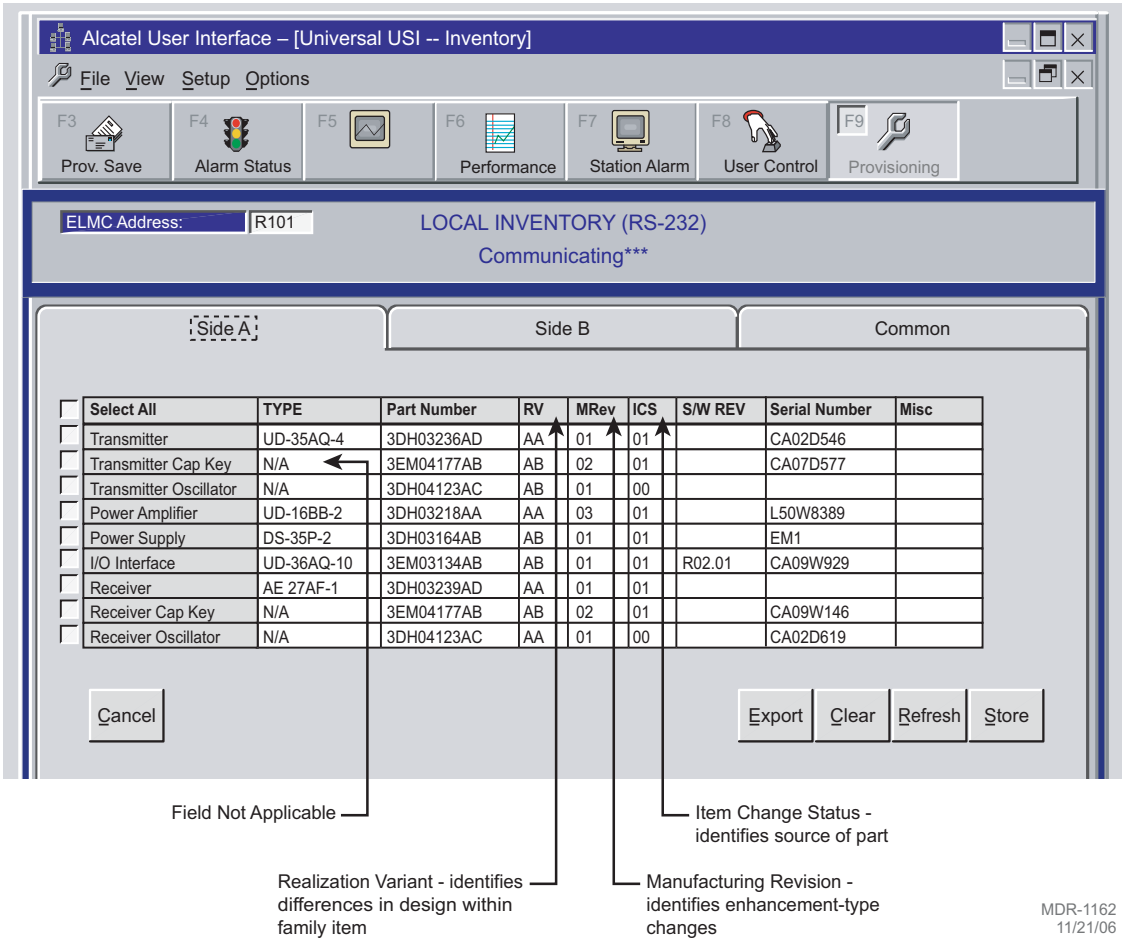

Figure 6-21 Inventory Screen