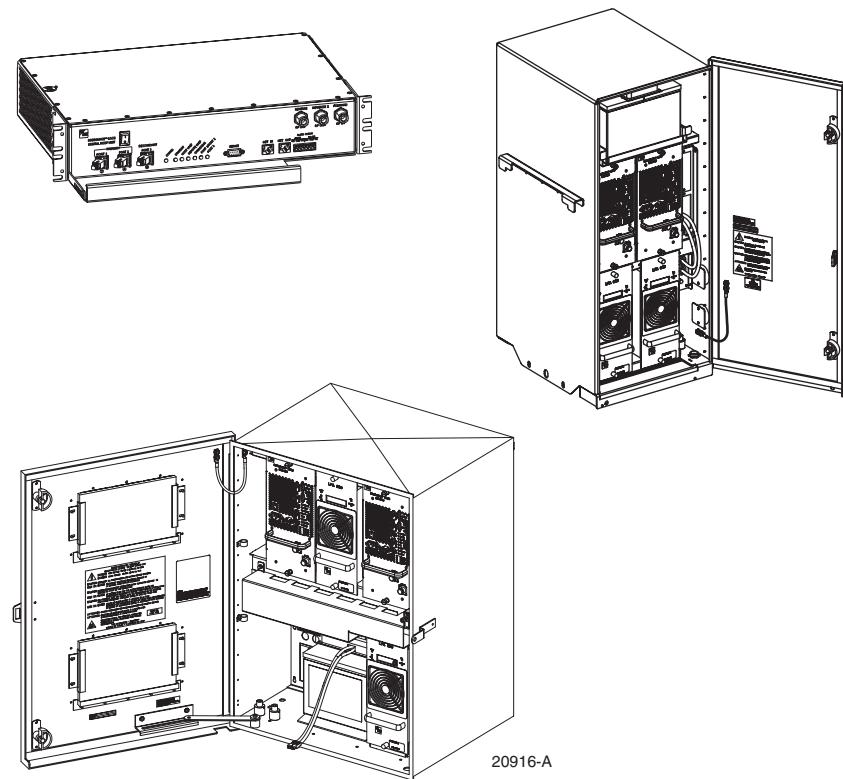




Digivance® LRCS 800 and 1900 MHz Systems Reverse Link Monitor User Guide



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REVISION HISTORY

ISSUE	DATE	REASON FOR CHANGE
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LIST OF CHANGES

The technical changes incorporated into this issue are listed below.

PAGE	IDENTIFIER	DESCRIPTION OF CHANGE
–	–	Original release

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ABOUT THIS MANUAL

This publication provides supplemental information about Digivance LRCS 800 and 1900 MHz Systems that are equipped with the Reverse Link Monitor (RLM) feature. An overview of the Digivance Long Range Coverage Solution (LRCS) System, a complete description of the system components, the system turn-up and test procedures, and the system troubleshooting procedures are provided in the applicable Digivance System Operation and Maintenance Manual (see Related Publications section).

RELATED PUBLICATIONS

Listed below are related manuals and their publication numbers. Copies of these publications can be ordered by contacting the ADC Technical Assistance Center at 1-800-366-3891, extension 73476 (in U.S.A. or Canada) or 1-952-917-3476 (outside U.S.A. and Canada).

Title	ADCP Number
Digivance LRCS 800/900 MHz SMR System with Version 3.01 EMS Software Operation and Maintenance Manual	75-179
Digivance LRCS 800 MHz System with Version 3.01 EMS Software Operation and Maintenance Manual	75-156
Digivance LRCS 1900 MHz System with Version 3.01 EMS Software Operation and Maintenance Manual	75-153
Digivance LRCS SMR System with Version 3.01 EMS Software Operation and Maintenance Manual	75-170

ADMONISHMENTS

Important safety admonishments are used throughout this manual to warn of possible hazards to persons or equipment. An admonishment identifies a possible hazard and then explains what may happen if the hazard is not avoided. The admonishments — in the form of Dangers, Warnings, and Cautions — must be followed at all times. These warnings are flagged by use of the triangular alert icon (seen below) and are listed in descending order of severity of injury or damage and likelihood of occurrence.



Danger: *Danger is used to indicate the presence of a hazard that **will** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*



Warning: *Warning is used to indicate the presence of a hazard that **can** cause severe personal injury, death, or substantial property damage if the hazard is not avoided.*



Caution: *Caution is used to indicate the presence of a hazard that **will** or **can** cause minor personal injury or property damage if the hazard is not avoided.*

GENERAL SAFETY PRECAUTIONS



Warning: *Wet conditions increase the potential for receiving an electrical shock when installing or using electrically-powered equipment. To prevent electrical shock, never install or use electrical equipment in a wet location or during a lightning storm.*

STANDARDS CERTIFICATION

FCC: The 800 MHz components of each LRCS system comply with the applicable sections of Title 47 CFR Part 22. The 1900 MHz components of each LRCS system comply with the applicable sections of Title 47 CFR Part 24. The SMR components of each LRCS system comply with the applicable sections of Title 47 CFR Part 90.

UL/CUL: This equipment complies with UL and CUL 50 Standard for Enclosures for Electrical Equipment. This equipment provides the degree of protection specified by IP43 as defined in IEC Publication 529.

FDA/CDRH: This equipment uses a Class 1 LASER according to FDA/CDRH Rules. This product conforms to all applicable standards of 21 CFR Part 1040.

IC: This equipment complies with the applicable sections of RSS-131. The term “IC:” before the radio certification number only signifies that Industry Canada Technical Specifications were met.

LIST OF ACRONYMS AND ABBREVIATIONS

The acronyms and abbreviations used in this manual are detailed in the following list:

BTS	Base Transceiver Station
EMS	Element Management System
FCC	Federal Communications Commission
FDA	Food and Drug Administration
IC	Industry Canada
LED	Light Emitting Diode
LRCS	Long-Range Coverage Solution
MHz	Mega Hertz
NEM	Network Element Manager
NEMA	National Electrical Manufacturers Association
NOC	Network Operations Center
RF	Radio Frequency
RLM	Remote Link Monitor
SMR	Specialized Mobile Radio
SNMP	Simple Network Management Protocol
STM	Spectrum Transport Module
UL	Underwriters Laboratories

1 DESCRIPTION

The Reverse Link Monitor (RLM) is an optional add-on feature that is available for the Digivance 800 and 1900 MHz LRCS product line. The RLM feature provides an alarm indication if there is a loss of gain in the reverse path RF signal. The standard Digivance product provides an alarm indication if there is an internal component failure or an optical failure but does not provide an alarm if a loss of gain occurs in the reverse path RF signal.

The RLM feature works by injecting a pilot tone at the STM and then measuring the level of the tone at the Host Unit. An RLM fault is reported if the reverse path signal level at the Host Unit RF output drops more than 10 dBm. This generates a major alarm which triggers the operation of the normally open and normally closed alarm contacts provided by the Host Unit. The RLM feature is available on both non-diversity and diversity systems. On diversity systems, an RLM fault in either the primary or diversity return path will trigger an RLM alarm.

The RLM alarm generates an alarm message which may be accessed through the Element Management System (EMS) software, the Network Operations Center-Network Element Manager (NOC-NEM) interface, or the Simple Network Management Protocol (SNMP) manager. The Host Unit (LED) indicators on both the Host Unit and the Remote unit (STM) turn red when an RLM alarm is reported. The RF output of the Remote Unit is not muted for an RLM alarm.

2 HARDWARE AND SOFTWARE REQUIREMENTS

The RLM feature requires that both the Host Unit and the Remote Unit Spectrum Transport Unit (STM) be equipped with the internal components that support RLM. This is an option that must be specified when either unit is ordered. There are no external markings that indicate if the Host Unit or STM supports RLM. Host Units and STM's equipped with the RLM feature are compatible with hardware that does not support the RLM feature. However, the RLM feature will not function unless both units are equipped to support the RLM feature.

The EMS and SNMP agent software has been upgraded to support the RLM feature. Only EMS software Version 7.0 and SNMP Agent software Version 7.1 can report when an RLM alarm has been generated. The upgraded versions of the EMS and SNMP agent software are compatible with any earlier versions of the Host Unit and STM that are not equipped with the RLM feature. Earlier versions of the EMS and SNMP agent software (Version 3.01 and Version 5.0) do not support RLM alarm reporting but are otherwise compatible with RLM equipped hardware.

3 APPLICATION

The RLM feature is primarily designed for simulcast applications where a single Base Transceiver Station (BTS) is configured to serve multiple Host Units as shown in [Figure 1](#). The BTS monitors the level of the reverse path RF signal and generates an alarm if the level drops below a specified threshold. When a single Host Unit is connected to the BTS, a drop in the reverse path signal level will generate an alarm by the BTS. When several Host Units are linked to the same BTS, a drop in the reverse path signal level from one of the Host Units will not generate an alarm if the reverse path RF signal levels from the remaining units are within specifications. The RLM feature provides selective alarming that cannot be provided by the BTS in a simulcast application.

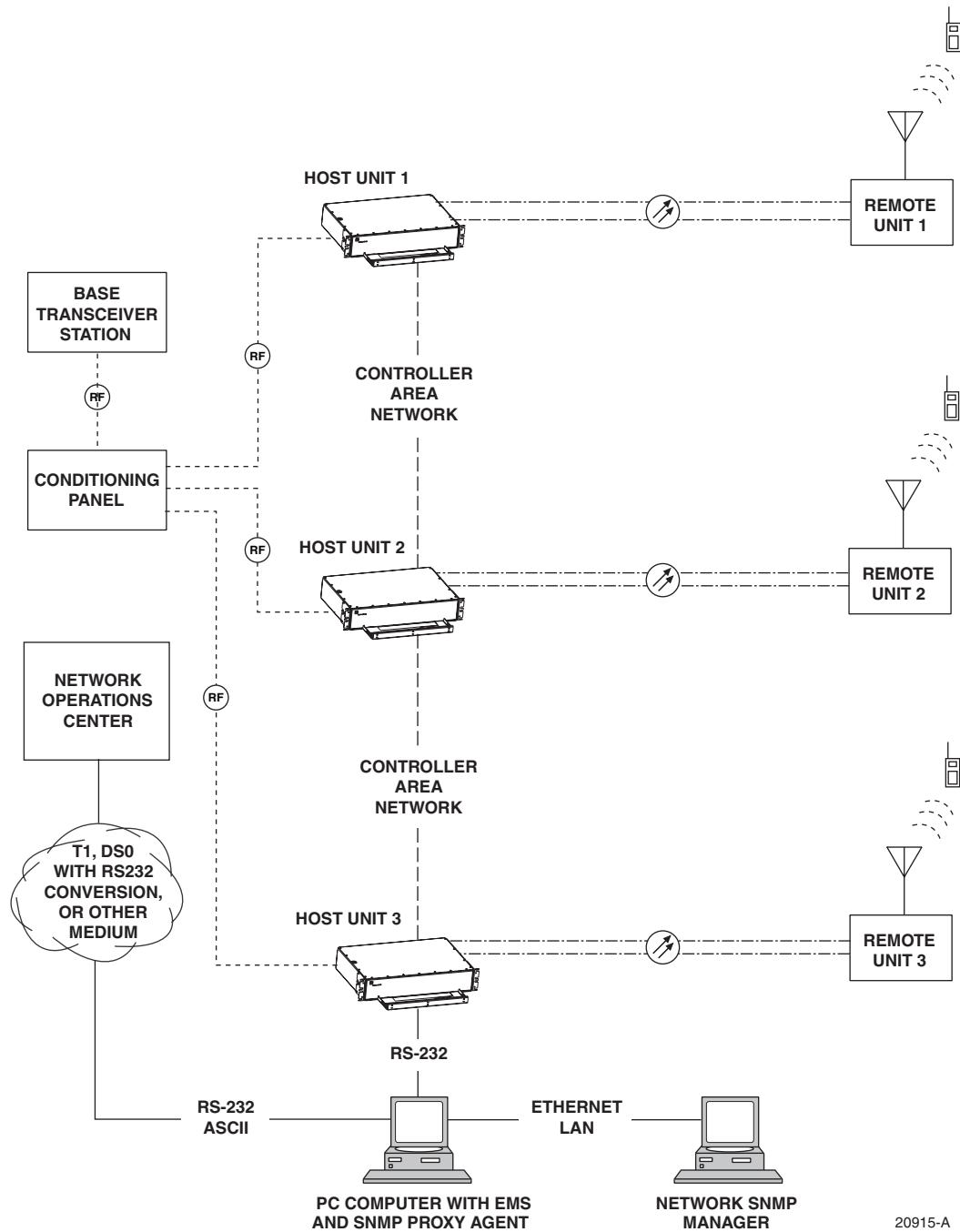


Figure 1. Typical Simulcast Application (Simplified)

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4 EMS SOFTWARE GRAPHICAL USER INTERFACE

The RLM alarm message is recognized by the Version 7.0 EMS software and displayed as a **Major** alarm on the **HOST** Alarm screen as shown in [Figure 2](#). When an RLM alarm message is received, the Reverse Link Fault indicator will change from green (normal) to red (alarm).

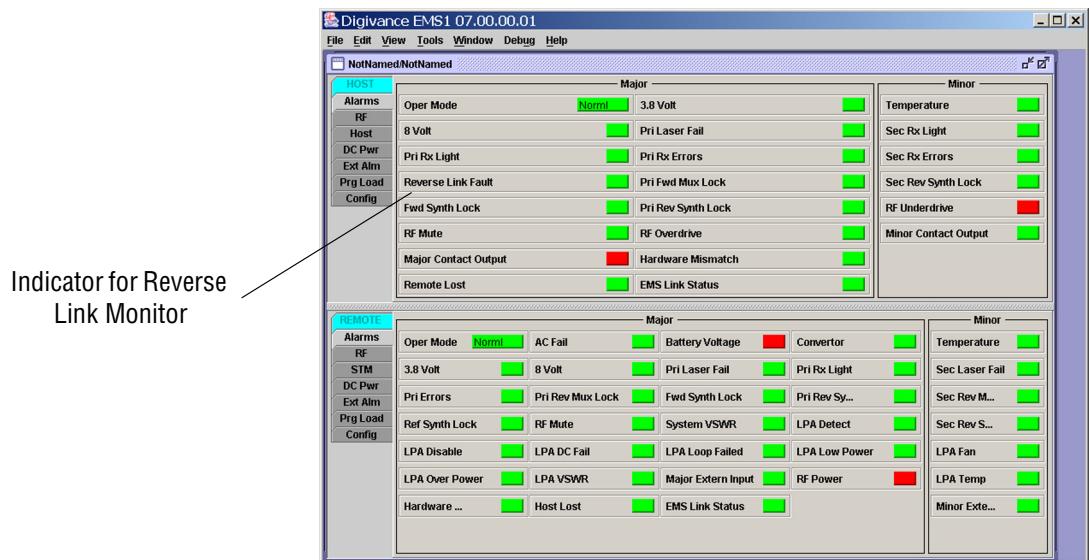


Figure 2. Host Unit and Remote Unit Alarm Screen

The EMS software also indicates whether or not the Host Unit and Remote Unit hardware support the RLM feature. If the Host Unit supports RLM, the Host Unit HOST screen will display the message “RLM supported” as shown in [Figure 3](#). Similarly, if the Remote Unit supports RLM, the STM screen will display the message “RLM supported”.

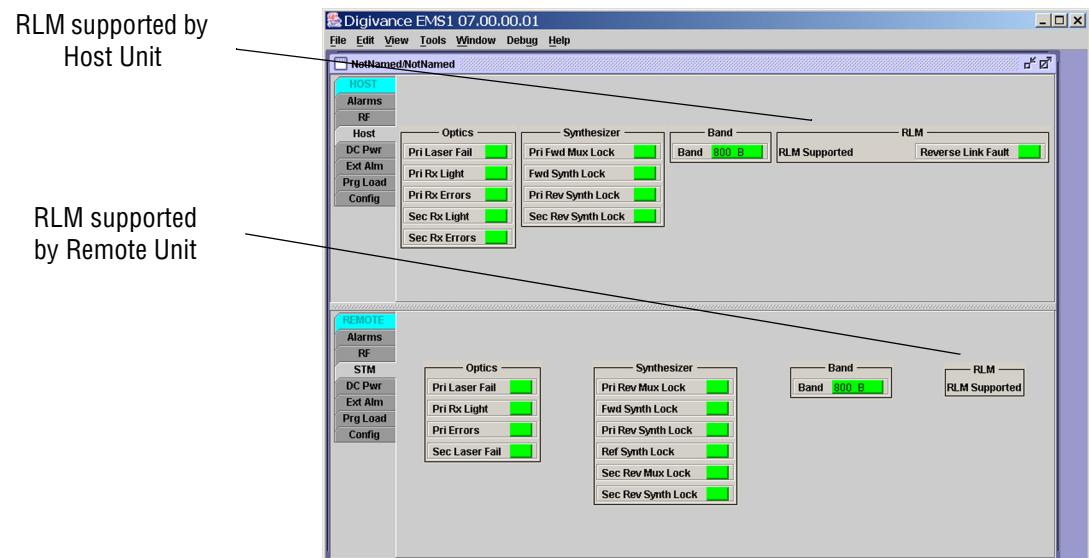


Figure 3. Host and STM Screens

5 TROUBLESHOOTING AN RLM ALARM

An RLM alarm indicates that the level of the reverse path RF signal has dropped by 10 dBm as referenced against a pilot tone injected at the STM and measured at the Host Unit. The reverse path gain is provided on a system level by both the Host Unit and the Remote Unit (STM). Together, the Host Unit and Remote Unit (STM) provide 30 dBm of gain in the reverse path. When an RLM alarm occurs, the problem could be within either the STM or the Host Unit. If replacing one unit does not clear the alarm, the fault is within other unit.

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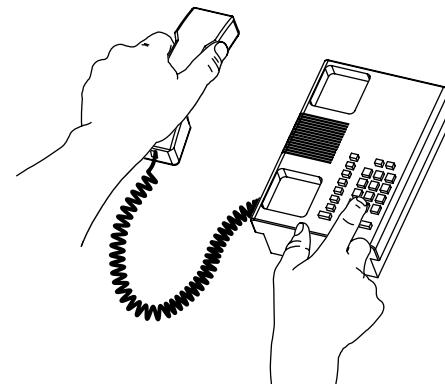
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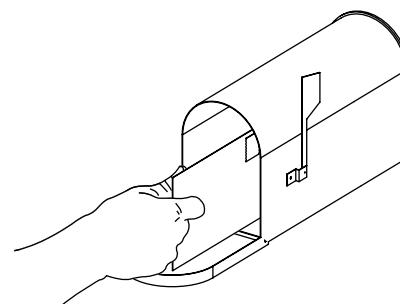


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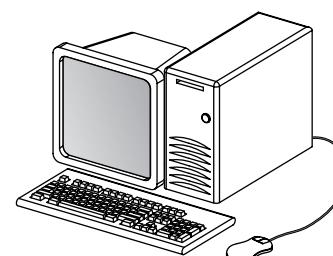
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