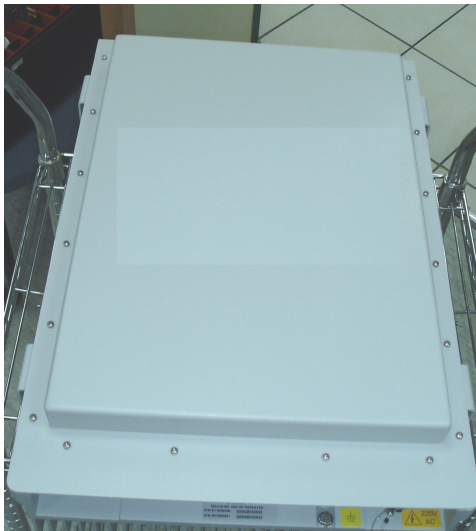




WiMax Optical Fiber Repeater 10W

Installation and Operation Manual



Remote Unit



Host Unit

February 2008

Document No. 913011900 Rev. 1.1

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Preface

This manual provides instructions for mounting, setting-up, and monitoring ADC OR system.

The WiMax 10W Optical Fiber Repeater is used to enhance the performance of Wimax networks by improving the coverage of the base station and increasing their traffic.

As a result, the resources of the base station are utilized more efficiently.

In addition, ADC Optical fiber Repeater is a flexible and cost-effective solution that enables the operator to provide cellular coverage without dependence on the original cell site coverage area. It is an ideal way to achieve targeted coverage of remote areas and 'coverage holes', and enables advanced coverage schemes, such as BTS hoteling and distributed coverage for high data-rate networks.

A powerful feature provided enables monitoring and controlling the parameters of each site from the other site (the Host unit can be controlled from the Remote unit and vice-versa), using a dedicated channel outside the WiMax frequency band.

This channel is used also to synchronize the TDD frame between the Remote and Host units.

ADC Repeater may be secured to an interior or exterior wall or attached to a concrete slab.

Records of Changes

Revision	Description	Initiated by	Date
1.0	Preliminary Release	Ram Dishon	November 2007
1.1	Update	Ram Dishon	February 2008

Safety Information

This section describes the use of warnings, cautions, and notes in this manual. It is the user's responsibility to follow all safety instructions and regulations.

NOTE: Notes clarify issues.



CAUTION

This symbol indicates special CAUTION required in a procedure. CAUTION signs prevent actions that may result in equipment malfunction or damage.



WARNING

WARNING signs prevent actions that may result in harm to personnel.

FCC Part 15A Compliance Statement

This device complies with Part 15 Class A of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate Radio Frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference in which case the users will be required to correct the interference at their own expense.



CAUTION

Changes or Modifications not expressly approved by ADC could void the user's authority to operate the equipment.

For customer and technical support, contact

ADC Telecommunications, Inc.

P.O. Box 1101, Minneapolis, Minnesota 55440-1101

In U.S.A. and Canada: 1-800-366-3891

Outside U.S.A. and Canada: (952) 928-8080

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or send an e-mail to wireless.tac@adc.com

WARRANTY

ADC Telecommunications, Inc. warrants its products as per agreement.

Exclusions

The warranty (as per the agreement) shall not apply to defects resulting from improper or inadequate use, unauthorized modifications or misuse.

Warranty Limitations

Under no circumstances will ADC Telecommunications, Inc. be liable in any way to the user or any third party for damages, including any loss of profits, lost savings, or other incidental or consequential damages arising out of the use, or inability to use, the product.

System Measurement and Testing Warnings



WARNING

When installing equipment, always connect the grounding cable first, only then connect the other cables.

When testing the units in the lab or during field installation, always practice RF radiation safety rules. It is not recommended for service or lab personnel to work closer than two meters from the Remote unit antenna surfaces when it is operating.



CAUTIONS

- Switch off the AC or DC power to the unit before connecting or disconnecting any cable.
- Do not connect or disconnect any RF coaxial connectors while power is applied to the Repeater. Disconnect power first.
- Do not apply more than +10dBm of RF input power to any RF port of the OR system, or irreversible damage may occur.
- When measuring high power outputs, always verify that the equipment input port is capable of handling the expected output power.
- During lab or field tests, with power applied to the Repeater, do not use any mobile transmitters in a range of less than 10 meters from the unit. An unexpectedly high RF power might appear at the output ports, which might in turn damage the measuring equipment connected to that port.

Glossary

ALC	Automatic Level Control
BDA	Bi-Directional Amplifier
BT	Bias T
BTS	Base Transceiver Station
dB	Decibel measurement of gain and loss
dBm	Decibel measurement of power, related to 1mW
dBmO	Decibel measurement of optical power, related to 1mWO
Ec	Energy per chip received at the mobile's rake receiver
FWD	Down-link from the donor base station to the mobile users, synonym to DL
HPA	High Power Amplifier
Io	Interference
LNA	Low Noise Amplifier
LPU	Low Power Unit
M&C	Monitoring and Control
MS	Mobile Station
mW	Milliwatt
NF	Noise Figure
NOC	Network Operating Center
OR	Optical Repeater (Fiber)
PA	Power Amplifier
RVS	Up-link from the mobile users to the donor base station, synonym to UL
Rx	Receive
TDR	Time-Domain Reflectometer
Tx	Transmit

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1 Introduction

1.1 About ADC Optical Fiber Repeater (OR)

ADC optical fiber repeater provides Up-link (RVS) and Down-link (FWD) cell coverage extension. It serves as a sophisticated remote bi-directional booster, sensing and re-amplifying the RF transmission in FWD (from the base-station to the mobile users), and in RVS (from the mobile-users to the base-station), concurrently. Coverage extension results in increasing traffic through the base station, thus improving utilization of the Base Transceiver Station (BTS) resources.

The WiMax system is an interactive, environment-sensitive network. Optimization of this network involves above all - coverage control. Repeaters in the WIMAX network are therefore highly interactive with the donor cell and the neighboring cells, and require flexible tuning and control. Their effectiveness depends highly on these and additional features.

The Repeater Transferred-Noise, as appearing at the input to the shared-donor Base Station receiver, has a detrimental effect on the cell capacity, as shown in Figure 1-1.

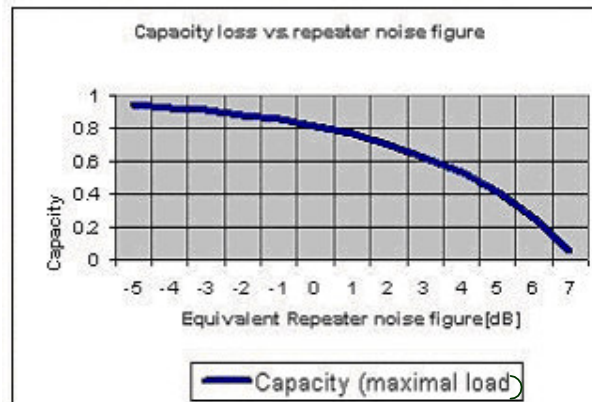


Figure 1-1 Capacity loss vs. repeater noise

A new added feature enables monitoring and control of each site from the other site, i.e. the Remote unit can be controlled from the Host unit and vice-versa.

Overall Unique Advantages

The OR product line shares unique features for exceptional coverage, low impact on the cell, high controllability, and low maintenance cost. The Remote unit is built of outdoor grade technology and a weather-proof unit, that guarantees low Noise Figure (NF), high power efficiency, unique flexibility in installation, and high reliability.

1.2 OR System Description

1.2.1 General Description

The ADC OR system consists of two units, a Host unit, installed close to the BTS, and a Remote unit, installed in the remote site. This integrated structure provides the advantage of easy installation and maintenance.

The Host Unit contains the following main units:

- Optical transceiver
- Signal processing and controller
- Power supply

Optical transceiver

The optical transceiver includes a transmitter and receiver units. The transceiver converts the FWD RF signals into light wave signals, which are then sent over optical fiber. The transceiver also reconverts the RVS light waves signals back to RF.

The signals passing through the optical fiber include also the M&C signals. This enables M&C of the Remote unit remotely from the Host and vice-versa.

Signal Processing and Controller

The RVS and FWD RF signals pass through the LPU, managed by the internal control system. The control system sets signal power levels, filters, and sets the selectable RF channels (if applicable).

A local connection to the system enables M&C of each settable component. The control software is described in Chapter 3.

The system controller in the LPU is monitoring and logging all activity changes and alarms.

System status parameters are also combined and their summary indicated by three LEDs on the repeater cabinet .

The Remote Unit contains the following main units:

- Optical Transceiver
- LPU (Low Power Unit)
- Distribution front end
- System Power Supply
- Frequency Channelizer that selects the desired operating channel (if applicable)

Distribution Front End

The distribution front end of the Remote unit consists of:

Duplexer

High Power Amplifier (HPA) for FWD signal

Low Noise Amplifier (LNA) for RVS signal

These are connected to the Distribution Tx/Rx antenna port. Both FWD and RVS amplification channels are gain-controllable, to obtain the optimal link balance with minimum noise introduction into the BTS.

1.2.2 Major Advantages

Exceptional Coverage

- Low system NF, with high gain, high linearity

Minimum Impact on Cell

- Low NF
- Increased capacity, provided by the low NF
- Wide range gain control for performance optimization

Extremely High Reliability

- Outdoor structure (Remote Unit)
- Integrated electronics, internal built-in test
- Automatic shut-down mechanism

Exceptional Flexibility

- Easy installation
- Easy maintenance with simple access to Repeater components

Automatic Level Control (ALC) for Power overload protection

ALC range of more than 35dB beyond the maximum output power is included in the amplifying chains.

During normal operating conditions, the repeater system should not reach the ALC level. The repeater should be “transparent” to the BTS power control and should not affect this mechanism.

The system set-up should ensure that that maximum power of FWD and RVS channels are below the ALC level.

2 Installation Procedure

NOTE: Installing an OR requires a site plan, which is a document defining the planned parameters of the cellular network. Parameters include the channel number in use, desired Repeater's coverage area, gain settings, and antenna location. If necessary, consult your network administrator for more information.

2.1 Pre-installation Procedures

2.1.1 Receiving and Inspecting the Repeater



CAUTION

Verify that the packages are complete and undamaged. If the boxes appear damaged, do not open the shipment.

Never ship any unit without adequate packing!

Follow this procedure prior to installation:

1. Unpack the shipment box.
2. Verify the contents of the box against the packing list.
3. Inspect the OR units for possible damage.

The items in Table 2-1 are required for the installation. They are supplied separately from the installation kit.

Table 2-1: Complementary installation equipment

Type	Description	Vendor
Documentation	This Assembly and Operation manual	ADC
Software	Control & Monitoring Software, ready for installation. This software sets up and tunes the Repeater during installation.	ADC
Cables	RF cables from distribution antenna to Remote unit	Customer
	Fiber cable from Host unit to Remote unit	Customer
	Communication cable for setting and maintenance	Customer
Antennas	Distribution antennas	Customer

Table 2-2: Repeater installation set

Supplier	Part Number	Description	Quantity
ADC	1428771	Remote unit, 110 VAC	1
ADC	334053000	Cable, AC power for 110 V Remote unit	1
ADC	1428774	Host unit, indoor	1
ADC	3340408	Cable, Power, Host	1

The contents of the installation set may change without notice.

Required Tools and Test Equipment

Table 2-3: Tools and test equipment for Repeater installation

Equipment	Use
Ring/Open spanner 1/2"	Install the Repeater units
Ring/Open spanner 7/16"	Close the ground lugs
Ring/Open spanner 30-32 mm	Open/close DIN 7/16 connectors
Digital Voltmeter Fluke 77 or equivalent	Measure voltage and polarity for the installation process
Pilot Scanner / Drive Test Set	Measure donor pilot signal levels
Frequency domain Reflectometer	Check Insertion loss and VSWR for system RF Cables
Network Analyzer (optional)	Check Insertion loss and VSWR for system RF Cables
Signal Generator	Check Isolation between antennas
Spectrum Analyzer	Check Repeater Output Power
30dB 50W attenuator (Cellular Band)	Protect RF Test equipment from overpowered signals
Type N 50Ω Termination (1 unit)	Terminate antenna port during off-air test procedures
Standard calibrated test cables	Test equipment usage
Laptop PC equipped with Windows 2000 with Service Pack 3 or Windows XP, SP2	Configure, control, and monitor the Repeater through the RS-232 communication port

NOTE: For antenna installation tools, refer to your antenna installation guide.

2.2 Run Sweep Test

Before installing the Repeater, check mechanical assembly of all RF connectors, run a sweep test of the RF cables and record the cables loss. Perform the sweep test using a Site Master analyzer or a Network Analyzer.

- Perform open/short tests on the distribution RF cables.
- Record the following parameters for each RF cable:
 - Insertion loss of the cable
 - Return loss (VSWR)
- If you detect a fault in any of the cables, repair it and re-check until all the cables are good.

NOTE: Record the information for reference in Appendix D. This information is used during the setup procedure.

2.3 Host Unit Installation

1. Locate the necessary space for mounting the Host unit inside the BTS enclosure or close to it.
2. Turn off transmission of the BTS when installing the Host unit.

2.3.1 Mount the Host Unit

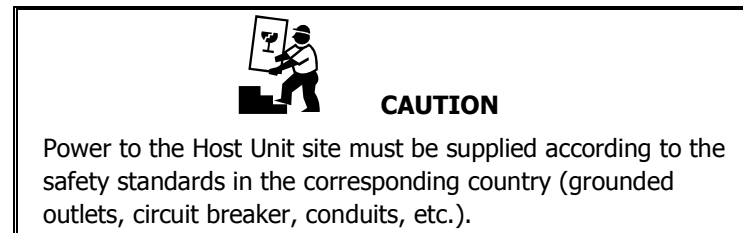
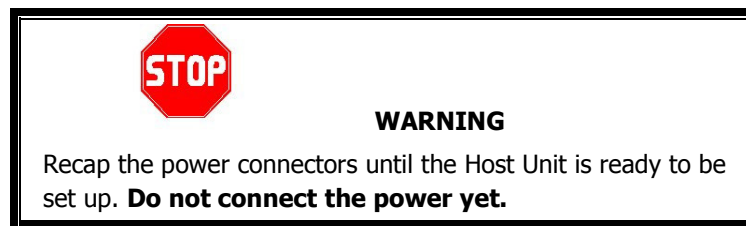
2.3.2 Outside the BTS enclosure

1. The unit is designed to fit into 19" rack. In case of 23" rack, a proper adapter should be used.
2. Mount the Host unit in a way that will enable good accessibility to the fiber, AC and RF connections.

2.3.3 Inside the BTS enclosure

Locate the necessary space and fix the Host unit professionally, making sure not to block air circulation to the unit

2.3.4 Prepare the Electrical Power Connections



The cable pinout can be found in Appendix B.

It is recommended to install a small junction box containing a circuit breaker of 5A before the power cable.

Installing an ELCB (Earth Leakage Circuit Breaker) is highly recommended.

Connect cables as follows:

- a. Grounding cable.
- b. RF cable from the BTS
- c. Optical Fiber cable (Clean professionally the fiber connector)
- d. AC cable (Use 5A circuit breaker)

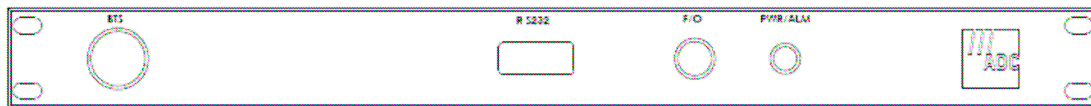


Figure 2-1: Host Unit

2.4 Optical Fiber Test

Check the optical fiber between the BTS and the remote site using Optical Power Meter or in loop-back (if a spare fiber is available), using the optical transceivers of each end as a light source or +3 dBmO (optical), or another known source.

Optical power output from the 2 OR units is +3 dBm nominal. 1310nm from Host and 1550 nm from Remote unit.

Get recent/valid test data.

2.4.1 Power Up the Host Unit.

2.5 Mount the Distribution Antenna (Remote Site)

The distribution antenna is supplied by the customer. Perform the following steps:

- Mount the antenna in its selected height, azimuth and tilt
- Connect the antenna to the feed lines and run a sweep test for antenna reflected power in the distribution frequency band.
- Seal the cables

2.6 Mount the Remote Unit

2.6.1 Precautions



CAUTION

The OR Remote unit is electrical equipment and should be treated accordingly.



CAUTIONS

- Always shut down the AC or DC supply to the Remote unit before handling, replacing, or removing the unit.
- The Remote unit overall weight is ~35Kg. Carry the unit carefully.
- The customer is not permitted to disassemble the Remote unit. Disassembling the unit voids the warranty.
- The Remote unit is hermetically sealed in a clean environment.

2.6.2 Remote Unit Installation - General Instructions

The Remote unit is intended for wall mounting. See holes dimensions in Appendix C.

- **RF coaxial cable connecting the Remote unit:**
 - Type: low loss type
 - Diameter: 1/2" or 7/8"
 - Length: The cables should be as short as possible. Cable length should not exceed 100m.

2.6.3 Sealing and Weatherproofing

Sealing and weatherproofing RF connectors is of prime importance to assure good electrical contact for many years and prevent passive RF inter-modulation effects. Thus, special care should be taken with the RF connectors sealing and weatherproofing.

For sealing instructions, refer, for example, to Andrews weatherproofing recommendations with 3M™ Cold Shrink™ Weatherproofing Kit, or an equivalent sealing method.

**CAUTION**

Improper sealing can cause damage not covered by warranty.

2.6.4 Remote Unit Mounting

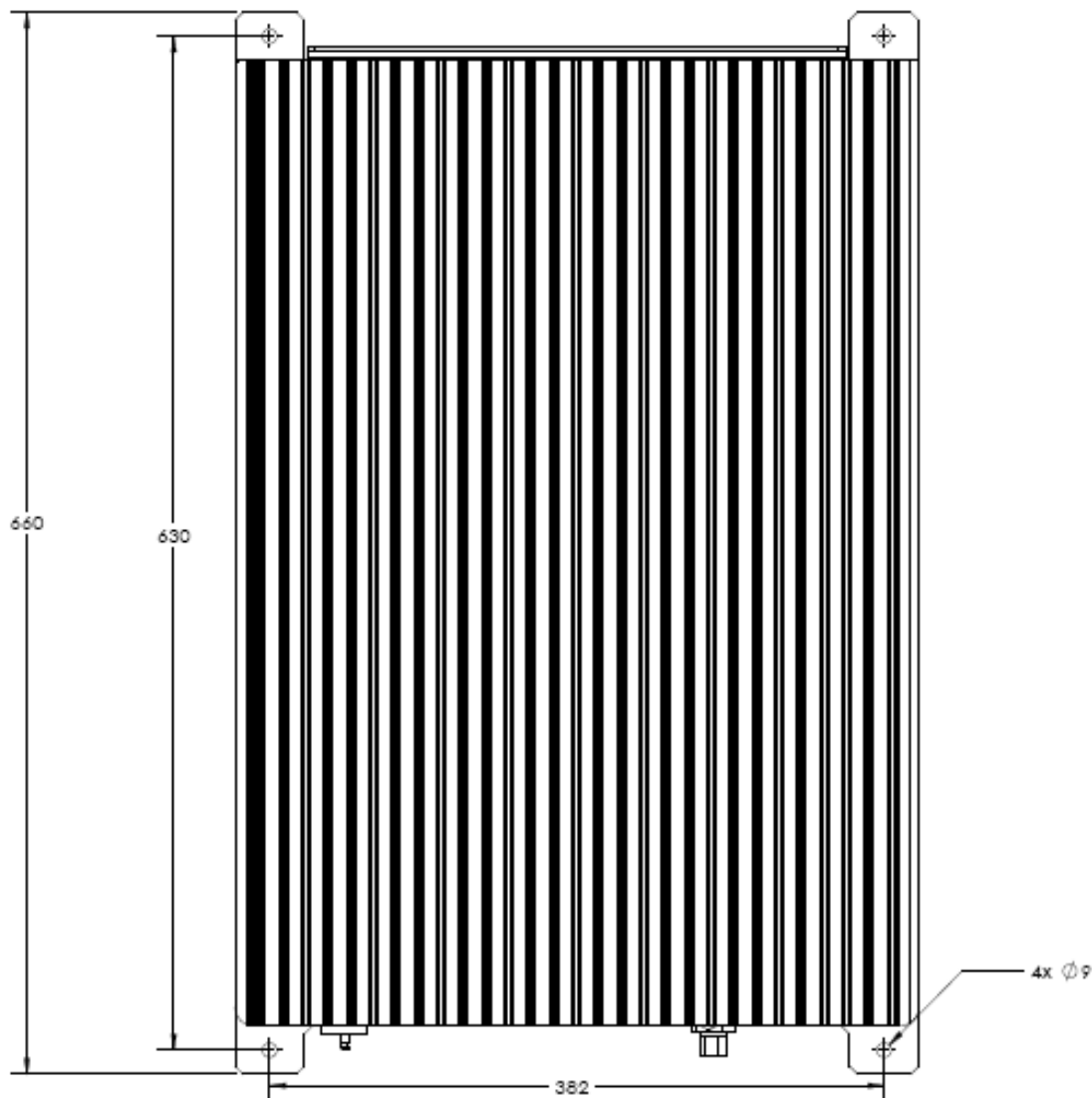


Figure 2-2: Mounting Holes Drawing

1. Select a location that will enable free air flow, away from heaters.
2. When installing inside a shelter, keep minimum spacing of 300 mm from Repeater top to the ceiling.
3. Drill holes and insert suitable dowels. See holes spacing dimensions in Figure 2-2.
4. Position the Repeater and tighten the screws.

2.6.5 Cables Connection

1. Connect the Ground screw of the Remote unit (located at the side of the unit) to either earth-ground or the ground-rod of the building. Tighten the ground screw using a 7/16" spanner
2. Connect RF cable to the distribution (service) antenna.
3. Connect the optical fiber to the Remote Unit (Clean professionally the fiber connector).
4. Connect the power cable.

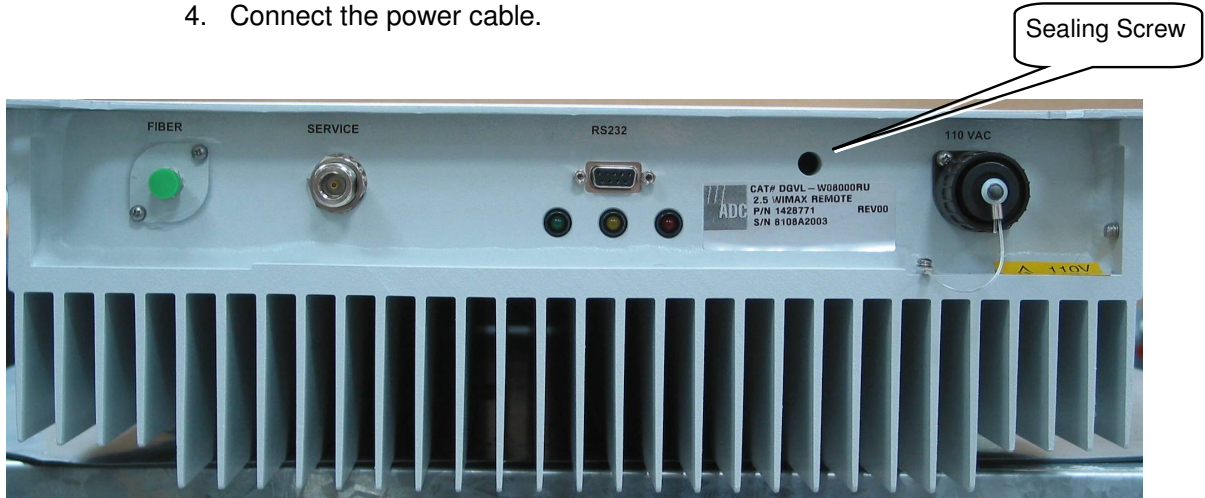


Figure 2-3: Remote Unit Panel

3 OR System Setup and Alignment

3.1 Connect To The Repeater

Monitoring and controlling the repeater are accomplished by a PC via web application.

Connect the system (Host, Remote, cables, antennas, fiber) and power it up. Connect the Host unit to the server PC.

3.2 Local Connection

Launch the application.

3.2.1 Description

The Main Screen opens. This is the “Systems” screen. See Figure 3-1.

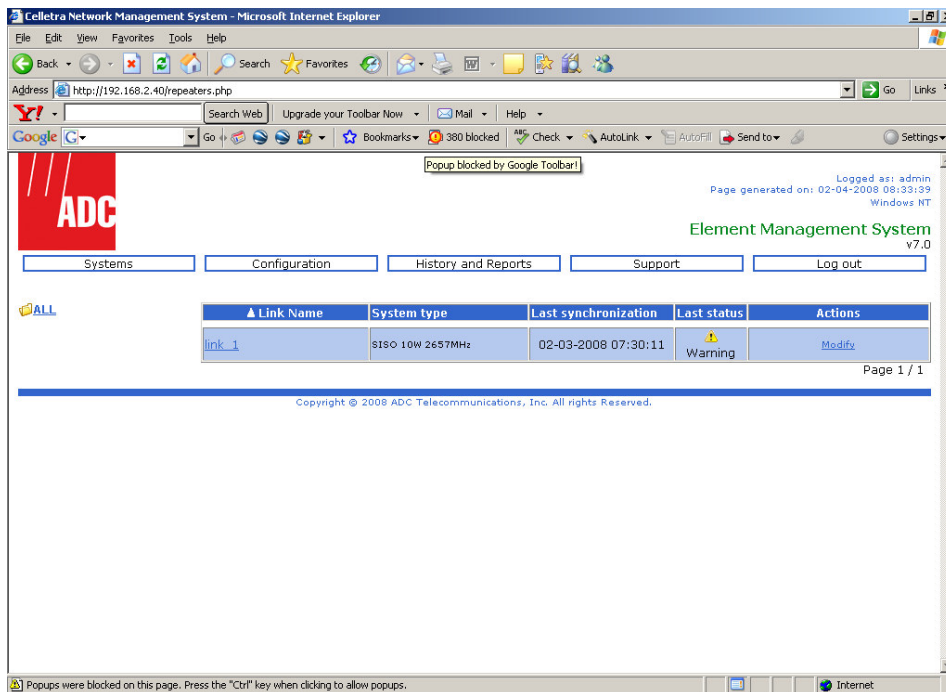


Figure 3-1

There are 5 tabs on its upper part.

Click on “Configuration” tab. The following screen appears (Figure 3-2).

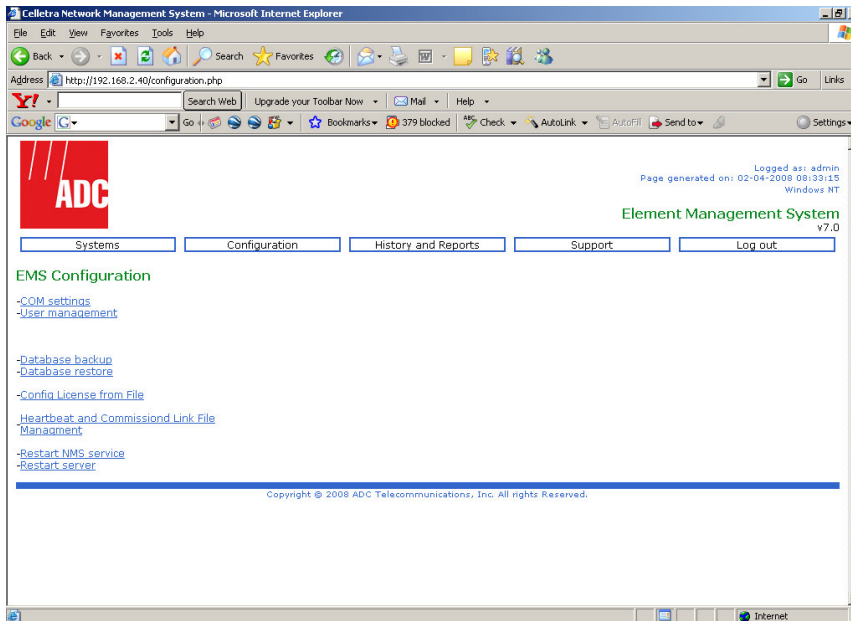


Figure 3-2

Click on “-COM settings”. The following screen appears (Figure 3-3).

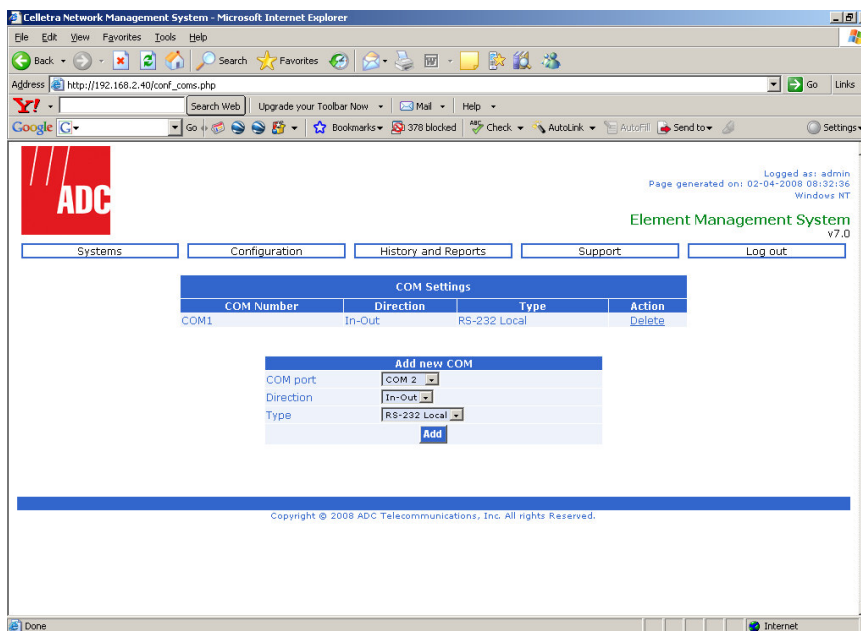


Figure 3-3

Define the COM port of the server to which the Host is connected; Click “Add”.

Repeat for all the Host units connected to the server. Each Host unit should be connected to a different COM port.

Click on “Systems” tab.

If the system is connected properly (Host & Remote), the application should identify it and show it as a new link.

If no link is connected, the following screen appears (figure 3-4):

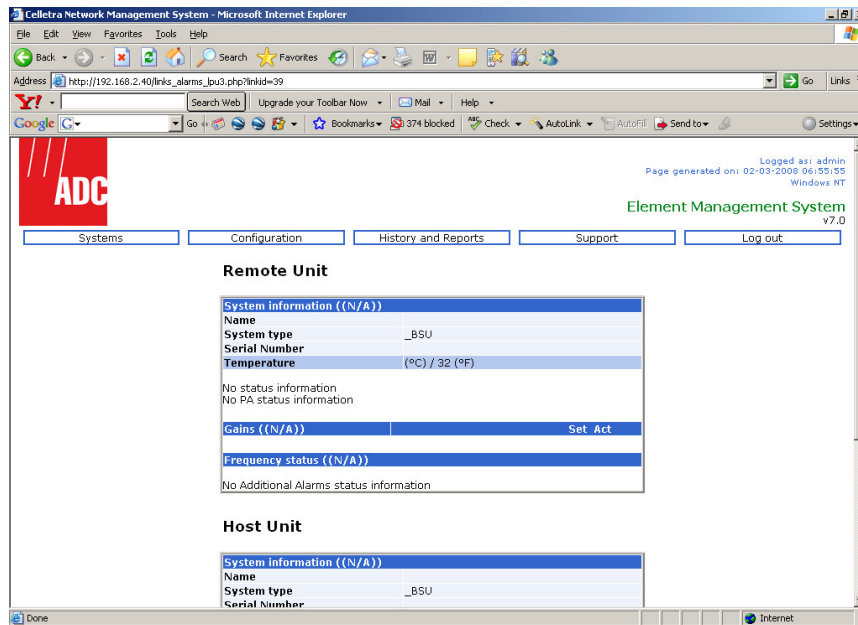


Figure 3-4

If you click on “Modify Link” at the right, you will be able to introduce the geographic coordinates of the Remote unit and the name of the link. See figure 3-5.

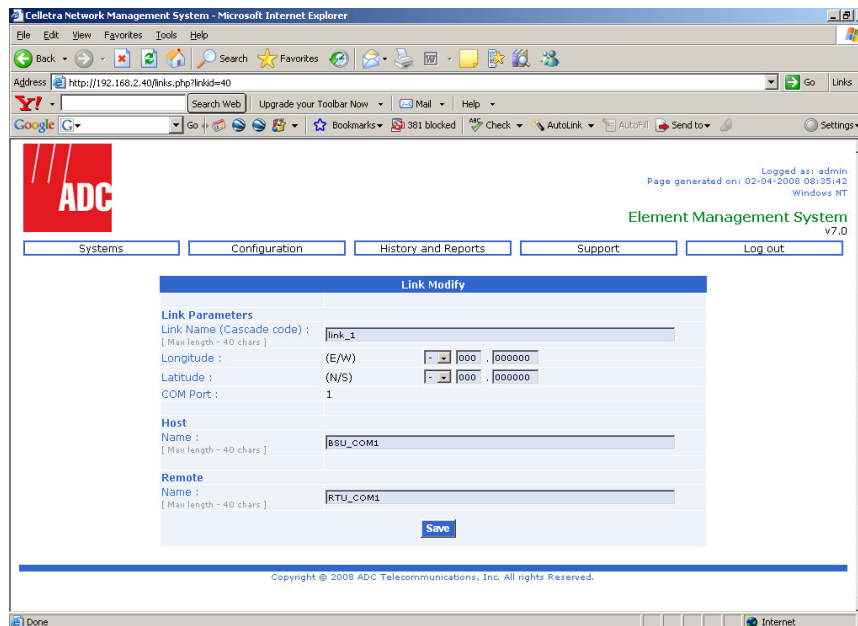


Figure 3-5

The Longitude / Latitude supports the format +/- dd.dddddd (decimal degrees).

+ is for North and East.

– is for South and West.

The Name fields support up to 40 characters.

Click on the Link name in Systems screen.

The following screen appears (figure 3-6).

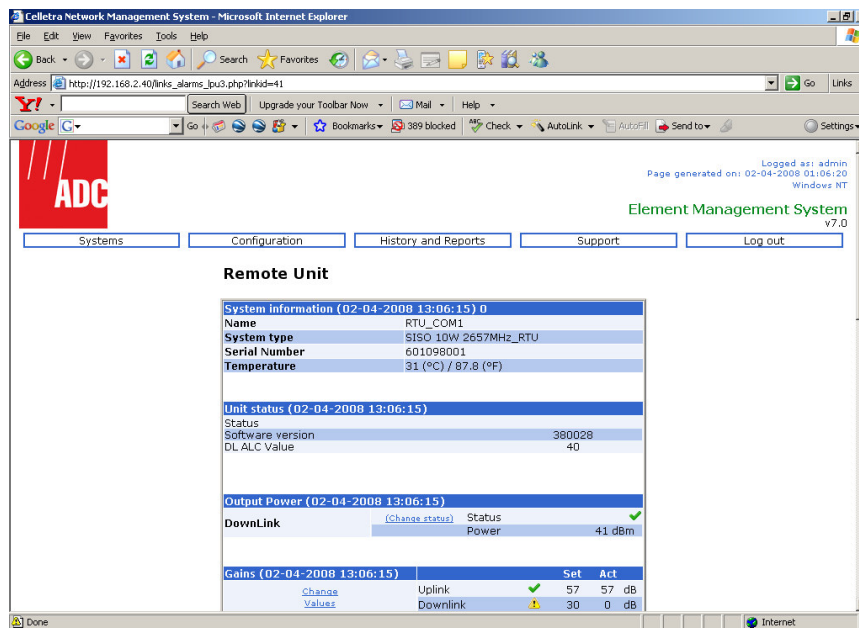



Figure 3-6

This screen shows all the parameters of the system, including alarms. Note that settable parameters have “Change Value” or “Change Status” tabs. (Scroll down to see the Remote and Host details).

The settable parameters are “PA Mute” of the Remote unit and Gains (Host and Remote, FWD and RVS).

Click on “Change Value” or “Change Status” of the parameter you want to change, change the value / status and click “Save”.

Until actual change is applied, a green note advising that a change is pending will appear.

Whenever this sign  appears in the Gains field, note that the Actual Gain differs from the Set Gain, implying that the ALC is in operation.

At the bottom of the screen there are three tabs:

- “Reset Link” soft-resets the internal software of the Remote unit, then the Host unit.
- “Set Time to Host” synchronizes the Host clock with the PC clock.
- “Set Time to Remote”- respectively.

The “Alarms” field lists all previous and current alarms of the system. For Alarms details and troubleshooting, see Section 4.

In the Main screen, click on “History and Reports” tab.

The following screen appears (Figure 3-7).

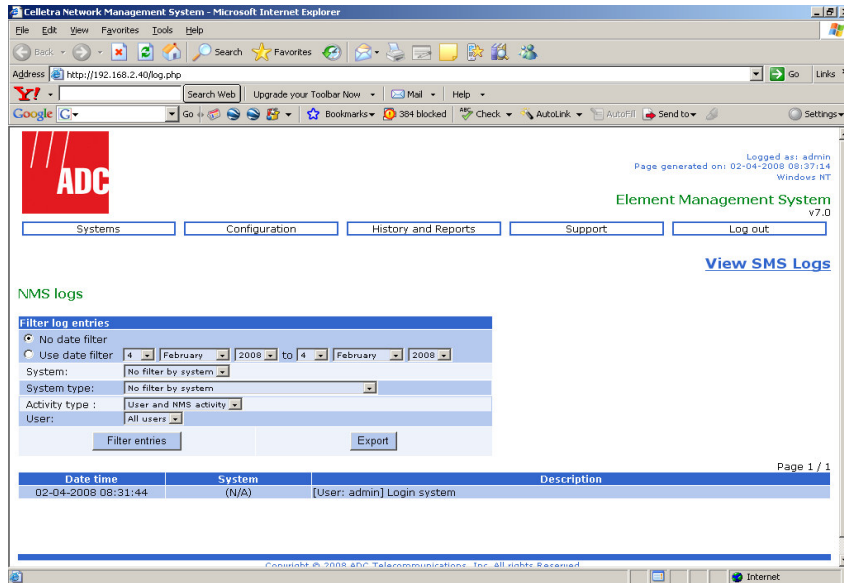
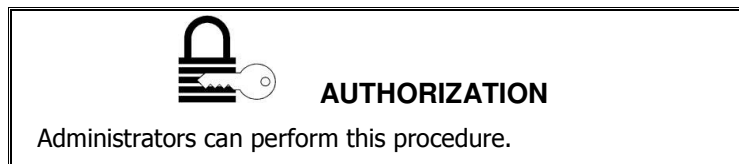


Figure 3-7

Clicking on “NMS Logs” will show activities of the application. The Logs can be filtered per dates.

“SMS Logs” and “Repeater Alarm and Information Reports” are not used in this application.

3.3 Set the System Parameters



3.3.1 System Setup Instructions

General.

The set-up of Host and Remote units FWD gains are based on maximum power considerations. This means that whenever the BTS transmits at maximum power, the Remote unit will also transmit at maximum power.

The set-up of the Host and Remote units RVS gains is based on known noise level introduction into the BTS

Make sure that you have a documented test results of the optical fiber link loss. Otherwise, measure it and record the results.

Make sure that the fiber termination type is **FC/APC**.

Use the following guidelines to set-up the Host and Remote units:

Host Unit:

- Determine the absolute maximum input power to the Host unit input connector (under the heaviest traffic conditions); let this be P_{inmax} [dBm].
- Set the Host unit FWD gain to $0 - P_{inmax}$ [dB]. (This is in order to enter the fiber at 0 dBm).
- If symmetrical link is requested, set the RVS gain to the same value as the FWD gain.
- If permitted, set the RVS gain 3 dB less than the FWD gain.

Remote Unit:

- Set the Remote unit FWD gain to the numerical value of the maximum output power of the unit in dBm, plus the absolute value of the RF loss of the fiber (in dB).
- Set the RVS gain to the same value as the FWD gain.

NOTE: If reduced coverage is required, reduce the gains respectively.

3.3.2 Remote Unit FWD Gain Optimization

NOTE: The RVS gain must be approximately equal to the FWD gain of the Remote unit.

For optimal FWD and RVS balancing it is recommended to perform an additional fine-tuning procedure on the FWD, after completing the previous processes.

1. Drive with a mobile station (MS) to the outskirts of the Remote unit coverage area and observe the Mobile Ec/Io (in test mode), or walk indoors to the worst-case location.
2. If the Mobile Ec/Io is low or marginal in the designated area, optimize the azimuth and elevation of the distribution antenna.
3. Make changes according to the following criteria: if the Mobile Ec/Io is higher than specified by the RF designer at the covered area border, decrease the FWD gain in 1dB steps, until the MS Ec/Io reaches the desired value.

Do not in any case set the gain to a higher value than that determined in this Section.

3.3.3 Host Unit RVS Gain Optimization

NOTE: The RVS gain must be approximately equal to the FWD gain of the Host unit.

1. Drive with a MS to the outskirts of the system coverage area, and observe the Mobile Tx Power (in test mode). Alternatively, walk indoors to the worst-case locations.
2. If the Mobile Tx Power reaches its maximum power (+23dBm), increase the RVS gain in 1dB steps until the Mobile Tx Power drops by 2dB below its maximum value (Mobile Tx power =+21dBm).
3. Do not, in any case, set the gain to a higher value than that set in this Section.

3.3.4 Noise Rise Check

After completion the optimization process, verify that the noise at the RVS channel at the BTS did not rise more than 1-2dB due to the system installation.

In case of noise rise greater than 2dB, decrease RVS gain to fit the BTS noise-rise parameter accordingly.

3.4 Remote Control

Use any PC connected to the Internet.

Launch Internet Explorer on the PC (Version 6 or higher).

Key-in the IP address provided by the Network Administrator.

Key-in your User Name and Password. Click "Login".

From this point, operation is similar to 3.2.1 onwards.

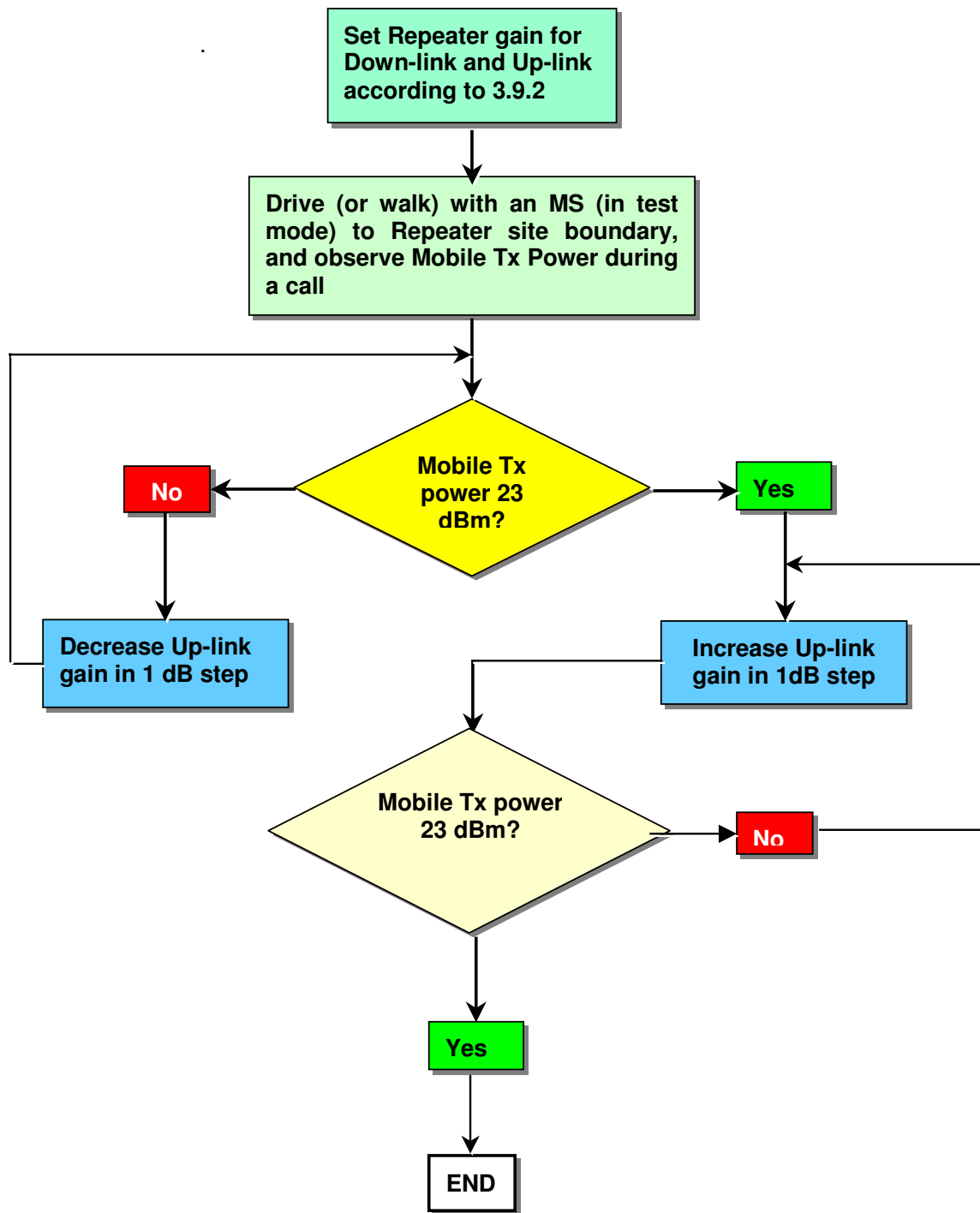


Figure 3-8: Host Unit RVS Gain Setting

4 Troubleshooting The OR System

4.1 Troubleshooting

Table 4-1 describes the supported alarms, their specifications and their remedies.

NOTE: For unsolved problems or difficulties, contact ADC Technical Support at wireless.tac@adc.com

Table 4-1: Alarms and troubleshooting

Alarm	Specification	Check the following:
RF Power Alarm	Output power level at Remote is below or above acceptable threshold	FWD gain, input signal level
VSWR Alarm	VSWR reading at Remote is out of acceptable range	RF cables, antenna
Power Alarm	Any AC/DC power source problem on host or remote unit	Power cables, mains power
RSSI Alarm	RSSI level is out of acceptable range	BTS coupler, RF cable, fiber loss
Over temperature Alarm	Temperature at host or remote is above or below acceptable range	Cooling fins integrity and dirt
Optical Link Quality Alarm	Fiber link quality will be monitored and alarmed.	Fiber loss, optical power output at Host and Remote

4.2 LEDs

4.2.1 LEDs Description

The Remote unit contains three LEDs as described below:



System Green LED
Normal System
operation



System red LED
Indicates alarm during
system operation



Warning LED
Indicates alarm with
low severity

The Host unit contains one bi-color LED:
Green- OK
Red- Alarm.

APPENDIX A. SPECIFICATIONS

Host Unit Specifications

Parameter	Specification
Forward path	
Input Frequency Range	2640.5 – 2673.5 MHz
BW	30 MHz
VSWR	< 1.5:1
Input Power Range	-10 to 10dBm
Max Rated Input Power	-10 to +10 dBm
Gain	-15 to 15dB, nominal –10 dB
Gain control step	1dB
Gain flatness	± 3 dB max, over 30MHz
Reverse path	
Output Frequency Range	2640.5 – 2673.5 MHz
VSWR	< 1.5:1
Max Output Power	–40dBm
Gain	-40 to 5dB
Gain control step	1dB over complete range
Gain flatness	± 0.5dB max, over 10MHz
Electrical Power, Mechanics, Environment	
Dimensions W x H x D [mm]	480 x 44 x 420 (1U)
Weight	3 Kg
Mounting	19" Rack
Operating Temperature	-5 ÷ +50 °C
RF Connectors	N-Type Female
Optical Connectors	FC/APC
Humidity	85% relative
Power Supply	110 VAC. (optional- -48VDC)
Power Consumption	< 40W

Remote Unit Specifications

Parameter	Specification
Forward path	
Output Frequency Range	2640.5 – 2673.5 MHz
BW	30 MHz
VSWR	<1.5:1
Max Output Power	10W
Gain	30 to 70dB, nominal 50 dB
Gain control step	1dB
Gain flatness	± 3 dB max, over 30MHz
Reverse path	
Input Frequency Range	2640.5 – 2673.5 MHz
VSWR	<1.5:1
Noise Figure	<5dB
Gain	30 to 60dB
Gain control step	1dB over complete range
Gain flatness	±-0.5dB max, over 10MHz
Electrical Power, Mechanics, Environment	
Dimensions W x H x D [mm]	659x424x137
Weight	25 Kg
Mounting	Wall
RF Connectors	N-Type Female
Optical Connectors	FC/APC
Operating Temperature	-33 ÷ +55 °C
Humidity	85% relative
Power Supply	110VAC to 230VAC
Power Consumption	< 270W

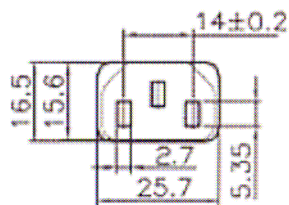
System Specification

Local Management	GUI application through RS-232 port
Monitors / Controls	Operation Frequency, Gain, PA Mute
Alarms	VSWR, Synthesizer Loss of Lock, PA
Fiber Link Wavelength	Single Mode, 1310/1550nm
Supported Fiber Length	Max. 10 km
Absolute Delay	Max. 5µsec, excluding fiber delay

APPENDIX B. CABLES CONNECTIONS AND PINOUT

Host Unit AC Power Cable Pin-out.

Name:LT-501
Type:IEC



Complied Standards:

IEC 320 C13

Rating


10A 250V
7/12/15A 125V
10/13/15A 125/250V

Figure B-1: AC Power Cable Layout

Brown Wire: Live

Blue Wire: Neutral

Yellow-Green Wire: Ground.



WARNING

Ensure you connect the cable correctly!

Remote Unit AC Power Cable Pin-out

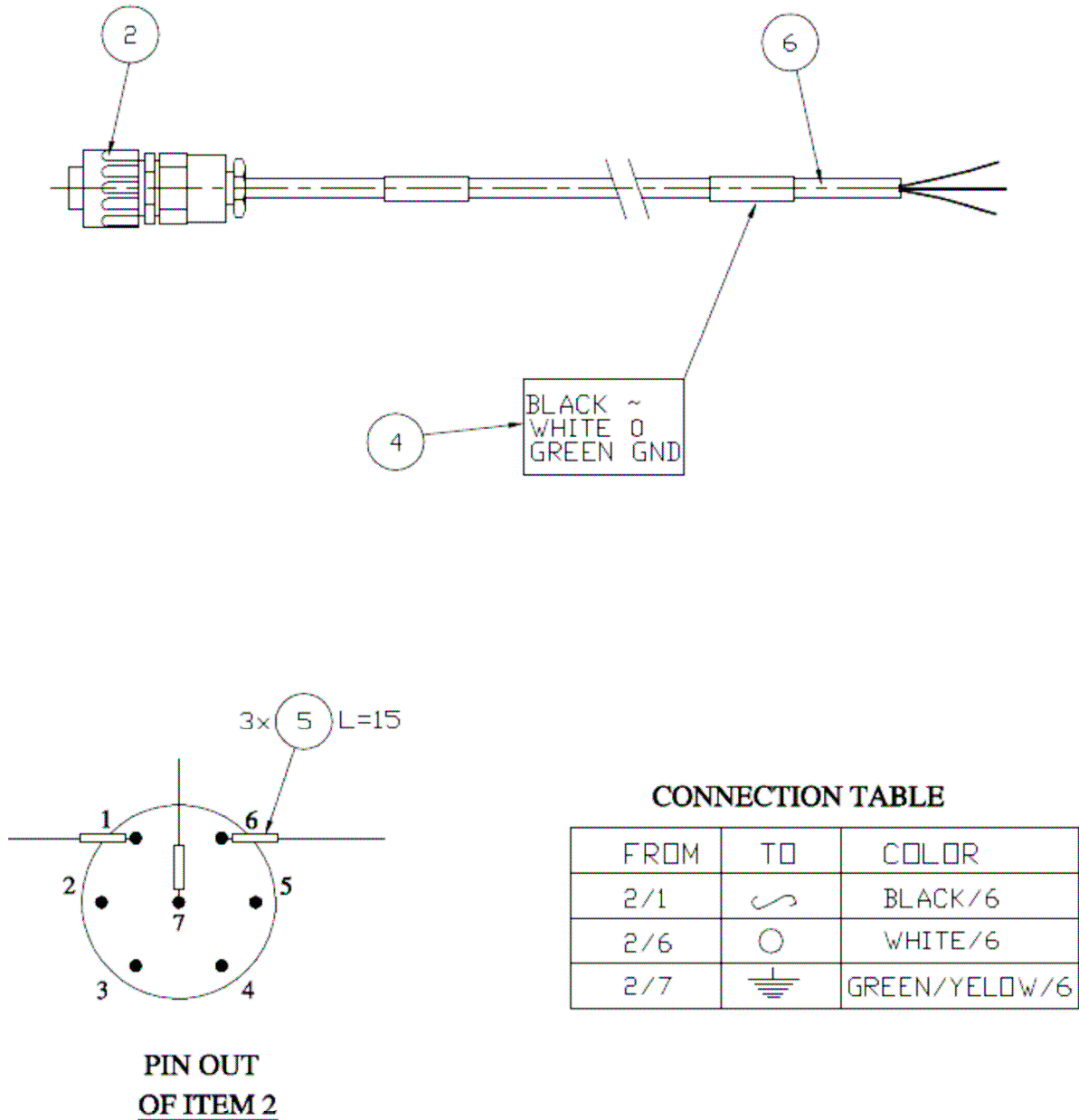


Figure B-3: Remote Unit AC power cable.

Common Cables

Grounding Cables.

Applies to both Host and Remote units.

Use 6 AWG wire, copper wire. Use termination with a hole/holes to accommodate a 1/4" screw.

RS232 Cable:

The following table shows the connector pins for the RS-232 cable.

Table B-1: RS-232 communication connector

Communication Cable	
Pin #	Function
2	PC Rx
3	PC Tx
5	GND

APPENDIX C. ACCESSORIES

Remote Unit Mounting Frame Dimensions

Allow 300 mm spacing between Remote unit top and ceiling.

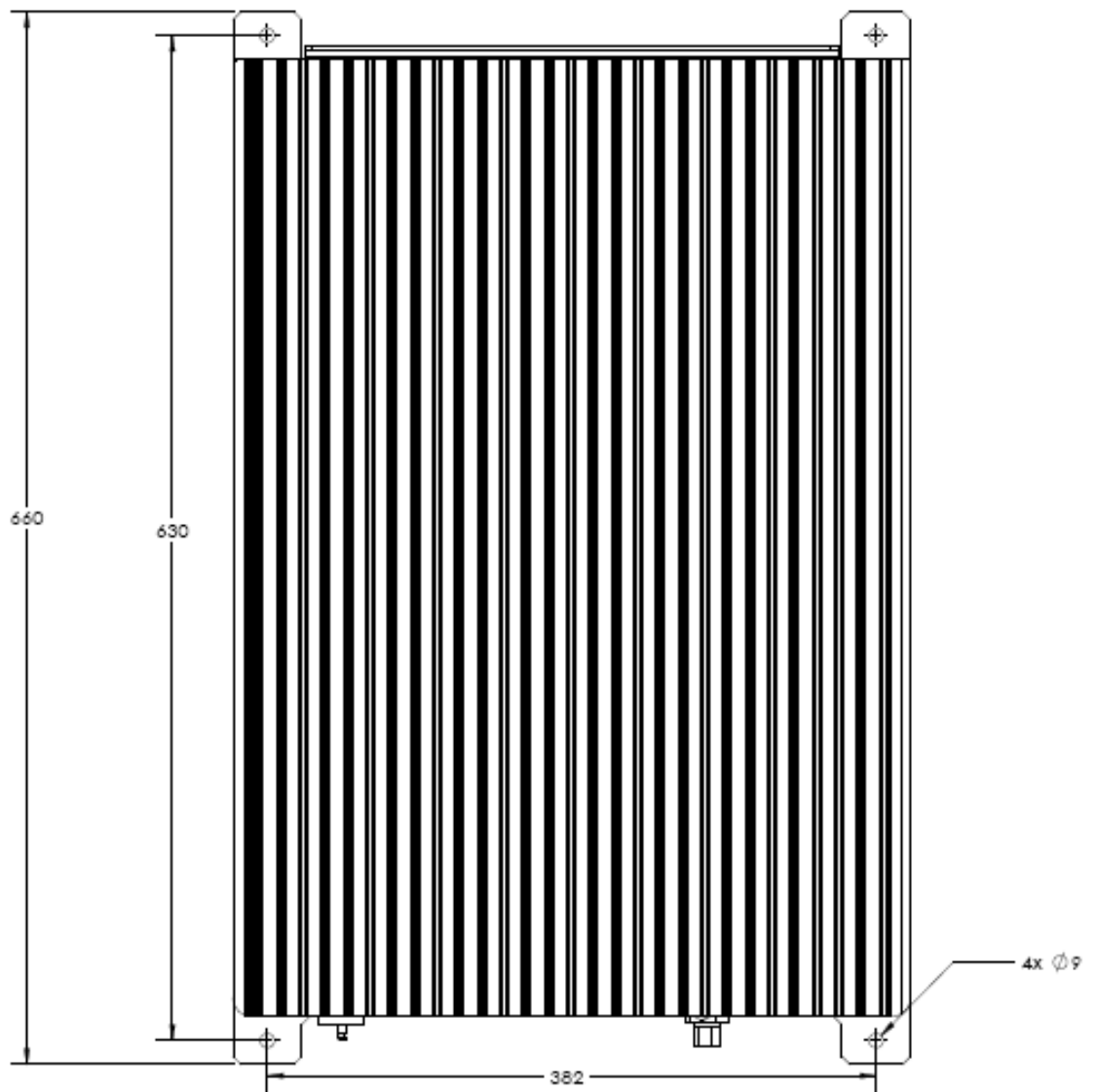


Figure C-1: Remote Unit wall-mount frame

APPENDIX D. RECORDS

Repeater System Installation Record

After setting the Repeater system, it is recommended to write down the site information for future reference.

Site Name (Host/Remote)

System #.....

Personal Phone#

Measured RF Cable Loss

Measured RF Cable Loss

Distribution Ant. to Remote unitdB

Coupler to Host Unit.....dB

Coupler to Fiber Loss.....dB

Fiber Loss.....dB

Down Link Channel Parameters

RSSI level at Remote Unit.....dBm

Remote unit Down Link gaindB

Remote unit measured output powerdBm

Host Down link Gain.....dB

Host measured output power.....dB

Up Link Channel Parameters

Up link Remote unit Gain Setting dB

Remote unit measured output powerdBm

Up link Host Gain SettingdB

Host measured output power ... dBm

Updated by: _____ Signature: _____ Date: _____