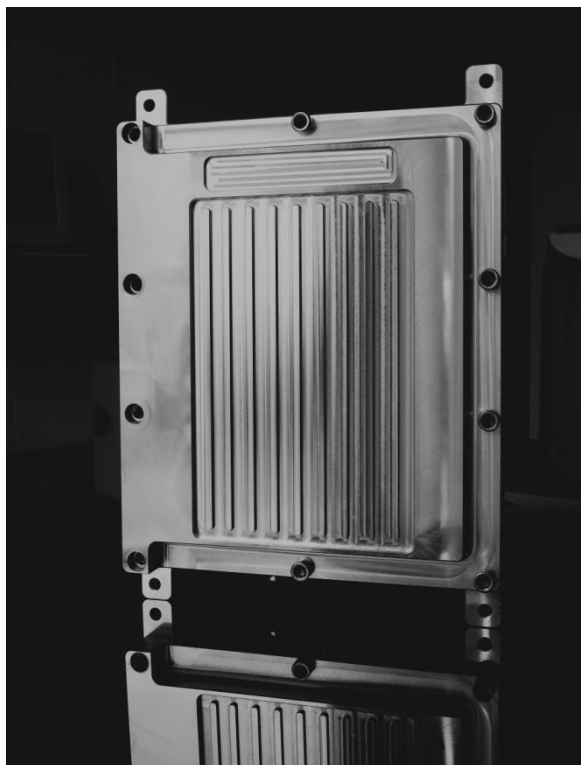


Telcosat Inc

OPERATION & MAINTENANCE MANUAL
CELLULAR CDMA/GSM/WCDMA
REPEATER MODEL RBB 850



WARNING. This is NOT a CONSUMER device. It is designed for an installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties of \$100,000 for each continuing violation.

Any modifications to this device will void FCC and IC approvals.

FCC NOTIFICATION

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Telcosat Inc

OPERATIONS & MAINTENANCE MANUAL CELLULAR REPEATER MODEL RBB 850

TELCOSAT RBB 850

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This document is an operation and maintenance manual. No disclosure or reproduction of the information or drawings shall be made of any other purpose without the prior written consent of Telcosat Inc. Use of the information contained herein to fabricate or assemble any item in whole or in part is expressly prohibited.

Any modifications to this device will void FCC and IC approvals.

A Canadian Company
Telcosat Inc.
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TEL (403) 291-4031
FAX (403) 291-3059

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SAFETY SUMMARY

High voltage is used in the operation of this equipment. Death on contact may result if personnel fail to observe the following safety precautions:

Only qualified trained personnel can install this equipment. Electrical connection and installation must meet your local Electrical Safety Installation codes.

Prior to any maintenance or inspection of this device disconnect the power supply.

Do not remove covers or access plates on the equipment unless you are a trained technician and authorized to carry adjustment and maintenance for this apparatus.

When installing antennas always be aware of high voltage overhead power lines. Contact with power lines will result in severe injury and or death.

To prevent electrical shock or damage to the equipment, do not operate the repeater until you thoroughly understand the operation and function of all controls, indicators, and connectors.

The RBB850 Repeater weighs approximately 25 lbs/ 12 kilograms. The repeater must be attached to the appropriate supporting device using nuts, bolts and lock washers. Material grade, must be a minimum Grade 5, 5/16th" (6mm) diameter and corrosion resistant.

FIRST AID

In case of electrical shock:

THIS PERSON COULD STILL BE IN CONTACT WITH ELECTRICAL POWER. DO NOT TOUCH THIS PERSON BEFORE YOU INSULATE YOUR SELF FROM THE ELECTRICAL SOURCE.

Turn off the electrical power.

If you cannot turn off the electrical power, pull, push, or lift the person to safety using a dry wooden pole, a dry rope, or some other insulating material. Do not use any metallic objects to move this person.

After the injured person is no longer in contact with the electrical source, obtain/perform immediate medical attention.

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CHAPTER 1

SCOPE

1.1 GENERAL

The TELCOSAT RBB 850 Cellular Repeater (consisting of UPLINK and DOWNLINK bidirectional system) contains operational and maintenance information.

- Chapter 1 outlines the manual contents, with description and general application notes
- Chapter 2 contains an operational and product overview.
- Chapter 3 contains of antennas, antenna isolation, installation tools.
- Chapter 4 contains information on the software GUI, connecting to a network, configuring the software and configuring the RBB850 repeater.
- Chapter 5 contains warranty information
- Appendix A contains FCC/IC RF Exposure Requirements and RBB850 repeater specifications.
- Appendix B contains the return goods procedure.

1.2 INTRODUCTION

The TELCOSAT RBB 850 is a bidirectional amplifier system consisting of UPLINK and DOWNLINK amplifiers.

When conventional cellular communication systems cannot penetrate a structure, or reach a target area, such as inside buildings, parking structures, tunnels and remote areas, other methods and or equipment are required.

To overcome coverage issues cellular repeaters can be deployed. Repeaters manufactured by Telcosat, Model RBB850 will alleviate many of these coverage issues.

The Telcosat RBB850 repeater has full remote control, monitoring and alarm feature, accessible over the Internet or IP network. The RBB850 has an internal web interface and a user friendly GUI software interface.

The GUI interface (Graphical User Interface) controls all functions of the repeater.

The RBB850 repeater also comes with digital power control and oscillation detection and control.

1.2.1

Materials

The RBB 850 Repeater is enclosed in a weather proof enclosure. System comes with instruction manual and attached power cord.

Fig. 1-1

Typical TELCOSAT INC remote location Site System

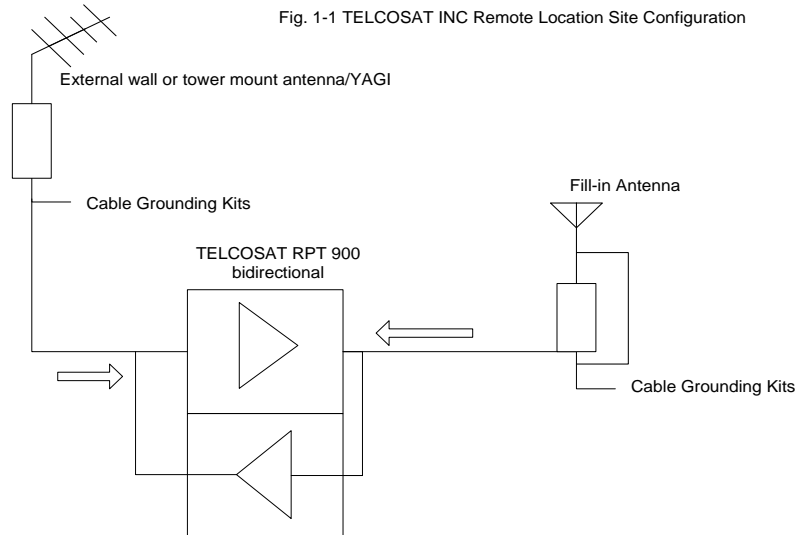


Fig. 1-1

1.3 RBB 850 SPECIFICATIONS

Appendix A contains the TELCOSAT RBB 850 Repeater Specifications.

1.4 TECHNICAL ASSISTANCE

Technical assistance on the TELCOSAT RBB 850 Repeater is available through:

TELCOSAT Customer Service Center,
 Phone: 1-403-291-4031.
 Fax: 1-403-291-3059

EMAIL: inquiries@telcosat.com

CHAPTER 2

OPERATIONAL OVERVIEW

2.1 GENERAL

The TELCOSAT RBB 850 provides service at cellular radio frequencies 824/849MHz & 869/894MHz.

Downlink RF signals from a donor cell site are routed through a pick-up antenna, through a Diplexer then continues to be process by the amplifier chain. The RF signal is amplified and filtered to reject out-

of-band IM products and unwanted radio signals. The downlink RF is injected into a fill-in antenna (coverage antenna) for null-area coverage.

The Up-link signals from mobile units are received into the coverage antenna of the repeater. The incoming signal then passes through a Diplexer, then amplified in the Up-link modules and finally the power amplifier. The Up-link process is the same as the Down-Link process.

2.2 OSCILLATION DETECTION

The RBB 850 has an oscillation detection function. Upon detection of oscillation the repeater will shut down for a short duration, approximately 25 seconds. After 25 seconds the repeater will restart, reduce the RF gain and determine if the repeater is stable. The repeater will continue this process until the oscillations are eliminated. If oscillation cannot be eliminated the repeater will activate the disable mode and will cease to transmit.

The repeater requires a power cycle to reset the auto oscillation detection process, or alternatively the repeater can be reactivated via the GUI web interface.

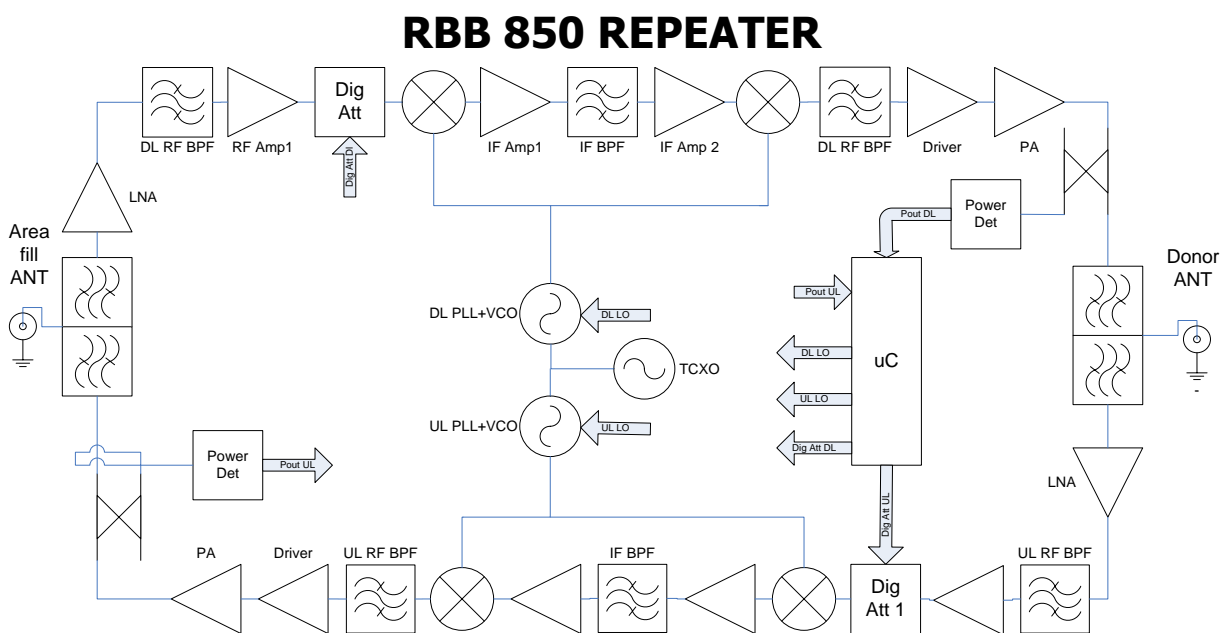


Figure 2-1 illustrated a simplified block diagram of the RBB 850 Cellular Repeater.

2.3 AC POWER DISTRIBUTION

AC input power via a power cord which feeds a power supply that converts the AC to DC low voltage. The DC power provides all the necessary requirements for the active components.

The repeater is equipped with a red LED power on light.

Power Supply Specifications,

-40c° to +50c° Operating Temperature Range

Short circuit, over power and over voltage protection

Input Power, 100-240 VAC

47/63 Hertz

Output Power, 12VDC/5AMPS

Approvals, UL, CUL, CE

CHAPTER 3

WARNING. This is NOT a CONSUMER device. It is designed for an installation by FCC LICENSEES and QUALIFIED INSTALLERS. You MUST have an FCC LICENSE or express consent of an FCC licensee to operate this device. Unauthorized use may result in significant forfeiture penalties, including penalties of \$100,000 for each continuing violation.

INSTALLATION

READ THESE INSTRUCTIONS PRIOR TO INSTALLATION

3.1 WARNING

Cellular Repeaters should be installed by fully trained technicians. Improper installation and excessive RF power levels can cause interference with the operation of cellular towers.

Antennas must be mounted in a secure safe manner and according to safe working practices.

To protect your equipment, lightning protection hardware is recommended when installing a cellular repeater unit.

Antennas must not be installed near overhead electrical power lines as this can cause serious injury and or death.

If you require any additional installation guidelines then please consult your supplier or consult with an RF Systems Engineer.

3.2 TOOLS REQUIRED

Spectrum analyzer with a tracking generator, frequency ranges 1 Gigahertz.
Optional Signal Generator for onsite testing of the repeater, frequency range of 1 Gigahertz minimum.
Antenna analyzer.
Computer with all necessary cables.
Multi-meter.
Hand tools.
Water proofing tape.
Coax cable straps for support.
Cellular Phone.

3.3 ANTENNA REQUIREMENTS

ANTENNAS: please read your manufacturers antenna specifications before installation. Your antenna will require a type “N” connection. The antenna, coax, and fittings must be 50 ohms impedance.

MAXIMUM ANTENNA SIZE CONNECTED TO THE RBB850 REPEATER IS 18dBi,

The cellular repeater requires antennas that operate in the desired frequency range of the cellular repeater. The RBB850 Repeater has a frequency operating range of 824 to 849 Megahertz for the up-link, and 869 to 894 Megahertz for the downlink. Your antennas must operate within these frequencies. Failure to select the proper antennas will degrade the performance of your repeater.

NOTE:

“UP-LINK” is the radio link from your hand held cellular phone to the cellular tower in the frequency range of 824/ 849 Megahertz

“DOWN-LINK” is the radio link from the cellular tower to your cellular phone in the frequency range of 869 /894 Megahertz.

3.4 ANTENNA ISOLATION & COAX CABLES

To protect wireless cellular networks from interference caused by oscillation, the RBB850 Repeater has internal automatic oscillation detection/control and auto shut down of the repeater.

Improper installation practices could can initiate automatic shut-down of your repeater.

All repeaters require antenna isolation to prevent oscillation. The usable gain level of your repeater is directly linked to the antenna isolation values. The maximum gain of your repeater must be adjusted to a minimum of 10 dB lower than your antenna isolation values. For example, if your antenna isolation value is 75dB then your maximum usable repeater gain is 65dB.

Due to the variations of system layouts and requirements it is not possible to have one procedure that will suffice every installation. You are strongly advised to acquire the services of an RF system designer to calculate your antenna isolation requirements.

Ensure that your antennas are at the maximum possible distance apart. Do not place antennas in close proximity to each other; otherwise you will activate the oscillation detection process. Coax cables should be low loss 50 ohm, and suitable for 800 Mhz band frequency. Antenna connections should be clean and moisture free. Do not spray lubricant into the connectors as this prevents the signal traveling through the coax. Use a cleaning solvent that has no oil and does not leave any residue. High quality oil-less contact cleaner is suitable.

All coax connectors must be water tight and wrapped with water proof tape. Any moisture in the connectors will degrade or eliminate the signals.

3.5 ANTENNA CONNECTIONS ON THE RBB850



The RBB850 can be installed indoors or outdoors. If mounted indoors ensure there is no elevated room temperatures and free flowing air for cooling of the repeater.

Connect the antenna that is aimed at the Cell Tower to the bottom left side N connector.

Connect the antenna that is aimed towards the Area Fill (target site) to the bottom right side N connector.

Connect your Ethernet cable to the connector socket located on the left side of the power on LED light.

NOTE; Water proof boot cover for the Ethernet connection, contact your Repeater supplier.

3.6 Aligning the Donor Antenna.

With the aid of a spectrum analyzer, connect your Donor antenna (antenna aimed at the Cell tower) to your spectrum analyzer and adjust your antenna to the maximum receive signal level. This process assures the Donor antenna is accurately aligned to the cell tower.

3.7 Adjusting area fill coverage (down link) to the target site/location.

Accessing your RBB850 software interface, Increase your downlink receive signal in 2dB increments to the required receive level. You will see the receive signal bars on your cellular phone increase in strength. Use test and measuring equipment to accurately adjust the down link receive signal level.

3.8 Adjusting Uplink (Reverse Link) RF power to cellular tower.

You are strongly advised to consult an RF Engineer to calculate the reverse link RF power settings.

Too much RF signal transmitting to the cellular tower can cause interference and degrade the performance of the cellular tower causing service disruptions. This must be avoided 100%

Accessing your RBB 850 software interface you can adjust your RF reverse link power settings.

For basic settings start your reverse link RF power levels at the lowest setting. Increase your RF transmit level in 1 dB increments. After every adjustments try to make a call. If your call does not connect increase the power setting 1dB and try to make a call. Continue this process until a call is established.

When you can connect to the cell tower the call should quickly connect and the calling process will immediately start and you will hear the dialing tone. At this point increase your power level an additional 2dB. Make a test call for connectivity quality.

This is your minimum RF power transmit setting for the reverse link to the cell tower.

Consult with the Wireless operator while you adjust your reverse link RF power settings. The operator can monitor the receive signals from your RBB 850 at the cell tower. They will instruct you if you can increase power or you need to decrease your power settings.

If you follow this process and you cannot make a call you must turn the RBB850 off and disconnect your power cord. Consult with your RF Technician/Engineer to rectify the problem.

3.9 ADJUSTING REVERSE LINK MAXIMUM POWER LEVEL.

Additional protection is gained if the reverse link maximum power level is adjusted to prevent the possibility of sudden unwanted high input RF levels. This can happen in various ways, mobile cellular vehicle boosters coming within range of the cellular repeaters, malfunctioning cellular phones, or other stray signals.

The RBB850 has an adjustable Maximum allowable RF Power limit. The maximum allowable RF power limit is 25dBm. The digitally controlled attenuator will not permit RF signal levels greater than 25dBm.

The user can decrease the maximum allowable RF transmit power from 25dBm to 0.0dBm. The microprocessor controlled digital attenuator will maintain the preset allowable RF transmit power limit regardless of unwanted high input signal levels.

Decreasing the level of maximum RF reverse link power helps to reduce possible cellular tower interference for sudden elevated RF power, especially when the RBB850 repeater is installed in areas where the cellular towers are less than 5 kilometres (2 miles) distance.

CHAPTER 4

CONNECTING THE RBB850 REPEATER TO A COMPUTER OR NETWORK

4.1 The default IP address of the Repeater

IP 192.168.1.100
NETWORK MASK
255.255.255.0

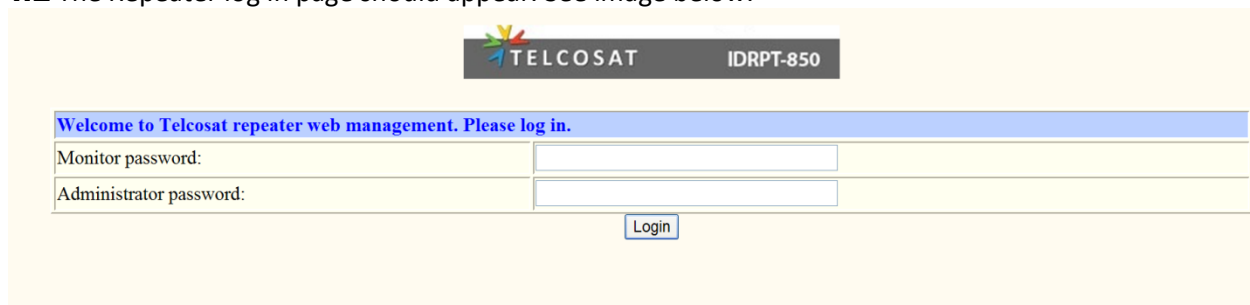
To connect your computer to the repeater you need to configure your network card in your computer to the following IP

IP 192.168.1.99
NETWORK MASK
255.255.255.0

Start your Internet Browser, for example Windows Internet Explorer.
In the browser address bar type in, <http://192.168.1.100>

REPEATER LOGIN SCREEN

4.2 The Repeater log in page should appear. See image below.



TEL COSAT IDRPT-850	
Welcome to Telcosat repeater web management. Please log in.	
Monitor password:	<input type="password"/>
Administrator password:	<input type="password"/>
<input type="button" value="Login"/>	

REPEATER LOGIN PAGE

The default log in password for the Administration is **“telcosat”**

The default log in password for the Monitoring password is **“telcosat”**

You can change the password in the System Setup Screen.

The repeater will allow two levels of password.

The Monitor Password only allows the user to view the details and cannot make any adjustments.

The Administrator Password allows the user to make all adjustments to the repeater and also change password settings.

REPEATER STATUS PAGE

4.3

> Menu > Status of Repeater	
System Information	
Firmware Version:	0.03
Repeater Model:	RBB-850
Repeater Serial Number:	1111-2222-3333-4444
Date Installed:	Jan 1, 2012
MAC Address:	00:80:a3:91:9a:2c
IP Address:	192.168.1.100 fe80::280:a3:ffe91:9a2c
Location of Repeater	
Number:	1
Street:	100
City:	Calgary
Province/State:	Alberta
Country:	Canada
Latitude:	0.00
Longitude:	0.00
Working Status	
Temperature of Unit:	34.2C
DC Current of Forward Link (To area fill):	91mA
DC Current of Reverse Link (To cell tower):	85mA
RF max power setting of Forward Link:	25dBm
RF max power setting of Reverse Link:	25dBm
RF power gain setting of Forward Link:	70dB
RF power gain setting of Reverse Link:	70dB
RF Power amplifier of Forward Link:	Off
RF Power amplifier of Reverse Link:	Off
Email Alarm	
Email Notification Sent To:	inquiries@telcosat.com inquiries@telcosat.com inquiries@telcosat.com
Number of Email Alarms Sent:	0

The “Status Page” is a summary of current settings of the repeater. This page is only a status page. No repeater adjustments can be performed from this screen.

When the repeater is remotely accessed using the Monitoring Mode, this page is displayed.

REPEATER SET UP PAGE

4.4

The screenshot shows the 'Repeater Setup' page with a navigation bar at the top containing '> Menu > Repeater Setup' and '<<'. The page is divided into two main sections: 'Repeater Adjustments' and 'Alarm Thresholds'.

Repeater Adjustments

RF Gain Forward Link (To Area Fill):	70dB	▼
RF Gain Reverse Link (To Cell Tower):	70dB	▼
RF Maximum Power Forward Link (To Area Fill):	25dBm	▼
RF Maximum Power Reverse Link (To Cell Tower):	25dBm	▼
Power Amplifier Forward Link (To Area Fill):	Off	▼
Power Amplifier Reverse Link (To Cell Tower):	Off	▼

Alarm Thresholds

Temperature High Alarm (C):	70	(10 to 80)
DC Current Low Alarm Forward Link:	0	(1-100mA)
DC Current Low Alarm Reverse Link:	0	(1-100mA)
DC Current High Alarm Forward Link:	1000	(200-500mA)
DC Current High Alarm Reverse Link:	1000	(200-500mA)
Email Alarm Counter:	<input type="checkbox"/> Reset Email Alarm Counter	

At the bottom left of the form is a 'Save Settings' button.

The Repeater Set-up Page is where all adjustments/settings are performed. Enter the required setting in the box and then click the “Save Settings” box. You can verify the setting by reviewing the “Status Page”

4.5 ALARM THRESHOLDS

Alarm thresholds will send an email alerting that the number in the threshold boxes have been reached. For example, the Temperature high alarm box is set to 70c°. If the temperature of the repeater reaches 70c° an email alert will be sent from the repeater.

Setting the Alarm Thresholds

Power up the repeater, allow the unit to warm up to operating temperature, log in and go to the **Repeater “Status Screen”**. Look for the **Repeater Status Screen**, then look for **Working Status Box** on the same page.

DC current of the Forward Link and the DC current of the Reverse Link.

4.6 High Current Alarm Settings

Using the data from the manual for this example only, REPEATER STATUS PAGE,

Displayed is DC current Forward Link 91mA

Displayed is DC current Reverse Link 85mA.

This is the normal operating current from your repeater and should be used as a guide line for Alarm Threshold.

Add another 5mA to each value, $91+5=96$ mA Forward Link

$85+5=90$ mA Reverse Link

The new values can be inserted into the Threshold Alarm settings

DC current High alarm Forward Link set to 96mA

DC current High alarm Reverse Link set to 90mA

In the event that the current reaches this alarm setting, an email will be sent, sudden high current could indicate a possible problem.

4.7 Low Current Alarm Settings

Using the same data set from the Status Page.

For low current alarm threshold we need to be less than the normal operating current. For low current settings minus 5mA from the operating current.

Minus 5mA to each value, $91-5=86$ mA Forward Link

$85-5=80$ mA Reverse Link

DC current low alarm Forward Link set to 86mA

DC current low alarm Reverse Link set to 80mA

In the event that the current reaches this alarm setting, an email will be sent.

Sudden low current could indicate a possible problem or failure.

4.8 EMAIL ALARM COUNTER.

The email alarm counter records the number of times and email was sent. You can reset the counter to zero by clicking the Reset Alarm Counter Box.

ALARM SET-UP PAGE

4.9

This page allows the user to configure the email settings for the alarm recipient. This page allows the user to enable or disable the Send Alarm Email. After entering the information the user must click the Saves Settings box.

The screenshot displays the 'Email Alarm Setup' page. It features a breadcrumb trail at the top: '> Menu > Email Alarm Setup'. The page is divided into two main sections: 'Email Recipients' and 'Alarm Selection'.

Email Recipients Section:

Recipient 1:	<input type="text" value="inquiries@telcosat.com"/>	Re-enter To Confirm:	<input type="text" value="inquiries@telcosat.com"/>
Recipient 2:	<input type="text" value="inquiries@telcosat.com"/>	Re-enter To Confirm:	<input type="text" value="inquiries@telcosat.com"/>
Recipient 3:	<input type="text" value="inquiries@telcosat.com"/>	Re-enter To Confirm:	<input type="text" value="inquiries@telcosat.com"/>

Below the table is a button labeled 'Send a test Email'.

Alarm Selection Section:

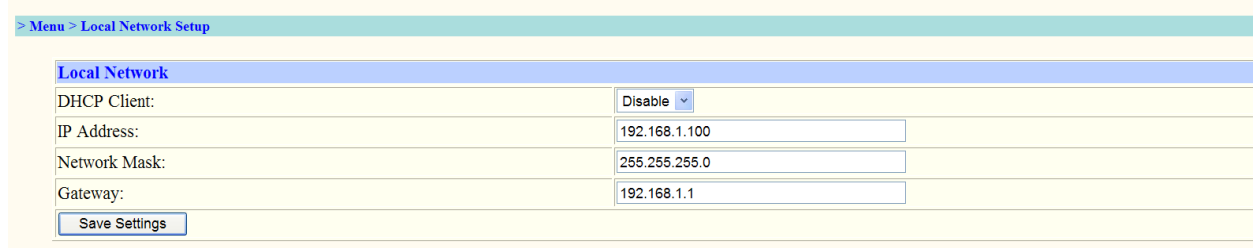
High Temperature Alarm:	<input type="checkbox"/> Send alarm E-mail
High Current Alarm Forward Link:	<input type="checkbox"/> Send alarm E-mail
Low Current Alarm Forward Link:	<input checked="" type="checkbox"/> Send alarm E-mail
High Current Alarm Reverse Link:	<input type="checkbox"/> Send alarm E-mail
Low Current Alarm Reverse Link:	<input type="checkbox"/> Send alarm E-mail
Door Open Alarm:	<input type="checkbox"/> Send alarm E-mail

At the bottom of this section is a button labeled 'Save Settings'.

The bottom portion of the image is a duplicate of the top portion, showing the same form structure.

LOCAL NETWORK SETUP

4.10



The screenshot shows a web interface for 'Local Network Setup'. At the top, there is a breadcrumb trail: '> Menu > Local Network Setup'. Below this is a blue header bar with the text 'Local Network'. The main content area is a table with four rows for configuration: 'DHCP Client' with a dropdown menu set to 'Disable', 'IP Address' with a text box containing '192.168.1.100', 'Network Mask' with a text box containing '255.255.255.0', and 'Gateway' with a text box containing '192.168.1.1'. At the bottom left of the table is a 'Save Settings' button.

Local Network	
DHCP Client:	Disable
IP Address:	192.168.1.100
Network Mask:	255.255.255.0
Gateway:	192.168.1.1
<input type="button" value="Save Settings"/>	

The local network set-up screen allows the user to modify the network setup. Enter the new information into each box and click the Save Settings box. Verify the settings in the System Status page. The user must record the network settings for future reference and access requirements.

4.11 RESETTING THE IP/NETWORK MASK DEFAULT

In the even the IP/Network information is not available then a manual reset has to be performed on the repeater.

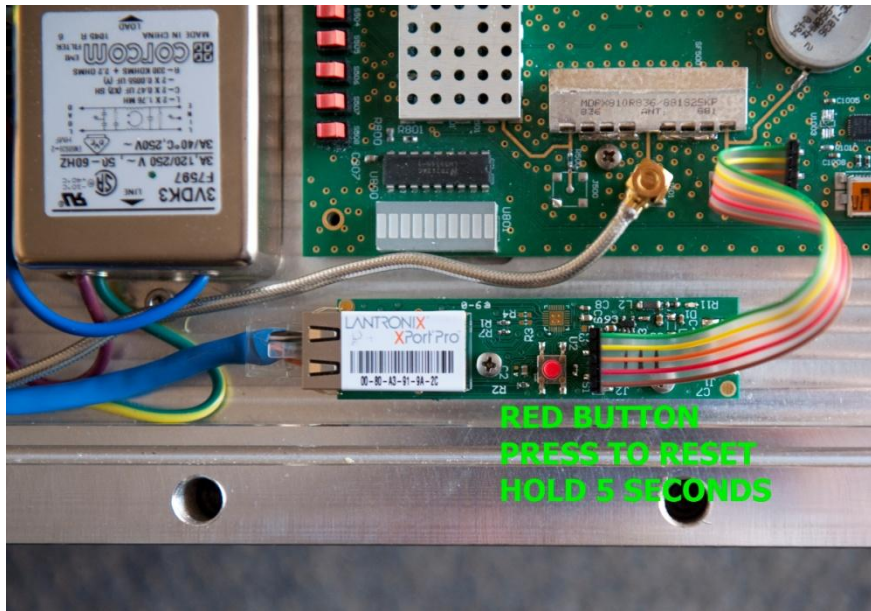
Remove the 10 Allen Head type bolts, use an 8 mm Hex Key wrench.

There is a small push button, press and hold for 5 seconds.

The default IP will be reset to 192.168.1.100

The default Network Mask will be reset to 255.255.255.0

See attached image to locate the RESET BUTTON.



4.12 PASSWORD SETUP AND REPEATER LOCATION SCREEN

Administration Password

Type in your new password in the Administration box. You will be required to retype your password to ensure accuracy. It is recommended that you use minimum of 12 characters, letter number mix for security. Click the Save Settings button.

The Administration screen allows the user to access all settings and make changes. Your Administration password should be different from your Monitoring Password.

Monitoring Password

Type in your new password in the Monitoring box. Retype your password to ensure accuracy. Click the Save Settings button.

The Monitoring screen does not allow the user to make any changes. The user can only view the data.

System Setup Screen

4.13 Repeater Location Setup Screen.

The repeater location box allows the user to insert the address and or location of the repeater. The location Latitude and Longitude are in Degrees Decimal. After entering data Click the Save Settings box.

Menu > System Setup	
Password Setup	
Administration Password:	<input type="password"/> <input type="password"/>
Monitoring Password:	<input type="password"/> <input type="password"/>
Repeater Location Setup	
Number:	<input type="text" value="1"/>
Street:	<input type="text" value="100"/>
City:	<input type="text" value="Calgary"/>
Province/State:	<input type="text" value="Alberta"/>
Country:	<input type="text" value="Canada"/>
Latitude:	<input type="text" value="0.00"/>
Longitude:	<input type="text" value="0.00"/>
Others	
Repeater Model:	<input type="text" value="RBB-850"/>
Repeater Serial Number:	<input type="text" value="1111-2222-3333-4444"/>
Date Installed:	<input type="text" value="Jan 1, 2012"/>
<input type="checkbox"/> Update:	Please choose a firmware image to upgrade <input type="button" value="Browse..."/>
<input type="checkbox"/> Reboot:	<input type="button" value="Reboot Device"/>

CHAPTER 5

WARRANTY AND REPAIR

5.1 WARRANTY

Your Telcosat Repeater is guaranteed against manufacturers defects for 2 years.

Telcosat Inc retains the right to decide if the fault/defect is a manufacturer's defect.

Telcosat Inc will not accept liability for any damage caused through improper use or poor installation practices.

5.2 Limited Warranty

Hardware. Telcosat Inc or any subsidiary selling the Product (RBB850 Cellular Repeater) warrants that commencing from the date of shipment for a period of 2 years factory warranty against manufactures defect. Warranty includes parts and labour only.

Note, freight is not included in the warranty. Shipper is liable for all freight costs.

Telcosat Inc reserves the right to determine if repair claims are Warranty, or damage caused by some other reason, for example and not limiting to, lightning strikes etc.,

EXCEPT AS SPECIFIED IN THIS WARRANTY, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS, AND WARRANTIES INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT, SATISFACTORY QUALITY, NON-INTERFERENCE, ACCURACY OF INFORMATIONAL CONTENT, OR ARISING FROM A COURSE OF DEALING, LAW, USAGE, OR TRADE PRACTICE, ARE HEREBY EXCLUDED TO THE EXTENT ALLOWED BY APPLICABLE LAW AND ARE EXPRESSLY DISCLAIMED BY TELCOSAT INC, ITS SUPPLIERS AND LICENSORS. TO THE EXTENT AN IMPLIED WARRANTY CANNOT BE EXCLUDED, SUCH WARRANTY IS LIMITED IN DURATION TO THE EXPRESS WARRANTY PERIOD. SOME STATES OR JURISDICTIONS DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS; THE

ABOVE LIMITATION MAY NOT APPLY. THIS WARRANTY GIVES CUSTOMER SPECIFIC LEGAL RIGHTS, AND CUSTOMER MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM JURISDICTION TO **JURISDICTION**. This disclaimer and exclusion shall apply even if the express warranty set forth above fails of its essential purpose.

Restrictions. This warranty does not apply if the Product or any other equipment upon which the Product is authorized to be used (a) has been altered, except by Telcosat Inc, (b) has not been installed, operated, repaired, or maintained in accordance with instructions supplied by Telcosat Inc, (c) has been subjected to abnormal physical or electrical stress, misuse, negligence, accidents forces of nature, earthquakes, lightning strikes, vandalism, and civil unrest.

5.3 Storage of Equipment

When storing your equipment you must place the unit in a dry location, away from direct sun exposure and take measures to prevent moisture/condensation build up in your repeater enclosure.

Silica Gel bags should be placed inside the enclosure to absorb moisture. The door on the enclosure should be closed and sealed. The silica gel bags should be changed /inspected at regular intervals to ensure proper functionality of the material.

You are strongly advised to seek the advice of a professional company that has expertise in long term preservation techniques of electronic equipment.

Maximum storage temperatures of your Telcosat Repeater is +50c (122F)

Minimum storage temperature of your Telcosat Repeater is -40c (-40F)

Appendix A

Specifications for Telcosat Repeater Model RBB850

Frequency Range:	Down link 824-849MHz / Up-link 869-894MHz
Overall systems Gain	70dB
Band Width	25 Megahertz
RF Composite Power	+25dBm
Noise Level	< Less than 5dB
RF Gain Adjustment	31.5 dB with 0.5dB increments via software
Antenna Connector	N type Female 50 ohms
EVM	<less than 3%
Ethernet Connector	RJ45
Power Requirements	110/240 VAC 47/63 Hertz
Power Consumptions	20 Watts
Enclosure Rating	IP67
Enclosure Material	Aluminium

EMC	EMC Compliant
Operating Temperature	-40°C to +50°C
Storage Temperature	-40°C to +70°C
Weight	25 lbs (11.4 Kilograms)
Dimensions	H x W x D 16.5"ins x 12"ins x 3inches (470mm x 305mm x 76mm)
Warranty	Two years
FCC and Industry Canada	Certified FCC and Industry Canada

Appendix A

NOTE RULE: RSS-133 section 5.3

The manufacturers rated output power of this equipment is for single carrier operation. For situations when multiple carrier signals are present, the rating would have to be reduced by 3.5dB, especially where the out-put signal is re-radiated and can cause interference to adjacent band users. This power reduction is to be by means of input power or gain reduction and not by an attenuator at the out-put device

FCC/IC RF Exposure Requirements.

Maximum Antenna size 18dBi

FCC antenna(s) used for this transmitter must be installed to provide a separation distance of at least 51.61 centimetres (cm) (20.32 inches) from all persons, and must not be co-located or operating in conjunction with any other antenna or transmitter.

Any modifications to this device will void FCC and IC approvals

APPENDIX B RETURNED GOODS PROCEDURE

B1. Technical Information

Contact Telcosat Inc or your supplier to determine whether or not an item should be returned for repair.
Contact Telcosat Inc 403 291 4031
Email, inquiries@telcosat.com

B2. Return Identification

Please provide the following information with each repair.

Date of requested repairs.
Customer name with full address for returning goods
Contact person responsible for returning the product for repairs
Client telephone number
Serial number
Original purchase date
Reason for return.

B3. Shipping Procedure

Ship all returned goods PREPAID to the following address:

Product Repairs,
Telcosat Inc,
Bay 116 1919 – 27th Avenue NE,
Calgary, Alberta,
Canada. T2E 7E4
Telephone 403 291 4031
Fax 403 291 3059
Email: inquiries@telcosat.com

Your commercial invoice must state REPAIR/RETURN. Failure to provide proper Commercial Invoices may result in taxes and duties which will be charged back to the client.

B4. Return Shipments

All returned shipments will be sent PREPAID, to the customer's indicated address.
Any extra packaging material will be charged back to the client.

B5. Repair / Return Status

Under normal circumstances defective items will be replaced repaired within 5 working business days of receipt.

Telcosat Inc will inspect and test your repeater in a lab environment. Upon completion of the inspection a written estimate will be provided to the client. A minimum charge of \$500.00 will be charged to the client to cover the cost of inspection and testing plus minor repairs.