

# RD-2020 CDMA AWS BANDWIDTH ADJUSTABLE REPEATER

## INSTALLATION GUIDE



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## 0.4 HISTORY

Change No.	ENU	Details Of Change
1	1-0-0	This manual first created in July 2010.

## 0.5 GLOSSARY OF TERMS

Abbreviation	Definition
ALC	Automatic Level Control
ATT	Attenuator
BTS	Base Transceiver Station
dB	Decibel
dBm	Decibels relative to 1 milliwatt
DL	Downlink
DT	Donor Terminal
DPX	Duplexer
FS	Frequency Selection
Hz	Hertz
ID	Identification
LNA	Low Noise Amplifier
MCU	Main Control Unit
MHz	Megahertz
MT	Mobile Terminal
MTBF	Mean Time Between Failures
NF	Noise Figure
OMC	Operation & Maintenance Center
OMT	Operation & Maintenance Terminal
PLL	Phase Locked Loop
PSU	Power Supply Unit
RF	Radio Frequency
SMA	Sub-Miniature A Connector
SMS	Short Message Service
UL	Uplink
VAC	Volts Alternating Current
VDC	Volts Direct Current
VSWR	Voltage Standing Wave Ratio
WCDMA	Wideband-Code Division Multiple Access

## 0.6 SAFETY NOTICES AND ADMONISHMENTS

This document contains safety notices in accordance with appropriate standards. In the interests of conformity with the territory standards for the country concerned, the equivalent territorial admonishments are also shown.

Any installation, adjustment, maintenance and repair of the equipment must only be carried out by trained, authorised personnel. At all times, personnel must comply with any safety notices and instructions.

Specific hazards are indicated by symbol labels on or near the affected parts of the equipment. The labels that conform to international standards are triangular in shape, and are coloured black on a yellow background. An informative text label may accompany the symbol label.

Hazard labeling is supplemented by safety notices in the appropriate equipment manual. These notices contain additional information on the nature of the hazard and may also specify precautions.

### **Warning Notices:**

These draw the attention of personnel to hazards that may cause death or injury to the operator or others. Examples of use are cases of high voltage, laser emission, toxic substances, point of high temperature, etc.

### **Alert Notice:**

These draw the attention of personnel to hazards that may cause damage to the equipment. An example of use is the case of static electricity hazard.

Caution notices may also be used in the handbook to draw attention to matters that do not constitute a risk of causing damage to the equipment but where there is a possibility of seriously impairing its performance, e.g. by mishandling or gross maladjustment. Warnings and Cautions within the main text do not incorporate labels and may be in shortened form.

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

Caution: The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. 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 communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

To comply with FCC RF exposure requirements, the device and the antenna for this device must be installed to ensure a minimum separation distance of 2.84 meters or more from a person's body. Other operating configurations should be avoided.

End of section

## 1 GENERAL INFORMATION

The RD-2020 CDMA AWS bandwidth adjustable repeater is designed for operation in the CDMA network for AWS band. Band specific linear amplifier and filtering effectively amplifies the desired Node B carrier and provides superior out-of-band rejection. Typical units with adjustable bandwidth are programmed to specific requirements of the network. Remote configuration and surveillance is possible through Comba's remote control and monitoring system, via PC or wireless modem to the OMC. Internal Li-ion battery backup ensures alarm signals are sent out in the event of power failure. The RD-2020 comes in a sealed, well-ventilated cast aluminum enclosure, suitable for all weather conditions.

### Main Features:

RD-2020 is a high quality repeater with the following features:

- Integrated wireless modem for remote configuration, monitoring and control (Optional).
- Internal backup battery keeps the alarm unit running for up to three hours in the event of power failure (Optional).
- OMC is available for remote operation and maintenance. (Optional)
- Designed for all outdoor installation - waterproof, damp-proof and omni-sealed (IP65).

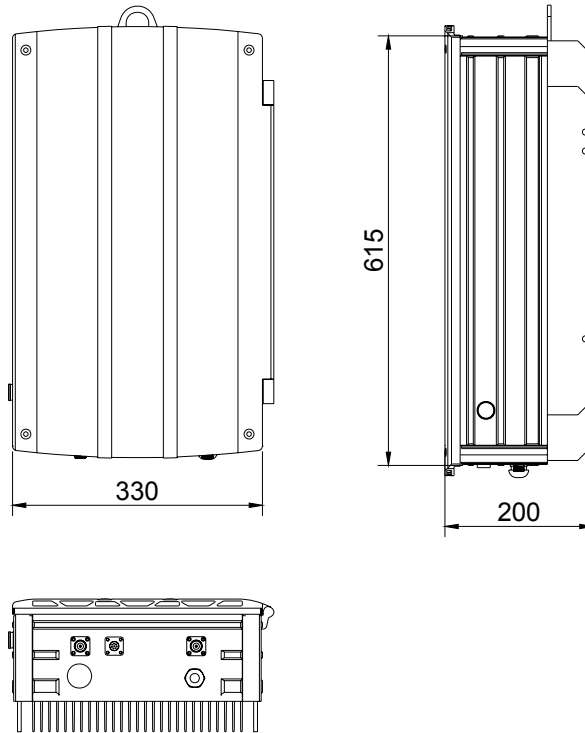


Figure 1: Front, Side and Bottom Views of Enclosure

End of section

## 2 EQUIPMENT DESCRIPTION

### 2.1 RD-2020 FUNCTIONAL BLOCK DIAGRAM

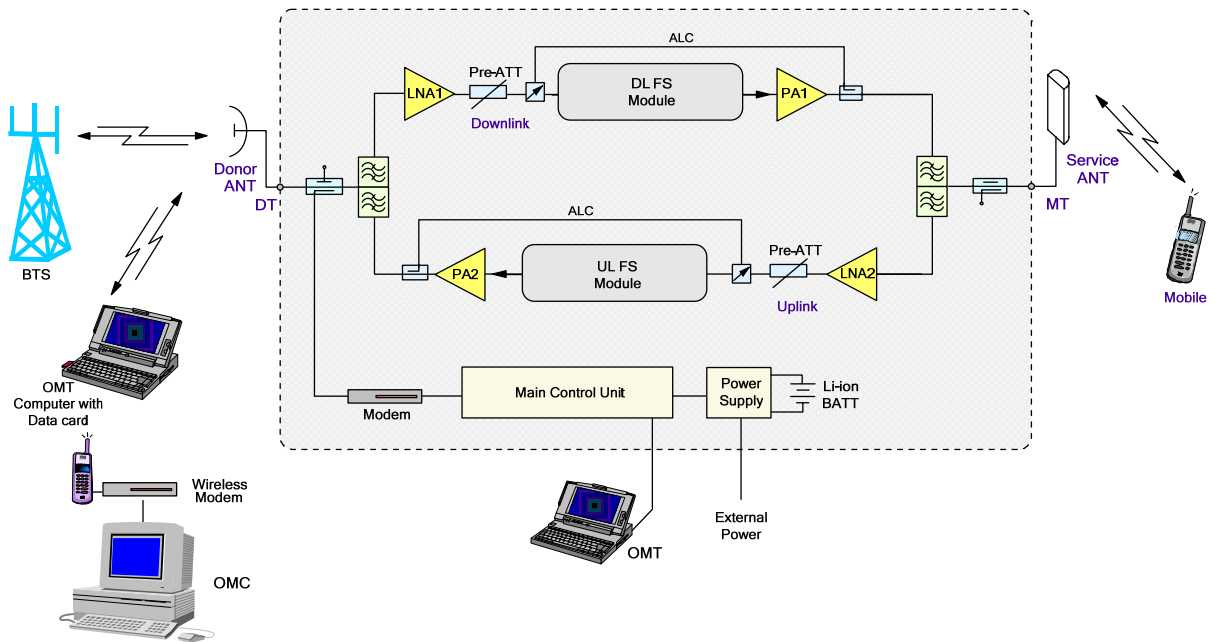


Figure 2: Functional Diagram

In the downlink, the BTS signals are received by donor antenna of the equipment. After the duplexer, the signals are sent to the LNA module for pre-amplification, followed by band selection using the Frequency Selection (FS) modules. The power amplifiers (PA) can amplify all carriers within the passband to the maximum output power permitted. The duplexer permits combining with the uplink signals to share a single service antenna.

In the uplink, the mobile signals are received by the service antenna. After the duplexer, the signals are sent to the LNA, FS and PA modules before duplexing with the downlink signals. The uplink signals are sent to the donor antenna for transmission back to the BTS.



## 2.2 EQUIPMENT LAYOUT

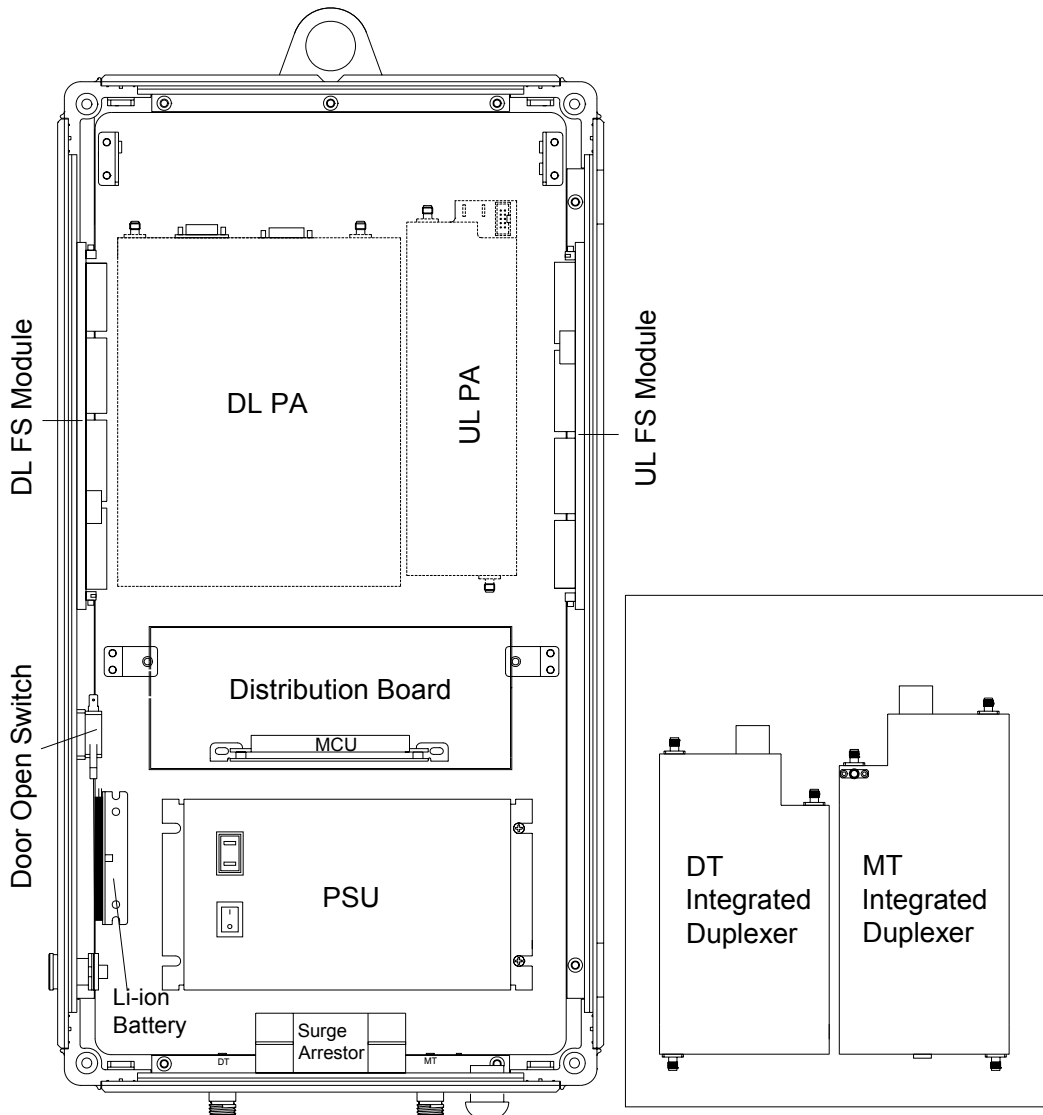


Figure 3: Layout of Equipped Product

### 2.3 EQUIPMENT CONSTITUTION

The RD-2020 consists of the following modules:

**Frequency Selection (FS):** The FS is used to select the desired carriers and reject unwanted signals.

**Power Amplifier (PA):** It fulfils power amplification in both UL and DL branches.

**Duplexer (DPX):** The DPX is located towards the DT and MT terminals and permits the uplink and downlink signals to share a common antenna. One LNA is integrated in each DPX.

**Li-ion Battery:** The Li-ion battery pack is enclosed within a plastic cover and provides back-up supply to the MCU to send out alarm signals in the event of mains failure.

**Main Control Unit (MCU):** The MCU is used to monitor and control the operation of the equipment. It also provides the communication interface for remote control and indication. LED indicators provide the operation status of the MCU.

**Power Supply Unit (PSU):** The PSU converts the input voltage into a stable DC to provide power for the internal functional modules and to charge the internal Li-ion battery.

**Distribution Board:** The distribution board serves as a distributor for power and internal communication within the equipment. It provides connectivity to function modules, MCU, RS232 port for local control.

**Surge Arrestor:** The AC Mains surge arrestor is mounted next to the PSU and has three connections: VAC Live, Neutral and Ground. This provides protection to the PSU. It is assumed that the antenna system will have ample lightning protection. On the top of each surge arrestor is a little window with a coloured indicator. 'Green' indicates protection is available, and in the event of a fault, the colour will turn to 'Black'. When this occurs, the surge protector has to be replaced.

Note: When the equipment is DC powered, no surge arrestor is required.

## 2.4 KITS OF PART

For this system, the following are shipped:

Product Identifier	Description	Quantity
Allen Key	5.5mm	1
CPC Connector	X14J7P	1
Clamp	T3-099901-5202	2
Carriage Bolt (L>120)	M12x160	4
Cable Gland	Waterproof RJ45 cable gland	1
Ethernet Cable	2M	1
Fuse	N/A	2
Hex Socket Bolt	M8x20	6
	M6x12	2
Key	N/A	2
Lifting Ring	T3-000201-5114	1
Masonry Bolt	M10x110	4
Mounting Rack	T3-099901-5201	1
Plain Washer	Φ8	6
Spring Washer	Φ8	6
	Φ6	2
9-Pin Local Commissioning Cable	R-9122C/ R-9122AC	1
O-Ring	7.1x1.8	8
User Manual	RD-2020 QI	on CD-Rom
OMT V4.0	OMT Software	

Table 1: RD-2020 KOP

End of section

## 3 INSTALLATION

### 3.1 WARNINGS AND ALERTS

#### Radio Frequency Energies

There may be situations, particularly for workplace environments near high-powered RF sources, where recommended limits for safe exposure of human beings to RF energy could be exceeded. In such cases, restrictive measures or actions may be necessary to ensure the safe use of RF energy.

#### High Voltage

The equipment has been designed and constructed to prevent, as far as reasonably, practicable danger. Any work activity on or near equipment involving installation, operation or maintenance must be, as far as reasonably, free from danger.

Where there is a risk of damage to electrical systems involving adverse weather, extreme temperatures, wet, corrosive or dirty conditions, flammable or explosive atmospheres, the system must be suitably installed to prevent danger.

#### Protective Earthing

Equipment provided for the purpose of protecting individuals from electrical risk must be suitable for the purpose and properly maintained and used.

#### Handling Precautions

This covers a range of activities including lifting, lowering, pushing, pulling, carrying, moving, holding or restraining an object, animal or person from the equipment. It also covers activities that require the use of force or effort, such as pulling a lever, or operating power tools.

Where some of the abovementioned activities are required, the equipment must be handled with care to avoid being damaged.

#### Electrostatic Discharge (ESD)

Observe standard precautions for handling ESD-sensitive devices. Assume that all solid-state electronic devices are ESD-sensitive. Ensure the use of a grounded wrist strap or equivalent while working with ESD-sensitive devices. Transport, store, and handle ESD-sensitive devices in static-safe environments.

## 3.2 SITE PLANNING CONSIDERATIONS

### Site Considerations

Outdoor equipment are designed to be waterproof, rainproof, and with snow protection. Temporary protection should be taken when the equipment enclosure is opened for installation or maintenance in an outdoor environment. The equipment must not be opened for installation or maintenance in bad weather (e.g. gale, storm rainfall, extreme temperatures and high humidity).

### Installation Location

Mounting surface shall be capable of supporting the weight of the equipment.

In order to avoid electromagnetic interference, a proper mounting location must be selected to minimize interference from electromagnetic sources such as large electrical equipment.

### Environmental

Humidity has an adverse effect on the reliability of the equipment. It is recommended to install the equipment in locations having stable temperature and unrestricted air-flow.

The installation location for the product should be well ventilated. The equipment has been designed to operate at the temperature range and humidity level as stated in the product specifications in the datasheet.

Direct sun light exposure to the equipment should be avoided. Provide additional shelter if necessary.

### Powering

The power supply unit (PSU) provides power to all modules within the equipment. Depending on the product variant, it is recommended that the PSU operates on a dedicated circuit breaker or fused circuit.

### Grounding Requirement

Verify that the equipment has been well grounded. This includes antennas and all cables connected to the system. Ensure lightning protection for the antennas is properly grounded.

### Cable Routing

Depending on equipment configuration, a variety of types of cables are required. Where applicable, ensure cables are properly routed and secured so that they are not damaged.

### Manual Handling

During transportation and installation, take necessary handling precautions to avoid potential physical injury to the installation personnel and the equipment.

### 3.2.1 INSTALLATION CHECKLIST

- Working space available for installation and maintenance for each mounting arrangement. Ensure unrestricted airflow.
- Ensure earthing point is within reach of the ground wire.
- Ensure a power source is within reach of the power cord and the power source has sufficient capacity (about 10A for 220/110VAC, 20A for +24VDC, 10A for -48VDC).
- Where appropriate, ensure unused RF connectors are terminated.
- Do not locate the equipment near large transformers or motors that may cause electromagnetic interference.
- Reduce signal loss in feeder cable by minimizing the length and number of RF connections.
- Ensure VSWR of antennas system < 1.5:1.
- Ensure equipment will be operated within the stated environment (refer to datasheet)
- Observe handling of all cables to prevent damage.
- Donor antenna should have a narrow beamwidth positioned in line-of-sight (LOS) to donor BTS site so that the donor signal level is maximized. This allows the use of minimum gain to achieve the maximum DL output power. The UL gain is typically set lower than or equal to the DL gain to minimize noise interference to the donor BTS.
- Service antenna should be selected based on the type of service area, e.g., indoor antenna for indoor application, and panel antenna for outdoor application.

### 3.3 INSTALLATION PROCEDURES

#### 3.3.1 GOODS INWARDS INSPECTION

- Verify the number of packages received against the packing list.
- Check all packages for external damage and report any external damage to the shipping courier. If damage occurs, a shipping agent should be present before unpacking and inspecting the contents because damage caused during transit is the responsibility of the agent.
- Open and check each package against the packing list. If any items are missing, contact Comba.
- Do not remove items from antistatic packing until ready for installation. If damage is discovered at the time of installation, contact the shipping agent.

#### 3.3.2 INSTALLATION TOOLS

Refer to Appendix A for a full list of recommended tools required for installation.

#### 3.3.3 MOUNTING RACK

The mounting rack is used for mounting the equipment to either a wall or on a pole. Shown below is the diagram of the mounting rack. The round holes are used for masonry bolts, and square holes for carriage bolts.

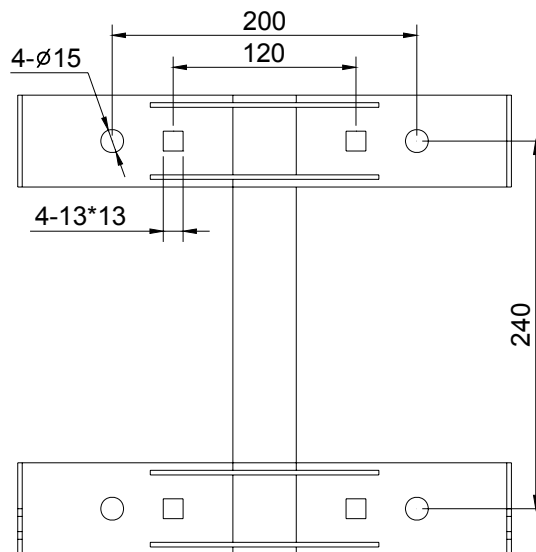


Figure 4: Mounting Rack Dimension

The mounting rack is pre-installed with the equipment for shipment. It needs to separate the mounting rack before commencing to wall or pole mounting.

Refer to Figure 8, use Allen key to unscrew M8x20mm hex socket bolts at 1, 2, 3, 4, 5, and 6 to separate the mounting rack from the equipment.

### 3.3.4 LIFTING LUG INSTALLATION

This is provided to facilitate lifting and positioning of the equipment during installation. The lifting lug is to be attached to the rear of the appropriate enclosure as shown below.

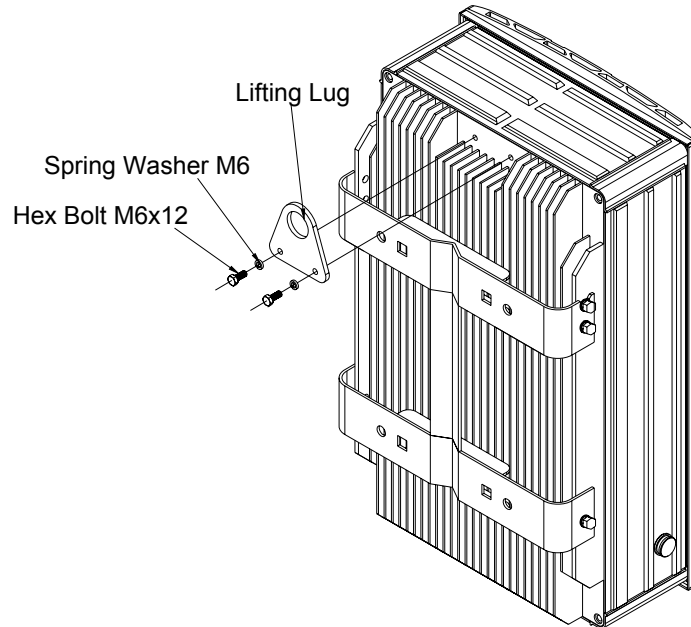


Figure 5: Attach the Lifting Lug to the Enclosure

### 3.3.5 WALL MOUNTING DETAILS

- Drill four holes on the wall using the position of the four round holes in the mounting rack as a guide.
- Secure the mounting rack onto the wall where four holes have been drilled with four M10x110mm masonry bolts.

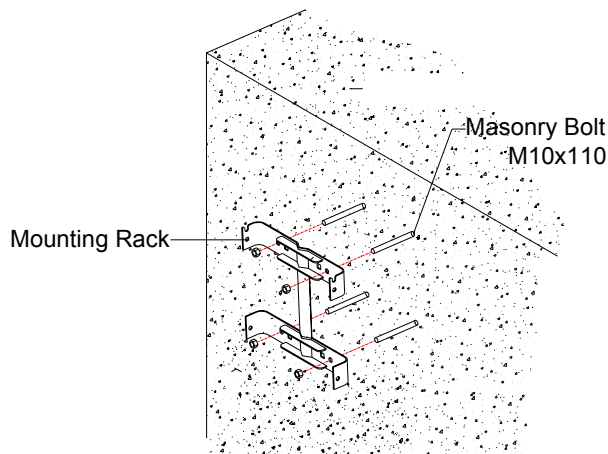


Figure 6: Wall Mounting Overview



### 3.3.6 POLE MOUNTING DETAILS

- The equipment can be mounted on poles of about 60~75mm in diameter.
- Secure the mounting rack onto the pole using M12x160mm carriage bolts and clamps through the square holes.
- Tighten and lock M12 nuts together onto the carriage bolts.

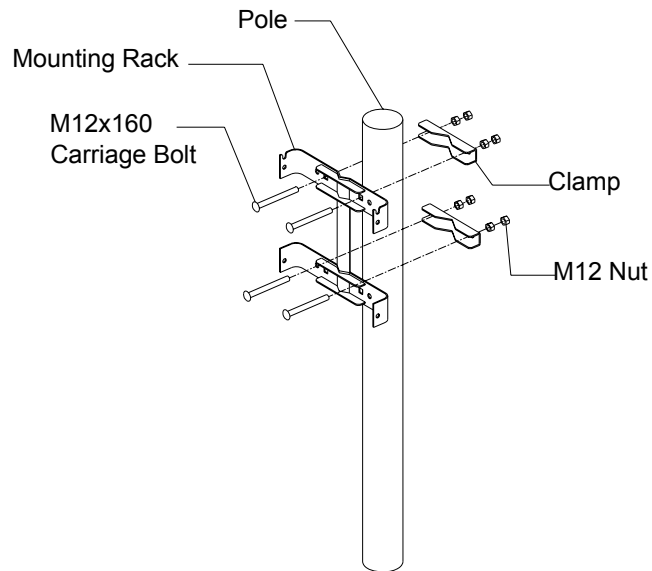


Figure 7: Pole Mounting Overview

### 3.3.7 ATTACHING EQUIPMENT ONTO MOUNTING RACK

- Located on the rear of the equipment enclosure are protruding vertical cooling fins.
- The two outer fins are designed for mounting the equipment onto the mounting rack; each of these fins has steel threaded inserts already fitted.
- Partially thread the hex socket bolts onto the steel threaded inserts identified in the following drawing as: '1' and '4'.
- Lift the equipment and position it over the mounting rack, such that the hex bolts rests in their designated locations on the mounting rack.
- Insert four more hex socket bolts '2', '3', '5' and '6' onto steel threaded insets to ensure the equipment is firmly mounted.
- Tighten all hex socket bolts to secure the equipment onto the mounting rack.

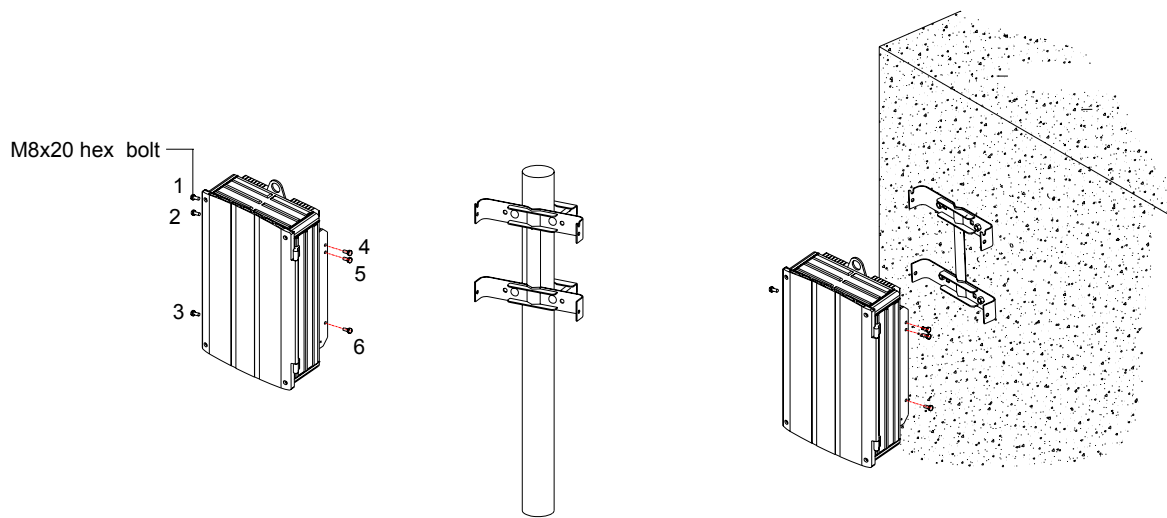


Figure 8: Attaching the Equipment onto the Mounting Rack

### 3.3.8 DRIP-LOOP

Comba recommends that every horizontal cable entry to the equipment forms a 'U' before its entry to the equipment. Water on the cable will drip down at the bottom of the loop and will not accumulate at the equipment connectors.

### 3.4 EQUIPMENT CONNECTORS

The equipment has been designed for all cable entries from the bottom of the enclosure, as shown in the following figure:

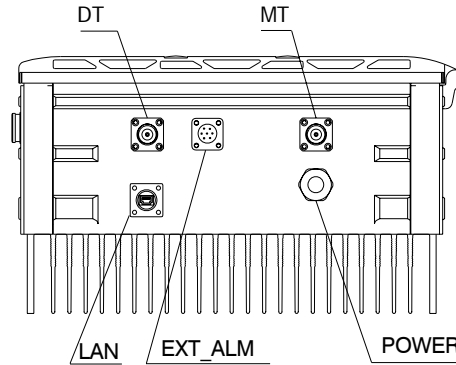


Figure 9: Equipment Connectors

Identifier	Descriptions
DT	N-Female connector for connection to donor antenna
MT	N-Female connector for connection to service antenna
LAN	Ethernet connector for connecting with Internet.
EXT_ALM	7-pin round connector for external alarm connection.
POWER <sup>1</sup>	This is a power cable gland for a pre-installed power cord for connection to AC or DC supply (e.g. 220V).

Table 2: RD-2020 Connectors

### 3.5 EQUIPMENT CONNECTIONS

#### 3.5.1 GROUNDING CONNECTION

##### Ground Connection

To ensure safe operation of the product, a ground (earth) connection is required. For single phase AC power source, the product must be grounded by connecting the “earth wire” of the power cord to the ground terminal of the AC supply. For operating this product with DC power system (such as rectifiers), the product should not be connected to power systems that switch open the return lead because the return lead could function as the ground (earth) connection for the equipment.

##### Protective Ground Connection

The enclosure must be grounded securely by connecting a copper wire (CSA 16mm<sup>2</sup>) to the grounding terminal on the equipment/rack, and the other end to a protective ground (i.e. building earth point). An internationally acceptable colour code of the ground connection wire is green/yellow.

<sup>1</sup> The voltage identification is a variant due to electricity system diversity of global regions. The power cable gland might be identified for AC 220V, AC 110V, AC 220V/110V, DC -48V, or DC +24V respectively. Please refer to specific product or contact local sales if any doubt.

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Such a ground connection implements the “Protective Ground Connection”, and must be connected to the equipment at the designated ground point. In general, do not connect the supply before establishing an adequate ground (earth) connection.

Construct the ground wire, and use appropriate crimp connectors where necessary. Locate and connect the equipment grounding terminal to a protective ground (i.e. building earth point).

### 3.5.2 SERVICE VOLTAGE CONNECTION

The product accepts AC or DC power depending on the type of PSU installed.

- For AC PSU – The equipment accepts single phase 220/110VAC power. The recommended AC connection is rated at AC220/110V, 10A and has three connections to include earth. The power cord has been pre-wired to the PSU and led out via the power cable gland.
- For DC PSU – When the equipment is required to be DC powered, DC power connection from telecom rectifier is via a wire with CSA of 2.1mm<sup>2</sup>. DC voltage supply is hard-wired to the rectifier equipment. For planning purposes, allow DC current up to 20A and 10A to be drawn when powered with +24V and -48V respectively. The wiring to telecom rectifiers is outside the scope of this document. Please consult and observe the installation guidelines for telecom rectifiers.
  - The DC power cable for -48V is colour coded, typically as BLUE for “-48V” or “Battery” and BLACK for “0V” or “Return” connections.
  - The DC power cable for +24V is colour coded, typically as RED for “+24V” or “Battery” and BLUE for “0V” or “Return” connections.
  - The power cord has been pre-wired to the PSU and led out via the power cable gland.

### 3.5.3 LI-ION BATTERY CONNECTION

Li-ion battery is provided with the product to ensure that power is supplied to the system monitoring unit and MCU, and the alarm message can be sent out to the OMC effectively in case of mains power failure.

With the equipment lying flat, remove the bolts with an Allen Key, unlock and open the enclosure door. Locate the battery pack. The in-line connector of the battery pack is “disconnected” from the PSU during shipment. During installation, re-connect the in-line connector to activate the back-up supply to the MCU board. Close the enclosure door, insert and tighten bolts to complete this procedure.

Caution: There is a risk of explosion if the battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.

### 3.5.4 RF CABLE CONNECTION

The connection of feeder cables is as follows:

- MT port → Connects to the feeder cable from service antenna
- DT port → Connects to the feeder cable from donor antenna

### 3.5.5 EXT\_ALM CONNECTION

Four alarm INPUT to RD-2020 are realized on the EXT\_ALM port, this is a 7-pin round connector. The following figure and table shows the pin allocation and definition. Pin numbering are shown looking-into the connector on the enclosure.

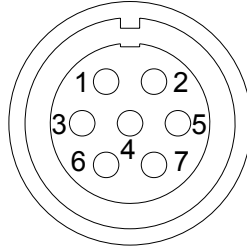


Figure 10: Pins Allocation for 7-pin EXT-ALM Connector

Pin number	1	2	3	4	5	6	7
Alarm definition	EXT. Alarm 1	EXT. Alarm 2	EXT. Alarm 3	GND	EXT. Alarm 4	Reserved	Reserved

Table 3: External Alarm Signal Definition

These signals are defined as “TTL/CMOS level”, for RD-2020, the following voltage are valid as EXT\_ALM signals:

Voltage as applied to EXT Alarm pin	Alarm Condition as Seen by the RD-2120
0V to 1.5V	Alarm recognized
3.5V to 5V	No Alarm recognized

Table 4: Voltage Applied to EXT Alarm Pin

### 3.5.6 RJ45 WATERPROOF CABLE CONNECTION

The RJ45 waterproof cable connection includes a waterproof cable plug, which needs to be disassembled as below.

No.	Description
1	Plastic O-ring
2	Body
3	Nut
4	Ring
5	Sealing nut

Pull the Ethernet cable through all components of the plug and terminated with RJ45 connector with crimper. Pull the connector to the end of the plug and then screw the plug.

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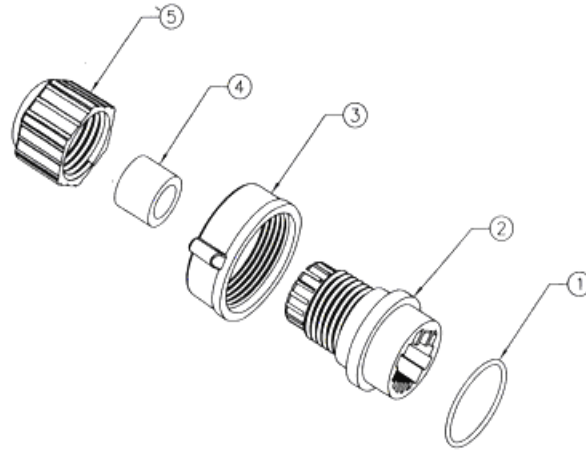


Figure 11: RJ45 Waterproof Cable Plug

### 3.6 PREPARATION FOR REMOTE CONTROL OF EQUIPMENT USING MODEM

#### Wireless Modem (Optional)

For the equipment variant equipped with wireless modem, the modem provides the option of remote connection of the equipment to the OMT. The wireless (GSM) modem implements the link for data and SMS.

Note: When CDMA modem is used, only SMS function is supported to retrieve alarm information and to provide remote control.

The power and data cables have been factory-connected to the wireless modem. User needs to insert the SIM / UIM card to the GSM / CDMA modem.

To insert or replace the SIM / UIM card, locate and press down the recessed button (yellow) to eject the SIM / UIM card carrier (refer to the following figure). Insert the SIM / UIM card and push back the carrier until it is latched in place.

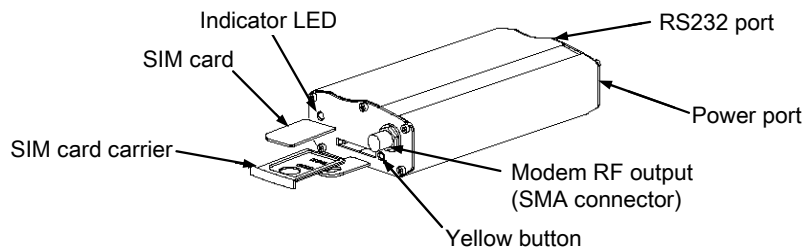


Figure 12: Wireless Modem

The LED indicator on the wireless modem displays the state of the modem:

- LED OFF: equipment power off
- LED ON: equipment power on, no SIM/ UIM card or no connection to antenna
- LED flash slowly: equipment power on, in SMS mode
- LED flash quickly: equipment power on, in data link mode

Note: Data link mode is dependent on service availability from service provider. If it is required, the operator's SIM card must be data-enabled (Circuit Switch Data) and without PIN code.

End of section

## 4 COMMISSIONING

### 4.1 PRE-COMMISSIONING

After equipment installation, perform the following steps before equipment powering and commissioning. Verify the incoming power source voltage, current, and power levels do not violate any ratings. Double check all connections before applying power. Do not manipulate circuits or make changes with power applied.

- Visually inspect the power connection within the equipment. Ensure that the power cable is correctly and securely connected, including grounding wire and RF cable.
- Check grounding connection and verify that the ground resistance is less than 5Ω.
- Connect the equipment with OMT software.
- With the equipment installed and cables connected, apply power to it by switching on the PSU switch.
- Monitor the initialization of the equipment through the indicator LEDs on the MCU. Refer to detailed LEDs information in the next section.

### 4.2 MCU LED INDICATORS

Three diagnostic LEDs are located on the MCU board, each indicating the status of a particular function:

Identifier	Colour	Indication
H1	Green	MCU operation. Flashing at a rate of 1 flash/sec. Any other flashing rate indicates MCU is faulty, and has to be replaced.
H2	Red	Warning LED. When ON, it indicates alarm condition.
H3	Red	Wireless modem status. During normal operation, it is OFF. When ON, it indicates faulty wireless modem and no communication will take place.

Table 5: LED Description

All the three diagnostic LEDs will flash simultaneously for three times when power is supplied to the equipment. Then H1 will keep flashing at the rate of 1 flash/second. H2 will be ON when any alarm occurs. H3 will be ON and will turn OFF two minutes after successful initialization of the modem; otherwise, it will remain ON.

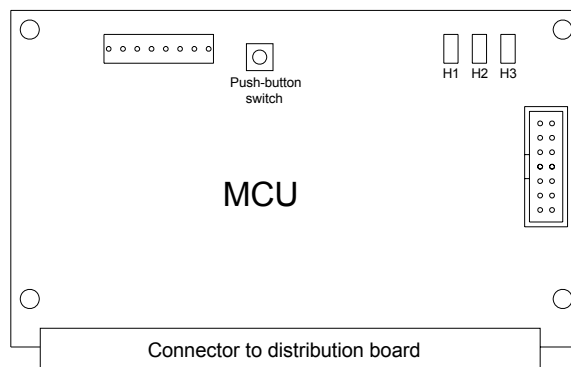


Figure 13: MCU LED Indicators

On the MCU there is a push-button switch (usually yellow) used to manually reset the equipment when equipment initialization fails, or any ab-normal operation happens, or when the equipment is re-connected to the OMT after powered off due to some reason.



## 4.3 WEB OMT

### 4.3.1 CONNECTION FROM PC TO EQUIPMENT

Before accessing to the OMT, physical connection between the OMT software and the equipment must be made. A straight-through RJ45 cable shall be applied for the connection.

In order to access to equipment by IP protocol, the PC must be set with proper IP address, subnet mask and gateway.

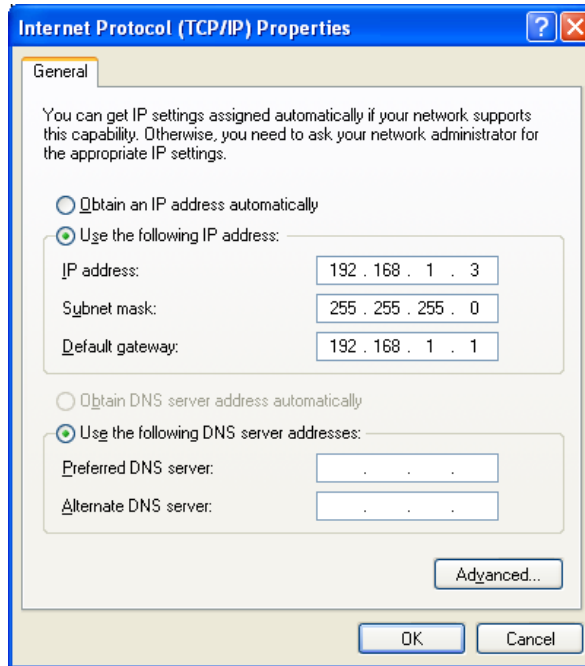


Figure 14: PC Protocol Setting

The default IP address of repeater is 192.168.1.2, and default gateway is 192.168.1.1. To access the repeater for the first time, the PC must be set with proper IP address: 192.168.1.X (X=3~254), subnet mask: 255.255.255.0, gateway: 192.168.1.1.

After the PC protocol has been properly set, please execute the IE browser and type 192.168.1.2 in the address bar. A pop-up window will be shown, requiring user name and password. The default user and password are the same: admin.

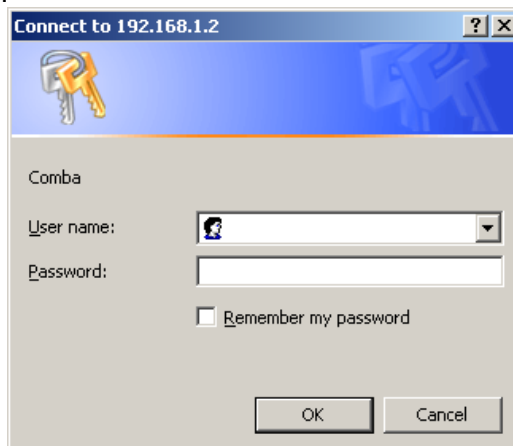


Figure 15: Log in

## INSTALLATION GUIDE FOR RD-2020

Items	Default Value
PC IP Address	192.168.1.X (X=3~254)
PC Subnet Mask	255.255.255.0
PC Gateway	192.168.1.1
Repeater IP Address	192.168.1.2
Repeater Gateway	192.168.1.1
User name	admin (Capital sensitive)
Password	admin (Capital sensitive)

Table 6: IP Setting Quick Look-up Table

If the user name and password have been entered properly, then the OMT webpage will be shown as below.

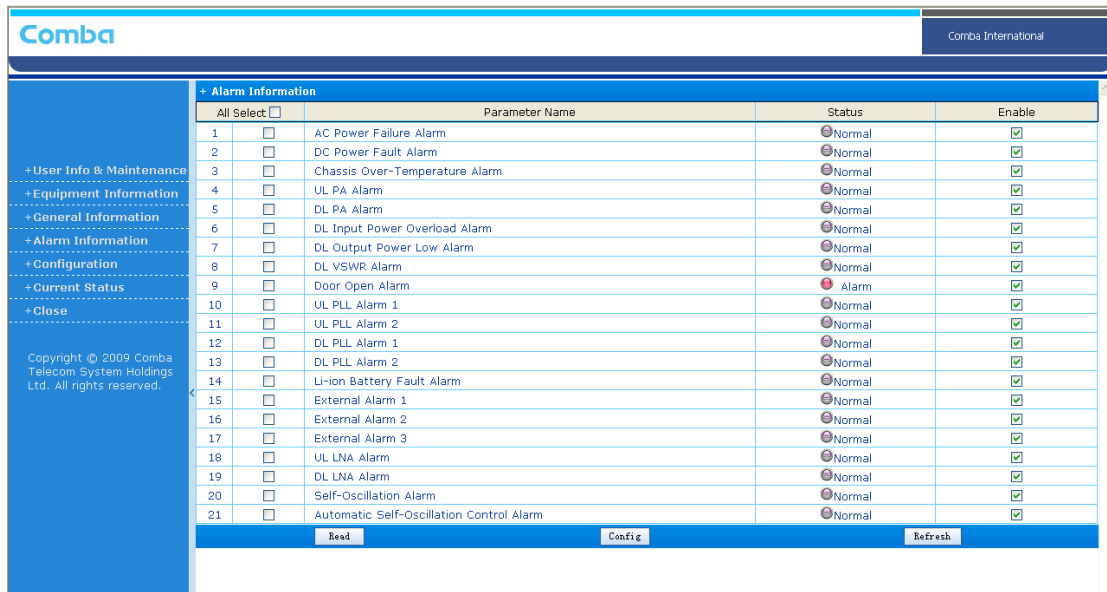


Figure 16: Alarm Information

The alarm information page will be shown as the first page whenever log in. The alarm history will be reserved in repeater until 24 hours after its first power on, and then automatically cleared up. Before its auto clear-up once a day, to manually refresh the alarm status please goes to “User Info & Maintenance” page as below and click “Clear History Alarm”. Below are the definitions for different buttons and functions.

Items	Functions
24 Hours	The “24 hours” defines a standard reset timing after repeater first power on. This function is designed for routined self-maintenance and alarms clear-up.
Read	Read alarm history from repeater. Any alarm has been detected, it will be kept in history until next alarm reset per 24 hours.
Refresh	Refresh local web page to check which items are selected, but no data read from repeater.
Clear History Alarm	Clear the alarm history manually.



Figure 17: User Info& Maintenance

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User can access to different sub-titles on the left part of the page.

The “Equipment Information” page contains basic information of the repeater such as firmware version, product model, serial No. etc.

**Note:** The IP network parameters of the repeater can be modified from this page.

All Select	Parameter Name	Status	Setting
<input type="checkbox"/>	Equipment Type	Band Selective Repeater	N/A
<input type="checkbox"/>	Firmware Version	M52RD202040CH10V7001	N/A
<input type="checkbox"/>	Equipment Model	RD2020_40	
<input type="checkbox"/>	Serial No.	10020200	
<input type="checkbox"/>	Longitude		
<input type="checkbox"/>	Latitude		
<input type="checkbox"/>	Equipment MAC Address	52-54-4C-19-F7-42	
<input type="checkbox"/>	Equipment IP Address	192.168.1.2	
<input type="checkbox"/>	Equipment TCP Port No.	8025	
<input type="checkbox"/>	Equipment Default GateWay	192.168.1.1	
<input type="checkbox"/>	Equipment SubNet Mask	255.255.255.0	
<input type="checkbox"/>	Datetime	2006-04-06 07:01:06	

Figure 18: Equipment Information

The “General Information” page is mainly for setting up the communication between repeater and other remote device such as OMC and mobile phone to receive alarm message.

All Select	Parameter Name	Status	Setting	Remark
<input type="checkbox"/>	Site Sub ID	00000000		
<input type="checkbox"/>	Site ID	FF		
<input type="checkbox"/>	OMC Server IP	0.0.0.0		
<input type="checkbox"/>	OMC Server IP Port	7025		
<input type="checkbox"/>	Equipment UDP Port No.	7025		
<input type="checkbox"/>	Alarm Report Mode	Ethernet		
<input type="checkbox"/>	Network Protocol	IP+UDP		
<input type="checkbox"/>	Heartbeat Detect Interval	120		

Figure 19: General Information

The “Configuration” page is for setting the RF parameters.

All Select	Parameter Name	Status	Setting	MinValue	MaxValue	Unit	Remark
<input type="checkbox"/>	Working Band High Edge Channel No.	560		0	899	MHz	UL: 1710.000-1754.950MHz DL: 2110.000-2154.950MHz
<input type="checkbox"/>	Working Band Low Edge Channel No.	360		0	899	MHz	UL: 1710.000-1754.950MHz DL: 2110.000-2154.950MHz
<input type="checkbox"/>	RF Switch state	ON					
<input type="checkbox"/>	UL ATT	0		0	30	dB	
<input type="checkbox"/>	DL ATT	0		0	30	dB	
<input type="checkbox"/>	DL VSWR Threshold	1.4		1.4	2.5		
<input type="checkbox"/>	Over-Temperature Threshold	-35		-40	125	°C	
<input type="checkbox"/>	DL Output Power Low Threshold	41		11	42	dBm	
<input type="checkbox"/>	DL Input Power Overload Threshold	-75		-80	-29	dBm	

Figure 20: Configuration

The “Current Status” shows the status of the running equipment and cannot be modified.

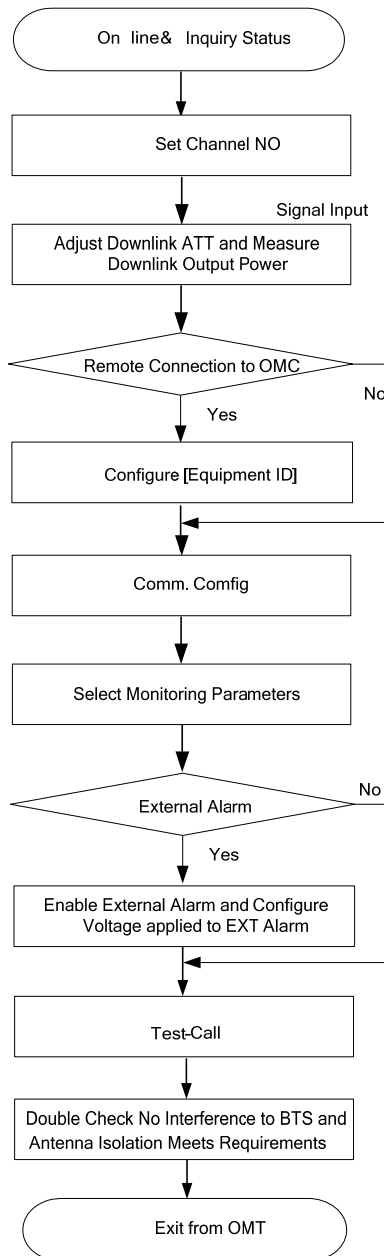
# INSTALLATION GUIDE FOR RD-2020

All Select <input type="checkbox"/>		Parameter Name	Status	Unit	Remark
1	<input type="checkbox"/>	Device Temperature	33	°C	
2	<input type="checkbox"/>	DL Input Power	--	dBm	
3	<input type="checkbox"/>	DL Output Power	--	dBm	
4	<input type="checkbox"/>	UL Gain	90	dB	
5	<input type="checkbox"/>	DL Gain	90	dB	
6	<input type="checkbox"/>	DL VSWR	--		
7	<input type="checkbox"/>	New Site Report Result	Unreported		

Figure 21: Current Status

## 4.4 COMMISSIONING PROCEDURE

System commissioning can commence after the monitoring system has completed self initialization. The commissioning procedure is as follows:



## INSTALLATION GUIDE FOR RD-2020

Commissioning Tasks	Observation
1. On-line and Inquiry status	<ul style="list-style-type: none"> <li>● Connect to repeater from PC via OMT.</li> </ul>
2. Set Channel No.	<ul style="list-style-type: none"> <li>● Keep RF switch ON and set the channel number of the repeater's operating frequency.</li> </ul>
3. Adjust Downlink Output Power and align donor antenna	<ul style="list-style-type: none"> <li>● Observe DL input power from measured value. Align the direction of donor antenna until the DL input power reading is maximized.</li> <li>● Note: To ensure that the measured DL input power is accurate, one should set the DL ATT to "0" before performing the check.</li> </ul>
4. Configure [Equipment ID]	<ul style="list-style-type: none"> <li>● Go to [Properties Info] and set [Equipment ID].</li> </ul>
5. Comm. Config	<ul style="list-style-type: none"> <li>● Enable the power supply by selecting "On" in [RF] -&gt; [Switch]; go to [Properties Info.] -&gt; [Comm. Config.] and set OMC Phones No. , the service No. of SMSC, Report Mode.</li> </ul>
6. Select Monitoring Parameters	<ul style="list-style-type: none"> <li>● Select the equipment controlled and monitored parameters.</li> <li>● If the external devices are connected to the equipment for management, please enable in the [External Alarm Info.] Interface.</li> </ul>
7. Test coverage area field intensity and adjust service antenna.	<ul style="list-style-type: none"> <li>● Use test-handset to verify field intensity within the coverage area. If needed, realign the service antenna to achieve the desired coverage.</li> <li>● Note: If during operation, the equipment gain could not be set to maximum or the output power is not high enough due to insufficient donor and service antennas isolation, then the antennas' position should be changed to increase isolation. If the output power is too high and ALC is activated, then adjust the DL ATT to achieve optimal DL Gain.</li> </ul>
8. Verify UL gain and ensure test call produces good voice quality and there is no interfering BTS	<ul style="list-style-type: none"> <li>● Adjust UL gain and perform test calls. Typically, the UL gain is set around 5dB less than DL gain. Perform test calls in the coverage area while adjusting UL gain if required.</li> <li>● Note: If the repeater is near the BTS and the test call performance is poor, this may be due to UL noise interference to the BTS. Users can calculate and determine if the repeater UL noise will interfere with the BTS.</li> <li>● Verify again that there is no unacceptable interference to BTS.</li> </ul>

Table 7: Commissioning

End of section

## 5 MAINTENANCE

The system is designed for trouble-free operation and generally does not need maintenance. Maintenance activities should only be carried out by trained personnel.

The equipment operation status can be observed remotely through the OMT/OMC.

Periodic inspection of the equipment(s) is recommended. The recommended tasks include:

- Measurement of the return loss of the feeder system.
- Ensure the reliable connection of cables, power cords and facilities located indoor.
- Inspect and record operation status and parameters, such as receive signal level, output noise level, DL output power of the equipment, from OMC or OMT.
- Check the PSU output voltage.
- Verify that the actual coverage has not degraded.
- Check the controlling and monitoring function.
- Verify that lightning and grounding protection is in good condition.
- Ensure the labels are clear and legible.
- For Li-ion battery, verify their state. Deeply discharged battery should be returned to the Factory for replacement. If the battery voltage drops under 16V within one hour, replacement of Li-ion battery is recommended.

### 5.1 O-RING FITTING DETAILS

The “O” ring serves as an effective alternative to prevent the countersunk door bolt from becoming loose and as a waterproof feature. The “O” rings have already been fitted with the equipment before shipment, and spare “O” rings are also provided for replacement. When necessary, users can replace the worn out “O” rings with the spare ones. The following figure illustrates how the “O” ring is fitted with the equipment enclosure.

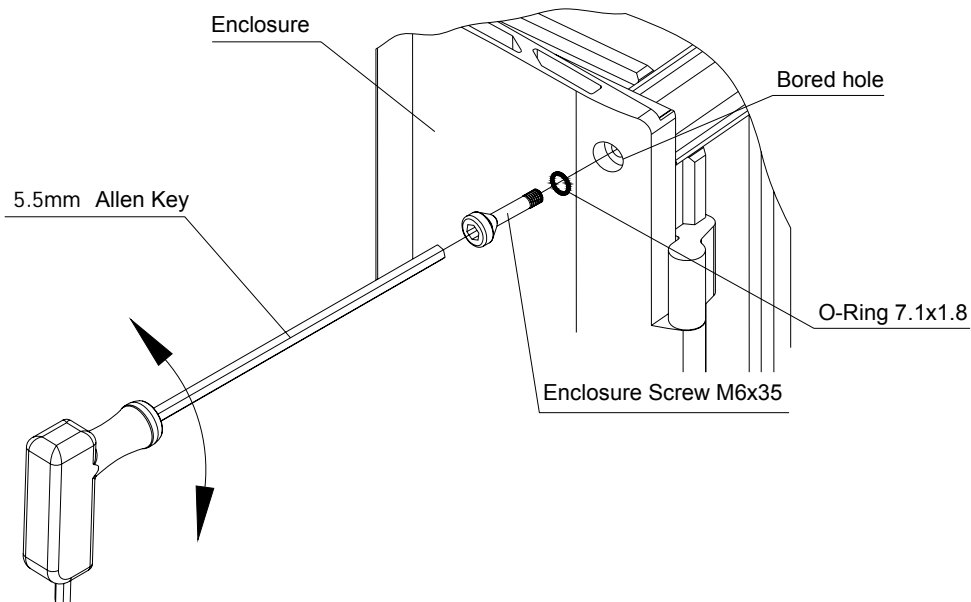


Figure 22: O-Ring Fitting Details

End of section

## 6 APPENDICES

### 6.1 APPENDIX A: TOOLS AND EQUIPMENT FOR INSTALLATION

The following are the recommended list of tools for new installation and routine maintenance:

- Slotted screwdriver
- Philips screwdriver
- Ring spanner (Assorted size: 12~20mm)
- Electrically operated drill and masonry drill bits  $\varnothing$ 12mm
- Anti-static wrist strap
- Allen key (M5.5)
- Side Cutter
- Frequency counter (e.g. FLUKE PM6685R)
- RF Power Meter (e.g. Bird 5000)

## 6.2 APPENDIX B: SERVICING POLICY AND RETURN OF EQUIPMENT

The repair of individual units and modules of this equipment is not considered practicable without factory facilities. It is, therefore, the policy of Comba whereby faulty units or modules are returned to the local agent for repair.

To enable an efficient, prompt after sales service to be provided for the diagnosis, repair and return of any faulty equipment, please comply with the following requirements.

Items to be sent for repair should be packaged so as to provide both electrostatic and physical protection and a Repair Material Authorization (RMA) should be completed giving the required information. A sample RMA form is provided in Appendix.

This request must be included with the item for repair. Items for repair should be sent to the nearest Comba office:

COMBA TELECOM LTD.

Hong Kong Office

Address: 611 East Wing, No. 8 Science Park West Avenue, Hong Kong Science Park, Tai Po, Hong Kong.  
Tel: +852 2636 6861 Fax: +852 2637 0966

Singapore Office

Address: No. 1 Kaki Bukit View, #02-10 Techview, Singapore 415941  
Tel: + 65 6345 4908 Fax: + 65 6345 1186

Thailand Office

Address: 3rd Floor, T. Shinawatra Building, 94 Sukhumvit Soi 23, Sukhumvit Road, Klongtoeynua,  
Wattana, Bangkok 10110  
Tel: +66 2664 3440 Fax: +66 2664 3442

India Office

Address: Suite No. 2, E-172, TSH House, Greater Kailash – I, New Delhi – 110 048, India  
Tel: + 91 11 4173 9997 / 8 Fax: + 91 11 4173 9996

Sweden Office

Address: Gustavslundsvagen 147, S- 167 51 Bromma, Stockholm, Sweden  
Tel: +46 8 25 38 70 Fax: +46 8 25 38 71

Brazil Office

Address: Avenida Engenheiro Luiz Carlos Berrini 1297, cj 122, 04571-090 Brooklin Novo, São Paulo,  
Brazil  
Tel: +55 11 35093700 Fax: +55 11 35093720

Dubai Office

Address: P.O. Box 450583, DUBAI, U.A.E.  
Tel: +971 0 4 433 5320 Fax: +971 0 4 422 6774

US Office


Address: Comba Telecom Inc. 2390 Bering Drive, San Jose, CA 95131, USA  
Tel: +1 408 526 0180 Fax: +1 408 526 0181

China Office

Address: No.10, Shenzhou Road, Guangzhou Science City, Guangzhou, China  
Tel: + 86 20 2839 0000 Fax: + 86 20 2839 0136



6.3 APPENDIX C: RMA (RETURN MATERIAL AUTHORIZATION) FORM



**Comba Telecom Ltd.**  
 611 East Wing, No. 8 Science Park West Avenue, Hong Kong Science Park, Tai Po, Hong Kong  
 Tel: +852 2636 6861 Fax: +852 2637 0966

**RMA Request Form**  
 Date: \_\_\_\_\_

From: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Tel: \_\_\_\_\_ Fax: \_\_\_\_\_  
 E-Mail: \_\_\_\_\_  
 ATTN: \_\_\_\_\_

**Product Information:**

Item	Model	Serial Number	Return Category	Qty	Problem Description
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

**Notes:**  
 1. For 'Return Category' column, please select from **A**: Return of Defective Product, **B**: Return of Trial Sample, or **C**: Return of New and Unused Product.  
 2. If **A** or **C** category of return product is chosen, please give short description of the problem or reason for returning.

**Transportation Information:**  
 Location of Product: \_\_\_\_\_  
 Transportation Method: \_\_\_\_\_  
 Shipping Forwarder: \_\_\_\_\_

**Note:** Location of Product must be stated, while 'Transportation Method' or 'Shipping Forwarder' can be left blank if not determined.

**Signature:**  
 \_\_\_\_\_

---

**For Comba Use (Only)**  
 Return Merchandise Authorization Number (RMA#): \_\_\_\_\_  
 Recommended Action:  
 Shipment and Handling Cost to be paid by: \_\_\_\_\_

Approved by: \_\_\_\_\_  
 \_\_\_\_\_  
 Date: \_\_\_\_\_

End of section

End of Document