Hytera

USER MANUAL

RD982i/RD982i-S/RD982i-S 100W DIGITAL REPEATER

Preface

Welcome to the world of Hytera and thank you for purchasing this product. This manual includes a description of the functions and step-by-step procedures for use. To avoid bodily injury or property loss caused by incorrect operation, please carefully read the *Safety Information Booklet* before use.

This manual is applicable to the following product:

RD982i/RD982i-S/RD982i-S 100W Digital Repeater

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RF Radiation Information

This product must be restricted to operations in an Occupational/Controlled RF exposure Environments. Users must be fully aware of the hazards of the exposure and able to exercise control over their RF exposure to qualify for the higher exposure limits.

RF Radiation Profile

Radio Frequency (RF) is a frequency of electromagnetic radiation in the range at which radio signals are transmitted. RF technology is widely used in communication, medicine, food processing and other fields. It may generate radiation during use.

RF Radiation Safety

In order to ensure user health, experts from relevant industries including science, engineering, medicine and health work with international organizations to develop standards for safe exposure to RF radiation.

These standards consist of:

- United States Federal Communications Commission, Code of Federal Regulations; 47 CFR § 1.1307, 1.1310 and 2.1091

- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1:2005; Canada RSS102 Issue 5 March 2015

- Institute of Electrical and Electronic Engineers (IEEE) C95.1:2005 Edition

Compliance with RF Exposure Standards

To control your exposure and ensure compliance with the occupational/controlled environment exposure limits, this equipment should be operated with minimum distance 45cm between the radiator& your body.

FCC Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. Verification of harmful interference by this equipment to radio or television reception can be determined by turning it off and then on. The user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna. Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a different circuit to that of the receiver's outlet.

- Consult the dealer or an experienced radio/TV technician for help.

Operation is subject to the following two conditions:

- This device may not cause harmful interference.

- This device must accept any interference received, including interference that may cause undesired operation.

Note: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Regulations

Federal Communication Commission (FCC) requires that all radio communication products should meet the requirements set forth in the above standards before they can be marketed in the U.S, and the

manufacturer shall post a RF label on the product to inform users of operational instructions, so as to enhance their occupational health against exposure to RF energy.

Operational Instructions and Training Guidelines

To ensure optimal performance and compliance with the occupational/controlled environment RF energy exposure limits in the above standards and guidelines, users should always adhere to the followings:

- Gain of antenna must not exceed 5.5dBi (UHF) or 3.5dBi (VHF).
- Antenna Installation: install the antenna at least 45cm (UHF) or 140cm (VHF) away from your body, in accordance with the requirements of the antenna manufacturer/supplier.

EU Regulatory Conformance

As certified by the qualified laboratory, the product is in compliance with the essential requirements and other relevant provisions of 2014/53/EU.

Please note that the above information is applicable to EU countries only.

Documentation Information

Icon Conventions

Icon	Description
NOTE	Indicates references that can further describe the related topics.
CAUTION	Indicates situations that could cause data loss or equipment damage.

Notational Conventions

Item	Description	Example
Boldface	Denotes menus, tabs, parameter names, window names, dialogue names, and hardware buttons.	To save the configuration, click **Apply**.
		The **Log Level Settings** dialogue appears.
		Press the **PTT** key.
" "	Denotes messages, directories, file names, folder names, and parameter values.	The screen displays "Invalid Battery!".
		Open "PDT_PSS.exe".
		Go to "D:/opt/local".
		In the **Port** text box, enter "22".
>	Directs you to access a multi-level menu.	Go to **File** > **New**.
Italic	Denotes document titles.	For details about using the DWS, refer to *Dispatch Workstation User Guide*.
`Courier New`	Denotes commands and their execution results.	To set the IP address, run the following command: `vos-cmd - m name IP`

Key Operations

Operation	Description
Short press	Press and release quickly.
Long press	Press and hold for the preset duration.
Press and hold	Keep the key pressed.

Contents

1. Packing List

Please unpack carefully and check that you have received the following items. If any item is missing or damaged, please contact your dealer.

Item	Quantity (PCS)	Item	Quantity (PCS)
Repeater	1	Documentation Kit	1
DC Power Cord	1	/	/

NOTE
- Figures in this manual are for reference only.
- Check the main unit label to ensure that the purchased product is correct.

2. Product Overview

2.1 Front Panel
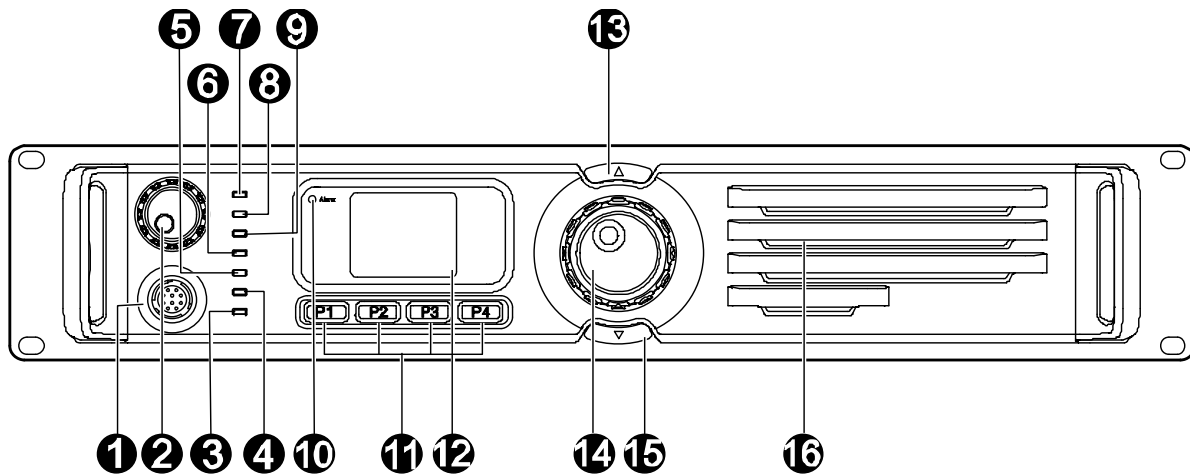
No.	Part Name	No.	Part Name
1	Accessory Jack	9	Timeslot 1 RX Indicator
2	Volume Control Knob/Power Indicator	10	Alarm Indicator
3	Operation Status Indicator	11	Programmable Keys
4	Analog Mode Indicator	12	LCD Display
5	Timeslot 2 RX Indicator	13	Channel Up Key
6	Timeslot 2 TX Indicator	14	Navigation Knob
7	Digital Mode Indicator	15	Channel Down Key
8	Timeslot 1 TX Indicator	16	Speaker

NOTE

- Programmable keys can be set by the CPS only in conventional mode.

- You can request your dealer to program the keys **P1**, **P2**, **P3** and **P4** as shortcuts. Contact your dealer for more information.

2.2 Rear Panel
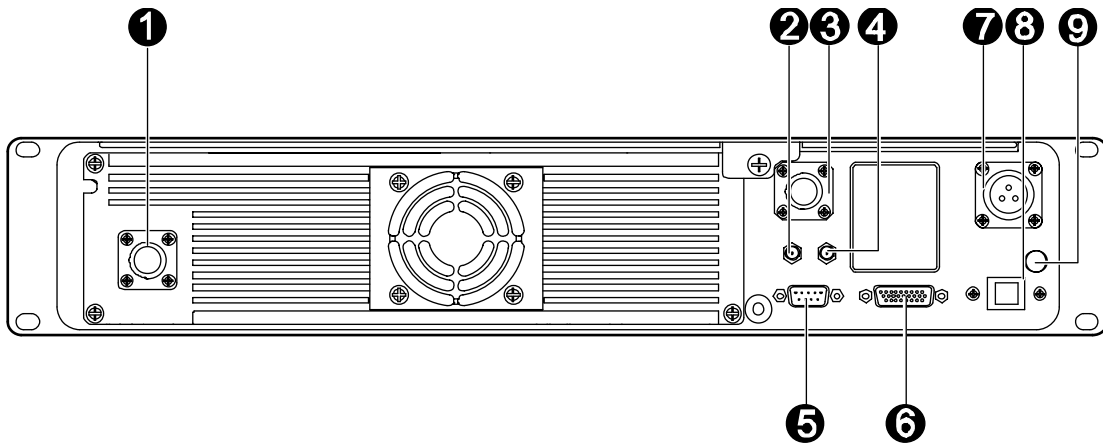
No.	Part Name	No.	Part Name
1	TX Antenna Connector (Type-N Female)	6	Accessory Jack
2	Optional Interface 1	7	DC Power Inlet
3	RX/Duplex Antenna Connector (Type-N Female)	8	Ethernet Port
4	Optional Interface 2	9	Ground Screw
5	Monitor/Tuning Interface	/	/

2.3 Internal Parts
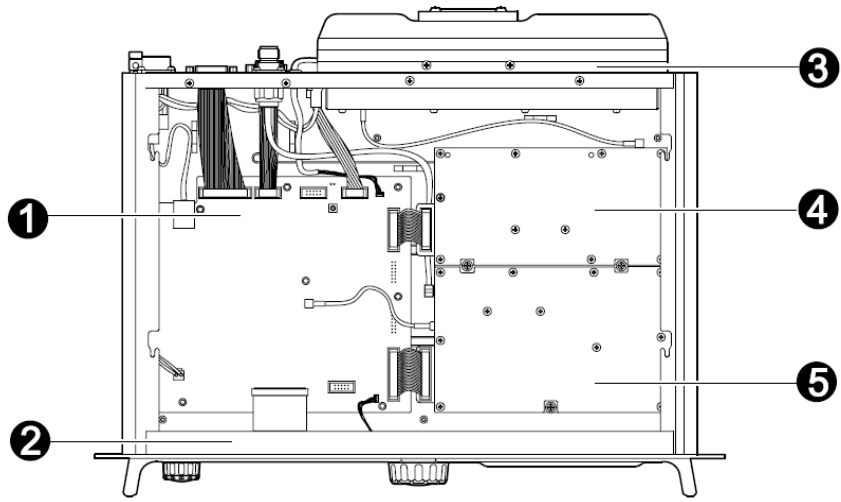
No.	Part Name	No.	Part Name
1	Baseband Module	4	Exciter Module
2	Front Panel	5	Receiver Module
3	PA Module	/	/

3. Installation

To ensure optimum performance and reliability of the product, install it properly according to the following instructions.

3.1 Installation Requirements

Ensure the following requirements are met:

- Environment: a dry and well-ventilated place with ambient temperature of -30°C to +60°C and relative humidity of 95%

- Location: in a rack, bracket, or cabinet, or on a desk

- Tools: a Phillips screwdriver, a T-10 torx screwdriver, and a spanner

- Voltage of DC power: 13.6±15% V

📝 **NOTE**

Refer to the *Safety Information Booklet* for more information.

3.2 Installation Procedure

3.2.1 Installing the Duplexer (Optional)

If the repeater works with a duplexer, install the duplexer into the repeater according to the following diagrams and steps before installing the repeater.
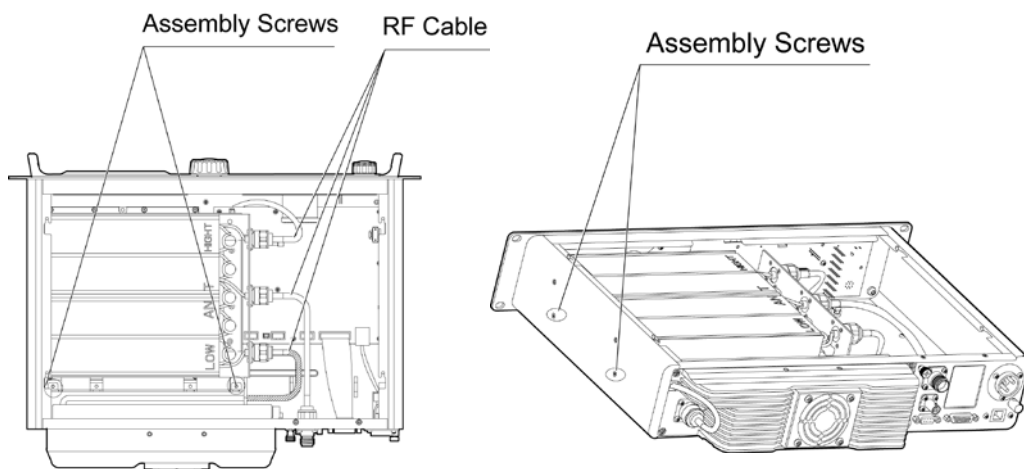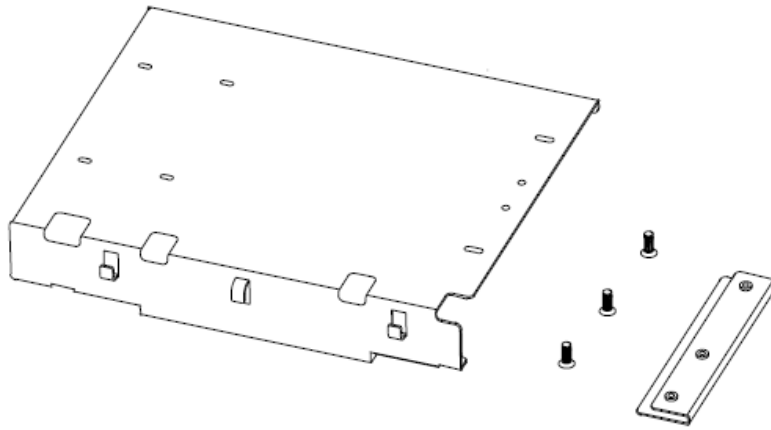

Duplexer with front side facing upwards
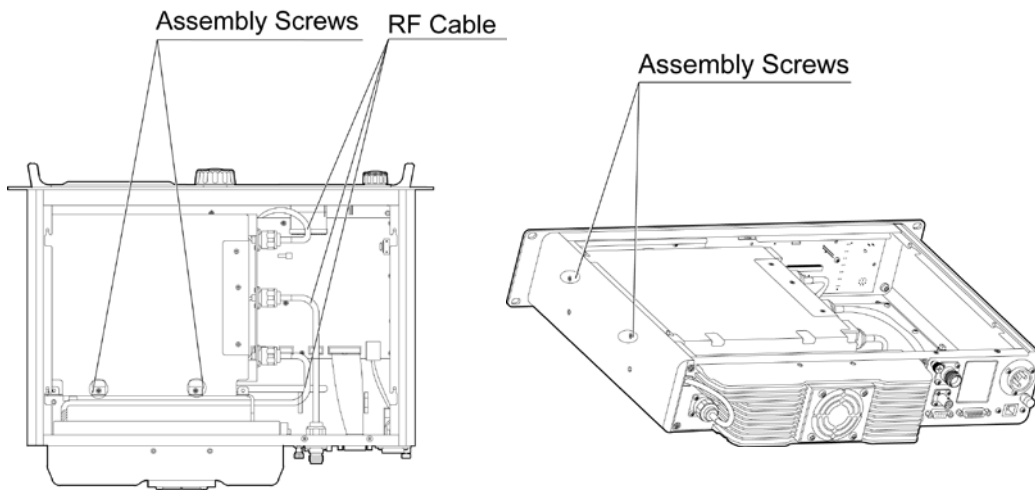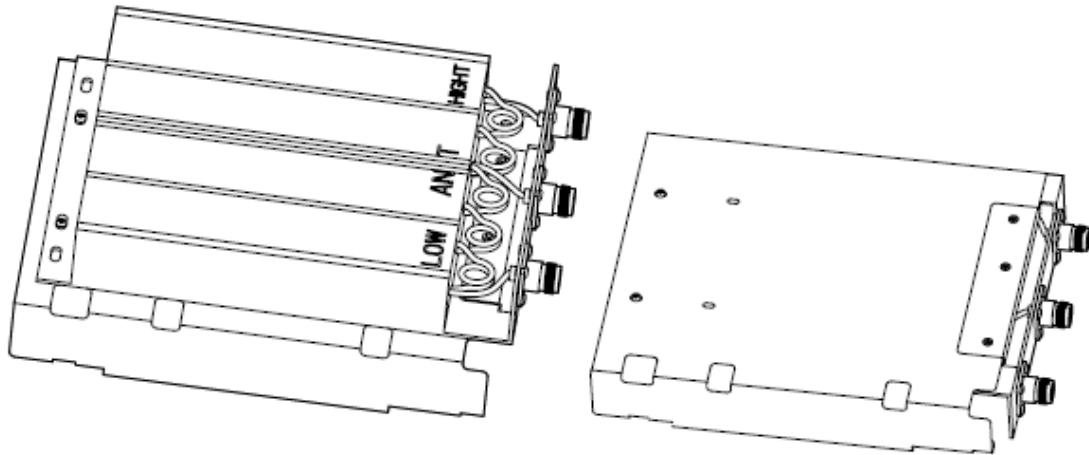
Duplexer with front side facing downwards

1. Loosen the three screws on the bracket with a Phillips screwdriver.
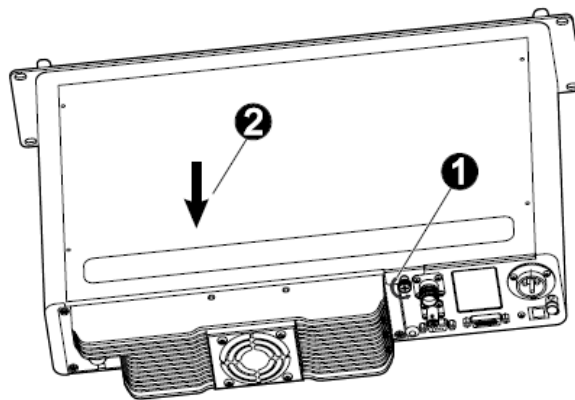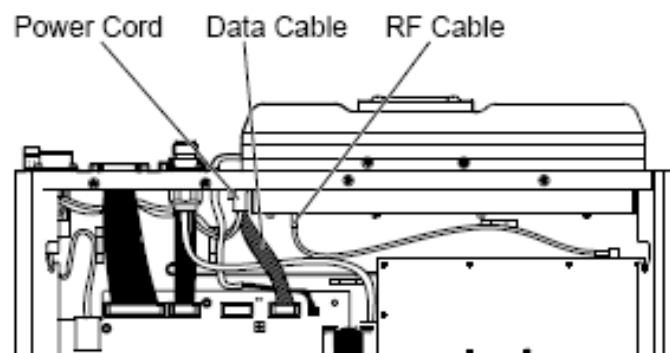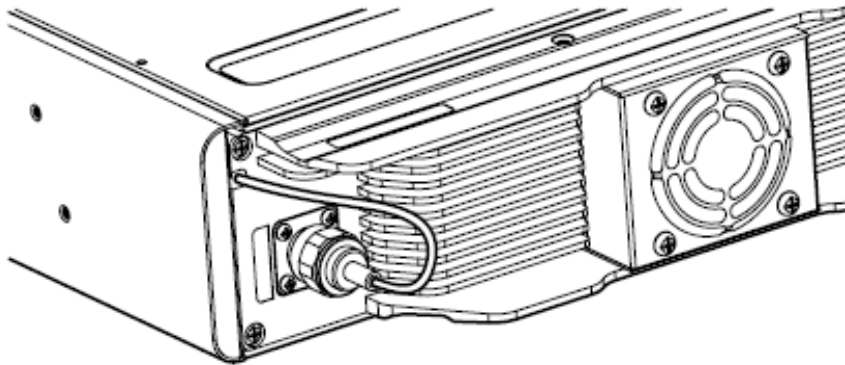
2. Install the duplexer onto the bracket.

3. Loosen the screws at the back of the repeater top cover, and then pull the top cover backwards to remove it.

4. Loosen the six screws locking the PA module of the repeater, remove all power, data and RF cables from the PA, and then remove the PA module.

Power Cord   Data Cable   RF Cable

5. Connect the RF cable through the hole next to the PA module.

6. Install the duplexer to the repeater.

   Mount the duplexer on the exciter module and receiver module of the repeater, and then fasten the duplexer with the two screws inside the housing and the two screws on the side of the housing.

7. Attach the PA module and connect all PA power, data and RF cables to it.

8. Close the repeater cover.

   The installation is complete.

3.2.2 Installing the Repeater

1. Place the repeater to a proper location.

2. Connect accessories including the antenna, feed lines, and power cords to the repeater.

> **NOTE**
>
> You must purchase the antenna and feed lines separately.

3. Ground the repeater through the Ground Screw located on the rear panel.

3.3 Post-installation Check

After installation, power on the repeater and check whether it works properly by observing the nine LED indicators and the LCD display in the front panel.

4. Basic Operations

4.1 Turning the Repeater On or Off

- To turn on the repeater, connect it to the DC power supply. During power-up process, the Power Indicator glows green and the power-up screen appears.

- To turn off the repeater, disconnect it from the DC power supply.

4.2 Adjusting the Volume

- For analog channel: Rotate the **Volume Control** knob clockwise to increase the volume or counter-clockwise to decrease the volume.

- For digital channel and mixed channel: The **Volume Control** knob is invalid, and the volume cannot be adjusted.

4.3 Adjusting the Power Level

You can request your dealer to set the TX power to High or Low. Low power can reduce power consumption. High power can extend the repeater coverage, enabling you to communicate with farther radios.

On the LCD, H indicates High power and L indicates Low power.

4.4 Turning the Backlight On or Off

Turning on the backlight can illuminate the LCD and all the front panel keys, so as to facilitate your operation under dim light conditions.

Your dealer can set the backlight to either of the following modes:

- Timed: Key press, knob operation, or receiving/transmitting signals can turn on the backlight. If no foregoing event occurs within the specified time period, the backlight turns off automatically.

- Enable: The backlight keeps on all the time.

4.5 Locking or Unlocking the Repeater

You can request your dealer to lock the knob and all keys in the front panel to prevent accidental operation. To unlock, ask your dealer to re-program the repeater.

4.6 Switching the Channel

You can use the **Channel Up** or **Channel Down** key in the front panel to change the channel. After you change the channel, the LCD displays the alias of the current channel.

5. Status Indications

5.1 Checking LCD Indications

Icon	Description
L	Low TX power for the current channel.
H	High TX power for the current channel.
	An accessory is connected.
	An alarm message is given.
	The GPS signals do not synchronize with the satellite signals.
	The GPS signals synchronize with the satellite signals.
RM	Repeater Mode: The repeater forwards the communication requests from radios and systems.
	The Monitor feature is enabled.
	The Scrambler/Encrypt feature is enabled.
	Scan is in progress.
	The speaker is unmuted.
	The repeater is connected to the network.
	The repeater is disconnected from the network.
	The network cable is removed from the repeater.

5.2 Checking LED Indications

Indicator	Color	Description
Power Indicator	Green	Normal power-on.
Alarm Indicator	Red	Abnormal operation and the alarm pops up.
Operation Status Indicator	Green	The repeater is operating in Repeater mode.
	Off	The repeater is operating in Base mode.
Digital Mode Indicator	Blue	The repeater is operating in Digital mode.
Analog Mode Indicator	Yellow	The repeater is operating in Analog mode.
Timeslot 1 TX Indicator	Red	● Analog mode: The repeater is transmitting. ● Digital mode: The repeater is transmitting in timeslot 1.
Timeslot 1 RX Indicator	Green	● Analog mode: The repeater is receiving. ● Digital mode: The repeater is receiving in timeslot 1.
Timeslot 2 TX Indicator	Red	Digital mode: The repeater is transmitting in timeslot 2.
Timeslot 2 RX Indicator	Green	Digital mode: The repeater is receiving in timeslot 2.

6. Alarm Information

With the Alarm feature enabled by your dealer, the repeater can detect alarms. When an error occurs, the LCD displays the alarm message with the Alarm Indicator on the front panel glowing red.

6.1 Low Forward Power Alarm

Description

When the forward power is below the preset value, the Alarm Indicator glows red and the LCD displays the message below:

Then the repeater may continue or stop the transmission.

Solution

Check if the connection between the repeater and RF adapter cable or antenna/feed line is loose or damaged.
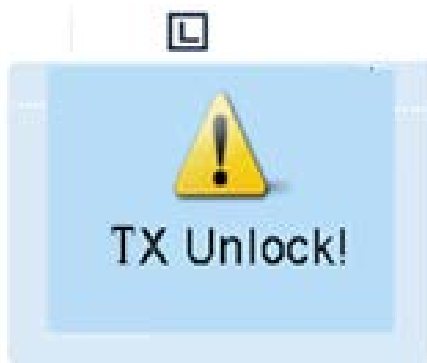
● If yes, secure or replace the cable or antenna/feed line.

● If no, contact your local dealer for technical support.

After the forward power recovers the normal value, the message disappears, and the Alarm Indicator goes off.

6.2 TX/RX Unlock Alarm

Description

When the TX PLL or RX PLL is unlocked, the Alarm Indicator glows red and the LCD displays the message below:

TX Unlock Alarm   RX Unlock Alarm

Then certain features of the repeater become unavailable automatically.

Solution

Disconnect the power supply, and then open the chassis to check if any cable is loose or damaged.

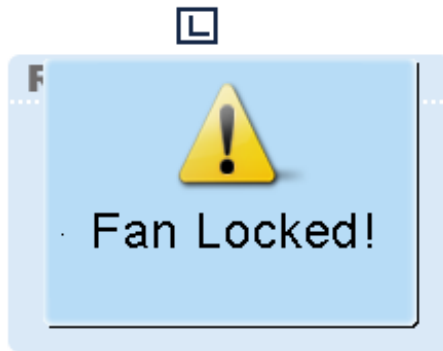- If yes, secure or replace the cable.
- If no, contact your local dealer for technical support.

After the TX/RX Unlock recovers the normal operation, the message disappears, and the Alarm Indicator goes off.

6.3 Fan Failure Alarm

Description

When the repeater is operating at high temperature and the fan fails to work, the Alarm Indicator glows red and the LCD displays the message below:

Then the repeater will automatically work at low TX power to avoid overheating.

Solution

Check whether the fan is blocked by an object.

- If yes, remove the object.

- If no, contact your local dealer for technical support.

After the fan recovers the normal operation, the message disappears, and the Alarm Indicator goes off.

6.4 Over Temperature Alarm

Description

When the temperature of the PA module exceeds the normal range, the Alarm Indicator glows red and the LCD displays the message below:

Then the repeater will stop transmission.

Solution

1. Check whether the temperature of the PA module surface is over 80 C.

    - If yes, proceed with Step 2.

    - If no, proceed with Step 3.

2. Check whether the ambient temperature and ventilation conditions of the repeater satisfy the foregoing installation requirements.

- If yes, proceed with Step 3.

- If no, make improvements as soon as possible by mounting air conditioning equipment, improving equipment ventilation, or reducing ambient temperature.

3. Check if the connection between the repeater and RF cable or antenna/feed line is loose or damaged.

- If yes, secure or replace the cable or antenna/feed line.

- If no, contact your local dealer for technical support.

After the temperature falls into the normal range, the message disappears, and the Alarm Indicator goes off.

6.5 Over/Low Voltage Alarm

Description

When the repeater detects that the voltage inputted by the external power supply is out of the normal range (11–15.6 V), the Alarm Indicator glows red and the LCD displays the message below:
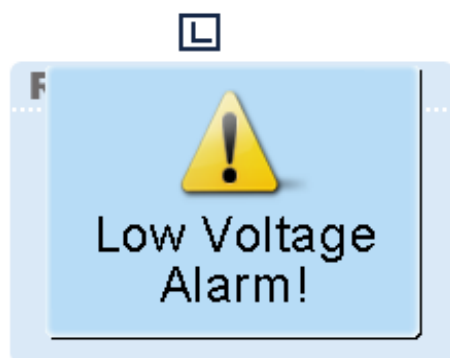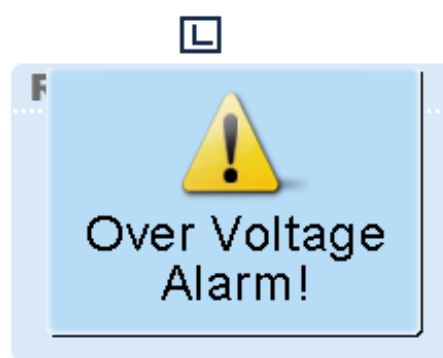
Low Voltage Alarm   Over Voltage Alarm

Then the repeater will automatically stop working.

Solution

1. Use voltmeter to check whether the DC power voltage is too low or too high.

- If yes, replace the DC power supply or use external battery.

- If no, proceed with Step 2.

2. Check whether the DC power cord is loose or damaged.

- If yes, secure or replace the cord.

- If no, contact your local dealer for technical support.

6.6 Voltage Standing Wave Ratio (VSWR) Alarm

Description

When the repeater detects that the voltage standing wave ratio (VSWR) of the TX antenna for the PA module exceeds the normal value, the Alarm Indicator glows red and the LCD displays the message below:

Then the repeater will automatically work at low TX power.

Solution

1. Check if the TX frequency is within the frequency range of the antenna.

   - If yes, proceed with Step 2.

   - If not, please contact your local dealer to replace the antenna.

2. Check if the connection between the repeater and RF adapter cable or antenna/feed line is loose or damaged.

   - If yes, please replace the cable.

   - If no, contact your local dealer for technical support.

After the VSWR falls into the normal range, the message disappears, and the Alarm Indicator goes off.

6. Troubleshooting

Phenomena	Analysis	Solution
Power-on Failure.	The power cord may be unconnected or not securely connected to the outlet.	Properly connect the power cord and ensure secure connection.
	The fuse in the power cord may be damaged.	Check if the fuse has blown. If yes, replace it with a new one.
Group members cannot talk to each other, or this repeater cannot communicate with a radio.	TX/RX frequency of the repeater is inconsistent with that of portable/mobile radios.	Check if the frequencies are consistent. Reset them when necessary.
	The repeater failed to repeat useful signal due to strong interference signal.	If you cannot remove or bypass the interference source, change to operate at other frequencies.
	The group member is out of the coverage of the repeater.	Go within the coverage of the repeater.
Group members cannot talk to each other, even though RX indication is given.	The radio ID is inconsistent with that of the other group members.	Set the subscriber ID to the same as that of the other members.
	The CTCSS/CDCSS of the radio is inconsistent with that of the repeater.	Check if the CTCSS/CDCSSs are consistent. Reset the CTCSS/CDCSSs when necessary.
Short communication range or poor audio.	The connecting cable is damaged, and the signal energy leaks.	Check the damages, and replace the cable with a new one if necessary.
	The antenna connector and the cable may get loose connection or even disconnected.	Check and secure the cable connector, or replace it if necessary.
	Invisible damage may occur to the cable.	Replace the cable with a new one.
	Duplexer is not properly set (if the duplexer is mounted).	Contact the manufacturer or your dealer to re-set the duplexer.

If the above solutions cannot fix the problems for you, or you may have some other queries, please contact us or your local dealer for more technical support.

7. Care and Cleaning

To guarantee optimal performance as well as a long service life of the product, please follow the tips below.

7.1 Product Care

● Keep the product at a place of good ventilation and heat dissipation to facilitate normal work.

● Do not place irrelevant articles on top of the product to ensure optimal heat dissipation.

● Do not pierce or scrape the product.

● Keep the product far away from substances that can corrode the circuit.

● Do not place the product in corrosive agents, solutions or water.

7.2 Product Cleaning

⚠ CAUTION

Be sure to power off the product before cleaning.

● Remove the dust and fine particles on the repeater surface with a clean and dry lint-free cloth or a brush regularly.

● Use a non-woven fabric with neutral cleanser to clean the keys, control knobs, LCD and connectors after long-time use. Do not use chemical preparations such as stain removers, alcohol, sprays or oil preparations.

● Make sure the product is completely dry before use.

8. Optional Accessories

⚠ CAUTION

Use the accessories specified by the Company only. If not, Hytera shall not be liable for any losses or damages arising out of use of unauthorized accessories.

For more information of the main optional accessories for the repeater, please consult your local dealer.