YAESU
The radio

System Fusion

DR-1
Operating Manual

144/430MHz 50W
VHF/UHF AMS DIGITAL REPEATER

C4FM FDMA/FM

Features of this radio

❍ 144/430 MHz repeater is equipped with a standard C4FM digital communication modem capable of selecting the communications mode automatically
❍ Clear audio and data communication is achieved using the digital modem functions
❍ Transmit power 50 watts with cooling fan
❍ Full color 3.5-inch LCD, high luminance TFT touch panel controller
❍ Intuitive, user touch panel operation

About the touch panel

● **Precautions in using the touch panel**
The touch panel of the controller is designed to work with the slightest touch of a finger.
❍ The touch panel may not work when a protective film or sheet is affixed to the LCD.
❍ Use of a pointed fingernail or pen to operate the touch panel, or pressing too hard may damage or scratch the screen.
❍ Smart phone operations such as flicking, pinch in and pinch out are not possible.

● **Maintaining the touch panel**
❍ To clean the touch panel, switch the power supply OFF before using a dry, soft cloth to wipe away dust and dirt from the touch panel. When the touch panel is really dirty, wet a soft cloth and wring it out thoroughly before using it to wipe the touch panel.
❍ When wiping the touch panel, be careful not to wipe too hard or scratch the surface with your nails. When the touch panel is scratched, it may become difficult to see the display.

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How to read this manual

In this manual, controller operations are expressed as follows:

Touch **[SQL]** ....Indicates that the symbol on the touch panel screen is to be touched quickly.

Select **[MODE]** ....Indicates that the items are to be highlighted on the touch panel screen.

The following symbols are also used in this manual:

Caution
...Explains information to avoid incorrect operation.

Tip
...Explains operating hints and helpful advice.

Also note: the actual product may differ from the drawings shown in this manual.

Before Using

Contents

Safety Precautions (make sure to read these)

Make sure to read this manual in order to use this radio safely and correctly.

Note beforehand that the company shall not be liable for any damages suffered by the customer or third parties in using this product, or for any failures and faults that occur during the use or misuse of this product, unless otherwise provided for under the law.

Type and meaning of the marks

⚠ **DANGER**	This symbol indicates the possibility of death or serious injury being inflicted on the user and the surrounding people when these instructions are ignored and the product is handled improperly.
⚠ **WARNING**	This symbol indicates the possibility of death or serious injury being inflicted on the user and the surrounding people when these instructions are ignored and the product is handled improperly.
⚠ **CAUTION**	This symbol indicates the possibility of physical impediments occurring or impediments being inflicted on the user and the surrounding people when these instructions are ignored and the product is handled improperly.

Type and meaning of symbols

🚫 Prohibited actions that must not be carried out in order to use this radio safely.
For example, 🚫 signifies that disassembly is prohibited.

❗ Precautions that must be adhered to in order to use this radio safely. For example, 🔌 signifies that the power supply is to be disconnected.

⚠ DANGER

🚫 **Do not use the device in "locations or aircraft and vehicles where its use is prohibited" such as in hospitals and aeroplanes.**
This may exert an impact on electronic and medical devices.

🚫 **Never touch the antenna during transmission.**
This may result in injury, electric shock and equipment failure.

🚫 **Do not transmit in crowded places in consideration of people who are fitted with medical devices such as heart pacemakers.**
Electromagnetic waves from the device may affect the medical device, resulting in accidents caused by malfunctions.

🚫 **Do not operate the device when flammable gas is generated.**
Doing so may result in fire and explosion.

🚫 **Use good engineering, proper grounding and protective devices to protect the repeater from power surges, lightening and electrical damage via the power and external antenna connections.**
Otherwise when it thunders, immediately disconnect the external antenna from the repeater and shut OFF the power supply.
If not, fire, electric shock and equipment failure this may result.

🚫 **Do not touch any liquid leaking from the liquid display with your bare hands.**
There is a risk of chemical burns occurring when the liquid comes into contact with the skin or gets into the eyes. In this case, seek medical treatment immediately.

⚠ WARNING

🚫 **Do not use voltages other than the specified power supply voltage.**
Doing so may result in fire and electric shock.

🚫 **Do not transmit continuously for long periods of time.**
This may cause the temperature of the main body to rise and result in burns and failures due to overheating.

🚫 **Do not dismantle or modify the device.**
This may result in injury, electric shock and equipment failure.

🚫 **Do not handle the power plug and connector etc. with wet hands. Also do not plug and unplug the power plug with wet hands.**
This may result in injury, electric shock and equipment failure.

🔌 **When smoke or strange odors are emitted from the radio, turn off the power and disconnect the power cord from the socket.**
This may result in fire, liquid leak, overheating, damage, ignition and equipment failure. Please contact our company amateur customer support or the retail store where you purchased the device.

❗ **Keep the power plug pins and the surrounding areas clean at all times.**
This may result in fire, overheating, breakage, ignition etc.

🚫 **Do not place the device in areas that may get wet easily (e.g. near a humidifier).**
This may result in fire, electric shock and equipment failure.

❗ **When connecting a DC power cord, pay due care not to mix up the positive and negative polarities.**
This may result in fire, electric shock and equipment failure.

🚫 **Do not use power cords other than the one enclosed or specified.**
This may result in fire, electric shock and equipment failure.

🚫 **Do not bend, twist, pull, heat and modify the power cord and connection cables in an unreasonable manner.**
This may cut or damage the cables and result in fire, electric shock and equipment failure.

🚫 **Do not pull the cable when plugging and unplugging the power cord and connection cables.**
Please hold the plug or connector when unplugging. If not, this may result in fire, electric shock and equipment failure.

🚫 **Do not use the device when the power cord and connection cables are damaged, and when the power connector cannot be plugged in tightly.**
Please contact our company amateur customer support or the retail store where you purchased the device as this may result in fire, electric shock and equipment failure.

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Do not use fuses other than those specified.
Doing so may result in fire and equipment failure.

Do not allow metallic objects such as wires and water to get inside the product.
This may result in fire, electric shock and equipment failure.

Disconnect the power cord and connection cables before incorporating items sold separately or replacing the fuse.
This may result in fire, electric shock and equipment failure.

Follow the instructions given when installing items sold separately and replacing the fuse.
This may result in fire, electric shock and equipment failure.

Do not use the device when it thunders.
For safety reasons, pull the power plug out of the AC socket. Never touch the antenna as well. This may result in fire, electric shock and equipment failure due to thunder.

⚠ CAUTION

Do not place this device near a heating instrument or in a location exposed to direct sunlight.
This may result in deformation and discoloration.

Do not place this device in a location where there is a lot of dust and humidity.
Doing so may result in fire and equipment failure.

Stay as far away from the antenna as possible during transmission.
Long-term exposure to electromagnetic radiation may have a negative effect on the human body.

Do not wipe the case using thinner and benzene etc.
Please use a soft and dry piece of cloth to wipe away the stains on the case.

Do not put heavy objects on top of the power cord and connection cables.
This may damage the power cord and connection cables, resulting in fire and electric shock.

Do not transmit near the television and radio.
This may result in electromagnetic interference.

Do not use optional products other than those specified.
If not, this may result in equipment failure.

Do not place the device on an unsteady or sloping surface, or in a location where there is a lot of vibration.
The device may fall over or drop, resulting in fire, injury and equipment failure.

For safety reasons, switch off the power and pull out the power cord when the device is not going to be used for a long period of time.
If not, this may result in fire and overheating.

Do not throw or subject the device to strong impact forces.
This may result in equipment failure.

Do not put this device near magnetic cards and video tapes.
The data in the cash card and video tape etc. may be erased.

Keep out of the reach of small children.
If not, this may result in injuries to children.

Do not stand on top of the product, and do not place heavy objects on top or insert objects inside it.
If not, this may result in equipment failure.

Do not use a microphone other than those specified when connecting a microphone to the device.
If not, this may result in equipment failure.

Do not touch the heat radiating parts.
When used for a long period of time, the temperature of the heat radiating parts will get higher, resulting in burns when touched.

Do not open the case of the product except when replacing the fuse and when installing items sold separately.
This may result in injury, electric shock and equipment failure.

Before Using

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Accessories

Options

DTMF Microphone MH-48A6JA
Hand Microphone MH-42C6J
Voice Guide Unit FVS-2

Before Using

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Name and Function of Each Component

Front
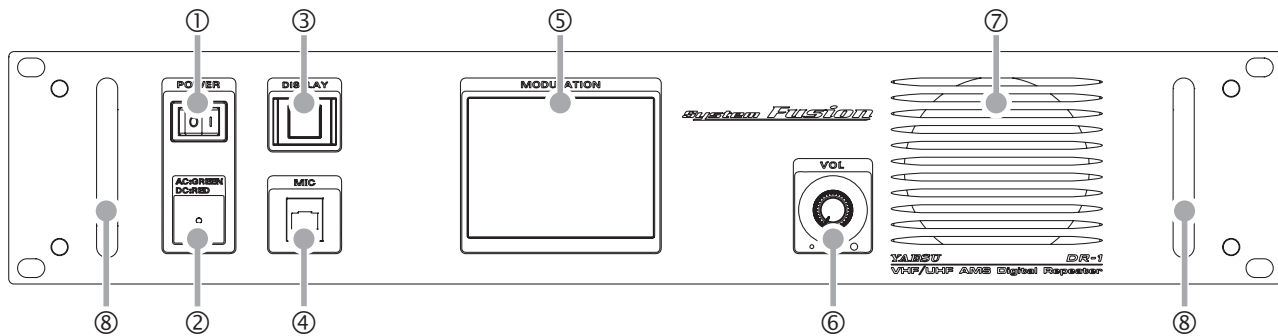
① POWER switch

Press "|" side to switch the radio on, and "O" side to switch the radio off.

② Power supply monitor (LED indicator)
* When the indicator illuminates in green, the power is supplied from the AC IN jack.
* When the indicator illuminates in red, the power supply is backed up through the BACKUP terminals (12 V DC).

③ DISPLAY button

Press to switch the display on and off.

④ MIC jack

Insert the plug of the optional microphone to this 6-pin modular jack.

(This jack is also used during the base mode in the remote operation (see page 23))

⑤ Touch panel display

⑥ VOL knob

The audio volume of the received (up link) signal will increase when the knob is turned in a clockwise direction and decrease when turned in a counter-clockwise direction.

⑦ Speaker

The internal speaker is located here.

⑧ Handle

Rear
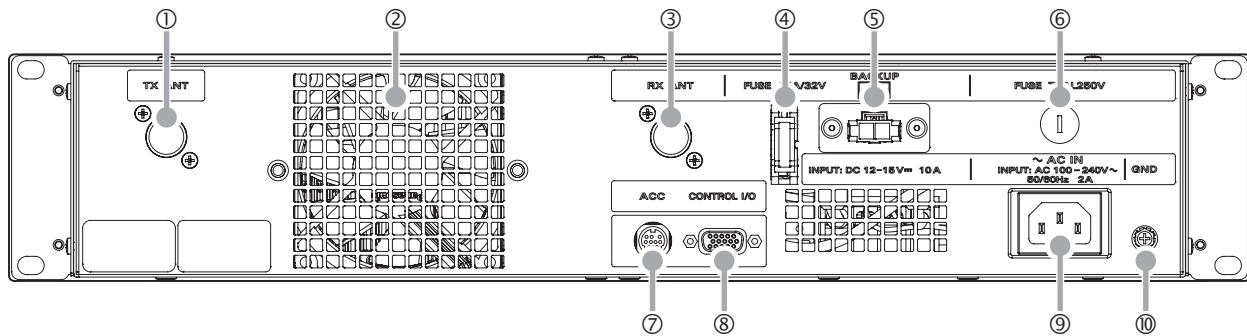
① TX ANT terminal

Connect to the transmitting antenna (down link) with the coaxial cable.

The output impedance requirement is 50 ohms.

② Air outlet for cooling fan

③ RX ANT terminal

Connect to the receiving antenna (up link) with the coaxial cable.

The input impedance requirement is 50 ohms.

④ FUSE 15A jack

A 15 A fuse for the DC power supply through the BACKUP terminals is attached.

⑤ BACKUP terminals

Connect to the 12 V DC power supply.

⑥ FUSE 5A jack

A 5 A fuse for the AC power supply through the AC IN jack is attached.

⑦ ACC jack

Connect to a personal computer with the provided PC connection cable "SCU-20".

⑧ CONTROL I/O connector

This connector allows the repeater to be connected to an external controller for remote operation.

⑨ AC IN jack

Connect to the 100 V to 240 V AC power supply with the provided power cable.

⑩ GND terminal

Before Using

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Explanation of the screen

Operation mode screen
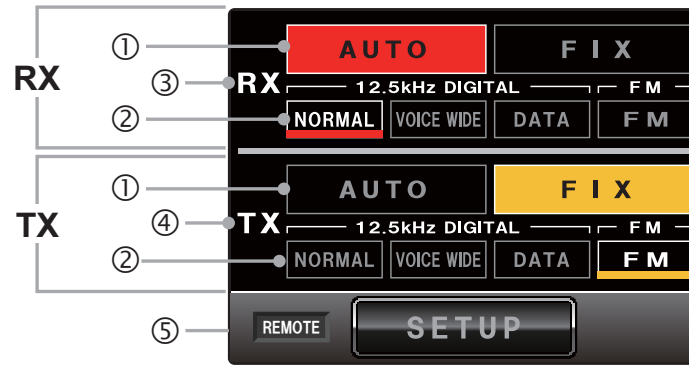
RX Receive (up link) band display area
TX Transmit (down link) band display area

① Operation mode display area

[AUTO]   Touch here to activate the AMS (automatic mode select) function. The communication mode switches automatically according to the received/transmitted signal types.

[FIX]   Touch here to receive/transmit signals in the selected communication mode at all time.

② Communication mode display area

The items are displayed in red during the AUTO mode and yellow during the FIX mode.

[NORMAL]   Indicates operation is in the simultaneous voice and data communication mode (digital).

[VOICE WIDE]   Indicates operation is in the high-rate voice communication mode (digital).

[DATA]   Indicates operation is in the high speed data communication mode (digital).

[FM]   Indicates operation is in the analog communication mode on the FM band.

③ RX indicator

This indicator shows green when a signal is received and white when there is no signal.

④ TX indicator

This indicator shows red when the repeater transmits and white when there is no transmit.

⑤ Settings display area

[REMOTE]   Displayed in red when remote operation with an external controller is enabled (see page 23).

[SETUP]   Touch here to switch the display to the setup mode screen.

Before Using

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Setup mode screen
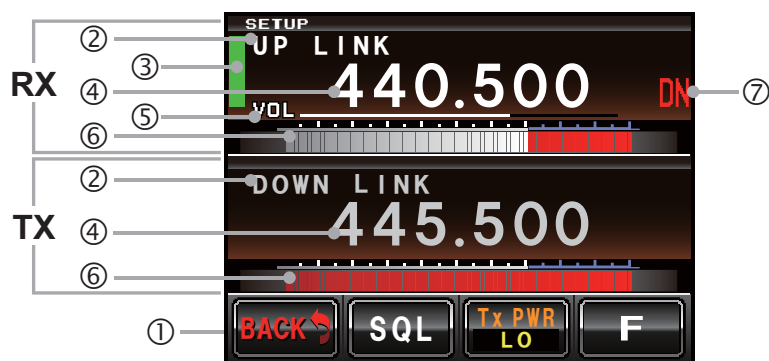
RX Receive (up link) band display area
TX Transmit (down link) band display area

① Touch key display area
  [BACK] Touch here to return to the operation mode screen.
  [SQL] Touch here to set the squelch level of the receiver.
  [Tx PWR] Touch here to set the transmitter output level.
  [F] Touch here to display the setup menu.
② Direction display area
  "UP LINK" is displayed on the RX band.
  "DOWN LINK" is displayed on the TX band.
③ Status display area
  A green bar is displayed during receive when signals are detected.
  The bar will not be displayed when the squelch is turned on.
④ Frequency display
⑤ VOL/SQL level display
⑥ S-meter/transmission power level display
⑦ Communication mode display

● **Squelch level setting screen**
The screen appears as below after **[SQL]** is touched.
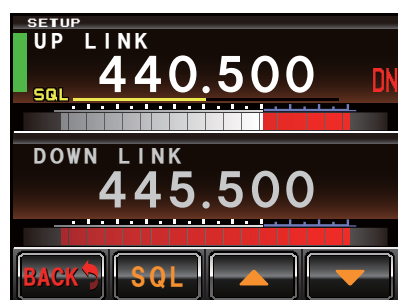
[▲][▼]   The squelch threshold will increase by touching [▲] and decrease by touching [▼].

Before Using

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Setting up the Repeater

Safety measures for installation

Note the followings precautions when installing this repeater.

❍　　　　　Use good engineering, proper grounding and protective devices to protect the repeater from power surges, lightening and electrical damage via the power and external antenna connections.

❍ Do not install the repeater in a place where there is extreme vibration, where there is a lot of dust, excessive humidity or high temperature, or where it is exposed to direct sunlight.

❍ Install the repeater in a well ventilated position, so heat dissipation is not obstructed. The heat sink becomes hot when transmitting for long periods of time.

❍ Do not place any objects on top of the repeater.

❍ Note that there is a risk that hum and noise may be introduced, depending on the installation conditions and the external power source used.

❍ Install the repeater as far as possible away from TV and radio equipment to avoid (TVI, BCI).

In particular, do not install the repeater near indoor antenna elements.

Installing the repeater

Place the repeater on a flat and level rack or shelf, with its bottom side down.

We recommend securing the wings of the repeater front panel to the equipment rack or shelf with bolts.
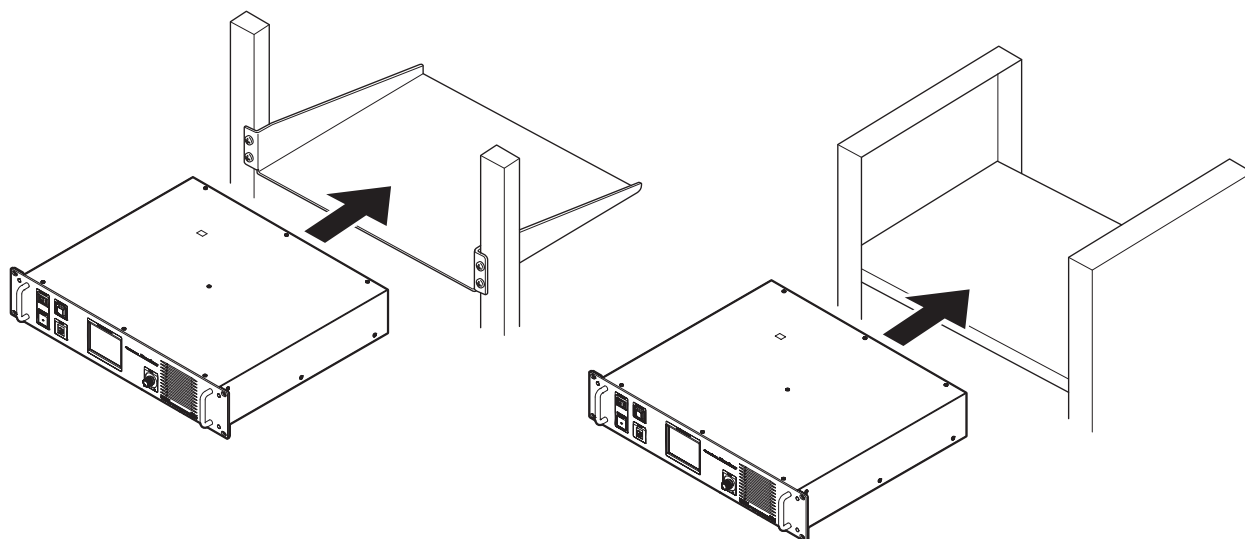
▊ Mounting on a desk

When using the repeater in a desktop location instead of a rack or shelf, attach the four supplied legs onto the bottom of the repeater case.

Installation and Connection

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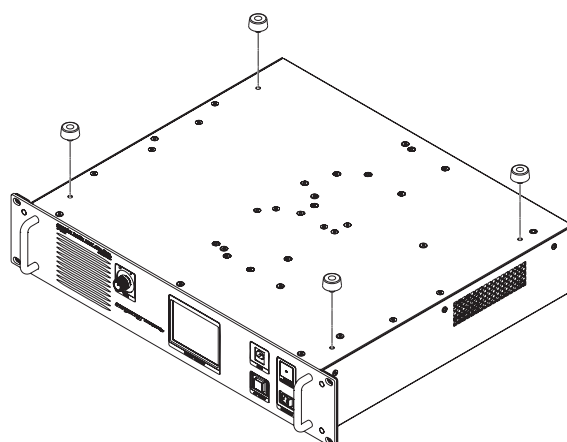
About electrical grounding

The DR-1 repeater, like any other communications apparatus, requires an effective ground system for maximum electrical safety and best communications effectiveness. A good ground system can contribute to station efficiency in a number of ways:

• It can minimize the possibility of electrical shock to the operator.
• It can minimize RF currents flowing on the shield of the coaxial cable and the chassis of the repeater. Such currents may lead to radiation, which can cause interference to home entertainment devices or laboratory test equipment.
• It can minimize the possibility of erratic repeater/accessory operation caused by RF feedback and/or improper current flow through logic devices.

To prevent damage from lightning, atmospheric electricity, electrical shock, etc., provide a good earth ground.
Use a short, thick, braided cable to connect your station equipment to the buried ground rod (or alternative earth ground system).

About the antenna

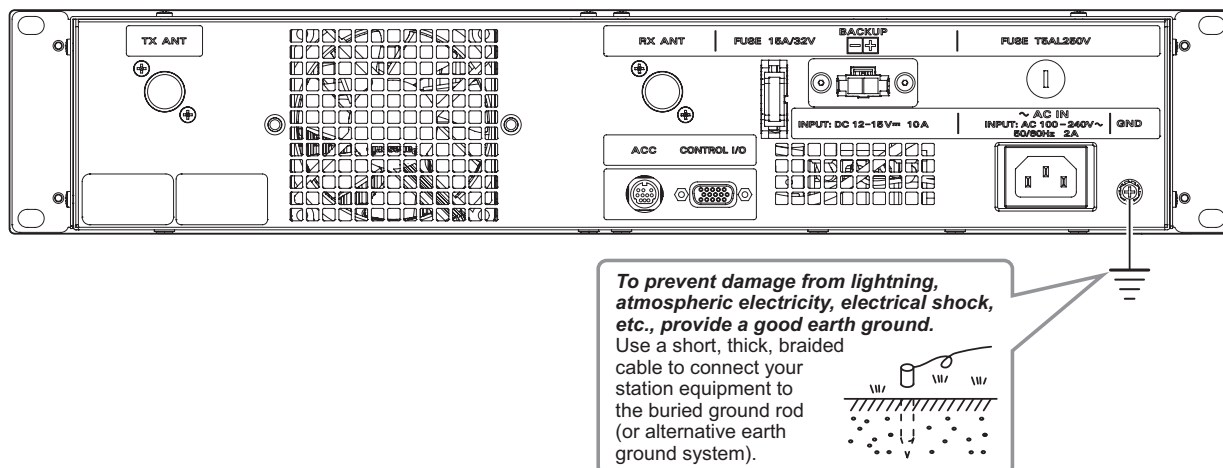A good antenna installation is extremely important for transmission and reception purposes. Note the followings, as the type and characteristics of the antenna largely determines whether the performance of the repeater can be fully realized.

• Use an antenna that is designed for the installation conditions and application objective.
• Use an antenna that is tuned for the operating band and frequency.
• Use an antenna and a co-axial cable with a characteristic impedance of 50Ω.
• Adjust the VSWR (standing wave ratio) until it is 1.5 or less for an antenna with an adjusted impedance of 50Ω.
• Keep the coaxial cable routing length as short as possible.
• Use lightening and voltage surge protection devises.

Antenna consideration

Repeater operation without a duplexer requires that two antennas be installed, one for receiving and one for transmitting, so that the receiving antenna does not absorb energy from the transmitting antenna. There are a number of ways to do this, depending on the TX/RX frequency separation, and on the locations available for antenna mounting. If a duplexer is used, a single antenna suffices for both transmitting and receiving. If using a reduced-size duplexer, a six-cavity model (minimum) is recommended. Yaesu recommends the use of the duplexer. For further details, contact your Yaesu dealer.

Regardless of the above choice, it is of paramount importance that the antenna(s) be mounted as high and in the clear as possible, preferably within line-of-sight to all repeater users. Furthermore, losses in the feedline(s) must be minimized, so the feedline(s) should be high quality, and as short as possible. If a long feedline is necessary, use coaxial "hardline" cable to reduce losses. Repeater antennas should have an impedance of 50 Ω at the operating frequency. When separate receive and transmit antennas are used, high-Q narrow-band types may serve to minimize interaction. However, when a single antenna is used with a duplexer, it should be a low-Q wide-band type.

Cautions
● Never transmit without having a transmit antenna connected to the TX antenna jack of the Repeater.
● Create a loop (slack) in the coaxial cable directly underneath the antenna and fasten it so that the weight of the cable does not pull on the antenna or connector itself.
● Install the antenna taking into consideration the securing supports and how the guying wires are positioned, so that the antenna does not fall over or get blown away in strong winds.

Installation and Connection

Connecting the antenna

1 Plug the coaxial connectors into the TX ANT and RX ANT jacks respectively at the rear of the repeater, and tighten the shields onto the jacks.
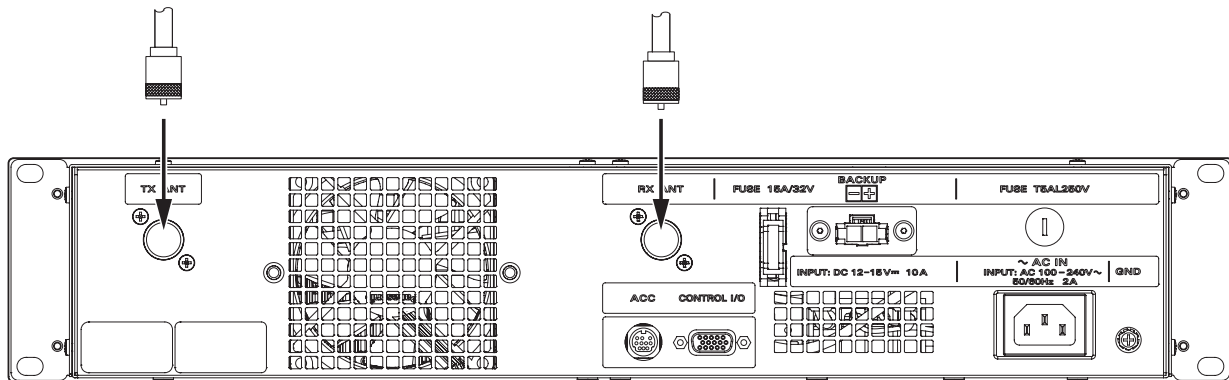
2 To use a duplexer prepared by yourself, plug in the terminal of the coaxial cables from the TX ANT and RX ANT terminals into the jacks of the duplexer, and turn to tighten

3 Plug in the terminal of the coaxial cable connected to the antenna into the jack of the duplexer, and turn to tighten

From TX ANT

To antenna

From RX ANT

Duplexer

Installation and Connection
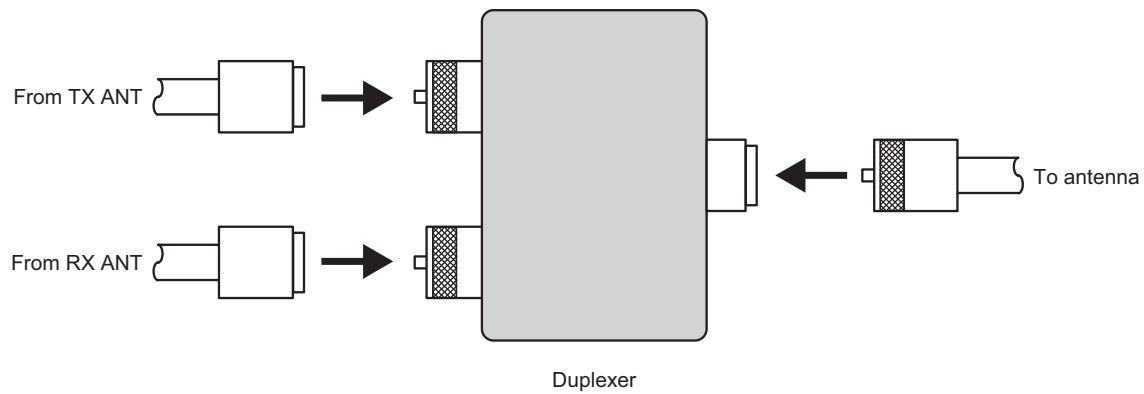
Connecting the Power Supply

● **Main power**

Caution

● Use an AC outlet capable of supplying AC 100 to 240 V at 50 or 60 Hz.

1 Insert the socket of the provided AC power cord into the AC IN jack at the rear of the repeater
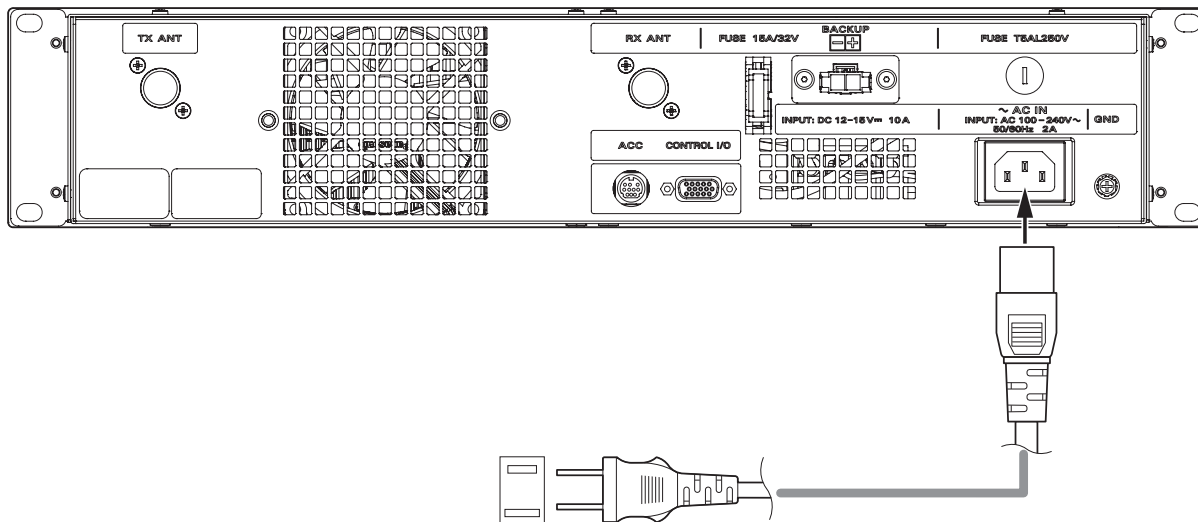**2** Insert the plug of the provided AC power cord into the AC outlet

● **Backup power**
For uninterrupted operation during power failures, a 13.8 V rechargeable automotive type battery (55-Ah or more recommended) may be connected to the BACKUP terminal posts on the rear panel. In the event of an AC power outage, the automatic power control circuit will automatically switch the repeater to the backup battery, and operation will not be interrupted.
If the power is out for a long time, the battery may be completely discharged. When the power is restored the DC startup current may blow the protection fuse. So the protection fuse in charge circuit should be checked after an outage.
While operating from a battery or DC supply, the repeater requires approximately 14 A at 13.8 V during transmit.
Follow the outline in the illustration regarding the proper connection of the DC power cable.
Always observe proper polarity when making DC connection.

Cautions

● Use a power source capable of supplying DC 13.8 V and a current capacity of 14 A or more.
● Make sure to switch OFF the power of the external power source before connecting.

1 Insert the socket of the provided DC power cord to the BACKUP jack at the rear of the repeater
2 Connect the red wire (+) of the provided DC power cord to the positive (+) terminal of the external power source, and the black wire (-) to the negative (-) terminal

Fuse (15 A)

(black) −   + (red)

Installation and Connection

Connecting External Devices
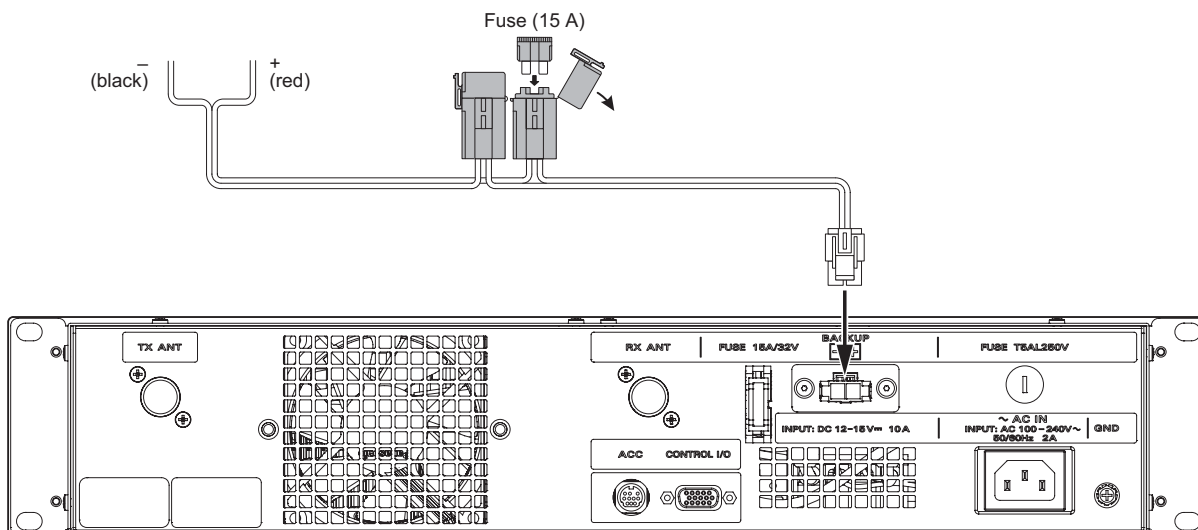
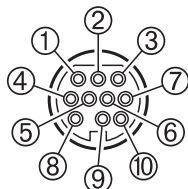### Connection to a personal computer

The provided PC connection cable "SCU-20" and other optional cables can be used to connect the repeater to a personal computer as a COM port.
Use the [ACC] jack at the back of the repeater to connect with the personal computer.
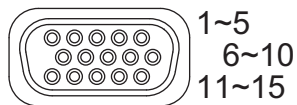The pin assignments of the [ACC] jack are as follows.

① PKD (packet data input)
② GND
③ PSK (PTT)
④ RX 9600 (9600 bps packet data output)
⑤ RX 1200 (1200 bps packet data output)
⑥ PK SQL (squelch control)
⑦ TXD (serial data output [transceiver → PC])
⑧ RXD (serial data output [transceiver ← PC])
⑨ CTS (data communication control)
⑩ RTS (data communication control)

Tips
• Make sure to switch off the power to the radio before connecting the cable.
• When using the PC connection cable "SCU-20", a dedicated driver needs to be installed in the personal computer. Download and use the driver and installation manual from the YAESU website.

Connection to an external controller

Some optional cables can be used to connect the repeater to an external controller that allows the repeater to be controlled remotely.
Use the [CONTROL I/O] connector at the back of the repeater to connect with the external controller.
The pin assignment of the [CONTROL I/O] connector is as follows.

1~5
6~10
11~15

Pin No	Pin Name	I/O	Operations
1	BASE	I	L: Base mode OPEN: Repeater mode
2	PTT*1	I	L: EXT PTT ON OPEN: EXT PTT OFF
3	CTCSS/DCS (PKSQL)*1	O	L: Decoded OPEN: Undecoded
4	SQL DET (Noise SQL)*1	O	L: SQL open OPEN: SQL close
5	GND	GND	GND
6	TONE IN*1	I	CTCSS/DCS EXT input / 600 ohm
7	AF IN*1	I	EXT Modulation input / 600 ohm
8	DISC OUT	O	Up-link RX Disc output (w/o de-emphasis)
9	AF OUT	O	Up-link RX AF output (w/ de-emphasis)
10	GND	GND	GND
11	EXT port 1*2	I	Determined by the signal combination of the port 1 and 2 as below:
12	EXT port 2*2	I	
13	EXT port 3*2	I	L: RX Tone OFF OPEN: Setup mode
14	EXT port 4*2	I	L: TX Tone OFF OPEN: Setup mode
15	VCC	VCC	Switched VCC (12 V)

Signal combination table for pins 11 and 12:

Port 2	Port 1	RX	TX
H	H	AUTO	FM
H	L	FM	FM
L	H	Digital	Digital
L	L	AUTO	AUTO

*1: These functions may only be activated while the repeater is in Base mode.

*2: These functions may only be activated while the repeater is in Remote mode.

Installation and Connection

Basic Operations

Turning the power on

1 Press the "|" side of the POWER switch

The power will be switched on, and the power supply monitor (LED indicator) will illuminate.

> **Tips** • When the power is supplied from the AC IN jack, the indicator illuminates in green.
> • When the power is supplied through the BACKUP terminals (12 V DC), the indicator illuminates in red.

The operation mode screen will appear on the display.
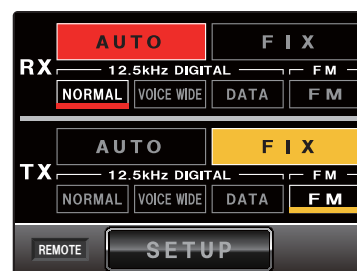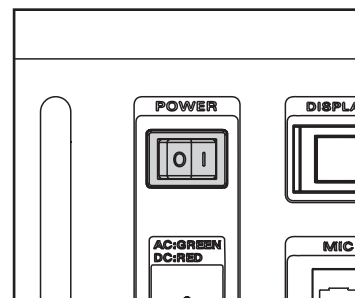
Switching the power off

1 Press the "O" side of the POWER switch

The power supply monitor and the display will turn off, and the power will be switched off.
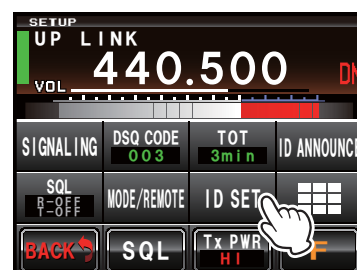
Setting the ID (call sign)

When switching the power on for the first time after purchasing, or after resetting the radio, you must enter the call sign.

1 Touch **[F]** in the setup mode screen

The setup menu will appear.

2 Touch **[ID SET]**

The character input screen will appear.

3 Touch a character key

The touched character will be displayed at the top of the screen.

> **Tips** • Each time **[✕]** is touched the cursor will move to the left and erase one character.
> • The input screen changes between numbers input and alphabet input each time **[ABC]** is touched.
> • The cursor in the input field moves left or right when **[←]** or **[→]** are touched.
> • Alphabets, numbers, and a hyphen up to 10 characters can be entered.
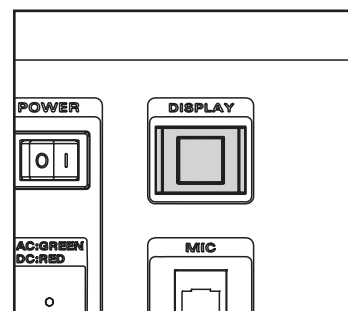
4 Touch **[ENT]**

The ID setting is saved and the display will return to the setup menu.

> **Tip** When switching the power ON for the first time after purchasing, or after resetting the radio, a screen will be displayed requesting the repeater ID be entered.

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Turning the display on and off

1 Press the DISPLAY button for 1 second to turn the display off

**2** Press the DISPLAY button for 3 seconds to turn the display on

Tip

The display can be set to turn off automatically after a period of time with no operation. See "Setting the turn-on time of the display" (Page 33) for details.

Adjusting the volume

1 Turn the VOL knob

The monitor speaker audio volume of the received (up link) signal will increase when the knob is turned in a clockwise direction and decrease when the knob is turned in a counter-clockwise direction.
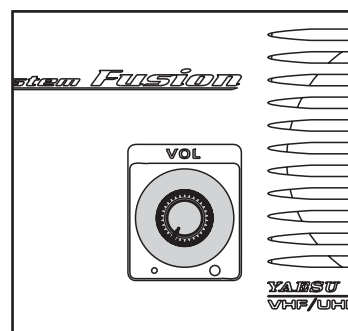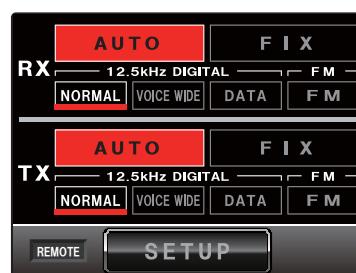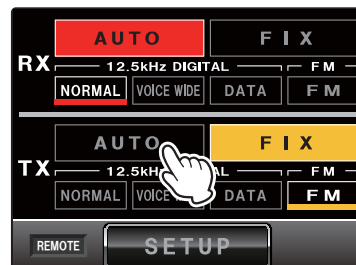
Switching the operating mode

The operating mode can be switched between the AUTO mode in which the communication mode switches automatically corresponding to the received/transmitted signal types, and the FIX mode in which the signals are always received/transmitted in the previously selected communication mode.

Tip

In the factory default, the RX band is set to the AUTO mode, and the TX band to the FIX mode.

1 Touch **[AUTO]** to activate the AMS (automatic mode select) function

One of the communication modes will be selected automatically and the corresponding indicator will be displayed in red (also see the next page).

2 Touch **[FIX]** to operate in the FIX mode

The indicator of the selected communication mode will turn yellow on the operation mode screen.

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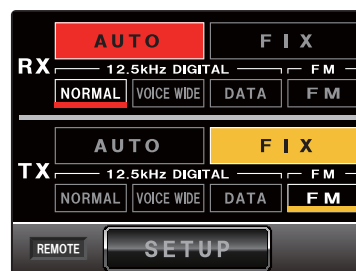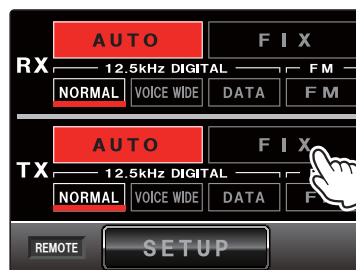
Switching the communication mode

This repeater is equipped with the AMS (automatic mode select) function which automatically selects one of four communication modes to match the signal received or transmitted.

C4FM digital signals or analog signals are identified in order to automatically match the communication mode of the partner station. When using AUTO mode, the AMS function is activated and the selected communication mode is indicated in red on the operation mode screen.

When using FIX mode, touch **[FIX]** repeatedly on the operation mode screen to select the communication mode. The selected mode is indicator in yellow and changes each time **[FIX]** is touched.

Tip The combination of UP LINK for "FIX mode" and DOWN LINK for "AUTO mode" can not be set.
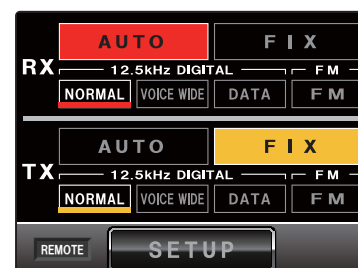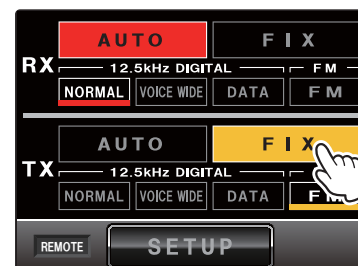
Communication mode	Indicator	Explanation of mode
V/D mode (Simultaneous voice and data communication mode)	NORMAL / DN	The audio signal error is detected and repaired during the transmission of the digital audio signal. This reduces interruptions to the conversation and is the basic C4FM FDMA digital mode.
Voice FR mode (Voice full-rate mode)	VOICE WIDE / VW	Digital voice data is transmitted using the entire 12.5 kHz bandwidth. High quality voice communication is possible.
Data FR mode (High speed data communication mode)	DATA / DW	High speed data communication mode using the entire 12.5 kHz bandwidth for data communication. Automatically switches to this mode for video communication.
Analog FM mode	FM	Analog communications using the FM mode. This mode is effective for communication when the signal strength is so weak that the voice is cut off or interrupted in the digital mode.

Caution

In the V/D mode ("NORMAL" is displayed), the position information is included in the transmitted signal during the conversation, however in the Voice FR mode ("VOICE WIDE" is displayed), the position information is not included.
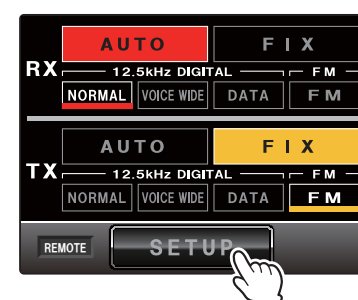
Adjusting the squelch level

Annoying noises can be muted when no signal is detected. The noise can be canceled more effectively when the squelch threshold is increased, but it may become more difficult to receive weak signals. Adjust the squelch level as required.

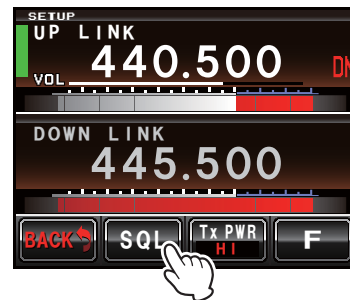Note When the squelch level is set to "open", the repeater cannot operate.

1 Touch **[SETUP]**
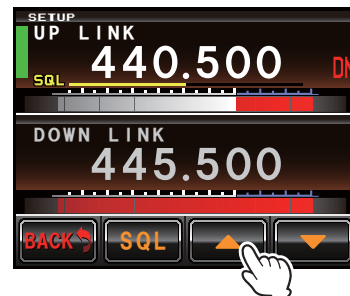
The setup mode screen will appear.
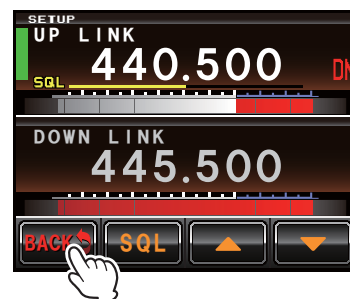
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2 Touch **[SQL]**

When **[SQL]** turns orange, the VOL meter below the frequency of the RX band will change to the SQL meter showing the squelch level setting.

3 Touch **[▲]** or **[▼]** to adjust the squelch level

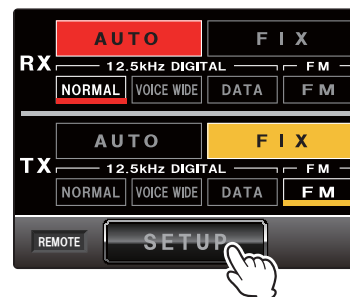The level will be displayed in the SQL meter.

4 Touch **[BACK]**

The squelch level is set and the display will return to the previous screen.

Adjusting the transmit power

The transmit power can be reduced to save on power consumption.

1 Touch **[SETUP]**

The setup mode screen will appear.
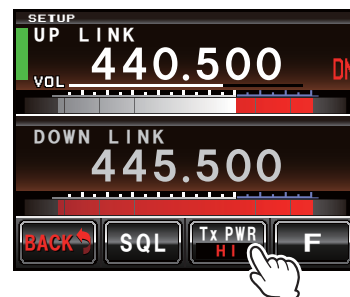
2 Touch **[Tx PWR]** to select the transmit power

The setting is changed in the following sequence, each time **[Tx PWP]** is touched.
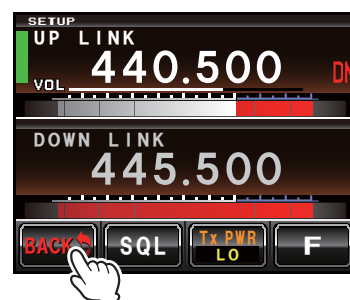
"HI" → "LO" → "MD"

HI	MD	LO
50 W	20 W	5 W

Tips • The current setting is displayed below **[Tx PWR]** on the screen.
• Factory default: HI

3 Touch **[BACK]**

The transmit power level is set and the display will return to the operation mode screen.
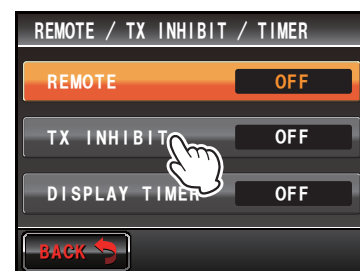
Repeater Operation

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Setting the TX Inhibit

1 Touch **[SETUP]** on the operation mode screen
The setup mode screen will appear.

2 Touch **[F]** in the setup mode screen
The setup menu will appear.

3 Touch **[MODE/REMOTE]**
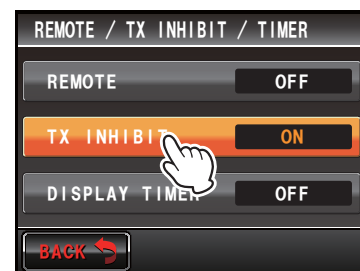The menu list will appear.
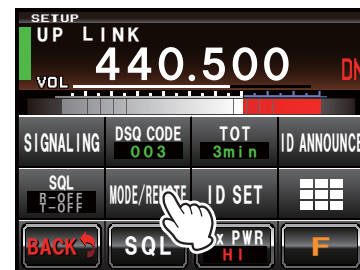
4 Select **[TX INHIBIT]**

5 Touch **[TX INHIBIT]**
The set value will change between **[OFF]** and **[ON]** each time it is touched.

OFF	ON
Disable transmission	Enable transmission

Tip Factory default: OFF

Note When [TX INHIBIT] is set to "OFF", all transmit action will be disabled.

6 Touch **[BACK]**
The setting is saved and the display will return to the setup menu.

Remote Operation

You can control the repeater operation remotely by connecting an external controller through the [CONTROL I/O] connector at the back of the repeater (see page 16).

To use the repeater under remote control, set up the repeater after it is connected to the external controller.

Turning remote operation ON/OFF

When the remote operation is "ON", the repeater operates according to the control instructions received from the external controller (the instructions are received through the pin 11 to pin 14 of the [CONTROL I/O] connector). When the remote operation is "OFF", the repeater operates according to the settings determined through the setup mode.
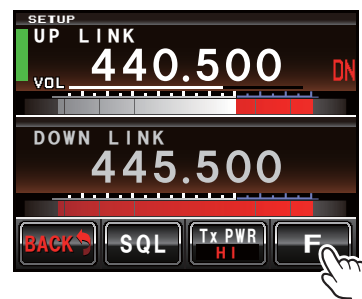
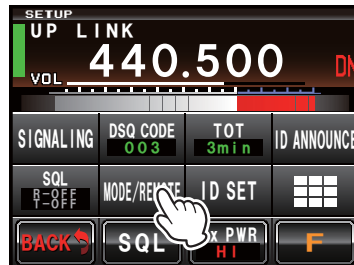**1** Touch **[SETUP]**

The setup mode screen will appear.
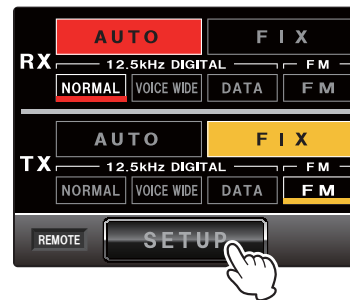
2 Touch **[F]**

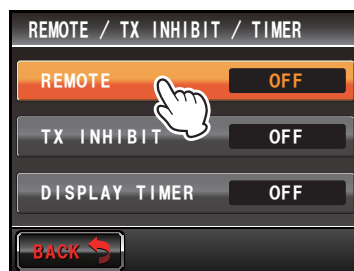The setup menu will appear.

3 Touch **[MODE/REMOTE]**

The menu list will appear.

4 Select and touch **[REMOTE]**

The set value will change between **[OFF]** and **[ON]** each time it is touched.

Tip   Factory default: OFF

5 Touch **[BACK]** three times

The setting is determined and the display will return to the operation mode screen.

Note that **[REMOTE]** at the bottom left of the screen is displayed in red.

Repeater Operation

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Setting up the Repeater

Using the setup menu, the various functions of the repeater can be customized to match the method of use. You can select the items that you would like to adjust from the respective lists and enter or select the appropriate settings for the intended repeater operation.

Setup menu basic operations

1 Touch **[SETUP]** on the operation mode screen
The setup mode screen will appear.

2 Touch **[F]**
The setup menu will appear.

3 Touch the menu item
The menu list will appear.

4 Touch the item to be set
The item will turn orange in color.

5 Touch **[▲]** or **[▼]**, or touch the item repeatedly
The set value will change each time it is touched.

6 Touch **[BACK]**
The setting is determined and the display will return to the setup menu.
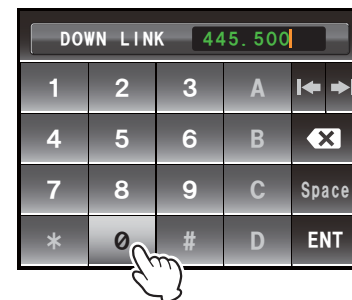
24
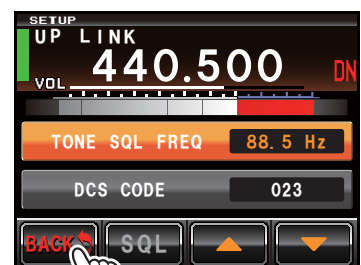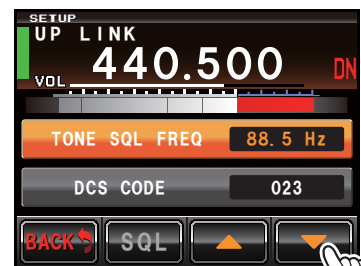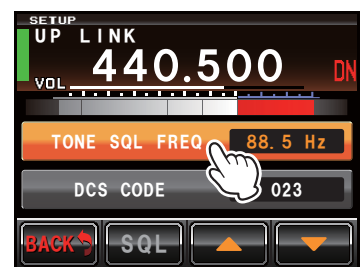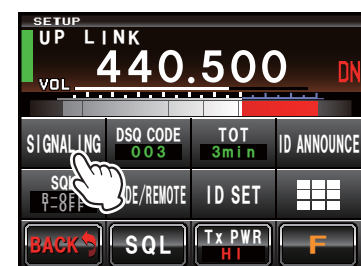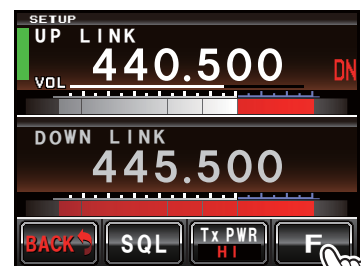
Setting the frequency

1 Touch the TX or RX band area.

The number input screen will appear.
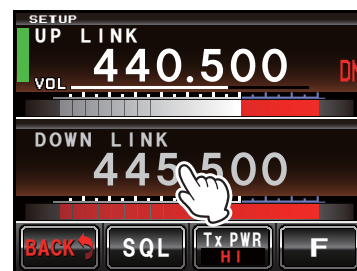
2 Touch a number key
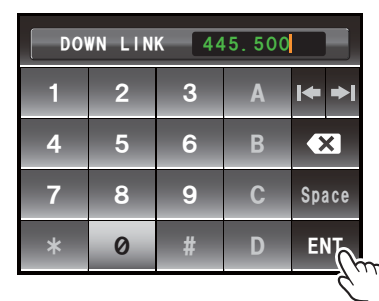
The touched number will be displayed at the top of the screen.

Tips • Each time **[X]** is touched the cursor will move to the left and erase one character.

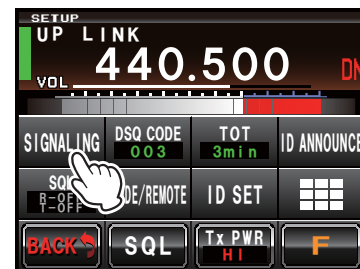• Touch the "DOWN LINK" or "UP LINK" area to change the frequency setting between TX or RX.

3 Touch **[ENT]**

The display will return to the setup menu.

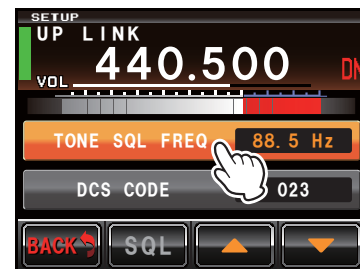The entered frequency will be displayed on the selected band.

Setting the tone signals
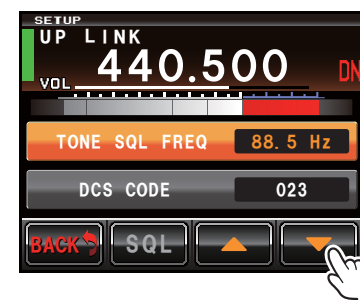
Setting the tone frequency

1 Touch **[F]** in the setup mode screen
The setup menu will appear.

2 Touch **[SIGNALING]**
The menu list will appear.

3 Select **[TONE SQL FREQ]**

4 Touch **[▲]** or **[▼]**
The set value will change each time it is touched.
Tips • Tone frequencies between 67.0 Hz and 254.1 Hz can be selected.
• Factory default: 100.0 Hz

5 Touch **[BACK]**
The setting is determined and the display will return to the setup menu.

Setting the DCS code

1 Touch **[F]** in the setup mode screen
The setup menu will appear.

2 Touch **[SIGNALING]**
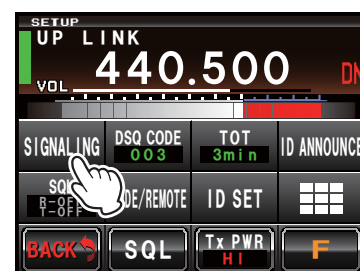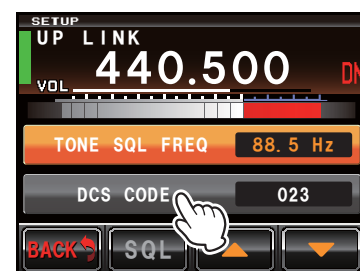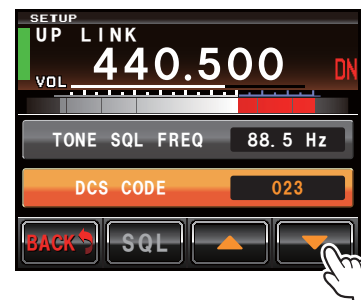The menu list will appear.

3 Select **[DCS CODE]**

Repeater Operation

4 Touch **[▲]** or **[▼]**

The set value will change each time it is touched.
Tips • DCS codes between 023 and 754 can be selected.
 • Factory default: 023

5 Touch **[BACK]**

The setting is determined and the display will return to the setup menu.

Switching the tone signal types

1 Touch **[F]** in the setup mode screen
The setup menu will appear.

2 Touch **[SQL]** in the setup menu
The menu list will appear.

3 Select **[RX SQL]** to set the tone signal type during reception, or select **[TX SQL]** to set the tone signal type during transmission
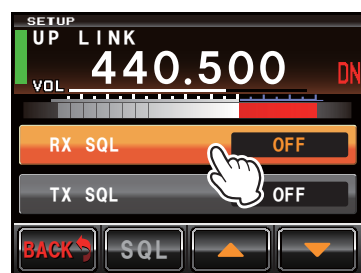
4 Touch **[▲]** or **[▼]**

The setting will change in the following sequence each time it is touched.
"OFF" → "TONE" → "DCS"
Tip Factory default: OFF

5 Touch **[BACK]**

The setting is determined and the display will return to the setup menu.

Repeater Operation

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Setting the digital squelch code

1 Touch **[F]** in the setup mode screen
The setup menu will appear.

2 Touch **[DSQ CODE]**
The menu list will appear.

3 Touch **[▲]** or **[▼]**
The set value will change each time it is touched.
Tips • Tone squelch codes between 001 and 126 or OFF can be selected.
  • Factory default: OFF

4 Touch **[BACK]**
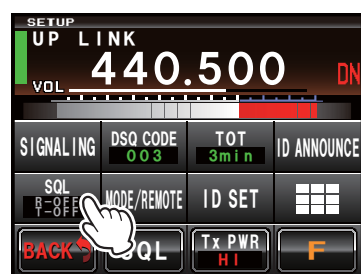The setting is determined and the display will return to the setup menu.
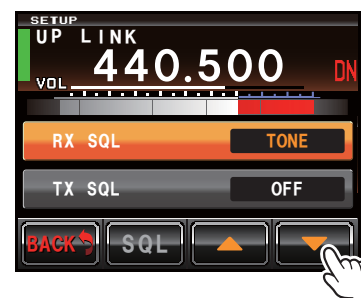The set value will be displayed below **[DSQ CODE]** on the menu.
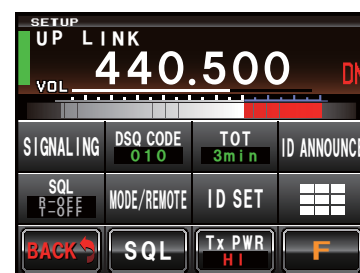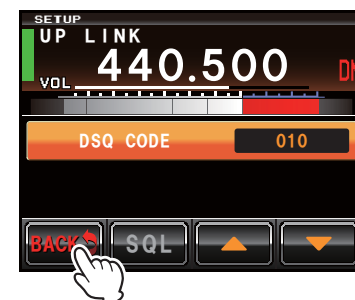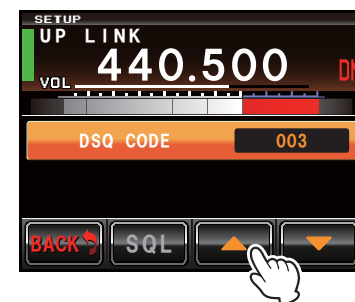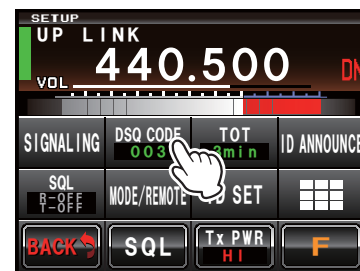
Setting the ID (call sign)

1 Touch **[F]** in the setup mode screen
The setup menu will appear.

2 Touch **[ID SET]**
The character input screen will appear.

Repeater Operation

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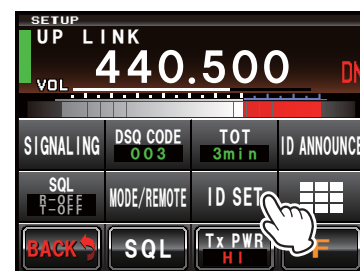
3 Touch a character key

The touched character will be displayed at the top of the screen.

Tips • One character to the left of the cursor is erased when **[✕]** is touched.
• The screen changes to the input screen for numbers and alphabet each time **[ABC]** is touched.
• The cursor in the input field moves left and right when **[←]** and **[→]** are touched.
• Alphabets, numbers, and a hyphen up to 10 characters can be entered.

4 Touch **[ENT]**

The setting is determined and the display will return to the setup menu.

Tip When switching the power ON for the first time after purchasing, or after resetting the radio, a screen will be displayed requesting the repeater ID entered.

Setting the ID announcement

Setting the way to announce

1 Touch **[F]** in the setup mode screen

The setup menu will appear.

2 Touch **[ID ANNOUNCE]**
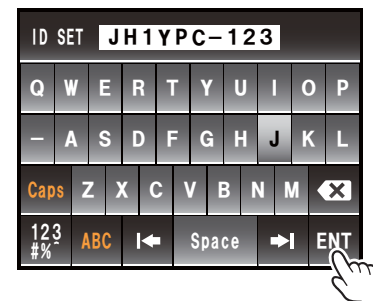
The menu list will appear.
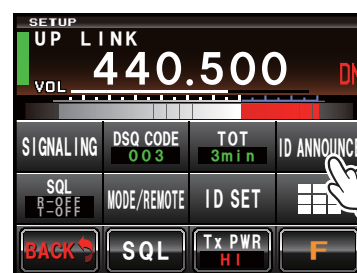
3 Select and touch **[ANNOUNCE]**

The menu list will appear.

4 Select and touch **[ANNOUNCE MODE]**

The set value will change between **[CW]** and **[VOICE]** each time it is touched.

Caution **[VOICE]** cannot be selected when the optional voice guide unit "FVS-2" is not mounted on the repeater.

Tip Factory default: CW

5 Touch **[BACK]**

The setting is determined and the display will return to the menu list.

Repeater Operation

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Setting the announcement output level

1 Touch **[F]** in the setup mode screen
The setup menu will appear.

2 Touch **[ID ANNOUNCE]**
The menu list will appear.

3 Select and touch **[ANNOUNCE]**
The menu list will appear.

4 Select and touch **[ANNOUNCE LEVEL]**
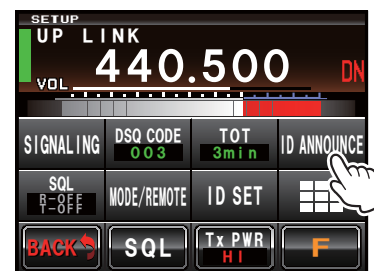The set value will change in the following sequence each time it is touched.
"HIGH" → "MID" → "LOW"
Tip Factory default: MID

5 Touch **[BACK]**
The setting is determined and the display will return to the menu list.

Setting the ID announcement CW speed

1 Touch **[F]** in the setup mode screen
The setup menu will appear.

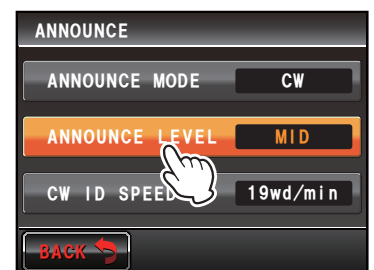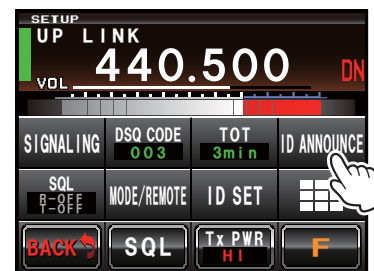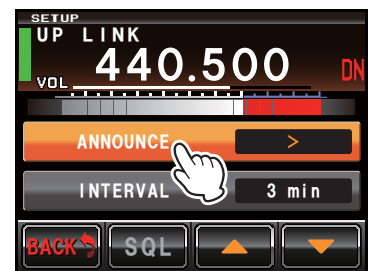**2** Touch **[ID ANNOUNCE]**
The menu list will appear.

3 Select and touch **[ANNOUNCE]**
The menu list will appear.

4 Select and touch **[CW ID SPEED]**

The set value will change in the following sequence each time it is touched.

"16wd/min" → "19wd/min" → "24wd/min" → "32wd/min"

Tip   Factory default: 19wd/min

5 Touch **[BACK]**

The setting is determined and the display will return to the menu list.

Setting the announcement time interval

1 Touch **[F]** in the setup mode screen

The setup menu will appear.

2 Touch **[ID ANNOUNCE]**

The menu list will appear.
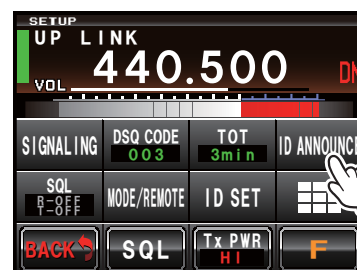
3 Select **[INTERVAL]**

4 Touch **[▲]** or **[▼]**

The set value will change in the following sequence each time it is touched.

"OFF" → "3min" → "5min" → "10min" → "15min" → "20min" → "30min" → "TOT"

Tip   Factory default: 10min

5 Touch **[BACK]**

The setting is determined and the display will return to the setup menu.

Repeater Operation

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Setting the TOT (timeout timer)

1 Touch **[F]** in the setup mode screen
The setup menu will appear.

2 Touch **[TOT]**
The menu list will appear.

3 Touch **[▲]** or **[▼]**
The set value will change in the following sequence each time it is touched.
"OFF" → "30sec" → "1min" → "1.5min" → "2min" → "2.5min" → "3min" → "4min" →
"5min" → "10min"
Tip Factory default: 3min

4 Touch **[BACK]**
The setting is determined and the display will return to the setup menu.
The set value will be displayed below **[TOT]** on the menu.
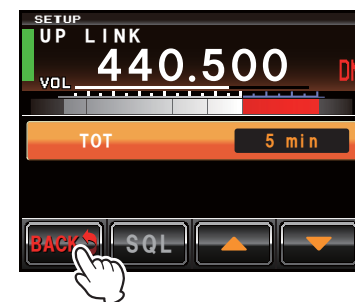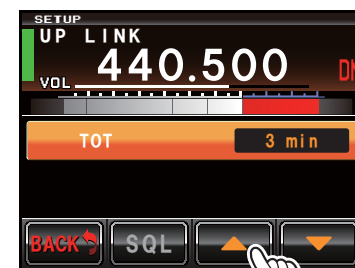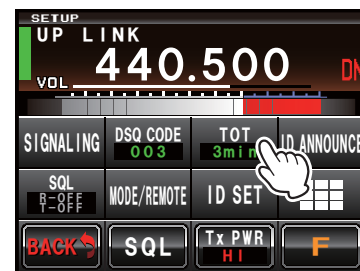
Setting other configuration

Setting the repeater for remote operation

See page 23 for details.

Turning transmission ON/OFF from the remote controller

See page 22 for details.
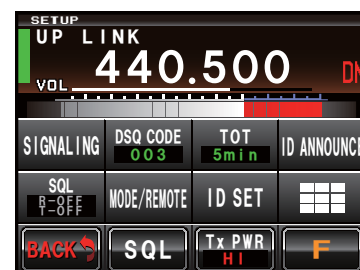
Setting the display turn-on time

1 Touch **[F]** in the setup mode screen
The setup menu will appear.

2 Touch **[MODE/REMOTE]**
The menu list will appear.

3 Select **[DISPLAY TIMER]**

4 Touch **[DISPLAY TIMER]**
The set value will change in the following sequence each time it is touched.
"CONTINUE" → "1min" → "5min" → "10min" → "30min"
Tip Factory default: CONTINUE

5 Touch **[BACK]**
The setting is determined and the display will return to the menu list.
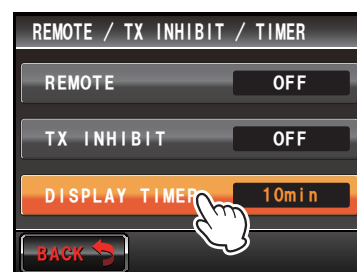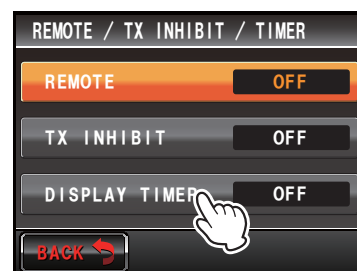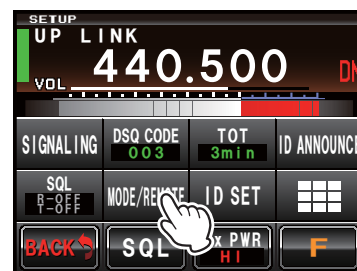
Setting the Packet Speed

1 Touch **[F]** in the setup mode screen
The setup menu will appear.

2 Touch the RX band area.
The set value will change between [1200 bps] and [9600 bps] each time it is touched.
Tip Factory default: 1200 bps

3 Three seconds after selecting the packet speed, the new setting is automatically saved and the display will return to the menu list.
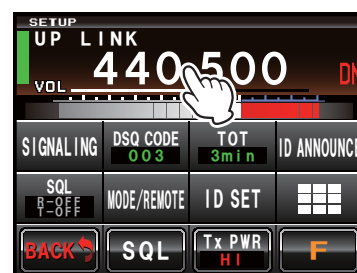
▐ Restoring Default Settings (Factory Reset)

1 Turn the radio off.

2 Press and hold in the DISPLAY button while turning the radio on.

> **Tip** Continue pressing the DISPLAY button until the operation mode screen appears on the display.
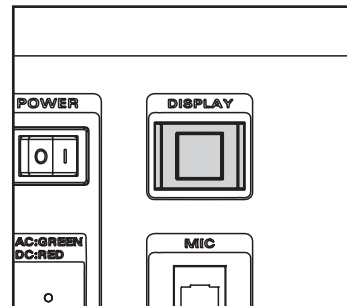
3 Touch **[SETUP]**

The setup mode screen will appear.

4 Touch **[F]** in the setup mode screen

The setup menu will appear.

5 Touch **[F]**

The reset confirmation screen will appear.
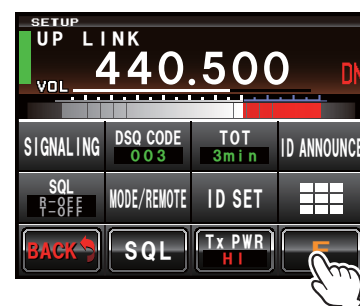
6 Touch **[OK?]**

The settings will be reset to the factory default values.

> **Tips** • Touch [Cancel] to stop the reset and keep the current settings.
>
> • After resetting the repeater, the call sign must be entered (see page 28).

Maintenance

Care and maintenance

Switch the power supply OFF before wiping away any dust and stains on the radio using a dry and soft cloth. For stubborn stains, wet a piece of soft cloth and wring it hard before using it to wipe away the stains.

Caution   Never use washing detergents or organic solvents (thinner, benzene etc.). These may result in the paint peeling off or the cover being damaged.

Replacing the fuse

When the fuses attached at the rear of the radio are blown and the radio can no longer operate, replace them with correct rating one (5 A for AC power supply, 15 A for DC power supply).

Caution   When replacing the fuse, disconnect the power supply cable from the radio.

Appendix

Advice when there is a problem

Caution

Check the following before requesting repair services.

There is no power

● Is the external power supply connected correctly?
Check the AC power supply; plug the connectors of the provided power supply cable all the way into the jacks.
Check the DC backup power supply; connect the black wire to the minus terminal and the red wire to the plus terminal.
● Is the voltage and current capacity of the external power supply sufficient?
Check the voltage and current capacity of the external power supply.
● Is the fuse open/blown?
Replace the fuse.

There is no sound

● Is the squelch level or setting too high?
Adjust the squelch level when receiving weak signals.
● Is the volume too low?
Increase the volume by turning the VOL knob in a clockwise direction.
● Is the tone squelch or DCS turned on?
When the tone squelch or DCS is turned on, no sound will be heard until signals containing the same tone frequency or DCS code as the repeater setting are received.

There is no transmission

● Is the transmit frequency set to the amateur band?
Transmission outside the amateur band is not possible.
● Is the antenna or coaxial cable at fault?
Replace the antenna or coaxial cable.
● Is the voltage of the external power supply normal?
When the voltage of the power supply drops during transmission, the radio may not function correctly.
Use a stable power supply with a proper voltage and current capacity.

There is no screen on the display

● Is the screen timeout timer set to ON?
Press and hold the DISPLAY button for 3 seconds to turn on the display.
Set a longer period of time for the timeout timer in the setup mode.

About internal spurious signals

Due to the combination of oscillator signals produced at the same time in the receiver, there may be some internal heterodynes due to the high frequency of the internal oscillator. However, this is not a malfunction (refer to the calculation formula below: n is any integer). Depending on the combination of the frequencies received at the same time, there may also be fluctuations in the reception sensitivity.

● Reception frequency = 12.288 MHz x n times
● Reception frequency = 2.4576 MHz x n times
● Reception frequency = 11.1 MHz x n times
● Reception frequency = 15.6 MHz x n times
● Reception frequency = 6.1444 MHz x n times
● Reception frequency = 18.432 MHz x n times
● Upper (Band A) frequency = (Lower (Band B) frequency ± 44.85 MHz) × n times
● Lower (Band B) frequency = (Upper (Band A) frequency ± 47.25 MHz) × n times @ Upper band (Band A) MODE = NFM

After-market Services

○ The warranty period is 1 year from the date of purchase

The warranty certificate is enclosed with the product. Malfunction arising during normal use of the product in accordance with the instructions in the operating manual, within a period of one year from the date of purchase, shall be repaired free-of-charge.

○ Keep the warranty certificate in a safe location

When the warranty certificate is lost, failures which occur during the warranty period will be treated as chargeable non-warranty claims.
A warranty certificate where the necessary information such as the purchase date and the name of the retail store have not been filled in will also be treated as void. Please ensure that the date of purchase and the name of the retail store are filled in correctly on the warranty certificate.

○ You may also check with us for any non-warranty repairs

We will make repairs at your expense if the functions can be reliably maintained after the repairs. Please check with the retail store or Yaesu customer support for more information.

○ Save the packaging box

When sending this product for inspection and repair, use the original product packaging box to prevent shipping damages during the transport.

Specifications

● General

Frequency range	:	144 to 148 MHz, 430 to 450 MHz
Channel steps	:	5/6.25 kHz
Emission type	:	F1D, F2D, F3E, F7W
Frequency stability	:	±2.5 ppm (−4°F to +140°F (−20°C to +60°C))
Antenna impedance	:	50 Ω
Supply voltage	:	AC 100 to 240 V
		DC 11.7 to 15.8 V, negative grounding
Current consumption	:	1.5 A (receive)
		13 A (50 W TX, 144 MHz band)
		14 A (50 W TX, 430 MHz band)
Operating temperature	:	−4°F to +140°F (−20°C to +60°C)
Dimensions	:	19" (W) × 3.5" (H) × 15" (D) (482 × 88 × 380 mm)
Weight (approx.)	:	22.05 lbs (10 kg)

● Transmitter

RF power output	:	50/20/5 W
Modulation type	:	F1D, F2D, F3E Variable Reactance Modulation
		F7W 4FSK (C4FM)
Spurious emission	:	At least 60 dB below

● Receiver

Circuit type	:	Double conversion super-heterodyne
Intermediate frequencies	:	1st: 47.25 MHz, 2nd: 450 kHz
Receiver sensitivity	:	0.3 µV (Digital 2 m/70 cm) BER 1 %
		0.2 µV (FM 2 m/70 cm) 12 dB SINARD
Adjacent Channel Selectivity	:	Better than 65 dB TYP (20 kHz offset)
Selectivity	:	FM 12 kHz/35 kHz (−6 dB/−60 dB)
Intermodulation	:	Better than 65 dB TYP (20 /40 kHz offset)
Audio output	:	4 W (4 Ω, THD 10%, 13.8 V; internal speaker)

Cautions
- Rated values are at normal temperature and pressure.
- Ratings and specifications are subject to change without notice for product improvement reasons.

Appendix

Memo

YAESU
The radio