vertex®

FTL-1011, FTL-2011 & FTL-7011

FM Land Mobile Transceivers

Operating Manual

Congratulations!

You now have at your fingertips a valuable communications tool — a Yaesu two-way radio! Rugged, reliable and easy to use, your Yaesu radio will keep you in constant touch with your colleagues for years to come, with negligible maintenance down time.

Please take a few minutes to read this manual carefully. The information presented here will allow you to derive maximum performance from your radio. After reading it, keep the manual handy for quick reference, in case questions arise later on.

We're glad you joined the Yaesu team. Call on us any time, because our business is communications. Let us help you get your message across.

NOTICE

There are no user-servicable points inside this transceiver. All service jobs must be referred to your Authorized Service Center or Network Administrator.

FTH-1011, FTL-2011 VHF and FTL-7011 UHF FM Land Mobile Transceivers

The 60-watt VHF Low-Band FTL-1011, 40-watt VHF High-Band FTL-2011 and 25-watt UHF FTL-7011 are rugged, full-featured FM transceivers designed for flexible mobile and base station business communications. Each model is available with either a -4 or -12 suffix, with a capacity of either 4 or 12 channels, respectively.

Reliability is assured by a highly integrated surface mount circuit design and a die-cast aluminum chassis. Important channel frequency data is stored in EEPROM, and is easily programmable by dealers using a personal computer and the Yaesu FRB-2 Interface Box, T9101410 Cable and CE-5 or VPL-1 Software.
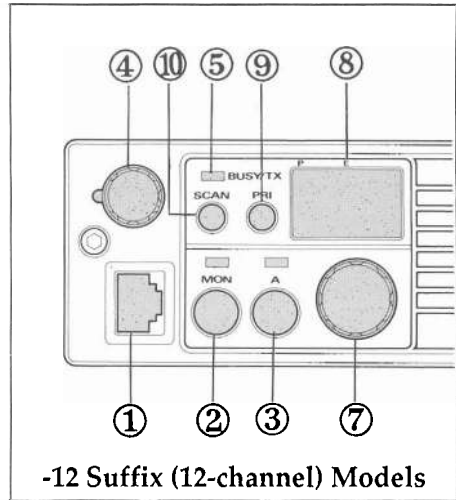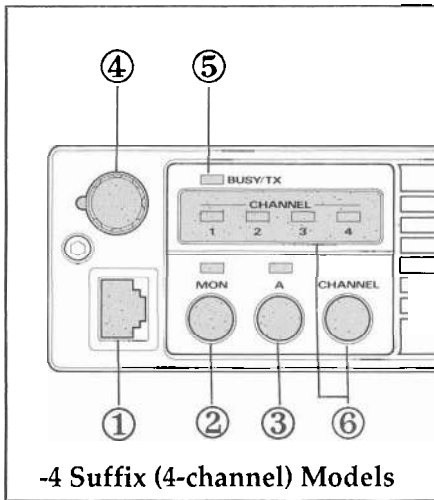
Special features include a built-in CTCSS (Continuous Tone Coded Squelch System) and in the 12-channel versions, two sets of scanning channels, one set preselectable by the dealer and another operator selectable. The operator can select which set to scan, and also two priority channels. Dealers can program Busy Channel Lockout, transmitter time out timers and scan stop activities for talkback on the paused channel, priority channel or the home channel (on which scanning was initiated). Scanning is not provided in the 4-channel versions.

Each transceiver is supplied with a mobile bracket and hand microphone. Options include the FP-711 Power Supply for operation from the AC mains, the FDS-1 Digitally Coded Squelch Unit and F2D-4 2-Tone Decoder programmable by your dealer.

Please take a few minutes to read this manual carefully. The information presented will help you derive maximum performance from the equipment. After reading, keep it handy near the radio for quick reference.

Controls & Connectors

Front Panel

-4 Suffix (4-channel) Models

-12 Suffix (12-channel) Models

① Microphone Jack

Connect the microphone plug to this jack.

② MON Button & Indicator

This button selects the squelch (receiver mute) mode. When the indicator is off, tone (or coded) squelch is active. When the indicator glows steadily (after pressing this button momentarily or removing the microphone from its hanger), only noise squelch is active, and any signal will be heard. Holding this button for two seconds disables all squelch, and the yellow indicator blinks. If the indicator is blinking, press this button once to return the previous squelch mode, and again to select the other mode.

③ A (Accessory) Button & Indicator

In the FTL-1011/-1014, this button activates the noise blanker. In the other models this button (and the green indicator above it) is provided for special applications, such as high/low power selection, talk-around and call alert functions, as determined by your network requirements and programmed by your Yaesu dealer. The

green indicator lights when the function is active. Your network administrator can advise you of the function of this button (if any). Otherwise, it may be disabled.

④ Volume and Power On/Off Knob

This knob adjusts the receiver volume, and turns the transceiver off when turned all the way to the left into the click-stop.

⑤ BUSY/TX Indicator Lamp

This lamp glows green when the channel is busy, and red while transmitting. Do not transmit when this indicator is green.

The following item is unique to 4-channel versions:

⑥ CHANNEL Numbered Indicators & Button

Press the button to select the operating channel, indicated by which of the numbered orange LED indicators is lit.

The remaining items are unique to 12-channel versions:

⑦ Channel Selector Knob

Turn to select the operating channel, as shown on the display.

⑧ Numeric Channel Display

Shows the selected channel number and priority/scan status. The **P** and **E** dots at the top of the display light if a channel is enabled for user-selectable priority or scanning, respectively.
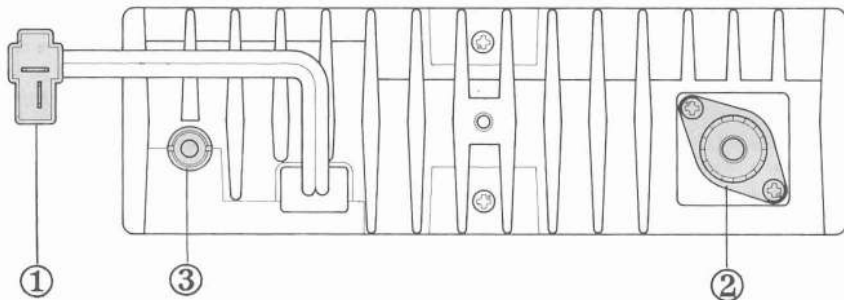
⑨ PRI (Priority) Button

This button is used to select a channel for priority monitoring, and together with the **SCAN** button for selecting scanning modes, as described in the next chapter, *How to Use the Transceiver*.

⑩ SCAN Button

This button is used to activate scanning, to select and deselect channels for scanning, and together with the **PRI** button to select scanning modes, as described in the next section.

REAR (Heatsink)

① 13.6VDC Cable Pigtail w/Connector

The supplied DC power cable must be connected to this 2-pin connector. Use only the supplied fused cable, extended if necessary, for power connection.

② Antenna Socket

The 50-ohm coaxial feedline to the antenna must be connected here using a type-M (PL-259) plug.

③ EXT SP (External Speaker)

External loudspeakers may be connected to this 2-contact, 3.5-mm mini-phone jack.

How To Use The Transceiver

Important! - Before turning on the radio the first time, confirm that the power connections have been made correctly and that a proper antenna is connected to the antenna jack. If the transceiver is not installed, see *Installation* near the back of this manual.

Turn the Volume/Power knob clockwise to turn on the radio. LEDs will light, indicating the channel and status of the radio (as set when last used).

In 4-channel versions press the **CHANNEL** button to change channels. In 12-channel versions, the display should show either a channel number or scan mode indicator (**Sc**, **Ur**, **SP** or **UP**). If **E2** is displayed instead, the transceiver has not yet been programmed with channel frequencies: switch off the power and contact your network administrator or Yaesu dealer. If a scan mode indicator is displayed, you can press the **SCAN** button to display a channel number, and turn the selector to change channels.

Coded Squelch – the **MON** *Button*

Your transceiver may use the built-in CTCSS (Continuous Tone Coded Squelch System), or optional DCS (Digitally Coded Squelch) or 2-Tone Sequential Codes, to keep the receiver quiet for all signals not intended for you.

The transceiver may be programmed so that when the microphone is removed from its hanger, coded squelch is defeated, and you can hear any signal on the channel (the yellow **MON** indicator will be lit). You can get the same result without lifting the microphone, by pressing the **MON** button momentarily. To avoid listening to unnecessary chatter, keep the microphone in its hanger, and press the **MON** button when necessary to turn the yellow indicator off unless you want to listen to other calls.

Holding the **MON** button for two seconds defeats not only coded squelch, but also the noise squelch, so background noise can be heard (the **MON** indicator blinks). This is useful for setting the volume when no signals are present. Press **MON** momentarily to return the yellow indicator to its previous state (off, or steadily on).

Setting the Volume

If no signals are heard and the **BUSY/TX** indicator is not glowing green (so you can adjust the volume on a signal), press and hold the **MON** button for two seconds until a beep is heard and the yellow indicator above the button blinks. Then adjust the volume control for a comfortable level on a signal or background noise. Press **MON** again momentarily so the yellow indicator stops blinking. See the box on the previous page for more information on controlling the squelch system.

Transmitting

To transmit, wait until the **BUSY/TX** indicator is off (the channel is not in use), and press the PTT (Push-To-Talk) switch on the side of the microphone (the **BUSY/TX** lamp glows red). While holding the PTT switch, speak across the face of the microphone in a clear, normal voice, and then release the PTT switch to receive. The box below describes some other features that may be programmed to affect your transmissions.

Remaining instructions apply to 12-channel versions only.

Scanning

Four scanning modes are available when the **SCAN** button has been pressed. Once a scan mode is selected, it remains selected

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Special Transmitter Functions

If your transceiver is programmed for *busy channel lock-out*, the transmitter will not activate when the PTT switch is pressed unless the **BUSY/TX** lamp is off (to prevent interference to other stations).

If the selected channel has been programmed for *automatic time-out*, you must limit the length of your transmissions. While transmitting, a beep sounds ten seconds before time-out, and then another beep sounds as the time-out period expires: the **BUSY/TX** indicator will turn off and transmission will cease. Release the PTT, listen for a moment, and then press it again to resume transmitting.

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when the transceiver is turned off, or when scanning is disabled (by pressing the **SCAN** button again, so that a channel number is displayed). The **SCAN** modes and their corresponding displays are as follows:

Display	Scanning Function
Sc	Scan all channels
Ur	Scan only user-selected channels
SP	Monitor one channel and pre-programmed priority(ies)
UP	Scan user-selected channels with user priority(ies)

The user-selected channels for the **Ur** and **UP** modes are those you can set yourself, as described in the box on the next page. The priority channels are those on which signals will take priority over signals received on other channels: that is, if a signal appears on a priority channel while another appears on a non-priority channel, the priority signal will be heard, and not the other. Up to two of the installed channels may be designated by your network administrator or dealer as pre-programmed priority channels for the **SP** mode (the radio does not indicate which they are), and you can program any two channels as user priorities for the **UP** mode. The non-priority channel in the **SP** mode is the one last displayed.

While a scan mode is displayed, you can select another by pressing the **PRI** button repeatedly (the display will cycle through the above). Make sure the microphone is in its hanger if you want

P (Priority) & E (Scan Enable) Indicators

When a channel number is displayed, either during manual (non-scanning) operation, or when scanning is paused, the **P** and **E** indicators at the top of the display may be lit. These indicate that the channel has been selected to be included in user scanning modes (**Ur** and **UP**). If the **P** indicator is blinking, the channel is the 1st (highest priority) channel for the **UP** mode. If the **P** is not blinking but steadily on, the channel is the 2nd priority channel. Both priority channels serve as ordinary user-selected scan channels in the **Ur** mode.

to hear only calls intended for you. While scanning, if a signal is received which includes the correct code to open your squelch, the channel number on which the signal appears will be displayed as you hear their call, and the display will then alternate between the scan mode indicator and the channel number. Scanning will resume automatically either after a preset interval of a few seconds, or after the station stops transmitting (depending on how your set was programmed).

User-Programmable Channel Selections

You can program a set of channels to be scanned, and up to 2 channels to be priority monitored. Selections are retained in memory until changed or deleted. To create or modify the selections:

Turn the radio off, then hold the **SCAN** button while switching it back on. The display will indicate a channel number.

The **E** (scan enable) indicator at the top center of the display is lit when the displayed channel is to be included in User-selected channel scanning. Press the **PRI** button, if necessary, to set the **E** indicator as desired for this channel. Then turn the channel selector and repeat the selection/deselection process on each channel.

To determine which channels are currently selected for priority monitoring, rotate the channel selector and watch the **P** indicator at the top left of the display. At the 1st priority channel the **P** indicator will blink, at the 2nd the indicator will stay lit. To change the priority channels, first cancel *both* by selecting *either* and pressing the **PRI** button. Then select the 1st new channel, and hold the **PRI** button for two seconds, until a beep sounds and the **P** indicator blinks. Next select the 2nd new channel, and again hold the **PRI** button, this time until the **P** indicator just lights.

Note: clearing priority selections also clears scan selection of the same channels (both **P** and **E** indicators off), so be sure to reselect them for scanning afterwards, if desired.

When you have the channels set up as desired for User scanning and priority monitoring, press the **SCAN** button to exit the user programming mode and return to normal operation.
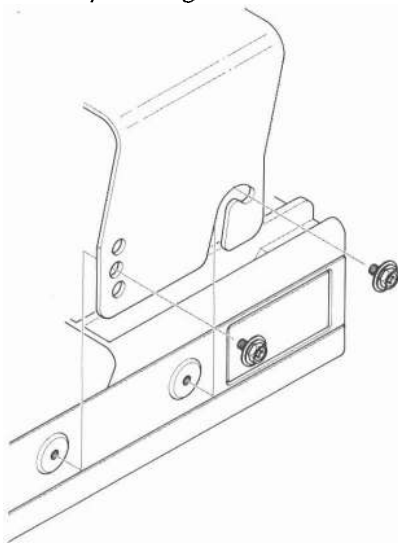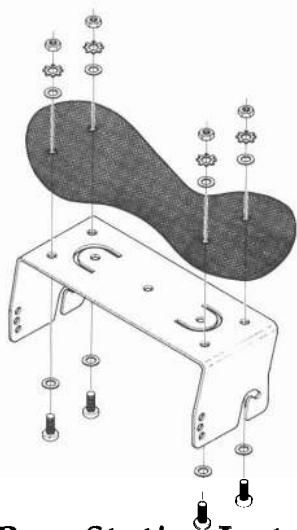
Installation

Normally, your Yaesu Dealer will provide complete installation of all stations in your system. However, basic installation information is provided here for your reference.

For mobile service, your transceiver should be installed so the controls, indicators and microphone are easily accessible for operation and viewing, without interfering with road vision, and so that the loudspeaker may be easily heard. The radio may be installed in any position without loss of performance. Typical locations are beneath the dashboard or atop the transmission tunnel in small vehicles, or overhead in a truck cabin.

The MMB-48 universal mounting bracket and mounting hardware are supplied with the transceiver.

Mobile Mounting Procedure

❒ Using the mounting bracket as a template, mark the locations of the mounting holes in the desired position. Use a 3/16" diameter bit to drill the holes after making certain that there will be enough space for the transceiver, connecting cables and controls. Secure the bracket with the screws, washers and nuts supplied, as shown in the drawing on the next page.

❒ Position the transceiver in the bracket so that the holes in the side panels are aligned with those in the sides of the bracket, and bolt the transceiver into place with the supplied short screws and flat washers.

❒ The microphone hanger must be installed so as to make electrical contact with the car body. Otherwise the hanger may be installed wherever convenient.

Base Station Installation

The FP-711 AC Power Supply can operate the transceiver from a variety of AC voltages. Connect the fused DC Cable supplied with the transceiver to the terminals on the rear of the FP-711.

NOTE: In all installations, means must be provided to ground the metal mounting loop on the microphone in order for the squelch and scanning/monitoring systems to function. In base installations, a grounding hook must be provided in which to rest the microphone when not transmitting.

Power Connections

For mobile installations, connect the power cable directly to the vehicle battery. This allows the radio to operate without turning on the ignition, and may also reduce noise in the receiver. Connection
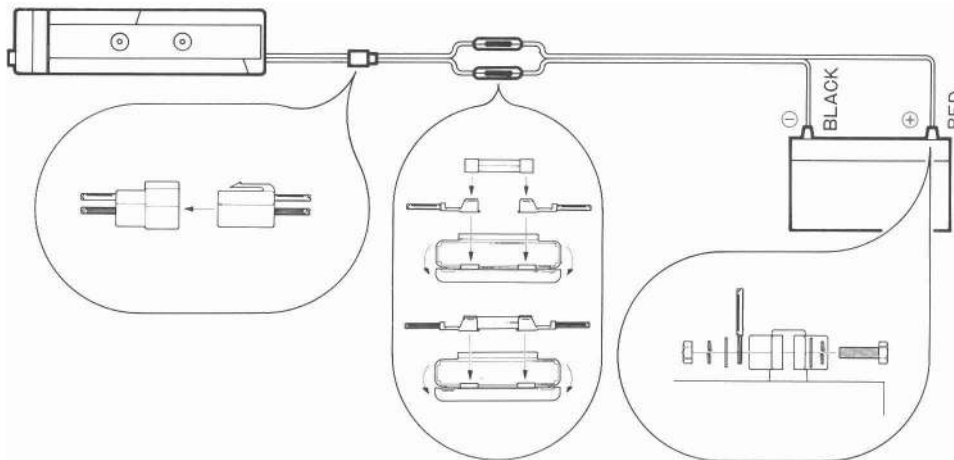
Caution!

Permanent damage will result if the power supply polarity is reversed. Our warranty does not cover damage caused by reversed power supply connections.

to the cigarette lighter or other existing circuits may result in over-load, or degrade transceiver performance.

Always use the supplied DC power cable, which includes fuses to protect you, the vehicle and the equipment. If the cable is too short, use #12 AWG stranded, insulated copper wire to lengthen it. Use the shortest length possible, connected to the end of the DC cable that does not have connectors installed.

Refer to the diagrams below for power cable connection details.

❒ Before connecting the supplied DC cable to the transceiver, connect the RED lead of the DC cable to the POSITIVE (+) battery (or power supply) terminal, and the BLACK lead to the NEGATIVE (–) terminal.

❒ Connect the DC power cable to the connector on the cable pigtail at the back of the transceiver.

❒ Connect the coaxial plug on the antenna cable (not supplied) to the coaxial antenna jack on the transceiver. Antenna impedance must be 50 ohms at the operating frequency.

❒ Connect the microphone plug to the jack on the transceiver.

❒ If an optional external speaker is to be installed, insert the plug from the speaker into the **EXT SP** jack on the rear (disabling the internal speaker).

Maintenance And Service

Keep the outside of the transceiver clean by wiping with a soft cloth as necessary. Avoid rain or immersion in water, and protect the radio from dust as much as possible. Do not open the case. If the radio fails to operate, check the cable connections, and inspect the fuses in the DC cable.

Regular Maintenance Plan

Your Yaesu dealer will advise you of the maintenance plan that best suits your needs. We recommend that the transceiver be returned to your Yaesu dealer at least once every two years, for testing of receiving sensitivity and transmitter power output. If the need for servicing does arise, phone your Yaesu dealer for an appointment. He will be pleased to answer any service-related questions, and his qualified service technicians will make sure that your radio is back in service as quickly as possible.

Fuse Replacement

If a fuse is blown try to determine if the failure was caused by something outside of the radio (like a short circuit due to a worn cable). Contact your dealer at once if you do not find the cause. Replace fuses only with the same type installed.

Service Information

If the transceiver fails to operate, check the fuses in the power cable. If either is blown, attempt to locate and correct the cause of the problem before replacing the fuse(s). These radios have no user-serviceable parts inside.

Caution

When replacing fuses, use the correct type (fast-blow) and rating (10A, or 15A for FTL-1011). Damage resulting from use of an improper fuse is not covered by warranty.

Specifications

Frequency Range (version)   FTL-1011: 37 – 48 MHz

                  FTL-2011: 134 – 160/148 – 174 MHz (vers. A/C, resp.)

                  FTL-7011: 400 – 440 MHz (A), 420 – 460 MHz (B),

                     450 – 490 MHz (D) or 480 – 512 MHz (F)

Nr. of Channels & Spacing   4 (-4 models), 12 (-12 models, 24 chs optional)

                  25-kHz spacing (12.5-kHz optional)

Mode of Emission   16K0F3E (direct frequency modulation)

Antenna Requirement   50-Ω, unbalanced (SO-239 socket)

Voltage Requirement   10.8 to 15.6 V DC, negative ground

Current Consumption (approx.)   300 mA Stby, 700 mA Rx, 7.0 A Tx (FTL-1011: 9A)

Operating Temperature Range   –30 to +60 °C (–22 to +140 °F)

Size (WHD, approx.)   160 × 50 × 180 mm (6-$\frac{1}{4}$ × 2 × 7-$\frac{1}{8}$")

Weight (approx.)   1.5 kg (3.3 lbs.)

Receiver

Receiver Circuit Type   Double Conversion Superheterodyne

Intermediate Frequencies   16.9 MHz (FTL-1011), 21.4 MHz (FTL-2011) or

                  47.9 MHz (FTL-7011), and 455 kHz (all models)

Sensitivity   0.25/0.3 µV for 12 dB SINAD,

                  0.35/0.45 µV for 20 dB QN (VHF/UHF, resp.)

Hum & Noise Ratio   Better than 45 dB

Adjacent Channel Selectivity   >80/75 or 70 dB (FTL-1011/-2011 and -7011, resp.)

Intermodulation Distortion   Better than 70 dB (3-signal)

Spurious Rejection   Better than 80 dB (VHF), or 70 dB (FTL-7011)

Audio Output Power   5 watts into 4 ohms with <10% THD

Transmitter

Power Output   FTL-1011: 60 watts (fixed)

                  FTL-2011: 40/5 watts (high/low, programmable)

                  FTL-7011: 25/2 watts (high/low, programmable)

Modulation Type/Deviation   Frequency Modulation, ± 5 kHz (± 2.5 kHz opt'l)

Hum & Noise Ratio   Better than 45 dB

Modulation Distortion   Less than 5%

Spurious Emissions   Better than 70 dB (below carrier)

Microphone Impedance   600 Ω

Specifications subject to change without notice or obligation.

Supplied Accessories

MH-5J8 Microphone (optional in North America)

Fused DC Cable: T9017910A w/two 10-A fuses
(15-A in FTL-1011)

MMB-48 Mobile Mounting Bracket

Optional Accessories

FDS-1 Digitally Coded Squelch Unit

F2D-4 Sequential 2-Tone Decoder

FRB-2 Programming Interface Box

CE-5 Programming Software (for IBM PC/compatibles only)

VPL-1 Programming Software (for IBM PC/compatibles only)

T9101410 Programming Connection Cable

T9101411 Radio-to-Radio Cloning Connection Cable

FP-711 AC (Base Station) Power Supply

YAESU

Performance without compromise