

YAESU

The radio

HF/50 MHz TRANSCEIVER

FT-410

OPERATION MANUAL

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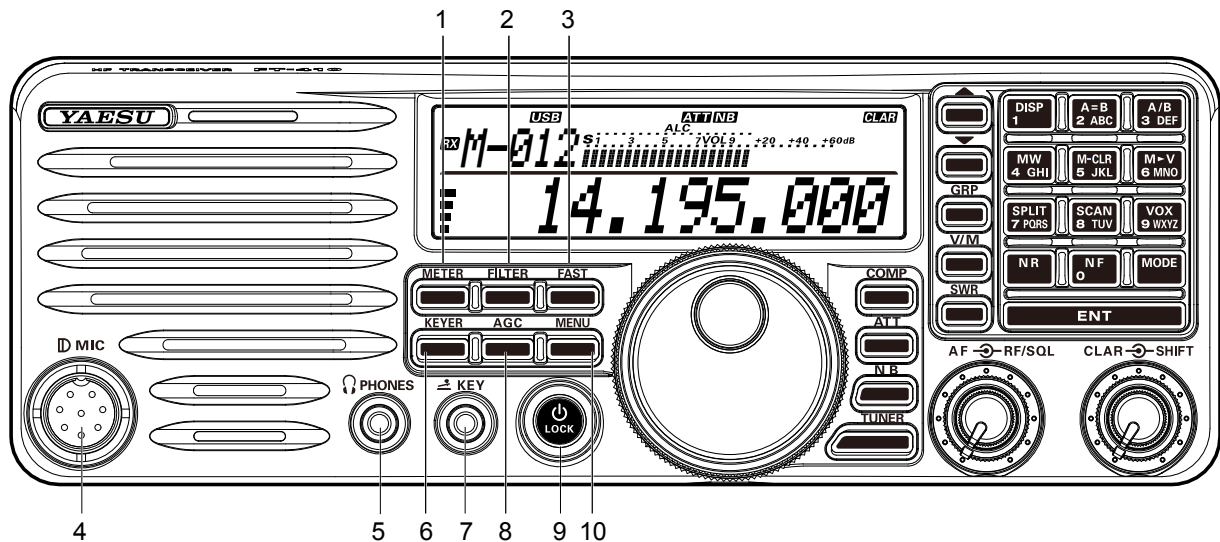
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FRONT PANEL BUTTONS AND KNOBS



1. METER Button

Press this button to change the meter function in the transmit mode as follows.

PO → ALC → SWR → PO

PO: Indicates the average power output level.

ALC: Indicates the relative ALC voltage.

SWR: Indicates the Standing Wave Ratio (Forward/Reflected).

2. Filter Button

Press this button to change the filter.

3. FAST Button

Pressing this button will increase or decrease the tuning rate of the [MAIN DIAL] knob.

4. MIC Jack

This 8-pin jack accepts input from a supplied Hand Microphone.

5. PHONE Jack

A 3.5 mm, 3-contact jack accepts either monaural or stereo headphones with 2 or 3-contact plugs. When a plug is inserted, the loudspeaker is disabled.

NOTE:

When wearing headphones, we recommend that you turn the AF GAIN levels down to their lowest settings before turning power on, to minimize the impact on your hearing caused by audio “pops” during switch-on.



6. KEYER Button

This button toggles the internal CW keyer on and off.

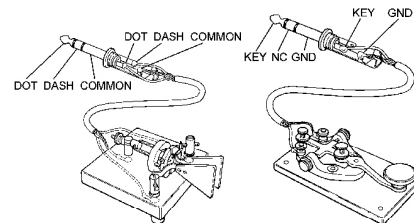
7. KEY Jack

This 3.5 mm, 3-contact jack accepts a CW key or keyer paddles (for the built-in electronic keyer), or output from an external electronic keyer. Pinout is shown below. Key up is 5 volts, and key down current is 0.5 mA.

Do not use the plug except the 3.5-mm 3-pin type plug. If the plug in correct size is not used the radio may be harmed or damaged.

If the Keyer plug is removed from the jack while the FT-410 is in operation, the FT-410 may be switched to the transmit mode.

Turn off the power of the FT-410 before connecting or disconnecting the Keyer.



8. AGC Button

This button selects the AGC characteristics for the receiver.

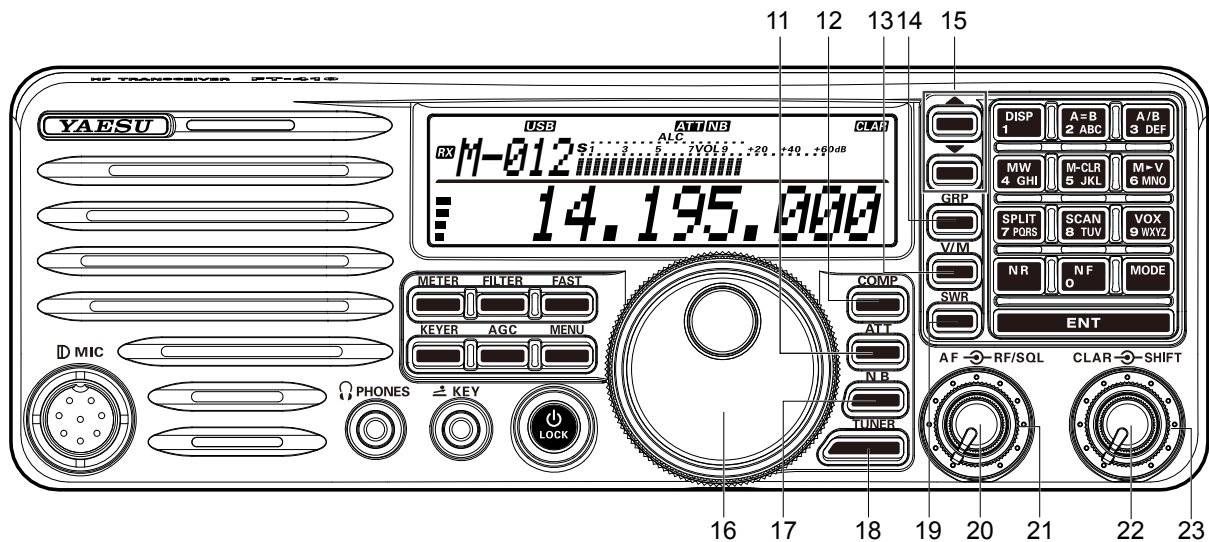
9. Power / LOCK Button

Press and hold in this button for one second to turn the transceiver on or off. Press this button the locking of the [MAIN DIAL] knob and some switches, to prevent accidental frequency changes.

10. MENU Button

Press this button, the Menu Item and a title for the Menu Mode will appear in the display.

FRONT PANEL BUTTONS AND KNOBS



11. ATT Button

This button selects the ATT level.

12. COMP Button

This button turns the Speech Processor on and off.

13. V/M Button

This button toggles frequency control between VFO-A and the memory system. In memory mode.

14. GRP Button

Pressing this button allows you to select a memory group.

15. ▲/▼ Button

These buttons select the operating band.

16. MAIN DIAL Knob

This knob adjusts the operating frequency.

17. NB Button

This button turns the IF Noise Blanker on and off. Press this button to reduce short-duration pulse noise.

18. TUNER Button

Press this button momentarily to toggle the Automatic Antenna Tuner on/off. Press and hold in this button to begin the automatic Tuning.

19. SWR Button

Indicates the Standing Wave Ratio (Forward/Reflected).

20. AF Knob

This knob sets the receiver's audio volume level. Typically, you will operate with this control set between the 9 o'clock and 10 o'clock positions.

21. RF/SQL Knob

In the factory default, this knob adjusts the gain of the receiver's RF and IF stages. Using Menu Item "SQL/RF Gain", this knob may be changed to function as a Squelch control, which may be used to silence background noise when no signal is present.

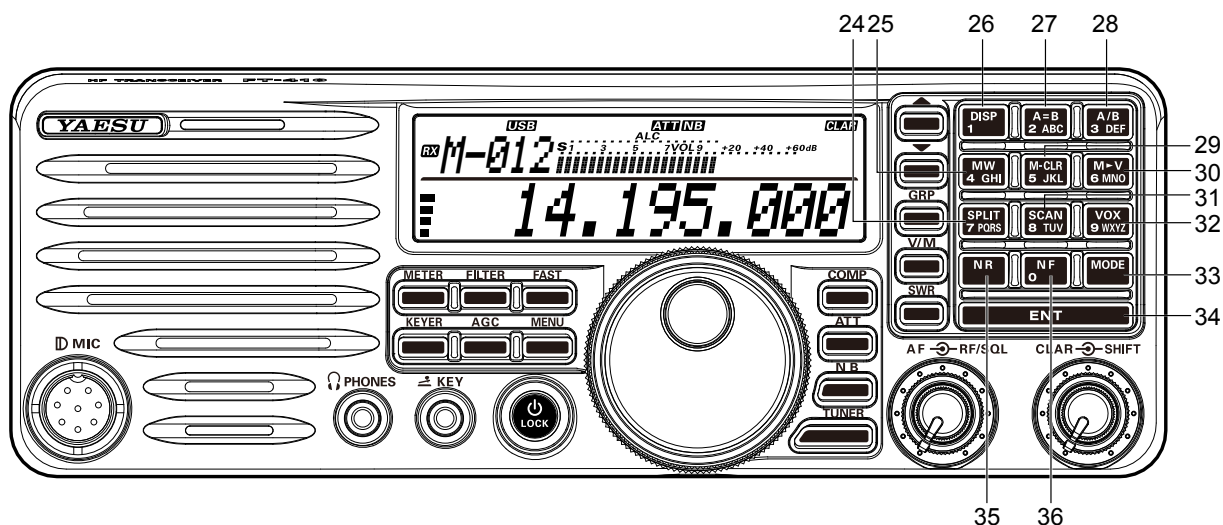
22. CLAR Knob

Pressing this button activates the Clarifier, to allow temporarily offsetting the receive frequency.

23. SHIFT Knob

This knob shifts the IF DSP passband to reduce an interfering signal which is inside the IF passband.

FRONT PANEL BUTTONS AND KNOBS



24. SPLIT Button

Press this button to activate split frequency operation between VFO-A, used for reception and VFO-B, used for transmission (or vice versa).

25. MW Button

Pressing this button copies the current operating data into the currently selected memory channel, over-writing any previous data stored there.

26. DISP Button

27. A=B Button

Press this button momentarily to transfer data from VFO-A frequency to VFO-B, overwriting the previous contents in VFO-B. Use this key to set both VFO-A and VFO-B to the same frequency and mode.

28. A/B Button

This button toggles the frequency control between VFO-A and VFO-B.

29. M-CLR Button

Press this button, a memory channel is cleared.

30. M▶V Button

Press this button, a frequency and a mode of a memory channel are forwarded to VFO.

31. SCAN Button

Press this button to initiate the upward scanning of VFO frequencies or memory channels.

32. VOX Button

Press this button to activate the VOX (voice-actuated transmitter switching) feature in the SSB, and AM modes.

33. MODE Button

These buttons select the operating mode.

34. ENT Button

Press this button, setting is Operating frequency.

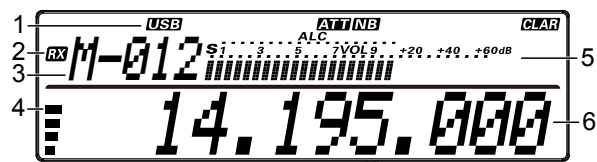
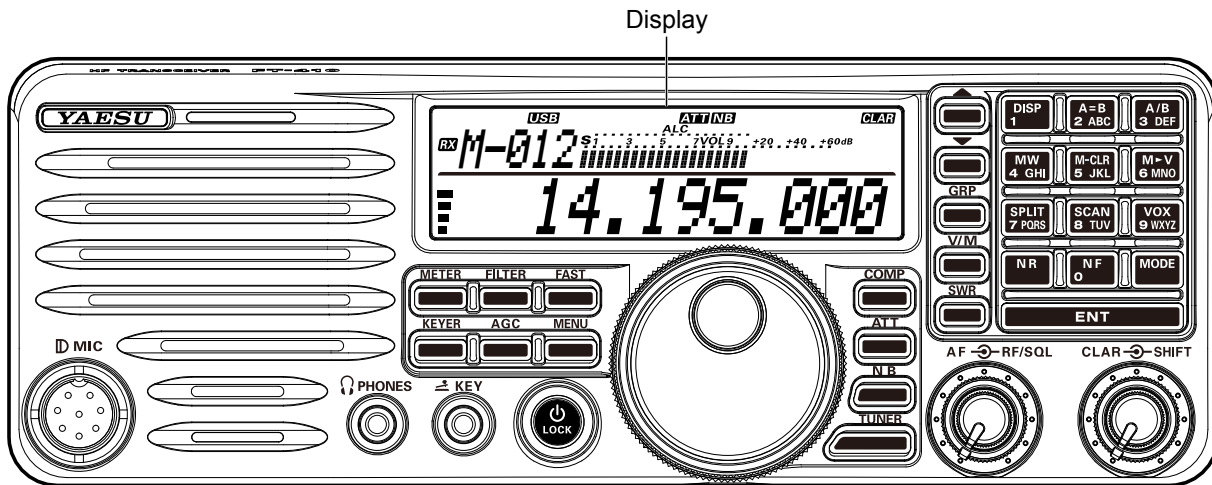
35. NR Button

Press this button to activate Noise Reduction operation

36. NF Button

Press this button to activate Notch Filter operation.

DISPLAY INDICATIONS



1. Information Display

ATT: Indicates the RF attenuator status (“ON” or “OFF”) selected for operation by the [ATT] button.

NB: Indicates the Noise Blanker status (“ON” or “OFF”).

LSB / **USB** / **CW** / **AM** / **DATA**: Displays the currently selected operating mode.

VOX: This indicator appears whenever the VOX (automatic voice-actuated transmitter switching) circuit is activated.

CLAR: This indicator appears whenever the Clarifier function is activated.

2. TX / RX Display

TX: This indicator appears during transmission.

RX: This indicator appears whenever the receiver squelch is open.

3. Indicates the operating band name, and memory channel

When in VFO mode, the operating band name (A or B) is displayed. While in memory mode, and the memory channel number are displayed.

4. AF level indication

5. Meter

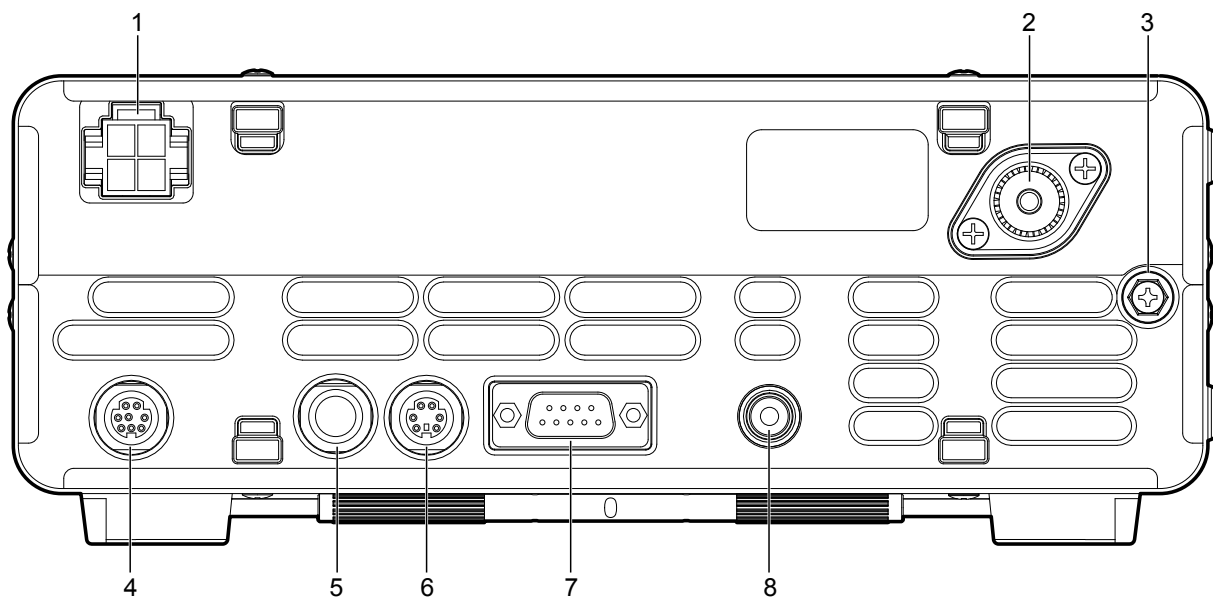
While receiving, the received signal strength is displayed.

While transmitting, the meter displays PO, ALC, or SWR (determined by the [METER/DIM] button).

6. Frequency Display

The operating frequency is displayed.

REAR PANEL JACKS



1. DC IN Jack

This is the DC power supply connection for the transceiver. Use the supplied DC cable to connect directly to the car battery or to a DC power supply, which must be capable of supplying at least 22 A @13.8 VDC.



(viewed from rear panel)

2. ANT Jack

Connect your antenna here, using a type-M (PL-259) coaxial connector and 50 Ohm coaxial feedline.

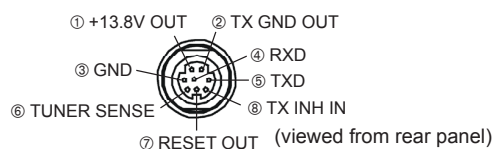
Warning!: High Power RF voltage is present at the TX RF section of the transceiver while transmitting. Absolutely! Do not touch the TX RF section while transmitting.

3. GND Terminal

For safety and optimum performance, use this terminal to connect the transceiver to a good earth ground. Use a large diameter, short braided cable for making ground connections. Refer to page 12 for other notes about proper grounding.

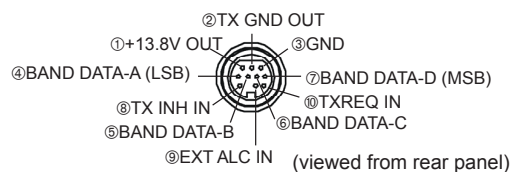
4. TUNER Jack

This 8-pin jack is used for Connection to the FC-40 External Automatic Antenna Tuner.



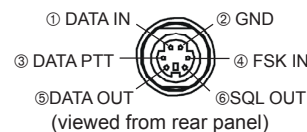
5. LINEAR Jack

This 10-pin output jack provides band selection data, which may be used for control of the optional VL-1000 Solid-State Linear Amplifier.



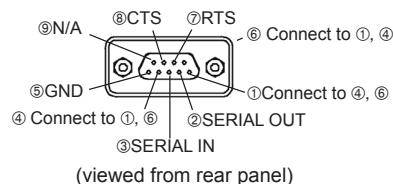
6. DATA Jack

This 6-pin input/output jack provides receiver audio and squelch signals, and accepts transmit (AFSK) audio and PTT control, from an external packet TNC.



7. CAT Jack

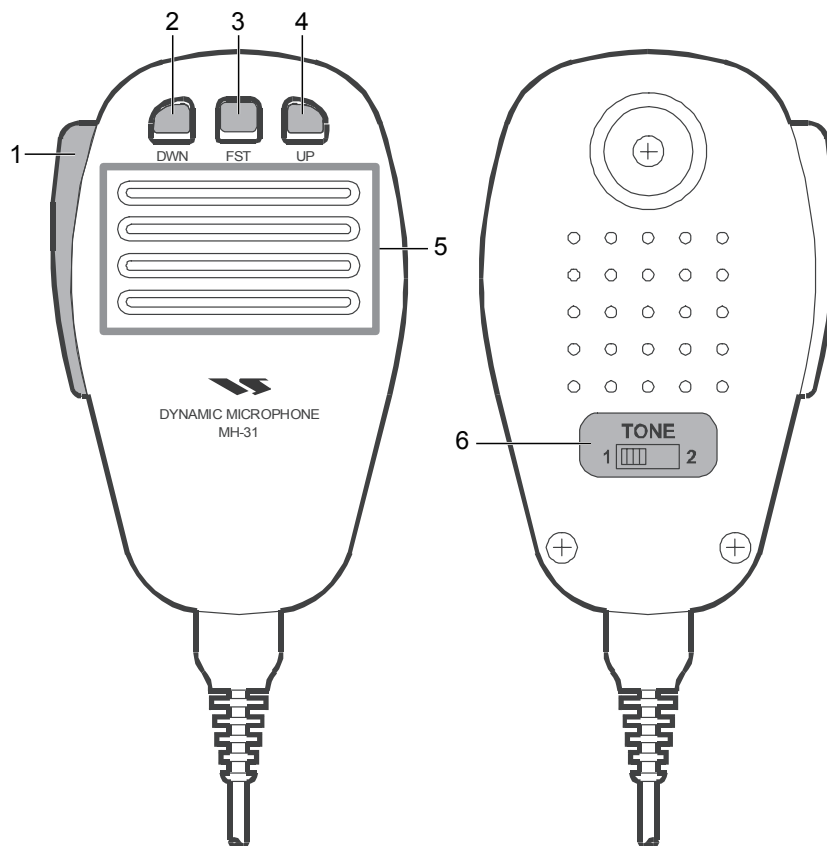
This 9-pin serial DB-9 jack allows external computer control of the FT-410. Connect a (straight) serial cable here and to the RS-232C COM port on your personal computer (no external interface is required).



8. EXT SPKR Jack

This 3.5-mm, 2-pin jack provides variable audio output for an external speaker. The audio output impedance at this jack is 4 - 16 Ohms and the level varies according to the setting of the front panel's [AF] knob. Inserting a plug into this jack disables the internal loudspeaker.

SUPPLIED MH-31B8 MICROPHONE



1. PTT Switch

Press this Switch to transmit, and release it to receive after your transmission is completed.

2. DWN Key

Press to tune down, hold to start scanning.

3. FST (FAST) Key

The FST Button on the transceiver should be set for momentary operation.

4. UP Key

Press to tune up, hold to start scanning.

5. MIC

The microphone is located here. Speak into the microphone in a normal voice level.

The microphone should be positioned within 2 inches (5 cm) from the mouth for optimum performance.

6. TONE Switch

Position 1 provides flat-audio-characteristic transmit audio.

Position 2 attenuates low audio tones, for improved clarity in moderate band conditions, or if you have a naturally deep voice.

ACCESSORIES & OPTIONS

SUPPLIED ACCESSORIES

Hand Microphone (MH-31B8)	1 pc	P/N: M3090086A
DC Power Cord with Fuse	1 pc	P/N: T9025225
Fuse	1 pc	P/N: Q0000074
Operation Manual	1 pc	
Warranty Card	1 pc	

AVAILABLE OPTIONS

External Automatic Antenna Tuner (for Wire Antenna)	FC-40
Active-Tuning Antenna System	ATAS-25
Active-Tuning Antenna System	ATAS-120A
Solid-State Linear Amplifier/AC Power Supply	VL-1000 / VP-1000
Band Data Cable (for VL-1000)	CT-118
Desktop Microphone	MD-100
Hand Microphone	MH-31B8
Lightweight Stereo Headphone	YH-77STA
Mobile Mounting Bracket	MMB-90
Carrying Handle	MHG-1
Linear Amplifier Connection Cable	SCU-28

INSTALLATION

CONNECTION OF ANTENNA AND POWER SUPPLY

The **FT-410** is designed for use with any antenna system providing a 50 Ohm resistive impedance at the desired operating frequency. Every effort should be made to ensure the impedance of the antenna system is as close as possible to the specified 50-Ohm value. Note that the “G5RV” type antenna does not provide 50-Ohm impedance on all HF Amateur bands, and an external wide-range antenna coupler must be used with this antenna type.

Any antenna to be used with the **FT-410** must, ultimately, be fed with 50 Ohm coaxial cable. Therefore, when using a “balanced” antenna such as a dipole, remember that a balun or other matching/balancing device must be used to ensure proper antenna performance.

⚠ Warning!

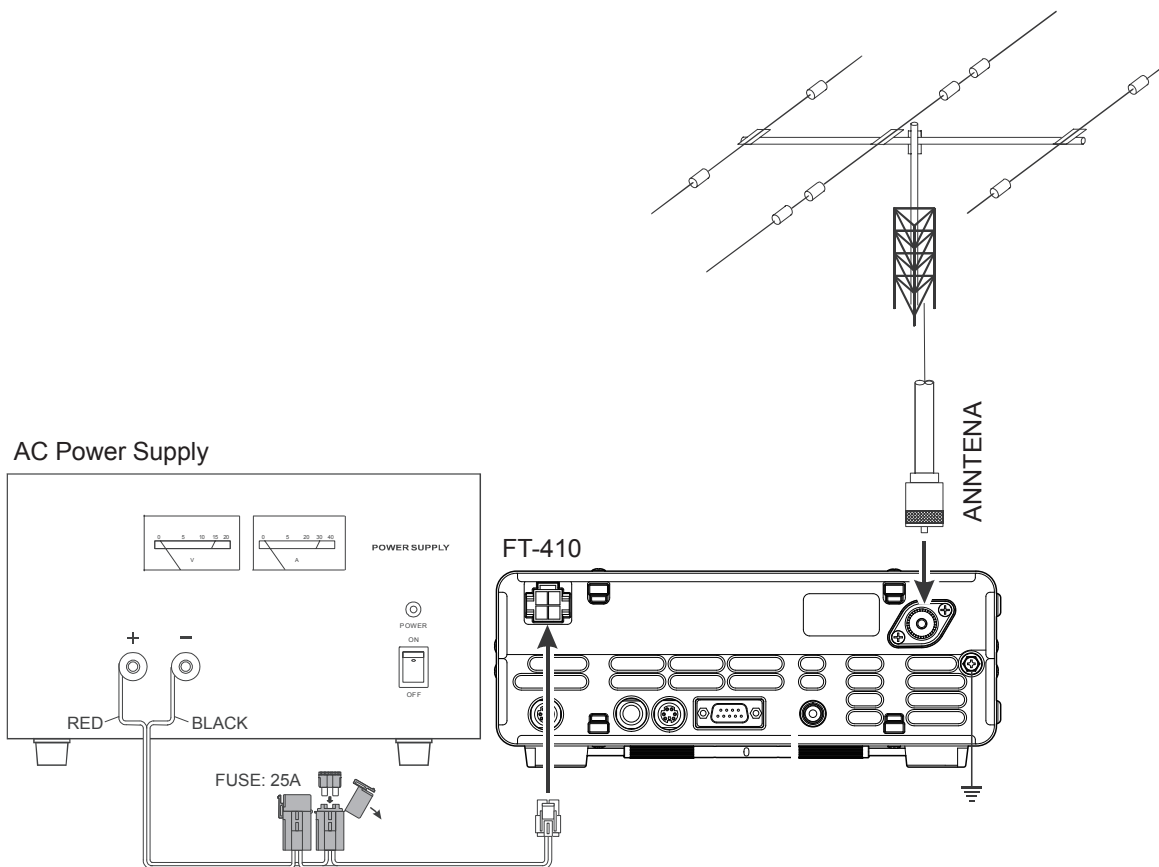
The 100V RF voltage (@100 W/50 Ω) is applied to the TX RF section of the transceiver while transmitting.

Do not touch the TX RF section absolutely while transmitting.

CAUTION

Permanent damage can result if improper supply voltage, or reverse-polarity voltage, is applied to the FT-410. The Limited Warranty on this transceiver does not cover damage caused by application of AC voltage, reversed polarity DC, or DC voltage outside the specified range of 13.8V ±15%.

When replacing fuses, be certain to use a fuse of the proper rating. The FT-410 requires a 25A fast-blow fuse.

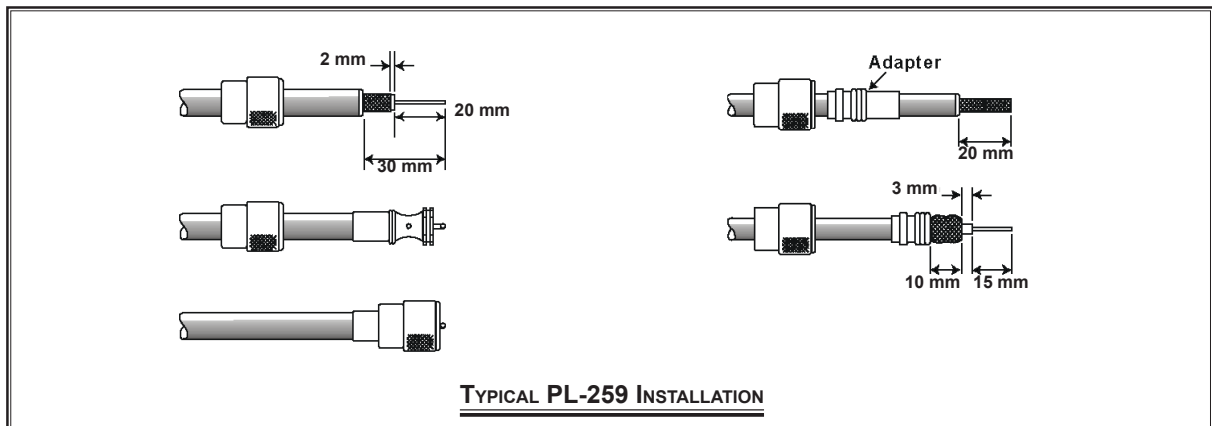


⚠ CAUTION ⚠

- Do not position this apparatus in a location with direct exposure to sunshine.
- Do not position this apparatus in a location exposed to dust and/or high humidity.
- Do not expose the apparatus to dripping or splashing. Do not put objects with liquids on the apparatus.
- Ensure adequate ventilation around this apparatus, so as to prevent heat build-up and possible reduction of performance due to high heat.
- Do not install this apparatus in a mechanically-unstable location, or where objects may fall onto this product from above.
- To minimize the possibility of interference to home entertainment devices, take all precautionary steps including separation of TV/FM antennas from Amateur transmitting antennas to the greatest extent possible, and keep transmitting coaxial cables separated from cables connected to home entertainment devices.
- Be absolutely certain to install your transmitting antenna(s) such that they cannot possibly come in contact with TV/FM radio or other antennas, nor with outside power or telephone lines.

ABOUT COAXIAL CABLE

Use high-quality 50-Ohm coaxial cable for the lead-in to your **FT-410** transceiver. All efforts at providing an efficient antenna system will be wasted if poor quality, lossy coaxial cable is used. This transceiver utilizes standard "M" ("PL-259") type connector.



GROUNDING

The **FT-410** transceiver, like any other HF 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 transceiver. 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 transceiver/accessory operation caused by RF feedback and/or improper current flow through logic devices.

An effective earth ground system may take several forms. For a more complete discussion, see an appropriate RF engineering text. The information below is intended only as a guideline.

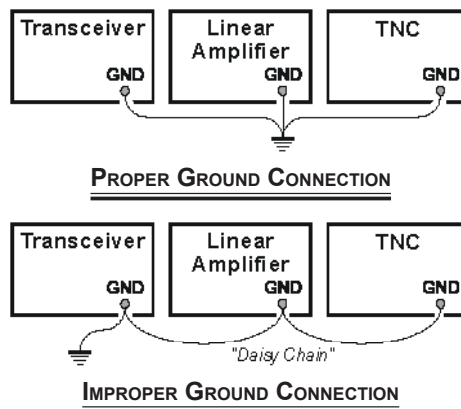
Typically, the ground connection consists of one or more copper-clad steel rods, driven into the ground. If multiple ground rods are used, they should be positioned in a “V” configuration, and bonded together at the apex of the “V” which is nearest the station location. Use a heavy, braided cable (such as the discarded shield from type RG-213 coaxial cable) and strong cable clamps to secure the braided cable(s) to the ground rods. Be sure to weatherproof the connections to ensure many years of reliable service. Use the same type of heavy, braided cable for the connections to the station ground bus (described below).

Inside of the station, a common ground bus consisting of a copper pipe of at least 25 mm (1”) diameter should be used. An alternative station ground bus may consist of a wide copper plate (single-sided circuit board material is ideal) secured to the bottom of the operating desk. Grounding connections from individual devices such as transceivers, power supplies, and data communications devices (TNCs, etc.) should be made directly to the ground bus using a heavy, braided cable.

Do not make ground connections from one electrical device to another, and thence to the ground bus. This so-called “Daisy-Chain” grounding technique may nullify any attempt at effective radio frequency grounding. See the drawing at the right for examples of proper grounding techniques.

Inspect the ground system - inside the station as well as outside - on a regular basis so as to ensure maximum performance and safety.

Besides following the above guidelines carefully, note that household or industrial gas lines must never be used in an attempt to establish an electrical ground. Cold water pipes may, in some instances, help in the grounding effort, but gas lines represent a significant explosion hazard, and must never be used.

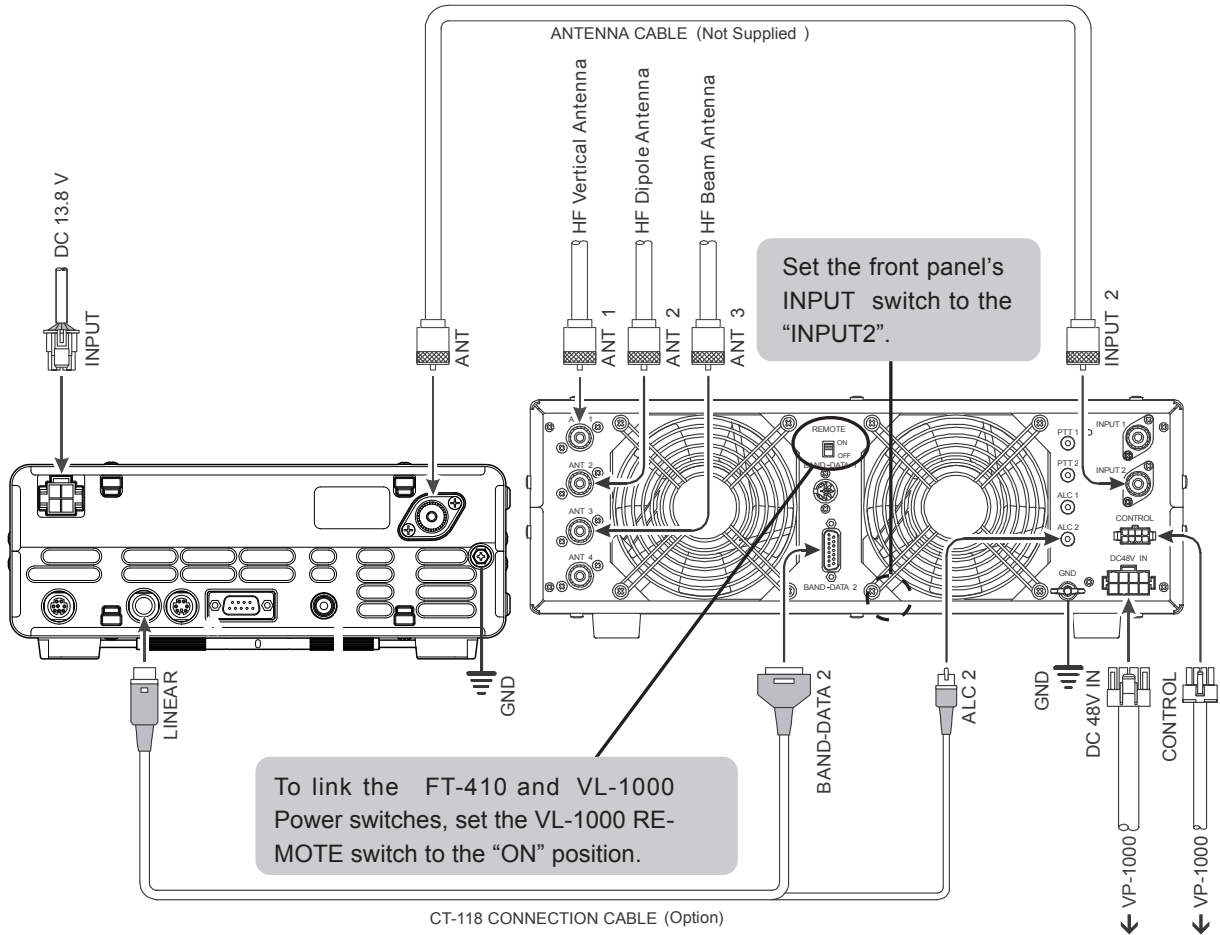


VL-1000 LINEAR AMPLIFIER INTERCONNECTION

Be sure that both the **FT-410** and **VL-1000** are turned off, then follow the installation recommendations contained in the illustration.

Note

- ❑ Please refer to the **VL-1000** Operating Manual for details regarding amplifier operation.
- ❑ Please do not attempt to connect or disconnect coaxial cables when your hands are wet.



INSTALLATION

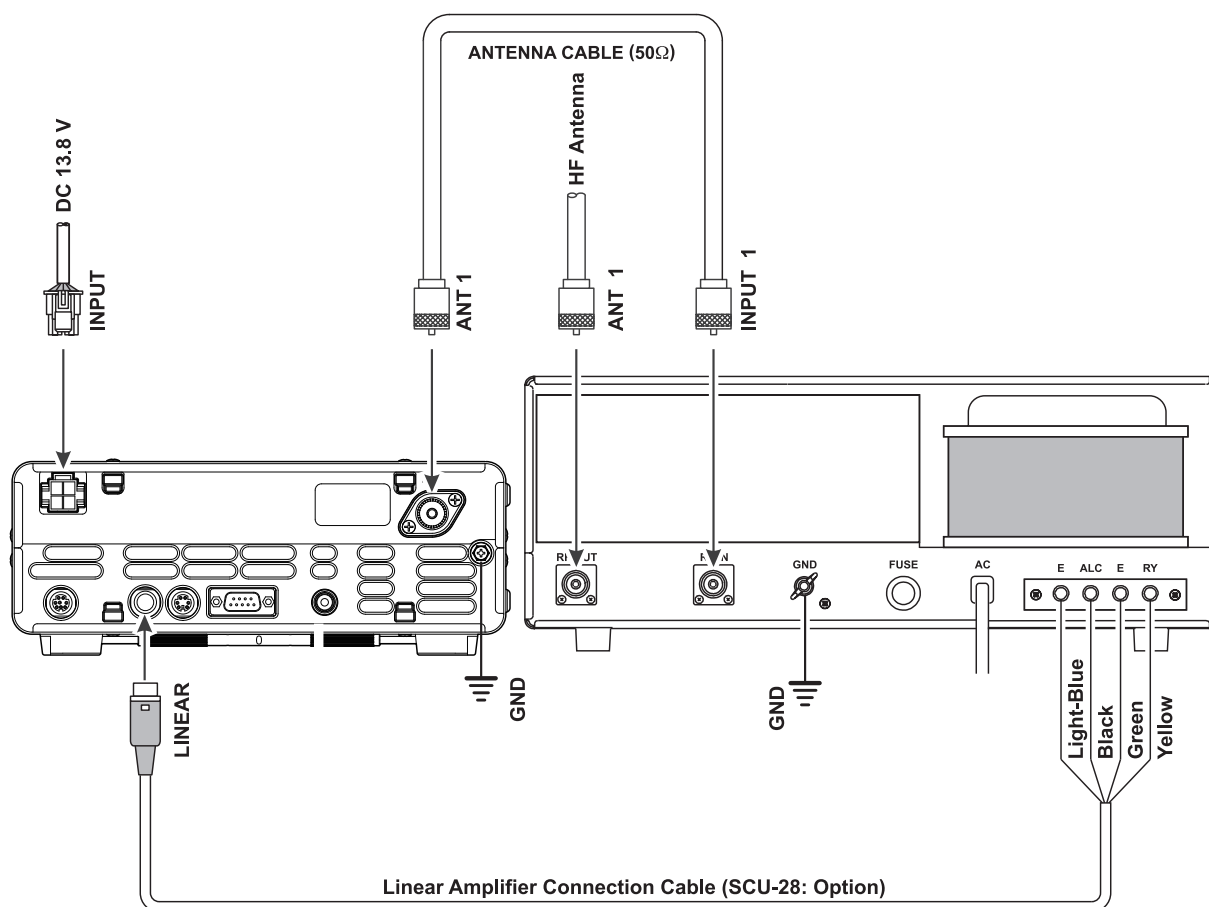
INTERFACING TO OTHER LINEAR AMPLIFIER

The T/R control line is a transistor “open collector” circuit, capable of handling positive amplifier relay coil voltages of up to +50V DC and current of up to 400 mA. If you plan on using multiple linear amplifiers for different bands, you must provide external band-switching of the “Lin Tx” relay control line from the “TX GND OUT” line at the **LINEAR** jack.

Important Note!

Do not exceed the maximum voltage or current ratings for the “TX GND OUT” line at the **LINEAR** jack. This line is not compatible with negative DC voltages, nor AC voltages of any magnitude.

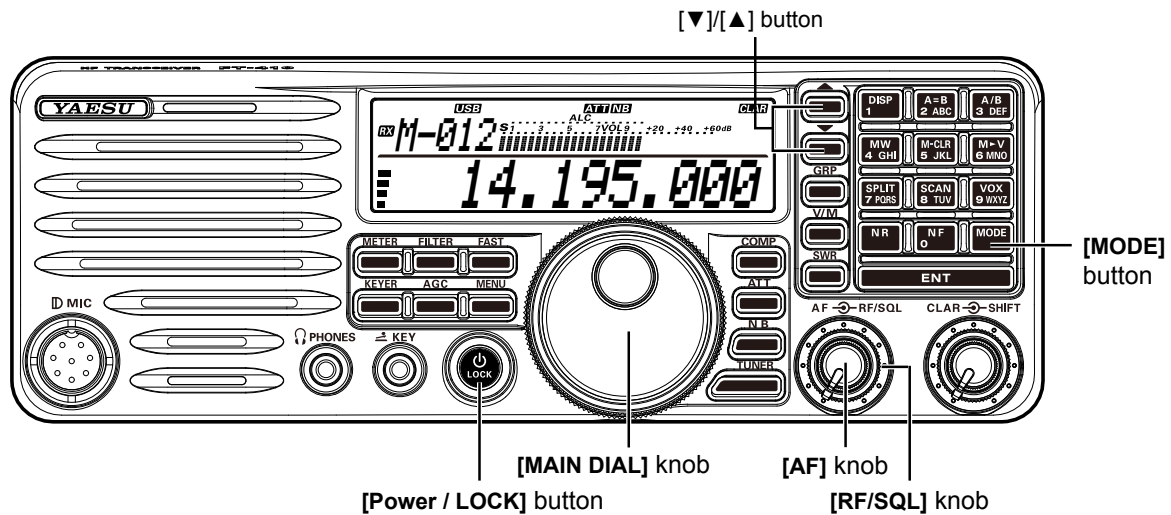
Most amplifier control relay systems require only low DC voltage/current switching capability (typically, +12V DC at 25 ~ 75 mA), and the switching transistor in the **FT-410** will easily accommodate such amplifiers.



Linear Amplifier Connection Cable (SCU-28)

Color Code Information

Wire Color	LINEA Jack (Pin Number)	Function
Orange	1	+13.8 V
Yellow	2	TX GND OUT
Green	3	GND
Red	4	BAND DATA A
White	5	BAND DATA B
Blue	6	BAND DATA C
Violet	7	BAND DATA D
Brown	8	TX INH
Black	9	EXT ALC IN
Gray	10	TX REQ IN
Light Blue	Case	Shield



RECEIVING

1. Connect your antenna to the ANT jack on the rear panel.
2. Connect the after-market DC power supply (or car battery) using the supplied DC power cable, and set the **POWER** switch of the DC power supply to on.
3. Press and hold in the **[Power / LOCK]** switch for one second to turn the transceiver on.
4. Rotate the **[RF/SQL]** knob to the fully clockwise position.
5. Rotate the **[AF]** knob to set a comfortable audio level on incoming signals or noise. Clockwise rotation of the **[AF]** knob increases the volume level.
6. Press the **[▼]/[▲]** button to select the amateur band which you wish to begin operating.
7. Press the **[MODE]** button to select the desired operating mode.
8. Rotate the **[MAIN DIAL]** knob to set the desired frequency.

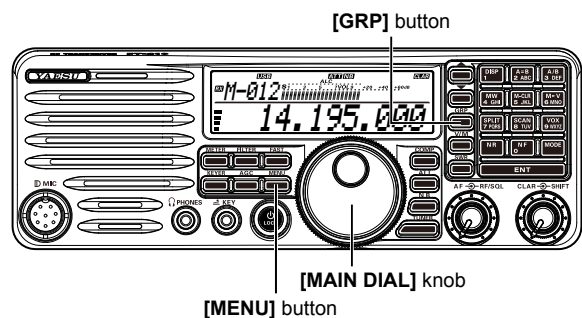
TRANSMIT

1. Connect the Microphone to the **MIC** jack on the front panel.
2. To transmit, press the microphone's **PTT** (Push To Talk) switch, speak into the microphone in a normal voice level.
3. Release the **PTT** switch to return to the receive mode.

MENU OPERATION

The Menu System allows you to customize a wide variety of transceiver performance aspects and operating characteristics. After you have initially customized the various Menu procedures, you will find that you will not have to resort to them frequently during everyday operation.

1. Press the **[MENU]** button to enter the Menu Mode. The "Menu." will appear on the display.
2. Rotate the **[MAIN DIAL]** knob to select the Menu Item to be adjusted.
3. Press the **[GRP]** button to enable adjustment of the selected Menu Item. The ">>" will appear on the display.
4. Rotate the **[MAIN DIAL]** knob to adjust or select the parameter to be changed.
5. Press the **[GRP]** button to save the selection. The icon appears continuously.
6. Press the **[MENU]** button to return to normal operation.



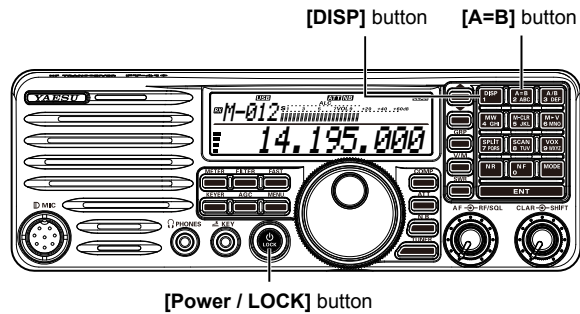
RESETTING THE MICROPROCESSOR

The FT-410 has two reset methods.

MENU MODE RESET

Use this procedure to restore the Menu settings to their factory defaults, without affecting the memories you have programmed.

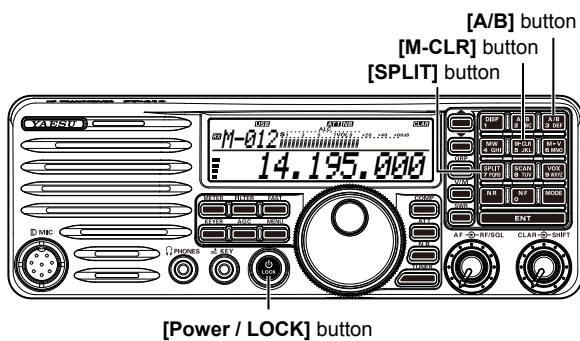
1. Press and hold in the **[Power / LOCK]** buttons for one second to turn the transceiver off.
2. Press and hold the **[DISP]** and **[A=B]** button. While holding it in, press and hold in the **[Power / LOCK]** button for one second to turn the transceiver on. Once the transceiver comes on, you may release the buttons.



ALL RESET

Use this procedure to restore all Menu and Memory settings to their original factory defaults. All Memories will be cleared by this procedure.

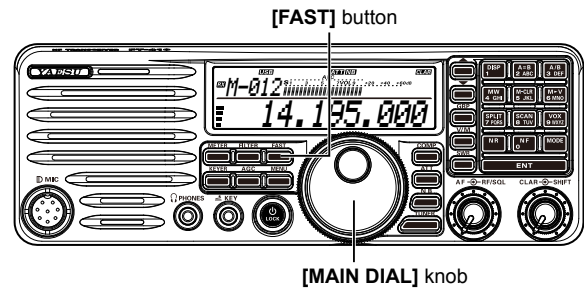
1. Press and hold in the **[Power / LOCK]** button for one second to turn the transceiver off.
2. Press and hold the **[A/B]**, **[M-CLR]** and **[SPLIT]** buttons. While holding it in, press and hold in the **[Power / LOCK]** button for one second to turn the transceiver on. Once the transceiver comes on, you may release the buttons.



TUNING STEPS

The tuning step of the [MAIN DIAL] knob on the operating mode.

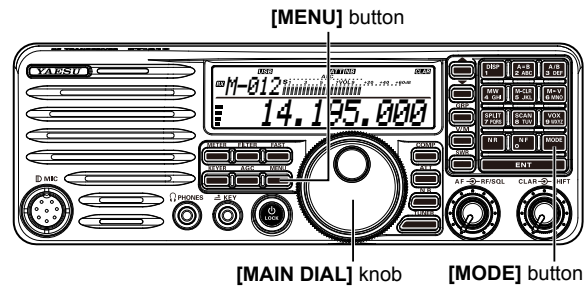
OPERATING MODE	[MAIN DIAL]
LSB/USB	10 Hz
CW	10 Hz
AM	1 kHz
DATA	10 Hz



- Pressing the [FAST] button will increase or decrease the tuning rate of the [MAIN DIAL] knob by a factor of ten.

CHANGE THE TUNING STEP OF THE [MAIN DIAL] KNOB

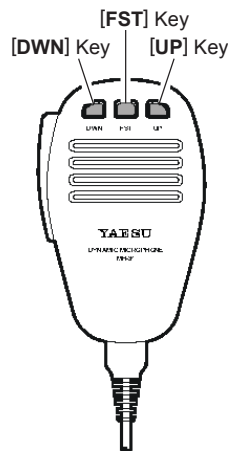
1. Set the operating mode by pressing the [MODE] button.
2. Press and hold the [MENU] button for one second to enter the Menu mode. The "Menu." will appear on the display.
3. Rotate the [MAIN DIAL] knob to select the menu item "Dial Step".
4. Press the [MAIN DIAL] knob to enable adjustment of this menu item. The "Menu." will be blinking.
5. Rotate the [MAIN DIAL] knob to select the desired tuning step described above.



- (You may Press the [MAIN DIAL] button to reset the tuning step to the factory default.)
6. Press the [MENU] button. The "Menu." is displayed continuously.
 7. Press and hold the [MENU] button for one second to save the new setting and return to normal operation.

ABOUT THE [UP]/[DWN] BUTTONS OF THE MH-31B8

- The microphone [UP]/[DWN] keys utilize the tuning steps of the [MAIN DIAL] knob on the SSB/CW/DATA mode.
- When the microphone [FST] key is pressed, the tuning rate increases by a factor of ten, in a manner similar to the effect of the transceiver front-panel [FAST] button.



RECEIVING

CLARIFIER

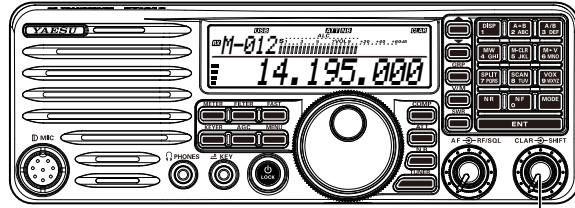
You may change the receiving frequency only without changing the transmit frequency.

Here is the technique for utilizing the Clarifier:

1. Rotation of the [CLAR] knob will allow you to modify your initial offset on the fly. Offsets of up to ± 9.995 kHz may be set using the Clarifier.

NOTE:

- Even when the clarifier is disabled, the variance of the clarifier remains (both TX and RX frequencies).



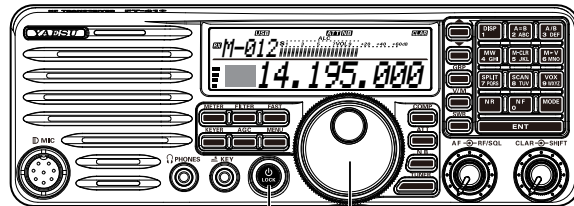
[CLAR] knob

DIAL LOCK

Pressing the [Power / LOCK] button toggles the locking of the [MAIN DIAL] knob and some switches, to prevent accidental frequency changes.

ADVICE:

You may select the locking schemes via the menu item "Lock Mode".

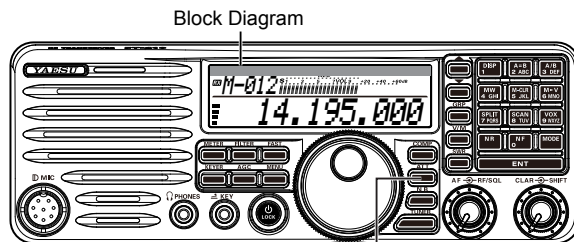


[Power / Lock] button [MAIN DIAL] knob

ATT (ADJUST THE RECEIVING SENSITIVITY)

You may reduce the receiving signal strength to 20 dB when extremely strong local signals or high noise degrade reception. You may optimize the characteristics of the receiver front-end, for best reception, depending on the noise levels and the signal strengths.

Press the [ATT] button several times to set the desired selection.

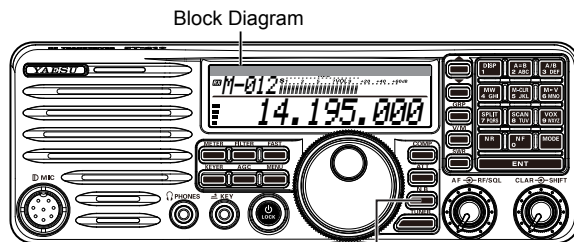


[ATT] button

NOISE BLANKER (INTERFERENCE REJECTION)

The FT-410 includes an effective Noise Blanker, which can significantly reduce noise caused by automotive ignition systems.

1. Press the [NB] button to activate the Noise Blanker.
2. Press the [NB] button again to disable the Noise Blanker.



[NB] button

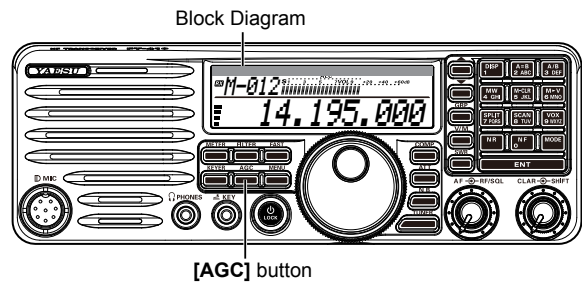
CONVENIENCE FEATURES

AGC (TOOL FOR COMFORTABLE AND EFFECTIVE RECEPTION)

The AGC system is designed to help compensate for fading and other propagation effects, with characteristics that can be of particular value on each operating mode. The basic objective of AGC is to maintain a constant audio output level once a certain minimum threshold of signal strength is achieved.

Press the [AGC] button repeatedly to select the desired receiver-recovery time constant. For most operations, we recommend the "AUTO" mode.

Auto	Sets the receiver-recovery time automatically depending on the operating mode.
Fast	Sets the receiver-recovery time to fast. This mode is suitable for CW/DATA reception.
Slow	Sets the receiver-recovery time to slow. This mode is suitable for SSB/AM reception.



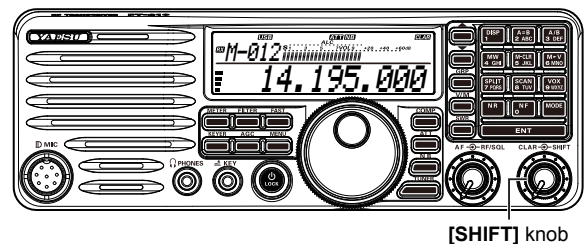
NOTE:

Normally, the "Auto" selection is satisfactory for most situations, but in the event of operation on a crowded band where you wish to receive a weak signal, you may wish to change the setting (to FAST, for example).

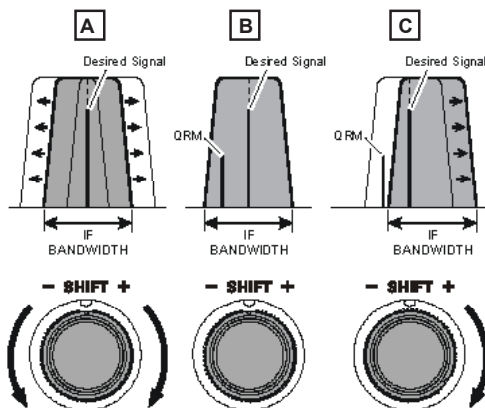
SHIFT (INTERFERENCE REJECTION)

IF Shift allows you to vary the DSP filter passband higher or lower, without changing the pitch of the incoming signal, so as to reduce or eliminate interference. Because the carrier tuning frequency is not varied, there is no need to re-tune the operating frequency when eliminating the interference.

Rotate the [SHIFT] knob to the left or right to reduce the interference.



Referring to Figure "A", note the depiction of the IF DSP filter as the thick line, with the [SHIFT] knob in the 12 o'clock position. In Figure "B", an interfering signal has appeared inside the original passband. In Figure "C", you can see the effect of rotating the [SHIFT] knob to reduce the interference level by moving the filter passband so that the interference is outside of the passband.



CONVENIENCE FEATURES

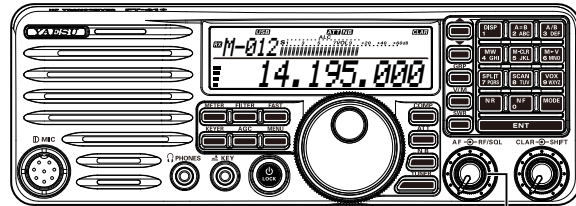
RF GAIN

The RF Gain controls provide manual adjustment of the gain levels for the receiver RF and IF stages, to compensate for noise and/or signal strength conditions at the moment.

The [RF/SQL] knob should, initially, be rotated to the fully clockwise position. This is the point of maximum sensitivity, and counter-clockwise rotation will gradually reduce the system gain.

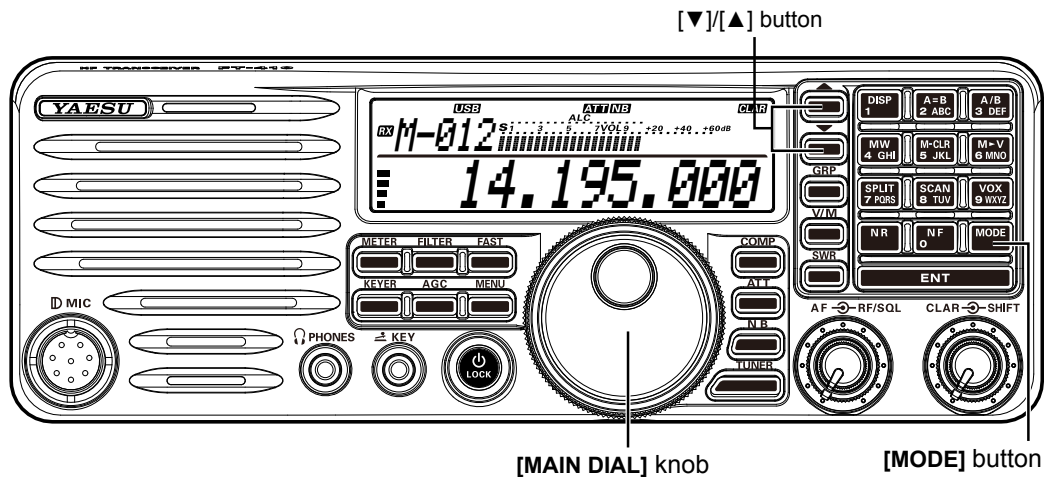
ADVICE:

- As the [RF/SQL] knob is rotated counterclockwise to reduce the gain, the S-meter reading will rise.
- Rotating the [RF/SQL] knob control to the fully counter-clockwise position will essentially disable the receiver, as the gain will be greatly reduced. In this case, the S-meter will appear to be “pegged”. (That is a full-scale reading).



[RF/SQL] knob

SSB/AM MODE TRANSMISSION



1. Press the [▼]/[▲] buttons to select the operating band.
By pressing the [▼]/[▲] buttons, the operating band will change as follows.
7 ⇄ 10 ⇄ 14 ⇄ 15 ⇄ 18 ⇄ 21 ⇄ 24.5 ⇄ 28 ⇄ 1.8 ⇄ 3.5 ⇄ 7 ……
2. Press the [MODE] buttons to select the LSB, USB or AM mode.
By convention, LSB is used in the 7 MHz and lower Amateur bands for SSB communication, and USB is used on the 14 MHz and higher bands (the 10 MHz band is used for CW and data modes only).
3. Rotate the [MAIN DIAL] knob to adjust the operating frequency.
If you use the **MH-31B8**, you may adjust the operating frequency by the [UP]/[DWN] buttons on the microphone.
4. Press the microphone's **PTT** (Push To Talk) switch to begin transmission. Speak into the microphone in a normal voice level.
The “**TX**” icon will appear in the display, confirming that transmission is in progress.
5. Release the **PTT** switch at the end of your transmission. The transceiver will return to the receive mode.

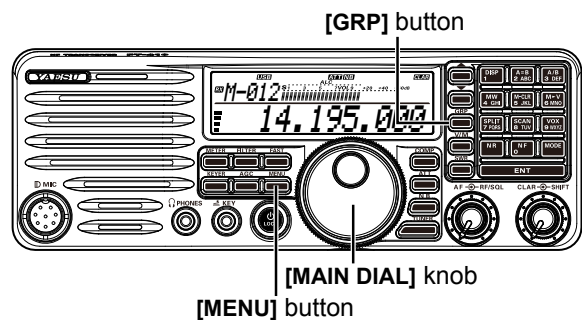
IMPORTANT NOTE:

When performing tests, be sure to check the frequency before transmitting, to avoid interfering with others who may already be using the frequency.

TX POWER ADJUSTMENT

Adjusting the TX output power:

1. Press the [MENU] button to enter the Menu mode.
The “Menu.” will appear on the display.
2. Rotate the [MAIN DIAL] knob to select the menu item “RF PWR Set”.
3. Press the [GRP] button.
4. Rotate the [MAIN DIAL] knob to select the desired power output.
5. Press the [GRP] button.
6. Press the [MENU] button to save the new setting and return to normal operation.



CW MODE OPERATION

The powerful CW operating capabilities of the **FT-410** include operation using both an electronic keyer paddle and a “straight key” or emulation thereof, as is provided by a computer-based keying device.

SETUP FOR STRAIGHT KEY (AND STRAIGHT KEY EMULATION) OPERATION

Before starting, connect your key to the front panel **KEY** jack in the status that turned off the [**Power / LOCK**] switch, and be sure the [**KEYER**] button is turned off for now.

1. Press the [**▼**]/[**▲**] buttons to select the operating band.

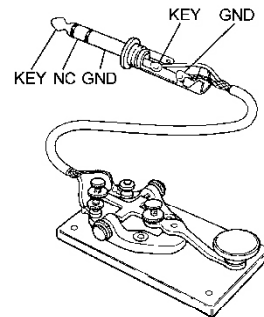
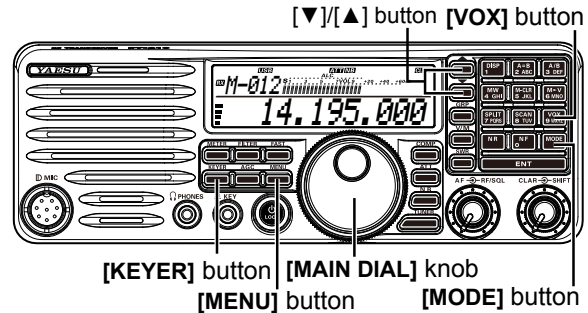
By pressing the [**▼**]/[**▲**] buttons, the operating band will change as follows.

7 ⇄ 10 ⇄ 14 ⇄ 15 ⇄ 18 ⇄ 21 ⇄ 24.5 ⇄ 28 ⇄ 1.8
⇄ 3.5 ⇄ 7

2. Press the [**MODE**] buttons to select the CW mode.
3. Rotate the [**MAIN DIAL**] knob to adjust the operating frequency.

If you use the **MH-31B8**, you may adjust the operating frequency by the [**UP**]/[**DWN**] buttons on the microphone.

4. Press the [**VOX**] button to engage automatic activation of the transmitter when you close the CW key. The “BK” icon will appear in the display.
5. When you close your CW key, the transmitter will automatically be activated, and the CW carrier will be transmitted. When you release the key, transmission will cease after a brief delay.



NOTE:

Do not use the plug except the 3.5-mm 3-pin type plug. If the plug in correct size is not used the radio may be harmed or damaged.

CW Mode Operation

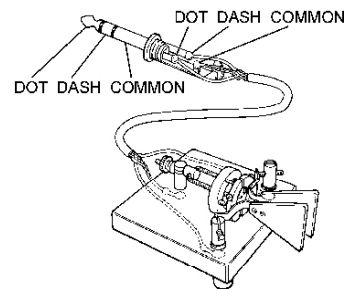
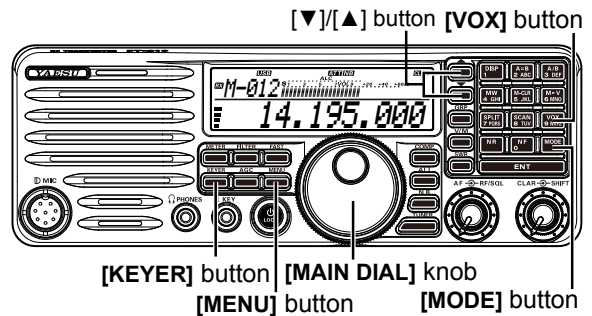
USING THE BUILT-IN ELECTRONIC KEYS

Before starting, connect your keyer paddle to the front panel **KEY** jack in the status that turned off the **[Power / LOCK]** switch.

1. Press the **[▼]/[▲]** buttons to select the operating band.
By pressing the **[▼]/[▲]** buttons, the operating band will change as follows.
7 ⇄ 10 ⇄ 14 ⇄ 15 ⇄ 18 ⇄ 21 ⇄ 24.5 ⇄ 28 ⇄ 1.8 ⇄ 3.5 ⇄ 7
2. Press the **[MODE]** buttons to select the CW mode.
3. Rotate the **[MAIN DIAL]** knob to adjust the operating frequency.
If you use the **MH-31B8**, you may adjust the operating frequency by the **[UP]/[DWN]** buttons on the microphone.
4. Press the **[VOX]** button to engage automatic activation of the transmitter when you close the CW key. The "BK" icon will appear in the display.
5. Press the **[KEYER]** button to activate the built-in Electronic Keyer.
6. When you press either the "Dot" or "Dash" side of your paddle, the transmitter will automatically be activated and the CW carrier will be transmitted. When you release the paddle, transmission will cease after a brief delay.

NOTE:

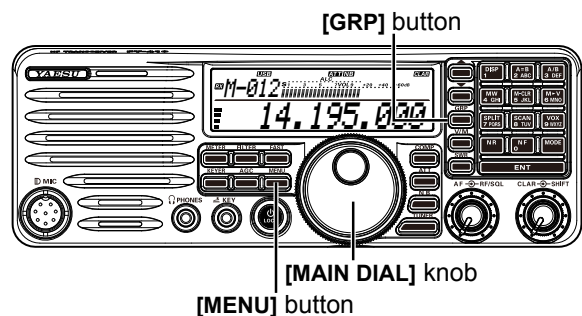
Do not use the plug except the 3.5-mm 3-pin type plug. If the plug in correct size is not used the radio may be harmed or damaged.



You may enable the CW keying by the **[UP]/[DWN]** keys of the **MH-31B8** (while the built-in electronic keyer is engaged) via menu item "CW Keyer".

ADJUSTING THE KEYS SPEED

1. Press the **[MENU]** button to enter the Menu mode.
The "Menu." will appear on the display.
2. Rotate the **[MAIN DIAL]** knob to select the menu item "CW Speed".
3. Press the **[GRP]** button to enable adjustment of this menu item.
4. Rotate the **[MAIN DIAL]** knob while pressing either the "Dot" or "Dash" side of your paddle, so as to set the desired keyer speed (4 - 60 wpm).
5. Press the **[GRP]** knob. The "Menu." returns to appear continuously.
6. Press the **[MENU]** button to save the new setting and return to normal operation.



MEMORY OPERATION

CONVENIENT MEMORY FUNCTIONS

The **FT-410** contains 120 regular memories, labeled “Mx001” through “Mx120”, one special programmed limit memory pairs, labeled “ScanL/ScanU”, one Alaska Emergency Frequency Channel (5167.5 kHz), and five 60-meter (5 MHz) band channels (US version only). Each (except the Alaska Emergency Frequency Channel and 60-meter Band channels, which are fixed.) stores various settings, in addition to the frequency and mode (See below). By default, the 120 regular memories are contained in one group; however, they can be arranged in up to 5 separate groups, if desired.

Quick Point:

The **FT-410**'s memory channels store the following data:

- Operating Frequency
- Operating Mode
- ATT status
- IPO status
- Repeater Shift Direction
- CTCSS Tone Frequency

IMPORTANT NOTE:

On a rare occasion the memory data may be lost or corrupted due to static electricity, electrical noise or erroneous operation. Parts changes or repairs may cause memory loss. Be sure to write down or record your data so you will be able to restore it.

REGULAR MEMORY OPERATION

The Regular Memory of the **FT-410** allows storage and recall of up to 120 memories, each storing frequency, mode, and a wide variety of status information detailed previously. Memories may be organized into as many as 5 Memory Groups.

Memory Storage

1. In the VFO mode, select the desired frequency, mode, and status the way you want to have it stored.

2. Press the **[M/W]** button.

The blinking current memory channel number will be shown on the display, and the contents of the current memory channel will be shown on the display.

If there is no action by you within 25 second from releasing the **[M/W]** button the Memory Storage procedure is canceled.

The memory storage procedure is canceled unless you operate it within 25 seconds.

3. Rotate the **[MAIN DIAL]** knob to select the memory channel in which you wish to store the data.
4. Press and hold the **[V/M]** button for one second to store the frequency and other data into the selected memory channel.

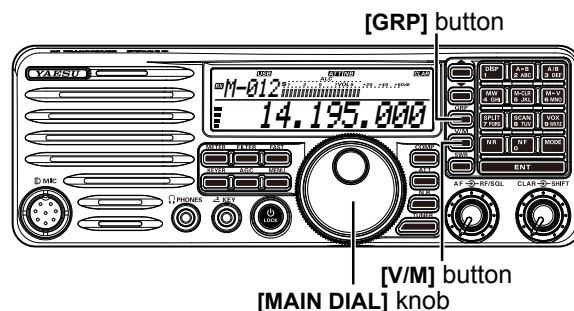
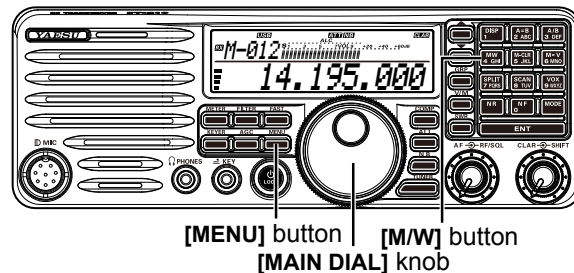
You may over write new data into a channel on which data is already stored.

Memory Channel Recall

1. Press the **[V/M]** button, if necessary, to enter the Memory mode. A memory channel number will appear in the display.
2. Rotate the **[MAIN DIAL]** knob to select the desired memory channel.

Advice:

To work within a particular Memory Group, press the **[GRP]** button. Then rotate the **[MAIN DIAL]** knob to select the desired Memory Group.

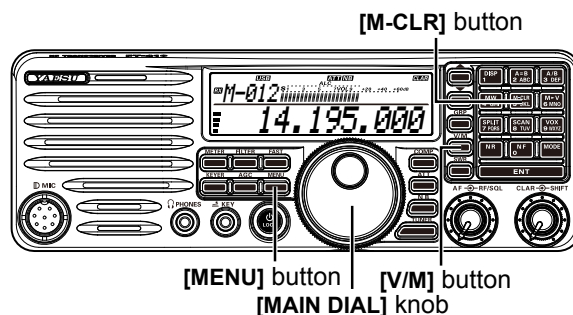


MEMORY OPERATION

REGULAR MEMORY OPERATION

Erasing Memory Channel Data

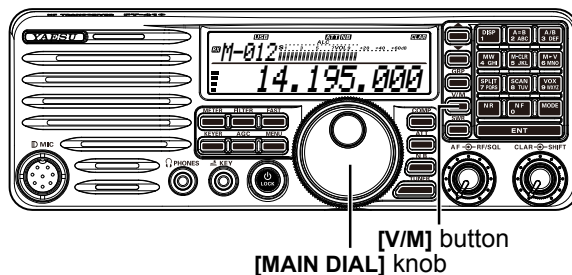
1. Press the [V/M] button, if necessary, to enter the Memory mode.
2. Rotate the [MAIN DIAL] knob to select the memory channel that you would like to erase.
3. Press and hold the [M-CLR] button to erase the contents of the selected memory channel. The display will revert to memory channel 1.



Memory Tune Operation

You may freely tune off of any memory channel in the "Memory Tune" mode, this is similar to VFO operation. So long as you do not over-write the contents of the current memory, Memory Tune operation will not alter the contents of the memory channel.

1. Press the [V/M] button, if necessary, to enter the Memory mode.
2. Rotate the [MAIN DIAL] knob. You will now observe that the memory channel's frequency is changing.
3. Press and hold the [V/M] button for one second. During Memory Tune operation, you may change operating modes, and engage and offset the Clarifier, if desired.
4. Press the [V/M] button momentarily to return to the originally-memorized frequency of the current memory channel. One more press of the [V/M] button will return you to VFO operation.



SCANNING OPERATION

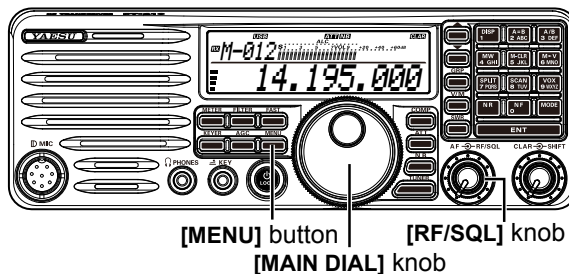
You may scan either the VFO or the memories of the **FT-410**, and the radio will halt the scan on any station with a signal strong enough to open the receiver's squelch.

VFO AND MEMORY SCANNING

Preparation

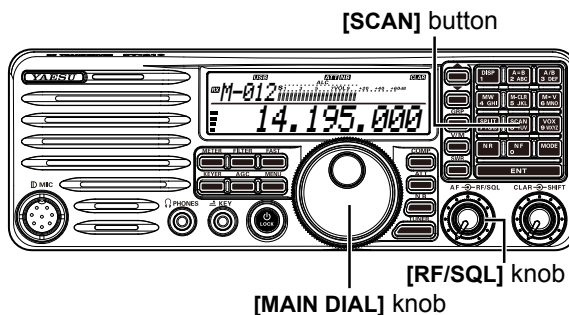
When operating the Scanning feature, set the configuration of the **[RF/SQL]** knob to "Squelch" via the Menu Item "SQL/RF Gain".

1. Press the **[MENU]** button to enter the Menu mode. The "Menu." will appear on the display.
2. Rotate the **[MAIN DIAL]** knob to select the menu item "SQL/RF Gain".
3. Press the **[GRP]** button to enable adjustment of this menu item.
4. Rotate the **[MAIN DIAL]** knob to select "SQL" to assign the Squelch feature to the **[RF/SQL]** knob.
5. Press the **[GRP]** button. The "Menu." returns to appear continuously.
6. Press the **[MENU]** button to save the new setting and return to normal operation.



VFO/Memory Scan

1. Rotate the **[RF/SQL]** knob just to the point where the noise is silenced and the "RX" indicator on the display turns off.
2. Press the **[SCAN]** button to initiate upward scanning (toward higher frequencies or higher memory channel numbers).
3. If you want to change direction of the scan while it is underway, rotate the **[MAIN DIAL]** knob in the opposite direction. You will see the scanner reverse direction and scan down in frequency. You may change the direction of the scanner by pressing and holding the microphone's **[UP]/[DWN]** key for one second, if you are using the **MH-31B8** Hand Microphone.
4. In AM mode, when the scanner encounters a signal strong enough to open the squelch, the scanner will halt for five seconds, after which scanning will resume. In the SSB/CW and SSB-based Data modes, when the scanner encounters a signal strong enough to open the squelch, the scanner will step across the signal very slowly, giving you time to stop the scan, if you like.
5. To stop the scanner, press the **[SCAN]** button or **PTT** switch.



ADVICE:

You may select the manner in which the scanner resumes while it has paused on a signal, using Menu Item "Scan Resume" The default "5sec" setting will cause the scanner to resume scanning after five seconds; you may change it, however, to resume only after the carrier has dropped out.

During Memory Group operation, only the channels within the current Memory Group will be scanned.

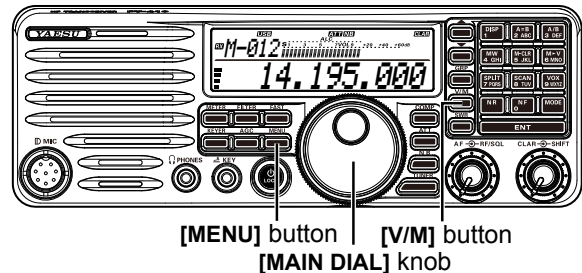
OPERATION ON ALASKA EMERGENCY FREQUENCY: 5167.5 kHz (U.S. VERSION ONLY)

Section 97.401(d) of the regulations governing amateur radio in the United States permit emergency amateur communications on the spot frequency of 5167.5 kHz by stations in (or within 92.6 km of) the state of Alaska. This frequency is only to be used when the immediate safety of human life and/or property are threatened, and is never to be used for routine communications.

The **FT-410** includes the capability for transmission and reception on 5167.5 kHz under such emergency conditions.

Preparation

1. Press the **[MENU]** button to enter the Menu mode. The "Menu." will appear on the display.
2. Rotate the **[MAIN DIAL]** knob to select the menu item "EMG".
3. Press the **[GRP]** knob to enable adjustment of this menu item.
4. Rotate the **[MAIN DIAL]** knob to select "ON".
5. Press the **[GRP]** button. The "Menu." returns to appear continuously.
6. Press the **[MENU]** button to save the new setting and return to normal operation.



Operation

1. Press the **[V/M]** button, if necessary, to enter the Memory mode. A memory channel number will appear in display.
2. Press the **[GRP]** button to select the emergency channel ("EMG").
3. To exit from emergency channel and return to the VFO mode, just press the **[V/M]** button.

Note:

- The receive-mode CLARIFIER functions normally while using this frequency, but variation of the transmit frequency is not possible. Activation of "EMG" does not enable any other out-of-amateur-band capability on the transceiver. The full specifications of the **FT-410** are not necessarily guaranteed on this frequency, but power output and receiver sensitivity should be fully satisfactory for the purpose of emergency communication.
- In an emergency, note that a half-wave dipole cut for this frequency should be approximately 45'3" on each leg (90'6" total length). Emergency operation on 5167.5 kHz is shared with the Alaska-Fixed Service. This transceiver is not authorized for operation, under the FCC's Part 87, for aeronautical communications.

SPECIFICATIONS

General

Rx Frequency Range:	30 kHz - 30 MHz (operating) 160 - 10 m (specified performance, Amateur bands only)
Tx Frequency Ranges:	160 - 10 m (Amateur bands only)
Frequency Stability:	±1 ppm/hour (@+25 °C, after warmup)
Operating Temperature Range:	14 °F ~ 122 °F (-10 °C ~ +50 °C)
Emission Modes:	A1A (CW), A3E (AM), J3E (LSB, USB)
Frequency Steps:	10 Hz (SSB & CW), 1 kHz (AM)
Antenna Impedance:	50 Ohms, unbalanced
Power Consumption:	Rx (signal present) 3.5 A Tx (100 W) 23 A
Supply Voltage:	DC 13.8 V ± 15%
Dimensions (WxHxD):	9' x 3.3" x 8.5" (229 x 84 x 217 mm)
Weight (approx.):	8.8 lb (4.0 kg)

Transmitter

Power Output:	100 watts (25 watts AM carrier)
Modulation Types:	J3E (SSB): Balanced, A3E (AM): Low-Level (Early Stage), Better than -50 dB
Harmonic Radiation:	Better than -50 dB
SSB Carrier Suppression:	At least 50 dB below peak output
Undesired Sideband Suppression:	At least 60 dB below peak output
Audio Response (SSB):	Not more than -6 dB from 300 to 2200 Hz
Microphone Impedance:	600 Ohms (200 to 10 kOhms)

SPECIFICATIONS

Receiver

Circuit Type:	Double-conversion superheterodyne		
Intermediate Frequencies:	67.899 MHz / 24 kHz		
Sensitivity (IPO "OFF", ATT: OFF):	SSB/CW (2.4 kHz, 10 dB S+N/N)		
	0.25 μ V (0.5 - 1.8 MHz)		
	0.25 μ V (3.5 - 30 MHz)		
	0.20 μ V (50 - 54 MHz)		
	AM (6 kHz, 10 dB S+N/N, 30 % modulation @400 Hz)		
	2.00 μ V (1.8 - 2.0 MHz)		
	2.00 μ V (3.5 - 30 MHz)		
	1.00 μ V (50 - 54 MHz)		
	There is no specification in frequency ranges not listed.		
Squelch Sensitivity: (IPO "OFF", ATT: "OFF")	SSB/CW/AM		
	2.50 μ V (1.8 - 30 MHz)		
	1.00 μ V (50 - 54 MHz)		
	There is no specification in frequency ranges not listed.		
Selectivity (-6/-60 dB):	Mode	-6 dB	- 60 dB
	SSB/CW (W)	2.0 kHz or better	4.5 kHz or less
	CW (N)	300 Hz or better	1.2 kHz or less
	AM	6 kHz or better	20 kHz or less
Image Rejection:	80 dB or better		
IF Rejection:	80 dB or better		
Maximum Audio Output:	10 W into 4 Ohms with 5% THD (EXT Speaker)		
Audio Output Impedance:	4 to 16 Ohms (8 Ohms: nominal)		

Specifications are subject to change, in the interest of technical improvement, without notice or obligation, and are guaranteed only within the amateur bands.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

1. Changes or modifications to this device not expressly approved by YAESU MUSEN could void the user's authorization to operate this device.
2. This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions; (1) this device may not cause harmful interference, and (2) this device must accept any interference including interference that may cause undesired operation.
3. The scanning receiver in this equipment is incapable of tuning, or readily being altered, by the User to operate within the frequency bands allocated to the Domestic public Cellular Telecommunications Service in Part 22.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

DECLARATION BY MANUFACTURER

The scanner receiver is not a digital scanner and is incapable of being converted or modified into a digital scanner receiver by any user.

WARNING: MODIFICATION OF THIS DEVICE TO RECEIVE CELLULAR RADIOTELEPHONE SERVICE SIGNALS IS PROHIBITED UNDER FCC RULES AND FEDERAL LAW.

CAN ICES-3 (B) / NMB-3 (B)

YAESU
The radio

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