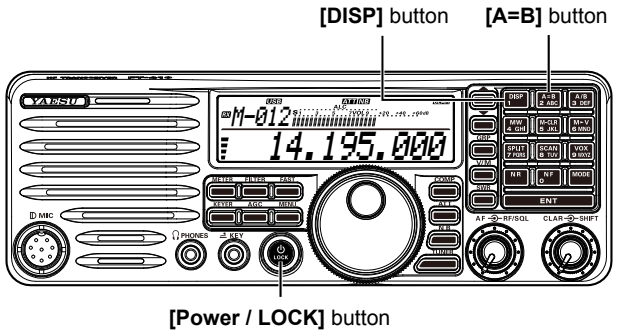
RESETTING THE MICROPROCESSOR

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.

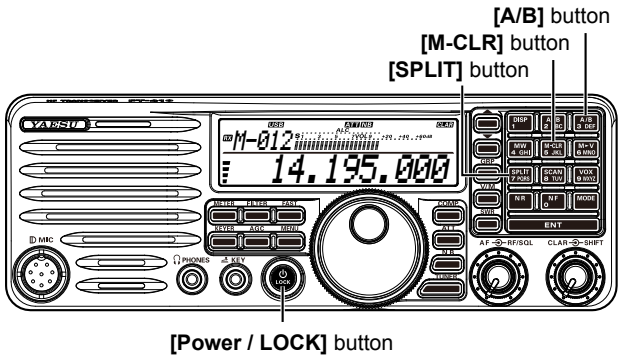
1. Press and hold in the [**Power / LOCK**] buttons for one second to turn the transceiver off.
2. Press and hold the [**DISP**] and [**A=B**] button. While holding it in, press and hold in the [**Power / LOCK**] button for one second to turn the transceiver on. Once the transceiver comes on, you may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

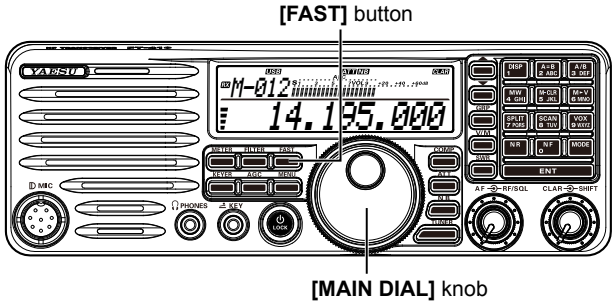
1. Press and hold in the [**Power / LOCK**] button for one second to turn the transceiver off.
2. Press and hold the [**A/B**], [**M-CLR**] and [**SPLIT**] buttons. While holding it in, press and hold in the [**Power / LOCK**] button for one second to turn the transceiver on. Once the transceiver comes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



TUNING STEPS

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

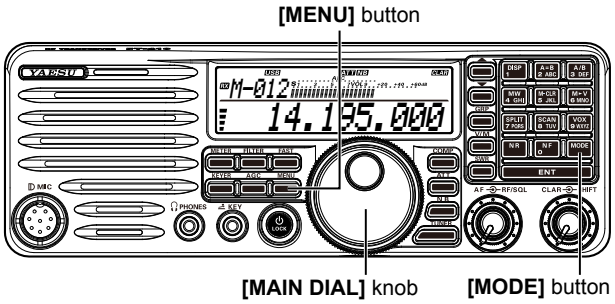
OPERATING MODE	[MAIN DIAL]
LSB/USB	10 Hz
CW	10 Hz
AM	1 kHz
DATA	10 Hz



❒ 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

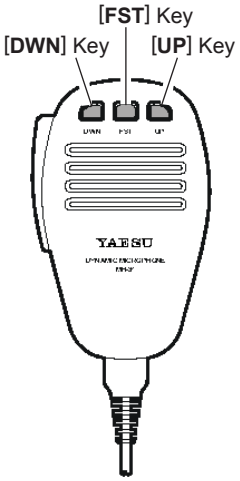
1. Set the operating mode by pressing the [**MODE**] button.
2. Press and hold the **[MENU]** button for one second to enter the Menu mode. The “Menu.” will appear on the display.
3. Rotate the [**MAIN DIAL**] knob to select the menu item “Dial Step”.
4. Press the [**MAIN DIAL**] knob to enable adjustment 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

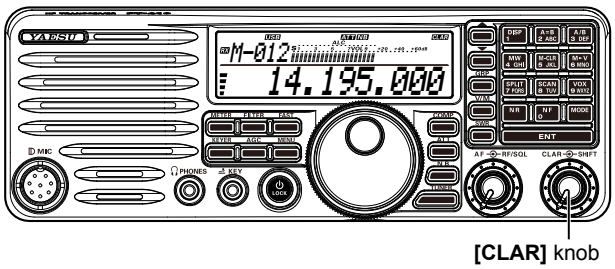
You may change the receiving frequency only without changing the transmit frequency.

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 Clarifie.

NOTE:

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

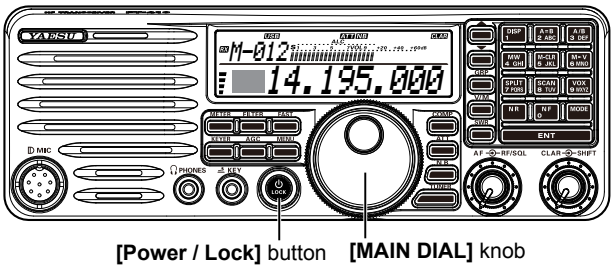


DIAL LOCK

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

ADVICE:

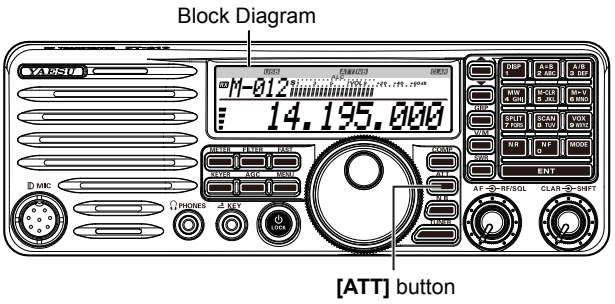
You may select the locking schemes via the menu item "Lock Mode".



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.

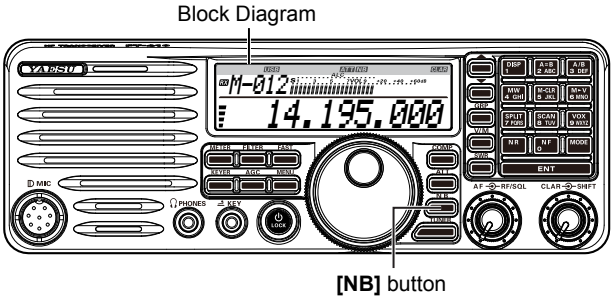
Press the [**ATT**] button several times to set the desired selection.



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.



CONVENIENCE FEATURES

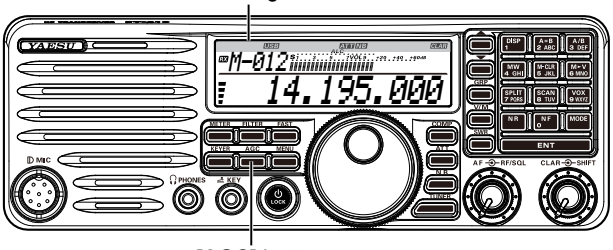
AGC (TOOL FOR COMFORTABLE AND EFFECTIVE RECEPTION)

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.

Block Diagram



[AGC] button

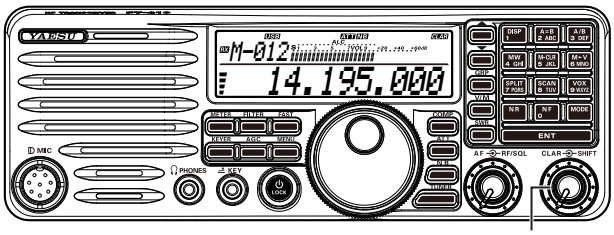
NOTE:

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)

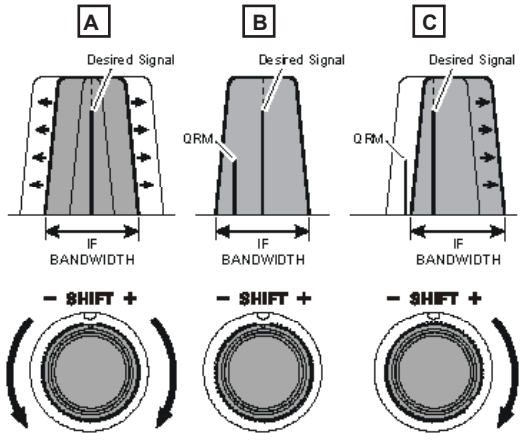
IF Shift allows you to vary the DSP filter passband higher or lower, without changing the pitch of the incoming signal, so as to reduce or eliminate interference. Because the carrier tuning frequency is not varied, there is no need to re-tune the operating frequency when eliminating the interference.

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



[SHIFT] knob

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.

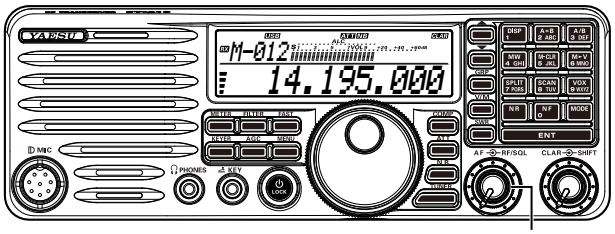


CONVENIENCE FEATURES

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.

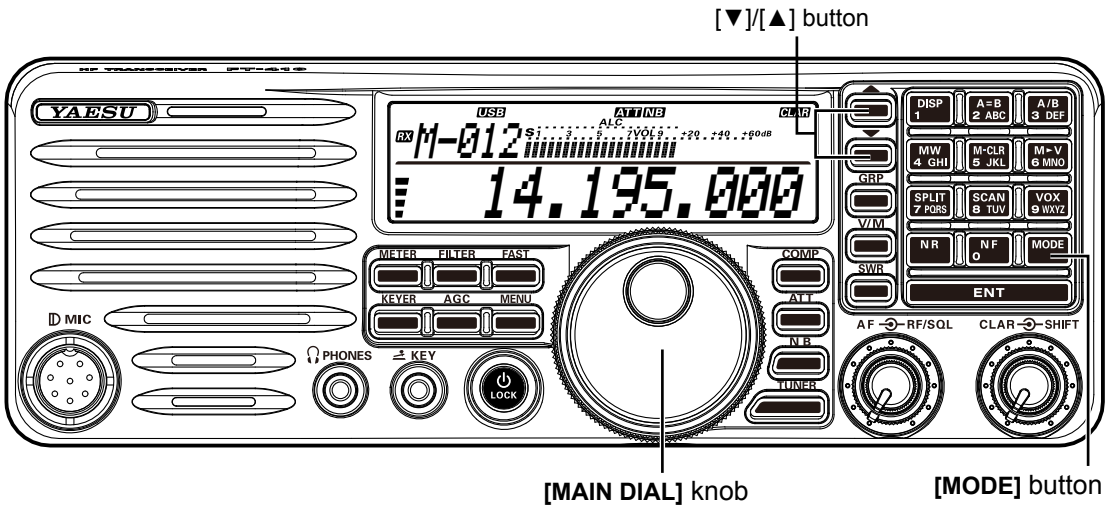
The [**RF/SQL]** knob should, initially, be rotated to the fully clockwise position. This is the point of maximum sensitivity, and counter-clockwise rotation will gradually reduce the system gain.



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).

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-31$_{B8}$**, 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 "**T X**" 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.

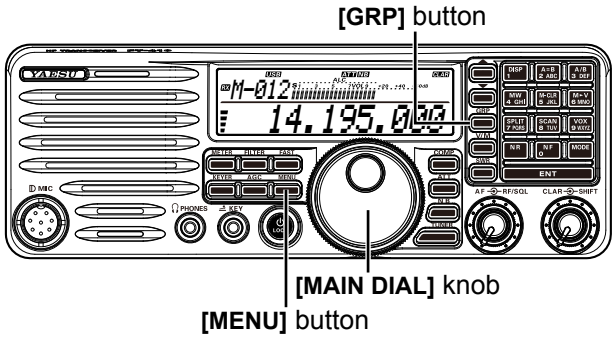
Important Note:

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.



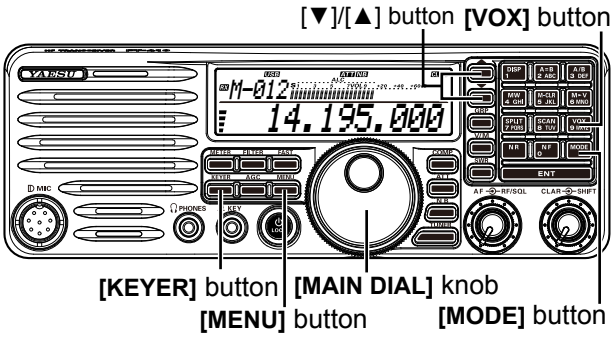
CW Mode Operation

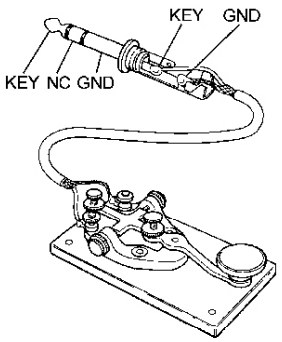
The powerful CW operating capabilities of the **FT-410** include operation using both an electronic keyer paddle and a “straight key” or emulation thereof, as is provided by a computer-based keying device.

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 your release the key, transmission will cease after a brief delay.





Note:

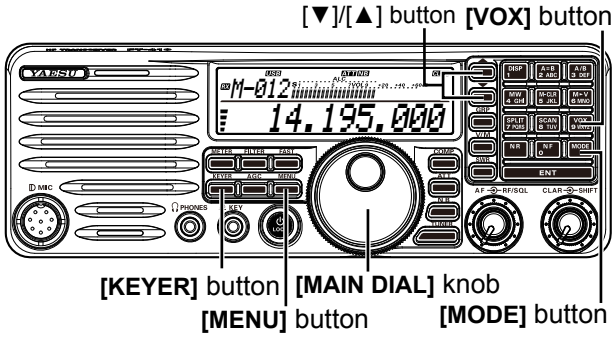
Do not use the plug except the 3.5-mm 3-pin type plug. If the plug in correct size is not used the radio may be harmed or damaged.

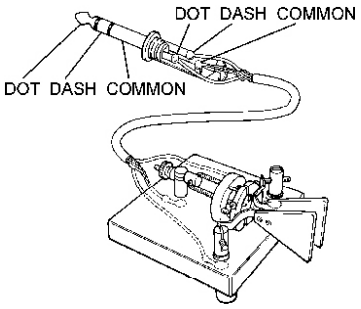
CW Mode Operation

Using the Built-in Electronic Keyer

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 your release the paddle, transmission will cease after a brief delay.





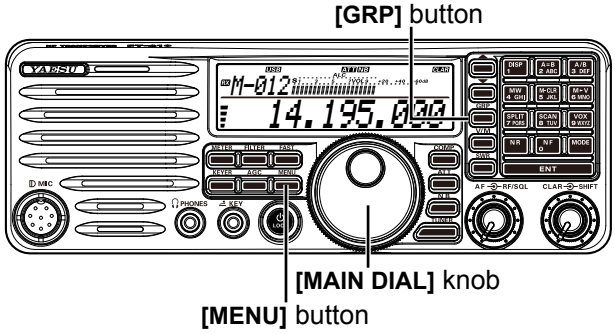
You may enable the CW keying by the [**UP**]/[**DWN**] keys of the **MH-31B8** (while the built-in electronic keyer is engaged) via menu item "CW Keyer".

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.

Adjusting the Keyer 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

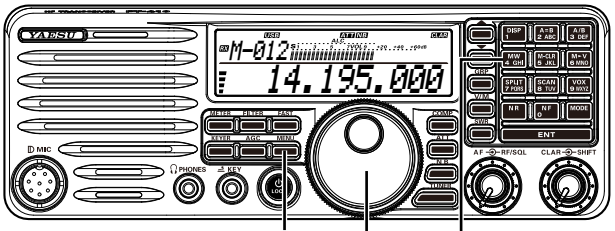
IMPORTANT NOTE:

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.

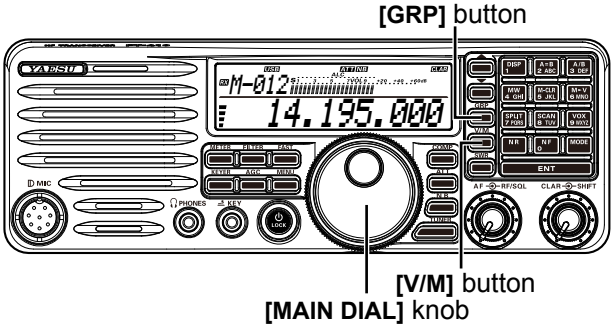
Memory Storage



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.

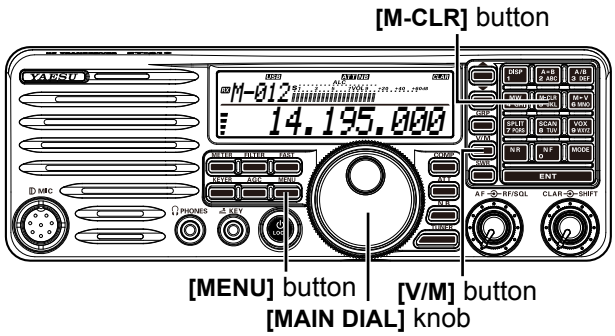
Advice:

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

REGULAR MEMORY OPERATION

Erasing Memory Channel Data

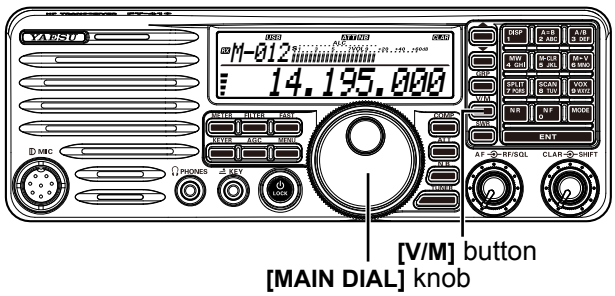
1. Press the [**V/M**] button, if necessary, to enter the Memory mode.
2. Rotate the [**MAIN DIAL**] knob to select the memory channel that you would like to erase.
3. Press and hold the **[M-CLR]** button to erase the contents of the selected memory channel. The display will revert to memory channel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

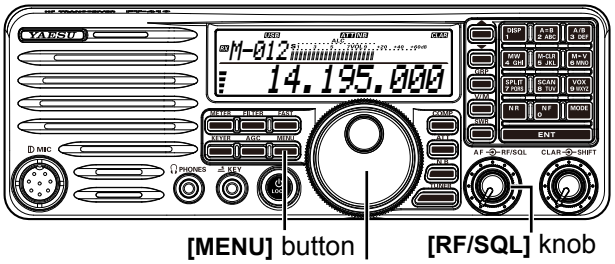


SCANNING OPERATION

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

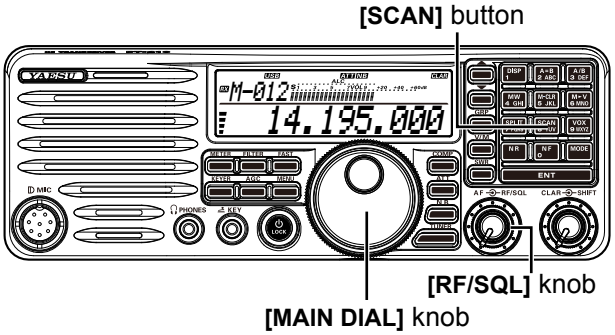
Preparation



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.

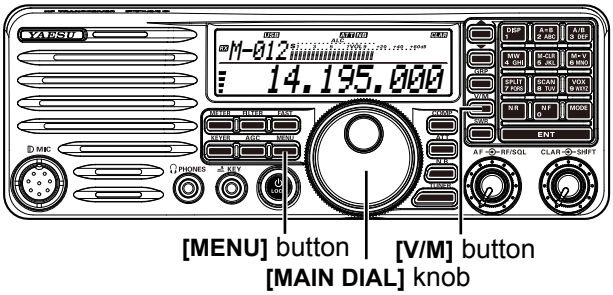
OPERATION ON ALASKA EMERGENCY FREQUENCY: 5167.5 kHz (U.S. VERSION ONLY)

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),
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 µV (0.5 - 1.8 MHz)		
	0.25 µV (3.5 - 30 MHz)		
	0.20 µV (50 - 54 MHz)		
	AM (6 kHz, 10 dB S+N/N, 30 % modulation @400 Hz)		
	2.00 µV (1.8 - 2.0 MHz)		
	2.00 µV (3.5 - 30 MHz)		
	1.00 µV (50 - 54 MHz)		
	There is no specification in frequency ranges not listed.		
Squelch Sensitivity:	SSB/CW/AM		
(IPO "OFF", ATT: "OFF")	2.50 µV (1.8 - 30 MHz)		
	1.00 µV (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.

FCC NOTICE

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

Printed in Japan