



Front Panel Control & Switches

- (1) **PWR** Switch
Press and hold in the **PWR** switch for one second to turn to the transceiver on or off.
- (2) **AF** Knob
This (inner) **VOL** knob adjusts the receiver audio volume level presented to the speaker or external speaker. Clockwise rotation increases the volume level.
- (3) **SQL/RF** Knob
In the USA version, this (outer) **SQL/RF** knob adjust the gain of the receiver's RF and IF stage. Using Menu Selection 45, this control may be changed to function as a Squelch control, which may be used to silence background noise when no signal is present. In the other versions, its default setting is squelch control.
- (4) **LOCK** Key
Pressing this key locks the so as to prevent accidental frequency change.
- (5) **V/M** Key
Pressing this key switches frequency control between the VFO and Memory System.
- (6) **TRANSMIT/BUSY** Indicator
This LED glows green when the squelch open, and turns red during transmit.
- (7) **MAIN DIAL**
This is the main tuning dial for the transceiver. It is used both for frequency tuning as well as "Menu" setting in the transceiver.
- (8) **F** Key
Pressing this key to changes the **SEL** knob which is selecting the **FUNC** key functions. Press and hold this key for one second to activate the menu function.
- (9) **FUNC** Keys
These three keys select many of the most important operating features of the transceiver. When pressing the **[F]** key, the current function of that key appears above each of the **[A]**, **[B]**, **[C]** keys (along the bottom of the LCD); rotating the SEL knob scrolls the display through eleven rows of functions available for use via the **[A]**, **[B]**, **[C]** keys.

The available features are shown in chart below.

| | [A] Key | [B] Key | [C] Key |
|---|---|---|---|
| 1 | A/B Press the [A] key to switch between VFO-A and VFO-B on the display. | A=B Press and hold the [B] key for 1/2 second to copy the contents of VFO-A into the VFO-B register, so that the two VFOs' contains will be identical. | SPL Press the [C] key to activates Split frequency operation between VFO-A and VFO-B. |
| 2 | MW Press and hold the [A] key for 1/2 second to transfer the contents of the VFO into a Memory register. | MC Press the [B] key to designates the current Memory channel to be "skipped" during scanning. | TAG Press the [C] key to select the display type (Frequency or Alpha-numeric Tag) during Memory operation. |
| 3 | STO Press the [A] key to store the contents of the VFO into a QMB register. | RCL Press the [B] key to recall the QMB Memory. | PMS Press the [C] key to activates the Programmable Memory Scan. |
| 4 | RPT Press the [A] key to select the direction of the uplink frequency shift ("−," "+," or simplex) during FM repeater operation. Press and hold the [A] key for 1/2 second to recall Menu #42 (for setting the shift frequency). | REV Press the [B] key to reverse the transmit and receive frequency while working through a repeater. | TON Press the [C] key to activate the CTCSS or DCS operation. Press and hold the [C] key for 1/2 second to recall Menu #48 (for selecting the CTCSS tone frequency). |
| 5 | SCN Press the [A] key to initiate scanning (in the direction of <i>higher</i> frequency). | PRI Press the [B] key to activate the priority scan. | DW Press the [C] key to activates the Dual Watch system. |
| 6 | SSM | SCH | ART |

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|----|--|---|--|
| | <p>Press the [A] key to activate the Spectrum Scope feature.</p> <p>Press and hold the [A] key for 1/2 second to recall Menu #43 (for selecting the sweep mode).</p> | <p>Press the [B] key to activate Smart Search™ operation.</p> | <p>Press the [C] key to initiate the Auto-Range Transponder mode.</p> <p>Press and hold the [C] key for 1/2 second to recall Menu #09 (for selecting the ARTS beep option).</p> |
| 7 | <p style="text-align: center;">IPO</p> <p>Press the [A] key to bypass the receiver preamplifier, thereby causing Intercept Point Optimization for improved characteristics.</p> <p>The IPO feature does not function on 144/430 MHz.</p> | <p style="text-align: center;">ATT</p> <p>Press the [B] key to engage the receiver front-end attenuator, which will reduce all signals and noise by approximately 10 dB.</p> <p>The ATT feature does not function on 144/430 MHz.</p> | <p style="text-align: center;">NAR</p> <p>Press the [C] key to activate the “Narrow” filter mode in the CW (optional YF-122C required) and SSB (optional YF-122S required) mode.</p> <p>On FM mode, it also select the low-deviation mode required for HF FM operation on 29 MHz.</p> <p>Press and hold the [C] key for 1/2 second to recall Menu #38 (for Enable/disable the optional filter).</p> |
| 8 | <p style="text-align: center;">NB</p> <p>Press the [A] key to activate the receiver’s IF noise Blanker.</p> | <p style="text-align: center;">AGC</p> <p>Press the [B] key to select the recovery time (FAST, SLOW, or AUTO) for the receiver’s AGC system.</p> | - |
| 9 | <p style="text-align: center;">PWR</p> <p>Press the [A] key to select the transmitter power output level (LOW 1, LOW 2, LOW 3, or HIGH).</p> | <p style="text-align: center;">MTR</p> <p>Press the [B] key to select the display function of the meter in the transmit mode (Power, ALC, SWR, or MOD indication).</p> | - |
| 10 | <p style="text-align: center;">VOX</p> <p>Press the [A] key to enable the VOX (voice-operated transmitter switching system) in the SSB, AM, and FM modes.</p> <p>Press and hold the [A] key for 1/2 second to recall Menu #51 (for setting the VOX Gain level).</p> | <p style="text-align: center;">BK</p> <p>Press the [B] key to activate CW Break-in operation.</p> <p>Press and hold the [B] key for 1/2 second to recall Menu #17 (for setting the CW Delay time).</p> | <p style="text-align: center;">KYR</p> <p>Press the [C] key to activate the built-in Electronic Keyer.</p> <p>Press and hold the [C] key for 1/2 second to recall Menu #21 (for setting the Keyer speed).</p> |
| 11 | <p style="text-align: center;">CHG</p> <p>Press the [A] key to initiate the battery charging.</p> <p>Press and hold the [A] key for 1/2 second to recall Menu #11 (for selecting the Charging period).</p> | <p style="text-align: center;">VTL</p> <p>Press the [B] key to display the current battery voltage.</p> | <p style="text-align: center;">DSP</p> <p>Press the [C] key to switches display between <i>Large</i> Character and <i>Small</i> Character mode.</p> |

*The Operating Function number in this column does not appear on the LCD.

(10) **BAND(DWN)/BAND(UP)** Key

Pressing one of these keys momentarily will cause the frequency to be moved up or down by one Frequency Band. The selections are available are:

... 1.8 MHz ⇔ 3.5 MHz ⇔ 7.0 MHz ⇔ 10 MHz ⇔ 14 MHz ⇔ 15 MHz ⇔ 18 MHz ⇔ 24 MHz ⇔ 28 MHz ⇔ 50 MHz ⇔ 88 MHz ⇔ 108 MHz ⇔ 144 MHz ⇔ 430 MHz ⇔ 1.8 MHz ...

(11) **MODE(◀)/MODE(▶)** Key

Pressing one of these keys momentarily will cause the operating mode. The selections are available are:

... USB ⇔ LSB ⇔ CW ⇔ CWR ⇔ AM ⇔ DIG ⇔ PKT ⇔ USB ...

(12) **HOME** Key

Pressing this key momentarily to recalls a favorite “Home” frequency memory.

(13) **SEL** Knob

This detented rotary switch is used for many tuning, Memory selection, and Function selection for the **[A]**, **[B]**, **[C]** keys of the transceiver.

(14) **CLAR** Key

Press this key momentarily to activate the Receiver Classifier feature. When this feature is activated, the **SEL** knob is used to set a tuning offset of up to ± 9.99 kHz.

Press and hold this key for 1/2 second to activate the IF Shift feature, which allows you to use the **SEL** knob to adjust the center frequency of the IF filter's passband response.

(15) **ANT** Jack

Connect the supplied 50/144/430 MHz rubber flex antenna (or another antenna presenting a 50Ω impedance).

In its default setting, this jack does not function on HF band. If you want to enable this jack on HF band, recall and changes the Menu #07 settings.

Side Panel Switch & Connectors

(1) **MIC** Jack

Connect the supplied **MH-31** Hand Microphone.

(2) **SP/PH** Jack

This 3.5-mm, 2-pin jack provides variable audio output for an external speaker ($4\Omega \sim 16\Omega$ impedance) or Earphone. This audio level varies according to the setting of the front panel's **AF** knob.

Important Note: When insert the Earphone plug into this jack, the slide **SP-PH** switch located on the right side of this jack **MUST BE** slide to the "**PH**" position to prevent the injure your ear.

(3) **SP-PH** Switch

If you use the Earphone with this transceiver, move this switch to the "**PH**" position before inserting the Earphone plug into the **SP/PH** Jack, to prevent the injure your ear.

Rear Panel Connectors

(1) **INPUT:13.8V** Jack

This is the DC power supply connection for the transceiver when operate the transceiver external power supply. Use the supplied DC cable to connect this jack to the car battery or base station DC power supply, which must be capable of supplying at least $2A @ 8 \sim 16$ VDC. This jack is also use the battery charging for the optional **FNB-72** battery pack.

(2) **GND** Terminal

For best performance and safety, this Ground lug should be connected to a good earth ground using a short, heavy, braided cable.

(3) **KEY** Jack

This 3.5-mm, 3-pin jack is used for connection to a CW keyer paddle or a straight key.

(4) **DATA** Jack

This 6-pin, mini-DIN jack accepts AFSK or FSK input from a Terminal Node Controller (TNC) or Terminal Unit (TU); it also provides fixed-level Receiver Audio Output, Push-To-Talk (PTT), and ground lines.

(5) **ACC** Jack

This 8-pin, mini-DIN jack is used for interfacing to a personal computer for control of this transceiver using the CAT System. It is also used for Transceiver-to Transceiver Cloning.

(6) **ANT** Jack

Connect your HF and/or 50 MHz antenna's 50Ω coaxial cable to this M-type ("SO-239") connector.

In its default setting, this jack does not function on 50/144/430 MHz bands. If you want to enable this jack on 50/144/430 MHz bands, recall and changes the Menu #07 settings.

Operation

Turning the Transceiver On and Off

1. To turn the transceiver on, press and hold the **PWR** switch for one second.
2. To turn the transceiver off, again press and hold the **PWR** switch for one second.

Supply Voltage Display

When you turn on the transceiver, the dc supply voltage is indicated on the upper right corner of the LCD for two seconds. After this interval, the display will resume its normal indication of the operating mode (VFOa, VFOb, or Memory Channel Number). To view the supply voltage at any time during operation:

1. Press the **[F]** key momentarily, then rotate the **SEL** knob to select Operating Function Row **[CHG, VLT, DSP]** on the display.
2. Press the **[B](VLT)** key momentarily to display the supply voltage on the upper right corner of the LCD.
3. To cancel the supply voltage display, again press the **[B](VLT)** key.

Operating Band Selection

This transceiver covers an incredibly wide frequency range, over which a number of different operating modes are used. Therefore, this transceiver's frequency coverage has been divided into different operating band, each of which has its own pre-set channel steps and operating modes. You can change the channel steps and operating mode later, of course, per the next section.

To change the operating bands, press either the **BAND(DWN)** or **BAND(UP)** Key to move to the next higher or lower operating band, respectively.

... 1.8 MHz ⇔ 3.5 MHz ⇔ 7.0 MHz ⇔ 10 MHz ⇔ 14 MHz ⇔ 15 MHz ⇔ 18 MHz ⇔ 24 MHz ⇔ 28 MHz ⇔ 50 MHz ⇔ 88 MHz ⇔ 108 MHz ⇔ 144 MHz ⇔ 430 MHz ⇔ 1.8 MHz ...

Mode Selection

Press either **MODE(◀)** or **MODE(▶)** key to move among the eight settings for the operating modes, respectively.

... USB ⇔ LSB ⇔ CW ⇔ CWR ⇔ AM ⇔ DIG ⇔ PKT ⇔ USB ...

Adjusting the Audio Volume Level

Rotate the **AF** knob to set a comfortable listening level.

Note 1: When operating in the “**DIG**” or “**PKT**” modes, you may set the **AF** knob to any comfortable setting, or even all the way off, because the output from the **DATA** jack is a fixed-level audio signal.

Note 2: Start with the **AF** knob set fully counter-clockwise, especially when using FM (the background noise on FM can be surprisingly loud)!

Setting the Operating Frequency

1. In the “**SSB/CW/DIG**” modes, rotate the **DIAL** knob to set the frequency. Clockwise rotation of the **DIAL** increase the operating frequency.
2. In the “**AM/FM/PKT**” modes, rotate the **SEL** knob to set the frequency. Clockwise rotation of the **SEL** increase the operating frequency.
3. You may also use the **SEL** knob to adjust the operating frequency in the “**SSB/CW/DIG**” modes.
4. Rotate the **SEL** knob after pressing the **SEL** knob, change the operating frequency in 1 MHz step, allowing quick excursions around the band.

Note: Both the synthesizer's steps and the tuning rate (the number of steps per rotation of the **DIAL**) can be adjusted.

Stacked VFO System

1. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[A/B, A=B, SPL]** on the display.
2. Now press the **[A](A/B)** key to toggle between the “**A**” and “**B**” VFO. There are two such VFOs provided on each Amateur band, so you may set VFO-A to the CW sub-band, and

VFO-B to the SSB sub-band, if you like. The operating mode will be preserved, along with the frequency information, on each VFO.

Receiver Accessory

Clarifier (Receiver Incremental Tuning)

The Clarifier (RIT) allows you to set an offset of up to ± 9.99 kHz of the receive frequency relative to your transmit frequency. To achieve wider offset, you may use the “split” operating mode, described later.

1. Press the [**CLAR**] switch momentarily to activate the Clarifier function.
2. Turn the **SEL** knob, which allows the receiver frequency to be varied over a range of 9.99 kHz.
3. When offsets the receiving frequency higher than transmit frequency, appear the “**↑**” icon at the right of the frequency display. Similarly, when offsets the receiving frequency lower than transmit frequency, appear the “**↓**” icon at the right of the frequency display.
4. When the receiving frequency equal transmit frequency (Clarifier offset is zero) while the Clarifier is activated, appear the “**-**” icon at the right of the frequency display.
5. To turn the Clarifier off, again press the [**CLAR**] switch momentarily.
6. To reset the Clarifier offset to zero, turn the Clarifier off, then turn the **DIAL** by any amount. The Clarifier will reset to zero after the first “step” of the **DIAL**.

IF SHIFT

The receiver’s IF SHIFT feature is an effective interference-reduction tool, which allows you to shift the passband response higher or lower without changing the pitch of the incoming signal.

1. Press the [**CLAR**] switch for one second to activate the IF SHIFT feature. A “**●**”, “**▲**,” or “**▼**” icon will appears at the right of the frequency display to inform the IF SHIFT’s current position.
2. Rotate the **SEL** knob, as needed, to reduce or eliminate interference.
3. To turn the IF SHIFT feature off, again press the [**CLAR**] switch for one second. The last setting of the IF SHIFT control will be retained until you change it again.

AGC (Automatic Gain Control)

The receiver recovery time constant may be modified to match your operating needs.

1. Press the [**F**] key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**NB, AGC**] on the display.
2. Press the [**B**](**AGC**) key to toggle the AGC recovery time constant among the following selection:
AGCauto → AGCfast --. AGCslow → AGCauto ...
where “AGCauto” represents “AGCfast” on CW and DIG(AFSK), and “AGCslow” on the voice modes.

Noise Blanker

The IF Noise Blanker may be useful in reducing or eliminating some types of impulse noise.

1. Press the [**F**] key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**NB, AGC**] on the display.
2. Press the [**A**](**NB**) key to activate the Noise Blanker. The “**◀**” icon will appears at the right of the “**NB**” indicate.
3. Press the [**A**](**NB**) key again to turn the Noise Blanker off.

IPO (Intercept Point Optimization)

The IPO feature bypasses the receiver RF preamplifier, thereby eliminating the preamp’s gain. This feature is not available on the 144 MHz and 430 MHz.

1. Press the [**F**] key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**IPO, ATT, NAR**] on the display.
2. Press the [**A**](**IPO**) key to bypass the receiver input preamplifier. The “**◀**” icon will appears at the right of the “**IPO**” indicate.

3. Press the [**A**](**IPO**) key once more to re-activate the preamp.

ATT (Front End Attenuator)

The Attenuator all signal (and noise) by 10 dB, and it may be used to make reception more pleasant under extremely noisy conditions. This feature is not available on the 144 MHz and 430 MHz.

1. Press the [**F**] key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**IPO, ATT, NAR**] on the display.
2. Press the [**B**](**ATT**) key to activate the Attenuator. The “◀” icon will appear at the right of the “**ATT**” indicate.
3. Press the [**B**](**ATT**) key once more to switch the Attenuator out of the receiver front end circuit.

AM/FM DIAL

In the AM and FM modes, the DIAL knob is locked out (via Menu setting) so as to allow “channelized” tuning on these modes. To adjust the operating frequency rotate the **SEL** knob.

If you wish to enable the **DIAL** for tuning in the AM and FM modes, change the setting of Menu #04.

1. Press and hold the [**F**] key for one second to enter the Menu mode.
2. Rotate the **SEL** knob to recall Menu #04 (**AM&FM DL**).
3. Rotate the **DIAL** knob to set this feature (“**AM&FM DL**”) to “**ENABLE**.”
4. Press and hold the [**F**] key for one second to save the new setting and exit to normal operation.

Automatic Power-Off Feature

The APO feature helps conserve battery life by automatically turning the transceiver off after a user-defined period of time within which there has been no dial or key activity. The available selections for the time before power-off are 1 ~ 6 hours, as well as APO Off. The default condition for the APO is OFF, and here is the procedure for activating it:

1. Press and hold the [**F**] key for one second to enter the Menu mode.
2. Rotate the **SEL** knob to recall Menu #08 (**APO TIME**).
3. Rotate the **DIAL** knob to select the desired time period after which the radio will automatically shut down.
4. Press and hold the [**F**] key for one second to save the new setting and exit to normal operation.

Once you have programmed a time interval, the APO countdown timer will start whenever some front panel action (tuning, transmission, etc.) ends.

When activate the APO, appear the “**TIMER**” icon at the center bottom on the LCD. If there is no action by you within the time interval programmed, the microprocessor will shut down the radio automatically. Just press and hold the **PWR** switch for one second to turn it back on, as usual.

Transmitter Operation

SSB Transmission

Basic Setup/Operation

1. Press the **MODE**(◀)/**MODE**(▶) key so to select the SSB (LSB/USB) mode. If you are operating on the 10 MHz or lower bands, to select the LSB mode. If you are operating on the 14 MHz or higher bands, to select the USB mode.
2. Press the [**F**] key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**PWR, MTR**] on the display, then press the [**B**](**MTR**) key to select the “**ALC**” meter function (appear “**alc**” at the right side of the “**MTR**” icon.).
3. Press the microphone’s **PTT** switch, and speak into the microphone in a normal voice while watching the meter. The ideal audio input level to the transmitter from the microphone will cause “**???**” “segment” of indication on the ALC meter. Release the **PTT** switch to return to receive mode.
4. If the ALC meter is too high, or too low, you may need to reset the Microphone Gain:

- (1) Press and hold the **[F]** key for one second to enter the Menu mode.
- (2) Rotate the **SEL** knob to recall Menu #46 (**SSB MIC**).
- (3) Close the **PTT** switch, and while speaking into the microphone rotate the **DIAL** until the proper ALC indication is achieved on voice peaks.
- (4) When done, press and hold the **[F]** key to save the new setting for the Microphone Gain.

VOX Operation

The VOX system provides automatic transmit/receive switching based on voice input to the microphone. With the VOX system enabled, you do not need to press the **PTT** switch in order to transmit.

1. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**VOX, BK, KYR**] on the display.
2. Press the **[A](VOX)** key to activate the VOX circuitry. The “◀” icon will appear at the right of the “**VOX**” indicate.
3. Without pressing the **PTT** switch, speak into the microphone in a normal voice level. When you start speaking, the transmitter should be activated automatically. When you finish speaking, the transceiver should return to the receive mode (after a short delay).
4. To cancel VOX and return to **PTT** operation., again press the **[A](VOX)** key. The “◀” icon is disappeared.
5. The VOX Gain may be adjusted, so as to prevent accidental transmitter activation in a noisy environment. To adjust the VOX Gain:
 - (1) While still in Operating Row [**VOX, BK, KYR**], press and hold the **[A](VOX)** key for one second. This instantly recall Menu #51 (**VOX GAIN**).
 - (2) While speaking into the microphone, rotate the **DIAL** to the point where the transmitter is quickly activated by your voice, without causing background noise to activate the transmitter.
 - (3) When you have selected the optimum setting, press and hold the **[F]** key for one second to save the new settings and return to normal operation.
6. The “Hang-Time” of the VOX system (the transmit-receive delay after the cessation of speech) may also be adjusted via the Menu. The default delay is 1/2 second. To set a different delay time:
 - (1) Press and hold the **[F]** key for one second to activate the Menu mode.
 - (2) Rotate the **SEL** knob to select Menu #50 (**VOX DELAY**).
 - (3) Rotate the **DIAL** while saying a brief syllable like “Ah” so as to set the desired delay time.
 - (4) When your adjustment is complete, press and hold the **[F]** key for one second to save the new setting and return to normal operation.

CW Transmission

Operation using Straight Key/External Keying Device

When using a straight key, an external electronic keyer, or a computer-generated keying device, please follow the instructions in this section.

1. Insert your key's (three-conductor) plug into the rear-panel **KEY** jack.
2. Press the **MODE(◀)/MODE(▶)** key, as needed, to select the CW (CW/CWR) mode.
3. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**VOX, BK, KYR**].
4. Press the **[B](BK)** key, as needed, to activate “Semi Break-In” operation. The “◀” icon will appear at the right of the “**BK**” indicate.
5. The CW hang time can be adjusted using Menu #17 (**CW DELAY**). To adjust the CW hang time:
 - (1) Press and hold in the **[F]** key for one second to enter the Menu mode.
 - (2) Rotate the **SEL** knob to select Menu #17 (**CW DELAY**).
 - (3) Rotate the **DIAL** to select a longer or shorter delay time (default: 250 ms). This transceiver was not designed for “full QSK” operation, the minimum setting of this Menu (**CW DELAY**) will be very close to full break-in performance.

- (4) When done, press and hold the **[F]** key for one second to save the new setting and exit to normal operation.
6. To practice your CW sending, press the **[B](BK)** key to disappear the “◀” icon. Now, pressing the key will cause the CW sidetone to be heard, but your radio will not be transmitting a signal on the air.
7. You can adjust the CW sidetone volume level via Menu #44 (**SIDETONE**). To adjust the CW sidetone volume level:
 - (1) Press and hold in the **[F]** key for one second to enter the Menu mode.
 - (2) Rotate the **SEL** knob to select Menu #44 (**SIDETONE**).
 - (3) Rotate the **DIAL** to select a new level; on the arbitrary scale of “0” ~ “100,” the default value is “50.”
 - (4) When done, press and hold the **[F]** key for one second to save the new setting and exit to normal operation.
8. You also can adjust the CW sidetone pitch using Menu #20 (**CW PITCH**). This adjustment also controls the BFO offset (actual pitch of your transmitted signal relative to your current receive frequency). To adjust the CW sidetone pitch:
 - (1) Press and hold in the **[F]** key for one second to enter the Menu mode.
 - (2) Rotate the **SEL** knob to select Menu #20 (**CW PITCH**).
 - (3) Rotate the **DIAL** to select a new pitch tone/BFO offset. The available offset range is 300 ~ 1000 Hz (default value is “700 Hz”).
 - (4) When done, press and hold the **[F]** key for one second to save the new setting and exit to normal operation.

Operation using Built-in Electronic Keyer

The built-in Electronic Keyer provides a convenient method of generating CW. The Electronic Keyer includes weight and speed adjustment.

1. Connect your keyer paddle’s cable to the **KEY** jack on the rear panel of the transceiver.
2. Press the **MODE(◀)/MODE(▶)** key, as needed, to select the CW (CW/CWR) mode.
3. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**VOX, BK, KYR**].
4. Press the **[C](KYR)** key to activate the Electronic Keyer. The “◀” icon will appear at the right of the “**KTR**” indicate.
5. The Keyer speed may be adjusted using Menu #21 (**CW SPEED**). To adjust the Keyer speed:
 - (1) Press and hold in the **[F]** key for one second to enter the Menu mode.
 - (2) Rotate the **SEL** knob to select Menu #21 (**CW SPEED**).
 - (3) Press the **SEL** knob to select between “cpm” and “wpm.”
 - (4) Rotate the **DIAL** knob, while sending, to set the desired sending speed.
 - (5) When done, press and hold the **[F]** key for one second to save the new setting and exit to normal operation.
6. The CW hang time, CW sidetone volume level, and CW sidetone pitch may all be adjusted as described previously.
7. The Dot:Dash weight ratio may be adjusted via Menu #22 (**CW WEIGHT**). To adjust the Dot:Dash weight ratio:
 - (1) Press and hold in the **[F]** key for one second to enter the Menu mode.
 - (2) Rotate the **SEL** knob to select Menu #22 (**CW WEIGHT**).
 - (3) Rotate the **DIAL** knob, while sending, to set the desired weight.
 - (4) When done, press and hold the **[F]** key for one second to save the new setting and exit to normal operation.
8. You may select normal or reverse the paddle polarity via Menu #19 (**CW PADDLE**). When this feature The default setting for this feature is “**NOMAL**.” To change the paddle polarity:
 - (1) Press and hold in the **[F]** key for one second to enter the Menu mode.
 - (2) Rotate the **SEL** knob to select Menu #19 (**CW PADDLE**).
 - (3) Rotate the **DIAL** knob to select a new setting.

- (4) When done, press and hold the **[F]** key for one second to save the new setting and exit to normal operation.
9. You also can adjust the CW sidetone volume and pitch via Menu Item described previously.

FM Transmission

Basic Setup/Operation

1. Press the **MODE(◀)/MODE(▶)** key so to select the FM mode.
2. Press the microphone's **PTT** switch, and speak into the microphone in a normal voice.
3. Release the **PTT** switch to return to receive mode.
4. If you get reports that your voice is too high or too low, you may need to adjust the FM-mode microphone gain. The procedure is similar to that used on SSB:
 - (1) Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[PWR, MTR]** on the display, then press the **[B](MTR)** key to select the "Deviation" meter function (appear "**mod**" at the right side of the "**MTR**" icon.).
 - (2) Press and hold the **[F]** key for one second to enter the Menu mode.
 - (3) Rotate the **SEL** knob to recall Menu #29 (**FM MIC**).
 - (4) Close the **PTT** switch, and while speaking into the microphone rotate the **DIAL** until the proper MOD indication is achieved on voice peaks.
 - (5) When done, press and hold the **[F]** key to save the new setting for the FM-mode microphone gain.
5. The VOX feature is operational during FM transmission. From Operating Function Row **[VOX, BK, KYR]**, press the **[A](VOX)** key to activate/deactivate VOX.

Repeater Operation

1. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[RPT, REV, TON]**.
2. Press the **[A](RPT)** key to activate repeater operation. One press of the **[A](RPT)** key will have set the transceiver for "Minus Shift" operation. In this situation, you will observe the "-" indicator on the display. The transmitter frequency will be shifted down by a default value so as to access the repeater input frequency. If your repeater uses a positive shift (instead of negative), press the **[A](RPT)** key again; the "+" indicator will replace the "-" indicator on the display.
3. If the default repeater shifts is not appropriate for your area, it may be set independently for each band*. To change the repeater shifts:
 - (1) Press and hold the **[A](RPT)** key for one second. This instantly recalls Menu #42 (**RPT SHFT**).
 - (2) Rotate the **DIAL** knob to select the desired shift frequency.
 - (3) When done, press and hold the **[A](RPT)** key for one second so save the new setting and exit to normal operation.
4. Press the **[C](TON)** key to activate the CTCSS tone encoder to repeater access tone. One press of the **[C](TON)** key will activate the CTCSS tone encoder. In this situation, you will observe the "T" indicator on the display.
5. If the default repeater access tone are not appropriate for your area, it also may be set independently for each band. To change the repeater access tone:
 - (1) Press and hold the **[C](TON)** key for one second. This instantly recalls Menu #48 (**STONE FREQ**).
 - (2) Rotate the **DIAL** knob to select the desired CTCSS frequency.
 - (3) When done, press and hold the **[C](TON)** key for one second so save the new setting and exit to normal operation.
6. Set the transceiver's receiver to the repeater output (downlink) frequency.
7. Close the **PTT** switch and speak into the microphone. You will observe that the transmitted frequency has shifted according to the setting of the **[A](RPT)** key with a low level CTCSS tone.
8. Release the **PTT** switch to return to the Receive mode.

9. With repeater shift activated, you can temporarily reverse the transmit and receive frequencies by pressing the **[B](REV)** key. The “-” icon will blink while “Reverse” shift is activated. Press the **[B](REV)** key again to revert to the “Normal” shift direction.
10. When finish a repeater operation, set the repeater shift to simplex by pressing **[A](RPT)** key, and disable the CTCSS tone encoder by pressing **[C](TON)** key.
11. On many transceiver versions, the Automatic Repeater Shift (ARS) feature is enabled at the factory. This feature automatically activates the appropriate repeater shift when you are operating inside the designated 144 MHz or 430 MHz FM repeater sub-bands in your country. If you wish to change the settings for the ARS, use Menu #01 (**144 ARS**) or Menu #02 (**430 ARS**) (see page ??).

*If your local repeaters need a 1750-Hz burst tone for access (typically in Europe), press and hold the **[HOME]** key to transmit the burst tone.*

CTCSS Encoder and Tone Squelch Operation

Many repeaters require a CTCSS Encode or 1750 Hz Burst Tone in order for the repeater to be activated. The CTCSS Tone Squelch feature (CTCSS “Decoder”), moreover, allows you to monitor silently for calls on busy channels, with your receiver’s Squelch only opening up when a signal bearing the matching CTCSS tone appears on your frequency.

1. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[RPT, REV, TON]**.
2. Press and hold the **[C](TON)** key for one second to recall the Menu # 48 (**TONE FREQ**), then rotate the **DIAL** knob to select the CTCSS tone frequency, as needed. When done, press and hold the **[C](TON)** key for one second so save the new setting and exit to normal operation.
3. Press the **[C](TON)** key once to activate the Tone Encoder (the “**T**” icon will appear on the display). When you transmit, the Subaudible tone will be superimposed on your signal, allowing repeater access.
4. For CTCSS Encode/Decode operation, press the **[C](TON)** key once more; the “**TSQ**” indicator will replace the “**T**” indication on the display. The receiver will become silent, unless a station bearing a CTCSS tone matching that of your transceiver appears on frequency. When this happens, the Squelch will open and normal reception will commence.
5. Press the **[C](TON)** key once more to cancel CTCSS Tone Squelch operation (the “**TSQ**” icons will disappear).

DCS Operation

Another form of tone access control is Digital Code Squelch, or DCS. It is a newer, more advanced tone system that is less susceptible to false triggering than CTCSS. A DCS Encoder/Decoder is built into your transceiver, and operation is very similar to that just described for CTCSS.

1. Set the desired DCS code via Menu #23 (**DCS CODE**).
2. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[RPT, REV, TON]**.
3. Press the **[C](TON)** key three times to activate the DCS Encoder/Decoder (the “**DCS**” icon will appear on the display). The receiver will remain muted until a matching DCS code is received on an incoming signal.
4. Press the **[C](TON)** key once to cancel the DCS (the “**DCS**” icon will disappear).

ARTS™ (Auto Range Transpond System) Operation

The ARTS™ system uses DCS signaling to inform you when you and another ARTS-equipped station are within communications range.

1. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[SSM, SCH, ART]**.
2. Press the **[C](ART)** key to activate the ARTS.
3. Your display will change to “**out range**” to indicate the beginning of ARTS operation. Every 15 seconds, your radio will transmit a “polling” call to the other station. When that station responds with its ARTS polling signal, your display will change to “**in**”

range” to confirm his response.

4. To cancel ARTS operation, press the **[C](ART)** key again (the “**out range**” or “**in range**” will disappear from the LCD).

The ARTS feature offers a choice of beep options to alert you to the current status of ARTS operation. Check out MENU #09 (ARTS BEEP) on page 85.

CW Identifier Setup

The ARTS feature includes a CW identifier. The radio can be instructed to send “**DE (your callsign) K**” in Morse code every ten minutes during ARTS operation.

To program the CW IDer, use Menu #31 (**ID**), as described on page ?? . And to activate the CW IDer, use Menu #18 (**CW ID**).

Split Frequency Operation

This transceiver provides convenient split-frequency operation, using the VFO-A and VFO-B, for DX working and other operating situations requiring unique split frequency pairs.

The example below will describe a split-frequency DX situation on the 20-meter band, with a DX station transmitting on 14.025 MHz, listening 10 kHz higher in the band.

1. With the VFO-A set to 14.035.00 MHz CW (DX station’s listening frequency).
2. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[A/B, A=B, SPL]**.
3. Press the **[A](A/B)** key momentarily to VFO-B.
4. Tune the VFO-B frequency to 14.025.00 MHz (DX station’s transmitting frequency).
5. Press the **[C](SPL)** key momentarily. The transceiver will now transmit using the VFO-A frequency, and will receive using the VFO-B frequency. The “**S**” icon will appear on the display.
6. To listen to the pile-up calling the DX station (so as to align your frequency more closely to that of the station being worked by the DX), the VFO-B will be tuning in the vicinity of 14.035 MHz, and you can zero in on the DX station’s listening frequency by tuning in on the station in QSO with the DX.
7. Press the **[C](SPL)** key once more to cancel split operation, and the “**S**” icon will disappear from the display.

Time-Out Timer

Most often used on FM, the transmitter’s Time-Out Timer (TOT) feature disables the transmitter after a user-defined period of transmission. This feature may be useful in preventing a “stuck microphone” (accidental closure of the **PTT** switch) from causing interference to other users.

To activate the Time-Out Timer:

1. Press and hold the **[F]** key for one second to enter the Menu mode.
2. Rotate the **SEL** knob to recall Menu #49 (**TOT TIME**).
3. The default setting for this feature is “off.” Rotate the **DIAL** knob to set a new setting from 1 minute to 20 minutes.
4. When you have made your selection, press and hold the **[F]** key for one second to save the new setting and exit to normal operation.

Memory Operation

QMB Channel

QMB Channel Storage

1. Tune in the desired frequency and set the operating mode and bandwidth.
2. Press and hold the **[V/M]** key until a *double* “beep” is heard. The double beep provides audible confirmation that the data is stored into memory.

QMB Channel Recall

1. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[STO, RCL, RCL]**.
2. Press the **[B](RCL)** key momentarily to recall the QMB memory. The “**QMB**” will appear at the upper right corner on the LCD.
3. Press the **[B](RCL)** key once more to return to the previous frequency (either a VFO

frequency or a Memory channel).

Note: If you move the **DIAL** knob or **SEL** knob while in the QMB mode, you can change frequencies as if you were in a “VFO” mode. You also can change operating mode by pressing **MODE(◀)** or **MODE(▶)** key. When this is done, the “**MTQMB**” will appear in the display. Press the **[B](RCL)** key once more to return to the originally-stored QMB frequency.

Memory Operation on “Regular” Memory Channels

Normal (“Simplex”) Memory Storage

1. Tune in the desired frequency, and set the operating mode and bandwidth.
2. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**MW, MC, TAG**].
3. Press the **[A](MC)** key momentarily to enter the “Memory Check” mode, which is used to find an unused memory channel. The frequency stored (if any) on the current memory channel will be shown in the display.
4. Rotate the **SEL** knob to select the channel on which you wish to store the current frequency data.
5. Press and hold in the **[A](MC)** key for one second until you hear a double beep, which confirms that the frequency information was successfully stored.

Split-Frequency Memory Storage

You can also store “Split” frequencies, such as when operating on a repeater system not utilizing a “standard” offset. This procedure may also be used for DX work on 7 MHz SSB, etc.

1. In the VFO mode, set the desired *Receive* frequency and mode.
2. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**MW, MC, TAG**].
3. Press the **[A](MC)** key momentarily to enter the “Memory Check” mode, which is used to find an unused memory channel. The frequency stored (if any) on the current memory channel will be shown in the display.
4. Rotate the **SEL** knob to select the channel on which you wish to store the current frequency data.
5. Press and hold in the **[A](MC)** key for one second until you hear a double beep, which confirms that the *Receive* frequency data is now stored.
6. Now, set the desired *Transmit* frequency and mode.
7. Press and hold the **[A](MC)** key for one second; **do not** rotate the **SEL** knob!
8. While “memory channel number” is blinking, press and hold the **PTT** switch, again press and hold the **[A](MC)** key for one second. The double “beep” will confirm that independent *Transmit* frequency data is now stored. You may release the **PTT** switch.

Note: In step 8 above, pressing the PTT switch does not activate the transmitter. It simply sends a signal to the microprocessor that an independent Transmit frequency is being stored on the same channel as a previously-stored *Receive* frequency.

Memory Channel Recall

1. If you currently are in the VFO tuning mode, press the **[V/M]** key once to enter the “Memory” mode (“memory channel number” will appear on the display placed by “**VFOa**” or “**VFOb**”).
2. To select another memory channel, turn the **SEL** knob.
3. When your memory channels are partitioned into Memory Groups via Memu Item #34, to change Memory Groups; press the **SEL** knob momentarily (a Group Number (“a” ~ “j”) will blinks), then turn the **SEL** knob to step through the channels until you enter another. You may now press the **SEL** knob once more to restrict memory channel access to the newly- selected Group.
4. Once you are operating on a memory channel, you may tune off of the originally-memorized frequency (as though you were in the VFO mode). Just rotate the **DIAL** knob; the “Memory Channel Number” will be replaced by one which indicates “**MTUNE**,” indicating that you have now shifted into the “Memory Tuning” mode. When operating the Memory Tuning mode, if you find another frequency you wish to store into another

memory channel, just press the **[A](MC)** key momentarily, select a new memory channel via the **SEL** knob, then press and hold the **[A](MC)** key until you hear the double beep.

5. To exit the Memory Tuning mode, press the **[V/M]** key as follows:
 - One touch of the **[V/M]** key returns you to the original memory frequency.
 - A second touch of the **[V/M]** key will cause you to exit the Memory mode and return to the VFO mode (the “memory channel number” will be replaced by “**VFOa**” or “**VFOb**”).

Note: When operating on a “Split” frequency memory, the “+,-” indication will appear on the LCD.

Memory Operation on “HOME” Channel Memory

Four Special one-touch “Home” channels are available, for special frequencies you use often. Either “simplex” or “split” frequency/mode data may be stored in the “Home” channel locations. Special “Home” channels are available for HF (any frequency between 1.8 and 29.7 MHz), 50 MHz, 144 MHz, and 430 MHz.

These memories may prove particularly useful for monitoring propagation beacons, providing one-touch recall of the beacon frequency for quick checks of band condition.

HOME Channel Storage

1. Tune the desired frequency, and set the operating mode.
2. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[MW, MC, TAG]**.
3. Press the **[A](MW)** key momentarily to enter the “Memory Check” mode.
4. Press and hold the **[HOME]** key for one second. This stores the frequency data into the “Home” channel location.
5. If you wish to store a “Split” frequency pair into the “Home” channel, store the *Receive* frequency in steps 1 ~ 4 above. Now set the desired *Transmit* frequency.
6. Once more, press the **[A](MW)** key momentarily.
7. Press and hold the microphone’s **PTT** switch; while holding the **PTT** switch, again press and hold the **[HOME]** key for one second. This stores the transmit frequency data into the “Home” channel location.

HOME Channel Recall

1. Press the **[HOME]** key momentarily to recall the Home Channel on the band group where you currently are operating (HF, 50 MHz, 144 MHz, or 430 MHz). The “**HOME**” will appear on the display.
2. Press the **[HOME]** key once more to return to the previously-used frequency (either a VFO frequency or a memory channel).

Memory Mode Accessory

Labeling Memory

You may wish to append an alpha-numeric “Tag” (label) to a memory or memories, to aid in recollection of the channel’s intended use (such as a club name, etc.). This is easily accomplished using the Menu mode.

1. Recall the memory channel onto which you wish to append a label.
2. Press and hold the **[F]** key for one second to enter the Menu mode.
3. Rotate the **SEL** knob to recall Menu #35 (**MEM TAG**).
4. Press the **SEL** knob to enable the programming of the label.
5. Rotate the **DIAL** knob to select the first character (number, letter, or symbol) in the name you wish to store, then rotate the **SEL** knob clockwise to move to the next character.
6. Again rotate the **DIAL** knob to select the next number, letter, or symbol, then rotate the **SEL** knob clockwise to move to the next character’s slot.
7. Repeat step 6 as many times as necessary to complete the name tag for the memory, then press and hold the **[F]** key for one second to save the A/N (Alpha-Numeric) name entry and exit to normal operation.

During “MR” (Memory Recall) operation, press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[MW, MC, TAG]**. Press the **[C](TAG)** key

momentarily to activate the alpha-numeric Tag. Repeatedly press this key will toggle operation between “Frequency” display and “Tag” display.

Note: You can recall the Menu #35 (**MEM TAG**) instantly by press and hold the [**C**](**TAG**) key for one second.

Spectrum Scope Operation

The Spectrum Scope allows viewing of operating activity on 5 channels above and 5 channels below the current operating channel in the VFO mode.

The display indicates the relative signal strength on channels immediately adjacent to the current operating frequency.

Two basic operating modes for Spectrum Scope are available:

CONT: In this mode, the transceiver sweeps the current band repeatedly until the Spectrum Scope is turned off.

CHK: In this mode, the transceiver sweeps the current band one cycle every 10 seconds.

Setting the Spectrum Scope Mode

1. Press and hold the [**F**] key for one second to enter the Menu mode
2. Rotate the **SEL** knob to select Menu #43 (**SCOPE**).
3. Rotate the **DIAL** to select the desired sweep mode (see above).
4. When you have made your selection, press and hold the [**F**] key for one second to save the new setting and exit to normal operation.

Activate the Spectrum Scope

1. Set the transceiver to the VFO mode in the desired band.
2. Press the [**F**] key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**SSM, SCH, ART**].
3. Press the [**A**](**SSM**) key momentarily to start the Spectrum Scope.
4. When the Spectrum Scope is in operation, the relative signal strength of stations on channels immediately adjacent to the current frequency will be indicated on the display.
5. To disable the Spectrum Scope, press the [**A**](**SSM**) key once more.

Note: The receiver’s audio output and S-meter are disabled when using the Spectrum Scope.

Smart Search Operation

The Smart Search™ feature automatically stores frequencies where activity is encountered on the current band. When Smart Search™ is engaged, the transceiver quickly searches above your current frequency, storing active frequencies as it goes (without stopping on them even momentarily). These frequencies are stored in a special Smart Search™ memory bank, consisting of 50 memories. This feature available on the FM and AM modes. This feature is especially helpful when traveling, as you can instantly store active FM repeater frequencies without having to look up the frequencies in a reference book.

1. Set the **SQL** knob to the point where background noise is silenced. A typical setting, for effective Smart Search™ operation, will be at 12 o’clock or slightly clockwise from this position.
2. Set the VFO frequency on which you wish to begin the search (the Smart Search™ feature is available on the VFO mode only).
3. Press the [**F**] key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**SSM, SCH, ART**].
4. Now press the [**B**](**SCH**) key momentarily, the blinking “SRCH” appear on the LCD and the transceiver will sweep upward on the current band, loading channels on which it encounters a signal strong enough to open the squelch.
5. All channels where activity is present (up to 50 channels) will be loaded into the Smart Search™ memories. Whether or not all 50 memories are filled, the search will stop after one sweep.
6. Now you can turn the **SEL** knob to select the Smart Search™ memories.
7. To disable Smart Search™ operation, press the [**B**](**SCH**) key momentarily.

Note: These memories are so-called “soft” memories; they will be lost if you initiate a new Smart Search™ sweep of the band.

Scanning Operation

This transceiver contains a wide variety of scanning capabilities. Whether you are in the VFO mode or one of the memory modes, scanning operation is fundamentally identical in all configurations, but with the following differences:

- In the VFO mode, scanning causes the transceiver to sweep up or down the band, pausing or halting on any signal encountered;
- In the Memory mode, the scanner will scan the programmed memories, and can be instructed to skip certain memories during scanning;
- In the Programmable Memory Scan (PMS) mode, the scanner will scan the band within user-programmed frequency limits.

Scanning Operation

1. Set the **SQL** knob to the point where background noise is silenced. A typical setting, for effective scanning operation, will be at 12 o'clock or slightly clockwise from this position.
2. Set the transceiver into the operating configuration in which you wish to scan (VFO or Memory: PMS describe later).
8. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[SCN, PRI, DW]**.
3. Press the **[A](SCN)** key momentarily to start upward scan (toward higher frequencies or higher memory channel numbers).
*You may also press and hold in either the **[UP]** or **[DWN]** key on the microphone for ½ second to initiate upward or downward scanning, respectively, if Menu #37 (MIN SCAN) set to “ON.”*
4. Rotate the **DIAL** knob counterclockwise to toggle the scanning direction downward.
5. The scanner will now cause the transceiver to increment in the chosen direction until a signal is detected. When a signal is encountered which opens the Squelch, the scanner will pause until the signal disappears (at the end of the other station's transmission), at which point the scanner will resume. While the transceiver is in the “Pause” condition, the decimal points in the frequency display area will blink. See “Scan-Resume Choices” on page ?? for details of how to customize the resumption of scanning.
6. Press the **PTT** switch on the microphone to cancel scanning.

Scan Skip Programming (Memory Mode Only)

Among the memories you have programmed, there may be some stations which you do not wish to scan. For example, weather broadcasts (which are transmitted continuously) will cause the scanner to stop, and such channels may be skipped so as to avoid this inconvenience.

To remove a channel from the scanning loop:

1. Press the **[F]** key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row **[MW, MC, TAG]**.
2. Recall the memory channel to be skipped.
3. Press the **[B](MC)** key momentarily. The “hyphen” in the memory channel number changes to “dot”; this shows that this channel is now not included in the scanning loop.
4. Repeat steps 2 and 3 as many times as necessary to skip all the channels you do not wish to scan.
5. Initiate memory scanning, you will observe that the channels you marked to be skipped are not included in the scanning loop.
6. Press the **PTT** switch to stop the scan; you may now use the **SEL** knob to step through the channels manually - one at a time - and you will observe that the “Skipped” channels are, nonetheless, available for recall by manual means.
7. You may restore a previously-skipped channel to the scanning loop by selecting the channel manually, then pressing the **[B](MC)** key momentarily so that the “dot” changes

to “hyphen.”

Programmable Memory Scan (PMS) Operation

To limit scanning (or tuning) within a particular frequency range, you can use the Programmable Memory Scanning (PMS) feature, which utilizes special-purpose memory pair (“**M-PL**” and “**M-PU**”). The PMS feature is especially useful in helping you to observe any operating sub-band limits which apply to your Amateur license class.

PMS setup is simple to complete;

1. Store the upper and lower frequency limits of the range in a PMS memory pair (“**M-PL**” and “**M-PU**”).
2. Press the [**F**] key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**STO, RCL, PMS**].
3. Press the [**C**](**PMS**) momentarily, appear “**PMS**” at the upper left corner on the LCD and activate PMS feature. Tuning and scanning are now within the limits of the selected PMS memory pair, keeping operation inside this programmed range.

Example: Limit tuning & scanning to the 17-m band

1. Press the [**V/M**] key, as necessary, to recall the VFO mode. Tune to the low edge of the 17-m band (18.068 MHz) and select the desired mode (probably USB or CW).
2. Press the [**F**] key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**MW, MC, TAG**].
3. Press the [**A**](**MW**) key momentarily, then turn the **SEL** knob to select memory channel “**MRPL**.”
4. Press and hold the [**A**](**MW**) key for one second to write the VFO frequency (18.068 MHz) into “**MRPL**.”
5. Tune to the high edge of the 17-m band (18.168 MHz), leaving the mode unchanged.
6. Press the [**A**](**MW**) key momentarily, then turn the **SELECT** knob to select the memory channel “**MRPU**.”
7. Press and hold the [**A**](**MW**) key for one second to write the VFO frequency (18.168 MHz) into “**MRPU**.”
8. Press the [**F**] key momentarily, then rotate the **SEL** knob one click clockwise to recall Operating Function Row [**STO, RCL, PMS**].
9. Press the [**C**](**PMS**) key momentarily. Tuning and scanning are now limited to the 18.068 ~ 18.168-MHz range until you press the [**V/M**] key to return to memory or VFO operation.

Scan-Resume Choices

Scanning operation requires that you have the transceiver’s audio squelched. The transceiver then “assumes” that the opening of the squelch corresponds to the discovery of a signal you may wish to listen to.

Once the scan has been halted, the transceiver pauses on the signal and stays locked on its frequency for five seconds. Thereafter, scanning will resume whether or not the other station’s transmission has ended. The scan resume interval (default: five second) can be select from 3/5/10 seconds and off (continuously halted; To re-start the scanner press the [**A**](**SCN**) key twice) via Menu #41 (**RESUME**) see page ??.

Dual Watch Operation

Dual Watch is similar, in some respects, to scanning. In Dual Watch, however, the transceiver monitors (squelched) on the VFO-A frequency while periodically checking VFO-B for activity (or vice-versa). A typical example might be for you to set VFO-A to 50.110 MHz, watching for DX stations who might call CQ on that frequency, while periodically checking 28.885 MHz for stations reporting band openings on 6 meters.

To activate Dual Watch:

1. Set up transmit and receive operation on VFO-A, establishing your primary monitoring frequency. Set up the frequency to be checked periodically on VFO-B.
2. Recall VFO-A, then rotate the **SQL** control until the background noise is just silenced.
3. Press the [**F**] key momentarily, then rotate the **SEL** knob, as needed, until Operating Function Row [**SCN, PRI, DW**].

4. Press the **[C](DW)** key momentarily to activate Dual Watch operation (the “**DW**” icon will appear at the bottom left corner on the LCD).
5. The transceiver will continue to monitor (squelched) on the current (VFO-A) frequency, but every five seconds will switch briefly to VFO-B frequency, looking for activity.
6. If a station is detected on the VFO-B frequency, the transceiver will pause on the VFO-B frequency (blink the decimal points).
7. Press the **[C](DW)** key again to cancel Dual Watch operation (“**DW**” icon will disappear). Note that pressing the **PTT** switch on the microphone does not cancel Dual Watch operation.

Menu Operation

The Menu System allows you to customize a wide variety of transceiver performance aspects and operating characteristics.

Menu Selections

1. Press and hold the **[F]** key for one second. The Menu Item number and a brief title for the Menu Item will appear in the display.
2. Rotate the **SEL** knob to select the Menu Item you wish to work on.
3. When you have chosen the desired Menu Item number, rotate the **DIAL** knob to change the value or condition for the Menu Item.
Press the **[HOME]** key momentarily, reset its setting to the default
4. When you have made your selection, press and hold the **[F]** key for one second to save the new setting and exit to the normal operation.

Menu Item 01 [144 ARS]

Function: Activate/deactivate the Automatic Repeater Shift when operating on the 144 MHz band.

Available Values: OFF/ON

Default: ON (depends on transceiver version)

Menu Item 02 [430 ARS]

Function: Activate/deactivate the Automatic Repeater Shift when operating on the 430 MHz band.

Available Values: OFF/ON

Default: ON (depends on transceiver version)

Menu Item 03 [9600 MIC]

Function: Adjust the audio input level from the TNC during 9600 bps Packet operation.

Available Values: 0 ~ 100

Default: 50

Menu Item 04 [AM&FM DL]

Function: Enabling/disabling the **DIAL** knob on the AM and FM mode.

Available Values: ENABLE/DISABLE

Default: DISABLE

Menu Item 05 [AM MIC]

Function: Adjust the microphone gain level for the AM mode.

Available Values: 0 ~ 100

Default: 50

Menu Item 06 [AM STEP]

Function: Select the tuning step for the **SEL** knob on the AM mode.

Available Values: 2.5/5/9/10/12.5/25kHz

Default: 5 kHz (depends on transceiver version)

Menu Item 07 [ANTENNA]

Function: Select the antenna connector to be used on operating band.

Available Values: FRONT/REAR

Default: HF: REAR, 50/144/430 MHz: FRONT

Menu Item 08 [APO TIME]

Function: Select the Auto Power Off time (time before power goes off).

Available Values: OFF/1h ~ 6h

Default: OFF

Menu Item 09 [ARTS BEEP]

Function: Select the ARTS beep mode.

Available Values: OFF/RANGE/ALL

Default: RANGE

OFF: No alert beeps sound; you must look at the display to determine current ARTS status.

RANGE: A high tone beep will sound when the transceiver first detects that you are within range, and a low beep will sound when the other station goes out of range.

ALL: A high tone beep will sound every time a polling transmission is received from the other station, and a low beep will sound *once* when the other station goes out of range.

Menu Item 10 [BACKLIGHT]

Function: Select the LCD lamp mode.

Available Values: OFF/ON/AUTO

Default: AUTO

OFF: Disable the LCD lamp.

ON: Illuminates the LCD lamp continuously.

AUTO: Illuminates the LCD lamp for five second when any key is pressed.

Menu Item 11 [BATT-CHG]

Function: Select the battery charging time.

Available Values: 6/8/10 h

Default: 10 h

Menu Item 12 [BEEP FREQ]

Function: Select the beep frequency

Available Values: 440/880 Hz

Default: 880 Hz

Menu Item 13 [BEEP VOL]

Function: Select the beep volume

Available Values: 0 ~ 100

Default: 50

Menu Item 14 [CAT RATE]

Function: Set the transceiver's circuitry for the CAT baud rate to be used.

Available Values: 4800/9600/38400 bps

Default: 4800 bps

Menu Item 15 [COLOR]

Function: Select the illumination color for the LCD backlight.

Available Values: COLOR1(Blue)/COLOR2(Amber)

Default: COLOR2(Amber)

Menu Item 16 [CONTRAST]

Function: Setting of the display contrast level.

Available Values: 1 ~ 12

Default: 5

Menu Item 17 [CW DELAY]

Function: Set the receiver recovery time during pseudo-VOX CW semi-break-in operation.

Available Values: 10 ~ 500 msec

Default: 250 msec

The recover time may be adjusted in steps of 10 msec. A longer delay may be preferable if you pause frequently while sending.

Menu Item 18 [CW ID]

Function: Enables/disables the CW identifier during ARTS operation.

Available Values: OFF/ON

Default: OFF

Menu Item 19 [CW PADDLE]

Function: Select the keyer paddle operating mode.

Available Values: NORMAL/REVERSE

Default: NORMAL

NORMAL: Keyer paddle polarity is normal. The "dot" paddle produces dots and the "dash" paddle produces dashes.

REVERSE: Keyer paddle polarity is inverted. The "dot" paddle produces dashes and the "dash" paddle produces dots.

Menu Item 20 [CW PITCH]

Function: Setting of the pitch of the CW sidetone, BFO offset, and CW filter center frequencies.

Available Values: 300 ~ 1000 Hz

Default: 700 Hz

The CW pitch may be adjusted in steps of 50 Hz.

Menu Item 21 [CW SPEED]

Function: Set the sending speed for the built-in Electronic keyer.

Available Values: 4wpm ~ 60 wpm/20cpm ~ 300 cpm

Default: 12wpm(60cpm)

This transceiver can be set the sending speed by two units (wpm: word per minutes or cpm: character per minutes), but does not independently.

To switch the units between “wpm” and “cpm,” just press the **SEL** knob

Menu Item 22 [CW WEIGHT]

Function: Set the Dot:Dash ratio for the built-in electronic keyer.

Available Values: 1:2.5 ~ 1:4.5

Default: 1:3.0

Menu Item 23 [DCS CODE]

Function: Setting the DCS code.

Available Values: 104 Standard DCS codes

Default: 023

Menu Item 24 [DIG DISP]

Function: Define the displayed frequency offset during DIG (USER-L or USER-U) mode operation

Available Values: -3000 ~ +3000 Hz

Default: 0 Hz

Menu Item 25 [DIG MIC]

Function: Adjust the audio input level from the equipment (such as TU or PSK-31 sound board) during DIG mode operation

Available Values: 0 ~ 100

Default: 50

Menu Item 26 [DIG MODE]

Function: Select the mode and sideband (if applicable) in the DIG mode.

Available Values: RTTY/PSK31-L/PSK31-U/USER-L/USER-U

Default: RTTY

RTTY: AFSK RTTY operation on the LSB mode

PSK31-L: PSK-31 operation on the LSB mode

PSK31-U: PSK-31 operation on the USB mode

USER-L: User-programmed costume operation based on LSB mode

USER-U: User-programmed costume operation based on USB mode

In the USER-L and USER-U modes, determine the display frequency offset and carrier frequency offset by menu Item #24 (**DIG DISP**) and #27 (**DIG SHIFT**).

Menu Item 27 [DIG SHIFT]

Function: Define the carrier frequency offset during DIG (USER-L or USER-U) mode operation

Available Values: -3000 ~ +3000 Hz

Default: 0 Hz

Menu Item 28 [EMERGENCY]: USA Version only

Function: Enable Tx/Rx operation on the Alaska Emergency Channel, 5167.5 kHz.

Available Values: OFF/ON

Default: OFF

When this Menu Item is set to “ON,” the spot frequency of 5167.5 kHz will be enabled. To get to this frequency, use the **SEL** knob to navigate; the Alaska Emergency Channel will be found between the Memory channel “**M-PU**” and “**M-001**.”

Note: Use of this frequency is restricted to amateurs operating in (or within 92.6 km of) the U.S. State of Alaska, and it is to be used for emergency communications only (involving the immediate protection of life or property).

Menu Item 29 [FM MIC]

Function: Adjust the microphone gain level for the FM mode.

Available Values: 0 ~ 100

Default: 50

Menu Item 30 [FM STEP]

Function: Select the tuning step for the **SEL** knob on the FM mode.

Available Values: 5/6.25/10/12.5/15/20/25/50 kHz

Default: 5 kHz (depends on operating band and transceiver version)

Menu Item 31 [ID]

Function: Store the CE identifier callsign. Up to eight characters may be stored. The storage procedure is as follows:

1. Press the **SEL** knob momentarily to initiate callsign storing (appear the under bar on the first character of the callsign).
2. Rotate the **DIAL** knob to select the first letter/number of your callsign, then rotate the **SEL** knob one click clockwise to save the first letter/number and move to the next entry position.
3. Repeat the previous step as necessary to complete your callsign.
4. Press the **SEL** knob to save your completed callsign and exit.

Default: YAESU

Menu Item 32 [LOCK MODE]

Function: Select the operation of the front panel's [**LOCK**] key

Available Values: DIAL/FREQ./PANEL

Default: DIAL

DIAL: Lock **DIAL** knob only

FREQ.: Locks front panel keys and knobs which is regarding the frequency controls (such as **BAND(DWN)/BAND(UP)** key, [**A**](**A/B**) key. Etc.).

PANEL: Locks all front keys and knobs (except [**PWR**] key and [**LOCK**] key)

Menu Item 33 [MAIN STEP]

Function: Setting pd **DIAL** speed.

Available Values: FINE/COARSE

Default: FINE

You may choose between two speeds for the **DIAL** knob. Selecting "COARSE" cuts the tuning rate in half compared to the default value.

Menu Item 34 [MEM GROUP]

Function: Enable/disable the memory group feature

Available Values: OFF/ON

Default: OFF

When this Menu Item is set to "ON," the 200 "standard" memory channels are partitioned into ten Memory Groups, each holding up to 20 memory channels.

Menu Item 35 [MEM TAG]

Function: Store Alpha-Numeric "Tags" for the memory channels.

Up to eight characters may be stored. The storage procedure is as follows:

1. Recall the memory channel on which you wish to append a label.
2. Recall this Menu Item (Menu #35 [**MEM TAG**]).
3. Press the **SEL** knob momentarily to initiate callsign storing (appear the under bar on the first character of the callsign).
4. Rotate the **DIAL** knob to select the first character (number, letter, or symbol) in the name you wish to store, then rotate the **SEL** knob clockwise to move to the next character.
5. Again rotate the **DIAL** knob to select the next number, letter, or symbol, then rotate the **SEL** knob clockwise to move to the next character's slot.
6. Repeat step 5 as many times as necessary to complete the name tag for the memory
7. Press the **SEL** knob to save the A/N (Alpha-Numeric) name and exit.

Menu Item 36 [MIC KEY]

Function: Enable/disable the CW keying by the microphone's [**UP**]/[**DWN**] keys.

Available Values: OFF/ON

Default: OFF

When this Menu Item is set to "ON," press the microphone's [**UP**] key to send a "dot," and press the microphone's [**DWN**] key to send a "dash" while built-in electronic keyer operation.

Menu Item 37 [MIC SCAN]

Function: Enable/disable the scanner by the microphone's [**UP**]/[**DWN**] keys.

Available Values: OFF/ON

Default: ON

Menu Item 38 [OP FILTER]

Function: Enable the CW signal path via the optional CW-N filter or enable the AM signal path via the optional AM filter.

Available Values: OFF/SSB/CW

Default: OFF

When the optional filter is installed, this Menu Item set to the corresponding value.

Menu Item 39 [PKT MIC]

Function: Adjust the audio input level from the TNC during 1200 bps Packet operation.

Available Values: 0 ~ 100

Default: 50

Menu Item 40 [PKT RATE]

Function: Set the transceiver's circuitry for the Packet baud rate to be used.

Available Values: 1200/9600 bps

Default: 1200 bps

Menu Item 41 [RESUME]

Function: Set the delay time for scanner.

Available Values: OFF/3/5/10 sec

Default: 5 sec

When this Menu Item set to "OFF," the scanner stops continuously until press again the SCAN key.

Menu Item 42 [RPT SHIFT]

Function: Set the magnitude of the Repeater Shift.

Available Values: 0 ~ 99.99 MHz

Default: Depends on transceiver version

Menu Item 43 [SCOPE]

Function: Select the Spectrum Scope mode.

Available Values: CONT/CHK

Default: CONT

CONT: The Spectrum Scope sweeps continuously.

CHK: The Spectrum Scope sweeps one cycle every 10 seconds.

Menu Item 44 [SIDETONE]

Function: Adjust the CW sidetone volume level.

Available Values: 0 ~ 100

Default: 50

Menu Item 45 [SQL/RF-G]

Function: Select the operation of the front panel's SQL/RF knob.

Available Values: RF-GAIN/SQL

Default: Depends on transceiver version

Menu Item 46 [SSB MIC]

Function: Adjust the microphone gain level for the SSB mode.

Available Values: 0 ~ 100

Default: 50

Menu Item 47 [SSB STEP]

Function: Select the tuning step for the SEL knob on the SSB mode.

Available Values: 1/2.5/5 kHz

Default: 2.5 kHz

Menu Item 48 [TONE FREQ]

Function: Setting the CTCSS Tone Frequency.

Available Values: 50 Standard CTCSS tones

Default: 88.5 Hz

Menu Item 49 [TOT TIME]

Function: Select the Automatic Power Off time (time before power goes off).

Available Values: OFF/1 ~ 20 min

Default: OFF

Menu Item 50 [VOX DELAY]

Function: Set the "hang tome" for the VOX circuitly.

Available Values: 100 ~ 2500 msec

Default: 500 msec

Menu Item 51 [VOX GAIN]

Function: Set the gain of the VOX circuitry's input audio detector.

Available Values: 1 ~ 100

Default: 50

Menu Item 52 [EXTEND]

Function: Enable/disable the extended Menu Item.

Available Values: OFF/ON

Default: OFF

Menu Item 53 [DCS INV]

Function: Select "Normal" or "Inverted" DCS code.

Available Values: Tn-Rn/Tn-Riv/Tiv-Rn/Tiv-Riv

Default: Tn-Rn

Menu Item 54 [R LSB CAR]

Function: Set the Rx Carrier Point for LSB

Available Values: -300 ~ +300 Hz

Default: 0 Hz

Menu Item 55 [R USB CAR]

Function: Set the Rx Carrier Point for USB

Available Values: -300 ~ +300 Hz

Default: 0 Hz

Menu Item 56 [T LSB CAR]

Function: Set the Tx Carrier Point for LSB

Available Values: -300 ~ +300 Hz

Default: 0 Hz

Menu Item 57 [T USB CAR]

Function: Set the Tx Carrier Point for USB

Available Values: -300 ~ +300 Hz

Default: 0 Hz