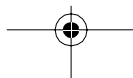
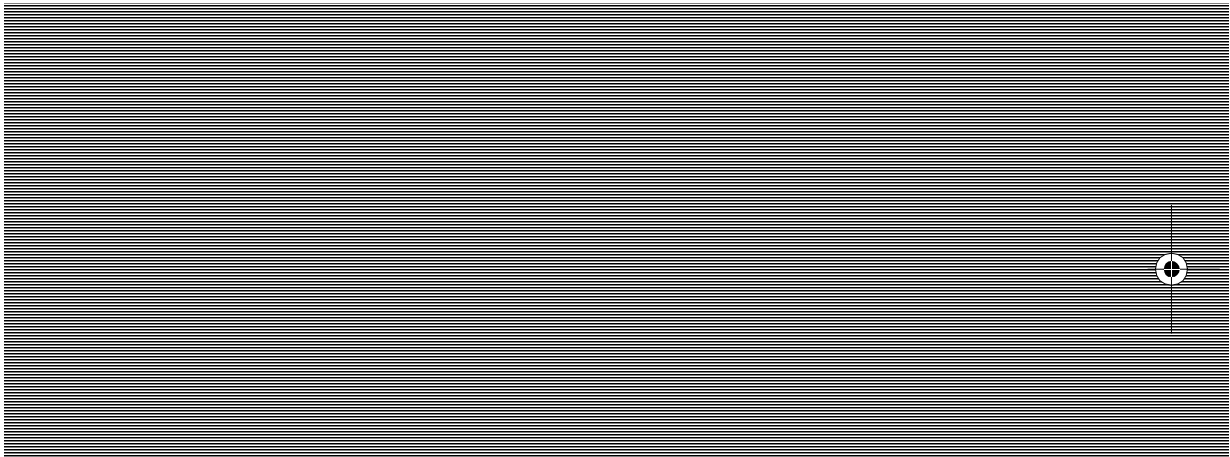


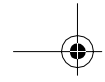


Cat. No. 19-1125  
OWNER'S MANUAL

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HTX-212 Two-Meter Mobile Transceiver  
Please read before using this transceiver.





## INTRODUCTION

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Your HTX-212 Two-Meter Mobile Transceiver is an exciting addition to Radio Shack's growing line of high-quality amateur radio equipment. It offers some of the most advanced, and most requested, features available in a mobile transceiver. Be sure to read this entire manual to understand how to use all the radio's features.

!

You must have a Technician Class or higher Amateur Radio Operator's License and a call sign issued by the FCC to legally transmit using this transceiver. Transmitting without a license carries heavy penalties. Getting a license is easier than ever.

## FEATURES

High (45 Watts) and Low (10 Watts) Power Settings—let you select the best power setting for effective communications.

True FM Modulation—provides a clear, natural-sounding signal.

31 Memory Channels—hold one calling frequency and 30 standard frequencies.

Priority Memory Channel 1—lets you set the HTX-212 to periodically check the frequency stored in Memory Channel 1 and alert you if there is activity on it.

Individually Programmable Repeater Offsets—let you program different repeater offset frequencies for each memory, and a default repeater offset for manually-tuned frequencies.

Subaudible Tone Transmit and Receive (CTCSS)—transmits the subaudible tones required to use some repeaters, and also lets you set a subaudible tone that your transceiver must receive to open squelch.

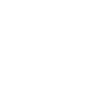
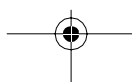
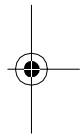
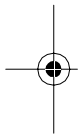
DTMF Page with Group Calling—lets you set a sequence of up to seven DTMF tones that your transceiver must receive to sound an alert tone and open squelch.

DTMF Transmit and Memory—lets you manually send DTMF tones or send DTMF sequences of up to 15 digits each from one of six DTMF memories to quickly access DTMF-access repeaters, autopatches, or other stations equipped with a DTMF page feature.

Programmable Frequency Step—lets you set the frequency step for tuning or scanning to 5, 10, 12.5, 20, 25, 50, or 100 kHz.

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**Extended Band Coverage**—receives from 136 to 174 MHz and lets you extend transmit coverage to include 2-Meter ham, MARS (Military Amateur Radio Service), and CAP (Civil Air Patrol).

**Dual VFO (Variable-Frequency Oscillator) and Duplex Modes**—two independent VFOs let you quickly select between two directly-entered frequencies. You can also use one of the VFOs as a repeater input frequency and the other as a repeater output frequency for odd-split repeaters.

#### USING THIS MANUAL

To make this manual as easy to use as possible, we give you several ways to find information.

**Contents**—lists all sections in the order they appear in the manual.

**Understanding the Display**—lists all display indicators and gives a brief explanation and the sections where the indicator is fully explained.

**Using the Menu**—lists the options in the configuration menu and gives the page numbers where the options are discussed.

**Quick Reference Card**—gives brief instructions for most functions.

**Type Conventions**—make the references to keys and displays easier to find in the text:

- Keys are bold. For example, VFO.
- When a key has more than one marking (for example, DTMF and ALM refer to the same key), we refer to the key by the name appropriate to the task.
- Where you are instructed to press two keys at once, the keys are separated by a + symbol. For example, F+DTMF.
- Text and symbols that appear on the transceiver's display appear in a special typeface. For example, 144.940.

Important notes in this manual have a large exclamation mark (!) in the margin. Warnings and cautions you should follow to prevent injury to a person or damage to the transceiver have a large lightning bolt (⚡) in the margin.

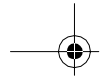
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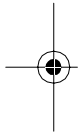
## INSTALLATION

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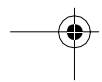
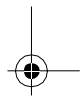
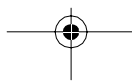
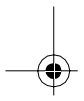
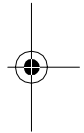
### UNPACKING THE TRANSCEIVER

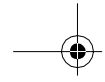
As you unpack the transceiver, check to be sure you have all the items shown in this illustration.



### CONNECTING THE MICROPHONE

Plug the microphone's connector into the microphone jack and clip the microphone to the holder.





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## MOUNTING THE HTX-212 IN A VEHICLE

When you select a mounting location for the HTX-212, be sure:

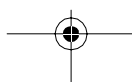
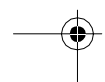
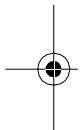
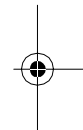
- You can easily reach it
- No wires or cables will interfere with the vehicle's operation
- It is not directly in front of heating vents
- All wires will reach their connection points

### Cautions:



- Install the transceiver only in a vehicle that has a 12-volt, negative-ground electrical system.
- To avoid damaging your vehicle's electronic systems, contact your vehicle's manufacturer before you install the HTX-212 to find out about the proper transceiver mounting locations, antenna locations, and power and antenna cable routing guidelines.
- Do not apply power to the transceiver until after you properly mount and connect an antenna.

Use the supplied screws, metal washers, bracket, rubber washers, and mounting knobs, as shown, to mount the transceiver.



---

## CONNECTING AN ANTENNA

You can connect a variety of antennas for both mobile and base-station use (see "Using the HTX-212 as a Base Station" on Page 10). Each type of antenna has its benefits. Choose the one that best meets your needs.

When deciding on a mobile or base-station antenna and its location, consider the following:

- The antenna should be as high as possible on your vehicle or house.
- The antenna and antenna cable should be as far away as possible from sources of electrical noise (ignition systems, power cables, and so on).
- The antenna should be vertical.
- The antenna should have an SWR of less than 1.5:1. SWRs of 1.8:1 or greater can prevent the HTX-212 from performing to its specified ratings.

After you select an antenna, follow its mounting instructions. Then route the antenna cable from the antenna to the HTX-212 and connect it to the antenna connector.

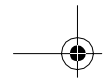
Connect the antenna to your HTX-212 using RG-8U coaxial cable or other 50-ohm cable. The cable should end in a PL-239 connector.

### Cautions:



- To prevent damage to your HTX-212, you must connect an antenna to it before you operate it.
- Do not run the cable over sharp edges or moving parts that might damage the cable.
- Do not run the cable through the engine compartment or other areas that produce extreme heat.
- Check with your vehicle manufacturer for antenna cable routing guidelines.





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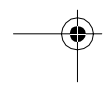
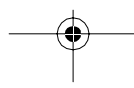
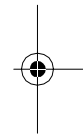
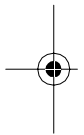
## CONNECTING TO YOUR VEHICLE'S POWER

Follow these steps to power the HTX-212 in your vehicle.

1. Connect the black wire to your vehicle battery's negative (-) terminal or to a metal part of the vehicle's frame. Be sure the metal part is not insulated from the vehicle's frame by a plastic part.
2. Connect the red wire to a source of voltage that turns on and off with the ignition and that can handle the transceiver's 10-amp maximum power draw.

Or, if you do not want the HTX-212 to turn on and off with your vehicle's ignition, connect the red wire directly to the battery's positive (+) terminal.

Note: You might need to connect the red wire directly to the battery if you experience ignition noise.



---

## USING THE HTX-212 AS A BASE STATION

Although we designed the HTX-212 primarily for use as a mobile transceiver, you can also use it as a base station. To do so, you need these items:

- 13.8-Volt DC regulated power supply that can supply at least 10 amps continuous power
- Base station antenna
- 50-ohm coaxial antenna cable and connectors

Follow these steps to connect the HTX-212 as a base station.

1. Mount the base station antenna according to its instructions.



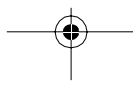
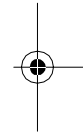
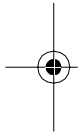
Warning: For your safety, follow all cautions and warnings included with the base station antenna.

2. Connect the antenna cable to the antenna jack on the back of the HTX-212.
3. Connect the black power wire to the power supply's negative (-) terminal.
4. Connect the red power wire to the power supply's positive (+) terminal.
5. Connect the power supply to a source of power.



### USING THE HTX-212 WITH PACKET RADIO

You can connect your HTX-212 directly to a packet radio terminal node controller, as shown below.





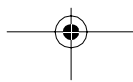
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### CONNECTING AN EXTERNAL SPEAKER (OPTIONAL)

You can connect an external speaker to your HTX-212.

Use an 8-Ohm communications or PA speaker that can handle 5 or more watts of power (such as Radio Shack Cat. No. 21-549). The speaker's cable must end in a 1/8-inch plug. Simply plug the speaker cable into the HTX-212's EXT. SP jack.

If your vehicle has a cassette player, you can easily connect your transceiver to your vehicle's audio system using a CD-to-cassette adapter and a mono-to-stereo audio plug. Simply connect the adapter as shown.



## UNDERSTANDING THE HTX-212

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This section explains some of the HTX-212's features. See "Basic Operation" which starts on Page 17 for instructions about how to use these features.

### DUAL VFO MODES

The VFO (Variable-Frequency Oscillator) modes let you directly select a frequency anywhere within the HTX-212's operating range. Your HTX-212 has two VFOs: VFO-A and VFO-B. You typically use the VFOs to tune to frequencies you have not stored into one of the HTX-212's memory channels (see "Memory Channels" on Page 14).

A related feature of the HTX-212 lets you transmit on the frequency selected with one VFO and receive on the frequency selected with the other VFO. (See "Using the Dual VFOs for Duplex Operation" on Page 27.)

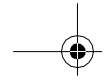
### DTMF (TOUCH-TONE) FEATURES

DTMF (Dual-Tone, Multiple Frequency) is another term for touch-tones (the tones a telephone produces when you press a digit). This standard set of tones is used by many different amateur radio systems for accessing programmable features and dialing through autopatches.

Your HTX-212 produces all 16 standard DTMF tones (0-9, Q, #, A, B, C, and D). It has six DTMF memories which can each hold up to 15 digits for quick transmission. You can also set the HTX-212 to listen for a specific set of DTMF tones, and alert you when it detects them (this feature is called DTMF Paging). Until it hears the sequence, the HTX-212 does not pass any transmissions to the speaker.

Group Calling lets you DTMF page a single person or an entire group of people. To use group calling, every person in the group selects the same first three digits as their DTMF page sequence. They then select up to four additional digits unique to each person. To page an individual, you transmit their entire DTMF page sequence. To page the entire group, you transmit at least the first three digits of the sequence, followed by the DTMF tones for A, B, and C.

Note: Group Calling only works with the HTX-212 and other transceivers that support this feature.



---

## SUBAUDIBLE TONE (CTCSS) FEATURES

Subaudible tones, also known as CTCSS (Continuous Tone-Coded Squelch System) are low-frequency tones that are mixed with a transmission. They are used by many repeaters to limit interference from other nearby radio transmitters. When a repeater uses a subaudible tone, it does not react to any transmission that does not include that tone.

Your HTX-212 includes all 38 standard subaudible tones. You can set your HTX-212 to include any of these tones with your transmissions. You can also set the your HTX-212 to limit reception to only those transmissions that include the selected tone.

## REPEATER OPERATION

Operation through a repeater, where you transmit on one frequency and receive on another, is called duplex operation. Operation direct to another station where you transmit and receive on the same frequency is called simplex operation.

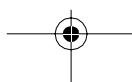
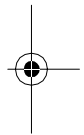
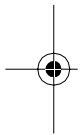
A repeater is a station that receives a signal on one frequency (the input frequency) and then retransmits that signal on a different frequency (the output frequency). Repeater antennas are typically located at the tops of tall buildings or on antenna towers, so a relatively low-power signal can reach the repeater. The repeater retransmits the signal at a higher power. This gives users of low-power transceivers the ability to communicate over a much greater range.

To use a repeater, you must know the repeater's input and output frequencies. Repeaters are usually identified by their output frequency. Thus, a repeater that has an output frequency of 146.94 is referred to as the 146.94 repeater. To determine the input frequency you must know the frequency offset (600 kHz for the 2-meter band) and the offset direction (+ if you add 600 kHz to the output or - if you subtract 600 kHz from the output).

Your HTX-212 is programmed with the default 600 kHz frequency offset and direction for the 2-meter band. When you tune to a frequency that is normally assigned for repeater use, the HTX-212 automatically selects the correct input frequency. See "Frequency Offset Defaults" on Page 26.

## MEMORY CHANNELS

Your HTX-212 has 31 memory channels (30 standard memory channels and one calling-frequency memory channel). Each memory channel can hold a transmit and receive frequency, subaudible transmit and receive tones, the transmit power level, and whether subaudible tone transmit and squelch are on or off. You cannot store non-amateur frequencies in memory.



---

## UNDERSTANDING THE DISPLAY

One or more of the following indicators appear when you turn on and use your HTX-212.

**VFO-A or VFO-B** — appears when you select one of the VFO modes. See “Dual VFO Modes” on Page 13.

**VFO-A-T**

**VFO-B** — appears when you select the DUP-A mode (transmit on VFO-A and receive on VFO-B). See “Using the Dual VFOs for Duplex Operation” on Page 27.

**VFO-A**

**VFO-B-T** — appears when you select the DUP-B mode (receive on VFO-A and transmit on VFO-B). See “Using the Dual VFOs for Duplex Operation” on Page 27.

**HIGH or LOW** — indicates the transmit power level. See “Setting the Power Level” on Page 18.

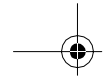
**FUNC** — appears after you press F. Flashes after you Hold F for at least 1 second.

**LOCK** — appears when you lock the HTX-212’s functions. See “Locking the Controls” on Page 19.

**T** — appears when transmit subaudible tone is turned on. See “Using Subaudible Tones” on Page 33.

**T-SQL** — appears when both transmit subaudible tone and subaudible tone squelch are turned on. See “Using Subaudible Tones” on Page 33.

**ALT** — appears when you turn on the DTMF page/subaudible tone alert. See “Setting the DTMF Page and Subaudible Tone Alert” on Page 34.



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+ or - — indicates the duplex offset direction. See “Overriding the Duplex Offset” on Page 27.

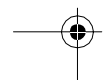
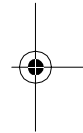
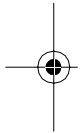
DTMF — appears when you turn on DTMF squelch. See “Using DTMF Page” on Page 32.

BUSY — appears when the HTX-212 is receiving a transmission. See “Receiving Transmissions” on Page 23.

ON-AIR — appears when you transmit. See “Transmitting” on Page 24.

◆ — appears when you turn on the Channel 1 alarm. Flashes when there is a transmission on Memory Channel 1 and the alarm is turned on. See “Checking Priority Channel 1” on Page 30.

M-CH — appears when you tune to a memory channel. See “Using the Standard Memory Channels” on Page 29.





## BASIC OPERATION

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### TURNING ON/OFF YOUR HTX-212

To turn your HTX-212 on or off, press POWER. When you turn it on, all display elements briefly turn on and the HTX-212 sounds three tones. Then it returns to the last-used settings.

### RESETTING THE HTX-212

When you first use your HTX-212, if it displays PLL Err or EEP Err, or if you ever want to reset the HTX-212 to the factory defaults and clear all memory, follow these steps.

! Important: This procedure clears all stored information.

1. Turn off the HTX-212.
2. While holding down F+T-SQL, turn on the HTX-212. All display elements stay on for about 2 seconds.

See "Extending the Transmit Frequency Range" (below) and "Using the Menu" on Page 35 for the default settings.

### EXTENDING THE TRANSMIT FREQUENCY RANGE

The following are the HTX-212's default frequency ranges:

|                  |           |                       |
|------------------|-----------|-----------------------|
| VFO* Mode:       | Transmit: | 144.600 – 148.000 MHz |
|                  | Receive:  | 136.000 – 174.000 MHz |
| Memory Channels: | Transmit: | 144.600 – 148.000 MHz |
|                  | Receive:  | 144.000 – 148.000 MHz |

! Important: Do not expand the transmit frequency coverage unless you are licensed to operate on MARS or CAP frequencies.

To expand the transmit frequency coverage, hold down F+DTMF while you turn on the HTX-212. The new frequency ranges are:

|                  |           |                       |
|------------------|-----------|-----------------------|
| VFO* Mode:       | Transmit: | 143.000 – 149.000 MHz |
|                  | Receive:  | 136.000 – 174.000 MHz |
| Memory Channels: | Transmit: | 143.000 – 149.000 MHz |
|                  | Receive:  | 143.000 – 149.000 MHz |

\* VFO (Variable-Frequency Oscillator) modes let you scan or select any frequency within the range.

Note: To return to the default frequency ranges, you must reset the transceiver. See "Resetting the HTX-212" on Page 17.

#### SETTING VOLUME AND SQUELCH

SQUELCH sets the minimum signal level that must be present before the HTX-212 amplifies the signal through the speaker. Follow these steps to set the squelch to a reasonable setting.

1. Rotate SQUELCH fully counterclockwise.
2. Set VOLUME so you can hear the background hiss between transmissions.

Note: If you do not hear hissing, turn TUNE/M-CH to select a frequency that does not have communications in progress.

3. Slowly turn SQUELCH clockwise until the hissing stops.

If you turn SQUELCH too far clockwise, you might miss parts of transmissions. If you do not turn SQUELCH far enough clockwise, you hear hissing between transmissions and the HTX-212 might not scan properly.

#### USING THE LIGHT

Your HTX-212 has two display light levels. To switch between the two levels, press F then DIM.

#### SETTING THE POWER LEVEL

Your HTX-212 has two transmit power levels. Low power is about 10 watts, and high power is about 45 watts. To switch between the two power levels, press LOW. LOW or HIGH appears on the display.

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## LOCKING THE CONTROLS

To lock the controls on the microphone (except the push-to-talk button), slide LOCK ON to the right. This does not lock the HTX-212's front panel controls.

To lock all controls except POWER, VOLUME, SQUELCH, and the push-to-talk button, press F then LOCK. LOCK appears on the display.

To unlock the controls, press F then LOCK again.

## SELECTING A FREQUENCY

You can use any of three methods to select a frequency.

- Direct entry
- Tuning
- Scanning

### Directly Entering a Frequency

1. Press VFO to select either VFO-A or VFO-B.
2. Enter the last five digits of the frequency. For example, to enter 145.050, simply press 45050.

### Notes:

- The HTX-212 rounds the last digit down to 5 or 0.
- The HTX-212's does not accept entries outside its range.
- The HTX-212 automatically selects the correct duplex offset for frequencies normally assigned to repeaters and selects no offset for other frequencies.

### Tuning to a Frequency

1. Press VFO to select either VFO-A or VFO-B.
2. Rotate TUNE, or press UP or DOWN on the microphone, to step through the frequencies.

#### Notes:

- You can set the HTX-212 to step in 5, 10, 12.5, 20, 25, 50, or 100 kHz increments. The default is 20 kHz. See "Setting the Frequency Step" on Page 21.
- To step in 1 MHz increments, press MHz. Press MHz again to return to the previous frequency step.
- The HTX-212 automatically selects the correct duplex offset for frequencies normally assigned to repeaters and selects no offset for other frequencies.

### Scanning for a Frequency

1. Press VFO to select either VFO-A or VFO-B.
2. Press F. Then press s to scan up or t to scan down.

#### Notes:

- You can set the HTX-212 to scan in 5, 10, 12.5, 20, 25, 50, or 100 kHz steps. The default is 20 kHz. See "Setting the Frequency Step" on Page 21.
- You can program up to five frequencies for the HTX-212 to skip when scanning. See "Storing Scan Skip Frequencies" on Page 21.
- When the HTX-212 reaches one end of the scanning range, it starts over at the other end. To set the scanning range, see "Setting the Scanning Range" on Page 23.
- When the HTX-212 stops on a transmission, it either stops scanning, resumes scanning in 10 seconds even if the transmission continues, or stays on the frequency until the transmission ends. To select the scan resume option, see "Setting the Scan Resume Condition" on Page 22.
- If you set the HTX-212 to resume scanning after the transmission ends, it pauses before resuming to ensure you do not miss a reply. To set the scan delay, see "Setting the Scan Resume Delay" on Page 22.

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## SETTING THE FREQUENCY STEP

The factory default frequency step is 20 kHz. Each time you rotate TUNE one click, or press UP or DOWN on the microphone, the frequency changes by 20 kHz. When scanning, the HTX-212 scans up or down 20 kHz per step.

Follow these steps to change the frequency step.

1. Press VFO.
2. Press F then STEP. The HTX-212 displays *st* and the current frequency step.
3. Rotate TUNE, or press UP or DOWN on the microphone, to select the desired frequency step (5, 10, 12.5, 20, 25, 50, or 100 kHz).
4. Press MHz to save the setting.

## SETTING THE SCAN OPTIONS

### Storing Scan Skip Frequencies

You can store up to five frequencies for your HTX-212 to skip when scanning. This lets you prevent the HTX-212 from stopping on beacon or packet repeater frequencies.

1. Press VFO.
2. Hold F for at least 1 second. *FUNC* flashes.
3. Press MR. The HTX-212 displays *sc* and the current scan resume setting.
4. Repeatedly press *s* until the HTX-212 displays *s1* and the first scan skip frequency (or *----.---* if no frequency is stored).
5. Select the first scan skip frequency by rotating TUNE, pressing UP or DOWN on the microphone, or directly entering the last five digits of the frequency.
6. Press *s* for the next scan skip memory—*s2*, *s3*, *s4*, or *s5*.
7. Repeat Steps 5 and 6 for each scan skip frequency.
8. Press MR to save the setting.

### Setting the Scan Resume Condition

When you scan VFO frequencies or frequencies you stored in memory, the HTX-212 stops at any signal strong enough to break squelch. The HTX-212 is preset to `ti`, meaning it resumes scanning in 10 seconds, even if the signal continues.

Follow these steps to change the scan resume condition.

1. Press VFO.
2. Hold F for at least 1 second. `FUNC` flashes.
3. Press MR. The HTX-212 displays `SC` and the current option.
  - `ti` Resumes scanning in 10 seconds
  - `cr` Resumes scanning after the carrier drops and the scan resume delay expires
  - `SE` Does not resume scanning
4. Rotate TUNE, or press UP or DOWN on the microphone, to select the desired option.
5. Press MR to save the setting.

### Setting the Scan Resume Delay

When you set the scan resume condition to `cr` (carrier), the HTX-212 resumes scanning after the carrier drops. The scan resume delay option lets you set the HTX-212 to pause before resuming so you can hear any reply. The factory default for this option is 2 seconds.

Follow these steps to change the scan resume delay.

1. Press VFO.
2. Hold F for at least 1 second. `FUNC` flashes.
3. Press MR.
4. Repeatedly press `s` until the HTX-212 displays `sd` and the current scan resume delay (0.5, 1, 2, or 4 seconds).
5. Rotate TUNE, or press UP or DOWN on the microphone, to select the desired scan resume delay.
6. Press MR to save the setting.

### Setting the Scanning Range

When you scan in a VFO mode, the HTX-212 only scans those frequencies within a selected range. The factory default scanning range is 144.0 to 148.0 MHz.

Follow these steps to change the scanning range.

1. Press VFO.
2. Hold F for at least 1 second. FUNC flashes.
3. Press MR.
4. Repeatedly press s until the HTX-212 displays SL and the current lower scan limit.
5. Rotate TUNE, press UP or DOWN on the microphone, or directly enter the lower scan limit's last five digits on the microphone's keypad.
6. Press s. The HTX-212 displays SH and the current upper scan limit.
7. Rotate TUNE, press UP or DOWN on the microphone, or directly enter the upper scan limit's last five digits on the microphone's keypad.
8. Press MR to save the settings.

### RECEIVING TRANSMISSIONS

To receive a transmission, turn on the HTX-212, adjust the volume and squelch, and tune to the frequency you want to monitor. The HTX-212 displays BUSY, and the signal-strength indicator shows the relative signal strength when it receives a signal.

Note: If BUSY appears, but you hear nothing from the speaker, be sure the DTMF page and tone-squelch features are turned off and SQUELCH is set correctly. To turn off DTMF page, press DTMF once. To turn off tone squelch, press T-SQL until neither T nor T-SQL appears on the display. See "Activating Subaudible Tone Transmit and Squelch" on Page 34.

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## TRANSMITTING

! Caution: It is illegal to transmit if you do not have a Technician Class (or higher) license issued by the FCC.

1. Select the desired frequency.

Note: If you select a repeater frequency, the HTX-212 displays + or - to show the offset direction. To operate with no offset (simplex) on that frequency, press SHIFT until neither + nor - appears.

2. Press LOW so LOW appears on the display. This selects the low power (10 watt) setting.
3. Press the push-to-talk button on the side of the microphone to transmit. The signal strength meter shows half-scale for low power (or full-scale for high power). Release the push-to-talk button to listen for a reply.

### Notes:

- If the other party advises you to improve your signal, press LOW. HIGH appears on the display, and the HTX-212 transmits at high power (about 45 watts).
- If you try to transmit outside the permitted range (144.600 to 148.000 MHz default or 143.000 to 149.000 MHz if you extend the range), the HTX-212 displays tF Err and beeps twice.

### Transmitting DTMF Tones

To transmit DTMF tones, follow the steps for transmitting. While holding down the push-to-talk button, press the digits on the microphone to transmit the tones.

Note: If auto-reply is turned on, you must hold down push-to-talk while you transmit. If auto-reply is off, you can release push-to-talk after you enter the first digit. The HTX-212 transmits for 1 second after you enter the last digit. See "Using Auto-Reply" on Page 33.



### Limiting Transmit Duration

When you communicate on the 2-meter band, you should keep your transmissions as brief as possible. Most repeaters have built-in timers that limit single transmissions to 3 minutes or less.

You can set the transceiver to stop transmitting and sound a beep if a single transmission exceeds 3 minutes. Follow these steps to turn the transmission time-out option on or off.

1. Press VFO.
2. Hold F for at least 1 second. FUNC flashes.
3. Press MR.
4. Repeatedly press s until the HTX-212 displays `to` and either `on` (if the time-out option is on) or `OFF` (if the option is off).
5. Rotate TUNE, or press UP or DOWN on the microphone, to select `on` (to turn on the time out option) or `OFF` (to turn off the option).
6. Press MR to save the settings.

### TURNING THE KEYTONE BEEP ON AND OFF

Your HTX-212 sounds a beep each time you press a button. Follow these steps to turn off this keytone beep.

Note: This does not affect the alert tone, alarm scan beep, or the transmit limit beep.

1. Press VFO.
2. Hold F for at least 1 second. FUNC flashes.
3. Press MR.
4. Repeatedly press s until the HTX-212 displays `bp` and either `on` (if the beep option is on) or `OFF` (if the option is off).
5. Rotate TUNE, or press UP or DOWN on the microphone, to select `on` (to turn on the beep option) or `OFF` (to turn off the option).
6. Press MR to save the settings.

## ADVANCED OPERATION

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### FREQUENCY OFFSET DEFAULTS

When you select a frequency, the HTX-212 defaults to the following frequency offsets:

| Receive Frequency      | Transmit Offset     |
|------------------------|---------------------|
| 144.600 to 144.910 MHz | + offset            |
| 144.910 to 145.210 MHz | No offset (Simplex) |
| 145.210 to 145.510 MHz | - offset            |
| 145.510 to 146.010 MHz | No offset (Simplex) |
| 146.010 to 146.380 MHz | + offset            |
| 146.380 to 146.610 MHz | No offset (Simplex) |
| 146.610 to 147.000 MHz | - offset            |
| 147.000 to 147.400 MHz | + offset            |
| 147.400 to 147.600 MHz | No offset (Simplex) |
| 147.600 to 148.000 MHz | - offset            |

The default offset is 600 kHz. For example, if you tune to receive 146.940 MHz, the HTX-212 automatically transmits at 146.340 MHz (600 kHz less than 146.940).

Note: Outside these ranges, the HTX-212 operates with no offset.

### Changing the Default Offset

Follow these steps to change the default offset for the VFO modes.

1. Press VFO.
2. Hold F for at least 1 second. FUNC flashes.
3. Press SHIFT. The HTX-212 displays  $\circ S$  and the current offset (in MHz).
4. Rotate TUNE, press UP or DOWN on the microphone, or directly enter the step using the microphone's keypad to select an offset default (from 0 to 4 MHz in 10 kHz steps).
5. Press SHIFT to save the setting.

Note: This setting does not affect frequencies stored in memory.

### Reversing the Offset

To reverse the transmit and receive frequencies when you are operating duplex, press F then REV. For example, if you tune to 146.940 (which has a - offset), pressing F then REV makes the transceiver receive on 146.340 and transmit on 146.940. The setting returns to the default if you change frequencies or turn off the HTX-212.

### Overriding the Duplex Offset

When you tune to a frequency, the HTX-212 automatically selects either simplex operation, or duplex operation with the correct offset direction. To override this setting, press SHIFT. Each time you press SHIFT, the offset switches between +, -, and no offset. The setting returns to the default if you change frequencies or turn off the HTX-212.

Note: The HTX-212 will not switch to an offset that would place the transmit frequency out of the permitted transmit range. For example, you cannot set the offset to - for frequencies less than 145.200 (600 kHz above the minimum transmit frequency of 144.600).

### USING THE DUAL VFOS FOR DUPLEX OPERATION

Follow these steps to use one VFO to transmit and the other to receive.

1. Press VFO to select VFO-A.
2. Select a frequency.
3. Press VFO to select VFO-B.
4. Select a frequency.
5. Press DUP. When the HTX-212 displays:

VFO-A-T  
VFO-B

it transmits on the VFO-A frequency and receives on the VFO-B frequency. When it displays:

VFO-A  
VFO-B-T

it transmits on the VFO-B frequency and receives on the VFO-A frequency.

## USING MEMORY CHANNELS

---

Your HTX-212 has 31 memory channels (one calling-frequency memory and 30 standard memory channels). See "Using DTMF and Subaudible Tones" on Page 31 for explanations of the subaudible tone features.

### USING THE CALLING-FREQUENCY MEMORY

With the press of a button, you can immediately select the settings stored in the calling-frequency memory.

Follow these steps to store receive and transmit frequencies, transmit and receive subaudible tones, and subaudible tone transmit and squelch in the calling-frequency memory.

1. Press CALL. **M-CH** and **C** appear, along with the current calling frequency.
2. Press T-SQL to set the desired subaudible tone transmit and squelch operation (see "Using Subaudible Tones" on Page 33).
3. Press SHIFT to select the desired duplex offset.
4. Press LOW to select either high or low power.
5. Hold F for at least 1 second. **FUNC** flashes on the display. Press CALL again. **M-CH** flashes.
6. Enter the last four digits of the receive frequency.
7. Press s. The HTX-212 displays **tF** and the current transmit frequency. If you want to change the transmit frequency, enter the last four digits of the desired transmit frequency.
8. Press s. The HTX-212 displays **tC** and the currently selected transmit subaudible tone. Rotate TUNE, or press UP or DOWN on the microphone, to select the desired transmit subaudible tone. If you do not want a transmit subaudible tone, either leave the setting as is (and do not turn on the subaudible tone transmit feature in Step 2) or set it to OFF.
9. Press s. The HTX-212 displays **rC** and the currently selected receive subaudible tone. Rotate TUNE, or press UP or DOWN on the microphone, to select the desired receive subaudible tone. If you do not want a receive subaudible tone, either leave the setting as is (and do not turn on the subaudible squelch feature in Step 2) or set it to OFF.
10. Press CALL to save the settings and return to the calling-frequency memory display.

To use the calling-frequency memory, press CALL at any time. Press CALL again to return to the previously selected channel or VFO.

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## USING THE STANDARD MEMORY CHANNELS

The HTX-212 has 30 standard memory channels where you can store frequently-used frequencies, along with duplex and subaudible tone settings, for quick access.

### Storing a Frequency

1. Press VFO and tune to a frequency you want to store. Set all duplex and subaudible tone settings, (see "Using Subaudible Tones" on Page 33), and the transmit power setting.
2. Press F. Then rotate TUNE, or press UP or DOWN on the microphone, until the HTX-212 displays the desired memory number to the left of the frequency.
3. Press MR. The HTX-212 beeps twice and stores all settings into the selected memory channel.

### Changing Stored Settings


To change the receive frequency, follow the steps under "Storing a Frequency." Follow these steps to change the transmit frequency or a tone squelch option without changing the receive frequency.

1. Press MR.
2. Rotate TUNE, or press UP or DOWN on the microphone, to select the memory channel you want to change.
3. If you want to turn tone squelch on or off, repeatedly press T-SQL to select the desired tone squelch mode. (See "Using Subaudible Tones" on Page 33)
4. Press F, then press MR. The HTX-212 displays  $\tau F$  and the transmit frequency, and M-CH flashes.
5. Rotate TUNE, press UP or DOWN on the microphone, or enter the desired transmit frequency using the microphone's keypad.
6. Press s. The HTX-212 displays  $\tau C$  and the current transmit subaudible tone.
7. Rotate TUNE, or press UP or DOWN on the microphone, to change the transmit subaudible tone.
8. Press s. The HTX-212 displays  $\tau C$  and the current receive subaudible tone.
9. Rotate TUNE, or press UP or DOWN on the microphone, to change the receive subaudible tone.
10. Press MR. The HTX-212 saves the new settings.

### Tuning to a Memory Channel

1. Press MR.
2. Rotate M-CH, or press UP or DOWN on the microphone, to select the desired memory channel.

### Checking Priority Channel 1

To have the HTX-212 periodically “look back” at Memory Channel 1 to check for a transmission, press F then ALM.  appears on the display. The HTX-212 looks back at Memory Channel 1 every 4, 8, 12, or 16 seconds. If there is a transmission, the HTX-212 beeps to let you know to tune to it, if desired.

Follow these steps to change the look-back time.

1. Press VFO.
2. Hold F for at least 1 second. FUNC flashes. Then press MR.
3. Repeatedly press s until the HTX-212 displays Lb and the current look-back time.
4. Rotate TUNE, or press UP or DOWN on the microphone, to select the desired look-back time (4, 8, 12, or 16 seconds).
5. Press MR to save the setting.

### Scanning Memory Channels

To set the HTX-212 to scan all memory channels, hold MR for at least 1 second. M-CH flashes, and the HTX-212 scans the memories. The HTX-212 stops when it encounters a transmission. It resumes scanning according to the saved scan settings (see “Setting the Scan Options” on Page 21).

### Clearing a Memory Channel

You can clear any memory channel except Memory Channel 1 and the calling-frequency memory.

1. Tune to the memory channel you want to clear.
2. Hold F for at least 1 second. FUNC flashes.
3. Press MR. All settings are cleared from the memory channel.

## USING DTMF AND SUBAUDIBLE TONES

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Your HTX-212 has seven DTMF (Dual-Tone, Multiple Frequency—another name for touch tones) memories where you can store DTMF sequences. DTMF Memory 0 can hold a seven-digit DTMF paging sequence your HTX-212 must receive for DTMF paging. DTMF Memories 1-6 each hold 15 digits you can quickly transmit.

### STORING A DTMF SEQUENCE

1. Hold down F for at least 1 second. FUNC flashes.
2. Press DTMF. The HTX-212 displays  $\tau d$ , DTMF 1, and the current sequence stored in DTMF Memory 1.
3. Rotate TUNE, or press UP or DOWN on the microphone, to select one of the six transmit DTMF memories (1–6) or the receive DTMF memory (0).

Note:  $\tau d$  appears before DTMF Memories 0–6, and  $\pi d$  appears before DTMF Memory 0.

4. Press SHIFT. Then use the keypad to enter the sequence you want to store.

Note: DTMF Memories 1–6 hold 15 digits each. DTMF Memory 0 holds 7 digits.

5. Repeat Steps 3 and 4 to store more DTMF sequences, or press DTMF to save all sequences and return to normal operation.

Note: To clear a DTMF sequence, repeat these steps but do not enter a frequency in Step 4 after you press SHIFT.

### TRANSMITTING A DTMF SEQUENCE

1. If DTMF is not on the display, press DTMF.

Note: If the DTMF memory that contains the sequence you want to transmit is already selected, skip to Step 6.

2. Hold F for at least 1 second. FUNC flashes.
3. Press DTMF.
4. Rotate TUNE, or press UP or DOWN on the microphone, to select the DTMF memory that contains the sequence you want to transmit.
5. Press DTMF.
6. Press the push-to-talk button. While holding down push-to-talk, press DTMF. The HTX-212 transmits the stored sequence.

## USING DTMF PAGE

DTMF page lets other operators page you through your HTX-212. To turn on DTMF page, press DTMF so *DTMF* appears on the display. The HTX-212 does not pass any transmission to the speaker until it receives the DTMF sequence you stored in DTMF Memory 0. If DTMF Memory 0 is empty, DTMF page does not operate.

When you receive a DTMF page, the HTX-212 turns on the speaker and turns off DTMF page.

### Notes:

- If you turn on auto-reply, the HTX-212 sends the sequence in the currently selected DTMF memory when it receives the DTMF sequence you set. See "Using Auto-Reply" on Page 33.
- If you turn on tone-alert, the HTX-212 sounds three tones when it receives its DTMF sequence you set. See "Setting the DTMF Page and Subaudible Tone Alert" on Page 34.

### Using Group Calling

Group calling lets several users be paged at once. Each user must have a transceiver that has this feature. When the HTX-212 receives at least three DTMF tones followed by the sequence A-B-C, it compares the DTMF tones it received before the A-B-C with the tones stored in DTMF Memory 0. If the tones match, it operates as if it received the entire sequence.

For example, if these page sequences are assigned to a group:

| Name   | Assignment | DTMF Page Sequence |
|--------|------------|--------------------|
| George | West Side  | 4654321            |
| Bob    | West Side  | 4654254            |
| Doug   | East Side  | 4651823            |
| Bill   | North Side | 4652252            |
| Cary   | East Side  | 4651855            |
| Paul   | South Side | 4653552            |
| Kim    | North Side | 4652183            |
| James  | South Side | 4653122            |
| Beth   | East Side  | 4651931            |

- Assuming all club members have DTMF page activated, to page everyone, transmit 465ABC.
- To page West Side members, transmit 4654ABC.
- To page Doug and Cary, transmit 46518ABC.
- To page only one person, transmit the 7-digit sequence.



### Using Auto-Reply

If you turn on the auto-reply feature, the HTX-212 automatically sends the sequence stored in the currently-selected DTMF memory when it receives a DTMF page.

Follow these steps to turn on auto-reply.

1. Press VFO.
2. Hold F for at least 1 second. FUNC flashes.
3. Press MR. The HTX-212 displays the first configuration menu item.
4. Repeatedly press s to select the Ar option. Then rotate TUNE, or press UP or DOWN on the microphone, to set the option to on.
5. Press MR to exit the configuration menu.

To turn off auto-reply, set the option to OFF in Step 4.

### USING SUBAUDIBLE TONES

Some repeaters require you to transmit a subaudible tone to activate them. You can set your HTX-212 to transmit any of the 38 standard subaudible tones. You can also limit incoming reception by setting the HTX-212 to open the squelch only when someone transmits a subaudible tone you select.

#### Valid Subaudible Tones

| Code | Freq. (Hz) | Code | Freq. (Hz) | Code | Freq. (Hz) |
|------|------------|------|------------|------|------------|
| XZ   | 67.0       | 1B   | 107.2      | 6Z   | 167.9      |
| XA   | 71.9       | 2E   | 110.9      | 6A   | 173.8      |
| WA   | 74.4       | 2A   | 114.8      | 6B   | 179.9      |
| XB   | 77.0       | 2B   | 118.8      | 7Z   | 186.2      |
| WB   | 79.7       | 3Z   | 123.0      | 7A   | 192.8      |
| YZ   | 82.5       | 3A   | 127.3      | M1   | 203.5      |
| YA   | 85.4       | 3B   | 131.8      | M2   | 210.7      |
| YB   | 88.5       | 4Z   | 136.5      | M3   | 218.1      |
| ZZ   | 91.5       | 4A   | 141.3      | M4   | 225.7      |
| ZA   | 94.8       | 4B   | 146.2      | M5   | 233.6      |
| ZB   | 97.4       | 5Z   | 151.4      | M6   | 241.8      |
| 1Z   | 100.0      | 5A   | 156.7      | M7   | 250.3      |
| 1A   | 103.5      | 5B   | 162.2      |      |            |

### Setting the Subaudible Tones

Some repeaters require you to transmit a subaudible tone with your transmission. You can also set a tone that must accompany transmissions for your HTX-212 to open squelch.

Follow these steps to set the subaudible tones for the VFO mode. After you set the tones, you must activate the function to turn it on. Changing this setting does not change the tones stored in any memory channel.

1. Hold F for at least 1 second. FUNC flashes.
2. Press T-SQL. The HTX-212 displays  $tC$  and the currently set transmit tone.
3. Rotate TUNE, or press UP or DOWN on the microphone, to set a different transmit tone. If you do not want a transmit tone, select OFF.
4. Press s. The HTX-212 displays  $rC$  and the currently set receive tone.
5. Rotate TUNE, or press UP or DOWN on the microphone, to set a different receive tone. If you do not want a receive tone, select OFF.
6. Press T-SQL to save the settings.

### Activating Subaudible Tone Transmit and Squelch

1. Press T-SQL once. T appears. The HTX-212 includes the selected transmit tone with your transmissions.
2. Press T-SQL again. T-SQL appears. The HTX-212 includes the selected transmit tone with your transmissions and requires the selected receive tone to open squelch.
3. Press T-SQL a third time to turn off both subaudible tone transmit and squelch. Neither T nor T-SQL appears on the display.

### SETTING THE DTMF PAGE AND SUBAUDIBLE TONE ALERT

When the alert function is turned on, the HTX-212 sounds a sequence of three tones when it receives a DTMF page (if DTMF page is activated) or a transmission that includes the correct subaudible tone (if tone squelch is activated).

To turn on the alert function, press F then ALT. ALT appears. The alert function automatically turns off after the three tones sound.

## USING THE MENU

Your HTX-212 has a menu that lets you select the way some of its functions work. The previous sections have included procedures that access this menu—this section provides an overview. Follow these steps to use the menu:

1. Press VFO.
2. Hold F for at least 1 second. FUNC flashes.
3. Press MR. The first menu item appears.
4. Press s or t to select the desired menu option.
5. Rotate TUNE, or press UP or DOWN on the microphone, to select the option setting. For options that require a frequency (such as scan skip), you can use the microphone keypad to directly enter the frequency's last five digits.
6. Press MR. The HTX-212 saves the settings.

| Menu Item | Default Option | Explanation/Available Settings   | Page # |
|-----------|----------------|--|--------|
| SC        | ti             | Scan resume option.<br>ti—time out in 10 seconds.<br>Cr—resume after carrier drops.<br>SE—do not resume scanning.                        | 22     |
| Sd        | 2.0            | Scan delay (delay before resume when SC is set to Cr). 0.5, 1, 2, or 4.  | 22     |
| S1        | ---.---        | Scan skip frequency 1 (frequency for HTX-212 to skip when scanning VFO).   | 21     |
| S2        | ---.---        | Scan skip frequency 2.   | 21     |
| S3        | ---.---        | Scan skip frequency 3.   | 21     |
| S4        | ---.---        | Scan skip frequency 4.   | 21     |
| S5        | ---.---        | Scan skip frequency 5.   | 21     |
| Lb        | 4              | Look-back time (how often the HTX-212 checks Priority Memory Channel 1 for a transmission when the alarm is activated). 4, 8, 12, or 16. | 30     |
| Ar        | oFF            | Auto reply (controls whether the HTX-212 transmits a DTMF memory sequence when it is DTMF paged). oFF or on.                             | 33     |
| SL        | 144.000        | Lower scan limit. With SH, determines the VFO scanning range.  | 23     |
| SH        | 148.000        | Upper scan limit.  | 23     |
| to        | oFF            | Time-out option (sets whether the HTX-212 limits transmissions to 3 minutes). oFF or on.   | 25     |
| bp        | oN             | Keytone beep option.   | 25     |

## TROUBLESHOOTING

### ERROR CODES

Your HTX-212 has the following three built-in error codes.

**tF Err**—appears if you try to transmit outside the allowed range (see “Extending the Transmit Frequency Range” on Page 17).

**PLL Err**—appears if the HTX-212’s PLL (phase-locked loop) section malfunctions. If turning the HTX-212 off then back on does not correct this error, take it to your local Radio Shack store to arrange for service.

**EEP Err**—appears if the HTX-212’s EEPROM checksum fails. Try resetting the HTX-212 (see “Resetting the HTX-212”). If this does not clear the error, take it to your local Radio Shack store to arrange for service.

### COMMON PROBLEMS AND SOLUTIONS

If your HTX-212 does not seem to be operating properly, check this section for a possible solution.

| Problem  | Possible Solutions  |
|--|---|
| Signal strength meter shows a signal and <b>BUSY</b> appears, but no sound from speaker. | <p>Be sure <b>DTMF</b> is not on the display. If it is, press <b>DTMF</b> to turn off <b>DTMF</b> page.</p> <p>Be sure <b>T-SQL</b> is not on the display. If it is, press <b>T-SQL</b> until neither <b>T</b> nor <b>T-SQL</b> appears.</p> <p>Be sure <b>VOLUME</b> and <b>SQUELCH</b> are properly adjusted.</p> <p>Be sure nothing is plugged into the <b>EXT. SP</b> jack.</p> |
| No controls operate.   | <p>Be sure <b>LOCK</b> is not on the display. If it is, press <b>F</b> then <b>LOCK</b> to unlock the controls.</p> <p>Be sure <b>LOCK</b> on the microphone is set to its leftmost position.</p>   |
| Other party cannot hear your transmission.   | <p>Be sure the duplex offset is set correctly.</p> <p>Set the output power to high by pressing <b>LOW</b> so <b>HIGH</b> appears on the display.</p>  |
| The display does not light when you press <b>POWER</b> .                                 | <p>Check the power connections.</p> <p>Check the fuse (see “Replacing the Fuse” on Page 37).</p>  |

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## REPLACING THE FUSE

Your HTX-212 (and vehicle) are protected by a 15-amp fuse in the HTX-212's positive (red) power wire. If the HTX-212 does not turn on, even when you are sure the power wire is properly connected to a 12V DC power source, check the fuse and replace it, if necessary.

1. Snap open the in-line fuse holder.
2. Remove the fuse from the holder, and slide the fuse out of the end connectors.
3. If the fuse's filament is no longer intact, replace the fuse with a 15-amp 1 <sup>1</sup>/<sub>4</sub> × 1 <sup>1</sup>/<sub>4</sub>-inch fuse (Cat. No. 270-1073).



Caution: Use only a fuse of the recommended size and type. Using another type fuse, or defeating the fuse protection, could damage your vehicle or your HTX-212. If the fuse frequently blows, there is a problem with the HTX-212 or its wiring. Have that problem fixed as soon as possible.

4. Replace the fuse in the holder and snap it closed.

## SPECIFICATIONS

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### GENERAL

#### Frequency Range (Factory)

|                             |   |
|-----------------------------|---|
| Transmit .....              | 144.600 – 148 MHz                                     |
| Receive .....               | 136.000 – 174.000 MHz                                 |
| Frequency Step .....        | 5/10/12.5/20/25/50/100 kHz                            |
| Frequency Stability .....   | ±10 ppm   |
| Antenna Impedance .....     | 50 Ohms   |
| Speaker .....               | 8 Ohms  |
| Microphone .....            | Electret Condenser (1.2 kOhms)                        |
| Operating Temperature ..... | -22 to 140°F (-30 to 60°C)                            |
| Dimensions (HWD) .....      | 1 5/8 ¥ 5 9/16 ¥ 6 3/16 Inches<br>(42 ¥ 142 ¥ 160 mm) |
| Supply Voltage .....        | 13.8 V DC (±15%)                                      |

### RECEIVER

#### Intermediate Frequency

|                                       |                       |
|---------------------------------------|-----------------------|
| 1st IF .....                          | 21.4 MHz              |
| 2nd IF .....                          | 455 MHz               |
| Sensitivity                           |                       |
| 12 dB sinad .....                     | 0.25 µV               |
| 20 dB nq .....                        | 0.39 µV               |
| Squelch Sensitivity                   |                       |
| Threshold .....                       | 0.1 µV                |
| Tight .....                           | 10 dB above threshold |
| Spurious Response Attention .....     | Better than 60 dB     |
| Adjacent Channel Rejection .....      | Better than 60 dB     |
| Modulation Acceptance Bandwidth ..... | Better than 7.5 kHz   |
| Hum and Noise .....                   | Better than 40 dB     |
| Audio Output Power at 10% THD .....   | Better than 2.0 W     |
| Audio Distortion .....                | 2%                    |
| Audio Response .....                  | -6 dB/Oct             |
| Stand-by Current .....                | 200 mA                |
| CTCSS Sensitivity .....               | 0.15 µV               |
| DTMF Squelch Sensitivity .....        | 0.2 µV                |

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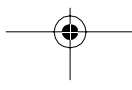
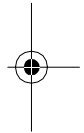
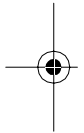
TRANSMITTER

|   |  |
|---|--|
| RF Power Output . . . . .                 | .45 W(high)/10 W(Low)                          |
| Maximum Deviation . . . . .               | 5 kHz  |
| Hum and Noise . . . . .                   | .Better than 35 dB                             |
| Audio Distortion . . . . .                | 3% (TX)  |
| Audio Response . . . . .                  | ±6 dB/Oct                                      |
| Spurious and Harmonic Emissions . . . . . | .Better than 60 dB                             |
| Frequency Error . . . . .                 | ±10 ppm  |
| Microphone Sensitivity . . . . .          | 4 mV rms                                       |
| CTCSS Tone Deviation . . . . .            | 0.75 kHz                                       |
| DTMF Tone Deviation . . . . .             | 3.5 kHz  |
| Current Drain . . . . .                   | Less than 9 A at 45 W<br>Less than 4 A at 10 W |

Specifications are typical; individual units might vary. Specifications are subject to change and improvement without notice.



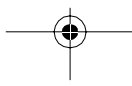
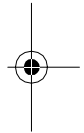
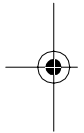
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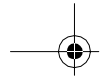






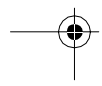
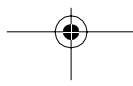
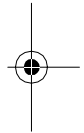
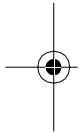
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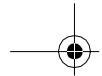




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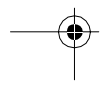
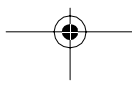
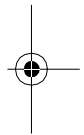
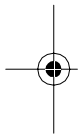
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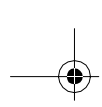




# MICROPHONE SCHEMATIC

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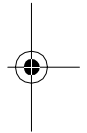




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