

HTX-420 2-Meter/70cm Dual Band FM Amateur Transceiver

19-1108

OWNER'S MANUAL — Please read before using this equipment.

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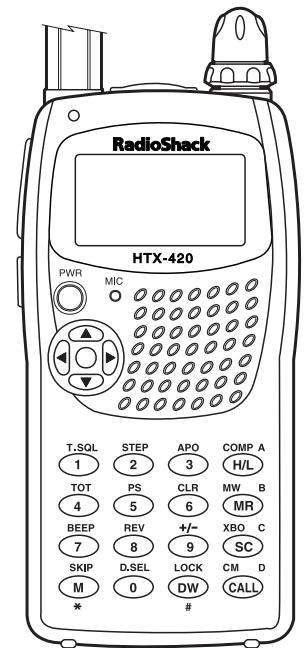
Thank you for purchasing a RadioShack HTX-420 2-Meter/70 cm Dual Band FM Amateur Transceiver. Your transceiver is compact and rugged, making it easy to carry almost anywhere. The crystal controlled circuitry provides accurate and stable frequency selection, making it an ideal choice for your amateur communications needs.

Electronic Compass — provides two letters to indicate direction (such as SW or NW) and up to three digits to show directional angle (such as 360°, 180°, 90° or 45°). See “Using the Electronic Compass” on page 9.

Full 16-Key DTMF (Dual-Tone Multi Frequency) Keypad — lets you dial and make telephone connections. See “Transmitting a DTMF Code” on page 7.

Programmable Frequency Steps — let you set the frequency increment for tuning or scanning to steps of 5, 6.25, 7.5, 10, 12.5, 15, 20, 25, or 50 kHz. See “Setting the Frequency Step” on page 8.

SAME Weather Alert — uses Specific Area Message Encoding (SAME) digital information to determine and display the level of weather events. See “Using the SAME Alert” on page 8.



INTRODUCTION TO AMATEUR RADIO

Amateur radio is a great hobby that has enriched the lives of millions of people all over the world. Your transceiver is the perfect first radio for anyone entering the exciting world of amateur radio, or as a great additional transceiver for the experienced amateur radio operator. Your transceiver opens a door for you to the world from almost anywhere! All you need is an Amateur Radio Operator's License (Technician Class or higher) issued by the Federal Communications Commission (FCC). If you do not have a license, it is easy to get one, and help from licensed operators is available. Find out if there is a ham radio club in your area. Most clubs welcome newcomers and are glad to help you get your license. Here are a few tips to help you get started.

You can turn on your transceiver and scan the entire band to hear what is going on; **however, do not attempt to transmit until you get your license.** If you transmit without a license, you are in violation of federal law that can lead to severe penalties. Ham operators take the FCC rules very seriously

and want nothing to do with “bootleggers” — their term for people who operate without a license. ☞

If you do not hear anyone talking about a local club as you listen to local transmissions, write to the American Radio Relay League (ARRL) at the following address to find out how to contact a local affiliate. The ARRL is the national organization representing amateur radio in the United States. The league has more than 150,000 members. Most are ham operators, or members in the process of obtaining their license.

The American Radio Relay League
225 Main Street
Newington, CT 06111
<http://www.arrl.org>

Start studying for the license exams. Most people can go from knowing absolutely nothing about amateur radio to passing the Technician written exam in less than a month.

The exams test your knowledge of basic radio regulations and elementary radio theory. Many clubs hold license classes which can be a fun and easy way to learn

! IMPORTANT !

If an icon appears at the end of a paragraph, go to the box on that page with the corresponding icon for pertinent information.

⚠ — Warning

! — Important

⚡ — Caution

☞ — Note

☞ NOTE ☞

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.



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WARNING

Using the Lithium-Ion Rechargeable Battery Pack

When you remove the battery pack from the transceiver, be sure to turn off the transceiver before you remove the battery pack.

Using AA Batteries

- When you remove the battery holder to replace the batteries, be sure to turn off the transceiver before you remove the battery holder.
- Dispose of old batteries promptly and properly. Do not burn or bury them.



CAUTION

Using the Lithium-Ion Rechargeable Battery Pack

- The supplied adapter is designed only to recharge the battery pack. Do not attempt to transmit using the adapter to power the radio.
- Use a coin or other solid object to unlatch the lock tab when you remove the battery pack.

Using AA Batteries

- Use only fresh batteries of the required size and recommend type.
- Always remove old or weak batteries. Batteries can leak chemicals that destroy electronic circuits.
- Do not mix old and new batteries, different types of batteries (standard or alkaline).
- If you do not plan to use the transceiver with batteries for two weeks or more, remove the batteries.

Using AC or DC Power

- You must use a Class 2 power source that supplies 12V DC and delivers at least 2A. Its center tip must be set to positive and its plug must fit the transceiver's **EXT** jack. Using a power supply that does not meet these specifications could damage the transceiver or the power supply.
- Always connect the power cable to the transceiver before you connect it to the power source. When you finish, disconnect the cable from the power source before you disconnect it from the transceiver.



Connecting the Antenna

Do not over-tighten the antenna.



NOTE

Using the Lithium-Ion Rechargeable Battery Pack

- The battery pack's indicator does not change to green if you use the transceiver while charging the battery pack.
- Using a pencil eraser, clean the charging contacts on lithium-ion battery pack.

Connecting the Antenna

You can connect an external antenna to the transceiver using an SMA-to-BNC adapter. The adapter and suitable antennas are available at your local RadioShack store.

about amateur radio. There are good books, cassette tapes, computer programs, and many other study aids available. Your local RadioShack store sells FCC License Preparation study guides for amateur radio operator licenses. While you are no longer required to learn Morse code for a Technician Class license, we encourage you to learn it so you can advance to higher levels of operating privileges.

There is a small fee required for taking the Technician exam. All license level tests are administered by a three-member Volunteer Examiner Team. Contact the ARRL for a schedule of exam opportunities in your area.

The Technician Class license lets you use the transceiver to communicate directly with other operators, and use repeaters for distant communication.

PREPARATION

You can power your transceiver using internal batteries, AC power or vehicle battery power (using a RadioShack 270-031 power cable, not supplied, available at your local RadioShack store or online at www.RadioShack.com).

USING INTERNAL BATTERIES

You can power the transceiver using the supplied lithium-ion rechargeable battery pack and its supplied adapter or four AA alkaline batteries (not supplied), available at RadioShack.

USING THE LITHIUM-ION RECHARGEABLE BATTERY PACK

Before you use the lithium-ion rechargeable battery pack, you must charge it. The battery pack has a built-in charging circuit.

To charge the battery pack, connect the supplied AC adapter to the battery pack's DC 12V jack. Then plug the adapter's other end into a standard AC outlet. If you have installed the battery pack to the transceiver, turn off the transceiver. The indicator on the battery pack lights red while charging and lights green when the charging finishes. A fully discharged battery pack can take as long as 10 hours to fully recharge.

When the battery pack is fully charged, unplug the adapter from the AC outlet, then disconnect the adapter from the battery pack.

Install the battery pack by inserting its upper edge first then press it down. Then lift and press down the lock tab to secure the battery pack.

When appears, recharge the battery.

USING AA BATTERIES

You can power your transceiver using four alkaline AA batteries (not supplied and available at your local RadioShack store) with the supplied battery holder.

1. Insert four AA batteries into the supplied battery holder according to the polarity symbols (+ or -) marked on the holder.
2. Attach the battery holder onto the transceiver and fasten the lock tab.

When appears, replace the batteries.

USING AC OR DC POWER

To power the transceiver from an AC outlet or your vehicle's battery power, you need a 12V regulated DC power supply that delivers at least 2A (for AC) and a RadioShack 270-031 power cable (not supplied, available at RadioShack). Another type of cable might not work with your transceiver.

1. *For AC power*, if the power supply has a voltage switch, set the switch to 12V.
2. Insert the power cable's cord into the transceiver's **EXT** jack.
3. *For AC power*, connect the other end of the power cable to the power supply, then plug the power supply's power cord into the power source.

For DC power, plug the other end of the power cable into the vehicle's cigarette lighter socket.

CONNECTING THE ANTENNA

Place the threaded base socket of the supplied antenna over the antenna connector on top of the transceiver and turn the antenna clockwise to tighten it. To remove the antenna, turn it counterclockwise.

ATTACHING THE BELT CLIP


Use a Phillips screwdriver and the two supplied screws to attach the supplied belt clip to your transceiver. Do not overtighten the screws.

ATTACHING THE WRIST STRAP

To attach the supplied wrist strap to the top of the belt clip, thread the strap's small loop through the opening in the top of the clip. Then insert the longer loop through the smaller loop and pull on the strap until the loop is tight.

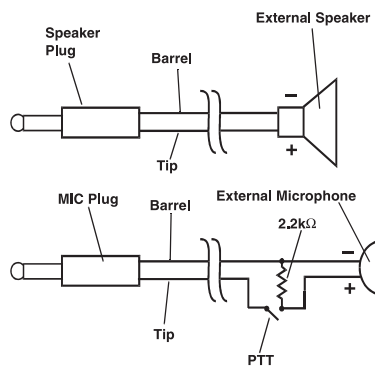
CONNECTING A MICROPHONE/SPEAKER

You can connect an external communications headset (consisting of a microphone and speaker) to the transceiver so you can use it privately. Lift the hinged,

rubber dust cover from the **SPK** and **MIC** jacks on top of the transceiver. Then insert the plug of an optional voice-activated headset with microphone, or an optional communication headset, into the jacks. 

You can also connect an optional mono earphone to the **SPK** jack. This lets you use the transceiver's push-to-talk button (**PTT**) to transmit as usual. Your local RadioShack store carries a wide selection of suitable communications headsets, earphones, and separate components.

The following schematic diagram shows the typical wiring for an external mic and speaker.



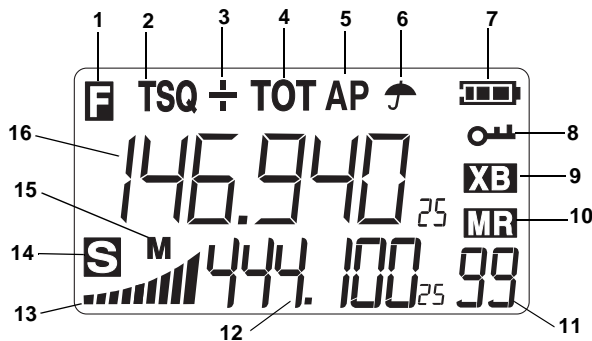
CAUTION




Use only microphone and speaker accessories that do not share a common ground for the speaker and the microphone. Doing otherwise might damage the transceiver.

NOTE

Connecting a headset's plug to the transceiver's **SPK** jack automatically disconnects the internal speaker.

A QUICK LOOK AT THE DISPLAY



1. **F** — appears when F (function) key is pressed.
2. **T** — appears when Tone Squelch (CTCSS) is enabled for transmitting. **SQ** appears when Tone Squelch (CTCSS) is enabled for receiving. **TSQ** appears when Tone Squelch (CTCSS) is enabled for transmitting and receiving.
3. **+** — appears to indicate a positive repeater offset. **-** indicates a negative offset.
4. **TOT** — appears when a time for the time-out timer is selected.
5. **AP** — appears when Auto Power Off is enabled.
6.  — appears when the SAME alert is enabled. The icon flashes when the transceiver is out of range.
7.  — indicates the battery strength.
8.  — indicates the keypad control is disabled to prevent accidental setting changes.
9. **XB** — appears when you use the cross band feature.
10. **MR** (Memory Channel Recall) — appears when you recall a memory channel.
11. 2-Digit Number below **MR** — indicates memory location number.
12. Sub Frequency Display (appears on the bottom of the display) — shows the transmit frequency and other settings. In the compass mode, the display shows direction indicator and angles in degree.
13. Signal Strength/Power Meter — shows the relative signal strength or power level.
14. **S** — appears and flashes when power save is on.
15. **m** — indicates the output power is middle. **L** indicates the output power is low. When neither of these appears, the output power is high.
16. Main Frequency Display (appears in the middle of the display) — shows the receive frequency.
17. **A** — appears when the transceiver tunes to the air band. (Not shown on this display.)

OPERATION

MANUAL CONVENTIONS

Your transceiver's buttons perform multiple functions. The abbreviation or symbol for a function is printed on, above, or below each button.

To activate certain transceiver features, you must press **F** (function) and another button at the same time. Those key combination instructions are printed as first button name, +, then the second button name. For example, **F+TOT** means hold down **F** while you press **TOT**.

Button names are printed in small, bold, capital letters such as **CLR** or **MR**. Words, symbols, and numbers that appear on the display are printed using a distinctive typeface, such as **146.940** or **MR**.

TURNING ON/OFF THE TRANSCEIVER

To turn on the transceiver, press **PWR**. The radio beeps once if the key tone feature is enabled. Then the current battery voltage briefly appears and the last used frequency appears. To turn the transceiver off, press **PWR** again.

SETTING THE SQUELCH LEVEL

Turn on the transceiver then repeatedly press **◀** or **▶** until the current squelch setting (**00** to **05**) and **SQL** appear. Repeatedly press **▲** or **▼** or rotate **CH** to change the squelch setting. A higher number reduces noise in-between transmissions while a lower number allows you to hear a weak transmission. Press **●** or **PTT** (Push to Talk) to store the setting and exit squelch setting.

TEMPORARILY OPENING SQUELCH

If you use the Tone Squelch (CTCSS) feature (see "Setting the CTCSS Tones" on Page 6), you might not hear a transmission on the current frequency. To temporarily open the squelch so you can hear all transmissions on the frequency, hold down **M**. To resume normal operation, release **M**.

USING THE UNIVERSAL TYPE KEYS

Repeatedly press **●** until the transceiver displays a frequency from the desired band. The band changes in the following order: VHF, UHF, AIR, WX.

Repeatedly pressing **◀** or **▶** allows selection of squelch, VHF repeater offset, UHF repeater offset, receive tone squelch (CTCSS), transmit tone squelch (CTCSS), DTMF, SAME area code, and SAME on/off

setting mode. **SQL**, **VHF RPT**, **UHF RPT**, **RX TONE**, **TX TONE**, **DTMF**, **AREA**, and **SAME** appear.

Press **▲** or **▼**, or rotate **CH** to change the value of the selected setting. Press **●** or **PTT** to store the setting and exit.

The detailed operation for squelch, VHF repeater offset, UHF repeater offset, receive tone squelch (CTCSS), transmit tone squelch (CTCSS), DTMF, SAME area code, and SAME on/off is described in the relevant sections.

SELECTING FREQUENCIES (DIRECT TUNING) AND RECEIVING TRANSMISSIONS

1. Repeatedly press **●** to select the desired receiving mode (VHF, UHF, Air, Weather).
2. Select a frequency using one of the following methods.

Using CH: Rotate **CH** clockwise or counterclockwise to select a frequency (or channel for the weather band). The frequency changes in increments you set (see "Setting the Frequency Step" on Page 8) for each rotation click. Hold down **F** while rotating **CH** to change the frequency by 1 MHz increments regardless of the selected step frequency.

Using ▲ and ▼: Repeatedly press (or hold down) **▲** or **▼** until the desired frequency appears. Hold down **F** while pressing **▲** or **▼** to change the frequency by 1 MHz increments.

Using Direct Key Entry: Use the number keys to directly enter a frequency, including the three numbers to the right of the decimal. (You do not enter the decimal point.)

3. Set **VOL** to a comfortable listening level.

TRANSMITTING

There are two basic types of communication possible with this transceiver: radio-direct-to-radio (simplex) or radio-to-repeater-to-radio (duplex). Simplex uses the same frequency to send and receive. Duplex uses one frequency to transmit and another to receive. For more information about duplex, see "Understanding Repeaters" on Page 5.

1. Select the desired transmit band VHF/ UHF and frequency using manual or direct entry.
2. Hold the transceiver about 3 inches from your mouth.

NOTE

Temporarily Opening Squelch

The current setting for Squelch, Repeater Offset for the selected band, RX Tone, and TX Tone can be displayed by pressing and holding **M**. (see "Setting the CTCSS Tones" on Page 6).

Selecting Frequencies and Receiving Transmissions

- When you directly enter a frequency, the transceiver accepts only six digits and it automatically rounds down the last digit of the frequency to 0 or 5. For example, if you enter 440.244, your transceiver accepts it as 440.240. If you enter 440.248, the transceiver accepts it as 440.245. If you set the frequency step to 6.25 kHz, 7.5 kHz, or 12.5 kHz, you need to select frequencies using **CH**, or **▲** or **▼**.
- If the transceiver picks up unwanted, weak transmissions, set the squelch to a different level (See "Setting the Squelch Level" on Page 4).

CAUTION

It is illegal to transmit if you do not have at least a Technician Class license issued by the FCC.

3. Hold down **PTT** (Push to Talk), then speak slowly and clearly into the microphone.
4. Release **PTT** when you finish transmitting.

UNDERSTANDING REPEATERS

A repeater is a radio that receives a signal on one frequency (the input frequency) and 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 your transceiver 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 (typically 600 kHz for the 2-meter band and 5 MHz for the 70-cm band) and the offset direction (+ if you add the offset (600 kHz) to the output, or – if you subtract the offset (600 kHz) from the output).

Whether the offset is positive or negative depends on:

- which part of the band the repeater operates on
- local convention
- proximity of repeaters using the same two frequencies

To determine the offset and the direction, obtain a copy of *The ARRL Repeater Handbook* (available through your local RadioShack store or the ARRL). That publication lists the locations of repeaters as well as their frequency and offset information.

A + above the displayed frequency indicates a positive offset, while a **–** above the frequency indicates a negative offset. If neither **+**, nor **–** appears, the transceiver is set for simplex operation.

SETTING THE REPEATER OFFSET FREQUENCY

The transceiver's default repeater offset is 600 kHz for the VHF band and 5 MHz for the UHF band. As the display shows all frequencies in MHz, you see **.600** (MHz) for VHF and **5.000** (MHz) for UHF. ☑

1. Repeatedly press **◀** or **▶** until **UHF RPT** appears.

2. Repeatedly press **▲** or **▼**, or rotate **CH** to change the offset to a new value ranging from .000 to 8.000 MHz.
3. Press **▶** until **UHF RPT** appears.
4. Repeatedly press **▲** or **▼**, or rotate **CH** to change the offset to a new value ranging from .000 (no offset) to 8.000 MHz.
5. Press **●** or **PTT** to store the setting and exit.

TURNING REPEATER OPERATION ON/OFF AND CHANGING THE OFFSET DIRECTION

To use the transceiver with a repeater, you must set either a + or – repeater offset direction. To turn on operation for use with a repeater in the VFO mode, press **F++/-**. The current offset indicator (+ or –) appears. To turn off repeater operation, repeatedly press **F++/-** until neither + or – appears.

If you want to reverse the repeater input and output frequencies, press **F+REV**.

MEMORY OPERATION

Your transceiver has 100 standard memory locations that you can use to store frequencies for quick access. You can store frequencies used for the VHF, UHF, AIR, and WX bands. When you store a frequency, other settings associated with that frequency (such as the repeater offset and CTCSS tones) are stored as well. ☑

STORING A TRANSMIT/RECEIVE FREQUENCY

1. Select the frequency you want to store.

Once you select a frequency, the other values such as the repeater offset and the CTCSS tones for that repeater are also stored in the memory location. To select other settings, see "Setting the Repeater Offset Frequency" on Page 5, "Setting the CTCSS Tones" on Page 6, and "Using DTMF Code" on Page 7.

2. Press **F+MW**. **MR** flashes and the lowest vacant memory location appears.
3. Repeatedly press **▲** or **▼** or turn **CH** to select the desired memory location.
4. Press **MW** or **F+MW** again to store the selected frequency and exit the memory mode. If a memory location already has a frequency stored in it, the new frequency is stored in its place.

RECALLING MEMORY LOCATIONS

To recall a saved memory location, press **MR**. **MR** appears and the last used memory

☑ NOTE ☑

Setting the Repeater Offset Frequency

This setting only affects the VFO mode. If you saved a frequency offset in a memory location, that setting is not affected.

Memory Operation

You cannot activate or deactivate the power save, auto power-shut off, time-out timer, frequency step, key tone on and off, and call features in memory mode.

NOTE

Clearing a Single Memory

You cannot clear memory location number 1.

Skipping Memory Channels While Scanning

You cannot skip memory channel 01.

location number appears beneath **MR**. Then turn **CH** or press **▲** or **▼** to select a different memory location. To return to VFO, press **●**.

CHECKING MEMORY LOCATION SETTINGS

To check all the settings stored in a memory location, press **MR**, then rotate **CH** (or use **▲** or **▼**) to select the desired memory location. Then hold down **M**. The settings stored in the memory location appear in sequence starting with the squelch setting value and ending with the frequency.

CLEARING A SINGLE MEMORY

Follow these steps to clear any single memory location. (To clear all memory locations, see "Resetting the Transceiver" on Page 11.)

1. Press **MR**. **MR** and the last used memory location number appear.
2. Repeatedly press **▲** or **▼**, or rotate **CH**, to select the desired memory location.
3. Press **F+CLR** (6). The selected memory location is cleared.

USING THE CALLING-FREQUENCY MEMORY

The calling-frequency memory location lets you quickly jump to a specific frequency. The preset calling frequency is 146.520 MHz in the VHF band and 446.000 MHz in the UHF band. You can store a different frequency into this memory, as well as other settings associated with that frequency, such as the repeater offset and CTCSS tone. You can use this feature when the transceiver is in VFO mode.

Press **CALL** to display the current calling frequency. The frequency (such as 146.520) and **C** appear. Press **CALL** again to return to VFO mode.

To change the stored frequency, select a new frequency, then press **F+CALL** (**CM**).

SCANNING OPERATION

SCANNING FOR ACTIVE FREQUENCIES

1. To search for activity on a frequency, press **SC**. The transceiver begins to scan up or down the band's full frequency range. The decimal point flashes as the transceiver scans. The displayed frequency stops on each active frequency for 8 seconds.

2. To change the scan direction, press **▲** or **▼** or rotate **CH**.
3. To stop on a frequency or to stop scanning, press **SC** or **PTT**.

SCANNING STANDARD MEMORY LOCATIONS

1. Press **MR** (so **MR** appears), then press **SC**. The decimal point flashes while the transceiver scans all but empty locations.
2. To change the scanning direction, press **▲** or **▼** or rotate **CH**.
3. To stop scanning, press **SC**, **PTT**, or **●**.

SKIPPING MEMORY CHANNELS WHILE SCANNING

While scanning memory channels, you can skip channels you do not want to receive. You cannot use this feature for normal frequencies.

To skip a channel, select the channel in memory mode, then press **F+M** (**SKIP**). **MR** flashes. Press **SC** to scan memory channels. You can also skip a channel when the transceiver stops while scanning by pressing **F+M** (**SKIP**). The transceiver resumes scanning after you press **F+M** (**SKIP**).

To clear a channel (turn off skip) skip memory, press **F+M** (**SKIP**).

CONTINUOUS TONE CODED SQUELCH SYSTEM FEATURES (CTCSS)

Your transceiver can transmit and receive a low-level, selectable subaudible tone at the same time as it receives (RX) or transmits (TX) a regular signal. This special tone lets you listen only to other radios set to the same tone frequency when you use the transceiver in simplex operation. The CTCSS feature also lets you match your HTX-420 to the subaudible tone frequency used by a local repeater.

SETTING THE CTCSS TONES

To set the RX and TX tones for the transceiver, follow these steps.

1. Repeatedly press **◀** or **▶** until **RX TONE** appears.
2. Press **▲** or **▼**, or rotate **CH** to select a frequency or no frequency (**CTCSS off**) from the table Page 7.
3. Press **▶** until **TX TONE** appears.

4. Press ▲ or ▼, or rotate **CH** to select a tone frequency from the list on Page 7.
5. Press ● or **PTT** to store the settings and exit.

USING THE CTCSS TONES

You can use a transmit tone, a receiver tone, or both. For example, if the selected repeater uses a receive only CTCSS tone, enable the transmit tone but not the receive tone on the HTX-420.

To enable only the **transmit (TX)** tone, press **F+T.SQL (1)**. **T** appears above the displayed frequency. Press **PTT** to store the setting.

To enable only the **receive (RX)** tone, press **F+T.SQL (1)** again. **SQ** appears above the displayed frequency. Press **PTT** to store the setting.

To enable both the **transmit (TX)** and **receive (RX)** tones, press **F+T.SQL (1)** again. **TSQ** appears above the displayed frequency. Press **PTT** to store the setting.

When you store a frequency in one of the 100 memory locations, all settings chosen for the selected frequency are stored as well. Before you store a frequency (see “Storing a Transmit/Receive Frequency” on Page 5), select the Subaudible Tone Frequencies first.

Subaudible Tone Frequencies (Hz)		
67.0	118.8	183.5
69.4	123.0	186.2
71.9	127.3	189.9
74.4	131.8	192.8
77.0	136.5	196.6
79.7	141.3	199.5
82.5	146.2	203.5
85.4	151.4	206.5
88.5	156.7	210.7
91.5	159.8	218.1
94.8	162.2	225.7
97.4	165.5	229.1
100.0	167.9	233.6
103.5	171.3	241.8
107.2	173.8	250.3
110.9	177.3	254.1
114.8	179.9	

USING DTMF CODE

DTMF (Dual-Tone Multi Frequency) tones are those typically associated with the use of your telephone. Your transceiver can transmit up to 16 separate DTMF tones and store a sequence of tones in up to 6 different memory locations (d1 to d6). You can use DTMF to transmit to a land-patch that is connected to a telephone line. This also lets you enable or disable certain repeater

functions, which is handy if you are involved with repeater administration. You can also signal to another radio equipped to receive DTMF codes.

1. Repeatedly press ◀ or ▶ until **dtmf** appears. If no DTMF codes are stored in memory, _ _ _ _ and **d1** appear.
2. Repeatedly press ▲ or ▼, or turn **CH** to select the desired DTMF memory location.
3. Enter up to 16 characters (0 through 9, and A through F; E=*, F=#). The radio sounds a short beep for each entry, and a long beep to indicate the sixteenth character. If you try to enter more than 16 characters, the radio sounds two short beeps.
4. To confirm the DTMF characters, hold down **F** and rotate **CH**, or press ▲ or ▼ to scroll it. If you make an entry error, press **F+CLR (6)** and repeat Step 3 again.

To enter another DTMF sequence, repeat Steps 2–4.

5. Press ● or **PTT** to store the sequence in the selected memory location. The transceiver returns to the VFO mode.

TRANSMITTING A DTMF CODE

You can transmit a DTMF code from stored memory or by direct entry.

TRANSMITTING A DTMF CODE FROM STORED MEMORY

1. Press **F+D.SEL**. The last stored DTMF sequence appears.
2. Repeatedly press ▲ or ▼, or rotate **CH** until you see the desired DTMF memory location. Then press **PTT** to exit.
3. Select a transmit frequency (see “Selecting Frequencies (Direct Tuning) and Receiving Transmissions” on Page 4).
4. Press **PTT+●** to transmit the selected DTMF code using the selected frequency.

TRANSMITTING A DTMF CODE USING DIRECT ENTRY

1. Hold down **PTT** (Push to Talk).
2. Enter each character of the desired DTMF code in order. The DTMF tone sounds to confirm your entry. ☞

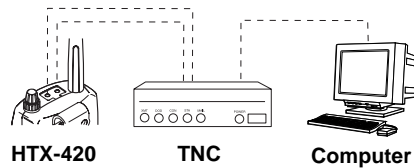
USING THE TRANSCEIVER WITH PACKET RADIO

You can connect your transceiver directly to a packet radio terminal node controller

NOTE

You can also hold down **PTT** and enter the first character of the DTMF sequence. Then, release **PTT** and continue to enter the balance of the characters as long as you enter each character within one second of the proceeding character entry.

(TNC). See the following diagram for a suggested connection. Refer to your TNC instructions for details.



LOCKING THE KEYPAD

To lock the transceiver's keypad so you do not accidentally change a setting, press **F+LOCK (DW)**. This locks all buttons except **PTT**, **PWR**, **F**, and **M**.

To unlock the keypad, press **F+LOCK (DW)** again.

LIGHTING THE DISPLAY

When you press any key except **PTT** or **F**, the backlight turns on for about 5 seconds. Press **M** to turn on the backlight.

TURNING THE KEY TONE ON AND OFF

The transceiver is preset to sound a beep each time you press a key. To turn off the beep, press **F+BEEP**. **BP-OFF** briefly appears. To have the beep sound again, press **F+BEEP** again.

SETTING THE FREQUENCY STEP

Follow these steps to change the frequency increment used during scanning and stepping to a frequency.

1. Press **F+STEP**. **STEP** and the current step setting (in kHz) appear.
2. Repeatedly press **▲** or **▼** or **CH** until the desired new setting appears. You can change the frequency step to 5 kHz, 6.25 kHz, 7.5 kHz, 10 kHz, 12.5 kHz, 15 kHz, 20 kHz, 25 kHz, or 50 kHz.
3. Press **●** or **PTT** to store your selection.

POWER SAVE

Power save conserves battery power by turning off power to the receiver part of the transceiver and turning it on briefly every 8 seconds to check for a transmission.

To enable power save, press **F+PS (5)**. **PS** appears.

To disable power save, press **F+PS (5)**. **PS** disappears.

USING AUTO POWER SHUTOFF

Follow these steps to have the transceiver automatically turn off after a preset period of non-use.

1. Press **F+APO (3)**. Auto Power Shutoff is normally disabled. **oFF** appears.
2. Repeatedly press either **▲** or **▼**, or turn **CH** to select a time period until power shutoff. You can select **oFF**, **30**, **60**, **90** or **120** minutes.
3. Press **PTT** or **●** to store your selection and exit.

To turn off auto power-shutoff, press **F+APO** again and select **oFF**.

LIMITING TRANSMIT DURATION (TIME-OUT TIMER)

When you communicate using repeaters, 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 if you exceed a set time limit with a single transmission.

To set a value for the time-out timer, press **F+TOT (4)**. The default setting **oFF** appears along with **TOT**. Repeatedly press **▲** or **▼**, or turn **CH** to select the desired time-out interval (up to 20 minutes). When you select a value for the time out feature, **TOT** appears. Press **●** or **PTT** to store the setting and exit to the VFO mode.

TUNING THE WEATHER RADIO FREQUENCIES

The transceiver can receive seven NOAA (National Oceanographic and Atmospheric Administration) weather broadcast frequencies. To listen to the channel broadcasting in your location, repeatedly press **●** to select the weather band. **WX** appears. Then rotate **CH** or repeatedly press **▲** or **▼** to select your local weather channel from the following table.

Channel Number	Frequency (MHz)
CH-1	162.400
CH-2	162.425
CH-3	162.450
CH-4	162.475
CH-5	162.500
CH-6	162.525
CH-7	162.550

USING THE SAME ALERT

Traditional weather radios simply receive the NOAA weather broadcast (usually within a 40-mile radius), then sound an alarm if any emergency code was transmitted along with the broadcast. People who live outside an affected area are often alerted even when their area is not affected, causing many of

NOTE

- When the transceiver receives no signal within an 8-second period, **PS** begins flashing indicating power save is active.
- When the transceiver receives a signal during the 8-second period, **PS** remains steady.
- The green signal indicator lights to indicate that a signal has been received and that power save is on stand-by.
- To use the transceiver for packet communications, disable power save (see "Using the Transceiver with Packet Radio" on Page 7).

them to potentially ignore real weather warnings that can save lives.

In 1994, NOAA began broadcasting SAME (Specific Area Message Encoding) codes along with their standard weather broadcasts from local stations in your area. SAME codes identify the type of emergency and the specific geographic area (such as a county) affected by the emergency. Your transceiver receives, interprets, and displays information about the codes so you can determine if the emergency might affect your area. Only SAME-compatible radios (such as this transceiver) are able to take advantage of this new technology.

Each SAME code identifies a specific geographic area (defined by the National Weather Service [NWS]), so your transceiver sounds an alert only when a weather emergency is declared in that area. This helps you more efficiently track the weather conditions in and around your area.

UNDERSTANDING SAME CODES

For the purpose of broadcasting weather information, the NWS divided the United States into regions by state and county (or parish, where applicable) then assigned a six-digit SAME code to identify each county or parish. For example, the code for Tarrant County, Texas, is 048439.

The first digit in a SAME code identifies the county subdivision, the next two digits identify the state, and the last three digits identify the county or parish. ☒

Your transceiver can receive all SAME alert signals broadcast within about a 40-mile radius. To receive SAME alerts and broadcasts about weather occurring only in particular counties within that area, you can program up to nine SAME codes into the transceiver's memory (see "Entering Your Area's SAME Codes" on Page 9). For example, this lets you avoid hearing an alert that applies to an area within a 40-mile radius but not necessarily to your county or parish.

TURNING ON THE SAME ALERT

When your local weather station broadcasts a weather alert signal, the transceiver sounds an alert tone and displays an alert code for 5 seconds, showing the level of alert being broadcast. Follow these steps to turn on the alert.

1. Repeatedly press ● to select the weather mode.
2. Repeatedly press ◀ or ▶ until **SAME** appears.
3. Press ▲ or ▼ to select **on**. ☒ appears.
4. Press ● or PTT to store the setting.

The transceiver displays one of the following codes when it receives an alert signal.

WARN for Warning

WATCH for Watches

STMT for Statement

TEST for Test

The weather alert operates only when the transceiver is in weather mode. ☒

ENTERING YOUR AREA'S SAME CODES

You can store up to nine SAME codes. Refer to the SAME codes at <http://www.nws.noaa.gov/nwr/indexnw.htm> for the corresponding codes for any specific area you wish to monitor for weather warnings or watches.

1. Repeatedly press ◀ or ▶ until **AREA** appears. If no SAME codes are stored in memory, _ _ _ _ and **A1** appear.
2. Repeatedly press ▲ or ▼ to select the desired memory location (A1–A9).
3. Enter your area's SAME code using the number keys.

If you want to enter another SAME code, repeat Steps 2 and 3.
4. Press ● or PTT to store the code and exit.

USING THE ELECTRONIC COMPASS

Your transceiver has an electronic compass that can display two digits of direction such as SE or NW and up to three digits of directional angle such as 360°, 180°, 90°, or 45° in five degree steps.

You must calibrate the electronic compass before using it.

1. Turn off the transceiver.
2. Place the transceiver horizontally on a flat surface that does not give off electrical or magnetic interference.
3. Hold down **COMP** and press **PWR**.
4. Place your index finger on the side of the transceiver's antenna and turn the transceiver clockwise or counterclockwise, twice, smoothly and continuously. Take 8 to 9 seconds to complete a circle.
5. Press PTT or ●. ☒

To use the electronic compass press **F+COMP (H/L)** to see the magnetic direction. The display provides 8 primary directions; **N**, **NE**, **E**, **SE**, **S**, **SW**, **W**, and **NW**. If you press any key, the compass display disappears. ☒

☒ NOTE ☒

Understanding SAME Codes

Most SAME codes begin with 0, which means the code represents an entire county. The NWS plans to eventually subdivide some large counties. When that happens, each subdivision will be assigned a digit from 1 through 9, resulting in codes such as 148439, 248439, and so on.

Turning on the SAME Alert

- When the SAME code is detected, the audio is muted.
- If you do not program any SAME codes into the transceiver's memory, the transceiver detects all SAME signals when the SAME function is on.

Using the Electronic Compass

- The compass is not intended to be used as a scientific instrument. The accuracy of the compass is affected by environmental factors in the area where the radio is being used. **CO-ERR** appears when the transceiver does not detect compass data. If **CO-ERR** appears, repeat Steps 1–5 to re-calibrate the compass.
- To use the electronic compass feature, you need to hold the transceiver within 30 degrees of a horizontal position.

SELECTING THE TRANSMIT POWER

You can select one of the three transmitting power levels: High (no display), Mid (M appears), and Low (L appears). To select the level, repeatedly press H/L.

CROSS BAND CHANNEL OPERATION

You can select a transmit frequency in the VHF band and a receive frequency in UHF band or vice versa. Or, you can select a transmit frequency and a receive frequency in the same band.

1. Press **F+XBO (SC)**. The main frequency is duplicated at the sub frequency display. **XB** appears to the right of the main frequency display.
2. Enter the transmit frequency on the main frequency display.
3. Press **F+REV (8)** to exchange the main frequency display and sub frequency display.
4. Enter the receive frequency on the main frequency display.
5. Press PTT to transmit using cross band.

To exit the cross band channel operation, press **F+XBO (SC)**.

DUAL WATCH

You can set the transceiver to check a specified channel every 2.5 seconds while receiving any other channel. If the transceiver finds a signal on the specified channel, it automatically switches to it.

1. Select a frequency you do not want to miss while you receive another frequency.
2. Press **DW**. The transceiver duplicates the selected frequency on the sub frequency display.
3. Select a frequency you want to receive on the main frequency display.

The transceiver scans the channel on the sub frequency display every 2.5 seconds.

If you press PTT, the transceiver transmits the frequency on the sub frequency display and the dual watch is canceled. If you want to transmit the frequency on the main frequency display, press **F+REV** to exchange the frequencies.

If you hold down M, the transceiver scans for the frequency on the sub frequency display until you release **M**.

RECEIVING THE AIR BAND

Repeatedly press **●** until **A** appears to select the airband at the top of the display. Press **▲** or **▼**, or rotate **CH** to tune to the frequency you want to hear. The air band receiving range is 108 to 136.9875 MHz.

CHANGING THE TRANSMIT FREQUENCY RANGE

You can change the standard transmit frequency ranges to extended ranges.

Standard Transmit Frequency Ranges:

2 m: 144–148 MHz

70 cm: 438–450 MHz

Extended Transmit Frequency Range:

2 m: 142.000–149.880 MHz

70 cm: 420.000–470.000 MHz

To extend the range, turn off the transceiver. Then while holding down **SC+9**, press **PWR**. To return to the standard range, repeat the above steps.

FCC INFORMATION

This device complies with Part 15 of the *FCC Rules*. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CARE

Keep the transceiver dry; if it gets wet, wipe it dry immediately. Use and store the transceiver only in normal temperature environments. Handle the transceiver carefully; do not drop it. Keep the transceiver away from dust and dirt, and wipe it with a damp cloth occasionally to keep it looking new.

ERR DISPLAY

If you use your transceiver in an area (such as a vehicle) that has many metal surfaces, the transmitted signal can reflect back into the radio and cause the PLL circuit to unlock. If this happens, **ERR** appears. This is an inherent problem with this type of transceiver.

To avoid this problem, you can try reducing output power, use an external antenna, or relocate the transceiver when **ERR** appears. If **ERR** appears even when you are using an external antenna located away from the transceiver, service might be required.

NOTE

Cross Band Channel Operation

You cannot transmit and receive at the same time.


Changing the Transmit Frequency Range

The extended transmit frequency range feature is only for MARS, CAP, and public service users. Once you change the setting to the extended ranges, be sure not to transmit on those frequencies unless you are licensed to do so.

SERVICE AND REPAIR

If your transceiver is not performing as it should, take it to your local RadioShack store for assistance. Modifying or tampering with the transceiver's internal components can cause a malfunction and might invalidate its warranty and void your FCC authorization to operate it.

RESETTING THE TRANSCEIVER

If the transceiver's display locks up or the transceiver does not work properly after you turn it on, you might need to reset it. 

To reset the transceiver, turn it off then hold down **F+6** and turn it on again. All the display indicators appear to confirm the reset operation. Release **F+6**.

CAUTION

This procedure clears all the information you have programmed into the transceiver. Before you reset the transceiver, try turning it off then on again to see if it begins working properly.

SPECIFICATIONS

GENERAL

Frequency:

2-Meter.....	TX: 144–148 MHz, RX: 137–174 MHz
70-cm.....	TX: 438–450 MHz, RX: 420–512 MHz
Air Band.....	108.000-136.9875 MHz

Weather Band CH1–CH7

Frequency Generation PLL Synthesizer

Frequency Stability ± 10 ppm

Operating Temperature 14° to 140° F (–10° to 60° C)

Operating Voltage DC 5 V to 13.8 V

Modulation F3E

Impedance 50 ohm

Dimension (HWD)..... 4¹/₂ × 2²/₅ × 1¹/₅ (122 × 61 × 31 mm)

Weight (w/rechargeable battery) 11.46 oz (325g)

RECEIVER

Circuit Type Dual Conversion, Superheterodyne

IF Frequency:

1st IF.....	45 MHz
2nd IF.....	450 kHz

Sensitivity 0.2 µV For 12dB Sinad

Distortion..... 5% Max

S/N Ratio..... 34 dB Min.

Audio Output @ 10% THD..... 300 mW at 8 ohm

TRANSMITTER

Power Output..... 3 W, DC 7.2 V 4 W, DC 13.8 V

Distortion (nominal)..... 3%

Deviation..... ± 5 kHz Max.

S/N Ratio..... 32 dB

Current Drain 1200 mA, DC 7.2 V 1500 mA, DC 13.8 V 

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

NOTE

The software protocol and construction for a PC interface cable is available in the 19-1108 Service Manual. You can order a service manual through your local RadioShack store.

Limited One-Year Warranty

This product is warranted by RadioShack against manufacturing defects in material and workmanship under normal use for one (1) year from the date of purchase from RadioShack company-owned stores and authorized RadioShack franchisees and dealers. EXCEPT AS PROVIDED HEREIN, RadioShack MAKES NO EXPRESS WARRANTIES AND ANY IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE DURATION OF THE WRITTEN LIMITED WARRANTIES CONTAINED HEREIN. EXCEPT AS PROVIDED HEREIN, RadioShack SHALL HAVE NO LIABILITY OR RESPONSIBILITY TO CUSTOMER OR ANY OTHER PERSON OR ENTITY WITH RESPECT TO ANY LIABILITY, LOSS OR DAMAGE CAUSED DIRECTLY OR INDIRECTLY BY USE OR PERFORMANCE OF THE PRODUCT OR ARISING OUT OF ANY BREACH OF THIS WARRANTY, INCLUDING, BUT NOT LIMITED TO, ANY DAMAGES RESULTING FROM INCONVENIENCE, LOSS OF TIME, DATA, PROPERTY, REVENUE, OR PROFIT OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, EVEN IF RadioShack HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

In the event of a product defect during the warranty period, take the product and the RadioShack sales receipt as proof of purchase date to any RadioShack store. RadioShack will, at its option, unless otherwise provided by law: (a) correct the defect by product repair without charge for parts and labor; (b) replace the product with one of the same or similar design; or (c) refund the purchase price. All replaced parts and products, and products on which a refund is made, become the property of RadioShack. New or reconditioned parts and products may be used in the performance of warranty service. Repaired or replaced parts and products are warranted for the remainder of the original warranty period. You will be charged for repair or replacement of the product made after the expiration of the warranty period.

This warranty does not cover: (a) damage or failure caused by or attributable to acts of God, abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation or maintenance, alteration, lightning or other incidence of excess voltage or current; (b) any repairs other than those provided by a RadioShack Authorized Service Facility; (c) consumables such as fuses or batteries; (d) cosmetic damage; (e) transportation, shipping or insurance costs; or (f) costs of product removal, installation, set-up service adjustment or reinstallation.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

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