



**RadioShack®**

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**200-Channel VHF/AIR/UHF  
Desktop Scanner  
with WX Alert**



20-423 **A**

Owner's Manual

Please read before using this equipment.

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## Introduction

Thank you for purchasing the RadioShack 200-Channel VHF/AIR/UHF Desktop Scanner. This scanner gives you direct access to over 25,000 frequencies, including those used by police and fire departments, ambulance services, government agencies, air, and amateur radio services. You can select up to 200 channels to scan, and you can change your selection at any time.

The secret to your scanner's ability to scan so many frequencies is its built-in microprocessor. Your scanner also has these special features:

**Four Service Banks** — let you search preset frequencies in separate fire/police, air, ham radio, and marine banks, to make it easy to locate specific types of calls.

**Two-Second Scan Delay** — delays scanning for 2 seconds before moving to another channel, so you can hear more replies.

**Ten Channel-Storage Banks** — let you store up to 20 channels in each of 10 different banks, to group channels so you can more easily identify calls.

**20 Monitor Memories** — let you temporarily save up to 20 frequencies you locate during a search, so you can move selected frequencies to channel storage later.

**Memory Backup** — keeps the channel frequencies stored in memory for about 1 hour during a power loss.

**HyperSearch™** and **HyperScan™** — let you set the scanner to search at up to 50 steps per second and to scan at up to 25 channels per second, to help quickly find interesting transmissions.

**Duplicate Frequency Check** — automatically notifies you if you are about to store a frequency you have already stored, to help avoid wasting storage space.

**Direct Search** — lets you search for new and unlisted frequencies starting from a specified frequency.

**Priority Channel** — lets you program a frequency in the priority channel to be scanned every 2 seconds so you do not miss important calls.

**Weather Band (WX) Key** — scans seven preprogrammed weather frequencies to keep you informed about current weather conditions.

**Weather Alert** — automatically sounds the alarm tone to advise of hazardous weather conditions when the scanner detects an alert signal on the local NOAA weather channel.

**Lock-Out Function** — lets you set your scanner to skip over specified channels or frequencies when scanning or searching.

**Liquid Crystal Display** — makes it easy to view and change programming information at any time.

**Display Backlight** — makes the scanner easy to read in low light situations.

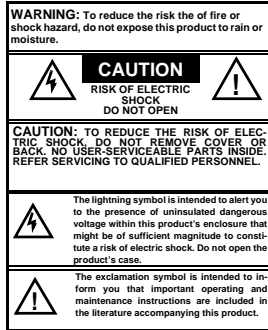
**Supplied Telescoping Antenna** — lets the scanner receive strong local signals.

**External Antenna Terminal** — lets you connect an external antenna (not supplied) to the scanner.

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**Dual Conversion** — helps prevent interference from image frequencies.



Your scanner receives these frequencies (MHz):

29–30	10m Amateur Radio
30–50	VHF Lo
50–54	6 m Amateur Radio
108–136.9875	Air
137–144	Government
144–148	2 m Amateur Radio
148–174	VHF Hi
380–420	Government
420–450	70 cm Amateur Radio
450–470	UHF Lo
470–512	UHF “T” Band

## FCC NOTICE

Your scanner might cause TV or radio interference even when it is operating properly. To determine whether your scanner is causing the interference, turn off your scanner. If the interference goes away, your scanner is causing it. Try to eliminate the interference by:

- moving your scanner away from the receiver

- connecting your scanner to an outlet that is on a different electrical circuit from the receiver
- contacting your local RadioShack store for help

If you cannot eliminate the interference, the FCC requires that you stop using your scanner.

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.

## SCANNING LEGALLY

Your scanner covers frequencies used by many different groups including police and fire departments, ambulance services, government agencies, private companies, amateur radio services, military operations, pager services, and wireline (telephone and telegraph) service providers. It is legal to listen to almost every transmission your scanner can receive. However, there are some transmissions you should never intentionally listen to. These include:

- telephone conversations (cellular, cordless, or other private means of telephone signal transmission)
- pager transmissions
- any scrambled or encrypted transmissions

According to the *Electronic Communications Privacy Act (ECPA)*, you are subject to fines and possible imprisonment for intentionally listening to, using, or divulging the contents of such a transmission unless you have the consent of a party to the communication (unless such activity is otherwise illegal).

This scanner has been designed to prevent reception of illegal transmissions. This is done to comply with the legal requirement that scanners be manufactured so as to not be easily modifiable to pick up those transmissions. Do not open your scanner's case to make any modifications that could allow it to pick up transmissions that it is not

legal to listen to. Doing so could subject you to legal penalties.

We encourage responsible, legal scanner use.

**Warning:** Modification of this device to receive cellular radio telephone service signals is prohibited under *FCC rules* and under federal law.

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## □ Preparation

### POWER SOURCES

#### Using AC Power

You can power the scanner using the supplied 12V, 300mA AC adapter.

##### Cautions:



You must use a Class 2 power source that supplies 12V DC and delivers at least 300 mA.

Its center tip must be set to positive and its plug must fit the scanner's **DC12V** jack. The supplied adapter meets these specifications. Using an adapter that does not meet these specifications could damage the scanner or the adapter.

- Always connect the AC adapter to the scanner before you connect it to AC power. When you finish, disconnect the adapter from AC power before you disconnect it from the scanner.

**Warning:** To prevent electric shock, do not use the AC adapter's polarized plug with an extension cord, receptacle, or other outlet unless you can fully insert the blades to prevent blade exposure.

Follow these steps to power the scanner from a standard AC outlet.

1. Insert the AC adapter's barrel plug into the **DC12V** jack on the back of the scanner.
2. Plug the adapter into a standard AC outlet.

#### Using Vehicle Battery Power

You can power the scanner from a vehicle's 12V power source (such as cigarette-lighter socket) using a 12V, 300-mA DC cord and a size M Adaptaplug™ connector (neither supplied). Both are available at your local RadioShack store.

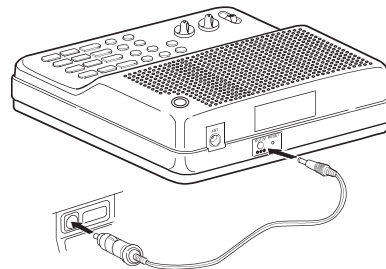
##### Cautions:



You must use a power cord that can carry 12V DC and at least 300 mA. Its center tip must be set to positive and its plug must fit the scanner's **DC12V** jack. Using a cord that does not meet these specifications could damage the scanner or the cord.

- Always connect the DC cord to the scanner before you connect it to the power source. When you finish, disconnect the cord from the power source before you disconnect it from the scanner.

Follow these steps to power the scanner from a vehicle's cigarette-lighter socket.



1. Connect the adaptaplug connector to the DC cord so the tip reads positive (+).
2. Insert the DC cord's barrel plug into the **DC12V** jack on the back of the scanner.

3. Plug the cord into the vehicle's cigarette-lighter socket.

**Notes:**

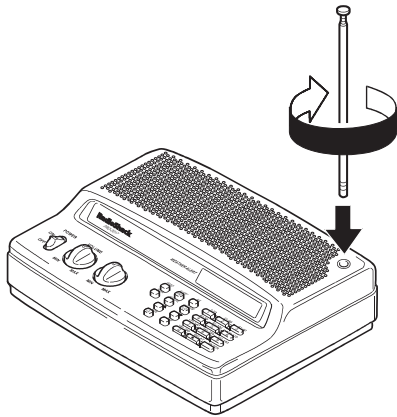
- If you use a 12V DC cord and your vehicle's engine is running, you might hear electrical noise on the scanner caused by the engine. This is normal.
- Mobile use of this scanner is unlawful or requires a permit in some areas. Check the laws in your area.

## CONNECTING AN ANTENNA

### Connecting the Supplied Antenna

You must install an antenna before you can operate the scanner.

The supplied telescoping antenna helps your scanner receive strong local signals. To install the antenna, thread it clockwise into the hole on top of the scanner.



The scanner's sensitivity depends on its location and the antenna's length. For the best reception of the transmissions you want

to hear, adjust the antenna's length according to the chart below.

Frequency	Antenna Length
29–174 MHz	Extend fully
380–512 MHz	Extend 2 segments

### Connecting an Outdoor Antenna

Instead of the supplied antenna, you can connect an outdoor base-station or mobile antenna (neither supplied) to your scanner. Your local RadioShack store sells a variety of antennas. Choose the one that best meets your needs.

When deciding on an outdoor antenna and its location, consider these points:

- The antenna should be located as high as possible.
- The antenna and antenna cable should be as far as possible from sources of electrical noise (appliances, other radios, and so on).
- The antenna should be vertical for the best performance.

To connect an optional base-station or mobile antenna, first remove the supplied antenna from the scanner. Always use 50 Ohm coaxial cable, such as RG-58 or RG-8, to connect the base-station or mobile antenna. For lengths over 50 feet, use RG-8 low-loss dielectric coaxial cable. If the antenna cable's connector does not fit in the **ANT** jack on the back of the scanner, you might also need a PL-259-to-Motorola antenna plug adapter. Your local RadioShack store carries a wide variety of coaxial antenna cable and connectors.

Once you choose an antenna, follow the mounting instructions supplied with the antenna. Then route the antenna's cable to

the scanner and connect the cable to the **ANT** jack.

**Warning:** Use extreme caution when you install or remove an outdoor antenna. If the antenna starts to fall, let it go! It could contact overhead power lines. If the antenna touches a power line, contact with the antenna, mast,

cable, or guy wires can cause electrocution and death. Call the power company to remove the antenna. Do not attempt to do so yourself.

**Caution:** Do not run the cable over sharp edges or moving parts that might damage it.

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## □ Understanding Your Scanner

Once you understand a few simple terms used in this manual and familiarize yourself with your scanner's features, you can put the scanner to work for you. You simply determine the type of communications you want to receive, then set the scanner to scan them.

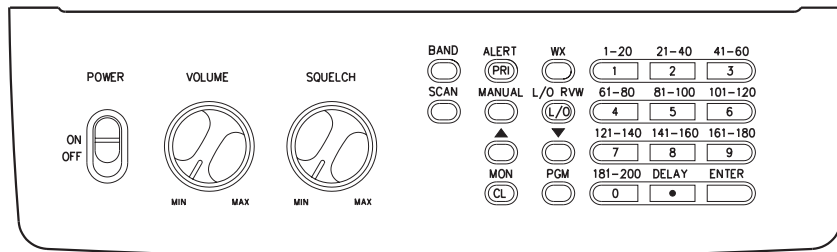
A **frequency** is the tuning location of a station (expressed in kHz or MHz). To find active frequencies, you can use the **search** function.

You can also search the **service-search banks**, which are preset groups of frequencies categorized by type of service.

When you find a frequency, you can store it into a programmable memory location called a **channel**, which is grouped with your other channels in a **channel-storage bank**. You can then **scan** the channel-storage banks to see if there is activity on the frequencies stored there. Each time the scanner finds an active frequency, it stays on that channel until the transmission ends.

## A LOOK AT THE CONTROLS

Some of the scanner's keys perform more than one function (such as **MON/CL**) and are marked with more than one label. The steps in this Owner's Manual show only the label on the key appropriate to the action being performed.



**POWER** — turns the scanner on and off.

**VOLUME** — adjusts the volume.

**SQUELCH** — adjusts the scanner's sensitivity to an incoming signal.

**BAND** — lets you search service banks.

**PRI/ALERT** — turns the priority function on and off, or sets the scanner to WX alert mode.



**WX** — scans through the seven preprogrammed weather channels.

**SCAN** — scans through the programmed channels.

**MANUAL** — stops scanning and lets you directly enter a channel number.

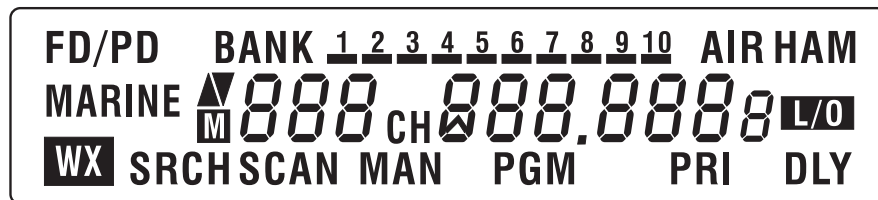
**L/O RVW, L/O (Lock Out Review/Lock Out)** — lets you review locked-out frequencies, or lets you lock out selected channels/frequencies so they will not be scanned or searched.

▲ and ▼ — enters the direction the scanner will search or scan.

**MON/CL (Monitor/Clear)** — accesses the 20 monitor memories or clears an incorrect entry.

## A LOOK AT THE DISPLAY

The display shows the scanner's current operating mode.



**FD/PD** — appears when you search the fire/police service bank.

**BANK** — appears with numbers (1–10). Bank numbers with a bar under them show which ones are turned on for scanning.

**AIR** — appears when you search the air service bank.

**HAM** — appears when you search the ham radio service bank.

**MARINE** — appears when you search the marine service bank.

**PGM (Program)** — programs frequencies into channels.

**Number Keys** — each key has a single-digit label and a range of numbers. Use the digits on the keys to enter the numbers for a channel or a frequency. Use the range of numbers above the key (21–40, for example) to select the channel in a channel-storage bank.

**DELAY/.** — programs a 2-second delay for the selected channel, or enters a decimal point (necessary when programming frequencies).

**ENTER** — enters frequencies into channels.

▲ or ▼ — indicates the search or scan direction.

**M** — flashes with a number (1–20) to show which monitor memory you are listening to.

**CH** — the digits that precede this indicator (1–200 and P) show which channel the scanner is tuned to.

**L/O** — appears when you manually select a channel you locked out while scanning or when you review a locked out frequency.

**WX** — appears when you scan the weather channels.

**SRCH** — appears during service bank and direct frequency searches.

**SCAN** — appears when you scan channels.

**MAN** — appears when you manually select a channel.

**PGM** — appears while you program frequencies into the scanner's channels.

**PRI** — appears when you turn on the priority feature.

**DLY** — appears when you program a 2-second delay.

**Error** — appears when you make an entry error.

**-dUPL-** (Duplicate) — appears when you try to store a frequency that is already stored in another channel.

**-d-** — appears during a direct frequency search.

**-b-** — appears during a service bank frequency search.

**Ch-FULL** — appears when you try to enter a frequency during a search when all channels are full.

**F L-out** — appears when you start direct search from a locked-out frequency.

**FLo -FULL** — appears when you try to lockout a frequency during a search when 50 frequencies are already locked out.

**L-r** — appears when you review the lockout frequencies.

**dEFAULT** — appears when you unlock all the locked-out frequencies from the service bank.

**FLo ALL-CL** — appears when you remove all the locked out frequencies during a service bank/direct search.

**P** — appears when the scanner is tuned to the priority channel.

**ALert** — appears when the scanner is watching the WX alert tone.

**WIrEd** — appears when you turn on the wired programming mode.

**StArt** — appears when the scanner starts wired programming.

**C-Err** — appears when the scanner receives a check sum error during wired programming.

**D-Err** — appears when the scanner finds a data error while using wired programming.

**End** — appears when the scanner finishes wired programming.

**oFF tone** — appears when you set the key tone off.

**on tone** — appears when you set the key tone on.

## UNDERSTANDING SERVICE BANKS/BANKS

### Channel Storage Banks

To make it easier to identify and select the channels you want to listen to, channels are divided into 10 banks of 20 channels each. Use each channel-storage bank to group frequencies, such as those used by the police department, fire department, ambulance services, or aircraft (see "Guide to the Action Bands" on Page 23). For example, the police department might use four frequencies, one for each side of town. You could program the police frequencies starting with Channel 1 (the first channel in bank 1) and program the fire department frequencies starting with Channel 21 (the first channel in bank 2).

## Service Banks

The scanner is preprogrammed with the frequencies allocated by fire/police, aircraft, ham radio, and marine services. In these service banks, you can search through the frequencies and store them in channels for fire/police, aircraft, ham radio, and marine banks. This is handy for quickly finding active frequencies instead of searching through an entire band.

**Note:** The frequencies in the scanner's service bank are preset. You cannot change them.

### Air

Group	Frequency Range (MHz)	Step (kHz)
—	108.000–136.9875	12.5

### Amateur Radio

Group	Frequency Range (MHz)	Step (kHz)
1	29.000–29.700	5
2	50.000–54.000	5
3	144.000–148.000	5
4	420.000–450.000	12.5

**Marine**

Channel	Frequency (MHz)	Channel	Frequency (MHz)
06	156.3000	64	156.2250
07	156.3500	65	156.2750
08	156.4000	66	156.3250
09	156.4500	67	156.3750
10	156.5000	68	156.4250
11	156.5500	69	156.4750
12	156.6000	70	156.5250
13	156.6500	71	156.5750
14	156.7000	72	156.6250
15	156.7500	73	156.6750
16	156.8000	74	156.7250
17	156.8500	77	156.8750
18	156.9000	78	156.9250
19	156.9500	79	156.9750
20	157.0000/161.6000	80	157.0250
21	157.0500	81	157.0750
22	157.1000	82	157.1250
23	157.1500	83	157.1750
24	157.2000/161.8000	84	157.2250/161.8250
25	157.2500/161.8500	85	157.2750/161.8750
26	157.3000/161.9000	86	157.3250/161.9250
27	157.3500/161.9500	87	157.3750/161.9750
28	157.4000/162.0000	88	157.4250

**Fire/Police**

<b>Group</b>	<b>Frequency Range (MHz)</b>	<b>Step (kHz)</b>
1	33.420–33.980	20
	37.020–37.420	20
	39.020–39.980	20
	42.020–42.940	20
	44.620–45.860	40
	45.880	—
	45.900	—
	45.940–46.060	40
	46.080–46.500	20
2	153.770–154.130	60
	154.145–154.445	15
	154.650–154.950	15
	155.010–155.370	60
	155.415–155.700	15
	155.730–156.210	60
	158.730–159.210	60
	166.250	—
	170.150	—
3	453.0375–453.9625	12.5
	458.0375–458.9625	12.5
	460.0125–460.6375	12.5
	465.0125–465.6375	12.5

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## □ Operation

### TURNING ON THE SCANNER/SETTING VOLUME AND SQUELCH

1. Turn **SQUELCH** fully counterclockwise until the indicator points to **MIN**.
2. Slide **POWER** to **ON** to turn on the scanner.
3. Turn **VOLUME** clockwise until you hear a hissing sound.
4. Turn **SQUELCH** clockwise, just until the hissing sound stops.

#### Notes:

- To listen to a weak or distant station, turn **SQUELCH** counterclockwise. If reception is poor, turn **SQUELCH** clockwise to cut out weak transmissions.
  - If **SQUELCH** is adjusted so you always hear a hissing sound, the scanner does not scan or search properly.
5. To turn off the scanner when you finish, slide **POWER** to **OFF**.

### STORING KNOWN FREQUENCIES INTO CHANNELS

Good references for active frequencies are the RadioShack *Police Call*, *Aeronautical Frequency Directory*, and *Maritime Frequency Directory*. We update these directories every year, so be sure to get a current copy.

Follow these steps to store frequencies into channels.

1. Press **PGM**, enter the channel number (1–200) where you want to store a frequency, then press **PGM** again. The channel number appears.
2. Use the number keys and **•** to enter the frequency (including the decimal point) you want to store.
3. Press **ENTER** to store the frequency into the channel.

#### Notes:

- If you made a mistake in Step 2, **Error** appears and the scanner beeps when you press **ENTER**. Simply start again from Step 2.
- Your scanner automatically rounds the entered frequency down to the closest valid frequency. For example, if you enter a frequency for 151.473, your scanner accepts it as 151.470.
- If you entered a frequency that is already stored in another channel, the scanner beeps three times and displays the lowest channel number where the frequency is already stored, and **-dUPL-** then the frequency flashes. If you want to store the frequency anyway, press **ENTER** again. Press **MON/CL** to clear the frequency.
- Press **DELAY** if you want the scanner to pause 2 seconds on this channel after a transmission ends before it proceeds to the next channel (see “Using the Delay Function” on Page 20). The scanner also stores this setting in the channel.

4. To program the next channel in sequence, press **PGM** and repeat Steps 2 and 3.

## FINDING AND STORING ACTIVE FREQUENCIES

### Searching the Service Banks

Your scanner contains groups of preset frequencies called service banks. Each service bank is associated with a specific activity (see “Understanding Service Banks/Banks” on Page 10). You can search for fire/police, air, ham, and marine transmissions even if you do not know the specific frequencies that are used in your area. Then you can store the frequencies you found into the scanner's channels or monitor memories.

**Note:** You can use the scanner's delay feature while searching the service banks (see “Using the Delay Function” on Page 20).

The following steps describe the operation of the HAM, FD/PD, and AIR service banks. To listen to the marine bank, see “Listening to the Marine Bank” on Page 19.

1. Press **BAND**. The last selected band name (such as **HAM**), **SRCH**, **-b-**, the frequency and the group number (if any) appear.
2. To select a different band, repeatedly press **BAND** until the desired band name appears on the display. After about 2 seconds, the scanner begins searching rapidly up or down in that band for an active frequency.

**Notes:**

- To search through the frequencies, hold down **▲** or **▼** for a few seconds. The scanner tunes through the frequencies until it finds an active frequency .

- To reverse the search direction at any time, hold down **▲** or **▼** until the scanner reverses the search direction.
- To search the band up or down in small increments repeatedly press and release **▲** or **▼** (see “Service Banks” on Page 11).
- To pause the search while receiving a signal, press and release **▲** or **▼** . To continue the search, hold down **▲** or **▼** for about 2 seconds.
- To move quickly up or down through the frequencies, press and hold down **▲** or **▼** . The scanner tunes through the frequencies until you release **▲** or **▼** .
- Use the number keys to select search groups.

3. When the scanner finds an active frequency, it stops searching and displays the frequency's number. To store the displayed frequency in the lowest available channel, press **PGM** then press **ENTER**. The channel and frequency flash twice, and the scanner stores the displayed frequency. The scanner then continues to search for frequencies.

**Notes:**

- If there is no empty channel, **Ch-FULL** appears when you press **PGM**. To store more frequencies, you must clear some channels. See “Clearing a Stored Channel” on Page 18. To continue searching after **Ch-FULL** appears, press and hold down **▲** or **▼** .
- If you entered a frequency that is already stored in another channel, **-dUPL-** and the lowest-numbered channel containing the duplicate

frequency flash for about 3 seconds. If you want to store the frequency anyway, press **ENTER** again. You can delete the frequency later.

4. To store the displayed frequency in the selected channel, press **PGM**, press the channel number you want to enter the channel and press **PGM** again, then press **ENTER**. The channel and frequency flash twice, and the scanner stores the displayed frequency. The scanner continues to search for frequencies.
5. To store the displayed frequency in the monitor memory, press **MON/CL**. The monitor memory number, **M**, and the frequency flash twice.
6. To search for another active frequency in the selected band, hold down **▲** or **▼** until the radio begins searching.
7. To select a different band and search for another active frequency, begin again from Step 2.

## Using Direct Search

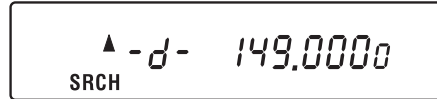
During a direct search, the scanner searches up or down, starting from a frequency you specify. Follow these steps to use direct search.

**Note:** You can use the scanner's delay feature while using direct search.

1. Press **MANUAL** or **PGM**, then enter the frequency (including the decimal point) you want to use as a starting point for the search.

**Note:** To start from a frequency already stored in one of your scanner's channels, press **MANUAL** or **PGM**, enter the desired channel number, then press **MANUAL** or **PGM** again.

2. Hold down **▲** or **▼** for a few seconds to search up or down. **-d-**, **SRCH**, and **▲** or **▼** appear on the display.



### Notes:

- To reverse the search direction at any time, hold down **▲** or **▼** for a few seconds.
  - To search up or down in the selected band in small increments (in steps of 5 or 12.5 kHz), press and release **▲** or **▼**.
  - To pause the search, press and release **▲** or **▼**. To begin searching again, hold down **▲** or **▼**.
  - To quickly move up or down through the frequencies, press and hold down **▲** or **▼**. The scanner tunes through the frequencies until you release **▲** or **▼**.
3. When the scanner finds an active frequency, it stops searching and displays the frequency. To store the displayed frequency in the lowest available channel, press **PGM** then press **ENTER**. The channel and frequency flash twice, and the scanner stores the frequency. The scanner continues to search for frequencies.

### Notes:

- If there is no empty channel, **Ch-FULL** appears. To store more frequencies, you must clear some channels. "Clearing a Stored Channel" on Page 18. To continue searching after **Ch-FULL** appears, press and hold down **▲** or **▼**.



- If you entered a frequency that is already stored in another channel, **DUPL-** and the lowest-numbered channel containing the duplicate frequency flash for about 3 seconds. If you want to store the frequency anyway, press **ENTER** again.
  - To store the displayed frequency in the selected channel, press **PGM**, press the channel number you want to use and press **PGM** again, then press **ENTER**. The channel and frequency flash twice, and the scanner stores the frequency. Then the scanner continues to search for frequencies.
4. To store the frequency in the monitor memory, press **MON/CL. M**, the monitor memory number, and the frequency flash twice.
  5. To search for another active frequency, hold down **▲** or **▼**.

## USING THE MONITOR MEMORY

The scanner has 20 monitor memories that you can use to temporarily store frequencies while you decide whether to save them into channels. This is handy for quickly storing an active frequency when you are searching through an entire band. You can store a frequency into a monitor memory during a service bank or direct search.

You can select monitor memories manually, but you cannot scan them. See "Listening to a Monitor Memory Frequency."

### Listening to a Monitor Memory Frequency

To recall a frequency stored in the monitor memory, press **MANUAL** then **MON/CL. M**, the monitor memory number, and **CH** flash and

the current monitor memory frequency appears. To select other monitor memories, enter the desired monitor memory's number (1–20), then press **MON/CL** again.

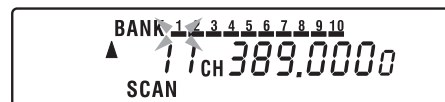


### Moving a Frequency from a Monitor Memory to a Channel

1. Press **PGM**, enter the channel number where you want to store the frequency, then press **PGM** again. **PGM** and the selected channel number appear.
2. Press **MON/CL. M**, a monitor memory number, and **CH** flash, and the monitor memory frequency appear.
3. Enter the desired monitor memory's number (1–20), then press **MON/CL** again. The selected monitor memory's frequency appears.
4. Press **ENTER**. The scanner stores the frequency in the selected channel.
5. To move another monitor memory frequency to the next channel, press **PGM** and repeat Steps 2–4.

## SCANNING THE STORED CHANNELS

To set the scanner to continuously scan through all channels with stored frequencies, press **SCAN**. **SCAN** and **▲** appear, and the scanner begins to rapidly scan until it finds an active frequency.



If the scanner finds an active frequency, it stops and displays that channel and

frequency number, then it automatically begins scanning again when the transmission ends on that frequency.

## Scanning Options

While scanning you can select from several options to enhance your scanning enjoyment.

- To reverse the scanning direction at any time, press **▲** or **▼**.
- To set the scanner to remain on the current channel for 2 seconds after the transmission ends, see “Using the Delay Function” on Page 20.
- To set the scanner to remain on the current channel even after the transmission stops, press **MANUAL** at any time during the transmission so **MAN** appears and **SCAN** disappears. See “Monitoring a Stored Channel.”
- To lock out channels so the scanner does not stop for a transmission on those channels, see “Locking Out Channels and Frequencies” on Page 20.

## TURNING CHANNEL STORAGE BANKS ON AND OFF

To turn off banks while scanning, press the bank’s number key until the bar under the bank’s number disappears. The scanner does not scan any of the channels within the banks you have turned off.

To turn on banks while scanning, press the bank’s number key until a bar appears under the bank’s number.

### Notes:

- You cannot turn off all banks. There must be at least one active bank.

- You can manually select any channel in a bank, even if the bank is turned off.
- When you turn on the bank while scanning, the scanner moves to the selected bank’s first channel and continues scanning.

## MONITORING A STORED CHANNEL

You can continuously monitor a specific channel without scanning. This is useful if you hear an emergency broadcast on a channel and do not want to miss any details — even though there might be periods of silence — or if you simply want to monitor that channel.

Follow these steps to manually select a channel.

1. Press **MANUAL**.
2. Enter the channel number (1–200).
3. Press **MANUAL** again.

## CLEARING A STORED CHANNEL

If you no longer want a frequency stored in a channel (and you do not want to replace that frequency with a different one), follow these steps to clear the stored frequency.

1. Press **MANUAL** to exit the service banks or to stop scanning.
2. Use the number keys to select the desired channel number, then press **MANUAL**.
3. Press **PGM**. **PGM** appears.
4. Press **0**, then press **ENTER**. The frequency number changes to **000 . 0000** to indicate the channel is cleared.

- To clear another channel, use the number keys to enter that channel number, then press **PGM** again. Or, repeatedly press **PGM** until the desired channel number appears. Then repeat Step 4.

## LISTENING TO THE MARINE BANK

- To listen to the marine bank, repeatedly press **BAND** until **MARINE** appears.
- To change the channel, press either **▲** or **▼**, or enter the two-digit channel.
- To scan through the marine bank, rotate **SQUELCH** clockwise until the hiss just disappears, then hold down either **▲** or **▼** for about 2 seconds. **MAN** disappears and **SCAN** appears.
- To exit scanning and to change the channel manually, hold down **▲** or **▼** for about 2 seconds.

## LISTENING TO THE WEATHER BAND

The FCC (Federal Communications Commission) has allocated seven frequencies for use by the National Oceanic and Atmospheric Administration (NOAA). NOAA broadcasts your local forecast and regional weather information on one or more of these frequencies. We have programmed your scanner with these seven frequencies.

To hear your local forecast and regional weather information, press **WX**. The scanner begins to scan the weather band.

You will probably receive one frequency better than the others for your area. The scanner should stop within a few seconds on that frequency. If the broadcast is weak, press **WX** again to resume scanning.

## Weather Channel Frequency Chart

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

## Using the Weather Alert

This scanner can receive NOAA weather alert tone broadcasts in case of an emergency. The weather alert tone sound warns you of serious weather conditions.

To listen for an alert tone, press **PR/ALERT** while you are tuned to the weather channel. **ALERT** appears. If the scanner detects a weather alert, it sounds a tone. Press any key to mute the tone. To cancel the alert monitoring and return to the weather channel standard broadcast, press **PR/ALERT** again.

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## □ **Special Features**

### **USING THE DELAY FUNCTION**

Many agencies use a two-way radio system that has a period of several seconds between a query and a reply. To avoid missing a reply, you can program a 2-second delay into any channel or frequency.

When your scanner stops on any channel or frequency with a programmed delay, **DLY** appears and the scanner continues to monitor that frequency for an additional 2 seconds after the transmission stops before resuming scanning or searching.

You can program a 2 second delay in any of these ways:

- If the scanner is scanning and stops on an active channel, quickly press **DELAY** before it continues scanning.
- If the desired channel is not selected, manually select the channel, then press **DELAY**.
- If the scanner is searching, press **DELAY**. **DLY** appears and the scanner automatically adds a 2-second delay to every transmission it stops on in that band.

To turn off the delay, press **DELAY** while the scanner is monitoring the channel or frequency. **DLY** disappears.

### **LOCKING OUT CHANNELS AND FREQUENCIES**

You can increase the scanning or search speed by locking out individual channels or frequencies that have a continuous transmission, such as a weather channel (see the "Weather Channel Frequency

Chart" on Page 19) or birdie frequency (see "Birdie Frequencies" on Page 22).

#### **Locking Out Channels**

To lock out a channel while scanning, press and release **L/O (L/O RVW)** when the scanner stops on the channel.

To lock out a channel manually, select the channel then press and release **L/O (L/O RVW)** until **L/O** appears.

To unlock a channel, manually select that channel again, then press **L/O (L/O RVW)**. **L/O** disappears from the display.

#### **Notes:**

- The scanner automatically locks out empty channels.
- You can still manually tune to locked-out channels.

#### **Locking Out Frequencies**

To lock out a frequency during a service bank, or a direct search, press **L/O (L/O RVW)** when the scanner stops on the frequency. The scanner locks out the frequency then continues searching. You can lock out frequencies in both direct search and service bank searches.

**Note:** You can lock out as many as 50 frequencies during a search. If you try to lock out more, **FLo -FULL** appears (see "Reviewing Locked-Out Frequencies" on Page 21 and "Removing All Locked-Out Tags From Frequencies" on Page 21).

## Reviewing Locked-Out Frequencies

To review the frequencies you locked out, hold down **L/O (L/O RVW)** at least 2 seconds during a search. **L-r** appears. As you press **▲** or **▼**, all locked-out frequencies appear in sequence. When you reach the highest frequency, the scanner beeps twice then returns to the lowest locked-out frequency.

## Removing All Locked-Out Tags From Frequencies

1. Start a service bank or direct search. See "Using Direct Search" on Page 16.
2. To review the frequencies you locked out, hold down **L/O (L/O RVW)** for about 2 seconds during the search. **L-r** appears.
3. Hold down **MON/CL** then press **L/O (L/O RVW)**. **FLo ALL-CL** appears.
4. Press **ENTER** to clear all lockout tags. The frequency clears and **000.0000** appears. To exit without clearing all locked out frequencies, press **MON/CL**.

## Removing All Lockout Tags from Frequencies in All Service Banks

1. Start a service bank or direct search. See "Using Direct Search" on Page 16.
2. To review the frequencies you locked out, hold down **L/O (L/O RVW)** for about 2 seconds during the search. **L-r** appears.
3. Hold down **MON/CL** then press **BAND**. **dEFAULT** appears.
4. Press **ENTER** to clear the lockout frequencies in all the service banks (except the weather and marine banks). If you do not want to clear the lockout

tags, press **MON/CL** to continue reviewing the lockout frequencies.

## Using Priority

You can scan the programmed channels using the priority feature, and still not miss an important or interesting call.

Follow these steps to program the priority channel.

1. Press **PGM**, then press **PRI/ALERT**.
2. Enter the desired frequency using the number keys.
3. Press **ENTER**.
4. To turn on the priority feature, press **PRI (ALERT)** while scanning. **PRI** appears. The scanner checks the priority channel every 2 seconds and stays on the channel if there is activity. **PCH** appears when the scanner is set to the priority channel.
5. To turn off the priority feature, press **PRI**. **PRI** disappears.

If you designate a weather frequency as the priority channel, the scanner detects the weather alert tone while the priority feature is on. When the scanner detects a weather alert tone, **ALERT** flashes. To cancel the alert tone, press any key. The scanner continues to monitor the weather channel.

## TURNING THE KEY TONE ON AND OFF

The scanner is preset to sound a tone each time you press one of its keys. You can turn the key tone on or off.

1. If the scanner is on, slide **POWER** to **OFF** to turn it off.

2. While you hold down **2** and **ENTER**, turn on the scanner. The display shows **OFF tonE** or **on tonE**. Then release the keys.

## USING A COMPUTER TO PROGRAM THE SCANNER

You can connect your scanner to a personal computer and program frequencies into the scanner from the computer using an optional cable and software.

**Note:** The necessary cable and software, and additional information about using your personal computer to program your scanner, are available at your RadioShack store.

## BIRDIE FREQUENCIES

Every scanner has birdie frequencies. Birdies are signals created inside the scanner's receiver. These operating frequencies might interfere with transmissions on the same frequencies. If you program one of these frequencies, you hear only noise on that frequency. If the interference is not severe, you might be able to turn **SQUELCH** clockwise to cut out the birdie.

To find the birdies in your scanner, follow these steps.

1. Disconnect the antenna and move it away from the receiver. Make sure that no other operating radio or TV sets are nearby.
2. Search in each frequency band from the lowest frequency to the highest. If the search stops on a frequency, but you hear no sound, chances are you have located a birdie. Note all birdie frequencies for reference.

The known birdie frequencies to watch for are:

29.800	122.9375	388.3875
30.375	128.000	398.5625
32.075	128.375	414.6125
38.400	136.5875	426.7875
40.000	149.400	431.1625
40.980	152.655	441.3875
51.200	160.470	457.4375
112.4875	162.200	462.7875
115.200	168.495	478.8375
120.5125	384.550	

## UNITED STATES BROADCAST BAND

In the United States, there are several broadcast bands. The standard AM and FM bands are probably the most well known. There are also four television audio broadcast bands — the lower three transmit on the VHF band and the fourth transmits on the UHF band. You can use your scanner to monitor the 470–512 MHz portion of the UHF band.

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## □ *Guide to the Action Bands*

### Typical Band Usage

<b>HF Band (3.00–30.00 MHz)</b>	
10 m Amateur	29.00–29.70 MHz
High Range	29.70–29.90 MHz
<b>VHF Band (30.00–300.0 MHz)</b>	
Low Range	30.00–50.00 MHz
6 m Amateur	50.00–54.00 MHz
U.S. Government	137.00–144.00 MHz
2 m Amateur	144.00–148.00 MHz
High Range	148.00–174.00 MHz
<b>UHF Band (300.00 MHz–3.0 GHz)</b>	
U.S. Government	380.00–420.00 MHz
70 cm Amateur	420.00–450.00 MHz
Low Range	450.00–470.00 MHz
FM-TV Audio Broadcast, Wide Band	470.00–512.00 MHz

### Primary Usage

As a general rule, most of the radio activity is concentrated on the following frequencies:

#### VHF Band

Government, Police, and Fire	153.785–155.980 MHz
Emergency Services	158.730–159.460 MHz
Railroad	160.000–161.900 MHz

#### UHF Band

Land-Mobile Paired Frequencies	450.000–470.000 MHz
Base Stations	451.025–454.950 MHz
Mobile Units	456.025–459.950 MHz
Repeater Units	460.025–464.975 MHz
Control Stations	465.025–469.975 MHz

**Note:** Remote control stations and mobile units operate at 5 MHz higher than their associated base stations and relay repeater units.

## BAND ALLOCATION

To help decide which frequency ranges to scan, use the following listing of the typical services that use the frequencies your scanner receives. These frequencies are subject to change, and might vary from area to area. For a more complete listing, refer to the *Beyond Police Call*, available at your local RadioShack store.

<b>Abbreviations</b>	<b>Services</b>
AIR .....	Aircraft
BIFC .....	Boise (ID) Interagency Fire Cache
BUS .....	Business
CAP .....	Civil Air Patrol
CCA .....	Common Carrier
CSB .....	Conventional Systems
CTSB .....	Conventional/Trunked Systems
FIRE .....	Fire Department
HAM .....	Amateur (Ham) Radio
GOVT .....	Federal Government
GMR .....	General Mobile Radio
GTR .....	General Trunked
IND .....	Industrial Services (Manufacturing, Construction, Farming, Forest Products)
MAR .....	Military Amateur Radio
MARI .....	Maritime Limited Coast (Coast Guard, Marine Telephone, Shipboard Radio, Private Stations)
MARS .....	Military Affiliate Radio System
MED .....	Emergency/Medical Services
MIL .....	U.S. Military
MOV .....	Motion Picture/Video Industry
NEW .....	New Mobile Narrow
NEWS .....	Relay Press (Newspaper Reporters)
OIL .....	Oil/Petroleum Industry
POL .....	Police Department
PUB .....	Public Services (Public Safety, Local Government, Forestry Conservation)
PSB .....	Public Safety
PTR .....	Private Trunked
ROAD .....	Road & Highway Maintenance
RTV .....	Radio/TV Remote Broadcast Pickup
TAXI .....	Taxi Services
TELB .....	Mobile Telephone (Aircraft, Radio Common Carrier, Landline Companies)
TELM .....	Telephone Maintenance
TOW .....	Tow Trucks
TRAN .....	Transportation Services (Trucks, Tow Trucks, Buses, Railroad, Other)
TSB .....	Trunked Systems
TVn .....	FM-TV Audio Broadcast
USXX .....	Government Classified
UTIL .....	Power & Water Utilities
WTHR .....	Weather

### HIGH FREQUENCY (HF)—(3 MHz–30MHz)

10 m Amateur Band (28.0–29.7 MHz)

29.000–29.700 ..... HAM



**VERY HIGH FREQUENCY (VHF)—(30 MHz–300 MHz)**

**VHF Low Band (29.7–50 MHz—in 5 kHz steps)**

29.700–29.790	IND
29.900–30.550	GOVT, MIL
30.580–31.980	IND, PUB
32.000–32.990	GOVT, MIL
33.020–33.980	BUS, IND, PUB
34.010–34.990	GOVT, MIL
35.020–35.980	BUS, PUB, IND, TELM
36.000–36.230	GOVT, MIL
36.230–36.990	Oil Spill Cleanup, GOVT, MIL
37.020–37.980	PUB, IND
38.000–39.000	GOVT, MIL
39.020–39.980	PUB
40.000–42.000	GOVT, MIL, MARI
42.020–42.940	POL
42.960–43.180	IND
43.220–43.680	TELM, IND, PUB
43.700–44.600	TRAN
44.620–46.580	POL, PUB
46.600–46.990	GOVT
47.020–47.400	PUB
47.420	American Red Cross
47.440–49.580	IND, PUB
49.610–49.990	MIL

**6 m Amateur Band (50–54 MHz)**

50.00–54.00	HAM
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**U.S. Government Band (138–144 MHz)**

137.000–144.000	GOVT, MIL
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**2 m Amateur Band (144–148 MHz)**

144.000–148.000	HAM
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**VHF High Band (148–174 MHz)**

148.050–150.345	CAP, MAR, MIL
150.775–150.790	MED
150.815–150.980	TOW, Oil Spill Cleanup
150.995–151.475	ROAD, POL
151.490–151.955	IND, BUS
151.985	TELM
152.0075	MED
152.030–152.240	TELB
152.270–152.480	IND, TAXI, BUS
152.510–152.840	TELB
152.870–153.020	IND, MOV
153.035–153.725	IND, OIL, UTIL
153.740–154.445	PUB, FIRE
154.490–154.570	IND, BUS
154.585	Oil Spill Cleanup
154.600–154.625	BUS
154.655–156.240	MED, ROAD, POL, PUB
156.255–157.425	OIL, MARI
157.450	MED

157.470–157.515	.....	TOW
157.530–157.725	.....	IND, TAXI
157.740	.....	BUS
157.770–158.100	.....	TELB
158.130–158.460	.....	BUS, IND, OIL, TELM, UTIL
158.490–158.700	.....	TELB
158.730–159.465	.....	POL, PUB, ROAD
159.480	.....	OIL
159.495–161.565	.....	TRAN
161.580–162.000	.....	OIL, MARI, RTV
162.0125–162.35	.....	GOVT, MIL, USXX
162.400–162.550	.....	WTHR
162.5625–162.6375	.....	GOVT, MIL, USXX
162.6625	.....	MED
162.6875–163.225	.....	GOVT, MIL, USXX
163.250	.....	MED
163.275–166.225	.....	GOVT, MIL, USXX
166.250	.....	GOVT, RTV, FIRE
166.275–169.400	.....	GOVT, BIFC
169.445–169.505	.....	Wireless Mikes, GOVT
169.55–169.9875	.....	GOVT, MIL, USXX
170.000–170.150	.....	BIFC, GOVT, RTV, FIRE
170.175–170.225	.....	GOVT
170.245–170.305	.....	Wireless Mikes
170.350–170.400	.....	GOVT, MIL
170.425–170.450	.....	BIFC
170.475	.....	PUB
170.4875–173.175	.....	GOVT, PUB, Wireless Mikes
173.225–173.5375	.....	MOV, NEWS, UTIL, MIL
173.5625–173.5875	.....	MIL Medical/Crash Crews
173.60–173.9875	.....	GOVT

**ULTRA HIGH FREQUENCY (UHF)—(300 MHz–3 GHz)**

**U. S. Government Band (380–406 MHz)**

381.800–383.900	.....	GOVT
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**U. S. Government Band (406–450 MHz)**

406.125–419.975	.....	GOVT, USXX
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**70 cm Amateur Band (420–450 MHz)**

420.000–450.000	.....	HAM
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**Low Band (450–470 MHz)**

450.050–450.925	.....	RTV
451.025–452.025	.....	IND, OIL, TELM, UTIL
452.0375–453.00	.....	IND, TAXI, TRAN TOW, NEWS
453.0125–454.000	.....	PUB, OIL
454.025–454.975	.....	TELB
455.050–455.925	.....	RTV
457.525–457.600	.....	BUS
458.025–458.175	.....	MED
460.0125–460.6375	.....	FIRE, POL, PUB
460.650–462.175	.....	BUS
462.1875–462.450	.....	BUS, IND
462.4625–462.525	.....	IND, OIL, TELM, UTIL
462.550–462.925	.....	GMR, BUS

462.9375–463.1875 .....	MED
463.200–467.925 .....	BUS

**FM-TV Audio Broadcast, UHF Wide Band (470–512 MHz)  
(Channels 14 through 20 in 6 MHz steps)**

475.750 .....	Channel 14
481.750 .....	Channel 15
487.750 .....	Channel 16
493.750 .....	Channel 17
499.750 .....	Channel 18
505.750 .....	Channel 19
511.750 .....	Channel 20

**Note:** Some cities use the 470–512 MHz band for land/mobile service.

**AVOIDING IMAGE FREQUENCIES**

You might discover one of your regular stations on another frequency that is not listed. It might be what is known as an image frequency. For example, you might find a service that regularly uses a frequency of 453.275 also on 474.675.

To see if it is an image, do a little math.

Note the new frequency.	474.675
Double the intermediate frequency of 10.7 MHz (21.400) and subtract it from the new frequency.	<u>-21.400</u>
If the answer is the regular frequency, then you have tuned to an image.	453.275

Occasionally, you might get interference on a weak or distant channel from a strong broadcast 21.4 MHz above or below the tuned frequency. This is rare, and the image signal is usually cleared whenever there is a broadcast on the actual frequency.

**FREQUENCY CONVERSION**

The tuning location of a station can be expressed in frequency (kHz or MHz) or in wavelength (meters). The following information can help you make the necessary conversions.  
1 MHz (million) = 1,000 kHz (thousand)

To convert MHz to kHz, multiply the number of MHz by 1,000:

$$30.62 \text{ MHz} \times 1000 = 30,620 \text{ kHz}$$

To convert from kHz to MHz, divide the number of kHz by 1,000.

$$127,800 \text{ kHz} \div 1000 = 127.8 \text{ MHz}$$

To convert MHz to meters, divide 300 by the number of MHz.

$$300 \div 50 \text{ MHz} = 6 \text{ meters}$$

## □ Troubleshooting

If your scanner stops operating properly, these suggestions might help you eliminate the problem. If the scanner still does not operate properly, take it to your local RadioShack store for assistance.

PROBLEM	SUGGESTION
Scanner is on, but will not scan.	Be sure <b>SQUELCH</b> is adjusted properly. See "Turning On the Scanner/Setting Volume and Squelch" on Page 14.
	Be sure <b>MAN</b> is not displayed. If it is, press <b>SCAN</b> .
Scanner receives stations poorly or not at all.	Check the antenna (indoor or outdoor).
	Signals may be blocked from being received by the scanner due to metal frames or material in the building. Change the scanner's location and try again.
The scanner's keys do not work, or the display shows random segments.	The scanner might be locked. Reset the scanner. If that does not work, reinitialize the scanner. See "Resetting/Initializing the Scanner."
Scanner does not work at all.	Check that the power supply (AC adapter/AC outlet) is working.
	The scanner might be locked. Reset the scanner. If that does not work, reinitialize the scanner. See "Resetting/Initializing the Scanner."
Scanner locks on frequencies that have an unclear transmission.	Be sure <b>SQUELCH</b> is adjusted properly.
	Be sure birdie frequencies are not programmed, or listen to birdie frequencies manually. See "Birdie Frequencies" on Page 22.

### RESETTING/INITIALIZING THE SCANNER

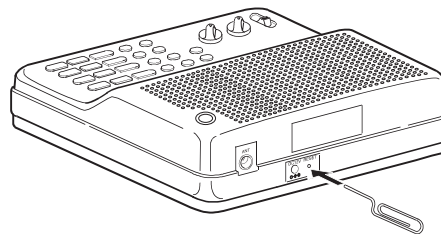
If the scanner's display locks up or does not work properly after you connect a power source, you might need to reset or initialize the scanner.

**Important:** If you have problems, first try to reset the scanner. If that does not work, you can initialize the scanner; however, this clears all information stored in your scanner's memory.

#### Resetting the Scanner

1. Turn off the scanner, then turn it on again.

2. Insert a pointed object, such as a straightened paper clip, into the reset opening on the back of the scanner (as shown) and gently press then release the reset button inside the opening. If the scanner still does not work properly, you might need to initialize the scanner.



## Initializing the Scanner

**Important:** This procedure clears all information you stored in the scanner's memory. Initialize the scanner only when you are sure the scanner is not working properly.

1. Turn off the scanner, then turn it on again.
2. Hold down **MON/CL**.
3. While you hold down **MON/CL**, insert a pointed object, such as a straightened paper clip, into the **RESET** opening on the back of the scanner and gently press then release the reset button inside the opening. The display should clear.
4. When the display reappears, release **MON/CL**.

**Note:** You must release the reset button before you release **MON/CL**, otherwise the memory might not clear.

## CARE

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

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

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## □ Specifications

### Frequency Coverage:

Ham .....	29–30 MHz (5.0 kHz Steps)
VHF Lo .....	30–50 MHz (5.0 kHz Steps)
Ham .....	50–54 MHz (5.0 kHz Steps)
Air .....	108–136.9875 MHz (12.5 kHz Steps)
Government .....	137–144 MHz (5 kHz Steps)
Ham .....	144–148 MHz (5 kHz Steps)
VHF Hi .....	148–174 MHz (5 kHz Steps)
Ham/Government .....	380–450 MHz (12.5 kHz Steps)
UHF Lo .....	450–470 MHz (12.5 kHz Steps)
UHF Hi (T) .....	470–512 MHz (12.5 kHz Steps)
Channels of Operation .....	200 Channels and 20 Monitor Memories

### Sensitivity (20 dB S/N):

29–54 MHz .....	0.5 $\mu$ V
108–136.9875 MHz .....	1.0 $\mu$ V
137–174 MHz .....	0.5 $\mu$ V
380–512 MHz .....	0.7 $\mu$ V

### Selectivity:

$\pm 10$ kHz .....	-6 dB
$\pm 18$ kHz .....	-50 dB

Spurious Rejection ..... 50 dB (FM at 154 MHz)

Scanning Rate ..... Up to 25 Channels/Second

Search Rate ..... Up to 50 Steps/Second

Delay Time ..... 2 Seconds

### Intermediate Frequencies (IF):

1st .....	10.7 MHz
2nd .....	455 kHz

IF Interference Ratio (10.7 MHz) ..... 70 dB at 154 MHz

### Squelch Sensitivity:

Threshold .....	Less than 0.5 $\mu$ V
Tight (FM) .....	(S+N)/N 25 dB
Tight (AM) .....	(S+N)/N 20 dB

Antenna impedance ..... 50 Ohms

Audio Output Power (10% THD) .....	0.8 W Nominal
Built-in Speaker .....	3 inch (77 mm), 8-Ohm, Dynamic Type
Power Requirements .....	120 V AC, 60 Hz, 8W
Current Drain .....	300 mA
Operating Temperature .....	32°F to 110°F (0°C to 43°C)
Dimensions (HWD) .....	2 <sup>1</sup> / <sub>16</sub> × 8 <sup>1</sup> / <sub>4</sub> × 6 <sup>7</sup> / <sub>8</sub> inches (52 × 210 × 175 mm)
Weight (without antenna and batteries) .....	24 oz (680 g)
Supplied Accessories .....	Telescoping Antenna, AC Adapter

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

### Limited One-Year Warranty

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