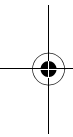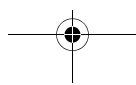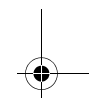**RadioShack** ®
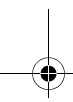
www.radioshack.com℠

# 45-Memory, Digital SSB Shortwave Receiver

## with AM/FM Radio

**R**
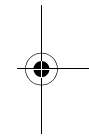
Owner's Manual

Please read before using this equipment.

**WARNING:** To reduce the risk of fire or shock hazard, do not expose this product to rain or moisture.

**CAUTION**

RISK OF ELECTRIC SHOCK. DO NOT OPEN.

**CAUTION:** TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER OR BACK. NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED PERSONNEL.

This symbol is intended to alert you to the presence of uninsulated dangerous voltage within the product's enclosure that might be of sufficient magnitude to constitute a risk of electric shock. Do not open the product's case.

This symbol is intended to inform you that important operating and maintenance instructions are included in the literature accompanying this product.

# ❒ *Contents*

# ☐ *Features*

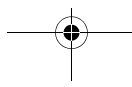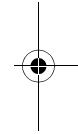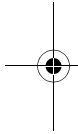Your RadioShack 45 Memory, Digital SSB Shortwave Receiver provides high quality in a compact design and brings the voices of the world to you. In the 18 international shortwave (SW) bands, you can hear news broadcasts and other programs from sources such as the British Broadcasting Company, Radio Cairo, and Radio Moscow.

You can get emergency information firsthand by listening to amateur radio broadcasts, which include single sideband (SSB) voice transmissions.

In the LW (longwave) band, you can sometimes hear hurricane reports, ship-to-shore calls, and other marine and aeronautical services. You can tune to local broadcasts in the FM and medium-wave (MW) AM bands.

The receiver's features include:

**Single Side Band (SSB) Reception** — lets you receive the popular band among ham and business radio users.

**Continuous SW Coverage** (from 1.711 MHz to 29.999 MHz) — allows you to scan the entire SW band.

**Digital Synthesized Receiver** — ensures fast, accurate, and drift-free tuning.

**Memory Tuning** — you can store up to 45 frequencies in memory so you can quickly select your favorite stations.

**Scan Tuning** — lets you quickly find stations.

**Stereo Headphone Jack** — lets you connect stereo headphones for FM stereo reception.

**Dual Time Clock** — you can set a primary clock to your local time and a secondary clock to another time zone so you can quickly check the time in another part of the world.

**Auto Tuning System** (ATS) — automatically tunes to the stations with the strongest signals and stores them in memory locations according to each station's signal strength.

**Timer Alarms** — lets you set the buzzer to sound or the receiver to turn on to awaken you at a time you set.

**Sleep Timer** — lets you set the receiver to turn off after a preset length of time so you can fall asleep as it plays.

# ❑ *A Quick Look at the Receiver*

**TUNE/SSB Indicator**

**(Display Backlight)**

**POWER/**

**DISPLAY**

**MODE**

**ALARM**

**ALARM**

**(TUNING/AUTO MEMO)**

**(ENTER/FREQ/TIME SET)**

**C (M. DEL)**

**SW SELECT**

**0 (M.SCAN)**

**Band**

**M (AM/PM)**

**CLOCK 1/2
(SW PAGE)**

RadioShack

DX-402 SW DIGITAL RECEIVER

TUNING

---

**NEWS/NORM/MUSIC**

**/ (Control**

**TUNING/**

**VOLUME**

VOLUME

NORM
NEWS MUSIC

DOWN    UP    TUNING
              STEP

---

**FM/SW
DX LOCAL**

**SW EXT.ANT**

**FM/FM ST
SSB/AM**

**Jack**

**+CLARIFY−**

**DC IN 6V Jack**

+ CLARIFY −

SW EXT. ANT

FM / SW
DX LOCAL

FM  FM ST

SSB     AM

DC IN 6V

☼ (Display Backlight) — lights the display for about 7 seconds.

**POWER**/⛉ — turns the receiver and the sleep timer on and off.

**DISPLAY** — displays settings.

**MODE** — changes the receiver's settings.

**ALARM** ⍃⍄ — sets the radio alarm.

**ALARM** ⏰ — sets the Humane Waking System (HWS) alarm.

∧∨ (**TUNING/AUTO MEMO**) — tunes up or down.

◄ (**ENTER/FREQ/TIME SET**) — stores frequencies and the time.

**C** (**M. DEL**) — cancels an entry or deletes a frequency stored in memory.

**0** (**M. SCAN**) — scans the receiver's preset memory locations.

**M** (**AM/PM**) — stores frequencies to memory or changes the time from AM to PM.

**CLOCK 1/2** (**SW PAGE**) — toggles between two clock settings. It also toggles between the two memory pages (see "Memory Tuning" on Page 16).

**SW PAGE/SW SELECT** — toggles between the SW (shortwave) meter bands (see "Selecting the Band" on Page 13).

**BAND** — toggles between the AM, LW (longwave), FM, and SW bands.

**VOLUME** — controls the volume.

▬/⍓ (Control Lock) — prevents you from accidentally turning the receiver on or off, changing the band or frequency, or accidentally selecting front-panel buttons.

**NEWS/NORM/MUSIC** — sets the receiver to enhance the sound of different types of programs.

**TUNING/**⛃ — sets the tuning range for manual tuning (see "Direct-Access Tuning" on Page 14).

**+CLARIFY–** — helps provide clearer reception for SSB (single side band) broadcast.

**SW EXT. ANT** — lets you connect an external antenna for shortwave use.

**FM/SW/DX LOCAL** — reduces interference from adjacent stations in the FM and SW bands.

**FM/FM ST/SSB/AM** — lets you select the FM, FM Stereo, Single Side Band (SSB) or AM band.

🎧 Jack — lets you connect headphones to the receiver.

**DC IN 6V Jack** — lets you connect external power to the receiver.

# ❑ *Preparation*

## CONNECTING TO POWER

You can power the receiver from internal batteries, standard AC power, or your vehicle's battery.

## Installing Batteries

Your receiver can use four AA batteries for power (not supplied). For the best performance, we recommend RadioShack alkaline batteries.

**Cautions:**

• Use only fresh batteries of the required size and recommended type.

• Do not mix old and new batteries, different types of batteries (standard, alkaline, or rechargeable), or rechargeable batteries of different capacities.

Follow these steps to install the batteries.
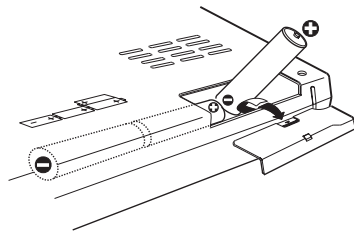
1. Slide the battery compartment cover in the direction of the arrow and remove it.

2. Slide four AA batteries into the compartment, according to the polarity symbols (**+** and **–**) marked next to the compartment. For easy removal, place the batteries on top of the lift-out ribbon.

3. Replace the cover.

**Notes:**

• When you press **POWER**/🔊 to turn on the receiver and ⌷BATT. flashes on the display, or the receiver stops operating properly, replace the batteries.

• To test the batteries' power strength, turn off the receiver. The battery power indicator displays for 7 seconds. If the battery power indicator is below 2, replace the battery.

• The receiver maintains all the memory settings for about 3 minutes after the batteries are removed.

**Warning:** Dispose of old batteries promptly and properly. Do not burn or bury them.

**Caution:** If you do not plan to use the receiver with batteries for a month or longer, remove the batteries. Batteries can leak chemicals that can destroy electronic parts.

## Using Standard AC Power

You can power the receiver using a 6V, 300 mA AC adapter (not supplied) available at your local RadioShack store.

**Note:** Connecting an AC adapter disconnects the battery power.

**Cautions:**

⚠ You must use a Class 2 power source that supplies 6V DC and delivers at least 300 mA. Its center tip must be set to negative and its plug must fit the receiver's **DC IN 6V** jack. Using an adapter that does not meet these specifications could damage the receiver or the adapter.

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

Insert the adapter's barrel plug into the receiver's **DC IN 6V** jack, then plug the adapter into a standard AC outlet.

## Using Vehicle Battery Power

You can power the receiver from your vehicle's 12V power source (such as a cigarette-lighter socket) using a 6V, 300-mA DC adapter (not supplied) available at your local RadioShack store.

**Cautions:**

⚠ You must use a power source that supplies 6V DC and delivers at least 300 mA. Its center tip must be set to negative and its plug must fit the receiver's **DC IN 6V** jack. Using an adapter that does not meet these specifications could damage the receiver or the adapter.

• Always connect the DC adapter to the receiver before you connect it to the power source. When you finish, disconnect the adapter from the power source before you disconnect it from the receiver.

Insert the adapter's barrel plug into the receiver's **DC IN 6V** jack.

Insert the adapter's large plug into the vehicle's cigarette-lighter socket.

# CONNECTING HEADPHONES

For private listening and for stereo sound during FM stereo broadcasts, you can connect optional stereo headphones with a $1/8$ -inch (3.5-mm) plug. Your local RadioShack store sells a wide selection of stereo headphones.

Insert the headphones' plug into the receiver's 🎧 jack. When you connect stereo headphones and tune to a stereo broadcast, **ST** appears on the display and the receiver's internal speaker disconnects. For the best reception, fine tune the receiver until **ST** appears continuously.

## Using the FM ST/FM Switch

You can receive FM broadcasts in stereo by connecting optional stereo headphones to the 🎧 jack and sliding **FM/FM ST/SSB/AM** to **FM ST** (stereo).

To improve reception for weak FM stereo stations, slide **FM/FM ST/SSB/AM** to **FM** (mono). The signal becomes monaural, but the sound might improve. To return to a stereo signal, slide **FM/FM ST/SSB/AM** to **FM ST**.

## Listening Safely

To protect your hearing, follow these guidelines when you use headphones.

- Set the volume to the lowest setting before you begin listening. After you begin listening, adjust the volume to a comfortable level.

- Do not listen at extremely high volume levels. Extended high-volume listening can lead to permanent hearing loss.

- Once you set the volume, do not increase it. Over time, your ears adapt to the volume level, so a volume level that does not cause discomfort might still damage your hearing.

## Traffic Safety

- Do not wear headphones while operating a motor vehicle or riding a bicycle. This can create a traffic hazard and could be illegal in some areas.

- Even though some headphones let you hear some outside sounds when listening at normal volume levels, they still can present a traffic hazard.

# USING THE CLOCK

Your receiver has dual clocks. We recommend you set the primary clock for local time and the secondary clock for UTC (Coordinated Universal Time, formerly called Greenwich Mean time), because most shortwave stations announce broadcast times in UTC 24-hour format.

To switch back and forth between times, press **CLOCK 1/2** then ◄◼ .

## Setting the CLOCK1 Time

1. If the receiver is on, press **DIS-PLAY**. 🕐 appears and the CLOCK 1 time displays. Hold down ◄◼ for about 2 seconds until 🕐 flashes and **−:− −** appears.

   If the receiver is off, hold down ◄◼ for about 2 seconds until 🕐 flashes and **−:− −** appears.

2. While 🕐 flashes, enter the time using the number keys.

   **Notes:**

   • The clock default is a 12-hour format. If you enter an invalid time, such as 13:00 or 11:69, the receiver beeps and **Err** appears, prompting you to enter the correct time.

   • To change the 12-hour format to a 24-hour format, see "Using Mode" on Page 20.

3. To set AM or PM, press **M**.

4. Press ◄◼ to store the setting. The CLOCK 1 time displays.

## Setting the CLOCK 2 Time

You can set CLOCK 2 to store a different time than CLOCK 1.

1. If the receiver is on, press **DIS-PLAY** so 🕐 appears and the CLOCK1 time displays. Then press **CLOCK 1/2**.

   If the receiver is off and while 🕐 and the CLOCK1 time display, press **CLOCK 1/2**.

2. 🕑 flashes for about 7 seconds and the CLOCK 2 time displays. While 🕑 flashes, press ◄◼ . 🕑 stops flashing.

3. Hold down ◄◼ for about 2 seconds until 🕑 flashes and **−:− −** appears.

4. While 🕑 flashes, enter the time using the number keys.

5. To set AM or PM, press **M**.

6. Press ◄◼ to store the setting. The CLOCK 2 time appears.

**Note:** To constantly display the CLOCK 2 time, press **CLOCK 1/2** then ◄◼ . 🕑 and the time appear. To return to CLOCK 1, press **CLOCK 1/2** then ◄◼ . 🕐 and the time appear.

## CONNECTING AN EXTERNAL ANTENNA

To improve SW reception, you can connect an optional external antenna directly to the **SW EXT. ANT** jack.

Follow the antenna's supplied instructions to connect the receiver to the antenna.

## SETTING THE AM TUNING INCREMENT

In the United States, the Federal Communications Commission (FCC) assigns frequencies for stations in the AM band in 10-kilohertz increments. In Europe and some other parts of the world, AM frequencies are assigned in 9-kilohertz increments.

If you are in the United States, Canada, or another North or South American country, set the tuning increment to 10kHz by pressing **MODE**, **2**, **1** then ◀■ . **AM 10 kHz** appears for 1 second then disappears.

If you are in a country where the AM frequency increments are 9 kHz, set the tuning increment to 9kHz by pressing **MODE**, **2**, **0** then ◀■ . **AM 9 kHz** appears for 1 second then disappears.

## USING THE FOLDING STAND

You can position the receiver more securely by resting the receiver on its stand.

Lift the latch on the back of the receiver to open the stand.

# ☐ *Operation*

## TURNING THE RECEIVER ON/OFF

Press **POWER**/▐◁ to turn on the receiver, then rotate **VOLUME** to the desired listening level. The band and frequency appear.

Press **POWER**/▐◁ again to turn off the receiver.

**Note:** If the receiver displays random characters or the display does not work properly, you might need to reset it (see "Resetting the Receiver" on Page 31).

## ADJUSTING THE ANTENNA

For the best reception, adjust the telescoping antenna for the desired band.

**FM** — Pull up the antenna base about halfway then fully extend the antenna and rotate it for the best reception.

**LW and AM** — Rotate the receiver. The receiver uses the internal antenna for the LW and AM bands.

**SW** — Pull up the antenna base then fully extend the antenna and point it straight up.

# TUNING

## Selecting the Band

Repeatedly press **BAND** until the desired band appears. To select a specific band within the SW band, repeatedly press **SW SELECT** until the desired meter band appears.

## Improving Reception

You can use **DX/LOCAL** to improve the receiver's reception when listening to SW and FM broadcasts.

For improved reception when listening to a station with a strong but distorted signal, slide **DX/LOCAL** to **LOCAL**.

To reduce interference when using the Automatic Tuning System (ATS) to scan and store stations on the FM band, slide **DX/LOCAL** to **LOCAL** so the receiver tunes to the stronger local station.

**Note:** Interference can be caused by a computer, motor, or other electronic device nearby. To improve reception, move the receiver away from these devices.

To improve reception of stations that are normally weak, slide the switch to **DX**.

## Automatic Tuning System (ATS)

The receiver features an Automatic Tuning System which scans all the available FM, AM, and LW stations and stores them in a memory locations for quick tuning.

The receiver tunes to and stores FM frequencies in the first available memory location and orders them in sequence from the lowest to the highest frequency.

The receiver tunes to and stores AM or LW frequencies in the first available memory location and orders them according to the frequencies' strength. The receiver stores the strongest signal first, then the second strongest signal next, and so on until all nine memory location numbers are occupied.

Follow these steps to set your receiver to tune automatically.

1. Repeatedly press **BAND** until the desired band appears

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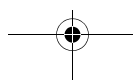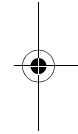2. Hold down ∨ and ∧ together until the receiver beeps once and the TUNE/SSB indicator flashes. Each memory location number (1–9) appears then disappears consecutively as the receiver scans and stores each station.

   **M1** and all of the memory location numbers appear, indicating automatic tuning is complete.

3. To select a stored ATS station, press the number key of the stored station.

**Notes:**

- The receiver automatically tunes and stores up to nine FM, nine AM, and nine LW stations.

- ATS does not work in the SW band.

- ATS clears all of the stations previously set.

- To stop ATS, press **POWER**/🛏.

## Direct-Access Tuning

To tune to a specific frequency, follow these steps.

1. Repeatedly press **BAND** until the desired band appears.

2. Press ◄━ .

If you selected the FM band, **FM MHz** flashes and **– – – –** appears for about 7 seconds.

If you selected the AM or LW band, **AM** or **LW** flashes and **kHz** and **–– –** appear for about 7 seconds.

If you selected the SW band, **SW** flashes and **kHz** and **–, – – –** appear for about 7 seconds.

3. Press the corresponding number buttons for the desired station, then press ◄━ . For example, to tune to FM 100.70 MHz, enter **10070** then press ◄━ . **FM 100.70 MHz** appears and the TUNE/SSB indicator lights.

**Notes:**

- If you wait more than 7 seconds to press a button, the receiver returns to the previous display and you must begin again at Step 1.

- You do not need to enter the decimal point. The receiver automatically tunes to the frequency.

- If you entered an invalid frequency, **Err** appears. Enter a valid frequency.
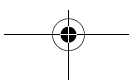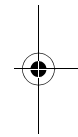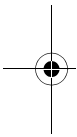
- If you enter an incorrect digit, press **C** (cancel) once to erase the last digit, twice to erase the last two digits, and so on, then enter the correct digit.

## Manual Tuning

You can select a lower or higher frequency by pressing ∨ or ∧ . Each press of ∨ or ∧ decreases or increases the frequency increments.

### Preset Tuning Steps

| FM | AM | SW | LW |
|---|---|---|---|
| 0.1 or 0.2 MHz | 9 or 10 kHz | 5 kHz | 9 kHz |

You can also rotate **TUNING/** to select a higher or lower frequency.

As you turn **TUNING/** to fine tune a frequency, you might find that you need the frequencies to change more slowly. To change the rate the frequencies change as you rotate the knob, press and rotate **TUNING/** until **STEP** appears, which tunes to the desired step.

### Preset Fine Tuning Steps

| FM | AM | LW | SW |
|---|---|---|---|
| .05MHz (50 kHz) | 1 kHz | 1 kHz | 1 kHz |

**Notes:**

- Fine tuning only works when you use rotary tuning.

- When you tune to a station and the TUNE/SSB tuning indicator lights but the sound is not clear, rotate **TUNING/** up or down to fine tune the station until you get the clearest sound.

## Scan Tuning

To automatically tune up or down to the next active frequency in the selected band, hold down ∨ or ∧ for about 1 second. The receiver scans up or down the selected band and tunes to the first frequency it finds with a strong signal.

**Note:** When scanning, the receiver only searches for frequencies with strong signals. To search for stations with weaker signals, use one of the manual tuning methods.

## Tuning an SW Meter Band

Follow these steps to tune an SW Meter band.

1. Repeatedly press **BAND** until **SW** appears.

2. Repeatedly press **SW SELECT** until the desired meter band appears.

3. Slowly rotate **TUNING/** to fine tune to the desired frequency according to the SHORTWAVE BANDS listed below the receiver's display.

## Tuning SSB Stations Using Clarity Control

Some shortwave (SW) stations transmit in Morse code using continuous wave (CW). Some SW stations use a special type of voice transmission called Single Side Band (SSB). SSB is very popular among ham and business radio users because of its superior signal quality.

Follow these steps to use the clarity control when tuning a CW or SSB station.

1. Repeatedly press **BAND** until **SW** appears.

2. Adjust the antenna for the best reception.

3. Set **FM/FM ST/SSB/AM** to **SSB**.

4. Slowly rotate **+CLARIFY–** left or right until the reception becomes clear. Each **+CLARIFY–** tuning step varies by 1.5 kHz. You can also use **TUNING/** to get the best SSB reception.

## Memory Tuning

For quick tuning, you can store up to 45 stations in your receiver's *memory locations*. The 45 memory locations are grouped into *pages* M1 and M2.

You can store nine frequencies each for the FM, AM, SW, and LW bands in the M1 page.

You can store nine SW frequencies in the M2 page.

Follow these steps to store your favorite stations' frequencies into memory.

1. Repeatedly press **BAND** until the desired band appears.

2. Tune to the desired frequency.

3. Press **M**. **M1** and the available memory location number flash for about 7 seconds.

   To access the M2 page, press **SW PAGE** while **M1** is flashing. **M2** and the available memory location number flash for about 7 seconds.

4. While **M1** or **M2** and the available memory location number flash, press ◄█ to store the station.

**Notes:**

- If the receiver's memory is full, no memory location number flashes and **FULL** appears when you press **M** to store a station.

• To replace an existing frequency with a new one, tune to the desired frequency then hold down the number key corresponding to that memory location for about two seconds while **FULL** appears. (Be sure you also set the correct memory page).

• *To rearrange manually stored FM frequencies in memory locations 1–9*, press **MODE 5 0 ◀▬** . The receiver orders the frequencies from the highest to the lowest.

**Note:** Frequencies stored in the AM or LW bands cannot be rearranged using **MODE**.
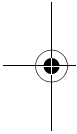
## Recalling a Station in Memory

Repeatedly press **BAND** until the desired band appears.

Use the number keys to enter the memory location for the desired station. The receiver instantly tunes to the station and displays its frequency and memory location number.

**Note:** The active memory location number appears in a frame.

## Deleting a Station from Memory

1. Repeatedly press **BAND** until the desired band appears.

2. Use the number keys to enter the memory location number you want to delete.

3. Press **M**. **M1** and the memory location number flash.

4. Press **C/M**. **DEL** and the memory location number disappear.

## Memory Scan

You can quickly scan the preset memory locations. Repeatedly press **BAND** until the desired band appears.

Press **M.SCAN**. The receiver scans each preset memory in turn, pauses for about 7 seconds on each memory location, and continues to scan for the next memory location. When you reach the desired memory location, press any button to stop memory scan.
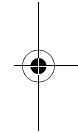
## Exchanging Station Positions in Memory

Follow these steps to move a station from one location to another.

1. Repeatedly press **BAND** until the desired band appears.

2. Recall the location number of the station you want to move (see "Recalling a Station in Memory").
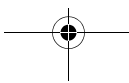
3. Press **M**. **M** and the memory location number flash.

4. Use the number keys to enter the new memory location number. The receiver beeps.

# ❒ *Special Features*

## Setting the Alarm Time

The receiver's timer alarm lets you set two alarm times, so you can awaken to either the radio or a buzzer.

## Setting the Radio Alarm

To set the radio alarm time, follow these steps.

1. Tune to the desired radio station.

2. If the receiver is on, press **DISPLAY** to display the time. If the receiver is off, it automatically displays the time.

3. Press (( . **AM 12:00** appears and (( flashes for about 7 seconds.

   You can set the clock to use a 12- or 24-hour format (see "Using Mode" on Page 20).

4. While (( is flashing, use the number keys to enter the desired alarm time then press **M** to set AM or PM.

If you enter an incorrect digit, press **C** (cancel) once to erase the last digit, twice to erase the last two digits, and so on, then enter the correct digit.

5. Press ◄ . The set time appears and (( stops flashing, indicating the radio alarm has been set. About 2 seconds later, the receiver returns to the current time.

6. To check the alarm time, press (( . The alarm time appears for about 5 seconds, then disappears. If you press (( again, the display returns to the current time.

7. To cancel the alarm time, press **POWER**/◄ or **DISPLAY** to display the current time then press (( . While (( flashes, press **C**. (( disappears.

## Setting the Humane Wake System (HWS) Alarm

The receiver features a Humane Waking System (HWS), so you are not startled awake.

To set the receiver's HWS alarm time, follow these steps.

1. If the receiver is on, press **DISPLAY** to display the time. If the receiver is off, it automatically displays the time.

2. Press ☿. **AM 12:00** appears and ☿ flashes for about 7 seconds.

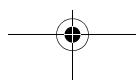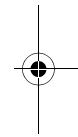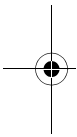3. While ☿ is flashing, use the number keys to enter the desired alarm time then press **M** to set AM or PM.

4. Press ◀━ . The set time appears and ☿ stops flashing, indicating the HWS alarm has been set. About 2 seconds later, the receiver returns to the current time.

To check the alarm time, press ☿. The alarm time appears for about 5 seconds, then disappears. Press ☿ again to return to the current time.

To cancel the alarm time, press **POWER**/▭ or **DISPLAY** to display the current time then press ☿. While ☿ flashes, press **C**. ☿ disappears.

## Silencing the Alarm

At the set alarm time, the radio turns on or the buzzer sounds and ((▯ or ☿ flashes.

After several seconds, the buzzer's volume increases. After a few more seconds, the volume increases again.

The buzzer automatically stops or the radio automatically turns off after 60 minutes.

To silence either alarm sooner, press **POWER**/▭. ((▯ or ☿ stop flashing and the alarm sounds again the next day at the set time.

## Using the Sleep Timer

You can set the sleep timer to have the receiver turn off (choosing from the various auto turn-off times), so you can fall asleep to music.

1. If the receiver is off, hold down **POWER**/▭ until the receiver beeps and ▭ flashes. The receiver turns on and ▭ appears.

2. Hold down **POWER**/▭. The sleep timer elapses from 60 → 30 → 15 → 120 → 90 → 60 minutes. Release **POWER**/▭ when the desired auto-turn off time appears.

3. If necessary, tune to the desired station.

At the preset auto-turn off time, the radio turns off.

To turn off the radio sooner, press **POWER**/▭.

## Using Mode

**MODE** lets you change the receiver's settings.

*To set a FM 100 kHz tuning step*, tune to a FM station, then press **MODE 1 0** ◀ . **0.1 MHz** appears briefly to confirm the setting.

*To set a FM 200 kHz tuning step*, press **MODE 1 1** ◀ . **0.2 MHz** appears briefly to confirm the setting.

*To set a 9kHz AM tuning increment*, tune to an AM station then press **MODE 2 0** ◀ . **9 kHz** appears briefly to confirm the setting.

*To set a 10kHz AM tuning increment*, press **MODE 2 1** ◀ . **10 kHz** appears briefly to confirm the setting.

*To set a 12-hour clock format*, press **MODE 3 0** ◀ . **12 Hr** appears briefly to confirm the setting.

*To set a 24-hour clock format*, press **MODE 3 1** ◀ . **24 Hr** appears briefly to confirm the setting.

*To turn off the beep tone*, press **MODE 4 0** ◀ . **OFF** appears briefly to confirm the setting.

*To turn on the beep tone*, press **MODE 4 1** ◀ . The receiver beeps once and **bEEP** appears briefly to confirm the setting.

*To rearrange manually stored FM frequencies in memory locations 1–9*, press **MODE 5 0** ◀ . The receiver orders the frequencies from the lowest to the highest.

**Note:** Frequencies stored in the AM or LW bands cannot be rearranged using **MODE**.

## Using the NORM/NEWS/ MUSIC Switch

You can enhance the sound of the different types of programs you hear through the receiver.

To enhance the high tones heard in music programs, slide the switch to **MUSIC**; to enhance the low tones heard in vocal programs, slide the switch to **NEWS**. To listen to normal programming, slide the switch to **NORM**.

## Using the Display Backlight

To turn on the display backlight, press ☀. To save battery power, the light automatically turns off about 7 seconds after you release ☀.

## Locking the Controls

The lock control prevents you from accidentally turning the receiver on or off, selecting the front-panel controls, or changing the band or frequency.

To lock all of the front panel controls, and **TUNING/**🔒, slide ➤ / 🔓 to 🔒. ⊶ appears.

**Note:** The display backlight and the controls located on either side of the receiver remain operational when you lock the controls.

To unlock the controls, slide ➞ / 🔓 back to ➞ . The controls unlock and ⟞ disappears.

# ☐ *Listening Hints*

Shortwave listening is a hobby with thousands of participants worldwide. It requires no special knowledge or skills, but your enjoyment increases as you gain experience and develop special listening techniques. The information in this section can help you make the most of your receiver.

## REFERENCE SOURCES

Many books and magazines about shortwave listening are available through your local library or newsstand. Consult sources such as the *World Radio Handbook*, *Radio Amateur's Handbook*, *Passport to World Band Radio*, *Monitoring Times*, and *Popular Communications*. These publications can help you learn about the conditions that make long-distance reception possible and provide up-to-date listings for shortwave broadcasts in English and in other languages.

## FREQUENCY CONVERSION

A band is a group of frequencies. Bands are grouped according to their wavelengths and measured in meters. A station's tuning location can be expressed as a frequency (kHz or MHz) or a wavelength (meters).

Amateur radio operators generally refer to the frequencies they operate on using the frequency's wavelength. For example, the 19-meter band refers to the range of frequencies with waves about 19 meters long.

Use the following equations to convert kHz, MHz, and meters.

*1 MHz (million) = 1,000 kHz (thousand)*

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

*9.62 MHz × 1000 = 9,620 kHz*

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

*2780 kHz ÷ 1000 = 2.780 MHz*

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

*300 ÷ 7.1 MHz = 42.25 meters*

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

*300 ÷ 42.25 meters = 7.1 MHz*

# BAND ALLOCATIONS

Certain bands are set aside for specific purposes.

## Amateur Radio Frequencies

Tuning to the amateur radio frequencies can be interesting and helpful, because amateur radio operators often broadcast emergency information when other means of communication are not available.

Amateur radio operators use the following bands. Portions of these bands are set aside for continuous wave (CW) Morse code communication or for single sideband (SSB) voice communication, as shown below.

**160 meters:**

1,800–2,000 kHz: SSB

**80 meters:**

3,500–3,800 kHz: CW
3,800–4,000 kHz: SSB

**40 meters:**

7,000–7,150 kHz: CW
7,150–7,300 kHz: SSB

**20 meters:**

14,000–14,200 kHz: CW
14,200–14,350 kHz: SSB

**15 meters:**

21,000–21,250 kHz: CW
21,250–21,450 kHz: SSB

**10 meters:**

28,000–28,500 kHz: CW
28,500–29,700 kHz: SSB

**Note:** These ranges are not precisely observed everywhere in the world.

## International Frequencies

International commercial broadcasts are found in the following shortwave bands. Programs (often in English) usually contain news, commentaries, music, and special features reflecting the culture of the broadcasting country. Reception for this range is best between 6:00 PM and midnight (your time).

| Band (in meters) | Frequency Range (in MHz) |
| --- | --- |
| *120 | 2.300–2.495 |
| *90 | 3.200–3.400 |
| *75 | 3.900–4.000 |
| *60 | 4.750–5.060 |
| 49 | 5.900–6.200 |
| **41 | 7.100–7.350 |
| 31 | 9.400–9.990 |

| Band (in meters) | Frequency Range (in MHz) |
|---|---|
| 25 | 11.600–12.100 |
| 21 | 13.500–13.870 |
| 19 | 15.100–15.800 |
| 16 | 17.480–17.900 |
| 13 | 21.450–21.750 |
| 11 | 25.600–26.100 |
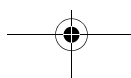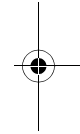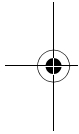
* These bands are reserved for stations in tropical areas.

** Interference is heavy in the 41m band (7.100–7.300 MHz) because amateur radio operators and international stations share this range.

## Aircraft Frequencies

Aircraft on international routes sometimes use SW. Most transmissions are in SSB, although you can still hear some AM transmissions. Here are some bands where you might hear aircraft communications.

4,650–4,750 kHz

6,545–6,765 kHz

8,815–9,040 kHz

11,175–11,400 kHz

13,200–13,360 kHz

15,010–15,100 kHz

17,900–18,030 kHz

## Ships and Coastal Station

## Frequencies

Most transmissions from ships and coastal stations are in SSB and CW. You can hear these transmissions in the following bands.

2,000–2,300 kHz*

4,063–4,139 kHz

4,361–4,438 kHz

8,195–8,181 kHz

12,330–12,420 kHz

13,107–13,200 kHz

16,460–16,565 kHz

* The Coast Guard and small boats use this band, with 2,182 kHz set aside as the international distress and emergency channel.

## Time Standard Frequencies

The following frequencies announce the exact time of day at specified intervals.

WWV in Fort Collins, Colorado:

    2,500 kHz

    5,000 kHz

    10,000 kHz

    15,000 kHz

    20,000 kHz

CHU in Canada: 7,335 kHz

VNG in Australia:
4,500 and 12,000 kHz

## Longwave Band

The 153–279 kHz range is known as the longwave band. Most stations in this range serve as beacons for aircraft and marine navigation by continuously transmitting their call letters. Reception for this range is best between 6:00 PM and midnight (your time).

Some ships also use this range, with 500 kHz set aside as an international distress and emergency station.

Most stations in this range use CW.

# ❑ *Listening Guide*

The following list contains some of the more frequently heard stations. All stations are broadcast in English unless otherwise specified. You can hear these stations throughout North America. However, reception varies based on the season, time of day, and a number of other conditions. This information can change at any time. For sources of yearly, up-to-date listings, see "Reference Sources" on Page 21.

| kHz | Station | Location | Remarks |
|---|---|---|---|
| 3,223 | Radio SR | Swaziland | |
| 3,265 | Radio Mozambique | Maputo, Mozambique | |
| 3,300 | Radio Cultural | Guatemala City, Guatemala | Religious Programs |
| 3,380 | Radio Iris | Esmeraldas, Ecuador | Programs in Spanish |
| 3,385 | FR3 | Cayenne, French Guiana | Programs in French |
| 3,396 | Radio Kaduna | Kaduna, Nigeria | |
| 4,750 | Radio Bertoua | Bertoua, Cameroon | |
| 4,755 | Imo Regional Radio | Imo, Nigeria | |
| 4,777 | Radio/TV Gabon | Libreville, Gabon | Programs in French |
| 4,795 | Radio Nueva America | La Paz, Bolivia | Programs in Spanish |
| 4,820 | Radio Paz y Bien | Ambala, Ecuador | Programs in Spanish |

| kHz | Station | Location | Remarks |
|---|---|---|---|
| 4,832 | Radio Reloj | San Jose, Costa Rica | Programs in Spanish |
| 4,855 | Radio Clube do Para | Belem, Brazil | Programs in Portuguese |
| 4,890 | National Broadcasting Commission | Papua New Guinea | |
| 4,915 | Voice Kenya | Nairobi, Kenya | |
| 4,920 | Australian Broadcasting Commission | Brisbane, Australia | |
| 4,945 | Radio Colossal | Neiva, Colombia | Programs in Spanish |
| 4,965 | Radio Santa Fe | Bogota, Colombia | Programs in Spanish |
| 4,980 | Ecos del Torbes | San Cristobal, Venezuela | Programs in Spanish |
| 5,020 | Solomon Islands Broadcasting Service | Honiara, Solomon Islands | |
| 5,057 | Radio Gjirokaster | Gjirokaster, Albania | Programs in Albanian |
| 5,950 | Guyana Broadcasting Service | Georgetown, Guyana | |
| 5,954 | Radio Casino | Puerto Limon, Costa Rica | |
| 5,960 | Radio Canada International | Montreal, Canada | |
| 5,980 | Radio RSA | Johannesburg, South Africa | |
| 6,005 | CFCX | Montreal, Canada | |
| 6,025 | Radio Malaysia | Kuala Lumpur, Malaysia | Programs in Chinese |
| 6,045 | Radio Australia | Lyndhurst, Australia | |

| kHz | Station | Location | Remarks |
|---|---|---|---|
| 6,055 | Nihon Shortwave Broadcasting Company | Tokyo, Japan | Programs in Japanese |
| 6,060 | Radio Nacional | Buenos Aires, Argentina | Programs in Spanish |
| 6,075 | Radio Sutatenza | Bogota, Colombia | Programs in Spanish |
| 6,090 | Radio Luxembourg | Ville Louvigny, Luxembourg | |
| 6,095 | Polskie Radio | Warsaw, Poland | |
| 6,105 | Radio New Zealand | Wellington, New Zealand | |
| 7,140 | Trans World Radio | Monte Carlo, Monaco | |
| 7,170 | Radio Noumea | Noumea, New Caledonia | Programs in French |
| 7,300 | Radio Tirana | Tirana, Albania | |
| 9,475 | Radio Cairo | Cairo, Egypt | |
| 9,515 | Voice of Greece | Athens, Greece | |
| 9,525 | Radio Korea | Seoul, South Korea | |
| 9,530 | Spanish Foreign Radio | Madrid, Spain | |
| 9,535 | Swiss Radio International | Berne, Switzerland | |
| 9,540 | Radio Prague | Prague, Czech Republic | |
| 9,570 | Radio Bucharest | Bucharest, Romania | |
| 9,575 | Italian Radio and Television Service | Rome, Italy | |
| 9,610 | Radio-TV Algeria | Algiers, Algeria | Programs in Arabic |
| 9,620 | Radio Berlin International | Berlin, Germany | |

| kHz | Station | Location | Remarks |
|---|---|---|---|
| 9,645 | Radio Norway | Oslo, Norway | |
| 9,720 | Radio Iran | Tehran, Iran | Programs in Farsi |
| 9,745 | HCJB | Quito, Ecuador | |
| 9,770 | Austrian Radio | Vienna, Austria | |
| 9,800 | Radio Kiev | Kiev, Ukraine | |
| 9,835 | Radio Budapest | Budapest, Hungary | |
| 10,040 | Voice of Vietnam | Hanoi, Vietnam | |
| 11,655 | Israel Radio | Jerusalem, Israel | |
| 11,690 | Radio Kuwait | Kuwait City, Kuwait | |
| 11,705 | Radio Sweden | Stockholm, Sweden | |
| 11,720 | Radio Moscow | Moscow, Russia | |
| 11,735 | Radio Sofia | Sofia, Bulgaria | |
| 11,745 | Voice of Free China | Taipei, Taiwan | |
| 11,815 | Radio Japan | Tokyo, Japan | |
| 11,825 | Radio Tahiti | Papeete, Tahiti | Programs in Tahitian |
| 11,835 | 4VEH | Cap Haitian, Haiti | |
| 11,845 | Radio Canada International | Montreal, Canada | |
| 11,850 | Deutsche Welle | Cologne, Germany | |
| 11,890 | Voice of Chile | Santiago, Chile | |
| 11,900 | Radio RSA | Johannesburg, South Africa | |
| 11,910 | BBC | London, England | |
| 11,930 | Radio Havana Cuba | Havana, Cuba | |

| kHz | Station | Location | Remarks |
|---|---|---|---|
| 11,935 | Radio Portugal | Lisbon, Portugal | |
| 11,945 | Radio Beijing | Beijing, China | |
| 11,955 | Voice of Turkey | Ankara, Turkey | |
| 11,980 | Radio Moscow | Moscow, Russia | |
| 15,038 | Saudi Arabian Broadcasting Service | Riyadh, Saudi Arabia | Programs in Arabic |
| 15,084 | Voice of Iran | Tehran, Iran | Programs in Farsi |
| 15,135 | Radio Moscow | Moscow, Russia | |
| 15,165 | HCJB | Quito, Ecuador | |
| 15,190 | ORU | Brussels, Belgium | |
| 15,205 | All India Radio | New Delhi, India | |
| 15,260 | BBC | London, England | |
| 15,265 | Finnish Radio | Helsinki, Finland | |
| 15,275 | Radio Sweden | Stockholm, Sweden | |
| 15,305 | Swiss Radio International | Berne, Switzerland | |
| 15,310 | Radio Japan | Tokyo, Japan | |
| 15,320 | Radio Australia | Melbourne, Australia | |
| 15,400 | BBC | London, England | |
| 15,430 | Radio Mexico | Mexico City, Mexico | Programs in Spanish |
| 15,465 | Radio Pakistan | Islamabad, Pakistan | Programs in Urdu |
| 17,720 | Radio France International | Paris, France | |
| 17,825 | Vatican Radio | Vatican City | |
| 17,860 | Austrian Radio | Vienna, Austria | |

| kHz | Station | Location | Remarks |
|---|---|---|---|
| 21,495 | Israel Radio | Jerusalem, Israel | |
| 21,525 | Radio Australia | Melbourne, Australia | |
| 21,625 | Israel Radio | Jerusalem, Israel | |
| 21,645 | Radio France International | Paris, France | |
| 21,735 | Radio-TV Morocco | Rabat, Morocco | Programs in Arabic |
| 25,790 | Radio RSA | Johannesburg, South Africa | |

# BIRDIES

Birdies are the products of internally generated signals that make some frequencies difficult or impossible to receive. If you program one of these frequencies, you hear only noise on that frequency. These are the most common birdies to watch for when using this receiver.

| | | | |
|---|---|---|---|
| 450 kHz | 3,844 kHz | 9,000 kHz | 10,250 kHz |
| 18,000 kHz | 20,490 kHz | 21,835 kHz | 21,868 kHz |

# AMATEUR SHORTWAVE BANDS IN THE US

Amateur radio operators in the U.S.A. are found in the bands listed here. They operate mostly in LSB (Lower Side Band) mode. Morse code operators are generally found in the lower areas of each band. The ham operators with the most advanced classification are found in the upper areas of each band.

## Amateur Shortwave Bands (in MHz)

| | | | |
|---|---|---|---|
| 3.500 – 4.000 | 80 Meters | 7.000 − 7.300 | 40 Meters |
| 10.100 – 10.150 | 30 Meters | 14.0 − 14.350 | 20 Meters |
| 18.068 − 18.168 | 17 Meters | 21.000 − 21.450 | 15 Meters |
| 24.890 − 24.990 | 12 Meters | 28.000 − 29.700 | 10 Meters |

# ☐ *Troubleshooting*

We do not expect you to have any problems with your receiver, but if you have a problem, the information in this chart might help. If the problem persists, take the receiver to your local RadioShack store for assistance.

| Problem | Possible Cause | Suggestion |
|---|---|---|
| Weak or intermittent sound. | The internal batteries are weak. | Check the batteries and replace or recharge them as necessary. |
| | The antenna needs adjusting. | Adjust the telescoping antenna or connect an external antenna. |
| | The signal is blocked by metal or concrete. | Move the receiver near a window when you use it inside a vehicle or metal-frame building. |
| | The frequency is not tuned properly. | Fine-tune the frequency. See "Tuning" on Page 13. |
| Scanning stops on a frequency that has an unclear transmission. | The frequency is not tuned properly. | Fine-tune the frequency. See "Tuning" on Page 13. |
| | The frequency is one of the receiver's birdie frequencies. | Tune another frequency. See "Birdies" on Page 29. |

| Problem | Possible Cause | Suggestion |
|---------|----------------|------------|
| **TUNING/** and the front panel controls do not respond. | The controls are locked (⊙━ appears on the display). | Slide ➤ / 🔓 to ➤ to unlock the controls. |

## RESETTING THE RECEIVER

If the receiver displays random characters or the display does not work properly, you might need to reset it.

**Important:** This procedure clears the time and frequency memory settings. Reset the receiver only when you are sure it is not working properly.

Insert a pointed object, such as a straightened paperclip, into the **RESET** hole located on the bottom of the receiver, then press and release **RESET**.

# ☐ *Care and Maintenance*

Your RadioShack 45-Memory, Digital SSB Shortwave Receiver is an example of superior design and craftsmanship. The following suggestions will help you care for your receiver so you can enjoy it for years.

Keep the receiver dry. If it gets wet, wipe it dry immediately. Liquids might contain minerals that can corrode the electronic circuits.

Use and store the receiver only in normal temperature environments. Temperature extremes can shorten the life of electronic devices, damage batteries, and distort or melt plastic parts.

Keep the receiver away from dust and dirt, which can cause premature wear of parts.

Handle the receiver gently and carefully. Dropping it can damage circuit boards and cases and can cause the receiver to work improperly.

Use only fresh batteries of the required size and recommended type. Batteries can leak chemicals that damage your receiver's electronic parts.

Wipe the receiver with a damp cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the receiver.

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

# THE FCC WANTS YOU TO KNOW

Your receiver might cause interference on other radio/TV devices even when it is operating properly. To determine whether your receiver is causing the interference, turn off your receiver. If the interference goes away, your receiver is causing it.

Try to eliminate the interference by:

- Moving your receiver away from the other device.

- Connecting your receiver to an outlet that is on a different electrical circuit from the other device.

- Contacting your local RadioShack store for help.
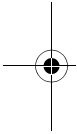
If you cannot eliminate the interference, the FCC requires that you stop using your receiver.
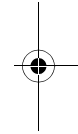
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
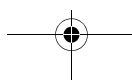
# ❏ *Specifications*

**Circuit**

LW/AM ............................................................................... Signal-Conversion Heterodyne

FM ...................................................................................................................... Heterodyne

SW ...................................................................................... Dual-Conversion Heterodyne

**Frequency Range**

FM ....................................................................................................... 87.5–108 MHz

LW ...................................................................................................... 153–279 kHz

AW ...................................................................................................... 520–1,710 kHz

SW ................................................................................................... 1.71–29.999 MHz

SW Sub-Bands ................................................................ 2.300–2.495 MHz (120 meters)
11.600–12.100 MHz (25 meters)
3.200–3.400 MHz (90 meters)
13.500–13.870 MHz (21 meters)
3.850–4.000 MHz (75 meters)
15.100–15.800 MHz (19 meters)
4.750–5.060 MHz (60 meters)
17.480–17.900 MHz (16 meters)
5.900–6.200 MHz (49 meters)
18.900–19.020 MHz (15 meters)
7.100–7.350 MHz (41 meters)
21.450–21.750 MHz (13 meters)
9.400–9.990 MHz (31 meters)
25.600–26.100 MHz (11 meters)

**Antenna**

LW/AM ....................................................................................................... Built-In Ferrite

SW .............................................................................. Telescoping or Optional External

FM ................................................................................................................ Telescoping

Output Power ................................................................................. 300 mW @ 10% THD

**Jacks**

External Power ................................................................................................. DC IN 6V

Stereo Headphones ................................................................................................ $1/8$-Inch
(3.5-mm)

SW External Jack .................................................................................................. $1/8$-Inch
(3.5-mm)

**Power Sources**

Battery ...................................................................................................... 4 AA Batteries

AC (Requires Optional Adapter) ....................................... 6V/300mA, Center Tip Negative

DC (Requires Optional Adapter) ....................................... 6V/300mA, Center Tip Negative

Battery Life (Alkaline) ...................................... 12 Hours Continuous Operation @ 50 mW

Dimensions (HWD) ...................................................................................... $5 \times 8^{1}/2 \times 1^{3}/8$ in
($128 \times 215 \times 35$ mm)

Weight (with batteries) ................................................................................................ 23 oz
(650 g)

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