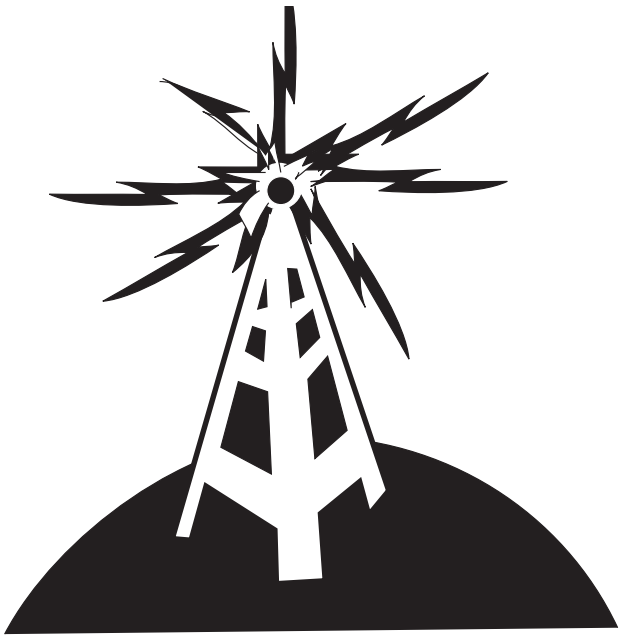
AM/Shortwave Radio Kit™



RadioShack®

CONTENTS

INTRODUCTION

ABOUT THIS RADIO KIT

The kit is perfect for children ages 8 and up, providing an excellent way to begin a hobby in electronics. You need only a couple of hours to put the parts together, gaining the benefit of hands-on learning. No soldering is required so you can make circuit changes very easily. The design of this radio kit is simple, but you will be amazed at its performance.

Radio circuits often require many electronic parts and complicated alignment procedures. This radio kit's tuning circuit, however, is pre-assembled and aligned at the factory. All you have to do is insert the spring terminals into the circuit diagram panel's terminal holes and connect the wires according to the wiring diagrams.

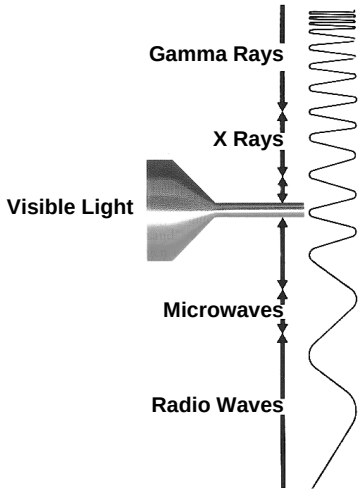
Hint: Read *all* of the instructions before you start assembling the radio. Ask an adult for help if you do not understand a particular step or process.

The experiments in this kit are designed to comply with FCC rules as long as you follow the instructions and use only the components and materials supplied with the kit.

ABOUT RADIO WAVES

Electromagnetic waves, such as radio waves, light, and x-rays, travel at the speed of light, which is 186,280 miles (299,792 km) per second, nearly one million times the speed of sound waves.

An electromagnetic force generates electromagnetic waves. Electromagnetic energy leaves its source in straight lines and is called radiation. Light and radio waves are different forms of electromagnetic radiation. The main difference between light waves and radio waves is their frequency. A radio wave frequency is much lower than a light wave frequency, which means that radio wavelength is longer than light wavelength.

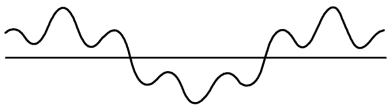


Radio waves consist of rapidly oscillating (varying) electric and magnetic fields. The oscillation rate is called the frequency of the radio wave, and is measured in Hertz (Hz). One Hz equals one oscillation per second; one kilohertz (kHz) equals 1,000 hertz, and one megahertz (million) equals 1000 kHz. The AM (Amplitude Modulation) radio tunes to the standard 520–1720 kHz AM band. The SW (short wave) radio tunes to both 6–8 MHz (SW1) and 12–17 MHz (SW2) bands. A radio station transmits its program on a set frequency, and you use your radio to tune to the same frequency to receive that program.

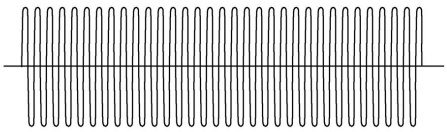
ABOUT THE RADIO TRANSMITTER

In a radio station, a microphone converts the sound of an announcer's voice into electrical signals where the words are mixed with the station's carrier wave. The mixed signal is then transmitted from the station's transmitting antenna as a broadcast signal wave.

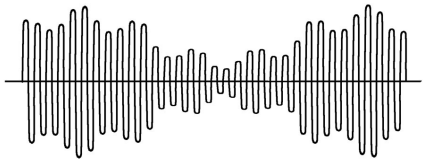
A sound wave might look something like this.



A station's carrier wave might look something like this.



A transmitter combines the sound wave with the carrier wave, looking something like this.

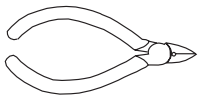


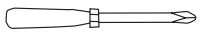
ABOUT RADIO RECEPTION

When radio waves hit a radio's antenna, they produce tiny oscillating electric currents within the antenna. This current then flows to the tuning circuit (made of the tuning coil and the variable capacitor). You use the **TUNER** knob to tune the tuning coil to select a radio frequency corresponding to a particular station. This radio frequency is boosted by the amplifier circuit to drive the speaker, which converts the radio waves into sound waves. See "Circuit Schematic" on Page 18 for a more complete explanation.

REQUIRED SUPPLIES

You need a pair of diagonal cutting pliers and a Phillips screwdriver to build your AM/SW radio. You also need 4 AA alkaline batteries to operate your radio.





GETTING STARTED

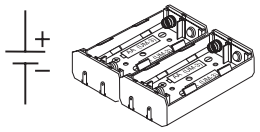
Make sure all the parts are included in your kit. (The parts are located under the circuit diagram panel.) Check the contents of your kit against the following Parts List. The parts list is divided into two sections, Electronic Parts (resistors, transistors, and so on) and Mechanical Parts (nuts, spring terminals, wire, and so on). After you check off the parts on the list, return them to their original place in the box so they will not get lost or damaged.

Printed on the radio kit's cardboard panel is a circuit diagram with parts schematic symbols to help you locate the correct part position on the circuit diagram panel. Mount parts on the circuit diagram panel according to their symbol printed on the panel.

SUPPLIED PARTS LIST

Electronic Parts and Symbols

☐ **Battery Holder (1)**



☐ **Antenna Bar and Antenna Coils, AM (1)**

The antenna coil is a coil of wire wrapped around a black ferrite rod. The antenna bar picks up AM radio signals. The two separate coils pick up shortwave signals.

☐ **Resistor (7)**

- ☐ **1k (1)**
- ☐ **3.9k (1)**
- ☐ **4.7K (1)**
- ☐ **10k (1)**
- ☐ **47k (1)**
- ☐ **330k (2)**

Resistors are brown tube-shaped parts with color bands around them to help you identify their Ohm value. The values of these resistors are abbreviated, using the letter k to symbolize 1,000 Ohms and the letter M to symbolize 1,000,000 Ohms. (For example, a 4.7k resistor has a resistance of 4,700 Ohms.)

Resistors oppose the flow of electrons. They are useful in supplying specific voltages to other electronic components. The Ohm value determines how strongly the resistor opposes the electron flow.

To calculate the Ohms value, use the color code below. Turn the resistor so the gold band faces toward the right. The first two colored bands on the left represent the first two numbers, and the third band represents the multiplier.

Color	Value	Multiplier
Black	0	1
Brown	1	10
Red	2	100
Orange	3	1000
Yellow	4	10,000
Green	5	100,000
Blue	6	1,000,000
Violet	7	10,000,000
Gray	8	100,000,000
White	9	1,000,000,000

For example, a resister with green, blue, orange, and gold bands would have a resistance of 56,000 Ohms (or 56k Ohms).

The following chart shows the color code for tolerance (or accuracy) of a resistor.

Color	Tolerance	Multiplier
None	±20%	0.02
Silver	±10%	0.01
Gold	±5%	0.1

In the example listed above, the resistor's final band indicates that it has a tolerance of ±5%. So the actual resistance of that particular resistor would be 56,000 ±5% (five percent of 56,000 is 2800). Therefore, the actual value is between 58,800 and 53,200 Ohms.

☐ **Capacitor (7)**

Ceramic Capacitors

- ☐ **0.1µF marked 0.1 or 104 (1)**
- ☐ **0.01µF marked 0.01 or 103 (1)**
- ☐ **0.05µF marked 0.05 or 503 (2)**
- ☐ **0.022µF marked 0.022 or 223 (1)**
- ☐ **100pF marked 100 or 101 (1)**

Electrolytic Capacitors

- ☐ **1µF 50V (1)**
- ☐ **47µF 16V (1)**

Capacitors temporarily store a charge or act as filters to smooth out pulsating signals. They can pass alternating current (AC) signals while blocking direct current (DC) signals. Usually, the negative (–) side is marked on the capacitor. You must connect the positive (+) terminal of an electrolytic capacitor correctly. Other capacitors (and resistors) can be connected either way.

All capacitors store electrons. This ability to store electrons is known as *capacitance*. Capacitance is measured in farads (F). Large capacitors are measured in microfarads (μF), and small capacitors are measured in picofarads (pF).

1 farad = 1F

1 microfarad = 1μF = 10^{-6}F = 0.000001F

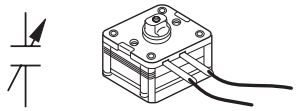
1 picofarad = 1pF = 10^{-12}F = 0.000000000001F

The numbers printed on each capacitor represent its capacitance. The first two numbers on the capacitor represent the first two digits of its capacitance. The third number is the multiplier (the number of zeros you add).

For example, if a capacitor has 223 printed on its body, then:

- the first two digits of its capacitance are 22
- the third digit (3) tells you to add 3 zeros to the first two digits
- the resulting capacitance would be 22,000pF

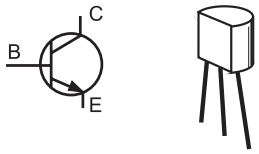
☐ **Variable Capacitor (AM Tuning Capacitor) (1)**



This is a special type of capacitor used with the AM antenna coil to tune-in to AM frequencies.

☐ **Speaker (1)**

☐ **Transistor (2)**



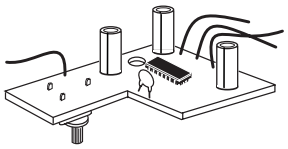
Your kit has two transistors, which can be used in several ways — to amplify weak signals; to connect or disconnect other components; or to allow signals to flow in pulses.

Each transistor has three connection points: B (base), C (collector), and E (emitter).

☐ **Diode (1)**

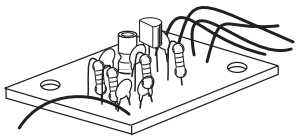
Diodes restrict the flow of electricity to only one direction.

☐ **Amplifier PCB Assembly (1)**



The amplifier circuits are pre-assembled on a small printed circuit board (PCB). The assembly is used to amplify weak audio signals.

☐ **SW Tuner PCB Assembly (1)**



The SW tuner circuit is pre-assembled on a PCB and is used to tune to the desired SW frequency (station).

Mechanical Parts

☐ **Plastic AM Antenna Bracket (2)** 

☐ **Plastic Spacers (6)** 

☐ **Spring Terminals (34)** 

☐ **Tuning Knob (1)** 

☐ **Speaker Bracket (3)** 

☐ **Green 21 cm Wire (4)** (Not Shown)

☐ **Red 10 cm Wire (8)** (Not Shown)

☐ **Yellow Antenna Wire (1)** (Not Shown)

Machine Screws:

☐ **3x 16 mm (2)** 

☐ **3x12 mm (2)** 

☐ **3x10 mm (3)** 

☐ **2.6 x 4 mm (1)** 

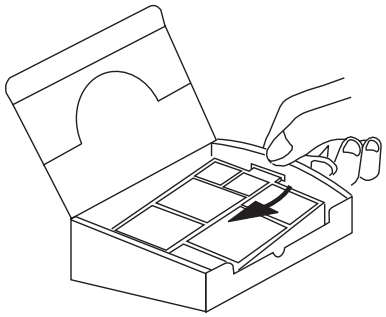
☐ **2.6 x 4 mm (2)** 

☐ **3 x 10 mm (2)** 

☐ **Nuts with 3 mm Hole (9)** 

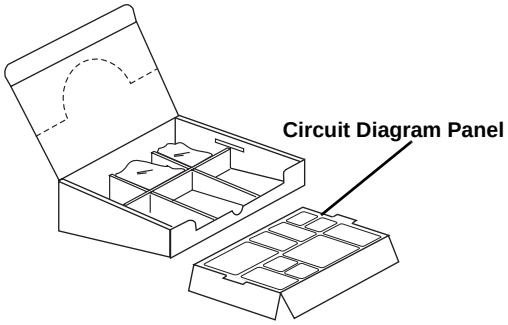
ASSEMBLY

Open the top cover and stretch out the box's left and right sides. Then grasp the circuit diagram panel and lift it out.



Take out the components from the box as you need them, but leave the partition inside.

Do not return the circuit diagram panel to the box for the time being. You will mount the components on it.



Hint: Unless otherwise directed, insert all components from the *top* of the circuit diagram panel.

MOUNTING COMPONENTS ON THE CIRCUIT DIAGRAM PANEL

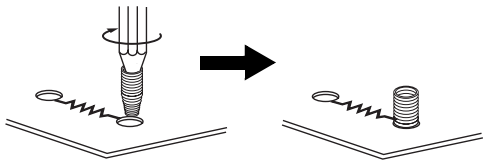
Many connections will be made on the backside of the circuit diagram panel. Write down the number of each spring terminal on the back side of the panel. Be sure to do this accurately.

Mounting the Spring Terminals

Spring terminals provide an easy way to make electrical connections without soldering.

There are 34 spring terminal holes numbered with 1 to 34 on the circuit diagram panel.

Insert the small end of a spring terminal into a terminal hole and press down until it clicks. To make sure that the spring terminals are securely installed, use the pointed end of a pencil to push the spring terminal down. Then slightly twist the pencil in the spring terminal. Allow the terminal to extend approximately one-quarter of its length above the circuit diagram panel.

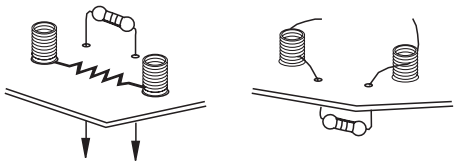


WIRE CONNECTION ON THE CIRCUIT DIAGRAM PANEL

To make the wire connections, bend the spring terminal to one side using your finger, and insert the lead between the spring terminal's coils. Allow the spring terminal to return to its original position as it holds the lead in place making a good connection.

Make the first connections close to the spring terminal's base, leaving room for connections made later.

MOUNTING THE RESISTORS



1. Grasp the 3.9K Ohm resistor (with orange, white, red, and gold bands around it) and slightly bend the two wire leads so they fit into the two holes marked **3.9K** in the **AM DETECTOR** section of the circuit diagram panel.

   Press each resistor all the way down so it is flush with the panel.

2. Turn the panel over and connect the resistor's two leads into Terminals 16 and 19 as directed in "Wire Connection on the Circuit Diagram Panel" on Page 8.

   Be sure that the resistors only contact the terminals indicated.

3. Grasp a 330K Ohm resistor (with orange, orange, yellow, and gold bands) and bend its two leads so they fit in the two holes marked **330K** in the **AM DETECTOR** section of the circuit diagram panel.

4. Turn the panel over and connect the resistor's two leads into Terminals 19 and 20.

5. Bend the other 330K Ohm resistor's two leads so they fit in the two holes marked **330K** in the **PREAMPLIFIER** section of the circuit diagram panel.

6. Turn the panel over and connect the resistor's two leads into Terminals 29 and 31.

7. Grasp the 1k Ohm resistor (with brown, black, red, and gold bands) and bend its two leads so they fit into the two holes marked **1K** in the **PREAMPLIFIER** section of the circuit diagram panel.

8. Turn the panel over and connect the resistor's two leads into Terminals 30 and 33.

9. Grasp the 4.7K Ohm resistor (with yellow, violet, red, and gold bands) and bend its two leads so they fit into the two holes marked **4.7K** in the **PREAMPLIFIER** section of the circuit diagram panel.

10. Turn the panel over and connect the resistor's two leads into Terminals 30 and 31.

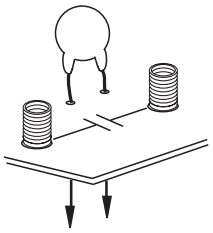
11. Grasp the 10K Ohm resistor (with brown, black, orange, and gold bands) and bend its two leads so they fit into the two holes marked **10K** in the **PREAMPLIFIER** section of the circuit diagram panel.

12. Turn the panel over and connect the resistor's two leads into Terminals 25 and 27.

13. Grasp the 47K Ohm resistor (with yellow, violet, orange, gold bands) and bend its two leads so they fit into the two holes marked **47K** in the **PREAMPLIFIER** section of the circuit diagram panel.

14. Turn the panel over and connect the resistor's two leads into Terminals 27 and 28.

MOUNTING THE CAPACITORS



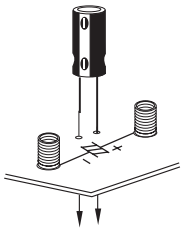
1. Insert the 0.1µF ceramic capacitor (marked .1 or 104) in the two holes marked **0.1µF** in the **AM DETECTOR** section of the circuit diagram panel.

2. Turn the panel over and connect the capacitor's two leads into Terminals 17 and 19.

3. Insert the 0.05µF ceramic capacitor (marked .05 or 503) in the two holes marked **0.05µF** in the **AM DETECTOR** section of the circuit diagram panel.

4. Turn the panel over and connect the capacitor's two leads into Terminals 18 and 21.
5. Insert the other 0.05µF ceramic capacitor in the two holes marked **0.05µF** in the **PREAMPLIFIER** section of the circuit diagram panel.
6. Turn the panel over and connect the capacitor's two leads into Terminals 26 and 27.
7. Insert the 0.022µF ceramic capacitor (marked .022 or 223) in the two holes marked **0.022µF** in the **PREAMPLIFIER** section of the circuit diagram panel.
8. Turn the panel over and connect the capacitor's two leads into Terminals 31 and 34.
9. Insert the 0.01µF ceramic capacitor (marked 0.01 or 103) in the two small holes marked **0.01 µF** in the **PREAMPLIFIER** section of the circuit diagram panel.
10. Turn the panel over and connect the capacitor's two leads into Terminals 31 and 32.
11. Insert the 100pF ceramic capacitor (marked 100 or 101) in the two holes marked **100pF** in the **TUNER** section of the circuit diagram panel.
12. Turn the panel over and connect the capacitor's two leads into Terminals 8 and 9.
13. The remaining two capacitors are electrolytic which have positive (+) and negative (-) leads. The shorter lead near the vertical stripe on the side of the electrolytic capacitor is the negative terminal, and the opposite longer lead is the positive terminal.

    When inserting the electrolytic capacitor into the panel, be sure that the positive (+) and negative (-) leads match the circuit diagram panel.

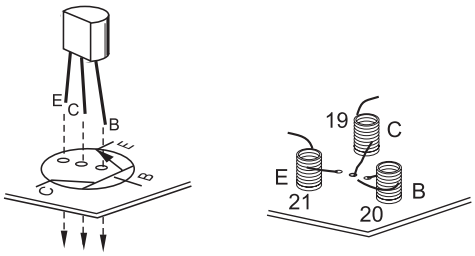


    Insert the 1µF electrolytic capacitors' leads into the two holes, marked **1µF** in the **PREAMPLIFIER** section of the circuit diagram panel so the longer positive (+) lead is in the + hole.
14. Turn the panel over and connect the capacitor's positive (+) longer lead to Terminal 27 and shorter lead to Terminal 29.
15. Insert the 47µF electrolytic capacitors' leads into the two holes, marked **47µF** in the **PREAMPLIFIER** section of the circuit diagram panel so the longer positive (+) lead is in the + hole.
16. Turn the panel over and connect the capacitor's positive (+) longer lead to Terminal 25 and shorter lead to Terminal 26.

STOP! Go back and *carefully* check your work. Be sure that you have mounted each part into the correct holes on the panel and that the leads are connected to the correct spring terminal numbers. Also, make sure that the electrolytic capacitors are installed with the positive and negative leads in the correct position.

Use the diagonal wire cutters to trim the resistors' and capacitors' excess wire ends (that extend *beyond* the spring terminals) from the bottom of the panel. Do not cut the connections to the electronic components, though!

MOUNTING THE TRANSISTORS

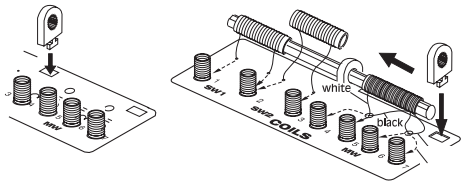


Each transistor has three leads, and each lead must go into the correct hole in the circuit diagram panel. Hold the transistor with the flat side facing you and the leads pointing down. The left lead is the emitter (E), the center lead is the collector (C), and the right lead is the base (B).

Important! A transistor will not function if its leads are installed incorrectly. Make sure that each lead is installed in the correct terminal hole in the panel, and that the connections are made to the correct spring terminals.

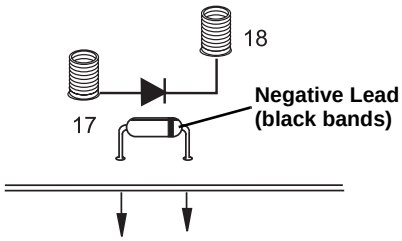
1. Position a transistor so the flat side faces Terminal 21 and insert the leads into the holes in the center of the ⏢ symbol in the **AM DETECTOR** section of the circuit panel.
2. Turn the panel over and insert the emitter lead into Terminal 21, the center lead into Terminal 19, and the base lead into Terminal 20.
3. Position the other transistor so the flat side faces Terminal 31 and insert the leads into the holes in the center of the ⏢ symbol in the **PREAMPLIFIER** section of the circuit panel.
4. Turn the panel over and insert the emitter lead into to Terminal 32, the center lead into Terminal 31 , and the base lead into Terminal 29.

MOUNTING ANTENNA BAR AND ANTENNA COILS



1. Insert one of the plastic antenna brackets into the slot above Terminals 3 and 4 in the **COILS** section of the circuit panel, then twist the bracket sideways so it locks into place.
2. Insert the antenna bar (as shown) in the bracket.
3. Insert the other plastic antenna bracket into the slot above Terminal 7, then twist the bracket sideways so it locks into place.
4. Slide the antenna bar down so both brackets hold it securely in place.
5. Thread the green, yellow, and black AM coil wires into the hole above Terminal 7, and the white wire into the hole above Terminal 5.
6. Turn the panel over and insert the green wire into Terminal 7, the yellow wire into Terminal 6, the black wire into Terminal 5, and the white wire into Terminal 4.
7. Turn the circuit panel over and insert the SW1 coil (with gold colored wire) into the antenna bar.
8. Insert the SW1 coil's wires into the small holes above Terminals 1 and 2.
9. Turn the panel over and insert the right lead to Terminal 1 and the left lead to Terminal 2.
10. Turn the circuit panel over and insert the red coil's leads into the small holes above Terminals 2 and 3.
11. Turn the panel over and insert the right lead to Terminal 2 and the left lead to Terminal 3.

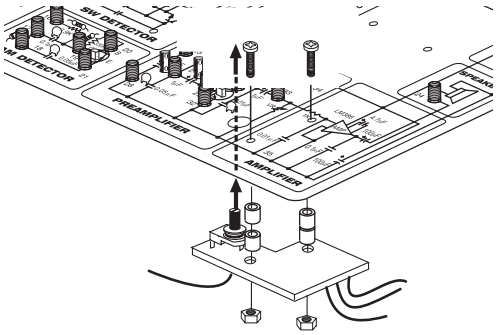
MOUNTING THE DIODE



In order for the diode to function properly, it must be mounted in the correct position (with the negative lead as shown).

1. Position the diode so the negative lead (marked with two black bands) is facing toward Terminal 18.
2. Bend the two leads so they fit into the two holes between Terminals 17 and 18 (with the black bands closer to Terminal 18).
3. Turn the circuit panel over and connect the negative lead to Terminal 18 and the positive lead to Terminal 17.

MOUNTING THE AMPLIFIER PCB ASSEMBLY



Caution! Use extreme care when you handle and mount this PCB assembly. Hold it only by the edges; avoid touching any parts on the PCB assembly.

1. Insert two 3×16 mm screws into the two holes between the **PREAMPLIFIER** and **AMPLIFIER** sections of the circuit panel.
2. Turn the panel over and insert two plastic spacers on both screws.
3. Grasp the amplifier PCB assembly and position it so it fits over the two screws and the volume shaft fits through the hole in the circuit panel in the **PREAMPLIFIER** section of the circuit panel, as shown in the illustration.
4. Fasten a nut to each screw and tighten them to secure the assembly to the circuit panel.
5. Connect the amplifier's four wires under the circuit panel as follows:

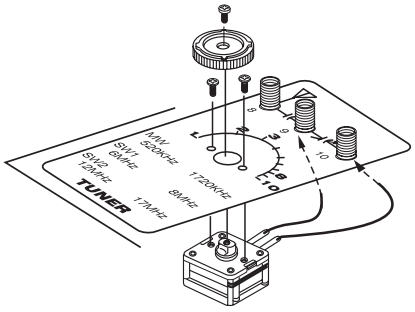
   yellow wire to Terminal 34

   black wire to Terminal 32

   red wire to Terminal 33

   blue wire to Terminal 24

MOUNTING THE TUNING CAPACITOR

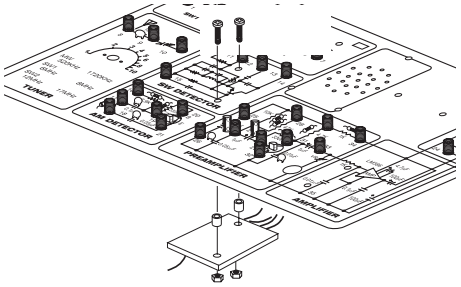


1. Hold the variable capacitor so the tuning shaft faces you and the two leads are pointing up.
2. Rotate the variable capacitor's tuning shaft counterclockwise (left) until it stops.
3. Insert the AM tuning capacitor's tuning shaft from the bottom of the circuit diagram panel through the large hole on the **TUNER** panel as shown.

4. Insert the two 2.6×4 flat head screws into the two small screw holes on the **TUNER** panel and tighten them to fasten the variable capacitor to the panel.
5. Position the tuning knob over the variable capacitor's tuning shaft so that if the **TUNER** panel were a clock, the white dot on the knob would point to 9.
6. Insert a 2.6 ×4 mm screw into the tuning knob and tighten it to fasten the tuning knob to the tuning shaft.
7. Turn the circuit diagram panel over and connect the tuning capacitor's right lead to Terminal 9 and the left lead to Terminal 10.

   Make sure that these bare wires do not contact any other spring terminals.
8. Trim the variable capacitor's excess wire ends (that extend *beyond* the spring terminals) with the diagonal cutters.

MOUNTING THE SW DETECTOR PCB ASSEMBLY



Caution! Use extreme care when you handle and mount this PCB assembly. Hold the circuit panel only by its edges and avoid touching any parts on the PCB.

1. Insert the two 3×12 mm screws from the top into the two holes on the **SW DETECTOR** section of the circuit panel, then turn the panel over and place a plastic spacer onto each of the two screws.
2. Align the two screw holes on the SW Detector PCB assembly with the two screws mounted on the panel, then fasten a nut onto each screw so the assembly is secured to the panel.
3. Fasten the SW detector's wires as follows:

   gray wire to Terminal 14

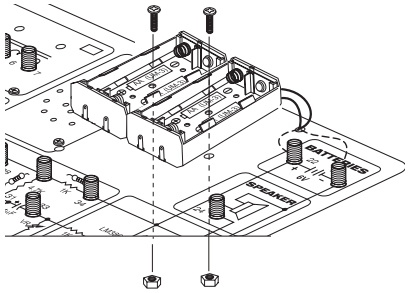
   white wire to Terminal 13

   blue wire to Terminal 15

   red wire to Terminal 11

   green wire to Terminal 12

MOUNTING THE BATTERY CASE

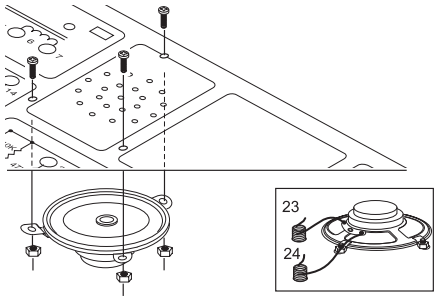


1. Insert the battery case's black and red wires into the wire hole next to the **BATTERIES** section of the circuit panel (as shown).
2. Position the battery case to the left of the **BATTERIES** section of the circuit panel (as shown), and align the battery case's two screw holes with the two screw holes on the panel.
3. Mount the two 3×10 mm flat-head screws into the screw holes on the battery case then fasten a nut onto each screw to secure the battery case to the panel.
4. Connect the battery case's wires as follows:

   red to Terminal 22

   black to Terminal 23

MOUNTING THE SPEAKER



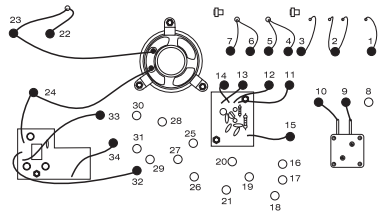
1. Insert the three 3×10 mm screws through the three screw holes on the speaker panel as shown.
2. Turn the circuit diagram panel over and slide the three speaker brackets over the screws.
3. Fasten three nuts to the screws and tighten them slightly. Do not tighten them all the way.
4. Set the speaker, flat side down, in the middle of the three brackets.
5. Swivel the brackets so they face toward the center of the speaker and then tighten the nuts to secure the speaker to the panel.
6. Connect the speakers wires as follows:

   blue lead to Terminal 23

   red lead to Terminal 24

CONNECTING THE WIRES BENEATH THE DIAGRAM PANEL

Turn the circuit diagram panel over and verify that the following connections have been made:.



1. **Tuning Capacitor:**

   right lead to Terminal 9

   left lead to the Terminal 10

2. **SW DETECTOR PCB Assembly:**

   gray wire to Terminal 14

   white wire to Terminal 13

   blue wire to Terminal 15

   red wire to Terminal 11

   green wire to Terminal 12

3. **Amplifier PCB Assembly:**

   yellow wire to Terminal 34

   black wire to Terminal 32

   red wire to Terminal 33

   blue wire to Terminal 24

4. **Speaker:**

   blue lead to Terminal 23

   red lead to Terminal 24

CONNECTING THE ANTENNA

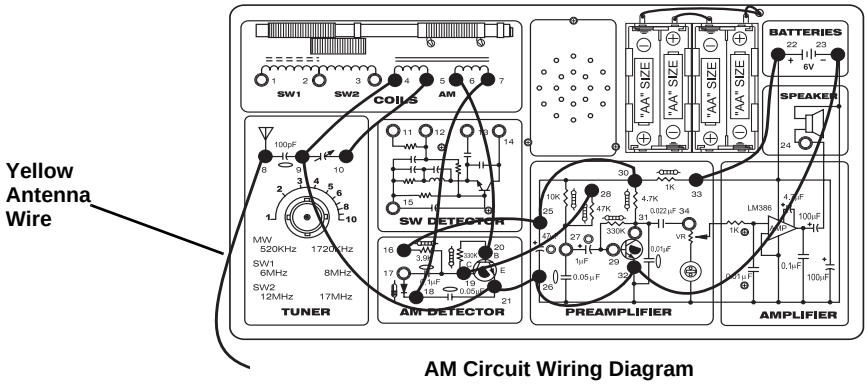
The long yellow wire is the antenna, which improves SW reception. Look at both ends. One end has a portion of the yellow insulation stripped away. Grasp the small piece of insulation above the stripped part and pull it off. Insert the bare lead into Terminal 8 when you wire the radio for SW reception. When you wire the radio for AM reception, do not use the antenna.

WIRING

Completing the AM Circuit

Your radio kit includes different lengths of wire for completing the circuit on top of the circuit diagram panel. Use the shorter wires for connecting closer terminals, and longer wires for connecting more distant terminals.

Following the AM Circuit Wiring Diagram (shown here) and using the supplied wire, insert wire leads into the indicated terminal combinations. Check off the terminal pairs as you go to make sure you complete each connection.

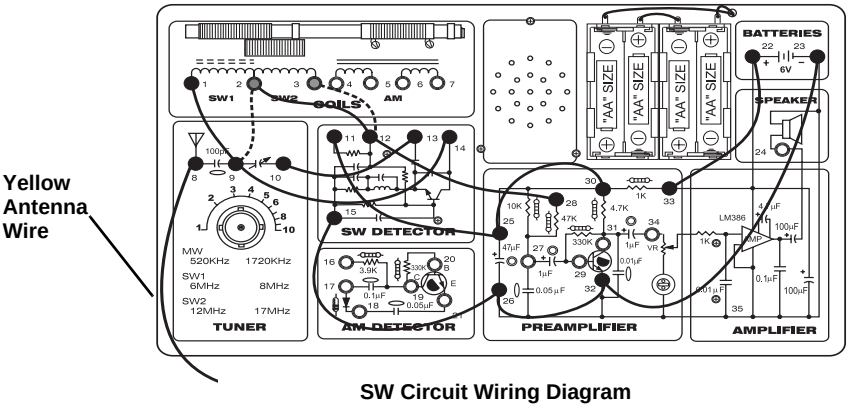


AM Circuit Wiring Diagram

- ☐ Terminals 4 and 9
- ☐ Terminals 9 and 21
- ☐ Terminals 21 and 26
- ☐ Terminals 26 and 32
- ☐ Terminals 32 and 23
- ☐ Terminals 22 and 33
- ☐ Terminals 5 and 10
- ☐ Terminals 6 and 20
- ☐ Terminals 7 and 18
- ☐ Terminals 16 and 25
- ☐ Terminals 25 and 30
- ☐ Terminals 28 and 19

Completing the SW Circuit

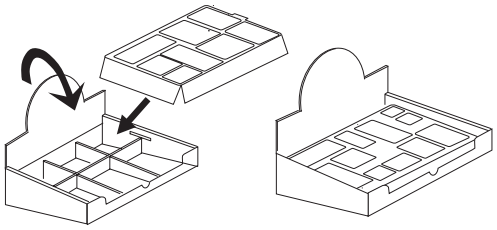
Following the SW Circuit Wiring Diagram (shown here) and using the supplied wire, insert wire leads into the indicated terminal combinations. Check off the terminal pairs as you go to make sure you complete each connection.



SW Circuit Wiring Diagram

- ☐ Terminals 1 and 9
- ☐ Terminals 9 and 14
- ☐ Terminals 2 and 12
- ☐ Terminals 12 and 28
- ☐ Terminals 10 and 13
- ☐ Terminals 11 and 25
- ☐ Terminals 25 and 30
- ☐ Terminals 15 and 26
- ☐ Terminals 26 and 32
- ☐ Terminals 32 and 23
- ☐ Terminals 22 and 33

FORMING THE RADIO KIT BOX



After you complete all connections on the circuit diagram panel, check with the wiring diagram to make sure that all the connections are correctly made. Then, proceed following steps to form the radio kit box.

1. Fold the top cover along the pre-cut line backward, then insert the flap into the groove on the box's rear panel.
2. Bend the four flaps on the circuit diagram panel and position the circuit diagram panel as shown, then place the circuit diagram panel onto the box.
3. Stretch out the left and right panels of the box, then insert the tabs at the left and right side of the circuit diagram panel into the slots at the left and right panels of the box.

INSTALLING BATTERIES

Your AM/Shortwave Radio Kit requires four AA batteries (not supplied) for power. For the best performance and longest life, 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.

Install the batteries according to the polarity (+ and –) marked inside the battery case.

When the reception becomes weak or the radio stops operating properly, replace the batteries.

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

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

OPERATION

LISTENING TO THE AM RADIO

1. Make sure the wires are connected according to "AM Circuit Schematic Diagram and Explanation" on Page 18.
2. Rotate the **TUNER** knob to tune to the desired AM station.
3. Adjust the volume with the knob on the **PREAMPLIFIER** section of the circuit panel.
4. To turn off the radio and conserve battery power, remove the batteries.

LISTENING TO THE SW RADIO

1. Make sure the wires are connected according to "SW Circuit Schematic Diagram and Explanation" on Page 18.
2. *To listen to SW1*, make sure the following Terminals are connected:

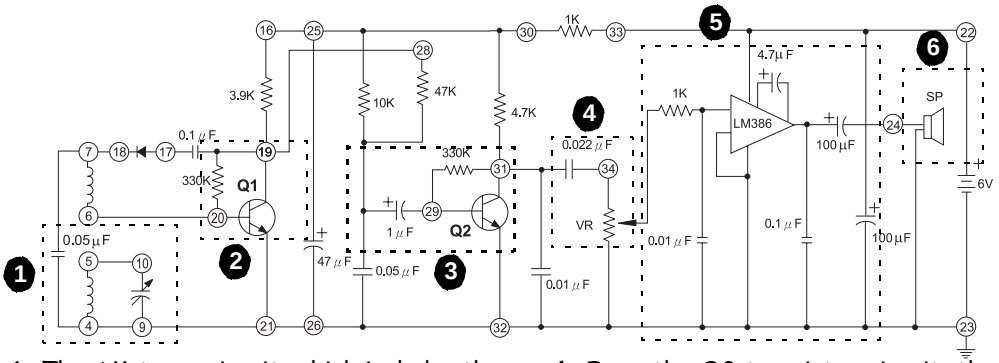
   14-9-1 and **28-12-2**

   To listen to SW2, make sure the following Terminals are connected:

   14-9-2 and **28-12-3**
3. Rotate the **TUNER** knob to tune to SW1 or SW2, according to the circuits you connected.
4. Adjust the volume with the knob on the **PREAMPLIFIER** section of the circuit panel.
5. To turn off the radio and conserve battery power, remove the batteries.

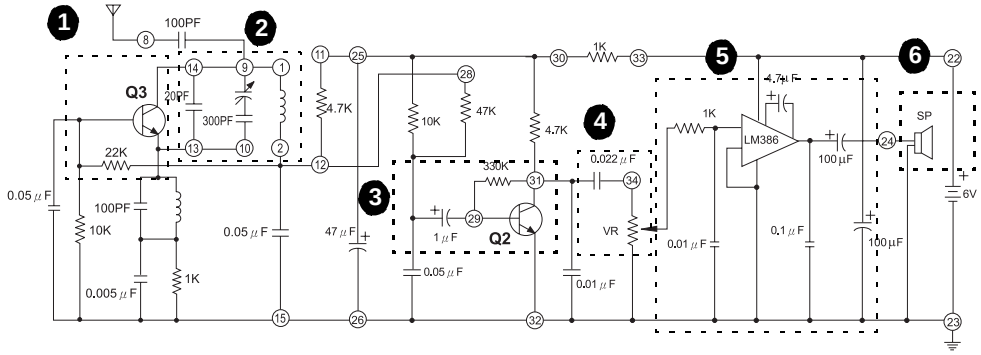
CIRCUIT SCHEMATIC

AM CIRCUIT SCHEMATIC DIAGRAM AND EXPLANATION



1. The AM tuner circuit, which includes the coil and the tuning capacitor, selects a tuning frequency, filtering out other frequencies.
2. The Q1 transistor circuit amplifies the tuning frequency.
3. The signal is coupled from the Q1 transistor to the Q2 transistor via the 1 µF to amplify low frequencies.
4. From the Q2 transistor circuit, the signal is passed to the variable resistor circuit which lets you adjust the volume.
5. From the variable resistor circuit, the signal is transferred to the amplifier circuit.
6. The signal is amplified and the 0.1 uF and 0.01 uF capacitors filter out the high frequency and then the audio frequency is transmitted to the speaker as sound.

SW CIRCUIT SCHEMATIC DIAGRAM AND EXPLANATION



1. The SW antenna receives a signal. The Q3 transistor circuit amplifies the weak signal.
2. The SW tuner circuit, which includes the tuning capacitor, selects either SW1 or SW2 tuning frequency, filtering out other frequencies.
3. The signal is coupled from the tuner circuit to the Q2 transistor via the 1 µF capacitor to amplify weak signals.
4. From the Q2 transistor circuit, the signal is passed to the variable resistor circuit which lets you adjust the volume.
5. From the variable resistor circuit, the signal is transferred to the amplifier circuit.
6. The signal is amplified and the 0.1 uF and 0.01 uF capacitors filter out the high frequency and then the audio frequency is transmitted to the speaker as sound.

TROUBLESHOOTING

If your radio does not pick up a strong signal, or if you do not hear anything, these suggestions might help you figure out the problem and fix it. If your radio still does not operate properly, take it to your local RadioShack store for assistance.

Problem	Solution
The radio does not work.	Install fresh batteries.
	Check to make sure all of the connections (above and below the circuit diagram panel) are made to the correct spring terminals.
	Make sure you placed the correct resistor and capacitor values and connected them to the correct spring terminals.
	Make sure that the transistors are correctly placed and connected to the correct spring terminals.
The reception is poor.	For AM stations, rotate the radio.
	For SW stations, connect the yellow antenna wire (see "Connecting the Antenna" on Page 14).
	For both AM and SW stations, move the radio away from TVs, CBs, stereos, or other devices which might interfere with reception.

Limited Ninety-Day Warranty

This product is warranted by RadioShack against manufacturing defects in material and workmanship under normal use for ninety (90) days from the date of purchase from RadioShack company-owned stores and authorized RadioShack franchisees and dealers. EXCEPT AS PROVIDED HEREIN, RadioShack MAKES NO EXPRESS WARRANTIES AND ANY IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE DURATION OF THE WRITTEN LIMITED WARRANTIES CONTAINED HEREIN. EXCEPT AS PROVIDED HEREIN, RadioShack SHALL HAVE NO LIABILITY OR RESPONSIBILITY TO CUSTOMER OR ANY OTHER PERSON OR ENTITY WITH RESPECT TO ANY LIABILITY, LOSS OR DAMAGE CAUSED DIRECTLY OR INDIRECTLY BY USE OR PERFORMANCE OF THE PRODUCT OR ARISING OUT OF ANY BREACH OF THIS WARRANTY, INCLUDING, BUT NOT LIMITED TO, ANY DAMAGES RESULTING FROM INCONVENIENCE, LOSS OF TIME, DATA, PROPERTY, REVENUE, OR PROFIT OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, EVEN IF RadioShack HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

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

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

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

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