

**AM-1 AM BROADCAST TRANSMITTER**  
**Quick Reference Page Guide**

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**REQUIRED TOOLS**

- ? Soldering Iron (Radio Shack #RS64-2072)
- ? Thin Rosin Core Solder (RS64-025)
- ? Needle Nose Pliers (RS64-1844)
- ? Small Diagonal Cutters (RS64-1845)
- ? <OR> Complete Soldering Tool Set (RS64-2801)

**ADDITIONAL SUGGESTED ITEMS**

- ? Soldering Iron Holder/Cleaner (RS-64-

**TOTAL SOLDER POINTS**

**99**

**ESTIMATED ASSEMBLY TIME**

**Beginner.....3 hrs**  
**Intermediate.....1.5 hrs**  
**Advanced .....1 hr**

Manual Price Only: \$5.00  
 Ramsey Publication No. MAM-1  
 Assembly and Instruction manual for:  
**RAMSEY MODEL NO. AM-1 BROADCAST AM**



**RAMSEY ELECTRONICS, INC.**  
 793 Canning Parkway  
 Victor, New York 14564  
 Phone (716) 924-4560

# AM BROADCAST TRANSMITTER KIT



**Ramsey Electronics Model No.**

**AM-1**

*Ever want to be your own disc jockey or talk show host ? Build and run your own AM broadcast station with this exciting kit ! The AM-1 transmitter is designed specifically for simplicity of construction and use - an ideal first kit !*

- ? **Great for transmitting your tape deck, CD player, or voice throughout the house, yard, or car !**
- ? **Powerful enough for high school, college, or neighborhood radio station - in use the world over !**
- ? **Easily tunes to any clear channel on the AM broadcast band. - from 530 to 1750 KHz.**
- ? **Operates on the same principle as the "big-boys", learn how commercial transmitters work as well !**
- ? **Superior performance - transmits up to 1/4 mile !**
- ? **Adjustable input level - can be configured for line level or microphone input.**
- ? **Unit runs on 9 - 12 volts DC.**
- ? **Handy information on FCC rules and antenna hints.**
- ? **Complete and informative instructions guide you to a kit that works the first time, every time - enhances resale value, too !**

### PARTIAL LIST OF AVAILABLE KITS:

#### RAMSEY TRANSMITTER KITS

- ??FM-10 FM Stereo Transmitter
- ??FM-1,2,4 FM Wireless Microphones
- ??PB-1 Telephone Transmitter
- ??AM-1 AM Transmitter

#### RAMSEY RECEIVER KITS

- ??FR-1 FM Broadcast Receiver
- ??AR-1 Aircraft Band Receiver
- ??SR-1 Shortwave Receiver
- ??AA-7 Active Antenna
- ??SC-1 Shortwave Converter

#### RAMSEY HOBBY KITS

- ??SG-7 Personal Speed Radar
- ??SS-70 Speech Scrambler
- ??SP-1 Speakerphone
- ??MD-3 Microwave Motion Detector
- ??PH-10 Peak hold Meter
- ??LC-1 Inductance-Capacitance Meter

#### RAMSEY AMATEUR RADIO KITS

- ??FX Series VHF and UHF Transceivers
- ??HR Series HF All Mode Receivers
- ??QRP Series HF CW Transmitters
- ??CW-7 CW Keyer
- ??PA Series VHF and UHF Power Amplifiers
- ??Packet Computer Interfaces
- ??QRP Power Amplifiers

#### RAMSEY MINI-KITS

Many other kits are available for hobby, school, Scouts and just plain FUN. New kits are always under development. Write or call for our free Ramsey catalog.

#### AM-1 AM BROADCAST TRANSMITTER KIT INSTRUCTION MANUAL

Ramsey Electronics publication No. MAM-1 Revision 1.2 First printing: August, 1994

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Please read carefully BEFORE calling or writing in about your kit. Most problems can be solved without contacting the factory.

Notice that this is not a "fine print" warranty. We want you to understand your rights and ours too! All Ramsey kits will work if assembled properly. The very fact that your kit includes this new manual is your assurance that a team of knowledgeable people have field-tested several "copies" of this kit straight from the Ramsey Inventory. If you need help, please read through your manual carefully, all information required to properly build and test your kit is contained within the pages!

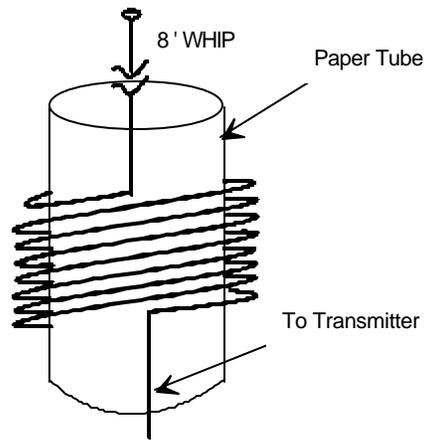
**1. DEFECTIVE PARTS:** It's always easy to blame a part for a problem in your kit. Before you conclude that a part may be bad, thoroughly check your work. Today's semiconductors and passive components have reached incredibly high reliability levels, and it's sad to say that our human construction skills have not! But on rare occasion a sour component can slip through. All our kit parts carry the Ramsey Electronics Warranty that they are free from defects for a full ninety (90) days from the date of purchase. Defective parts will be replaced promptly at our expense. If you suspect any part to be defective, please mail it to our factory for testing and replacement. Please send only the defective part (s), not the entire kit. The part(s) MUST be returned to us in suitable condition for testing. Please be aware that testing can usually determine if the part was truly defective or damaged by assembly or usage. Don't be afraid of telling us that you 'blew-it', we're all human and in most cases, replacement parts are very reasonably priced.

**2. MISSING PARTS:** Before assuming a part value is incorrect, check the parts listing carefully to see if it is a critical value such as a specific coil or IC, or whether a RANGE of values is suitable (such as "100 to 500 uF"). Often times, common sense will solve a mysterious missing part problem. If you're missing five 10K ohm resistors and received five extra 1K resistors, you can pretty much be assured that the '1K ohm' resistors are actually the 'missing' 10 K parts ("Hum-m-m, I guess the 'red' band really does look orange!") Ramsey Electronics project kits are packed with pride in the USA. If you believe we packed an incorrect part or omitted a part clearly indicated in your assembly manual as supplied with the basic kit by Ramsey, please write or call us with information on the part you need and proof of kit purchase.

#### **3. FACTORY REPAIR OF ASSEMBLED KITS:**

To qualify for Ramsey Electronics factory repair, kits MUST:

1. NOT be assembled with acid core solder or flux.
2. NOT be modified in any manner.
3. BE returned in fully-assembled form, not partially assembled.
4. BE accompanied by the proper repair fee. No repair will be undertaken until we have received the MINIMUM repair fee (1/2 hour labor) of \$18.00, or authorization to charge it to your credit card account.
5. INCLUDE a description of the problem and legible return address. DO NOT send a separate letter; include all correspondence with the unit. Please do not include your own hardware such as non-Ramsey cabinets, knobs, cables, external battery packs and the like. Ramsey Electronics, Inc., reserves the right to refuse repair on ANY item in which we find excessive problems or damage due to construction methods. To assist customers in such situations, Ramsey Electronics, Inc., reserves the right to solve their needs on a case-by-case basis. The repair is \$36.00 per hour, regardless of the cost of the kit. Please understand that our technicians are not volunteers and that set-up, testing, diagnosis, repair and repacking and paperwork can take nearly an hour of paid employee time on even a simple kit. Of course, if we find that a part was defective in manufacture, there will be no charge to repair your kit (But please realize that our technicians know the difference between a defective part and parts burned out or damaged through improper use or assembly).
4. REFUNDS: You are given ten (10) days to examine our products. If you are not satisfied, you may return your unassembled kit with all the parts and instructions and proof of purchase to the factory for a full refund. The return package should be packed securely. Insurance is recommended. Please do not cause needless delays, read all information carefully.



2. Identify the location and purpose of your transmissions from time to time. This is a common courtesy toward other persons who may hear your transmission. The FCC is toughest about clandestine transmission which costs time and money to track down.
3. If you are contacted by the FCC regarding the use of this device, cooperate fully and promptly.
4. If you receive any complaint about your transmissions interfering with broadcast reception, stop or change your operation immediately.

You also have the option of writing a clear and polite letter to the FCC Engineer in Charge of your local district, describing your intended operation. Mention the operating frequency and planned hours of operation. This could be a good step to take if your project is on behalf of a school, scout or community group.

### ANTENNA EXPERIMENTING

Since one wavelength (?) at AM broadcast frequencies is over 950 feet, and the distance of only ten feet is allowed between the transmitter and antenna, including the antenna, you may want to experiment with a "loaded" antenna for better performance.

An easy way to describe what happens when you "load" the antenna is that we electrically increase the "length" of the antenna without increasing the mechanical "length" of the antenna. Our goal is to approximate a functional portion of the full wavelength (i.e.  $\frac{1}{4}$  or  $\frac{1}{8}$ )

Using an 8 foot whip antenna, a series inductance of about 350  $\mu\text{H}$  is required to properly load the circuit. Older CB radios and car stereos usually use a large inductor in series with the power lead, typically 100 to 150  $\mu\text{H}$ . Two or three of these coils placed in series and connected to a whip can do the job.

## KIT ASSEMBLY AND INSTRUCTION MANUAL FOR

# AM BROADCAST TRANSMITTER AM-1

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# RAMSEY

**RAMSEY ELECTRONICS, INC.**  
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## INTRODUCTION

Many times we wish to be heard via wireless communications. Whether transmitting music or voice, what's required is a stable transmitter tunable to an unused frequency on the broadcast band. Here at Ramsey, we have produced several models of FM wireless units for years. Recent requests for an AM type transmitter have been answered with this kit.

The Ramsey AM-1 transmitter is a true broadcast transmitter, which any person may build and use in accordance with the rules of one's national telecommunications authority. For U.S. residents, that authority is the Federal Communications Commission (FCC). The AM-1's low power broadcasting capabilities make it practical for many uses, but one should remember that this transmitter is definitely not a toy. We will refer to the FCC regulations frequently in this manual and provide you with some information necessary to enjoy the AM-1's capabilities in accordance with the law.

Typical uses for the AM-1 include:

- ? Student operated school radio stations.
- ? Re-broadcasting received audio for shortwave or HAM radio use.
- ? Listening aid for auditoriums, churches, or other events.
- ? Short range experimentation.

We think that you will be very pleased with the transmitting range, audio quality, and frequency stability of this build it yourself AM transmitter. If you follow our assembly instructions carefully and use your AM-1 in accordance with applicable FCC rules, a whole new world of sharing news, views, and music with friends and neighbors awaits you.

## AM-1 CIRCUIT DESCRIPTION

Before we dive into the circuit description of the AM transmitter, first we'll describe exactly what we mean when we say "AM". An (A)mplitude (M)odulated signal is actually a combination of two signals. The high frequency carrier is the frequency that one will tune on the radio receiver's dial, from 530 to 1750 KHz. The modulation is the audio information that rides "on top" of the high frequency carrier, resulting in a changing of the level, or amplitude, of the output waveform. Take a glance at the schematic and follow along at how we produce this AM waveform.

The RF oscillator consists of Q6 and associated components. The frequency of operation is determined by selecting the proper values for C9 and C10, and adjusting the inductance of coil L2. The "buffer" amplifier (Q5)

The individual kit builder and all end users of this device assume responsibility for lawful uses conforming to the FCC part,15 rules. Operation is subject to the following conditions:

1. This device may not cause any harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation.

These rules are published in 100 "Parts," covering anything imaginable concerning the topic of "Telecommunications." The six books containing the FCC rules are section 47 of the complete Code of Federal Regulations, which you are likely to find in the reference section of your local Public Library. If you have any legal questions concerning your AM-1 or any home built device which emits RF energy, it is your responsibility to study the FCC regulations. It is best if you personally read the rules (and consult with a lawyer if you're in doubt) and not bother understaffed and busy FCC employees with questions that are clearly answered in the rules. A sign on the side of one of David Copperfield's tour trucks comes to mind - "Only fools disturb sleeping tigers!"

Here are what we feel are the primary "do's and don'ts" picked from the current FCC rules, as of May, 1990. This is only a **brief** look at the rules and should not be construed to be the absolute complete legal interpretation! It is up to you to operate within the current Part 15 rules and Ramsey Electronics, Inc. cannot be held responsible for any violation thereof.

Licensed Broadcast stations and their listeners have all the rights! Your non-licensed use of any device such as the AM-1 has absolutely no rights at all over the rights of a licensed broadcast operator. If your operation of the AM-1 interferes with anyone's use or enjoyment of an FCC licensed transmission of any kind, your only choice is to immediately terminate or change the operation of your low power transmitter.

For some frequency bands, the FCC sets 100 milliwatts as the maximum permitted power for unlicensed, home built transmitting devices. It is also noted that the combined length of the antenna and feedline (coaxial cable or other) must not exceed 10 feet.

### **"On the Air" Etiquette**

1. Do not use "made up" call signs to identify your transmissions. Only the FCC has the authority to grant such call signs. Use some other way to identify your transmitting activity, such as " This is radio 550, Pittsford School Student Radio," and so forth.

## EXPERIMENTAL “BROADCASTING” PROJECTS

To use the AM-1 successfully as a “broadcasting” service to interested listeners in a school or immediate neighborhood, most of your effort will be concentrated on smoothly “managing” or mixing the audio signals into the transmitter input. Operation of the transmitter consists of the following:

If you wish to “mix” between audio inputs, i.e. microphone and music sources, you may need an external audio “mixer” unit. Many sources exist for audio mixers, including the Radio Shack No. 32 - 1105 which is one of least expensive that we have found. There are more sophisticated models, but bear in mind that model numbers and specs for such units can change from year to year. Also, some home entertainment audio equipment includes simple mixing capabilities which will permit you to fade and “cue” music and microphone inputs.

## TROUBLESHOOTING INSTRUCTIONS

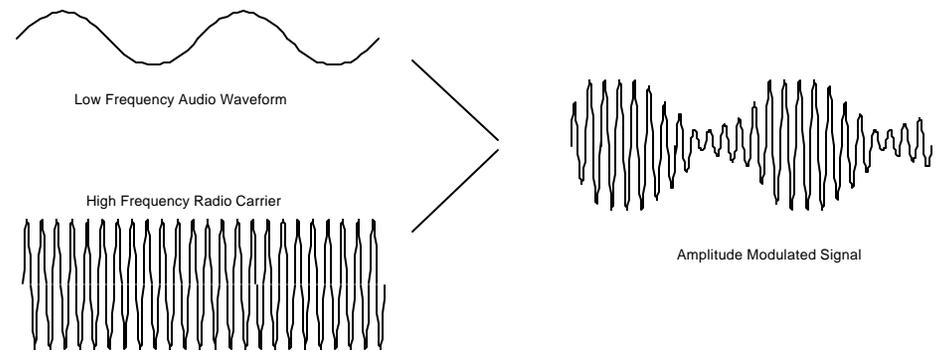
While we had hoped that it wouldn't come to this, if you are having trouble with your transmitter, here are a few suggestions.

By far the most common source of problems is due to misplaced parts or poor solder connections. It's always best to take a break before searching for bad connections. Around here it's referred to as the “Irwin Time Test” which states that “anything left alone long enough seems to repair itself!” A good way of checking component placement is to double check the assembly steps going backwards from the last steps to the the first. Bright lighting and a magnifying aid can be helpful in identifying soldering problems.

Use a methodical, logical troubleshooting technique. Most problems can be solved using common sense. A volt-ohm meter and a clear head are usually all that are needed to correct any problem. Please understand that it is nearly impossible to “troubleshoot” by phone, any specific questions should be documented and sent to us by mail.

## PLEASE READ THIS IMPORTANT FCC INFORMATION

The AM-1 is classified by the FCC as an “intentional radiator,” and it's operation is covered by Part 15 of the FCC rules which were updated in June 1989. In brief, what you need to know about these rules is that your AM broadcaster must not interfere with AM radio or TV reception of other people. As designed, the AM-1 complies with FCC technical requirements for devices used in the AM broadcast band.



is connected to the base of Q6 in order to use the undistorted oscillator output for the RF carrier frequency.

The audio input path is routed from J1, the audio input source, to transistor Q2 to amplify the incoming signal. Notice that the transistor is biased to be linear using resistors R3, R5, and R6. The incoming audio signal is therefore amplified undistorted (for great sounding audio). Optional capacitor C4 is used only when a microphone input is used to provide additional gain from transistor Q2. The audio input level to the amplifier can also be adjusted using R12, the input level adjustment.

The resulting audio output is fed to transistor Q1, which does not provide any gain, but supplies enough current to modulate the RF carrier. Inductor L1 allows the low frequency audio to pass through but “chokes” the RF signal and does not allow it to get “back into” the audio circuitry.

Transistors Q3 and Q4 comprise the “power amplifier” section of the circuit. Their collector supply voltage is furnished by Q1, thus producing an AM output waveform. This signal is then low pass filtered using C13, C14, and L3.

Notice also that the audio information is applied at the power amplifier stage. This is referred to as “high level” modulation, and is commonly used for high power AM broadcast stations. The distinct advantage to this is that the RF amplifiers need not be biased for linear operation. It is much cheaper to manufacture a linear amplifier for the relatively low frequency audio, than to produce the AM waveform at a low level and amplify it to a higher power level without distortion. The main disadvantage of high level modulation is that the audio modulator's power must be half that of the final transmitter, not too tough for our low power kit, but try to imagine the amplifier for a 50,000 watt AM broadcast station! Boy, that audio amp would sure crank the 'ol car stereo!

It should also be stated that, due to the linear operation of the amplifiers in this circuit (transistors Q1 and Q2 biased “on”), this circuit will consume some power. It is not recommended that a common rectangular 9V battery be used

**CONGRATULATIONS**

You have just completed your AM-1 wireless broadcast unit. Take a well deserved break now. Give your eyes a rest. When you return, be sure to check over your work on the entire circuit board. Energizing the circuit board with solder “bridges” or misplaced components can damage your kit.

**ANTENNA CONSIDERATIONS**

For many applications, a 5 - 6 foot wire antenna connected to the center pin of the “RF OUT” connector will produce satisfactory results.

Another simple but effective hint is to connect the chassis “ground” to a good earth ground (like a cold water pipe, etc.). Be sure, however, that the total length of the antenna, feedline, and grounding wire is less than 10 feet as required by the FCC Part 15 rules.

Once the tuning capacitors and some sort of antenna have been installed, it’s time to align your transmitter.

**ALIGNMENT PROCEDURES**

Keep all tests very brief until you have carefully chosen an open operating frequency in the AM broadcast band.

- ✍ 1. Tune an AM receiver to a quiet spot on the dial where you wish to receive your transmitter.
- ✍ 2. Connect an antenna to the RF OUT jack.
- ✍ 3. Energize the circuit with a suitable power source.
- ✍ 4. Using the plastic tuning tool, adjust coil L2 until you hear the AM-1’s carrier signal. If the radio is very close and you have configured the AM-1 for a mike input, you may hear a feedback squeal. It might seem a little tricky at first to set the exact frequency you want, as the frequency may be affected by how close your hand is to the circuit board.
- ✍ 5. Rotate the LEVEL ADJ control to its full clockwise position. This is the maximum level input position. The best audio source for testing if you’ve configured the AM-1 for line level is the line level outputs of a tape deck or CD player. Most stereo systems have a variety of output jacks of which one or more are “line level”. Connect the audio source to the AUDIO IN jack . Adjust R12 for undistorted audio.

decisions on how we are going to use our AM transmitter. Follow the following final assembly instructions carefully.

### AM-1 Final Assembly Instructions

If you wish to use a microphone as the audio source for your AM transmitter, you'll need to increase the gain of the audio amplifier by installing electrolytic capacitor C4.

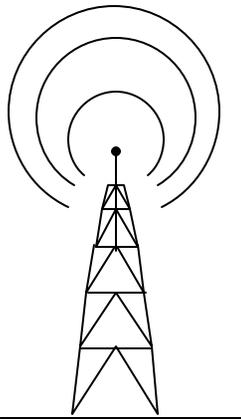
If the input is to be "line level" audio from a tape or CD player, there is no need to install capacitor C4.

✂ If necessary, (as discussed above) install 10  $\mu$ F electrolytic capacitor C4. Observe the correct polarity!

Next, you'll need to determine what frequency you wish to set your transmitter to. It really is not sufficient to just "check" the AM band for an empty frequency, using the AM radio closest at hand. It is your responsibility to research what AM stations can be listened to in your area and not to interfere with any of your neighbors in their reception of **any** commercially licensed broadcast station. Usually a modern car radio (with external antenna) is extremely sensitive and a good indicator of what stations will be received in your area.

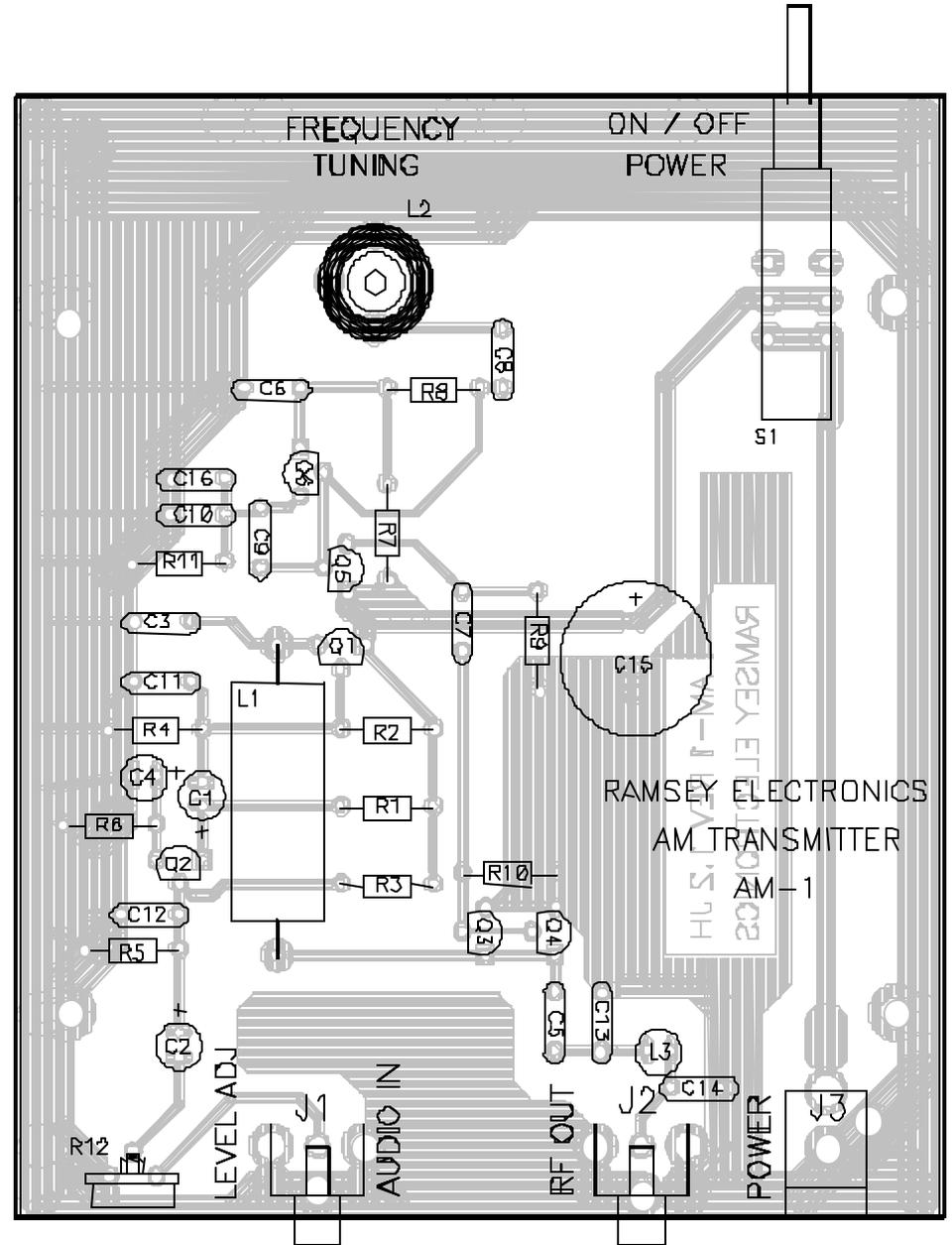
Once you have determined what your operating frequency will be, refer to the following chart for the correct values of C9, C10, and C16.

✂ Install the correct values for C9, C10, and C16.



- ? Correct construction and adjustment of the transmitter.
- ? Carefully checking for an open frequency in accordance with the FCC part 15 rules.
- ? Setting up a suitable antenna.
- ? Connecting the audio source to the audio input jack.

### PARTS LAYOUT DIAGRAM



to power this kit. Instead, a battery “pack” consisting of eight 1.5 volt cells, a 12V sealed battery, or other external 12V DC supply may be used.

## PARTS LIST

Please verify that the following items are in your kit before beginning assembly.

### RESISTORS

- ✂ 4 270 ohm [red-violet-brown] (R6,7,9,11)
- ✂ 2 1K ohm [brown-black-red] (R5,10)
- ✂ 1 2.2K ohm [red-red-red] (R1)
- ✂ 4 10K ohm [brown-black-orange] (R2,3,4,8)
- ✂ 1 5K PC mount potentiometer [marked 502] (R12)

### CAPACITORS

- ✂ 1 220 pF disc capacitor [marked 220 or 221] (see text C9,10,16)
- ✂ 1 470 pF disc capacitor [marked 470] (see text C9,10,16)
- ✂ 1 .001  $\mu$ F disc capacitor [marked .001 or 102] (see text C9,10,16)
- ✂ 4 .002 or .0022  $\mu$ F disc capacitor [marked .002,.0022 or 2000,2200] (C13,14, see text C9,10,16)
- ✂ 7 .01  $\mu$ F disc capacitor [marked .01 or 103 or 10nF] (C3,5,6,7,8,11,12)
- ✂ 3 10  $\mu$ F electrolytic capacitors (C1,2,4)
- ✂ 1 220  $\mu$ F electrolytic capacitor (C15)

### INDUCTORS

- ✂ 1 48  $\mu$ H inductor [enameled copper wire wound on ferrite core] (L1)
- ✂ 1 10  $\mu$ H inductor [marked 100] (L3)
- ✂ 1 slug tuned variable inductor [fine wire wound on plastic and cardboard cylinder] (L2)

### SEMICONDUCTORS

- ✂ 6 NPN transistors [marked 3904] (Q1,2,3,4,5,6)

### MISCELLANEOUS PARTS AND HARDWARE

- ✂ 2 RCA type PC mount connectors (J1,2)
- ✂ 1 2.5mm power jack (J3)

Transmitter Frequency (KHz)	C9 (pF)	C10 (pF)	C16 (pF)
520 - 660	1000 (marked .001 or 102)	2000/2200 (marked .002/.0022)	2000/2200 (marked .002/.0022)
550 - 720	2000/2200 (marked .002/.0022)	2000/2200 (marked .002/.0022)	Not used
700 - 870	1000 (marked .001 or 102)	2000/2200 (marked .002/.0022)	Not used
800 - 1000	470 (marked 470)	2000/2200 (marked .002/.0022)	Not used
1000 - 1250	470 (marked 470)	1000 (marked .001 or 102)	Not used
1250 - 1600	220 (marked 220)	1000 (marked .001 or 102)	Not used
1500 - 1750	220 (marked 220)	470 (marked 470)	not used

- ✂ 26. Install C11, .01  $\mu$ F disc capacitor [marked .01 or 103 or 10nF].

- ✂ 27. Install C3, .01  $\mu$ F disc capacitor.

- ✂ 28. Install Q1, 2N3904 NPN transistor. Be sure to orient the part correctly.

You’ve just completed the audio input circuitry. Have another look at your solder connections to ensure that there are no cold or intermittent joints. Hang in there, only 7 parts to go!

- ✂ 29. Install L1, the large 48  $\mu$ H wire wound inductor.

- ✂ 30. Install R10, 1K ohm resistor [brown-black-red].

- ✂ 31. Install Q3 and Q4, the last two 2N3904 NPN transistors. Be sure to orient the flat side correctly.

- ✂ 32. Install C5, .01  $\mu$ F disc capacitor [marked .01 or 103 or 10nF].

- ✂ 33. Install C13, .002 or .0022  $\mu$ F disc capacitor [marked 2000, 2200 or .002, .0022].

- ✂ 34. Install inductor L3, 10  $\mu$ H [marked 100].

- ✂ 35. Install C14, .002 or .0022  $\mu$ F disc capacitor [marked 2000, 2200 or .002, .0022].

**What about those extra parts !!!???** Now you’ll need to make some

- ✍ 10. Install R7, another 270 ohm [red-violet-brown].
- ✍ 11. Install Q5, a 2N3904 transistor. Be sure to orient it correctly! See the parts diagram for correct orientation.
- ✍ 12. Install C7, .01  $\mu$ F disc capacitor [marked .01 or 103 or 10nF].
- ✍ 13. Install R9, 270 ohm [red-violet-brown].
- ✍ 14. Install C15, 220  $\mu$ F electrolytic capacitor. Electrolytic capacitors are polarized with a (+) and a (-) lead and must be installed in the correct orientation. Ordinarily, only the negative side is marked on the capacitor body with a dark band and the (-) sign clearly shown, while PC boards will usually show the (+) hole location. Use care to ensure proper polarity.

- ✍ 1 DPDT pushbutton switch (S1)
- ✍ 1 AM-1 printed circuit board
- ✍ 1 “diddle stick” plastic alignment tool

Whew ! Now that wasn't so bad now was it? You have just completed most of the oscillator. Notice that we have excluded a few capacitors, C9, 10, and 16. We will install these later while testing the unit. Take a moment now to recheck you work for clean, shiny solder connections. Resolder any connections that are less than perfect.

We'll get back to building now, starting at the audio input and working through the audio circuitry.

- ✍ 15. Install trimmer potentiometer R12. Solder all three leads.
- ✍ 16. Install C2, 10  $\mu$ F electrolytic capacitor. Be sure to orient the part correctly. See the parts placement diagram for correct orientation.
- ✍ 17. Install R5, 1K ohm [brown-black-red].
- ✍ 18. Install C12, .01  $\mu$ F disc capacitor. This capacitor act as a RF bypass component. It effectively “shorts” the high frequency signals to ground while not effecting the low frequency audio.
- ✍ 19. Install Q2, 2N3904 NPN transistor [marked 2N3904]. Pay attention to the orientation!
- ✍ 20. Install R3, 10K ohm [brown-black-orange].
- ✍ 21. Install R1, 2.2K ohm [red-red-red].
- ✍ 22. Install R2, 10K ohm [brown-black-orange].
- ✍ 23. Install R6, 270 ohm [red-violet-brown].
- ✍ 24. Install C1, 10  $\mu$ F electrolytic capacitor. Watch the polarity!
- ✍ 25. Install R4, 10 K ohm [what colors were those ???!] [brown-black-orange].

## **ASSEMBLY INSTRUCTIONS**

There are numerous solder connections on the AM-1 printed circuit board. Therefore, PLEASE take us seriously when we say that good soldering is essential to the proper operation of your transmitter!

- ? Use a 25-watt soldering pencil with a clean, sharp tip.
- ? Use only rosin-core solder intended for electronics use.
- ? Use bright lighting, a magnifying lamp or bench-style magnifier may be helpful.
- ? Do your work in stages, taking breaks to check your work. Carefully brush away wire cuttings so they don't lodge between solder connections.

We have a two-fold "strategy" for the order of the following kit assembly steps. First, we install parts in physical relationship to each other, so there's minimal chance of inserting wires into wrong holes. Second, whenever possible, we install in an order that fits our "Learn-As-You Build" Kit building philosophy. This entails describing the circuit that you are building, instead of just blindly installing components. We hope that this will not only make assembly of our kits easier, but help you to understand the circuit you're constructing.

For each part, our word "Install" always means these steps:

1. Pick the correct part value to start with.
2. Insert the part, oriented correctly, into its correct holes in the PC-board.
2. If helpful, gently BEND the part's wire leads or tabs to hold it into place, with the body of the part snugly against the top side ("component side") of the PC-board. The top side is the side that does not contain metal traces, but does have an outline of each part printed on it.
3. Insert it into the correct PC board location.
4. Orient it correctly, follow the PC board drawing and the written directions for all parts - especially when there's a right way and a wrong way to solder it in. (Diode bands, electrolytic capacitor polarity, transistor shapes, dotted or notched ends of IC's, and so forth.)

5. Solder all connections unless directed otherwise. Use enough heat and solder flow for clean, shiny, completed connections.

6. Trim or nip all excess wires extending beyond each solder connection, taking care that wire trimmings do not become lodged in PC-board solder connections.

### **Now, let's get building!**

Since you may appreciate some "warm-up" soldering practice as well as a chance to put some "landmarks" on the PC board, we'll first install some "hardware" components. This will also help us to get acquainted with the up - down, left - right orientation of the circuit board. Remember that the components will be mounted on the "component" (printed) side of the circuit board and then soldered on the "solder" (foil) side of the circuit board.

- ✂ 1. Install DPDT switch S1. Position it so that the plunger of the switch extends over the edge of the PC board. Be sure to push the switch flat to the circuit board. Solder all six connections.
- ✂ 2. Install RCA phono jacks J1 and J2. These connectors will "snap" into place before soldering. Don't be afraid to completely solder all three ground connections as these will also limit the "stress" on the input and antenna connections.
- ✂ 3. Install the 2.5 mm power connector in the J3 position.

We'll now begin to construct the RF oscillator section of the AM-1. Be sure to mount the components as close as possible to the PC board to avoid "radiating" any unwanted signals due to long lead lengths.

- ✂ 4. Install L2, the slug tuned inductor. Solder all three tabs.
- ✂ 5. Install C8, .01  $\mu$ F disc capacitor [marked .01 or 103 or 10nF].
- ✂ 6. Install R8, 10K ohm [brown-black-orange].
- ✂ 7. Install C6, .01  $\mu$ F disc capacitor [marked .01 or 103 or 10nF].
- ✂ 8. Identify Q6, a 2N3904 NPN transistor. When installing Q6, observe correct placement of the flat side. Press the transistor snugly into the PC board so that only a minimum amount of wire lead is exposed above the board. In soldering, do not be afraid of using enough heat to make a good solid connection.
- ✂ 9. Install R11, 270 ohm [red-violet-brown].