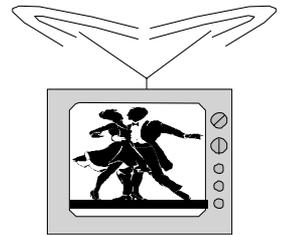


# TELEVISION TRANSMITTER KIT



**Ramsey Electronics Model No.**

**TV6C**

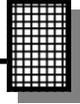
*Don't string cables through the house! Transmit your VCR or camera signal to any nearby TV set with great audio and video quality. You can be the program manager of your own Mini-TV station!*

*Typical uses of the TV transmitter:*

- Watching one VCR from anywhere in the house
- Using the camcorder camera to watch remote areas
- Hidden camera fun
- Home TV station
- Student TV station

*The Ramsey TV6C transmitter features:*

- Runs on 12 to 15 volts DC
- On-board whip antenna
- Stable output adjustable to channels 3 - 6
- Clear, concise step-by-step instructions
- Video and Audio inputs compatible with any VCR or TV camera



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- The "Cube" Video Transmitters
- AM1, AM25 AM Transmitters

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- VLF1 Low Bander
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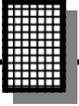
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Many other kits are available for hobby, school, Scouts and just plain FUN. *New kits are always under development. Write or call for our free Ramsey catalog.*



### TV6C TV TRANSMITTER KIT INSTRUCTION MANUAL

Ramsey Electronics publication No. MTV6C Revision 1.2a  
First printing: January 1995



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# KIT ASSEMBLY AND INSTRUCTION MANUAL FOR

# TELEVISION TRANSMITTER

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## **INTRODUCTION TO THE TV6C:**

The answer to all your TV and VCR hook-up problems is now in your hands. Your TV6C TV Transmitter kit is the handy "wireless wire" you can use to connect up the whole house for TV of your choice!

The TV6C accepts normal video and audio signals from VCRs, camcorders, or TV cameras and generates a low power TV signal that can be picked up by nearby TV sets. Please be aware that this kit is a real transmitter and can be received by others - whether they want to or not! Be especially cautious to not cause any interference to neighbors or others close by, they are entitled to enjoy their own choice of programming without any interference from you. Pay particular attention to the FCC Rules section later in the manual.

In keeping with our spirit of getting folks to build and learn, you'll see that your kit has step-by-step instructions that carefully guide you to a finished, fully operating kit. And, you'll not only build the kit, but learn it too! Kit building is a fun and rewarding way to spend an evening at home, especially on a cold winter night.

## **BUILDING YOUR KIT:**

Many Ramsey kits can be classified as single evening kits suitable for beginners or old pros and this one is no exception. But, don't let confidence get in the way of better judgment. With well over 100 solder joints, even being right 99% of the time will still allow one error to creep in! Therefore, please take to heart these following guidelines:

- Use a comfortable soldering iron or pencil for assembly. 30 to 50 watts is ideal.
- Keep your iron tip clean; it will then produce professional, shiny and reliable joints. Use a damp sponge to wipe your tip before every joint. Use the wife's kitchen sponge and not your expensive super-dandy-whiz-bang car wash sponge!
- Good lighting is a must; why strain yourself with poor lighting?
- Take advantage of the fact that our manuals are written in stages, take a break between sections and check your work before proceeding on.
- Be on the look-out after each solder joint for a splash, bridge or errant wire lead that could prove hard to find later.
- Enough said, let's get building....

## TV6C PARTS LIST:

### CAPACITORS

- 7 .001 uf disc (marked .001 or 102 or 1nf) [C3,4,5,6,11,14,15]
- 2 39 pf disc [C7,9]
- 1 100 pf disc (marked 100 or 101) [C10]
- 2 68 pf disc [C12,13]
- 1 220 pf disc [bottom of PC board]
- 1 2.2 uf electrolytic [C2]
- 1 100 uf electrolytic [C1]
- 2 1000 uf electrolytic [C8,16]

### SEMICONDUCTORS

- 1 1N4148 or 1N914 diode [D1]
- 2 1N4002 diode [D2,3]
- 4 2N3904 NPN transistor [Q1,2,3,4]
- 1 2N3866 NPN transistor [Q5]
- 1 7808 voltage regulator [VR1]

### INDUCTORS

- 1 .15 uh miniature inductor (has brown and green bands) [L5]
- 2 2.2 uh miniature inductor (green body with 2 red bands) [L2,3]
- 1 5.5 turn slug tuned coil [L4]
- 1 IF can style RF transformer (marked 42IF122) [L1]

### RESISTORS

- 1 180 ohm (brown-gray-brown) [R1]
- 3 1K ohm (brown-black-red) [R1,2,11]
- 1 3K ohm (orange-black-red) [R4]
- 3 4.7K (yellow-violet-red) [R5,8]
- 2 10K (brown-black-orange) [R9,10]
- 2 75 ohm (violet-green-black) [R6,12]
- 1 1K trimmer potentiometer (yellow adjuster) [R7]
- 1 5K trimmer potentiometer (yellow adjuster) [R3]

### CONTROLS AND HARDWARE

- 1 Pushbutton switch [S1]
- 3 PC mount RCA phono jacks [J1,2,3]
- 1 DC power jack [J4]
- 1 Telescopic whip antenna [Ant 1]
- 1 Printed circuit board [TV6C]
- 1 Plastic tuning tool "diddle stick"

## **CIRCUIT DESCRIPTION:**

Video signals from J1 are suitably terminated by the 75 ohm resistor R6 and coupled through capacitor C1 to the clamp diode D1. The clamp forces the sync pulses on the video to a fixed DC level which will reduce 'blooming' on some video scenes. Video gain pot R3 permits you to adjust the amount of video applied to the modulator section of the transmitter, its function is similar to the contrast control on a TV receiver. The bias control R7 adjusts the 'black' level of the transmitter. Ideally you want the transmitter to produce some level of signal even when a totally dark screen is presented. This is to allow the TV receiver to properly maintain sync and sound when no screen video is seen. This control is adjusted in conjunction with R3 for best all-around performance.

Transistors Q1 and Q2 are the modulator devices. Television signals are complex waveforms which are AM (Amplitude Modulation) modulated upon an RF signal carrier. In this case we use Q1 and Q2 to control the supply voltage to the power amp, thus varying the RF power output in step with the video signal.

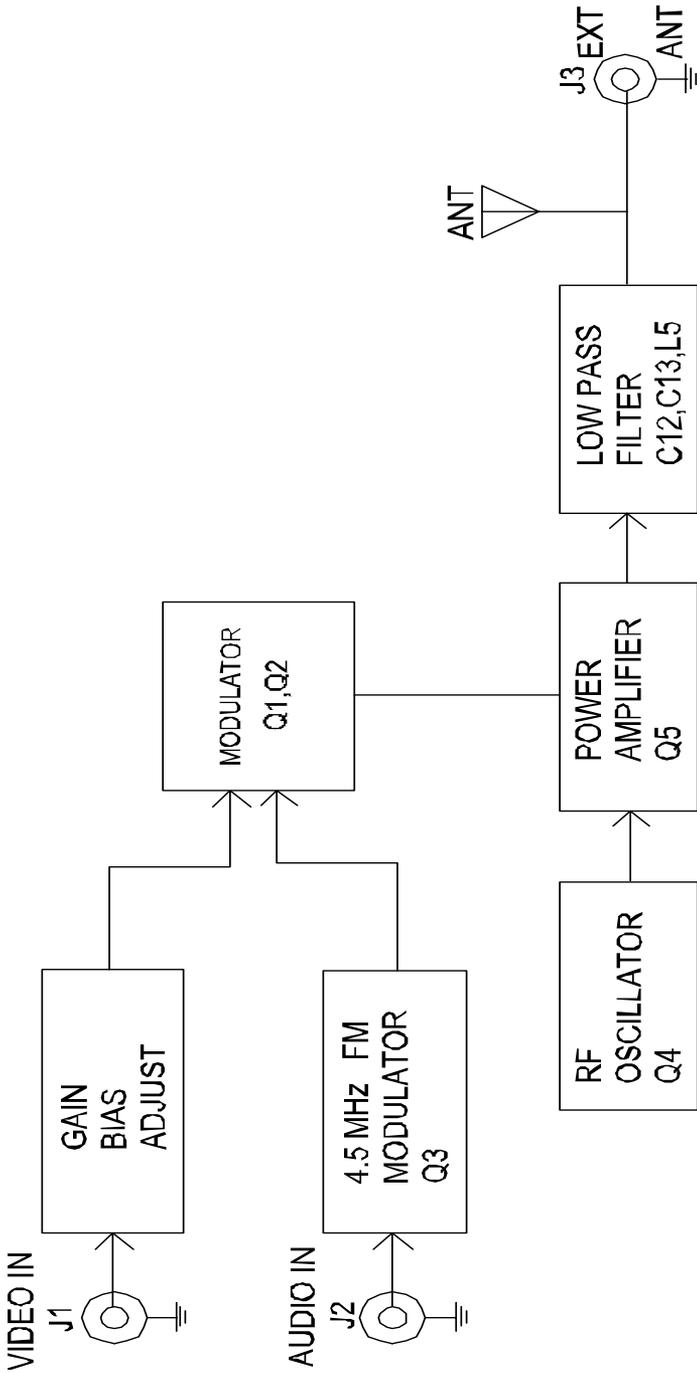
The audio signal is FM (Frequency Modulation) modulated on a subcarrier oscillator. To understand the purpose of the subcarrier oscillator, think of it as another transmitter that operates on another frequency from the video transmitter. In actual practice, the audio subcarrier is 4.5 Mhz higher than the video carrier frequency. Transistor Q3 is a 4.5 Mhz oscillator which is FM modulated by having its bias voltage slightly varied. Audio signals are coupled into Q3's base through capacitor C2 and resistor R4, thus varying the bias voltage at an audio rate causing frequency modulation. Coil L1 and its internal capacitor form the tank circuit of a Hartley oscillator which is tuned to the required 4.5 Mhz frequency. This FM modulated signal is then applied to the modulator section through C5 and R9. Resistor R9 sets the proper amount of subcarrier signal in relation to video signal.

The transmitter operating frequency is set by coil L4 which is part of a Colpitts tank circuit along with capacitors C7 and C9. Transistor Q4 uses this tank circuit as its feedback network and oscillates at whatever frequency you select.

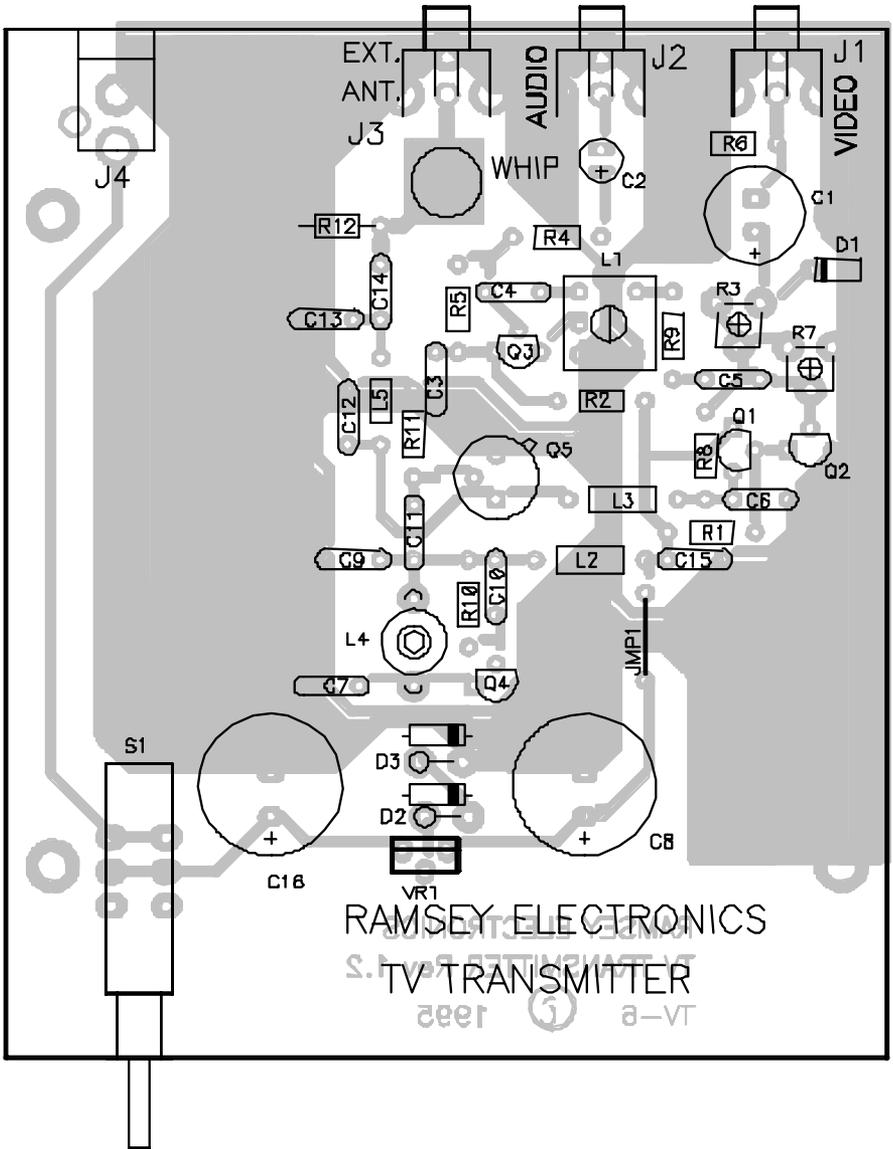
RF output from the oscillator is amplified by transistor Q5 whose supply voltage comes from the modulator section. This voltage is varying at a video and audio subcarrier rate, thus modulating the RF power output. Matching to the antenna and low pass filtering is provided by the two capacitors C12, C13 and inductor L5.

Power is supplied by an external 12 -15 volt DC source. This voltage is regulated at approximately 9.4 volts by the 8 volt regulator, VR1 and the series connected diodes, D2 and D3 in VR1's ground leg.

**TV TRANSMITTER BLOCK DIAGRAM:**



**PARTS PLACEMENT:**

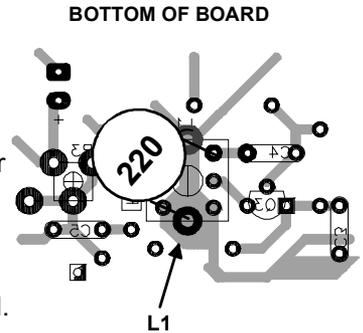


## KIT ASSEMBLY:

Each of the following assembly steps is complete in itself. This means that you:

- 1) Identify the component called for,
- 2) Insert it into the proper location on the PC board,
- 3) Solder its leads to the PC board and,
- 4) Carefully trim away the excess lead wire. As you complete each step, check it off and proceed to the next step.

- 1. Install switch S1 into its six holes on the PC board and solder all six pins. Ignore the other set of six solder terminals on top of the switch.
- 2. Install the three RCA phono jacks, J1,2,3. Solder all four pins on each jack.
- 3. Install J4, the DC power jack, solder all pins securely.
- 4. Install L1, the IF can style adjustable RF transformer. Note that it will go in only one way. Solder all five pins and the two mounting tabs.
- 5. Install the 220 pf capacitor on the bottom (solder) side of the PC board. The capacitor connects between the pin of L1 that connects to C4 and the ground lead of L1. Keep the leads as short as possible.
- 6. Install L4, the plastic molded slug tuned coil.



Now the major 'landmark' components are installed and we'll go about putting in the smaller parts. These components are spaced close together on the PC board, so pay particular attention to the layout so you'll install them right the first time! Also, we'll ask that you understand that install means to not only install the part, but to solder it and trim the leads as well.

### **RF Oscillator Section**

- 7. Install C7, 39 pf disc capacitor.
- 8. Install Q4, 2N3904 transistor. Observe correct placement of the flat side.
- 9. Install C9, another 39 pf disc capacitor.
- 10. Install C11, .001 uf disc capacitor (marked .001, 102, or 1nf).
- 11. Install C10, 100 pf disc capacitor (marked 100 or 101).

- 12. Install R10, 10K ohm (brown-black-orange).
- 13. Install L2, 2.2 uh inductor (green body marked with two red bands).

### **Modulator Section**

- 14. Install C1, 100uf electrolytic capacitor. Electrolytic capacitors are polarized devices with a plus (+) and a minus (-) lead. This means that you must install them on your PC board in the correct direction, with the plus lead going into the plus hole and the minus lead going into the minus hole. Ordinarily, only the minus side is marked on the capacitor body with a dark band and a clearly labeled (-) sign shown, with the other lead being the plus (+) side. Note that the PC board layout diagram shows where the plus side should go.
- 15. Install C15, .001 uf disc capacitor (marked .001, 102 or 1nf).
- 16. Install R1, 180 ohm (brown-gray-brown).
- 17. Install C6, .001 uf disc capacitor (marked .001, 102 or 1nf).
- 18. Install Q1 and Q2, 2N3904 transistors. Pay attention to correct placement of their flat sides.
- 19. Install R8, 4.7K ohm (yellow-violet-red).
- 20. Install C5, .001 uf (marked .001, 102 or 1nf).
- 21. Install R9, 10K ohm (brown-black-orange).
- 22. Install L3, 2.2 uh inductor (green body marked with two red bands).
- 23. Install R7, the 1 K ohm trimmer pot. This is the small yellow device with a screwdriver adjustment slot, marked 102. Be sure not to mix it up with R7, the 5K pot (marked 502). Make sure it is firmly seated and securely soldered to the PC board.
- 24. Install R3, the 5 K ohm trimmer pot. This is the other small yellow device with an adjustment slot, however this one is marked 502. Make sure it is firmly seated and securely soldered to the PC board.
- 25. Install D1, 1N4148 or 1N914 diode. Pay close attention to the proper orientation of the banded end of the diode.
- 26. Install R6, 75 ohm (violet-green-black).

### **Audio subcarrier section**

- 27. Install C2, 2.2 uf electrolytic capacitor, observe polarity.

- 28. Install C3, .001uf disc capacitor (marked .001, 102 or 1nf).
- 29. Install R5, 4.7K ohm (yellow-violet-red).
- 30. Install R4, 3K ohm (orange-brown-red)
- 31. Install C4, .001 uf disc capacitor (marked .001, 102 or 1nf).
- 32. Install Q3, 2N3904 transistor. Observe correct placement of the flat side.
- 33. Install R2, 1K ohm (brown-black-red).
- 34. Install Jumper JMP1. This is a short scrap of component lead wire bent to fit into the PC board holes and soldered into place. Its function is to act as a 'bridge' over circuit board traces running underneath it!

## **RF Power Amplifier and Power Supply Sections**

- 35. Install R11, 1K ohm (brown-black-red).
- 36. Install Q5, 2N3866 transistor, Observe correct orientation of the small metal locating tab on the transistor's metal body. This transistor is rated for higher power than the other devices, so it is housed in a metal package able to dissipate more heat.
- 37. Install C12, 68 pf disc capacitor.
- 38. Install C13, 68 pf disc capacitor.
- 39. Install C14, .001 disc capacitor (marked .001, 102 or 1nf).
- 40. Install L5, .15 uh inductor (green body marked with brown and green bands).
- 41. Install R12, 75 ohms (violet-green-black).
- 42. Install C8 and C16, 1000 uf electrolytic capacitors. Remember to observe correct orientation of polarity.
- 43. Install D2 and D3, 1N4002 rectifier diodes (black epoxy body). Notice that these devices stand upright rather than laying flat as most other components. Be sure to observe correct orientation of their banded ends which face C8.
- 44. Install VR1, 7808 voltage regulator. Pay attention to the proper placement of the metal back side which should face diodes D2 and D3.
- 45. Now it is time not only to sit back and admire your work but to carefully examine all solder joints and placement of components before the final

assembly is completed. Be sure all excess leads are trimmed away and touch up any solder joints that don't appear perfect. You may wish to brush the solder side of the PC board with a stiff brush to make sure that no loose lead trimmings or solder drippings are lodged between connections.

### **Final Assembly:**

Locate the whip antenna and matching mounting screw. Insert the mounting screw through the PC board from the solder side to the component side and thread the whip antenna on to the screw. For a sturdy assembly, the screw may be soldered to the PC board. If you desire to do this, use a small nail file or bit of sandpaper to gently remove the plating from the screw head before soldering since the plating on the screw head does not accept solder readily.

### **TESTING, ALIGNMENT AND OPERATION:**

To properly test your TV transmitter, you will need these basic tools and equipment:

1. A TV set,
2. A source of video such as a VCR,
3. A 12 to 15 volt DC power source,
4. Plastic alignment tool for L1, L4, R3 and R7.

### **Alignment Procedure:**

1. Tune a nearby TV set to an unused channel between channels 3 and 6. Remember since we are transmitting locally, your TV set should have a nearby antenna connected such as a pair of rabbit ears or a short dipole style antenna. You cannot operate the TV with the outdoor antenna or the local cable TV system hooked up to it - after all, their master antenna may be located 30 miles away!
2. Adjust both R3, the video gain pot and R7, the bias pot to mid rotation.
3. Connect a properly regulated and stable 12 to 15 volt DC power source to the external power jack. Be sure that your power source can provide at least 100 ma of current. Depress the TV6C on-off button to turn it on.
4. Adjust channel adjust coil L4 with the plastic tuning tool until you see the TV screen go blank. Slightly move the slug around this point for the most blank picture. The sound may or may not be producing noise or silence since we have not yet adjusted our sound section.

5. Connect a VCR or other video and audio source to the corresponding inputs on the TV transmitter. Insert a tape into your VCR and press 'Play'.
6. You should now see some resemblance of a picture on your TV screen. Now adjust channel adjust coil L4 for best picture.
7. Adjust the video gain pot R3 for best 'brightness' in the picture and bias pot R7 for best overall picture. These two adjustments interact and it is best to 'fiddle' back and forth until best picture is obtained. You may wish to touch-up the channel coil L4 also.
8. Adjust the audio subcarrier coil L1 for best sounding audio.

### **Using the TV6C within the home:**

One of the most practical uses of the TV6C is to hook it up to your VCR and transmit a tape to other TV sets throughout the house, yard or to the garage. This connection involves using shielded audio or video 'patch cords' to connect the audio and video outputs from the VCR to the TV transmitter inputs. These patch cords are available at any Radio Shack or stereo shop, and don't believe that you'll need the Ultra-Classic El-Mucho-Bucko gold plated, oxygen free type either! Any good quality cable suitable for audio will pass your video just fine.

Remember, even if this is your only use of the TV transmitter, it is your responsibility to ensure that your operation does not interfere with your neighbors TV viewing - and don't forget, someone may be watching what you're watching too!

### **Antenna considerations:**

The TV6C's on-board whip antenna is suitable for most in-home applications and can usually transmit throughout an average sized home. If you need more range, an external antenna connected to the TV transmitter's antenna jack will do the trick. Use a length of RG-59 or RG-58 coax cable to locate the antenna in a position closer to the TV set when reception is desired. Under no circumstances should you attempt to connect a larger antenna to the TV6C. FCC rules are very strict as to radiated power allowed. In the interest of remaining invisible to others, use a minimum amount of antenna system for reliable operation. Remember your obligation is to not cause interference to others. Your neighbor may have invested in a high gain TV antenna system and top quality TV set and doesn't need you to come along to spoil it for him. *If you desire to connect the TV6C directly to a TV set, be sure that there are no other connections to the TV set's antenna terminals!*

## **Troubleshooting Hints:**

If your TV6C does not work at all, re-check the following:

- Correct orientation of all transistor flat sides.
- Correct resistor placement, "that's not a 10K where a 1K should be, is it?"
- Proper power source of 12 to 15 volts DC, check this by actually measuring the power source's voltage while it is connected and powering your TV6C.
- Proper video and audio from your source, be it a VCR or other.
- Correct placement of disc capacitors. Make sure the .001 uf values are not confused with other capacitors.
- All solder connections.

As a general rule, frequency drift or hum in the audio is caused by a poorly regulated power source and erratic or intermittent operation from faulty solder joints or cable connections.

If you're having trouble getting your TV6C to tune to channel 6 you may want to try changing C7 and C9 to 27 pf capacitors. The change may affect your ability to tune channel 3 but will move the range up so that you can tune channel 6.

## **The Ramsey Electronics Case, Knob and Hardware Set:**

Your finished TV transmitter can be installed in a variety of enclosures of your own design and choosing. You might be planning to combine several Ramsey kit circuit boards into one single enclosure. Ramsey offers an inexpensive, yet attractive custom designed case and knob set that will give your unit that finished look and increase its resale value. These sturdy black instrument cases are supplied with neatly lettered front and rear panels that are already punched and drilled for the controls and switches. Also included is any necessary mounting hardware, matching knobs and even rubber feet. Most Ramsey kits are available with this case option providing you with a complete matching station look throughout your shop or home.

## **Other Enclosure Recommendations:**

While we believe that the Ramsey enclosure and knob option is a fine value for finishing off your Ramsey kit, we're happy to give you an additional suggestion. If your first goal is economy and rugged portability, you will find that the circuit board can be mounted nicely in a standard VHS videotape storage box. It will be necessary to drill some holes for mounting and knob clearance, but a suitable enclosure will result. These storage boxes come in several sizes, so pick the one which looks most practical for your application.

## **APPENDIX A: FCC RULES AND INFORMATION**

*The Rules of the FCC (Federal Communications Commission) and your kit built TV Transmitter.*

It is the policy of Ramsey Electronics, Inc., that knowing and observing the lawful use of all kits is a first responsibility of our kit user-builders. We do not endorse any unlawful use of any of our kits, and we do try to give you as much common sense help about normal and lawful use as we can. Further, it is the policy of Ramsey Electronics, Inc., to cooperate with all applicable federal regulations in the design and marketing of our electronics kit products. Finally, we urge all of our overseas customers to observe the regulations of their own national telecommunications authorities. In all instances, compliance with FCC rules in the operation of what the FCC terms an "intentional radiator" is always the responsibility of the user of such an "intentional radiator".

To order your copy of FCC rules part 15, call the US Government, Superintendent of Documents, at 202-512-3238, or fax at 202-512-2250. To order the correct document, ask for "CFR Title 17: Parts 1 to 19." The cost is \$24.00, Master Card and Visa accepted.

### **In the United States, this is how the FCC regards your transmitter kit:**

Licensed TV broadcast stations and their listeners have **ALL** the rights! This means that your non-licensed use of the TV6C kit has no rights whatsoever. Unlicensed operation of small transmitting devices is discussed in "Part 15" of the FCC Rules. These Rules are published in 100 "Parts," covering everything 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 Public Library. If you have questions about the legal operation of your TV6C or any other kit or home-built device which emits RF energy, it is your responsibility to study the FCC regulations. It is best if YOU read (and consult with a lawyer if you are in doubt) the rules and do not bother the understaffed and busy FCC employees with questions that are clearly answered in the rules.

Here are the primary "dos 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 proper FCC rules and Ramsey Electronics, Inc. cannot be held responsible for any violation thereof.

1. Part 15 discusses various transmitters such as "wireless microphones" (for example, the Ramsey FM-1, FM-4, etc.), cordless telephones and the like. In general, the FCC permits various unlicensed transmitters provided that they DO NOT cause ANY interference to authorized users. The FCC appears to recognize the "wireless" ways of the world and allows such transmitters as long as interference is not caused. Specific rules and electrical limits have been written to assure this.

2. It is the sole responsibility of the builder-user of any TV or FM broadcast-band device to research and fully avoid any and all interference to licensed broadcast transmission and reception. This instruction manual gives you practical advice on how to do a good job of finding a clear frequency, if one is available.

3. For some frequency bands, the FCC sets 100 milliwatts (0.1 watt) as the maximum permitted power output for unlicensed, home-built transmitting devices, and that the combined length of your antenna and feedline (coaxial cable or other) must not exceed 10 feet. The technical standards for the VHF and UHF frequency bands are very different, primarily concerned with band width and RF field strength.

4. FCC Rule 15.5: General conditions of operation: "(b) Operation...is subject to the conditions that no harmful interference is caused and that interference must be accepted that may be caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical equipment, or by an incidental radiator. (c) The operator of a radio frequency device shall be required to cease operating the device upon notification by a Commission representative that the device is causing harmful interference."

5. The most specific FCC regulation of unlicensed operation is that the "field strength" of the signal must not exceed 100 microvolts/meter at a distance of 3 meters from the transmitter (FCC rule 15.209). If you have any concern about this emission limit, have your device checked by a technician with accurate measuring equipment. Remember that the "field strength" of a signal is determined as much by the antenna as by the RF output of the transmitter itself.

## **APPENDIX B: UNDERSTANDING LEGAL "FIELD STRENGTH"**

A "microvolt" is one-millionth of one volt and designated " $\mu\text{V}$ " in the following explanations.

The new FCC Part 15 Rules specify a maximum "Field Strength" of your transmitted signal. Since it is unlikely that you have the equipment to carry out accurate field strength measurements in microvolts, it is useful to understand at least the theory of field strength so that you can understand both what you can expect from such transmitters, and what limits the FCC intends.

In all cases, the field strength of a signal decreases in direct proportion to the distance away from the antenna. Power decreases by the square of distance: for every doubling in distance, the signal power is quartered, but the field strength voltage is only halved. Using this theory, we can construct a simple chart to show the maximum permitted performance of a non-licensed FM band transmitter. The theoretical figures assume a simple 1 meter receiving antenna in all cases and do not take into consideration that reception can be greatly enhanced with larger, multi-element antennas and preamplifiers. In the following chart, the field strength (theoretical minimum) gets even stronger as you move from the edge of these circular boundaries toward the antenna:

This "exercise in meters and microvolts" demonstrates that the FCC clearly intends to limit the theoretical range of non-licensed devices operating in this band. It also shows the potential for causing interference at a home down the street from you. But it also shows that you can legally put out quite a good signal over wider areas than you might have imagined.

<b>DISTANCE FROM TRANSMITTER ANTENNA</b>			
<b>METERS</b>	<b>FEET</b>	<b>FIELD STRENGTH (<math>\mu\text{V}</math>)</b>	<b>TOTAL RECEPTION AREA</b>
<b>3</b>	10	100	314 FT
<b>6</b>	20	50	1256 FT
<b>12</b>	39	25	4800 FT
<b>24</b>	78	12	19113 FT
<b>48</b>	157	6	1.8 ACRES
<b>96</b>	315	3	7.2 ACRES

For other kinds of radio services, the FCC restricts such factors as transmitter power or antenna height, which cannot really limit the possible "range" of a transmission under good conditions. By restricting the maximum field strength at a specific distance from your antenna, the FCC clearly plans for your signal to "die out" at a specific distance from your antenna, no matter what kind of transmitter power or extra-gain antenna you are using. On the other hand, the FCC standards do make it legal and possible for you to broadcast in a school room or home - *as long as you do not cause interference to broadcast reception.*

### **"Why talk about acres"?**

There are three reasons to translate our look at "field strength" into "acres".

- (1) The first one is easy: the numbers would get too cumbersome if we discussed your possible signal coverage in terms of square feet or square meters.
- (2) It's easy to see that your signal can easily serve a school or home.
- (3) And, if we remember that typical urban single-family home sites run from 1/4 to 1/2 acre on the average, it should become extremely clear that your obligation to avoid interfering with broadcast reception can easily involve lots of homes, before adding apartments!

In fact, the most significant distance in the above chart is the 3  $\mu\text{V}$  signal strength permissible at 315 feet, covering a circular area of about 7.2 acres. A quick check at a TV set's specifications shows maximum sensitivity of about 5  $\mu\text{V}$  before considering high-gain antennas or preamplifiers. Your non-licensed signal can provide serious competition to a public broadcast station fifty miles away, a station which someone in your neighborhood may have set up a special antenna to enjoy.

Calibrated "field strength meters" such as described in the ARRL Radio Amateur's Handbook can detect signals down to about 100 microvolts. To measure RF field strength below such a level, professional or laboratory equipment and sensitive receivers are required. A "sensitive" receiver responds to a signal of 1 or even .5 microvolt "delivered" to the receiver input by antenna. If the antenna is not good, the receiver cannot respond to the presence of fractions of a microvolt of RF energy.

## SUMMARY

The present edition of Part 15 of the FCC rules provides detailed guidance on all aspects of using low-power transmitters. The main point is that you may not cause any interference whatsoever to licensed broadcast services and that you must be willing to put up with any interference that you may experience.

In addition to operations not requiring authorization, 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.

## USAGE SUGGESTIONS FOR THE TV6C

1. Build and adjust this kit strictly according to the published instructions.
2. Use the whip antenna supplied with the kit.
3. Do not modify your kit in any way.
4. Check your intended operating frequency very carefully, as clearly explained in this instruction manual, to ensure you will not cause interference to reception of licensed broadcasting.

***5. If you receive ANY complaint about your transmissions interfering with broadcast reception, stop or change your operation IMMEDIATELY.***

***6. If you are contacted by the FCC regarding use of this device, cooperate fully and promptly.***

7. Do your own homework and research to understand and comply with present and future FCC rulings concerning devices of this kind.
8. Identify the location and purpose of your transmissions from time to time. This is common courtesy toward other persons who may hear your signal. The FCC is toughest about clandestine transmission which cost time and money to track down.
9. Do not assume that the mere fact that you purchased this kit gives you any specific right to use it for any purpose beyond generating a low-level RF signal which is barely detectable beyond the perimeter of your personal dwelling space.

Finally, the FCC Rules call for the posting of printed notices on devices intended for non-licensed operation under Part 15 Rules. You will find such notices written up for the front or back of the instruction manual for nearly any computer or video accessory that you have seen in recent months. Consult the Part 15 Rules for the exact wording of such notices. Following is a text for such a notice which responds to FCC rule making intentions:

**NOTICE:**

The radio-frequency "intentional radiator" device which may be constructed from kit parts supplied by us is intended and designed by Ramsey Electronics, Inc. to conform to applicable provisions of Part 15 of FCC Rules. The individual kit-builder and all users of this device assume responsibility for lawful uses conforming to FCC Part 15 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.

**CASE UP INSTRUCTIONS:**

The enclosure is a key element to the overall pride you will have upon completing your Ramsey kit. The enclosure will show how you were able to "build from scratch" a commercial piece of high-tech electronics. For some of us, the enclosure will also hide a number of "not-so-pretty" assembly mistakes. Once the kit is enclosed your friends will never know that you were new to soldering. Finally, the enclosure case will protect your electronics from many possible causes of damage so that you can receive years worth of enjoyment using, talking about, and remembering the fun you had building your kit.

- If you haven't already done so, screw the antenna to the PC board. If you wish you can solder the screw holding the antenna to the bottom of the board so that you can unscrew the antenna with the cover on the unit and screw it back in without removing the top cover. This is helpful if you intend to transport your kit.
- Note that the top cover has a groove and a lip on it that correspond to the groove and lip on the bottom case half. Because the antenna has to fit through the predrilled hole in the top of the case you'll have to fit the case halves together to determine which end is the front and which is the back based on the antenna hole.
- Once you've decided which end is the front, take the prepunched front panel and slide it into the grooves in the bottom case half.
- Insert the board into the case with the power switch, etc. extending through the hole(s) in the front panel. Don't screw the board into place yet.
- Raise the rear portion of the PC board and extend the jacks through the

rear plastic plate. Insert the plate into the grooves on the base tray.

- With both the front and rear panels in place, secure the PC board to the bottom base tray with 4 short Phillips screws.
- Place any knob or button covers on the switches and pots on the front panel.
- Fit the top cover on and use the two long screws to hold it in place.
- While the kit is flipped over, stick the rubber feet on the 4 corners of the case bottom.

Now you're really finished! Start using and amazing your friends with your new TV Transmitter!

### **Final comment**

A well-informed person will see today's FCC Rules to be evolving and progressively less-restrictive. Even though today's technology is far more complex than what was possible at the time of the Communications Act of 1934, the FCC rules are becoming more relaxed, giving radio experimenters more and more opportunities to explore many frequency bands, using many communications modes, with no need for a formal license of any kind. A thorough study of Part 15 of the FCC Rules, which is completely beyond the purpose of this kit manual, will show you many legal uses of radio transmitting devices which do not require licensing, either amateur or commercial.

To provide more personal and club radio-learning opportunities, and to cut down on administrative costs, today's FCC permits far more non-licensed activity than at any time in previous history. On the other hand, today's FCC enforcement actions get bigger fines and real prison terms for scofflaws! From CB (now 3 bands of it, for varying applications) to easy entry-level Amateur Radio with long-term licensing, to numerous unlicensed Part 15 operations, the FCC is beginning to look out for the interest and good plans and intentions of private citizens and school-community groups as never before in radio communications history. Learn the rules...observe them...and have fun in radio!

If you enjoyed this Ramsey kit, there're plenty more to choose from in our catalog - write or call today!



# **The Ramsey Kit Warranty**

**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 occasions 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 \$25.00, 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 \$50.00 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.

**TELEVISION TRANSMITTER  
Quick Reference Page Guide**

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**REQUIRED TOOLS**

- Soldering Iron (WLC100)
- Thin Rosin Core Solder (RTS12)
- Needle Nose Pliers (PTS401)
- Small Diagonal Cutters (PTS400)

**ADDITIONAL SUGGESTED ITEMS**

- Helping Hands Holder for PC Board/Parts (HH3)
- Desoldering Braid (RTS08)

Price: \$5.00

Ramsey Publication No. MTV6C

Assembly and Instruction manual for:

***RAMSEY MODEL NO. TV6C  
TV TRANSMITTER KIT***

**TOTAL SOLDER POINTS**

**109**

**ESTIMATED ASSEMBLY**

**TIME**

Beginner .....3.0 hrs  
Intermediate .....1.75 hrs  
Advanced .....1.3 hrs



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