IMPORTANT WARRANTY INFORMATIONI PLEASE READ

Return Policy on Kits When Not Purchased Directly From Vectronics: Before continuing any further with your VEC kit check with your Dealer about their return policy. If your Dealer allows returns, your kit must be returned before you begin construction.

Return Policy on Kits When Purchased Directly From Vectronics: Your VEC kit may be returned to the factory in its pre-assembled condition only. The reason for this stipulation is, once you begin installing and soldering parts, you essentially take over the role of the device's manufacturer. From this point on, neither Vectronics nor its dealers can reasonably be held accountable for the quality or the outcome of your work. Because of this, Vectronics cannot accept return of any kit-in-progress or completed work as a warranty item for any reason whatsoever. If you are a new or inexperienced kit builder, we urge you to read the manual carefully and determine whether or not you're ready to take on the job. If you wish to change your mind and return your kit, you may-but you must do it before you begin construction, and within ten (10) working days of the time it arrives.

Vectronics Warrants: Your kit contains each item specified in the parts list.

Missing Parts: If you determine, during your pre-construction inventory, that any part js missing, please contact Vectronics and we'll send the missing item to you free of charge. However, before you contact Vectronics, please look carefully to confirm you haven't misread the marking on one of the other items provided with the kit. Also, make certain an alternative part hasn't been substituted for the item you're missing. If a specific part is no longer available, or if Engineering has determined that an alternative component is more suitable, Vectronics reserves the right to make substitutions at any time. In most cases, these changes

Defective Parts: Today's electronic parts are physically and electrically resilient, and defective components are rare. However, if you discover an item during your pre-construction inventory that's obviously broken or unserviceable, we'll replace it. Just return the part to Vectronics at the address below accompanied with an explanation. Upon receipt, we'll test it. If it's defective and appears unused, well ship you a new one right away at no charge.

Missing or Defective Parts After You Begin Assembly: Parts and materials lost or damaged after construction begins are not covered under the terms of this warranty. However, most parts supplied with VEC kits are relatively inexpensive and Vectronics can replace them for a reasonable charge. Simply contact the factory with a complete description. We'll process your order quickly and get you back on track.

Factory Repair After You Begin Assembly: Kits-in progress and completed kits are specifically excluded from coverage by the Vectronics warranty. However, as a service to customers, technicians are available to evaluate and repair malfunctioning kits for a minimum service fee of $18.00 ('/a hour rate) plus $7.00 shipping and handling (prices subject to change). To qualify for repair service, your kit must be fully completed, unmodified, and the printed circuit board assembled using rosin-core solder. In the event your repair will require more than an hour to fix (or 536.00, subject to change), our technicians will contact you in advance by telephone before performing the work. Defective units should be shipped prepaid to:

Vectronics

300 Industrial Park Road
Starkville, MS 39759

When shipping, pack your kit well and include the minimum payment plus shipping and handling charges (525.00 total). No work can be performed without pre-payment Also, provide a valid UPS return address and a day time phone number where you may be reached.

TABLE OF CONTENTS

INTRODUCTION

Own and operate your own low-cost AM broadcast station! You're the disc jockey or talk show host-play music from your CD player, tape deck or other audio source. Play vintage radio show cassettes on your favorite antique radios! The VEC-1290K is easily setup to broadcast a High-Fidelity signal in the AM broadcast band between 540 and 1710 kHz-find a clear frequency and broadcast interference free to your neighbors! The transmitter is fully *compatible* with either 9-kHz European or 10-kHz American channel spacings! Accepts audio from standard line-level or microphone-level sources. True high-level Class C modulation delivers good modulation depth and linearity. No FCC license is required, its perfectly legal under Part 15 of the FCC rules. This Vectronics kit features a professional quality epoxy PC board, with solder mask and silk-screened parts legend to make assembly a breeze!

TOOLS AND

Construction Area: Kit construction requires a clean, smooth, and welllighted area where you can easily organize and handle small parts without losing them. An inexpensive sheet of white poster board makes an excellent construction surface and provides protection for the underlying table or desk. Well-diffused overhead lighting is a plus, and a supplemental high-intensity desk lamp is especially helpful for close-up work. Safety is always important! Be sure to use a suitable high-temperature stand for your soldering iron, and keep the work area free of combustible clutter.

Universal Kit-building Tools: Although your particular kit may require additional items for completion, virtually all construction projects require a work area outfitted with the following tools and supplies:

- ☐ 30 to 60 Watt Soldering Iron
- ☐ High-temperature Iron Holder with Moist Cleaning Sponge
- ☐ Rosin-core Solder (thin wire size preferred, .031")
- ☐ Needle Nose Pliers or Surgical Hemostats
- ☐ Diagonal Cutters or "Nippy Cutters"
- ☐ Solder Sucker (squeeze or vacuum pump type), or Desoldering Braid
- ☐ Bright Desk Lamp
- ☐ Magnifying Glass

Special Tools for This Kit: Blade" type tuning tool or jeweler's screwdriver.

BEFORE YOU START BUILDING

Experience shows there are *four common mistakes* builders commonly make. Avoid these, and your kit will probably work on the first try!

1. Installing the Wrong Part: It always pays to double-check each step. A 1K and a IOK resistor may look *almost* the same, but may act very differently in an electronic circuit! The same is true for capacitors-a device marked 102 (or .001 uF) may have very different operating characteristics from one marked 103 (or .01 uF).

2. Installing Parts Backwards: Always check the polarity of electrolytic capacitors to make sure the positive (+) lead goes in the (+) hole on the circuit board. Transistors have a flat side or emitter tab to help you identify the correct mounting position. ICs have a notch or dot at one end indicating the correct direction of insertion. Diodes have a banded end indicating correct polarity.

3. Faulty Solder Connections: Inspect for cold-solder joints and solder bridges. Cold solder joints occur when you don't fully heat the connection or when metallic corrosion and oxide contaminate a component lead or pad. Solder bridges form when a trail of excess solder shorts pads or tracks together (see Solder Tips below).

4. Omitting or Misreading a Part: This is easier to do than you might think! Always double-check to make sure you completed each step in an assembly sequence.

Soldering Tips: *Cleanliness* and good *heat distribution* are the two secrets of professional soldering. Before you install and solder each part, inspect leads or pins for oxidation. If the metal surface is dull, sand with fine emery paper until shiny. Also, clean the oxidation and excess solder from the soldering iron tip to ensure maximum heat transfer. Allow the tip of your iron to contact both the lead and pad for about one second (count "one-thousand-one") before feeding solder to the connection. Surfaces must become hot enough for solder to flow smoothly. Feed solder to the opposite side of the lead from your iron tip. Solder will wick around the lead toward the tip,

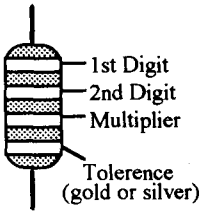
Desoldering Tips: If you make a mistake and need to remove a part, follow these instructions carefully! First, grasp the component with hemostats or needle-nose pliers. Heat the pad beneath the lead you intend to extract, and, pull gently. The lead should come out. Repeat for the other lead. Solder may

fill in behind the lead as you extract it-especially if you are working on a double-sided board with plate-through holes. Should this happen, try heating the pad again and inserting a common pin into the hole. Solder won't stick to the pin's chromium plating. When the pad cools, remove the pin and insert the correct component. For ICs or multiple-pin parts, use desoldering braid to remove excess solder before attempting to extract the part. Alternatively, a low-cost vacuum-bulb or spring-loaded solder sucker may be used. Parts damaged or severely overheated during extraction should be replaced rather than reinstalled.

Work Habits: Kit construction requires the ability to follow detailed instructions and, in many cases, to perform new and unfamiliar tasks. To avoid making needless mistakes, work for short periods when you're fresh and alert. Recreational construction projects are more informative and more fun when you take your time. Enjoy!

Sorting and Reading Resistors: The electrical value of resistors is indicated by a color code (shown below). You don't have to memorize this code to work with resistors, but you do need to understand how it works:

Resistor Color Code



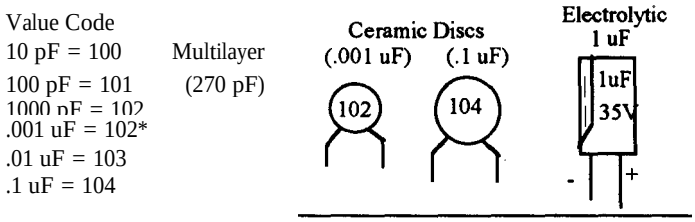
Black = 0 (tens)	Blue = 6
Brown = 1 (hundreds)	Violet = 7
Red = 2 (K)	Gray = 8
Orange = 3 (10K)	White = 9
Yellow = 4 (100K)	Silver = 10%
Green = 5 (1Meg)	Gold = 5%

When you look at a resistor, check its multiplier code first. Any resistor with a black multiplier band falls between 10 and 99 ohms in value. Brown designates a value between 100 and 999 ohms. Red indicates a value from 1000 to 9999 ohms, which is also expressed as 1.0K to 9.9K. An orange multiplier band designates 10K to 99K, etc. To inventory resistors, first separate them into groups by multiplier band (make a pile of 10s, 100s, Ks, 10Ks etc.). Next, sort each group by specific value (1K, 2.2K, 4.7K, etc). This procedure makes the inventory easier, and also makes locating specific parts more convenient later on during construction. Some builders find it especially helpful to arrange resistors in ascending order along a strip of double-sided tape.

This VEC kit contains molded chokes which appear, at first glance, similar to resistors in both shape and band marking. However, a closer look will enable you to differentiate between the two-chokes are generally larger in diameter

and fatter at the ends than resistors. When doing your inventory, separate out any chokes and consult the parts list for specific color-code information.

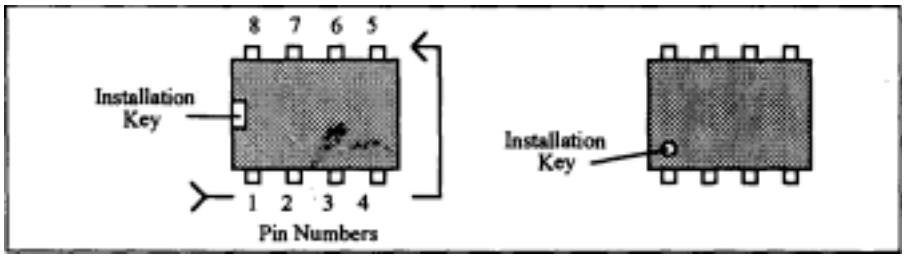
Reading Capacitors: Unlike resistors, capacitors no longer use a color code for value identification. Instead, the value, or a 3-number code, is printed on the body.



As with resistors, it's helpful to sort capacitors by type, and then to arrange them in ascending order of value. Small-value capacitors are characterized in pF (or pico-Farads), while larger values are labeled in uF (or micro-Farads). The transition from pF to uF occurs at 1000 pF (or .001 uF)*. Today, while *most* monolithic multilayer and disc-ceramic capacitors are marked with a three-number code, you may still find a .1 uF capacitor marked either "104" or ".1". For three digit codes, the first two digits indicate a numerical value, while the last digit indicates a multiplier (same as resistors). The value is in pF; thus a capacitor marked "104" is 100,000 pF, or. 1 uF.

Electrolytic capacitors are always marked in uF. Electrolytics are polarized devices and must be oriented correctly during installation. If you become confused by markings on the case, remember the uncut negative lead is slightly shorter than the positive lead.

Integrated Circuits: Proper IC positioning is indicated by a dot or square marking located on one end of the device. A corresponding mark is silk-screened on the PC board and printed on the kit's parts-placement diagram. To identify specific IC pin numbers for testing purposes, see the diagram below. Pin numbers always start at the keyed end of the case and progress counterclockwise around the device, as shown:



PARTS LIST

Your kit should contain all of the parts listed below. Please identify and inventory each item on the checklist before you start building. If any parts are missing or damaged, refer to the manual's warranty section for replacement instructions. If you can't positively identify an unfamiliar item on the basis of the information given, set it aside until all other items are checked off. You may then be able to identify it by process of elimination. Finally, your kit will go together more smoothly if parts are organized by type and arranged by value ahead of time. Use this inventory as an opportunity to sort and arrange parts so you can identify and find them quickly.

Resistors:

Q	Qty	Part Description	Designation
	1	15 ohm (brown-green-black)	R2
	1	1K ohm (brown-black-red)	R3
	1	4.7K ohm (yellow-violet-red)	R4

Capacitors:

Q	Qty	Part Description	Designation
	2	100 pF ceramic disc (101)	C9,C10
	1	510 pF polstyrene (510)	C8
	5	0.1 uF ceramic disc (104)	C3,C4,C5,C6,C7
	2	100 pF ceramic trimmer	C1,C12

Semiconductors:

Q	Qty	Part Description	Designation
	1	4049 16-pin DIP integrated circuit	U1
	1	LM386 8-pin DIP integrated circuit	U2

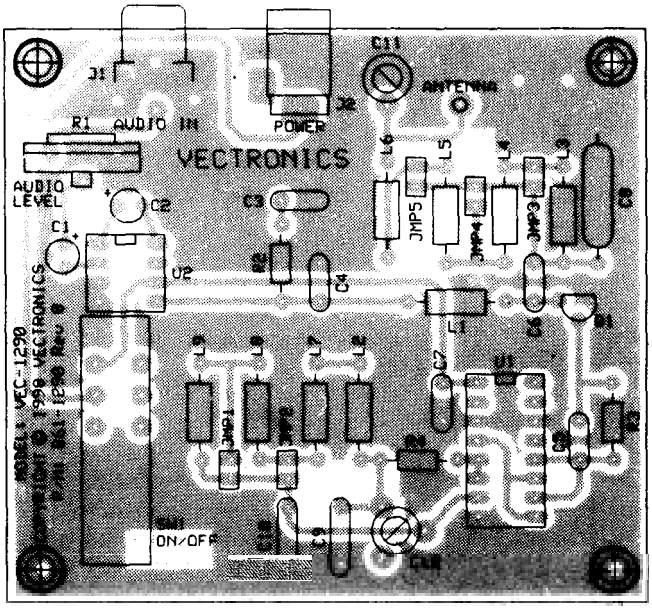
Inductors:

[X]	Qty	Part Description	Designation
	1	22 uH molded choke (red-red-black)	L2
	2	100 uH molded choke (brown-black-brown)	L7,L8
	2	180 uH molded choke (brown-gray-brown)	L5,L6
	2	330 uH molded choke (orange-orange-brown)	L4,L9
	1	680 uH molded choke (blue-gray-brown)	L3

Switches/Jacks/Misc.:

Qty	Part Description	Designation
1	DPDT push-action switch	SW1
1	RCA phono jack, PC-mounted	J1
1	2.1 mm DC coaxial power jack	J2
5	2-pin PC board mount headers	JMP1,2,3,4,5
2	2-pin jumpers, shorting	
1	16-pin IC socket	
1	8-pin IC socket	
1	4" nylon cable tie	
1	PC board	
1	6' length of insulated 20-AWG solid wire	ANTI

PARTS PLACEMENT DIAGRAM



STEP-BY-STEP ASSEMBLY INSTRUCTIONS

Before assembling your kit, please take time to read and understand the VEC kit warranty printed on the inside cover of this manual. Read through the assembly instructions to make sure the kit does not exceed your skill level. Once construction is started, the kit is non-returnable. Finally, if you haven't already done so, please verify that all parts listed in the inventory are included. If anything is missing or broken, refer to the warranty instructions for replacing missing or damaged parts.

First, a few notes and comments to help you along. Part designators for components such as R1, C3, etc., appear on the silk-screened legend on the component-mounting side of the printed circuit board. These correspond to the drawing shown in **PARTS PLACEMENT** section of this manual. The parts are inserted on the silk-screen side of the board. All capacitors should be installed with their bodies as close to the PC board as possible; this is very important in RF circuits.

If you have last-minute questions concerning what tools or materials are needed to assembly this kit, please refer back to the section entitled **BEFORE YOU BEGIN.**

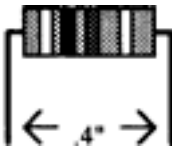
"Install" When you are directed to *install* a part, this means to locate, identify, and insert the part into its mounting holes on the PC board. This includes pre-bending or straightening leads as needed so force is not required to seat the part. Once a component is mounted, bend each lead over to hold it in place. Make sure trimmed leads don't touch other pads and tracks, or a short circuit may result:

"Solder" When you are directed to *solder,* this means to solder the part's leads in place, and to inspect both (or all) solder connections for flaws or solder bridges. If no soldering problems are noted, nip off the excess protruding leads with a sharp pair of side cutters.

Phase 1: Resistors

Begin assembly by installing the '/,-watt fixed resistors. Because these are all 5-percent tolerance ending with a fourth gold color band, you need only read the first three bands of the color code during the following steps. All resistor

leads should be formed as shown below. Install and solder resistors at the following locations:



Important Note: the fourth resistor color band is for tolerance, and is not called out in the following steps.

1. Find the 15-ohm (brown-green-black) '/,watt resistor.

2. Install the 15-ohm resistor at R2 on the printed circuit board.

3. Solder and trim the leads.

4. Find the 1K-ohm (brown-black-red) ^{1}/4-watt

resistor. 5. Install and solder at R3.

6. Find the 4.7K-ohm (yellow-violet-red) '/.-watt

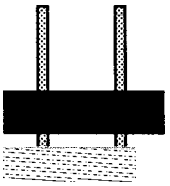
resistor. 7. Install and solder at R4.

resistor

9. Check each solder joint. Look for solder splashes, bridges (a *bridge* is where solder has made a connection between two or more points that should not be connected), or poor solder connections.

Phase 2: Jumper Headers

[ ] [ ] 1. Locate the five 2-pin jumper headers.



Short pins into pc

O O board holes

Important Note: When installing the two-pin jumper headers, the shorter pins are inserted into the pc board.,

10. Locate the two 100-pF ceramic trimmer capacitors. When inserting, ensure that the three component leads are fully seated and that the capacitor body is level. Install and solder at the following locations:

11. C11 100-pF trimmer

12. C12 100-pF trimmer

13. Locate the 510-pF polystyrene capacitor. This *part may be marke 511, or with 510 using the old marking code system.*

14. Install and solder the 510-pF (510 or 511) polystyrene capacitor al C8.

Phase 4: Molded choke installation

Important Note: only the first three color bands are specified in the following directions. The fourth band is for tolerance and may be disregarded.

1. Locate the 1000-uH molded choke (brown-black-red). Install and solder at location L1.

2. Locate the 22-uH molded choke (red-red-black). Install and solder at location L2.

3. Locate the 680-uH molded choke (blue-gray-brown). Install and solder at location L3.

4. Locate the two 330-uH (orange-orange-brown) molded chokes. Install and solder at locations:

5. L4 330 uH (orange-orange-brown).

6. L9 330 uH (orange-orange-brown).

7. Locate the two 180-uH (brown-gray-brown) molded chokes. Install and solder at the following locations:

8. L5 180 uH (brown-gray-brown).

9. L6 180 uH (brown-gray-brown).

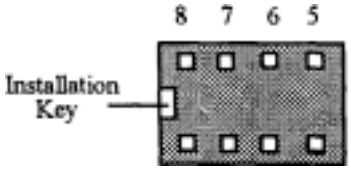
and solder at the following

11. L7 100 uH (brown-black-brown).

12. L8 100 uH (brown-black-brown).

rnase 5: IC Sockets/ICs

1. Locate the 8-pin DIP IC socket. Note that the socket is "keyed", and should be installed with its key aligned to the silk-screened outline on the PC board.

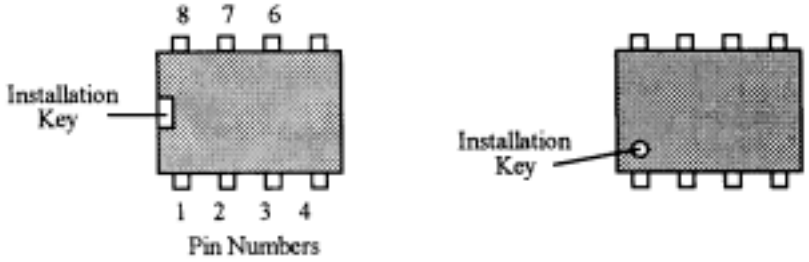


Top view of

☐☐ 2. Install and solder the 8-pin IC socket at location U2. Observe proper orientation! The notch should face capacitor C2.

☐☐ 3. Locate the 16-pin DIP IC socket. Install and solder at location U1. The key should face capacitor C6.

☐☐ 4. Locate the LM386 audio IC. Align its key with the socket key for U1. Be sure that all 8 pins are freely entering the socket holes, and apply firm pressure to fully seat the IC.

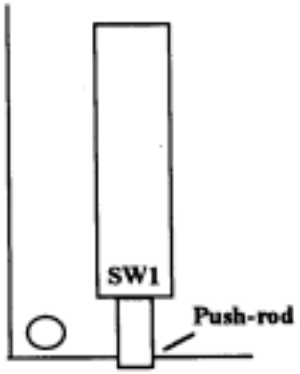


The IC body has a small notch, or *key*, molded at one end, indicating pins 1 and 8. A small dimple-like body-molding is often found adjacent to pin 1. Some IC packages may include both key indicators.

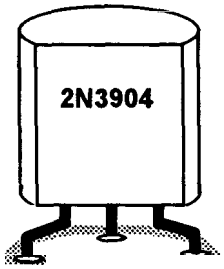
☐☐ 5. Locate the 4049 IC. Align its key with the socket key for U2. Be sure that all 16 pins are freely entering the socket holes, and apply firm pressure to fully seat the IC.

Phase 6: Power Switch and Transistor

☐☐ 1. Locate the push-action DPDT power switch. Install and solder at SW1. The push shaft should extend over the front of the board. Be sure the switch is fully seated and level before soldering.



2. Locate the 2N3904 plastic transistor. Form its leads so it sits close to the board at location Q1. Note that the device has a rounded and flat side. Align the package to conform to the silk-screened legend. Solder and trim.



Phase 7: Electrolytic Capacitors

Electrolytic capacitors are *polarized* devices, and must be inserted with respect to polarity. The style used in the VEC direct conversion receivers have *radial* leads; both leads exit from one end of the device body. Each capacitor's plus (+) mounting holes are noted both on the circuit board and parts placement diagram. If the markings on the capacitor body are unclear, the plus (+) lead is the longer of the two.

1. Locate the two 10-uF electrolytic capacitors. Install and solder at the following locations. Observe the polarity markings!

2. C1 10uF

3. C2 10

Phase 8: The Finishing Touches

1. Locate the IOK-ohm vertical trimmer resistor. Install at location RI. Be sure the pot is fully seated to the board, and solder the three leads.

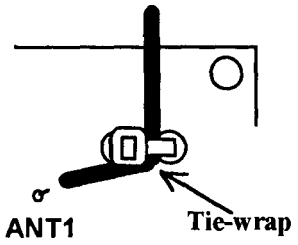
2. Locate the RCA PC-board mount phono jack. Install at location Jl. Be sure the jack is fully seated, solder.

3. Locate the 2.lmm coaxial power jack. Install at location J2. Be sure the jack is fully seated, solder.

4. Locate the six-foot length of white insulated 20-AWG antenna

5. At one end, strip '/a" of insulation from the wire.

7. Find the 4" nylon wire tie. Secure the antenna wire to the PC board using the wire tie as shown below. Pull the tie wrap tight, and trim excess tie length.



8. Locate the two plastic shorting jumpers. Put these in the parts bag until needed for the alignment procedures.

9. This completes the assembly of the VEC-1290K AM radio transmitter. Please go over the board and verify that all parts are properly installed. Check all solder connections, and redo those that look suspect.

TESTING AND ALIGNMENT

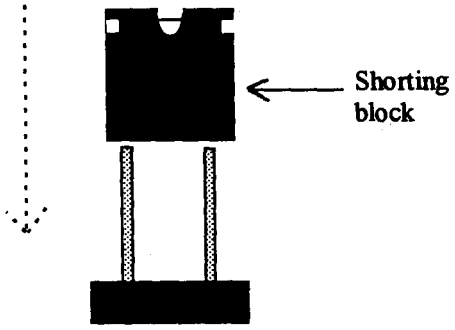
Before attempting any adjustments, the entire section dealing with Alignment and Testing should be read, and some familiarity with the Operating Instructions section is also advisable. The transmitter requires a suitable external power and audio source for alignment and operation.

Initial alignment sets the transmitter to the desired operating segment of the AM broadcast band. The VEC-1290K oscillator stage covers the AM band in three preset ranges. These are determined by the presence or absence of a jumper at locations JMP1 and JMP2. Fine tuning within each of the three ranges is set by trimmer capacitor C12.

Oscillator frequency ran 'reset'	
540kHz to 870kHz	no jumper
870kHz to 1420kHz	JMP1
1 l70kHz to l7l0kHz	

Table 1

How the shorting clip is placed over jumper pins:



The output stage of the VEC-1290K has three jumper positions at JMP3, JMP4, and JMP5 to give four tuning ranges for the antenna matching network. Fine adjustment of the matching network is set via trimmer capacitor C11. Antenna tuning is critical as it affects modulation linearity, and the maximum transmitter range.

Transmitter antenna tuning preset:	
530kHz to 650kHz	no jumper
650kHz to 840kHz	JMP3
730kHz to 1400kHz	JMP4
950kHz to 1800kHz	JMP5

Table 2

Important Note: settings may vary slightly from the data shown in the tables due to parts tolerance variations.

Setting the Frequency:

Important Note: For the following steps, the transmitter is turned on, and attached to a suitable source of power. Suitable power sources are discussed in the next section on **OPERATING INSTRUCTIONS** for the VEC-1290K.

The transmitter should be set to an AM broadcast frequency that is clear in your area. Once a clear channel is found, the oscillator preset jumpers should be set according to the data in Table 1. For example, if 910 kHz is free of stations, the 870 to 1420 kHz range should be selected by placing a shorting

clip on JMP 1. Capacitor C 12 will now tune the transmitter frequency from 870 to 1420 kHz.

A frequency counter is the quickest method to set the transmitter precisely on channel. Attach the counter input to either side of resistor R3. The signal is strong enough at this point to drive any 50-ohm or high-impedance counter without problem.

A portable radio can also be used. Set the radio to the clear frequency, and apply an audio source to the transmitter. (This is discussed in the **OPERATING INSTRUCTIONS** section.) Slowly tune C12 until the transmitter is heard on the radio.

Hint: Store unused shorting clips where they won't become lost. Place unused shorting clips over one *pin of open junipers.*

Antenna Matching:

Important Note: For reasons given later, the transmitter is designed to be operated only with the supplied 6-foot antenna wire. Attempting to **use other antennas will result in a severe mismatched condition, reduced range and distorted audio. The antenna wire should be run out straight, avoiding proximity to nearby metal objects. If more range is needed, try relocating the transmitter to a different location.**

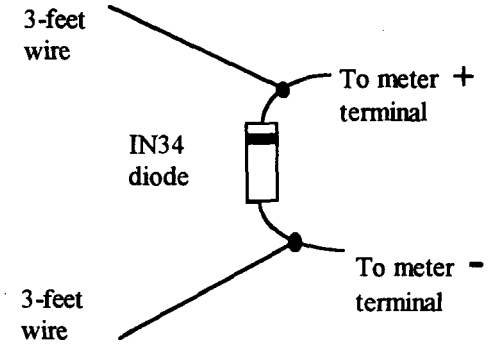
Once a clear channel has been found, and the oscillator set to frequency, the antenna matching network must be tuned. Refer to Table 2. Note that some frequencies, such as 800 kHz, can be matched by one of two possible jumper configurations. Try both, and use the one which works best. Using the previous example where the oscillator was set to 910 kHz, Table 2 shows the proper antenna match range is selected by placing a shorting clip across the pins of JMP4. (910 kHz falls between 730 kHz and 1400 kHz.)

When the proper antenna matching range has been set, capacitor CI I is tuned for maximum radiated signal. This can be done by carefully adjusting CII while increasing the distance between the transmitter and a portable radio. As the signal grows weaker with distance, adjust CI I for the loudest signal.

If you have access to test equipment, the following steps may also be

Using an oscilloscope: If your oscilloscope has a vertical amplifier with useable bandwidth to at least 2 MHz, you may attach the probe to the junction of ANT 1, C 1 I and L6 as shown on the schematic. C 11 should be peaked for maximum scope amplitude. A low-capacitance 10:1 probe is recommended to avoid detuning.

Using afield strength indicator: If you have a general purpose volt-ohmmeter, the schematic below shows a simple and easily constructed RF field strength meter. Most of the parts can be found at Radio Shack. Assembly is not critical due to the very low operating frequencies.



The diode must be a germanium type. The 3-foot wire "antennas" should be run near the VEC-1290K transmitter antenna. Adjust C11 for a maximum DC voltage reading on the voltmeter. Keep the field strength meter pickup antenna wires as far from the transmitting as possible to prevent interaction. Use the lowest DC voltage setting on the voltmeter for maximum sensitivity. Some voltmeter test lead jacks may allow the diode leads to be slipped between the test lead plugs and meter jacks-if so, the meter leads may be spread apart and used as the pickup antenna.

Audio Gain Setting:

The VEC-1290K will accommodate a wide range of audio levels, from "line level" cassette or CD deck feeds, or even the very low output from a local mike. Removing capacitor C2 will reduce the amplifier gain; this is the preferred configuration for usually high line-level audio sources such as when taking an audio feed directly from a speaker output.

Setting the gain *control.* The gain control sets the modulation percentage. Setting the gain control too high results in over modulation and considerable audio distortion The proper setting for the gain control RI can be found by starting at it lowest setting, and with an audio source connected, slowly increasing the gain the control until the audio starts to sound raspy or clipped. Once clipping is heard, the control setting should be reduced until the distortion,goes away. This is most noticeable on music sources. Experienced technicians may use an oscilloscope to observe the RF modulation envelope for clipping, but those procedures are beyond the scope of this manual.

The VEC-1290K should be mounted in an enclosure. Vectronics has design a matching enclosure for the VEC-1290K. The matching enclosure is anal metal box which includes knobs, hardware, decals, and rubber feet. (Model VEC-1290KC.) If you wish to supply your own, RadioShack offers several styles that are suitable for this purpose.

Power requirements: The VEC-1290K operates from an external 12-volt D source and draws about 100 mA. Wall-plug power supplies are an ideal sour of power, but should have the following specifications:

1. Internally *filtered* and *regulated* 12-volt DC
2. Rated for at least 300 mA continuous
3. Be equipped with a 2.1 mm coaxial power jack, *center pin*

The VEC-1290K can be operated at lower supply voltages down to about 9 volts, but the transmitter range will be reduced. The transmitter is powered when the SW1 push shaft is in the depressed position.

Once set to frequency, and the antenna tuned, the only control that needs be set is the audio level (trimmer potentiometer R1).

Your home studio: The VEC-1290K will accommodate various sources of audio-CD players, tape or cassette decks, or even a local microphone for the budding DJ or talk show host. Unless a single audio source is going to be used, the audio gain control R1 will have to be continuously adjusted for each new audio source. Tape decks and cassette players provide "line level" audio outputs for interconnections between decks and amplifiers. Microphone produce much, much lower signal levels. As mentioned in the alignment section, capacitor C2 should be removed when using speaker level audio feeds.

Using a "mixer": To give your home station that "pro" sound, an inexpensive four or five channel mixer may be used between the various audio sources and the transmitter audio input. The mixer will allow the level for each source to be set individually so all of your audio feeds will be balanced when played on the air. The mixer master output can be used to set the modulation limits. The level controls can be used to "fade" into one source from another, just like disc jockies do on the air! You can also use an inexpensive graphic equalizer to tailor your station's on-the-air sound-but the VEC-1290K as-is rivals the fidelity of many FM broadcast stations!

Other uses: Let your imagination be your guide! We know of one VEC-1290K that is being used on a DSS satellite system to play the MusicChoic6m Big *Band* music channel to vintage AM radios throughout the housel

Getting the most range: The transmitter antenna system is most efficient at the higher frequencies. The new expanded AM broadcast band between 1610 and 1710 kHz is still relatively free of new station assignments. Likewise, many VEC-1290K's will make it down to as low as 530 kHz, a relatively quiet frequency in most areas.

Try to locate the VEC-1290K transmitter in area that is free of metal support structures. Remember that the VEC-1290K may be remotely located; use shielded audio cable to run between the transmitter audio input back to the "station" location. Another "trick" you may try is attaching a good ground to the transmitter cabinet. This will improve the antenna radiation efficiency. Always run the six-foot antenna wire in a straight line, never coiled or zig-zagged.

Understanding the FCC rules:

Federal Communication Commission (FCC) rules and regulations governing unlicensed AM broadcast transmitters are complicated and technical. Devices such as the VEC-1290K AM transmitter are covered under Part 15 of the FCC rules and regulations.

Part 15 rules permit a maximum field strength of *24000/fkH$_z$ uV-per-meter* at 30 meters, between 510 kHz and 1710 kHz. The rules also permit a 100-mW transmitter with a ten-foot antenna, including the feedline. In order to meet Part 15 regulations, the transmitter output must be kept below 2 volts rms when using a 50-ohm antenna. The high-impedance antenna and power level of the VEC-1290K meet FCC Part 15 requirements.

Your responsibilities under Part 15. Unlicensed devices operating under Part 15 must not cause interference, and must accept interference as a part of their operation. What does this mean in plain English? If your station is causing interference to the reception of a licensed broadcast station in your neighbors' radios, you are in violation of FCC rules and are operating illegally. Either operation must be suspended, or a new clear frequency found. If broadcast stations are interfering with your broadcasts, this is something you must accept being a *micro-broadcaster* under FCC Part 15 regulations. .

Here are some guidelines to

1. Identify your station regularly, stating your location and purpose. Do not make up FCC call letters! You can use an ID along the lines of "This is Radio 910, operating from New York City".
2. Never transmit false distress signals!
3. Avoid profanity or indecency.

4. Do not use your transmitter to "jam" legitimate broadcasts.
5. Do not attempt to modify the transmitter for more power, or modify t design of the antenna system.

Only high-quality components and proven circuit designs are used i Vectronics kits. In very rare instances is a defective component the source of problem. Replacement of defective parts is covered in the Warranty section Ninety-five percent of the kits returned for factory repair are due to solderin problems or parts in the wrong locations. We advise repeating the assembl instructions step-by-step, looking for mistakes or soldering problems. Be especially wary of electrolytic capacitors and semiconductors. Kit builders often miss obvious mistakes. What is needed is a "fresh" set of eyes. Enlist a friend to go over your work.

Always check the obvious! Is the power supply plugged in? Is the power switch on?

Low range: Check power supply voltage, alignment of C11 and proper jumper configuration for antenna matching circuit. Check antenna wire connection at ANTI on pc board. Antenna not located in an optimum location.

Audio distorted: Gain control set too high. Capacitor C11 improperly tuned, or wrong jumper configuration for antenna matching circuit.

Loud hum on audio: Bad audio cables, check for broken shield wires. Power supply filtering poor.

Osciilator dead: CMOS device U1 (4049A) defective.

Carrier signal, no audio: Bad audio cables, RI set to minimum. IC U2 (LM386) defective.

Voltage tests:	IC2 pin 5	about 6 volts DC
	IC1 pin 1	12 Vdc

If all else fails, refer to the **Warranty** for information on factory repair service.

THEORY OF OPERATION AND SPECIFICATIONS

Technical Circuit Description:

RF oscillator section: One section of six-section inverter CMOS IC package is used for the oscillator (UID). The oscillator tank coil is made of four inductors in series. Two sets of shorting jumpers allow the inductance value to be set from 122 uH to 552 uH. Each of the three possible jumper configurations covers a portion of the 530 to 1710 kHz AM broadcast band. Fine tuning to an exact channel is done via a 100-pF ceramic trimmer across the tank coil.

Buffer and driver stages: The oscillator output is buffered by section UIB of the 4049 inverter chip. The output of UIB drives two inverter gates in parallel- U 1 D and U 1 E.

The paralleled operation insures sufficient drive level the final transistor for Class C operation.

Final amplifier stage: A 2N3904 transistor is used for the power amplifier stage. The transistor is biased for Class C 'operation. ``Class C operation permits the use of high-level modulation for best linearity and efficiency. Note that many inexpensive AM transmitter kits use modulated oscillators, with resulting ***FM'ing of*** the carrier and a maximum modulation level *of* perhaps 25 to 30 percent.

Audio Amplifier and Modulator stage: Low level microphone or line-level audio is amplified by a LM386 audio amplifier IC. The audio level to the IC is set by gain control R1. The output from the IC is directly applied to the RF power stage, the 2N3904 transistor.

The DC output *of* the LM386 is normally at "/s *of* the supply voltage with no signal. The DC level follows the audio signal; at maximum modulation (100%) the instantaneous output voltage will vary from near zero to almost the full supply voltage. In a true Class C stage, doubling the supply voltage will produce a peak power level (PEP) *of* four times the carrier power.

Direct coupling: After C1, all audio stages up to the PA transistor collector are DC coupled, with no interstage coupling capacitors or modulation transformers to limit or tailor the audio response.

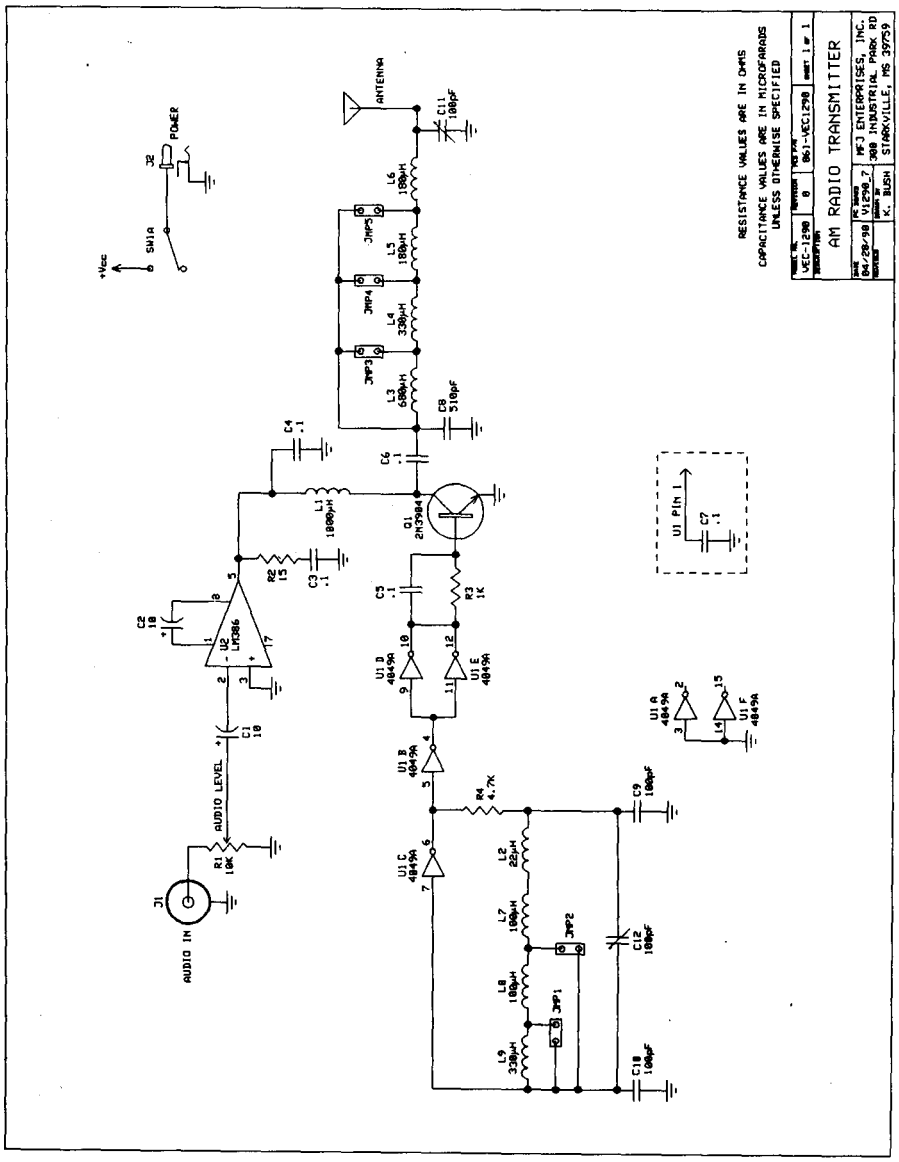
Antenna and matching: The VEC-1290K is supplied with an attached 6-foot wire radiator. This antenna meets current FCC Part 15 requirements for unlicensed RF transmitters. The antenna is extremely capacitive reactive at broadcast band frequencies, and presents a very high impedance to the transmitter. Capacitor C8, inductors L3, L4 and L5, and trimmer capacitor C11 form a pi-network impedance transformation network to match the

antenna to the low-impedance of the final RF stage transistor. Jumpers are used to select the optimum amount of inductance for segments of the AM band. Trimmer capacitor C11 allows for a precise match at the operating frequency-or, maximum transfer of RF energy to the antenna. The pi-network is in essence is a low-pass filter configuration, and also offers some degree of harmonic energy rejection.

Specifications:

Modulation mode: ..... A3, high level AM
Power output: ..... Meets FCC Part 15 requirements
Power requirements: ..... 12 Vdc at 100 mA
Power connector: ..... 2.1mm coaxial
Audio input: ..... Mike or line level, adjustable
Audio connector: ..... Standard RCA phono jack
Antenna: ..... Attached 6 foot matched radiator
Frequency range: ..... 530 to 1710 kHz typical

SCHEMATIC


RESISTANCE VALUES ARE IN OHMS
CAPACITANCE VALUES ARE IN MICROFARADS
UNLESS OTHERWISE SPECIFIED
AM RADIO TRANSMITTER
MFJ ENTERPRISES, INC.
300 INDUSTRIAL PARK RD
STARKVILLE, MS 39759
ANTENNA
POWER
AUDIO IN
AUDIO LEVEL
U1 Pin 1

ENCLOSURE

Vectronics has designed a matching enclosure just for your VEC-1290K AM Radio Transmitter Kit. The matching enclosure is an all metal box which includes knobs, hardware, decals, and rubber feet. Model: VEC-1290KC.

To install your receiver in the VEC-1290KC matching enclosure *follow* these instructions *(read all instructions before beginning ... take your time):*

1. Find the front panel decal and rear panel decal; separate using scissors. Put the rear panel decal on first. This is done by: a.) Remove all debris and oil from the chassis. b.) Remove the crack and peel to expose the adhesive. c.) Place the decal on the rear panel without securing it completely. d.) Gently rub the alignment circles with your finger--if the circles are centered in the enclosure holes (also check the corner alignment marks) secure the decal by rubbing and removing all air bubbles. e.) If the alignment circles are not centered, adjust the decal accordingly then secure. f.) Use a penknife, or small Exact6m knife, to cut away the unused edges and cut out the component holes. g.) Repeat this procedure *for* the front panel.
2. Next, install the two L-brackets on the chassis using two of the 3/16" screws. The longer side of the L-bracket must be connected to the chassis using the two holes centered on each edge of the enclosure. Refer to the diagram on the next page for location and orientation.
3. Install the four 1/2" mounting screws next. Insert the screws, from the bottom, through the four holes relatively close to each corner of the chassis.
4. Placethe four 3/16" round spacers on the mounting
5. Now insert the PC board. This must be done by: a.) inserting the front of the PC board at an angle, b.) then push down on the rear of the board. Make sure the mounting screws align with the mounting holes in the PC board before pushing.
6. Use the four hex nuts to secure the PC board. Be certain all appropriate components are centered with the enclosure holes before tightening.
7. Find the switch cap. Align the switch cap with SWl and push it on. If it is difficult to push on, then rotate it 90° and try again.
8. The top should now be installed. Use the two remaining 3/16" screws for securing the top to the L-brackets.
9. Place the four rubber feet on the bottom of the enclosure at the comers.