- **Turns ON when you talk**
- **Turns OFF when you stop**
- **Uses any type of microphone**
- **Compact & easy to install**
- **Operates on 9 - 12 volts DC**

"VOX" VOICE ACTIVATED SWITCH

The VS-1 provides quality components and a compact printed circuit board that makes it a snap to "turn on" a multitude of devices, from HAM transmitters and amps to tape recorders or clandestine listening equipment.....HAVE FUN!

ramsey

Kit No. VS1

INTRODUCTION TO THE VS1

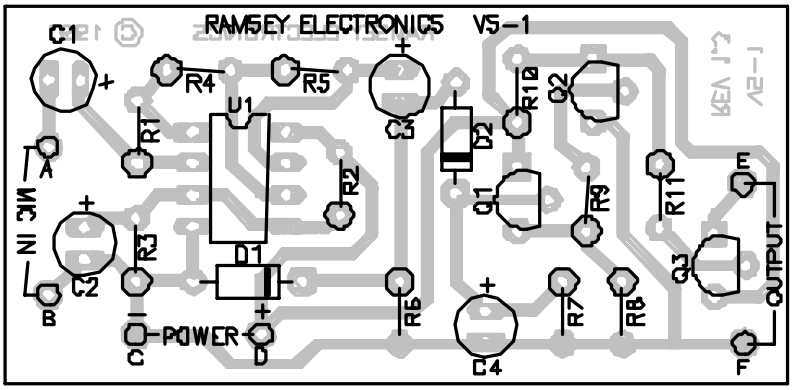
The VS1 is a universal voice-operated-switch (VOX) module which may be used in any application where VOX operation is desired. It may be used with virtually any type of microphone. The circuit itself draws only 10 mA at 9 volts DC and will directly switch low voltage loads up to 100 mA. Numerous small and inexpensive relays are available to permit switching of higher voltage and current. The VS- 1 VOX may be used to control ham radio transmitters, CB transceivers, and similar equipment for other radio services. In addition, it can be used to control tape recorders or any other device for which you envision voice-operated switching.

HOW IT WORKS:

The dual op amps of the LM358 IC amplify the microphone signal. R2,R3 and C2 configure the LM358 for operation from a single voltage supply. The output from the op amp is rectified to DC by the diodes D1 and D2. The VOX delay (length of time that the transistor Q3 is switched on) is determined by C4 and R7. The 220K ohm value for R7 produces a VOX delay quite useful for most applications. A 500K or 1 megohm trimmer in place of R7 permits a wide range of VOX delay settings. Transistors Q1 and Q2 provide enough drive for efficient switching by Q3.

VS1 PARTS LIST

- ❑ 4 4.7 or 10uF electrolytic capacitors (C1, C2, C3, C4)
- ❑ 4 1K ohm resistors [brown-black-red] (R4, R5, R10, R11)
- ❑ 5 10K ohm resistors [brown-black-orange] (R2, R3, R6, R8, R9)
- ❑ 1 220K ohm resistor [red-red-yellow] (R7)
- ❑ 1 1 Megohm resistor [brown-black-green] (R1)
- ❑ 2 NPN transistors [marked 2N3904] (Q1, Q2)
- ❑ 1 PNP transistor [marked 221334] (Q3)
- ❑ 1 LM358 8-pin DIP Dual Operational Amp IC (U1)
- ❑ 2 1N4148 diode (D1, D2)
- ❑ 1 VS1 printed circuit board



VS1 - 3

ASSEMBLY OF THE VS1

Notice that all resistors are installed vertically. Since most of the resistors are either of two values; 1K (brown-black-red) or 10K (brown-black-orange), be sure not to mix them up. Only four capacitors are used, all small electrolytics; be sure to observe correct polarity . While the PC board can be quickly "stuffed" in any order you like by referring to the parts layout diagram, we suggest you use the following step-by-step assembly directions.

- ❑ 1. Install the LM358 IC. If you prefer to use a socket, install it with the same care as the IC itself. Be sure that the notched end of the chip is oriented as illustrated!

- ❑ 2. Install electrolytic capacitor C1. Observe proper polarity.

- ❑ 3. Install C2, observing correct polarity.

- ❑ 4. Install R1, 1 megohm [brown-black-green].

- ❑ 5. Install R3, 10K [brown-black-orange].
- ❑ 6. Install R4, 1K [brown-black-red].
- ❑ 7. Install R5, 1K [brown-black-red].
- ❑ 8. Install diode D1. Be sure that the banded (cathode) end is oriented correctly.
- ❑ 9. Install R2, 10K [brown-black-orange].
- ❑ 10. Install C3, observing correct polarity.
- ❑ 11. Install diode D2, being careful to orient the band correctly.
- ❑ 12. Install R6, 10K [brown-black-orange].
- ❑ 13. Install C4, observing correct polarity.
- ❑ 14. Install R7, 220K [red-red-yellow].

- ❑ 15.The position for Q3 (marked 221-334), the PNP switching transistor is obvious at the end of the PC board. Identify and install it now so that it will not be mixed up with Q1 or Q2. Point the flat side as shown on the parts layout diagram.

- ❑ 16. Install Q1, 2N3904 NPN transistor.

- ❑ 17. Install R10, 1K [brown-black-red].

- ❑ 18. Install Q2, 2N3904 NPN transistor.

- ❑ 19. Install R9, 10K [brown-black-orange].

- ❑ 20. Install R11, 1K [brown-black-red].

- ❑ 21. Install R8, 10K [brown-black-orange].

FINAL CONNECTIONS AND OPERATION

Connect RED hookup wire to point D for (+) DC.

- ❑ Connect BLACK hookup wire to point C for ground (-) DC.

The VS1 is designed for optimum operation at 9VDC but it also may be operated from 12 volts. If you do not like its performance (sensitivity and delay time) at 12 volts, the addition of a simple 3-terminal voltage regulator such as a 7808 will provide a reduced and regulated voltage for the VS1. For satisfactory 6-volt operation, the value of R7 will need to be adjusted.

- ❑ Unless a microphone cartridge is to be mounted at the edge of the PC board itself, use miniature shielded wire for the microphone connections at A and B. Point A is the "hot" side. Connect the shield to Point B.

For the simplest first test, connect a voltmeter to points E (+) and F (-). When you speak into the microphone, you should get a voltage reading fairly close to the supply voltage. If you make a brief sound, the output will be powered for about one second. If you speak steadily, the circuit will remain powered without interruption, unless there are long pauses (See Application Notes below regarding VOX Delay adjustment).

The most practical output device to connect at points E and F is a low-current 6 or 12 volt DC relay. Many suitable SPST, SPDT and DPDT relays are available at Radio Shack.

APPLICATION NOTES

The length of VOX delay is controlled by the values of C4 and R7. A 1 megohm trimmer in place of the 220K R7 resistor will provide excellent delay range. Another factor which you may wish to control is "VOX Gain", which is different from "Mike Gain" of the transmitter or other device controlled by the VS1 VOX circuit. A simple gain control hookup is indicated as optional on the schematic diagram.

Another feature of VOX circuits is called "anti-trip" or "anti-VOX". This is useful in communications equipment to prevent the signals or noise coming from the speaker from tripping the VOX. Effective anti-vox requires additional differential amplifier or comparator circuitry that is beyond the purpose of the simple VS1. To minimize unwanted tripping of your VS1, keep both the suggested VOX gain control and speaker volume as low as possible or maximize the distance between the radio's speaker and the VS1 microphone.

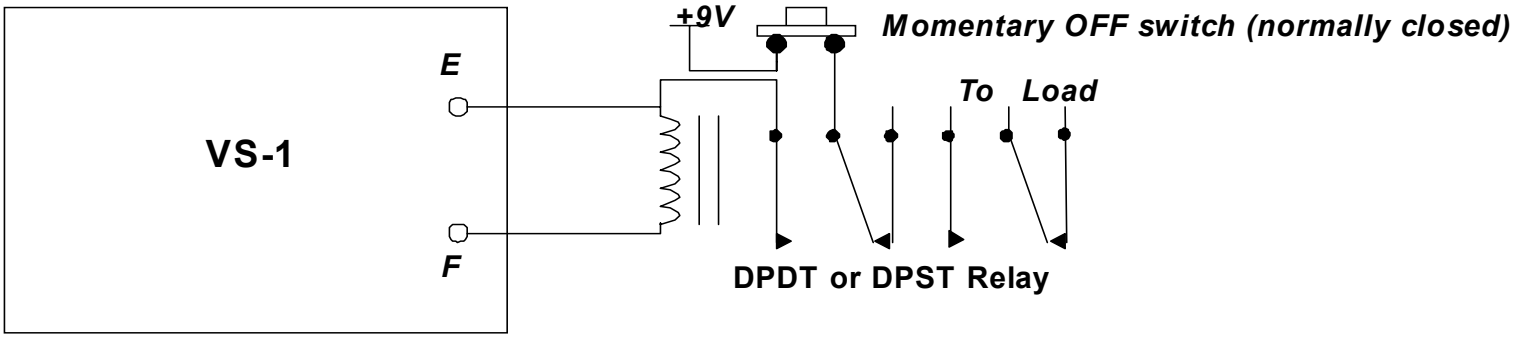
If controlling a tape recorder motor is your intended application, test the motor's current requirement in mA with your VOM. If it is less than that 100 mA, the Q3 transistor switch can control the motor directly. If you have any hesitation, use a relay.

Finally, we note that some customers have bought the VS1 assuming they can use it to

switch a device such as a computer or appliance or lamp on and off by voice command or other sound. Obviously, such "latching" or "toggling" functions are not the primary applications for which the output circuit of the VS1 was designed. Can it be done?

Yes, if you would like to explore the capabilities of flip-flop IC's such as the 4013. For example, study how our TS- 1 Touch Switch works. A simple latch circuit can be made with a relay as illustrated, but you would have to turn it off manually, not by sound.

In "rigging up" the VS1 to control circuits not discussed in this booklet, particularly any AC-line powered device such as a lamp, please remember that the direct switching output is intended only for DC loads under 30 volts and under 100 mA. When wiring a relay to control other loads, particularly 120 Volt AC circuits, please observe all standard electrical safety precautions.



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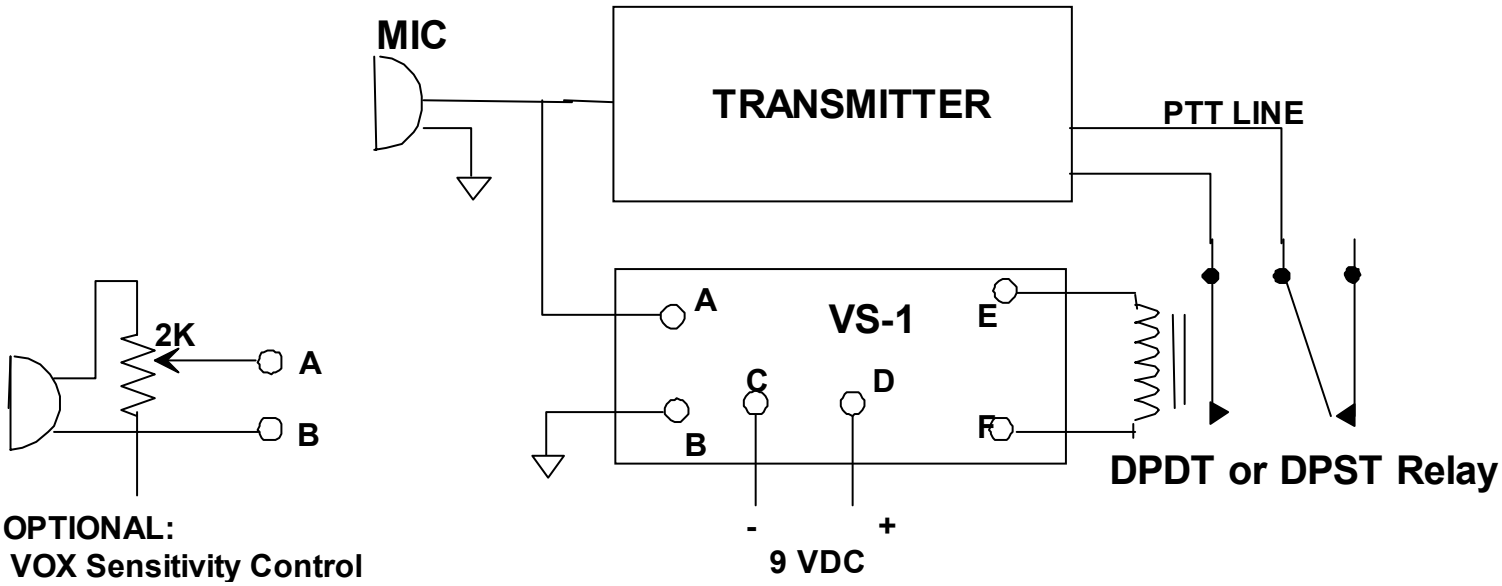
VS1 HOOK-UP DIAGRAM:



The Ramsey Kit Warranty

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

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. If you believe we packed an incorrect part or omitted a part, 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.

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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.

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- Small Diagonal Cutters Ramsey RTS04

<OR> Technician's Tool Kit TK405

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