

THE BULLSHOOTER

ENDLESS LOOP

VOICE RECORDER



Ramsey Electronics Model No.

BS1

Announcing an event is now easier than ever! Just say it once and hear it over and over. Easy transmitter hookup for broadcasting.

- **Compact design stores up to 8 full minutes of audio.**
- **Provides endless looping playback of any message...FOREVER !!**
- **Add a transmitter for error free broadcasting of repetitive announcements. “This Cape Cod rests on 12 acres with...”**
- **Easy to use, pushbutton operation - No fumbling around!**
- **Convenient line and speaker level outputs for any application.**
- **Handy built in microphone for use “on the fly” and external input for pre-recorded messages.**
- **Operates on 9 to 15 Volts DC.**
- **Clear, concise instructions guide you step-by-step to a finished product that works FIRST time.**



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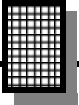
ENDLESS LOOP VOICE RECORDER INSTRUCTION MANUAL

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KIT ASSEMBLY
AND INSTRUCTION MANUAL FOR

THE BULLSHOOTER
ENDLESS LOOP
VOICE RECORDER

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INTRODUCTION

Each of us at one time or another has probably heard an endless loop player repeating a list of movies playing at the local theatre, or advertising a house for sale through your car radio. Sure could be handy around the house occasionally, or maybe down at the local flea market. Could you modify a cassette or CD player to duplicate this function? Good luck! Where could you even find that sort of machine anyway, and how much would it cost? Enter the BS1 Bullshooter.

As a stand alone unit, the BS1 is perfect for the task of, say, announcing repetitive instructions at an event: *“All vendors please report to the registration desk located at the ...”*. Connected to one of our personal broadcasters like the FM-25, the BS1 is ideal for advertising neighborhood garage sales or school or church functions. How about a look at the BS1?

You will notice right away that the Bullshooter isn't your average tape player. In fact, utilizing one of the latest voice recording chips on the market, the BS1 performs its job without need of a tape. There are no motors, drive belts, or gears to wear out. With the exception of the front panel controls, there are no moving parts at all! In addition, the endless loop playback feature makes the Bullshooter a truly unique device.

A quick push of the “Record” button sets up the BS1 to record up to a full eight minutes of audio. Use the on-board microphone to record a quick message or move the pc board mounted jumper to enable use of the line level input for recording from other sources; cassette, CD, radio, etc. A “Record” LED serves as the record mode indicator and extinguishes when the maximum memory capacity has been reached.

The “Play” button selects playback mode which is automatically set up for endless loop operation. The message recorded will continue playback indefinitely, looping over and over for as long as the unit remains in play mode. Through programming of the internal microcontroller the message will always start from the beginning, thus negating the need for rewinding. The “Play” LED simply serves as an indicator for playback mode.

The Bullshooter features two sets of audio outputs to best suit the application at hand. The speaker output (volume controlled by the front panel volume knob) has sufficient power to drive most speakers well into normal listening volumes. Although being a monaural device, twin line level outputs are provided for connection to equipment such as mixers, amplifiers, or transmitters which would normally require left and right inputs.

BS1 CIRCUIT DESCRIPTION

In the BS1, as in all electronic devices, specific power and voltage requirements exist. Although appearing quite simple at a glance, the power supply of this unit provides three separate outputs (+12V unregulated, +5V, and +3V regulated.) The +12V comes from an external source such as battery or wall adapter and is filtered or “smoothed” by capacitor C21. D4 is a reverse polarity protection diode which acts as a switch for the applied voltage. If proper polarity is observed, D4 is forward biased and simply turns on like a switch. However, if for some reason the applied voltage is reversed, D4 becomes reverse biased and turns off, thus protecting all components. VR1 is a voltage regulator which takes the raw +12V and provides a very clean +5 volts output. D1, D2, and D3 together drop about 2 volts leaving a nice clean +3 volts required by U2.

Most of the “magic” inside the BS1 lies within the ISD4004 IC (U2). This unique chip manages all the recording, audio storage, and playback functions requiring only address and control information from the microcontroller. An internal 8kHz sampling frequency provides high quality voice reproduction. A four-wire serial peripheral interface provides the means of data transfer into and out of the chip.

If the ISD4004 IC were the “heart” of the BS1, then the 68HC705K1 microcontroller (U4) would be the “brains” of the outfit. The micro takes inputs from the pushbutton switches and through the use of an internal program, processes this information in order to light the LEDs and send data to control the voice chip. R15 and C18 with U4 set up an oscillator used for timing purposes.

U1, the LM358 is a dual opamp by trade. One side (U1:A) is used as an active low-pass filter with supporting components R9, C4 and R10, C10. A low-pass filter is used to prevent any undesired high frequency noise from U2 and U4 from passing on to the audio amplifiers, degrading the audio output. U1:B is used as an audio amplifier to increase the small signal of U2 to a line level sufficient for driving a high power amplifier or to feed into a transmitter for broadcasting. The LM386 is self contained audio amplifier which is used here to amplify our audio up to about half a watt, which will drive the average sized speaker to comfortable listening levels.

The on-board jumper J2 selects either the microphone or external line level inputs for recording.

PARTS SUPPLIED WITH BS1 VOICE RECORDER KIT

Capacitors

- 1 .0047 μF or .005 μF disc capacitor (marked 472, .005, or 502) [C4]
- 1 .002 μF or .0022 μF disc capacitor (marked .002, 202 or 222) [C10]
- 3 .01 μF disc capacitors (marked .01, 103, or 10 nF) [C14,C16,C17]
- 4 .1 μF disc capacitors (marked .1, 104, or 100 nF) [C3,C5,C9,C19]
- 1 100 pF capacitor (marked 100 or 101) [C18]
- 1 1 μF electrolytic capacitor [C11]
- 8 10 μF electrolytic capacitors [C1,C2,C6,C7,C8,C13,C20,C22]
- 2 220 μF electrolytic capacitors [C12,C15]
- 1 470 μF electrolytic capacitor [C21]

Resistors

- 1 2 ohms (red-black-gold) [R14]
- 1 100 ohms (brown-black-brown) [R3]
- 1 470 ohms (yellow-violet-brown) [R16]
- 3 1K ohms (brown-black-red) [R4,R7,R15]
- 1 4.7K ohms (yellow-violet-red) [R6]
- 7 10K ohms (brown-black-orange) [R1,R8,R9,R10,R11,R13, one for the bottom of the board]
- 1 15K ohms (brown-green-orange) [R5]
- 1 1K ohm potentiometer (marked 102) [R2]
- 1 PC mount 10K ohm trimmer potentiometer (marked 10K) [R12]

Semiconductors

- 3 1N4148 diodes (small glass diodes) [D1,D2,D3]
- 1 1N4002 diode (epoxy case marked 1N4004) [D4]
- 1 Red LED [D5]
- 1 Green LED [D6]
- 1 7805 +5 Volt voltage regulator [VR1]
- 1 LM358 Dual Opamp IC [U1]
- 1 ISD4004 Voice Recorder IC [U2]
- 1 LM386 Audio Amplifier IC [U3]
- 1 68HC705K1 Microcontroller IC (marked with white sticker) [U4]

Hardware, Misc.

- 3 Horizontal push-button switch [S1,S2,S3]
- 1 3 pin vertical header strip and jumper block [J2]
- 1 .5 mm center pin type power jack [J5]
- 3 RCA-style jacks [J1,J3,J6]
- 1 Subminiature speaker jack [J4]
- 1 16-pin socket for U4
- 1 28-pin socket for U2
- 1 MC-1 microphone cartridge [MIC1]

- 1 BS1 printed circuit board

Required, not supplied

- 12 Volt DC power transformer

Optional

- Line level audio source (such as a tape deck or CD player)
- Shielded stereo audio cables
- Speaker

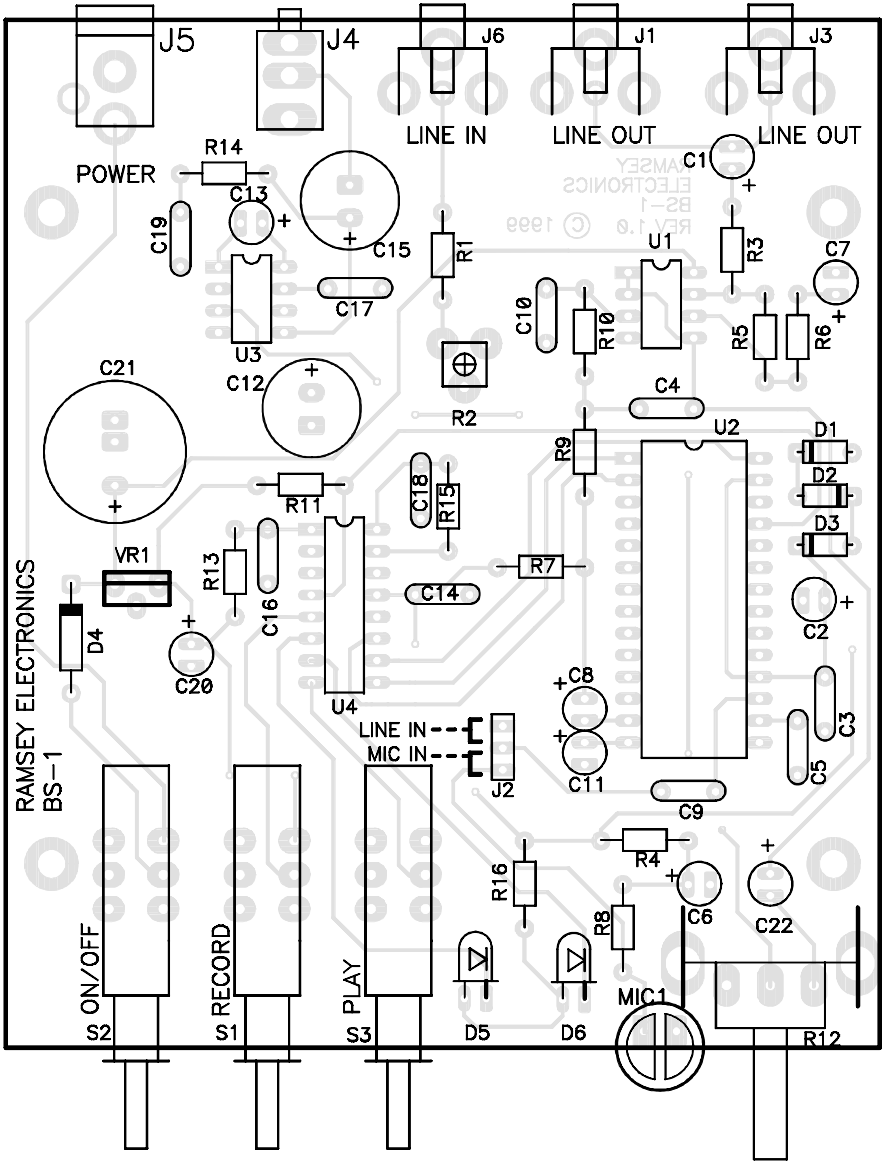
Case and Knob Parts

- Top Cover
- Bottom Base Tray
- 4 - Short Phillips Head Screws
- 2 - Long Phillips Screws
- Front and Rear Plastic Panels
- Front and Rear Labels
- 4 - Rubber Feet
- Appropriate Knobs for Kit

Required Tools

- Pen or Pencil
- Sharp hobby knife or hand held paper punch
- Small Phillips Head Screwdriver

BS1 PARTS LAYOUT DIAGRAM



RAMSEY "LEARN-AS-YOU-BUILD" ASSEMBLY STRATEGY

As you can see in examining the circuit board and components, there is a bit more to this voice recorder kit than just soldering a few parts. So that you don't spend extra time "troubleshooting" instead of enjoying your new kit, we strongly recommend that you follow the assembly strategy and step-by-step procedures we provide.

Our strategy in installing parts on our PC board is to install the larger and more obvious parts such as the connectors and controls. These parts will then act as "landmarks" so that each additional device installed is seen in relationship to them, or to others previously installed.

In addition, we'll discuss the purpose of most of the components or groups of components as we go along. If you are new to the idea of building your own kit, perhaps our explanations will help you understand and learn as we go along. The assembly sequence will complete operational blocks as faithfully as is practical, as part of Ramsey's "Learn-As-You-Build" kit assembly philosophy.

BS1 ASSEMBLY

Use the boxes to check off your progress.

Check all received parts against the Parts list on page 6 and 7. The parts list describes the various markings that may be found on the kit parts.

In ALL the following instruction steps, our word "INSTALL" means this:

- Insert the part, oriented correctly, into its correct holes in the PC board.
- If helpful, gently BEND the part's wire leads or tabs to hold it in place, with the body of the part snugly against the top "component side" of the PC board.
- SOLDER ALL wires or pins of the part, whether the two wires of a resistor or every pin of an IC socket.
- Nip or "trim" all excess wires extending beyond each solder connection, taking care that wire trimmings do not become lodged in PC board solder connections.

Enough said. . . Let's get building!

Since you may appreciate some “warm-up” soldering practice as well as a chance to put some “landmarks” on the PC board, we’ll first install some of the larger components. Have a look at the Parts Layout Diagram to help with your assembly.

- 1. Install S2, the Power DPDT horizontal push-button switch. It fits correctly only one way. Ensure that the white plastic switch extends out over the edge of the printed circuit board. Solder all six pins.
- 2. Install S1, the Record DPDT horizontal push-button switch.
- 3. Install S3, the Play DPDT horizontal push-button switch.
- 4. Install J5, the power jack. Solder all 3 pins.
- 5. Install J4, the sub-miniature speaker jack. Solder all 3 points of the jack securely.
- 6. Install J6, the RCA jack (line input). Solder all 4 pins.
- 7. Install the two remaining RCA jacks J1 and J3. These are the line level outputs. Don’t forget to solder all pins on both jacks.

OK, that was a good warm-up. Let’s take a look at those solder joints to make sure we’re in good shape to move on. A good solder connection should be shiny, smooth, and solid. No room for loose connections here! An old trick is to wipe the hot tip of the iron across a damp sponge before soldering each connection. This keeps the tip clean and spreads the heat faster for a solid connection. If you haven’t tried it, give it a shot and see how much easier it goes. Ready to move on?

- 8. Install the 28 pin DIP socket for U2. There is no right or wrong direction to this socket, but the U2 IC itself certainly needs to be inserted correctly (later). Before soldering, make sure the socket body is flush against the PC board, and that all 28 pins have been inserted. Solder all 28 pins and then CAREFULLY check to ensure you have not caused any "solder bridges" between pins.
- 9. Install the 16 pin DIP socket for U4. Make sure all 16 pins made it through the board and solder all pins.
- 10. Install U3, the audio amplifier IC LM386. Be careful you haven’t picked up the LM358 by mistake. (these two chips are not interchangeable) Observe proper orientation and solder all 8 pins.
- 11. Install U1, the LM358. Check for proper orientation of the notched end and solder all 8 pins.

Now is a good time to double check your work. Loose pins, solder bridges, or an improperly installed IC can really throw a wrench into the works. It’s also a good time to take a break and maybe rub your eyes before you get back into it.

As we head into the smaller components, remember to push each lead all the way through the board until the component body rests on the board.

- ❑ 12. Install C8, 10 μF electrolytic capacitor. Electrolytic capacitors are polarized with a (+) and (-) lead and must be installed in the correct orientation. Ordinarily, only the negative side of the capacitor is marked (typically with a stripe and the (-) sign clearly shown,) while the PC board will show only the (+) hole location. Use care to ensure proper placement.
- ❑ 13. Install R7, 1K ohm resistor (brown-black-red).
- ❑ 14. Install R9, 10K ohm resistor (brown-black-orange).
- ❑ 15. Install C4, .0047 μF - .005 μF capacitor (marked 502, .005, or 472).
- ❑ 16. Install R10, 10K ohm resistor (brown-black-orange).
- ❑ 17. Install C10, .002 μF – .0022 μF capacitor (marked .002, 202, or 222).

If you're following with the schematic, the last group of components completed an active low-pass filter with U1:A. This circuit prevents any higher frequency noise (byproducts from U2 and U4 "working") from being passed on to the audio outputs.

- ❑ 18. Install C7, 10 μF electrolytic capacitor. Be sure to orient for proper polarity.
- ❑ 19. Install R6, 4.7K ohm resistor (yellow-violet-red).
- ❑ 20. Install R5, 15K ohm resistor (brown-green-orange).
- ❑ 21. Install R3, 100 ohm resistor (brown-black-brown).
- ❑ 22. Install C1, 10 μF electrolytic capacitor. Polarity!

The last five components form a non-inverting amplifier to increase the audio level up to the line level (1-2Vpp) needed for input to auxiliary equipment. Moving on, we'll finish up the circuit surrounding the LM386 audio amplifier.

- ❑ 23. Install C22, 10 μF electrolytic capacitor. Check orientation.
- ❑ 24. Install C13, 10 μF electrolytic capacitor. You guessed it...Polarity!
- ❑ 25. Install C17, .01 μF disc capacitor (marked 103 or .01 or 10nF).
- ❑ 26. Install R14, 2 ohm resistor (red-black-gold).
- ❑ 27. Install C19, .1 μF disc capacitor (marked 104 or .1).
- ❑ 28. Install C12, 220 μF electrolytic capacitor. Observe polarity.
- ❑ 29. Install C15, 220 μF electrolytic capacitor. Don't forget... the proper orientation is noted on the PC board or Parts Layout Diagram.

OK, we're halfway there. Let's take care of the audio inputs next. Have you been following the assembly with the schematic diagram?

- 30. Install R1, 10K ohm resistor (brown-black-orange).
- 31. Install R2, 1K ohm potentiometer (3 legs, marked 102).
- 32. Install R4, 1K ohm resistor (brown-black-red).
- 33. Install C6, 10 μ F electrolytic capacitor. Check orientation.
- 34. Install R8, 10K ohm resistor (brown-black-orange).
- 35. Install J2, 3 pin header strip with jumper block.
- 36. Install C9, .1 μ F disc capacitor (marked 104 or .1).

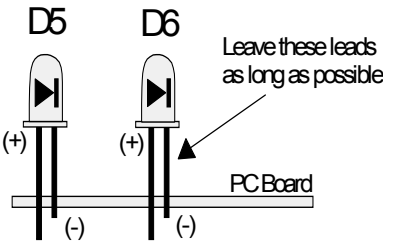
Now is a good time to check our previous work. Take a quick glance at the board checking for possible solder shorts, cold solder joints, etc. If everything looks to be in order we can move on to the power supply components.

- 37. Install D4, 1N4002 diode (black epoxy case with a polarity band). The band denotes the cathode or negative end of the diode and must be installed as shown in the parts layout diagram.
- 38. Install C21, 470 μ F electrolytic capacitor. Orientation?
- 39. Install VR1, 5 volt regulator (3 legged device marked 7805). Make sure the metal tab is oriented as shown in the parts layout. The text side of the component should be facing S2.
- 40. Install C20, 10 μ F electrolytic capacitor. Observe polarity.
- 41. Install D1, 1N4148 diode (small orange glass body with a black band at one end). Remember, diodes are polarity sensitive and must be oriented correctly. Check the parts layout diagram for proper orientation of the banded end.
- 42. Install D2, 1N4148 diode. Ensure the banded end is oriented correctly.
- 43. Install D3, 1N4148 diode. Ensure the banded end is oriented as shown in the parts layout diagram.
- 44. Install C2, 10 μ F electrolytic capacitor. Watch that polarity.
- 45. Install C3, .1 μ F disc capacitor (marked 104 or .1).
- The next group of components would best be classified as "miscellaneous support components". This doesn't mean that they aren't important, as without them the BS1 is just a paperweight. Bypass capacitors, pull-up resistors and a small oscillator comprise this group.
- 46. Install R11, 10K ohm resistor (brown-black-orange).
- 47. Install R13, 10K ohm resistor (brown-black-orange).

- 48. Install R15, 1K ohm resistor (brown-black-red).
- 49. Install C14, .01 μF disc capacitor (marked .01 or 103 or 10nF).
- 50. Install C16, .01 μF disc capacitor (marked .01 or 103 or 10nF).
- 51. Install C18, 100 pF disc capacitor (marked 100 or 101).
- 52. Install C5, a .1 μF disc capacitor (marked 104 or .1)
- 53. Install C11, 1 μF electrolytic capacitor. Check orientation.
- 54. Install R16, 470 ohm resistor (yellow-violet-brown).

Good job! Take a moment to check over the last group of components installed. Double check resistor R15 as the color code of this 1K ohm resistor is easy to mistake for one of the 10K ohm resistors.

Observe the miniature LED's provided with your kit. Being diodes, these components are polarized and must be oriented correctly. Examine one of the LED's and notice how one lead is longer than the other. The longer of the two leads is the anode, or (+) connection. Most (+) diodes also have a flat molded in the component body. This corresponds to the cathode or (-) side of the part.

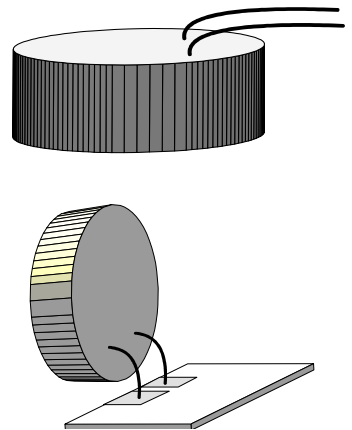


When the pc board is installed into the case the LEDs will be bent over and pushed through the front panel, so be sure to keep the leads as long as possible.

- 55. Install the red "Record" LED D5. (Leave the leads as long as possible)
- 56. Install the green "Play" LED D6.

Let's move on to the installation of the microphone. Once installed, the case of the microphone cartridge is at electrical ground so extra care is needed with this installation.

- 57. Bend the two leads of the MIC1 cartridge as per diagram taking care that the leads do not touch the chrome case of the cartridge. Keep the leads as long as possible as the cartridge will sit up off the circuit board by approximately 1/8".
- 58. To ease the mounting of the microphone, first melt a bit of solder onto the two solder pads on the board. Now the cartridge can be

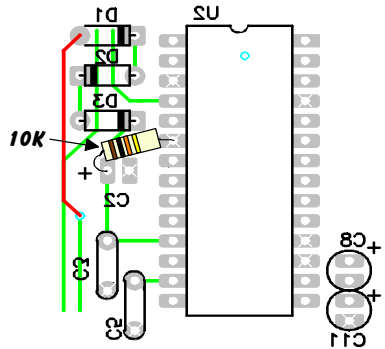


installed by reheating each solder pad while holding the cartridge in place. Once installed, you may want to touch-up each joint with a bit more solder to ensure a solid connection.

- ❑ 59. Check once again to be sure that the two leads do not touch the outer chrome case of the MIC1 and also that the case does not contact the circuit board. A short in this area will prevent the Microphone input from working.
- ❑ 60. Install R12, 10K ohm potentiometer (marked 10K). Solder all five points.

If everything looks good, it's time to install the three remaining parts.

- ❑ 61. Carefully insert the voice recorder IC U2 into the socket, taking care that ALL 28 pins get into their proper holes. The orientation of the notched end, as shown on the Parts Layout Diagram is **critically** important.
- ❑ 62. Install the microprocessor U4 into the socket. This is the 16 pin IC with the sticker. Once again, check for proper orientation of the notched end. Double check all pins to make sure none are bent under. A little time spent here can save a lot of grief later!
- ❑ 63. You should still have one 10K ohm resistor left. This is to be soldered on the bottom side of the PC board, from pin 23 of U2 to the positive side of C2. Follow the diagram for correct placement.



That's it! All components should be installed. Before applying power it would be a good idea for one last glance over the entire pc board. Check for:

- Missed solder joints.
- Solder shorts between components. Check your schematic and parts layout diagrams if you suspect a fault.
- Proper orientation of diodes, capacitors, and ICs.
- Ensure proper power supply polarity and voltage. (12 volts DC, center tip positive)

INITIAL TESTING AND OPERATION

Power Supply Considerations

The BS1 is designed to run off an external source of 9 to 15 VDC. Batteries, power supplies, or AC adapters may be connected to the unit through the power jack, J5. Care should be taken to ensure that the center tip is positive. Before applying power, make sure the three pushbutton switches are in the "out" position and the volume control is turned down.

Recording

Recording is possible from either the on-board microphone or external line input. The input choice is selected by jumper position of J2. To select the Microphone input, move the jumper to the "MIC IN" position as marked on the board. The "LINE IN" position selects recording from a Line Level input from an external source such as the Line Out of a cassette or CD player.

To record a voice message:

1. Set J2 to the "MIC IN" position.
2. Power up the unit by pushing in the power button.
3. Push the "Record" button S1. (The "Record" LED will illuminate.)***
4. Start speaking into the microphone.
5. Push the "Record" button a second time to release it and end recording.

To record from an external source:

1. Set J2 to the "LINE IN" position.
2. Connect the Line Level Output of the CD or tape player to the "Line Input" jack J6 on the BS1. Potentiometer R2 adjusts the recording level and is typically set to about the "4 o'clock" position (as seen from looking over the front panel.) **DO NOT CONNECT SPEAKER LEVEL OUTPUTS TO THE BS1 INPUTS OR DAMAGE TO U2 COULD RESULT!**
3. Push the "Record" button on the BS1. (The "Record" LED will illuminate.)***
4. Start the playback of the CD or tape player.
5. Push the "Record" button a second time to release it and end recording.

*** If maximum memory capacity has been reached before releasing the "Record" button, the "Record" LED will turn off indicating the unit has stopped recording. Release the "Record" button at this time.

Recorded messages may be any length of time up to the maximum capacity of 8 minutes. Since the ISD4004 stores the recordings in a non-volatile memory, there is no worry of losing a recording due to loss of power.

Playback

The BS1 has both a speaker level output (jack J4), for monitoring playback or announcing to a local audience, and a set of Line Level outputs (jacks J1 and J3) designed for connection to auxiliary equipment such as power amplifiers or broadcast transmitters. The two Line Outputs are identical and serve only to provide easier connections to units which require stereo (left and right) inputs.

To playback a message into a speaker:

1. Connect a speaker to the “Speaker Out” jack J4.
2. Power up the BS1.
3. Push the “Play” button S3. (The “Play” LED will illuminate.)

To play a message into auxiliary equipment:

1. Connect the “Line Out” jacks J1 and J3 to the Line Level inputs on the desired equipment.
2. Power up the BS1.
3. Push the “Play” button S3. (The “Play” LED will illuminate.)

TROUBLESHOOTING

Won't record from Microphone and/or Line In.

1. Check for proper positioning of jumper block on J2.
2. Check for proper adjustment of R2 if recording from Line In.

The LEDs work, but nothing else happens.

1. Make sure U2 is properly seated.
2. Check for 2 volts DC on U2 pins 18 & 27. U2 runs off a separate power source through diodes D1, D2, and D3.

Misc. faults or problems.

1. Check for proper voltage and polarity from the power source. Center tip of power plug should be positive.
2. Check for proper DC voltages on the circuit board. (+2, +5, +12)
3. Loose or cold solder joints, solder splashes, etc. A good solder joint is clean and shiny. As a rule, if you need a magnifying glass to check for a good contact, resolder it. Check your work against the schematic and parts layout diagrams in cases of questionable solder shorts or opens.
4. Check for proper orientation and placement of ICs, and that all pins are soldered (or fully seated if in a socket).

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.

Endless Loop Voice Recorder Kit Quick Reference Page Guide

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REQUIRED TOOLS

- Soldering Iron (WLC100)
- Thin Rosin Core Solder (RTS12)
- Needle Nose Pliers (MPP4 or RTS05)
- Small Diagonal Cutters (RTS04)

ADDITIONAL SUGGESTED ITEMS

- Helping Hands Holder for PC Board/Parts (HH3)
- Technician's Tool Kit (TK405)
- Desoldering Braid (RTS08)

Price: \$5.00

Ramsey Publication No. MBS1

Assembly and Instruction manual for:

RAMSEY MODEL NO. BS1



TOTAL SOLDER POINTS

200

ESTIMATED ASSEMBLY TIME

Beginner 6 hrs

Intermediate..... 3 hrs

Advanced..... 1 hrs

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