

The Simple Simplex Repeater

An easily built project for interfacing with most transceivers

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The Simple Simplex Repeater is a low-cost, easy-to-build project that, when interfaced with a transceiver, acts as a limited simplex repeater. Unlike most repeaters, a simplex repeater operates on a single frequency by recording the incoming transmission and playing back this recording on the same frequency. Operators who would otherwise not be able to contact each other directly can use a simplex repeater operated by another party to communicate. The Simple Simplex Repeater is handy in these situations and for use during emergency conditions.

The Simple Simplex Repeater is easy to interface to most transceivers, and can be built using readily available parts. Only three ICs and a handful of other components are needed to build the project. The core of the project is the ISD1000A Voice Record and Playback IC, available from Radio Shack, that stores up to 20 seconds of audio from an incoming transmission. When the incoming transmission has ended, the repeater keys the transceiver and plays the recorded transmission.

Design

Figure 1 shows the schematic diagram for the Simple Simplex Repeater. Point J1 is the input of the carrier-operated squelch (COS) signal from the radio. A received audio signal is said to be present when the COS signal is greater than 0.7 V, switching the collector of transistor Q2 to ground. The play/record (P/*R) pin of U1, the ISD1000A, then becomes low, placing U1 in record mode. NAND gates U3B and U3C are set up as inverters, and thus generate a high output. D flip-flop U4A is clocked on this positive edge, therefore making the Q output high. NAND gate U3A has both inputs high, therefore generating a low input to the power down (PD) pin of U1. The resistor R2 and capacitor C6 combination is used to generate a brief delay.

After COS drops below 0.7 V, the P/*R pin of U1 is made high, placing U1 in play mode. D flip-flop U4B is clocked on the positive edge, making the Q output high, which keys the PTT of the radio by switching transistor Q1. The R3-R4-C7 combination works as a

negative-edge triggered negative pulse, which places the output of NAND gate U3A high for a brief period to allow U1 to enter playback mode.

When play is complete (or the audio memory is full), the end of message (*EOM) pin of U1 goes low. This clears U4A and U4B, allowing the PTT to be released and U1 to power down. The play sequence is entered if this state is created by a memory full condition after COS drops below 0.7 V.

Potentiometer R1 controls the volume of the audio out signal. A transformer can be used to match the output impedance to the radio, if desired.

U2 is a 5 V voltage regulator included in the design to allow connection to various unregulated DC supplies between the ranges of 7 V and 12 V. If, however, a regulated 5 V supply is used to provide power, U2 can be eliminated and the regulated supply can be connected to the V_{CC} points in the diagram.

Interfacing

The Simple Simplex Repeater can be interfaced easily to most radios. Six in-

Parts List for the Simple Simplex Repeater

Semiconductors

U1—ISD1000A Voice Record/Playback IC (RS 276-1325)
U2—7805 5 V voltage regulator
U3—74LS00 quad NAND gate IC
U4—74LS74 dual D flip-flop IC
Q1, Q2—2N3904 NPN transistors

Resistors

(All fixed resistors are 1/4-watt, 5% units)

R1—1K ohm potentiometer
R2—15K ohm
R3—1K ohm
R4—2.2K ohm
R5, R8—4.7K ohm
R6, R7—20K ohm

Capacitors

C1, C2, C3, C4, C5, C6—0.22- μ F capacitor (RS 272-1070)
C7—220- μ F electrolytic capacitor (RS 272-1029)

Additional Parts and Materials

Connectors, solder, breadboarding material, power supply

Point

Description

J1—COS	Connect to carrier-operated squelch of radio. Must provide >0.7 V if a carrier is present, and <0.7 V if no carrier is present.
J2—V _{CC}	Unregulated DC input from 7 to 12 V.
J3—Audio Out	Connect to audio input of radio and adjust R1 to suitable volume level.
J4—PTT	Connect to push-to-talk of radio to control transmitting. This point is grounded to key the transmitter.
J5—Audio In	Connect to audio output of radio. The input impedance of this point is 2.7k ohm and the maximum drive level is 50 mV p-p.
J6—GND	Connect to ground of the radio.

Table 1. Interfacing Information.

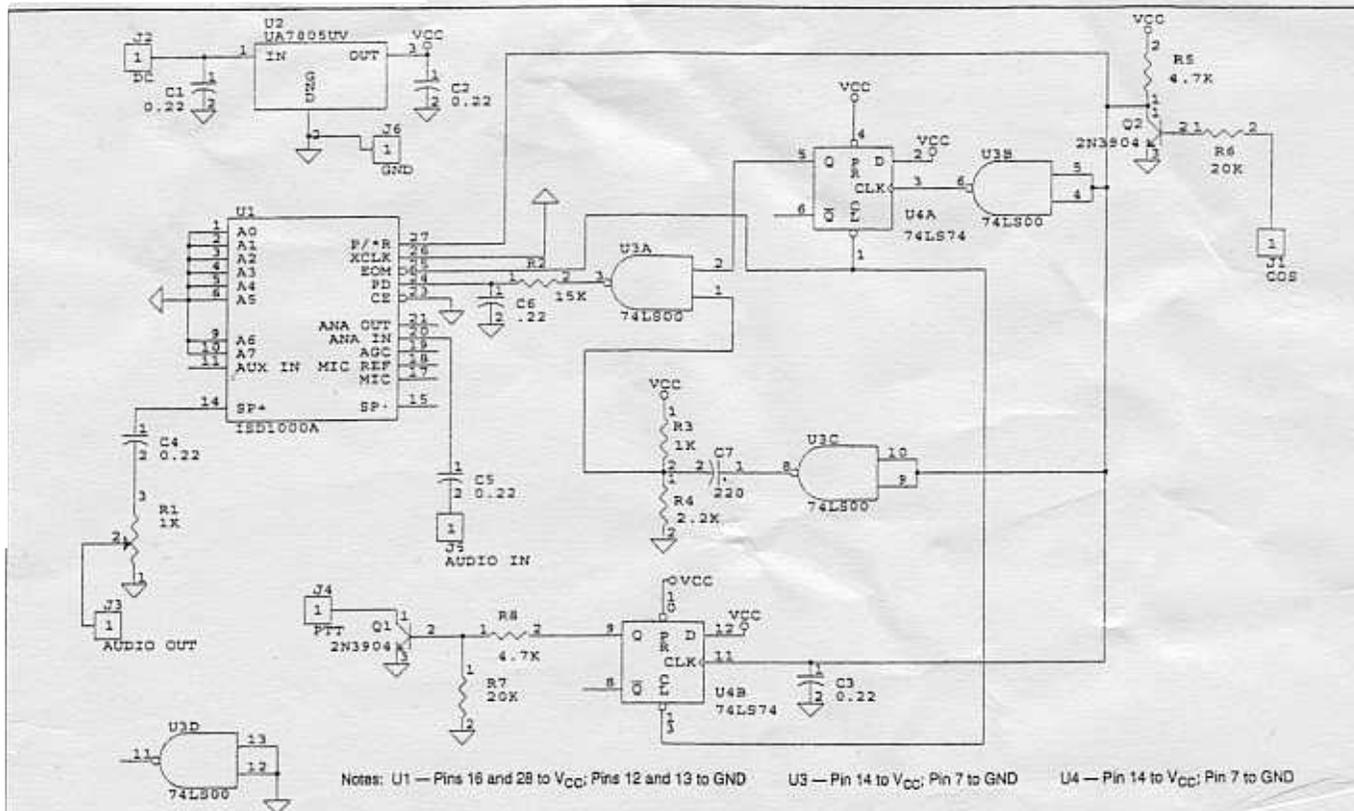


Figure 1. Schematic Diagram for the Simple Simplex Repeater.

put/output points are shown in Figure 1 for interfacing the Simple Simplex Repeater. Table 1 details the interfacing information needed for connecting the six input/output points to a radio. If your radio cannot be interfaced directly, a minimal amount of interfacing hardware is required to complete the interface.

Conclusion

The Simple Simplex Repeater is ready to be powered up and used! This inexpensive and easy-to-build project allows anyone to have a repeater readily available for emergency use.

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