

World's Fair Super Squelch

With this two-digit DTMF decoder—a perfect club project—you hear only calls meant specifically for you.

Early in the planning stages for the world's fair amateur radio station, WA4KFS, it was decided that a telephone in the station would not be desirable. After all, we wanted to dem-

onstrate the usefulness of radio—and the budget was tight. A telephone seemed out of place. Still, there was a need for a way to get through to the station's control operator without forc-

ing him to monitor a normally busy repeater. Since each of the directors of the Tennessee Wireless Association, the station's sponsor, had touchtone™ capabilities, a touchtone-operated

squelch was the obvious answer. The circuit presented here is the one that we used at the fair.

Description

The circuit in Fig. 1

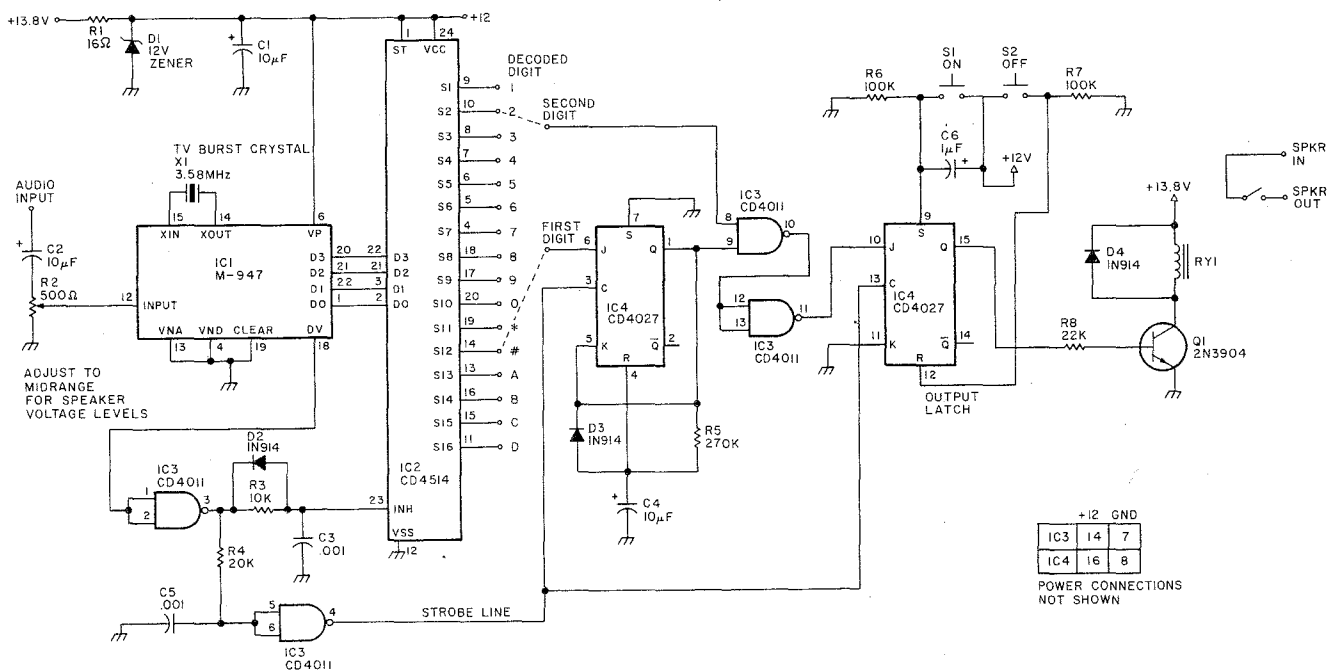


Fig. 1. Touchtone squelch schematic.

makes use of the M-947 DTMF decoder from Teltone, of Kirkland, Washington. The 947 has, on a single IC, all of the filters, amplifiers, and tone detectors needed to detect all 16 touchtone digits and output the corresponding binary codes.

These binary codes are then routed to a CD4514 four-to-sixteen-line decoder IC which activates a single output line for each touchtone digit. The outputs of this IC should then be connected to the proper stages of the sequence detector corresponding to your desired access code.

Also attached to the 947 decoder are a couple of gates wired as inverters and used with a couple of RC networks to provide delays in strobe-line timing needed to ensure proper clocking of the sequence detector.

The CD4027 dual J-K flip-flop IC is used as a sequence detector. In our case, we needed only a two-digit sequence. However, any number of flip-flops may be wired in series to provide sequence codes of any length. One flip-flop is needed per digit. A four-digit sequence detector is shown in Fig. 2.

Resistor R5 and capacitor C4 form a timer which resets the detector about one second after the first digit of the sequence is received. In this way, not only must the proper sequence be received, but it also must be received in a given time. This guard time may be adjusted for longer sequences according to the formula: Time in seconds = $RC/2$, where R is in Ohms and C is in microfarads.

The last stage of the sequence detector is the output latch. Attached to its set-and-reset inputs, momentary push-button switches S1 and S2 are provided for local control of the squelch. Pressing S1 will enable the speaker, while

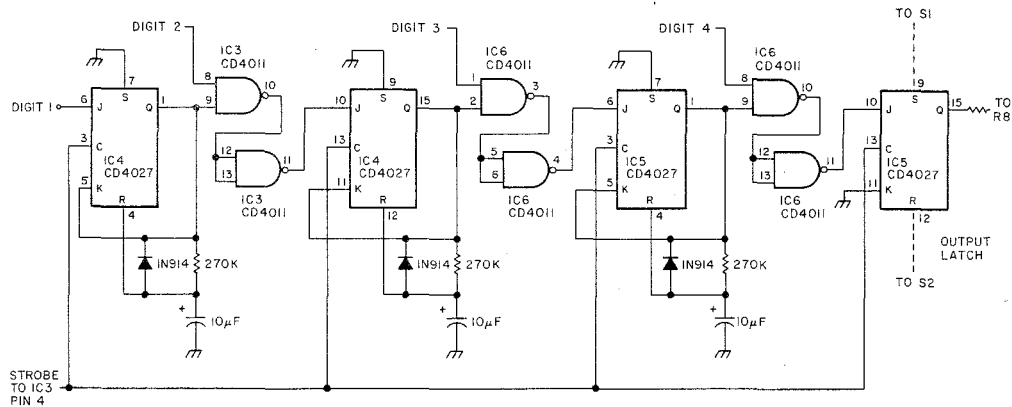


Fig. 2. Four-digit sequence detector.

pressing S2 will disable the speaker until the next correct sequence is received.

Transistor Q1 is used as a buffer/driver between the output latch and reed relay RY1. Relay RY1 is connected in series with the radio's speaker leads.

One last comment. Since the M-947 is limited to a maximum power-supply voltage of 13.5 V, a 12-volt zener is included to protect the decoder from power supplies with 13.8-volt outputs. Yes, it is *that* critical!

Construction and Operation

Our two-digit detector was built on perfboard in a Bud CU124 die-cast minibox. It was then wired into the accessory socket of a KDK2025 MK11 2m transceiver.

Before applying power, set your rig's volume control to a normal listening level and then apply power to the circuit. The circuit will always come on in the unsquelched condition. If the opposite is desired, connect capacitor C6 across the off switch, S2, instead of across S1. Now, using another transmitter, send the desired access code to the receiving rig. The speaker will be enabled after the last digit of the access code is released. The speaker then will remain enabled until turned off locally with the off button. Although no circuit for turning off the speaker remotely was included in this design, another sequence detector

could be built with its output feeding the K input of the output latch to accomplish this task. ■

Parts List

Designation	Description	Price Each	Total
R1	16 Ohm, 1/4 W, 5% (15 Ohm may be used)	.06	\$.06
R2	500 Ohm, 1/4 W potentiometer	.59	.59
R3	10k Ohm, 1/4 W, 10%	.06	.06
R4	20k Ohm, 1/4 W, 5%	.06	.06
R5	270k Ohm, 1/4 W, 5%	.06	.06
R6, R7	100k Ohm, 1/4 W, 10%	.06	.12
R8	22k Ohm, 1/4 W, 10%	.06	.06
C1, C2, C4	10-uF electrolytic, 15 volt or greater	.59	1.77
C3, C5	.001-uF, 50-volt ceramic disc	.20	.40
C6	1-uF electrolytic, 15 volt or equivalent	.59	.59
D1	Zener diode, 12 volt, 1 Watt, 1N4742 or equivalent	.45	.45
D2-D4	1N914 or equivalent	.10	.30
Q1	Transistor NPN 2N2222, 2N3904, or equivalent	.69	.69
IC1	*Teltone M-947 DTMF decoder	53.00	53.00
IC2	CMOS CD4514, 4-bit latch, 4-to-16-line decoder	3.95	3.95
IC3	CMOS CD4011, quad NAND gate	.39	.39
IC4	CMOS CD4027, dual J-K flip-flop	.69	.69
X1	Crystal TV Color Burst, 3.579545 MHz	1.98	1.98
RY1	12 V dc SPST	2.99	2.99
S1, S2	Push-button momentary SPST (RS 275-1547)	.50	1.00
MISC	IC socket, 14 pin IC socket, 16 pin IC socket, 22 pin IC socket, 24 pin Perfboard (RS 276-1390) Minibox, Bud CU124	.20 .22 .37 .38 1.39 4.40	.20 .22 .37 .38 1.39 4.40
Total			\$76.17

* Available from Teltone Corp., PO Box 657, 10801 120th Ave. N.E., Kirkland WA 98033; (206)-827-9626.