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 demonstrate 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 forcing 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...
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 touch-
tone digit. The outputs of
this IC should then be con-
nected to the proper stages of the sequence detector corresponding to your de-
sired 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 se-
quency 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 capaci-
tor 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 se-
quency 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 se-
quency detector is the output latch. Attached to its
set-and-reset inputs, mo-
tary push-button switches S1 and S2 are
provided for local control of the squelch. Pressing S1 will enable the speaker, while
pressing S2 will disable the speaker until the next cor-
rect sequence is received.

Transistor Q1 is used as a
buffer/driver between the output latch and reed relay
RY1. Relay RY1 is connect-
ed 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 ac-
cessor socket of a KDK2025
MK112 2m transceiver.

Before applying power,
set your rig’s volume con-
trol to a normal listening level and then apply power to the circuit. The circuit
will always come on in the unquelled condition. If the
opposite is desired, con-
nect 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 out-
put feeding the K input of
the output latch to ac-
complish this task.

Fig. 2. Four-digit sequence detector.

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<td>Designation</td>
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<td>D1</td>
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<td>Q1</td>
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*Available from Teltone Corp., PO Box 657, 10801 120th Ave. N.E., Kirkland WA 98033; (206)-827-9626.