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Hunt the Auto-Fox

Has your transmitter-hunting gone sour?
DFers will love chasing this wily box, and
its variable skill levels give them a run for their money.

Many radio clubs across the country partici-pate regularly in hidden-transmitter hunts. The Pikes Peak Radio Amateur Association, for example, has a fox hunt once a month, with each month's winner play-
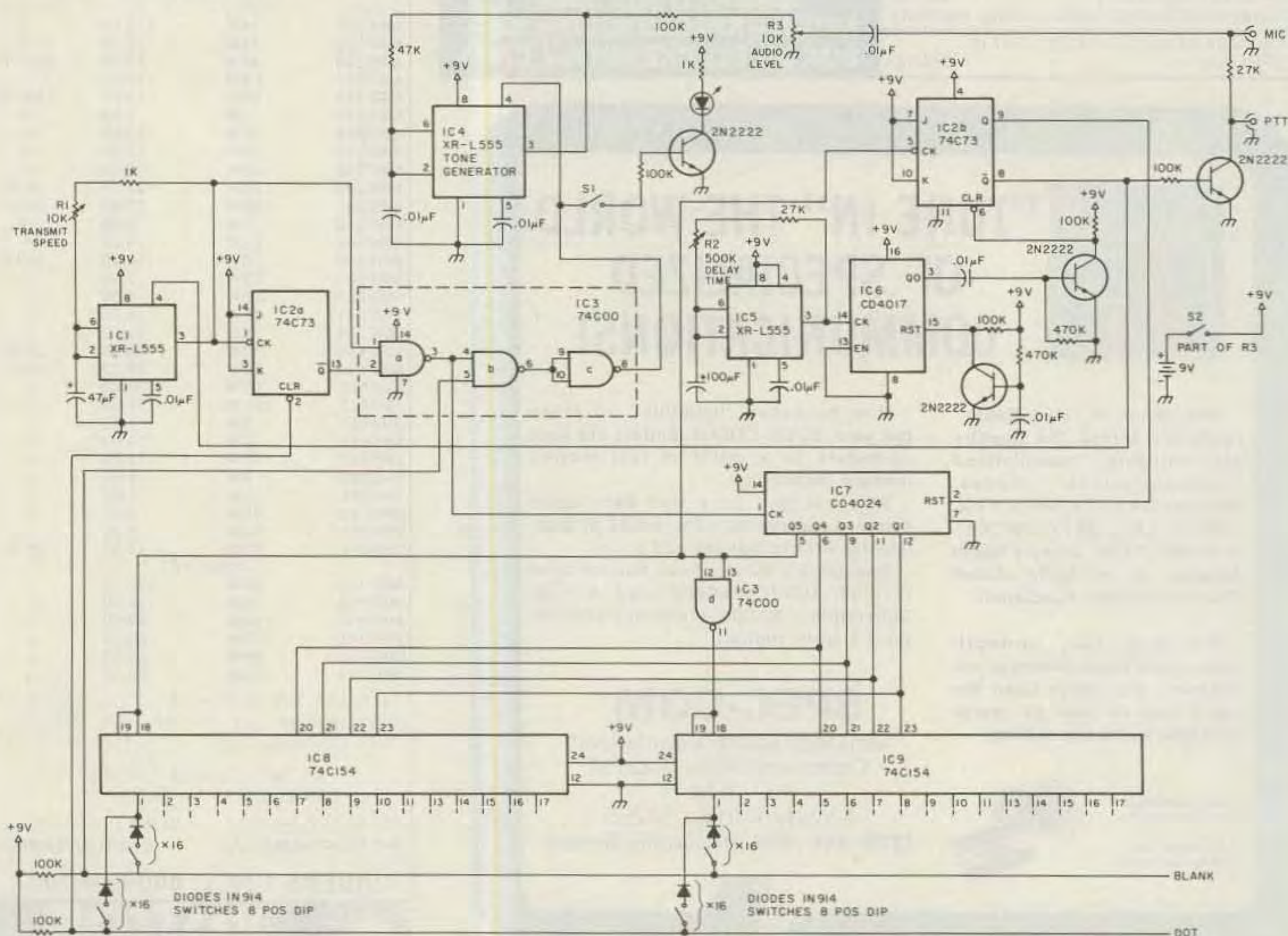

Fig. 1. Schematic.

ing the role of the fox the following month. When he/she is in place, the rest of the participants begin the hunt from a predetermined meeting area. The new winner is the person who finds the fox after traveling the shortest distance.

This game is lots of fun, of course—at least for the participants. However, the fox usually becomes quite bored with the whole process while sitting in a car somewhere and transmitting for one minute out of every five.

This problem can be alleviated somewhat by the use of the Auto-Fox, a device which attaches to just about any transceiver and sends a preprogrammed callsign in code at intervals determined by the operator. Now the real fox can read a book at least, or listen to the radio, or even rag-chew on a different frequency without being interrupted every few minutes for a fox-hunt transmission.

Built with CMOS devices, the Auto-Fox draws about one milliamp of current and should run for many hours using a 9-volt transistor-radio battery as a power source. Any callsign can be programmed with the DIP switches on the front panel of the device, and the operator has full control over the length of transmission (10 seconds to 1 minute), the time between transmissions (1 to 12 minutes), and the audio level into the transmitter.

Circuit Description

The Auto-Fox is based upon a clever repeater IDer designed by K2OAW.* The circuit is designed entirely with CMOS and low-power 555 timers (Fig. 1) for operating currents of just over 1 mA when transmitting and just under 1 mA between

*"A TTL Logic CW ID Generator," Peter A. Stark K2OAW, 73 Magazine, February and March, 1973.

The Auto-Fox was built using point-to-point wiring on parts of a protoboard and put into a Radio Shack 270-233 experimenter's box. The top panel contains the callsign programming DIP switches, transmit speed, delay, and audio level/on-off pots, as well as the push-button switch which activates the monitor LED. The right side of the enclosure (not shown) has a subminiature mike jack, a miniature PTT jack, and an external power connector.

transmissions. Logic designers call this a "counter-based controller" since operation is controlled by binary counter IC7 and its clock, IC1. The DIP switches on the front panel of the Auto-Fox allow the system to produce a dash when both switches are open for a particular count, a blank by turning off the audio generertor, IC4, or a dot by increasing the count speed by bypassing IC2a. IC8 and IC9 allow for 32 counts, each of which can be programmed independently as a dot, dash, or blank. The Auto-Fox can produce the longest US callsign, which consists of 29 counts including the 5 blanks between characters. The 10k pot on IC1 allows a callsign to be transmitted in a minimum of about 10 seconds or up to a maximum of about 1 minute.

The interval between successive callsign transmissions is determined by IC5 and IC6. The decade counter at IC6 is used in a divide-by-ten configuration to allow smaller timing components on IC5; the decade counter also has a power-on start feature on pin 15, so the fox will begin a transmission cycle when first turned

on. This feature also allows the user to transmit an ID at any time simply by turning the Auto-Fox off for a moment, then on again. The 500k pot on IC5 sets the time between transmissions from a minimum of about 1 minute to a maximum of about 12 minutes.

When the push-button switch on pin 8 of IC3c is pressed, the LED will turn on whenever IC4 is producing an audio tone during the transmission cycle. Of course, a momentary switch is used here to prevent inadvertent draining of the battery by extended LED operation.

The mike output of the Auto-Fox will provide a variable-level audio tone to the microphone input of the companion transceiver and is configured to provide the correct push-to-talk (PTT) logic to the ICOM IC series of handie-talkies as well. A separate PTT output also is provided by the Auto-Fox for other transceivers requiring this additional control signal.

Construction and Operation

Parts layout of the Auto-Fox is not critical, and just about any convenient arrangement can be used. I tried to miniaturize my design as much as possible and managed to put everything into a Radio Shack experi-

Parts List

Quantity	Type	Description
3	IC	XR-L555 (276-1718)
1	IC	74C00 (276-2411)*
1	IC	74C73
2	IC	74C154
1	IC	CD4017 (276-2417)
1	IC	CD4024
4	Transistor	2N2222 (276-2009)
64	Diode	1N914 (276-1122)
6	Capacitor	.01 μF (272-131)
1	Capacitor	47 μF (272-1027)
1	Capacitor	100 μF (272-1028)
2	Resistor	1k Ω (271-1321)
2	Resistor	27k Ω (271-1340)
1	Resistor	47k Ω (271-1342)
5	Resistor	100k Ω (271-1347)
2	Resistor	470k Ω (271-1354)
1	Pot	10k audio w/SPST SW (271-215)
1	Pot	10k linear (271-1715)
1	Pot	500k linear (271-210)
8	Switch	8-pos. SPST DIP (275-1301)
1	Switch	SPST push-button NO (275-1547)
1	LED	General purpose (276-026)

Radio Shack part numbers are in parentheses; other parts available from Jameco Electronics, 1355 Shoreway Road, Belmont CA 94002.

*Functionally equivalent to 74C00, but pin assignment differs.

menter's box (270-233). However, unless you are an experienced builder, I recommend that you gain some working room at the expense of using a slightly larger enclosure.

If the Auto-Fox is to be used with only a single callsign, you may want to save the cost of the DIP switches and extra diodes by hard-wiring the callsign to the 74C154 chips, using only the required diodes.

Unlike most sequential digital circuits, the Auto-Fox operates slowly enough so that you can see most of the logic transitions on a volt-meter, which makes trouble-shooting substantially easier. You can also temporarily short across the push-button switch to activate the LED continually for a simple operational check.

Once the Auto-Fox is operating correctly, construct the proper patch cords between the unit and the mike and PTT (if applicable) con-nections of the companion transceiver. Use a receiver to verify correct operation of the complete system, and adjust the transmit time, delay between transmissions, and audio level as required. The Auto-Fox is now ready for the hunt!

Conclusion

Since any callsign may be programmed into the Auto-Fox, it may be tailored to the person who happens to be the fox on a particular hunt. As the hunters become more proficient, the transmit time may be decreased by in-creasing the speed of the ID, thus requiring a faster direc-tion fix. Also, the time be-tween transmissions may be increased to provide fewer opportunities for a fix.

The Auto-Fox should take some of the boredom out of being the fox and will pro-vide a precise signal which can be programmed for just about any direction-finding situation. ■