...N CIRCUITS FOR CHILDRENS TOYS

This circuit was originally designed to produce the sound of a police siren for my son's pedal car. It uses two 555 timers connected as oscillators (see Fig. a). The first oscillator IC1 is set for a period of 6 secs, 3 on and 3 off. Diode D1 is included to give equal mark-space ratio. This oscillator determines the rise and fall time of the siren.

The square wave output on pin 3 is turned into an exponential rise and fall by R3 and C3. This is reproduced at a low impedance by the emitter follower TR1 at pin 5 of IC2. The 555 timer has the facility for its timing period to be controlled externally by means of a control voltage applied to pin 5. IC2 is set for a nominal frequency of oscillators of about 1kHz, but this is pulled above and below the set frequency by the exponential waveform on pin 5. The output wave form starts at a low frequency, rises over 3 secs to a high frequency, falls over 3 secs to a low frequency and so on.

The loudspeaker used was a 75 ohm ex mobile radio handset speaker. This gave more than adequate volume off a 9V battery. Any loudspeaker can be used, provided a resistor is put in series with it to keep the total impedance above 45 ohms (for a 9V supply).

As originally designed the circuit gives an American-type police siren. It can easily be changed to give other types of siren: If R3, C3, TR1, R4 are omitted, and IC1 pin 3 is linked to IC2 pin 5 by R7 as shown in Fig. 1b, the "De-Dah" sound used by the British police is given.

If the values of R1, R2 are changed and D2 is added as shown in Fig. 1c we get the Star Trek "Red Alert". The values of R1 and R2 give a highly unsymetrical output from IC1. C3 now

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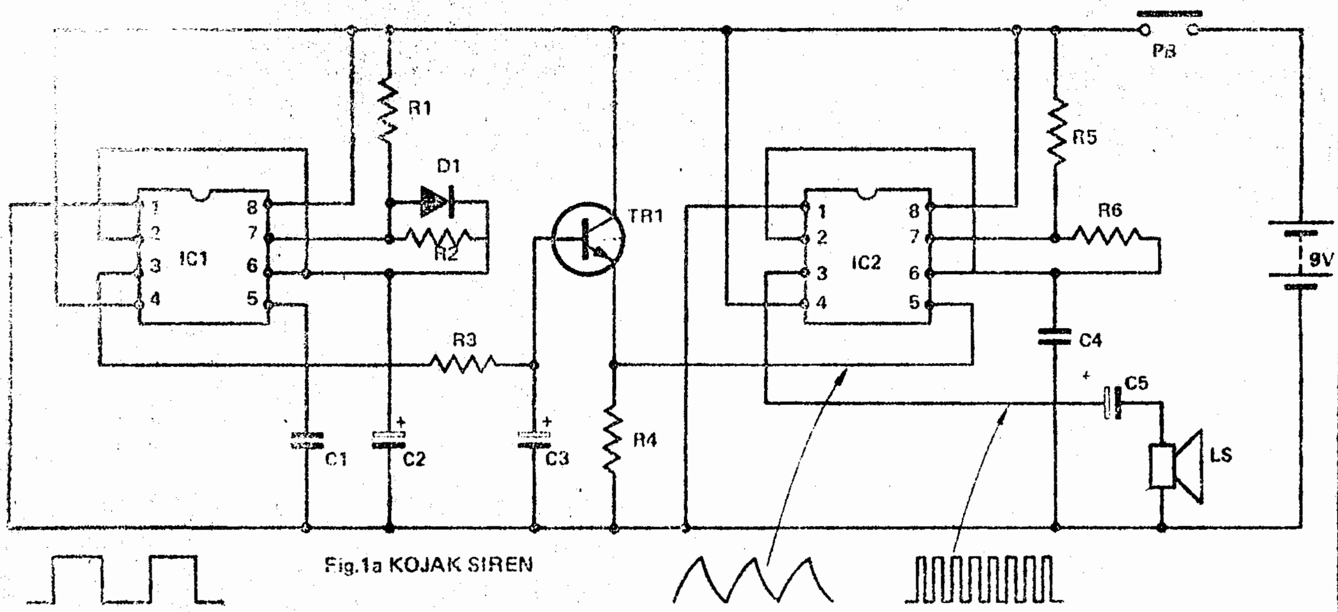


Fig.1a KOJAK SIREN

Component Values

R1	220k	R4	1k0	IC1,IC2 555 (or one 556)	D1 Any G.P. Silicon diode
R2	220k	R5	4k7	TR1 Any G.P. NPN Silicon (eg BC107)	R7 5k6 R2c 220k
R3	220k	R6	4k7	C1 0.01μF C2 250μF C3 250μF	R1c 1k
				C4 0.1μF C5 250μF 25V	D2 Any G.P. Silicon diode

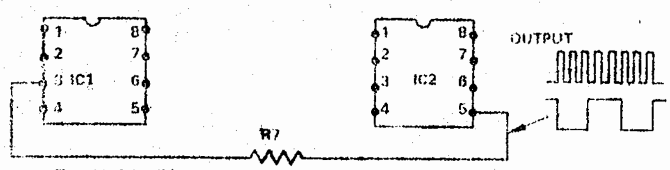
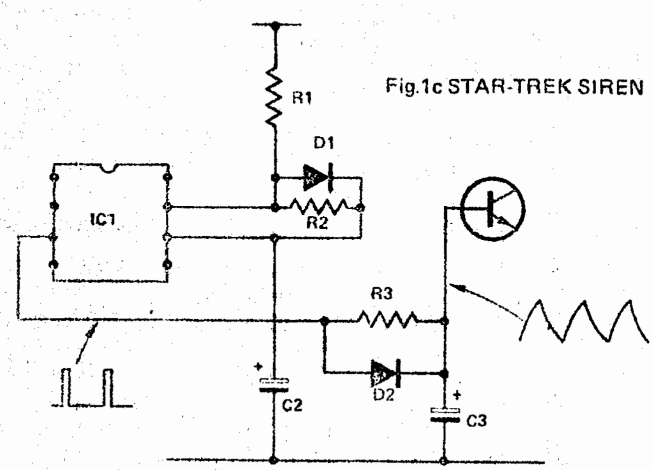


Fig.1b Modification to give Z-CARS SIREN

Fig.1c STAR-TREK SIREN



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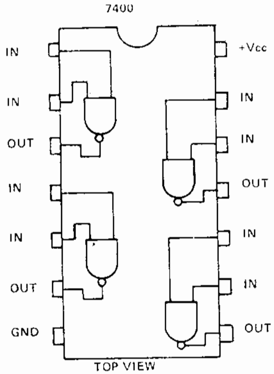
gets a rapid charge via D2 during the short positive output from IC1, but discharges through R3 during the long low output time. The wave form at IC2 pin 5 thus approximates to a saw tooth, and the resulting output starts at a low frequency rises up to a high frequency over a period of 3 secs then falls abruptly to the low frequency again, and so on.

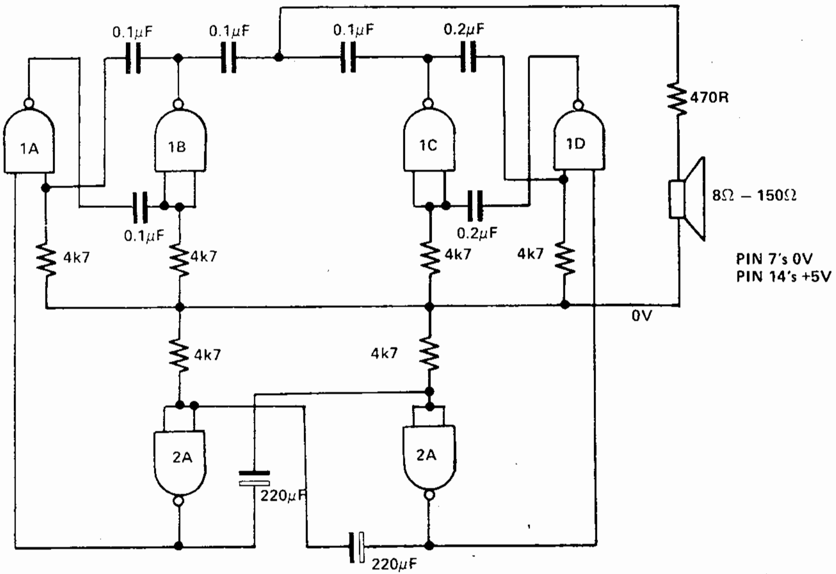
The circuits were originally built with 555 timers because I had a box full of them. A more elegant circuit can be made, however, by using the 556 dual timer. IC1 and IC2 can thus be obtained in one chip. The circuit works equally well with the 556, but the device has a slightly lower current rating than the 555. The loudspeaker impedance should be kept above 60 ohms by a series resistor as described above.

7400 SIREN

The siren consists of two oscillators which generate the tones. A third oscillator is used to switch the others on and off alternately, giving the two tone effect

By changing thr capacitor values different tones can be produced.

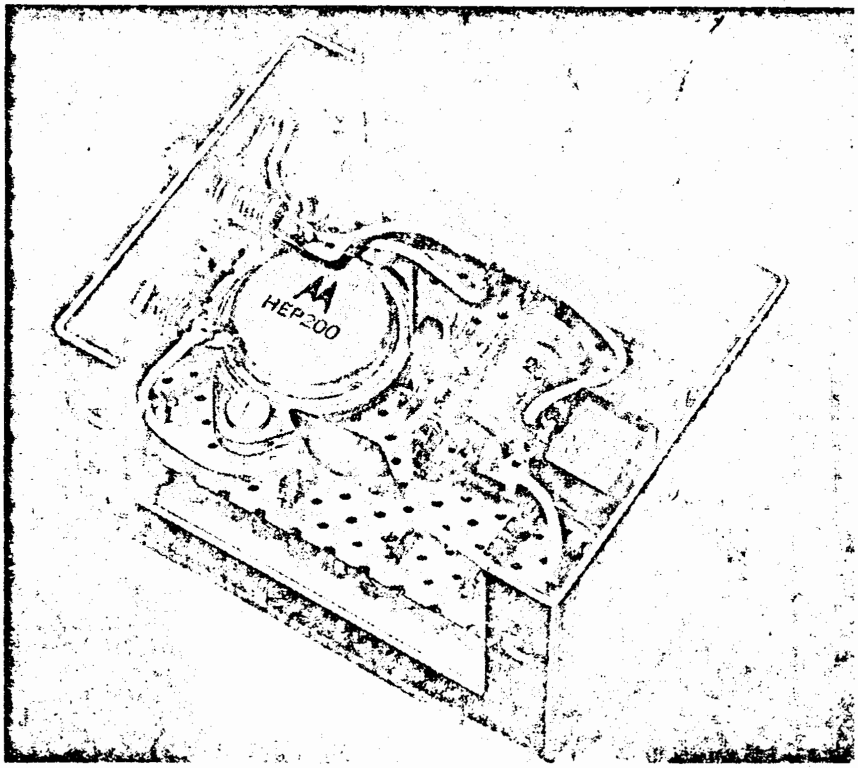




Panic Button

By PAUL FRANSON

Like to build a simple electronic siren? Here are construction details for two such units, including one with self cycling.



Internal view of the "panic button" shown schematically in Fig. 2. The entire unit can be housed in small chassis box.

OF all the electronic toys and games that have been developed, none seems to have more appeal than the "panic button" or simple siren. In its best-known form, which has been around for many years, the panic button consists of a small box with a push-button mounted on it. When the button is depressed, an oscillator is energized and, instead of producing a tone of constant frequency, the oscillator furnishes a slowly rising note much like that of a siren. The tone rises while the button is held down, then, when it is released, falls slowly and finally stops unless the button is depressed again.

How it Works

The basic circuit for producing the siren tone consists of a complementary, direct-coupled amplifier using silicon plastic transistors (Fig. 1A). Oscillation, produced by capacitive feedback (*C1*) from the output to the input, is frequency dependent on the bias current present on the base of *Q1*. When switch *S1* is depressed, *C2* is charged at a rate (time constant) dependent on the values of *R1* and *C2*. This causes the bias current and the audible oscillation frequency to rise slowly. Likewise, when switch S1 is opened, *C2* discharges slowly at a rate dependent on the time constant of *C2* and *R2* plus *R3* in parallel with the input resistance of transistor *Q1*.

Since the transistors used in this circuit are silicon and have very low leakage, they can be left connected to the battery (standby current is in microamperes). The maximum current drain during operation is about 15 mA, so a 9-volt transistor radio battery will do for intermittent use.

The loudest siren-like sound can be obtained using a high-impedance (up to 40-ohm) speaker, although a loud and annoying output can be obtained with an 8-ohm speaker.

A Lounder Panic Button

The schematic of a more powerful version of the panic button is shown in Fig. 1B. This is the same circuit as that shown in Fig. 1A, except the components have been changed. The *p-n-p* silicon output transistor (Q2) has been replaced by a germanium power transistor which, due to its lower impedance, provides greater output. In addition, since it also draws more current, this circuit should be operated from a 12-volt car battery. (*Continued on page* 62)

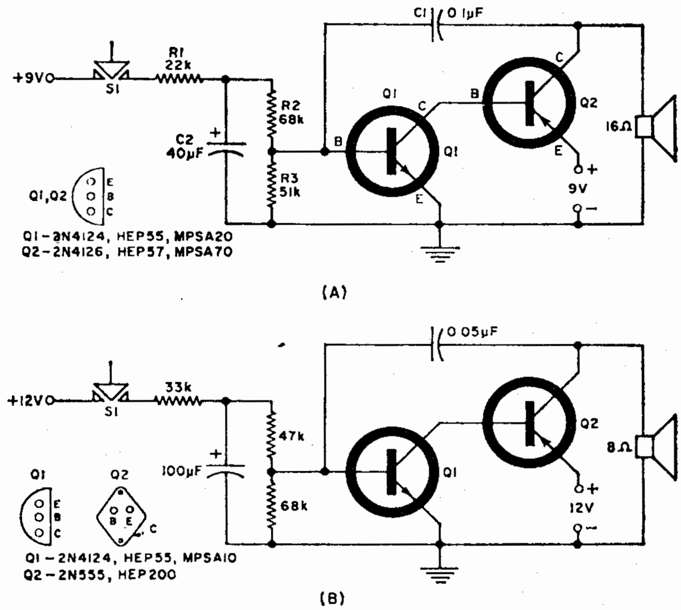
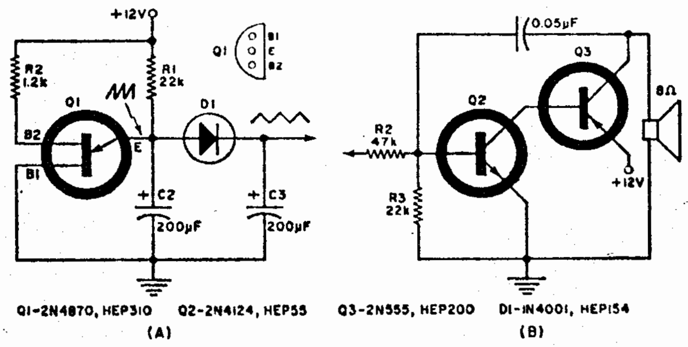


Fig. 1. Schematic diagrams of the (A) simple panic button operating off a 9-volt transistor radio battery, and (B) a louder version of panic button powered by a 12-volt battery.

Fig. 2. Schematic of the self-cycling panic button showing (A) triangular-wave generator used to generate slow rise, slow fall input needed by (B) oscillator to produce sound.



Panic Button

(*Continued from page 41*)

For best results, the bias supply network was modified. The values shown in Fig. 1B seemed optimum with the components used.

The standby current is about ½ mA; still low, but far more than the all-silicon version. A separate switch can be included to disconnect the battery from the circuit.

Self-Cycling Circuit

Both of the circuits discussed above suffer from one disadvantage—the push-button must be depressed and released for each cycle of sound. An obvious improvement would be automatic cycling and one way to do this would be to replace the push-button by a timer-controlled latching relay. Another method would be to use an astable multivibrator or flip-flop to generate a long pulse of voltage, followed by a period of zero output, that can be applied to the input in place of the switch.

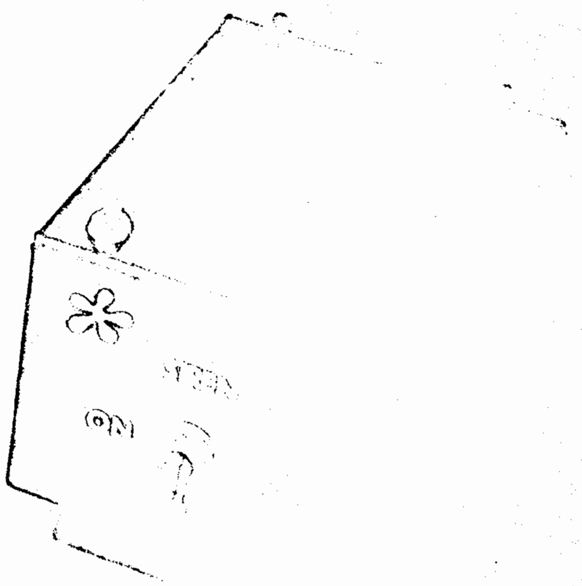
However, the approach used here was to eliminate the time-delay capacitor and resistor and apply the output of a triangular-wave generator (Fig. 2A) to the input of the oscillator circuit. The rise and fall of voltage at the output of the triangular-wave generator provides the proper bias current for the siren sound.

The triangular wave is derived from a unijunction relaxation oscillator that generates a sawtooth voltage waveform. The UJT relaxation oscillator (Q1) acts like a neon-bulb oscillator and does not conduct until the voltage on its emitter reaches a critical (peak-point) value. The length of time required for this to occur is dependent on the time needed to charge capacitor C2 through resistor R1. When the proper voltage is reached, Q1 conducts, discharging C2; and when the voltage across C2 drops below the critical value, Q1 stops conducting, starting the cycle over again. This repeated cycling produces a sawtooth voltage at the emitter of Q1.

To adapt the sawtooth waveform generated by the UJT to the slow rise and slow fall needed to produce an authentic siren sound, diode D1 and capacitor C3 (Fig. 2A) are added to the relaxation oscillator. The diode is forward-biased (conducting) during the period when C2 is charging so that C3 charges at the same slow rate as C2. It is this slowly rising triangular waveform, fed to the oscillator circuit (Fig. 2B), that causes a rising tone to be generated by Q2 and Q3. However, when Q1 (Fig. 2A) conducts and C2 discharges, D1 becomes reverse-biased (stops conducting), causing C3 to discharge slowly through R2 and R3. This action causes a falling tone, generated by Q2 and Q3, which continues to fall until the rising voltage on C2 is greater than the voltage on C3 (actually about 0.7 volt greater to overcome the threshold of the silicon diode), when the cycle repeats. The rise time of the triangular waveform is controlled by C2 and R1 while the fall time is controlled by C3 and R2.

Obviously, there is no need for a push-button when using the triangular-wave generator discussed above since the siren cycle will continue to provide a loud sound until power is interrupted.

The triangular-wave generator shown in Fig. 2A is for 12-volt, high-power operation, but can also be used with the lower power oscillator of Fig. 1A. As shown in the lead photo and the photo below, the entire panic-button circuit can easily fit into a small chassis box. ▲



Power siren with automatic cycling showing siren "On-Off" switch.

DUAL-SOUND ELECTRONIC SIREN

OWNER'S MANUAL

Please read before using this equipment

SAFE HOUSE

49-488C

*TRADEMARKS OF RADIO SHACK DIVISION, TANDY CORPORATION

Your Dual-Sound Electronic Siren is a weatherproof, simple-to-install 12.6-volt DC warning device. The dual sound capability is selectable (with simple wiring changes).

SPECIFICATIONS:

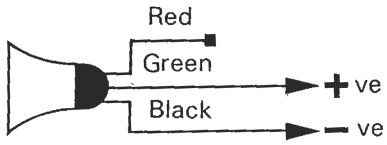
Horn-Speaker:	Anodized aluminum, 5¼" (13 cm) diameter
Power Rating:	6 Watts nominal
Impedance:	8 ohms
Operating Voltage:	6-16 volts DC (12.6 volts nominal)
Current Drain:	550mA (max)
Tone:	Rise-fall or steady (wiring selectable)
Output Level:	110±5 dBA at 10 feet

INSTALLATION:

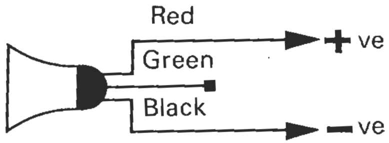
Because the Siren is weatherproof you can install it outdoors; but do not position it so the horn is directed upward or it will collect rain and moisture. The adjustable metal bracket permits the sound to be directed as desired. All it requires is to be connected to a source of 12.6 volts DC.

Wiring:
Extra wire can be added as required.
Black wire: Connect to negative side of 12.6 volts DC.
Red wire: For rise-fall sound, connect to positive side of 12.6 volts DC.
Green wire: For steady sound, connect to positive side of 12.6 volts DC.

For Steady Tone:



For Rise-Fall Tone:



Caution: *If you are not using one of the wires, be sure to insulate the bare end with electrical tape.*

Because this Siren has two-tone capability, you can use the two sounds for different warning purposes. For example, have the steady tone wired through a panic switch and have the rise-fall sound for intrusion warning, Or use one for fire and the other for intrusion. Or, if you have an alarm system that has dual alarm outputs, you can connect one for rise-fall and the other for steady tone.

WARNING: Use of Sirens and Alarm may be subject to local by laws.

AN ELECTRONIC SIREN

BY PAUL EISENBRANDT

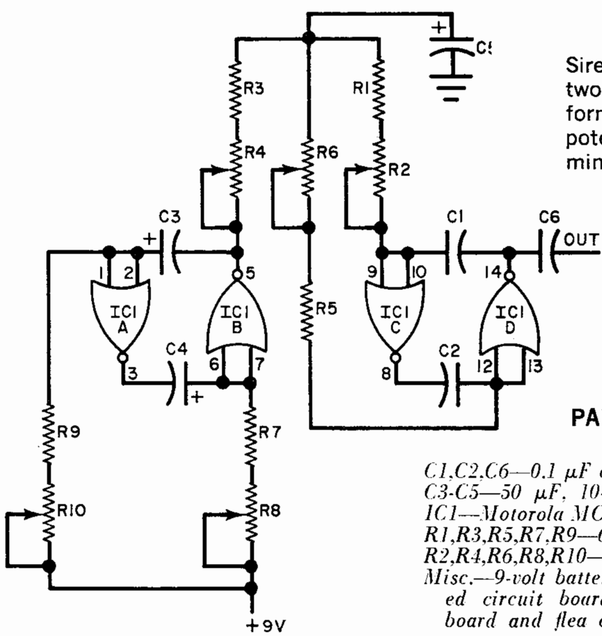
For entertainment or for auto burglar alarm

WHETHER for sound effects purposes or for use in a theft alarm system, a great many experimenters have tried to make the electronic equivalent of a police siren. Many designs have appeared in the past, but very few can match the range of adjustability provided by the one shown in the diagram.

The heart of the electronic siren is a quad two-input gate MC717 integrated circuit. The four gates are used in pairs to make two oscillators. One oscillator varies the frequency of the other.

Assembling the electronic siren is a straightforward procedure. You can use a printed circuit board of your own design, or you can go the perforated board-and-flea clip route. If you choose the latter, plan on using a socket with *IC1;* don't try to solder the interconnecting wiring directly to the IC's leads. Also, during assembly take care to properly index *IC1* and observe the polarity of *C5.*

After the circuit is assembled, connect its output to the input of an audio amplifier (your hi-fi system will do fine). Turn on the system and familiarize yourself with the effects each potentiometer has on the sound you hear. Setting all pots to mid-position should yield a sound much like that of an air raid siren. Experiment with the pots, and you will soon have the sound like that of a police siren. In fact, as you experiment with the pot settings, you will find that this circuit will do a lot more than give just siren sounds. ◆



Siren circuit uses single quad two-input gate IC. Gate pairs form two separate oscillators; potentiometers permit programming a wide range of effects.

PARTS LIST

C1,C2,C6—0.1 µF capacitor
C3-C5—50 µF, 10-volt electrolytic capacitor
IC1—Motorola MC717P or HEPC2502
R1,R3,R5,R7,R9—680-ohm, ½-watt resistor
R2,R4,R6,R8,R10—1-megohm potentiometer
Misc.—9-volt battery or power supply; printed circuit board or perforated phenolic board and flea clips; IC socket; etc.

NON-PEEP SIREN

I recently constructed the "Electronic Siren" (December 1973). So far, I haven't been able to get a "peep" out of it.

RICHARD H. LIVINGSTON
Springfield, Pa.

The diagram in the article showed only the logic connections to IC1. The author (or somebody) just assumed that the power connections would be made also. Connect +3.6 volts to pin 11 and ground to pin 4. Actually the 9-volt supply is not absolutely necessary; 3.6 volts can be used throughout if it is more convenient.

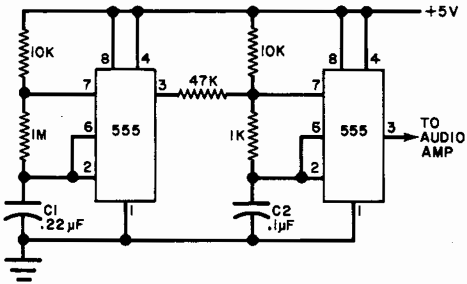
With the battery connected, the circuit will operate as described.

Hobby Scene

PUT AN ALARM ON PA SYSTEM

Q. ***We have an audio system in our plant (for background music, announcements, etc.). We would like to add some kind of alert signal to the system to be used in case of fire or other emergencies. The sound should be distinctive and capable of cutting through normal noise.***

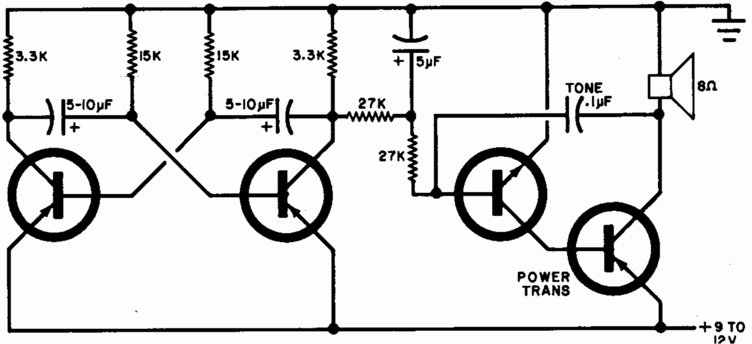
A. Try this circuit, using a pair of 555 timers or a single dual timer (if you use the correct pins). Capacitor *C1* controls the speed of the warble, while *C2* determines the pitch. The values shown should produce quite a distinctive signal. The output of the circuit goes to your audio amplifier.



"WHELPER" ALARM

Q. ***I am looking for a circuit for a low-cost "whelper" alarm (that makes the kind of noise police cars do) to use with my burglar protection system. Can this be done easily*?**

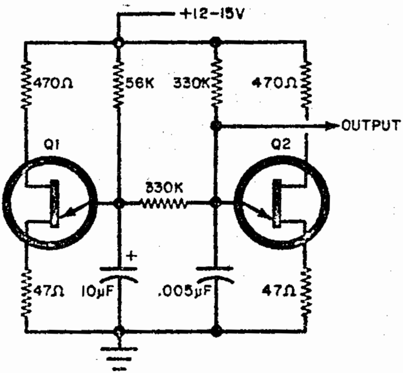
A. The circuit shown here can be built using any type of pnp (silicon) transistor, with one npn in the audio oscillator. The output stage should be a medium-power pnp transistor. You can adjust the tone by changing the capacitor in the last stage and the on/off times by varying the time constants of the multivibrator.



Warbling Tone Generator

Q. ***I need a circuit for a warbling tone generator to drive an audio amplifier.***

A. The circuit shown here, using two unijunction transistors should do the job. The low-frequency sawtooth generated by *Q1* modulates the high-frequency tone generated by *Q2*. The output should feed into a high-impedance amplifier.



BUILD A

Once it's on, it stays

By TOMMY N. TYLER

EVER HAVE ONE OF THOSE DAYS WHEN things just seem to pile up on you, and to top it off the boss asks you to get out a rush job before quitting time? Here's just what the doctor ordered for moments like this—a genuine Panic Button to vent your frustrations. Press the button and you start a wailing siren which slowly cycles up and down in pitch—just like a police siren. It lets everyone within earshot know that an official "panic" is underway. If you're in the mood to build a conversation piece which you can leave lying around on desk, work bench, or service counter for a thousand laughs, look no further. The Panic Button can be built for about $13 worth of parts. Warning—be prepared for an avalanche of requests from friends and relatives to make them one too!

In Fig. 1—a block diagram of the unit—you will see a free-running multivibrator with approximately a 6-second period. It varies the pitch of the panic-button siren up and down by controlling the frequency of the second multivibrator. The square-wave output (Fig. 2-a) of the slow generator is passed through an RC integrating circuit which converts the square wave to a near triangular wave (Fig. 2-b). This sawtooth waveform is coupled to the fast multivibrator to vary its frequency (Fig. 2-c). The variable frequency output is then amplified to drive the speaker.

You'll see the complete circuit in Fig. 3. Transistors Q1 and Q2 generate the 6-second square wave to integrator circuit R6–C4. Q3 is an emitter-follower buffer amplifier, which prevents loading the integrator. The output of Q3 varies the "off" time of transistor

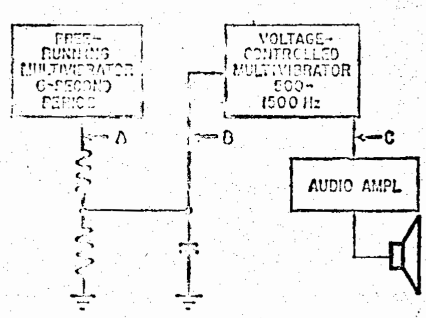


Fig. 1—Block diagram of the Panic Button. Free-running multivibrator changes the frequency of the voltage-controlled multivibrator to produce a siren-like sound.

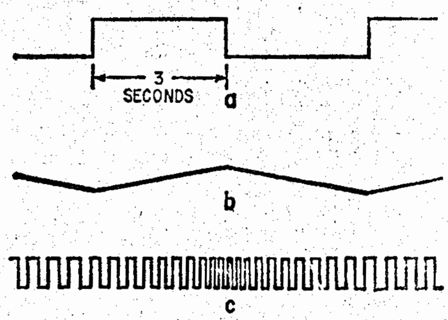


Fig. 2—Waveforms at points in Fig. 1: (a) Output of the free-running multivibrator; (b) past the integrator; (c) the output of the voltage-controlled oscillator.

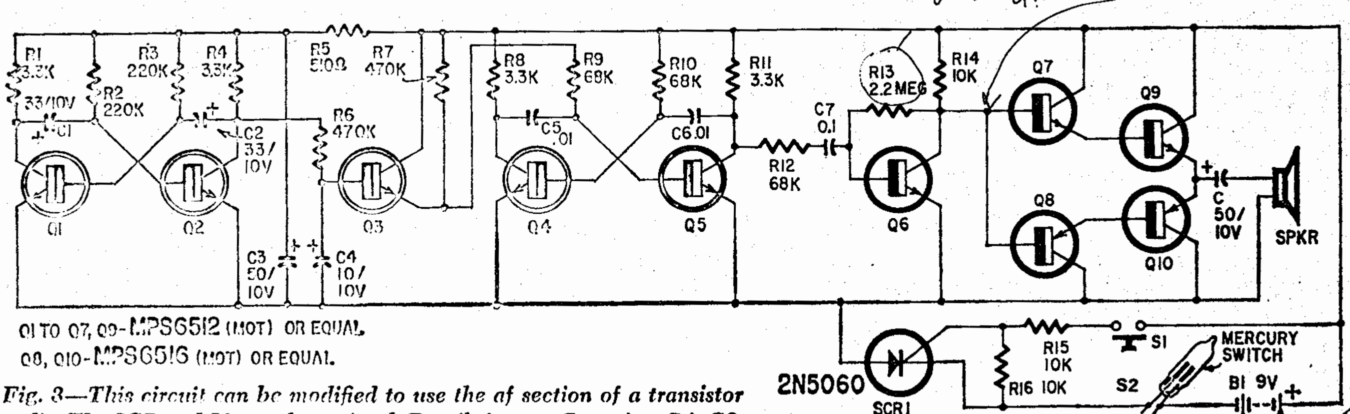


Fig. 3—This circuit can be modified to use the af section of a transistor radio. The SCR and S2 may be omitted. Details in text. Capacitor C is C8.

MULTI OPTION SIREN

Subtle Susurrations from a Sensational Sonic Siren

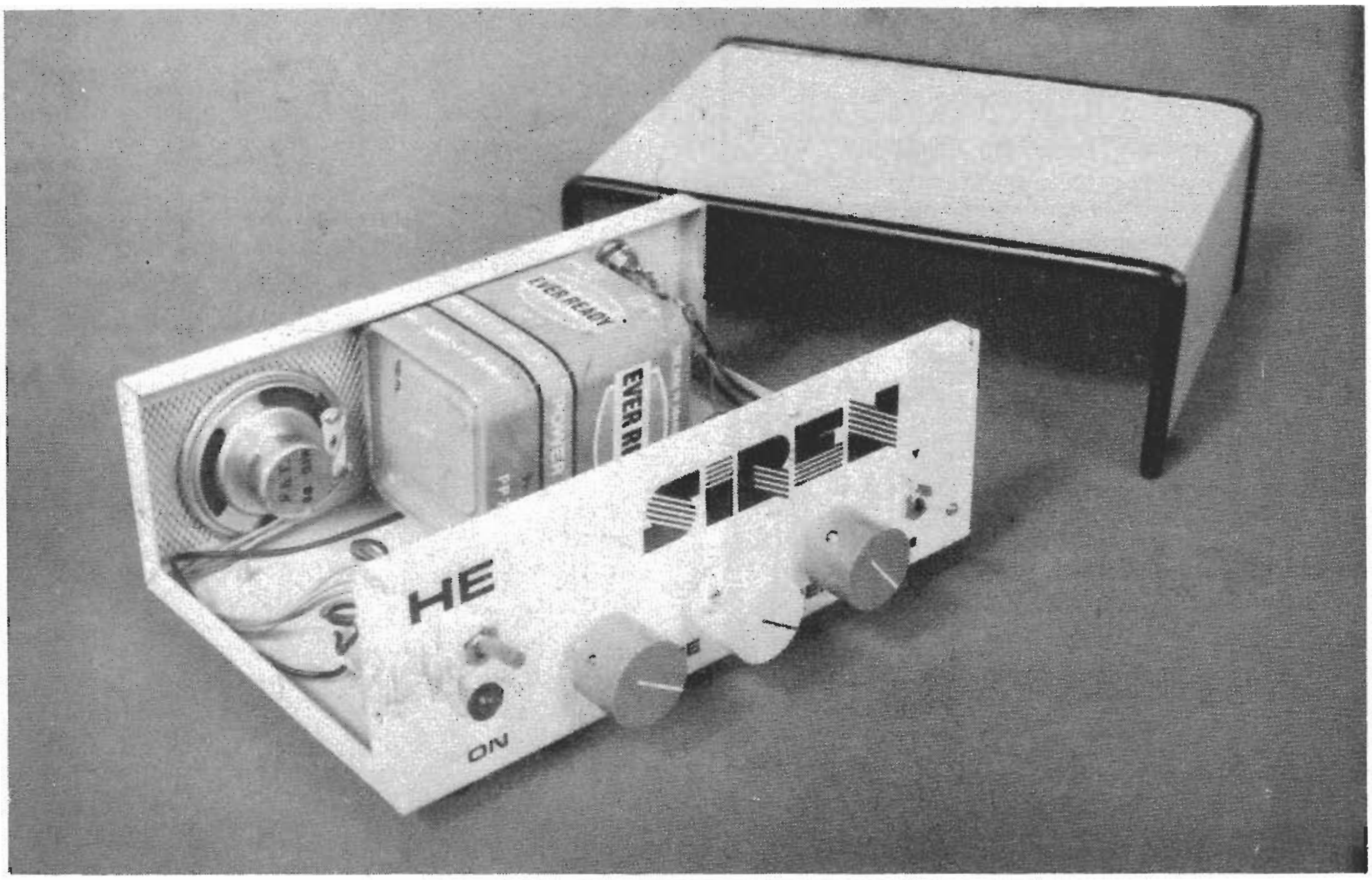
ECONOMY AND VERSATILITY are the key features of this unit. We are not saying you can produce any siren sound, but there is enough variety available to keep anyone happy for hours if not days. Build two and saturate your senses in stereo. You can reproduce a great American police siren and a World War two air raid alert and a whole universe of effects as well.

Possible applications include burglar alarms, sound effects units, a 'button-box' to amuse the kids or just put it through your stereo and annoy the neighbours.

Complete Control

Four independently adjustable parameters give you fingertip control over the rise and fall times of the control voltage, the sensitivity of the voltage controlled oscillator and the basic centre frequency of the unit. You can switch between a square wave or triangle waveshape from the control oscillator and the control oscillator period may be varied between several seconds and several hertz.

The unit may find uses at home or in the family wheel-mobile. Although characterised for use at 9



The Hobby Siren on view to the world. Note the minature speaker which produces surprisingly loud volume and the use of a large battery for extra long life.

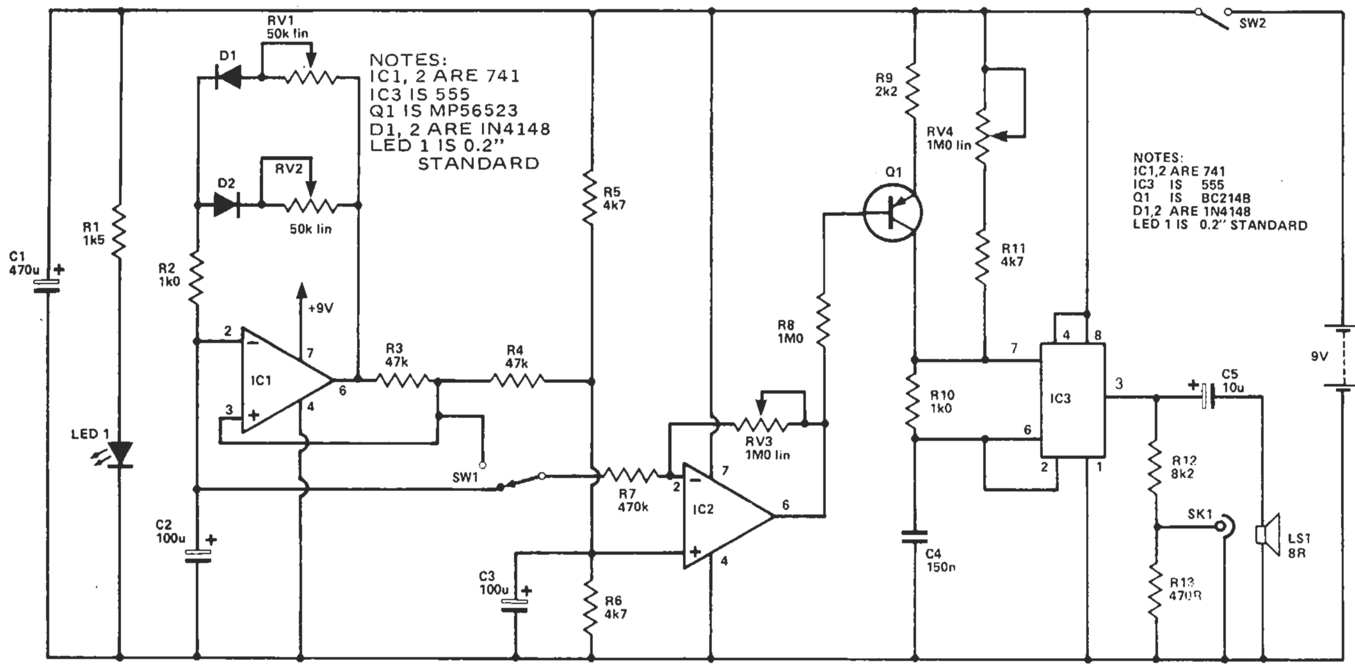


Fig. 1. Circuit diagram of Multi Siren.

HOW IT WORKS

Circuit operation is quite straightforward. IC3 is configured as a voltage controlled oscillator and produces the audio frequency tone. RV4 provides direct control over the frequency while Q1 provides an electronic control. Frequency is altered by changing the voltage applied to R8 and thus the current into Q1. C4 is the timing capacitor.

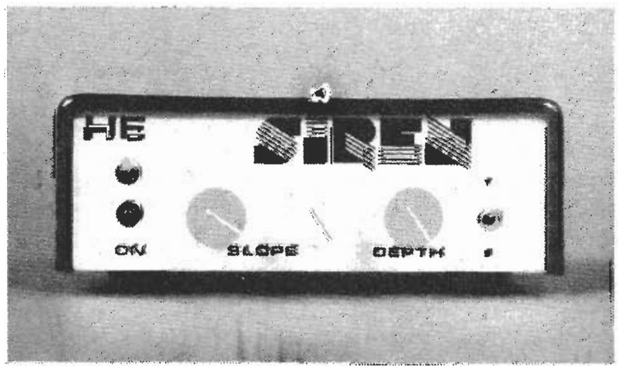
The control voltage is derived from the slow oscillator built around IC1. IC2 is used to amplify this signal and controls the depth of modulation applied to the VCOby adjustment of feedback resistor RV3. IC1 is connected as a conventional op-amp astable multivibrator with the exception of diodes D1, 2 which are used to steer current through RV1 and RV2 on alternate half cycles. R2 limits the maximum current flow.

Power 'on' is indicated by LED 1 and current is limited to about 5 milliamps by R1. A mid-voltage point is provided by R5, 6 decoupled by C3 and overall supply decoupling is provided by C1.

volts, satisfactory operation will be obtained from a car battery (up to 14 volts) provided capacitors of suitable voltage rating are employed.

A miniature one and a half inch monitor loudspeaker was incorporated in the prototype and the sound output was surprisingly loud (we could hear it all over the office much to everyone's great delight?). If you want real pulverising power, a low level output is provided for an interface to your sound system. The output level is suitable for an amplifier line input; about 500 mV peak to peak, but can be easily changed by selection of two resistors.

The electronic 'works' of this sonic sensation are built around three readily available and inexpensive chips, two 741 op-amps and the ubiquitous 555 timer. The 555 is employed in a novel configuration as a voltage controlled oscillator with one of the timing resistors replaced by a transistor current source. Only a few other inexpensive components are required.



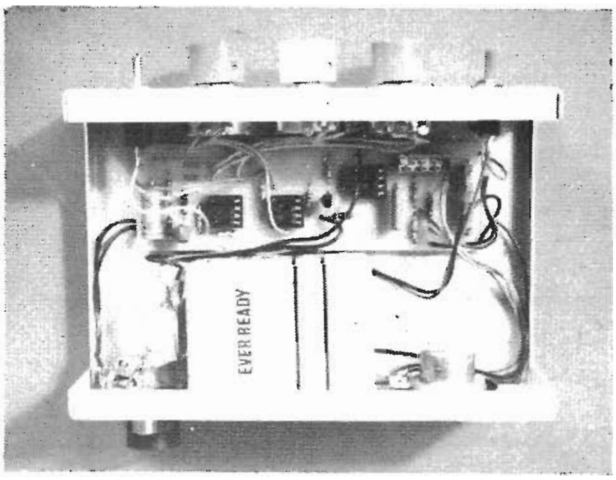
A few simple to operate controls enable the production of an amazing variety of effects.

Construction

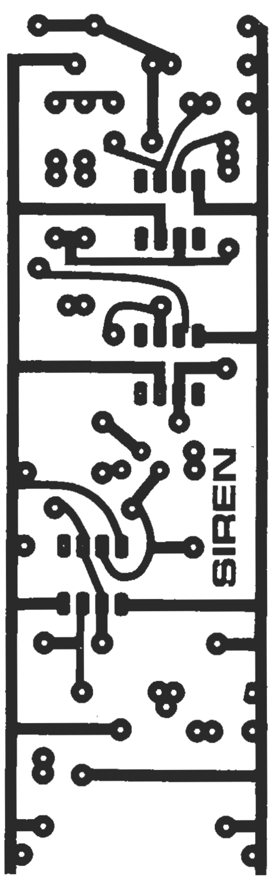
Construction is uncritical and should be simplicity itself. Layout is unimportant and any scraps of verobaord, breadboard or cheeseboard (copper-clad only) may be pressed into service. Though if you are too haphazard you may have problems troubleshooting the monster you've created. For a trouble-free, no hassles, right first time project use of a PCB is recommended. Our design is best (or so we keep telling ourselves).

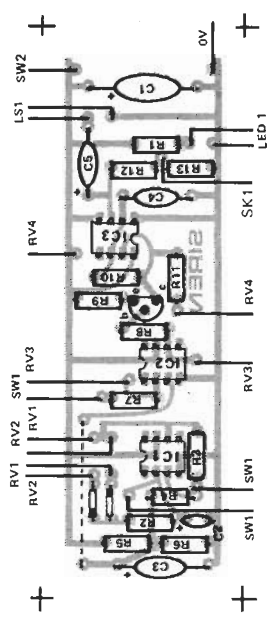
None of the component values are critical and you can change almost anything to achieve that elusive sound you seek. However, polarity of diodes and capacitors is important and these should be checked first if you experience any problems.

The Hobby siren was designed and built in two days. It was easy, it was cheap. Go and do it!●



A bird's eye view of the Siren showing the component layout. Note the phono output socket and pot RV4 on the rear panel.





PARTS LIST

RESISTORS (All ¼W 5%)	
R1	1k5
R2, 10	1k
R3, 4	47k
R5, 6, 11	4k7
R7	470k
R8	1M
R9	2k2
R12	8k2
R13	470R
POTENTIOMETERS	
RV 1, 2	50k lin
RV 3, 4	1M lin
CAPACITORS	
C1	470µ electrolytic
C2	100µ tantalum
C3	100µ electrolytic
C4	150n polyester
C5	10µ electrolytic
SEMICONDUCTORS	
IC1, 2	741
IC3	555
Q1	MPS 6523
D1, 2	1N4148
LED 1	standard 0.2"
MISCELLANEOUS	
SW1	SPDT
SW2	SPST
SK1	phono socket
LS1	8 ohm loudspeaker
PCB	
case to suit	