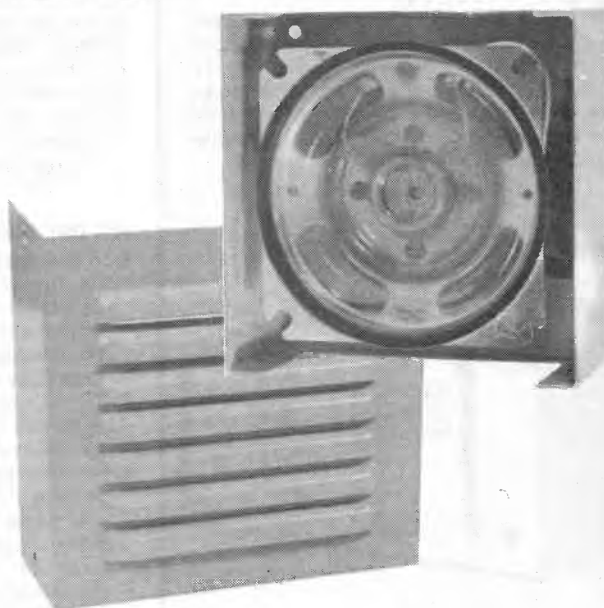# EXTERNAL HORN PROGRAMMABLE TIMER

by Dave Goodman

★ **Three timing settings from 2 minutes to 2½ hours**

★ **Switch over from sounder to flashing beacon when time is up**

★ **Directly replaces the previous external horn PCB**

★ **Two wire control with tampering detection**

N ew recommendations concerning the use of burglar alarm sounders have recently been introduced, and apply only to sirens or bells fitted outside protected premises, not to those used internally, unless they are likely to be audible outside. The ruling comes under the noise pollution title, and requires that alarm sound indicators cease to function after a seventeen minute running period from switch-on. Presumably the alarm would, or should, have been raised within this time, and the appropriate authorities notified, making further ear-blasting and nerve-shattering decibels unnecessary. So that it is not forgotten that the alarm system has been activated a flashing lamp or beacon can be switched on which will flash away until reset. Perhaps eye pollution will become a problem in the future!

Specification

A timer project has been designed for use with the Home Security System (see March issue) which will directly replace the previous External Horn PCB. Any type of siren, bell, or sounder requiring 12V at no more than 1A DC can be used, and in addition a lamp or beacon rated at 12V and less than 1A DC can be switched on after a preset time-out period has elapsed. One of three timing periods (see table 1) ranging from 2 minutes to 2½ hours can be programmed by removing or adding two wire links as required.

A 12V battery supply is needed to power this system, and batteries, siren, and PCB will all fit into an external horn cabinet. Unfortunately, this PCB is larger than the previous one, and the mounting holes in the cabinet lid will not align with it, so a further two 6BA holes are required. The lamp may be fitted to the cabinet, or wherever it will be readily visible.

Circuit Description

R1 terminates a two wire loop connection from the mother board in the main alarm. Removal of R1 from the circuit, either by shorting or open
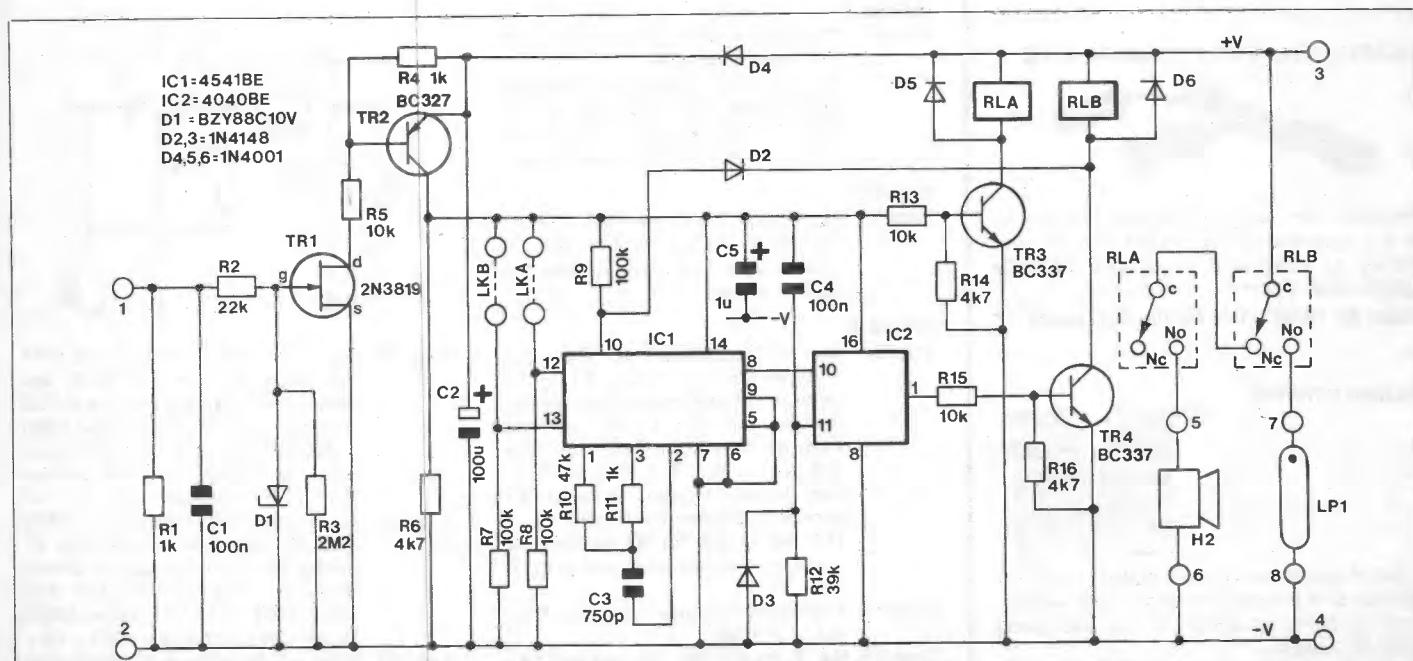

Figure 1. Circuit diagram.
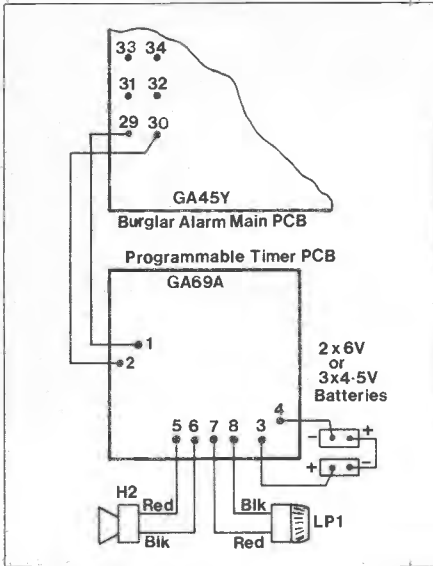
IC1=4541BE
IC2=4040BE
D1 = BZY88C10V
D2,3 = 1N4148
D4,5,6 = 1N4001
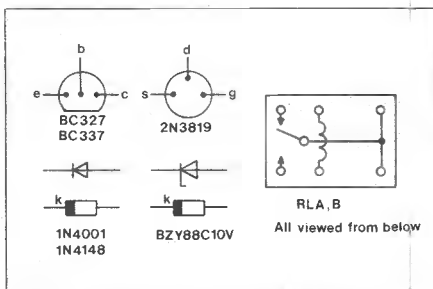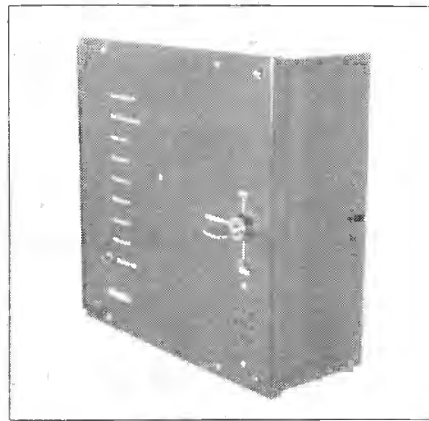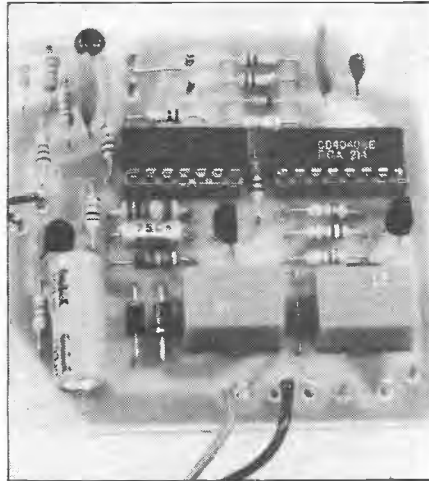
Figure 2. PCB layout and overlay.

Figure 3. Wiring to main burglar alarm PCB.

circuiting the loop, will trigger the main alarm (described in the March issue). TR1 is an N-type J-FET device, and requires a negative potential between gate and source to prevent drain current flow. With Pin 1 or 2 disconnected, R3 holds TR1 gate to ground, allowing drain current to flow.

C1, R2 and D1 help prevent RF and voltage spikes, that may be introduced along the length of connecting cable used, false triggering the timer. Now, with TR1 conducting, the voltage drop across R4 and R5 is sufficient to allow TR2 to conduct, and connect the battery positive rail, via D4, to the supply rail. R13 monitors the positive supply rail, and TR3 immediately conducts, switching RLA, and allowing the siren connected between pins 5 and 6 to operate for a period of time (generated by IC1 and 2.

IC1 is a programmable timer, with an internal clock and four dividing stages. Clock frequency is set by R10, R11 and C3 to 16.5kHz, which is divided down by one of three stages set by links from the positive rail to pins 12 and 13 (Table 1). The Q output at pin 8 requires further dividing, and is applied to a 12 stage ripple counter, IC2. C4 and R12 apply a reset pulse to IC2, ensuring that all twelve dividing stages will
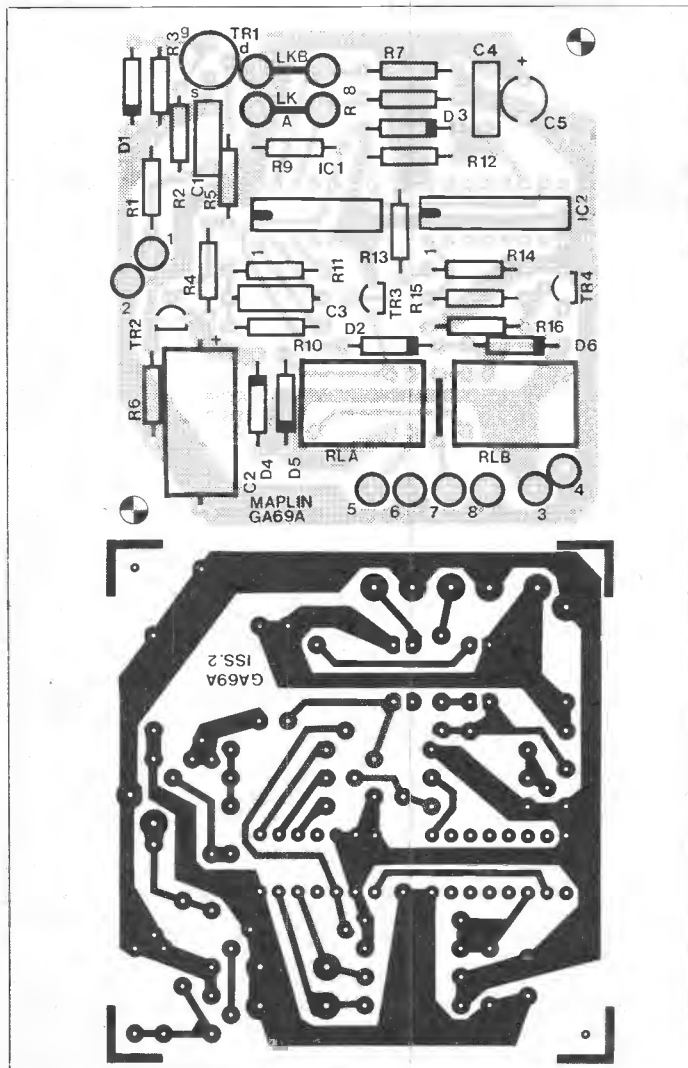
PROGRAMMABLE TIMER PARTS LIST

Resistors – All 0.4W 1% metal film unless specified.

R1, 4, 11	1k	3 off	(M1K)
R2	22k		(M22K)
R3	2M2		(M2M2)
R5, 13, 15	10k	3 off	(M10K)
R6, 14, 16	4k7	3 off	(M4K7)
R7, 8, 9	100k	3 off	(M100K)
R10	47k		(M47K)
R12	39k		(M39K)

Capacitors

C1, 4	100nF Disc Ceramic	2 off	(BX03D)
C2	100uF 25V axial electrolytic		(FB49D)
C3	750pF 1% polystyrene		(BX55K)
C5	1uF 35V Tantalum		(WW60Q)

Semiconductors

D1	BZY88C10V		(QH14Q)
D2, 3	1N4148	2 off	(QL80B)
D4, 5, 6	1N4001	3 off	(QL73Q)
TR1	2N3819		(QR36P)
TR2	BC327		(QB66W)
TR3, 4	BC337	2 off	(QB68Y)
IC1	4541BE		(QQ47B)
IC2	4040BE		(QW27E)

Miscellaneous

RLA, B	Ultra-min relay SPDT	2 off	(YX94C)
	Veropin 2141	1 Pkt	(FL21X)
	14 pin DIL skt		(BL18U)
	16 pin DIL skt		(BL19V)
	Programmable timer P.C.B.		(GA69A)
LP1	12V 50mA Beacon		(YK39N)

Printed below are the parts needed for the External Horn Case. (If required)

H2	Electronic siren		(XG14Q)
B1, 2	6V lantern battery	2 off	
	Case		(XG07H)
	Grommet Small		(FW59P)
	No. 6 self-tapping screws × ½"	10 off	(BF67X)
	Bolt 6BA × ½" (for P.C.B.)	2 off	(BF06G)
	Washer 6BA	4 off	(BF22Y)
	Nut 6BA	4 off	(BF18U)
	Spacer 6BA×¼"	2 off	(FW34M)
	Bolt 6BA×¼" (for Siren)	2 off	(BF05F)
	Wire to suit		

A kit of parts is available for this project. It does not include the Beacon which must be ordered separately if required, not does it include any of the parts listed below.
Order As LW98G (Programmable Timer Kit) Price £6.95

EXTERNAL HORN PROGRAMMABLE TIMER

function, and a positive-going output at pin 1 operates TR4 and relay RLB.

The timing sequence must now be inhibited in this mode, otherwise RLB will switch off and on after each timeout period, and D4 stops this by preventing IC1 pin 8 from changing state. RLB contacts, changing over, will remove the battery supply from the siren and reconnect it to pin 7, hence the beacon will flash until the control loop is restored, either by resetting the main burglar alarm, or by the batteries running down.

Time Period	Link
2 mins	Link B
2hrs 30mins	Links A & B
17 mins	No Links

Table 1: Program Table

Assembly

Refer to figure 2 and the parts list for building this project. You may commence construction by bending and inserting resistors R1 to 16 and diodes D1 to 6. Note that D1 is a zener diode, and different from the others. Fit capacitors C1 to 5, you will see that C2 and C5 are polarised, and must be fitted the correct way round. Finally, fit transistors TR1 to 4, and relays RLA and B, both IC holders, and all the Vero pins. Solder all the components into place,
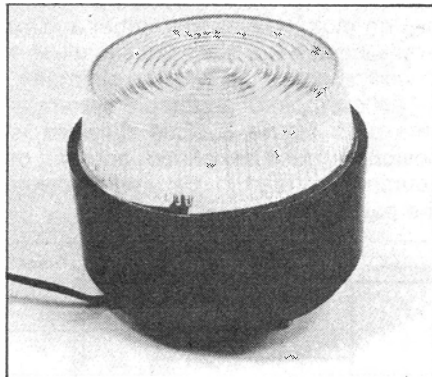
clean, and inspect the track for shorts and dry joints. When you are completely satisfied with your handiwork, proceed with testing before putting into use.

Testing

Preliminary checks can be made with a meter set to resistance range. Measure between pins 3 and 4 (supply rails), there should not be a shortcircuit here. Measure between one of the supply rail pins of LKA or LKB and pin 4, again there should not be a short circuit. Wire the PCB to the burglar alarm as shown in figure 3, and connect to a suitable 12V battery supply. Two 6V lantern type or three 4.5V batteries are recommended for use with the project, because quite high currents can be drawn by bells or sirens.

The beacon listed in the parts list gives a very bright flash once a second, but only draws 50mA, so battery life is extended. It is not necessary to make connection to a siren or lamp at this stage, as both RLA and B give an audible click when operated. Remove the wire from pin 1 and you should hear RLA click on. If you have placed a link in LKB you will have to wait two minutes before RLB clicks on. The next step is to connect both siren and lamp to repeat the tests after remaking the connection to pin 1. Ensure correct polarity of the four connecting wires, red is positive and black negative (figure 3). The system is now ready for use.

Usage

Fit the timer PCB into your external horn cabinet. If you already have an external horn PCB it must now be discarded as this new system completely replaces the old unit. Two new holes are needed, but the existing spacers, nuts, and bolts can be used for mounting. If you do not possess our external horn cabinet, see parts list for details. Connect the batteries and siren, you will need a length of two-wire cable for connection to the lamp if fitted externally. Connect up to the Burglar Alarm and the system is complete.