TALKING ELECTRONICS®

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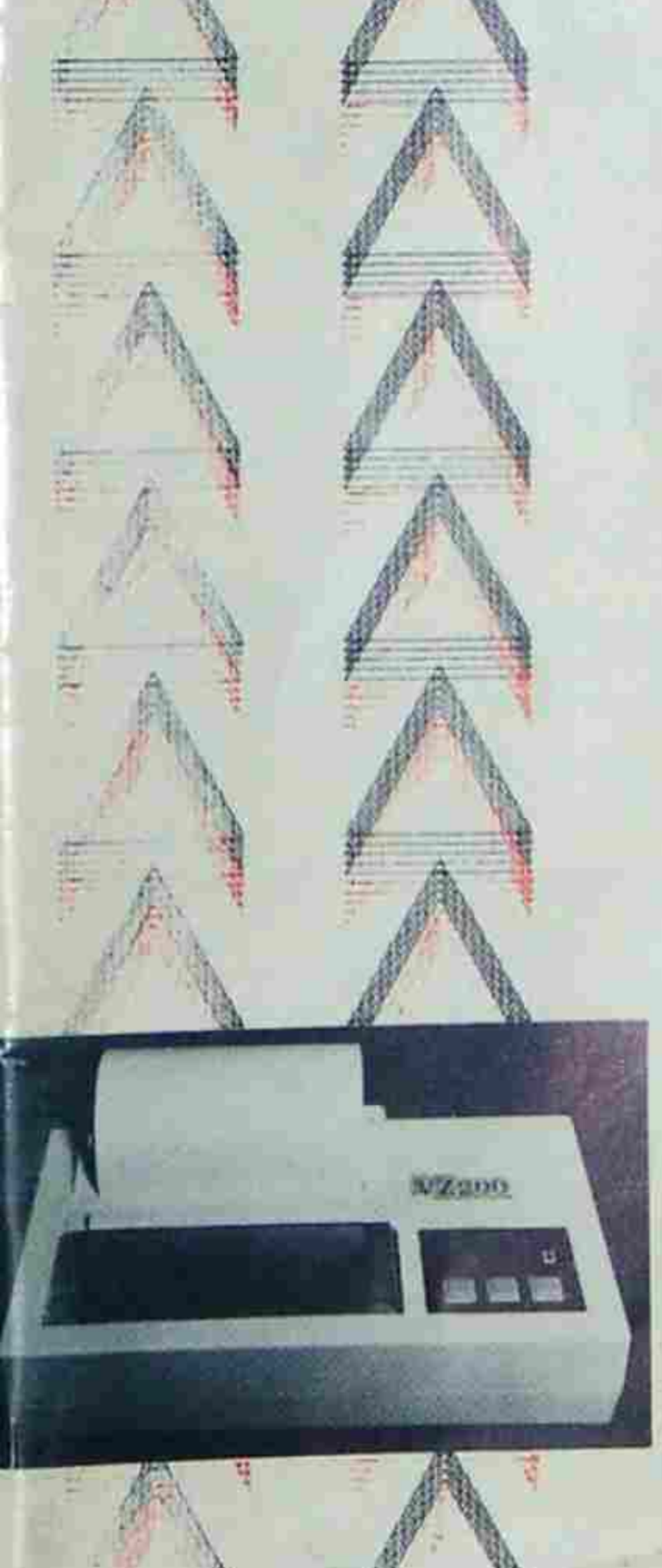
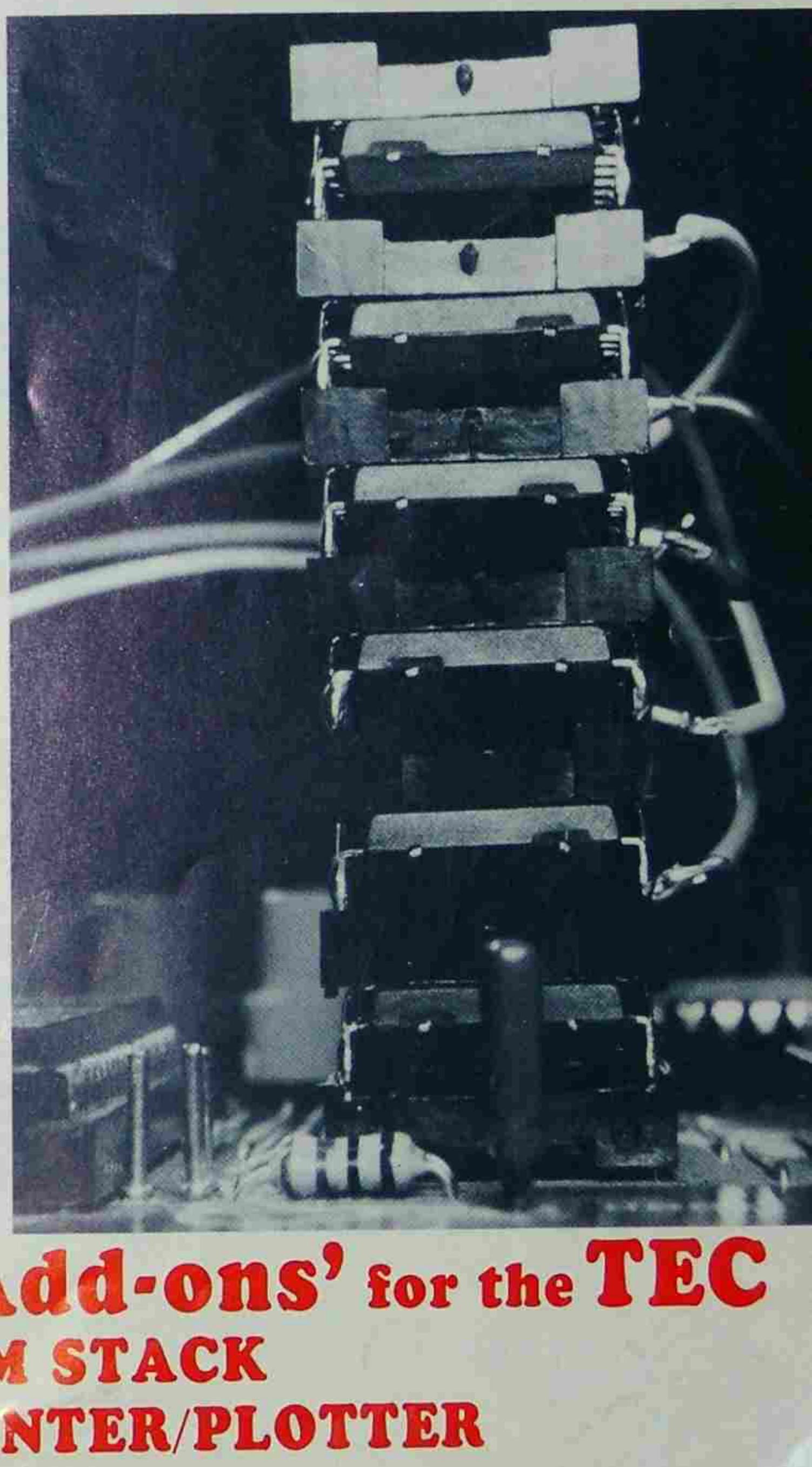
Issue No 12

HEADLIGHT REMINDER

BIG EAR

TOUCH PUZZLE





2 'Add-ons' for the TEC

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TALKING ELECTRONICS

Vol. 1 No: 12.

Editorial...

At the moment we are seeing a dramatic increase in magazines and books from overseas, dealing with computers and the like. And it may seem to be a bonus for Australia.

But there's a hidden reason for their presence.

Apart from the added sales they generate, many of these are a vehicle for promoting ONE brand of computer or ONE manufacturer of components.

Cleverly consealed within the web of information is an underlying stream of self promotion. Not evident at first, the general bias towards one particular theme gradually emerges.

Undoubtedly this arrangement is one of the cheapest and most efficient methods of promotion but it undermines the whole structure and intent of magazines and books. Supposedly impartial in content, magazines have always been considered to provide an overall unbiased view.

Those titles clearly displaying their association are exempt from this criticism. It's only the devious titles we are referring to.

I take particular exception to these because they are bought by the reader in the hope that they cover a broad spectrum of material. But in the end they are little more than an expanded advertising brochure.

I have been caught 4 times now. One series of magazines leant towards a particular brand of computer, another promoted a range of components from a particular manufacturer, another contained grossly out of date material and the fourth left the reader up in the air at the turn of each page - none of the examples were fully explained.

I won't be caught again.

Of course any market seeks its own level and very few 'false' magazines like this see an active market in Australia. But until their demise they take up valuable shelf space on the newsstand.

And they detract from the sales of more informative magazines.

I think all Australian publishers are suffering from the broad competition rising from these imports.Also from increasing costs and falling readership. But if a title contains valuable editorial, it will survive in the market place.

Fortunately we seem to be in the survival category. With the increase in electronics courses in schools and in industry, more people are realising the value of having an understanding of electronics.

At the moment we are planning an electronics text book for a course which will commence in two year's time. So you can be reassured we will be flat out for the next two years at least!

As I have said before, we have not seen 1% of the potential of electronics. Its impact will be the greatest thing ever to hit mankind.

If you are following electronics, you are going in the right direction. And I am sure we will be staying together.

Colin Mitchell.

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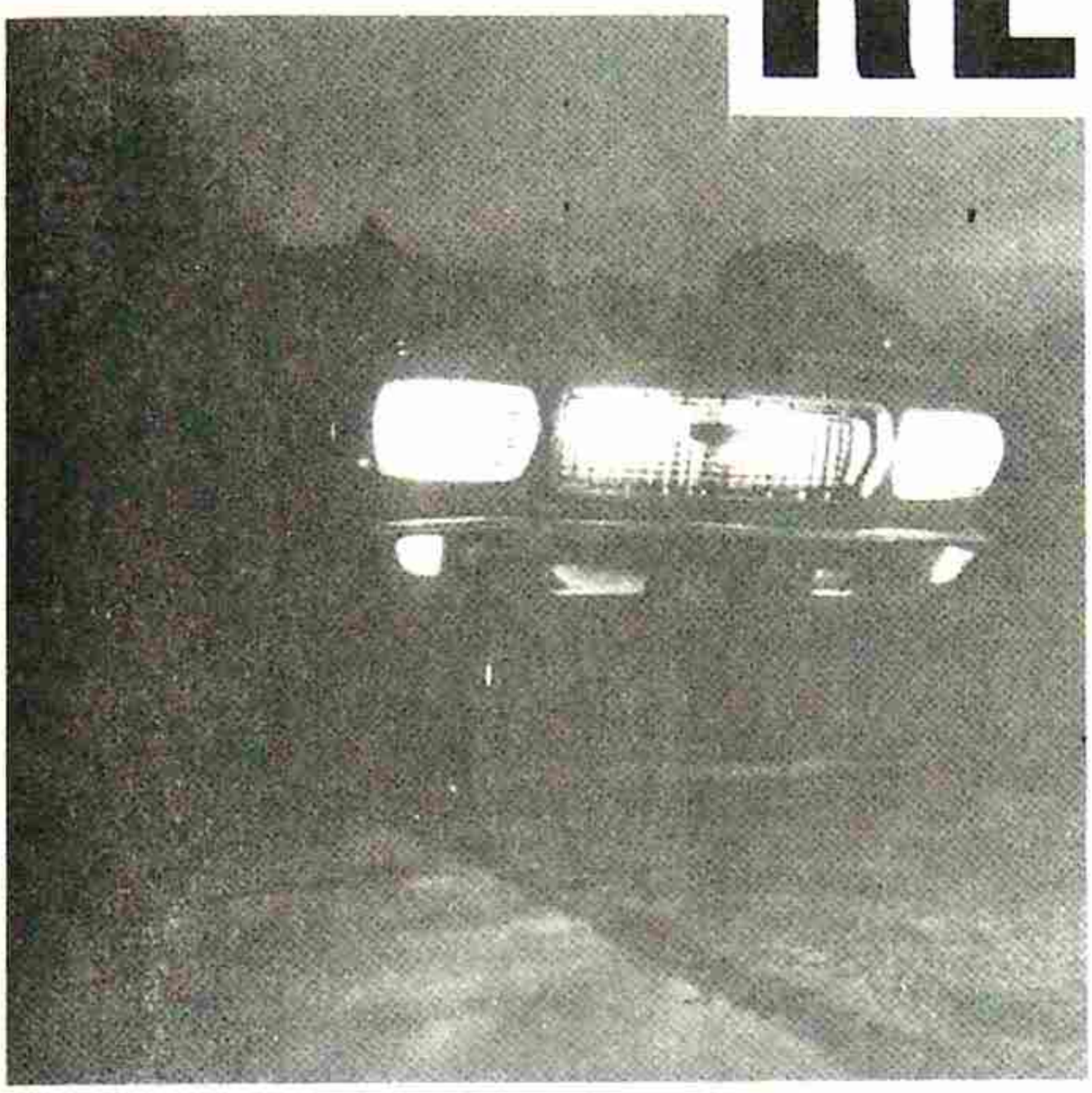
INDEX

TECHNICAL *Ken Stone*
ARTWORK *Ken Stone*
ENQUIRIES *10 minute queries will be answered on* **584 2386** *8am - 6pm.*
ADVERTISING **(03) 584 2386**

HEADLIGHT REMINDER

Parts: $9.60
PC board: $3.30
Complete: $12.90



This clever little circuit is a three-in-one design.

It will tell you when to turn your headlights ON, when to turn them OFF and provide a flashing indicator on the dash-board similar to the indicator of a burglar alarm.

For the cost of building and fitting this circuit to your car, you could it save it being tampered with or even stolen!

Anyone looking into a car and seeing a flashing light (beside a sign reading ALARM ACTIVATED), will be sufficiently deterred to move onto an easier target.

Even though the flasher in our unit does not connect to any alarm equipment, how is the would-be thief to know? Some deterrents are silent and kill the ignition after 15 seconds, others sound the horn after a pre-determined time, while others switch off the fuel in the middle of an intersection!

Rather than risk a possible embarrassing situation, anyone intent on stealing your car will prefer to go to an unprotected model.

Our idea of a deterrent is by far the best, as alarms which have to be energised every time you leave the car (and de-activated on entry) often cause an annoyance when they accidently go off. Inevitably the driver tends to leave them disconnected for the rest of their serviceable life to avoid a reoccurance.

This leaves the car without any visible form of protection and the money spent on the alarm system is completely wasted.

Providing you don't add a sticker indicating the type of alarm you have fitted, no thief will know how the alarm works, when it works, or if it works at all!

But let's get back to the real reason for the production of this project.

No doubt, some time in the life of your driving career, you will forget to turn the headlights off when leaving the car. Most likely it won't be you but another member of the family who is less versed in the complexities of driving.

The result will be a flat battery and all the hassles of jump-starting.

On the other hand, this same member may take to the wheel without remembering to turn the headlights ON. And a potential moving death-trap will be created.

Without admitting too much about my driving ability, I must admit I have done both.

It is very easy to drive off without noticing the headlights are not on. Unless another motorist alerts you, it is possible to travel quite a distance, making the situation very dangerous.

The circuit presented here will help to overcome these situations.

It gives both visual and audible warning if you have forgotten to turn your headlights ON or OFF.

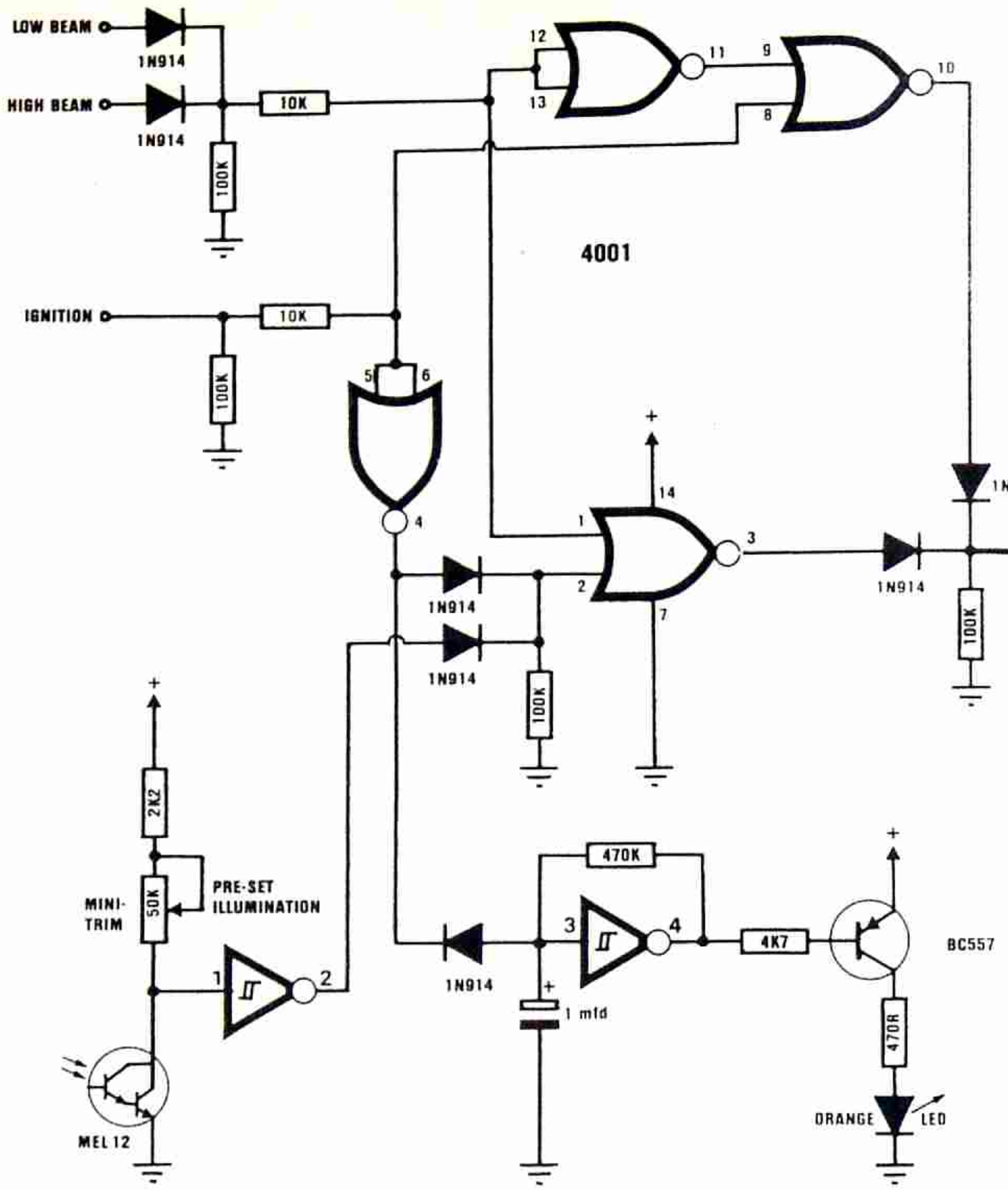
When designing the HEADLIGHT REMINDER, there were a number of points we had to take into account. It had to be cheap and compact, have both visual and audible indication, but most important it had to be easy to wire in.

We had to be very careful with the audible indication as it could be very distracting if allowed to continue for a long time, so we gave it a short burst.

The visual indication was different. It could be designed to stay on until the condition was rectified.

The only other gating condition was the pseudo-alarm LED. It would have to be turned OFF when the ignition was ON to avoid distracting the driver.

With all these conditions put together, we designed the following circuit.



HEADLIGHT

As you can see, it is a set of individual blocks, each gated into operation by one or more diodes. Diode gating saves a lot of IC's and has allowed us to reduce the circuit to two low-cost chips.

The versatile Schmitt Trigger has once again been used and this time its six inverters have been made into three different types of circuits. One is a level detector, two are delay circuits, and three are used as oscillators.

The operation of the circuit provides a good example of simple logic as well as gating arrangements. So, here's a run-down on:

HOW THE CIRCUIT WORKS

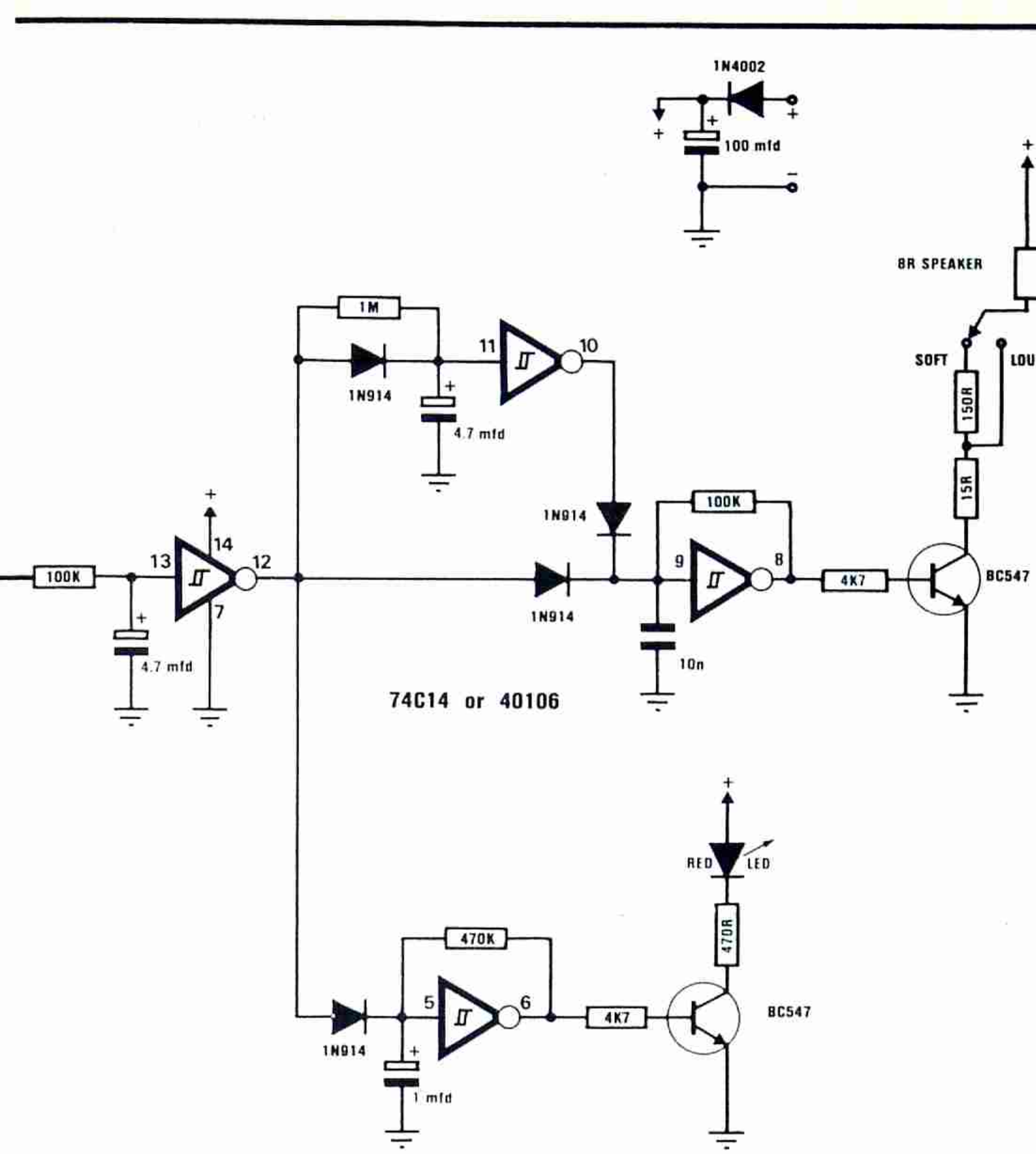
Starting at the top left-hand side of the circuit, we have two diodes detecting the high and low beams. These two diodes form an OR gate so that the circuit responds when either beam is in operation.

It should be noted that the high beam, low beam and ignition lines are ACTIVE HIGH lines. This means the circuit takes a HIGH signal from them as an indication that they are ON.

The output of this gate feeds an inverter so that the second NOR gate has one LOW line and one HIGH line when the circuit is detecting both ignition and beam inputs.

The output of the NOR gate will be LOW and basically this will inhibit the two output oscillators so that the speaker and red LED will not operate.

The only condition to bring this NOR gate circuit into operation is for the ignition to be switched OFF when the headlight line is ON. If this happens, both inputs to the NOR gate will be LOW and thus the output will be HIGH. This will charge the 4.7mfd electrolytic on pin 13 of the Schmitt Trigger and after a period of time, the output of this gate (pin 12) will go LOW.



REMINDER CIRCUIT

The LED oscillator circuit between pins 5 and 6 will immediately cause the indicator LED to flash and the oscillator between pins 9 and 8 will cause the speaker to sound.

The delay circuit made up of the Schmitt trigger between pins 11 and 10 will start timing as the 4.7mfd electrolytic on pin 11 is initially charged and thus keeps the output LOW. But when pin 12 goes LOW, the electrolytic begins to discharge through the 1M resistor and after a short period of time the output pin 10 changes to a HIGH and shuts the speaker OFF. The diode on pin 11 of the delay circuit allows the recharge-time for the delay-circuit electrolytic to be very short.

Next we go to the other input sensor, the light-sensing darlington transistor, and see how it fits into the circuit.

When light is falling on this sensor, it conducts and thus the voltage on the input of the Schmitt trigger between pins 1 and 2 is LOW and the output is HIGH.

This puts a HIGH on pin 2 of the NOR gate via a diode. Also connected to pin 2 of the NOR gate is another diode, which is connected to the ignition line via an inverter. These two diodes and the 2-input NOR gate effectively form a 3-input NOR gate.

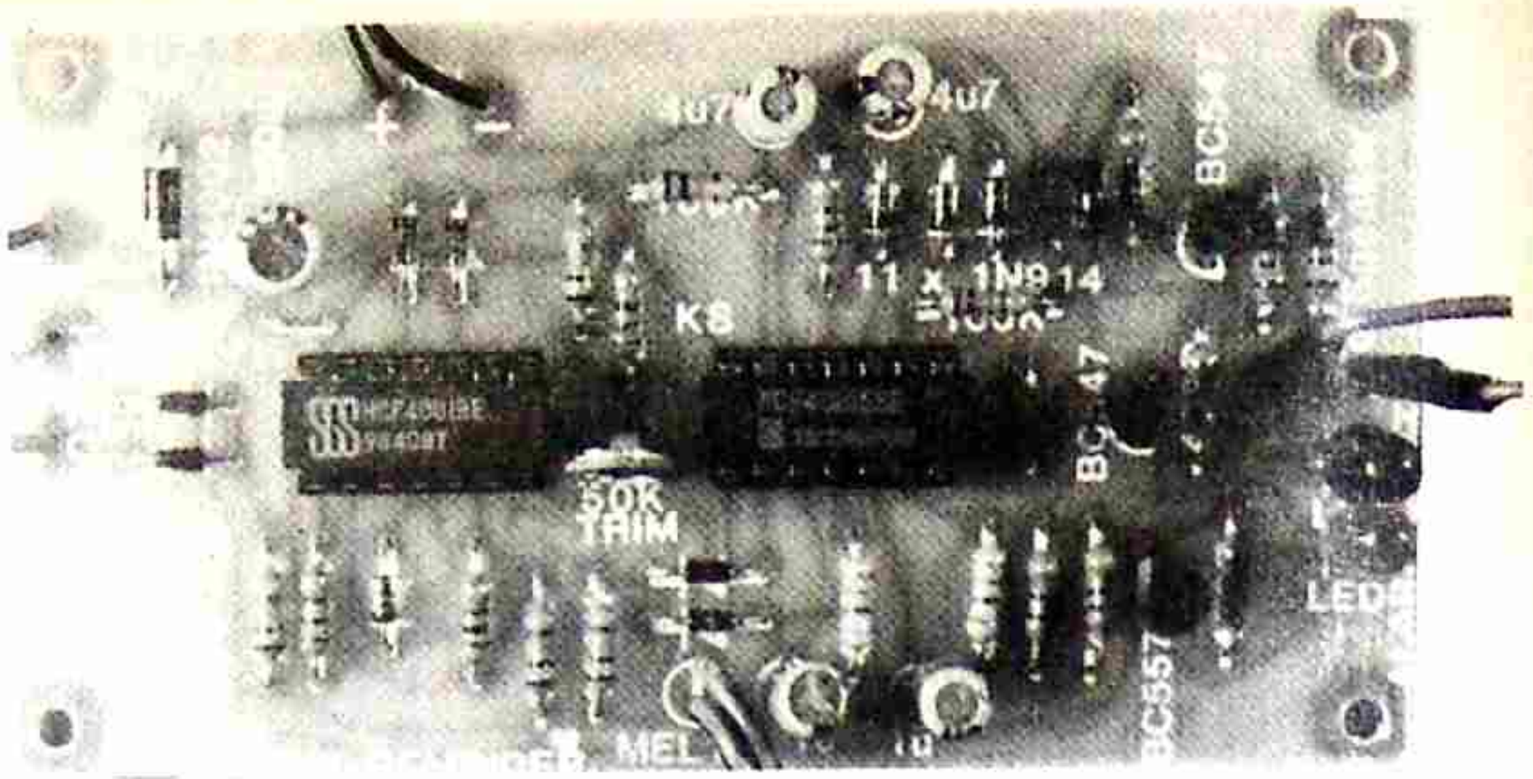
The only time when the output of this gate (pin 3) will go HIGH is when the ignition is ON, the headlights are OFF and light is NOT falling on the photo-transistor. The signal from this gate is OR gated with the other gate system (pin 10 of the CD 4001) and fed to the alarm circuit.

The only circuit remaining to be covered is the oscillator between pins 3 and 4. This is the imitation burglar alarm warning indicator. It is in operation when the ignition is NOT on, and shuts OFF when the ignition is turned ON.

The signal diode on pin 3 creates the shut-off condition by preventing the 1mfd from charging more than .6v. This is too low to enable the Schmitt Trigger to change states.

As you can see, a lot of gating is required to fulfill the set of conditions and this has been very cheaply done with diodes and inverting gates.

The delay circuit made up of the Schmitt Trigger between pins 13 and 12 is designed to prevent the alarm going off when the lights are changed from one beam to the other or when shadows fall on the photo-cell, such as when driving under a bridge etc.



Complete unit showing parts and overlay.

CONSTRUCTION

Like most TE projects, the Headlight Reminder PCB has a component overlay, making it possible to construct the project without even looking at the magazine.

Firstly solder all the diodes and resistors. One diode is a 1N 4002 so make sure you get it in the correct location. The holes for the trim pot may have to enlarged a little to take the legs.

Insert the IC sockets, making sure all the pins go down the holes in the PC. Next solder in the 10n greep cap, the electrolytics and the transistors. One transistor is a BC 557. This is soldered onto the board in the location marked by the solid white shape. The BC 547 transistors are soldered into the positions marked by an outline.

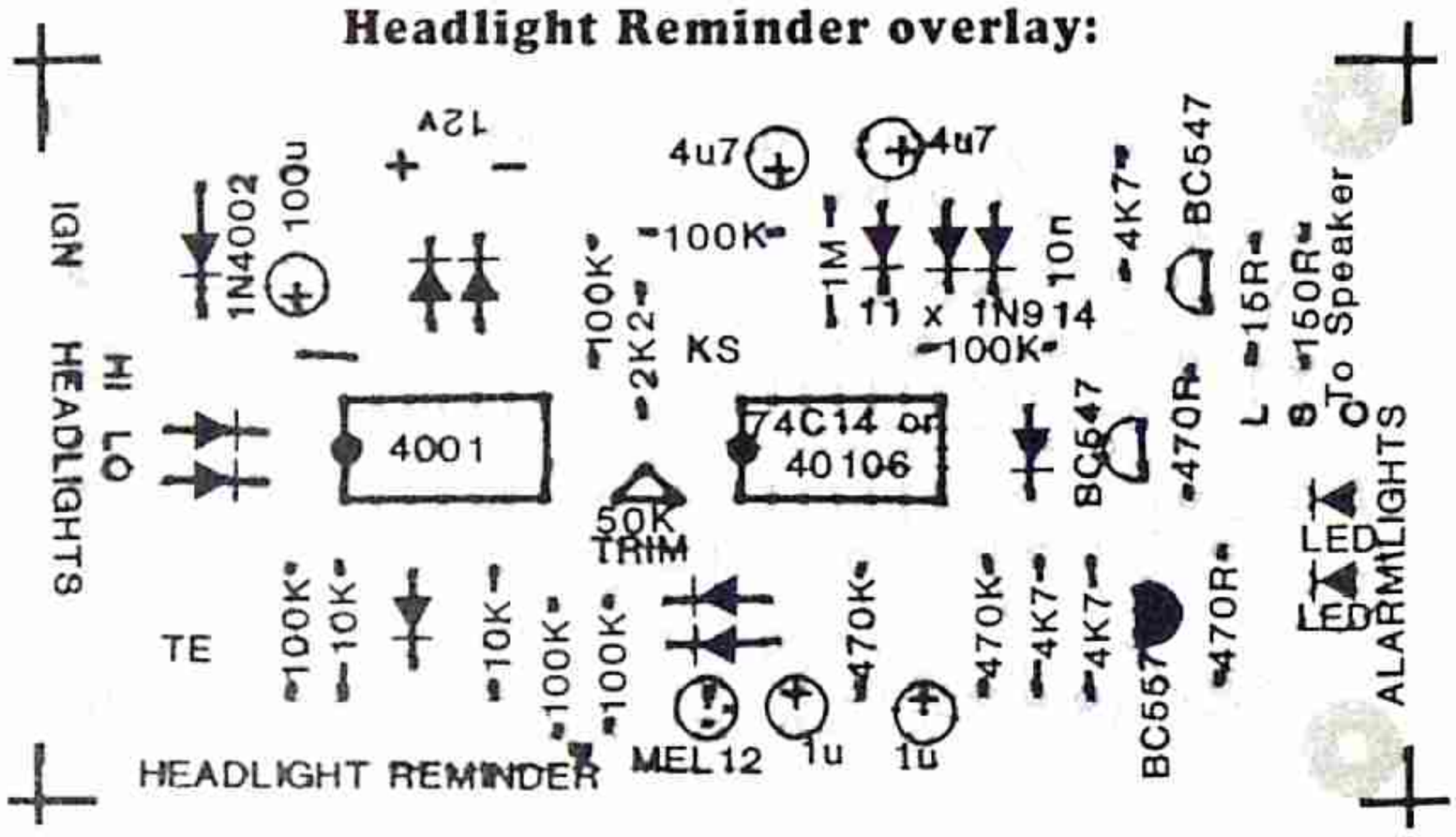
Enlarge the three holes marked 'L', 'S', and 'C'. Insert matrix pins into these holes. These three terminals are for the connection of the speaker. The hole marked 'C' is common and 'L' signifies Loud while 'S' indicates Soft. Connect the speaker to the pin best suited to your 'attention-getting'.

Insert the IC's in the sockets making sure they are in the correct sockets and facing the right direction.

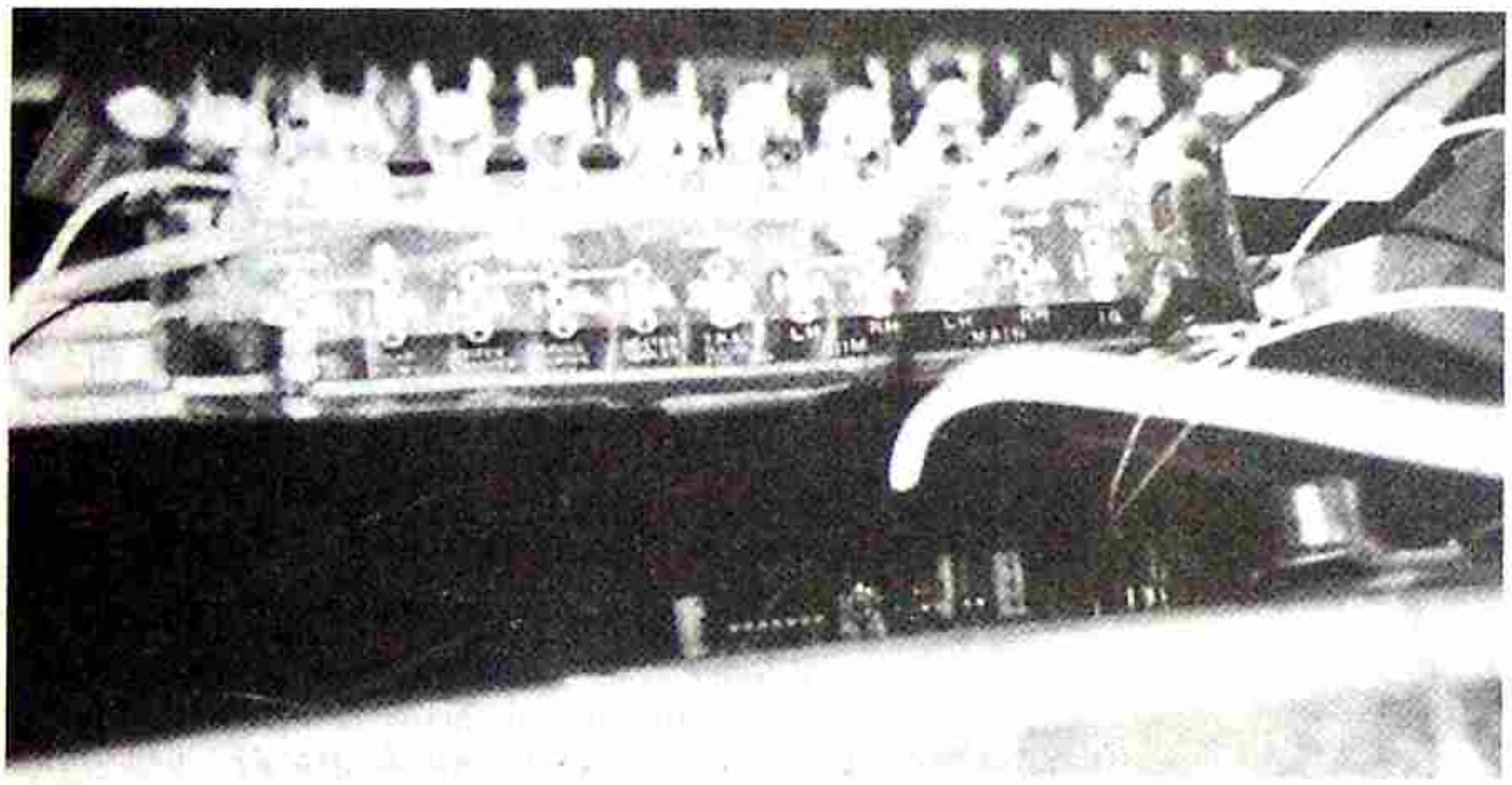
The two LEDs are mounted on the dash in a position that is visible to the driver. We used an orange LED for the pseudo alarm and a red LED for the 'lights on' reminder.

Mount the circuit board near the fuse box of the car. Wire the circuit to this box using lengths of hook-up flex.

Headlight Reminder overlay:



Connections under the dash:



You can make connection by twising the wire around the end of the fuse and pushing it back into the holder but the best way is to solder onto the fuse and fit them back into the holder.

Look for fuses marked Headlamp L.H. and L.D. (left high beam and left dim). Connect the headlamp inputs on the PCB to these fuses. Note that no connection has been made to the parking lamps. If you connect to these, the circuit will mistake the parkers for the headlamps on the second function of the unit, with the result that you could drive around with the parkers on and the head-lamps off, when it is dark, without the alarm sounding.