TALKING ELECTRONICS®

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Issue No 15

☆CAR ALARM
☆ULTIMA
(A 1km TRANSMITTER)
☆SPEECH MODULE

☆ DAT BOARD

☆ FM RADIO

☆ ORGAN

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TALKING ELECTRONICS

Vol.1 No: 15.

Editorial

It's great to get another issue of TE out. If you think the delay between issues is intentional you're wrong. It's much more complex than that.

The instant we get an issue out the orders start to flow and it takes about three months before they taper off enough for us to get back to the drawing board for the next issue.

Since the last issue we have doubled in size and now have 6 staff and 2 part-time helpers. Even so, we can't get the issues out any quicker as each project takes a long time to prepare, when you take as much care as we do.

Most of the delay is not our doing at all.

It comes from the run-arounds from suppliers and the like. Take the trouble we have had with designing a new microprocessor project. It is practically impossible to find a suitable CPU thats cheap and surpasses the Z-80. We have come to so many dead ends that we have given up on the idea for the moment.

Even with the range of common parts as used in TE kits, we experience shortages of components for nearly every kit and it's a constant hassle waiting for things to come in.

Never-the-less we have been hard at it, producing ideas for beginners, add-ons for the TEC and projects for the more advanced experimenter.

The DAT board is our latest add-on for the TEC and includes a software package that advances the TEC's capability quite considerably.

Also included is a speech project using the SP 0256 AL2 allophone chip. Although I find it difficult to understand some of the words it produces, this chip is the cheapest and best on the market at the moment. With this project we can finally say we have a talking project to substantiate our name "Talking Electronics."

Our cover project is a car alarm that offers all the features you have ever wanted, and at a price that beats anything else on the market.

For the beginner we have a couple of starter projects that will introduce the magic of electronics.

All in all we hope to cater for everyone and I hope you have noticed our new format and different type-style.

This is the first issue from our desk-top publishing set-up. After spending nearly $20,000 and experiencing 2 hard-disk crashes with the loss of weeks of work, we can say we are on the way to producing page-finished copy for the magazine. We will tell you more about our system next time as we have a whole story to relate! It's a bit like the photocopy saga all over again.

See the centre pages of this issue for a current list of kits and books we have released. The notebook series is especially important as notebook number 5 has a BEC (Basic Electronics Certificate) set of questions to show you the content of a course that gets you started in electronics via Australia-wide TAFE colleges. If you have ever wanted to know where to start, this is it. The BEC is the first step to take.

Our shop at Moorabbin has just opened to coincide with the release of this issue. If you are passing by that way, call in and see Ross, he will be only too glad to show you the enormous range of Public Domain software and all the other things he has on the shelves.

Don't forget our kits (we have over 100 different models) and I hope to see you sending for something in the near future.

For now,

Colin Mitchell.

PUBLISHERS NOTE:

Talking Electronics is designed by Colin Mitchell at 35 Rosewarne Avenue, Cheltenham, Victoria 3192, Australia. Articles suitable for publication should be sent to this address. Ring us first on (03) 584 2386. All material is copyright however photocopies are allowed when building a model and for those issues no longer available.

*Maximum recommended retail price only

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ADVERTISERS INDEX

Technical: Jim Robertson
CAD Artwork: Paul Loiacono
Enquiries: 10 minute queries
584 2386 8am - 6pm.

Our Talking Electronics Shop, 2 Central Ave., Moorabbin, carries the full range of TE kits and parts and over 2000 Public Domain titles for IBM and compatible computers

TE's

CAR ALARM

PROTECT YOUR CAR FROM THEFT WITH THIS FULL-FEATURED ALARM

Police records show that, in 1988, 780 cars were stolen per 100,000 population. That's 117,000 cars per year for a population of 15 million. Or approximately 1 car every 4.5 minutes!

Most cars are usually stripped and sold as spare parts to wreckers or taken by joy riders, for an evening of what they call fun, or broken into just for the contents.

Insurance companies have increased their premiums accordingly and some offer a small discount if your car is fitted with a car alarm. That's what inspired us to design an alarm for the magazine.

A lot of thought has been put into the design and all the common features have been included, including a few of my own.

Here they are:

*Runs off a 12v car battery.

*Has battery backup. (Kept charged when the engine is running)

*Will flash a signal lamp as soon as the ignition is switched off, regardless of whether the alarm is swithed on or not.

*As soon as the ignition is switched off, a beep will be produced for approximately 5 seconds (to remind you to turn the alarm on).

*A 10 second exit delay is provided to allow you to leave the vehicle and lock all doors. (The delay can be removed, as explained in the article)

*The indicators will flash twice after the 10 second exit delay to indicate the alarm is activated and ready.

*Two delayed inputs on-board (active low, ie must be taken to ground or low) to trigger the alarm.

*The alarm is activated approximately 5 seconds after an input has been taken low to give plenty of time for it to be turned OFF by the operator.

*The siren will sound for approximately 2 minutes and shut down ready for another break-in attempt.

*Indicators flash in conjunction with the siren to give a visual indication that the vehicle has been broken into.

*An ignition killer cuts off the ignition as soon as the alarm is turned on.

HOW THE CIRCUIT WORKS

The best way to describe how the circuit works is from the power supply section and battery charger.

The battery charger and power supply is fairly straight foward. The car battery voltage is approximately 12v. This passes through a 1N5404 power diode to the input of a 5 volt regulator. The ground pin of the regulator has two resistors to increase the output voltage to about 9 volts and supplies the rest of the circuit. The key switch connects power to sections of the circuit to activate the alarm.

When the engine is started, the voltage across the car battery increses to about 14 volts. This is due to the battery charging. When the voltage rises to 14 volts, there will be sufficient voltage drop across the 1N5404 diode to keep the backup battery charged.

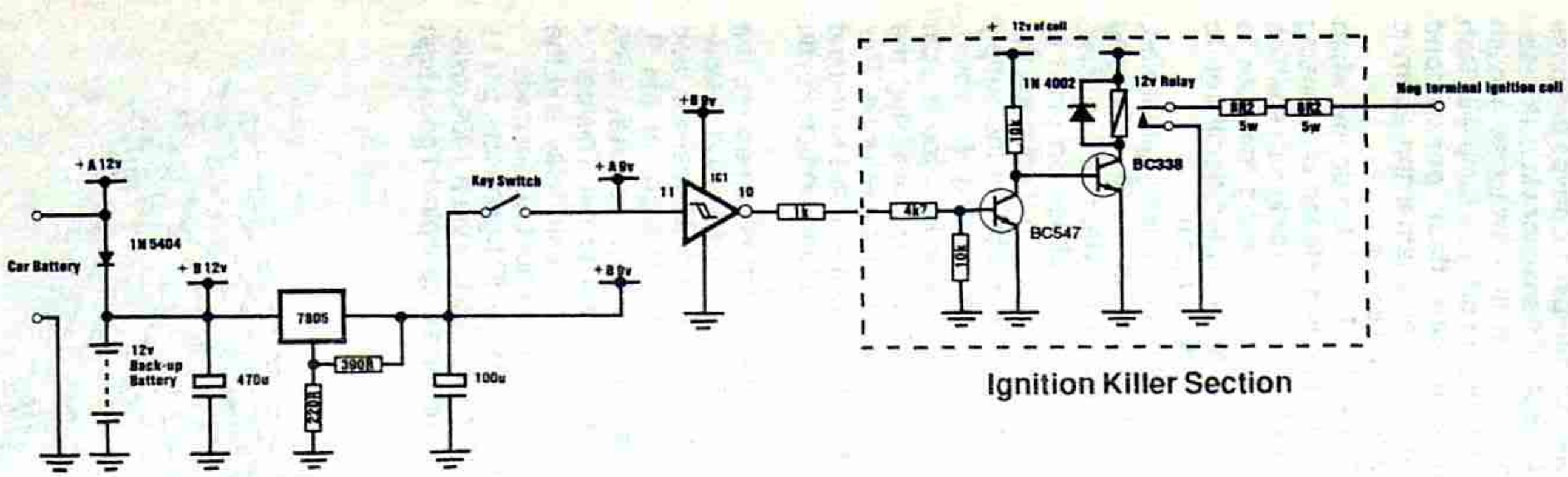
As soon as the ignition is switched off, the voltage on the 47k on the ignition line is removed, thus enabling pin 13 of IC1 and allowing the gate to operate as a low frequency oscillator with an even mark-space ratio. Output pin 12 drives the base of a BC338 transistor via a 1k resistor which in turn switches a dash lamp on and off. The lamp will flash at about one flash per second regardless of whether the alarm is switched on or not.

Pin 1 of IC1 will also go low when the ignition is switched off, causing pin 2 to go high. This in turn enables pin 5 of IC1, allowing the gate to operate as another oscillator to directly drive a piezo.

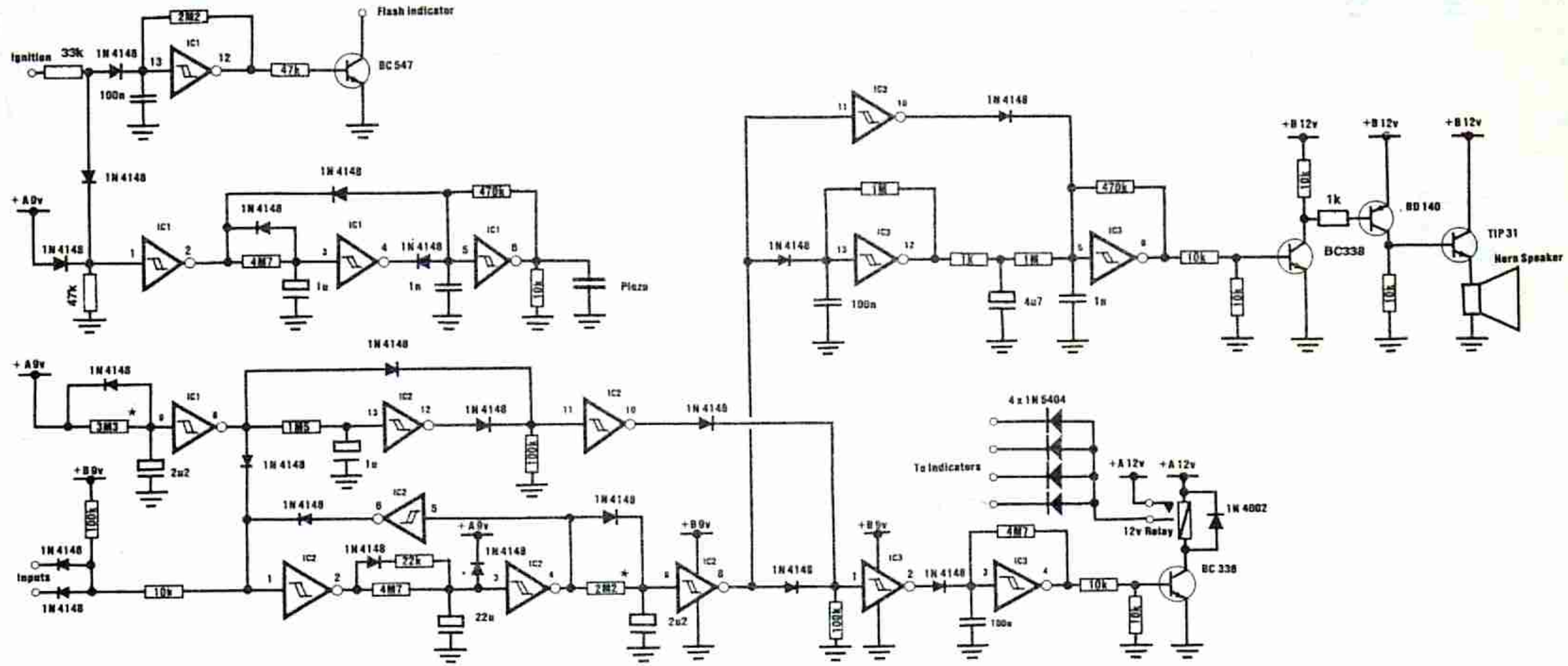
While the tone is being generated, a 1uF electro is slowly charging from pin 2 of IC1 via a 4M7 resistor, increasing the voltage on pin 3 of IC1. After about 5 to 8 seconds the voltage reaches 66% of the supply voltage (approximately 6 volts). Output pin 4 will go low, causing pin 5 of IC1 to go low, disabling the oscillator and the tone will stop. This part of the circuit is used to remind you to tum the alarm on before you leave the vehicle.

When the alarm is turned on, the 2.2uF electro on pin 9 of IC1 is slowly charged via a 3M3 resistor, and increases the voltage on pin 9. When the voltage reaches 66% supply, pin 8 will go low. This part of the circuit is the exit delay and the process takes about 20 seconds.

When pin 8 of IC1 goes low, pin 11 of IC2 is forced low via a 100k resistor. Thus the output pin 10 goes high



Ignition Killer Section



CAR ALARM CIRCUIT

enabling the indicator flash circuit, causing all four of the car's indicators to flash. The 1uF on pin 13 of IC2 is slowly discharging, thus decreasing the voltage on pin 13. When the voltage on pin 13 drops to 33%, the output pin 12 will go high, taking pin 11 high, causing the output pin 10 to go low. This disables the indicator flash circuit. This process will flash the indicators twice, indicating the alarm is activated and ready.

Pin 1 of IC2 is also enabled when pin 8 of IC1 goes low and is ready to detect when either or both alarm inputs are pulled low. When this happens, pin 1 of IC2 will go low and the output pin 2 will go high, quickly charging the 22uF electro on pin 3 of IC2. When the voltage on pin 3 rises to 66%, the output pin 4 will go low, taking pin 5 low with it. This causes pin 6 to go high and holds pin 1 high to prevent the circuit from being retriggered. Pin 2 will go low, allowing the 22uF electro to slowly discharge through pin 2 via the 4M7 resistor.

While pin 4 of IC2 is low, the 2.2uF on pin 9 of IC2 is slowly discharging through pin 4, via the 2M2 resistor and when the voltage drops to 33%, the output pin 8 will go high. This part of the circuit is the entry delay and the process takes about 10 seconds. When the 10 seconds are up, both the siren circuit and the indicator flash circuit are enabled.

When pins 8 or 10 of IC2 are high, pin 1 of IC3 will go high and the output pin 2 will go low, enabling pin 3 of IC3, and the gate will operate as a low frequency oscillator with even mark-space ratio. The output pin 4 drives the base of a BC338 transistor, via a 10k resistor, to switch a relay and turn the car indicators on and off (via four 1N5404 power diodes).

The siren circuit is also activated when pin 8 of IC2 goes high. Pin 11 of IC3 goes high causing the output pin 10 to go low. This enables pin 5 of IC3 and the gate works as an oscillator to generate a tone. Pin 13 is also enabled and the gate works as a low frequency oscillator of about 2Hz (2 pulses per second). The purpose of the 1k resistor, the 4.7uF electro and the 1M resistor, is to alter the output frequency of pin 6, as the output pin 12 rises and falls to give a WAH WAH tone rather than a pulsed-tone effect.

Pin 6 is then fed into the input of a simple three transistor amplifier via a 10k resistor. The collector of the first transistor, a BC547, is taken to the base of the second, a BD140. The collector of the BD140 drives the base of the third transistor, a TIP31. This is an emitter follower and the emitter drives an 8 ohm horn speaker to give a very loud output.

The ignition killer is a seperate board controlled by the main board. When the alarm is switched on, pin 11 of IC1 goes high, causing the output pin 10 to go low. This is then passed to the ignition killer board.

The ignition killer consists of three main parts; two transistors and a relay. The positive of the board goes to the positive terminal of the ignition coil. When pin 10 of IC1 is low, the first transistor in the ignition killer (a BC547) is turned off, allowing the current flowing through its 10k collector resistor to flow through the base of the second transistor (a BC338) switching the trasistor on. If the ignition is started, the 12v 10A relay will close, connecting two series 8R2 resistors from the negative terminal of the ignition coil to ground, making it impossible to start the car.

CONSTRUCTION

Construction is straight foward. The board may look difficult to build but is really quite simple.

The first thing to do is to inspect the P.C. board for any holes not drilled or shorts due to poor etching. Some holes may be covered by solder, but this can be removed by applying a hot soldering iron to the land to melt the solder.

PARTS LIST

CAR ALARM - MAIN BOARD

1 - 220R All resistors on the
1 - 390R main board are 1/4 Watt
4 - 1k
8 - 10k
1 - 22k
1 - 39k
1 - 47k
3 - 100k
2 - 470k
2 - 1M
1 - 1M5
2 - 2M2
1 - 3M3
3 - 4M7

2 - 1n Greencap
3 - 100n Greencap
2 - 1u 25v Electrolytic
2 - 2u2 25v Electrolytic
1 - 4u7 25v Electrolytic
1 - 22u 25v Electrolytic
1 - 100u 25v Electrolytic
1 - 470u 25v Electrolytic

21 - 1N4148 Signal Diodes
1 - 1N4002 1A Power Diodes
5 - 1N5404 3A Power Diodes
3 - BC338 Transistor
1 - BD140 Transistor
1 - TIP31 Transistor
1 - 7805 Regulator
3 - 74C14 or 40106 IC's

3 - 14 Pin IC sockets
1 - FBR611D012 12v 10A SPDT Relay
1 - 16 way screw terminal strip or 2 x 8 way
1 - Small Piezo
1 - Key Switch
1 - 12v Dash Lamp
1 - 8R 10 Watt Horn Speaker
1 - Nut and Bolt for regulator
8 - 2m heavy duty hook up wire (2 Red, 2 Black, 2 Brown and 2 Blue)
3 - 2m medium duty hook up wire (3 different colours)
4 - 1m medium duty hook up wire (different colours)

1 - 1m of light duty hook up wire (any colour)
20cm Tinned Copper Wire for links and tests

CAR ALARM P.C. BOARD

IGNITION KILLER SECTION

2 - 8R2 5 Watt
2 - 10k 1/4 Watt
1 - 47k 1/4 Watt

1 - 1N4002
1 - BC547
1 - BC338

1 - FBR611D012 12v 10A SPDT Relay

IGNITION KILLER P.C. BOARD