PEDESTRIAN CROSSING

This kit is available from:

Talking Electronics

email Colin Mitchell:

talking@tpg.com.au

for pricing and postage.

PEDESTRIAN CROSSING

A clever device that will amuse any person visiting your model railway.

The circuit of the pedestrian crossing is made of several distinct blocks, all of them easily seen on this diagram.
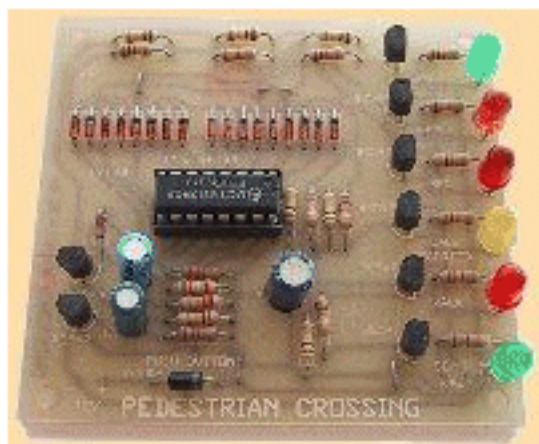
This circuit has been designed to fascinate spectators at exhibitions, but it can be used just as successfully to impress those viewing your layout.

It is an OPERATING PEDESTRIAN CROSSING complete with WALK and DON'T WALK signs. The unit is normally displaying a green light to the traffic and a DON'T WALK to the pedestrians, but when a person presses the button (mounted at the edge of the layout), the CALL RECORDED or WAIT lamp illuminates.

Then after a few seconds, the traffic lights change to yellow, then red. And the WALK sign comes on. After the scale pedestrians have been given time to cross, the DON'T WALK sign illuminates. This lets the slow walkers or those who insist on walking against the DON'T WALK sign, to cross! The traffic lights then change to green.

This unit controls only the lights on the model crossing but I am sure someone will create scale pedestrians to cross the road when the WALK sign comes on.

HOW IT WORKS

The Pedestrian Crossing circuit can be separated into a number of sections for easy explanation.

The first section is the MASTER OSCILLATOR, from which all timing is taken. It is a 2 - transistor astable multivibrator operating at a low frequency. The second section is the 4017 and the push button.

The reset pin of the 4017 is held LOW via a 100k pull-down resistor. The signal from the oscillator is fed to the CLOCK input of the 4017, and the chip will count until it reaches Q9, and then halt. It halts because the CLOCK INHIBIT is tied to this output (Q9). When Q9 goes HIGH, the clock signal is internally prevented from reaching the counter in the 4017. This means the chip will freeze every time it comes to Q9.

The only way to start the chip counting is to RESET it. This is what the push button does. The chip will then count up to Q9 and halt again.

The third section of the circuit is the DIODE MATRIX consisting of 17 1N 4148 diodes. The outputs of the 4017 are gated through these diodes to produce the light sequence i.e. the TRAFFIC LIGHT sequence and the WALK/DON'T WALK signs.

The outputs of the matrix are all buffered and they are capable of driving one or two miniature 12v lamps. The outputs to the traffic lights and the CALL RECORDED light are all driven via these one-transistor buffers.

But the buffer for the WALK/DON'T WALK sign is a little different.

You will notice that there are only five lines out of the diode matrix. The line for DON'T WALK is missing. As the DON'T WALK sign will be ON every time the WALK sign is OFF, and vise versa, it is simpler to invert the signal of one, to produce the other. As the number of diodes required to produce the WALK signal is only three, rather than the seven for the DON'T WALK, it was decided to invert the WALK signal to produce the DON'T WALK signal.

The buffer for the WALK signal is similar to the buffer for the other signals, except for the line taken from its collector. This line is connected to an emitter-follower transistor which drives the DON'T WALK sign.

The positive voltage needed to turn on the emitter-follower is supplied through the lamp connected to the output of the WALK buffer. Or if a lamp is not present, through the LED and resistor.
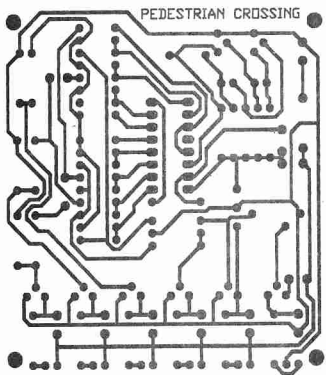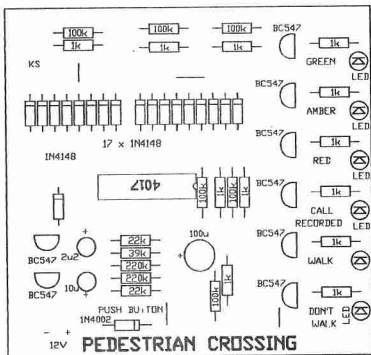
CONSTRUCTION

The Pedestrian Crossing unit is constructed on a 7 cm x 7.5 cm printed circuit board.

Firstly solder the 17 1N 4148 (1N 914) diodes. These are all in a row above the 4017. Only the two outside diodes are marked on the PC overlay but all 17 are soldered onto the board the same way around. That is, with their cathode facing away from the 4017.

Next solder the links, resistors and the 1N 4002 power diode, followed by the IC socket. You will notice that the socket has a notch at one end. This should be lined up with the dot marked on the overlay. This notch is used as a reference when inserting the IC, so to make it easier when trouble-shooting later, the socket must be positioned correctly.

Next insert the LEDs, transistors, electrolytics and the 4017 integrated circuit. Be careful with the orientation of the 4017, as it is upside down with respect to the rest of the components. Finally connect the push button via short lengths of hook-up flex.

Connect the unit to a power supply of 9v to 12v and watch the LEDs come on. Push the button to initiate the sequence. Do not hold the button ON because it takes the RESET line HIGH, preventing the 4017 from counting. Watch the unit cycle through the sequence to check its operation.

The circuit board of the pedestrian crossing: the cycle can easily be followed by watching the on - board LEDs. Note that the 4017 is upside down.

LEFT: Shown here are a partially completed WALK sign and a signal head. Both use LEDs instead of grain of wheat bulbs.

THE MODEL

The model of the Pedestrian Crossing can be built around a commercial 3 - aspect signal. The lamps will need to be removed and replaced in the propper order with red at the top. If you wish to have more than two signal-heads on the crossing, replace the lamps with LEDs. Make sure each LED is in series with a 470R to 1K resistor to prevent it burning out.

The WALK/DON'T WALK signs can be constructed from rectangular LEDs or from dual LEDs. See the article later in this book called: Three Coloured LEDs.

If your layout is of a recent period, the WALK and DON'T WALK signs can be the newer design, displaying a man walking (in green) or not walking (in red).

The CALL RECORDED lamp is mounted near the push button, at the edge of the layout. Some constructors may even model the button to look like the real thing! It would also be possible to shape a 3mm LED to resemble the CALL RECORDED sign on the post itself.

Don't place a model car at the lights as it is sure to bring some smart comment about it never moving when the light is green . . . however, if it had its bonnet open . . .
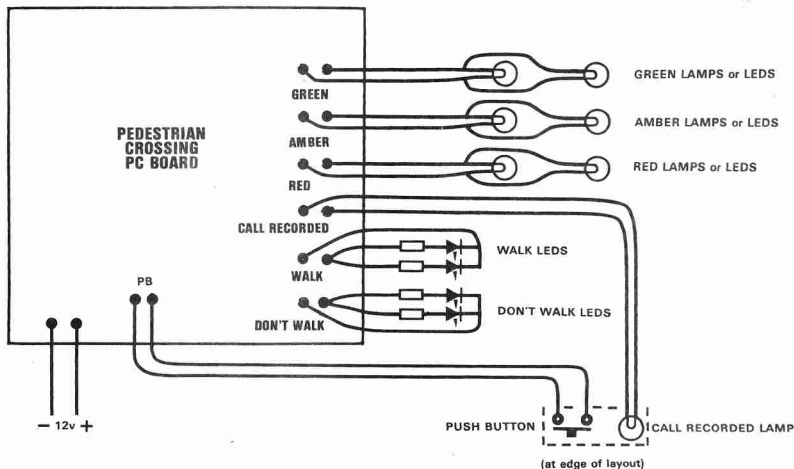
Pedestrian Crossing Parts List

12 - 1K
2 - 22K
1 - 39K
6 - 100K
2 - 220K

1 - 2.2 mfd
1 - 10 mfd
1 - 100 mfd

2 - 3mm Red LEDs
2 - 3mm Green LEDs
2 - 3mm Yellow LEDs
1 - 1N4002 diode
18 - 1N914 diodes
8 - BC547 transistors
1 - CD4017 IC

1 - 16 pin IC socket
1 - Push button
1 - Pedestrian crossing PCB

This diagram shows how to wire both lamps or LEDs to the pedestrian crossing PC board though LEDs are recomended if more than two signal heads are to be used. Each LED must be in series with a 470R to 1K resistor.