

THROTTLE

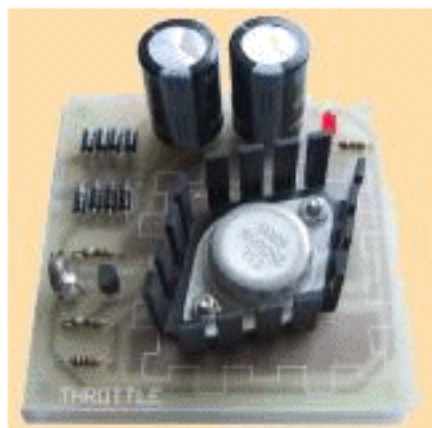
This kit is available from:

Talking Electronics

email Colin Mitchell:

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for pricing and postage.



A SIMPLE SINGLE BOARD

THROTTLE

Most commercial train controllers contain a transformer and a wire wound rheostat. These transformers often have an uncontrolled DC or AC output as well. Extra control units can be added to these train controllers, allowing independent control of two trains, on different tracks, simultaneously. This simple throttle is ideal as an add-on throttle for the control of shunting yards or a second main line. It can also be mounted in a box with its own transformer, as a stand-alone unit.

Construction has been kept very simple by the use of a printed circuit board. Nearly all of the components, including the heatsinked power transistor, have been mounted on the PC board, leaving only minimal external wiring. The only external components are the switch for changing the direction of the train, the speed control pot and the transformer.

The circuit operates very simply. The AC from the transformer is rectified by the diode bridge then smoothed by the two 1000 mfd capacitors. The current is then passed to the speed control circuit. A carbon pot has no chance of being able to supply the current needs of a motor directly so the answer is to buffer its output using transistors. The voltage on the pot wiper is fed to the base of the BC547 transistor. This transistor is wired as an emitter follower, so the voltage at the emitter of the transistor will 'follow' the voltage applied to the

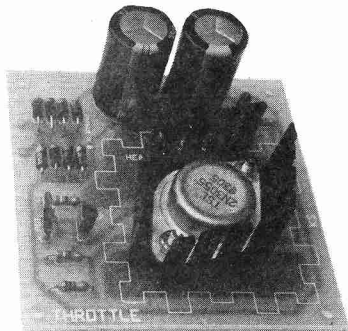
base of it. The transistor can supply more current than the pot, so now we have a buffered output. This output is still not enough to drive a motor, so we have to buffer it again. The principles are the same but this time a bigger transistor is used. The controller can now supply a variable voltage that is reasonably independent of the current being drawn through it.

The throttle can supply 1 to 2 amps depending on the transformer being used. All diodes in the diode bridge have been paralleled to form a 2 amp bridge. The electrolytics will not be needed in all applications of the throttle and in most cases can be omitted. The pulse action of the unsmoothed DC can be beneficial to the starting of some motors.

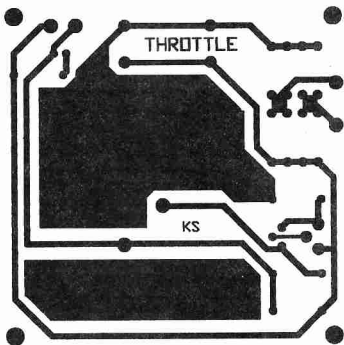
This throttle does not have any overload protection built into it. If you feel that protection is necessary, there are two simple ways of providing it. One way is to put a 1 or 2 amp fuse in line with the output, depending upon both the transformer rating and the maximum current that your engines should draw. The other is to put a 12 volt car headlamp or brakelight bulb in line with the output. The best way to chose a bulb for this application is to try one or two of them.

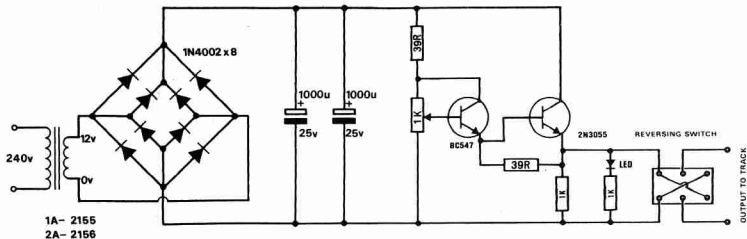
Construction

Solder all of the small components onto the PC board first. Cut two pieces of insulating sleeving, each about 2mm long, and slip them onto the leads of the 2N3055 transistor. These pieces of tubing



All components of the throttle except for the speed control pot and the direction switch are mounted on the printed circuit board. Construction is greatly simplified by the use of an on board heatsink.





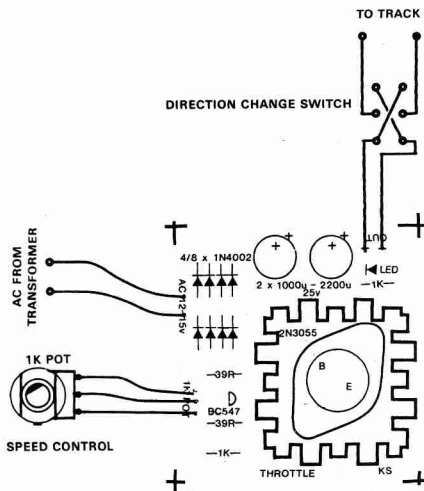
will prevent the transistor from shorting against the heatsink.

Bolt the transistor and heatsink onto the PC board. No insulating kit is needed. Care must be taken to make sure that the heatsink does not come into contact with anything.

The final wiring of the unit can now be completed and the unit tested. When you are mounting the throttle unit in a box, make sure that the heat sink is well ventilated.

Throttle Parts List

- 2 - 39R
- 2 - 1K
- 1 - 1K pot
- 2 - 1000 mfd electro's
- 8 - 1N4002 diodes
- 1 - red LED
- 1 - BC547
- 1 - 2N3055
- 1 - T03 Minifin heatsink
- 2 - nuts & bolts
- 1 - DPDT Switch
- 1 - Throttle PCB
- 1 - transformer 2155 or 2156



For simplicity, the external wiring of the throttle was kept to a minimum. The wiring needed to complete the throttle is shown in this diagram.

