The ‘Basin Street’ controller.

This controller was designed for the club’s small HO switching layout based somewhere in the US which got the name of ‘Basin Street’. Actually two controllers were fitted and block switching allowed for dual cab operation.

The controller itself is built on a small PCB fitted behind the control panel. Operation is with a separate plug-in handset which contains the speed pot, direction switch, overload light and reset button. The circuit may seem more complex than many conventional controllers but it contains a number of useful features and has proved itself very popular with the operators and completely reliable over several years of club and exhibition use.

Description. (refer to schematic)

The PCB is supplied with AC at a nominal 16v RMS but a 15v transformer with two 25VA windings powered both controllers satisfactorily. The AC is rectified by bridge BR1 and smoothed to true DC by capacitor C1. Diodes D1 and D2 also provide an unsmoothed full-wave rectified voltage at low power. A switch connected to J3 can select either the unsmoothed or smooth DC as the type of waveform to power the loco. The smooth DC option is for ironless motors which may prefer this. The normal setting is the pulsed DC. VR2 adjusts the pure DC so the speed setting is about the same as for the pulsed DC.

Transistor Q2 is an emitter follower with the base voltage set by the speed control. Diode D4 clamps the pulsed or smooth DC to the emitter at a level determined by the speed control. R6 and C2 give a progressively more pulsatile waveform to the unsmoothed DC as the speed decreases. This improves slow speed running but without the noise of a PWM controller. Transistors Q6 and Q7 form a Darlington pair to boost the output current. Q7 is a 2N3055 which is cheap and virtually indestructible. It is mounted on an external heatsink. However, the PCB allows for a TO-220 outline device to be mounted on the board provided the heat sinking is adequate, i.e. fastened to the controller case. The power diode D6 prevents damage due to inductive spikes from the motor and C4, together with D5 provide additional noise filtering and protection against reverse voltages.

Motor reversal is via a relay on the PCB to avoid heavy currents in the handset. The relay is driven by Q1 and controlled by a low current on / off switch. If a 24 volt relay is used, R2 should be a wire link. If only 12v relays are available, R2 should be chosen to drop about 10 volts at the relay current.

Transistors Q3 and Q4 form a latching overcurrent trip. The output current is sensed by R10. When the voltage drop exceeds 0.6v, Q3 will start to conduct and provide base current to Q4 via R7 and R8. Q4 turns on and its collector current keeps Q3 on even if the overload has passed. The circuit is reset with the handset pushbutton. If Q3 is on, then so is Q5 and this cuts the output to Q6 and hence to the motor.

A value of 0.47 ohm for R10 sets the trip at about 1.4 amps. Different values may be used for other currents.

Construction.

Apart from the need for a heatsink for Q7, construction is not in any way critical. A PCB can be made using the PDF file to create a mask. Print the PDF file on a clear film, preferably with a laser printer. Keep the size at 100%, do not check the ‘shrink to fit’ box on the Acrobat reader.

Disclaimer.

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