MERG DCC Accessory encoder. (version 2B)

The MERG DCC accessory system is designed to be independent of the track DCC although it uses the NMRA Standard for its information encoding. The rationale for this was to have a system for controlling points, signals, lights etc which could be used to simplify the wiring on larger non-DCC layouts while remaining compatible with existing DCC accessory decoders. Even on wholly DCC layouts, it is not really advisable to control the accessories (points in particular) via the track. If a short develops on the track it is quite likely (in my experience) to be a point 'set against' the loco. If the point is controlled via the (now shorted) track, you cannot rectify the situation. Another disadvantage is that accessories may take substantial currents so putting an unnecessary load on the DCC boosters.

The MERG accessory encoder was intended for use with the MERG accessory decoders which have built-in capacitor discharge units (CDUs) for solenoid style point motors (ACC2B) or the version for 'tortoises' or LEDs, lamps etc. (ACC3B). The whole accessory system is powered by a 15 - 20v AC transformer. The DCC signal is a low power, 12 or 15v line run as a pair of wires round the layout. As the decoders are optically coupled, there is a lot of flexibility with regards to the local power requirements and type of decoder used. The encoder output is suitable as a signal source for Lenz accessory decoders but does not provide the power for decoders designed to run entirely off the track. The encoder output can be amplified by a booster if necessary.

From my experience, operating points from the same DCC handset as the loco is problematical, especially with regard to the time taken to change a point. Also, most established modellers are used to a layout diagram style control panel with switches. The MERG encoder is specifically designed for this type of panel. Each point is operated by a single on / off switch and the direction of the switch lever indicates the point direction. (Unlike many CDU systems, it does not use a centre off switch). It would also suit prototypical 'lever frame' switches.

The encoder is electronically very simple. A PIC microcontroller (16F627) creates the DCC waveform and also scans a matrix array of switches. Due to pin limitations on the PIC, this is an array of 8 rows and 16 columns, giving 128 switches maximum. The switch array uses low current on / off switches with a diode in series with each switch. The switch lies at the junction of a row and column. An additional 4 to 16 line multiplexer IC (CD4515) is used for the column scan. This matrix arrangement reduces the number of wires needed to the control panel. Only 24 wires for 128 points!

The PIC program continually looks for any switch changes. A detected change will send the appropriate DCC packet to an accessory decoder to change the point. With solenoid point motors, the initial direction is arbitrary so at switch on, the encoder checks all the switches and sets the points to correspond. There is provision for a manual reset button to perform the same task.

The accessory decoder address depends on the position of the switches in the array. The NMRA RP presently allows only 4 pairs of outputs (4 points) per decoder address. Column 1 and rows 1 to 4 give address 0, column1, rows 5 to 8 are address 1, column 2, rows 1 to 4 are address 3 etc. so the encoder can work with up to 32 decoders. The present encoder program sends a 'deactivate' command to one of the decoder output pairs and then an 'activate' command to the other so it will work with decoders requiring a continuous output (tortoises, signals etc) or with solenoid types giving a short pulse output.

On the website is a PCB layout for the encoder. Connections to the switch array are via a 25 way D type socket. The encoder can be powered off the same transformer as all the decoders or off any 15 to 20vAC supply with at least 0.5 amp capability. The PIC assembly and HEX code is also on the web page. (DCCACE3.ASM and DCCACE3.HEX)

Any comments or suggestions gratefully received (but I cannot guarantee to be able to provide custom solutions for individual requirements)

Mike Bolton   25/03/03