

Traverser Controlled by Arduino and Stepper Motor

When I started to plan my O gauge layout "Rosedale", I quickly realised that having a 5 track storage yard using standard turnouts was just not achievable in the space I had available and even if I did have another 4'6" for these extra turnouts, I would rather use this space for more scenic layout than fiddle yard.

The answer of course was to use a traverser sliding on good quality drawer runners, however, I really wanted to automate the track selection for two reasons:

- 1) So that Rosedale can be operated by 1 person at the control panel near to the Station (at the opposite end to the storage yard)
- 2) When at exhibitions, the storage yard operator could easily select the correct lane with the press of a button - no manual pushing the traverser into position, aligning the rails and using bolt locks to keep in position.

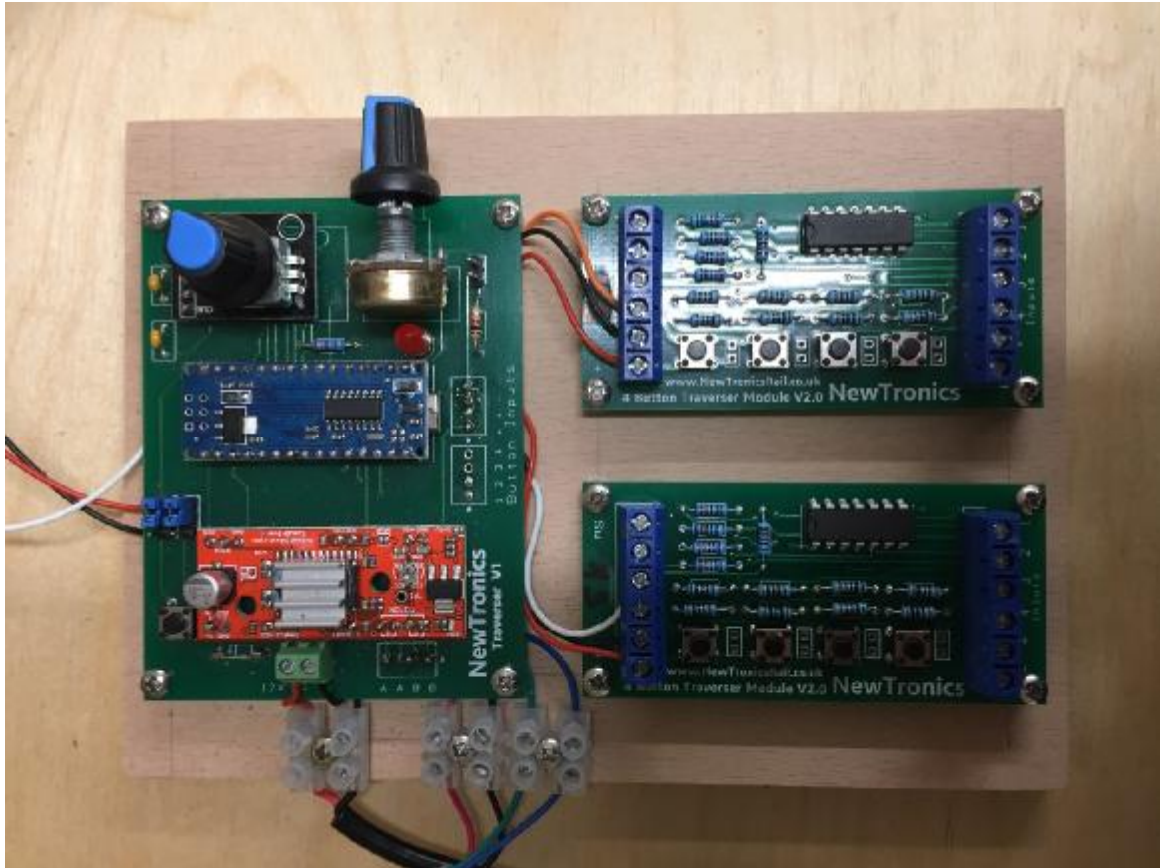
The Traverser is shown below where you can see the drawer runners on two of the board supports. There is also a centrally located lead screw which is attached to a Nema17 stepper motor. The stepper motor has a step angle of 1.8 degrees - 200 steps per revolution and together with a lead screw and nut, provides extremely accurate and repeatable track positioning.



The electronics to control the stepper motor is by a standard Arduino Nano and stepper controller – these are low cost and commercially available.

A rotary encoder allows the user to manually set each of the track positions, in my case 5 but is capable of 16 if required and assign each position to one of the buttons.

Printed circuit boards were designed and produced to mount the Arduino Nano, Stepper motor controller, encoder and button selection, these are shown below.



On power up, the stepper motor first has to calibrate its position relative to an end stop (Home position) and so the Arduino program rotates the stepper motor in the direction of Home, where there is a microswitch end stop. Once it hits this microswitch, the system knows that it is at the Home position and sets a counter to zero.

To first program the Arduino, the tracks are aligned manually using the rotary encoder knob, once the first track position is set up, then the appropriate track button is pressed and this stores the entry into non volatile memory in the Arduino. For example this maybe 38 steps from the Home position, track 2 maybe 176 steps etc. So depending on which of the 5 buttons are pressed the stepper motor will move the required number of steps in the correct direction in order to accurately align the tracks. This manual programming is only required once.

This system has proved to not only be a useful addition to Rosedale but great fun to use on my own or with a separate fiddle yard operator and also extremely reliable.

As the components are low cost and commercially available, I have been asked to build several of the electronics boards for other modellers. In particular I built the 3 track traverser for Bob Alderman's layout, Hobsons Brewery.

This realised that the Arduino controlled stepper motor operation of a traverser became a necessity for someone who is severely disabled.

Dave Haines who helped Bob to complete Hobsons Brewery sent me the traverser section for me to fit the stepper motor, lead screw and Arduino electronics which I did and returned to Dave so that he could complete the automation of Hobsons Brewery. This enabled Bob to operate the locomotives, traverser, turnouts, uncouplers, wagon turntable all with the use of a joystick.

Hobsons Brewery has been shown at several exhibitions as well as been featured in Railway Modeller and I understand will be exhibited at Guildex this year, so hopefully the judges can take a closer look. The picture below shows Hobsons Brewery with its traverser to the right hand side and the joystick controller at the front.

