CMRCI DCC PROGRAMMING BOX

A little while ago club-member Ron circulated a link to an article in Model Railroad Hobbyist Magazine describing a portable DCC programming system. The idea was to be able to take a small programming system along with club layouts to exhibitions and the like to allow locos to be programmed if necessary. The system described in the article was put together from surplus components.

While the idea had merit, it still needed an external computer and programming application to be functional. We have a programming track in the club room, but if we took that with us to exhibitions, someone would need to have a laptop available with JMRI and Decoder Pro 3 installed, as well as the correct driver to accept the Silicon Labs USB Interface used with the track. It's also a bit bulky.

Then Daryl suggested using a Raspberry Pi microcomputer to do the computing work, and a plan was hatched.

The specification. The whole unit was to be self-contained, and capable of fitting into one of the usual plastic storage boxes we take with us whenever we travel somewhere. The only external connections needed would be power and a plug for an NCE Power Cab.

The components. The heart of the system is a Raspberry Pi 3 computer. It has four USB ports, an HDMI output for a display, and operates on 5v power. The display is a 7 inch touch screen with 480 x 800 resolution. The power for the display comes from one of the Raspberry Pi USB ports. The connection to the track uses an NCE PCP and a USB interface.
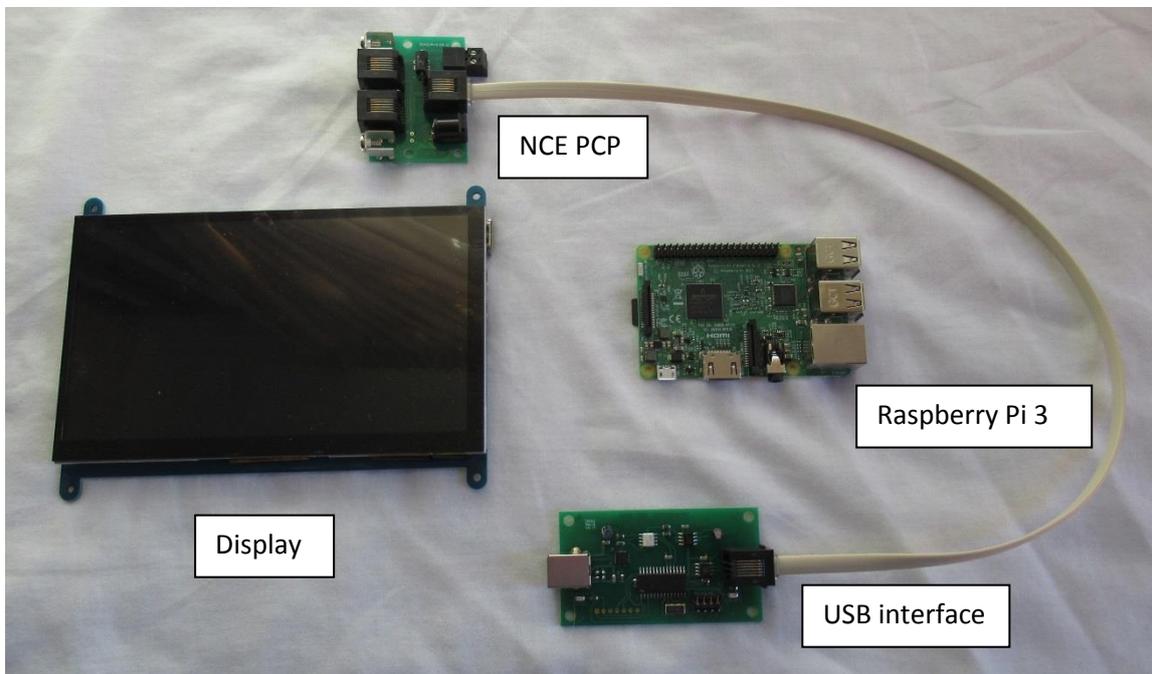

Figure 1: Programming track components

Figure 2: Components with cabling and power supply

Additional bits. As the plan progressed, it became apparent that the box would need a keyboard, and potentially a mouse. While the display is a touch screen, its size meant that for extended operations a mouse would be useful. Therefore an external USB plug was incorporated to allow connection of a mouse, as well as powering the rechargeable keyboard and interfacing with the computer. Also, the display is small, and an external HDMI port would allow connection to a larger display screen for demonstrations and the like. The box would also be built with a small storage area for the keyboard, mouse, external cabling, and potentially a spare NCE Power Cab.

Construction. The box is constructed from 9mm medium density fibreboard, with an upper and lower compartment. The lower compartment has a hinged door. The power is brought into the box via a standard three pin power cord, with a switch provided in the active line. The power is then distributed from a power board via three power packs – one to the computer, one to the NCE PCP and the third to an HDMI splitter to allow the HDMI signal to go to both the display and the external plug. The four Raspberry USB ports feed the display power, and connect to the USB interface, the external USB panel, and the keyboard dongle.
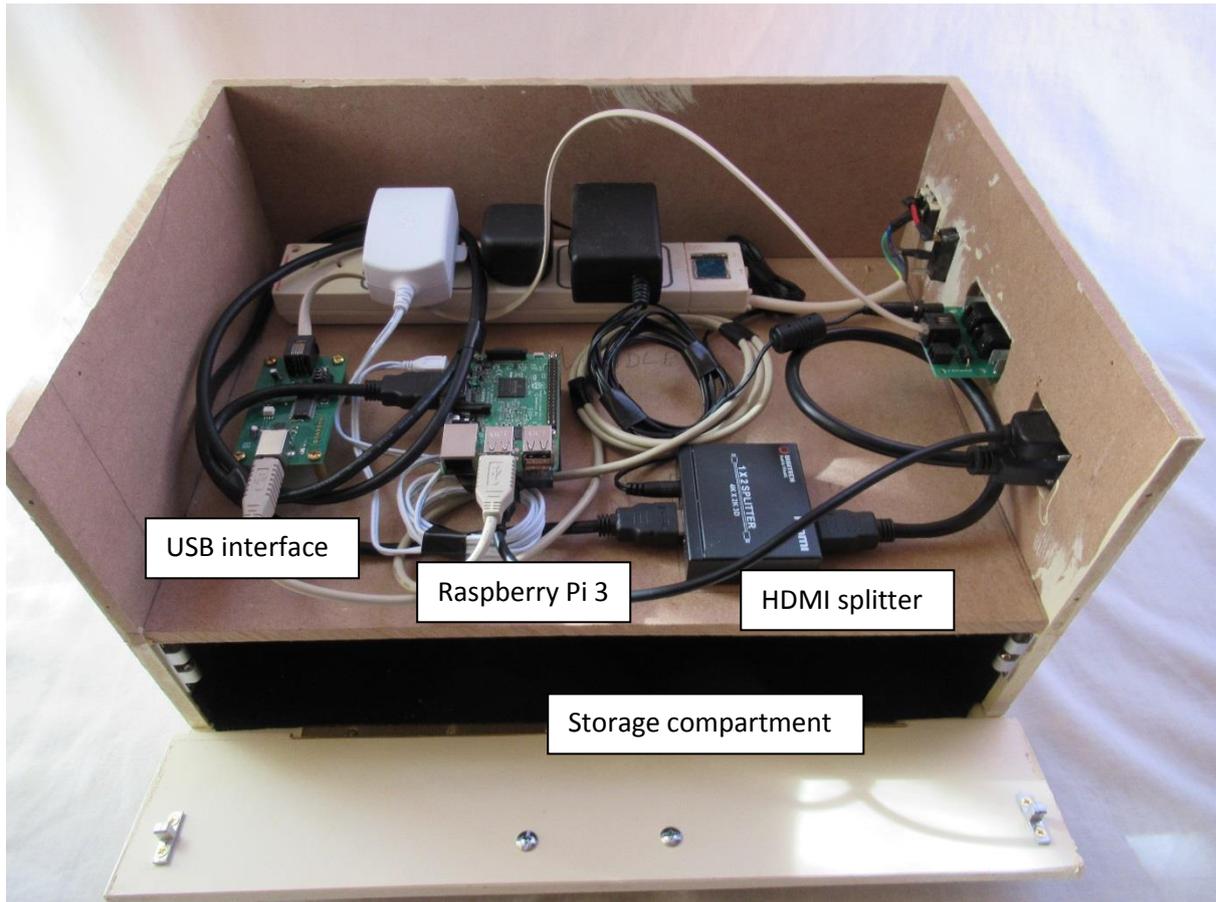
USB interface

Raspberry Pi 3

HDMI splitter

Storage compartment

Figure 3: The box with components in the upper section, storage below.
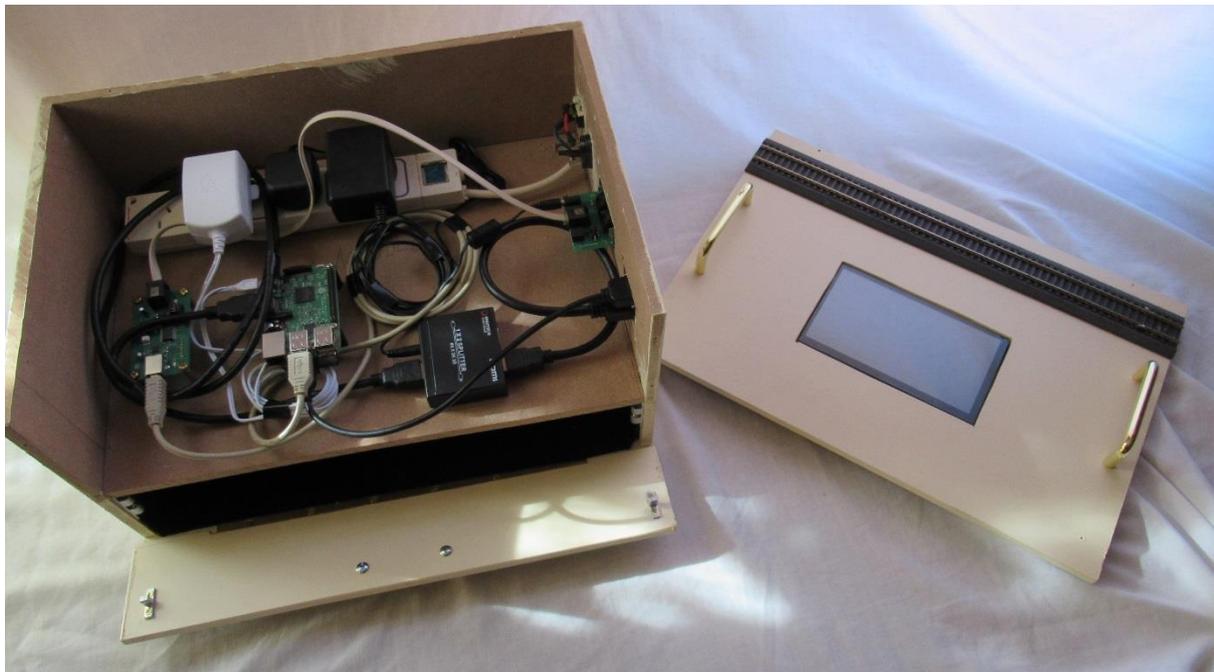

Figure 4: The box and lid, showing track and display

Figure 5: The connections - HDMI and USB on the left, PCP in the middle

Programming the Raspberry Pi was relatively simple. It came with a 16GB SD card with a Linux operating system installed. JMRI provides an installation package for Decoder Pro 3 that suits a Linux system and it loaded without hassle.

The finished box is 42 cm wide, 30 cm deep and 25 cm high. The completed system, together with its stored components, weighs 6.4 kilograms.

Figure 6: The finished system with its keyboard