Build a MAGNUM Programming Station for Large Scale and Multiple Decoders

By Paul Turvill

Introduction

The Quantum Programmer by QSI Solutions and its attendant software applications, Quantum CV Manager, Q1a Upgrade, and Q2 Upgrade, represent powerful tools for the model railroad enthusiast intent on programming, maintaining, upgrading and optimizing a roster of locomotives equipped with decoders from QSI and QSI Solutions. Add to this the fact that the Quantum Programmer can be used in its Operations Mode as a Command Station capable of driving virtually any DCC booster, and you have the capability of working with combinations of multiple decoders and large scale equipment that can easily require more electrical current than can be provided by the Quantum Programmer alone.

After taking on the task of programming and configuring a Magnum large scale decoder from QSI Solutions installed in an LGB Mogul steam locomotive, I quickly became aware of an important limitation of using the Quantum Programmer as a standalone device: it is limited to a maximum throughput of about 800 ma at 12 volts DC. This is fine for upgrading firmware with Q1a Upgrade or Q2 Upgrade and programming decoders with Quantum CV Manager in Service Mode, but quickly becomes inadequate for running and optimizing large scale decoders (such as the Magnum) or multiple smaller scale decoders in Operations Mode. A single Magnum decoder is rated at 2.5 amps (2500 ma), and running multiple smaller scale decoders, as when speed matching a four unit consist, can easily overwhelm the QP's 800 ma capacity.

Adding a Booster

Since the output of the QP in Ops Mode is essentially identical to the "RailSynch" signal used by DCC systems to control trains and perform Ops Mode programming (or programming "on the Main"), it makes sense that it can be used to drive a DCC booster to increase its effective output. Since I had recently acquired a spare Digitrax DB150 to fill in while one of mine was at the factory for repair work, I decided to put it to work in conjunction with my QP to do some serious speed matching on some units in my HO roster.

The booster connection is fairly straightforward: all that was required was a modified LocoNet cable with the railsynch leads connected to the QP, and the standard RJ12 connector plugged in to either LocoNet jack on my DB150. Using standard 6-wire telephone cable, the railsynch leads are the two outermost ones, normally the blue and white leads. I stripped about an inch of the outer sheath from a length of cable, then trimmed back the four inner wires flush with the sheath. After stripping about 1/4 inch of insulation from the blue and white wires, I tinned them with a bit of solder, and installed an RJ12 plug on the other end in the normal fashion.

Next, it was necessary to set up the DB150 in booster mode, which is done by simply connecting a jumper between its Config A and Ground terminals. With the jumper in place, the DB150 automatically enters booster mode whenever power is applied.

With the QP connected to a USB port on my railroad computer, its output connected to the DB150, and the Rail A and Rail B terminals of the DB150 connected to my test track, I now had the capability to program in Ops Mode and to run engines in combinations pulling up to the full 5 amp capacity of the DB150.

However, as I soon discovered, if I wanted to perform a firmware upgrade to any of my QSI or Magnum decoders, or to retrieve CV values or do any programming in Service Mode, I had to reconnect everything: Power down. Disconnect the DB150 from the track. Disconnect the QP from the DB150. Connect the QP output to the track. Power back up, and hope I had everything right. This struck me as a time-consuming and error-prone chore that tended to slow down productivity, and if not done correctly, could result in disaster. The last straw was when, after being interrupted during this changeover process and going back to my programming efforts, I inadvertently powered up with the QP and the DB150 both connected to the test track. The QP was not happy with this arrangement, and showed its displeasure by blowing its output circuits. Something needed to be done.

The Magnum Programming Station

My solution was to come up with a system of interlocked switches which could handle the necessary switching and at the same time prevent cabling errors. After much doodling, I settled on a pair of 4PDT toggle switches to handle the connections and mode switching. One of the switches has a center off position which disconnects the Config-A-to-Ground connection on the DB150 and provides a momentary power-off condition so the DB150 can sense the transition from booster to command station and back again.

In addition to setting the DB150's mode, this switch also manages the input to LocoNet jack A on the front panel. When the DB150 is in booster mode, the QP's output is connected; with the DB150 in command station mode, it is disconnected from the QP to eliminate the possibility of "dueling command stations."

The other 4PDT switch is used to make the correct connections to the test track. In the QP/Service position, the QP's output is connected directly to the track in Service Mode for upgrading firmware and doing decoder programming with readback capability. In the other (DB150/Ops) position, the output of the QP chained through the first switch to LocoNet, and the output of the DB150 (Rail A and Rail B) is connected to the track. A look at the schematic wiring diagram will reveal that it is impossible to connect both the QP and the DB150 to the track simultaneously—for me, and important safety feature.

Setting the DB150 Mode switch to "Cmd Sta" and the Track Feed switch to "DB150/Ops" permits a standard handheld throttle to be plugged into the DB150's LocoNet B jack for running trains in the usual manner. Since the Quantum Programmer's output is disconnected in this mode, there can be no adverse interaction between the QP and the DB150.

Construction

Since I have the luxury of a dedicated DB150 and power supply, I decided to mount the several necessary components to an 8.5"x11" piece of 3/8" plywood. The components consist of a Quantum Programmer, of course, as well as a DB150, a MF615 power supply, and a surface-mount electrical box to bring 120-volt AC to the MF615 and an 800 ma "wall wart" supply for the QP.

All of the components are more-or-less permanently mounted to the board except for the Quantum Programmer, for which I fashioned a spring-brass clip to hold it firmly in place while in use, but which also allows it to be removed easily when I want to use it in conjunction with my original programming track which is incorporated into my layout. The photographs and the layout drawing in Figure 2 show the general arrangement.

Since none of the components (other than the hardware store electrical box) have any arrangements for fixed mounting, I fashioned tiedowns from some 12" long rods I found in my junk collection. These were threaded with 1-1/2" of 2-56 (DB150) or 4-40 (MF615) threads on each end and were malleable enough to allow me to custom bend them to fit as shown in the photos. I trimmed all of the mounting hardware just beyond the mounting nuts, and added a set of rubber "feet" to complete the major assembly.

Also from my junk collection came a 6" length of 2-1/2"x3/4"x1/16" aluminum channel which I drilled for the toggle switches and mounting screws, and fastened to the front edge of the board. The "pretty face" is a Corel Draw creation applied as a home-made custom decal.

Photo 1 — Magnum Programming Station on the workbench, ready to be put into service.

Photo 2 — The Quantum Programmer is held in place by a brass spring clip to permit easy removal for other applications.

Photo 3 — The Magnum Programming Station in use testing and programming a QSI Solutions Magnum decoder installed in an older LGB Mogul steam locomotive.

Figure 1 — The author’s front panel layout, shown full size (2.5 ” x 6 ”). The original was created in CorelDraw, then printed on white inkjet decal paper from BEL, Inc., and overlaid with several coats of Krylon aerosol crystal clear satin finish.

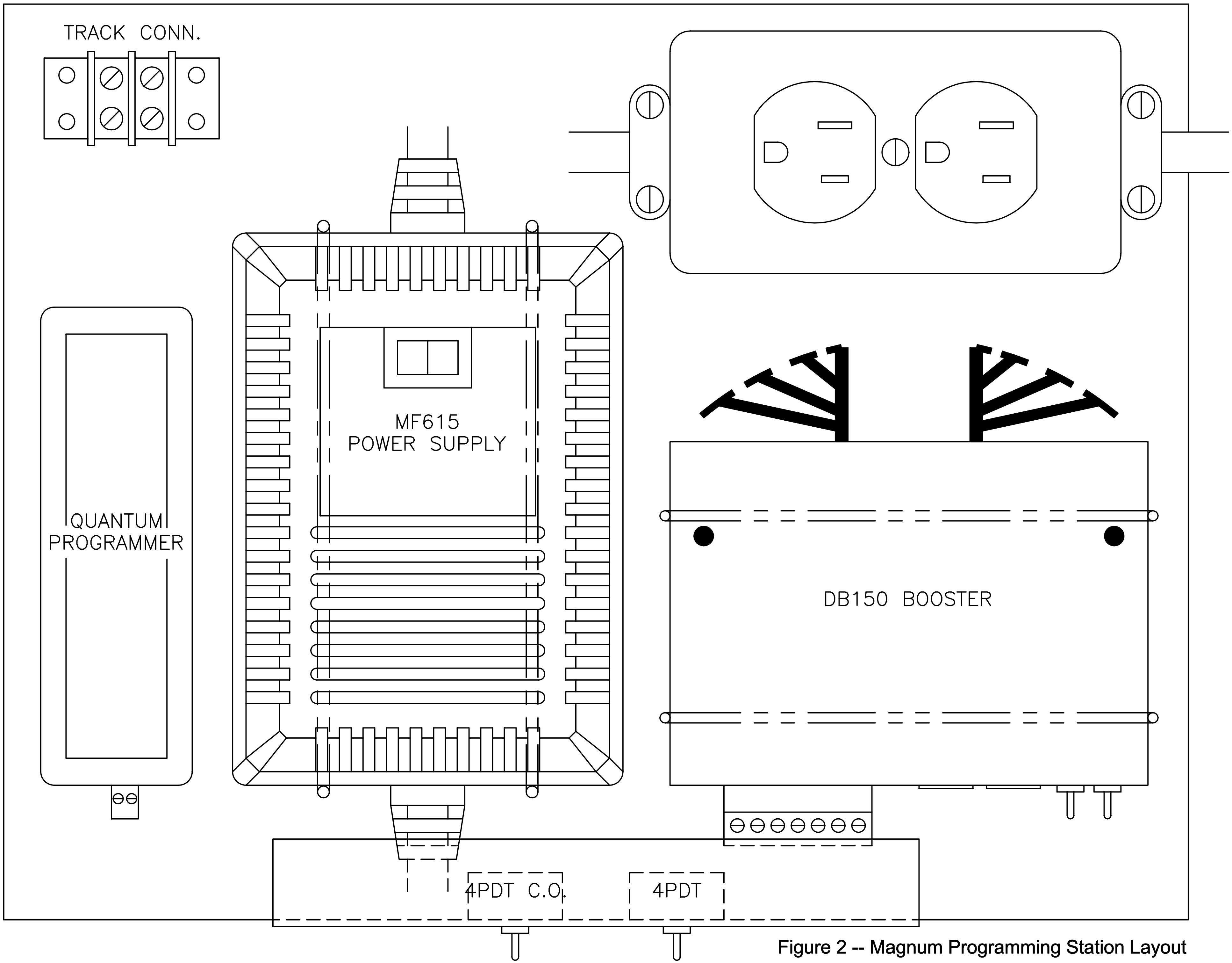

Figure 2 -- Magnum Programming Station Layout

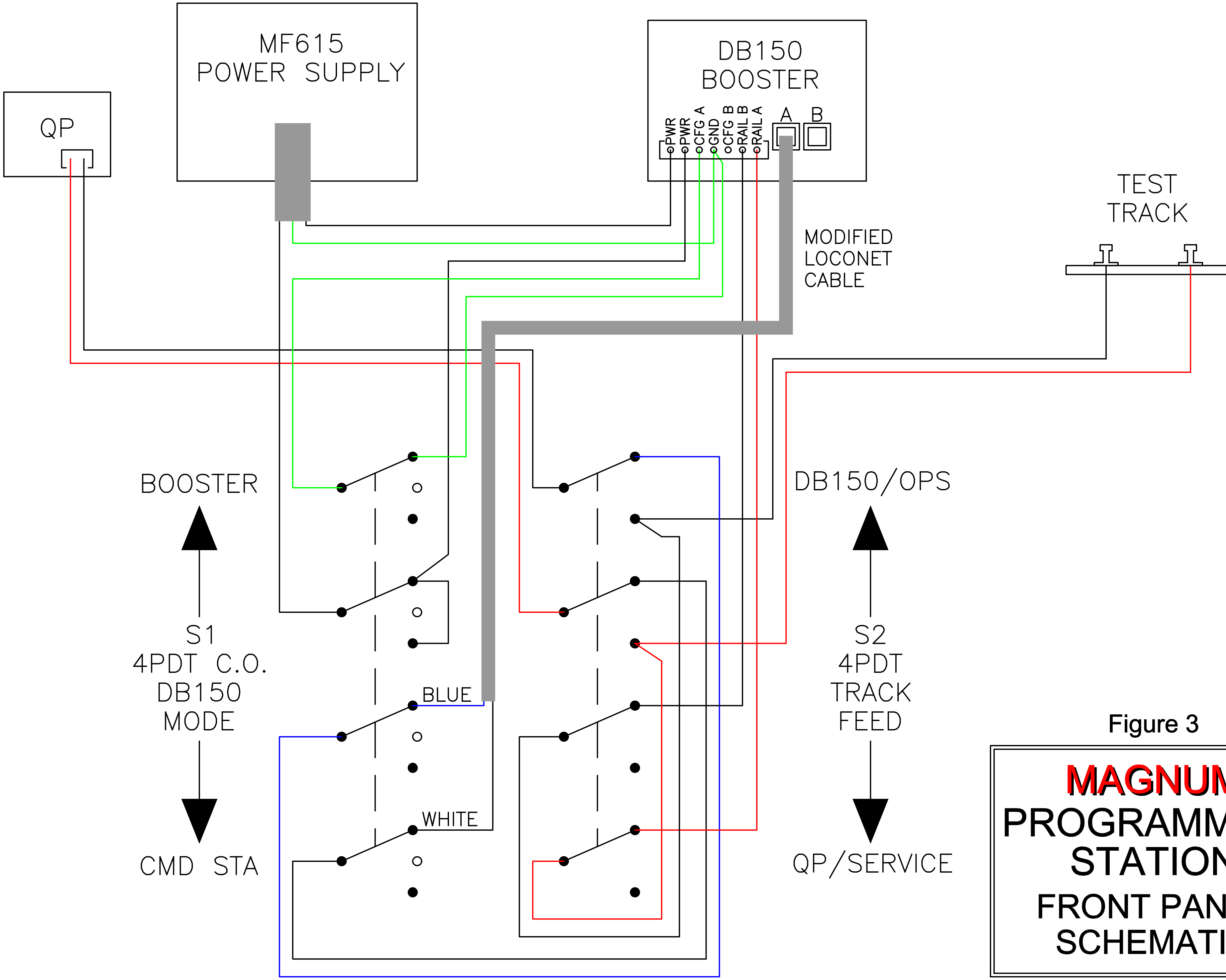

Figure 3

MAGNUM PROGRAMMING STATION

FRONT PANEL SCHEMATIC