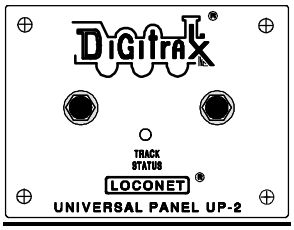
DIGITRAX UP2 Universal Panel Instructions



Digitrax Universal Panels make hookup, maintenance and troubleshooting of your LocoNet® network system simple. By using 6 conductor telephone cable with RJ12 6 pin male connectors on each end it's easy to daisy chain your network around the layout without worrying about hooking up a lot of wires. The UP2 has two 1/4" stereo jacks on the front and two RJ12 jacks on the back. It has an indicator LED that monitors the power state of a local track section. In addition, the UP2 can be used in conjunction with a UP3 with a DC power supply connected to it as a battery saver terminal for your throttles. The UP2 gives you the flexibility to rewire your Digitrax throttles with 1/4" stereo connectors if you wish. See Diagram 4 for instructions. The UP2 gives your layout a professional look and provides a simple, cost effective way to add throttle jacks and to expand LocoNet wiring. You can use your UP2 with other Digitrax Universal Interconnect products such as the UP1 and UP3 and also with TelCo RJ12 6 pin type jacks. See Diagram 1 for connection diagram.

Front Panel:

Two 1/4" Stereo Jacks: The front panel of the UP2 has 2 1/4" stereo jacks that can be used with any Digitrax LocoNet® throttle that is not running as the command station for the system (DT200, BT2, DT100, etc.). If you are running with a DT200 as the system command station, that particular DT200 must be operated with the RJ12 6 conductor connection that came with the throttle and must be plugged in to the "A" end of the LA-1. All other throttles running with the system can be rewired to operate with 1/4" stereo jacks if you wish. Note: The 1/4" stereo jacks in the front of the UP2 can only be used as throttle jacks and should not be used as LocoNet connections. LocoNet connections are provided on the RJ12's on the rear of the UP2.

TRACK STATUS Indicator: The TRACK STATUS indicator is a bi-color LED that reports the power state for a local track section connected to the UP2 for monitoring. This LED will not be lit if the UP2 is not hooked up to a local track section to provide power. The 1/4" stereo jacks will provide throttle power when you hook the UP2 up to a local powered track section.

Mounting Holes: The Universal Panel has 4 corner mounting holes for #6 screw clearance. The panel is normally flush mounted in the fascia of the layout or module, and the network wiring is accessed and hidden behind the fascia. See Diagram 2 for mounting template.

Rear Panel:

Two RJ12 Jacks: The rear of the UP2 has two RJ12 6 pin jacks that are "daisy-chained" pin-for-pin. These are typically used with the LocoNet® jumper plug coming from the previous Universal Panel in on one side, and continuing out on the other side with a jumper cable to the next Universal Panel in the network. You can use these two jacks in any convenient order for connection to other devices. You can use "splitters" to provide more connections if needed just be sure that they are 6 pin to 6 pin.

LocoNet® can typically support a total cable length of up to 1,200 feet, & no two devices should be connected by more than 600 feet of cable. This allows for the network to be split & branched in a free form style with no stringent connection rules for network transmission. You can "tree" or branch out network stubs wherever it is convenient for the layout and debugging or servicing. The single network termination needed is provided by the LA-1 LocoNet Adapter or the DCS100 Command Station. *We do not recommend looping the network back on itself.*

You can purchase ready made 6 pin male RJ12 to RJ12 jumper cables of various lengths from many sources. *Be sure to use 6 conductor and not 4 conductor plugs and wires.* Alternately, you can crimp your own jumper cables. The digital LocoNet® will operate with either "reversing" or "non-reversing" type jumper cables. The Universal panels are "reversing" in that all pin 1's of the RJ12 jacks connect to one another.

2-Local Track Power Terminals: There are two #6-32 right angle screw terminals provided at the rear of the UP2. Connect these to each rail of a convenient track section using 22 to 28AWG wire. These terminals can be hooked up

either way to the rails. The TRACK STATUS led on the panel front will be lit when the local track has power. This allows individual UP2's to diagnose whether individual power boosters or "districts" are shorted. Note that the TRACK STATUS circuit and the throttles draw their power from this input, and the 1/4" stereo jacks need this connection to provide extra operating power to throttles connected to them. Normally this Local track input **should** be wired to the track so that the unit can pick up track power.

Using the UP2 with a UP3 to provide additional power to run throttles when the local track section is not powered up. The UP3 has a 2mm DC power jack that lets your UP3's and UP2's act as "battery saver" modules by powering throttles from LocoNet rather than from their internal batteries. You can power up to 9 additional UP3's and UP2's from a single +12V to +15V DC supply such as the Mouser 412-1104 (12v 500ma) connected to one UP3. See Diagram 3 for connections needed. When one or more of these jacks are powered they will "keep alive" LocoNet even when the command station is off and all throttles plugged in will run off LocoNet Power and will conserve battery power. You can leave this jack unconnected if you choose not to use it as a keep alive jack.

Wiring Your Layout with LocoNet®

There are no real restrictions on LocoNet wiring with respect to wire pairs. Most Digitrax customers choose to use 6 wire Telco type flat ribbon cables because they are cost effective, simple to wire and give superior network performance. We engineered LocoNet to use 6 wires because of several advantages outlined below. LocoNet can actually run on just 2 or 3 wires.

1) In a 6 wire flat configuration, as crimped onto a RJ12 6 pin style plug, the left 3 wires are effectively a "mirror" image of the right 3 wires. This allows you to "daisy-chain" outlets without worrying about whether the cables are "reversing" or "non-reversing."

2) There are 2 ground and 2 LocoNet data connections, so the effective "loop resistance" is lower due to paralleled wires. This makes it possible to run LocoNet over greater distances than other command control systems.

3) If a ground or signal connection is broken or intermittent the network can still maintain a reliable connection. These types of faults are the greatest nightmare to locate and fix!

4) The two outside wires, typically Blue and White in a 6 conductor Telco ribbon, actually carry opposite phase copies of the master system rail packets, this is called RAIL SYNC. Because these are broadcast differentially in a single cable, we can accurately and reliably tap a remote Track booster anywhere along a LocoNet cable run. We can do this many thousands of feet from the Master Packet generator (Command station) with very good signal fidelity, even in the presence of a lot of noise and interference! Also, this signal is capable of supporting a number of low current draw modules that can tap on anywhere in the network.

5) The balanced nature of the cable and the way the signal currents propagate in this "RF Quad" configuration allow the lowest possible RFI radiation outwards, and EMC susceptibility or inward interference pickup. This is a good thing. This is part of the reason Digitrax's LocoNet handily passed the FCC Class B radiation Certification requirements.

6) The LocoNet philosophy and architecture were carefully crafted to allow "free-form" wiring with no termination or "linear-bus" restrictions. You can "star", "tee" into, branch or expand the network any way that is convenient for you. If you do choose to "loop" the wiring back on itself (like a snake biting its tail) be sure that the outside 2 Railsync wires have a matched polarity! The center 4 pins of the RJ12 can be plugged in either orientation.

These are the reasons we would recommend the loop around the layout be a 6 conductor ribbon type wire. The wire guage in the range of 22AWG to 28AWG is OK. Telco uses typically 26AWG. If you don't mind the extra work, you could use round 3 pair cables. It is best to stay with a fixed color to pin number in the jacks throughout the layout to prevent later problems debugging!

We find it best to break up this "backbone" wiring into sections. Each section will be a run of cable connected by male-male 6 conductor cords with RJ12 plugs on each end. This allows the network to be quickly disconnected and isolated for fault-finding or expansion. The Digitrax Universal Panels (UP1, UP2, & UP3) are connection panels that are very convenient for quick layout hook up. They come in a variety of configurations to suit the needs of most layouts. You just plug in your cables and you are ready to play. Obviously it is cheaper to use 6 conductor dual wallplates and wire them in parallel around the layout. This will take you a little more time but will save money. The main down-side to this is that if any of the cables are disturbed or yanked on, it is very time-consuming to try to repair a "birdsnest" of small wires under the layout! The choice is up to the you!

Your LocoNet wiring scheme is very flexible and easy to wire. It was designed to be "plug & play" because we know you would rather spend your time running your trains instead of troubleshooting the wiring. The primary concern really boils down to having a physically secure and maintainable wiring strategy and discipline. The "glow" of low price wire and fixtures quickly fades, as you become the poor individual who has to trouble-shoot a maze of "spaghetti" that was disturbed by someone who tripped over "some wires" under the layout!!