



Complete Train Control
Run Your Trains, Not Your Track!

LNRJ12P20 20 RJ12 Modular Plugs

For All Scales

LNRJ12P20 Contents:

- 20 x RJ12 Modular Plugs
- Instruction Sheet

Uses for RJ12 Modular Plugs

- Use with all LocoNet Cables and Throttles
- Make up LocoNet Cables using 6 conductor flat ribbon cable.
- Repair broken plugs on existing LocoNet cables
- Repair broken plugs on Digitrax Throttles
- Use with RJ12 Crimping Tool as provided in the LocoNet Cable Maker Kit (LNCMK)

LocoNet, the Digitrax Difference

LocoNet is Digitrax's method of communication between LocoNet compatible devices on a model railroad layout. LocoNet Compatible devices are designed to work together on the network, and in some cases can also accept DCC commands from the track, but often go beyond the scope of simple DCC train control.

LocoNet is a peer-to-peer Ethernet type multiple access network. Because of its design architecture, it is very robust and powerful. Layout implementation is simple and wiring is free form with minimal limits.

LocoNet is designed to run an unshielded 6 conductor ribbon cable. Digitrax recommends using flat, six-conductor telephone wire and RJ12 6P6C connectors for LocoNet wiring. This is a simple, cost effective way to wire LocoNet for excellent network performance and reliability.

Using shielded twisted pair conductors or Cat3, Cat4, Cat5 and above will degrade LocoNet data performance and limit maximum wire footage that can be installed on the network. This type of wiring is not recommended by Digitrax because of its limitations.

The 6 LocoNet conductors are: two ground return connections (Pins 2 and 5), two data network signal connections for LocoNet message exchanges (pins 3 and 4), and two RailSync lines for signals that are mirror copies of the system DCC or other digital track control packets (pins 1 and 6).

With no message traffic, the two LocoNet data wires should measure approx. +12V DC with respect to LocoNet ground.

The RailSync lines communicate a copy of the track signals to the Boosters for amplification and transmission to the rails. RailSync lines can power a limited number of LocoNet connected devices on small layouts. As the number of power consuming LocoNet devices attached to LocoNet increases, the need to separately power those devices increases.

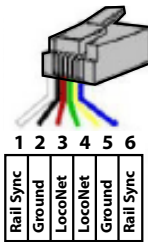
RailSync is a low power signal that mirrors the DCC packets on the rails. It is generated by the Command Station and sent out via LocoNet (pins 1 & 6) to devices such as Boosters, Occupancy Detectors and any other device which require RailSync to operate. Boosters receive the RailSync data, amplify or boost the signal and output it to the track. RailSync can also be used as a source of power for low current devices such as throttles.

The LocoNet data network capability can run on as few as 2 or 3 wires. Confusion may result in that the whole cable is termed a “LocoNet” cable but in fact carries the LocoNet data messages and also packet copy/connectivity functions.

Digitrax uses the following LocoNet Wiring Convention:

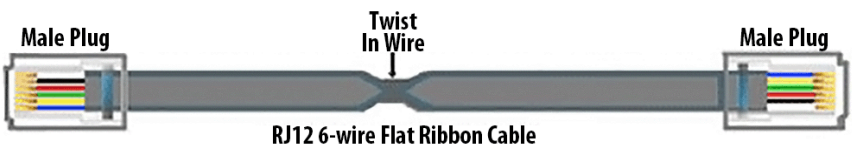
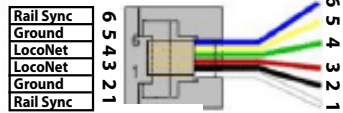
Pin No	Color	Function	Voltage
1	White	Rail Sync B	7 vdc
2	Black	Ground	—
3	Red	LocoNet	14.5 vdc
4	Green	LocoNet	14.5 vdc
5	Yellow	Ground	—
6	Blue	Rail Sync A	7 vdc

All components are RJ12 6-wire
Do not use RJ11 4-wire

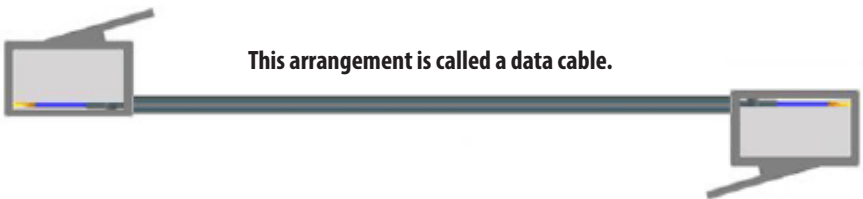


Male Plug

Female Jack



This arrangement is called a data cable.



LocoNet Wiring: The Theory Behind the Practice

Digitrax recommends using the 6-wire configuration for the following reasons:

1. In a 6 wire flat configuration, the left 3 wires are effectively a “mirror” image of the right 3 wires.
2. There are 2 Ground (pins 2 & 5) and 2 LocoNet data connections (pins 3 & 4), so the effective “loop resistance” is lower because of paralleled wires. This lets LocoNet run over greater distances.
3. If one ground or signal connection is broken or intermittent, the network can maintain a reliable connection.
4. The two outside wires (pins 1 & 6) carry opposite phase copies of the master system rail packets, this is called RailSync. RailSync allows LocoNet boosters and other LocoNet devices to be connected anywhere along a cable run. This works even with cable runs of thousands of feet and in the presence of noise and interference.
5. The balanced nature of the cable and the way the signal currents propagate in this “RF Quad” configuration generate the lowest possible RFI radiation and EMC susceptibility or inward interference pick-up. This is a good thing. This is part of the reason Digitrax LocoNet handily passes the FCC Class B radiation Certification requirements.
6. LocoNet’s philosophy and architecture allow “free-form” wiring with no termination or “linear-bus” restrictions. You can star, tee, branch, or expand LocoNet in any configuration. LocoNet can be used in any configuration except for a ring. You should NEVER connect LocoNet back on itself, because pins 1 and 6 should not be connected.

Test EVERY LocoNet Cable before installation as follows:

1. Commercial cable testers can be used to test LocoNet Cables. Follow the instructions provided with the cable tester to test cables without connecting them to LocoNet. Once the test is completed good, cables can be installed on the layout.
2. Every Digitrax Starter Set and LocoNet Cable Maker Kit includes an LT1 for testing LocoNet cables. LT1 LocoNet Testers can also be purchased separately.
3. Plug one end of the LocoNet cable being tested into the LT1
4. Plug the other end of the LocoNet cable being tested into LocoNet
5. Turn on Track Power using a throttle.
6. Make sure address 00, the analog loco address, is set to 0 speed.
7. Leave the throttle plugged in to LocoNet.

8. If the cable is good ALL 4 LEDs will glow.
- a. LED 1 checks RailSync White & Black wires
 - b. LED 2 checks LocoNet Black & Red wires
 - c. LED 3 checks LocoNet Green & Yellow wires
 - d. LED 4 checks RailSync Yellow & Blue wires



9. If any of the LEDs fail to glow or are dim, cut the ends off the cable and crimp new connectors on the cable. Re-test the cable. If it still fails the test, there may be a problem with the cable itself and you should consider discarding it.
10. DO NOT leave the LT1 connected to a running layout, because it adds an extra unnecessary load LocoNet. It is meant to be used as a simple temporary diagnostic tool.
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