



## RX-3P RECEIVER INSTALLATION MANUAL

### Basic installation (motor, power, and sensor wiring)

NOTE: All receivers are shipped with the following configuration:

- Primary channel = 01
- Secondary channel = 01
- Momentum = 0
- Speed curve = 0
- Headlight mode = 0

Please read the entire installation procedure before starting to install the receiver in a locomotive. If any of the steps are skipped or done wrong, there is the possibility of damaging the receiver.

*RAIL-LYNX* acknowledges that our receiver is more difficult to install than most command control systems; on the other hand almost no modifications to the layout are required.

If after reading the instructions you feel uncomfortable about doing the mechanical and electrical work, you may want to consider one of the following options:

1. Have the installation done for you by a professional. *RAIL-LYNX* can supply you with the names of people who have installed large numbers of command control receivers and are interested in doing it for you for a modest fee.

2. If you do not want to do the installation yourself or have someone else do it for you, *RAIL-LYNX* will cheerfully allow you to return the units for a full refund of your purchase price. The only charge to you will be for shipping (this offer is made only if the units are returned exactly as they were shipped).

Assuming you have decided to do the installation, let's get on with it!

#### MECHANICAL

The receiver consists of two sections: The small printed circuit board (board from now on), and the small black photo-sensor (sensor from now on). The board must be mounted somewhere in the loco, and the sensor must be located somewhere on the upper surface of the loco. The somewhere is the challenge.

Stuffing the board into some locos can take some imagination while others only require some double-sided tape to mount the board on top of the motor (diesels) or in the tender (steam).

After a location for the board has been selected the sensor mounting should be considered. This takes the most creativity. As stated above it must be located on the upper surface to insure maximum exposure to the infrared signals sent by the transmitter. If it is not, the distance for reliable control may be greatly reduced. Another option is to mount in the cab windows, one sensor facing to either side of the track (Figure 2).

One of the easiest sensor installations is to simply drill a 3/16" diameter hole in the top of the shell. Carefully counter sink the hole from the top and cover any exposed plastic (if it is a different color) with black paint. The sensor can then be

mounted in one of two ways. One method is to glue the sensor on the inside of the shell with the dome centered in the hole and the leads connected as described below. Care should be taken that none of the sensor wires get tangled in the flywheel or other parts of the mechanism when the shell is put on.

Another, and recommended method, is to drill the same hole as above, but to mount the sensor on the mechanism of the loco on top of a small piece of sponge rubber. The sensor will move up and down slightly so when the shell is slipped onto the mechanism, the sensor will be held up against the bottom of the shell by the sponge rubber. The advantage of this mounting is that all of the wiring to the receiver can be anchored to the mechanism and the shell can be easily removed without having any wires dangling.

If the installation is in a brass loco, care must be taken to prevent the leads from shorting to the shell. Insulated tubing should be used. The wires from the leads of the sensor may be anchored to the inside of the shell using double-sided tape.

The three leads on the sensor may be bent 90 degrees without any damage as long as they are held with pliers while bending to prevent stress on the plastic housing. The sensor may be painted, except for the domed part. The dome is where the infrared signal enters. Slight weathering has little effect on the sensor, but don't get carried away.

#### ELECTRICAL

If the loco is equipped with a standard DCC socket use the matching *RAIL-LYNX* plug. This will greatly simplify the installation. Even with the plug, step 3 below still has to be performed.

There are three electrical sections of the receiver that have to be connected.

1. Power input from the track via the wheels (2 wires)
2. Power output to the motor (2 wires)
3. Data input from the photo-sensor (3 wires)

The first two are identical to most other command control systems, while the third is unique to *RAIL-LYNX*.

The first step is to isolate the motor from the track or wheels. This is extremely important! Both of the motor leads must be isolated from all other connections. Some locos have one side of the motor connected to the frame and this has to be broken.

Once the motor is isolated it should be confirmed by using a multimeter set to read ohms. Connect one side of the meter to one of the motor terminals and then, with the loco on a piece of track, touch the other lead of the meter first to one and then to the other rail. There should be no reading on the meter. If there is then the motor is not isolated. Carefully inspect the motor and its wiring to find where one or more of the connections either connect to the frame or to the wires coming from the wheels. This may take some effort, but it is vital to the operation (and survival) of the receiver.

RX-3 only: After the motor is isolated the two motor drive leads from the receiver (gray and orange) should be connected to the motor (Figure 1). Connect the gray lead to the motor brush that had been connected to the right hand rail. Connect the orange lead to the motor brush that had been connected to the left hand rail. This will insure that the loco goes in the proper direction when commanded by the hand-held transmitter.

Next connect the two power leads (red and black) to the track connections. It does not matter which wire goes to which track connection, the track connections vary with different locos and manufacturers. Most diesels have two wires which connect to the wheels, or have one wire from the wheels and the other connection is via the frame. On diesels make sure power is connected to both trucks. After the power is connected, check for a short by placing the loco on a piece of test track with a multimeter set to read resistance connected across the rails. A very low reading (less than 20 ohms) indicates a short in the power wiring. Check to see if any wires are pinched, or if the leads from the two trucks are reversed.

Most steam locos have the loco frame connected to one rail of the track and the tender frame connected to the other rail. Therefore, connect one red lead to the loco frame and the other to the tender frame.

The sensor leads (white, black and green) must be connected next (Figure 2). If the sensor was mounted on the upper surface of the diesel or tender and the leads bent and passed through three holes (a common method), then the three wires may be soldered to the three leads of the sensor. Care should be taken not to apply the soldering iron to the leads too long (3 to 5 seconds max.) or the sensor may be damaged. Make sure that the green and white leads are not reversed (the black lead goes to the center lead and that's tough to reverse). Please closely follow Figure 1 for the green and white connections and remember to picture how they look when viewed from the bottom, which is where the solder connections will be made. A piece of shrink tubing can be placed on the center pin to prevent any of the leads from shorting.

To test the receiver place the loco on a piece of test track. Connect the power supply or power pack to the track with the 10 ohm resistor (the one supplied with the receiver) connected in series with one of the leads (Figure 3). This resistor will most likely (but not positively) protect the receiver from a wiring error. Connect a multimeter set to read voltage as shown in figure.

Slowly advance the speed control on the power pack and observe the voltage reading on the meter. If the meter reads backwards, reverse the meter leads. Continue to increase the voltage until 12 volts is reached. If, as the speed control is increased, the voltage does not read anything, or reads very little, most likely a short or miswire has occurred. A finger placed on the resistor can detect any temperature rise. The resistor will get hot if any thing is wrong! If the voltage does not increase and/or the resistor gets hot, quickly remove the power. After removing power, recheck the wiring. Normally the resistor will prevent any damage to the receiver if something is wrong with the installation.

During all this time the loco should not move, but sit patiently and wait for a command from the hand-held transmitter. If it starts to move there is probably a miswire. Turn off the power and recheck the wiring.

If everything seems OK, turn on the *RAIL-LYNX* transmitter by moving the toggle switch to the on position. Set the top channel switch to "0" and the lower channel switch to "1". This selects channel 01, which is the primary channel that all receivers are initially loaded with before shipment. Move the "FORWARD" switch to the right (HL), point the transmitter toward the loco, depress the right hand

DIRECTION button and rotate the speed knob to about the eight or nine o'clock position.

The loco should begin to move or at least make a buzzing sound. If the loco just buzzes, increase the speed knob until it starts to move. To stop the loco depress the "STOP" button. After stopping the loco depress the left hand DIRECTION button. The loco should move in the opposite direction. If the loco behaves correctly the wiring is correct.

With the "FORWARD" switch in the "HL" position the loco should move in the forward direction, when the right hand DIRECTION button is pushed, if it moves in the rearward direction the leads to the motor should be reversed (NOT THE LEADS TO THE TRACK!).

On the first installation it may be desirable to make all connections temporary and operate the loco without the shell to confirm that the wiring is correct and understood. Please be very careful to make sure that none of the wiring or sensor leads touch the loco frame or the track as severe damage can result.

That's all there is to it... that wasn't all that bad, was it?

## ADVANCED FEATURES AND INSTALLATION

### SPEED CURVE

There are five speed curves stored in the receiver. Curves 0-3 are stored in program memory and cannot be changed. Curve 4 is stored in data memory and can be customer designed and loaded using SPEED-LYNX and any computer capable running DOS.

The speed curve determines the speed of the loco vs the position of the speed knob.

Speed curve 0 is a linear straight line from 0 to 100% of track voltage.

Speed curve 1 is a linear straight line from 0 to 75% of track voltage.

Speed curve 2 is a linear straight line from 0 to 50% of track voltage.

Speed curve 3 is a linear straight line from 0 to 37% of track voltage

Speed curve 4 is a CUSTOM SPEED CURVE.

As shipped the receiver does not have a speed curve 4, it should not be selected.

It can be changed using the SPEED-LYNX software running under DOS, and either the loader module, or any repeater. Any of the 126 speed values may be assigned to any of the 32 knob positions to produce any type of curve desired. See the SPEED-LYNX manual.

### SPEED CURVE SELECTION

To select one of the speed curves, set the loco's primary channel on the channel switches and set the speed knob in position 0 (full stop), 1, 2, 3, or 4. While holding the "SHIFT" button down, depress the hidden button on the bottom of the XMTR. This will select the desired speed curve.

**CAUTION;** this command is an offshoot of the primary channel command and will be accepted by any loco equipped with an older RX-1 receiver seeing the message. It should normally be used only during installation on the bench, or be sure you prevent any other locos in the area from accidentally accepting the command.

## SPEED OFFSET

This is used to correct for a loco that doesn't start until the speed is increased to a fairly high value. This command essentially adds several (up to 7) clicks to the speed knob's position. Any number over 7 will be interpreted as 7.

For example, suppose a loco does not start to move until the speed knob has reached 6 clicks. A reasonable correction would be to add 4 clicks of positive speed offset. To do this, set the loco's primary channel on the channel switches, and advance the speed knob 4 clicks

above 0. Depress the hidden button on the bottom of the XMTR. This will load an offset of 4 into the loco. Now the loco should start to move after only 2 clicks.

**CAUTION:** This command is an offshoot of the primary channel command and will be accepted by ANY loco seeing the message. It should normally be used only during installation on the bench, or be sure you prevent any other locos in the area from accidentally accepting the command.

## CONNECTION DIAGRAM

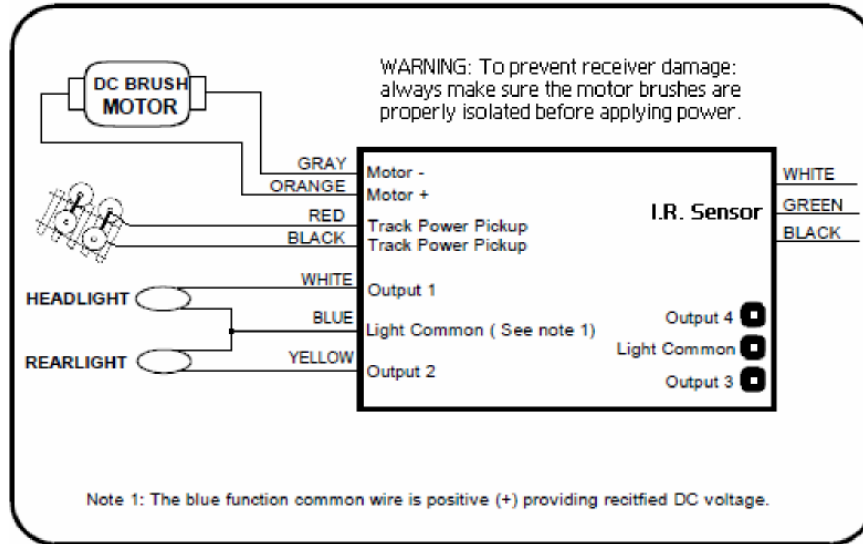


Figure 1

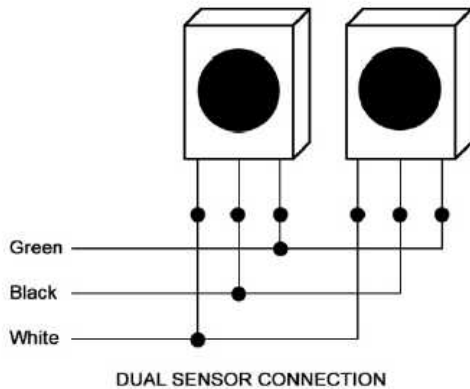


Figure 2

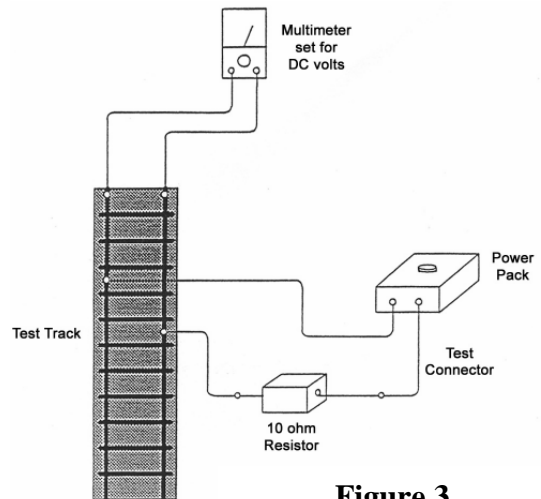


Figure 3

## RAIL-LYNX

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## MARS, STROBE, & DITCH LIGHTS FOR RX-3P

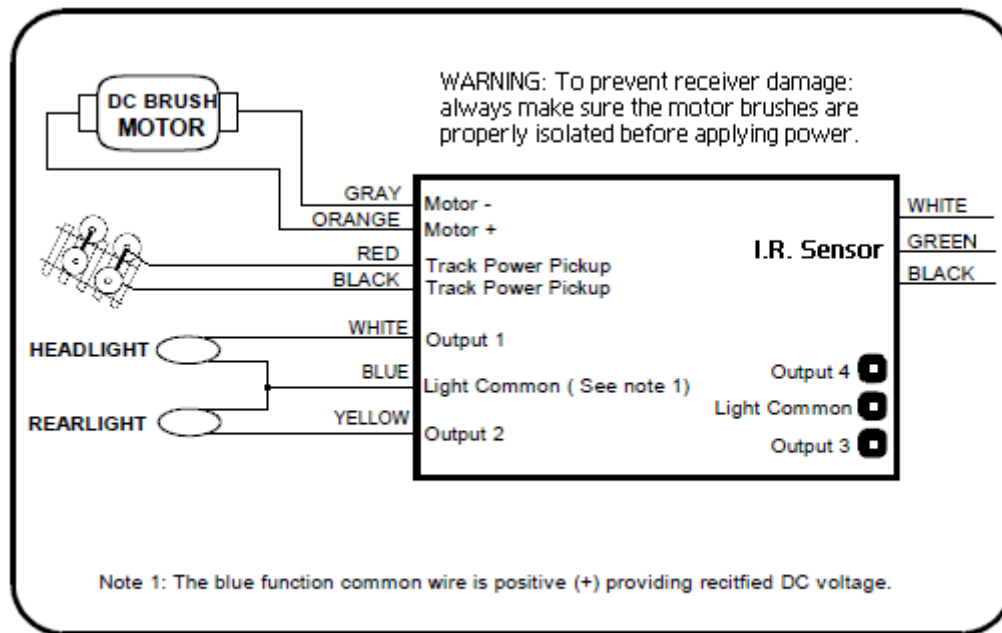
The MARS light is connected between the Common "C" and the "3" hole. The Strobe and Ditch Lights connect between the Common "C" and the "3 & 4" holes. The outputs of all the lighting effects are 12 Volts. Feel free to cut back some of the heat shrink tubing if required to gain better access to the wiring holes.

Note: Due to the high in-rush current of incandescent grain-of-wheat type bulbs (about 10 times their normal operating current) outputs are rated at 40mA each if used with incandescent bulbs, otherwise they are rated at 100mA continuous if used with LEDs or other low in-rush devices. We recommend the Miniaturics #18-712-10[12v], #18-014-10 [14v] If you wish to use 50-100mA rated lamps we recommend a 22 ohm 1/4 Watt resistor in series with each bulb (this will greatly extend bulb life).

If you use an LED a series resistor is required, typical values are about 1K ohm but can be varied to adjust brightness. The cathode (shorter lead or lead by the flat spot on body) goes towards the "3 or 4" side.

The RX-3P ships from the factory with Aux lighting in "toggle" mode unless otherwise specified at time of order.

### CONNECTION DIAGRAM



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