RAIL-LYNX INFRARED REPEATER SYSTEM

INSTALLATION AND OPERATION MANUAL

The Rail-Lynx repeater system is designed to provide continuous control of infrared command control equipped locos while operating in tunnels, hidden trackage and staging yards.

The system consists of an infrared (IR) sensor, a repeater module, and ten IR light emitting diodes (LEDs).

The IR sensor (a 1/4" square unit with a bubble on one surface) is installed where it can receive the signals sent by the hand-held transmitter. It can be mounted in the scenery (near the tunnel portal?), in the ceiling, or in the bench work. Three wires (any gauge will do) connect to the repeater module.

The repeater module should be mounted reasonably close to the sensor, preferably within several feet. The three wires that connect the sensor to the repeater module, should be twisted together to reduce noise pickup, which could result in erratic operation,

The ten IR LEDs are connected to the repeater module in two strings of five each (Figure 1). The length and gauge of the wires is not critical. The positioning and aiming of the LEDs is somewhat critical and can be done in one of two ways. One is the "direct" method (Figure 3), in which the signals of the LEDs travel directly to the loco. The other is the "indirect" method, where the signals are bounced off the surface above the hidden trackage.

If the clearance above the track is 18" or more, the "above" track method usually works best. If the clearance is less than 18", the "below" mounting using the bounce method seems best (Figure 2). Of course a combination of the two may also be used. It may take some experimentation to get optimum performance.

The invisible LED output is similar to a flashlight, in that it is a fairly narrow beam (about 20 degrees wide). Pointed straight down (or up) it will create a circle about 4" in diameter for each 12" of distance it travels. The circle increases in size linearly with distance. Thus it will be 8" in diameter at 24", 12" in diameter at 36" etc.

To increase the coverage all we have to do is tilt the LED so it will create an oval shaped pattern. If the LED is tilted 45 degrees, the oval will be 8" for each 12" of distance. At 60 degrees the oval will be 18" for each 12" of distance (try it with a flashlight). Therefore it seems obvious, that tilting gives more coverage as long as you don't get carried away. As you increase the coverage, the signal strength decreases as the square of the distance. This means that you when you double the distance the signal is reduced four times. Notice how the intensity of the flashlight decreases as you increase the angle.

Slowly run a loco through the hidden trackage. Continuously stop and start it as it proceeds to identify any dead spots. If the loco will not stop or start it is in a dead spot, the LED near that area should be re-aimed to eliminate the dead spot. Repeat the test run after each adjustment. To get complete coverage you may have to relocate, carefully bend and or/twist the LEDs. Make sure you do not short the two leads of the LED. It will stop working but the others will continue to operate correctly. This may cause the repeater to overheat.

The effort required to position and adjust the LEDs correctly will be well rewarded, with a smooth and unnoticeable transition from visible to hidden operation.

Where there are several short tunnels a single repeater may be used by distributing the ten LEDs among the tunnels and locating the sensor in a central position.

If more than 5 LEDs per loop is desired, 24 volts may be used to power the unit. This will allow up to 10 LEDs to be used in each loop. Note that if this is done then both loops must use the 10 LEDs.

TROUBLESHOOTING

If the LED on the repeater module stays on continuously after it is powered up, most likely the sensor wiring is incorrect (check to make sure the outer pins on the sensor are not backwards. If it stays on after sending a command, then feedback might be the problem (check the position of the sensor relative to the LEDs).

If the LED fails to flash after each command is sent one of several problems may exist.

1. The sensor is miswired.
2. One or both of the loops are broken
3. One or more of the LEDs is connected backwards.

If all the wiring appears correct connect the plus lead of a multimeter (set for something around 10 volts DC) to terminal 7 of the repeater and the negative lead to terminal 2. The meter should show about 5 volts. Each time a command is sent the meter should jump downward and return to 5 volts. If it does not the wiring or the sensor is defective. Note: If the meter shows a very low reading it may be caused by a bright nearby incandescent light. This type of bulb emits large quantities of infrared energy and may be saturating the sensor. If this is the case relocate the sensor or the light.

If the meter does jump downward the sensor is operating correctly. Connect the multimeter (now set to read around 500 ma.) in series with one of the LED loops.

Break the look at terminal 4 and connect the plus lead toward the LEDs and the minus to terminal 4. The meter should jump upwards when ever a command is sent. If it does not then one of the LEDs is either backwards or defective. Temporarily short one LED at a time until you see the meter jump with each command. That LED is either backwards or defective. If this loop works OK, then repeat the test on the other loop using terminal 5 instead of 4.

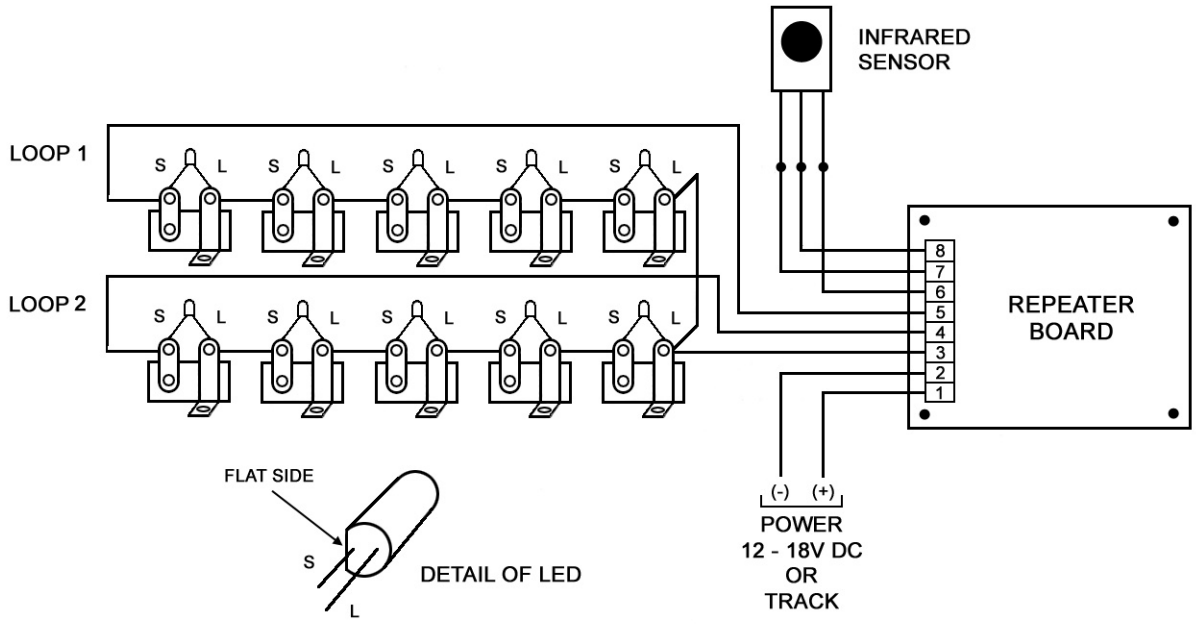

FIGURE 1

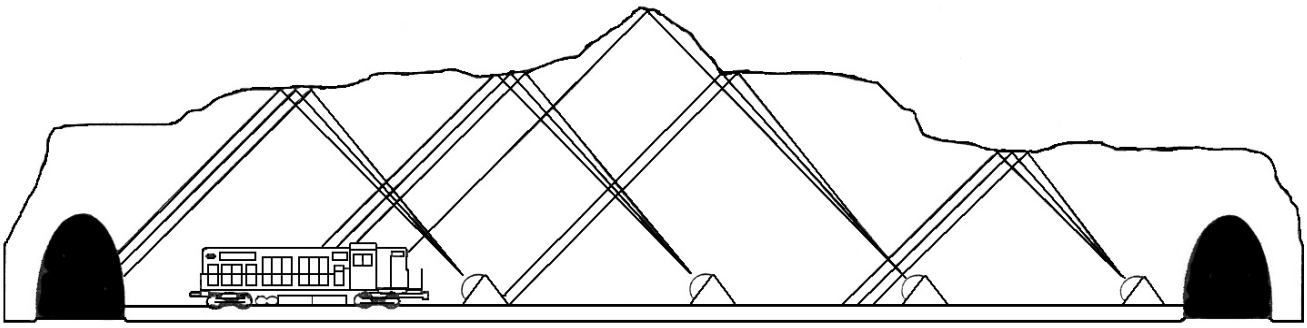

FIGURE 2

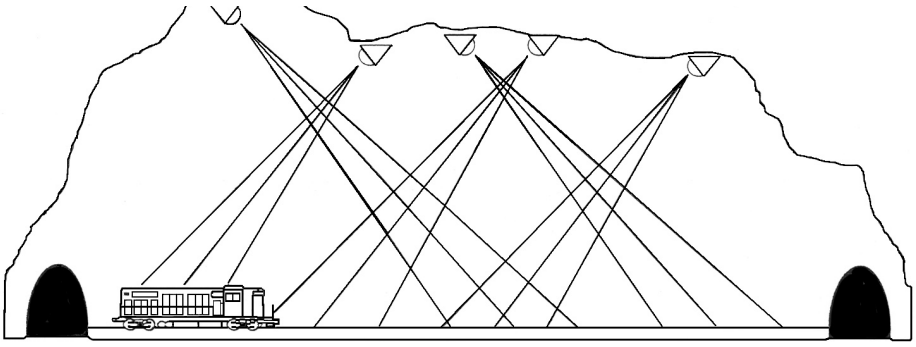

FIGURE 3

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