

## Troubleshooting Tips

**Beware Other Transmitters:** Your wireless equipment operates in an unlicensed band shared by many other transmitters. Some of these external transmitters can and will create interference, intermittent throttle operation or complete failure of one or more of the wireless receiver's 8 frequencies. The sources of these external interfering signals can be from your own home or from adjacent homes and businesses. Here's a list of devices known to have cause problems when operated near the ALR900 wireless receiver: wireless devices attached to computers, TV remote controls, cordless telephones, alarm systems, baby monitors, unlicensed personal communication devices, lawn sprinklers, remote starter switches, cordless light switches, outdoor lighting controllers, toys and games. If you encounter a strong interfering signal, you may have to forego use of the affected frequency for your installation.

### Common Causes For Loss Of Control

**Duplicate frequencies when in scan mode** - Each throttle must be on its own unique frequency when using scan mode. Two throttles on the same frequency will jam each other.

**Duplicate wireless or plug-in throttle IDs** - The most common cause is a duplicate ID that has been accidentally entered into the throttle. The older RF1300 throttles don't have a display which makes checking them difficult. If you have any doubt, use the switch #7 on the receiver to tell you the throttle ID.

**Incorrect settings on Wireless Receiver** - When using 8 or fewer throttles and each is set for SCAN mode, each throttle must be on its own unique frequency. For the T5000E, check the home page which continuously shows the frequency and the ID number. For RF1300 throttles, inspect each DIP switch setting and confirm no two throttles are on the same frequency. For T9000 throttles, verify that each unit is on the desired frequency without duplicates.

**Poor reception caused by "black holes"** - A layout has many objects that absorb radio energy and distort the antenna reception pattern. In addition to inanimate objects, your human operators also absorb radio energy. If you find a location that has poor reception, your only solution is to try a different location.

**External jammers** - This cause is a bit more difficult to assess. The most common symptom will be one throttle that always seems to have trouble. This is usually a sign that an external "jammer" (another wireless device on the same frequency as the throttle) has rendered the frequency unusable. Your only solution is to remove the jamming source after confirming your own equipment is not the cause [IDs and frequencies need to be checked.] If your equipment is OK and you can not locate or disable the jammer, you must declare that specific frequency unusable and move to a different frequency.

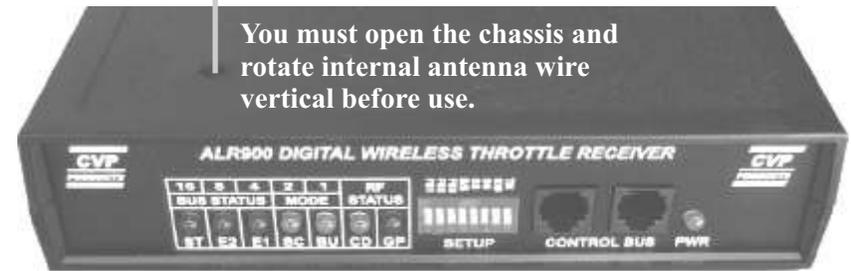
**Too many throttles near the receiver** - This cause is not very common but it does happen. In this case, the trouble is too many throttles, and operators, standing near the receiver antenna. This is quite common in new installations where the receiver is simply placed near the main system and connected with the short cable. Try repositioning the receiver away from the congested area.

**Slow Response Especially To F2 Sound:** This usually happens when using burst mode with many throttles sharing the frequency. To speed up response to an F2 activation, decrease the number of throttles sharing a frequency or switch to scan mode.

### Want To Use More Than 8 Wireless Throttles?

The new ALR900-XF2 wireless receiver adds 8 more unique frequencies that do not interfere with the original 8 frequencies. Only the T5000E throttle works with the XF2. The XF2 receiver is now available and the price is the same. There are no changes to your system or your original ALR900 receiver.

## ALR900-XF Series Wireless Receiver For Lenz DCC Systems



### First Things First - Unpack The Antenna



The ALR900 has a small wire antenna that is snapped onto the internal radio receiver module. The antenna is shipped rotated horizontal and underneath the top of the case to prevent damage during shipping. You must open up the ALR900 case and rotate the antenna upwards so that it is vertical and sticking through the small hole in the case top. You will need a Philips screwdriver to open the case.

Turn the case upside down. Remove the two screws holding the two halves of the case together. Turn the case right side up and gently lift off the top. The rear panel is floating so it may or may not come out. If it does come off, just slip it back in place using the slots on the sides and bottom.

Use your fingers to rotate the small gold connector attached to the small clear plastic covered antenna so that it is vertical. The connector snaps onto the module. If it has come off, just snap it back on.

To reassemble, place the lid with the stamped writing on its flip side towards the rear of the case and the small hole towards the front panel. Thread the antenna through the small hole in the lid. Reattach the screws. Take care not to kink or bend the whip. It must be vertical for best operation.

### XF1 Frequencies and Throttle ID Numbers

Every wireless throttle must have a unique ID number. See your Lenz documentation to determine the ID range of your system. You should record the ID number assigned to each throttle for easy reference. The T5000E display will show the current ID number.

Assign each wireless throttle to a unique frequency. This provides the best response time and no jamming by another throttle. There are two groups of frequencies. Group 1 uses RF00 to RF07 and works with a Group 1 receiver. Group 2 uses RF08 to RF15 and works with a Group 2 receiver.

Group 1	
Freq #	Freq MHz
0	903.37
1	906.37
2	907.87
3	909.37
4	912.37
5	915.37
6	919.87
7	921.37

Group 2	
Freq #	Freq MHz
8	904.87
9	910.87
10	913.62
11	916.87
12	918.12
13	923.12
14	924.62
15	926.12

## About The Modular Cables

**Before You Begin – Modular Cables Are Not All The Same!** In the Lenz/Atlas system, only "DATA" Style Cables Can Be Used

Your ALR900 Receiver uses 6 conductor DATA cables. A 7 foot cable is included with the ALR900 receiver. Longer lengths may be purchased from CVP Products or from a local computer store.

When building or buying your own cables, be sure to polarize the plugs properly. The picture shows an easy way to remember the proper orientation relative to the molding ridge which runs along one side in the center of the flat cable. The molding ridge is easily seen on the cable.



## Hookup Diagram - Lenz Set 01/04, Set 90 and Set 100

**Note: Your system must be using version 3 software for the ALR900 to work properly.**

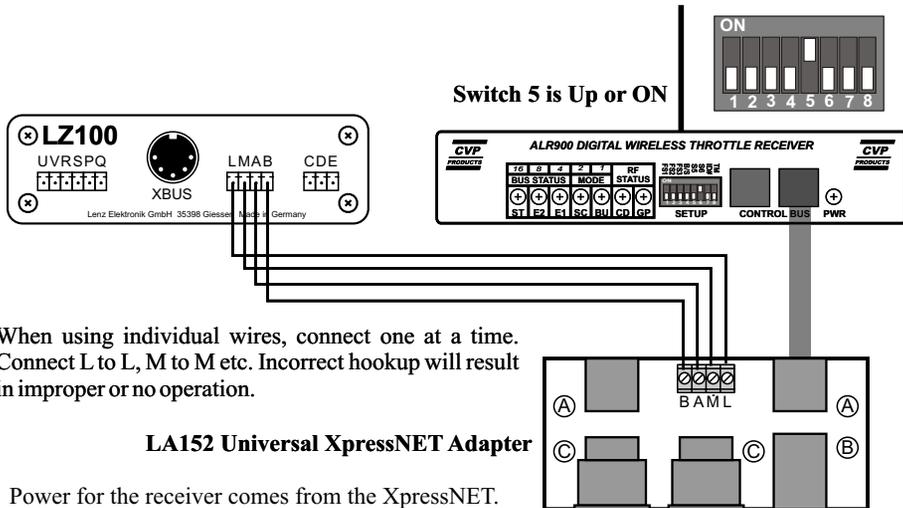
With this system plus the ALR900 receiver, the following limitations will be in effect.

Max number of throttles, either wired or wireless ..... 31 (including one LH100)

Throttle ID number range..... 1 to 31

Decoder Address Range:.....0001 to 9999

**If the E2 LED is on, there is an incorrect throttle ID in use. The throttle ID numbers must be unique.**



When using individual wires, connect one at a time. Connect L to L, M to M etc. Incorrect hookup will result in improper or no operation.

### LA152 Universal XpressNET Adapter

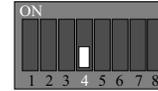
Power for the receiver comes from the XpressNET.

### Power Cycle Is Needed If Switches Are Changed

You must power cycle the ALR900 receiver when changing the setup switches. To do this, simply unplug the modular data cable, count to 10 and plug it back in.

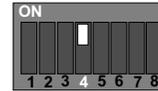
## Scan and Burst Reception Mode

### Reception Mode Select



Scan Mode

Most commonly used mode. The receiver scans all 8 of the possible frequencies. Each throttle has a dedicated frequency. Only one throttle is used per frequency. The maximum number of throttles that can be used at one time is 8.

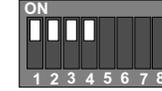


Burst Mode

The receiver in burst mode receives only on a single frequency set by FS1, FS2, FS3. Since the receiver does not scan, more than one throttle can share this frequency. Up to 4 throttles can be shared per frequency. However, you will need one receiver for each frequency to be used.

### Frequency Selection (When Using Burst Mode)

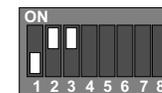
#### Frequency #0



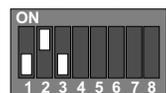
#### Frequency #4



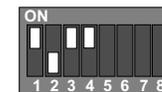
#### Frequency #1



#### Frequency #5



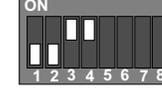
#### Frequency #2



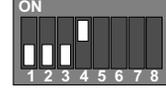
#### Frequency #6



#### Frequency #3

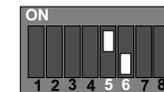


#### Frequency #7

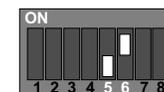


Not available in burst mode - do not use

## Switch Setting For System Used



LENZ SET-01/4



LENZ SET-02/4



ATLAS DCC

### Power Cycle Is Needed If Switches Are Changed

You must power cycle the ALR900 receiver when changing the setup switches. To do this, simply unplug the modular data cable, count to 10 and plug it back in.

## ALR900 Receiver Indicators And Their Use

16	8	4	2	1	RF	
BUS STATUS			MODE		STATUS	
○	○	○	○	○	○	○
ST	E2	E1	SC	BU	CD	GP

The ALR900 receiver has several indicators to show the receivers status, operating mode and assist with troubleshooting.

**The GP indicator** turns on whenever a throttle is turned on and the receiver receives good data packets from the throttle on the appropriate frequency. This indicator is excellent when checking reception and ranging. This indicator stays on until the last throttle is turned off - a handy feature to prevent running down a throttle's battery.

**The CD indicator** briefly turns on whenever throttle data is interrupted. This occurs primarily when addresses are changed or throttles are turned off.

**The BU and SC indicators** show the reception mode selected by switch number 4. When switch 4 is off, the scan mode is selected and the SC indicator is on. When switch 4 is on, the burst mode is selected and the BU indicator is on.

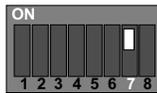
**ER1 indicator:** If a 4 digit address is used by a throttle on a system that does not support 4 digit addresses, this indicator will turn on. If this occurs, your system only supports 2 digit decoder addresses in the range of 01 to 99.

**ER2 indicator:** ER2 turns on if the ExpressNET ID is not a valid number for the system in use. Although wireless throttles can have almost any ID number, each Lenz system allows only specific IDs. Check the hookup diagram for your system to find the supported ID numbers. Correcting the ID number will turn off the ER2 indicator.

**The ST indicator** is on and flickering whenever the receiver is recognized by the Command Station and valid throttle data is being sent from the receiver. This indicator normally flickers or flashes depending on the number of throttles in use. This is normal is does not indicate a problem.

### Show Throttle ID - Switch #7

Turn on switch #7 to activate this mode. Only one throttle can be turned on during this procedure. To confirm that all throttles are off, first check the GP indicator. It must be off. Now turn on the throttle to be checked. The GP indicator turns on followed by a group of LEDs underneath the numbers. To determine the ID number, add up the numbers above each of the LEDs that are turned on. The sum is the ID number for the throttle.



For this example, the 16, 8, 2 and 1 indicators are on [shown by the filled circle.] Add these numbers together to get the ID number. For this example, the ID for the throttle that is turned on is 27. The GP is counted but it will be on if the throttle is on.

16	8	4	2	1	RF	
BUS STATUS			MODE		STATUS	
●	●	○	●	●	○	●
ST	E2	E1	SC	BU	CD	GP

To exit this mode, turn off switch #7.

## Hookup Diagram - Lenz Set 02/4

The Set02/04 can only use a limited number of wireless throttles. You must also use the correct ID numbers for the wireless throttles.

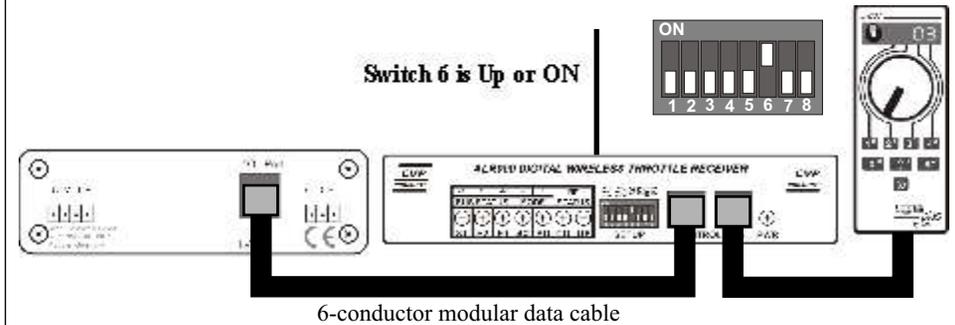
With this system plus the ALR900 receiver, the following limitations will be in effect.

Max number of throttles: .....5 (including one LH200)

Throttle ID numbers: .....1, 2, 3, 29, 30 - only

Address Range: .....0001 to 9999

The throttle ID number must be unique. If the E2 LED is on, there is an incorrect throttle ID in use. Double check your throttles and make sure each has a unique ID.



6-conductor modular data cable

## Hookup Diagram - Atlas Commander

The Atlas-Commander System can only use a limited number of wireless throttles. You must also use the correct ID numbers for the wireless throttles.

With this system plus the ALR900 receiver, the following limitations will be in effect.

Max number of throttles: .....7 (including one Commander)

Throttle ID numbers: .....1 to 31

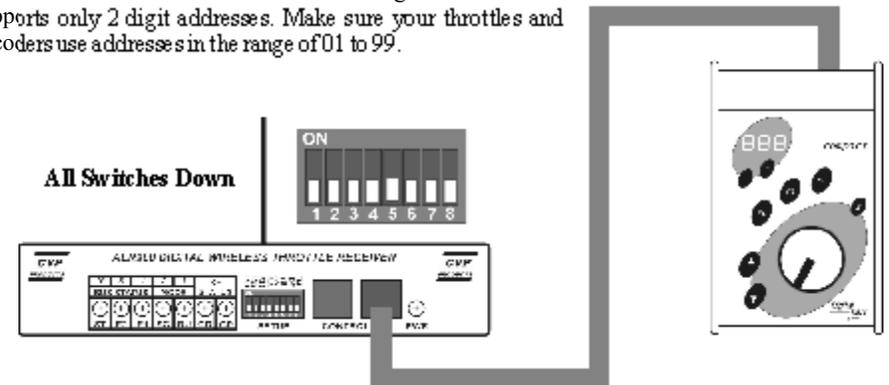
Address Range: .....01 to 99 [two digit addresses only]

### Special Note About Speed Step Setting

If you change the Commander's transmitted speed step setting to something other than 28 steps, the changes are not permanent and ARE NOT STORED by the Commander. The moment power is turned off, the speed step setting returns to the default of 28 steps. Also if the speed step is changed the wireless receiver must be notified by simply selecting a different address with the wireless throttle then back to the loco address you want to run.

**If the E2 LED is on,** there is an incorrect throttle ID in use. The throttle ID number must be unique.

**If the E1 LED is on:** a throttle has a 4 digit address. Atlas supports only 2 digit addresses. Make sure your throttles and decoders use addresses in the range of 01 to 99.



All Switches Down

## ALR900 Receiver Detailed User's Guide

Please read the section on receiver placement before permanently mounting your receiver!

### 1. Unpack The Antenna

Make sure the antenna is exposed and vertical. Do not allow it to touch any metal object.

### 2. Set Switches 1-4 For The Desired Receiver Operating Mode

We recommend you start with the most basic setup. Set switches 1,2,3 and 4 all down. Down is the OFF position. This sets the receiver into the SCAN mode where each of the 8 frequencies are scanned, looking for throttle information. Each throttle is set to its own dedicated frequency and there is no interference between throttles.

The receiver supports other operating modes. Later, as time permits and after learning the limits and differences, you can experiment with the other reception modes.

### 3. Connect Receiver To XpressNET Jack

Power for the receiver comes from the XpressNET. Use only a standard 6 conductor "DATA" cable to connect the receiver to the XpressNet connector. DO NOT USE PHONE CABLES! They won't work! Note: If you use accidentally use a telco cable, the receiver will not receive power and the power indicator (PWR) will be off.

### 4. Set Switches 5 and 6 For Your System

Setting these switches is based on the brand and model of your DCC system. You must set the switches to match your brand and model or the receiver will not operate properly. See the hookup drawing for your system on the previous pages and then set the switches for your system..

### 5. Set Switches 7 And 8 Down

Switches 7 and 8 are both down. Their use will be explained later.

### 6. Setup The Handheld Throttle

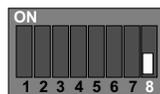
You need to set the throttle ID number, and the desired frequency first. For detailed information about how to do this and what to set, see your throttle documentation.

Beware that the available ID numbers are based on the system in use. See the hookup drawing for your system on the previous pages and then be sure to stay within the described limits.

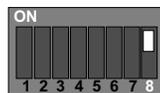
Once your throttle is setup, the only thing remaining is to select the loco address and run your train.

### Using The ExpressNet Terminator - Switch #8

Use the terminator only for XpressNET lengths greater than 300 feet and only when the ALR900 is at the end of the ExpressNET. The internal resistor has a value of 120 ohms when the switch is set to the on position. Only one terminator should be used and it should be at the end of the longest cable.



Terminator OFF



Terminator ON

## ALR900 Receiver Placement Suggestions

There are no hard rules for locating the ALR900 receiver since each layout environment is different. For this reason, we recommend an extended period of trial and error placement. Use the indicators on the receiver along with the tips below to determine the best location.

- ◆ Higher is generally better. Rafter installations, especially in basements, seem to be better than the floor. But your house may be different! Try them both.
- ◆ Pick a spot away from an area that will have a heavy concentration of transmitters.
- ◆ Don't put the receiver in areas where a transmitter will be permanently stationed. For example, if the receiver is underneath your busy yard, the constant presence of the yard operator's transmitter can jam weaker signals from distant transmitters.
- ◆ To test a location, temporarily set the receiver in the desired location. Then walk the layout with a SINGLE transmitter. Have someone watch the receiver's GP light. If it stays on constantly no matter where the transmitter is located, you've found a good spot. However, if the GP light flickers, relocate the receiver and try again. In many cases a move of less than 1 foot can make a dramatic difference in reception. Receiver placement should be tried in all different directions, including vertical and rotated.
- ◆ If you find a chronic weak area, physically move the receiver towards the weaker area.
- ◆ Keep objects away from the receiver's antenna, especially metallic objects. Keep all other materials away from the antenna.
- ◆ For best signal transmission, hold the throttle so its antenna is vertical. Don't place your hand around or near the antenna.
- ◆ Homemade and store-bought dimmers for layout lighting emit a broad spectrum of interfering radio signals and may jam the receiver. If you have a lighting system like this, consider not using it or equipping it with UL approved line filters.
- ◆ Keep the receiver antenna away from fluorescent lights.
- ◆ Consider using a line filter. Line filters can be purchased from Radio Shack or other electrical supply houses. This is different than a "surge limiter" so unless it says "line filter," don't waste your money.
- ◆ Train your operators to recognize when the receiver has lost contact with their throttle. If this occurs, it is the same as if a regular tethered throttle was unplugged. In most cases, control can be regained by having the operator move a bit. In some cases, this may be nothing more than moving less than 12 inches.
- ◆ Surplus power supplies, especially high-tech switching supplies are in use on many railroads. These supplies are inexpensive for the amount of power they provide. However, these surplus supplies tend to emit a broad spectrum of interference and can sometimes jam one or more of the wireless throttle's frequencies. Try turning off the power supply to check if it is the cause of interference. If being off helps, replace the power supply.
- ◆ Don't use 900MHz cordless phones when using the wireless throttle. Cordless phones use the same frequencies and can jam the wireless receiver. If you must have a cordless phone, consider using the newer 2.5GHz or 5.6GHz phones. Cell phones are OK since they don't use throttle frequencies.