AWID
APPLIED WIRELESS ID

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Technical Reference

Long-Range Readers -- Quick Trouble-Shooting Guide

Change History

Version	Date	Author	Comments
1.0	21 April 2009	L. Hickcox	First release.

These "trouble-shooting" topics may help you before and after you install the LR-2000 and LR-911 long-range readers for automated vehicle identification. The topics are listed in the order that service problems are likely to occur. You may use these notes as a checklist. Please suggest other ideas to AWID's Technical Support.

TOOLS AT SITE (REQUIRED)

AWID's Installation Kit – For LR-2000 reader, use LR-2000KIT. For LR-911 reader, use LR-911KIT.

Multimeter
 DC Volts: ranges 0-20 V and 0-200 V. DC Amperes: ranges 0-1 A and 0-10 A.
 AC Volts: ranges 0-20 V and 0-200 V. Resistance: ranges 0-100 Ω and 0-1000k Ω . . . Or equivalent.

Hand tools – Standard set for installations.

Back-up battery – Typical alarm-system battery = 12 volts, 7.5 ampere-hours, fully charged.

Instructions – Full Installation & Operation Manual for LR-2000 or LR-911 reader. Tags Installation sheet.

TEST STEPS

1. RF Signal Detector (RF-SD from LR-2000 Installation Kit)

Purpose: (a) To detect radiation in a broad spectrum (nominal 50 MHz to 3 GHz) from other sources in the neighborhood when the reader is *not* generating its own UHF radiation. (Do a hand-held sweep of the area.)
(b) To prove that the reader itself *is* generating its own UHF radiation, even if the Installation Kit's test unit and the access control system do not indicate code input from the reader. (Hold the RF-SD near the reader.)

Start: Test the RF-SD Detector – Is its LED on? Does it react to a cell phone when transmitting your voice?

Power: The slide-switch for the RF-SD is on the side, "1" for ON. Be sure to switch it OFF ("0") when the RF-SD is not in use, to preserve battery life.

Don't forget: (a) The RF-SD measures the reader's transmission to about 50 feet in front of the reader.
(b) If the RF-SD detects radiation when the detector is held more than ~50 feet from the reader, the source is probably a communications antenna in the neighborhood (perhaps many blocks away).
(c) This low-level radiation from a distant antenna usually has no effect upon the LR-2000 or LR-911 reader's performance. Therefore low-level external radiation can usually be ignored.
(d) Radiation from neighboring sources that could affect the LR-2000 and LR-911 readers will always be detected by the RF-SD. Distinguish between the reader's UHF transmission and neighboring sources by shielding the reader (with aluminum foil, for example), or by moving the reader to an RFI-free location.

Instructions: This is it. It's this simple … and valuable.

Evaluation: (a) Be sure that radiation from surrounding sources is not interfering with the reader.
(b) Be sure that the reader is radiating its UHF field out to about 50 feet in front of the reader. Next tests …

2. Test Unit (SP-6820-LR from the Installation Kit)

Purpose: (a) To indicate proper performance of the reader and its tags, isolated from the rest of the system.
(b) To give you full confidence that AWID's products are working perfectly.
(c) To show that the set-up and aiming of the installed reader and tags are correct.

Start: Connect the three spring clips of the Kit's test unit to the corresponding wires on the reader, preferably with all other connections to the power supply and to the system's controller disconnected at the reader.

Power: Use the Kit's plug-in DC power module, or (better) use your back-up battery. Measure voltages.

Don't forget: (a) To generate RF, connect the reader's yellow wire to the 3 black/negative wires.
(b) The SP-6820-LR test unit is a visual and audible indicator only. Hold the test tag in front of the LR-2000 or LR-911 reader, but watch the test unit for indication of good reads by the reader.
(c) Some background radiation is common. But only an AWID tag will cause the reader to register a read.

Instructions: Use the "Quick Installation Guide" that AWID supplied with the Installation Kit.

Evaluation: Expect an easy 10 feet or more for the LR-2000 reader with hand-held test tags. Expect 8 feet
or more for the LR-911 reader with hand-held test tags. (The WS windshield-type tag must be permanently mounted on a piece of windshield glass to give its rated reading distance.)   Next tests …

3. Cable

Purpose: To check that AWID's specifications for cable have been met completely. This is a necessary step.

Start: Identify the cables that are in place. Review AWID's cable specifications. For *any* length of power cable, it must be 18 gauge or larger. Data cable (if separate from power cable) may be 22 gauge or larger. Power and data may be combined in a single 18 gauge cable. *All cable must be overall 100% shielded*.
Cable should have bunched wires, not twisted pairs. (If they are twisted pairs, separate the 3 data wires
into different pairs.) If existing power cable is only 22 gauge, use spare conductors in that cable to double up the wires for both positive and negative DC; or pull new cable that meets the specs. Use really good cable.

Limits: The Wiegand protocol limits cable length to 500 feet. You may cheat on longer runs and be lucky. A safer solution is to use Cypress Computer Systems' Wiegand drivers or radio links or protocol converters.

Don't forget: The reader may work OK for a while using non-spec cable. Eventually it may cause trouble.

Instructions: Read the online Manual (complete version) for the LR-2000 or LR-911 reader. See the specs.

Evaluation: Cable is not just a supply item. It is a vital participant in the good reader package. It assures unimpeded current flow to the reader, and clean data to the controller.   Next tests …

4. Electric Power

Purpose: To know that a suitable power source is being used, and that it is connected correctly.

Start: Voltage-drop tests –
   (a) Disconnect cable from power supply. Measure voltage at power supply when *nothing* is connected.
   (b) Connect cable alone (without reader) to the power supply. Measure voltage at the power supply.
   (c) Go to the reader-end of the cable (without reader). Measure voltage at the reader-end of the cable.
   (d) Connect the reader to the cable. Measure voltage across the reader's black and red wires.
If voltage drop in any of these steps is more than a few tenths of a volt – even if the 18 gauge cable is 500 feet long –
there is a problem to be corrected. Call AWID's Technical Support.

Proof: Substitution test –
   (a) Disconnect the reader's red and black wires from the cable.
   (b) Clip a fully charged back-up battery (see page 1, "Tools") to the reader's black and red wires.

(c) Repeat the basic tests in step 2 (page 2), using the Installation Kit.

If you use the PS12-3.3A DC power module instead of a battery for this test, place the reader at its full DC cable length from the reader – at least 6 feet or 8 feet between the power module and the reader.

Don't forget: (a) Connect the reader's yellow wire to the black wire for all tests that require RF generation.
(b) There must be a separate, dedicated power supply for each reader – one reader per power supply, and nothing else connected to each power supply except its reader.

Instructions: Use the "Quick Installation Guide" for the LR-2000KIT or LR-911KIT Installation Kit.

Evaluation: Having correct power is vital to the reader. If necessary, change the power supply and the power cable. Be sure that the cable is shielded, and that its shield is drained to the reader's drain wire, but *not grounded.*   Next tests …

5. Wiring

Purpose: To check on accuracy of the reader's wiring to the power supply, and to the controller's data input.

Start: Break out the wiring diagram in the reader's installation instructions. This is vital. Wiring the LR-2000 or LR-911 reader is *not* the same as wiring the familiar proximity readers.

Checks: It's really easy – 2 wires to the power supply, 3 wires to the controller, 2 wires interconnected right at the reader, and drain wire connections to cable shields. But *no* ground connections anywhere. That's all!

Don't forget: There is only one way to wire the reader that is correct. Use it!

Instructions: Start with the Quick Installation Guide that comes with the reader. See Figure 3. Download the full Installation & Operation Manual for your reader, from AWID's Web site or Technical Support.

Evaluation: Correct wiring makes the reader work. Incorrect wiring may work for a while, and then cause poor performance. The easy solution is to do exactly as the Manual's instructions say.   Next tests …

6. Tag Mounting

Purpose: To assure that the tags are located properly for the layout, and that the reader is aimed well.

Start: First test the installation using the hand-held test tags in the Installation Kit. Then hand-test the customer's tags inside or outside the vehicles. Finally adhere or fasten the tags in their permanent location.

Saving tags: You do not need to use the windshield tag's permanent adhesive, or otherwise commit the tag to a particular location, until you have tested the tag inside or outside the vehicle, using temporary techniques. This lets you move the tag around and change its orientation (horizontal or vertical) before the final decision. Windshield and Rear-View Mirror tags are for one-time-only application; there is no second chance.

Don't forget: Tags need some experimentation. A small percentage of vehicles may not work with the tag that you select for inside the vehicles. The MT tag is the usual back-up in this case. When you visit the site, check that all vehicles have a tag on the vehicle, and check that all tags are mounted correctly.

Instructions: See the instructions for mounting tags in the reader's full Manual, and in the 2-page Installation Instructions for the appropriate tags.

Evaluation: If you are letting your client install the tags, please give the Property Manager a set of Instructions for the tag types being used. Copy them from the reader Manual, or write your own.   Next …

7. Driving

Purpose: To help the drivers achieve reliable tag reading every time.

Start: The drivers need instructions for the new system. The Property Manager should give suggestions for driving to all drivers when the tags are distributed or installed.

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Discipline: Drivers who expect the gate-control tags to work like their high-speed toll-gate tags need to be reminded that these are different products, and their driving technique needs to be different.

Don't forget: Instructions for the drivers are a part of the complete installation. Having the drivers understand their tag and the reader leads to good performance of the system.

Instructions: Use the "Guidelines for the Installation" in the full LR-2000 or LR-911 Installation Manual. The key factors are – (a)   Drive in a single lane close to the reader.
(b)   When possible, drive in a straight line as the tag passes though the reading zone.
(c)   Drive at about 5 mph through the reading zone (don't stop unless necessary).
(d)   Observe lane markings, signs, speed bumps, etc.

Evaluation: The drivers are an important component of the successful system. It is easy to gain their cooperation, because they want the gate to open as much as you do.   Next item …

8. **Instructions for the Property Manager**

Purpose: To provide the system's administrator with all information that results in a satisfied customer.

Start: Decide on the amount and kind of instructions that the system's administrator needs.

Preparation: Make the Property Manager a partner to your work. There must be no surprises when the system's administrator takes over the system.

Don't forget: A satisfied customer starts with a customer who knows the system and is comfortable with it from Day One.

Instructions: Necessary contents are – (a)   Instructions for the drivers.
(b)   Instructions for the person who mounts the tag in or on the vehicle (ideally this is a trained technical representative of the Property Manager).
(c)   Your contact information, so that the customer can reach you easily.
(d)   Information on how your customer can order additional tags – including the products' part numbers, and the three vital pieces of code data (the code format name, the facility code or site code, and the tags' range of ID numbers).
Please contact AWID's Technical Support for suggestions and documents.

Evaluation: Good service for your customer includes occasional follow-up, to see what questions have accumulated. The best result is a compliment from the Property Manager.   Finally …

Summary
- You need AWID's instructions for the LR-2000 or LR-911 reader – the full Manual, not the Quick Guide.
- You need to check the specifications for cables and power supplies, and the layout for various applications.
- You need to study the wiring diagram carefully, and follow the wiring faithfully.
- You need to contact AWID's Technical Support for Access Control as soon as a question arises.
- You need to give your client the tag-mounting instructions and good driving suggestions from the Manual.
- AWID invites you to suggest other tests that help you in your installations. Please contact Technical Support.