APPLIED WIRELESS ID

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Instructions

LR-911 LONG-RANGE READER AND PASSIVE TAGS
Part 2: INSTALLING THE PRODUCTS (Wiegand Interface)

These instructions describe the steps toward successful installation of AWID's long-range reader and tags. The wiring diagrams for testing and installing the products are on pages 7 and 8.

Reference Material

- PowerPoint presentation, "LR-911 Installation Practices and Procedures", on AWID's web site (www.awid.com). Select "Download" on AWID's homepage. *This is an informative and important starting point to learn about the products and their installation.*
- "LR-911 Surveillance Zone Diagram"
- "GMWS Glass-Mounted Windshield Tags – Instructions for Holding"
- "Tags for Long-Range Readers – Location, Testing"
- "Vehicle Mounting Recommendations" for WS tags and for MT tags

CONTENTS

A. PRODUCTS

Reader	LR-911	For WS and MT tags. (Reader does **not** contain an LED.)
Mounting Bracket	LRMB	For LR-911 reader. (Includes screws for nuts on reader.)
Windshield Tag	WS	For attachment inside windshields; passive.
Metal-Mounting Tag	MT	For attachment to flat surfaces including metal; passive.
Installation Kit	LRIN	Consists of …
Test unit	SP-6820-LR	Has beeper and LED; includes cable with spring clips.
Power module	PS12-1A	DC power supply, 12 volts, 1 ampere, linear regulated.
Test tag	GMWS	Windshield tag attached to 3 inch by 4 inch glass sample.
Test tag	MT	Metal tag for zone mapping and location testing.
Adapter cable	--	6 inches long, with 9-pin "D" female connector and 3 spring clips.
Documents	--	Instructions: "Part 1. Planning the System" "Part 2. Installing the Products" "Part 3. Assuring Best Performance"
		"LR-911 Surveillance Zone Diagram"
		"GMWS – Instructions for Holding"
		"Tags for Long-Range Readers – Location, Testing"
		"Vehicle Mounting Recommendations for WS Tag"
		"Vehicle Mounting Recommendations for MT Tag"

Wiring – Good Practices

Please observe these important suggestions when wiring the LR-911 reader – or any low-voltage products or systems.

- Connect wires in this sequence:
  First .... **ground** connections.
  Second .... **general** wiring – data lines, control lines.
  Third .... **power**.   (Be *certain* that all other wires are connected before applying power.)

- The LR-911 has, in effect, 3 separate ground connections –
  black wire to the power supply's negative,
  blue wire to the panel's data common, and
  drain wire to the shield of the cable between reader and panel.
  Do not connect these three wires together. Do not earth-ground any of these wires.

B. PRE-INSTALLATION TESTING

1. Introduction

Careful preparation is important for successful installation of AWID's long-range readers and tags. Each moment spent at the installer's shop preparing for the actual work at the installation site will pay dividends. For additional information and technical support, contact AWID at support@awid.com or phone toll-free 800-369-5533 (outside the United States, 845-369-8800).

2. Items for Bench Testing

AWID's long-range reader and tags are tested easily using only the items listed below. It is not necessary to interface the reader to a controller panel or reader-input module while conducting this test.

- LR-911 reader (does **not** contain an LED)
- GMWS windshield tag attached to glass *
- MT metal-mounting tag *
- SP-6820-LR test unit, cable with 3 clips *
- PS12-1A power module, cable with 2 clips *
- Wiring diagram, Figure 1 (on page 7)

* A component of the LRIN Installation Kit

3. Supporting the Reader

The reader's "surveillance zone" (that is, the effective RF field in which the long-range tags can be detected) is maximized when there is no material in front of the reader or immediately to the sides of the reader. See the LR-911 Surveillance Zone Diagram (attached).

- Hang the reader on a clear vertical surface in an open space, about 4 feet above the bench top, 4 feet from a side wall, and 4 feet below the ceiling.

- → Connect the wires as shown in the wiring diagram, Figure 1 (on page 7). Read the notes carefully.

- Be sure that unused wires are touching nothing. Do not cut off unused wires yet.

- The *first* connection made should be the reader's black (electrical ground) wire.

- The *last* step should be to plug in the DC power module.

4. Wiring for Quick Test

→ See the wiring diagram, Figure 1, and notes (on page 7).

Proper operation of the reader and tags is indicated by a signal from the SP-6820-LR test unit each time that the tag is read. The LED changes briefly from standby Red to Green, and a short beep (4 kHz tone) is heard. If the tag remains in the reader's surveillance zone, reads repeat at about 3 per second (factory default rate).

5. Holding the Tag

- Hold the GMWS test tag by pressing the opposite edges of the glass rectangle between the thumb and middle fingertip, with the hand behind the glass (away from the reader). Or …

- Hold the MT tag by pressing either end of the tag at the screw hole between thumb and finger tips.

- Hold either tag so that the face of the tag is approximately parallel with the reader's face. (The reader is circular-polarized, so the tags may be held at any angle – up-and-down, or side-to-side, or diagonal.)

- Move the tag slowly though the surveillance zone in front of the reader, observing the edges of the zone and the point of maximum read range.

C.   <u>INSTALLING AT THE SITE</u>

1. Introduction

Before installing the long-range readers and tags, the rest of the application system is usually in place and tested. The system components for each entrance are commonly –

- Computer with the application program
- Controller panel and reader-input module
- Gate or door operator (control and motor)
- Status switch for gate or door
- Exit-request device

- Safety loop detector beyond the gate or door
- Ground loop to detect approaching vehicles
- System power source
- Cabling in conduit

These wiring instructions are for the LR-911 reader's Wiegand-protocol interface, using Data-0 and Data-1 wires (like most readers in access control). ***Note****: LR-911 wiring is not the same as a 125 kHz proximity reader; follow the wiring diagram, Figure 2 on page 8.* If a serial interface using RS-232 protocol will be used, please request AWID's memo on RS-232 Reader Interface.

Collect these items to install the readers and tags at the site –

- LR-911 readers
- Mounting brackets or housings for readers
- WS and MT tags

- LRIN installation kit
- Installation instructions, LR-911 Part 2

Contact AWID at <u>support@awid.com</u>; phone toll-free 800-369-5533 (outside the U.S., 845-369-8800).

2. Installing LR-911 Readers

a. Plan ahead. Before starting installation at the site, plan the layout. See AWID's LR-911 Instructions, Part 1: Planning the System.

b. Keep the reader assembled. Do *not* remove the aluminum plate behind the reader. Do *not* remove the plastic cover of the reader. Do *not* tighten or loosen the screws through the cover.

c. Attach the LRMB mounting bracket to the reader's aluminum plate using 2 screws (supplied).

d. To use a different mounting device, make an adapter plate or bracket that lets you fasten your mounting device to the two capture nuts near the center of the reader's aluminum plate (1/4"-20 thread). Do *not* drill holes through the reader's aluminum plate. The mounting device must allow pan & tilt adjustment for the reader.

e. Watch the installation space. The reader may be mounted on any material including metal, but there must be open space in front of the reader and to its sides. There must be no material interfering with the reader's surveillance zone between the reader and the tags' location.

f. Measure the mounting height. With WS tags, it is typically 7 feet above the vehicle lane.

g. Watch the environment. Stay away from UHF communications devices. Avoid fluorescent lighting fixtures by 3 or 4 feet. Keep neighboring long-range readers on parallel lanes at least 12 feet apart, with their surveillance zones parallel. Do not have LR-911 readers facing each other (but "back-to-back" is OK).

h. Avoid proximity readers. Keep the LR-911 reader about 8 feet from MR-1824 readers, and 2 to 4 feet from smaller proximity readers.

i. Fasten the reader's adjustable bracket or housing to the pole, post, pedestal, wall or ceiling.

j. Aim the reader approximately so that a perpendicular line (axis) from the center of the front face of the reader points toward the planned location of tags on the vehicles when they are detected. This usually requires that the reader be adjustable downward between 25 and 35 degrees ("tilt"), and toward the vehicle lane ("pan").

3. Wiring the Reader

Cable between the LR-911 reader and the controller panel should be –

- 6 conductors
- 22 gauge (18 gauge is OK)
- Stranded wire
- Not twisted-pair *
- Color-coded insulation
- Overall 100% shielded
- High quality
- Maximum length – 500 ft

  * *If the cable is twisted pair, combine ground (black wire) with one data line (green or white wire) in one twisted pair, and combine DC power (red wire) with the other data line in a second twisted pair. This prevents crosstalk on the data lines.*

→ See the wiring diagram, Figure 2, and notes (on page 8).

4. Aiming the Reader

This step should be taken before the tags are installed on the vehicles. Use the SP-6820-LR test unit and the GMWS windshield tag mounted on glass (parts of the LRIN installation kit) and the wiring diagram. The reader does not have to be interfaced with the host system (but they *may* be connected). Use the DC power module from the LRIN installation kit *only* if the independent DC power supply is not yet connected.

→ See the wiring diagram, Figure 1, and notes (on page 7).

Procedure:

a. With no vehicle present, hold the GMWS or MT tag in the approximate location of tags after they are finally attached to the vehicles. For best read range, see Section B.5, Holding the Tag.

b. With the tag held as described above, adjust the pan and tilt angles of the reader until the SP-6820-LR test unit indicates most robust reading. (Occasional reads will be missed normally because of the frequency-hopping feature of the LR-911 reader.)

c. Map the extent of the reader's surveillance zone by moving the tag side-to-side slowly through the zone and along the axis from the reader's front face.

5. Installing Tags

WS tags: Follow instructions in "Vehicle Mounting Recommendations for Windshield Tag (WS)".

- To identify a good location for a WS tag, it may be pressed by hand, with the peelable label still on the tag, against the inside of the windshield close to the reader. The tag may be secured temporarily by masking tape or electrical tape. Try the tag in both "portrait" and "landscape" orientation.

- WS tags must be firmly attached on the inside of vehicle windshield glass to assure rated read range. Expose the tag's adhesive by peeling off the unprinted label from one side of the tag. Then press the *edges* of the tag (not the center) firmly by the fingers against the windshield glass.

- Do *not* put the tag in a pouch, or attach it by tape, or hold it by hand, or place it on the dashboard. Do *not* attempt to move the tag from one vehicle to another. It is designed for a single installation.

- *Caution:* Any metal content in or on the windshield where the WS tag is attached can severely limit the read range. Find the location on the windshield where the tag performs best. Then re-aim the reader.

MT tags: Follow instructions in "Vehicle Mounting Recommendations for Metal Mount (MT) Tags".

- MT tags offer flexibility in use. They may be attached to a *flat* surface outside a vehicle, trailer, container or pallet, or set on a dashboard, or held by the fingers. Try the tag in both "portrait" and "landscape" orientation.

- MT tags may be attached by spreading a thin layer of silicone adhesive behind the adhesive on the back of the tag, and pressing it on the surface, or by screwing the ends of the tag to the surface using non-metallic screws.

D. TESTING THE INSTALLATION – OFFLINE

At any time after AWID's long-range products have been installed on the system, the LR-911 readers may be tested independently of the host system, using the LRIN installation kit. This allows the installer to isolate the reader and tags from other aspects of the installation.

    a. Disconnect the LR-911 reader from the cable that connects it to the controller panel.

    b. Temporarily connect the SP-6820-LR test unit and the PS12-1A power module (or a back-up battery) to the reader's wires, as in Section B, Pre-Installation Testing (page 3) and Figure 1 (page 7).

    c. Test operation of the reader using hand-held GMWS and MT tags. If these tests are good …

    d. Test operation of the reader using the tags that are mounted on the vehicles.

    e. Use the results of these tests to identify any problem in the system.

E. TESTING THE READER AND TAGS – SERIAL INTERFACE TO PC

The LR-911 reader has wires for both serial interface by RS-232, and Wiegand interface. The reader transmits data on both interfaces simultaneously. Reader data output can be checked using the serial adapter cable in the LRIN installation kit. For this test, the reader's Wiegand Data-0 and Data-1 wires may be either connected or disconnected. Several test modes are available (see paragraphs 1 and 2 below).

→ See the wiring diagram, Figure 3, and notes (on page 7).

1. Microsoft Windows HyperTerminal

    a. Attach the 9-pin "D" connector on the adapter cable to the PC's serial input port.

    b. Connect the spring clips on the adapter cable to the wires on the LR-911 reader –
Orange to *Violet*, Blue to Blue, and Violet to *Orange*.

    c. Run HyperTerminal on the PC. The path in Microsoft Windows is:
Start → Programs → Accessories → Communications → HyperTerminal → Hypertrm.exe.
Configuration: 9,600 bits per second, 1 start bit, 8 data bits, 1 stop bit, no parity, ASCII emulation.

    d. The tag's code is listed on the monitor as a string of ASCII characters (not the Wiegand-formated code that is printed on the tag's label).

2. AWID's Demonstration/Test Software

Follow the instructions for the "Reader Output Demonstration and Timing Setup Program", which is available upon request from AWID as a DOC file attached to e-mail.

F. TESTING THE INSTALLATION – ONLINE

While the LR-911 reader is connected to the controller panel, and while the host system is operating, the installer may observe operation of the LR-911 reader at the reader by connecting the SP-6820-LR test unit to the reader's wires, as in Section B, Pre-Installation Testing (pages 3 and 7). This is helpful if the host system is at a distance from the reader.

<center>Attachments</center>

- "LR-911 Surveillance Zone Diagram"
- "GMWS Glass-Mounted Windshield Tags – Instructions for Holding"
- "Tags for Long-Range Readers– Location, Testing"
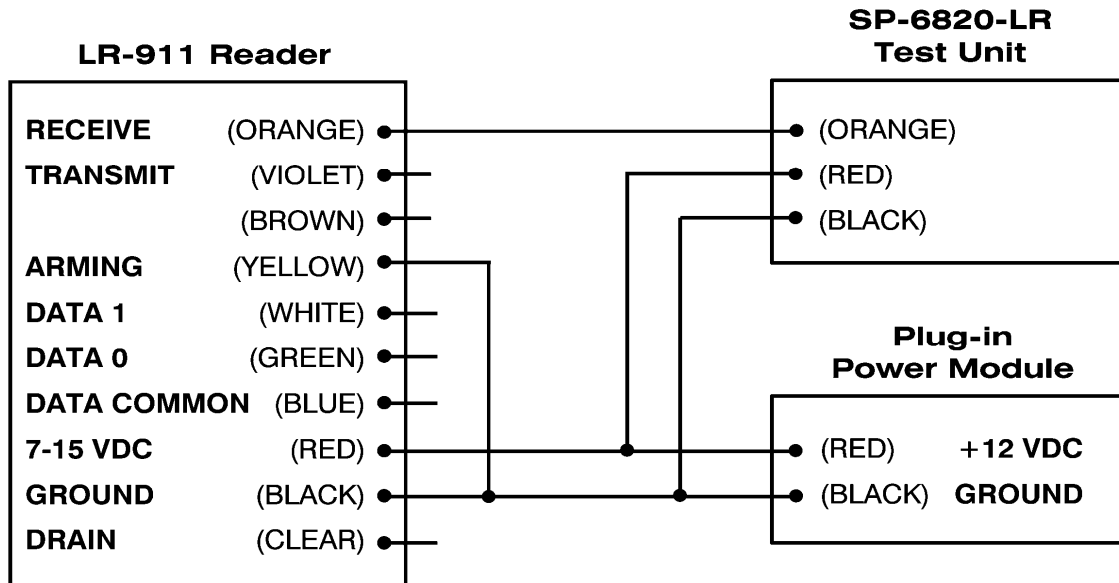- "Vehicle Mounting Recommendations …" for WS Tags and for MT Tags

LR-911 Reader

**SP-6820-LR
Test Unit**

RECEIVE	(ORANGE)	(ORANGE)
TRANSMIT	(VIOLET)	(RED)
	(BROWN)	(BLACK)
ARMING	(YELLOW)	
DATA 1	(WHITE)	
DATA 0	(GREEN)	**Plug-in Power Module**
DATA COMMON	(BLUE)	
7-15 VDC	(RED)	(RED) **+12 VDC**
GROUND	(BLACK)	(BLACK) **GROUND**
DRAIN	(CLEAR)	

Figure 1. Section B – Pre-installation testing
Section C – Aiming the reader

NOTES for Figure 1

1. Separate the unused wires. Keep the unused wires isolated.

2. On some earlier LR-911 readers, the spring clip on the **orange** wire of the test unit must connect to the reader's *violet* wire. If the orange-to-orange connection does not work, use an orange-to-violet connection.
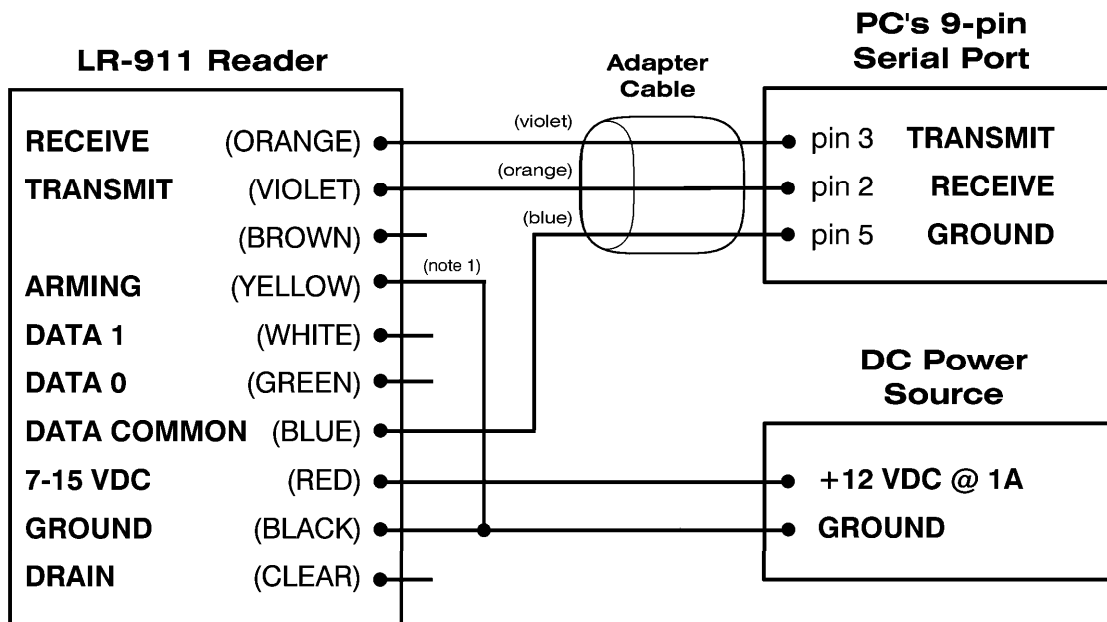
LR-911 Reader

Adapter Cable

**PC's 9-pin
Serial Port**

RECEIVE	(ORANGE)	(violet) pin 3 **TRANSMIT**
TRANSMIT	(VIOLET)	(orange) pin 2 **RECEIVE**
	(BROWN)	(blue) pin 5 **GROUND**
ARMING	(YELLOW)	(note 1)
DATA 1	(WHITE)	
DATA 0	(GREEN)	**DC Power Source**
DATA COMMON	(BLUE)	
7-15 VDC	(RED)	**+12 VDC @ 1A**
GROUND	(BLACK)	**GROUND**
DRAIN	(CLEAR)	

Figure 3. Section E – Serial interface to PC

NOTES for Figure 3

1. When running Microsoft HyperTerminal, tie the reader's **yellow** wire to the black wire. When running AWID's LR-911 programs, leave the yellow wire unconnected.

2. On some earlier LR-911 readers, the **orange** and **violet** spring clips of the adapter cable must be reversed – orange-to orange and violet-to-violet instead of the connections shown in Figure 3.
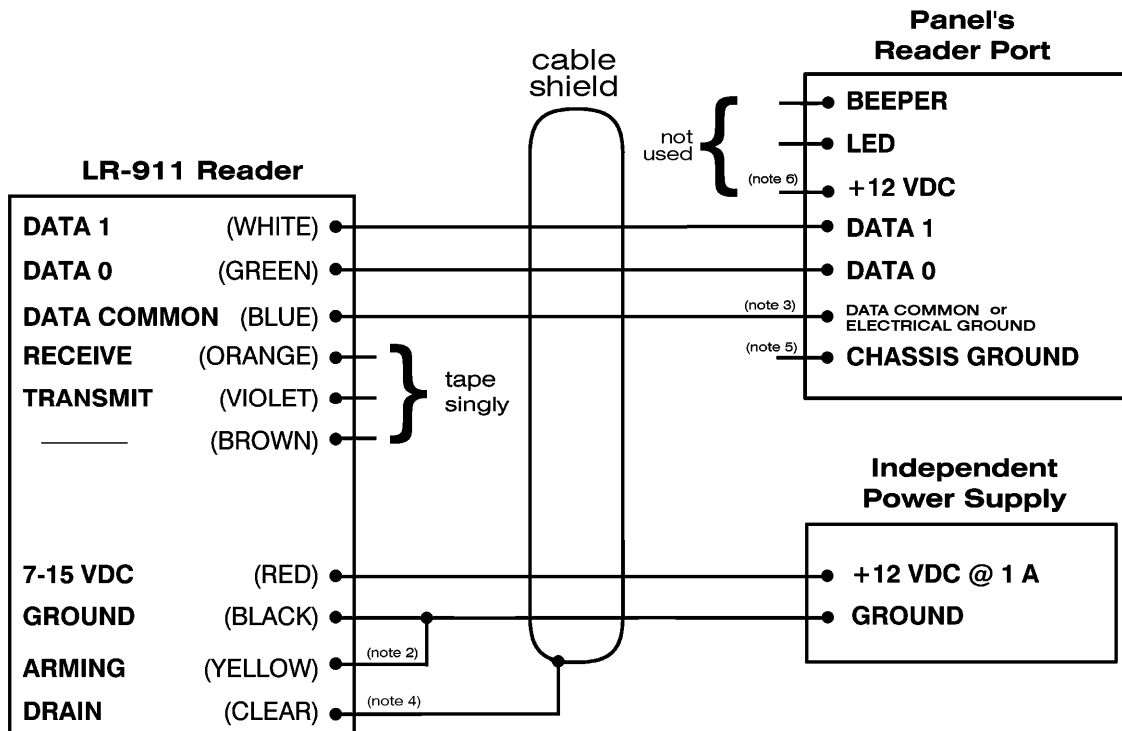
Figure 2. Section C - Installing at the Site

NOTES for Figure 2

1. Unused wires: Separate the unused wires (**orange**, **violet** and **brown**). Tape them off singly.

2. Arming: o   To arm the reader permanently, tie the **yellow** wire to the black wire at the reader.
   o   To arm the reader only when an approaching vehicle is over a ground loop, ground the yellow wire when the vehicle is over the ground loop by connecting it to the ground loop's relay.
   o   To disarm the reader, let the yellow wire float (connected to nothing).

3. Data lines: o   Connect the **blue** wire to the reader port's "Data Common" or "Signal Return" terminal, *if there is one*.
   o   If not, connect the blue wire to the reader port's "Electrical Ground" terminal.
   o   Be sure that the green, white and blue Data wires all go to the *same* reader port on the panel.

4. Drain: Tie the reader's **drain** wire (with clear insulation) to the cable's shield, but *do not* ground the shield anywhere.

5. Chassis ground: Connect the panel's ground to earth ground only if listed in the panel's instructions.

6. Power: o   Do *not* power the LR-911 reader from the reader port's DC power terminal.
   o   Use an independent power supply for the readers – a *linear regulated* DC power supply, between 7 volts, 1.5 amperes and 15 volts, 0.75 ampere.
   o   A typical power supply for each reader is 12 volts, 0.75 to 1.0 ampere.
   o   Use a separate power supply for each reader, or a central power supply for all readers.

7. Electrical grounds: Do *not* tie grounds for the independent power supply and the panel's reader port together. Connect only the reader's **black** wire to the independent power supply's ground or negative terminal.

8. Tests: Before sealing the cable terminations --
   o   Test no-load voltage at the independent power supply, and
   o   Test voltage at the reader when it is connected to the power supply, and
   o   Test reader and tag operation using the LRIN installation kit.

L.H.H. 15Sep'05