

LR-911 2.6H3



SENTINEL-PROX LR-911 2.6H3

LONG-RANGE TAG READER

Installation & Operation Manual-041359



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FCC COMPLIANCE

This equipment has been tested and found to be in compliance with the limits for FCC Part 15, Class A digital device. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

The users are prohibited from making any change or modification to this product, any modification to this product shall voids the user's authority to operate under FCC Part 15 Subpart A Section 15.21 regulations.

"This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference and, (2) this device must accept any interference received, including interference that may cause undesired operation."

INDUSTRY CANADA COMPLIANCE

Operation is subject to the following two conditions: (1) this device may not cause interference and (2) this device must accept any interference, including interference that may cause undesired operation of the device.



CAUTION:

Reader should be positioned so that personnel in the area for prolonged periods may safely remain at least 20 cm (8 in) in an uncontrolled environment from the reader's surface. Observe FCC OET Bulletin 56 "Hazards of radio frequency and electromagnetic fields" and Bulletin 65 "Human exposure to radio frequency electromagnetic fields."

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NOTE: READ AND USE THIS MANUAL.

NOTE: FAILURE TO FOLLOW THE INSTALLATION GUIDE MAY RESULT IN POOR PERFORMANCE OR EVEN CAUSE PERMANENT DAMAGE TO THE READER, THUS VOIDS THE PRODUCT WARRANTY.

REVISION HISTORY

Version No.	Revised By	Date	Sections Affected	Remarks
0.1	E. Wei	9/2007	All	Initial version

1 INTRODUCTION

AWID's Sentinel-Prox LR-911 2.6H3 is a long-range (9 to 11 feet) Radio Frequency IDentification (RFID) reader that works with paper-thin passive windshield mounting tags or credit card size tags. This reader comes with a unique combination of long read range, small size, and low power consumption. It has an internal power converter, allowing it to work with a wide range of supply inputs without affecting its performance. With a 15 V DC supply, its current consumption is less than 500 mA, making it possible to be powered directly from the supply in the access control panel, thereby eliminating the need for an external supply. LR-911 has simultaneous Wiegand and RS-232 outputs, its primary applications are automated parking garage entrance control, hands-free access control, asset tracking and asset management applications.

1.1 GENERAL DESCRIPTIONS

- Wall mount or post mount reader
- Indoor or outdoor installation
- Metal back plate for attachment
- Wiegand and RS-232 output

1.2 SPECIAL FEATURES

- Thin passive tags with long-range performance
- Designed for automated operation with tags mounted on automobile's windshield
- Simultaneous Wiegand (Access Control) and RS-232 (transaction control) outputs
- Permanently sealed electronics for indoor or outdoor applications
- UV stabilized plastic housing

1.3 SUGGESTED APPLICATIONS

- Garage Gate Control
- Asset Management
- Item Tracking
- RFID

2 SPECIFICATIONS

- Input voltage..... +7.0 VDC to +15 VDC
- Input current..... 1.0 A (7.0 V) to 0.50 A (15 V) typical
- Read range:
 - Prox-Linc WS Windshield Tag.....Up to 11 feet
 - Prox-Linc MT Metal Tag.....Up to 11 feet
- Transmit frequency..... 902-928 MHz
- Receiver frequency..... 902-928 MHz (Amplitude Modulated)
- Hopping channels..... 123 Channels
- Channel spacing..... 200 kHz
- Hopping sequence..... Pseudo random
- Operating temperature range..... -30° C to +65° C (-22° F to 149° F)
- Color..... Beige
- Output data format..... Simultaneous Wiegand & RS232 (Standard)

2.1 CHANNEL FREQUENCY HOPPING TABLE

CH	902~928	MHz	CH	902~928	MHz	CH	902~928	MHz	CH	902~928	MHz	CH	902~928	MHz
0	902.80	MHz	25	907.80	MHz	50	912.80	MHz	75	917.80	MHz	100	922.80	MHz
1	903.00	MHz	26	908.00	MHz	51	913.00	MHz	76	918.00	MHz	101	923.00	MHz
2	903.20	MHz	27	908.20	MHz	52	913.20	MHz	77	918.20	MHz	102	923.20	MHz
3	903.40	MHz	28	908.40	MHz	53	913.40	MHz	78	918.40	MHz	103	923.40	MHz
4	903.60	MHz	29	908.60	MHz	54	913.60	MHz	79	918.60	MHz	104	923.60	MHz
5	903.80	MHz	30	908.80	MHz	55	913.80	MHz	80	918.80	MHz	105	923.80	MHz
6	904.00	MHz	31	909.00	MHz	56	914.00	MHz	81	919.00	MHz	106	924.00	MHz
7	904.20	MHz	32	909.20	MHz	57	914.20	MHz	82	919.20	MHz	107	924.20	MHz
8	904.40	MHz	33	909.40	MHz	58	914.40	MHz	83	919.40	MHz	108	924.40	MHz
9	904.60	MHz	34	909.60	MHz	59	914.60	MHz	84	919.60	MHz	109	924.60	MHz
10	904.80	MHz	35	909.80	MHz	60	914.80	MHz	85	919.80	MHz	110	924.80	MHz
11	905.00	MHz	36	910.00	MHz	61	915.00	MHz	86	920.00	MHz	111	925.00	MHz
12	905.20	MHz	37	910.20	MHz	62	915.20	MHz	87	920.20	MHz	112	925.20	MHz
13	905.40	MHz	38	910.40	MHz	63	915.40	MHz	88	920.40	MHz	113	925.40	MHz
14	905.60	MHz	39	910.60	MHz	64	915.60	MHz	89	920.60	MHz	114	925.60	MHz
15	905.80	MHz	40	910.80	MHz	65	915.80	MHz	90	920.80	MHz	115	925.80	MHz
16	906.00	MHz	41	911.00	MHz	66	916.00	MHz	91	921.00	MHz	116	926.00	MHz
17	906.20	MHz	42	911.20	MHz	67	916.20	MHz	92	921.20	MHz	117	926.20	MHz
18	906.40	MHz	43	911.40	MHz	68	916.40	MHz	93	921.40	MHz	118	926.40	MHz
19	906.60	MHz	44	911.60	MHz	69	916.60	MHz	94	921.60	MHz	119	926.60	MHz
20	906.80	MHz	45	911.80	MHz	70	916.80	MHz	95	921.80	MHz	120	926.80	MHz
21	907.00	MHz	46	912.00	MHz	71	917.00	MHz	96	922.00	MHz	121	927.00	MHz
22	907.20	MHz	47	912.20	MHz	72	917.20	MHz	97	922.20	MHz	122	927.20	MHz
23	907.40	MHz	48	912.40	MHz	73	917.40	MHz	98	922.40	MHz			
24	907.60	MHz	49	912.60	MHz	74	917.60	MHz	99	922.60	MHz			

An LR-911 can be configured to support any of the four (4) frequency bands each constituted with 50 channels as listed below:

- USA1 – channels 0, 2, 4, ..., 94, 96, 98
- USA2 – channels 0, 1, 2, ..., 47, 48, 49
- USA3 – channels 37, 38, 39, ..., 84, 85, 86
- USA4 – channels 73, 74, 75, ..., 120, 121, 122

2.2 MEASURING READ DISTANCE

The Prox-Linc WS transponder for this Reader is designed for windshield mounting. To measure the read range between the Reader and the transponder, the transponder must be placed behind a piece of glass about 0.25 inches thick and the transponder must be flat against the glass. Grasp the transponder by the edges and hold the transponder so that the copper circuit faces the Reader. Move the transponder toward the Reader, with the card surface parallel to the Reader, until a BEEP occurs (using the SP-6820-LR test unit). The BEEP indicates that the Reader detects and reads the transponder. Optional firmware allows the user to select read repetition rates of about 3 per second, 1 per second, or 1 per 3 seconds.

NOTE: FAILURE TO FOLLOW THE INSTALLATION GUIDE MAY RESULT IN POOR PERFORMANCE OR EVEN CAUSE PERMANENT DAMAGE TO THE READER, THUS VOIDS THE PRODUCT WARRANTY.

3 PREPARATION FOR INSTALLATION

3.1 SITE SURVEY

Always conduct a site survey before starting installation. Avoid any possible sources of interference. If the reader is not installed properly, the performance will be degraded or more seriously the reader may get damaged. Listed below are steps that should be followed during installation:

- Do not install reader in an area where sources of broadband electromagnetic noise may exist. Avoid mounting the reader facing a cellular phone tower or in close proximity to the base station of a 900 MHz wireless telephone.
- Keep all of the Reader wiring at least 12 inches (30 cm) away from all other wiring, including, but not limited to, AC power, computer data wiring, telephone wiring, and wiring to electrical locking devices.
- Do not operate the reader in close proximity to other 900 MHz wireless equipment/devices.

3.2 PREFERRED READER INSTALLATION PRACTICES

- Avoid mounting the reader under direct sunlight. Exposure to direct sunlight may cause the reader to operate at a temperature above the 65 degrees Celsius upper limit.
- Make sure that the supply voltage of the reader is within specification
- Use cables with over-all braid or shield
- For best results, run the cable in an individual conduit, in safe distance from AC power, computer cables and cables for electrical locking devices
- Use recommended cable. Do not use any unshielded *Twisted Pair* type cable
- Use the largest wire gauge where feasible
- Use dedicated power supply, where necessary
- Use Single Point Grounding (Earthing) for block wire of cable. No ground loops. Outer shield of cable should not be grounded.

3.3 MOUNTING PREFERENCE

The LR-911 has a uni-directional antenna with an antenna beam width of about 60-70 degrees. The radiation pattern is an oval-shaped beam, which should be aimed toward where the transponders will pass. For best results, the antenna should be mounted on a post; about 6 to 7 feet from pavement with the antenna angled slightly downward. With a vehicle passing through the drive lane, the center of the antenna radiation pattern should project to the windshield directly in front of the passenger or driver.

Install Readers for neighboring vehicle lanes so that the effective areas for detecting tags do not intersect. Only one Reader should be able to read a tag at any location of

the tag. Be sure to elevate the antenna slightly to accommodate sport utility vehicles, minivans and trucks.

3.4 GENERAL WIRING REQUIREMENTS

All the reader wiring should be continuously shielded. AWID recommends using #22 AWG up to #18 AWG, longer distances and higher current consumption on the power supply line will require larger gauge wires. Due to system data termination differences, contact your panel manufacturer for the proper wire sizes to meet their specific requirements.

TABLE 3.4-1: Data Line's Wiring Requirement

WIRE SIZE	#22 AWG (0.6 mm Dia.)	#18 AWG (0.5 mm Dia.)
WIEGAND	500 ft (152 meters)	980 ft (300 meters)
RS-232	50 ft (15 meters)	50 ft (15 meters)

NOTE: WHEN USING AN EXTERNAL POWER SUPPLY, USE A HIGH-QUALITY POWER SUPPLY THAT MEETS THE CURRENT SPECIFICATION (SECTION 2).

3.5 POWER SUPPLY

For consistent performance, choose a high-efficiency switching power supply with remote sense and use the voltage sense wire to ensure consistent performance. Alternatively, use a linear, regulated power supply with sufficient current capacity (see Section 2, Specifications).

3.6 GROUNDING

Grounding is critical for proper operation of LR-911. When installing the reader, it is crucial to assure that the earth ground is the best ground available. If you elect to use the AC main power ground, conduct a test by measuring its resistance relative to a known good ground, such as a cold water pipe or structural steel that is in direct contact with the ground. The resistance should be less than 50 ohms. If the AC main power is found not to provide adequate earth ground, try using a solid connection to a cold water pipe. Outer shield of cable should not be grounded.

For multiple LR-911 installations, it is critical that all units are connected to the same grounding system. Using different grounding systems will create secondary current paths or ground loops that can affect the performance and cause damage to LR-911.

3.7 WIRING DIAGRAMS

See Figure 1 for wiring using Wiegand output to the host panel, Figure 2 for using RS-232 to the control device, or Figure 3 for a combination of them.

The Reader's Blue wire is Signal Ground. It must be connected to the signal-return at the panel or reader-input module. This is commonly (but not always) the panel ground terminal.

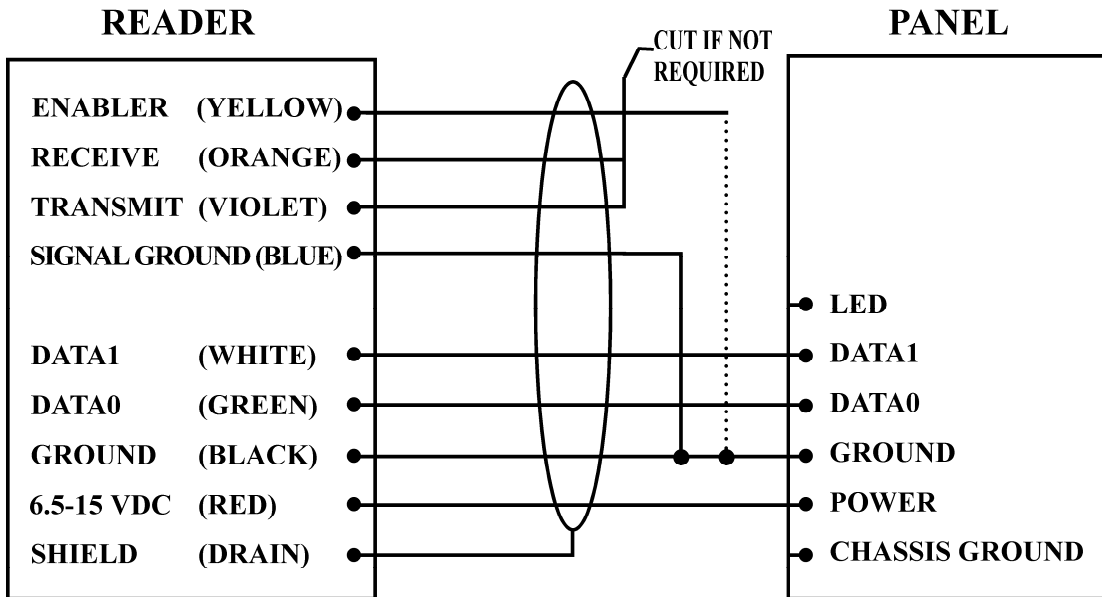


Figure 1 Wiegand Output Format

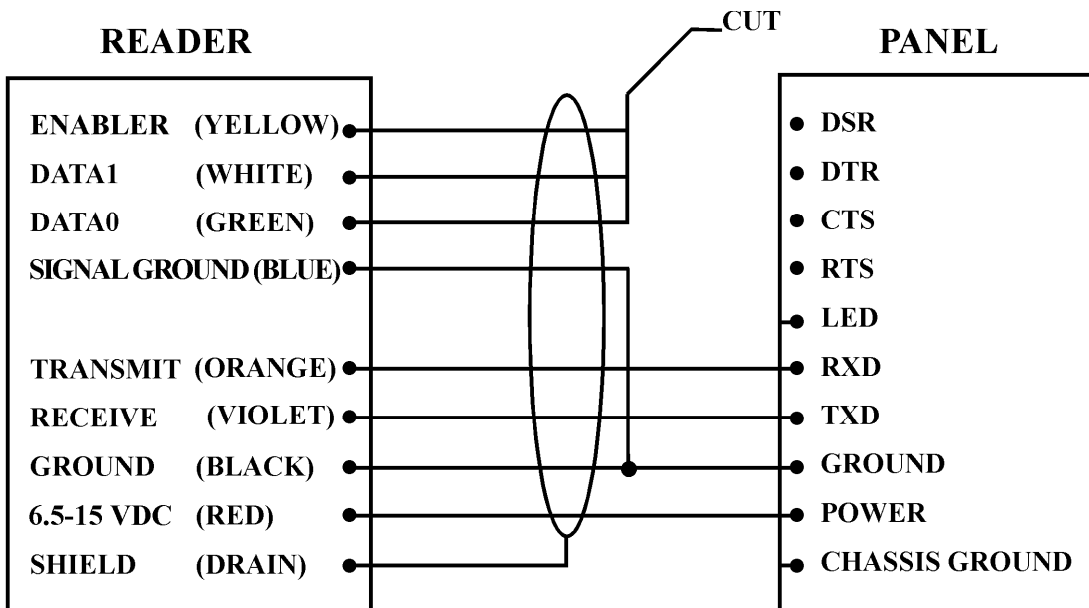


Figure 2 RS-232 Output Format

The Reader's Yellow wire enables the Reader to function only when this line is pulled low (0 V) by a dry contact or by connection to ground. The Yellow wire must be connected to either (a) a vehicle-sensing switch (if used), which is at ground potential

when a vehicle is present, or (b) a permanent ground, for example, the Reader's black wire.

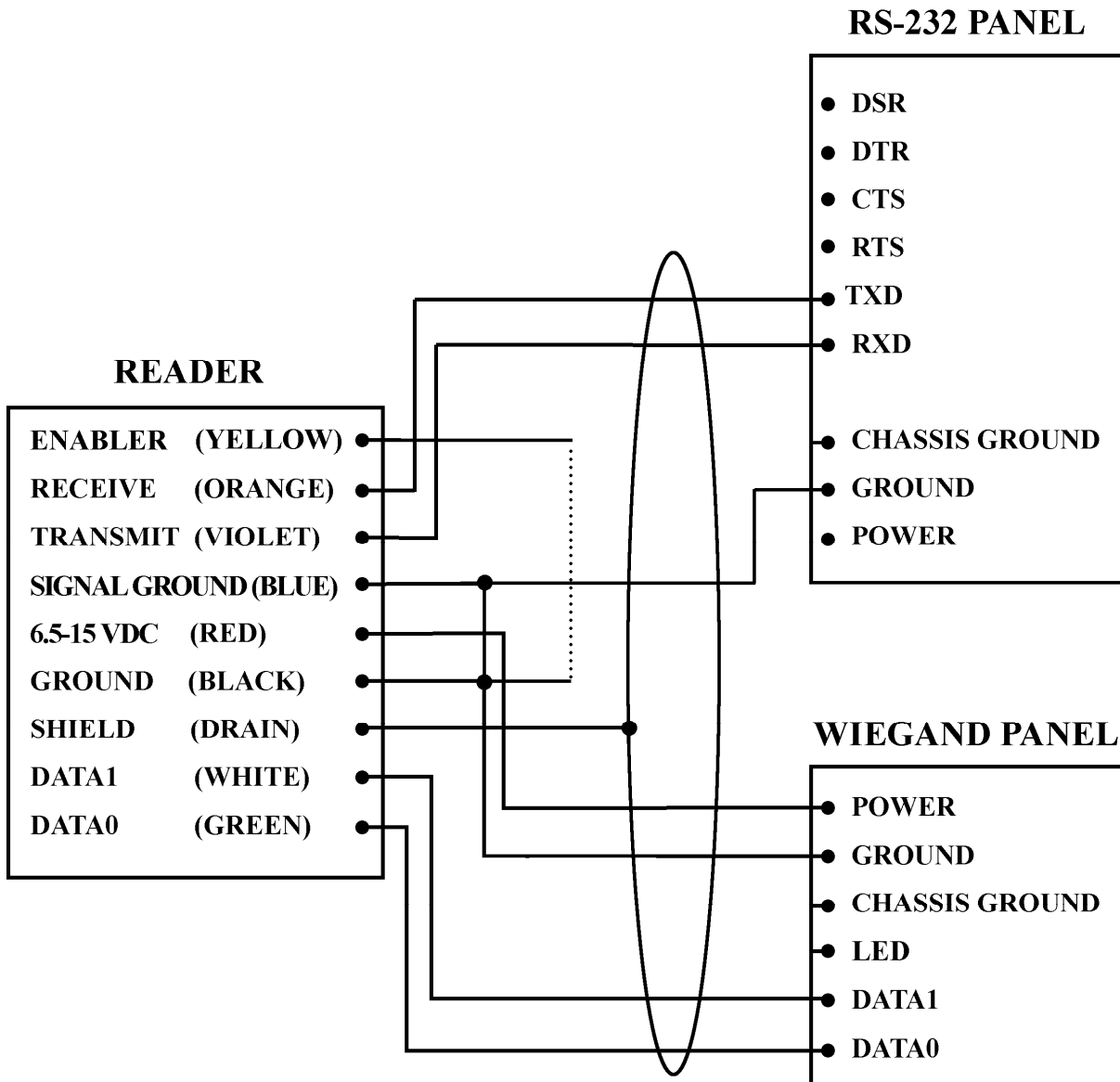


Figure 3 RS-232 & Wiegand Output Format

4 INSTALLATION PROCEDURE

Verify that all items listed in section 4.1 of this manual are present before starting the installation.

4.1 PARTS LIST

- a. Installation Instructions (packed inside Reader carton) Qty=1
- b. Sentinel-Prox LR-911 Reader Qty=1
(Tags for the LR-911 Reader and Installation Kit are available separately)

4.2 INSTALLATION STEPS

- a. Locate the Reader (Item b on Parts List) at the desired mounting position on a mounting post or a mounting surface. For mounting on a flat surface, drill four small holes through the aluminum plate behind the Reader housing for mounting screws, and one clearance hole for reader cable. For flexible mounting, use a video camera adjustable mount or clamps. The installer determines the size of the mounting holes and the clearance hole.
- b. Install the tags on the selected surface, for example, inside vehicle windshields or on the side of bins, pallets, truck trailers, etc.
- c. Use the LR Installation Kit to provide audible and visible feedback as the tags are attached and the Reader is aimed at the tags.
- d. **For Wiegand output, connect the Reader and the Panel together by cable according to Figure 1. For RS-232 data format, see Figure 2. For simultaneous outputs, see**

Figure 3.

4.3 VERIFICATION

- a. Connect the SP-6820-LR test unit, which is part of the LR Installation Kit, to the Reader cable. Use the wiring list in the Installation Instructions. Apply power to the reader and the test unit, using the plug-in DC power module in the Installation Kit.
- b. Use either a Prox-Linc WS tag that is attached firmly by its adhesive to a rectangle of windshield glass, or a Prox-Linc MT tag for verification. Hold the tag so that the hand does not interfere with direct line-of-sight between the tag and the Reader.
- c. Move the tag into the field. Observing the SR-6820-LR test unit, there is a brief LED color change and a beep to indicate each read of the tag by the Reader. Reads will repeat at a rate that is determined by the Reader's firmware.
- d. Move the tag from side to side, and at varying distances from the front of the Reader housing, to determine the space in which the tag and Reader are active.

4.4 MOUNTING

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- a. Check to ensure that all connections are secure. Feed all wires through the cable access hole to the rear or the side of the mounting position.
- b. Mount the Reader using fasteners on the aluminum plate to which the LR-911 Reader is attached. Drill holes through the plate as required by the application, or attach flexible mounting devices or clamps.
- c. Adjust the position or the angle of the Reader so that the tags (which have been fastened by adhesive to the windshield or other surface) are detected and read at the desired distance from the Reader.