

Technical Reference

Long-Range UHF Readers – Trouble-Shooting

DC Power, Isolation & Substitution Tests

*These tests for AWID's long-range UHF readers show the procedure for identifying a problem in **DC power**, either applied to the reader or generated by the reader's internal DC power supply – or an **environmental effect** on the reader. These notes apply to UHF reader models LR-2000, LR-2200, LR-3000 and LR-911.*

TOOLS These tools are useful at the site –

- AWID's Installation Kit for the long-range reader model . . . This is a required purchase by every installing dealer.
- Digital multimeter, including a DC amperes scale . . . An analog multimeter may be used.
- Back-up battery -- 12 volts, 7.5 ampere-hours, well charged . . . Substitute for the reader's DC power supply.
- Proximity reader and compatible card . . . Substitute for the long-range reader at the controller's reader port.
- Test tag from the customer's application system . . . Program its code into the host system as a Master tag.

TESTS These tests may be used to isolate and identify the cause of . . .

(a) reader failure or (b) intermittent reading or (c) resettable operation after “lock-up” –

- A. 5-point voltage checks for cause of voltage drop (see steps below)
- B. Series current in the reader
- C. Isolation tests of the reader's performance
- D. Wiegand data line voltage
- E. System component tests

PREPARATION

- The only wires of the long-range reader that are never used are **violet** and **brown**. Insulate these two wires permanently from each other and from everything else (like the cable's shield).
- For “isolation” tests, have all other wires accessible, spread out so that they can touch nothing.

A. 5-POINT VOLTAGE-DROP TESTS

The 5 steps in the test for cause of voltage drop are –

1. Disconnect the DC power supply's DC output (positive and negative) completely. Measure DC voltage on the positive and negative terminals of the power supply, no-load.
2. Disconnect the DC power cable from the reader, but connect its other end to the DC power supply. Measure voltage on the power supply's DC terminals.
3. Move the voltmeter to the other end of the DC power cable. Have the cable still disconnected from the reader. Measure voltage on the power cable's loose **red** and black wires near the reader.
4. Connect the reader's yellow to the reader's black wires (to arm the reader for RF generation). Connect the DC power cable to the reader's **red** and black wires. Measure voltage on the **red** and black wires.
5. Leave all connections as in step 4. Return to the DC power supply, and measure voltage on the positive and negative terminals.

These voltage measurements can identify a problem in the DC power supply, or in the wiring connections, or in the cable between the reader and the power supply, or in the reader itself.

Typical voltage drop from the connected power supply (step 5) and the reader (step 4) is about 0.4 volt.

B. SERIES CURRENT IN THE READER

To measure the current drawn by the reader from the DC power source –

1. At the reader, have the reader's yellow wire (the RF arming circuit) connected to the reader's black wire.
2. Other wiring may be as in a normal installation, or disconnected.
3. At the reader, disconnect the reader's **red** wire from the power cable.
4. Set the multimeter to DC Current, for a range of 1 or 5 or 10 amperes.
5. Hold the multimeter's probes on these two **red** wires – **red** probe on the cable's positive DC wire, and black probe on the reader's **red** wire.
6. Normal current when no tag is near the reader is about 450 milliamperes (less than 0.5 ampere). When a tag is present, current may be slightly higher and fluctuation quickly (3 times per second, if the meter reacts quickly to changes in current).

Higher or lower current could indicate a problem inside the reader. Higher than normal current could be the cause of excess voltage drop between the power supply and the reader (see section A.).

C. ISOLATION TESTS FOR THE LONG-RANGE READER

To see the reader operating completely separated from the rest of the installation –

1. Disconnect *all* wires of the long-range reader, except the yellow wire (it remains shorted to the reader's black wire).
2. Substitute a back-up battery (12 volts, 7.5 ampere-hours, well charged), clipped to the reader's black (negative) and **red** (positive) wires.
3. Connect the Test Unit (part no. SP-6820-LR) from the Installation Kit to the reader's black, **red** and **orange** wires.
4. Hold the test tag in front of the reader. The test unit beeps and its LED changes color for every reading event – 3 reads per second for a new reader. A test tag held in the fingertips should read to about 20 feet in front of the reader (for LR-3000, to 25 feet; for LR-911, to 9 feet).
5. If necessary, remove the reader from its mounting, and carry it to a remote location, distant from the installation site. This removes the reader from possible RF interference from other devices and antennas near the installation. For this “**green field**” testing use the reader, the battery, and the Kit (test unit and test tag).

Isolation Tests indicate if the long-range reader is able to work independent of everything else in the application system. For more detailed testing with the Installation Kit, see its Quick Installation Guide (provided in the Kit).

D. WIEGAND DATA LINES VOLTAGE TESTS

The Isolation Tests (above) use the reader's RS-232 Transmit Data (orange) wire to indicate reading. To test the possibility that the reader's Wiegand data drivers have been damaged, follow these steps –

1. Isolate the reader as in steps C.1 and C.2, above.
2. Measure the voltage on the reader's black and **red** wires. Confirm that the voltage is close to the battery's voltage when nothing is connected to the battery (perhaps 0.5 volt less).
3. Move *all* tags and cards for the long-range reader at least 30 feet *behind* the reader, so that no tag can be read by the reader.

(continued)

4. Measure DC voltage between the reader's black and *green* wires (Wiegand Data-0). It should read about +4.96 volts, varying randomly only about 0.01 volt. (Meter's black probe to black wire, and *red* probe to *green* wire.)
5. Measure DC voltage between the reader's black and *white* wires (Data-1). It also should read about +4.96 volts, with the same slight variation. (Meter's black probe to black wire, and *red* probe to white wire.)
6. If these voltages are correct, bring a single test tag from the Installation Kit, or from the customer's tags, in front of the reader, within a foot or two. It may be convenient to tape the test tag to the face of the reader.
7. Repeat the voltage measurements of steps 4 and 5. The voltages should be similar to steps 4 and 5, but (a) the voltage should be slightly lower, and (b) it should vary in a range of about +4.88 to 4.94 volts. By careful observation, the variation may be seen to occur 3 times per second (the read repetition rate of a new reader).

Failure of these voltage checks indicates damage to the reader and need for repair by AWID. If the reader tests normal, the problem is elsewhere in the system.

E. SYSTEM COMPONENT TESTS

When the DC power tests normal in the procedures described above, the following items, related to the installation rather than the reader, should be checked –

1. **Cable** between the reader and its power supply, and between the reader and the system's controller panel – AWID's specifications for the cable must be observed.
2. **Wiring connections** – 7 of the reader's wires must be used (yellow, black, red, green, white, blue and drain). The *orange* wire must be accessible for the Installation Kit's Test Unit. Only *violet* and *brown* wires are never used.
3. **Reader** mounting, location, aiming – Follow AWID's recommendations in the installation instructions.
4. **Tags** location and attachment – Follow AWID's instructions.
5. **Driving** conditions – In the reader's Manual, observe Section 3.2 carefully.
6. Host **system** -- Substitute a proximity reader and a compatible card, in place of the long-range reader, into the host system's controller (the panel's reader input port).

For guidance on these tests, see the Reference documents listed below, and contact AWID's Technical Support.

NOTES

1. Never have more than 1 UHF tag or card present in the reader's RF field. Store other tags 30 feet behind the reader.

REFERENCE

- Manual for the long-range reader model – Section 11, "Trouble-Shooting" (pages 16-20)
- Technical Reference: "Long-Range UHF Readers – Pre-Installation Testing; Evaluating Site Conditions"
- Technical Reference: "Trouble-Shooting Quick Guide"
- Technical Reference: "Trouble-Shooting the System"
- Quick Installation Guide for the Installation Kit
- Technical Reference "Material List" for the reader model (specifications and sources)
- Diagram for "Effective RF Field"