Industrial RFID Reader

User's Manual

for the following models:

FCC ID: IOL-125-AV1015 (6" Coil System)

FCC ID: IOL-125-AV1016 (12" Coil System)

FCC ID: IOL-125-AV1017 (24" Coil System)

The 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.
2. This device must accept any interference received, including interference that may cause undesired operation.

WARNING: This equipment has been tested and found to comply with the limits for Class A digital device pursuant to Part 15 of the FCC Rules. 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 the instructions, may cause interference to radio communications. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the User is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and the receiver.
• Connect the equipment into an outlet on a different circuit from that to which the receiver is connected.
• Consult the Dealer or an experienced Radio/TV Technician for help.

The User is cautioned that changes and modifications made to the equipment without the approval of the manufacturer could void the user's authority to operate this equipment.

Table of Contents

Terminology

AC	Alternating current. AC power can be directly obtained from the wall-plug.
CR	Carriage return. A special character used to indicate the end of a line.
DB-9	The type of 9-pin serial connector used by the Avid reader.
DC	Direct current. DC power is used by the Avid reader.
DIP	Dual in-line package. The configuration switch package used by the Avid reader.
FCC	Federal Communications Commission. Avid readers are fully certified by FCC to operate within the United States of America.
ID	Identification number. The unique identification number stored in RFIDs.
LCD	Liquid crystal display. The display technology used by the Avid add-on display board.
LF	Line feed. A special character used to indicate the end of a line.
NEMA	National Electrical Manufacturers Association. The Avid enclosure meets the NEMA 250-2003 Type 4X standard.
RF	Radio frequency. The type of signals that Avid tags use to provide identity.
RFID	Radio-frequency identification. The type of electronic tag that the Avid readers are designed to read.
RMA	Return merchandise authorization. An RMA number is required for Avid to identify a returned product.
RS-232	Recommended Standard 232. The serial port standard used by the Avid reader.
RTC	Real-time clock. This component provides an accurate current time and date reference for the Avid reader.

1 Introduction

The Avid Industrial RFID Reader is a stationary reader that can process Avid and FECAVA RFID tags. When installed in the optional NEMA 250-2003 Type 4X enclosure, the reader is weather and chemical resistant. Every reader is tuned to the included antenna for optimal performance. Standard antenna sizes are 6", 12", and 24", but other shapes and sizes are also supported. The expected read distances range from 6" to 48" depending on the antenna-transponder combinations.

The standard industrial reader sends all tag data in real-time to host computers through the on-board RS-232 serial interface. With the optional data logger, the reader can function as a standalone logger to record up to 2,000 IDs with date and time stamps.

2 Reader Board Setup

The Industrial Reader's main circuit board is shown in Figure 1. This board has an antenna connector, a configuration DIP switch, and the signal ports for connecting to other devices. Optional add-on boards like the LCD and data logger may be attached on top of the main reader board to provide additional features. All Avid readers are pre-configured to perform standard reading at power-on. Users may modify the settings for their particular applications.
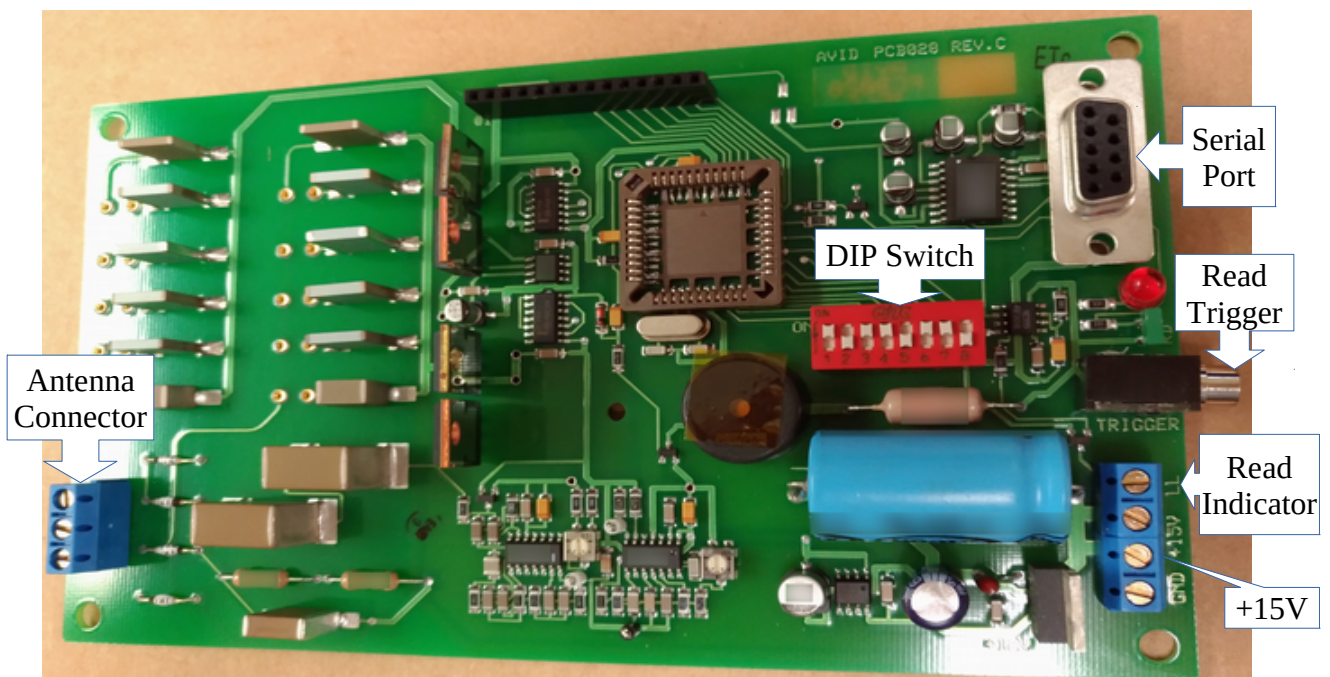

Figure 1: Avid Industrial RFID Reader Circuit Board

[WARNING: High voltage.]

2.1 Power Requirements

The reader can operate at a constant DC voltage between 12V and 18V. If an AC outlet is available, use the 15V AC-to-DC wall-adapter provided by Avid. The Avid reader can also be powered by batteries and custom DC power supplies. Please contact Avid if a different power supply is required.

2.2 Power-On Defaults/DIP Switch Settings

The DIP switch shown in Figure 1 controls the reader power-on default functions. When power is applied to the Avid Industrial Reader, the reader will start operating according to the position of the switches listed below:

SW1   On – Continuous Read   Off – Read Once and stop

SW2   On – A123456789   Off – AVID123*456*789

SW3   On – Beep On   Off – Beep Off

Baud Rate	2400	9600	19200	57600
SW4	Off	On	Off	On
SW5	Off	Off	On	On

SW6* On – LCD Installed   Off – LCD **NOT** installed

SW7   On – LED Enabled   Off – LED **NOT** enabled

SW8   On – Report tag departures   Off – Do **NOT** report tag departures

*Note: If the optional LCD is not installed, SW6 **MUST** be switched to the **OFF** position; if the LCD is installed, it will display 'AVID ID READY' *at power-on* and immediately switch to the 'LOOKING' mode.

2.3 Antenna [Warning: High Voltage]

The Industrial Reader is FCC certified for three different sizes of circular coil antennas: 6", 12" and 24". Customized antennas can also be made to fit your applications. Every Avid reader is tuned to its attached antenna at assembly time. Please consult Avid should modifications be needed.

The antenna is connected to the top and bottom pins of the 3-pin terminal strip denoted by 'Antenna Connector' in Figure 1. The antenna and the circuitry around its connector operate at high voltages. Do not open the Avid enclosure when power is connected.

2.4 Interference from Other RF Sources and Metal Objects

The reader performance can be affected by two main external sources: RF interference and conductive material detuning.

RF signals emitted by electrical devices like computers, transformers, and lamps can be captured by the highly sensitive antenna and circuitry in the Avid reader. Both the antenna and the reader board are susceptible to RF interference. If the reader consistently fails to read tags, move the antenna and reader away from other electrical devices.

Proximity to conductive objects like metallic necklaces, cages, and desks can detune the antenna. If the reader has difficulty reading tags, move all the conductive objects at least **four feet** away from the antenna and the tagged animal.

3 Peripheral Connections

The Industrial Reader has an on-board serial interface, a read trigger, and a read indicator for user system integration. Users may connect the reader to a computer, a remote controller, and a relay switch using its on-board peripheral interfaces.

3.1 Serial Interface

Table 1: RS-232 Serial Cable Pin Assignment

Signal	DB-9 Pin #
TXD	2
RXD	3
GND	5
DSR	6

The Industrial Reader can communicate with a host computing device through its on-board RS-232 port. A 6-foot serial cable with a female DB-9 connector are attached to every standard reader. By default, all messages and ID numbers are sent to the serial

communications port with carriage-return/line-feed termination characters. The RS-232 pin-out is listed in Table 1.

3.1.1 Serial Terminal

Users can use a serial port terminal to send commands to and receive responses from the reader. Manufacturer testings are done with the open-source terminal emulator TeraTerm (https://osdn.net/projects/ttssh2/) on Microsoft® Windows® 10, but the reader is compatible with most serial terminal emulators. By default, the reader serial port has the following configuration, and the terminal software should use matching settings:

9600 baud, 8 bit, no parity, 1 stop bit (N, 8, 1)

With the correct connection setup, the reader will prompt ' AVID/FECAVA Rdy' at power-on. When the reader is scanning for tags, it prompts ' LOOKING'.

3.1.2 Serial Interface Commands

The standard reader supports the set of commands listed in Table 2. The reader immediately responds to all the single-character commands but waits for the carriage return before processing the multi-character 'W' command.

Table 2: Serial Interface Commands

Command	Function
R	Read. Start Looking for tags.
S	Stop. Stop looking for tags.
C or M	Enable continuous reading. Start looking for tags and continuous looking after one is found. On readers equipped with LED read indicators, the LED will flash as long as a valid tag is present.
c or m	Disable continuous reading. Reading will continue until a valid tag is read or when a stop command is received by the reader.
(space) or x	Toggle between Read and Stop.
B	[NV] Enable the reading and message beeps.
b	[NV] Disable the reading and message beeps.
Q	[NV] Stop sending prompts to the serial port. Tag ID information is still sent.
q	[NV] Start sending prompts to the serial port.
:	[NV] Use CR/LF for prompt and tag line termination.
;	[NV] Use LF for prompt and tag line termination. To be used with Linux.
W	Write up to 16 characteres to the LCD. More than 16 characters or a control character (such as CR) will terminate the command.

Note: [NV] *indicates that the command changes the reader configuration memory. The change is saved by the reader for subsequent operations.*

3.2 Read Trigger

While the reader operates in the continuous-read mode with the default configuration, it can also be manually triggered into the single-read mode with an optional external push-button switch. When installed, the push-button switch connects to the on-board 3.5mm sub-miniature phone jack Read Trigger shown in Figure 1.

The reader stays in READ mode as long as the button is held down. If an ID tag is found, the reader will turn off the antenna and the results will be sent; however, if the button is released before an ID tag is found, the 'NO ID FOUND' message will be sent instead. The messages are sent to both the serial port and the optional LCD.

To start the READ process again, the button must be released and held down again until the next tag is found. If a host device is connected to the serial port, it can also start the next READ cycles by sending the 'R' command.

3.3 Read Indicator

The reader provides an electrical read indicator to signal valid tag reads. The read indicator connector pin is marked LL and denoted by 'Read Indicator' on the 4-pin terminal strip shown in Figure 1. This indicator is an active-low signal. When no tag is detected, the voltage stays at the power supply voltage V+, i.e. 15V with the Avid AC adapter; when a valid tag is read, the signal momentarily drops to a lower voltage for 30ms before returning to V+ again.

The reader indicator can be connected to a relay switch to control a gate or diverter. The reader provides an extra V+ pin (denoted by '+15V' in Figure 1) at the 4-pin terminal for this purpose. This V+ connector is directly driven by the power source at its supply voltage. To add a relay, connect the coil of the relay between the LL pin and the V+ pin on the terminal strip.

4 Add-on Boards

The Industrial Reader can include an LCD board for tag ID displays and a data logger board for standalone tag ID activity recording. These boards are installed by Avid at assembly time. Please consult your sales representative regarding these add-on options.

4.1 LCD

The single-line, 16-character LCD provides visual display of the scanned tag IDs to allow attended monitoring. The Industrial Reader with an LCD is installed inside a NEMA enclosure with clear lid. Users may observe the displayed reader activities through the enclosure. The following are the standard LCD messages:

AVID/FECAVA Rdy	Reader is powered ON and battery is OK.
LOOKING	Reader is looking for an ID tag.
No ID Found	Reading is terminated and no valid ID tag is found.
Low Battery	Power supply voltage is low. Check power adapter or replace battery.
AVID*123*456*789	Example of a valid Avid ID tag.

4.2 Data Logger with Real-Time Clock

With the data logger board installed, the reader can store 2000 IDs with date and time stamps. The data logger enables the reader to autonomously monitor and record tag activities as a standalone unit without a host controller. For the operation details of the data logger, please refer to the *Avid Memory Module Data Logging Guide*.

5 Avid Keyboard Wedge™

The Avid Industrial Reader is fully compatible with the Avid Reader Wedge software. With the Reader Wedge, the Industrial Reader outputs can be directly translated into keyboard entries for Microsoft® Windows® applications like Excel® and web browsers. To acquire a copy of the Avid Reader wedge, please contact sales@avidid.com.

6 Specifications

Operating Frequency:	125 kHz
AC Power Adapter:	input 100-240 V, 50-60Hz output 15 V, 1.6A max
Operating Current:	6-inch coil 600 mA max 12-inch coil 750 mA max 24-inch coil 750 mA max
Stand-by Current:	base model 50 mA data logger model 90 mA
Display [optional]:	Single-line, 16-character dot-matrix LCD
Operating Temperature:	0° to 50°C (32° to 122°F)
Storage Temperature:	-20° to 65°C (-4° to 149°F)
Reading distance:	6" to 48"
FCC Information:	FCC ID: IOL-125-AV1015 - 6" Coil System FCC ID: IOL-125-AV1016 - 12" Coil System FCC ID: IOL-125-AV1017 - 24" Coil System

7 Warranty Service

The Avid Industrial Reader is warranted against defects in material and workmanship, under normal use and service, for a period of 1 year from the date of shipment from Avid. This warranty will not apply if repairs, parts or adjustments are required due to accident, neglect, damage during transportation, or causes other than ordinary use. Avid's sole responsibility under this warranty shall be, at Avid's option, to either repair or replace any product, which fails during the warranty period. In no event shall Avid be liable for any indirect or consequential damages or loss of profits.

A **Return Material Authorization (RMA)** number must be issued before a unit is returned to Avid for service. Contact Avid's Sales Department for a **RMA** number or other service questions. (951) 371-7505 Option 3.

For information:

Within USA	1(800) 336-2843 Option 3
Outside USA	+1(951) 371-7505
Fax	+1(951) 737-8967
Email	sales@avidid.com

3185 Hamner Avenue
Norco, California
USA, 92860
www.avidid.com