

INSTALLATION AND OPERATING
MANUAL

FOR

MODEL 1840
READER

Part No. 710-0001-00

Version 3/00

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SECTION 1 GENERAL INFORMATION

1.1 INTRODUCTION

This manual provides information pertaining to the installation and operation of the Model 1840 Reader, PCB only, (RFID, inc. Part No. 710-0001-00) or Model 1840E (the E signifying enclosure) (RFID, inc. Part No. 800-0005-00).

1.2 DESCRIPTION

The Model 1840 is a versatile, low powered Reader that operates with an external Antenna. Various configurations of Antennas are available from RFID or a custom Antenna can be designed to meet unique requirements. The Model 1840 is ideally suited for integration into conveyor systems, Automated Storage and Retrieval Systems (AS/RS) and other RFID requirements in warehouse and factory applications. What makes the 1840 ideally suited its ability to mount the Antenna at the reading station and the Reader electronics at a more convenient location up to 12 feet away.

The Reader operates as both a transmitter and receiver. The Reader provides a low-frequency electromagnetic field at 148 kHz to energize and activate an Electronic Transponder, or Tag, in the vicinity of the Antenna. Once the Tag is energized, it modulates its data back to the Reader. The Reader detects, amplifies and filters this modulation and relays it to the Interface unit for use by a host computer, process controller or display and storage device.

The Reader is simple to use and install. It requires no alignment or adjustment and can operate from different types of power sources. The unit may be mounted in a variety of ways to suit the particular application and equipment.

1.3 SPECIFICATIONS

Operating Frequency:	148 kHz +/-0.5% (transmit) 37 kHz (receive)
Tag Reading Distance:	Up to 37" (depending on Antenna, transponder and orientation)
Remote Enable:	5 mA, Opto-isolated
Signal Output:	75 ohms, balanced
Cable Distance to Interface:	Up to 5000 feet (with shielded twisted pair cable)
Connectors:	Angle entry terminal strips:
Antenna:	TB3 - 1 and 3
Signal to Reader:	TB1 - 1 and 2
Remote Enable:	TB2 - 1 and 2
Power:	TB2 - 3, 4 and 5
Power Supply Voltage:	
DC:	18 to 32 VDC Regulated
AC:	24 V Regulated RMS(+10/-20%),47-63 Hz
Power Supply Current:	200 mA (max)- Enabled 150 mA (typ)- Enabled 30 mA (typ)- Disabled
Remote Antenna	
Inductance:	1.10 mH +/- 3%
Resistance:	12 Ohms (max)
Temperature Range	
Operating:	-40 to +55 degrees C
Non-operating:	-55 to +85 degrees C
Dimensions	
PCB:	4.0 x 4.4 x 1.1 inches
Enclosure:	4.75 x 4.75 x 2 inches
Weight:	0.25 lbs. (0.12kg)

SECTION 2 INSTALLATION

2.1 INTRODUCTION

This section contains information for unpacking, inspection and installation. Installation includes power and signal wiring as well as mounting of the Reader itself.

2.2 UNPACKING AND INSPECTION

If the shipping carton is damaged or shows evidence of abusive handling, inspect the Reader for visible damage including dents, scratches, etc. If the unit appears damaged, contact the carrier and RFID, inc. Sales or Customer Service Departments immediately. Keep the shipping and packaging material for the carrier's inspection. RFID, inc. will arrange for repair or replacement of the damaged unit without waiting for the claim settlement with the carrier.

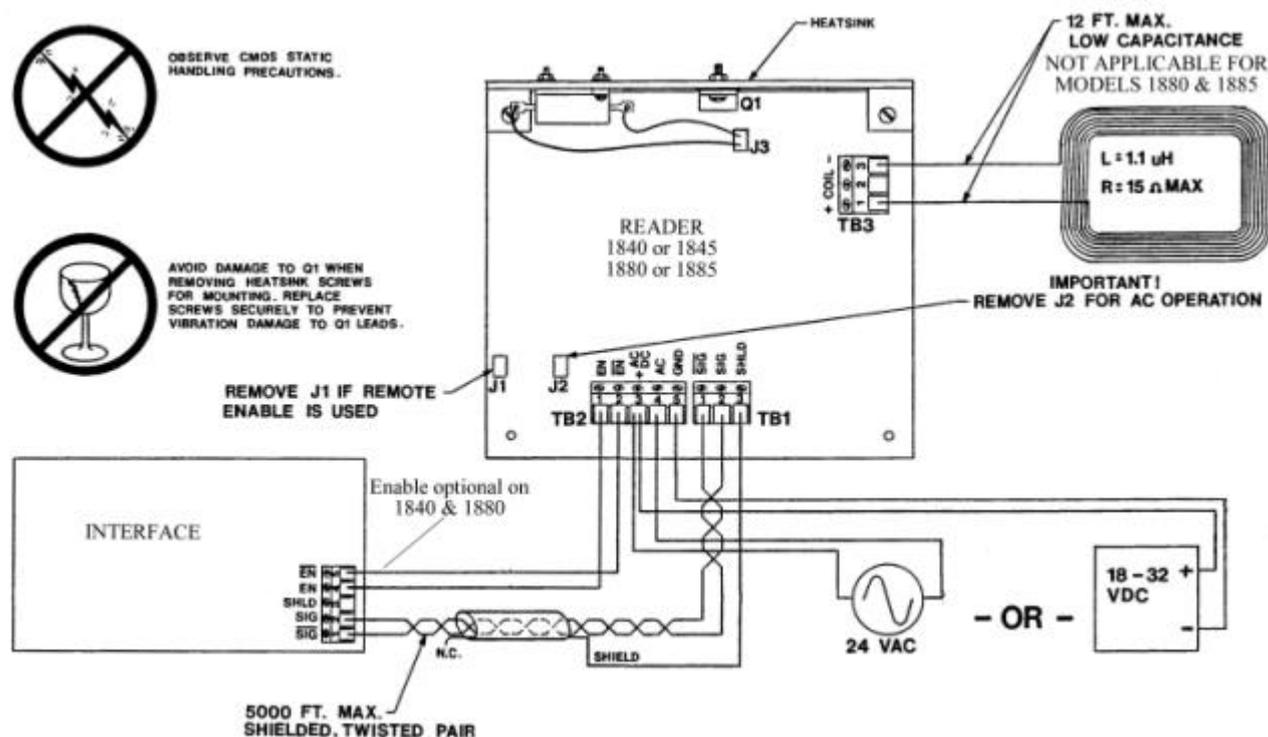


Figure 2-1 Installation Summary

Connect Antenna to TB3 - 1 and 3. No polarity exists, meaning it does not matter which screw terminal you connect the white or black Antenna leads to.

Connect SIG and SIG BAR outputs from TB1 - 1 and 2 to Interface inputs SIG and SIG using #20 - #28 AWG twisted pair wire. If used, connect shield to TB1 - 3, leave unconnected at other end.

OPTIONAL. Note: EN and EN BAR connections are used for multiplexing systems on Reader Model 1845(E) and Interface Model 2022(E). They are wholly unnecessary with Connect EN and EN inputs at TB2 - 1 and 2 to Reader outputs EN and EN. If used, connect shield at Reader only. Remove J1 for remote operation.

Select power source. Leave off while making connections:

AC - Connect AC power source to TB2 - 3 and 4.
Remove J2.

DC - Connect DC+ to TB2 - 3.
Connect DC- (GND) to TB2 - 5.
Install J2.

CAUTION!

Failure to remove the shorting jumper from J2 when operating with an AC power source will cause permanent damage to Reader circuitry. The Reader is normally supplied with the shorting jumper installed on J2 (DC operation).

2.3 POWER REQUIREMENTS

The Reader may be powered from regulated or linear, AC or DC power sources having the following characteristics:

Voltage DC:	Voltage Range:	18 to 32 volts
	Ripple:	100 mv p-p (max.)
Voltage AC:	Voltage Range:	24 v RMS (+10%, -20%)
	Frequency:	47-63 Hz
Current:	Operating:	200 mA. (max.)
		150 mA. (typ.)
	Disabled:	30 mA (max.)

RFID, inc. can provide transformers and power supplies suitable for use with the Model 1840. If you provide your own power supply, it is recommended that you **avoid switching power supplies**. These supplies produce electromagnetic interference (EMI) that **WILL** interfere with the operation of the Reader.

The Reader assembly can operate from grounded or floating supplies. It may operate from a separate ground reference with respect to the interface or host computer.

2.4 AC/DC POWER SELECTION

The Reader contains an on-board bridge rectifier for conversion of floating AC power input to DC. For operation with DC input, this full-wave bridge can be bypassed with jumper J2.

AC Operation - Select the full-wave bridge by removing shorting jumper J2 from the printed circuit board.

DC Operation - Bypass the full-wave bridge by connecting both of J2's pins together with the shunt provided.

2.5 POWER CONNECTIONS

Power wiring should be connected to terminal strip TB2 using #20 to #28 AWG insulated, stranded wire. The power source should be turned off while making connections to the Reader. Wires should be stripped approximately 3/8 of an inch. Tinning of these ends is recommended.

AC Supply: Connect AC power inputs to TB2 locations 3 and 4 that are marked AC/DC+ and AC.

Since AC has no polarity, pins 3 and 4 are interchangeable. TB2 location 5 (GND) is left unconnected and may be used as a DC ground reference if a floating supply is used. Be sure jumper J2 is removed before applying AC power.

DC Supply - Connect the positive DC input to TB2 location 3 (AC/DC+) and the DC return to TB2 location 5 (GND). TB2 location 4 (AC) is left unconnected. Reverse polarity can cause permanent damage so verify connections before applying power.

2.6 SIGNAL CABLING

For best performance, signal connections should be made with shielded, twisted pair cable. If the signal wires are combined in the same cable with the power and remote enable wires, then they should be separately shielded. The following cables are recommended for general use:

<u>APPLICATION</u>	<u>CABLE DESCRIPTION</u>	<u>PART NUMBERS</u>
Signal Only	2 Conductor paired cable #22 AWG w/foil shield Polyethylene & PVC 60 degrees C	Belden 8761 Columbia C2514 Manhattan M13226 RFID, inc. PN 214-2202-00
Signal and Remote Enable Or Signal and Power Input	4 Conductor paired cable 1 pr. 22 AWG w/ foil shield 1 pr. 22 AWG unshielded Polypropylene & PVC 60 degrees C	Belden 8724 Alpha 2464 Manhattan M4451 TELSOR PN 214-2204-00
Signal Power, and Remote Enable	6 Conductor paired cable 2 pair 24 AWG w/foil shield 1 pair 22 AWG unshielded PVC, 80 degrees C	Belden 8786 Manhattan M14477 TELSOR PN 214-2206-00

Signal outputs are connected from terminal strip (TB1) on the Reader to the SIG and SIG BAR inputs on the selected Interface. Wires should be stripped approximately 3/8 of an inch and tinned. The SIG output from the Reader (TB1-2) connects to the SIG input on the Interface. The SIG output (TB1-1) connects to the SIG input on the Interface. If shielded cable (recommended) is used, the shield should be connected on one end only. It is recommended to connect the shield to the Reader SHLD connection (TB1-3) and leave the other end floating. It is acceptable to connect the shield to the Interface and leave it floating on the Reader. Over short distances or in environments that are free of electromagnetic noise the shield may be omitted.

DO NOT CONNECT THE SHIELD TO BOTH THE READER AND INTERFACE!

2.7 REMOTE ENABLE CABLING

Reader operation may be controlled from an Interface or remote unit via the enable inputs (EN, EN BAR) at TB2 locations 1 and 2. Disabling the Reader shuts off the Antenna's 148 kHz transmissions and reduces current draw to 30 mA (max). If the remote enable feature is not used, a shorting jumper must be placed across J1 and the EN/EN BAR inputs may be left unconnected. The shunt overrides the remote control and continuously enables the Reader regardless of the EN/EN BAR inputs. The Model 1840 is normally supplied with the shorting shunt installed.

The remote enable feature can be used by some Readers by directly connecting the Interface EN output to the Reader EN input and the Interface EN output to the Reader EN input. Interfaces with this feature have ENABLE and DISABLE commands. Multiplexing Interfaces use this output to control Reader multiplexing and may not be compatible with the remote enable feature. Check the Interface to determine if it provides remote enable requirements.

To enable the Reader remotely, a custom interface may be designed to provide the following characteristics:

ENABLED STATE: Differential Voltage = +3V (min) to +15V (max) into 500 OHM Load.

DISABLED STATE: Differential Voltage = +0.5V (max) to -5V (min) into High Impedance Load.

Differential voltage is measured from the EN to the EN terminal. That is, a +3V differential voltage means that the EN terminal (TB2 Pin 1) is 3.0 volts above the EN terminal (TB2 Pin 2). The remote enable circuit on the Reader is an opto-isolator with a 470 ohm, .5 watt current limiting resistor in series. 5 mA is required to turn on the isolator. The following 2 control schemes are available for remote control:

SOURCE: Connect EN to Ground.
Connect EN input to the output of a logic device capable of sourcing 5 mA minimum.

Set EN to 0 volts to disable the Reader.
Set EN to +5 to +12 volts to enable the Reader.

SINK: Connect EN to +5 to +12 volts.
Connect EN input to the output of a logic device capable of sinking 5 mA minimum.

Set EN to 0 volts to enable Reader.
Set EN to EN voltage to disable Reader.

2.8 ANTENNA CONNECTIONS

Antenna connections are made at TB3 locations 1 and 3 marked + COIL -. The center position of TB3 is not connected. The COIL - connection is internally connected to the Reader's ground reference. Antenna polarity is irrelevant in the case of a single coil and must be observed only if multiple Reader Antennas are to be employed to create multiple fields. Connected Antennas have the following characteristics standard from our factory:

INDUCTANCE:	1.1 mH +/- 3% at 10KHz
RESISTANCE:	15 Ohms max.
SELF-RESONANT FREQUENCY:	500 KHz min.

Cable distance to the Antenna is 12 feet using the proper cable. It is possible to increase or decrease the amount of Antenna cable, however please contact RFID, inc. first. Since the cable is a part of the Antenna, its length affects the attenuation of the overall circuit and capacitance adjustments may have to be made at 1840. Making cable length adjustments on your own may result in degraded read range operations. The connection is made with low capacitance (i.e. unshielded), high voltage cable. Compatible Antennas, enclosures and cables are available from RFID, inc.

2.9 MOUNTING CONSIDERATIONS

The Reader's operations can be affected by metal in close proximity to its Antenna. Some Antennas are designed however to specifically perform unhindered when mounted on metal. Please consult the RFID, inc. Customer Service or Sales departments. A high concentration of metal can distort or block fields created by the Antenna as well as absorb some of the energy it creates. For the Model 1840 Reader, the following guidelines should be used in determining mounting locations:

- Operation is not significantly affected by small isolated metal objects such as screws or other hardware.
- Large conductive areas such as metal plates should be kept at least 3 3/4 inches from the antenna.
- The impact on Reader operation is primarily a function of the area enclosed by the conductor. That is, a closed loop of wire of a given area can have nearly the same impact as a solid sheet of metal of the same area.

Standard anti-static precautions should be observed when handling 1840 Readers outside of enclosures.

If the heatsink connection holes are to be used to mount the Reader, caution should be observed when removing the existing screws. When the screws are removed, angular force on the heatsink should be avoided to prevent stress on the pins of transistor Q1. Following mounting of the Reader board, the heatsink must remain securely attached to the Sensor to avoid damage to Q1. Q1 must maintain secure contact with the heatsink to avoid component overheating; and the external resistor must be connected to jumper J3. If the standard heatsink is replaced by a custom configuration, sufficient heat dissipation must be provided to avoid damage to electronics.

2.10 EXTERNAL INTERFERENCE

Since the Model 1840 transmits and receives electromagnetic fields, it is susceptible to interference from external sources of intentional and unintentional electromagnetic radiation. At its frequency of operation, the effect of external sources falls off rapidly with distance. The operation of the unit may be degraded by lower level sources of interference within 20 feet or so of the Reader and higher level sources up to 100 feet away. The following items should be given consideration when operating the Reader:

- Unshielded CRT's should be kept at least 20 feet from the Reader to reduce the effect of the deflection yoke magnetic field. Orientation of the screen to the Reader can have an affect on the exact distance of the interference. Try turning the screen, or changing its Hz settings at which it operates.
- Signal lines from the Reader should always be run through shielded twisted pair cable.
- Power input lines should be well filtered and free of switching spikes caused by thyristors, SCR's, etc. which create interference across a broad spectrum of frequencies.

2.11 WARRANTY

RFID, inc. products are warranted against defects in materials and workmanship for one (1) year from date of shipment. RFID, inc. shall, at its option, either repair or replace products that prove to be defective and are returned with freight prepaid to RFID, inc.'s plant within the warranty period. The foregoing warranty shall not apply to defects resulting from abuse, misuse, accident, alteration, neglect or unauthorized repair or installation. RFID, inc. shall have the right of final determination as to the existence and cause of the defect.

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