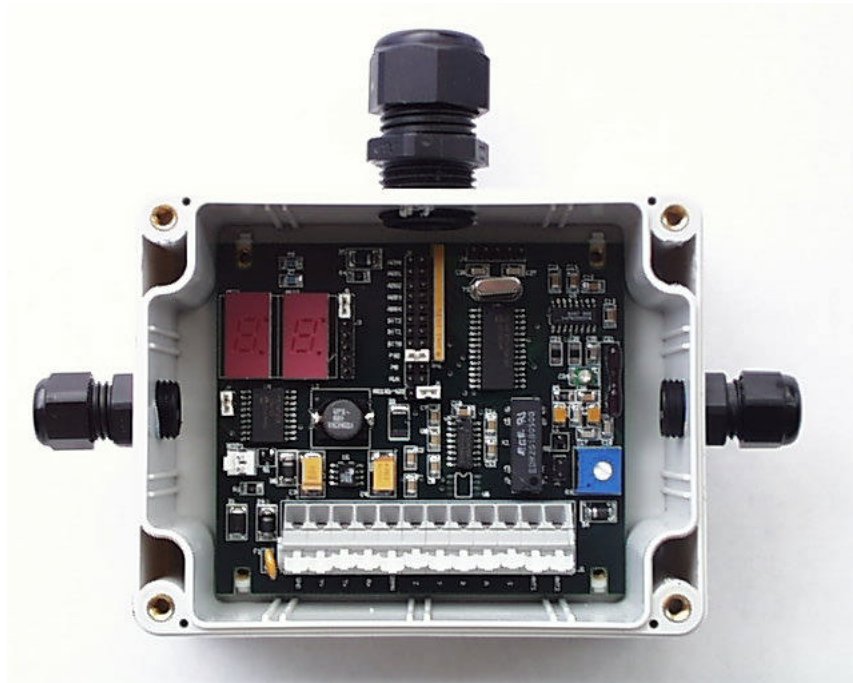# MODEL 7050-RO & 7050-RW SERIES

READ ONLY AND READ WRITE
RS485 RFID TAG READER AND PROGRAMMER

OPERATING MANUAL

Version 12.03 (mm/yy)

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If you have comments you think would improve this manual, please email us. We appreciate your input.

If you are reading a PDF version of this manual you may notice page numbers and the above contents to be off by a page from time to time. The conversion to Acrobat has a tendency to move sections, as the fonts don't translate perfectly.

Contact us:

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303-366-1234 phone   303-366-1222 fax   info@rfidinc.com email   www.rfidinc.com

QUICK START GUIDE

Anytime the Model 7050 is referred to within this manual, it is a generic statement covering all Models of the product line. Whether they are RO or RW is for the user to discern.

Simply power the unit on by plugging the power supply into the Reader and into an AC outlet. At PCB address "Beep1" there will exist either a set of pins or an LED. If there is an LED, it should become illuminated and remain on, indicating the Reader has performed its own self-test and is ready to be operated. If there is a set of pins, there is probably an audible indicator attached to them, and the indicator should beep once, indicating the Reader has performed its own self-test and is ready to be operated. The pins can also be used to drive a relay.

Ensure there is an Antenna applied to the end of the Antenna cable. If you have ordered the Internal Antenna option, no external Antenna or cable exist, the Antenna has been applied for you. Present a Tag to the Antenna and the LED previously discussed will blink off then back on indicating a Tag has been successfully read, assuming the Tag has been programmed with data, or the audible indicator will beep.

You will not be able to program Tags with the Model 7050E-RO series Readers. Only reading is available. You will be able to program Tags if you are using our line of Model 7050E-RW Reader Writers.

If you are in possession of an 8 character Reader, it will only output the hex characters 0-9 & A-D. There is also a 16 and 32 character version of this Reader. If there is a shunt installed on the pins at PCB address P32, then you are in the 32-character mode. If the shunt is off, then you are in the 16-character mode. If you possess an 8 character Reader or the Read Only version of this Reader, no shunt will be present at P32.

Tag Read Modes
The Reader may be operated in a Single Tag Report or Duplicate Tag Report mode, both non-polling, or a third polling mode. These modes can be set to be defaulted at power up through pin settings, or can be alternately entered via software commands [S] or [D] or [P]. It will become obvious once you begin reading Tags which mode the Reader is in. If the Reader is in the Single Tag Read Mode, a Tag will only read and report once, per Tag presented, with a 2.5 second timeout before the same Tag can be read again assuming it leaves the Reader's RF field. If the Reader is in the Duplicate Tag Read Mode, a Tag will continue to be read and reported as long as it remains present to the Antenna. The LED located at PCB address BEEP1 will blink each time a read is achieved, if it is installed. If the Reader is in the Polling Tag Read Mode, the Reader will not attempt to read a Tag until it is commanded to do so. The LED will blink when a Tag upon that successful read. If an audible indicator is installed at PCB address BEEP1, then obviously a beep will occur each time a Tag is read.

In any operating Mode, if a read is not achieved, the Tag may not yet be programmed if using a Read Write System.

Prepare the Reader for reporting to your PC – 3rd Party Terminal Program

The Model 7050 series Readers are always in a receive mode, waiting to be issued a command, waiting for instruction from a host. Likewise, the controller/software being used to interface to the Readers should always be in a receive mode. Although both the Readers and controller can initiate commands and communication, the Model 7050 is constantly monitoring the communication line prior to initiating any communication, listening to ensure no other Reader is communicating, so that collision of data does not occur. Likewise, any controller and 3rd party software should be monitoring the communication line prior to initiating communications.

Upon power up, the following start up message will be sent by the Reader:

> RFID, Inc.

> V.1.xx (00xx)-xx Address xx

> (version numbers will differ dependent upon part number and Reader options)

If 32 Readers are wired into a single network with a common power supply, 32 start up messages will be sent, without collision, as all Readers are set to transmit on a timing sequence dependent upon their Reader address.

You are now ready to read Tags, and write Tags if you are in possession of a RW unit.

Some helpful hints:

Readers ignore all receptions until an open square bracket [is received. Once this occurs all Readers will interrupt their activities, except for reading of Tags presented to their respective RF fields, until a closed square bracket] is received. Then the Readers will test for an address match, part of the command sequence inside the brackets, and if the match tests negative the command will be disregarded. The one Reader that matches positive to the address will actuate upon that command.

All commands and characters must be sent in caps, capital letters.

SECTION 1
GENERAL INFORMATION

1.1 INTRODUCTION

This manual provides information pertaining to the installation and operation of the Model 7050E series Readers under the following Model and Part Numbers:

Model#	Part Number	Serial Connection	Power Connection	Tag Characters
7050-RO	710-0089-01	NA	NA	10 hex
7050-RW8	710-0089-06	NA	NA	8 decimal
7050-RW16/32	710-0089-02	NA	NA	16 or 32 ASCII
7050E-RO	800-0097-00	pigtails	pigtails	10 hex
7050E-RW8	800-0096-00	pigtails	pigtails	8 decimal
7050E-RW16/32	800-0099-00	pigtails	pigtails	16 or 32 ASCII

Accessories
PS12PJ	720-0004-01	AC Power Supply with pigtail wiring
PS12PT	720-0004-0	AC Power Supply for pigtail wiring

The E extension stands for "Enclosure with cabling". The RO extension stands for Read Only, meaning the Tags cannot be programmed and the Reader operates only with Read Only Tags. The RW extension stands for Read Write, meaning the Tags can be reprogrammed and the Reader operates only with Read Write Tags.

Adding an IA to the Model or Part Number indicates the Reader contains an Internal Antenna, mounted to the lid of the Reader enclosure. Adding ME to a Model or Part Number indicates the Reader comes with a Metal Enclosure, versus the standard NEMA 4X plastic enclosure. Obviously the two, an internal antenna and a metal box, cannot be ordered together.

1.2 DESCRIPTION

The Model 7050 series Readers read and reprogram electronic Tags (transponders), interfacing to a PC or logic device through RS485 communications. The Reader provides a half-duplex asynchronous bit serial data stream.

The Model 7050 detects, filters and amplifies the data emitted from a Tag and converts that data into a serial string. Basically, the Interface provides RF to digital translation of the signal produced by RF Electronic Labels, Tags, when scanned in proximity to the Reader's Antenna, or the RF field produced by that Antenna. Advanced error detection algorithms provide error-free operation. All messages are transmitted in printable ASCII characters.
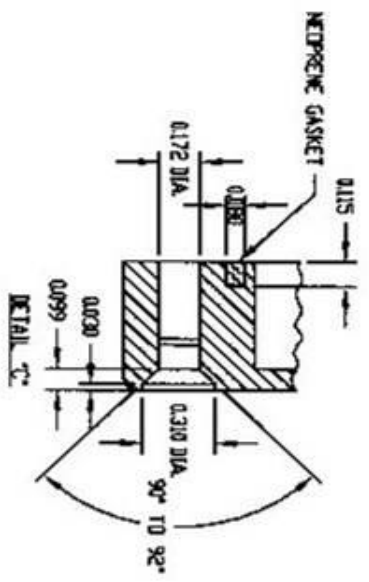
1.3 SPECIFICATIONS

Protocol: Half-duplex, RS-485, single pair A & B

Baud Rate: 9600 or 19200 selectable

Bits Per Character: 8

Parity: None

Stop Bits: 1

Error Rate: Less than 1 in 10 to the 14th readings

Power Input: +7 to +28 VDC +/- .5%
                        200 mA maximum, 125 mA typical

Temperature Range   Operating: -40 to +55 degrees C
                        Non-operating: -55 to +85 degrees C

Dimensions: 4.5" x 3.5" x 2.1875"

Weight: 8 ounces

PART NAME	NEMA 4X ENCLOSURE	PART No.	PN-1323, PN-1323-C AND PN-1323-DG

INDUSTRY STANDARDS:
POLYCARBONATE (LIGHT GRAY AND CLEAR)
UL94V-2 FLAMMABILITY RATING (LIGHT GRAY AND CLEAR)
UL FILE #E41613)
UV STABILIZED
SERVICE TEMPERATURE RANGE:
-40°C TO +120°C
ABS (DARK GRAY)
UL94-HB FLAMMABILITY RATING
(UL FILE #E56070)
SERVICE TEMPERATURE RANGE:
-40°C TO +80°C

BODY

0.749
3.031
4.056
0.236
1.177
0.431
0.588
0.234
0.844
0.118 TYP.
0.181
1.855
3.543
1.190
2.680
2.367
3.076
4.156
3.307
3.181
0.181

M4 × 0.315 LG.
THREADED INSERT
(4) PLACES

0.315 DIA. BOSS
WITH M3 × 0.188 LG
THREADED INSERT
(4) PLACES
(SCREWS NOT
SUPPLIED)

1.150
2.264
0.491
3.546
4.528

SECTION "A-A"
0.050
0.088
0.090
1.184
0.315 DIA.
0.120
0.297
0.172 DIA.
1.640

COVER
0.178 TYP.
3.076
3.543
4.056
4.528
0.234
0.226
SEE DETAIL "C"
B

SECTION "B-B"
0.120
0.591 REF.
0.591
2.165

NEOPRENE GASKET
DETAIL "C"
0.172 DIA.
0.188
0.115
0.099
0.030
0.310 DIA.
90° TO 92°
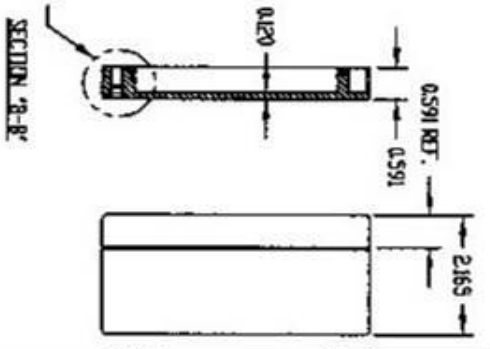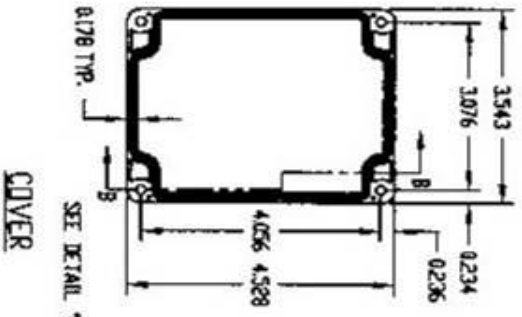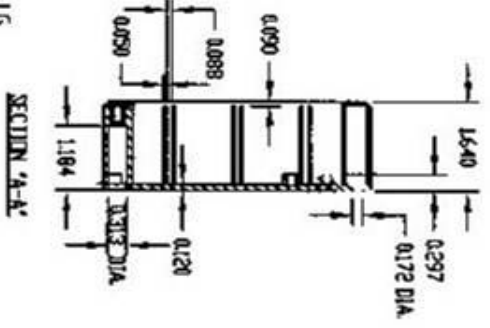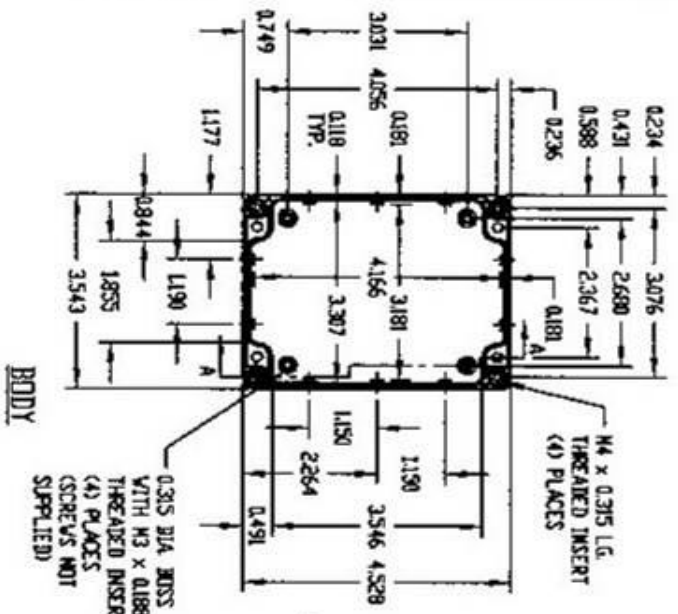
PART NUMBER	MATERIAL		FINISH		HARDWARE
	BODY	COVER	BODY	COVER	KIT
PN-1323	POLYCARBONATE	POLYCARBONATE	LIGHT GRAY	LIGHT GRAY	KIT CONTAINS (4) M4 × 20mm (0.787") LG SCREWS FOR ASSEMBLY
PN-1323-C	POLYCARBONATE	POLYCARBONATE	LIGHT GRAY	CLEAR	
PN-1323-DG	HIGH-IMPACT ABS	POLYCARBONATE	DARK GRAY	CLEAR	
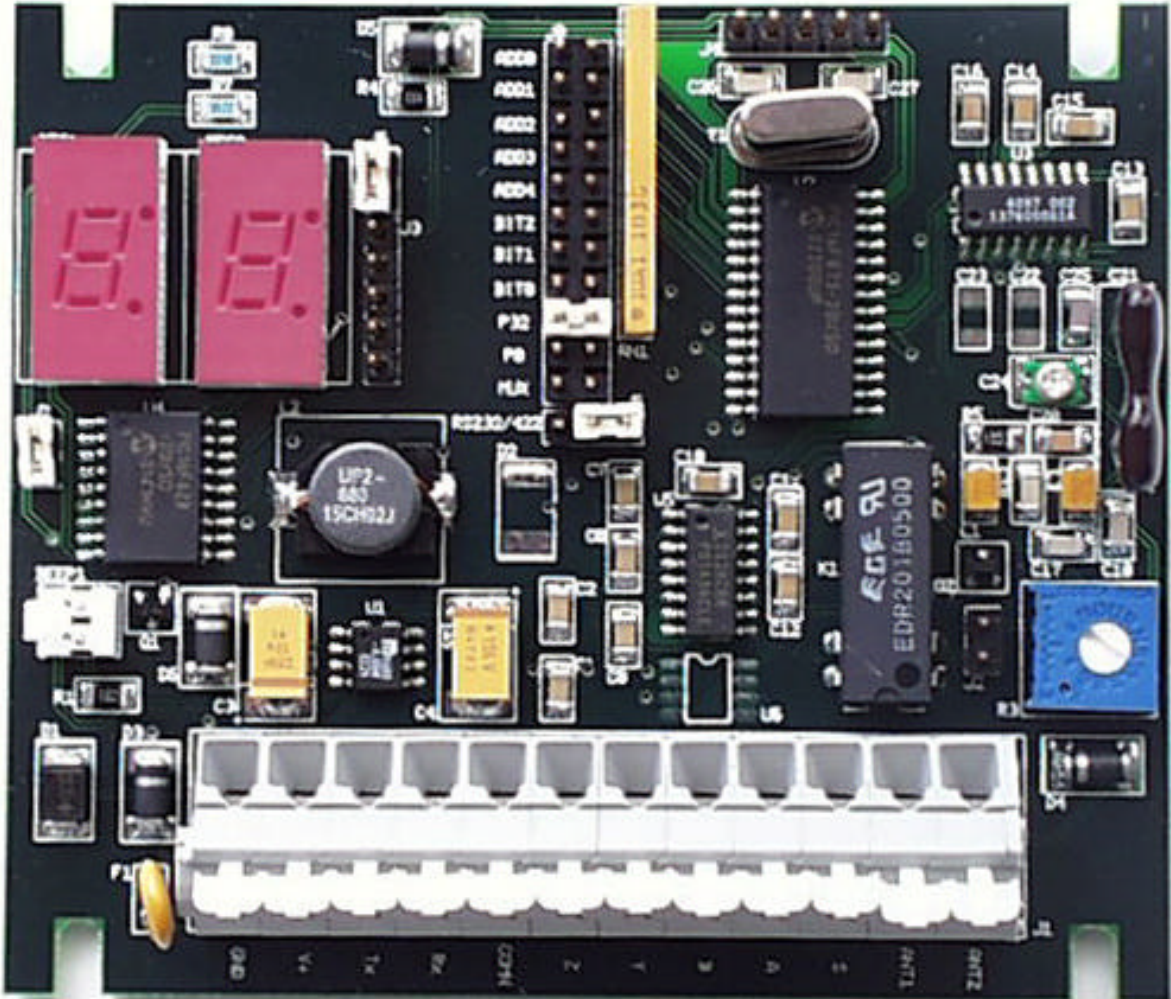
2.1 POWER CONNECTION

The Model 7050 Reader offers the ability to operate at varying power inputs, from +7 to +28 VDC, plus or minus 5%. Its current draw is 125 mA typical with a maximum of 200 mA. The Reader is available only with pigtail wiring for power connection, no quick connector external to the housing is available.

Power connection is made at the PCB thumb terminals marked GND and V+. See photo above. The maximum wire size accommodated by the thumb terminals is 14 to 22 AWG stranded copper.

2.2 COMMUNICATIONS CONNECTION

Communications connection is made at the PCB thumb terminals marked A, B, Y, Z and COMN (ground). A and Y are for Data. B and Z are for Data Not, also called Data Bar or Data Inverted. Note the existence of 2 terminals for each Data and Data Not. This feature is intended for convenience and ease of wiring. In reality, the installer could bring 2 wires into either A or Y, one coming from the previous Reader in the network, one going to the next Reader in the network. The same holds true for thumb terminals B and Z.

Communication characteristics, speed, parity, and number of bits per character, must be matched between the Reader and the connected host. If the Reader is talking at 19200 baud (bits per second) and the host at 4800, they'll never understand each other. If Tag reports or the power up message is reporting in an unintelligible language, this is good, at least you have established communications and only need to change your program or host settings to 19200, 8, N, 1, at half duplex, which is the Model 7050's default settings, unless you have changed these default settings.

The Model 7050 could also be used as an RS-232 or RS-422 Reader. These next paragraphs address usage as a serial Reader. The RS232 mode is of little use in the Model 7050 series however, as the communications will continue to operate on RS485 principals. Placed in a network, the Reader would then lock up as it is unable to listen to the communications line and determine when it is appropriate to send data. The only use of this function is if a user operated a single 7050 Reader on a serial port for testing purposes, to issue setup commands or default modes, or in use as a programmer, to program Tags. The address portion of any command must still be used when issuing commands to the Reader through RS232.

The serial connection is configured DTE, further explained below, so you must determine which type of equipment, its settings, and which type of COM port you have. Being Data Terminal Equipment (DTE), the Reader transmits its data on pin 2 of a standard serial 9 PIN connector and receives data on pin 3. Conversely, a Data Communication Equipment (DCE) device receives on Pin 2 and transmits on Pin 3. Most terminals and IBM-PC compatible interfaces have 9 pin COM ports configured as DCE. But if your control device's 9 pin COM port does not receive on pin 3, there exist simple converters called modem eliminators, which accomplish the crossing of pins 2 and 3 for you. Since RS-232 pin designations are not always standardized, check your host's

operating manual for verification. The important thing is to connect the 7050's Transmit Data signal (9 PIN connector pin 2), labeled Tx on the 7050's pcb, to the host's Receive data (RxD) signal, the 7050's Receive Data signal (9 PIN connector pin 3), labeled Rx on the 7050's pcb, to the host's Transmit Data (TxD) signal, and the 7050's Ground, labeled CMN to the host's Ground.

- If your 9 PIN COM port is Data Communications Equipment (DCE) configured a straight connection may be made.
- If your 9 PIN COM port is Data Terminal Equipment (DTE) then a null modem connector will be necessary, or you could simply switch the Rx and Tx wires at the thumb terminal connector. The null modem switches the activity on pins 2 & 3, so that they do not transmit and receive on the same lines. If the Model 7050 is ordered with a 9 PIN connector, here are the pin designations:

9 PIN#	SIGNAL NAME
2	Tx - Transmitted Data
3	Rx - Received Data
5	GND - Signal Ground

2.3 OTHER PIN AND ADJUSTABLE FUNCTIONS ON THE PCB

Pins at J2
DO NOT ALTER, whether there is or is not a shunt installed.

Screw at C2
DO NOT ALTER.

Pins at J4
DO NOT ALTER. These exist for programming the Reader's microprocessor.

Pins at J5
Although marked RS232/RS422, for the Model 7050 series, shunting the left 2 pins places the Reader in its RS485 mode. Shunting the right 2 pins places the Reader into an RS232 mode. The RS232 mode is of little use in the Model 7050 series however, as the communications will continue to operate on RS485 principals. Placed in a network, the Reader may or may not operate correctly depending upon your hosts activity. The only use of this function is if a user operated a single 7050 Reader on a serial port for testing purposes, to issue setup commands or default modes, or in use as a programmer, to program Tags.

Long row of Pins at J8

ADD0 through ADD4 – Setting of Reader Address
Similar to a hex table, these 5 pins represent the values of 1, 2, 4, 8, and 16, respectively. In order to set a Reader with the address of 5, shunts would be applied to pins ADD0 and ADD2.

ADD0 = value of 1
ADD1 = value of 2
ADD2 = value of 4
ADD3 = value of 8
ADD4 = value of 16

So in order to match an address of 17, pins ADD0 and ADD4 would need to be shunted.

BIT2 and BIT1
These pins are not yet implemented.

BIT0 – Baud Rate
These pins set the baud rate. Shunt on equals 19200 baud, shunt off equals 9600 baud.

P32 – number of Tag Characters
Selectable between 16 and 32 on the appropriate 7050 model, this does not apply for the 8 character version of the model 7050. Shunt off equals 16 characters of Tag data. Shunt on equals 32 characters of Tag data.

P8 – BEEP1
These pins set the footprint at BEEP1 to be either an LED or pins for a relay driver. Shunt on equals LED, shunt off equals relay driver. The Reader is normally delivered with the LED function in place. If the audible indicator is preferred, you may build your own or ask RFID, Inc. to supply one to you.

Pins marked MUX – Polling Mode
It is important to understand the Model 7050 has 3 modes of operation. See section 3.2.3 for a full explanation of these modes.

These pins will allow you to set the default Tag Read Mode to either polling or non-polling. Of the non-polling mode, there are 2 subsequent modes, Single Tag Report or Duplicate Tag Report. If a shunt is applied here, the polling mode is defaulted upon powering of the Reader. If the shunt is off here, the Reader will not be entered into its polling mode, and the two non-polling modes, the Single Tag Report mode will be defaulted upon powering the Reader. The Duplicate Tag Report mode can then be entered via software command. Each time the Reader is powered on, it will set itself to the defaulted mode as set by these pins, although any of the other modes can be entered at any time via software command. Use of the P command, issued as [xxP], where xx stands for the Reader address, will command the Reader to enter its polling mode. You can issue a T command to check if the Reader is in the Polling mode or not. If the Reader is in its polling mode, either Tag data or the message "xxe" will be sent back, where xx stands of the Reader address and "e" stands for empty, or no Tag present. If the Reader is not in its polling mode, a question mark, "?", will be returned.

2.4 TAG VERSIONS

It is important to understand the Tag versions RFID, Inc. offers with the Model 7050-RW, if you intend to write to more than one type of Tag. RFID, Inc. uses 4 different EEPROM ASIC chips for its Tags. Although the Model 7050-RW can operate with all 4 chips simultaneously, the Reader's Tag Mode will need to be changed through the Tag Mode command if you intend to write to different versions of Tags. This is a necessary evil in our wanting to be able to offer so many Tag options on the same product line, indeed with the same Reader. Those chip versions are:

1. 00 = HQS (Ferrite Antenna Tags)
2. 08 = HQU (Ferrite Antenna Tags)
3. 10 = LQS (Planar Antenna Tags)
4. 18 = LQU (Planar Antenna Tags)

If you intend to only use one type of Tag, then your Reader(s) have been preset, defaulted to the correct Tag Mode. It may assist you at this point to view the Tag models available in our Rcubed2 Data Sheet, but here is a listing of the Tags and their associated chip type:

00HQS = Model 1775
08HQU = Models 1774, 1781M, 1791M
10LQS = Models 1765, 1766, 1767, 1768, 1769, 1770, 1773, 1776, 1784
18LQU = Models 1771, 1772, 1783, 1786, 1787, 1788, 1791, 1795, 1796

Read Only Tag versions are not addressed in this section, as they are not subject to the Tag Mode. Read Only Tags have their own Reader version, the RO series, (any Model ordered with the extension RO) with software exclusively operating the Read Only Tags.

The Read Write versions are more complex. Since there are 4 different types of Read Write chips used to manufacture the Tags, the Reader, RW series, (any Model ordered with the RW extension) is capable of operating with all four, but you must set the Reader in the correct Tag Mode when writing. These Tag Modes are defined as the 00, 08, 10, and 18 Modes, aptly named to equate to the chips above. In any of the 3 Modes, reading Tags is not an issue. The Reader can be set to any of the Modes, and read Tags just fine. The correct Mode must be set solely when writing. Setting the Reader to the correct Mode allows it to correctly program the particular chip being used, according to its bit structure.

When you order a particular Tag and Reader combination, the Reader will be set to default to the correct Mode. Setting the Mode is done via software. This is accomplished via the M8 command, initiated through the serial port. See section 3.2.3 for further explanation.

2.5 ANTENNA CABLE

Connection of the Reader Antenna is provided at the thumb terminals marked ANT1 and ANT2.

There is no polarity, meaning either Antenna Cable lead can be inserted into either terminal.

The Antenna lengths, 12', 19' or 30', are custom and part of the Antenna's attenuated circuit, therefore altering the length of the Antenna cable <u>will</u> affect read and write range between the Antenna and a Tag. Custom cables can be accommodated without losing read range by altering capacitance at the PCB. Please ask us for such customization. Read & Write specifications as documented in the R3-2 product data sheet are quoted for 12' of cable. Using the standard 19' & 33' cable options garners 25% and 50% less read range respectively.

2.6 ANTENNA MOUNTING CONSIDERATIONS

The Model 7050's Antenna operation and resulting read range could be affected by large metal objects in close proximity. These objects distort the field area created by the Antenna as well as absorb some of the energy it creates. The Model 5110 Antenna is specifically designed for metal mounting however. The following guidelines should be used in determining mounting locations:

1. Small isolated metal objects such as screws or washers do not significantly affect antennas.
2. Large conductive areas such as metal plates, screens, etc., should be kept at least 4 inches from the Antenna.
3. The impact on Antenna operation is primarily a function of the area enclosed by the conductor. That is, a closed loop of wire having the same area as the antenna base can have nearly the same impact as a solid sheet of metal of the same area. For example, running the Antenna Cable in the same conduit as the power and serial cables is not a good idea.
4. As a general rule of thumb, an Antenna may be spaced half its diameter from metal to regain full functionality.
5. There is truly only one way to discover how an Antenna will function in a heavy metal environment, install a system and test.

2.7 EXTERNAL INTERFERENCE (EMI)

Since the Model 7050 transmits and receives electromagnetic fields, it is susceptible to interference from external sources of electromagnetic interference. EMI will cause a reduced read and write range. At its frequency of operation, the effect of external sources falls off rapidly with distance. Low-level sources of interference within 10 feet or so of the Antenna may degrade the operation of the unit, and higher-level sources up to 100 feet away. 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. Also watch out for interference from motors and some lighting systems. A simple method of testing whether EMI is effecting read range, move the Reader system to another environment or clean room. Or, operate the Reader system by simultaneously turning off suspected sources of EMI and test read range.

SECTION 3
OPERATE THE READER

3.1 POWER UP MESSAGE

Power the Model 7050 on. Whenever the Reader is powered up or reset, it issues a power up message. This message lets you know that a self-diagnostic test has been performed and the Reader is ready for use. In any program you have developed, or any generic terminal program the following power up message should be received:

> RFID, Inc.
> V.1.xx (00xx)-xx Address xx

The issuance of this message signifies to you at least one-way communication, the transmission function, is working properly. The power up message is preceded by a Carriage Return (<CR>) and then a Line Feed (<LF>), and is followed by the same, then the version data is delivered, and this too is followed by a Carriage Return (<CR>) and then a Line Feed (<LF>).

3.2 RECEIVING TAG READS

To test communication from the host to the Reader, issue a Carriage Return (hit return). The response you get should be that of a question mark. If successful, you now know two way communication has been established.

3.2.1 Receiving Read Only Tag Data

When a Tag is scanned, 10 characters of unique data should be received. This data is available only in an ASCII representation within hex character limitations, that is, the characters of 0-9 and A-F.

3.2.2 Receiving Read Write Tag Data

Tags can be programmed with 8, 16, or 32 characters, depending upon which Reader version you have ordered. 8 character Tags use only decimal characters with the ASCII representations of 0-9 A-D. 16 or 32 character Tags use most of the ASCII range available on any keyboard, in capital letters only.

Either Read Only or Read Write Tags will report in the following format:
(32 characters is the example used herein)

00 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx<CR><LF>, where 00 equals the Reader address, followed by a space, where x equals data characters, followed by a carriage return and line feed. Data characters are not necessarily limited to hex.   Tags may be programmed with the ASCII representations detailed in the Valid Tag Character Set table below, also listing hex value in case

you need to know that value for your own programming purposes.

Valid Tag Character Set

ASCII	Hex	ASCII	Hex	ASCII	Hex	ASCII	Hex
@	40	0	30	A	41	P	50
!	21	1	31	B	42	Q	51
"	22	2	32	C	43	R	52
#	23	3	33	D	44	S	53
$	24	4	34	E	45	T	54
%	25	5	35	F	46	U	55
&	26	6	36	G	47	V	56
'	27	7	37	H	48	W	57
(	28	8	38	I	49	X	58
)	29	9	39	J	4A	Y	59
*	2A	:	3A	K	4B	Z	5A
+	2B	;	3B	L	4C	[	5B
,	2C	<	3C	M	4D	\	5C
-	2D	=	3D	N	4E	]	5D
.	2E	>	3E	O	4F	^	5E
		/	2F	?	3F		

3.2.3 Issuing Commands and Writing Tags

Any command must be preceded by an open square bracket, " [", followed by the Reader address and the particular command, and ended with a closed square bracket "] " or a carriage return. The Reader recognizes both a closed square bracket and a carriage return as the same keystroke. All commands must be issued in capital letters. In the examples given below, the numbers 00 prior to a command represent the Reader address which could be any address from 00 to 31.

There are basically only 6 commands available with the Model 7050-RW (Read Write).

1. Set **Tag Type** Mode [M8]
2. Request **Version** of Tag Type [V]
3. Set **Single** Report Tag Mode [S]   (can be used with RO version too)
4. Set **Duplicate** Report Tag Mode [D] (can be used with RO version too)
5. Set **Polling** Tag Report Mode [P]   (can be used with RO version too)
6. **Transfer** Tag Data [T]   (can be used with RO version too)

Tag Type Mode Command

For ease of use, Readers are normally set prior to shipment to the appropriate default Tag Type mode according to the Tags that are being used. However, should you find it necessary for some reason to write to different styles of Tags, you will have to know which Tag is associated to which Mode, see section 2.4 and change to the appropriate Mode.

Enter: [00M8]
Response: OK followed by <CR><LF>

Each issuance of the M8 command will step the Reader to the next mode in sequence of 00, 08, 10, 18, and then back to 00.

Version of Tag Type Command

This command allows the user to ascertain which Tag Type Mode the Reader is in for writing purposes.

Enter: [00V]
Response: 00, 08, 10, or 18, followed by <CR><LF>

Single Tag Report Command

The Reader always defaults to the Single Tag Report Mode upon power up or re-power if the pins at pcb address MUX are not shunted. Operating in this mode, the Model 7050 will detect and immediately report a Tag read, once. This mode can also be entered into via the S command by typing or entering "[S00]", whereby the 00 represents the Reader's address. Upon recognition of this command, the Reader will respond with the message "OK'.

Enter: [00S]
Response: OK followed by <CR><LF>

Duplicate Tag Report Command

This mode allows the Reader to continually report a Tag as long as it is present to the Reader's Antenna. It will repeatedly be read and reported out its serial port. The Read LED will continue to flash and the relay output will continue to be pulled high. You can program a Tag while the Reader is in the Duplicate Mode and continually reading the Tag.

Enter: [00D]
Response: OK followed by <CR><LF>

The Reader can only be exited from this mode by issuance of the Single or Polling Tag Report command or by cycling power to the Reader.

Write Command
(assume a 32 character Tag is being employed)

Enter: [00W123]
Response: PROGRAMMED (followed by a Tag read) 12300000000000000000000000000000

followed by <CR><LF>

or

Response: NO TAG or FAILED followed by <CR><LF> (No Tag is present or wrong Tag Type Mode is in use)

Although you may be using an 8, 16, or 32 character Tag, notice that all of the characters do not need to be filled in. Any characters undefined will be filled in with zeros automatically by the Reader's software.

3.3 ADVANCED TAG MEMORY MANAGEMENT

It is important for you to understand that any Read Write Tag holds 256 bits of memory, and that memory can be managed in many different ways. Many different options are available to you.

RFID, Inc. does offer Reader versions utilizing lock bits, that once executed will lock all or part of the Tag's data, irreversibly.

More memory characters are available if RFID, Inc. uses fewer bits per character than the 6 bit hybrid ASCII scheme employed in the standard Model 7050.

Larger memory 1k and 2k bit EEPROM chips could be used to offer more data characters.

If you feel you need advanced Tag memory options, please ask to see our 256 bit Tag specifications document which will detail for you how the EEPROM is set up and different options available to manage that memory.

3.4 ERROR MESSAGES

1. **?.**
2. **Illegal Character (during writing attempt).**

You will receive this error message if you have issued an invalid command to the Reader. Basically the Reader is indicating it does not understand the command it has been issued.

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.

The warranty set forth above is exclusive and no other warranty whether written or oral, is expressed or implied. RFID, Inc. specifically disclaims the implied warranties or merchantability and fitness for a particular purpose.

The remedies provided herein are Buyer's sole and exclusive remedies. In no event shall RFID, Inc. be liable for direct, indirect, special, incidental or consequential damages, (including loss of profits) whether based on contract, tort, or any other legal theory.