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**Magnetic Stripe
Reader/Writer
SERIES 714x**

**OPERATION
MANUAL**

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Jarltech International Inc.
3F, No. 1, Lane 538, Chung Cheng Road,
Hsin Tien, Taipei, Taiwan, R.O.C.

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 in a residential installation. This equipment generates, uses, and if not installed and used in accordance with the instructions may cause harmful interference will not occur in a particular installation. 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 correct interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help. This booklet is available from the U.S. government Printing Office, Washington, DC 20402, Stock NO.004-000-00345-4.

CAUTION: Any changes of modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment.

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.

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1

Before You Install

This document describes the Electrical, Operational, Environmental and Mechanical requirements of the Model 714x family of Magnetic stripe Readers/Writers respectively.

Model 714x is capable of reading/writing both the ISO 7811/2 THRU 5 and IBM 4700 data format which is specified by the command through RS232 interface. User can choose track configuration of single track/dual tracks/triple tracks according to the application requirements.

The unit has three color (green/yellow/red) LEDs which are controlled by the host and the communication with a host is via an industry standard UART, at voltages compatible with the EIA RS232 specification.

Step 1: Turn off your computer

By shutting off your computer, you will prevent any accidental damage to this device and your computer.

Step 2: Review packing list

Please ensure that your 714x shipment is complete.

Model 714x includes:

- 1 pce Reader/Writer unit.
- 1 pce Communication Cable
- 1 pce AC Adapter (option)
- 1 pce Operation Manual
- 1 pcs Demo/Utility Disk (option)

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Installation For Application

This chapter describes the connection of the 714x to a host computer for applications. Follow next steps to install your reader/writer, wrong connection might damage the unit.

Step 1: Turn off your computer

If you have not already done so, turn off your computer to avoid any accidental damage to the reader/writer and your computer.

Step 2: Decide on power access

The low coercivity Model 7140 requires +12V DC for application via the RS232 port, where as the high coercivity Model 7140H requires +24V DC. This may be provided through an internal connection in your computer or through an external connection to a 110V/220V adapter. If you are using an external adapter, be sure that it conforms with the specifications listed in Appendix I .

Step 3: Connect 714x to computer

Attach the 9-pin female (DB9F) RS232 connector with built-in DC jack to an available male equivalent (DB9M) RS232 communication port on your computer. Provide power to the DC jack on the DB9F connector. Connect RJ45 connector of the RS232 cable to the port on the rear face of the reader/writer.

Step 4: Turn on your computer

Once all connections are complete, turn on your computer. It should boot up normally. The LED of the unit will flash once and off.

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Communication and Commands

Communication specifications

Interface	RS-232C
Baud Rate	9600 BPS
Data Format	7Bit Data; Even Parity; One Stop Bit

Command code list

COMMAND	CODE	DESCRIPTION
CLED	60H	CONTROL LED ON/OFF (R/Y/G)
CRESET	68H	RESET READER/WRITER
CECHO	69H	ECHO COMMAND
CABORT	6AH	ABORT PREVIOUS COMMAND
CSENSE	6BH	CHECK MODEL COMMAND
CREPORT	6CH	ACKNOWLEDGE/REPORT COMMAND
CDISABLE	6DH	DISABLE READ/WRITE
CENABLE	6EH	ENABLE READ/WRITE
CRESEND	6FH	REQUEST HOST/RESEND COMMAND
CIWISO	31H	WRITE ISO TRACK 1 DATA
CIRISO	35H	READ ISO TRACK 1 DATA

TABLE I

COMMAND	CODE	DESCRIPTION
C2WISO	41H	WRITE ISO TRACK 2 DATA
C2RISO	45H	READ ISO TRACK 2 DATA
C3WISO	51H	WRITE ISO TRACK 3 DATA
C3RISO	55H	READ ISO TRACK 3 DATA
C2W4700	40H	WRITE IBM4700 FORMAT TRACK 2/3 DATA
C2R4700	44H	READ IBM4700 FORMAT TRACK 2/3 DATA
C1WISOC	33H	WRITE TRACK 1 DATA WITH CUSTOMIZED DATA FORMAT
C1RISOC	38H	READ TRACK 1 DATA WITH CUSTOMIZED DATA FORMAT
C2WISOC	43H	WRITE TRACK 2 DATA WITH CUSTOMIZED DATA FORMAT
C2RISOC	48H	READ TRACK 2 DATA WITH CUSTOMIZED DATA FORMAT
C3WISOC	53H	WRITE TRACK 3 DATA WITH CUSTOMIZED DATA FORMAT
C3RISOC	58H	READ TRACK 3 DATA WITH CUSTOMIZED DATA FORMAT
C2W4700C	42H	WRITE TRACK 2/3 DATA WITH CUSTOMIZED DATA FORMAT
C2R4700C	47H	READ TRACK 2/3 DATA WITH CUSTOMIZED DATA FORMAT
C3W7BIT	21H	WRITE TRACK 3 WITH ISO TRACK 1 FORMAT
C3R7BIT	25H	READ TRACK 3 WITH ISO TRACK 1 FORMAT

TABLE I

Command format

<STX><COMMAND>[DATA1.....DATAn]<ETX><LRC>

Control Text	Value	Description
<STX>	02H	Start of text control
<ETX>	03H	End of text control
<LRC>	Variable	XOR of relative bits of each characher in the command block excluding <STX>

Example and Description

Command	Value	Description
CSENSE	6BH	Host uses this command to inquire the model No. of reader/writer

Host	↔	Reader/Writer
<STX><6BH><ETX><LRC>	→	
	←	<STX><6BH><MODEL CODE><ETX><LRC>

MODEL	CODE	DESCRIPTION
MODELX1	31H	ISO TRACK 1 READ/WRITE
MODELX2	32H	ISO TRACK 2 READ/WRITE
MODELX3	33H	ISO TRACK 3 READ/WRITE
MODELX4	34H	ISO TRACK 1/2 READ/WRITE
MODELX5	35H	ISO TRACK 2/3 AND PASSBOOK READ/WRITE
MODELX6	36H	ISO TRACK 1/2/3 AND PASSBOOK READ/WRITE
MODELX7	37H	ISO TRACK 1/2/3 AND PASSBOOK READ, TK2 WRITE ONLY

TABLE II

Command	Value	Description
CABORT	6AH	Host uses this command to ask reader/writer to discard the previous command

Host	↔	Reader/Writer
<STX><6EH><ETX><LRC>	→	
	←	<STX><6CH><30H><ETX><LRC>
<STX><6AH><ETX><LRC>	→	
	←	<STX><6CH><30H><ETX><LRC>

CRESEND	6FH	Host or reader/writer unit asks for resending pervious command again
---------	-----	--

Host	↔	Reader/Writer
<STX><69H><DATA1><DATA2>....<DATA _n ><ETX><LRC>	→	
	←	<STX><69H><DATA1><DATA2>....<DATA _n ><ETX><LRC>
<STX><6FH><ETX><LRC>	→	
	←	<STX><69H><DATA1><DATA2>....<DATA _n ><ETX><LRC>

CREPORT	6CH	<ul style="list-style-type: none"> - Host uses this command to ask reader/writer status report - Reader/Writer uses this command to acknowledge and report status (status code is as Table III)
---------	-----	---

Host	↔	Reader/Writer
<STX><40H><ETX><LRC>	→	
	←	<STX><6CH><STATUS CODE><ETX><LRC>

Command	Value	Description
	STATUS	CODE
	DESCRIPTION	
	SCOMOK	30H
	RECEIVE IS OK	
	SCOMPE	31H
	RECEIVE PARITY IS ERROR	
	SCOMLE	32H
	RECEIVE LRC IS ERROR	
	SCOMERR	33H
	COMMAND IS INVALID	
	SCORBF	34H
	RECEIVE BUFFER IS FULL	
	SWTOK	40H
	WRITE DATA OK	
	SWTER	41H
	WRITE DATA ERROR	
	SRDOK	50H
	READ DATA OK	
	SRDER	51H
	READ DATA ERROR	
	SRDND	52H
	READ NO DATA	

TABLE III

CLED	60H	Host uses this command to control LEDS
------	-----	--

Host	↔	Reader/Writer
<STX><60H><LED CODE><ETX><LRC>	→	
	←	<STX><CREPORT> <SCOMOK><ETX> <LRC>

LED CODE	SELECT
30H	LED ALL OFF
31H	LED GREEN ON
32H	LED RED ON
33H	LED YELLOW ON

TABLE IV

Communication and Commands

Command	Value	Description
CRESET	68H	Host uses this command to reset reader/writer unit

Host	↔	Reader/Writer
<STX><68H><ETX><LRC>	→	
	←	All LED's "ON" about 1 second then all LED's "OFF"

CECHO	69H	Host asks reader/writer unit to echo the received
-------	-----	---

Host	↔	Reader/Writer
<STX><69H><DATA1> <DATA2>...<DATA _n ><ETX>	→	
	←	<STX><69H><DATA1> <DATA2>...<DATA _n > <ETX><LRC>

C1WISOC	31H	<ul style="list-style-type: none"> - Host writes customized data format - Refer to Appendix for detailed command sequence *Within each data bytes, only b0~b3 is valid data; b4~b7=1100 *b0 is written on the magnetic stripe first, followed by b1, b2, b3. *User must specify leading zero's in the data, byte, with <ul style="list-style-type: none"> Track1: minimum 63 leading zeros Track2: minimum 22 leading zeros Track3: minimum 63 leading zeros *Maximum data length (excludes leading zero's) <ul style="list-style-type: none"> Track1: 553 bits Track2: 200 bits Track3: 535 bits *Trailing zero's will be added by reader/writer automatically, users don't need to specify it in the command.
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Read/Write command sequence

• Command sequence to read

Host	↔	Reader/Writer	Description
<STX><CENABLE> <ETX><LRC>	→		Enable to read
	←	<STX><CREPORT> <SCOMOK><ETX> <LRC>	Report comm. OK *Turn on green LED and wait for card swipe. * After crad swipe
	←	<STX><CREPORT> <SRDOK><ETX> <LRC>	Report data ready
<STX><C1RISO> <ETX><LRC>	→		Read track 1 data
	←	<STX><C1RISO> <DATA1>..... <DATA _n ><ETX> <LRC>	
<STX><C2RISO> <ETX><LRC>	→		Read track 2 data
	←	<STX><C2RISO> <DATA1>..... <DATA _n ><ETX> <LRC>	
<STX><C3RISO> <ETX><LRC>	→		Read track 3 data
	←	<STX><C3RISO> <DATA1>..... <DATA _n ><ETX> <LRC>	

- If read error

Host	↔	Reader/Writer	Description
<STX><C1RISO> <ETX><LRC>	→		Read track 1 data
		<STX><CREPORT> <SRDER><ETX> <LRC>	Read data error

Communication and Commands

• Command sequence to write data in non-passbook format

Host	↔	Reader/Writer	Description
<STX><C1WISO> <DATA1>...<DATA _n > <ETX><LRC>	→		Write track 1 data
	←	<STX><CREPORT> <SCOMOK><ETX> <LRC>	
<STX><C2WISO> <DATA1>..<DATA _n > <ETX><LRC>	→		Write track 2 data
	←	<STX><CREPORT> <SCOMOK><ETX> <LRC>	
<STX><C3WISO> <DATA1>..<DATA _n > <ETX><LRC>	→		Write track 3 data
	←	<STX><CREPORT> <SCOMOK><ETX> <LRC>	
<STX><CENABLE> <ETX><LRC>	→		Enable to write
	←	<STX><CREPORT> <SCOMOK><ETX> <LRC>	Report comm. OK * Green LED flash and wait for card swipe. *After card swipe.
	←	<STX><CREPORT> <SWTOK><ETX> <LRC>	Report write data OK

- If write error

Host	↔	Reader/Writer	Description
	←	<STX><CREPORT> <SWTER><ETX> <LRC>	Write data error

• **Command sequence to read passbook
(IBM 4700 Mode)**

Host	↔	Reader/Writer	Description
<STX><CENABLE> <ETX><LRC>	→		Enable to read
	←	<STX><CREPORT> <SCOMOK><ETX> <LRC>	Report comm. OK *Turn on green LED and wait for card swipe. *After card swipe.
	←	<STX><CREPORT> <SRDOK><ETX> <LRC>	Report data ready
<STX><C2R4700> <ETX><LRC>	→		Read passbook data

- If read error

Host	↔	Reader/Writer	Description
<STX><C2R4700> <ETX><LRC>	→		Read passbook data
	←	<STX><CREPORT> <SRDER><ETX> <LRC>	Read data error

• **Command sequence to write passbook
(IBM 4700 Mode)**

Host	↔	Reader/Writer	Description
<STX><C2W4700> <DATA1>.. <ETX><LRC>	→		Write passbook data
	←	<STX><CREPORT> <SCOMOK><ETX> <LRC>	
<STX><CENABLE> <ETX><LRC>	→		Enable to write
	←	<STX><CREPORT> <SCOMOK><ETX> <LRC>	Report comm. OK *Green LED flash and wait for card swipe. *After card swipe.
	←	<STX><CREPORT> <SWTOK><ETX> <LRC>	Report write data OK

- If write error

Host	↔	Reader/Writer	Description
	←	<STX><CREPORT> <SWTER><ETX> <LRC>	Write data error



Appendix I

Specifications



Standard ID Card / Bank Card	<ul style="list-style-type: none">• ANSI 4.16 1983• ISO 7811/2 THRU 5
Bank Passbook	<ul style="list-style-type: none">• IBM 4700 data format. (wide track)
Coercivity	<ul style="list-style-type: none">• Model 7140: 300 Oe• Model 7140H: 4000 Oe
Medium thickness	<ul style="list-style-type: none">• 0.25~0.80mm (0.01~0.031 inches) Typical
Track Configuration	<ul style="list-style-type: none">• ID Card/Bank Card: Single/Dual/Triple• Bank Passbook: wide track (track 2/3)
RS232C Interface	<ul style="list-style-type: none">• 9600 bps, 7 data bits, Even parity, 1 stop bit
Physical	<ul style="list-style-type: none">• Dimensions: 2.4"L x 8.7"W x 2.2"H (inches)

Specifications

Environmental

- Operating temperature: 0-40°C
- Storage temperature: -20-60°C
- Humidity: 10% - 90% RH
(non-condensing)

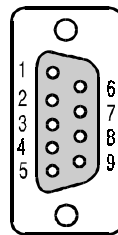
Power Requirements

- Model 7140: +12V DC with polarity as follows: +  -
- Model 7140H: +24V DC with polarity as follows: +  -

Power Consumption

- During operation: max 300 mA
- While idle: 60 mA

Interface Connector Pin Assignments



DB9F RS232 Interface

- #2: TX
#3: RX
#5: Ground
#7: CTS
#8: RTS



Appendix II

Customized Read/Write

Customized data format

0	0	1	1	b3	b2	b1	b0
---	---	---	---	----	----	----	----

Hints

- Within each data byte, only b0~b3 is valid data; b4~b7 is fixed as “1100” by factory.
- b0 is written on the magnetic stripe first, from left to right, followed by b1, b2, b3.
- User must specify leading zeros (zero bits) in the data byte, with
Track1: minimum 63 leading zeros.
Track2: minimum 22 leading zeros.
Track3: minimum 63 leading zeros.
- Maximum data length (exclude leading zeros)
Track1: 553 BITS
Track2: 200 BITS
Track3: 535 BITS
- Trailing zeros will be added by 7140 automatically, users don't need to specify it in the command.
- User is recommended to have a leading byte (01-0F) ahead of the data string for customer's data identification.

Examples: Write and Read “12345” on track 1 with leading byte “0A”

Write :

- Command:
<STX><C1WISOC><16 bytes 0+“0A”+12345><ETX><LRC>
- Data = 12345
- The data (exclude bit 4~7) at binary mode is:
64bits 0 + 1010 + 0001 0010 0011 0100 0101
- The data be reversely written into 7140 (exclude bit 4~7) at binary mode will be :
64bits 0 + 0101 + 1000 0100 1100 0010 1010
.....[Result]

Read:

- Command:
<STX><C1RISOC><ETX><LRC>
- Data read at binary mode will be :
0000...0000 1000 0110 1000 1100 0000 0101 0001
This bit string was generated by 7140 itself.
- User has to reverse each 4 bits of above data into:
0000...0000 0001 0110 0001 0011 0000 1010 1000
- The underline block just the same as [Result]
- Exclude the leading zeros we get :
0101 1000 0100 1100 0010 1010
- Inverse each 4 bits block again and the real data will be:
1010 0001 0010 0011 0100 0101 (“0A”+12345)
- Remove the “0A” leading byte, user will get the data 12345 exactly.



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