THE IM-1RFID/B DISPENSER

SET UP AND OPERATION MANUAL

FOR SERVICE CALL
1-800-795-8251

Dispenser Serial Number _____

Software Version _____

THE IM-1RFID/B DISPENSER
SET UP AND OPERATION MANUAL

TABLE OF CONTENTS

SAFETY CONSIDERATIONS

Unplug the dispenser when servicing – failure to do so could cause serious injury.

UNPACKING

When the dispenser is received, it should be carefully unpacked and checked closely for any possible damage. If a freight company is involved and there is damage, please notify them immediately. They will need to thoroughly inspect the damage and fill out a report. Please **do not** touch the dispenser until this has been done.

Please remove and save packing materials for later use.

STANDARD MACHINE PACKING LIST

QUANTITY	DESCRIPTION
1	IM-1RFID/B dispenser
1	Hex key (side of dispenser)
1	MIFARE test card
1	Card weight
1	Card hook
1	Warranty certificate
1	Operation manual
1	Software Reference Manual

LOADING / UNLOADING CARDS

Cards may be loaded from the top or front of the column, as is most convenient, with either side up in any orientation. Once the cards are loaded place the included weight on top of the stack with the word "FRONT" facing forward, right side up.

For unloading cards, a card hook is provided that allows for easy removal of the bottom-most cards.

CARD THICKNESS ADJUSTMENT PROCEDURE

1. With a 9/64 hex head wrench, turn the adjustment screw on the dispenser counterclockwise until a card will not pass the adjustment mechanism.
2. Place a card of the type to be dispensed in the bottom of the column.
3. Place the card weight on top of the card with the word "FRONT" facing forward.
4. Place the hex head wrench into the adjustment screw.
5. Try to dispense the card and turn the adjustment screw clockwise until the card is dispensed. It may take a few tries before the card is dispensed smoothly.
6. Once the card is dispensed, the column is properly adjusted.

REGULAR MAINTENANCE

Dispenser lubrication is not necessary. Improper lubrication can result in machine malfunction.

DISPENSER COMMUNICATION SPECIFICATIONS

Please refer to the included IM-1RFID/B Software Reference Manual for information on configuring communication between the dispenser and host computer.

Technik Mfg. Item # 426-005 RFID Read/Write Board

FCC ID: N9O-RFID1

FCC Compliance Statement

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

Changes or modifications made by the user and not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

IM-1RFID/B Dispenser Drawings

DESIGNER APPROVAL

MANAGER APPROVAL

MATERIALS REVIEW
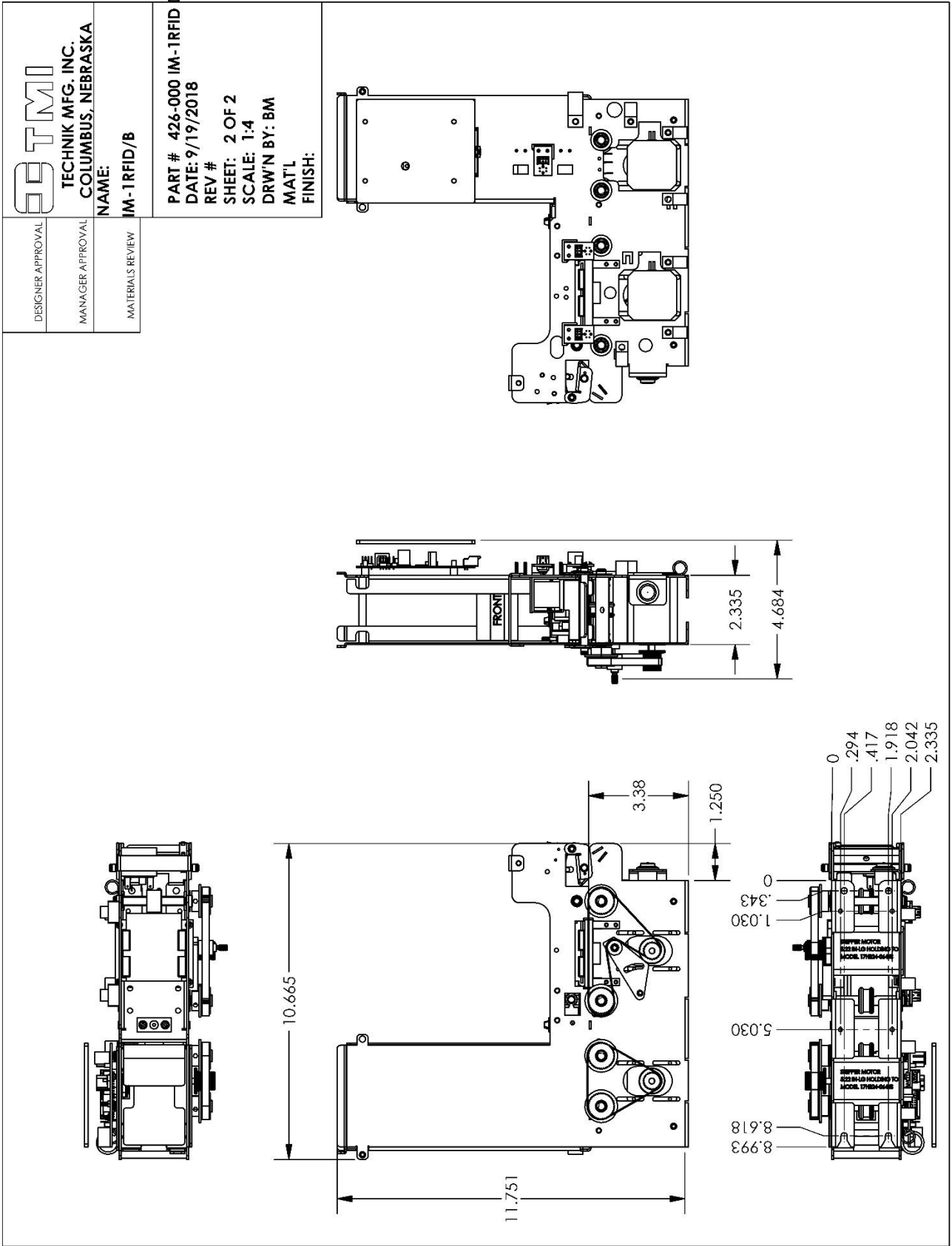
TECHNIK MFG. INC.
COLUMBUS, NEBRASKA
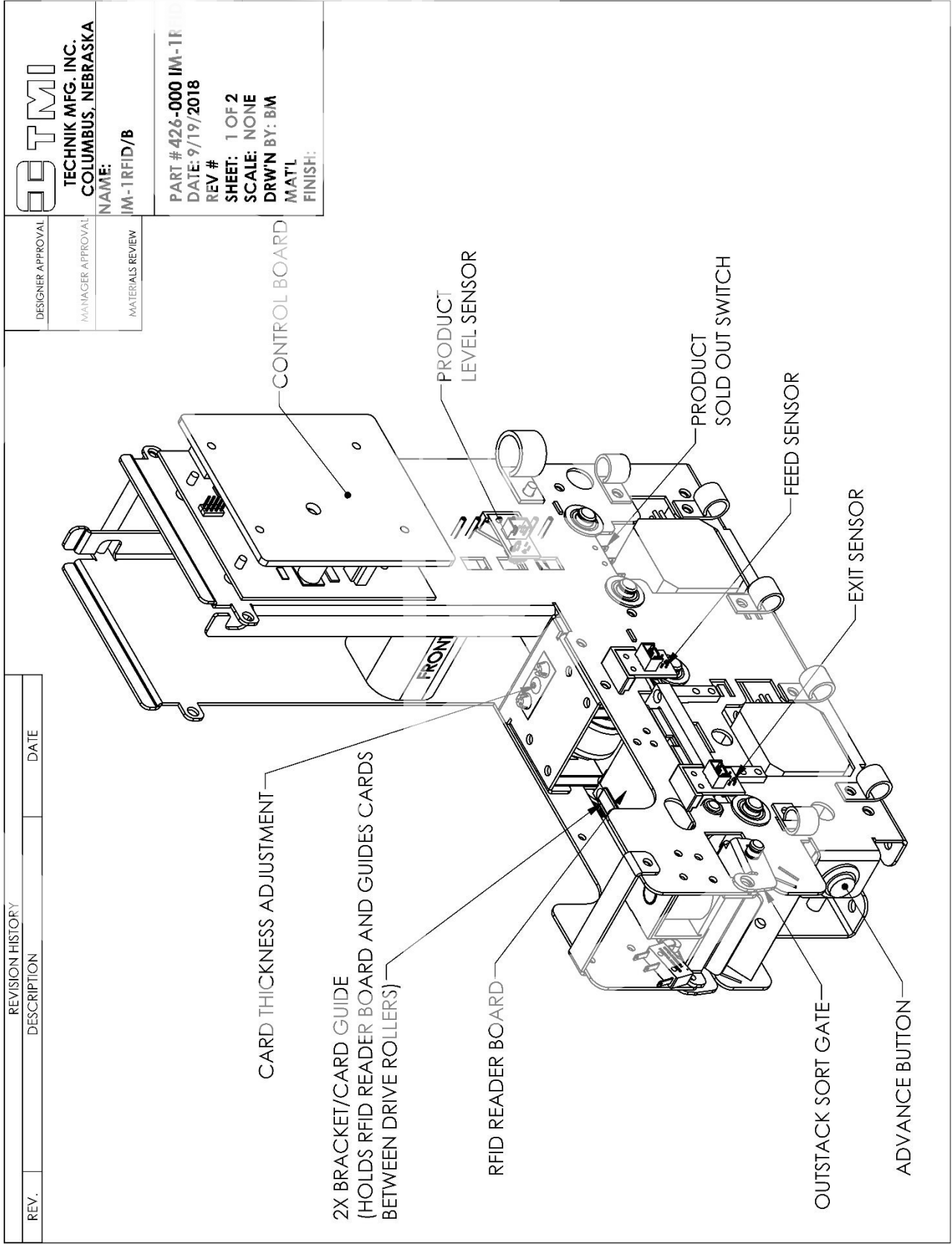
NAME:
IM-1RFID/B

PART # 426-000 IM-1RFID
DATE: 9/19/2018
REV #
SHEET: 2 OF 2
SCALE: 1:4
DRW'N BY: BM
MAT'L
FINISH:

2.335
4.684

3.38
1.250
10.665
11.751

0
.294
.417
1.918
2.042
2.335

0
.343
1.030
5.030
8.618
8.993

STEPPER MOTOR
822 IN-LB HOLDING TQ
MODEL 17H6H-04AN

STEPPER MOTOR
822 IN-LB HOLDING TQ
MODEL 17H6H-04AN

TECHNIK MFG. INC.
COLUMBUS, NEBRASKA

DESIGNER APPROVAL

MANAGER APPROVAL

MATERIALS REVIEW

NAME:
IM-1RFID/B

PART # 426-000 IM-1R
DATE: 9/19/2018
REV #
SHEET: 1 OF 2
SCALE: NONE
DRW'N BY: BM
MAT'L
FINISH:

REVISION HISTORY
DESCRIPTION
DATE
REV.

CONTROL BOARD

PRODUCT LEVEL SENSOR

PRODUCT SOLD OUT SWITCH

FEED SENSOR

EXIT SENSOR

CARD THICKNESS ADJUSTMENT

2X BRACKET/CARD GUIDE
(HOLDS RFID READER BOARD AND GUIDES CARDS
BETWEEN DRIVE ROLLERS)

RFID READER BOARD

OUTSTACK SORT GATE

ADVANCE BUTTON

FRONT

110-095 Series Control Board Description

Please refer to the following image of the 110-095 series board for the locations of the various controls, test points and indicators described below.
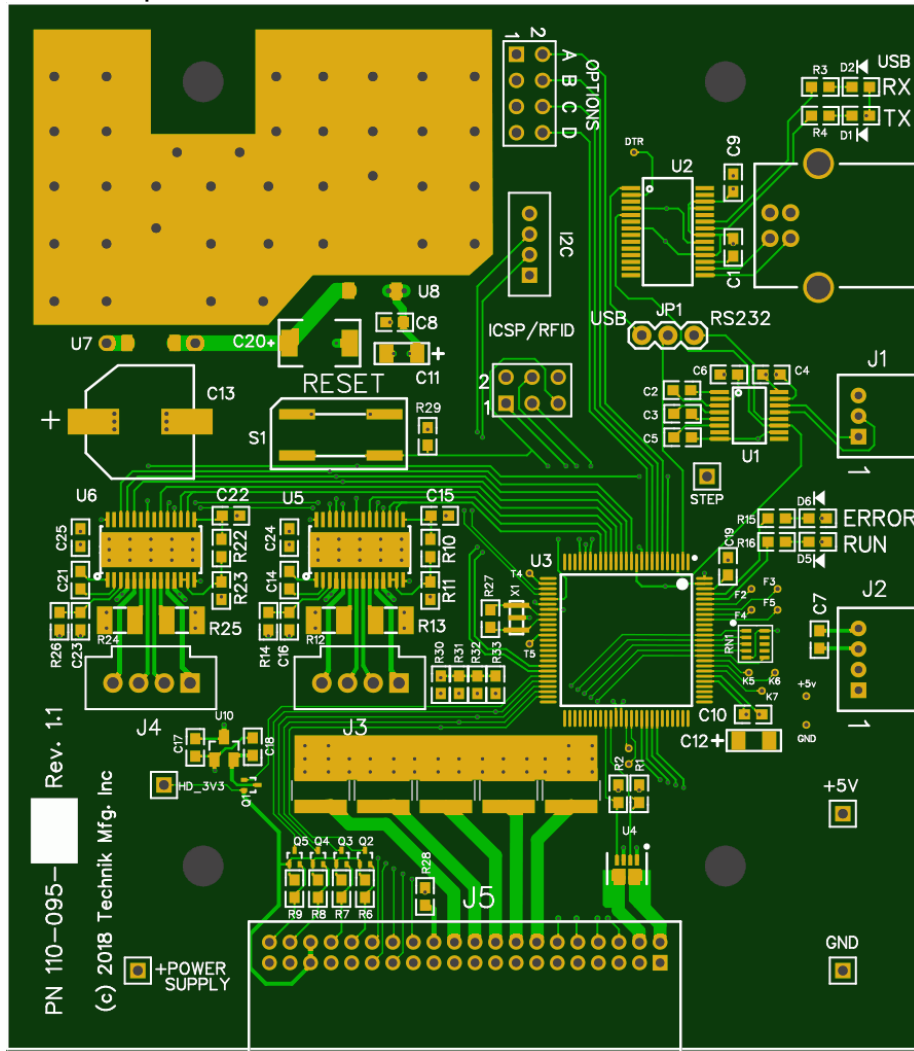
NOTE:

Part #110-095-24 boards operate from a **24VDC**, 3A power supply only.
Part #110-095-12 boards operate from a **12VDC**, 3A power supply only.

J1   3-pin RS232 serial I/O connector (mating connector: JST PHR-3):
        Pin 1 - TX data out from dispenser to host
        Pin 2 - RX data in from host to dispenser
        Pin 3 - GND

J2   4-pin power connector (mating connector: JST PHR-4):
        Pins 1 & 4 - +24v (110-095-24) or 12v (110-095-12) DC @ 3A
        Pins 2 & 3 - GND

J3   Column (rear) motor connector
J4   Feed (front) motor connector

J5   Main wiring harness connector

RESET button:
    Resets the controller to the same state as a power-on condition.

OPTION Jumpers A-D:
    OPTION A - Placing a jumper in the OPTION A position will cause the board to use
                a baud rate of 115200 for serial communication. No jumper on OPTION
                A (default) will use 9600 baud. A reset is required after changing this
                jumper.
    OPTION B - Unused.
    OPTION C - Unused. Store spare jumper at this location.
    OPTION D - Enables internal diagnostics. Place a jumper at this location only if
                instructed to by Technik technical support.

Jumper JP1:
    USB position - selects the USB connector for serial communication
    RS232 position - selects the RS232 connector (J1) for serial communication

USB LEDs:
    RX - flashes when data is received by the board on the USB connector
    TX - flashes when data is transmitted from the board on the USB connector

ERROR LED:
    Illuminates to indicate an error condition on the controller.

RUN LED:
    Blinks regularly to indicate normal controller operation.

Test Points:
   +POWER SUPPLY - incoming 24VDC or 12VDC power supply
    +5V - regulated +5VDC onboard power supply
    HEAD_3V3 - regulated 3.3VDC power supply to mag stripe heads
    GND - common system ground

110-096 Series Control Board Description

Please refer to the following image of the 110-096 series board for the locations of the various controls, test points and indicators described below.
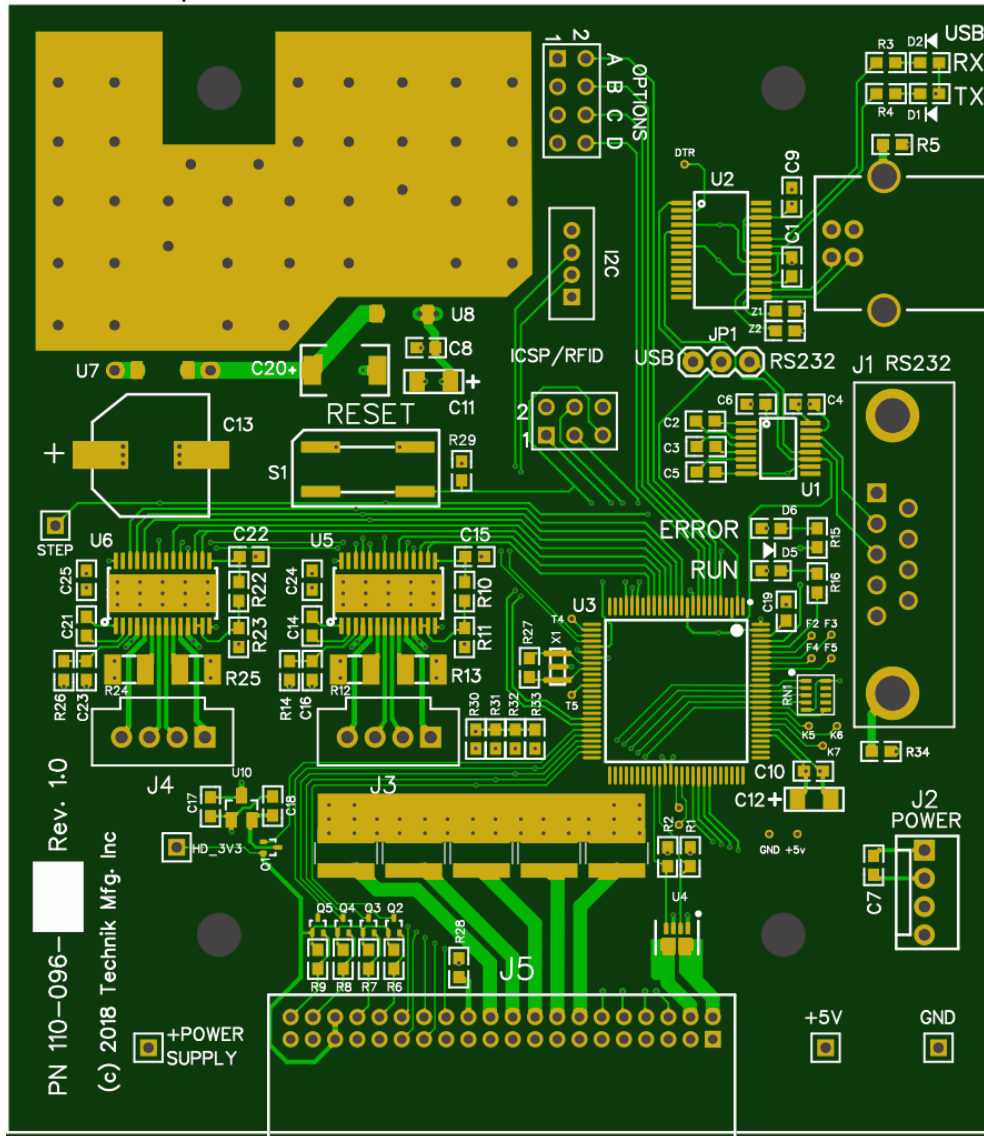
NOTE:

Part #110-096-24 boards operate from a **24VDC**, 3A power supply only.
Part #110-096-12 boards operate from a **12VDC**, 3A power supply only.

J1   DB-9 female RS232 serial I/O connector:
        Pin 2 - TX data out from dispenser to host
        Pin 3 - RX data in from host to dispenser
        Pin 5 - GND
        Pins 1,6,7,8 - DCD, DCE, RTS, CTS connected together internally

J2   4-pin power connector (mating connector: Molex 22-01-2047 or equiv.):
        Pins 1 & 4 - +24v (110-096-24) or 12v (110-096-12) DC @ 3A
        Pins 2 & 3 – GND

J3 Column (rear) motor connector
J4 Feed (front) motor connector
J5 Main wiring harness connector

RESET button:
 Resets the controller to the same state as a power-on condition.

OPTION Jumpers A-D:
 OPTION A - Placing a jumper in the OPTION A position will cause the board to use a baud rate of 115200 for serial communication. No jumper on OPTION A (default) will use 9600 baud. A reset is required after changing this jumper.
 OPTION B - Unused.
 OPTION C - Unused. Store spare jumper at this location.
 OPTION D - Enables internal diagnostics. Place a jumper at this location only if instructed to by Technik technical support.

Jumper JP1:
 USB position - selects the USB connector for serial communication
 RS232 position - selects the RS232 connector (J1) for serial communication

USB LEDs:
 RX - flashes when data is received by the board on the USB connector
 TX - flashes when data is transmitted from the board on the USB connector

ERROR LED:
 Illuminates to indicate an error condition on the controller.

RUN LED:
 Blinks regularly to indicate normal controller operation.

Test Points:
 +POWER SUPPLY - incoming 24VDC or 12VDC power supply
 +5V - regulated +5VDC onboard power supply
 HEAD_3V3 - regulated 3.3VDC power supply to mag stripe heads
 GND - common system ground

Status Indicators

The **RUN** and **ERROR** LEDs provide a visual indication of the operating state of the dispenser.

RUN
This LED will blink green once per second during normal operation.

ERROR
This LED will illuminate red to indicate various error conditions:

Errors at startup
Solid red after power-on or reset - Unable to communicate with RFID reader board. Contact Technik technical support for assistance.

Sequence of 3 blinks - A failure in the exit position sensor has been detected. Contact Technik technical support for assistance.

Sequence of 4 blinks - A failure in the column feed position sensor has been detected. Contact Technik technical support for assistance.

Sequence of 5 blinks - The RFID reader board has failed its internal self-test. Contact Technik technical support for assistance.

Errors during operation
A red ERROR indicator during routine operation may mean one of the following conditions:

Failure to feed - a mechanical problem occurred while moving a card from the column through the feed channel. This error will clear on the next successful card dispense cycle.

Motor fault - the motor control circuity has detected a problem with one of the drive motors.

IM-1RFID/B Software Reference

Note that the current version of controller firmware is designed to work only with MIFARE Ultralight, Ultralight C, Ultralight Nano and Ultralight EV1 cards under ISO/IEC 14443-2, Type A at 13.56 MHz.

110-095/096 Controller Communications Protocol

The following document describes the low-level serial command and status messages passed between the host computer and the 110-095/096 controller. The communications format for either the USB or RS232 serial interface is 9600 Baud, 8 bits, no parity, one stop bit.

A speed of 115200 baud is available by placing a jumper on position A of the option jumper block and resetting the dispenser.

The USB interface emulates a serial COM port and is compatible with standard FTDI FT232R Virtual COM Port drivers.

All messages sent between host and dispenser are sent in plain ASCII text. Messages sent to the dispenser are not case-sensitive.

In the following command descriptions [\r] represents the ASCII carriage return character and [\n] represents the ASCII newline character.

Commands (issued from the host to the controller)

Miscellaneous Commands
STATUS QUERY
Format: SQ[\r]
This causes the controller to return a status message.

RESET
Format: RS[\r]
This causes the controller firmware to restart, returning all devices to their initial state. If a card is present in the read station, it will be returned to the product stack.

Dispenser Commands

MOTOR FORWARD
Format: MF[\r]
This causes the dispenser motor to run forward continuously. This is useful for cleaning the dispenser. Canceled by *DISPENSE MODE*.

MOTOR REVERSE
Format: MR[\r]
This causes the dispenser motor to run in reverse continuously. This is useful for cleaning the dispenser. Canceled by *DISPENSE MODE*.

DISPENSE MODE
Format: MD[\r]
This causes the controller to return to normal operating mode.

READ CARD DATA.
Format: CR[\r]
This command causes the dispenser to advance the next card from the stack to the reader and return ALL data from the card. If a card is already under the reader the card's data will be read again. The card will be held under the reader and a status message will be returned to the host.

WRITE CARD DATA.
Format: CW[page][byte][byte][byte][byte][checksum][\r]
This command causes the dispenser to write one page of data to the previously read card. The data parameter always consists of exactly four bytes per page with the page, data and checksum parameters of the command sent as hexadecimal values of 2 characters each.
The card will be held under the reader and a status message containing the result status after the write will be returned to the host. No data will be returned in this status message. To verify the data written issue a Read Card command (CR) after all data has been written and compare the data read to the data written.

Example: CW0A544553541C[\r]
          Write the values 54h 45h 53h 54h (ASCII "TEST") to page 0Ah.
          The checksum value of the data (page thru byte #4) = 1Ch (see below)

VEND CARD.
Format: CV[\r]
This command causes the card dispenser to dispense the previously read card. This command will only be accepted following a *READ CARD* or *WRITE CARD* command.

OUTSTACK CARD.
Format: CO[\r]
This command causes the card dispenser to deposit the previously read card into the reject bin. This command will only be accepted following a *READ CARD* or *WRITE CARD* command.

RESTACK CARD.
Format: CK[\r]
This command causes the card dispenser to return the previously read card to the stack of un-dispensed cards. This command will only be accepted following a *READ CARD* or *WRITE CARD* command.

Reply Messages (sent from the controller to the host)

All messages sent between dispenser and host are sent in plain ASCII text. Card data returned to the host in status messages is sent in hexadecimal form with two characters per byte of card data. The length of the data string returned in the **RD(n);** parameter of the status message is returned as a **base-10 integer value**. The length value returned by RD(n); indicates the number of bytes of data read from the card plus one for the message checksum byte.

Status
Format:
        ST;VER=1.00;DS=UP;LC=SQ;CS=OK;LP=0;SO=0;SG=0;GT=1;RD=(n)xxxx***END***[\r\n]

This message is sent by the controller at reset or after completion of any command. Note that all fields are identified by a fixed field name followed by an equals sign [=] with the parameter terminated by [;]. The data portion of the field is terminated with [***END***].

NOTE: Except for the ST, VER and RD fields, host software should not assume that message fields will always be delivered in the same order within the status message or that field parameters will always have the same number of characters. Host software should not parse status messages based on specific character positions of fields within the reply string. Host software must also be tolerant of currently unused fields not being included in future versions of controller firmware or new fields being added. The host software's parsing routines should be flexible and fault-tolerant.

ID	Field Name	Description
ST	Record type	Fixed record ID
VER	Firmware version	String identifying the revision level of the firmware

DS	Dispenser Status	Card dispenser status:
		        UP = Ready to dispense
		        DN = Dispenser is jammed
		        SO = Sold out

LC	Last Command	The last command received by the controller.

CS	Completion Status	Results of last command:
		        OK = Command completed successfully
		        BZ = Dispenser busy executing prior command
		        NG = Error. Command failed.
		        CS = Checksum error in card data to be written (CW command)
		        NC = No valid MIFARE Ultralight/C/EV1 card detected in reader
		        EW = Error writing data to card

LP	Low product	1 = product stack low, 0 = product present at sensor
SO	Sold Out	1 = sold out, 0 = OK
SG	Card staged	1 = card is positioned in dispenser channel, 0 = not present

GT	Sort gate status	1 = sort gate open, 0 = sort gate closed
RD	Read data length	Number of <u>bytes</u> represented by the data string between (n) and ***END***. If non-zero, this byte will always equal the number of data bytes read from the card plus 1 for the message checksum byte. A value of zero in this parameter means no valid data was read from a card. This value is returned as a **decimal** number (i.e. 1 thru 9999).
Returned data	Data read from card	Data read from card represented by hexadecimal values for each byte read. Two hex characters are returned for each byte with the checksum of the data included as the final hex byte.
END	Terminator	Indicates end of card data and status message

Checksum calculation

Checksums on data sent to the controller from the host and returned in status messages from the controller are generated as a running exclusive-or checksum of the data bytes in the reply or command.

Examples:

CW0A544553541C (Card Write command):
    Page to write = 0Ah
    Page data = 54h 45h 53h 54h
    Checksum = 0A xor 54h xor 45h xor 53h xor 54h = 1Ch

Data returned from a Card Read command:
ST;VER=1.00;DS=UP;LC=CR;CS=NG;LP=0;SO=0;SG=1;GT=0;RD=(65)04AED0F2223
64980DD48E00100000000FFFFFFFF6DD2BD5E589AD122FAF6131CD9DB74090000
0000000000000000000000000000000000000000000000000030***END***
    Data = 04AED0F222364980DD48E00100000000FFFFFFFF6DD2BD5E589AD122
             FAF6131CD9DB7409000000000000000000000000000000000000000000
             00000000000000
    Checksum = 04h xor all bytes thru final 00h = 30h

Example Command Sequences

Reset dispenser (or power on):
(from host)   RS[\r]
(from dispenser)   ST;VER=1.00;DS=UP;LC=RS;CS=OK;LP=0;SO=0;SG=0;GT=0;
RD=(0)***END***[\r\n]

Read data from a MIFARE Ultralight card (64 bytes of card data):
(from host)   CR[\r]   (allow 5 seconds for read to complete)
(from dispenser)   ST;VER=1.00;DS=UP;LC=CR;CS=NG;LP=0;SO=0;SG=1;GT=0;
RD=(65)04AED0F222364980DD48E00100000000FFFFFFFF6DD2BD5E589AD122FA
F6131CD9DB740900000000000000000000000000000000000000000000000000000
0030***END***[\r\n]
(checksum = 30h)

Read successful - card data is 64 bytes long and consists of the hexadecimal string
"04AED0F222364980DD48E00100000000FFFFFFFF6DD2BD5E589AD122FAF6131C
D9DB74090000000000000000000000000000000000000000000000000000000000".
The checksum value is 30h.

- OR-

(from host)   CR[\r]   (allow 5 seconds for read to complete)
(from dispenser)   ST;VER=1.00;DS=UP;LC=CR;CS=NC;LP=0;SO=0;SG=1;GT=0;
RD=(0)***END***[\r\n]

Read unsuccessful - no card data returned. In this case, "CS=NC" indicates no
readable card could be detected under the card reader. At this point the card is left
under the reader and can be outstacked, vended or restacked.

Write data to page 0Ah on card just read:
(from host)   CW0A544553541C[\r]   *(checksum of 0Ah thru 54h= 1Ch)*
(from dispenser)   ST;VER=1.00;DS=UP;LC=CW;CS=OK;LP=0;SO=0;SG=1;GT=0;
RD=(0)***END***[\r\n]

Vend modified card:
(from host)   CV[\r]
(from dispenser)   ST;VER=1.00;DS=UP;LC=CV;CS=OK;LP=0;SO=0;SG=0;GT=0;
RD=(0)***END***[\r\n]

<u>SERVICE LOG SHEET</u>

DISP. SERIAL NUMBER _____   DATE INSTALLED _____
DISP. MODEL TYPE _____ INSTALLED BY _____
BUSINESS LOCATION _____
BUSINESS ADDRESS _____
CITY/STATE/ZIP _____

<u>DATE</u>	**<u>SERVICE PERFORMED</u>**	**<u>SERVICED BY</u>**

DISPENSER #_____ LOG SHEET

DATE	MACHINE ROW	CARD VALUE	TOTAL CARDS	TOTAL CASH
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
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