CardMaster
Access and Control Systems

From
CARDLOCK VENDING

CardMaster Installation Manual

11.05.30 rev 1

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Critical Do's and Don'ts

- Do not proceed without reading the following information on this page. Critical!

- All work should be done only by a qualified electrician, experienced in installing Petroleum Equipment in a Class 1 Div 1 or 2 environment.

- All work needs to be done in conformance with
- applicable NFPA codes.

- All work needs to be done in conformance with
- applicable provisions of the National Electric Code.
-
- All work needs to conform to all applicable local codes: electrical, safety, and fire department.

- Do not substitute telephone wire as communication wire
- where Belden Shielded Cables are required.

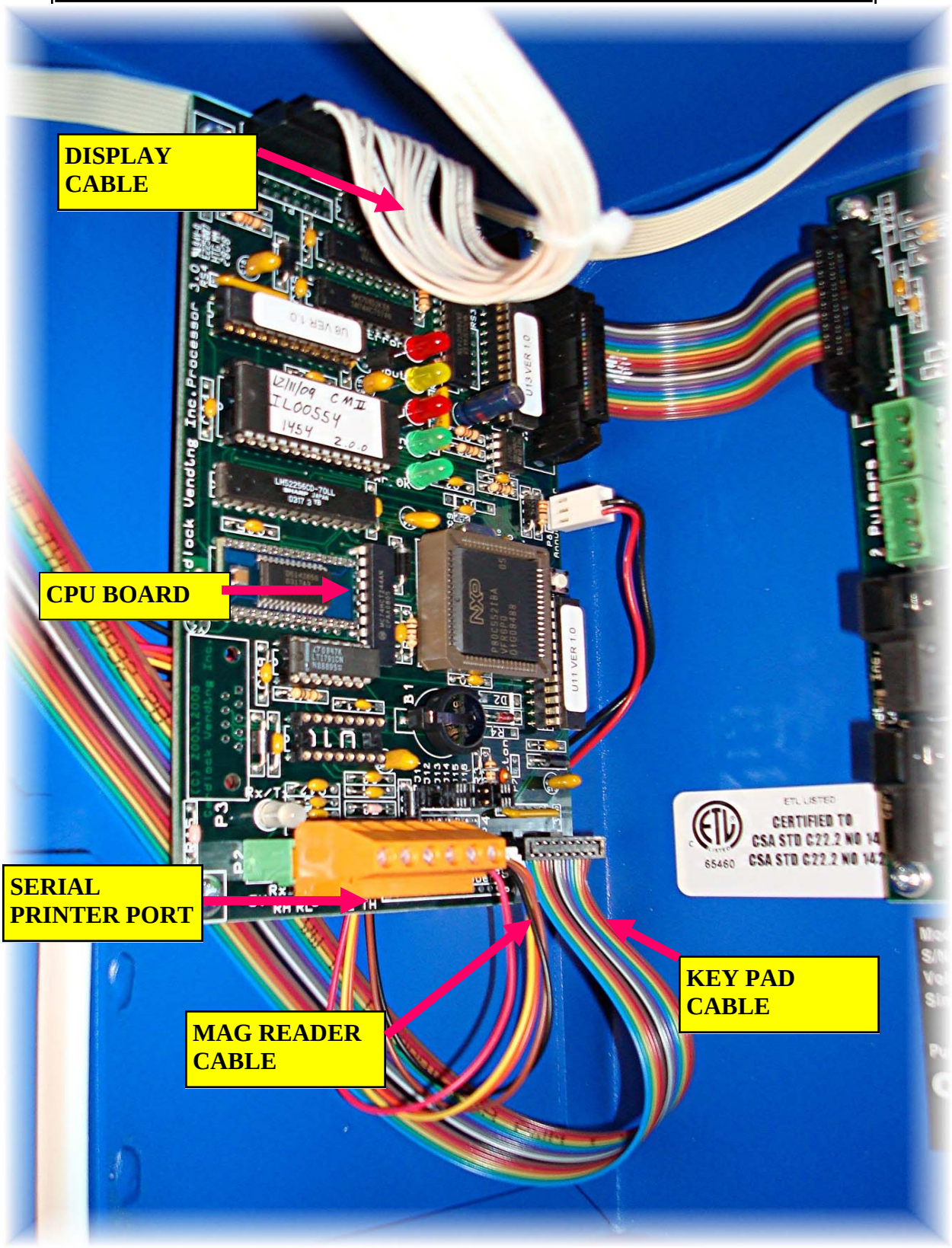
- CardMaster 120vac Power must be from a dedicated circuit.

- Do insure clean electrical power.

In case of doubt install "AC" line conditioners with surge suppression

EARTH GROUND– TESTING TO ZERO (0) OHMS REQUIRED

CARDMASTER LEFT SIDE INTERNAL VIEW



FIRST ACTION NEW INSTALLATIONS

ALL NEW CARDMASTERS COME WITH A PAPER TAB BETWEEN THE BATTERY AND THE CONTACT PIN.

THIS PAPER TAB NEEDS TO BE REMOVED BEFORE PROGRAMMING THE UNIT.

ONCE REMOVED THE CARDMASTER WILL BE IN
MEMORY FAIL.

ACCESS TO THE CARDMASTER MUST BE MADE BY USE OF THE PC INTERFACE.

ONCE THE INTERFACE IS STARTED FIRST TYPE “R” AND RESET THE CARDMASTER.

THEN TYPE “P” FOR PASSWORD.

WHEN THE REQUEST FOR PASSWORD IS RESPONDED BY THE CARDMASTER TYPE “LETMEIN” TO ACCESS THE MEMORY.

ONCE ACCESS HAS BEEN ACHIEVED TYPE
“SHIFT KEY” AND “3” KEY AT THE SAME TIME. THE RESPONSE WILL BE
“CLEAR MEMORY AND LOAD DEFAULTS” Y or N
TPYE “Y” AND RETURN KEY.

THEN TYPE THE “SHIFT KEY” AND THE “6” KEY AT THE SAME TIME TO EXIT THE UNIT.

ONCE THE EXIT RESPONSE IS ACHIEVED TYPE “R” AND RESET THE CARDMASTER

THE UNIT IS NOW READY TO PROGRAM AS NORMAL .

Overview

System Components of the CardMaster Console:

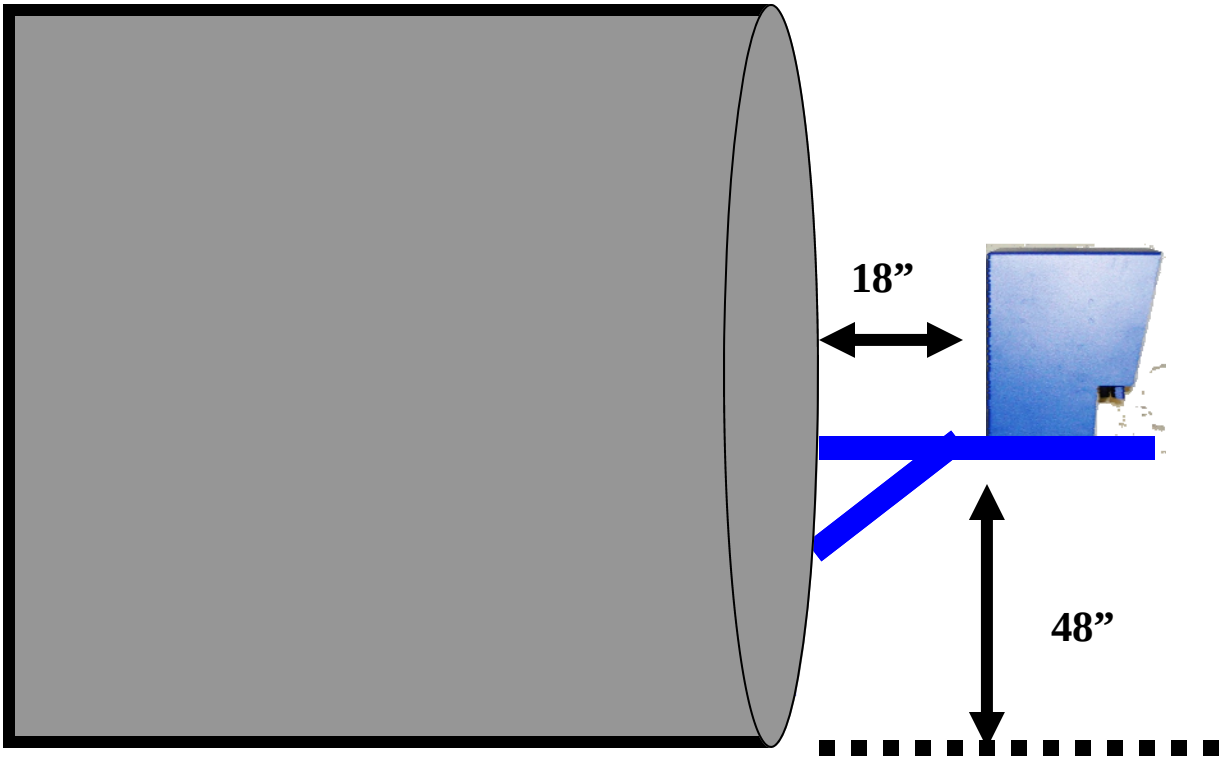
Processor Board (CPU)	**This board contains the microprocessors, the EPROM with the operating system firmware and memory for databases and transactions. This board also interfaces to the annunciator, display, card reader, pin-pad (keyboard), and the printer serial port.**
Power Supply Board	**The PSB inputs 110/220 vac (or 12/24 vdc) and regulates it to 12 vdc—providing DC Voltage to our other boards and peripherals.**
I/O Board Pump Control	**The I/O board interfaces with the CPU board, and controls two (2) 30 amp hose / pump relays. The PCB-I/O board has AC power inputs, heater output voltage, DC power input, pulser inputs, and the data serial ports (RS-232 or RS-485 as applicable)**
Cabinet Heater	**The thermostatically controlled cabinet heaters are located on the inside of the front door adjacent to the area of the card swipe. These heaters have multiple purposes: reducing corrosion from humidity, and keeping components at operating temperatures in cold climates. They also help to keep the card swipe from freezing with snow and rain in bad weather.**
LCD Display	**CardMaster's back-lighted LCD displays 16 characters, 1/2" size, displaying screen prompts and input verifications**
Magnetic Stripe Card Reader	**Swipe type magnetic stripe card reader, which reads cards swiped from right to left as you are facing the CardMaster, with stripe side facing away from operator.**
12 Key keypad	**Weatherproof metal keypad for keyboard entry of PIN, Odometer, Vehicle Number, etc; as well as entry of card number in "card-less" operation**
EMERGENCY STOP	**All applicable codes require that an Emergency Stop Switch be provided in an easy to locate position—safely off the fueling islands. This is critical to local and national safety codes, and common sense safety considerations.**

CardMaster mounted to end of tank

Always follow the rules of the National Electric Code and all UL provisions when mounting or installing CardMaster on the ends of aboveground tanks (skid mounted, vehicle mounted, or merely sitting on the ground.

While we find no NEC drawings for this application it appears reasonable to follow the rules used when mounting items such as card systems on the islands where there are gasoline dispensers,

This would be interpreted to mean 18” or more away from the vertical surface of the tank or container, and 48” or more above the ground (or skid platform) surface. Please see below sketch.



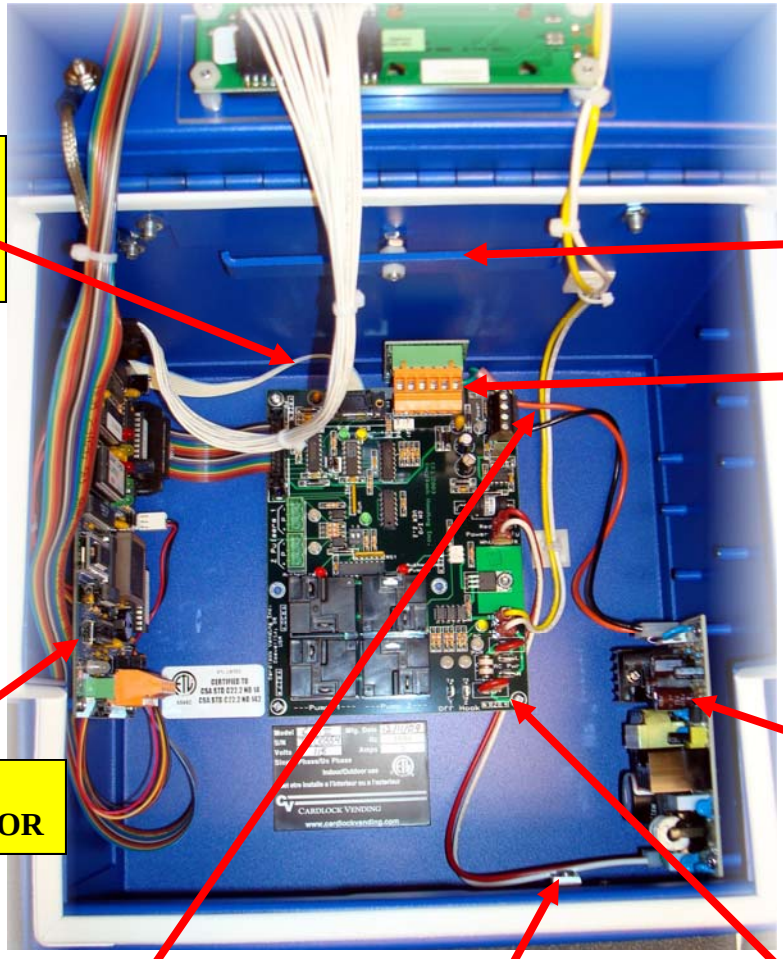
CARDMASTER

INTERNAL

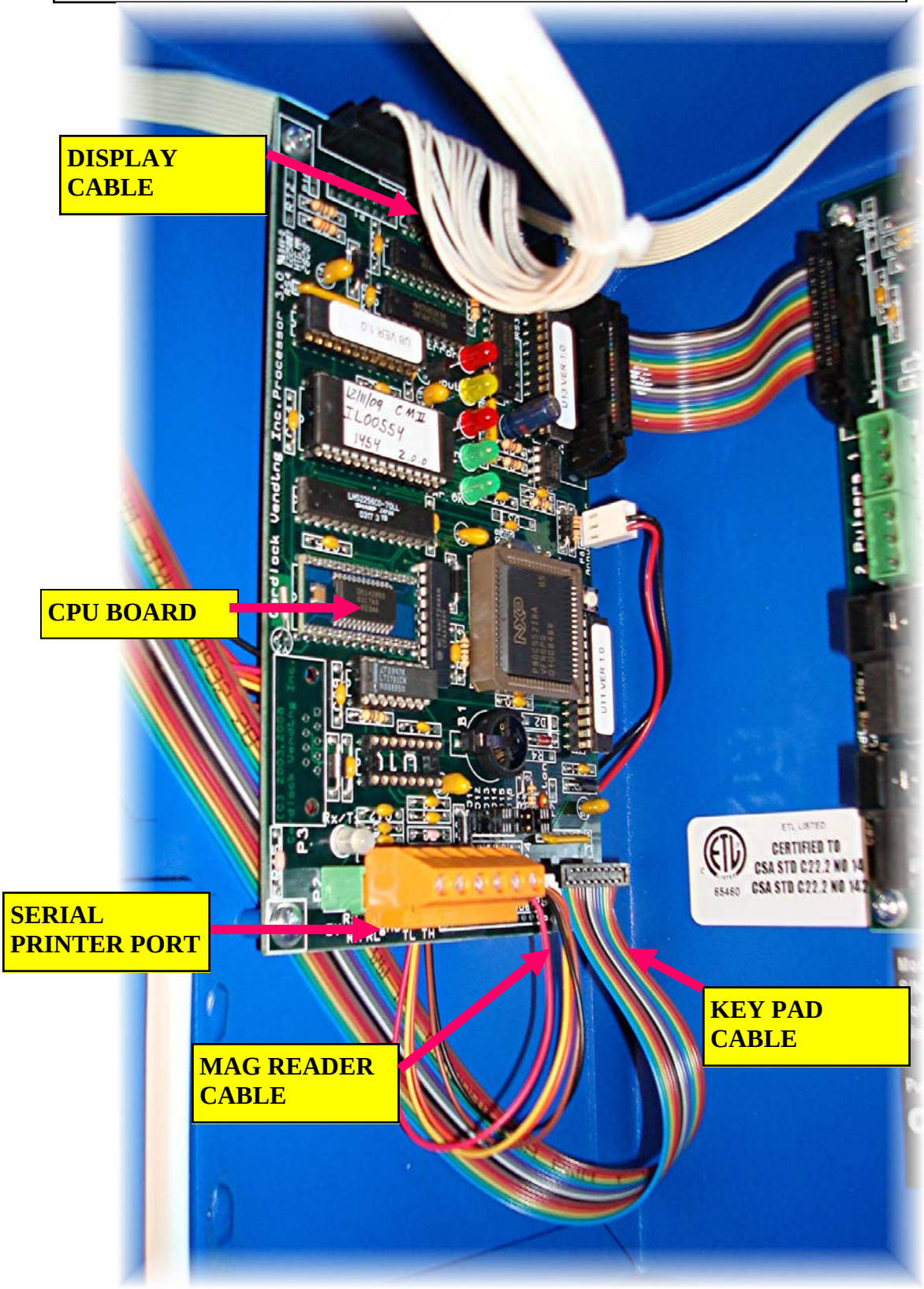
COMPONENT

LOCATIONS

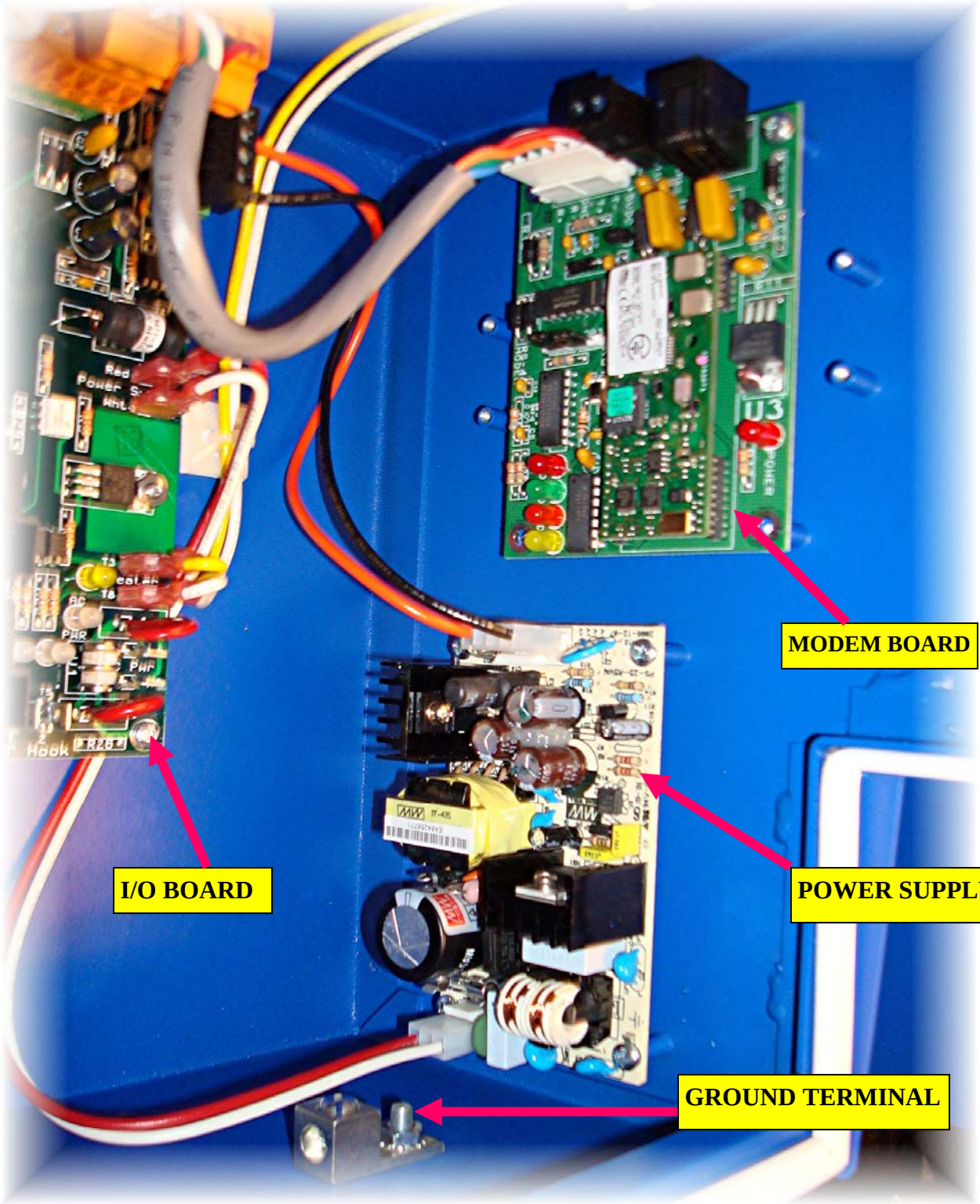
Internal View of CardMaster Cabinet



CARDMASTER LEFT SIDE INTERNAL VIEW



CARDMASTER RIGHT SIDE VIEW



CARDMASTER

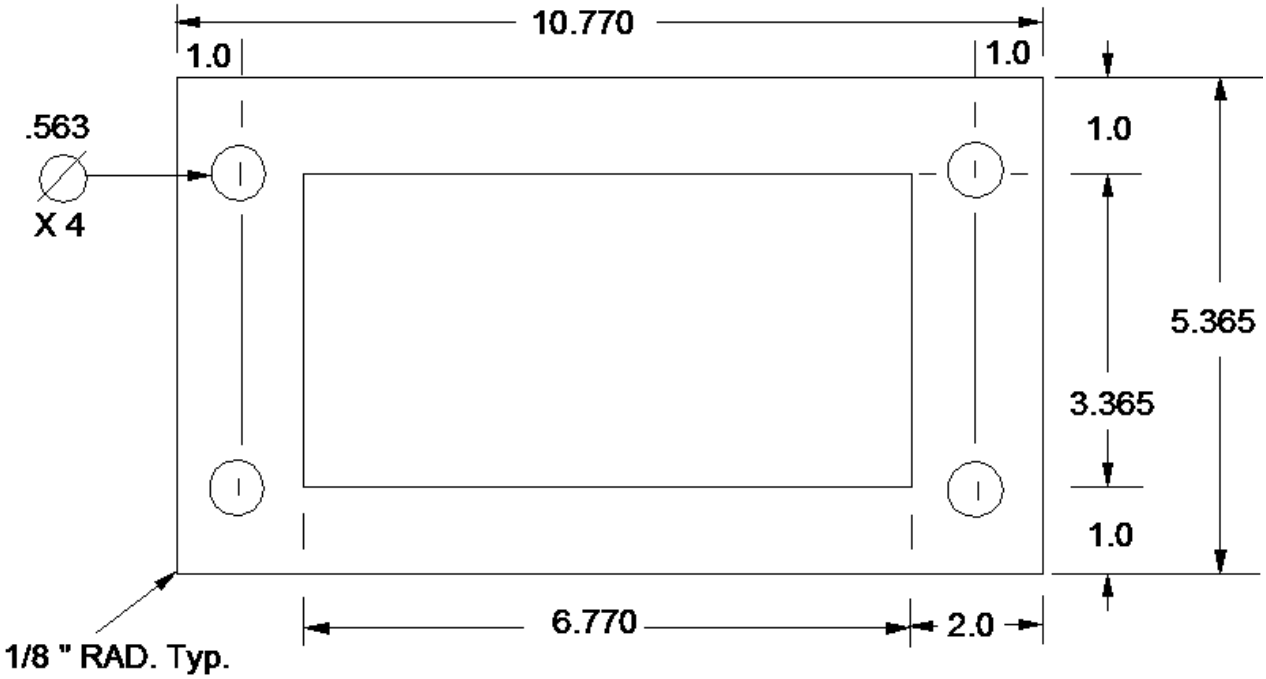
PHYSICAL

INSTALLATION

The CardMaster may be mounted on a Island Pedestal, or a "Pump Topper Pedestal". Installation must be done according to all applicable codes as spelled out on page 2 of this manual.

PEDESTAL MOUNTED CARDMASTER

CARDMASTER ON A SHORT PEDESTAL. SHORT PEDESTAL ACTS AS A SPACER, AND A PROTECTOR FOR CONDUITS/ WIRING.



NEC Hazardous Location Installation Parameters

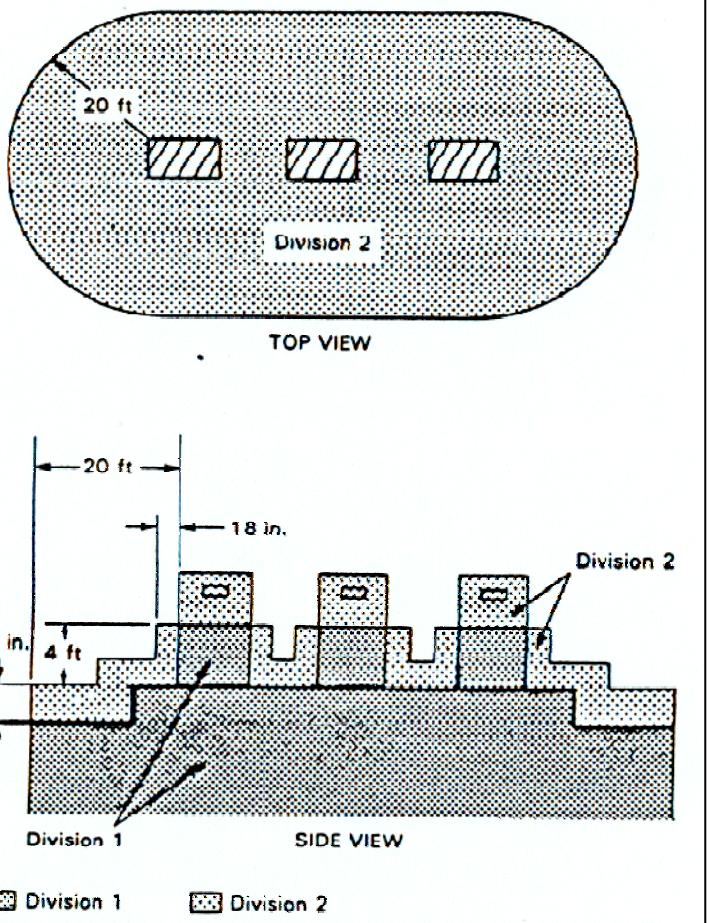


Figure 514-1. Extent of Class I location around gasoline dispensing units (except overhead type).

It is important to note that all conductors of a circuit, including the grounded conductor, that may be present within a dispensing device are required to be provided with a switch or special-type circuit breaker that will simultaneously disconnect all conductors. The intent is that no energized conductors be in the dispenser vicinity during maintenance or alteration. Considering possible accidental reversal of the polarities of conductors at panelboards, the grounded conductor must be able to be switched to the open or off position. Grounded conductors may be present in old-style pump motors, or they may pass through a dispenser as part of a circuit for the island lighting.

Since a fire or large gasoline spill at the dispensing island may make it impossible to operate the switches on the dispensing island that shut off the flow of gasoline, paragraph 4-1.2 of NFPA 30A, *Automotive and Marine Service Station Code*, requires an easily accessible and clearly identified emergency power cutoff to be provided at a location remote from the dispensing device. The term "clearly identified" means that a sign is to be posted indicating where the cutoff switch is located. This emergency power cutoff should be readily accessible and not blocked

736

Division 1 is the area around the gasoline/ diesel dispensers.

Division 2 is the area 0” to 18” above grade and 0” to 18” away from the islands out to a distance of 20’.

This means CardLock Vending’s CardMaster can be installed 48” above grade & 18” horizontal gap or space between the CardMaster and the dispensers.

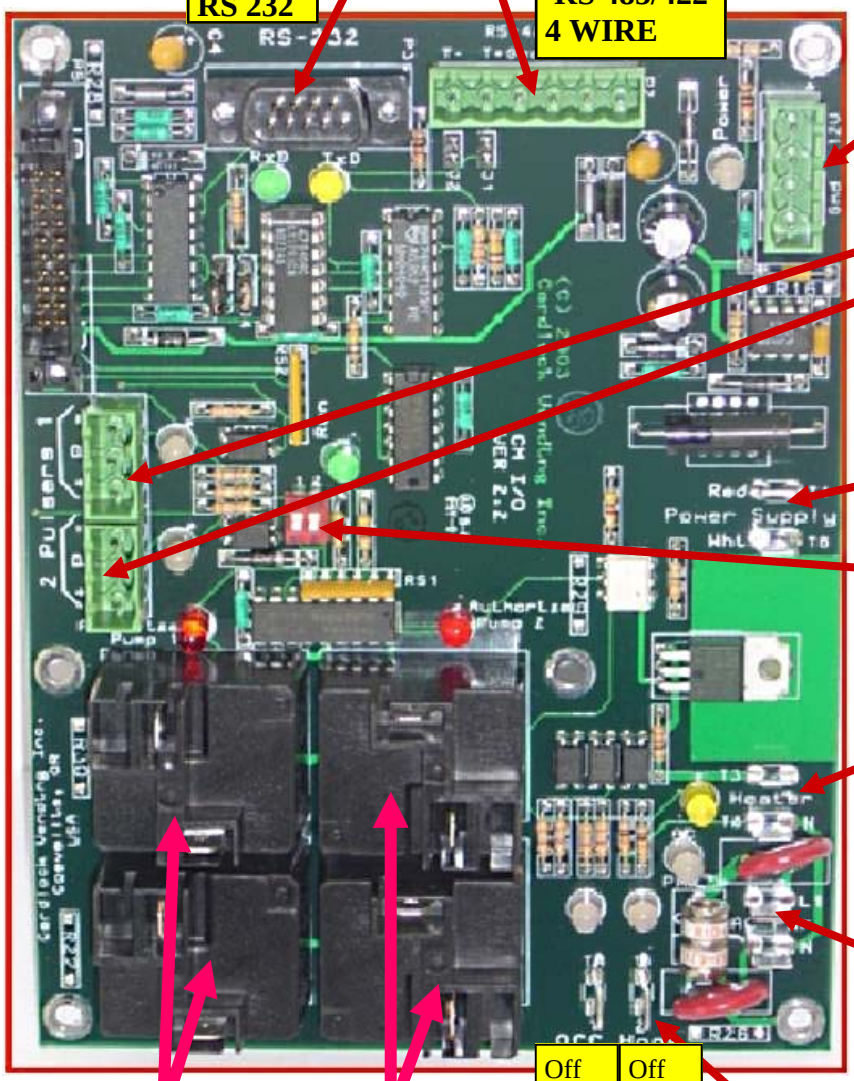
Always follow the local codes and the national electric codes when installing Cardlock Vending equipment. This is true at fueling islands as well as any other locations.

AC

WIRING

SECTION

I/O Board Key Connections and features Locations



Serial Ports

RS 232

RS 485/422
4 WIRE

12 vdc input from Power supply

Pulser 1 & 2 Wire Inputs

120 ac input to Power supply

Manual By-Pass Switches

Heater Output Connection

120 vac Power Input Top Terminal ACH and bottom Terminal Neutral

Off Hook

Off Hook

Hose # 1 Hose # 2
Relays for Pump Control, two (2) 30 amp relays per hose position, enabling 240 vac, or 120 vac with switching neutrals

"Off Hook" Handle from Pump Handle input

CardMaster WIRING Instructions

Follow all applicable local and national safety codes

Install CardMaster on a dedicated 10 amp circuit.

"AC" WIRING – 120vac Single Hose Suction Pump:
"AC" wire inputs use "spade" connectors.

Install according to all applicable codes with steel conduit for the AC voltage. CM must be on a dedicated circuit. AC should be in a separate conduit from the DC, pulser and 485 com lines. Install the following wires, select depending on 120 vac or 240 vac, single hose or two hose, and voltage of pump motor for hose relays:

L1	120 vac	Black Wire	12 Gauge	System Power
N	Neutral	White Wire	12 Gauge*	System Power*
GRD	Ground	Green	12 Gauge	Safety Ground

Earth Grounded with less than 1 ohm of resistance.

*When wiring for 220 vac application the white neutral needs to be changed to a red L-2 wire

Off Hook	120 vac (on) zero vac (off)	Blue Wire	12 Gauge	Sale Termination (pump handle)

P1-	Pulser	Black	18 Gauge	Pulser**
P1P	Pulser	Purple	18 Gauge	Pulser**
P1+	Pulser	Orange Wire	18 Gauge	Pulser**

**CardMaster works with reed switch pulsers and most powered pulsers.

Hose 1

R1	120 vac	Black	12 Gauge	Motor Relay 220 vac
R2	120 vac	Red	12 Gauge	Motor Relay 220 vac

Hose 2

R1	Neutral	White	12 Gauge	Motor Relay 120 vac
R2	120 vac	Red	12 Gauge	Motor Relay 120 vac

**** switch neutral systems require two white wires, instead of 1)***

Serial Ports – See separate page .

EARTH GROUND

GROUNDING:

INSTALL THE 12 GAUGE GREEN GROUND WIRE TO THE GROUND LUG IN THE CARDMASTER, AND THE OTHER END TO A EARTH GROUND, AND TEST FOR LESS THAN 1 OHM OF RESISTANCE.

CONDUITS DO NOT REPRESENT AN ADEQUATE SAFETY GROUND.

GROUND ROD AT THE BREAKER PANEL IS THE MOST DESIRED WAY TO ADEQUATELY GROUND SYSTEM.

Dry sandy soil will provide a poor ground. Moist dirt is the best.

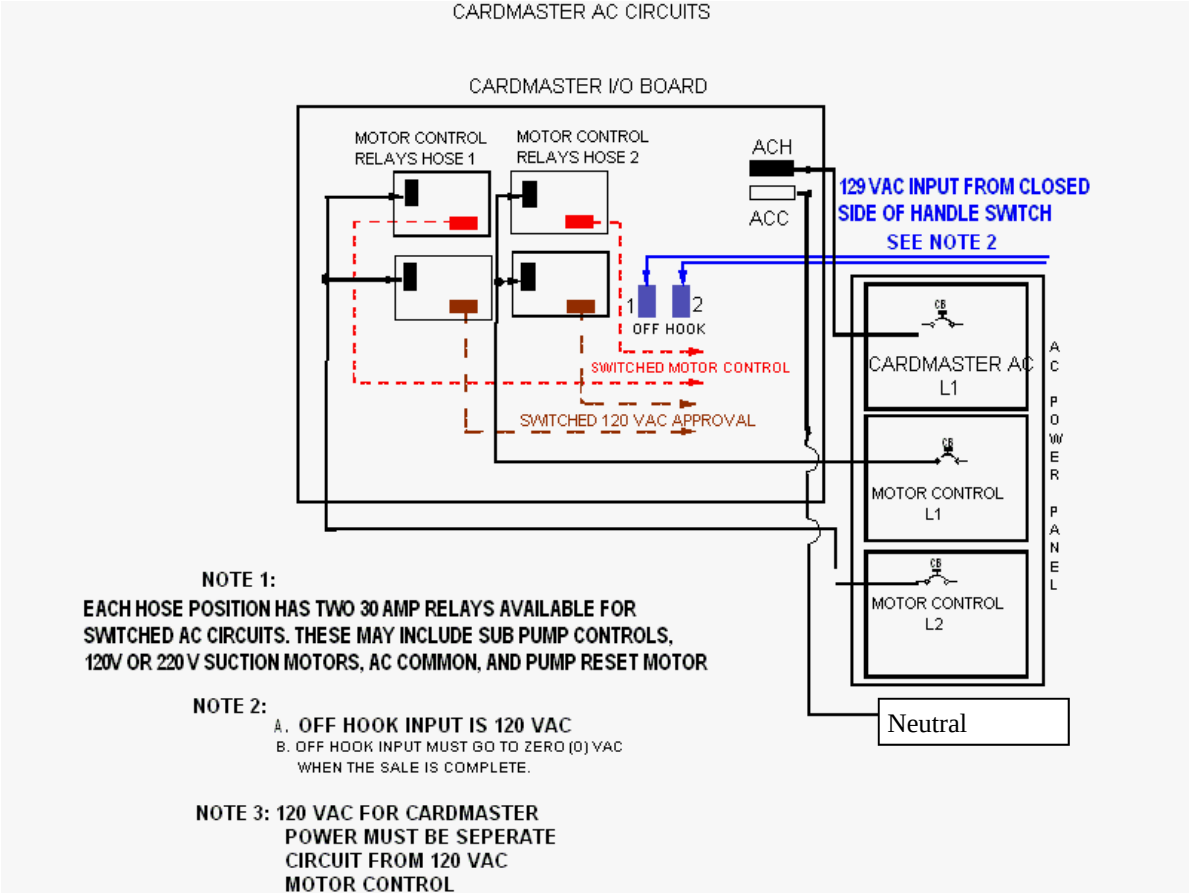
POLE GROUND IS NOT ADEQUATE.

CARDMASTER 120 VAC POWER SOURCE

1. **The 120 vac power circuit used to power the CardMaster must be a dedicated isolated circuit.**

2. **Submerge Pump, Dispenser, Suction Pump and reset motor switched AC circuits must be separate from the 120 VAC CardMaster power circuit.**

3. **All AC circuits that interface with the CardMaster, (CardMaster AC Power, Switched Motor control, Relay Control, Switched Off Hook) must be same phase.**



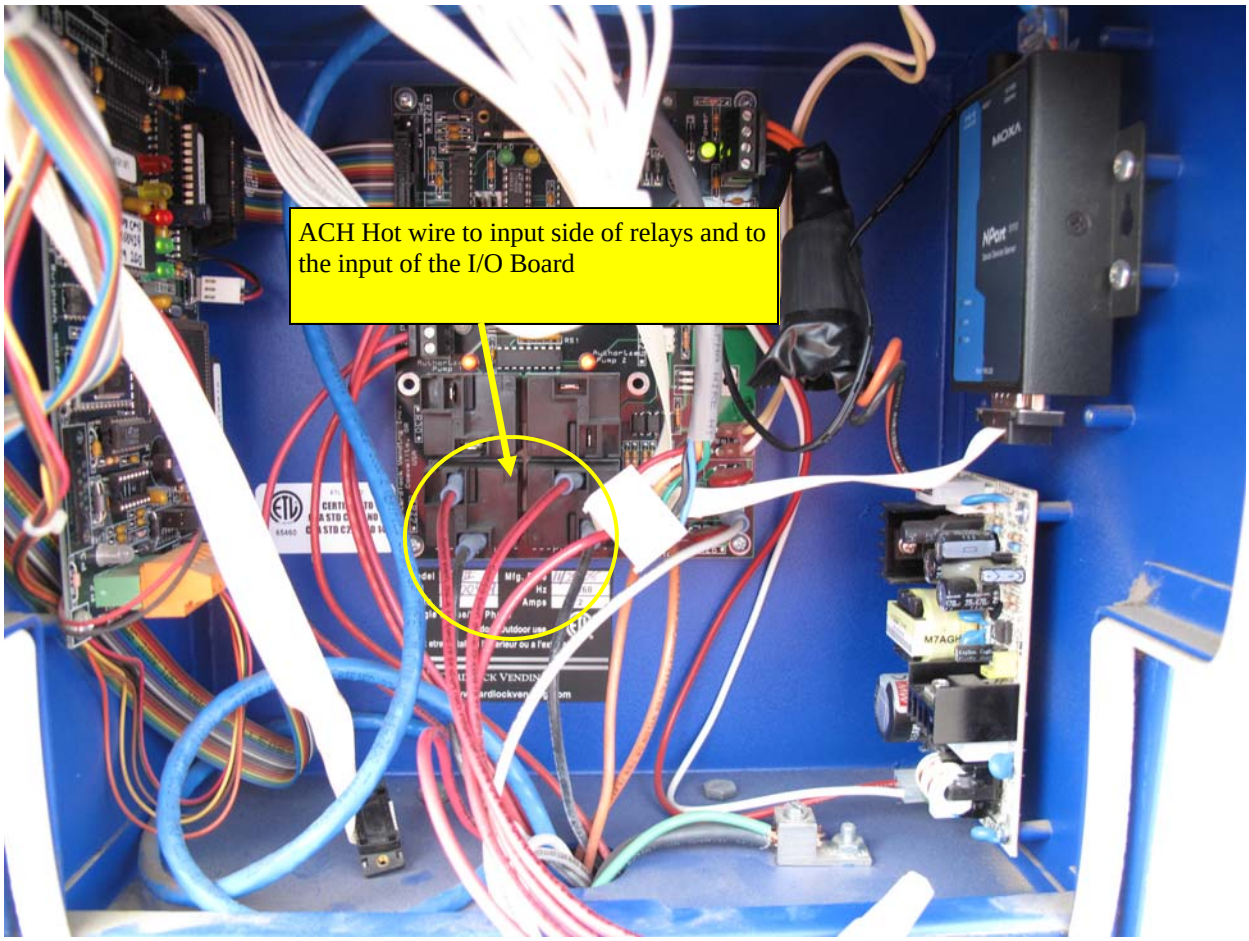
4. **GROUND MUST BE EARTH GROUND.**

WHAT NOT TO DO
AC POWER

The above picture shows the incorrect way of wiring a CardMaster AC power source. The AC Hot and the AC Neutral are run from the breaker panel along with the ground wire. The wire run to the panel is over 300'. Only one AC power source is run to the island in the card reader.

The AC Neutral is split, one to the I/O board of the CardMaster and two feeds to two suction pumps and tied together by the wire nut.

The AC Hot is split to the I/O of the CardMaster, and the two relays on the I/O board and tied together with a wire nut.

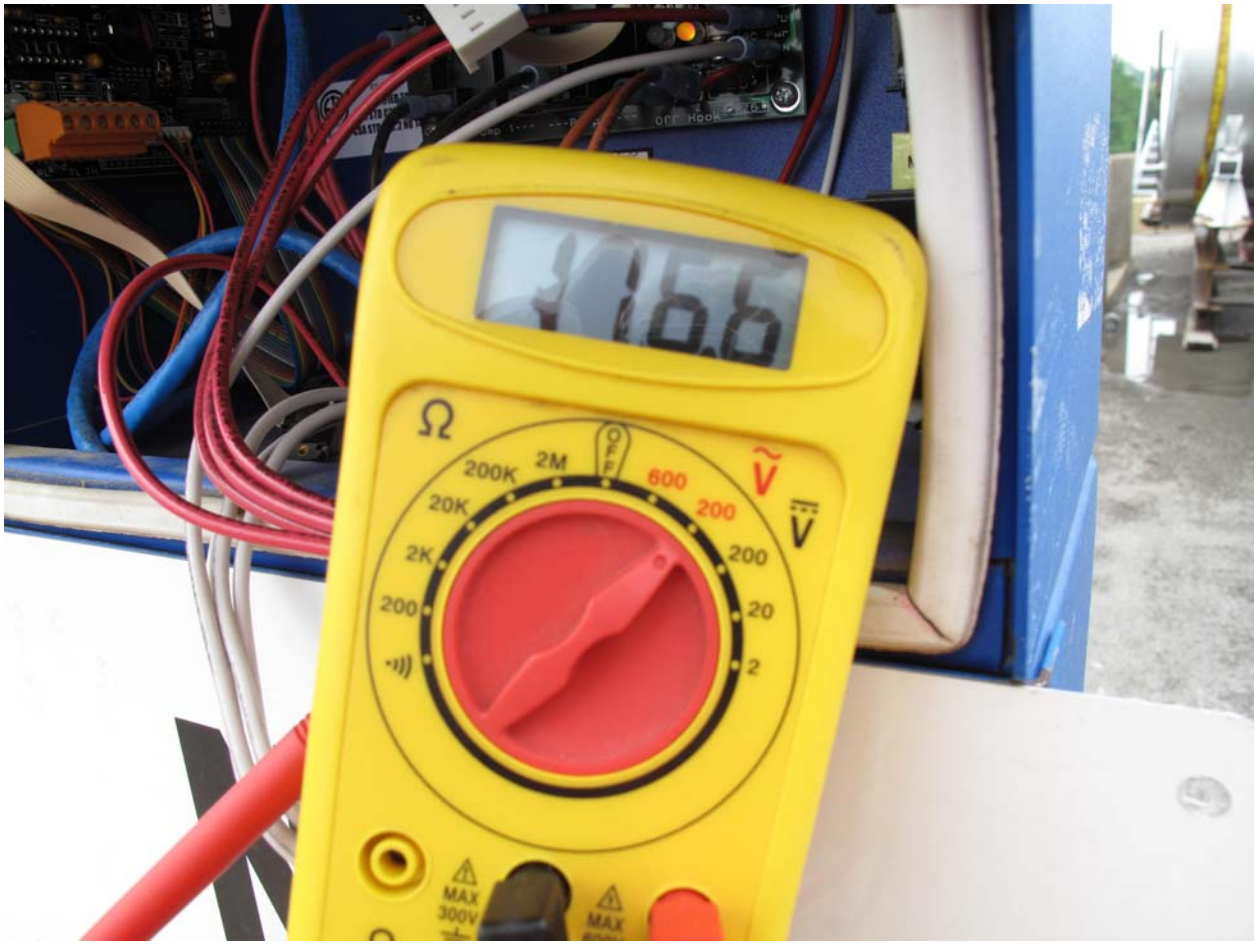


The above picture is a continuation of the previous page

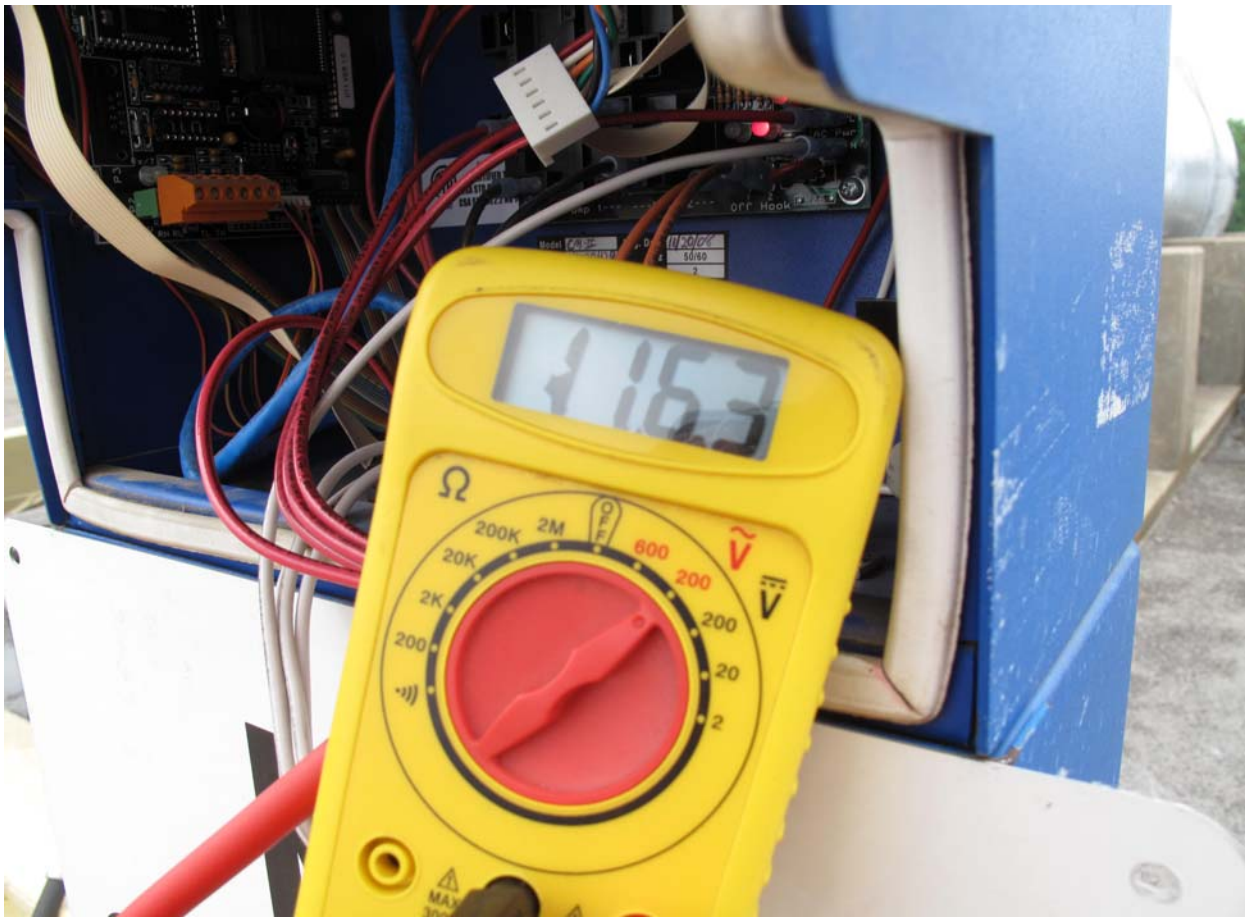
WHAT HAPPENS WHEN AC POWER
IS WIRED INCORRECTLY!

THE REPORTED PROBLEM? MEMORY FAILS WHEN STORMS HAPPEN OR POWER FAILS

Above is the AC input voltage with only the CardMaster Powered



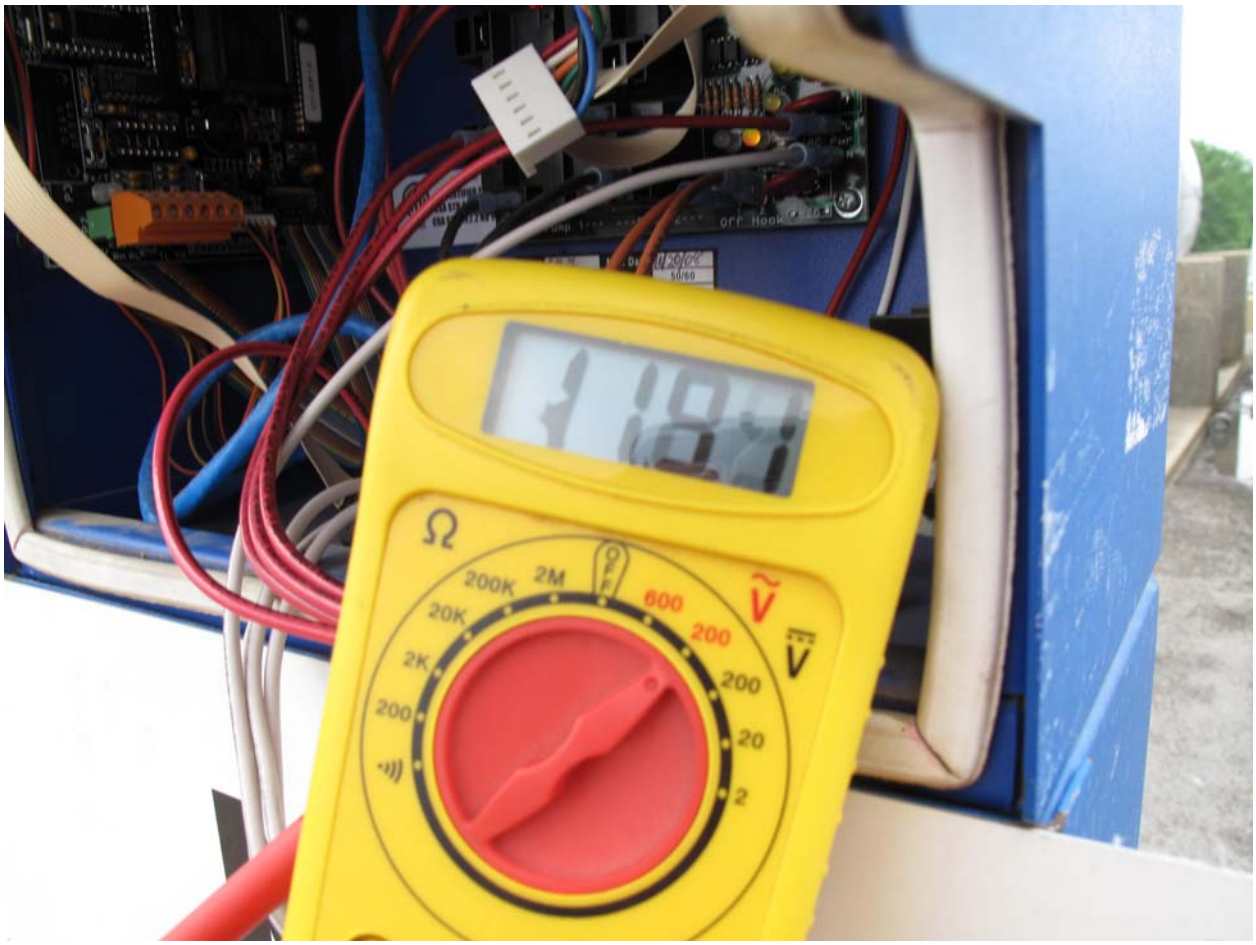
Voltage while Suction Pump # 1 is on. Notice the 2.4vac drop at Running. This does not reflect the drop in voltage at pump start. It was much greater.



Voltage while Suction Pump # 2 is on. Notice the 2.7vac drop at Running. This does not reflect the drop in voltage at pump start. It was much greater. Observed voltage drop was to 104.3vac.

CardMaster operating AC voltage is 108vac - 132vac.

Below 108vac CardMaster senses a power loss and shuts down. Depending on what is happening at the time memory could be affected.



AC Input voltage returned to 118.1vac after pumps turned off. This is a 0.8vac difference from the beginning of testing. Measurement of ground resistance determined the ground was not correct as well.
Resistance reading between Ground and AC Neutral should be less than 1 Ohm. At this site the reading was 5 Ohms or more.

SOLUTION TO PROBLEM

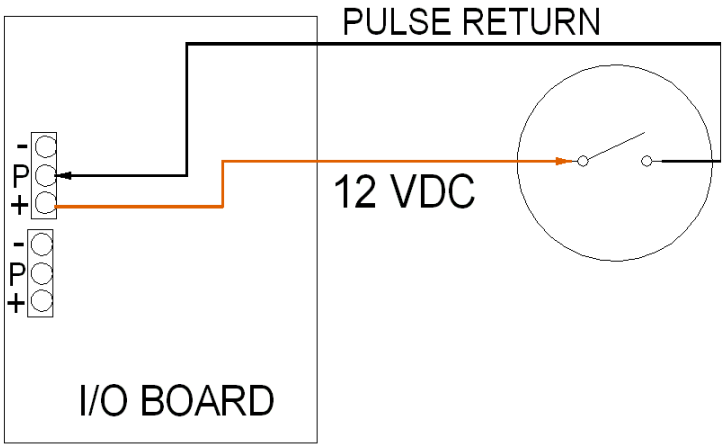
BRING A DEDICATED CIRCUIT FOR AC POWER TO THE CARDMASTER TO POWER CARDMASTER ONLY.

INSTALL GROUND ROD AT CARDMASTER AND TIE CARD READER AND DISPENSER GROUNDS TO IT.

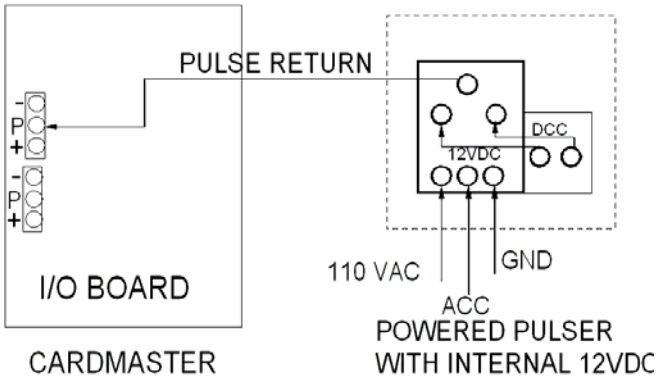
PULSER CIRCUIT

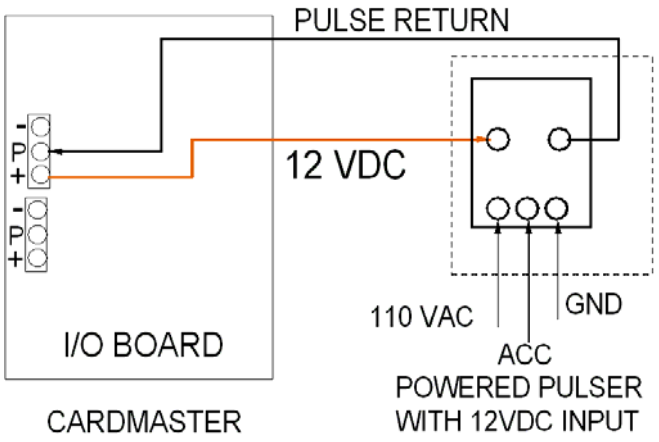
There are several types of pulsers used with dispensing equipment. The basic difference is mechanical pulsers versus electronic power pulsers. Electronic pulsers are further divided into two categories: 12vdc provided from outside source and 12vdc generated by the pulser. In pulsers where the 12vdc is provided by an outside source categories are further divided as to the need for a dc common point or not. The CardMaster unit can manage any of the above situations.

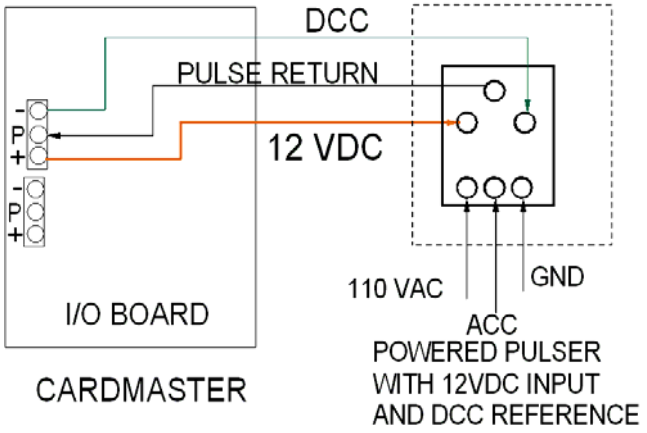
THE DRAWINGS PROVIDED ARE GUIDELINES. VERIFY PULSER WIRING REQUIREMENTS WITH THE MANUFACTURER OF THE PULSER.



MECHANICAL PULSER


PULSE RETURN
P
-
+
P
-
+
I/O BOARD
CARDMASTER
DCC
12VDC
110 VAC
GND
ACC
POWERED PULSER
WITH INTERNAL 12VDC

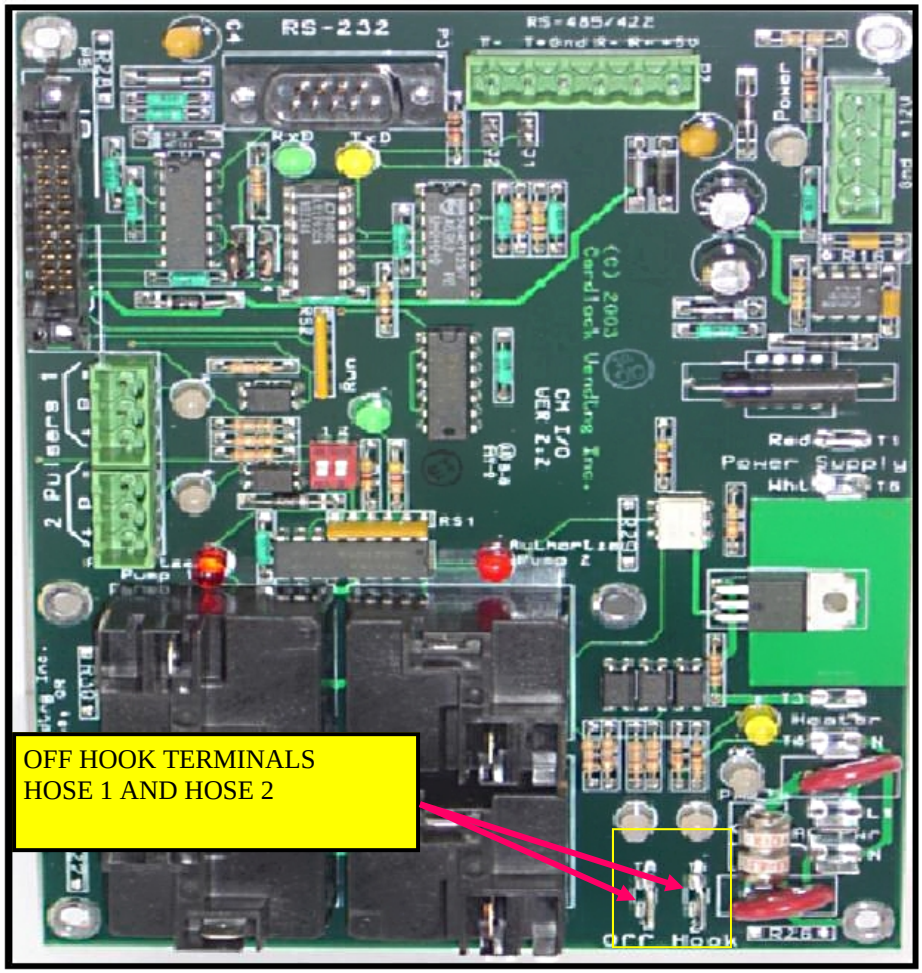

PULSE RETURN
12 VDC
P
-
+
P
-
+
I/O BOARD
CARDMASTER
110 VAC
GND
ACC
POWERED PULSER
WITH 12VDC INPUT


DCC
PULSE RETURN
12 VDC
P
-
+
P
-
+
I/O BOARD
CARDMASTER
110 VAC
GND
ACC
POWERED PULSER
WITH 12VDC INPUT
AND DCC REFERENCE

OFF HOOK

Pump Handle (OFF HOOK) - This wire input tells the CardMaster the dispenser is on (120 vac) and it initiates the recording of the transaction. When this input is not active because of no input or wire is missing no transaction will occur (voltage is zero input). Likewise, when this wire goes to zero vac it tells the CardMaster the pump handle has been hung up and the sale is terminated. If bleed through voltage exists it will not terminate the sale until a time out, and will not start a new sale properly.

The Circuit is a 110vac input to the I/O board and must be applied after the reset is complete or the handle switch is turned on. The voltage must go to 0 vac when the handle is turned off.
0 VOLTS AC IS 0 VOLTS. LEAKAGE VOLTAGE OF 1 VAC OR HIGHER WILL NOT ALLOW THE CARDMASTER TO SENSE A 'SALE COMPLETE' SIGNAL. SEE TYPICAL WIRING DIAGRAMS FOR FURTHER INFORMATION.

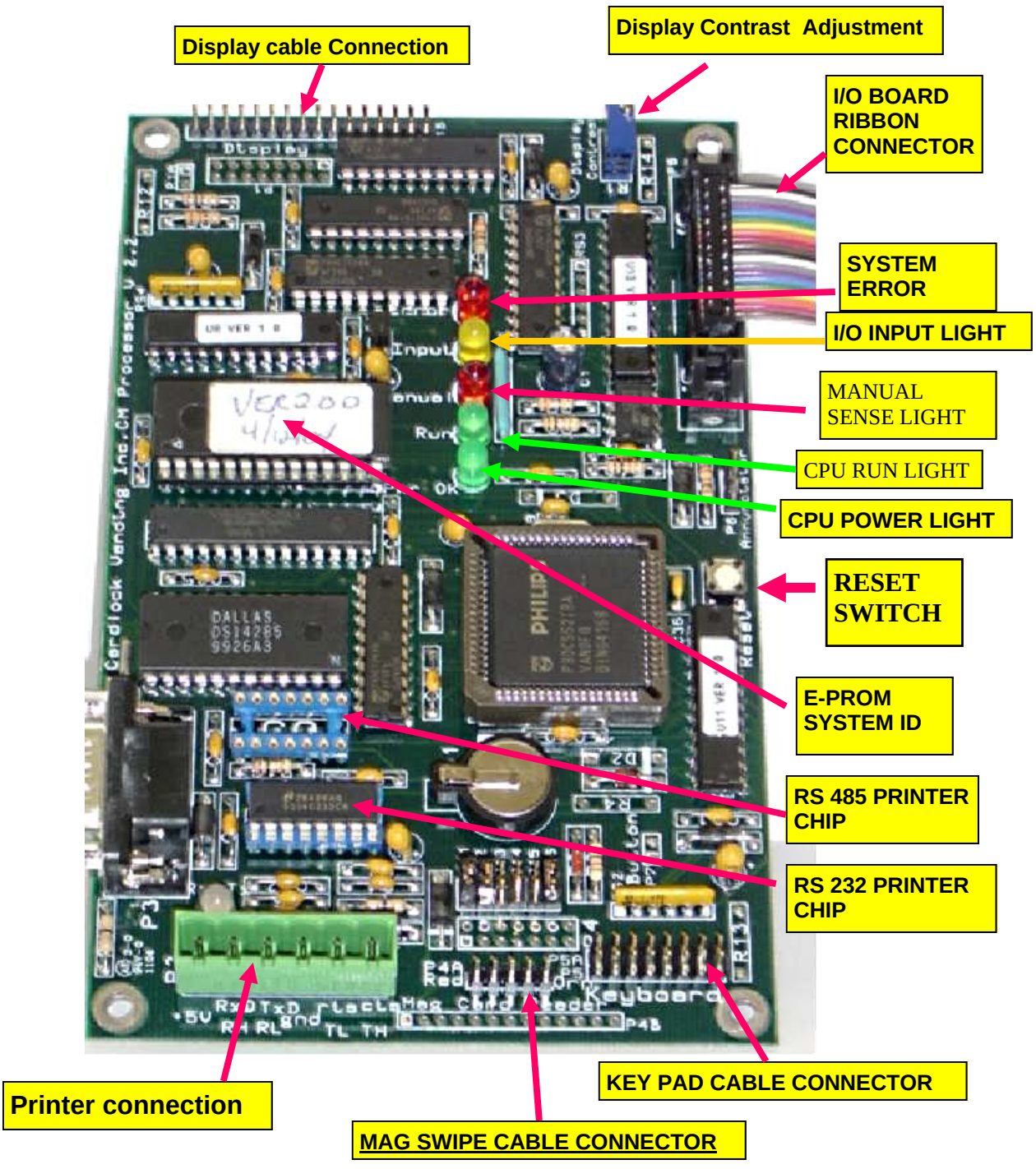


COMMUNICATION

WIRING

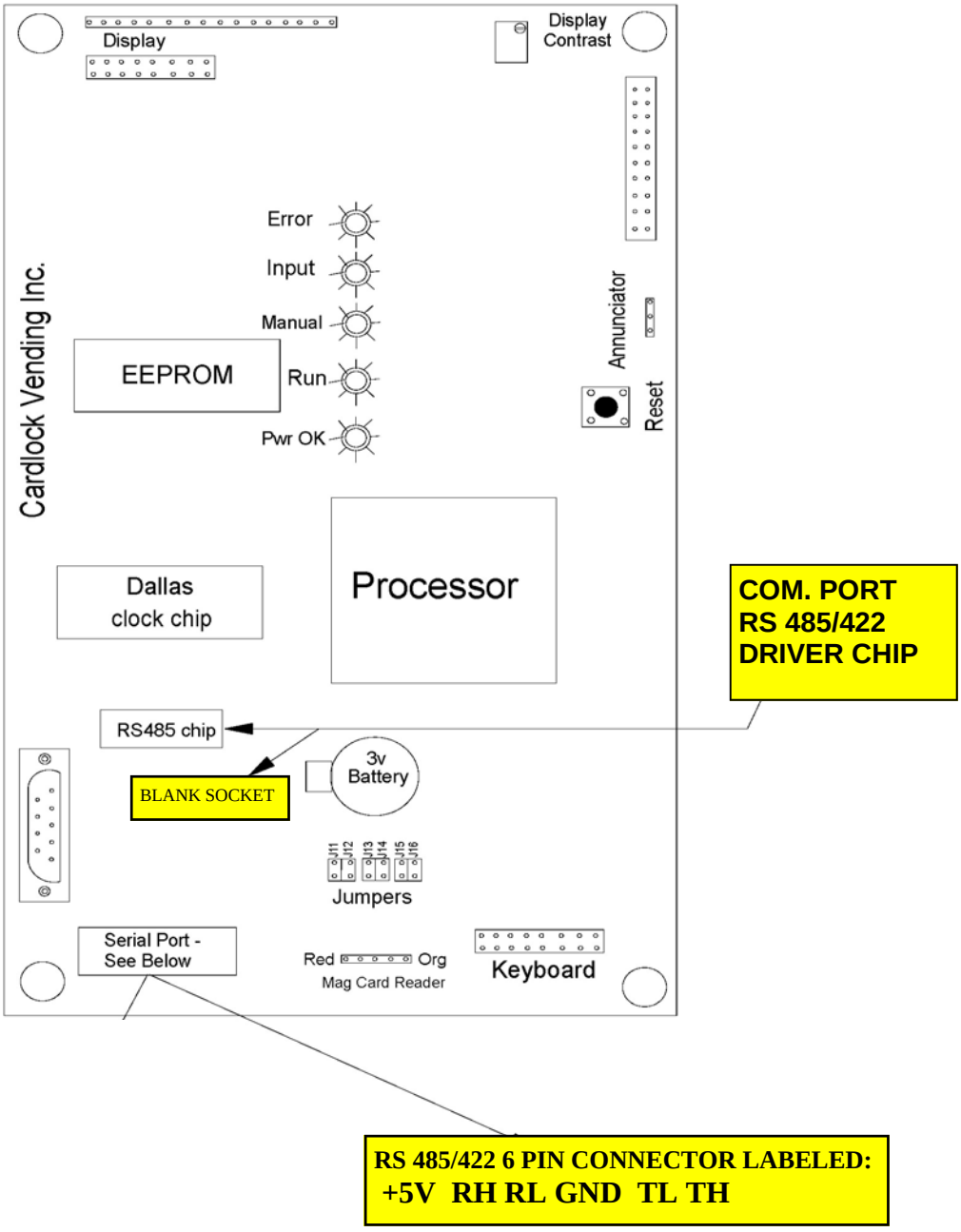
SECTION

CPU BOARD LAYOUT

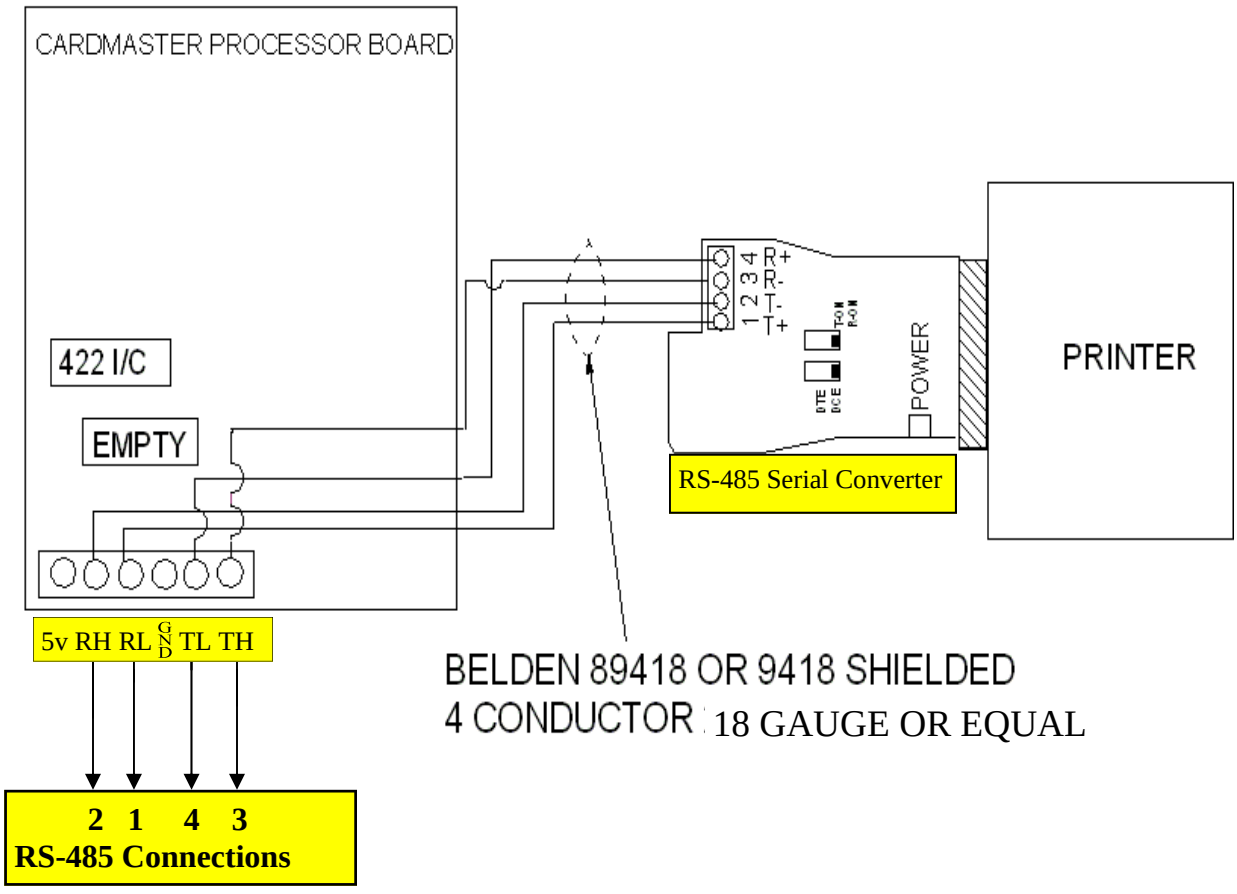


Processor Board (CPU) TYPICAL

PRINTER COMMUNICATIONS



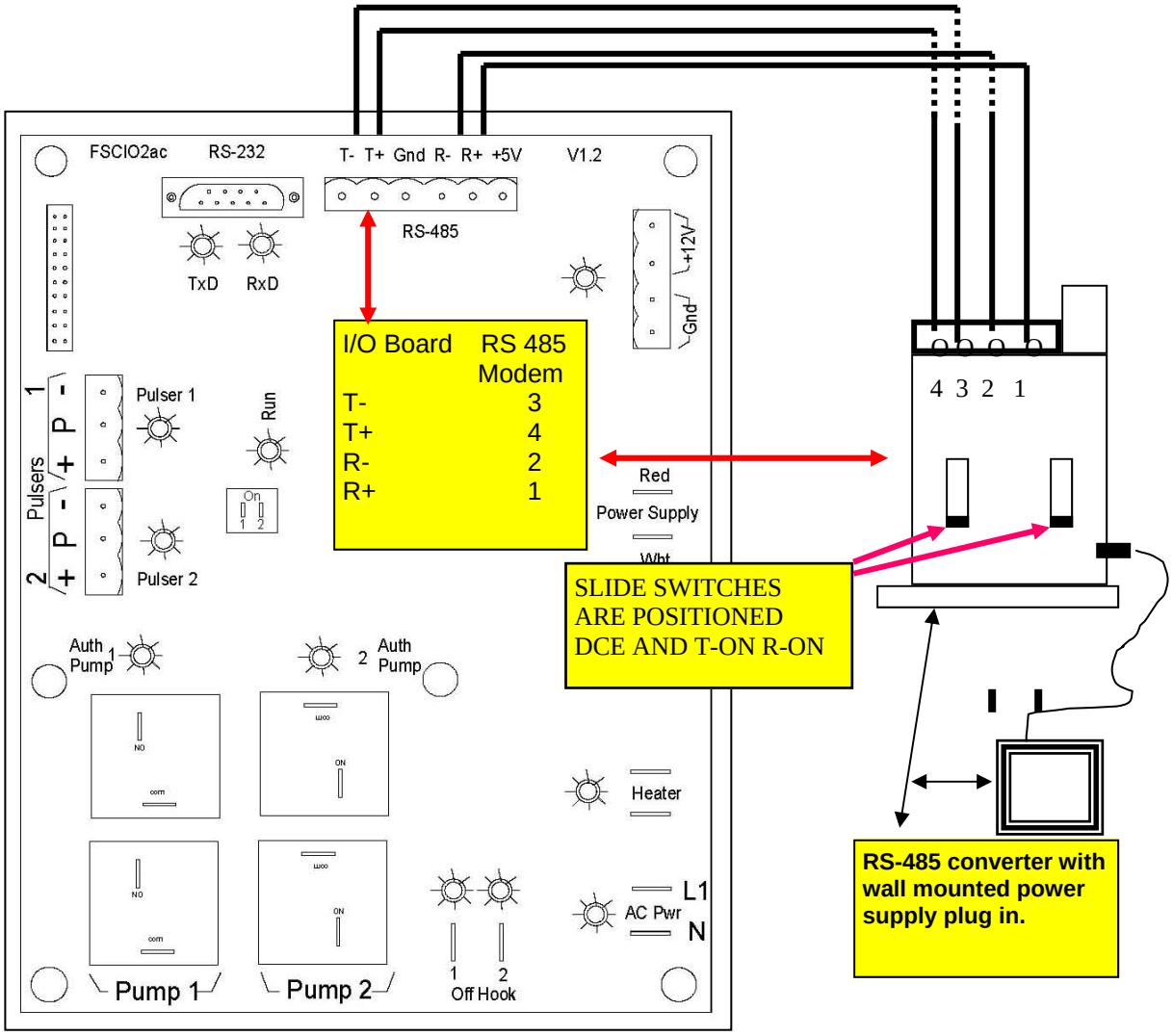
RS 422 TO PRINTER COMMUNICATION



THE CABLE SHIELD SHOULD BE GROUNDED AT ONE END. THE COMPUTER END IS OPTIMUM, BUT MAY NOT BE PRACTICAL. THEREFORE, GROUND THE SHIELD WIRE AT THE CARDMASTER GROUND LUG.

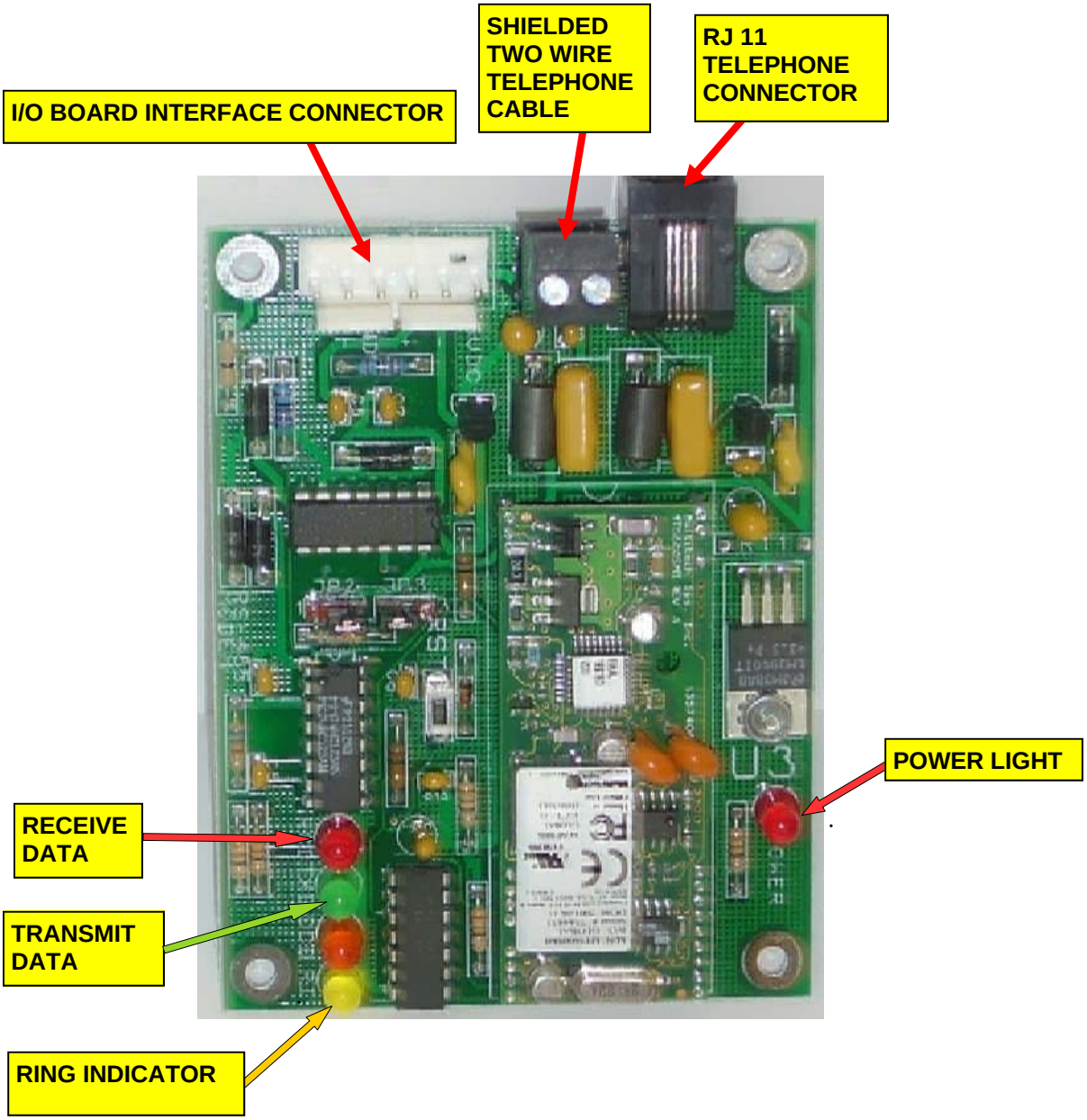
IF THE PRINTER PRINTS ????????? THEN THE TL AND TH LINES ARE MOST LIKELY CROSSED.

RS-485 data port wiring information for direct to PC for systems shipped after January 1, 2003



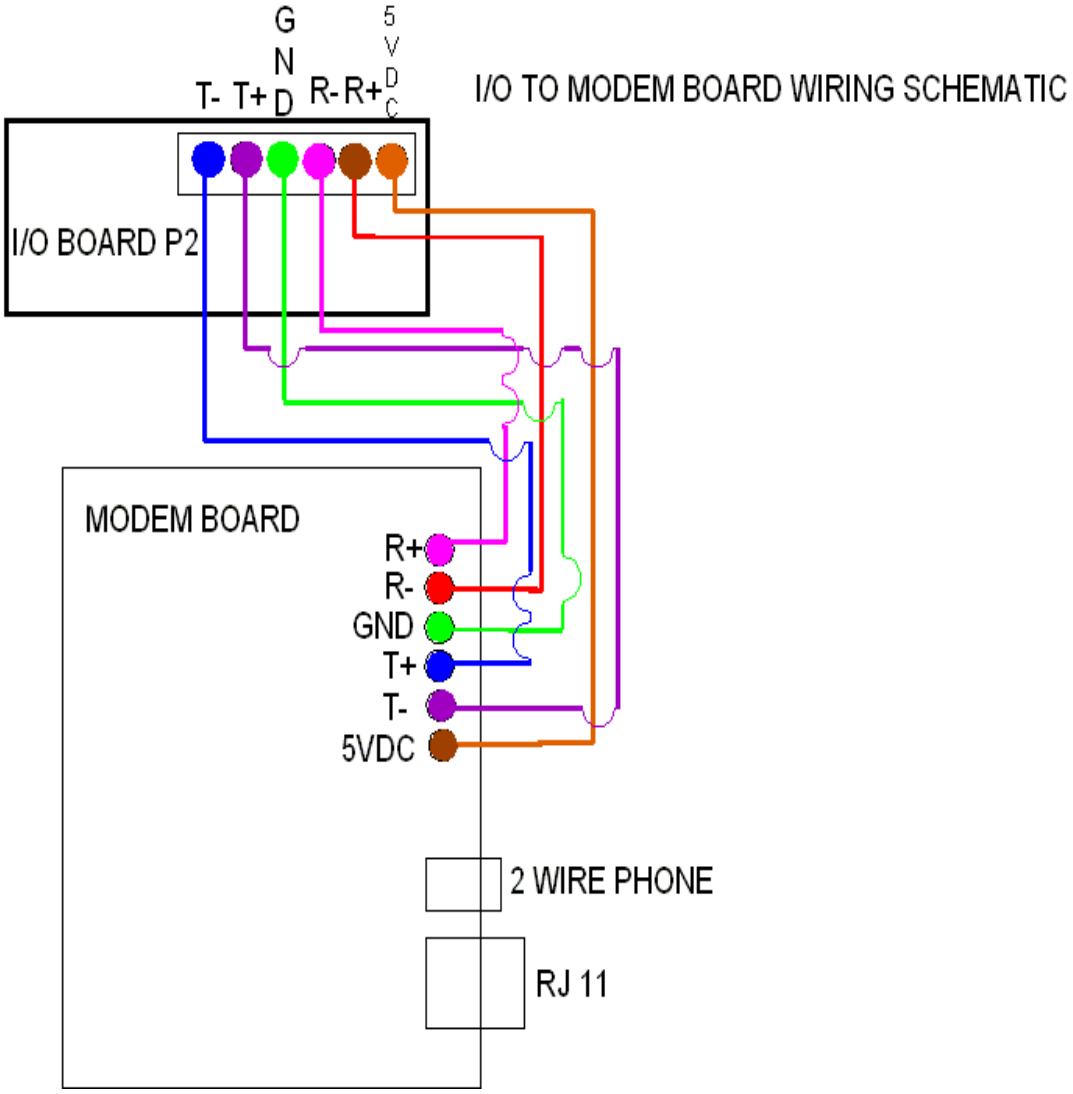
Serial cable specification is Belden 4 conductor #89418 or 9418. Do NOT use substitutes such as solid wire or telephone wire. It will void the warranty. For systems with Telco telephone modems please see next page.

MODEM BOARD LAYOUT



TELEPHONE 2 WIRE SHIELDED CABLE OR RJ 11 CABLE MAY BE USED IF IT IS IN A SEPARATE CONDUIT.
CAT 5 COMMUNICATION CABLE IS BEST.

RS-485 data port wiring information for Internal Phone Modem for systems shipped after March 1, 2004



FIELD WIRING NOTES: **Not all potential wires are shown due to congestion of space. Please read all comments and add applicable wires to your installation.**

Cardlock Vending includes two relays per hose/motor position. This allows you to wire for neutral switching where required by code, or desired by operator. The second relay also allows you to switch both legs of a 240 vac circuit if desired. We show only one pump handle off hook wire. One is required for each hose if there are two hoses.

RS-232 Serial Data Wires: Laptops or PDA's (Palm Pilots)
Printer Belden 8770 shielded 3 conductor 18 gauge cable or equal

RS-485 Serial Data Wires:
Printer Belden 89418 or 9418 shielded 4 conductor 18 gauge cable or equal

Note: RS-485 converters require a wall plug power supply at the indoor end.

NOTE: THE CABLE SHIELD SHOULD BE GROUNDED AT ONE END.
THE COMPUTER END IS OPTIMUM, BUT MAY NOT BE PRACTICAL. THEREFORE, GROUND THE SHIELD WIRE AT THE CARDMASTER GROUND LUG.

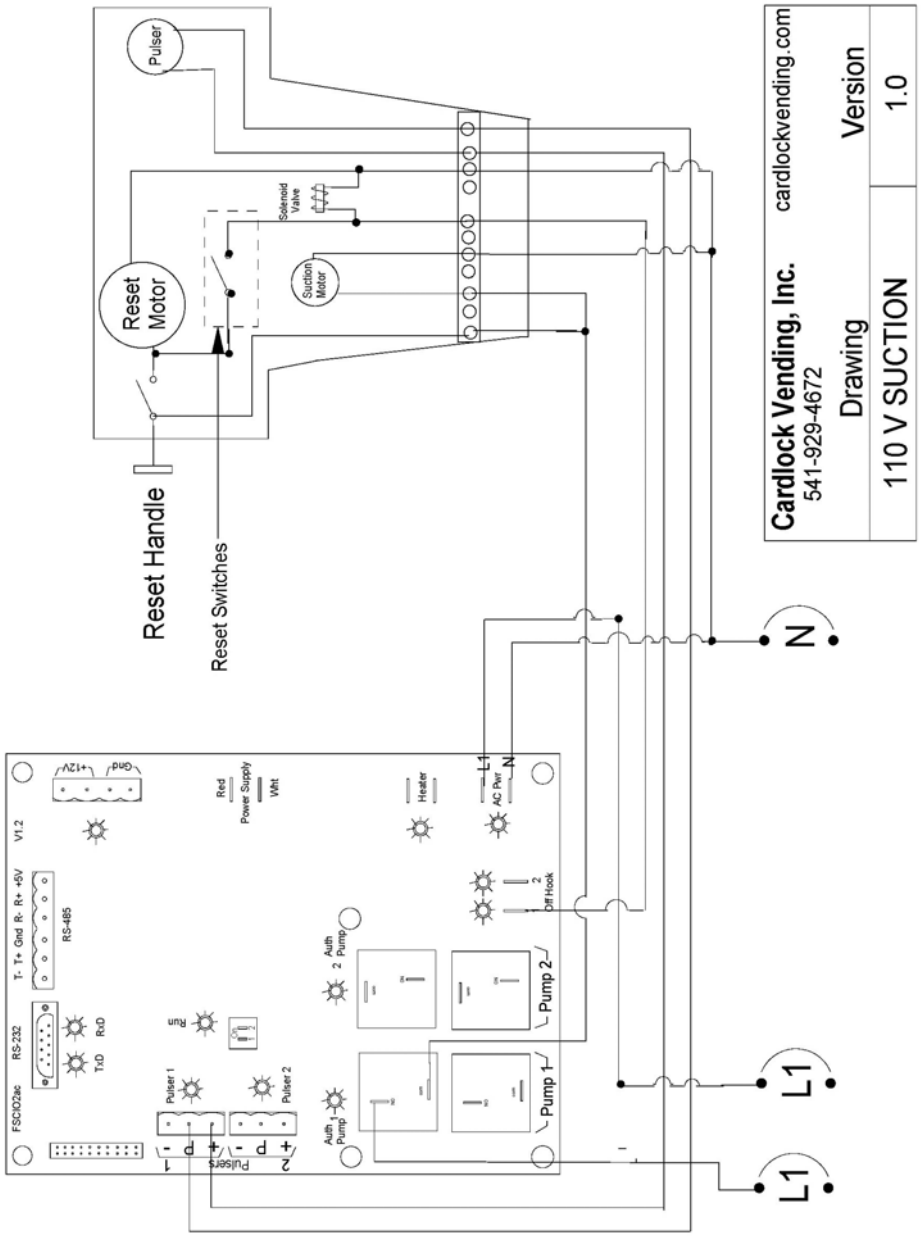
CARDMASTER TYPICAL INSTALLATION DRAWINGS

THESE DRAWINGS ARE OFFERED AS GUIDELINES ONLY

EACH INSTALLATION IS DIFFERENT

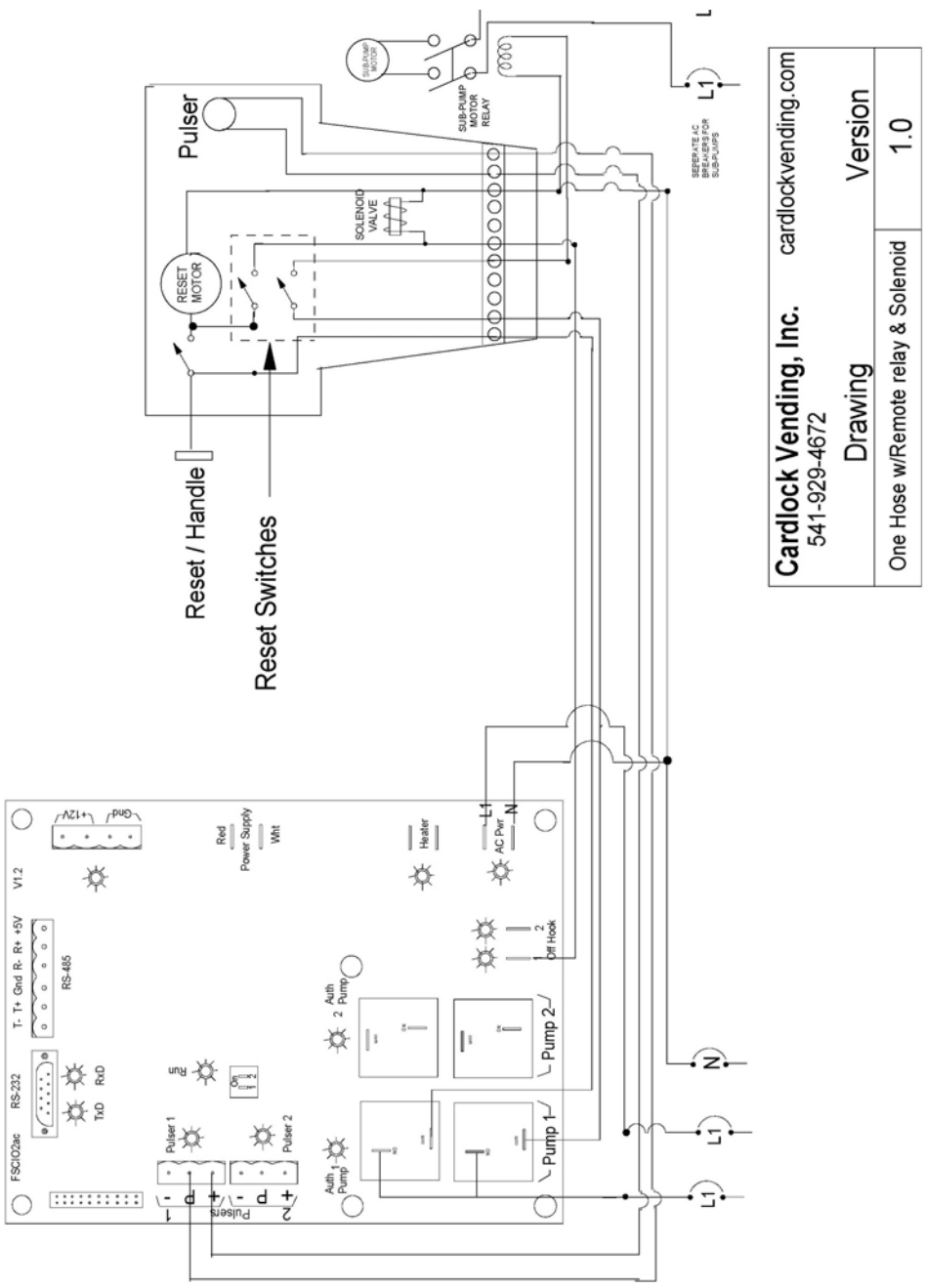
THE INSTALLER MUST ADHERE TO THE BASIC REQUIREMENTS OUTLINED EARLIER IN THIS MANUAL .

Single Hose Suction Pump 120 vac wiring



Pictured above is a wiring drawing for a single hose 120 vac suction pump. Please see separate pages in this manual for serial communications wiring. Serial communications can be either journal printers – or data serial communications. Cardlock Vending offers RS-485 serial communications. RS-485 serial is commonly run as far as 5000 feet. When installing serial communications it is critical that you use the specific Belden shielded cables recommended. Never use telephone wire. Never use solid wire. Never use unshielded wire.

Single Hose Dispenser with Relay Control Box

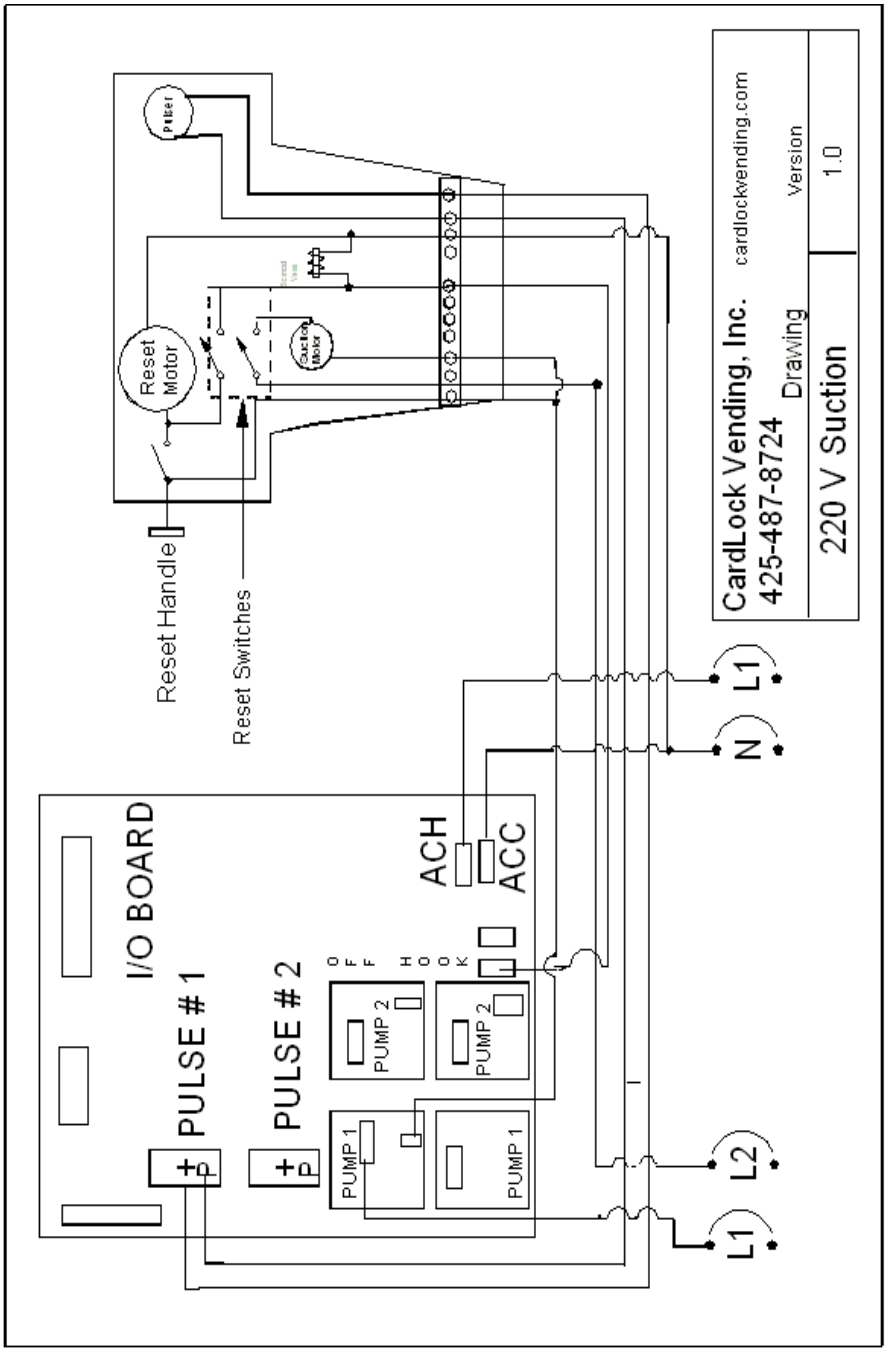


Cardlock Vending, Inc. cardlockvending.com
541-929-4672

Drawing	Version
One Hose w/Remote relay & Solenoid	1.0

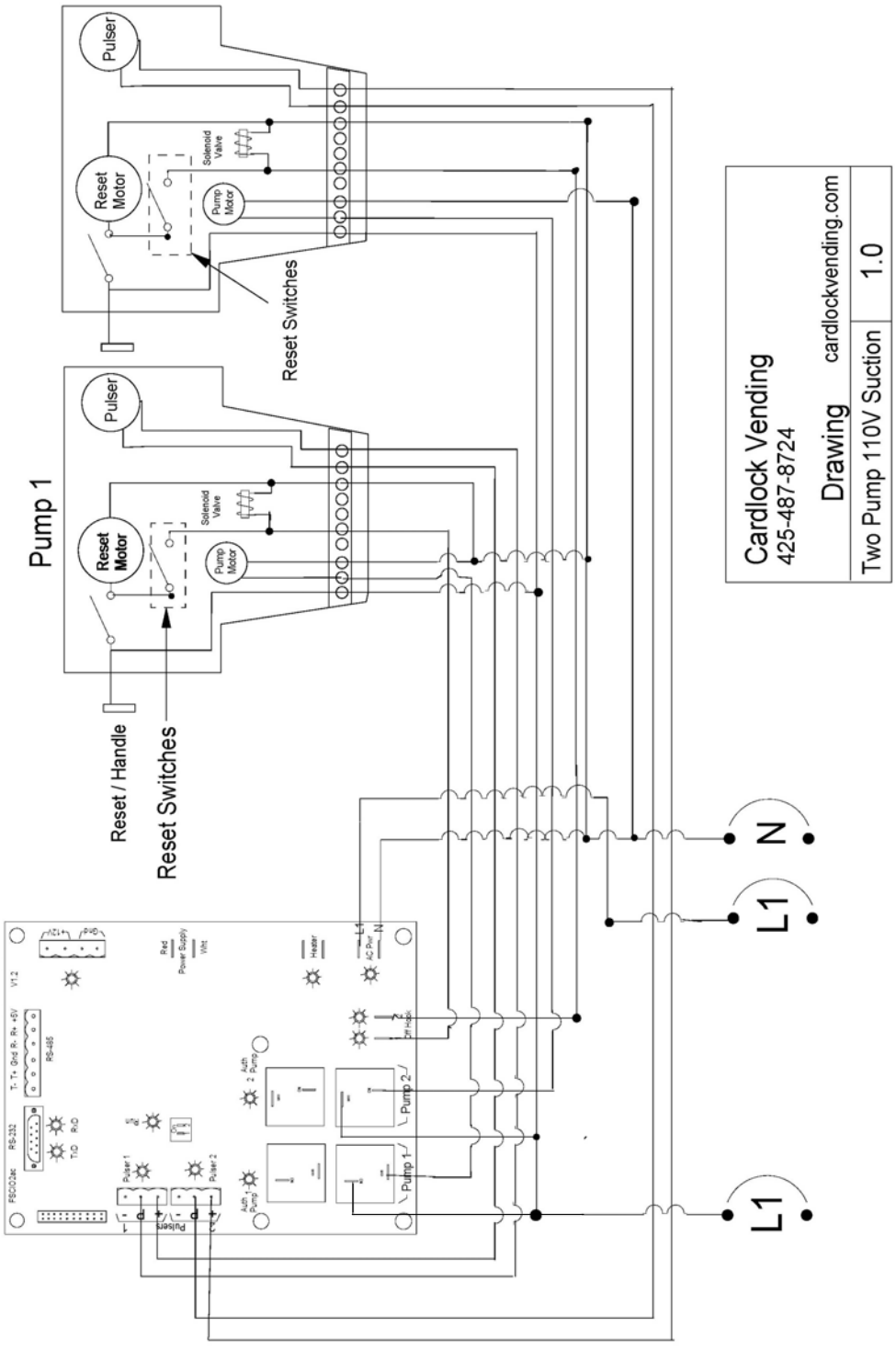
Pictured above is a wiring drawing for a single hose 120 w/remote relay & selenoid. Please see separate pages in this manual for serial communications wiring. Serial communications can be either journal printers – or data serial communications. Cardlock Vending offers RS-485 serial communications. RS-485 serial is commonly run as far as 5000 feet. When installing serial communications it is critical that you use the specific Belden shielded cables recommended. Never use telephone wire. Never use solid wire. Never use unshielded wire.

Single Hose Suction Pump Wiring 220 vac



Pictured above is a wiring drawing for a single hose 220 vac suction pump. Please see separate pages in this manual for serial communications wiring. Serial communications can be either journal printers – or data serial communications. Cardlock Vending offers RS-485 serial communications. RS-485 serial is commonly run as far as 5000 feet. When installing serial communications it is critical that you use the specific Belden shielded cables recommended. Never use telephone wire. Never use solid wire. Never use unshielded wire.

Dual Hose Suction Pump 120 vac

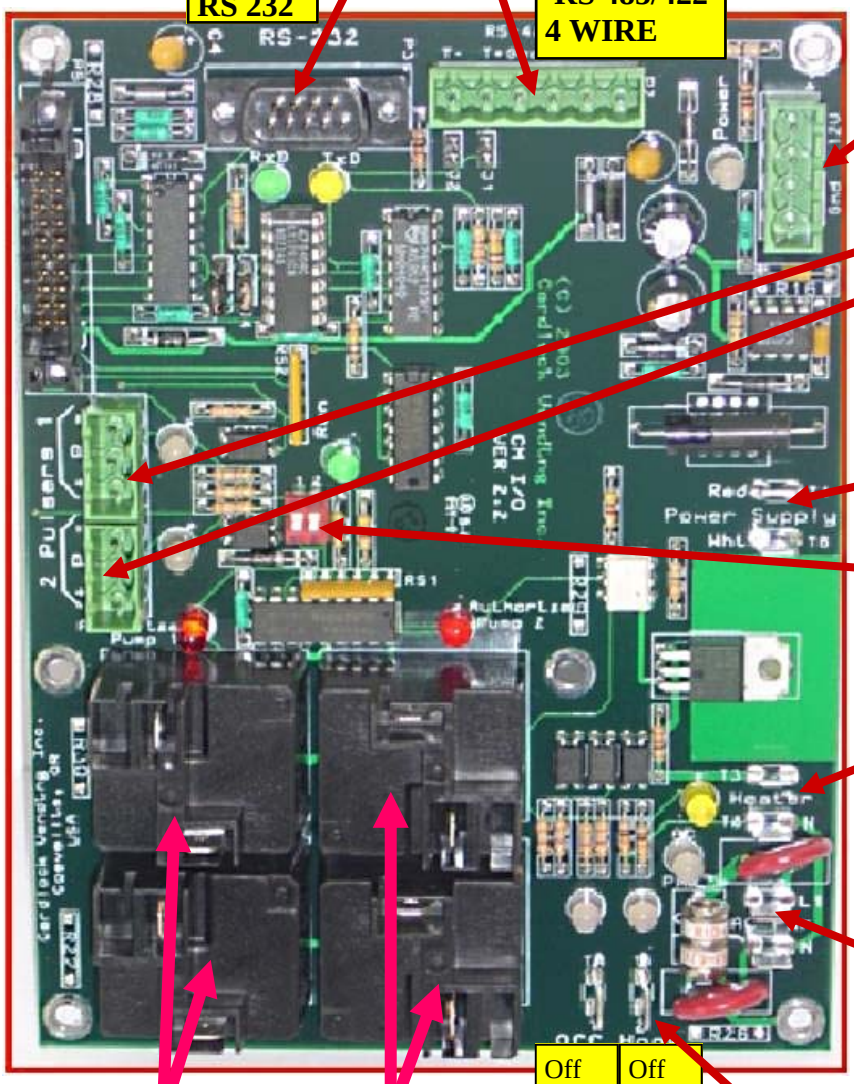


Pictured above is a wiring drawing for a dual hose 120 vac suction pump. Please see separate pages in this manual for serial communications wiring. Serial communications can be either journal printers – or data serial communications. Cardlock Vending offers RS-485 serial communications. RS-485 serial is commonly run as far as 5000 feet. When installing serial communications it is critical that you use the specific Belden shielded cables recommended. Never use telephone wire. Never use solid wire. Never use unshielded wire.

12-24 VDC

SYSTEMS

I/O Board Key Connections and features Locations



Serial Ports

RS 232

RS 485/422
4 WIRE

12 vdc input from Power supply

Pulser 1 & 2 Wire Inputs

120 ac input to Power supply

Manual By-Pass Switches

Heater Output Connection

120 vac Power Input Top Terminal ACH and bottom Terminal Neutral

Off Hook

Off Hook

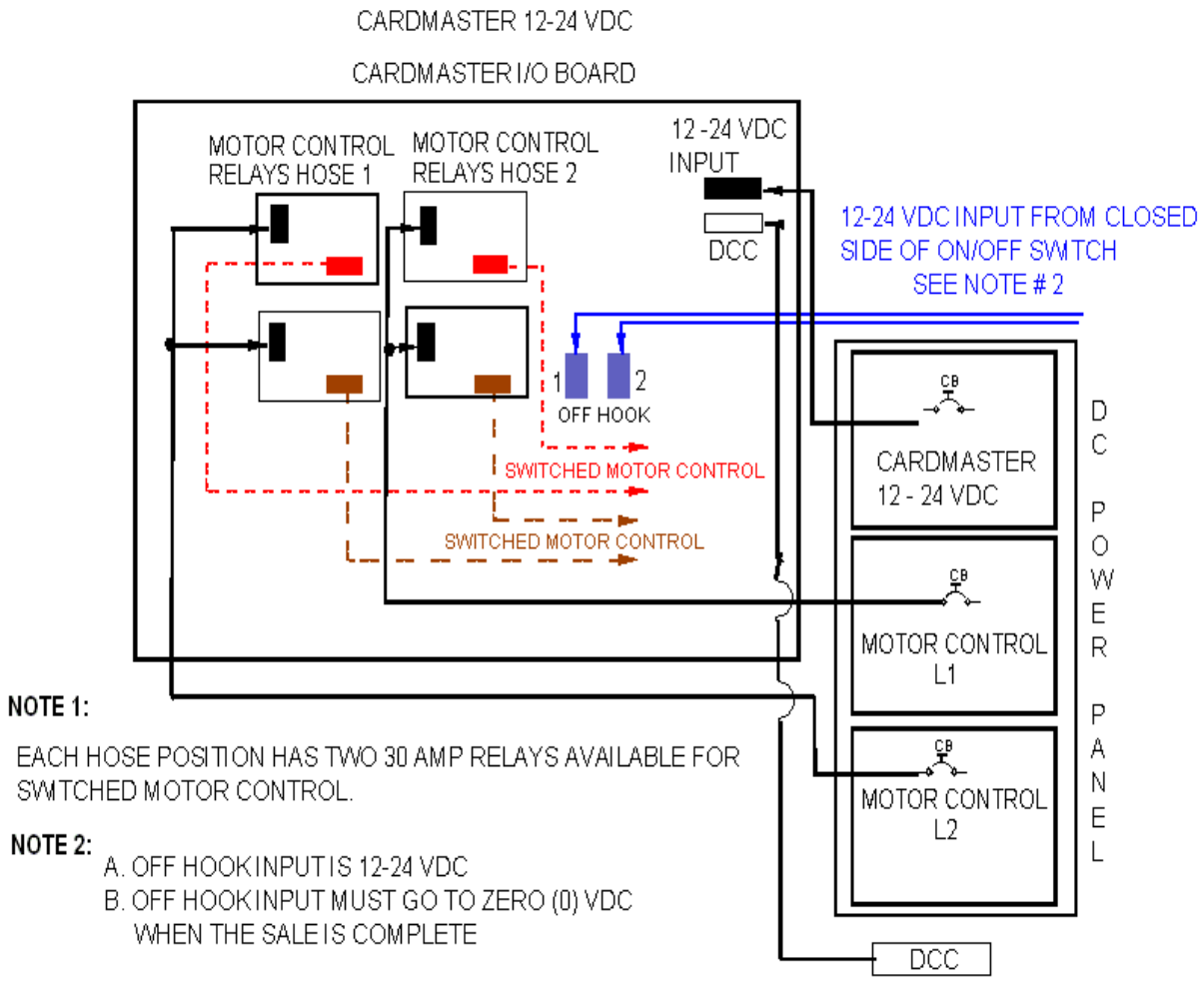
Hose # 1 Hose # 2
Relays for Pump Control, two (2) 30 amp relays per hose position, enabling 240 vac, or 120 vac with switching neutrals

"Off Hook" Handle from Pump Handle input

CARDMASTER 12-24 VDC POWER

The 12-24 VDC power circuit to power the CardMaster must be fuse or circuit breaker protected.

OFF HOOK MUST BE USED AND WIRED ON THE CLOSED SIDE OF THE ON/OFF SWITCH. OFF HOOK MUST GO TO (0) ZERO VOLTS WHEN THE SWITCH IS OPENED—*test and verify, or your sales will not count properly..*



NOTE 1:

EACH HOSE POSITION HAS TWO 30 AMP RELAYS AVAILABLE FOR SWITCHED MOTOR CONTROL.

NOTE 2:

A. OFF HOOK INPUT IS 12-24 VDC
B. OFF HOOK INPUT MUST GO TO ZERO (0) VDC WHEN THE SALE IS COMPLETE

GateControl WIRING Instructions

Follow all applicable local and national safety codes

Install CardMaster on a dedicated 10 amp circuit.

"AC" WIRING – 120/240 vac:
"AC" wire inputs use "spade" connectors.

Install according to all applicable codes with a steel conduit for the AC voltage, the DC pulser voltages and the Belden shielded RS-232 & RS-485 communications wires. Install the following wires, select depending on 120 vac or 240 vac, single or two gate operation.

L1	120 vac	Black Wire	12 Gauge	System Power
N	Neutral	White Wire	12 Gauge*	System Power
L2	120 vac	Red Wire	12 Gauge*	System Power

(* select depending on 120 vac operation or 240 vac operation)

Gr	Ground	Green	12 Gauge	Safety Ground

Earth Grounded with less than 1 ohm of resistance.

GCS	120 vac	Blue Wire	12 Gauge**	Gate Closure Signal

** Gate Closure can be electrical signal, or a programmed time out.

R1	120 vac	Black	12 Gauge	Motor relay
R1	120 vac	Red	12 Gauge	Motor relay#
R1	Neutral	White	12 Gauge	Motor Relay#

 # select depending on 120 or 240 vac operation, and number of motors)

GROUNDING: INSTALL THE 12 GAUGE GREEN GROUND WIRE TO THE GROUND LUG IN THE CARDMASTER, AND THE OTHER END TO AN EARTH GROUND, AND TEST FOR LESS THAN 1 OHM OF RESISTANCE. THE CONDUITS DO NOT REPRESENT AN ADEQUATE SAFETY GROUND.

SERIAL DATA WIRES:

Printer Port – Belden or equal 4 conductor shielded cable
Data Serial Port – Belden or equal 4 conductor shielded cable

NOTE: THE CABLE SHIELD SHOULD BE GROUNDED AT ONE END. THE COMPUTER END IS OPTIMUM, BUT MAY NOT BE PRACTICAL. THEREFORE, GROUND THE SHIELD WIRE AT THE CARDMASTER GROUND LUG.

CARDMASTER CONFIGURATIONS

CardMaster RF is available for those sites that do not want to tear up concrete or asphalt to install communication wiring. RF CardMasters eliminate problems related to transient voltages such as lightning strikes and static discharges.

The CardMaster may be used to control many different devices that need to have a card system control their on/off functions, and the CardMaster will allow accountability for those functions.

Gate Control is the most common usage after fuel control for the CardMaster. Gate control wiring is similar to the fuel wiring. However, it is best to determine wiring requirements from the Gate Manufacturer.

Contact CardLock Vending for assistance.

CardMaster may be used to control devices such as a carwash. Separate typical wiring diagrams are available. However, please contact the Car Wash supplier for the proper wiring of a control device to their Car Wash System. Please contact CardLock Vending for further assistance with Car Wash Control.

Environments with much sand, dust, cement and other types of airborne contaminants can cause premature failure of magnetic cards and magnetic reader components. When considering installation in these types of environments please consider the Cardless option for the CardMaster.

Sales and technical help are available at our toll free number 1-888-487-5040

CARDLOCK VENDING

Thank you for using CardMaster from Cardlock Vending. Cardlock Vending also manufactures:

GateControl –	**for access to bathrooms, gates, RV dumps, garbage compactors, and other electro-mechanical devices.**
CRE-HL -	**Card Reader Enclosure, 1/2 height version, similar to partial phone booth type**

Please look at Cardlock Vending's web site for more product or sales information.

www.cardlockvending.com Cardlock Vending, Inc.