# Centroid Acorn CNC Relay Board Kit

Software version: CNC12 V.4.12+
Models: Acorn CNC

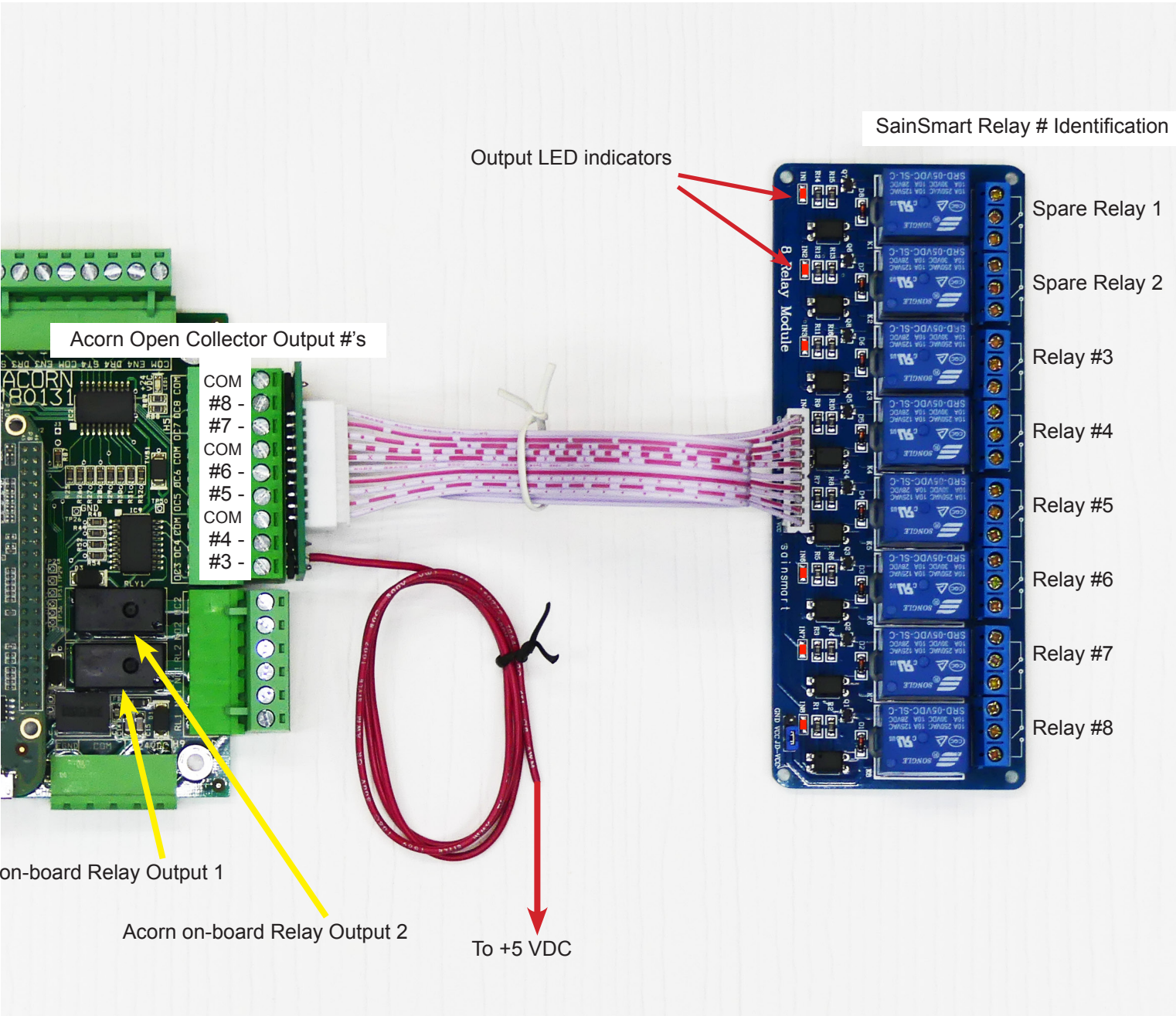**Plug and Play Relay Outputs with the Acorn CNC Relay Board kit.**

This kit will convert Acorn's six open collector outputs into Relay Outputs in under a minute. The kit uses an off the shelf SainSmart "8 Relay Module" combined with Centroid's Relay Module Adapter Card and a ribbon cable for easy installation. The adapter card simply inserts into the Acorn Output Connector header screw terminals. Powered by 5 Volts DC the Adapter card comes with a pre-installed 5 VDC pig tail which connects to the 5 VDC terminal on the Acorn Logic Power supply. This allows CNC controlled connections to various CNC devices such as VFD's, solenoids, lights, fans, pumps, motors, other larger relays and contactors in a compact format. The 8 relay module contains eight SPDT (Single Pole Double Throw) high current relays (10 AMPS at 250 VAC,and 10 amps at 30 VDC) which can directly control any device rated at or below the maximum rating of the relays. If higher current devices are required these relays can then in turn control larger relays or contactors to control the higher current device.
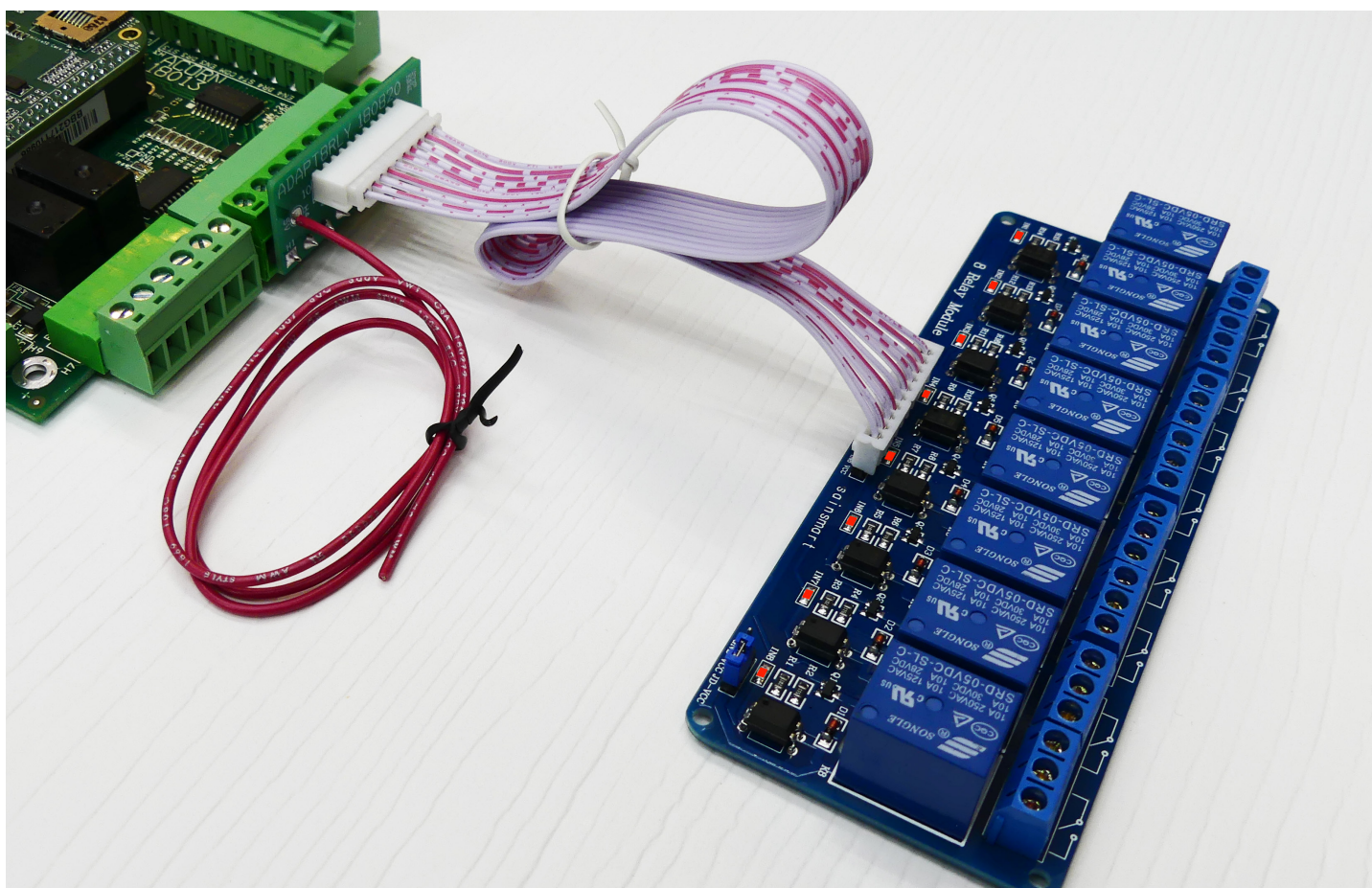
Acorn Relay Board Kit Includes:
- SainSmart "8 Relay Module"
- Ribbon Cable
- Acorn Relay Adapter Card with 5 vdc pig tail.

Acorn Outputs Numbers 3 through 8 are utilized to control the relays on the SainSmart 8 Relay Module

Output LED indicators

SainSmart Relay # Identification

Spare Relay 1

Spare Relay 2

Acorn Open Collector Output #'s

COM
#8 -
#7 -
COM
#6 -
#5 -
COM
#4 -
#3 -

Relay #3

Relay #4

Relay #5

Relay #6

Relay #7

Relay #8

Acorn on-board Relay Output 1

Acorn on-board Relay Output 2

To +5 VDC

Acorn Output Number	...controls SainSmart Relay Number
3	3
4	4
5	5
6	6
7	7 and 2 *
8	8 and 1 *

* Note: Acorn Output #7 activates both SainSmart Relay #7 and Spare Relay #2
Acorn Output #8 activates both SainSmart Relay #8 and Spare Relay #1

Installation of the Acorn Relay adapter card.

1.) Bench Test the Acorn CNC control board <u>without the Relay board connected</u> to verify CNC12 Communication to Acorn. See videos on the forum for Acorn Bench Test procedure. After successful Acorn Bench test, with the power off, insert the Centroid Adapter card into the Acorn connector and tighten down the terminal screws.
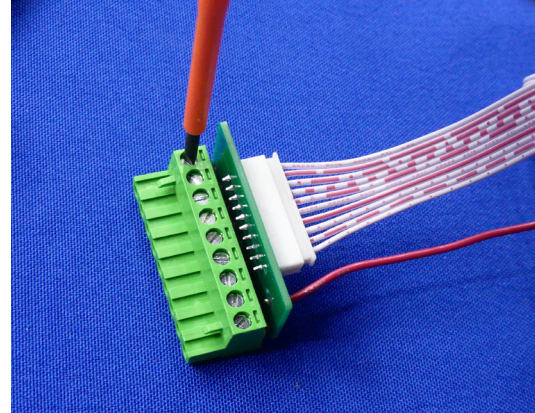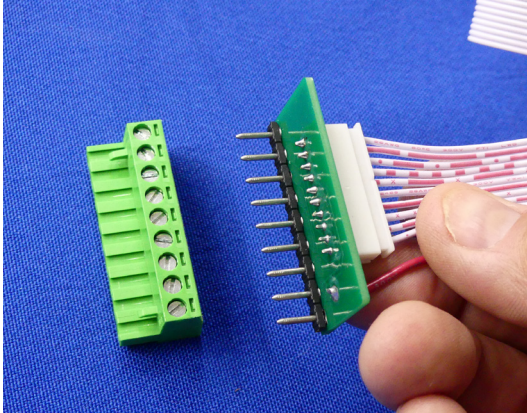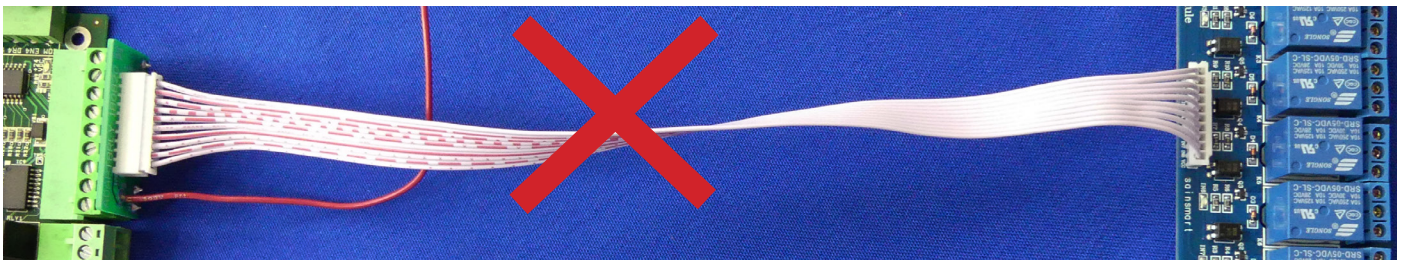
2.) Reinsert the Acorn Output connector onto the Acorn board.
Be sure to make sure the ribbon cable is connected "straight through" from the Centroid Relay Adapter card to the SainSmart relay module. Both connectors are labeled at the base of the connector for your reference.
Do not flip the ribbon cable.
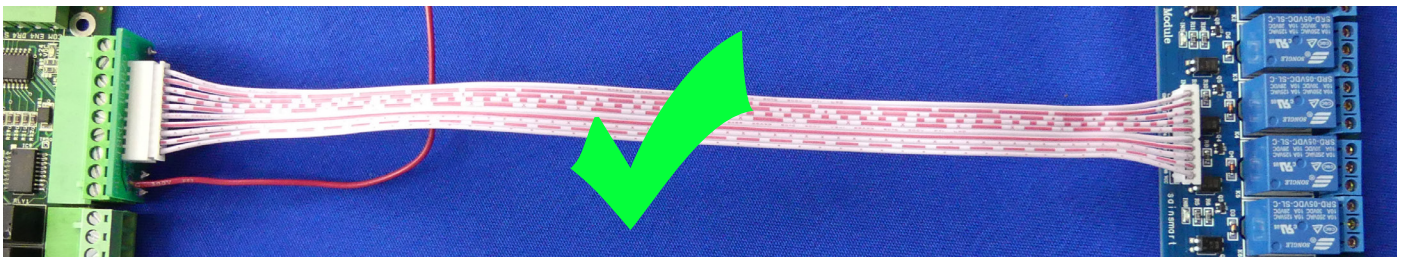
3.) With the power off, connect the red pig tail wire from the Centroid Relay Adapter card to the 5 VDC terminal on the Logic power supply.

+5 VDC
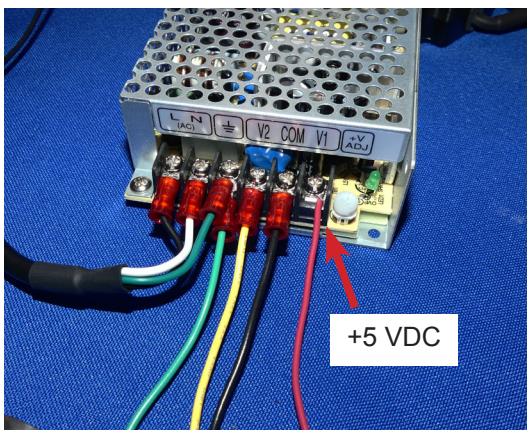
4.) **Bench Test the Relay Kit:** Power up Acorn wait for heart beat and then start CNC12. At the main screen press <Alt i> to enter the PLC diagnostic menu. Navigate the cursor box to the Output #3 indicator LED and toggle the output with the hot keys < CRTL ALT F> and observe the LED's on the SainSmart Relay Module, do the same for outputs 4,5,6,7 and 8. When you toggle you will see the LED on the SainSmart module light up and hear a distinct click" noise from the relay(s). Cycle through each one and verify that the Relays and Outputs are working.
< CTRL ALT F> is a 3 step cycle: force on, force off, and normal. Press < CTRL ALT F > again to cycle through.

● = Output OFF   ● = Output ON

< CTRL ALT F > to toggle the outputs
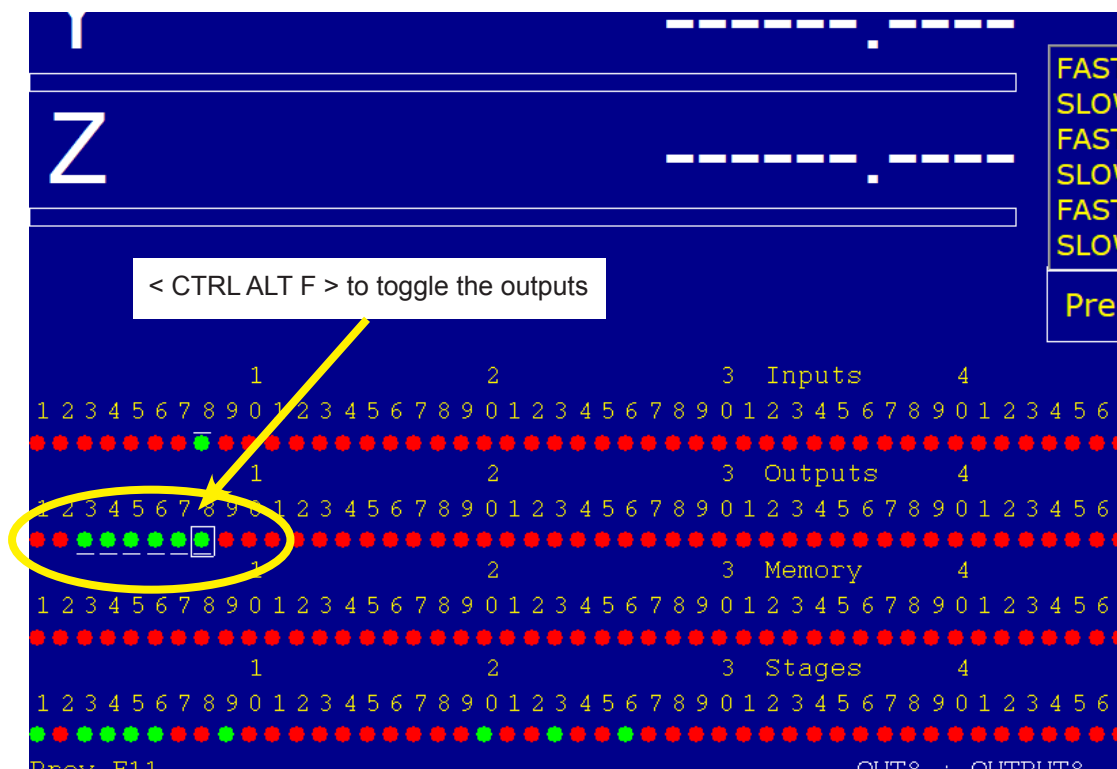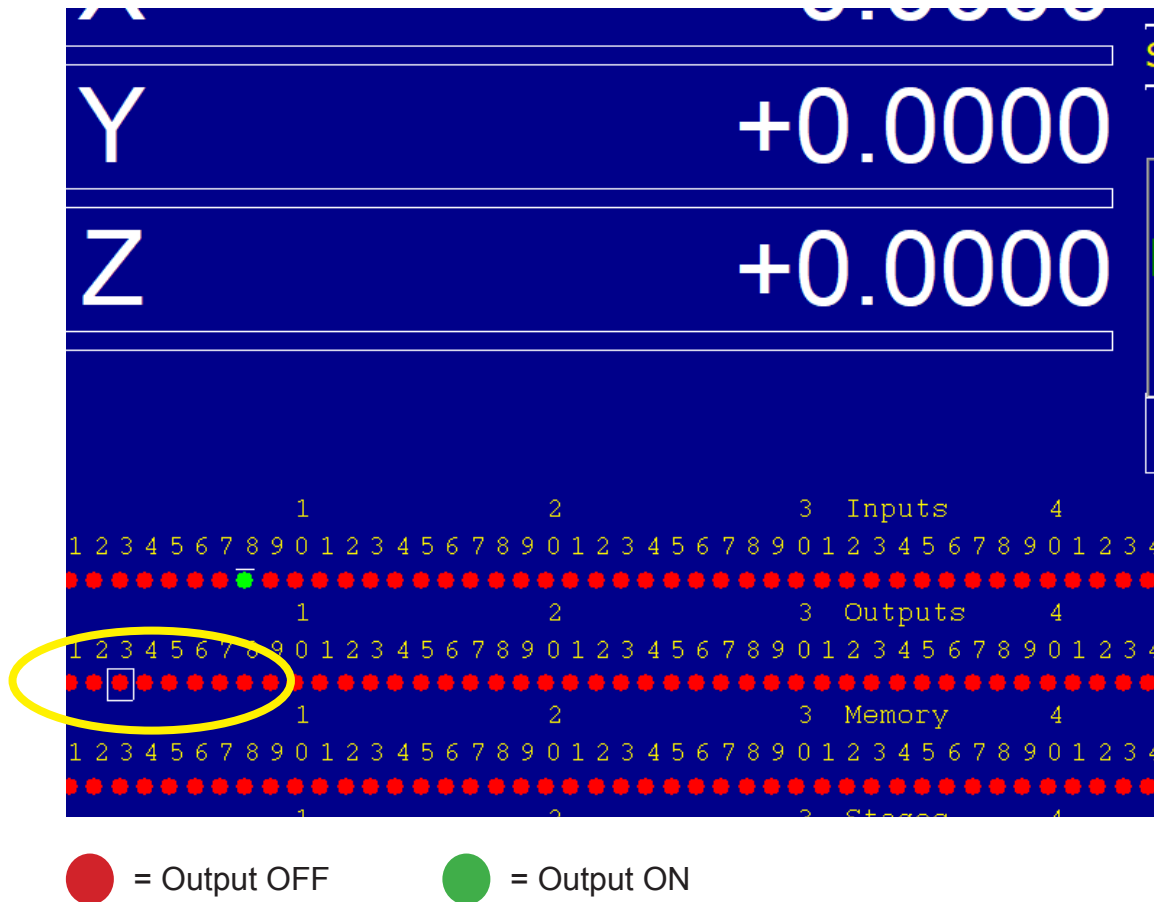
On the SainSmart Relay Module when the LED is ON (Red) the Acorn Output is ON and the Relay is energized. When the SainSmart Relay Module LED is off the Acorn Output is off and the relay is not energized.

Y

Z

Acorn Outputs #3 through #8 are ON

```
            1                   2
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
            1                   2
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
            1                   2
1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●
```

=

SainSmart Relay #'s 3 thru 8 are ON
(as well as Spare Relay #1 and #2)
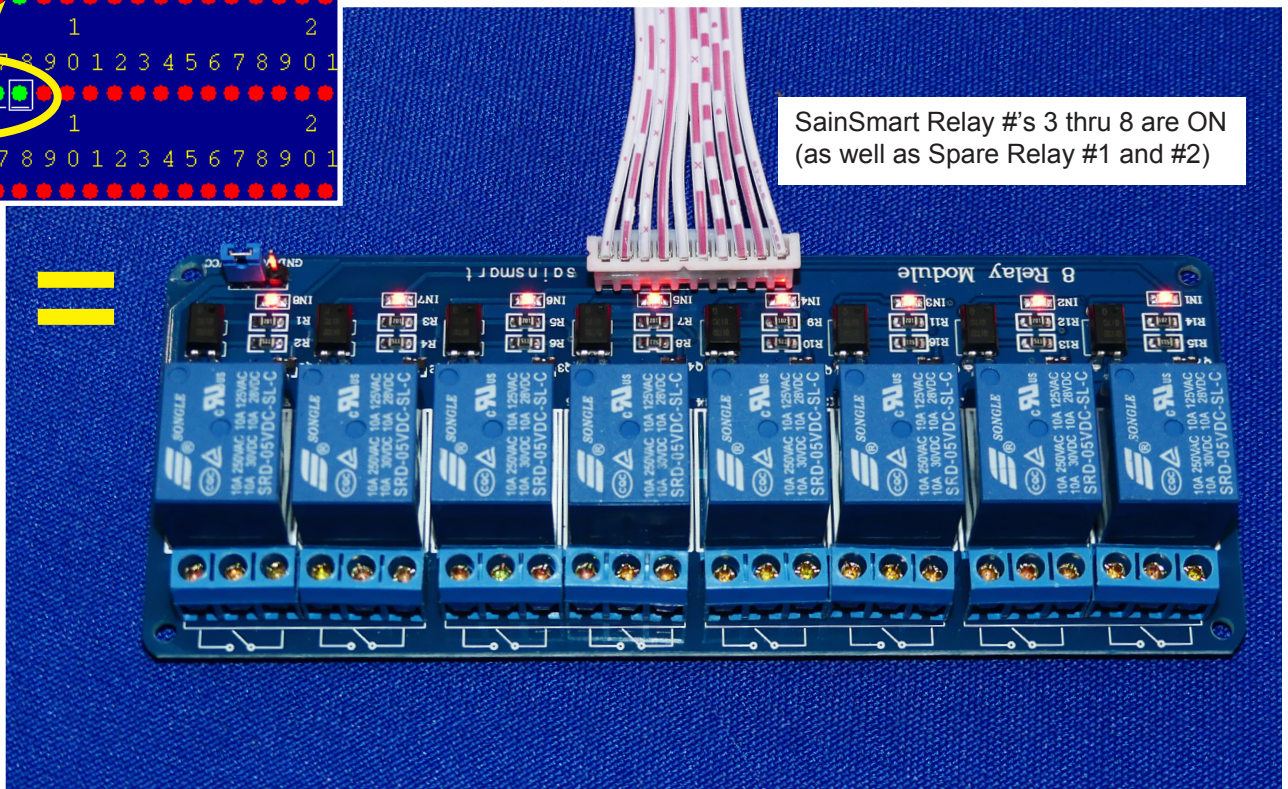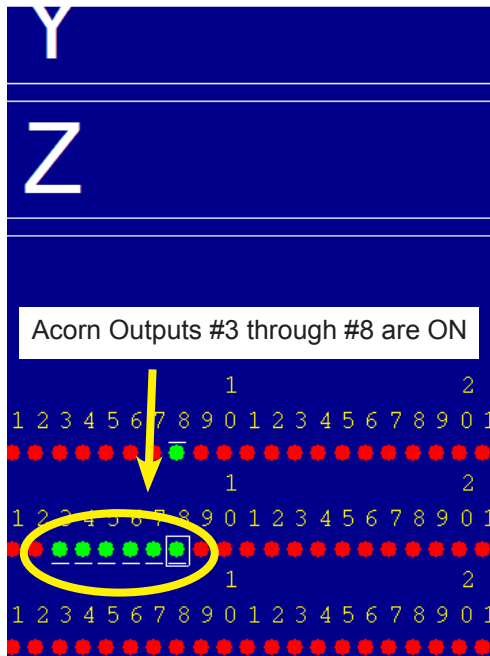
5.) Use the Acorn CNC setup Wizard to configure the Relays for a particular purpose. When selecting a Drive Type the I/O map automatically populates with the Centroid Acorn defaults for the input and output definitions that match the corresponding Acorn schematic for that drive type. Use the defaults I/O map as is or customize it by selecting any one of the custom output labels in the drop down box.

Drive Type and I/O Definitions

Select Axis Drive Type

- ○ Gecko G540 "Legacy"
- ○ Gecko G540 "Drive Only"
- ○ Gecko G201, G214, and others
- ○ Clearpath SDSK/SDHP
- ○ DMM DYN2/DYN4
- ● Custom Leadshine
- ○ Estun Pronet

- ○ Yaskawa Sigma 5/7
- ○ Delta
- ○ TECO
- ○ Chinese Router/Engraver
- ○ Other
- ○ Bench Test

Restore Drive Defaults	Schematics and Other Info

Input and Output Map

Note: Modify this I/O assignment *only if* different Input and Output assignments are required. Otherwise, follow these standard I/O assignments which match the standard Acorn hookup schematics.

	Input Definition	Input Type		Output Definition
Input 1	HomeAll	NC	Output 1	NoFaultOut
Input 2	Unused	NO	Output 2	Lube
Input 3	Unused	NO	Output 3	SpindleBrakeRelease
Input 4	Unused	NO	Output 4	SpinFWD
Input 5	DriveOk	NO	Output 5	SpinREV
Input 6	Unused	NO	Output 6	DriveResetOut
Input 7	Unused	NO	Output 7	Flood
Input 8	EStopOk	NC	Output 8	OUTPUT8

NC = Normally Closed, NO = Normally Open, TTL Output Open Collector: See hookup schematics for proper wiring.

The example above shows the standard Leadshine input and output map with Output 8 customized.
We used the drop-down list for Output 8 and selected the generic output label "OUTPUT8".
These generic output labels are available for the case where the output drop down list does not contain an output label to match a particular application. These are general purpose Labels that use M codes M61 thru M68 and M81 thru M88. For example: You may use the generic label "OUTPUT3" for Output 3 and then use M63 to activate the #3 relay and M83 to turn off relay #3, you may use the generic "OUTPUT4" for Output 4 and use M64 to activate the #4 relay and M84 to turn off relay #4, and so on for outputs 5,6,7..and 8. Use generic "OUTPUT8" for Output 8 and use M68 to activate the #8 relay and M88 to turn off relay #8.

6.) Connect devices to be controlled to the Relay Module terminals.

The relays on the SainSmart Relay Module are single pole double throw (SPDT) relays. Relays are just a switch. SPDT relays are a switch with connections on either side of the switch so when the switch is ON two of the terminals are connected and when the relay is OFF the other two of the terminals are connected. That is, a common terminal connects to either of two others, never connecting to both at the same time. Each relay has three connection terminals as see in the image below.
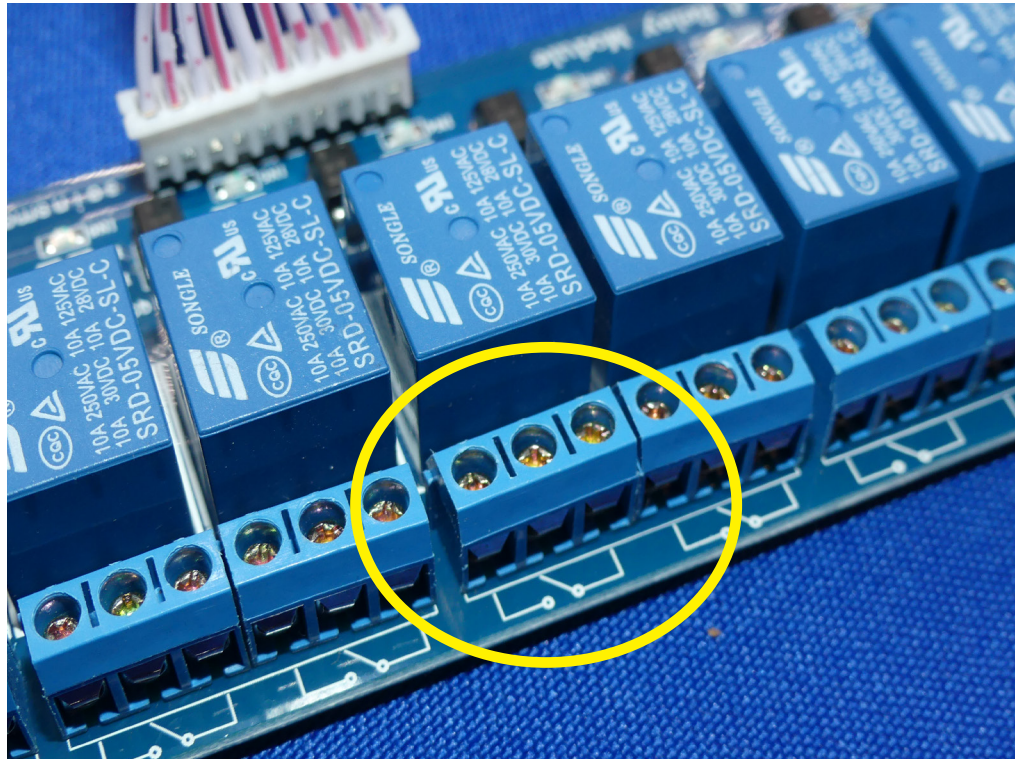
110 VAC Flood Pump wiring example using Output 7 set to "Flood". The number 7 relay will be energized when "Flood" is activated by either manually using the Coolant controls on the VCP or by using the M-code "M8".

Relay Terminal #3 NC
Relay Terminal #2 Common
Relay Terminal #1 NO

Ground

110 VAC Flood Motor

110 VAC Neutral From Terminal distribution

LED ON = Relay Energized = Terminal #2 (center common) and Terminal #1 are closed and the Flood motor is running

110 VAC Hot from fused terminal distribution

OPTIONAL CONNECTIONS ARE BLUE
GROUNDS ARE GREEN
110VAC IS VIOLET

FROM SPINDLE ENCODER

SHIELDED ETHERNET CABLE FROM PC

H6

P10

H8
AN GND
AN OUT

ETHERNET

H9
CHASSIS
COM
COM
+24VDC
+24VDC

COM

H6
Output 5 15 — Input 5
Output 4 17 — Output 3 16
Input 4 19 — Output 2 14
Input 3 21 — Output 1
Input 2 23 —
Input 1 25 — COM
Chassis GND
1 — Output 1
2 — Step 1
3 — Direction 1
4 — Step 2
5 — Direction 2
6 — Step 3
7 — Direction 3
8 — Step 4
9 — Direction 4
10 — Input 1
11 — Input 2
12 — Input 3
13 — Input 4

PIN 9 = +5VDC
PIN 8 = B
PIN 7 = A
PIN 6 = Z
PIN 5 = B\
PIN 4 = A\
PIN 3 = Z\
PIN 2 = COM
PIN 1 = N/C
P10

ACORN
REV 180131
PN:14445

H4
IN1 IN2 IN3 IN4
24 IN

H1
IN5
IN6
IN7
IN8
24 IN

H2
ST1
DR1
EN1
COM
ST2
DR2
EN2
COM

H3
ST3
DR3
EN3
COM
ST4
DR4
EN4
COM

RL1 NO1 NC1 RL2 NO2 NC2
H7
OUT1   OUT2

OC3 OC4 COM OC5 OC6 COM OC7 OC8 COM
H5

ADAPT8RLY 180820

RY8 RY7 RY6 RY5 RY4 RY3 RY2 RY1 GND
5V

5V

Power jumper must
connect VCC to
JD_VCC.

GND
VCC
JD-VCC

GND IN1 IN2 IN3 IN4 IN5 IN6 IN7 IN8 VCC

5VDC NPN
RELAY BOARD

OUT8 OUT7 OUT6 OUT5 OUT4 OUT3 OUT7 OUT8

GRN
BLK
YEL

RED
BLK
YEL
GRN
WHT
BLK

110VAC
L
N

V1 (+5 VDC) 2.2A
COM
V2 (+24 VDC) 1.0A

MEANWELL
RD-35B

NOTE

The ADAPT8RLY board connects ACORN outputs #3,4,5,6,7
and 8 to the SainSmart 8 Relay Module.
The 8 relays on the SainSmart 8 Relay Module are
outputs of the ACORN board. ACORN outputs #7 and #8 are
connected in parallel to two relays each on the SainSmart
Module.

Please double check the ribbon cable connections before
applying power, as it is possible to flip the ribbon cable.
Observe the labels on both boards and make sure that the
ribbon cable is connected straight between the two boards.

ACORN   Relay Board
Output # - Activates - Output #
3   3
4   4
5   5
6   6
7   7 and 2
8   8 and 1

Title:
ACORN_rev3, ADAPT8RLY, 8 RELAY BOARD

Date: 180904   Ver: 1   Drawn by: CEM
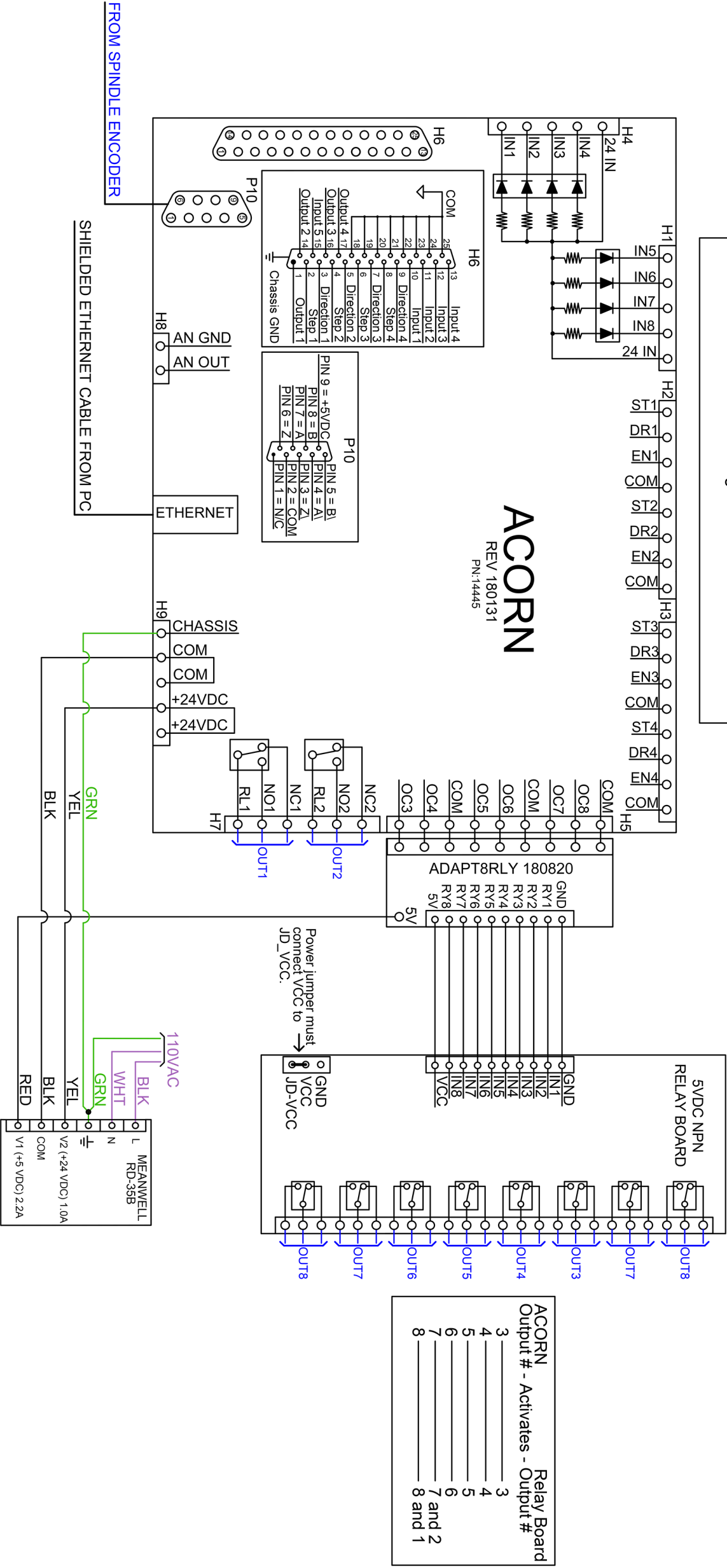
Filename: 8RLY_R2-ADAPT.DWG   Sheet 1 of 1

How to tell the difference between Acorn_rev2 and Acorn_rev3
Acorn_rev2 has FIXED green screw terminal blocks
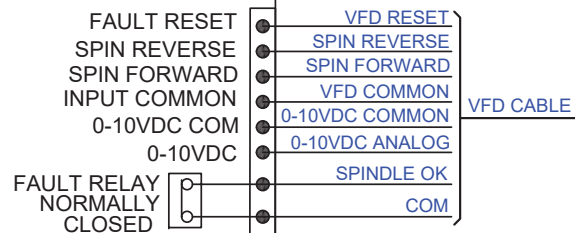Acorn_rev3 has REMOVABLE green screw terminal blocks

VFD

- FAULT RESET — VFD RESET
- SPIN REVERSE — SPIN REVERSE
- SPIN FORWARD — SPIN FORWARD
- INPUT COMMON — VFD COMMON
- 0-10VDC COM — 0-10VDC COMMON
- 0-10VDC — 0-10VDC ANALOG
- SPINDLE OK
- FAULT RELAY NORMALLY CLOSED — COM

VFD CABLE

OPTIONAL CONNECTIONS ARE BLUE
GROUNDS ARE GREEN
110VAC IS VIOLET

BIT1 BIT2 BIT3 BIT4 COM +24VDC

TURRET
B1 B2 B3 B4 24V COM +24VDC
+24VDC 24V COM FG TURRET MOTOR

COM E-STOP SIGNAL

DRIVE OK
HOME ALL SWITCHES
SPINDLE OK
E-STOP SIGNAL
+24VDC

Z-AXIS DRIVE
X-AXIS DRIVE

STEP DIRECTION ENABLE COMMON
ST1 DR1 EN1 COM
ST2 DR2 EN2 COM
ST3 DR3 EN3 COM
ST4 DR4 EN4 COM

H1 H2 H3

ACORN
REV 180131
PN:14445

H4 24 IN
+24VDC
BIT4 IN4
BIT3 IN3
BIT2 IN2
BIT1 IN1

H5
OC8 OC7 COM OC6 OC5 COM OC4 OC3

ADAPT8RLY REV 180629
GND RY1 RY2 RY3 RY4 RY5 RY6 RY7 RY8 5V
5V

GND IN1 IN2 IN3 IN4 IN5 IN6 IN7 IN8 VCC

5VDC NPN RELAY BOARD

NC NC

GND VCC JD-VCC

OPTIONAL E-STOP CONTACTOR
A1 COIL A2
L4 T4
L3 T3
L2 T2
L1 T1

COIL POWER SUPPLY

SPIN FORWARD
VFD COMMON
SPIN REVERSE
VFD RESET
CONTACTOR COIL POWER
FLOOD PUMP CONTACTOR

VFD CABLE

CNT1
T1 L1
T2 L2
T3 L3
22NC 21NC
A2 COIL A1

CNT2
T1 L1
T2 L2
T3 L3
22NC 21NC
A2 COIL A1

+24VDC TURRET MOTOR POWER
24V COM

REVERSE
FORWARD
RELAY COIL POWER

H6
COM
13 Input 4
12 Input 3
11 Input 2
10 Input 1
9 Direction 4
8 Step 4
7 Direction 3
6 Step 3
5 Direction 2
4 Step 2
3 Direction 1
2 Step 1
1 Output 1
25 24 23 22 21 20 19 18 17 16 15 14
Output 4 / Output 3 / Input 5 / Output 2
Chassis GND

P10
PIN 9 = +5VDC
PIN 8 = B\
PIN 7 = A
PIN 6 = Z
PIN 5 = B\
PIN 4 = A\
PIN 3 = Z\
PIN 2 = COM
PIN 1 = N/C

NC2 NO2 RL2
NC1 NO1 RL1
H7

H8 AN GND AN OUT
ETHERNET
H9 CHASSIS COM COM +24VDC +24VDC

FROM SPINDLE ENCODER
VFD CABLE
0-10VDC COM
0-10VDC
SHIELDED ETHERNET CABLE FROM PC

110VAC
BLK WHT GRN
MEANWELL RD-35B
L N
V2 (+24 VDC) 1.0A
COM
V1 (+5 VDC) 2.2A

GRN YEL BLK
YEL BLK RED

COM +24VDC
COM +24VDC

SNUBBER

ACH ACN ACG
LUBE PUMP
110VAC