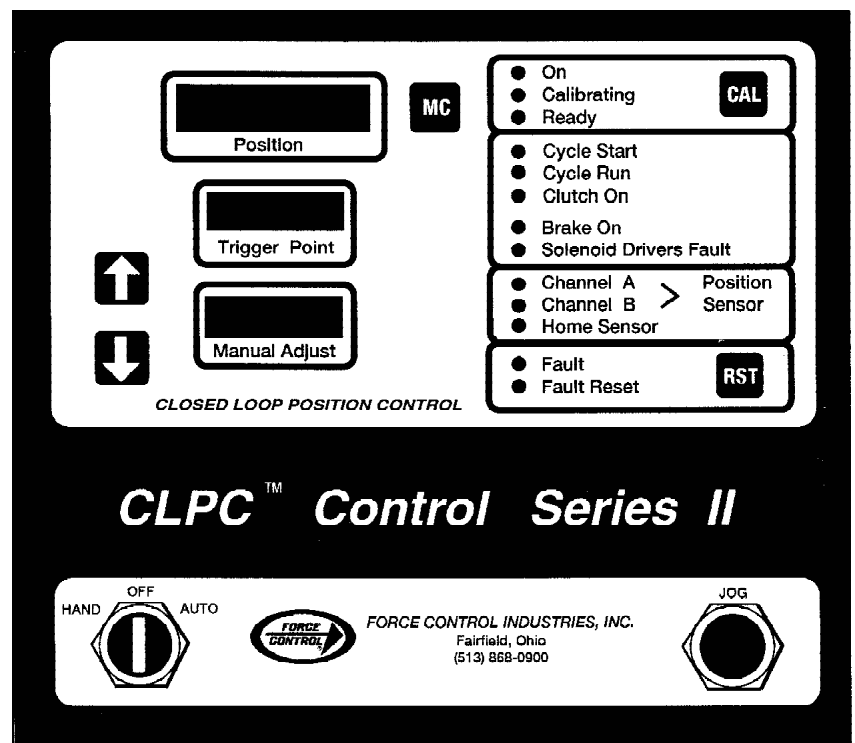




502-CLPC-004-02

CLPC™ CONTROL Series II **with Zero Power RAM** **OPERATION AND** **SERVICE MANUAL**



FORCE CONTROL INDUSTRIES, INC.

WARNING - Read this manual before any installation, maintenance and operation.

MANUFACTURERS OF MECHANICAL AND ELECTRICAL POWER TRANSMISSION EQUIPMENT

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A Return Goods Authorization (RGA) number must be obtained from the factory and clearly marked on the outside of the package before any equipment will be accepted for warranty work. Force Control will pay the shipping costs of returning the owner parts that are covered by warranty.

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CLPC II CONTROL

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Section 1 INTRODUCTION

IMPORTANT:

THIS MANUAL ONLY APPLIES TO CLPC Series II CONTROL SYSTEMS WITH SOFTWARE VERSION OF 2.0.0 OR HIGHER.

1-1 THEORY OF OPERATION

Clutch/Brakes have been used for many years to index to position for feeding, cutting, packing, etc. Through the years the consistency of clutch/brakes to stop in position has improved some, but not to a great extent. The multiple disc, oil shear **Posidyne Clutch/Brake** has been a leader in dependable and accurate positioning drive systems. The Oil Shear System lubricates and cools the friction surfaces creating an environment which maintains a very consistent coefficient of friction. Therefore the transmitted torque is very consistent.

Here in lies the problem. Most machine drives are required to operate under varying loads, speeds, or other variable conditions. Therefore even with a very consistent torque the acceleration and deceleration time can vary causing inaccuracies in position. Various attempts have been tried to better control positioning accuracy. Adjustable limit switches or proximity switches have been tried, but need to be manually adjusted. On newer equipment the **PLC** is often used to read an encoder and stop the drive at the proper time. There are several problems with this system. (1) The scan time of the PLC, even though only 20 to 40 milliseconds, can be enough to cause different stop positions on high speed applications. (2) Unless a very sophisticated feed back loop system is designed the **PLC** still has no way to correct for varying conditions.

The **CLPC Series II Closed Loop Positioning Control** developed by Force Control Industries, Inc. uses a positioning encoder and home sensor to continually look at the stopping position, compare it to the actual home position and make corrections as errors begin to occur.

There are several types of applications which can utilize the **CLPC Series II Closed Loop Positioning Control**.

1-2 TYPICAL APPLICATIONS

A. Single Revolution - A single revolution cut off drive for a guillotine cutter, fly cutter, shingle catcher, etc.

In these applications the final shaft turns one revolution each index cycle. In most cases it is critical that the blade reach the same point at the same time in the cycle for accurate cut length. Here the acceleration rate as well as the stop position are critical for consistency. On these

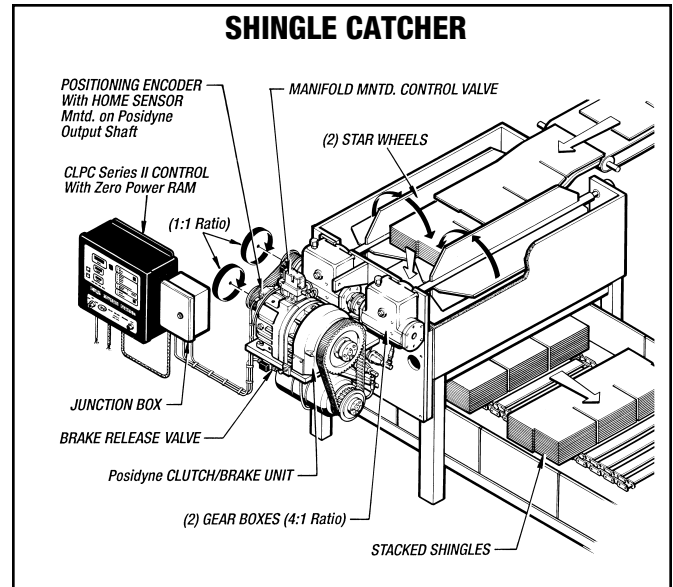


Figure 1.1 - Single Revolution Application

applications usually the index length, once set, never changes. (See Figure 1.1)

B. Partial Revolution - These are applications such as a case packer or dial table where each index is a preset number of degrees. In these applications the stop position is critical to prevent jams. Also the index length is seldom

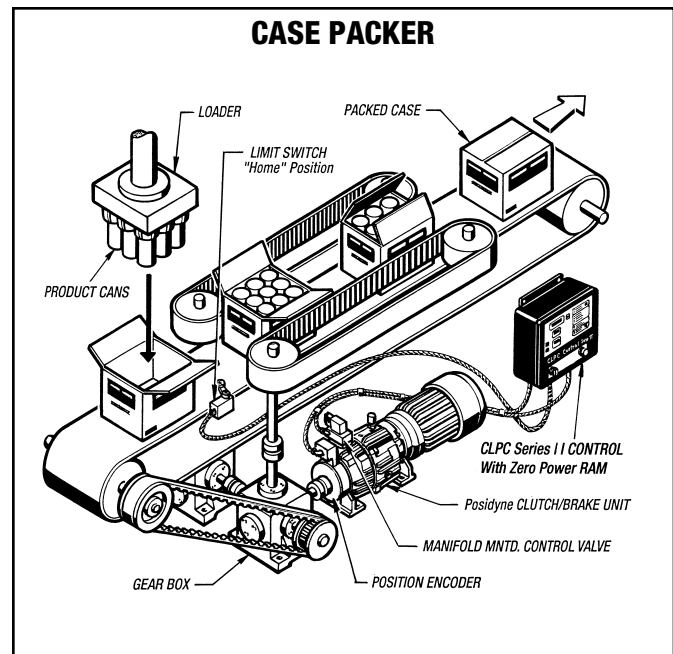


Figure 1.2 - Partial Revolution Application

changed, however it could be if a tooling change changed the number of stops. (See Figure 1.2)

C. Index to Length - These are applications such as feeding steel for cut to length or plastic film for making plastic bags.

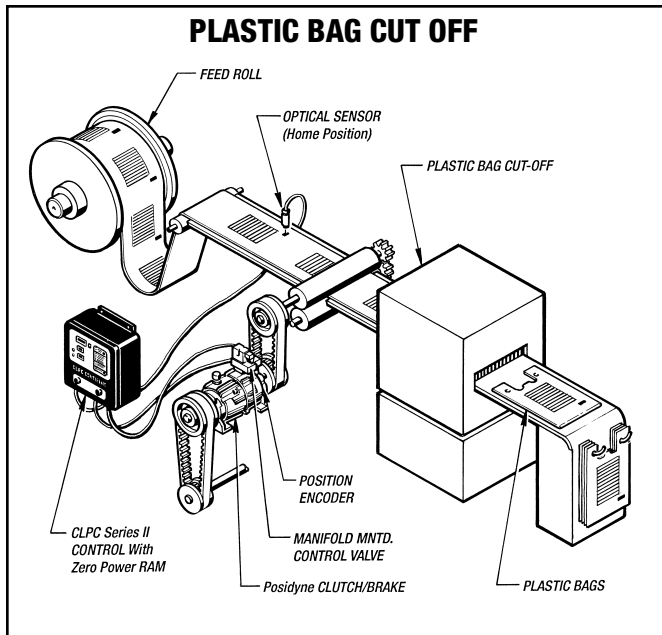


Figure 1.3 - Index To Length Application

This application requires the ability to change the index length for each product change. A product is fed with nip rolls to feed a preset length of product. (See Figure 1.3)

1-3 COMPONENTS IN A TYPICAL SYSTEM

(See Figure 1.4)

A. CLPC Series II Control

The **CLPC Series II Closed Loop Positioning Control** is an electronic, error correcting, closed loop positioning control used to control the **Posidyne Clutch/Brake** in a positioning or index to length application. It is designed primarily as a stand alone interface control between a main machine process controller, (PLC) or other machine control and the **Posidyne Clutch/Brake** unit. It can also be used to operate other types of clutch/brake units.

Upon a signal from the machine control the **CLPC Series II Control** will energize the actuation valve solenoid from a 24 VDC output to engage the clutch and allow the drive to run until a preset trigger point is reached, at which time the valve solenoid is de-energized engaging the brake (a separate 24 VDC brake output is available if required) to stop the drive in position.

B. Position Encoder

The **CLPC Series II Control** operates by counting pulses using a quadrature pulse train generated by an incremen-

tal quadrature encoder to determine actual position and facilitate stopping position. The control will recognize various types of encoders, however they must meet the following specifications:

1. Sinking open collector output.
2. RS 422 / RS 485 differential output.
3. 5, 12 or 15 volt DC.
4. Either single ended, open collector output or differential line driver.

The number of pulses per revolution or resolution is determined by the location of the encoder, accuracy of the stopping position required and the accuracy of the drive train. Resolution must be high enough to be accurate without being overly fine with no actual positioning benefit. The closer the encoder to the final shaft the higher resolution required.

C. Home Sensor

The **CLPC Series II Closed Loop Positioning Control** requires a home sensor to indicate where the mechanical home of the drive is located. This can be any kind of a single pulse generated from a limit switch, proximity switch optical limit switch, Z pulse encoder, etc. The duration of the pulse must be at least .15 milliseconds and meet the following specifications:

1. Output saturation (voltage drop across conducting sensor) to be a maximum of 1.0 Volts @ 50 milliamps if single ended.
2. Normally open (NO) or normally closed (NC).
3. NPN Sinking.
4. 3 wire.
5. TTL compatible.
6. If a Limit Switch is used it may need a capacitor. Contact factory for further assistance.

D. Actuation Output (Solenoid Valve Actuator)

The **CLPC Series II Closed Loop Positioning Control** has 3 direct actuation outputs which are 24 VDC, at a maximum of 3 Amps total for all three combined. They are identified as Clutch #1, Clutch #2 and Brake #1. There are also 3 solid state relays driven by the same coil driver circuit, available to operate systems which are not 24 VDC. These can be AC or DC.

The **Posidyne** actuation valve solenoid is normally 24 VDC, 12.7 Watts

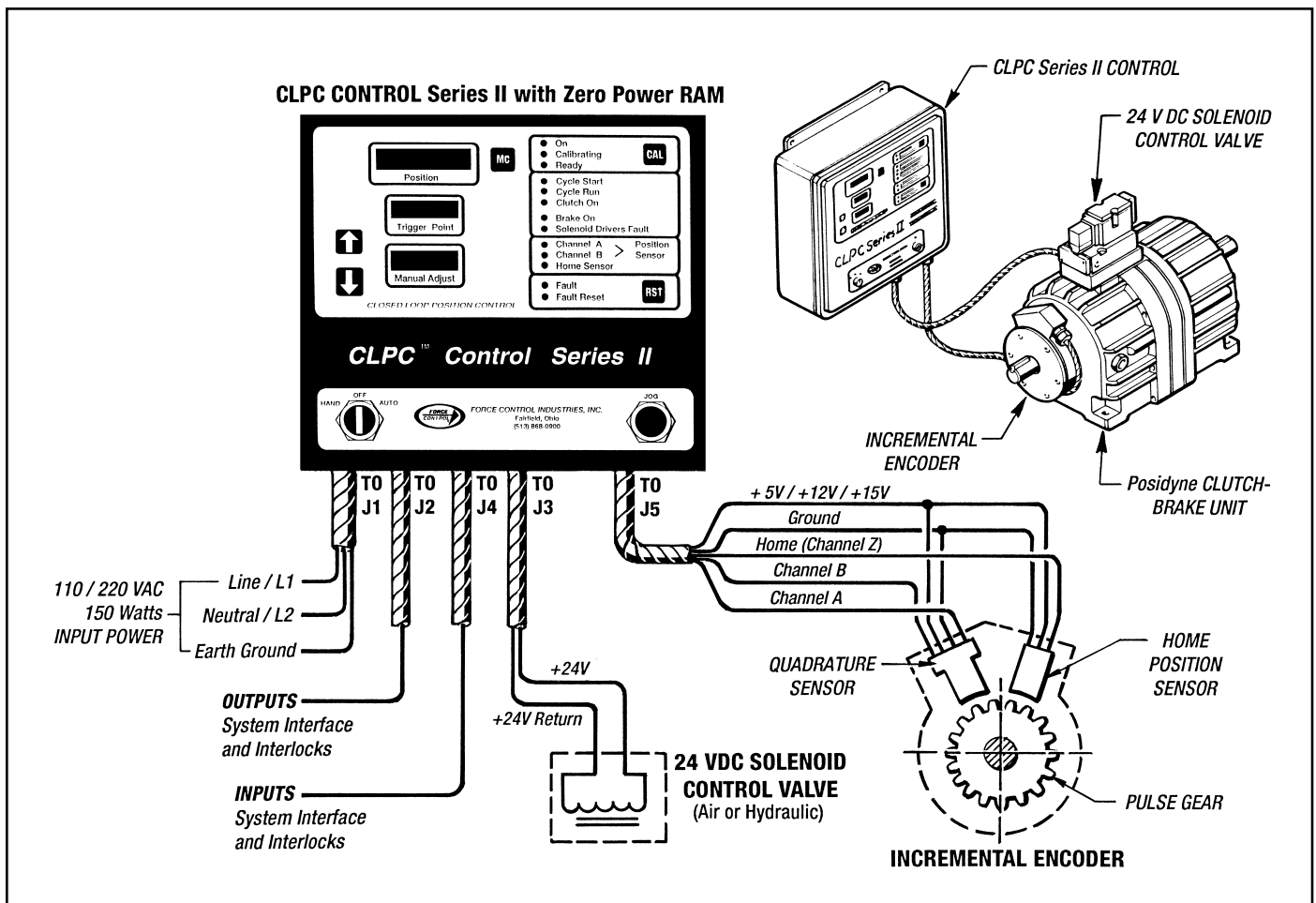


Figure 1.4 - CLPC Series II Control

E. Start Cycle (PLC Interface)

The start cycle signal required by the **CLPC Series II Control** is a short pulse of 50 milliseconds in duration which can be furnished from a PLC output or other source. The required signal can be AC (standard) or DC and must be:

1. 90 to 140 VAC (typ. 115 VAC), cold contact, 40 milliseconds minimum in duration with 6 to 10 milliamps input current and 2.5 milliamps drop out current.
2. 10 to 30 VDC and 1 millisecond minimum in duration.

Section 2 INSTALLATION

2-1 RECEIVING AND UNPACKING PARTS

Upon receipt of this product the following steps should be followed:

1. Inspect all shipping boxes for possible shipping damage. If damaged the freight carrier should be contacted immediately and a claim filed.
2. Verify that the model numbers match the purchase order. Contact Force Control if there is a question or problem.

A **CLPC Series II Control System** comes in many varieties. Most components are usually supplied by Force Control, but can be supplied by the customer. Also some of the components may be mounted on the **Posidyne Clutch/Brake**. Therefore it is critical that all of the components are carefully checked for receipt. A basic check list follows:

1. CLPC Series II Control
2. Position Encoder (May be furnished loose, by customer, or mounted on the **Posidyne Clutch/Brake**.)
3. Home Sensor (May be part of the Encoder, furnished loose, by customer, or mounted on the **Posidyne Clutch/Brake**.)
4. Junction Box (Optional).
5. Cables (quick disconnect) to actuation valve, incremental encoder, home sensor and brake release valve.

2-2 MOUNTING CLPC Series II Control

(See Figure 2.1)

The **CLPC Series II Control** is mounted in a rugged Nema 4 enclosure, however it should be mounted in a location convenient to the operator and where conditions are conducive for electronic controls.

1. Away from excessive heat. (Ambient temperature should be from 0° to 120° F.)
2. Protected from rain or excessive moisture.
3. Protected from high levels of metallic dust, corrosive gases or explosive components.
4. Mounted on a solid structure protected from excessive vibration.
5. Within 50 ft. of the encoder.

2-3 MOUNTING OPTIONAL JUNCTION BOX

(See Figure 2.2)

The optional Junction Box is used when the distance between the **CLPC Series II Control** and the encoder, home, switch and actuation valve are located where conduit should be run, rather than cables, directly from the control. The Junction Box should be located near the **Posidyne Clutch/Brake** and /or external encoders. The Brad-Harrison quick connect cables are used to connect these components to the junction box. Conduit is then run from the Junction Box to the **CLPC Series II Control**.

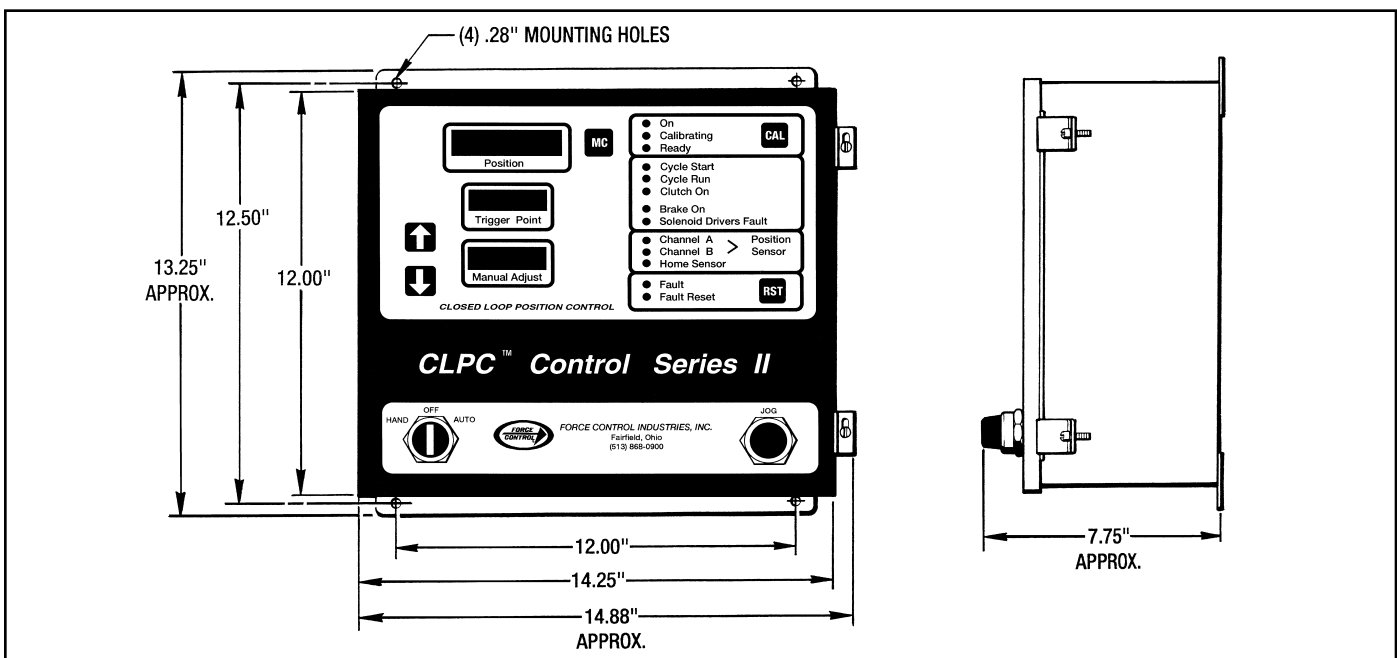


Figure 2.1 - Mounting Hole Dimensions for CLPC Series II Control

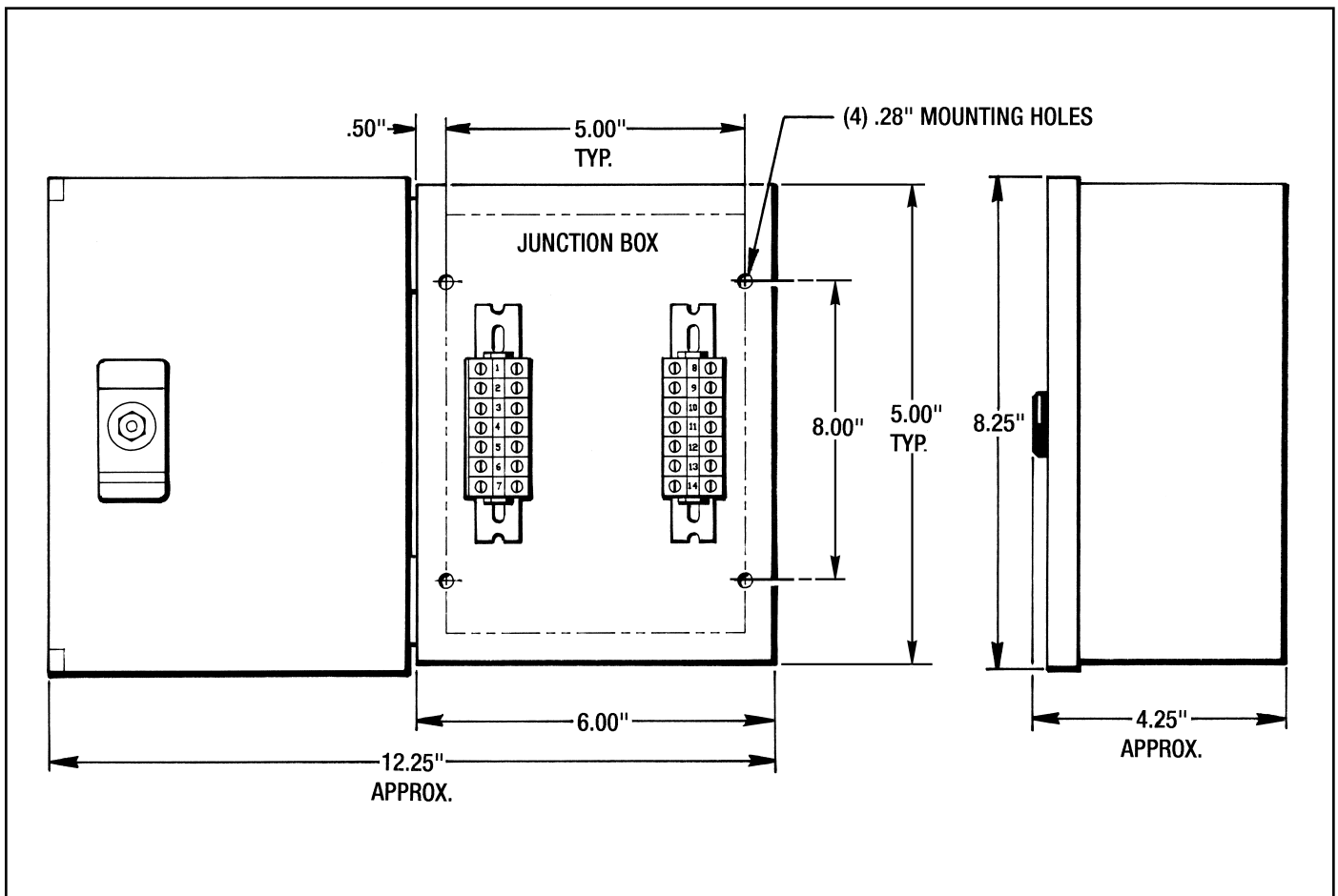


Figure 2.2 - Junction Box Mounting

2-4 MOUNTING EXTERNAL ENCODER

If you are using an external Encoder it should be mounted to pick up the proper shaft for correct control operation. Check with **Force Control Industries, Inc.** if there are any questions.

2-5 MOUNTING EXTERNAL HOME SENSOR

The external **Home Sensor** is used to calibrate the control to the mechanical position of the machine drive and to verify "**Home**" position for each index or cycle.

It should be located where it will pick up the "**Home**" position of the machine for each cycle. This can be on the output shaft of a reducer, head shaft of a conveyor, located to detect a product going by, or the crank arm on a harmonic application.

On some cut-to-length applications the Home Sensor may be triggered by the operation of the cut-off device, when the press opens or used to maintain registration on printed material by reading a registration mark.

On many applications the Home Sensor is located in the Encoder Housing on the **Posidyne Clutch/Brake** and is connected by the same cable as the Incremental Encoder.

2-6 ELECTRICAL CONNECTIONS

There are numerous wiring connections to be made, some of which will be completed when the system is received and others that will need to be completed in the field. Also note that there may be optional items which will not be used in all applications.

IMPORTANT: It is critical that the correct wiring type and wiring paths be followed for maximum performance and minimum of electrical noise interruptions.

Electrical noise is any electrical disturbance which can cause erroneous operation of the control. It is often caused by transients generated by load switching where line to ground spikes are generated. Starting of motors, actuating solenoids and certain types of motors such as regenerative and synchronous motors can all cause transients.

The **CLPC Series II Control** has a high degree of noise immunity built in, however electrical noise can cause erratic operation of the CLPC. Therefore it is important to follow the following recommended wiring procedures on the next page.

A. Type of Wiring for Encoder Connections

The wire for the encoders should be individually shielded, twisted pair tray cable with minimum 22 AWG copper stranded conductors. Pairs which can be routed together are shown on the wiring diagrams. The wire should be as short as possible. **Excess wire should be cut off, not coiled up. The cable shields should be grounded only at the DC negative.** (See wiring diagram for proper terminals on the CLPC Series II Control.)

B. Wire Paths

CAUTION:
Avoid running high voltage and low voltage lines together.

All high speed, low voltage cables from encoders, home switch, air valves, etc. must be routed away from high voltage cables, AC power lines or other wiring carrying rapid switching transients. If a long run is necessary the encoder wiring should be run in a dedicated conduit for that purpose only.

C. Max. Wire Lengths

With an Open Collector Encoder the max. length is 250 Ft.

With a Differential Line Driver Encoder the max. wire length is 1000 Ft., also the Pneumatic Control Valve can be a max. of 1000 Ft. away from the control.

2-7 MAIN POWER TO CLPC Series II CONTROL

(See Figure 2.3)

The main power supply to the CLPC Series II Control should be 115 VAC or 230 VAC, 150 Watts. The Input Power Selector must be set to match the input voltage (Default setting is 115 VAC). The selector switch is located in the upper left hand corner of the internal power supply board.

The power should be clean and of good quality similar to that used for other electronic devices. Should the line power be “dirty” with high voltage spikes and transients a dedicated isolation transformer should be used.

2-8 TERMINAL BLOCK J1 (Main Power Supply to CLPC Series II Control)

(See Figures 2.3 and 2.4)

- 115 VAC to Terminal Block J1 Terminal #1
- Neutral to Terminal Block J1 Terminal #2
- Earth Ground to Terminal Block J1 Terminal #3

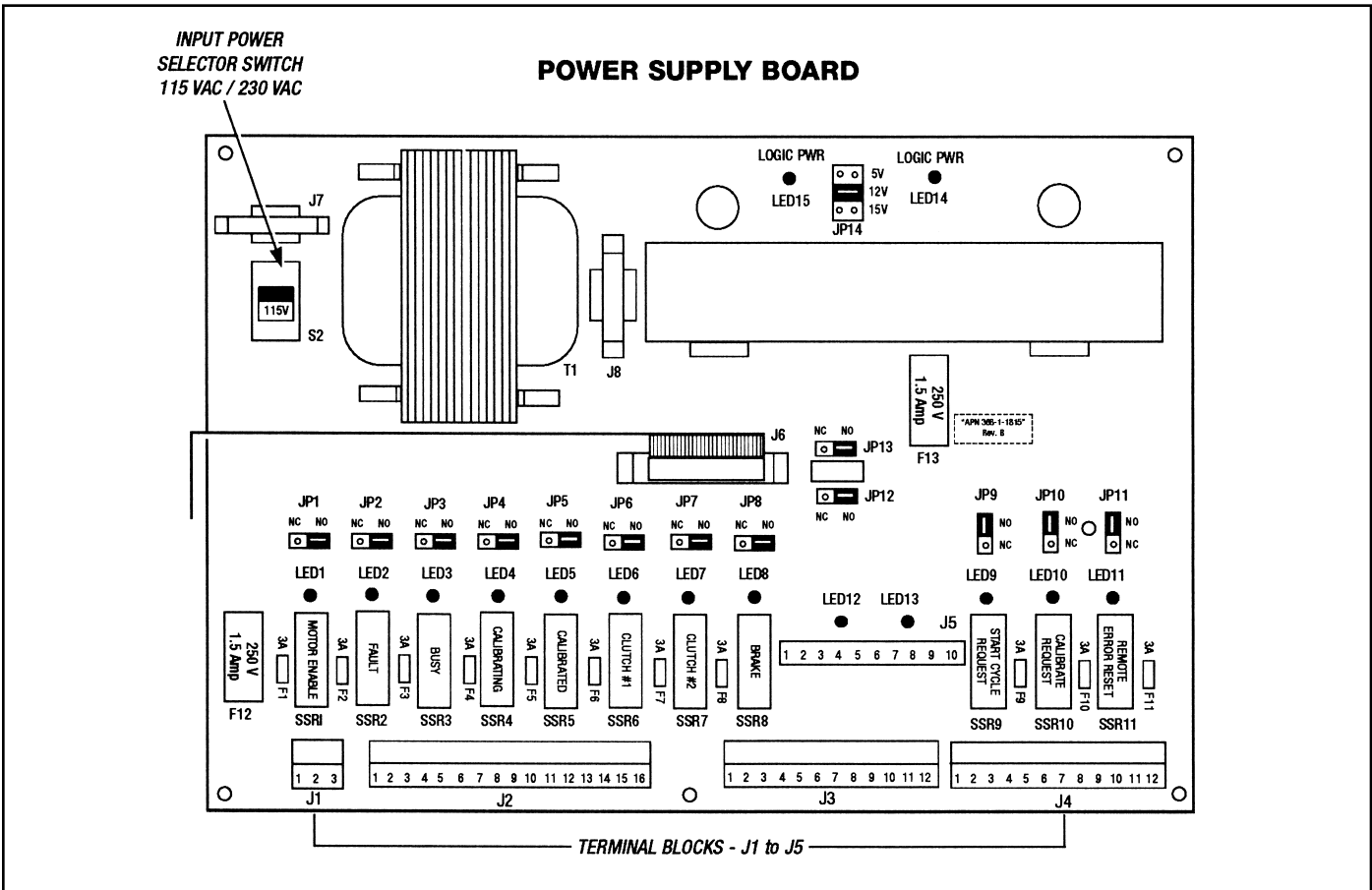


Figure 2.3 - Power Supply Board

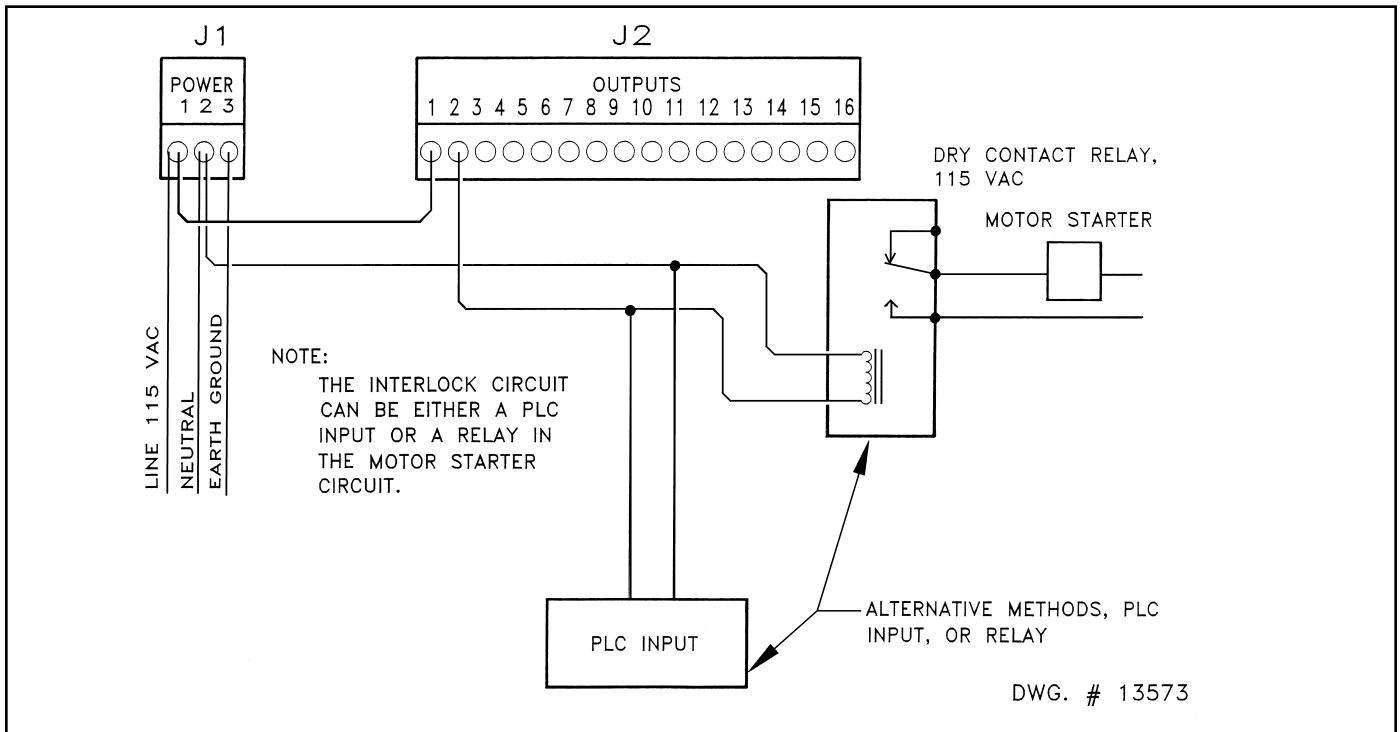


Figure 2.4 - Motor Interlock Schematic

2-9 TERMINAL BLOCK J2 (CLPC Series II Control to PLC or other Monitoring Control-Outputs from the CLPC Series II Control for Safety Interlocks and System Monitoring)

(See Figures 2.4 and 2.5)

Solid state relays are used, 115 VAC are standard, 7-60 VDC relays are available. N.O. cold contacts, .05 to 3.5 amp on state current, 25 mA max. off state leakage. None of these outputs are required for the control to operate.

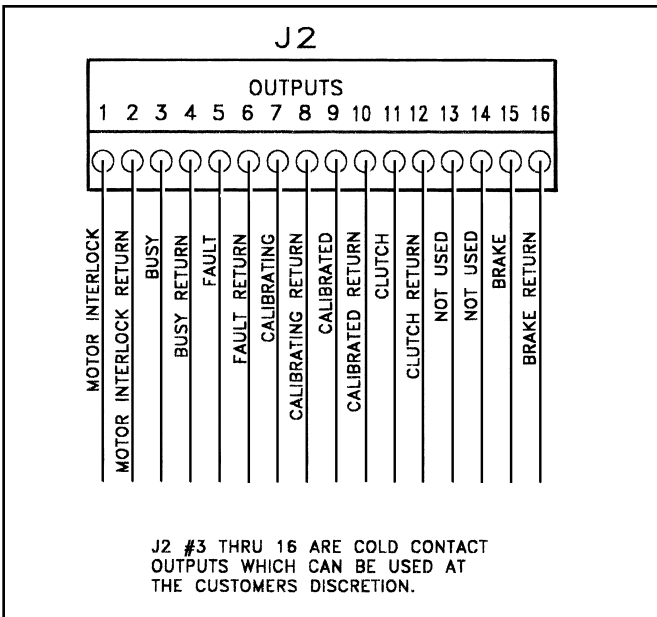


Figure 2.5 - Terminal Block J2

TERMINAL BLOCK J2

Terminal #1	Motor Interlock and/or Brake Pr. Release Valve.	Contacts closed only when front panel HOA Sel. Sw. is in Hand or Auto
Terminal #2	Motor Interlock and/or Brake Pr. Release Valve Return.	
Terminal #3	Busy.	On when control is performing an index.
Terminal #4	Busy Return.	
Terminal #5	Fault.	Indicates a Fault has occurred in the CLPC.
Terminal #6	Fault Return.	
Terminal #7	Calibrating	On when control is in Calibrating Mode.
Terminal #8	Calibrating Return.	
Terminal #9	Calibrated.	On when control has been Calibrated and Ready to Run.
Terminal #10	Calibrated Return.	
Terminal #11	Clutch #1 On.	Power is on to Clutch #1 Actuation Valve.
Terminal #12	Clutch #1 Return	
Terminal #13	Clutch #2 On	For future use.
Terminal #14	Clutch #2 Return	For future use.
Terminal #15	Brake On	On when Brake is engaged.
Terminal #16	Brake Return	

2-10 TERMINAL BLOCK J3 (CLPC Control to Actuation Valve) (See Figure 2.6 and Wiring Diagrams on Pages 11, 14, 36 & 37)

TERMINAL BLOCK J3 (DC Power, DC Ground and DC Outputs)

Terminal #1	Misc. power +8 Volts DC unregulated
Terminal #2	Misc. power +8 Volts DC unregulated
Terminal #3	Misc. DC Ground
Terminal #4	Misc. DC Ground
Terminal #5	Misc. Pwr. +24 VDC, unregulated, 1 Amp max.
Terminal #6	Clutch/Brake coil over ride
Terminal #7	Clutch #2 actuation valve, switched
Terminal #8	Clutch #2 actuation valve, +24 Volts DC
Terminal #9	Clutch #1 actuation valve, switched
Terminal #10	Clutch #1 actuation valve, +24 Volts DC
Terminal #11	Brake actuation valve, switched
Terminal #12	Brake actuation valve, +24 Volts DC

NOTES:

1. Terminals #1 and #2 together must not exceed 1 Amp.
2. Terminals #8, #10 and #12 together must not exceed 3 Amps.
3. 24 VDC power is supplied to coils at all times. Ground leg is switched by the CLPC.
4. Any wires connected to this terminal block must be shielded from any high voltage lines (over 50 volts) to avoid any erratic operation caused by electrical noise.

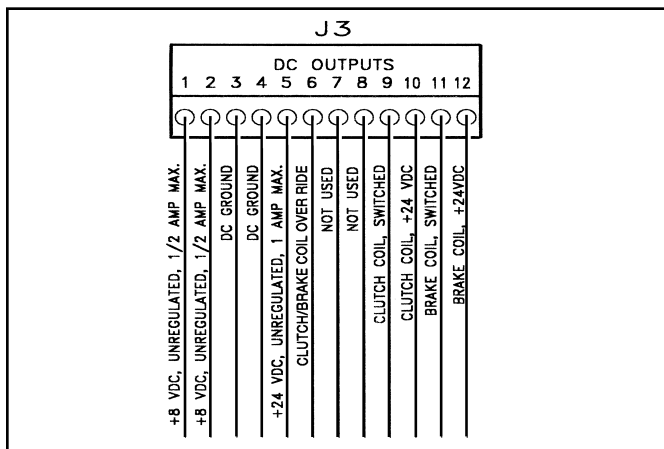


Figure 2.6 - Junction Block J3

2-11 TERMINAL BLOCK J4 (Inputs from external source to CLPC Series II Control)

(See Figure 2.7)

Inputs - Solid state relays are used (115 VAC are standard), 7 to 60 VDC relays are available, cold contacts, 10 mA max. input current, 2.5 mA drop out current, 3.0 mA allowable for no output.

NOTE: For AC inputs that are driven by a device that has leakage current (PLC) a resistor must be used across the terminals to bleed off current to avoid false triggering. The resistor size is dependent upon the leakage current of the PLC output. If the leakage current is no more than 50 mA use a 2500 ohm, 10 watt resistor. If less than 12 mA use a 10,000 ohm, 2 watt resistor. (See Figure 2.7)

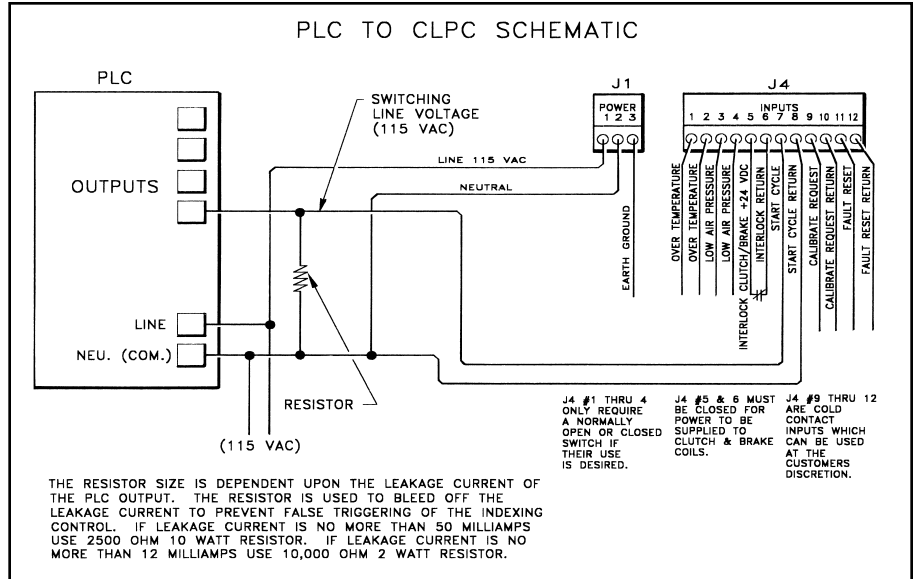


Figure 2.7 - Terminal Block J4 and PLC to CLPC Schematic

TERMINAL BLOCK J4

Terminal #1	Misc. Fault Input #1. Sensor can be N.O. or N.C. Use Jumper on Switch #JP12 to set. (See Note 1) It can be used as Over Temperature Sensor. (Thermal cut-out switch must be installed in Posidyne Clutch/Brake.)
Terminal #2	Misc. Fault Input #1 Return.
Terminal #3	Misc. Fault Input #2. Sensor can be N.O. or N.C. Use Jumper on Switch #JP13 to set. (See Note 1). It can also be used as a low pressure sensor. (Pressure Transducer must be installed in the air line upstream from air valve.)
Terminal #4	Misc. Fault Input #2 Return.
Terminal #5	Interlock, Clutch/Brake +24 VDC
Terminal #6	Interlock Return
Terminal #7	Start Cycle - Initiates an index (+ when using DC)
Terminal #8	Start Cycle Return. (- when using DC)
Terminal #9	Calibrate Request. (Initiates Calibration remotely)
Terminal #10	Calibrate Request Return
Terminal #11	Fault Reset - Resets Faults remotely. Resets all faults except solenoid fault.
Terminal #12	Fault Reset Return

NOTES: 1. On Jumper JP12 & JP13 the middle and right pins are for N.O., the middle and left pins are for N.C.
2. Terminals 1 thru 6 and 9 thru 12 are optional and not required for the control to operate properly.

**2-12 TERMINAL BLOCK J5
(CLPC Series II Control to Encoder)**

**A. Open Collector Quadrature Encoder
(With Internal Z Channel Home Sensor)**

(See Figure 2.8)

TERMINAL BLOCK J5

Terminal #1	Not Used
Terminal #2	Channel Z - Home Input
Terminal #3	Not Used
Terminal #4	Channel A - Input (See Note 2)
Terminal #5	Not Used
Terminal #6	Channel B - Input (See Note 2)
Terminal #7	SP Ground (See Note 1)
Terminal #8	Sensor Power (See Note 1)
Terminal #9	Not Used
Terminal #10	Not Used

NOTES:

1. The Internal Home Sensor uses the same power as the Quadrature Sensor.
2. Encoder wiring shown is for C.W. rotation of *Posidyne* output shaft. If C.C.W. rotation is desired reverse "A" and "B" encoder signals.
3. Encoder Channel "A" must lead Channel "B". Slowly rotate the *Posidyne* output shaft in the proper direction and check to be sure light "A" comes on before light "B". If they don't, reverse the "A" and "B" wires. The **CLPC** will count backwards or give an **E6** Error Code if the wires are backwards.

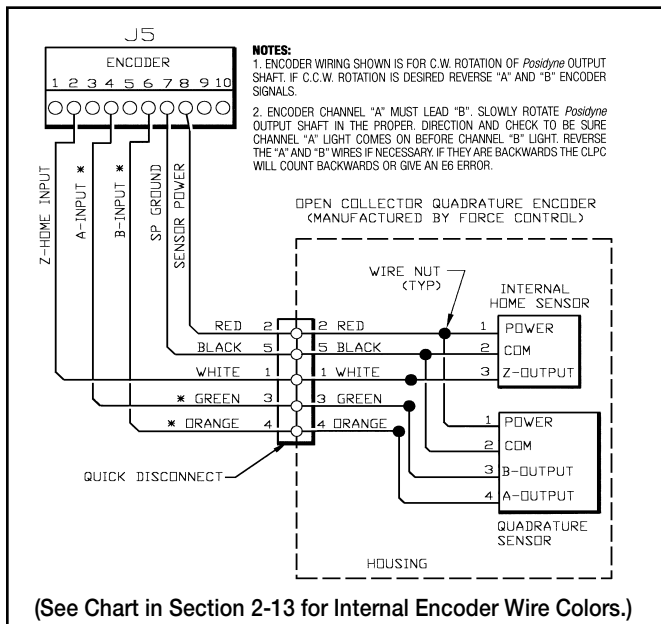


Figure 2.8 - Wiring Diagram - Terminal Block J5 (Open Collector Quad. Encoder with Internal Home Sensor)

**B. Open Collector Quadrature Encoder
(With External Z Channel Home Sensor)**

(See Figure 2.9)

TERMINAL BLOCK J5

Terminal #1	Not Used
Terminal #2	Channel Z - Home Input
Terminal #3	Not Used
Terminal #4	Channel A - Input (See Note 1)
Terminal #5	Not Used
Terminal #6	Channel B - Input (See Note 1)
Terminal #7	SP Ground (Quadrature Sensor)
Terminal #8	Sensor Power (Quadrature Sensor)
Terminal #9	SP Ground (Home Sensor)
Terminal #10	Sensor Power (Home Sensor)

NOTES:

1. Encoder wiring shown is for C.W. rotation of *Posidyne* output shaft. If C.C.W. rotation is desired reverse "A" and "B" encoder signals.
2. Encoder Channel "A" must lead Channel "B". Slowly rotate the *Posidyne* output shaft in the proper direction and check to be sure light "A" comes on before light "B". If they don't, reverse the "A" and "B" wires. The **CLPC** will count backwards or give an **E6** Error Code if the wires are backwards.

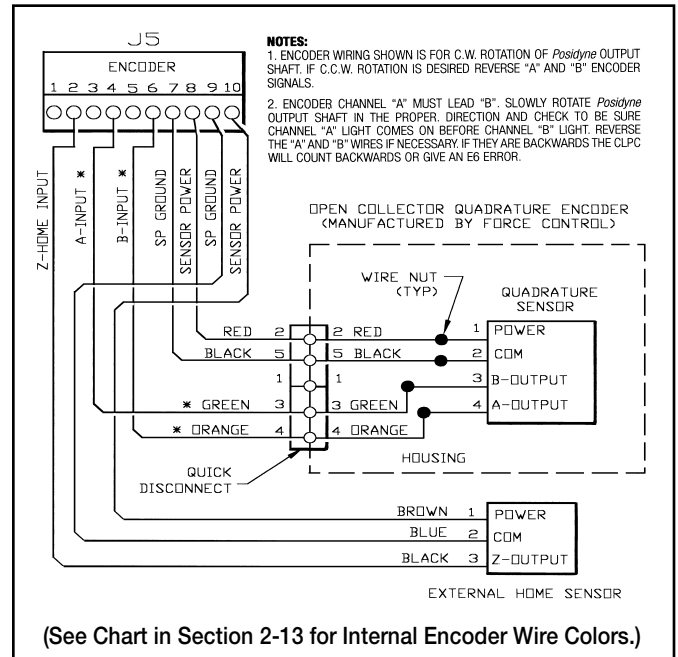


Figure 2.9 - Wiring Diagram - Terminal Block J5 (Open Collector Quad. Encoder with External Home Sensor)

If you are using an Optional Junction Box, the previous J5 Terminals will be wired to the Junction Box Terminals. (See Section 2-14)

C. Differential Line Driver Encoder (With Internal Z Channel Home Sensor)

(See Figure 2.10)

TERMINAL BLOCK J5

Terminal #1	Channel Z' - Home Input
Terminal #2	Channel Z - Home Input
Terminal #3	Channel A' - Input (See Note 2)
Terminal #4	Channel A - Input (See Note 2)
Terminal #5	Channel B' - Input (See Note 2)
Terminal #6	Channel B - Input (See Note 2)
Terminal #7	SP Ground (See Note 1)
Terminal #8	Sensor Power (See Note 1)
Terminal #9	Not Used
Terminal #10	Not Used

NOTES:

1. The Internal Home Sensor uses the same power as the Quadrature Sensor.
2. Encoder wiring shown is for C.W. rotation of *Posidyne* output shaft. If C.C.W. rotation is desired reverse "A" and "B" encoder signals.
3. Encoder Channel "A" must lead Channel "B". Slowly rotate the *Posidyne* output shaft in the proper direction and check to be sure light "A" comes on before light "B". If they don't, reverse the "A" and "B" wires. The **CLPC** will count backwards or give an **E6** Error Code if the wires are backwards.

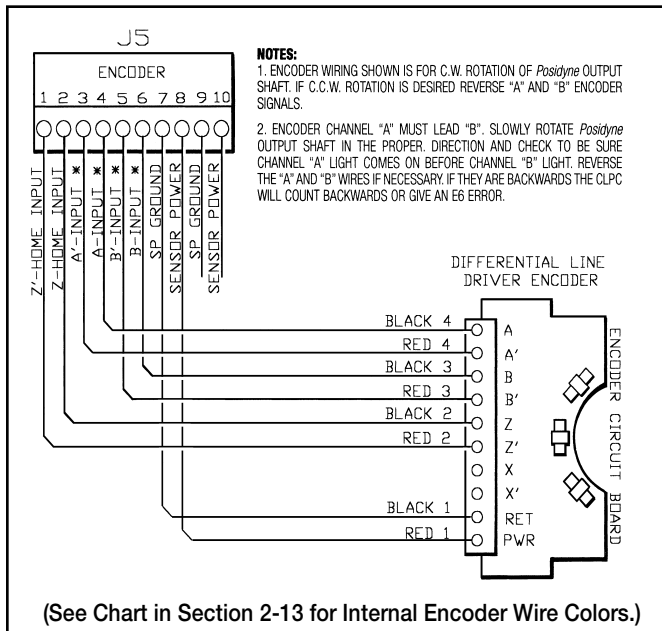


Figure 2.10 - Wiring Diagram - Terminal Block J5
(Differential Line Driver Encoder with Int. Home Sensor)

D. Differential Line Driver Encoder (With External Z Channel Home Sensor)

(See Figure 2.11)

TERMINAL BLOCK J5

Terminal #1	Channel Z' - Home Input
Terminal #2	Channel Z - Home Input
Terminal #3	Channel A' - Input (See Note 1)
Terminal #4	Channel A - Input (See Note 1)
Terminal #5	Channel B' - Input (See Note 1)
Terminal #6	Channel B - Input (See Note 1)
Terminal #7	SP Ground (Quadrature Sensor)
Terminal #8	Sensor Power (Quadrature Sensor)
Terminal #9	SP Ground (Home Sensor)
Terminal #10	Sensor Power (Home Sensor)

NOTE:

1. Encoder wiring shown is for C.W. rotation of *Posidyne* output shaft. If C.C.W. rotation is desired reverse "A" and "B" encoder signals.
2. Encoder Channel "A" must lead Channel "B". Slowly rotate the *Posidyne* output shaft in the proper direction and check to be sure light "A" comes on before light "B". If they don't, reverse the "A" and "B" wires. The **CLPC** will count backwards or give an **E6** Error Code if the wires are backwards.

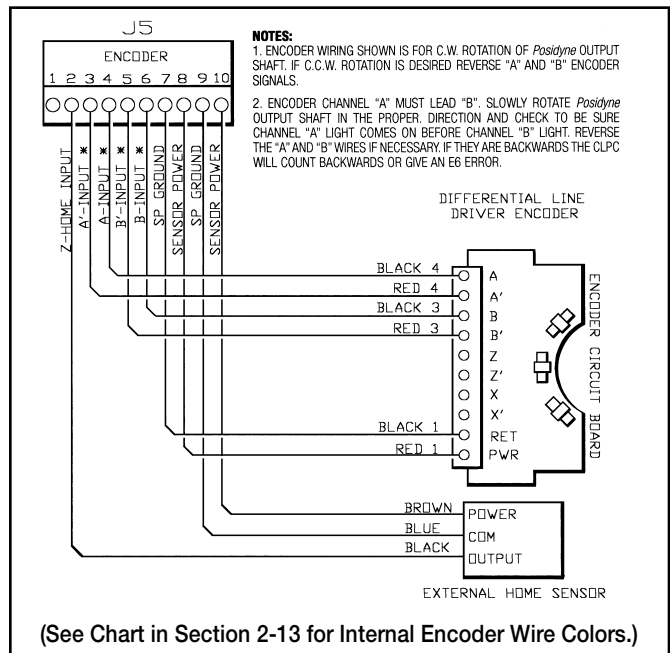


Figure 2.11 - Wiring Diagram - Terminal Block J5
(Differential Line Driver Encoder with Ext. Home Sensor)

If you are using an Optional Junction Box, the previous J5 Terminals will be wired to the Junction Box Terminals.
(See Section 2-16)

2-13 ENCODER AND SENSOR WIRE COLORS

WIRE	OPEN COLLECTOR ENCODER				DIFFERENTIAL LINE DRIVER ENCODER	
	QUAD. SENSOR		HOME SENSOR		INCREMENTAL ENCODER	HOME SENSOR
	(Old)	(New)	External	Internal		External
Power	Red	Red	Brown	Red	Red #1	Brown
Ground	Black	Black	Blue	Black	Black #1	Blue
A	White & Orange	White & Green	---	---	Black #4	---
A'	---	---	---	---	Red #4	---
B	White & Purple	White & Yellow	---	---	Black #3	---
B'	---	---	---	---	Red #3	---
Z	---	---	Black	White	Black #2	Black
Z'	---	---	---	---	Red #2	---

2-14 OPTIONAL JUNCTION BOX TO CLPC CONTROL (With Open Collector Quadrature Encoder)

JUNCTION BOX TERMINAL	FUNCTION	CONNECT TO:	JUNCTION BOX TERMINAL	FUNCTION	CONNECT TO:
1	Clutch Coil, +24 VDC	J3, #10	8	Encoder Channel Z (Home)	J5, #2
2	Clutch Coil, Switched	J3, #9	9	Encoder Power	J5, #8
3	Not Used	---	10	Encoder DC Ground	J5, #7
4	Not Used	---	11	Encoder Channel A or B	*J5, #4 or #6
5	Not Used	---	12	Encoder Channel A or B	*J5, #4 or #6
6	Not Used	---	13	Not Used	---
7	Not Used	---	14	Not Used	---

* See Note Below

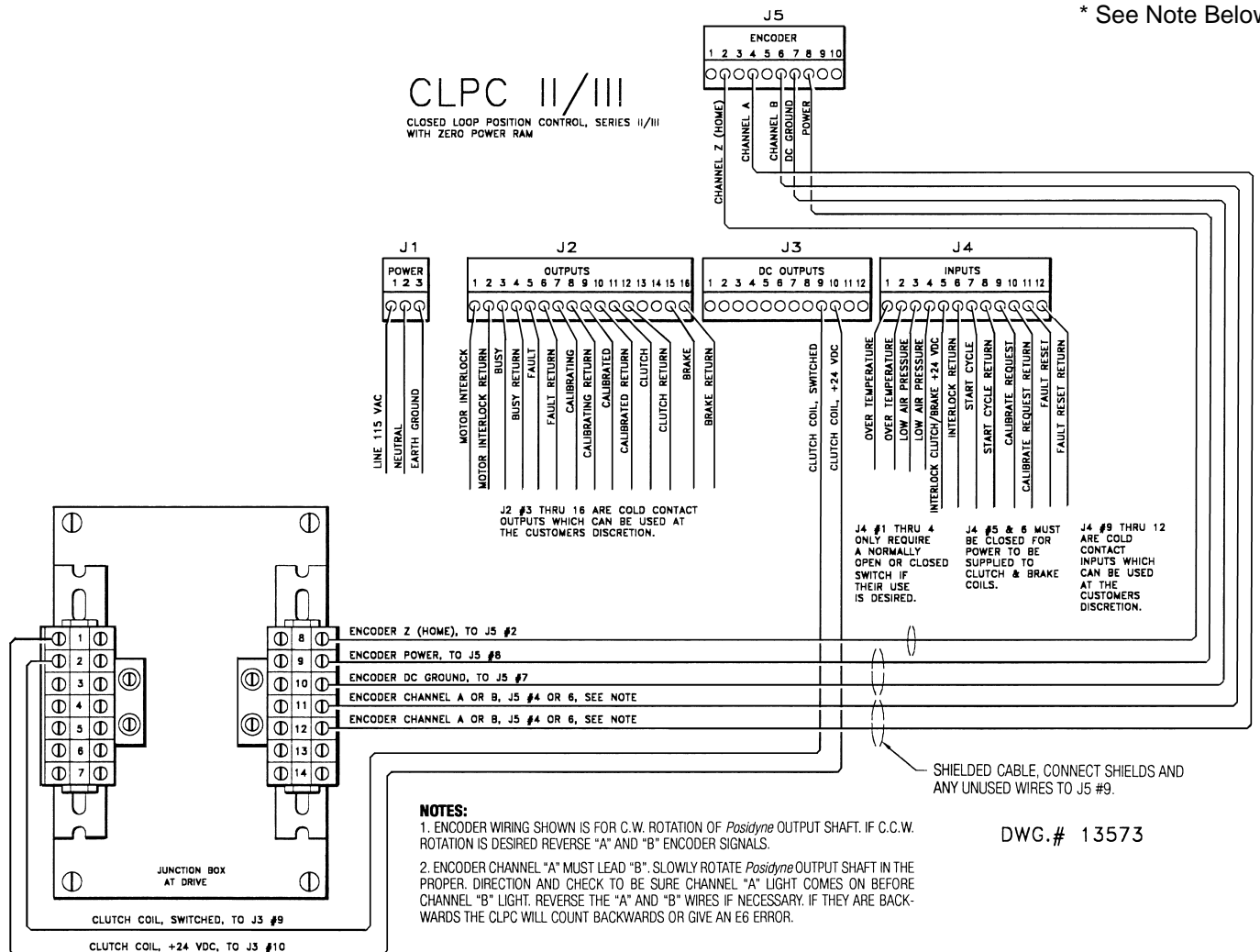


Figure 2.12 - Wiring Diagram - Junction Box to CLPC Control

2-15 JUNCTION BOX TO ACTUATION VALVES AND POSITION ENCODER (Open Collector Quadrature Encoder)

A. With Internal Channel Z (Home Sensor)

JUNCTION BOX TERMINAL	FUNCTION	WIRE COLOR	CONNECTOR PIN NUMBER
(Size 1.5 to 10 Posidyne Clutch/Brake Unit)			
1	Clutch Coil, +24 VDC	White	2
2	Clutch Coil, Switched	Black	1
(Size 11 and 20 Posidyne Clutch/ Brake Unit)			
1	Clutch Coil, +24 VDC	Black	2
2	Clutch Coil, Switched	Red	1
(All Sizes Posidyne Clutch/ Brake Units)			
3	Not Used	---	---
4	Not Used	---	---
5	Not Used	---	---
6	Not Used	---	---
7	Not Used	---	---
8	Encoder Channel Z (Home) Sensor	White	1
9	Encoder Power	Red	2
10	Encoder DC Ground	Black	5
11	Encoder Channel A or B	Green	3
12	Encoder Channel A or B	Orange	4
13	Not Used	---	---
14	Not Used	---	---

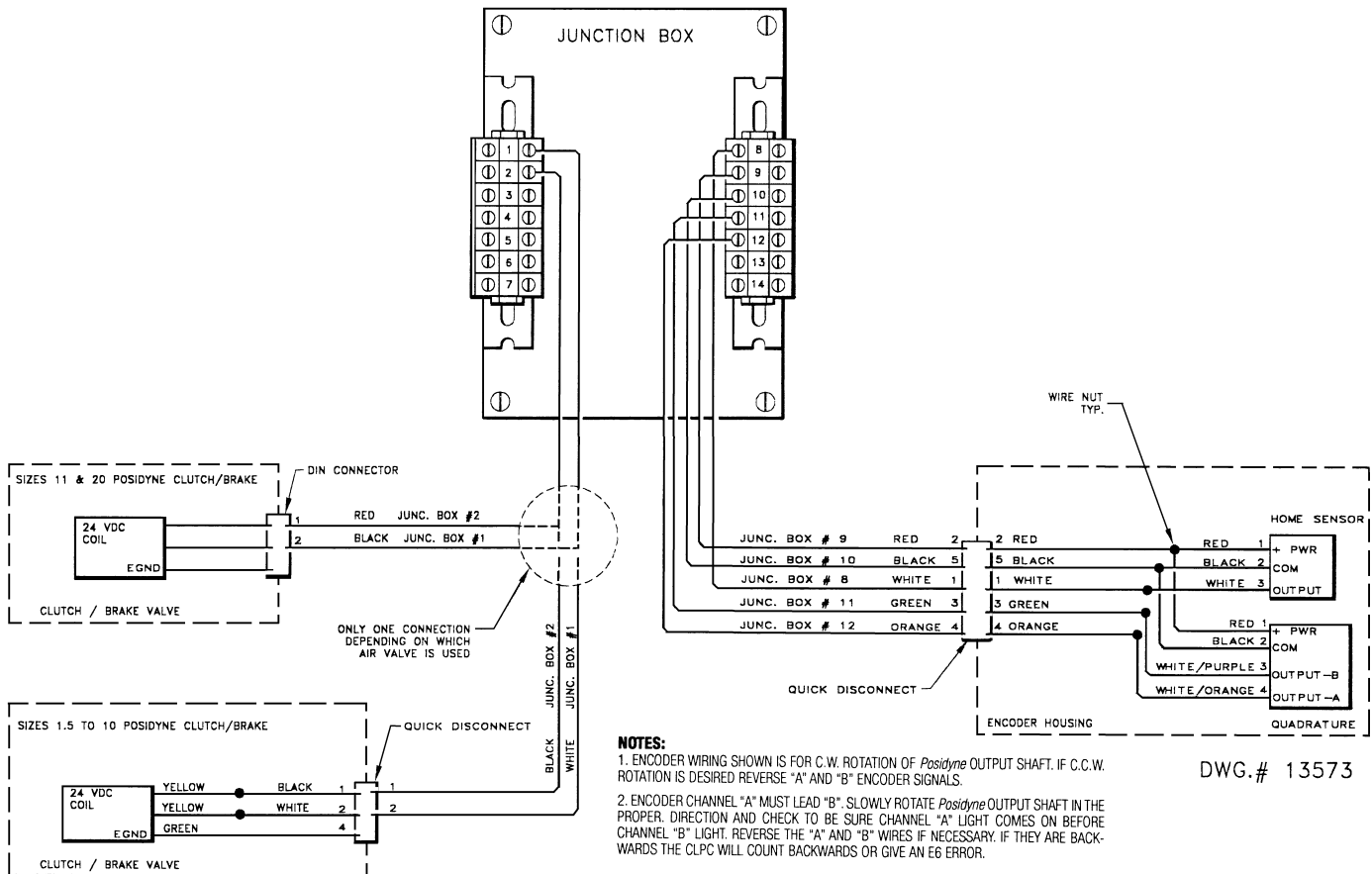
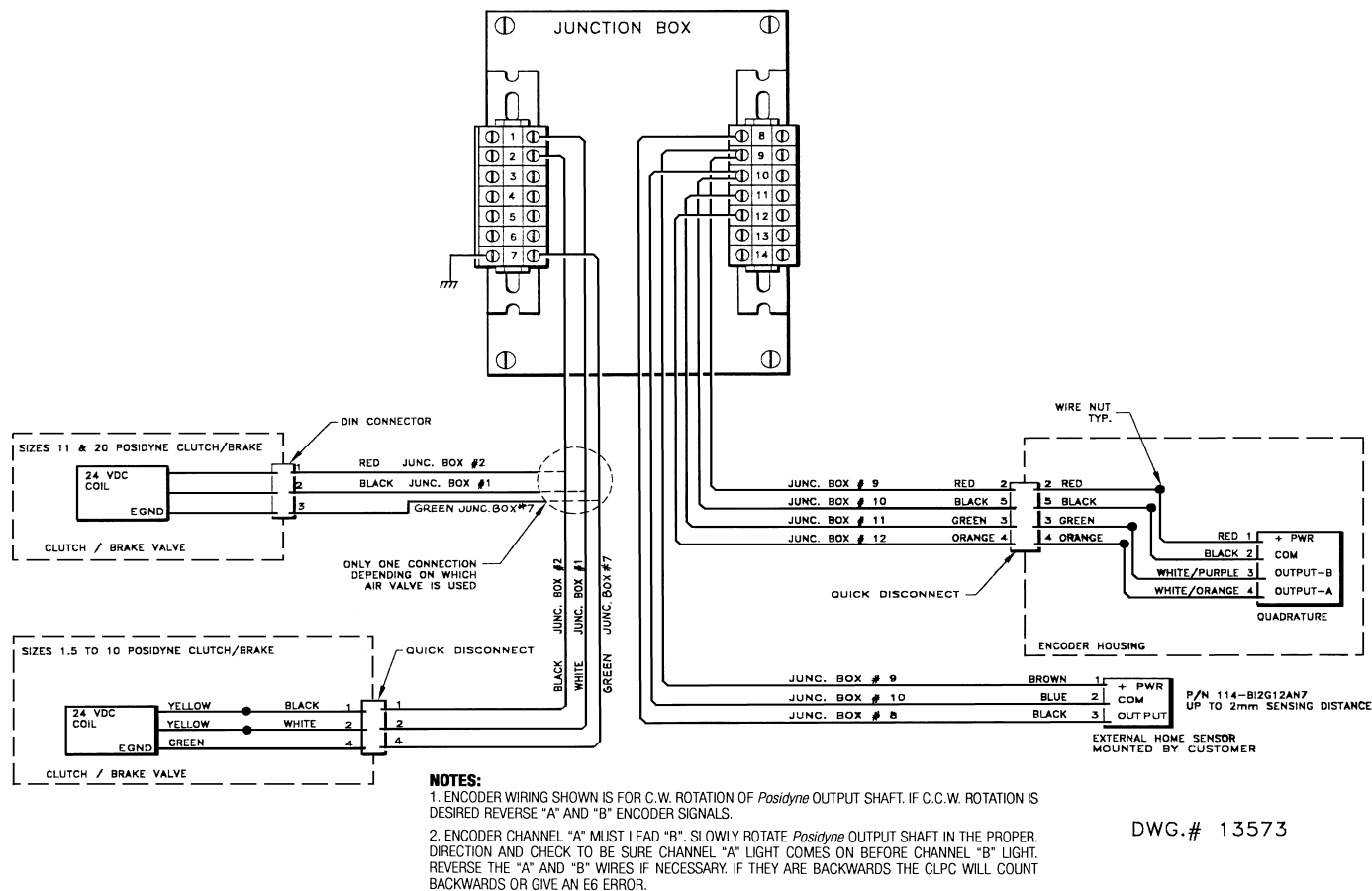


Figure 2.13 - Wiring Diagram - Junction Box to Actuation Valves and Position Encoder (Open Collector Quadrature Encoder with Internal Channel Z Home Sensor)

B. With External Channel Z (Home Sensor)

JUNCTION BOX TERMINAL	FUNCTION	WIRE COLOR	CONNECTOR PIN NUMBER
(Size 1.5 to 10 Posidyne Clutch/Brake Unit)			
1	Clutch Coil, +24 VDC	White	2
2	Clutch Coil, Switched	Black	1
(Size 11 and 20 Posidyne Clutch/ Brake Unit)			
1	Clutch Coil, +24 VDC	Black	2
2	Clutch Coil, Switched	Red	1
(All Sizes Posidyne Clutch/ Brake Units)			
3	Not Used	---	---
4	Not Used	---	---
5	Not Used	---	---
6	Not Used	---	---
7	Not Used	---	---
8	Encoder Channel Z (Home Sensor)	Black	1
9	Quadrature Encoder Power	Red	2
9	Home Sensor Power	Brown	1
10	Quadrature Encoder DC Ground	Black	5
10	Home Sensor DC Ground	Blue	2
11	Encoder Channel A or B	Green	3
12	Encoder Channel A or B	Orange	4
13	Not Used	---	---
14	Not Used	---	---



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Figure 2.14 - Wiring Diagram - Junction Box to Actuation Valves and Position Encoder (Open Collector Quadrature Encoder with External Channel Z Home Sensor)

2-16 JUNCTION BOX TO CLPC CONTROL (With Differential Line Driver Encoder)

JUNCTION BOX TERMINAL	FUNCTION	CONNECT TO CLPC TERMINAL	JUNCTION BOX TERMINAL	FUNCTION	CONNECT TO CLPC TERMINAL
1	Clutch Coil, +24 VDC	J3, #10	9	Encoder Channel Z	J5, #2
2	Clutch Coil, Switched	J3, #9	*10	Encoder Channel A' or B' (Compliment)	J5, #3 or #5
3	Not Used	---	*11	Encoder Channel A or B	J5, #4 or #6
4	Not Used	---	*12	Encoder Channel A' or B' (Compliment)	J5, #3 or #5
5	Not Used	---	*13	Encoder Channel A or B	J5, #4 or #6
6	Not Used	---	14	Encoder & Home Sensor DC Grd.	J5, #7
7	E Ground	---	15	Encoder & Home Sensor Power	J5, #8
8	Encoder Channel Z' (Home, Compliment)	J5, #1	---	Encoder Cable Shields	J5, #9

* See Note Below

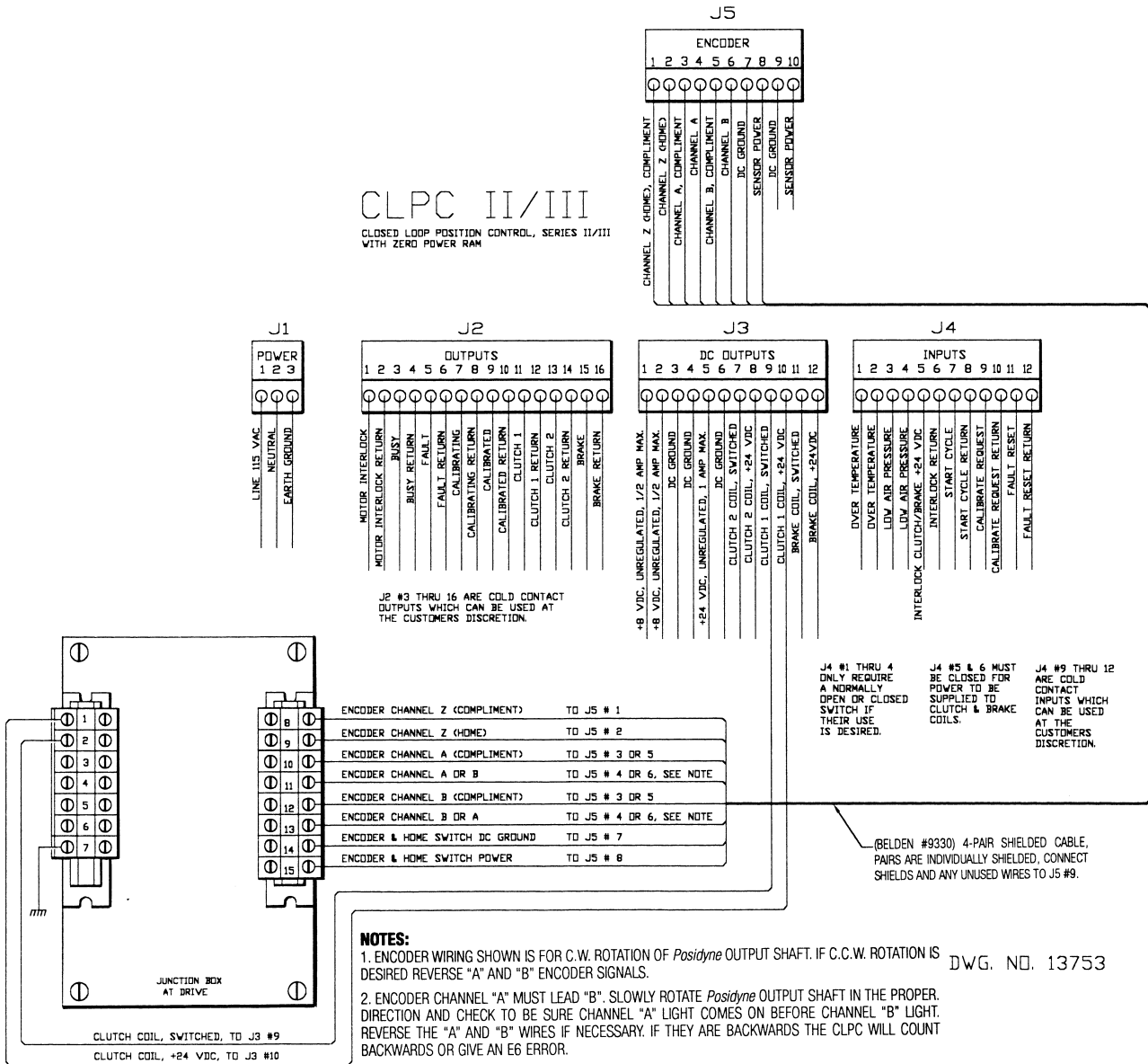


Figure 2.15 - Wiring Diagram - Junction Box to CLPC Control (With Differential Line Driver Encoder)

2-17 JUNCTION BOX TO ACTUATION VALVES AND OPTICAL ENCODER (Differential Line Driver Encoder)

A. With Internal Channel Z (Home Sensor)

JUNCTION BOX TERMINAL	FUNCTION	WIRE COLOR	CONNECT TO TERMINAL
(Size 1.5 to 10 Posidyne Clutch/Brake Unit)			
1	Clutch Coil, +24 VDC	White	2
2	Clutch Coil, Switched	Black	1
(Size 11 and 20 Posidyne Clutch/ Brake Unit)			
1	Clutch Coil, +24 VDC	Black	2
2	Clutch Coil, Switched	Red	1
(All Sizes Posidyne Clutch/ Brake Units)			
3	Not Used	---	---
4	Not Used	---	---
5	Not Used	---	---
6	Not Used	---	---
7	E Ground	Green	4
8	Encoder Channel Z'	Red 2	Z'
9	Encoder Channel Z (Home) Sensor	Black 2	Z
10	Encoder Channel A'	Red 4	A'
11	Encoder Channel A	Black 4	A
12	Encoder Channel B'	Red 3	B'
13	Encoder Channel B	Black 3	B
14	DC Ground	Red 1	Ret
15	Encoder Power	Black 1	Pwr

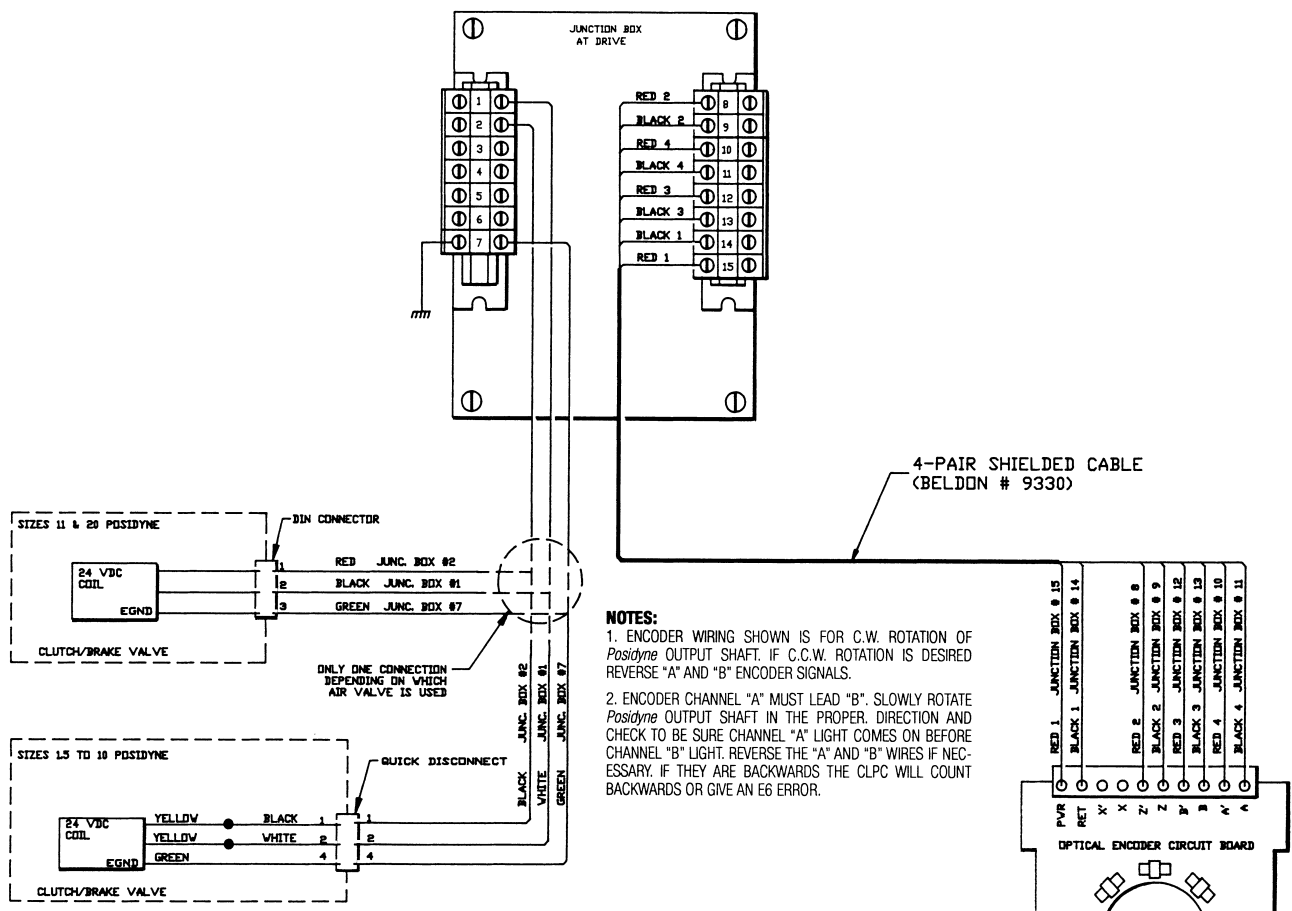


Figure 2.16 - Wiring Diagram - Junction Box to Actuation Valves and Differential Line Driver Encoder (With Internal Channel Z (Home Sensor))

B. With External Channel Z (Home Sensor)

JUNCTION BOX TERMINAL	FUNCTION	WIRE COLOR	CONNECT TO TERMINAL
(Size 1.5 to 10 Posidyne Clutch/Brake Unit)			
1	Clutch Coil, +24 VDC	White	2
2	Clutch Coil, Switched	Black	1
(Size 11 and 20 Posidyne Clutch/ Brake Unit)			
1	Clutch Coil, +24 VDC	Black	2
2	Clutch Coil, Switched	Red	1
(All Sizes Posidyne Clutch/ Brake Units)			
3	Not Used	---	---
4	Not Used	---	---
5	Not Used	---	---
6	Not Used	---	---
7	E Ground	Green	4
8	Not Used	---	---
9	External Channel Z (Home) Sensor	Black	3
10	Encoder Channel A'	Red 4	A'
11	Encoder Channel A	Black 4	A
12	Encoder Channel B'	Red 3	B'
13	Encoder Channel B	Black 3	B
14	Encoder Ground	Black 1	Ret
14	Home Sensor Ground	Blue	2
15	Encoder Power	Red 1	Pwr
15	Home Sensor Power	Brown	1

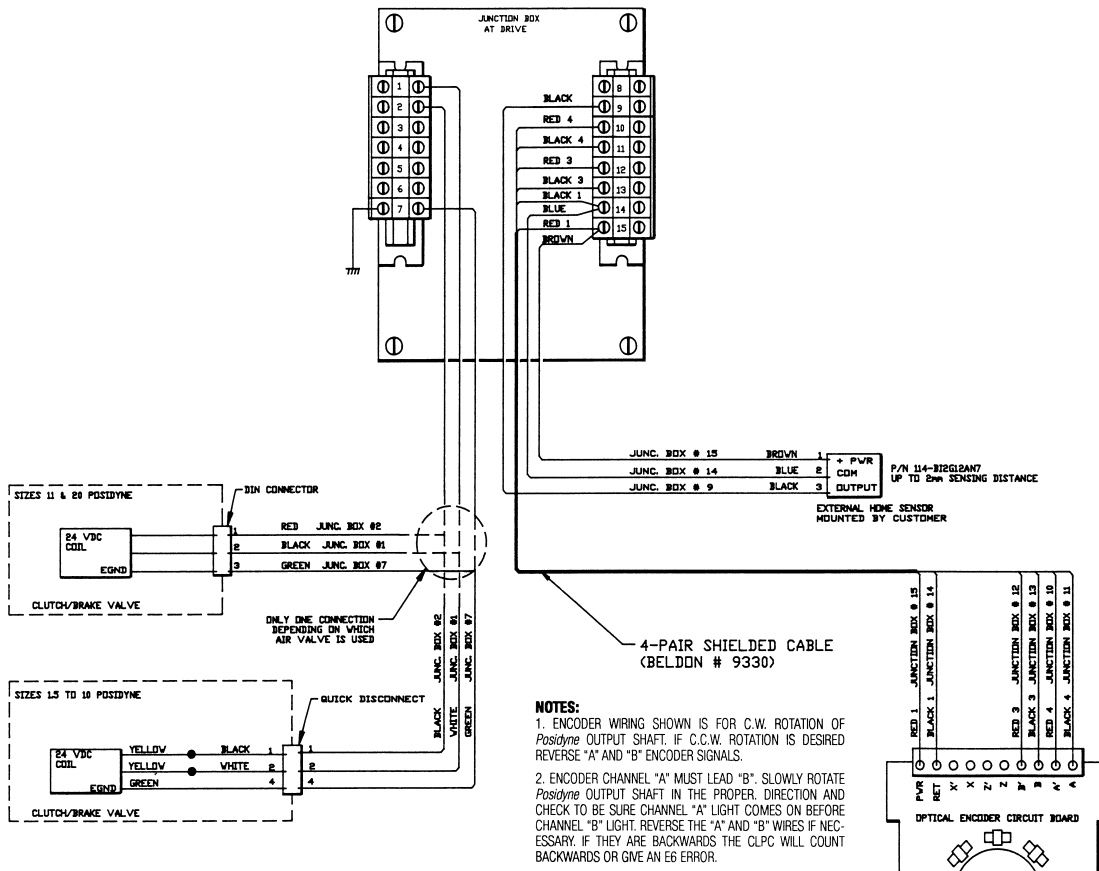


Figure 2.17 - Wiring Diagram - Junction Box to Actuation Valves and Differential Line Driver Encoder (With External Channel Z (Home Sensor))

Section 3

START-UP and OPERATION

3-1 DESCRIPTION OF FRONT CONTROL PANEL

(See Figure 3.1)

A. Displays

1. **Position** - Shows relative position of the **Encoder Counter**. It should theoretically stop at 0. Due to slight variations in stopping position and depending on resolution, it may read 1 or 2 if over and 119 or 118 if under if the Max Count is set to 120.
2. **Trigger Point** - This is the count at which the brake is engaged before the desired stopping point. It is continually adjusted by the Automatic Closed Loop Control. When the Fault light is on an Error Code is indicated in the Trigger Point Display. The installed Software Version will momentarily be displayed when the control is first turned on.
3. **Manual Adjust** - Displays the manual adjustment to the Stopping Point. This adjustment is the number of pulses from the Home (Z Channel) marker.

B. Indicator Lights

1. **On** - Indicates that **Power is ON** and the Selector Switch is in **Hand** or **Auto**.
2. **Calibrate** - Indicates the Control is in the **Calibrating Mode**.
3. **Ready** - Indicates the Control is **Calibrated and Ready for Operation**.
4. **Cycle Start** - Lights when the control gets a Signal to **Start the Cycle**, either from the Jog Switch or Cycle Start Input Relay.
5. **Cycle Run** - Lights when a **Cycle** is in operation.
6. **Clutch On** - Indicates when the **Clutch Solenoid** is energized.
7. **Brake On** - Indicates when the Clutch Solenoid is de energized and the **Brake is On**.
8. **Solenoid Driver Fault** - Indicates that there is a Short or Overload in the Valve Solenoid or Wiring.
9. **Channel A** - Indicates a pulse from "A" Channel of the Quadrature Encoder.
10. **Channel B** - Indicates a pulse from "B" Channel of the Quadrature Encoder.
11. **Home Sensor** - Indicates a pulse from the **Home Sensor** (Z Channel).
12. **Fault** - Indicates a Control Fault. (An Error Code will be displayed in the Trigger Point Display.)
13. **Fault Reset** - Lights when the control sets a Fault Reset signal, either from the RST Button or fault reset input relay.

C. Switches

1. **HAND/OFF/AUTO** - Switch used to select "Hand", "Off" or "Auto" Mode.
2. **JOG** - Used to manually index the control when the selector is in "Hand" Mode.

D. Buttons

1. **CAL** - Used to initiate the **Calibrate Cycle**.
2. **RST** - **Resets the Control** after a Control Fault.
3. **Manual Adjust "UP"** - Adjusts the **Trigger Point** in a Positive Direction.
4. **Manual Adjust "DOWN"** - Adjusts the **Trigger Point** in a Negative Direction
5. **MC-(Max Count)** - Used to set the Total Number of Pulses to complete a Single Index or Cycle.

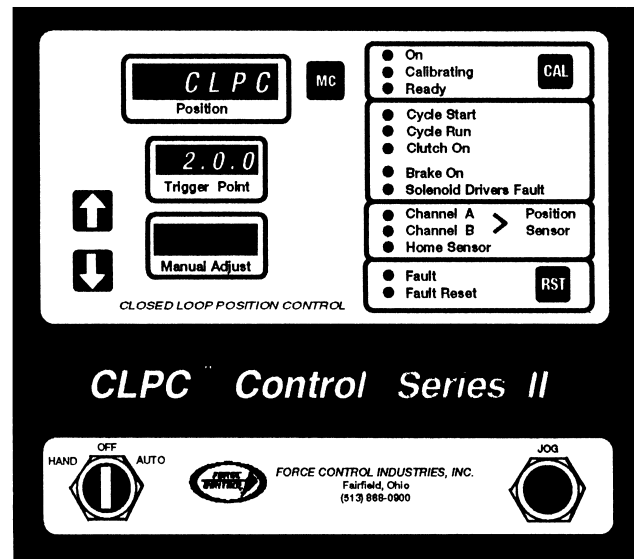


Figure 3.1 - Front Control Panel

3-2 INITIAL SET-UP PROCEDURE

The **CLPC Series II Control** operates by counting pulses from an incremental encoder and when a preset number of pulses (**Max Count +/- Manual Adjust - Trigger Point**) is reached the brake is engaged to stop the drive in position.

A. Setting Max Count

The **Max Count** can only be set or changed by the **UP** and **DOWN** Buttons plus the **MC** Button on the front control panel as described in **STEP #3**.

The **Max Count** is the total number of pulses to complete a single index or cycle. The **Max Count** is determined by the following formula:

1. No. of Encoder Counts x Ratio Setting = Resolution (Pulses per Revolution) (Example: 60 x 2 = 120)
2. Resolution x Revolutions per Index = Max Count (Pulses per Index) (Example: 120 x 10 = 1200)

The proper **Resolution** is critical for accuracy and usability of the control, it should be set to provide accurate positioning, but should not be so high as to over run the control or display such a rapid change of numbers as to be meaningless. **Resolution** can be changed by choosing an encoder which furnishes more or fewer pulses per revolution, or changing the encoder **Ratio Setting** (number of counts per pulse)

STEP #1 (Setting Max Count)

Determine the Ratio Setting for the proper Resolution.

The **CLPC Series II Control** is designed to read a quadrature encoder to count the number of pulses. A quadrature encoder consists of two pickups located at such a position over a toothed gear to read the edge of the tooth out of phase by 1/4 tooth. The **“A” channel** (first pickup) will see the tooth edge first, the **“B” channel** (second pickup) will see the tooth 1/4 tooth later. Therefore the control can be set to read the leading and trailing edge of the teeth by each pickup.

1. Set the Resolution with the **Dip Switch #S1 (Encoder Control)** located in the lower left corner of the CPU board. (See *Ratio Setting Chart and Figure 3.2*).

X1 Mode - Control counts just the leading edge of each tooth.

X2 Mode - Control counts both the leading and trailing edge of each tooth.

X4 Mode - Control counts both the leading and trailing edge of each tooth by each pickup.

X1/n Mode - Control divides the number of pulses by n to reduce the number of counts per revolution. (See the following Note)

Note - In some cases a very high pulses per revolution encoder may be used in which the encoder fractional (X1/n) Ratio Setting may be used to reduce the number of pulses counted by the control.

RATIO SETTING CHART For Dip Switch S1

(0 = OFF 1 = ON)

Div./Mult. Ratio	1	2	3	4	5	6	7
x 4	0	1	0	0	0	1	1
x 2	1	0	0	0	0	1	1
x 1	0	0	0	0	0	1	1
x 1/2	1	1	1	1	1	1	1
x 1/4	0	1	1	1	1	1	1
x 1/6	1	0	1	1	1	1	1
x 1/8	0	0	1	1	1	1	1
x 1/10	1	1	0	1	1	1	1
x 1/12	0	1	0	1	1	1	1
x 1/14	1	0	0	1	1	1	1
x 1/16	0	0	0	1	1	1	1
x 1/18	1	1	1	0	1	1	1
x 1/20	0	1	1	0	1	1	1
x 1/22	1	0	1	0	1	1	1
x 1/24	0	0	1	0	1	1	1
x 1/26	1	1	0	0	1	1	1
x 1/28	0	1	0	0	1	1	1
x 1/30	1	0	0	0	1	1	1
x 1/32	0	0	0	0	1	1	1
x 1/34	1	1	1	1	0	1	1
x 1/36	0	1	1	1	0	1	1
x 1/38	1	0	1	1	0	1	1
x 1/40	0	0	1	1	0	1	1
x 1/42	1	1	0	1	0	1	1
x 1/44	0	1	0	1	0	1	1
x 1/46	1	0	0	1	0	1	1
x 1/48	0	0	0	1	0	1	1
x 1/50	1	1	1	0	0	1	1
x 1/52	0	1	1	0	0	1	1
x 1/54	1	0	1	0	0	1	1
x 1/56	0	0	1	0	0	1	1

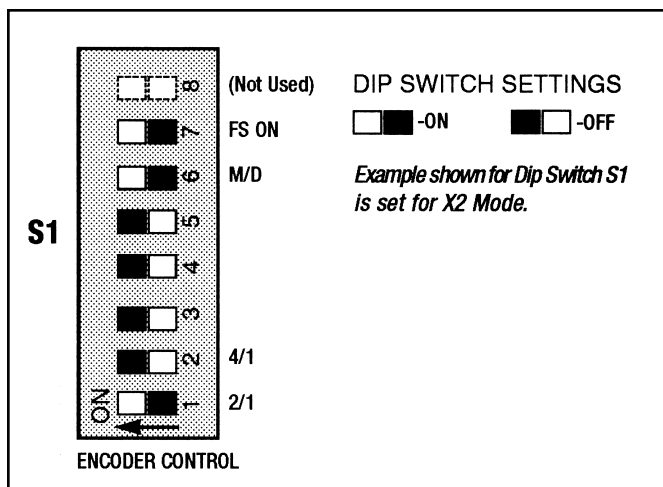


Figure 3.2 - Dip Switch S1 (Example)

STEP #2 (Setting Max Count)

Next determine the **Number of Revolutions or Partial Revolutions the Encoder will turn in one index**. If the encoder is not on the final drive shaft, the ratio between the final drive shaft and the encoder will have to be determined. Multiply the amount of rotation at the final drive shaft times the ratio of the Drive to determine the amount of rotation of the encoder.

This is multiplied by the **Number of Pulses per Revolution**, then times the **Ratio Setting** which determines the **Max Count**. In many cases a 60 tooth pulse gear is used

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and a **Ratio Setting of (x 2)**, which would give a Count of 120 pulses per revolution. (See Example)

Example:

Number of teeth on Encoder - 60

Ratio Setting - x2

Number of Revolutions per Index - 10

Max Count = 60 x 2 x 10 = 1200 Pulses

Pulses per Revolution			Posidyne Sizes
X1	X2	X4	
OPEN COLLECTOR QUADRATURE ENCODER			
60	120	240	01, 1.5, 02, 2.5, 03, 05, 10, 11
90	180	360	20
DIFFERENTIAL LINE DRIVER ENCODER			
60	120	240	01, 1.5, 02, 2.5, 03, 05
90	180	360	10, 11, 20

STEP #3 (Setting Max Count)

1. Set the **Max Count** on the front of the control using the “UP” and “DOWN” Buttons plus the “MC” Button. Push and hold the “MC” Button down while pushing the “UP” or “DOWN” Button to set the **Max Count** in the “POSITION” Display. (See Figure 3.4)

NOTE: When holding the buttons down the numbers will accelerate, facilitating large changes in the count.

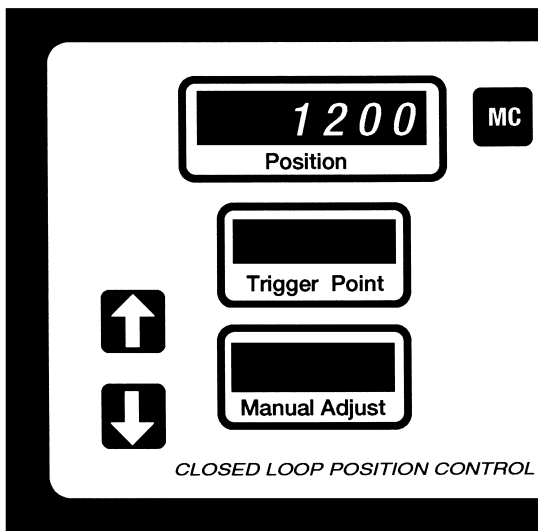


Figure 3.3 - Setting Max Count

B. Set Watch Dog Timer (Dip Switch #S4)

The Watch Dog Timer is an internal device which will stop the drive if the cycle is not completed within a set amount of time. This feature is used to protect the clutch and other downstream equipment. When the **Set Time** is exceeded, the control will end the cycle, which will release the clutch, engage the brake and if the motor interlock system is used, turn off the motor. This timer should be set at a time slightly greater than the longest cycle required.

The Watch dog Timer is set with dip switches on S4. The control is factory set for 300 mS. (Only Sw. #3 is turned on.) This time can be adjusted from 100 mS to 1 Minute. (See Watch Dog Timer Chart and Figure 3.4)

1. Determine the time required to complete an index.
2. Set the dip switches on S4 to a time slightly greater than one complete index.

WATCH DOG TIMER CHART

(0 = OFF 1 = ON)

TIME	1	2	3	4
100 mS	0	0	0	0
150 mS	1	0	0	0
200 mS	0	1	0	0
250 mS	1	1	0	0
300 mS	0	0	1	0
400 mS	1	0	1	0
500 mS	0	1	1	0
750 mS	1	1	1	0
1 Sec.	0	0	0	1
2.5 Sec.	1	0	0	1
5 Sec.	0	1	0	1
7.5 Sec.	1	1	0	1
15 Sec.	0	0	1	1
30 Sec.	1	0	1	1
45 Sec.	0	1	1	1
1 Min.	1	1	1	1

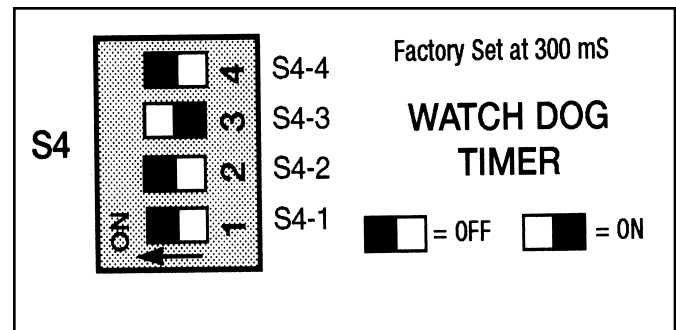


Figure 3.4 - Watch Dog Timer Dip Switch S4

C. Setting Control Mode (Dip Switch #S5)

Dip Switch Functions

- **Standard CLPC Mode, One index per cycle input.**
All switches **OFF**
- **PosiWeave Mode**
Switch 1 **ON**
Switches 2, 3 and 4 **OFF**
- **CLPC Mode, Run until cycle start input is turned off, then engage brake at next trigger point. (Lathe application)**
Switch 2 **ON**
Switches 1, 3 and 4 **OFF**
- **Standard CLPC with IP/PLS, One index per cycle input.**
Switch 1 and 2 **ON**
Switch 3 and 4 **OFF**

- **CLPC Mode with IP/PLS, Run until cycle start input is turned off, then engage brake at next trigger point.**
Switch 3 **ON**
Switches 1, 2 and 4 **OFF**

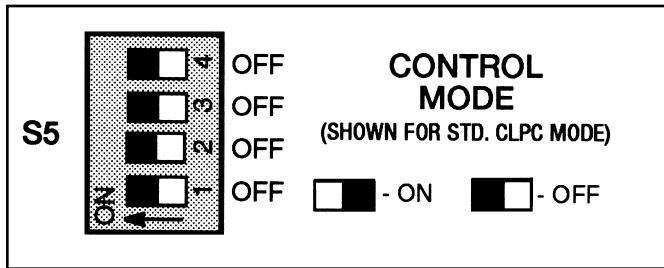


Figure 3.5 Setting Dip Switch S5 (Control Mode)

D. Setting Misc. Functions (Dip Switch #S2)

- 1 = **OFF** - Search for home for initial calibration.
ON - Skip home search for initial calibration. (for relative positioning applications.)
- 2 = **OFF** - CLPC
ON - Home signal is externally synchronized.
- 3 = **OFF** - Emergency/Fault Stop in position.
ON - Emergency/Fault Stop immediately.
- 4 = **OFF** - Must calibrate before ready when powered up.
ON - Force ready when powered up.
- 5 = **OFF** - Zero position when powered up.
ON - Use last known position when powered up.
- 6 = **OFF** - Trigger Point calculation only includes pulses while stopping.
ON - Trigger Point calculation includes pulses while stopping and any other movement until the next cycle starts.

- 7 = **OFF** - Use 5 index count averaging for trigger point.
ON - Use 10 index count averaging for trigger point.
- 8 = **OFF** - Calibrate in low speed only. (CLPC III)
ON - Calibrate with dual speed profile. (CLPC III).

E. Setting Misc. Functions (Dip Switch #S3)

- 1 = **OFF** - PLS is locked to home position.
ON - PLS is relative to home position (Moves with Manual Adjust).
- 2 = **OFF** - PLS is active in Auto mode only
ON - PLS is active in Hand, Off and Auto mode.
- 3 = **OFF** - Stall Detection disabled.
ON - Stall Detection enabled.
- 4 = Stall Detection Enable Delay at start of cycle.
OFF - 100 ms (Should work for most applications.)
ON - 250 ms
- 5 = Not defined.
- 6 = Not defined.
- 7 = Not defined.
- 8 = Not defined.

F. Resetting the CLPC Series II Control

(See Figure 3.6)

Whenever any changes are made to the Dip Switch Settings the control will need to be **Reset**. Press the **Reset Button on the CPU Board** to reset the control.

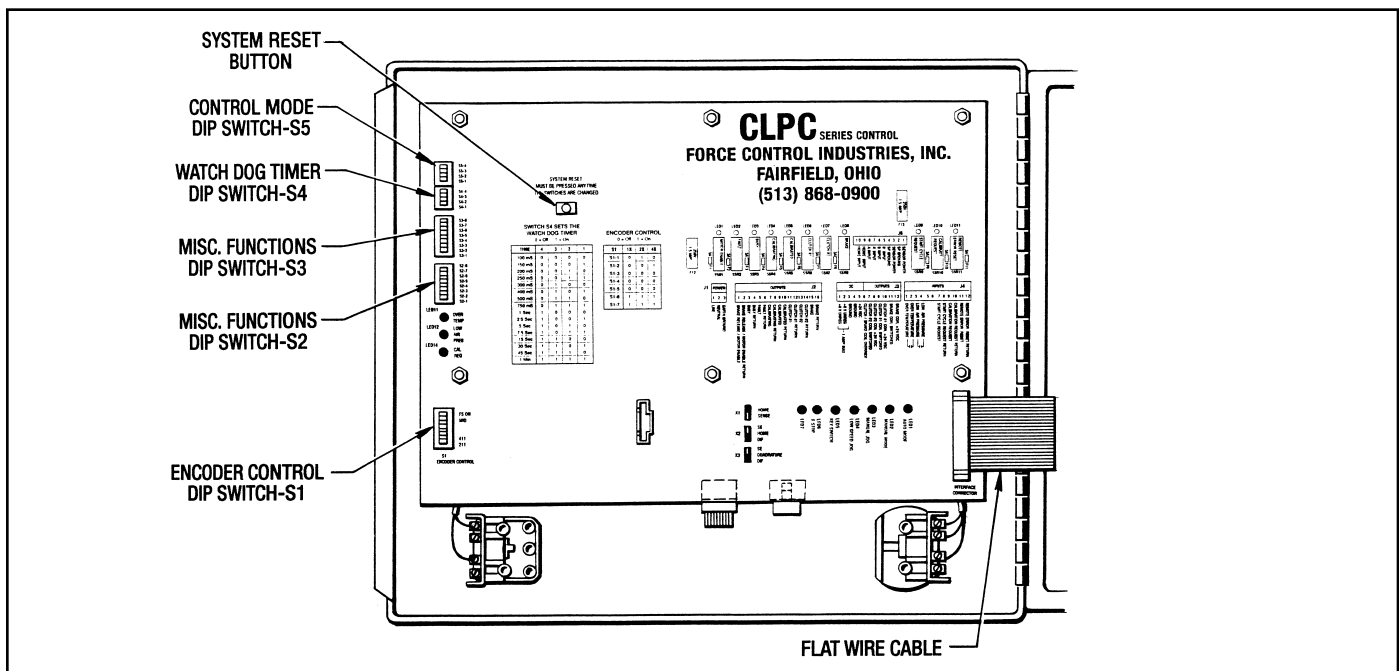


Figure 3.6 - CPU Board Component Location

G. Setting the Jumpers

1. **X1** (On CPU Board)
This Jumper controls whether the "Home" LED on the front panel is normally ON or OFF. (See Page 36)
2. **X2 and X3** (On CPU Board)
These Jumpers select whether the Encoder Channels are Single Ended or Differential Line Driver Inputs. (See Page 36)
3. **JP1 to JP11** (On Power Supply Board)
These Jumpers are for the (11) possible Solid State Relays. They are for N.C. or N.O. operation of the relays. (See Page 37)
4. **JP12 and JP13** (On Power Supply Board)
These determine a N.C. or N.O. operation of the High Temperature Switch and Low Air Pressure Switch. (See Page 37)
5. **JP14** (On Power Supply Board)
This Jumper sets the Encoder Power. Set to 5VDC for a Differential Line Driver Encoder using an Internal Z (Home) Channel. Set to 12VDC for a Differential Line Driver Encoder using an External Z (Home) Channel or an Open Collector Quadrature Encoder. (See Page 37)

3-3 DESCRIPTION OF CALIBRATION METHODS

As with any Positioning Control the system initially needs to be calibrated to relate the electronic system with the mechanical system. This is done by establishing a **Trigger Point**, which is the number of pulses at which the brake is energized to stop the drive at the required position.

A Home Sensor is used to indicate to the control where the Home Position is located. In operation the Home Sensor Pulse (Z Channel) re-zeros the position. In other words the control begins counting from the Home Sensor Pulse (Z Channel) on each index. This eliminates the possibility of accumulated error. The **Manual Adjust** is used to move the actual stop position the required number of pulses from the home position, either positive or negative. Therefore with a positive 10 pulses in the manual adjust the drive should stop at 10. If a home sensor pulse (Z Channel) is not seen, the control will re-zero when max count is reached.

Position Error is detected by comparing the required stop position against the actual stop position. The required stop is Max Count plus or minus Manual Adjust.

Example: With Manual Adjust set at 0 the required stop is at 0. With Manual Adjust set at +10 the drive should stop at 10. If the actual stop is 11 an error of +1 pulse is fed into the correction system.

A. Finding Home Position

In order for the control to find the Home Position it must be Calibrated. The Calibration Procedure runs the drive until a signal is received from the home sensor. At this point the CLPC will perform one complete index. The control determines how many pulses were required for the drive to stop and adjusts the Stop Signal Position "Trigger Point" to cause the drive to stop at the Home Position. The second index will run to the Trigger Point, at which point the brake will engage stopping the drive in position. This position will be related to the Home Position by the number of pulses set in the Manual Adjust.

B. Forced Ready

NOTE: On initial system set-up and start-up this option should not be used. Initial calibration is required for the CLPC to learn its environment.

"Forced Ready" is an option that allows the unit not to require calibration each time it is powered up. It is controlled by setting Dip Switch #S2-4.

If Dip Switch #S2-4 is in the "OFF" position, only the green **ON** LED will illuminate when the CLPC is powered up and placed in **HAND**. The calibration procedure (See Section 3-4) will have to be followed to place the control in the **READY** state and illuminate the green **READY** LED. This is the proper mode for initial set-up.

Once the unit has been initially calibrated and it is desired to use this option, the #S2-4 Dip Switch can be placed in the "ON" position. At this point if power is lost or the CLPC is reset by the internal Reset Button, it will return the **READY** state when restored.

IMPORTANT:

When using the **FORCED READY** function, it is recommended that Dip Switch S2-5 be placed in the "ON" position. With S2-5 ON the CLPC will power up to its last known position. This would be a true **FORCED READY** state. If S2-5 was left in the OFF position, the CLPC would come up ready but reset the position to zero regardless of position when powered down.

3-4 CALIBRATION PROCEDURE

(See Figure 3.1 or 4.1 for Front Control Panel)

1. Press the internal Reset Button.
2. Adjust the air pressure to the Clutch and Brake . (See Clutch/Brake Manual for proper pressure settings.)
3. Check to see if all personnel are free and clear of the operating equipment. Unlock and turn the power **ON** to the drive motor and control. The Software Version installed in your system will temporarily show in the Trigger Point Display.
4. Set the **Manual Adjust to 0** using the **UP** and **DOWN** Buttons.

5. Turn the **HOA** Switch to **HAND** position. If you are using the Motor Interlock System the drive motor or motors should come on. The green **ON** light should come on.
6. Push the **CAL** Button . The clutch engages and will run until it receives a Home Pulse (Z Channel) that will re-zero the control position and will perform one full index from that point.
7. Push the **CAL** Button a second time. The Drive will index and should stop in position. The green **READY** Light should come on and the **POSITION** Display should show "0". **NOTE:** Zero will not be displayed if the Manual Adjust is not set to "0".

NOTE: If the control has a new CPU board that has never been calibrated the **CAL** Button will have to be pushed 3 times.

8. Jog the machine several times with the **JOG** Button.

3-5 SET MANUAL ADJUST

(See Figure 4.1 for Front Control Panel)

The Manual Adjust allows the operator to adjust the Stop Position to some position before or after the Home Sensor Position. It is set in pulses of the encoder and can be positive or negative. A negative setting stops the drive

before the Home Sensor Position and a positive setting stops the drive after the Home Sensor Position. **NOTE:** A setting in the **Manual Adjust** increases or decreases the number in the **Trigger Point Display** by the same amount. Also the number in the **Position Display** will be adjusted by the same amount on the next stop.

The Manual Adjust can be changed without stopping the drive, however the changes will not be accepted while the control is busy.

1. Push the **UP** Button to enter a positive number and the **DOWN** Button to enter a negative number.

The adjustment range is plus or minus 1/4 of Max Count, or plus or minus 1999 which ever is less.

3-6 AUTOMATIC OPERATION

(See Figure 4.1 for Front Control Panel)

The CLPC Series II Control is now ready for Automatic Operation.

1. Turn the **HOA** Switch to **AUTO**. The motors should be running and the brake on.
2. When a Start Signal is received the drive will index to position, stop and wait for the next Start Signal.

Section 4 TROUBLESHOOTING

Trouble shooting the CLPC Control Series II is greatly simplified due to Indicator Lights and Error Codes built into the Front Control Panel. (See Figure 4.1) Section 4-1 describes the Front Control Panel and Section 4-2 describes the "Error Codes" shown in the "Trigger Point" Display. Corrective measures are also given to correct the "Fault" for each "Error Code".

4-1 DESCRIPTION OF FRONT CONTROL PANEL

A. DISPLAYS

1. **Position** - Shows relative position of the Encoder Counter. It should theoretically stop at 0. Due to slight variations in stopping position and depending on resolution, it may read 1 or 2 if over, and 119 or 118 if under. (Only if Max Count is set to 120.)
2. **Trigger Point** - This is the count at which the brake is engaged before the desired stopping point. It is continually adjusted by the Automatic Closed Loop Control. When the Fault light is on an Error Code is indicated in the Trigger Point Display. The installed Software Version will momentarily be displayed when the control is first turned on.

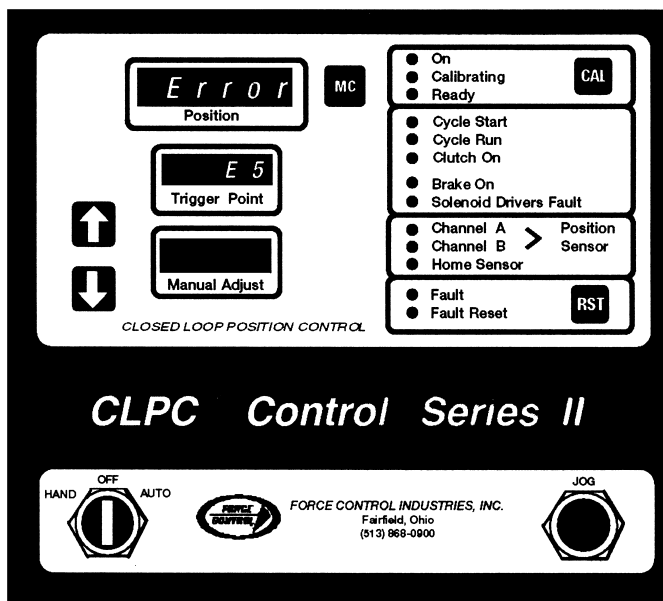


Figure 4.1 - Front Control Panel

-
-
3. **Manual Adjust** - Displays the manual adjustment to the Stopping Point. This adjustment is the number of pulses from the Home (Z Channel) marker.

B. INDICATOR LIGHTS

1. **On** - Indicates power is on to the CLPC Series II Control and the **H-O-A** Switch is in **Hand** or **Auto**.
2. **Calibrating** - Indicates the control is in the Calibrating Mode.
3. **Ready** - Indicates that the control is calibrated and ready for operation.
4. **Cycle Start** - Lights when the control gets a signal to start the cycle either from the "JOG" switch or PLC input.
5. **Cycle Run** - Lights while the cycle is in operation.
6. **Clutch On** - Indicates that the Clutch Solenoid is energized.
7. **Brake On** - Indicates that the Clutch Solenoid is de-energized.
8. **Solenoid Driver Fault** - Indicates that there is a short or overload in the valve solenoid or wiring.
9. **Channel "A"** - Indicates a pulse from "A" channel of the Quadrature Encoder.
10. **Channel "B"** - Indicates a pulse from "B" channel of the Quadrature Encoder.
11. **Home Sensor** - Indicates a pulse from the Home Sensor (Z Channel).
12. **Fault** - Indicates a Control Fault.
13. **Fault Reset** - Indicates that the Fault Reset Button is pushed.

C. SWITCHES

1. **HAND/OFF/AUTO** - Switch used to select "Hand", "Off" or "Auto" mode.
2. **JOG** - Used to manually index the control when selector is in "Hand" mode.

D. BUTTONS

1. **CAL** - Used to initiate the Calibration Cycle.
2. **RST** - Resets error after Control Fault.
3. **Manual Adjust "UP"** - Adjusts Stopping Position in a positive direction.
4. **Manual Adjust "DOWN"** - Adjusts Stopping Position in a negative direction.
5. **MC (Max Count)** - Used to set the total number of pulses to complete a single index or cycle

NOTE- The Manual Adjust can be adjusted in a positive or negative direction up to 1/4 of the total cycle or 1999 which ever is less.

4-2 ERROR CODES

1. **Error Code "E-1"** - Solenoid driver overload. Usually caused by a short in the valve solenoid or wiring.
Correction:
 - (a) Check and/or replace wiring.
 - (b) Check and /or replace valve or solenoid.
 - (c) Verify that **Remote Reset** is not active during "Power UP".
2. **Error Code "E-2"** - Indicates an over temperature condition in the *Posidyne* Clutch/Brake Unit.
Correction:
 - (a) Check for overheating in the *Posidyne* and correct problem. (See *Posidyne* Service Manual)
3. **Error Code "E-3"** - Low air pressure.
Correction:
 - (a) Check the air pressure with the optional Low Pressure Switch or Pressure Gauges on the Accumulator and correct any problems. (See *Posidyne* Service Manual)
4. **Error Code "E-4"** - Watchdog Timer expired.
Correction:
 - (a) Push "RST" Reset on front control panel.
 - (b) If tripping continues, check #S4 Dip Switch settings.
5. **Error Code "E-5"** - Count set to equal 1 or 0. (Count cannot equal 1 or 0)
Correction:
 - (a) Reset Max Count to a value greater than 1.
6. **Error Code "E-6"** - The counts required to stop is greater than the total cycle counts.
Correction:
 - (a) Increase the total cycle time or shorten the stopping time to be less than the total cycle.
 - (b) Channel A and B of encoder may be backwards. Swap A and B channel wires if necessary.
7. **Error Code "E-7"** - High Speed Interrupt (Pulses per Second too high). Maximum allowable counts per second of Pulse Counter is 7200 counts per second.
Correction:
 - (a) Set ratio or change Encoder to reduce maximum counts per second to be less than 7200.
8. **Error Code "E-8"** - Calibration data invalid.
Correction:
 - (a) Control needs to be Re-Calibrated (See Section 3-3).
9. **Error Code "E-9"** - Mode changed to **OFF** while in motion or calibrating.
Correction:
 - (a) Turn **HOA** Switch to **Hand** or **Auto** Position.
10. **Error Code "E-10"** - Twists per Picket = 0 (*PosiWeave Only*)

11. **Error Code "E-11"** - Emergency Stop.

Correction:

(a) Reset **Emergency Stop** button. (CLPC III only.)

12. **Error Code "E-12"** - Undefined Model selected by Dip Switch.

Correction:

(a) Correct dip switch settings.

13. **Error Code "E-43"** - Stall Detection - Failure to start.

Correction:

(a) Check to be sure machine is not jammed.

(b) Check to be sure motor is running and Posidyne input rotating.

(c) Check air supply to control valve.

14. **Error Code "E-44"** - Stall Detection - Stall occurred while clutch was engaged.

Correction:

(a) Check to be sure machine is not jammed.

(b) Check to be sure motor is running and Posidyne input rotating.

(c) Check air supply to control valve.

15. **Error Code "E-50"** - Stack Overflow

Correction:

(a) Replace CPU board.

16. **Error Code "E-51"** - Stack Under flow

Correction:

(a) Replace CPU board.

17. **Error Code "E-52"** - Software Timer 0 Interrupt Request missing.

Correction:

(a) Replace CPU board.

18. **Error Code "E-53"** - Software Timer 1 Interrupt Request missing.

Correction:

(a) Replace CPU board.

19. **Error Code "E-54"** - Software Timer 2 Interrupt Request missing.

Correction:

(a) Replace CPU board.

20. **Error Code "E-55"** - Software Timer 3 Interrupt Request missing.

Correction:

(a) Replace CPU board.

21. **Error Code "E-56"** - Power Unsafe, or Manual Reset, or Watch Dog Timer timed out.

Correction:

(a) Reset error.

(b) Replace CPU board if problem persists.

22. **Error Code "E-80"** - Software changed, proceed at your own risk. (*E-Prom software was changed from one version to another.*)

Correction:

(a) Push **Reset** button on CPU board.

(b) Re-calibrate.

(c) Replace CPU board if calibration does not fix problem.

23. **Error Code "E-81"** - Configuration trashed, default loaded.

Correction:

(a) Push **Reset** button on CPU board.

(b) Re-calibrate.

(c) Replace CPU board if calibration does not fix problem.

24. **Error Code "E-82"** - Counters trashed, set to zero.

Correction:

(a) Push **Reset** button on CPU board.

(b) Re-calibrate.

(c) Replace CPU board if calibration does not fix problem.

25. **Error Code "E-83"** - Saved position invalid, set to zero.

Correction:

(a) Push **Reset** button on CPU board.

(b) Re-calibrate.

(c) Replace CPU board if calibration does not fix problem.

26. **Error Code "E-84"** - DIP Switch settings changed.

Correction:

(a) Push **Reset** button on CPU board.

(b) Re-calibrate.

(c) Replace CPU board if calibration does not fix problem.

4-3 TROUBLE SHOOTING AREAS

Trouble shooting the CLPC Control Series II is divided into (5) five areas based on the symptoms. The basic areas are:

A. DRIVE WILL NOT INDEX

B. DRIVE STOPS OUT OF POSITION (Same position each time.)

C. DRIVE STOPS OUT OF POSITION (Different position each time.)

D. DRIVE DOES NOT STOP

A. DRIVE WILL NOT INDEX

1. CLPC Control Series II “ON” Light not on.

- (a) Turn H-O-A switch to “HAND” or “AUTO”
- (b) Check main power to control.
- (c) Check the AC Fuse and the DC Fuse and replace if necessary.

2. “Ready” Light not on.

- (a) Unit not calibrated. Run calibration cycle
- (b) If control will not calibrate, continue check list.

3. “Fault” light on and “Error Code” in TRIGGER POINT Display.

- (a) Push “RST” button on front control panel. If this does not correct the problem, push the “Fault Reset” button inside front cover. Then push the “RST” button on front control panel again
- (b) If this does not clear the Fault, check the Error Codes in Section 4-2.

4. “Solenoid Driver Fault” light on. (Usually caused by a short in the wiring or a valve solenoid failure.)

- (a) Refer to Section 4-2 Error Codes "E-1" for more information.

5. “Cycle Start” light does not come on when signal is initiated. This indicates that the Control is not receiving a signal from the PLC.

- (a) Check the PLC output and wiring.
- (b) Check Fuse #F9.
- (c) Be sure correct input relay is installed.
- (d) Check to be sure that voltage is being applied to relay.

6. “Cycle Run” light stays on continuously. Drive skips an index in high cycle applications. Indicates a new start signal was received before the drive completed the previous cycle. The control can not receive a new start signal until the previous cycle is complete. The “Cycle Run” light should turn off after each cycle. To correct this problem:

- (a) Reduce the Cycle Rate of the machine.
- (b) Speed up the drive to reduce Cycle Time.
- (c) Increase air pressure to reduce Cycle Time.
- (d) Decrease PLC Scan Time.

7. Motor not running.

- (a) Check the drive motor, relay, fuses, motor starter and interlock. Correct any problem and re-start.

8. Clutch does not engage.

- (a) Check air pressure. (See All Products Catalog for Torque vs. Pressure Information.)

- (b) Check the Solenoid Valve for proper operation and replace if necessary.

- (c) Check the air lines for any leaks. Repair leaks or fittings.

- (d) Check and drain the water out of the Accumulators.

9. Watchdog Timer times out and shuts off control.

- (a) Push “RST” Reset on front panel. If tripping continues check Dip Switch setting.

B. DRIVE STOPS OUT OF POSITION (Same position each time.)

1. Caused by machine not aligned with the Home Position.

- (a) Realign with the Home Position.

2. Caused by a setting in the Manual Adjust.

- (a) Set Manual Adjust back to zero. **NOTE:** Manual Adjust will remain in the system even if the control is off, and is used when re-calibrated.

C. DRIVE STOPS OUT OF POSITION (Different position each time.)

1. Count or rotation does not equal the correct amount of rotation of the driven machine.

- (a) Check count and ratio to assure that the number of revolutions at the Encoder equals the desired degree of rotation of the driven machine.

2. Quadrature Encoder counting error.

- (a) Check wiring for shorts, breaks, etc.
- (b) Encoder wires not properly shielded or not isolated from high voltage wires. (See Section 2-6, 2-7 and 2-8 for proper installation.)
- (c) Encoder direction not correct. Check sequence of channel A and B lights. (See Section 3, START-UP)

D. DRIVE DOES NOT STOP

1. Brake does not engage.

- (a) Check air pressure. (See All Products Catalog for Torque vs. Pressure Information.)
- (b) Check Solenoid Valve for proper operation and replace if necessary.
- (c) Check Brake Release Valve for proper operation and replace if necessary.
- (d) Check air lines for leaks. Repair leaks or tighten fittings.
- (e) Check and drain water out of the accumulators.

2. Brake on - light does not come on.

- (a) Call factory.

Section 5

REPAIR and REPLACEMENT

5-1 REMOVAL OF OPEN COLLECTOR QUADRATURE ENCODER ASSEMBLY

(See Figure 6.3)

The Output Drive Belt and Drive Sheave or Coupling must first be removed from the *Posidyne* Output Shaft.

1. Remove the 5-Pin quick disconnect cable from the Pick-Up Assembly.
2. Remove the Housing Cover (#253) by taking out the (4) Screws (#268).
3. Take the (4) attaching Screws (#76) and (4) Washers (#257) out of the Pick-Up Housing (#17) and pull the housing off of the *Posidyne* output shaft and the pilot flange.
4. Take the Key (#234) out of the output shaft. Loosen the Set Screw (#154) and slide the Pulse Gear (#186) off the output shaft.

5-2 REMOVAL OF QUADRATURE SENSOR (#355) AND MAGNETIC PICK-UP (#22)

(See Figure 6.3)

NOTE: The Pick-Up Assembly does not have to be removed to replace the Sensors.

1. Take the Top Cover (#372) and the Front Cover (#253) off the Pick-Up Housing (#17).
2. Disconnect the wires from the quick disconnect connectors to both sensors.
3. Loosen the Set Screw (#241) and pull the Magnetic Pick-Up (#22) out of the housing. **Do not remove this screw.**
4. Remove the (2) Screws (#226) and lift the Quadrature Sensor (#355) out of the housing.
5. If any Shims (#214) are under the Sensor, remove them and save for Reassembly.

5-3 INSTALLING OPEN COLLECTOR QUADRATURE ENCODER ASSEMBLY

(See Figure 6.3)

1. Replace Key (#234) into the *Posidyne* output shaft if it was removed.
2. Attach the Encoder Housing (#17) to the output housing with (4) Screws (#76) and (4) Washers (#257).
3. Slide the Pulse Gear (#186) on to the output shaft, aligning the groove in the pulse gear with the alignment face of the encoder housing, as shown in *View B-B* Figure 5.2. Tighten Set Screw (#154).

Jump ahead to Section 5-4 and install the Quadrature Encoder (#355) and the Magnetic Pick-Up (#22).

4. Attach the Top Cover (#372) with (4) Screws (#225) and the Front Cover (#253) with (4) Screws (#268).

5-4 INSTALLING QUADRATURE ENCODER (#355) AND MAGNETIC PICK-UP (#22)

(See Figure 6.3)

Before installing the Quadrature Encoder and Magnetic Pick-Up a Special .015" Shim must be made to set the Gap between them and the Pulse Gear. (See Figure 5.1)

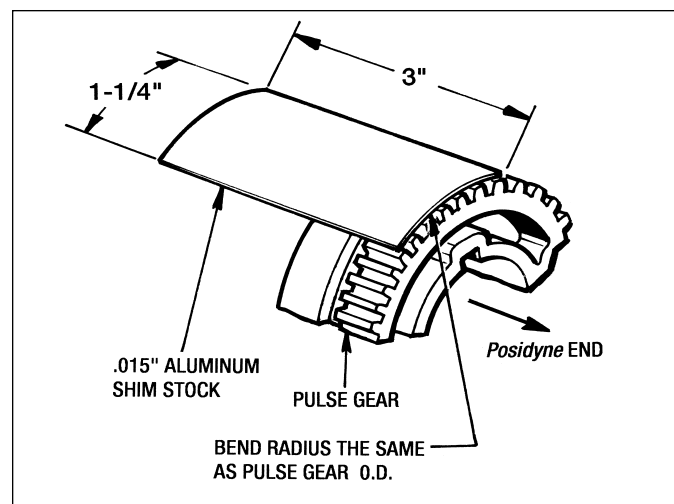


Figure 5.1 - Sensor Gap Shim

A. QUADRATURE ENCODER (#355)

1. Looking through the hole where the Encoder is to be placed, check to see that the Pulse Gear (#186) is in position so the teeth will be aligned with the Encoder.
2. Position the Encoder so the (2) mounting holes are lined up with the holes in the housing. Insert the Sensor into the slot and attach with (2) Screws (#226).

NOTES:

The holes are offset to one side so the Encoder can only be installed one way.

Do not install any Shims (#214) at this time. The Gap must be checked first.

3. Check the Gap between the Pulse Gear and the Encoder with the Special .015" Shim that you made. If necessary, remove the Encoder and place Shims (#214) under the Encoder. (.015" is sufficient.) Re-attach the Encoder and re-check the Gap. (See Figure 5.2)
4. Connect the sensor wires to the quick disconnect connector wires. (See Figure 2.8 for Wiring Diagram.)

B. MAGNETIC PICK-UP SENSOR (#22)

(See Figure 5.2)

1. Visually check through the hole to see if the single tooth in the Pulse Gear (#186) is aligned with the Sensor and that the teeth for the Quadrature Encoder will not be visible to the Magnetic Pick-Up Sensor.

The Magnetic Pick-Up Sensor has a **Scribed Line** down one side of it. To facilitate installation, highlight this **Scribed Line** with a felt tip pen.

2. Insert the Magnetic Pick-Up Sensor (#22) into the hole with the **Scribed Line** in position as shown in Figure 5.2, View A-A.
3. Insert the Special .015" Shim in between the Pulse Gear and the Sensor. Tighten the Set Screw (#241).
4. Connect the sensor wires to the quick disconnect connector wires. (See Figure 2.8 for Wiring Diagram.)

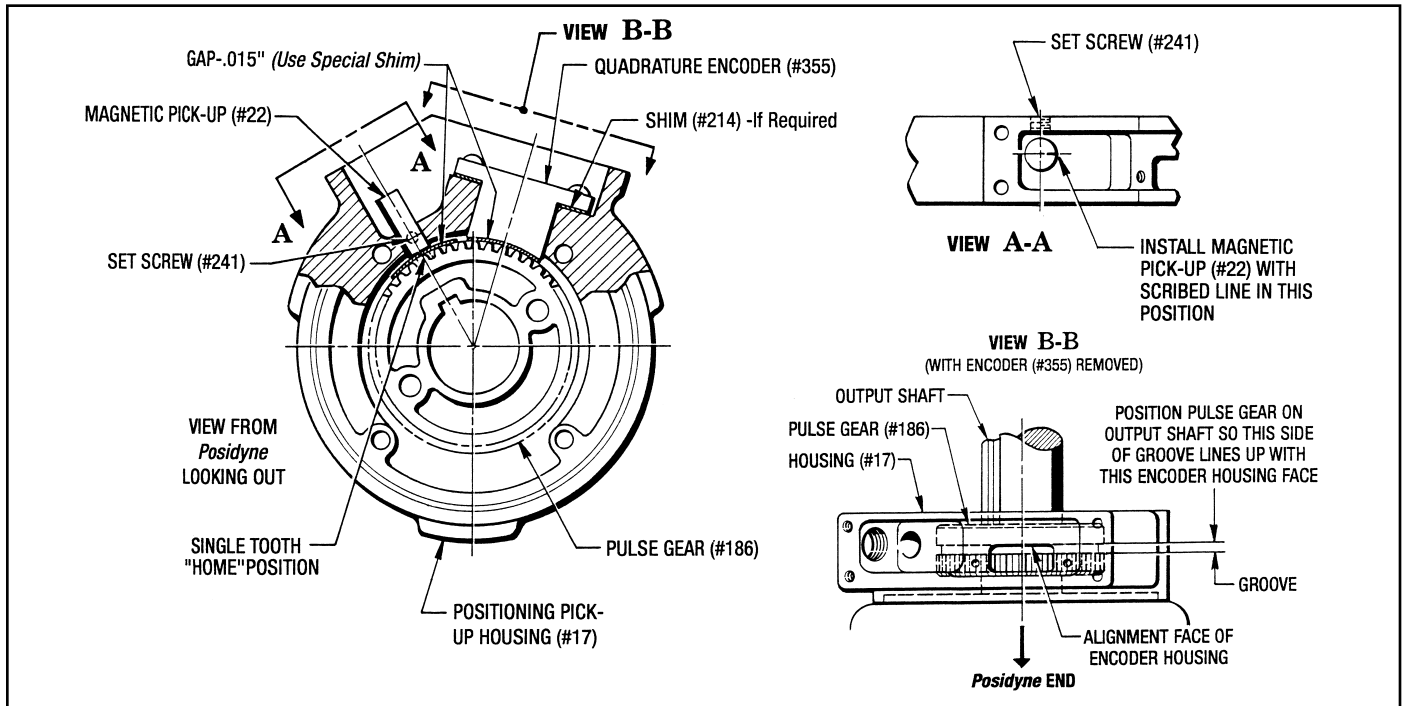


Figure 5.2 - Position Sensor Installation

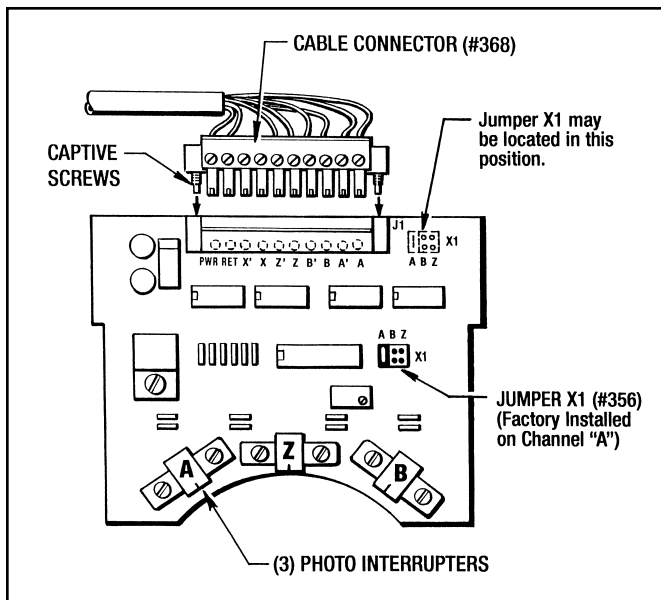


Figure 5.3 - Circuit Board Connector

5-5 REMOVAL and DISASSEMBLY of DIFFERENTIAL LINE DRIVER ENCODER ASSEMBLY (Optical Encoder)

(See Figure 6.4)

Any Drive Sheaves, Pulleys or Couplings must first be removed from the output shaft.

1. Take out the (4) Screws (#225) and remove the Top Cover (#372) and the upper Gasket (#19) from the Upper Enclosure (#18). This gasket is reusable.
2. Pull the Insulator (#373) up and out of the Upper Enclosure (#18).
3. Loosen the (2) captive screws in the Cable Connector (#368) and unplug it from the Circuit Board (#355). (See Figure 5.3)
4. Pull the Cable Grommet (#260), Cable (#259) and Cable Connector (#368) out of the Top Enclosure slot.
5. Remove the (2) Cap Screws (#77) and take the Upper Enclosure (#18) and lower Gasket (#19) off of the Disc Housing (#17). This gasket is also reusable.

6. Pull the Circuit Board (#355) straight up and out of the Disc Housing (#17).
7. Remove the (4) Screws (#76) and pull the Disc Housing off the *Posidyne* mounting face. Sizes 01, 1.5 and 02 also has (4) Lockwashers (#257).

CAUTION

Be very careful not to bump or bend the Optical Disc (#186) which is still attached to the output shaft or damage the Dirt Seal (#269) in the Disc Housing (#17).

8. If the *Posidyne* still has the main driving key in the output shaft, remove it at this time.
9. Loosen the Set Screw (#154) and pull the Optical Disc Assembly (#186) off of the output shaft.
10. On the 2.5 *Posidyne* remove the Key (#234) then the Spacer (#270) from the output shaft.
11. Check the Dirt Seal (#269) in the Disc Housing (#17) and remove it if necessary.

5-6 REASSEMBLY and INSTALLATION of DIFFERENTIAL LINE DRIVER ENCODER (Optical Encoder)

(See Figure 6.4)

1. If the Key (#234) was previously removed, install it into the output shaft, except for the 2.5 *Posidyne*.

(01, 1.5 and 02 *Posidyne*)

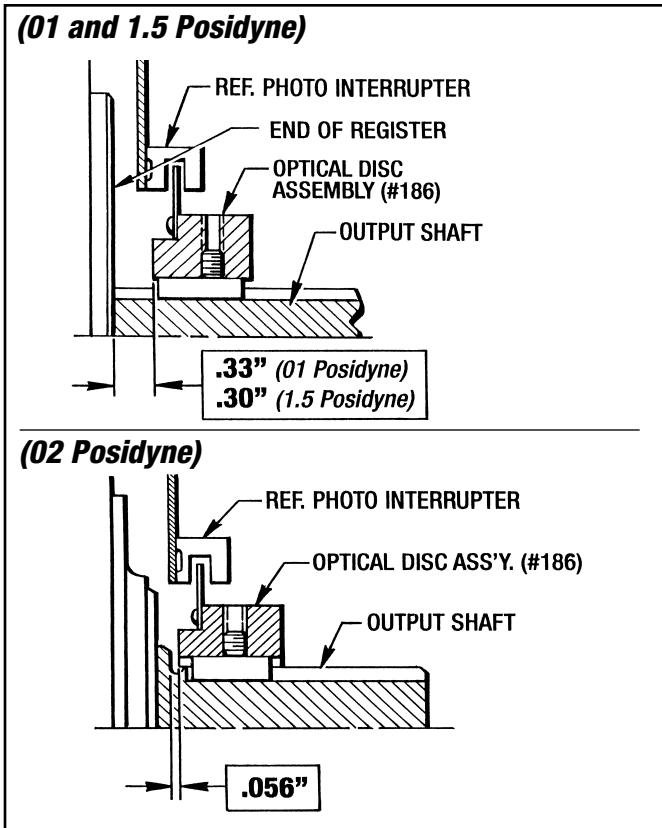


Figure 5.4 - Optical Disc and Hub Positioning (Sizes 01, 1.5 and 02 *Posidyne*)

2. Slide the Optical Disc Assembly (#186) onto the output shaft and position as shown in Figure 5.4. **The positioning of this Optical Disc Assembly must be accurate.**

(2.5 *Posidyne*)

2. First slide the Spacer (#270) onto the output shaft as far as it will go. Install Key (#234), then slide the Optical Disc Assembly onto the output shaft, butting it up against the Spacer. (See Figure 5.5)

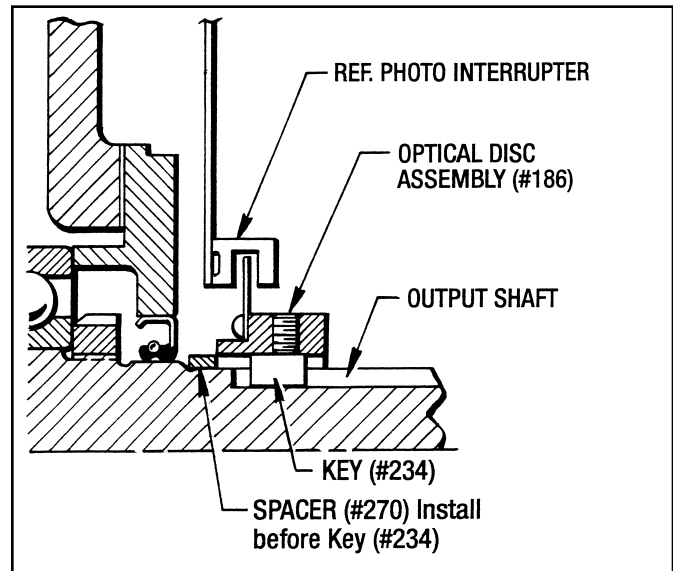


Figure 5.5 - Optical Disc and Hub Positioning (Size 2.5 *Posidyne*)

(03 and 05 *Posidyne*)

2. Slide the Optical Disc Assembly (#186) onto the output shaft until the Optical Disc Hub butts up against the Locknut on the output shaft. (See Figure 5.6)

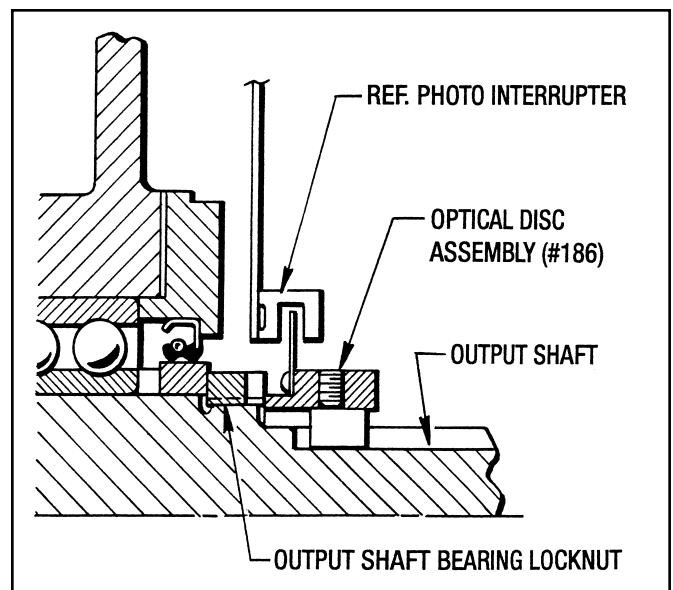


Figure 5.6 - Optical Disc and Hub Positioning (Sizes 03 and 05 *Posidyne*)

(01, 1.5, 02, 2.5, 03 and 05 Posidyne)

3. Tighten Set Screw (#154) and recheck the Hub position on the output shaft.
4. Apply a light coat of grease to the Optical Disc Hub where the Dirt Seal (#269) rides.
5. If the Dirt Seal (#269) was removed then install it into the Disc Housing (#17).
6. Attach the Disc Housing (#17) to the output end of the Posidyne with the (4) Screws (#76). Also (4) Lockwashers (#257) for Sizes 01, 1.5 and 02.
7. Place the Gasket (#19) on top of the Disc Housing.
8. Carefully insert the Circuit Board (#355) into the top of the Disc Housing making sure the (3) Photo Interrupters straddle the Optical Disc. (See Figures 5.4, 5.5 or 5.6)
9. While holding the Circuit Board upright slide the Upper Enclosure (#18) down over the Circuit Board onto the Disc Housing. Make sure the edges of the Circuit Board are in the (2) side retaining slots located in the Upper Enclosure. (See Figure 5.7)

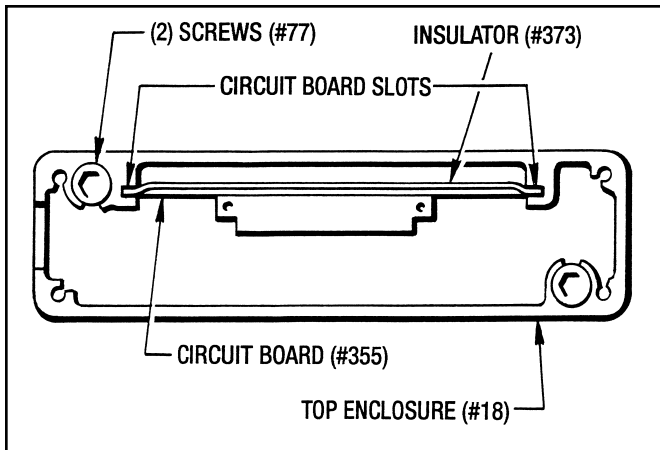


Figure 5.7 - Circuit Board Slots

10. Check the Gasket (#19) to see if it is still in place. Insert the (2) Screws (#77) and tighten down.
11. Slide the Insulator (#373) down and into the Upper Enclosure (#18) behind the Circuit Board (#355) placing the upper tabs into the circuit board slots.
12. Place the Cable Grommet (#260) and Cable (#259) into the upper slot and plug in the Cable Connector (#368) to the Circuit Board Connector.
13. Place the top Gasket (#19) on the Upper Enclosure and attach the Top Cover (#372) with (4) Screws (#225).

5-7 REPLACING CIRCUIT BOARDS

(See Figure 5.8)

A. Power Supply Board

1. Disconnect the Terminal Strip Connectors #J1, #J2, #J3, #J4, #J5 and the Flat Wire Connector.

NOTES:

1. Pull down to unplug #J1 to #J4. and pull out to unplug #J5.
2. There are release tabs on the ends of the Flat Wire Connector. Pull the tabs out and pull up on the connector to unplug it.
2. Disconnect the Transformer Connector by squeezing the end tabs and pulling it up.
3. Remove the (4) #10-32 Phillips Head Screws from the Transformer and pull it off the board.
4. Take the (6) #10-32 Phillips Head Screws out of the Power Supply Board, leaving the bottom middle screw until last. Remove the Power Supply Board from the control box.

To Reinstall a new Power Supply Board just reverse these steps. Put the bottom middle screw in first and proceed.

B. CPU Board

1. Unplug the Flat Wire Connector from the bottom right hand corner of the CPU Board.
2. Remove the (6) #8-32 Kep-Nuts with a 11/32" Nut Driver.
3. Unplug the two remaining Connectors at the bottom of the CPU Board.

NOTES:

1. The connector on the right hand side has a release tab. Push the tab to unplug the connector.
2. The connector on the left is a pull-off type and has no release tabs. **Be very careful not to crimp or bend the flat wire cable when unplugging this connector.**
4. The CPU Board can now be removed from the control box.

To reinstall a new CPU Board, just reverse the removal procedure.

WARNING

Please pay close attention to the instructions and diagrams shown in Figure 5.8 on how to install the Inter-Connecting Flat Wire Cable correctly. If the Cable Connector for the CPU Board is not plugged in properly, the CPU Board will be damaged when power is restored.

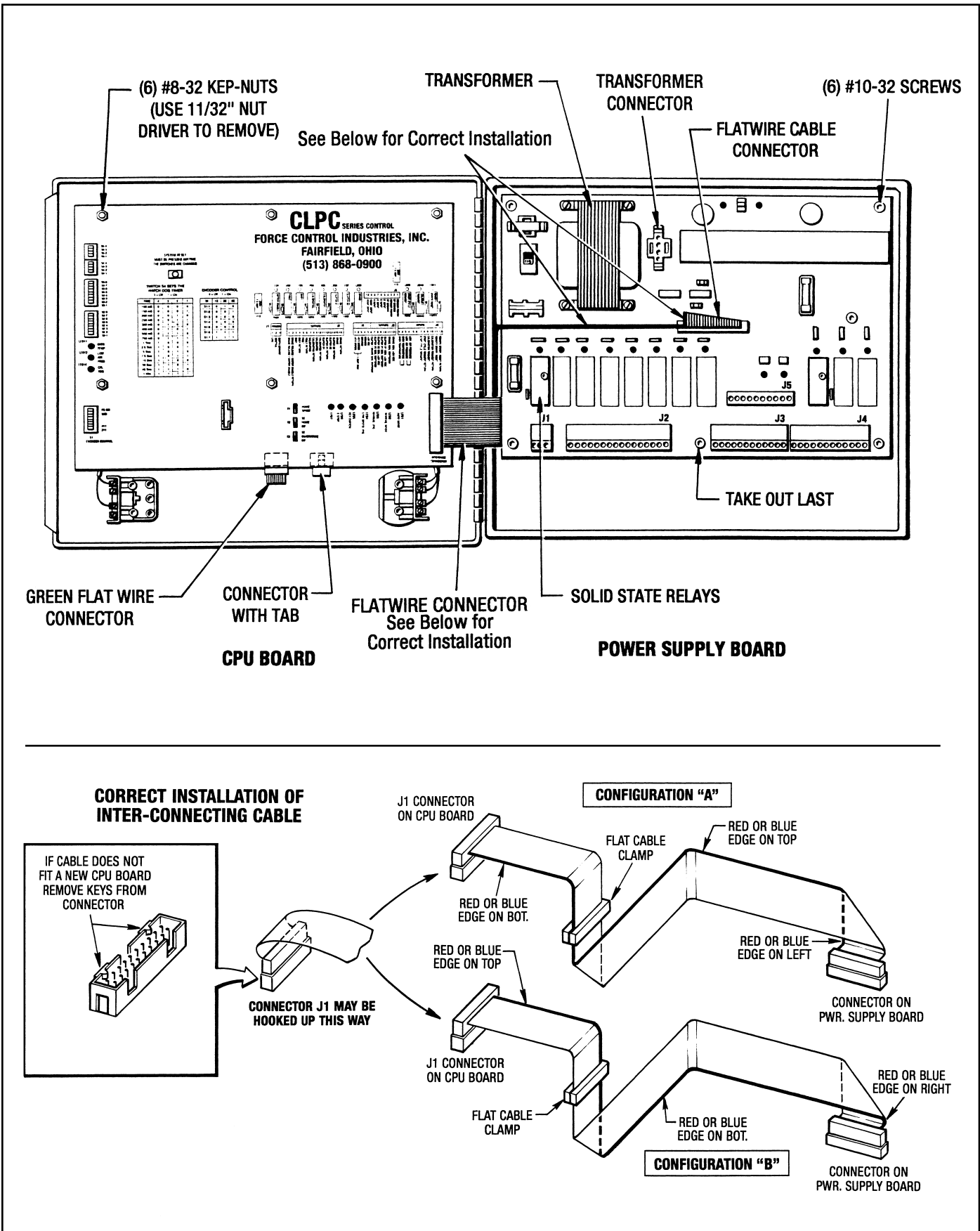


Figure 5.8 - Replacing Circuit Boards

Section 6

ORDERING REPAIR PARTS

6-1 GENERAL INFORMATION

This section illustrates, lists and describes all available Repair Parts for the Force Control CLPC Series II Control. Exploded views with numbers are used to identify the various parts in the Control Unit. These numbers are listed in the parts list along with the part name and quantity used.

6-2 FACTORY RE-BUILD SERVICE

Re-conditioning service is offered by Force Control Industries at the factory. Before returning a unit for this service, be sure to first contact the Force Control Industries Service Sales Dept. for authorization and shipping instructions. Force Control Industries cannot be responsible for units returned to the factory without prior notice or authorization.

Care must be given to the packaging of returned drives. Always protect mounting feet by attaching to a skid. Shipment-damaged drives always delay repairs. When possible, describe the problem experienced on your shipping papers.

6-3 ORDERING REPAIR PARTS

When ordering replacement parts, please specify all of the following information:

1. Drive Model Number (on the nameplate).
2. Drive Serial Number (on the nameplate).
3. Part Reference Number.
4. Part Name.
5. Quantity.
6. Complete shipping Information.

Failure to include information for items 1 through 6 will only delay your parts order. Unless another method is specified for item 6, parts less than 70 pounds will be shipped United Parcel Service, parts over 70 pounds will be shipped motor freight. Air freight and other transportation services are available, but only if specified on your order.

SHIPPING ADDRESS:

Force Control Industries, Inc.
3660 Dixie Highway
Fairfield, Ohio 45014

Telephone: (513) 868-0900

Fax: (513) 868-2105

E-Mail: info@forcecontrol.com

Web: www.forcecontrol.com

CLPC Series II Control and Optional Junction Box

(Figure 6.1 and 6.2)

REF No.	PART NAME	QTY.	REF No.	PART NAME	QTY.
*1	CPU Circuit Board, Zero Power RAM	1	29	Terminal Strip, 16 Circuit	1
3	Power Supply Board, Zero Power RAM.....	1	30	Terminal Strip, 12 Circuit	2
4	Fuse, 1.5 Amp, 250 Volt	2	31	Terminal Strip, 10 Circuit	1
5	Microfuse, 3 Amp, .250 Volt.....	AR	33	Interface Cable CPU/PS Boards.....	1
8	Input Relay, Solid State		34	Wiring Harness	1
	AC, Yellow, IAC5	AR	35	Removable Jumper, Shunt Bar.....	17
	DC, White, IDC5	AR	36	Overlay, Door Face Plate.....	1
9	Output Relay, Solid State		40	Junction Box	1
	AC, Black, OAC5	AR	41	Terminal Block	
	DC, Red, ODC5	AR		Open Collector Quadrature Encoder	14
22	H-O-A Switch	1		Differential Line Encoder.....	15
25	Jog Switch.....	1	42	Cable, 3 Pin Connector.....	1
27	Transformer Assembly.....	1	43	Cable, 4 Pin Connector.....	1
28	Terminal Strip, 3 Circuit	1	44	Cable, 5 Pin Connector.....	1

*-Specify Software Version when ordering a CPU Board.
AR-As Required.

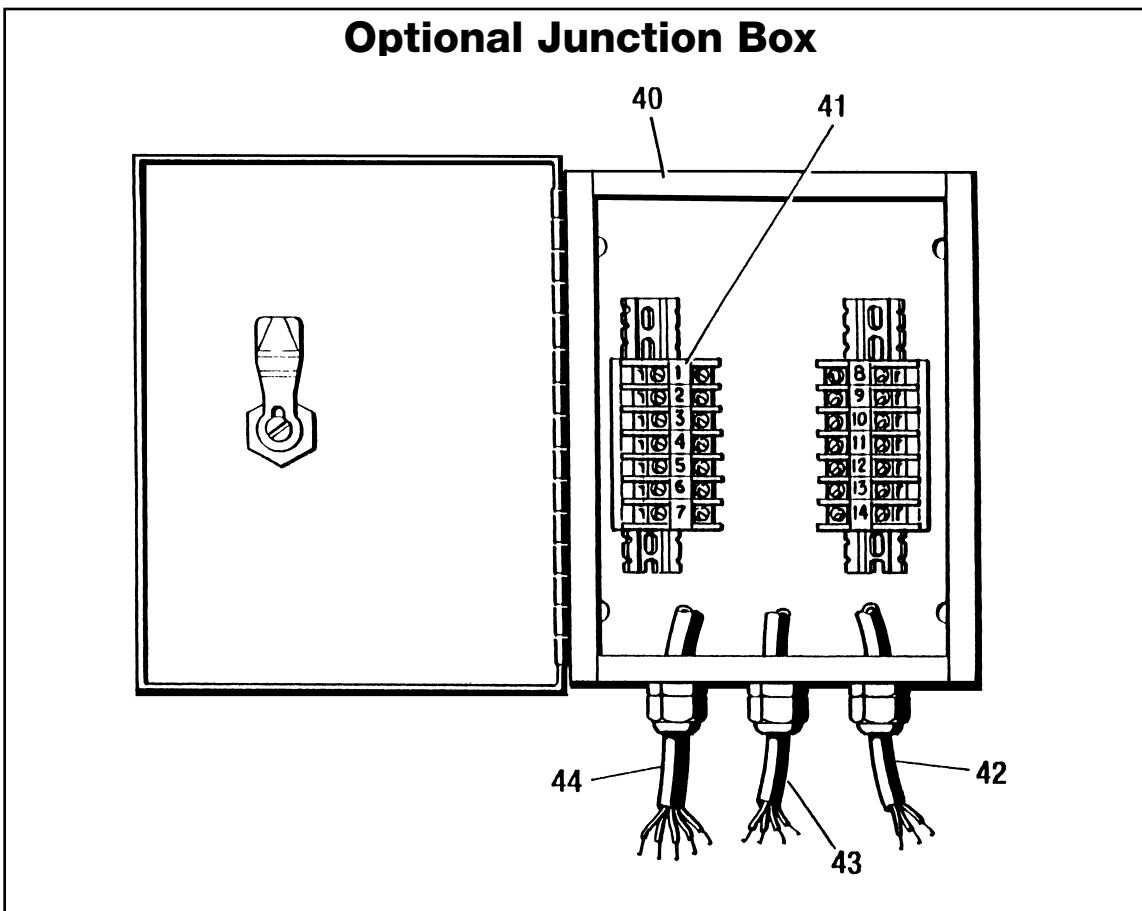
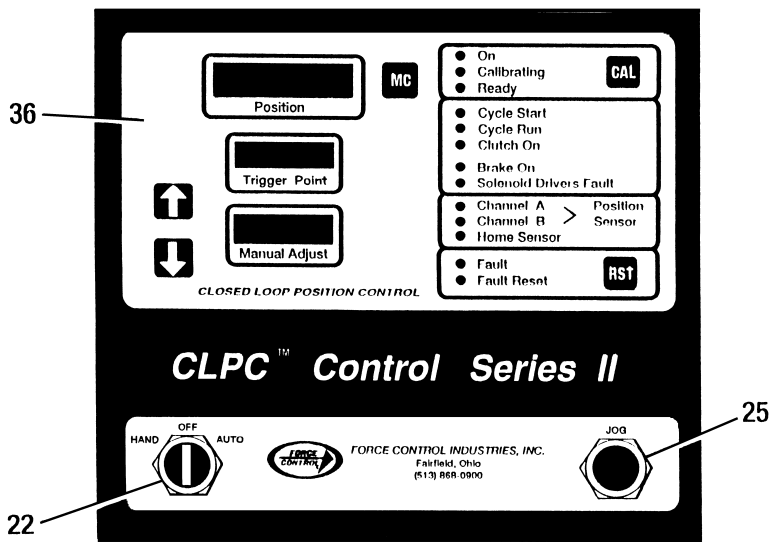
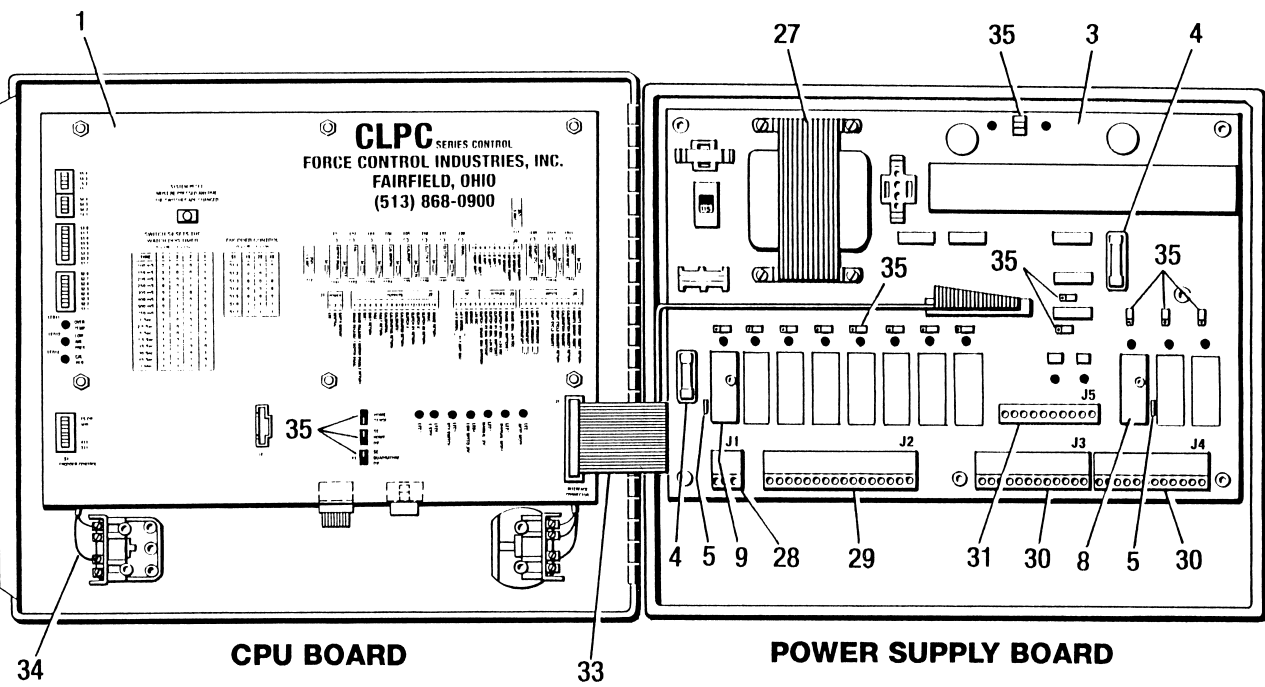


Figure 6.1 - Optional Junction Box

CLPC Series II Control



FRONT PANEL



CPU BOARD

POWER SUPPLY BOARD

See Page 30 for Correct Installation of Inter-connecting Flatwire Cable.

Figure 6.2 - CLPC Series II Control

Open Collector Quadrature Encoder

(Figure 6.3)

REF No.	PART NAME	QTY.	REF No.	PART NAME	QTY.
17	Magnetic Pickup Housing	1	241	Soc. Set Screw	1
22	Magnetic Pickup	1	253	Magnetic Pickup Housing Cover.....	1
76	Soc. Hd. Cap Screw	4	257	Lockwasher.....	4
154	Set Screw	1	259	Cable, 5 Pin Straight, 5' Lg.	1
186	Pulse Gear.....	1	268	Button Hd. Cap Screw	4
214	Shim.....	AR	355	Quadrature Pickup.....	1
225	Button Hd. Cap Screw	4	368	Receptacle, 5 Pin.....	1
226	Round Hd. Machine Screw	2	372	Top Cover	1
234	Key.....	1			

AR - As Required

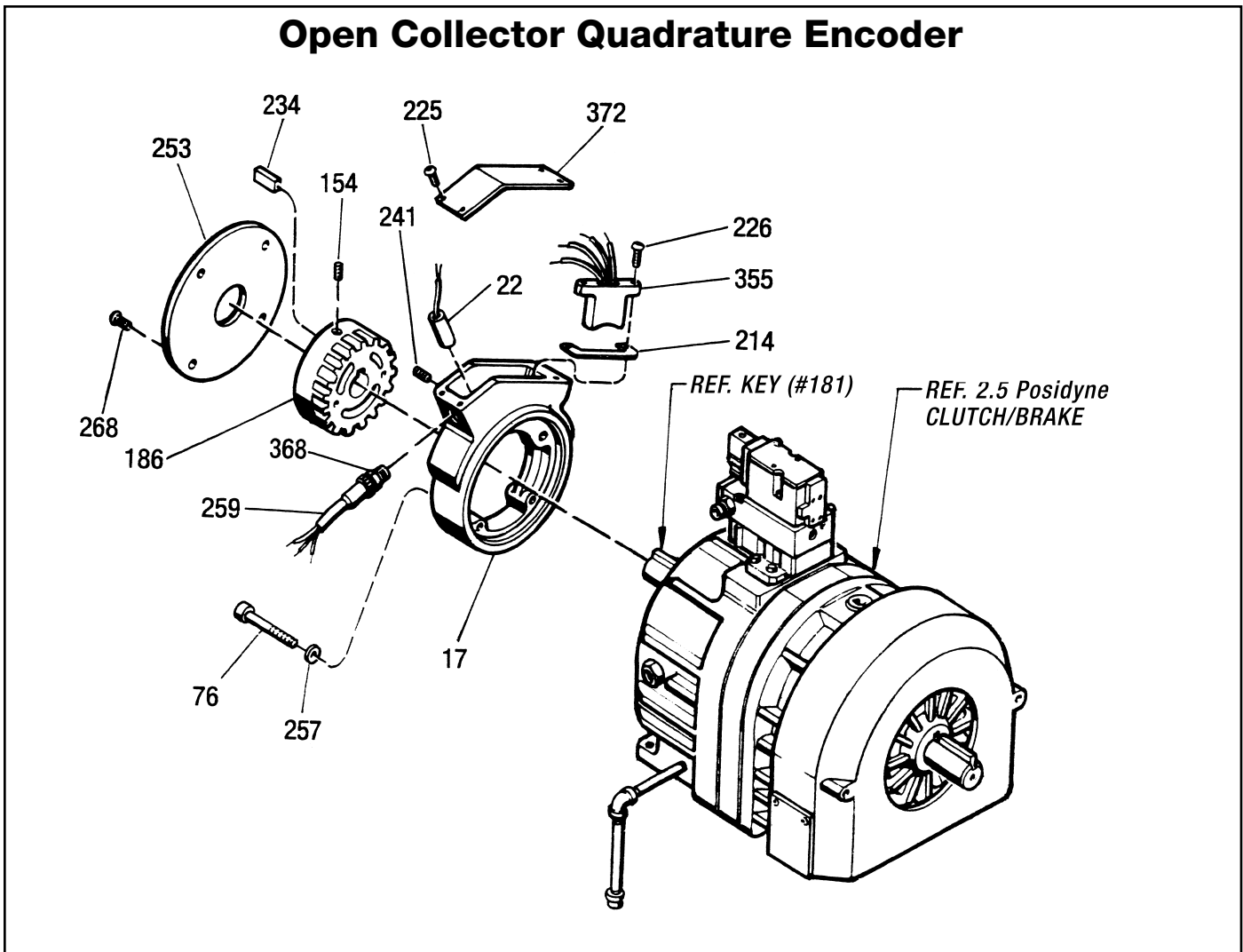


Figure 6.3 - Open Collector Quadrature Encoder

Differential Line Driver Encoder

(Figure 6.4)

REF No.	PART NAME	QTY.	REF No.	PART NAME	QTY.
17	Disc Housing.....	1	259	Cable	1
18	Upper Enclosure	1	260	Cable Grommet	1
19	Gasket	2	269	Dirt Seal	1
76	Screw.....	4	270	Spacer (2.5 Posidyne Only).....	1
77	Screw.....	2	355	Circuit Board	1
154	Set Screw	1	356	Jumper.....	1
186	Optical Disc Assembly	1	368	Cable Connector.....	1
225	Screw.....	4	372	Top Cover	1
234	Key.....	1	373	Insulator	1
257	Lockwasher.....	4			

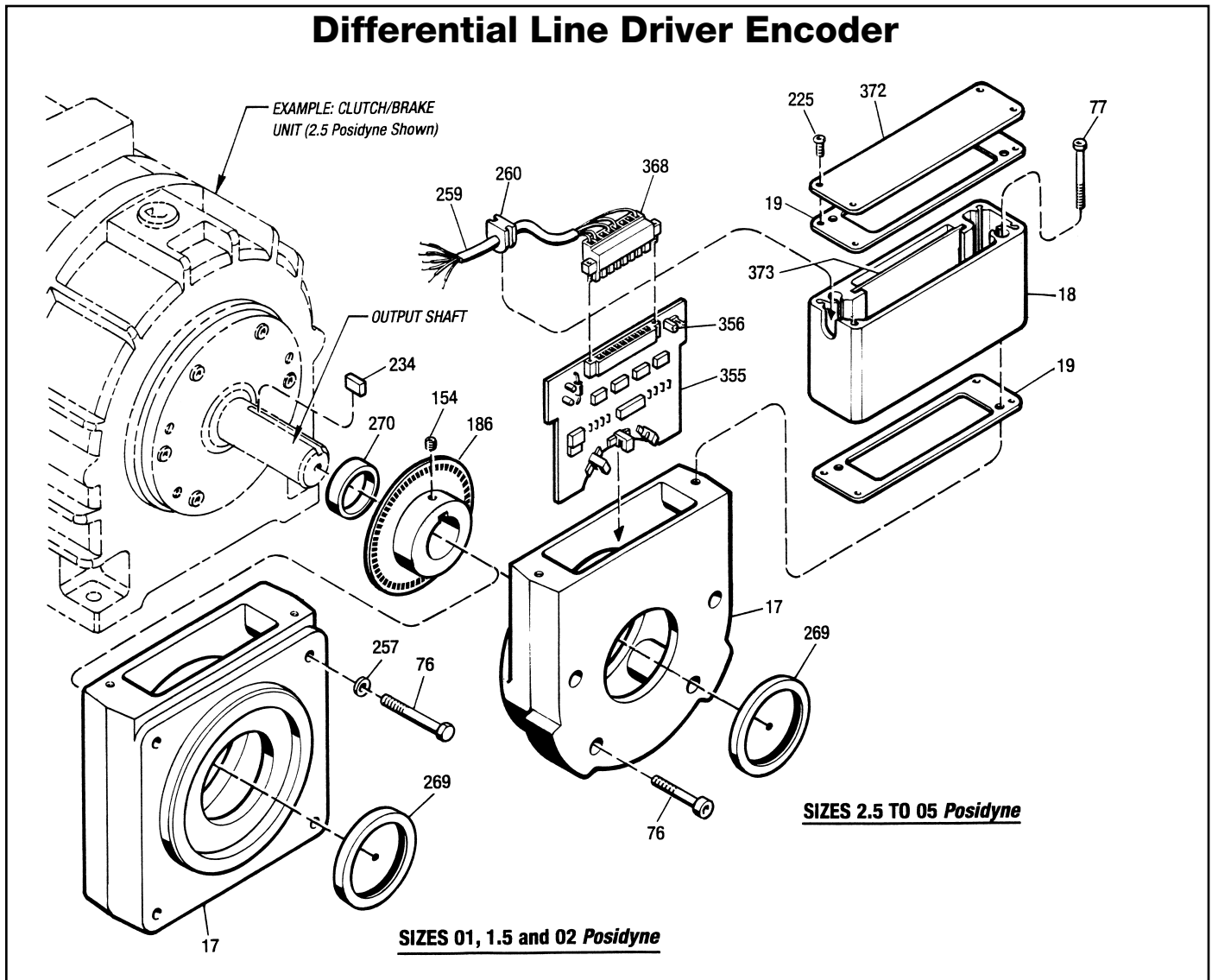


Figure 6.4 - Differential Line Driver Encoder

CLPC CONTROL Series II CPU BOARD

DIP SWITCHES (See Section 3 - Start-Up and Operation)

- S1 - ENCODER CONTROL
- S2 - MISC. FUNCTIONS
- S3 - MISC. FUNCTIONS
- S4 - WATCH DOG TIMER
- S5 - CONTROL MODE

INTERNAL SYSTEM RESET BUTTON

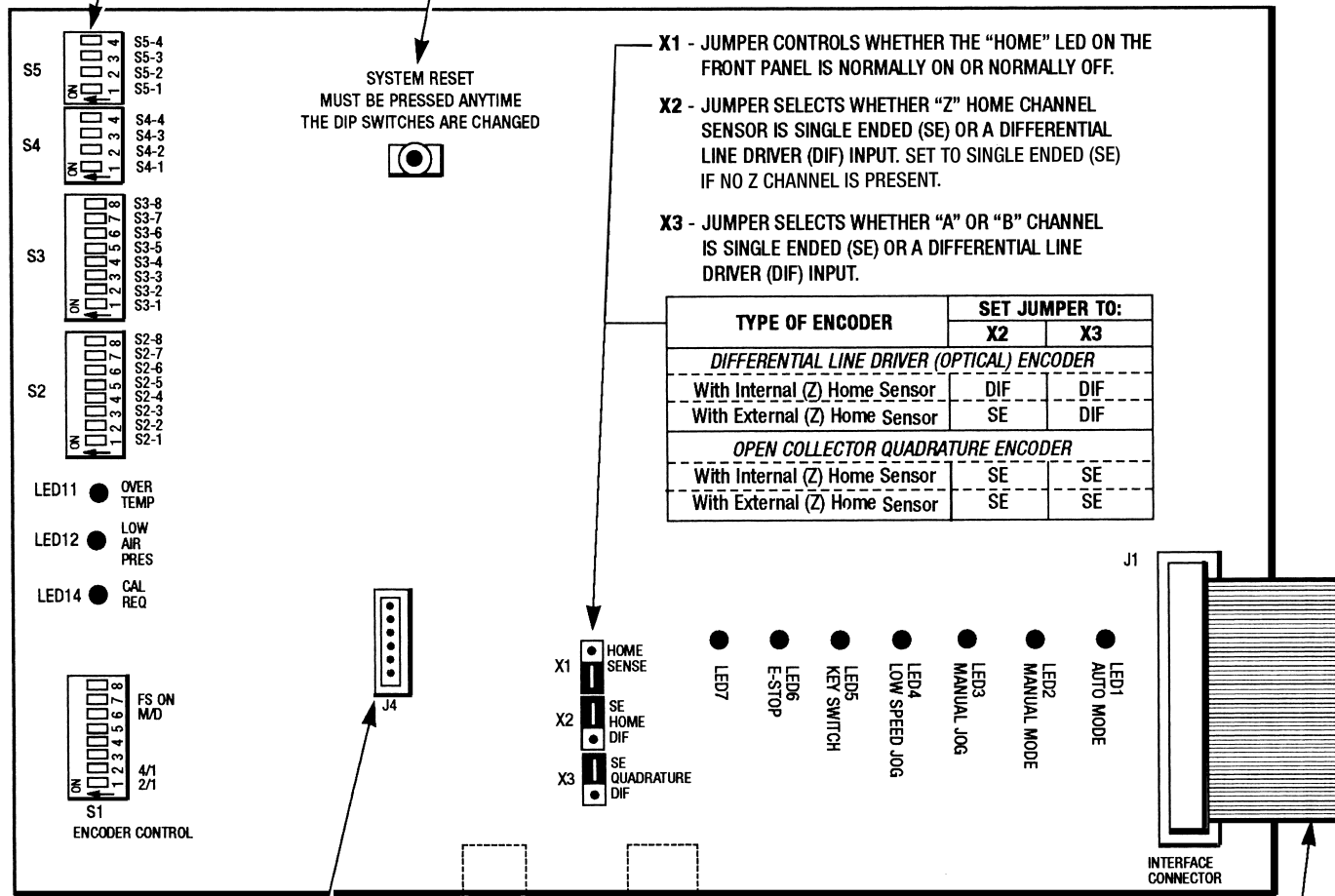
SYSTEM RESET
MUST BE PRESSED ANYTIME
THE DIP SWITCHES ARE CHANGED

X1 - JUMPER CONTROLS WHETHER THE "HOME" LED ON THE FRONT PANEL IS NORMALLY ON OR NORMALLY OFF.

X2 - JUMPER SELECTS WHETHER "Z" HOME CHANNEL SENSOR IS SINGLE ENDED (SE) OR A DIFFERENTIAL LINE DRIVER (DIF) INPUT. SET TO SINGLE ENDED (SE) IF NO Z CHANNEL IS PRESENT.

X3 - JUMPER SELECTS WHETHER "A" OR "B" CHANNEL IS SINGLE ENDED (SE) OR A DIFFERENTIAL LINE DRIVER (DIF) INPUT.

TYPE OF ENCODER	SET JUMPER TO:	
	X2	X3
<i>DIFFERENTIAL LINE DRIVER (OPTICAL) ENCODER</i>		
With Internal (Z) Home Sensor	DIF	DIF
With External (Z) Home Sensor	SE	DIF
<i>OPEN COLLECTOR QUADRATURE ENCODER</i>		
With Internal (Z) Home Sensor	SE	SE
With External (Z) Home Sensor	SE	SE



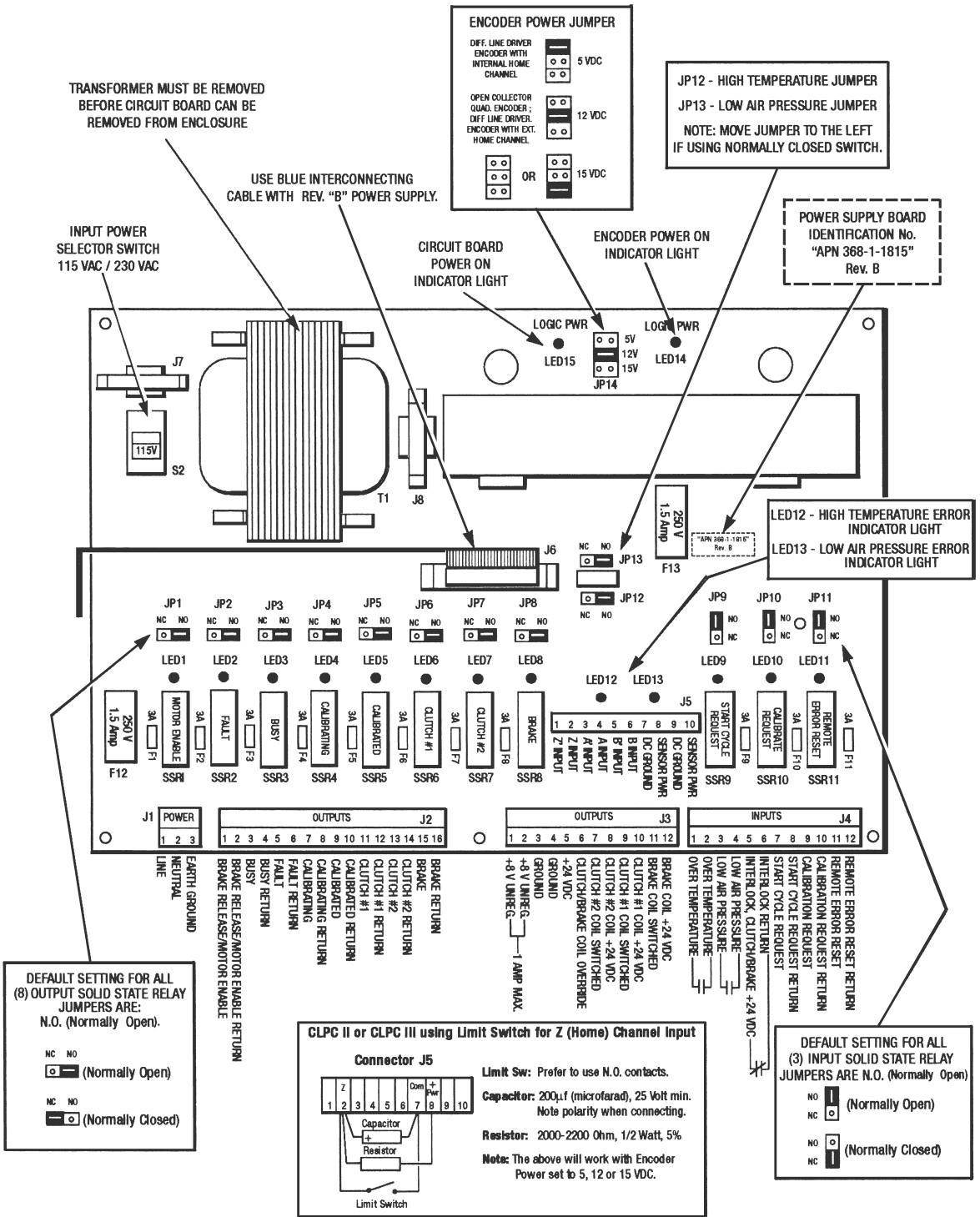
COMMUNICATIONS BOARD
ELECTRICAL CONNECTOR.

OVERLAY ELECTRICAL CONNECTOR.

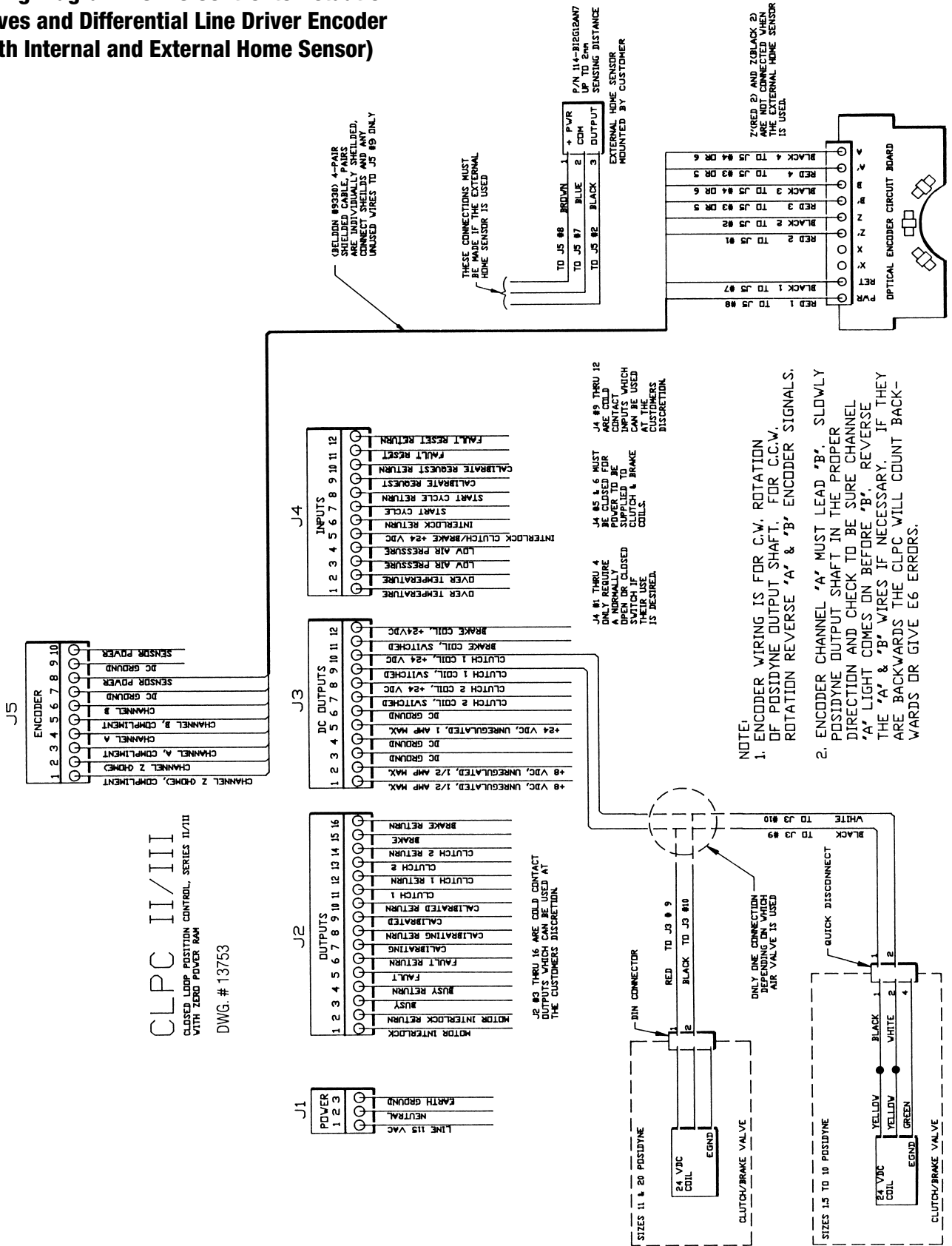
H-O-A SWITCH AND JOG SWITCH
ELECTRICAL CONNECTOR.

USE BLUE INTERCONNECTING CABLE
WITH POWER SUPPLY Revision "B"

CLPC CONTROL Series II POWER SUPPLY BOARD



Wiring Diagram - CLPC Control to Actuation Valves and Differential Line Driver Encoder (With Internal and External Home Sensor)



CLPC II Revision History

PART No.	REV. No.	DATE	FEATURE / IMPROVEMENT	SYSTEM HARDWARE	NOTES
- REVISION NAMING CONVENTION STARTED WITH 1 DOT NOTATION. - ALL SYSTEM CALCULATIONS ARE PERFORMED USING 16 BIT ARITHMETIC.					
371-1-1279-1.08	1.08	10/10/93	- Changed Stop Check from 50mS to 100mS.	EE Prom BH CPU	Currently installed on Auto Catcher Applications.
371-1-1279-1.09	1.09	12/1/93	- Changed Stop Check from 100mS to 25mS.	EE Prom BH CPU	Improved timing to increase cycle rates on Auto Catcher Applications.
371-1-1279-3.05	3.05	9/19/94	- Significant Weaver support updated. - Calibration Input must be activated for each index until the Calibration is complete. - Limited Manual Offset to +/- 90°	EE Prom BH CPU	Migration path of CLPC to include Weaver Application.
371-1-1279-3.06	3.06	11/17/94	- Customer modification of Stop Check Valve.	EE Prom BH CPU	Special Application.
371-1-1279-4.04	4.04	11/18/94	- First version supporting Zero Power Ram. - Manual Adjust was increased to 50% of the maximum count. - Stop Check set to 25 ms..	Zero Pwr. Ram BH CPU	First major board revision. Introduction of Zero Power Ram Chip.
- CHANGED REVISION NAMING CONVENTION TO 2 DOT NOTATION. - ALL SYSTEM CALCULATIONS ARE PERFORMED USING 32 BIT ARITHMETIC.					
371-1-1279-2.0.4	2.0.4	12/8/95	- Added support for IP/PLS hardware. - Added Stall Detection capabilities.	Zero Pwr. Ram BH CPU	Added In Position and Programmable Limit Switch function through an Expansion Board.
371-1-1279-2.0.7	2.0.7	6/19/96	- Corrected IP/PLS start-up problems.	Zero Pwr. Ram BH CPU	Series II CLPC current production software for old 8096BH processors.
371-1-1279-2.0.8	2.0.8	10/9/98	- Decreased Stop Check from 25ms to 5ms.	Zero Pwr. Ram KB CPU	
371-1-1279-2.1.0	2.1.0	2/16/98	- Added Multiple Index Parameter Support. - New 80C196KB Processor Support.	Zero Pwr. Ram KB CPU	Series II CLPC current production software for new 80C196KB processors
371-1-1279-2.1.1	2.1.1	11/10/98	- Decreased Stop Check from 25ms to 5ms.	Zero Pwr. Ram KB CPU	
371-1-1279-2.2.0	2.2.0	11/16/99	- Corrected Absence of "No Twist" on High Temperature Weaver Applications.	Zero Pwr. Ram KB CPU	

Revision Naming Convention Definitions:

* 1 Dot Notation - M.N Where: M = Major Revision Number; N = Minor Revision Number.

** 2 Dot Notation - S.V.E Where: S = CLPC Series Number; V = Version Number; E = Edit Level Number

System Hardware:

EE Prom..... Type of Computer Memory
 Zero Power Ram Type of Computer Memory
 BH CPU Usable Types, 8096BH or 8097BH
 KB CPU..... Usable Types, 80C196KB or 90C196KB-16

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