USING PHYSICS AND COMPUTATION IN INDUSTRY

PETER REIS

PART FLIPPER

OPERATOR CONTROLS

ELECTRICAL ENCLOSURE

HYDRAULIC UNIT

TPA – 25 ELECTRIC & HYDRAULIC MANIPULATOR

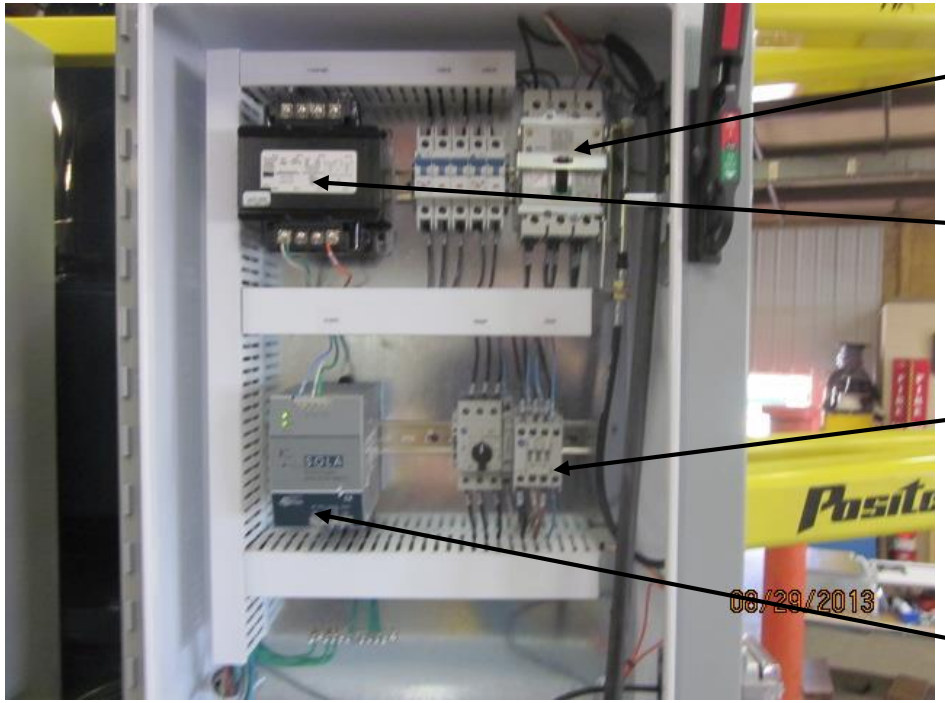
ELECTRICAL ENCLOSURE

HYDRAULIC UNIT "ON BACK"

OPERATOR CONTROLS

HIGH AND LOW VOLTAGE ELECTRICAL ENCLOSURES

HIGH VOLTAGE ENCLOSURE
460 VAC



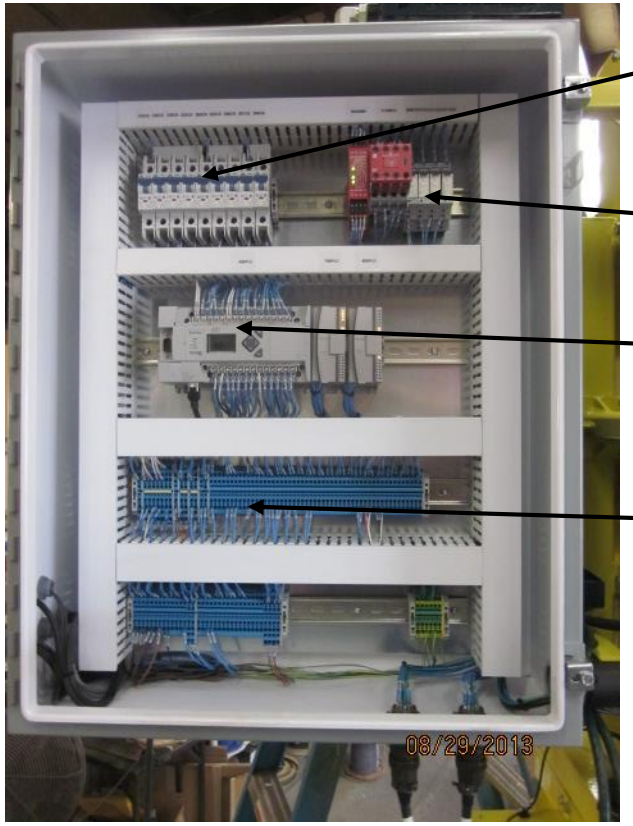
ELECTRICAL DISCONNET

460 VAC / 110 VAC TRANSFORMER

HYDRAULIC MOTOR CONTACTOR

460 VAC / 24 VDC POWER SUPPLY

LOW VOLTAGE ENCLOSURE
24 VDC



CIRCUIT BREAKERS

RELAYS

PLC

TERMINAL STRIP

HYDRAULIC POWER UNIT (HPU)

HYDRAULIC MOTOR

GEAR PUMP
INSIDE RESERVOIR

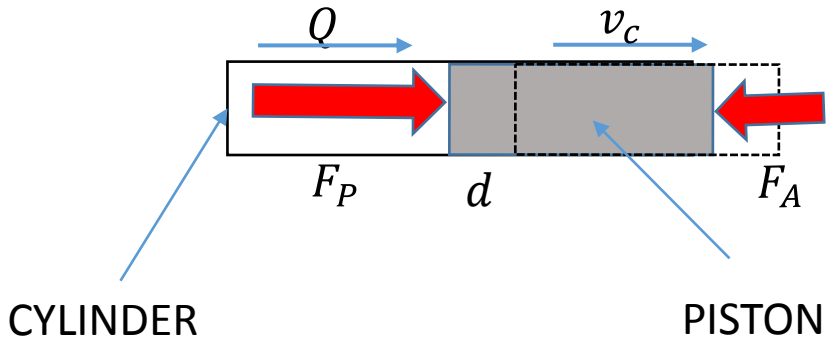
VALVE STACK

HYDRAULIC RESERVOIR

MULTIPLE FUNCTION HPU

HYDRAULIC DESIGN

- WHAT IS THE FUNCTION OF THE MANIPULATOR?
- HOW MANY HYDRAULIC FUNCTIONS ARE REQUIRED?
- HOW MANY FUNCTIONS ARE SIMULTANEOUS?
- WHAT IS THE MAXIMUM LIFT REQUIREMENT?
- WHAT IS THE DUTY CYCLE OF THE MANIPULATOR (THE NUMBER OF CYCLES PER HOUR)?
- WHAT FLOW RATE MUST THE HPU BE DESIGNED FOR?
- WHAT MAXIMUM PRESSURE MUST THE HPU SUPPLY?



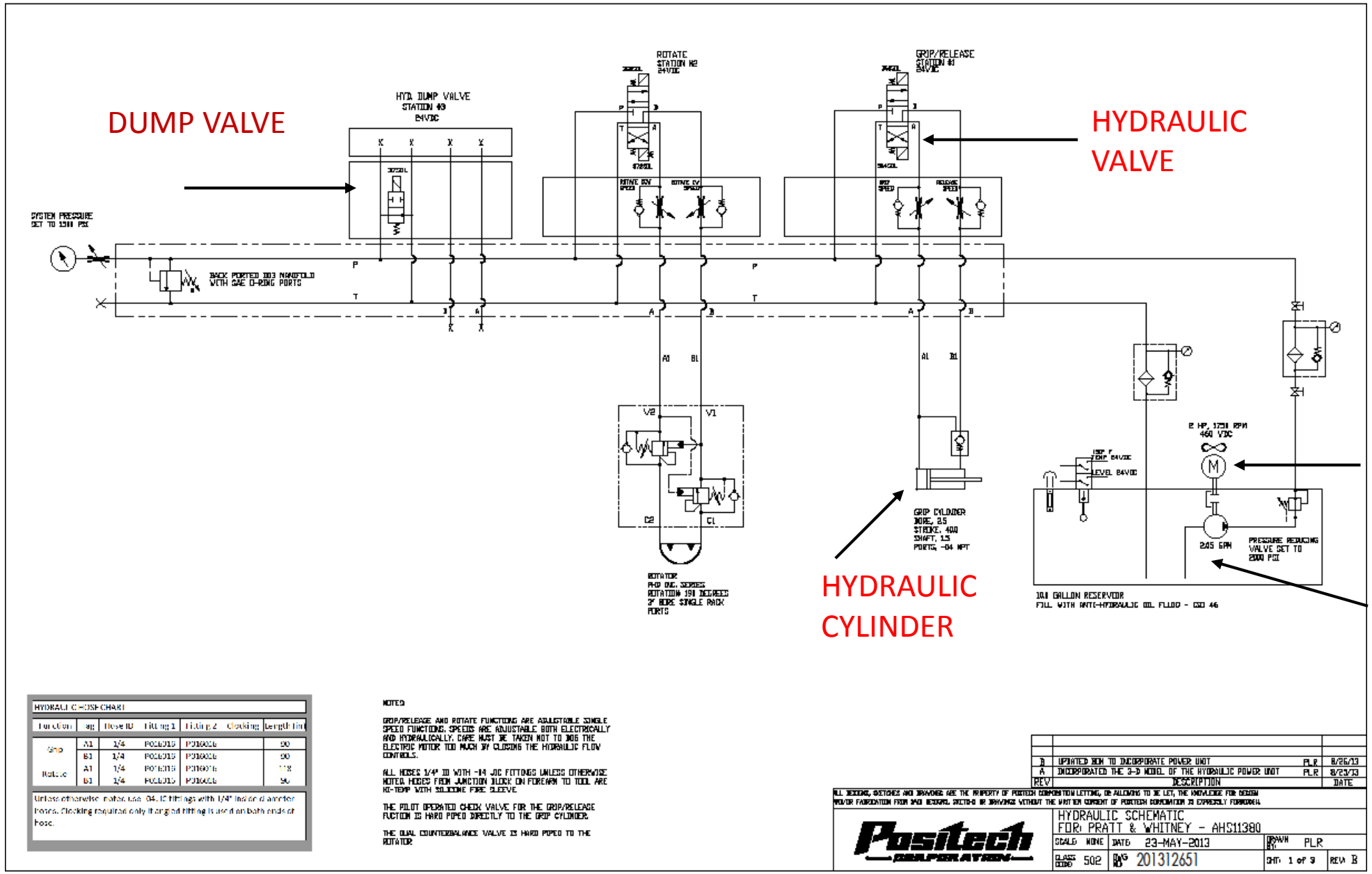
- WHAT HORSEPOWER MOTOR IS REQUIRED TO PROVIDE THE MAXIMUM PRESSURE TO LIFT THE HEAVIEST PART AT THE REQUIRED CYLINDER SPEED?

$$Q = v_C A_C$$

$$P = \frac{F_P}{A_C}$$

$$H.P. = PQ$$

HYDRAULIC SCHEMATIC



HYDRAULIC HOSE CHART

Function	Leg	Hose ID	Fitting 1	Fitting 2	Clocking	Length (in)
Grip	A1	1/4	P016015	P316016		90
	B1	1/4	P016015	P316016		90
Rotate	A1	1/4	P016015	P316016		118
	B1	1/4	P016015	P316016		90

Unless otherwise noted, use -04 JIC fittings with 1/4" inside diameter hoses. Clocking required only if angled fitting is used on both ends of hose.

NOTES:

GRIP/RELEASE AND ROTATE FUNCTIONS ARE ADJUSTABLE SINGLE SPEED FUNCTIONS. SPEEDS ARE ADJUSTABLE BOTH ELECTRICALLY AND HYDRAULICALLY. CARE MUST BE TAKEN NOT TO OVER THE ELECTRIC MOTOR TOO MUCH BY CLOSING THE HYDRAULIC FLOW CONTROLS.

ALL HOSES 1/4" ID WITH -04 JIC FITTINGS UNLESS OTHERWISE NOTED. HOSES FROM JUNCTION BLOCK ON FOREARM TO TOOL ARE HI-TEMP WITH SILICONE FIRE SLEEVE.

THE PILOT OPERATED CHECK VALVE FOR THE GRIP/RELEASE FUCTION IS HARD PIPED DIRECTLY TO THE GRIP CYLINDER.

THE DUAL COUNTERBALANCE VALVE IS HARD PIPED TO THE ROTATOR.

REV	DESCRIPTION	DATE
B	UPDATED BOM TO INCORPORATE POWER UNIT	PLR 8/26/13
A	INCORPORATED THE 2-D MODEL OF THE HYDRAULIC POWER UNIT	PLR 8/23/13

Positech CORPORATION

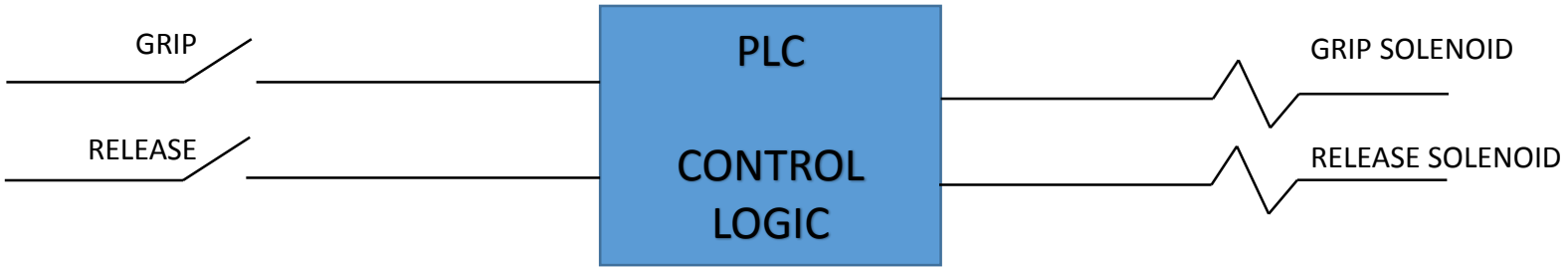
HYDRAULIC SCHEMATIC FOR: PRATT & WHITNEY - AHS11380

SCALE: NONE | DATE: 23-MAY-2013 | DRAWN BY: PLR

CLASS CODE: 502 | DWG NO: 201312651 | SHT: 1 of 3 | REV: B

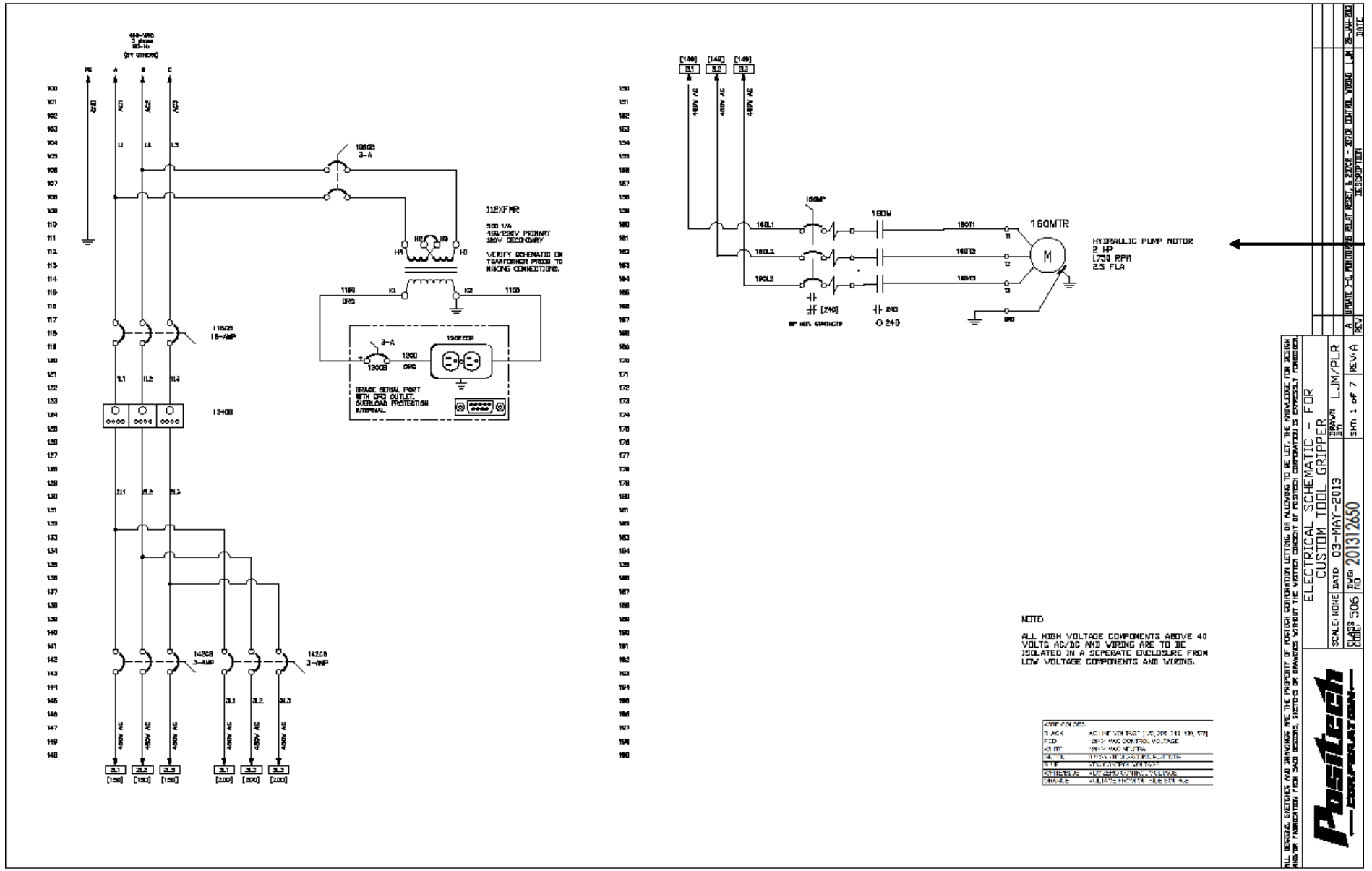
ELECTRICAL DESIGN

- WHAT ARE THE INPUT AND OUTPUT SIGNALS TO AND FROM THE PLC?



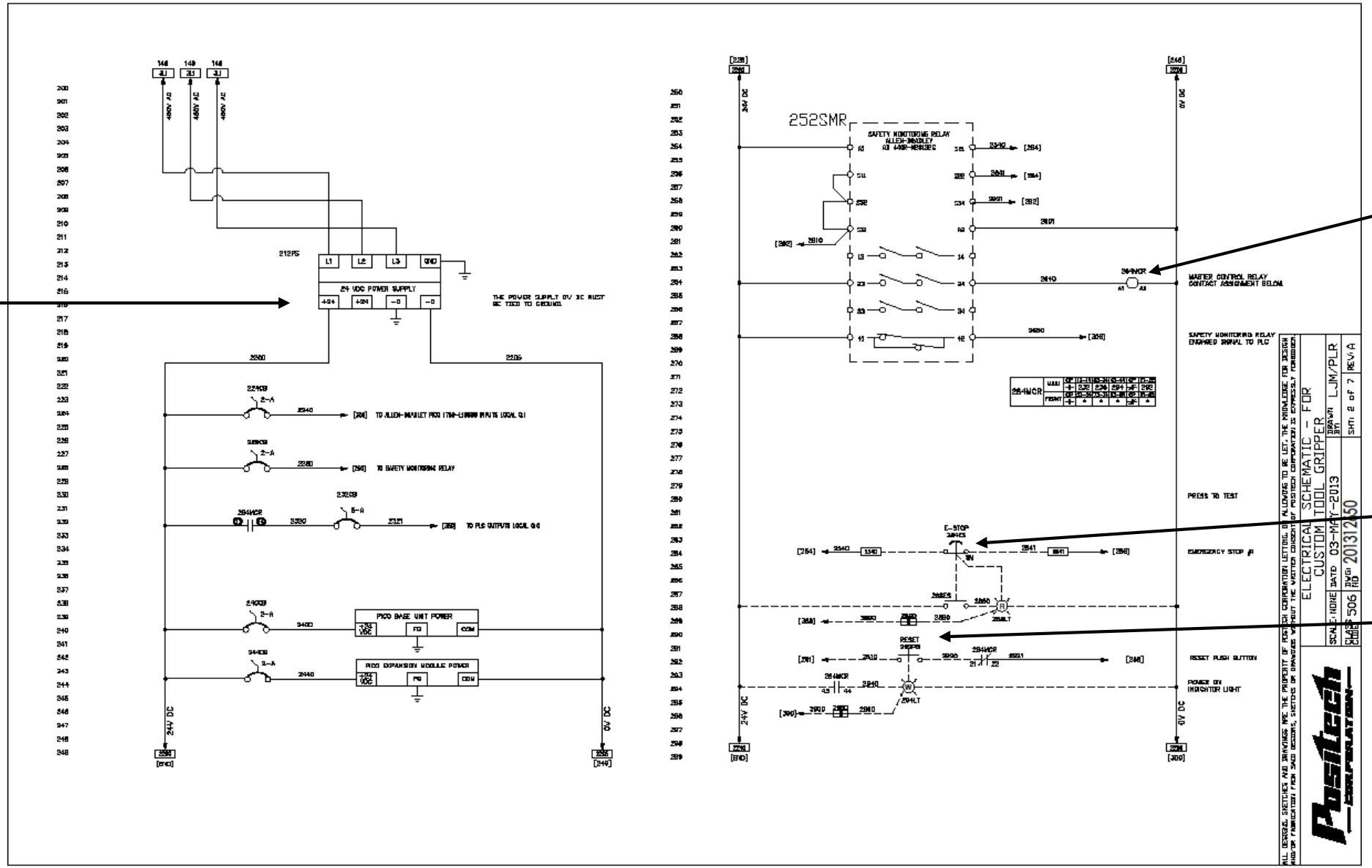
- WHAT TYPE OF PLC IS REQUIRED FOR THE I/O COUNT?
- WHAT IS THE FULL LOAD AMPS OF THE HPU?
- WHAT IS THE MAXIMUM CURRENT RATING OF THE ELECTRICAL ENCLOSURE?

ELECTRICAL SCHEMATIC



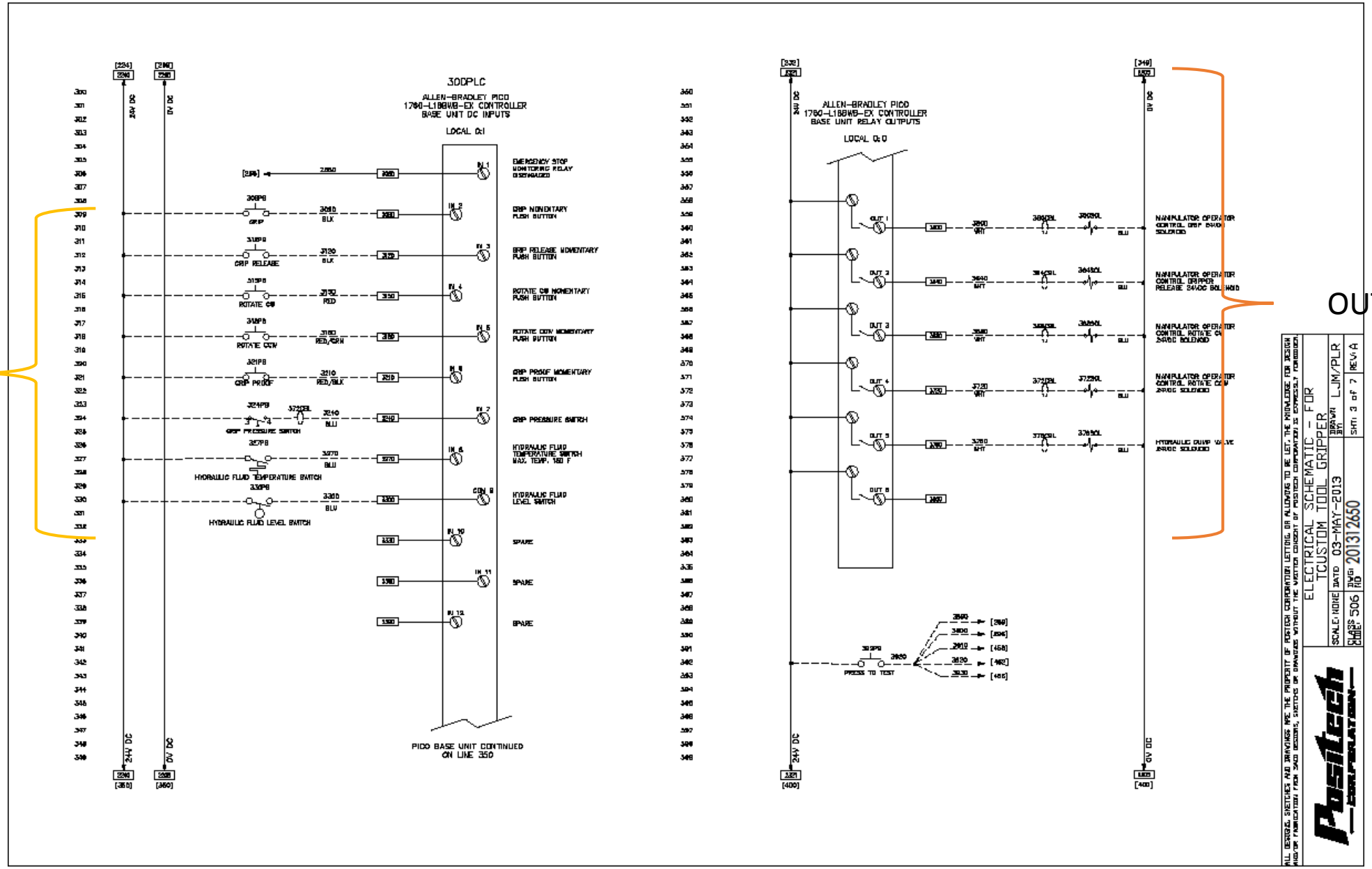
HYDRAULIC MOTOR

ELECTRICAL SCHEMATIC



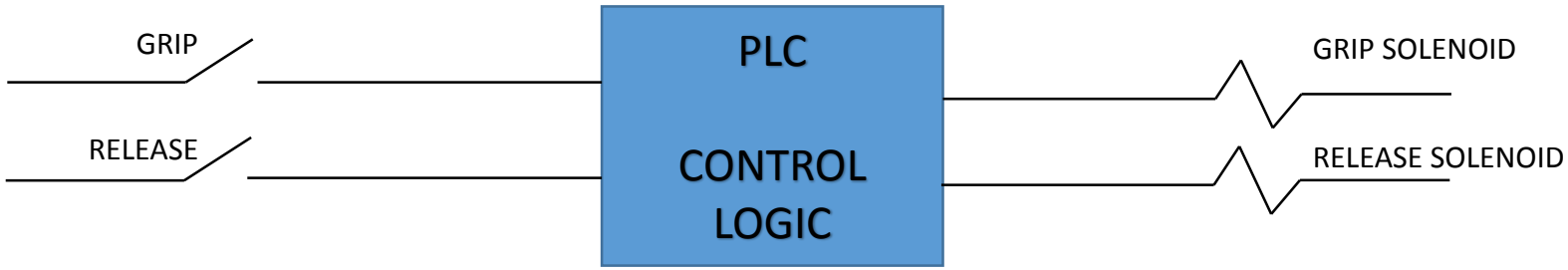
ELECTRICAL SCHEMATIC

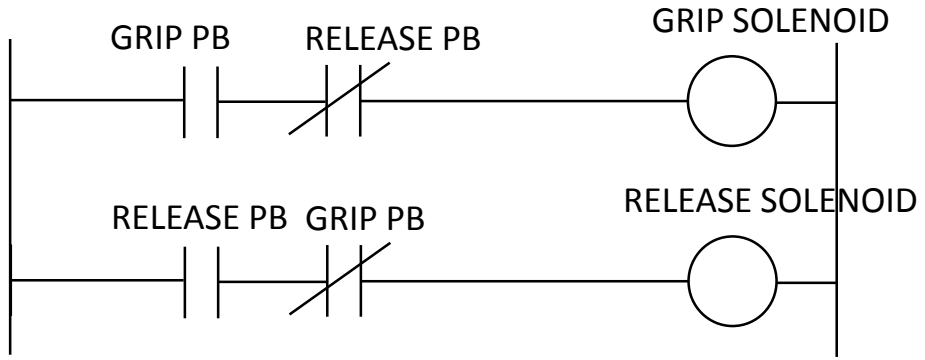
INPUTS



OUTPUTS

LADDER LOGIC





Conclusion

THIS IS HOW I USE PHYSICS AND COMPUTATION IN INDUSTRY.

THANKS FOR YOUR ATTENTION.