

# Main drive power

Computer 50 W

Alt Amps ea motor

slow 52 ft-lb - 20 sec

track 66 ft-lb - 2 min

Average = 64 ft-lb

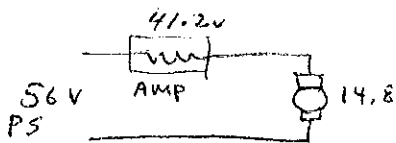
$K_T = 7.68 \text{ ft-lb/A}$

Average current 8.7 A

Average Voltage ea motor 14.8 V

Power supply Voltage ea motor 56 V

$$0.2^\circ/\text{sec}^2 = 38 \text{ ft-lb}$$



**358 W ea Alt AMP**

Az ea Amp

slow 88 ft-lb - 20 sec

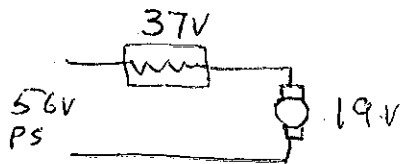
track 84 ft-lb - 2 min

Average 85 ft-lb

Average Current 11

Average Voltage @ Motor 19 V

$$0.1^\circ/\text{sec}^2 = 56 \text{ ft-lb}$$



**407 W ea Az Amp**

Do not exceed 400 watts average power.

Q Can we program to monitor the average power?



**TYPE 475 SOLENOID VALVES**

**Valve Selection - Item Numbers**

**Type 475 Solenoid Valves**

Control Function	Voltage	Item No.
3/2-Way Normally Closed	24V AC/DC	456083J
	110V AC/DC	456084K
	220V AC/DC	456085L
3/2-Way Normally Open	24V AC/DC	456089Y
	110V AC/DC	456090V
	220V AC/DC	456091J
5/2-Way Universal	24V AC/DC	456092K
	110V AC/DC	456093L
	220V AC/DC	456094M
5/2-Way Bi-Stable	24V AC/DC	125713R
	110V AC/DC	125714J
	220V AC/DC	125715K
5/3-Way Center Off	24V AC/DC	122705X
	110V AC/DC	122707Z
	220V AC/DC	122708A
5/3-Way Center Open	24V AC/DC	122709B
	110V AC/DC	122711L
	220V AC/DC	122712M

**Options**

- ◆ External Pilot
- ◆ Vacuum Version
- ◆ Pneumatic Version
- ◆ Field Bus, see Burkert Data Sheet type 1470/1475

Unit has 2 coils one to install  
pin one to remove pin.

.084A

once the pin has been installed or removed the power to that coil can be removed, i.e. when the limit has been activated.

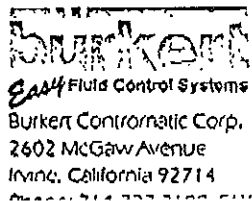
**Manifold Modules & Accessories**

Description	Item No.	
Manifold Module	2-Station	635319D
	3-Station	635343D
Connection Module	Right End	639618M
	Left End	639616B
Blanking Plates	3/2 Blanking	635337X
	5/2 Blanking	635335V
Cable Plugs	Type 1054	006699H
	Pre-Wired (3 ft. Leads)	413693P

Post-It™ brand fax transmittal memo 7671 # of pages 3

To	Co.	From	Co.
Dave	CAT	Simon	L+E
Dept.		Phone #	
Fax #		Fax #	

375 coils

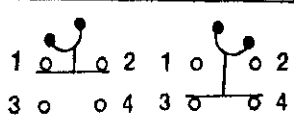
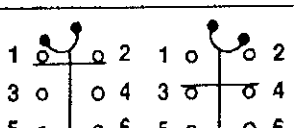
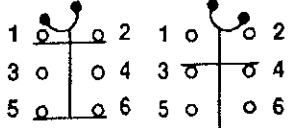
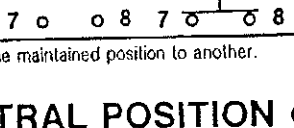


In Canada:  
760 Pacific Road, Unit 3  
Oakville, Ontario L6L 6M5

Bulletin  
**802M**

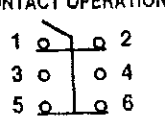
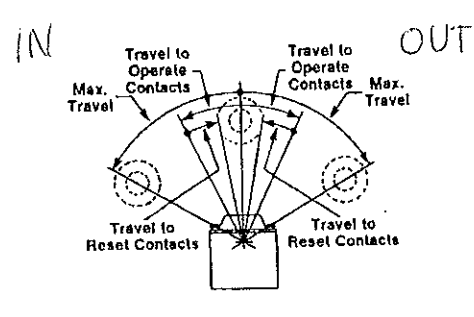
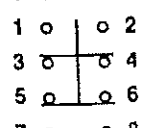
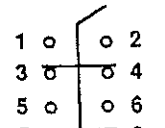
**PRE-WIRED — FACTORY SEALED**  
**NEMA TYPE 1, 4, 6P AND 13 LIMIT SWITCH**

**LEVER TYPE ● MAINTAINED CONTACT**

No. of Circuits	LEVER MOVEMENT CONTACT OPERATION	Force To Operate (Max.)	Travel To Operate Contacts (Max.)	Maximum Travel	Travel To Reset Contacts (Max.)	Complete Switch Without Lever		Operating Head Only		Switch Only	
						Catalog Number	Price	Catalog Number	Price	Catalog Number	Price
2 Circuit		2.75 lb-in	75°	87° <input checked="" type="checkbox"/>	35°	802M-AMY5	\$177	802M-AMX	\$105	802M-XY5	\$ 72
											
4 Circuit		2.75 lb-in	75°	87° <input checked="" type="checkbox"/>	35°	802M-AMTY5	207	802M-AMX	105	802M-XTY5	102
											

From one maintained position to another.

**NEUTRAL POSITION ● SPRING RETURN**

LEVER MOVEMENT CONTACT OPERATION	IN	OUT	Force To Operate (Max.)	Travel To Operate Contacts (Max.)	Maximum Travel	Travel To Reset Contacts (Max.)	Complete Switch Without Lever		Operating Head Only		Switch Only	
							Catalog Number	Price	Catalog Number	Price	Catalog Number	Price
			7 lb-in	16°	75°	7°	802M-NPY5	\$235	802M-NPX	\$125	802M-XNPY5	\$110
												
			7.5 lb-in									

See modifications on Page 582 for factory installed pre-wired type "STO" cable in 8, 12 and 16-foot cable lengths.  
 Operating lever, Catalog Number 802T-W3F, is not applicable to this switch.

for Lock Pin.

SERVICES

LEVERS — See Page 592 for a complete listing of operating levers.

Dimensions — See Page 589

Wiring Diagram — See Page 587

# Type 475 Solenoid Valves

## Description

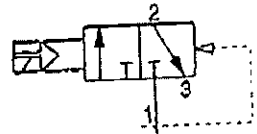
Type 475 3/2-Way, 5/2-Way and 5/3-Way Solenoid Valves for High Flow Rate Applications. Available as Stand-alone or Manifold Valves with 1/4 NPT Pipe Connections.

## Specifications

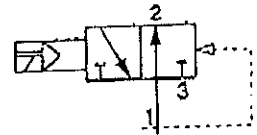
Installation:	As Required, but preferably with Solenoid System Upright. DIN-Rail 32mm/72mm (DIN 50022/50023)
Materials:	
Body:	
3/2- and 5/2-Way	Thermoplastic
5/2 Bi-Stable and 5/3-Way	Aluminium
Internals:	
3/2- and 5/2-Way	Thermo Plastic
5/2 Bi-Stable and 5/3-Way	Aluminium
Seals:	
3/2- and 5/2-Way	Perbunan, Polyurethane
5/2 Bi-Stable and 5/3-Way	Perbunan, POM
Medium	Filter Compressed air or Neutral Gas, Lubricated or Unlubricated
Temperature	
Ambient	-14°F to +131°F (-10°C to +55°C)
Fluid	-14°F to +122°F (-10°C to +50°C)
Response Times	Opening Approx. 25 ms Closing Approx. 55 ms
Operating Voltage	24V AC/DC 110V AC/DC 220V AC/DC
Power Consumption	2 W
Voltage Tolerance	±10%
Electrical Connection	Spade Connection Cable Plug Type 1054
Duty Cycle	100% Continuously Rated
Electrical Rating	Cable Plug: Nema 4

## Control Functions

3/2-Way  
Normally Closed (N.C.)

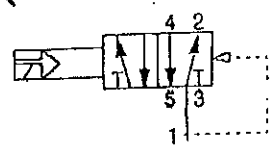


3/2-Way  
Normally Open (N.O.)

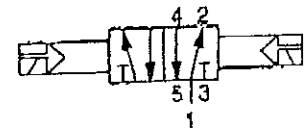
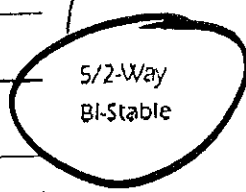


5/2-Way  
Universal

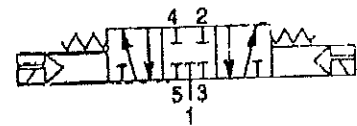
*for Lock Pin*



5/2-Way  
Bi-Stable



5/3-Way  
Center Off

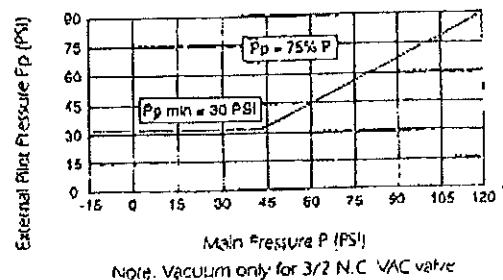


5/3-Way  
Center Open



Function	Orifice Dia.	Cv	Pressure (PSI)	Weight (lbs)
3/2-Way N.C.	.314" (8mm)	1.4	28-115	.44
3/2-Way N.O.	.314" (8mm)	1.4	28-115	.44
5/2-Way Universal	.314" (8mm)	1.4	28-115	.55
5/2-Way Bi-Stable	.354" (9mm)	1.7	28-140	1.10
5/3-Way	.354" (9mm)	1.7	42-140	1.10

All pressures quoted are gauge pressures with respect to the prevailing atmospheric pressures



mm  
Main drive Amp

Max Temp - 80°C

Set trip to - 60°C

Pete Law - Kollmorgen Corp  
(714) 581-3626

Use WARREN VE-3101 \$100- ea

50° to 105°C OPEN ON RISE

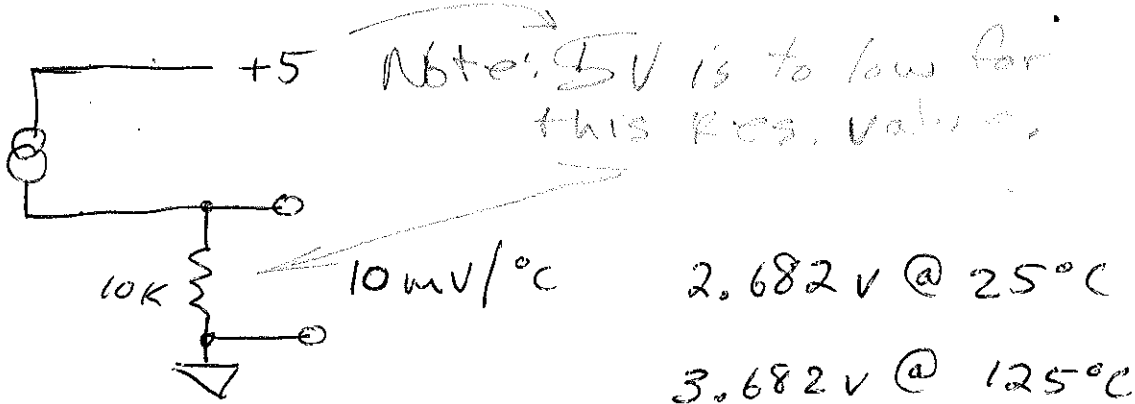
Ref: MASCO 714 680-9180

---

AD590

output = 298.2  $\mu$ A @ 25°C

1  $\mu$ A / °C



Resolution for the 12 bit ADC w/  $\pm 5V$  input range.  
 $15: \Delta V / (10/4096) = 4 \text{ ADU}/^\circ\text{C}$

Dave -

I found some very old figures for the telescope moment of inertia. You might want to have Charlie check these. I converted the moment of inertia to the equivalent one at the motor and capstan, just so you can compare to the actual motor moment of inertia, which must be much, much smaller.

Then I calculated the amount of energy which must be dumped when slowing down from slew speed, which takes 10 seconds.

Hope this helps to size the shunt resistors. Will return Aug 16.

Regards

Steve Shectman

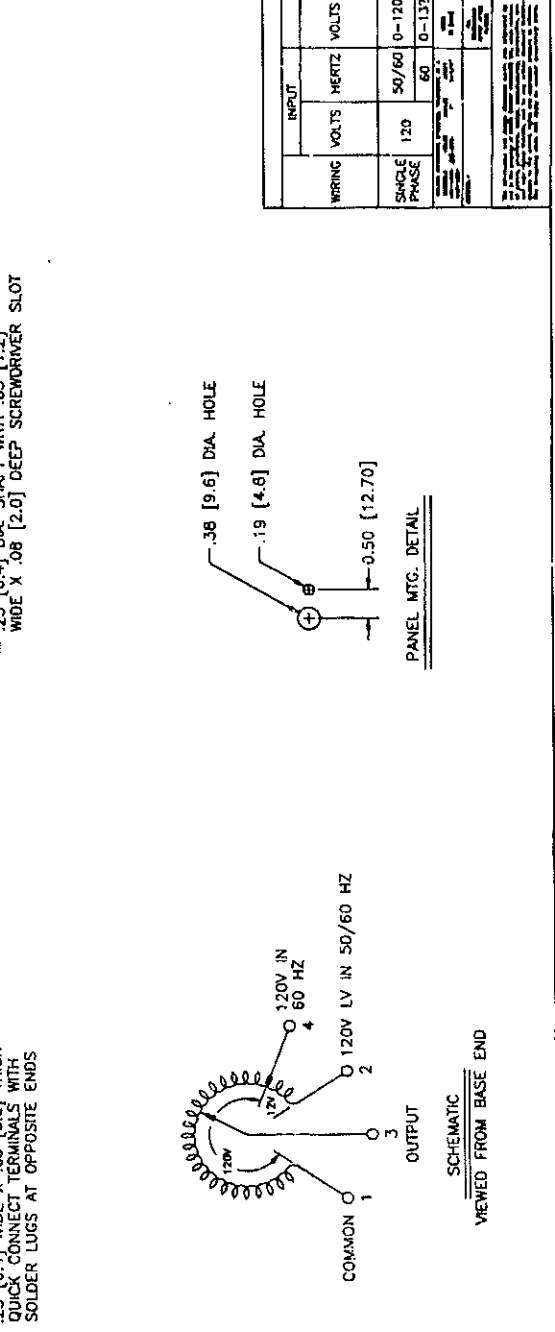
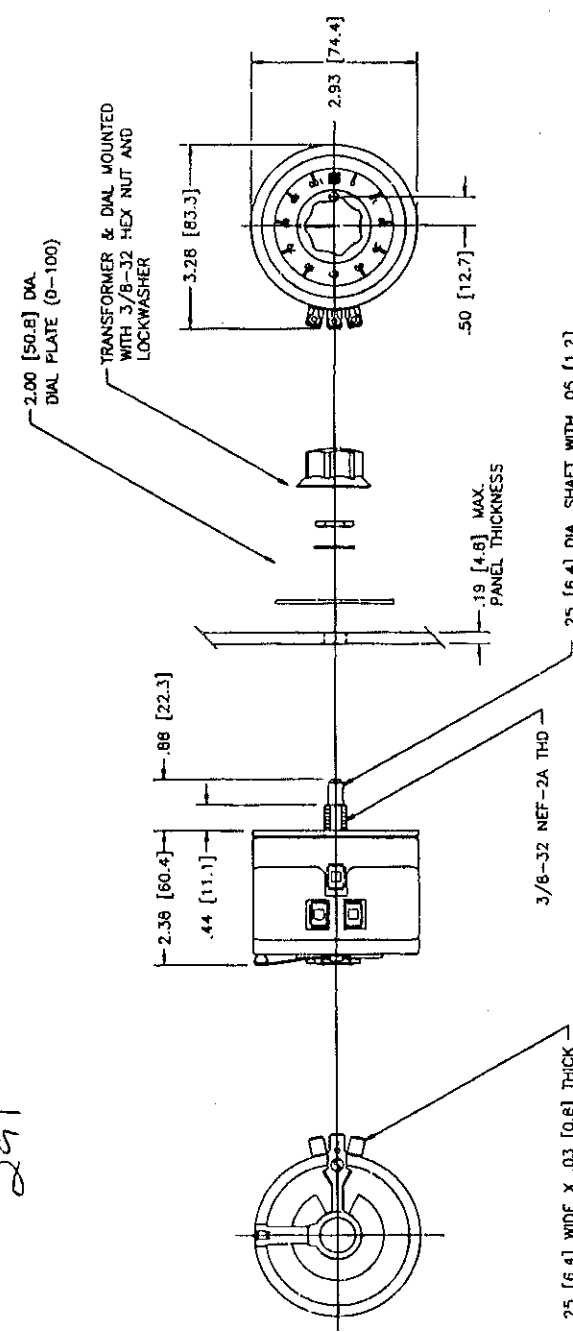
	Az.	E1.	
1. Telescope moment of inertia	$2.1 \times 10^6$	$7.0 \times 10^5$	$\text{Kg-m}^2$
2. Capstan Ratio	24.5	35.6	to 1
3. Tel. moment of inertia referenced to capstan (J)	3500	550	$\text{Kg-m}^2$
4. Telescope Slow Speed	2	1	$^\circ/\text{sec}$
5. Capstan Slow Speed ( $\omega$ )	0.86	0.62	radian/sec
6. Telescope Kinetic Energy ( $\frac{1}{2} J \omega^2$ )	1300	106	Joules

notes - 1. half of energy (#6) goes into each of two motors!

2. absolute worst case is that energy ~~is~~ is being dumped half of the time (the other half is accelerating).

3. Energy is dumped in 10 seconds. So average power rating would be 32.5 watts in Az, 2.65 watts in E1, for ~~average~~ each motor.

Post-it® Fax Note 7671 Date 10/20/98 # of pages 1  
 To David Carr From Mary Marrese  
 Co. Dept. Energy Co. STACO Energy  
 Phone # 437-253-1191  
 Fax # 626/795-8136  
 291  
 -6546



INPUT		SPECIFICATIONS				TERMINAL CONNECTIONS	
WIRING	VOLTS	CONSTANT CLUENT LOAD	MAX. AMP	MAX. KVA	SHAFT ROTATION	FOR INCREASING VOLTAGE AS VIEWED FROM BASE END	
50/60	120	3.0	3.5	0.42	INCREASE TO VOLTAGE	INPUT JUMPER OUTPUT	
60	0-120	3.0	0.40	0.42	INCREASE FROM BASE END	1-2	1-3
	0-132	3.0	0.40	0.42	CCW	1-4	1-3
					CW	1-4	1-3

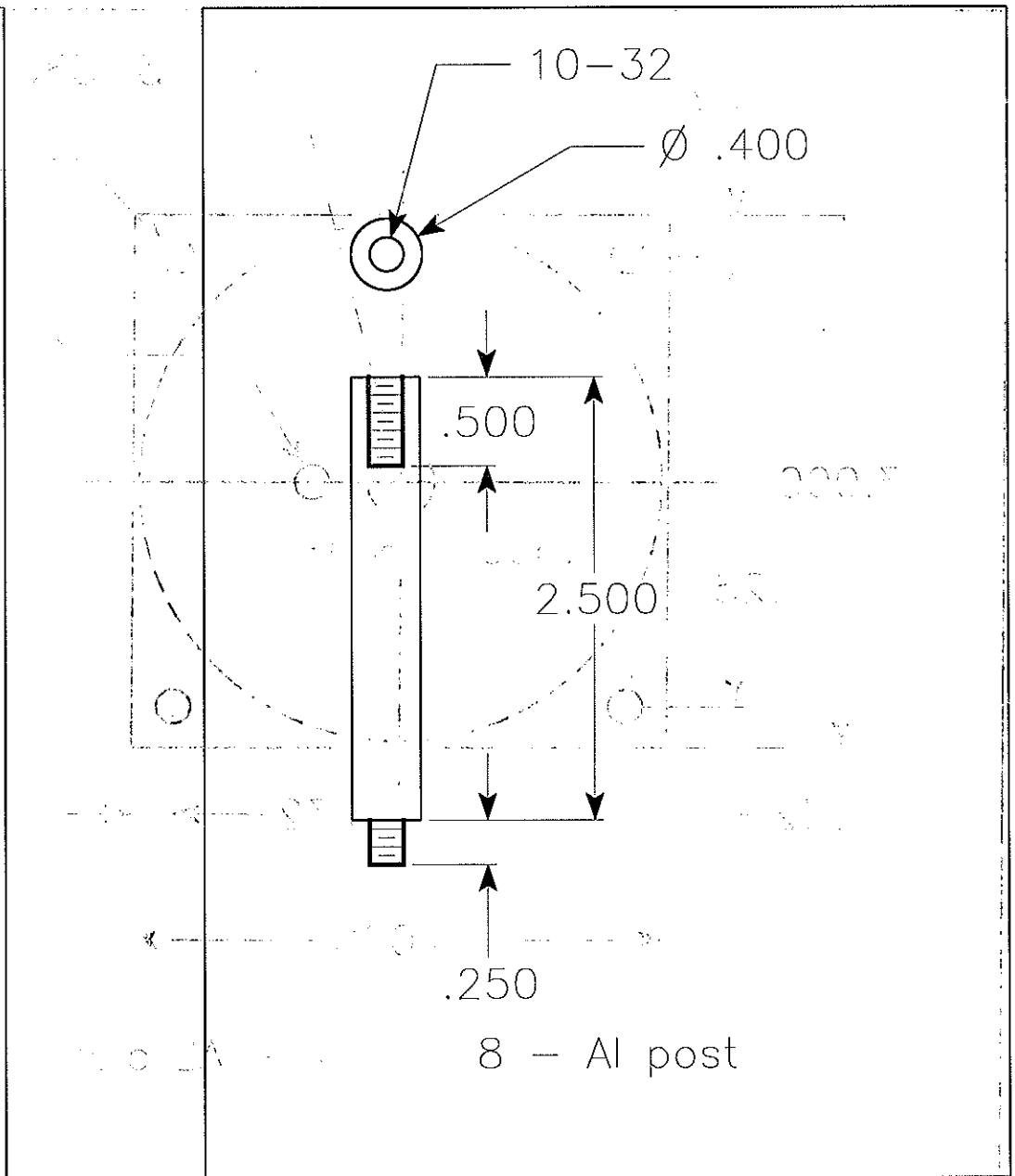
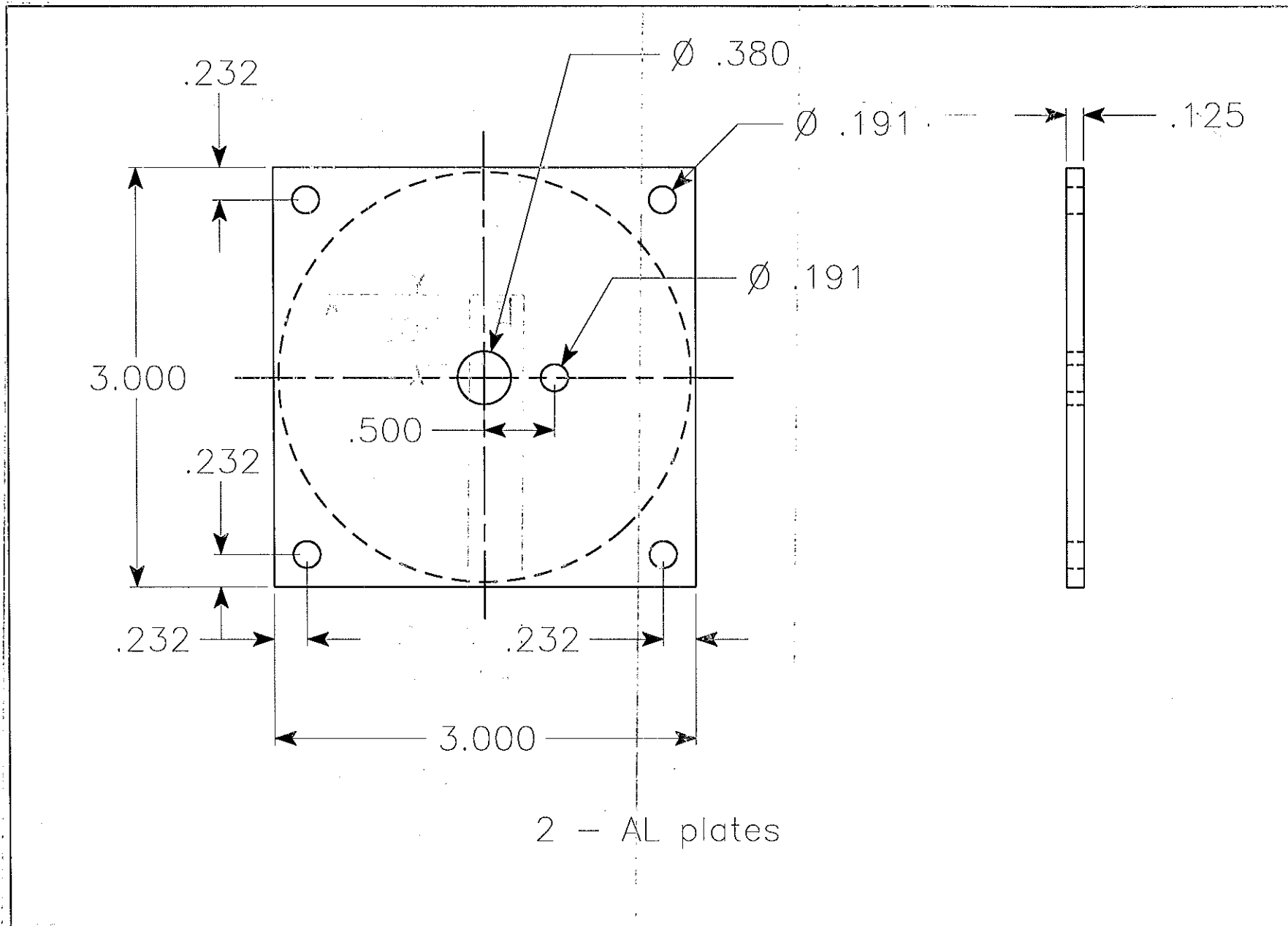
TYPE: 291

REVISIONS

NO.	DATE	BY	DESCRIPTION
1	8/23/91		ISSUE FOR PRODUCTION
2	8/23/91		REVISED TO 291

031-0291



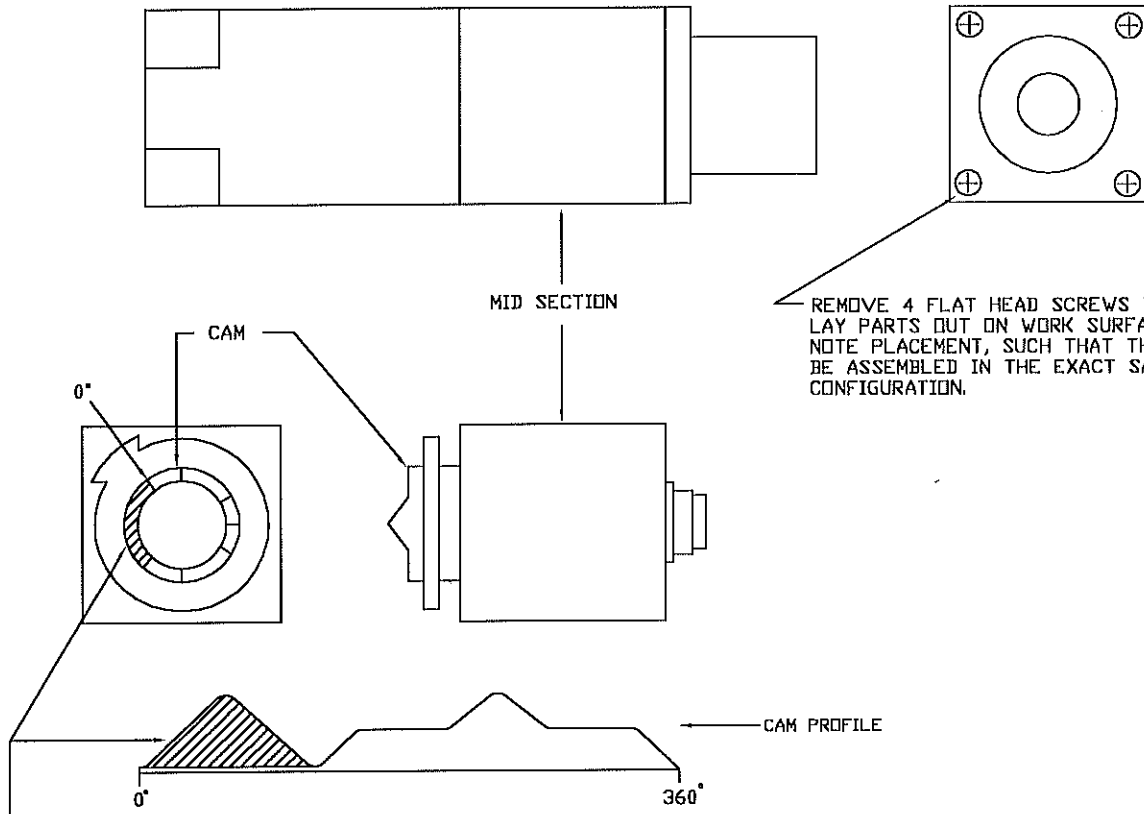


MAIN DRIVE FAN SPEED CONTROL  
 fan\_variac.vlm  
 10/21/98

**KEY SWITCH MODIFICATION NOTES:**

THE KEY SWITCH IS DISASSEMBLED, A PORTION OF A PLASTIC CAM IS MACHINED OFF. THE SWITCH IS RE-ASSEMBLED TO PRODUCE THE FUNCTION DIAGRAM BELOW. THIS IS A SIMPLE MODIFICATION. IT CAN BE DONE WITH NO MEASUREMENTS. I USED A HACK SAW AND EXACTO KNIFE.

ALLEN BRADLEY 800M-XA KEYSWITCH ASSEMBLED



REMOVE THIS PORTION OF CAM. LEAVE MODIFIED SURFACE AS SMOOTH AS POSSIBLE.

MODIFIED FUNCTION DIAGRAM:

KEY POSITION				
RIGHT SIDE from front	A B	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/>
LEFT SIDE from front	A B	<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/>

MATERIAL: N/A  
FINNISH: N/A MAKE: \_\_\_\_\_

*Carnegie Institution of Washington*  
The Observatories  
813 Santa Barbara Street  
Pasadena, California 91101  
PHONE (818)577-1122 FAX (818)795-8138

Title: KEY SWITCH MODIFICATION  
Date: 6-5-96 Scale: NOT TO SCALE  
File: KEYSWITCH.DWG  
Drawn By: J.W.A. joe@ociw.edu

From: "Joe Asa" <joe@shadow.ociw.edu>  
Subject: Re: alt limit sw  
To: dave@ociw.edu

OK here you go:

The switch is an Allen-Bradley 802M-NPJ1 A

ORG & BLU..... NC, open at 90 limit (horizon)  
RED/BLK & GRN/BLK.... NO, closed at 90 limit

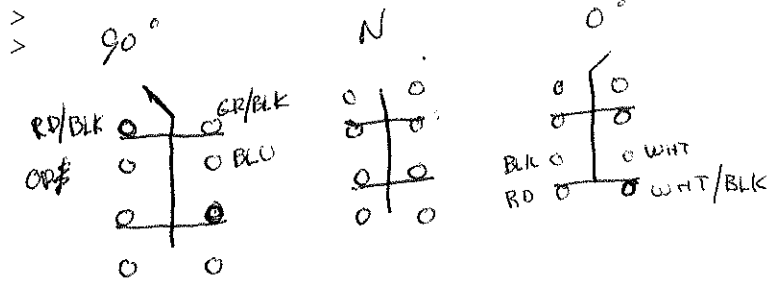
BLK & WHT..... NC, open at 0 limit (zenith)  
RED & WHT/BLK..... NO, closed at 0 limit

Hope this helps. The shipment arrived full of stuff. Thank Emily and anyone else who helped to get that stereo in there. It really helps to have some music here. Also thanks for getting those Hoffman panels in there. It means that I can mount up the Seimens panels permanently. Things are going well. All of the little details are being worked out now - terminal blocks for the motors, AC to the motor boxes etc.

Joe.

At 02:08 PM 4/28/98 -0700, you wrote:

>Joe,  
>I need a sketch of the limit sw at its three states. Or just a model no.  
>of the sw. and it's positions at zero limit, 90 limit and no limit.  
>  
>For now why don't you just run the cable up to the sw (you probably  
>already have) and I'll sort out what to do with them.  
>  
>Thanks  
>dave



0° limit - BLK & WHT  
90° limit - ORG & BLU

BLK = AL0M  
WHT = AL0LC  
ORG = AL90LM  
BLU = AL9LC

IPB

## Installation

The Model 14 is designed to operate in an IP bus system. To insure application success, proper connections to the card must be made with for external devices. For reliable system operation, power and ground connections must also be correct.

External connections are made to the card through the 50-pin dsub 50 HD connector on the carrier card. Pin assignments for these connections are shown in Table 1 on this page.

To install the Model 14 IP module, simply plug the card into the slot you have selected on your carrier card.

## Power Considerations

The Model 14 requires +5V from the carrier card. The typical current load is .25 Amps with no external devices or 1.5 Amps if external devices are also powered. An additional +5V may be fed through the external connector to the encoder or to any other external device that requires an additional supply.

The total current load must be considered when determining how much power is required for the system. Please see the technical specifications on pages 42-43 for additional details and information.

Before any connection on the card is changed, it is essential to remove the power from the PC rack and all external devices.

**Failure to disconnect all power may result in permanent damage to the card and will void the product's warranty in the case of such damage.**

**Table 1 Model 14 Pin Assignments**

Pin	Signal	Pin	Signal
1	GND	2	GND
3	+5VDC	4	+5VDC
5	+A 0 <i>AZ BRN</i>	6	-A 0 <i>AZ GRN</i>
7	+B 0 <i>AZ GRAY</i>	8	-B 0 <i>AZ PINK</i>
9	+I 0	10	-I 0
11	+A 1 <i>ALT BRN</i>	12	-A 1 <i>ALT GRN</i>
13	+B 1 <i>ALT GRAY</i>	14	-B 1 <i>ALT PINK</i>
15	+I 1	16	-I 1
17	+A 2	18	-A 2
19	+B 2	20	-B 2
21	+I 2	22	-I 2
23	+T/S1	24	-T/S1
25	+T/S2	26	-T/S2
27	(No connection)	28	(No connection)
29	+A 3	30	-A 3
31	+B 3	32	-B 3
33	+I 3	34	-I 3
35	+A 4	36	-A 4
37	+B 4	38	-B 4
39	+I 4	40	-I 4
41	+A 5	42	-A 5
43	+B 5	44	-B 5
45	+I 5	46	-I 5
47	+5VDC	48	+5VDC
49	GND	50	GND

*These pin assignments result when the cable is plugged into the Model 14-6 external interface. The Model 14-4 does not use pins 35 through 46.*

— IPA —

## Installation

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To install the Model 14 IP module, simply plug the card into the slot you have selected on your carrier card.

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**Table 1 Model 14 Pin Assignments**

Pin	Signal	Pin	Signal
1	GND	2	GND
3	+5VDC	4	+5VDC
5	+A 0 AZ.A GRN	6	-A 0 AZ.A BLK
7	+B 0 AZ.A BLU	8	-B 0 AZ.A BLK
9	+I 0 AZ.A YEL	10	-I 0 AZ.A BLK
11	+A 1 AZ.B GRN	12	-A 1 AZ.B BLK
13	+B 1 AZ.B BLU	14	-B 1 AZ.B BLK
15	+I 1 A.B YEL	16	-I 1 AZ.B BLK
17	+A 2 AZ.C GRN	18	-A 2 AZ.C BLK
19	+B 2 AZ.C BLU	20	-B 2 AZ.C BLK
21	+I 2 AZ.C YEL	22	-I 2 AZ.C BLK
23	+T/S1	24	-T/S1
25	+T/S2	26	-T/S2
27	(No connection)	28	(No connection)
29	+A 3 AZ.D GRN	30	-A 3 AZ.D BLK
31	+B 3 AZ.D BLU	32	-B 3 AZ.D BLK
33	+I 3 AZ.D YEL	34	-I 3 AZ.D BLK
35	+A 4 ALT.A GRN	36	-A 4 ALT.A BLK
37	+B 4 ALT.A BLU	38	-B 4 ALT.A BLK
39	+I 4 ALT.A YEL	40	-I 4 ALT.A BLK
41	+A 5 ALT.B GRN	42	-A 5 ALT.B BLK
43	+B 5 ALT.B BLU	44	-B 5 ALT.B BLK
45	+I 5 ALT.B YEL	46	-I 5 ALT.B BLK
47	+5VDC	48	+5VDC
49	GND	50	GND

121  
121  
121  
121  
121  
121  
121  
121  
121  
121  
121  
131  
133  
133  
133  
133  
133  
133  
133  
133

*These pin assignments result when the cable is plugged into the Model 14-6 external interface. The Model 14-4 does not use pins 35 through 46.*

### 3.3 Mating Connectors

The 5641 brings all IP I/O through standard spaced 50-pin shrouded headers: J1 for IPD, J2 for IPB, J4 for IPC, and J5 for IPA. General purpose and other I/O are brought out to connector J3, a 60-pin standard spaced shrouded header (see figure 3.4 and table 3.4). Mating cables are provided in the development kit.

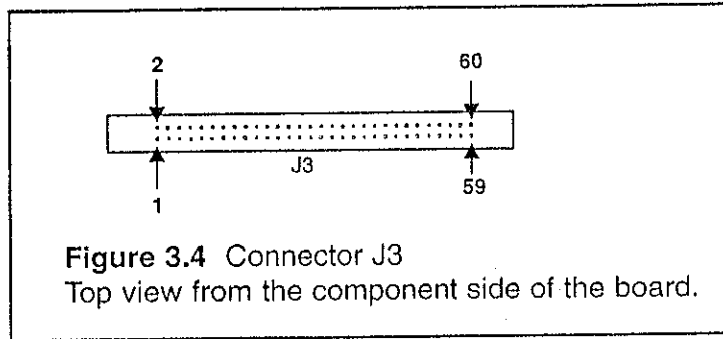


Figure 3.4 Connector J3  
Top view from the component side of the board.

**Table 3.4 Connector J3 Pinout**

Pin	Description	Pin	Description
1	I/O (0)	2	I/O (1)
3	I/O (2)	4	I/O (3)
5	I/O (4)	6	I/O (5)
7	I/O (6)	8	I/O (7)
9	Ground	10	I/O (8)
11	I/O (9)	12	I/O (10)
13	I/O (11)	14	I/O (12)
15	I/O (13)	16	I/O (14)
17	I/O (15)	18	Ground
19	I/O (16)	20	I/O (17)
21	I/O (18)	22	I/O (19)
23	I/O (20)	24	I/O (21)
25	I/O (22)	26	I/O (23)
27	Ground	28	I/O (24)
29	I/O (25)	30	I/O (26)
31	I/O (27)	32	I/O (28)
33	I/O (29)	34	I/O (30)
35	I/O (31)	36	Ground
37	I/O (32)	38	I/O (33)
39	I/O (34)	40	I/O (35)
41	I/O (36)	42	I/O (37)
43	I/O (38)	44	I/O (39)
45	Ground	46	I/O (40)
47	I/O (41)	48	I/O (42)
49	I/O (43)	50	I/O (44)
51	I/O (45)	52	I/O (46)
53	I/O (47)	54	I/O +5V
55	I/O +5V	56	I/O +5V
57	Relay Common	58	Relay NC
59	Ground	60	Relay NO

**Note:** All I/O bits are active HIGH and pulled Active LOW on reset

LIMITS-RD { AZ.A --- 1  
AZ.C --- 3  
ALT.A --- 5

ALARMS-ORG { AZ.B --- 11  
AZ.D --- 13  
ALT.B --- 15

AZ.B --- 2  
AZ.D --- 4  
ALT.B --- 6

AZ.A --- 8  
AZ.C --- 10  
ALT.A --- 12