



hubbell industrial controls, inc.

INSTRUCTIONS

4216

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SERVICE AND REPAIR PARTS

EUCLID TYPE 4216/CAM OPERATED MASTER SWITCH WITH EXTERNAL STOPS SERIES 4903X-XXX

POWER OFF

Remove all power from master switch before providing service or repairs.

I. Mounting

Mounting brackets are incorporated at the base of the master switch on Nema 1 enclosures for floor type mounting; (4 .344" diameter holes are provided.) A 1-1/4" conduit opening is located at the base of the switch. For open type or desk mounting, use the four counter-sunk .219" diameter holes located on the Intermediate Plate (1).

IIA. Handle Arrangement

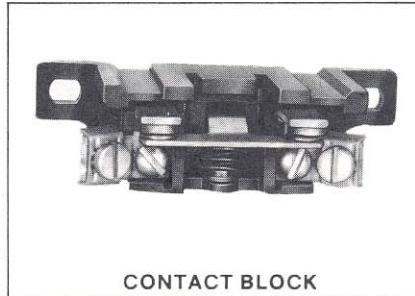
Handle arrangement can be changed from STANDARD RIGHT HAND MASTER to LEFT HAND MASTER by the following method:

- 1) Remove four mounting screws (27) and take off cover (28).
- 2) Remove one stop screw (61) on gear box (3).
- 3) Remove four gear box mounting screws (4).
- 4) Turn Handle 90°.
- 5) Remove one spring pin (63) inside gear housing on operating shaft. Drive the gear spring pin (63) 5/8" deep into the gear hub to clear operating shaft.
- 6) Pull out handle and shaft, (while holding gear), from gear housing.
- 7) Reposition gear, (spring pin up), for standard left hand arrangement. Insert handle and shaft. Align hole in shaft and gear, and drive spring pin into shaft, (1/16" below gear hub diameter).
- 8) Install Spring pin (63) into hole in operating shaft.
- 9) Apply loctite to threads on stop screw (61). Install stop screws into gear housing.

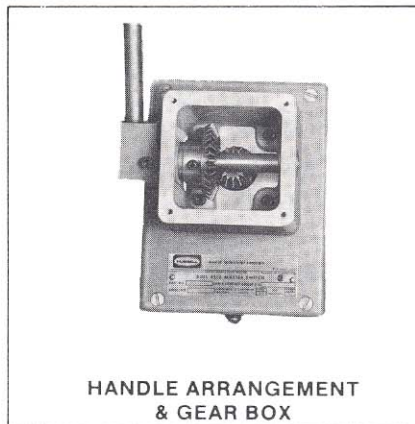
NOTE "A"

Handle should be in the up-right position and the switch in the off-point position. This insures proper cam to handle orientation.

- 10) Reinstall gear box assembly on master switch to new position.



CONTACT BLOCK



HANDLE ARRANGEMENT
& GEAR BOX

Tighten four mounting screws (4).

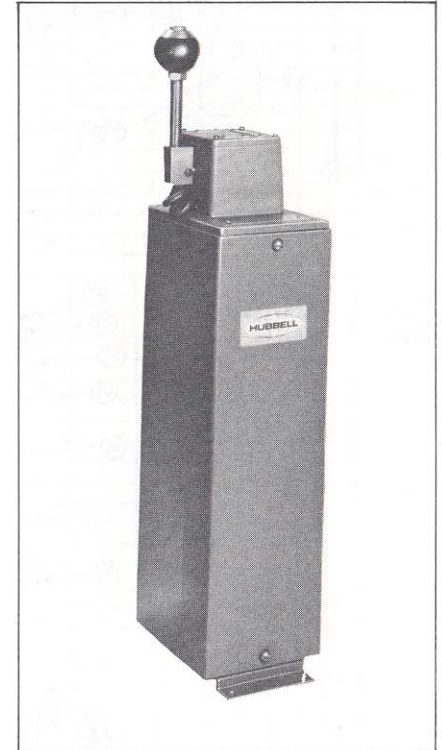
- 11) Install cover (28) and tighten four mounting screws (27).

IIB. Auxiliary Pushbutton Handle Arrangement

The Master Switch handle can be changed from standard right hand to left hand operation only! For 90° rotation, turn Master Switch enclosure 90°.

The Master Switch must be removed from the enclosure or desk. Follow Part IV instructions for changing cams, (1 thru 6), and continue:

- 1) Disconnect switch wires from terminal block (12), cut off "push-on" terminals from wires. (Follow IIA HANDLE ARRANGEMENT instructions 1 thru 9).
- 2) Feed handle cable through intermediate plate (1) and hole in main frame (10); (See Note "A").
- 3) Align cable and gear box (3) on master switch and tighten four mounting screws (4).



- 4) Install cover (28) and tighten four mounting screws (27).

- 5) Install new "crimp-on" terminals on handle wires and connect terminals to block (12).

- 6) Install Master Switch into enclosure or desk, and follow Part IV instructions 1 thru 6 in reverse order to assemble Master Switch.

III. Gear Box Assembly

NOTE "B"

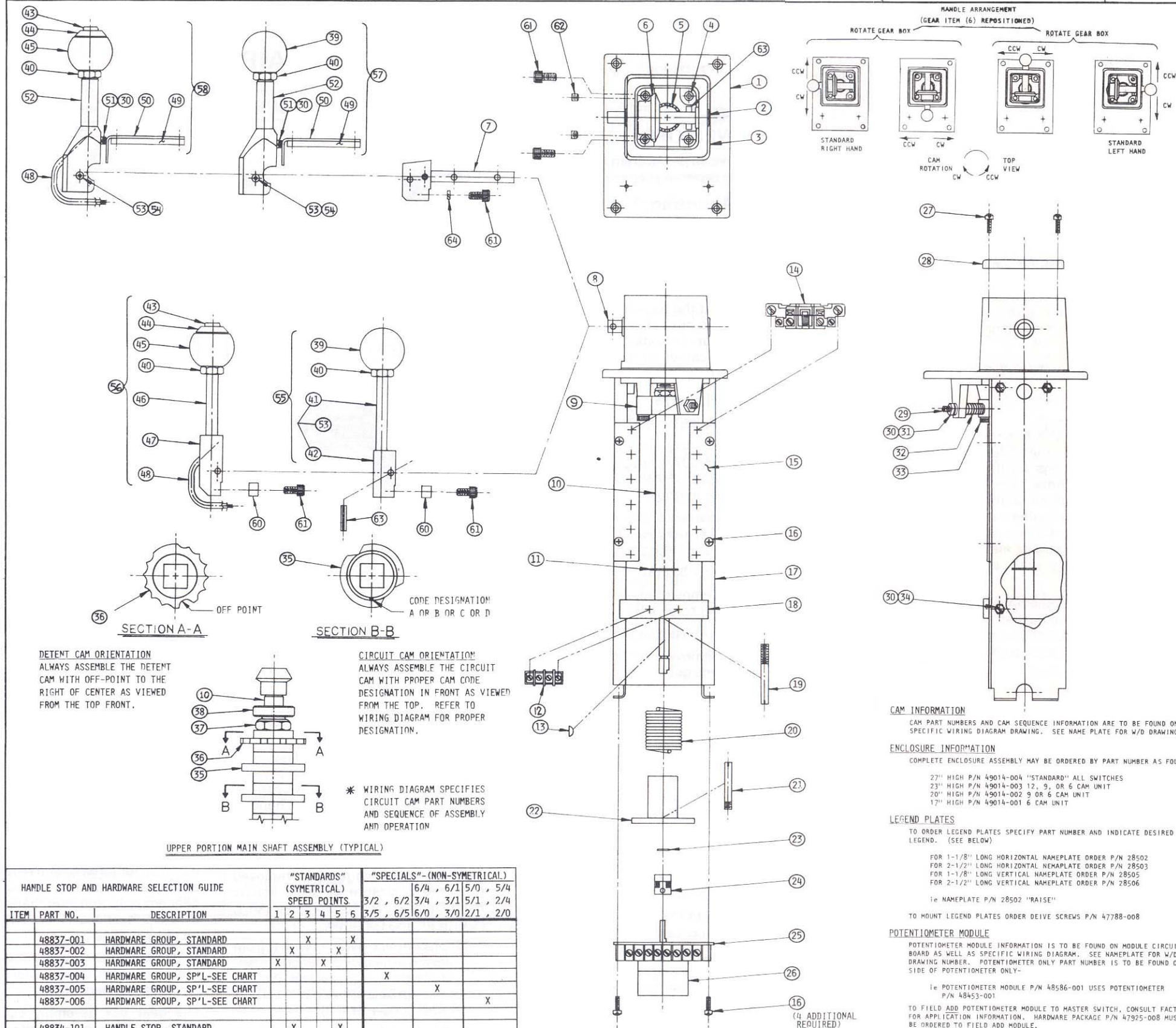
The gear box (3) can be repositioned from standard right hand to left hand operation when contact sequence is identical for forward and reverse. This can be accomplished by rotating the gear box only, and interchanging electrical connections 1F and 1R on contact blocks (14).

CAUTION: Remove all power from Master Switch before interchanging electrical connections.

The gear box assembly can be repositioned to one of the alternate 90° locations by the following method:

CAUTION: Be sure that the switch is in off-point position prior to repositioning the gear box assembly. The detent follower must be engaged with the off-

(Continued on last page)



HANDLE STOP AND HARDWARE SELECTION GUIDE			"STANDARDS" (SYMMETRICAL) SPEED POINTS					"SPECIALS" (NON-SYMMETRICAL)				
ITEM	PART NO.	DESCRIPTION	1	2	3	4	5	6	7	8	9	10
48837-001	HARDWARE GROUP, STANDARD				X							
48837-002	HARDWARE GROUP, STANDARD			X								
48837-003	HARDWARE GROUP, STANDARD		X		X							
48837-004	HARDWARE GROUP, SP'L-SEE CHART							X				
48837-005	HARDWARE GROUP, SP'L-SEE CHART								X			
48837-006	HARDWARE GROUP, SP'L-SEE CHART									X		
48834-101	HANDLE STOP, STANDARD			X		X						
48834-102	HANDLE STOP, STANDARD		X		X							
48834-103	HANDLE STOP, SPECIAL							1				
48834-104	HANDLE STOP, SPECIAL								1			
48834-105	HANDLE STOP, SPECIAL									1		
61	47100-086	SCR, SKT HD CAP 5/16-18 x 1/2"	3	3	3	3	3	3	3	3	3	3
62	47103-040	SCR, SKT SET 5/16-18 x 1/4"	2	2	2	2	2	2	2	2	2	2
63	57401-031	SPRING PIN .25" DIA x 1.00"	3	3	3	3	3	3	3	3	3	3
64	47252-410	LOCKWASHER, HI COLLAR 5/16			1							

OTHER DRAWINGS AVAILABLE UPON REQUEST
C-49015-005-SPRING RETURN ASSEMBLY INSTRUCTIONS
C-49015-010-OUTLINE, STANDARD MASTER - EXTERNAL STOPS
C-49015-011-OUTLINE, SPECIAL ENCLOSURE HEIGHT - EXTERNAL STOPS
C-49015-012-OUTLINE, 56" OFF POSITION - EXTERNAL STOPS
D-49015-015-4216 CAM MASTER RENEWAL PARTS - JOYSTICK

25 piece bulk pack of contact blocks
P/N 48448-025

4216 CAM MASTER SWITCH - EXT STOPS			6 CAM UNIT		9 CAM UNIT		12 CAM UNIT		16 CAM UNIT	
ITEM	PART NO.	DESCRIPTION	STD.	P.B.	STD.	P.B.	STD.	P.B.	STD.	P.B.
1	48468-000	INTERMEDIATE PLATE, STD	1				1		1	
2	48469-003	INTERMEDIATE PLATE, P.B.		1		1		1		1
3	48449-000	BUSHING, FLANGED OILITE	2	2	2	2	2	2	2	2
4	48829-001	GEARBOX & BUSHING STD.	1		1		1		1	
5	48829-003	GEARBOX & BUSHING P.B.		1		1		1		1
6	47100-056	SCR, SKT HD CAP #10-24 x 1"	4	4	4	4	4	4	4	4
7	48824-000	PINION - EXT STOPS	1	1	1	1	1	1	1	1
8	48823-000	GEAR - EXT STOPS	1	1	1	1	1	1	1	1
9	48865-000	HANDLE BASE ASSEMBLY - O.P.L.	1	1	1	1	1	1	1	1
10	48826-001	OPERATOR SHAFT - STD	1	1	1	1	1	1	1	1
11	48473-001	DETENT ARM ASSEMBLY	1	1	1	1	1	1	1	1
12	48825-001	MAIN SHAFT - 6 CAM UNIT	1	1						
13	48825-002	MAIN SHAFT - 9 CAM UNIT			1	1				
14	48825-003	MAIN SHAFT - 12 CAM UNIT					1	1		
15	48825-004	MAIN SHAFT - 16 CAM UNIT							1	1
16	57429-018	RETAINING RING .75" EXT	1	1	1	1	1	1	1	1
17	57520-147	TERMINAL BLOCK, 2 POS	1	1			1	1		
18	57458-008	WOODRUFF KEY #303	1	1	1	1	1	1	1	1
19	48448-100	CONTACT BLOCK	AR	AR	AR	AR	AR	AR	AR	AR
20	48462-001	SW, MTG PLATE, 6 CAM UNIT	2	2						
21	48462-002	SW, MTG PLATE, 9 CAM UNIT			2	2				
22	48462-003	SW, MTG PLATE, 12 CAM UNIT					2	2		
23	48462-004	SW, MTG PLATE, 16 CAM UNIT							2	2
24	48606-223	SCR, PAN HD TYPE C #10-32 x 1/2"	4	4	6	6	8	8	10	10
25	48596-001	MAIN FRAME, 6 CAM UNIT	1	1						
26	48596-002	MAIN FRAME, 9 CAM UNIT			1	1				
27	48596-003	MAIN FRAME, 12 CAM UNIT					1	1		
28	48596-004	MAIN FRAME, 16 CAM UNIT							1	1
29	48828-000	LWR BRG BLOCK, STD	1	1			1	1		
30	48828-001	LWR BRG BLOCK, P.B.		1		1		1		1
31	48631-001	THREADED STUD, 5/16-18 x 2.35"	1	1			1	1		
32	48714-001	RED SPRING, LIGHT DUTY	1	1	1	1	1	1	1	1
33	48714-002	GREEN SPRING, STD, DUTY	1	1	1	1	1	1	1	1
34	48714-003	BLUE SPRING, MED, DUTY	1	1	1	1	1	1	1	1
35	48714-004	YELLOW SPRING, HEAVY DUTY	1	1	1	1	1	1	1	1
36	48630-001	THREADED STUD, 5/16-18 x 1.91"	1	1	1	1	1	1	1	1
37	48498-002	SPRING RETAINER HUB	1	1	1	1	1	1	1	1
38	57429-019	RETAINING RING .375" EXT	1	1	1	1	1	1	1	1
39	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
40	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
41	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
42	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
43	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
44	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
45	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
46	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
47	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
48	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
49	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
50	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
51	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
52	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
53	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
54	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
55	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
56	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
57	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1
58	48451-000	POTENTIOMETER COUPLING	1	1	1	1	1	1	1	1

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REV.

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DESCRIPTION

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4216 CAM MASTER SWITCH

"EXTERNAL STOPS"

RENEWAL PARTS

DRG. NO. D49015-014

(Continued from front page)

point on the detent cam to insure proper cam-to-handle orientation.

- 1) Remove cover (28) by removing four screws (27).
- 2) Remove four socket head screws (4), lift gear box assembly, and rotate in 90° increments to one of the alternate positions.

(SEE NOTE "B")

- 3) Set housing down in new position and re-install four socket head cap screws (4).

CAUTION: Be sure that handle is in the up-right position and the switch is in the off-point position to insure proper cam-to-handle orientation.

IV. Changing Cams

- 1) Remove all power to Master Switch.
- 2) Remove Circuit Blocks and Switch Mounting Plates (14) and (15) by removing required number of screws (16). IT IS NOT NECESSARY TO DISTURB EXISTING WIRING.
- 3) Customer wiring must be disconnected from terminal block (12) if switch is equipped with auxiliary pushbutton handle.
- 4) Disconnect customer wiring if switch is equipped with potentiometer module (25).
- 5) Remove four screws securing intermediate plate (1).
- 6) Remove Master Switch from enclosure or desk mounting.
- 7) If Switch is equipped with potentiometer module (25), it must

be removed prior to main shaft (10) removal. It is not necessary to remove the potentiometer coupling (24) from the main shaft (10).

- 8) Remove detent cam compression spring (32).
- 9) Remove four screws (34) and lockwashers (30) which secures lower bearing block (18).
- 10) Remove the main shaft assembly from the main frame (17).
- 11) Remove pinion (5) off top of main shaft (10).
- 12) Remove upper bearing (38).
- 13) Remove locknut (37) that secures detent cam (36) and circuit cams (35).

CAUTION: Observe the orientation and order of assembly of detent cam (36) and circuit cams (35).

- 14) Refer to cam coding on wiring diagram for proper cam orientation.
- 15) Re-assemble the Master Switch. The handle should be in an up-right position with the main shaft in the off point position to insure proper cam-to-handle orientation.

V. Adjusting Potentiometer Assembly (25)

(For Stepless Application)

- 1) Remove all power to Master Switch.
- 2) Remove wires #2 & 4 on Potentiometer Assembly (25) Terminal Board.

- 3) Remove 4 flat head screws from Intermediate Plate (1).
- 4) Lift and tilt the Master Switch so the bottom of switch (Potentiometer Assembly) clears the Housing. Support the tilted switch.
- 5) Attach Ohm Meter leads to Potentiometer Assembly Terminals #2 & 4.
- 6) Move handle from STOP to STOP in opposite directions.

Record the Ohmic Value. Loosen two locking screws, (do not remove), on bottom of Circuit Board. Rotate handle on switch to stop position and rotate potentiometer until ohmic value is equal in both directions. Secure two locking screws. Check Ohmic Value again in both directions.

- 7) Re-assemble Master in reverse order.

VI. Lubrication

Your Euclid Type 4216 Mill Master Switch is equipped with double sealed and lubricated ball bearings on the main shaft and oilite bronze sleeve bearings impregnated with oil on the operator shaft. While the sealed ball bearings do not require lubrication maintenance, the oilite bearings may be lubricated periodically with an SAE30 non-detergent oil.

The pinion-bevel gear combination should be inspected on a regular basis, and lubricated with an NLGI #1 grease such as Lubriplate #107 or equivalent.

Electrical Ratings

Electrical Contacts are rated in accordance with NEMA Standard ICS-2-125 (B600 and N600 Table Rating)

AC	Maximum Continuous Amperes	Maximum Make and Break Current — Amperes							
		120V		240V		480V		600V	
		Make	Break	Make	Break	Make	Break	Make	Break
B600	5	30	3	15	1.5	7.5	.75	6	.6
DC	Maximum Continuous Amperes	Maximum Make and Break Current — Amperes							
		125V		250V		301V to 600V			
		Make	Break	Make	Break	Make	Break	Make	Break
N600	10	2.2	2.2	1.5	1.5	0.4	0.4		

The list prices shown are subject to change without notice.



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