

**AMETEK<sup>®</sup>**  
**PATRIOT SENSORS**

Series 1980

**Gemco<sup>™</sup>**

Rotating Cam Limit Switches

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## Micro-Adjust Cams



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# Rotating Cam Limit Switches

## FEATURING

- PRECISION CAM ADJUSTMENT AT ANY ANY ANGULAR POSITION OF THE CAM SHAFT
- SPEEDS FROM 0 to 500 RPM IN EITHER DIRECTION
- NO SPECIAL CAMS REQUIRED FOR ANY CONTACT SETTING FROM 4° to 356°
- NO TOOLS REQUIRED TO ADJUST CAM SETTING
- ACCURATE REPEATABILITY
- GEMCO RUGGED DUTY PRECISION SNAP ACTION SWITCHES

## ACCESSORIES

The following accessories can be obtained with the Gemco Rotating Cam Limit Switch:

- Straight Drive and Right Angle Gear Reducers
- Timing Dial and Timing Dial Window
- Electrical Wiring per Customer's Specification
- Motor Driven Rotating Cam Limit Switch with A.C. or D.C. for Adjustable Speed Drives
- Potentiometer driven off the cam shaft
- Spring Return Mechanism
- Plug-In Socket
- Double Ended Shafts
- Pilot Lights
- 3 Way and 4 Way Air Valves directly interchangeable with switches
- Special Conduit Opening
- Special shaft extensions and keyway
- Adjustable Coupling (See Catalog Section 3001)
- Special Cams & Large 6" Cams for Higher Resolution
- Combination Adjustable-In-Motion and Micro-Adjust Circuits (see Catalog Section 1981)
- Electric Clutch and/or Brake
- Separate Terminal Strips
- Add-A-Cam Feature
- Factory Adjustment of Cams Available
- Open Type Units
- Dual Shafts

## FOR OSHA STANDARDS

- Motion Detector
  - Gemco DRIVE-CHEK®
  - Dual Shaft Cam Switch
  - Consult manufacturer for desired accessories
- } Either is necessary for mechanical press application\*

## APPLICATION:

Gemco's all new Micro-Adjust Rotating Cam Limit Switch is a pilot device used for heavy duty material handling mechanisms, mechanical presses,\* packaging machines, rotary table, and in many other applications where accurate, repetitive, and sequential operations are required in control circuitry.

When motion is expressed in shaft rotation, either through a roller chain, gear train, or directly, the Gemco Rotating Cam Limit Switch makes it possible to open or close independent circuits at any desired angular position.

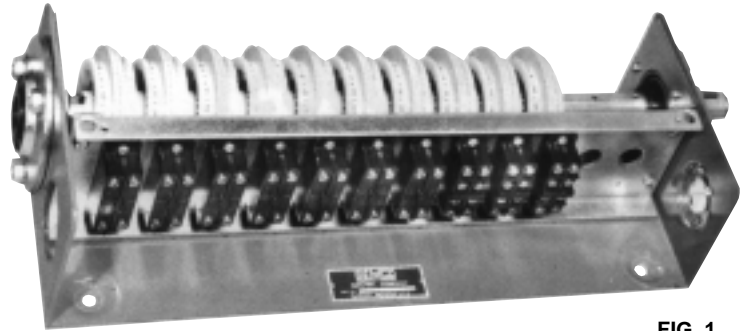


FIG. 1

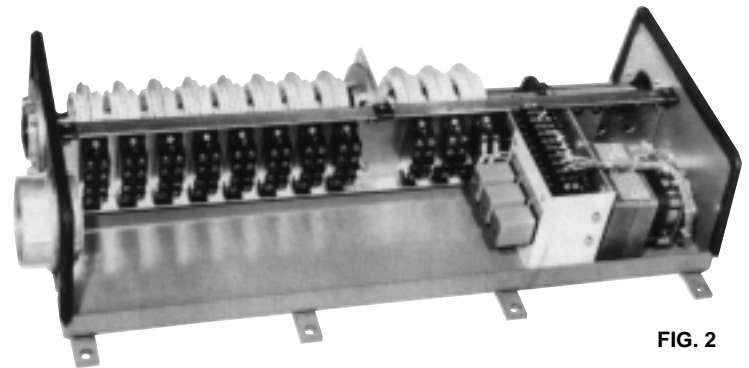


FIG. 2

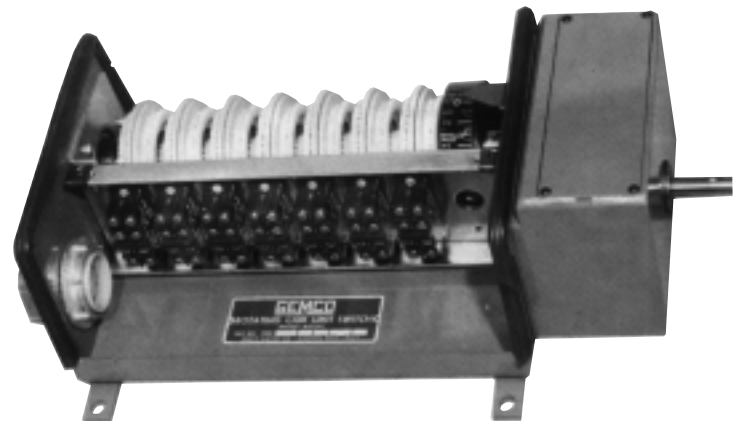
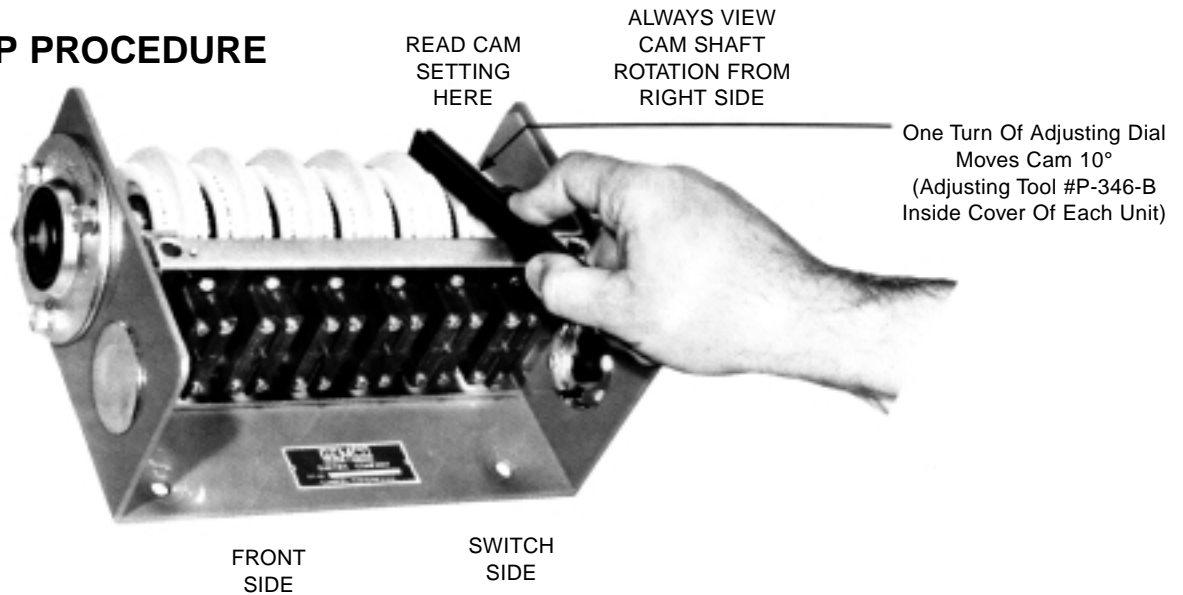


FIG. 3

# Rotating Cam Limit Switches

## EASY SET-UP PROCEDURE



## MOUNTING OF UNIT

Mount the assembly and couple input shaft to the driving member with the shaft keyway up and in line with the positioning arrow on the bearing end plate. The machine should be in the start cycle position.

## ESTABLISHING CAM SHAFT DIRECTION OF ROTATION

Cam settings should be made with the cam shaft uppermost to the viewer. The picture at the top right illustrates this viewing position and also shows the adjusting tool being applied to the adjusting wheel. Shaft rotation is always established off the right end of the unit even when the input shaft, whether direct or through a gear reducer, is situated at the left end. As an aid to designating shaft rotation when a gear reducer is used, consult page 14 of this catalog section.

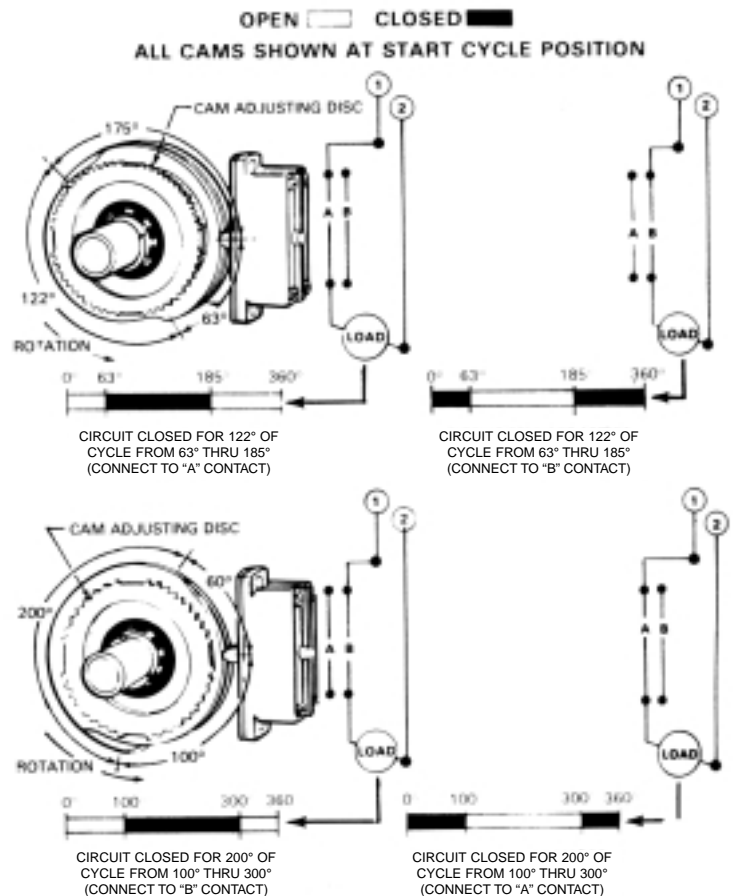
## CAM SETTINGS

For clockwise rotation set "make" angle with the black dial and "break" with the red dial for dwell settings less than 180°. Reverse colors for dwells 180° or greater.

For counterclockwise rotation, set "make" angle with the white dial and "break" with the yellow dial. Reverse colors for dwells 180° or greater.

Switch connections should be made in accordance with the illustrations to the right, which incidentally are both clockwise rotating examples.

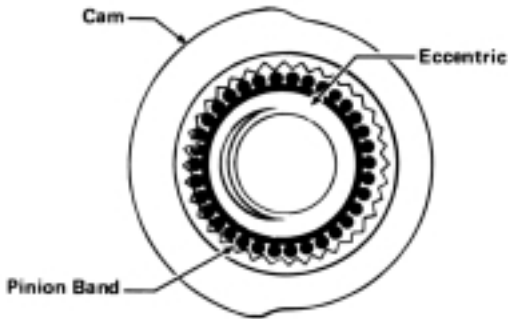
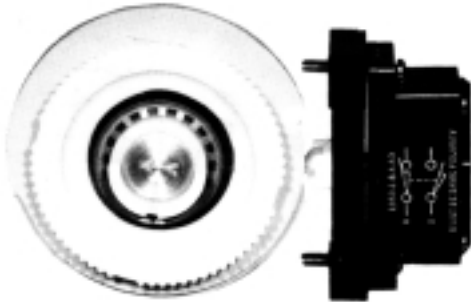
## TYPICAL SETTINGS AT BEGINNING OF MACHINE CYCLE



# Rotating Cam Limit Switches

## DESCRIPTION

Precision, rugged duty snap action switches, extremely accurate cam adjustments with a heavy duty shaft, rugged case and lifetime sealed ball bearings, have been combined by Gemco to provide the most versatile and dependable Rotating Cam Limit Switch available.



### NO SPECIAL CAMS ARE REQUIRED

The accurate cam adjustments are made possible by the use of a separate reduction drive in each half of a circuit cam block assembly. This drive provides a 36 to 1 ratio which means that one revolution of the adjustment wheel will advance or retard the cam setting by 10 degrees.

For most applications, therefore, no special cams are necessary and settings may be changed at any angular position of the cam shaft.

**LIFETIME SEALED BALL BEARING** allows mounting in any position.

**LARGE COVER OPENINGS** for ease of wiring.

**NO MINIMUM SPEED** is specified because snap action contacts are used. Maximum rated speed of the cam shaft is 500 RPM and can be rotated either clockwise or counterclockwise.

Two types of compact integrally **MOUNTED GEAR REDUCERS** are available with ratios of 1:1 through 600:1. They can also be supplied with speed multipliers up to 1:8.

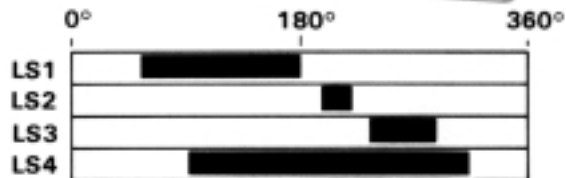
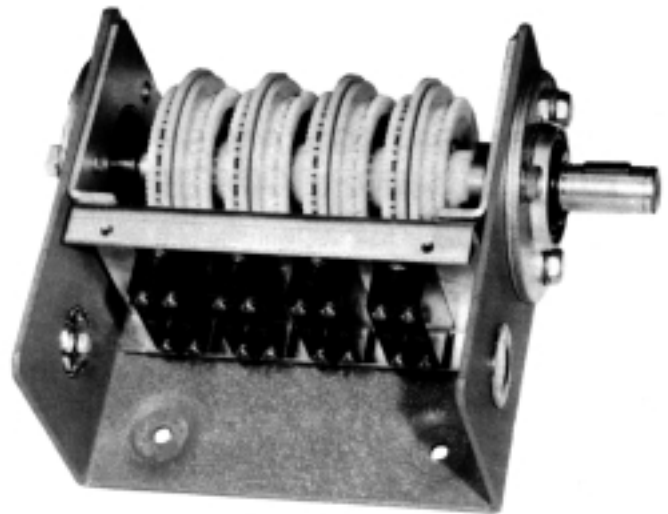
## TECHNICAL DATA

- The maximum temperature with full electrical load is 185°F. The minimum operating temperature is -50°F minimum cam adjusting temperature is -10°F.
- Standard Gemco Rotating Cam Limit Switches have a rating of 50 pounds end thrust and 500 pounds radial load on standard shaft extensions.
- TORQUE REQUIRED— .6 LB-IN/CIRCUIT.
- REPEATABILITY + OR - 1/4°

## SNAP ACTION SWITCHES

All standard Gemco Rotating Cam Limit Switches employ S.P.D.T. precision type snap action switches which provide the advantage of double break contacts and are actuated at a uniform rate to give long life. D.P.D.T. switches can be provided upon request. Any number of circuits from 1 to 40 may be supplied as standard in NEMA 1, NEMA 4, NEMA 7 and NEMA 12 enclosures.

## GEMCO MICRO-ADJUST CAMS PROVIDE UNLIMITED CIRCUIT VERSATILITY



Each switch setting can be adjusted to your circuit requirements. An unlimited selection of circuit arrangements is available with the Gemco Rotating Cam Limit Switch, with no special mounting cams, dogs, etc. for contact settings.

# Rotating Cam Limit Switches

## ELECTRICAL SWITCHES

### DESCRIPTION

The **Gemco** Precision Snap Switches are designed for industrial duty applications where compact size, complete reliability and millions of trouble free operations are required.

The housing is molded material which has excellent resistance to arcing and carbon tracking. The operating button is of molded nylon, a material with excellent wear characteristics.

The button is well guided at the top and bottom to insure accurate repeatability and minimum wear.

Any combination of Single Pole Double Throw or Double Pole Double Throw snap action switches can be supplied with the **Gemco** Rotating Cam Limit Switch.

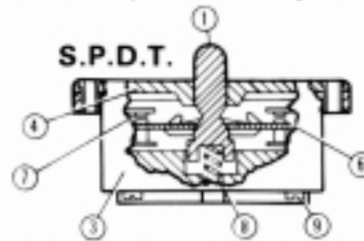
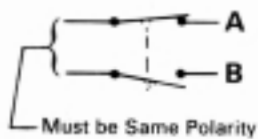
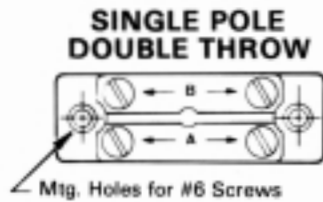
The switches are individually mounted and can be readily replaced without the need of adjustment or alignment. All switches have binder head terminal screws which are accessible for wiring with either stripped or wire lug connections.



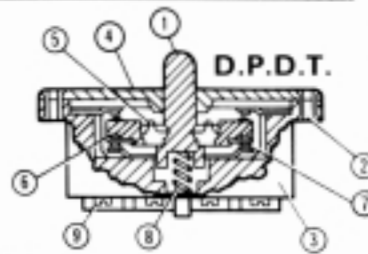
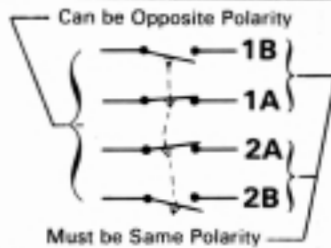
### NOTE:

Refer to Catalog Section 1950 for detailed information pertaining to all Standard and Special **Switch** Options.

Switch replacement is recommended every 15 million cycles.



1. Plunger
2. Eyelet
3. Enclosure
4. Cover
5. Contact Spring
6. Movable Contact Ass'y
7. Stationary Contact Ass'y
8. Return Spring
9. Terminal Screws



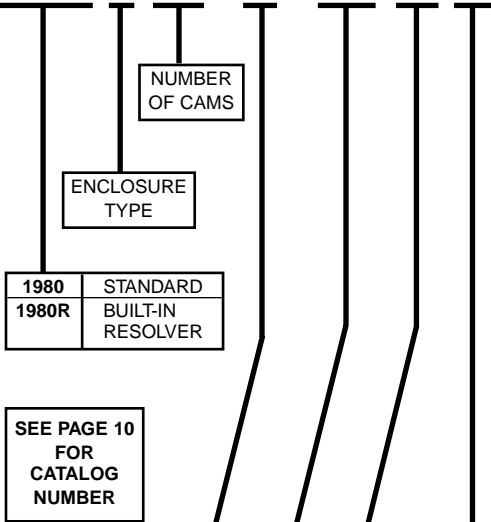
### ELECTRICAL CONTACT RATINGS

Switch Type	Contacts	Volts	AC						Volts	DC		
			Inductive Pilot Duty 35% Power Factor				Resistive 75% Power Factor			Inductive Pilot Duty and Resistive		
			Make		Break		Continuous Carrying Amperes	Make, Break and Continuous Carrying Amperes		Make and Break Amperes		Continuous Carrying Amps
			Amps	VA	Amps	VA				Single Throw	Double Throw	
1950-4	DPDT	115	30	3450	3	345	10	10	115	1.0	0.2	10
		230	15	3450	1.5	345	10	10	230	0.3	0.1	10
		440	7.5	3450	0.75	345	10	10	600	0.1	....	10
		575	6	3450	0.6	345	10	10				
1950-1	SPDT	110	40	....	15	....	15	15	115	0.5	0.25	15
		220	20	....	10	....	15	15	230	0.25	0.1	15
		440	10	....	6	....	15	15	600	0.05	....	15
		600	8	....	5	....	15	15				

# Rotating Cam Limit Switches

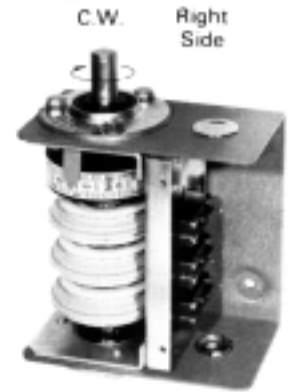
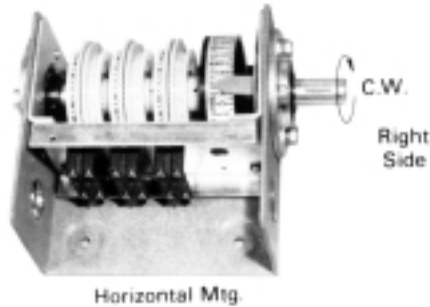
## EXPLANATION OF CATALOG

1980 1 04-R-SP-X



1980	STANDARD
1980R	BUILT-IN RESOLVER

SEE PAGE 10 FOR CATALOG NUMBER



**NOTE:** Timing dial always mounted at right hand and as shown, takes one circuit space, as viewed from right side.

TIMING DIAL*	
X	NO TIMING DIAL
TD1	C.W. ROTATION
TD2	C.C.W. ROTATION
TD3	C.W. ROTATION
TD4	C.W. ROTATION

Horiz. Mtg. }  
Vert. Mtg. }



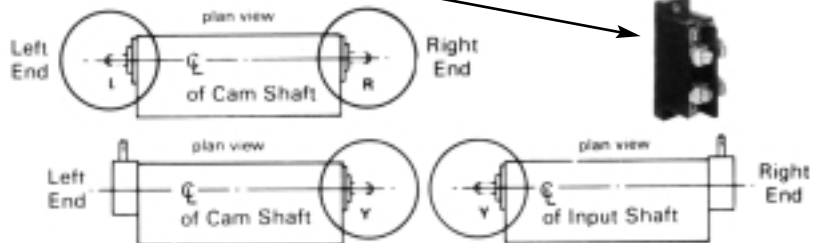
\* NOTE: If window is required for timing dial replace D with W in Catalog Number (i.e., TW1)

TIMING DIAL DECAL
TD1 NP-76-B
TD2 NP-71-B
TD3 NP-78-B
TD4 NP-77-B

SWITCH OPTION	
-	NO SWITCH OPTION
R	RUBBER BOOT

SWITCH TYPE	
SP	SINGLE POLE DOUBLE THROW
DP	DOUBLE POLE DOUBLE THROW
**SPP	SPDT WITH PLUG-IN SOCKET
**DPP	DPDT WITH PLUG-IN SOCKET
SPK	SPDT WITH CLAMP TERMINAL

SHAFT EXTENSION	
R	RIGHT HAND
L	LEFT HAND
D	DOUBLE ENDED
X	NO SHAFT EXTENSION OPPOSITE GEAR BOX
Y	SHAFT EXTENSION OPPOSITE GEAR BOX



\*\* When plug-in switches are specified, one extra circuit space must be allowed for in the enclosure.

# Rotating Cam Limit Switches

## NUMBERING SYSTEM

R

1.5

R1

TYPE OF GEAR REDUCER	
R	RIGHT ANGLE
S	STRAIGHT DRIVE
M	MULTIPLIER DRIVE

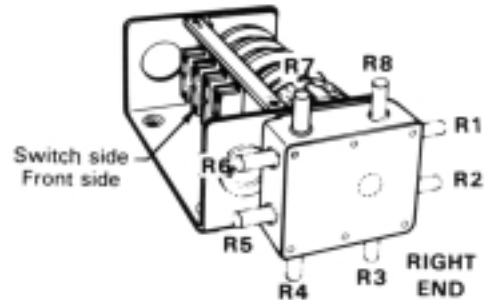
RATIO	GEAR REDUCER	
	Straight Drive	Right Angle
1		1:1
1.2		1.2:1
1.25	1.25:1	1.25:1
1.33	1.33:1	1.33:1
1.5	1.5:1	1.5:1
1.6	1.6:1	1.6:1
2	2:1	2:1
2.2	2.2:1	
2.5	2.5:1	2.5:1
3	3:1	3:1
4	4:1	4:1
4.75		4.75:1
5	5:1	5:1
6	6:1	6:1
7	7:1	7:1
7.5	7.5:1	7.5:1
8	8:1	8:1
8.5	8.5:1	8.5:1
10	10:1	10:1
12	12:1	12:1
12.5		12.5:1
14	14:1	14:1
15	15:1	15:1
16	16:1	16:1
17		17:1
18	18:1	18:1
20	20:1	20:1
24	24:1	24:1
25	25:1	25:1
28	28:1	28:1
30	30:1	30:1
32	32:1	32:1
35	35:1	
36	36:1	36:1
40	40:1	40:1
48	48:1	48:1
50	50:1	50:1
60	60:1	60:1
64	64:1	64:1
72		72:1
80	80:1	80:1
96	96:1	96:1
100	100:1	100:1
200	200:1	
400	400:1	
500	500:1	
600	600:1	
GEAR MULTIPLIER		
2	1:2	
3	1:3	
4	1:4	
5	1:5	
*6	1:6	
*7	1:7	
*8	1:8	

NOTE: Gear reducer must be ordered in the required position, it cannot be changed in the field.

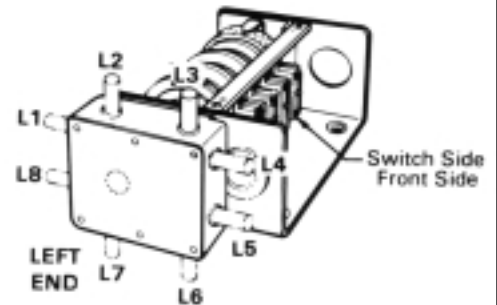
### SHAFT LOCATION

Right Angle Gear Reducer  
Check Shaft Location For Possible Interference

R1  
R2  
R3  
R4  
R5  
R6  
R7  
R8

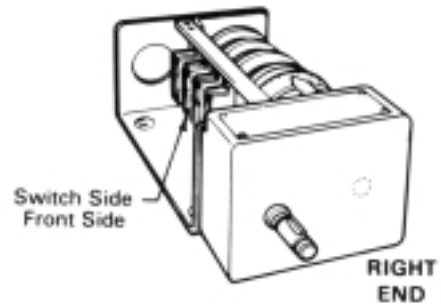


L1  
L2  
L3  
L4  
L5  
L6  
L7  
L8

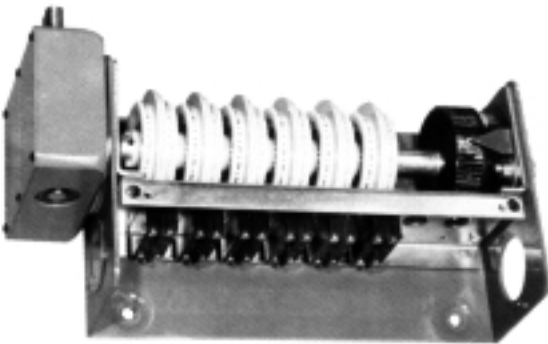
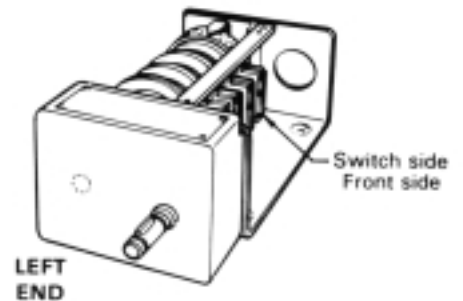


Straight Drive Gear Reducer

R\*\*



L\*\*



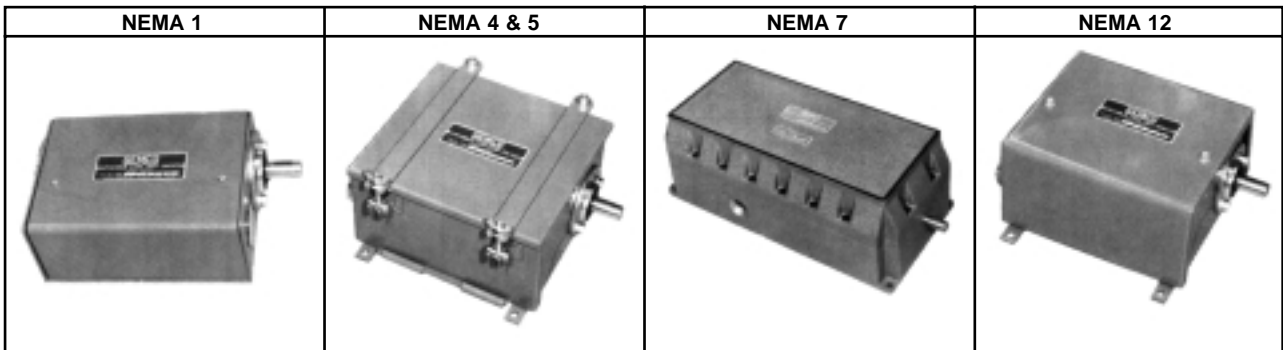
\*\* For straight drive gear reducers with 1970 Drive Chek, refer to section 1970 for shaft extension location.



\* Number of Circuits Restricted — Consult Factory.

# Rotating Cam Limit Switches

## STANDARD PART NUMBERS



Number of Circuits	NEMA 1		NEMA 4 & 5		NEMA 7		NEMA 12	
	Catalog Number	Cat. No. w/Resolver	Catalog Number	Cat. No. w/Resolver	Catalog Number	Cat. No. w/Resolver	Catalog Number	Cat. No. w/Resolver
1	1980-101	1980R-101	1980-401	1980R-401	1980-701	Consult Factory	1980-1201	1980R-1201
2	1980-102	1980R-102	1980-402	1980R-402	1980-702		1980-1202	1980R-1202
3	1980-103	1980R-103	1980-403	1980R-403	1980-703		1980-1203	1980R-1203
4	*1980-104	1980R-104	1980-404	1980R-404	1980-704		*1980-1204	1980R-1204
5	1980-105	1980R-105	1980-405	1980R-405	1980-705		1980-1205	1980R-1205
6	*1980-106	1980R-106	1980-406	1980R-406	1980-706		*1980-1206	1980R-1206
7	1980-107	1980R-107	1980-407	1980R-407	1980-707		1980-1207	1980R-1207
8	*1980-108	1980R-108	1980-408	1980R-408	1980-708		*1980-1208	1980R-1208
9	1980-109	1980R-109	1980-409	1980R-409	1980-709		1980-1209	1980R-1209
10	1980-110	1980R-110	1980-410	1980R-410	1980-710		1980-1210	1980R-1210
11	1980-111	1980R-111	1980-411	1980R-411	1980-711		1980-1211	1980R-1211
12	*1980-112	1980R-112	1980-412	1980R-412	1980-712		*1980-1212	1980R-1212
13	1980-113		1980-413		1980-713		1980-1213	
14	1980-114		1980-414		1980-714		1980-1214	
15	1980-115		1980-415		1980-715		1980-1215	
16	1980-116		1980-416		1980-716		1980-1216	
17	1980-117		1980-417		1980-717		1980-1217	
18	1980-118		1980-418		1980-718		1980-1218	
19	1980-119		1980-419		1980-719		1980-1219	
20	1980-120		1980-420		1980-720		1980-1220	
21	1980-121		1980-421		1980-721		1980-1221	
22	1980-122		1980-422		1980-722		1980-1222	
23	1980-123		1980-423		1980-723		1980-1223	
24	1980-124		1980-424		1980-724		1980-1224	
25	1980-125		1980-425		1980-725		1980-1225	
26	1980-126		1980-426		1980-726		1980-1226	
27	1980-127		1980-427		1980-727		1980-1227	
28	1980-128		1980-428		1980-728		1980-1228	
29	1980-129		1980-429		1980-729		1980-1229	
30	1980-130		1980-430		1980-730		1980-1230	
31	1980-131		1980-431		1980-731		1980-1231	
32	1980-132		1980-432		1980-732		1980-1232	
33	1980-133		1980-433		1980-733		1980-1233	
34	1980-134		1980-434		1980-734		1980-1234	
35	1980-135		1980-435		1980-735		1980-1235	
36	1980-136		1980-436		1980-736		1980-1236	
37	1980-137		1980-437		1980-737		1980-1237	
38	1980-138		1980-438		1980-738		1980-1238	
39	1980-139		1980-439		1980-739		1980-1239	
40	1980-140		1980-440		1980-740		1980-1240	

\* Stock with a right hand shaft and S.P.D.T. switches.

SINGLE SHAFT EXTENSION

MAXIMUM SPEED 500 R.P.M.

CONSULT FACTORY FOR OPTIONS AND NON-LISTED CATALOG NUMBERS.



# Rotating Cam Limit Switches

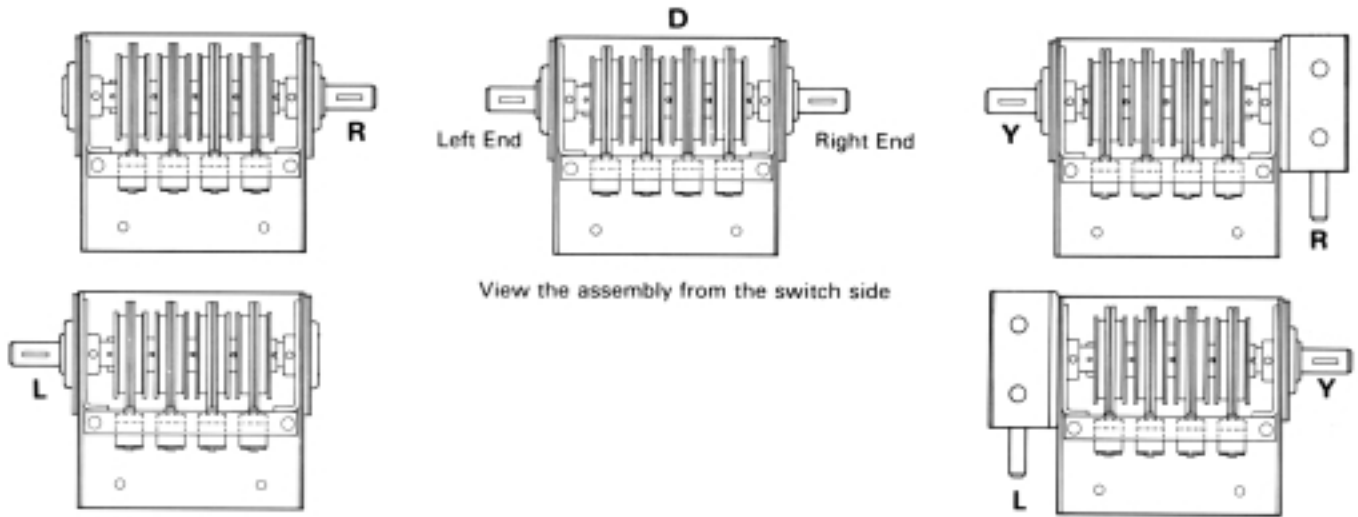
## SHAFT EXTENSION

The **Gemco** Rotating Cam Limit Switch can be supplied with the desired shaft extension. The standard shaft extension can be specified in the catalog numbering system on page 8.

To determine the shaft extension symbol, the Rotating Cam Limit Switch must be viewed from the switch side of the assembly as shown.

The shaft extension can be specified as either:

- L = Left shaft extension**
- R = Right shaft extension**
- D = Double shaft extension (both ends)**
- X = No shaft extension opposite the gear box**
- Y = Shaft extension opposite gear box**



## SWITCH TYPE

The **Gemco** Precision Snap Switches are specifically designed for industrial duty applications where reliability, ease of wiring and millions of trouble free cycles are required.

The **Gemco** Rotating Cam Limit Switch can be supplied with either a basic single pole double throw (S.P.D.T.), double pole double throw (D.P.D.T.) or a combination of both types.

A Plug-In Socket can be supplied with either the S.P.D.T. Or D.P.D.T. switches.

NOTE: REFER TO CATALOG SECTION 1950 FOR FURTHER DETAILS ON SNAP SWITCH PARTS AND OPTIONS.

The type of snap switch can be specified in the catalog numbering system on page 8.

- SP = Single pole double throw**
- DP = Double pole double throw**
- SPP = Single pole double throw with a plug-in socket**
- DPP = Double pole throw with a plug-in socket**

The Plug-In Socket eliminates error due to disconnecting and connecting wires during replacement of the snap switch. A marking strip is supplied with each plug-in socket for ease of wire identification.

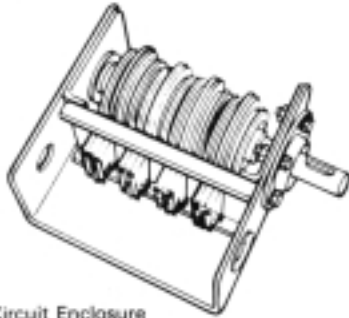


**Switch Replacement is Recommended Every 15 Million Cycles.**

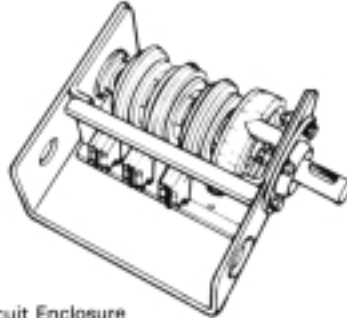
# Rotating Cam Limit Switches

## ADDING A TIMING DIAL

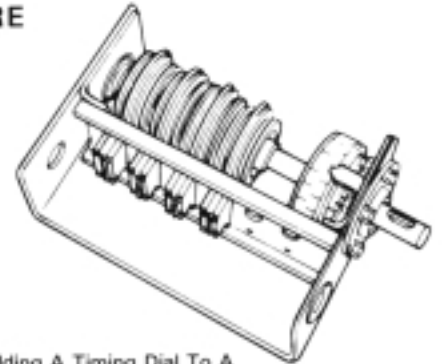
### SELECTING THE CORRECT SIZE ENCLOSURE



4 Circuit Enclosure  
Without A Timing Dial  
Exp. 1980-104-R-SP-X



4 Circuit Enclosure  
With Timing Dial Added  
Only 3 Circuits Remain  
Exp. 1980-103-R-SP-TD



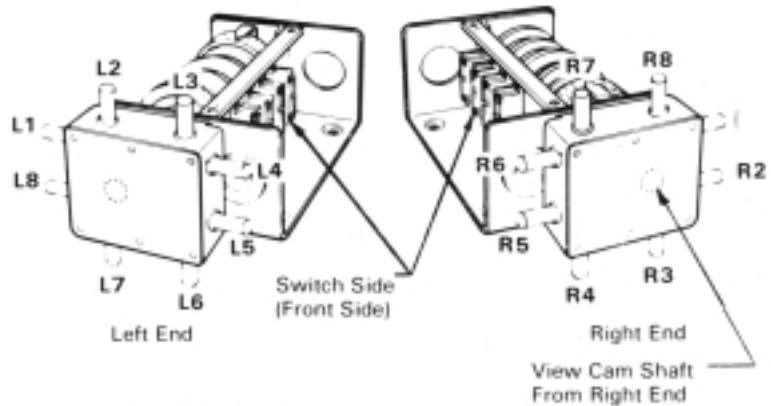
Adding A Timing Dial To A  
4 Circuit System, 6 Circuit  
Enclosure is Remained  
Exp. 1980-104-R-SP-TD

## DETERMINING DIRECTION OF CAM SHAFT — TIMING DIAL ROTATION

### RIGHT ANGLE GEAR REDUCER ROTATION

Rotation Input Shaft Versus Cam Shaft

GEAR REDUCER POSITION	GEAR REDUCER INPUT SHAFT ROTATION	CAM SHAFT TIMING DIAL ROTATION
R1 or L1	CW	CW
	CCW	CCW
R2 or L2	CW	CCW
	CCW	CW
R3 or L3	CW	CW
	CCW	CCW
R4 or L4	CW	CCW
	CCW	CW
R5 or L5	CW	CW
	CCW	CCW
R6 or L6	CW	CCW
	CCW	CW
R7 or L7	CW	CW
	CCW	CCW
R8 or L8	CW	CCW
	CCW	CW

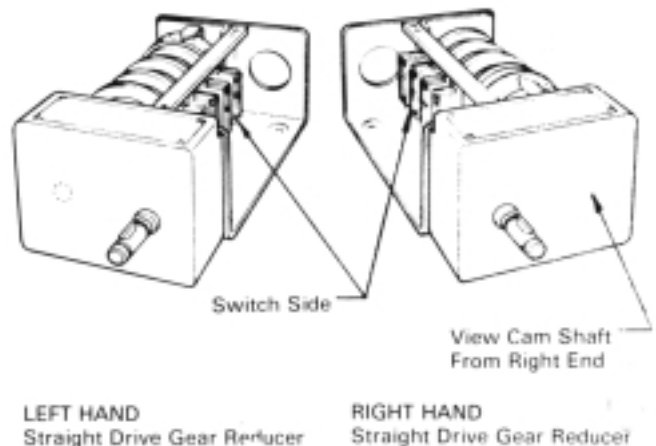


**CW = Clockwise**  
**CCW = Counter Clockwise**

### STRAIGHT DRIVE GEAR REDUCER

Input Shaft Rotation Versus Cam Shaft Rotation

STRAIGHT DRIVE GEAR REDUCER	LOCATION OF INPUT SHAFT	GEAR REDUCER INPUT SHAFT ROTATION	CAM SHAFT TIMING DIAL ROTATION
All Ratios From 1.25:1 to 3:1	Right End	CW	CCW
		CCW	CW
	Left End	CW	CW
		CCW	CCW
All Ratios From 4:1 to 8.5:1	Right End	CW	CW
		CCW	CCW
	Left End	CW	CCW
		CCW	CW
All Ratios From 10:1 to 600:1	Right End	CW	CW
		CCW	CCW
	Left End	CW	CCW
		CCW	CW
All Gear Multipliers From 1:2 to 1:3	Right End	CW	CCW
		CCW	CW
	Left End	CW	CW
		CCW	CCW
All Gear Multipliers From 1:4 to 1:8	Right End	CW	CW
		CCW	CCW
	Left End	CW	CCW
		CCW	CW



# Rotating Cam Limit Switches

## REPLACEMENT CAM ASSEMBLIES



Std. Cam Ass'y  
Part No. SD-1178-C



Blank Cam Ass'y  
Part No. SD-1140-C

### STANDARD CAM ASSEMBLY

Part No. SD-1178-C

(includes two cams, part nos. P-356-B and P-357-B)

### BLANK CAM ASSEMBLY

Part No. SD-1140-C

(includes two blank cams, part no. P-271-B)

### SPECIAL CAMS

A **Blank Cam Assembly (Part No. SD-1140-C)** can be supplied in place of the **Standard Cam Assembly, (Part No. SD-1178-C)** at no additional charge, when specified. Advise number required and location.

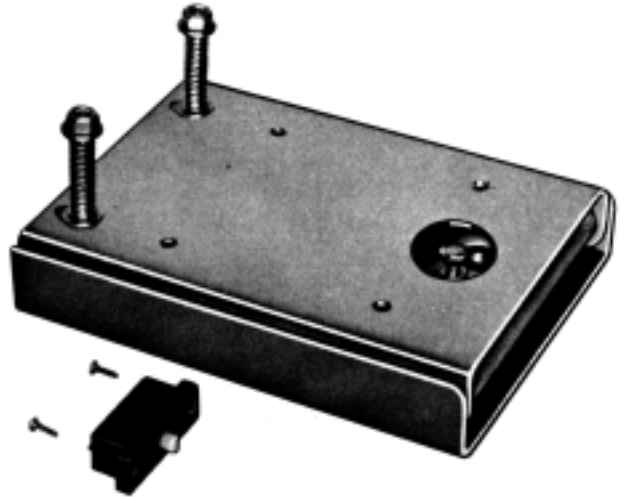
A DRAWING OF THE CAM SHAPE MUST BE FURNISHED WITH ORDER. Generally, two cams are required per circuit.

When ordering special cut cams, the customer will supply a detail of the cam profile and the electrical timing chart showing the contact setting as required.

## SPECIAL CONDUIT OPENING



Specify conduit size and location.



## DESCRIPTION

The **DRIVE-CHEK** is a multi-purpose sub base that is mounted under a chain or belt driven mechanism. The unit serves three purposes; a broken chain or belt detector, a chain or belt tightener, and a shock and vibration isolator.

A Gemco Indicator Switch is provided with each **DRIVE-CHEK** Unit to indicate when a drive belt or chain failure has occurred. Shock and vibration from the machine to the hinge plate of the **DRIVE-CHEK** Unit are dampened by coil springs on one end of the hinge plate and an elastomeric support on the other end.

The springs also maintain a constant tension in the drive belt or chain. **DRIVE-CHEK** is of rugged welded construction and is painted to prevent corrosion. The drive chain or belt can be attached to the mechanism being driven from either above or below the **DRIVE-CHEK** base.

The **DRIVE-CHEK** base can be purchased as a separate item for field mounting or factory assembled to the 1980 camswitch. If factory installation is desired, order as separate item and specify as being assembled in the description.

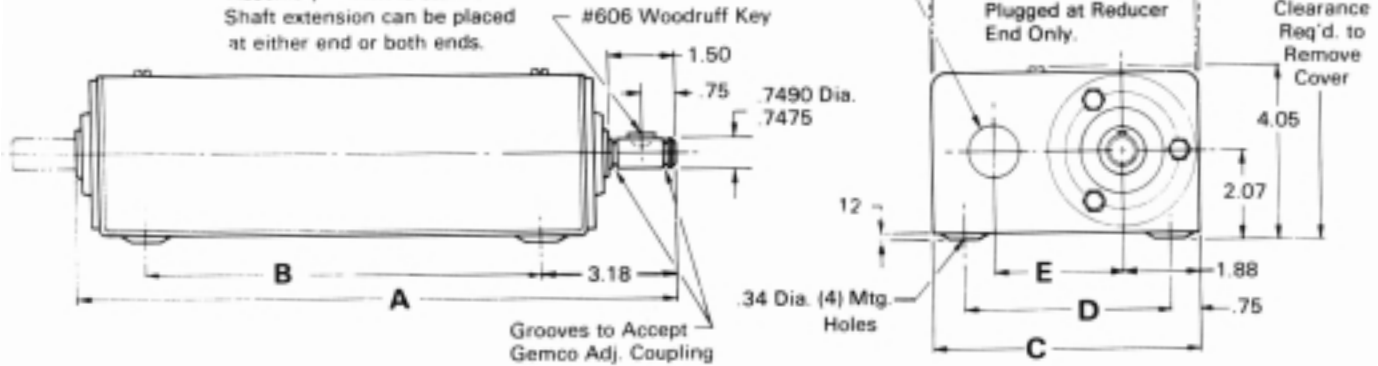
A Gemco single pole double throw switch with mounting plate is supplied with each **DRIVE-CHEK** Unit and can be easily mounted inside the Gemco Rotating Cam Limit Switch enclosure. A Gemco double pole double throw switch can also be supplied.

# Rotating Cam Limit Switches

## ENCLOSURE DIMENSIONS

### NEMA 1

Note: Assembly shown is standard.  
Shaft extension can be placed  
at either end or both ends.



NUMBER OF CIRCUITS	A	A-S	A-R	B	C	D	E	L	WEIGHT APPROX. GROSS*
2 thru 4	9.28	12.12	9.38	4.42	6.50	5.00	3.12	.75	12 lb.
5 thru 6	11.72	14.56	11.82	6.86	6.50	5.00	3.12	1.25	14 lb.
7 thru 8	14.16	17.00	14.26	9.30	6.50	5.00	3.12	1.25	16 lb.
9 thru 12	19.04	21.88	19.14	14.18	6.50	5.00	3.12	1.25	21 lb.
13 thru 16	25.45	28.29	25.55	20.60	7.00	5.50	3.40	2.00	35 lb.
17 thru 20	30.33	33.17	30.43	25.48	7.00	5.50	3.40	2.00	46 lb.
21 thru 24	35.21	38.05	35.31	30.36	7.00	5.50	3.40	2.00	55 lb.
25 thru 28	41.62	44.46	41.72	36.76	7.00	5.50	3.40	2.00	
29 thru 32	46.50	49.34	46.60	41.64	7.00	5.50	3.40	2.00	
33 thru 36	51.38	54.22	51.48	46.52	7.00	5.50	3.40	2.00	
37 thru 40	56.26	59.10	56.36	51.40	7.00	5.50	3.40	2.00	

\* NOTE: Add 4 lbs. with Right Angle Gear Reducer.  
Add 6 lbs. with Straight Drive Gear Reducer.

### STRAIGHT DRIVE

RATIO	X	Y	RATIO	X	Y
1.25:1	2.71	2.07	32:1	3.82	2.26
2:1	2.63	2.07	35:1	3.82	2.32
2.2:1	3.13	2.07	40:1	3.82	1.88
3:1	2.80	2.07	48:1	3.82	2.01
4:1	4.13	2.07	50:1	3.82	2.07
5:1	4.38	2.07	80:1	3.82	2.44
6:1	4.30	2.07	96:1	3.82	2.32
7:1	4.55	2.07	100:1	3.82	2.07
8:1	4.51	2.07	200:1	3.82	2.07
8.5:1	3.99	2.07	400:1	3.82	2.07
10:1	3.82	1.88	500:1	3.82	1.91
12:1	3.82	2.01	600:1	3.82	1.76
14:1	3.82	2.13	1:2	2.63	2.07
15:1	3.82	2.19	1:3	2.80	2.07
16:1	3.82	2.26	1:4	4.13	2.07
20:1	3.82	1.88	1:5	4.38	2.07
24:1	3.82	2.01	1:6	4.30	2.07
25:1	3.82	2.07	1:7	3.34	2.13
28:1	3.82	2.13	1:8	3.57	2.07
30:1	3.82	2.19			

### RIGHT ANGLE DRIVE

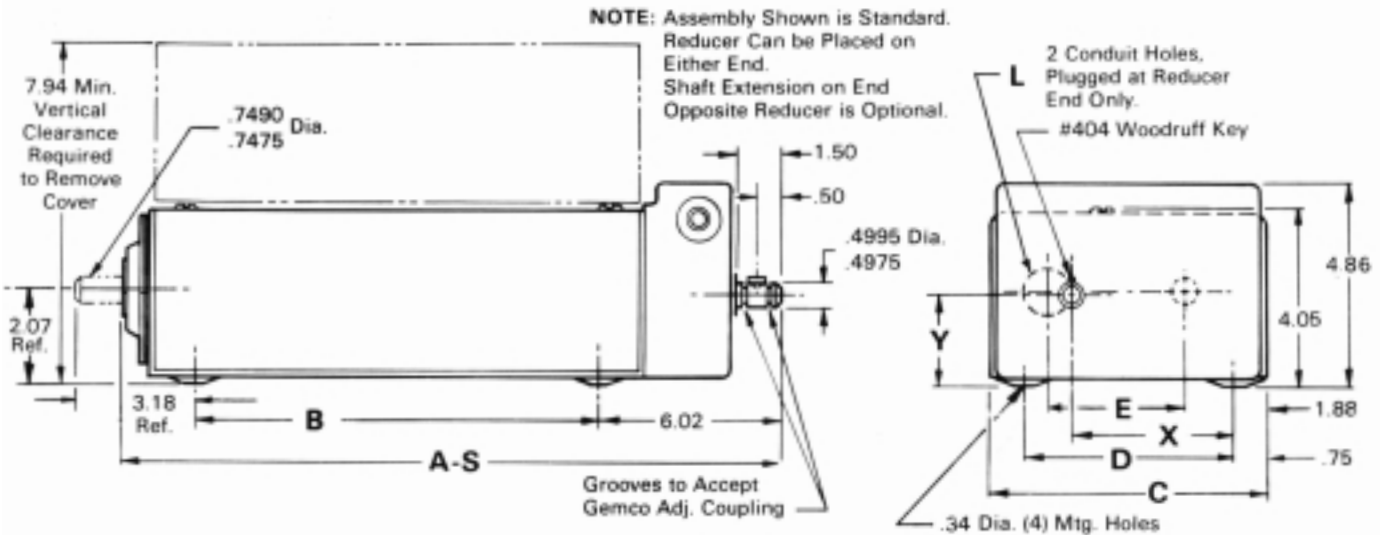
RATIO	Y	RATIO	Y	RATIO	Y	RATIO	Y
1:1	1.00	4.75:1	.906	15:1	1.250	36:1	1.437
1.2:1	1.375	5:1	.937	16:1	1.312	40:1	1.562
1.25:1	1.125	6:1	1.062	17:1	1.368	48:1	1.812
1.33:1	1.750	7:1	1.187	18:1	1.437	50:1	1.875
1.5:1	1.250	7.5:1	1.250	20:1	.937	60:1	1.156
1.6:1	1.625	8:1	1.312	24:1	1.062	64:1	1.218
2:1	1.500	10:1	.937	25:1	1.875	72:1	1.344
2.5:1	1.750	12:1	1.062	28:1	1.187	80:1	1.469
3:1	2.00	12.5:1	1.875	30:1	1.250	96:1	1.719
4:1	1.875	14:1	1.187	32:1	1.312	100:1	1.781

Consult Factory for Gear Reducer Dimensions

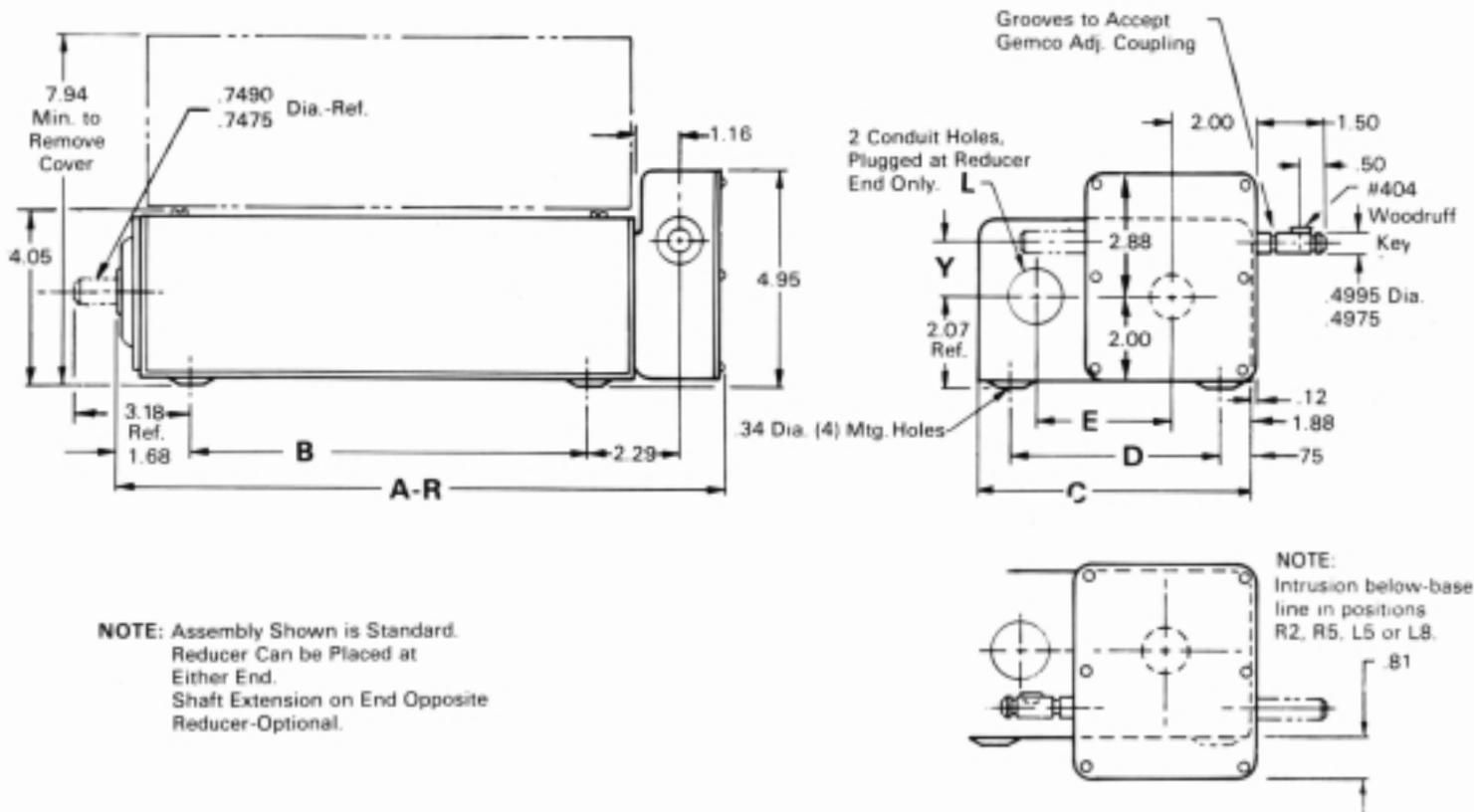
# Rotating Cam Limit Switches

## ENCLOSURE DIMENSIONS

### NEMA 1 WITH STRAIGHT DRIVE GEAR REDUCER



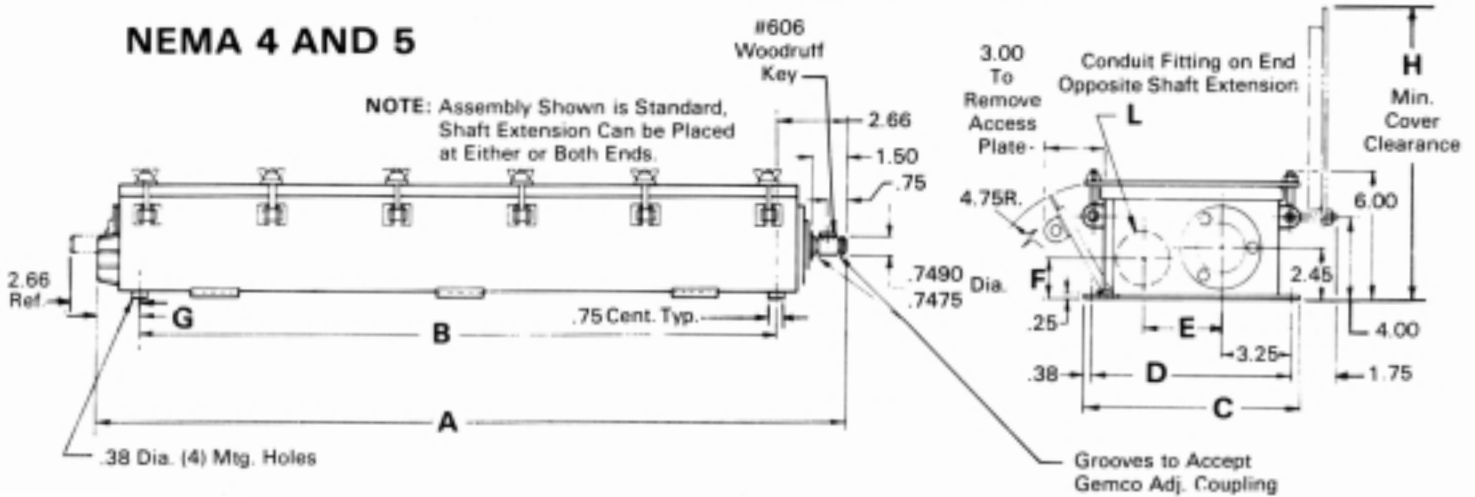
### NEMA 1 WITH RIGHT ANGLE GEAR REDUCER



# Rotating Cam Limit Switches

## ENCLOSURE DIMENSIONS

### NEMA 4 AND 5



NUMBER OF CIRCUITS	A	A-S	A-R	B	C	D	E	F	G	H	L	WEIGHT APPROX. GROSS*
2 thru 4	9.69	12.53	9.78	5.45	10.12	9.38	3.69	2.06	1.58	13.64	.75	18 lb.
5 thru 6	12.24	15.08	12.32	7.89	10.12	9.38	3.69	2.06	1.69	13.64	1.25	22 lb.
7 thru 8	14.68	17.52	14.78	10.33	10.12	9.38	3.69	2.06	1.69	13.64	1.25	32 lb.
9 thru 12	19.56	22.40	19.66	15.21	10.12	9.38	3.69	2.06	1.69	13.64	1.25	50 lb.
13 thru 16	26.02	28.86	26.11	21.62	12.12	11.38	4.69	2.81	1.74	15.64	2.00	65 lb.
17 thru 20	30.90	33.73	30.99	26.50	12.12	11.38	4.69	2.81	1.74	15.64	2.00	75 lb.
21 thru 24	35.78	38.62	35.87	31.38	12.12	11.38	4.69	2.81	1.74	15.64	2.00	
25 thru 28	42.19	45.02	42.27	37.80	12.12	11.38	4.69	2.81	1.74	15.64	2.00	
29 thru 32	47.07	49.91	47.15	42.66	12.12	11.38	4.69	2.81	1.74	15.64	2.00	
33 thru 36	51.95	54.79	52.03	47.54	12.12	11.38	4.69	2.81	1.74	15.64	2.00	
37 thru 40	56.83	59.67	56.92	52.42	12.12	11.38	4.69	2.81	1.74	15.64	2.00	

\* NOTE: Add 4 lbs. with Right Angle Gear Reducer.  
Add 6 lbs. with Straight Drive Gear Reducer.

### STRAIGHT DRIVE

RATIO	X	Y	RATIO	X	Y
1.25:1	4.83	2.45	32:1	5.94	2.64
2:1	4.75	2.45	35:1	5.94	2.70
2.2:1	5.25	2.45	40:1	5.94	2.26
3:1	4.92	2.45	48:1	5.94	2.39
4:1	6.25	2.45	50:1	5.94	2.45
5:1	6.50	2.45	80:1	5.94	2.82
6:1	6.42	2.45	96:1	5.94	2.70
7:1	6.67	2.45	100:1	5.94	2.45
8:1	6.63	2.45	200:1	5.94	2.45
8.5:1	6.11	2.45	400:1	5.94	2.45
10:1	5.94	2.26	500:1	5.94	2.29
12:1	5.94	2.39	600:1	5.94	2.14
14:1	5.94	2.51	1:2	4.75	2.45
15:1	5.94	2.57	1:3	4.92	2.45
16:1	5.94	2.64	1:4	6.25	2.45
20:1	5.94	2.26	1:5	6.50	2.45
24:1	5.94	2.39	1:6	6.42	2.45
25:1	5.94	2.45	1:7	5.46	2.51
28:1	5.94	2.51	1:8	5.69	2.45
30:1	5.94	2.57			

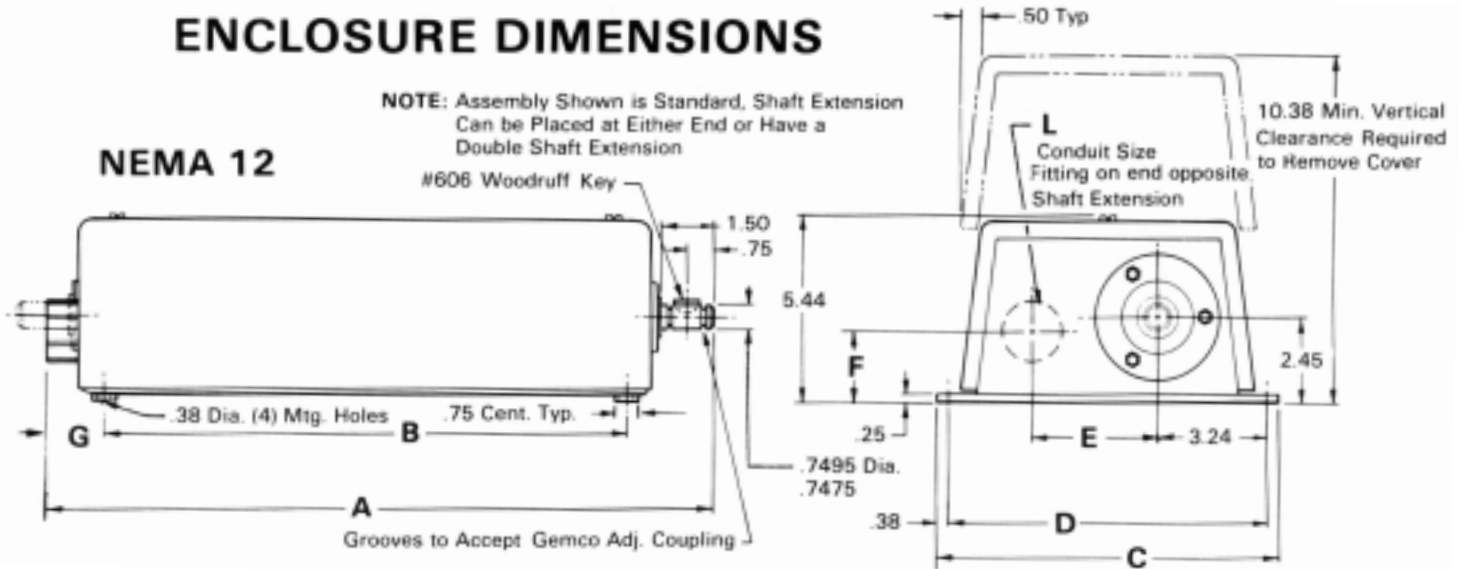
### RIGHT ANGLE DRIVE

RATIO	Y	RATIO	Y	RATIO	Y	RATIO	Y
1:1	1.00	4.75:1	.906	15:1	1.250	36:1	1.437
1.2:1	1.375	5:1	.937	16:1	1.312	40:1	1.562
1.25:1	1.125	6:1	1.062	17:1	1.368	48:1	1.812
1.33:1	1.750	7:1	1.187	18:1	1.437	50:1	1.875
1.5:1	1.250	7.5:1	1.250	20:1	.937	60:1	1.156
1.6:1	1.625	8:1	1.312	24:1	1.062	64:1	1.218
2:1	1.500	10:1	.937	25:1	1.875	72:1	1.344
2.5:1	1.750	12:1	1.062	28:1	1.187	80:1	1.469
3:1	2.00	12.5:1	1.875	30:1	1.250	96:1	1.719
4:1	1.875	14:1	1.187	32:1	1.312	100:1	1.781

Consult Factory for Gear Reducer Dimensions

# Rotating Cam Limit Switches

## ENCLOSURE DIMENSIONS



NUMBER OF CIRCUITS	A	A-S	A-R	B	C	D	E	F	G	L	WEIGHT APPROX. GROSS*
2 thru 4	9.69	12.53	9.78	5.45	10.12	9.38	3.69	2.06	1.57	.75	18 lb.
5 thru 6	12.24	15.08	12.32	7.89	10.12	9.38	3.69	2.06	1.69	1.25	24 lb.
7 thru 8	14.68	17.52	14.78	10.33	10.12	9.38	3.69	2.06	1.69	1.25	26 lb.
9 thru 12	19.56	22.40	19.66	15.21	10.12	9.38	3.69	2.06	1.69	1.25	32 lb.
13 thru 16	26.02	28.86	26.11	21.62	12.12	11.38	4.69	2.81	1.74	2.00	50 lb.
17 thru 20	30.90	33.73	30.99	26.50	12.12	11.38	4.69	2.81	1.74	2.00	65 lb.
21 thru 24	35.78	38.62	35.87	31.38	12.12	11.38	4.69	2.81	1.74	2.00	75 lb.
25 thru 28	42.19	45.02	42.27	37.80	12.12	11.38	4.69	2.81	1.74	2.00	
29 thru 32	47.07	49.91	47.15	42.66	12.12	11.38	4.69	2.81	1.74	2.00	
33 thru 36	51.95	54.79	52.03	47.54	12.12	11.38	4.69	2.81	1.74	2.00	
37 thru 40	56.83	59.67	56.93	52.42	12.12	11.38	4.69	2.81	1.74	2.00	

\* **NOTE:** Add 4 lbs. with Right Angle Gear Reducer.  
Add 6 lbs. with Straight Drive Gear Reducer.

### STRAIGHT DRIVE

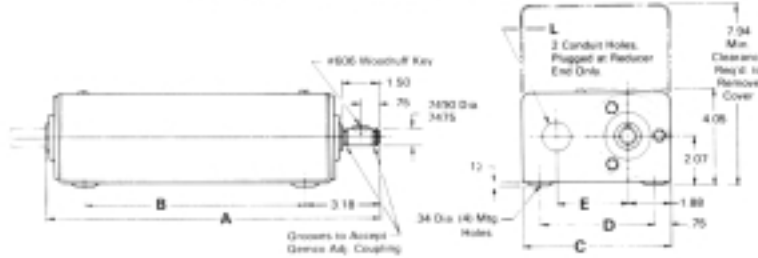
RATIO	X	Y	RATIO	X	Y
1.25:1	4.83	2.45	32:1	5.94	2.64
2:1	4.75	2.45	35:1	5.94	2.70
2.2:1	5.25	2.45	40:1	5.94	2.26
3:1	4.92	2.45	48:1	5.94	2.39
4:1	6.25	2.45	50:1	5.94	2.45
5:1	6.50	2.45	80:1	5.94	2.82
6:1	6.42	2.45	96:1	5.94	2.70
7:1	6.67	2.45	100:1	5.94	2.45
8:1	6.63	2.45	200:1	5.94	2.45
8.5:1	6.11	2.45	400:1	5.94	2.45
10:1	5.94	2.26	500:1	5.94	2.29
12:1	5.94	2.39	600:1	5.94	2.14
14:1	5.94	2.51	1:2	4.75	2.45
15:1	5.94	2.57	1:3	4.92	2.45
16:1	5.94	2.64	1:4	6.25	2.45
20:1	5.94	2.26	1:5	6.50	2.45
24:1	5.94	2.39	1:6	6.42	2.45
25:1	5.94	2.45	1:7	5.46	2.51
28:1	5.94	2.51	1:8	5.69	2.45
30:1	5.94	2.57			

### RIGHT ANGLE DRIVE

RATIO	Y	RATIO	Y	RATIO	Y	RATIO	Y
1:1	1.00	4.75:1	.906	15:1	1.250	36:1	1.437
1.2:1	1.375	5:1	.937	16:1	1.312	40:1	1.562
1.25:1	1.125	6:1	1.062	17:1	1.368	48:1	1.812
1.33:1	1.750	7:1	1.187	18:1	1.437	50:1	1.875
1.5:1	1.250	7.5:1	1.250	20:1	.937	60:1	1.156
1.6:1	1.625	8:1	1.312	24:1	1.062	64:1	1.218
2:1	1.500	10:1	.937	25:1	1.875	72:1	1.344
2.5:1	1.750	12:1	1.062	28:1	1.187	80:1	1.469
3:1	2.00	12.5:1	1.875	30:1	1.250	96:1	1.719
4:1	1.875	14:1	1.187	32:1	1.312	100:1	1.781

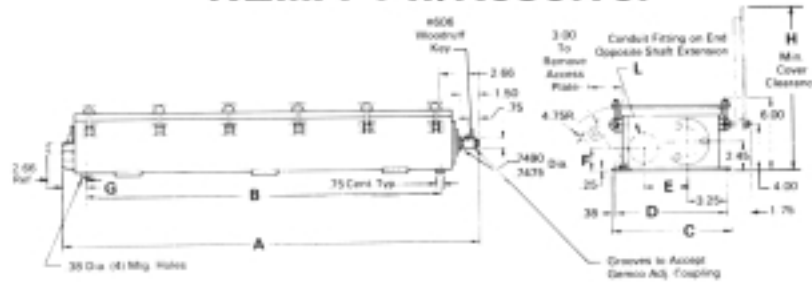
Consult Factory for Gear Reducer Dimensions

# ENCLOSURE DIMENSIONS NEMA 1 w/Resolver



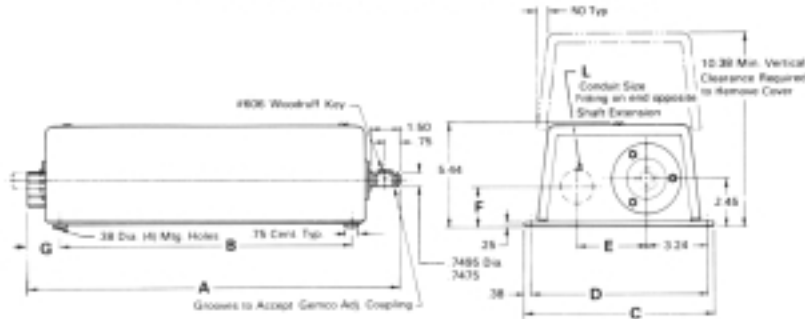
NUMBER OF CIRCUITS	A	A-S	A-R	B	C	D	E	L	WEIGHT APPROX. GROSS*
2 thru 4	11.72	14.56	11.82	6.86	6.50	5.00	3.12	1.25	14 lb.
5 thru 6	14.16	17.00	14.26	9.30	6.50	5.00	3.12	1.25	16 lb.
7 thru 8	19.04	21.88	19.14	14.18	6.50	5.00	3.12	1.25	21 lb.
9 thru 12	25.45	28.29	25.55	20.60	7.50	5.50	3.40	2.00	35 lb.

# NEMA 4 w/Resolver



NUMBER OF CIRCUITS	A	A-S	A-R	B	C	D	E	F	G	H	L	WEIGHT APPROX. GROSS*
2 thru 4	12.24	15.08	12.32	7.89	10.12	9.38	3.69	2.06	1.69	13.64	1.25	22 lb.
5 thru 6	14.68	17.52	14.78	10.33	10.12	9.38	3.69	2.06	1.69	13.64	1.25	32 lb.
7 thru 8	19.56	22.40	19.66	15.21	10.12	9.38	3.69	2.06	1.69	13.64	1.25	50 lb.
9 thru 12	26.02	28.86	26.11	21.62	10.12	11.38	4.69	2.81	1.74	15.64	2.00	65 lb.

# NEMA 12 w/Resolver



NUMBER OF CIRCUITS	A	A-S	A-R	B	C	D	E	F	G	L	WEIGHT APPROX. GROSS*
2 thru 4	12.24	15.08	12.32	7.89	10.12	9.38	3.69	2.06	1.69	1.25	24 lb.
5 thru 6	14.68	17.52	14.78	10.33	10.12	9.38	3.69	2.06	1.69	1.25	26 lb.
7 thru 8	19.56	22.40	19.66	15.21	10.12	9.38	3.69	2.06	1.69	1.25	32 lb.
9 thru 12	26.02	28.86	26.11	21.62	12.12	11.38	4.69	2.81	1.74	2.00	50 lb.

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