AMETEK
PATRIOT SENSORS

## Rotary Limit Switches

## worm gear type

## SUPERIOR DESIGN AND OPERATING FEATURES

Heavy-Duty, Shock Resistant

- resists shocks, acids, alcohol, etc.
- withstands more punishment than die cast enclosures.
"1/2" Input Shaft
- Ample extension for direct, chain, or gear drive.
- Includes Woodruff Key for quick drlve connections.

Positive, Independent Cam settings

- Cams adjusted independently of each other.
- Allen Wrench supplied for adjustment.
U.L. Listed -

Snap Action Switches

- Both switches have single pole double throw contacts for versatility of control circuits.


## Cantilever Main Gear Hub

Bronze gear and steel cams are...

- mounted on common cam block.
- supported on a sturdy shaft.
- requires no support in cover.


## Application

Gemco's Rotary Limit Switches are primarily used for machine tools, handling devices, and rotary operators where motion is expressed in shaft rotation. The primary purpose of the switch is to control the intermediate or end limits of a linear or rotary motion. The switch is often used as a safety device to protect against accidental damage to equipment.

## Description

Quality parts make each Rotary Limit Switch highly dependable.

- The $1 / 2$ " input shaft (includes Woodruff Key) drives a bronze gear which rotates the cam block. The cam block houses independently adjustable cams that actuate the precision type snap action switches.
- Each switch can be provided with one to four single pole, double throw switches or a maximum of two double pole, double throw switches for versatility of control circuits.
- No minimum speed is specified because snap action contacts are used. Maximum rated speed of the worm shaft is 1000 RPM and can be rotated clockwise or counterclockwise.
- Gemco's Rotary Limit Switch offers the broadest range of standard gear selections of any switch available. Standard ratios range from 5:1 through 5333.3:1.
- Max. Operating Temperature $180^{\circ} \mathrm{F}$


## Enclosures

NEMA Type 1 and 12 (General Purpose) enclosures are molded from FIBRALLOY® a special fiber glass material that is resistant to acids, alcohols, hydro carbons and heat. A tight fitting synthetic gasket prevents the entrance of oil and coolants. External mounting holes enable switch mounting without internal interference. (See Figures 1 and 2.)

NEMA Type 4 (Watertight) enclosures are made of cast aluminum; cast iron or cast bronze enclosures can be provided upon request.

NEMA Type 7 \& 9 (Hazardous Location) enclosures are designed to meet the requirements of the National Electrical Code for Class 1, Group D, and Class 2.

Groups E, F \& G. The enclosures are made of cast aluminum; cast iron or bronze enclosures can be provided upon request. (See Figure 3.)


Figure 1 NEMA 1 Enclosure 2 circuit


Figure 2 NEMA 1 Enclosure 4 circuit


Figure 3 NEMA 7 Enclosure 2 circuit

## Rotary Limit Switches

## check these advantages.... worm gear type



The GEMCO Rotary Limit Switch

- reduces hazards to inexperienced users.
- removes danger of terminal shorting from water, corrosion, or accidental shorting from other metal objects because of its insulating properties.
- enclosures are made of FIBRALLOY® -- an electrical insulator.

The GEMCO Rotary Limit Switch.

- reduces design time.
- reduces machine work on special cams and gears for different operating ratios.
- cams are all standard regardless of ratios.
- offers special cams upon request.

The GEMCO Rotary Limit Switch.

- often pays for itself by eliminating cost of stampings and machined bushings in linkages.
- reduces assembly time.


## Mounting

The switch may be mounted in any convenient position. An "L" shaped mounting bracket which permits innumerable mounting positions for all enclosures, can be supplied upon request.

## Adjustment

- Front cam "A"actuates switch "F"; rear cam "0" actuates switch "E".
- Both switches "E" and "F" have independent adjustable cams.
- To adjust cam "A" loosen Allen Screw "B".
- To adjust cam "0" loosen Allen Screw "C".

When the cam rotates, the switches "E" and "F" are actuated and the contacts change from the normally closed to open position and normally open to the closed position.


Figure 4 Diagram showing:

- independent adjustable cams A-D
- switches E-F
- Allen Screws B-C


## worm gear type

## .....plus a broad range of application



## mechanical presses

Both die and press, worth thousands the cost of the Gemco Rotary Limit Switch, are safely protected when the connecting rod length is adjusted.

door operators
The Gemco Rotary Limit Switch is mounted on the drive unit, with gear take-off from the main drive shaft. Much wiring is eliminated. Cam accuracy maintains door closing to practical limits.


Gemco switches on this line of hoists protect power unit from damage by controlling critical upper and lower limit.
You can control travel of
pushers, grabs, and other
reciprocating parts
handlers directly from

drive shafts. | One or more open and close |
| :--- |
| limits on pipe line, pumping |
| station and machinery valves |
| are accurately controlled with |
| Gemco Rotary Limit |
| Switches. |

pipe threading machines
index tables
transformer tap changers
conveyors

Max Speed - 1000 RPM worm gear type

|  | Input Shaft | $\begin{aligned} & \text { Cam } \\ & \text { Block } \end{aligned}$ | NEMA 1* \& 12 Encl. | NEMA 4 Encl. <br> (1) | NEMA 7 Encl. <br> (1) | Input Turn | haft |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Standard | Rev. | Rev. | Catalog No. | Catalog No. | Catalog No. | Max. Setting | $\begin{gathered} \text { To } \\ \text { Reset } \end{gathered}$ |
| Two Cam | 5 | 1 | 2000-1B | 2000-98 | 2000-17B | 4 1/2 | 1/16 |
| Two Cam | 10 |  | 2000-38B | 2000-39B | 2000-40B | $91 / 4$ | 18 |
| S.P.D.T.* | 20 |  | 2000-2B | 2000-10B | 2000-18B | 18 | 1/8 |
| Contact Symbol | 30 | 1 | 2000-3B | 2000-11B | 2000-198 | 28 | 1/4 |
| For Each Cam | 40 |  | 2000-4B | 2000-12B | 2000-20B | 37 | 1/4 |
|  | 50 |  | 2000-5B | 2000-13B | 2000-21B | 46 | 1/4 |
| - | 60 | 1 | 2000-6B | 2000-14B | 2000-22B | 58 | $11 / 2$ |
| 0 | 80 |  | 2000-7B | 2000-15B | 2000-23B | 77 | 3/4 |
|  | 100 |  | 2000-8B | 2000-16B | 2000-24B | 94 | 3/4 |
| Deduct $\$ 12.00$ list If One Switch Is Omitted. | 150 | 1 | 2000-129B | 2000-132B | 2000-135B | 135 | 4 |
|  | 250 |  | 2000-28B | 2000-31B | 2000-34B | 230 | 6 |
|  | 300 |  | 2000-130B | 2000-133B | 2000-136B | 265 | $61 / 2$ |
|  | 500 | 1 | 2000-29B | 2000-32B | 2000-35B | 460 | $151 / 4$ |
|  | 600 |  | 2000-131B | 2000-134B | 2000-43B | 555 | 16 |
|  | 1000 |  | 2000-30B | 2000-33B | 2000-36B | 920 | 29 |
|  | 2000 | 1 | 2000-292B | 2000-299B | 2000-291B | Consult Factory |  |
|  | 4000 |  | 2000-279B | 2000-127B | 2000-128B |  |  |
|  | 53333 |  | 2000-281B | 2000-157B | 2000-158B |  |  |
| Standard | Input Shaft Rev. | Cam Block Rev. | NEMA $1^{*}$ \& 12 Encl. | NEMA 4 Encl. <br> (1) | NEMA 7 Encl. <br> (1) | Input Shaft Turns* |  |
|  |  |  | Catalog No. | Catalog No. | Catalog No. | Max. Setting | $\begin{gathered} \hline \text { To } \\ \text { Reset } \end{gathered}$ |
| Two Cam | 5 | 1 | 2000-137B | 2000-145B | 2000-159B | $43 / 4$ | 1/8 |
| Two Cam | 10 |  | 2000-138B | 2000-146B | 2000-160B | $91 / 4$ | 1/4 |
| D.P.D.T.** <br> Contact Symbol For Each Cam | 20 |  | 2000-25B | 2000-147B | 2000-161B | 19 | 1/2 |
|  | 30 | 1 | 2000-47B | 2000-148B | 2000-60B | $281 / 2$ | 1/2 |
|  | 40 |  | 2000-139B | 2000-149B | 2000-1628 | $373 / 4$ | 3/4 |
|  | 50 |  | 2000-73B | 2000-1508 | 2000-163B | $463 / 4$ | 3/4 |
|  | 60 | 1 | 2000-75B | 2000-151B | 2000-164B | 58 | $11 / 2$ |
|  | 80 |  | 2000-77B | 2000-152B | 2000-165B | 75 | $13 / 4$ |
|  | 100 |  | 2000-43B | 2000-153B | 2000-166B | 95 | 2 |
|  | 150 | 1 | 2000-1130B | 2000-1131B | 2000-1132B | 135 | 4 |
|  | 250 |  | 2000-140B | 2000-154B | 2000-167B | 237 | 6 |
|  | 300 |  | 2000-1133B | 2000-1134B | 2000-1135B | 265 | $611 / 2$ |
|  | 500 | 1 | 2000-141B | 2000-155B | 2000-168B | 460 | $151 / 4$ |
|  | 600 |  | 2000-1136B | 2000-1137B | 2000-1138B | 555 | 16 |
|  | 1000 |  | 2000-142B | 2000-156B | 2000-169B | 920 | 29 |
|  | 2000 | 1 | 2000-1139B | 2000-1140B | 2000-1141B | Consult Factory |  |
|  | 4000 |  | 2000-1142B | 2000-1143B | 2000-1144B |  |  |
|  | 5333.3 |  | 2000-1145B | 2000-1146B | 2000-1147B |  |  |


| Standard Three Cam S.P.D.T.*** | Input <br> Shaft <br> Rev. | Cam Block Rev. | NEMA 1* \& 12 Encl. Catalog No. | $\begin{aligned} & \hline \text { NEMA } 4 \text { Encl. } \\ & (1) \\ & \hline \text { Catalog No. } \end{aligned}$ | $\begin{aligned} & \text { NEMA } 7 \text { Encl. } \\ & (1) \\ & \hline \text { Catalog No. } \end{aligned}$ | Input Shaft Turns**** |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  | Max. Setting | $\begin{gathered} \text { To } \\ \text { Reset } \end{gathered}$ |
|  | 5 | 1 | 2000-174B | 2000-188B | 2000-263B | $43 / 4$ | 1/16 |
|  | 10 |  | 2000-175B | 2000-189B | 2000-264B | $91 / 2$ | 116 |
|  | 20 |  | 2000-176B | 2000-190B | 2000-265B | $191 / 4$ | 1/8 |
| Contact Symbol For Each Cam | 30 | 1 | 2000 177B | 2000-191B | 2000-266B | $281 / 2$ | 1/4 |
|  | 40 |  | 2000 178B | 2000 192B | 2000 267B | 38 | 1/2 |
| $0-0$ |  |  | 2000 179B | 2000 193B | 2000 268B | 47 | 1/2 |
|  | 60 | 1 | 2000-180B | 2000-194B | 2000-269B | 5712 | 12 |
|  | 80 |  | 2000-181B | 2000-195B | 2000-270B | 76 3/4 | 12 |
|  | 100 |  | 2000-182B | 2000-196B | 2000-271B | $961 / 4$ | 112 |
| $0-9$ | 150 | 1 | 2000-170B | 2000-171B | 2000-186B | 135 | 4 |
|  | 250 |  | 2000-183B | 2000-197B | 2000-272B | 234 | 2 |
|  | 300 |  | 2000-187B | 2000-300B | 2000-301B | 265 | $61 / 2$ |
|  | 500 | 1 | 2000 184B | 2000 198B | 2000 273B | 460 | 7 |
|  | 600 |  | 2000-1100B | 2000-1101B | 2000-1102B | 555 | 16 |
|  | 1000 |  | 2000-185B | 2000-199B | 2000-274B | 920 | 10 |
|  | 2000 | 1 | 2000-1103B | 2000-104B | 2000-1105B | Consult Factory |  |
|  | 4000 |  | 2000-1106B | 2000-1107B | 2000-1108B |  |  |
|  | 5333.3 |  | 2000-1109B | 2000-11108 | 2000-1111B |  |  |
| Standard <br> Four Cam <br> S.P.D.T.*** | Input Shaft | Cam Block Rev. | NEMA $1^{*}$ \& 12 Encl. | NEMA 4 Encl. <br> (1) | NEMA 7 Encl. <br> (1) | Input Shaft Turns**** |  |
|  | Rev. |  | Catalog No. | Catalog No. | Catalog No. | Max. Setting | To Reset |
|  | 5 | 1 | 2000-89B | 2000-101B | 2000-113B | 434 | 1/16 |
|  | 10 |  | 2000-90B | 2000-102B | 2000-114B | 912 | 1/16 |
|  | 20 |  | 2000-91B | 2000-103B | 2000-115B | 1914 | 18 |
|  | 30 | 1 | 2000-92B | 2000-104B | 2000-11 6B | $281 / 2$ | 1 |
|  | 40 |  | 2000-93B | 2000-105B | 2000-117B | 36 | 12 |
|  | 50 |  | 2000 94B | 2000 106B | 2000-118B | 47 | 12 |
| Contact Symbol For Each Cam | 60 | 1 | 2000-95B | 2000-107B | 2000-119B | 57 1/2 | 1/2 |
|  | 80 |  | 2000-96B | 2000-1 088 | 2000-1 20B | 76 3/4 | 1/2 |
|  | 100 |  | 2000-97B | 2000-109B | 2000-121B | $961 / 4$ | 11/2 |
| 000 | 150 | 1 | 2000-1112B | 2000-1113B | 2000-1114B | 135 | 4 |
|  | 250 |  | 2000-98B | 2000-110B | 2000-122B | 234 | 2 |
|  | 300 |  | 2000-1115B | 2000-1116B | 2000-1117B | 265 | 61/2 |
|  | 500 | 1 | 2000-99B | 2000-111B | 2000-123B | 460 | 7 |
|  | 600 |  | 2000-1118B | 2000-1119B | 2000-1120B | 555 | 16 |
|  | 1000 |  | 2000-100B | 2000-112B | 2000-124B | 920 | 10 |
|  | 2000 | 1 | 2000-1121B | 2000-1122B | 2000-1123B | Consult Factory |  |
|  | 4000 |  | 2000-1124B | 2000-1125B | 2000-1 126B |  |  |
|  | 5333.3 |  | 2000-1127B | 2000-1128B | 2000-1129B |  |  |
| *Switch capacities: 125 V . - 15 amps . AC., $1 / 2 \mathrm{amp}$. D.C. 15 amps . AC.. $1 / 4 \mathrm{amp}$. D.C. |  |  |  | ***Switch capacities: 250V. <br> Mechanical rating - 20 million cycles |  |  |  |
|  |  |  |  |  |  |  |  |
| 460 V . 15 amps . AC. |  |  |  |  |  | Electrical rating - 125V. AC. - 10 amps . resistive load. 250 V . AC. - 10 amps. resistive load |  |  |  |
| **Switch capacities: 125 or 250V. AC. - 10 amps. 125V. D. - $1 / 2$ amp |  |  |  | 30V. D.C. - 7 amps. inductive load |  |  |  |
|  |  |  |  |  |  |  |  |
| 250V. D.C. - $1 / 4 \mathrm{amp}$. |  |  |  |  |  | ****Figures are based on a switch using a standard 25 ' cam: maximum setting between limits. |  |  |  |
| (1) - For Cast Iron or Bronze Enclosure Contact Factory. |  |  |  |  |  |  |  |

## worm gear type

## Special Cams*

| Cam <br> Part No. | Period for which switch contacts <br> are opened or closed |
| :---: | :---: |
| S-55-A Standard | $25^{\circ}$ or $335^{\circ}$ |
| S-68-A Special | $540^{\circ}$ or $306^{\circ}$ |
| S-84-A Special | $75^{\circ}$ or $285^{\circ}$ |
| S-69-A Special | $90^{\circ}$ or $270^{\circ}$ |
| S-85-A Special | $105^{\circ}$ or $255^{\circ}$ |
| S-86-A Special | $135^{\circ}$ or $225^{\circ}$ |
| S-87-A Special | $150^{\circ}$ or $210^{\circ}$ |
| S-70-A Special | $180^{\circ}$ |
| S-71-A Special | $240^{\circ}$ or $120^{\circ}$ |
| S-127-A Special | $360^{\circ}$ Blank Cam |

${ }^{*}$ Special cams not listed, can be furnished on special order. When ordering, please specify cam angle.

## Ordering

When ordering desired switch, specify:

1. Catalog Number
2. Desired Gear Ratio
3. Number of Cams
4. Type of Enclosure

Example: If a four circuit standard enclosure, $5: 1$, is required with four 900 cams, order Catalog No. 2000-89 with four Part No. S-69-A Cams. See Special Cam Chart above.

In selecting a gear ratio, maximum accuracy and ease of adjustment are more easily obtained if full travel of drive equals, or is less than maximum setting between limits.
Example: If 90 revolutions of a window drive opens a window, a gear ratio of 100:1 should be selected.

## Design Service

Gemco Design Engineers will be pleased to assist in the solution of any special control problems and to recommend the most suitable Gemco Rotary Limit Switch for your needs. Custom designed switches are available to specifications.

## WORM GEAR TYPE - NEMA I \& 12



Approximate dimensions - not for construction unless certified.
Approximate shipping weight 2 lbs .
WORM GEAR TYPE - NEMA 4 \& 7
DWG. NO. D-16-C (NEMA 4)


## Superior Design and Operating Features



## Rotary Limit Switches

## Application

GEMCO's Spur Gear Type Rotary Limit Switch is used in applications requiring ratios below 3:1 and 1:3 for controlling the end and/or intermediate limits of reciprocating or rotary motion. This device extends the present line of Gemco Rotary Limit Switches by providing ultra-sensitive control for small increments of motion.

## Many beneficial features include:

- Control of motor-operated valves, dampers and hopper gates used in pipe lines, ventilating equipment and material handling systems.
- Improved environmental conditions for longer switch life.
- Smaller space requirements.
- Material and labor savings of reduced drilling, tapping, piping, and wiring.
- Economies afforded when Gemco units are applied for many short travel end limit uses instead of conventional lever operated limit switches actuated by cams or dogs.
- Unique mounting which permit these switches to be installed in convenient mounting positions. Mounting holes are provided for either direct or sprocket drive applications in three different positions.


## Description

The basic switch units are actuated by independently adjustable cams which are driven by the input shaft. All cams are mounted on a common block, which is directly coupled or geared to the drive shaft.

## - Ratios

Standard geared ratios between the input shaft and cam block are $1: 1,1 / 2: 1,1 / 3: 1,2: 1$, and $3: 1$. The $1: 1$ ratio may be supplied with a potenti-ometer gear coupled to the input shaft with ratios of $1: 1,1: 2$ and 1:3.

## spur gear type

## - Long Life Switches

Each enclosure can accommodate from two to four S.P.D.T. switches. All switches are provided with silver to silver contacts for reliability along with screw type terminals,


Figure 5 Sketch showing:

- independent adjustable cams A-D
- switches E-F
- Allen screws B-C for cam adjustment


## Mounting

Unique mounting features permit these switches to be installed in any of three different positions. Mount-ing holes are provided for either direct or sprocket drive applications.

## Adjustment

- Top cam 'A' actuates switch ' $F$ '; bottom cam ' $D$ ' actuates switch 'E'.
- Adjustment of cam ' $A$ ' is independent of cam ' $D$ '.
- To adjust cam 'A', loosen cam locking screw ' C ' and rotate cam ' $A$ ' until trip point of switch ' $F$ ' is reached.
- To adjust cam ' D ', loosen cam locking screw ' B ' and rotate cam ' $D$ ' until trip point of switch ' $E$ ' is reached.

When the cams rotate, the switches are actuated and the contacts change from the normally closed to open position.
(See Figure 5.)

## Rotary Limit Switches

## spur gear type

## Enclosures

NEMA Type 1 and 12 (General Purpose) enclosures consist of a die cast housing and FIBRALLOY® cover. All mounting holes are external to the wiring cavity eliminating interference with internal wiring when the switch is mounted. Captive screws fasten the cover to the die cast housing and eliminate problems of misplaced screws. (See Figure 6.)

NEMA 4 and 7 enclosures are constructed of aluminum to prevent corrosion. The NEMA 7 (Hazardous Location) enclosure is available for use in Class 1, Group D, areas as outlined in the National Electrical Code. Cast iron enclosures can also be provided on special request. All units are provided with an attractive red wrinkle finish. (See Figure 7.)

## Potentiometer

An optional salient feature of mounting a 2 watt potentiometer within the enclosure, and gear coupled to the input shaft, is offered. This feature permits the potentiometer to be used as a remote position indicator or as a constant output auxiliary control device for open or closed loop feedback systems. (See Figure 8.)

- Step-up geared ratios between the input shaft and the potentiometer are available to provide a choice of sensitivity and resolution to meet most applications.
- The special type potentiometer allows continuous rotation of the drive and a zero or reference point to be adjusted without removing any gears or components.


## SG Type....




Figure 6 NEMA 1 Enclosure 2 circuit


Figure 7 NEMA 7 Enclosure 2 circuit


Figure 8 NEMA 1 Enclosure 4 circuit with Gear Coupled Potentiometer

## Rotary Application

## - reciprocating motions

Assures accurate movement and placement of parts in all types of handling and positioning fixtures.

NOTE - Replaces two limit switches and electrical piping.

## Rotary Limit Switches

spur gear type - ROTARY LIMIT SWITCH

| Enclosure <br> Type | Input <br> Shaft <br> Rev. | Cam <br> Rlock <br> Rev. | Two Circuit <br> S. P. D. T. <br> Symbol A | Two Circuit <br> D. P. D. T. <br> Symbol B | Three Circuit <br> S. P. D. T. <br> Symbol C | Four Circuit <br> S.P. D. T. <br> Symbol C |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Catalog <br> Number | Catalog <br> Number | Catalog <br> Number | Catalog <br> Number |
| NEMA 1 \& 12 | 1 | 1 | $2000-800$ | $2000-805$ | $2000-810$ | $2000-815$ |
|  | $1 / 2$ | 1 | $2000-801$ | $2000-806$ | $2000-811$ | $2000-816$ |
|  | $1 / 3$ | 1 | $2000-802$ | $2000-807$ | $2000-812$ | $2000-817$ |
|  | 2 | 1 | $2000-803$ | $2000-808$ | $2000-813$ | $2000-818$ |
|  | 3 | 1 | $2000-804$ | $2000-809$ | $2000-814$ | $2000-819$ |
| NEMA 4 | 1 | 1 | $2000-832$ | $2000-837$ | $2000-842$ | $2000-847$ |
|  | $1 / 2$ | 1 | $2000-833$ | $2000-838$ | $2000-843$ | $2000-848$ |
| (1) | $1 / 3$ | 1 | $2000-834$ | $2000-839$ | $2000-844$ | $2000-849$ |
|  | 2 | 1 | $2000-835$ | $2000-840$ | $2000-845$ | $2000-850$ |
|  | 3 | 1 | $2000-836$ | $2000-841$ | $2000-846$ | $200-851$ |
| NEMA 7 | 1 | 1 | $2000-864$ | $2000-869$ | $2000-874$ | $2000-879$ |
|  | $1 / 2$ | 1 | $2000-865$ | $2000-870$ | $2000-875$ | $2000-880$ |
| (1) | $1 / 3$ | 1 | $2000-866$ | $2000-871$ | $2000-876$ | $2000-881$ |
|  | 2 | 1 | $2000-867$ | $2000-872$ | $2000-877$ | $2000-882$ |
|  | 3 | 1 | $2000-868$ | $2000-873$ | $2000-878$ | $2000-883$ |

ROTARY LIMIT SWITCH WITH POTENTIOMETER

| Enclosure <br> Type | Input <br> Shaft <br> Rev. | Cam <br> Block <br> Rev. | Pot. | Rev. | Two Circuit <br> S. P. D. T. <br> Symbol A | Two Circuit <br> D. P. D. T. <br> Symbol B | Three Circuit <br> S. P. D. T. <br> Symbol C |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | Four Circuit <br> S. P. D. T. <br> Symbolog <br> Sumber | Catalog <br> Number | Catalog <br> Number | Catalog <br> Number |
| NEMA 1 \& 12 | 1 | 1 | 1 | $2000-820$ | $2000-823$ | $2000-826$ | $2000-829$ |
|  | 1 | 1 | 2 | $2000-821$ | $2000-824$ | $2000-827$ | $2000-830$ |
|  | 1 | 1 | 3 | $2000-822$ | $2000-825$ | $2000-828$ | $2000-831$ |
| NEMA 4 | 1 | 1 | 1 | $2000-852$ | $2000-855$ | $2000-858$ | $2000-861$ |
|  | 1 | 1 | 2 | $2000-853$ | $2000-856$ | $2000-859$ | $2000-862$ |
|  | 1 | 1 | 3 | $2000-854$ | $2000-857$ | $2000-860$ | $2000-863$ |
| NEMA 7 | 1 | 1 | 1 | $2000-884$ | $2000-887$ | $2000-890$ | $2000-893$ |
|  | 1 | 1 | 2 | $2000-885$ | $2000-888$ | $2000-891$ | $2000-894$ |
|  | 1 | 1 | 3 | $2000-886$ | $2000-889$ | $2000-892$ | $2000-895$ |

(1) Contact Factory for Cast Iron or Bronze Enclosure.

## Ordering

When ordering desired switch, specify:

1. Catalog Number
2. Quantity Required
3. Desired Gear Ratio
4. Resistance of Potentiometer (if used)

## Potentiometer

Potentiometers can be provided with resistance of $1,2,5,10,20,50,100,200,500,1000,2000,5000,10,000$, or 20,000 ohms. All potentiometers are rated at 2 watts. (Linear taper).

## Gear Ratio Selection

In selecting a gear ratio, maximum accuracy and ease of adjustment are more easily obtained if rotation of input shaft between limits is equal to, or less than, maximum settings between limits. For example, if .8 revolutions of the input shaft is required to open and close a valve, a gear ratio of $1: 1$ input to cam should be selected.

TABLE 1 - engineering data

| Input <br> Shaft <br> Rev. | Cam <br> Block <br> Rev. | TURNS OF INPUT SHAFT * |  |  |
| :---: | :---: | :---: | :---: | :---: |
| Max. Setting <br> Between Limits | Min. Setting <br> Between Limits | To <br> Reset |  |  |
| 1 | 1 | 0.9 | 0.05 | 0.025 |
| $1 / 2$ | 1 | 0.45 | 0.025 | 0.012 |
| $1 / 3$ | 1 | 0.30 | 0.016 | 0.008 |
| 2 | 1 | 1.8 | 0.1 | 0.050 |
| 3 | 1 | 2.7 | 0.15 | 0.075 |

* Figures are based on a switch using standard 25 cams and with Symbol A
contacts as noted in Table 2.

TABLE 2 - basic switch data

| Symbol A | Symbol B | Symbol C |
| :---: | :---: | :---: |
| S.P.D.T. | D.P.D.T. | S.P.D.T. |
|  |  |  |
| Ratings |  |  |
| 125V-15A., A.C. | Ratings | Ratings |
| 1/2Amp. D.C. | 125-250V.A.C. | $125-250$ V.A.C. |
| 250V-15A., A.C. | 10Amp. D.C. | 10 Amp.. |
| 1/4 Amp. D.C. | 125-V.D.C | 30-V.D.C. |
| 460V-15A., A.C. | 1/2 Amp. | 10 Amp. |
|  | 250-V.D.C. |  |
|  | 1/4Amp. |  |

## Special Cams*

| Cam ** <br> Part No. | Period for which switch contacts are opened or closed |  |
| :---: | :---: | :---: |
| S-55-A Standard | $25^{\circ}$ or $335{ }^{\circ}$ |  |
| S-68-A Special | $540^{\circ}$ or 306 ${ }^{\circ}$ |  |
| S-84-A Special | $75^{\circ}$ or $285{ }^{\circ}$ |  |
| S-69-A Special | $90^{\circ}$ or $270{ }^{\circ}$ |  |
| S-85-A Special | $105^{\circ}$ or $255{ }^{\circ}$ |  |
| S-86-A Special | 1350 or $225{ }^{\circ}$ |  |
| S-87-A Special | $150{ }^{\circ}$ or $210^{\circ}$ |  |
| S-70-A Special | 180응 |  |
| S-71-A Special | $240^{\circ}$ or $120{ }^{\circ}$ |  |
| S-127-A Special | $360{ }^{\circ}$ Blank Cam |  |

## Heavy-Duty Dimensions

SPUR GEAR TYPE - NEMA I \& 12 оwe. no. D-34-c
Input Shaft Has Snap Ring
Grooves For Sect. 3001
Adjustable Coupling
NOTE-
approximote dimensions - not for con struction unless certified. Shipping weight 2lb. $\mathrm{B}_{\mathrm{oz}}$.


SPUR GEAR TYPE-NEMA 487 owe no. 0-35-c

Apprasimate dimensions - net to constraction unipsis certitied. Approdimsle stipging seight 4bilizaz

| UNIT | $X$ IETOHT |
| :---: | :---: |
| NEMA 4 | $4 \frac{8}{16}$ |
| NENA T | $4 \frac{29}{32}$ |



## Application:

Ruggedly built, GEMCO'S heavy duty Rotary Limit Switches have gained wide acceptance on installations such as mechanical press ram adjustments, press extractors and shuttles which require dependable trouble free performance. These installations require a limit switch that will withstand rapid starting and stopping, shock, vibration and still successfully control the end or intermediate limits of such devices. Because of these demands and the high reliability required, GEMCO'S heavy-duty Rotary Limit Switch far exceeds any on the market.

Heavy Duty... Rotary Limit Switch with reduction ratios to... 3000:1

Figure 10 NEMA 12 Heavy Duty Rotary Limit Switch 2 circuit

## Cams

The input shaft (includes Woodruff Key) drives a bronze gear which rotates the cam block. The cam block houses independently adjustable cams that actuate the precision type snap action switches.

## Input Speed

Maximum rated speed of the input Input Speed shaft is 1800 RPM; can be rotated clockwise or counterclockwise.

|  | Reduction Ratios | Two Circuit S.P.D.T. Symbol A* | Two Circuit D.P.D.T. Symbol B* $\cdots-9$ $\cdots-\infty$ | Two Circuit S.P.D.T. Symbol C* $0-\infty$ $0-\infty-0$ | Two Circuit S.P.D.T. Symbol C* -a, $0-\infty-0$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Catalog No. | Catalog No. | Catalog No. | Catalog No. |
| $\begin{aligned} & \text { Dwg. } \\ & \text { No. D-96-C } \end{aligned}$ | 5:1 | 2000-2000 | 2000-2006 | 2000-2012 | 2000-2018 |
|  | 7.5:1 | 2000-2001 | 2000-2007 | 2000-2013 | 2000-2019 |
|  | 10:1 | 2000-2002 | 2000-2008 | 2000-2014 | 2000-2020 |
|  | 15:1 | 2000-2003 | 2000-2009 | 2000-2015 | 2000-2021 |
|  | 20:1 $30: 1$ | $2000-2004$ $2000-2005$ | $2000-2010$ $2000-2011$ | $2000-2016$ $2000-2017$ | 2000-2022 |
|  | $125 \cdot 1$ | 2000-2024 | 2000-2039 | 2000-2054 | 2000-2069 |
|  | 156.25:1 | 2000-2025 | 2000-2040 | 2000-2055 | 2000-2070 |
|  | 187.5:1 | 2000-2026 | 2000-2041 | 2000-2056 | 2000-2071 |
|  | 250:1 | 2000-2027 | 2000-2042 | 2000-2057 | 2000-2072 |
|  | 312.5: 1 | 2000-2028 | 2000-2043 | 2000-2058 | 2000-2073 |
|  | 375:1 | 2000-2029 | 2000-2044 | 2000-2059 | 2000-2074 |
|  | 500:1 | 2000-2030 | 2000-2045 | 2000-2060 | 2000-2075 |
|  | 625:1 | 2000-2031 | 2000-2046 | 2000-2061 | 2000-2076 |
|  | 750:1 | 2000-2032 | 2000-2047 | 2000-2062 | 2000-2077 |
| $\begin{aligned} & \text { Dwg. } \\ & \text { No. D-85-C } \end{aligned}$ | 1000:1 | 2000-2033 | 2000-2048 | 2000-2063 | 2000-2078 |
|  | 1250:1 | 2000-2034 | 2000-2049 | 2000-2064 | 2000-2079 |
|  | 1500:1 | 2000-2035 | 2000-2050 | 2000-2065 | 2000-2080 |
|  | 2000:1 | 2000-2036 | 2000-2051 | 2000-2066 | 2000-2081 |
|  | 2500:1 | 2000-2037 | 2000-2052 | 2000-2067 | 2000-2082 |
|  | 3000:1 | 2000-2038 | 2000-2053 | 2000-2068 | 2000-2083 |

[^0]
## Heavy-Duty Dimensions



## General Purpose Rotary Limit Switches

Featuring:


- S.P.D.T. or D.P.D.T. Industrial Duty Switches With Isolated Contacts
- Ease of Wiring With Direct Access To All Switch Terminals
- Gear Ratios From 5:1 to 1080:1
- Positive, Independent Cam Settings
- Rugged Duty Die Cast Enclosures
- Large Cover Openings For Ease of Wiring
- NEMA 4 \& 5 Oiltight - Watertight - Dusttight


4 CIRCUIT

## TWO (2) CIRCUIT ROTARY LIMIT SWITCH CATALOG NUMBERING SYSTEM



| CROSS REFERENCE |  |
| :---: | :---: |
| 2 CIRCUIT ROTARY LIMIT SWITCH |  |
| CUTLER HAMMER <br> PART NO. | GEMCO <br> PART NO. |
| $10316 \mathrm{H}-155-1$ | $2006-402-\mathrm{L}-120-\mathrm{A}$ |
| $10316 \mathrm{H}-156-1$ | $2006-402-\mathrm{L}-60-\mathrm{A}$ |
| $10316 \mathrm{H}-157-1$ | $2006-402-\mathrm{L}-40-\mathrm{A}$ |
| $10316 \mathrm{H}-167-1$ | $2006-402-\mathrm{L}-357-\mathrm{A}$ |
| $10316 \mathrm{H}-169-1$ | $2006-402-\mathrm{L}-1080-\mathrm{A}$ |
| $10316 \mathrm{H}-179-1$ | $2006-402-\mathrm{R}-120-\mathrm{A}$ |
| $10316 \mathrm{H}-180-1$ | $2006-402-\mathrm{R}-60-\mathrm{A}$ |
| $10316 \mathrm{H}-181-1$ | $2006-402-\mathrm{R}-40-\mathrm{A}$ |
| $10316 \mathrm{H}-1016-1$ | $2006-402-\mathrm{L}-10-\mathrm{A}$ |
| $10316 \mathrm{H}-1017-1$ | $2006-402-\mathrm{L}-20-\mathrm{A}$ |
| $10316 \mathrm{H}-1018-1$ | $2006-402-\mathrm{R}-10-\mathrm{A}$ |
| $10316 \mathrm{H}-1019-1$ | $2006-402-\mathrm{R}-20-\mathrm{A}$ |
| $10316 \mathrm{H}-4556-1$ | $2006-402-\mathrm{L}-5-\mathrm{A}$ |
| $10316 \mathrm{H}-4557-1$ | $2006-402-\mathrm{L}-30-\mathrm{A}$ |
| $10316 \mathrm{H}-4559-1$ | $2006-402-\mathrm{L}-80-\mathrm{A}$ |
| $10316 \mathrm{H}-4560-1$ | $2006-402-\mathrm{R}-5-\mathrm{A}$ |
| $10316 \mathrm{H}-4561-1$ | $2006-402-\mathrm{R}-30-\mathrm{A}$ |
| $10316 \mathrm{H}-4563-1$ | $2006-402-\mathrm{R}-80-\mathrm{A}$ |
| $10316 \mathrm{H}-4591-1$ | $2006-402-\mathrm{R}-357-\mathrm{A}$ |
| $10316 \mathrm{H}-4595-1$ | $2006-402-\mathrm{R}-1080-\mathrm{A}$ |
| $10316 \mathrm{H}-4599-1$ | $2006-402-\mathrm{L}-270-\mathrm{A}$ |
| $10316 \mathrm{H}-4606-1$ | $2006-402-\mathrm{R}-270-\mathrm{A}$ |



* Available from stock


## "L" SHAPE BRACKET

| When "L" Shape Bracket is purchased, use |
| :---: |
| CATALOG NUMBER |
| $\mathrm{C}-6131-\mathrm{B}(2$ circuit unit) |
| $\mathrm{C}-6132-\mathrm{B}(4$ circuit unit $)$ |


| Circuits | Dimensions in inches |  |  |  | Lbs. |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | A | B | C | D |  | Boxed |
| 2 Circuit Enclosure | $47 / 8$ | $41 / 2$ | $25 / 8$ | $43 / 8$ | $51 / 4$ | 3 |
| 4 Circuit Enclosure | $67 / 8$ | $\mathbf{1 1 5}$ | 3 | $3 / 8$ | $3 / 8$ | $3 / 8$ |

[^1]Approximate Dimensions And Shipping Weights For 2 and 4 Circuit Units Left Hand Extension Shown
("L" shape mounting bracket, when purchased separately, is shown in some of the possible mounting positions by broken lines.)

FOUR (4) CIRCUIT ROTARY LIMIT SWITCH CATALOG NUMBERING SYSTEM


4 Circuit
NEMA 4 Enclosure

| CROSS REFERENCE |  |
| :---: | :---: |
| 4 CIRCUIT ROTARY LIMIT SWITCHES |  |
| CUTLER HAMMER <br> PART NO. | GEMCO |
| PART NO. |  |
| $10316 \mathrm{H}-156-1$ | $2006-404-\mathrm{L}-120-\mathrm{A}$ |
| $10316 \mathrm{H}-159-1$ | $2006-404-\mathrm{L}-60-\mathrm{A}$ |
| $10316 \mathrm{H}-160-1$ | $2006-404-\mathrm{L}-40-\mathrm{A}$ |
| $10316 \mathrm{H}-173-1$ | $2006-404-\mathrm{L}-1080-\mathrm{A}$ |
| $10316 \mathrm{H}-175-1$ | $2006-404-\mathrm{L}-357-\mathrm{A}$ |
| $10316 \mathrm{H}-1026-1$ | $2006-404-\mathrm{L}-10-\mathrm{A}$ |
| $10316 \mathrm{H}-1027-1$ | $2006-404-\mathrm{L}-20-\mathrm{A}$ |
| $10316 \mathrm{H}-4568-1$ | $2006-404-\mathrm{L}-5-\mathrm{A}$ |
| $10316 \mathrm{H} \cdot 4569-1$ | $2006-404-\mathrm{L}-30-\mathrm{A}$ |
| $10316 \mathrm{H}-4571-1$ | $2006-404-\mathrm{L}-80-\mathrm{A}$ |
| $10316 \mathrm{H}-4600-1$ | $2006-404-\mathrm{L}-270-\mathrm{A}$ |

SPARE SNAP SWITCHES

| SPARE SNAP SWITCHES |
| :--- |
| CUTLER HAMMER <br> PART NUMBER |
| PART NUMBER |


|  | RATIO |
| ---: | ---: |
| 5 | $5: 1$ |
| 10 | $10: 1$ |
| 20 | $20: 1$ |
| 30 | $30: 1$ |
| 40 | $40: 1$ |
| 60 | $80: 1$ |
| 80 | $80: 1$ |
| 120 | $120: 1$ |
| 270 | $270: 1$ |
| 357 | $357: 1$ |
| 1080 | $1080: 1$ |

ELECTRICAL CONTACT RATINGS

| Switch Type | Contacts | Volts | AC |  |  |  |  |  | Volts | DC |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Inductive <br> Pilot Duty 35\% Power Factor |  |  |  |  | Resistive 75\% Power Factor <br> Make, Break and Continuous Carrying Amps |  | Inductive Pilot Duty and Resistive |  |
|  |  |  | Make |  | Break |  | Continuous Carrying Amps |  |  | Make and Break Amperes | Continuous Carrying |
|  |  |  | Amps | VA | Amps | VA |  |  |  | Double Throw | Amps |
| 1950-1-B-A-D0 | SPDT | 110 | 40 | $\ldots$ | 15 | $\ldots$ | 15 | 15 | 115 | 0.25 | 15 |
|  |  | 220 | 20 | $\ldots$ | 10 | $\ldots$ | 15 | 15 | 230 | 0.1 | 15 |
|  |  | 440 | 10 | $\ldots$ | 6 | $\ldots$ | 15 | 15 | 600 | $\ldots$ | 15 |
|  |  | 600 | 8 | $\ldots$ | 5 | $\ldots$ | 15 | 15 | $\ldots$ | $\ldots$ | $\ldots$ |
| 1950-4-B-A-D0 | DPDT | 115 | 30 | 3450 | 3 | 345 | 10 | 10 | 115 | 0.2 | 10 |
|  |  | 230 | 15 | 3450 | 1.5 | 345 | 10 | 10 | 230 | 0.1 | 10 |
|  |  | 440 | 7.5 | 3450 | 0.75 | 345 | 10 | 10 | 600 | $\ldots$ | 10 |
|  |  | 575 | 6 | 3450 | 0.6 | 345 | 10 | 10 | $\ldots$ | $\ldots$ | $\ldots$ |

NOTE: The maximum period for which the switch contacts are opened or closed during one revolution (360 ${ }^{\circ}$ ) of the cam block assembly is $25^{\circ}$ or $335^{\circ}$. Multiply the Rotary Limit Switch gear ratio times $25^{\circ}$ or $335^{\circ}$ to obtain the input shaft rotation which will yield $25^{\circ}$ or $335^{\circ}$ of cam block rotation.

## APPLICATION:

The Type K Rotary Limit Switch is used in applications requiring ratios from 5:1 to 1080:1 for controlling the end and/or intermediate limits of a reciprocating or rotary motion. Two circuit and four circuit assemblies are available from stock.

The NEMA 4 \& 5 enclosure provides a clean environmental condition for the industrial duty snap action switches. Where motion can be expressed in shaft rotation either through a roller chain, gear train or direct coupling, the Type K Rotary Limit Switch makes it possible to open or close up to four independent circuits at the desired angular positions.

Ease of Making Cam Settings


## TYPICAL APPLICATIONS ARE:

- Door Operators
- Index Tables
- Hoists
- Material Handling Equipment
- Valves
- Reciprocating Linear Actuators
- Elevating Jack
- Dampers Mechanisms
- Tapping Heads
- Packaging
- End Limits on Machine Tool Lead Screws
- Machinery
- Conveyors


## DESCRIPTION:

Precision rugged duty snap action switches, combined with a wide selection of gear ratios provides reliable electrical signals as a function of the shaft rotation. No minimum speed is specified due to the snap action contacts of the switch. The cam settings and the switch wiring can be easily accomplished through the full size cover.

With the two circuit assembly, either a left hand or right hand shaft extension can be supplied. This pro-vides the added versatility when packaging this assembly in hard-to-get-at locations.

Easy to Wire Terminals


Industrial Duty Switches With Isolated Contacts

D.P.D.T.


Contact positions shown are when cams ARE NOT actuating levers.


## DESCRIPTION

This rotary limit switch is designed to control the limits of travel of rotating reversing equipment. The limit switch input shaft is connected to a worm gear. Adjustable self lubricating nylon roller cams are concentrically mounted to the worm gear. These adjustable cams actuate the precision limit switches by utilizing a lever assembly.

## INSTALLATION

This limit switch may be mounted in any convenient position. when installed this limit switch will provide long life with a minimum amount of service maintenance.

## The following recommendations will prove helpful

1. Install the limit switch so that the shaft load will not exceed (5) live pounds.
2. A flexible coupling is recommended for all installation other than gear drive application.
3. Coupling should be employed in a manner that results in a minimum of thrust loading on the shaft. If switches are mounted with the shaft up or down, some additional thrust loading resulting from the weight of the shaft plus a very light coupling is permissible.
4. Whenever possible, a separate support bearing for the drive sprocket should be used.
5. Permissible speed of the input shaft 2000 R.P.M.

## LUBRICATION

This limit switch was lubricated at the factory and should not require lubrication for the life of the switch.

## ADJUSTMENT

Refer to figure 1. The electrical switch units "G" and "H" are shown with the contact positions assumed when the cams are not actuating the switch units.

When the cam rotates and actuates the switch, the " $B$ " (closed) contact opens and the " $A$ " (open) contact closes. Each precision switch has (1) one independent adjustable cam.

## TO ADJUST SWITCH "H"

1. Loosen Green Set Screw
2. Turn "D" to Trip "H"
3. Tighten Green Set Screw

## TO ADJUST SWITCH "G"

1. Loosen Yellow Set Screw
2. Turn " C " to Trip " G "
3. Tighten Yellow Set Screw

WARNING:
LOOSEN CAM SET SCREW BEFORE ADJUSTING OR DAMAGE OF CAMS WILL OCCUR

| Nominal Input Shaft to Cam Ratio |  | Turns of Input Shaft |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | Maximum | Minimum | Over Travel | To Rese |
| 5: |  | 4 | 1/8 | 1/8 | 1/16 |
| 10 |  | 8-1/2 | 1/4 | 1/4 | 1/8 |
| 20 |  | 17 | 1/2 | 1/2 | 1/4 |
| 30 |  | 26 | 1 | 3/4 | 3/8 |
| 40 |  | 35 | 1 | 1 | 1/2 |
| 60 |  | 53 | 2 | 2 | 3/4 |
| 80 |  | 72 | 2-1/2 | 2-1/2 | 1 |
| 120 |  | 108 | 3 | 3 | 1-1/2 |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
| Wr FIG. \#2 <br> Pa <br> Re <br> (10) <br> (9) <br> (4) <br> 2 |  |  |  |  |  |
| licivi |  | UESCKIPIIU |  | mi ivuivib | U1 \%'. |
| 1 | Case | nd Shaft assem |  |  | 1 |
|  |  | 5:1 Ratio |  | -0092400-DN |  |
|  |  | 10:1 Ratio |  | -0092500-DN | $\cdots$ |
|  |  | 20:1 Ratio |  | -0092600-DN | .... |
|  |  | 30:1 Ratio |  | -0092700-DN | $\ldots$ |
|  |  | 40:1 Ratio |  | -0092800-DN | $\ldots$ |
|  |  | 60:1 Ratio |  | -0092900-DN | .... |
|  |  | 80:1 Ratio |  | -0093000-DN | $\ldots$ |
|  |  | 120:1 Ratio |  | -0093100-DN | $\ldots$ |
| 2 | Cam | ock \& Worm | ear assy. |  | 1 |
|  |  | 5:1 Ratio |  | -0093500-DN | $\ldots$ |
|  |  | 10:1 Ratio |  | -0093600-DN | .... |
|  |  | 20:1 Ratio |  | -0093700-DN | .... |
|  |  | 30:1 Ratio |  | -0093800-DN | $\ldots$ |
|  |  | 40:1 Ratio |  | -0093900-DN | .... |
|  |  | 60:1 Ratio |  | -0094000-DN | .... |
|  |  | 80:1 Ratio |  | -0094100-DN | .... |
|  |  | 120:1 Ratio |  | -0094200-DN |  |
| 3 | Shim | am Block (. 080 | THK.) | 0003300-A | 1 |
| 4 | Shim | am Block (. 020 | THK.) | 0000800-A | , |
| 5 |  | am Block (. 016 |  | 0003200-A | 3 |
| 6 | Limit Switch Standard S.P.D.T. Optional D.P.D.T. Optional S.M.S.B. |  |  | -1-B-A-DO | 4 |
|  |  |  |  | -4-B-A-DO | .... |
|  |  |  |  | -1408 |  |
| 7 | Optional S.M.S.B. Adjusting Bracket Assembly |  |  | -0024700-B |  |
| 8 | Gear | d Roller Asse | mbly | -00904-00-A | 4 |
| 9 | Spring | Compression |  | 001 8000-A | 4 |
| 10 | Lever | ssembly |  | -0024500-A | 2 |
| 11 | Cover |  |  | 0069200-A | 1 |
| 12 | Cover | Gasket |  | 0001 000-A | 1 |
| 13 | Space | Center Post |  | 073000-A | 1 |
| 14 | Wood | ff Key (\#404) |  | 6401 9-DN | 1 |



DESCRIPTION
This rotary limit switch is designed to control the limits of travel of rotating reversing equipment. The limit switch input shaft is connected to a worm gear. Adjustable selflubricating nylon roller cams are concentrically mounted to the worm gear. These adjustable cams actuate the precision limit switches by utilizing a lever assembly.

## installation

This limit switch maybe mounted in any convenient position. When installed this limit switch will provide long life with a minimum amount of service maintenance.
The following recommendations will prove helpful.

1. Install the limit switch so that the shaft load will not exceed (5) live pounds.
2. A flexible coupling is recommended for all installation other than gear drive application.
3. Coupling should be employed in a manner that results in a minimum of thrust loading on the shaft. If switches are mounted with the shaft up or down, some additional thrust loading resulting from the weight of the shaft plus a very light coupling is permissible.
4. Whenever possible, a separate support bearing for the drive sprocket should be used.
5. Permissible speed of the input shaft 2000 R.P.M.

## LUBRICATION

This limit switch was lubricated at the factory and should not require lubrication for the life of the switch.

## ADJUSTMENT

Refer to figure 1. The electrical switch units "G", "H' , "L" AND "M" are shown with the contact positions assumed when the cams ARE NOT actuating the switch units.

When the cam rotates and actuates the switch, the "B" (closed) contact opens and the "A" (open) contact closes. Each precision switch has (1) one independent adjustable cam.

TO ADJUST SWITCH "M"

1. Loosen Red Set Screw
2. Turn "K" to Trip "M"
3. Tighten Red Set Screw

TO ADJUST SWITCH "H"

1. Loosen Green Set Screw
2. Turn "D" to Trip "H"
3. Tighten Green Set Screw

## TO ADJUST SWITCH "L"

1. Loosen Blue Set Screw
2. Turn "J" to Trip "L"
3. Tighten Blue Set Screw

## TO ADJUST SWITCH "G"

1. Loosen Yellow Set Screw
2. Turn "C" to Trip "G"
3. Tighten Yellow Set Screw

## WARNING: LOOSEN CAM SET SCREW BEFORE ADJUSTING OR DAMAGE

 OF CAMS WILL OCCUR| Nominal <br> Input Shaft <br> to Cam Ratio | Turns of Input Shaft |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Maximum | Minimum | Over Travel | To Reset |
| $5: 1$ | 4 | $1 / 8$ | $1 / 8$ | $1 / 16$ |
| $10: 1$ | $8-1 / 2$ | $1 / 4$ | $1 / 4$ | $1 / 8$ |
| $20: 1$ | 17 | $1 / 2$ | $1 / 2$ | $1 / 4$ |
| $30: 1$ | 26 | 1 | $3 / 4$ | $3 / 8$ |
| $40: 1$ | 35 | 1 | 1 | $1 / 2$ |
| $60: 1$ | 53 | 2 | 2 | $3 / 4$ |
| $80: 1$ | 72 | $2-1 / 2$ | $2-1 / 2$ | 1 |
| $120: 1$ | 108 | 3 | 3 | $1-1 / 2$ |



RENEWAL PARTS
When ordering Renewal Parts give this form No. PF-047, Item No., Description, Part No., Quantity, and the Complete Unit Number stamped on the label. Reference FIG. \#1 and FIG. \#2 above.

| ITEM | DESCRIPTION | PART NUMBER | QTY. |
| :---: | :---: | :---: | :---: |
| 1 | Case and Shaft assembly <br> 5:1 Ratio <br> 10:1 Ratio <br> 20:1 Ratio <br> 30:1 Ratio <br> 40:1 Ratio <br> 60:1 Ratio <br> 80:1 Ratio <br> 120:1 Ratio |  | 1 |
|  |  | PSD-0092400-DN |  |
|  |  | PSD-0092500-DN |  |
|  |  | PSD-0092600-DN |  |
|  |  | PSD-0092700-DN |  |
|  |  | PSD-0092800-DN | .... |
|  |  | PSD-0092900-DN | $\ldots$ |
|  |  | PSD-0093000-DN | .... |
|  |  | PSD-0093100-DN |  |
| 2 | Cam block \& Worm Gear assy. 5:1 Ratio 10:1 Ratio |  | 1 |
|  |  | PSD-0093500-DN | $\ldots$ |
|  |  | PSD-0093600-DN | .... |
|  | 20:1 Ratio | PSD-0093700-DN | .... |
|  | 30:1 Ratio | PSD-0093800-DN | .... |
|  | 40:1 Ratio | PSD-0093900-DN | .... |
|  | 60:1 Ratio | PSD-0094000-DN | .... |
|  | 80:1 Ratio | PSD-0094100-DN | $\ldots$ |
|  | 120:1 Ratio | PSD-0094200-DN | .... |
| 3 | Shim Cam Block (. 080 THK.) | PS-0003300-A | 1 |
| 4 | Shim Cam Block (. 020 THK.) | PS-0000800-A | 1 |
| 5 | Shim Cam Block (. 016 THK.) | PS-0003200-A | 3 |
| 6 | Limit Switch Standard S.P.D.T. | 1950-1-B-A-DO | 4 |
|  | Optional D.P.D.T. | 1950-4-B-A-DO | .... |
|  | Optional S.M.S.B. | 1950-1408 |  |
| 7 | Adjusting Bracket Assembly | PSD-0024700-B | 1 |
| 8 | Gear and Roller Assembly | PSD-00904-00-A | 4 |
| 9 | Spring, Compression | PM-001 8000-A | 4 |
| 10 | Lever Assembly | PSD-0024500-A | 2 |
| 11 | Cover | PC-0069200-A | 1 |
| 12 | Cover Gasket | PS-0001 000-A | 1 |
| 13 | Spacer Center Post | M-0073000-A | , |
| 14 | Woodruff Key (\#404) | 04-56401 9-DN | 1 |

## Special Gemco Rotary Limit Switches To Meet Your Specific Applications



Two Circuit Rotary Limit Switch with a Special Mounting Bracket and Integral Right Angle Worm Gear for Mounting in a Power Jack.


Special Two Circuit Open Type Rotary Limit Switch with a Single Turn Potentiometer.


Special NEMA 4 Four Circuit Rotary Limit Switch with a Potentiometer for mounting on a rotary valve.


Special Three Circuit Rotary Limit Switch used on a Mobile Man Lift.


WORM GEAR TYPE
Ratios from 5:1 to 5333.3:1


SPUR GEAR TYPE
Ratios from .5:1 to 3:1


HEAVY DUTY TYPE
Ratios from 5:1 to 3000:1


## 2 CIRCUIT

WORM GEAR TYPE
Ratios from 5:1 to 1080:1


4 CIRCUIT
WORM GEAR TYPE
Ratios from 5:1 to 1080:1


[^0]:    * For switch capacities, see page 13

    For Cast Iron or Bronze Enclosure Contact Factory.

[^1]:    1 Includes half inch hub extension.

