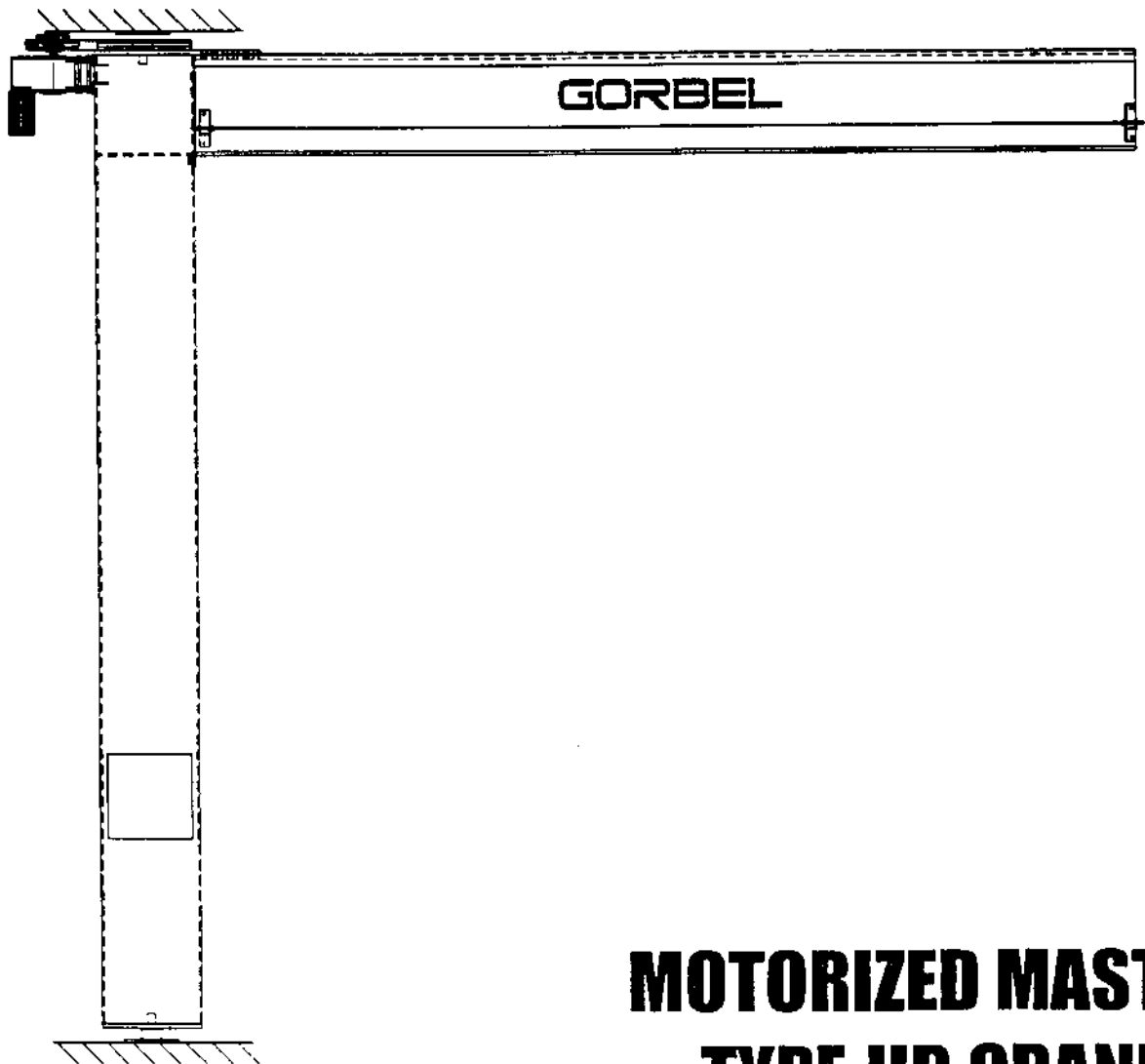


Installation, Operation, & Maintenance Manual



MOTORIZED MAST TYPE JIB CRANE

Gorbel Dealer _____

Gorbel Customer Order No. _____

Date _____
Month Year

TABLE OF CONTENTS

| | |
|--|-----|
| INSTALLATION INSTRUCTIONS..... | 2 |
| AUTOMATIC SAFETY CLUTCH OR TORQUE TAMEER INSTALLATION..... | 4 |
| SINGLE SPEED ACCELERATION CONTROL MODULE..... | 6 |
| LIMIT SWITCH INSTALLATION AND OPERATING INSTRUCTIONS (IF APPLICABLE)..... | 9 |
| START-UP INSTRUCTIONS..... | 10 |
| OPERATING INSTRUCTIONS..... | 11 |
| SHUT-DOWN INSTRUCTIONS..... | 12 |
| SAFETY WARNINGS AND PRECAUTIONS..... | 13 |
| TROUBLE SHOOTING..... | 14 |
| MAINTENANCE SCHEDULE..... | 16 |
| TAGLINE FESTOON SYSTEM (IF APPLICABLE)..... | TFS |
| SPECIFICATION SHEET..... | SS |
| GENERAL ARRANGEMENT..... | 17 |
| ELECTRICAL PRINT..... | 18 |
| PENDANT WIRING DIAGRAM (IF APPLICABLE)..... | PD |
| SPARE PARTS LIST..... | 19 |

INSTALLATION INSTRUCTIONS

(SEE FIGURE "A" FOR INSTALLATION PRINT)

- 1) Locate the top and bottom pivot bearing housing (1) in the desired location (mounting hardware by others). See the General Arrangement, Page 17, for mounting hole pattern. Make sure the pivot bearing assemblies are in line and plumb through pivot pin holes in the bearings. Note: purchaser is responsible for determination of structural adequacy of the overhead structure and the floor support.
- 2) Place the top and bottom assemblies on the top and bottom pivot pin of the mast (2). Be sure thrust washers (3) are in position. Take the entire mast assembly and raise it to the position where it is to be installed. Bolt the top pivot assembly to the overhead support and the bottom assembly to the bottom support.
- 3) Bolt the boom (4) to the mast (2) using mounting hardware (5) provided for the top of boom and (6) for back of boom.
- 4) Tighten all mounting hardware till the lock washer are flat.
- 5) See Page TFS for mounting of the tagline kit (7).

1. All drawings and the information contained on it are confidential and proprietary and any reproduction, distribution or disclosure of this drawing or information or any manufacturing of the products or parts depicted on it are expressly prohibited without the written consent of Ringfeder Corporation. All functional values, dimensions and technical data listed in our design proposals are based on proven methods of calculation, backed by our empirical values and experience. Adapt to original RINGFEDER products only.

When the torque is initially set, the friction clutch should be slipped several times at 50% maximum torque in order to establish a uniform surface on the friction linings. During normal running, an occasional adjustment to compensate for friction lining wear is necessary, depending on the frequency of overloads occurring.

Friction Clutches can be supplied with a pilot bore or finished bore. A tolerance of H8 per ANSI B4.1 (see table) and square keyway per ANSI B17.1 should be used.

The bronze bushing must be machined to fit the width of the driven component. If no width is given at time of order, the maximum length bushing "M" is provided. For any component shorter than width "G", machine bushing length $M = G \text{ actual} + 1 \frac{1}{2} \times H$. "H" is the friction lining thickness.

See catalog TL-1 for dimensions.

TORQUE ADJUSTMENT FOR FRICTION CLUTCH FC SIZES 40 TO 170

Proper torque setting is achieved when the adjusting nut (6) is turned clockwise until the mounted component will not slip under normal operating conditions. Using a face or hook wrench, the adjusting nut can be turned, applying increasing force on the friction linings holding the rotating component. After adjustment is made, tighten locking screw of adjusting nut to insure that it does not come loose.

The Friction Clutch consists of the following components:

- | | | |
|---------------------|--------------------|----------------------|
| 1) Hub | 2) Control Element | * 3) Friction Lining |
| * 4) Bronze Bushing | 5) Disc Spring | 6) Adjusting Nut |

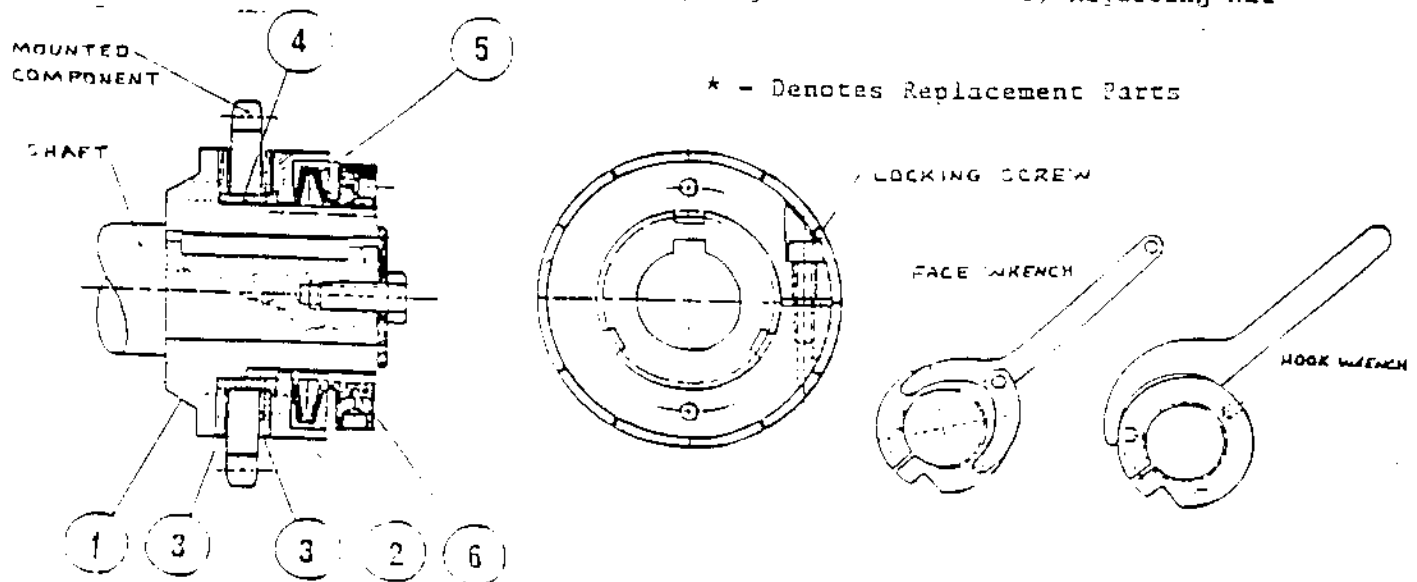


Fig. 1

Torque Adjustment for Friction Clutch FC Sizes 200, 240 and 300

Friction clutches are LBO and LRRR have a series of smaller disc springs mounted in set screws that are threaded into the adjusting nut. Setting is accomplished by turning the disc spring set screws flush with the adjusting nut, after determining the proper distance "X" for the slip torque desired. Dimension "X" is the distance the adjusting nut is from the control element, when the friction linings are new and the torque setting is proper for the application. Procedures for determining minimum and maximum torque settings are noted below. Settings in between are proportional to the distance the nut is set over the determined range. Note the final dimension "X" for future adjustment.

The Friction Clutch consists of the following components:

- | | | |
|-------------------|-----------------------------------|--------------------|
| 1) Hub | 2) Control Element | 3) Friction Lining |
| 4) Bronze Bushing | 5) Disc Spring Set Screw Assembly | 6) Adjusting Nut |

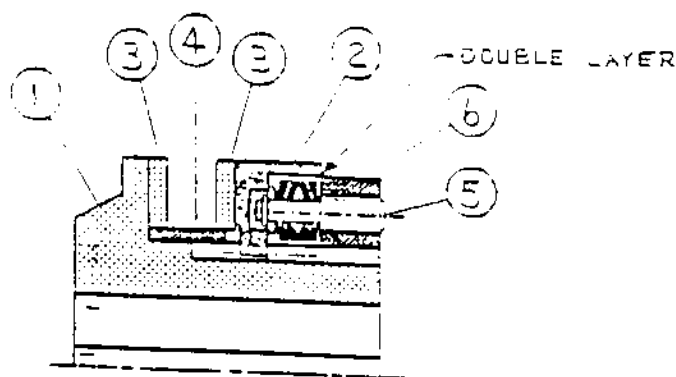
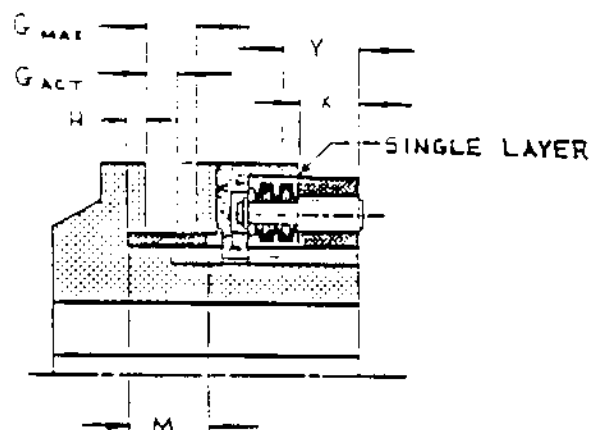


Fig. 1A



- 1) **Minimum Torque** - Turn all disc spring set screws counter clockwise until the cup spring stack touches the adjusting nut. Thread adjusting nut onto hub until nut is flush with hub end. If the component clamped between the friction linings is equal to "G Max", shown in the catalog, then this is the proper setting for minimum slip torque when all screws are set flush with the adjusting nut. Tighten screws incrementally and in a diametrical pattern. Measure the actual "X" dimension and maintain this distance as friction linings wear and torque drops off.

NOTE: If "G Actual" is not equal to "G Max", adjust bushing length "M" to $G_{Act} - (1\frac{1}{2} \times H)$, then the proper "X" dimension is $x = y - (G_{Max} - G_{Act})$ where y is the actual dimension from edge of control element to end of hub.

- 2) **Maximum Torque** - Turn adjusting nut down with screws backed off, as in step one, until the disc spring stacks touch the control element. Note dimension for future adjustment. When all screws are set flush with adjusting nut, the friction clutch will be at its maximum setting.

Bore tolerance H8

Table 1

| Bore range | | Tolerance H8 | |
|-------------------|---------------|--------------|-------|
| Inches over + .00 | mm over + .01 | in. (H8) | mm |
| 0.24 - 0.40 | 6 - 10 | + 0.0010 | + 25 |
| 0.40 - 0.71 | 10 - 18 | + 0.0015 | + 38 |
| 0.71 - 1.19 | 18 - 30 | + 0.0020 | + 50 |
| 1.19 - 1.97 | 30 - 50 | + 0.0030 | + 76 |
| 1.97 - 3.15 | 50 - 80 | + 0.0040 | + 101 |
| 3.15 - 4.73 | 80 - 120 | + 0.0050 | + 127 |
| 4.73 - 7.09 | 120 - 180 | + 0.0060 | + 152 |
| 7.09 - 9.85 | 180 - 250 | + 0.0070 | + 178 |

Permissible run-out

The maximum run-out of the friction surfaces in relation to the bore is given in the table below.

Table 2

| Clutch size | permissible run-out | |
|-------------------|---------------------|------|
| | in. | mm |
| 40 - 50 - 70 - 90 | 0.002 | 0.05 |
| 115 - 140 - 150 | 0.003 | 0.08 |
| 200 - 240 - 300 | 0.004 | 0.10 |

Mounting the hub on the shaft can be accomplished by means of a key and a setscrew arrangement or key and end plate as shown in figs. 2, 3 & 4.

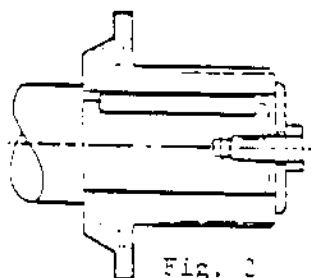


Fig. 2

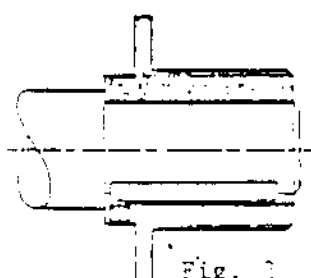


Fig. 3

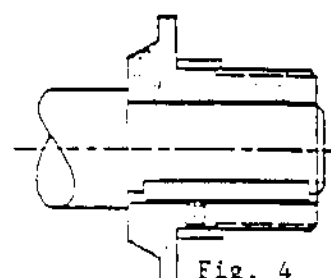


Fig. 4

Torque ranges for each clutch are selected by arranging the disc springs as shown.

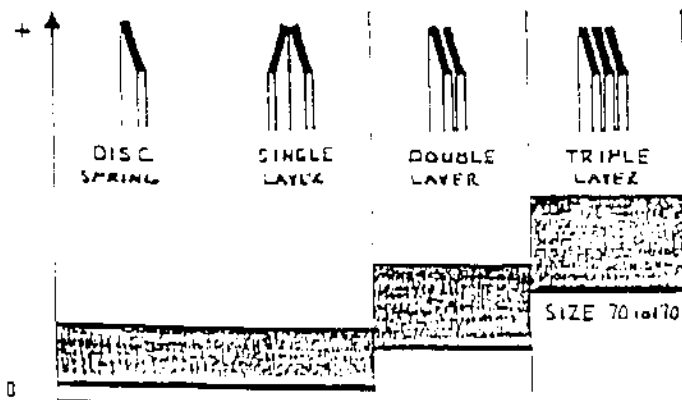


Fig. 5

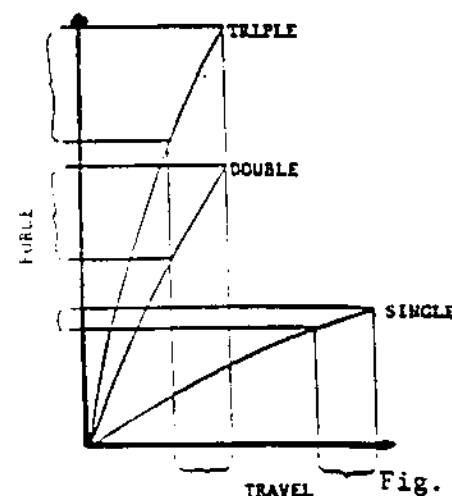


Fig. 6

Each of these arrangements provide a different spring force and corresponding torque range, as shown in the technical data for each device. The force reflection diagram illustrates the direct relationship of adjusting nut travel to transmissible torque. For size 300 and larger, the disc spring set screw assembly can be arranged in single and double layer configurations only.

RFC Torque Limiters offer a variety of combinations to meet your specific needs. Please contact us for more information on any of the products shown below.

FC Friction Torque Limiters, Type FC

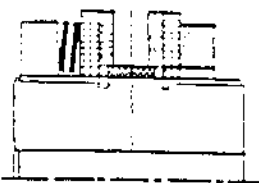


Fig. 1 Friction Clutch with axial adjustment FCC...AX

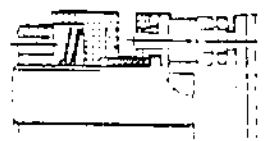


Fig. 2 Friction Clutch with overload signal FCC...OS

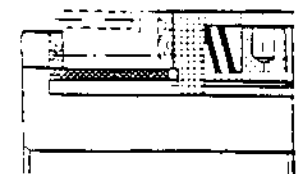


Fig. 3 Friction Clutch with reduced flange diameter FCC...RDW

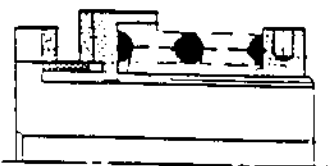


Fig. 4 Low Torque Friction Clutch FCC...LT

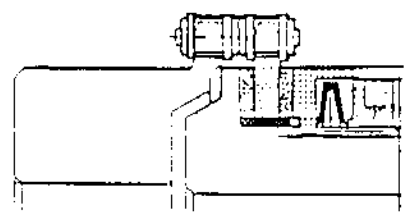


Fig. 5 Friction Clutch Chain Coupling FCC...CH

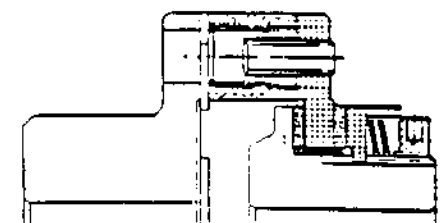
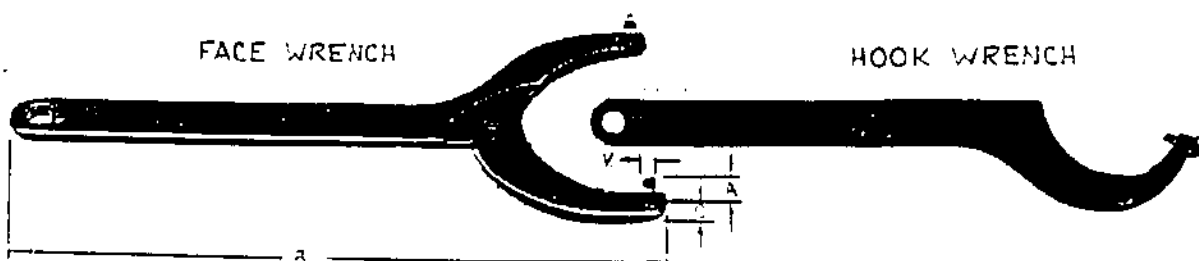


Fig. 6 Flexible Friction Clutch Coupling FCC...FL



NOTE: DIMENSIONS IN MILLIMETERS, WEIGHT IN GRAMS (g) 1000g = 2.2046 LBS
V = NOMINAL PIN DIAMETER - ADJUSTING NUT HOLE SIZE
D = DISTANCE BETWEEN HOLES IN FACE OF ADJUSTING NUT

| TORQUE LIMITER | | | FACE WRENCH | | | | | | | HOOK WRENCH | | | |
|----------------|------|---|-------------|----------|---------|-----|-----|----|-------|-------------|-----------|------|------|
| FC | BDRI | V | U | PART NO. | RANGE | A | B | C | WT g | PART NO. | DIA RANGE | WT g | |
| 40 | | | 27 | 41046 | 18-40 | 5 | 150 | 5 | 90 | 51854 | 35-60 | 175 | 100 |
| | 70 | 4 | 36 | | | | | | | | | | |
| 50 | | | 39 | | | | | | | | | | |
| 70 | 140 | | 51 | 41077 | 40-80 | 7 | 220 | 6 | 245 | 51888 | 60-90 | 250 | 280 |
| 90 | 110 | 6 | 68 | | | | | | | | | | |
| 115 | 130 | | 85 | 41087 | 80-125 | 7 | 320 | 8 | 670 | 51896 | 90-155 | 290 | 460 |
| 140 | 160 | 7 | 105 | 41095 | 80-125 | 7.5 | 320 | 8 | 670 | | | | |
| 170 | 200 | 8 | 125 | 41111 | 125-200 | 8 | 450 | 10 | 11750 | 51912 | 155-230 | 420 | 1200 |

In accordance with our established policy to constantly improve our products, the specifications contained herein are subject to change without notice.

Since our Engineers cannot be aware of all applications and control all the factors that may affect the function of our products, our warranty applies to Ringfeder products only.

RINGFEDER CORPORATION

5 Carver Avenue

P.O. Box 691

Westwood, NJ 07675

Tel (201) 666-3320 • FAX (201) 664-6053

Los Angeles Office: Tel (714) 581-3644 • FAX (714) 581-5956



RINGFEDER

SINGLE SPEED ACCELERATION CONTROL MODULE

THEORY OF OPERATIONS

The speed of a squirrel cage induction motor is proportional to the power line frequency, the number of poles, and the slip of the motor. Since the poles and line frequency are fixed, the only variable therefore, is slip. The slip of the motor is directly related to the energy (voltage in this case) applied at the input power terminals of the motor. The torque of the motor is proportional to the square of the voltage applied at the input. Therefore, by inserting solid state control rectifies (SCR'S) between the input voltage and the input motor power terminal and phase controlling the voltage to the SCR'S, the torque and speed of the motor can be varied.

Power Electronics (PEI) Acceleration Control Module provides an INITIAL TORQUE ADJUSTMENT for setting the initial voltage to the single speed winding and a TIME ADJUSTMENT which varies the rate of voltage applied to the winding.

Note, when setting an adjustment, it is not necessary to loosen the locknuts; just turn the set screw drive adjustment shaft to the desired position. Please adjust potentiometer gently - IT CAN BE BROKEN INTERNALLY WHEN FORCED PAST ITS "STOP".

ACCELERATION

The basic system TIME profile is set so that at a TIME ADJUSTMENT setting of maximum time, the control rectifiers will begin to pass full line voltage in approximately two (2) to six (6) seconds.

CONTACTOR ARC SUPPRESSION

The PEI SINGLE SPEED ACCELERATION CONTROL MODULE should be used with a three pole reversing contactor in a normal reversing configuration.

A THREE POLE CONTACTOR IS REQUIRED FOR THE FOLLOWING REASONS:

- a. The PEI system suppresses the arc on the "MAKE" and "BREAK" of the contactors by controlling the "ON" and "OFF" time of the control SCR'S in relation with the time period for the contactor coils to pull "IN" and drop "OUT".

- b. Since the heat sinks are directly attached to the control SCR'S (for efficient heat transfer). The heat sinks are at line potential when the contactor is energized. The three pole contactor isolates the three phase input power from the SCR'S when energized. This is assuring safe handling of the PEI control unit when off-line.

PRECISION SPOTTING AND INCHING

The PEI SINGLE SPEED UNIT is especially suitable for spotting and inching. In the event, for example, the bridge or trolley over shoots the increased in the reverse direction from a predetermined minimum to smoothly bring the bridge or trolley back point.

The system is designed to provide a constant initial torque to the motor during the first second after starting of reversing motor direction (set by the "INITIAL TORQUE ADJUSTMENT"). This enables the operator to "INCH" or precision spot a load by applying the initial torque for short periods of time.

CONTROL SIGNALS

Note, that in the PEI schematic drawings, inputs are connected from the FORWARD and REVERSE contactor coils to terminals "A" and "B" on the ACCELERATION CONTROL MODULE. These inputs are used only for sensing and do not drain any appreciable power: for 115 volt control signal only two milliamps are dissipated during sensing. The control inputs are required for the following purposes:

- a. To provide a turn "ON" signal for the SCR'S when the contactor coil is energized.
- b. To turn "OFF" signal for the SCR'S when a signal loss is detected across the contactor coil.

SETTING THE TIME AND INITIAL TORQUE ADJUSTMENTS

- a. Set the TIME ADJUSTMENT at the maximum point and the INITIAL TORQUE ADJUSTMENT at the minimum point. (This setting provides the softest start, but the initial torque may be too small to start the motor for the first few cycles.)

- b. Set the INITIAL TORQUE ADJUSTMENT first, usually one quarter ($1/4$) to three quarters ($3/4$) of a turn from the maximum point is adequate.
- c. Decrease the TIME ADJUSTMENT if under half the starting is too sort.

ROTARY LIMIT SWITCHES

SECTION
2000

check these advantages.....

worm gear type

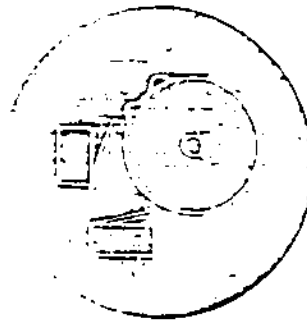
✓ exposed switches



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.

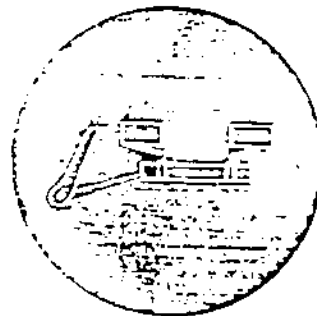
✓ cams & gears



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.

✓ linkages



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.

are actuated and the contacts change from the normally closed to open position and normally open to the closed position.

Adjustment

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

When the cam rotates, the switches "E" and "F"

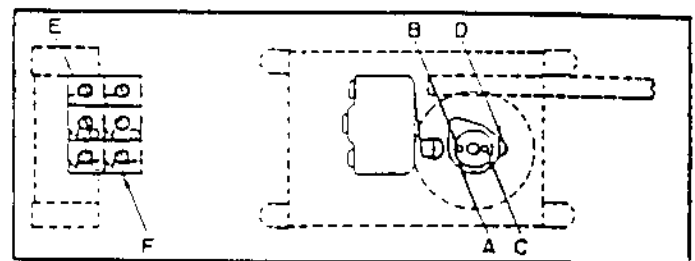


Figure 4 Diagram showing:

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



GEMCO ELECTRIC
a McGraw-Edison Company Division
1080 N. Central Expressway, Chicago, Ill.

DESCRIPTION SHEET

START-UP INSTRUCTIONS

Take normal safety precautions to assure the crane is safe to operate. These include, but are not limited to, checking for obstructions in crane swing, making sure all bolts are tight, lock washers, and trolley stops are in place. If crane is electrified, make sure electrification cannot be snagged or pinched.

Turn power on. Push the "START" or "STOP" button on the pendant. Try all of the buttons to assure that they are working properly and to see how each button functions.

OPERATING INSTRUCTIONS

Maneuver crane so the hoist is directly above the load. Attach the hoist to the load. Stand clear, proceed to lift slowly. (WARNING: LOAD WILL SWING WHEN LIFTED). Carefully maneuver the load to its designated area, watching for obstructions and interferences. Let the load down slowly. When the load is secured in its designated area, disconnect the hoist from the load.

Be sure your installers, maintenance personnel, and operators realize this jib CAN ONLY BE USED TO PICK UP A MAXIMUM OF ITS RATED CAPACITY.

After a few loads, the operator should check:

- a. All mounting hardware to make sure bolts are tight.
- b. The endstops and endstop hardware to be sure that endstops are fully engaging the trolley and that bolts are tight.
- c. All wires for free movement and that connections are tight. BE SURE POWER IS OFF WHEN CHECKING WIRES AND CONNECTIONS.

Safety is very important, the operator should have full concentration on the crane and its surroundings at all times.

SHUT-DOWN INSTRUCTIONS

Secure the beam in shut-down position or storage area. If crane is outdoor application and it has a tie down loop, secure tightly especially in high wind areas. Check crane, hoist, and hook storage positions to be sure there is no interference with other pieces of equipment that maybe operating in the area.

If crane is electrified, shut power off on pendant and disconnect switch. Make sure there are not any damaged wires and connections are tight.

SAFETY WARNINGS AND PRECAUTIONS

Safety is very important when operating a jib crane. There are many safety warnings and precautions the operator should be aware of:

- a. This jib can only be used to pick up a maximum of its rated capacity.
- b. The load will swing when lifted.
- c. When doing any electrical or checking wires and connections, make sure the power is off.
- d. When loading, pick load directly up. Crane should not be used to pick a load up diagonally or out of the range of the span.
- e. On all baseplate mounted cranes, periodically check anchor bolts to make sure they are tight.
- f. Watch for wet spots: oil, water, etc. where the operator may slip.
- g. Make sure endstops are fully engaging the trolley and the endstop hardware is tight.

OTORIZED IS A NAME TROUBLE SHOOTING GUIDE

| PROBLEM | CHECK | YES | NO** |
|--|---|-----------|---|
| JIB DOES NOT ROTATE | 1. IS AC CONTACTOR COIL PULLING IN WHEN "ON" IS PRESSED AND DOES IT STAY IN ? | SEE NO. 2 | CHECK FUSES IN JIB PANEL. CHECK PENDENT WIRING. CHECK CONTROL TRANSFORMER FUSE. |
| | 2. ARE REVERSING STARTER COILS PULLING IN WHEN. "CW" OR "CCW" BUTTONS ARE PRESSED ? | SEE NO. 3 | CHECK PENDENT WIRING. |
| | 3. IS MOTOR SHAFT TURNING ? (WITH TEFC MOTORS. IF FAN IS BLOWING AIR MOTOR SHAFT IS TURNING.) | SEE NO. 4 | CHECK MOTOR LEADS TO BE SURE THEY ARE SECURE. CHECK THERMAL OVER LOADS ON REV. STARTER. |
| | 4. DOES DRIVE SHAFT OF CHAIN DRIVE. OR OUT PUT SHAFT OF DRIVE REDUCER TURN ? | SEE NO. 5 | TIGHTEN CLUTCH. SEE INSTRUCTIONS IN MAINTENANCE MANUAL. |
| | 5. ARE TRUNNION ROLLERS TURNING ? | SEE NO. 6 | TIGHTEN CLUTCH. SEE INSTRUCTIONS IN MAINTENANCE MANUAL. |
| | 6. CALL FACTORY 1-800-821-0086 ASK FOR ENGINEERING. OR CUSTOMER SERVICE. | | |
| JIB ROTATES IN ONE DIRECTION ONLY | 1. ARE REVERSING STARTER COILS PULLING IN WHEN. "CW" OR | SEE NO. 2 | CHECK PENDENT WIRING. |

{ NOT
APPLICABLE }

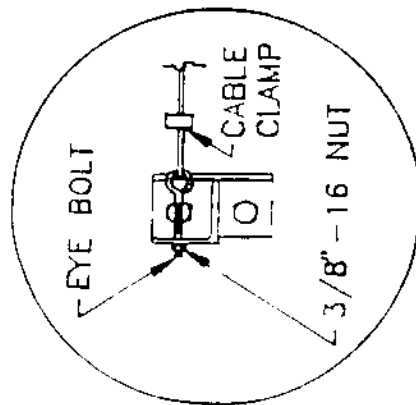
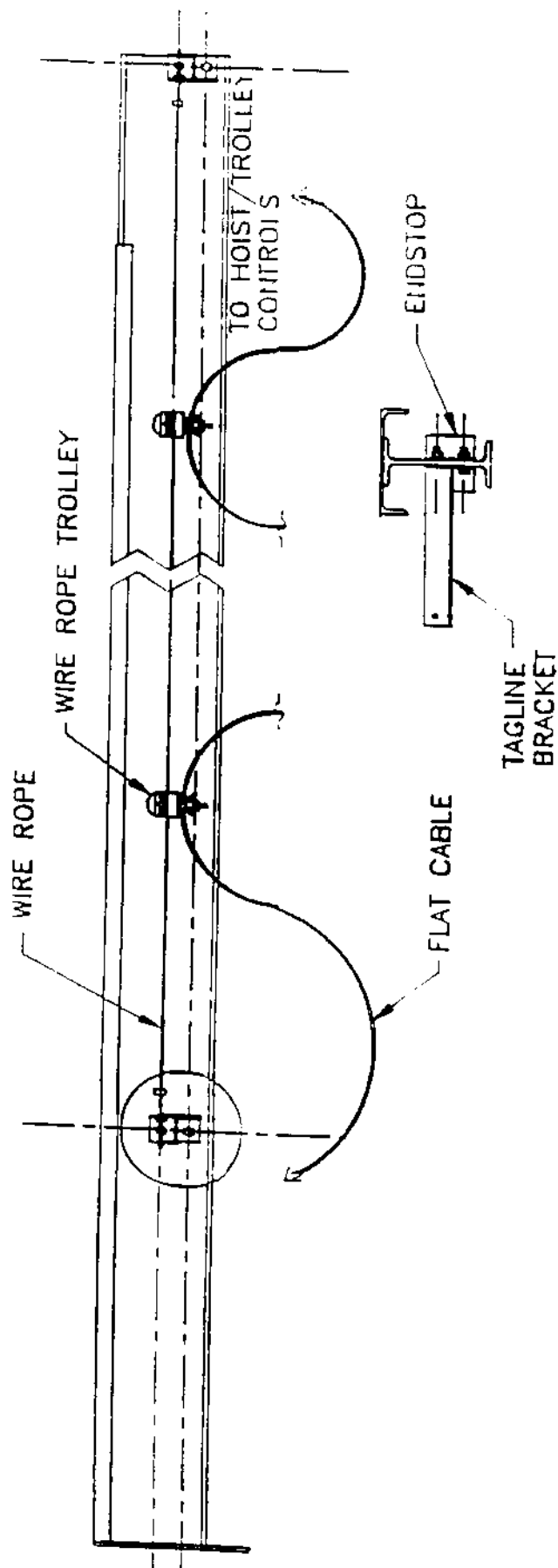
- IF YOU ARE EXPERIENCING ANY OTHER PROBLEMS IN THE START-UP
OR OPERATION OF YOUR GORBEL CRANE PLEASE CALL 1-800-821-0086
• AND ASK FOR ENGINEERING OR CUSTOMER SERVICE.

MAINTENANCE SCHEDULELUBRICATION SCHEDULE

| <u>COMPONENT</u> | <u>LUBRICANT</u> | <u>FREQUENCY</u> |
|--------------------------------|---|---|
| DRIVE CHAIN | KENDALL SR-12X OPEN GEAR DIPPER STICK & WIRE ROPE LUBRICANT | MONTHLY |
| TOP & Bottom Pivot BEARINGS | HI-PRESSURE BEARING GREASE LUBRIPLATE NO. 630-2 MULTI-PURPOSE GREASE | MONTHLY |
| WORM GEAR REDUCER | AGMA STANDARD #8 COMPOUND <u>DIFFERENT MANUFACTURER'S</u> CITY SERVICE CO.-CITGO OIL 680-7 CHEVRON-NL GEAR COMP. 680 SUN OIL CORP.-SUNEP 1150 TEXACO INC.-HONOR CYL. OIL 680 GULF OIL CORP.-TRANSGEAR EP680 SHELL OIL CORP.-OMALA 680 FRISKE BROTHERS REFINING-CP GEAR OIL #8 KEYSTONE DIVISION-K-600 MOBIL OIL CORP.-MOBIL 600W SUPER AMERICAN LUBE INC. AGMA #8 GEAR OIL | <u>1ST LUBE</u> AFTER 250 HOURS OF OPERATION <u>REGULARLY</u> 3 MONTHS |

ABOVE IS THE SUGGESTED SCHEDULE. BE SURE TO ALWAYS USE
GOOD GRADE LUBRICANTS. FOR HOIST AND TROLLEY MAINTENANCE
CONSULT MANUFACTURER'S MAINTENANCE INSTRUCTIONS AND
LUBRICATION SCHEDULE.

TAGLINE FESTOON ASS'Y



1. ATTACH TAGLINE ANGLES TO BOOM.
2. INSERT $3/8"$ x $4"$ LG. EYEBOLTS THRU ANGLE.
3. RUN CABLE BETWEEN EYEBOLTS AND CLAMP TO FORM A LOOP AT EACH END.
4. TIGHTEN EYEBOLTS TO DESIRED CABLE TENSION.
5. RUN FESTOON CABLE THROUGH WIRE ROPE TROLLEYS AND TIGHTEN DOWN.

NOTE: DO NOT SCALE
FROM THIS DRAWING.