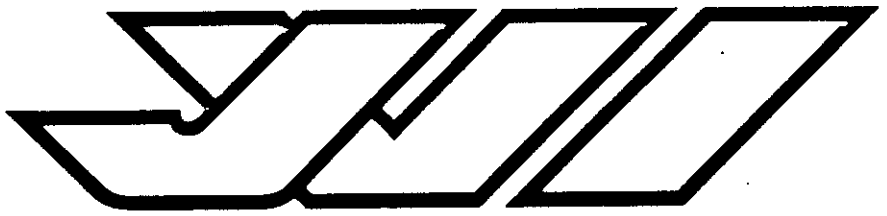
MFG: JVI INDUSTRIES
NAME: MONSTER

Monster

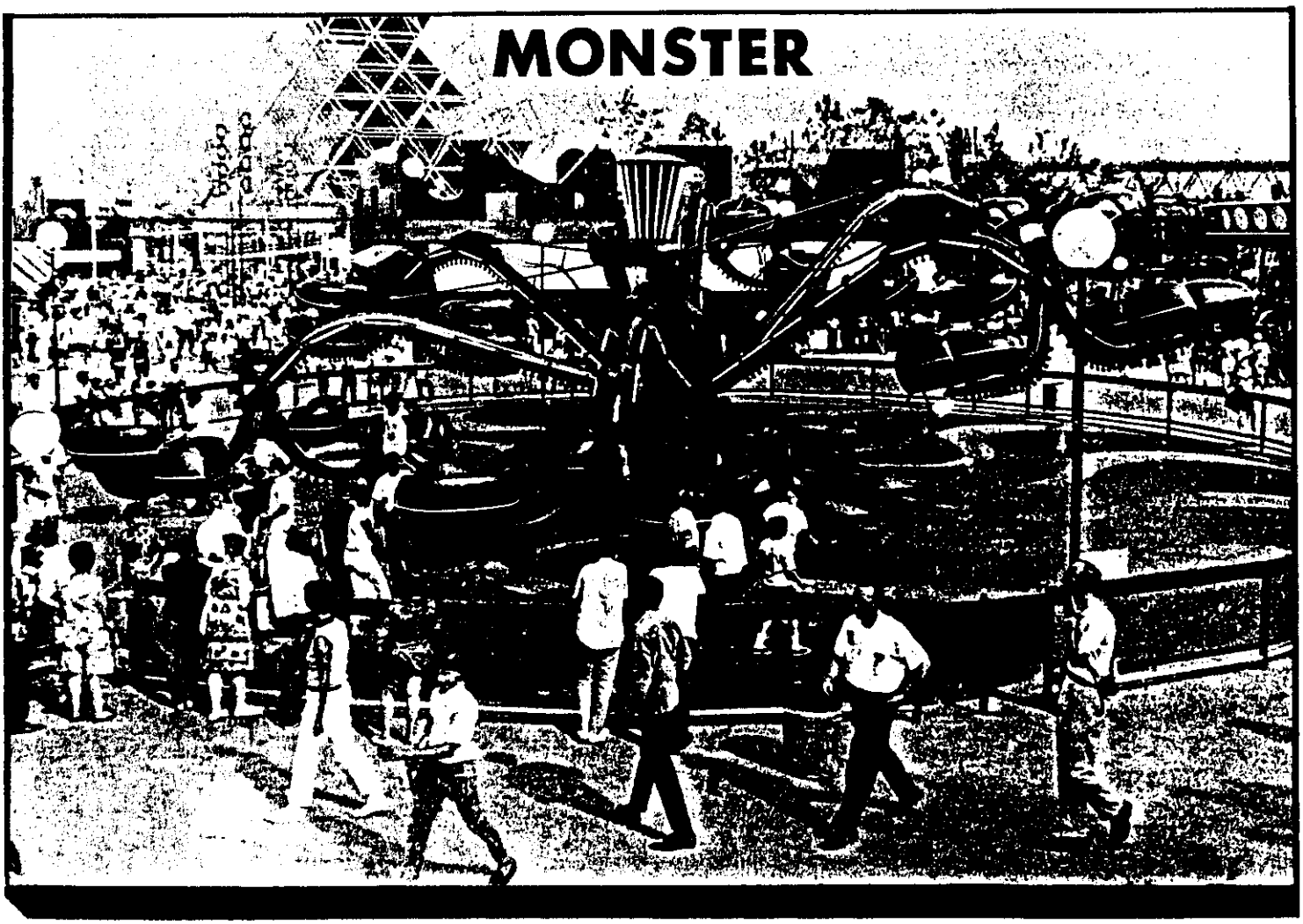


JV INDUSTRIES, INC.

P.O. BOX 13399 SALEM, OR 97309-1399

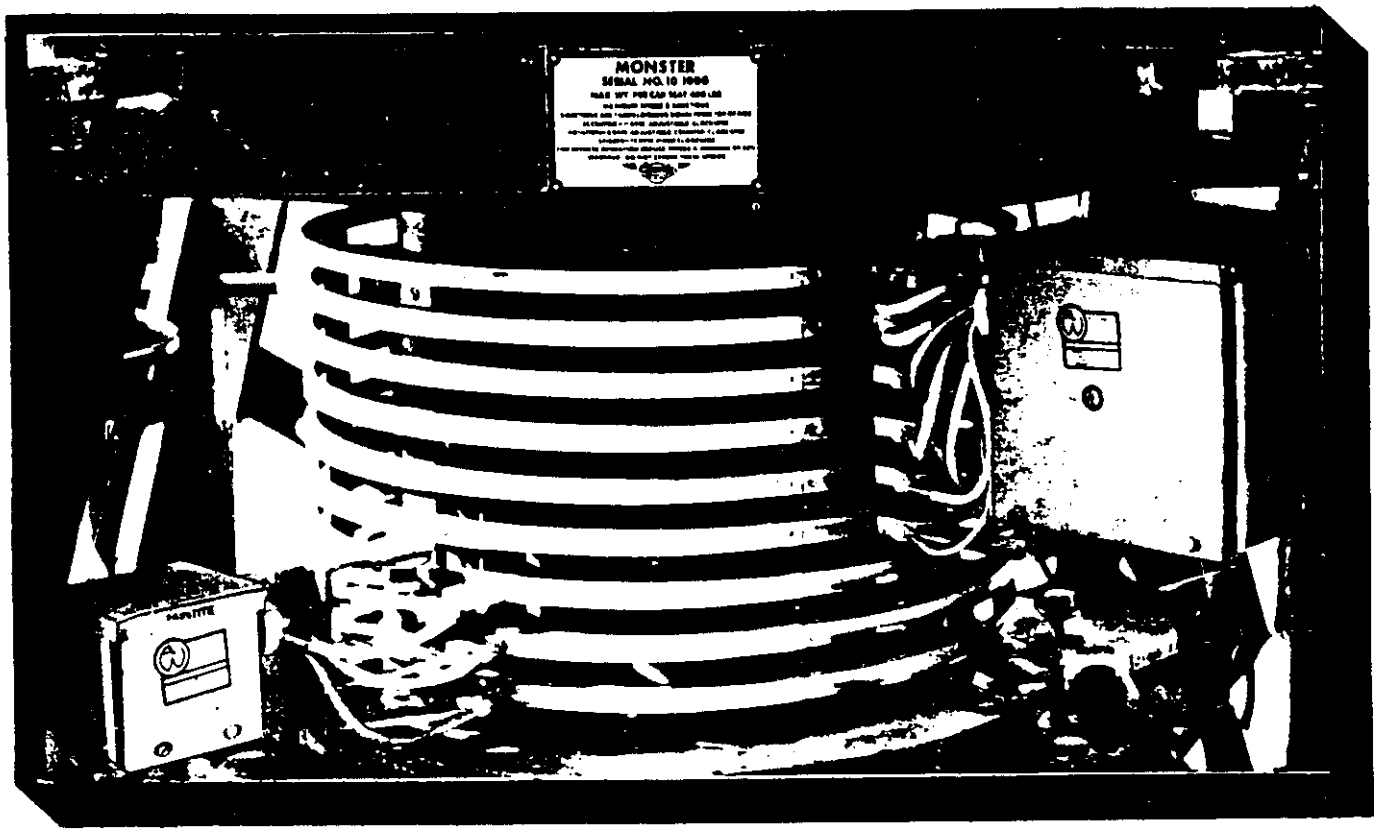
(503) 399-0817

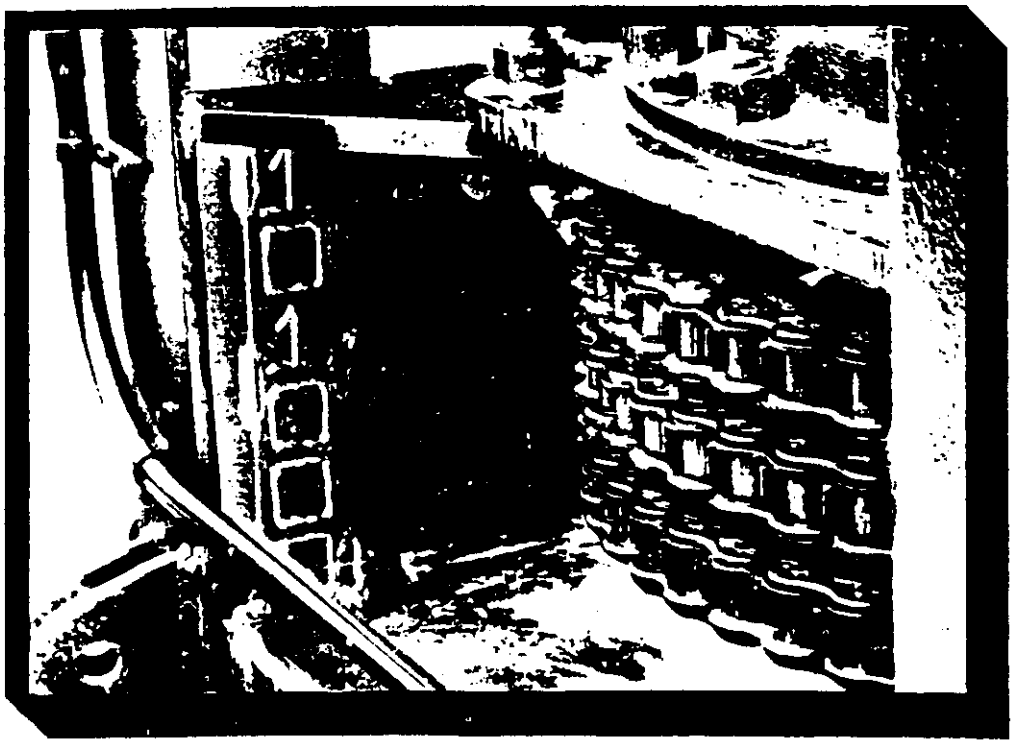
■ FABRICATORS OF STEEL AND FIBERGLASS PRODUCTS ■
■ MANUFACTURER OF AMUSEMENT DEVICES ■


MONSTER

LOCATION OF MONSTER SERIAL NUMBERS

NOTE:
WHEN ORDERING PARTS PLEASE GIVE SERIAL NUMBER OF YOUR MACHINE ALONG WITH THE PART NUMBERS FROM THIS CATALOG.



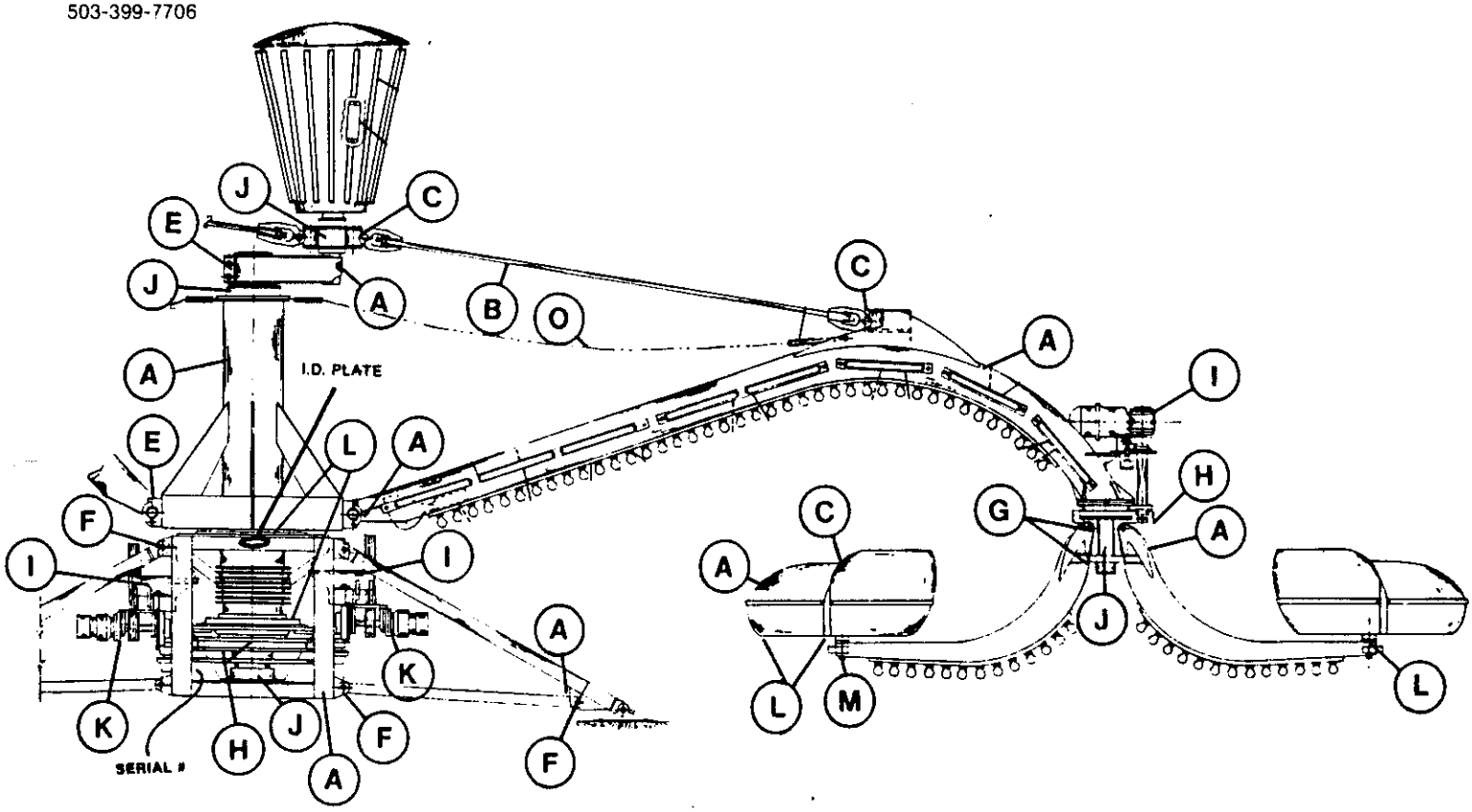


THE NAME PLATE, SPECIFYING THE SERIAL NUMBER, CAPACITY AND SPEEDS OF THE RIDE, IS LOCATED ON THE UPPER FRONT CAGE CHANNEL FACING THE OPERATOR. THE SERIAL NUMBER IS ALSO WELDED ON THE RIGHT HAND SURFACE OF THE LEFT HAND CORNER POST OF THE CAGE.

THE MONSTER

INSPECTION CHECK LIST

SALES & SERVICE
Toll Free outside Oregon
(800) 547-9156
Eyerly Inc.
P.O. Box 12155
2050 Turner Rd. S.E.
Salem, Oregon 97309
503-399-7706



A. Inspect for weld cracks and structural damage

B. Check support rods for equal tension. If bent replace. Inspect threads for cracks, check thrust washer for wear.

C. Inspect swivel block needle bearings yearly, check for worn thrust washers, check attaching pin and nuts for tightness. Check for proper lubrication.

D. Check safety cable for condition, broken strand, corrosion and adjustments. Cable should not bear weight of sweep when extended. Attaching points should move freely. Cable should be replaced if sweep is dropped.

E. Check bolts for condition and correct tightness. Bolt should be replaced if torqued to max. after removal. Inspect condition of pillow block - hinge pin, if damaged or loose - replace.

F. Check condition of attaching pins & fastener. Pin should be cotter keyed and not hair pinned. Inspect for hole enlargement and repair if needed.

G. Inspect for loose bolts. If bolts are torqued to max. Bolt should be replaced after removal. Inspect safety pin for fastener. Fastener may be hair pin or cotter key.

H. Check for loose or worm chain; repair or replace. Make sure chain does not rub guards, adj. as needed. Check all sprocket fasteners or securing members.

I. Check oil level in gear housing, change yearly. Inspect oil level of fluid clutch and torque arm snubber in spider gear drive.

J. Check all rotating hubs for play and rough bearing. Repair as necessary.

K. Check all hyd. attaching pins & bolt for wear or looseness. Replace or tighten as needed. Inspect drive belts for wear, cracks or looseness. Repair as necessary.

L. Check for wear in bushings, joints, hinges and linkage.

M. Inspect spindle for wear and fastener for condition.

N. General Information:

400 lbs. per car.

Rotation 8 RPM ccw — Eccentric 11 RPM cw

Spiders 15 RPM cw

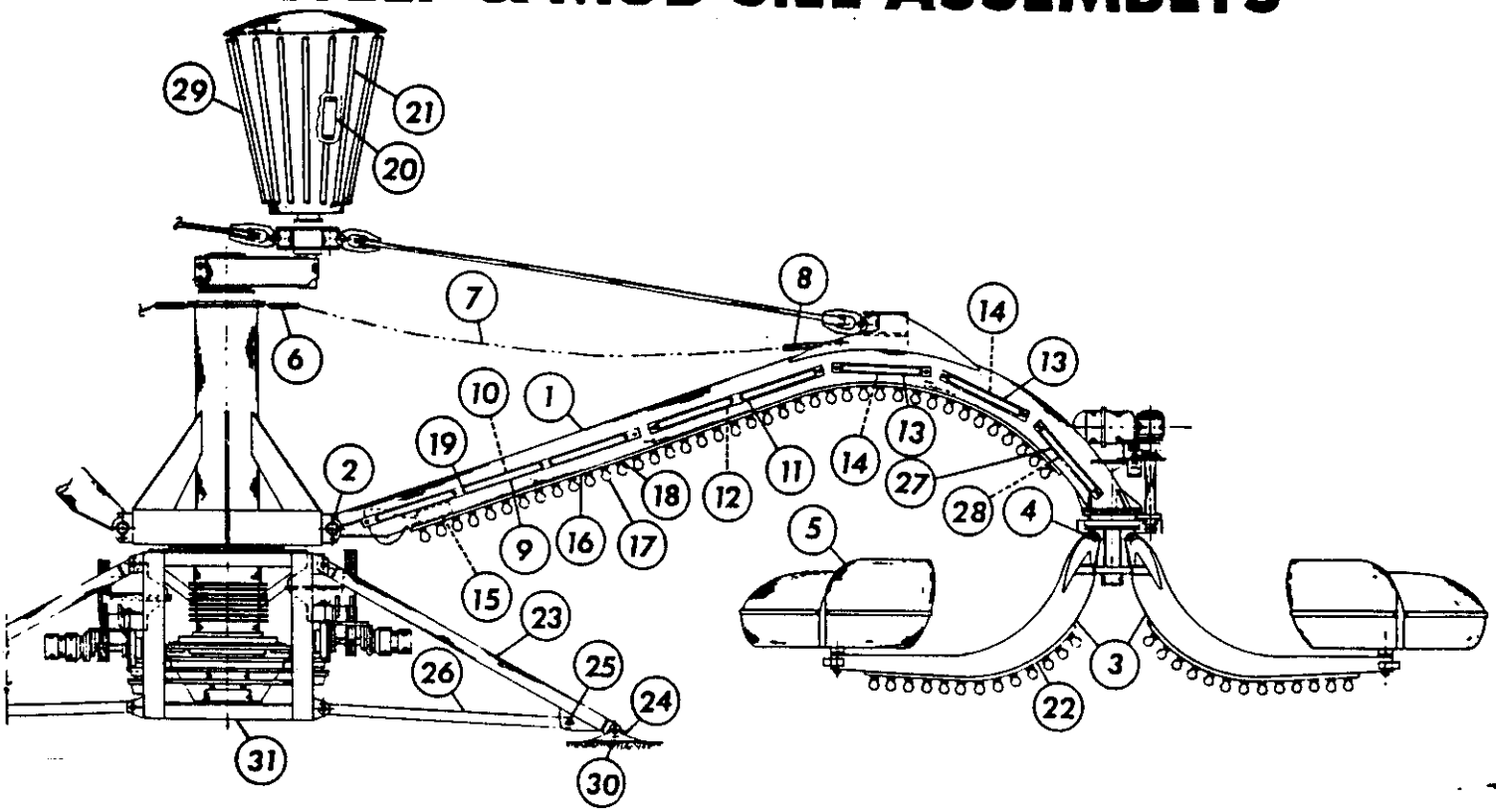
Do not operate over 50% of recommended RPM in reverse.

Note: (1) The monster requires a routine checking for loosening bolts. We recommend every 30 days of operation.

(2) Many causes of mechanical repair have resulted from failure to follow the recommended lubrication frequency or failure to follow the lubrication chart. We cannot overstress the importance of following the factory lubrication instructions.

JANUARY 1978 PRINTED IN U.S.A.

SWEEP & MUD SILL ASSEMBLYS

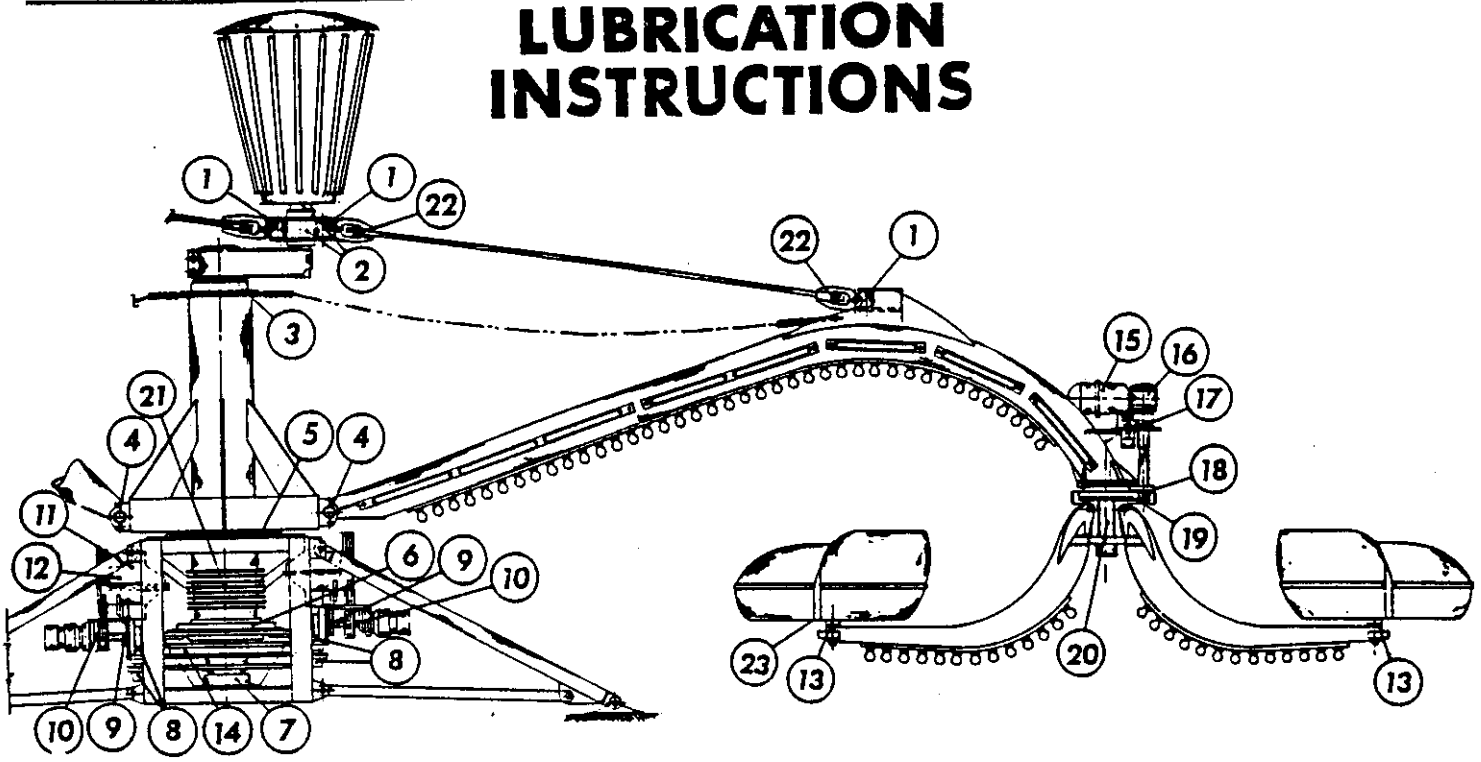


REF NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-390	SWEEP	1
2	O-151	PILLOW BLOCK BUSHING	2
3	P-284	STUB ARM	4
4	P-394	STUB ARM BOLT ASSEMBLY	4
5	P-395	CAR ASSEMBLY	4
6	P-391	SAFETY CABLE FITTING (Inner)	1
7	P-392	SAFETY CABLE	1
8	P-393	SAFETY CABLE FITTING (Outer)	1
9	EP-1	FLUORESCENT FIXTURE (L.H.)	1
10	EP-2	FLUORESCENT FIXTURE (R.H.)	1
11	EP-3	FLUORESCENT FIXTURE (L.H.)	1
12	EP-4	FLUORESCENT FIXTURE (R.H.)	1
	EP-5	FLUORESCENT FIXTURE (L.H.)	1
14	EP-6	FLUORESCENT FIXTURE (R.H.)	1
15	E-245	SWEEP JUNCTION BOX	1

REF NO.	PART NO.	NAME OF PART	NO. REQ.
16	E-246	INCANDESCENT LIGHT STRINGER	1
17	E-240	INCANDESCENT LAMP	92
18	E-189	INCANDESCENT LAMP SOCKET	92
19	E-1G	FLUORESCENT LAMP	16
20	E-242	FLUORESCENT BALLAST	8
21	E-243	FLUORESCENT LAMP	16
22	E-247	INCANDESCENT LIGHT STRINGER	4
23	P-188	MUD SILL	1
24	P-227	MUD SILL FOOT	2
25	O-25	TAPER PIN	8
26	P-187	MUD SILL TIE ROD	2
27	EP-7	FLUORESCENT FIXTURE (L.H.)	1
28	EP-8	FLUORESCENT FIXTURE (R.H.)	1
29	E-244	CENTER ORNAMENT ASSEMBLY	1
30	P-450	RUBBER SHOCK PADS	8
31	P-482	CAGE ASSEMBLY	1

NOTE:
The No. Req. Column indicates the number required for one Sweep Assembly and one Mud Sill Assembly.

LUBRICATION INSTRUCTIONS



LUBRICATION INTERVAL: THE ABOVE TABLE OF LUBRICATION INTERVALS REFER TO AVERAGE OPERATING CONDITIONS WITH GREASE SEALS INTACT.

NO.	DESCRIPTION OF PART	BEARING TYPE	•
1	SWIVEL BLOCKS	ANTI-FRICTION	(A)
2	ECCENTRIC HUB	ANTI-FRICTION	(B)
3	ECCENTRIC TUBE UPPER BEARING	ANTI-FRICTION	(B)
4	HINGE PIN BUSHING	BRONZE	(A)
5	HINGE COLUMN UPPER BUCHING	BRONZE	(A)
6	HINGE COLUMN LOWER BUSHING	BRONZE	(A)
7	ECCENTRIC TUBE LOWER BEARING	ANTI-FRICTION	(B)
8	DRIVE SHAFT BEARINGS	ANTI-FRICTION	(C)
9	HYDRAULIC DRIVE INNER BEARING	ANTI-FRICTION	(C)
10	HYDRAULIC DRIVE OUTER BEARING	ANTI-FRICTION	(B)

NO.	DESCRIPTION OF PART	BEARING TYPE	•
11	GEAR CASE UPPER BEARING	ANTI-FRICTION	(A)
12	GEAR CASE	ANTI-FRICTION	(D)
13	CAR SPINDLE BUSHINGS	NYLON OR BRONZE	(A)
14	MAIN DRIVE CHAINS		(G)
15	HYDRO SHEAVE		(F)
16	SPIDER MOTOR GEAR BOX	ANTI-FRICTION	(H)
17	DRIVE SHAFT UPPER BEARING	ANTI-FRICTION	(C)
18	DRIVE SHAFT LOWER BEARING	ANTI-FRICTION	(B)
19	SPIDER DRIVE CHAINS		(G)
20	SPIDER HUB ASSEMBLY	ANTI-FRICTION	(B)

(A) DAILY OR EVERY EIGHT HOURS DURING HEAVY OPERATIONS:**

(B) LIGHTLY EVERY TWO WEEKS:**

(C) EVERY THREE MONTHS:**

(D) CHECK EVERY MONTH, CHANGE EVERY YEAR. USE E.P. 90

(E) KEEP ALL MOVING PARTS OF THE CARS AND SUPPORT RODS OILED DAILY.

(F) CHANGE OIL IN HYDRO-SHEAVE EVERY 4000 HOURS OR ONCE A YEAR. USE 10W ABOVE 10 DEGREE F. & 5W BELOW 10 DEGREE F. OIL IS TO BE HEAVY DUTY RO MEET A. P. I. SPECIFICATIONS CLASS M. S.

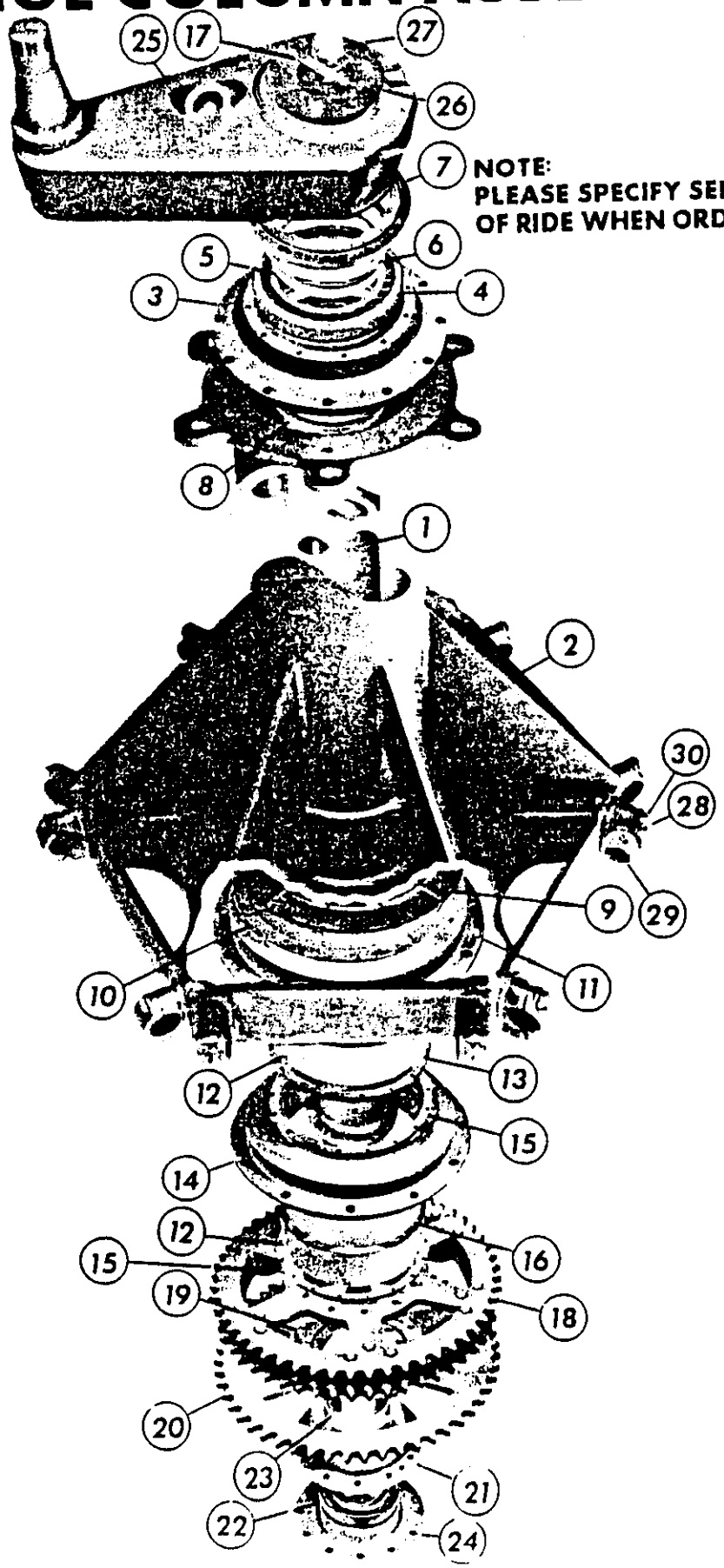
(G) LUBRICATE DRIVE CHAINS EVERY TWO WEEKS WITH AN APPROVED LUBRICANT SUCH AS CHEVRON PINION GREASE M. S., ROTANIUM POWER-LUBE NO. 91665 OR EQUIVALENT.

(H) USE A COMPOUNDED GEAR LUBE WITH AN E. P. ADDATIVE TO COMPLY WITH AGMA-7 E. P. OR AGMA-8 E. P. SPECIFICATION.

NOTES:
** USE A MULTI-PURPOSE WATER RESISTANT GREASE WITH AN ACCEPTED EXTREME PRESSURE ADDATIVE SUCH AS CHEVRON R. P. M. MOLYGREASE NO. 1 OR MOBIL GREASE SPECIAL IN ALL PRESSURE FITTINGS.

KEEP LIGHT RINGS CLEAN AND FREE OF CONTAMINANTS SUCH AS GREASE, OIL ETC.

HINGE COLUMN ASSEMBLY



NOTE:
PLEASE SPECIFY SERIAL NUMBER OF RIDE WHEN ORDERING PARTS

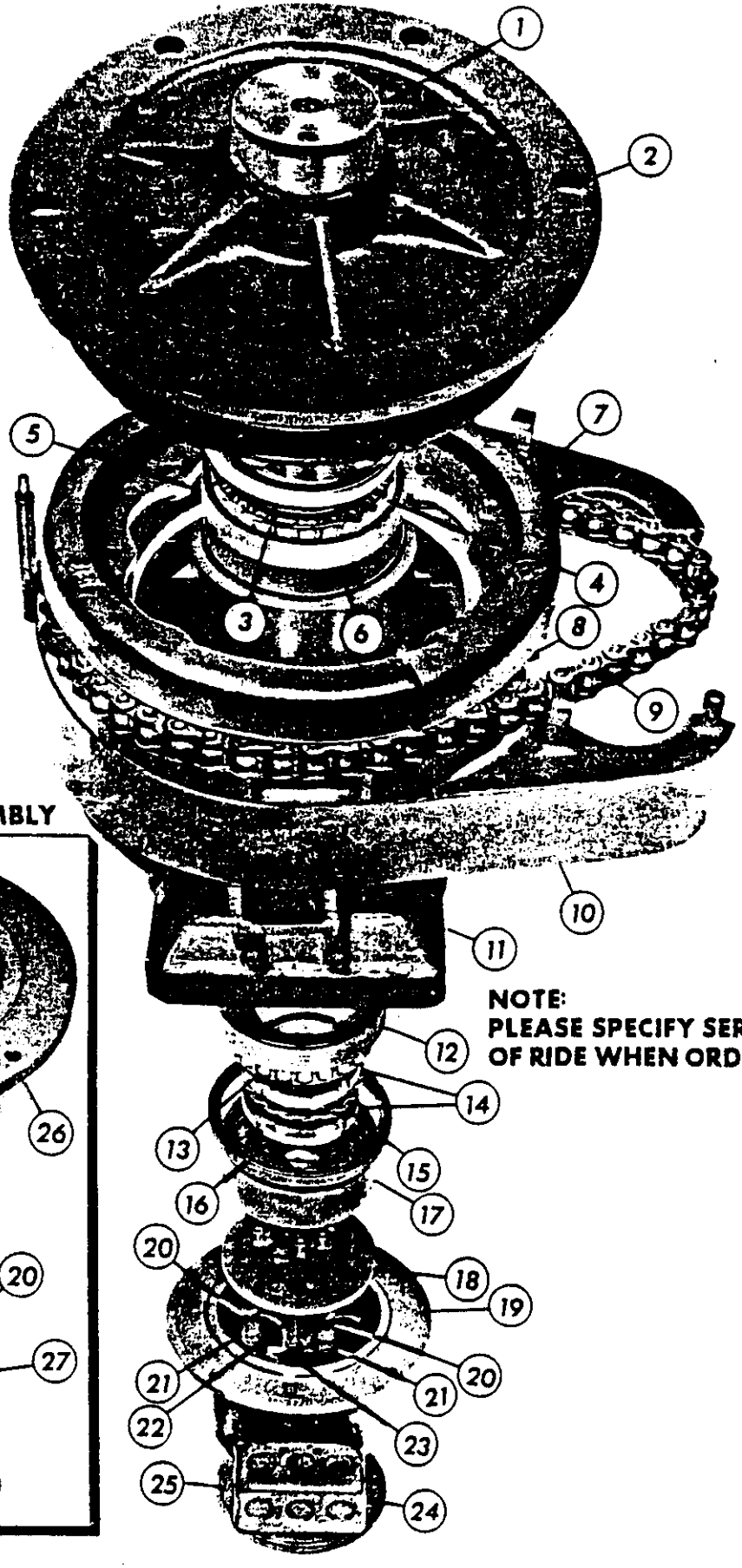
HINGE COLUMN ASSEMBLY

REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-254	ECCENTRIC SHAFT	1
2	P-258	HINGE COLUMN	1
3	P-142	UPPER BEARING HOUSING	1
4	P-256	UPPER BEARING	1
5	P-132	UPPER BEARING THRUST RING	1
6	P-255	UPPER BEARING TOP SEAL	1
7	P-157	UPPER BEARING RETAINER	1
8	P-257	UPPER BEARING LOWER SEAL	1
9	P-226	COLUMN BEARING RING	1
10	P-8	COLUMN THRUST RING	1
11	P-6	UPPER COLUMN SUPPORT	1
12	P-7	COLUMN BUSHING	2
13	P-195	SEAL RING	1
14	P-242	LOWER COLUMN SUPPORT	1
15	P-232	LOWER SEAL RING	2
16	P-234	LOWER BEARING BAND	1
17	P-426	ECCENTRIC CRANK RETAINING BOLT WASHER	1
18	P-263	DRIVEN SPROCKET (Rotation)	1
19	P-233	LOWER SPROCKET RING	1
20	P-264	DRIVEN SPROCKET (Eccentric)	1
21	P-143	LOWER BEARING HOUSING	1
22	P-266	LOWER BEARING	1
23	W-88	LOWER BEARING GREASE SEAL	1
24	P-231	LOWER BEARING RETAINING PLATE	1

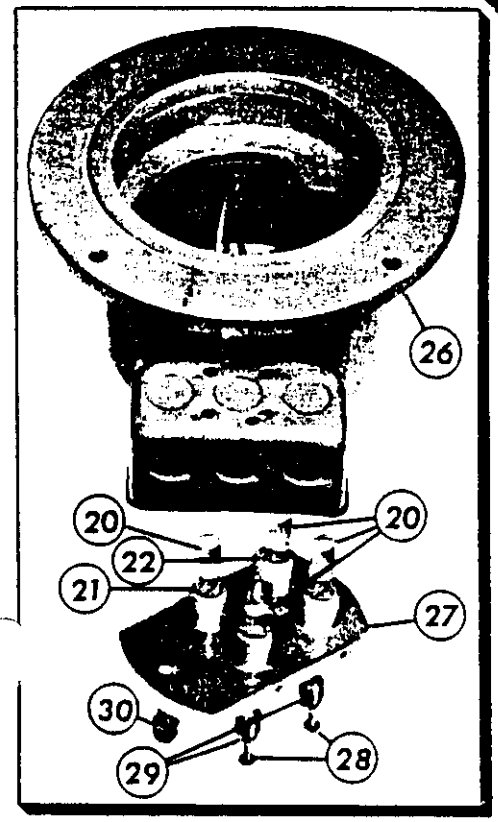
REF. NO.	PART NO.	NAME OF PART	NO. REQ.
25	P-251	ECCENTRIC CRANK	1
26	P-112	ECCENTRIC CRANK RETAINER	1
27	P-253	ECCENTRIC CRANK RETAINING BOLT	1
28	O-31	HINGED PILLOW BLOCK	12
29	O-151	HINGED PILLOW BLOCK BUSHING	12
30	O-32	HINGED PILLOW BLOCK BOLT ASSY.	12
*	O-275	ZERK FITTING	24
*	P-260	UPPER COLUMN SUPPORT PACKING (5/8" X 5/8" X 64")	1
*	P-261	LOWER COLUMN SUPPORT PACKING (3/8" X 3/8" X 64")	2
*	P-252	ECCENTRIC CRANK KEY	1
*	P-417	UPPER BEARING RETAINER BOLT ASSEMBLY (1/2" X 1-1/2" N. C.)	12
*	P-418	UPPER BEARING HOUSING BOLT ASSEMBLY (3/4" X 3-1/4" N. F.)	12
*	P-419	COLUMN BEARING RING BOLT ASSEMBLY (1/2" X 2-1/4" N. F.)	6
*	P-420	UPPER & LOWER COLUMN SUPPORT BOLT ASSEMBLY (1-1/4" X 3-1/4" N. F.)	24
*	P-421	SEAL RING BOLT ASSEMBLY (3/8" X 1-1/4" N. C.)	54
*	P-422	ROTATION DRIVEN SPROCKET BOLT ASSEMBLY (3/4" X 4" N. F.)	12
*	P-423	LOWER SPROCKET RING BOLT ASSEMBLY (7/8" X 3" N. F.)	12
*	P-424	ECCENTRIC DRIVEN SPROCKET BOLT ASSEMBLY (3/4" X 3" N. F.)	12
*	P-425	LOWER BEARING HOUSING BOLT ASSEMBLY (7/8" X 3-1/4" N. F.)	12

* Not Illustrated.

CROSS ARM HUB ASSEMBLY



DUAL BRUSH ASSEMBLY



NOTE:
PLEASE SPECIFY SERIAL NUMBER OF RIDE WHEN ORDERING PARTS

CROSS ARM HUB ASSEMBLY

REF. NO.	PART NO.	NAME OF PART.	NO. REQ.
1	P-17	CROSS ARM SPINDLE	1
2	P-18	CROSS ARM SPINDLE SUPPORT	1
3	P-279	GREASE SEAL	1
4	O-380B	TAPER ROLLER BEARING CONE	1
5	O-380A	TAPER ROLLER BEARING CUP	1
6	P-159	CROSS ARM GREASE PLATE	1
7	P-12	SAFETY RING (Two Halves)	1
8	P-282	DRIVEN SPROCKET	1
9	P-414	ROLLER CHAIN	1
10	P-428	CHAIN GUARD	1
11	P-499	CROSS ARM HUB	1
12	P-245	TAPER ROLLER BEARING CUP	1
13	P-246	TAPER ROLLER BEARING CONE	1
	W-84	BEARING LOCK NUT	2
15	W-85	BEARING LOCKWASHER	1
16	P-285	GREASE SEAL	1
17	P-160	CROSS ARM SEAL RING	1
18	P-229	SLIP RING ASSEMBLY	1
19	P-286	CROSS ARM HUB CAP	1
20	E-260	CARBON BRUSH (Large)	4
21	E-261	CARBON BRUSH HOLDER (Large)	4
22	E-262	CARBON BRUSH (Small)	1
23	E-263	CARBON BRUSH HOLDER (Small)	1
24	E-192	MAKE-UP BOX ASSEMBLY	2

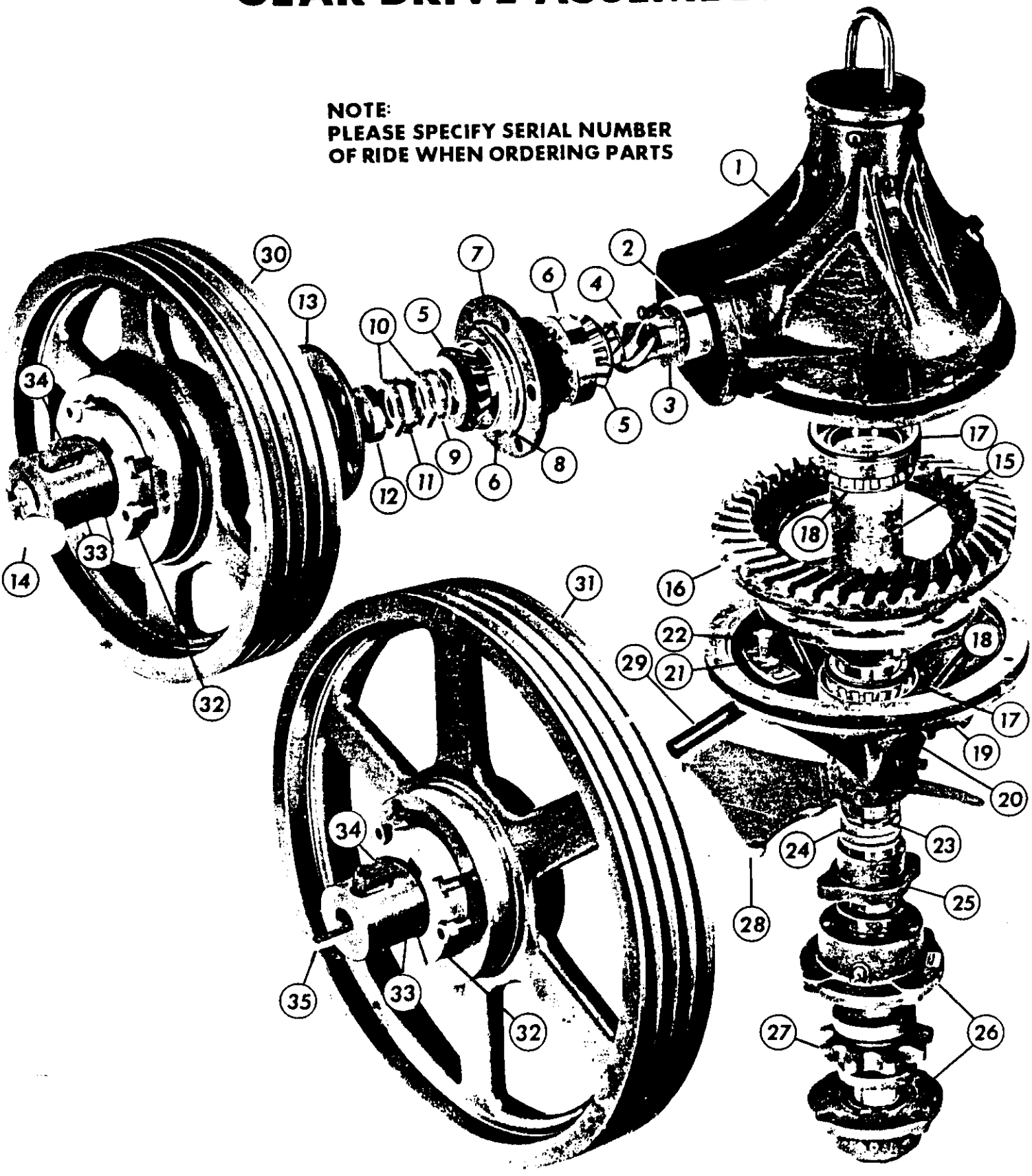
NOTE:
The Number in the No. Req. Column Indicates the Number Required for One Sweep.

REF. NO.	PART NO.	NAME OF PART	NO. REQ.
25	P-294	CROSS ARM HUB CAP COVER	1
26	P-470	CROSS ARM HUB CAP (Dual Brush)	1
27	P-469	CROSS ARM BRUSH HOLDER PLATE	1
28	E-260A	BRUSH TERMINAL MACHINE SCREW (10/32 X 5/8")	4
29	E-260B	BRUSH TERMINAL PIPE PLUG (3/8")	4
30	P-469A	BRUSH HOLDER CAP SCREW & LOCKWASHER (5/16" X 3/4" N. C.)	2
*	P-261A	BRUSH HOLDER SET SCREW (1/4" X 3/8")	4
*	E-73	OUTLET	2
*	E-259	CONNECTOR	2
*	P-430	CROSS ARM SPINDLE SUPPORT BOLT ASSEMBLY (7/8" X 3" N. F.)	6
*	P-431	CROSS ARM HUB BOLT ASSEMBLY (5/8" X 2" N. F.)	8
*	P-435	CROSS ARM SEAL RING BOLT ASSEMBLY (1/2" X 1-1/4" N. F.)	2
*	P-432	SLIP RING BOLT ASSEMBLY (8/32 X 3/4" Machine Screw)	4
*	P-433	CROSS ARM HUB CAP SCREW ASSEMBLY (5/16" X 1-1/4" N. F.)	4
*	P-434	CROSS ARM HUB CAP COVER BOLT (10/32 Machine Screw 5/8" Long)	4
*	O-275	ZERK FITTING	1
*	P-441	CHAIN GUARD BOLT ASSEMBLY (1/4" X 3/4" N. C.)	1
*	P-442	CHAIN GUARD NUT & LOCK-WASHER (3/8" N. F.)	1

* Not Illustrated.

GEAR DRIVE ASSEMBLY

NOTE:
PLEASE SPECIFY SERIAL NUMBER OF RIDE WHEN ORDERING PARTS



GEAR DRIVE ASSEMBLY

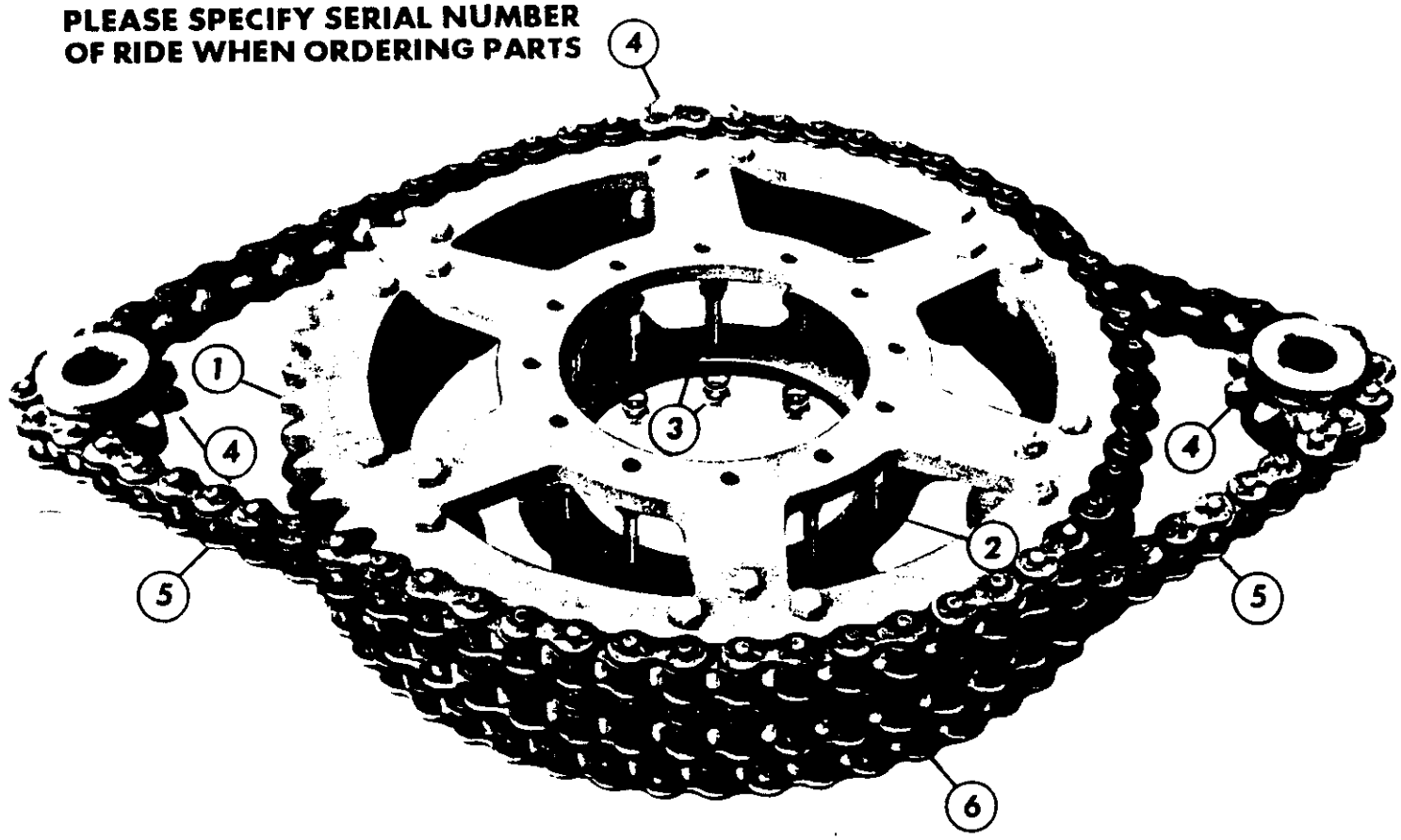
REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	O-97	UPPER BELL HOUSING	1
2	O-114	PINION PILOT BEARING	1
3	O-117	PILOT BEARING RETAINER	1
4	O-120	PINION GEAR	1
5	O-113B	PINION BEARING CONE	2
6	O-113	PINION BEARING CUP	2
7	O-111	PINION SLEEVE	1
8	O-540	PINION SLEEVE CORK SEAL	1
9	O-113A	PINION BEARING WASHER	1
10	O-115	PINION BEARING NUT	2
11	O-116	PINION BEARING LOCKWASHER	1
12	O-539	OIL SEAL	1
13	O-358	PINION COVER PLATE	1
14	O-120A	PINION GEAR NUT	1
15	O-371	DRIVE SHAFT	1
16	O-536	RING GEAR (40 Tooth)	1
17	O-112	DRIVE SHAFT BEARING CUP	2
18	O-112A	DRIVE SHAFT BEARING CONE	2
19	O-103	HOUSING GASKET	1
20	O-402	LOWER HOUSING BELL	1
21	O-402C	RING GEAR THRUST BLOCK	1
22	O-402D	RING GEAR THRUST BLOCK PIN	1
23	O-100	PACKING RETAINING RING	1
24	O-528	PACKING (3 Rings)	1
25	O-508	PACKING GLAND	1
26	O-320	DRIVE SHAFT BEARING	2
27	O-496	DRIVING SPROCKET (9 Tooth)	1
28	P-508	HOUSING BRACKET	2
29	P-509	HOUSING BRACKET STUD ASSY.	2
30	P-236	SHEAVE (Eccentric)	1
31	P-238	SHEAVE (Rotation)	2
32	P-406	SHEAVE HUB BUSHING ASSY.	1
33	O-600	PINION TAPERED HUB BUSHING	1
34	O-600B	SHEAVE HUB BUSHING KEY	1
35	O-120C	PINION GEAR KEY	1
*	O-275	ZERK FITTING	3
*	O-97A	BEARING RETAINER RIVET	2
*	O-358A	PINION COVER PLATE CAP SCREW	6
*	O-120B	PINION NUT COTTER KEY	1
*	O-371B	BOLT ASSEMBLY (Drive Shaft Bearing)(Long)	4
*	O-371C	BOLT ASSEMBLY (Drive Shaft Bearing)(Short)	4
*	O-512	PACKING GLAND STUD & NUT	2
*	O-102	HOUSING BOLT ASSEMBLY	11
*	O-404	GIB HEAD TAPER KEY	2
*	O-536A	RING GEAR RIVET	12

* Not Illustrated.

NOTE:
The number in the No. Req. column indicates the number required for one Gear Drive.

ROTATION & ECCENTRIC CHAIN DRIVE ASSEMBLY

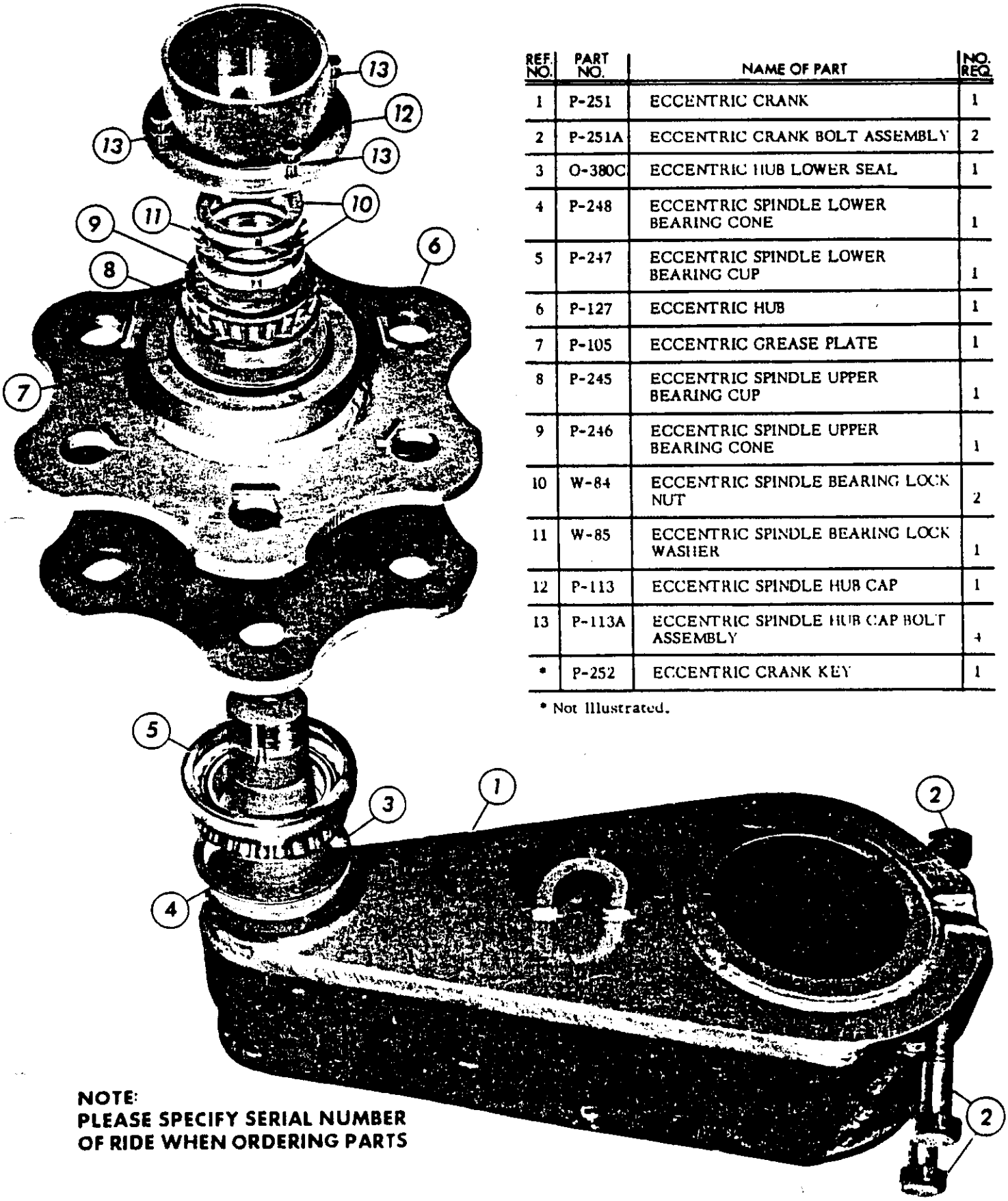
NOTE:
PLEASE SPECIFY SERIAL NUMBER OF RIDE WHEN ORDERING PARTS



REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-263	ROTATION DRIVEN SPROCKET	1
2	P-264	ECCENTRIC DRIVEN SPROCKET	1
3	P-412	ECCENTRIC DRIVEN SPROCKET BOLT ASSEMBLY	12

REF. NO.	PART NO.	NAME OF PART	NO. REQ.
4	O-496	DRIVING SPROCKET	3
5	P-409	ROTATION CHAIN (61 Pitches)	2
6	P-410	ECCENTRIC CHAIN (62 Pitches)	1

ECCENTRIC CRANK & HUB ASSEMBLY



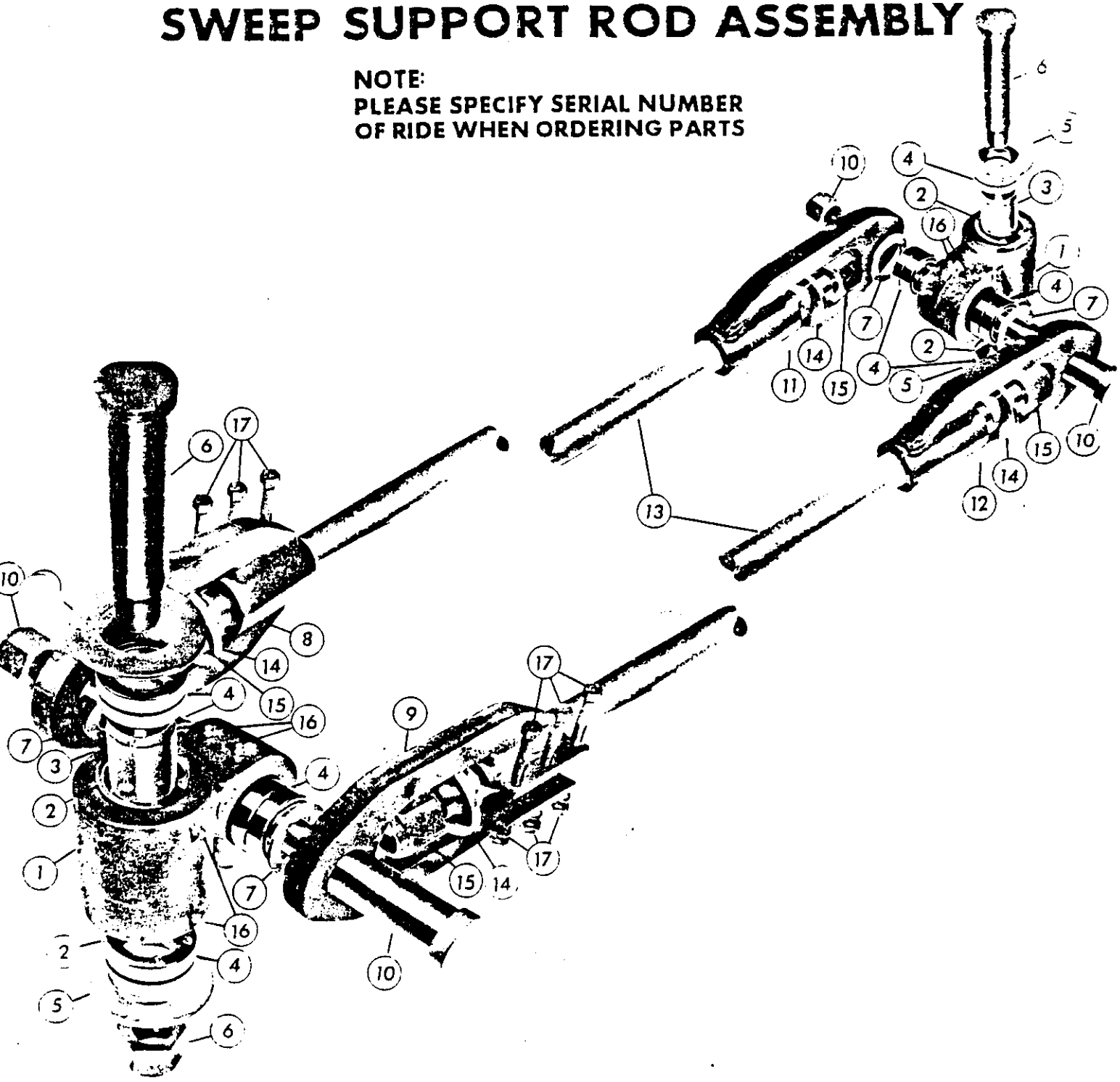
REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-251	ECCENTRIC CRANK	1
2	P-251A	ECCENTRIC CRANK BOLT ASSEMBLY	2
3	O-380C	ECCENTRIC HUB LOWER SEAL	1
4	P-248	ECCENTRIC SPINDLE LOWER BEARING CONE	1
5	P-247	ECCENTRIC SPINDLE LOWER BEARING CUP	1
6	P-127	ECCENTRIC HUB	1
7	P-105	ECCENTRIC GREASE PLATE	1
8	P-245	ECCENTRIC SPINDLE UPPER BEARING CUP	1
9	P-246	ECCENTRIC SPINDLE UPPER BEARING CONE	1
10	W-84	ECCENTRIC SPINDLE BEARING LOCK NUT	2
11	W-85	ECCENTRIC SPINDLE BEARING LOCK WASHER	1
12	P-113	ECCENTRIC SPINDLE HUB CAP	1
13	P-113A	ECCENTRIC SPINDLE HUB CAP BOLT ASSEMBLY	4
*	P-252	ECCENTRIC CRANK KEY	1

* Not Illustrated.

NOTE:
PLEASE SPECIFY SERIAL NUMBER OF RIDE WHEN ORDERING PARTS

SWEEP SUPPORT ROD ASSEMBLY

NOTE:
PLEASE SPECIFY SERIAL NUMBER OF RIDE WHEN ORDERING PARTS

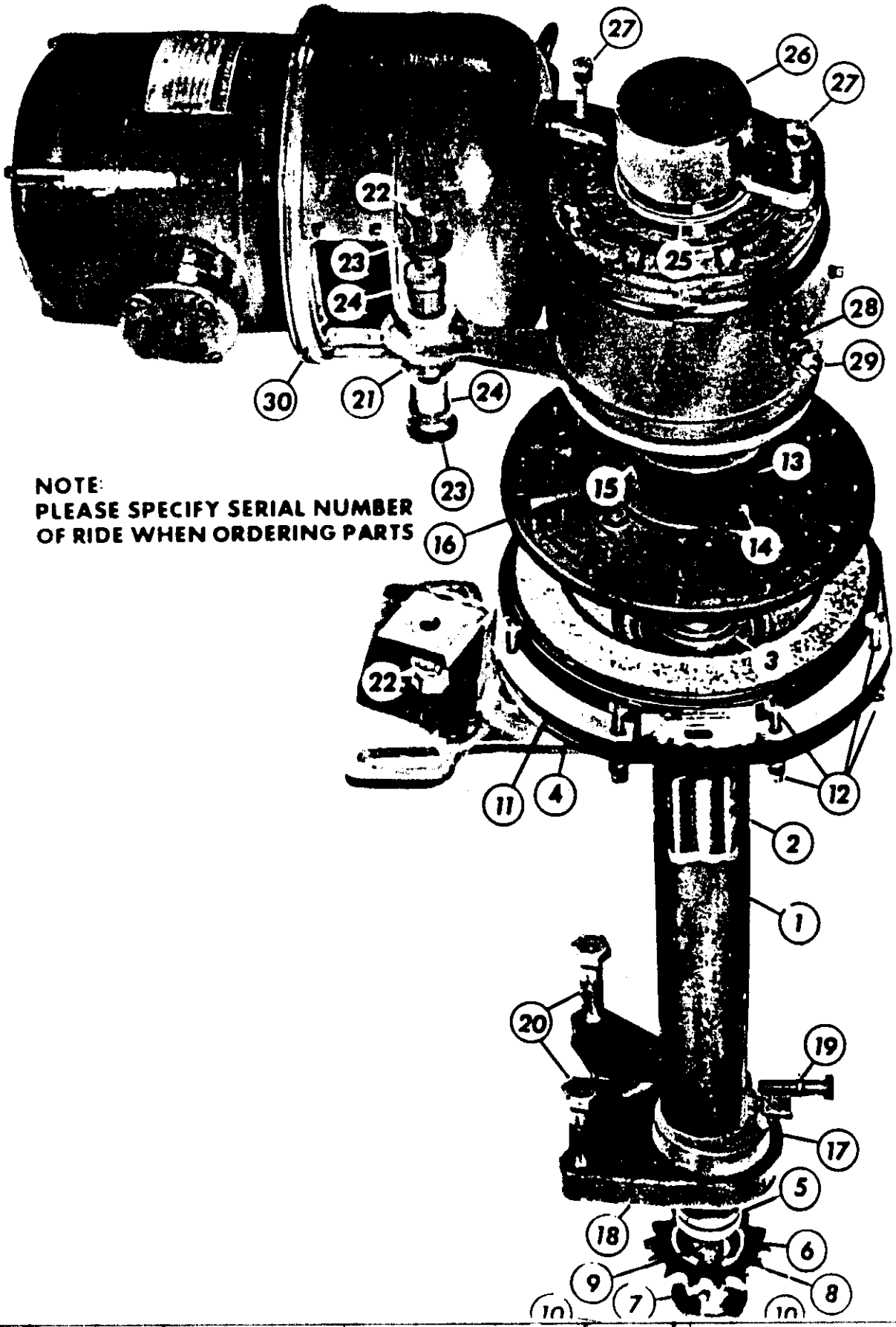


SWEEP SUPPORT ROD ASSEMBLY

REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-153	SWIVEL BLOCK	2
2	P-348	SNAP RING	4
3	P-194	SWIVEL BEARING SPACER	2
4	P-349	NEEDLE BEARING (Inner & Outer)	8
5	P-351	SWIVEL BLOCK WASHER (Large)	4
6	P-192	SWIVEL BEARING PIN & NUT (Long)	2
7	P-208	SWIVEL BLOCK WASHER (Small)	4
8	P-217	SUPPORT ROD END (Split)	1
9	P-217A	SUPPORT ROD END (Split)	1
10	P-193	SWIVEL BEARING PIN & NUT (Short)	2
11	P-176	SUPPORT ROD END	1
12	P-176A	SUPPORT ROD END	1
13	P-196	SUPPORT ROD	2
14	P-197	SUPPORT ROD BUSHING	4
15	P-350	SUPPORT ROD NUT	4
16	O-275A	ZERK FITTING (1/4")	8
17	P-217B	SUPPORT ROD END BOLT ASSEMBLY	6

NOTE:
THE NUMBER IN THE NO. REQ. COLUMN INDICATES THE NUMBER REQUIRED FOR ONE SWEEP.

SPIDER DRIVE ASSEMBLY



NOTE:
PLEASE SPECIFY SERIAL NUMBER
OF RIDE WHEN ORDERING PARTS

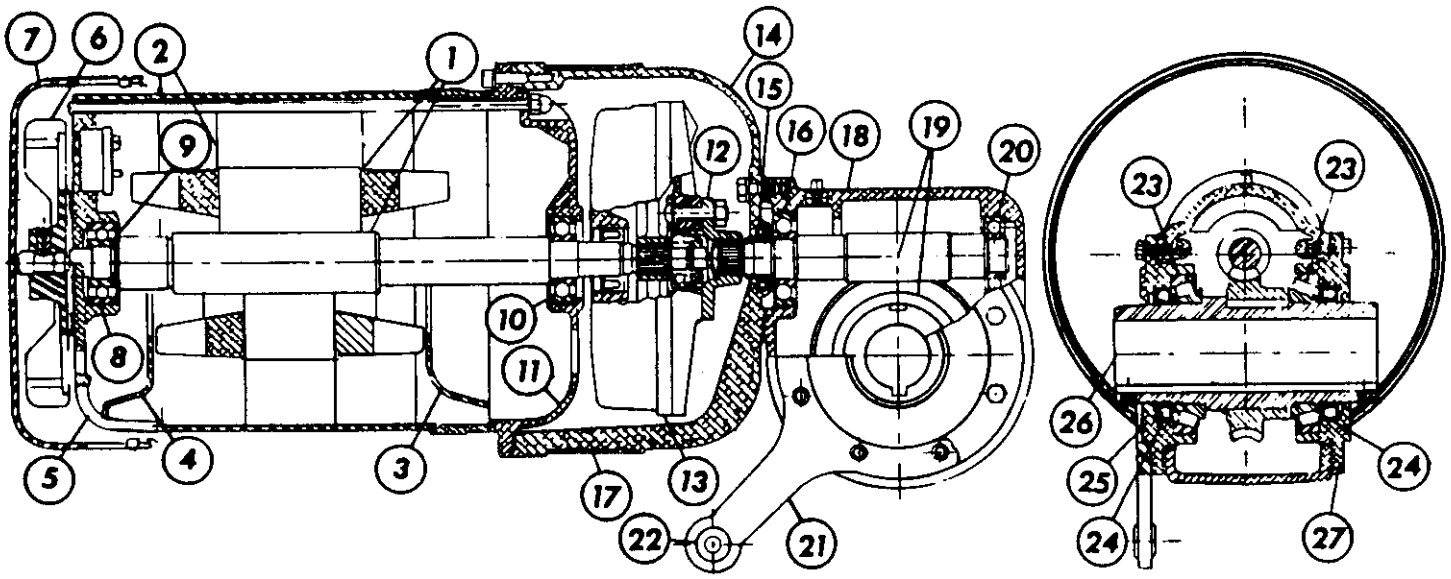
SPIDER DRIVE ASSEMBLY

REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-570	SPIDER DRIVE HOUSING	1
2	P-559	SPIDER DRIVE SHAFT	1
3	P-354	FLANGE BEARING	1
4	P-560	BRAKE MOUNTING PLATE	1
5	P-405	NEEDLE BEARING	1
6	P-348	NEEDLE BEARING LOCK RING	1
7	P-362	BROWNING TAPERLOCK BUSHING	1
8	P-363	BROWNING #80 SPROCKET (14 Tooth)	1
9	P-359	LOWER KEY	1
10	P-364	TAPERLOCK BUSHING CAP SCREW (5/16" X 1" N. C.)	3
11	P-267	BRAKE MAGNET	1
	P-274	BRAKE MAGNET BOLT ASSEMBLY (5/16 X 1" N. F.)	8
	P-269	SPLINED HUB	1
14	P-572	SPLINED HUB LOCK RING	1
15	P-571	BROWNING BUSHING	1
16	P-268	BRAKE ARMATURE	1
17	P-180	SPIDER CAM BUSHING	1
18	P-179	SPIDER DRIVE SUPPORT BRACKET	1
19	P-438	SPIDER DRIVE SUPPORT BRACKET CLAMP BOLT (5/8" X 2-1/4" N. F.)	1

REF. NO.	PART NO.	NAME OF PART	NO. REQ.
20	P-445	SPIDER DRIVE SUPPORT BRACKET BOLT ASSEMBLY (7/8" X 3" N. F)	2
21	P-561	TORQUE ARM	1
22	P-573	TORQUE ARM BOLT ASSEMBLY (5/8" X 4-1/2" N. F.)	1
23	P-573A	WASHER (5/8" Flat)	2
24	B-60	TORQUE ARM BUSHING	2
25	P-439	QUAD RING (Gear Box Cover)	1
26	P-353	GEAR BOX COVER	1
27	P-440	GEAR BOX COVER BOLT ASSEMBLY (5/16" X 1-1/2" N. F.)	2
28	P-620	PIPE BUSHING (1/4" X 1/8")	1
29	P-621	HIGH PRESSURE RELIEF VALVE	1
30	P-358	SPIDER DRIVE MOTOR ASSEMBLY	1
*	P-357	UPPER KEY	1
*	P-574	FLANGE BEARING BOLT ASSEMBLY (5/8" X 2-3/4" N. F.)	4
*	P-571A	BROWNING BUSHING BOLT ASSY. (3/8" X 1-1/4" N. C.)	3
*	P-272	BUSHING KEY	1
*	O-275	ZERK FITTING	2

* Not Illustrated.

SPIDER DRIVE MOTOR ASSEMBLY



REF. NO.	PART NO.	NAME OF PART	NO. REQ.
	P-358	SPIDER DRIVE MOTOR ASSY.	1
1	P-645	ROTOR & SHAFT	1
2	P-646	STATOR & HOUSING ASSY.	1
3	P-647	BAFFLE (Adaptor End)	1
4	P-648	BAFFLE (End Cap)	1
5	P-624	END CAP	1
6	P-625	FAN	1
7	P-626	FAN SHIELD	1
8	P-627	MOTOR BEARING	1
9	P-628	LOADING SPRING	1
10	P-629	ROTOR BEARING	1
11	P-630	BEARING CARRIER	1
12	P-631	SPLINE COUPLING	1
	P-632	FLUID COUPLING	1

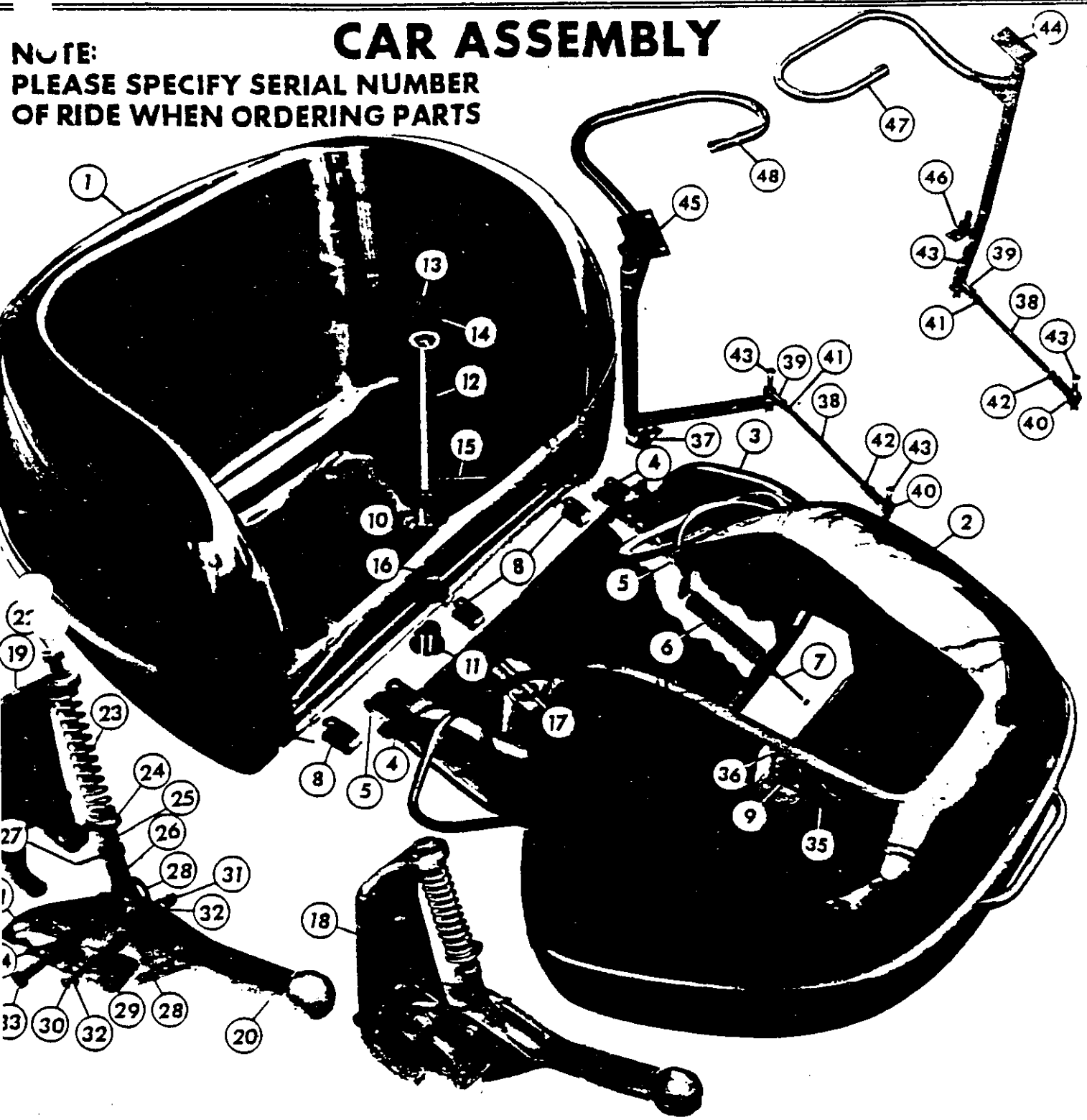
REF. NO.	PART NO.	NAME OF PART	NO. REQ.
14	P-633	ADAPTOR & COUPLING ASSY.	1
15	P-634	SEAL (Input)	1
16	P-635	WORM BEARING - M. E.	1
17	P-636	HOUSING END	1
18	P-637	GEAR CASE	1
19	P-638	WORM GEAR SET	1
20	P-639	WORM BEARING - W. E.	1
21	P-561	TORQUE ARM	1
22	B-60	TORQUE ARM BUSHING	2
23	P-640	OUTLET SHAFT BEARING	2
24	P-641	SEAL (Output Shaft)	2
25	P-642	SIDE PLATE	1
26	P-643	OUTPUT SHAFT	1
27	P-644	SIDE PLATE	1

7-20-71

* Not Illustrated.

CAR ASSEMBLY

NOTE:
PLEASE SPECIFY SERIAL NUMBER OF RIDE WHEN ORDERING PARTS



CAR ASSEMBLY

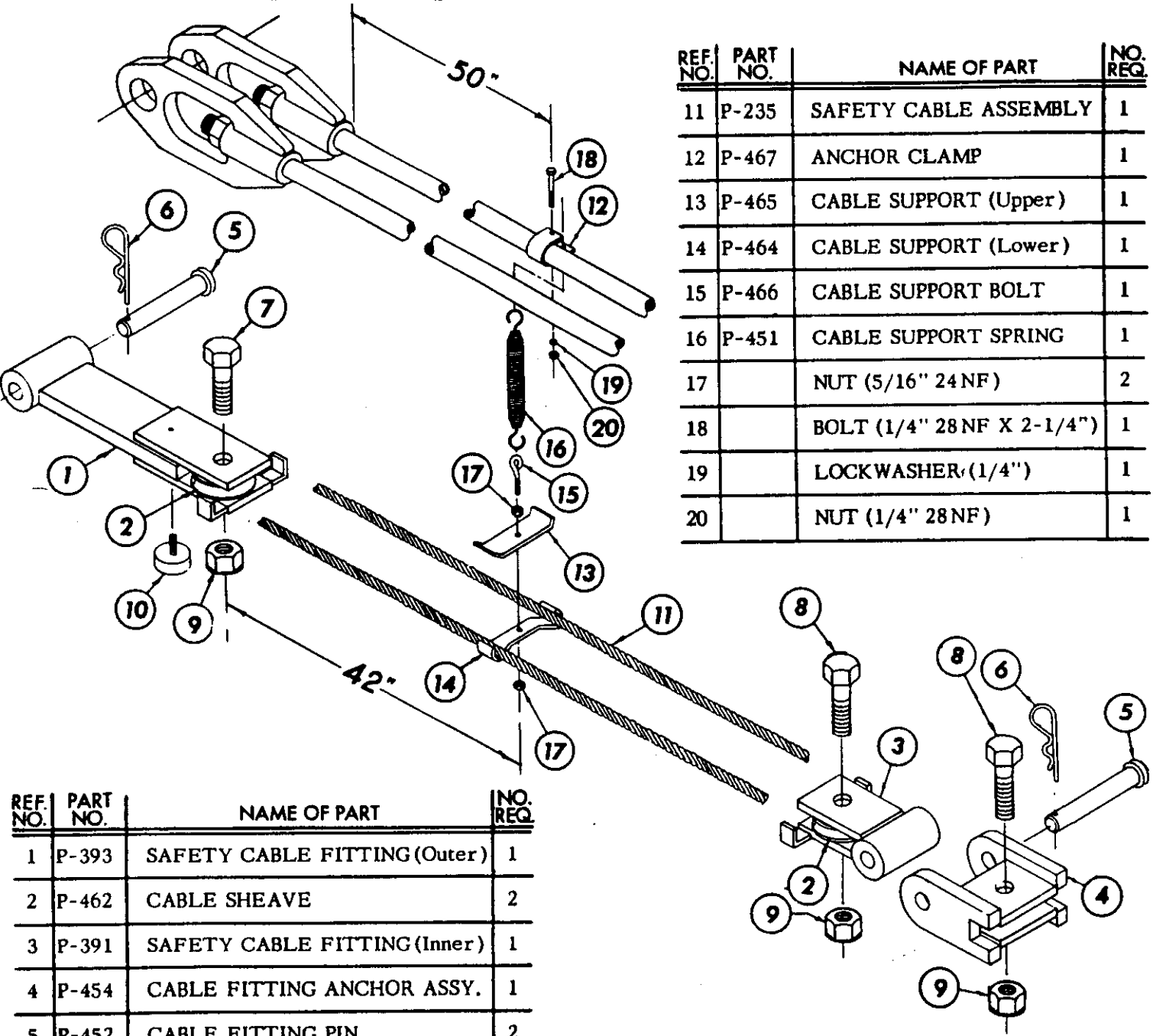
REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-398	CAR BACK SECTION	1
2	P-399	CAR NOSE SECTION	1
3	O-654	CAR TRAY	1
4	O-687	CAR NOSE HINGE	2
5	O-685	SPRING LINK	2
6	O-704	SPRING	2
7	O-688	SPRING TIGHTENER	2
8	O-183	HINGE STRAP	3
9	=O-693	SAFETY BAR CONTROL ROD CLEVIS	2
10	O-387	CAR SPINDLE BUSHING (Upper) (Nylon or Bronze Optional)	1
11	O-388	CAR SPINDLE BUSHING (Lower) (Nylon or Bronze Optional)	1
12	O-631	CAR SPINDLE	1
13	O-653A	CAR SPINDLE COVER PLATE	1
14	O-653B	CAR SPINDLE COVER PLATE SCREW	4
15	O-646	CAR SPINDLE SAFETY BOLT ASSEMBLY (3/8" X 3-3/4")	1
16	O-656	CAR SPINDLE RETAINER	1
17	O-603	CAR SAFETY CLAMP	1
18	O-851	CAR LOCK LATCH ASSEMBLY	1
19	O-862	HINGE PLATE	1
20	O-860	LOCK LEVER	1
21	O-861	CATCH PLATE	1
22		BOLT (3/8"X 3-1/2" 24 NF)	1
23	O-187	SPRING	1
24		FLAT WASHER (5/16")	1
25		NUT (3/8" 24 NF)	1
26	O-788	ROD END (3/8" R. H.)	1
27		ROLL PIN (3/32"X 3/4")	1
28		WASHER (3/8" S. A. E.)	2
29		ROLL PIN (3/8"X 1-1/4")	1
30		MACHINE SCREW (10-32 X 1-3/4")	1
31		LOCK NUT (10-32)	1
32		BRASS WASHER	2
33		BOLT (5/16"X 1-3/4" 24 NF)	1
34		ROLL PIN (1/2"X 1-1/4")	1
35	=O-686	SAFETY BAR CONTROL ROD	2
36	=O-694	SAFETY BAR CONTROL ROD PIN & COTTER KEY	4
37	O-702	SAFETY BAR BEARING (Lower L. H.)	1
38	O-787	SAFETY BAR CONTROL ROD	2
39	O-788	ROD END (3/8" R. H. Thread)	2
40	O-789	ROD END (3/8" L. H. Thread)	2
41	O-787A	ROD END JAM NUT (3/8" R. H. Thread)	2
42	O-787B	ROD END JAM NUT (3/8" L. H. Thread	2
43	O-788A	ROD END BOLT ASSEMBLY (3/8"X 1-1/4")	4
44	O-699	SAFETY BAR BEARING (Upper R. H.)	1
45	O-700	SAFETY BAR BEARING (Upper L. H.)	1
46	O-701	SAFETY BAR BEARING (Lower R. H.)	1
47	O-697	SAFETY BAR (R. H.)	1
48	O-698	SAFETY BAR (L. H.)	1
*	O-703	SAFETY BAR BEARING BOLT ASSEMBLY (5/16"X 3/4")	8
*	O-695	NOSE HINGE CLAMP BOLT ASSEMBLY (Long) (1/4"X 2-3/4")	2
*	O-696	NOSE HINGE CLAMP BOLT ASSEMBLY (Short)(3/8"X 1-1/2")	2
*	O-603A	CAR SAFETY CLAMP BOLT ASSEMBLY (1/4"X 2-1/2")	1
*	O-505A	CAR LOCK CATCH PLATE BOLT ASSEMBLY (3/16"X 1" Carriage)	2
*	O-183A	HINGE STRAP BOLT ASSEMBLY (1/4"X 1-3/4")	3
*	O-656A	SPINDLE RETAINER BOLT ASSY. (5/16"X 1")	1
*	O-275	ZERK FITTING	2

NOTE:
The Number in the "No. Req." Column Indicates the Number Required for One Car.

* Not Illustrated.

= These Parts are Replaced by Part Nos. O-787, O-788, O-788A and O-789

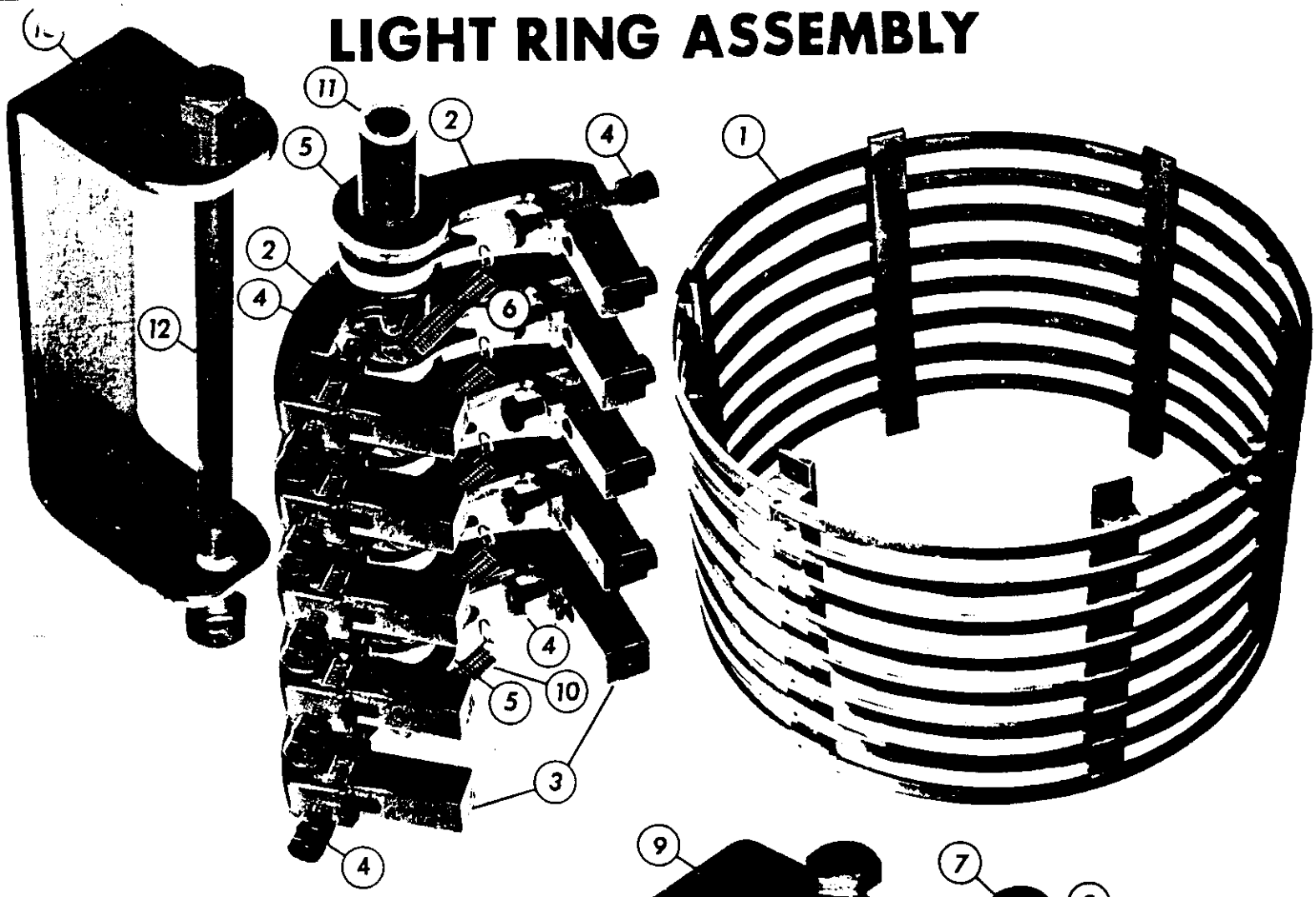
SAFETY CABLE, FITTINGS, ANCHOR & SUPPORT ASSEMBLY

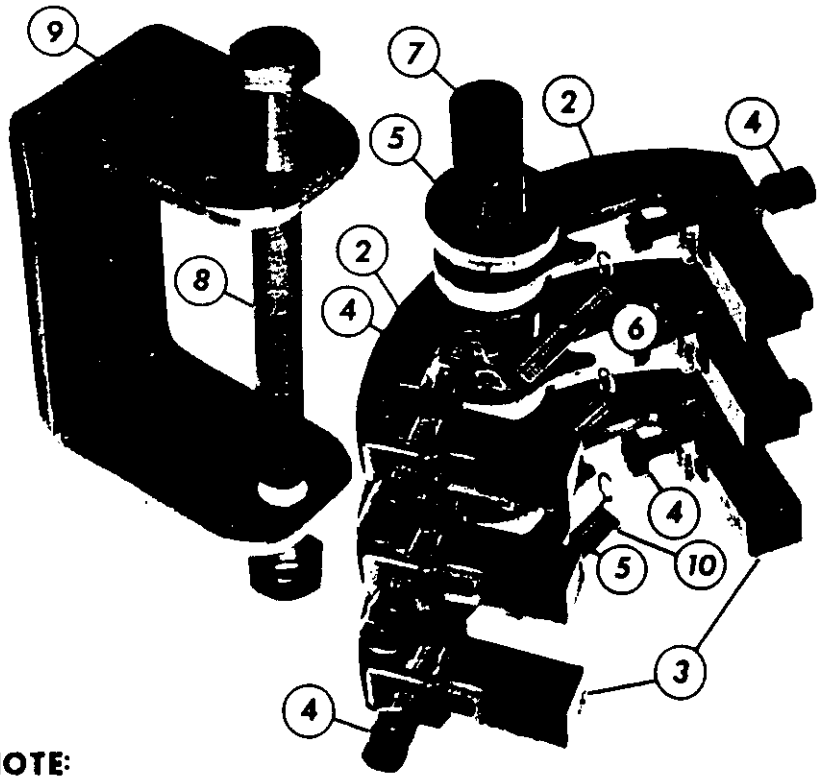


REF. NO.	PART NO.	NAME OF PART	NO. REQ.
11	P-235	SAFETY CABLE ASSEMBLY	1
12	P-467	ANCHOR CLAMP	1
13	P-465	CABLE SUPPORT (Upper)	1
14	P-464	CABLE SUPPORT (Lower)	1
15	P-466	CABLE SUPPORT BOLT	1
16	P-451	CABLE SUPPORT SPRING	1
17		NUT (5/16" 24 NF)	2
18		BOLT (1/4" 28 NF X 2-1/4")	1
19		LOCKWASHER (1/4")	1
20		NUT (1/4" 28 NF)	1

REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-393	SAFETY CABLE FITTING (Outer)	1
2	P-462	CABLE SHEAVE	2
3	P-391	SAFETY CABLE FITTING (Inner)	1
4	P-454	CABLE FITTING ANCHOR ASSY.	1
5	P-452	CABLE FITTING PIN	2
6	~~W-97A~~	PIN, SAFETY ~~CLIP~~ $\frac{1}{4}$ X 2	2
		BOLT (1-1/4" X 12 NF X 3-1/2")	1
		BOLT (1-1/4" X 12 NF X 3-3/4")	2
9		LOCKNUT (1-1/4" 12 NF)	3
10	P-453	NEOPRENE BUMPER	1

LIGHT RING ASSEMBLY

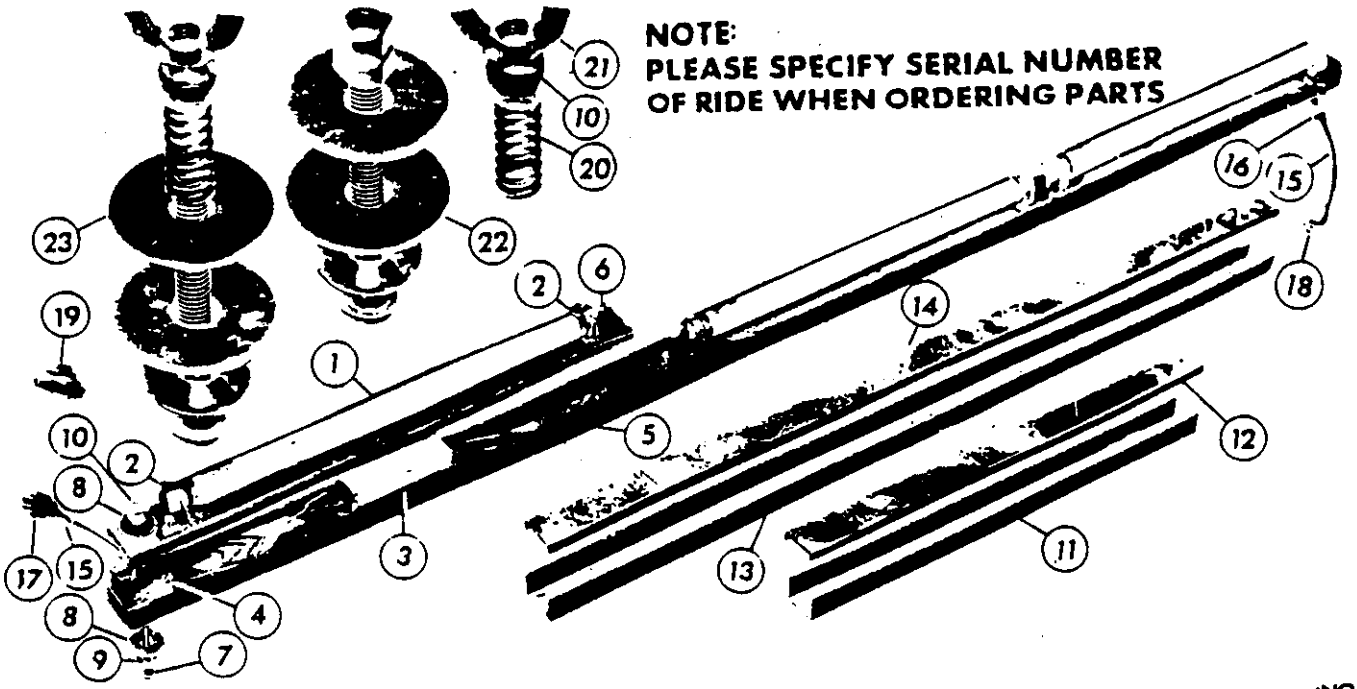




REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	E-226	SLIP RING ASSEMBLY	1
2	E-128	BRUSH HOLDER	16
3	E-227	BRUSH	16
4	E-228	BRUSH BOLT ASSEMBLY	16
5	E-229	BRUSH INSULATOR WASHER	4
6	E-230	BRUSH INSULATOR SPACER	6
7	E-231	BRUSH INSULATOR TUBE (Short)	1
8	E-232	BRUSH HINGE BOLT ASSEMBLY (Short)	1
9	E-233	BRUSH HINGE BRACKET (Short)	1
10	E-234	BRUSH SPRING	8
11	E-235	BRUSH INSULATOR TUBE (Long)	1
12	E-236	BRUSH HINGE BOLT ASSEMBLY (Long)	1
13	E-237	BRUSH HINGE BRACKET (Long)	1

NOTE:
PLEASE SPECIFY SERIAL NUMBER OF RIDE WHEN ORDERING PARTS

FLUORESCENT FIXTURE COMPONENTS



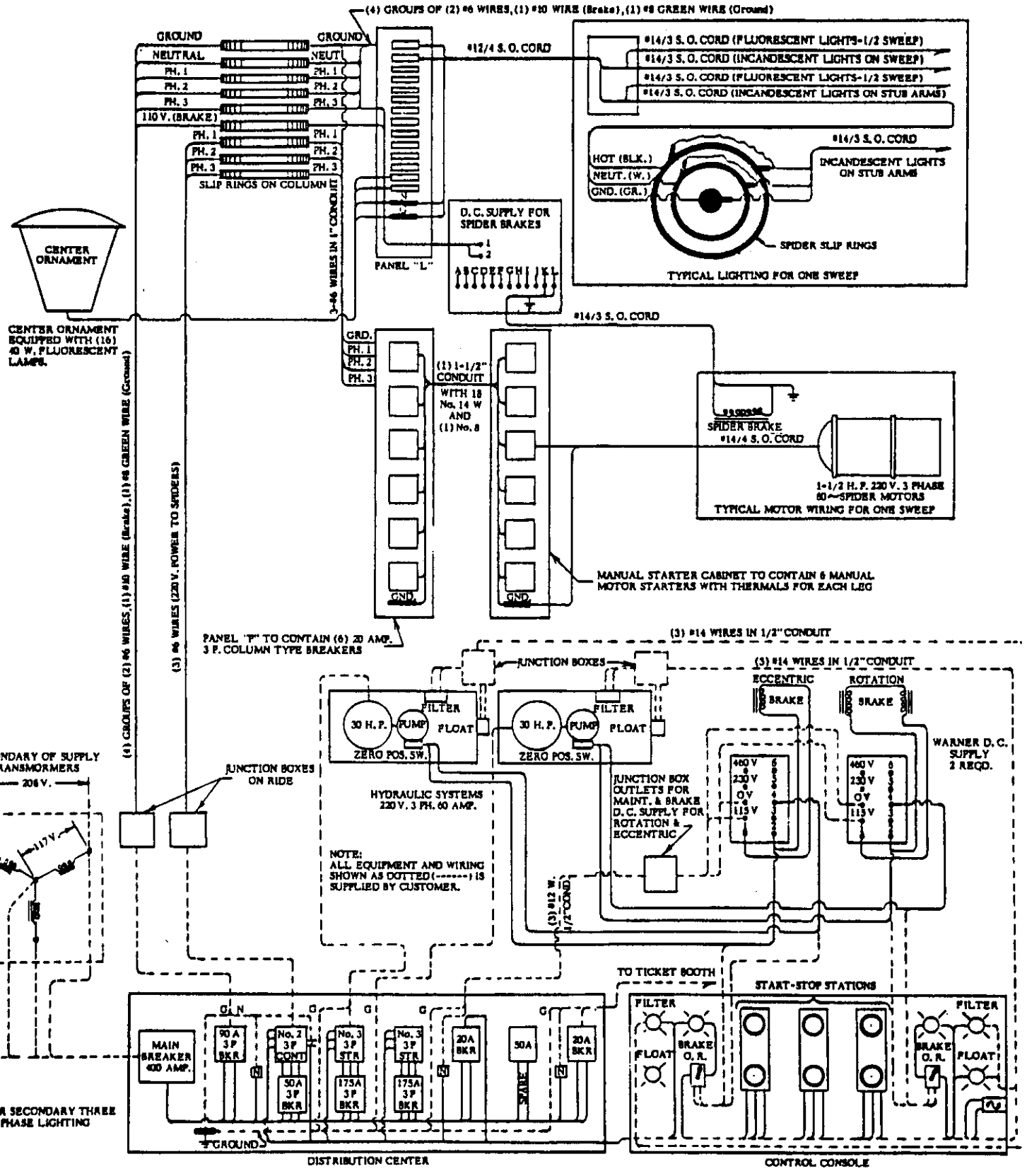
NOTE:
PLEASE SPECIFY SERIAL NUMBER OF RIDE WHEN ORDERING PARTS

REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	E-1G	FLUORESCENT LAMP (Green) (F 20 T 12 G)	**
	E-1GO	FLUORESCENT LAMP (Gold) (F 20 T 12 GO)	
	E-1R	FLUORESCENT LAMP (Red) (F 20 T 12 R)	
2	E-4	FLUORESCENT LAMP HOLDER	6
3	E-11	BALLAST	3
4	E-10	BLOCK (Box End)	2
5	E-15	BOX (Three Lamp Fixture)	1
6	E-8	BOX COVER (Three Lamp Fixture)	1
7		MOUNTING BOLT (5/16" X 3" NC Round Head) (Stainless Steel)	2
8	E-12	WASHER (Flat)	4
9	E-13	WASHER (Curved)	2
10		MOUNTING NUT (5/16" NC)	2
11	E-16	BOX (One Lamp Fixture)	**
12	E-19	BOX COVER (One Lamp Fixture)	**
13	E-22	BOX (Two Lamp Fixture)	**
14	E-21	BOX COVER (Two Lamp Fixture)	**
15	E-2A	FLUORESCENT FIXTURE CORD (9")	2
	E-2B	FLUORESCENT FIXTURF CORD (15")	
	E-2C	FLUORESCENT FIXTURE CORD (18")	
	E-2D	FLUORESCENT FIXTURE CORD (22")	
	E-2E	FLUORESCENT FIXTURE CORD (24")	
	E-2F	FLUORESCENT FIXTURE CORD (26")	
	E-2G	FLUORESCENT FIXTURE CORD (28")	
	E-2H	FLUORESCRNT FIXTURE CORD (32")	
	E-2J	FLUORESCENT FIXTURE CORD (36")	
	E-2K	FLUORESCENT FIXTURE CORD (40")	
	E-2L	FLUORESCENT FIXTURE CORD (48")	
	E-2M	FLUORESCENT FIXTURE CORD (53")	
	E-2N	FLUORESCENT FIXTURE CORD (63")	
16	E-9	CORD GRIP	2
17	E-20	PLUG (Midget) (B-7594 NP)	1
18	E-17	RECEPTACLE (Midget) (B-7593 NC)	1
19	E-3	PLUG (B-4721 NP)	1
20	E-7	SPRING (Mounting) (Standard Ride)	2
21	E-5	WING NUT (5/16" Mounting Bolt) (Standard Ride)	2
22	E-14B	MOUNTING BOLT ASSY. (Portable Ride)	2
23	E-14A	MOUNTING BOLT ASSY. (Standard Ride)	2
*		MACHINE SCREW ASSY. (6-32 X 3/8") (Lamp Holder & Ballast)	18
*		SHEET METAL SCREW (Box Cover) (#7 X 1/1/2")	12

NOTE: The "NO. REQ." Column Indicates the Number of Each

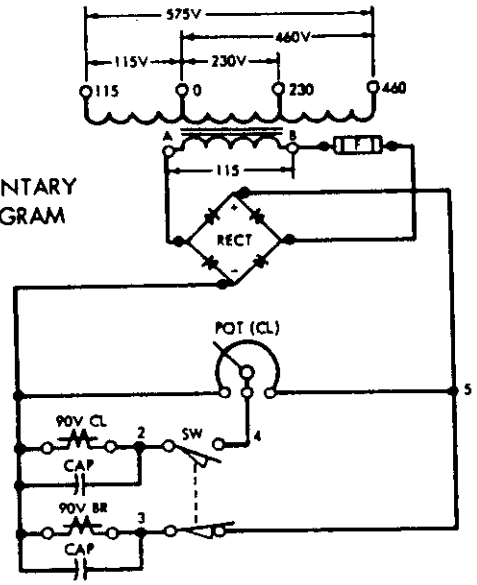
* Not Illustrated. **Specify Number Required.

MONSTER WIRING DIAGRAM



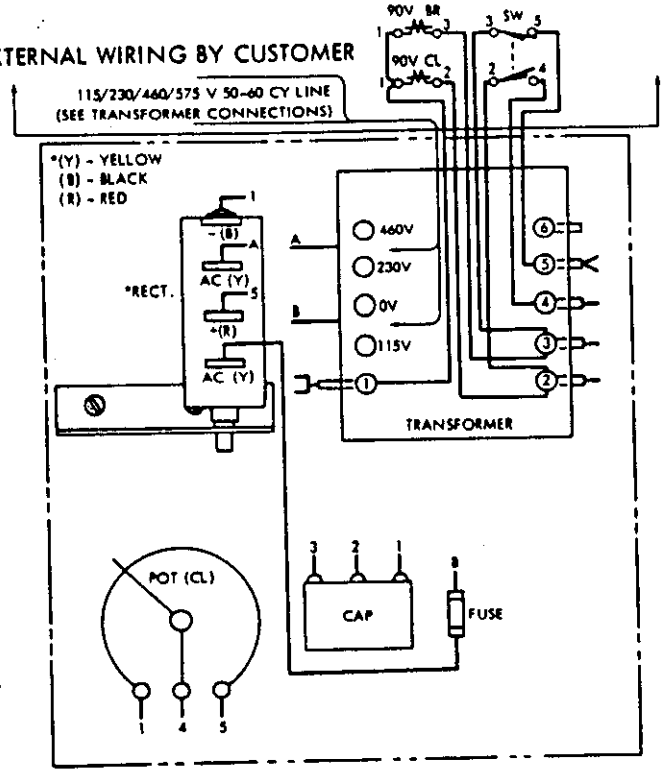
WARNER D.C. SUPPLY NO. 5400-25

ELEMENTARY DIAGRAM



WIRING DIAGRAM

EXTERNAL WIRING BY CUSTOMER



NAMEPLATE DATA

MODEL 5400-25 or 5400-26
AC VOLTS 115/230/460/575 CY 50-60
PH-1 VA-60
DC VOLTS 90 AMPS - 0.4

SIZE

5400-25	5400-26
7-3/8" Width	6-7/8" Width
8-1/2" Height	7-5/8" Height
5-3/16" Depth	4-1/2" Depth

WIRING COLOR CODE

DC CONTROL - BLUE

MOUNTING CENTERS

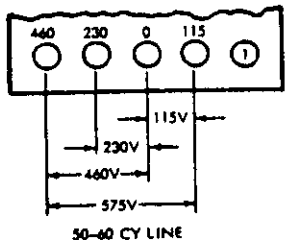
5400-25	5400-26
5" Width	Upper hole - centered
6" Height	Lower holes - 7" below and 6" apart

DC SWITCHING

Double pole, double throw maintained contact switch provided by the customer.

Switch contact rating: .5 amp, 125 Volts DC
or
15 amp, 125/250/460 Volts AC

TRANSFORMER CONNECTIONS



FOR USE WITH ALL WARNER UNITS EXCEPT THE HI-TORQUE SF-1525

AC INPUT: 115 Volts, 230 Volts, 460 Volts, 575 Volts, 60 VA, 50-60 Cycles

OUTPUT: .45 amps, 90 Volts DC, Controllable from 0-90V on one unit

INSTALLATION

A. The 5400-25 control is an enclosed unit complete with a cover and mounting panel. The 5400-26 control is the same control electrically but without an enclosure. The 5400-25 model is normally mounted as a separate control while the 5400-26 model is usually installed as a component of a larger control panel.

B. Connect two wires from the brake coil to 1 and 3 on the transformer terminal board.

C. Connect two wires from the clutch coil to 1 and 2 on the transformer terminal board.

rately with this control or two clutches or two brakes, one unit on at a time.

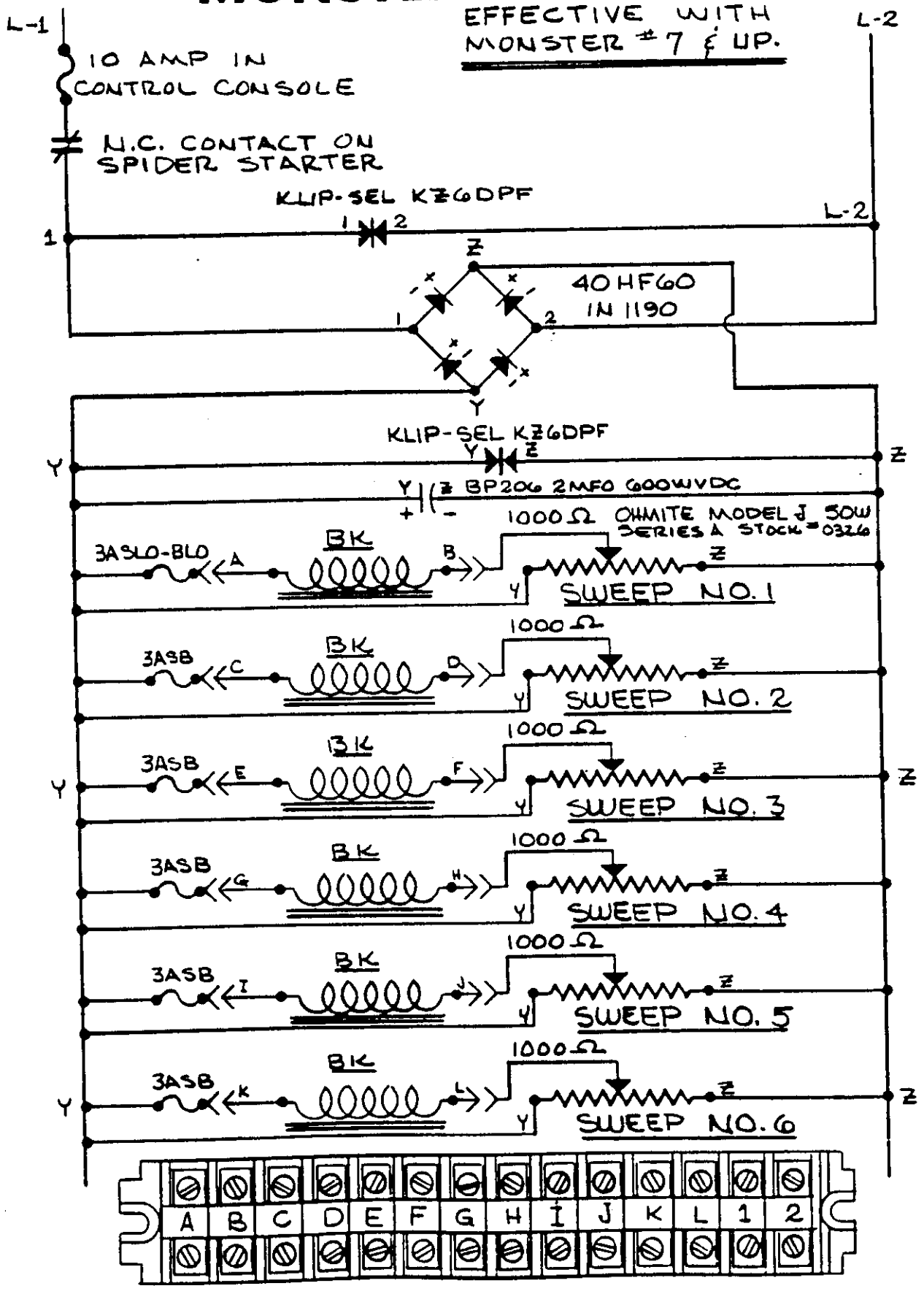
If voltage control is desired on the brake and not the clutch follow step B for the clutch wiring and step C for the brake wiring.

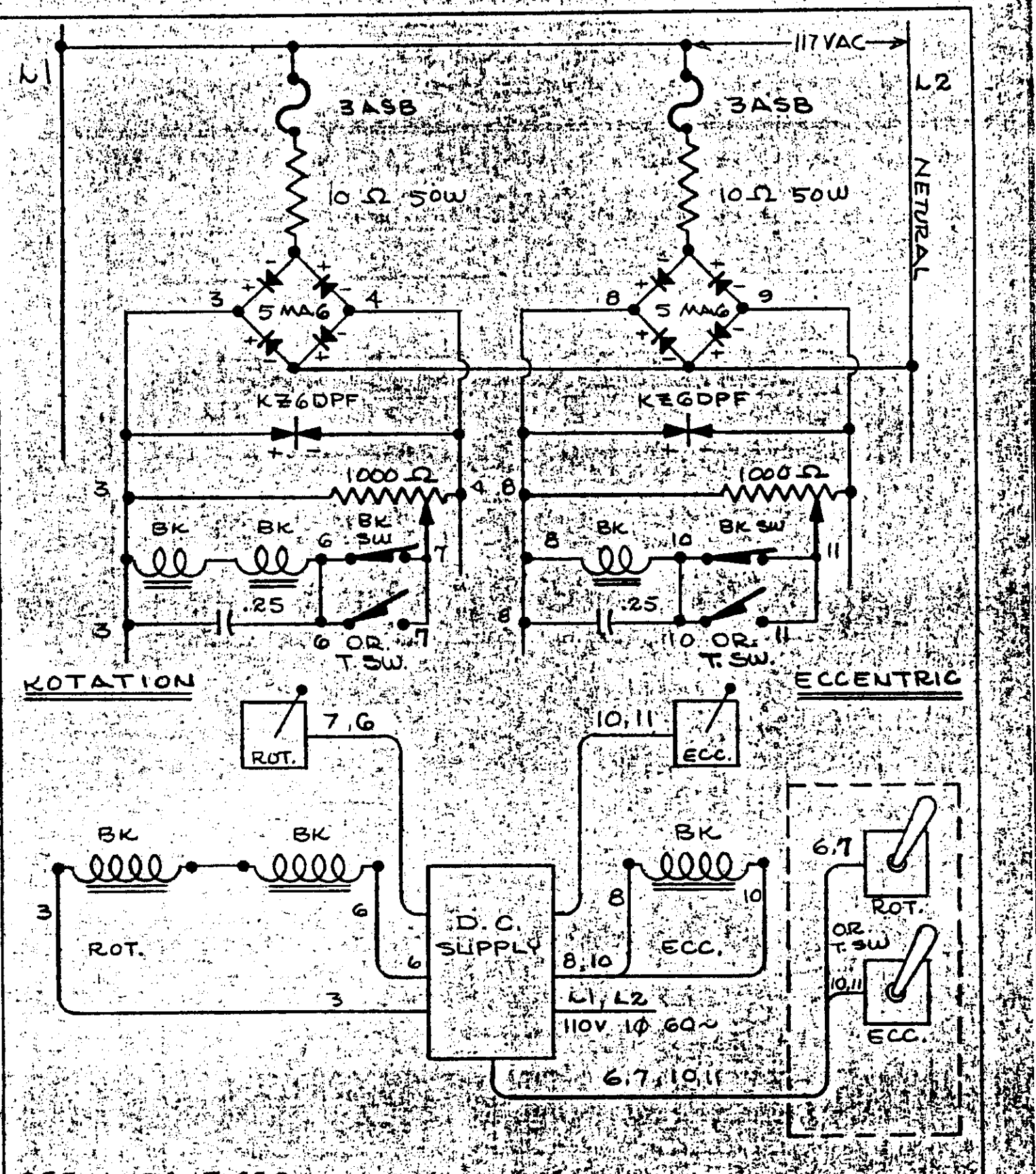
D. The switch connections are made as shown. 3 and 5 are the brake switch connections and 2 and 4 are for the clutch.

E. The AC input is connected in accordance with the "Transformer Connections" shown on the drawing. If the AC input is a three wire system

MONSTER D.C. SUPPLY

EFFECTIVE WITH MONSTER #7 & UP.





SEE ALSO E-420

MONSTER D.C. SUPPLY FOR ROT. & ECC BRAKES

DRAWN BY:	SCALE:	NO. REQ'D.:	MATERIAL:
LEA	NONE	1	

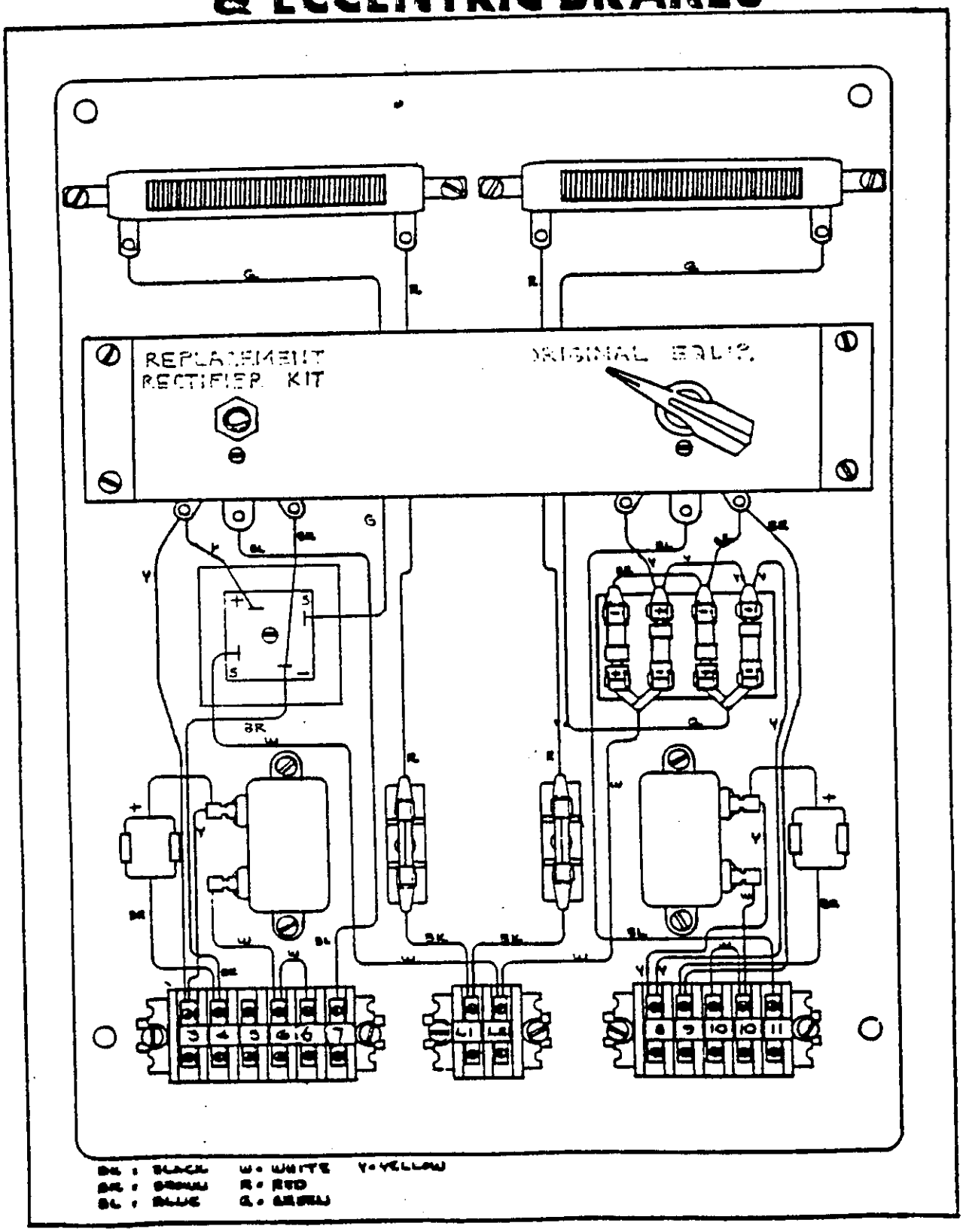
DATE:	NEXT ASSY.:	SDS. NO.:	EFF. W/SN:
2-26-71		SDD. BY NO.:	EFF. W/SN:

CURTISS-WRIGHT CORP. CARLSTADT, N.J. SALEM, ORE.

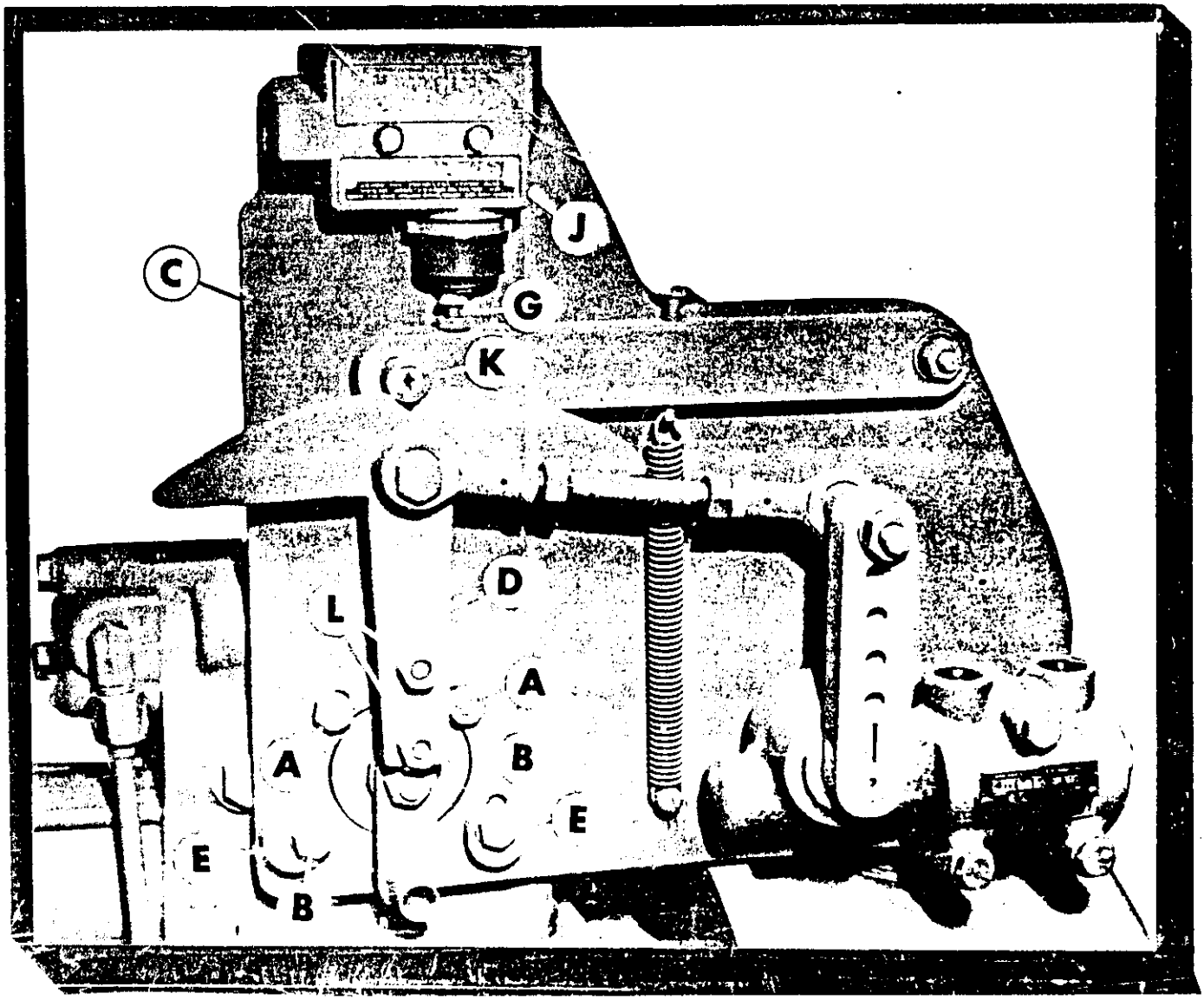
Drg. No. E-389

E-389

MONSTER D.C. SUPPLY FOR ROTATION & ECCENTRIC BRAKES



INSTRUCTIONS FOR ADJUSTING THE POWER SERVO CONTROL



If it becomes necessary to adjust the Power Unit Servo-Control System the following steps should be followed with the power Unit Motor running.

(1) Loosen the four Cap Screws "A" and "B" until Plate "C" is loose enough to reposition.

(2) Move Plate "C" in conjunction with Lever "D" until the neutral Pump position is attained.

(3) Tighten the two Cap Screws "A" and move Lever "D" to be certain the Cam Follower "K" is seating firmly in notch in the Lever "D". If the Cam Follower does not seat properly loosen Cap Screws "L". Adjust the Lever "D" and retighten Cap Screws "L".

(4) To limit the maximum Rotation and Eccentric speeds rotate the Cams "E" to bear against Lever Arm "D" when it is in a position that produces maximum operational speeds. Cap Screws "B" are then tightened to lock Cams "E" into position.

(5) Adjust the Brake Switch "J" with Screw and Lock Nut "G" so the Switch is deenergized at the zero position and energized during operation.

IMPORTANT

Before adjusting the speed of your ride be certain the directions os rotation are proper.

The Eccentric rotates clockwise. The Rotation counter-clockwise and the Spiders clockwise. All directions are looking down from the top of the ride.

THE MAXIMUM ROTATION SPEEDS ARE AS FOLLOWS:

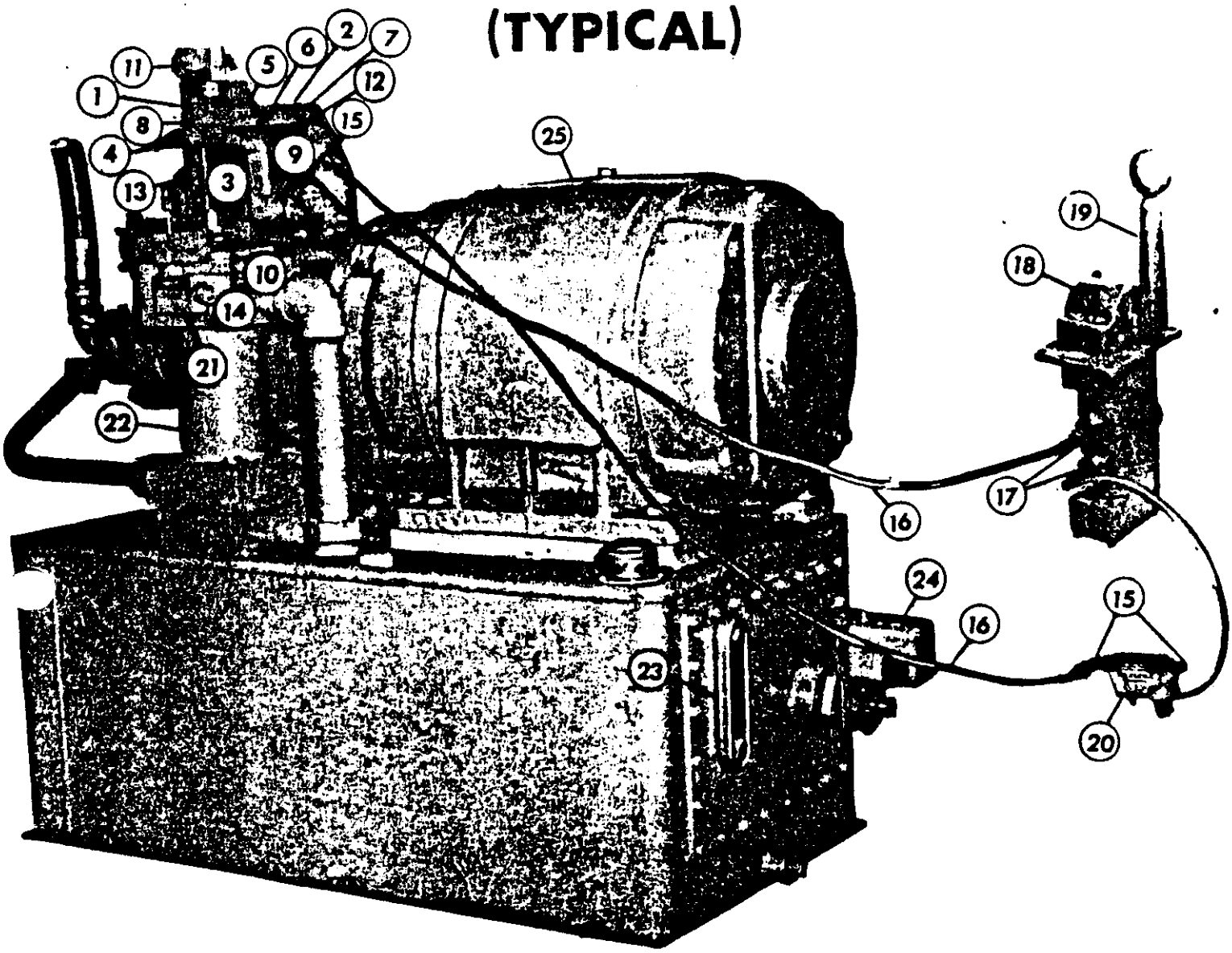
ECCENTRIC 11 RPM ROTATION 8 RPM

DO NOT EXCEED THESE SPEEDS

For reverse operation speeds must be reduced a minimum of 50%

Everly AIRCRAFT CO. SALEM, ORE.

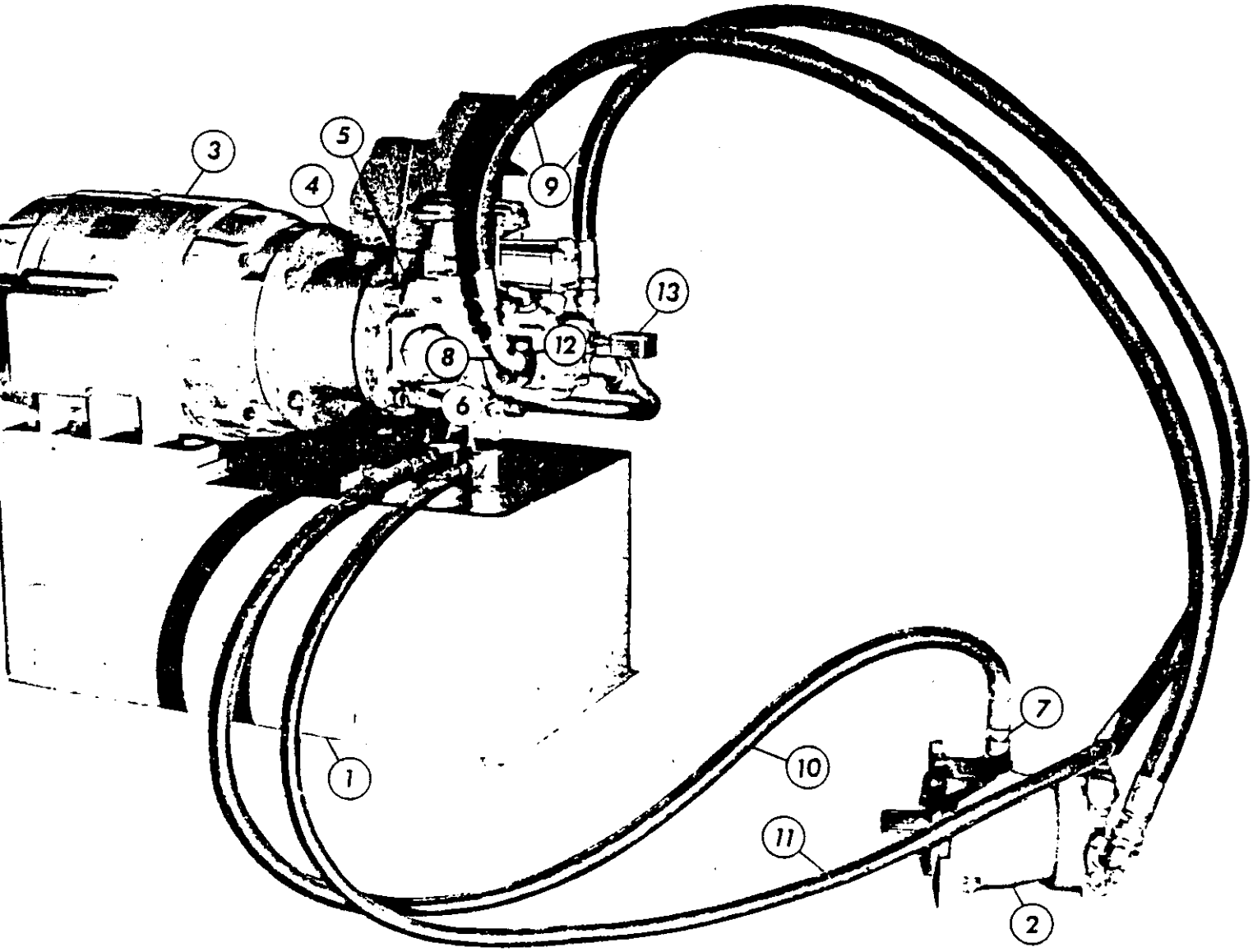
POWER UNIT SERVO-CONTROL (TYPICAL)



REF NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-540	HYDRAULIC CONTROL MOUNTING PLATE	1
2	P-541	CAM CONTROL ARM	1
3	P-542	CONNECTING ROD ASSEMBLY	1
4	P-543	CAM	1
5	P-544	SPRING ADJUSTING SCREW	1
6	P-545	CAM CONTROL ARM SPRING	1
7	P-547	BEARING	2
8	P-548	CAM FOLLOWER	1
9	P-332	SERVO-SLAVE ARM	1
10	P-331	SERVO-SLAVE HYDRAULIC REMOTE CONTROL	1
11	P-546	BRAKE SWITCH	1
12	P-549	SPACER	1
13	P-550	VALVE CONTROL LEVER	1
14	P-498	ECCENTRIC CAM (Speed Adjustment)	2
15	P-558	TUBE FITTING (90 Degree)	4
16	P-556	COPPER TUBE (1/4"X 50 Ft.)	2
17	P-557	TUBE FITTING (Straight)	2
18	P-553	HYDRAULIC MASTER CONTROL	1
19	P-554	HYDRAULIC MASTER CONTROL LEVER	1
20	P-555	HYDRAULIC BLEED VALVE	1
21	P-336	FILTER CONTAMINANT SWITCH	1
22	P-654	SUCTION FILTER	1
23	P-649	SIGHT GAGE	1
24	P-337	TANK FLOAT SWITCH	1
25	P-651	HYDRAULIC POWER UNIT ASSEMBLY	1

The Number in the "No. Req." Column Indicates the Number Required

HYDRAULIC ECCENTRIC DRIVE ASSEMBLY



REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-283	RESERVOIR	1
2	P-328	HYDRECO MOTOR	1
3	P-650	ELECTRIC DRIVE MOTOR (30 H. P.)	1
4	P-653	PUMP MOUNTING ADAPTOR	1
5	P-327	HYDRECO PUMP	1
6	P-340	SWIVEL UNION ADAPTOR (90 Degree)	2
7	P-346	ADAPTOR	1

* Not Illustrated.

REF. NO.	PART NO.	NAME OF PART	NO. REQ.
8	P-326A	BENT STEM ADAPTOR	4
9	P-322	HIGH PRESSURE HOSE ASSEMBLY (Less 90 Degree Adaptor)	2
10	P-342	CASE DRAIN LINE (3/4")	1
11	P-551	LOW PRESSURE RELIEF LINE (5/8")	1
12	P-325	SPLIT FLANGE	4
13	P-319	PRESSURE GAGE (0 to 500 Lbs.)	1
*	P-329	MOTOR PUMP COUPLING	1

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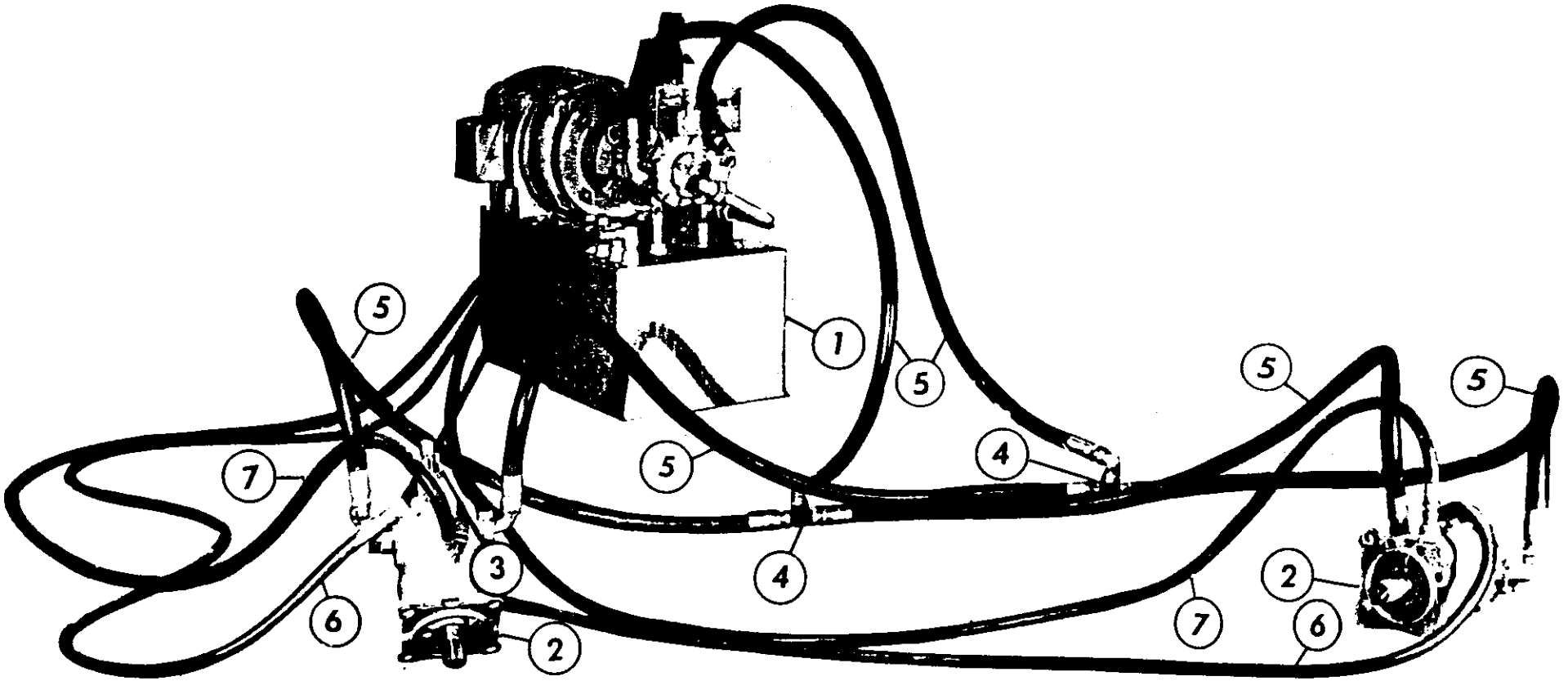
HYDRAULIC ROTATION DRIVE ASSEMBLY



REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-651	HYDRAULIC POWER UNIT ASSEMBLY	1
2	P-328	HYDRECO MOTOR	2
3	P-315	HIGH PRESSURE GAGE	1
4	P-323	HIGH PRESSURE TEE	2
5	P-322	HIGH PRESSURE HOSE ASSEMBLY	6
6	P-347	CASE DRAIN LINE (3/4")	2
7	P-552	LOW PRESSURE RELIEF LINE (3/4")	2

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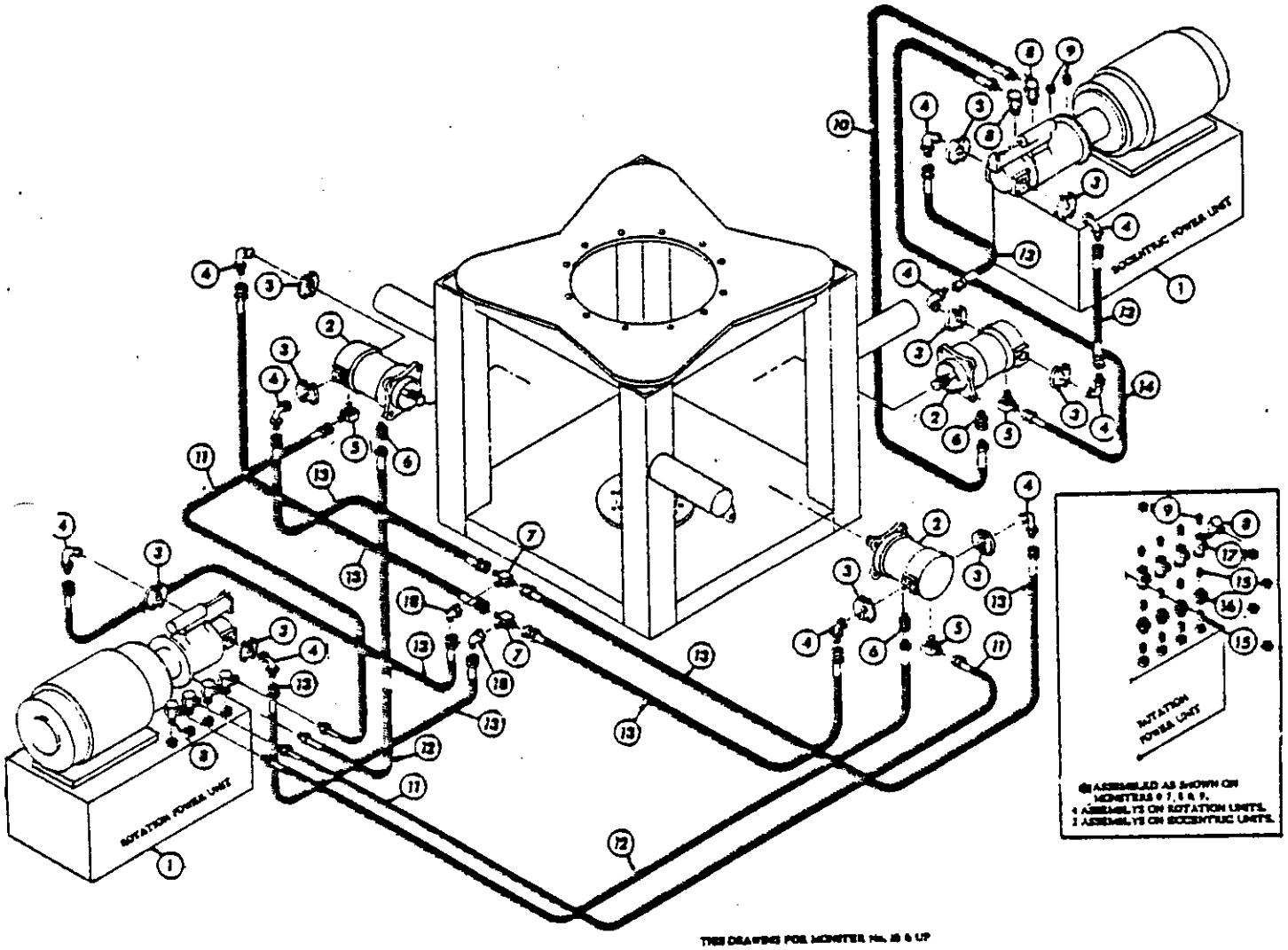
MONSTER DRIVE HYDRAULIC ASSEMBLY

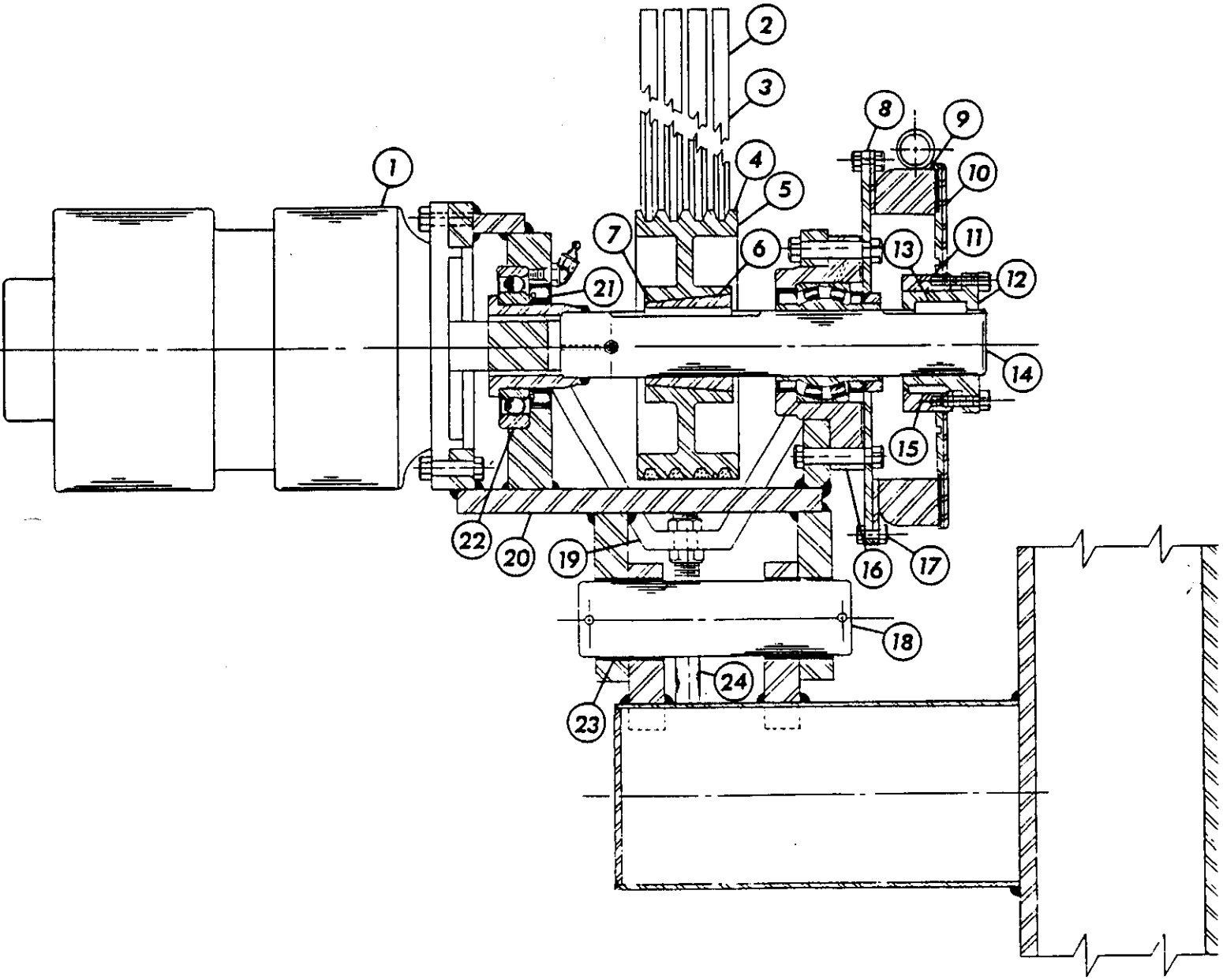


THIS DRAWING FOR MONSTER No. 10 & UP

REF NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-644	POWER UNITS	2
2	P-328	HYDRECO MOTOR ASSEMBLY	3
3	P-325	SPLIT FLANGE ASSEMBLY (Complete) (2522-16)	10
4	P-326A	BENT STEM ADAPTER-90 Degree, SF15908-16-16, J. I. C. TO FLANGE ADAPTER	10
5	P-341	ELBOW, 90 Degree, SF1048-8-103 O-RING TO J. I. C. ADJUSTABLE	3
	P-346	SWIVEL ADAPTER, SF15858-12-12S O-RING TO FEMALE PIPE	3
7	P-323	HIGH PRESSURE TEE SF1031-16-16S J. I. C.	2
8	P-340	SWIVEL ADAPTER UNION SF1037-16-12S, 90 Degree MALE PIPE/FEMALE PIPE SWIVEL	6
9	P-565	PLUG (1" Black Pipe)	2
10	P-342	CASE DRAIN LINE HOSE ASSY. 212 P12-PM12-PM12 X 84" LONG	1
11	P-552	LOW PRESSURE RELIEF LINE HOSE ASSY. 215 P10-JS10-PM12 X 168" LONG	2
12	P-347	CASE DRAIN LINE HOSE ASSY. 215 P12-PM12-PM12 X 168" LONG	2
13	P-322	HIGH PRESSURE HOSE ASSY. 217 P16-JS16-JS16 X 84" LONG	8
14	P-551	LOW PRESSURE RELIEF LINE HOSE ASSY. 215 P10-JS10-PM12 X 84" LONG	1
15	P-562	1" CLOSE NIPPLE	12
16	P-563	1" BLACK UNION	6
17	P-564	45 Degree "Y"	6
18	P-324	90 Degree SWIVEL ELBOW L & L 16-SW-6	2

Everly
AIRCRAFT CO.
SALEM, ORE.

HYDRAULIC MOTOR DRIVE ASSEMBLY



HYDRAULIC MOTOR DRIVE ASSEMBLY

REF. NO.	PART NO.	NAME OF PART	NO. REQ.
	P-280	HYDRAULIC DRIVE SYSTEM	3
	P-243	2 SETS OF (4) "V" BELTS (Rotation)	8
	P-244	1 SET OF (4) "V" BELTS (Eccentric)	4
	P-239	DRIVE SHEAVE (4 Groove) (Rotation)	2
	P-237	DRIVE SHEAVE (4 Groove) (Eccentric)	1
	P-250	TAPER LOCK BUSHING	3
	P-265	KEY	3
	P-211	BRAKE PLATE	3
	P-267	BRAKE MAGNET	3
	P-268	BRAKE ARMATURE	3
	P-269	SPLINED HUB	3
	P-270	BUSHING	3
13	P-271	KEY	3
14	P-183	DRIVE COUNTERSHAFT	3
15	P-272	BUSHING KEY	3
16	P-273	COUNTERSHAFT INNER BEARING	3
17	P-274	BRAKE MAGNET BOLT ASSEMBLY	24
18	P-184	DRIVE HINGE PIN	3
19	P-275	BELT TIGHTENER YOKE	3
20	P-182	DRIVE MOTOR MOUNT	3
21	P-276	SEAL	3
22	P-277	COUNTERSHAFT OUTER BEARING	3
23	P-278	BRONZE BUSHING	12
24	P-281	BELT TIGHTENER BOLT ASSEMBLY	3

ER TO HYDRECO MANUAL

TROUBLE SHOOTING THE MONSTER HYDRAULIC SYSTEM

nding the cause of trouble on any pump or motor installation quires some "know how" and good common sence. When tr- ble develops, DON'T START TAKING THE UNITS APART. ALYZE THE PROBLEM FIRST AND GIVE IT A LOT OF OUGHT BEFORE YOU ACT.

Before you look for trouble in the units themselves, check installation carefully, (2) During maintenance operations, sure to keep all parts clean. (3) Take care that dirt does enter the system. (4) Clean all new parts prior to instal- ion. (5) After completion of maintenance, check fluid level fore re-starting system. (6) Then follow re-starting pro- dures as outlined on the following page.

EXCESSIVE NOISE-Cavitation or internal damage from con- mination are the most common causes of excessive pump or tor noise.

Check the filter on the pump inlet line. A dirty filter will use cavitation. (2) Check for restrictions in the inlet line. defective hose or a plugged line will cause cavitation. (3) eck for the proper oil. Heavy oil will cavitate the pump. Use p Transmission Oil. (4) Water in the oil forms emul- n. ch acts like heavy oil. Check for water in the reservoir. move the case drain line and check for steel or brass rticles. Their presence indicates wear and damage of the ernal moving parts. A loss of pressure and flow as well as ise may be noticed. If so, the unit is probably damaged be- nd field repair and should be returned to the factory for re- ilding.
PORTANT-Dirt or any foreign matter will cause damage to y internal moving part. (6) Excessive air entrained in the will also cause cavitation and noise.

OVERHEATING-Overheating indicates pump or motor slip- ge and lost horsepower.

Excessive wear of internal parts, generally due to con- mination, can cause excessive slippage and overheating. (2) relief valves are bypassing, this will cause excessive wear d heat. (3) Maximum oil operating temperature should not ceed 200 degree F.

NO PRESSURE-If pressure will not build up in the system, eck for malfunctioning of relief valve, wear or damage of ernal moving parts or excessive air in the oil.

Install a 6000 PSI gage on a motor as shown on Fig. 1 (2) pressure does not build up, make the following checks: (A) move the high pressure pilot relief assembly from motor heck Fig. 2, 3 or 4 to determine arrangement of parts.) (B) eck all "O" rings for cuts or extrusions. In re-assembly, clean all parts, coat "O" rings with petroleum jelly and seat properly. (3) Excessive flow from the case drain may indicate seperation between valve plate and cylinder body. Flow from the case drain should not exceed 1/2 GPM for each 1000 PSI working pressure. The appearance of steel or brass particles indicate this excess flow may be due to contamination. (4) Refer to paragraph IV "Air in Oil" for other causes of no pressure. (5) Check charge pump pressure. See Fig. 5, 6 or 7. Correct pressure should be 100 to 150 PSI, maximum should not exceed 300 PSI.

IV AIR IN OIL-Air entrained in the oil can be the cause of noise, low pressure and low volume.

(1) Check all line connections, especially the inlet line, for possible leaks which could permit air to get into the system, (2) Check oil level in the reservoir. Low oil level will allow air to enter the system through the inlet line. (3) If oil level is below the return line, turbulence is created which will introduce air into the oil.

V LOSS OF CONTROL-Control of pumps and variable motors depends on pilot oil pressure from the charge pump. In case of control malfunction, install a gage in the gage port (Fig. 5, 6 or 7) and check charge pump pressure. 100 to 150 PSI working pressure is normal, maximum should not exceed 300 PSI.

(1) Check for dirty oil filter or plugged line. (2) The "O" ring between the pump and control housing may be defective. (3) Low oil level in the reservoir. (4) Faulty relief valve. (5) Charge pump worn out. (6) Examine check valves for possible sticking. See Fig. 5

VI FAILURE OF CONTROL LINKAGE-Loss of control may be due to mechanical rather than hydraulic causes.

(1) Check for external linkage to the control for loose or broken connections. (2) Malfunction of the internal mecnanism may be checked by moving the control lever. If no response, check for (See Fig. 7) A broken pin on lever arms, (B) Broken cam follower, (C) Broken pressure override spring. (D) Broken sleeve spring. (E) Sticking valve sleeve, (F) Damaged or cut "O" ring on piston. (3) For malfunction of hydronic control. Refer to hydronic service bulletin in your manual.

VII LEAKING SHAFT SEAL
(1) Remove the seal retainer (See Fig. 9) and replace the lip seal. Install seal with lip towards the shaft extension. (2) Press in until seal is recessed 1/8". (3) When re-installing seal retainer and new seal, use a sleeve or thin wall socket over the spline to prevent damage to the lip. Pack seal with clean grease before installing.

TROUBLE SHOOTING THE MONSTER HYDRAULIC SYSTEM

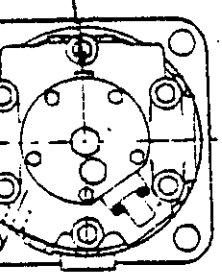


FIG. 1

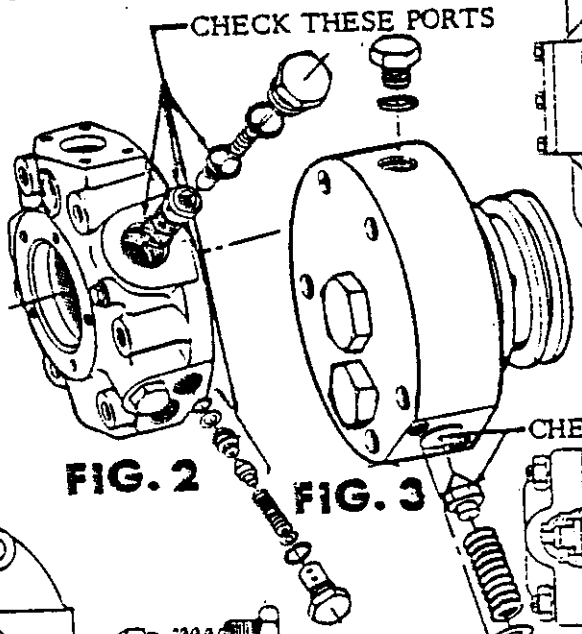


FIG. 2

FIG. 3

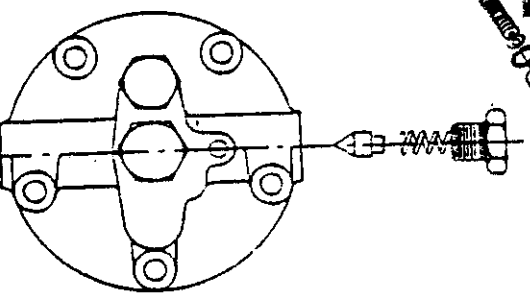


FIG. 4

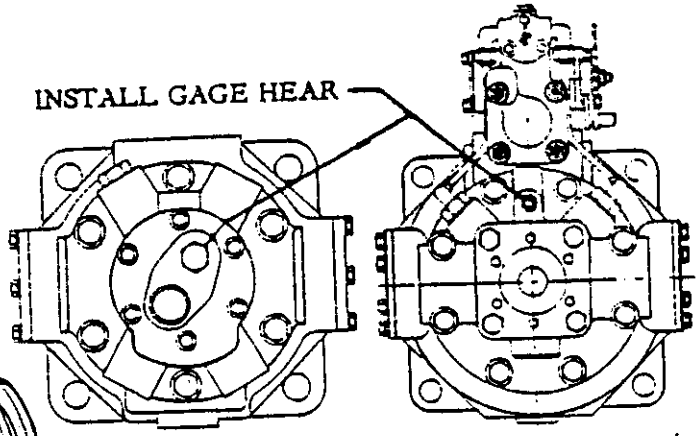
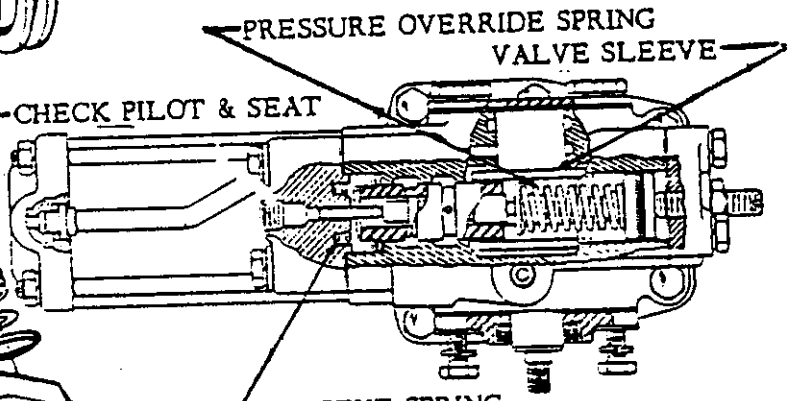


FIG. 5

FIG. 6



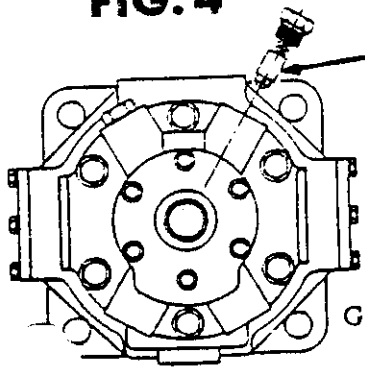


FIG. 8

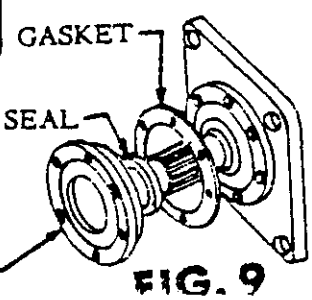


FIG. 9

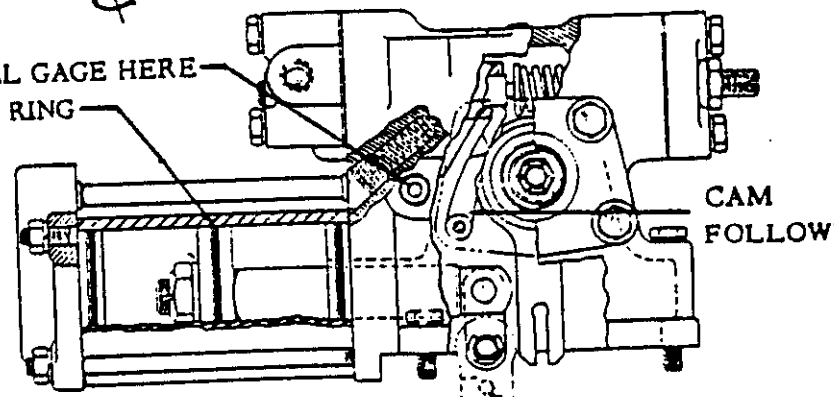


FIG. 7

PRECAUTIONS FOR RE-STARTING SYSTEM

rain precautions should be taken prior to re-starting your tem after completion of a maintenance operation.

the below procedures should be taken prior to re-starting r system after completion of a maintenance operation.

of the below procedures should be followed if an overhaul our system was performed.

ne of the more basic repairs do not require adherence to of these procedures, however, you should review the below erial and follow those steps which are pertinent.

MOUNTING PUMP & MOTORS

st grease the spline with non-corrosive grease, then bolt pump to its flange. Follow the same procedure for mount- the motor, first greasing the spline and then bolting the or to its mounting flange.

USE GOOD HYDRAULIC PRACTICES

sur e interiors of reservoir, connections and fittings are fec clean.

BEFORE OPERATION

sure all lines and connections are set up according to your tem layout.

BE SURE SYSTEM IS FULL

npletely fill the reservoir, being sure that all the fluid goes ough a mesh or gauze strainer.

DISCONNECT LOAD

ossible, disconnect the motor so that the transmission may started without putting an excessively heavy load on it. Now, sure the pump control lever is in neutral position,

STARTING THE INSTALLATION

After the previous requirements have been met, start the power source.

(G) FIRST START

Move your DYNAPOWER pump control lever slowly into the forward or reverse position. Assuming you do get immediate motor response, run the system slowly in both directions for 10 or 15 minutes to bleed all the remaining air from the system. If there is no motor output, shut off the system and refer to the Trouble Shooting Chart Section for possible causes, if motor direction does not correspond to direction of rotation designed for movement of control lever, high pressure lines must be switched on the pump or motor. Check control lever linkage for no binding and complete movement, or stop-to-stop. Be certain that proper charge pump pressure is attained.

(H) SYSTEM RUN-IN

During the low-speed run-in in both directions, noise level of the pump and motor will decrease steadily as air continues to bleed from the system. After about 15 minutes of running, check the fluid level in the reservoir. If the bleeding of the system has caused a large drop in the reservoir level, add more oil to bring it up to the point required. Be sure to filter or strain this added oil in the manner previously outlined.

(I) FULL SCALE RUN-IN

Then, if possible, operate your DYNAPOWER under actual working conditions. Test for peak performance under the heaviest loads you may encounter; check for smoothness of starts and stops in both directions under extreme loads and light loads. Try quick starts and stops; try slow ones. Check for steadiness of power flow throughout the entire range of system speed. Finally, go over all connections, checking for possible leaks and tighten as required. Check the fluid supply in the reservoir again and refill to proper level.

Your system is now on full scale operating status. Remember, KEEP YOUR SYSTEM ABSOLUTELY CLEAN AT ALL TIMES.

CLEVELAND AIRCRAFT CO. SALEM, ORE.

HYDRONIC REMOTE CONTROL INSTALLATION & FILLING INSTRUCTIONS

WARNING

Dirt, chips or other foreign material are the enemy of this Hydronic Remote Control System. It gets into valves "A" and "B", cuts piston seals and scores cylinder walls causing the control to malfunction.

Be sure that all tubing and fittings used to pipe the system are absolutely clean and that any container used for the oil is clean.

This control was both static and power tested and operated perfectly when it left the factory. If it is properly filled and bled and the above instructions on cleanliness are followed, it will give trouble free service for many thousands of cycles.

GUARANTEE

This Hydronic Remote Control is guaranteed for six months against defects in material and workmanship and guarantee is limited to repair or replacement when the control is returned to the manufacturer transportation prepaid. This guarantee is void if the control is altered, misused or abused with the manufacturer to be the sole judge.

I. DESCRIPTION

The Hydronic Remote Control is a positive remote positioning device in which the movement applied to the Master Unit is duplicated by the Slave Unit at some remote position. Due to temperature compensation, the relative position between the levers of the Master and Slave Units remain in synchronization even during wide varations of temperature.

e compensation for expansion and contraction of the fluid obtained by floating cylinder heads in the Master Unit. These ..oating cylinder heads are connected by racks and pinion so that they move in and out equally thus forming equal expansion reservoirs on each side of the system. The floating cylinder heads are free to move when there is no load on the control but lock immediately when a load is applied.

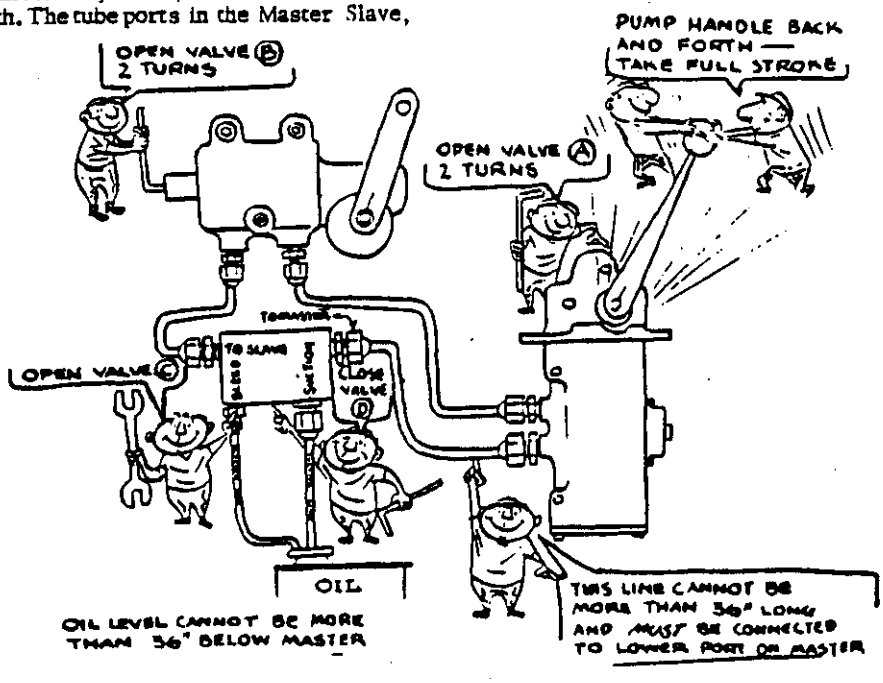
II. MOUNTING THE MASTER & SLAVE UNITS

The Units should be rigidly mounted. The Master Unit is designed primarily for tabletop mounting through a hole 1-7/8" wide by 3-3/4" long. The Master can also be mounted by means of two holes through the body. Both Master and Slave can be mounted in any position.

The Units should be connected by two 1/4 inch O.D. tubes of EXACTLY the same length. The tube ports in the Master Slave, Filler and Bleeder are 7/16-20 threads for SAE straight thread tube fittings with "O" Ring seals. Be sure tubing and fittings are absolutely clean. The Filler and Bleeder Fitting is placed in the tube connecting to the LOWER connection of the Master Unit. This is the connection farthest away from the handle if the Master is mounted other than vertical (see illustration). The Filler and Bleeder Fitting MUST be mounted in the line in the position shown in the illustration with suction line down and with the port marked "To Master" connected to the lower port on the Master. It is best to place the Filler and Bleeder Fitting in the tube as close to the Master Unit as possible, preferably 12 inches or less but never more than 36 inches. It should also be located in such a manner that the level of the oil in the filling can is never more than 36 inches below the Master Unit.

III. FLUID

One quart of Hydronic Remote Control Fluid No. X-232 is furnished with each Control. X-232 Fluid was developed after exhaustive tests and no other oil should be used at operating temperatures between -30 degree and +200 degree. One quart of fluid is sufficient for systems up to 50 feet between Master and Slave.



IV. FILLING & BLEEDING WITH S2 SLAVE

1. The entire Hydronic Remote Control system can be filled with oil and bled of air by following the procedure as shown in the illustration.

2. When the entire system is mounted and all pipe connections are tight the cap should be removed from the connection marked suction, and the suction line attached. The bleeder tube should be slipped onto the fitting marked "bleed". Be sure the synchronizing valve "A" in the Master Unit is screwed all the way in-then loosen it two turns. Do the same with synchronizing valve "B" in the Slave Unit. Open the bleed valve "C" about THREE turns and close valve "D" located between bleed valve "C" and suction in the Filler and Bleeder fitting. Valve "D" should not be forced after bottoming. Valve "A", "B" and "D" require a 5/32" allen wrench.

3. Now place the suction line and bleeder tube in a can of CLEAN oil (see III) and start pumping the handle on the Master Unit back and forth taking full stroke. It is necessary to pump quite rapidly to prime. As soon as the system is primed it will immediatly be felt, then continue to pump the handle of the Master Unit at a slower rate. Oil will very soon start coming out of the bleeder tube as it passes from the Master through the Slave and back to the Filler and Bleeder fitting. During this process the slave lever should be moved back and forth slowly through its full stroke to quickly remove all air from the slave. At fi[illegible]the oil coming out of the bleeder fitting will contain air [illegible]e Master Handle should continue to be pumped and the s[illegible] lever moved until no more air but clear oil comes out of the bleeder tube. The system is now filled with oil and bled of air and the next step is to fill expansion reservoirs in the Master.

4. To fill expansion reservoirs proceed as shown in illustration. Close valve "C" bur leave valves "A" and "B" open and valve "D" closed as before. Place 5/32" allen wrench in the screw holding the pointer on the dial of the Master. At this time the pointer should point to empty and if it does not, loosen the screw and move the pointer to empty and again tighten the screw. Now with the allen wrench turn the pointer CLOCKWISE until the pointer points to the surrounding temperature and continue pumping the Master Handle. This will be a very slow motion as you are pumping only enough oil to fill the expansion reservoirs. If the Master and Slave are more than 10 feet apart it is not necessary to use the allen wrench to turn the pointer on dial of Master. Moving handle of Master back and forth (this will be a very short stroke) will move the pointer slowly without using wrench.

5. CAUTION: It is very important that the pointer be positioned reasonably accurate, otherwise the unit will not operate satisfactorily through the entire temperature range.

6. As a safety precaution, there are small bleeder holes in the side of the Master Unit and if the system is overfilled, oil will leak out of these holes. In this case some oil should be removed from the system by opening valve "C" until the pointer points to the surrounding temperature.

7. [illegible]e Hydronic Remote Control should now be completely fi[illegible] and bled. Remove the bleeder tube from valve "C". Open valve "D" five turns. CAUTION do not attempt to open valve "D" past this point or remove as threads have beeb peened to prevent this. Remove the suction tube and recap the fitting TIGHTLY.

8. With valves "A" and "B" still open, it is possible to move both the Master and Slave levers into any required relation to each other. Then close valves "A" and "B" TIGHTLY and the controls should be ready for operation with the Master and Slave levers remaining in the relation in which they were set regardless of time or temperature changes.

9. The relation of the Master handle and the Slave lever can be changed by opening either the valve "A" or valve "B". When changing this relation at the Master Unit, valve "A" should be opened SIX turns, Both valves "A" and "B" must be closed TIGHTLY in order for the control to operate correctly under load.

10. If sponginess is evident between the Master and Slave Units it indicates there is still air in the system. This is because it is sometimes difficult to get all air out of the Slave when it is mounted in certain positions. This can be remedied by repeating the filling and bleeding procedure and moving the lever of the Slave back and forth slowly through its full stroke while pumping oil through the system with the Master.

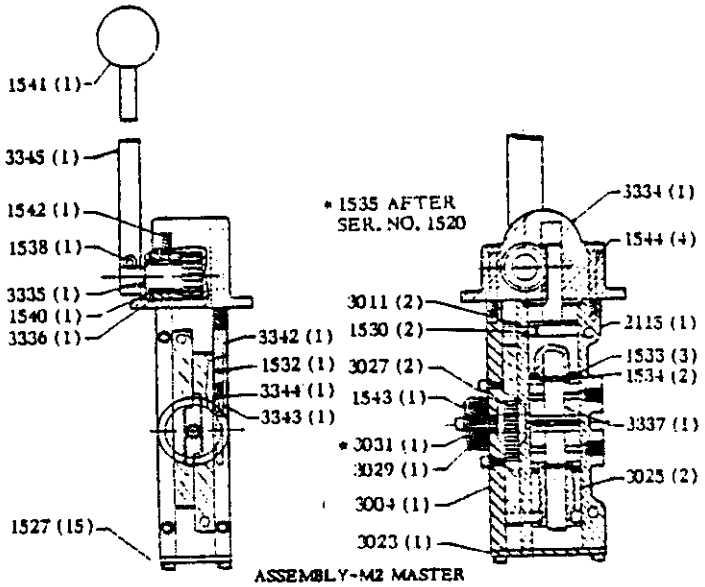
V. SUPPLIMENTAL INFORMATION

1. All Hydronic Remote Controls are filled and operated 100 cycles to test for operation and leakage before shipment. [illegible] they do not operate correctly when installed it is because they are not properly piped and filled or because there is dirt or chips in seat of valves A & B. Therefore, when installing, use great care to insure that there is no dirt or chips in the tubing or fittings, If the Master and Slave creep in relation to each other it is because of dirt or chips in seat of valve A or B. Do not attempt to stop creep by tightening valve A & B tighter than normal. Alternately open valve A & B and flush dirt out by moving lever of Master. This will generally eliminate trouble unless the valve seat has been marred by the chip.

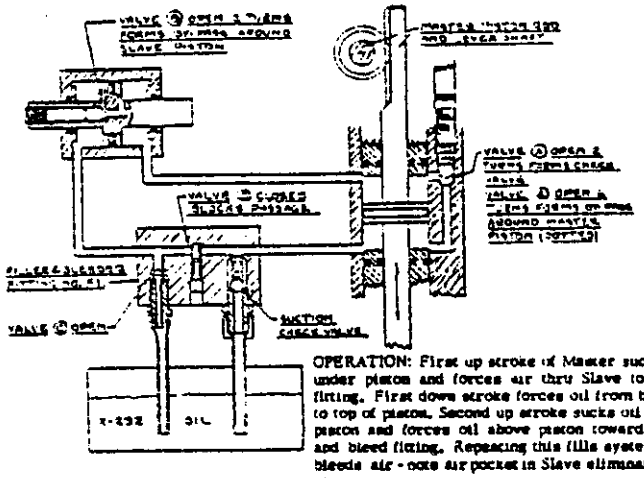
2. Always use take-off hole in Slave lever nearest the shaft that will give stroke desired. This will keep the load on the control to a minimum which will, in turn, give greater sensitivity and longer life.

3. In the first 24 hours after the Remote Control has been filled, the pointer on the Master Unit will drop five to ten degrees, This is caused by setting of the seals and obsorption of fluid into them. To compensate for this, it is advisable to set pointer five to ten degrees above surrounding temperature when filling unit.

4. If it is necessary to use Flexible Hose in the lines between the Master and Slave, use only all metal hose such as Titeflex or Pennflex. Synthetic rubber lined hose or nylon tubing absorbs considerable quantity of fluid causing the Control to become empty even though there are no external leaks. This makes it necessary to refill and bleed the system periodically and quite often if much synthetic hose is used.

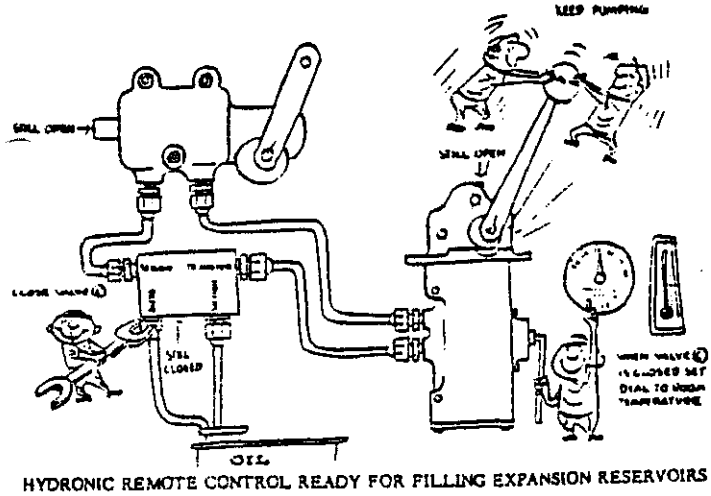


ASSEMBLY-M2 MASTER

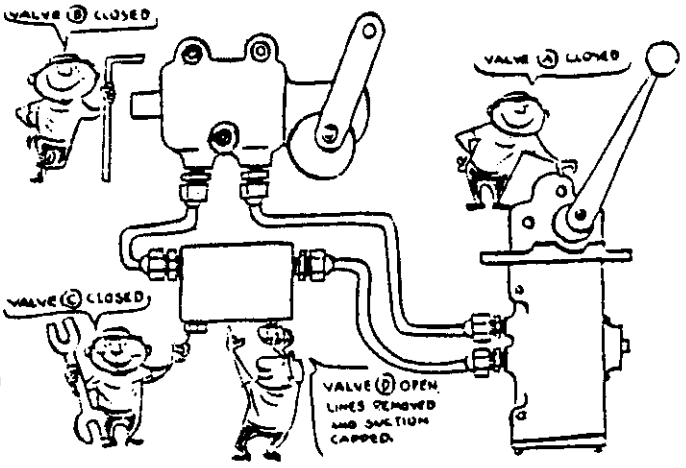


OPERATION: First up stroke of Master sucks oil under piston and forces air thru Slave to bleed fitting. First down stroke forces oil from bottom to top of piston. Second up stroke sucks oil under piston and forces oil above piston toward Slave and bleed fitting. Repeating this fills system and bleeds air - note air pocket in Slave eliminated by piston movement.

CIRCUIT DIAGRAM SHOWING HOW HYDRONIC REMOTE CONTROL MASTER UNIT CONVERTS TO A PUMP FOR FILLING SYSTEM WITH OIL AND BLEEDING AIR.



HYDRONIC REMOTE CONTROL READY FOR FILLING EXPANSION RESERVOIRS



HYDRONIC REMOTE CONTROL READY FOR USE

HYDRONIC REMOTE CONTROL SERVICE INSTRUCTIONS

When the Hydronic Remote Control is properly installed with all tube fittings tight and filled with clean oil of the proper grade, no service should be required for long periods of time. Need of service will generally be indicated by the Master and Slave Units getting out of phase with each other. This is usually caused by worn "O" ring seals which must be replaced. If the screws holding spring cover sub-assembly 3031 have been loosened, the springs will unwind and the Control will malfunction. If this has happened before filling, the Control will not fill properly. If the screws are loosened after filling, the Unit will become spongy as if it were not properly filled. To correct, read Assembly of Master Unit.

Lost motion in Master or Slave levers will generally be between lever shaft and piston rack teeth, not in lever serrations. Correct by adjusting bushing 3336 as in paragraph 9 Assembly Master Unit.

When the Master and Slave Units get out of phase with each other it is because of leakage, either internal or external. To determine whether the leakage is internal or external it is only necessary to observe the pointer on the Master Unit. If this pointer has dropped below its normal position for a given surrounding temperature, the leakage is external. If the pointer is in its normal position but the Master and Slave still get out of phase, it indicates that the leakage is internal. If internal leakage is indicated, the first thing to do is to inspect by-pass and check valve 3342 on the Master and by-pass valve 3009 in the Slave to be sure they are closed tightly. If this does not correct the trouble, the "O" ring seals on the pistons of the Master or the Slave Unit, or both, are worn and must be replaced. As it is impossible to tell whether the internal leakage is occuring in the Master or Slave Unit it is necessary to replace the "O" rings in both.

If external leakage has been indicated, the first thing to do is to examine all tube connections. If no leakage can be found at these points the Slave should be examined next. Any external leakage in the Slave can be noted visually at the head end or around the lever shaft bushing. If there is no visable evidence of external leakage, it will be in the Master Unit which should be disassembled to correct the leak.

ISASSEMBLY OF THE MASTER UNIT

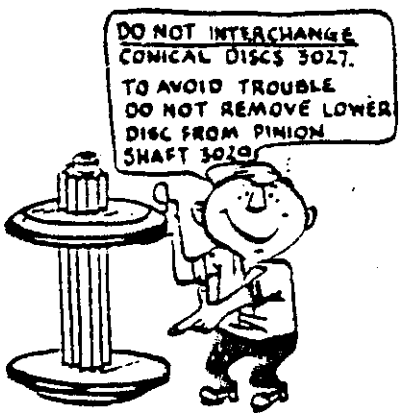
Before starting to disassemble the Master Unit it is advisable to study the complete "Disassembly and Assembly Instructions". Certain parts are selectively fit and laying them out in their proper order during disassembly is helpful in getting them back in their original position,

It is advisable, but not necessary, to first remove the lever shaft and bushing assembly 3335 and 3336. This is done by loosening the set screw 1542 in the cover and then pulling the lever shaft and bushing out of the cover.

Next remove end cover 3334 by removing four screws 1544. End cover 3023 should also be removed by removing the four screws which hold it in place.

Spring cover sub-assembly 3031 should now be removed in the following manner: First the screw and pointer 1543 are removed. Next the two screws holding 3031 spring and cover sub-assembly to 3004 body plate are loosened slightly. The springs in this cover are pre-loaded one full turn in a counter-clock-wise direction so when the screws are loosened the cover will rotate one full turn in a clock-wise direction. If the screws holding the cover are loosened rapidly and the cover allowed to snap around this one full turn, the springs are sometimes damaged. Loosening the screws slowly or holding the cover with a large plier will allow it to unwind slowly and prevent damage to springs.

Eight screws holding the body plate 3004 to the Master Body are now removed and the plate taken off. The two racks 3011, two conical discs 3027 and pinion shaft 3029 can now be removed by lifting up on pinion shaft 3029. At this point, care should be taken not to interchange conical discs 3027 as they are selectively fit. This can readily be done by not removing the lower one from pinion shaft 3029. It will only slide off towars the tapped end.

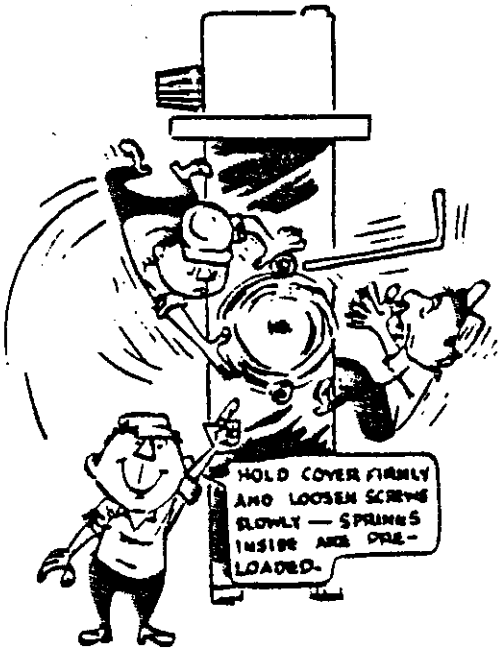


6. Now piston 3337 and one cylinder head 3025 can be removed by pulling on the piston rod. This should be done carefully with no side thrust od the rod which might scratch the cylinder wall. The other cylinder head 3025 can now be removed by removing into the cylinder bore with a bar and pushing it out. Great care should be used during this operation not to scretch the cylinder wall. A hammer handle or screw driver handle can be used and they will not injure the cylinder wall.

7. At any time during the disassembly operation, by-pass and check valve 3342 can be removed although it is not necessary except to examine "O" ring 1532. When this screw is removed spring 3344 and check valve 3343 will come out with it.

8. The entire Master Unit is now disassembled and can be examined. When removing the "O" rings from the piston 3337 and cylinder heads 3025, great care should be used not to scratch the bottom of the "O" ring groove.

9. If internal leakage has been evident and was not caused by screw 3342 being loose, it can only occur past the "O" ring on the piston.



10. Leakage past the piston "O" ring can occur for three reasons. 1. A worn or mutilated "O" ring. 2. Scratches in the bottom of the "O" ring groove from previous repair. 3. Scratches on the bore caused by using dirty oil in the system.

11. If there are no scratches on the "O" ring groove or the bore, replacement of the "O" ring 1533 will be all that is necessary. If there are scratches in the "O" ring groove these can generally be taken out with fine emery paper. If there are scretches in the bore it is necessary to replace the entire Master Body 2115.

12. If replacement of Body 2115 is necessary it is advisable to return the entire Unit to the factory. This is because it is almost always necessary to refit conical discs 3027 in order to make the re-assembled Master Unit operate properly.

13. If external leakage has been evident, it will occur at the external or internal "O" rings on cylinder heads 3025 or perhaps at "O" ring 1532 on valve 3342. The same examination and replacement procedure, outlined above for the piston, should be used for external "O" rings 1533 on cylinder heads 3025. Leaks past the internal "O" ring 1534 may occur because the piston rod is scratched but this is extreamely unlikely because this rod is chrome plated. Leaks at this point will generally be caused by worn "O" rings or scratches in the bottom of the groove from a previous repair. It is almost impossible to correct scratches in the bottom of the internal groove and cylinder head 3025 must be replaced.

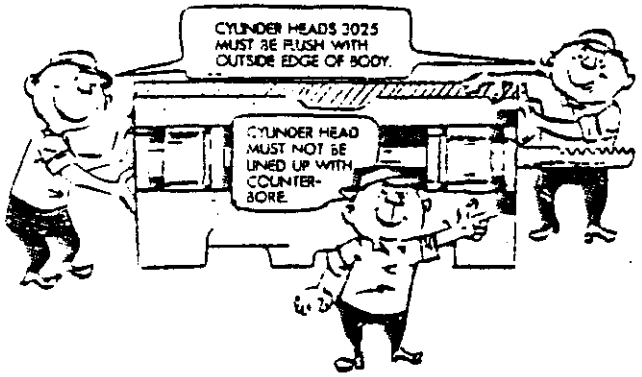
14. To replace "O" ring 1532 on valve 3342, if it is scratched or torn, it is necessary to remove spring 3344 and part 3343. This can be done with a pointed tool. Care should be taken not to bend end of spring as it is closed in to snap into groove in valve 3342 and part 3344 to hold it in place.

15. Regardless of the condition of the "O" rings, it is always advisable to replace all "O" rings except 1542 on valve 3342, with new ones while the Master Unit is apart.

ASSEMBLY OF THE MASTER UNIT

1. Before assembling the Master Unit, be sure that all parts are absolutely clean and free from grit. All new "O" rings should be well lubricated, preferably with a light grease, so they will slide easily and not cut when they squeeze into place. Racks 3011 and rack end of piston 3337 should also be lubricated lightly with grease.

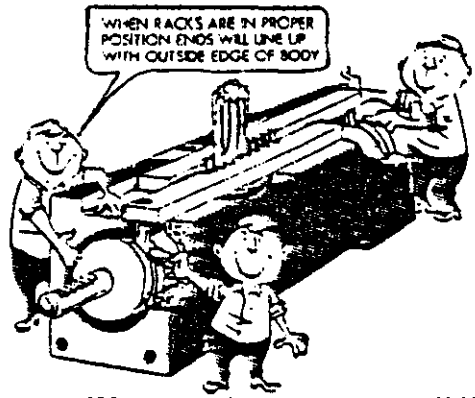
2. First slide one cylinder head 3025 into Master Body so that it is exactly flush with the end of the Body as shown in sketch. When sliding these cylinder heads in it should be done slowly so that the "O" ring will not cut when it reachs the end of the rack pin groove.



3. Now slide the piston into the Body from the opposite end, using the same slow procedure, and position it approximately in the center. Now the cylinder head 3025 can be slid over the piston rod and into the Body, again positioning it so that the end is exactly flush with the end of the Master Body.

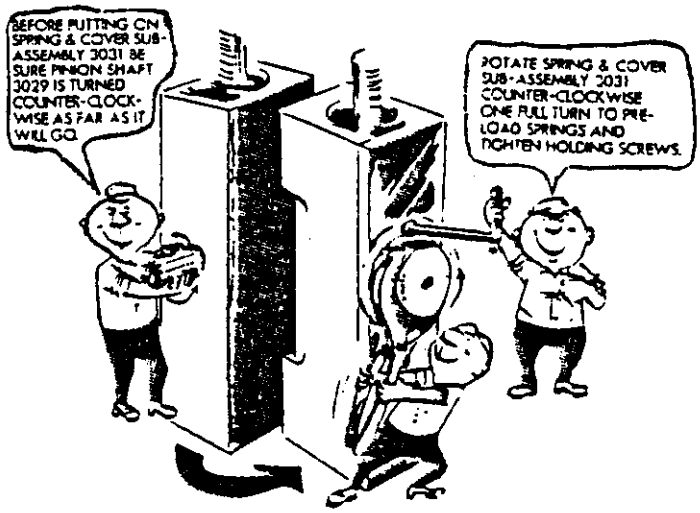
4. The reason for placing the cylinder heads so their ends are flush with the Master Body, is because they must always be e distance from the center when they are moved in and o / racks 3011 and by placing the pistons flush with the end of the Body and assembling the racks into them while they are in this position, this condition is assured.

5. Next, place pinion 3029 with lower conical disc 3027 still in place, into the Body. Now racks 3011 can be dropped in place. When the racks are in the right position pin 1530 will drop into the groove of floating cylinder heads 3025 and they will also fit into the teeth of pinion 3029 without tilting it. When



6. After cover 3004 is in place, pinion shaft 3029 should be turned counter-clock-wise as far as it will go. This will move cylinder heads 3025 to their innermost position. The force required to turn pinion 3025 counter-clock-wise should be only enough to overcome the drag of the "O" rings. If pinion shaft 3029 turns very hard or tends to bind, it is because there is some dirt in the rack groove or conical discs 3027 or the positions of the conical discs have been reversed. This condition should be corrected until pinion 3029 will turn with a light force.

7. Spring and cover sub-assembly 3031 should now be put in place. When this sub-assembly was removed, the springs will remain in the cover and should not be taken out. If for any reasons they were removed from the cover they should be re-assembled so that they both operate in the same direction and are in the position shown in picture at left.



8. Before putting spring cover sub-assembly 3031 into place it is advisable to again check and be sure that pinion shaft 3029 is turned counter-clock-wise as far as it will go. Now slide the cover in place on pinion 3029 and put in the two holding screws but do not tighten them. Now with a large plier or scrap wrench, rotate spring and cover sub-assembly counter-clock-wise one full turn to pre-load the springs, then tighten the holding screws. Pointer 1543 should now be put into place and locked with the screw so it points to "empty" on the dial. "Empty" mark may be in any position in relation to Master Body, depending on its position when it was put on pinion 3029. If the Master Unit is assembled correctly, pinion shaft 3029 and pointer can be turned clock-wise about 3/4 of a turn with a wrench in the pointer hold-on screw. When pressure on the wrench is released, the pinion shaft should again rotate counter-clock-wise so that the pointer comes back to "empty". If the pointer will not return to "empty" without aid from the wrench, it is because spring cover has not been rotated one full turn

9. ...ate piston 3337 so rack teeth are in position shown in Master Assembly Drawing and replace covers 3023 and 3024. Lever shaft and bushing assembly 3335 and 3336 should now be placed into cover 3334. Lever shaft bushing 3336 is eccentric so that it can be rotated to adjust the clearance between lever shaft gear and the rack on the master piston rod. By adjusting this carefully it is possible to eliminate all lash between lever shaft and piston rack without bind. Be sure locking screw 1542 is tight.

10. If the Master Unit has been in service for a long time, there may be some wear of the lever shaft gear and the piston rack. In this case it is necessary to put the lever shaft back into the Unit in the same position it was in originally so that the worn teeth on the lever shaft match the worn teeth on the piston rack. This can be done by the cut and try process until the bushing can be adjusted for zero lash and no bind.

11. If the by-pass and check valve 3342 with spring 3344 has been removed from the Unit it can be replaced anytime during assembly. When replacing it be sure that the "O" ring is well lubricated and that it is pushed in slowly until the "O" ring is in place in the bore. This completes the assembly of the Master Unit.

DISASSEMBLY & ASSEMBLY OF THE SLAVE UNIT

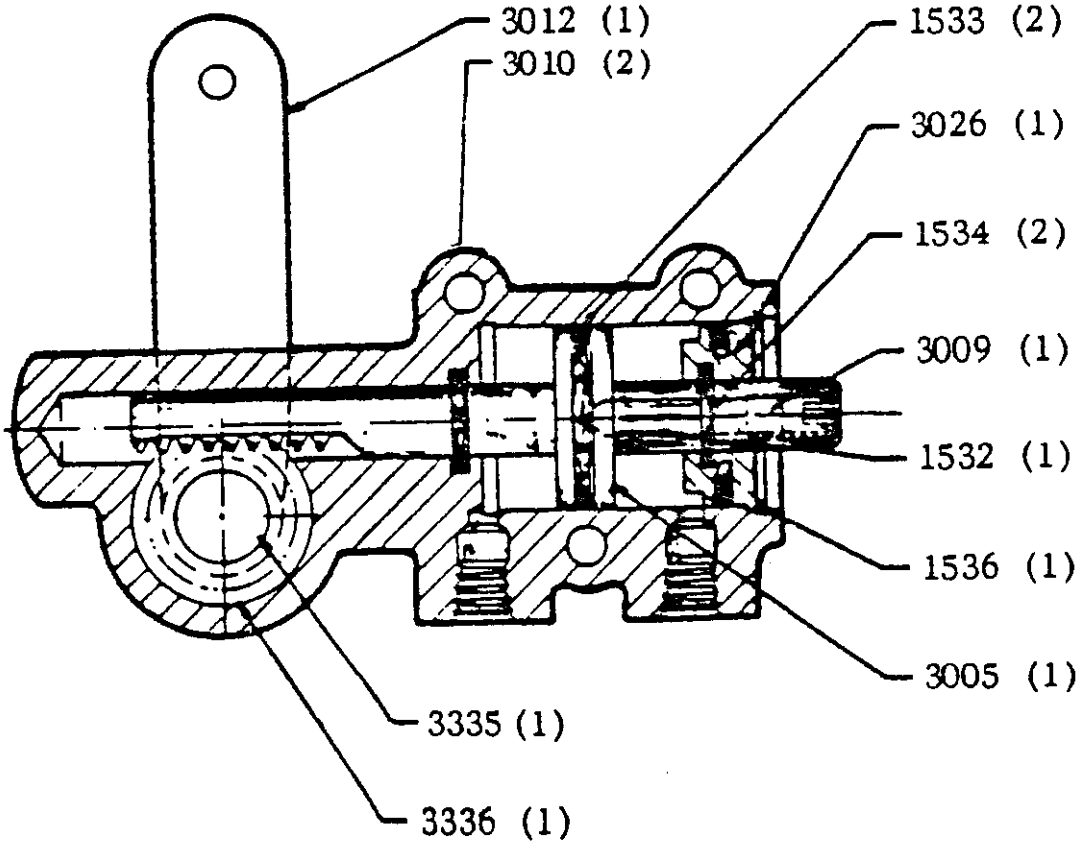
1. The Slave can be entirely disassembled simply by removing snap ring 1536. This is a spiral lock snap ring and can be removed by using the point of a knife or a small screw driver. Pry the hook on the end of the ring out and then with a rotary m...on the ring can be spiraled out of the groove. For easy d... sembly of the Slave, it is advisable to leave the lever 3... and the lever shaft 3335 in place.

2. After snap ring has been removed the lever shaft 3335 can be rotated so that the piston will push cylinder head 3026 out. Piston 3005 can now be removed without removing lever shaft 3335. This lever shaft and bushing assembly need not be removed at all except for convenience or inspection.

3. The same procedure and precautions are used in checking "O" rings and grooves in the Slave Unit as in the Master Unit. If external leakage has been observed at the rack end of the Slave piston rod and the "O" ring is not worn or there are no scratches on the piston rod, it is evident that the bottom of the "O" ring groove has been scratched on a previous repair and Body 3010 must be replaced. The same is true if external leakage has been observed at the piston rod in the cylinder head end of the Slave Unit. The external "O" ring on the cylinder head is static and should never give any trouble unless it is cut or mutilated.

4. Before assembling the Slave Unit, be sure that all parts are absolutely clean and free from grit. All new "O" rings should be well lubricated preferably with a light grease, so they will slide in easily and not cut when they squeeze into place. Rack end of piston 3005 should also be lubricated lightly with gearse.

5. If lever shaft 3335 has not been removed, it is necessary to mesh the rack teeth on piston 3005 into this gear. This can be very easily done by "feeling" the piston rod into place. When the piston is in place the cylinder head 3026 can be pushed into the cylinder bore and replacement of the snap ring completes the assembly of the Slave Unit.



ASSEMBLY-S2 SLAVE

HYDRECO

DYNAPOWER

Model 45 Piston Pump

VARIABLE DISPLACEMENT WITH SAE 1-3/4 SPLINE SHAFT & SIZE D FOUR BOLT MOUNTING FLANGE

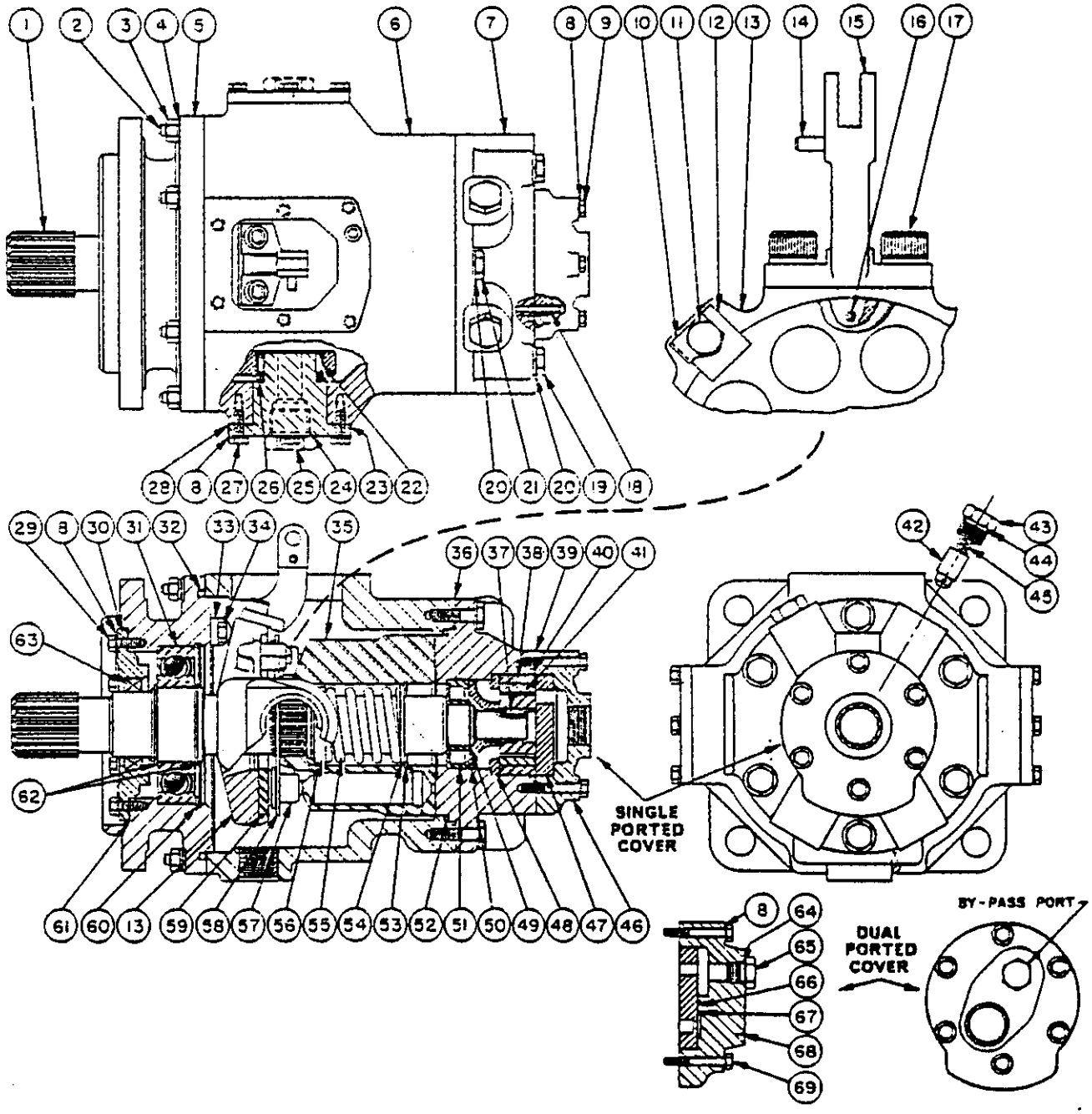
PARTS DRAWING
14-504.9
SHEET 1

Pumps less control | For Petroleum Base Oils | October 1, 1967

This drawing covers the following models

PLAIN TRUNIONS		PORTED TRUNIONS	
45-*PVAIA1AA(R or L)	*and*	45-*PVAIA2AA(R or L)	*Having single ported charge pump cover*
45-*PVAIA1AB(R or L)	*and*	45-*PVAIA2AB(R or L)	*Having dual ported cover with 3/16" by-pass port*
45-*PVAIA1AC(R or L)	*and*	45-*PVAIA2AC(R or L)	*Having dual ported cover with 7/8" by pass-port*

A number 1 in place of the asterisk denotes no cam stop is used - A number 2 in place of the asterisk denotes a 0° cam stop is used - See item 33 for part number



HYDRECO

DYNAPOWER

Model 45 Piston Pump

PART NUMBERS

1	840418	SHAFT
2	840027	STUD - 8 Req'd.
3	870565	HEX NUT - 8 Req'd.
4	870492	LOCK WASHER - 8 Req'd.
5	840442	MOUNTING FLANGE
6	830002	HOUSING ASSEM (Includes item 2)
7	840063	COVER (See kit J below)
8	870460	LOCK WASHER - 20 Req'd.
9	——	CAP SCREW (See specific model no.)
10	840282	TAB LOCK WASHER - 4 Req'd (See kit H below)
11	870181	CAP SCREW - 4 Req'd (See kit H below)
12	840019	GUIDE - 4 Req'd (See kit H below)
13	830095	CAM ASSEM (Includes items 16 & 22)
14	840057	PIN
15	830007	LEVER ASSEM (Includes item 14)
16	870045	PIN
17	870377	CAP SCREW - 2 Req'd.
18	870092	PIN
19	870264	CAP SCREW - 4 Req'd.
20	870492	LOCK WASHER - 8 Req'd.
21	870194	CAP SCREW - 2 Req'd
22	870647	BEARING - 2 Req'd.
23	——	TRUNION (See specific model no.)
24	——	O-RING (See specific model no.)
25	——	PLUG (See specific model no.)
26	840029	BEARING - 2 Req'd.
27	870160	CAP SCREW - 8 Req'd
28	840031	GASKET - 2 Req'd. (See kit L below)
29	870150	CAP SCREW - 6 Req'd.
30	830000	SEAL ASSEM (Includes item 63) See kit K below
31	870642	BEARING
32	875261	O-RING (See kit L below)
33	840150	CAM STOP - For models begining 45-2 only
34	870162	CAP SCREW - 2 Req'd
35	830150	BLOCK ASSEM (See kit H below)
36	840073	GASKET (See kit H & L below)
37	871054	PIN (See kits E,F & G below)
38	830041	SPACER ASSEM (Includes item 18) See kits E,F & G
39	870305	GASKET .001 Amoer) See kits A thru G & L below)
	870306	" .002 Red
	870307	" .003 Green
	870308	" .004 Blue
40	871231	O-RING (See kits E,F,G & L below)
41	830091	ROTOR (See kits E,F & G below)
42	840035	PLUNGER - 2 Req'd. (See kit J below)
43	840037	PLUG - 2 Req'd. (See kit J below) See note below
44	871908	O-RING - 2 Req'd. (See kits J & L below)
45	840036	SPRING (See kit J below)
46	——	COVER (See specific model no.)
47	——	PLATE (See specific model no.)
48	840038	PLATE (See kits E,F & G below)
49	870101	RETAINING RING
50	871140	O-RING (See kits E,F,G & L below)
51	870648	BEARING
52	871158	O-RING (See kit J & L below)
53	870103	RETAINING RING (See kit H below)
54	840023	SPRING RETAINER (See kit H below
55	840022	SPRING (See kit H below)
56	840021	SPRING RETAINER (See kit H below)
57	830003	PISTON ASSEM. - 9 Req'd. (See kit H below)
58	840018	PLATE (See kit H below)
59	840013	PLATE (See kit H below)
60	870104	RETAINING RING
61	840008	GASKET (See kit K & L below)
62	870102	RETAINING RING - 2 Req'd.
63	870106	SEAL (See kit L below)
64	——	O-RING (See specific model no.)
65	——	PLUG (See specific model no.)
66	——	PLATE (See specific model no.)
67	——	O-RING (See specific model no.)
68	——	COVER (See specific model no.)
69	——	CAP SCREW (See specific model no.)

45 - * PVAIA1AA(R or L)③ - PLAIN TRUNIONS

9	870220	CAP SCREW - 6 Req'd
23	840028	TRUNION - 2 Req'd.
46	840120	COVER - CW (See kit A below)
	840117	COVER - CCW (See kit B below)
47	840185	PLATE (See kit E below)

45 - * PVAIA1AB(R or L)③ - PLAIN TRUNIONS

23	840028	TRUNION - 2 Req'd.
64	871906	O-RING (See kit L below)
65	872675	PLUG - 9/16-18 Thd.
66	840353	PLATE - CW (See kits C & F below)
	840352	PLATE - CCW (See kits D & G below)
67	871021	O-RING (See kits C,D,F,G & L below)
68	840381	COVER - CW (See kit C below)
	840354	COVER - CCW (See kit D below)
69	870230	CAP SCREW - 6 Req'd. (See kits C & D)

45 - * PVAIA1AC(R or L)③ - PLAIN TRUNIONS

23	840028	TRUNION - 2 Req'd.
64	871910	O-RING (See kit L below)
65	872720	PLUG - 7/8-14 Thd.
66	840353	PLATE - CW (See kits C & F below)
	840352	PLATE - CCW (See kits D & G below)
67	871021	O-RING (See kits C,D,F,G & L below)
68	840794	COVER - CW (Not in kit form)
	840785	COVER - CCW (Not in kit form)
69	870230	CAP SCREW - 6 Req'd. (See kits C & D)

45 - * PVAIA2AA(R or L)③ - PORTED TRUNIONS

9	870220	CAP SCREW - 6 Req'd.
23	840756	TRUNION - 2 Req'd.
24	871912	O-RING - 2 Req'd. (See kit L below)
25	872678	PLUG - 2 Req'd.
46	840120	COVER - CW (See kit A below)
	840117	COVER - CCW (See kit B below)
47	840185	PLATE (See kit E below)

45 - * PVAIA2AB(R or L)③ - PORTED TRUNIONS

23	840756	TRUNION - 2 Req'd.
24	871912	O-RING - 2 Req'd. (See kit L below)
25	872678	PLUG - 2 Req'd.
64	871906	O-RING (See kit L below)
65	872675	PLUG - 9/16-18 Thd.
66	840353	PLATE - CW (See kits C & F below)
	840352	PLATE - CCW (See kits D & G)
67	871021	O-RING (See kits C,D,F,G & L below)
68	840381	COVER - CW (See kit C below)
	840354	COVER - CCW (See kit D below)
69	870230	CAP SCREW - 6 Req'd. (See kits C & D)

45 - * PVAIA2AC(R or L)③ - PORTED TRUNIONS

23	840756	TRUNION - 2 Req'd.
24	871912	O-RING - 2 Req'd. (See kit L below)
25	872678	PLUG - 2 Req'd.
64	871910	O-RING (See kit L below)
65	872720	PLUG - 7/8-14 Thd.
66	840353	PLATE - CW (See kits C & F below)
	840352	PLATE - CCW (See kit D & G below)
67	871021	O-RING (See kits C,D,F,G & L below)
68	840784	COVER - CW (Not in kit form)
	840785	COVER - CCW (Not in kit form)
69	870230	CAP SCREW - 6 Req'd. (See kits C & D)

SERVICE KITS

	Kit No	
A	45K4002	SINGLE PORT CHARGE PUMP COVER - CW ROT - Includes items 39 & 46
B	45K4003	SINGLE PORT CHARGE PUMP COVER - CCW ROT - Includes items 39 & 46
C	45K4004	DUAL PORT CHARGE PUMP COVER - CW ROT - Includes items 39,66,67,68 & 69
D	45K4005	DUAL PORT CHARGE PUMP COVER - CCW ROT - Includes items 39,66,67,68 & 69
E	45K4012	CHARGE PUMP REPLACEMENT - SINGLE PORT - Includes items 37,38,39,40,41,47,48 & 50
F	45K4147	CHARGE PUMP REPLACEMENT - DUAL PORT - CW ROT - Includes items 37,38,39,40,41,48,50,66 & 67
G	45K4148	CHARGE PUMP REPLACEMENT - DUAL PORT - CCW ROT - Includes items 37,38,39,40,41,48,50,66, & 67
H	45K4049	ROTATING GROUP - Includes items 10,11,12,35,53,54,55,56,57,58 & 59
J	45K4051	PUMP COVER - Includes items 7,38,42,43,44,45 & 52
K	45K4098	SHAFT SEAL - Includes items 30 & 61
L	45K4149	SEAL KIT - Includes items 24,28,32,36,39,40,44,50,52,61,63,64 & 67

③ R is for CW (clockwise) rotation and L is for CCW (counterclockwise) rotation when viewing rear cover

Note A ported plug is substituted for item 43 when pump control connection is required - see specific control parts drawing

HYDRECO®

DYNAPOWER

Model 45 Controls

HORSEPOWER LIMITING TYPE with LONG DIFFERENTIAL PRESSURE COMPENSATED OVERRIDE

PARTS DRAWING
14-548.9
SHEET 1

Controls with internal feed only | For Petroleum Base Oils | October 1, 1967

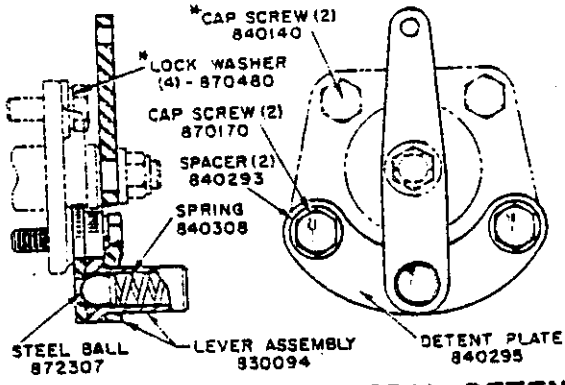
THIS PARTS DRAWING COVERS CONTROLS HAVING A MODEL NUMBER AS LISTED BELOW — *and with an input torque limit of 90, 120 or 180 pounds feet appearing in place of the parenthesis.*

Model numbers with the prefix 45CP denote controls having two tube connections for use with a *SINGLE* or *DUAL PORTED CHARGE PUMP COVER* of a model 45 pump. The prefix 45CM indicates a single tube connection required when a *RELIEF VALVE TYPE COVER* is used on a model 48 motor or a model 45 pump (see inside page).

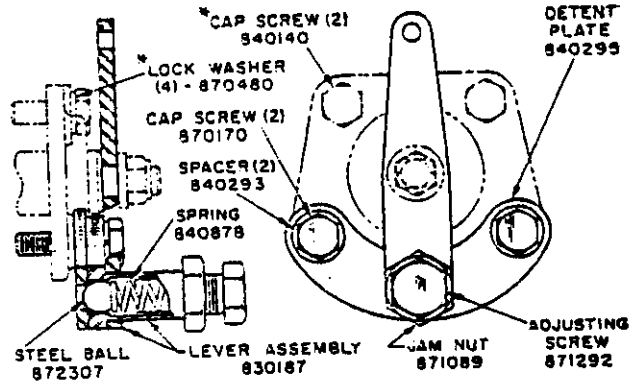
A 1, 2, 3, or 4 appearing in place of the first asterisk denotes the orifice size used (see item 53 on inside pages) — and the following letter A, B, C, or D specifies the type of actuator. A final two digit number at the end of a model number expresses the pressure setting in hundreds, such as 30 = 3000PSI, 35 = 3500PSI, 40 = 4000PSI, etc.

No. 45CPA*A1A(—)-** & 45CMA*A1A(—)-** - *with actuator lever having a non-adjust. detent.*
No. 45CPA*B1A(—)-** & 45CMA*B1A(—)-** - *with actuator lever having no detent.*
No. 45CPA*C1A(—)-** & 45CMA*C1A(—)-** - *with actuator lever having an adjust. detent.*
No. 45CPA*D1A(—)-** & 45CMA*D1A(—)-** - *with actuator being a position indicator.*

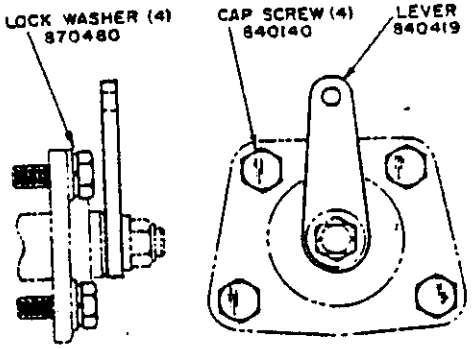
ACTUATORS



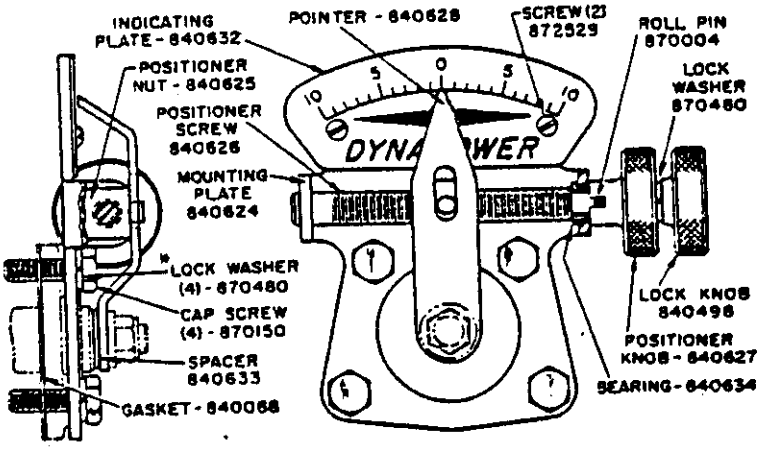
NON-ADJUSTABLE NEUTRAL DETENT
CONTROL MODELS 45CPA*A-etc. & 45CMA*A-etc.
ACTUATOR KIT No. 45K4000



ADJUSTABLE NEUTRAL DETENT
CONTROL MODELS 45CPA*C-etc. & 45CMA*C-etc.
ACTUATOR KIT No. 45K4109



LEVER WITHOUT DETENT
CONTROL MODELS 45CPA*B-etc. & 45CMA*B-etc.
ACTUATOR NOT IN KIT FORM

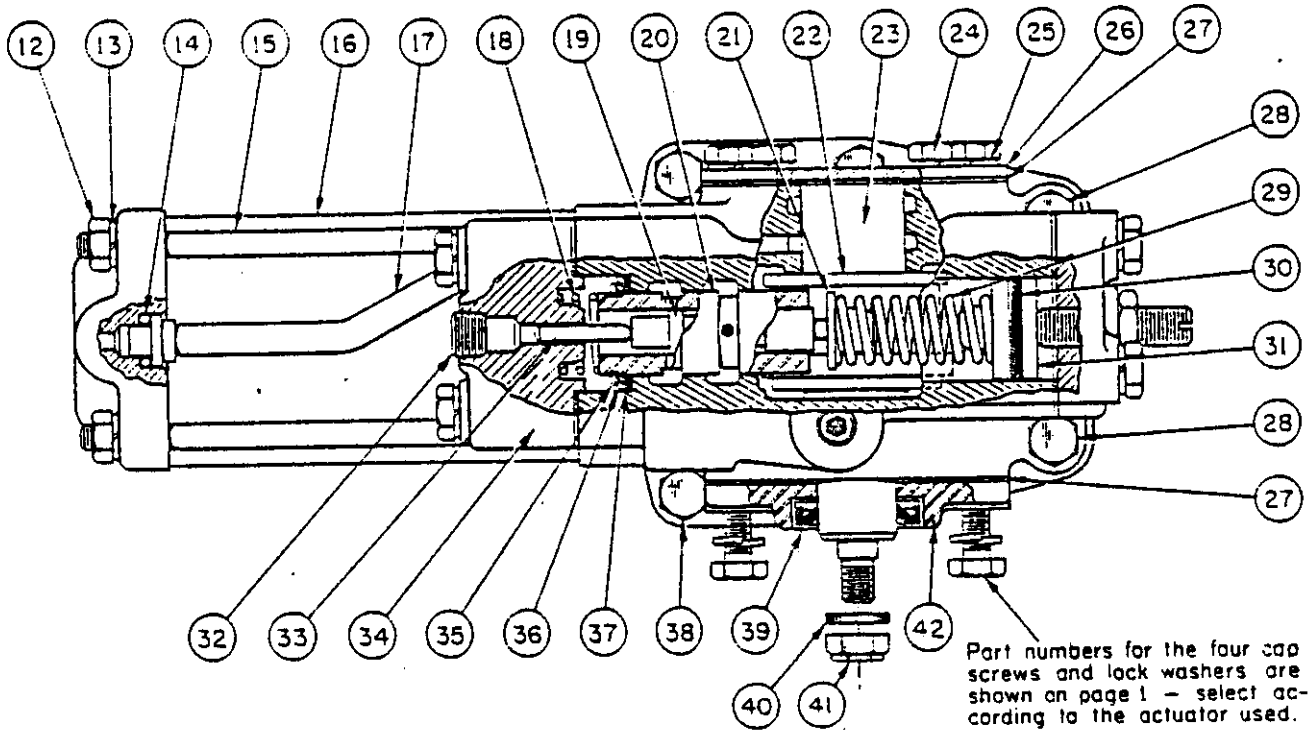


INDICATING POSITIONER
CONTROL MODELS 45CPA*D-etc. & 45CMA*D-etc.
ACTUATOR KIT No. 45K4035

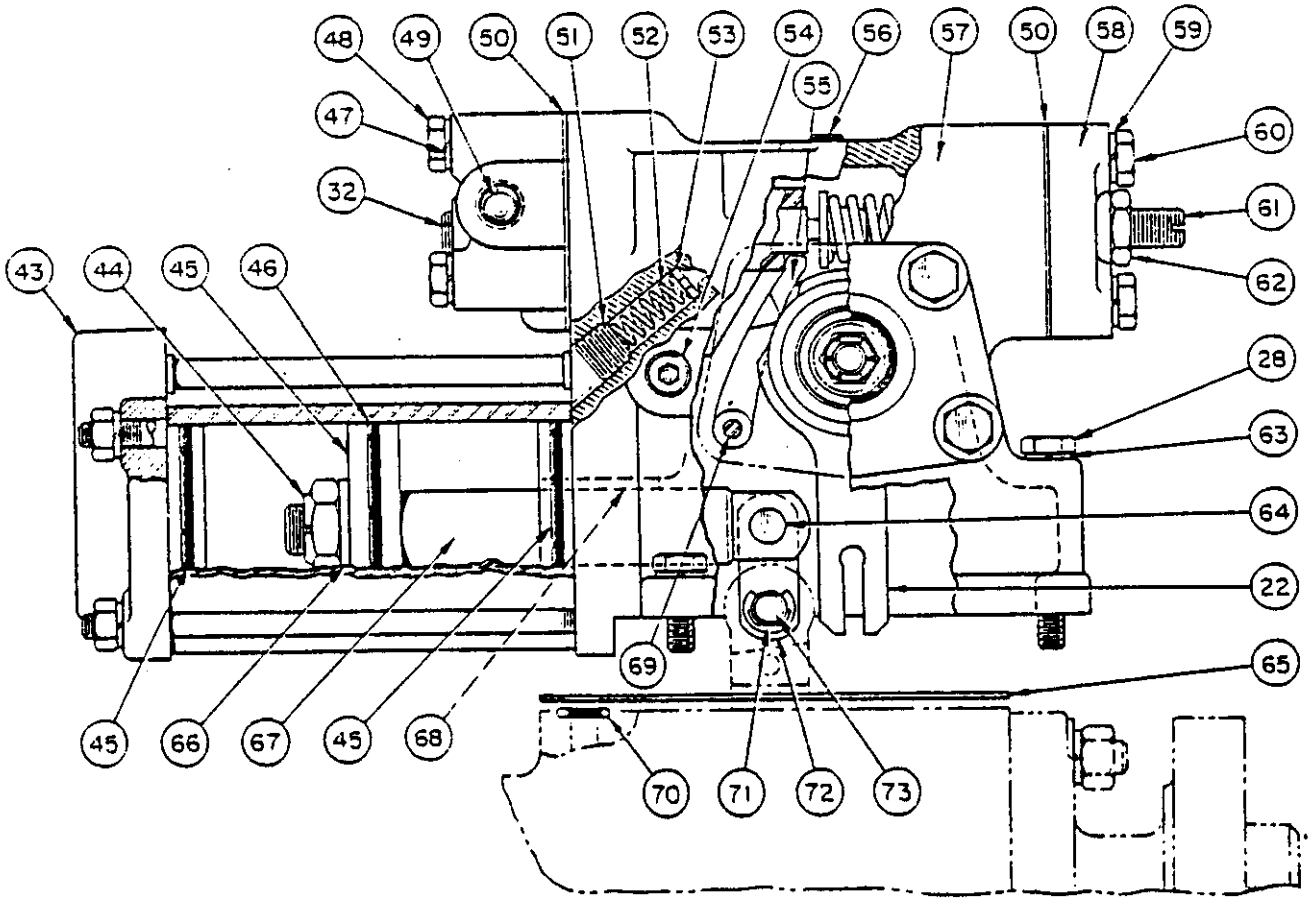
* PARTS NOT INCLUDED IN KITS

DYNAPOWER

Model 45 Controls



Part numbers for the four cap screws and lock washers are shown on page 1 — select according to the actuator used.



DYNAPOWER

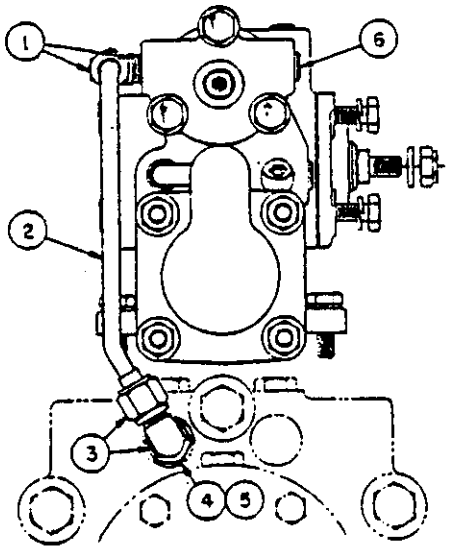
Model 45 Controls

Control Less The Actuator

A.	45K4025	SEAL KIT (Includes items 14, 27, 30, 39, 46, 50, 65, 70 & 71).
B.	45K4137	KIT to convert to 90 input torque limit (denoted in model no.)
C.	45K4136	KIT to convert to 120 input torque limit (denoted in model no.)
D.	45K4135	KIT to convert to 180 input torque limit (denoted in model no.)

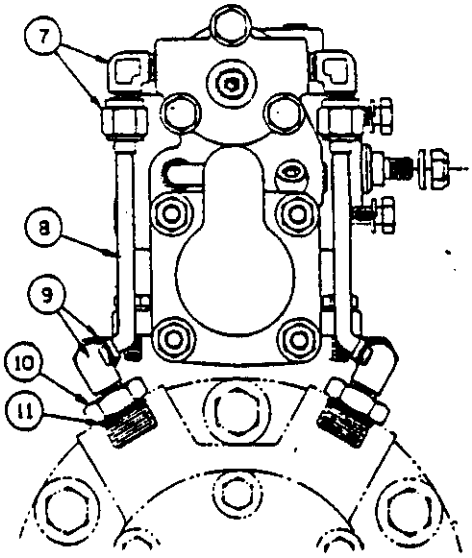
NOTE - Kits B, C & D each include items 27, 30, 35, 36, 37, 50, 65, 70 and respective items 22, 29, 33 and 34 depending on the input torque.

1.	876074	TUBE FITTINGS - See item 2.
2.	830136	TUBE ASSEMBLY (Includes items 1, 3 & 4)
3.	876100	TUBE FITTINGS - See item 2.
4.	———	PORTED HEX PLUG - See item 2.
5.	871904	O-RING SEAL
6.	872493	PIPE PLUG
7.	840602	TUBE FITTINGS (2 REQ'D.) - See item 8.
8.	830138	TUBE ASSEMBLY (2 REQ'D.) - Includes items 7 & 9.
9.	876074	TUBE FITTINGS (2 REQ'D.) - See item 8.
10.	840348	PORTED HEX PLUG (2 REQ'D.)
11.	871908	O-RING SEAL (2 REQ'D.)
12.	870561	HEX NUT (4 REQ'D.)
13.	870480	LOCK WASHER (4 REQ'D.)
14.	871011	O-RING SEAL (2 REQ'D.) - See kit A.
15.	840304	STUD (4 REQ'D.)
16.	840298	CYLINDER TUBE
17.	830080	TRANSFER TUBE ASSEMBLY
18.	840518	SLEEVE SPRING
19.	840249	VALVE SPOOL
20.	840565	VALVE SLEEVE
21.	840206	SPRING GUIDE
22.	*CONTROL*	*MODEL NO. DENOTES REQUIRED VALVE SLEEVE ASS'Y*
	830149	For Models 45CPxxxxxx90 & 45CMxxxxxx90 - See kit B.
	830152	For Models 45CPxxxxxx120 & 45CMxxxxxx120 - See kit C
	830153	For Models 45CPxxxxxx180 & 45CMxxxxxx180 - See kit D.
23.	830018	CONTROL VALVE
24.	870140	CAP SCREWS (4 REQ'D.)
25.	870480	LOCK WASHER (4 REQ'D.)
26.	840087	HOUSING COVER
27.	840088	GASKET (2 REQ'D.) - See kits A, B, C & D
28.	470230	CAP SCREW (2 REQ'D.)
29.	*CONTROL*	*MODEL NO. DENOTES REQUIRED HORSEPOWER SPRING*
	840696	For Models 45CPxxxxxx90 & 45CMxxxxxx90 - See kit B
	840702	For Models 45CPxxxxxx120 & 45CMxxxxxx120 - See kit C
	840706	For Models 45CPxxxxxx180 & 45CMxxxxxx180 - See kit D
30.	871117	O-RING SEAL - See kits A, B, C or D.
31.	840731	SPRING RETAINER
32.	872493	PIPE PLUG
33.	*CONTROL*	*MODEL NO. DENOTES REQUIRED DOWEL PIN*
	871046	For Models 45CPxxxxxx90 & 45CMxxxxxx90 - See kit B.
	840701	For Models 45CPxxxxxx120 & 45CMxxxxxx120 - See kit C.
	840701	For Models 45CPxxxxxx180 & 45CMxxxxxx180 - See kit D.
34.	*CONTROL*	*MODEL NO. DENOTES REQUIRED END CAP*
	840568	For Models 45CPxxxxxx90 & 45CMxxxxxx90 - See kit B.
	840700	For Models 45CPxxxxxx120 & 45CMxxxxxx120 - See kit C.
	840700	For Models 45CPxxxxxx180 & 45CMxxxxxx180 - See kit D.
35.	871937	RETAINING RING (Use only with 35 & 36) - See kits B, C & D.
36.	841207	SPACER - Can be used as supplement to item 37.
37.	840695	LAMINATED SHIM - Not req'd. when press. set at 5000 PSI.
38.	870160	CAP SCREW (4 REQ'D.)
39.	870115	LIP SEAL - See kit A & item 42
40.	840125	WASHER
41.	870705	SELF-LOCKING NUT
42.	830028	SEAL PLATE ASSEMBLY (Includes item 39).
43.	840299	CYLINDER COVER
44.	870709	SELF-LOCKING NUT
45.	840297	PISTON
46.	871133	O-RING SEAL (3 REQ'D.) - See kit A.
47.	870480	LOCK WASHER (3 REQ'D)
48.	870220	CAP SCREW (3 REQ'D.)
49.	872523	STEEL BALL
50.	840274	BOOSTER GASKET (2 REQ'D.) - See kits A, B, C & D.
51.	872493	PIPE PLUG
52.	840613	ORIFICE SPRING
53.	*CONTROL*	*MODEL NUMBER DENOTES ORIFICE SIZE & PART NO.*
	———	None used - Models 45CPx etc. & 45CMx etc.
	840612	.062 dia - Models 45CPx2 etc. & 45CMx2 etc.
	840614	.052 dia - Models 45CPx3 etc. & 45CMx3 etc.
	840838	.042 dia - Models 45CPx4 etc. & 45CMx4 etc.
54.	872493	PIPE PLUG
55.	840563	CAM FOLLOWER
56.	872492	PIPE PLUG
57.	840393	CONTROL HOUSING
58.	840729	ADJUSTMENT CAP
59.	870480	LOCK WASHER (3 REQ'D.)
60.	870190	CAP SCREW (3 REQ'D.)
61.	872364	ADJUSTING SCREW
62.	871087	JAM NUT
63.	870480	LOCK WASHER (6 REQ'D.)
64.	———	PIN (Included with item 67)
65.	840058	GASKET - See kits A, B, C & D
66.	840288	WASHER
67.	830067	ROD ASSEMBLY (Includes items 64 & 72
68.	———	BUSHING (Included with item 57)
69.	840564	CAM FOLLOWER PIVOT
70.	871011	O-RING SEAL - See kit A, B, C & D.
71.	870100	RETAINING RING - See kit A, B, C & D.
72.	———	LINK (Included with item 67)
73.	840059	CLEVIS PIN



Connection for Control Models with prefix 45CM

Used with a RELIEF VALVE TYPE COVER



Connection for Control Models with prefix 45CP

Used with SINGLE or DUAL PORTED

HYDRECO

DYNAPOWER

Model 48 Piston Motor

FIXED DISPLACEMENT WITH SAE 1-3/4 SPLINE SHAFT & SIZE D FOUR BOLT MOUNTING FLANGE

For Petroleum Base Oils

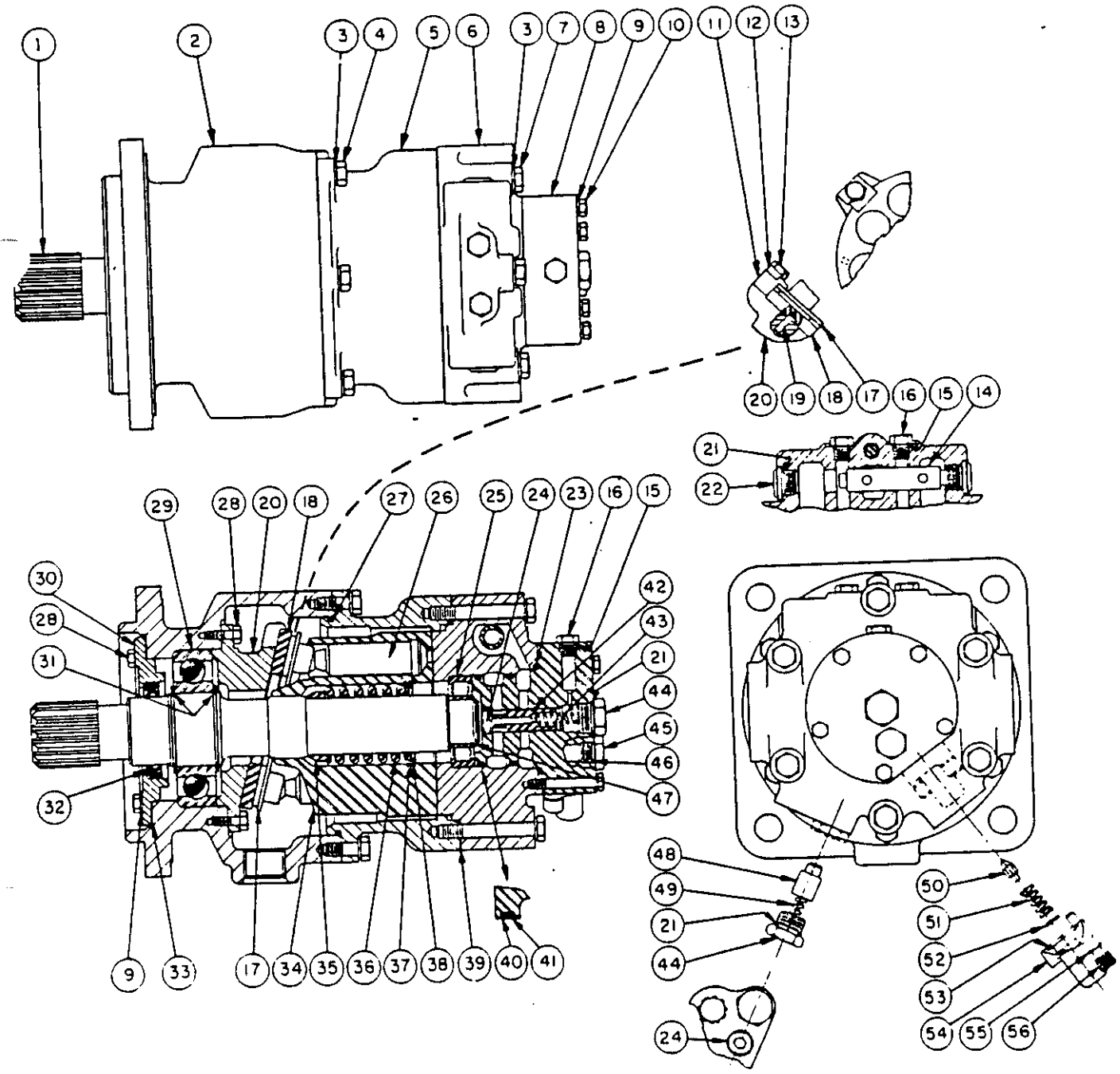
PARTS DRAWING
14-528.9
SHEET 1

November 1, 1967

This drawing covers the following model

48-1MFA1A1AA-** *Having system relief valve package with standard shuttle plugs*

A two digit number in place of the asterisks in the model number indicates the relief valve setting, such as 30 = 3000 PSI, 35 = 3500 PSI, etc.



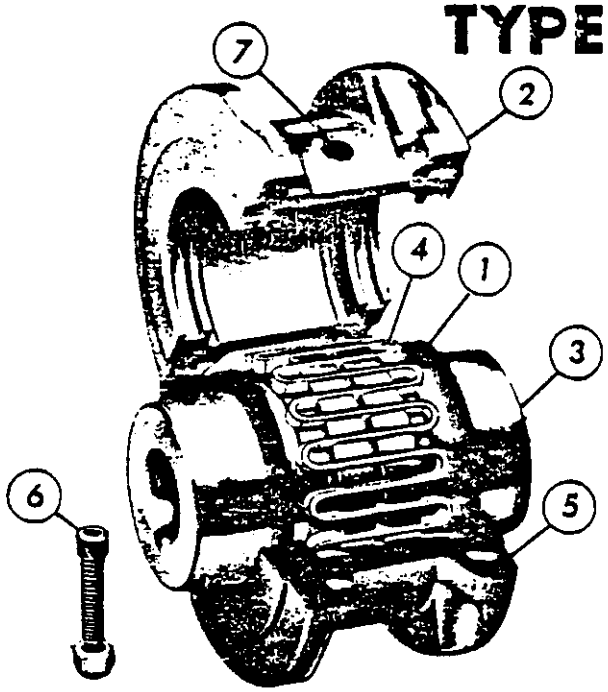
DYNAPOWER
Model 48 Piston Motor
PART NUMBERS

	840201	SHAFT
	840199	FLANGE
	870492	LOCK WASHER - 12 Req'd.
	870194	CAP SCREW - 6 Req'd.
	840210	HOUSING
	840245	COVER
	870264	CAP SCREW - 6 Req'd.
	840806	SLEEVE
	870480	LOCK WASHER - 11 Req'd.
	870230	CAP SCREW - 5 Req'd.
	840019	GUIDE - 4 Req'd. (See kit B)
	840282	TAB LOCK WASHER - 4 Req'd. (See kit B)
	870181	CAP SCREW - 4 Req'd. (See kit B)
	830219	SHUTTLE ASS'Y. (See kit F)
	871904	O-RING - 3 Req'd. (See kits D & G)
	840146	PLUG - 3 Req'd. (See kit D)
	840018	RETURN PLATE (See kit B)
	10013	PLATE (See kit B)
9.	870045	ROLL PIN
10.	830088	CAM ASS'Y. - Includes item 19
11.	871908	O-RING - 4 Req'd. (See kits D, E, F & G)
12.	841113	PLUG - 2 Req'd. (See kit F)
13.	871146	O-RING (See kits D & G)
14.	872495	PLUG - 2 Req'd.
15.	870648	BEARING
16.	830003	PISTON ASS'Y. - 9 Req'd. (See kit B)
17.	871256	O-RING (See kit G)
18.	870150	CAP SCREW - 10 Req'd.
19.	870642	BEARING
30.	830000	RETAINER ASS'Y. - Includes item 32 (See kit C)
31.	870102	RETAINING RING - 2 Req'd.
32.	870106	SEAL (See kit G)
33.	840008	GASKET (See kits C & G)
34.	830150	BLOCK ASS'Y. (See kit B)
35.	840021	SPRING RETAINER (See kit B)
36.	840022	SPRING (See kit B)
37.	840023	SPRING RETAINER (See kit B)
38.	870103	RETAINING RING (See kit B)
39.	840073	GASKET (See kits D & G)
40.	870653	BACK-UP RING - 2 Req'd. (See kits D & G)
41.	871140	O-RING - 2 Req'd. (See kits D & G)
42.	840808	PLUNGER (See kit E)
43.	840138	SPRING
44.	840037	PLUG - 2 Req'd. (See kits D & E)
45.	872675	PLUG (See kit D)
46.	871906	O-RING (See kits D & G)
47.	870101	RETAINING RING
48.	840035	PLUNGER
49.	840134	SPRING
50.	840811	VALVE (See kit D)
51.	840144	SPRING (See kit D)
52.	870661	SHIM - .003
	870662	SHIM - .005
	870663	SHIM - .010 } See kits A & D
	870664	SHIM - .020
	870665	SHIM - .030
53.	871115	O-RING (See kits D & G)
54.	840812	CAP (See kit D)
55.	872706	LOCK WASHER - 2 Req'd. (See kit D)
56.	870360	CAP SCREW - 2 Req'd. (See kit D)

SERVICE KITS

	Kit No.	
A	45K4017	SHIM KIT - Includes item 52 (5 each)
B	45K4049	ROTATING GROUP KIT - Includes items 11, 12, 13, 17, 18, 26, 34, 35, 36, 37 & 38
C	45K4098	SHAFT SEAL KIT - Includes items 30 & 33
D	45K4126	RELIEF VALVE PACKAGE - Includes items 8, 9, 15, 16, 21, 23, 39, 40, 41, 44, 45, 46, 50, 51, 52, 53, 54, 55 & 56
E	45K4127	ROD-LESS RELIEF VALVE - Includes items 21, 42 & 44
F	45K4140	SHUTTLE VALVE KIT - Includes items 14, 21, 22
G	45K4152	SEAL KIT - Includes items 15, 21, 23, 27, 32, 33, 39, 40, 41, 46 & 53

FALK STEELFLEX COUPLING
TYPE T10-60T



REF. NO.	PART NO.	NAME OF PART	NO. REQ.
*	P-329	COUPLING ASSEMBLY	1
1	P-329-1	SEAL	2
2	P-329-2	COVER	2
3	P-329-3	HUB	1
4	P-329-4	GRID	1
5	P-329-5	GASKET	2
6	P-329-6	BOLT ASSEMBLY	4
7	P-329-7	LUBE PLUG	1

* Not Illustrated.

This applies to Type T10 FALK STEELFLEX TAPERED GRID COUPLINGS. It is designed to operate in either the horizontal or vertical position without modification. Its preformance and life depends largely upon how it is serviced. Carefully follow instructions for optimum preformance and trouble free service.

INSTALLATION – Only standard mechanics tools are required to install Falk Steelflex Couplings. For best results, clean all parts thoroughly and align coupling for minimum angular and parallel misalignment. Set the coupling gap, permanently fasten unit foundation bolts and then re-check alignment.

LUBRICATION – Adequate lubrication is essential for proper operation of the coupling. It is recommended that the coupling be checked once a year and lubricant added if required. The following specifications apply to lubricants for Falk Couplings which are lubricated annually and operate within ambient temperatures of 0 degree to 150 degree F.

DROPPING POINT – 300 degree F. or higher.

CONSISTENCY – NLGI No. 2 with worked penetration value in the range of 250 to 300.

SEPARATION & RESISTANCE – Low oil separation rate and high resistance to separation from centrifuging.

LIQUID CONSTITUENT – To possess good lubrication properties equivalent to a high quality, well refined petroleum oil.

INACTIVE – Should not corrode steel or cause swelling or deterioration of neoprene.

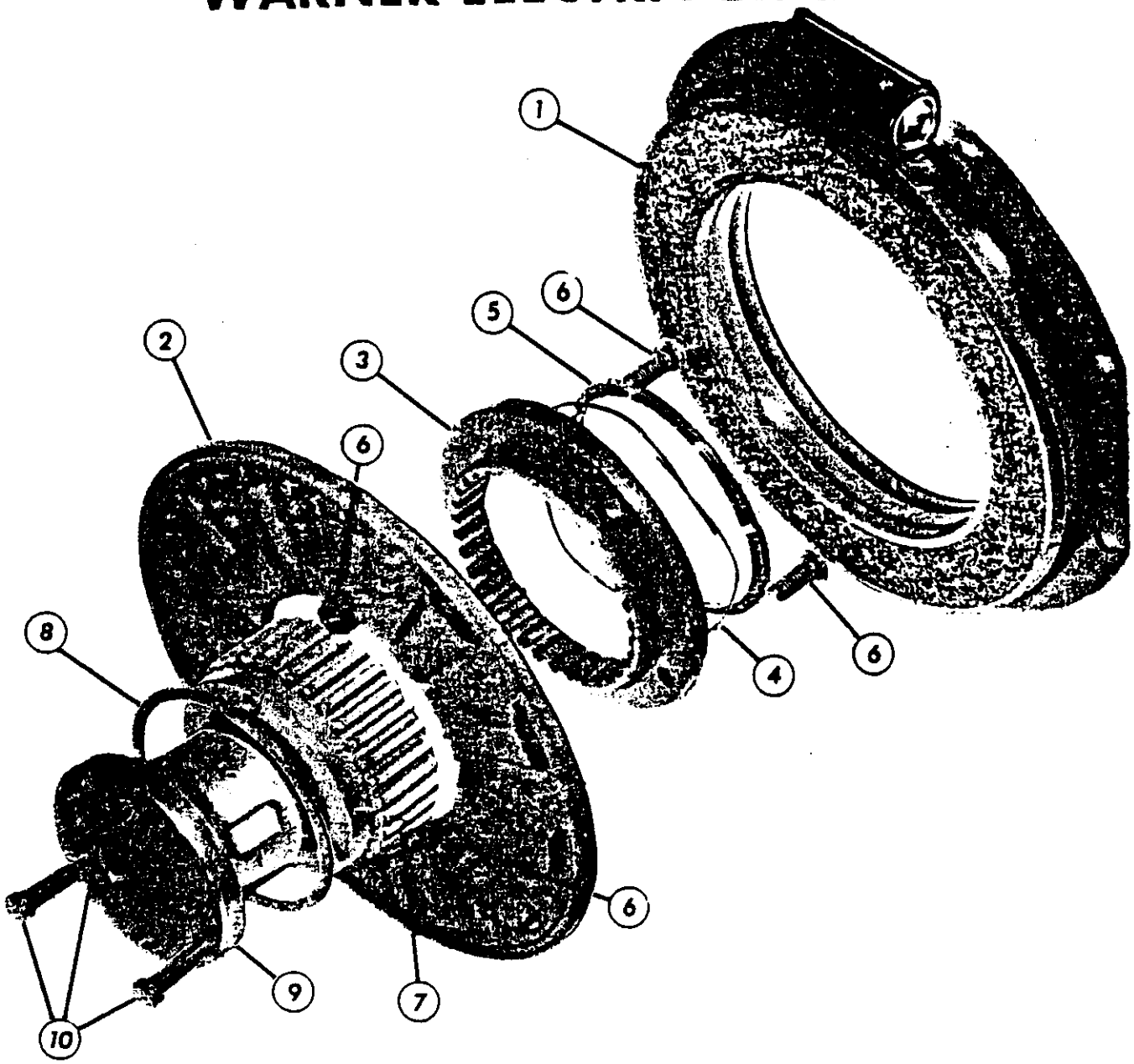
CLEAN – Free from foreign inclusions.

Semi-permanent lubrication, with up to three years between lubrication checks, may be obtained thru the use of "still-bottom" asphaltic based lubricants with a viscosity of 2000 SSU at 210 degree F. At normal temperatures, this lubricant is tacky and, therefore, not easily pumped. Couplings should be hand packed, or the grease heated and poured into the coupling. Some of these greases are available with a cutback solvent which facilitates use in a grease gun. These greases, however, are not recommended for applications that exceed 100 degree F. ambient.

A list of lubricants meeting the above specifications is available from your local Falk Representative, Authorized Falk Distributor, or directly from the Factory.

LUBE FITTINGS—A standard grease gun with a 1/8 NPT fitting, or any standard lube fitting including the Alemite No. 1610B, Lincoln No. 5000 or Universal No. 800 may be used in the 1/8 NPT hole in the covers.

WARNER ELECTRIC BRAKE



REF. NO.	PART NO.	NAME OF PART	NO. REQ.
1	P-267	MAGNET ASSEMBLY	1
2	P-268	ARMATURE ASSEMBLY	1
3	P-616	SPLINED ARMATURE ADAPTER	1
4	P-617	AUTOGAP SPRING	1
5	P-618	RETAINER RING	1

REF. NO.	PART NO.	NAME OF PART	NO. REQ.
6	P-618A	BUTTON HEAD BOLT ASSEMBLY	3
7	P-269	SPLINED HUB	1
8	P-572	RETAINER RING	1
9	P-571	BUSHING	1
10	P-571A	BUSHING CAPSCREW	3
*	P-619	WARNER BRAKE ASSY.	1

* Not Illustrated.

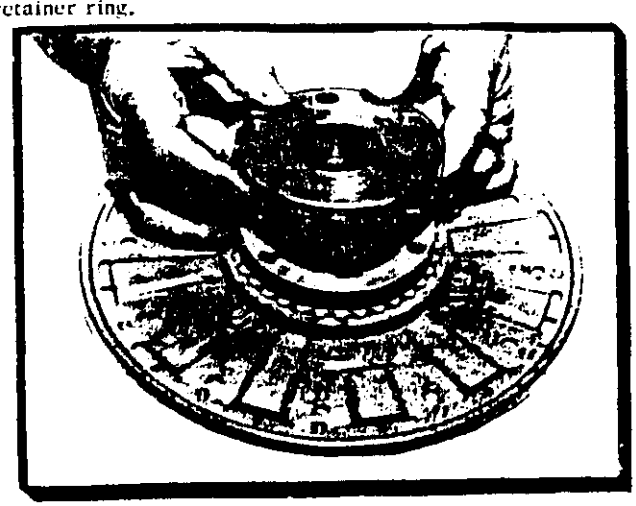
INSTALLATION INSTRUCTIONS

The installation procedure for the splined armature assembly is as follows:

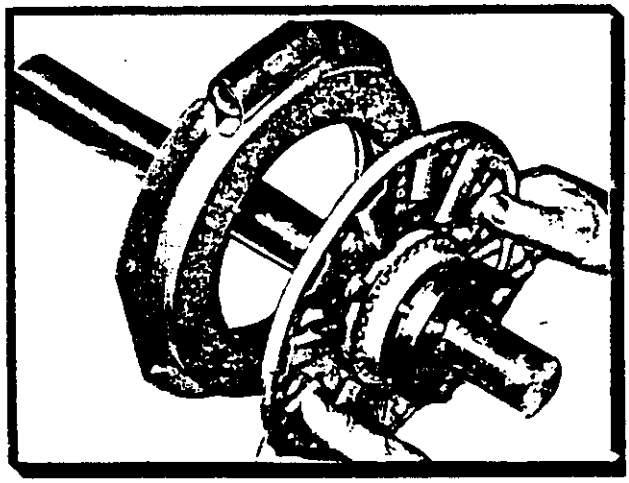
STEP 1. Place the armature-splined adapter assembly on a flat surface, segments up. Take the splined hub, retainer ring groove first, and press it through the autogap spring and splined armature adapter.

STEP 2. Insert the retainer ring in the groove.

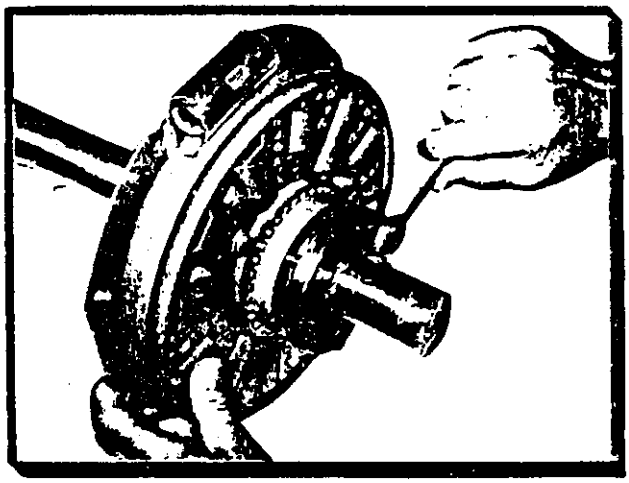
STEP 3. Slide the armature-adapter assembly up against the retainer ring.



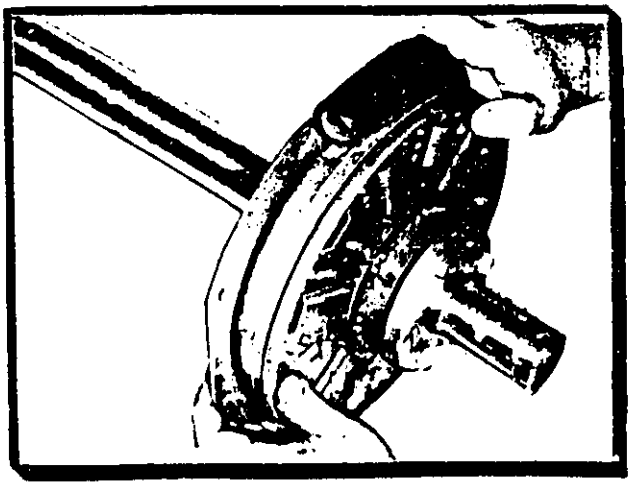
STEP 4. Insert the bushing in the retainer ring side of the armature hub. The clearance holes in the bushing flange must [illegible] the tapped holes in the splined hub.



STEP 5. Slide the complete assembly on the shaft and place it in contact with the magnet.



STEP 6. Tighten the bushing capscrews, taking a few turns at a time on each capscrew. As the capscrews are tightened, the armature will back away slightly from the magnet. After the capscrews are completely tight, there should be a clearance of about 1/16" between armature and magnet.



STEP 7. After the bushing is secured on the shaft, push the armature against the magnet faces. Then release the armature, and a 1/32" gap will be automatically attained.

MAINTENANCE

When a Warner Brake is properly assembled and installed, no further servicing, lubrication or maintenance should be required throughout the life of the unit. As with any friction-type device, some initial care should be given to wear rate, as minor adjustments in actuation time can sometimes greatly extend the life of the unit.

Slight changes in torque, made with the control potentiometer may greatly and easily extend the life of your unit by increasing the actuation time. Keep the input voltage to the magnet as low as possible when maximum capacity is not required. Once the right speed has been established, precautions should be taken to prevent machine operators, or other personnel not familiar with wear characteristics, from changing the potentiometer setting arbitrarily for effecting minor operating changes. A good rule to remember is the quicker the stop, the shorter the life.

WEAR PATTERN: Wear grooves appear on the armature and magnet surfaces. This is a normal wear condition and does not impair functioning of the unit. Never machine either the armature or magnet contact surfaces to remove grooves or score marks resulting from wear.

Remachining the face of a worn armature is not recommended. If a replacement armature is to be used with a used magnet, it is necessary to remachine the worn magface. In refacing a magnet: (1) machine only enough aterial to clean up the complete face of the magnet, (2) hold the face within .005" of parallel with the mounting plate; and (3) undercut the molded facing material .002"-.004" below the metal poles. Normally the magnet and armature, as a mating pair, will wear at the same rate. It is the usual recommendation that both components be replaced at the same time.

HEAT: Excessive heat and high operating temperatures are causes of rapid wear. Units, therefore, should be ventilated as efficiently as possible, especially if the application requires fast, repetitive cycle operation.

FOREIGN MATERIALS: Oil and grease accidentally reaching the friction surfaces may be removed by wiping with a rag dampened with trichlorethylene. In performing this operation, do not drench the friction material. If the friction material has been saturated with oil or grease no amount of cleaning will be completely effective. Once such a unit has been placed back in service, heat will cause the oil to be boiled to the surface resulting in further torque loss.

TORQUE LOSS: If a brake slips or loses torque completely, the initial check should be the input voltage to the magnet as follows:

90 VOLT SERIES: Connect a DC voltmeter with a range of 0-100 or more directly across the magnet terminals. With the power on and the potentiometer turned up, an approximate maximum reading is 100 volts, although 85 to 95 is satisfactory. The reading should drop as the potentiometer control is adjusted.

The above check normally is sufficient. Further checks may be made as follows: a low range ammeter, when connected in series with one magnet lead, will normally indicate approximately .35 amperes for the 90 volt units. These readings are with the power on and the potentiometer control in the maximum position.

Ohmmeter checks should be made with the power off and the circuit open (to be certain, disconnect one lead to the magnet). Average resistance for the 90 volt series is 260 ohms. A very high or infinite resistance reading would indicate an open coil.

If the above checks indicate that the proper voltage and current is being supplied to the magnet, mechanical parts should be checked to assure that they are in good operating condition and properly installed.

THE RECOMMENDED OPERATING PROCEDURES FOR STARTING, RUNNING AND STOPPING THE MONSTER RIDE ARE AS FOLLOWS:

STARTING

ROTATION — AFTER THE LAST SWEEP OR CAR HAS BEEN LOADED AND SECURED, ADVANCE ROTATION CONTROL LEVER IN A SLOW, EVEN MOVEMENT TO ATTAIN THE MAXIMUM ROTATION RPM IN NOT LESS THAN ¾ OF 1 REVOLUTION.

CROSS ARMS — WHILE ADVANCING ROTATION CONTROL LEVER, START CROSS ARMS ROTATING AND CHECK VISUALLY EACH SWEEP AS IT PASSES.

ECCENTRIC — THE ECCENTRIC IS STARTED IN THE SAME MANNER AS THE ROTATION. MAINTAIN A STEADY ADVANCEMENT OF THE CONTROL AS TO REACH FULL RPM IN NOT LESS THAN ¾ OF 1 REVOLUTION.

RUNNING

THE MAXIMUM RPM AND DIRECTIONS LOOKING DOWN FROM THE TOP OF THE RIDE ARE AS FOLLOWS:

ECCENTRIC — 11 RPM CLOCKWISE
ROTATION — 8 RPM COUNTER-CLOCKWISE
CROSS ARMS — 15 RPM CLOCKWISE

FOR REVERSE OPERATION REDUCE ROTATION AND ECCENTRIC SPEEDS A MINIMUM OF 50%. DO NOT EXCEED THESE SPEEDS.

STOPPING

IN STOPPING USE REVERSE APPLICATION OF STARTING PROCEDURE.

MONSTER OPERATING PROCEDURES				
DRAWN BY: MEA	SCALE: ~	NO. REQ'D.: ~	MATERIAL: ~	Chance Rides — Drg. No. P-4-77
DATE: 1-19-77	NEXT ASSY.: ~	SDS. NO.:	SDD. BY NO.:	

P-4-77

HYDRECO INDUSTRIAL DISTRIBUTORS

ALABAMA

Activation Incorporated (H)
A/C (205) 787-9661
Homer Urquhart -- Carl Scott
1026 Lomb Avenue, S. W.
P. O. Box 3990
Birmingham, Alabama 35208

ARIZONA

Sweetland Company (H-D-S)
T. Stott
3033 North Central Avenue
Suite 211
Phoenix, Arizona 85012

CALIFORNIA

Sweetland Company (H-D-S)
A/C (213) 685-7200
Ralph Moss
5574 East Washington Boulevard
Los Angeles, California 90022

Sweetland Company (H-D-S)
A/C (415) 421-2662
Eugene Sweetland -- Tenney Campbell
Donald Davie
160 Folsom Street
San Francisco, California 94105

COLORADO

Electro-Hydraulics Company (H-D-S)
A/C (303) 244-2996
A/C (303) 244-3111
K. E. Carlson -- R. A. Mitchell
4426 Vine Street
Denver, Colorado 80216

CONNECTICUT

Stewart-Hunt, Incorporated (H-D-S)
A/C (203) 745-3688
H. C. Lancaster
Box 279
657 Enfield Street, Rt. 5
Thompsonville, Connecticut

FLORIDA

Hydraulic Supply Company (H-D)
A/C (305) 888-2414
Harold Inglis -- R. J. Hutchinson
Tom Kent
680 Kenmore Drive
Miami Springs, Florida 33166
(Send all material and inquiries to Miami)

Hydraulic Supply Company (H-D)
A/C (305) 295-4617
R. Witter
Montgomery Street
P. O. Box 15482
Orlando, Florida 32808

GEORGIA

Activation, Incorporated of Georgia (H-D)
A/C (404) 755-6601
Leo Gray -- Troy Grooms -- Mike Sasser
Warren Sharp
P. O. Box 11048
1252 Murphy Avenue, S. W.
Atlanta, Georgia 30310

HAWAII

Hawaiian Fluid Power Corporation
1314 Kaumualii Street
Honolulu, Hawaii 96817

ILLINOIS

Midwest Hydraulics, Incorporated (H-D)
A/C (312) 921-8140
A/C (312) 711-8142 (Home)
David Malasky -- James W. Kelley
Mike Biondi -- Gene Kosciolek
Wally Lipowski
3500 West North Avenue
Melrose Park, Illinois 60160
(Referred OEM purchase orders to above)

Midwest Hydraulics, Incorporated (H-D)
A/C (815) 964-9641
Pierce Barker -- Ian Proudfoot
Tim Schoen -- Reed Overstreet
29 Airport Drive
Rockford, Illinois 61109
(Referred OEM purchase orders to Melrose Park)

INDIANA

Tec-Hackett Engineering, Inc. (H-D)
A/C (219) 742-8261
Ed Hughs -- Don Peterson -- Lewis Finch
646 Growth Avenue P. O. Box 57
Fort Wayne, Indiana 46801

Tec-Hackett Engineering, Inc. (H-D)
A/C (317) 923-8538
Don Naylor
P. O. Box 55564
Indianapolis, Indiana 46205

Tec-Hackett Engineering, Inc. (H-D)
A/C (219) 753-3305
Rupert Esser
P. O. Box 4
Logansport, Indiana

Tec-Hackett Engineering, Inc. (H-D)
A/C (317) 282-7735
John C. Dale
2800 Oaklyn Avenue
Muncie, Indiana 47304

Tec-Hackett Engineering, Inc. (H-D)
A/C (219) 389-6877
Ronald Witherby
P. O. Box 2146
South Bend, Indiana 46624

IOWA

Midwest Hydraulics, Incorporated (H-D)
A/C (319) 323-2638
George Goecke -- Richard Dorman
325 Union Arcade
Davenport, Iowa 52801
(Referred OEM purchase orders to Melrose Park)

KANSAS

Baker Engineering Company (H-D)
A/C (316) WH3-0213
F. Earl Baker
1111 South West Street
Wichita, Kansas 67213

LOUISIANA

Pneumatic & Hydraulic Company (H-D)
A/C (504) 343-6693
Paul Nugent -- Leo Tullier
2500 North Street P. O. Box 352
Baton Rouge, Louisiana 70802

MARYLAND

Dees Hydraulics Company (H-D-S)
A/C (301) 243-1407
Charles M. Dees -- A. R. Donnelly
George Hayes -- E. J. Bond
2731 Greenmount Avenue
Baltimore, Maryland 21218

MASSACHUSETTS

Stewart-Hunt, Incorporated (H-D-S)
A/C (413) 253-5615
James Stewart
North Valley Road
Amherst, Massachusetts 01002

Stewart-Hunt, Incorporated (H-D-S)
A/C (617) 272-4411
Larry Hunt -- Richard K. Whiting
Dick Cloutman -- Bob MacInnis
8 Garfield Circle
Burlington, Massachusetts 01803
(For speedier delivery send all 1st Class Mail to P. O. Box 68
Lexington, Mass. 02173

MICHIGAN

L. R. Twyman & Associates (S)
A/C (313) 647-1000
L. R. Twyman (Pres.)
N. D. Kulsavage (Sales Mgr.)
Don Wahlberg -- Lloyd Brasher
John MacLennan -- Curt Swineford
Hal Twyman -- Floyd Weir
P. O. Box 220 4114 Telegraph Rd.
Bloomfield Hills, Michigan 48013

Scherer Fluid Power Company (H-D)
A/C (616) 327-7048
James C. Henning
10336 Portage Road
Portage, Michigan 49081

Scherer Fluid Power Company (H-D)
A/C (313) 398-2800
John J. Scherer -- William T. Phillips
Garland D. Holmes -- Geo. Kokalis
Robert Lorimer
711 North Main Street
Royal Oak, Michigan 48067

NESOTA

Hydra-Powr, Incorporated (H-D)
A/C (612) 377-1377
Maynard Benson -- Geo. Krause
4903 South Cedar Lake Road
Minneapolis, Minnesota 55416

MISSISSIPPI

M & I Supply (H-D)
A/C (601) 355-0704
Wilburn Dacus -- Steve Reilly
900 South Roach Street P.O. Box 3215
Jackson, Mississippi 39202

MISSOURI

Missouri-Midwest Hydraulics, Inc. (H-D)
A/C (314) 968-2220 or 968-2221
Wheaty Zelnio
9929 Manchester Road
St. Louis, Missouri 63122

Horespower Control Systems (H-D-S)
Div. of the Foster & Felter Co.
A/C (816) 471-6363
R. W. Harris, Jr.
1815 Walnut Street
Kansas City, Missouri 64108

NEBRASKA

d Hydraulics (H-D)
A/C (402) 344-4434
Glen Brand -- Neil Prettyman
Don Sheppard -- Tim Chew
2332 South 25th Street
Omaha, Nebraska 68102

NEW JERSEY

Van-Air & Hydraulics, Inc. (H-D-S)
A/C (609) 665-3336 N. J.
(215) 923-2575 Phila.
William Van Fossen -- Robert Test
Robert R. Ries
525 East Woodlawn Avenue
Maple Shade, New Jersey 08052

Hydro-Air, Incoporated (D)
A/C (201) 688-6600
Robert E. Pfitzenmeier
480 Chestnut Street
Union, New Jersey 07083

NEW YORK

R. C. Neal Company, Incorporated (H-D)
A/C (716) 856-1110
Richard J. Misener -- James Larkowski
Bruce M. Miller
76 Pearl Street
Buffalo, New York 14202

Neal Company, Incorporated (D)
(607) 734-5168
d Suhriven Street P.O. Box 526
Elmira, New York 14902

Hydro-Air, Incorporated (D)
A/C (516) 731-3978
Edward R. Schweser
22 Saddle Lane
Levittown, New York 11756

Stimmel Hydraulics, Incorporated (H-D)
A/C (212) 361-0710
Herb Frie -- Joe Pelka -- Leonard Stimmel
37-24 33rd Street
Long Island City, New York 11101

R. C. Neal Company, Incorporated (H-D)
A/C (716) 254-0220
M. W. Nulton -- William Meegan
99 Ridgeland Road
Rochester, New York 14623

R. C. Neal Company, Incorporated (H-D)
A/C (315) 437-2555
A. D. Williams
200 Boss Road
Syracuse, New York 13211

NORTH CAROLINA

Livingston & Haven, Incorporated (H-d)
A/C (704) 377-6551
John Morefield -- Frank Kish -- Wilse Wallace
1119 East 10th P.O. Box 4391
Charlotte, North Carolina 28204

Livingston & Haven, Incorporated (H-D)
A/C (919) 286-0583
Keith Christian
2500 Guess Road
Durham, North Carolina 27705

OHIO

The Paquin Company (H-D-S)
A/C (513) 761-7550
John Hughey -- Harold Maines
6901 Longview Street
Cincinnati, Ohio 45216

The Paquin Company (H-D-S)
A/C (216) 851-4100
Don Woodruff -- Norm Paquin
Fred Wyss -- Don Johnson
13405 St. Clair Avenue
Cleveland, Ohio 44110

OKLAHOMA

Womack Machine Supply Company (H-D-S)
A/C (405) 631-1589
Gordon Arfsten -- Don Brock
2809 South Western
Oklahoma City, Oklahoma 73109

Womack Machine Supply Company (H-D-S)
A/C (918) 582-5288
Bob Boswell -- W. H. Wagner
31 North Peoria P.O. Box 50156
Tulsa Oklahoma 74120

OREGON

Sweetland Company (H-D-S)
A/C (503) 288-7001
Art Charboneau
1212 Northeast 63rd Avenue
Portland, Oregon 97213

PENNSYLVANIA

Automation Equipmant, Incorporated (H-D)
A/C (412) 695-7392
John Parks -- John Swoager
Main Street & Route 30
Imperial, Pennsylvania 15126

SOUTH CAROLINA

Livingston & Haven, Incorporated (H-D)
A/C (803) 744-3334
Malcolm D. Haven -- John Flint -- Hal Watt
P.O. Box 4887
Charleston Heights, South Carolina 29405

Livingston & Haven, Incorporated (H-D)
A/C (803) 232-0096
Richard Teague
P.O. Box 6192, Station B 411 East North St.
Greenville, South Carolina 29606
(For Trucks, Air Express Shipments:
2800 Azalea Drive, Charleston Heights,
South Carolina)

TENNESSEE

Livingston & Haven, Incorporated (H-D)
A/C (615) 524-9879
Bill E. Rosenstengel
P.O. Box 4333 3408 Western Avenue
Knoxville, Tennessee 37921

Air Draulics Engineering Company (H)
A/C (901) 743-2282
W. M. Bowen, Jr.
2206 Dunn Avenue P.O. Box 14723
Memphis, Tennessee 38114

TEXAS

Womack Machine Supply Company (H-D-S)
A/C (214) 357-3871
John Chance -- R. C. Womack -- Charles Hedges
Les Polly -- Ralph O. Womack
2010 Shea Road
Dallas, Texas 75235

Womack Machine Supply Company (H-D-S)
A/C (817) 335-5701
Erick Boyd -- Wayne Myers (Mgr.)
1226 South Main P.O. Box 2134
Fort Worth, Texas 76104

Womack Machine Supply Company (H-D-S)
A/C (713) 748-6400
Dan Ellis -- Neal Smith
4006 Dennis
Houston, Texas 77004

Womack Machine Supply Company (H-D-S)
A/C (806) 763-7001
Paul Ammon -- George Williams
1302 Erskine
Lubbock, Texas 79403

Lynn Elliott Company (H) (Special)
A/C (713) 449-1571
Leon Ince
Pike Road P.O. Box 428
Missouri City, Texas 77459

Womack Machine Supply Company (H-D-S)
A/C (512) 732-8251
Eddy Pabon (Gen. Mgr.)
Gene Riley (Outside Sales)
2202 Blanco Road
San Antonio, Texas 78212

Womack Machine Supply Eastern, Inc. (H-D-S)
A/C (214) LY-30157
Murri Hair -- Malcom Johnson -- Robert G. Ford
2724 E. Erwin Street
Tyler, Texas 75701

UTAH

The Rains Company (H-D)
A/C (801) 355-1768
Phillip K. Rains
756 South First West Street
Salt Lake City, Utah 84101

VIRGINIA

Cardwell Machine Company (H)
A/C (703) 275-1471
John Boehling -- Ron Burnett
Cardwell & Castlewood Roads
P.O. Box 1359
Richmond, Virginia 23211

Industrial Supply Corporation (H)
A/C (703) 355-8041
C. H. Baker
1905 Westwood Avenue P.O. Box 6356
Richmond, Virigina 23230

WASHINGTON

Sweetland Company (H-D-S)
A/C (206) 763-0515
R. E. Schulke
222 South Lucile Street
Seattle, Washington 98108

WISCONSIN

Midwest Hydraulics, Incorporated (H-D)
A/C (414) 476-3981
Ed Burkhardt -- Jerry Anderson
Allen Hartwig -- Steve Spasoff -- Verne Sidie
11610 West North Avenue
Milwaukee Wisconsin 53226
(Referred OEM purchase orders to
Melrose Park)

CANADA

BRITISH COLUMBIA

Stratoflex of Canada, Limited (H-D-S)
A/C (604) 531-5651
L. W. Marshall (Resident Sales Engineer)
13677 Marine Drive
White Rock, British Columbia

NEW BRUNSWICK

Stratoflex of Canada, Limited (D)
A/C (504) 692-9159
A. B. McLean
19 Fourth Street
St. John, New Brunswick

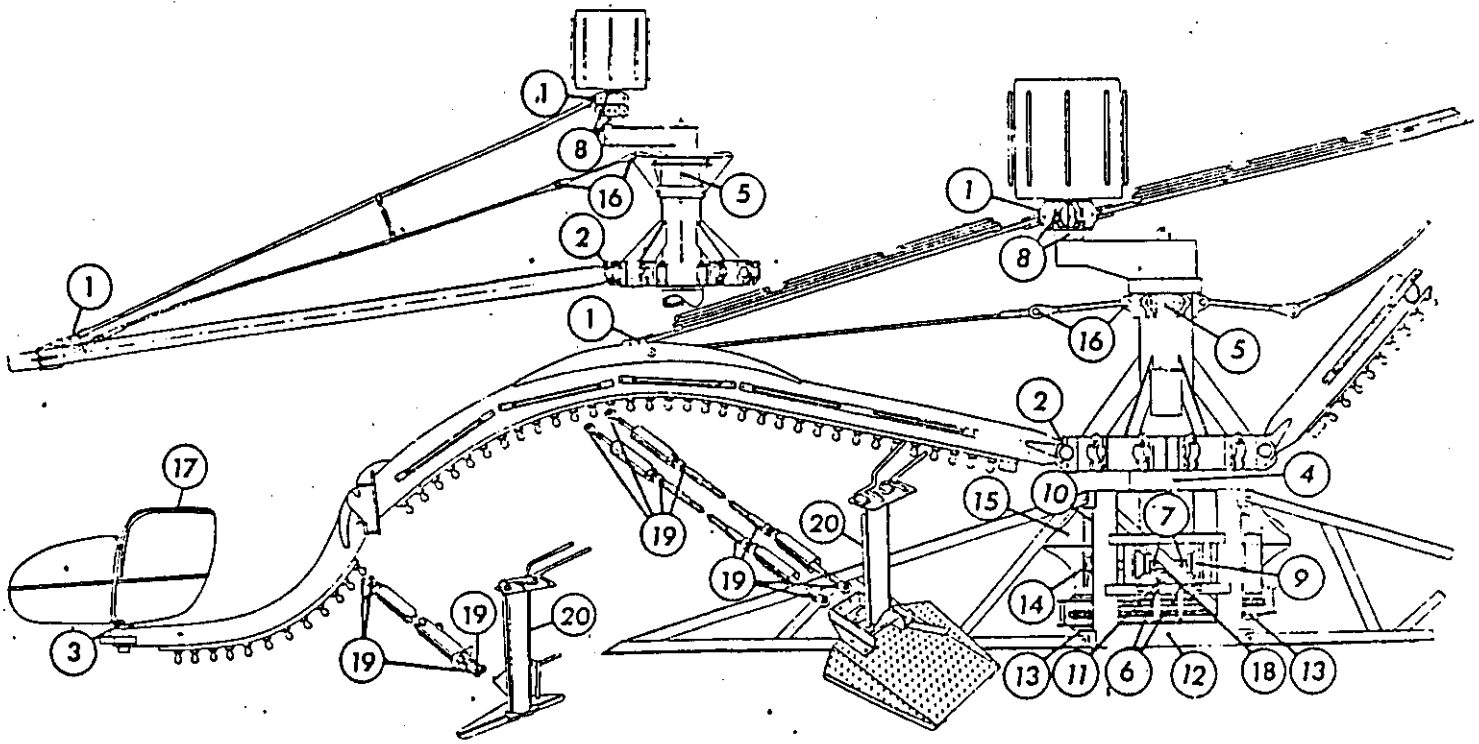
ONTARIO

Stratoflex of Canada, Limited (H-D-S)
A/C (416) 251-3145, 6, 7 & 8
W. S. Matthews -- K. Tsujimura
James McGuinness -- Ron Milne
395 Evans Avenue
Toronto, 18 Ontario

Stratoflex of Canada, Limited (H-D-S)
A/C (613) 722-2268
C. Salton
598 Wavell Avenue
Ottawa, Ontario

(H) Hydreco Distributors
(D) Dynapower Distributors
(S) Systems Distributors

LUBRICATION INSTRUCTIONS



NO.	NAME OF PART	TYPE OF BEARING	*
1	SWIVEL BLOCKS	BRONZE	(A)
2	HINGE BUSHINGS	BRONZE	(A)
3	CAR SPINDLE BUSHINGS	NYLON OR BRONZE	(A)
4	SPLIT HUB BUSHING	BRONZE	(A)
5	ECCENTRIC TUBE BUSHING	BRONZE	(A)
6	CLUTCH THROW-OUT BUSHINGS	BRONZE	(A)
7	CLUTCH SHIFTER RING BEARING	ANTI-FRICTION	(A)
8	ECCENTRIC HUB BEARINGS	ANTI-FRICTION	(B)
9	CLUTCH BOWL BEARINGS	ANTI-FRICTION	(B)
10	GEAR CASE UPPER BEARING	ANTI-FRICTION	(A)

NO.	NAME OF PART	TYPE OF BEARING	*
11	BASE BEARING (Upper)	ANTI-FRICTION	(A)
12	BASE BEARING (Lower)	ANTI-FRICTION	(A)
13	DRIVE SHAFT BEARINGS	ANTI-FRICTION	(C)
14	COUNTERSHAFT BEARINGS	ANTI-FRICTION	(C)
15	GEAR CASE	ANTI-FRICTION	(D)
16	SAFETY CABLE ASSEMBLY	STEEL	(A)
17	CAR	STEEL	(E)
18	CLUTCH ROLLERS & SHAFT	STEEL	(E)
19	ROD ENDS	STEEL	(B)
20	CONTROL STAND	STEEL	(E)

***LUBRICATION INTERVAL: THE ABOVE TABLE OF LUBRICATION INTERVALS REFER TO AVERAGE OPERATING CONDITIONS WITH GREASE SEALS INTACT.**

(A) DAILY OR EVERY EIGHT HOURS DURING HEAVY OPERATIONS.*

(B) LIGHTLY EVERY TWO WEEKS.*

(C) EVERY THREE MONTHS.*

(D) CHECK EVERY MONTH. CHANGE EVERY YEAR. USE E. P. 90 GEAR LUBE.

(E) KEEP ALL MOVING PARTS OILED DAILY.

NOTES:

* USE A MULTI-PURPOSE WATER RESISTANT GREASE WITH AN ACCEPTED EXTREME PRESSURE ADDATIVE SUCH AS CHEVRON R. P. M. MOLYGREASE NO. 1 OR MOBIL GREASE SPECIAL IN ALL PRESSURE FITTINGS.

KEEP LIGHT RINGS CLEAN AND FREE OF CONTAMINANTS SUCH AS GREASE, OIL, ETC.

CHANGE OIL IN HYDRO-SHEAVE EVERY 4000 HOURS OR ONCE A YEAR. USE 10W ABOVE 10 DEGREE F. & 5W BELOW 10 DEGREE F. OIL IS TO BE HEAVY DUTY TO MEET A. P. I. SERVICES CLASS M, S.

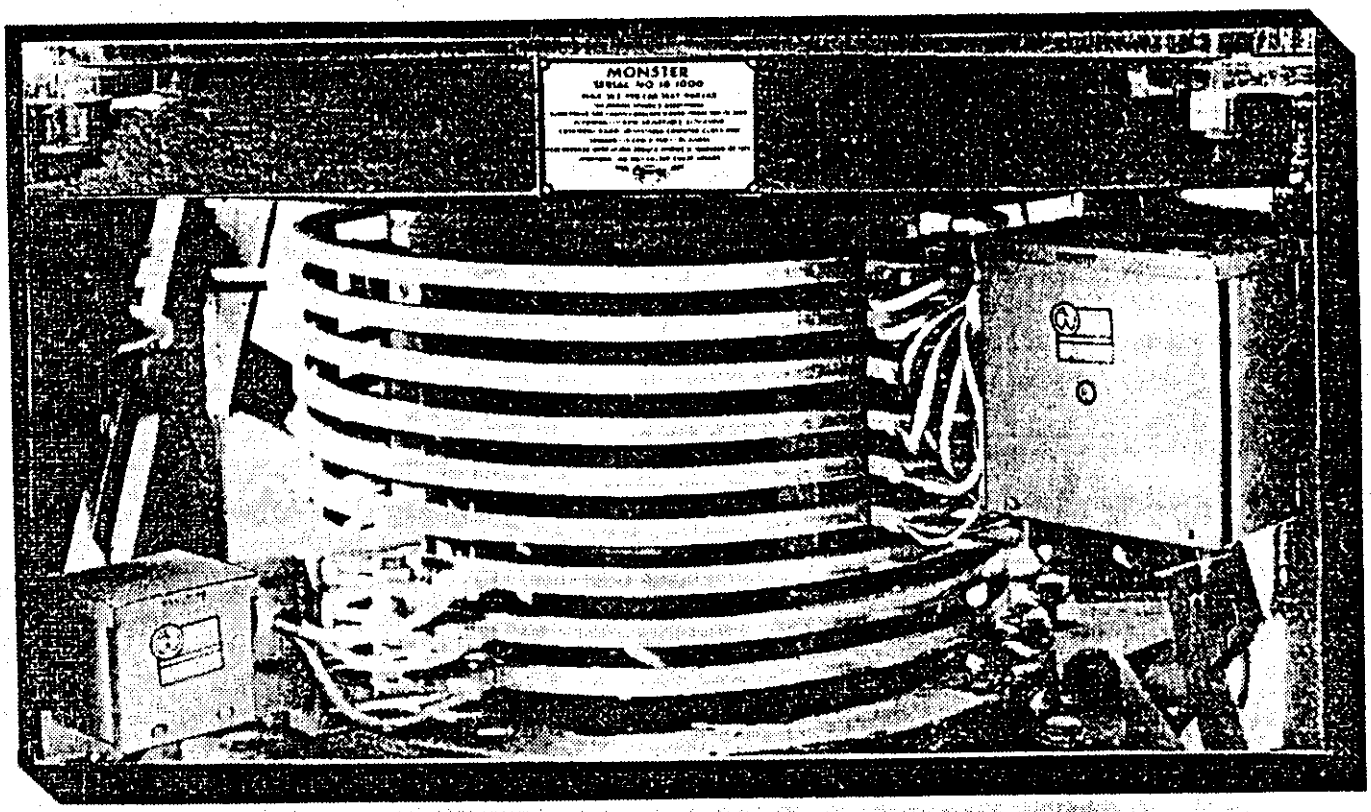
LUBRICATE DRIVE CHAINS EVERY TWO WEEKS WITH AN APPROVED LUBRICANT SUCH AS ROTANIUM POWER-LUBE NO. 91665, CHEVRON PINION GREASE MS OR EQUIVALENT.

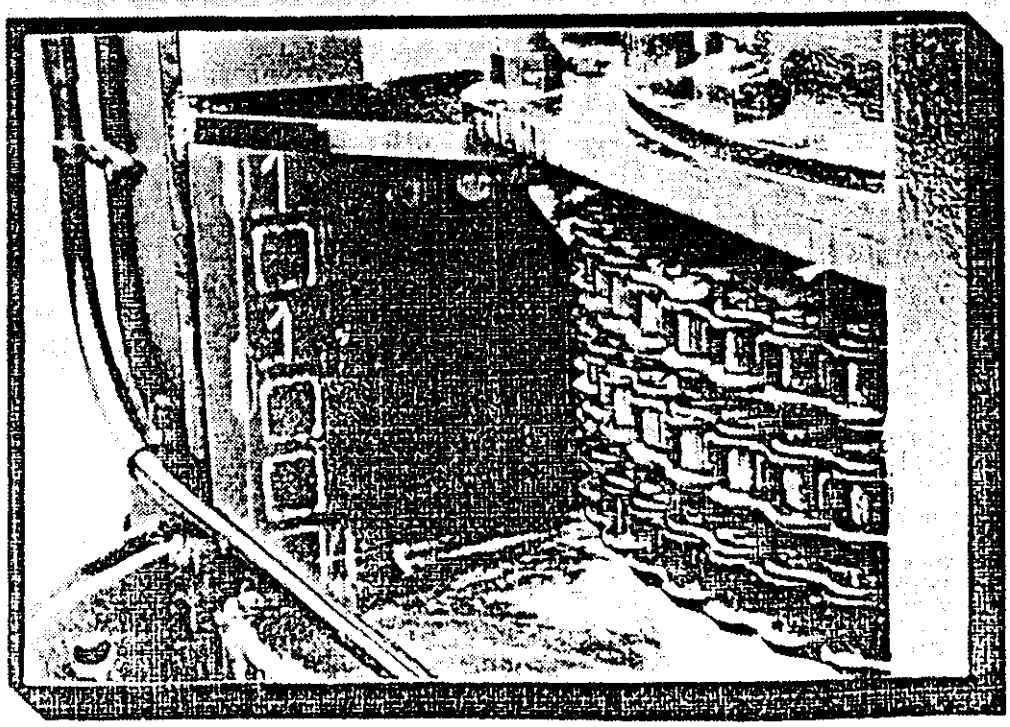
WHEN GREASING SWIVEL BLOCKS, RAISE THE SWEEPS TO RELIEVE PIN PRESSURE AND ENABLE THE LUBRICANT TO COMPLETELY SURROUND THE SWIVEL PIN.

REFER TO THE ALLIS-CHALMERS OPERATING & MAINTENANCE

LOCATION OF MONSTER SERIAL NUMBERS

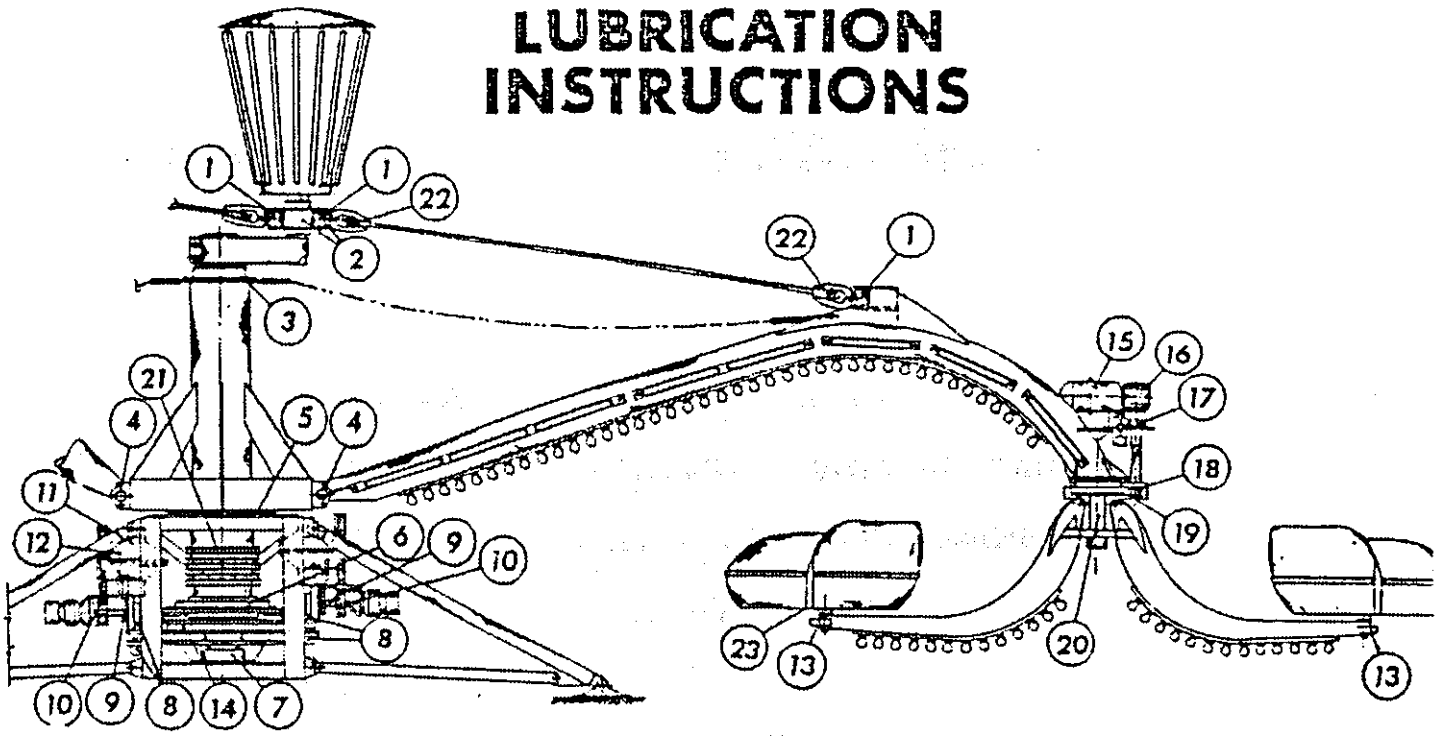
NOTE:
WHEN ORDERING PARTS, PLEASE GIVE SERIAL NUMBER OF YOUR MACHINE ALONG WITH THE PART NUMBERS FROM THIS CATALOG.





THE NAME PLATE, SPECIFYING THE SERIAL NUMBER, CAPACITY AND SPEEDS OF THE RIDE, IS LOCATED ON THE UPPER FRONT CAGE CHANNEL FACING THE OPERATOR. THE SERIAL NUMBER IS ALSO WELDED ON THE RIGHT HAND SURFACE OF THE LEFT HAND CORNER POST OF THE CAGE.

LUBRICATION INSTRUCTIONS



*LUBRICATION INTERVAL: THE ABOVE TABLE OF LUBRICATION INTERVALS REFER TO AVERAGE OPERATING CONDITIONS WITH GREASE SEALS INTA

NO.	DESCRIPTION OF PART	BEARING TYPE	*
1	SWIVEL BLOCKS	ANTI-FRICTION	(A)
2	ECCENTRIC HUB	ANTI-FRICTION	(B)
3	ECCENTRIC TUBE UPPER BEARING	ANTI-FRICTION	(B)
4	HINGE PIN BUSHING	BRONZE	(A)
5	HINGE COLUMN UPPER BUCHING	BRONZE	(A)
6	HINGE COLUMN LOWER BUSHING	BRONZE	(A)
7	ECCENTRIC TUBE LOWER BEARING	ANTI-FRICTION	(B)
8	DRIVE SHAFT BEARINGS	ANTI-FRICTION	(C)
9	HYDRAULIC DRIVE INNER BEARING	ANTI-FRICTION	(C)
10	HYDRAULIC DRIVE OUTER BEARING	ANTI-FRICTION	(B)

NO.	DESCRIPTION OF PART	BEARING TYPE
11	GEAR CASE UPPER BEARING	ANTI-FRICTION
12	GEAR CASE	ANTI-FRICTION
13	CAR SPINDLE BUSHINGS	NYLON OR BRONZE
14	MAIN DRIVE CHAINS	
15	HYDRO SHEAVE	
16	SPIDER MOTOR GEAR BOX	ANTI-FRICTION
17	DRIVE SHAFT UPPER BEARING	ANTI-FRICTION
18	DRIVE SHAFT LOWER BEARING	ANTI-FRICTION
19	SPIDER DRIVE CHAINS	
20	SPIDER HUB ASSEMBLY	ANTI-FRICTION

(A) DAILY OR EVERY EIGHT HOURS DURING HEAVY OPERATIONS.**

(B) LIGHTLY EVERY TWO WEEKS.**

(C) EVERY THREE MONTHS.**

(D) CHECK EVERY MONTH, CHANGE EVERY YEAR. USE E.P. 90

(E) KEEP ALL MOVING PARTS OF THE CARS AND SUPPORT RODS OILED DAILY.

(F) CHANGE OIL IN HYDRO-SHEAVE EVERY 4000 HOURS OR ONCE A YEAR. USE 10W ABOVE 10 DEGREE F. & 5W BELOW 10 DEGREE F. OIL IS TO BE HEAVY DUTY RO MEET A.P.I. SPECIFICATIONS CLASS M.5.

(G) LUBRICATE DRIVE CHAINS EVERY TWO WEEKS WITH AN A ROVED LUBRICANT SUCH AS CHEVRON PINION GREASE M ROTANIUM POWER-LUBE NO. 91666 OR EQUIVALENT.

(H) USE A COMPOUNDED GEAR LUBE WITH AN E.P. ADDATIVE COMPLY WITH AGMA-7 E.P. OR AGMA-8 E.P. SPECIFICAT

NOTES:
** USE A MULTI-PURPOSE WATER RESISTANT GREASE WITH ACCEPTED EXTREME PRESSURE ADDATIVE SUCH AS CHEV R.P.M. MOLYGREASE NO. 1 OR MOBIL GREASE SPECIAL IN PRESSURE FITTINGS.

KEEP LIGHT RINGS CLEAN AND FREE OF CONTAMINANTS S AS GREASE, OIL ETC.

THE RECOMMENDED OPERATING PROCEDURES FOR STARTING, RUNNING AND STOPPING THE MONSTER RIDE ARE AS FOLLOWS:

STARTING

ROTATION — AFTER THE LAST SWEEP OR CAR HAS BEEN LOADED AND SECURED, ADVANCE ROTATION CONTROL LEVER IN A SLOW, EVEN MOVEMENT TO ATTAIN THE MAXIMUM ROTATION RPM IN NOT LESS THAN 3/4 OF 1 REVOLUTION.

CROSS ARMS — WHILE ADVANCING ROTATION CONTROL LEVER, START CROSS ARMS ROTATING AND CHECK VISUALLY EACH SWEEP AS IT PASSES.

ECCENTRIC — THE ECCENTRIC IS STARTED IN THE SAME MANNER AS THE ROTATION. MAINTAIN A STEADY ADVANCEMENT OF THE CONTROL AS TO REACH FULL RPM IN NOT LESS THAN 3/4 OF 1 REVOLUTION.

RUNNING

THE MAXIMUM RPM AND DIRECTIONS LOOKING DOWN FROM THE TOP OF THE RIDE ARE AS FOLLOWS:

ECCENTRIC — 11 RPM CLOCKWISE
ROTATION — 8 RPM COUNTER-CLOCKWISE
CROSS ARMS — 15 RPM CLOCKWISE

FOR REVERSE OPERATION REDUCE ROTATION AND ECCENTRIC SPEEDS A MINIMUM OF 50%. DO NOT EXCEED THESE SPEEDS.

STOPPING

IN STOPPING USE REVERSE APPLICATION OF STARTING PROCEDURE.

MONSTER OPERATING PROCEDURES

DRAWN BY:	SCALE:	NO. REQ'D.:	MATERIAL:
AEA	~	~	~
DATE: 1-19-77	NEXT ASSY: ~	SOS. NO.:	
		ADD BY NO.:	

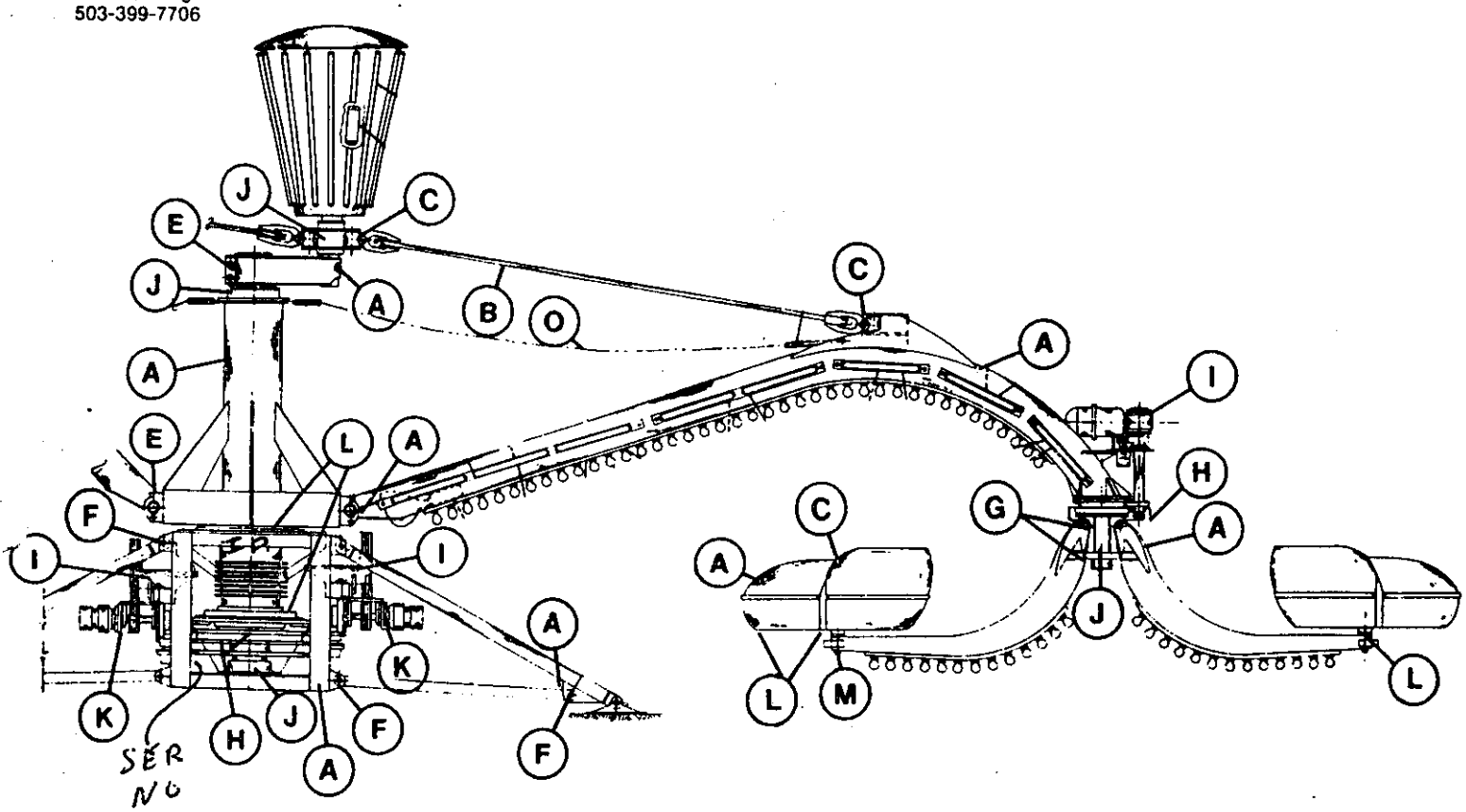
Chance Rides

Drg. No P-4-77

P-4-77

THE MONSTER
INSPECTION CHECK LIST

SALES & SERVICE
Toll Free outside Oregon
(800) 547-9156
Eyerly Inc.
P.O. Box 12155
2050 Turner Rd. S.E.
Salem, Oregon 97309
503-399-7706



A. Inspect for weld cracks and structural damage
B. Check support rods for equal tension. If bent replace. Inspect threads for cracks, check thrust washer for wear.
C. Inspect swivel block needle bearings yearly, check for worn thrust washers, check attaching pin and nuts for tightness. Check for proper lubrication.
D. Check safety cable for condition, broken strand, corrosion and adjustments. Cable should not bear weight of sweep when extended. Attaching points should move freely. Cable should be replaced if sweep is dropped.
E. Check bolts for condition and correct tightness. Bolt should be replaced if torqued to max. after removal. Inspect condition of pillow block - hinge pin, if damaged or loose - replace.
F. Check condition of attaching pins & fastener. Pin should be cotter keyed and not hair pinned. Inspect for hole enlargement and repair if needed.
G. Inspect for loose bolts. If bolts are torqued to max. Bolt should be replaced after removal. Inspect safety pin for fastener. Fastener may be hair pin or cotter key.
H. Check for loose or worm chain; repair or replace. Make sure chain does not rub guards, adj. as needed. Check all sprocket fasteners or securing members.
I. Check oil level in gear housing, change yearly. Inspect oil level of fluid clutch and torque arm snubber in spider gear drive.
J. Check all rotating hubs for play and rough bearing. Repair as necessary.
K. Check all hyd. attaching pins & bolt for wear or looseness. Replace or tighten as needed. Inspect drive belts for wear, cracks or looseness. Repair as necessary.
L. Check for wear in bushings, joints, hinges and linkage.
M. Inspect spindle for wear and fastener for condition.
N. General information:
400 lbs. per car.
Rotation 8 RPM ccw — Eccentric 11 RPM cw
Spiders 15 RPM cw
Do not operate over 50% of recommended RPM in reverse.
Note: (1) The monster requires a routine checking for loosening bolts. We recommend every 30 days of operation.
(2) Many causes of mechanical repair have resulted from failure to follow the recommended lubrication frequency or failure to follow the lubrication chart. We cannot overstress the importance of following the factory lubrication instructions.

JANUARY 1978 PRINTED IN U.S.A.

MEMORANDUM

Bureau of Fair Rides Inspection
3125 Conner Blvd., Bldg. #4
Tallahassee, FL 32399-1650

DATE: September 16, 1994

TO: All Inspection Specialists and Supervisors

FROM: Ron Safford, Chief
Fair Rides Inspection

SUBJ: **SAFETY ALERT FOR EYERLY AIRCRAFT'S OCTOPUS, SPIDER AND MONSTER**

Enclosed is one copy of CPSC's September 13, 1994, safety alert for the Octopus, Spider and Monster.

All applicable rides shall comply with these recommendations when permitted or they are to be considered an imminent danger and closed.

Any carrier that cannot be proved to be less than 15 years old shall be tested in accordance with this alert.

Record the results of your inspection in the comment area for these rides.

RS/sm

Enclosure

U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

OFFICE OF COMPLIANCE
AND ENFORCEMENT

Division of
Corrective Actions
Tel: 301-504-0608
Fax: 301-504-0359

AMUSEMENT RIDE SAFETY ALERT!

ATTENTION! STATE AMUSEMENT RIDE SAFETY OFFICIALS
2nd NOTICE

EYERLY AIRCRAFT
"OCTOPUS, SPIDER & MONSTER RIDES"
September 13, 1994

As noted in our August 16, 1994 Safety Alert, the U.S. Consumer Product Safety Commission (CPSC) in conjunction with the Commonwealth of Kentucky's Department of Weights & Measures, investigated an accident involving an "Octopus" amusement in Irvine, Kentucky. The accident involved the failure of the car's tubular framing behind and under the seat causing the two passengers to be dumped from the car. CPSC staff have preliminarily determined the cause of the accident to be due to excessive corrosion (wide pits, deep pits, and perforation) and fracturing of the tubular structure supporting the hub under the car's seat. The corrosion appears to have been as a result of moisture collecting in the gap between two under-side tubes and their fiberglass covering. Fracture of these tubes is believed to have preceded the fracture of the other frame tubes.

The rides were manufactured from 1936 to the mid-1970's by the defunct Eyerly Aircraft Co., Salem, Oregon. No new rides are being made, although parts can be purchased from Oregon Rides, Salem, OR. The rides involved are all "Octopus", "Spider" and "Monster" rides with fiberglass covered tubs/cars. Production of fiberglass cars began in 1964. These tubs/cars are believed to be used interchangeably by the industry. Those fiberglass tubs/cars that are 15 years and older are considered the most likely to have hidden corrosion.

The CPSC recommends inspection of the cars critical areas. The following text provides information about using either destructive or nondestructive techniques for the examination of the tubing that is covered by fiberglass matting on the underside of a car seat.

General Inspection Comments

The inspection for possible corroded or cracked tubing hidden by a fiberglass covering may be done by either destructive or nondestructive methods. Either method is to be used in conjunction with the use of visual inspection or magnetic particle inspection of the car's other underside tubing that is not covered by fiberglass. Attachment 11 shows the location of the tubing that is the subject of this bulletin. This bulletin is not intended to exclude the inspection of other components of the cars or ride as described by the manufacturer and past and present parts suppliers.

Cars that are known to be over 15 years old or those cars whose age cannot be verified to be less than 15 years old are subject to this inspection recommendation. Follow up inspections are to be done at 5-year intervals after the initial inspection.

The number of cars on an individual ride to be inspected should be based on whether or not that cars have a history of being together as one unit. If the ride's cars have an unknown history or if the cars are known to not have always been together as a unit, then all of that ride's cars should be inspected. The inspection should be repeated in succeeding 5-year intervals. If all of a ride's cars have a known history of always being together as a unit, then one-third of that ride's cars may be selected for examination. This first one-third of a rides cars should not be examined again if the cars remain together as a unit until each third has been examined over each succeeding 5-year inspection interval. Consult with Oregon Rides about all instances of tubing corrosion, perforation, or cracking.

The fracture of the other frame tubes may be assisted by the distortion of the underside tubes during handling. This distortion may have increased the stress in the frame increasing the probability of crack initiation. These other tubes should be inspected for straightness. This inspection should be combined with a visual or magnetic particle inspection of this other exposed tubing. This should be done in addition to the ride owner's choice of doing a destructive examination or a nondestructive examination of the tubing that is covered by the fiberglass matting. Oregon Rides is preparing a bulletin providing detailed information about the examination of a car's exposed tubing.

Destructive Examination

Destructive examination of the tubing is intended to be only estructive to the fiberglass matting that bonds the tubing to the derside of the fiberglass seat. It is destructive because the camination entails the incremental removal of 1-inch wide strips of berglass matting with a blade. The tubing and the fiberglass seat terial is not to be cut. The destructive examination should be complished by:

(1) - Locating a point 12-inches from the car's spindle retainer on the fiberglass matting covering and bonding the two underside tubes that are welded to the spindle retainer to the fiberglass seat. On the fiberglass covering of the two other tubes bonded to the seat bottom, mark a point on these two tubes that is next to the 12-inch point marked on the first two tubes.

(2) - Locating the edges of the fiberglass matting nearest to the car's drain holes for the four tubes bonded to the car's underside.

(3) - Starting from the edge of the fiberglass matting, use a blade, without cutting the tubing or fiberglass seat, to remove a 1-inch wide section of fiberglass matting from the four tubes bonded to the fiberglass seat.

(4) - If no corrosion is observed after removing the first 1-inch wide section of fiberglass matting stop and repair the fiberglass matting according to instructions from Oregon Rides.

(5) - If light surface corrosion that does not reduce the wall thickness is observed, continue removing 1-inch wide sections of fiberglass matting until no corrosion (clean metal surface) is observed or the 12-inch point described above is reached. If only light surface corrosion that does not reduce the wall thickness is observed, clean the tube surface with a wire brush and repair the fiberglass covering according to instructions from Oregon Rides.

(6) - If severe corrosion, deep or wide pitting, wall penetration, or wall cracking is observed, then the tubing should be replaced and bonded to the fiberglass seat with new fiberglass matting according to instructions from Oregon Rides.

(7) - The other tubing that is not covered by fiberglass matting may be inspected by visual inspection or magnetic particle inspection techniques according to instructions from Oregon Rides.

Non-Destructive Examination

(1) - The non-destructive examination involves radiography of the underside tubing through the fiberglass seat and fiberglass matting covering the underside tubing. The examination can be done by a Level II or III Inspector qualified in radiography.

(2) - If the radiography does not reveal any corrosion, deep or wide pitting, perforation, or cracking in the tubing, then the tubing shall be considered to be not affected.

(3) - If corrosion is observed, the corrosion should be exposed by removing 1-inch wide increments of the fiberglass matting from the tube. Remove 1-inch wide sections of fiberglass matting until no corrosion is observed. (a) If only light surface corrosion that does not reduce the wall thickness is observed, use a wire brush to clean the corrosion from the tube surface and repair the fiberglass covering according to instructions from Oregon Rides. (b) If severe corrosion, in the form deep or wide pitting, wall porosity, or through wall thickness cracking is observed, then the tubing should be replaced and bonded to the fiberglass seat with new fiberglass matting according to instructions from Oregon Rides.

(4) - The other underside tubing, not covered by the fiberglass matting, may be inspected by visual inspection or magnetic particle inspection techniques.

For further information or clarification on this Safety Bulletin you may contact one of the following:

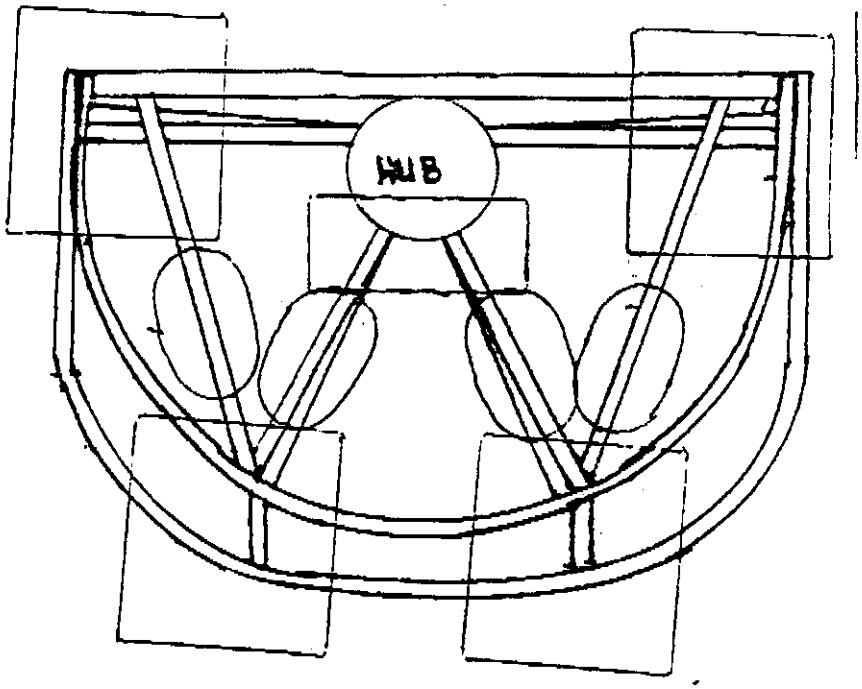
US Consumer Product Safety Commission
Division of Corrective Actions
Washington, DC
Jay DeMarco at (301) 504-0608 ext 1353
and
Division of Mechanical Engineering
Thomas Caton at (301) 504-0494 ext 1305
or
Oregon Rides, Inc.
Portland, OR
Guy Sherborne, Sr. at (503) 588-0984.

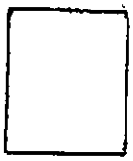
tachment 11 - Examination Areas for Destructive/Non-Destructive and Visual/ Magnetic Particle Techniques

- Areas to be examined by visual or magnetic particle inspection techniques

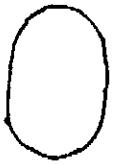
- Areas to be examined by destructive or non-destructive radiographic techniques

Attachment 11 - Examination Areas for Destructive/Non-Destructive and Visual/ Magnetic Particle Techniques





- Areas to be examined by visual or magnetic particle inspection techniques



- Areas to be examined by destructive or non-destructive radiographic techniques

688

U.S. CONSUMER PRODUCT SAFETY COMMISSION
WASHINGTON, D.C. 20207

OFFICE OF COMPLIANCE AND ENFORCEMENT

Division of Corrective Actions
Tel: 301-504-0608 Ext. 1353
Fax: 301-504-0359

DATE: August 16, 1994 PAGES TRANSMITTED: 3 + Cover

TO: State Amusement Ride Safety Official

TITLE:

OFFICE FAX:

FROM: James A. DeMarco, Compliance Officer, CECA, HQ

MARKS: The attached "Safety Alert" is being provided as part of the Commission's Amusement Ride Safety Program.

RECEIVED
AUG 16 1994
BUREAU OF
FAIR RIDES INSPECTION

NOTE: If you have any problems with this transmittal, please contact the person listed above.

U.S. CONSUMER PRODUCT SAFETY COMMISSION

WASHINGTON, D.C. 20207

OFFICE OF COMPLIANCE
AND ENFORCEMENT

Division of
Corrective Actions
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AMUSEMENT RIDE SAFETY ALERT!

ATTENTION! STATE AMUSEMENT RIDE SAFETY OFFICIALS

EYERLY AIRCRAFT
"OCTOPUS, SPIDER & MONSTER RIDES"
August 16, 1994

On August 10 - 11, 1994, the U.S. Consumer Product Safety Commission (CPSC) in conjunction with the Commonwealth of Kentucky's Department of Weights & Measures, investigated two cars/tubs removed from an "Octopus" amusement ride involved in an accident on August 3, 1994, at the Estill County Fair in Irving, Kentucky. The accident involved the failure of a car that contained two male passengers. The car's tubular framing fractured behind and under the seat causing the two passengers to be dragged and then dumped from the car. CPSC staff have prelimarily determined the cause of the accident to be due to excessive corrosion and fracturing of the tubular structure supporting the hub under the car's seat. The corrosion appears to have been as a result of water draining from the drain holes and collecting in the gap between two under-side tubes and their fiberglass covering. The corrosion was greatest near the drain holes. Fracture of these tubes is believed to have preceded the fracture of the car's other frame tubes.

The rides were manufactured from 1936 to the mid-1970's by the defunct Eyerley Aircraft Co., Salem, Oregon. No new rides are being made, although parts can be purchased from Oregon Rides, Salem, OR. The rides involved are all "Octopus" and "Spider" with fiberglass or metal covered tubs/cars and "Monster" rides with serial number 22 and above.

While the CPSC's investigation into the cause of the failure continues, in the interim, we recommend inspection of the cars critical areas, as follows:

1. The critical areas are identified as the four tubes under the car seat that are covered by fiberglass. The tubes are shown in the attached schematic based on the Eyerly Aircraft Company drawing O-913 entitled "Octo & Spider Car Back Section."

2. Inspection by radiography is recommended if ride owners do not want to remove the fiberglass covering the car's tubing. It is recommended to have the radiography done by a class III technician. NOTE: Ultrasonic inspection is not recommended as tube roughness may make an accurate interpretation extremely difficult.
3. A visual inspection of the tubing may be done, but the fiberglass covering the tubing would need to be removed first for an adequate inspection.
4. Fiberglass removal techniques must be obtained from Oregon Rides prior to removing any fiberglass.
5. If excessively corroded or cracked tubing is found during the inspection, those tubes or the car should be replaced.
6. It is our understanding that a retrofit/fiberglass repair kit is being developed by Oregon Rides, Inc. CPSC will be evaluating the adequacy of this repair kit.
7. Magnetic particle inspection may be used to inspect the numerous welds around the hub and tubing of car back's underside.

Corrosion and cracking may also be found in non-critical areas of the seat front and seat back of the car. This corrosion and cracking may also be concealed by the fiberglass covering the car. Again, if corrosion or cracking is found, consult with Oregon Rides about the repair.

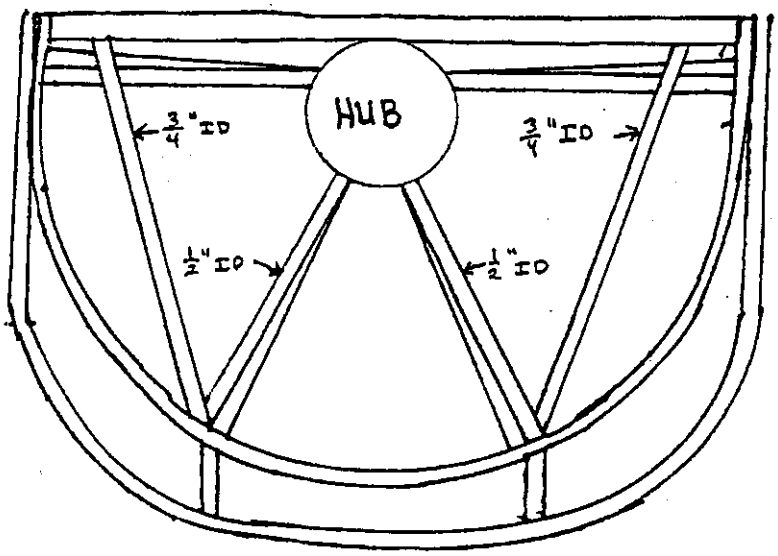
For further information or clarification on this Safety Bulletin you may contact one of the following:

US CPSC
Division of Corrective Actions
Jay DeMarco at (301) 504-0608 ext 1353
Division of Mechanical Engineering
Tom Caton at (301) 504-0494 ext 1305

Commonwealth of Kentucky, Dept. of Weights & Measures
Carl Dills at (502) 564-4870

Oregon Rides, Inc., Salem, OR
at (503) 588-0984.

SCHEMATIC BASED ON EYERLY AIRCRAFT COMPANY DRAWING O-913 "OCTO & SPIDER CAR BACK SECTION"



1. THE ¾"ID AND ½"ID TUBES ARE COVERED BY FIBERGLASS ON THE UNDERSIDE OF THE CAR BACK SECTION
2. NUMEROUS FILLET WELDS JOIN THE TUBES

(NOT TO SCALE)

Carnival Ride Examined After Teen-ager's Death

THE WASHINGTON POST

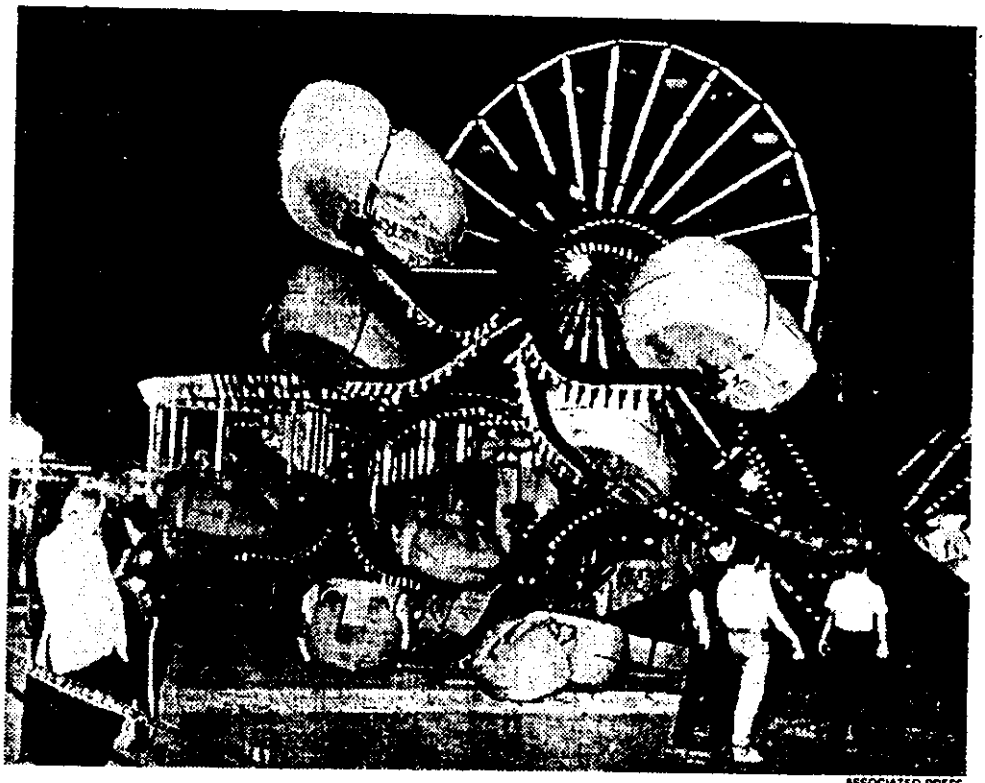
FRIDAY, NOVEMBER 25, 1988

HALLANDALE, Fla.—State investigators yesterday examined a carnival ride that partially collapsed while in operation and killed a teen-ager at the Broward County Fair.

The fair's other rides and shows were operating as usual.

One of six arms of the whirling "Giant Octopus" or "Spider" ride broke apart and crashed to the ground Wednesday evening, authorities said. Each arm supported four cars, and about 40 people were in the cars that fell nearly 10 feet, authorities said. At least seven people were injured.

Investigators believe the dead girl was in a car connected to another arm and was struck by the falling part of the machine.



ASSOCIATED PRESS

Investigators view partially collapsed ride at Hallandale, Fla., where one was killed, six hurt.

U.S. CONSUMER PRODUCT SAFETY COMMISSION

WASHINGTON, D C 20207

December 9, 1988

IMPORTANT SAFETY NOTICE CONCERNING EYERLY AIRCRAFT CO. "MONSTER RIDE"

Dear State Ride Official:

The U.S. Consumer Safety Commission is a federal regulatory agency established pursuant to the Consumer Product Safety Act, to protect the public against unreasonable risks of injury associated with consumer products.

As you may be aware, an accident recently occurred involving a "Monster" ride manufactured by Eyerly Aircraft Company and operated as a mobile ride by James Strates Shows in Broward County Florida. In this incident a sweep broke at the outer tip of the weldment on the long side reinforcing gusset (Location 6 in technical drawing #P-760). In discussing the problem with a number of State amusement ride inspectors and the Commission's own technical staff, we believe the critical areas involved may be identified by using the attached technical drawing (#P-760) and the bulletin and appendix previously supplied by Eyerly Aircraft Company in documents dated September 27, 1982. In addition to the testing recommended in the bulletin, further testing may be required such as dye penetrant testing preceded by non-abrasive paint removal.

You should be aware that the Commission staff will be notifying all known owners and operators of the "Monster" ride once they have been identified. In the meantime, if you are

aware of a "Monster" ride in your jurisdiction please call me at (301) 492-6608 with that information. If you have any questions or care to discuss our recommendations further, please feel free to contact me.

Please note that this document contains information on a specific ride in a way that allows the public to identify the manufacturer or private labeler. The information has not been provided to the appropriate firm for comment in accordance with section 6(b) of the Consumer Product Safety Act (15 U.S.C. 2055(b) and must not be released to the public under any circumstances. Section 29(e) of the Consumer Product Safety Act (15 U.S.C. 2078(e)), however, authorizes the Commission to share this information with federal, state and local agencies. In accordance with that section, no agency to which the information in this bulletin is provided may disclose it to the public until the Commission has complied with the applicable requirements in Section 6(b). Since the Commission has not provided Section 6(b) notice to the manufacturer or private labeler of the ride listed, it is a violation of federal law to disclose this information to the public. It is to be used by appropriate amusement ride officials only.

We appreciate your assistance in this matter of mutual concern for consumer safety.

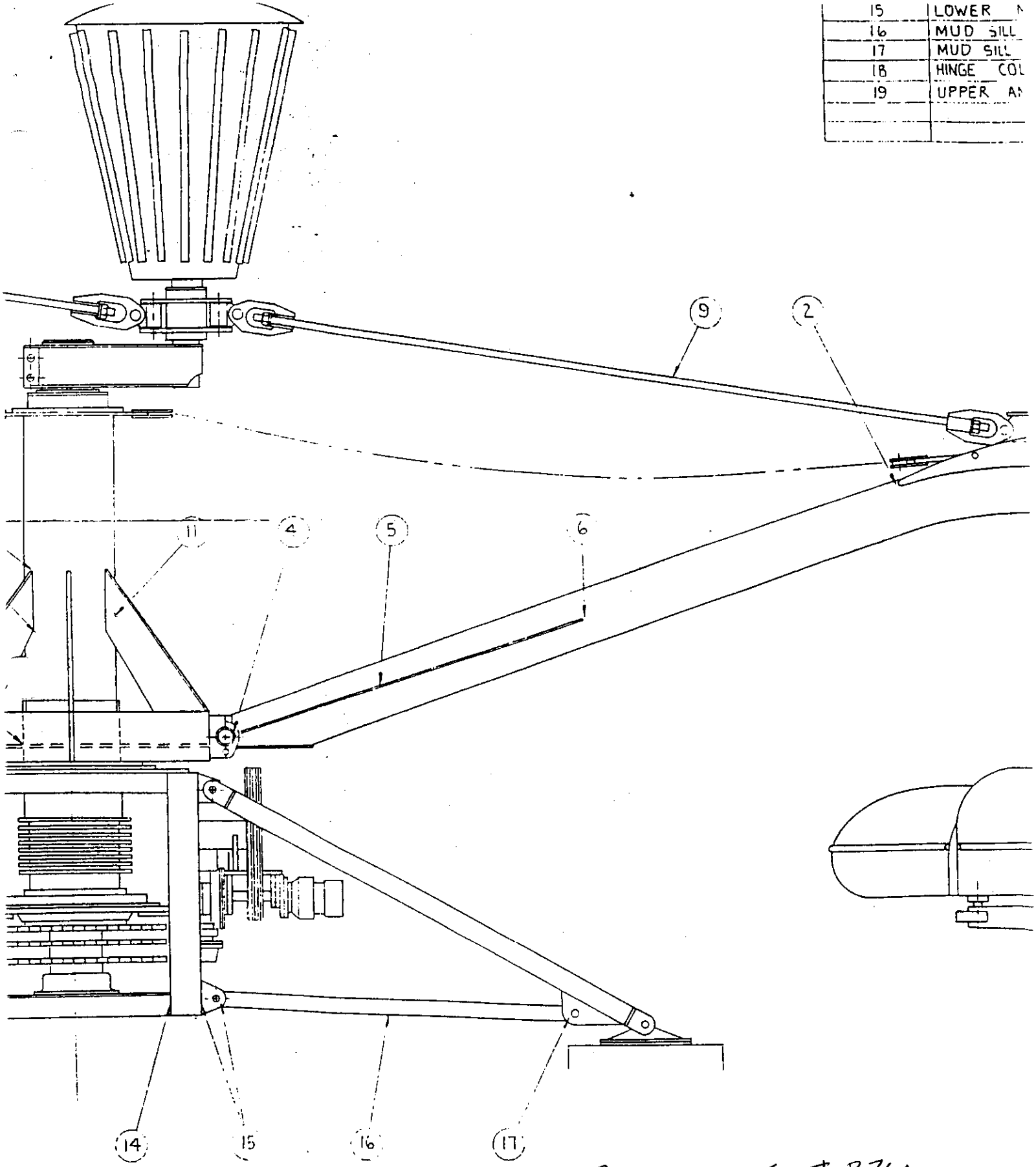
Sincerely,

James A. DeMarco
Compliance Officer
Division of Corrective Actions
Directorate for Compliance and
Administrative Litigation

Attachments:

Technical Drawing P-760
Bulletin
Appendix

15	LOWER
16	MUD SILL
17	MUD SILL
18	HINGE COL
19	UPPER AN



REDUCTIONS OF # P760

APPDENIX FOR MONSTER BULLETIN

APPENDIX FOR

INSPECTION, OPERATION, AND MAINTENANCE BULLETIN FOR MONSTERS NOT OUTFITTED WITH THE STRUCTURAL REINFORCEMENT KIT.

SEPTEMBER 27, 1982

APPENDIX FOR MONSTER BULLETIN

CONTENTS OF APPENDIX

M O N S T E R B U L L E T I N

INSPECTION, OPERATION AND MAINTENANCE BULLETIN FOR MONSTERS NOT OUTFITTED WITH THE STRUCTURAL REINFORCEMENT KIT.

PREPARED FOR

ALL MONSTER OWNERS OPERATING MONSTERS NOT OUTFITTED WITH THE STRUCTURAL REINFORCEMENT KIT.

PREPARED BY

EYERLY AIRCRAFT COMPANY

P. O. BOX 12155

SALEM, OREGON 97309

SEPTEMBER 27, 1982

MONSTER BULLETIN

TABLE OF CONTENTS

1.0 INTRODUCTION.

This important special MONSTER Bulletin deals with recommended periodic inspection programs and operations/maintenance recommendations intended to (1) minimize fatiguing effects that might occur during operation of the ride thereby extending its useful life, (2) allow the early detection of fatigue damage and structural cracking, should it occur, well before the structural integrity of the ride has become significantly affected, (3) indicate means of safely repairing the ride, should significant structural damage be found, to fully restore structural adequacy and safety to the ride. Also dealt with in this Bulletin is the recommendation for the replacement of certain specific MONSTER parts with factory new replacement parts of a new and improved design. This Bulletin strictly applies to MONSTERS not presently outfitted with the MONSTER STRUCTURAL REINFORCEMENT KIT.

It is assumed that all MONSTER owners presently operating MONSTERS have already fully complied with the June 12, 1981 MONSTER Bulletin that was sent out by Eyerly Aircraft Company. This June 12, 1981, MONSTER Bulletin required a complete NDT inspection of structurally critical areas of the ride by qualified NDT professionals. Eyerly Aircraft Company recommends that MONSTERS with signs of fatigue damage or fatigue cracking not be operated until a factory approved repair can be accomplished.

A very significant aspect of this special Bulletin to be highlighted for emphasis is the requirement for a detailed and thorough annual inspection of all the structurally critical areas and locations using the magnetic particle NDT technique. This full annual NDT inspection requirement to apply to those MONSTERS not outfitted with the MONSTER STRUCTURAL MODIFICATION KIT. (MONSTER Bulletins of January 18 and April 20, 1982.)

Inasmuch as operating stresses at critical locations are reduced by the addition of the MONSTER STRUCTURAL MODIFICATION KIT, those MONSTERS operating with the kit installed will not require the complete and detailed NDT inspection program to be performed annually.

This directive Bulletin is to be incorporated into all MONSTER documentation officially becoming part of the MONSTER Operation/Maintenance/Parts Manual/Catalog. This information to always accompany The MONSTER in the event of its transfer or sale. In the event of sale or transfer of The MONSTER, it is the responsibility of seller to inform buyer or future owner of this directive Bulletin so buyer or future owner may take appropriate action as outlined herein.

2.0 BULLETIN RECOMMENDING REPLACEMENT OF CERTAIN MONSTER PARTS

Eyerly Aircraft Company recommends the replacement of certain MONSTER parts with factory new replacement parts of a new and improved design. Owners may directly contact the parts department, Eyerly Aircraft Company, at (503) 399-7706 regarding arrangements for the purchase of these parts:

NEW PART NAME	NEW PART NO.	QUANTITY	REPLACES OLD PART	REPLACES OLD PART NO.
Mudsill Shock Pad	P-741	8	Rubber Shock Pad	P-450
Bushing, Hinge Pin	P-744	12	Pillow Block Bushing	O-151
Swivel Block Bushing Long	P-745	12	12 spacers, 24 snap rings 24 needle bearings	P-348,P-194, P-349
Swivel Block Bushing Short	P-746	12	24 Needle Bearings, 24 Washers	P-349 P-208
Washer, swivel block	P-747	24	Large swivel block washer	P-351

The new mudsill shock pads are of a new design made from a different rubber compound. The new rubber shock pad is designed to be far more flexible than the existing one and to retain the flexibility even at lower temperatures. In the event of shock and impact loadings that might occur in the ride sometime during future operations, the new rubber shock pads will help minimize them and also minimize the resulting structural damage.

Two possible sources for such shock and impact loadings are (1) loose critical bolted flange joints or (2) excessive wear clearances in critical bushing locations. Also the increased flexibility of the new shock pad design gives them increased ability to absorb uneven ground displacements that might occur in the future, due to heaving and settling of the soil under some of the foot pads, without producing excessive pad loadings in adjacent pads.

The new sweep hinge pin bushings, swivel block bushings, and large swivel block washers are all manufactured from Nylatron (impregnated with molybdenum disulfide). Benefits of these bushings are threefold: (1) the Nylatron material with its greater flexibility and damping characteristics than the present brass bushing material, will have the tendency to attenuate shock and impact loads that otherwise would be fully transmitted through these critical joints, (2) somewhat more ability to tolerate missed lubrication periods will exist with the Nylatron bushings since they are compounded with molybdenum disulfide which serves as a self lubricant, (3) periodic maintenance replacement of these bushings in the future can be accomplished with much less labor due to the simplicity of the new design.

3.0 SPECIAL OPERATOR INSTRUCTIONS

1. Smooth, reduced acceleration on rotation start-up: control the acceleration on rotation start-up by taking at least 3/4 of a revolution to bring it up to speed.

2. Smooth, reduced acceleration on eccentric start-up: control the acceleration on eccentric start-up by taking at least 3/4 of a revolution to bring it up to speed.

3. Check the ride speeds at least once during each operating shift to insure that the ride is not operated at excessive speeds. The RPM's can be checked by timing the number of revolutions with the second hand on a wristwatch. The following RPM's should not be exceeded:

Rotation: 7 to 7-1/2 RPM's CCW

Eccentric: 10 to 10-1/2 RPM's CW

NOTE: Notify the maintenance supervisor if these RPM's are at any time observed to be exceeded so that the necessary adjustments to the ride may be made.

4. Smooth, reduced deceleration on rotation stopping: control the deceleration on rotation stopping by taking at least 3/4 of a revolution to bring it to a stop.

5. Smooth, reduced deceleration on eccentric stopping: control the deceleration on eccentric stopping by taking at least 3/4 of a revolution to bring it to a stop.

6. Do not allow passenger overloading of cars - 400 lbs is the maximum per car.

7. Make every effort to load approximately equal passenger loadings in opposite cars to achieve well balanced loads.

8. Make every effort to load approximately equal passenger loadings in opposite sweeps to achieve well balance loads.

NOTE: Adherence to these instructions is important to avoid excessive ride loadings and to minimize fatigue damage in critical structural locations. The maximum rotation and eccentric RPM's of 8 RPM CCW and 11 RPM CW respectively given in the MONSTER OPERATING MANUAL are to be considered as MAXIMUM limits and are not to be considered as settings for continuous operation.

4.0 RIGOROUS LUBRICATION PROGRAM ESSENTIAL

The importance of adhering to the required periodic lubrication program cannot be overstressed. Faithful diligence in following the lubrication chart and the recommended lubrication frequency is essential in avoiding premature wear of critical bushings and bearings. Such premature wear in critical bushings and bearings can create excessive clearances and be the cause for excessive shock and impact loadings seen by the ride during operation. This can result in premature fatigue damage to critical structural elements of the ride necessitating possible extensive mechanical repair.

Refer to the MONSTER OPERATING MANUAL and the LUBRICATION INSTRUCTIONS SHEET for details on lubrication requirements.

5.0 DAILY CHECKING OF RIDE SPEEDS

Rotation and eccentric RPM's are to be checked (1) each day before the days ride operations begin and (2) following the performance of maintenance work of any kind before the ride is returned back into service.

The ride should not be operated at RPM's in excess of the following:

ROTATION: 7 to 7-1/2 RPM's CCW Maximum

ECCENTRIC: 10 to 10-1/2 RPM's CW Maximum

The RPM's can be checked by timing the number of complete revolutions turned in a given period of time using a wristwatch.

The maintenance department must make suitable adjustments if required to insure that the above ride speeds are not exceeded.

The maximum rotation and eccentric RPM's of 8 RPM CCW and 11 RPM CW respectively given in the MONSTER OPERATING MANUAL are to be considered as MAXIMUM limits and are not to be considered as settings for continuous operation.

6.0 WEEKLY STRUCTURAL INSPECTIONS

On a weekly basis a very thorough visual inspection is to be made of all the critical structural locations as shown on enclosed drawing P-760. This visual inspection is to be made in sufficient detail to successfully identify if they are present, cracks as small as 1/8 inch in length.

In the event a suspected crack is found, the location should be given a thorough NDT inspection using the magnetic particle technique to clarify whether or not the indication is actually a flaw or crack that has the potential of growing in length under further operation of the ride. A significant crack is a crack determined to be 1/8 inch in length or greater. The ride can continue to be operated if isolated small cracks of less than 1/4 inch are present providing the location is closely monitored on a daily basis. However, the ride should not be operated with the cracks present that are 1/4 inch in length or greater until a suitable repair has been accomplished. Eyerly Aircraft Company recommends that MONSTERS with significant fatigue damage (i.e., fatigue cracks of 1/4 inch or greater in length) be (1) weld repaired in accordance with a factory established criteria and (2) properly reinforced with a MONSTER STRUCTURAL MODIFICATION KIT before the ride is returned to service.

As a further aid in insuring that inspection locations of importance are not missed, use the attached MONSTER INSPECTION CHECK LIST SHEET and the MONSTER OPERATING MANUAL.

7.0 WEEKLY INSPECTIONS OF STRUCTURALLY CRITICAL BOLTS AND BOLTED JOINTS

On a weekly basis, very thorough visual inspection is to be made of all the structurally critical bolts and bolted joints in locations as shown on attached drawing P-761. These are to be carefully examined for signs of (1) a loose joint with play in it, (2) loose bolts, or (3) excessively worn bolts.

Joints having bolts that are suspected of being loose should have bolt torque levels checked against the factory provided bolt torque criteria as given on drawing P-761. Bolts that are found to have become loose or bolts that have been found to have fallen in torque value below 50% of the factory recommended torque levels should be replaced with new bolts and nuts of the required size and grade using the bolt torque criteria provided. Tightening procedures should be done using a torque wrench. For the larger bolts, it may be advantageous to use a 600 ft. lb. capacity torque wrench together with a 4 to 1 multiplier.

The matter of tight bolted joints is very important and the ride must not be operated with loose bolted joints or with bolts that are loose or improperly torqued. Otherwise severe shock loadings caused by the play in loose joints can produce structural fatigue damage and structural cracking in the ride that can necessitate mechanical structural repair of the ride before it can be returned to service.

8.0 MONTHLY INSPECTIONS OF STRUCTURALLY CRITICAL BOLTS AND BOLTED JOINTS

On a monthly basis all bolts at structurally critical locations are to be actually checked for proper tightness and torque. Locations to be checked are as shown on drawing P-761. Bolt torque levels should be checked against the factory provided bolt torque criteria as given on drawing P-761. Bolts that are found to be torqued within 50% of the factory recommended torque levels can be torqued up to the recommended levels. Bolts that are found to have become loose or bolts that have been found to have fallen in torque value below 50% of the factory recommended torque levels should be replaced with new bolts and nuts of the required size and torqued to the factory recommended torque values. All tightening must be done using a torque wrench. For the larger bolts, it may be advantageous to use a 600 ft. lb. capacity torque wrench together with a 4 to 1 multiplier in the event a torque wrench is not available that has the full torque capacity required.

The matter of tight bolted joints is very important and the ride must not be operated with loose bolted joints or with bolts that are loose or improperly torqued. Otherwise severe shock loadings caused by the play in loose joints can produce structural fatigue damage and structural cracking in the ride that can necessitate the performance of suitable mechanical structural repair of the ride before it can be returned to service.

9.0 REGULAR MAJOR ANNUAL STRUCTURAL INSPECTIONS REQUIRED

Eyerly Aircraft Company recommends that on a regular basis a major structural inspection be performed. This is to be a very thorough inspection consisting of the following:

(1) Complete NDT inspection by magnetic particle of all the structurally critical areas and locations to be performed by qualified expert professionals in the NDT technique.

(2) Inspection of all critical bushings and bearings for excessive wear damage.

(3) Replacement of all structurally critical bolts and nuts with new ones of the required grade and size and torqued to the factory required torque levels.

The NDT inspection is to be performed by competent professionals in the magnetic particle technique. Magnetic partical inspection is to be made of the critical structural areas and locations as shown on drawing P-760. This inspection to be made in such detail as to insure that cracks, flaws, or defects as small as 1/8 inch in length and 0.020 inches in depth will be detected. Small cracks that may be found are to be weld repaired providing they are less than 1/4 inch long and isolated from other similiar cracks that might have been detected. Contact factory for recommended repair procedure for such cracks. The ride should not be operated with cracks present that are 1/4 inch or greater until a suitable repair has been accoumplished. Eyerly Aircraft Company recommends that MONSTERS with significant fatigue damage (i.e., fatigue cracks of 1/4 inch or greater in length) be (1) weld repaired in accordance with a factory established criteria and (2) properly reinforced with a MONSTER STRUCTURAL MODIFICATION KIT* before the ride is returned to service.

All structurally critical bushings and bearings must be inspected for condition and excessive wear clearance and replaced if required. For the sweep hinge pin bushings, the maximum diametral clearance allowed between pin and bushing diameters including wear is 0.012 inches using the bronze bushings and 0.018 inches using the Nylatron bushings. The preferred method for checking this clearance is by physical measurements of the sweep hinge pin and bushing diameters upon their disassembly. However, if their clearances are to be determined without removal of the bushings, the procedures outlined on enclosed drawings P-756 and P-757 (depending on whether Nylatron or bronze bushings) may be used. For the hinge column bushings, a maximum total diametral clearance of 0.035 inches is allowed. If the hinge column is to be removed from the cage, this

clearance may be determined using the procedure given on enclosed drawing P-758. If the hinge column is not to be removed from the cage, this clearance may be determined using the alternate procedure given on enclosed drawing P-755. Allowable wear on the hinge column thrust ring is established from the criteria given on enclosed drawing P-759. For the car spindle bushings, a maximum diametral clearance between car spindle and car spindle bushing of 0.010 inches is allowed considering the effects of wear. Check all bearings and rotating hubs for play and rough bearing. Repair/replace as required. Owner is cautioned to completely and fully lubricate prior to leaving the MONSTER idle for an extended period (such as for example, over the winter months until the next operating season) to avoid corrosion damage to critical bearings.

As part of the annual inspection, all structurally critical bolts and nuts must be replaced with new ones of the required grade and size and torqued to the factory required levels as given on drawing P-761. All tightening must be done using a torque wrench. For the larger bolts it may be advantageous to use a 600 ft. lb. capacity torque wrench together with a 4 to 1 multiplier in the event a torque wrench is not available that has the full torque capacity required. Care is to be exercised to insure that the interfaces between bolted flanges and bolted joints are free from grease and oil before thay are bolted together. This will minimize the possibility of play or slippage of the properly torqued joint. Following bolt assembly, exposed bolt threads are to be left coated with a thin film of grease or corrosion preventati

All pins and holes in pinned joints/connections are to be inspected for wear, hole enlargement, and cracks. Replace/repair as required if connection is excessively loose.

Extreme care must be exercised to insure that the support rods are straight, of equal length adjustment, and are evenly carrying the sweep loads following major inspection activity prior to returning the ride to service. Inspection of the support rod assembly is to be performed per attached drawing P-754/sheet 20 of 24. Support rod length adjustments that may be required are to be performed per the instruction given on drawing P-751.

As an aid in insuring that important inspection locations are not missed, use the attached MONSTER INSPECTION CHECK LIST SHEET and the MONSTER OPERATIONS MANUAL.

*FOOTNOTE: Described in MONSTERS BULLETINS of Jan. 18 & April 20, 1982.

10.0 SPECIAL STRUCTURAL INSPECTIONS REQUIRED FOLLOWING OCCURENCE OF AN INCIDENT.

A special structural inspection is to be performed immediately following occurrence of an incident before the ride is returned back into service. In the context here, an incident is defined as any extraordinary event that has the potential of producing extraordinary loadings of any kind (including impact or shock loadings) that could adversely affect the structural integrity or safety of the ride. A few examples of incidents requiring special structural inspections are:

(1) Structurally critical bolted joints found to be loose allowing play or movement during operation.

(2) Critical bushings or bearings found to have developed excessive clearance and play.

(3) Discovery that the ride has operated significantly over the recommended RPM's.

(4) Discovery that the ride has operated with significant passenger overloading.

(5) Discovery that the ride has operated with excessively imbalanced passenger loads.

(6) Discovery that the ride has been subjected to excessive starting or stopping loads.

In the event of the occurrence of such an incident, the special structural inspection required to be performed consists of essentially the same tasks as the regular major annual structural inspections required as described in Section 9.0 of this Bulletin. The areas to be inspected and the level of detail of the inspection to be governed by the exact nature of the incident however.