MFG: EYERLY
NAME: SIDE WINDER
TYPE: NON-KIDDIE

Sidewinder

JV INDUSTRIES, INC.

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

(503) 399-0817

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

FOREWORD

The Eyerly Sidewinder is constructed of the finest materials available. Craftsmanship is the key to Eyerly Products with quality and durability as primary considerations. The design is appealing to the eye, and approved by professional engineers.

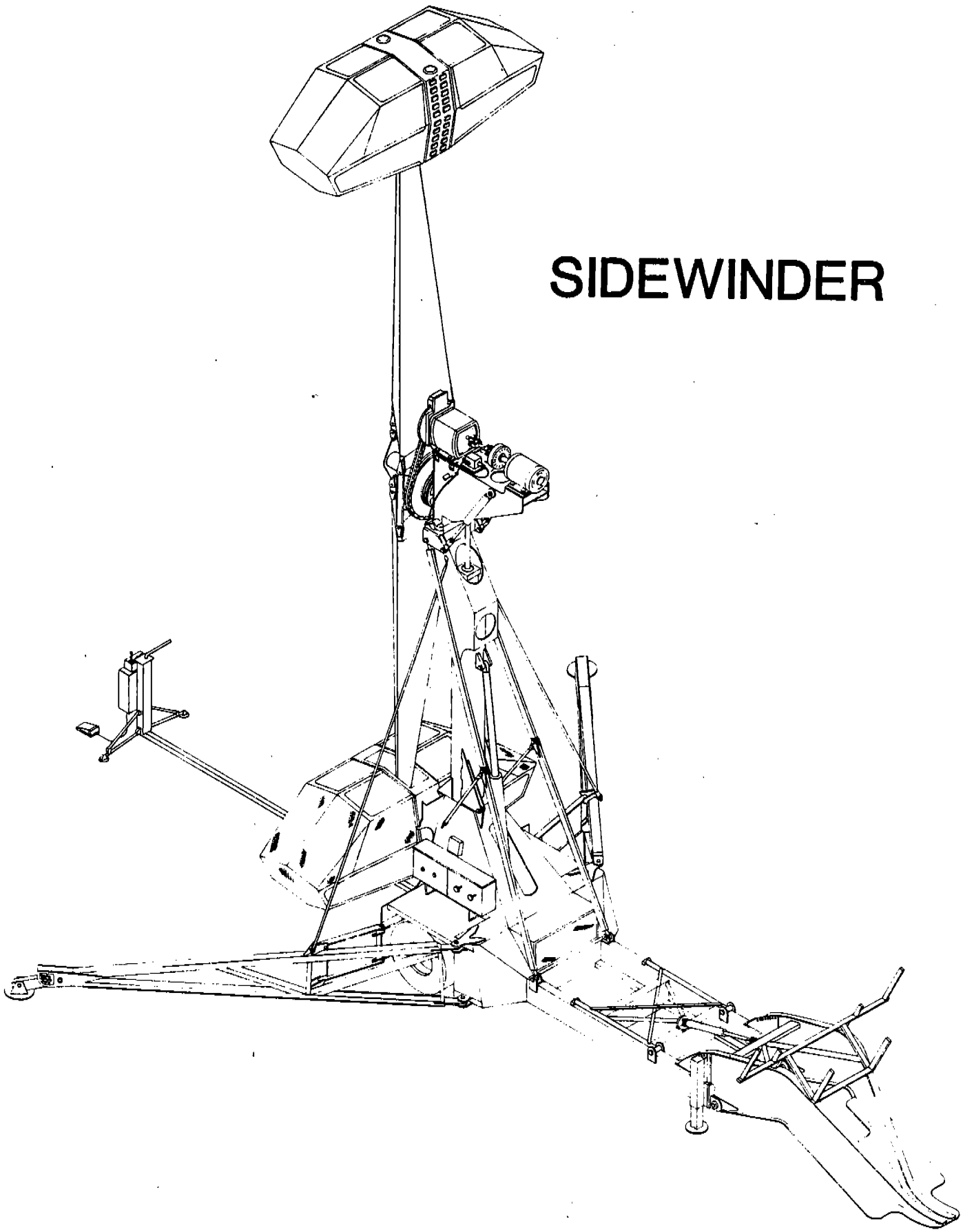
A Sidewinder that continues to operate well needs a regular and careful maintenance program, the replacement of worn or damaged parts, and regular lubrication and service attention.

Ride Operators must be properly instructed both as to operating techniques and maintenance service requirements. As with any other mechanical device, an operator must never operate the Sidewinder if he suspects a malfunction!

No modification of any part of the Sidewinder or substitution of parts is authorized by Eyerly Aircraft Co. Any repair or modification may drastically change the stress loading, may reduce safety, and may result in failure.

Information in this manual is intended to serve as a guide to trouble shooting, maintenance, regular lubrication and service, and replacement part selection.

SIDEWINDER



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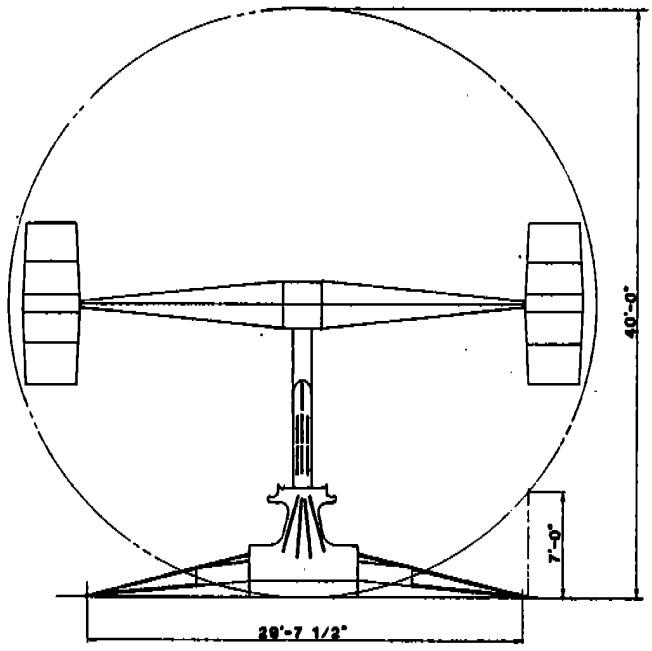
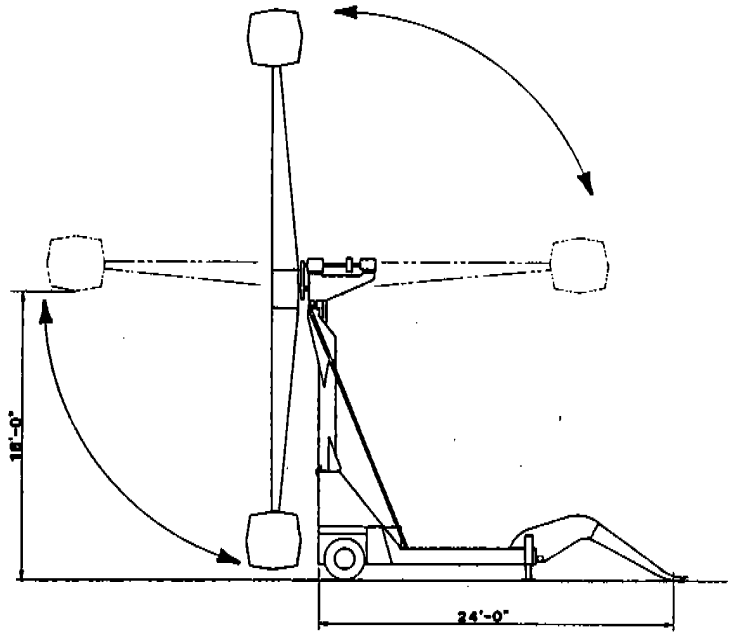
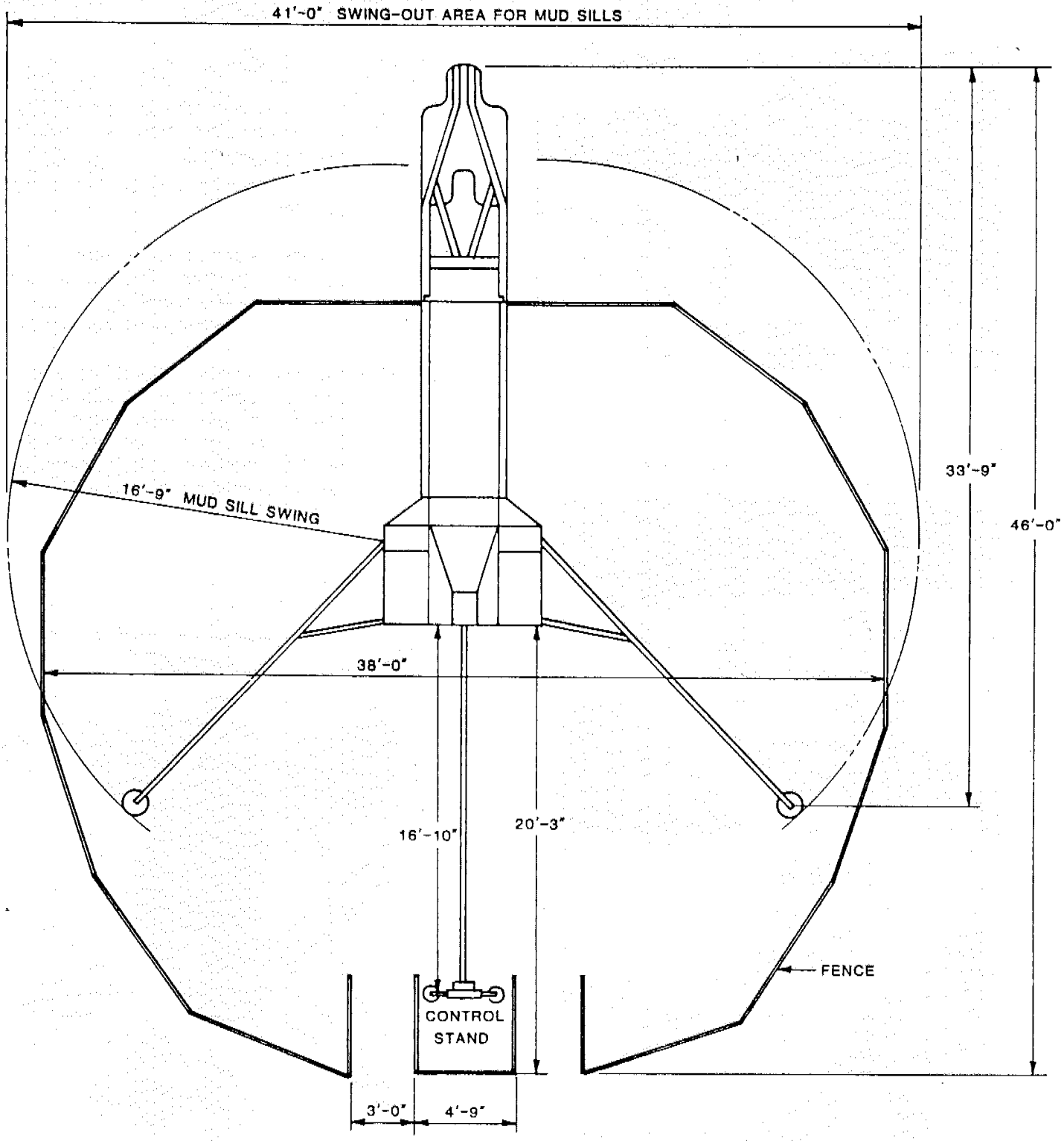


FRONT VIEW



SIDE VIEW

PLAN VIEW & FENCE LAYOUT



SET-UP PROCEDURE

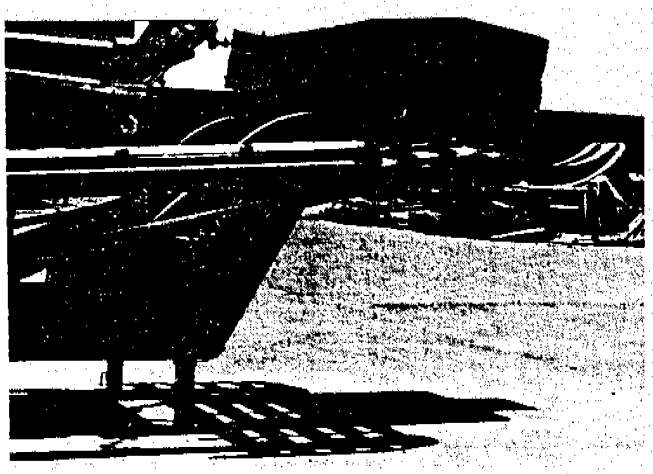


FIG A

Step 1 Spot ride with rear bumper 17 feet from fence line. Lower front jack legs (FIG A) and remove truck.

NOTE: Blocking may be necessary under jack legs.

Step 2 Remove rear bumper by removing pin from center support and safety pins from gates (FIG B). Disconnect light cord and lift bumper from gates and store under ride.

Step 3 Remove control stand assembly from transport position on left side of ride. Set up stand and pin support tube to center bumper support and connect brake cable (FIG C). Attach main disconnect panel and deadman switch (FIG D).

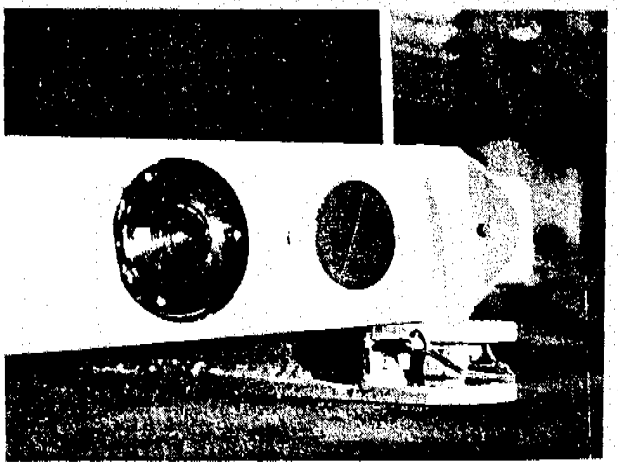


FIG B

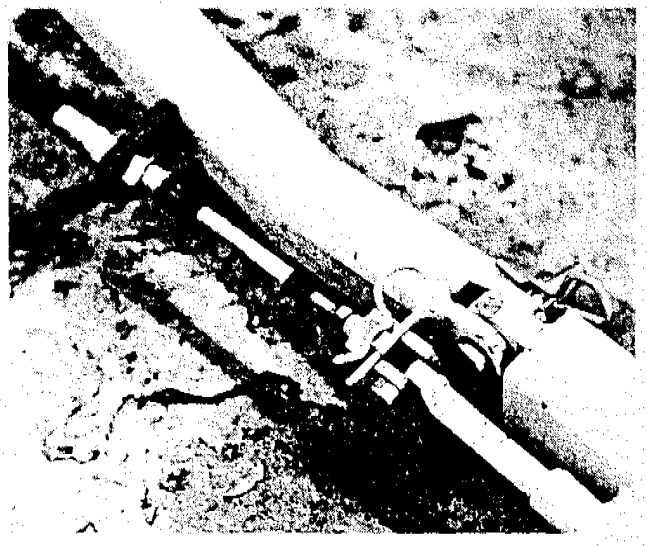


FIG C

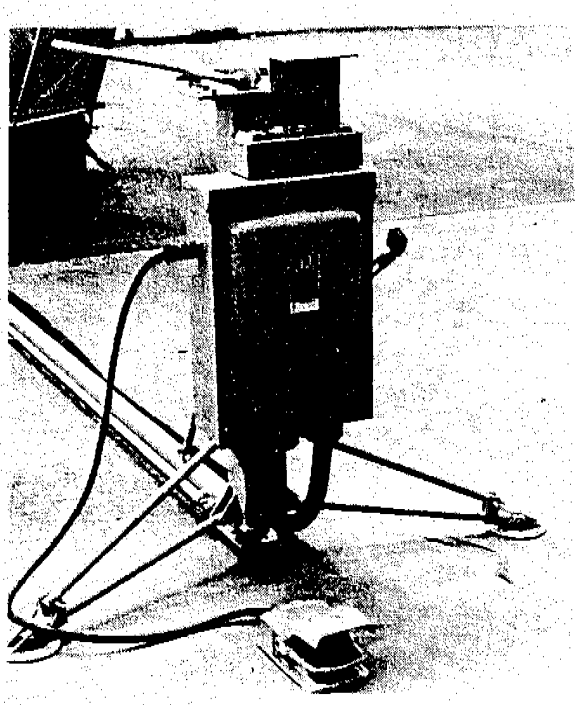


FIG D

SET-UP PROCEDURE

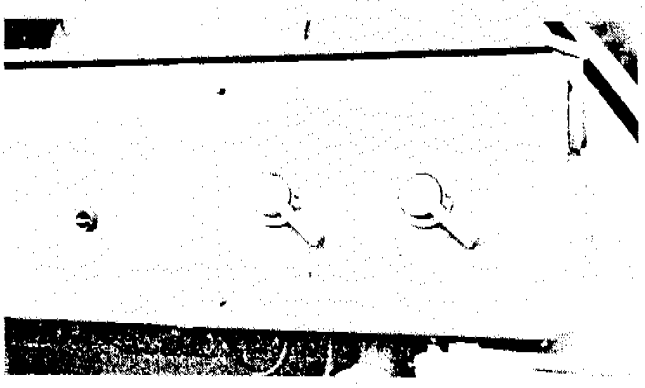


FIG E

Step 4 Making certain all electric panel disconnects are in "Off" position (FIG E) and toggle switches on control stand are in center position (FIG F), connect power supply cord from panel on control stand to 208 3-phase source.

Step 5 Move hydraulic system selector valve to manual position (FIG G). Switch main disconnect on control stand and motor disconnect on distribution panel to "On" position (FIG H). Depress black button on control stand while depressing deadman switch to verify that pump belt sheave on hydraulic motor rotates counterclockwise as indicated by the arrow on motor. (FIG I). Depress red button on control stand to stop hydraulic motor.

NOTE: Entire electric drive system will not function unless deadman switch is depressed.

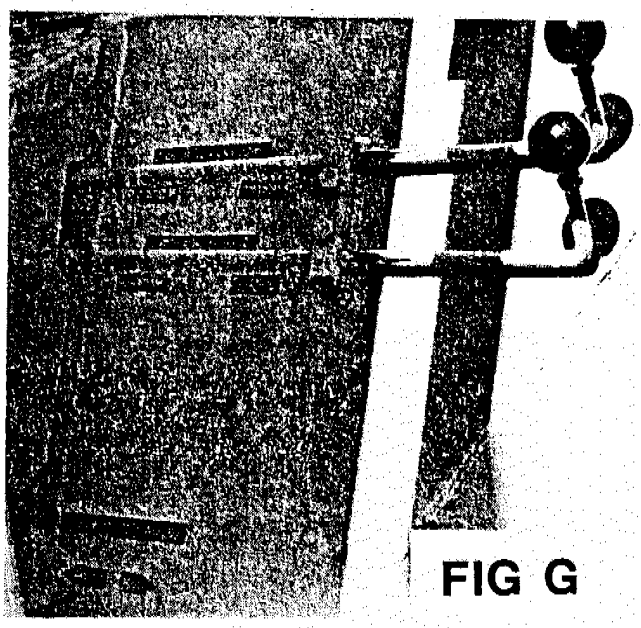


FIG G

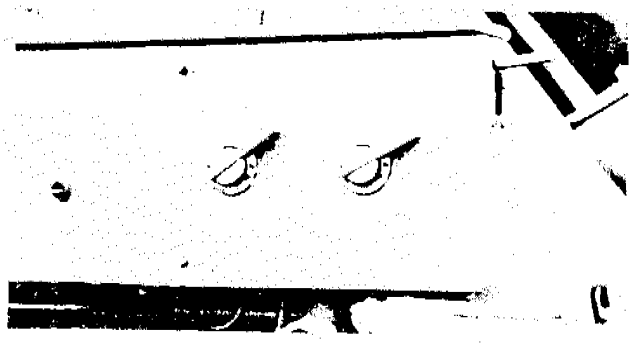


FIG H

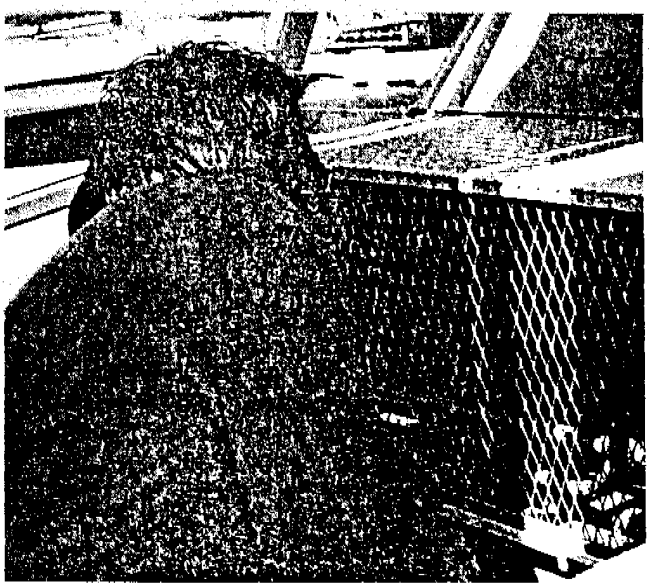


FIG I

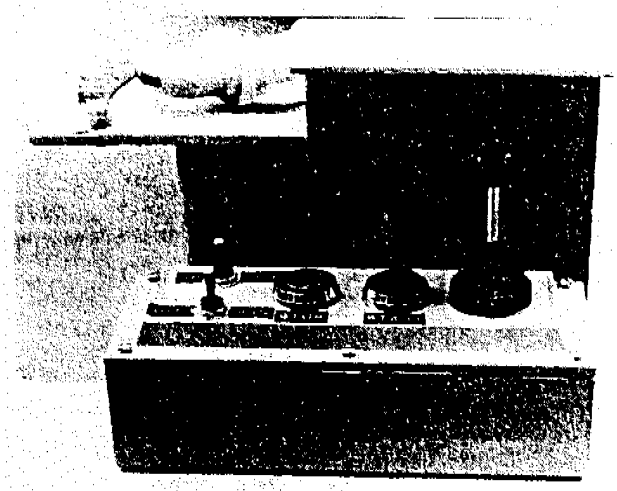


FIG F

SET-UP PROCEDURE

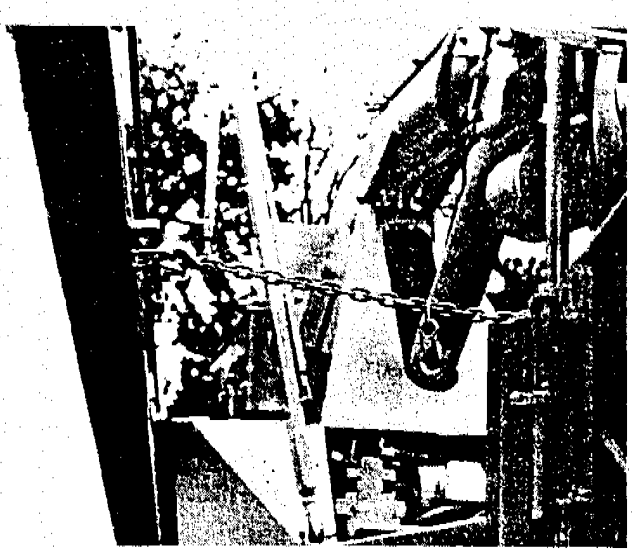


FIG J

Step 6 Lift transport pin from mudsill and swing mudsill outward and let rest on safety chain outer hook (FIG J).

Step 7 With selector valve in manual position, start hydraulic pump. Unpin gooseneck from transport position on both sides (FIG K). Hold gooseneck hydraulic valve in "Lower" position until jack legs on both sides of gooseneck are free. Raise legs and secure (FIG L).

Step 8 Move gates to extreme forward position (FIG M). This will free the car transport locking mechanism. Disconnect boom transport locks and secure (FIG N).

CAUTION: Make sure boom safety chains are connected as booms could swing out uncontrolled when raised from saddles.

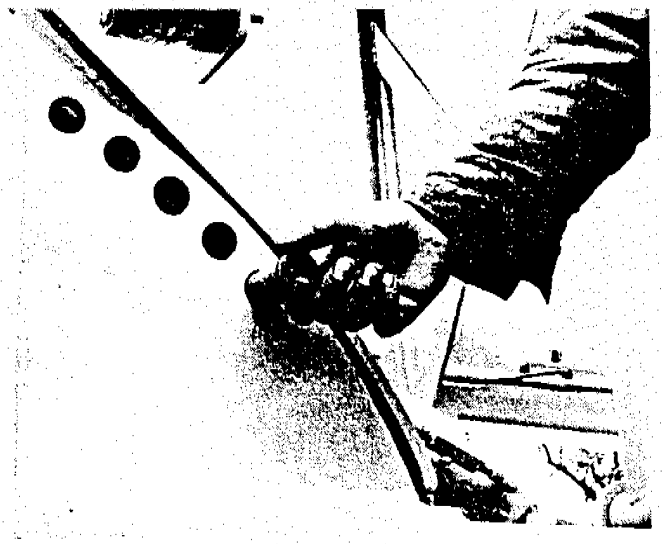


FIG K

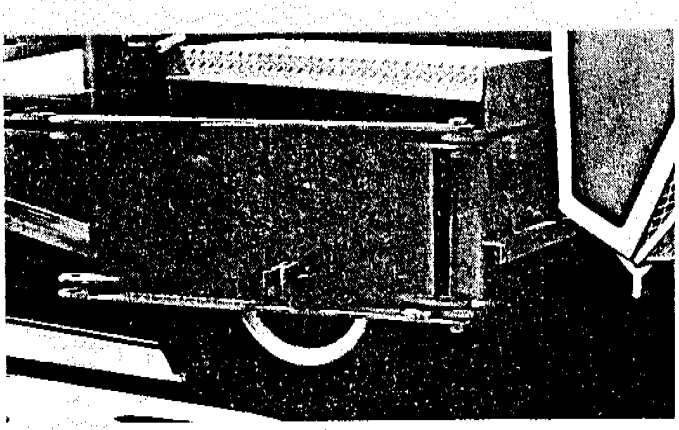


FIG M

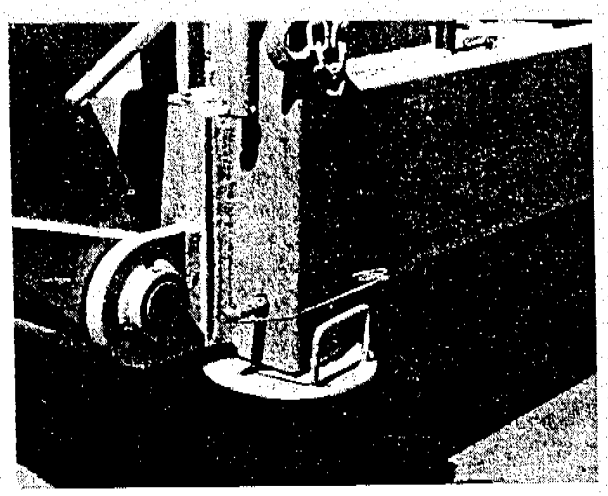


FIG L

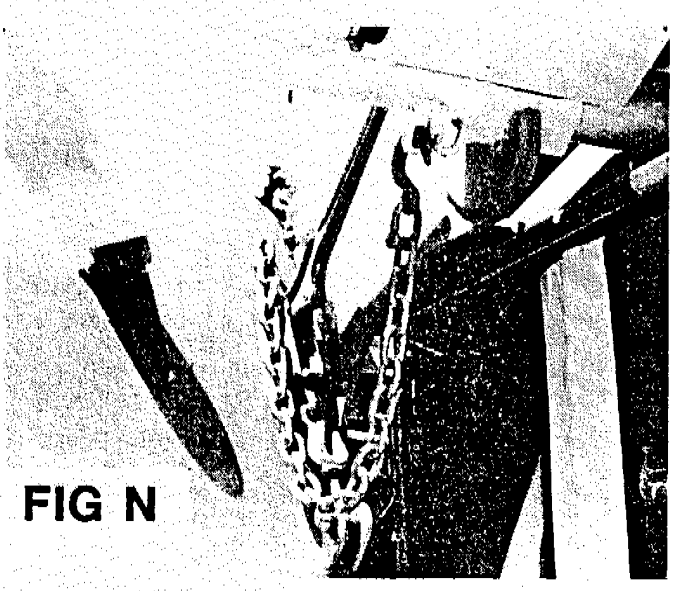


FIG N

SET-UP PROCEDURE

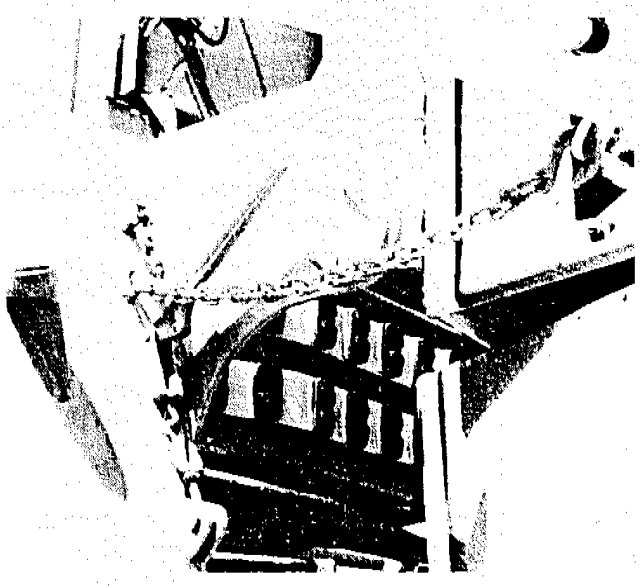


FIG O

Step 9 Hold tilt cylinder valve lever in "Close" position until booms clear transport saddles (FIG O). Disconnect boom safety chains and swing booms out to pin position (FIG P).

CAUTION: Maintain firm control. Booms can swing ,uncontrolled if column and/or ride is not level. Pin booms with 1¼ " pins and safety. Unpin car revolving rods from transport position and secure to crank with retainer, Grade 8 bolt and nut supplied (FIG Q) — make sure this connection is tight and safetied. Lube at this time.

Step 10 Unpin knee braces from transport position (FIG R) and let hang on back braces. Remove transport back brace restraint bar and store. Hold column cylinder lever in "Raise" position (FIG S) until cars are approximately 3 feet above the ground or until mudsills can be swung back under cars (FIG T).

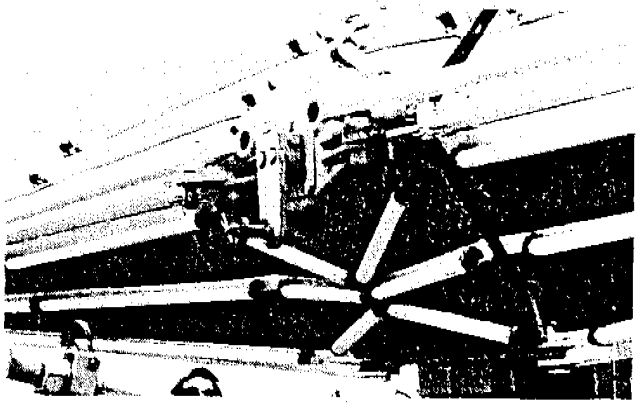


FIG P

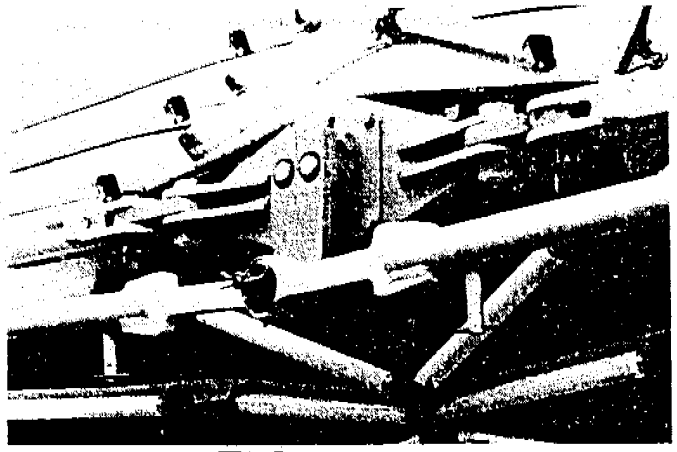


FIG Q

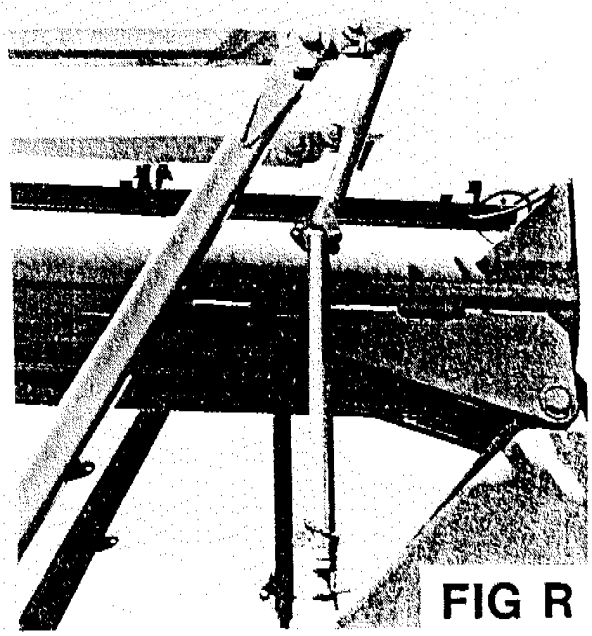


FIG R

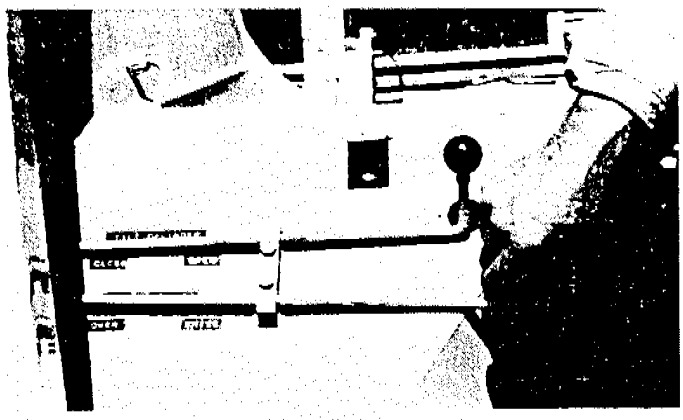


FIG S

SET-UP PROCEDURE

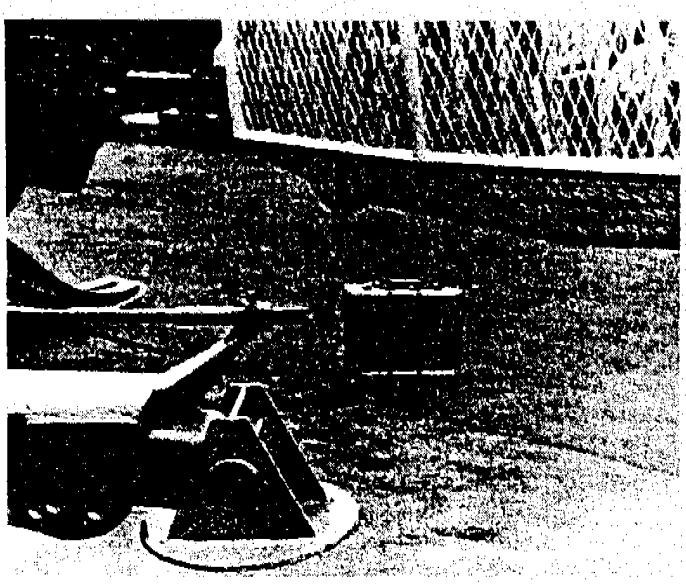


FIG T

Step 11 Hold gooseneck hydraulic valve in "Raise" position until gooseneck hinge point rests on ground.

CAUTION: Exercise care to prevent injury to hands and feet.

Step 12 Remove safety chains from mudsill and ease back until they mate with gates and secure in place with wedges (FIG U).

CAUTION: Maintain firm control as mudsills can swing uncontrolled due to their hinge arrangement.

Step 13 Lower outer adjusting foot of mudsills to lowest possible position and pin (FIG V). Each foot must be adjusted individually according to level of terrain. On unusually unlevel ground, blocking may be necessary.

Step 14 Move gooseneck hydraulic valve lever to "Lower" position and raise ride to rest on gooseneck shoe and musdills feet and set ride according to levels (FIG W). If unlevel, readjustment may be necessary to musdill adjusting feet at this time.

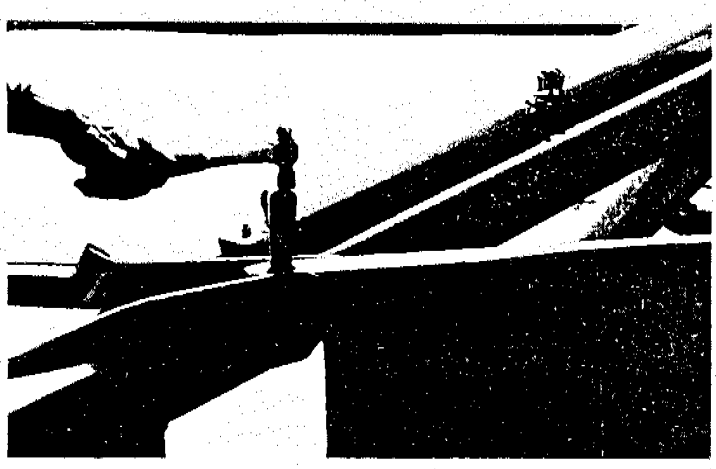


FIG U

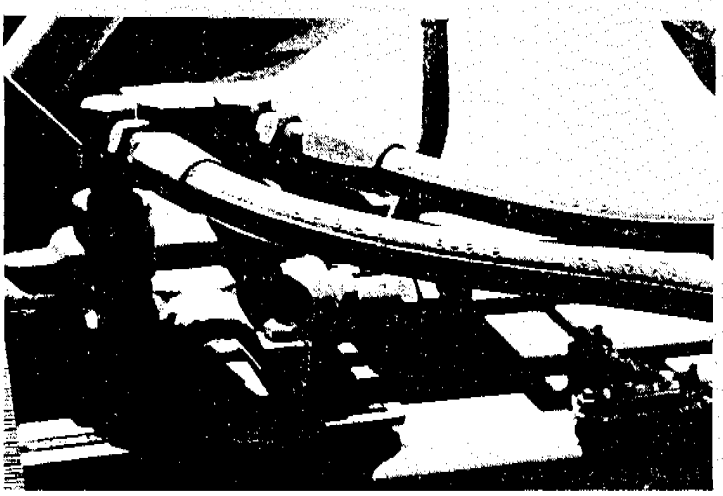


FIG W

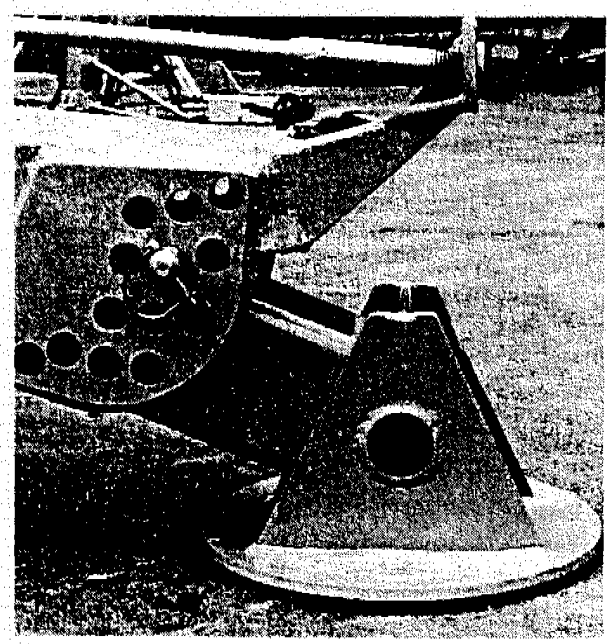


FIG V

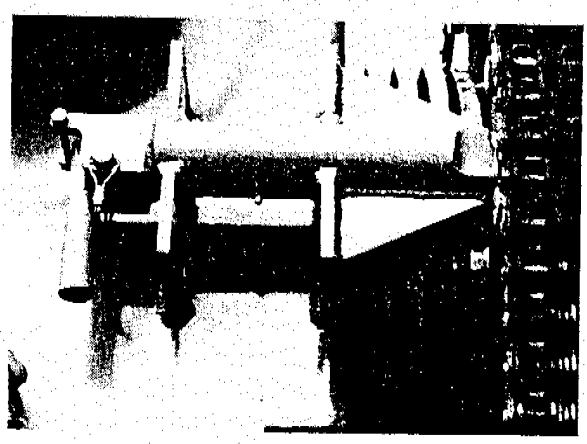


FIG X

Step 15 Engage and lock rotation brake handle on control stand. Unlock hub lock pin and secure in outer position (FIG X). Move column cylinder lever to "Raise" position (FIG S) until column is fully erected. Install 1" column bolts and tighten securely (FIG Y).

NOTE: Attention should be given to back and knee braces to assure proper unfolding.

Step 16 Install column tie rods in key holes just below upper back brace mounts (FIG Z) on both sides of column head. Insert threaded end of tie rod in slotted socket on mudsill (FIG AA). Tighten nuts equally until rods are taut.

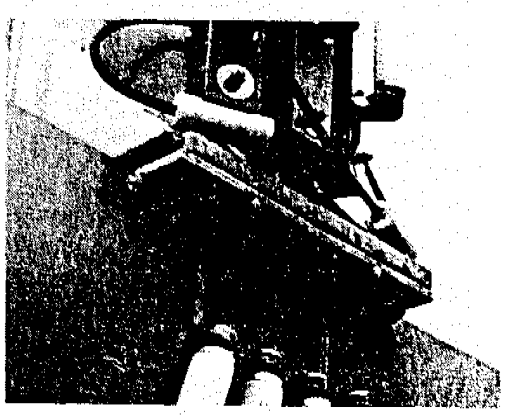


FIG Y

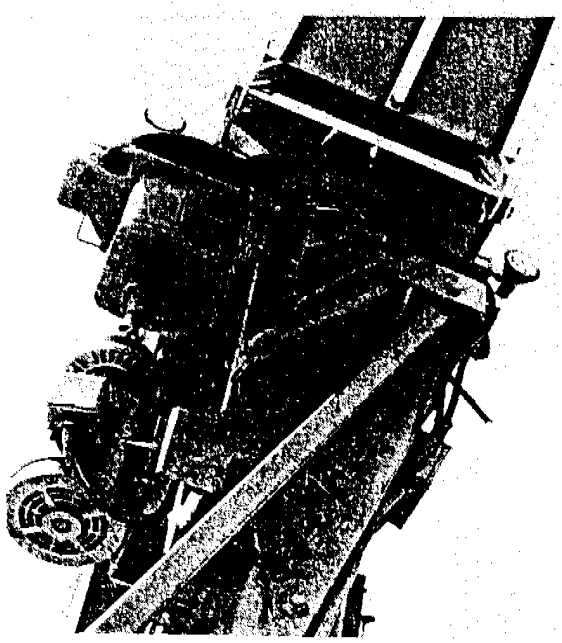


FIG Z

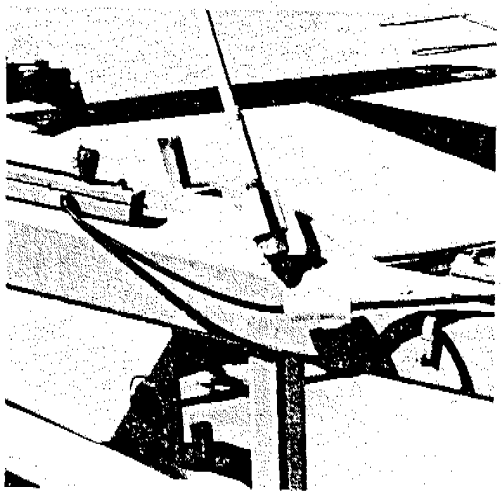


FIG AA

SET-UP PROCEDURE

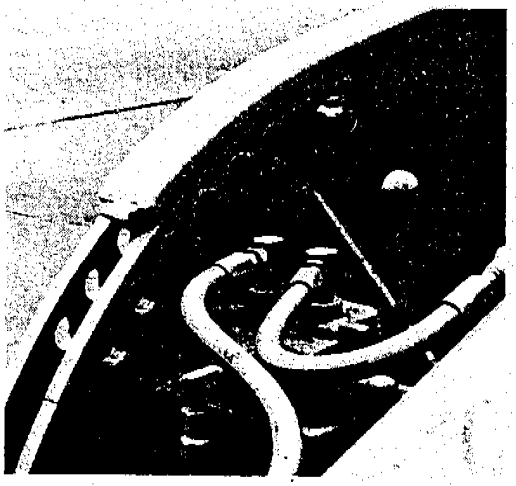


FIG BB

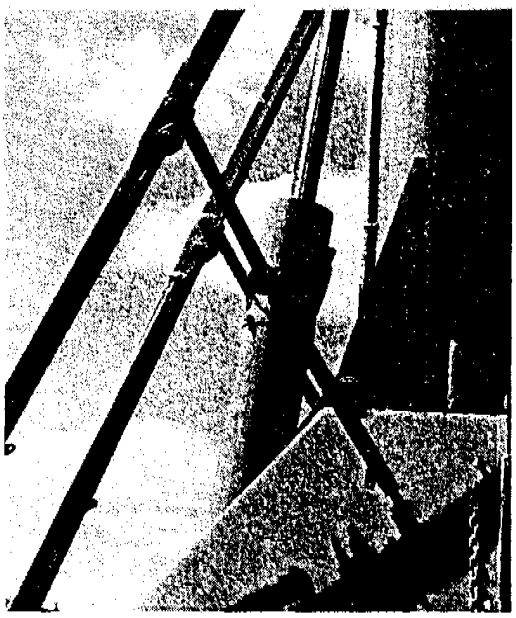


FIG CC

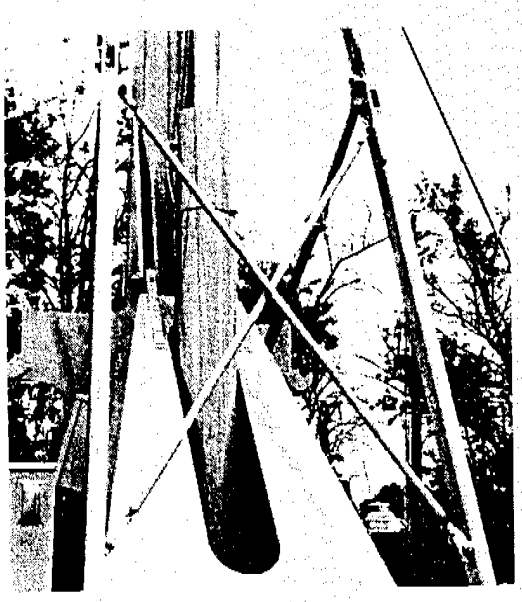


FIG DD

NOTE: Column at this time should be plumb front-to-back and side-to-side. If not, it will be necessary to readjust mudsill feet to plumb column (refer back to Steps 11, 13, and 14). Be sure to pin the gooseneck adjusting plates on both sides in nearest aligned holes. Use 1¼" pins and secure with safeties (FIG BB).

Step 17 Place the back brace knee braces in sockets on each side of pyramid, snap into place and pin (FIG CC). Set the back brace cross brace tubes in place and secure (FIG DD).

Step 18 Depress red "Stop" button on control stand to stop hydraulic system motor. Move selector valve lever to "Auto" position. Move toggle switch on control stand box to "Auto" and depress black "Start" button.

NOTE: Deadman switch has to be depressed or electric system will not operate. When booms reach full vertical position, they will automatically stop and the hydraulic system will shut down.

Step 19 Making sure ride area is clear, depress deadman switch, release brake lever and move wobble stick (FIG D) right or left to rotate booms. Wobble stick will automatically return to neutral when released. Apply brake to stop cars in loading position.

Step 20 Set fence according to diagram. Maintain minimum 5 foot clearance from any moving part.

To make ride ready for transport, simply reverse set-up procedure. Make certain the mudsill outer adjusting feet are pinned in the highest position before attaching mudsills to transport position. Check to confirm that all pins and/or safeties are in place.

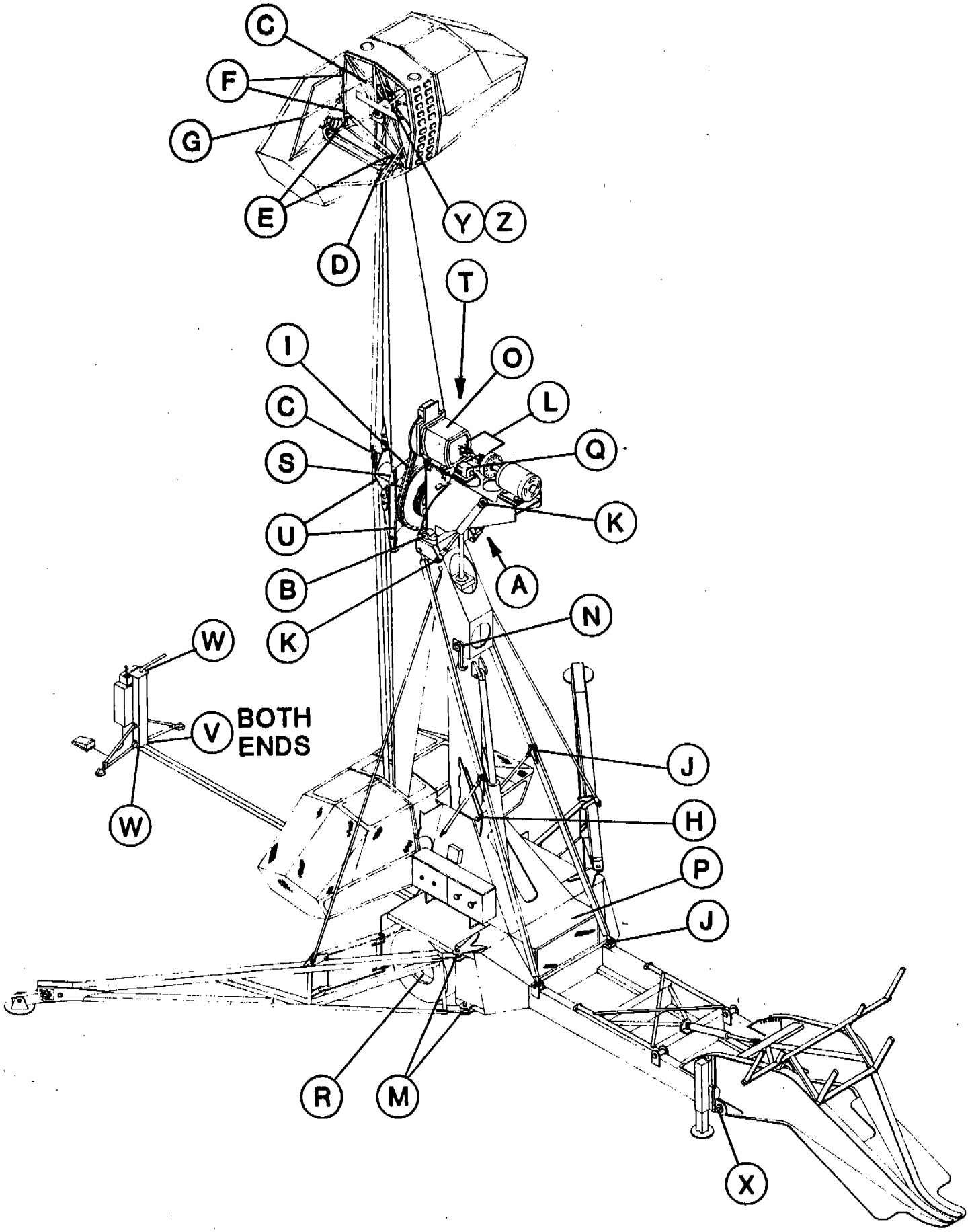
TO OPERATE

1. Always make sure area is clear before starting ride.
2. Depress deadman switch.
3. Release hand brake.
4. Hold wobble stick right or left to engage rotation.
5. After one complete revolution, depress black button and hold to start tilt operation. Button has to be held until car has moved out from column about 3 or 4 feet. Tilt cycle thereafter is automatic and booms will return to vertical position and stop.
6. Rotation can be reversed only when booms are in vertical position and braked to a complete stop.
7. For emergency operation, tilt mechanism may be operated manually by moving toggle switch to "Man" and operated with toggle switch labeled "Up-Down". If automatic electric control system has malfunctioned, booms can be lowered by placing hydraulic selector valve in "Manual" position and activating hydraulic tilt cylinder valve lever.

TO LOAD CARS

1. Remove belt bar door restraint key.
2. Depress spring-loaded door latch knob.
3. Open door — belt bar will raise automatically. Maximum passenger weight per seat is 400 lb.
4. Firmly close door engaging spring-loaded latch.
   NOTE: While door is being closed visually check belt tension, adjust as necessary — belt should be taut over passenger laps when door is latched.
5. Insert door restraint key in belt bar.
6. Rotate boom and load remaining cars as above.
   NOTE: Care should be taken to balance weight of passengers when loading ride.

LUBRICATION INSTRUCTIONS



LUBRICATION INSTRUCTIONS

	LUBE POINT LOCATION	LUBRICANT TYPE	DAILY	WEEKLY	MONTH	90 DAYS	YEARLY
A	TILT CYLINDER ROD END	BEARING LUBE	X				
B	TILT HEAD HINGE BEARINGS	BEARING LUBE	X				
C	REVOLVING ROD BUSHINGS	BEARING LUBE	X				
D	CAR BELT BAR PIVOT	30W OIL		X			
E	RETURN ROD LINKAGE (CAR)	BEARING LUBE		X			
F	CAR DOOR HINGES	30W OIL		X			
G	CAR DOOR LATCH PLUNGER	30W OIL		X			
H	COLUMN HINGE BUSHINGS	BEARING LUBE			X		
I	BOOM HUB DRIVE CHAIN	HI-SPEED CHAIN LUBE			X		
J	BACK BRACES	BEARING LUBE				X	
K	SAFETY CYLINDERS	BEARING LUBE	X				
L	UNIVERSAL JOINTS & SPLINE	BEARING LUBE			X		
M	MUDSILL PIVOT BEARINGS	BEARING LUBE				X	
N	TILT HEAD SAFETY HOOKS	BEARING LUBE			X		
O	GEAR REDUCER	GEAR LUBE			CHECK		DRAIN & REFILL
P	HYDRAULIC SYSTEM*	HYD. FLUID		CHECK			X
Q	BRAKE MASTER CYLINDER DISC	HYD. BRAKE FLUID			CHECK		
R	WHEEL BEARINGS (TLR)	GEAR LUBE			CHECK		DRAIN & REFIL
S	BOOM ANCHOR POINTS (HUB) 4	BEARING LUBE			X		
T	BOOM HUB LOCK BOLT	BEARING LUBE			X		
U	BOOM HUB	BEARING LUBE			X		
V	CONTROL STAND LINKAGES	BEARING LUBE		X			
W	BRAKE LEVER SHAFT BEARINGS	30W OIL	X				
X	GOOSENECK HINGE	BEARING LUBE		X			
Y	CAR REVOLVING CHAIN	HI-SPEED CHAIN LUBE	X				
Z	CAR REVOLVING BEARINGS	BEARING LUBE	X				

* DRAIN & REFILL - CHANGE FILTER CARTRIDGE 1ST 90 DAYS OPERATION.

Bearing Lube - A multi-purpose water resistant grease with an accepted extreme pressure additive.

30w Oil - Good grade 30w motor oil.

Hi-Speed Chain Lube - Hydrotex #525 deluxe leaded or equivalent.

Gear Lube - Hydrotex 80w-140 or equivalent.

Hyd. Brake Fluid - Vegetable based brake fluid.

Hyd. Fluid - DTE light or equivalent.

EMERGENCY PROCEDURE

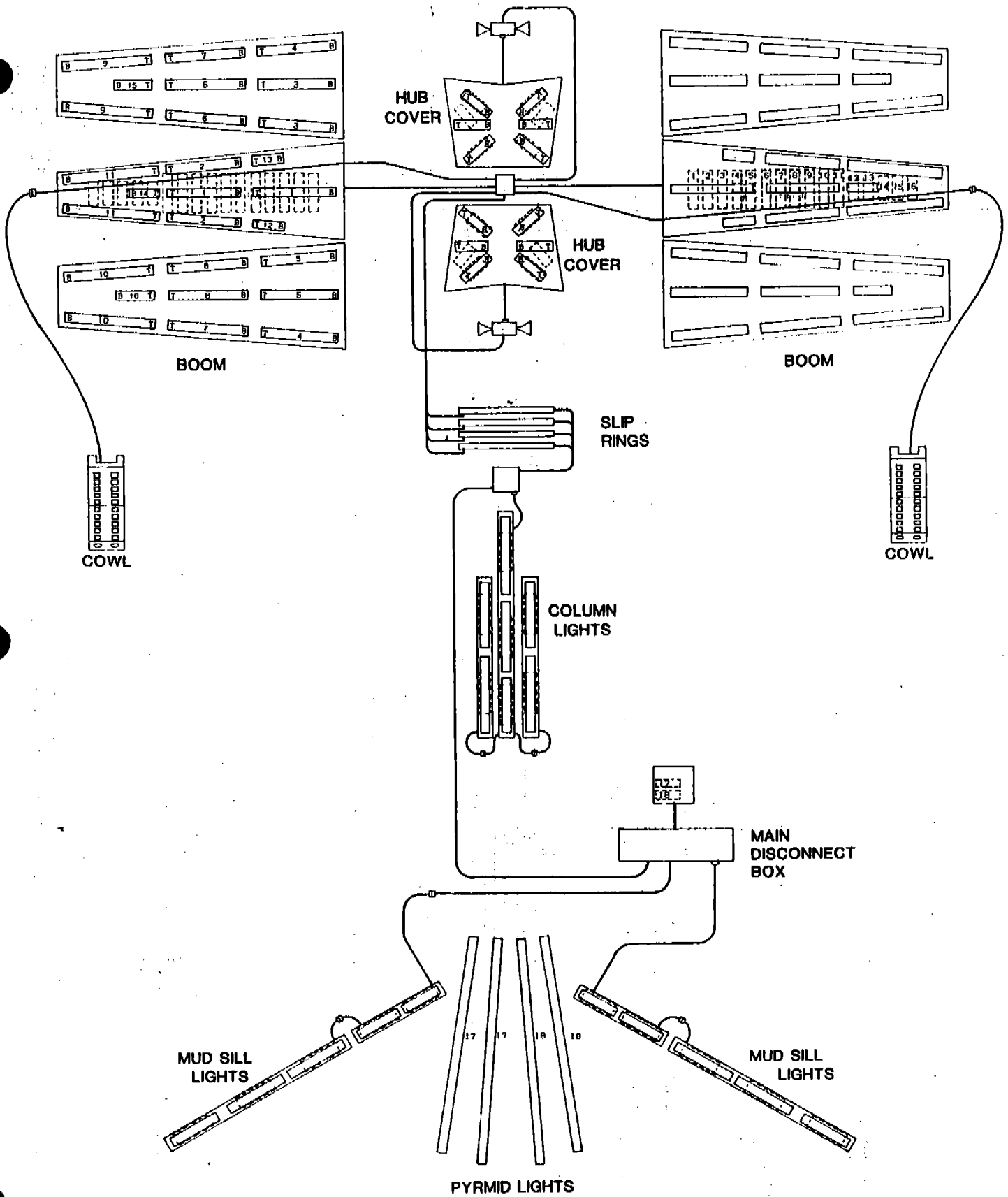
EMERGENCY PROCEDURE FOR LOWERING PASSENGER LOADED CARS TO LOADING POSITION IN EVENT OF HYDRAULIC PUMP DRIVE OR BELT FAILURE

There are two counterbalance valves located just behind the solenoid operated valve. Each have ½" adjusting bolts (¾" hex), locked with a locknut and jam nut. Back off each bolt until they are within one or two full turns of thread of being removed. Scribe a mark on the bolt and valve body to enable easier return to proper adjustment. Engage the rotation slowly until the boom end with heavier cars starts to descend. As the boom lowers, apply the rotation hand brake. The car will come to rest at the loading position. With the hand brake applied, unload only one car, unless only one car is loaded at the upper boom end. Unload both cars if only one car in the second set is loaded.

If cars are evenly balanced and will not descend, it will be necessary to lower the cars with a line as follows:

With the booms located in line with the ride (cars directly over operator), apply and lock hand brake. Pass a rope (⅜" or larger) over the boom above the operator, as near the cars as possible and manually pull the cars down. As the boom assembly passes over the center of the hinge it will descend to loading position without further assistance. Unload passengers in the sequence as outlined in the operating procedure.

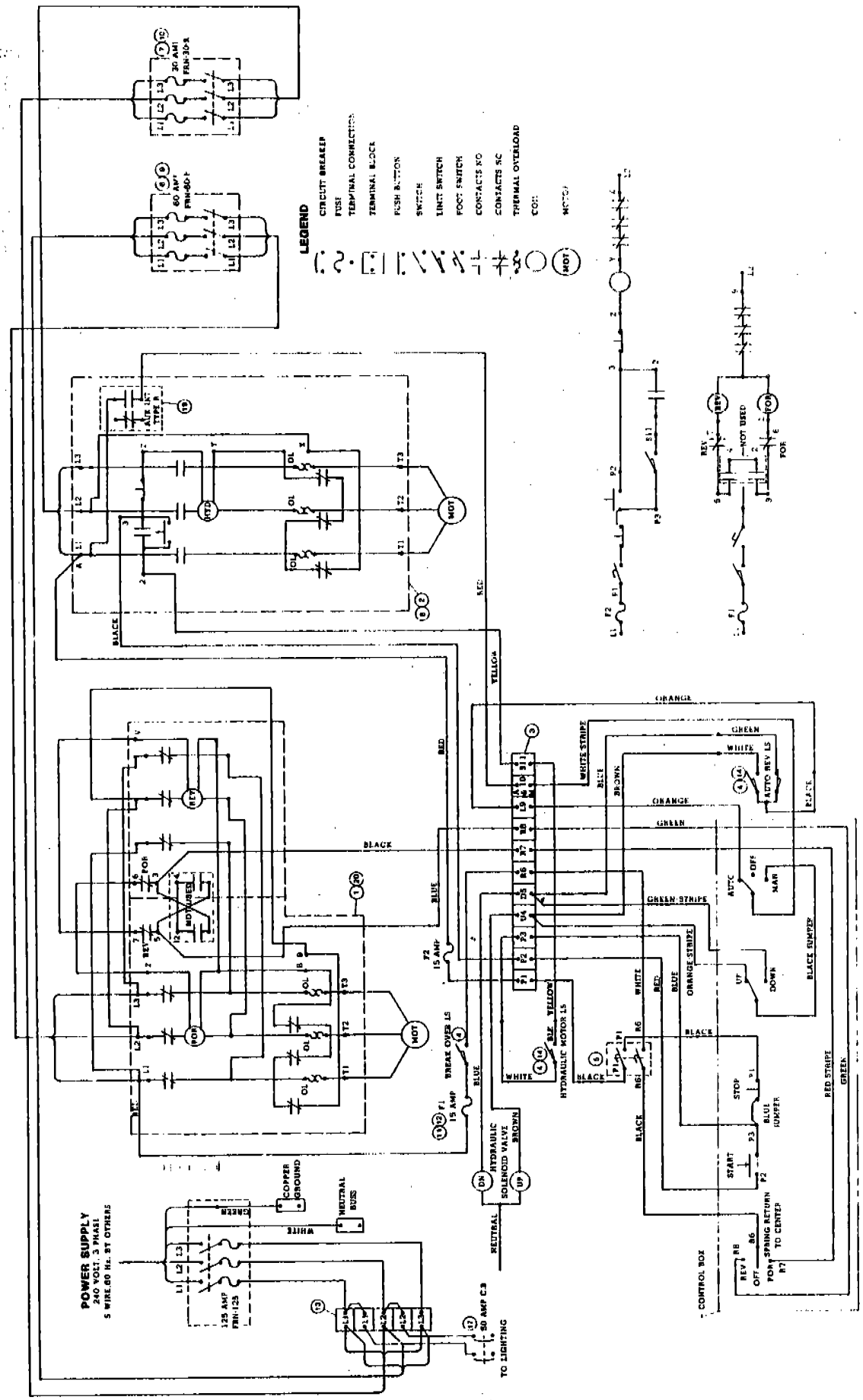
LIGHT & BALLAST LOCATIONS



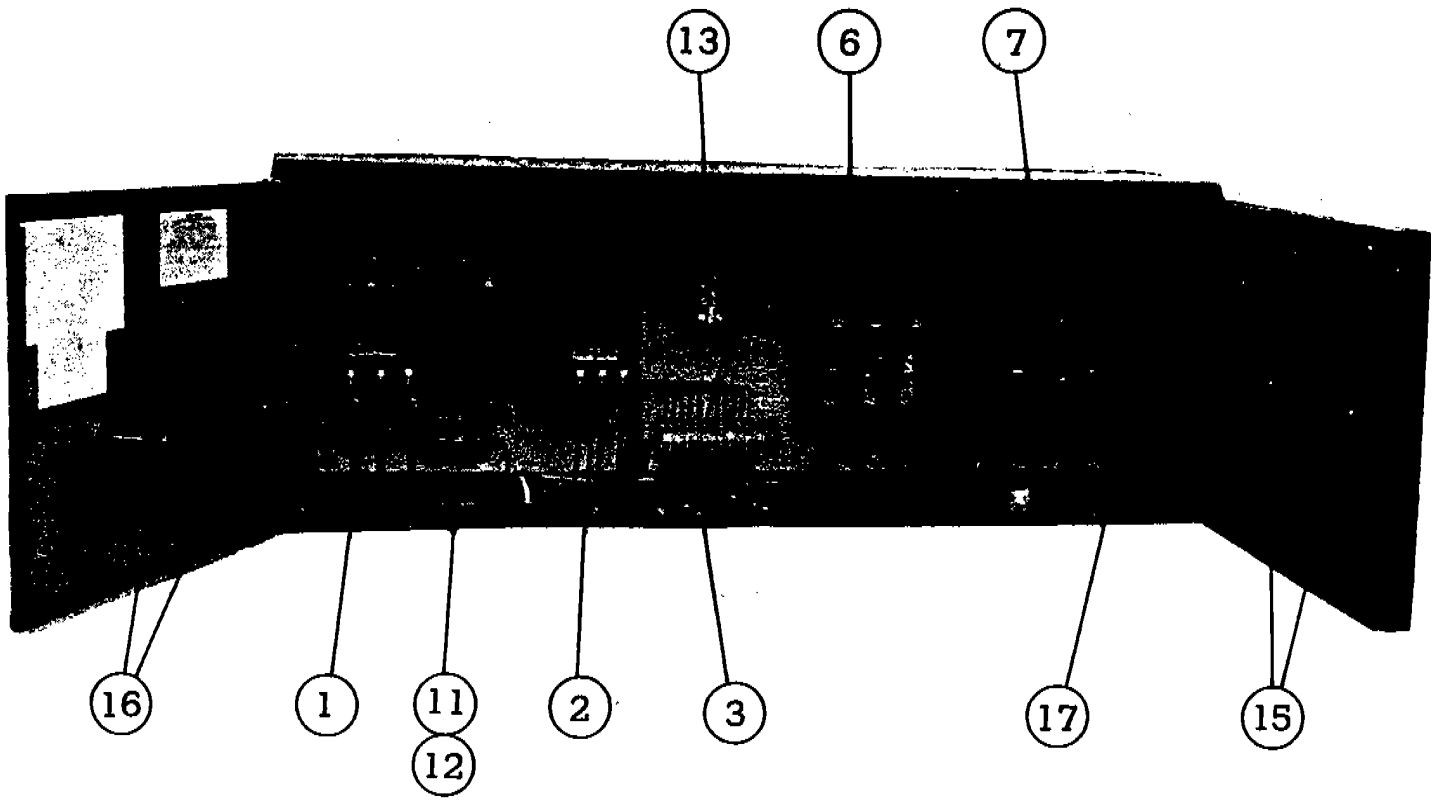
IMPORTANT:

REFER TO BALLAST WIRING SCHEMATICS FOR SINGLE AND TWIN LAMP WIRING. BE SURE TO NOTE "T" AND "B" POSITION OF LAMPS.

POWER WIRING DIAGRAM



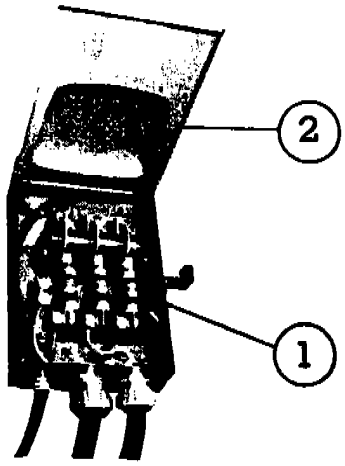
MAIN DISTRIBUTION PANEL COMPONENT LOCATIONS



REF NO	PART NO	NAME OF PART	NO REQ
1	E-551	STARTER, REVERSE	1
2	E-668	STARTER	1
3	E-669	STRIP, TERMINAL	1
4	E-609	SWITCH, LIMIT	4
5	E-656	SWITCH, FOOT	1
6	E-249	SWITCH, MOT. CONTROL	1
7	E-553	SWITCH, MOT. CONTROL	1
8	E-689	HEATER	3
9	E-282	FUSE, 60 AMP, FRN-60R	3
10	E-677	FUSE, 30 AMP, FRN-30R	3

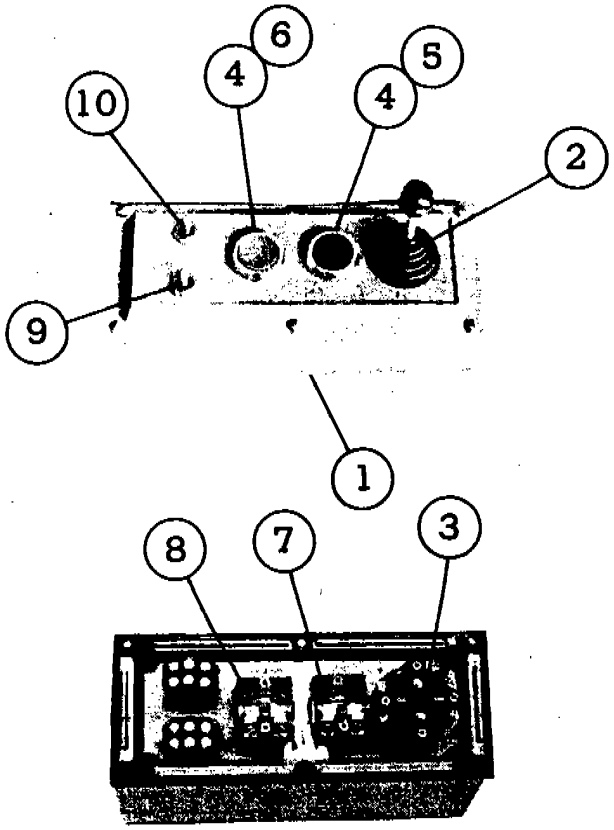
REF NO	PART NO	NAME OF PART	NO REQ
11	E-623	HOLDER, FUSE	1
12	E-676	FUSE, 15 AMP	2
13	E-670	BLOCK, TERMINAL	1
14	E-685	ARM, LEVER	2
15	E-567	KIT, HANDLE	2
16	E-568	KIT, RESET BUTTON	2
17	E-690	BREAKER, CIRCUIT	2
18	E-564	PLATE, COVER	1
19	E-691	INTERLOCK, AUX	1
20	E-433	HEATER	3

MAIN DISCONNECT



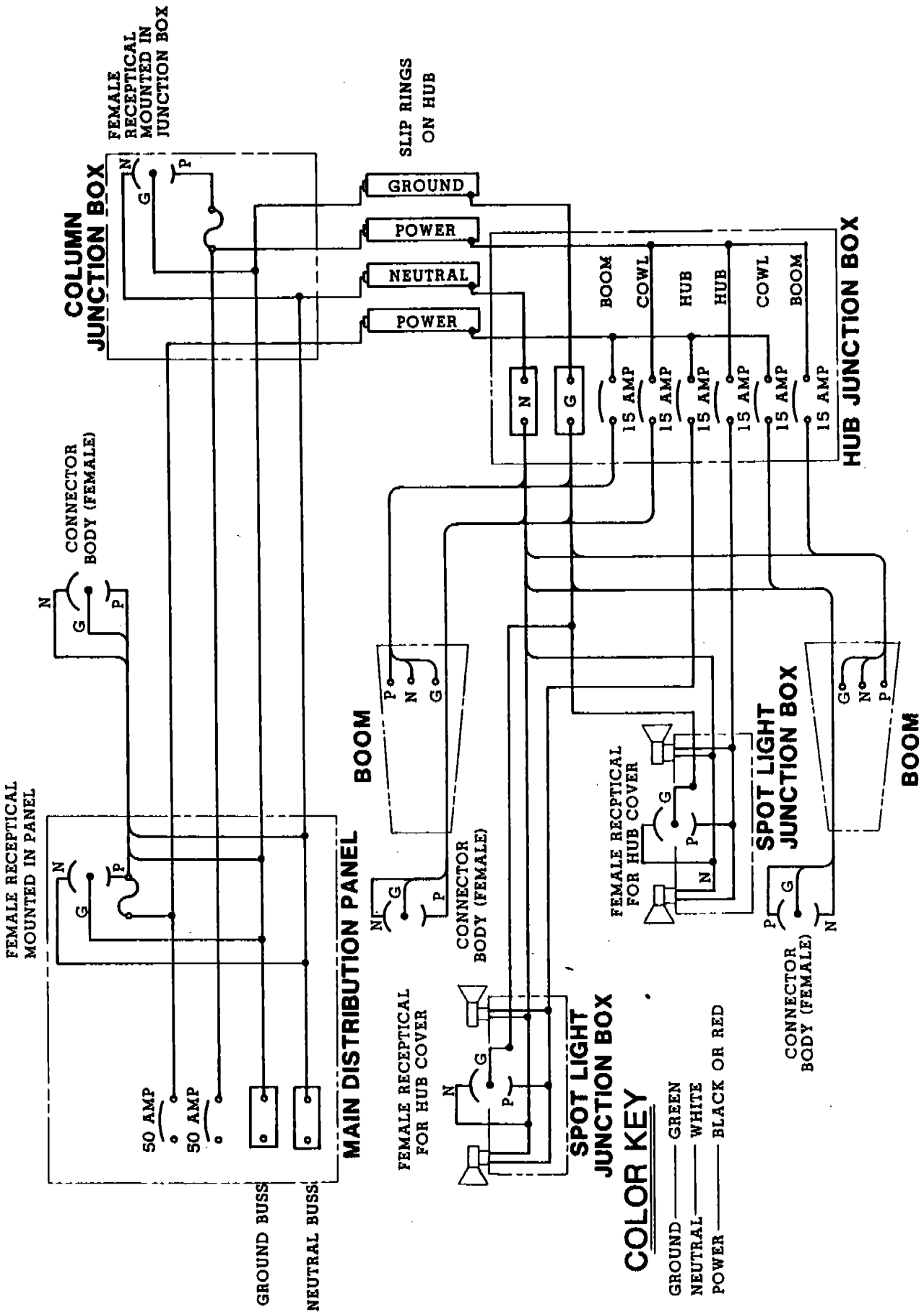
REF NO	PART NO	NAME OF PART	NO REQ
1	E-675	FUSE, FRN-125	3
2	E-644	SWITCH, DISCONNECT	1

CONTROL BOX

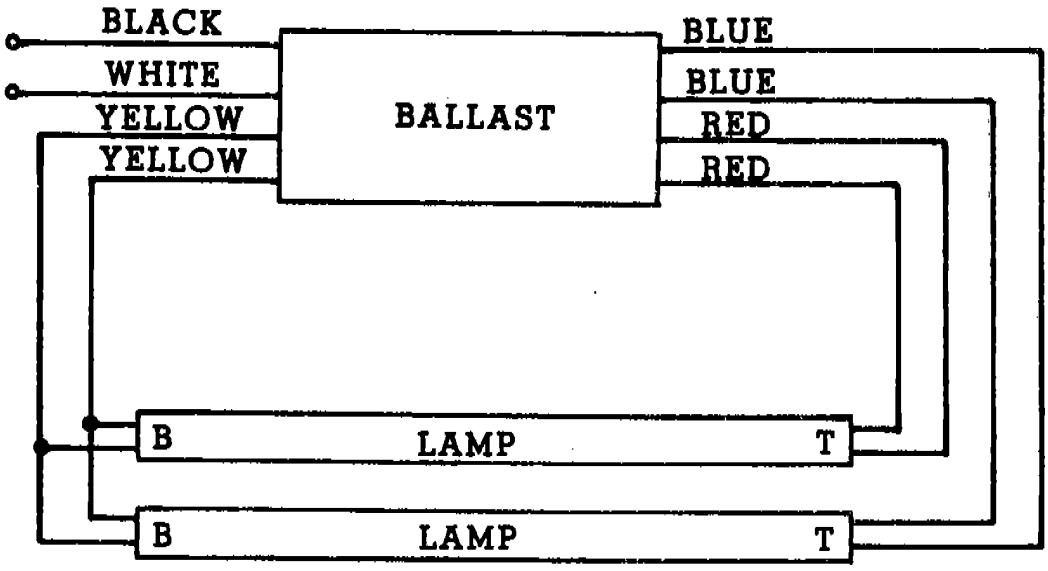


REF NO	PART NO	NAME OF PART	NO REQ
1	E-674	BOX, UTILITY	1
2	E-683	SWITCH, WOBBLE STICK	1
3	E-692	CONTACTS, 2 NO	1
4	E-687	OPERATOR, PUSH BUTTON	2
5	E-682	CAP, BLACK	1
6	E-681	CAP, RED	1
7	E-679	CONTACTS, NO	1
8	E-680	CONTACTS, NC	1
9	E-672	SWITCH, STATIONARY	1
10	E-673	SWITCH, MOMENTARY	1

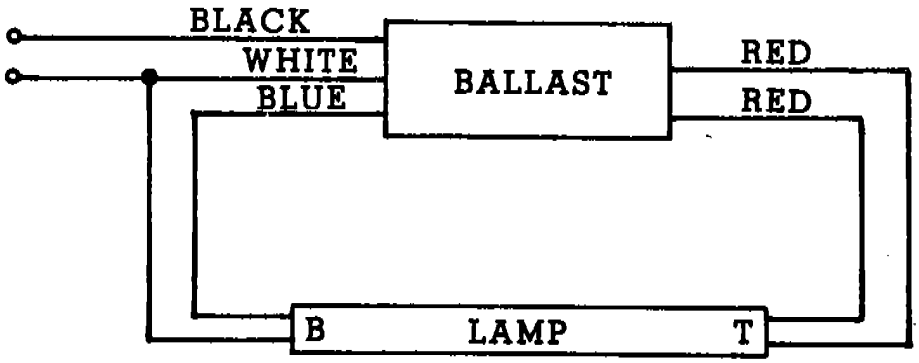
LIGHTING POWER DIAGRAM



BALLAST WIRING SCHEMATICS

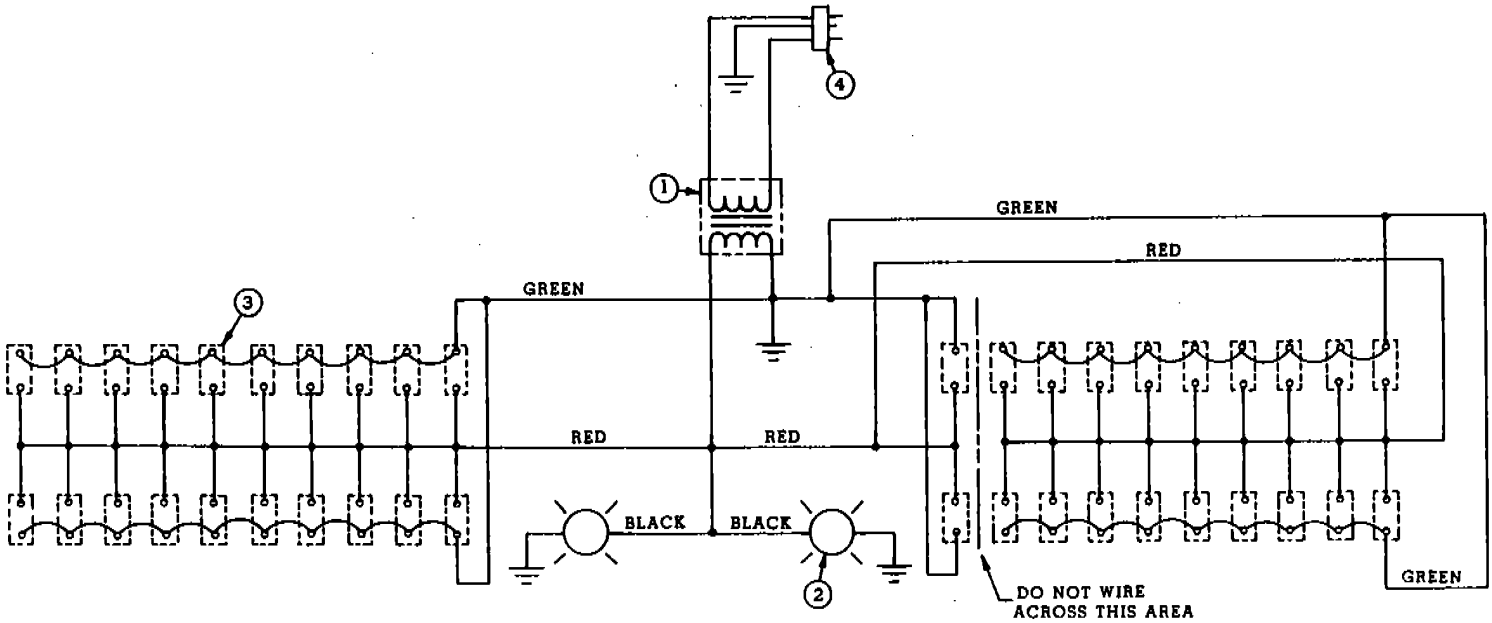


TWIN LAMP



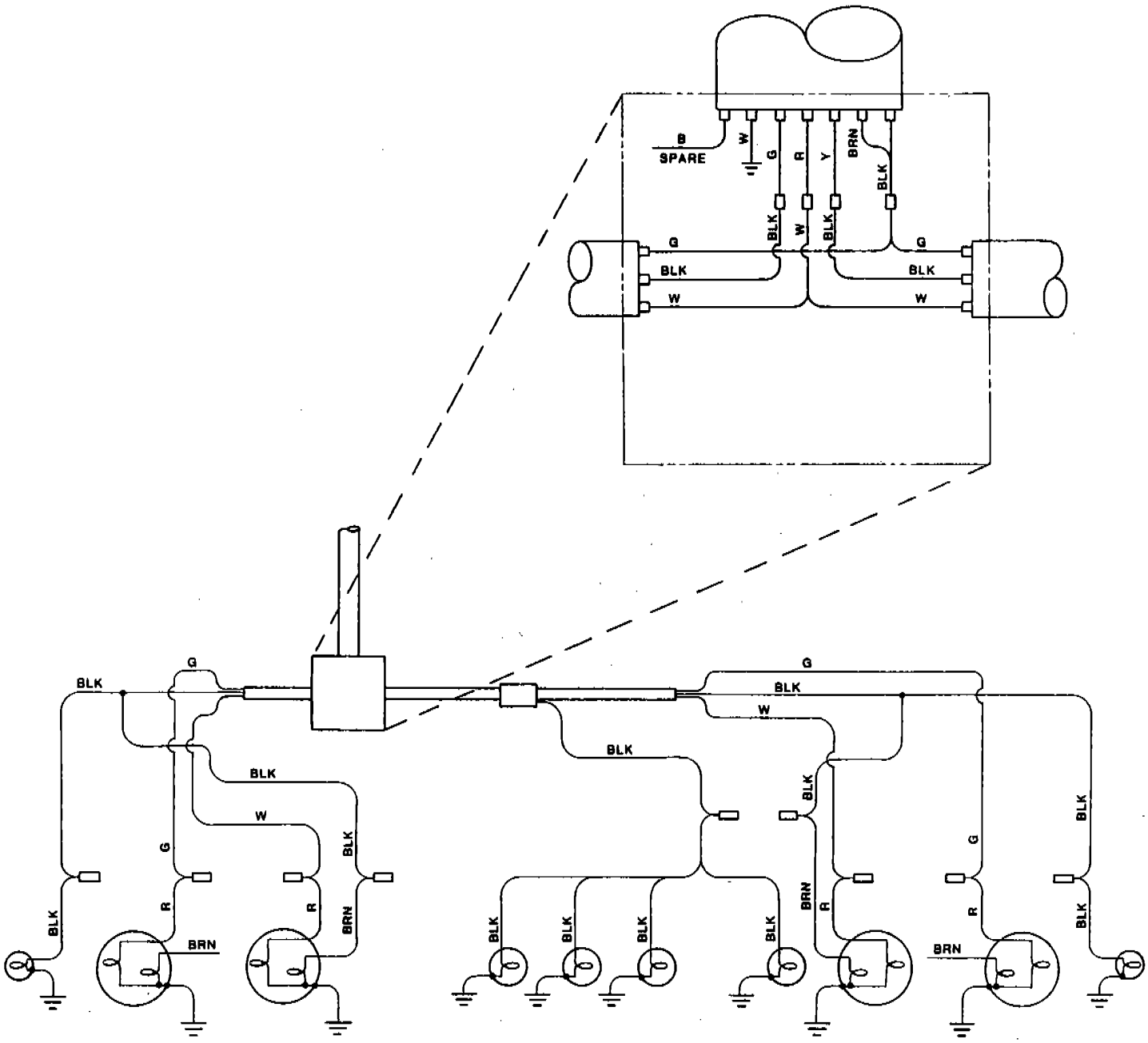
SINGLE LAMP

CAR COWL WIRING DIAGRAM

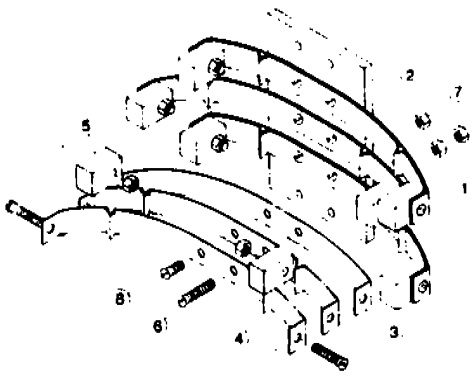


REF NO	PART NO	NAME OF PART	NO REQ
1	E-666	TRANSFORMER	1
2	E-667	LIGHT, SPOT	2
3	E-662	LIGHT, MARKER, ASS'Y	40
4	E-20	CONNECTOR, MALE	1

REAR BUMPER WIRING DIAGRAM

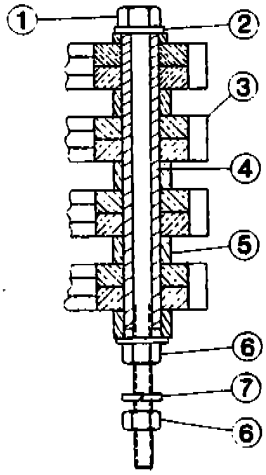


BRUSH ASSEMBLY



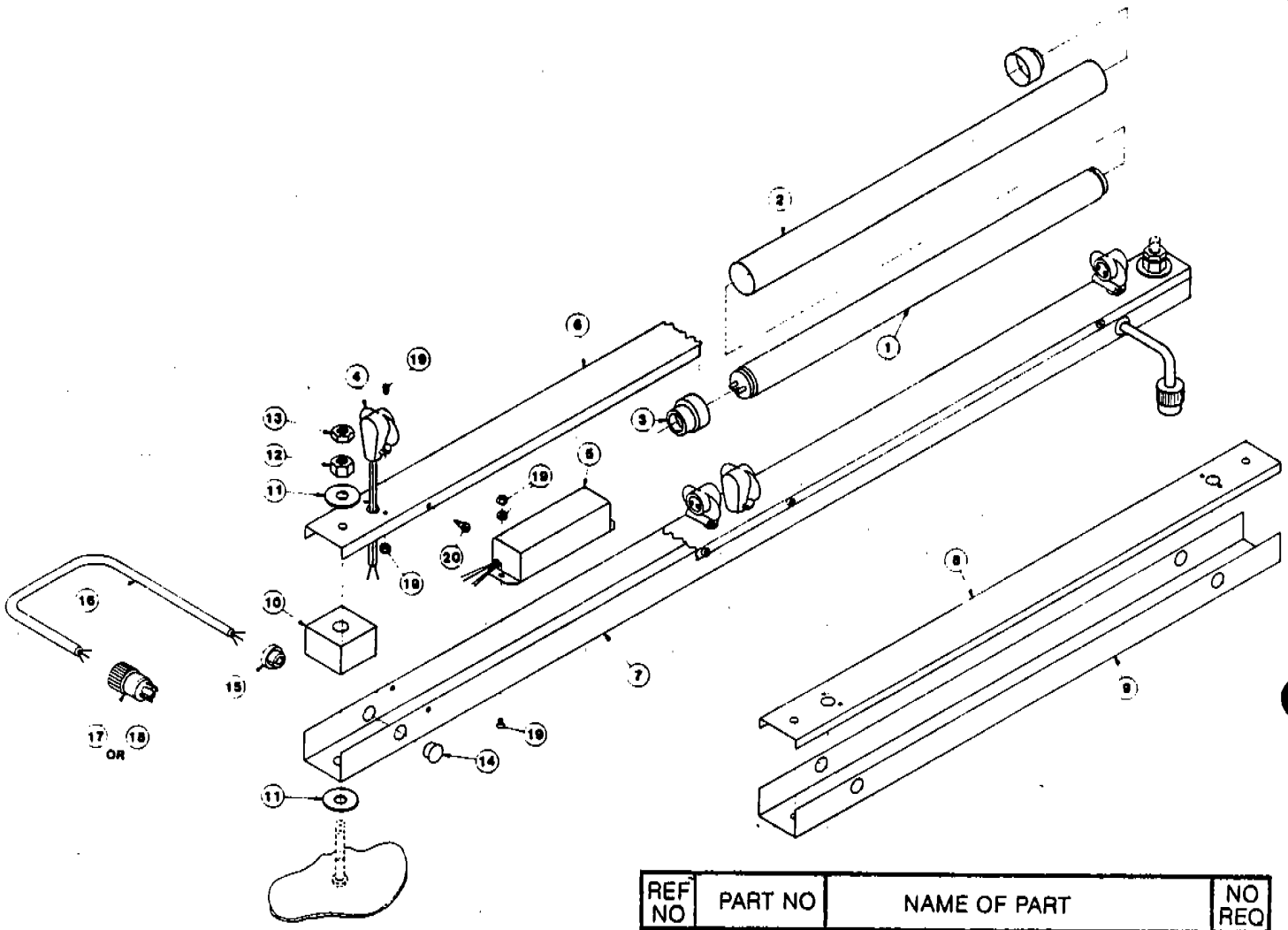
REF NO	PART NO	NAME OF PART	NO REQ
1	E-51B	ASSY, DOUBLE FINGER	4
2	E-697	BLOCK, INSULATOR	1
3	E-52	SPRING	4
4	E-53	STRIP, CONDUCTOR	8
5	E-54	CONTACT, BRUSH	8
6		BOLT, 1/4-20NC X 1, BRASS	12
7		NUT, 1/4-20NC, BRASS	16
8		BOLT, 1/4-20NC X 1/2	4

LIGHT RING ASSEMBLY



REF NO	PART NO	NAME OF PART	NO REQ
1		BOLT, 1/4-28NF X 5 1/2	4
2	E-62	WASHER, 1/4 FLAT	8
3	E-60	RING, LIGHT	4
4	E-698	INSULATOR	4
5	E-61	INSULATOR	16
6		NUT, 1/4-28NF	8
7		WASHER, 1/4 LOCK	4

FLUORESCENT FIXTURE COMPONENTS



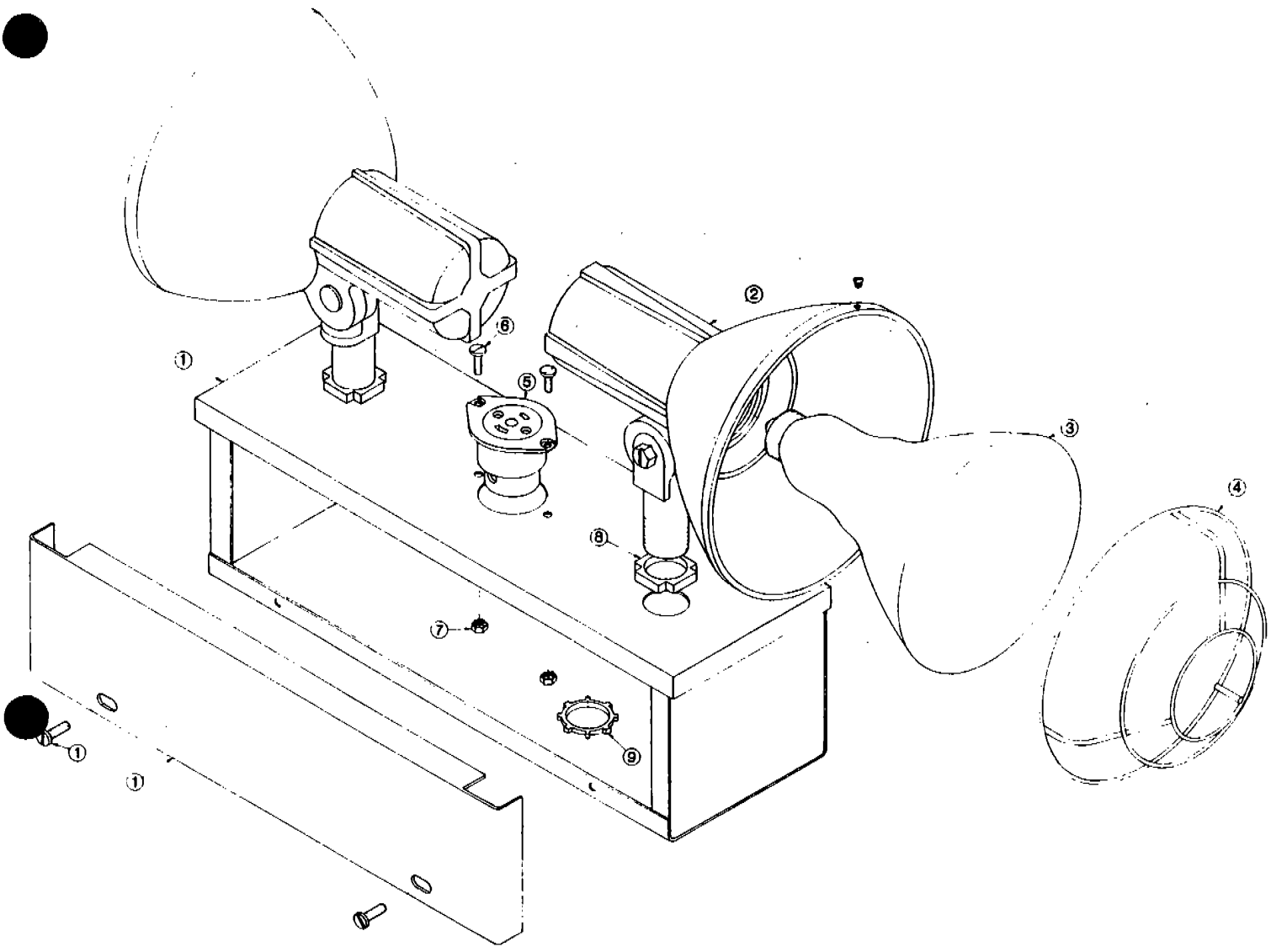
REF NO	PART NO	NAME OF PART	NO REQ
1	E-1	LAMP, FLUORESCENT	2
2	E-687	TUBE (SPECIFY COLOR)	2
3	E-688	CAP, END	4
4	E-4	HOLDER, FLUOR. LAMP	4
5	E-11	BALLAST	2
6	E-22	COVER, BOX (2 LAMP FIX.)	1
7	E-21	BOX (2 LAMP FIX.)	1
8	E-19	COVER, BOX (1 LAMP FIX.)	
9	E-16	BOX (1 LAMP FIX.)	
10	E-10	BLOCK, BOX END	
11	E-12	WASHER	
12		NUT, HEX 5/16-NC, BRASS	

REF NO	PART NO	NAME OF PART	NO REQ
13		NUT, JAM 5/16-18NC, BRASS	2
14	E-399	PLUG, HOLE	*
15	E-9	GRIP, CORD	*
16	E-2-A	CORD, FLUOR. FIX (12")	*
16	E-2-C	CORD, FLUOR. FIX (18")	*
16	E-2-R	CORD, FLUOR. FIX (25")	*
16	E-2-H	CORD, FLUOR. FIX (32")	*
16	E-2-S	CORD, FLUOR. FIX (44")	*
17	E-20	MALE CAP	*
18	E-17	CONNECTOR BODY (FEMALE)	*
19	E-11A	MACHINE SCREW ASS'Y	4
20	E-8A	SCREW, SHEET METAL	8

NOTE: THE "NO REQ" COLUMN INDICATES THE NUMBER OF EACH PART FOR A TWO LAMP FIXTURE

"*" DENOTES AS REQUIRED

HUB ILLUMINATION BOX

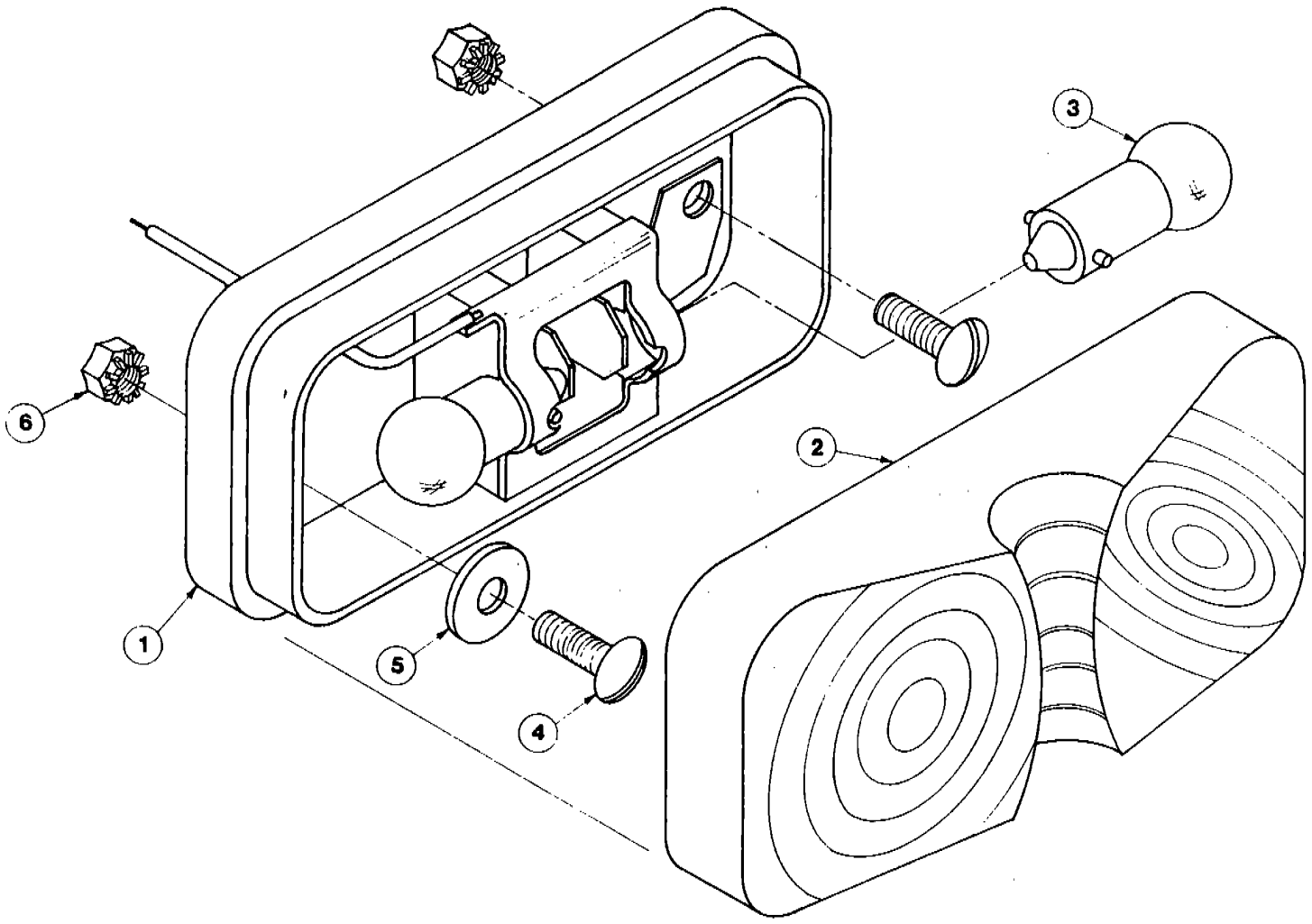


REF NO	PART NO	NAME OF PART	NO REQ
1	E-686	JUNCTION BOX	1
2	E-602	LAMP HOLDER	2
3	E-601	LAMP, 150W LONGLIFE	2
4	E-604	LAMP PROTECTOR	2
5	E-44	FEMALE RECEPTICAL	1

REF NO	PART NO	NAME OF PART	NO REQ
6		SCREW, #6-32x3/8"	2
7		NUT, KEPT #6-32	2
8		NUT, LOCK 1/2"	2
9		NUT, CONDUIT 1/2"	2
#		SCREW, 1/4-NC X 1" BRASS	1
#		NUT, 1/4-NC BRASS	1

NOT ILLUSTRATED

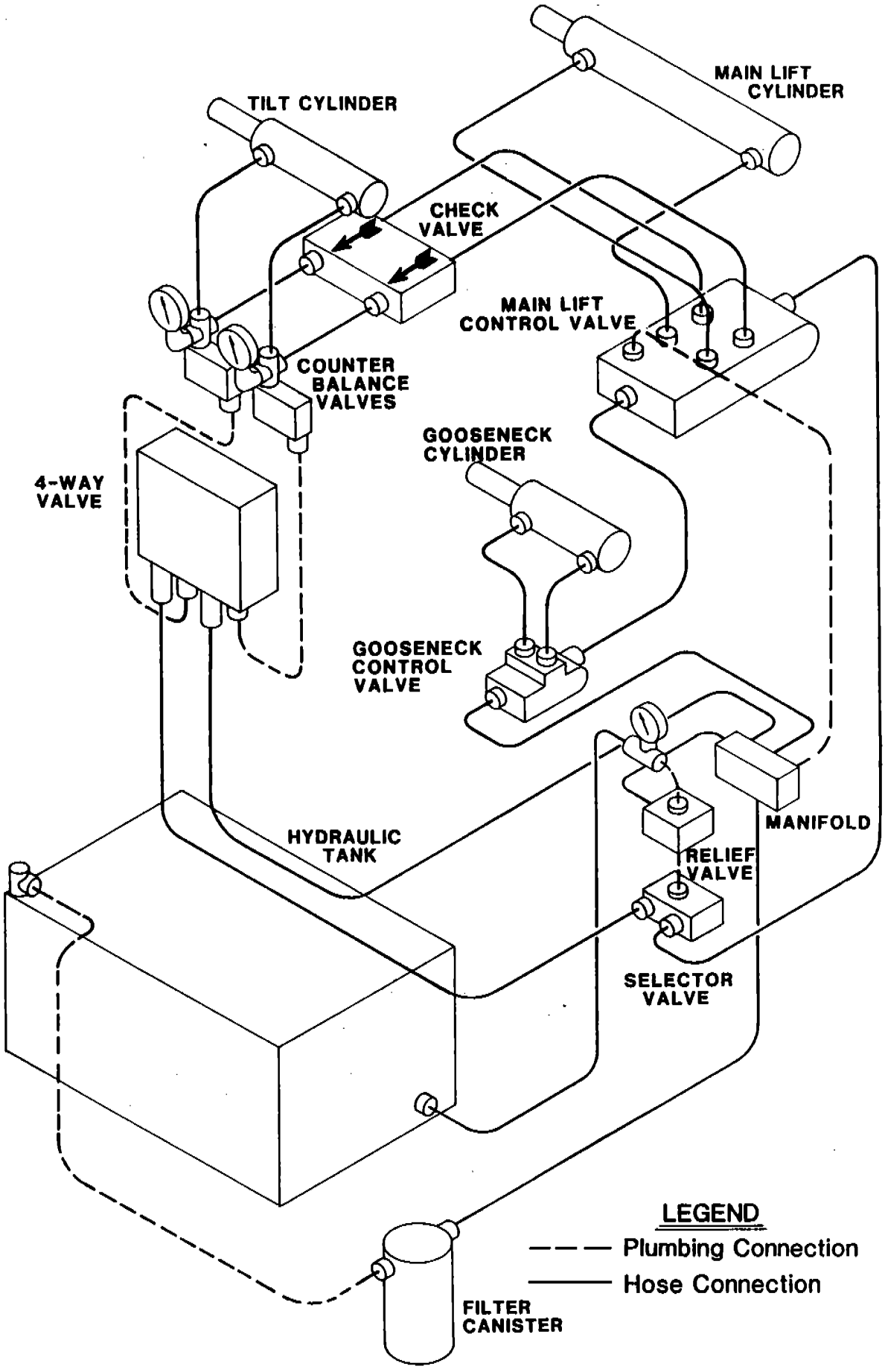
COWL MARKER LIGHT



REF NO	PART NO	NAME OF PART	NO REQ
	E-662	ASSEMBLY, LAMP	
1		HOUSING, LIGHT	1
2		LENSE	1
3	E-664	BULB	2

REF NO	PART NO	NAME OF PART	NO REQ
4		BOLT, ROUND HEAD	
		#10-32 x 3/8", BRASS	2
5		WASHER, #10 FLAT, BRASS	1
6		NUT, #10-32 KEPT	2

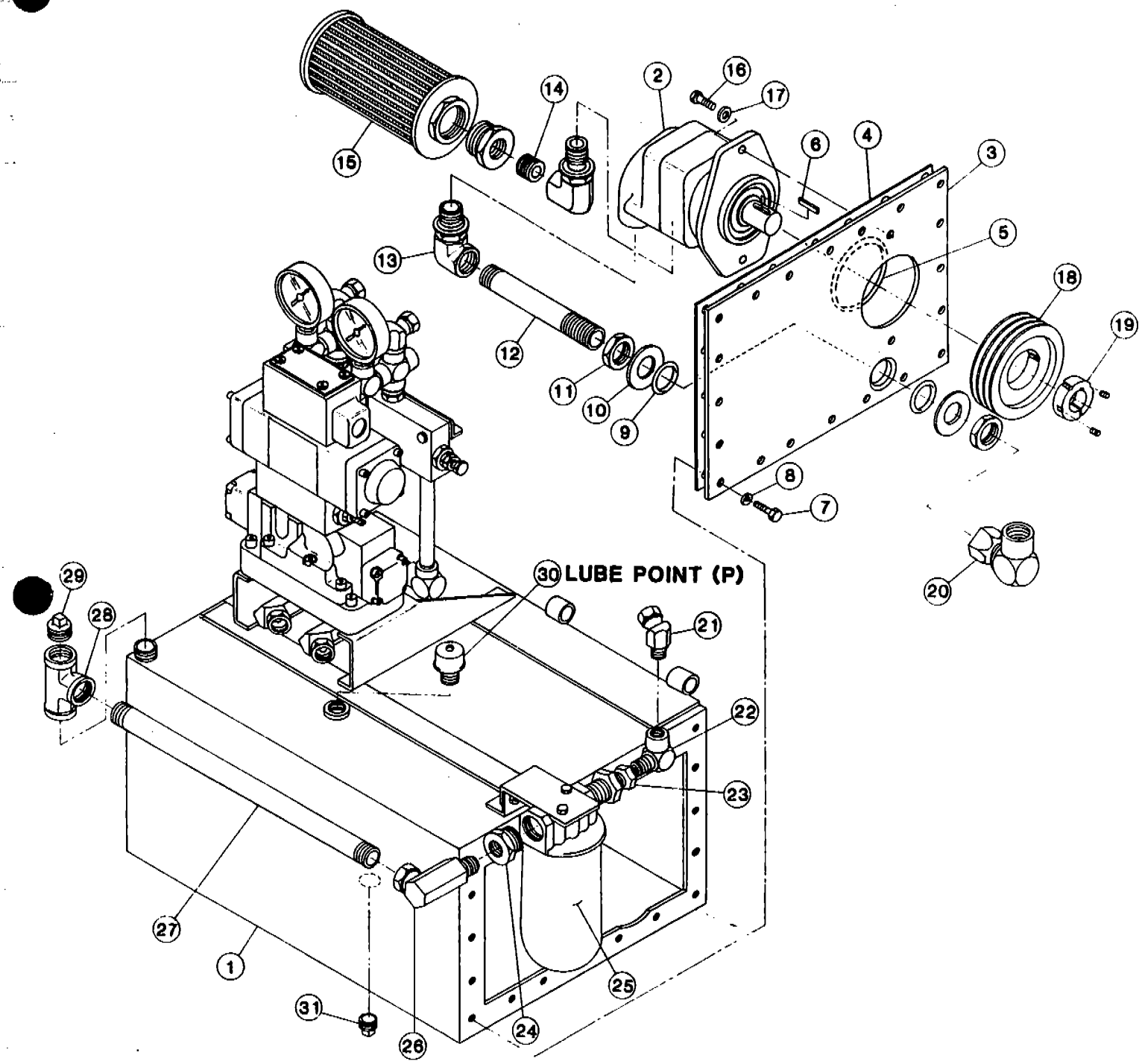
HYDRAULIC DIAGRAM



HYDRAULIC TANK ASSEMBLY

REF NO	PART NO	NAME OF PART	NO REQ
1	ST-30-1	TANK, HYDRAULIC	1
2	ST-187	PUMP, HYDRAULIC	1
3	ST-30-6	PLATE, PUMP MOUNTING	1
4	ST-30-21	GASKET	1
5	ST-165	O-RING	1
6		KEY, 1/4 SQ X 1 1/4	1
7		BOLT, 5/16-18NC X 1"	20
8		WASHER, 5/16 LOCK	20
9	ST-166	O-RING	2
10	ST-30-8	WASHER, BULK HEAD	2
11	ST-167	NUT, LOCK	2
12	ST-30-7	PIPE, BULKHEAD	1
13	ST-178	90° ELL, 3/4" (HYD)	2
14	ST-177	NIPPLE, 3/4" (HYD)	1
15	ST-168	FILTER	1
16		BOLT, 1/2-13NC X 1	2
17		WASHER, 1/2 LOCK	2
18	ST-169	SHEAVE, 3 GROOVE	1
19	ST-170	BUSHING, TAPER LOCK	1
20	ST-176	90° ELL, 3/4 SWIVEL	1
21	ST-180	45° ELL, 3/8 SWIVEL	1
22	PR-500	STREET ELL, 3/8 (HYD)	1
23	L-462	BUSHING, 3/4 X 3/8 (HYD)	1
24	PR-679	BUSHING, 1 1/4 X 3/4 (HYD)	3
25	PR-475	FILTER	1
26	ST-176	STREET ELL, 3/4 SWIVEL	1
27		PIPE, 3/4" X 25" TBE	1
28	PR-692	TEE, 3/4, (HYD)	1
29		PLUG, 3/4 PIPE	1
30	L-212A	BREATHER, TANK	1
31		PLUG, 1/2 PIPE	1

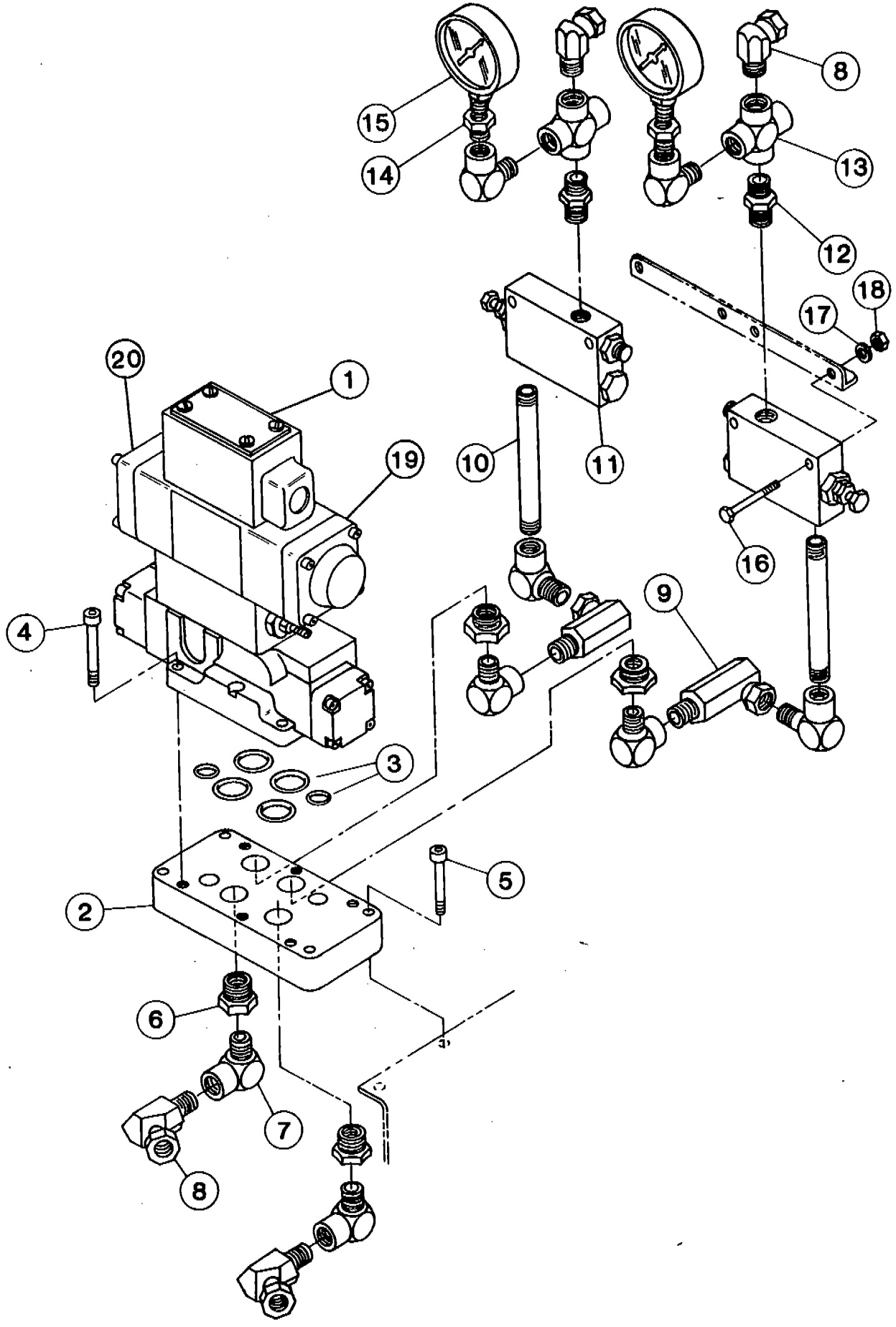
HYDRAULIC TANK ASSEMBLY



4-WAY & COUNTER BALANCE VALVE ASSEMBLY

REF NO	PART NO	NAME OF PART	NO REQ
1	ST-188	VALVE, 4 WAY	1
2	ST-185	SUB PLATE	1
3	ST-183	KIT, O-RING	1
4	ST-184	KIT, BOLT	1
5		BOLT, ALLEN HEAD	
		3/8-16NC X 1 3/4	4
6	L-462	BUSHING, 3/4 X 3/8 (HYD)	4
7	PR-500	STREET ELL, 3/8 (HYD)	8
8	ST-180	45° ELL, 3/8 SWIVEL	4
9	ST-181	90° ELL, 3/8 SWIVEL	2
10		PIPE, 3/8 X 6" TBE	2
11	ST-189	VALVE, COUNTER BALANCE	2
12	L-466	NIPPLE, 3/8 (HYD)	2
13	ST-175	CROSS, 3/8 (HYD)	2
14	ST-179	BUSHING, 1/4 X 3/8 (HYD)	2
15	ST-186	GAUGE, PRESSURE	2
16		BOLT, 5/16-18NC X 2"	4
17		WASHER, LOCK 5/16	4
18		NUT, 5/16-18NC	4
19	ST-223	SOLENOID, UP	1
20	ST-223	SOLENOID, DOWN	1

4-WAY & COUNTER BALANCE VALVE ASSEMBLY



MANUALLY CONTROLLED AND CHECK VALVES

MAIN LIFT AND SELECTOR VALVES

REF NO	PART NO	NAME OF PART	NO REQ
1	ST-186	GAUGE, PRESSURE	1
2	ST-179	BUSHING, 1/4 X 3/8	1
3	PR-680	STRAIGHT SWIVEL, 3/8	2
4	ST-174	TEE, 3/8 (HYD)	1
5	L-466	NIPPLE, 3/8 (HYD)	2
6	PR-500	STREET ELL, 3/8 (HYD)	3
7	ST-193	VALVE, RELIEF	1
8	ST-208	REDUCER, 1/2 X 3/8	5
9	ST-194	VALVE, SELECTOR	1
10	ST-30-23	HANDLE, SELECTOR VALVE	1
11	ST-181	90° ELL, 3/8 SWIVEL	7
12	ST-30-22	MANIFOLD	1
13	ST-209	PLUG, 3/8 PIPE	2
14	L-462	BUSHING, 3/4 X 3/8	2
15	ST-180	45° ELL, 3/8 SWIVEL	1
16	ST-173	90° ELL, 1/2 MALE X 3/8	
		FEMALE SWIVEL	2
17	ST-191	VALVE, MAIN LIFT	1

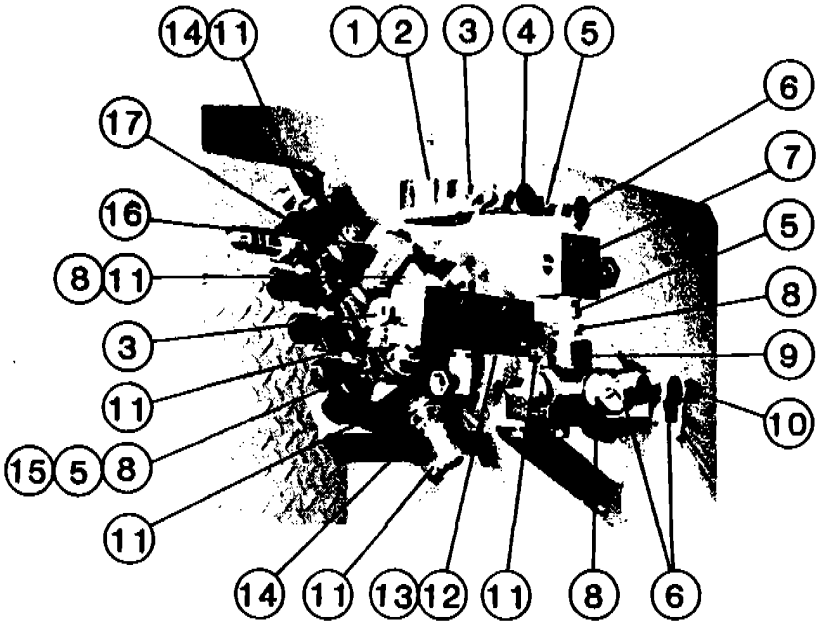
CHECK VALVES

18	ST-190	VALVE, CHECK	1
19	PR-680	STRAIGHT, SWIVEL 3/8	4

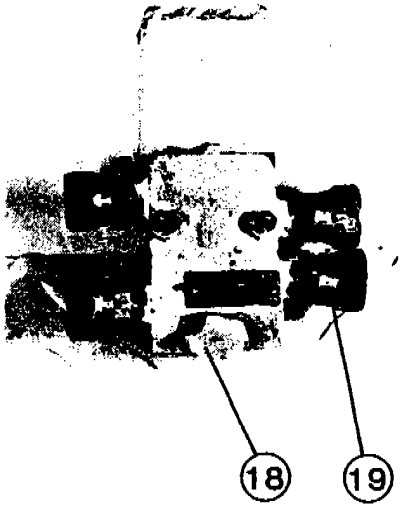
GOOSENECK VALVE

20	ST-192	VALVE, GOOSENECK	1
21	ST-173	90° ELL, 1/2 MALE X 3/8	
		FEMALE SWIVEL	2
22	L-462	REDUCE, 3/4 X 3/8	2
23	ST-181	90% ELL, 3/8 SWIVEL	2

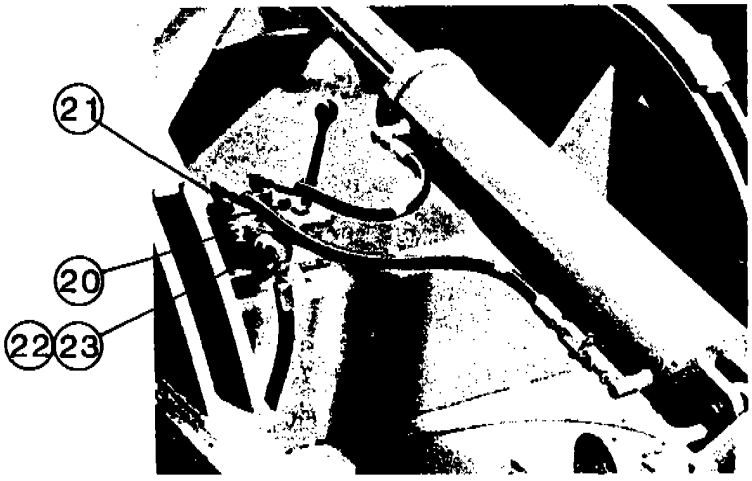
MANUALLY CONTROLLED AND CHECK VALVES



MAIN LIFT AND SELECTOR VALVES

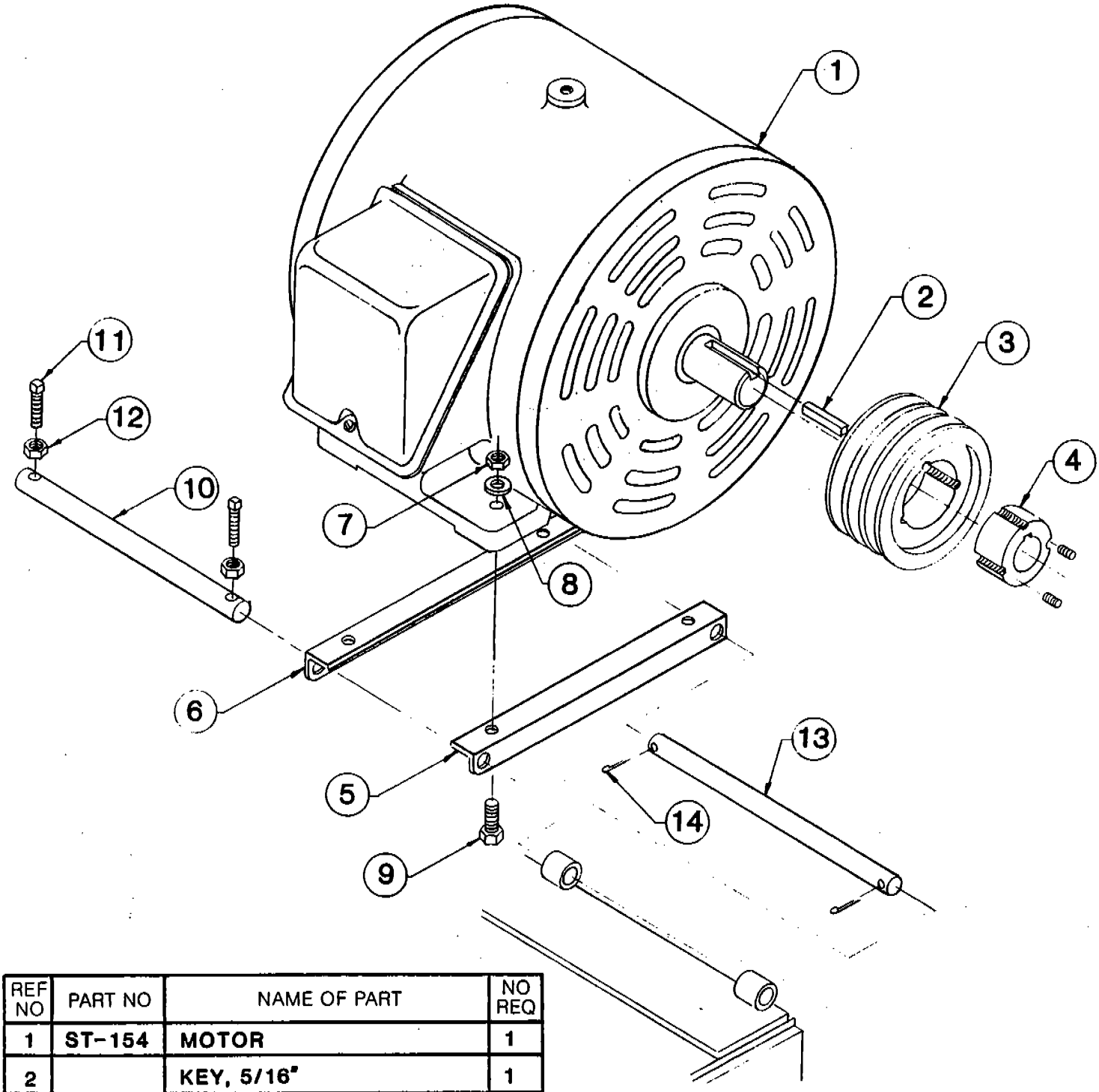


CHECK VALVE



GOOSENECK VALVE

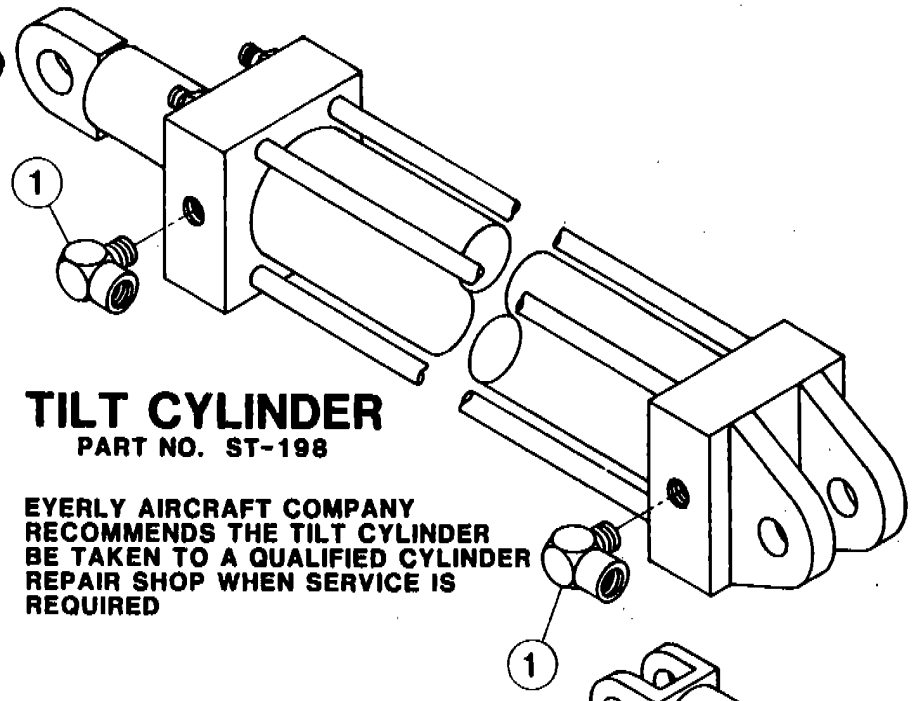
HYDRAULIC PUMP MOTOR



REF NO	PART NO	NAME OF PART	NO REQ
1	ST-154	MOTOR	1
2		KEY, 5/16"	1
3	ST-155	SHEAVE, 3 GROOVE	1
4	ST-156	BUSHING W/SET SCREWS	1
5	ST-30-15	RAIL, MOTOR MTG (RH)	1
6	ST-30-15	RAIL, MOTOR MTG (LH)	1
7		NUT, 3/8-16 NC	4
8		WASHER, 3/8" LOCK	4
9		BOLT, HEX HEAD	
		3/8-16NC X 1 1/2" LG	4

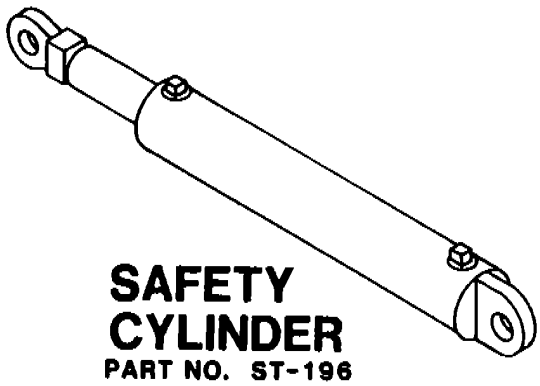
REF NO	PART NO	NAME OF PART	NO REQ
10	ST-30-17	BAR, BELT TENSIONING	1
11		BOLT, SQ. HEAD CUP PT	
		1/2-13NC X2 1/2" LG	2
12		NUT 1/2-13NC	2
13	ST-30-16	BAR, HINGE	1
14		PIN, COTTER 1/8" X 1/4"	2

HYDRAULIC CYLINDERS



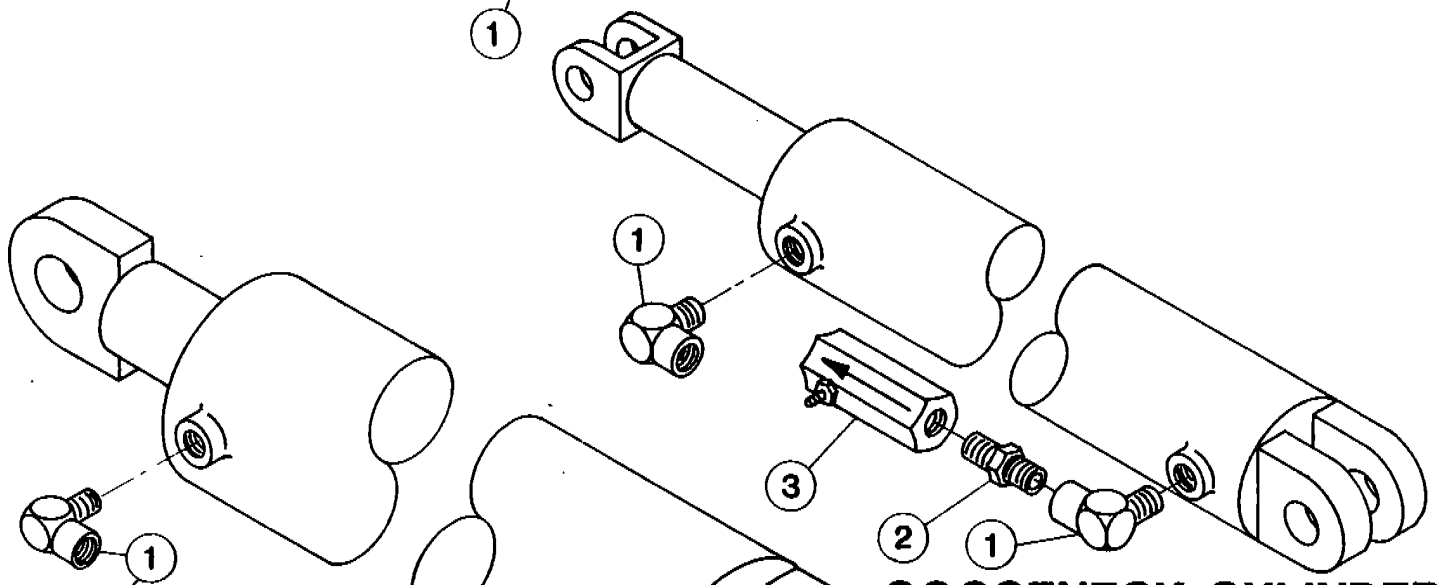
TILT CYLINDER
PART NO. ST-198

EYERLY AIRCRAFT COMPANY RECOMMENDS THE TILT CYLINDER BE TAKEN TO A QUALIFIED CYLINDER REPAIR SHOP WHEN SERVICE IS REQUIRED



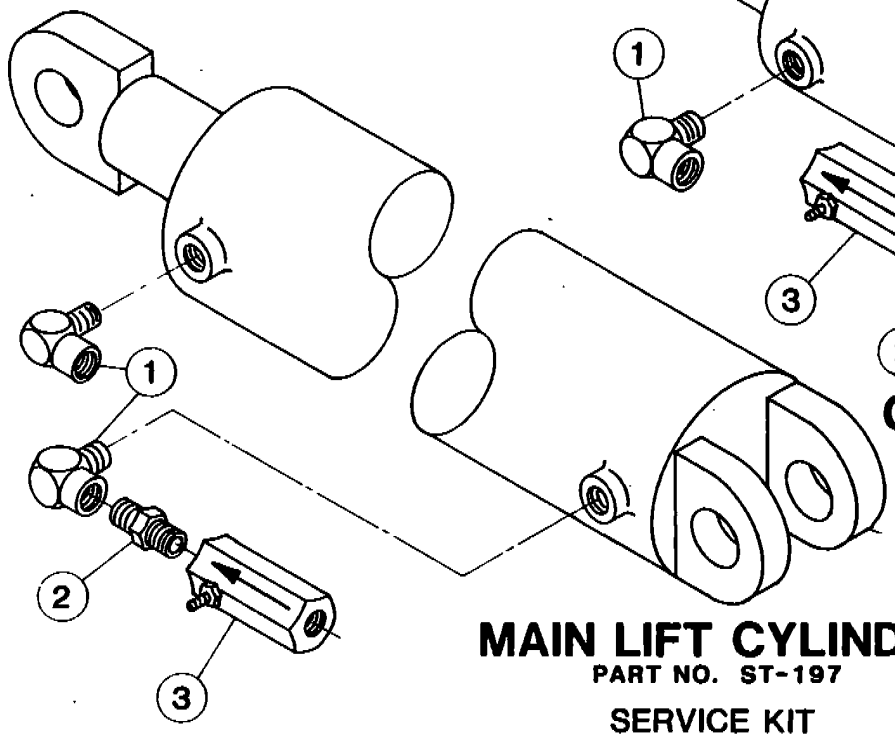
SAFETY CYLINDER
PART NO. ST-196

REBUILT SAFETY CYLINDERS AVAILABLE ON AN EXCHANGE BASES



GOOSENECK CYLINDER
PART NO. ST-195

SERVICE KIT
PART NO. ST-195A



MAIN LIFT CYLINDER
PART NO. ST-197

SERVICE KIT
PART NO. ST-197A

REF NO	PART NO	NAME OF PART	NO REQ
1	PR-500	STREET ELL, 3/8 (HYD)	6
2	L-466	NIPPLE, 3/8 (HYD)	2
3	L-242	VALVE, FLOW CONTROL	2

LIMIT SWITCH ADJUSTING PROCEDURE

This assembly is set at the factory and should require no further adjustment. However, there may be a certain part or parts at some time that may require replacing, in which case, re-adjustment may be necessary.

The following procedure will facilitate this operation.

1. With the column erected and the cars in loading position, rotate booms ¼ revolution, or until parallel with ground. Apply and lock brake. Remove access plate located approximately 24" below boom hub on side of column facing operator. Loosen the set screws securing the actuator tabs, Ref. #8, until they slide freely on connecting rod, Ref. #4. The limit switch lever RH, Ref. #2, should be set at approximately 90° with limit switch. The limit switch lever LH should be set slightly above as shown in Fig. #LS-1.

2. With hydraulic selector valve lever positioned at "Auto" and toggle switch on control box switched to "Man" start hydraulic system. Move stop tab up connecting rod until it engages the roller on LH limit switch lever.

   NOTE: Do not move lever, Ref. #12, up to the end of the stroke at this time. Move it up just far enough to solidly engage the lever roller without stopping the hydraulic system. Secure set screw.

3. Move the lower reversing tab up the connecting rod until it engages the RH (Reversing Limit Switch) lever roller. Secure set screw on tab.

4. Screw out adjusting bolt, Ref. #9, on stop tab (LH) until limit switch is activated and the hydraulic system shuts off.

5. Screw out adjusting bolt, Ref. #9, on reversing tab until a 'click' is heard in the reversing limit switch. Turn out the adjusting bolt one-half turn further.

6. With selector valve and toggle switch on "Auto" have someone depress the hydraulic start button. The tilt head should begin closing. Let the system operate until the lower reversing tab has moved approximately 3" down from the limit switch lever. Reach in and manually press down on the RH reversing limit switch lever. The tilt head will reverse itself and the lower reversing tab will move upwards. If the reversing tab adjusting bolt contacts the roller and the cycle reverses, the adjusting bolt will have to be turned in until the 'Reversing' limit switch and the 'Stop' limit switch activate simultaneously.

   NOTE: To get adequate movement on the adjusting bolts it may be necessary to re-locate the adjusting tabs.

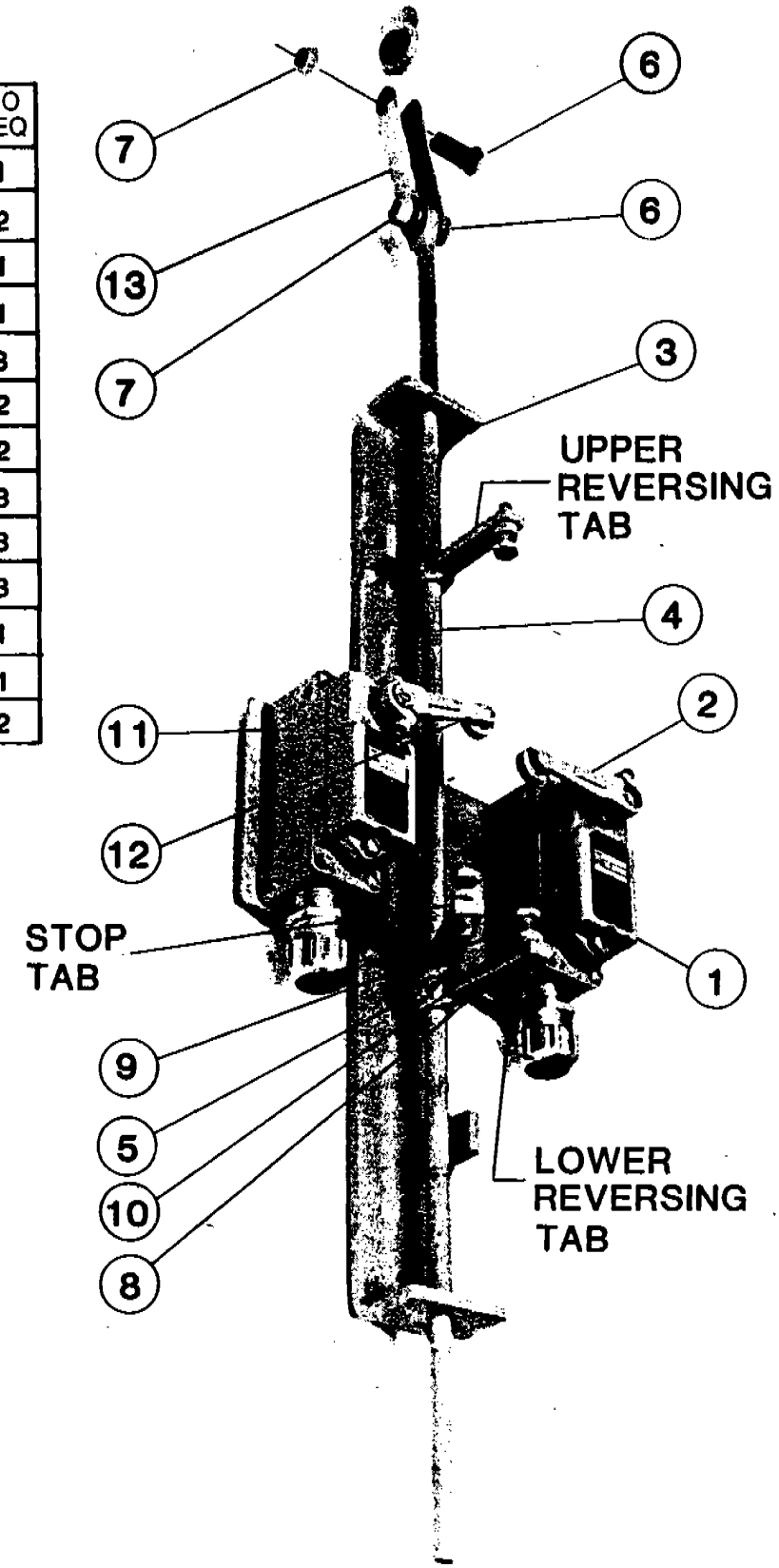
7. Depress the start button. The tilt head will begin closing and continue until the tilt cylinder is completely closed and hydraulic system will by-pass. Depress the stop button. Lower the upper reversing tab until a 'click' is heard in the reversing limit switch. Secure the tab with set screw to the connecting rod. Turn out the adjusting screw one-half turn. Depress the start button. The tilt head should operate through the complete cycle.

8. Operate the tilt cycle in the usual manner, making sure all adjustments are correct. If no further adjustments are required, the adjusting bolts on the stop and reversing tabs must be locked at this time. Make certain the jam nuts are tight!

LIMIT SWITCH ACTUATOR ASSEMBLY

FIG LS-1

REF NO	PART NO	NAME OF PART	NO REQ
1	E-700	SWITCH, REVERSE LIMIT	1
2	E-701	LEVER, LIMIT SWITCH	2
3	ST-45-1	ASSEMBLY, BASE	1
4	ST-45-5	ROD, CONNECTING	1
5		SCREW, 1/4-28 NF SET	3
6		BOLT, 3/8-24NF X 1	2
7		NUT, 3/8-24 LOCK	2
8	ST-45-6	TAB, ACTIVATOR	3
9		BOLT, 1/4-28 NF x 1	3
10		NUT, 1/4-28 NF JAM	3
11	E-700A	SWITCH, STOP LIMIT	1
12	E-701	LEVER, LIMIT SWITCH	1
13	ST-45-4	LINK, CONNECTING	2

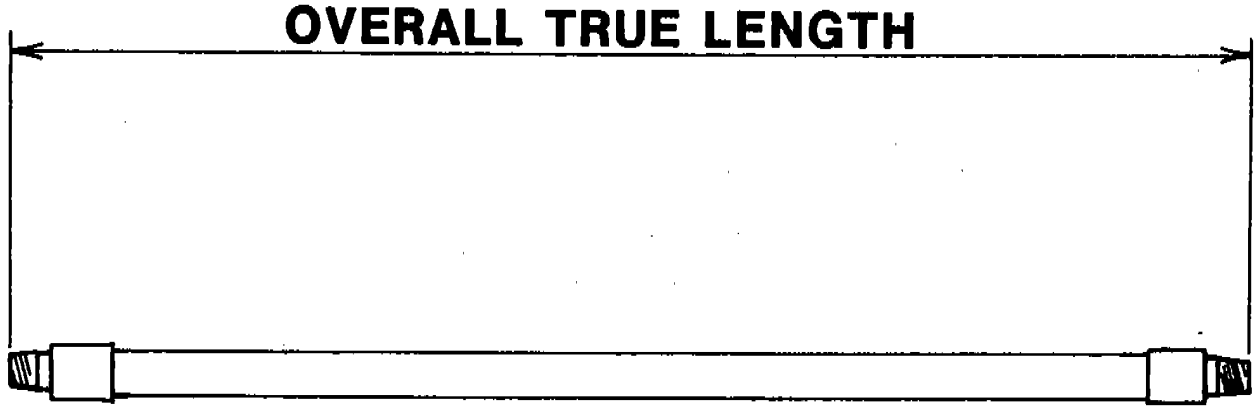


NOTE:

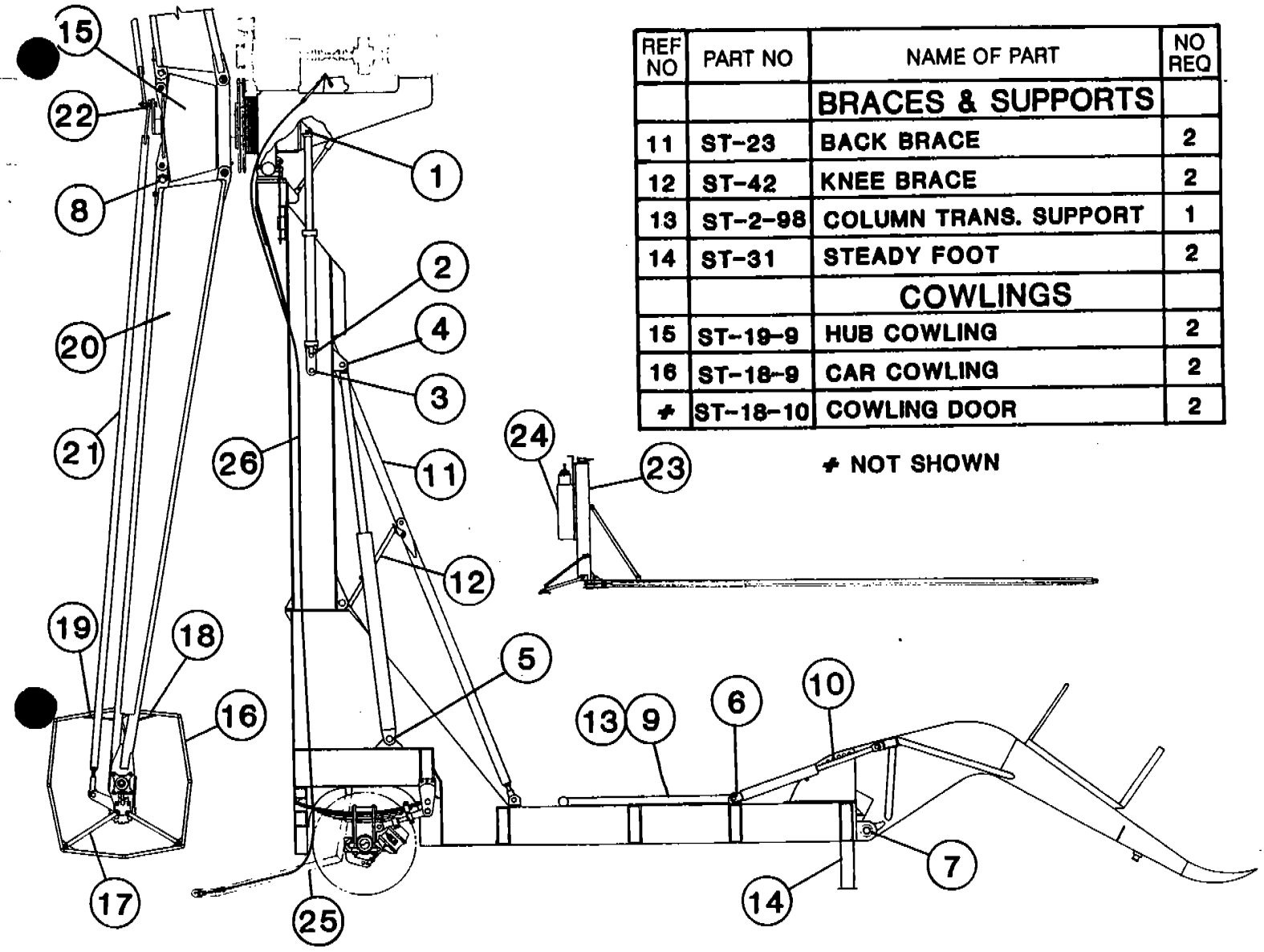
COVER PLATE (ST-12-22) AND (8) 1/4-28 NF x 1/2" MUST BE REMOVED FOR ACCESS TO LIMIT SWITCHES.

HYDRAULIC LINE ORDERING PROCEEDURE

1. REMOVE LINE TO BE REPLACED.
2. PLUG BOTH PORTS TO KEEP DIRT FROM ENTERING SYSTEM.
3. MEASURE LINE AS SHOWN BELOW.
4. SPECIFY SIZE OF FITTINGS ON BOTH ENDS.



QUICK REFERENCE



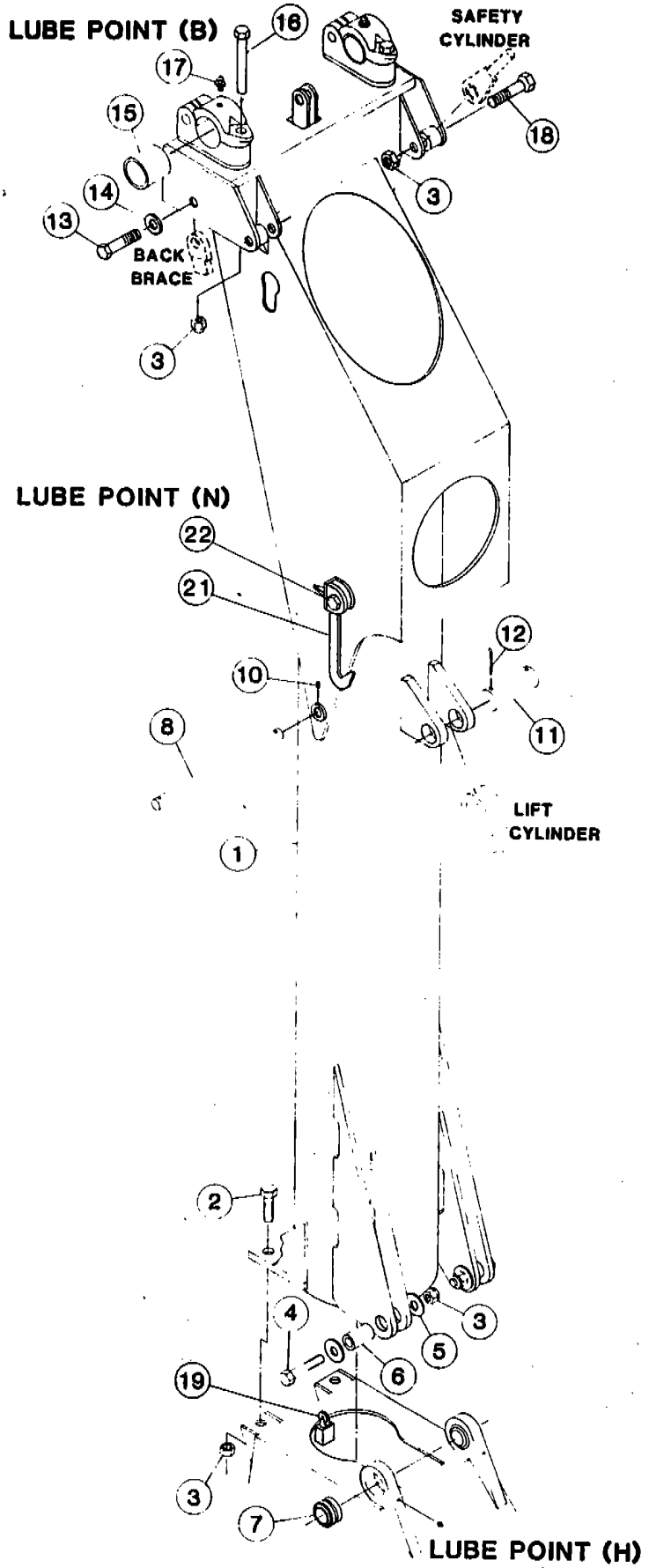
REF NO	PART NO	NAME OF PART	NO REQ
		BRACES & SUPPORTS	
11	ST-23	BACK BRACE	2
12	ST-42	KNEE BRACE	2
13	ST-2-98	COLUMN TRANS. SUPPORT	1
14	ST-31	STEADY FOOT	2
		COWLINGS	
15	ST-19-9	HUB COWLING	2
16	ST-18-9	CAR COWLING	2
*	ST-18-10	COWLING DOOR	2

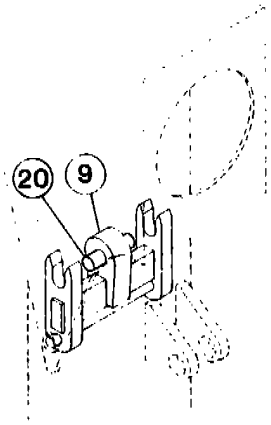
* NOT SHOWN

REF NO	PART NO	NAME OF PART	NO REQ
		PINS	
1	ST-29-5	TILT CYL, UPPER	1
2	ST-29-4	TILT CYL, LOWER	1
3	ST-116	TILT CYL, HANGER	1
4	ST-112	LIFT CYL, UPPER	1
5	ST-113	LIFT CYL, LOWER	1
6	ST-114	GOOSENECK CYL	2
7	ST-108	GOOSENECK HINGE	2
8	O-25	BOOM	2
9	ST-102	COLUMN TRANS SUPPORT	2
10	ST-109	GOOSENECK LOCKING	2

		CAR COWL MNTG	
17	ST-146	LOWER BRACKET	8
18	ST-148	UPPER SHORT BRACKET	4
19	ST-147	UPPER LONG BRACKET	4
		BOOMS	
20	ST-15	BOOM	2
21	ST-26	REVOLVING ROD	2
22	ST-103	REVOLVING ROD MONO-BALL	2
		CONTROL STAND	
23	ST-24	CONTROL STAND	1
24	E-644	MAIN DISCONNECT	1
25	ST-37	CONTROL TUBE	1
26	ST-206	BRAKE CABLE	1

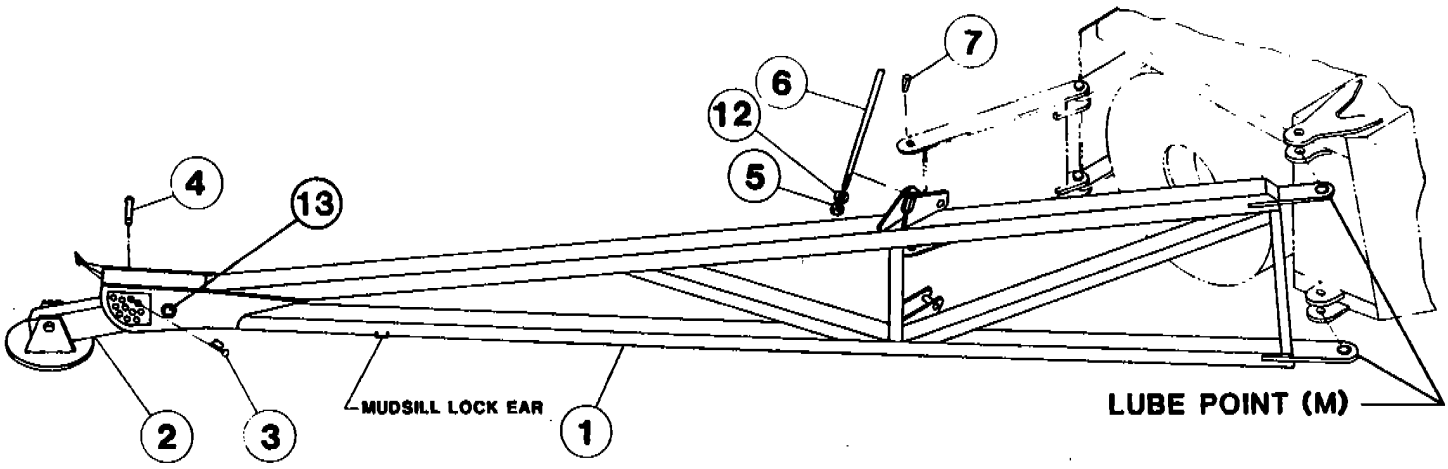
COLUMN ASSEMBLY

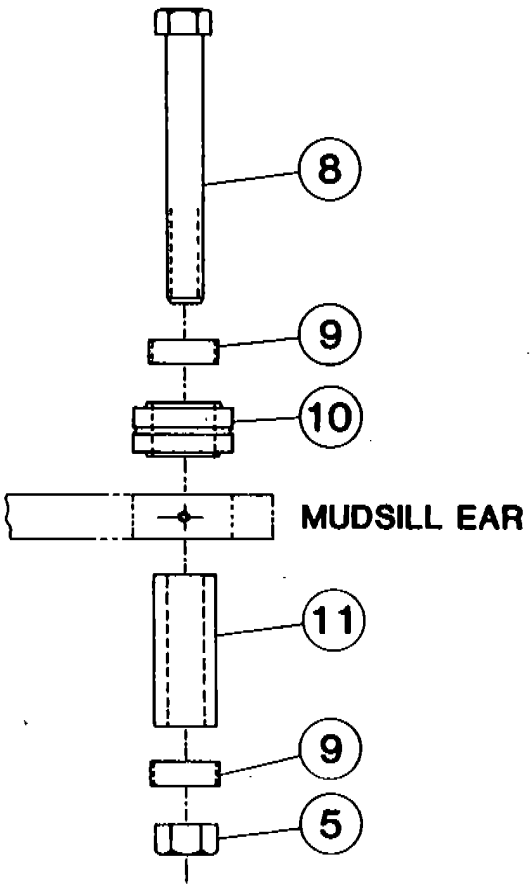




REF NO	PART NO	NAME OF PART	NO REQ
1	ST-12	COLUMN	1
2		BOLT, 1-NF X 2 1/2 GR 8	2
3		NUT, LOCK, 1-12NF GR.8	8
4		BOLT, 1-NF X 4 1/2 GR 8	2
5		WASHER, FLAT, 1"	4
6	ST-12-35	BUSHING, HINGE	2
7	ST-102	BEARING, MONO-BALL	2
8	ST-29-7	PIN, HANGER	1
9	ST-29	HANGER, TILT CYLINDER	1
10		SCREW, 3/8-16NC SET	2
11	ST-12-34	PIN, UPPER LIFT CYL.	1
12		PIN, COTTER, 1/4 X 3	2
13		BOLT, 1-8NC X 6" GR.8	2
14		WASHER, LOCK, 1	2
15	RR-189	BUSHING	2
16		BOLT, 1-12NF X 7 GR.8	2
17		ZERK, 1/8 NPT	4
18	ST-127	BOLT, UPPER SAFETY CYL	2
19	E-609	SWITCH, BREAKOVER LIMIT	1
20	ST-29-8	PIN, LOWER TILT CYL	1
21	ST-125	HOOK, SAFETY	2
22	ST-124	BOLT, SAFETY HOOK	2

MUDSILL ASSEMBLY





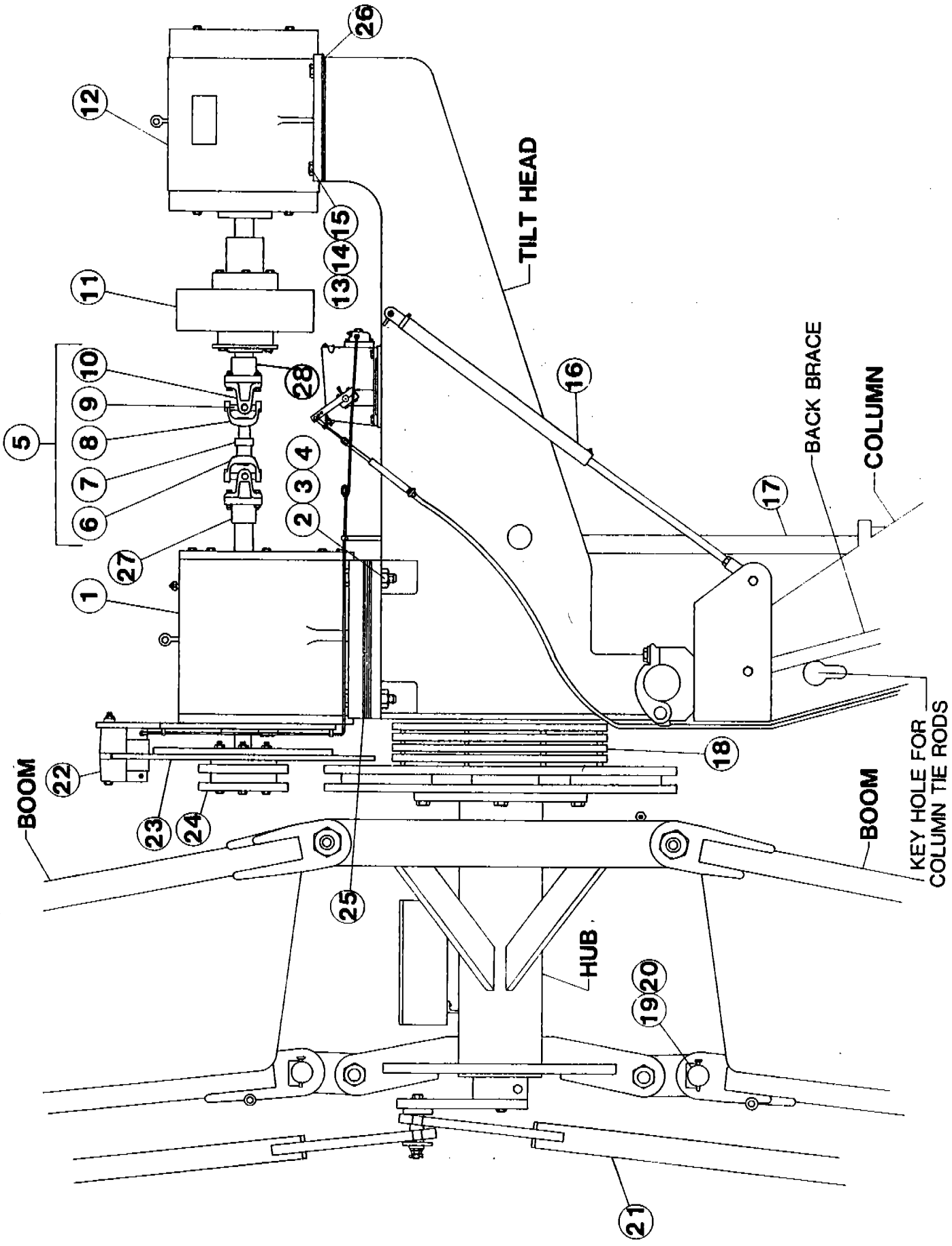
REF NO	PART NO	NAME OF PART	NO REQ
1	ST-4	MUDSILL (LH)	1
	ST-5	MUDSILL (RH)	1
2	ST-4-28	FOOT, MUDSILL	1
3	ST-172	PIN, SAFETY	1
4	ST-4-35	PIN, MUDSILL LOCKING	1
5		NUT, 1-8 NC	3
6	ST-27	ROD, COLUMN TIE	1
7	PR-646	WEDGE ASSEMBLY	2
8		BOLT, 1-8 NC X 7 1/2	2
9	ST-4-32	COLLAR, UPPER EAR	2
9	ST-4-31	COLLAR, LOWER EAR	2
10	ST-102	BEARING, MONOBALL	2
11	ST-4-29	BUSHING, UPPER EAR	2
11	ST-4-30	BUSHING, LOWER EAR	2
12		WASHER, 1 LOCK	1
13	ST-4-34	PIN, MUDSILL FOOT	1

TILT HEAD ASSEMBLY

REF NO	PART NO	NAME OF PART	NO REQ
1	ST-161	GEAR BOX	1
2		BOLT, 1-12NF	4
3		WASHER, 1 LOCK	4
4		NUT, 1-12NF	4
5	W-336	ASSEMBLY, UNIVERSAL	1
6	W-342	YOKE, SLEEVE	1
7	W-345	KIT, DUST CAP	1
8	W-346	YOKE, SHAFT	1
9	W-338	KIT, JOURNAL CROSS	2
10	W-337	YOKE, FLANGE	2
11	ST-207	SHEAVE, HYDRO	1
12	ST-164	MOTOR, DRIVE	1
13		BOLT, 1/2-20NF X 2	4
14		WASHER, 1/2 LOCK	4
15		NUT, 1/2-20NF	4
16	ST-196	CYLINDER, SAFETY	2
17	ST-198	CYLINDER, TILT HEAD	1
18		ASSEMBLY, LIGHT RING	1
19		PIN, BOOM	2
20		PIN, SAFETY	2
21	ST-26	ROD, CAR REVOLVING	2
22	ST-203	BRAKE, DISC	1
23	ST-44-4	DISC	1
24	ST-158	SPROCKET, DRIVE	1
25	ST-139	SHIMS, GEAR BOX	X
26	ST-126	SHIMS, MOTOR	X
27	ST-117	FLANGE, COUPLING	1
28	ST-118	OUTPUT, HYDRO-SHEAVE	1

NOTE: "X" INDICATES AS REQUIRED
DRIVE CHAIN NOT SHOWN

TILT HEAD ASSEMBLY

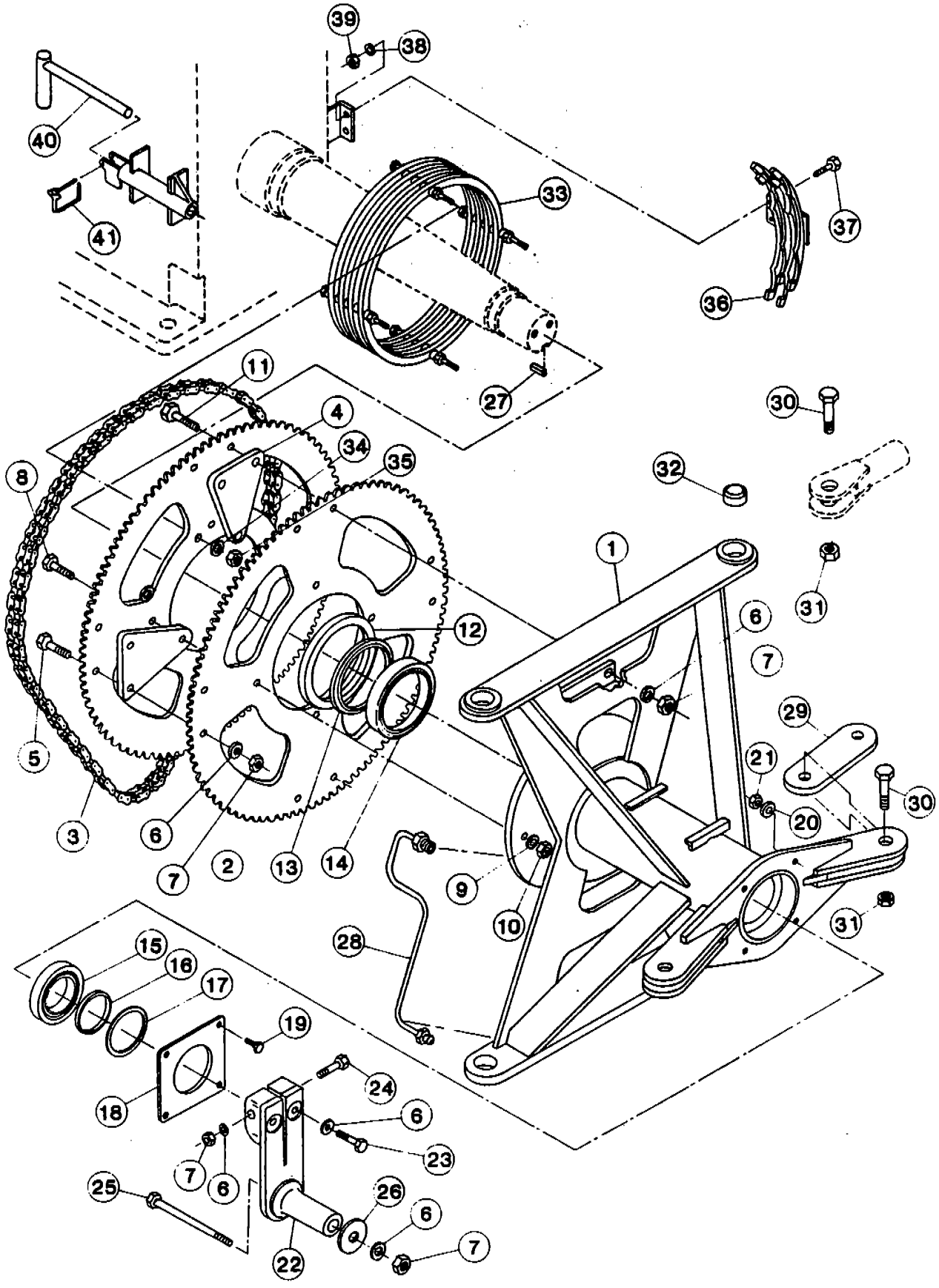


HUB ASSEMBLY

REF NO	PART NO	NAME OF PART	NO REQ
1	ST-14	HUB	1
2	ST-20-1	SPROCKET	2
3	ST-158	CHAIN	1
4	ST-20-2	SPACER, SPROCKET	4
5		BOLT, 3/4-16NF X 3	4
6		WASHER, LOCK, 3/4	11
7		NUT, 3/4-16 NF	10
8		BOLT, 1-12NF X 4	4
9		WASHER, LOCK, 1	4
10		NUT, 1-12 NF	4
11		BOLT, 3/4-16 NF X 3 1/2	4
12	W-51	RING, SEAL	1
13	W-88	SEAL, GREASE	1
14	W-87	BEARING	1
15	W-86	BEARING	1
16	ST-22-5	SPACER, CRANK	1
17	ST-162	SEAL, GREASE	1
18	ST-14-21	PLATE, GREASE SEAL	1
19		BOLT, 1/2-20NF X 1 1/2	4
20		WASHER, LOCK, 1/2	4
		NUT, 1/2-20 NF	4

REF NO	PART NO	NAME OF PART	NO REQ
22	ST-22	CRANK, REVOLVING	
23		BOLT, 3/4-16 NF X 2	2
24		BOLT, 3/4-16 NF X 5 1/4	1
25		BOLT, 3/4-16 NF X 5	1
26	ST-22-6	RETAINER, CRANK PIN	1
27		KEY 3/4 SQ X 1 3/4	1
28		LINE, GREASE	1
29		LINK, BOOM	2
30	ST-138	BOLT, BOOM	6
31		NUT, LOCK, 1 1/2 X 12 NF	6
32	ST-103	BALL, MONO	4
33	E-657	ASSY, LIGHT RING	1
34		WASHER, LOCK, 1/4	4
35		NUT, 1/4-28NF	4
36	E-658	ASSY, BRUSH	1
37		BOLT, 1/4-20NC X 1	2
38		WASHER, LOCK 1/4	2
39		NUT, 1/4-20NC	2
40		PIN, HUB LOCK	1
41	ST-171	PIN, SAFETY	1

HUB ASSEMBLY



CAR SPINDLE ASSEMBLY

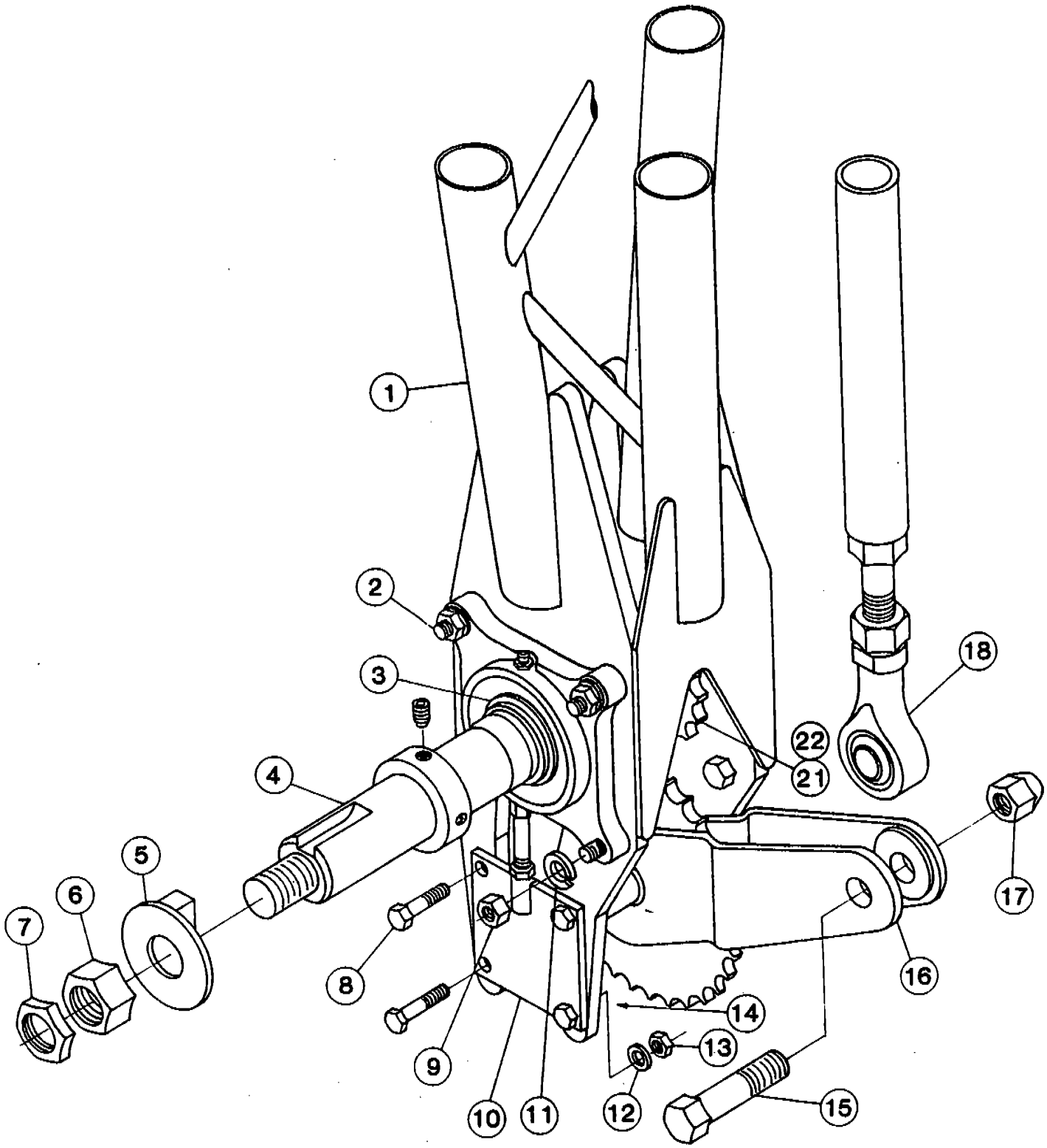
REF NO	PART NO	NAME OF PART	NO REQ
1	ST-15-9	BOOM	1
2		BOLT, 5/8-18NF X 2 1/4	8
3	W-79	BEARING WITH COLLAR	2
4		SPINDLE	1
5	RR-395	LOCKWASHER, CAR	2
6	RR-259	NUT, CAR SPINDLE	2
7	RR-258	LOCKNUT, CAR SPINDLE	2
8		BOLT, 1/2-20NF X 2	8
9		NUT, 5/8-18NF	8
10	ST-21	SPINDLE, ADJUSTING ASSY	2
11		WASHER, 5/8 LOCK	8
		WASHER, 1/2 LOCK	8
13		NUT, 1/2-20NF	8
14	ST-163	BEARING (NOT SHOWN)	2
15		BOLT, 1-12NF X 4 GR 8	1
16	ST-25	SPROCKET, REVOLVING	
		WITH SHAFT	1
17		NUT, 1-12NF GR 8	1
18	ST-26	ROD, CAR REVOLVING	1
19	ST-160	CHAIN (NOT SHOWN)	1
20			
21	ST-142	BUSHING	1
22	ST-225	SPROCKET	1

NOTE

NO. REQ PER SINGLE BOOM ASSEMBLY ONLY

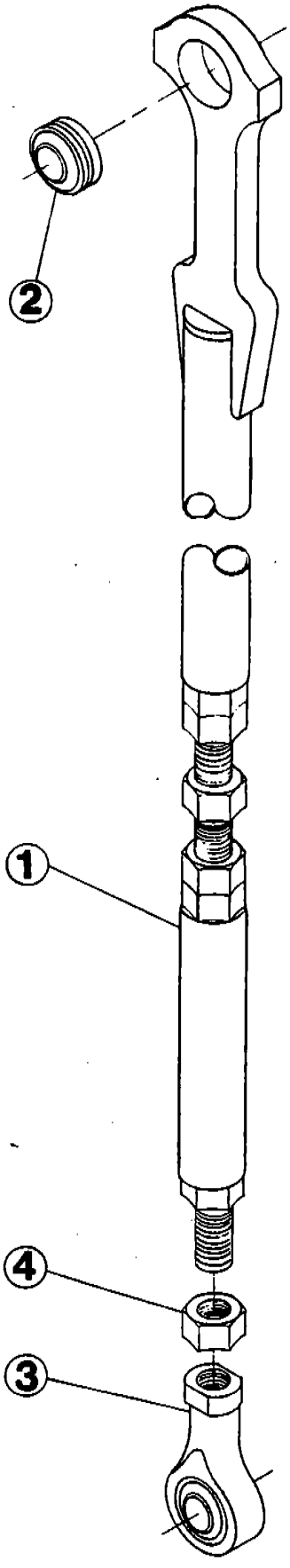
2 BOOM ASSEMBLIES REQUIRED

CAR SPINDLE ASSEMBLY

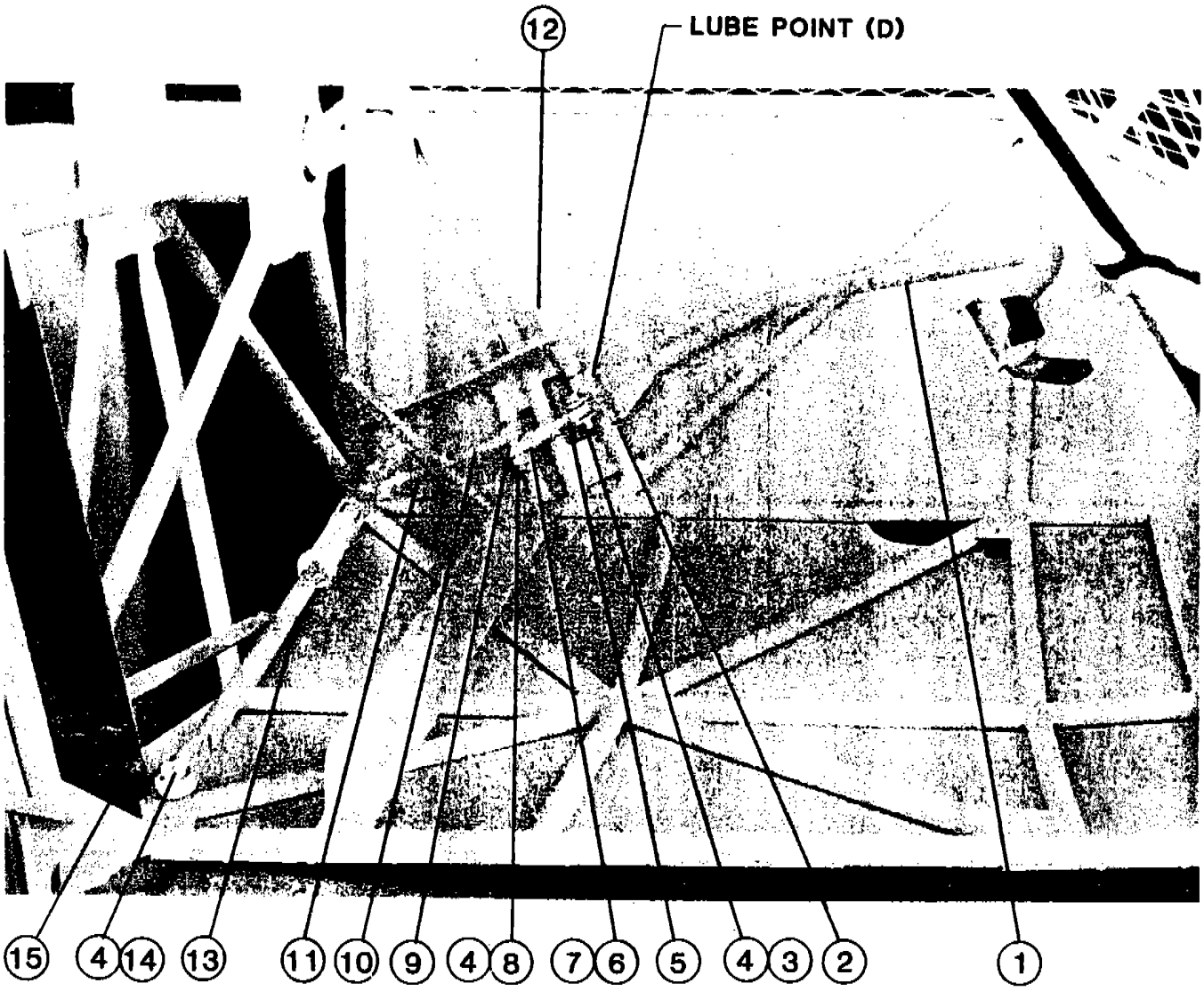


REVOLVING ROD ASSEMBLY

REF NO	PART NO	NAME OF PART	NO REQ
1	ST-26	ROD, CAR REVOLVING	1
2	ST-103	MONO-BALL	1
3	PR-675	ROD END	1
4		NUT, 1 1/4-12NF JAM	1



AUTOMATIC BELT BAR



REF NO	PART NO	NAME OF PART	NO REQ
1	ST-16-18	BAR, BELT (LH)	1
	ST-16-17	BAR, BELT (RH)	
2	W-98A	PIN, COTTER	2
3		BOLT, 1/2-20NF X 2	1
4		NUT, 1/2-20NF LOCK	4
5		END, 1/2 STUD ROD	1
6		END, 1/2 ROD	1
7		NUT, 1/2-20NF JAM	1

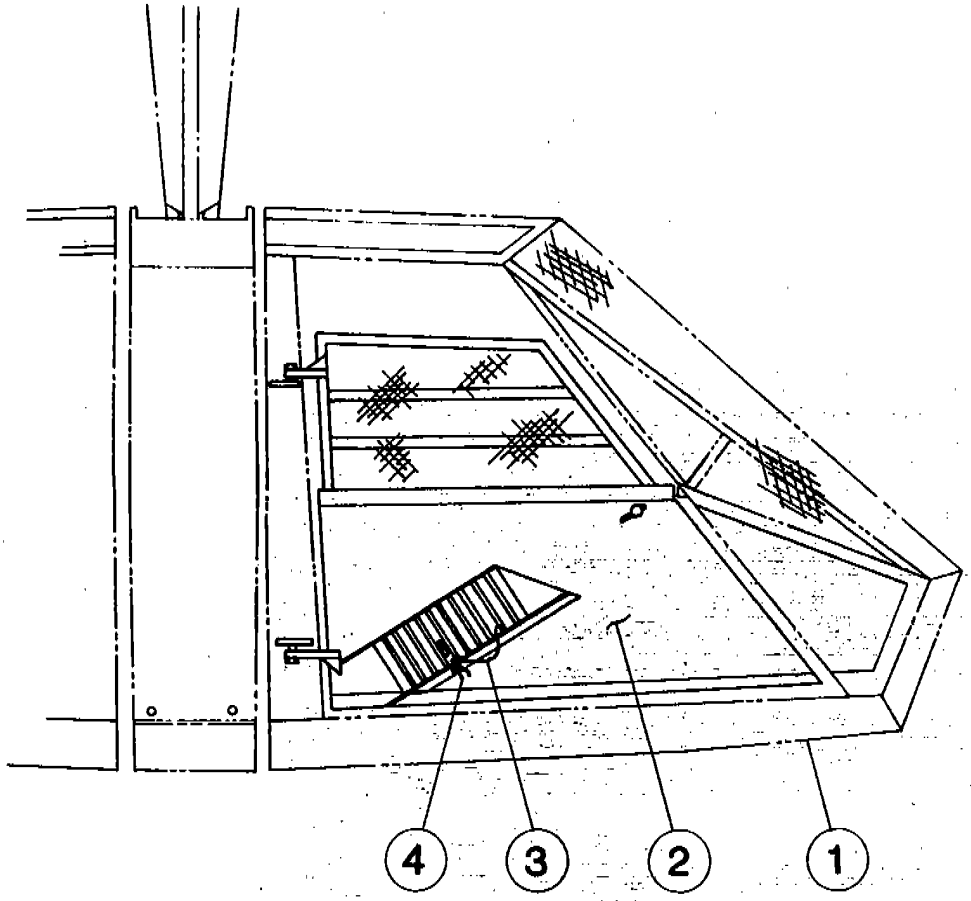
REF NO	PART NO	NAME OF PART	NO REQ
8		BOLT, 1/2-20NF X 1 1/2	
9		SPACER	1
10	ST-16-10	LEVER, RETURN	1
11	L-421A	STOP, BAR	1
12	W-98	PIN, HINGE	2
13	ST-16-11	ROD, TIE	1
14		BOLT, 1/2-20NF X 1 3/4	2
15		SPRING, BELT LIFT	1

NOTE:

QUANITIES PER SINGLE CAR ONLY

RESTRAINT BELT L-451 NOT SHOWN

CAR ASSEMBLY

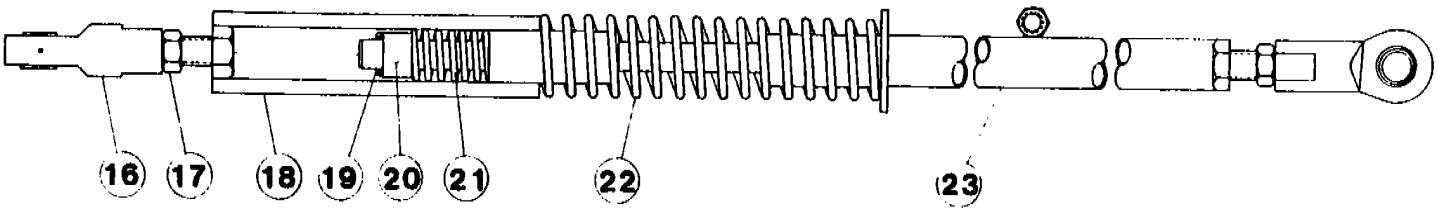


REF NO	PART NO	NAME OF PART	NO REQ
1	ST-16	CAR (RH)	1
	ST-17	CAR (LH)	1
2	ST-16-15	DOOR, CAR (RH)	1
	ST-16-16	DOOR, CAR (LH)	1
3	W-97C	STRAP, KEY	1
4	W-97A	KEY, SAFETY	1
5	W-89B	NUT, HINGE	2
6	W-89A	WASHER, LOCK	2
7	W-89	PIN, HINGE	2
8	W-90	BUSHING, HINGE	2
9	W-131A	KNOB, LATCH	1
10	ST-16-24	PLUNGER, LATCH	1
11	W-94	SPRING, LATCH	1
12	W-130A	WASHER, TUBE	1

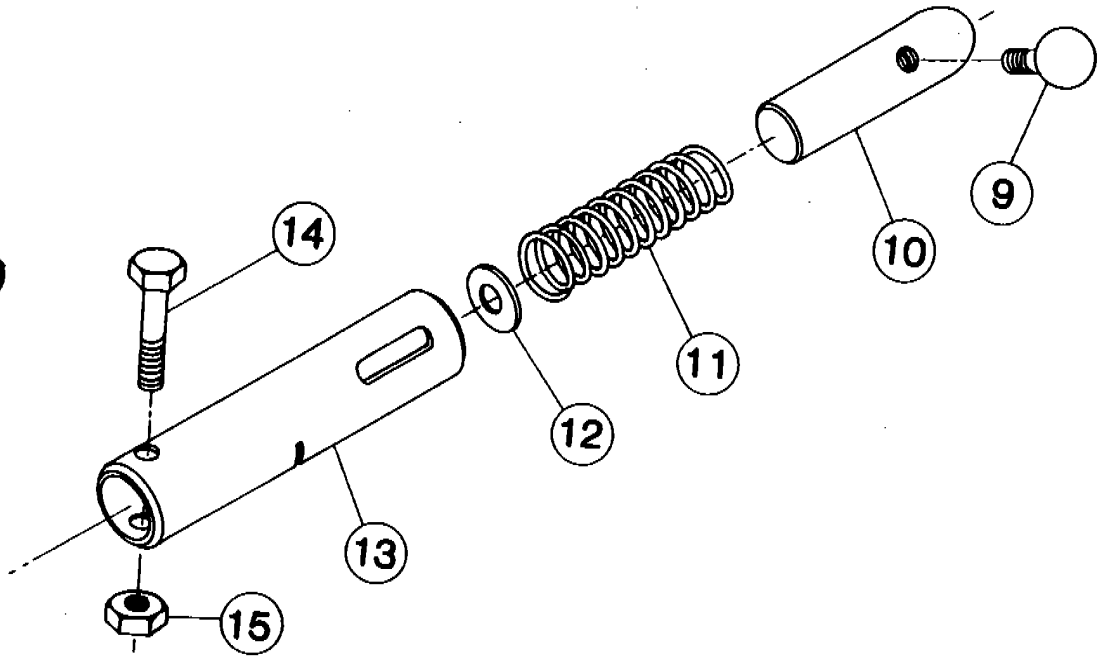
REF NO	PART NO	NAME OF PART	NO REQ
13	ST-12-23	TUBE, LATCH	1
14		BOLT, 1/4-20NC X 1 1/2	1
15		NUT, 1/4-20NC	1
16	O-551	END, 1/2 ROD	2
17		NUT, 1/2-20NF JAM	2
18	ST-36-2	CLEVIS	1
19	W-362A	PIN, COTTER	1
20	W-362	RETAINER	1
21	ST-16-14	SPRING, CUSHION	1
22	W-91	SPRING, PRESSURE	1
23	ST-16-12	ROD, TIE	1

NOTE: FIBERGLASS SEAT ST-52 AND HEAD PAD ST-53 NOT ILLUSTRATED WHEN ORDERING SPECIFY LEFT OR RIGHT WITH OR WITHOUT HEAD PAD

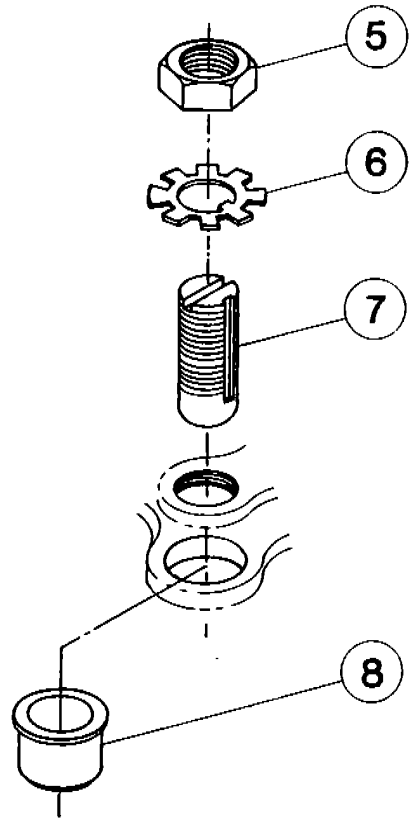
CAR ASSEMBLY



TIE ROD ASSEMBLY

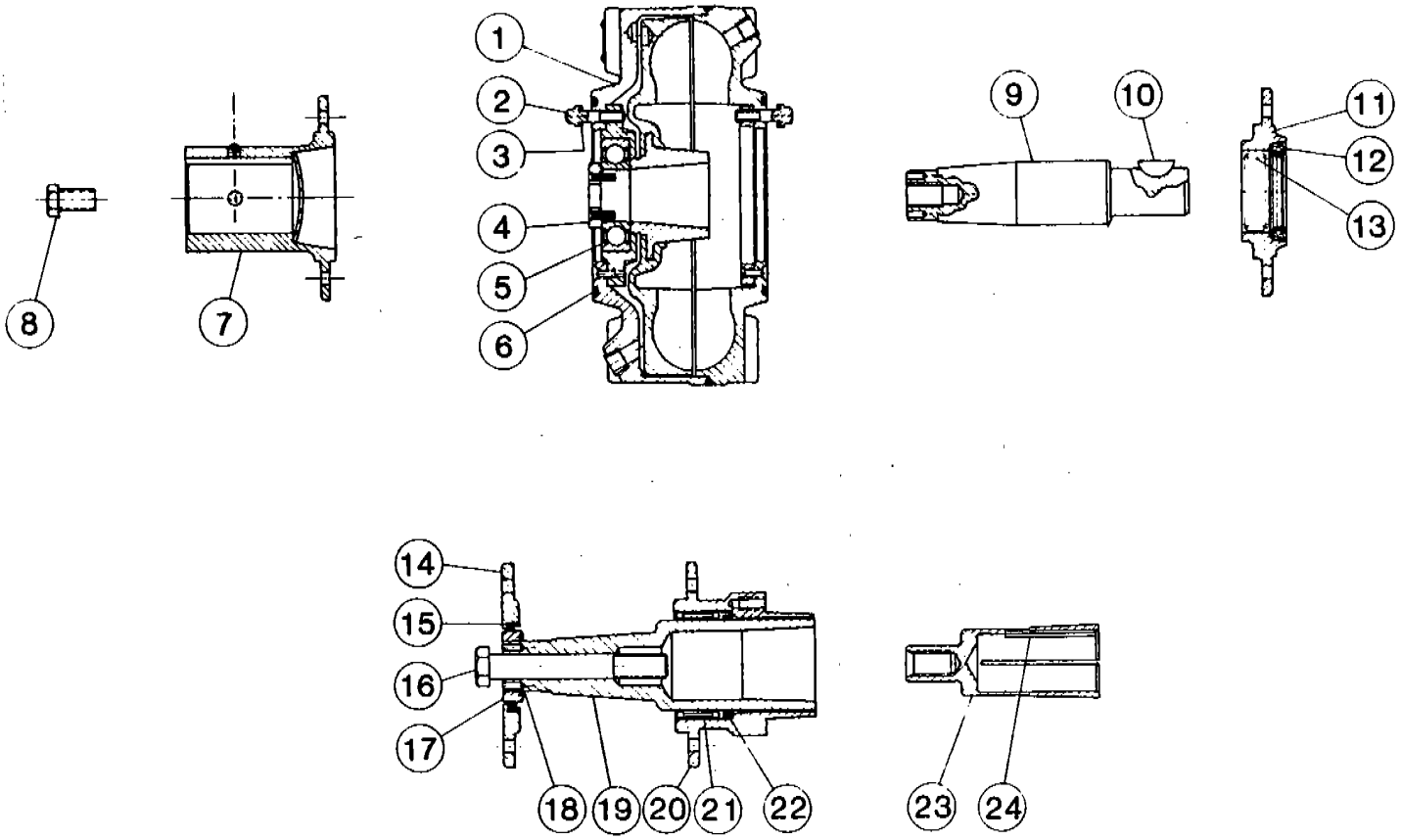


CAR DOOR LATCH ASSEMBLY



CAR DOOR HINGE ASSEMBLY

HYDRO-SHEAVE



REF NO	PART NO	NAME OF PART	NO REQ
1	ST-208	FRONT COVER AND	
		IMPELLER ASSEMBLY	1
2	ST-209	SCREW, 12 POINT	12
3	ST-210	RING, O	12
4	ST-211	WASHER ASSEMBLY	1
5	ST-212	BEARING, BALL	1
6	ST-213	RING, O	2
7	ST-214	HCF INPUT GROUP	1
8	ST-215	SCREW, HEX HEAD	1
9	ST-216	SHAFT, OUTPUT, HBM	1
10	ST-217	KEY, WOODRUFF	1
11	ST-218	CARRIER, BEARING	1
12	ST-219	SEAL, OIL	1

REF NO	PART NO	NAME OF PART	NO REQ
13	ST-220	BEARING, NEEDLE	1
14		CAP, END	
15		SEAL, OIL	
16		SCREW, HEX HEAD	
17		BUSHING, SEAL	
18		RING, O	
19		SHAFT, INPUT	
20		HUB, SHEAVE	
21		BEARING, NEEDLE	
22		SEAL, OIL	
23		ADAPTER, MOTOR SHAFT	
24		KEY, STEPPED	

NOTE: ITEMS 14-24 NOT USED ON THE SIDEWINDER

MODELS 9.4 HC, HCF, HCM, HBM FLUID COUPLINGS UNIT ASSEMBLY AND SERVICE INSTRUCTIONS

ASSEMBLY INSTRUCTIONS

NOTE: Tapers to be cleaned with suitable solvent, wiped dry and assembled per S765. Do Not use molybdenum disulfide or equivalent friction reducing compounds on fasteners or taper.

1. If seal and needle bearing are not in place in rear bearing carrier, install them using special seal and bearing driver.
2. Install "O" ring in coupling face, mount rear bearing carrier to coupling face using six 12 point capscrews with "O" rings. Torque capscrews to 27-30 lb. ft.
3. Install ball bearing into front bearing carrier with special bearing driver. Care must be taken to not damage circuit front cover adjacent to flat head screws.
4. Install output shaft or output flange assembly through rear bearing carrier and into taper in runner hub. Support the output end of output shaft flange assembly and press ball bearing onto output shaft until bearing inner race overhangs shaft end .060 to .120". **CAUTION:** Do not press flush with shaft end. Press force never to exceed 24,000 lbs. and touque to 177-195 lb. ft. bearing and runner are now in place.

   NOTE: To hold shaft from turning while torquing capscrew, use open end or pipe wrench on retainer washer.
5. Mount selected input group with "O" ring and six 12 point capscrews with "O" rings to input end. Torque to 27-30 lb. ft.
6. Check air tightness with 5-10 PSI pressure applied thru filler hole.

TOOLS REQUIRED FOR ASSEMBLY

1. Bearing and seal driver.
2. Bearing driver.

SERVICE DISASSEMBLY INSTRUCTIONS

1. Remove the two pipe plug in the front cover and impeller, allow fluid to drain completely.
2. Remove coupling assembly from installation.
3. Remove the six 12 point capscrews and "O" rings from the input group. Remove input group and "O" ring.
4. Remove hex head capscrew which retains the output shaft or output flange assembly. Remove the retainer washer.
5. To remove Models HC or HCF output shaft and Model HCM output flange assembly, pack shaft center screw hole with grease. Wrap thread of removed hex. Head capscrew with several layers of teflon tape to seal against high grease pressure. Insert screw thru retainer washer into grease filled hole and tighten. Repack hole if necessary until release of taper joint is achieved. To remove Model HBM output shaft, first remove output bearing carrier per instructions no. 6. Support runner on a tube* and press output shaft from runner. Use plug against output shaft to protect threads in shaft.
6. Remove six 12 point capscrews and "O" rings from output bearing carrier. Remove carrier assembly and "O" ring.
7. If removal of bearing and seal from output bearing carrier is necessary, press out from coupling side.
8. To remove input ball bearing use a rod and tap out from coupling output end.

   NOTE: If the front cover and impeller assembly is damaged, the basic unit must be replaced.

***TOOLS REQUIRED FOR DISASSEMBLY**

1. Teflon tape
2. Tube (3.00 O.D. x 1.81 I.D. x 5.00 Long)

RECOMMENDED REPLACEMENTS FOR OVERHAUL

1. Seal
2. Bearings
3. All "O" rings

HYDRO-SHEAVE

MODEL 9.4 HSD FLUID COUPLING (HYDRO SHEAVE) UNIT ASSEMBLY AND SERVICE INSTRUCTIONS

ASSEMBLY INSTRUCTIONS

NOTE: Tapers to be cleaned with suitable solvent, wiped dry and assembled per S765. Do not use molybdenum disulfide or equivalent friction reducing compounds on fasteners or tapers.

1. If seal and needle bearing are not in place in sheave hub install them using special seal and bearing driver.
2. Install "O" ring in coupling face. Mount sheave hub to coupling face using the six 12 point capscrews with "O" rings. Torque capscrews to 27-30 lb. ft.
3. Install ball bearing into front bearing carrier with special bearing driver. Care must be taken to not damage circuit front cover adjacent to flat head screws.
4. To install input shaft, seal bushing with "O" ring, end cap assembly, and retaining ring.
   a) Install input shaft through sheave hub and into taper in runner hub. Press shaft through ball bearing until it overhangs bearing 3/8 to 7/16 inch.
   b) Install seal bushing with "O" ring into overhung end of shaft.
   c) If seal is not in place in end cap install it using special seal driver.
   d) Mount end cap assembly with "O' ring and six 12 point capscrews with "O" rings. Torque to 27-30 lb. ft.
   e) Install roll pins in retainer washer. Place retainer washer with roll pins over shaft end making sure pins align with holes in shaft.
   f) Insert capscrew through retainer washer and into thread of special tapped tool. Torque capscrew to 177-195 lb. ft.
   g) To install motor shaft adapter, loosen capscrew from special tapped tool and remove tool. Insert motor shaft adapter and engage screw hand tight for shipment purposes only.
5. Check air tightness with 5-10 psi pressure applied thru filler hole.

TOOLS REQUIRED FOR ASSEMBLY

1. Needle bearing and seal driver (sheave hub)
2. Ball bearing driver
3. Seal driver (end cap)
4. Tapped bar

SERVICE DISASSEMBLY INSTRUCTIONS

1. Remove the two pipe plugs in the front cover and impeller. Allow fluid to drain completely.
2. Remove six 12 point capscrews and "O" rings from end cap and coupling. Remove end cap and "O" ring.
3. Remove hex head capscrew which retains the motor shaft adapter. Remove retainer washer with roll pins.
4. Remove seal bushing and "O" ring from shaft end.
5. Insert push rod through hole in input shaft to bottom of tapped hole in motor shaft adapter. Use a capscrew* in end of input shaft, and tighten against push rod to break taper between input shaft and motor shaft adapter. Use flats on shaft end to react wrench torque on screw. It may be necessary to tap end of capscrew to break taper contact.
6. Remove input shaft and coupling assembly with sheave from motor shaft adapter. Remove the 3 capscrews retaining the sheave. Remove sheave from sheave hub.
7. Remove six 12 point capscrews and "O" rings from sheave hub and coupling. Remove hub assembly and "O" ring.
8. If removal of bearing and seal from sheave hub is necessary, use a rod and tap from sheave side to remove.
9. Remove pusher rod from motor shaft adapter. Remove shaft adapter from motor shaft.
10. To remove input shaft, support runner on a tube* and press input shaft from runner. Use plug against input shaft to protect threads in shaft.
11. To remove ball bearing, use a rod and tap out from coupling sheave end.

NOTE: If the front cover and impeller assembly is damaged, the basic unit must be replaced.

***TOOLS REQUIRED FOR DISASSEMBLY**

1. Push rod (50 dia. x 4.00 long steel hardened to Rc 50 min.)
2. Tube (3.44 O.D. x 2.75 I.D. x 7.00 long)
3. Capscrew (3/4 10 NC x 1.00 long)

RECOMMENDED REPLACEMENTS FOR OVERHAUL

1. Seals
2. Bearings
3. "O" rings

SERVICING THE CONTROL CYLINDER

Service the control cylinder if one or more of the following symptoms are suspected:

1. If normal lever force and stroke develops braking pressure, but the lever then drifts, service the head and barrel (13).
2. If the lever will not return to normal position after brake application, service the spring case (20).
3. If brake fluid leaks past the shaft or the spring case, replace these seals (8-12).
4. If the supply tank (3) appears defective, *discard and replace* the complete assembly.

When servicing the assembly, always refer to the nameplate assembly number on top of the supply tank.

SERVICING THE HEAD AND BARREL (13)

Drain fluid from the supply tank (3). Remove four stud bolts and head and barrel assembly (13). Clamp barrel lightly in vise in vertical position with piston end up. Remove stop wire, support ring piston, cup retainer and return spring, valve and valve seat. Clean cylinder using only brake fluid or isopropyl alcohol. *Do not* use gasoline, cleaning solvent or mineral oil. Bypass port holes must not be clogged. If cylinder bore is scratched or pitted, discard and replace head and barrel assembly.

Reassemble head and barrel in reverse order using all new parts (14, 16-19A) from head and barrel repair kit, ST-201. Lubricate parts with vegetable base fluid. Clean residual fluid from supply tank reservoir and reinstall head and barrel using new gear gasket (31). Make sure that piston push rod aligns with socket on lever (5).

SERVICING THE SPRING CASE (20-26)

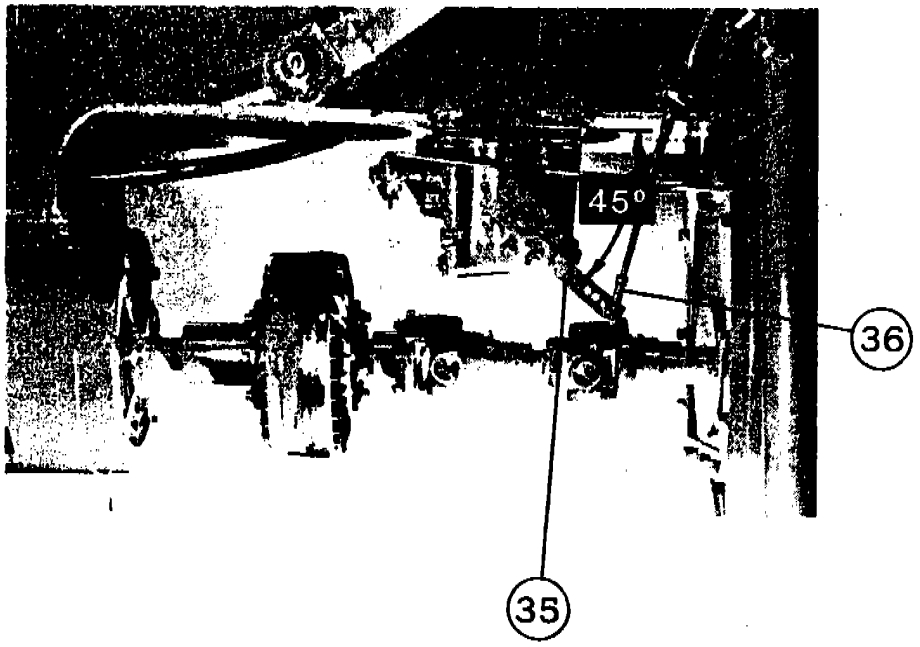
If the lever will not return to normal position, loosen the three screws (26) and apply 125-175 in. lb. counterclockwise torque to the spring case (20). Tighten screws. If this does not help, the clock spring may be defective. Loosen screws and unwind the spring case clockwise, remove the screws and spring case. The spring case is serviced as a ST-202 Kit including items 20-26. Note that a new spring case includes a hex for tightening with standard wrench.

To reassemble, lubricate gasket (23) with brake fluid and slide over spring case (20). Insert assembly into supply tank (3) while rotating to engage pin (21) to slot in shaft (4). Attach three lockwashers, case washers and screws loosely. Use wrench to wind spring case counterclockwise to 125-175 in. lb. torque. Tighten the screws and check torque by installing arm at a 45° angle above floor. With head and barrel (13) in place, depressed arm must return to original angle.

SERVICING THE SHAFT SEAL (8-12)

Remove retainer, felt seal, snap ring, retainer plate and o-ring. Use new parts (8-12) from ST-200 Shaft Kit. Dip o-ring and felt seal in brake fluid and reinstall in reverse order.

CONTROL CYLINDER

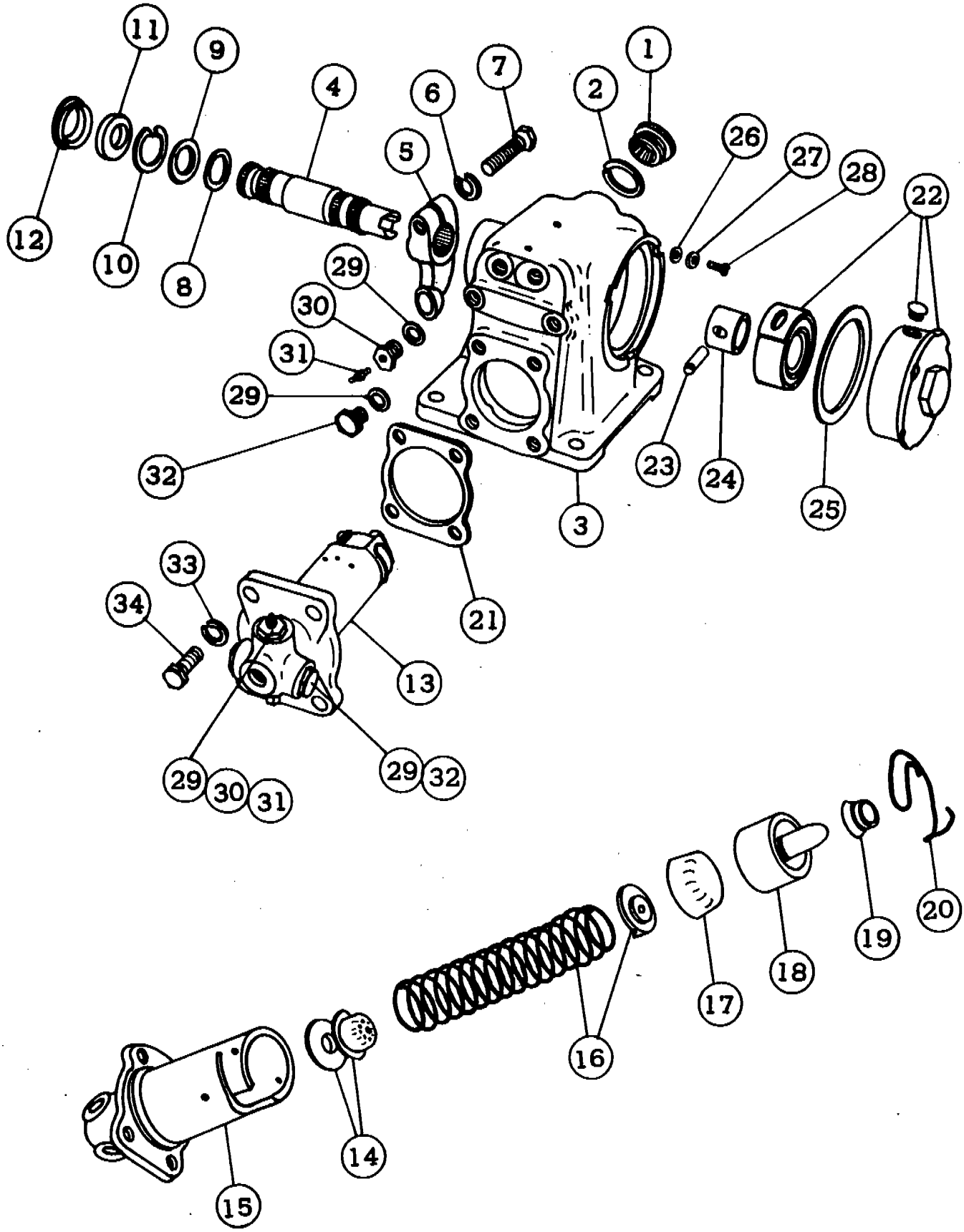


REF NO	PART NO	NAME OF PART	NO REQ
	ST-199	CYLINDER, CONTROL	
1		PLUG, FILLER	
2		GASKET, FILLER PLUG	
3		TANK, SUPPLY	
4		SHAFT	
5		LEVER	
6		LOCKWASHER, 1/2"	
7		BOLT, 1/2-20NF X 2	
	ST-200	KIT, SHAFT SEAL	
8		"O" RING	
9		PLATE RETAINER	
10		RING, SNAP	
11		SEAL, FELT	
12		RETAINER, FELT	
13		ASSEMBLY, HEAD & BARREL	
	ST-201	KIT, HEAD & BARREL	
14		VALVE & VALVE SEAT	
15		HEAD & BARREL	
16		SPRING, RETAINER	
17		CUP, PISTON	
18		PISTON	

REF NO	PART NO	NAME OF PART	NO REQ
19		RING, SUPPORT	
20		STOPWIRE, PISTON	
21		GASKET, HEAD	
22		ASSY, SPRING & CASE	
23		PIN, SHAFT ENGAGING	
24		ARBOR, SLEEVE	
	ST-202	KIT, SPRING CASE ASSY	
25		GASKET, SPRING CASE	
26		WASHER, CASE	
27		WASHER, INTERNAL TOOTH	
28		SCREW, ALLEN, SS	
29		GASKET	
30		ADAPTER, BLEEDER SCREW	
31		SCREW, BLEEDER	
32		PLUG	
33		LOCKWASHER, 7/16	
34		BOLT, 7/16-NC X 1 1/4	
35	ST 44-3	ARM, CONTROL CYLINDER	
36	L-427	ROD END	

NOTE: KIT ST 200 CONTAINS ITEMS 8-12, KIT ST 201 ITEMS 14-21, KIT ST 202 ITEMS 25-28

CONTROL CYLINDER



SERVICING THE DISC BRAKE

SEAL REPLACEMENT — DISASSEMBLY PROCEDURE

1. Remove brake from base plate by disconnecting necessary fluid lines and removing mounting bolts. (Drain fluid from assembly.)
2. Separate housings (item 53) by removing tie bolts (item 51), washers (item 52), tubing assembly (item 60) and spacer (item 59). (Use bench vise.)
3. Remove free floating lining assembly (item 58).
4. Remove piston (item 57) from housing by pulling piston from bore. If piston fails to move, place housing half face down on bench. Protect piston face by placing a cloth between piston and bench. Support housing half on bench in such a way that piston (item 57) can be blown out of its bore. This is accomplished by carefully introducing low pressure air (10-15 p.s.i.) through fluid inlet fittings. *CAUTION: Do not use high pressure as it is dangerous and unnecessary.* While pulling piston out of its bore work seal lip (item 56) from piston. Be careful not to scratch piston.
5. Remove seal (item 56) from housing. Remove back-up ring (item 55) and o-ring (item 54) from inner housing groove. Use a small screwdriver or similar tool. Be careful not to scratch the bore.
6. Repeat steps 3-5 for second housing half.

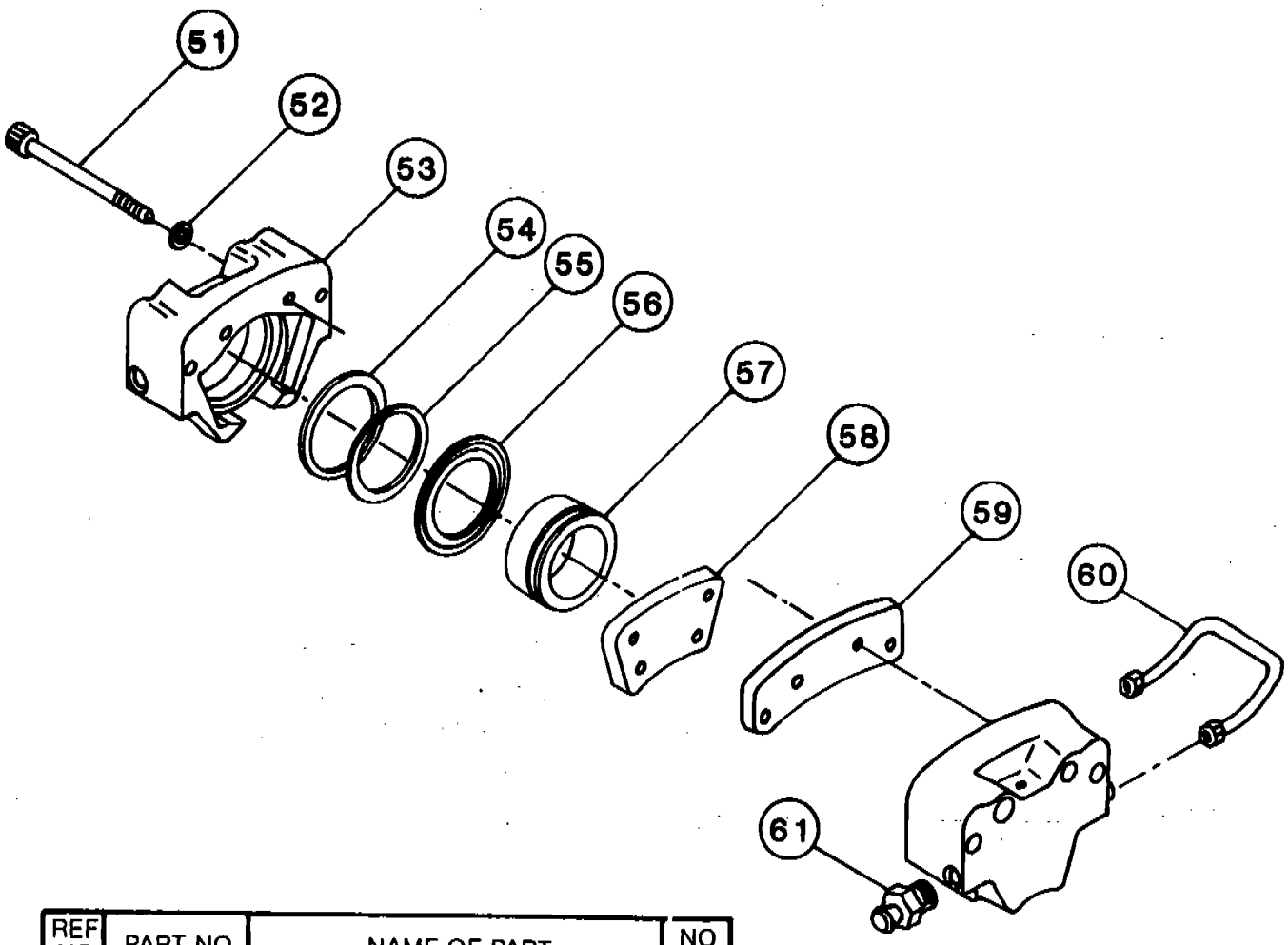
SEAL REPLACEMENT — ASSEMBLY PROCEDURE

1. Clean housing bore with type fluid used in system.
2. Lubricate o-ring (item 54) and back-up ring (item 55) with type fluid used in system and install in groove of housing (item 53). *CAUTION: When installing back-up ring (item 55) be sure it is positioned on the lining side of groove. If the back-up ring is cupped be sure that cupped side is against o-ring (item 54).*
3. Install seal (item 56) in housing (item 53).
4. Lubricate piston (item 57) with type fluid used in system. Carefully insert piston through seal (item 56). Push piston into bore with a twisting motion. Piston must bottom on housing to assure lining to disc clearance on vehicle.
5. Position seal (item 56) in piston groove.
6. Install free floating lining assembly (item 58) in housing pocket.
7. Repeat steps 1-5 for second housing half.
8. Position spacer (item 59) between the housing halves (item 53). Install washers (item 52) and torque tie bolts (item 51) to approximately 95 ft. lbs.
9. Connect tubing assembly (item 60).
10. Install brake assembly on vehicle with bleeder screw up. Torque mounting bolts to 80 ft. lbs. Shim as required to center caliper over disc.
11. Connect necessary fluid lines.
12. Bleed according to standard procedure.
13. Make several static applications, check for leaks and bleed once more.
14. Check linings to be sure there is no drag. If lining to disc drag occurs, refer to STEP 4 to correct.

CHANGE LINING PROCEDURE

1. Remove brake from vehicle by disconnecting necessary fluid lines and removing mounting bolts.
2. Remove old linings (item 58) from housing pockets.
3. Push piston back into bore. Piston must bottom on housing to assure lining to disc clearance on vehicle.
4. Insert new linings (item 58) into housing pockets.
5. Complete brake assembly and installation by using STEPS 9-14 of Assembly Procedure.

DISC BRAKE



REF NO	PART NO	NAME OF PART	NO REQ
	ST 203	DISC BRAKE	
51		BOLT, 1/2 NC X 7 GR. 5	4
52		WASHER, LOCK	4
53		HOUSING	2
	ST 204	KIT, REPAIR	
54		"O"-RING	2
55		RING, BACKUP	2
56		SEAL	2
57		PISTON	2
58	ST 205	PAD, BRAKE	2
59		SPACER	1
60		ASSY, CONNECT TUBE	1
61		VALVE, BLEEDER	1

[59]SERVICING THE HYDRAULIC BRAKE SYSTEM

After all brake components are completely assembled, but before connecting rod end (part 36), follow the following procedure:

A. Locate tilt head in a position where the control cylinder filler plug (part 1) is in the "Up" position.

B. Remove filler plug (part 1) and fill the control cylinder reservoir with an automotive type (vegetable based brake fluid). Replace filler plug (part 1).

C. Back disc brake bleeder plug (part 61) out ⅛ turn.

D. With bleeder plug (part 61) in the open position, pump the control cylinder until brake fluid is ejected from the bleeder plug (part 61).

E. Re-tighten bleeder plug (part 61) securely. Operate control cylinder arm (part 35), using 16" crescent wrench, or other advantage. Maintain pressure on cylinder arm (part 35) and open bleeder plug (part 61) ⅛ turn. Re-tighten before releasing cylinder arm (part 35).

F. Wipe clean all evidence of brake fluid spills.

G. Pre-load control cylinder by fixing control arm (part 35) in such a position that it requires half its throw to mate the rod end (part 36) when the brake cable is in the "Brake Off" position. This will establish the "Brake Off" position of the control arm (part 35) to be approximately 45° with respect to the base of the control cylinder when control cylinder arm (part 35) is connected to rod end (part 36).

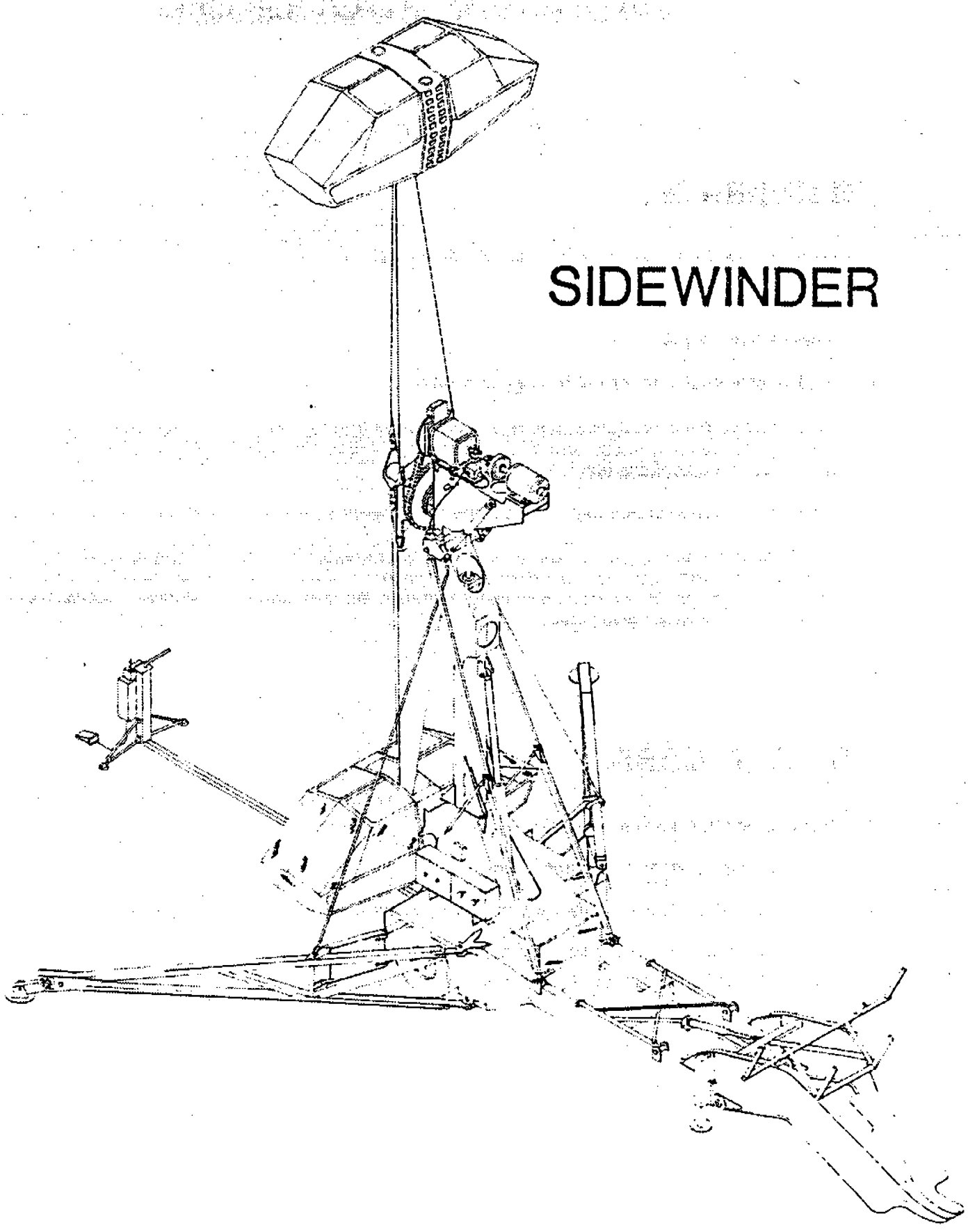
H. Actuate brake system from operators control stand. If steps (A) through (G) were successful, the brake handle will develop considerable resistence. If the brake arm is soft, it indicates that either the bleeding was not satisfactorily completed, or there is a leak in the system.

I. Inspect all connections for leaks.

J. In the event the brake does not operate and there are no leaks, repeat steps (A) through (I) until trapped air is disposed of through bleeding.

K. When the brake is operational, locate the tilt head in a position where the control cylinder filler plug is up and carry out step (B).

II



SIDEWINDER

OPERATING PROCEDURE

TO OPERATE

1. Always make sure area is clear before starting ride.
2. Depress deadman switch.
3. Release hand brake.
4. Hold wobble stick right or left to engage rotation.
5. After one complete revolution, depress black button and hold to start tilt operation. Button has to be held until car has moved out from column about 3 or 4 feet. Tilt cycle thereafter is automatic and booms will return to vertical position and stop.
6. Rotation can be reversed only when booms are in vertical position and braked to a complete stop.
7. For emergency operation, tilt mechanism may be operated manually by moving toggle switch to "Man" and operated with toggle switch labeled "Up-Down". If automatic electric control system has malfunctioned, booms can be lowered by placing hydraulic selector valve in "Manual" position and activating hydraulic tilt cylinder valve lever.

TO LOAD CARS

1. Remove belt bar door restraint key.
2. Depress spring-loaded door latch knob.
3. Open door — belt bar will raise automatically. Maximum passenger weight per seat is 400 lb.
4. Firmly close door engaging spring-loaded latch.
   NOTE: While door is being closed visually check belt tension, adjust as necessary — belt should be taut over passenger laps when door is latched.
5. Insert door restraint key in belt bar.
6. Rotate boom and load remaining cars as above.
   NOTE: Care should be taken to balance weight of passengers when loading ride.

EMERGENCY PROCEDURE

EMERGENCY PROCEDURE FOR LOWERING PASSENGER LOADED CARS TO LOADING POSITION IN EVENT OF HYDRAULIC PUMP DRIVE OR BELT FAILURE

There are two counterbalance valves located just behind the solenoid operated valve. Each have ½" adjusting bolts (¾" hex), locked with a locknut and jam nut. Back off each bolt until they are within one or two full turns of thread of being removed. Scribe a mark on the bolt and valve body to enable easier return to proper adjustment. Engage the rotation slowly until the boom end with heavier cars starts to descend. As the boom lowers, apply the rotation hand brake. The car will come to rest at the loading position. With the hand brake applied, unload only one car, unless only one car is loaded at the upper boom end. Unload both cars if only one car in the second set is loaded.

If cars are evenly balanced and will not descend, it will be necessary to lower the cars with a line as follows:

With the booms located in line with the ride (cars directly over operator), apply and lock hand brake. Pass a rope (⅜" or larger) over the boom above the operator, as near the cars as possible and manually pull the cars down. As the boom assembly passes over the center of the hinge it will descend to loading position without further assistance. Unload passengers in the sequence as outlined in the operating procedure.

LUBRICATION INSTRUCTIONS

	LUBE POINT LOCATION	LUBRICANT TYPE	DAILY	WEEKLY	MONTH	90 DAYS	YEARLY
A	TILT CYLINDER ROD END	BEARING LUBE	X				
B	TILT HEAD HINGE BEARINGS	BEARING LUBE	X				
C	REVOLVING ROD BUSHINGS	BEARING LUBE	X				
D	CAR BELT BAR PIVOT	30W OIL		X			
E	RETURN ROD LINKAGE (CAR)	BEARING LUBE		X			
F	CAR DOOR HINGES	30W OIL		X			
G	CAR DOOR LATCH PLUNGER	30W OIL		X			
H	COLUMN HINGE BUSHINGS	BEARING LUBE			X		
I	BOOM HUB DRIVE CHAIN	HI-SPEED CHAIN LUBE			X		
J	BACK BRACES	BEARING LUBE				X	
K	SAFETY CYLINDERS	BEARING LUBE	X				
L	UNIVERSAL JOINTS & SPLINE	BEARING LUBE			X		
M	MUDSILL PIVOT BEARINGS	BEARING LUBE				X	
N	TILT HEAD SAFETY HOOKS	BEARING LUBE			X		
O	GEAR REDUCER	GEAR LUBE			CHECK		DRAIN & RE
P	HYDRAULIC SYSTEM*	HYD. FLUID		CHECK			X
Q	BRAKE MASTER CYLINDER DISC	HYD. BRAKE FLUID			CHECK		
R	WHEEL BEARINGS (TLR)	GEAR LUBE			CHECK		DRAIN & REFILL
S	BOOM ANCHOR POINTS (HUB) 4	BEARING LUBE			X		
T	BOOM HUB LOCK BOLT	BEARING LUBE			X		
U	BOOM HUB	BEARING LUBE			X		
V	CONTROL STAND LINKAGES	BEARING LUBE		X			
W	BRAKE LEVER SHAFT BEARINGS	30W OIL	X				
X	GOOSENECK HINGE	BEARING LUBE		X			
Y	CAR REVOLVING CHAIN	HI-SPEED CHAIN LUBE	X				
Z	CAR REVOLVING BEARINGS	BEARING LUBE	X				

* DRAIN & REFILL - CHANGE FILTER CARTRIDGE 1ST 90 DAYS OPERATION.

Bearing Lube - A multi-purpose water resistant grease with an accepted extreme pressure additive

30w Oil - Good grade 30w motor oil.

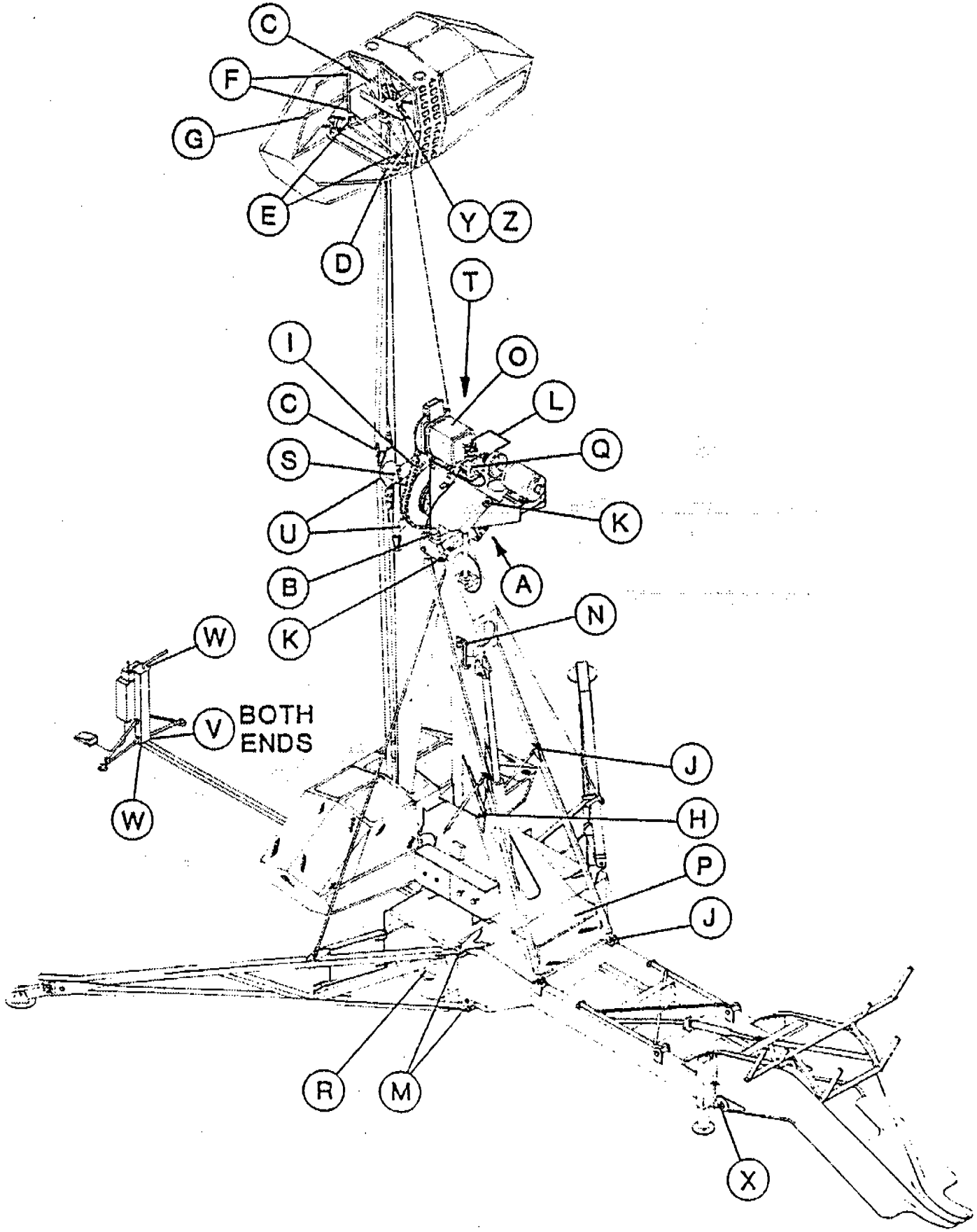
Hi-Speed Chain Lube - Hydrotex #525 deluxe leaded or equivalent.

Gear Lube - Hydrotex 80w-140 or equivalent.

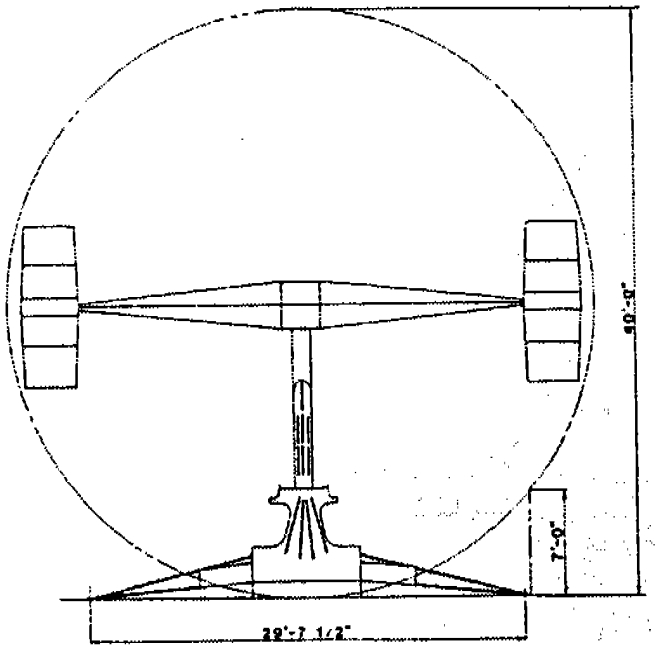
Hyd. Brake Fluid - Vegetable based brake fluid.

Hyd. Fluid - DTE light or equivalent.

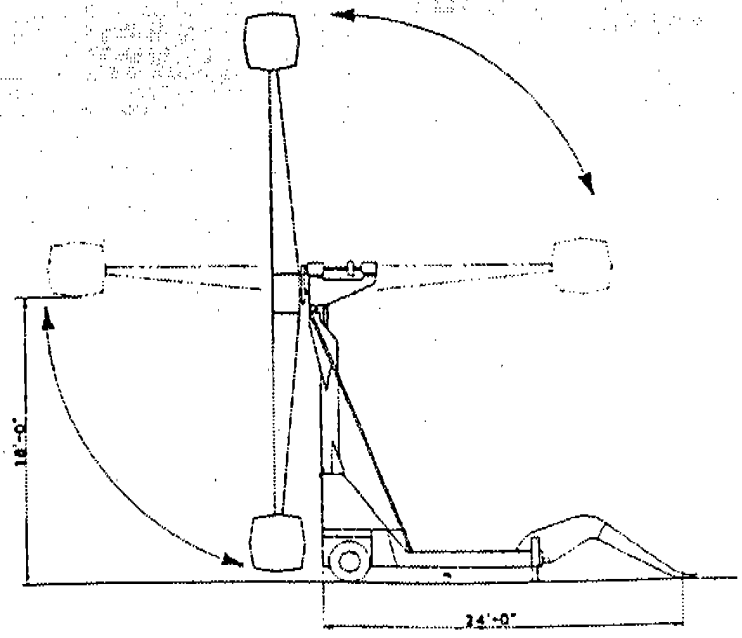
LUBRICATION INSTRUCTIONS



SPACE REQUIREMENTS

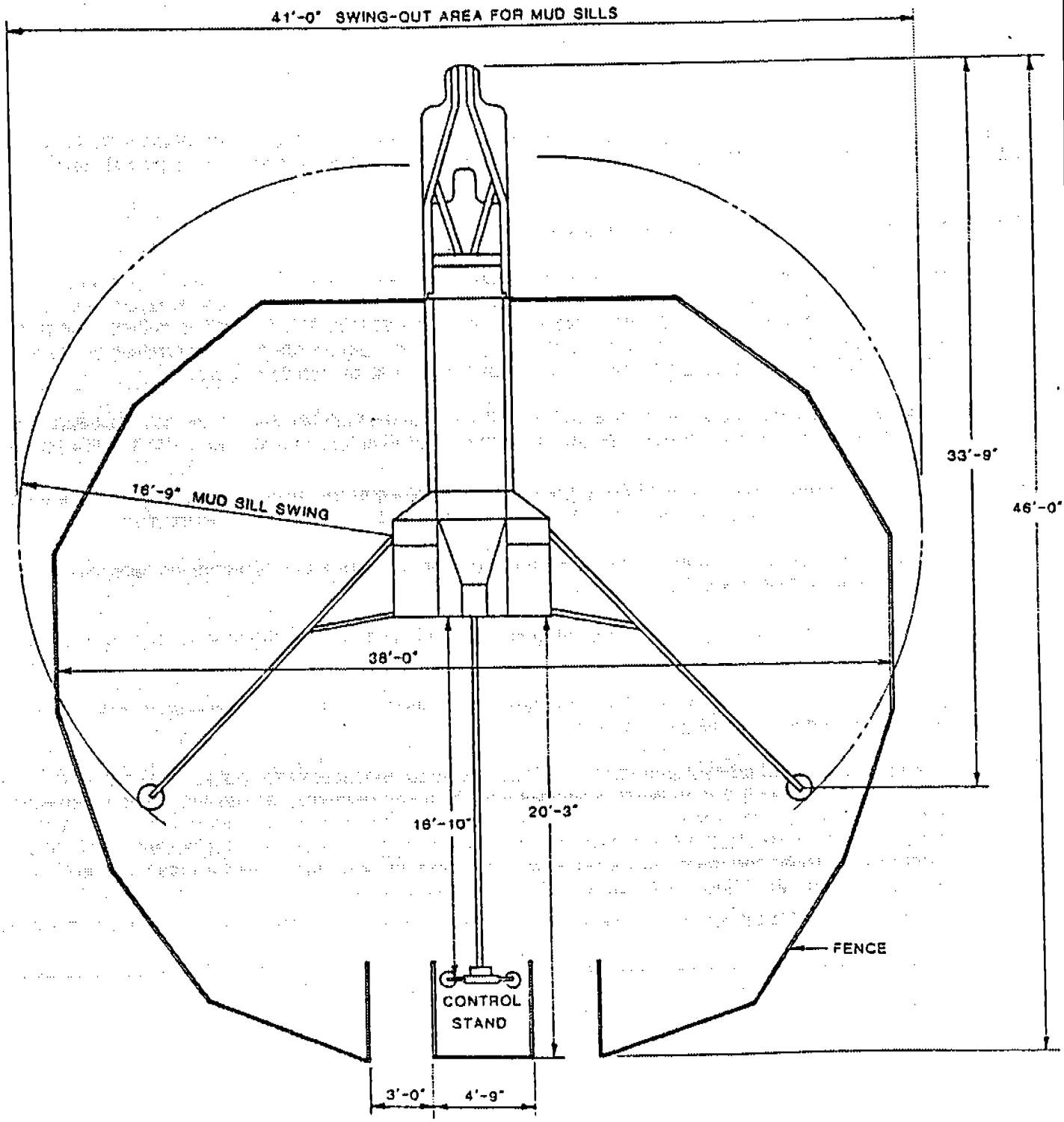


FRONT VIEW



SIDE VIEW

PLAN VIEW & FENCE LAYOUT



5 LIMIT SWITCH ADJUSTING PROCEDURE

This assembly is set at the factory and should require no further adjustment. However, there may be a certain part or parts at some time that may require replacing, in which case, re-adjustment may be necessary.

The following procedure will facilitate this operation.

1. With the column erected and the cars in loading position, rotate booms ¼ revolution, or until parallel with ground. Apply and lock brake. Remove access plate located approximately 24" below boom hub on side of column facing operator. Loosen the set screws securing the actuator tabs, Ref. #8, until they slide freely on connecting rod, Ref. #4. The limit switch lever RH, Ref. #2, should be set at approximately 90° with limit switch. The limit switch lever LH should be set slightly above as shown in Fig. #LS-1.

2. With hydraulic selector valve lever positioned at "Auto" and toggle switch on control box switched to "Man" start hydraulic system. Move stop tab up connecting rod until it engages the roller on LH limit switch lever.

   NOTE: Do not move lever, Ref. #12, up to the end of the stroke at this time. Move it up just far enough to solidly engage the lever roller without stopping the hydraulic system. Secure set screw.

3. Move the lower reversing tab up the connecting rod until it engages the RH (Reversing Limit Switch) lever roller. Secure set screw on tab.

4. Screw out adjusting bolt, Ref. #9, on stop tab (LH) until limit switch is activated and the hydraulic system shuts off.

5. Screw out adjusting bolt, Ref. #9, on reversing tab until a 'click' is heard in the reversing limit switch. Turn out the adjusting bolt one-half turn further.

6. With selector valve and toggle switch on "Auto" have someone depress the hydraulic start button. The tilt head should begin closing. Let the system operate until the lower reversing tab has moved approximately 3" down from the limit switch lever. Reach in and manually press down on the RH reversing limit switch lever. The tilt head will reverse itself and the lower reversing tab will move upwards. If the reversing tab adjusting bolt contacts the roller and the cycle reverses, the adjusting bolt will have to be turned in until the 'Reversing' limit switch and the 'Stop' limit switch activate simultaneously.

   NOTE: To get adequate movement on the adjusting bolts it may be necessary to re-locate the adjusting tabs.

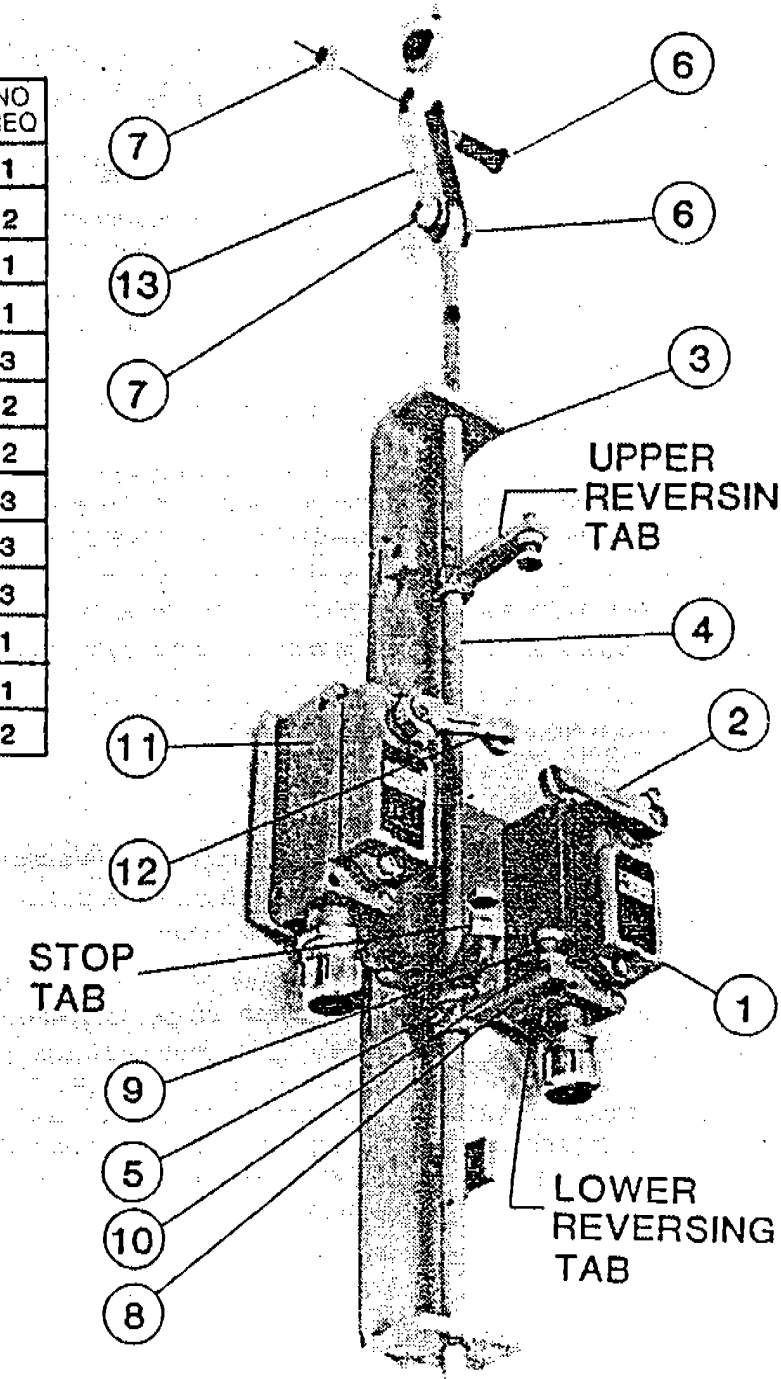
7. Depress the start button. The tilt head will begin closing and continue until the tilt cylinder is completely closed and hydraulic system will by-pass. Depress the stop button. Lower the upper reversing tab until a 'click' is heard in the reversing limit switch. Secure the tab with set screw to the connecting rod. Turn out the adjusting screw one-half turn. Depress the start button. The tilt head should operate through the complete cycle.

8. Operate the tilt cycle in the usual manner, making sure all adjustments are correct. If no further adjustments are required, the adjusting bolts on the stop and reversing tabs must be locked at this time. Make certain the jam nuts are tight!

LIMIT SWITCH ACTUATOR ASSEMBLY

FIG LS-1

REF NO	PART NO	NAME OF PART	NO REQ
1	E-700	SWITCH, REVERSE LIMIT	1
2	E-701	LEVER, LIMIT SWITCH	2
3	ST-45-1	ASSEMBLY, BASE	1
4	ST-45-5	ROD, CONNECTING	1
5		SCREW, 1/4-28 NF SET	3
6		BOLT, 3/8-24NF X 1	2
7		NUT, 3/8-24 LOCK	2
8	ST-45-6	TAB, ACTIVATOR	3
9		BOLT, 1/4-28 NF x 1	3
10		NUT, 1/4-28 NF JAM	3
11	E-700A	SWITCH, STOP LIMIT	1
12	E-701	LEVER, LIMIT SWITCH	1
13	ST-45-4	LINK, CONNECTING	2



NOTE:

COVER PLATE (ST-12-22) AND (8) 1/4-28 NF x 1/2" MUST BE REMOVED FOR ACCESS TO LIMIT SWITCHES.

MODELS 9.4 HC, HCF, HCM, HBM FLUID COUPLINGS UNIT ASSEMBLY AND SERVICE INSTRUCTIONS

ASSEMBLY INSTRUCTIONS

NOTE: Tapers to be cleaned with suitable solvent, wiped dry and assembled per S765. Do Not use molybdenum disulfide or equivalent friction reducing compounds on fasteners or taper.

1. If seal and needle bearing are not in place in rear bearing carrier, install them using special seal and bearing driver.
2. Install "O" ring in coupling face, mount rear bearing carrier to coupling face using six 12 point capscrews with "O" rings. Torque capscrews to 27-30 lb. ft.
3. Install ball bearing into front bearing carrier with special bearing driver. Care must be taken to not damage circuit front cover adjacent to flat head screws.
4. Install output shaft or output flange assembly through rear bearing carrier and into taper in runner hub. Support the output end of output shaft flange assembly and press ball bearing onto output shaft until bearing inner race overhangs shaft end .060 to .120". **CAUTION:** Do not press flush with shaft end. Press force never to exceed 24,000 lbs. and torque to 177-195 lb. ft. bearing and runner are now in place.

   NOTE: To hold shaft from turning while torquing capscrew, use open end or pipe wrench on retainer washer.
5. Mount selected input group with "O" ring and six 12 point capscrews with "O" rings to input end. Torque to 27-30 lb. ft.
6. Check air tightness with 5-10 PSI pressure applied thru filler hole.

TOOLS REQUIRED FOR ASSEMBLY

1. Bearing and seal driver.
2. Bearing driver.

SERVICE DISASSEMBLY INSTRUCTIONS

1. Remove the two pipe plug in the front cover and impeller, allow fluid to drain completely.
2. Remove coupling assembly from installation.
3. Remove the six 12 point capscrews and "O" rings from the input group. Remove input group and "O" ring.
4. Remove hex head capscrew which retains the output shaft or output flange assembly. Remove the retainer washer.
5. To remove Models HC or HCF output shaft and Model HCM output flange assembly, pack shaft center screw hole with grease. Wrap thread of removed hex. Head capscrew with several layers of teflon tape to seal against high grease pressure. Insert screw thru retainer washer into grease filled hole and tighten. Repack hole if necessary until release of taper joint is achieved. To remove Model HBM output shaft, first remove output bearing carrier per instructions no. 6. Support runner on a tube* and press output shaft from runner. Use plug against output shaft to protect threads in shaft.
6. Remove six 12 point capscrews and "O" rings from output bearing carrier. Remove carrier assembly and "O" ring.
7. If removal of bearing and seal from output bearing carrier is necessary, press out from coupling side.
8. To remove input ball bearing use a rod and tap out from coupling output end.

   NOTE: If the front cover and impeller assembly is damaged, the basic unit must be replaced.

*TOOLS REQUIRED FOR DISASSEMBLY

1. Teflon tape
2. Tube (3.00 O.D. x 1.81 I.D. x 5.00 Long)

RECOMMENDED REPLACEMENTS FOR OVERHAUL

1. Seal
2. Bearings
3. All "O" rings

HYDRO-SHEAVE

MODEL 9.4 HSD FLUID COUPLING (HYDRO SHEAVE) UNIT ASSEMBLY AND SERVICE INSTRUCTIONS

ASSEMBLY INSTRUCTIONS

NOTE: Tapers to be cleaned with suitable solvent, wiped dry and assembled per S765. Do not use molybdenum disulfide or equivalent friction reducing compounds on fasteners or tapers.

1. If seal and needle bearing are not in place in sheave hub install them using special seal and bearing driver.
2. Install "O" ring in coupling face. Mount sheave hub to coupling face using the six 12 point capscrews with "O" rings. Torque capscrews to 27-30 lb. ft.
3. Install ball bearing into front bearing carrier with special bearing driver. Care must be taken to not damage circuit front cover adjacent to flat head screws.
4. To install input shaft, seal bushing with "O" ring, end cap assembly, and retaining ring.
   a) Install input shaft through sheave hub and into taper in runner hub. Press shaft through ball bearing until it overhangs bearing 3/8 to 7/16 inch.
   b) Install seal bushing with "O" ring into overhung end of shaft.
   c) If seal is not in place in end cap install it using special seal driver.
   d) Mount end cap assembly with "O" ring and six 12 point capscrews with "O" rings. Torque to 27-30 lb. ft.
   e) Install roll pins in retainer washer. Place retainer washer with roll pins over shaft end making sure pins align with holes in shaft.
   f) Insert capscrew through retainer washer and into thread of special tapped tool. Torque capscrew to 177-195 lb. ft.
   g) To install motor shaft adapter, loosen capscrew from special tapped tool and remove tool. Insert motor shaft adapter and engage screw hand tight for shipment purposes only.
5. Check air tightness with 5-10 psi pressure applied thru filler hole.

TOOLS REQUIRED FOR ASSEMBLY

1. Needle bearing and seal driver (sheave hub)
2. Ball bearing driver
3. Seal driver (end cap)
4. Tapped bar

SERVICE DISASSEMBLY INSTRUCTIONS

1. Remove the two pipe plugs in the front cover and impeller. Allow fluid to drain completely.
2. Remove six 12 point capscrews and "O" rings from end cap and coupling. Remove end cap and "O" ring.
3. Remove hex head capscrew which retains the motor shaft adapter. Remove retainer washer with roll pins.
4. Remove seal bushing and "O" ring from shaft end.
5. Insert push rod through hole in input shaft to bottom of tapped hole in motor shaft adapter. Use a capscrew* in end of input shaft, and tighten against push rod to break taper between input shaft and motor shaft adapter. Use flats on shaft end to react wrench torque on screw. It may be necessary to tap end of capscrew to break taper contact.
6. Remove input shaft and coupling assembly with sheave from motor shaft adapter. Remove the 3 capscrews retaining the sheave. Remove sheave from sheave hub.
7. Remove six 12 point capscrews and "O" rings from sheave hub and coupling. Remove hub assembly and "O" ring.
8. If removal of bearing and seal from sheave hub is necessary, use a rod and tap from sheave side to remove.
9. Remove pusher rod from motor shaft adapter. Remove shaft adapter from motor shaft.
10. To remove input shaft, support runner on a tube* and press input shaft from runner. Use plug against input shaft to protect threads in shaft.
11. To remove ball bearing, use a rod and tap out from coupling sheave end.

NOTE: If the front cover and impeller assembly is damaged, the basic unit must be replaced.

*TOOLS REQUIRED FOR DISASSEMBLY

1. Push rod (50 dia. x 4.00 long steel hardened to Rc 50 min.)
2. Tube (3.44 O.D. x 2.75 I.D. x 7.00 long)
3. Capscrew (3/4 10 NC x 1.00 long)

RECOMMENDED REPLACEMENTS FOR OVERHAUL

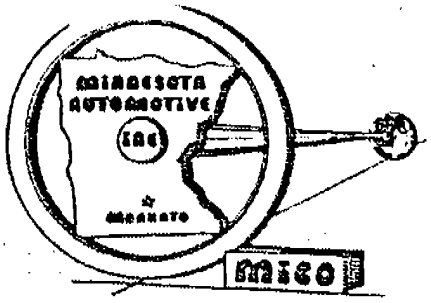
1. Seals
2. Bearings
3. "O" rings

INSTALLATION AND SERVICE INSTRUCTIONS

mico

CALIPER DISC BRAKE

MODEL NO. 02-520-027



The MICO Model 02-520-027 Disc Brake is designed to be used with a disc of 1/2 inch thickness. (For other disc thicknesses consult manufacturer.) If a disc of lesser thickness is used, the same centerline must be maintained and the initial disc to puck clearance will be greater; however, after an initial brake application the linings will contact the disc, then upon pressure release, the Mico-Jeffries retractor-compensator will provide the proper running clearance of .010 inch to .030 inch per side.

CAUTION: Minimum allowable disc thickness for use with this caliper assembly is 7/16". If a thinner disc is used, a loss of fluid may occur at the time of complete lining wear.

Uneven lining wear may occur if the caliper is not mounted squarely over the disc, or, if the pucks are not parallel to the disc surface. Reduced 'O' ring seal life may also be evident. After the linings have worn to the point of replacement they then may be replaced with lining 20-060-012.

When installing the MICO Model 02-520-027 Disc Brake it is of utmost importance that the caliper be centered evenly and squarely over the disc. This is to provide even and equal travel and contact of the lining assemblies or "pucks". The MICO Model 02-520-027 has a mounting face to disc centerline distance of 2-11/16". When planning or designing an installation of this brake on a vehicle this dimension should be close ly held. A .03 inch variance (greater or lesser) from this 2-11/16" dimension will eliminate the disc running clearance. Proper shims must be inserted between the disc brake mounting face and the vehicle mounting surface. Torque mounting bolts to approximately 80 foot pounds. Bleed according to standard procedure.

DISASSEMBLY PROCEDURE

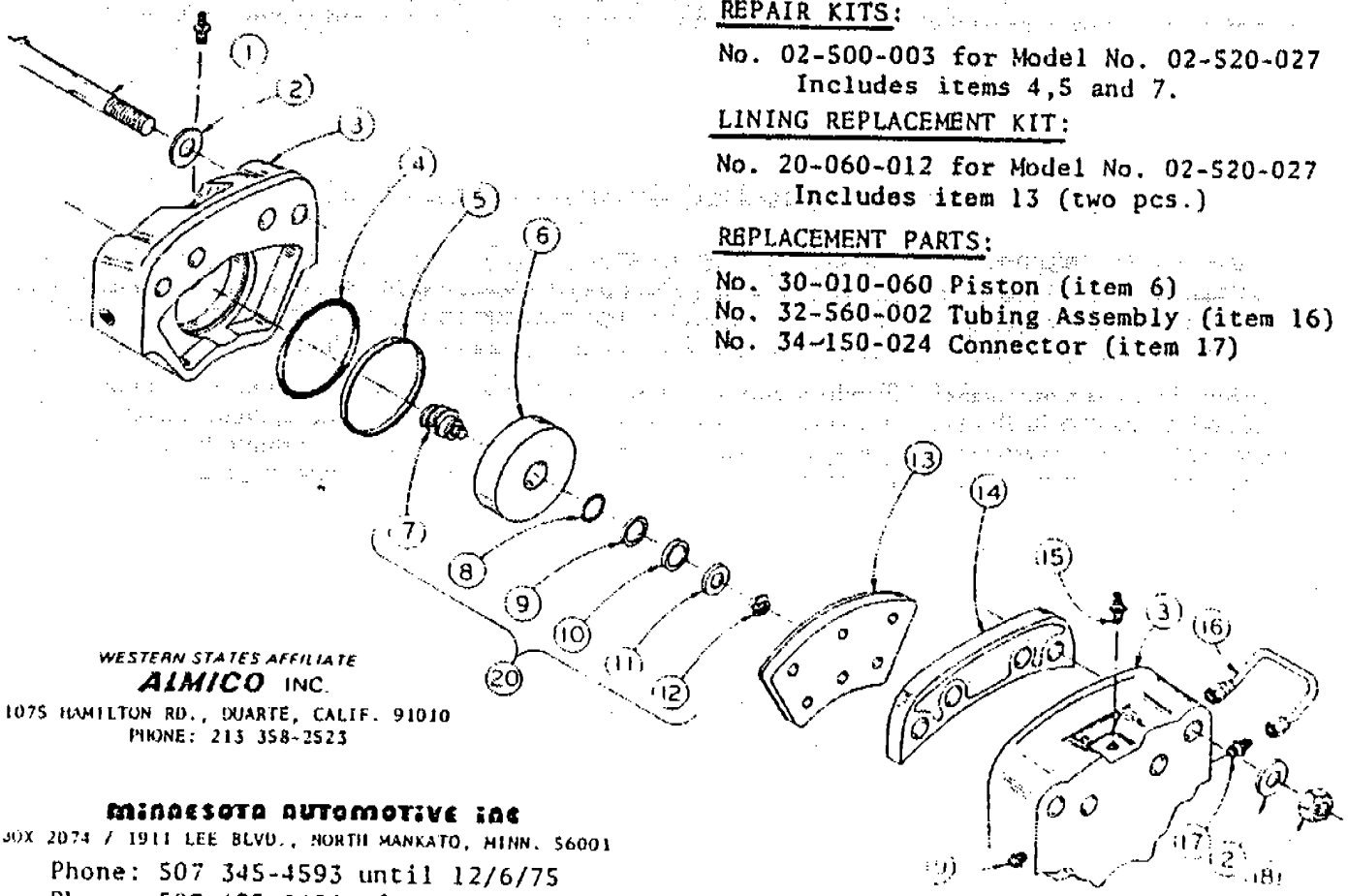
1. Remove brake from vehicle by disconnecting necessary fluid lines and removing mounting bolts. (Drain fluid from assembly.)
2. Separate caliper halves (item 3) by removing assembly bolts (item 1), washers (item 2), nuts (item 18), tubing assembly (item 16) and spacer (item 14). Use bench vise.
3. Remove free floating lining assembly (item 13).
4. Loosen assembly nut (item 12) approximately 3 turns with a 12" socket wrench.
5. Remove piston (item 6) from housing by pulling piston from bore. If piston fails to move, place housing half face down on bench. Protect piston face by placing a cloth pad between piston and bench. Support housing half on bench in such a way that piston can be blown out of its bore. This is accomplished by carefully introducing low pressure air (10-15 p.s.i.) through fluid inlet fittings. *CAUTION: Do not use high pressure as it is dangerous and unnecessary. Be careful not to scratch piston.*
6. Remove assembly nut (item 12), loading spring (item 11), wedge (item 10), pressure ring (item 9), and o'ring (item 8) from compensator assembly (item 20).
7. Remove compensator sub-assembly (item 7) from bottom of housing (item 3) using an 11/16" socket wrench over the retainer.
8. Remove back-up ring (item 5) and o'ring (item 4) from housing groove.
9. Repeat steps 3-8 for second caliper half.

CHANGE LINING PROCEDURE

1-2, Follow steps 1 and 2 of Disassembly Procedure.
3. Remove free floating lining assemblies (item 13).
4. Install new linings (item 13) into housing pockets.
5. Complete assembly and installation by following steps 8-14 of Assembly Procedure.

ASSEMBLY PROCEDURE:

1. Clean housing bore with type fluid used in system.
2. Lubricate o'ring (item 4) and back-up ring (item 5) with type fluid used in system and install in groove of housing. *CAUTION: When installing back-up ring (item 5) be sure it is positioned on the lining side of groove. If the back-up ring is cupped be sure that cupped side is against o'ring (item 4).*
3. Install new compensator sub-assembly (item 7) in bottom of housing using an 11/16" socket wrench over the retainer.
4. Lubricate piston (item 6) with type fluid used in the system. Carefully insert piston through o'ring (item 4). Push piston into bore with a twisting motion. Piston must bottom on housing to assure lining to disc clearance on vehicle.
5. Lubricate and install compensator o'ring (item 8), pressure ring (item 9), wedge (item 10) with taper to match that of the compensating piston. Install loading spring (item 11) and assembly nut (item 12). Torque assembly nut to approximately 15 ft. lbs.
6. Install lining (item 13) into housing pocket.
7. Repeat steps 1-6 for second housing half.
8. Position spacer (item 14) between the caliper halves (item 3) and insert two 1/2" bolts (item 1) with washers (item 2) through the outboard holes. Assemble washers (item 2) and nuts (item 18) and torque to approximately 80 ft. lbs.
9. Connect tubing assembly (item 16).
10. Install brake assembly on vehicle with bleeder screw up. Torque mounting bolts to approximately 80 ft. lbs. and connect lines.
11. Connect necessary fluid lines.
12. Bleed according to standard procedure.
13. Make several static brake applications. Check for leaks and bleed again.
14. Check linings to be sure there is no drag. If lining to disc drag occurs refer to step 4 above to correct.



REPAIR KITS:

No. 02-500-003 for Model No. 02-520-027
Includes items 4,5 and 7.

LINING REPLACEMENT KIT:

No. 20-060-012 for Model No. 02-520-027
Includes item 13 (two pcs.)

REPLACEMENT PARTS:

No. 30-010-060 Piston (item 6)
No. 32-560-002 Tubing Assembly (item 16)
No. 34-150-024 Connector (item 17)

WESTERN STATES AFFILIATE
AIMICO INC.
1075 HAMILTON RD., DUARTE, CALIF. 91010
PHONE: 213 358-2523

MINNESOTA AUTOMOTIVE INC
BOX 2074 / 1911 LEE BLVD., NORTH MANKATO, MINN. 56001
Phone: 507 345-4593 until 12/6/75
Phone: 507 625-6426 after 12/6/75

FORM NO. 81-520-004 / 12-75

Printed in U.S.A.

SERVICING THE CONTROL CYLINDER

Service the control cylinder if one or more of the following symptoms are suspected:

1. If normal lever force and stroke develops braking pressure, but the lever then drifts, service the head and barrel (13).
2. If the lever will not return to normal position after brake application, service the spring case (20).
3. If brake fluid leaks past the shaft or the spring case, replace these seals (8-12).
4. If the supply tank (3) appears defective, *discard and replace* the complete assembly.

When servicing the assembly, always refer to the nameplate assembly number on top of the supply tank.

SERVICING THE HEAD AND BARREL (13)

Drain fluid from the supply tank (3). Remove four stud bolts and head and barrel assembly (13). Clamp barrel lightly in vise in vertical position with piston end up. Remove stop wire, support ring piston, cup retainer and return spring, valve and valve seat. Clean cylinder using only brake fluid or isopropyl alcohol. *Do not* use gasoline, cleaning solvent or mineral oil. Bypass port holes must not be clogged. If cylinder bore is scratched or pitted, discard and replace head and barrel assembly.

Reassemble head and barrel in reverse order using all new parts (14, 16-19A) from head and barrel repair kit, ST-201. Lubricate parts with vegetable base fluid. Clean residual fluid from supply tank reservoir and reinstall head and barrel using new gear gasket (31). Make sure that piston push rod aligns with socket on lever (5).

SERVICING THE SPRING CASE (20-26)

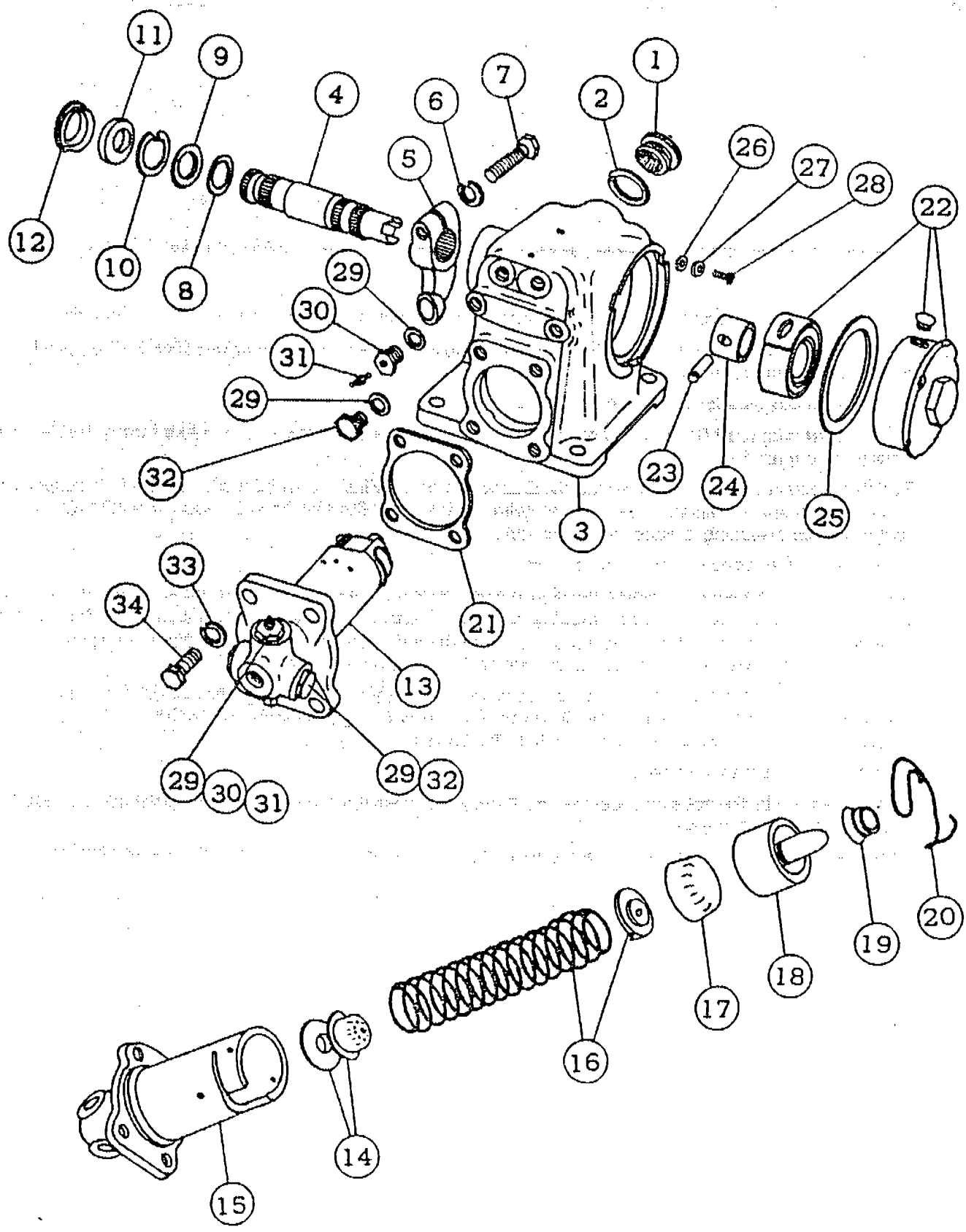
If the lever will not return to normal position, loosen the three screws (26) and apply 125-175 in. lb. counterclockwise torque to the spring case (20). Tighten screws. If this does not help, the clock spring may be defective. Loosen screws and unwind the spring case clockwise, remove the screws and spring case. The spring case is serviced as a ST-202 Kit including items 20-26. Note that a new spring case includes a hex for tightening with standard wrench.

To reassemble, lubricate gasket (23) with brake fluid and slide over spring case (20). Insert assembly into supply tank (3) while rotating to engage pin (21) to slot in shaft (4). Attach three lockwashers, case washers and screws loosely. Use wrench to wind spring case counterclockwise to 125-175 in. lb. torque. Tighten the screws and check torque by installing arm at a 45° angle above floor. With head and barrel (13) in place, depressed arm must return to original angle.

SERVICING THE SHAFT SEAL (8-12)

Remove retainer, felt seal, snap ring, retainer plate and o-ring. Use new parts (8-12) from ST-200 Shaft Kit. Dip o-ring and felt seal in brake fluid and reinstall in reverse order.

CONTROL CYLINDER



[59]SERVICING THE HYDRAULIC BRAKE SYSTEM

After all brake components are completely assembled, but before connecting rod end (part 36), follow the following procedure:

A. Locate tilt head in a position where the control cylinder filler plug (part 1) is in the "Up" position.

B. Remove filler plug (part 1) and fill the control cylinder reservoir with an automotive type (vegetable based brake fluid). Replace filler plug (part 1).

C. Back disc brake bleeder plug (part 61) out ⅛ turn.

D. With bleeder plug (part 61) in the open position, pump the control cylinder until brake fluid is ejected from the bleeder plug (part 61).

E. Re-tighten bleeder plug (part 61) securely. Operate control cylinder arm (part 35), using 16" crescent wrench, or other advantage. Maintain pressure on cylinder arm (part 35) and open bleeder plug (part 61) ⅛ turn. Re-tighten before releasing cylinder arm (part 35).

F. Wipe clean all evidence of brake fluid spills.

G. Pre-load control cylinder by fixing control arm (part 35) in such a position that it requires half its throw to mate the rod end (part 36) when the brake cable is in the "Brake Off" position. This will establish the "Brake Off" position of the control arm (part 35) to be approximately 45° with respect to the base of the control cylinder when control cylinder arm (part 35) is connected to rod end (part 36).

H. Actuate brake system from operators control stand. If steps (A) through (G) were successful, the brake handle will develop considerable resistence. If the brake arm is soft, it indicates that either the bleeding was not satisfactorily completed, or there is a leak in the system.

I. Inspect all connections for leaks.

J. In the event the brake does not operate and there are no leaks, repeat steps (A) through (I) until trapped air is disposed of through bleeding.

K. When the brake is operational, locate the tilt head in a position where the control cylinder filler plug is up and carry out step (B).

STATE OF CALIFORNIA

GEORGE DEUKMEJIAN, Governor

ARTMENT OF INDUSTRIAL RELATIONS
.VISION OF OCCUPATIONAL SAFETY AND HEALTH
525 GOLDEN GATE AVENUE
SAN FRANCISCO, CA 94102

ADDRESS REPLY TO:
Elevator Unit
P O Box 603
San Francisco, CA 94101
(415) 557-2910

April 9, 1986

CIRCULAR LETTER AR-86-5

TO: Amusement Ride Owners/Operators
and Other Interested Parties

SUBJECT: Sidewinder By Eyerly Aircraft Company

Effective immediately no sidewinder manufactured by Eyerly Aircraft Company shall be operated in California until the following four modifications have been made and certified by a California registered engineer.

1. A braking system shall be provided that is capable of stopping and holding the boom in the horizontal position with not less than 125% of the rated load in the carriers on one end of the boom and no load in the carriers on the opposite end.

2. The braking system shall be arranged so that it cannot be inadvertently contaminated with substances that would negatively affect the braking force.

3. The braking system shall be so arranged that there are no clutches, belts, drive chains, or similar devices in the drive system between the brake and the boom.

4. The braking system shall be arranged so that the brake will apply and remain in the applied position in the event of a failure of any clutch, belt, chain, or similar device in the drive system.

These orders are in accordance with Labor Code Section 7902 and are the result of testing witnessed by a Division representative April 3, 1986.

D. A. Swerrie
Principal Safety Engineer
Elevator and Ride Unit

by:

R. C. Craven
Senior Safety Engineer
Elevator and Ride Unit

/fld