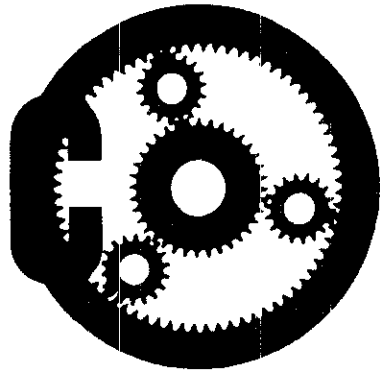


# **Gearmatic**

**CO. LTD.**



**MODEL 22 and 23**

**INSTRUCTION AND**

**PARTS MANUAL**

**FREE  
FALL**

# **FREE FALL WINCH**

**Parts and Instruction  
Manual**

**Model 22 & 23**

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## **FACTORY WARRANTY FOR GEARMATIC PRODUCTS**

Gearmatic Co. Ltd., (Hereinafter "Gearmatic"), warrants its products to be free from defects in material and workmanship when installed in an application consistent with Gearmatic instruction manual procedures and specifications for that product. Should any part of said products, within one year from the date of shipment from the Gearmatic factory and under normal use and service, be found to have been defective when shipped, and such product was stored and maintained in factory condition until commencement of service, Gearmatic will repair or replace said part, f.o.b. Surrey, B.C., Canada, provided such defective part is returned to the location designated by an authorized Gearmatic representative, charges prepaid, and provided further that inspection of the original part establishes the claimed defect to the satisfaction of Gearmatic.

Any replacement part supplied by Gearmatic is warranted to be free from defects in material and workmanship for a period of ninety (90) days after proper installation.

Gearmatic's liability under this warranty is limited to such repair or replacement, subject to the conditions stated, and Gearmatic shall not in any event be held liable for any damage or delay caused by defective material or workmanship, and no allowances will be made for repairs, replacements, or alterations unless previously authorized in writing by Gearmatic.

Gearmatic makes **NO WARRANTY of MERCHANTABILITY or FITNESS FOR PURPOSE** and shall not be liable for any conditions, guaranties or warranties, express or implied by law, except those specifically set forth herein. Gearmatic shall not in any event be liable for any consequential or other damages, loss or expense resulting from any alleged defect in said products.

## **HOW TO ORDER PARTS**

Order parts from your nearest authorized distributor. Order by part number only and state the serial number of the winch. The serial number is stamped on the manufacturer's name plate attached to the winch base. To determine the correct part number refer to the instructions on page 6.

# DESCRIPTION OF THE GEARMATIC FREE-FALL WINCH

The free-fall assembly contains the final drive planetary reduction for the winch. The planet hub is attached to the cable drum by a spline and the internal gear is mounted on ball bearings. The internal gear is held from rotating by a multi-disc brake. The brake is applied by springs that force a piston against segments which in turn act as levers to magnify the spring load and hold the brake engaged.

When hydraulic oil is introduced into the annular area formed between the piston and the cylinder shaft, the effective spring load is reduced as the hydraulic pressure increases. When a load is suspended on the winch cable and hydraulic pressure is applied to move the piston to the end of its travel, or the full release position, the internal gear will spin and allow the load to drop freely to the ground.

In order to provide good control in lowering a load with the free-fall brake, it is necessary to regulate the brake release pressure. The actual pressure required at the piston varies depending on the cable load. This pressure also changes in proportion to the static and dynamic friction values of the brake. Since it is difficult for the operator to alter the pressure in proportion to these changing friction values, a metering pump is installed to control the pressure automatically. The metering pump provides good control for lowering light loads at high line speeds.

The control valve is a type of manually operated relief valve, normally open. It is suggested that the control valve be mounted on the winch control lever so that it can be operated by squeezing the two levers together. Oil enters the control valve at point B as shown on Figures A & B and as the control lever is moved, the flow of oil is restricted creating pressure at the brake release port in the winch. As soon as the brake is released sufficiently to allow the internal gear to rotate, the metering pump is driven by the internal gear and meters part of the oil supply out of the circuit. This allows the brake release pressure to drop and compensate for the change from static to dynamic friction at the brake.

The speed at which the load is lowered is proportional to the amount of travel on the control valve lever. As the travel of the control lever is increased, the flow of oil through the control valve is restricted to a greater extent and a slight increase in pressure releases the brake further, causing an increase in speed and a larger flow of oil through the metering pump. When the control valve lever is moved to its full extent, all the oil requires to pass through the metering pump and a maximum uniform speed is obtained.

When a load is being lowered with the free-fall brake, the control valve lever must be moved gradually. Sudden movement of the control valve lever will create a pressure surge and cause the load to lower at an uneven speed. The control valve lever must also be moved slowly to stop the load smoothly.

Emergency Free-Fall control can be combined with the controlled free-fall circuit as shown in Figure A. A selector valve is used to divert the control oil flow away from the control valve and direct it to the brake release port through the shuttle valve. The oil flow is prevented from reaching the metering pump by the shuttle valve and the pressure increases to the relief valve setting of 500-550 PSI in the flow divider. The pressure holds the brake in full release and the load will fall freely to the ground.

When controlled free-fall is not necessary and emergency or full release only is required, the metering pump is not used.

# EXPLANATION OF MODEL NUMBERS

Winch Model Number \_\_\_\_\_ Model \*-\*-\*  
Final Drive Assembly \_\_\_\_\_

SF = Low Final Drive Reduction, Full Release and Controlled Free Fall.  
SG = Low Final Reduction, Controlled Free Fall Only.  
SJ = Low Final Reduction, Full Release Free Fall Only.  
MF = Medium Final Reduction, Full Release and Controlled Free Fall.  
MG = Medium Final Reduction, Controlled Free Fall Only.  
MJ = Medium Final Reduction, Full Release, Free Fall Only.  
HF = High Final Reduction, Full Release and Controlled Free Fall.  
HG = High Final Reduction, Controlled Free Fall Only.  
HJ = High Final Reduction, Full Release Only.

Direction of Drum Rotation \_\_\_\_\_  
(Viewed from Final Drive End)

EA = Counter Clockwise Forward Rotation (Equal Speed Unit)  
EC = Clockwise Forward Rotation (Equal Speed Unit)  
A = Counter Clockwise Forward Rotation (High Speed Reverse)  
C = Clockwise Forward Rotation (High Speed Reverse)

## Example: Model 23-SF-EC

The Above Model Number Indicates:  
23 = Basic Model Number Indicating the size of the Winch.

SF = The Winch has a Low Final Drive Planetary Reduction with a Full Release and Controlled Free Fall.

EC = When Viewed from the Final Drive End, the Winch Drum Rotates **Clockwise** when Winching in.

## CONTROL GROUP INSTALLATION INSTRUCTIONS

### FULL RELEASE AND CONTROLLED FREE-FALL COMBINED CIRCUIT

(Ref. Figures A & D)

- The following parts are required in order to complete this installation:
  - Selector Valve  
—Must have a detent in both positions of spool.
  - Flow Divider  
—Controlled flow of 1.5 GPM with a Relief Valve setting of 550 PSI. Pressure and flow must be non-adjustable.
  - Pressure Gauge (1000 PSI)
  - Hose and Fittings
- Install the flow divider between the pump and the control valve in an existing hydraulic circuit.
- Install the selector valve as shown in Figure A.
- Install the pressure gauge and free-fall control valve. It is suggested that the free-fall

control valve be clamped to the handle of the winch control valve.

#### IMPORTANT:

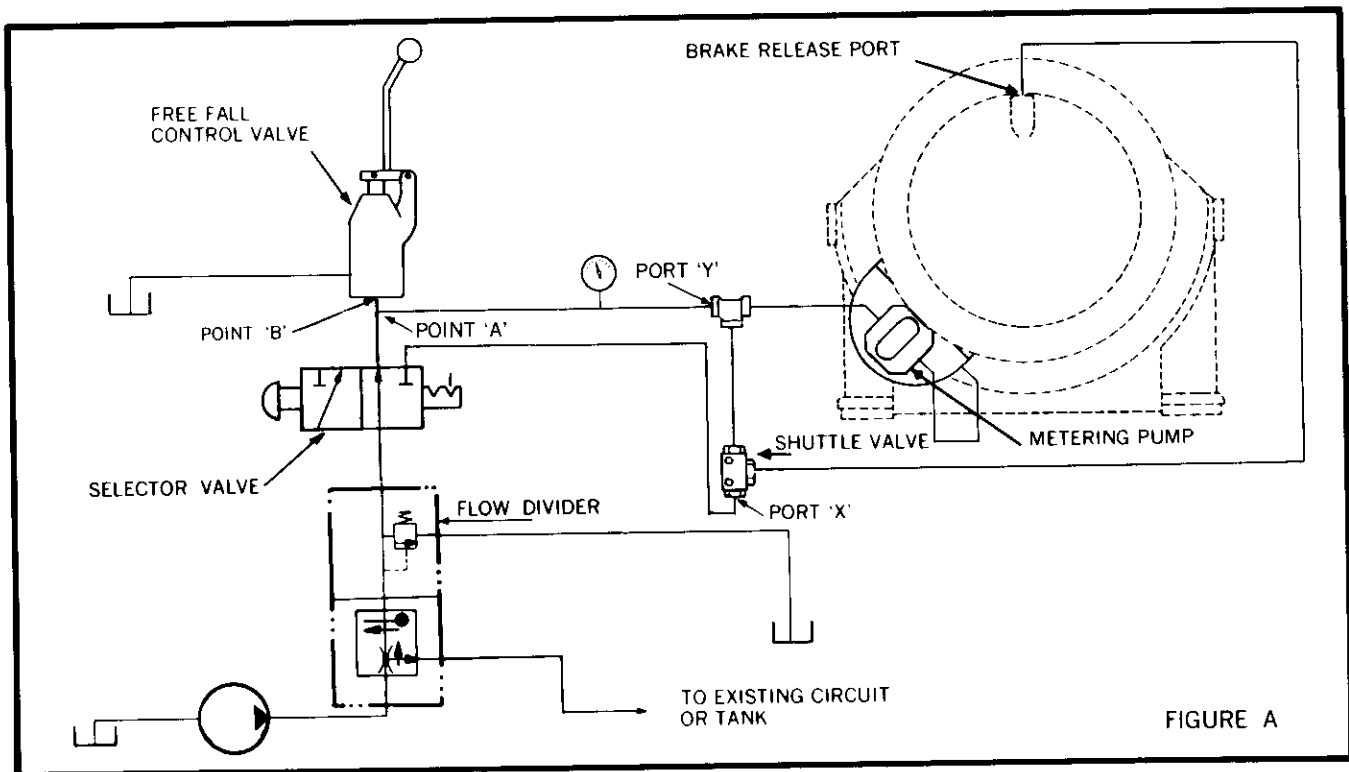
In order to minimize the back pressure at Point 'A', the length of hose used between Points 'A' and 'B' and from Point 'C' on the free-fall control valve to the reservoir should have a 1/2" I.D. and be as short as possible.

The maximum allowable back pressure at Point 'A' should not exceed 150 PSI When control valve is in the neutral position (fully open). If the pressure is greater, the winch must not be used to hoist a load until the hydraulic system has warmed up and reduced the pressure.

- Connect the winch inlet circulating line to Port 'P' in the primary housing. Connect the return circulating hose to Port 'H' in the final housing, see Figure D.

#### TO BLEED THE AIR FROM THE HYDRAULIC CIRCUITS

When the hydraulic circuits are completed, all the air must be bled from the system before operating the winch.



FULL RELEASE AND CONTROLLED FREE-FALL CIRCUIT

1. While the main supply pump for the winch is running, bleed all air from the end housings by slackening the  $\frac{1}{4}$  NPT pipe plug on top of each end housing illustrated by 'U' Figure D.
2. Remove all load from the cable drum, and with the supply pump running, slacken the fitting at the brake release port.
3. Operate the free-fall control valve slowly to the full extent of its travel. Release the control valve and wait a few seconds. Repeat this process several times until all signs of air bubbles have gone from the brake release port. Retighten the fitting at the brake release port.
4. Disconnect the fitting at Port 'X'. Position the selector valve so that oil flows from this port when the supply pump is running. Stop the oil from flowing to Port 'X' by moving the selector valve. Reconnect the fitting at Port 'X' and leave the fitting slack. Pressurize Port 'X' by again moving the selector valve. Tighten the fitting when there is no longer any sign of air bubbles.
5. Move the selector valve to its mid-travel position, wait a few moments. Pull the selector valve spool out to its full extent. The controls are now ready for testing.

### TEST FREE-FALL CONTROLS

Hoist a light load off the ground a few feet. Test the controls by lowering the load in stages with the free-fall control valve. Repeat this two or three times gradually increasing the height of the lift.

Position the load a few feet off the ground and test the emergency free-fall by pushing the selector valve spool into the valve. To reset the brake, move the selector valve into its mid-travel position and pause for a few seconds, then pull the selector valve spool out to its full extent.

### CONTROLLED FREE-FALL CIRCUIT

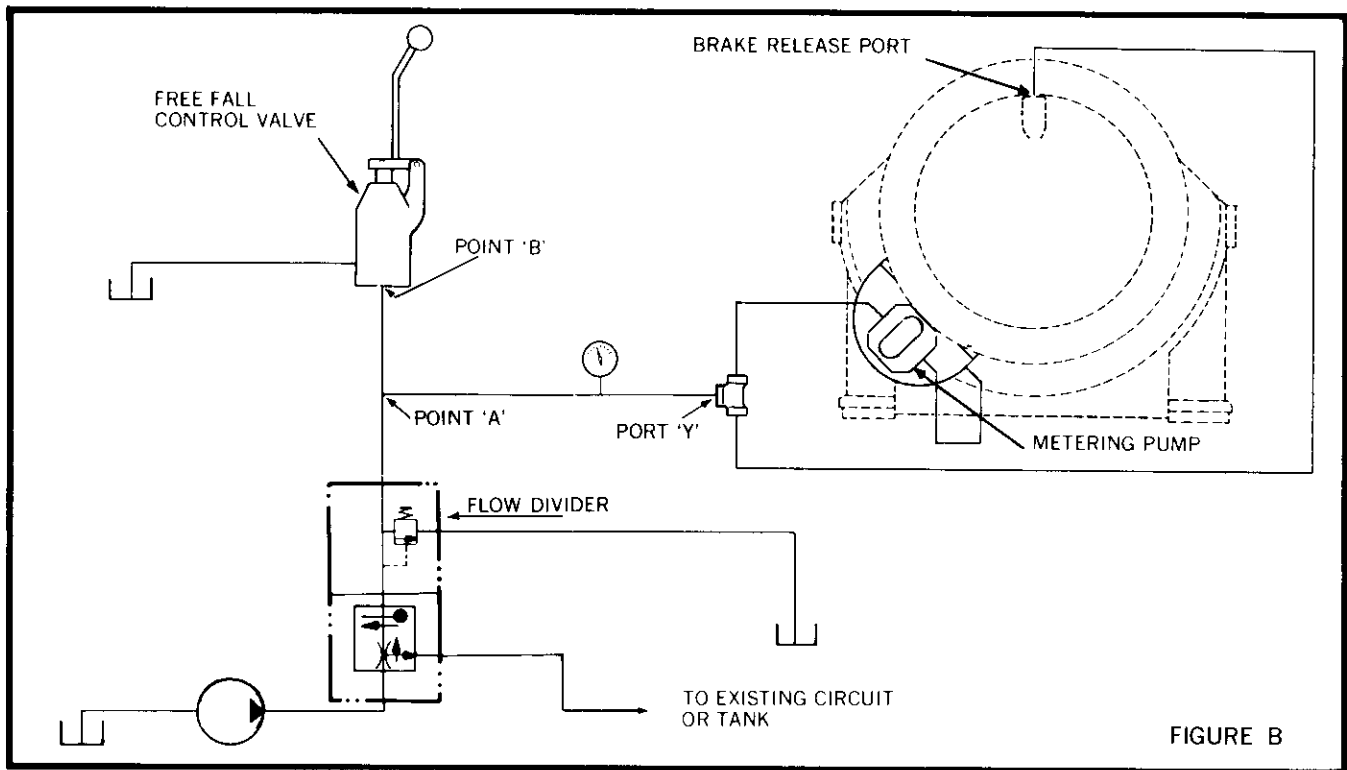
(Ref. Figure B & D)

1. The following parts are required in order to complete this installation:
  - a. Flow Divider
    - Controlled flow of 1.5 GPM with a Relief Valve setting of 550 PSI. Pressure and flow must be non-adjustable.
  - b. Pressure Gauge (1000 PSI)
  - c. Hose and Fittings
2. Install the flow divider between the pump and the control valve in an existing hydraulic circuit.
3. Install the pressure gauge and free-fall control valve. It is suggested that the free-fall control valve be clamped to the handle of the winch control valve.

#### IMPORTANT:

In order to minimize the back pressure at Point 'A', the length of hose used between Points 'A' and 'B' and from Point 'C' on the free-fall control valve to the reservoir should have a  $\frac{1}{2}$  I.D. and be as short as possible.

The maximum allowable back pressure at Point 'A' should not exceed 150 PSI. When



CONTROLLED FREE-FALL CIRCUIT

the control valve is in the neutral position (fully open). If the pressure is greater, the winch must not be used to hoist a load until the hydraulic system has warmed up and reduced the pressure.

4. Connect the winch inlet circulating line to Port 'P' in the primary housing. Connect the return circulating hose to Port 'H' in the final housing, see Figure D.

### TO BLEED THE AIR FROM THE HYDRAULIC CIRCUITS

When the hydraulic circuits are completed, air must be bled from the systems before operating the winch.

1. While the main supply pump for the winch is running, bleed all air from the end housings by slackening the 1/4 NPT pipe plug on top of each end housing, illustrated by 'U' Figure D.
2. Remove all load from the cable drum, and with the supply pump running, slacken the fitting at the brake release port.
3. Operate the free-fall control valve slowly to the full extent of its travel. Release the control valve and wait a few seconds. Repeat this process several times until all signs of air bubbles have gone from the brake release port. Retighten the fitting. The controls are now ready for testing.

### TEST FREE-FALL CONTROLS

Hoist a light load off the ground a few feet. Test the controls by lowering the load in stages

with the free-fall control valve. Repeat this two or three times gradually increasing the height of the lift.

### EMERGENCY FREE-FALL CIRCUIT (Ref. Figure C & D)

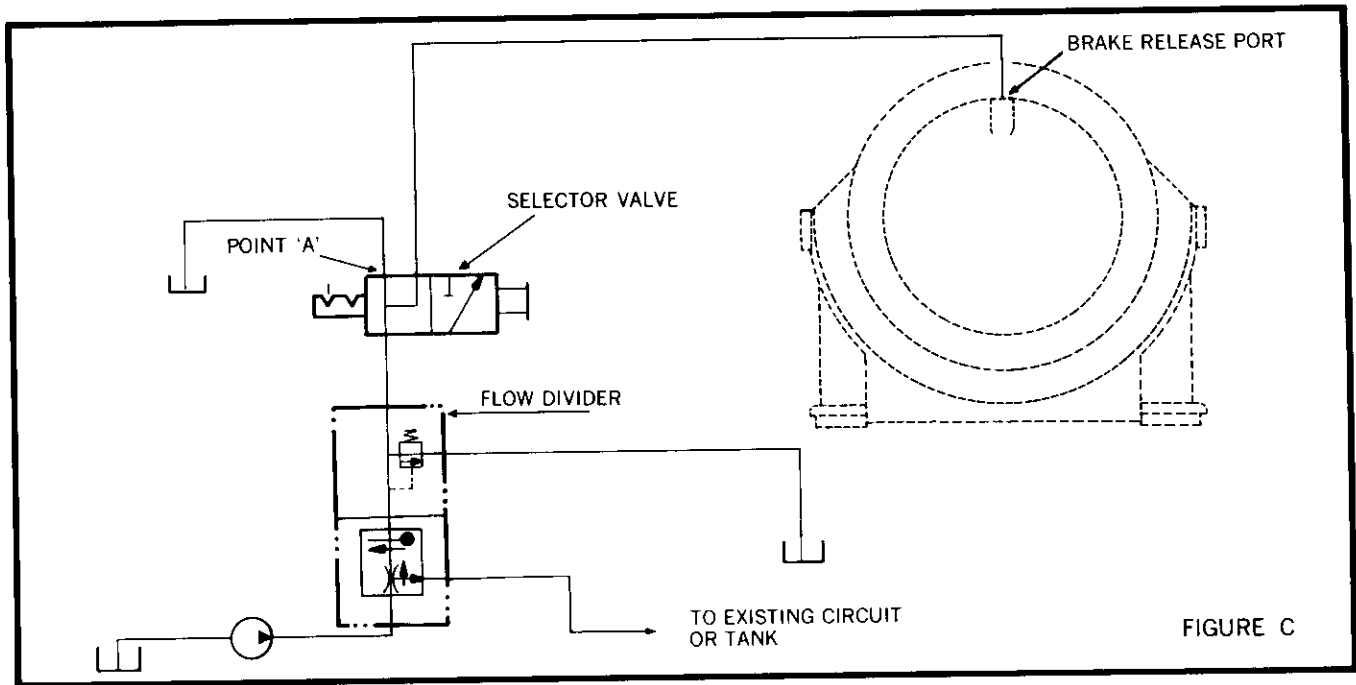
1. The following parts are required in order to complete this installation:
  - a. Flow Divider
    - Controlled flow of 1.5 GPM with a Relief Valve setting of 550 PSI. Pressure and flow must be non-adjustable.
  - b. Selector Valve
  - c. Hose and Fittings
2. Install the flow divider between the pump and the control valve in an existing hydraulic circuit.
3. Install the selector valve between the flow divider and the brake release port.
4. Connect the winch inlet circulating line to Port 'P' in the primary housing. Connect the return circulating hose to Port 'H' in the final housing, see Figure D.

#### IMPORTANT:

In order to minimize the back pressure at Point 'A', the length of hose used between Point 'A' and the reservoirs should have a 1/2" I.D. and be as short as possible.

The maximum allowable back pressure at Point 'A' should not exceed 150 PSI. If the pressure is greater, the winch must not be used to hoist a load until the hydraulic system has warmed up and reduced the pressure.





EMERGENCY FREE-FALL CIRCUIT

FIGURE C

### TO BLEED THE AIR FROM THE HYDRAULIC CIRCUITS

When the hydraulic circuits are completed, all the air must be bled from the systems before operating the winch.

1. While the main supply pump for the winch is running, bleed all air from the end housings by slackening the  $\frac{1}{4}$  NPT Pipe Plug on top of each end housing illustrated by 'U' Figure D.
2. Remove all load from the cable drum, and with the supply pump running, slacken the

fitting at the brake release port.

3. Operate the selector valve to allow oil to flow to the brake release port. Release the valve and wait a few seconds. Repeat this process until all sign of air bubbles have gone from the brake release port. Retighten the fitting and the system is ready for testing.

### TEST FREE-FALL CONTROLS

Position the load a few feet off the ground and test the emergency free-fall by operating the selector valve. Reset the selector valve.

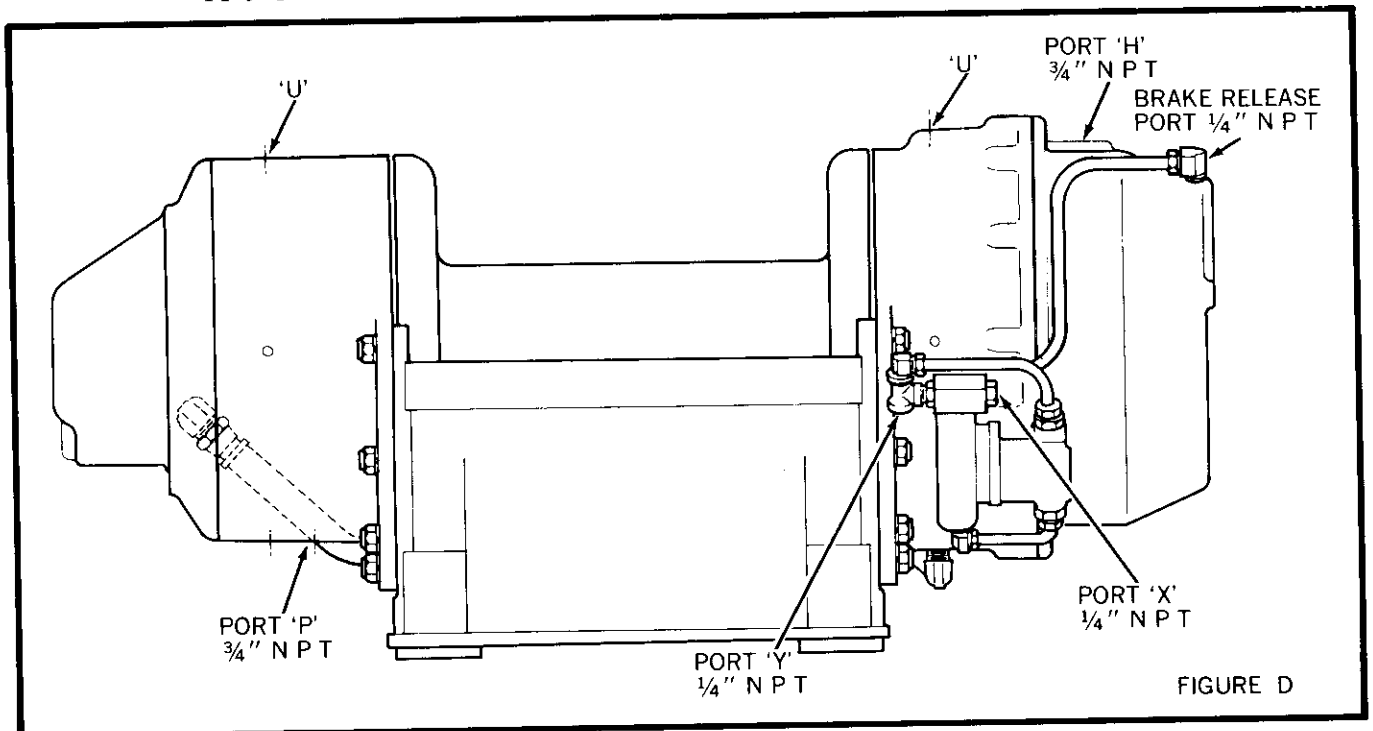


FIGURE D

# PREVENTIVE MAINTENANCE

At the end of every 500 hours of operation or every 12 months whichever comes first, disassemble the free fall assembly and inspect all parts as per the inspection instructions in this manual. The hours referred to are 500 hours of actual drum rotation which will be a percentage of actual man hours depending on the application.

## FREE FALL SPECIFICATIONS

- Maximum recommended load for controlled lowering with "free-fall" brake.

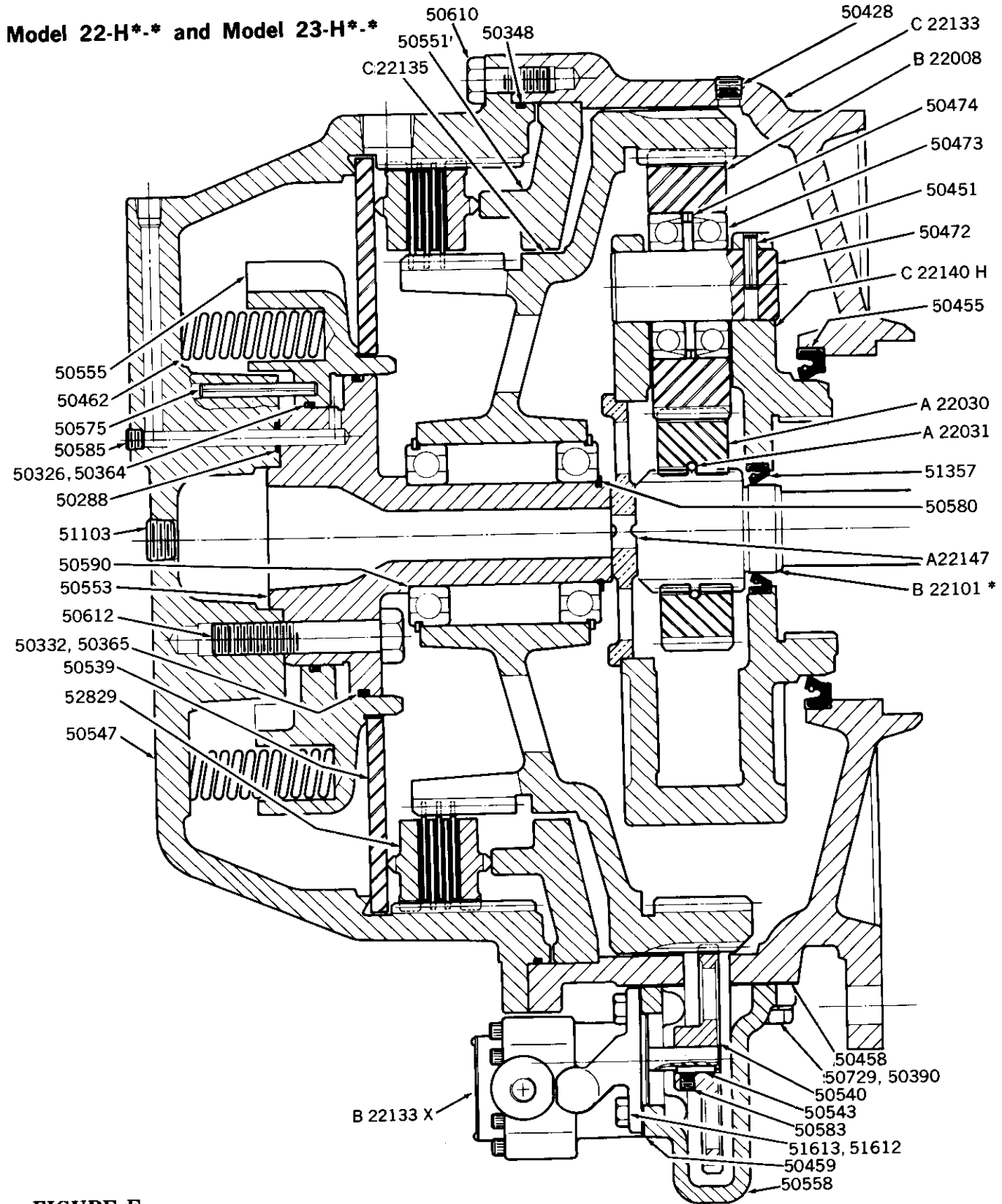
Pitch Diameter of Cable on Drum	Load Lbs.
<b>Model 22-S*-* and Model 23-S*-*</b>	
19" .....	2,680
17" .....	3,000
15" .....	3,400
13" .....	3,920
11" .....	4,640
Equivalent Drum Torque = 25,500 in. lbs.	

<b>Model 22-M*-* and Model 23-M*-*</b>	
19" .....	2,200
17" .....	2,470
15" .....	2,800
13" .....	3,230
11" .....	3,820
Equivalent Drum Torque = 21,012 in. lbs.	

<b>Model 22-H*-* and Model 23-H*-*</b>	
19" .....	1,340
17" .....	1,500
15" .....	1,700
13" .....	1,960
11" .....	2,320
Equivalent Drum Torque = 12,750 in. lbs.	

- Maximum drum speed during controlled lowering = 380 RPM (estimated).
- The "free-fall" brake is capable of stopping the maximum load that the winch can lift while 120 PSI back pressure exists at the brake release port.
- The "free-fall" brake should not be used to lower heavy loads. Heavy loads are to be lowered with the main control valve for the winch.
- The maximum allowable back pressure acting on the "free-fall" brake release port under lowest ambient temperature conditions when the control valve B 22600X is in neutral (fully open) = 150 PSI.
- Control circuit flow = 1.5 GPM  $\pm$  1 GPM.
- Relief valve setting for control circuit = 500-550 PSI.
- Pressure on brake piston for full release position = 460-480 PSI.
- Pressure to lower maximum recommended load under control = 320-380 PSI.
- NOTE: DO NOT USE FREE-FALL BRAKE TO LOWER A LOAD THAT IS GREATER THAN 1/3 OF THE RATED CAPACITY OF THE WINCH.**

# SECTION DRAWING OF FREE-FALL ASSEMBLY



**FIGURE E**

The above drawing illustrates the location of all parts used in the Model 22-H\*.\* and 23-H\*.\* free-fall assembly. When ordering replacement parts for any free-fall, consult the parts lists according to the winch model number on pages 12 to 26.

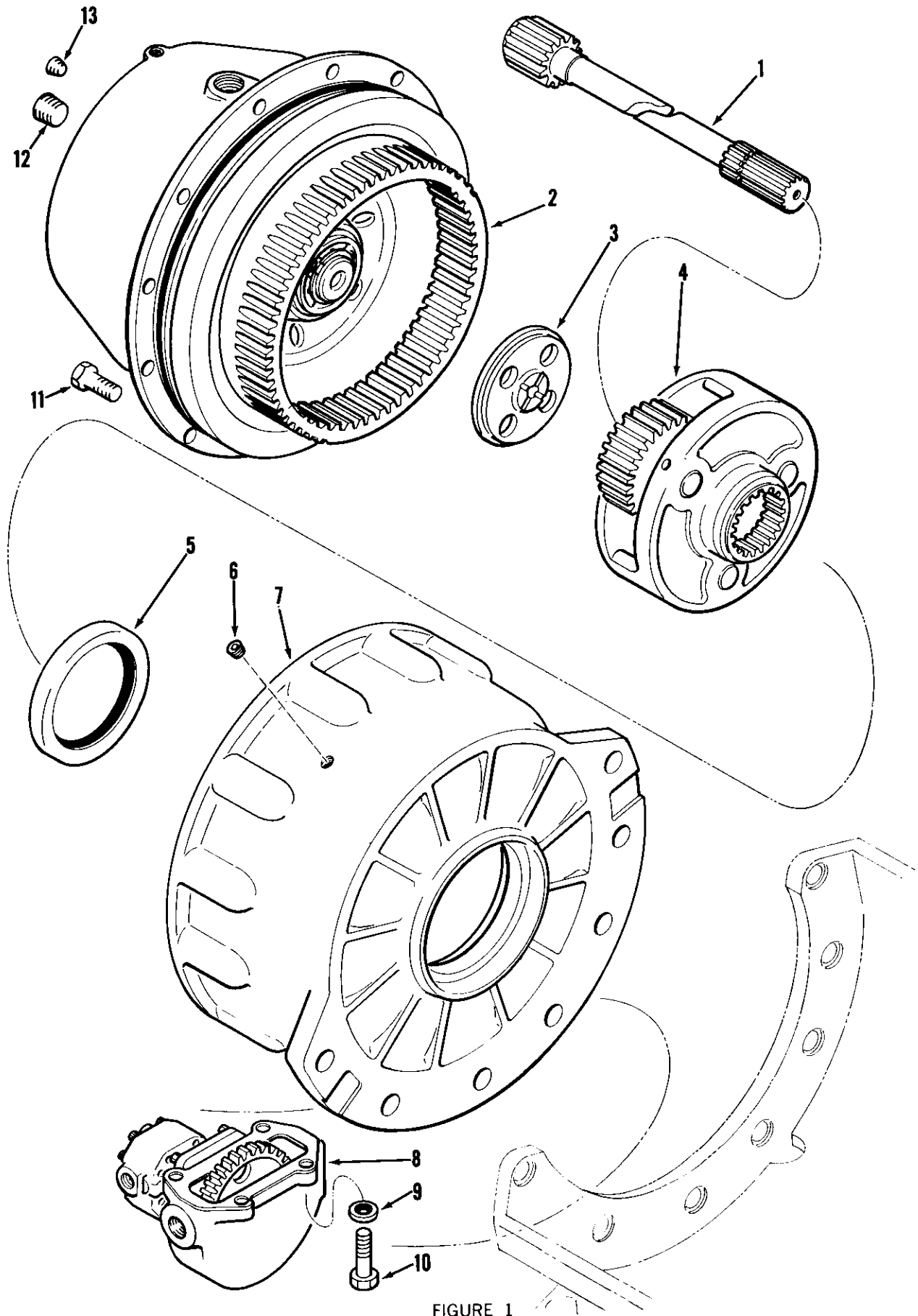


FIGURE 1

# FREE-FALL FINAL DRIVE ASSEMBLY

## Model 22-S\*-\* and Model 23-S\*-\*

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
*1	B22101-*	Sun Gear Shaft	1	10	0
2	See Fig. 2	End Cover Assembly	1	275	0
3	A 22147	Thrust Plate	1	2	1
4	C 22140XS	Planet Hub Assembly	1	76	10
5	50455	Oil Seal	1	0	8
6	50428	Pipe Plug	4	—	—
7	C 22133	End Housing	1	96	0
8	See Fig. 4	Pump and Housing Assembly	1	10	15
9	50390	Washer	4	—	—
10	50729	Capscrew	4	—	—
11	50610	Capscrew	12	0	2.5
12	51103	Pipe Plug	1	0	3
13	50585	Pipe Plug	1	0	1.5

## Model 22-M\*-\* and Model 23-M\*-\*

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
		This assembly includes all parts as listed above under Model 22-S*-* and Model 23-S*-* except items 1 and 4 change to the part numbers listed below:			
**1	B 22136-*	Sun Gear Shaft	1	11	0
4	C 22140XM	Planet Hub Assembly	1	72	0

## Model 22-H\*-\* and Model 23-H\*-\*

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
		This assembly includes all parts as listed above under Model 22-S*-* and Model 23-S*-* except item 4 changes to the part number listed below:			
4	C 22140XH	Planet Hub Assembly	1	64	8

\*Part Number for Low and High Speed Sun Gear Shafts = B 22101-\*

Insert barrel length measured between flanges (inches)  $\xrightarrow{\quad\quad\quad}$

\*\*Part Number for Medium Speed Sun Gear Shafts = B 22136-\*

Insert barrel length measured between flanges (inches)  $\xrightarrow{\quad\quad\quad}$

WHEN ORDERING PARTS BE SURE TO STATE THE SERIAL NUMBER OF WINCH

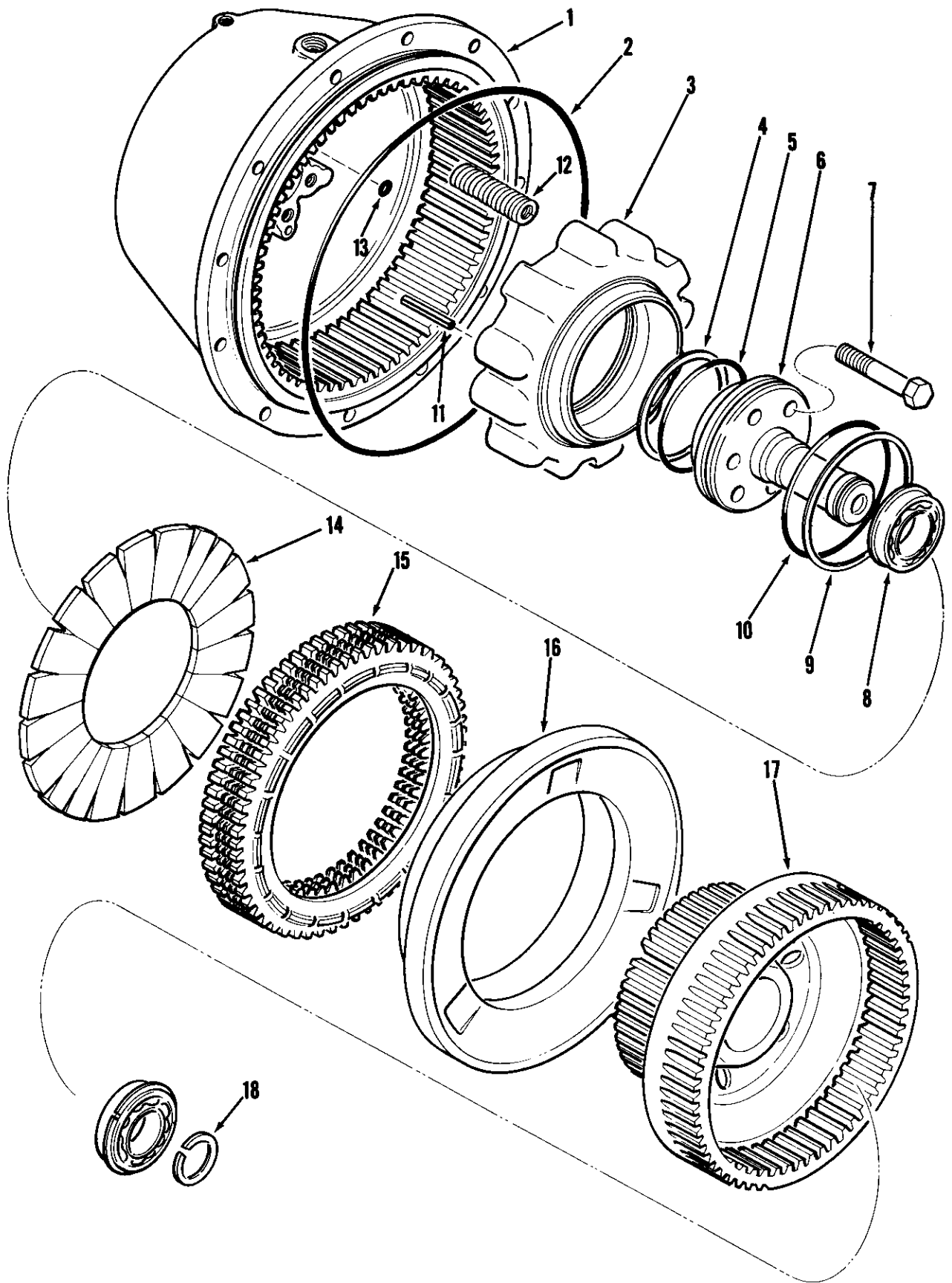


FIGURE 2

# END COVER ASSEMBLY

## Model 22-S\*.\* and Model 23-S\*.\*

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
1	50547	End Cover	1	94	0
2	50348	'O' Ring	1	—	—
3	50555	Piston	1	17	8
4	50364	Back-up Washer	1	—	—
5	50326	'O' Ring	1	—	—
6	50553	Cylinder Shaft	1	11	8
7	50612	Capscrew	6	0	6
8	50590	Ball Bearing	2	1	3
9	50365	Back-up Washer	1	—	—
10	50332	'O' Ring	1	—	—
11	50575	Pin	1	—	—
12	50462	Spring	24	0	3.5
13	50288	'O' Ring	1	—	—
14	50539	Segment	20	0	10
15	50242	Brake Assembly (Matched Set)	1	32	0
16	50549	Pressure Plate	1	26	0
17	C 22135	Internal Gear	1	67	0
18	50580	Snap Ring	1	—	—

## Model 22-M\*.\* and Model 23-M\*.\*

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
		This assembly includes all parts as listed above under Model 22-S*.* and Model 23-S*.* except items 15 and 16 change to the part numbers listed below:			
15	52816	Brake Assembly (Matched Set)	1	29	0
16	52817	Pressure Plate	1	27	0

## Model 22-H\*.\* and 23-H\*.\*

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
		This assembly includes all parts as listed above under Model 22-S*.* and Model 23-S*.* except items 15 and 16 change to the part numbers listed below:			
15	52829	Brake Assembly (Matched Set)	1	24	0
16	50551	Pressure Plate	1	30	0

WHEN ORDERING PARTS BE SURE TO STATE THE SERIAL NUMBER OF WINCH

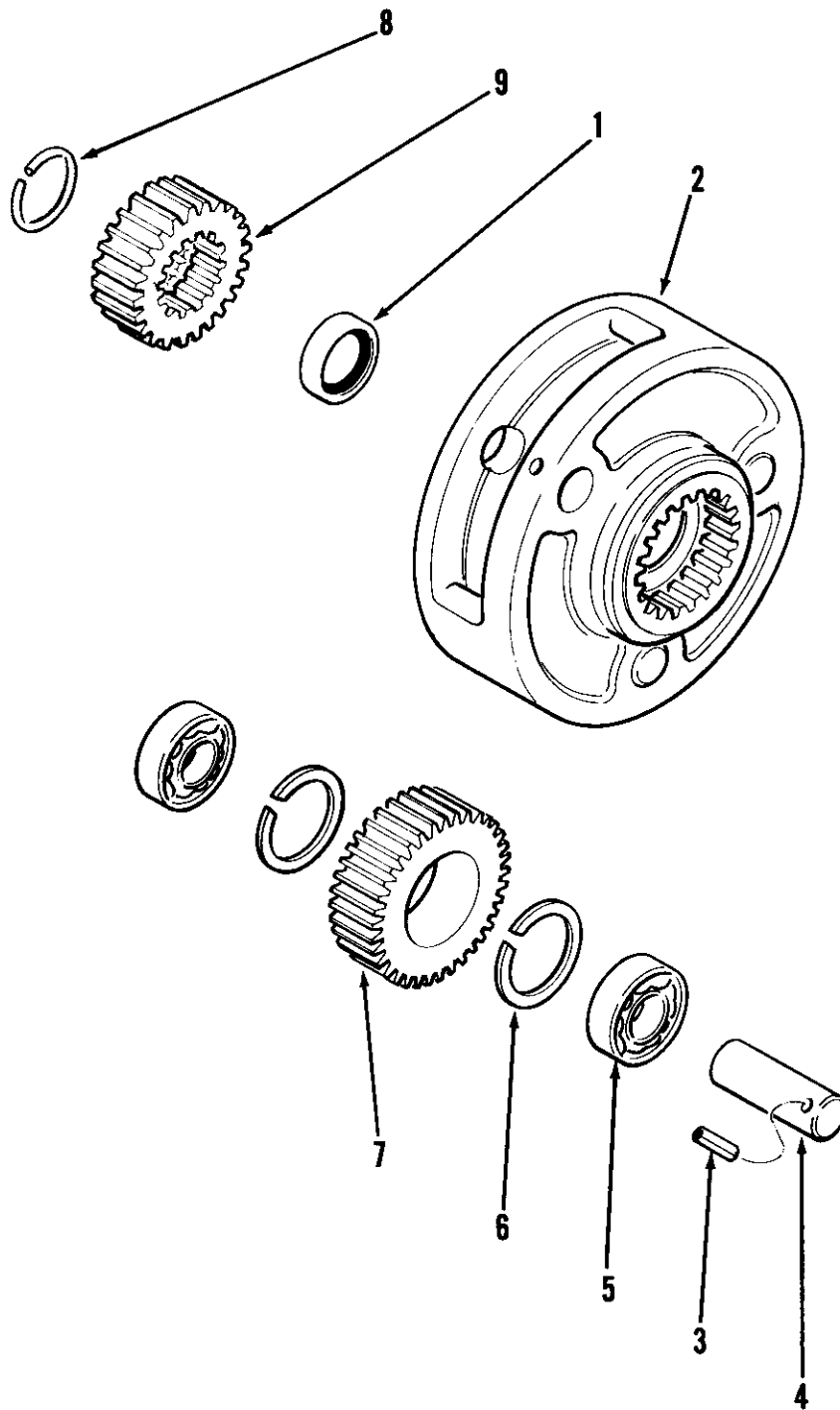


FIGURE 3



# PLANETARY GEAR REDUCTION

## Model 22-S\*.\* and Model 23-S\*.\*

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
Assembly	C 22140XS	Planet Hub Assembly		76	0
1	51357	Oil Seal	1	0	2
2	C 22140S	Planet Hub	1	35	0
3	50451	Pin	3	—	
4	50472	Planet Pin	3	1	8
5	50473	Ball Bearing	6	1	0
6	50474	Snap Ring	6	—	
7	50471	Planet Gear	3	9	8

## Model 22-M\*.\* and Model 23-M\*.\*

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
Assembly	C 22140XM	Planet Hub Assembly		72	0
1	51357	Oil Seal	1	0	2
2	C 22140M	Planet Hub	1	35	0
3	50451	Pin	3	—	
4	50472	Planet Pin	3	1	8
5	50473	Ball Bearing	6	1	0
6	50474	Snap Ring	6	—	
7	B22134	Planet Gear	3	7	1

## Model 22-H\*.\* and Model 23-H\*.\*

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
Assembly	B 22140X	Planet Hub Assembly		71	0
1	51357	Oil Seal	1	0	2
2	C 22140H	Planet Hub	1	35	0
3	50451	Pin	3	—	
4	50472	Planet Pin	3	1	8
5	50473	Ball Bearing	6	1	0
6	50474	Snap Ring	6	—	
7	B 22008	Planet Gear	3	5	0
8	A 22031	Retainer Ring	1	—	
9	A 22030	Sun Gear	1	4	8

WHEN ORDERING PARTS BE SURE TO STATE THE SERIAL NUMBER OF WINCH

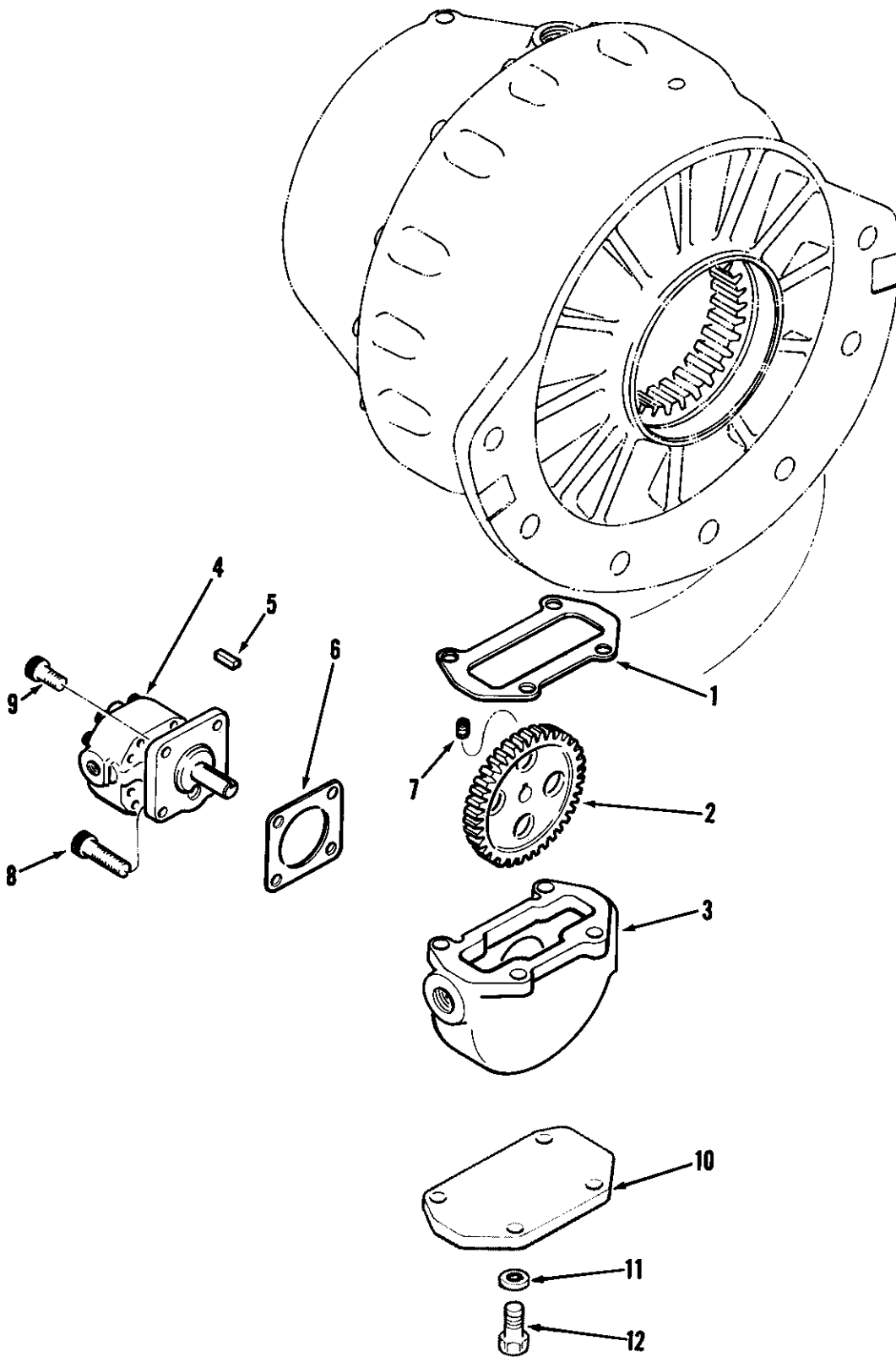


FIGURE 4

# PUMP AND HOUSING ASSEMBLY

**Model 22-\*F-\* and Model 23-\*F-\***

**Model 22-\*G-\* and Model 23-\*G-\***

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
1	50458	Gasket	1	—	
2	50540	Gear	1	1	1
3	50558	Housing	1	5	0
*4	B 22133X	Pump (includes items 8 and 9)	1	4	8
5	50543	Key	1	—	
6	50459	Gasket	1	—	
7	50583	Set Screw	1	—	
8	51613	Capscrew (Part of item 4)	2	0	1.5
9	51612	Capscrew (Part of item 4)	2	0	0.7

**Model 22-\*J-\* and Model 23-\*J-\***

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
		Items 2 to 9 are not required in this assembly.			
1	50458	Gasket	1	—	
10	50542	Cover	1	0	12
11	50390	Washer	4	—	
12	50784	Capscrew	4	—	

**\*Model 22 Free Fall Winches Only:**

When ordering replacement pumps for winches serial number 22-4627 and down order 50546  
 When ordering replacement pumps for winches serial number 22-4628 and up order B 22133X.

**Model 23 Free Fall Winches Only:**

When ordering replacement pumps for winches serial number 23-933 and down order 50546  
 When ordering replacement pumps for winches serial number 23-934 and up order B 22133X.

WHEN ORDERING PARTS BE SURE TO STATE THE SERIAL NUMBER OF WINCH

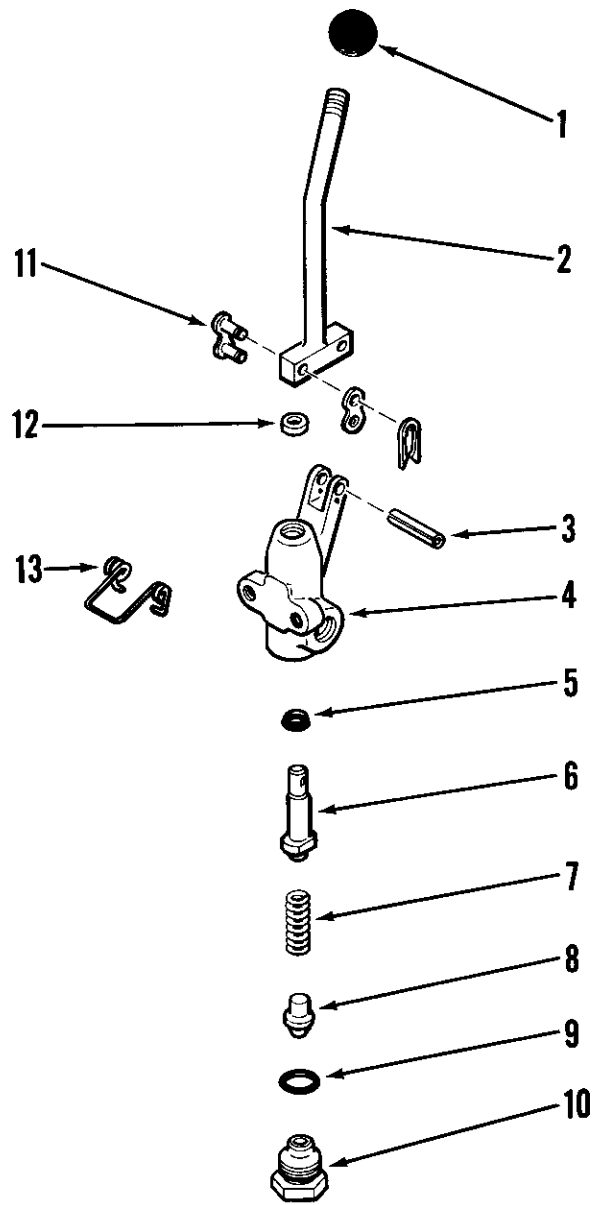


FIGURE 5

# CONTROL VALVE ASSEMBLY

## ALL MODELS

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
Assembly	B 22600X	Control Valve	1	1	2
1	51046	Knob	1	0	1
2	B 22594	Handle	1	0	4
3	51048	Pin	1	—	—
4	B 22599	Valve Body	1	0	7
5	51049	Seal	1	—	—
6	A 22785	Stem	1	0	1
7	A 22776	Spring	1	—	—
8	A 22772	Valve	1	0	1
9	50298	'O' Ring	1	—	—
10	A 22773	Valve Seat	1	0	2
11	51047	Chain Connector	1	—	—
12	A 22786	Ring	1	—	—
13	A 22784	Spring	1	—	—

WHEN ORDERING PARTS BE SURE TO STATE THE SERIAL NUMBER OF WINCH

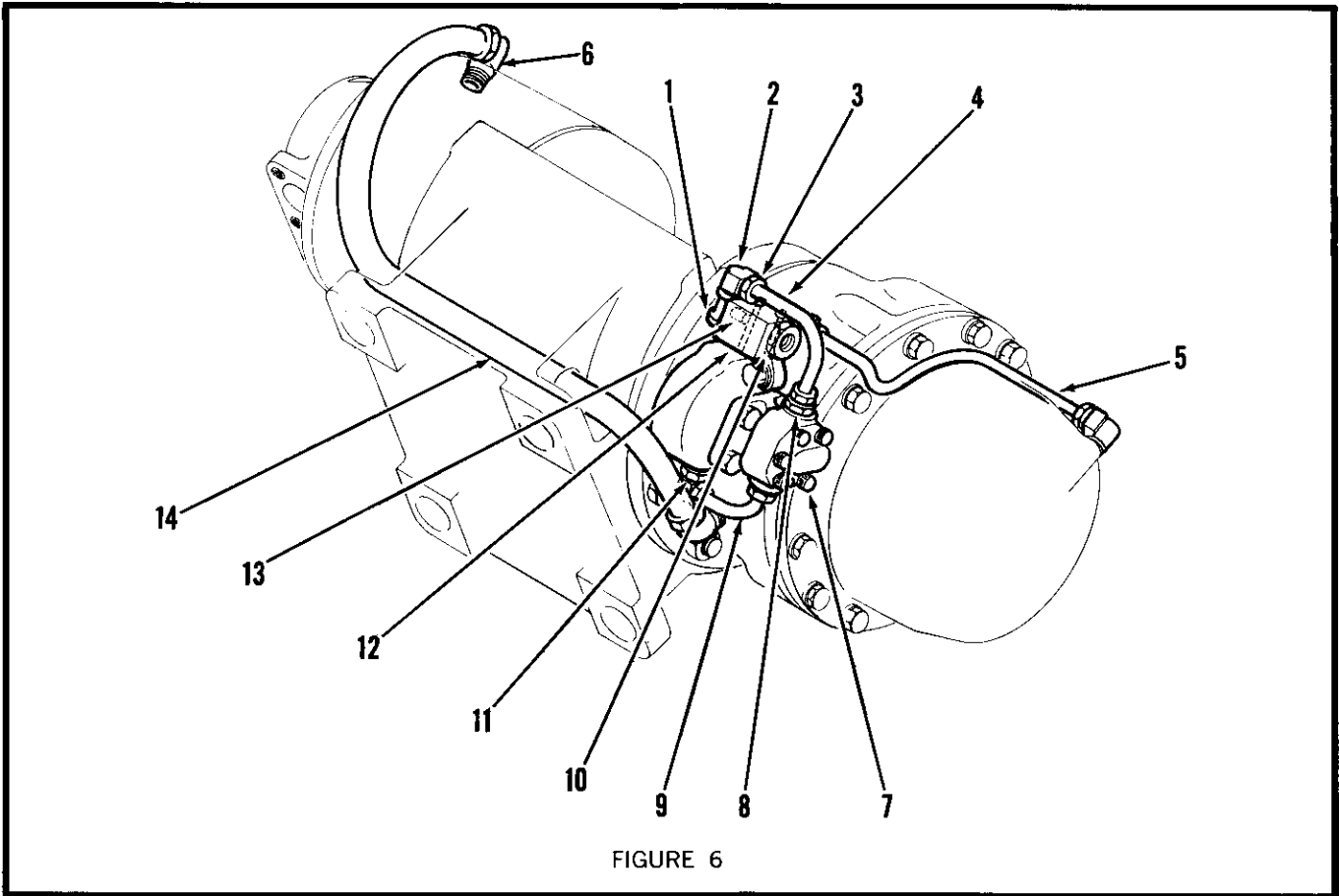


FIGURE 6

## PIPING ASSEMBLY

Model 22-\*F-C and Model 22-\*F-EC  
 Model 23-\*F-C and Model 23-\*F-EC

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
Assembly	C 22577X	Piping Assembly	—	—	—
1	51116	Tee	1	0	3
2	50796	Elbow	4	0	2
3	50826	Nut	6	0	1
4	51123	Tube Assembly (Includes 2 of item 3)	1	0	3
5	51121	Tube Assembly (includes 2 of item 3)	1	0	4
6	51115	Elbow	2	0	8
7	See Fig. 4	Pump and Housing Assembly	1	10	15
8	50912	Connector	2	0	2
9	51124	Tube Assembly (includes 2 of item 3)	1	0	2
10	50834	Screw	2	0	1
11	51118	Bushing	1	0	1
12	A 22763X	Shuttle Valve	1	1	0
13	51117	Nipple	1	0	1
*14	B 22119X-*	Hose Assembly	1	2	6

\*Part Number for Hose Assembly B 22119X-\*  
 Insert barrel length measured between Flanges (inches)

WHEN ORDERING PARTS BE SURE TO STATE THE SERIAL NUMBER OF WINCH

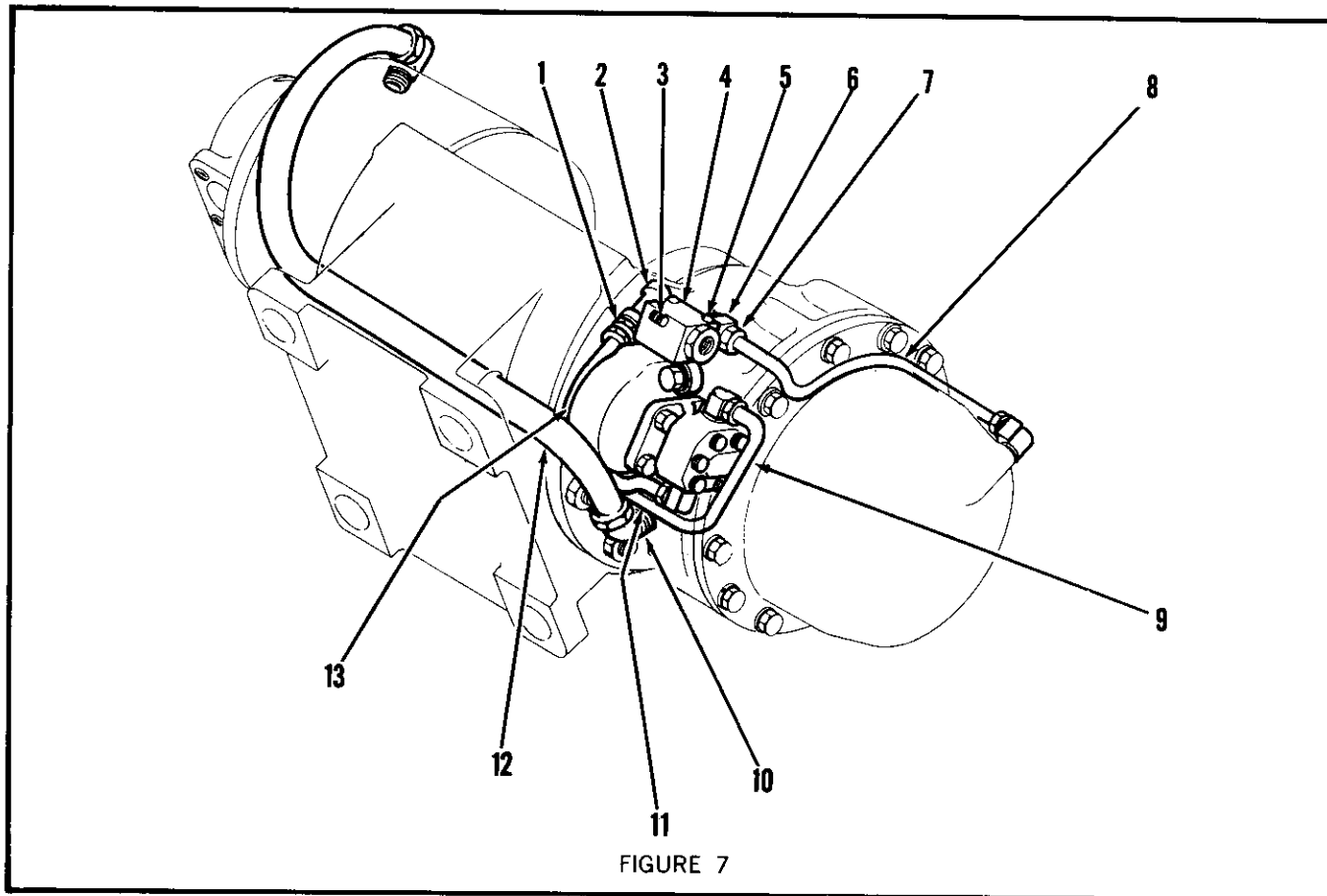


FIGURE 7

## PIPING ASSEMBLY

Model 22-\*F-A and Model 22-\*F-EA  
 Model 23-\*F-A and Model 23-\*F-EA

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
Assembly	C 22579X	Piping Assembly	—	—	—
1	50912	Connector	1	0	2
2	51116	Tee	1	0	3
3	51117	Nipple	1	0	1
4	A 22763X	Shuttle Valve	1	0	1
5	50834	Screw	2	0	1
6	50796	Elbow	5	0	2
7	50826	Nut	6	0	1
8	51121	Tube Assembly (Includes 2 of item 7)	1	0	4
9	50706	Tube Assembly (Includes 2 of item 7)	1	0	4
10	51115	Elbow	2	0	8
11	52707	Tube Assembly (Includes 2 of item 7)	1	0	3
*12	B 22119X-*	Hose Assembly	1	2	6
13	See Fig. 4	Pump and Housing Assembly	1	10	15
14	51118	Reducer Bushing (not shown)	1	0	2

\*Part Number for Hose Assembly B 22119X-\* ←  
 Insert Barrel length measured between Flanges (inches) ↷

WHEN ORDERING PARTS BE SURE TO STATE THE SERIAL NUMBER OF WINCH

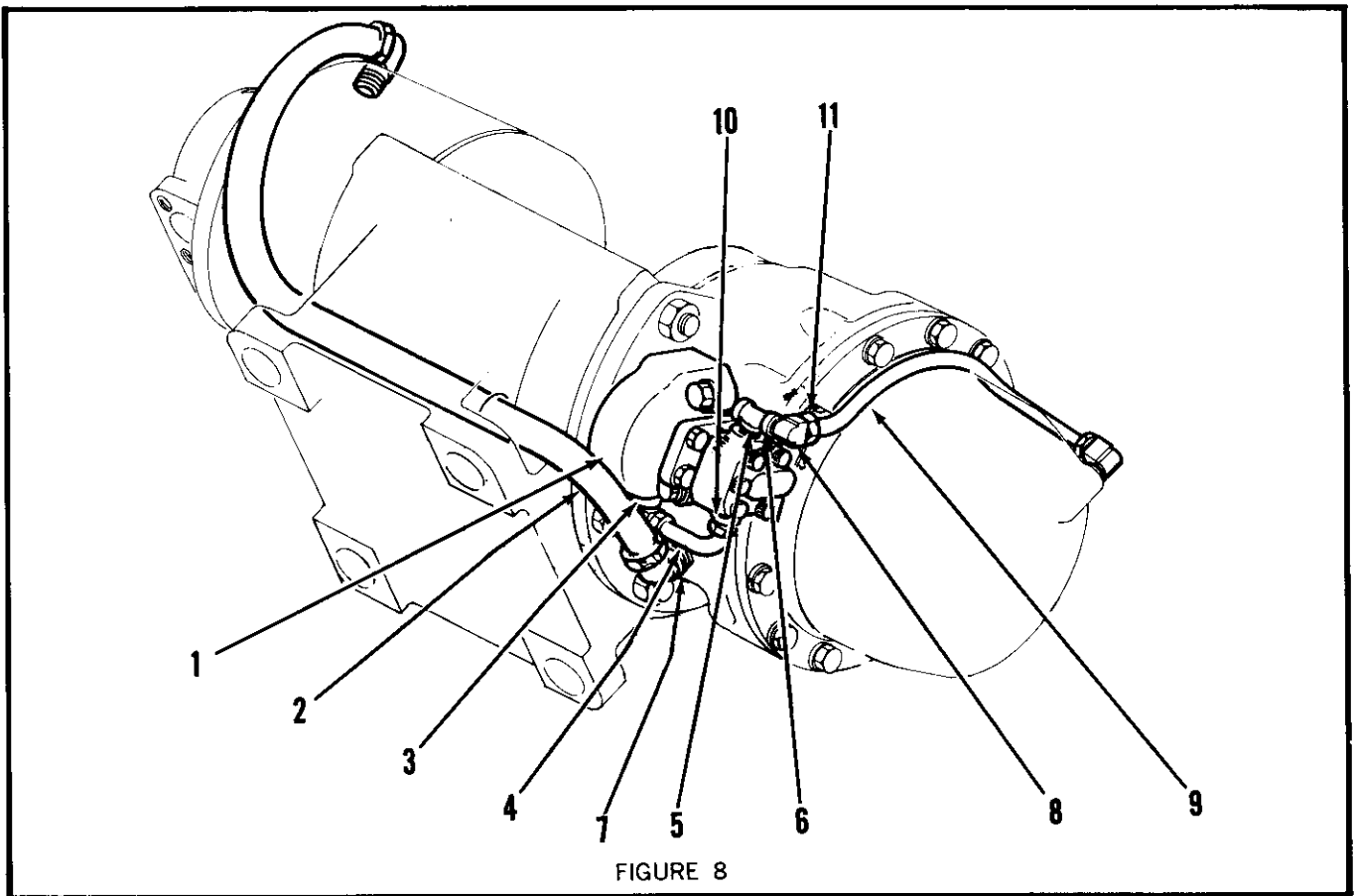


FIGURE 8

## PIPING ASSEMBLY

Model 22-\*G-C and Model 22-\*G-EC  
 Model 23-\*G-C and Model 23-\*G-EC

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
Assembly	C 22578X	Piping Assembly	—	—	—
1	See Fig. 4	Pump and Housing Assembly	1	10	15
* 2	B 22119X-*	Hose Assembly	1	2	6
3	51118	Bushing	1	0	1
4	51124	Tube Assembly (Includes 2 of item 11)	1	0	2
5	51117	Nipple	1	0	1
6	51116	Tee	1	0	3
7	51115	Elbow	2	0	8
8	50796	Elbow	3	0	2
9	51742	Tube Assembly (Includes 2 of item 11)	1	0	5
10	50912	Connector	1	0	2
11	50826	Nut	4	0	1

\*Part Number for Hose Assembly B 22119X-\* ←  
 Insert Barrel length measured between Flanges (inches) →

WHEN ORDERING PARTS BE SURE TO STATE THE SERIAL NUMBER OF WINCH



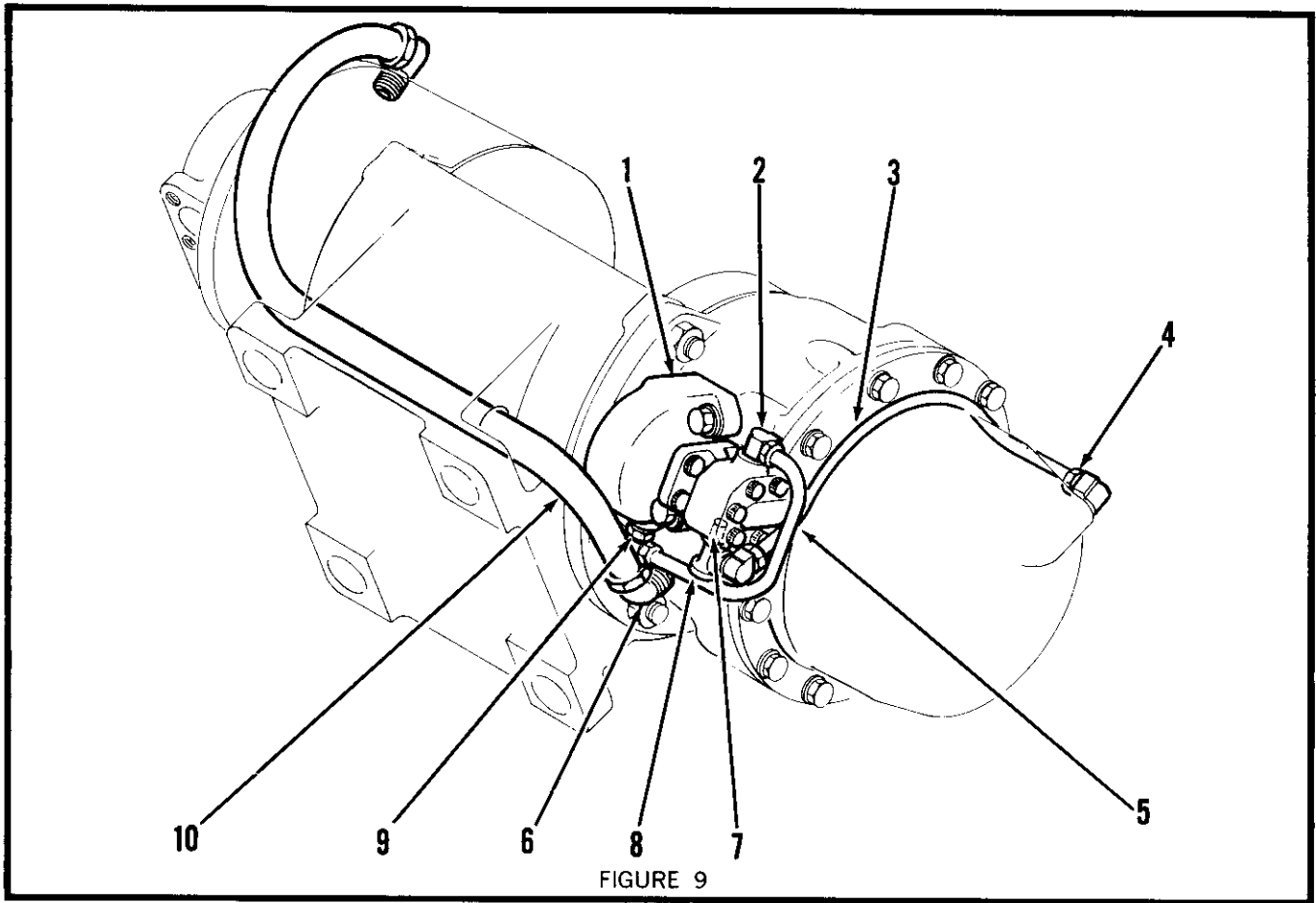
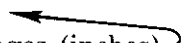


FIGURE 9

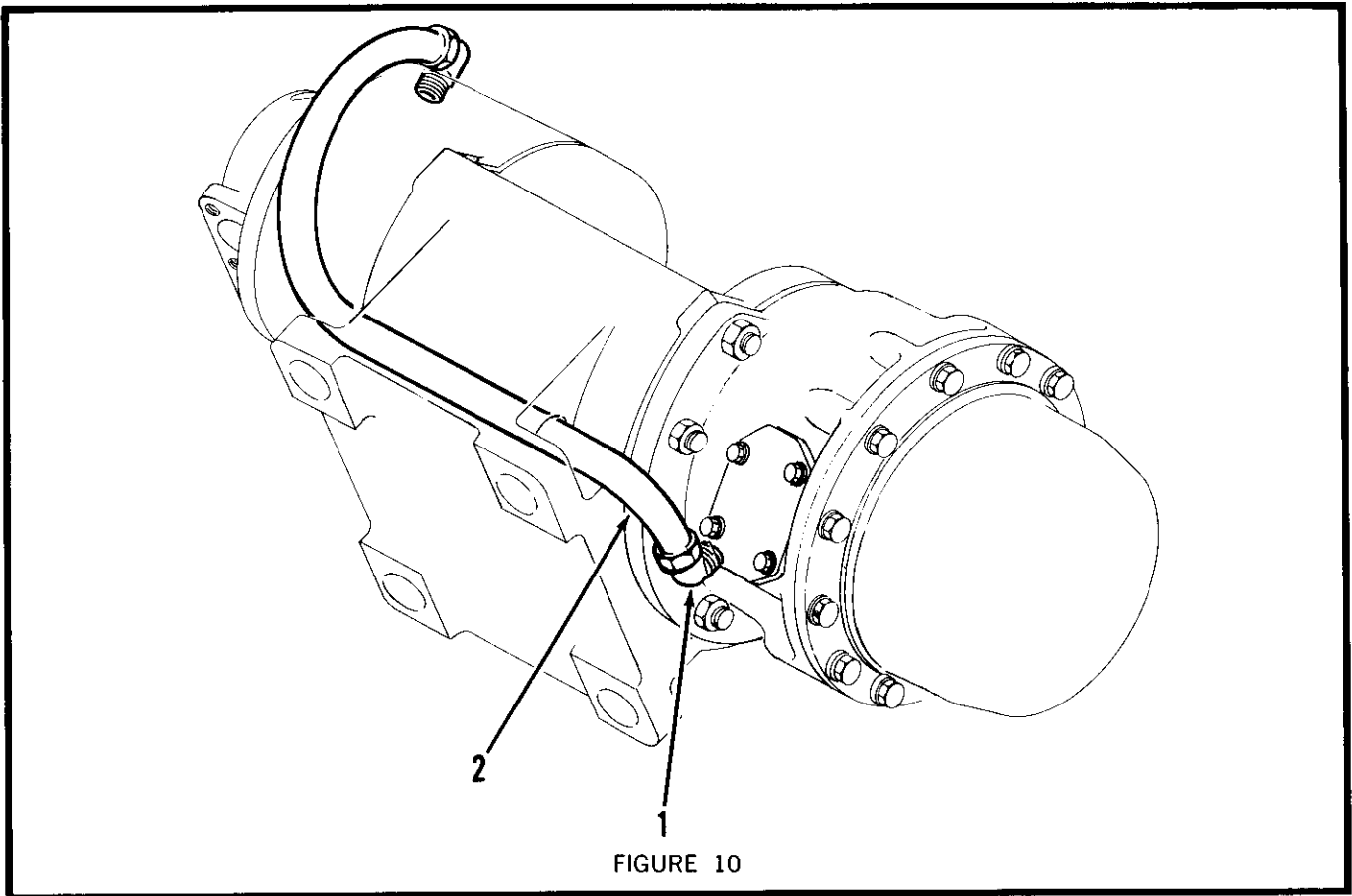
## PIPING ASSEMBLY

Model 22-\*G-A and Model 22-\*G-EA  
 Model 23-\*G-A and Model 23-\*G-EA

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
Assembly	C 22580X	Piping Assembly	—	—	—
1	See Fig. 4	Pump and Housing Assembly	1	10	15
2	50796	Elbow	4	0	2
3	A 22179X	Tube Assembly (Includes 2 of item 4)	1	0	6
4	50826	Nut	4	0	1
5	52706	Tube Assembly (Includes 2 of item 4)	1	0	4
6	51115	Elbow	2	0	8
7	51117	Nipple	1	0	1
8	51116	Tee	1	0	3
9	51118	Bushing	1	0	1
*10	B 22119X-*	Hose Assembly	1	2	6

\*Part Number for Hose Assembly B 22119X-\*   
 Insert Barrell length measured between Flanges (inches)

WHEN ORDERING PARTS BE SURE TO STATE THE SERIAL NUMBER OF WINCH



# PIPING ASSEMBLY

Model 22.\*J-\* and Model 23.\*J-\*

Item No.	Part No.	Description	No. Req'd.	Weight	
				Lbs.	Ozs.
Assembly	C 22582X	Piping Assembly	—	—	—
1	F 175	Elbow	2	0	6
2	B 22119X-*	Hose Assembly	1	1	8

\*Part Number for Hose Assembly B 22119X-\* ←  
 Insert Barrel length measured between Flanges (inches) →

WHEN ORDERING PARTS BE SURE TO STATE THE SERIAL NUMBER OF WINCH

# FOREWORD TO SERVICING

The following service instructions have been arranged to provide the best methods for assembly and disassembly of the Gearmatic Free-Fall. It is suggested that before any work is done on this unit, all the steps for disassembly and assembly should be read and understood.

Expendable parts such as oil seals, back-up washers and 'O' rings should never be re-used even though inspection may show these items as being serviceable for future use. The cost of these items is negligible compared to the labour involved in replacing such items if they do not function properly.

All replacement parts should be given your final inspection to insure that no damage has resulted after the final factory inspection was made.

Cleanliness is of prime importance when any part of this Free-Fall is to be assembled or disassembled. Before commencing disassembly be sure that a clean work area with a dust and grit free work bench is available.

For ease of assembly and disassembly and in order to avoid damage to some elements in the Free-Fall, it is recommended that when possible, the winch should be removed from its mounting base. The reasons for this will become evident once the following instructions have been studied.

## GENERAL

Before reassembly of the Free-Fall be sure that all parts are perfectly clean, and that all machined surfaces of the Free-Fall parts are in good condition and free from damage or excessive wear.

During reassembly lubricate all 'O' rings and oil seals with grease before installation.

In the following assembly, disassembly and inspection instructions, the numbers in brackets refer to the item numbers on the exploded parts drawing illustrated on the reference page stated beside the heading for each section.

# DISASSEMBLY INSTRUCTIONS

## TO DISASSEMBLE THE FREE-FALL FINAL DRIVE ASSEMBLY

(Ref. Figure 1)

1. Drain all the oil from the Primary and Final Drive Ends of the winch. Remove all High Pressure Hydraulic Lines attached to the winch. Unbolt the winch and take it into a well equipped service shop.
2. Set the winch in a safe working position so that the Primary End is facing down and the Free-Fall End is facing up. Remove the Metering Pump and Housing Assembly (8) and all hydraulic lines connected to the Final Drive Assembly (see Figure F).

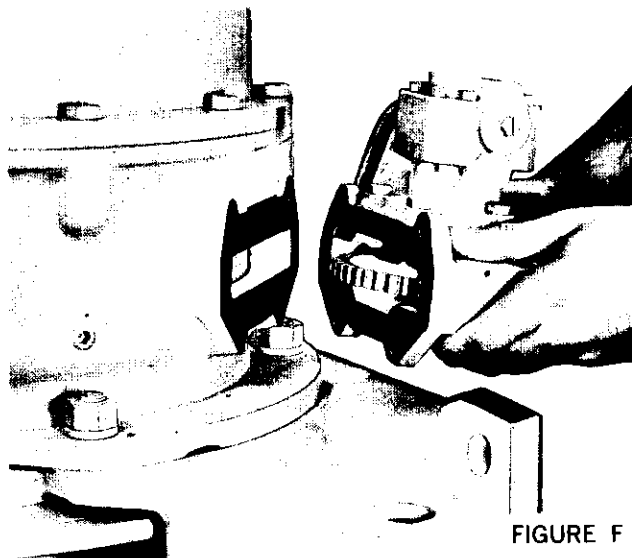


FIGURE F

3. Remove the Capscrews (11) from the End Housing (7). Remove these capscrews progressively around in a clockwise or anti-clockwise direction, turning them one-half turn at a time until all of the spring load has been removed.
4. Remove the Pipe Plug (12) and replace it with a Lifting Ring in the back of the End Cover Assembly (2). (Gearmatic Tool A 22214X can be purchased for this purpose). Carefully lift the End Cover Assembly (2) out of the End Housing, (see Figure G). Set the End Cover Assembly on to a clean dust free surface for disassembly later.
5. Lift the Thrust Plate (3) from the bore of the Final Planet Hub (4).
6. Lift the Sun Gear Shaft (1) out of the centre of the Final Planet Assembly (4) (see Figure H) then lift the Final Planet Assembly out of the End Housing (7).
7. Remove the Hex Nuts and Lockwashers from the Dowel Bolts. Then using two pinch bars under the cast slots provided under the

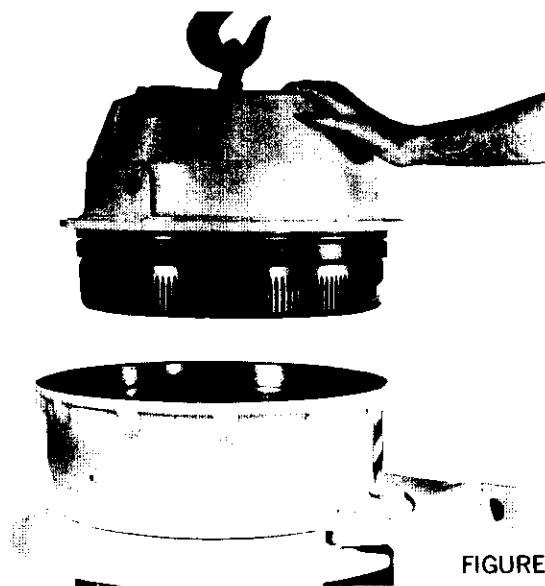


FIGURE G

- flange of the Housing (7), pry the Housing off the Dowel Bolts.
8. Remove the Oil Seal (5) from the bore of the Housing (7).

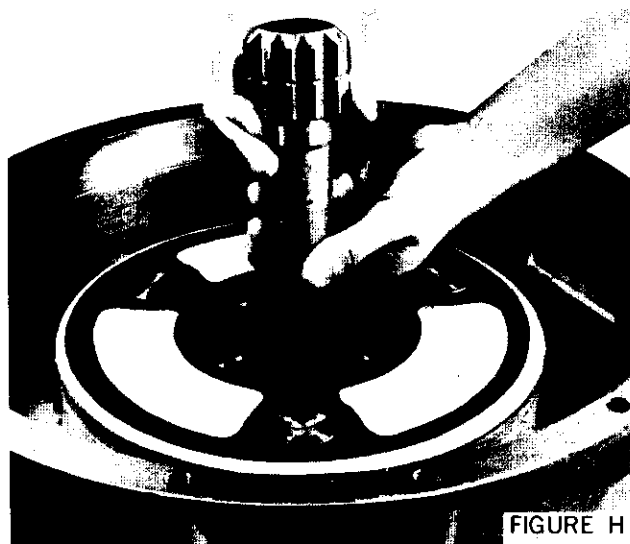


FIGURE H

## TO DISASSEMBLE THE END COVER ASSEMBLY

(Ref. Figure 2)

1. Take the End Cover Assembly and set it on end so that it is resting safely with the Internal Gear (17) facing up.
2. Remove the Snap Ring (18) from the Cylinder Shaft (6).
3. Remove the Internal Gear (17). Using two pinch bars between the Internal Gear (17) and the Pressure Plate (16), pry the Internal Gear (17) and Bearings (8) off the Cylinder Shaft (6), (see Figure J).
4. Press the Bearings (8) out of the Internal Gear (17).

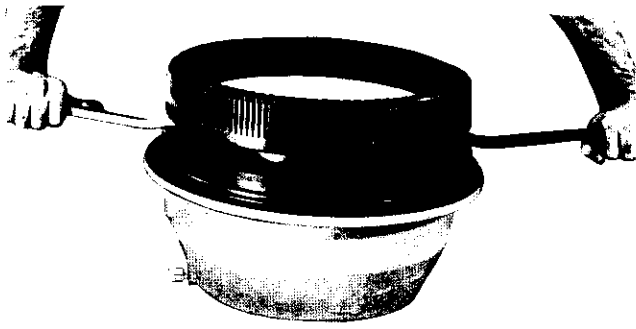


FIGURE J

5. Remove the Pressure Plate (16) and lift the Brake Plate Assembly (15) out of the End Cover (1). Be careful that the Brake Plates remain together as a unit.
6. Lift the Segments (14) out of the End Cover (1) (see Figure P).
7. Remove the six Capscrews (7) by slackening them one-half turn at a time, progressively in a clockwise or counterclockwise direction until all the load has been removed from the Springs (12), then remove the Cylinder Shaft (6) and Piston (3).
8. Remove the Springs (12) and discard 'O' Ring (13).
9. Remove the Piston (3) from the Cylinder Shaft (6) and remove and discard 'O' Rings (5) and (10) and Backup Washers (4) and (9).
10. Remove the Pin (11) from the Piston (3) only if it shows signs of wear or being bent.

### INSPECTION OF PARTS FOR THE FREE-FALL ASSEMBLY

(Ref. Figures 1 and 2)

1. Discard all 'O' Rings, Backup Washers, Oil Seals and Seal Washers.
2. Wash all parts in a suitable solvent and dry thoroughly with compressed air or clean cloths.  
**\*WARNING**—Do not dry the bearings (8) with compressed air as this may drive particles of dirt into the ball bearings.
3. Check all Snap Rings for flatness and that they form a true circle. If they are bent or damaged, replace with new parts.
4. Check for wear at the centre of the Thrust Plate (3). The original thickness was .500. If the wear is greater than 3/32", replace the Thrust Plate.
5. Check that the Final Planet gears (4) run freely in the Final Planet Assembly. For disassembly instructions and inspection, refer to "TO DISASSEMBLE THE FINAL PLANET ASSEMBLY".

6. Inspect the gear teeth in the Internal Gear (17). If wear is greater than .015 when compared to the unworn part of the teeth, replace the part.
7. Check the large pilot bore at the end of the End Housing (7) (figure 1) used to carry the End Cover (1). Remove all roughness and scores carefully using a scraper and extra fine emery cloth so that the 'O' Ring (2) will seal on this diameter.
8. Check the Segments (14) for flatness. Replace with new parts if bent or distorted.
9. Inspect the Brake Plate Assembly (15) for wear. If the wear is more than .030", then replace the complete brake assembly. The original thickness of the Brake Plate Assembly was as listed below, (see Figure K).

Part No.	Dimension 'A'
50242	2.845" to 2.852"
52829	2.011" to 2.017"
52816	2.567" to 2.574"



↑ FIGURE K

10. Check the Pin (11). If it is bent or worn, discard and replace it.
11. Inspect the Ball Bearings (8) for wear and pitting at the balls and ball grooves. Replace bearings if worn or pitted.

### TO DISASSEMBLE THE FINAL PLANET ASSEMBLY

(Ref. Figure 3)

1. Using a 1/4" diameter pin punch, drive Pin (3) completely into the Final Planet Pin (4), (see Figure L).
2. Remove the Final Planet Pin (4) by tapping it out of the Planet Hub (2) so that it is removed from the splined bore side of the planet hub. Remove Pin (3) from the Planet Pin (4).
3. Now remove the Planet Gear (7).
4. Press the Bearing (5) and Rings (6) out of the Planet Gear (7) using a drift.
5. Remove the Oil Seal (1) from the internal bore of the planet hub.

### INSPECTION OF PARTS FOR THE FINAL PLANET ASSEMBLY

1. Wash all parts in a suitable solvent and dry thoroughly using compressed air or clean cloths.  
**\*WARNING**:—Do not dry the bearings with compressed air, allow them to air dry after they are properly cleaned.



FIGURE L

2. Inspect the planet pin bores in the Planet Hub (2) for scores or bruises which may have been caused in removing the planet pins. Remove the high spots of any scores or bruises carefully with a scraper, sufficiently to allow a planet pin to be pressed into each bore by hand.
3. Check the Planet Gear (7) for wear and damage on the gear teeth. If wear is excessive, or if the Sun Gear Shaft (1) on Page 12 or Sun Gear (9) are being replaced because of gear tooth wear, replace the Planet Gears (7).
4. Inspect the Ball Bearings (5) for wear and pitting at the balls and ball grooves. Replace the bearings if any of these conditions exist.
5. **High speed units only:**—Inspect the Retainer Ring (8) for damage. If it is bent or has notches on the inside diameter, replace the retainer ring.

### TO DISASSEMBLE THE PUMP AND HOUSING ASSEMBLY

(Ref. Figures 1 and 4)

**Model 22-\*F.\* and Model 22-\*G.\*  
Model 23-\*F.\* and Model 23-\*G.\***

The metering pump used in this assembly is not expensive, therefore, it is recommended that if trouble has been traced to the pump, the pump should be discarded and replaced by a new pump.

1. If the Pump Assembly (4) is still on the free-fall assembly, then disconnect all the piping connected to the pump.
2. Remove the Capscrews (10) and Seal Washers (9) from the End Housing (7). Lift the Assembly (8) off the End Housing (see Figure F).
3. Rotate the Gear (2) until the Set Screw (7) is in a position where it can be removed.
4. Loosen the four Capscrews (8) and (9) that hold the housing and pump together. Slide the pump out of the Housing (3).
5. Remove the Gear (2) from the Housing (3). Remove the Key (5) from the Gear (2).
6. Remove Gaskets (1) and (6) from the Housing (3).
7. On units with a shuttle valve, remove the Valve (12) by loosening the Screws (10) on Page 22.

### TO DISASSEMBLE THE CONTROL VALVE ASSEMBLY

(Ref. Figure 5)

All Models

1. Remove all piping connected to the control valve assembly.
2. Remove the control valve from its mounting position.
3. Unscrew the Valve Seat (10) and remove and discard the 'O' Ring (9).
4. Remove the Valve (8) and Spring (7).
5. Disconnect and remove the Chain Link (11) from the Handle (2) and the Pin (6). Slide the Washer (12) off the Stem (6). Remove the Stem (6) from the valve body.
6. Remove and discard the Seal (5) from the inside bore of the Valve Body (4).
7. Using a 1/8" diameter pin punch, drive the Pin (3) out of the Valve Body (4). Remove the Handle (2) and spring (13) from the Valve Body (4).

## ASSEMBLY INSTRUCTIONS

### TO ASSEMBLE THE FREE-FALL FINAL DRIVE ASSEMBLY

(Ref. Figures 1 and 2)

In order to complete the following steps, it is recommended that the winch assembly be turned up in a safe vertical position so that the final drive end can be worked on safely and freely. Make sure that the drum and the drum bearings are in place on the winch assembly.

1. Make sure that the four Pipe Plugs (6) on (Figure 1) are in place in the End Housing (7). Attach the End Housing (7) to the winch base using the dowel bolts and lock-washers and nuts.
2. Pack the ball bearing on the cable drum with grease.

3. Install the Oil Seal (5) into the bore provided on the inside of the End Housing (7). The lip of the seal must be facing toward the open end of the End Housing, (see Figure M). Coat the oil seal with grease.

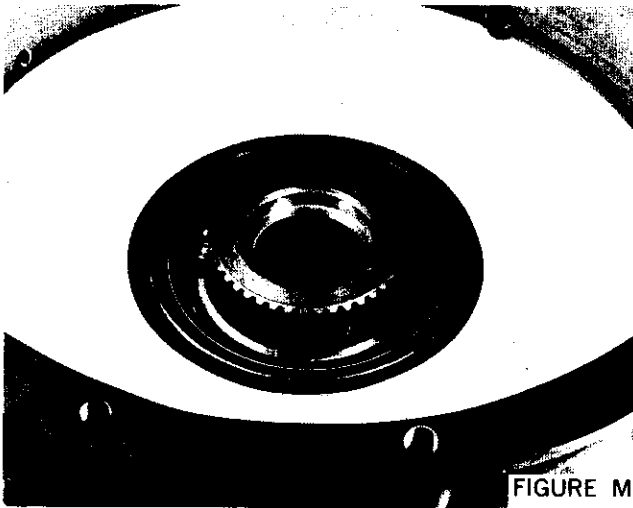


FIGURE M

4. Install the Final Planet Assembly (4) so that the splined bore of the Planet Hub locates over the splined end of the drum. Tap the Planet Assembly into place until it contacts the bearing that carries the drum in the End Housing.
5. Install the Sun Gear Shaft (1) so that it passes through the drum and engages with the Planet Hub Assembly in the Primary Drive.
6. Install the Thrust Plate (3) in the end of the Planet Assembly (4).
7. Turn the Assembled End Cover Assembly (2) onto its side. Install a lifting eye in the tapped hole in the centre of the End Cover (1) Gearmatic Part Number A 22214X can be purchased for this purpose.
8. Using a shop hoist, lift the End Cover Assembly (2) onto the Final Drive End of the winch. Rotate the assembly until the Internal Gear (17) meshes with the Planet Gears at the same time the Pressure Plate (16) must fit into the bore of the End Housing (7).
9. Using a feeler gauge, measure the distance between the flange on the End Cover (1) and the Housing (7), this gap should measure .043 to .108 inch. If the gap is not within these dimensions, then disassemble the Final Drive Assembly and investigate, (see Figure N).
10. Screw the twelve Capscrews (11) into the End Housing (7) until they are finger tight. Tighten each capscrew evenly by turning each one-half turn at a time progressively around in a clockwise or counter-clockwise direction until all the capscrews are tight. Torque each capscrew to a torque loading of 75 lbs. ft.

11. Remove the lifting eye from the End Cover (1) and install the Pipe Plug (12).

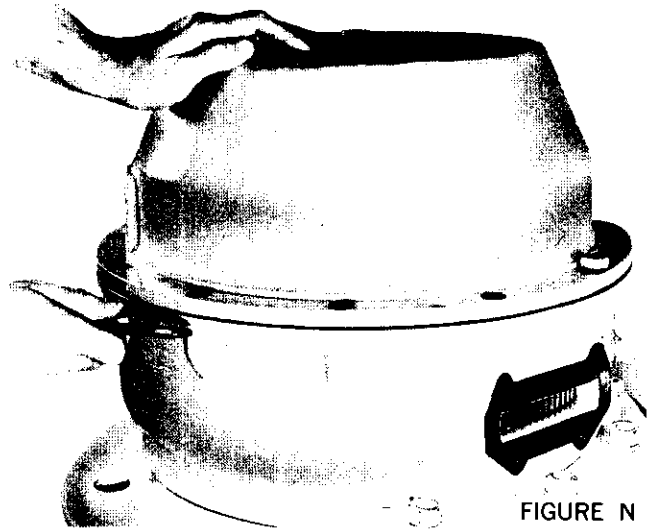


FIGURE N

### TO ASSEMBLE THE END COVER ASSEMBLY (Ref. Figure 2)

#### All Models

1. Lay the Piston (3) flat on the bench so that the drilled holes are facing down. Spread a light coat of grease onto the Backup Washer (4) and the 'O' Ring (5). Install the backup washer and then the 'O' Ring into the groove provided on the inside of the piston so that the 'O' Ring is on the top of the backup washer.
2. Turn the Piston (3) over and drive the Pin (11) into the hole provided on the inside face of the piston.
3. Install the Backup Washer (9) in its groove on the outside diameter of the Cylinder Shaft (6). Lubricate the 'O' Ring (10) and install it next to the Backup Washer (9) so that the backup washer is nearest the shaft end of the cylinder shaft. Give the 'O' Ring and backup washer an additional coat of grease.
4. Install the Piston (3) over the Cylinder Shaft (6) taking care that the backup washers do not get pinched between the mating diameters of the piston and cylinder shaft.
5. Give the 'O' Ring (13) a coat of grease and install it in the recess provided at the end of the Brake Release Port in the End Cover (1).

**IMPORTANT:**—Before installing the cylinder shaft, inspect the pilot diameters and mating faces of the cylinder shaft and end cover. Make sure that both surfaces and pilot diameters are perfectly clean and free from bruises or other imperfections.

6. Install the Pin (11) and Springs (12) in the Brake Piston (3). Turn the End Cover (1) on edge. Install the brake piston and cylinder shaft in the end cover. Make sure that the brake port in the cylinder shaft lines up with the hole in the end cover. The Pin (11) must enter its clearance hole in the End Cover before the Capscrews (7) can be installed, (see Figure O).

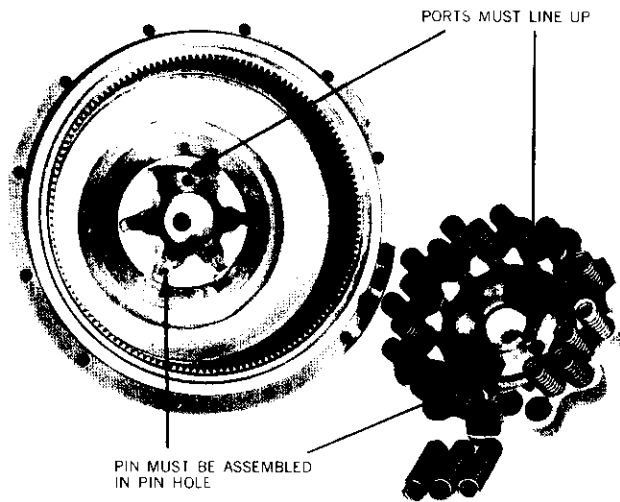


FIGURE O

7. Install the six Capscrews (7) and tighten progressively, one-half turn at a time in a clockwise or counterclockwise direction. Torque to 150 lbs. ft.
8. Install the twenty Segments (14). Each one must be installed so that the widest end of each segment rests on the step just below the gear teeth in the End Cover (1). The narrowest end of the segment will rest on the step on the Piston (3), (see Figure P).

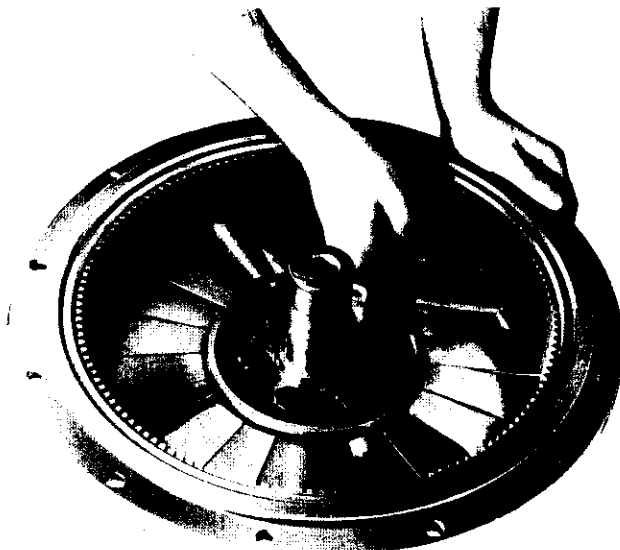


FIGURE P

9. Take the Brake Plate Assembly (15) and install it so that the external teeth of the brake assembly fit into the gear teeth in the End Cover (1). Line up the internal teeth of the brake plates so that they will mate with the Internal Gear (17) later.
10. Set the Pressure Plate (16) onto the Brake Plate Assembly (15) so that the dished face will be upward.
11. Check the Bearing (8) to see that the snap rings are in place on both of the bearings.
12. Install one Ball Bearing (8) in the bottom side of the internal gear.
13. Install the Internal Gear (17) so that the external teeth on the Internal Gear (17) mesh with the Brake Plates (15).
14. Install the second Bearing (8) over the end of the Cylinder Shaft (6). Tap the Bearing (8) into place until the snap ring shoulders up against the hub of the Internal Gear (17).
15. Install the Snap Ring (18) into its groove in the Cylinder Shaft behind the Bearing (8).
16. Lubricate the 'O' Ring (2) and install it in its groove in the End Cover (1). Check to make sure that the Pipe Plug (13) (Figure 1) is installed.

## TO ASSEMBLE THE FINAL DRIVE PLANET ASSEMBLY

(Ref. Figure 3)

### All Models

1. Install the Oil Seal (1) in the bore of the Planet Hub (2). The seal must enter through the non-splined bore of the Planet Hub (2) and the lip must face away from the spline bore in the Hub (2). Lubricate the lip of the oil seal with grease.
2. Install two Snap Rings (6) in the bore of each Planet Gear (7). Press the Ball Bearings (5) into the Final Planet Gear so that the ends of the bearings shoulder against the Snap Rings (6).
3. Place the Final Planet Gear (7) into the Planet Hub (2) so that the bore of the Bearings (5) line up with a planet pin hole.
4. Install a Final Planet Pin (4) in the Final Planet Hub (2) so that it passes through the Ball Bearings (5) in the planet gear and the drilled hole in the final planet pin lines up with the hole in the rim of the planet hub.
5. Install Pin (3) and using a  $\frac{1}{4}$  diameter pin punch, drive the pin in until the outer end of the pin is approximately  $\frac{7}{16}$  below the outside diameter of the final planet hub (see Figure L).
6. Repeat Steps 2, 3, 4 and 5 for the remaining two gears. Check to see that the gears run freely.



## TO ASSEMBLE THE PUMP ASSEMBLY

(Ref. Figure 4)

1. Screw the Set Screw (7) into the tapped hole provided in the Gear (2).
2. Install a new Gasket (6) on the Pump (4) and the Key (5) on the pump shaft.
3. Insert the Gear (2) in the Housing (3) and install the Pump (4) in the small bore of the Housing (3) so that the pump shaft fits into the Gear (2) with the Key (5) in place (see Figure Q). Tighten the Set Screw (7).

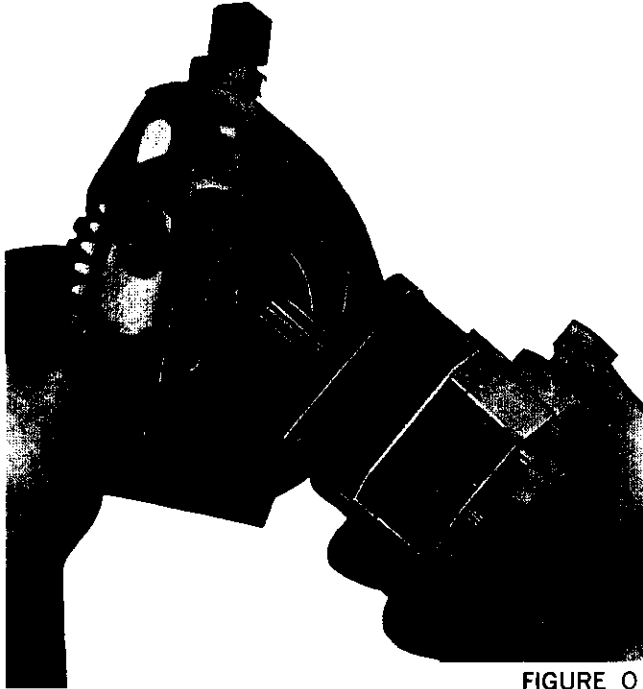


FIGURE Q

4. Bolt the Pump (4) to the Housing (3) with the Capscrews (8) and (9) and tighten to 17 lbs. ft. of torque.

## TO ASSEMBLE THE PUMP AND HOUSING ASSEMBLY

(Ref. Figures 1 and 4)

1. Coat the Gasket (1) on Page 18 with a light coating of gasket cement and press the gasket onto the Housing (3).
2. Take the pump and Housing Assembly (8) and bolt it on to the End Housing (7), using the Capscrews (10) and Washers (9) (figure 1). Torque the capscrews to 30 lbs ft.
3. Remove the pipe fittings from the ½ NPT port in the side of the pump housing. **Move the pump gear by hand to insure that some back lash exists between it and the internal gear.**

## TO ASSEMBLE THE CONTROL VALVE ASSEMBLY

(Ref. Figure 5)

### All Models

1. Spread a light coat of grease over the Seal (5) and install it flat side first into the bore provided in the inside of the valve body. The flat side of the seal must seat completely into the small bore.
2. Install the Stem (6) in the Valve Body (4).
3. Insert the Spring (7) into the bore of the valve body so that it pilots over the spigot diameter of the end of the Pin (6).
4. Take the Valve (8) and insert it so that the spigot diameter pilots into the Spring (7).
5. Spread a thin coat of grease on the 'O' Ring (9) and install it in the groove provided in the Valve Seat (10).
6. Screw the Valve Seat (10) into the tapped hole provided in the bottom of the Valve Body (4).
7. Install the Spring (13) in the holes provided in the Valve Body (4).
8. Place the Handle (2) in position on the valve body and install Pin (3) to connect the handle to the valve body.
9. Connect the Chain Link Assembly (11) to the end of the Pin (6) and the Handle (2).

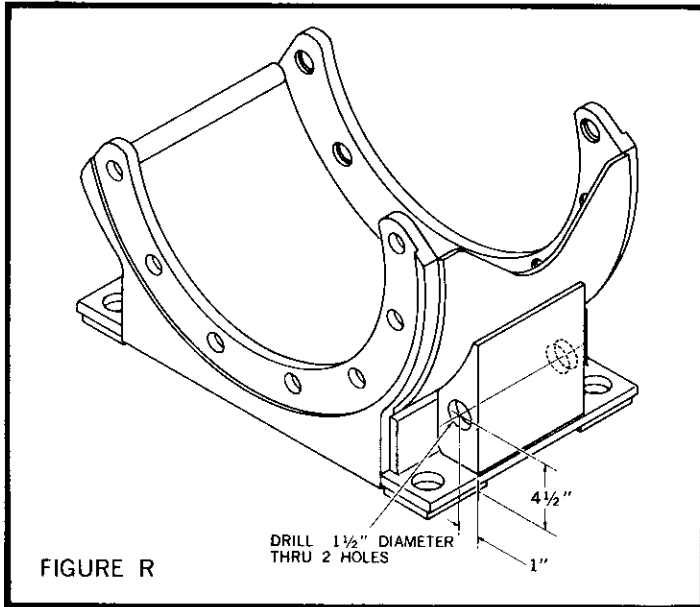
## TO ASSEMBLE THE PIPING TO THE FREE-FALL ASSEMBLY

### All Models

In assembling the piping for the free-fall assembly, lightly coat all pipe threads with a good quality pipe sealant. Piping for a particular model should be assembled exactly as shown on the piping assemblies.

## TO INSTALL A FREE-FALL FINAL DRIVE ASSEMBLY IN PLACE OF A CONVENTIONAL FINAL DRIVE

1. Remove the standard final drive assembly from the winch as per the instructions "To Remove The Final Drive Assembly" shown in the Winch Parts and Instruction Manual.
2. On older winches, two holes must be drilled in the winch base in order to fit the circulating line. These holes should be drilled as shown in Figure R.
3. Insert the free-fall model letter on the winch name plate in accordance with the Model Number Code on page 6.
4. Assemble the free-fall drive assembly to the winch, as explained in this manual on Page 30.



## TORQUE LOADING FOR FASTENERS

Part Number	Torque Load Lbs. Ft.
50608	17
50784	30
50729	30
50610	75
50612	150
51613	17
51612	17

## TROUBLE SHOOTING

Trouble	Probable Cause	Remedy
<p><b>A</b> Load cannot be lowered with good control.</p>	<ol style="list-style-type: none"> <li>1. Air is trapped in the brake release piston and control circuit.</li> <li>2. Load is greater than recommended in the specifications.</li> <li>3. Oil supply to control circuit is not according to specifications.</li> <li>4. Control lever is being moved with an uneven motion when starting and stopping the load.</li> <li>5. Winch is twisted on its mounting causing misalignment of the winch housings.</li> </ol>	<p>Bleed air from the control circuit as stated on Page 7 and 8.</p> <p>Check the weight of the load being lowered and refer to the specifications on Page 10.</p> <p>Disconnect the supply line to the free-fall control valve. Using a one gallon measure, and a stop watch, measure the flow of oil from the supply line. This should be between 1.4 and 1.6 GPM.</p> <p>Move the control lever slowly with a smooth motion.</p> <p>Refer to the Parts and Instruction Manual for the winch under the heading, "Check The Alignment of the Winch".</p>
<p><b>B</b> Winch will not hoist a load.</p> <p>or</p> <p>Brake will not stop a load when lowering.</p>	<ol style="list-style-type: none"> <li>1. Pressure is trapped in the brake release piston.</li> <li>2. Back pressure at point 'A' on Figures 'A' and 'B' is in excess of 150 PSI.</li> </ol>	<p>Check that control valve is in neutral. Check that the selector valve is not in the emergency free-fall position.</p> <p>Install a pressure gauge as shown in Figures A and B and read the pressure when the engine is run at full RPM. Check the flow in the control circuit as stated in the remedy for cause 3 trouble A.</p>

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