

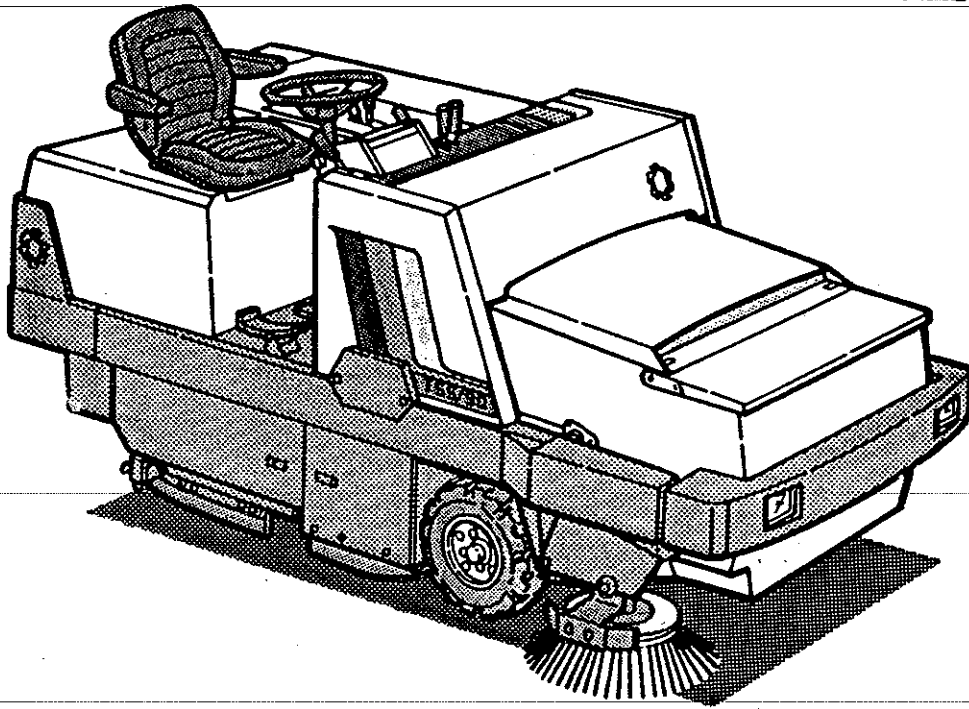
1989 80, 82, 90 SERIES UNITS

POWERBOSS™

SWEEPER/SCRUBBER

TSS/90 HC • TSS/90 • TSS/80
ISS/90 HC • ISS/90 • ISS/80
CSS/90 HC • CSS/90 • CSS/80

OPERATION MAINTENANCE PARTS



AAR BROOKS & PERKINS HANDLING TECHNOLOGIES DIVISION

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DECEMBER '89



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PowerBoss™

Sweeper/Scrubber

This manual contains information for several models of the Power Boss™ sweeper/scrubber. The combination of special features and options checked off below identifies your particular unit.

Use this page to determine what information in the manual is applicable to your sweeper/scrubber.

Unit Serial Number _____

- MODEL:**
- TSS/90 HC
 - TSS/90
 - TSS/80
 - ISS/90 HC
 - ISS/90
 - ISS/80
 - CSS/90 HC
 - CSS/90
 - CSS/80

- SCRUB BRUSH:**
- Nylon
 - Nylo-grit
 - Strato-grit

- SIDE BROOM:**
- Polypropolene
 - Nylon

- OPTIONS:**
- Power Packer™
 - Power Stacker™
 - Blower Attachment
 - Vacuum Wand Attachment
 - Snow Plow
 - Bucket Attachment
 - Overhead Guard
 - Side Scrub Brush
 - Side Sweep Broom
 - Side Broom Guard
 - Water Extension System
 - Wet-Sweep By-Pass
 - Water Recycling System
 - Squeegee Wand Attachment
 - Hopper Dolly
 - Lights
 - Cab
 - Cab Heater
 - Cab Defroster/Fan
 - Windshield Wiper
 - Cab Air Pressurizer
 - Fire In Hopper Indicator
 - Clogged Filter Indicator
 - Recovery Tank Warning
 - Solution Tank Warning
 - Hand Parking Brake
 - Timed Filter Shaker
 - Fire Extinguisher
 - Adjustable/Impact Seat
 - Stainless Steel Tanks
 - Vacuumized Side Broom
 - Heavy Duty Radiator
 - Automatic Engine Shutdown

- ENGINE:**
- Gasoline
 - LPG
 - Diesel

- ENGINE MANUFACTURE:**
- Ford (4 cylinder)
 - Toyota (4 cylinder)
 - Perkins (4 cylinder)
 - Kubota (4 cylinder)
 - Kubota (3 cylinder)

- HOPPER:**
- Multi-Level High Dump
 - Low Dump
 - Manual Lift Out

- TIRES:**
- Michelin Pneumatic
 - Solid
 - Solid Soft Shoe
 - Solid Nonmarking
 - Special Scrubber Compound

- MAIN-BROOM BRISTLES:**
- Nylon
 - Proex
 - Proex and Wire
 - Natural Fiber
 - Pure Nylon
 - Steel
 - Union Fiber & Wire Mix

(LIMITED) PRODUCT WARRANTY
(NORTH AMERICA ONLY)

AAR Brooks & Perkins Corp. (B&P) warrants that the PowerBoss® machine will be free from defects in material and workmanship for a period of 24 months or 2,000 operating hours on rider units, 12 months or 500 operating hours on walk-behind units from date of installation, whichever comes first. Written notice of any claimed defect must be given to B&P within the warranty period and within thirty (30) days after such defect is discovered. Liability under this warranty is limited to either replacing or repairing, at B&P's election, any part or parts deemed defective after examination by B&P or an Authorized Service Representative. Any PowerBoss® machine or any of its parts returned by customer to B&P or an Authorized Service Representative via prepaid transportation and which is found to be defective, will be repaired or replaced and returned to customer via prepaid surface transportation within the Continental U.S. On the other hand, should a part be found not defective, inspection and handling charges may be charged to the customer by B&P or an Authorized Service Representative.

For one hundred eighty (180) days from date of installation, B&P will provide repair labor, at no charge, solely through an Authorized Service Representative. Thereafter, labor will be charged.

This warranty does not extend to any PowerBoss® machine, or its parts, that have been subject to misuse, accident or improper handling, installation, maintenance or application, nor does it extend to PowerBoss® machine and/or parts which have been repaired or altered outside B&P's plant or the facility of Authorized Service Representative.

This warranty does not apply to routine wearable parts of the PowerBoss® machine such as brushes, flaps, filters, seals, points, plugs, hoses or similar items. Moreover, this warranty does not extend to any PowerBoss® machine or part replaced or repaired under this warranty.

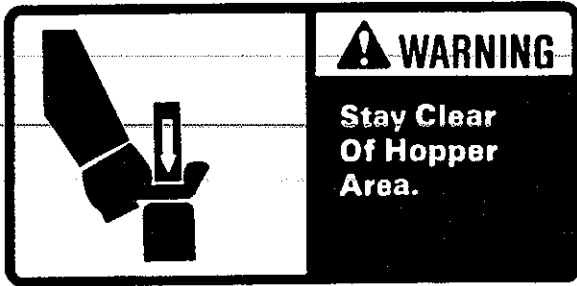
Only replacement parts supplied by B&P are warranted for 30 days after installation.

The warranty for optional engines shall be limited to the warranty extended to B&P by the supplier.

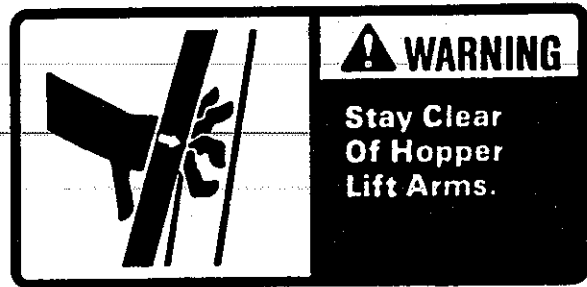
THE WARRANTY SET FORTH HEREIN IS IN LIEU OF AND EXCLUDES ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND CUSTOMER WAIVES ANY OBLIGATION OR LIABILITY OF B&P ARISING IN TORT OR STRICT LIABILITY IN TORT, OR FOR LOSS OR USE, REVENUE OR PROFIT WITH RESPECT TO PowerBoss® MACHINE AND/OR PARTS FOR ANY LIABILITY OF CUSTOMER TO ANY THIRD PARTY, OR FOR OTHER DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

SAFETY

High dump and low dump hopper



High dump hopper



GENERAL INSTRUCTIONS

To ensure the safety of both the operator and the equipment, the sweeper/scrubber should be operated and maintained by only trained authorized personnel. All malfunctioning equipment should be removed from service until any necessary repairs and adjustments have been completed.

The following DANGER, WARNING, CAUTION, and ATTENTION comments should be observed at all time.

! DANGER

1. Keep cigarettes, matches, and all other flame sources away from the sweeper/scrubber. Gasoline, LP gas, and diesel fuel are highly flammable. Lead acid batteries are equally dangerous due to the highly explosive hydrogen gas they emit.

! WARNING

1. Before starting the engine, make sure that:

- Your are securely seated in the operator's seat.
- The parking brake is locked.
- The directional control pedal is in neutral.
- The throttle is in idle.
- Hydraulic controls are in OFF position.

2. During operation:

- Keep your hands and body clear of moving parts, especially when the hopper or lift arms are partially or fully raised.
- Make sure others in the area stay clear of the equipment and moving parts.
- Never attempt to dump debris from a dock or mezzanine. Dump from ground level only.

3. When leaving the sweeper/scrubber unattended:

- Place the controls in OFF position.
- Set the parking brake.
- Shut off the engine.

4. During cleaning and maintenance:

- Always stop the engine and set the parking brake before servicing.
- Never use detergents or cleansers that are flammable or combustible.
- Never inflate a pneumatic tire without using a safety cage.
- Lock and support the scrubhead assembly in raised position.

NOTE: Later models with electric scrub head do not have a separate lock.

- Do not attempt any impeller adjustment unless you have shut of the engine. Never place your hands near the intake hoses or inlet when the engine is running.
- With *high dump models*, always engage the safety arm before getting under

SAFETY

the hopper. Do not rely on the hydraulic cylinder to keep the hopper raised.

5. When servicing or repairing the fuel system:

- Work in a properly ventilated area, do not smoke, or allow an open flame near the fuel system.
- Never bypass safety components unless you are testing them.
- Never bypass the fuel filter lock or oil pressure switch, except when testing them (and always reconnect them after testing).
- Wear gloves to disconnect the tank coupling.

6. Do not operate an LPG powered sweeper/scrubber when any component in the fuel system is malfunctioning or leaking.

7. Replace any defective safety components before operating the sweeper/scrubber.

 **CAUTION**

1. Do not drive with the hopper in the raised position except the few feet necessary to

position the hopper over the dumpster or receptacle. Driving with the hopper raised reduces visibility and creates conditions for striking overhead objects, throwing the machine off balance, and other hazards.

2. Travel slowly on grades.

3. Place a block or chock behind the wheels when parking on inclines.

4. Use special care when traveling on wet surfaces.

5. Observe all proper procedures for operation and maintenance of the sweeper/scrubber, as outlined in this manual.

6. Remain alert at all times to people and equipment in and around your area of operation.

ATTENTION!

1. Do not operate the #2 RTR lever before the #1 light illuminates.

SAFETY

SAFETY SYMBOLS

All PowerBoss™ sweepers and sweeper/scrubbers have been designed and built with safety as a top priority. The safety information given in this manual is for the protection of the operator, the maintenance people and the equipment. Notice and strictly adhere to all safety instruction given in this manual and on the sweeper/scrubber.

Listed below are five symbols and their meanings used in this manual. The symbols are listed in order of seriousness with the strongest listed first. However, all safety symbols and decals should be strictly observed to prevent personal harm or injury as well as damage to equipment.



DANGER: To warn of immediate hazards which will result in severe personal injury or death.



WARNING: To warn of hazards or unsafe practices which could result in severe personal injury or death.



CAUTION: To warn of hazards or unsafe practices which could result in minor personal injury.

ATTENTION!

ATTENTION! To warn of practices which could result in extensive equipment damage.

NOTE

NOTE To direct your attention to important equipment information or special instructions for preventing damage to equipment.

SAFETY DECALS

Decals directly attached to various parts of the sweeper/scrubber are highly visible safety reminders which should be read and observed. If decals become damaged or il-

legible replace immediately. The following are illustrations of the decals and their location on the sweeper/scrubber.

SAFETY

SAFETY DECALS

Drive compartment

⚠ CAUTION

For Your Safety And Safety Of Others:

1. **DO NOT Operate Machine:**
Unless Operation Manual Is Read And Understood.
Unless Authorized And Trained.
In Areas With Flammable Or Explosive Conditions.
Without Adequate Ventilation.
2. **Do Not Use Flammable Cleaning Materials.**
3. **Inspect Vehicle For Fuel Leakage.**
4. **Drive Slowly On Inclines And Slippery Surfaces.**
5. **Do Not Power Dump Hopper Unless Vehicle Is On A Level Surface.**
6. **Before Leaving Vehicle: Lock Parking Brake, Stop Engine, And Remove Key.**

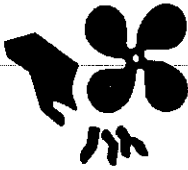
Solution tank

⚠ WARNING



Keep Away From Engine Fan.

Impeller



⚠ WARNING

Keep Hands Away From Vacuum Fan Inlet When Engine Is Running.

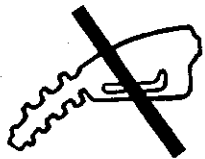
Impeller



⚠ WARNING

Keep Away From Fan Belt Drive.

Shroud of radiator

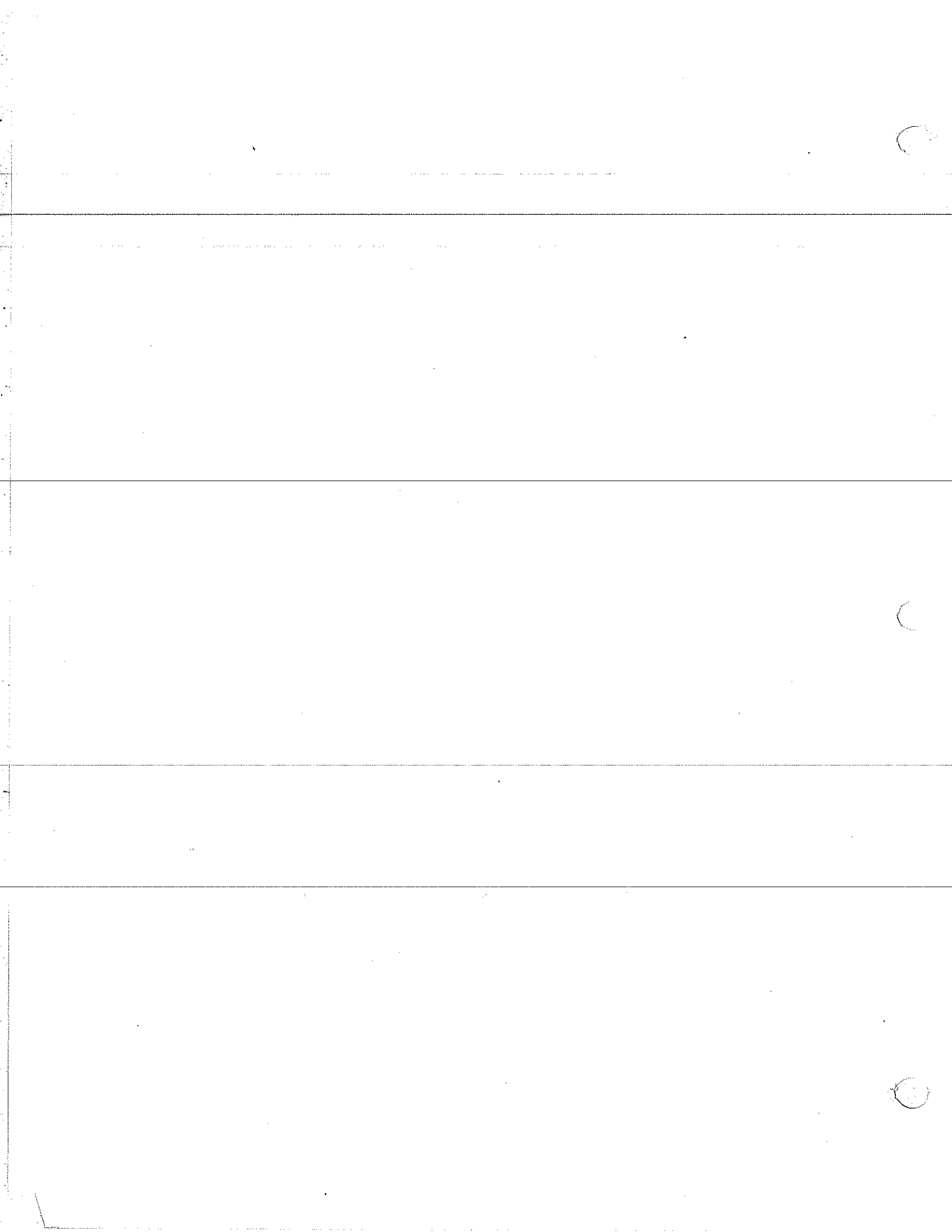


⚠ WARNING

No Gasoline Combustible Or Flammable Material In This Tank.

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1-1. General	1-1	1-6. Terms and Abbreviations	1-3
1-2. Scope	1-1		



INTRODUCTION

1-1. GENERAL. The PowerBoss™ sweeper/scrubber is a superior product, designed and built for the long haul. The PowerBoss™ sweeper/scrubber performs two jobs simultaneously doubling worker productivity. This is all accomplished with safety as the number one priority. To assure the safety of the operator and equipment follow all safety instructions exactly. The Safety instructions are found at the front of the manual.

1-2. SCOPE. This technical manual provides information to assist both the operator and maintenance personnel. The information is divided into the following sections:

Introduction The Introduction list each PowerBoss™ sweeper/scrubber covered in this manual and summarizes the special features they possess.

Specifications The Specifications section lists specifications for each model of the PowerBoss™ indicating capacities, capabilities, and other basic information.

Operation The Operation section locates and describes all controls and components on the PowerBoss™ as well as giving operating instructions for each.

Maintenance The Maintenance section contains preventive maintenance charts and service instructions for required maintenance tasks.

Troubleshooting The Troubleshooting section contains a troubleshooting chart to assist you in identifying and correcting problems which may occur during the operation of your equipment.

Parts The Parts section contains parts lists and exploded views of all machine components and options.

Manufacturer's Literature The Manufacturer's Literature section contains information supplied by manufactures for purchased parts and assemblies used on The PowerBoss™.

Service Bulletins This section is available to store all service Bulletins required to keep this manual up to date and accurate.

Index The Index contains an alphabetical listing of information found in this manual and a reference to the page on which that information can be found.

1-3. Nine models of PowerBoss™ sweeper/scrubbers as well as their options are covered in this manual, see figure 1-1. The information given in this manual is true for all models unless otherwise noted. Those models are:

Total Sweeper/Scrubbers:

TSS/90 HC
TSS/90
TSS/80

Intermediate Sweeper/Scrubbers:

ISS/90 HC
ISS/90
ISS/80

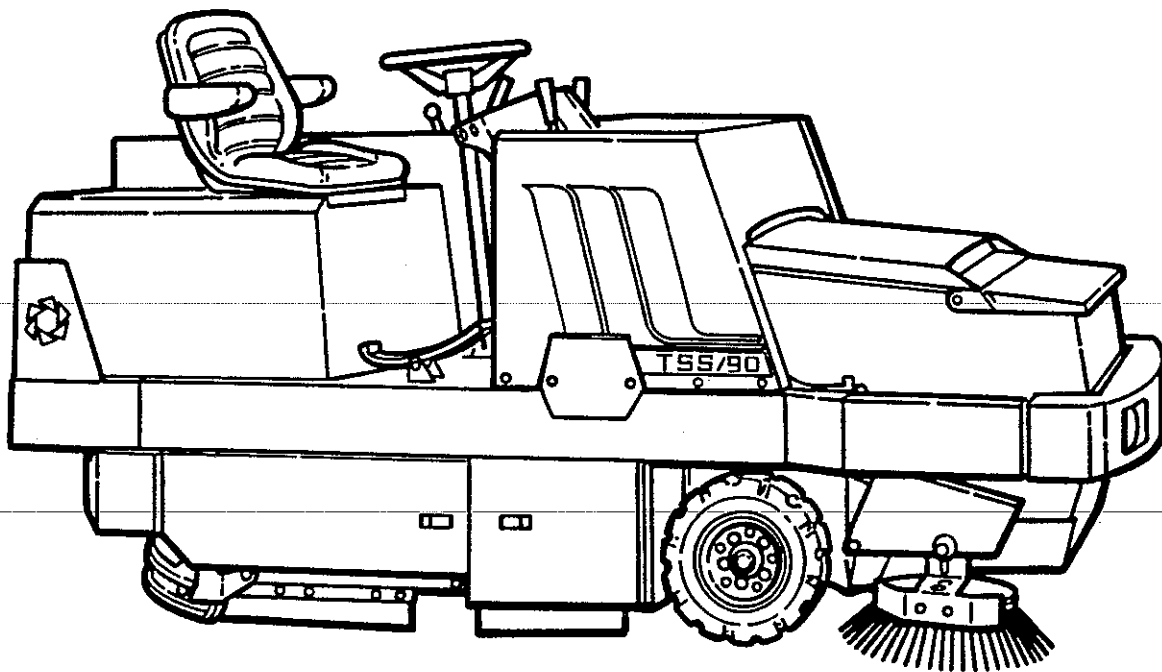
Conventional Sweeper/Scrubbers:

CSS/90 HC
CSS/90
CSS/80

1-4. **STANDARD FEATURES.** The PowerBoss™ combines all features necessary to make an efficient reliable product, see figure 1-2. The following lists contain those features which are standard.

1-5. The features listed below are standard on all units:

- Rugged one-piece unitized frame
- Reliable hydraulic drive with premium, easy to service components
- Transverse mid-engine design for stability



Sweeper/Scrubber
(with Side Broom)

Figure 1-1. The PowerBoss™

- Single rear wheel drive and steering for exceptional maneuverability
- Efficient and effective direct throw sweeping
- Squeegee automatically raises when unit backs up
- Parabolic squeegee for effective water pick up
- Four cylinder, liquid cooled engine
- Floating brooms, brushes, and squeegees for uneven surfaces
- Positive-seal, quick change filter
- Quick release squeegees and scrub brushes
- Oversize clean out doors on recovery tanks
- Application designed air system

1-6. TERMS AND ABBREVIATIONS. The following terms and abbreviations are used throughout this manual.

CSS	Conventional Sweeper/Scrubber
FS	Full Size
HC	High Capacity
HD	High Dump
ISS	Intermediate Sweeper/Scrubber
LD	Low Dump
LP	Liquid Propane
MS	Mid Size
RTR	Rotary Trash Relocator
TSS	Total Sweeper/Scrubber

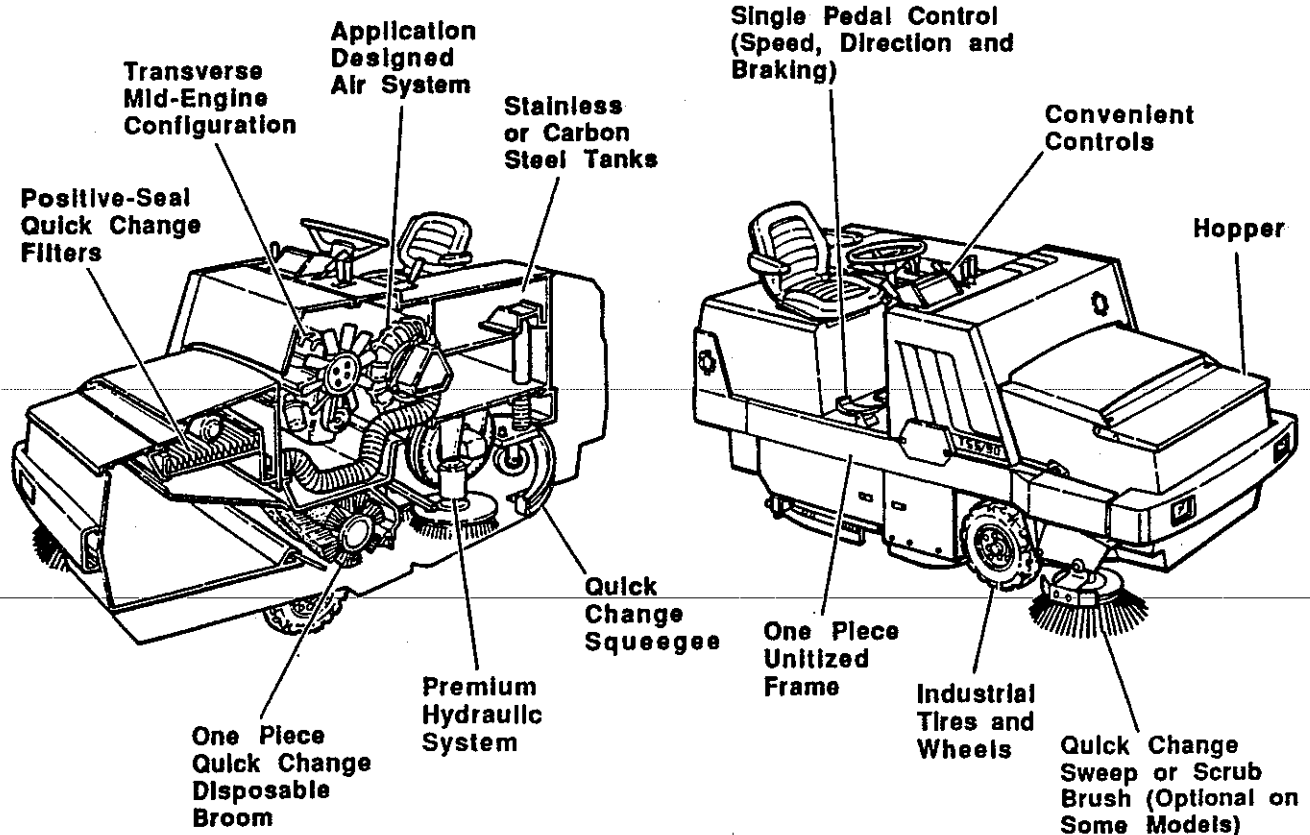


Figure 1-2. PowerBoss™ Features



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2-2. Model Specifications	2-1



SPECIFICATIONS

2-1. GENERAL. This section contains specifications for each of the nine models covered in this manual. The specifications are given for reference only. Refer to the operation and maintenance sections of this manual to find specific procedures and safety information.

2-2. MODEL SPECIFICATIONS. Specifications given in this section are in U.S. Customary units with metric equivalents in parentheses. An illustration of each model is shown along with the specifications, see figures 2-1 through 2-3.

2-3. Total Sweeper/Scrubber.

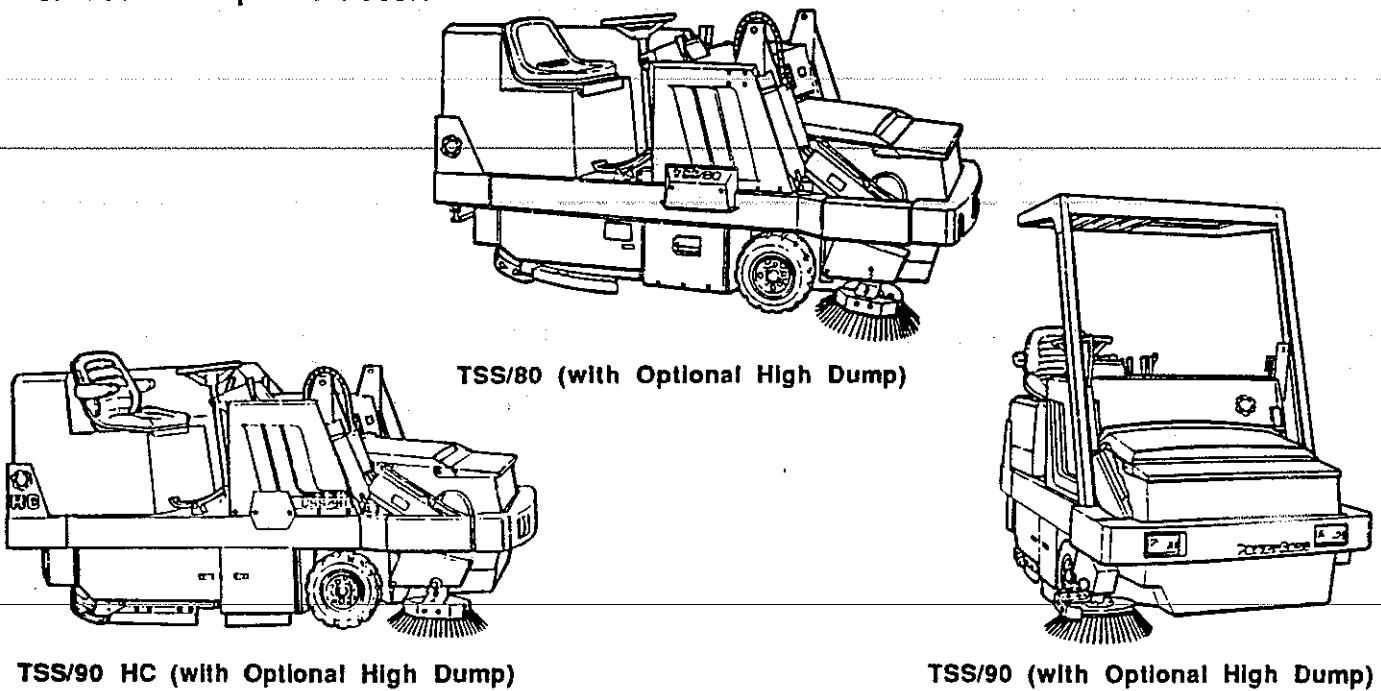


Figure 2-1. Total Sweeper/Scrubbers.

	TSS/90 HC	TSS/90	TSS/80
BRAKES:	Mechanical drum (Front two tires)	Mechanical drum (Front two tires)	Mechanical drum (Front two tires)
DIMENSIONS:			
Length	119.37 in (3032 mm)	115.37 in (2930 mm)	114.56 in (2910 mm)
Width	60.12 in (1527 mm)	60.12 in (1527 mm)	54.12 in (1375 mm)
Height	58.00 in (1473 mm)	57.00 in (1448 mm)	57.00 in (1448 mm)
Height (with over head guard)	87.00 (2210 mm)	87.00 in (2210 mm)	87.00 in (2210 mm)
Height (with cab)	83.50 in (2121 mm)	83.50 in (2121 mm)	83.50 in (2121 mm)
ENGINE:			
Gasoline	47.5HP (35.4 kw)	47.5HP (35.4 kw)	47.5HP (35.4 kw)
LPG	47.5HP (35.4 kw)	47.5HP (35.4 kw)	47.5HP (35.4 kw)
Diesel	46HP (34.3 kw)	46HP (34.3 kw)	32HP (23.9 kw)
FLUID CAPACITIES:			
Fuel tank	8 gal (30.3 l)	8 gal (30.3 l)	8 gal (30.3 l)
Radiator	3 qt (2.8 l)	3 qt (2.8 l)	3 qt (2.8 l)
Total coolant system	6 qt (5.7 l)	6 qt (5.7 l)	6 qt (5.7 l)
Hydraulic Fluid Reservoir	6 gal (22.7 l)	6 gal (22.7 l)	6 gal (22.7 l)
FRAME:	Unitized construction, 3/16 inch (4.8 mm) steel plate (Reinforced at stress points)		
HOPPER:			
Volume	16 ft ³ (.45 m ³)	16 ft ³ (.45 m ³)	14 ft ³ (.39 m ³)

	TSS/90 HC	TSS/90	TSS/80
Weight limit Multi-level high dump [60 inch (1524 mm) max. height]	1200-lb (544-kg) Optional	1200-lb (544-kg) Optional	1000-lb (454-kg) Optional
HYDRAULICS: Wheel motor Broom & brush motors Propulsion pump Accessories pump Directional control valve System filter Heat exchanger	Char-Lynn 4000 Series (15 in ³ /rev) Char-Lynn H Series Cessna Vari-displacement Piston Pump (1.24 in ³ /rev) Cessna gear pump (.84 in ³) Cessna Donaldson 10 micron One-piece tubular coil	Char-Lynn 4000 Series (15 in ³ /rev) Char-Lynn H Series Cessna gear pump (.84 in ³) Cessna Donaldson 10 micron One-piece tubular coil	Char-Lynn 4000 Series (15 in ³ /rev) Char-Lynn H Series Cessna gear pump (.84 in ³) Cessna Donaldson 10 micron One-piece tubular coil
RECOVERY TANK CAPACITY:	100 gal (378.5 l)	60 gal (227 l)	65 gal (246 l)
SCRUBBING: Main scrub brushes (diameter) Side scrub brushes (diameter) Scrub path Scrub path [with side scrub brush] Scrub coverage (4 inch over lap at 4 mph[area/hour]) Scrub coverage (with side scrub brush)	16 in (406 mm) 16 in (406 mm) 48 in (1219 mm) 56 in (1422 mm) 77,500 ft ² (7200 m ²) 91,500 ft ² (8500 m ²)	16 in (406 m) 16 in (406 m) 48 in (1219 mm) 56 in (1422 mm) 77,500 ft ² (7200 m ²) 91,500 ft ² (8500 m ²)	14 in (356 mm) 14 in (356 mm) 42 in (1067 mm) 50 in (1270 mm) 67,000 ft ² (6224 m ²) 77,500 ft ² (7200 m ²)
SOLUTION TANK:	100 gal (378.5 l)	65 gal (246 l)	68 gal (257 l)
SQUEEGEE: Rear	50 in (1270 mm)	50 in (1270 mm)	44 in (1118 mm)
STEERING:	Cam and lever (Rear wheel)	Cam and lever (Rear wheel)	Cam and lever (Rear wheel)
SWEEPING: Main broom (diameter) Side broom (diameter) Sweep path (main broom) Sweep path (with side broom) Sweep coverage Sweep coverage (with side broom) (area/hour) (6 inch over lap at 7.5 mph)	14 in (356 mm) 24 in (610 mm) 48 in (1219 mm) 60 in (1524 mm) 138,600 ft ² (12876 m ²) 178,000 ft ² (16536 m ²)	14 in (356 mm) 24 in (610 mm) 48 in (1219 mm) 60 in (1524 mm) 138,600 ft ² (12876 m ²) 178,000 ft ² (16536 m ²)	14 in (356 mm) 24 in (610 mm) 42 in (1067 mm) 54 in (1372 mm) 118,800 ft ² (11036 m ²) 154,000 ft ² (14715 m ²)
TIRES (diameter):	16 in (406 mm)	16 in (406 mm)	16 in (406 mm)
TURNING RADIUS (Left Hand):	85.75 in (2178 mm)	82 in (2083 mm)	81 in (2057 mm)
VACUUM SYSTEM: Impeller	High-speed 9 in (228 mm)	High-speed 9 in (228 mm)	High-speed 9 in (228 mm)
WEIGHT: Net (Low Dump) Net (High Dump) Shipping (Low Dump) Shipping (High Dump)	3475 lb (1576 kg) 3800 lb (1724 kg) 3875 lb (1758 kg) 4200 lb (1905 kg)	3375 lb (1531 kg) 3700 lb (1678 kg) 3775 lb (1712 kg) 4100 lb (1860 kg)	3300 lb (1497 kg) 3600 lb (1633 kg) 3700 lb (1678 kg) 4000 lb (1814 kg)

2-4. Intermediate Sweeper/Scrubber.

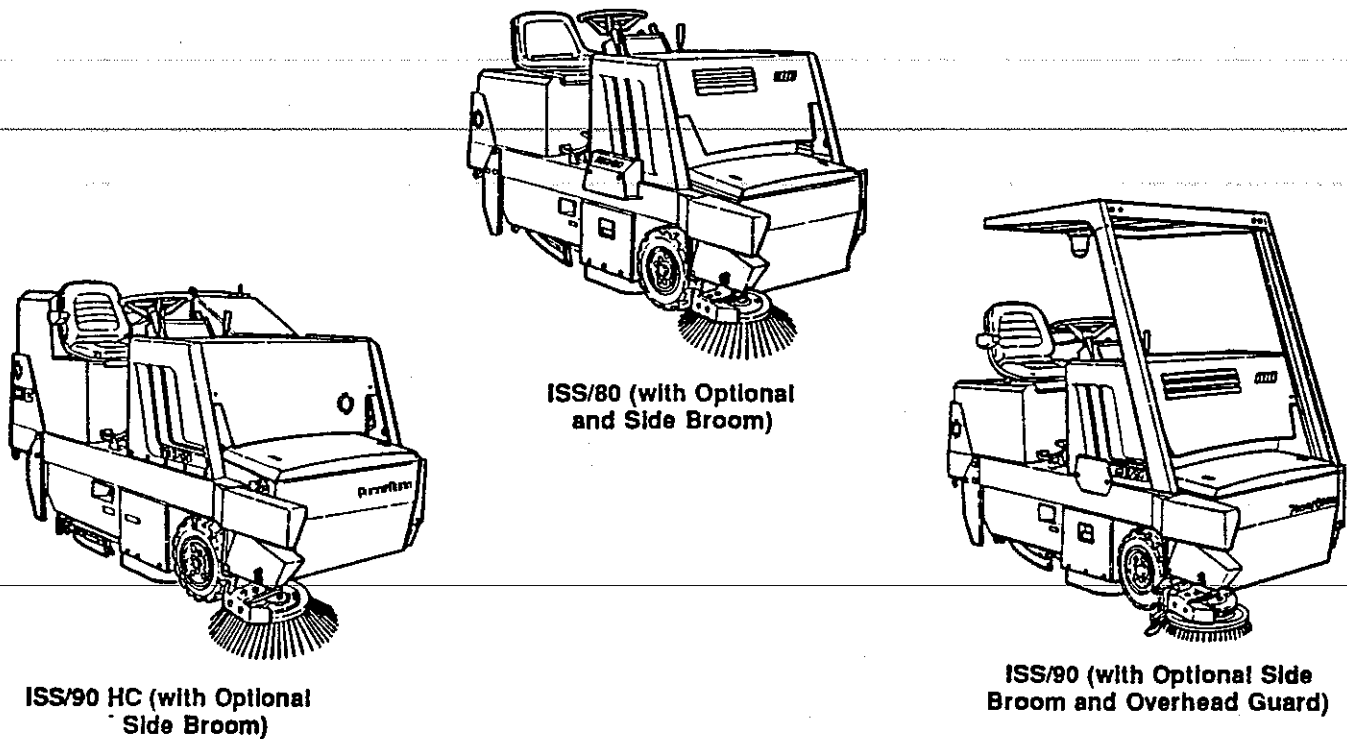


Figure 2-2. Intermediate Sweeper/Scrubbers.

	ISS/90 HC	ISS/90	ISS/80
BRAKES:	Mechanical drum (Front two tires)	Mechanical drum (Front two tires)	Mechanical drum (Front two tires)
DIMENSIONS:			
Length	95 in (2413 mm)	91 in (2311 mm)	91 in (2311 mm)
Width	54 in (1372 mm)	54 in (1372 mm)	48 in (1218 mm)
Height	58 in (1473 mm)	57 in (1448 mm)	57 in (1448 mm)
Height (with over head guard)	87 in (2210 mm)	87 in (2010 mm)	87 in (2210 mm)
Height (with cap)	83.5 in (2121 mm)	83.5 in (2121 mm)	83.5 in (2121 mm)
ENGINE:			
Gasoline	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)
LPG	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)
Diesel	46.0 HP (34.3 kw)	46.0 HP (34.3 kw)	32 HP (23.9 kw)
FLUID CAPACITIES:			
Fuel tank	8 gal (30.3 l)	8 gal (30.3 l)	8 gal (30.3 l)
Radiator	3 qt (2.8 l)	3 qt (2.8 l)	3 qt (2.8 l)
Total coolant system	6 qt (5.7 l)	6 qt (5.7 l)	6 qt (5.7 l)
Hydraulic Fluid Reservoir	6 gal (22.7 l)	6 gal (22.7 l)	6 gal (22.7 l)
FRAME:	Unitized construction, 3/16 inch (4.8 mm) steel plate (Reinforced at stress points)		

	ISS/90 HC	ISS/90	ISS/80
HOPPER:			
Volume	7 ft ³ (.2 m ³)	7 ft ³ (.2 m ³)	6 ft ³ (.17 m ³)
Weight limit	400 lb (181 kg)	400 lb (181 kg)	300 lb (136 kg)
Low dump	Standard	Standard	Standard
HYDRAULICS:			
Wheel motor	Char-Lynn 4000 Series (15 in ³ /rev)	Char-Lynn 4000 Series (15 in ³ /rev)	Char-Lynn 4000 series (15 in ³ /rev)
Broom & Brush	Char-Lynn H series	Char-Lynn H series	Char-Lyn H series
Propulsion pump	Cessna Vari-displacement Piston Pump (12.4 in ³ /rev)		
Accessories pump	Cessna (.84 in ³ /rev)	Cessna (.84 in ³ /rev)	Cessna (.84 in ³ /rev)
Directional control valve	Cessna	Cessna	Cessna
System filter	Donaldson 10 micron	Donaldson 10 micron	Donaldson 10 micron
Heat exchanger	One-piece tubular coil	One-piece tubular coil	One-piece tubular coil
RECOVERY TANK CAPACITY:	100 gal (378.5 l)	60 gal (227 l)	65 gal (246 l)
SCRUBBING:			
Main Scrub brushes (diameter)	16 in (406 mm)	16 in (406 mm)	14 in (356 mm)
Side Scrub brushes (diameter)	16 in (406 mm)	16 in (406 mm)	14 in (356 mm)
Scrub path	48 in (1219 mm)	48 in (1219 mm)	42 in (1067 mm)
Scrub path (with side scrub brushes)	56 in (1422 mm)	56 in (1422 mm)	50 in (1270 mm)
Scrub coverage [[4 inch over lap at 4 mph (area/hour)]]	77,500 ft ² (7200 m ²)	77,500 ft ² (7200 m ²)	67,000 ft ² (6224 m ²)
Scrub coverage (with side scrub brush)	91,500 in (8500m ²)	91,500 ft (8500 m ²)	77,500 ft ² (7200 m ²)
SOLUTION TANK:	100 gal (378.5 l)	65 gal (246 l)	68 gal (257 l)
SQUEEGEE:			
Rear	50 in (1270 mm)	50 in (1270 mm)	44 in (1118 mm)
STEERING:	Cam and lever (Rear wheel)	Cam and lever (Rear wheel)	Cam and lever (Rear wheel)
SWEEPING:			
Main broom (diameter)	14 in (356 mm)	14 in (356 mm)	14 in (356 mm)
Side broom (diameter)	24 in (610 mm)	24 in (610 mm)	24 in (610 mm)
Sweep path (main broom)	48 in (1219 mm)	48 in (1219 mm)	42 in (1067 mm)
Sweep path (with side broom)	60 in (1524 mm)	60 in (1524 mm)	54 in (1372 mm)
Sweep coverage	75,500 ft ² (7200 m ²)	77,500 ft ² (7200 m ²)	67,000 ft ² (6224 m ²)
Sweep coverage (with side broom) (area/hr) (6 inch over lap at 4 mph)	95,000 ft ² (8825 m ²)	95,000 ft ² (8825 m ²)	77,500 ft ² (7200 m ²)
TIRES (diameter):	16 in (406 mm)	16 in (406 mm)	16 in (406 mm)
TURNING RADIUS (Left Hand):	85.75 in (2178 mm)	82 in (2083 mm)	81 in (2057 mm)
VACUUM SYSTEM:			
Impeller	High-speed 9 in (228 mm)	High-speed 9 in (228 mm)	High-speed 9 in (228 mm)
WEIGHT:			
Net	3300 lb (1497 kg)	3200 lb (1452 kg)	3100 lb (1406 kg)
Shipping	3700 lb (1678 kg)	3600 lb (1633 kg)	3500 lb (1588 kg)

2-5. Conventional Sweeper/Scrubbers.

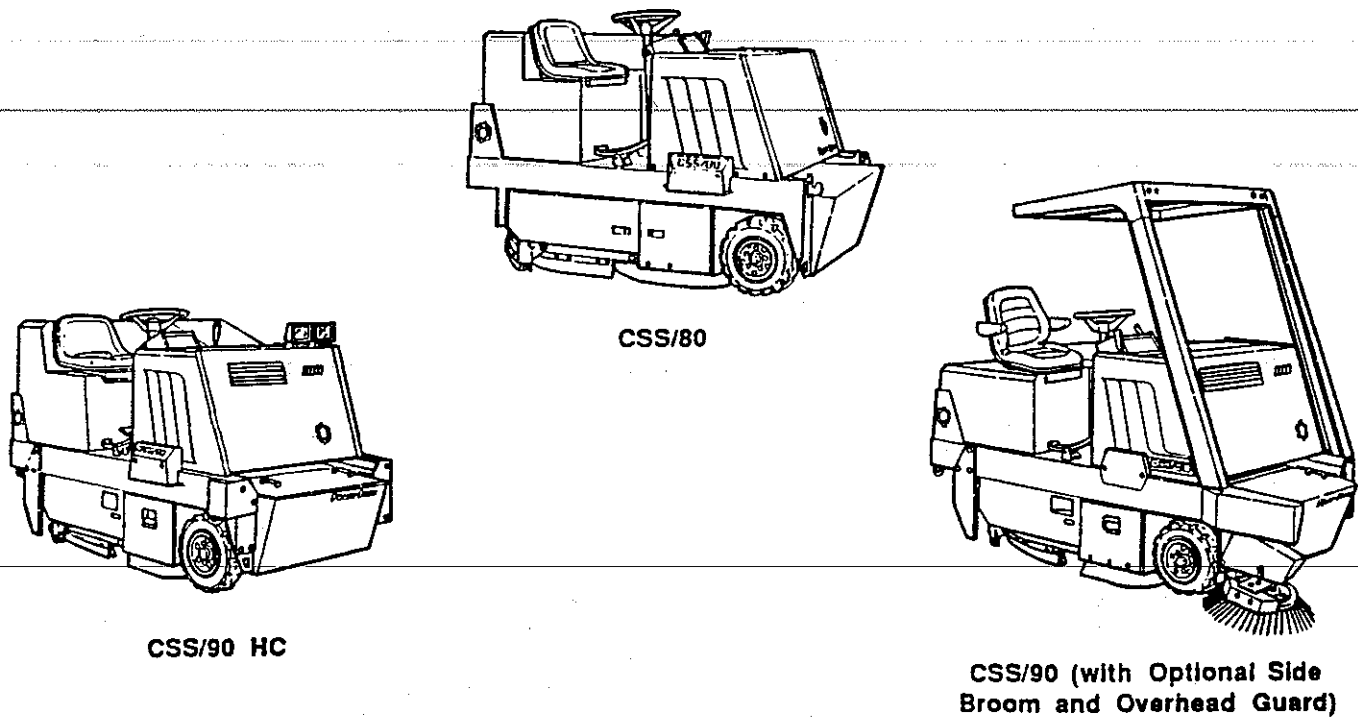


Figure 2-3. Conventional Sweeper/Scrubbers.

	CSS/90 HC	CSS/90	CSS/80
BRAKES:	Mechanical drum (Front two tires)	Mechanical drum (Front two tires)	Mechanical drum (Front two tires)
DIMENSIONS:			
Length	95 in (2413 mm)	91 in (2311 mm)	91 in (2311 mm)
Width	54 in (1372 mm)	54 in (1372 mm)	48 in (1219 mm)
Height	58 in (1473 mm)	57 in (1448 mm)	57 in (1448 mm)
Height (with over head guard)	87 in (2210 mm)	87 in (2010 mm)	87 in (2210 mm)
Height (with cap)	83.5 in (2121 mm)	83.5 in (2121 mm)	83.5 in (2121 mm)
ENGINE:			
Gasoline	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)
LPG	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)
Diesel	46.0 HP (34.3 kw)	46.0 HP (34.3 kw)	32 HP (23.9 kw)
FLUID CAPACITIES:			
Fuel tank	8 gal (30.3 l)	8 gal (30.3 l)	8 gal (30.3 l)
Radiator	3 qt (2.8 l)	3 qt (2.8 l)	3 qt (2.8 l)
Total coolant system	6 qt (5.7 l)	6 qt (5.7 l)	6 qt (5.7 l)
Hydraulic Fluid Reservoir	6 gal (22.7 l)	6 gal (22.7 l)	6 gal (22.7 l)
FRAME:	Unitized construction, 3/16 in (4.8 mm) steel plate (Reinforced at stress points)		

	CSS/90 HC	CSS/90	CSS/80
HOPPER:			
Volume	6 ft ³ (.17 m ³)	6 ft ³ (.17 m ³)	5 ft ³ (.14 m ³)
Weight limit	-	-	-
Manual lift out	Standard	Standard	Standard
HYDRAULICS:			
Wheel motor	Char-Lynn 4000 Series (15 in ³ /rev)	Char-Lynn 4000 Series (15 in ³ /rev)	Char-Lynn 4000 series (15 in ³ /rev)
Broom & Brush	Char-Lynn H series	Char-Lynn H series	Char-Lynn H series
Propulsion pump	Cessna Vari-displacement Piston Pump (12.4 in ³ /rev)		
Accessories pump	Cessna (.84 in ³ /rev)	Cessna (.84 in ³ /rev)	Cessna .84 in ³ /rev
Directional control valve	Cessna	Cessna	Cessna
System filter	Donaldson 10 micron	Donaldson 10 micron	Donaldson 10 micron
Heat exchanger	One-piece tubular coil	One-piece tubular coil	One-piece tubular coil
RECOVERY TANK CAPACITY:	100 gal (378.5 l)	60 gal (227 l)	65 gal (246 l)
SCRUBBING:			
Main Scrub brushes (diameter)	16 in (406 mm)	16 in (406 mm)	14 in (356 mm)
Side Scrub brushes (diameter)	16 in (406 mm)	16 in (406 mm)	14 in (356 mm)
Scrub path	48 in (1219 mm)	48 in (1219 mm)	42 in (1067 mm)
Scrub path (with side scrub brushes)	56 in (1422 mm)	56 in (1422 mm)	50 in (1270 mm)
Scrub coverage (4 inch over lap at 4 mph (area/hour))	77,500 ft ² (7200 m ²)	77,500 ft ² (7200 m ²)	67,000 ft ² (6224 m ²)
Scrub coverage (with side scrub brush)	91,500 in (8500m ²)	91,500 ft (8500 m ²)	77,500 ft ² (7200 m ²)
SOLUTION TANK:	100 gal (378.5 l)	65 gal (246 l)	68 gal (257 l)
SQUEEGEE:			
Rear	50 in (1270 mm)	50 in (1270 mm)	44 in (1118 mm)
STEERING:	Cam and lever (Rear wheel)	Cam and lever (Rear wheel)	Cam and lever (Rear wheel)
SWEEPING:			
Main broom (diameter)	14 in (356 mm)	14 in (356 mm)	14 in (356 mm)
Side broom (diameter)	24 in (610 mm)	24 in (610 mm)	24 in (610 mm)
Sweep path (main broom)	48 in (1219 mm)	48 in (1219 mm)	42 in (1067 mm)
Sweep path (with side broom)	60 in (1524 mm)	60 in (1524 mm)	54 in (1372 mm)
Sweep coverage	77,500 ft ² (7200 m ²)	77,500 ft ² (7200 m ²)	67,000 ft ² (6224 m ²)
Sweep coverage (with side broom) (area/hr) (6 inch over lap at 7.5 mph)	95,000 ft ² (8825 m ²)	95,000 ft ² (8825 m ²)	77,500 ft ² (7200 m ²)
TIRES (diameter):	16 in (406 mm)	16 in (406 mm)	16 in (406 mm)
TURNING RADIUS (Left Hand):	85.75 in (2178 mm)	82 in (2083 mm)	81 in (2057 mm)
VACUUM SYSTEM:			
Impeller	High-speed 9 in (228 mm)	High-speed 9 in (228 mm)	High-speed 9 in (228 mm)
WEIGHT:			
Net	2950 lb (1338 kg)	2850 lb (1293 kg)	2800 lb (1270 kg)
Shipping	3450 lb (1565 kg)	3250 lb (1474 kg)	3200 lb (1452 kg)

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PowerBoss™

OPERATION

3-1. GENERAL. This section contains operating instructions for nine models of the PowerBoss™ sweeper/scrubbers and their available options. Disregard any information which does not pertain to your model. Read this entire section before attempting to operate the sweeper/scrubber. Then follow all operating instruction exactly to assure the safety and long life of this product.

3-2. THEORY OF OPERATION. PowerBoss™ sweeper/scrubbers combine two separate functions in one unit: sweeping and scrubbing. The *sweeping system* using a main broom, a side broom (optional on some models) and an application designed air system cleans surfaces thoroughly and efficiently without creating a dust problem. The side broom creates a wider sweeping path by pushing dirt and debris into the path of the main broom. The main broom then throws all dirt

and debris in its path into the hopper. The *scrubbing system* takes water (with soap) from the solution tank and puts it on the floor where the scrub brushes do the cleaning. Then the vacuum system, with the help of the squeegees, picks up the water and puts it into the recovery tank leaving the floor virtually dry.

3-3. The two functions sweeping and scrubbing can be used individually or in combination such as: sweeping, scrubbing, double-scrubbing or sweeping/scrubbing. This makes the PowerBoss™ the most efficient, economical, and versatile unit available.

3-4. MAJOR COMPONENTS. A brief explanation of all major components and systems is provided in the following paragraphs. For the location of major components see figure 3-1.

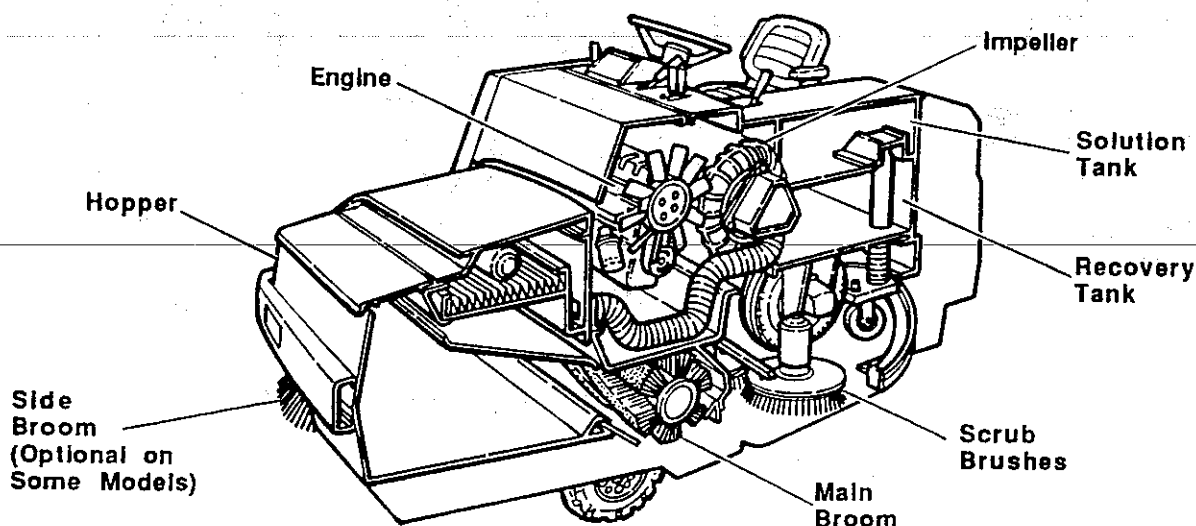


Figure 3-1. Major Components

3-5. Air Intake System. Engines are equipped with a dry cartridge type air filter with a rubber dust cup in the housing. The filters are readily accessible for easy removal and cleaning. All engines have two-stages Donaldson filters.

3-6. Coolant System. Engine coolant is stored in a three quart radiator and circulates through the hoses and engine block which bring the total system capacity to six quarts. A spring-loaded valve in the radiator pressure cap, designed to open at 14 psi, closes the outlet to the overflow pipe.

3-7. Electrical System.

3-8. Battery. The battery has 12 volts, 325 cold cranking amps and is maintenance free.

3-9. Fuses. The fuses are located in four fuse holders on the instrument control panel, see figure 3-2.

3-10. Instruments. Gauges and indicator lights include an ammeter, hour meter, fuel gauge, oil pressure gauge, water temperature indicator and scrubhead position indicator when equipped. For descriptions of these basic instruments and various accessory instruments, refer to paragraph 3-47.

3-11. Scrubhead Lift Actuator. On all scrubbers, a scrubhead down pressure gauge is supplied to indicate to the operator when the scrub brushes touch the floor and visually displays how much pressure is being applied to the floor. It also indicates when the brushes are raised.

- | | | | |
|----|--------|---|--|
| 1. | 30 amp | - | Main Fuse |
| 2. | 20 amp | - | Filter Shaker Motors,
Horn, Fuel Gauge,
Option Connector |
| 3. | 15 amp | - | Oil Pressure Gauge,
Water Temperature
Gauge, Hour Meter |
| 4. | 15 amp | - | Head Lights, Tail Lights,
Gauge Lights |

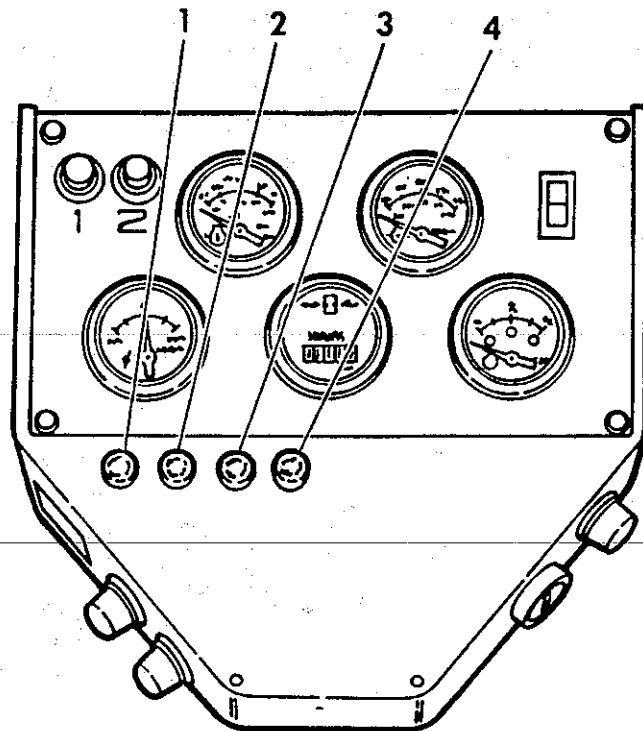


Figure 3-2. Fuses

3-12. Engine. Engines on the PowerBoss™ have the following features: 4 cylinder, liquid cooled, electric start and transverse mid-engine design.

3-13. Gasoline Engines.

90 Series - 47.5 HP
80 Series - 47.5 HP

3-14. Diesel Engines.

90 Series - 46 HP
80 Series - 32 HP

3-15. For additional information on a specific engine refer to the manufacturer's literature furnished in this manual.

3-16. Fuel System. Fuel from the 8-gallon capacity tank moves through the disposable inline filters to the engine. The fuel supply is monitored by a fuel gauge. Fuel system characteristics of gasoline, LPG, and diesel engines are listed below.

3-17. Gasoline. Major fuel system components for gasoline fueled engines are:

- Fuel tank
- Fuel filter
- Mechanical fuel pump
- Carburetor
- Manually operated carburetor choke

3-18. Liquid Propane Gas (LPG). Major fuel system components for LPG fueled engines are:

- Fuel tank
- Pressure relief valve/fuel filter
- Vacuum lock off valve
- Combination water heated vaporizer and primary regulator
- Combination carburetor and secondary regulator

3-19. Diesel. Major fuel system components for diesel fueled engines are.

- Fuel tank
- Fuel water trap
- Fuel filter
- Fuel lift pump
- Fuel injection pump
- Fuel injectors

3-20. Hoppers. To contain dust and fine debris within the hopper all machines are equipped with both a frame seal and side seals.

3-21. High-Dump models have hoppers made of 12 GA steel.

3-22. Low-Dump models have hoppers made of 12 GA steel.

3-23. Manual Lift Out Hoppers are constructed from aluminium.

3-24. Rotary Trash Relocator. The rotary trash relocater (RTR®) on high dump models increases the debris holding capacity of the hopper extending the sweeping time before dumping. By rotating the hopper about halfway through the dump rotation, the debris at the lip of the hopper moves to the front wall, leaving the entrance area clear to receive and hold more debris.

3-25. Hydraulic System. Hydraulic fluid is pumped from an eight-gallon capacity reservoir. The fluid passes through a 100 mesh suction strainer into supply lines which circulate fluid through two systems: the propulsion system and the accessory system. Fluid returns through a heat exchanger and a filter equipped with a condition gauge.

3-26. Propelling System. The major component of the propelling system is a variable displacement piston pump protected by relief valves. The pump

sends fluid to drive the wheel motor which controls the forward and reverse speed of the machine, as well as dynamic braking.

3-27. Accessories System. The major component of the accessories system is a gear pump. The gear pump protected by a relief valve sends fluid through a control valve to raise and lower the hopper, to rotate the hopper (on high dump models), and to drive brooms, brushes and other accessories. Brooms and brushes are driven by Gerotor-type high torque, low speed motors. Hopper is raised, lowered, and rotated (on multi-level high dump) by hydraulic cylinders.

3-28. Lubrication System. Grease fittings are located in the following areas:

- Impeller bearing housing
- Steering link arm
- Steering fork assembly
- Pillow blocks supporting dump arms

3-29. For detailed information on lubrication requirements and the lubrication points and grease fittings, refer to the Maintenance section of this manual.

3-30. Scrub and Water Pick-Up Components. The PowerBoss™ sweeper/scrubbers have three rotary quick change scrub brushes. An optional side scrub brush is available for all scrubber models, providing a wider scrub path.

3-31. Water Pick-Up Components. Two side squeegees and one main rear squeegee provide water pick-up. The side squeegees keep the water in front of the main squeegee and control water during turns.

3-32. Capabilities. Scrub paths and coverages are listed by model in the Specifications section of this manual.

3-33. Steering, Brakes, and Tires.

3-34. Steering. PowerBoss™ sweeper/scrubbers are designed with standard cam and lever steering through the rear wheel.

3-35. Brakes. PowerBoss™ sweeper/scrubbers are equipped with a parking brake, mechanically operated by a cable which connects to drum brakes on the two front wheels.

3-36. Tires. PowerBoss™ sweeper/scrubbers use an interchangeable, two-piece, bolt together cast rim for mounting tires. For more detailed information related to dimensions and pressure requirements, refer to the Specifications and Maintenance sections of this manual.

3-37. Sweep Components. Together the brooms and skirt take dirt debris and litter from the floor and throw it into the hopper.

3-38. Main Broom. The main broom has the following features:

- One-piece, cylindrical, and disposable
- Runs at constant RPM
- Can be changed in less than five minutes
- Is raised and lowered from operator compartment
- Floats for uneven surfaces
- Adjusts for pressure and wear

3-39. Side Broom. The rotary one-piece disposable side broom on TSS model (optional on ISS and CSS models) can be quickly changed in seconds without tools. It is bumper protected, and adjustable for angle, pressure, and wear.

3-40. Skirts. Skirts on the bottom of each broom door and at the back of the broom chamber help contain the dust inside the sweeping and vacuuming compartment.

3-41. Capabilities. Sweep paths and coverages are listed by model in the Specifications section of this manual.

3-42. Tanks. Solution and recovery tanks are housed in the same unit. The recovery tank is equipped with over-sized clean out doors to facilitate draining and sludge removal. The drain hose for the recovery tank is located inside the left scrubhead access door on its storage bracket.

3-43. Capacities. Size and capabilities of hopper and tanks vary and are listed by model in the Specification section of this manual.

3-44. Vacuum System. The vacuum system is comprised of an impeller, belts, filters and shakers.

3-45. Impeller and Belts. The vacuum system operates from three basic components: one high speed 9 inch belt driven impeller and two hoses (one to the hopper and one to the recovery tank). The impeller provides water pickup through the rear squeegee and dust control from the filters in the hopper. The air is expelled over the heat exchanger outside the engine compartment.

3-46. Filter and Shakers. ISS and TSS models are equipped with a manifold which controls dust and water pickup. The air flow bias is operated from the drive compartment.

- *TSS models* have two fully enclosed, positive sealed, quick-change filters providing 100 sq. ft. of filtering area and two electric shakers for cleaning the filters.
- *ISS models* have one fully enclosed, positive sealed, quick-change filter providing 50 sq. ft. of filtering area and an electric shaker for cleaning the filter.

3-47. CONTROLS AND INDICATORS. All controls and indicators are highly visible and conveniently located for operator use. The operation of all controls is explained later in this section. The

following is a list of all controls and indicators with a brief description, see figure 3-3 for locations.

3-48. Air Control Knob (TSS and ISS Only). The air control knob is located beneath the choke knob on gasoline-fueled machines and beneath the engine stop knob on diesel-fueled machines. This knob should remain pushed all the way in for normal sweeping and scrubbing. In heavy dust conditions or when sweeping outdoors, pull the knob all the way out to divert all vacuum for sweeping.

3-49. Ammeter. The ammeter indicates the charging current which is being sent to the battery by the alternator. It also indicates the discharge of current being used by the sweeper/scrubber when the alternator is not charging.

3-50. Blower Control. To activate the blower pull out on blower control knob.

3-51. Brake Pedal. The mechanical drum brakes on the two front wheels are used primarily for parking the machine and are operated by the brake pedal. Always chock wheels if machine is parked on an incline.

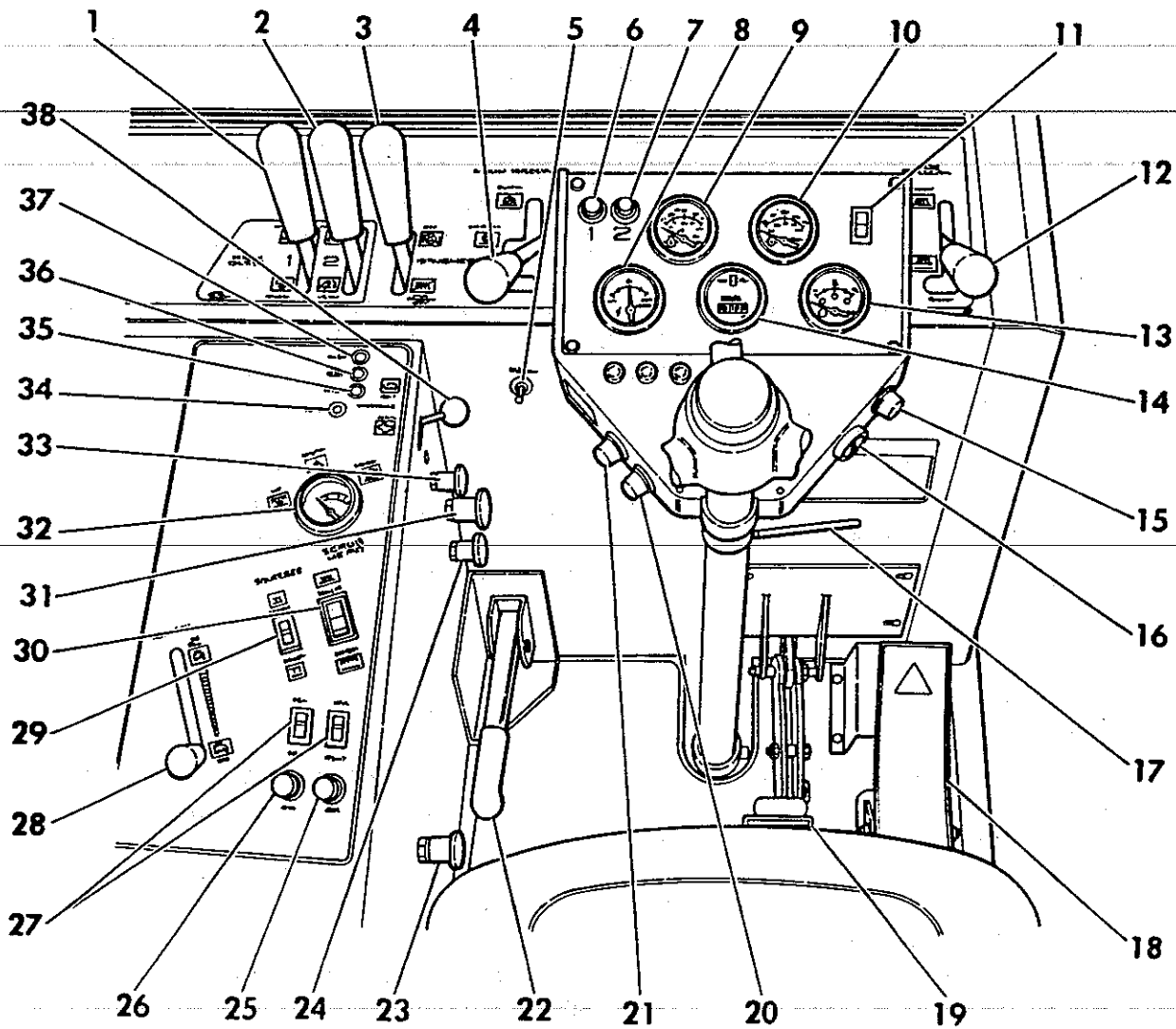
3-52. Broom and Brush Control Lever. The broom and brush control lever to the left of the main broom handle activates the brooms and scrub brushes. Even though both brooms and brushes are rotating each can be lowered independently.

3-53. Cab Fan Switch. This switch turns the fan on and off.

3-54. Cab Heater Switch. This switch turns the cab heater fan on and off.

3-55. Cab Pressurizer Control. This switch activates the cap pressurizer.

3-56. Choke Knob. The choke knob on gasoline-powered machines is connected to a cable which controls the engine choke.



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|--|---------------------------------|--|
| 1. Hopper Lever 1 (High Dump) | 14. Hour Meter | 28. Solution Delivery Lever |
| 2. Hopper Lever 2 (High Dump)
Hopper Lever (Low Dump) | 15. Horn | 29. Squeegee Rocker Switch |
| 3. Broom and Brush Control Lever | 16. Ignition Switch | 30. Scrub Head Switch |
| 4. Main Broom Lever | 17. Turn Signal Lever | 31. Air Control Knob (TSS and ISS) |
| 5. Cab Heater Switch | 18. Directional Control Pedal | 32. Scrub Head Position Gauge |
| 6. Hopper Height Indicator (RTR®) | 19. Brake Pedal | 33. Choke Knob (Gasoline Engine)
Stop Cable (Diesel Engine) |
| 7. Hopper Rotation Indicator (RTR®) | 20. Glow Plug Switch (Diesel) | 34. Glow Light (Diesel) |
| 8. Ammeter | 21. Hopper Filter Shaker Button | 35. Hopper Fire Warning Light |
| 9. Oil Pressure Gauge | 22. Hand Brake | 36. Recovery Tank Warning Light
Solution Tank Warning Light |
| 10. Coolant Temperature Gauge | 23. Blower Control | 37. Clogged Filter Indicator |
| 11. Light Switch | 24. Remote Hopper Shut Off | 38. Throttle |
| 12. Side Broom Lever | 25. Cab Pressurizer Control | |
| 13. Fuel Gauge | 26. Windshield Wiper Switch | |
| | 27. Water Recycling Switches | |

Figure 3-3. Controls and Indicators

- Pull the knob out for aid in cold starting the engine.
 - Push the knob in after the engine starts.
- 3-57. Clogged Filter Indicator.** This indicator alerts the operator to the need to shake the filters.
- 3-58. Coolant Temperature Gauge.** The engine coolant temperature gauge registers the temperature of engine coolant. Temperatures above 210°F indicate an overheating engine.
- 3-59. Directional Control Pedal.** The directional control pedal controls the speed and direction of the machine. It is also used for slowing or stopping the machine during normal operation.
- 3-60 Fuel Level Gauge.** The fuel level gauge indicates the amount of fuel remaining in the tank.
- 3-61. Hand Brake (optional).** This brake is used for parking. It operates the mechanical drum brakes on the front two wheels and is engaged by lifting up on the lever.
- 3-62. Horn.** The horn is activated by pressing the horn button located on the right side of the instrument panel.
- 3-63. Hour Meter.** The hour meter records the number of hours the machine has been operated, providing a helpful guide for performing routine maintenance tasks.
- 3-64. Hopper Fire Indicator.** The hopper fire indicator illuminates when a fire exists in the hopper.
- 3-65. Hopper Levers 1 & 2. (High Dump)** The two far left levers on the front control panels are used to raise (up to 60 inches) and dump the hopper. The levers are spring loaded to the center off position.
- 3-66. Hopper Lever. (Low Dump)** The left lever on the front control panel is used to raise and dump the hopper. This lever is spring loaded to the center off position. There is also a detent in the dump position to hold the hopper in the raised position.
- 3-67. Hopper Height Indicator (RTR®).** Light 1 illuminates when the hopper reaches the minimum height required to use the RTR feature.
- 3-68. Hopper Rotation Indicator (RTR®).** Light 2 illuminates when the hopper reaches the rotation stop point.
- 3-69. Ignition Switch.** The four position ignition switch is used to start the engine.
- 3-70. Light Switch (optional).** This switch is used to turn the lights on and off.
- 3-71. Main Broom Lever.** The main broom lever to the immediate left of the instrument panel raises and lowers the main broom.
- 3-72. Oil Pressure.** The engine oil pressure gauge ranges from 0 to 60 psi. A reading below 7 psi indicates problems which may result in damage to the machine.
- 3-73. Parking Brake.** The parking brake operates the mechanical drum brakes on the front two wheels and is engaged by the brake pedal.
- 3-74. Recovery Tank Warning Light.** This light illuminates when the recovery tank is full.
- 3-75. Recycling Pump Switches (2).** These switches are used to activate the recycling pumps when using the Water Recycling or Water Extension Systems.
- 3-76. Remote Hopper Shut-Off.** The remote hopper shut-off is used when sweeping areas which are wet. This stops the flow of air in the hopper from going through the filters and getting them wet. As use of the filters is not required to control dust in these areas. To activate the hopper shut-off pull the knob out .

3-77. Soap Metering Pump Switch. The soap metering pump switch is used in conjunction with the water recycling to regulate the amount of soap added to the water.

3-78. Scrubhead Position Gauge. The scrubhead position gauge indicates the scrubhead position (raised, lowered) and the amount of pressure exerted on the scrubhead in the lowered position. Pressure variable is from 0 to 300 pounds.

3-79. Scrubhead Switch. The scrubhead raise and lower switch is a spring-centered rocker switch. The switch raises and lowers the scrubhead and provides variable pressure to the scrubhead in the lowered position.

3-80. Side Broom Lever. The side broom lever to the right of the instrument panel raises and lowers the side broom.

3-81. Solution Delivery Lever. The solution delivery lever stops, starts, and regulates the flow of clean water solution to the floor for scrubbing. The amount of solution dispensed increases as the lever is moved forward, varying the flow rate between 0 gallons per minute (in the OFF position) and 3 gallons per minute (in the SOLUTION ON FULL position).

3-82. Solution Tank Warning Light. This light indicates the solution tank is empty.

3-83. Squeegee Switch. The squeegee rocker switch raises, lowers, and locks the squeegee.

3-84. Stop Cable. The stop cable is used on diesel engines to stop the engine by shutting off the fuel flow. The stop cable knob should be pulled out only after turning off the key switch, to prevent running down the battery.

3-85. Throttle. The throttle adjusts the engine speed from idle to the normal operating speed.

- The throttle should be in the IDLE position when starting the engine and immediately before shutdown.

- The throttle should be in the RUN position during normal operation to insure proper broom speed and dust control (RUN on sweeper/scrubbers and NORMAL on sweepers).

3-86. Timed Filter Shaker. This button is used to activate the filter shakers prior to dumping or as needed for cleaning the dust control filters. When the filter shaker button is pushed in, the timer will automatically shake the filters for approximately 20 seconds. This button should only be pushed when the machine is stopped, the engine speed is at idle and the hopper is raised approximately 4 inches above the ground.

3-87. Wet Sweep By-Pass. This by-pass accomplishes the same result as the remote hopper shut-off. It stops the flow of wet air in the hopper from passing through the filters when sweeping wet areas. To achieve this, open the vent located on top of the hopper, see figure 3-4.

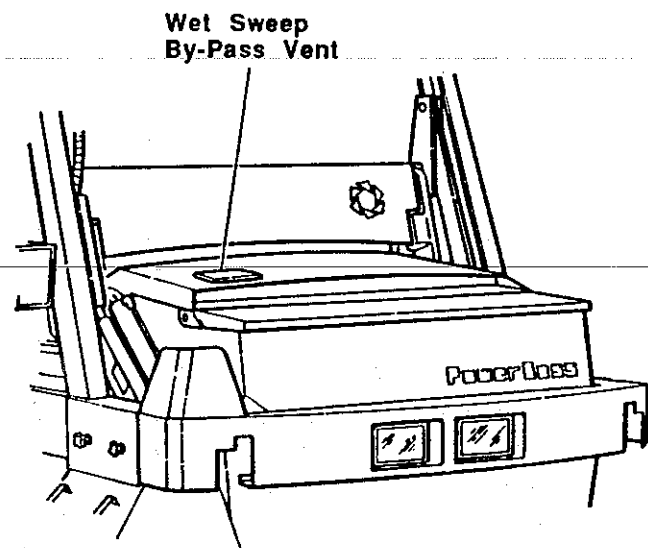


Figure 3-4. Wet Sweep By-Pass

3-88. Windsheld Wiper Switch.

3-89. PRE-OPERATION CHECK. Prior to operating any PowerBoss™ sweeper/scrubber check the following:



WARNING

If fluids are hot allow engine or system to cool before checking fluid levels.

1. Engine oil level.
2. Engine coolant level.
3. Hydraulic fluid level
4. Fuel level
5. Brakes, steering and directional controls
6. Floor for wet spots caused by leaks.



WARNING

Fluids are to be replenished only when engine is off.

ATTENTION!

Equipment can be damaged if it is used while fluid levels are incorrect

3-90. Any problems found with the equipment must be corrected before attempting to operate the sweeper/scrubber.

3-91. GENERAL OPERATION.

3-92. Starting. To start the sweeper/scrubber proceed as follows:



WARNING

Always be seated in the operator's seat with the parking brake locked when starting the engine.

1. Put the directional control pedal in neutral.
2. Put the throttle in the IDLE position.
3. *Gasoline Engine:* Pull the choke knob out (if engine is cold). Turn the ignition switch

to the START position; then release. When the engine is running smoothly, push in the choke knob.

Diesel Engine: Push in the engine stop knob. Turn the ignition switch to the first position; then press glow plug switch (shown in figure 3-3) for approximately 15-20 seconds. Turn the ignition switch to the START position and release.

NOTE

For both gasoline and diesel engines, if the engine fails to start do not continue cranking more than ten seconds. Allow the starter motor to cool between attempts.

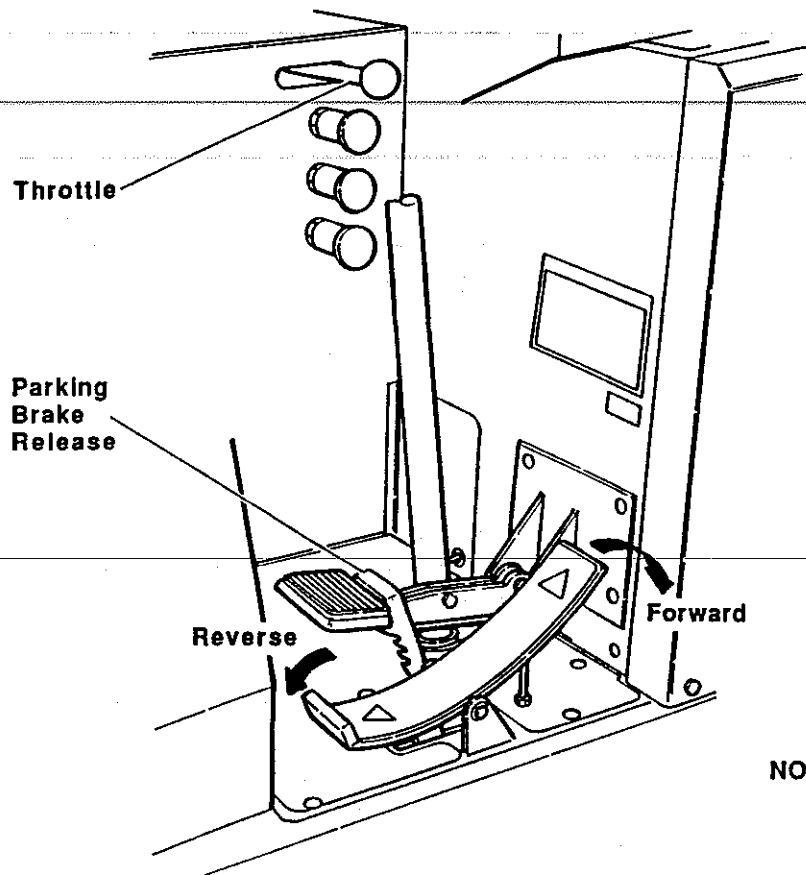
4. Allow the engine to warm up approximately two minutes.

3-93. Driving. To drive the sweeper/scrubber, refer to figure 3-5 and proceed as follows:

1. Move the throttle from the IDLE to the RUN position.
2. Unlock the parking brake.
3. Move the machine forward or backwards as follows:
 - a) Forward. Apply pressure to the front of the directional control pedal, increasing pressure to increase speed.
 - b) Reverse. Apply pressure to the rear of the pedal, increasing pressure to increase speed.

NOTE

The sweeper/scrubber is equipped with a speed limiter, a stop under the pedal which can be raised or lowered to reduce or increase maximum speed.



NOTE: Directional control pedal is shown in the neutral position.

Figure 3-5. Directional and Brake Controls

3-94. Slowing, Stopping and Parking. To slow or stop the machine proceed as follows:

3-95. Slowing. Return the directional pedal to the neutral position.

3-96. Stopping. Return the directional pedal to the neutral position and coast to a stop or push the directional pedal in the opposite direction the machine is moving until the machine comes to a stop.

3-97. Parking. When parking the sweeper/scrubber engage the parking brake by pressing down on the pedal and tilting it forward. To disengage the parking brake apply pressure to the back of the pedal and release. If hand lever brake, engage by

pulling up on the lever. Disengage by pushing the button at the end of the lever in and lowering the lever.

3-98. Operating on grades. Observe the following rules when operating this machine on a grade.

1. Travel slowly.
2. Exercise extreme caution when traveling across or turning on grades.

3-99. The following options are available for operator safety and convenience: hand lever brake, back up alarm, engine running beeper, Grammer seat, curb broom spot light, brake lights, turn signals, stud mounted or flush mounted head-

lights, red rotating light, over head guard, cab and accessories. For more information on these and other options see paragraph 3-124.

3-100. SWEEPING.

3-101. Main Broom. To operate the main broom proceed as follows:

1. Lower the main broom. This is done by positioning the main broom lever in the NORMAL position for even floor surfaces or FLOAT position for extremely uneven surfaces. When not sweeping position the lever in the RAISED position.

NOTE

Extensive use of the float position reduces the life of brooms.

2. Activate the main broom only by putting the broom and brush control lever in the SIDE BROOM OFF position. To stop the broom return the lever to the center OFF position.

NOTE

Even though the brooms and brushes are both rotating each is lowered independently.

3. Drive the sweeper/scrubber over the area to be swept as explained in paragraph 3-93.

3-102. Side Broom. The side broom also known as the curb broom is used to widen the sweep path and to clean close to walls and other obstructions. A heavy duty side broom guard is available to protect the side broom when brushing against obstacles. In areas of heavy dust a vacuumized side broom attachment can be used. This sealed enclosure provides optimum dust control. To operate the side broom follow these steps:

1. Place the side broom lever in the LOWER position. When not sweeping the lever

should be placed in the RAISED position.

2. Both the side broom and main broom are activated by putting the broom and brush control lever in the ON position. The side broom can not be engaged independently.

3-103. Hopper. The hopper holds all debris picked up when sweeping. To assist in utilizing all available space in the hopper a PowerPacker™ sweeping aid can be mounted inside the lip. The PowerPacker™ is a hydraulically driven auxiliary broom which hurls lighter litter and trash to the forward portion of the hopper during the sweeping operation. This reduces the frequency of needed dumping and increases overall performance. Dump the hopper by following the appropriate set of procedures.



CAUTION

Do not leave the hopper in the raised position for an extended period of time.

NOTE

A hopper fire warning indicator is available for all models.

3-104. High Dump Models. Empty the hopper as follows, see figure 3-6:

1. Drive the machine to the dumping area.
2. Use the directional control pedal to position the machine so that the space between the machine and the container or dumpster is adequate to raise the hopper.

NOTE

Broom control lever must be in center off position.

3. Move the throttle to the IDLE position.

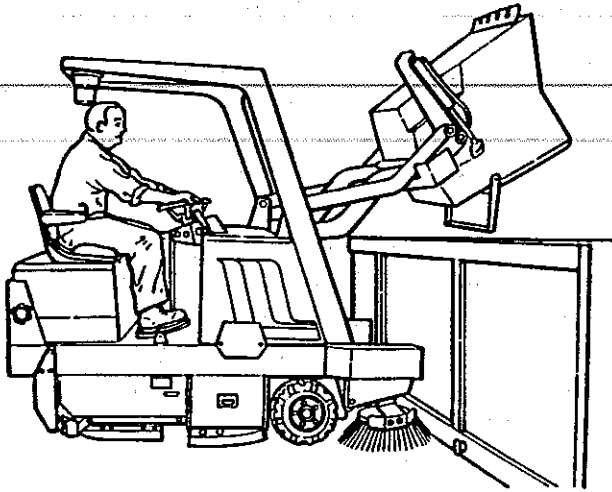


Figure 3-6. High Dump Hopper

4. Pull back Lever 1 to RAISE position and hold until the bottom of the hopper is high enough to clear the top of the container (60 inch maximum).

! WARNING

Never place your hands or other body parts near the lift arms when the hopper is operating.

5. Use the directional control pedal to slowly and carefully move the machine forward until the hopper is properly positioned to dump debris into the container.

! CAUTION

It is unsafe to travel an extended distance with the hopper raised. Travel only the distance necessary to position the hopper.

6. At this point, shake filters for 20-30 seconds. Pull back Lever 2 to DUMP position to rotate the hopper forward and empty the debris.
7. After hopper empties, push Lever 2 forward to RETURN position until the hopper rotates and stops.
8. Slowly back machine away from dumpster approximately 5 ft.
9. Push Lever 1 forward to the LOWER position until the hopper stops.

3-105. Rotary Trash Relocator (RTR®). The RTR® is a standard feature on high-dump models. The two lever system with corresponding indicator lights is used to raise and rotate the hopper. This relocates the trash within the hopper to increase the holding capacity and make dumping necessary less frequently. Operate as follows:

1. Use the directional control pedal to stop the machine on a level surface.
2. Move the throttle to IDLE position.
3. Move the broom lever to the OFF position.

NOTE

As you complete steps four and five, observe the two red lights labeled 1 and 2 in the upper left corner of the control panel.

- Light 1 illuminates when the hopper reaches the minimum height required to use the RTR® feature.
 - Light 2 illuminates when the hopper reaches the rotation stop point.
4. Pull back Lever 1 to the RAISE position and hold until Light 1 illuminates, then release.

⚠ WARNING

Make sure no one is in the area under or around the hopper.

5. Pull back Lever 2 to DUMP position and hold until Light 2 illuminates, then release.

NOTE

This rotates the hopper, causing debris to move from the rear entrance to the front wall of the hopper. Rotating beyond this point will cause debris to be dumped from the hopper.

6. Push Lever 2 forward to RETURN position until the hopper rotates back and stops.
7. Push Lever 1 forward to the LOWER position until the hopper returns to the normal operating position.
8. Move the throttle back to RUN and resume sweeping.

3-106. Low Dump Model. Empty the hopper as follows, see figure 3-7:

1. Drive the machine to the dumping area.

NOTE

Broom control lever must be in center off position.

⚠ WARNING

Never attempt to dump debris off a dock or mezzanine. Dump onto ground surface only.

3. Push the throttle to the IDLE position.

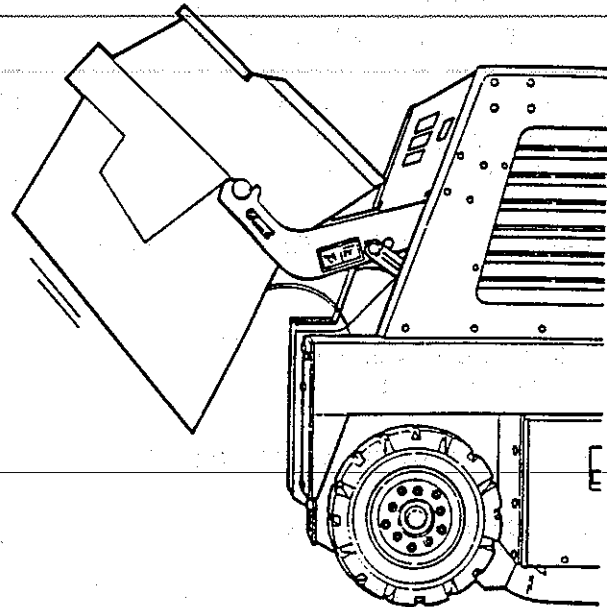


Figure 3-7. Low Dump Hopper

4. Pull back the lever marked DUMP from its center off position until the hopper raises and locks in dump position. Debris will empty onto floor.
5. With the hopper in the raised position, press the **filter shaker** button for 20 to 30 seconds to shake the dust from the hopper filter(s).
6. Use the directional control pedal to slowly back the machine a distance of about five feet.

⚠ WARNING

It is unsafe to travel an extended distance with the hopper raised. Travel only the distance necessary to clear the debris area.

WARNING

Never place your hands or other body parts under a raised or partially raised hopper unless the safety arm is in place.

7. Use the directional control pedal to stop the machine, then release the DUMP lever to return it to its center off position.
8. Pull the throttle back to RUN and resume sweeping.

3-107. Manual Lift-Out Models. Empty the hopper as follows, see figure 3-8:

1. Drive the machine to the dumping area.
2. Grasp the handles on top of the hopper.
3. Lift the hopper straight up (about 3 in) until the support brackets clear the frame.
4. Move the hopper back and dump it out.
5. Replace hopper.

NOTE

If the debris in the hopper is too heavy, the hopper can be rotated and partially dumped to make it lighter.

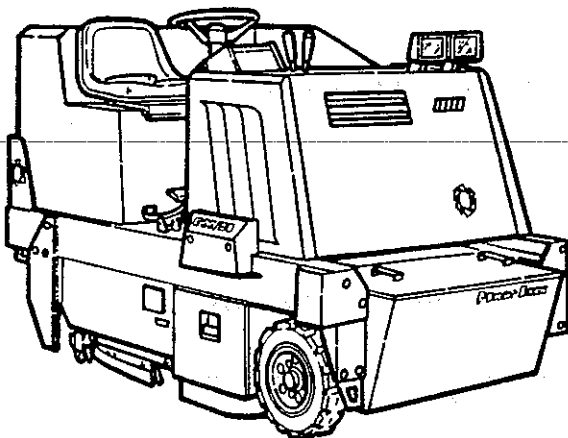


Figure 3-8. Manual Dump Hopper

3-108. Vacuum Attachment. The vacuum attachment is designed to clean elevated surfaces and areas where the PowerBoss™ is unable to drive, see figure 3-9. This is especially useful in dust laden areas. To operate the vacuum, open the hopper lid, close the vacuum door (at the front of the dust filter housing) and attach the vacuum hose. With the parking brake locked, move the throttle to the run position. The vacuum is now ready for use.

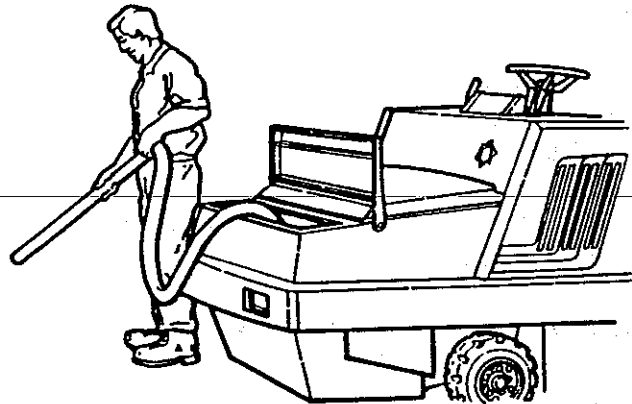


Figure 3-9. Vacuum Attachment

3-109. Blower. The blower blows debris from hard to reach areas into the path of the sweeper, see figure 3-10. To operate the blower, remove the wand from the hanger and pull the blower control knob.

3-110. SCRUBBING.

3-111. Filling Solution Tank. To fill the solution tank follow these steps:

1. Make sure the air control knob is pushed in (on TSS and ISS models).
2. Drive to the solution filling site.
3. Park the machine on a level area and lock the parking brake.

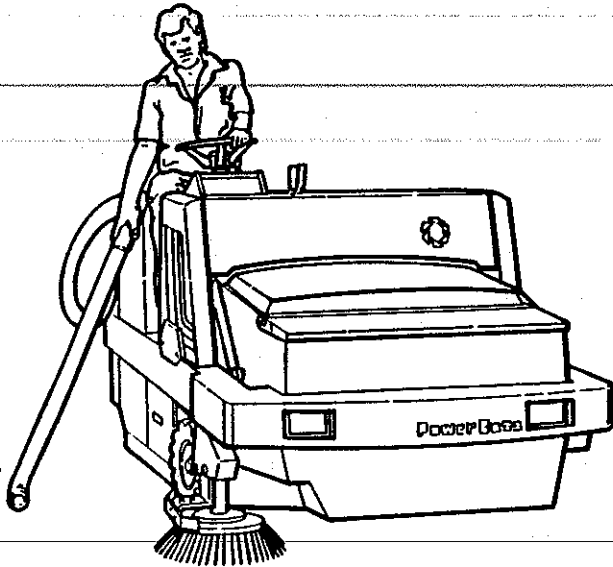


Figure 3-10. Blower

4. Make sure the solution delivery valve is closed.
5. Open the top side door of the machine and fill the top tank with cleaning water solution.
6. When the tank is full, close the top door.

⚠ WARNING

Never use detergents or cleaners that are flammable or combustible.

3-112. Main Scrub Brushes. To operate the main scrub brushes follow these steps:

1. Lower the scrubheads to the floor with the scrubhead switch. Obtain the correct pressure for the floor conditions by noting pressure shown on the scrubhead position gauge. The scrubheads are raised with the same switch.

NOTE

For normal scrubbing, the main broom and side broom remain in the raised position.

NOTE

To sweep simultaneously lower the brooms at this time, see paragraph 3-100 for instructions.

2. Activate the scrub brushes by putting the broom and brush control lever in the SIDE BROOM OFF position. Stop the brushes by returning the lever to the center off position.

NOTE

Even though the brooms and brushes are both rotating each is lowered independently.

3. Lower the squeegee and lock it in the down position with the squeegee switch. The squeegee can also be raised with the same switch.
4. Start the flow of solution to the floor. To dispense solution push the solution delivery lever forward. To stop the flow of solution pull the lever back to the OFF position. The amount of solution dispensed increases as the lever is moved forward, varying the flow rate between 0 gallons per minute (in the OFF position) and 3 gallons per minute (in the SOLUTION ON FULL position).
5. Drive forward slowly.

NOTE

Do not drive in reverse with the squeegee down.



CAUTION

Use care when driving on wet surfaces.



CAUTION

Always travel slowly on grades.

3-113. Side Scrub Brush. To use the side scrub brush (optional on some models) in conjunction with the main scrub brushes, proceed as follows:

1. Complete step 1 from paragraph 3-112.
2. Lower the side scrub brush by positioning the side broom lever in the LOWER slot. To raise the scrub brush return the lever to the RAISED position.
3. Activate the main scrub brushes and the side scrub brush by placing the broom and brush control lever in the ON position. To stop both return the lever to the OFF position.
4. Complete steps 3, 4 and 5 paragraph 3-112.

NOTE

Do not drive in reverse with the squeegee down.



CAUTION

Use care when driving on wet surfaces.



CAUTION

Always travel slowly on grades.

3-114. Double Scrubbing. For double scrubbing proceed as follows:

1. Follow the procedures in paragraph 3-112 for scrubbing without lowering the squeegee to the floor.

2. Make multiple passes over the same area of floor as conditions dictate.
3. Lower and lock the squeegee in the down position with the squeegee switch for the final pass. The squeegee can be raised with the same switch.

3-115. Squeegee Wand. This attachment allows the operator to vacuum up spills and standing water in areas which the PowerBoss™ can not maneuver, see figure 3-11. To operate the squeegee wand, follow these steps:

1. Remove the hose from the squeegee tool.
2. Attach the adapter to the hose.
3. Connect the squeegee wand to the adapter.
4. Set the engine at high idle and vacuum.

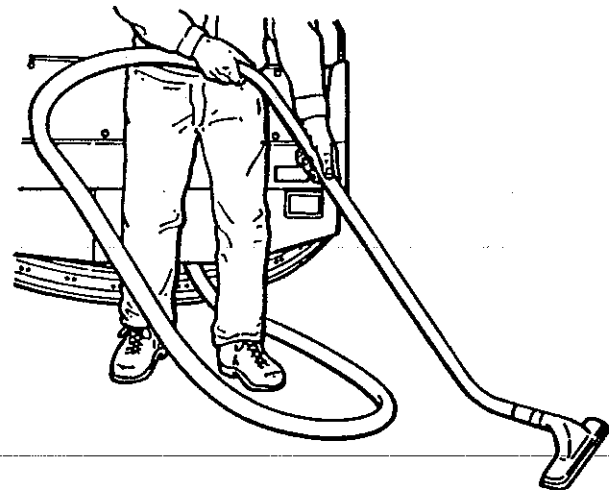


Figure 3-11. Squeegee Wand

3-116. Air Control. During normal sweeping and scrubbing the air control knob should be pushed in all the way. In heavy dust conditions or when sweeping outdoors pull the knob all the way out to divert all vacuum to sweeping.

3-117. Water Extension. The water extension system doubles the area which can be scrubbed without emptying the recovery tank and refilling the solution tank with clean water and soap. This is accomplished by using the same water solution twice to clean the floor. To use the water extension option follow these steps:

NOTE

Water Extension is designed for light cleaning only. Do not use this system in areas with a lot of oil or heavy build up on the floor.

1. Put twice the typical amount of soap in the solution tank.
2. Follow the normal procedure for scrubbing, paragraph 3-112, until the solution tank is empty. Solution tank warning light or recovery tank warning light will illuminate (optional).
3. Turn on the two recycling pump switches. This will pump the dirty water in the recovery tank through the filter and back to the floor. Use the water from the recovery tank to clean the floor approximately the same length of time it took to use all the water from the solution tank.
4. Drain and clean the recovery tank as explained in paragraph 3-119 and 3-120.

3-118. Water Recycling. The water recycling system allows the operator to clean many times the typical area before emptying the recovery tank and refilling the solution tank. This is achieved by using the same water again and again but adding extra soap to maintain the cleaning power. The Water recycling system is designed for light cleaning only. Do not use this cleaning method in areas with a lot of oil or heavy build up on the floor. To use this system follow these steps:

1. Fill the solution tank using the typical amount of soap.
2. Fill the soap tank, see figure 3-12.
3. Follow normal procedures for scrubbing found in paragraph 3-112 until the solution tank is empty. Solution tank warning light or recovery tank warning light will illuminate (optional).
4. Turn on the two recycling pump switches to pump the water from the recovery tank back to the floor. Then turn on the soap metering pump and adjust it to the appropriate rate for the conditions. This system will recycle the recovery tank water several times. This can continue until the soap tank is empty.
5. Drain and clean the recovery tank as explained in paragraph 3-119 and 3-120.

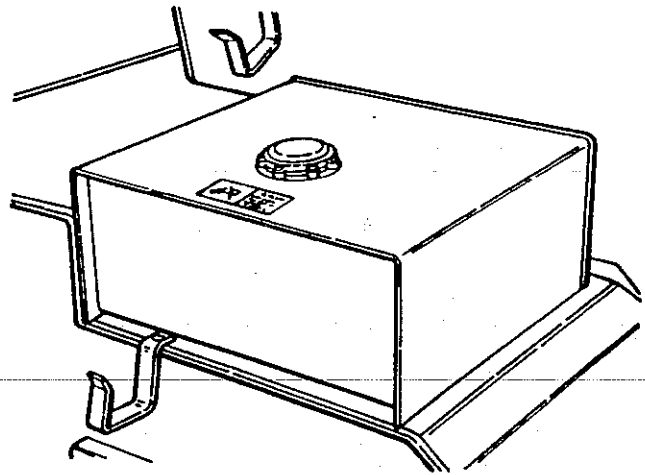


Figure 3-12. Soap Tank

3-119. Draining the Recovery Tank. Follow these steps to drain the recovery tank, see figure 3-13.

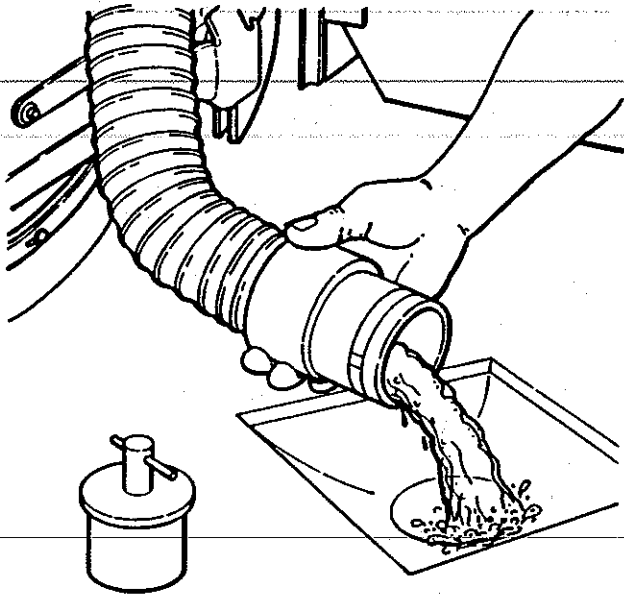


Figure 3-13. Recovery Tank Drain

1. Park the machine on a level surface with the left rear of machine beside the drain site.
2. Engage the parking brake.
3. Turn off the engine.
4. Open the left scrubhead access door.
5. Remove the flexible drain hose from its storage hook. Pull out the drain hose for maximum reach.
6. Place the drain hose at the floor drain opening, grate or on the ground.
7. Loosen and remove the drain plug.
8. Drain the tank completely and reinstall the plug.

9. Reposition the drain hose on its storage hook.

3-120. Cleaning the Recovery Tank. To clean the recovery tank processed as follows:

NOTE

The recovery tank should be cleaned after each shift.

1. After draining the recovery tank, park the machine so the rear access doors are positioned over the drain opening or grate, or on the ground.
2. Engage the parking brake.
3. Shut off the engine.
4. Remove the two access doors located at the rear of the unit, see figure 3-14.

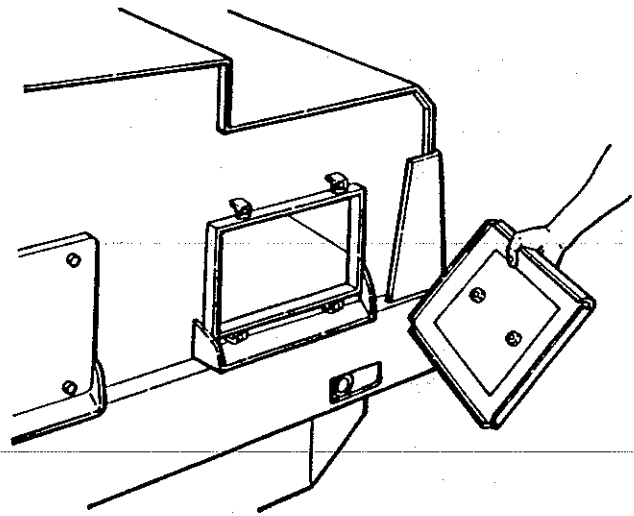


Figure 3-14. Recovery Tank Access Doors

5. Remove the drain hose and position it over the floor drain opening.

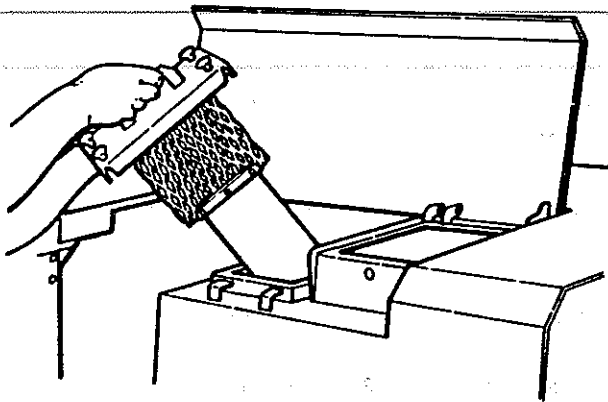


Figure 3-15. Ball Float Assembly

6. Remove the drain plug.
7. Spray the recovery tank with clean water, flushing all sludge out the access doors.
8. Remove the ball float assembly, see figure 3-15. Clear holes in the bottom of the ball float assembly, rinse and reinstall.
9. Reinstall the drain plug.
10. Reposition the hose on the storage rack.
11. Reinstall the access doors.

3-121. TRANSPORTING THE POWERBOSS™.

3-122. Loading. To load the PowerBoss™ on another vehicle or trailer proceed as follows:



WARNING

Exercise extreme caution when traveling on grades.

1. Position the machine on the trailer or vehicle.

2. Apply the parking brake.
3. Tie the machine down using the tie down holes in the frame behind both front wheels and eye bolts located at rear of frame; see figure 3-16.

NOTE

Attach the tie downs to the frame only.

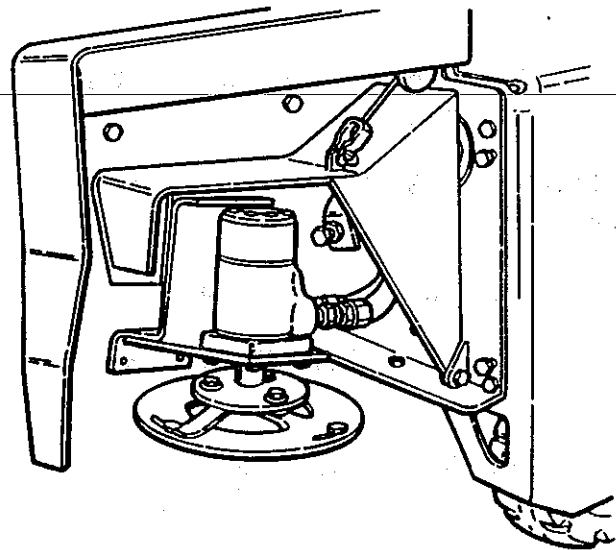


Figure 3-16. Tie Down Holes

3-123. Pushing. Push the machine from the front or rear using bumpers only.

ATTENTION!

Do not tow or push the machine a distance of more than .5 miles or faster than one mile per hour. Exceeding these restrictions may cause damage to the hydraulic system. If towing will exceed the above restrictions, the rear wheel must be raised or supported by a dolly.

3-124. ADDITIONAL OPTIONS. The following options are available on all models of the PowerBoss™. See figure 3-17 for the locations of these options and their controls.

3-125. PowerStacker™. The PowerStacker™ forklift attachment can be used on all high dump models. This options replaces the hopper when the PowerBoss™ is not being used to clean the floor. The PowerStacker™ lifts and moves loaded pallets weighing up to 800 pounds (363 kg). To operate the forklift use the hopper controls.

3-126. Flush Mounted Head Lights. Available on all TSS models.

3-127. Stud Mounted Head Lights. Available on all ISS and CSS models.

3-128. Curb Broom Spot Lights. Available on all models.

3-129. Brake Lights. Available on all models.

3-130. Turn Signals with 4-Way Flasher. Available on all models.

3-131. Rotating Red Light. Available on all models.

3-132. Back Up Alarm. Available on all models.

3-133. Engine Running Beeper. Available on all models.

3-134. Grammer Seat. Not available on machines with the cab option.

3-135. Overhead Guard. Available on all models.

3-136. Cab. Available on all models.

3-137. Windshleld Wiper. Available on all models with the cab option.

3-138. Cab Heater. Available on all models with the cab option.

3-139. Fan/Defroster. Available on all models with the cab option.

3-140. Cab Pressurizer. Available on all models with the cab option.

3-141. Hopper Dolly. Recommended with all low dump models.

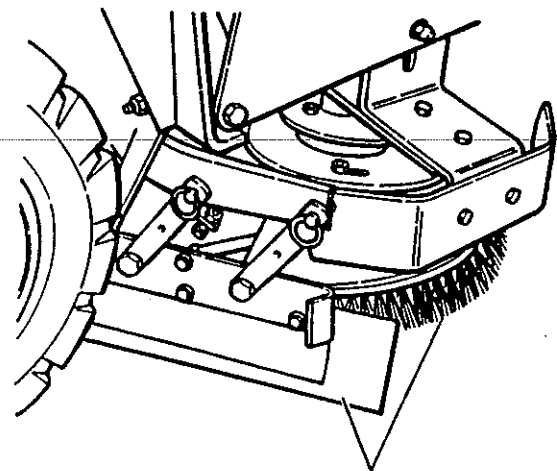
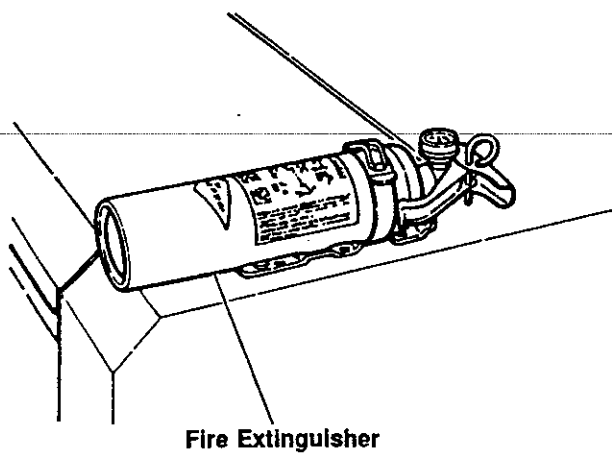
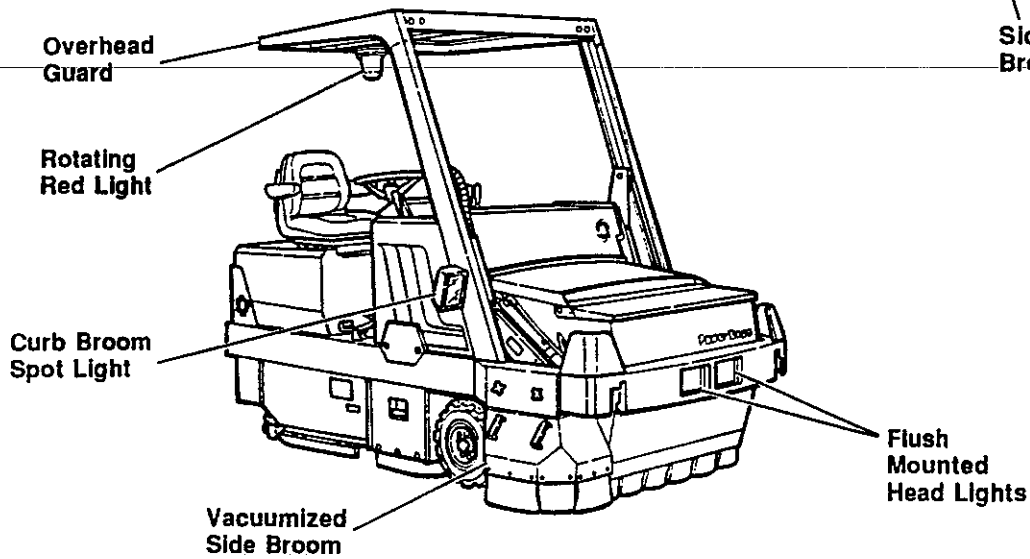
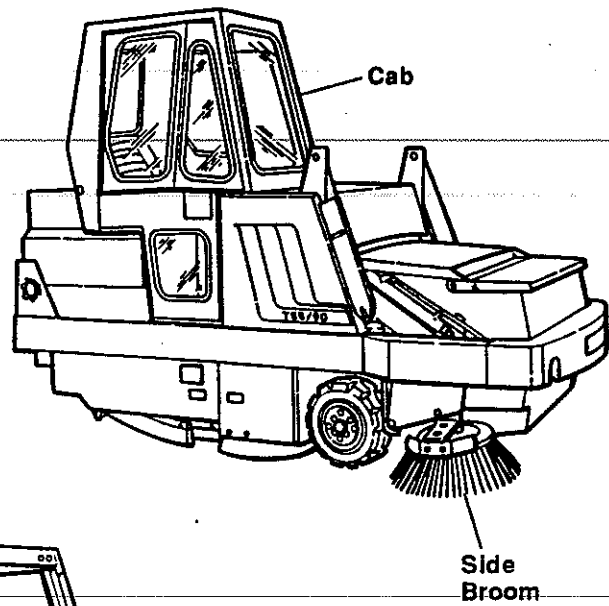
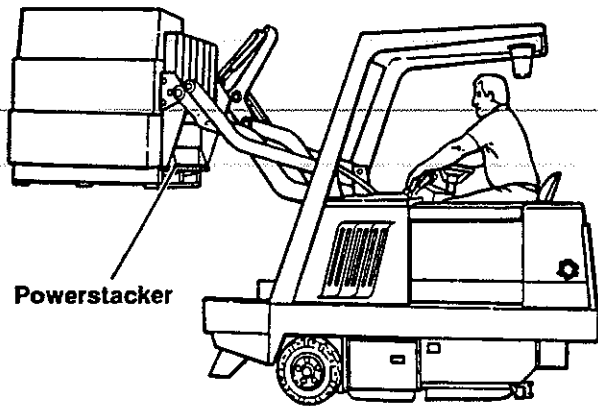


Figure 3-17. Options



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MAINTENANCE

4-1. GENERAL. This section contains maintenance information and instructions for all models of the PowerBoss™ sweeper/scrubbers and their options. This information is divided into two major categories; preventive maintenance and maintenance procedures. The preventive maintenance program is designed to provide a longer life and continued effective/efficient cleaning for your PowerBoss™. The maintenance procedures are provided to assist the service personnel when performing maintenance tasks. Maintenance charts, lubrications charts, electrical schematics and hydraulic schematics have all been included in this section for easy reference when performing maintenance tasks.

4-2. Regular maintenance on your sweeper/scrubber results in better more efficient cleaning and a prolonged life. When performing any maintenance or repair task on the equipment observe

all safety precautions. The following warning is especially important and is repeated throughout the section.



WARNING

Never attempt to perform any service on the equipment or its components until the engine is OFF, the parking brake is LOCKED and the wheels are CHOCKED.

4-3. PREVENTIVE MAINTENANCE. A preventive maintenance chart has been developed for quick reference by maintenance personnel, see table 4-1. Procedures for the tasks listed in this chart will be found later in this section. (Self explanatory functions are not listed.) To assure that all tasks are completed on schedule, keep a record of all maintenance tasks performed and date completed. See table 4-2 at the end of this section.

Table 4-1. Maintenance Chart

Service/Task (Performed by maintenance personnel)	Frequency (Hours)				
	8	50	100	250	500
ENGINE: For additional maintenance requirements refer to the engine manual furnished with this manual.					
GASOLINE					
Tune up				●	
Change oil & filter			●		
Change fuel filter				●	
Air filter - clean dust cup	●				
- clean element			●		
- change element				●	

Table 4-1. Maintenance Chart - Contd.

Service/Task (Performed by maintenance personnel)	Frequency (Hours)				
	8	50	100	250	500
GASOLINE - Contd.					
Check PCV (Change as required)				●	
Check fan belt (Change as required)			●		
Adjust valves*					
Pressure wash the engine			●		
LPG					
Inspect system for leaks and proper connections			●		
Tune up				●	
Change oil & filter			●		
Change fuel filter				●	
Air filter - clean dust cup	●				
- clean element			●		
- change element				●	
Check PCV (Change as required)				●	
Check fan belt (Change as required)			●		
Adjust valves*					
Pressure wash the engine			●		
DIESEL					
Change oil & filter			●		
Fuel filter - change				●	
- drain water separator	●				
Air filter - clean dust cup	●				
- clean element			●		
- change element				●	
Check PCV (Change as required)				●	
Check fan belt (Change as required)			●		
Adjust valves*					
Pressure wash the engine			●		
ELECTRICAL SYSTEM:					
Check electrolyte level in batteries (Fill as needed)		●			
Hydrometer Test				●	
Clean battery			●		
Inspect wiring and cables					●

Table 4-1. Maintenance Chart - Contd.

Service/Task (Performed by maintenance personnel)	Frequency (Hours)				
	8	50	100	250	500
COOLANT SYSTEM:					
Check coolant level (Fill as needed)	●				
Inspect and blow out radiator fins (Make sure radiator is cool)	●				
Drain and flush coolant system					●
Pressure test cooling system and cap					●
HYDRAULIC SYSTEM:					
Check hydraulic reservoir gauge (Fill as needed)	●				
Blow off or pressure wash cooling coil			●		
Change filter breather cap					●
Change hydraulic fluid and filter					●
Check function of directional control pedal (Adjust as needed)					●
Clean hydraulic fluid strainer in reservoir					●
Inspect swivels on drive motor				●	
Check for damage or leaking hoses	●				
SWEEPING COMPONENTS:					
Inspect brooms for wear; remove strings and debris from bristles and drive assembly (Replace as necessary)	●				
Inspect broom chamber door seals and broom skirts (Adjust or replace as needed)		●			
Rotate main broom end to end		●			
Perform main broom adjustment test (Adjust as needed)	●				
Check side broom lift cable (Adjust or replace as needed)					●
Inspect the main broom idler bearing			●		
SCRUB AND WATER PICKUP COMPONENTS:					
Inspect scrub brushes for wear (Replace as needed)		●			
Inspect main squeegee flare (Adjust as needed)	●				
Check main squeegee for wear (Turn or replace as needed)		●			
Check squeegee caster for wear (Replace as needed)				●	
Check squeegee lift (Adjust or replace as required)					●

Table 4-1. Maintenance Chart - Contd.

Service/Task (Performed by maintenance personnel)	Frequency (Hours)				
	8	50	100	250	500
HOPPERS:					
Check hopper filters (Clean or replace as needed)	●				
Inspect filter gaskets			●		
Check hopper clearance from floor (Adjust as needed)		●			
Inspect hopper lid gaskets for proper seal (Adjust or replace as needed)			●		
Inspect hopper flaps for wear or damage (Replace as required)	●				
Inspect hopper side and frame seals for wear or damage (Adjust or replace as needed)			●		
Lubricate pillow blocks supporting dump mechanism					●
Check RTR™ lights for adjustments (If applicable)				●	
TANKS:					
Adjust solution delivery valve linkage			●		
Clean and inspect recovery tank ball float and drain hose	●				
Check squeegee tool and vacuum hose for clogs	●				
Inspect clean out doors for leaks	●				
STEERING:					
Lubricate steering gear box					●
Lubricate steering link arm					●
Lubricate steering fork assembly					●
Check steering gear box for wear (Adjust as needed)					●
PARKING BRAKE:					
Check for proper functioning and adjust as needed	●				
Check brake cable for wear (Replace as required)					●
TIRES:					
Visually inspect for wear and damage (Repair or replace as needed)	●				
Check pneumatic tires for proper air pressure (Adjust inflation as needed)				●	

Table 4-1. Maintenance Chart - Contd.

Service/Task (Performed by maintenance personnel)	Frequency (Hours)				
	8	50	100	250	500
MISCELLANEOUS: Inspect latches and hinges (Tighten and lubricate as needed) Check anti-static drag chain on rear wall of broom chamber for damage or excessive wear (Replace as needed)				●	●
IMPELLER: Lubricate Check belt tension and alignment (Adjust as needed)		●	●		

4-4. **MAINTENANCE PROCEDURES.** The maintenance procedures outlined in this manual have been developed to assist maintenance personnel with the up keep and repair of PowerBoss™ sweeper/scrubbers. Heed all safety instructions when servicing the PowerBoss™.

 **WARNING**

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

 **WARNING**

Never operate an LPG powered sweeper/scrubber when any component in the fuel system is malfunctioning or leaking.

 **WARNING**

Never bypass safety components before operating the sweeper/scrubber.

 **WARNING**

Replace any defective safety component before operating the sweeper/scrubber.

 **WARNING**

During repair or servicing of the fuel system, work in a properly ventilated area and do not smoke or allow an open flame near the fuel system.

 **WARNING**

When disconnecting the LPG tank coupling, always wear gloves. LPG fuel can freeze bare hands.



WARNING

Under no circumstances should the fuel filter lock or the oil pressure switch be bypassed, except when testing them. After testing, always reconnect them. Bypassing the fuel filter lock or the oil pressure switch after testing creates a potential fire hazard.

4-5. ENGINE. For maintenance information not covered in this manual, refer to the manufacturer's engine manual provided.

NOTE

Fill the fuel tank at the end of each shift to prevent condensation from forming in the fuel tank. Use clean gasoline of at least 85 octane.

4-6. Tune Up.

Gasoline and LPG Engines.

1. Change spark plugs. (See manufacturer's literature.)
2. Inspect spark plug wires and boots for cracks and fraying. (Replace as needed.)
3. Change and set ignition points, if applicable. (See manufacturer's literature.)
4. Change rotor.
5. Inspect distributor cap for cracks and corroded contacts. (Replace as needed.)
6. Check and set timing. (See manufacturer's literature.)

LPG. Sweeper/scrubbers which run on LPG are equipped with a vacuum activated fuel shutoff system. The shutoff uses vacuum pressure from the engine manifold to open the fuel flow. When the engine is stopped there is no vacuum pressure; consequently the fuel flow is cut off. To change the fuel shutoff, follow these steps:

1. Shut off the fuel flow at the tank.
2. Locate the fuel shutoff in the fuel line between the tank and the vaporizer.

3. Turn on the fuel at the tank and check for leaks.

Diesel Engines. Diesel engines do not require periodic tune ups as do gasoline and LPG engines. However, oil change, filter replacement and other scheduled maintenance is needed. Refer to table 4-1 in this section for more information.

4-7. Inspect for leaks (LPG).

1. Place soapy water around all connections between the tank and the carburetor.
2. Watch for bubbling.
3. Tighten or replace connections as needed.

4-8. Changing the Fuel Filter.

Gasoline Engine.

1. Locate the in-line disposable filter approximately half way between the gasoline tank and the carburetor.
2. Remove the two attaching clamps.
3. Replace the filter and reattach the two clamps.
4. Bleed the fuel lines.

LPG Engine.

1. Located the fuel filter in the same housing as the relief valve close to the tank.
2. Turn off the gas flow and open the housing.
3. Clean or replace the cloth element as needed.
4. Bleed the fuel lines.

NOTE

Perform this task on LPG engines only if troubleshooting indicates a problem with the fuel flow. This is not a preventive maintenance procedure.

Diesel Engine.

1. Open the top and side engine access doors.
2. Loosen the vent plug and open the water trap to drain the fuel.

3. Remove the filter element and the trap from the filter head.
4. Remove the water trap bowl from the element and clean it.
5. Lubricate the O-ring and spin the bowl onto a new filter element.
6. Lubricate the O-ring and spin the new filter element, with the clean bowl, onto the filter head.
7. Bleed the fuel lines.

4-9. Priming the Fuel System. (Diesel)

1. Locate the fuel pipe on top of the fuel filter cover and unscrew it two or three turns.

NOTE

Do not confuse this pipe with the fuel return pipe to the tank.

2. Locate the hydraulic head locking screw. (It is on the side of the fuel injection pump body).
3. Loosen the fuel injection pump air vent screws on the governor housing.
4. Use the lever of the fuel lift pump to prime the fuel system.

NOTE

If you are unable to operate the priming lever, turn the engine a complete revolution until fuel bleeds from the vent points free of air bubbles.

5. Tighten connections as follows: First the filter cover fuel pipe, then the fuel injection pump head locking screw, then the governor air vent screws.
6. Loosen the pipe union nut at the inlet of the fuel injection pump.
7. Use the lever on the lift pump to prime the system.
8. When fuel without air bubbles bleeds around the threads, re-tighten the pipe union.

NOTE

Hand priming may take four or five minutes, but the entire process should be completed with care. Otherwise, the engine may fail to start.

9. Loosen the unions located at the injector ends of the high pressure fuel pipes.
10. Put the accelerator in the full-open position. Make sure the stop control is in the RUN position.
11. Use the starter motor to rotate the engine until fuel oil without air bubbles flows from the fuel pipes. This may require up to 60 seconds of rotation, depending upon rotation speed and the effectiveness of the bleeding operation just outlines.
12. Secure the union on the fuel pipes and start the engine.

NOTE

If the engine starts but stops after a few minutes, repeat the bleeding process and check for leaks and weak connections.

4-10. Cleaning the Water Trap (Perkins)

1. Lift the engine hood.
2. Clean the outside of the water trap thoroughly.
3. Remove the retaining bolt from the center of the water trap head.
4. Remove the bowl and clean it in cleaning fluid.

NOTE

Do not use gasoline to clean the bowl.

5. Refill the bowl with clean fuel.
6. Position and hold the water trap bowl under the trap head and secure it with the retaining bolt.
7. Bleed the fuel system as outlined under Priming the Perkins Diesel Fuel System.

4-11. Draining the Water Trap (Kubota)

1. Loosen the knob on the bottom of the trap unit.
2. Wait for the water to drain and watch for the diesel fuel which will follow.
3. When the diesel fuel begins to drain tighten the drain knob.

4-12. Clean/Change the Air Filter. See figure 4-1.

NOTE

Do not operate the machine without the air filter element in place.

Daily Cleaning

1. Locate the air filter.
2. Unscrew the ring clamp.
3. Remove the dust cup and pull the rubber plug out of the cup (if so equipped).
4. Empty the contents.
5. Replace the dust cup. Ensure the word "TOP" is positioned correctly, pointing up.

6. Tighten the ring clamp.

Cyclic Cleaning

1. Locate the air filter.
2. Unscrew the ring clamp.
3. Remove the dust cup and pull the rubber plug out of the cup (if so equipped).
4. Empty the contents.

NOTE

The following steps must be completed periodically on heavy duty three stage filters.

7. Use an air hose to blow all dirt and dust from the filter. (Air pressure should be 100 psi or less.

NOTE

After cleaning the air filter check for air holes by putting a light inside the filter, see figure 4-2. If any holes are found (including pin holes) replace the filter.

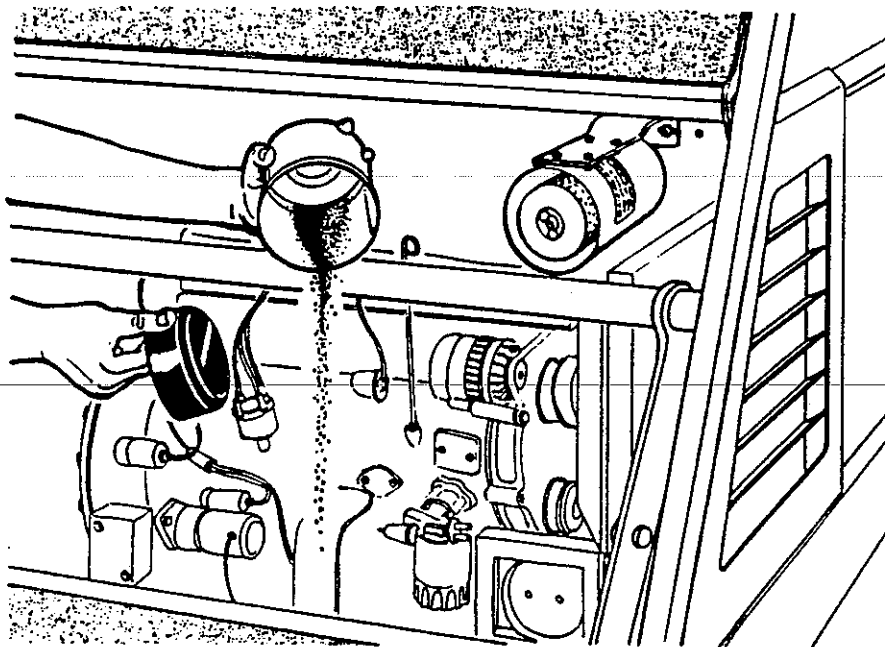


Figure 4-1. Air Filter

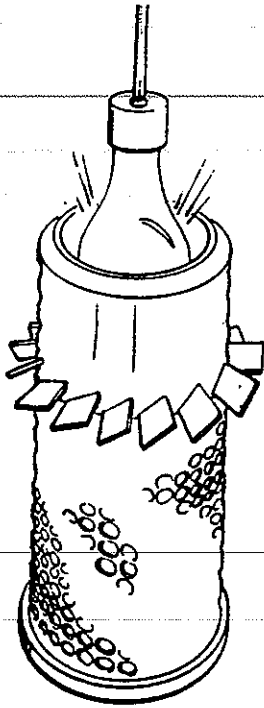


Figure 4-2. Air Filter Check

8. Wipe out the air cleaner housing with a damp cloth. Make sure all dirt is removed.
9. Replace the filter with the fins at the far end of the housing. Do not damage fins.

NOTE

If the old filter is being used inspect the rear gasket before replacing.

10. Replace wing nut and tighten.
11. Replace the dust cup. Ensure the word "TOP" is positioned correctly, pointing up.
12. Tighten the ring clamp.
13. Check the condition of intake hoses and clamps.

4-13. Check PCV.

1. Remove valve.
2. Blow (by mouth) into the engine side of the valve. Air should pass freely.
3. Blow (by mouth) into the intake side of the valve. The valve should close.

4. If either step 2 or 3 do not function as stated replace the valve.

4-14. Check the fan belt.

1. Check tension. See manufacturer's literature for the correct tension.
2. Inspect the belt for cracks, glazing or fraying. Replace as required.

4-15. Adjust Valves. See manufacturer's literature.

4-16. ELECTRICAL SYSTEM. Wiring and cables should be replaced immediately if found damaged to prevent shorting or electrical shock. Replace the battery when minimum requirements can no longer be maintained.



WARNING

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

4-17. Schematics are included to assist maintenance personnel when servicing the PowerBoss™, see figures 4-3 through 4-6.

4-18. Check Electrolyte Level.

1. Remove cell caps.
2. Visually check the level of each cell. The electrolyte should just touch the bottom of the fill tube, see figure 4-7.

4-19. Hydrometer Test. The specific gravity of each cell in a fully charged battery should be 1.260. Variations in this reading must not exceed 10%.

4-20. Clean Battery.

1. Combine baking soda and water in a strong solution.
2. Brush the solution over the battery top, including terminals and cable clamps. Make

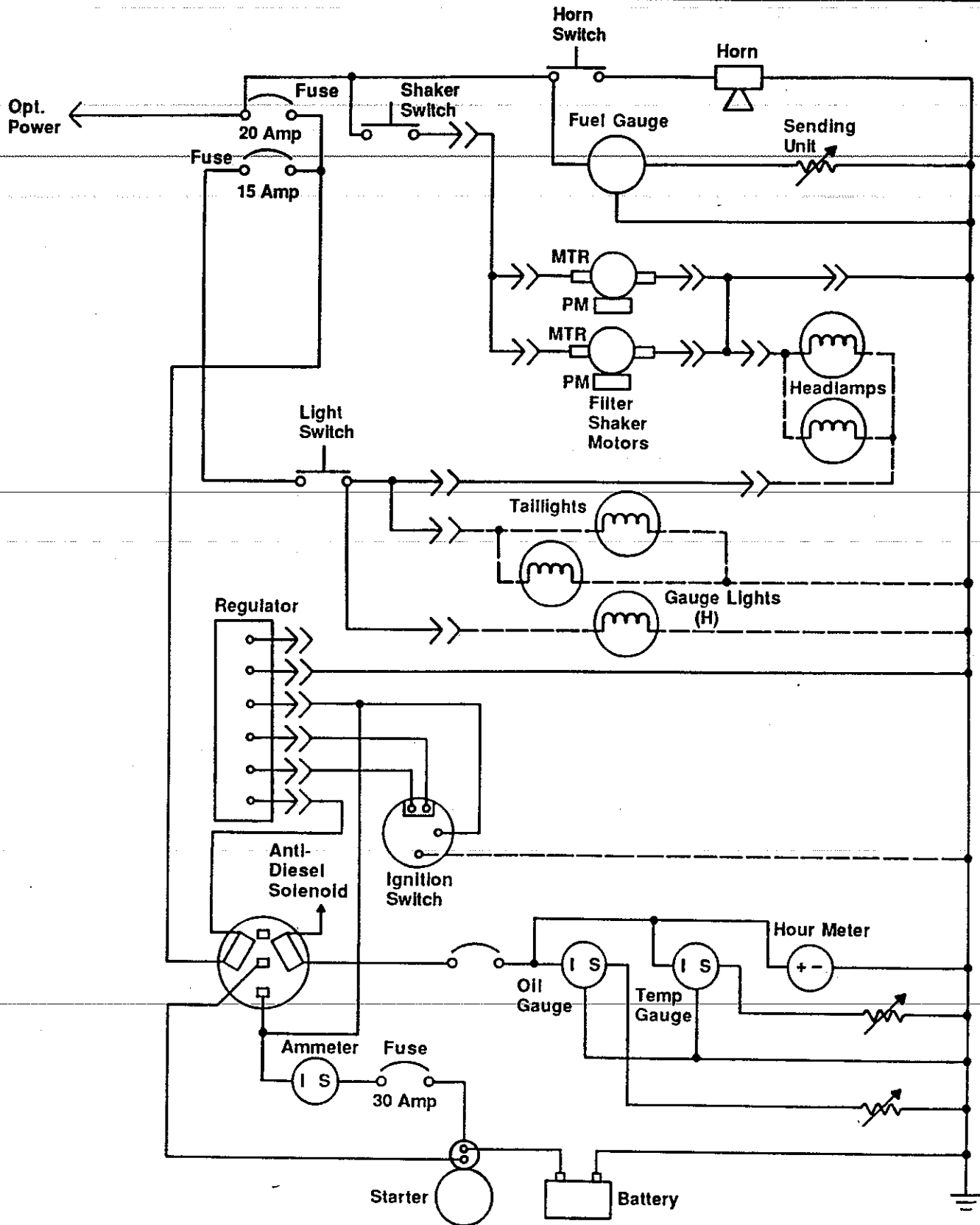


Figure 4-3. Kubota (Diesel) Engine Electrical Schematic

Please refer to addendum at the back of this manual.

Figure 4-4. Toyota Engine Electrical Schematic

To be supplied at a later date.

Figure 4-5. Ford Engine Electrical Schematic

To be supplied at a later date.

Figure 4-6. Perkins Engine Electrical Schematic

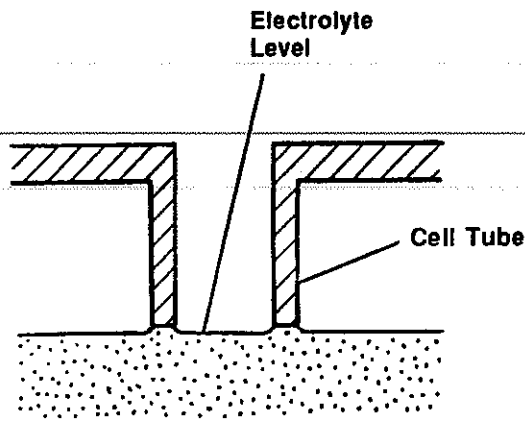


Figure 4-7. Electrolyte Level

sure the solution does not enter the battery.

3. Using a wire brush, clean the terminal posts and cable clamps.
4. Apply a thin coating of vasoline to the terminals and cable clamps.

4-21. Battery Replacement.



CAUTION

Remove the negative battery cable before you remove the positive battery cable. This is done to prevent accidental electrical shorting which can result in personal injury.

1. Disconnect the negative (-) cable and then the positive (+) cable.
2. Remove the battery.
3. Install new battery.
4. Connect the positive (+) battery cable first, then the negative (-) cable.

4-22. Fuse Replacement.

1. Remove the blown fuse by turning the fuse holder cap counterclockwise.
2. Insert the correct amperage fuse into the fuse holder cap.

3. Install the fuse holder cap by turning the cap clockwise.

NOTE

Remember to reposition the rubber ring under the fuse holder cap.

4-23. COOLANT SYSTEM. The normal operating temperature of the engine is 180°-200°F (82°-93°C). Abnormally high operating temperatures and overflow loss are symptoms of a clogged radiator, the core clogged with rust and sludge or the fins clogged with dirt and debris. To clear the system first flush with a cleaning compound, second reverse flow flush the system.



WARNING

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

4-24. Coolant Level. The correct coolant level in the radiator is 3/4" below the top of the radiator (excluding the fill neck), see figure 4-8.

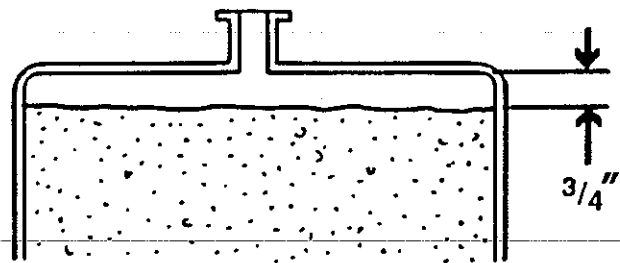


Figure 4-8. Coolant Level

4-25. Blow Out Radiator Fins. Allow the radiator to cool before cleaning with compressed air. Clean by blowing air from the side opposite the engine fan.

4-26. Drain and Flush Radiator.

1. Start and run engine for 10 minutes to heat the system.
2. Shut off engine.
3. Open drain cock and allow the system to drain.
4. Close the drain cock and refill the system with water.
5. Start the engine and let run until the upper radiator hose is hot.
6. Shut off engine.
7. Open drain cock and allow the system to drain.

NOTE

If the water is dirty repeat steps 4 through 7.

8. Close drain cock.
9. Refill system with 50% glycol /50% water.

27. Reverse Flow Flushing. See figure 4-9.

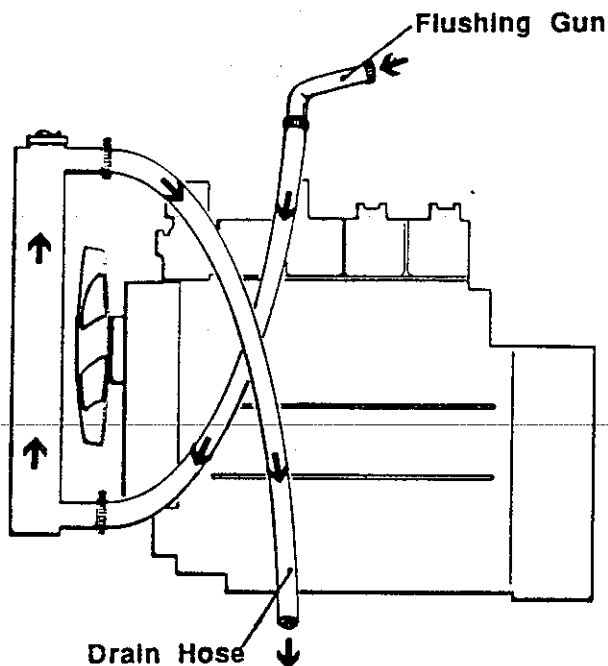


Figure 4-9. Reverse Flow Flushing

1. At the engine, disconnect the hoses.
2. Make sure the radiator cap is on tight.
3. Using a hose clamp, clamp a flushing gun onto the lower hose.
4. Turn on the water and fill the radiator.
5. To keep from damaging the radiator, apply air pressure slowly and carefully.
6. Shut off the air pressure, refill the radiator with water and reapply the air pressure. You will need to repeat these steps until water flushed from the radiator runs out clear.
7. Inspect and clean the radiator cap.
8. Inspect and reconnect the hoses.
9. Refill the radiator with coolant.

4-28. HYDRAULIC SYSTEM. The hydraulic system drives most major components on the PowerBoss™. For component locations and hose connections, refer to figures 4-10 through 4-12.

⚠ WARNING

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED and the wheels are CHOCKED.

4-29. Checking the fluid reservoir. See figure 4-13. Inspect the sight gauge (4) with the hopper in the down position and the machine cool. Fill as needed. Hydraulic fluid should fill $\frac{2}{3}$ of the sight glass.

4-30. Filling the Fluid Reservoir

NOTE

The reservoir is located inside the machine and is accessible through the top side door.

1. Remove the cooler/breather cap (1) located on top of reservoir.
2. Fill the reservoir two thirds full with fluid that meets the viscosity specifications indicated

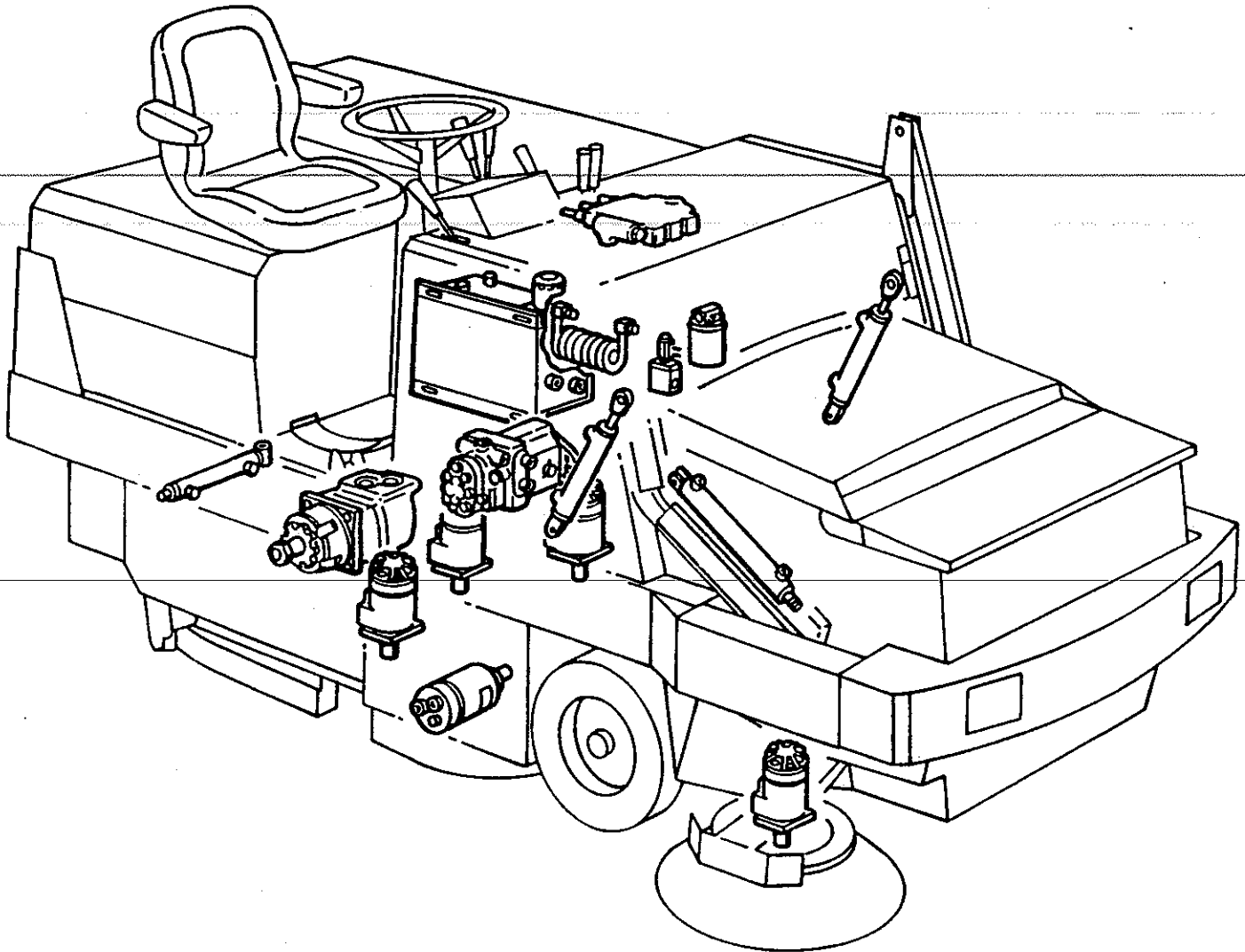


Figure 4-10. Hydraulic Component Locations

below, then replace the filler cap (1). The reservoir is filled with 15W40 oil from the factory.

NOTE

Do not use transmission fluid in place of hydraulic fluid. Brooks & Perkins recommended Chevron Dello 400.

Hydraulic Fluid Viscosity Specifications:

SUS @ 100°F	510-560
SUS @ 210°F	78-84

4-31. Maintaining Cooling Coil Efficiency. The cooling coil is located at the exit port of the impeller fan and utilizes exhausted impeller air to cool the hydraulic fluid. To maintain its efficiency, periodically blow off the cooling coil with compressed air and pressure wash the cooling coil every 100 hours of operation.

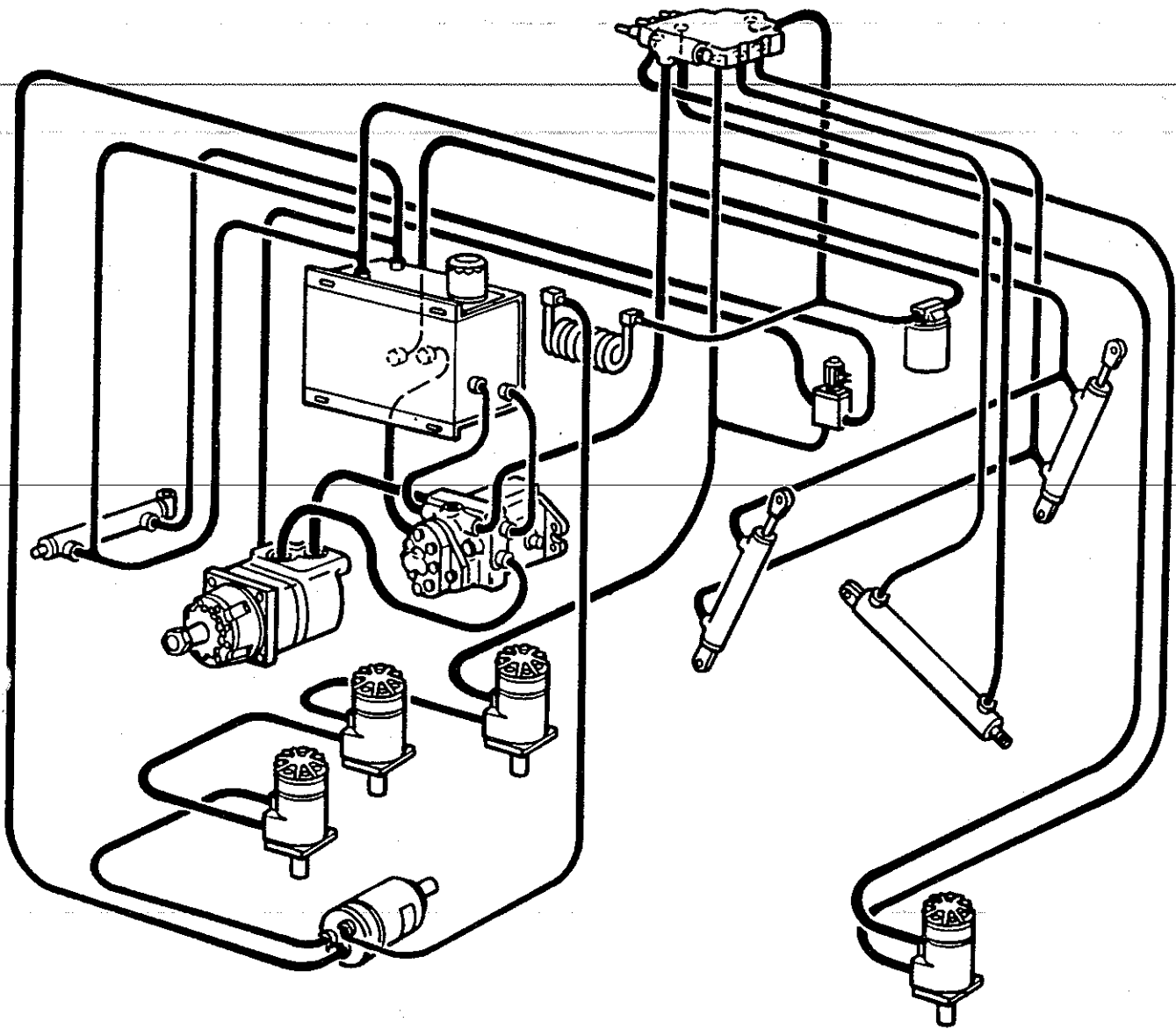


Figure 4-11. Hydraulic Hose Connections (High Dump)

4-32. Changing the Hydraulic Fluid

1. Turn off the engine and engage the parking brake.
2. Place a drain pan on the floor below the reservoir.
3. Remove the drain plug located on the bottom rear of the reservoir and allow the fluid to drain.
4. Discard the fluid, then replace and re-tighten the drain plug.
5. Remove the filler/breather cap (1) located on top of the reservoir (3) and fill the reservoir with approved hydraulic fluid.

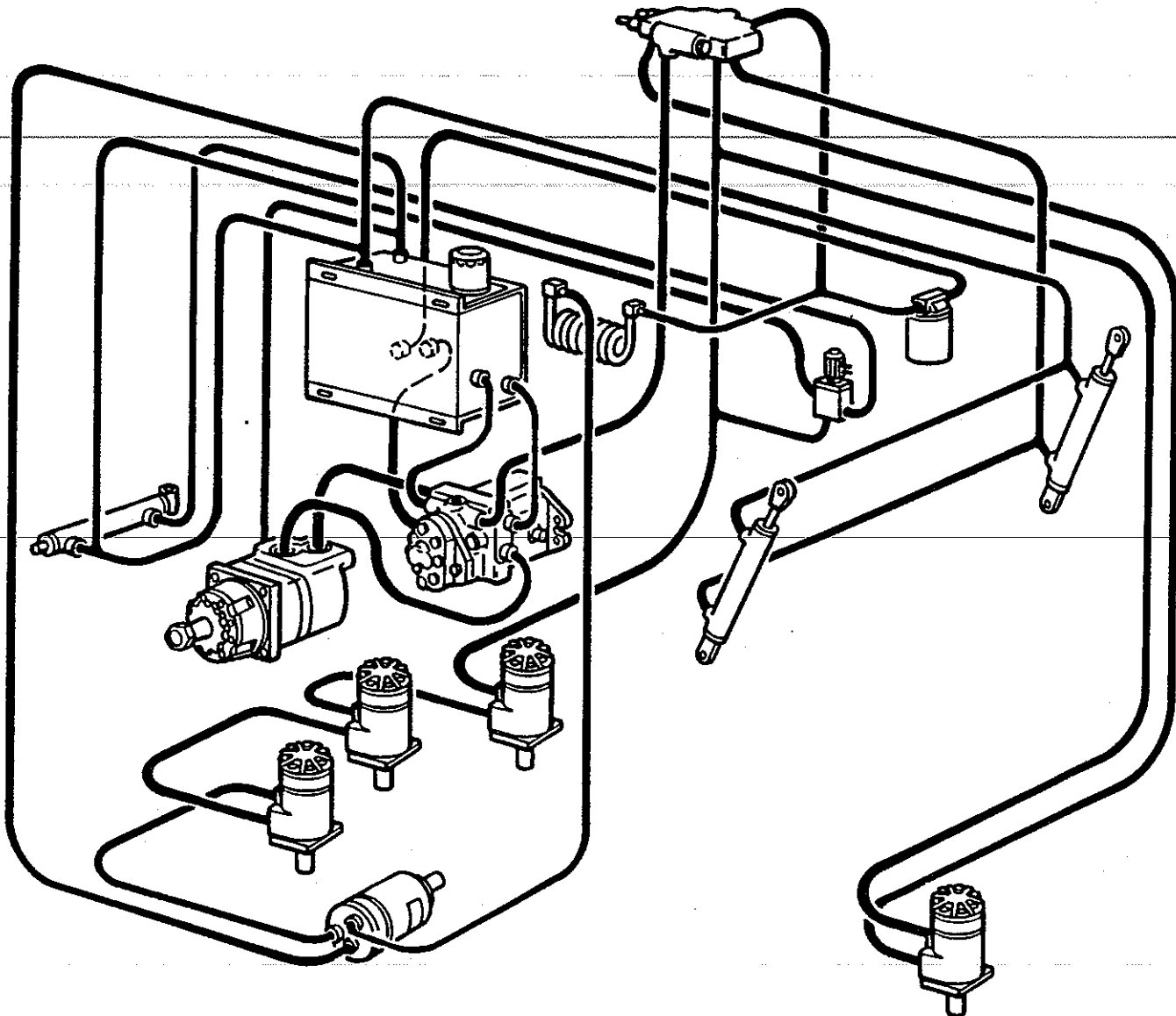


Figure 4-12. Hydraulic Hose Connections (Low Dump)

NOTE

This will require six gallons of fluid.

6. Check the sight gauge (4) to insure the proper two-thirds level is achieved.
7. Install a new filler/breather cartridge.
8. Check the drain plug for leakage.

4-33. Changing the Hydraulic Fluid Filter

1. Turn off the engine and engage the parking brake.
2. Remove the oil filter cartridge (5) from the mount and discard.
3. Apply a thin coating of fluid to the seal of a new filter element.

1. Filler/Breather Cap
2. Access Plate
3. Hydraulic Reservoir
4. Hydraulic Level Sight Gauge
5. Hydraulic Filter
6. Hydraulic Filter Condition Indicator

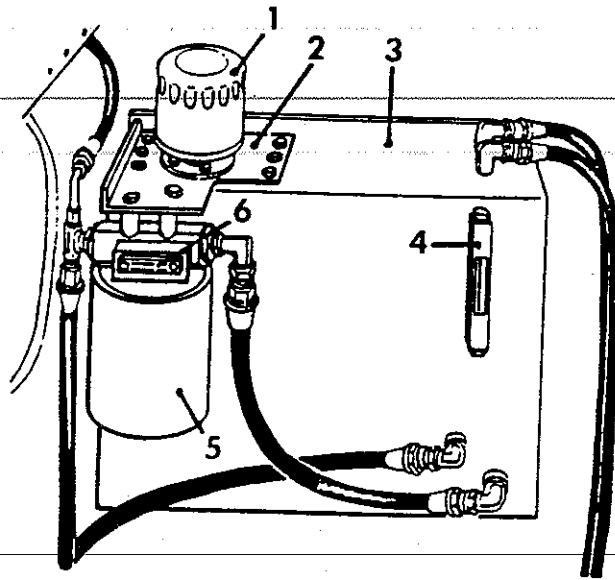


Figure 4-13. Hydraulic Fluid Reservoir

4. Thread onto the mount and hand tighten.
5. Tighten an additional one-half turn after the seal is completely seated.

NOTE

Do not over tighten.

6. Start the machine, shut it off, then check for leakage.

4-34. Changing the Hydraulic Fluid Strainer

1. Remove the eight bolts which hold the access plate (2) to the reservoir (3).
2. Lift the access plate (2) from the top of the reservoir (3).
3. Inside grasp the strainer and turn counter clockwise to remove.
4. Clean and inspect the strainer. (Change as required.)
5. Replace the strainer and the access plate.

4-35. Adjusting the Directional Control Return Spring. See figure 4-14. You may encounter "creeping" problems from time to time. Creeping means the machine moves backward or forward

when the forward/reverse pedal is in neutral. A grinding noise when the engine is shut down is also an indicator that the directional control return spring needs adjusting. If this occurs perform the procedure which follows.

1. On low dump models, remove the hopper. On high dump models raise and engage hopper safety arm.



CAUTION

For maintenance on high dump models, do not rely on the hydraulic cylinder to keep the hopper raised. Always engage the safety arm before going under the hopper.

2. Turn off engine, engage parking brake, and chock both wheels.
3. Jack the rear of the machine so that the rear tire just clears the floor. Use two jack stands to support the machine. **DO NOT USE JACK ALONE TO HOLD THE MACHINE UP.**
4. If an assistant is not available to watch the rear wheel, use a mirror to allow you to see the rear wheel.

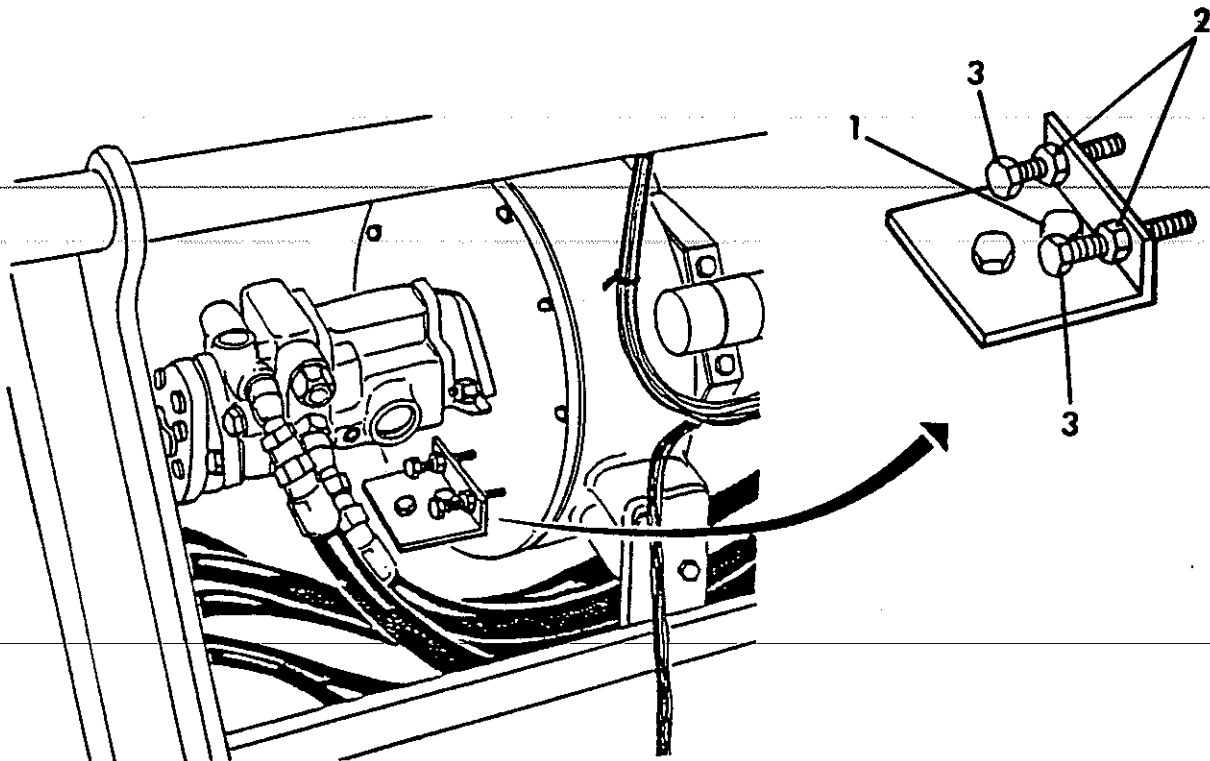


Figure 4-14. Adjustment Bracket

5. Locate the forward/reverse adjustment bracket mounted beneath the pump on the pump mounting plate.
6. Slightly loosen the bolt on the center of the bracket (1).
7. Now loosen the locking nut (3) on each of the adjusting bolts (3) on the side of the bracket closest to the pump mounting plate.
8. From the operator's seat, start the engine and run at half throttle.
9. Turn the adjusting bolts while watching the rear wheel. Continue to adjust until the rear wheel does not turn in either direction.
10. Fully open throttle. Push the directional control pedal forward and backward to be sure pump stays in neutral. Check wheel again and adjust as needed until the wheel remains motionless.
11. Retighten all the locking nuts and the bolts.

12. Turn engine off and lower the machine to the floor.

4-36. Adjusting Machine Speed. See figure 4-15.

To limit the speed of the machine, simply reposition the speed limiter, a bolt underneath the directional control pedal which can be moved in or out. Be sure that the directional control pedal contacts the speed limiter bolt before the pump control arm hits the pump stop.

4-37. Swivel Fittings. Visually inspect the two swivel fittings on top of the motor and the case drain fitting (on the smallest of the 3 hoses) for oil leaks. If the fittings are leaking reseal using a seal kit.

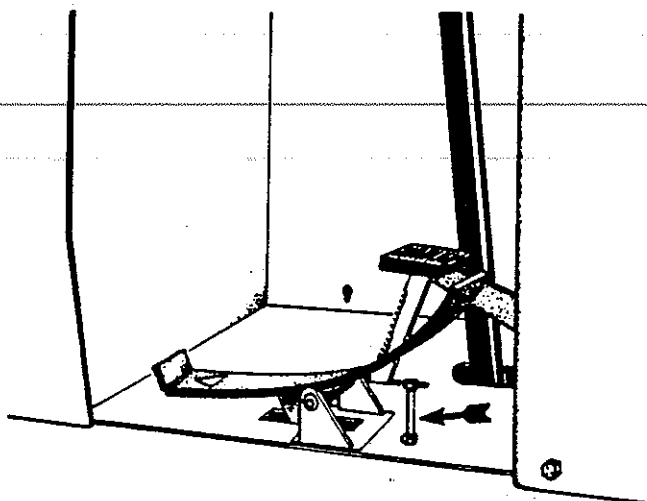


Figure 4-15. Speed Limiter

4-38. Hydraulic Schematics. Use the schematics which follow to assist when troubleshooting and maintaining the hydraulics system of the sweeper/scrubber, see figure 4-16 through 4-23.

4-39. IMPELLER

WARNING

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and wheels are CHOCKED.

CAUTION

If the engine must be started for test purposes, do not put your hands near intake hoses or openings or near the impeller or belts.

4-40. Lubricate Bearing Housing. All scrubbers have two housings;. Grease bearing housings with Lubriplate EMB or Chevron SR1 #2, see

figure 4-24. Four or five strokes/pumps from a hand held grease gun in each bearing housing is sufficient.

ATTENTION

Do not overfill the housings. This will cause grease to be thrown onto the belts and pulleys which drive the impeller. Any excess grease expelled from these bearings should be wiped away.

4-41. Pulley Alignment

4-42. Check Alignment. Pulley alignment can be checked visually or with a straight edge. If pulleys and belts are parallel they are correctly aligned, see figures 4-25.

4-43. Adjusting Belt Tension. To adjust the impeller belt tension, proceed as follows:

Engine to Idler

1. Locate the bracket on the bottom of the impeller mount. This bracket contains two set screws and one locking bolt.
2. Loosen the locking bolt in the center of the bracket and the jam nuts on the set screws.
3. Use a 1/4" Allen wrench to increase belt tension by tightening the set screws. (Alternate tightening set screws to preserve belt alignment.)
4. Check belt alignment.
5. Tighten jam nuts and locking bolts.

Idler to Impeller

1. Locate the four bolts which hold the impeller bearing housing to the impeller mount.
2. Loosen the four bolts.
3. Locate the tensioning bolt at the rear of the impeller.
4. Loosen the jam nut and tighten the bolt (clockwise) to increase belt tension.

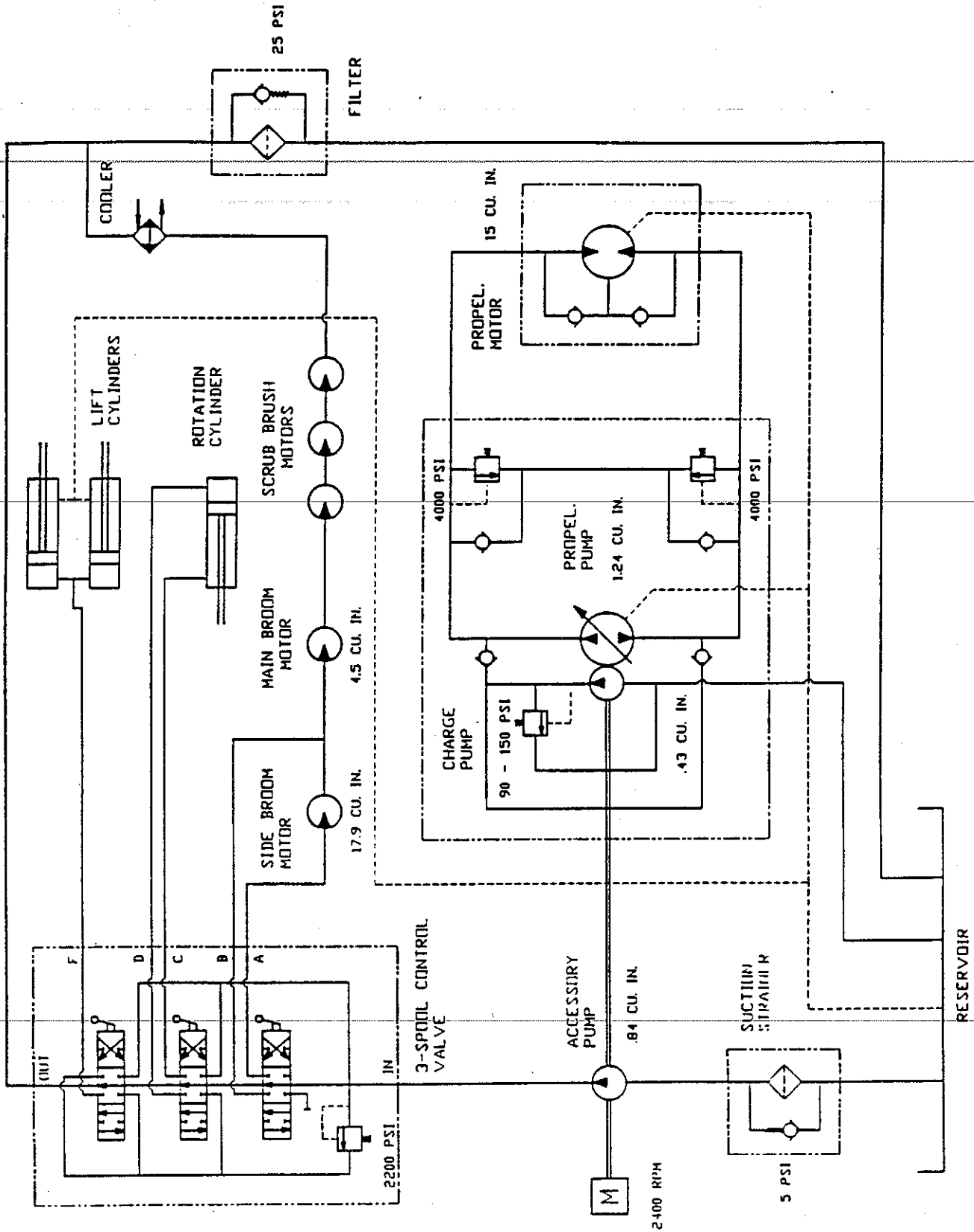


Figure 4-16. TSS/90 High Dump Hydraulic Schematic

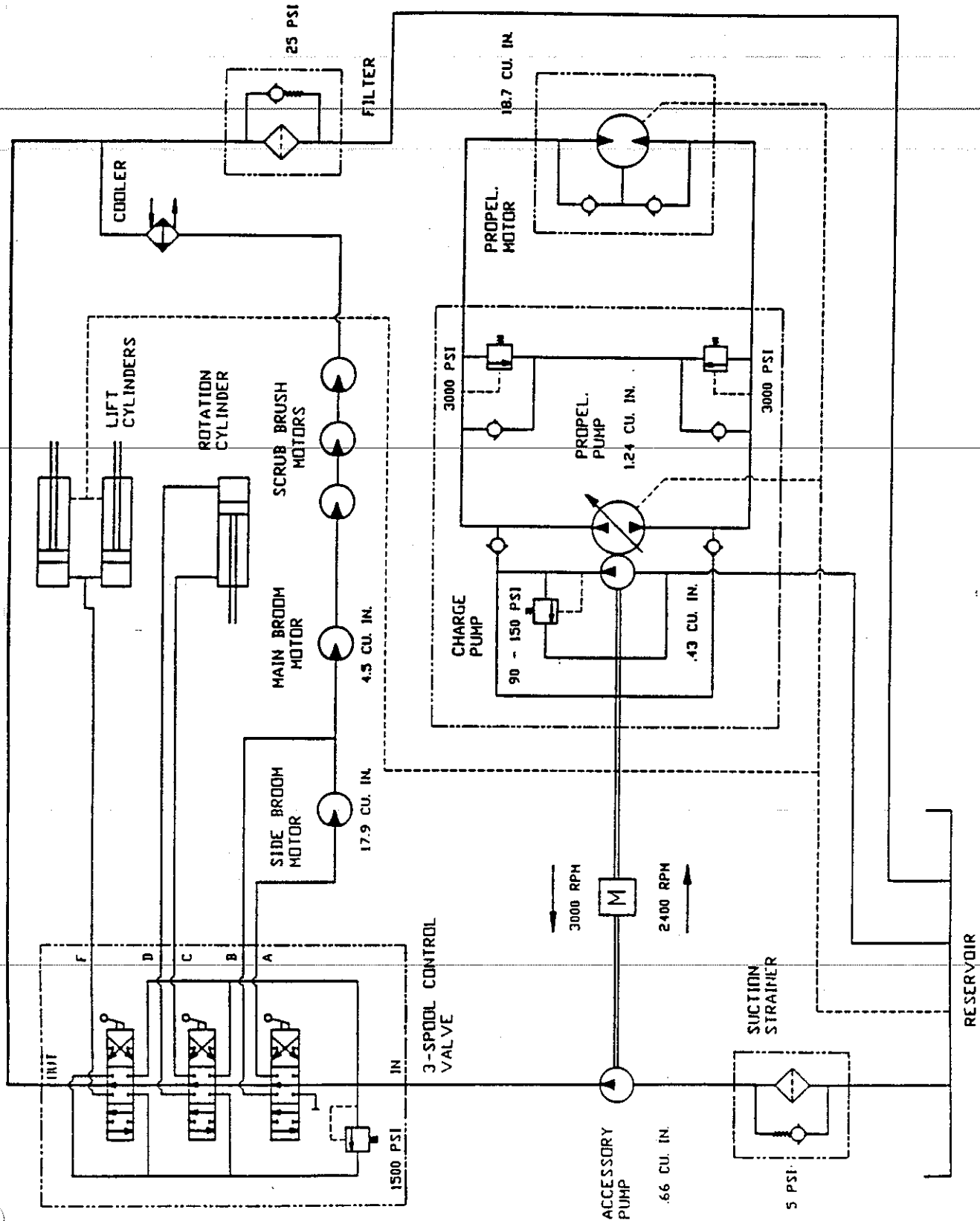


Figure 4-17. TSS/80 High Dump Hydraulic Schematic

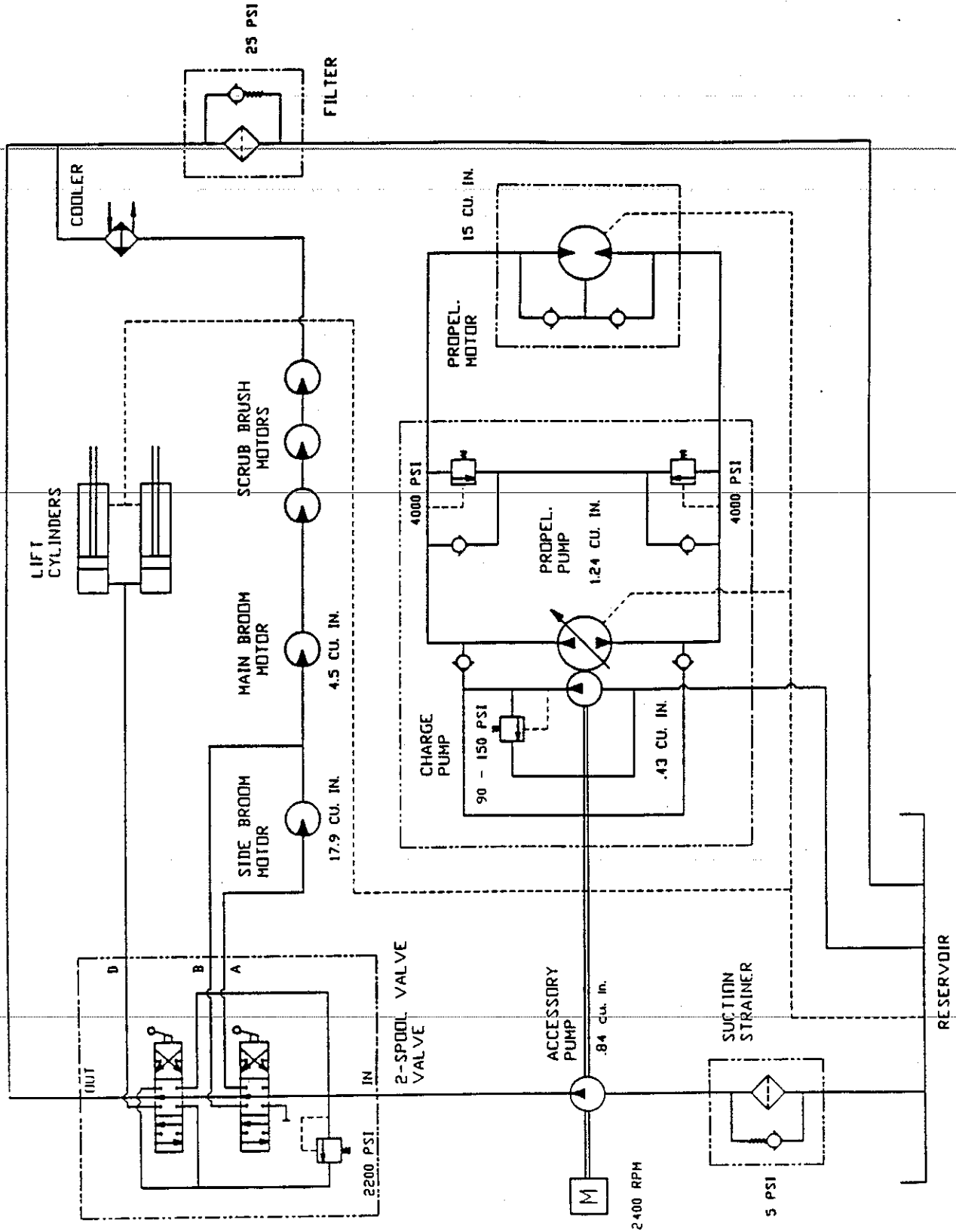


Figure 4-18. TSS/90 Low Dump Hydraulic Schematic

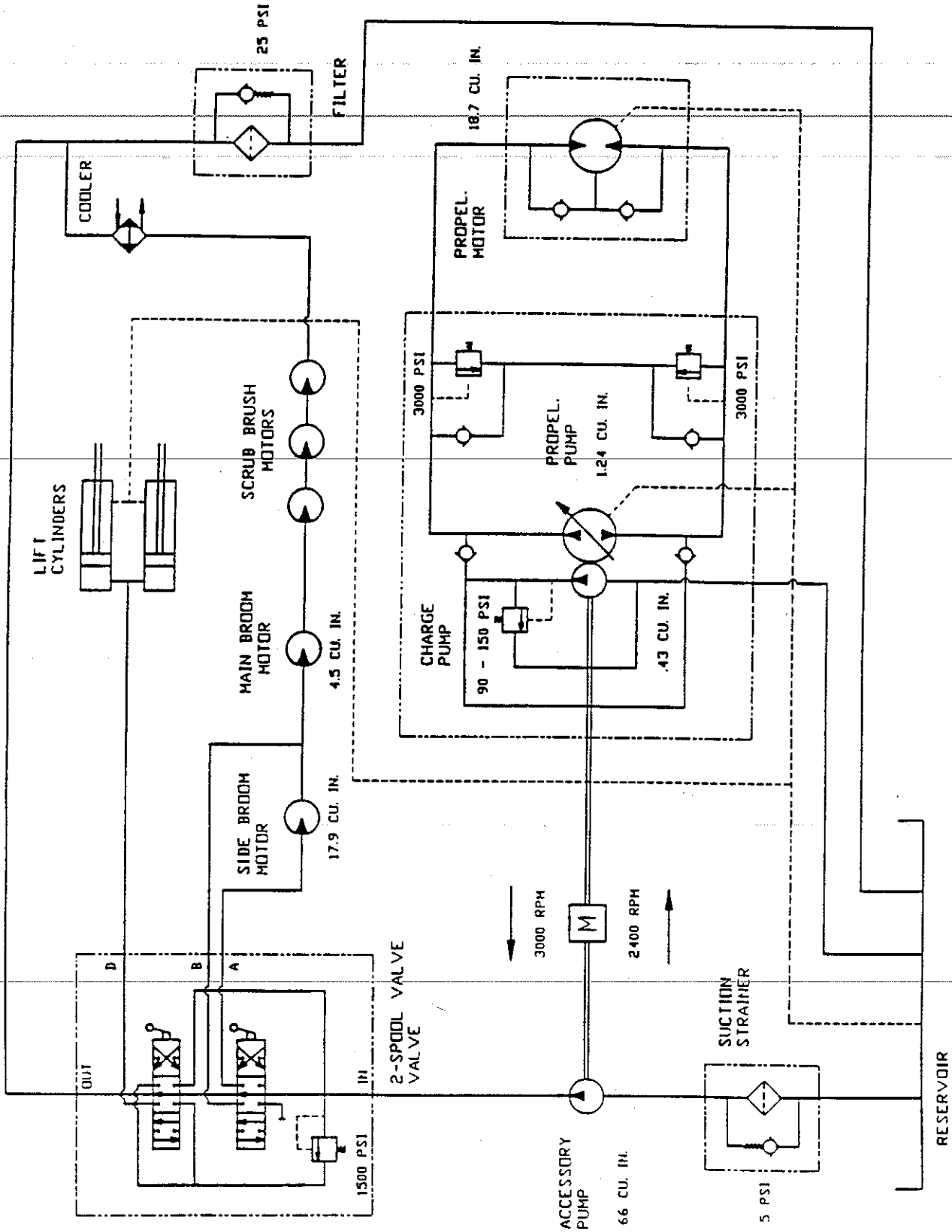


Figure 4-19. TSS/80 Low Dump Hydraulic Schematic

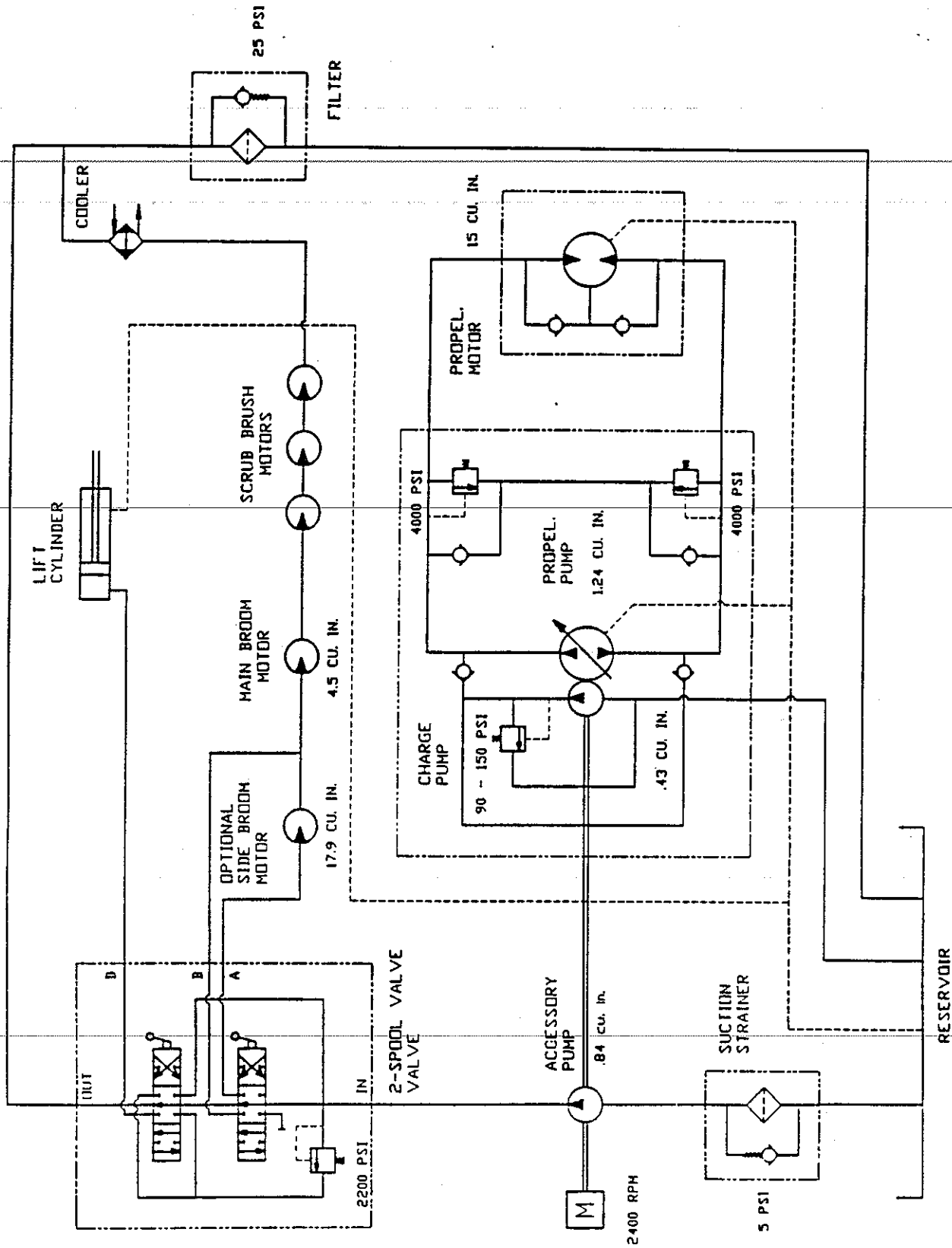


Figure 4-20. ISS/90 Hydraulic Schematic

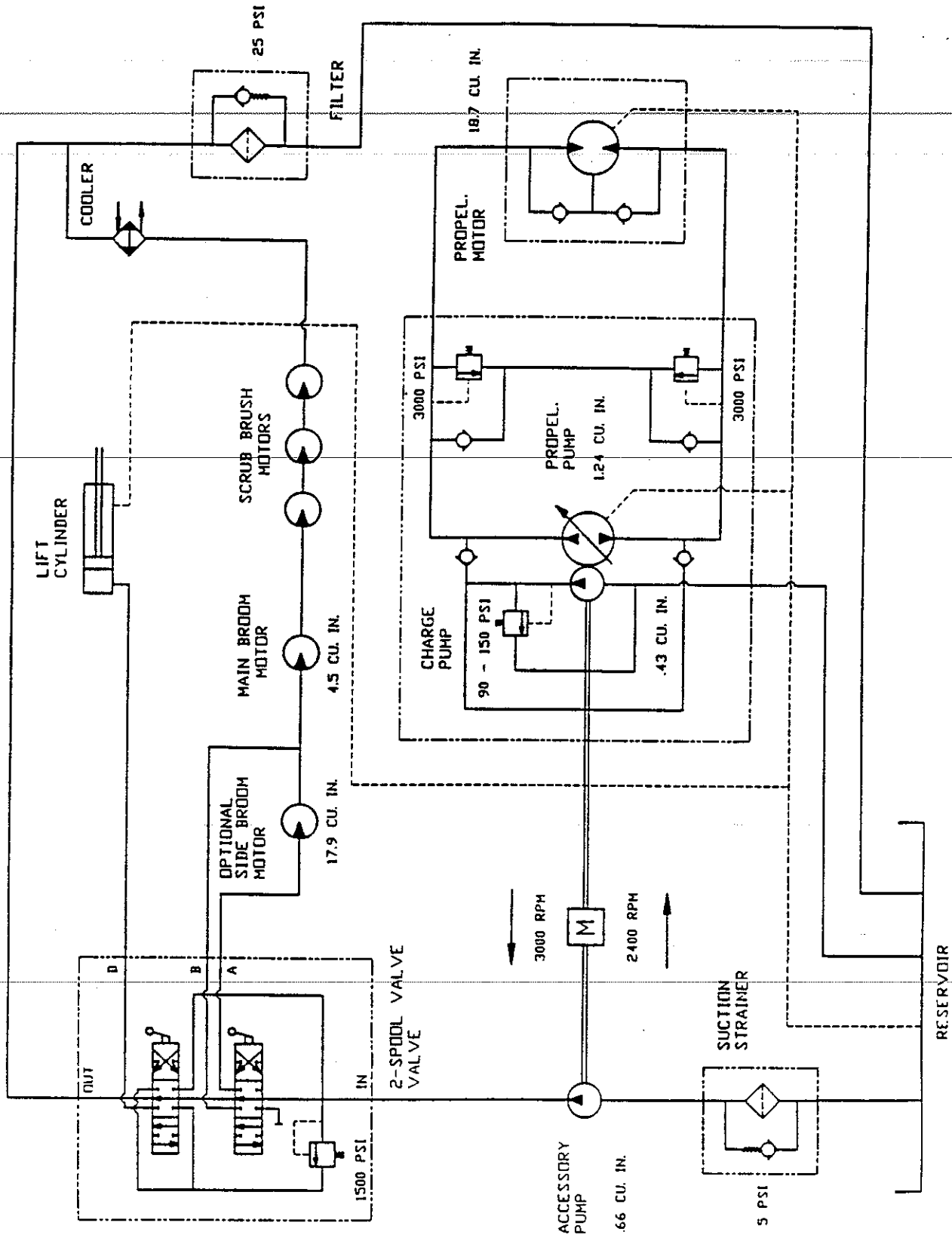


Figure 4-21. ISS/80 Hydraulic Schematic

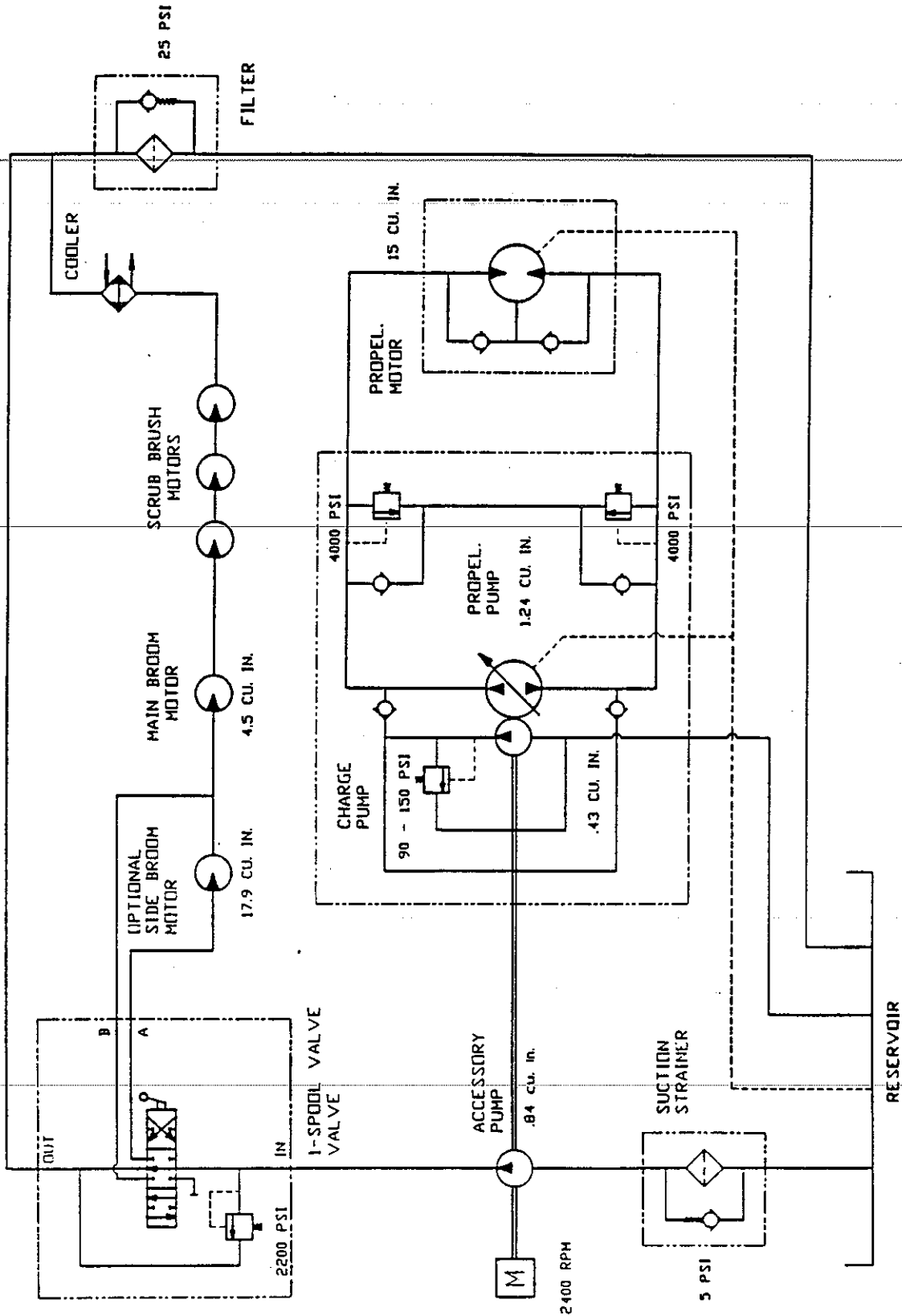


Figure 4-22. CSS/90 Hydraulic Schematic

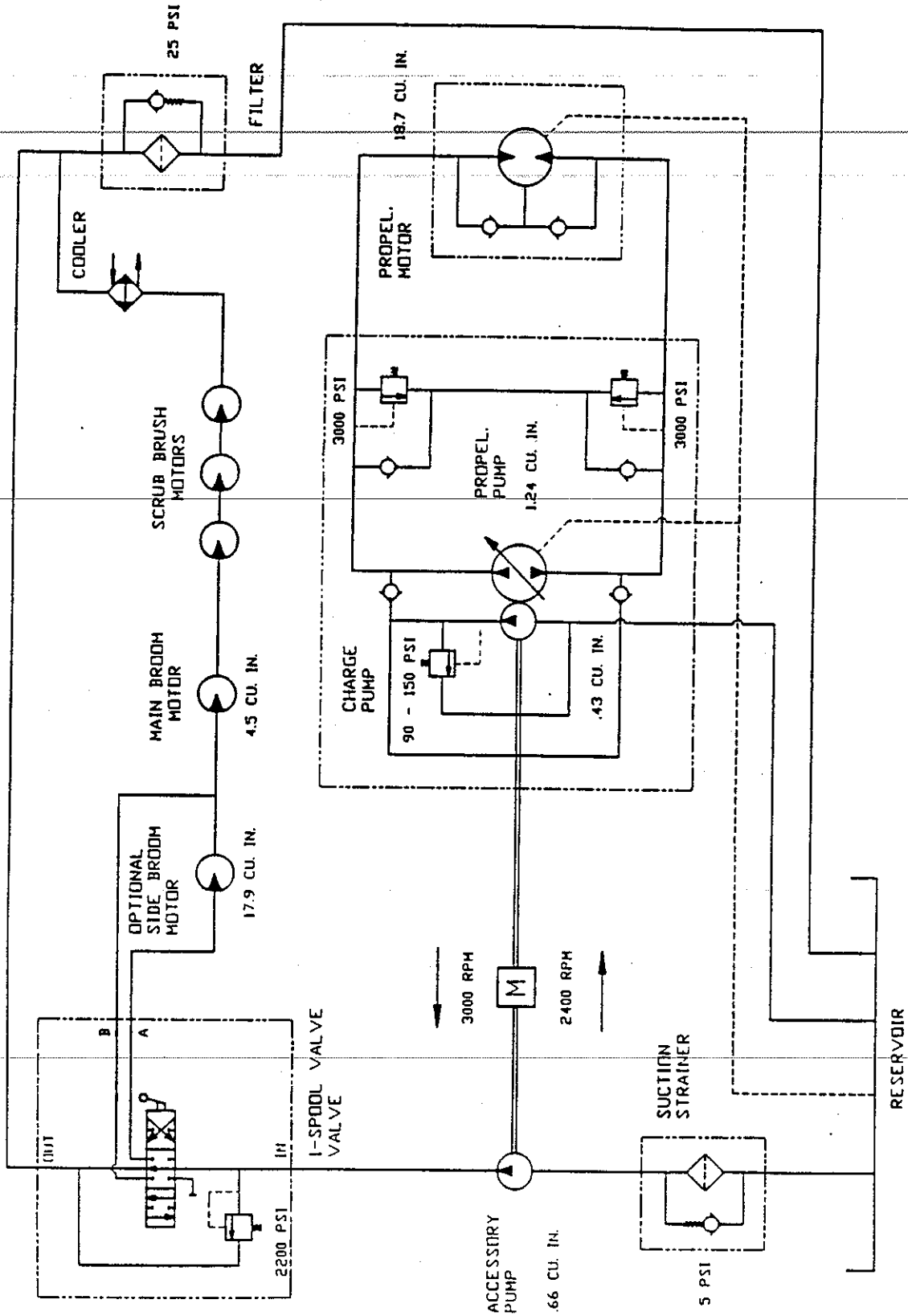


Figure 4-23. CSS/80 Hydraulic Schematic

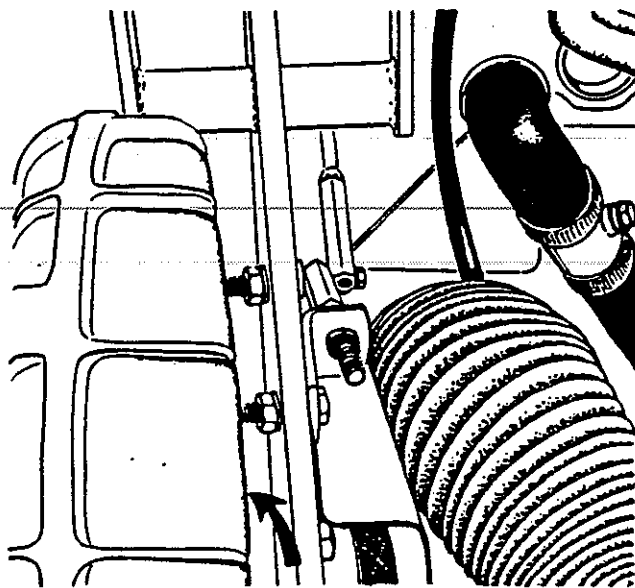


Figure 4-24. Impeller Bearing Housing Lubrication

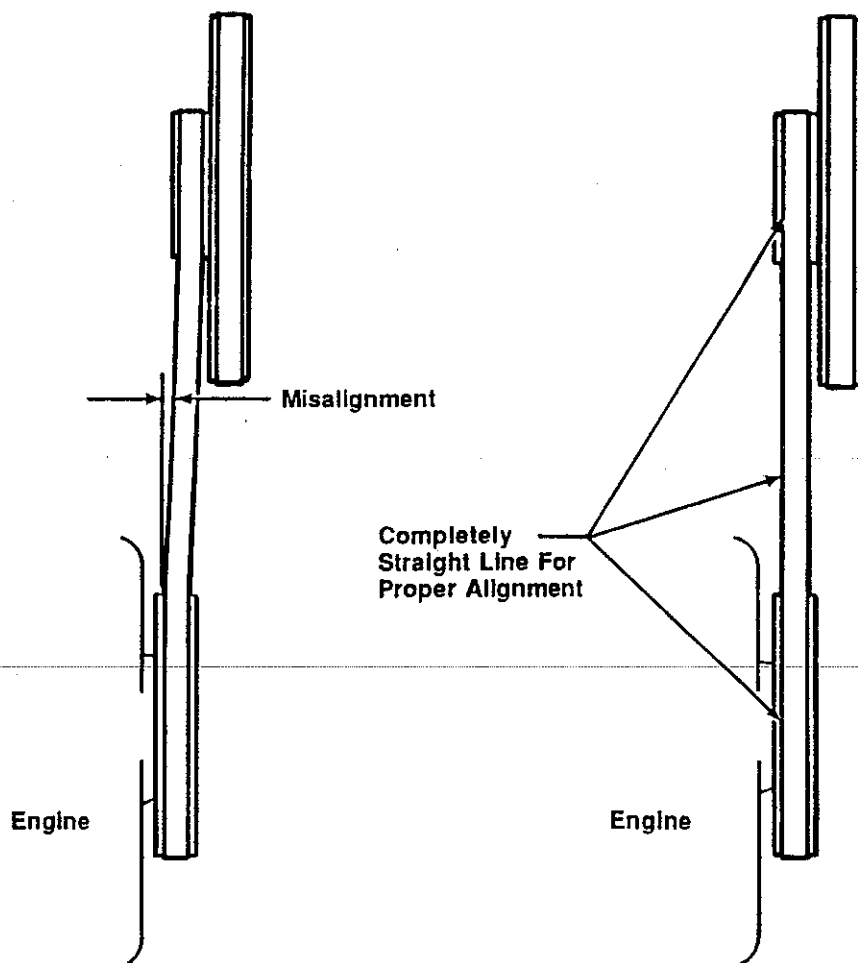


Figure 4-25. Pulley Alignment

5. Tighten jam nut and the four bolts on the bearing housing.

adjust flaps, loosen nuts and bolts, slide flap up or down as needed. Re-tighten nuts and bolts.

NOTE

If using a belt tensioning gauge, belt deflection should be one half inch at 5 lbs. of pressure.

4-44. SWEEPING COMPONENTS

WARNING

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

- 4-45. Broom Door Skirt and Seal Inspection. See figure 4-26.

NOTE

Perform this inspection when the machine is parked on a level surface.

1. Turn the machine off and lock the parking brake.
2. Inspect broom door skirts for wear and damage. Flap clearance should be $\frac{1}{8}$ " above the floor.
3. Worn and damaged skirts should be replaced immediately to maintain proper dust control.
4. Check door seals for tears, cuts and general wear. Replace as necessary.

4-46. Broom Door Flap Replacement and Adjustment

The flaps are attached to the broom doors by a retainer bar and hex bolts and nuts. To remove the flaps, remove nuts and bolts and retainer bar. To

4-47. Main Broom Adjustment Test

NOTE

Perform this adjustment on a flat, smooth test surface.

1. Drive the machine onto the test surface with the main broom in the RAISED position.
2. Set the parking brake and position the main broom handle in NORMAL position.
3. Push the broom control lever on ON position to activate the broom motor and open throttle to full RPM.
4. Allow about 45 seconds for the broom to operate, then deactivate the broom motor and raise the broom.

NOTE

Test time will vary according to the test surface used. If test pattern is not clear apply chalk to the test area prior to testing.

5. Drive the machine clear of the test site.
6. Examine the polished pattern made by the broom on the test area, see figure 4-27.

NOTE

A rectangular shape the length of the main broom, 2" wide, indicates the main broom is properly adjusted. A pattern smaller than 2" indicates need for lower adjustment. A pattern wider than 2" indicates a need for higher adjustment. If pattern is tapered from end to end instead of rectangular, see Taper Adjustment on the next page.

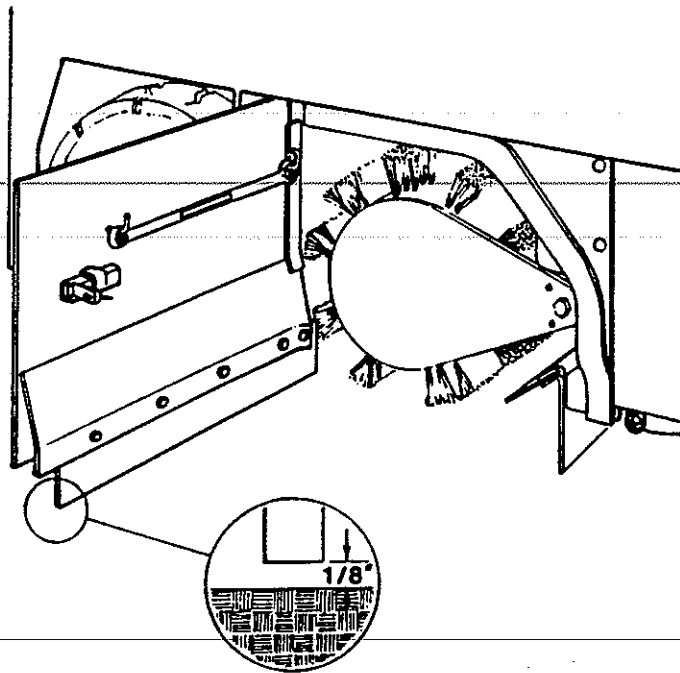
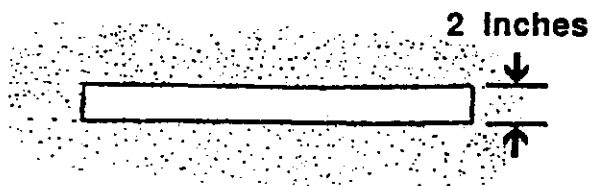
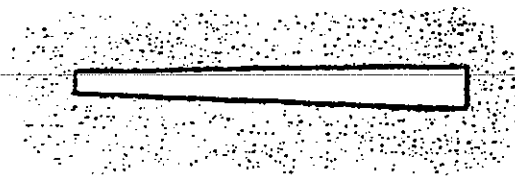


Figure 4-26. Broom Door Skirt and Seals



Correct Taper Pattern



Incorrect Taper Pattern

Figure 4-27. Main Broom Test Pattern

4-48. Main Broom Adjustment. See figure 4-28.

1. Turn the machine off and lock the parking brake.
2. Position the main broom lever in the full FLOAT position.

NOTE

The adjustment knob is located under the engine cover immediately beside the battery on the firewall.

3. Turn the broom adjusting knob (1) clockwise one-eighth turn to free wingnut (2).
4. Turn the wingnut counterclockwise to allow space for adjustment.
5. Make a lower or higher adjustment with the knob as required.
6. Re-tighten the wingnut.
7. Repeat the main broom adjustment test to see that the broom is properly adjusted.

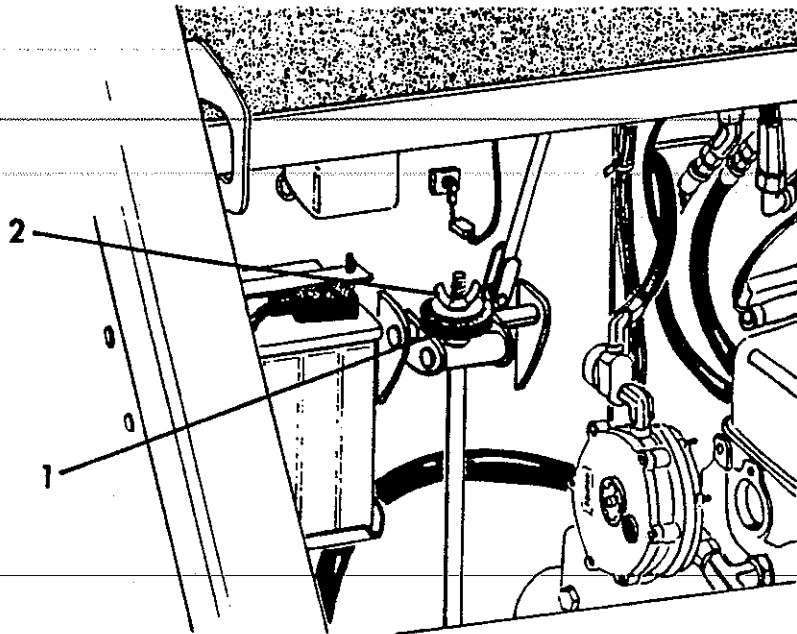


Figure 4-28. Main Broom Adjustment

49. Main Broom Taper Adjustment

NOTE

It is not usually necessary to perform this adjustment. However, if the main broom adjustment test shows a pattern that is tapered in length (one end is wider than the other), perform the procedures which follow.

1. Locate the hex-shaped adjustment bar on the left rear wall of the broom chamber underneath the machine, see figure 4-29.
2. Loosen the locking bolt on the right side of the hex bar.
3. Grasp the hex bar with a wrench and rotate it to raise or lower the left end of the main broom. (The right end of the main broom remains fixed. All adjustments affect the left end of the broom.)
4. After adjustment, re-tighten the bolt.
5. Repeat the main broom adjustment test to see that the broom is properly adjusted.

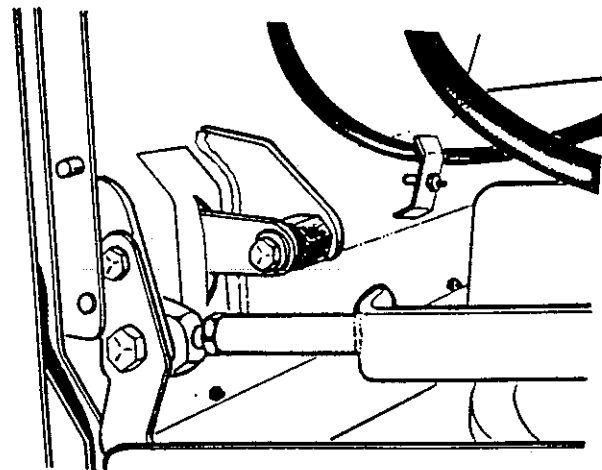


Figure 4-29. Main Broom Taper Adjustment

4-50. Main Broom Replacement. Replace the main broom when bristles wear to 1" in length.

1. Turn the engine off and lock the parking brake.

2. Push the main broom control lever to the NORMAL position.
3. Open the left broom chamber door (the door opposite the driver's side).
4. Using the wrench stored inside the broom chamber door, remove the hex bolt on the main broom idler mount, see figure 4-30.
5. Pull the main broom idler mount straight out to remove.
6. Grasp the main broom by the plastic drive hub, pull the main broom straight out and clear of the broom chamber.
7. At this point, depending on broom condition, you can either rotate the old broom end-for-end and re-install it or you can install a new broom. In either case, you need to slide the main broom into the broom chamber and align the broom with the metal drive hub located at the far side of the broom chamber.
If a worn broom is being replaced, it may be easier to install the new broom by first adjusting the broom arms up, to better match the position of the drive hub with the hub on the new broom.
8. Once the broom is started onto the drive hubs, rotate the broom counterclockwise while pushing lightly against the broom.

9. Once the broom is fully engaged, replace the idler hub while aligning the seats in the idler hub with the broom's drive hub ears.
10. Install the retaining bolt into position and tighten with the wrench.
11. Return the wrench to its storage hooks on the inside of the broom chamber door.
12. Close and latch the left broom door.
13. Perform a main broom adjustment test and adjust as needed.

4-51. Main Broom Idler Bearing Inspection

1. Remove the main broom idler plate.
2. Spin the idler hub. The hub should spin freely with no noise.
3. Replace bearing as needed.

4-52. Side Broom Adjustment Inspection. See figure 4-31. Inspect the side broom for proper angle and contact with the floor. Optimum side broom angle is 6°. Proper contact is achieved when the bristles contact the floor from 3:00 to 10:00 as shown in drawing.

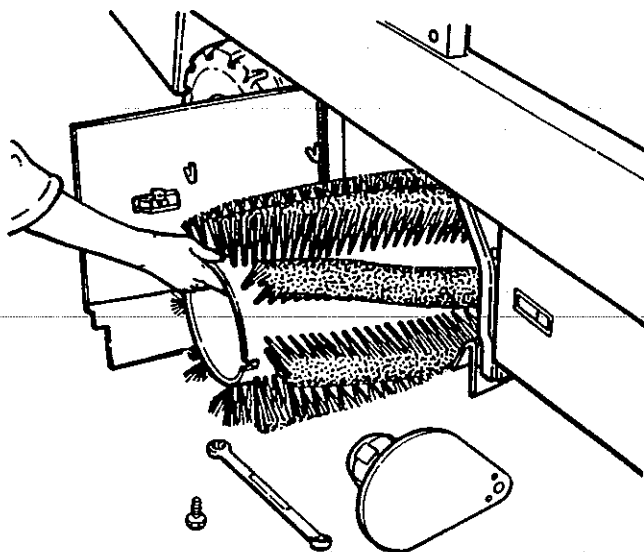


Figure 4-30. Main Broom Change

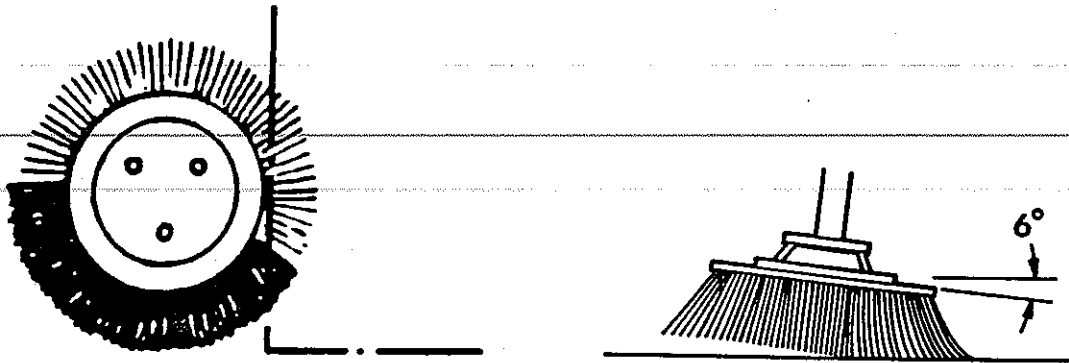


Figure 4-31. Side Broom Inspection

4-53. Side Broom Height (Wear) Adjustment

1. Stop the engine and lock the parking brake.
2. Position the side broom handle in LOWER position.
3. Loosen the side broom adjusting nuts located on the exterior of the side broom arm assembly, see figure 4-32.
4. Adjust the side broom height by sliding the broom assembly up or down until proper floor contact is made.
5. After adjustment, tighten the adjusting nut.

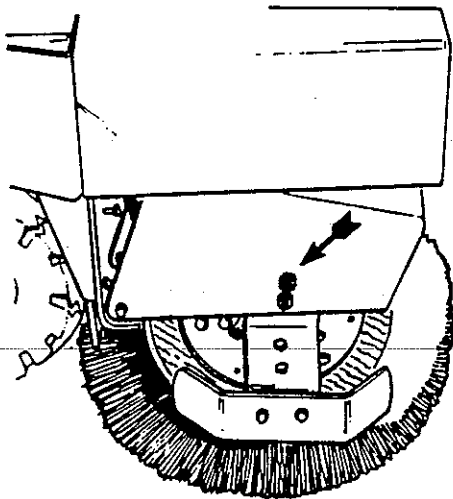


Figure 4-32. Side Broom Height Adjustment

4-54. Side Broom Angle Adjustment. See figure 4-33.

NOTE

This adjustment is controlled by a bolt located on the inside of the side broom arm assembly. By turning this bolt, the angle at which the bristles contact the floor can be changed. The optimum angle is 6°.

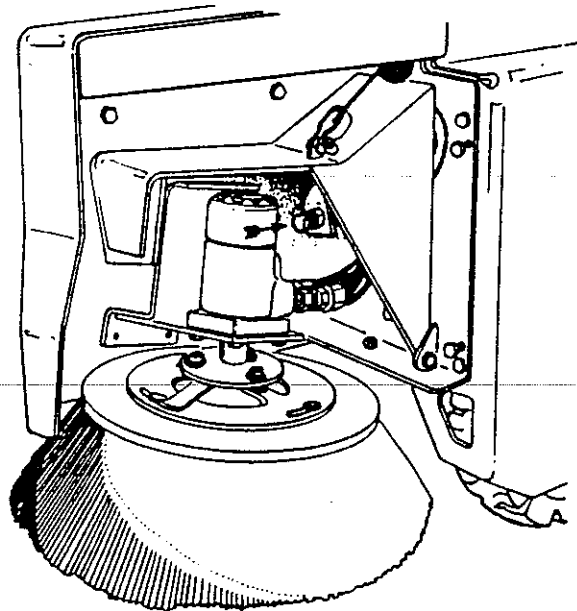


Figure 4-33. Side Broom Angle Adjustment

4-55. Side Broom Cable Adjustment. This adjustment is made at the hex-shaped adjustment bar attached to the side broom lift lever in the engine compartment. It controls the height of the side broom when raised. See figure 4-34.

On high dump models this adjustment must be performed with the hopper fully lowered.

1. Pull the side broom lever into the raised position.
2. Loosen the locknut on the hex bar.
3. Turn the cable in or out of the hex bar as necessary to set the side broom in the maximum raised position.
4. Secure the cable adjustment by tightening the locknut against the hex bar.

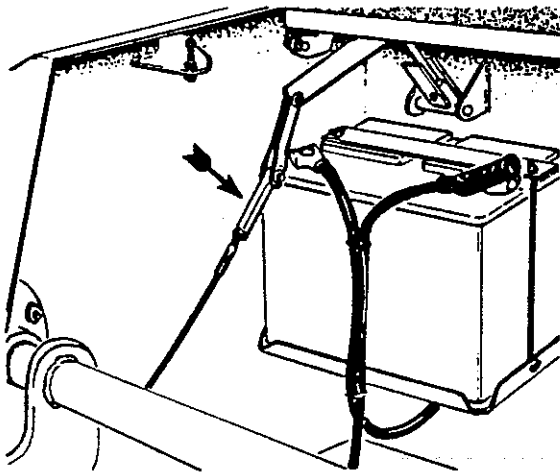


Figure 4-34. Side Broom Lift Cable

4-56. Side Broom Replacement. Refer to figure 4-35.

NOTE

The side broom features a quick release mechanism which enables the operator to remove the brush in seconds. The side broom should be replaced when bristles wear to 3" in length.

1. Raise the side broom and lock in RAISE position.
2. Turn the side broom by hand until the brush retainer is accessible.
3. Lift the bar and turn the broom clockwise (about one eighth of a turn) until the lock pins in the broom disengage from the drive plate.
4. Install the new broom by positioning three drive pins into the pilot holes of the drive plate.
5. Lift and rotate the broom until the broom retainer bar springs into the locked position.
6. Check to make sure all three drive lugs are properly engaged.

4-57. Blower Wand Adjustment. If the blower wand does not provide proper air flow the cable is probably adjusted incorrectly. To correct the adjustment:

1. Locate the cable sheath anchor on the impeller housing.
2. Loosen the sheath anchor nut.
3. Slide the sheath closer to the arm for more air flow or away from the arm if the blower does not shut off properly.
4. Retighten the sheath anchor nut.

4-58. SCRUB AND WATER PICKUP COMPONENTS.

WARNING

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

4-59. Scrub Brush Replacement. See figure 4-36. The scrub brush features a quick release mechanism which enables the operator to remove the brush in seconds.

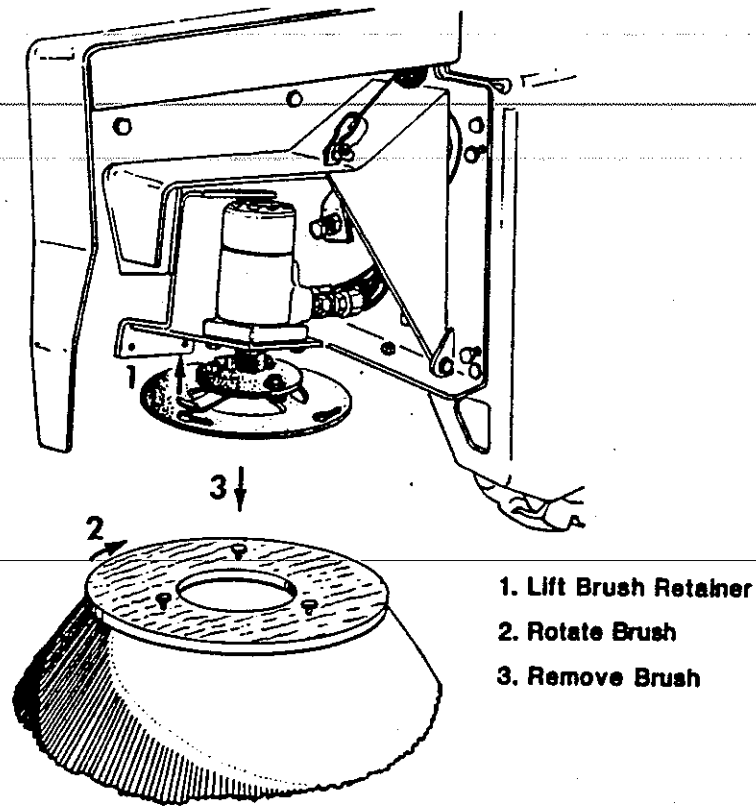


Figure 4-35. Side Broom Replacement

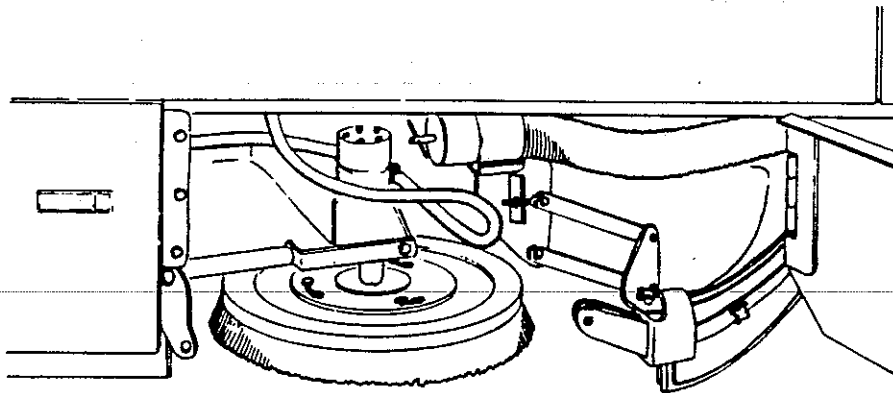


Figure 4-36. Scrub Brush Replacement

NOTE

Brushes should be replaced when bristles are less than 1/2" long. The three scrub brushes all feature quick release locks.

1. Raise the scrubhead.
2. Turn the scrub brush by hand until the brush retainer bar is accessible.
3. Lift the bar and turn the brush clockwise (about one eighth of a turn) until the lock pins in the brush disengage from the drive plate.
4. Install the new brush by positioning three drive pins into the pilot holes of the drive plate.
5. Lift and rotate the brush until the brush retainer bar springs into the locked position.
6. Check to make sure all three drive lugs are properly engaged.

4-60. Centering and Leveling the Scrubhead. This is an adjustment which is not usually required; however, if it is necessary, follow the steps below.

CAUTION

Do not get under the scrubhead without first placing a safety support (jackstand or brace) under the scrubhead.

1. Park the machine on a level surface and lower the scrubhead so that it just contacts the floor. Do not apply pressure.
2. Turn off the engine and engage the parking brake.
3. Open the access doors and remove the bolt which attaches the right and left lift arm assembly to the frame on each side, see figure 4-37. The scrub brushes should now be lying flat on the floor. If not, lower the scrubhead until the brushes contact the floor at all points.
4. Push the right or left side of the scrubhead as far toward the broom chamber wall as possible and measure the distance be-

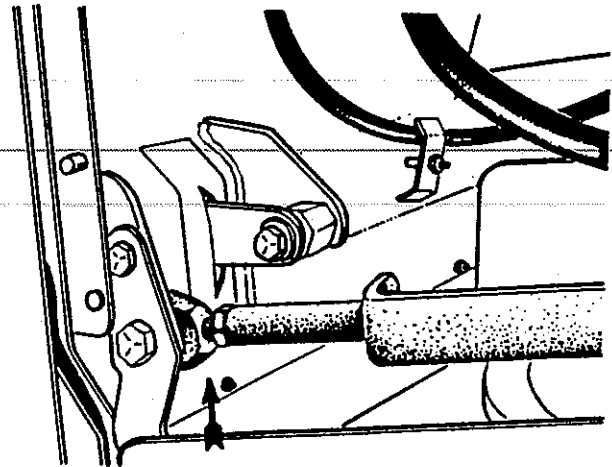


Figure 4-37. Scrub Head Adjustment

tween a point on the scrubhead and the broom chamber.

5. Then push the same side of the scrubhead as far away from the broom chamber wall as possible and measure the distance between the same two points.
6. Center the scrubhead halfway between the two measurements.
7. With the scrubhead in its centered position, compare the holes in the rod ends with the corresponding holes in the frame.

NOTE

If the holes do not line up, loosen the locking nut on the rod end shaft and adjust the rod end until the holes do align. Re-tighten locking nuts.

8. Secure the scrubhead in centered position by reinstalling the bolts which attach the lift arm assembly to the frame.

4-61. Scrubhead Gauge Adjustment. See figure 4-38.

1. Raise the scrubheads to the full "UP" position.
2. Locate the linkage (1) attached to the frame above the scrubheads.
3. Loosen set screw (2).

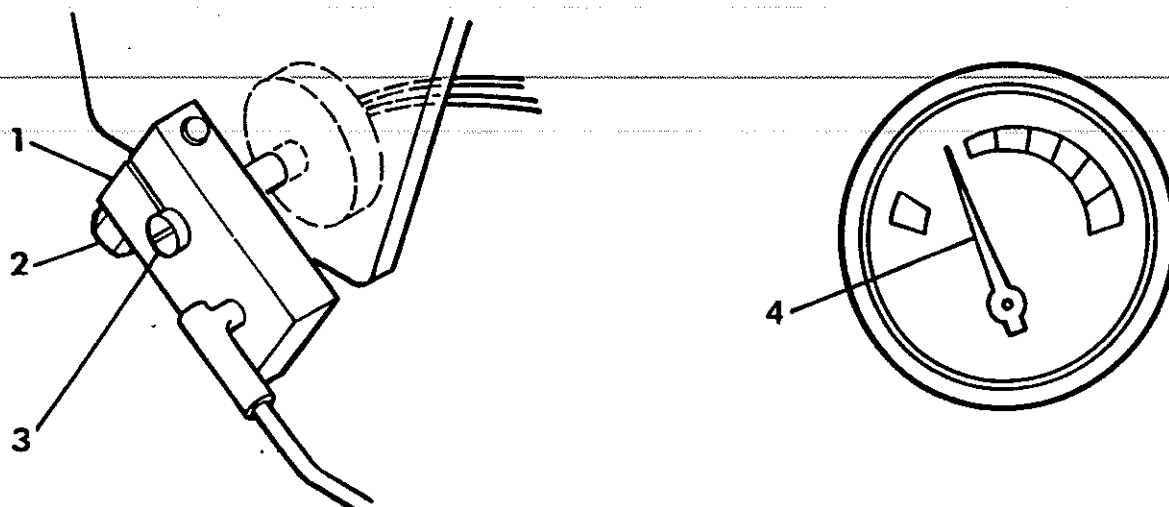


Figure 4-38. Scrubhead Gauge Adjustment

4. Turn the potentiometer shaft (3) until the gauge needle (4) points to the white dot at the left of the gauge.
5. Re-tighten set screw (2).

NOTE

A nonfunctional gauge does not prevent the scrubhead from being used.

4-62. Checking and Adjusting the Main Squeegee Flare.

1. Park the machine on a flat surface.
2. Turn the engine off and engage the parking brake.
3. Open the rear lower access doors.
4. Remove the pull pins and remove the side squeegees.
5. Put the squeegee lever in the down and locked position.
6. Release the quick-disconnect at the back of the rear squeegee, see figure 4-39.
7. Loosen the locking nut on the squeegee caster and screw the caster up until it clears the floor.
8. Locate the squeegee arms (1) on each side of the machine, see figure 4-40.
9. Loosen the bolt (3) which attaches the upper squeegee arm to the squeegee mount plate on each side.
10. Locate and loosen both nuts (3) on each squeegee adjustment link and back them away from the gussets. The rear squeegee is now free to be aligned with the floor.
11. Check the squeegee rubber to make sure the squeegee makes contact with the floor all the way around. It should stand straight on the floor with no flare.
12. At each squeegee mount, turn the two nuts on the adjusting link by hand until they both make contact with the mount plate on each side.
13. Tighten the nuts on each mount plate. Then tighten the bolt on top of each of the two upper squeegee arms.
14. With the squeegee straight-up on the floor (no flare), adjust the caster until it clears the floor by $\frac{1}{2}$ ".
15. Use a $\frac{1}{2}$ " shim spacer of metal or wood as a feeler gauge for this procedure.
16. Tighten the nut on the caster and move the shim.
17. Reattach the quick-disconnect at the rear of the squeegee.
18. With the squeegee lever in the down locked position, drive the machine forward approximately two feet.

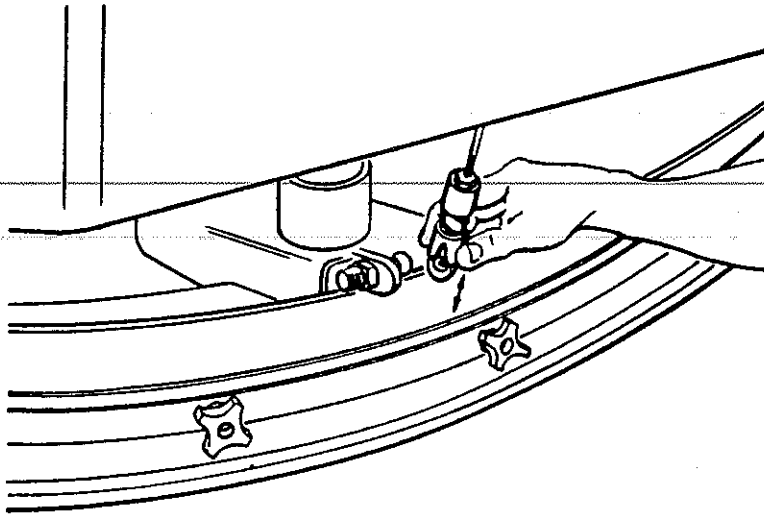


Figure 4-39. Rear Squeegee Disconnect

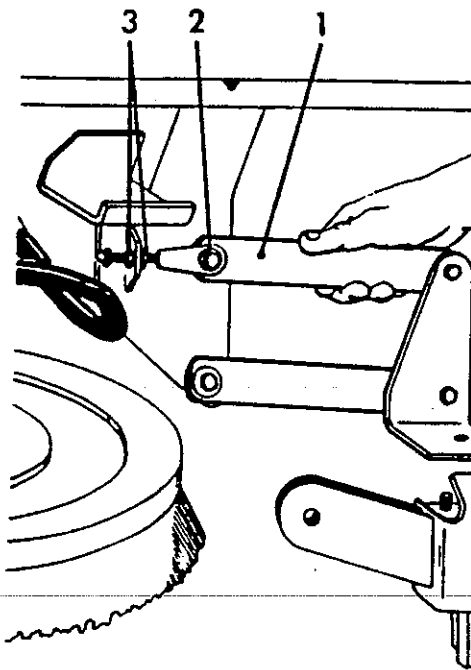


Figure 4-40. Squeegee Arms

19. Examine the flare in the squeegee rubber to see that it is uniform around the entire parabola. If not, go through Steps 7 to 15.
20. Reinstall the side squeegee. If necessary, readjust side squeegees (see Side Squeegee Adjustment).

NOTE

Excessive side squeegee flare may raise the rear squeegee enough to prevent correct rear squeegee flare.

4-63. Turning or Replacing the Main Squeegee Rubber. See figure 4-41. The primary rubber on the main squeegee frame has four different edges that may be used: the front and back lower edge, and the front and back upper edge. When the edge in use becomes worn to the midpoint of thickness, turn the rubber to an unused edge in the order indicated by the numbers above. First use the opposite side of the lower front edge, then turn the squeegee upside down to use the front and then the back of the upper edge. Removal and replacement instructions follow. This procedure can be performed with the squeegee tool on or off machine.

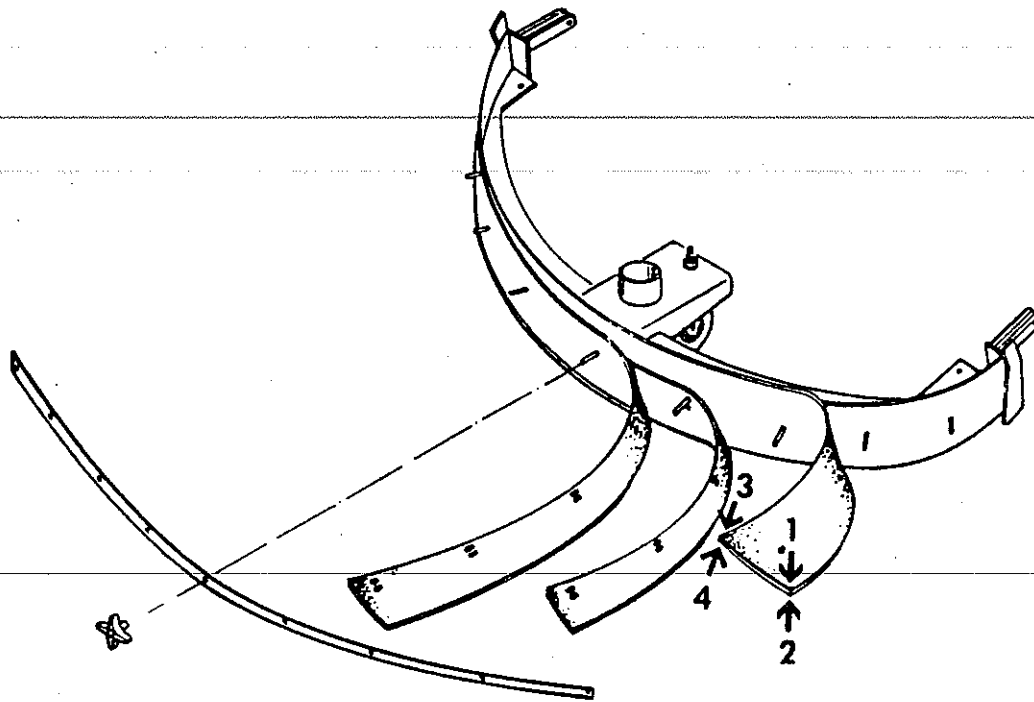


Figure 4-41. Squeegee Rubber

NOTE

Removal and replacement of the main squeegee elements is easier if the squeegee frame is removed from the machine.

1. Remove the nine hand knobs from the rear of the squeegee frame.
2. Remove the metal strap, the two back-up strips, and the outer squeegee rubber.
3. Turn the side ends of the squeegee rubber 180°, or turn the rubber upside down, to expose an unused edge. Reposition the rubber on the pins of the squeegee frame.
4. Reposition the first back-up strip using the top holes.
5. Reposition the second back-up strip using the bottom holes.
6. Reposition the metal strap so that the center slot is on the center stud.
7. Install the center knob and tighten it.
8. Place the remainder of the strap and knobs on the studs, working from the center out to the edge.

NOTE

Replace the back-up strips only if they lose their elasticity.

4-64. Main Squeegee Tool Removal. All machines are equipped with auto-squeegee lift. To remove the squeegee tool, refer to figures 4-42 and 4-43 then proceed as follows:

1. Engage parking brake and chock wheels.
2. Start the engine at idle.
3. Place the broom control lever in the "side broom off" position.
4. Put the squeegee switch in the down position and turn the ignition switch off. (This will hold the squeegee in the down position.)
5. Disconnect the vacuum hose from the squeegee.
6. Disconnect the quick-release ball joint from the squeegee.
7. Return the broom control lever to the "OFF" position.

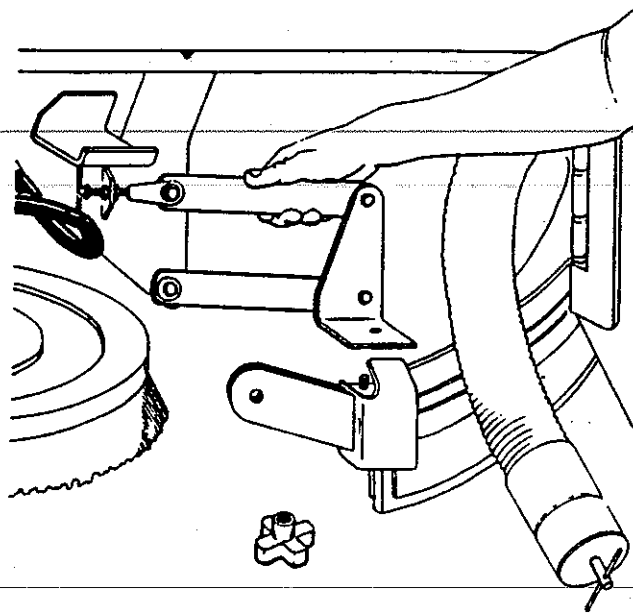


Figure 4-42. Squeegee Supports

8. Locate the squeegee frame supports inside each scrubhead access door and remove the hand knobs (one on each side).
9. Lift the supports up off the pins on the squeegee frames and slide the squeegee tool toward the rear of the machine.
10. Go to the back of the machine and pull the squeegee straight back and out.

4-65. Main Squeegee Tool Installation

1. At the back of the machine, push the squeegee forward under the machine.
2. Lift the supports up onto the pins on the squeegee frames.
3. Inside each scrubhead access door attach the hand knobs (one on each side) to the squeegee frame supports.
4. Start the engine at idle.
5. Place the broom control lever in the side broom off position.
6. Put the squeegee switch in the down position and turn the ignition switch off. (This

will hold the squeegee in the down position.)

7. Connect the quick-release ball joint to the squeegee.
8. Connect the vacuum hose to the squeegee.
9. Install the side squeegees.

4-66. Inner Squeegee Replacement. The inner squeegee is a component of the rear squeegee. When the squeegee is down, locked, and the rear squeegee rubber is flared, the inner squeegee when it becomes too worn to make proper contact with the floor.

1. Remove the main squeegee tool (see removal instructions).
2. Remove nuts on the front of the inner squeegee frame.
3. Remove the strap and the inner squeegee rubber.
4. Install the new inner squeegee rubber.
5. Position the strap and secure with the nuts.

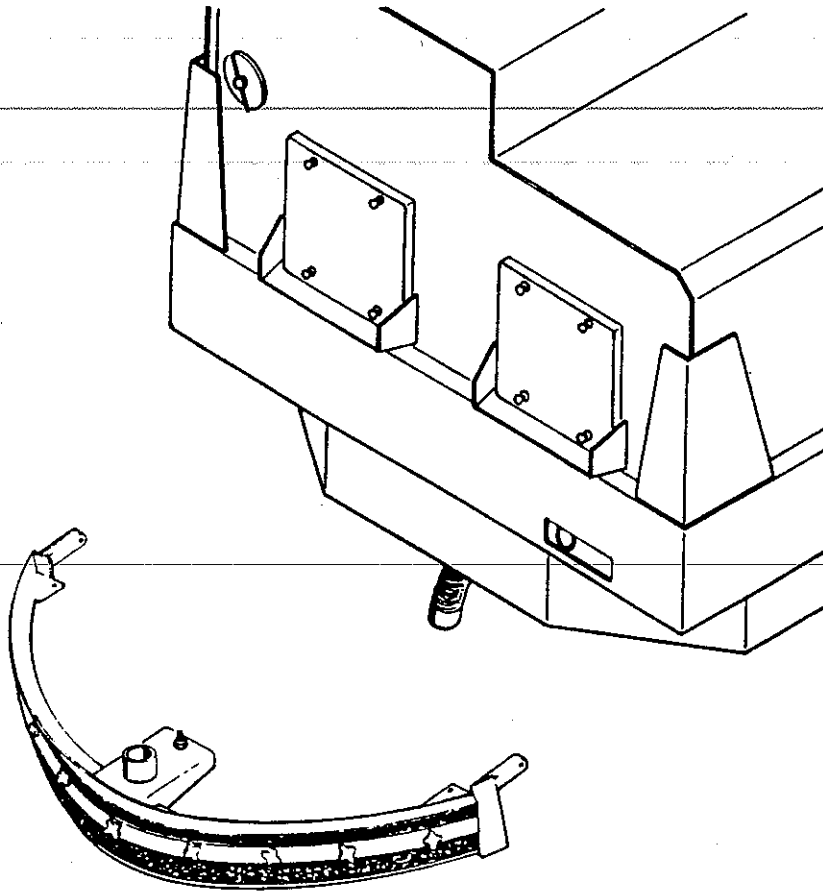


Figure 4-43. Rear Squeegee Removal

4-67. Auto Squeegee Lift Mechanism.

Lift Springs. The two lift springs can be adjusted (tightened) to compensate for the stretching or weakening which can occur over a period of time. To adjust:

1. Locate the adjusting nut found in the access hole on the left side of the machine close to the rear.
2. Tighten the adjusting nut to increase lift tension.

Bearing Replacement. If any binding occurs in the lift apparatus replace the bushings, spacers and dry bearings as necessary.

4-68. Auto Squeegee Lift Switch Adjustment. See Back-Up Alarm Adjustment, paragraph 4-100.

4-70. Side Squeegee Adjustment. See figure 4-44.

NOTE

This adjustment should be performed after the rear squeegee is properly adjusted.

1. Loosen the attaching bolts.
2. Slide the rubber down until contact is made evenly with the floor.
3. Tighten the bolts to secure the squeegee in the adjusted position.

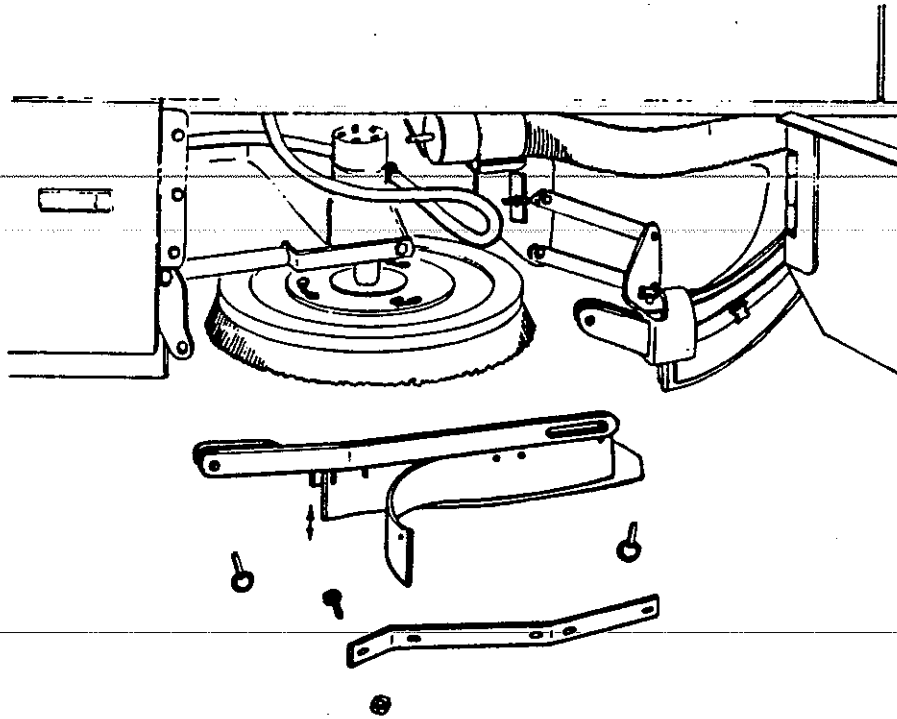


Figure 4-44. Side Squeegee

4-70. Side Squeegee Replacement. Replace the side squeegee if it loses its elasticity or becomes too worn to adjust.

1. Remove the attaching bolts and retainer bar.
2. Remove the worn rubber.
3. Install the new rubber and secure retainer bar with bolts and adjust.

4-71. Water Extension and Water Recycling

4-72. Clean Screens

1. Locate the screens in the recovery tank.
2. Unscrew screens from their mount.
3. Clean screens.
4. Replace.

4-73. Water Pumps

1. Locate the water pumps at the left rear corner of the squeegee skirt.
2. Check for electrical problems.
3. Remove the top of the pump body.
4. Remove debris from the pump.
5. Replace the pump body top.

4-74. Soap Metering Pump (Recycling Systems)

1. Locate the pump at the right rear corner of the squeegee skirt.
2. Check for electrical problems.
3. Prime pump.
 - Remove the outlet hose from the pump.
 - Run the pump at the highest setting with the engine off.
 - Check for restrictions on the inlet side and that the soap tank has fluid.
 - When fluid begins to exit the outlet side reattach the outlet hose.

4-75. HOPPERS.



WARNING

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

4-76. Low Dump Hopper Removal and Replacement. The hopper must be removed on low dump models for service and maintenance. A low dump hopper dolly is needed for this procedure, see figure 4-45.

Removal:

1. Park the machine on a level surface and engage the parking brake.
2. Adjust the throttle to just above idle.
3. Raise the hopper to full dump height and lock it into the raised position.
4. Turn engine off.
5. Insert the hook on top of the dolly into the opening between the bottom of the sweeper/scrubber's bumper and the hop-

per. Position it near the center of the bumper.

NOTE

The dolly should stay attached in this position when released.

6. Return the dump lever to its center off position to lower the hopper.
7. Push down on the dump arms until the ends of the dump arms are lower than the hopper lift brackets.
8. Disconnect the wire connection at rear of hopper.
9. Grab bumper and pull the hopper straight out away from machine.

Replacement

1. Make sure the ends of the dump arms are lower than hopper lift brackets.
2. Roll the hopper between lift arms.
3. Be sure the hopper stop bars are positioned immediately above the dump arm flanges located at the rear of the dump arms.

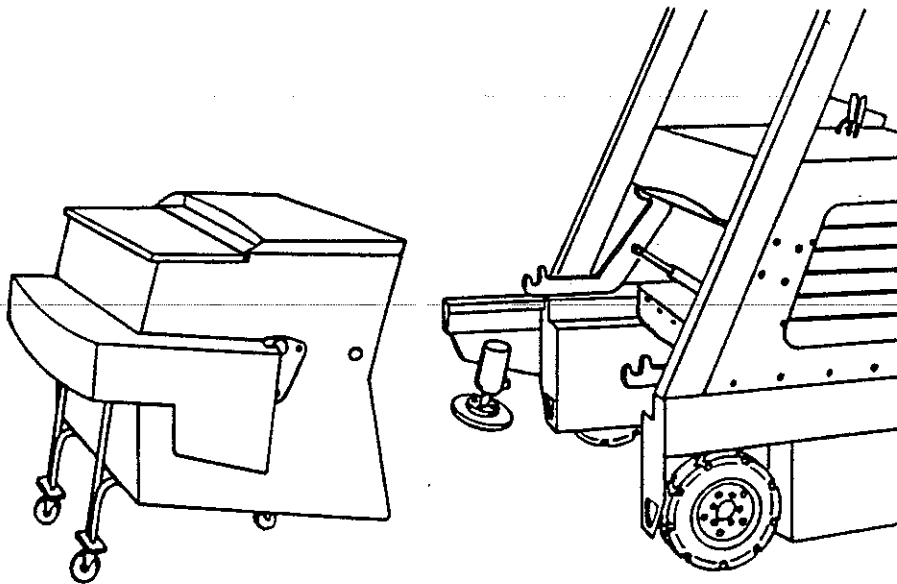


Figure 4-45. Low Dump Hopper and Dolly

4. Align the hopper lift brackets with the hook openings located at the front of the lift arms.
5. Start the engine and lift the dump arms slowly. When lift arms engage hopper lift brackets, lift the hopper all the way up.
6. Pull dump lever back to lock hopper in the raised position. Remove dolly.
7. Lower hopper.

4-77. High Dump Hopper Removal and Replacement. It is not usually necessary to remove or replace the hopper on high dump models. However, if it becomes necessary for maintenance or to install an option, use the following procedures.

Removal

1. Park the machine on a level surface and engage the parking brake.
2. Raise the hopper and position the high jump hopper dolly, a platform truck or similar

four wheeled cart under the hopper, see figure 4-46.

3. Set the hopper down on the truck and turn the engine off.
4. Cycle the rotation control handle (2) in both positions to relieve any residual hydraulic pressure.
5. Remove the bolts and backing plate located on both sides of the hopper inside the dump door.
6. Disconnect the wire connections at the right side of the hopper.
7. While spreading dump arms slightly roll the hopper away from machine.

Replacement:

1. Position the hopper on the dolly so as to align the mounting holes in the sides of the hopper with the rotation mounts on the arms. Lift arms should be positioned about $\frac{1}{3}$ of way up.
2. Engage lift arm rotation plates with three mounting bolts on each side of the hopper.

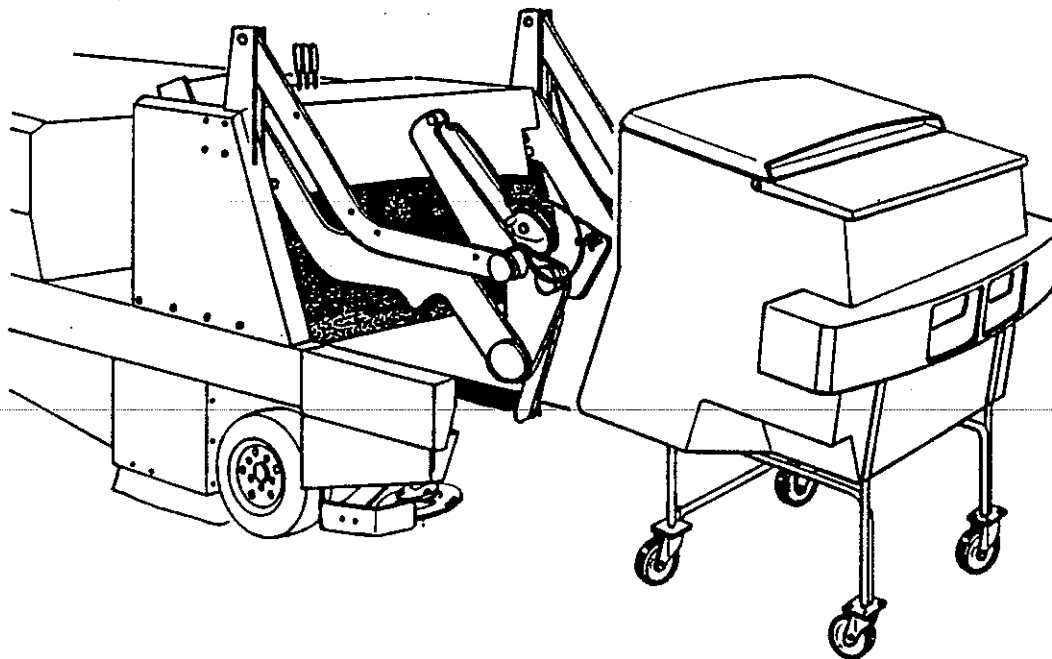


Figure 4-46. High Dump Hopper and Dolly

NOTE

The right rotation plate may have to be repositioned hydraulically to align the holes.

3. Replace all bolts, washers, spacers and mounting plates.

NOTE

Rotation mounts have holes that must engage bolt heads on side of hopper prior to threading in spindles.

4. Start the machine and lift hopper.
5. Drive the truck away from the hopper dolly or cart.
6. Lower hopper.
7. Engage wire connections at right side of hopper.

4-78. Filter Removal. See figure 4-47.

1. Release the two latches on the hopper cover and raise cover.
2. Disconnect the wire harness leading to the filter shaker motor(s).
3. Unscrew the four knobs securing the shaker motor mount to the hopper.
4. Remove the shaker motor assembly.
5. Lift out the panel filter.

4-79. Filter Cleaning. Filters are permanent type paper element filters. They may be vacuumed, blown out with compressed air, tapped against the floor, or washed with soap and water.

1. When cleaning filters with compressed air, use 100 psi or less.

NOTE

Filters may be blown out while installed or removed.

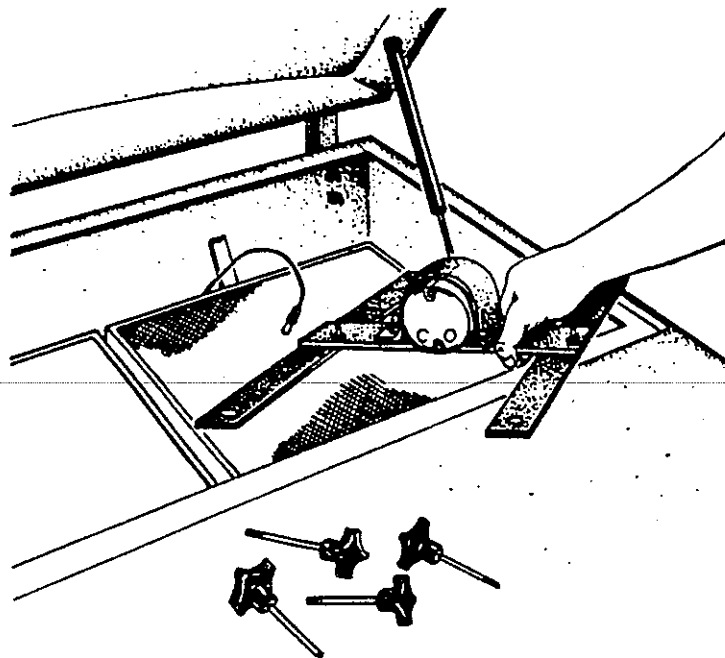


Figure 4-47. Filter Replacement

- When cleaning filters with soap and water, use 40 psi water pressure or less.

adjusted, the front edge of the hopper will be 5" to 6" from the floor.

NOTE

Make sure filters are thoroughly dried while standing on their sides before installing them in the hopper. Do not install or use a wet filter.

Low Dump Models (see figure 4-48):

- Park the machine on a level surface, shut off the engine, and engage the parking brake.
- Adjust the two hex bolt stops, located on the frame under the middle of the lift arms, so that the hopper lip is about 3-1/2" from the floor. This is a coarse adjustment.

4-80. Filter Replacement.

- Insert the panel filter.
- Install the shaker motor assembly.
- Install and tighten the four filter retaining knobs.
- Hook the wire harness to the filter shaker motor.
- Close the hopper cover and secure the latches.

NOTE

A 3 to 4 foot length of dressed 2" x 4" lumber set on edge works well for this measurement.

4-81. Hopper Floor Clearance and Dump Adjustments. To perform properly the hopper (on both low and high dump models) must maintain a distance of 3-1/2" from the floor to the rear hopper entrance lip. The front of the hopper should be adjusted so that the front bumper aligns with the hopper frame where the two meet. When properly

- Use the set screws located in the lift arm flanges located at the rear of each lift arm as a fine adjustment to achieve the 3-1/2" clearance.
- Check the floor clearance on each side of the hopper to see that it is level from side to side.

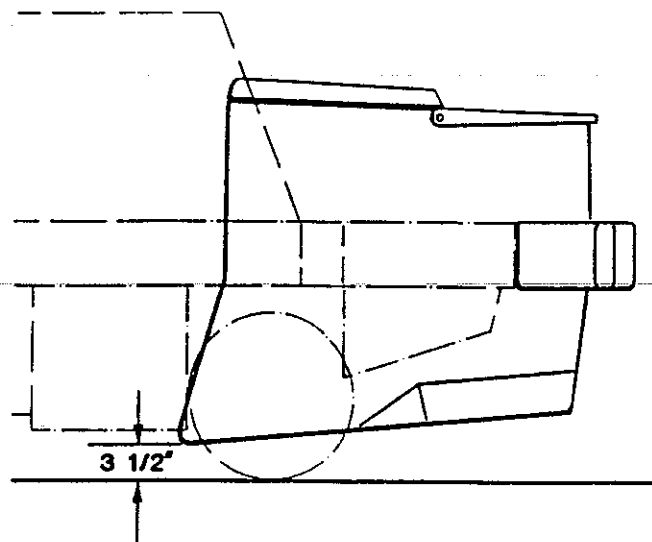


Figure 4-48. Hopper Clearance

NOTE

If after the initial adjustment the bumper is lower or higher than the frame, raise or lower the hex bolt stops until it is level with the frame. Then readjust the set screws to restore the 3-1/2" floor clearance.

NOTE

A balanced adjustment of both of these sets of screws is required to achieve correct hopper position.

5. After adjustment, check that hopper vacuum seal still contacts and seals against rear of hopper. If not, readjust hopper seal.
6. Lower the hopper.

4-82. Adjusting Low Dump Maximum Hopper Dump Angle.

NOTE

By observing the cylinder strokes, you can determine if maximum stroke (maximum hopper dump angle) is being achieved and then make necessary adjustments. Unpainted exposed portion of the cylinder rods when hopper is down indicates a loss of stroke.

1. With the hopper lowered, with correct floor clearance, note the amount of unpainted cylinder that does not return into the cylinder bodies.
2. If more than 1/8" of unpainted cylinder rod is exposed on both cylinders, then the hopper dump angle can be increased by the following:
3. Start the engine, raise the hopper and lock the lever in full RAISE position.
4. Turn off the engine.
5. Loosen the set screw on each of the cylinder clevises and adjust each side alternately. With a tapered punch, rotate the cylinder rod to thread it out of the clevis a distance equal to the length of exposed rod

on the cylinder observed when the hopper was down.

6. Tighten the set screws.
7. Lower the hopper.
8. Check to see that both the cylinders reach their extended positions at the same time. If not screw in the clevis on the longer cylinder to match the other cylinder's extended length.

High Dump Models:

1. Park the machine on a level surface, shut off the engine, and engage the parking brake.



CAUTION

Do not rely upon hydraulic cylinders to keep hopper raised for maintenance on high dump models. Always engage the safety arm before getting under the hopper, see figure 4-49.

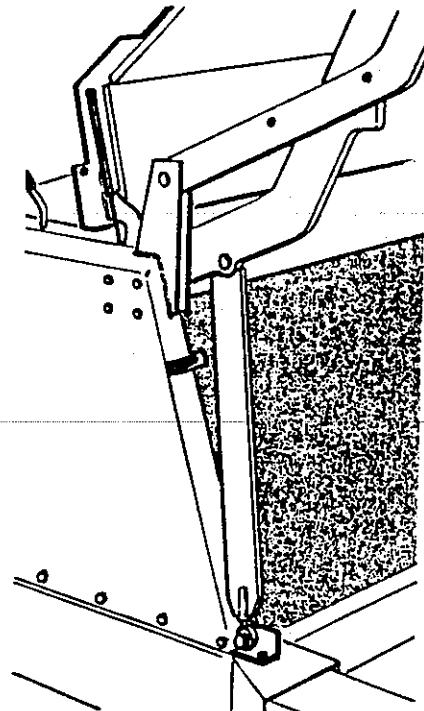


Figure 4-49. Hopper Safety Arm

2. Adjust the lift arm stop bolts located on top of the wheel wells as low as possible while still allowing the side broom assembly to clear the lift arms when the hopper is in normal position. Be sure that both lift arms contact the stop bolts at the same time.

NOTE

This may involve raising and lowering the hopper several times.

3. After adjustment, with the hopper down, use the two adjustable stops located on the rotation plates on both sides of the hopper to establish 3-1/2" clearance between the rear hopper entrance lip and the floor.

NOTE

The stop on the driver's side is located immediately below the cylinder rod end and is threaded into the cylinder mount arm. The stop on the left side is located directly above the arm rotation plate.

4. After the 3-1/2" clearance is established, make sure both stops make contact simultaneously. The lower front edge of the hopper should be 5"-6" from the floor. A balanced adjustment of both sets of adjustment bolts is required to correctly adjust the hopper in the lowered position. If the bumper is lower than the frame, after the hopper is correctly adjusted, loosen the bumper attachment bolts and reposition the front bumper.
5. Next, raise the hopper and rotate fully.
6. Turn the engine off.



CAUTION

Do not rely upon hydraulic cylinders to keep hopper raised for maintenance on high dump models. Always engage safety arm before getting under the hopper.

7. Adjust the stops on the hopper mounts on each side of hopper so that clearance between the lift arms and the cut outs in bumper is 1/4" maximum.
8. Loosen the locking set screw in the bottom side of the rotation cylinder rod end.
9. Using the hole in the cylinder rod, turn the rod to adjust cylinder extended length to match hopper rotation stops.
10. Tighten the set screw.
11. Rotate the hopper back, remove the safety arm, and lower the hopper.

4-83. Hopper Vacuum Gasket Mount Adjustment.

1. With hopper in normal position, observe contact between back of hopper and gasket. If complete seal is not maintained, remove low dump hopper or raise high dump hopper.



CAUTION

Do not rely on hydraulic cylinders to keep the hopper raised for maintenance on high dump models. Always engage the safety arm before getting under the hopper.

2. Loosen mounting bolts in gasket mount. Move assembly toward hopper. Tighten bolts. Test and repeat if necessary.

4-84. Hopper Flap Replacement. Flaps located at the entrance lip of the hopper, and on the sides of the hopper, must be replaced when worn or damaged. The flap panels may be replaced separately.

1. Park the machine on a level surface and engage the parking brake.
2. Raise (high dump models) or remove (low dump models) the hopper.

CAUTION

Do not rely on hydraulic cylinders to keep the hopper raised for maintenance on high dump models. Always engage the safety arm before getting under the hopper.

3. Turn off the engine.
4. Remove the flap retaining angle and worn or damaged flaps.
5. Install new flaps.
6. Replace the retaining angle.

4-85. Hopper/Frame Seal Replacement. See figure 4-50.

Front Frame Seal

The hopper seal bolts to the front edge of the engine pan. Install a new seal by folding it in

half to align holes. Doubled edge with holes goes on bottom. Support the seal straight up while bolting the retainer bar in place. The seal should fall over the retainer bar after installation. Be certain that the seal edges are aligned to prevent twisting of the seal.

Side Frame Seals

The side frame seals should clear the floor by at least $\frac{1}{8}$ ".

If the bottom of a side seal measures $\frac{1}{2}$ " or more above the floor, readjust it or replace it by removing the bolts on the inside of the frame wheel wells, installing a new seal, and securing it with the bolts. The double edge with the holes goes toward the front.

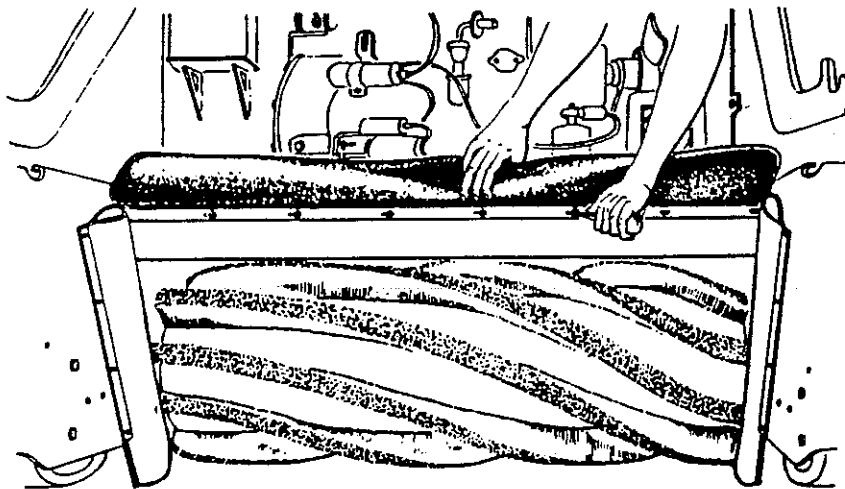


Figure 4-50. Hopper Seals

4-86. Rotary Trash Relocator (RTR®) Control Adjustment. See figure 4-51.

No. 1 Light

1. Raise the hopper until the rear corner is approximately 32 inches above the floor. (Light no. 1 should illuminate at this time.)
2. If the indicator light illuminates too soon or too late, adjust the tilt switch bracket.

No. 2 Light

1. Raise the hopper until the no. 1 light illuminates.
2. Rotate the hopper until the top is perpendicular to the floor. At this time light no. 2 should illuminate.
3. If the light does not illuminate at the correct time adjust the tilt switch by bending the mounting bracket.

4-87. TANKS. Refer to the operation section for procedures which are not explained here.

4-88. Adjusting Solution Delivery Valve Linkage (Scrubber Models). The valve linkage should be adjusted so that the valve is turned completely off and on, see figure 4-52. When adjustment is needed:

1. Locate the solution valve arm (1) and remove the nut (2) attaching rod end. (3).
2. With the rod end removed, lengthen or shorten the linkage arm (4) as require by threading the rod into or out of the rod end (3).
3. Reattach the rod end (3) to the valve arm (1).
4. Tighten locknuts.

4-89. Clearing Obstructions In the Delivery Tube. This part of the machine rarely need maintenance. However, if the holes in the delivery tube become clogged, use a punch or small screwdriver to clear the obstruction.

4-90. STEERING. Check the steering gear box for wear as the preventive maintenance chart

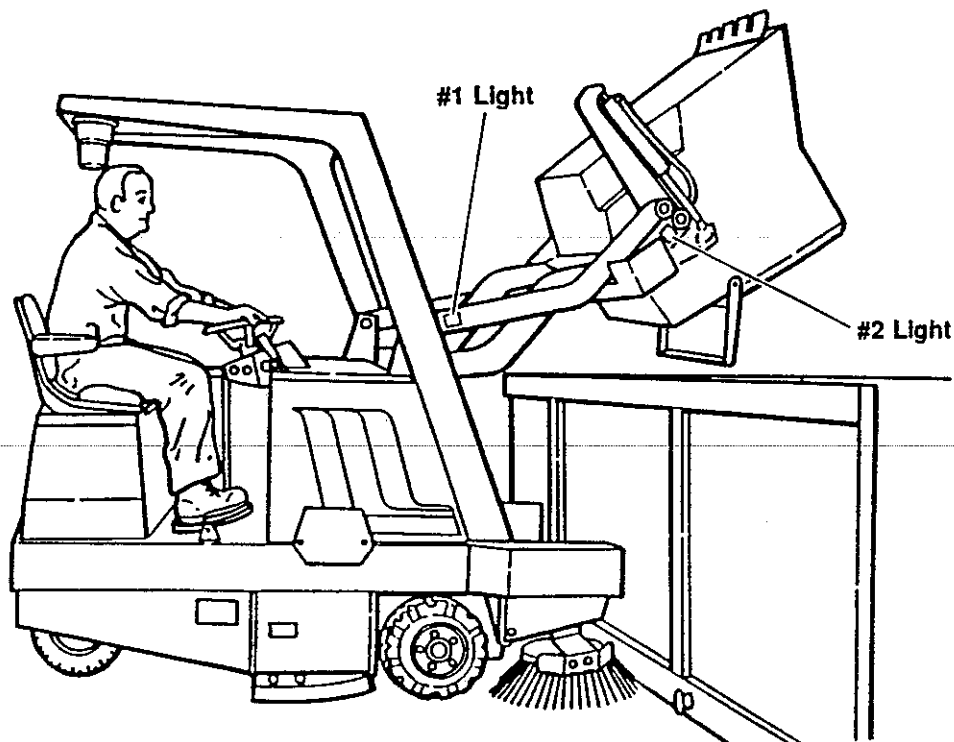


Figure 4-51. RTR® Switch Adjustments

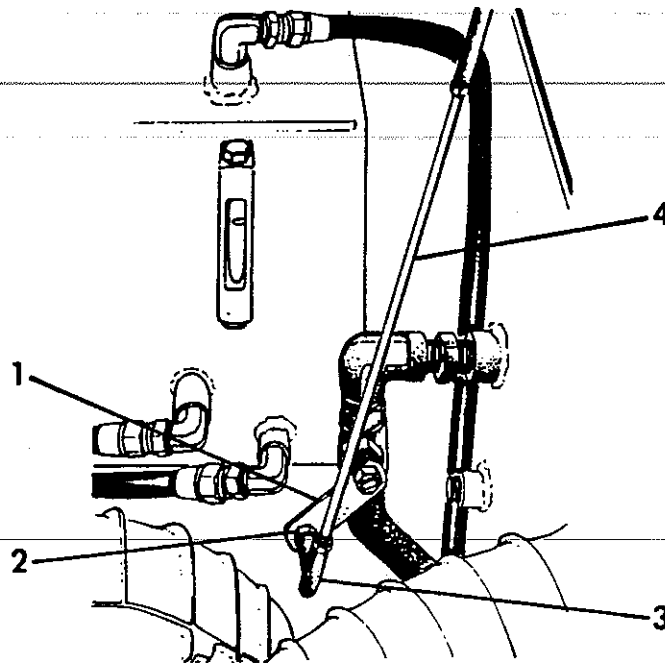


Figure 4-52. Solution Delivery Valve Linkage

specifies. Information on the lubrication of steering components can be found in the lubrication paragraph later in this section.

4-91. PARKING BRAKE. The parking brake on the sweeper/scrubber is a set of mechanical drum brakes operated by a cable from the foot pedal (or optional hand lever).

⚠ WARNING

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

4-92. Parking Brake Adjustment. See figure 4-53.

1. Locate the parking brake cable in the top of the left wheel well opening.
2. Loosen the locking nut located against the hex bar.

3. Thread the cable end as far into the hex bar.
4. If threads are not sufficient for adjustment, move the cable bars to the next adjusting hole on the hex bar.
5. Retighten the locking nut against the hex bar. This adjusts both sets of brake shoes.
6. Test brakes. Readjust if necessary.

4-93. TIRES. PowerBoss™ sweeper/scrubbers use a two piece interchangeable bolt-together cast ruin to mount solid tires and a special three piece rim to mount pneumatic tires. Solid scrubber tires are permanently molded to a one piece rim and used as the drive tire on some scrubber models.

⚠ WARNING

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

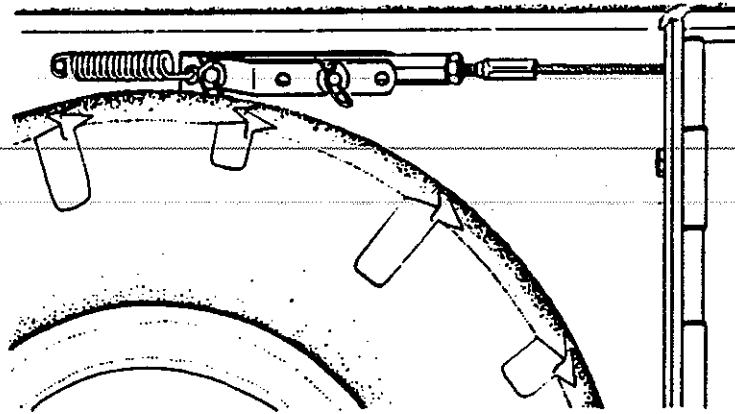


Figure 4-53. Parking Brake Adjustment

4-94. Inflation. Inflate Michelin pneumatic tires to 145 psi. This must be done in a safety cage.

4-95. Changing Solid Tires

1. Remove tire from vehicle by removing the five inner lug nuts.
2. Remove the five flathead bolts and nuts.
3. Press the tire from rim.
4. Press the large rim half into the new tire.
5. Mount the small rim half and secure with flathead bolts.
6. Reinstall tire on machine.

4-96. Changing Pneumatic Tires. Because procedures to change Michelin tires must be performed in a safety cage and require special tools, we recommend they be changed by a professional tire dealer.

4-97. MISCELLANEOUS MAINTENANCE TASK.



WARNING

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

4-98. Anti-Static Chain. Each machine is equipped with an anti-static drag chain bolted to the back wall of the broom chamber. This should remain in contact with the floor at all times. Inspect the chain every 250 hours. Replace if at least one link does not drag the surface of the floor.

4-99. Latches and Hinges. Latches and hinges should be inspected after every 500 hours of use. Retighten and oil if necessary.

4-100. Back-Up Alarm Adjustment.

1. Locate the switch box on the floor board beneath the directional control pedal, see figure 4-54.
2. This box may contain up to three switches. Determine which switch controls the option requiring adjustment.
3. Loosen the lock nut (1).
4. Adjust the bolt (2). Turn the bolt in to make the option activate with more throw in reverse, out to make the option t work with less throw in reverse or in neutral.
5. Tighten lock nut (1).

4-101. Brake Lights Adjustment. See Back-Up Alarm Adjustment, paragraph 4-100.

4-102. LUBRICATION. Use only grease which meets API SD or SE specifications and temperature requirements. See figure 4-55 for lubrication points.

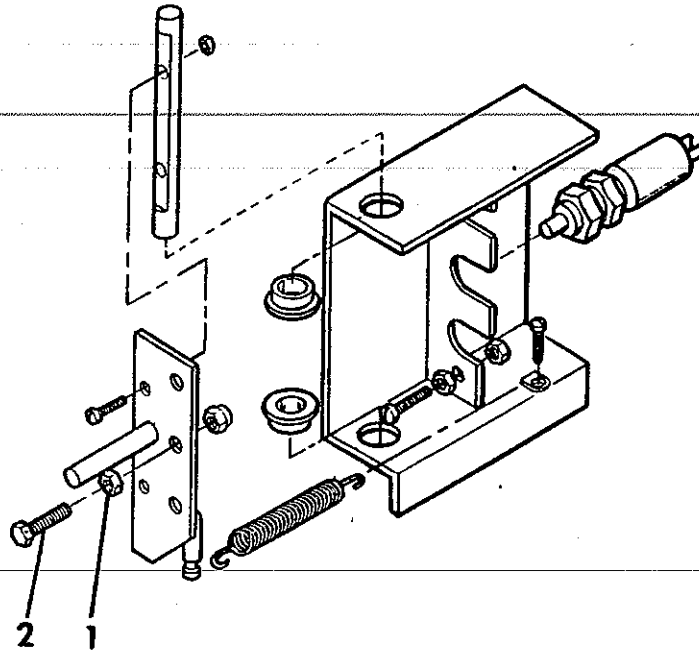


Figure 4-54. Switch Box

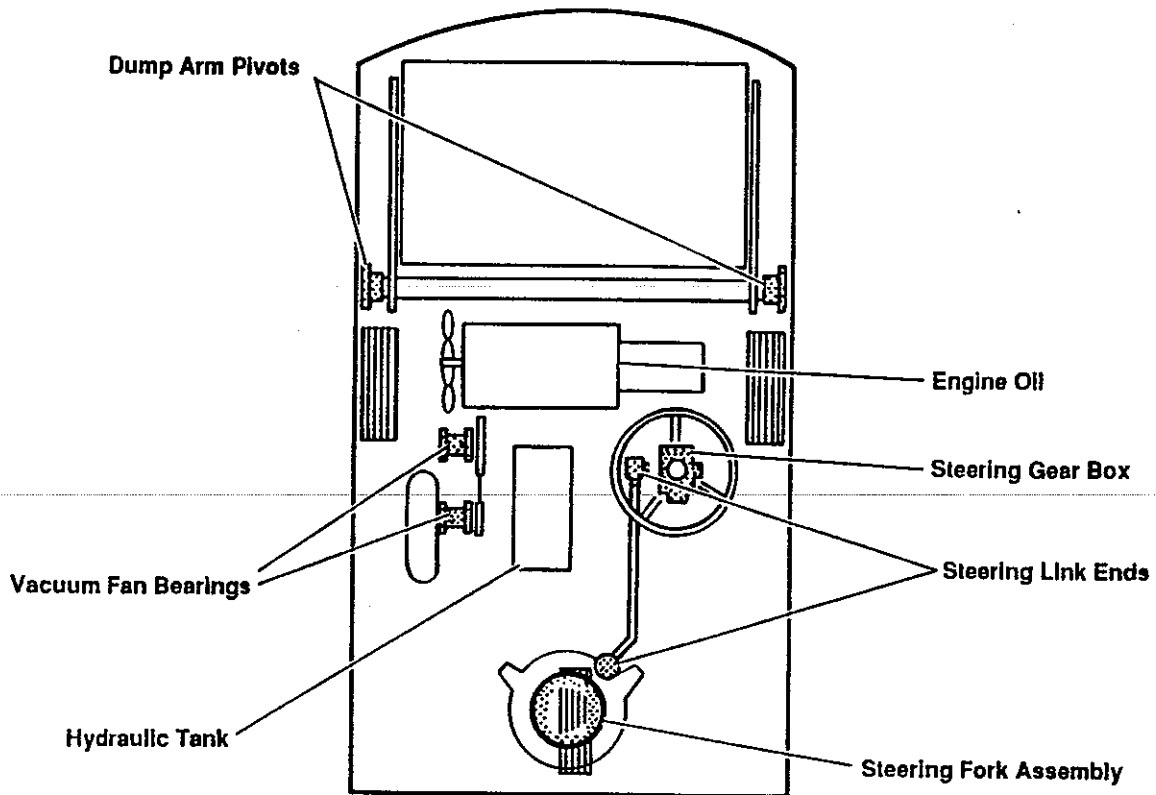


Figure 4-55. Lubrication Points

⚠ WARNING

Never attempt to perform any service on the equipment or components until the engine is OFF, the parking brake is LOCKED, and the wheels are CHOCKED.

4-104. Changing Engine Oil.

NOTE

The engine oil drain plug is located at the bottom of the engine pan.

4-103. Engine Oil. Gasoline and LPG Engines. Use any SD or SE rated oil meeting API specifications and suited to seasonal temperatures.

Temperatures	SAE Viscosity
Below 0° (Below -17° C)	SW-20, SW-30
0 to 32°F (-17° to 0°C)	10W, 10W-30, 10W-40
32° to 75°F Above 75°F (Above 24°C)	20W, 10W-30, 10W-40 30,W 10W-30, 10W-40, 15W-40

1. Low Dump Models: Remove the hopper and place the drain pan beneath the plug in the engine pan.
High Dump Models: Raise the hopper and engage the safety arm.
2. Remove the drain plug and allow oil to drain into the pan, see figure 4-56.
3. Replace the drain plug.
4. Remove the used oil filter and replace with a new one.
5. Remove the engine oil cap, add oil in the amounts listed in engine manual, then secure the cap.

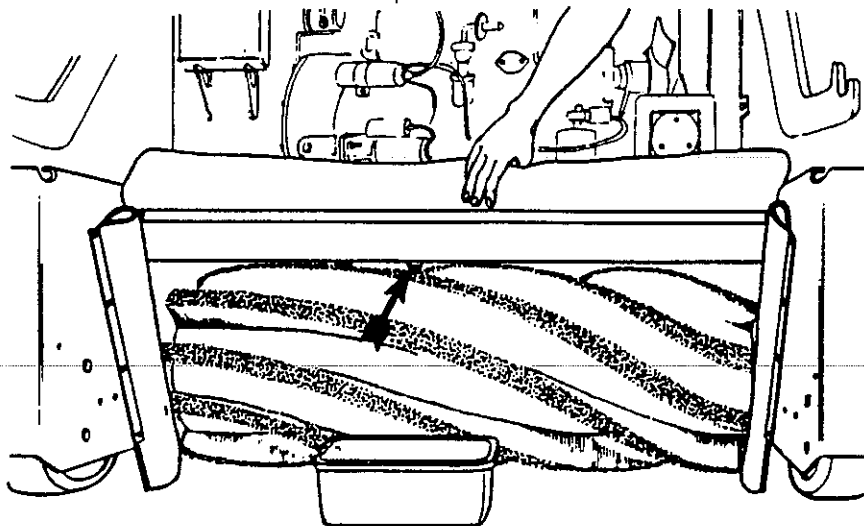


Figure 4-56. Oil Drain Plug

4-105. Steering. Lubricate the grease points on the steering gear box (1) fitting, steering link arm (2) fittings and the steering fork assembly (1) fittings with lithium grease, see figure 4-57.

4-106. Pillow Blocks. Lubricate the pillow blocks (2 fittings) supporting the dump mechanism with lithium grease. See figure 4-58 for location.

4-107. Impeller Bearing Housing. Lubricate the impeller bearing housings with Lubriplate EMB.

1. With the engine OFF use a hand operated grease gun to put 5 pumps of grease into each bearing housing.

NOTE

Do not apply grease until grease comes out of bearings.

2. Start the engine and run at IDLE for 5 minutes.
3. Run engine at normal RPMs.

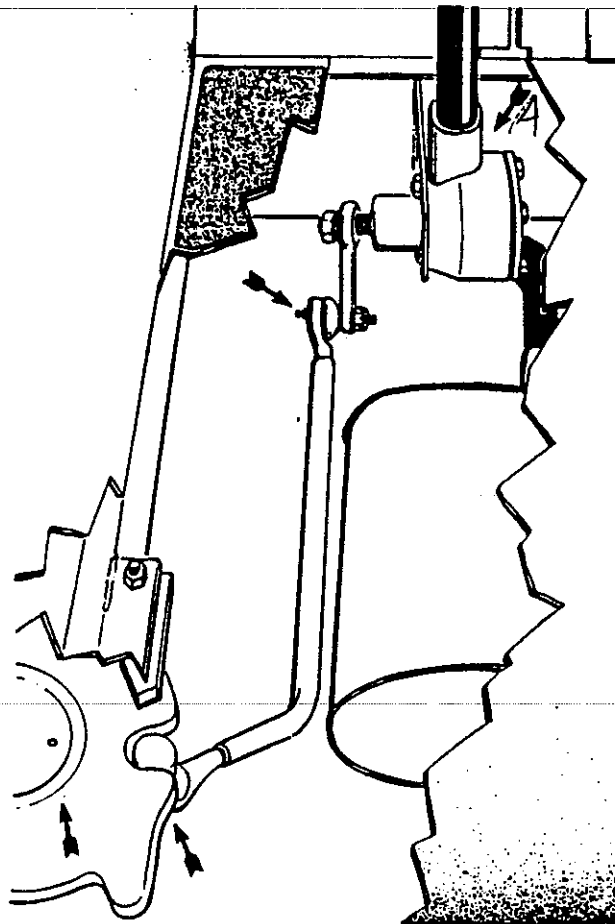


Figure 4-57. Steering Lubrication Points

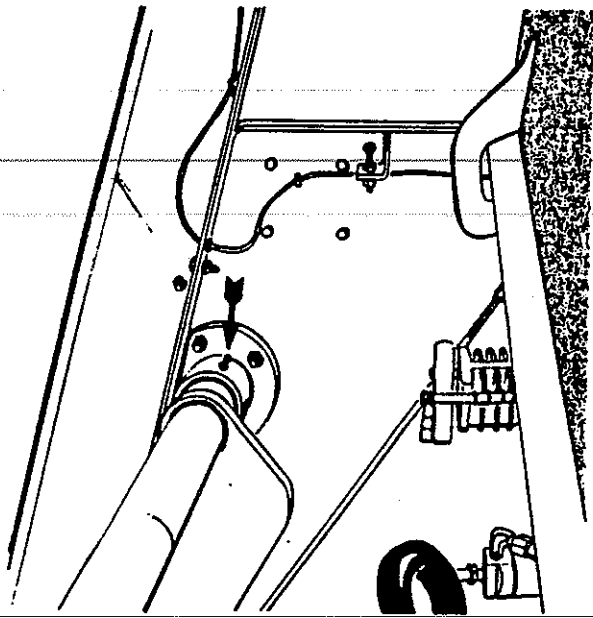


Figure 4-58. Pillow Block Lubrication

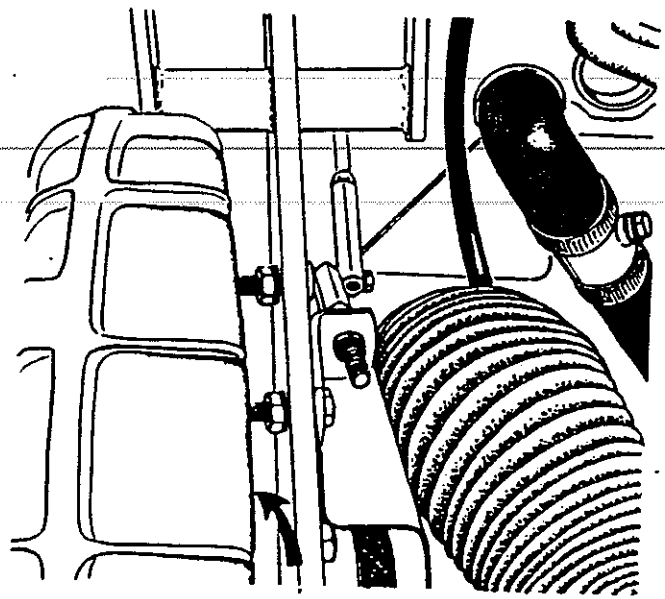


Figure 4-59. Impeller Bearing Housing Lubrication

Table 4-2. Maintenance Record

DATE	HOUR METER READING	SERVICE COMPLETED	SERVICE PERSON

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5-1. General	5-1



TROUBLESHOOTING

5-1. GENERAL. This section is designed to aid maintenance personnel in determining the cause and solution for any problems which may occur with the PowerBoss™. See table 5-1 for trouble shooting assistance. If problems occur with the

PowerBoss™ which are not covered in this section contact your local distributor or AAR Brooks & Perkins Handling Technologies division at:

(800)-334-7141 or (919) 944-2167

Table 5-1. Trouble Shooting

PROBLEM	CAUSE	SOLUTION
<p>BASIC MACHINE OPERATING PROBLEMS</p> <p>Engine will not start or runs roughly after start.</p>	<p>Battery dead</p> <p>Machine out of fuel</p> <p>Fuel filter plugged</p> <p>Fuel line broken or obstructed</p> <p>Fuel line connection loose</p> <p>Dirty air filter</p> <p>Problems with spark plugs, ignition points, ignition coil, ignition switch, carburetor, regulator, wiring harness</p>	<p>Recharge or replace battery.</p> <p>Refuel.</p> <p>Clean or replace filter.</p> <p>Blow fuel line out with compressed air.</p> <p>Tighten connection.</p> <p>Clean or replace air filter. (See Service/Repair Section.)</p> <p>Review engine manual at back of this book for maintenance and troubleshooting procedures.</p>
<p>NOTE: On machines using LPG Fuel, also check the following:</p>	<p>Tank valve not fully opened</p> <p>Fuel tank type does not match fuel supply</p> <p>Fuel tank and lines are frosting up</p>	<p>Open the valve slowly.</p> <p>Use the correct tank type for the fuel supply.</p> <p>Open shut-off valve slowly to 1/4 open; start.</p>

Table 5-1. Trouble Shooting - CONT.

PROBLEM	CAUSE	SOLUTION
<p>Engine overheats.</p>	<p>Low coolant level.</p>	<p>Supply coolant.</p>
	<p>Restricted airflow through radiator</p>	<p>Clean with compressed air.</p>
	<p>Clogged radiator</p>	<p>Flush radiator.</p>
	<p>Loose fan belt</p>	<p>Tighten belt.</p>
	<p>Defective thermostat</p>	<p>Replace thermostat.</p>
<p>NOTE: If coolant loss has not occurred, check for malfunction of the temperature sending unit.</p>		
<p>PowerBoss™ moves slowly or does not move.</p>	<p>Parking brake on</p>	<p>Release brake.</p>
	<p>Directional pedal linkage jammed, damaged, or not adjusted properly</p>	<p>Clear jam or adjust linkage.</p>
	<p>Tires skidding from contact with oil or grease</p>	<p>Clean tires or drive through a solvent absorbing substance.</p>
	<p>Wheels jammed</p>	<p>Clear jam.</p>
	<p>Low hydraulic oil level</p> <p>Hydraulic oil temperature too high and too thin caused by excessive load, climbing, high environment temperatures or worn pump</p>	<p>Add oil.</p> <p>Use the proper weight of oil for operation conditions; check pump.</p>
	<p>Damaged or worn pump drive coupling</p>	<p>Replace.</p>
	<p>Other problems with the hydraulics system: pump failure, motor failure, relief valve leaking or stuck open</p>	<p>See Hydraulics System Problems in this section.</p>

Table 5-1. Trouble Shooting - CONT.

PROBLEM	CAUSE	SOLUTION
PowerBoss™ creeps in neutral.	Directional pedal return spring out of adjustment	Perform the adjustment procedure.
SWEEPING PROBLEMS		
Brushes do not turn or turn very slowly.	Hydraulic system problem: - motor - control valve - gear pump - relief valve	See Hydraulics System Problems in this section.
Little or no vacuum in brush compartment.	Filters clogged	Clean filters.
Loss of dust control.	Leak or clog in hose from impeller	Repair leaks; clear obstructions or replace hose.
	Impeller belt slipping due to grease on belt or looseness	Clean grease from belt or tighten. Re-size if too large.
	Impeller belt worn	Replace belt.
	Impeller failure	Check and repair.
	Debris in hose or impeller inlet	Clean.
	Broom skirts or seals worn	Replace.
	Skirt clearance from floor exceeds 1/8"	Adjust clearance.
	Dust filter clogged	Clean filters.
	Filter seals worn or missing	Replace.
	Impeller belts worn	Replace.
	Impeller belts slipping due to grease on belts or looseness	Clean or tighten.
	Poor seal with vacuum gasket at hopper	Visually check and adjust, if necessary.

Table 5-1. Trouble Shooting - CONT.

PROBLEM	CAUSE	SOLUTION
Sweeper unit leaving debris.	Hopper full Broom(s) out of adjustment Broom bristles worn Poor performance of broom drive mechanism Broom lift arms hung up with debris	Dump hopper. Adjust. Check broom for wear and adjustment. Check for jam in broom chamber. Clear out debris.
Hopper does not raise or lower.	Hopper flaps damaged or missing Hopper out of adjustment Filters clogged Hydraulics system problem: - control valve - gear pump - lift cylinder - relief valve Hopper arms binding	Replace or adjust clearance. Check hopper floor clearance. Clean filters. See Hydraulics System Problems in this section. Lubricate or adjust arm linkage.
Hopper does not rotate or rotates slowly.	Hopper load too heavy Hydraulics system problem: - control valve - gear pump - lift cylinder - relief valve	Dump more frequently. See Hydraulics System Problems in this section.
	- control valve - gear pump - lift cylinder - relief valve	

Table 5-1. Trouble Shooting - CONT.

PROBLEM	CAUSE	SOLUTION
SCRUBBING PROBLEMS		
Poor water pickup.	Recovery tank full Squeegee worn Debris caught in squeegee or pick-up tube. Leak or clog in hose from impeller	Empty tank; if foaming excessively, change detergent. Replace. Remove debris. Repair leak, clear obstruction or replace hose.
Detergent solution not being delivered.	Squeegee out of adjustment Engine not operating at governed speed Impeller belts worn or slipping Impeller failure Solution tank empty Solution tank outlet screen clogged Delivery lines clogged Solution valve out of adjustment	Adjust. Readjust governor. Replace, tighten or clean grease off belts. Check and repair. Fill tank. Clean screen. Clear lines. Adjust.
Scrubber unit not cleaning the floor.	Brushes worn Need different type of brush or detergent Debris caught in brush drive mechanism Brushes out of adjustment	Replace. Use manufacturer's recommended brushes or detergent. Clear obstruction. Adjust.

Table 5-1. Trouble Shooting - CONT.

PROBLEM	CAUSE	SOLUTION
Scrubber unit not cleaning the floor. (CONT.)	Brush motor failure	See Hydraulics System Problems in this section.
HYDRAULIC SYSTEM PROBLEMS		
Hopper lift cylinder failure.	Line to cylinder leaking	Tighten fittings or replace hose.
	Piston seals leaking	Replace seals.
	Bent piston rod	Replace rod.
Hydraulic control valve failure.	Misaligned control linkage	Align.
	Foreign matter in spool bore	Remove spool and clean bore.
	Valve seals leaking	Replace seals.
	O-rings leaking	Replace O-rings.
	Relief valve stuck open	Clean or replace relief valve.
Hydraulic motor failure.	Motor leaking	Replace seals.
	Drive link malfunction	Replace drive link.
	Gerotor worn	Replace gerotor set.
	Output shaft malfunction	Replace output shaft and bearings.
Hydraulic gear pump failure.	Pump leaking	Replace seals.
	Gears worn or scored	Rebuild pump.
	Relief valve stuck	Clean or replace (at control valve).
	Oil supply low	Check and fill.
	Oil strainer clogged	Replace strainer (inside reservoir).

Table 5-1. Trouble Shooting - CONT.

PROBLEM	CAUSE	SOLUTION
Hydraulic gear pump failure. (CONT.)	Incorrect oil	Use recommended viscosity oil.
Hydraulic variable displacement pump failure.	Damage due to entry of air into hydraulic system	Maintain correct hydraulic oil level in reservoir. Keep suction hose fittings tight.
	Pump leaking	Replace seals.
	Relief valve(s) stuck	Clean or replace relief valve(s).
	Drive coupling malfunction	Replace coupling.
Hydraulic system noisy.	Control linkage out of adjustment	Check to see if linkage is binding or unfastened.
	Charge pump gears worn or scored	Replace defective gears.
	Damage due to entry of air into hydraulic system	Maintain correct hydraulic oil level in reservoir. Keep suction hose fittings tight.
	Air in system	Check oil level in reservoir; check for loose connections or leaks.
	Relief valve dirty or damaged	Clean or replace.
	Loose suction line	Tighten fittings.
	Clogged section filter or pump inlet line	Replace filter, clear line; change oil in reservoir if dirty and flush system.
	Internal pump or motor damage	Inspect and repair.



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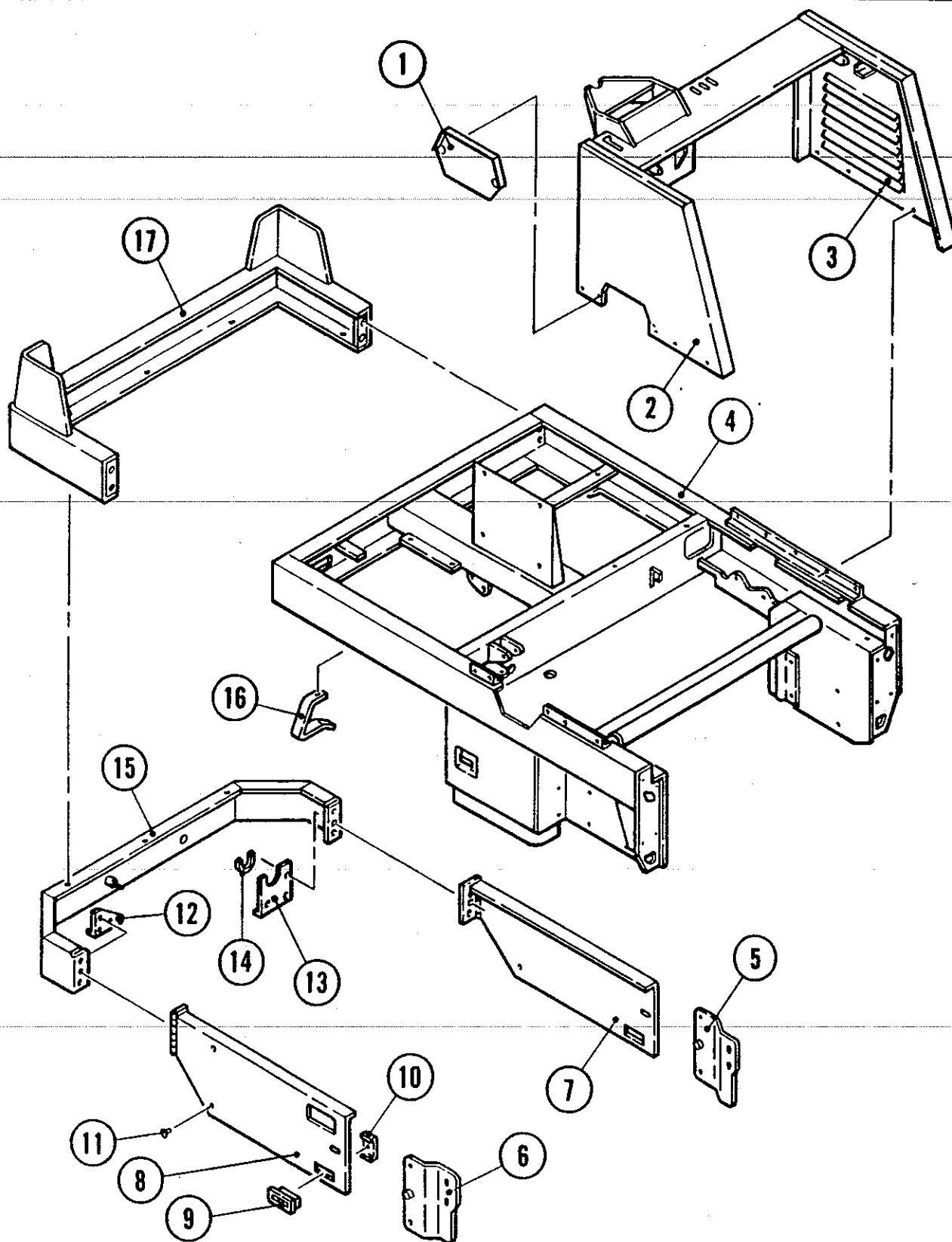


Figure 1. Frame Assembly (Sheet 1 of 2)

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
1			FRAME ASSEMBLY
-1	304970	305380	Cover Assembly, Pump, Painted
-2	300269	300270	Lintel Assembly, Painted (Low Dump)
	300833	300831	Lintel Assembly, Painted (High Dump)
-3	303150		Grille Assembly, Radiator
-4	305825	305799	Frame Assembly
-5	300935		Retainer Assembly, Scrub Door (LH)
-6	300933		Retainer Assembly, Scrub Door (RH)
-7	301225		Door Assembly, Scrub (LH)
-8	301227		Door Assembly, Scrub (RH)
-9	300380		Latch Assembly
-10	302342		Retainer, Latch
-11	300526		Bumper, Rubber
-12	301290		Stop, Squeegee (RH)
-13	305876		Stop, Squeegee (LH)
-14	301618		Edging, Squeegee Stop
-15	305878	305877	Guard Assembly, Squeegee
-16	301413		Support, Drain Hose
-17	300811	305926	Extension Assembly, Bumper
	304597		Extension Assembly, Bumper (High Capacity)
-18	301386		Seal, Lift Rod, Main Broom (Not Illustrated)
-19	301387		Seal, Lift Arm, Main Broom (Not Illustrated)
-20	306246		Retainer, Seal, Lift Rod (Not Illustrated)
-21	306248		Cover, Clean Out, Engine Pan (Not Illustrated)
-22	301168		Edging, Curb Broom
-23	300949	300206	Strap, Hopper Frame
-24	300190	300180	Seal, Hopper Frame
-25	300397		Seal, Hopper, Side
-26	300150		Retainer, Side Seal
-27	300549		Gasket, Broom Door
-28	301488		Gasket, Front, Broom Door
-29	306380		Strap, Flap, Inner Broom Door
-30	306377		Flap, Inner, Broom Door
-31	306378		Mount, Inner Broom Door Flap (RH)
	306379		Mount, Inner Broom Door Flap (LH)
-32	305868		Strap, Inner Broom Door Flap
-33	305870		Flap, Broom Door
-34	300888		Spacer, Broom Door
-35	305865		Handle, Broom Door (RH)

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

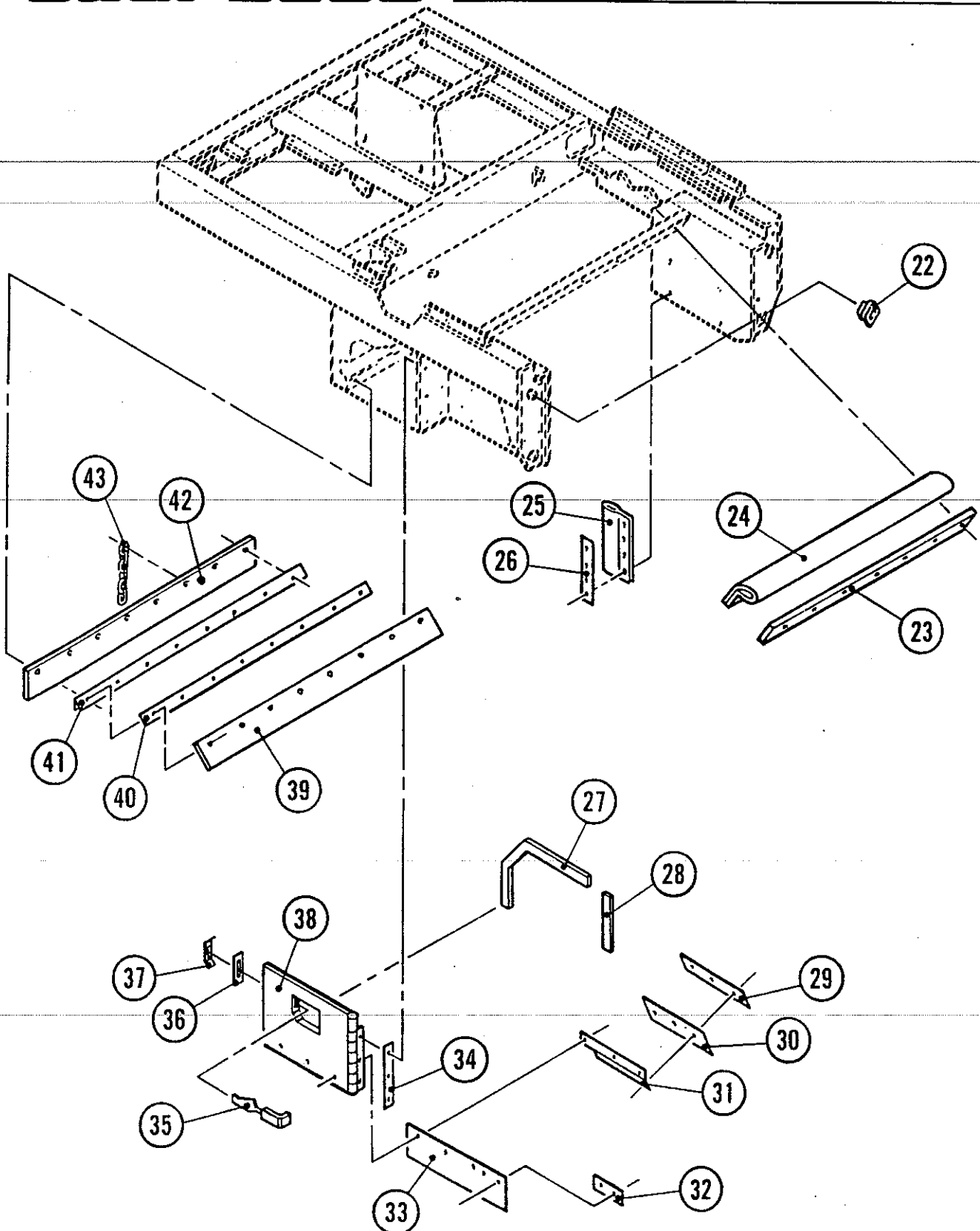


Figure 1. Frame Assembly (Sheet 2 of 2)

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
1			FRAME ASSEMBLY
	305864		Handle, Broom Door (LH)
-36	305869		Seal, Broom Door Latch
-37	305866		Retainer, Seal, Broom Door Latch
-38	305854		Door Assembly, Main Broom (RH)
	305855		Door Assembly, Main Broom (LH)
-39	305788	305786	Skirt, Inner
-40	305801	305792	Strap, Skirt, Inner
-41	305802	305791	Angle, Skirt
-42	305787	305785	Skirt, Outer
-43	301648		Chain, Grounding

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

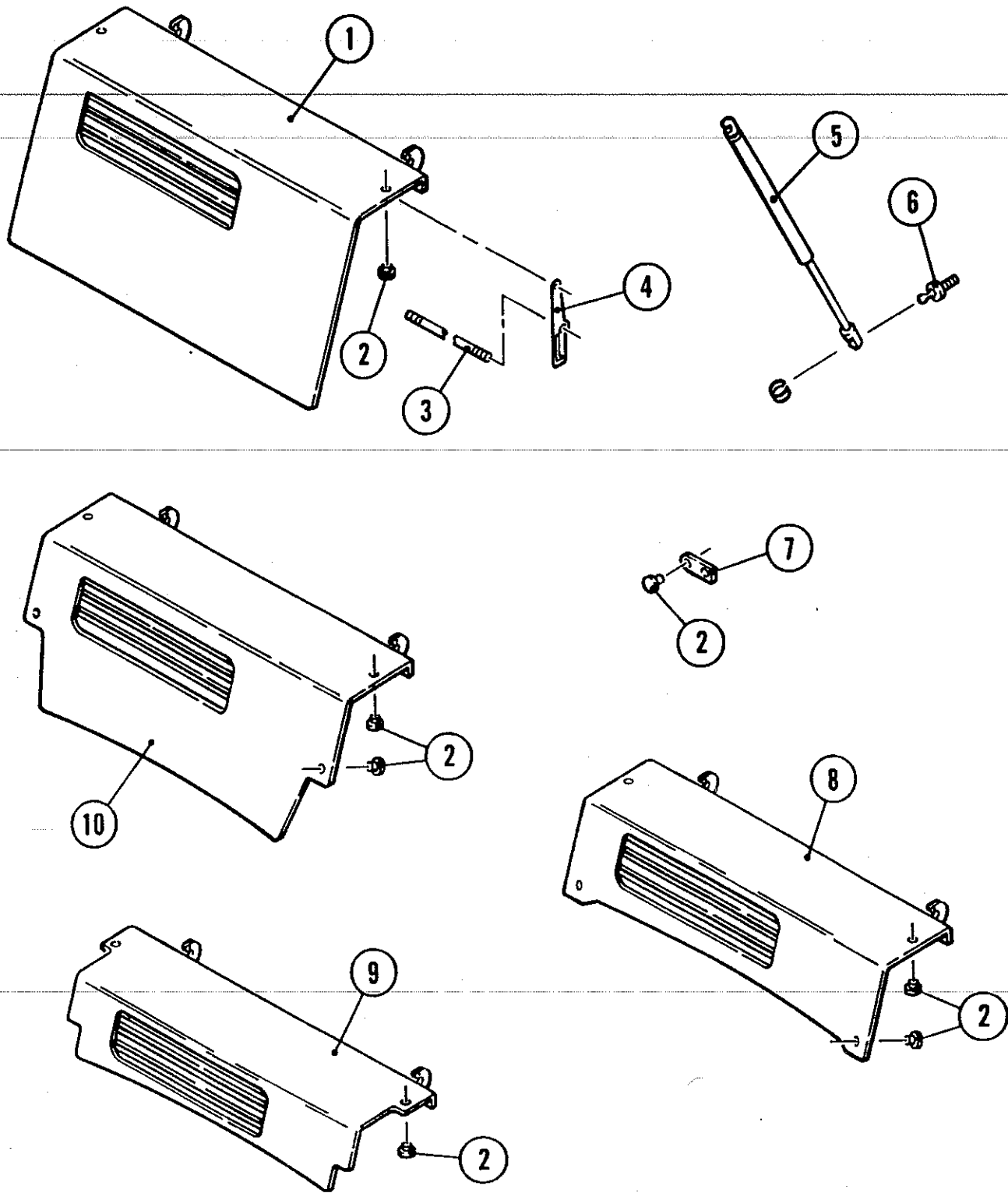


Figure 2. Engine Covers

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
2			ENGINE COVERS
-1	301784	301787	Cover Assembly, CSS Engine, Pntd
-2	300526		Bumper, Engine Cover, Rubber
-3	303993	303994	Handle, CSS Engine Cover, Pltd
-4	303992		Latch, CSS Engine Cover, Pltd
-5	300375		Spring, Gas, Cover
-6	300376		Stud, Ball, Gas Spring
-7	302442		Support, Cover, CSS
-8	300992	301502	Assy Engine Cover (Low Dump)
-9	301211	301505	Assy Engine Cover (High Dump)
-10	301778	301781	Assy Engine Cover (ISS)

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

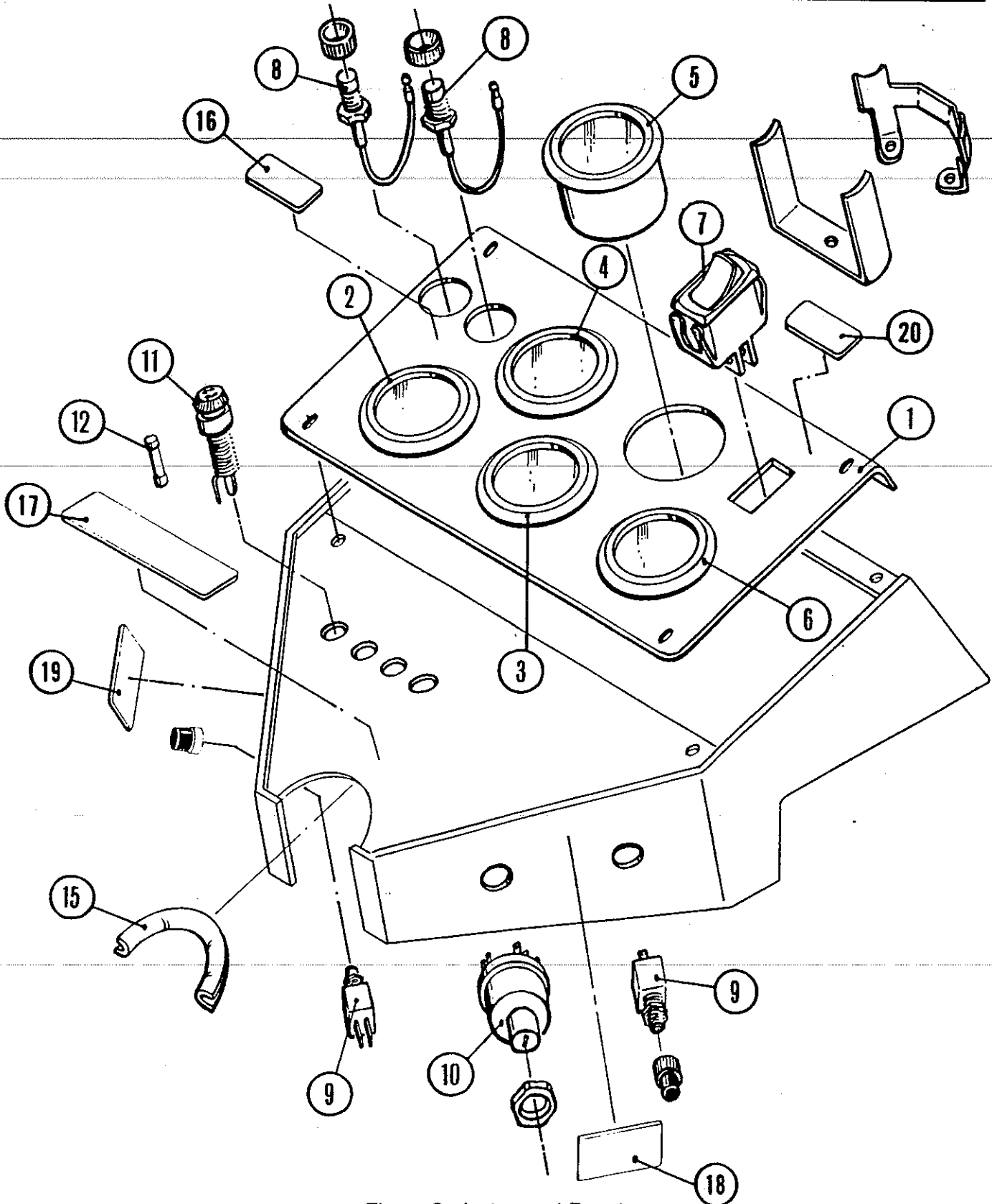


Figure 3. Instrument Panel

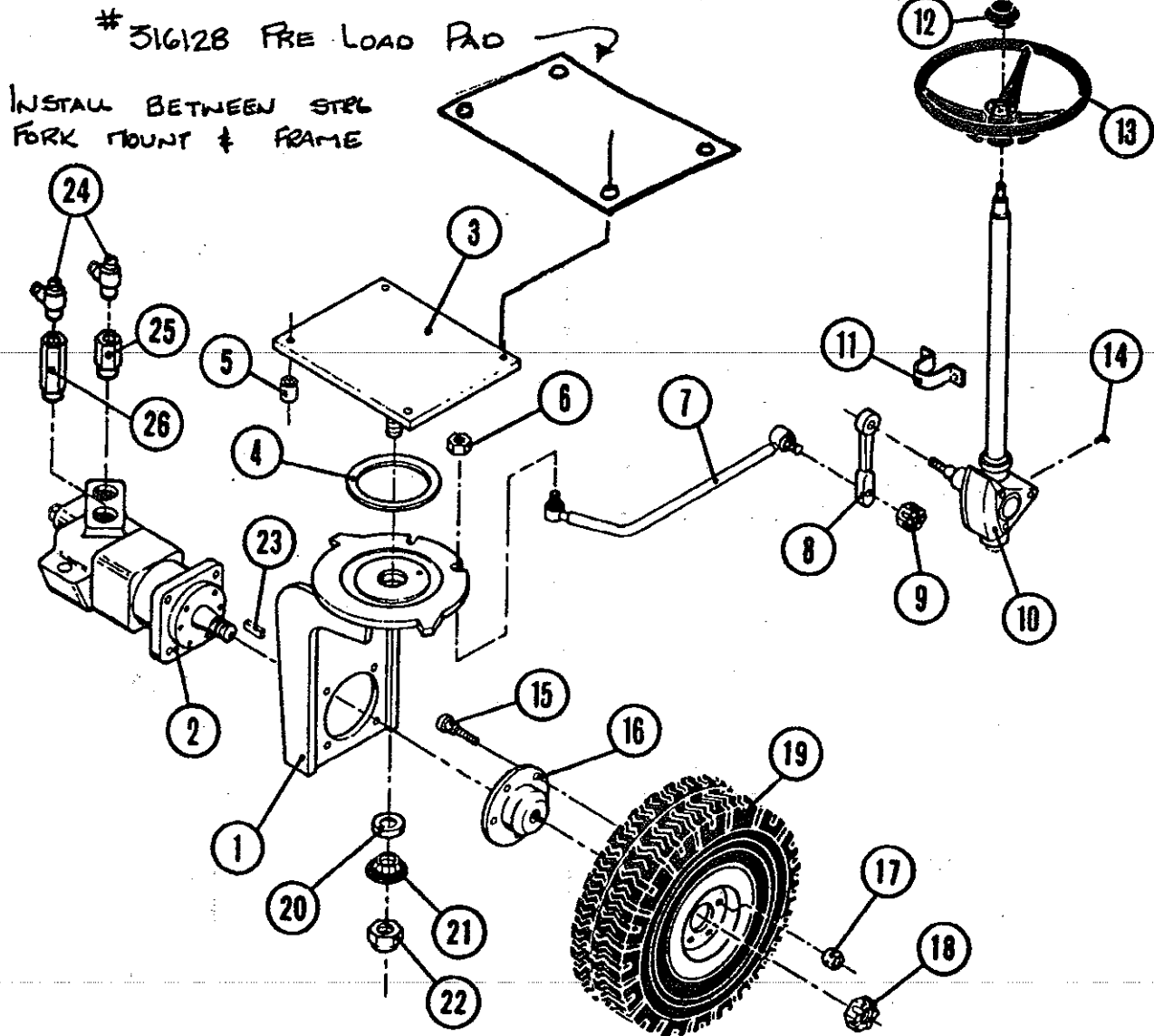


Figure 5-A. Steering Assembly w/ Hub Modification

(All Scrubbers manufactured beginning in April 1992
will be affected by this modification.)



FIGURE & INDEX	PART NUMBER	DESCRIPTION
3		INSTRUMENT PANEL
-1	300860	Panel, Instrument
-2	300381	Gauge, Ammeter
-3	300382	Gauge, Fuel
-4	300383	Gauge, Oil Pressure
-5	300384	Gauge, Water Temperature
-6	300385	Gauge, Hour Meter
-7	300442	Switch, Rocker, (Lights)
-8	301553	Light, Trash Relocator
-9	300441	Switch, Momentary
-10	300443	Switch, Ignition
-11	300444	Holder, Fuse
-12	300445	Fuse, 30 Amp
-13	300446	Fuse, 15 Amp (Not Shown)
-14	300447	Fuse, 20 Amp (Not Shown)
-15	301165	Edging, Steering Column
-16	302517	Decal, RTR Lights
-17	302522	Decal, Fuse
-18	302525	Decal, Horn
-19	302520	Decal, Filter Shaker
-20	302524	Decal, Light (Optional)

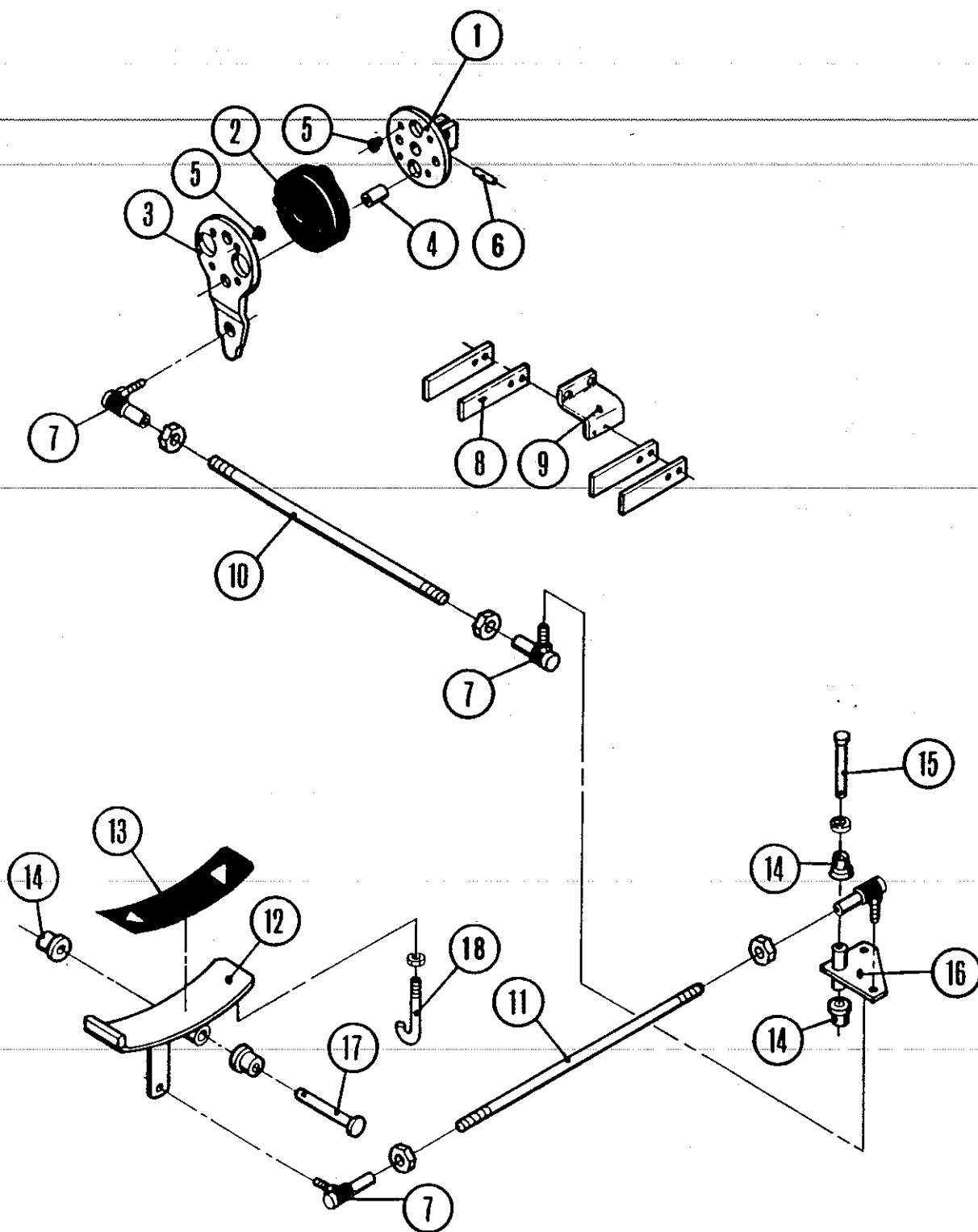


Figure 4. Directional Control

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
4			DIRECTIONAL CONTROL
-1	301544		Disc Assembly, Fwd/Rev
-2	301507		Ring, Coupling
-3	301542		Arm, Fwd/Rev
-4	300339		Sleeve, Fwd/Rev
-5	300526		Bumper, Rubber
-6	400127		Pin, Roll, 1/4 x 1.50
-7	300461		Joint Assembly, Ball, 3/8
-8	300543		Spring, Return Directional Control
-9	**		Bracket, Adjustment, Fwd/Rev
-10	304916	302357	Rod, Fwd/Rev (Toyota)
	300030		Rod, Fwd/Rev (Ford)
	302793	302357	Rod, Fwd/Rev (Diesel)
-11	300029		Rod, Fwd/Rev
-12	300737		Pedal Assembly, Fwd/Rev
-13	300544		Pad, Foot Pedal
-14	300414		Bushing, Plastic
-15	400115		Pin, Clevis, 3/8 x 3.00
-16	300053	305312	Arm Assembly, Intermediate
-17	400114		Pin, Clevis, 3/8 x 4.00
-18	303818		Bar

* When no part number appears in this column, the parts number for the 80 Series is the same as that for the 90 Series.

See the correct engine section for part number.

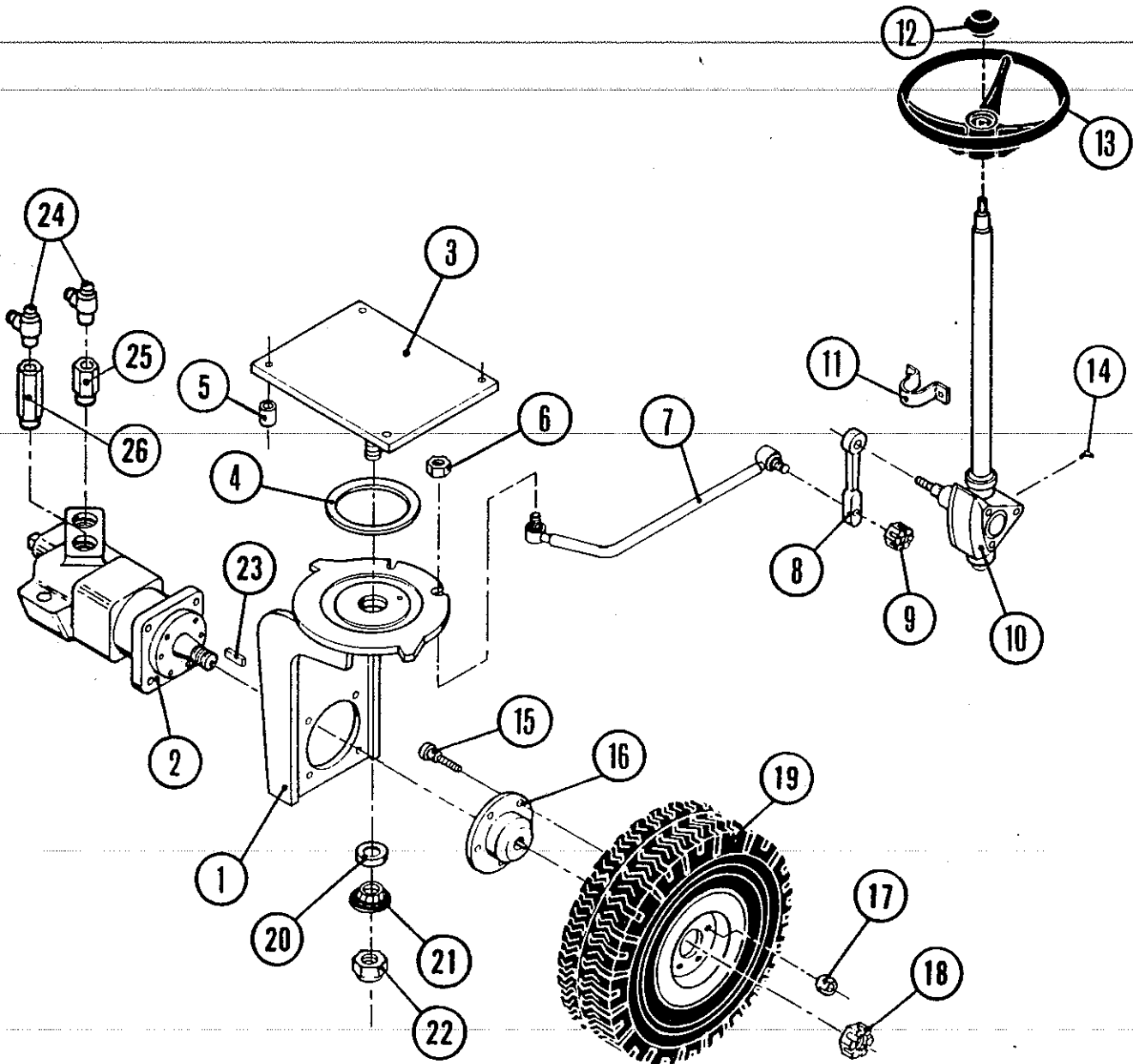


Figure 5. Steering Assembly

FIGURE & INDEX	PART NUMBER	DESCRIPTION
5		STEERING ASSEMBLY
-1	300208	Fork Assembly, Steering
-2	301533	Motor, Hydraulic
-3	300153	Pivot Assembly, Fork
-4	300472	Bearing, Thrust
-5	301440	Spacer, Main Broom
-6	400188	Nut, Hex Jam, 1/2-20
-7	301013	Link Assembly, Steering
-8	300215	Arm, Steering
-9	400223	Nut, Hex Slotted, 1/2-20 SP
-10	300374	Gear Assembly, Steering
-11	300228	Bracket, Steering
-12	300373	Cap, Steering Wheel
-13	300372	Wheel, Steering
-14	400205	Fitting, Grease, 65 Elbow 1/4 NPT
-15	300415	Stud, Wheel Hub
-16	301014	Hub, Rear Wheel
-17	300411	Nut, Wheel Lug
-18	400224	Nut, Hex Slotted, 1 1/4-18 x .62
-19	304763	Tire and Rim Assembly
-20	300470	Bearing, Tapered Roller Cup
-21	300471	Bearing, Tapered Roller Cone
-22	400083	Jam Nut, Lock Half Height, 1 1/4-12
-23	302122	Key, Hydraulic Motor, 4000 Series
-24	400169	Fitting, Swivel
-25	400167	Fitting, Wheel Motor
-26	301834	Fitting, Wheel Motor
-27	302949	Seal Kit, Swivel Ftg. (Not Shown)

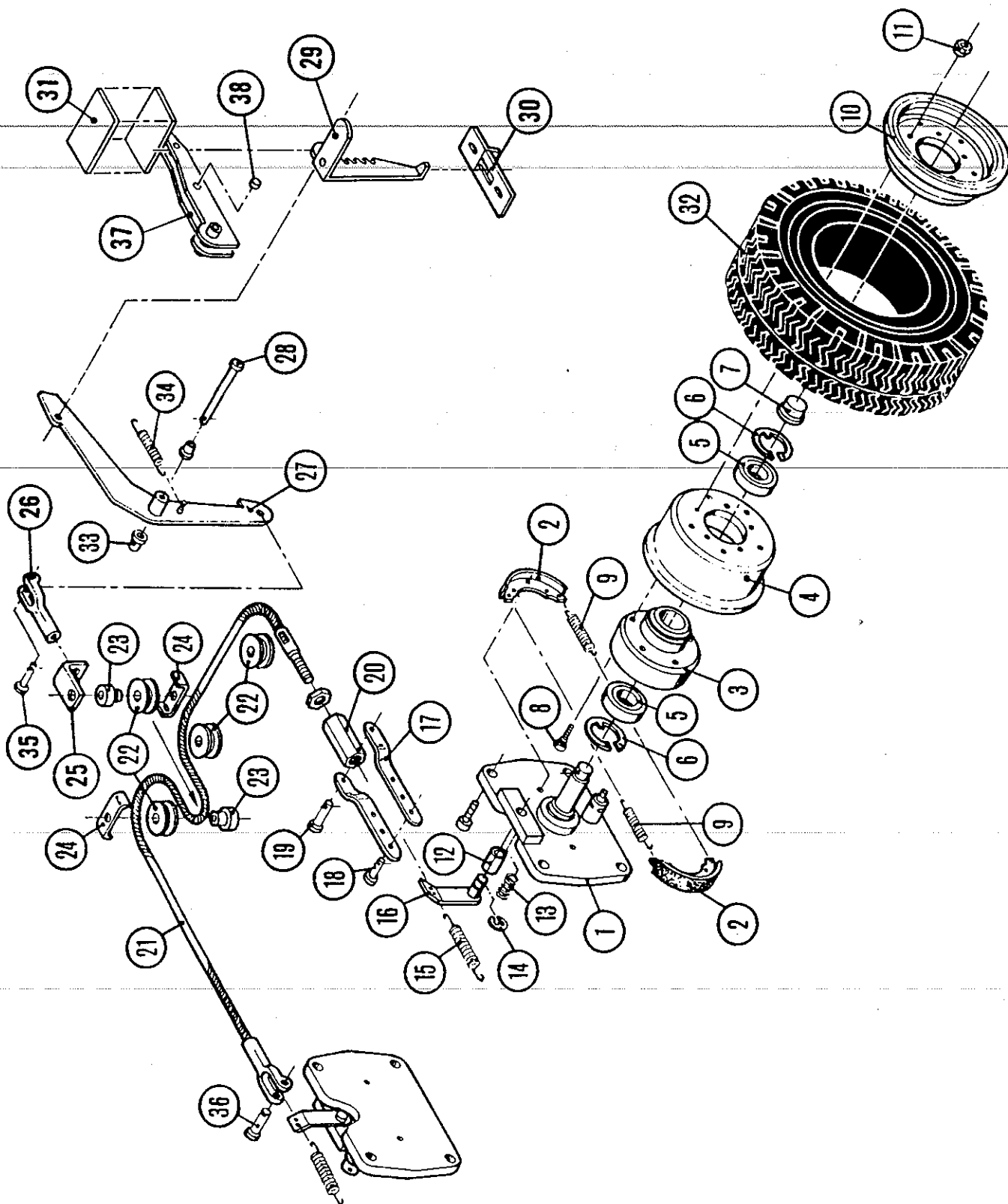


Figure 6. Axle, Brakes and Wheels

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
6			AXLE, BRAKES AND WHEELS
-1	300852		Axle Assembly, Front
-2	300523		Shoe, with Lining, Brake
-3	300787		Hub, Front Wheel
-4	300211		Rim, Front Wheel
-5	300467		Bearing, Ball, 2.44 x 1.18 I.D.
-6	300473		Ring, Retainer Internal
-7	300369		Cap, Hub
-8	300415		Stud, Wheel Hub
-9	301519		Spring, Extension Brake Shoe
-10	300408		Rim, Outer
-11	300411		Nut, Wheel Lug
-12	300410		Bushing, 1.00 O.D. x .87 I.D.
-13	301518		Spring, Compression Brake Shoe
-14	300484		Ring, Retainer Extension, .87
-15	301517		Spring, Extension Brake Lever
-16	300870		Lever Assembly, Brake
-17	300203		Bar, Cable
-18	400118		Pin, Clevis, 5/16 x .88
-19	400185		Pin, Clevis, 5/16 x 1.25
-20	300202		Bar, Cable Adjustment
-21	300412	300486	Cable, Brake
-22	300367		Pulley, Brake
-23	300035		Spacer, Brake Pulley
-24	300209		Retainer, Cable
-25	300955		Bracket, Brake Pulley
-26	300462		Clevis, Cablecraft AC-218
-27	300132	305333	Arm Assembly, Brake
-28	400115		Pin, Clevis 3/8 x 3.00
-29	303718		Lock Assembly, Brake Pedal
-30	300058		Lock Assembly, Brake
-31	300413		Pad, Brake Pedal
-32	300370		Tire (Solid)
-33	300414		Bushing, Plastic Main Broom
-34	301522		Spring, Extension Brake Arm
-35	400116		Pin, Clevis, 3/8 x 1.25
-36	400118		Pin, Clevis, 5/16 x .88
-37	303716		Arm Assembly, Brake Pedal
-38	303723		Roller, Brake Arm

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

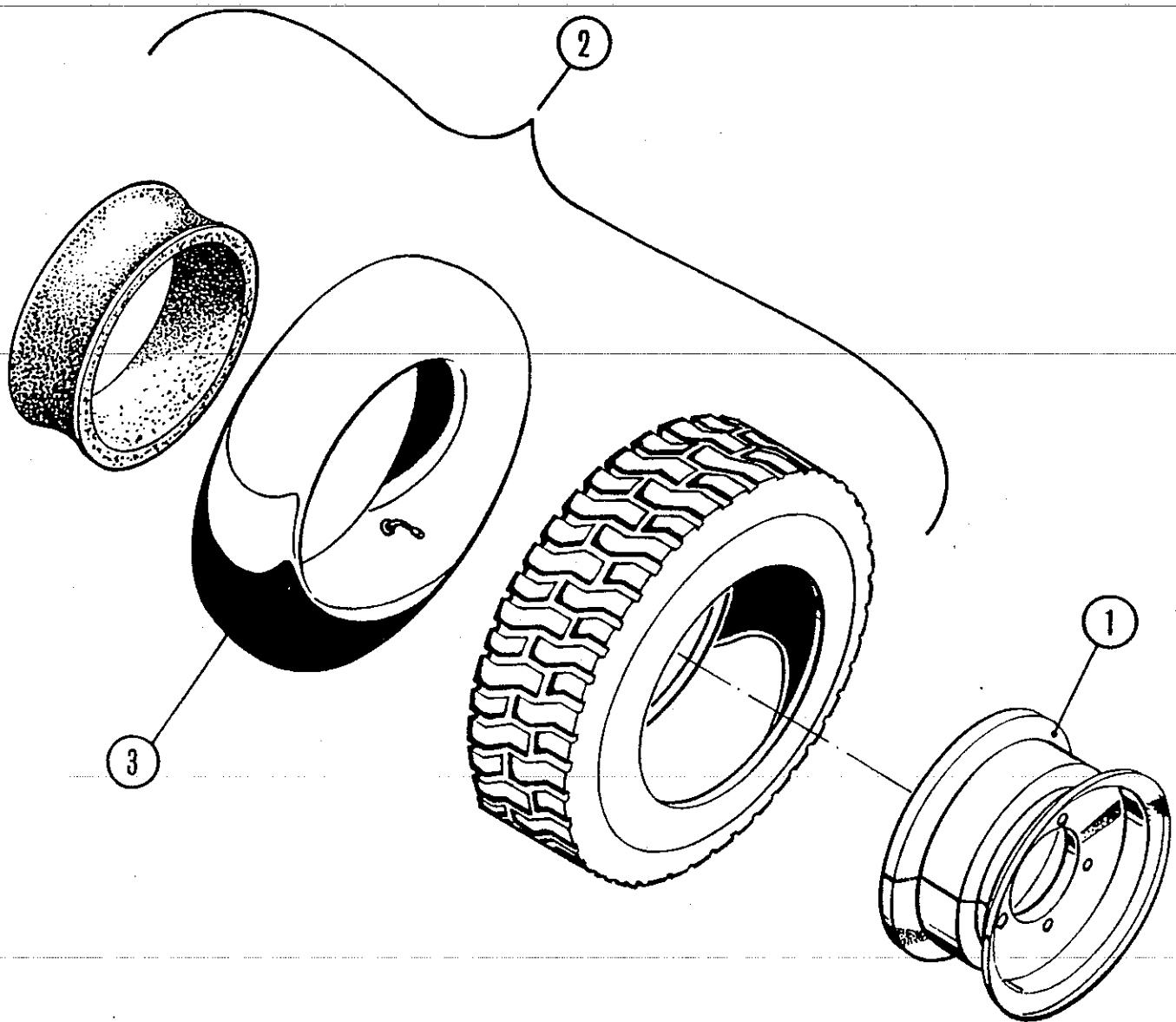


Figure 7. Michelin Tire Assembly

FIGURE & INDEX	PART NUMBER	DESCRIPTION
7 -1 -2 -3	302734 302735 302736	MICHELIN TIRE ASSEMBLY Rim, Radial Tire Tire Assembly, Michelin Radial Tube, Tire Michelin (SP)

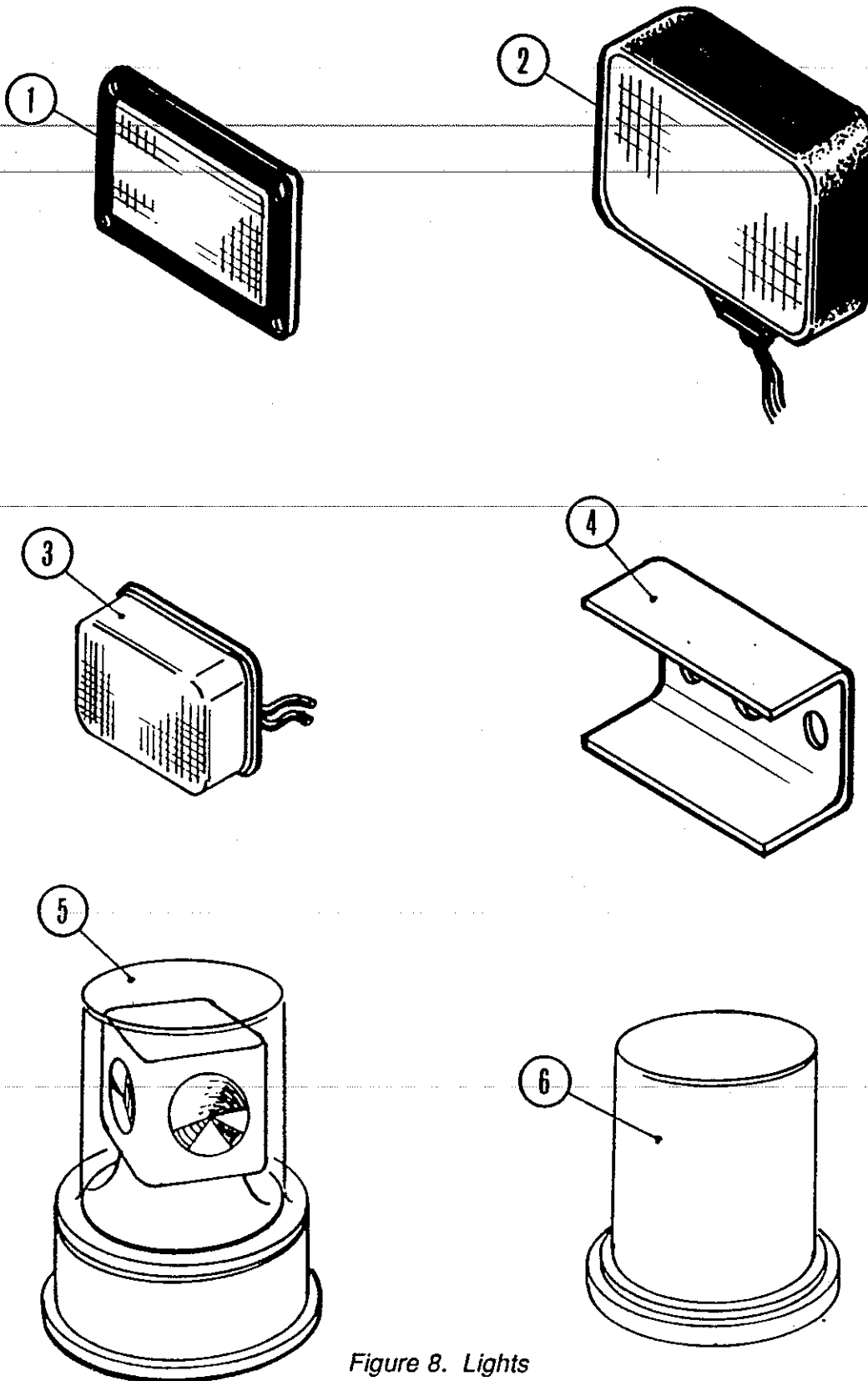


Figure 8. Lights

FIGURE & INDEX	PART NUMBER	DESCRIPTION
8		LIGHTS
-1	301359	Headlight, Flush Mount
-2	301360	Headlight, Stud Mount
-3	303204	Light, Tail/Combination
-4	303206	Bracket, Tail Light Guard
-5	302654	Light, Emergency Rotating Amber
	302626	Light, Emergency Rotating Blue
	301347	Light, Emergency Rotating Red
-6	301816	Light, Emergency Flasher Red
	302627	Light, Emergency Flasher Amber
	302628	Light, Emergency Flasher Blue
	302630	Light, Safety Blue Strobe
	302629	Light, Safety Red Strobe
	301817	Light, Safety Amber Strobe

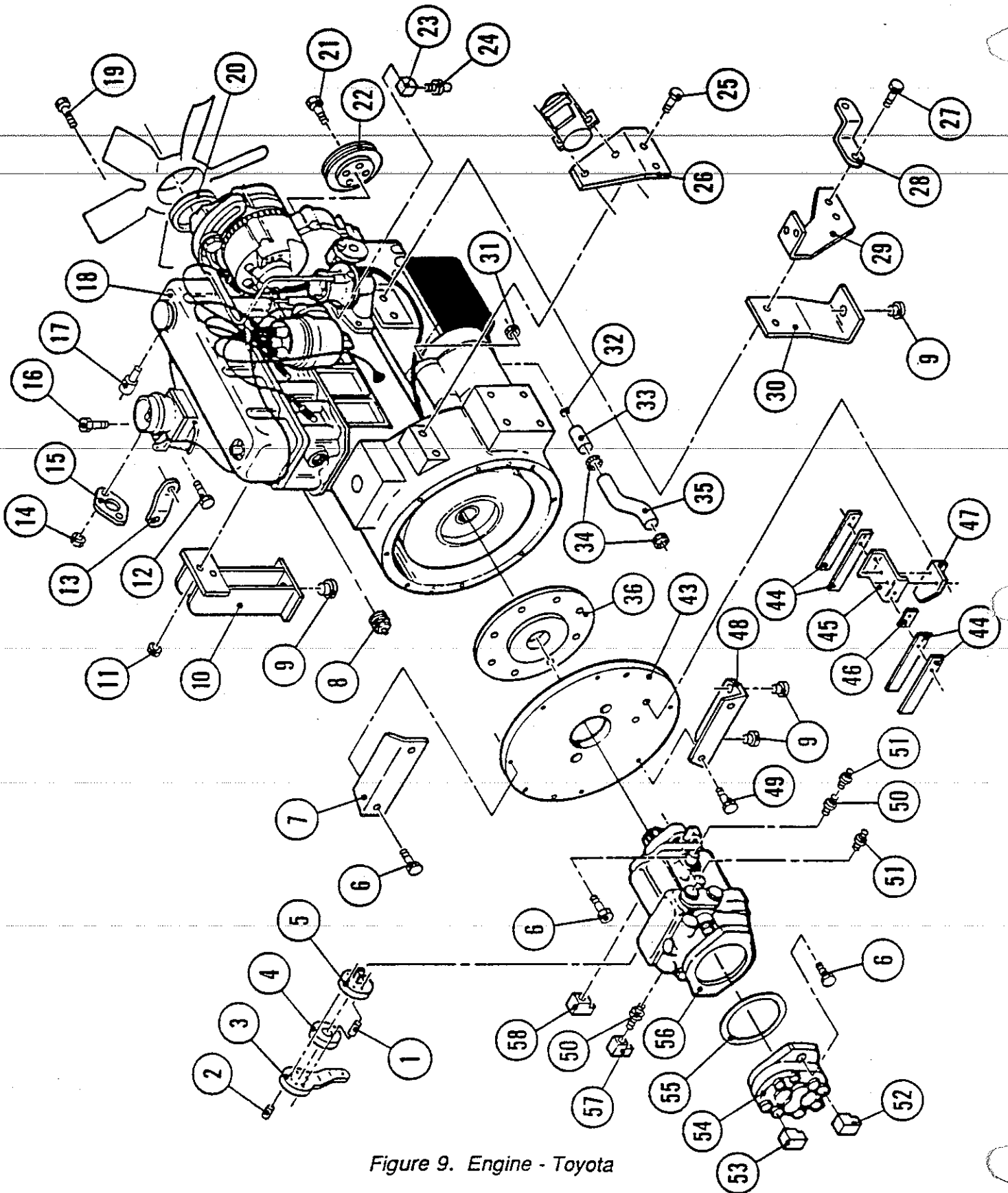


Figure 9. Engine - Toyota

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
9			ENGINE - TOYOTA (cont.)
-39	400372		Screw, HHM, 10mm-1.25P x 32mm (Not Shown)
-40	400366		Screw, HHM, 10mm-1.25P x 42mm (Not Shown)
-41	302558		Sprocket Assembly, Driven & Drive (Not Shown)
-42	300531		Bushing, Tapered (Not Shown)
-43	304764	305303	Plate, Pump Mounting
-44	300543		Spring, Return
-45	302115		Bracket, Forward/Reverse
-46	303918		Spacer, Forward/Reverse
-47	304825		Bracket, Directional Control
-48		305313	Mount, Engine
-49		400028	Screw, HHM, 3/8"-16 x 1.5"
-50	400167		Fitting, Adapter 1 1/16-12
-51	400157	304899	Fitting
-52	400154	400155	Fitting
-53	400156		Fitting, 90°, 1 5/16-12
-54	300482		Pump, Auxiliary
-55	303711		O-Ring, Static Seal
-56	303581	303582	Pump, Main
-57	400154		Fitting, 90°, 3/4"-16
-58	400153		Fitting, 90°, 9/16-18

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

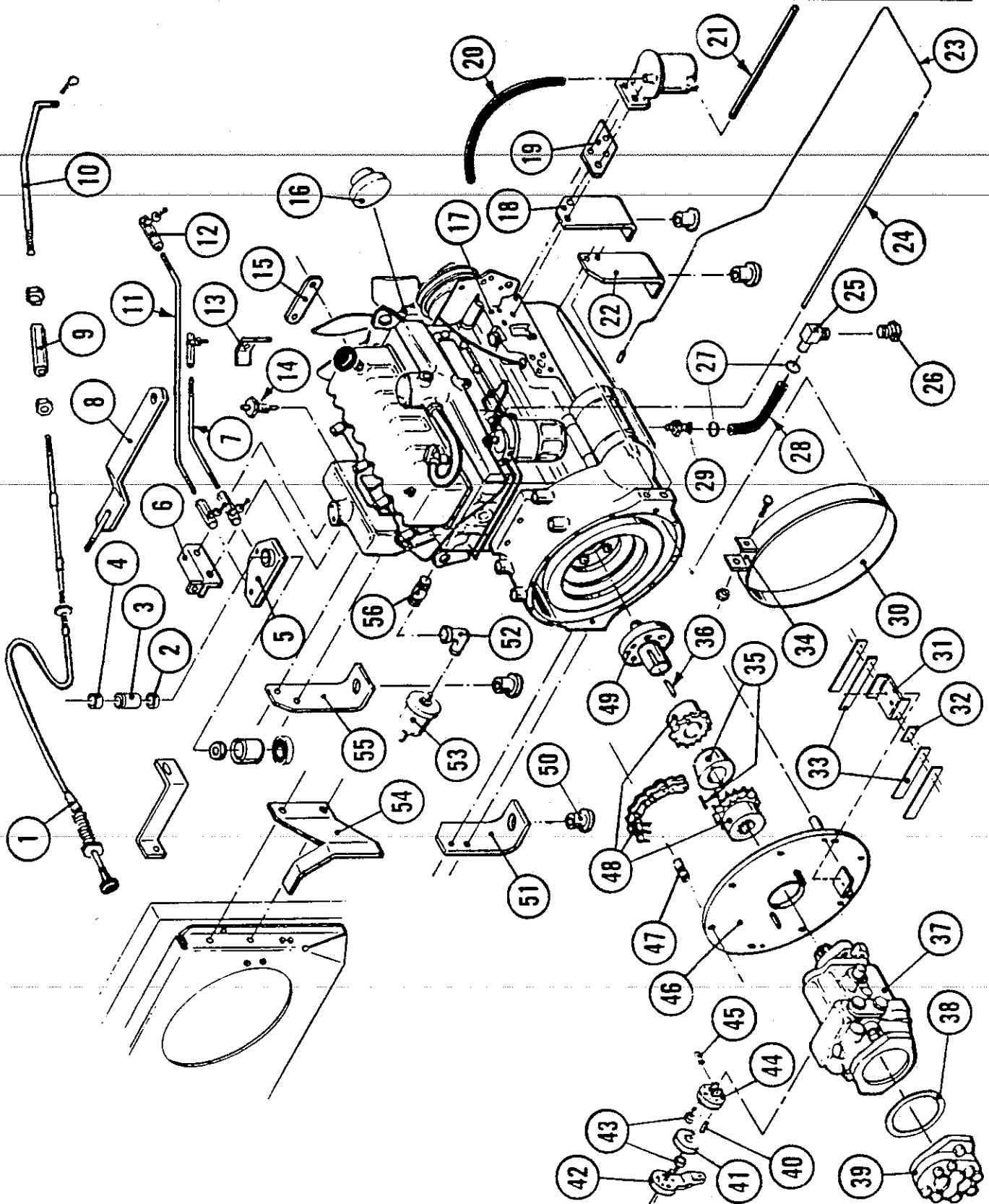


Figure 10. Engine - Perkins Diesel

FIGURE & INDEX	PART NUMBER	DESCRIPTION
10		ENGINE - PERKINS DIESEL
-1	301427	Cable, Stop Diesel
-2	300430	Bushing, Self Lubricating
-3	300339	Sleeve
-4	400178	Bearing, Thrust
-5	302985	Pivot Assembly, Bellcrank
-6	302987	Mount Assembly, Bellcrank
-7	302976	Rod, Throttle, Short
-8	302846	Lever Assembly, Throttle
-9	303110	Bar, Stop Cable Adjustment
-10	302990	Rod, Stop Cable Ext.
-11	302991	Rod, Throttle Linkage
-12	301199	Joint Assembly, Ball, 1/4-28
-13	302340	Clip, Hydraulic Hose
-14	302904	Sender, Temp Diesel
-15	302993	Bracket, Hose Retaining
-16	302970	Spacer, Engine Fan
-17	302745	Engine, Perkins Diesel
-18	302979	Engine Mount, Left Front
-19	302989	Mount, Water Separator
-20	303107	Hose, Water Separator (Outlet)
-21	302931	Hose, Water Separator (Inlet)
-22	302981	Engine Mount, Right Front
-23	303006	Tube, Fuel Return Line
-24	303107	Hose, Fuel Return Line
-25	400190	Fitting, 90° Elbow, 1/2" to 3/8" NPT
-26	400194	Fitting, Pipe Plug, 3/8" NPT
-27	302144	Clamp, Hose, 1/2"
-28	303013	Hose, Oil Drain
-29	302969	Fitting, Oil Drain
-30	303098	Coupling, Flywheel
-31	302115	Bracket, Forward/Reverse
-32	303918	Spacer, Bracket
-33	300543	Spring, Return
-34	303099	Bracket, Flywheel Coupling
-35	300531	Bushing, Taper
-36	301718	Key, 1/4 Square x .88 Lg
-37	303581	Pump, Main VD
-38	303711	O-Ring, Static Seal

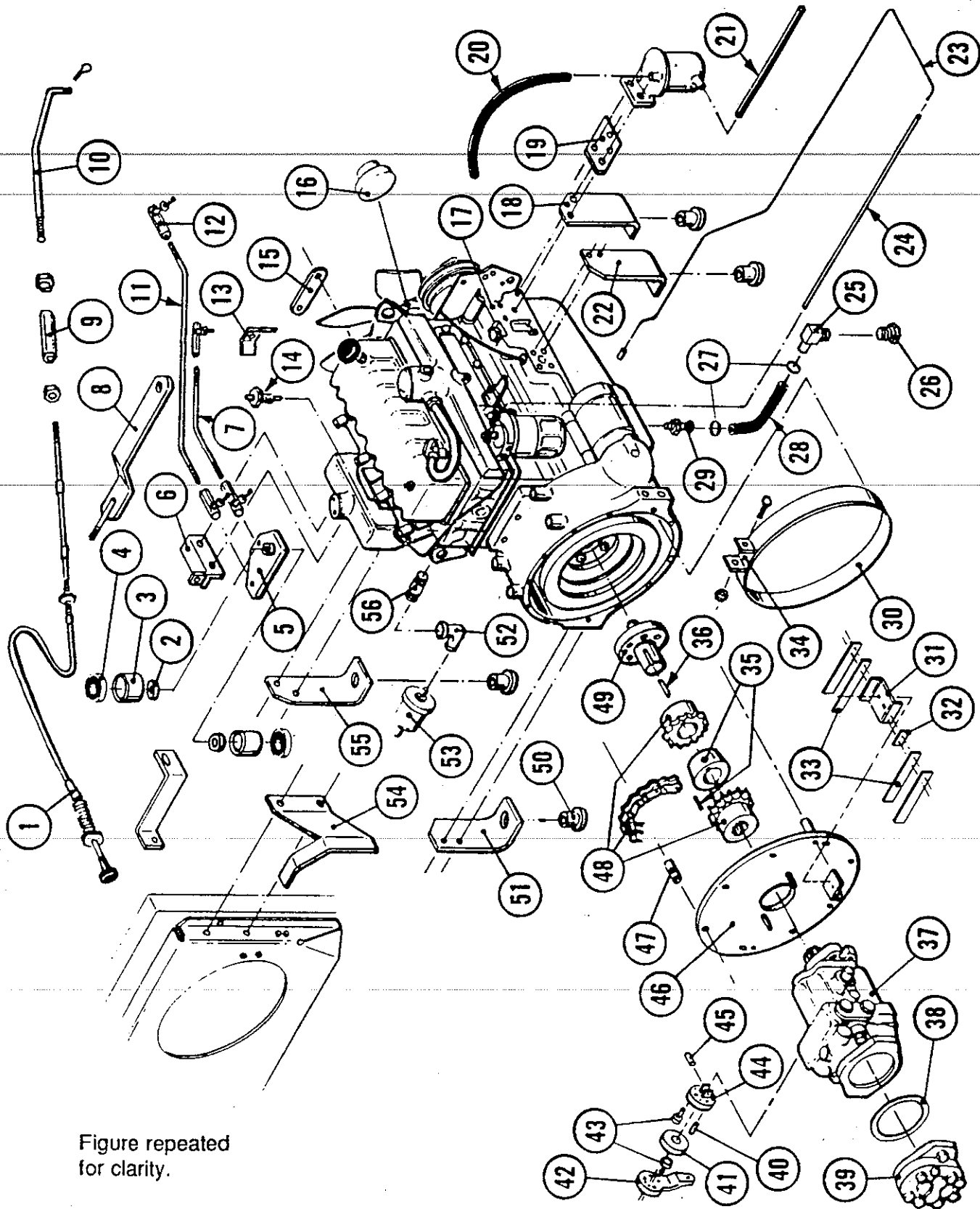


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for clarity.

Figure 10. Engine - Perkins Diesel

FIGURE & INDEX	PART NUMBER	DESCRIPTION
10		ENGINE - PERKINS DIESEL
-39	300482	Pump, Aux
-40	300339	Sleeve
-41	301507	Coupling
-42	301542	Arm, Forward/Reverse
-43	300526	Bumper, Rubber
-44	301544	Disc Assembly, Forward/Reverse
-45	400173	Screw, HHM, 1/4-20 x 1.75
-46	303101	Plate Assembly, Pump Mounting
-47	302994	Spacer, Pump Mounting Plate
-48	302558	Sprocket Assembly, Driven & Drive Comp
-49	302971	Adapter, Pump Drive
-50	300464	Mount, Isolation
-51	302980	Engine Mount, Right Rear
-52	301720	Fitting, 90° Elbow, 1/8" NPT
-53	300387	Sender, Oil Pressure
-54	303122	Guard, Alternator Belt
-55	302978	Engine Mount, Left Rear
-56	303105	Fitting, Nipple, 1/8" NPT x 2.00" Lg

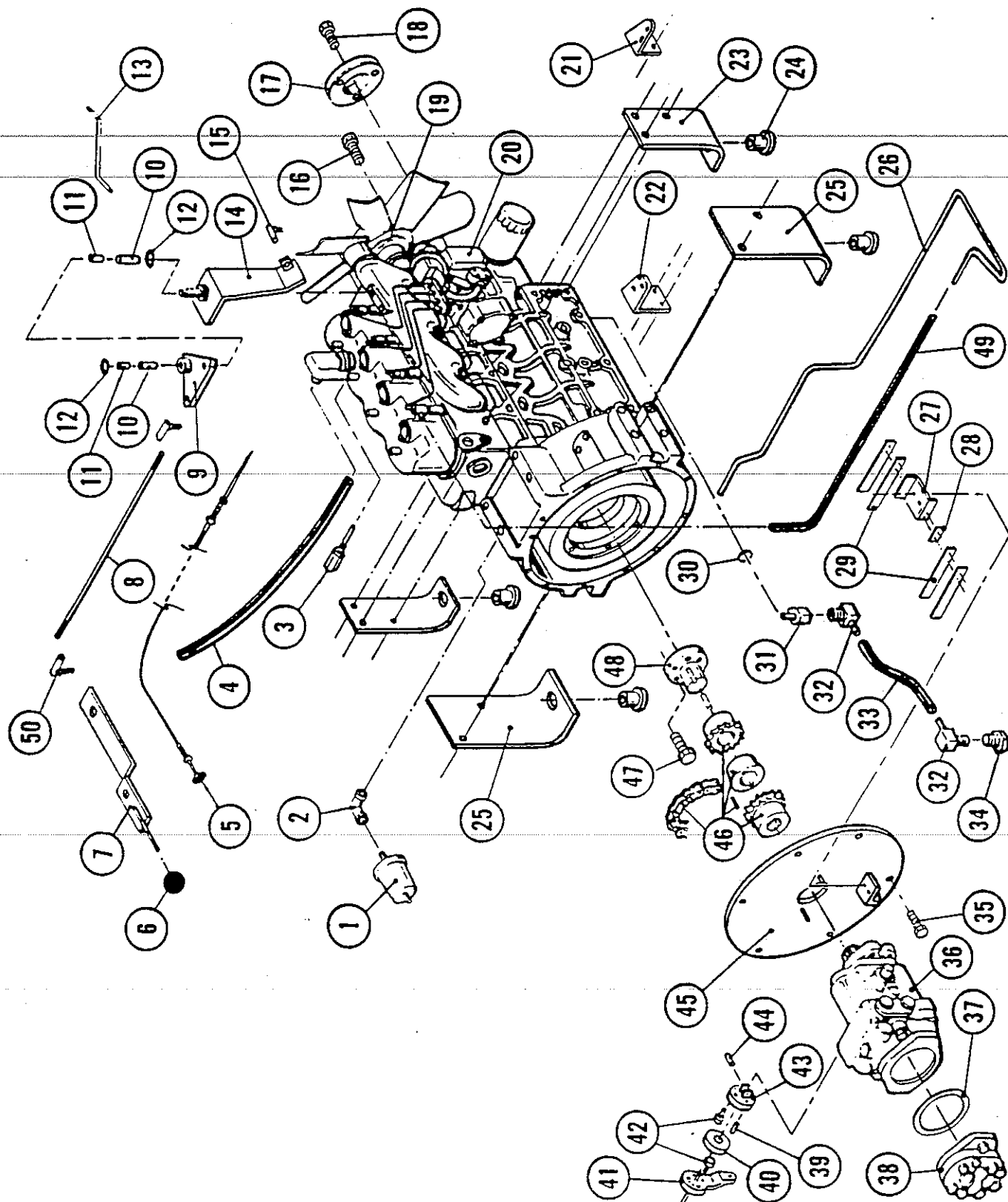


Figure 11. Engine - 4 Cylinder Kubota Diesel

FIGURE & INDEX	PART NUMBER	DESCRIPTION
11		ENGINE - 4 CYLINDER KUBOTA DIESEL
-1	300387	Sender, Oil Pressure
-2	301720	Fitting, 90° Elbow, 1/8" NPT
-3	302904	Sender, Temp Diesel
-4	303014	Hose, Crankcase Vent
-5	301427	Cable, Imp & Stop Diesel
-6	300563	Knob, Ball, 1" Dia
-7	302846	Lever Assembly, Throttle
-8	302790	Rod, Throttle, Long
-9	302780	Pivot Assembly, Bellcrank
-10	300430	Bushing, Self Lubricating, .499 I.D. x .594 O.D.
-11	300339	Sleeve
-12	400178	Bearing, Fiberglide, .531 I.D. x 1.00 O.D.
-13	302791	Rod, Throttle, Short
-14	302783	Mount Assembly, Bellcrank
-15	301459	Joint Assembly, Ball, 10-32
-16	400290	Screw, HHM, 6 mm x 1.00 P x 20 mm
-17	302801	Pulley, Engine
-18	400292	Screw, HHM, 8 mm x 1.25 P x 50 mm
-19	302906	Spacer, Fan
-20	300439	Engine, Diesel Kubota
-21	305882	Mount, Fuel Filter
-22	305883	Mount, Hydraulic Oil Filter
-23	301885	Mount, Front Engine
-24	300464	Mount, Isolation
-25	301883	Mount, F/W Engine
-26	303006	Tube, Fuel Return Line
-27	302115	Bracket, Forward/Reverse
-28	303918	Spacer, Bracket
-29	300543	Spring, Return
-30	305252	Washer
-31	305251	Fitting, Oil Pan Drain
-32	400190	Fitting, 90° Elbow, 1/2" to 3/8" NPT
-33	303013	Hose, Oil Drain
-34	400194	Fitting, 3/8" Pipe Plug
-35	400296	Screw, HHM, 12 mm x 1.25 P x 32 mm
-36	303581	Pump, Main VD
-37	303711	O-Ring, Static Seal

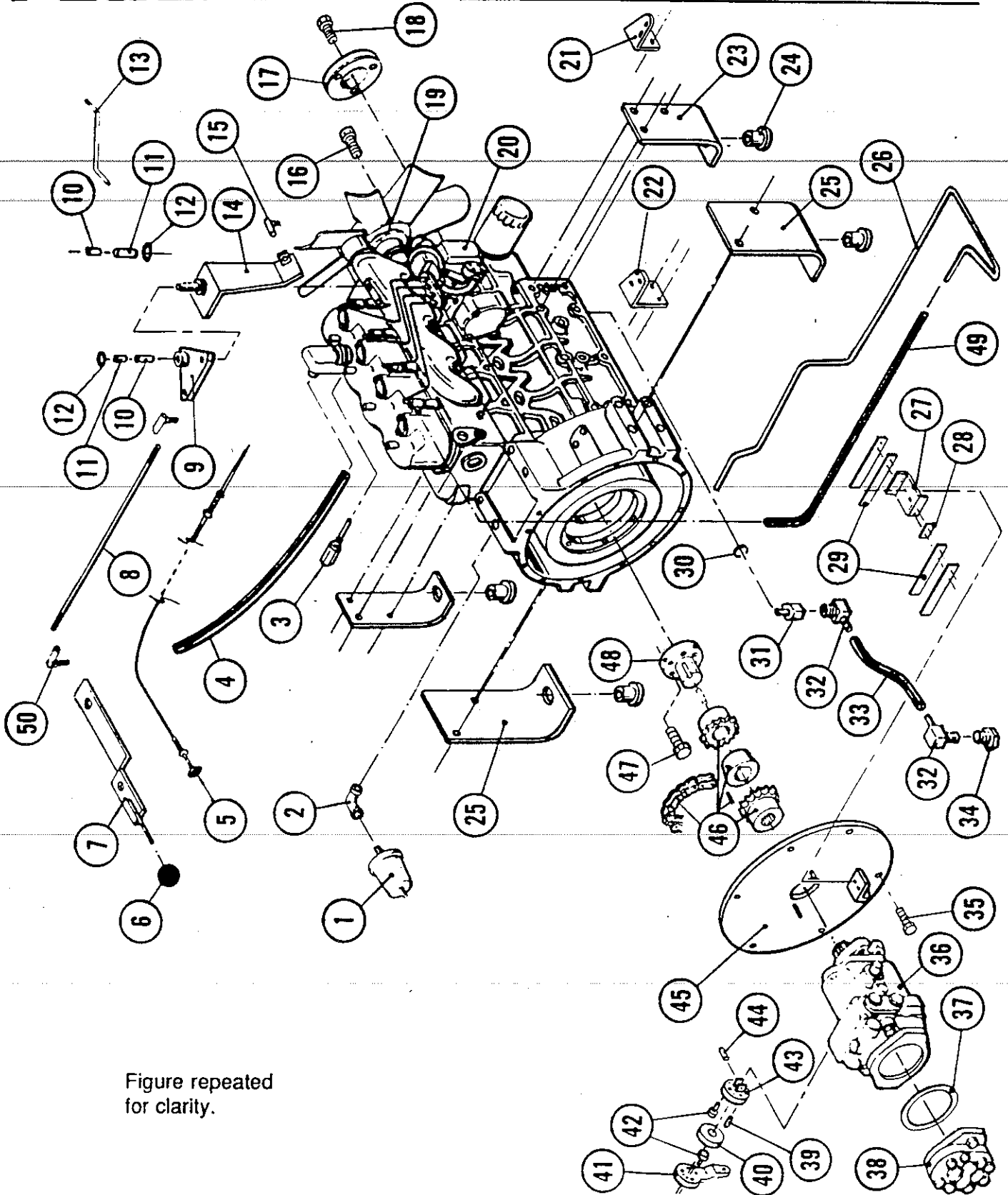


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for clarity.

Figure 11. Engine - 4 Cylinder Kubota Diesel

FIGURE & INDEX	PART NUMBER	DESCRIPTION
11		ENGINE - 4 CYLINDER KUBOTA DIESEL
-38	300482	Pump, Aux
-39	300339	Sleeve
-40	301507	Coupling
-41	301542	Arm, Forward/Reverse
-42	300526	Bumper, Rubber
-43	301544	Disc Assembly, Forward/Reverse
-44	400173	Screw, HHM, 1/4-20 x 1.75
-45	301134	Plate Assembly, Pump Mounting
-46	302655	Sprocket Assembly, Drive
-47	400295	Screw, HHM, 12 mm x 1.25 P x 50 mm
-48	302799	Adapter, Pump Drive
-49	303008	Hose, Fuel Return Line
-50	301199	Joint Assembly, Ball, 1/4-28

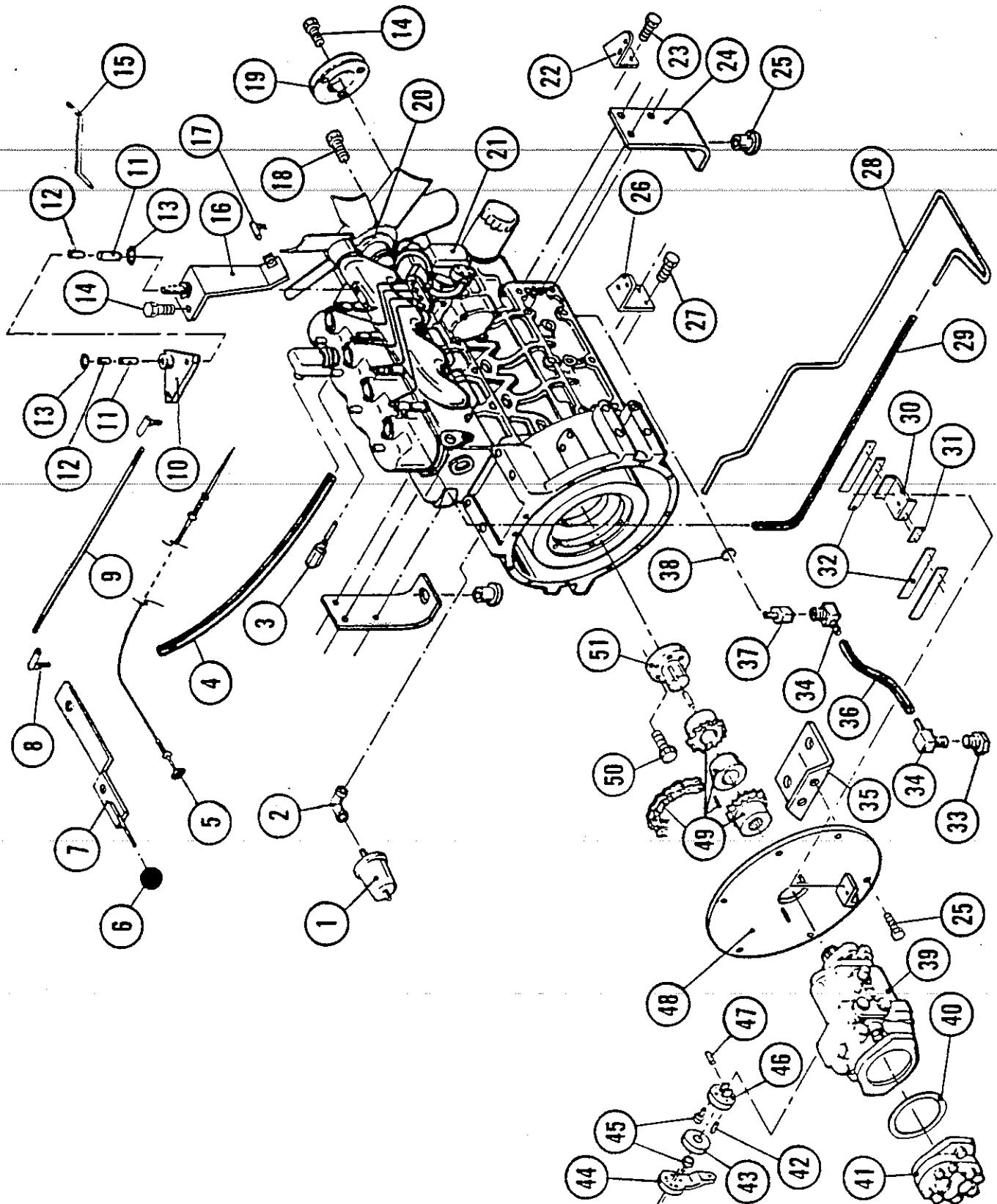


Figure 12. Engine - 3 Cylinder Kubota Diesel

FIGURE & INDEX	PART NUMBER	DESCRIPTION
12		ENGINE - 3 CYLINDER KUBOTA DIESEL
-1	300387	Sender, Oil Pressure
-2	301720	Fitting, 90° Elbow, 1/8" NPT
-3	302904	Sender, Temp Diesel
-4	303014	Hose, Crankcase Vent
-5	301427	Cable, Imp & Stop Diesel
-6	300563	Knob, Ball, 1" Dia
-7	302846	Lever Assembly, Throttle
-8	301199	Joint Assembly, Ball, 1/4-28
-9	302790	Rod, Throttle, Long
-10	302780	Pivot Assembly, Bellicrank
-11	300430	Bushing, Self Lubricating, .499 I.D. x .594 O.D.
-12	300339	Sleeve
-13	400178	Bearing, Fiberglide, .531 I.D. x 1.00 O.D.
-14	400292	Screw, HHM, 8 mm x 1.25 P x 50 mm
-15	302791	Rod, Throttle, Short
-16	302783	Mount Assembly, Bellcrank
-17	301459	Joint Assembly, Ball, 10-32
-18	400290	Screw, HHM, 6 mm x 1.00 P x 20 mm
-19	302801	Pulley, Engine
-20	302906	Spacer, Fan
-21	304907	Engine, Diesel
-22	305882	Mount, Fuel Filter
-23	400402	Screw, HHM, 12 mm x 1.25 P x 40 mm
-24	301885	Mount, Engine, Front
-25	300464	Mount, Isolation
-26	305883	Mount, Hydraulic Oil Filter
-27	400296	Screw, HHM, 12 mm x 1.25 P x 30 mm
-28	303006	Tube, Fuel Return Line
-29	303008	Hose, Fuel Return Line
-30	302115	Bracket, Forward/Reverse
-31	303918	Spacer, Bracket
-32	300543	Spring, Return
-33	400194	Fitting, Pipe Plug, 3/8" NPT
-34	400190	Fitting, 90° Elbow, 1/2" to 3/8" NPT
-35	305499	Mount, Engine Pump Plate
-36	303013	Hose, Oil Drain
-37	305251	Fitting, Oil Pan Drain
-38	305252	Washer, Oil Drain
-39	303581	Pump, Main VD
-40	303711	O-Ring, Static Seal

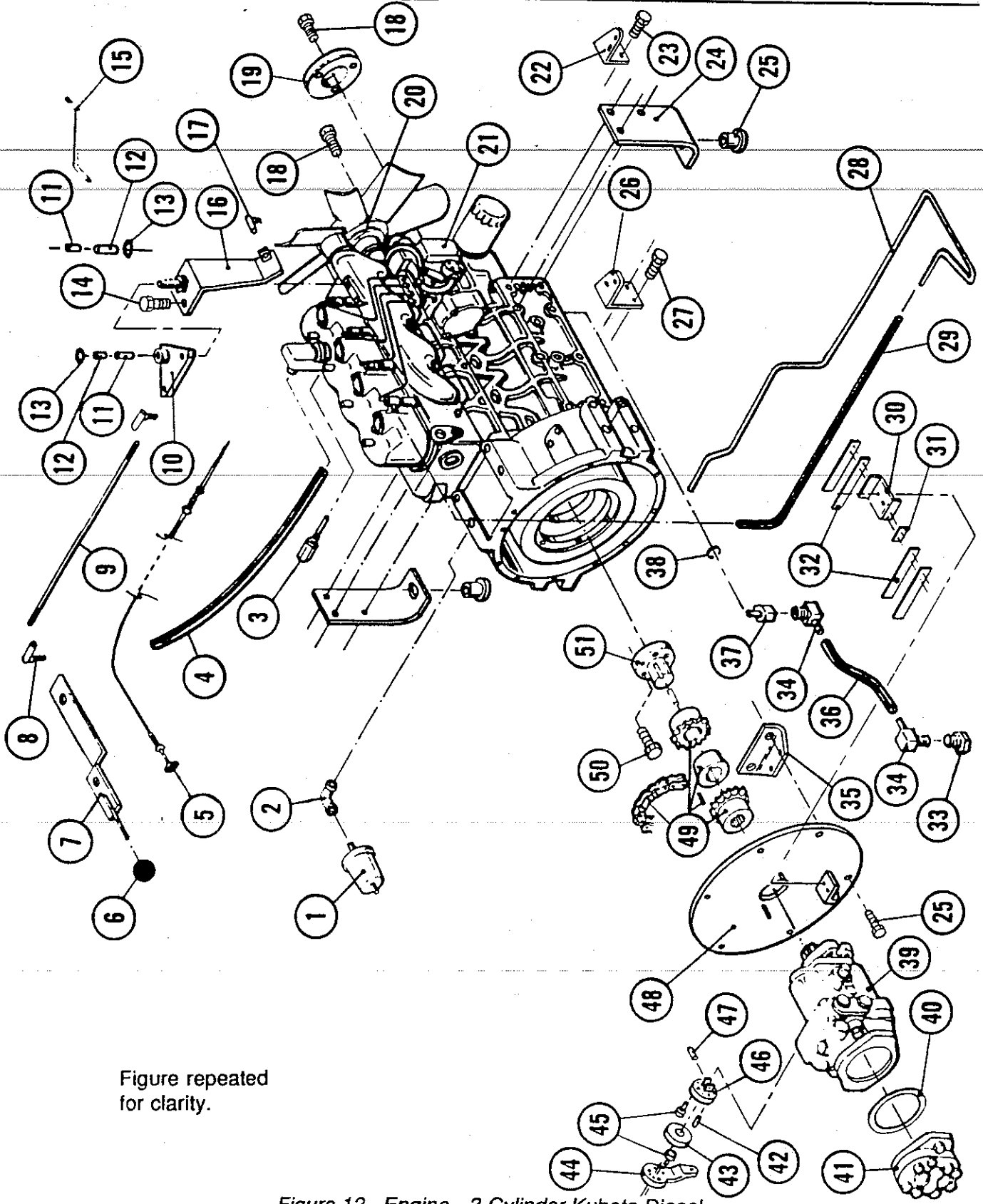


Figure repeated
for clarity.

Figure 12. Engine - 3 Cylinder Kubota Diesel

FIGURE & INDEX	PART NUMBER	DESCRIPTION
12		ENGINE - 3 CYLINDER KUBOTA DIESEL
-41	300482	Pump, Aux
-42	300339	Sleeve
-43	301507	Coupling
-44	301542	Arm, Forward/Reverse
-45	300526	Bumper, Rubber
-46	301544	Disc Assembly, Forward/Reverse
-47	400173	Screw, HHM, 1/4-20 x 1.75
-48	305511	Plate Assembly, Pump Mounting
-49	302655	Sprocket Assembly, Drive
-50	400295	Screw, HHM, 12 mm x 1.25 P x 50 mm
-51	302799	Adaptor, Pump Drive

To be supplied at a later date.

Figure 13. Engine - Ford

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	

To be supplied at a later date.

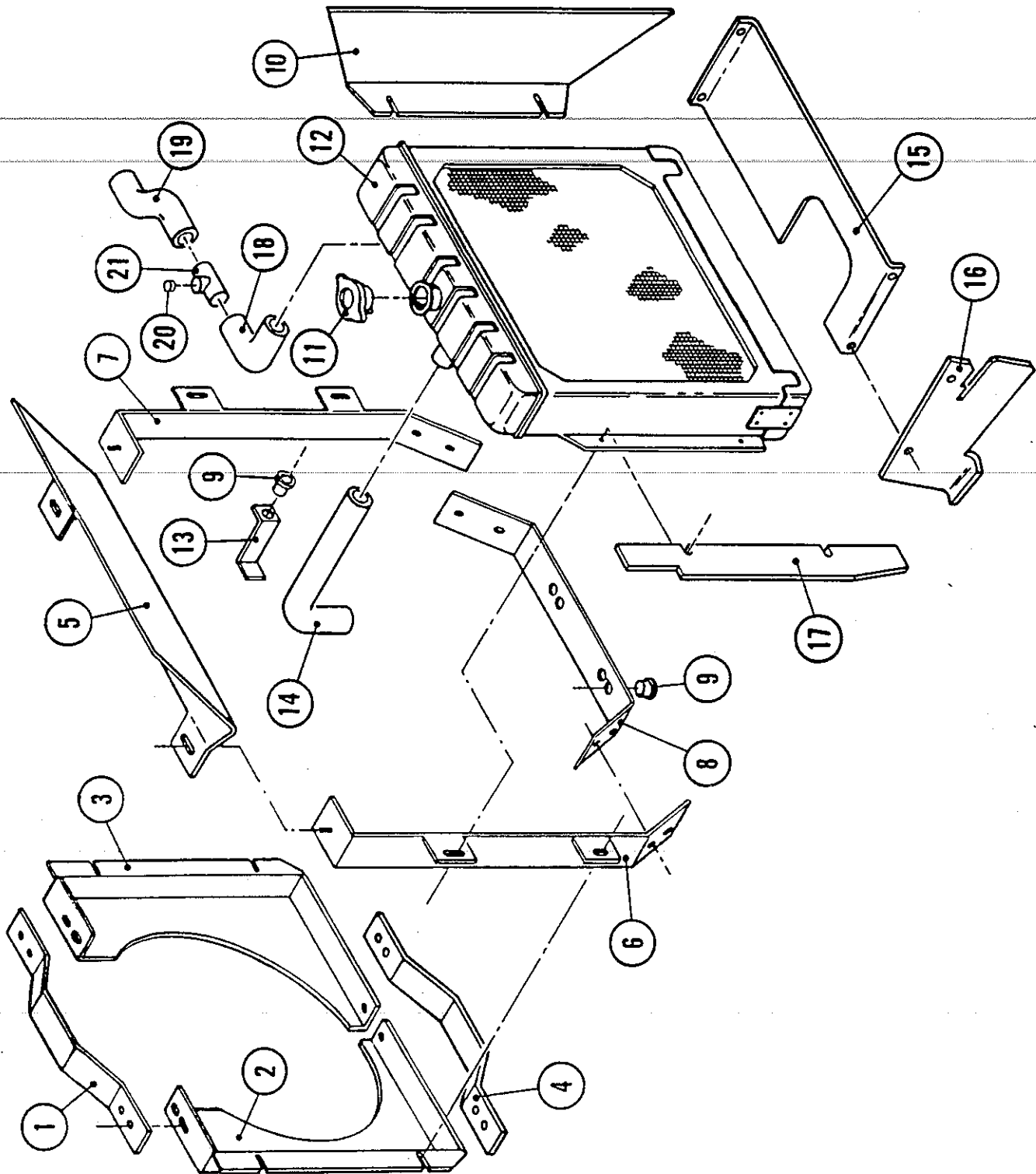


Figure 14. Radiator (Toyota), Shrouds & Mounts

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
14			RADIATOR (TOYOTA), SHROUDS & MOUNTS
-1	304926	305318	Strap Assembly, Radiator Shroud, Upper
-2	304924	305315	Shroud, Radiator, Front
-3	304923	305314	Shroud, Radiator, Rear
-4	304928	305319	Strap Assembly, Radiator Shroud, Lower
-5	304951		Baffle, Radiator, Upper
-6	302112		Mount Assembly, Radiator, Front
-7	302114		Mount Assembly, Radiator, Rear
-8	304853		Mount, Radiator
-9	300465		Mount, Isolation
-10	304989		Baffle, Radiator, Rear
-11	300420		Cap, Radiator
-12	302101		Radiator, 3 Core
-13	304932		Mount, Radiator, Side
-14	300533		Hose, Radiator, Upper
-15	305262		Baffle, Radiator, Lower
-16	305263		Baffle, Radiator, Corner (HD)
	305448		Baffle, Radiator, Corner
-17	305261		Baffle, Radiator, Front
-18	303115		Hose, 90° Elbow, Radiator, Lower
-19	304930		Hose, Radiator, Lower
-20	400256		Plug, 1/4" NPT
-21	302451		Tap Assembly, Coolant
-22	305289		Seal, Baffle, Upper (Not Illustrated)
-23	305290		Seal, Baffle, Upper (Not Illustrated)
-24	305291		Seal, Baffle, Air Cylinder (Not Illustrated)
-25	305292		Seal, Baffle, Front (Not Illustrated)
-26	305293		Seal, Baffle, Lower (Not Illustrated)
-27	305449		Bar, Baffle, Corner (Not Illustrated)

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

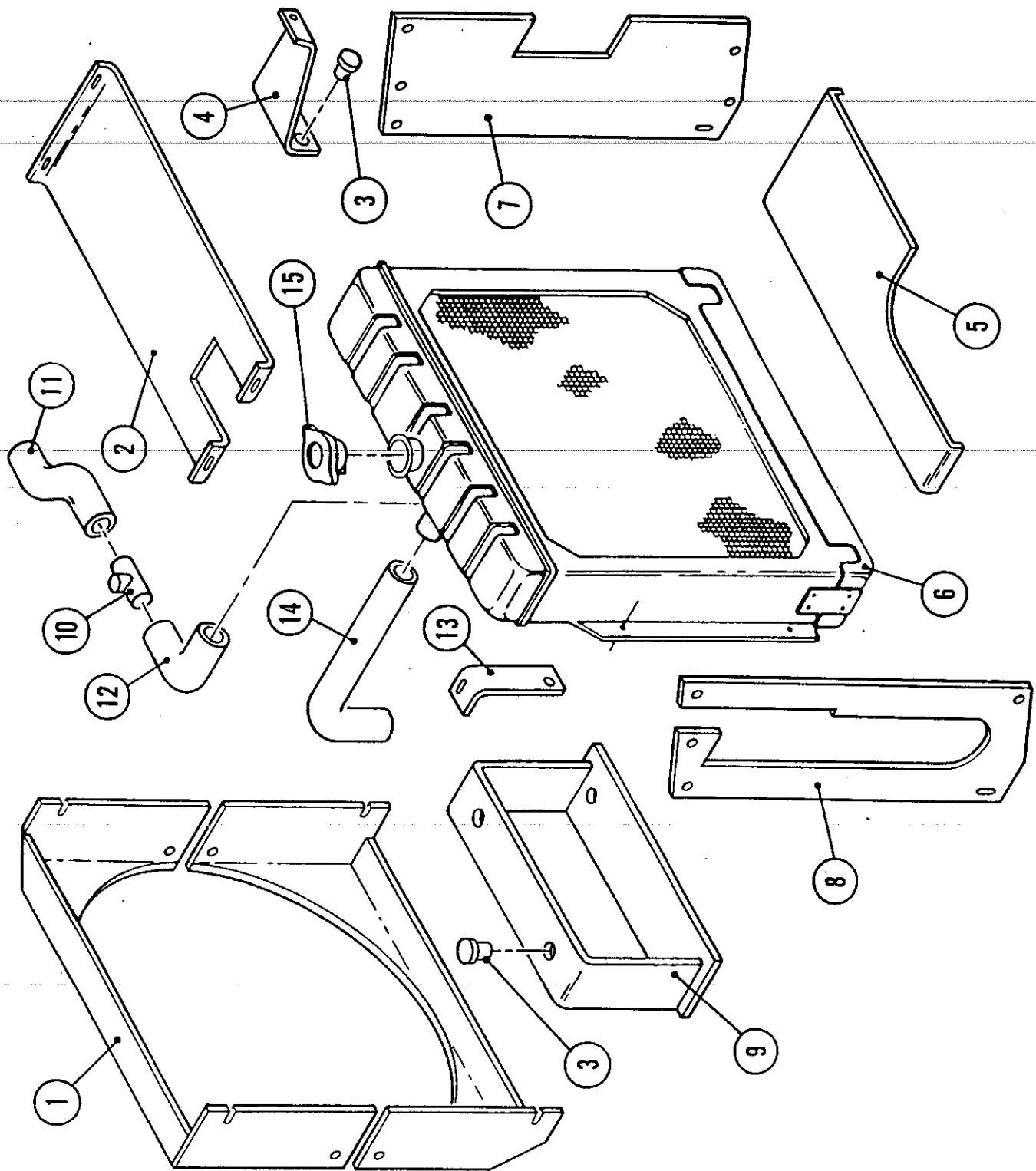


Figure 15. Radiator (Toyota), Shrouds & Mounts (Heavy Duty)

PowerBoss™

Same For Ford (Raid)
↓

PARTS

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
15			RADIATOR (TOYOTA), SHROUDS & MOUNTS (HEAVY DUTY)
-1	305324	305335	Shroud, Radiator, 4-Core
-2	305391		Baffle, Radiator, 4-Core, Top (LD)
	305392		Baffle, Radiator, 4-Core, Top (HD)
-3	300465		Mount, Isolation
-4	305325		Bracket, Radiator Mount
-5	305390		Baffle, Radiator, 4-Core, Bottom
-6	301995		Radiator, Heavy Duty
-7	305395		Baffle, Radiator, 4-Core, Rear
-8	305393		Baffle, Radiator, 4-Core, Front (LD)
	305394		Baffle, Radiator, 4-Core, Front (HD)
-9	305328		Mount Assembly, Radiator
-10	302457		Tap Assembly, Coolant
-11	304930		Hose, Radiator, Lower
-12	303115		Hose, 90° Elbow, Radiator, Lower
-13	305396		Bracket, Air Intake
-14	300533		Hose, Radiator, Upper
-15	300420		Cap, Radiator
-16	305469		Seal, Baffle, 4-Core, Bottom (Not Illustrated)
-17	305470		Seal, Baffle, 4-Core, Top/Bottom (Not Illustrated)
-18	305471		Seal, Baffle, 4-Core, Rear (Not Illustrated)

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

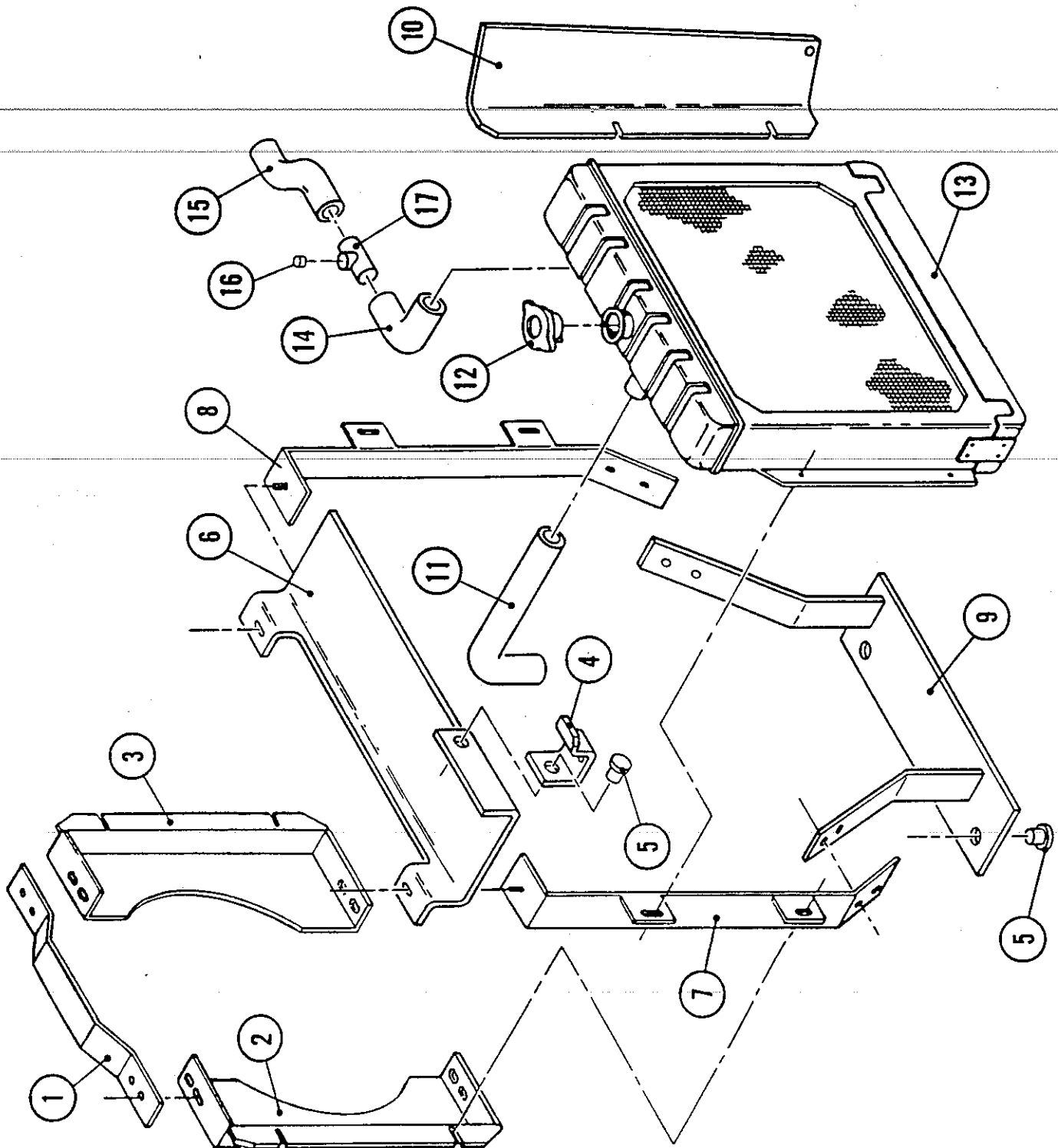


Figure 16. Radiator (Perkins), Shrouds & Mounts

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
16			RADIATOR (PERKINS), SHROUDS & MOUNTS
-1	302972		Strap, Radiator Shroud (HD)
	303185		Strap, Radiator Shroud (LD)
-2	302974		Shroud, Radiator Front (HD)
	303184		Shroud, Radiator Front (LD)
-3	302975		Shroud, Radiator Rear (HD)
	303183		Shroud, Radiator Rear (LD)
-4	302955		Mount, Radiator Baffle (HD)
-5	300465		Mount, Isolation
-6	302956		Deflector, Radiator Top (HD)
	302852		Deflector, Radiator Top (LD)
-7	302112		Mount Assembly, Radiator Front
-8	302114		Mount Assembly, Radiator Rear
-9	302945		Mount Assembly, Radiator (HD)
	302849		Mount Assembly, Radiator (LD)
-10	302779		Deflector, Radiator Side (HD)
	302853		Deflector, Radiator Side (LD)
-11	303113		Hose, Radiator Upper
-12	300420		Cap, Radiator
-13	302101		Radiator, 3 Core
-14	303116		Hose, 90° Elbow
-15	303112		Hose, Radiator Lower
-16	400361		Plug, 1/4" NPT (HD)
	400256		Plug, 1/4" NPT (LD)
-17	302457		Tap Assembly, Coolant

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

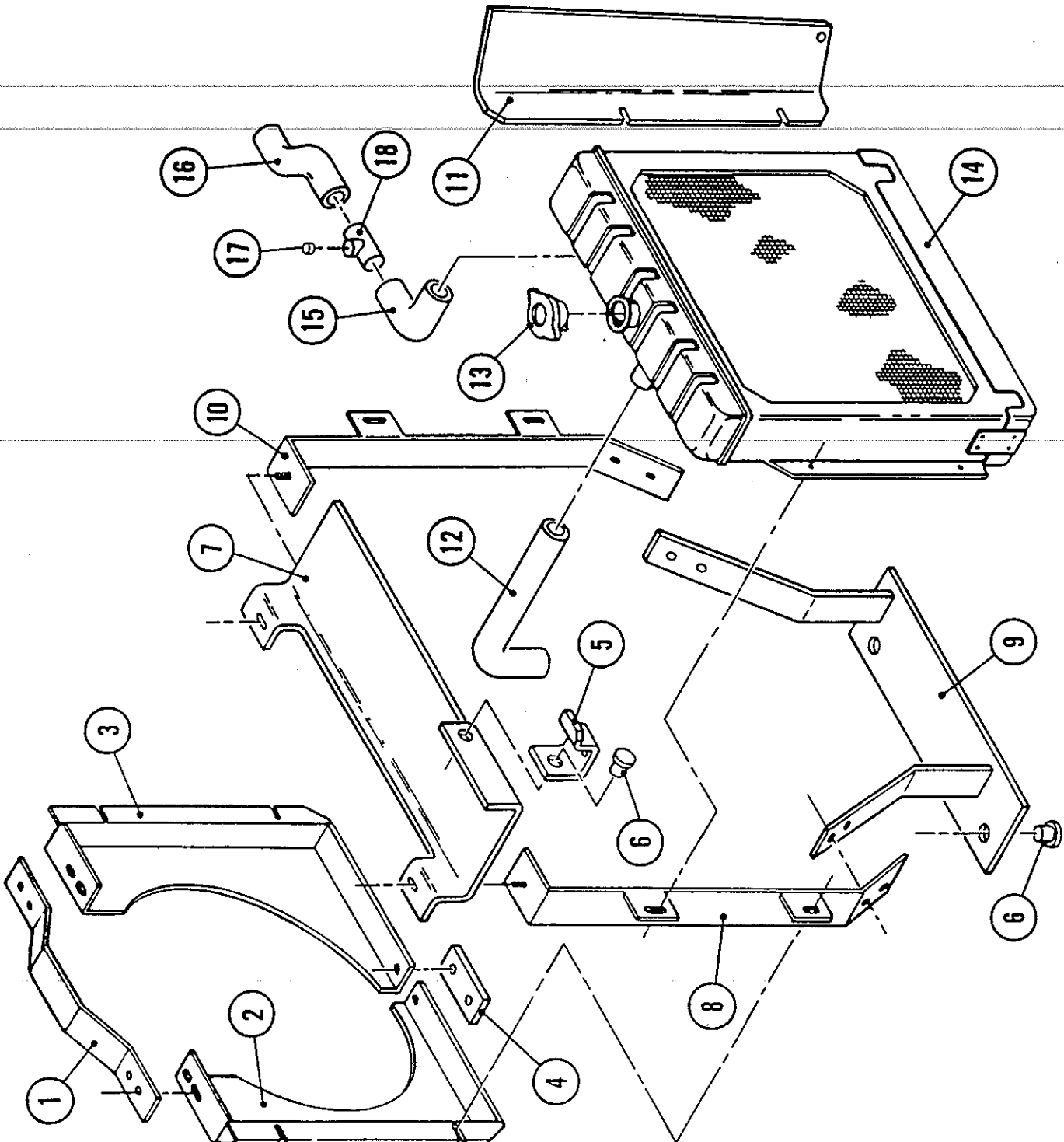


Figure 17. Radiator (Kubota), Shrouds & Mounts

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
17			RADIATOR (KUBOTA), SHROUDS & MOUNTS
-1	302957		Strap, Radiator Shroud (HD)
	302854		Strap, Radiator Shroud (LD)
-2	302942		Shroud, Radiator Front (HD)
	302856		Shroud, Radiator Front (LD)
-3	302943		Shroud, Radiator Rear (HD)
	302855		Shroud, Radiator Rear (LD)
-4	301264		Plate, Fan Shroud
-5	302955		Mount, Radiator Baffle
-6	300465		Mount, Isolation
-7	302956		Deflector, Radiator Top (HD)
	302852		Deflector, Radiator Top (LD)
-8	302112		Mount Assembly, Radiator Front
-9	302945		Mount Assembly, Radiator (HD)
	302849		Mount Assembly, Radiator (LD)
-10	302114		Mount Assembly, Radiator Rear
-11	302779		Deflector, Radiator Side (HD)
	302853		Deflector, Radiator Side (LD)
-12	302920		Hose, Radiator Upper
-13	300420		Cap, Radiator
-14	302101		Radiator, 3 Core
-15	303116		Hose, 90° Elbow, Lower
-16	300534		Hose, Radiator, Lower
-17	400361		Plug, 1/4" NPT
-18	302457		Tap Assembly, Coolant
-19	301085		Spacer, Front Bumper

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

To be supplied at a later date.

Figure 18. Radiator (Ford), Shrouds & Mounts

**FIGURE
& INDEX**

**PART NUMBER
90 SERIES 80 SERIES***

DESCRIPTION

To be supplied at a later date.

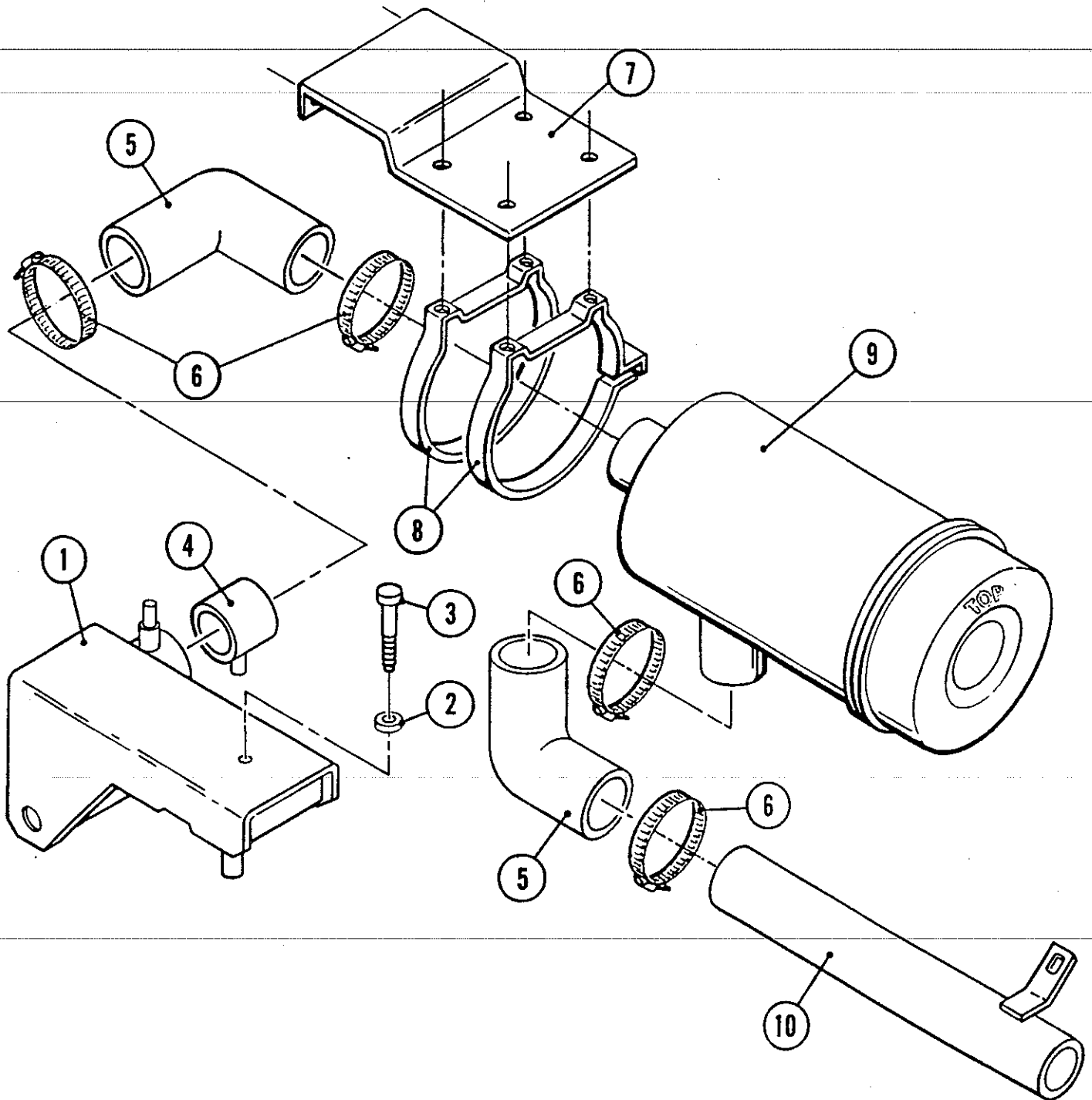




Figure 19. Air Cleaner - Toyota

FIGURE & INDEX	PART NUMBER	DESCRIPTION
19		AIR CLEANER-TOYOTA
-1	304947 †	Manifold Assembly, Intake
-2	302249 †	Spacer, Nylon .56 O.D. .25 I.D.
-3	400197 †	Screw, HHM 6MM - 1.00 P x 40 MM
-4	302787 ††	Tube Assembly, Engine Vent
-5	300396	Adaptor, 90° Elbow, Rubber
-6	300336	Clamp, Hose, 2 1/2" Nom
-7	304990	Mount, Air Cleaner
-8	300459	Band, Mounting, Air Cleaner
-9	300395	Air Cleaner, Donaldson
-10	305271	Intake Assembly, Air Cleaner

 Gas engines only.
 LPG engines only.

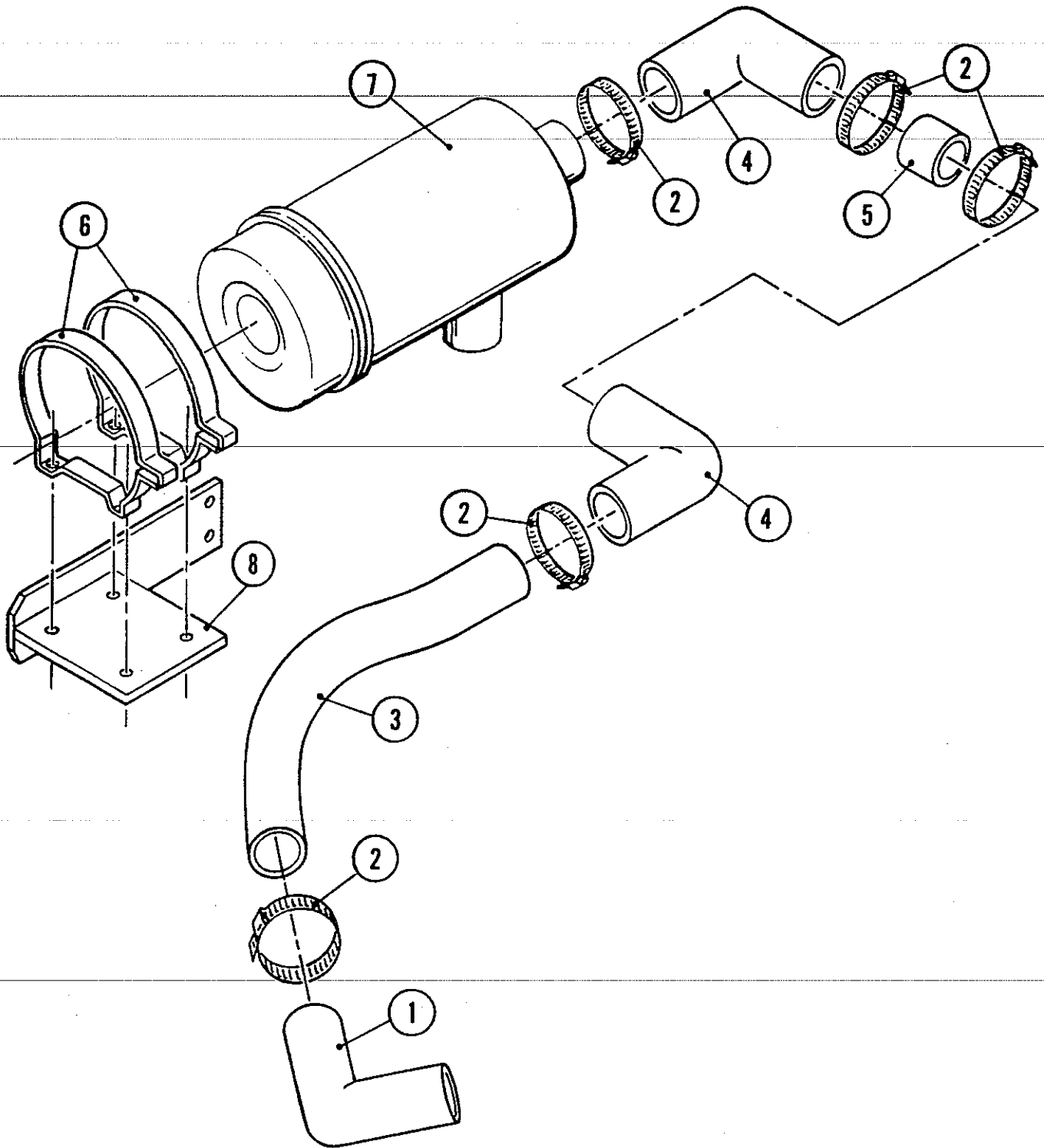


Figure 20. Air Cleaner - Perkins

FIGURE & INDEX	PART NUMBER	DESCRIPTION
20		AIR CLEANER - PERKINS
-1	302212	Adapter, 90° Elbow, Rubber (HD, Heavy Duty)
-2	300336	Clamp, Hose, 2 1/2"
-3	302998	Tube, Air Cleaner
-4	300396	Adapter, 90° Elbow, Rubber
-5	303223	Tube, Air Cleaner Intake, Short
-6	300459	Band, Mounting, Air Cleaner
-7	300395	Air Cleaner, Donaldson
	303031	Air Cleaner, Donaldson (Heavy Duty)
-8	302982	Mount Assembly, Air Cleaner (HD)
	303222	Mount, Air Cleaner (LD)

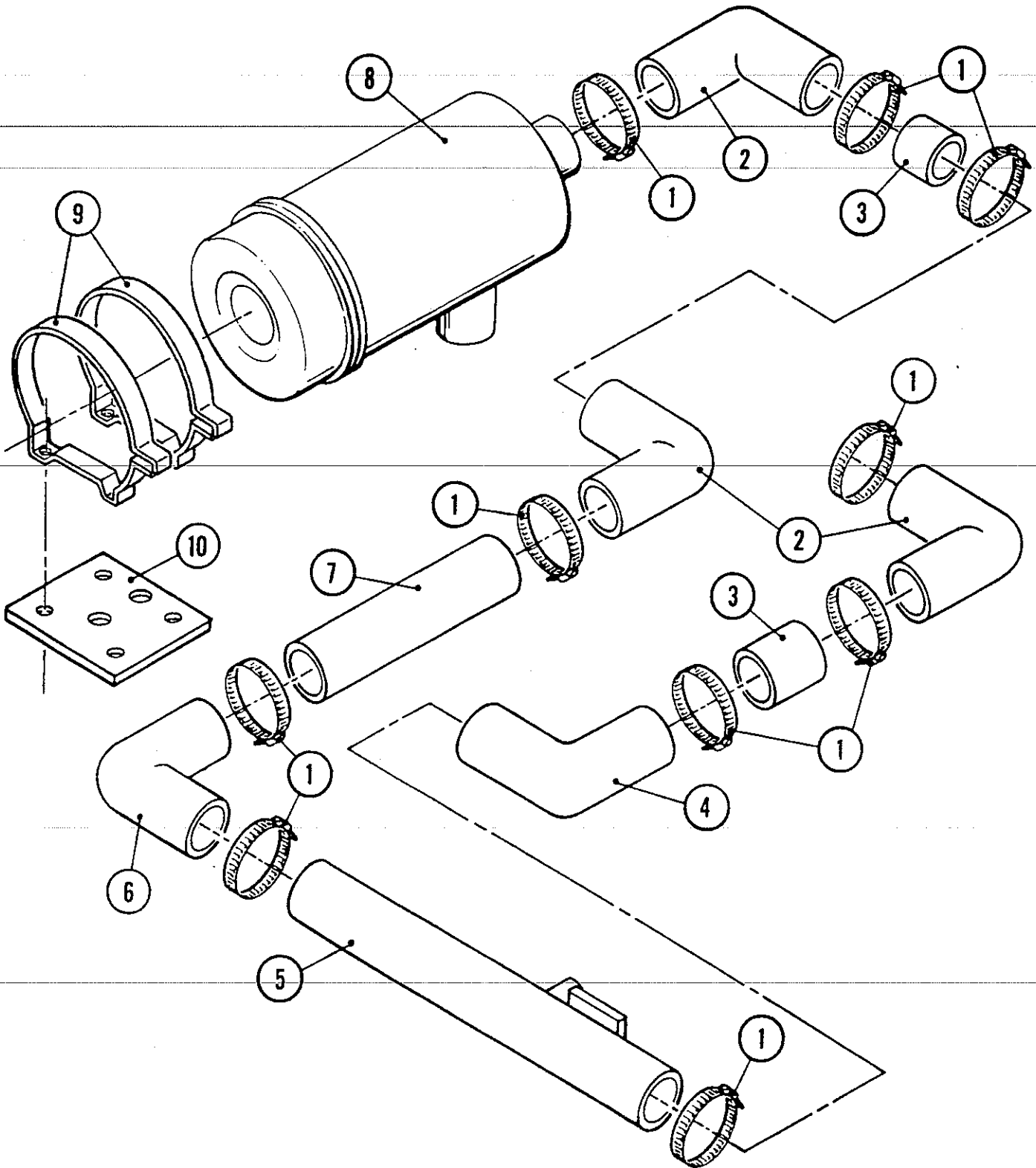


Figure 21. Air Cleaner - Kubota

FIGURE & INDEX	PART NUMBER	DESCRIPTION
21		AIR CLEANER - KUBOTA
-1	300336	Clamp, Hose, 2 1/2"
-2	303386	Adapter, 90° Elbow, Rubber
-3	303076	Tube, W.D. Manifold Intake
-4	303385	Adapter, 90° Elbow, Rubber
-5	303127	Tube Assembly, Air Cleaner
	305507	Tube Assembly, Air Cleaner
-6	300396	Adapter, 90° Elbow, Rubber
-7	302786	Tube, Air Cleaner Intake
-8	300395	Air Cleaner, Donaldson
	303031	Air Cleaner, Heavy Duty
-9	300459	Band, Mounting, Air Cleaner
-10	304256	Plate, Air Cleaner Mount (HD)
	305509	Mount, Air Cleaner, Kubota (LD)
-11	300526	Bumper, Rubber
-12	303638	Tube, Air Cleaner (HD)
	302787	Tube Assembly, Engine Vent

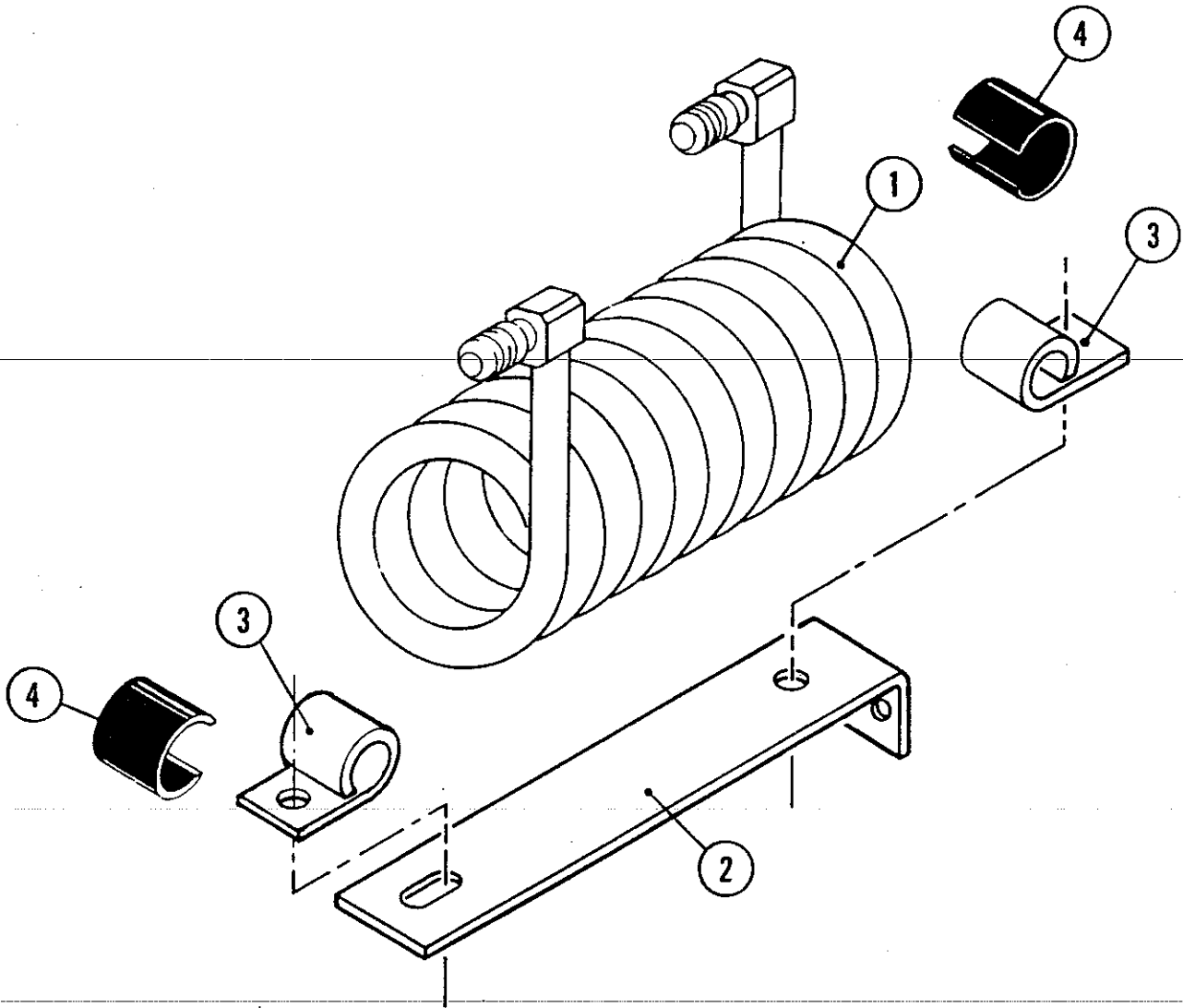


Figure 22. Cooling Coil

FIGURE & INDEX	PART NUMBER	DESCRIPTION
22		COOLING COIL
-1	300541	Coil, Cooling
-2	305771	Mount, Cooling Coil
-3	301158	Clamp, Cable, 3/4"
-4	301597	Retainer, Rubber

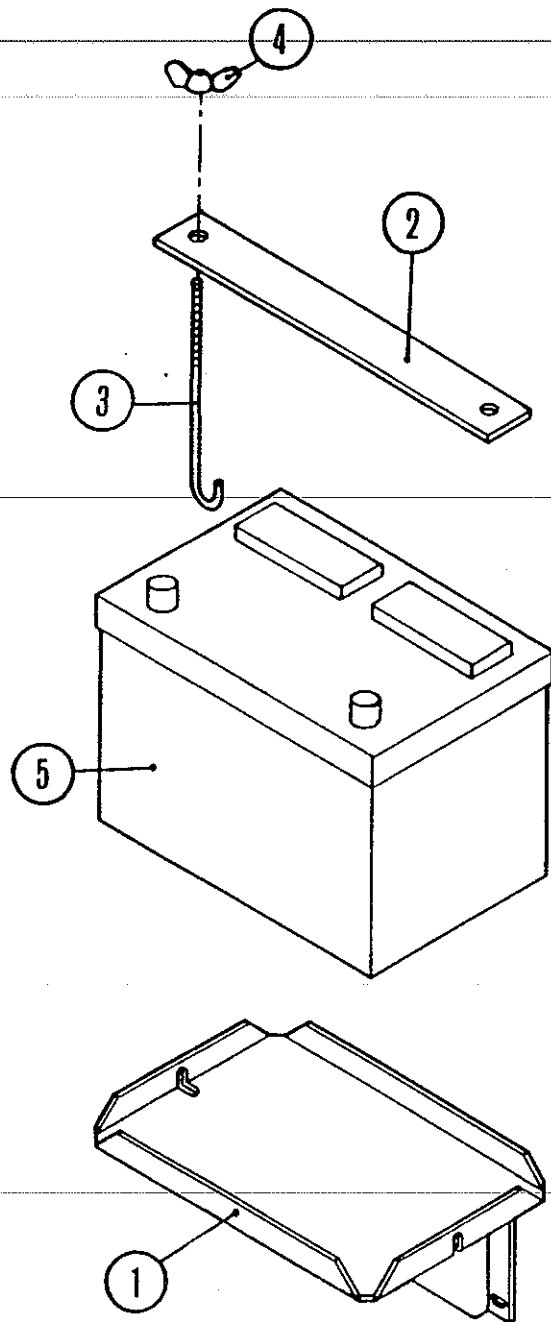


Figure 23. Battery

FIGURE & INDEX	PART NUMBER	DESCRIPTION
23		BATTERY
-1	300210	Mount Assembly, Battery
-2	301076	Hold Down, Battery
-3	301079	Rod, Battery Tie Down
-4	400085	Nut, Wing, 1/4 - 20
-5	300440	Battery, Gas Engine
	300448	Battery, Diesel Engine
-6	301384	Cable Assembly, Battery, Positive (Not Shown)
-7	301385	Cable Assembly, Battery, Negative (Not Shown)

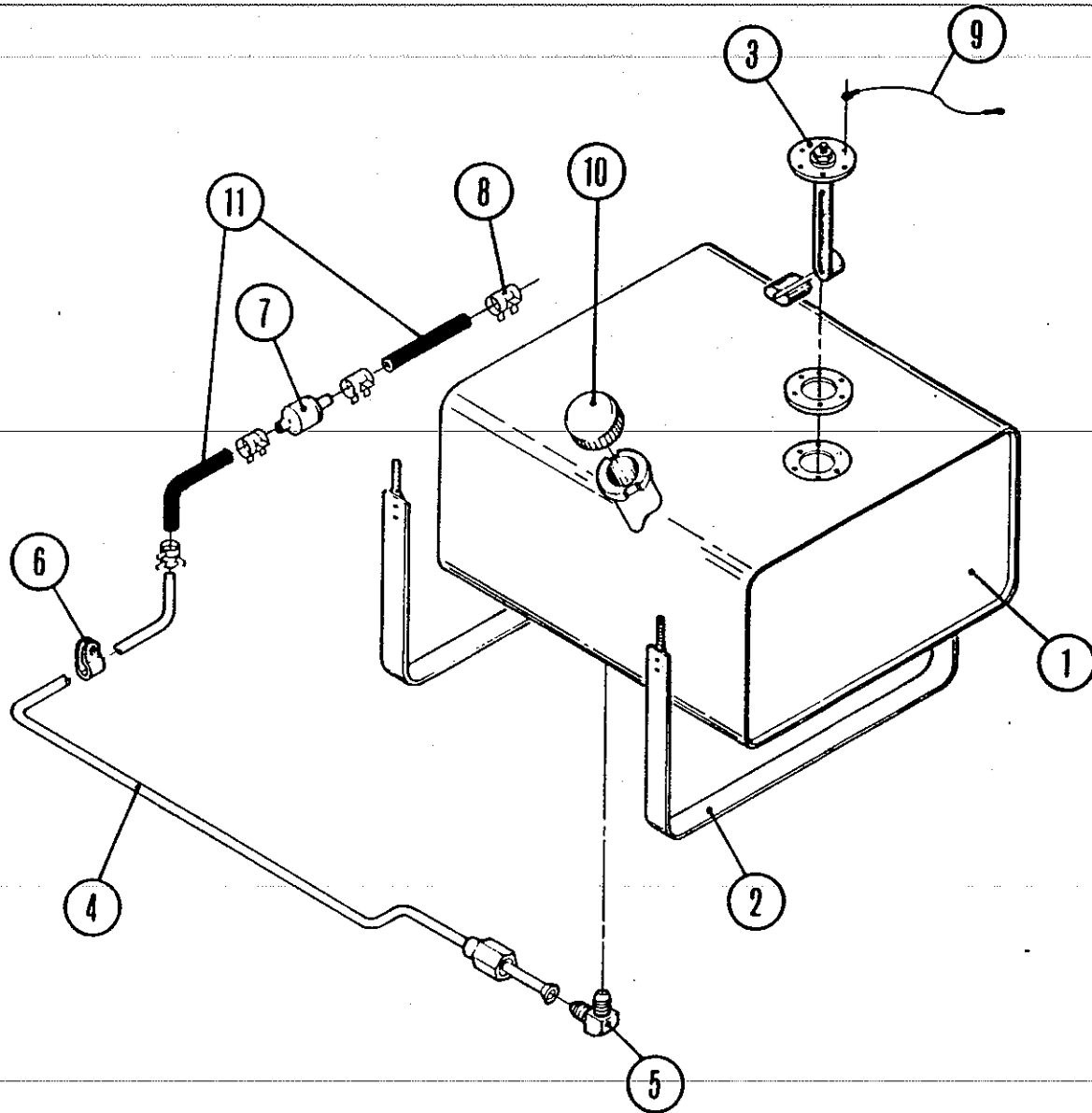


Figure 24. Fuel System

FIGURE & INDEX	PART NUMBER	DESCRIPTION
24		FUEL SYSTEM
-1	301023	Tank Assembly, Fuel
-2	300757	Strap Assembly, Fuel Tank
-3	300388	Sender Assembly, Fuel
-4	301561	Line Assembly, Fuel
-5	400183	Fitting, Gasoline
-6	301558	Clamp, Fuel Line
-7	300417	Filter, Fuel (Not on Diesel)
-8	302338	Clamp (Not on Diesel)
-9	301363	Wire, Ground
-10	300393	Cap, Gas Tank
-11	302085	Hose (SP) (Not on Diesel)

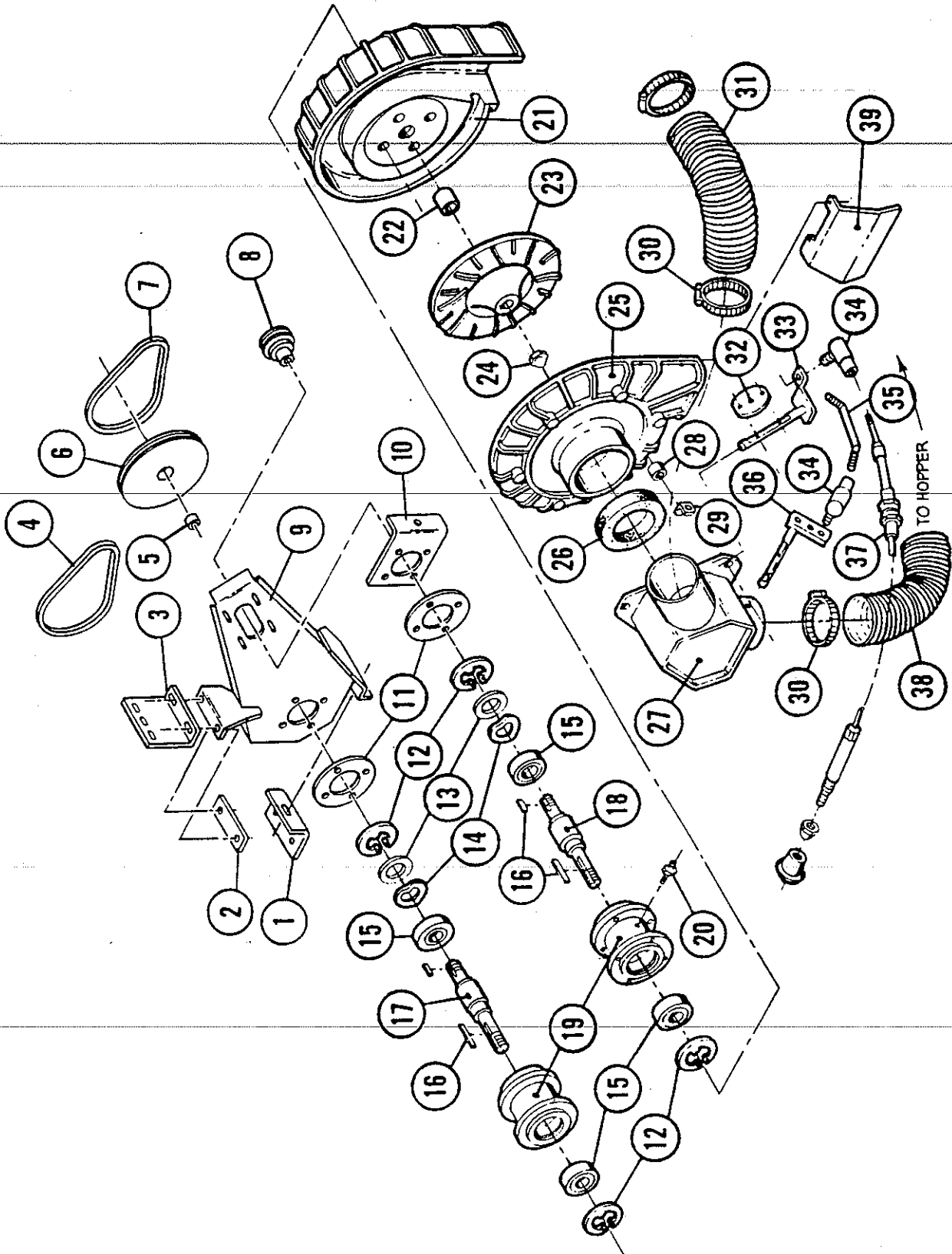


Figure 25. Impeller (Heavy Duty)

FIGURE & INDEX	PART NUMBER	DESCRIPTION
25		IMPELLER (HEAVY DUTY)
-1	305631	Bracket, Impeller Frame Mount
-2	304075	Bar, Impeller Adjustment
-3	305884	Bracket, Impeller Mount (Diesel)
	304125	Bracket, Impeller Mount
-4	304933	Belt
-5	305634	Spacer, Impeller
-6	305632	Pulley, Large
-7	305641	Belt, Impeller
-8	305603	Pulley, Small
-9	305602	Mount Assembly, Base Impeller
-10	305609	Plate, Mount Adj.
-11	305607	Spacer, Impeller Mount
-12	300474	Ring, Retainer
-13	301330	Spacer, Flat
-14	300476	Washer, Wave
-15	300468	Bearing
-16	300344	Key, 1/8 Square x .75
-17	301354	Shaft, Impeller
-18	300185	Shaft, Impeller
-19	300186	Housing, Bearing Impeller
-20	400012	Fitting, Grease, 3/16
-21	301027	Shroud Assembly, Inner
-22	300902	Spacer
-23	300133	Impeller
-24	400062	Nut, 1/2-20, Acorn
-25	300139	Shroud, Outer
-26	301383	Gasket, Impeller Manifold
-27	301223	Manifold Assembly, Impeller
-28	301793	Spacer, Bracket
-29	301622	Retainer, Impeller Cable
-30	300351	Clamp, Hose, 4" Dia.
-31	300349	Hose (Impeller to Tank)
-32	301498	Damper, Hopper Shutoff
-33	301434	Arm Assembly, Impeller Shutoff
-34	301459	Joint, Ball, #10-32
-35	301626	Rod, Impeller Shutoff
-36	301455	Arm Assembly, Impeller Shutoff, Bottom
-37	301427	Cable, Impeller Manifold Control

Figure repeated
for clarity.

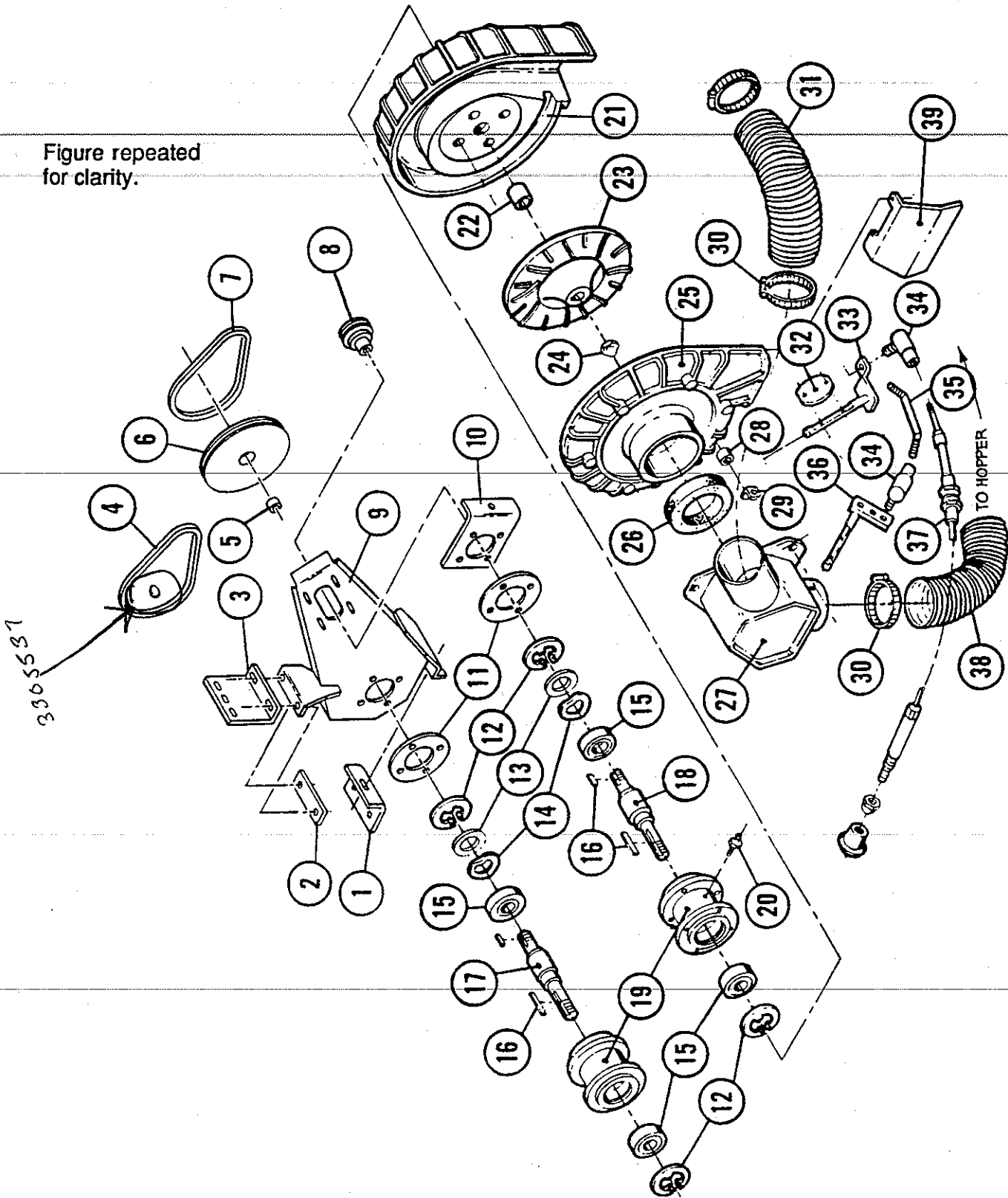


Figure 25. Impeller (Heavy Duty)

FIGURE & INDEX	PART NUMBER	DESCRIPTION
25		IMPELLER (HEAVY DUTY)
-38	304511	Hose (Impeller to Hopper)
-39	300908	Deflector, Impeller
-40	301388	Cover, Impeller Bearing (Not Shown)

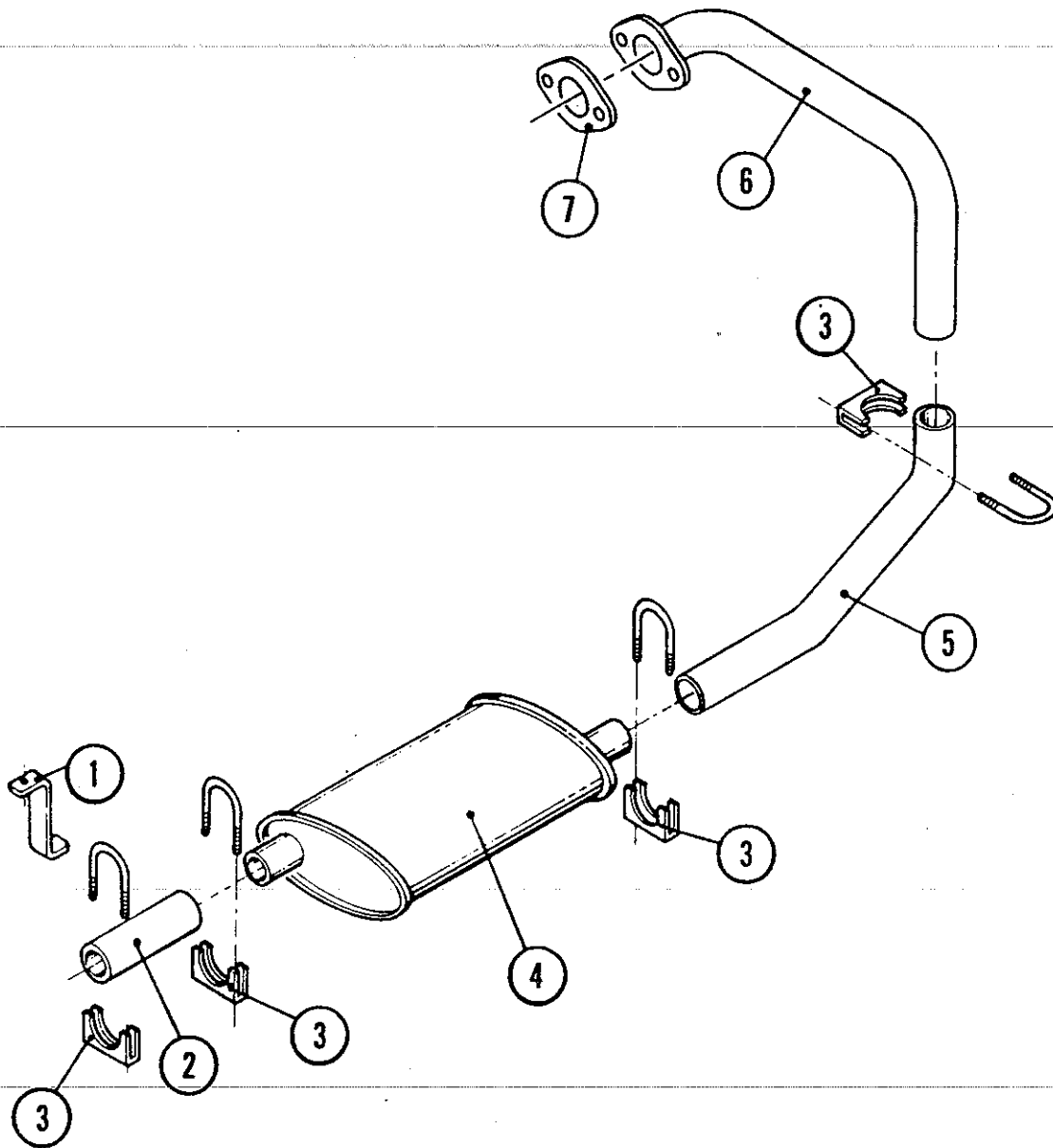


Figure 26. Exhaust - Toyota

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
26			EXHAUST - TOYOTA
-1	300944		Support, Muffler
-2	301460		Tube, Exhaust Tail Pipe
	304762		Tube, Exhaust Tail Pipe (HC)
-3	301640		Clamp, Exhaust, 1 3/4"
-4	300539		Muffler
-5	305502		Tube, Intermediate Exhaust
-6	304770	305332	Tube Assembly, Exhaust Manifold
-7	304918		Gasket, Manifold Tube
-8	302631		Converter, Catalytic (Optional) (Not Shown)

* When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

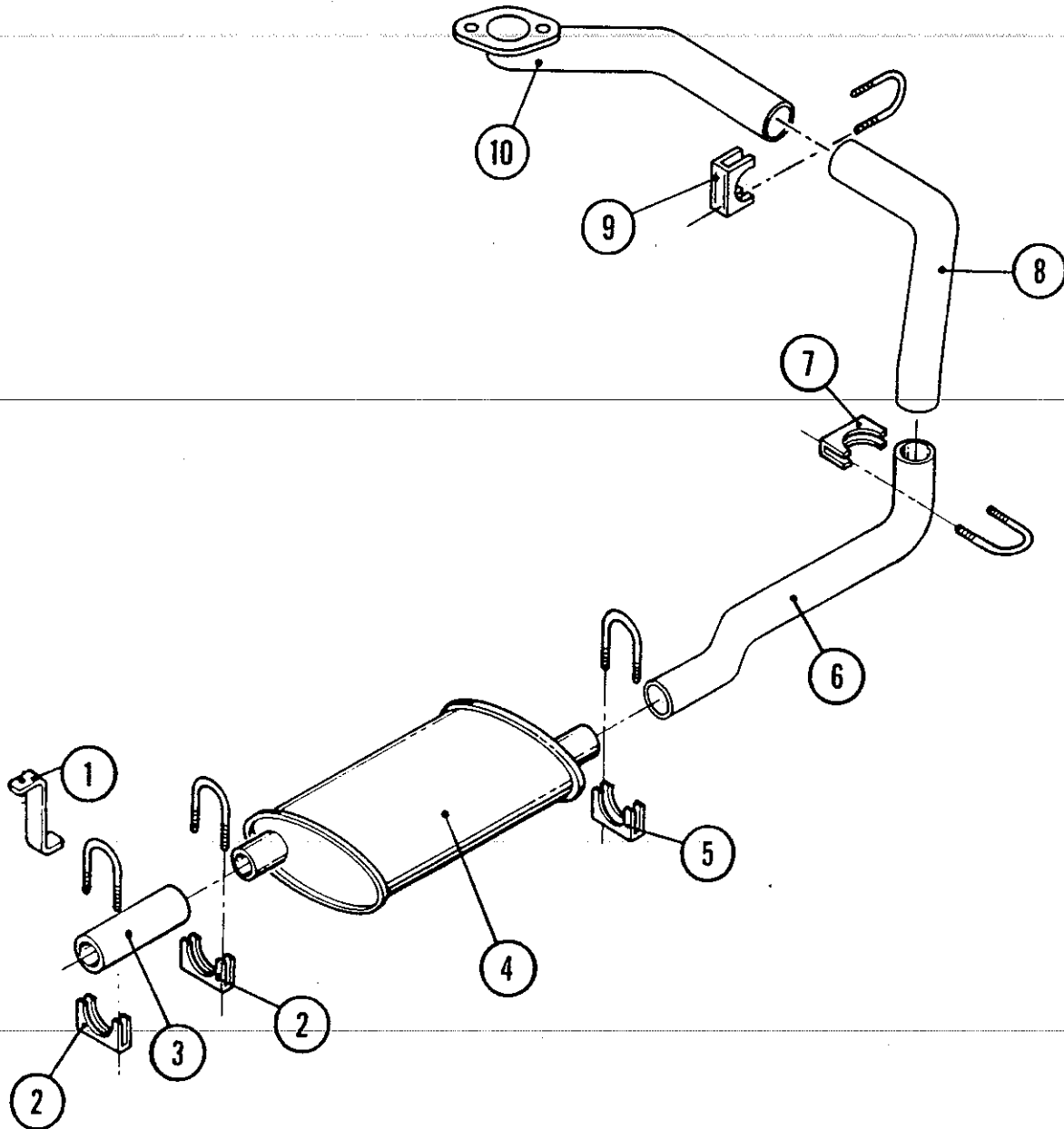


Figure 27. Exhaust - Perkins (Full Size)

FIGURE & INDEX	PART NUMBER	DESCRIPTION
27		EXHAUST - PERKINS (FULL SIZE)
-1	300944	Support, Muffler
-2	301640	Clamp, Exhaust, 1 3/4"
-3	301460	Tube, Exhaust Tail
	304762	Tube, Exhaust Tail, (HC)
-4	300539	Muffler
-5	300540	Clamp, Exhaust, 1 7/8"
-6	301639	Tube, Intermediate Exhaust
-7	303118	Clamp, Exhaust, 1 5/8"
-8	302940	Tube, Intermediate Exhaust
-9	301641	Clamp, Exhaust, 1 1/2"
-10	302937	Tube Assembly, Exhaust Manifold
-11	303187	Converter, Catalytic (Optional) (Not Shown)

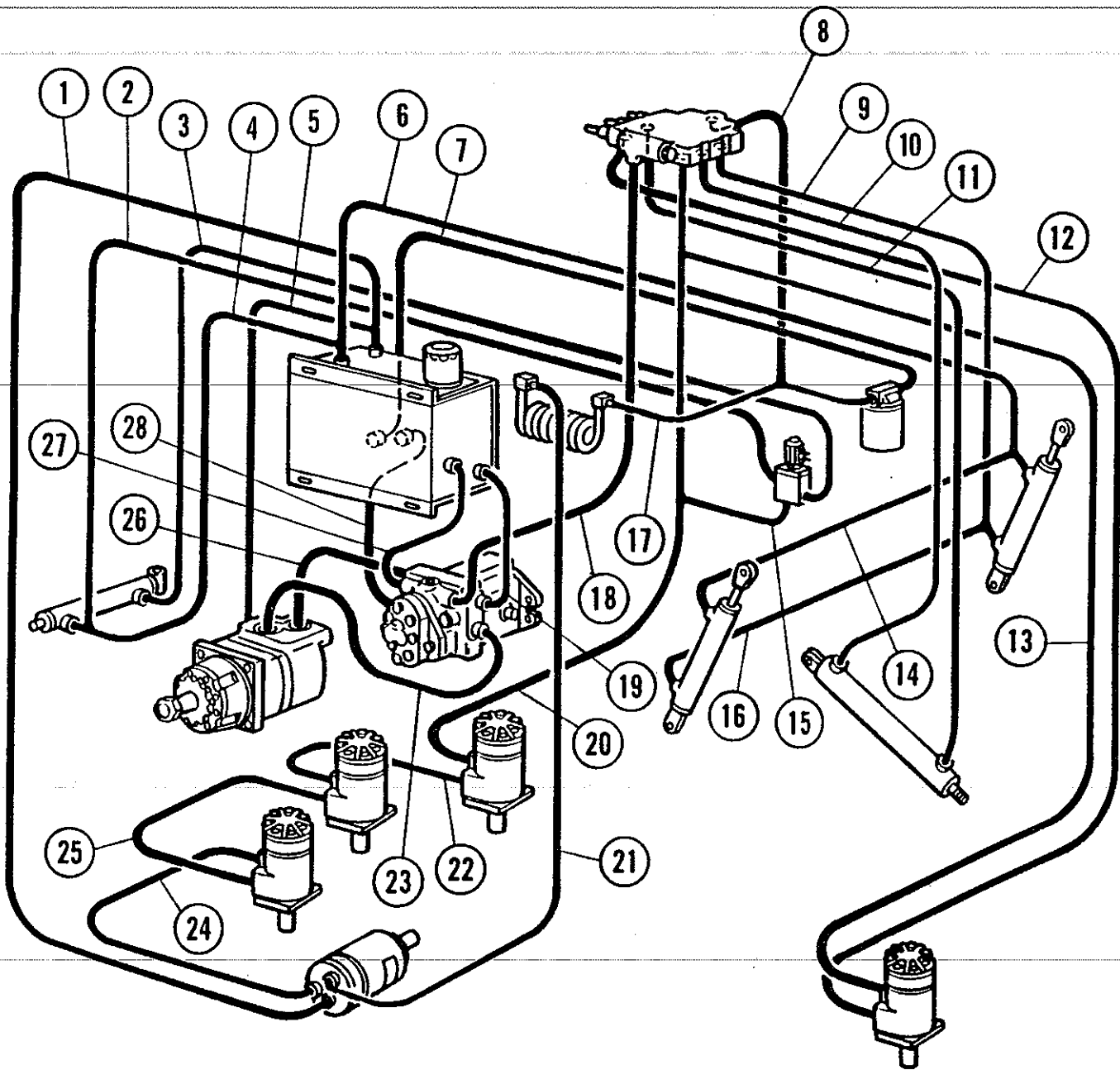


Figure 29. Hydraulic Hoses - High Dump Models

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	

"When ordering hydraulic hoses, give Brooks & Perkins the figure and index number of the part needed. Also supply your machine model number, serial number, engine manufacturer and any other information which may be helpful to supply the correct part."

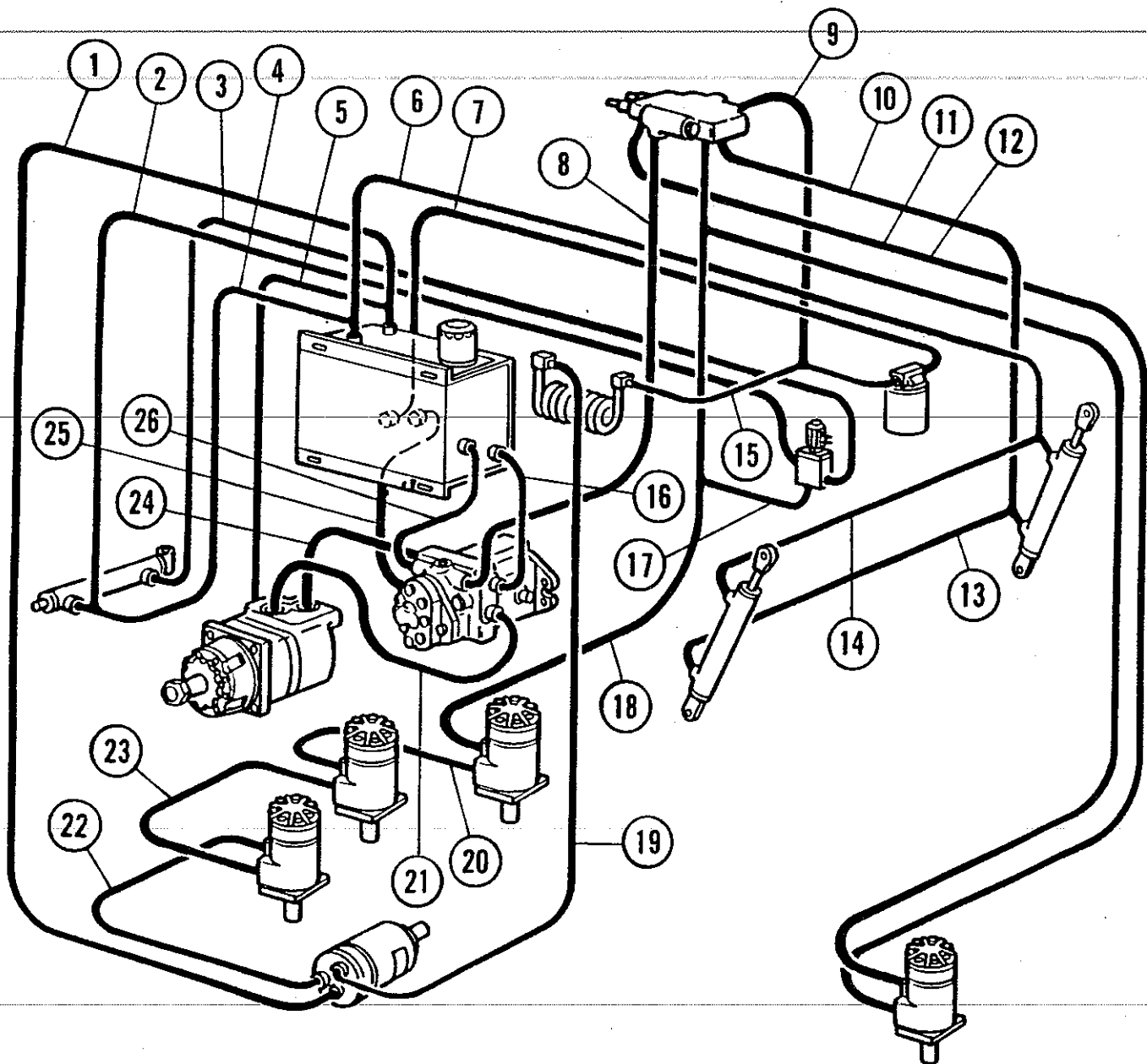


Figure 30. Hydraulic Hoses - Low Dump Models

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	

"When ordering hydraulic hoses, give Brooks & Perkins the figure and index number of the part needed. Also supply your machine model number, serial number, engine manufacturer and any other information which may be helpful to supply the correct part."

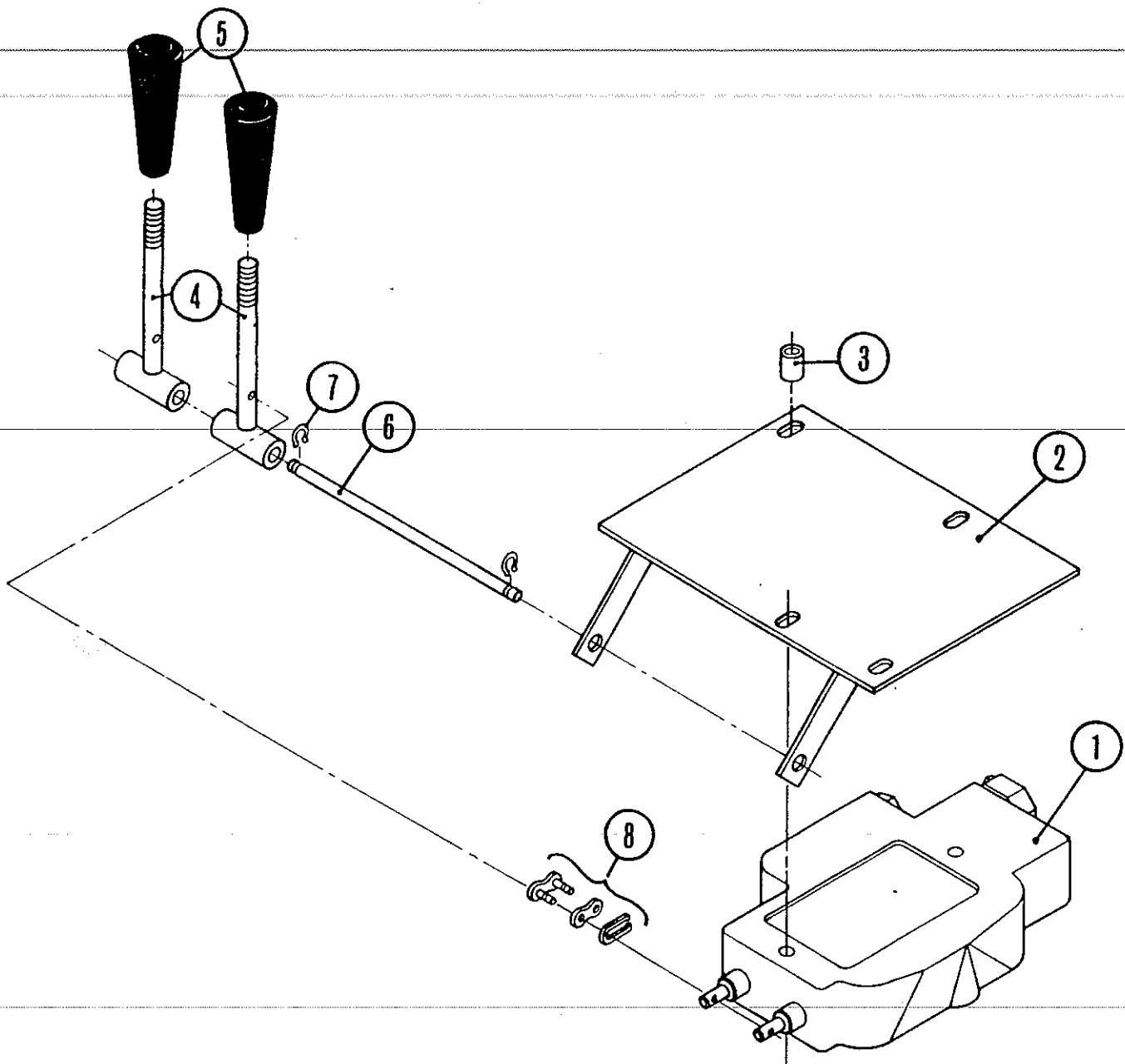


Figure 31. Hydraulic Valve

FIGURE & INDEX	PART NUMBER	DESCRIPTION
31		HYDRAULIC VALVE
-1	300357	Valve Assembly, Hydraulic
	300356	All TSS High Dump 3-Spool
	300355	All ISS Units 2-Spool
		All CSS Units 1-Spool
-2	300743	Mount Assembly, Valve
-3	300883	Spacer, Control Valve
-4	300070	Lever Assembly
-5	300558	Knob
-6	300884	Rod, Pivot Control Valve
-7	300548	Ring, Retaining
-8	300547	Link Assembly, Connecting

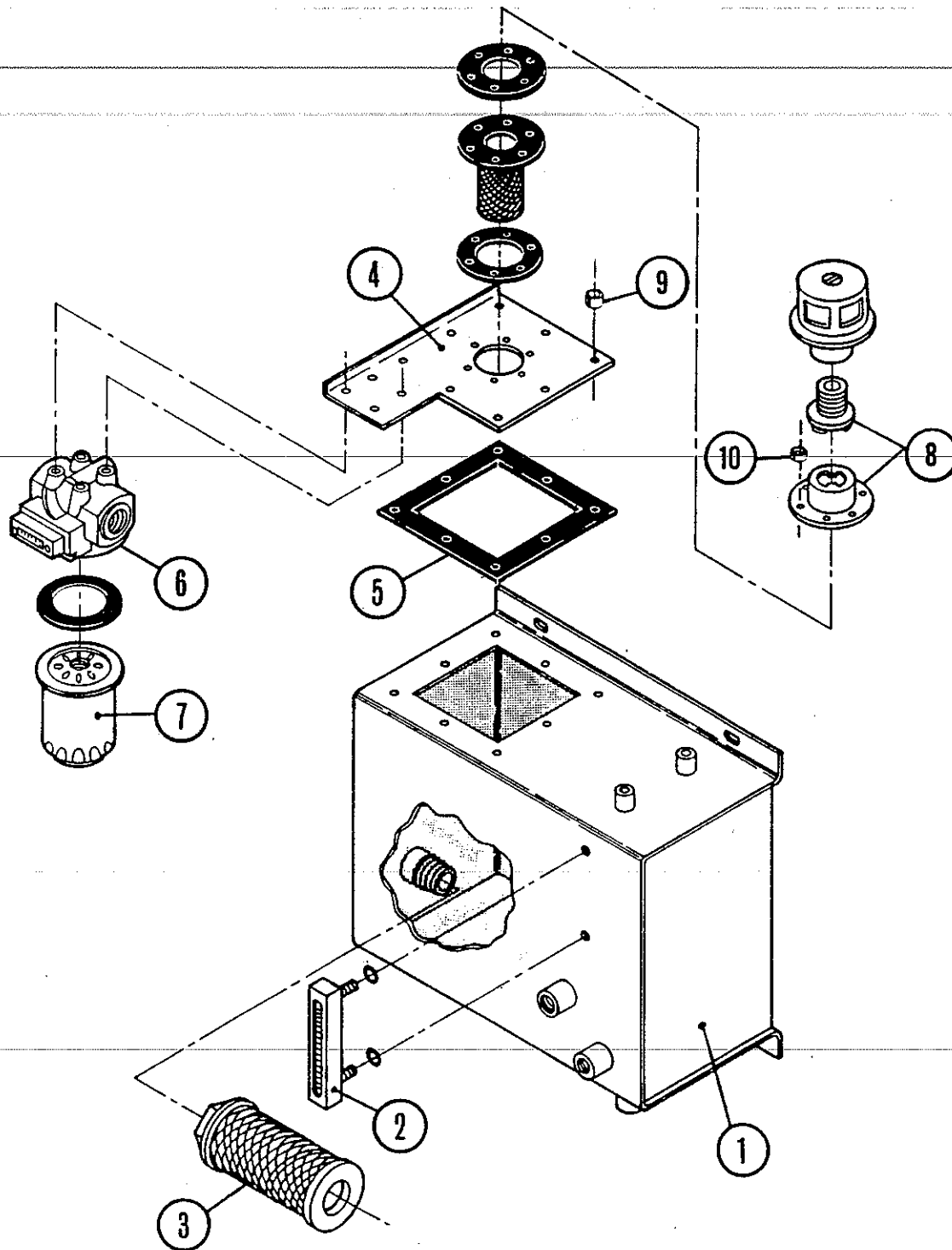


Figure 32. Hydraulic Reservoir

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
32			HYDRAULIC RESERVOIR
-1	300001		Reservoir Assembly, Hydraulic
	304831 †		Reservoir Assembly, Hydraulic
-2	300366		Gauge, Level Hydraulic Reservoir
-3	300360		Strainer, Hydraulic Reservoir
-4	300020††	302372	Cover, Reservoir
-5	300007		Gasket, Hydraulic Reservoir
-6	300358		Filter Assembly, Hydraulic
-7	300359		Filter, Hydraulic
-8	305576		Filter/Breather Assembly
-9	302249		Spacer, Nylon
-10	302248		Spacer, Nylon

† Large fitting at front of reservoir.

†† Cover with filter mount.

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

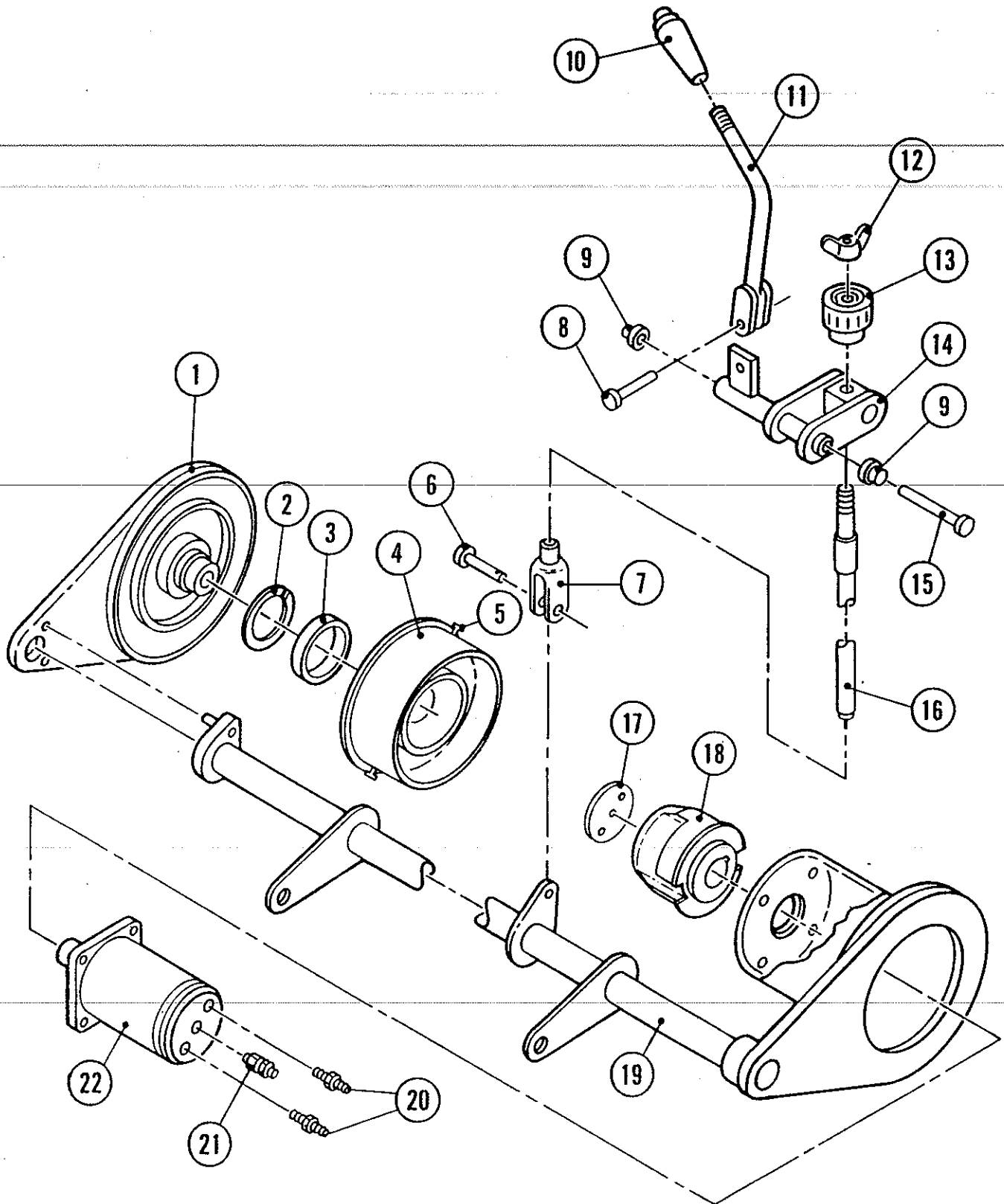
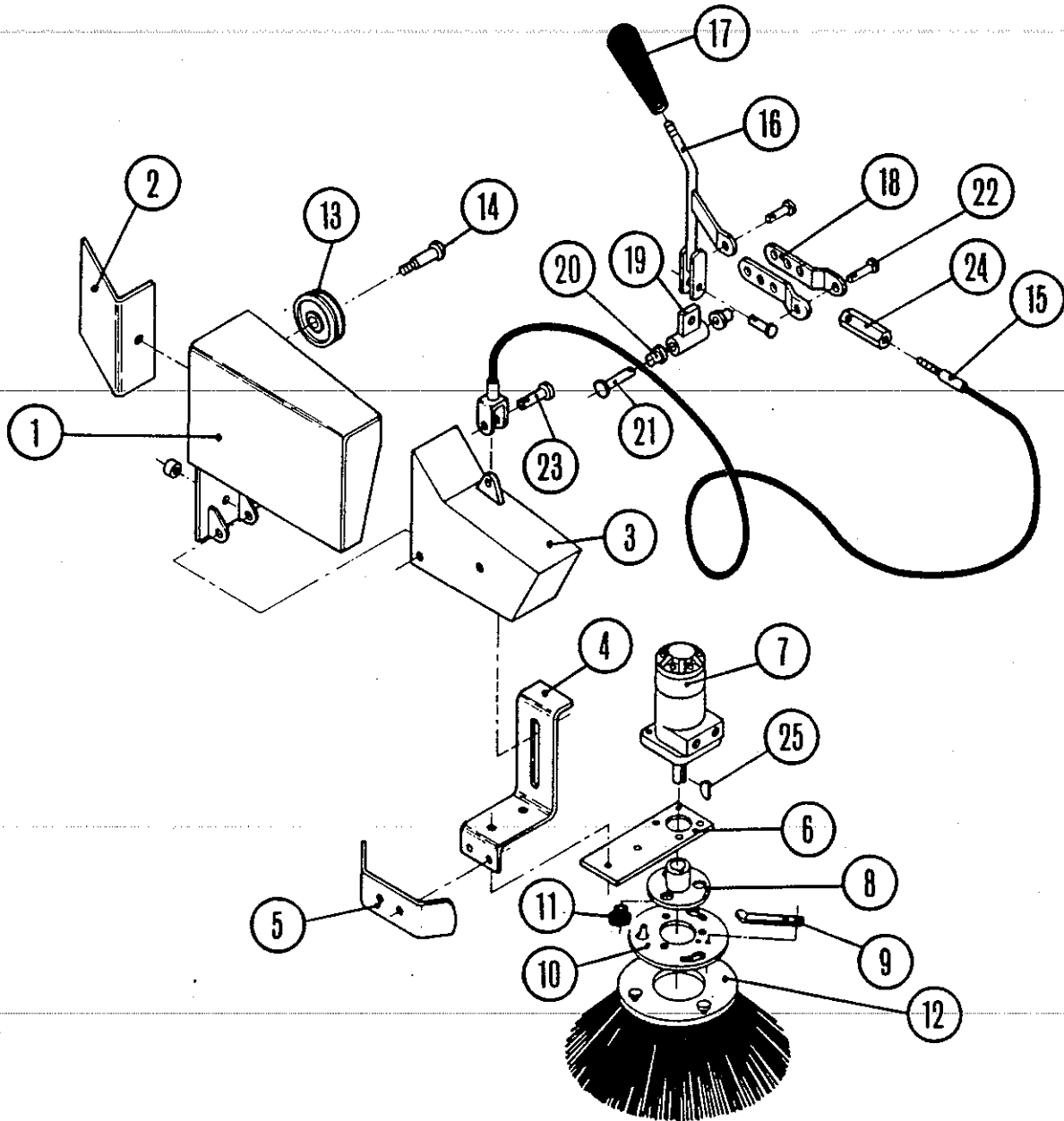


Figure 33. Main Broom

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
33			MAIN BROOM
-1	305795		Arm Assembly, Idler
-2	305666		Ring, Retaining
-3	305667		Bearing, Idler
-4	305642		Hub, Idler
-5	400047		Screw, SHC, 5/16"-18 x .75"
-6	400116		Pin, Clevis, 3/8" x 1.25"
-7	301447		Clevis
-8	400117		Pin, Clevis, 3/8" x 1.12"
-9	300414		Bushing, Plastic
-10	300558		Knob
-11	300675		Lever Assembly, Lift
-12	400084		Nut, Wing
-13	300352		Knob, Lift Adjustment
-14	300088		Arm Assembly, Lift
-15	400113		Pin, Clevis, 3/8" x 6.12"
-16	302375	300858	Rod, Lift
	302792		Rod, Lift (All Diesels)
-17	301285		Retainer, Drive Hub
-18	301050		Hub, Drive
-19	305841	305784	Mount Assembly, Main Broom
-20	304899		Fitting, Adapter, 3/4"-16 to #8
-21	400212		Fitting, Adapter, 7/16-20 to #4
-22	305669		Motor, Hydraulic, Main Broom

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.



3324169
(Seal Kit)

Figure 34. Side Broom

FIGURE & INDEX	PART NUMBER	DESCRIPTION
34		SIDE BROOM
-1	301676	Bracket Assembly, Mounting Curb Broom (High Dump)
	300985	Bracket Assembly, Mounting Curb Broom (Low Dump)
-2	300959	Guard, Frame
-3	300929	Arm Assembly, Curb Broom
-4	300054	Bracket, Curb Broom
-5	304953	Guard Assembly, Curb Broom
-6	300956	Plate, Mounting, Curb Broom
-7	301560	Motor, Hydraulic Curb Broom
-8	300875	Hub Assembly
-9	302058	Bar, Brush Retainer
-10	301262	Plate, Gimbal
-11	300465	Isolator, Rubber
-12	300307	Broom, Side (Poly)
	300309	Broom, Side (Nylon)
-13	300368	Pulley, Plastic
-14	400051	Screw, Hex Head, 5/16 x .50
-15	300342	Cable, Curb Broom
-16	300682	Lever Assembly, Lift, Curb Broom
-17	300558	Knob, Curb Broom
-18	300203	Bar, Cable
-19	300036	Pivot Assembly, Lift Lever
-20	300414	Bushing, Plastic Main Broom
-21	400115	Pin, Clevis, 3/8 x 3.00
-22	400135	Pin, Clevis, 5/16 x 1.25
-23	400118	Pin, Clevis, 5/16 x .88
-24	300202	Bar, Cable Adjustment
-25	302082	Key, Hydraulic Motor (Curb Broom)

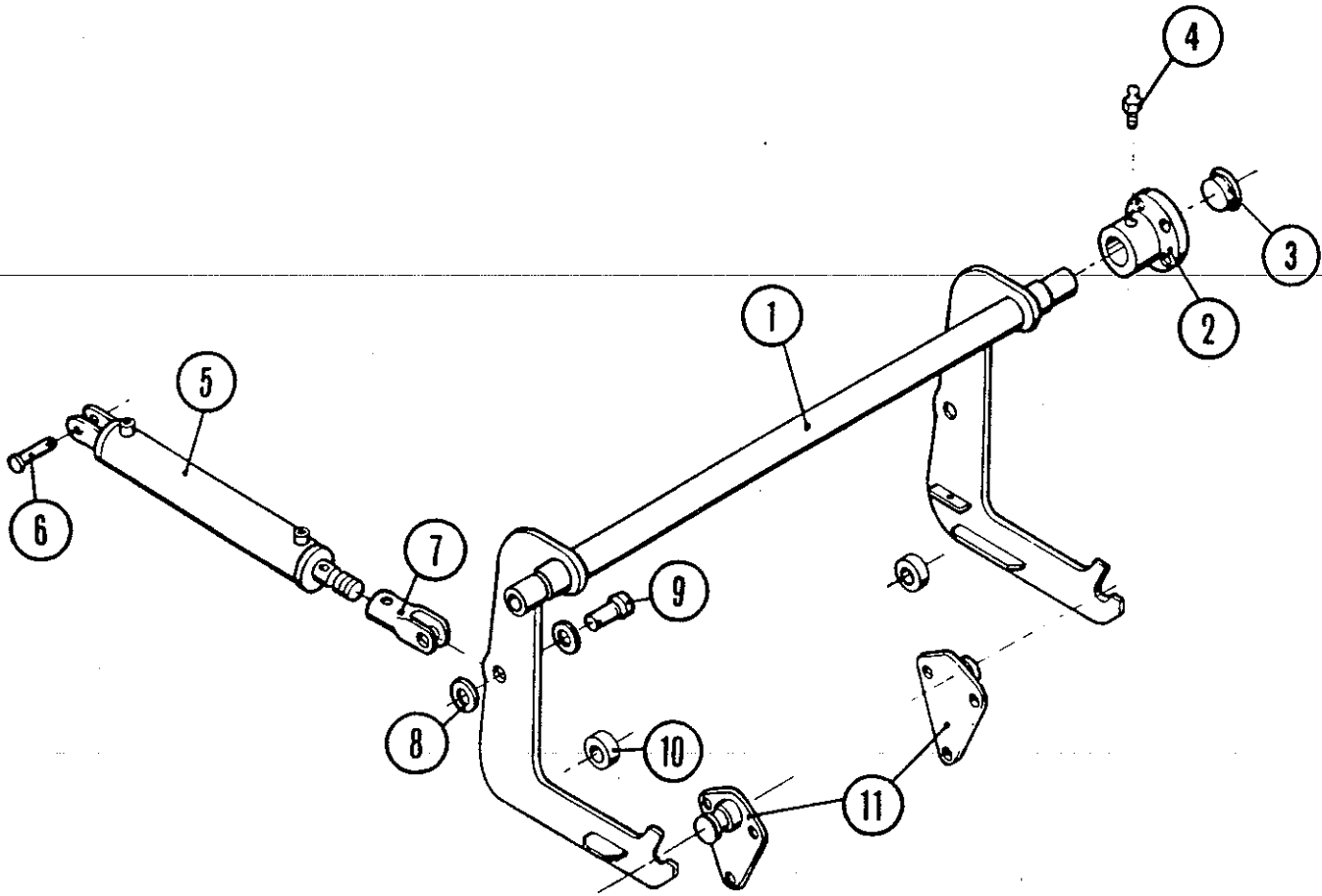


Figure 35. Low Dump Arm Assembly

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
35			LOW DUMP ARM ASSEMBLY
-1	300294	300104	Arm Assembly, Lift (Low Dump)
-2	301075		Mount, Dump Arm
-3	301420		Spacer, Dump Arm Mount
-4	400012		Fitting, Grease, 3/16"
-5	300068		Cylinder, Hydraulic (Low Dump)
-6	400110		Pin, Clevis, 7/8 x 2.00
-7	301370		Cylinder, Clevis (Low Dump)
-8	301416		Spacer, Lift Cylinder, Clevis
-9	400107		Pin, Clevis, 1.00 x 2.62
-10	300028		Bar, Stop Hopper
-11	300096		Lift Bracket Assembly, Hopper

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

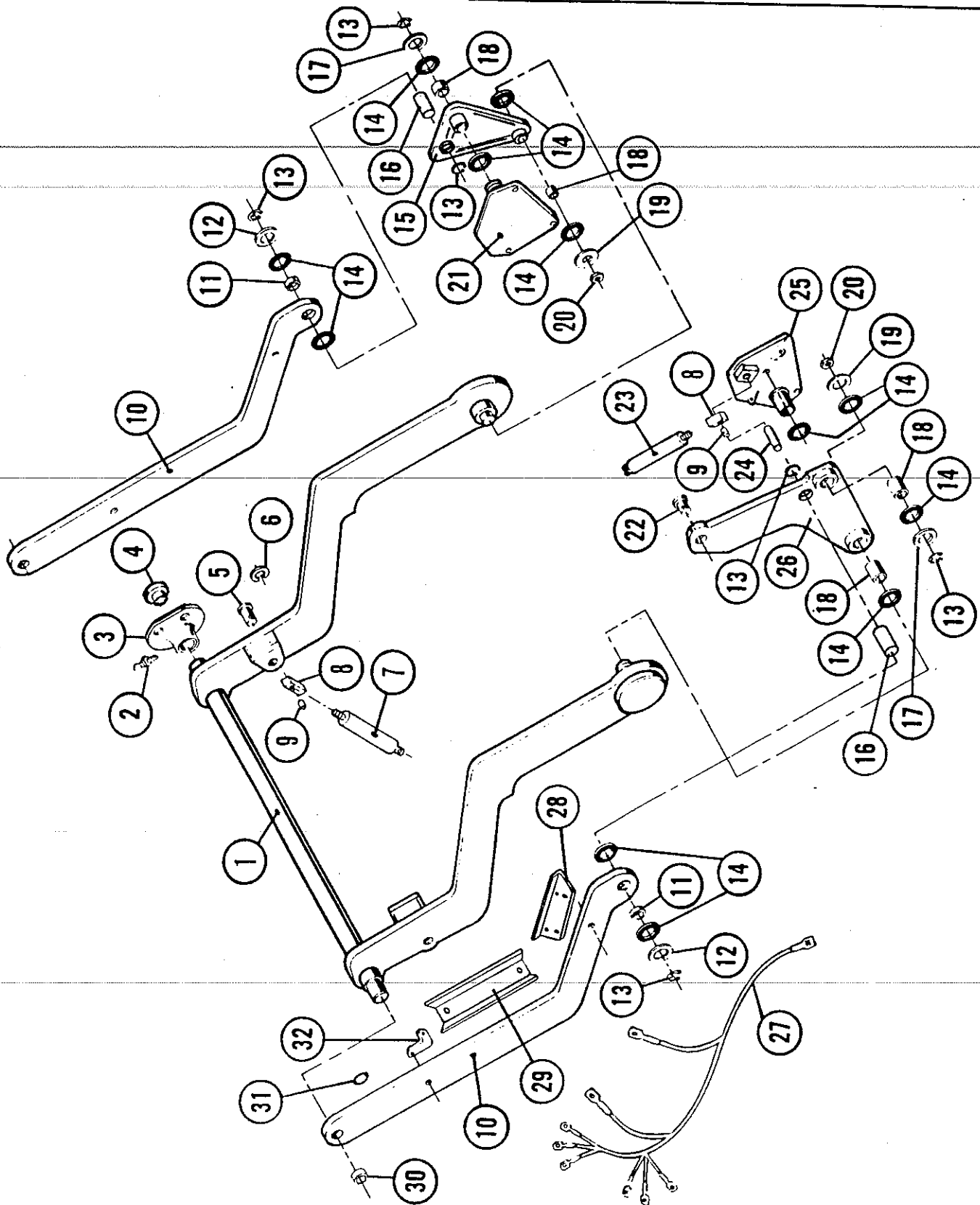


Figure 36. High Dump Arm Assembly

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
36			HIGH DUMP ARM ASSEMBLY
-1	300824	300822	Arm Assembly
-2	400012		Fitting, Grease
-3	301075		Mount Assembly, Dump Arm
-4	301420		Spacer, Dump Arm
-5	303360		Pin, Upper Cylinder Mount
-6	301998		Ring, Retaining
-7	300426		Cylinder, Hydraulic Lift
-8	300229		End, Rod
-9	300552		Bushing, 1" I.D. x 1.24" O.D. x 1.50"
-10	300829		Arm, Lift, Secondary
-11	300836		Bearing, 2.8" O.D. x 2.0" I.D. x .75"
-12	300882		Washer
-13	301709		Ring, Retaining
-14	400177		Bearing, Thrust
-15	300713		Plate Assembly, Arm Rotation
-16	300715		Shaft, Arm Rotation Plate
-17	300882		Washer
-18	300840		Bearing, 2.18" O.D. x 2.00" I.D. x 1.50"
-19	300879		Washer, 3.25" O.D. x 1.00" I.D.
-20	400076		Nut, Hex Jam, 1.25" Slotted
-21	300711		Mount Assembly, Rotation (LH)
-22	301996		Pin, Rotating Cylinder Outer
-23	300407		Cylinder, Hydraulic Rotation
-24	301997		Pin, Rotation Cylinder
-25	300697		Mount Assembly, Rotation (RH)
-26	300809		Arm Assembly, Rotating Cylinder Mount
-27	302030		Harness, Wiring (HD)
-28	303873		Bracket, Hydraulic Hose, Forward (HD)
-29	303170		Clip, Hydraulic Hose (HD)
-30	300837		Bearing
-31	301665		Grommet
-32	302037		Bracket, Upper Switch

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

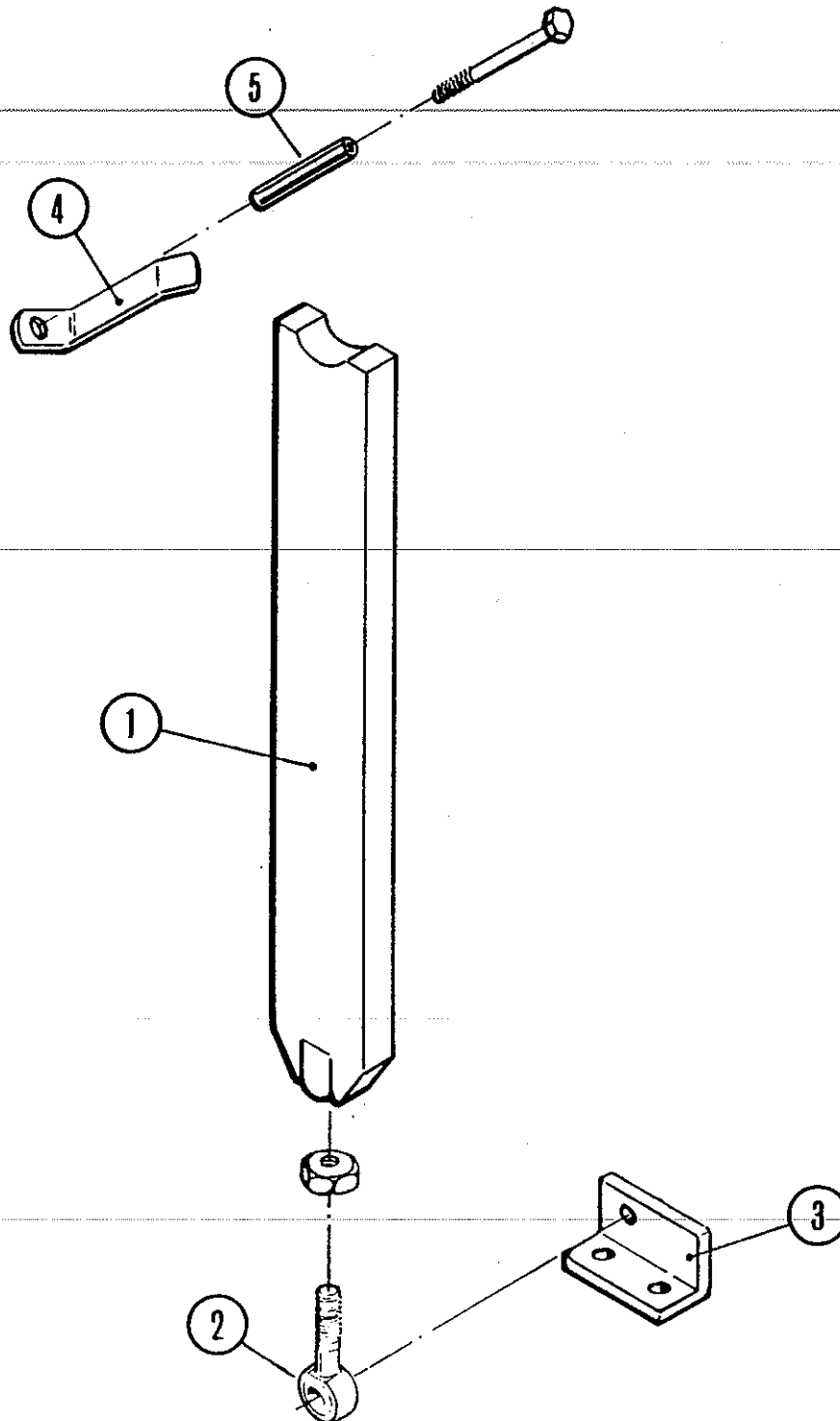


Figure 37. Safety Arm Assembly

FIGURE & INDEX	PART NUMBER	DESCRIPTION
37 -1 -2 -3 -4 -5	302042 300457 302045 302076 302077	SAFETY ARM ASSEMBLY Arm Assembly, Safety Ball Joint, 5/8" - 18 Bracket, HD Safety Arm Ret, HD Safety Arm Hose, HD Safety Arm

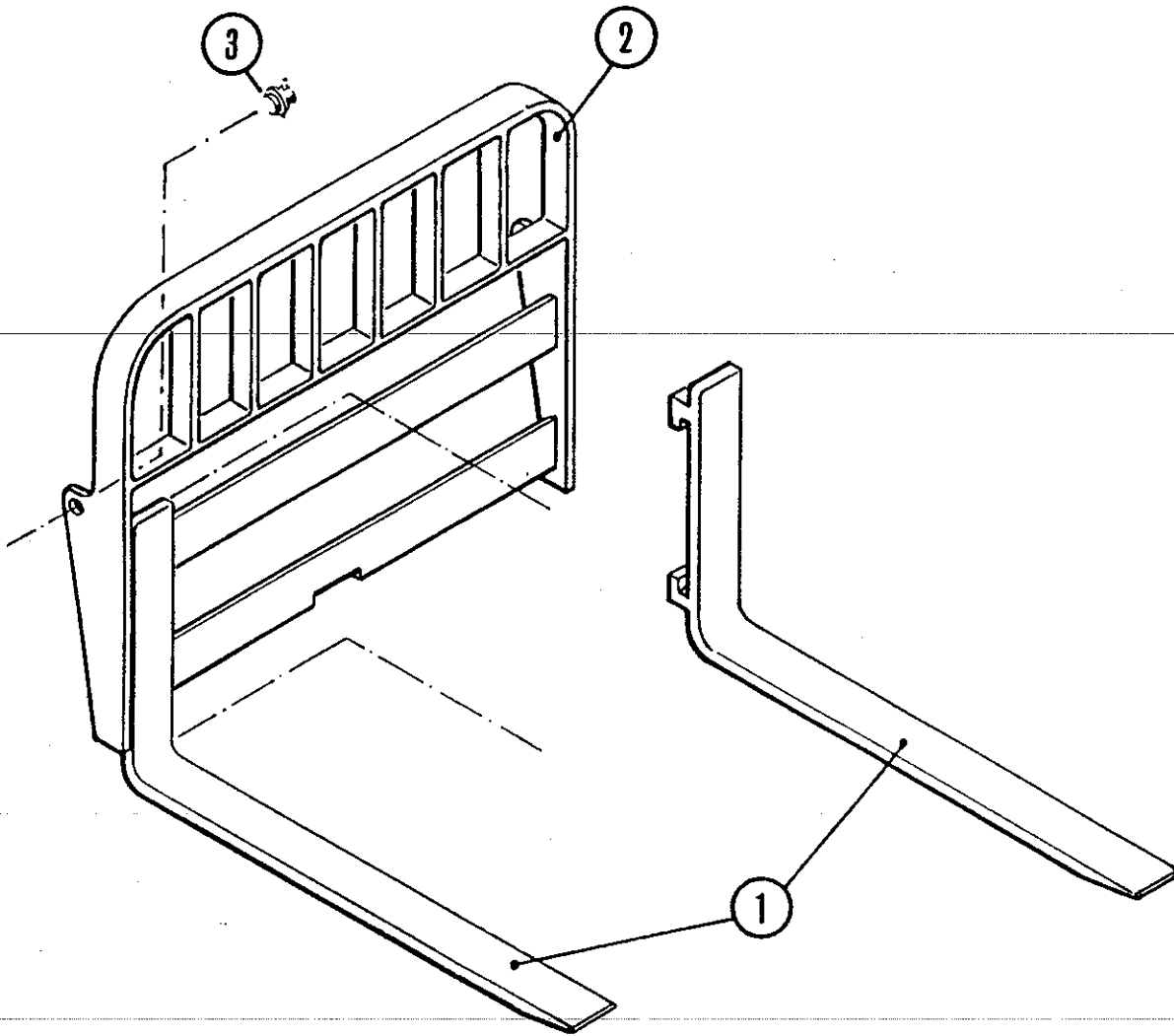


Figure 38. PowerStacker™

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
38			POWERSTACKER™
-1	301925		Tine Assembly, Fork Lift (Pntd)
-2	301934	301941	Fork Lift Assembly, (Pntd)
-3	301920		Retainer, Fork Lift

* When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

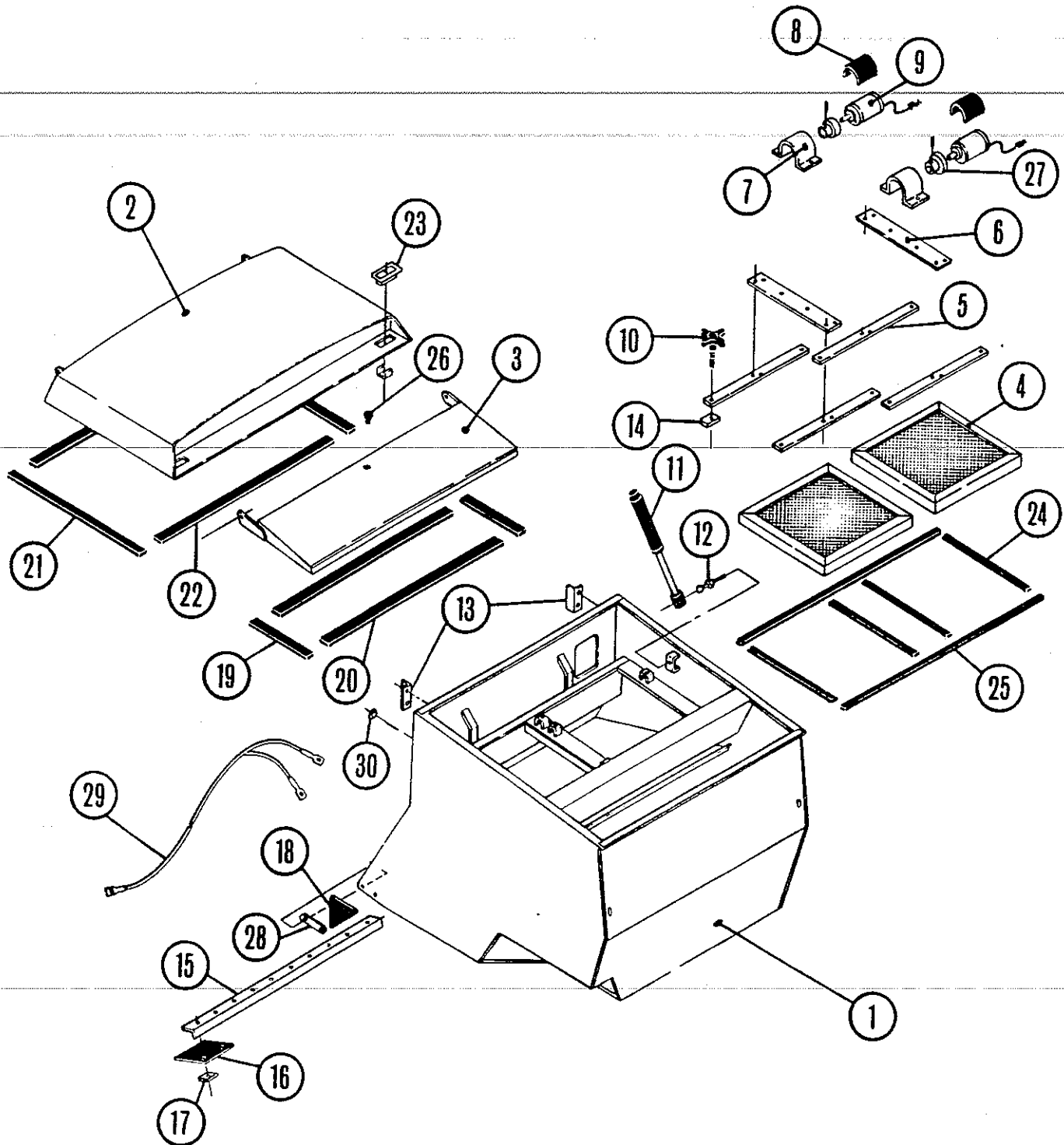


Figure 39. High Dump Hopper Assembly

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
39			HOPPER ASSEMBLY, HIGH DUMP
-1	300125	300099	Hopper Assembly
-2	300769	300767	Hood Assembly, Hopper
-3	300121	300114	Lid Assembly, Hopper
-4	305645 → 300391	300390 305645	Filter, Dust Control
-5	300919	300921	Bar, Filter Retainer
-6	300917		Mount, Filter Shaker
-7	300915		Retainer, Shaker
-8	300904		Mount, Neoprene Shaker (Motor)
-9	300424		Motor, Shaker Filter
-10	300353		Knob, Clamping Filter Retainer
-11	300375		Gas, Spring Cover
-12	300376		Stud, Ball Gas Spring
-13	300946		Hinge, Hopper Cover
-14	301155		Clipnut, 5/16 - 18
-15	300188	300205	Angle, Flap Hopper
-16	300195	300194	Flap, Hopper Front
-17	301146		Clipnut, 1/4 - 20
-18	300151		Flap, Hopper Side
-19	300662		Gasket, Lid Short
-20	300555		Gasket, Lid Long
-21	300429		Gasket, Hood Short
-22	300428		Gasket, Hood Long
-23	300380		Latch Assembly, #HTL81
-24	300449		Gasket, Filter Dust Short
-25	300418	300419	Gasket, Filter Dust Long
-26	300526		Bumper, Rubber Engine Cover
-27	301053		Weight, Eccentric
-28	302146		Backing, Hopper Side Corner
-29	302033		Wiring Harness, High Dump
	301368		Wiring Harness, Low Dump
-30	301668		Strain Relief

* When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

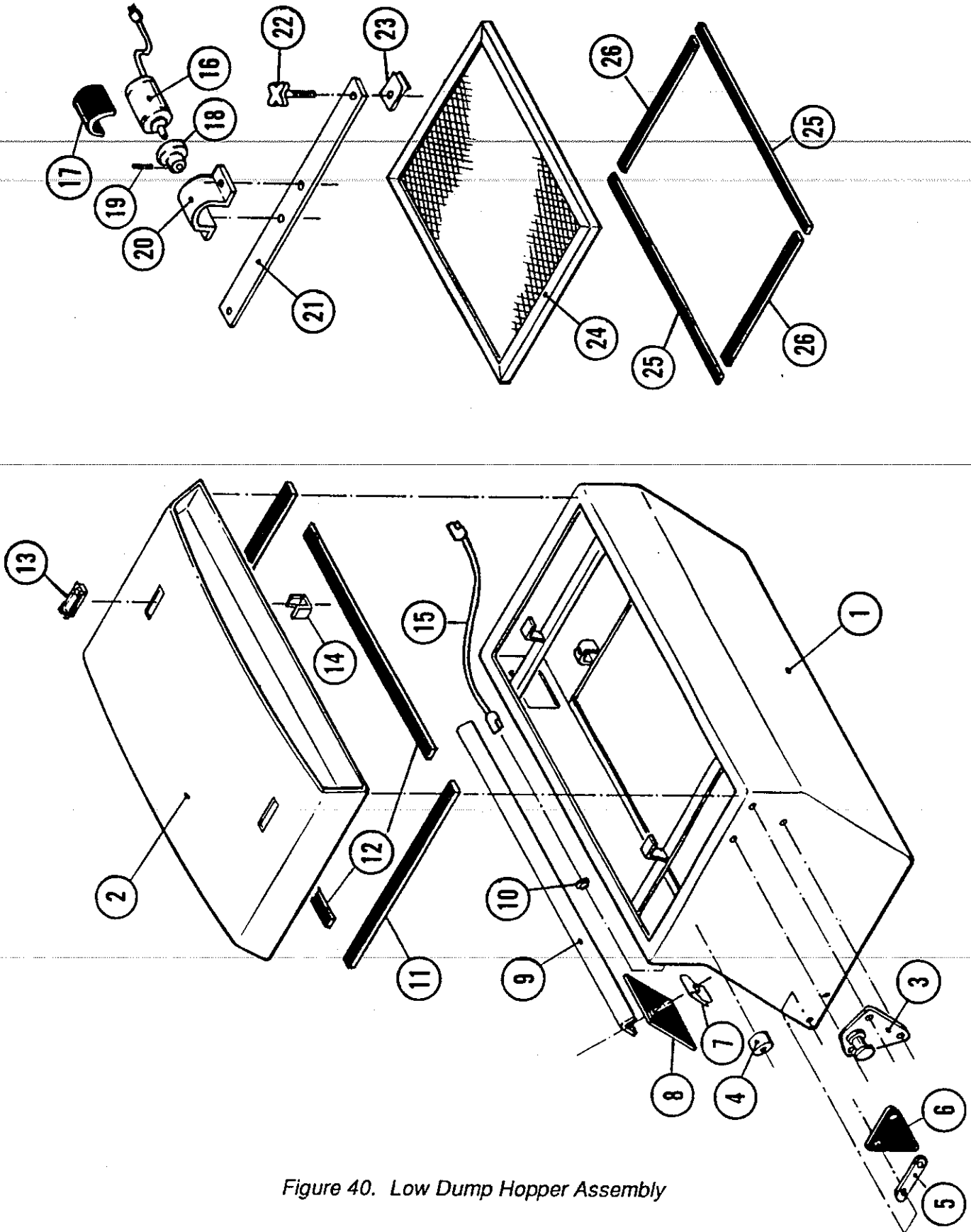


Figure 40. Low Dump Hopper Assembly

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
40			HOPPER ASSEMBLY, LOW DUMP
-1	301009	301007	Hopper Assembly, ISS
-2	301677	301678	Hood Assembly, Hopper, ISS
-3	300096		Lift Bracket Assembly, Hopper
-4	300028		Bar, Stop (Pltd)
-5	302146		Backing, Hopper Side Corner
-6	300151		Flap, Hopper Side Corner
-7	301146		Clipnut, 1/4 - 20
-8	300195	300194	Flap, Hopper
-9	300188	300205	Angle, Flap Hopper
-10	301668		Fitting, Strain Relief
-11	301672		Gasket, Hood, ISS
-12	300428	300554	Gasket, Hood, Long
-13	300380		Latch Assembly
-14	302342		Retainer
-15	302328		Wiring Harness, Hopper, LD
-16	300424		Motor, Shaker Filter
-17	300904		Mount, Neoprene Shaker Motor
-18	301053		Weight, Eccentric
-19	400055		Screw, SSCP, #10-24 x .34 Lg
-20	300915		Retainer, Shaker Motor
-21	301674		Mount, Filter Shaker Motor
-22	300353		Knob, Clamping Filter Ret
-23	301155	400083	Screw, HHM, 5/16 - 18 x 2.25 Lg
-24	300390		Clipnut, 5/16 - 18
-25	300449		Filter, Dust Control
-26	301594		Gasket, Filter Dust, Short
			Gasket, Filter Dust, ISS

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

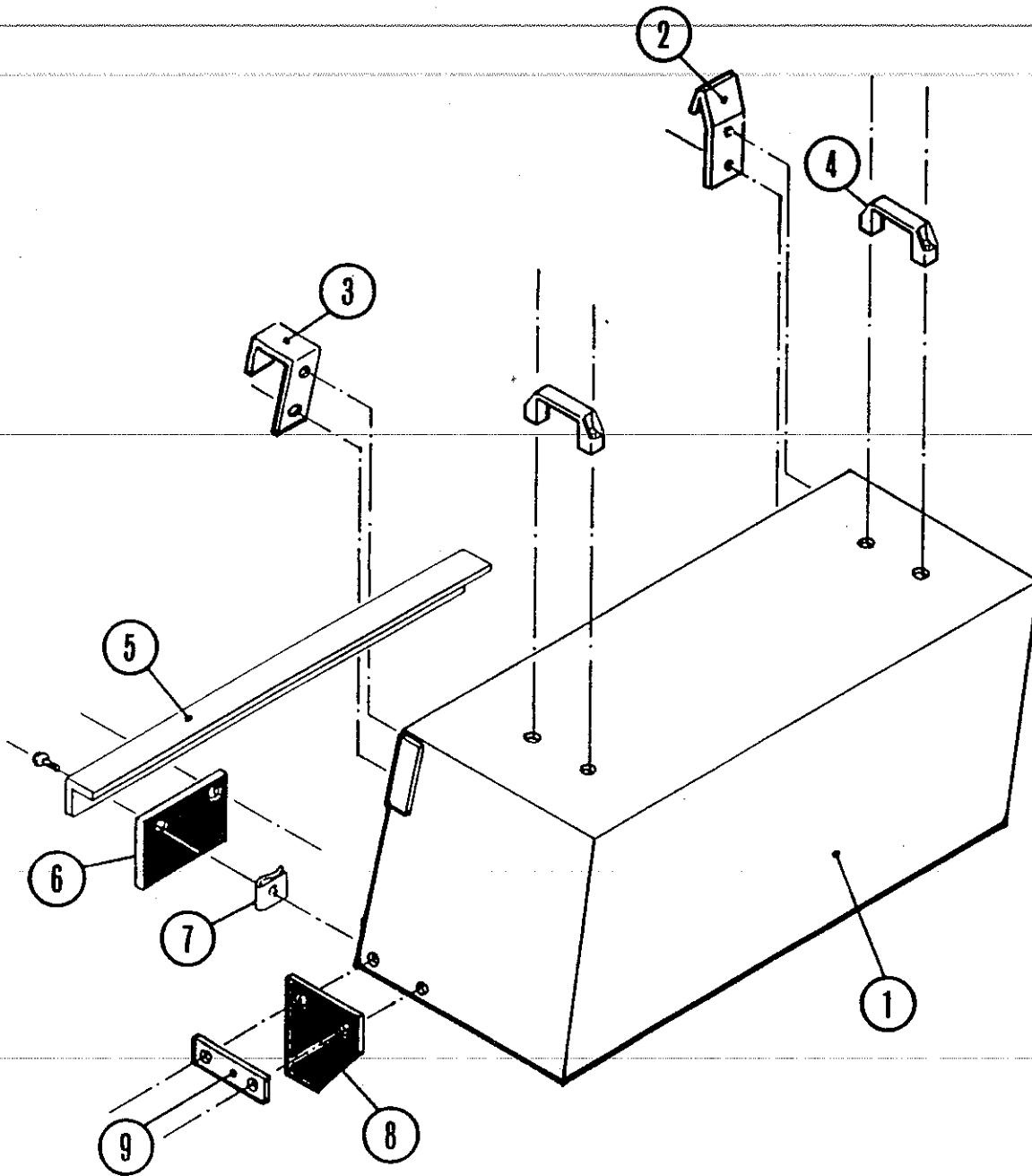


Figure 41. Manual Dump Hopper Assembly

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
41			HOPPER ASSEMBLY, MANUAL DUMP
-1	301191	301181	Hopper Assembly, CSS
-2	301169		Bracket, CSS Hopper
-3	302444		Bracket, CSS Hopper, LH
-4	301297		Handle, Plastic
-5	300188	300205	Angle, Hopper Flap
-6	300195	300194	Flap, Hopper Front
-7	301146		Clipnut, 1/4 - 20
	301146		Clipnut, 1/4 - 20
-8	300151		Flap, Hopper Side
-9	302146		Backing, Hopper Side Corner
-10	400059		Screw

* When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

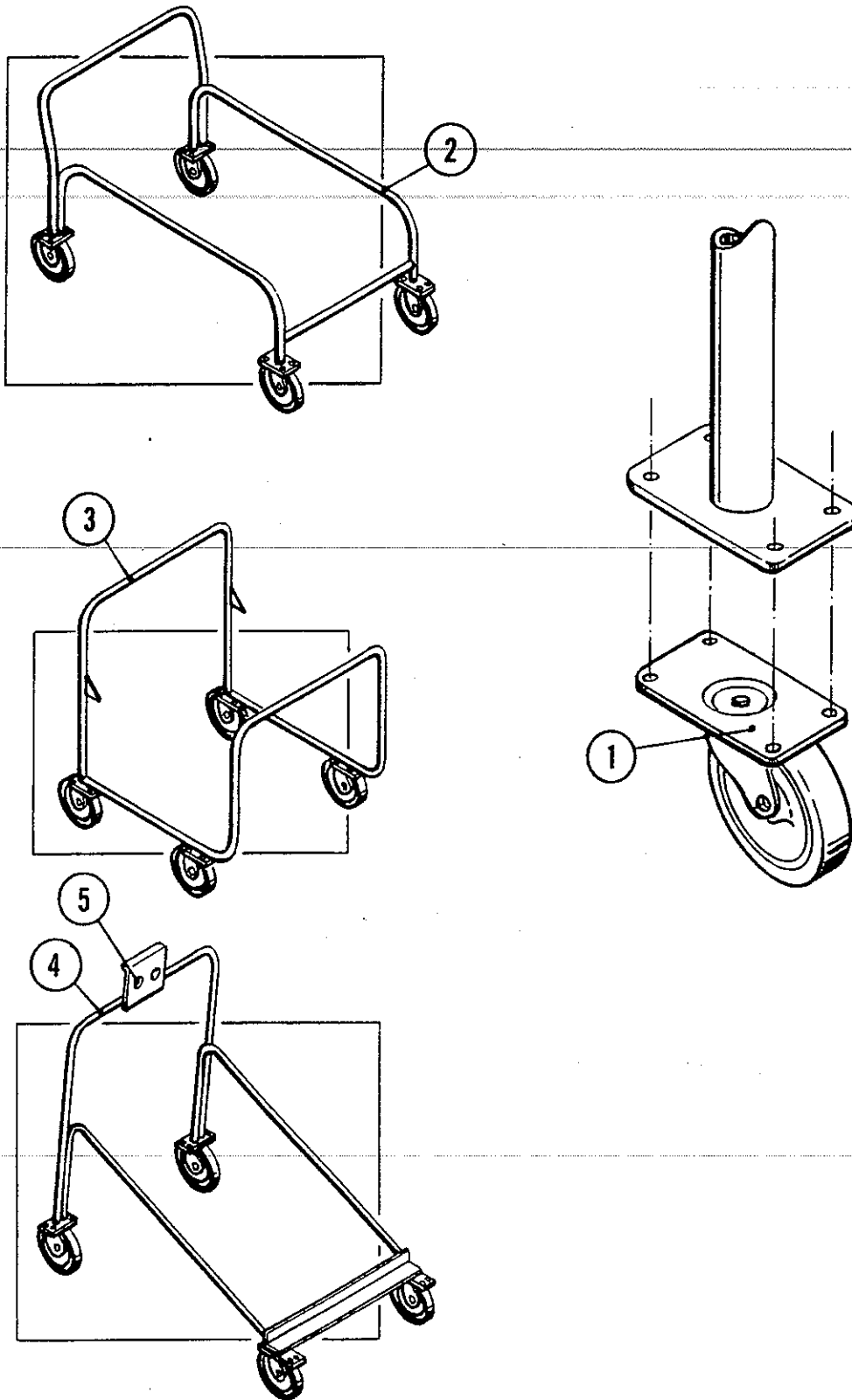


Figure 42. Hopper Dollies

FIGURE & INDEX	PART NUMBER	DESCRIPTION
42		HOPPER DOLLIES
-1	301321	Caster, Swivel 4.00 Diameter
-2	302012	Dolly Assembly, Hopper, Grp HD
	302011	Dolly Assembly, Hopper, HD
-3	302029	Dolly Assembly, Hopper, Grp ISS
	302028	Dolly Assembly, Hopper, ISS
-4	301701	Dolly Assembly, Hopper, Grp LD
	301314	Dolly Assembly, Hopper, LD
-5	300526	Bumper, Rubber

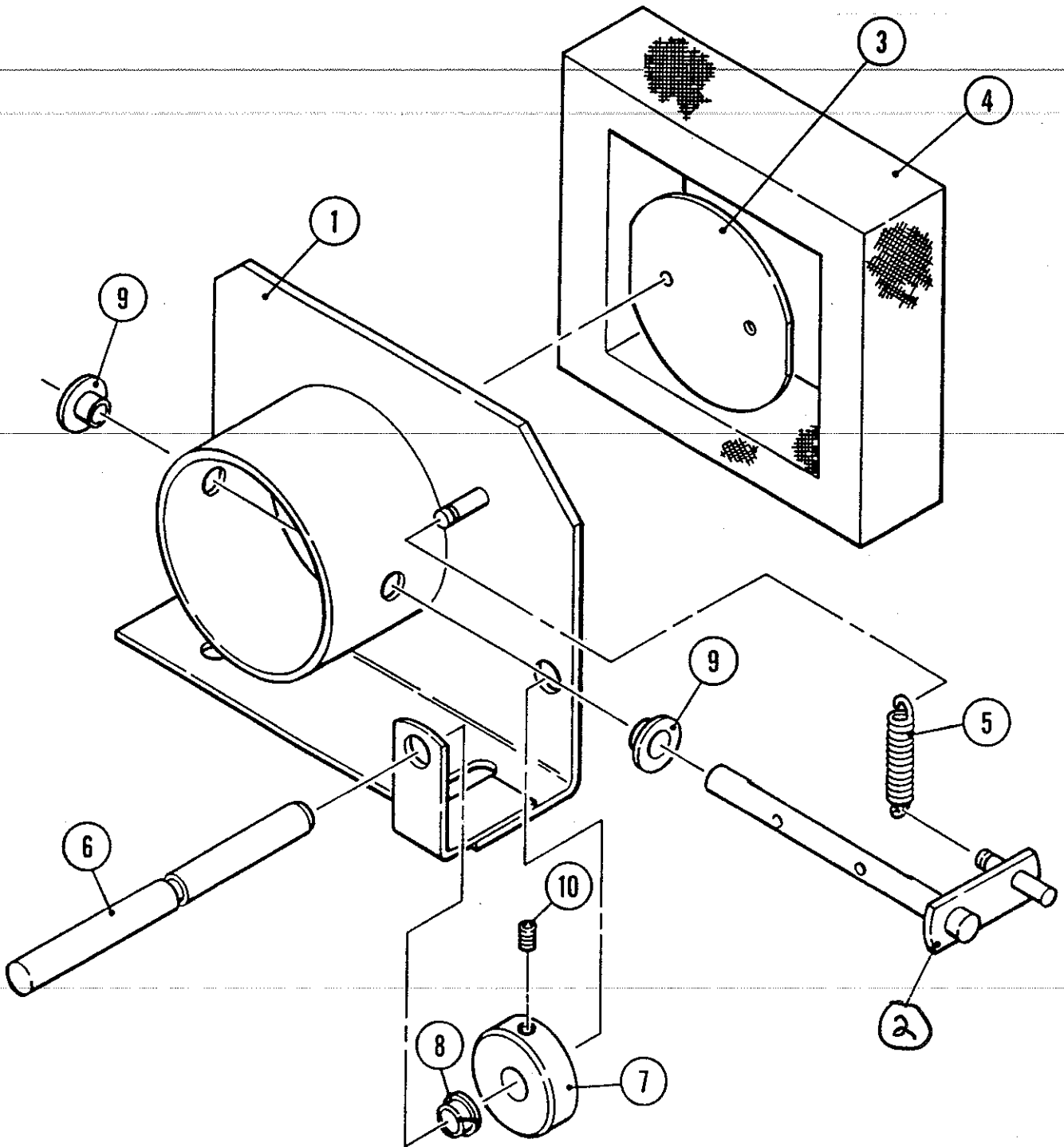


Figure 43. Hopper Shutoff

FIGURE & INDEX	PART NUMBER	DESCRIPTION
43		HOPPER SHUTOFF
-1	304105	Mount Assembly, Gasket
-2	304104	Damper Assembly
-3	304103	Damper, Gasket Mount
-4	300193	Gasket
-5	304160	Spring
-6	304101	Rod, Gasket Mount
-7	304097	Spacer, Gasket Mount
-8	304017	Bushing, Nylon
-9	300414	Bushing, Plastic
-10	400341	Screw, SSCP, #8-32 x .44

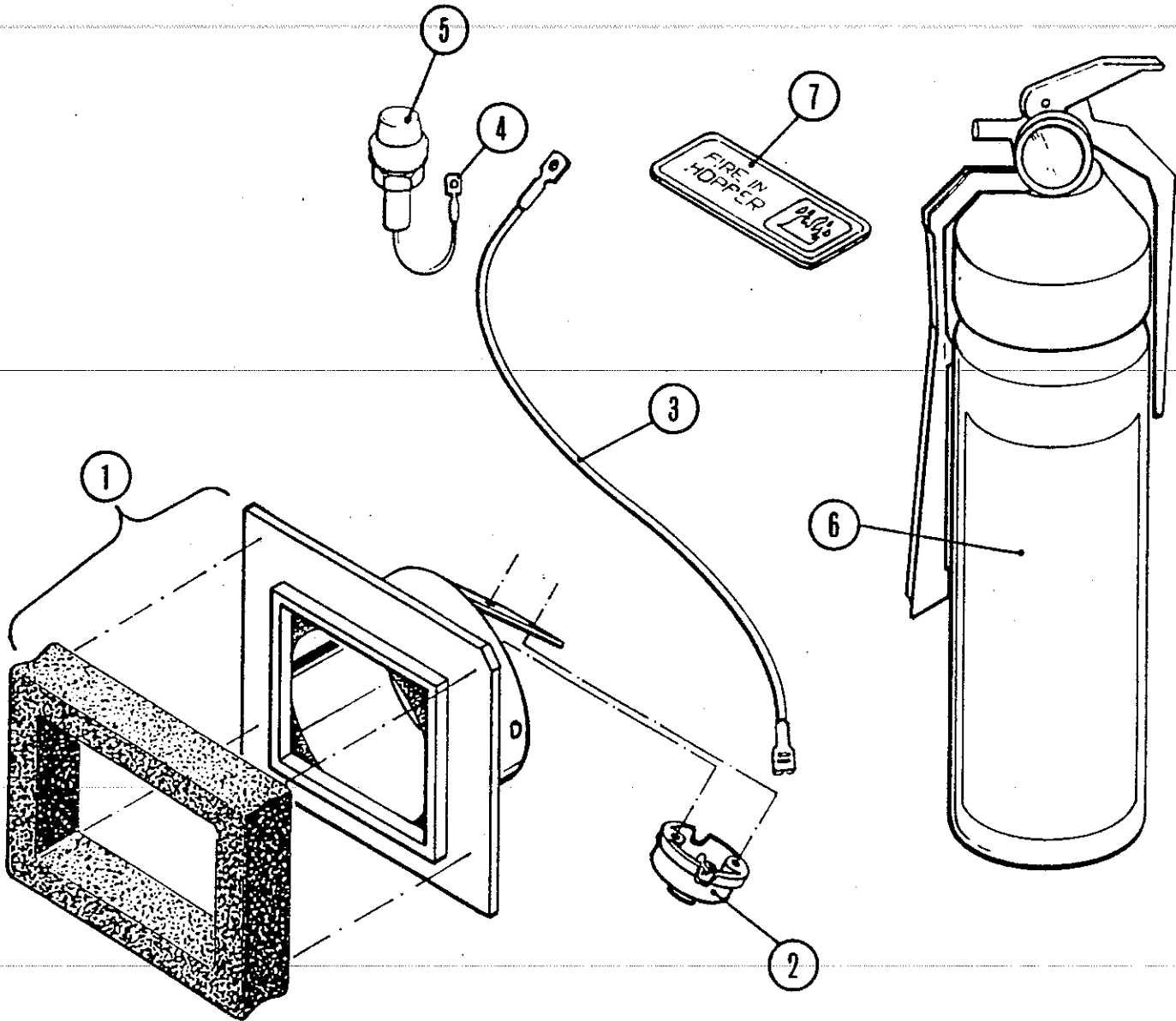


Figure 44. Hopper Fire Indicator

FIGURE & INDEX	PART NUMBER	DESCRIPTION
44		HOPPER FIRE INDICATOR
-1	303083	Mount Assembly, Fire Sensor
-2	403003	Sensor, Fire
-3	303580	Wiring Kit, Hopper Fire Warning
-4	302462	Terminal, Male Snap Plug
-5	301553	Light, Trash Relocator
-6	302769	Extinguisher, Fire
-7	302521	Decal, Fire

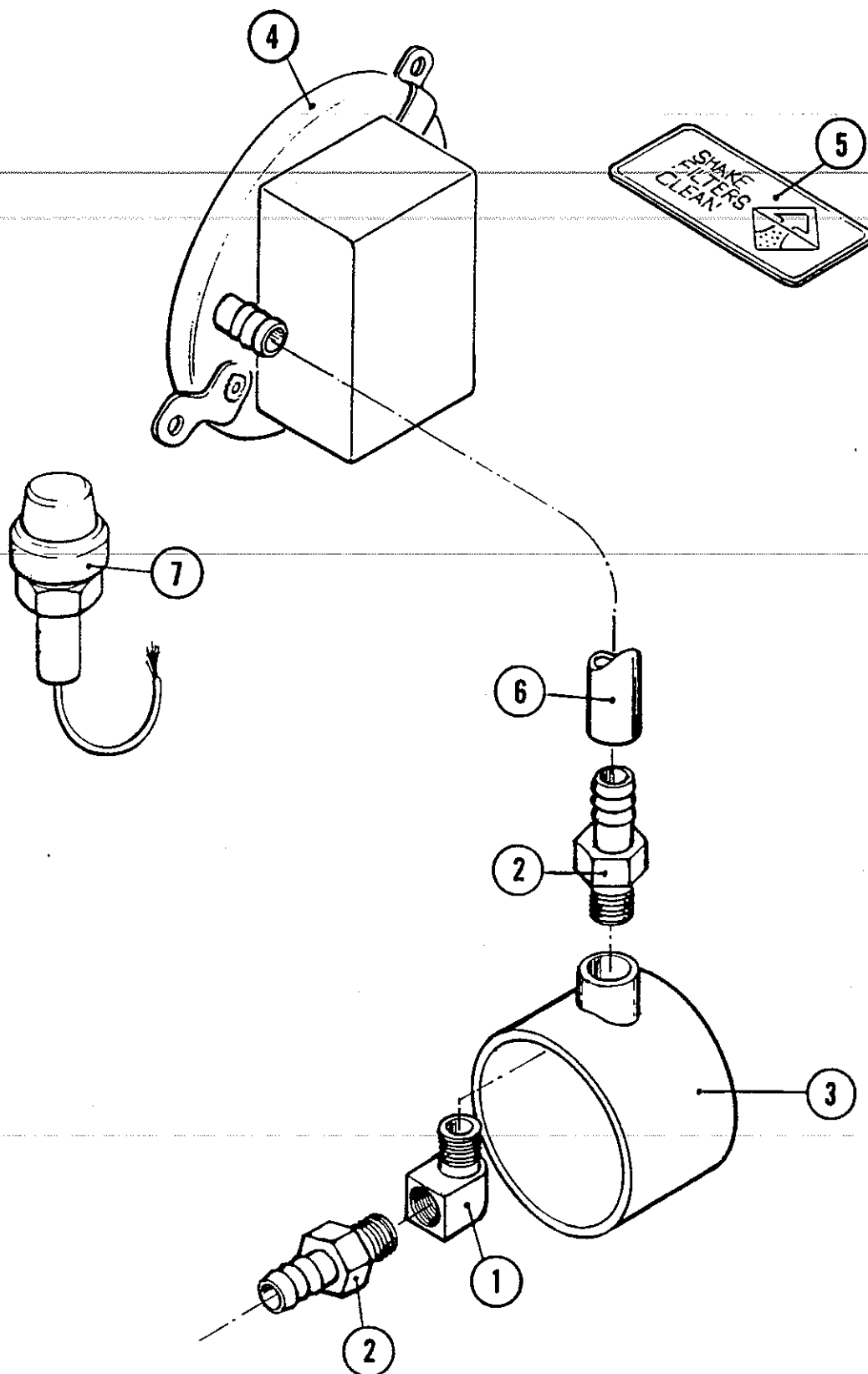


Figure 45. Clogged Filter Indicator

FIGURE & INDEX	PART NUMBER	DESCRIPTION
45		CLOGGED FILTER INDICATOR
-1	400260	Fitting, 90° 1/4 NPT x 1/4 NPT
-2	400261	Fitting, Hose Barb 3/8 NPT x 5/16 Hose
-3	303515	Mount Assembly, Clogged Filter
-4	303327	Vacuum, Switch
-5	302518	Decal, Filter (Dirty)
-6	303516	Hose, Clogged Filter
-7	301553	Light, RTR

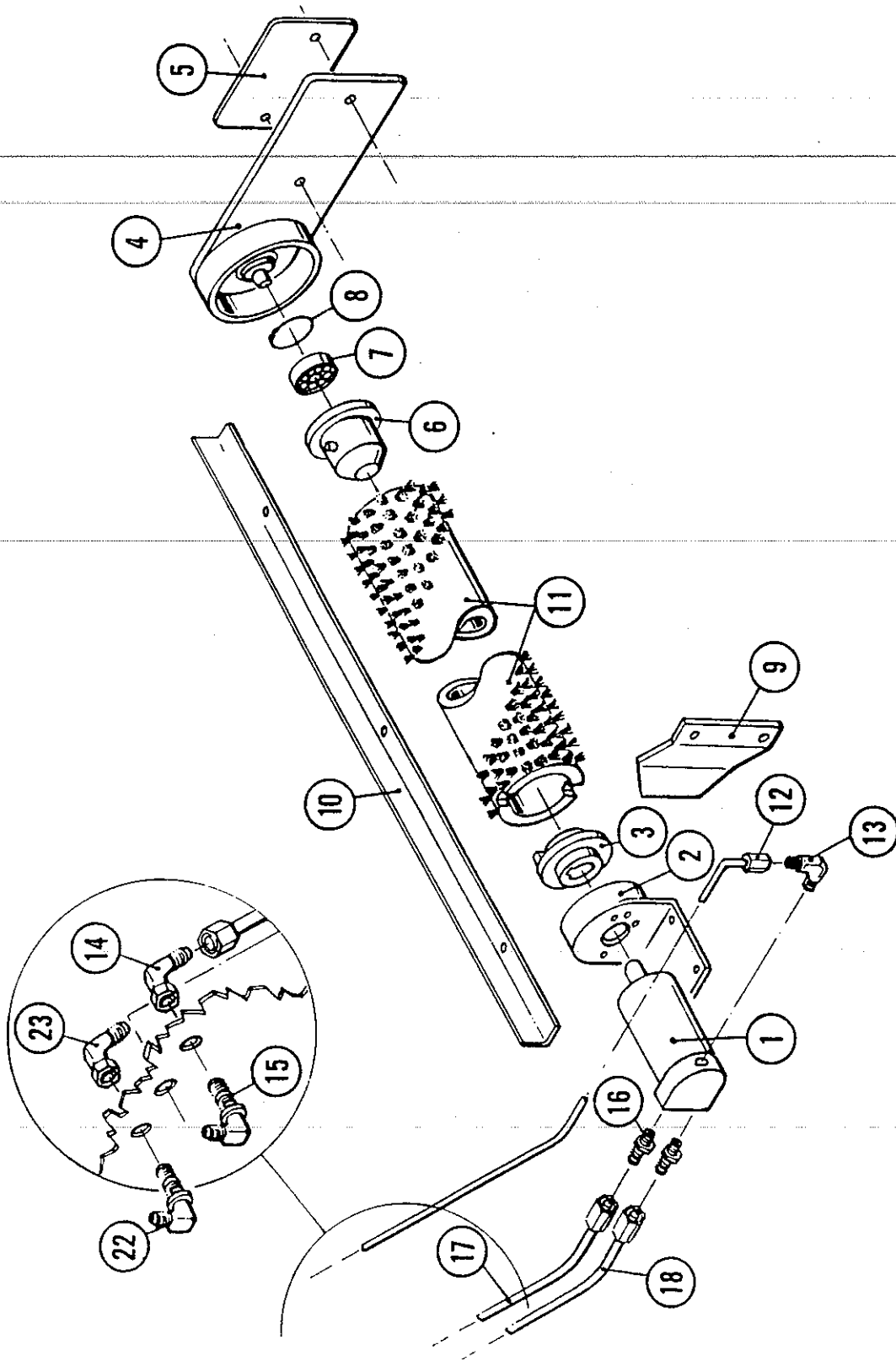


Figure 46. PowerPacker™ (Sheet 1 of 2)

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
46			POWERPACKER™
-1	303041		Motor, Hydraulic
-2	303042		Mount Assembly, Drive
-3	303048		Hub Assembly, Drive
-4	303044		Mount Assembly, Idler
-5	303046		Spacer, Idler Mount
-6	302806		Idler, PowerPacker
-7	303058		Bearing, 1.57 O.D. x .669 I.D.
-8	303059		Ring, Retaining, Internal, 1.575
-9	303060		Guard, Motor
-10	303070	303071	Guard, Broom
-11	303062	303063	Broom, PowerPacker
-12	303061		Tube Assembly, Case Drain
-13	303052		Fitting, 90° Elbow 3/8-24 to #3
-14	303065		Fitting, Swivel 90° #4
-15	303154		Fitting, 90° Bulkhead #4
-16	303050		Fitting, STR 9/16-18 to #6
-17	303162		Tube Assembly, Inlet, Hydraulic Motor
-18	303163		Tube Assembly, Outlet, Hydraulic Motor
-19	301711		Clip, Hydraulic Hose (Pntd)
-20	303170		Bracket, Hydraulic Hose
-21	303171		Bar, Hydraulic Hose Retainer
-22	303051		Fitting, 90° Bulkhead #6
-23	303065		Fitting, Swivel 90° #6

* When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

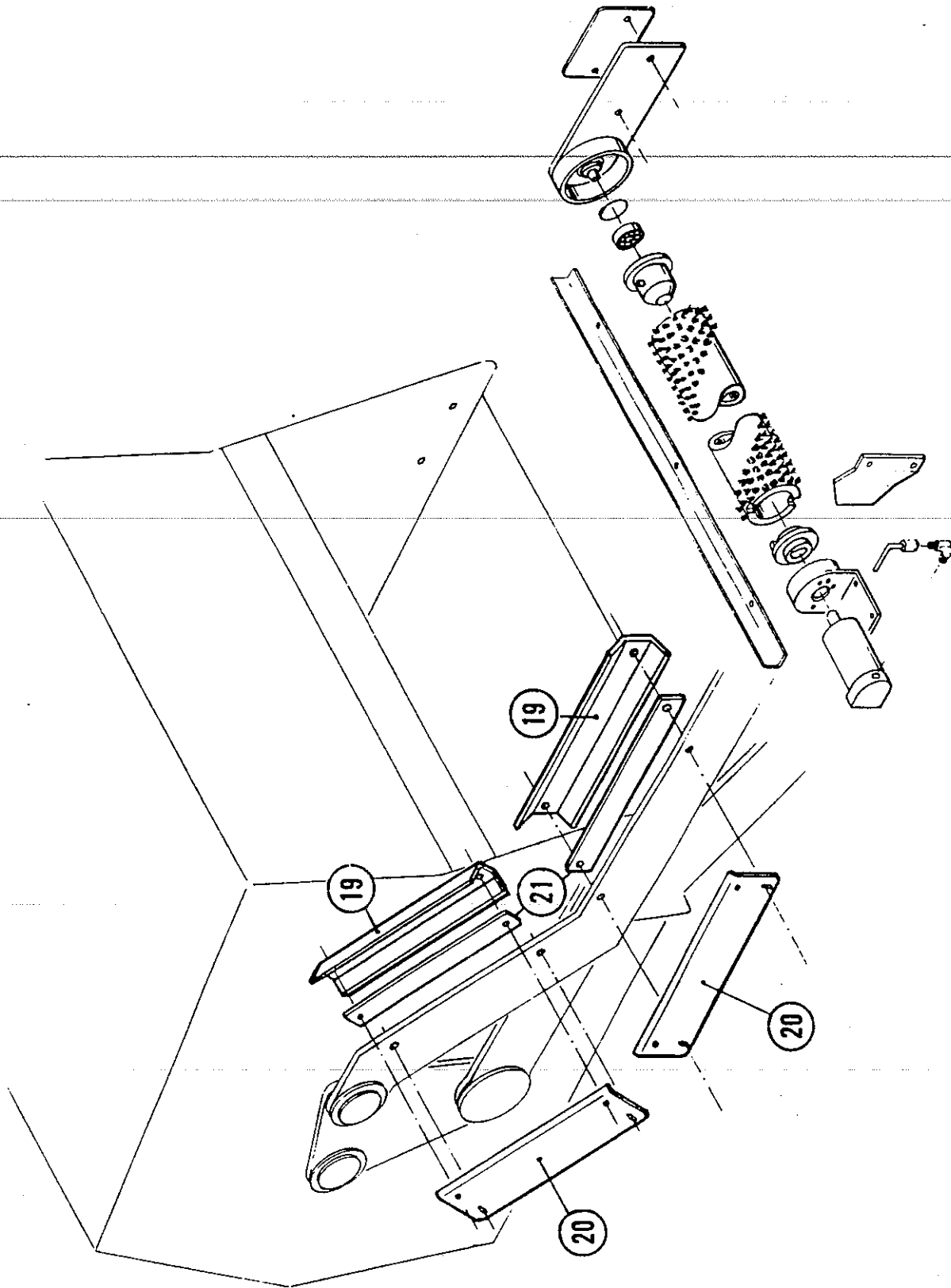


Figure 46. PowerPacker™ (Sheet 2 of 2)

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
46			POWERPACKER™
-1	303041		Motor, Hydraulic
-2	303042		Mount Assembly, Drive
-3	303048		Hub Assembly, Drive
-4	303044		Mount Assembly, Idler
-5	303046		Spacer, Idler Mount
-6	302806		Idler, PowerPacker
-7	303058		Bearing, 1.57 O.D. x .669 I.D.
-8	303059		Ring, Retaining, Internal, 1.575
-9	303060		Guard, Motor
-10	303070	303071	Guard, Broom
-11	303062	303063	Broom, PowerPacker
-12	303061		Tube Assembly, Case Drain
-13	303052		Fitting, 90° Elbow 3/8-24 to #3
-14	303065		Fitting, Swivel 90° #4
-15	303154		Fitting, 90° Bulkhead #4
-16	303050		Fitting, STR 9/16-18 to #6
-17	303162		Tube Assembly, Inlet, Hydraulic Motor
-18	303163		Tube Assembly, Outlet, Hydraulic Motor
-19	301711		Clip, Hydraulic Hose (Pntd)
-20	303170		Bracket, Hydraulic Hose
-21	303171		Bar, Hydraulic Hose Retainer
-22	303051		Fitting, 90° Bulkhead #6
-23	303065		Fitting, Swivel 90° #6

Parts list repeated for clarity.

* When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

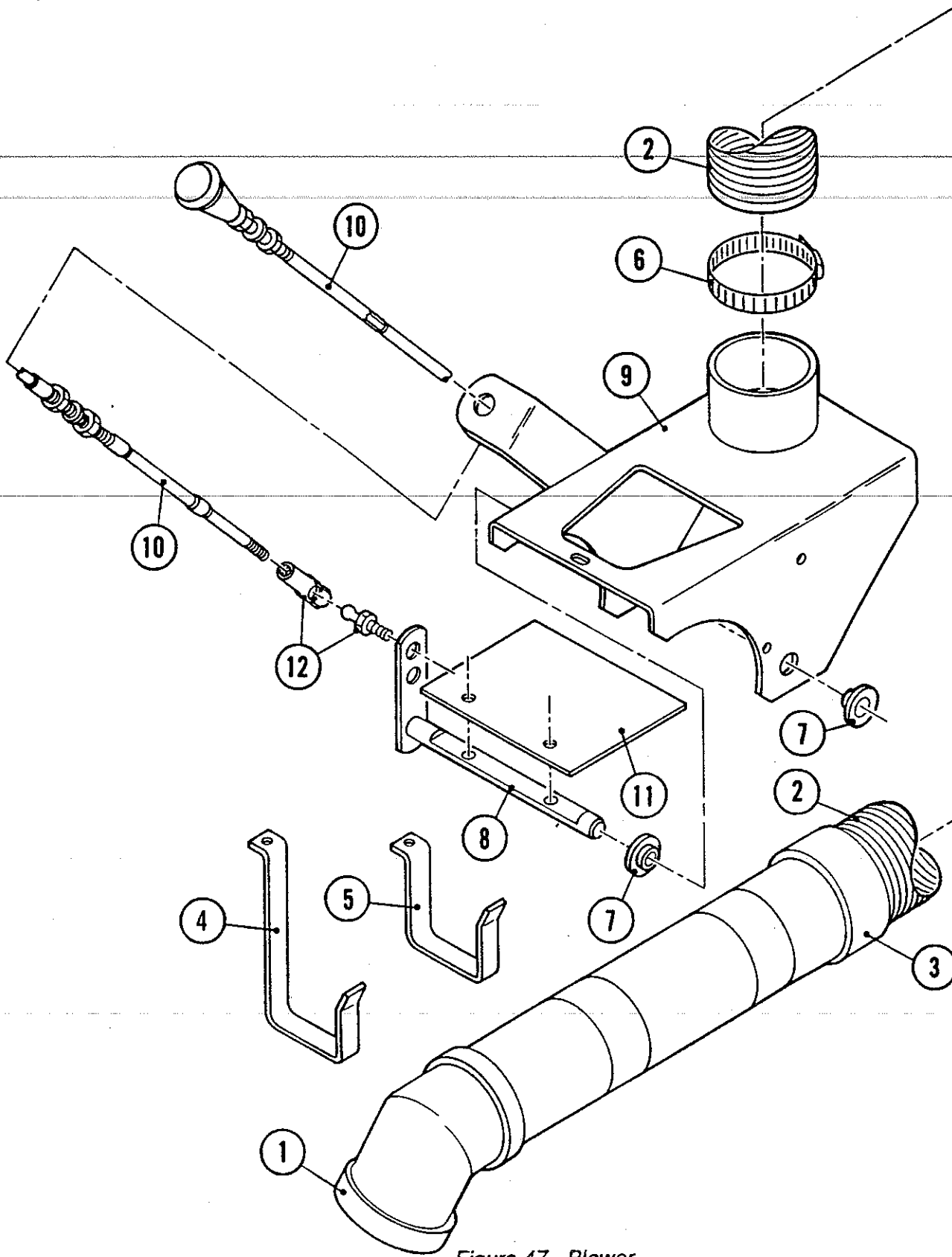


Figure 47. Blower

FIGURE & INDEX	PART NUMBER	DESCRIPTION
47		BLOWER
-1	302337 †	Wand Assembly, Blower
-2	302329	Hose, 2 1/2" ID, Blower
-3	302203	Cuff, 2 1/2" ID, Blower
-4	302530	Bracket, Hose Retainer, Long
-5	302529	Bracket, Hose Retainer, Short
-6	300336	Hose, Clamp
-7	300414	Bushing
-8	305768	Rod Assembly, Damper, Blower Manifold
-9	305763	Manifold Assembly, Blower
-10	301427	Cable, Impeller Stop
-11	305770	Damper, Blower Manifold
-12	301459	Ball Joint, #10-32

† Includes items 2 and 3.

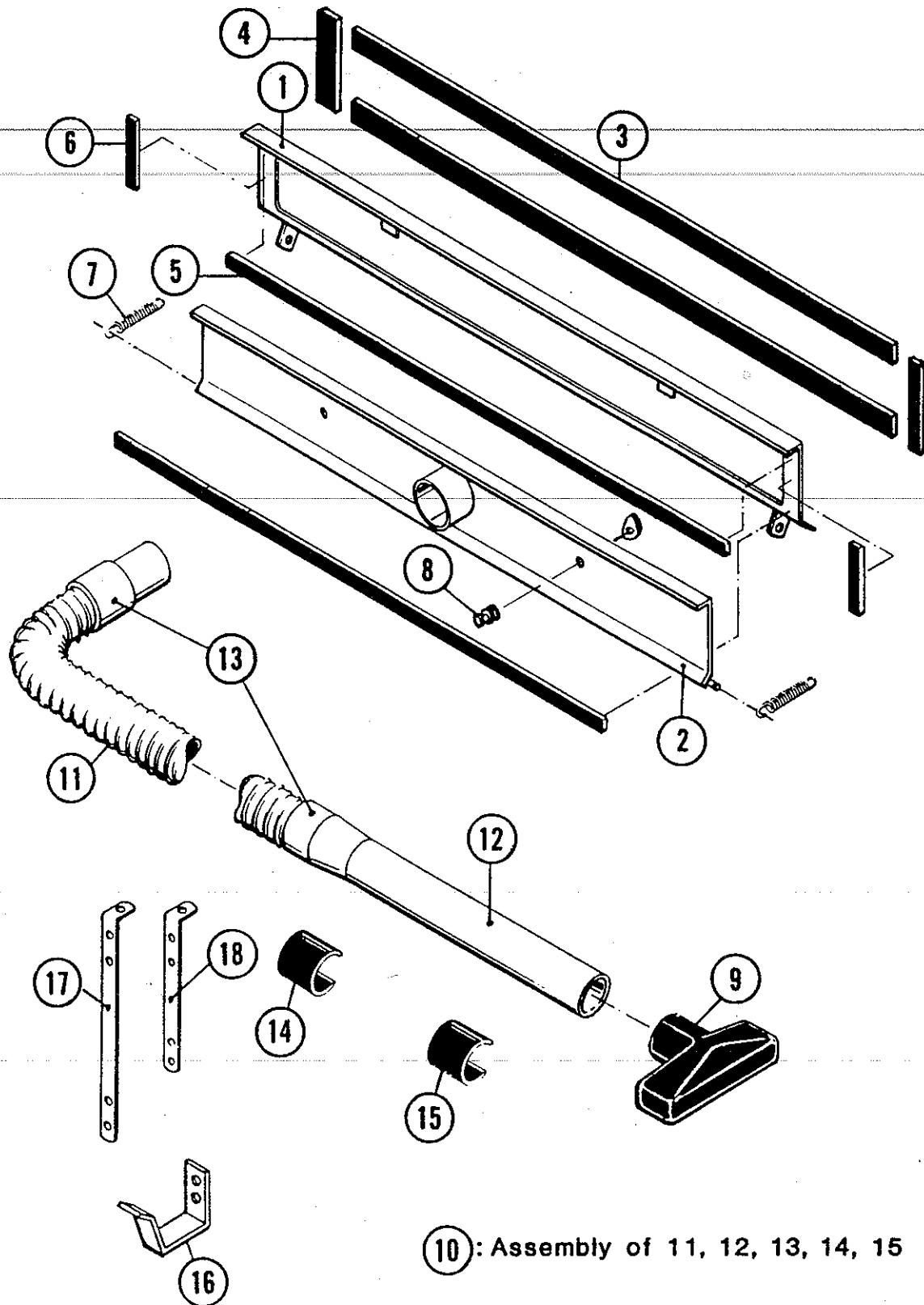


Figure 48. Vacuum Wand

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
48			VACUUM WAND
-1	302309	302418	Mount Assembly, Vacuum Wand
-2	302305	302416	Door Assembly, Vacuum Wand
-3	302449	302450	Gasket, Vacuum Wand
-4	303139		Gasket, Vacuum Wand, Short
-5	302316	302415	Gasket, Door, Vacuum Wand, Long
-6	302315		Gasket, Door, Vacuum Wand, Short
-7	302448		Spring, Vacuum Wand
-8	302324		Latch, Vacuum Wand
-9	303139		Nozzle, Vacuum Wand
-10	302336	302451	Wand Assembly, Vacuum
-11	302334	302329	Hose, 2 1/2" I.D. Tuff-Lite
-12	302335		Pipe, 2" Dia PVC
-13	302203		Cuff, 2 1/2" I.D. Tuff-Lite
-14	302332		Sheet, Anti-Slip Pad, Large
-15	302333		Sheet, Anti-Slip Pad, Short
-16	302314		Bracket, Hose Retainer
-17	303433		Bar, Hose Retainer, Long
-18	303434		Bar, Hose Retainer, Short

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

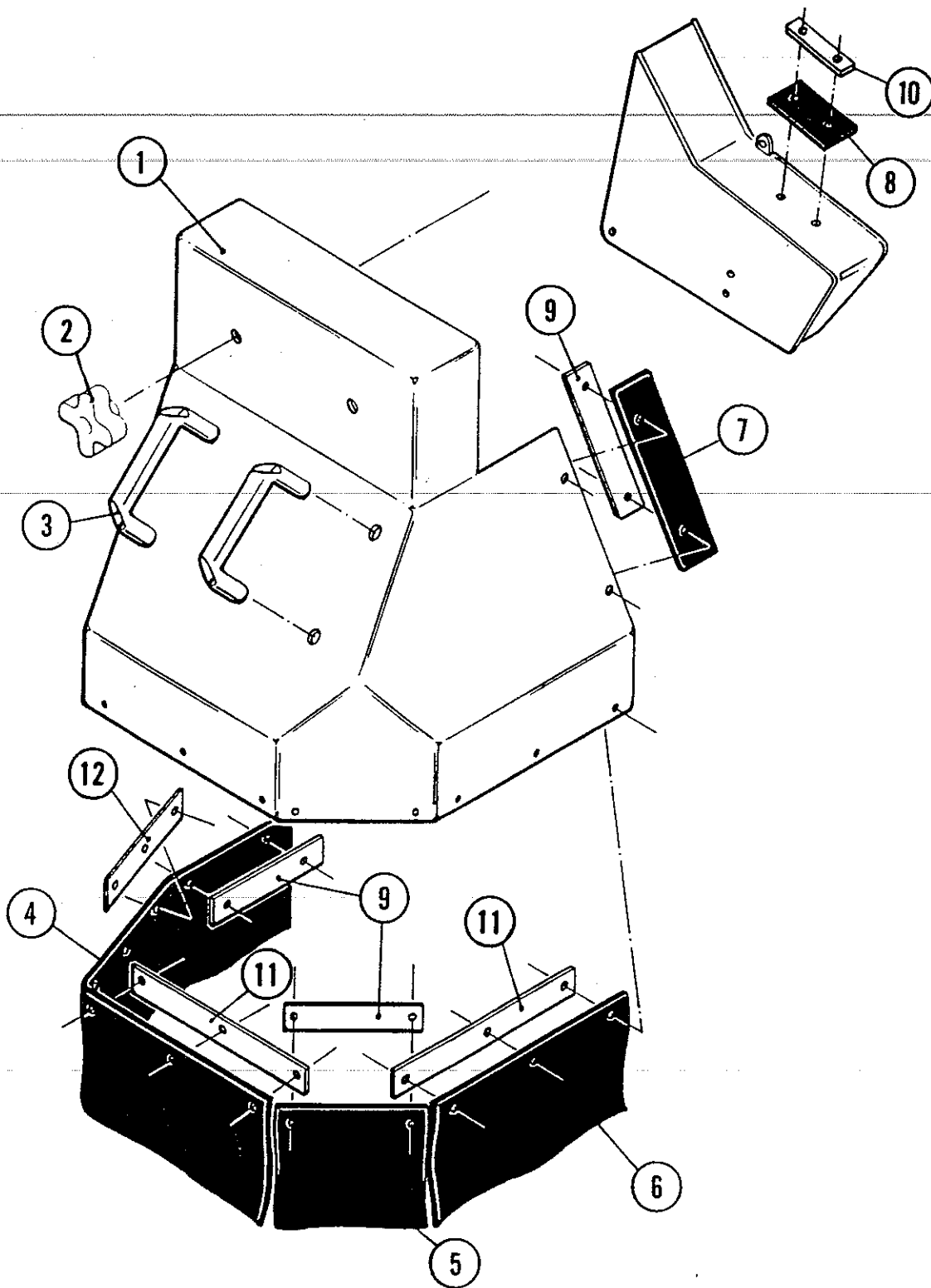


Figure 49. Vacuumized Curb Broom (Hood Detail)

FIGURE & INDEX	PART NUMBER	DESCRIPTION
49		VACUUMIZED CURB BROOM (HOOD DETAIL)
-1	303260	Hood Assembly
-2	303179	Knob, Aluminum Hand
-3	301297	Handles, Plastic
-4	303281	Flap
-5	303283	Flap, Front Corner
-6	303282	Flap, Front
-7	303284	Flap, Front
-8	303285	Flap, Arm (HD)
	303286	Flap, Arm (LD)
-9	303277	Strap
-10	303290	Strap, Arm Flap SPT (Low Dump Only)
	303277	Strap, Hood (High Dump Only)
-11	303275	Strap, Front & Side
-12	303276	Strap, Back Corner



FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
50			VACUUMIZED CURB BROOM (HOPPER DETAIL)
-1	303265		Tube Assembly, Hopper
-2	303268		Plate, Front
-3	303269	303287	Bar, Front
-4	303271		Bar, Left Side
-5	303311		Bar, Right Side (New)
	303270		Bar, Right Side (Old)
-6	303566		Bar, Cut-Out
-7	303278		Flap, Front
-8	303279		Flap, Left Side
-9	303313		Flap, Right Side (New)
	303280		Flap, Right Side (Old)
-10	303567		Flap, Cut-Out
-11	303272	303288	Strap, Front & Left Side
			Strap, Front
-12	303272		Strap, Front & Left Side
-13	303312		Strap, Right Side (New)
	303274		Strap, Right side (Old)
-14	303273		Strap, Front

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

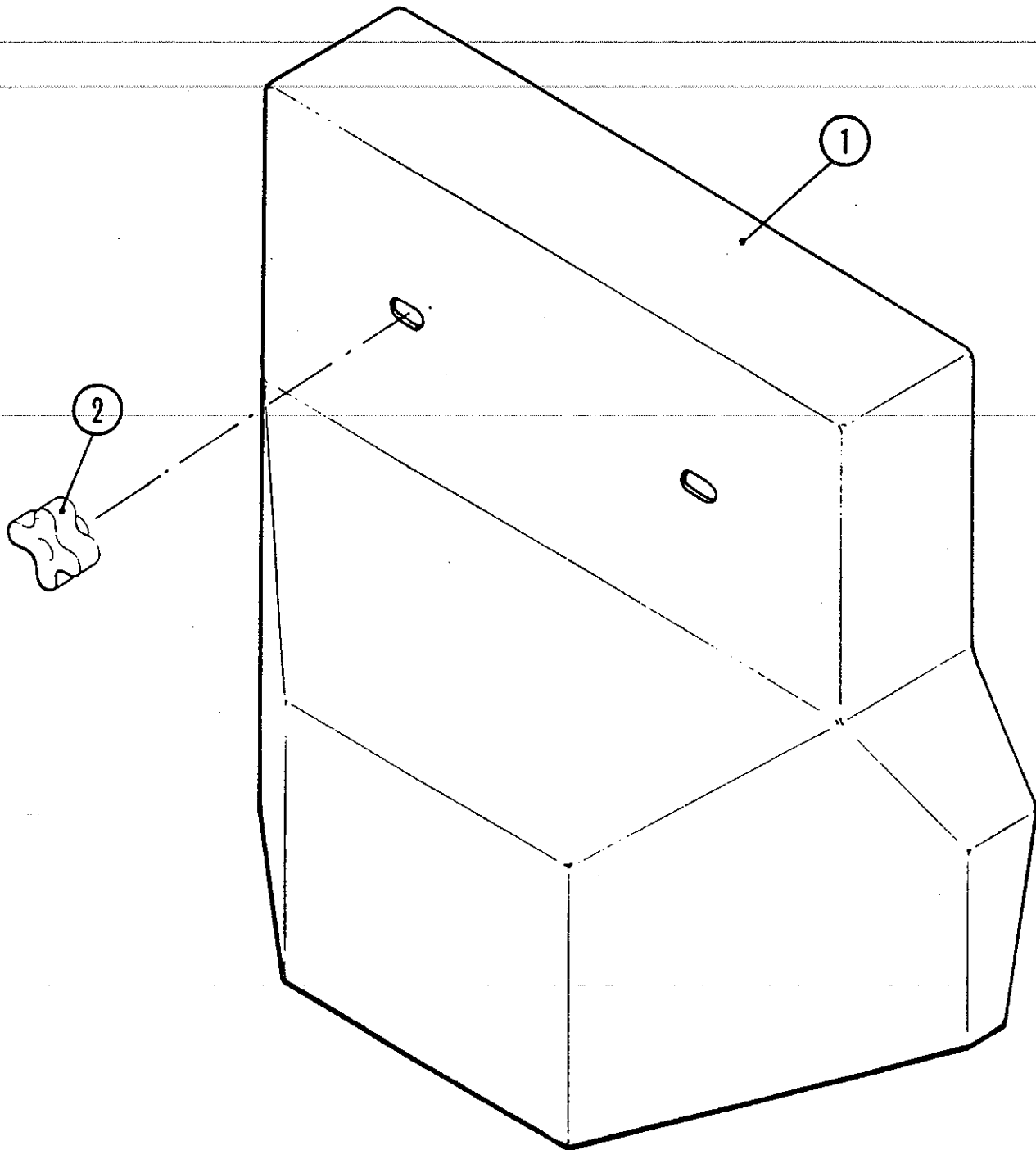


Figure 51. Heavy Duty Curb Broom Guard

FIGURE & INDEX	PART NUMBER	DESCRIPTION
51 -1 -2	303119 303179	HEAVY DUTY CURB BROOM GUARD Guard Assembly, Heavy Duty Curb Broom Knob, Aluminum Hand

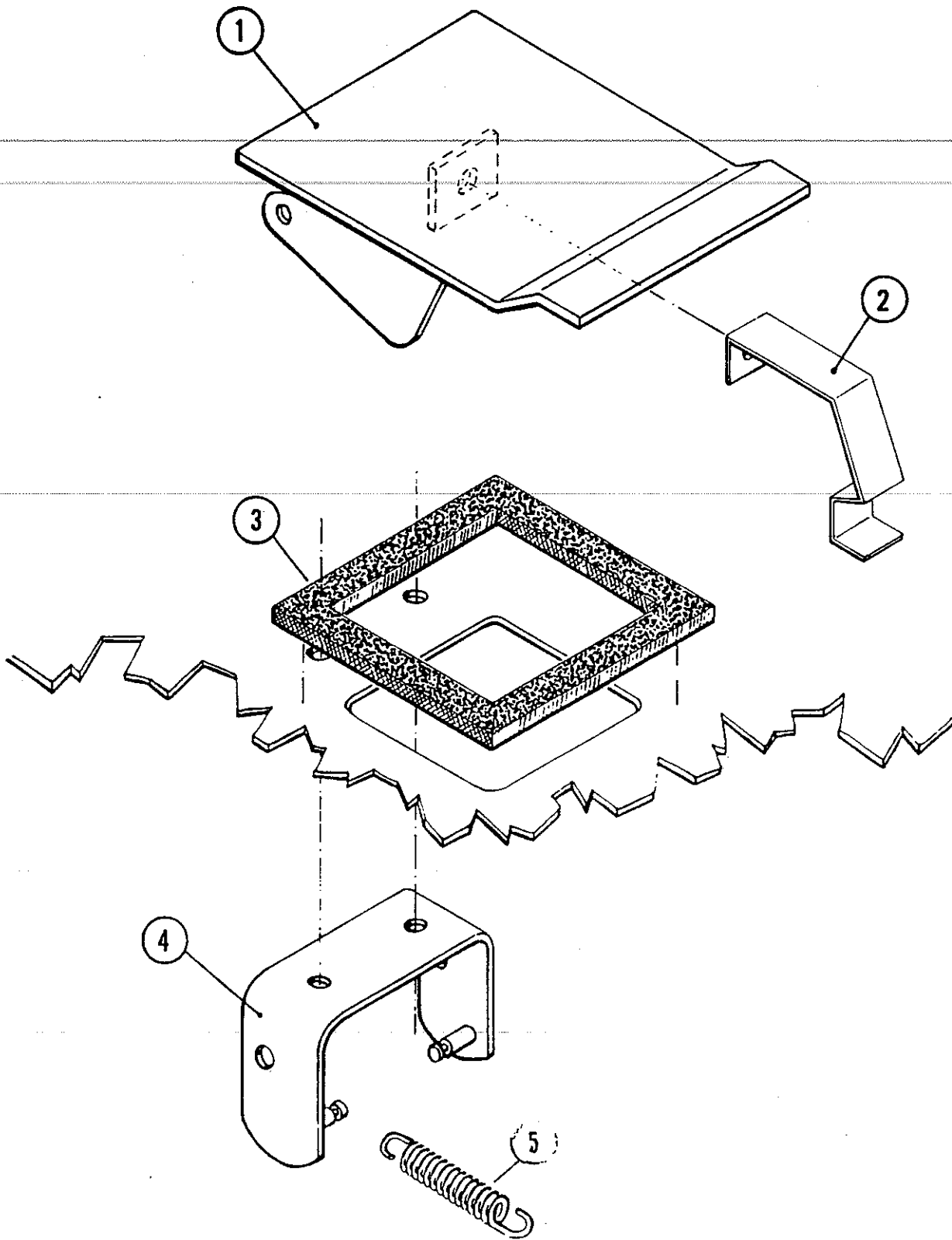


Figure 52. Wet Sweep Bypass

FIGURE & INDEX	PART NUMBER	DESCRIPTION
52		WET SWEEP BYPASS
-1	302273	Cover Assembly, Wet Sweep
-2	302312	Latch, Wet Sweep
-3	302317	Gasket, Wet Sweep
-4	302269	Bracket Assembly, Mounting, Wet Sweep
-5	302229	Spring, Ext Wet Sweep

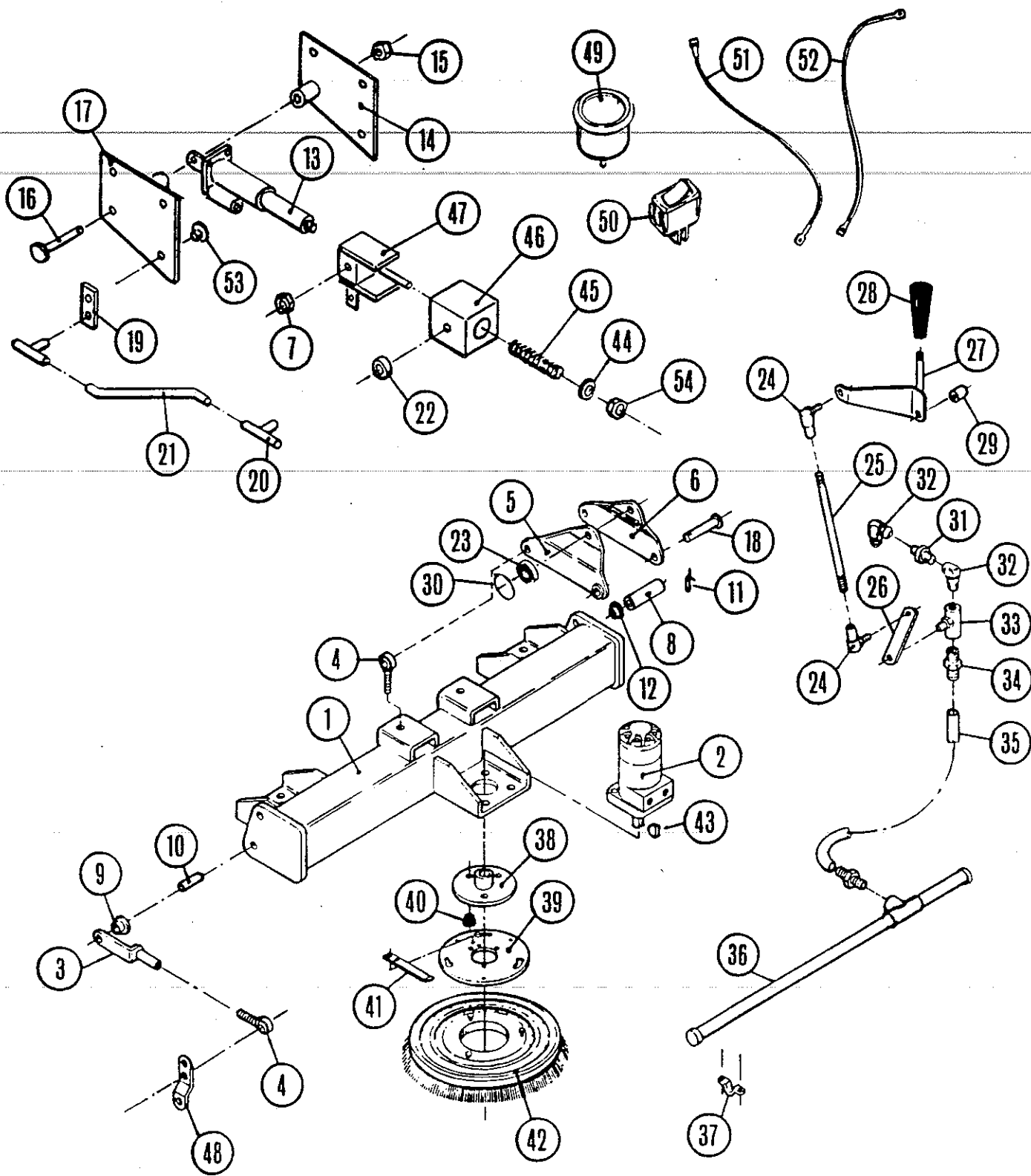


Figure 53. Scrubhead Lift and Solution Delivery

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
53			SCRUBHEAD LIFT AND SOLUTION DELIVERY SYSTEM
-1	303458	303459	Scrubhead Assembly, Electric
-2	301467		Motor, Hydraulic Scrubhead
-3	301089	303493	Lift Arm Assembly, Full
-4	300457		Ball, Joint, .50 Bore
-5	303239	303241	Lift Arm Assembly, Scrubhead Rt
-6	303238	303240	Lift Arm Assembly, Scrubhead Lft
-7	400317		Nut, Hex Jam
-8	301083		Pivot, Scrubhead
-9	300432		Bushing, Flanged
-10	302411		Sleeve, Lift Arm Spacer
-11	400124		Pin, Cotter, 5/8 Rue Ring
-12	300550		Bushing, Bronze Flanged
-13	302775		Actuator, Elec Scrubhead Lift
-14	303543		Mount Assembly, Elec Scrubhead LH
-15	400192		Nut, Hex, 5/8 - 11
-16	400302		Pin, Clevis, 1/2 x 5.00
-17	303544		Mount Assembly, Elec Scrubhead RH
-18	400111		Pin, Clevis, 5/8 x 6.00
-19	303299		Gauge Assembly, Lift Arm
-20	301199		Ball Joint, 1/4
-21	303296		Linkage, Scrubhead Gauge
-22	303224		Spacer, Elec Scrubhead Lift
-23	303219		Bearing, Spherical Plain
-24	300460		Ball Joint, 5/16
-25	301398		Rod, Solution Valve
-26	300027		Arm, Solution Valve
-27	301307		Lever Assembly, Solution Valve
-28	300558		Knob, Main Broom
-29	302420		Spacer, Lever Sol Valve
-30	303217		Ring, Ret, Int, .87
-31	301480		Fitting, Nipple, 3/4 NPT Brass
-32	301481		Fitting, 90° El 3/4 NPT
-33	300330		Valve, 2-Way Solution
-34	300802		Fitting, Adapter, 3/4 NPT
-35	300331		Hose, Solution Valve
-36	301473	301472	Tube Assembly, Sol Delivery

* When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

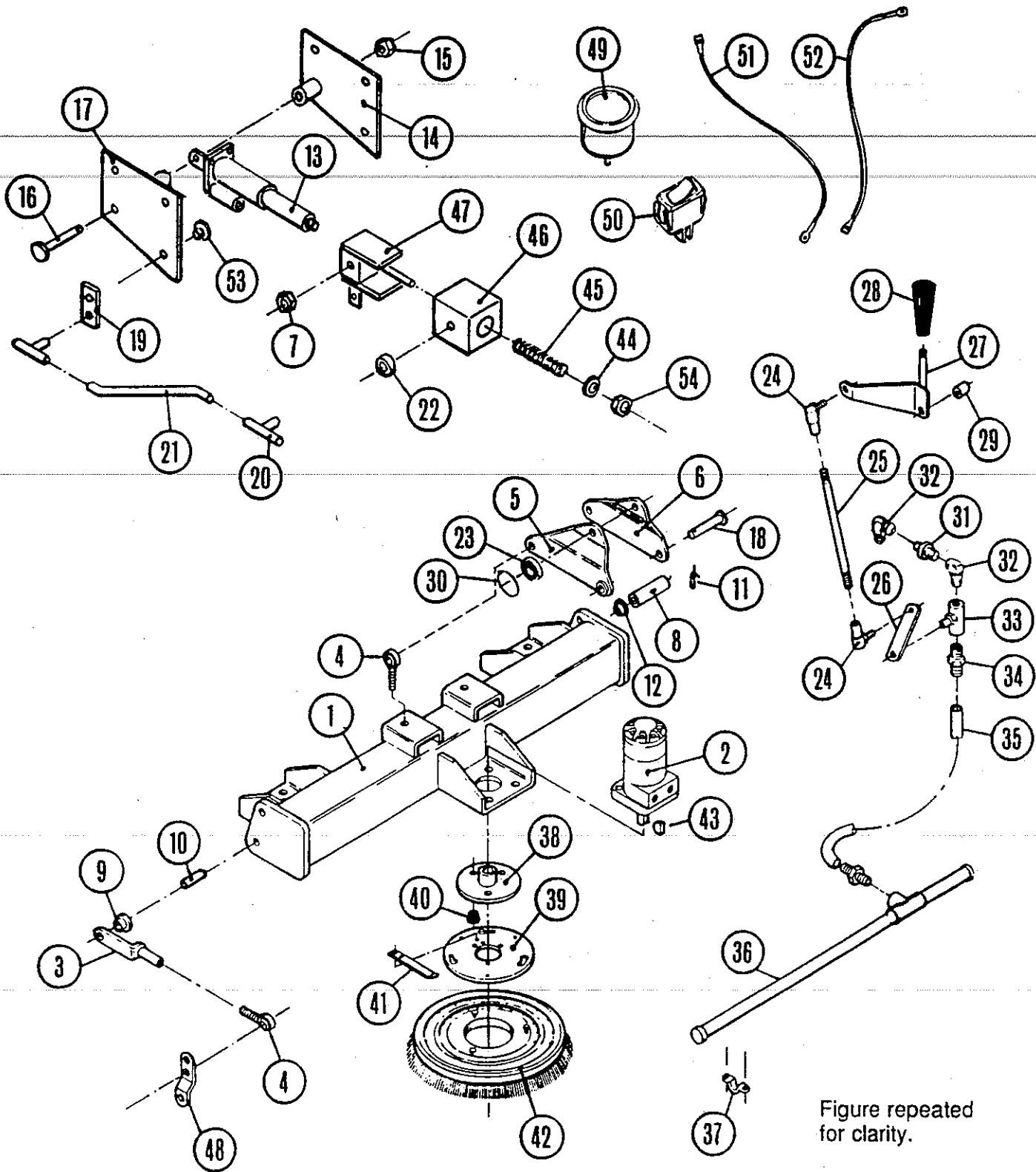


Figure 53. Scrubhead Lift and Solution Delivery

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
53			SCRUBHEAD LIFT AND SOLUTION DELIVERY SYSTEM
-37	300551		Clamp, 3/4
-38	300875		Hub Assembly, Scrub Brush
-39	301262		Plate, Gimbal Scrubhead
-40	300465		Mount, Isolation
-41	302058		Retainer, Brush
-42	300796	300795	Scrub Brush, Nylo-Grit
	300794	300793	Scrub Brush, Nylon
	300792	300791	Scrub Brush, Straight Wire
-43	302082		Key, Hydraulic Motor, Curb Broom
-44	303225		Retainer, Elec Scrubhead Lift
-45	303218		Spring, Compression 1.00
-46	303227		Block, Pressure, Scrubhead Lift
-47	303309		Pin Assembly, Scrubhead
-48	300913		Mount, Side Squeegee LH
-49	303258		Gauge, Elec Scrubhead
-50	303307		Switch, 2 PDT
-51	303467		Wiring Harness, Ignition Elec
-52	303308		Wiring Harness, Elec Scrubhead Lift
-53	303465		Potentiometer Assembly
-54	400188		Nut, Hex Jam, 1/2 - 20 Half ES
-55	300911		Mount, Side Squeegee RH (Not Shown)

* When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

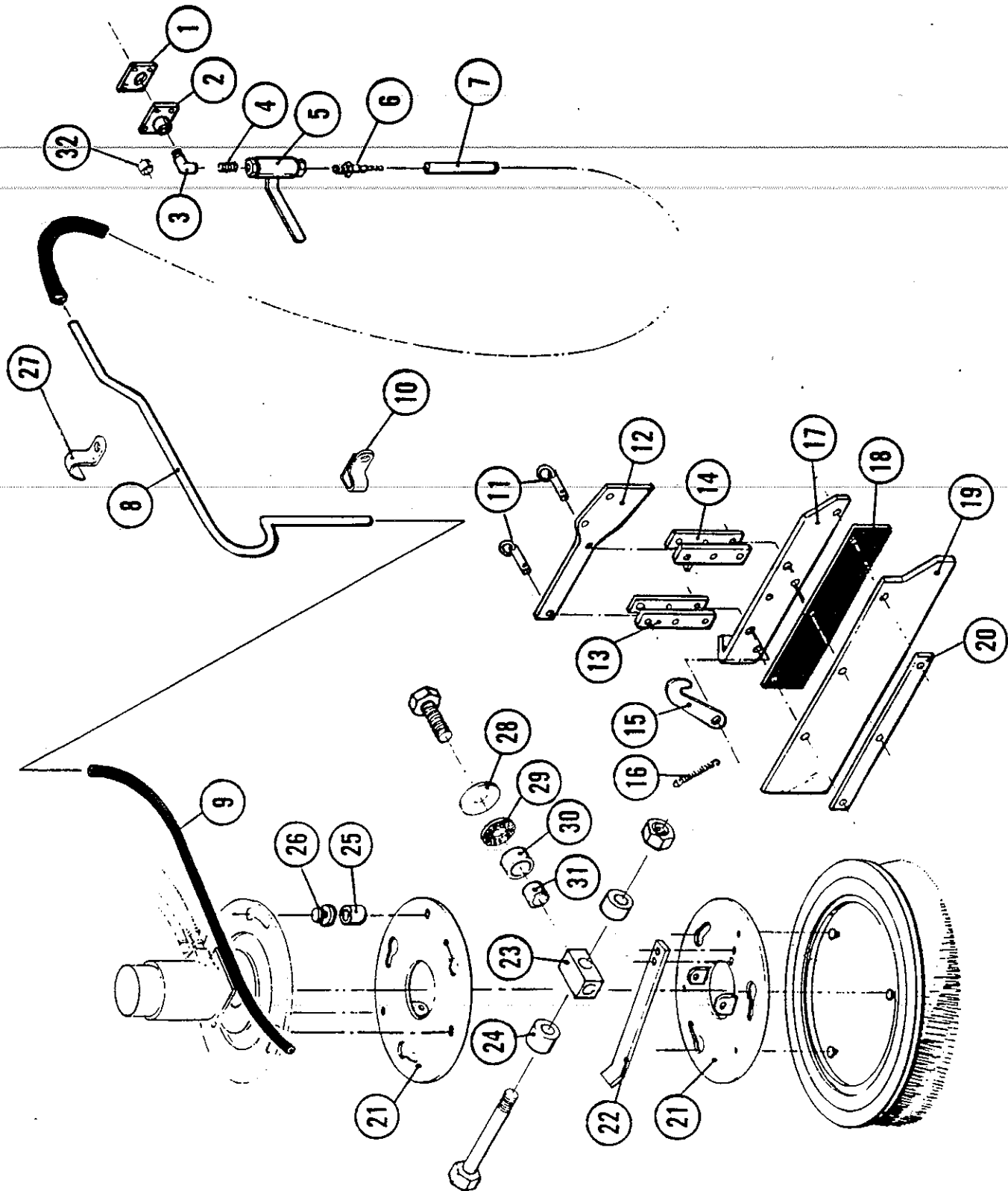


Figure 54. Side Scrub Brush

FIGURE & INDEX	PART NUMBER	DESCRIPTION
54		SIDE SCRUB BRUSH
-1	302547	Gasket, Valve Mount
-2	302536	Mount Assembly, Valve
-3	400260	Fitting, 1/4" NPT Street Elbow
-4	400240	Fitting, Nipple 1/4" NPT
-5	400241	Valve, Shut-Off
-6	400261	Fitting, Hose Barb 3/8"
-7	302544	Hose, Long 5/16" I.D.
-8	302141	Tube, Solution
-9	302433	Hose, Short 5/16" I.D.
-10	301558	Clamp, Fuel Line
-11	400126	Pin, Hitch 1/2" Dia x 1.50 Lg
-12	302138	Bracket, Upper
-13	302127	Linkage Assembly
-14	302129	Linkage Assembly, Adjustable Squeegee
-15	302132	Latch, Squeegee Linkage
-16	302147	Spring, Ext
-17	302140	Bracket, Lower
-18	302133	Backing
-19	302134	Squeegee
-20	302136	Strap
-21	302348	Plate Assembly, Gimbal
-22	302058	Retainer, Brush
-23	302425	Block, Pivot
-24	302427	Spacer, SSB .88 Lg
-25	302426	Spacer, SSB .62 Lg
-26	301512	Lug, Broom Mounting
-27	302543	Clamps
-28	400092	Washer, Fender
-29	400178	Bearing, Fiberglide
-30	300339	Sleeve
-31	300430	Bushing
-32	302249	Spacer, Nylon

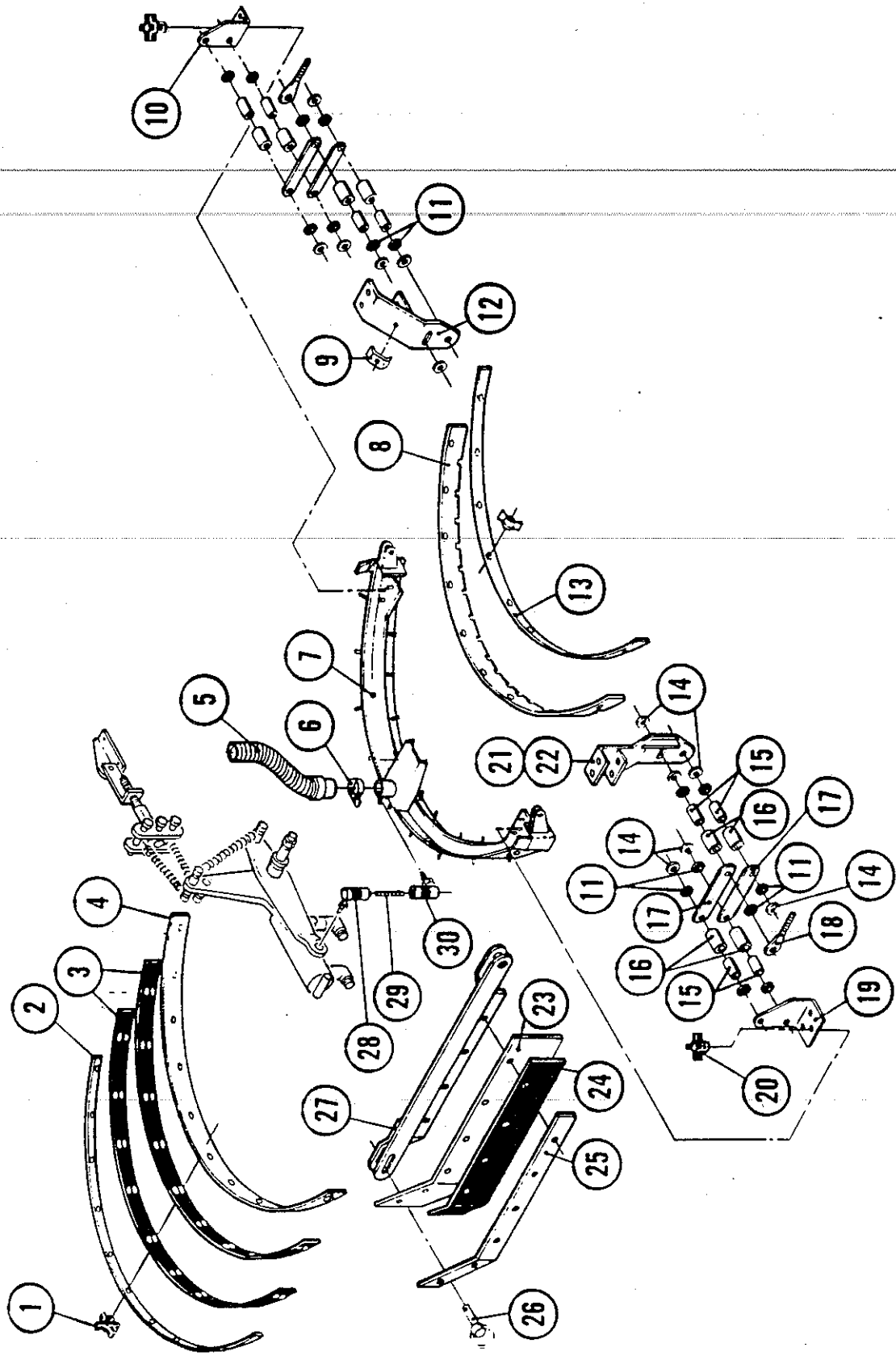


Figure 55. Squeegee

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
55			SQUEEGEE
-1	300564		Knob, 5/16"-18
-2	301296	301635	Strap, Squeegee Rear
-3	300334	301637	Strip, Back Up Rear
-4	300333	301636	Squeegee, Rear
-5	300335		Hose, Squeegee Pick Up
-6	300336		Clamp, Hose, 2 1/2"
-7	300266	301632	Frame Assembly, Squeegee
-8	300553	301633	Squeegee, Inner
-9	301437		Retainer, Hose
-10	301081 300961		Support, Squeegee Frame, (LH)
-11	400178		Bearing, Fiberglide, .50" ID x 1.00"
-12	300973		Mount Assembly, Squeegee Frame, (LH)
-13	300901	301634	Strap, Squeegee Inner
-14	400087		Washer, Flat, 3/8"
-15	300339		Sleeve, Fwd/Rev
-16	300430		Bushing, .499 x .594 O.D.
-17	300855		Arm, Squeegee
-18	300846		Link Assembly, Squeegee Adjustment
-19	300961 301081		Support, Squeegee Frame, (RH)
-20	302339		Knob, 5/16"-18
-21	300978		Mount Assembly, Squeegee (RH)
-22	300975		Bracket, Mount, Squeegee (RH)
-23	300328		Squeegee, Side, (RH & LH)
-24	302057		Backing, Side Squeegee, (RH & LH)
-25	300897		Strap, Side Squeegee
-26	400126		Pin, Hitch
-27	301255		Squeegee Assembly, Side (RH)
	301257		Squeegee Assembly, Side (LH)
-28	300461		Joint Assembly, Ball, 3/8"
-29	300853		Rod, Threaded
-30	300820		Joint Assembly, Ball

* When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

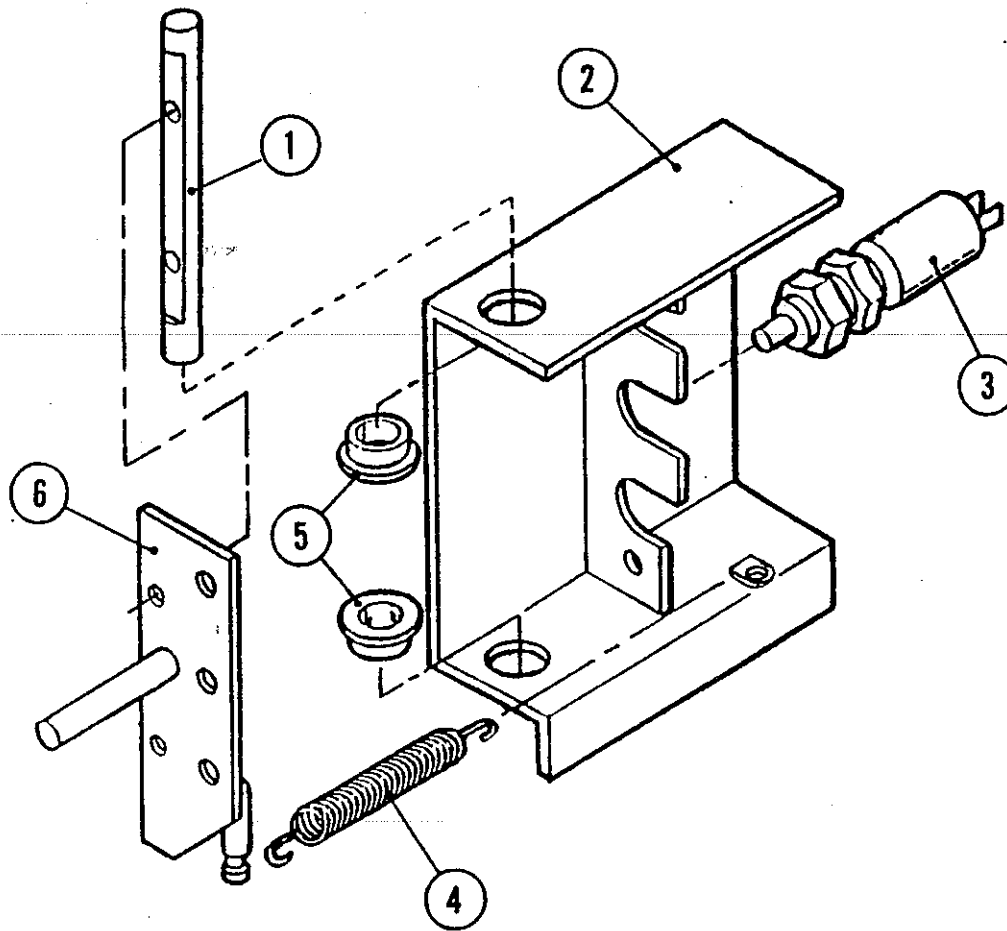


Figure 56. Squeegee Switch Box

FIGURE & INDEX	PART NUMBER	DESCRIPTION
56		SQUEEGEE SWITCH BOX
-1	303817	Bar, Plate Pivot
-2	303814	Box Assembly, Hydraulic Switch
-3	302678	Switch, Squeegee Lift
-4	304160	Spring, Extension, 2"
-5	304017	Bushing, Nylon
-6	303811	Plate Assembly, Switch

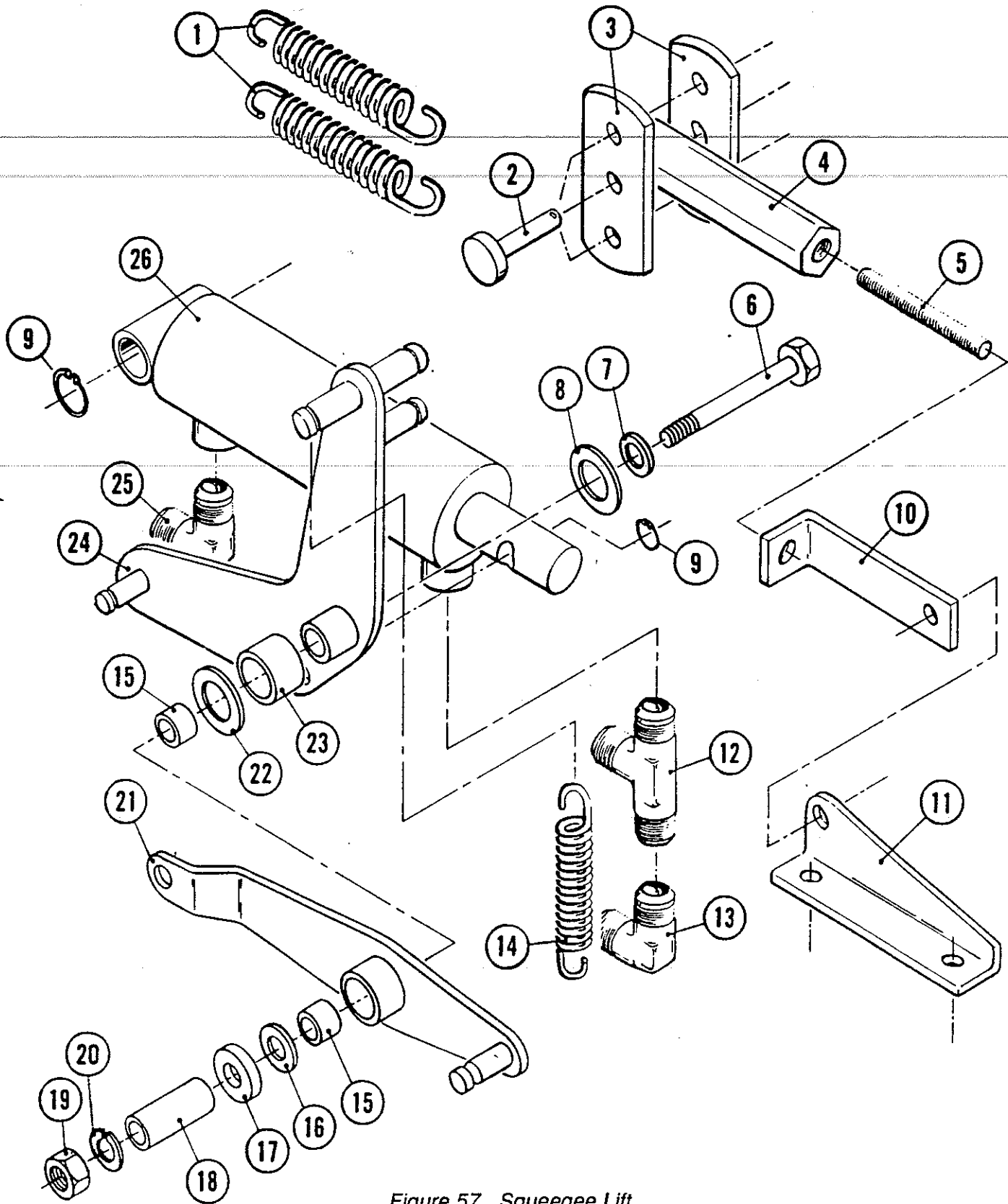


Figure 57. Squeegee Lift

FIGURE & INDEX	PART NUMBER	DESCRIPTION
57		SQUEEGEE LIFT
-1	301520	Spring, Extension Squeegee
-2	400185	Pin, Clevis, 5/16" Dia. x 1.25
-3	302676	Bar, Cable Adjustment
-4	300202	Bar, Cable Adjustment
-5	301393	Rod, Adjustment
-6	400370	Screw, HHM, 5/8-11 x 5.50
-7	400094	Washer, Flat
-8	303946	Washer, Fiberglide
-9	302207	Ring, Retaining, .50"
-10	301439	Bracket, Adjustment
-11	302690	Bracket, Squeegee Lift
-12	400162	Fitting, Offset Tee, 1/2-20 to #5
-13	400246	Fitting, Swivel 90° Elbow, #5 to 5/16" Tube
-14	302599	Spring, Extension Squeegee Lift
-15	303945	Bearing, Fiberglide
-16	303948	Washer, Fiberglide
-17	303937	Washer, Retainer
-18	303935	Bushing, Sleeve
-19	400192	Nut
-20	305382	Lockwasher
-21	303943	Arm Assembly, Squeegee Lift
-22	303947	Washer, Fiberglide
-23	303944	Bearing, Fiberglide
-24	303940	Arm Assembly, Pivot
-25	400152	Fitting, 90° Elbow, 1/2-20 to #5
-26	300141	Cylinder, Squeegee Lift

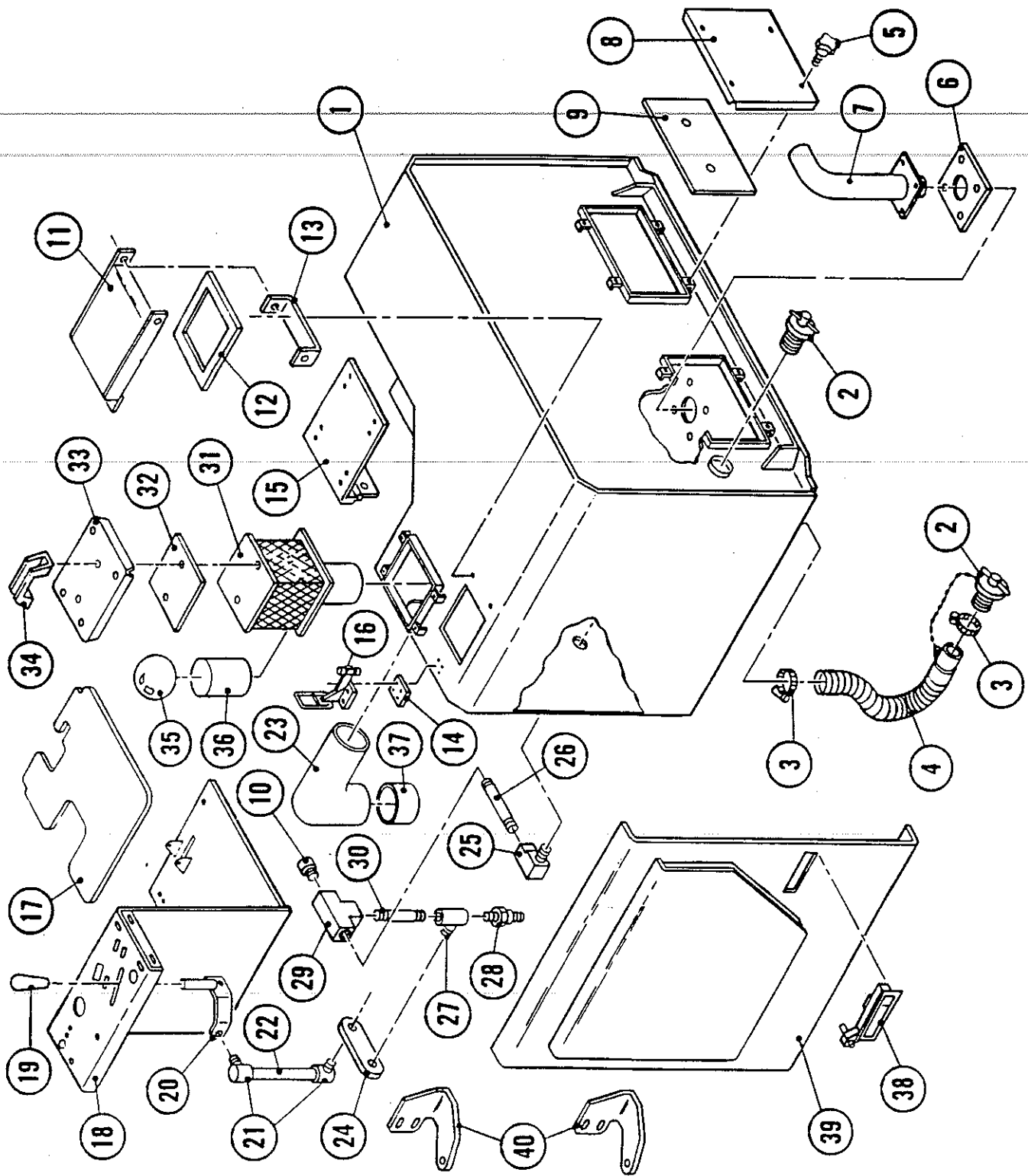


Figure 58. High Capacity Solution Tank

FIGURE & INDEX	PART NUMBER	DESCRIPTION
58		HIGH CAPACITY SOLUTION TANK
-1	304556	Tank Assembly, High Capacity
-2	300451	Plug, Adj. Closure
-3	300336	Clamp, Hose
-4	302480	Hose Assembly, Drain
-5	305871	Knob, Clamping
-6	300405	Gasket, Suction Tube
-7	304595	Tube Assembly, Suction
-8	300779	Door Assembly, Cleanout
-9	300403	Gasket, Cleanout Door
-10	400356	Fitting, 3/4 Pipe Plug Brass
-11	304580	Door Assembly, Fill
-12	304592	Gasket, Tank Water Inlet
-13	304589	Hinge, Fill Door
-14	304759	Spacer, Latch
-15	301312	Mount Assembly, Seat, Michigan Seat w/Armrest
	301770	Mount Assembly, Seat, Grammar Seat
-16	304934	Clamp, Fill Door
-17	300546	Pad, Anti Slip
-18	304573	Console Assembly
-19	300558	Knob
-20	306213	Lever Assembly, Solution Control
-21	300460	Joint, Ball, 5/16
-22	305458	Rod, Solution Valve
-23	305745	Adapter, 90° Elbow, Rubber 4.00 I.D.
-24	300027	Arm, Solution Valve
-25	400238	Fitting, 90° Elbow, 3/4 MPT 3/4 FPT
-26	400410	Fitting, Nipple, Brass 3/4 x 5.00
-27	300330	Valve, Solution
-28	300802	Fitting, Hose Barb
-29	400235	Fitting, Tee, 3/4 FPT Brass
-30	400411	Fitting, Nipple, Brass 3/4 x 1.50
-31	301270	Float Assembly
-32	301272	Gasket, Float Assembly
-33	301269	Cover, Tank Float
-34	301297	Handle
-35	300452	Ball
-36	300458	Float, Tank
-37	305750	Tube, Impeller Hose
-38	300380	Latch Assembly
-39	304584	Door Assembly, Side, Tank
-40	300968	Hinge, Scrubber
-41	305924	Hose, Tank Connector (Not Shown)

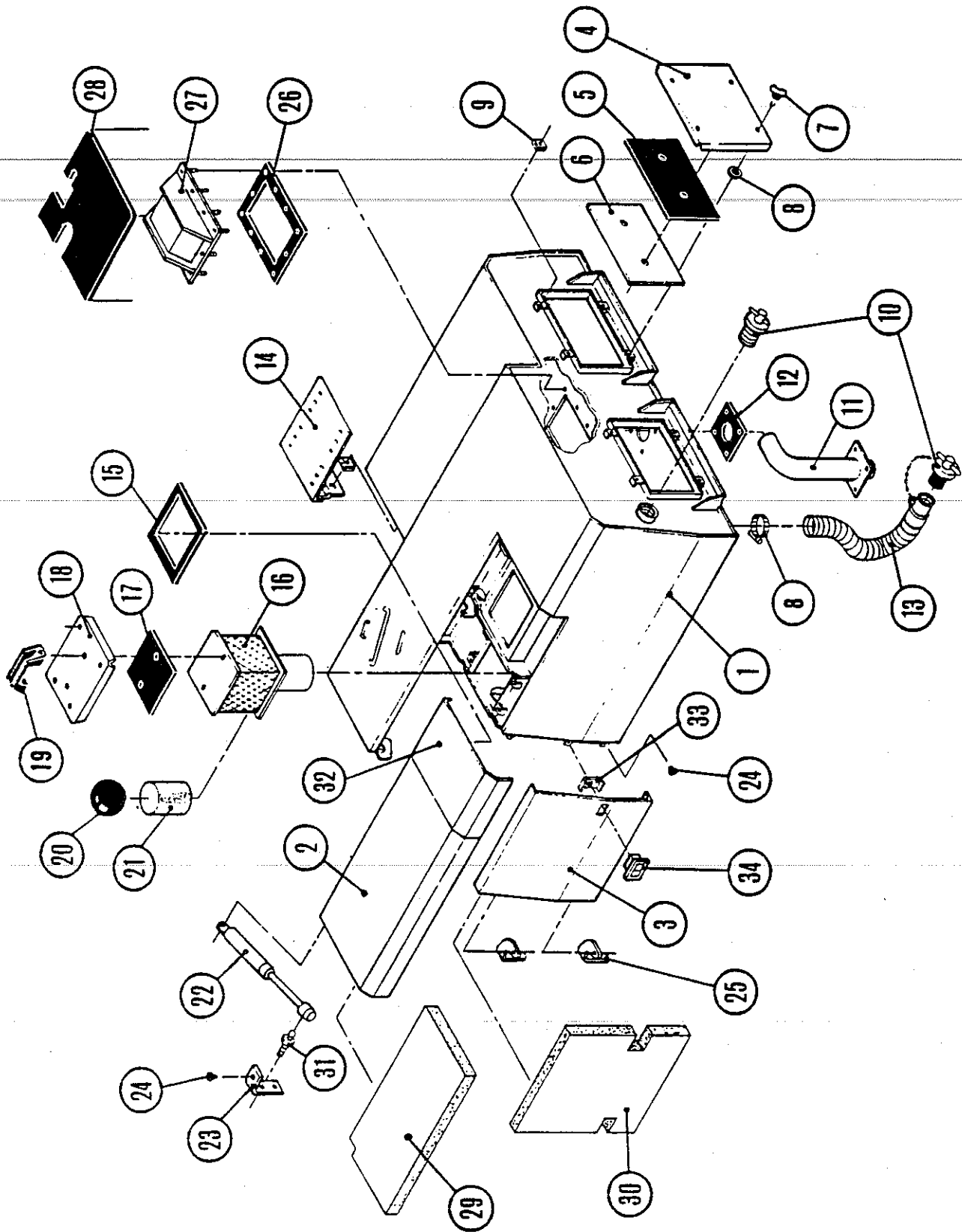


Figure 59. Full Size Solution Tank

FIGURE & INDEX	PART NUMBER	DESCRIPTION
59		FULL SIZE SOLUTION TANK
-1	301109	Tank Assembly, Cold-Rolled Steel
	300596	Tank Assembly, Stainless Steel
-2	301276	Door Assembly, Top, Scrubber
-3	301281	Door Assembly, Side, Scrubber
-4	300779	Door Assembly, Clean Out
-5	300403	Gasket, Clean Out Door
-6	300856	Plate Retainer, Clean Out Door
-7	305871	Knob, Clamping
-8	300336	Clamp, Hose
-9	301157	Clipnut
-10	300451	Plug, Adjustable Closure
-11	300046	Tube Assembly, Suction
-12	300405	Gasket, Suction Tube
-13	302480	Hose Assembly, Drain
-14	301312	Mount Assembly, Seat, Michigan Seat w/Armrest
	301770	Mount Assembly, Seat, Grammar Seat
-15	300404	Gasket, Tank Water Inlet
-16	301270	Float Assembly
-17	301272	Gasket, Float Assembly
-18	301269	Cover, Tank Float
-19	301297	Handle, Plastic
-20	300452	Ball, Plastic
-21	300458	Float, Tank
-22	300375	Gas, Spring, Cover
-23	300953	Stop, Top Cover
-24	300526	Bumper, Rubber
-25	300968	Hinge Assembly, Side Door
-26	300450	Gasket, Deflector Tank
-27	300988	Deflector Assembly, Tank (Stainless Steel)
-28	300546	Pad, Anti-Slip, Floor
-29	302070	Insulation, Top Scrubber Door
-30	302068	Insulation, Side Scrubber Door
-31	300376	Stud, Ball Gas Spring
-32	301766	Door Assembly, Top Fill (LP)
-33	302342	Retainer, Latch
-34	300380	Latch Assembly

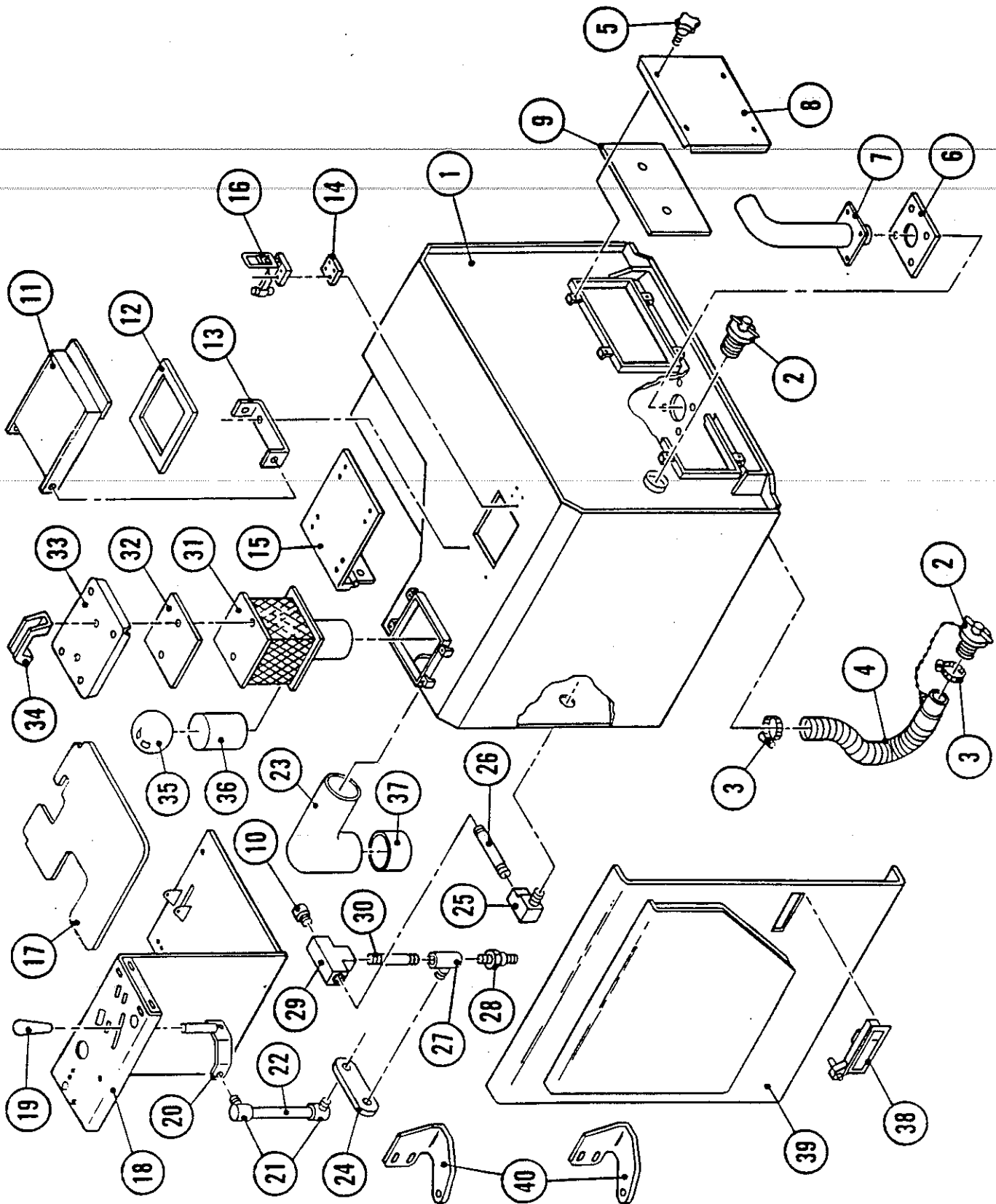


Figure 60. Mid Size Solution Tank

FIGURE & INDEX	PART NUMBER	DESCRIPTION
60		MID SIZE SOLUTION TANK
-1	305670	Tank Assembly, Stainless Steel
-2	300451	Plug, Adj. Closure
-3	300336	Clamp, Hose
-4	302480	Hose Assembly, Drain
-5	305871	Knob, Clamping
-6	300405	Gasket, Suction Tank
-7	304595	Tube Assembly, Suction
-8	300779	Door Assembly, Cleanout
-9	300403	Gasket, Cleanout Door
-10	400356	Fitting, 3/4" Pipe Plug Brass
-11	304580	Door Assembly, Fill
-12	304592	Gasket, Tank Water Inlet
-13	304589	Hinge, Fill Door
-14	304759	Spacer, Latch
-15	301312	Mount Assembly, Seat, Michigan Seat w/Armrest
	301770	Mount Assembly, Seat, Grammar Seat
-16	304934	Clamp, Fill Door
-17	300546	Pad, Anti-Slip
-18	304573	Console Assembly
-19	300558	Knob
-20	306213	Lever Assembly, Solution Control
-21	300460	Joint, Ball, 5/16
-22	305458	Rod, Solution Valve
-23	305745	Adapter, 90° Elbow Rubber 4.00 I.D.
-24	300027	Arm, Solution Valve
-25	400238	Fitting, 90° Elbow, 3/4 MPT - 3/4 FPT
-26	302504	Fitting, Nipple, Brass 3/4 x 4.00
-27	300330	Valve, Solution
-28	300802	Fitting, Hose Barb
-29	400235	Fitting, Tee 3/4 FPT Brass
-30	400411	Fitting, Nipple 3/4 x 1.50
-31	301270	Float Assembly
-32	301272	Gasket, Float Assembly
-33	301269	Cover, Tank Float
-34	301297	Handle
-35	300452	Ball
-36	300458	Float, Tank
-37	305750	Tube, Impeller Hose
-38	300380	Latch Assembly
-39	304584	Door Assembly, Side Tank
-40	300968	Hinge, Scrubber
-41	305925	Hose, Tank Connector (Not Shown)

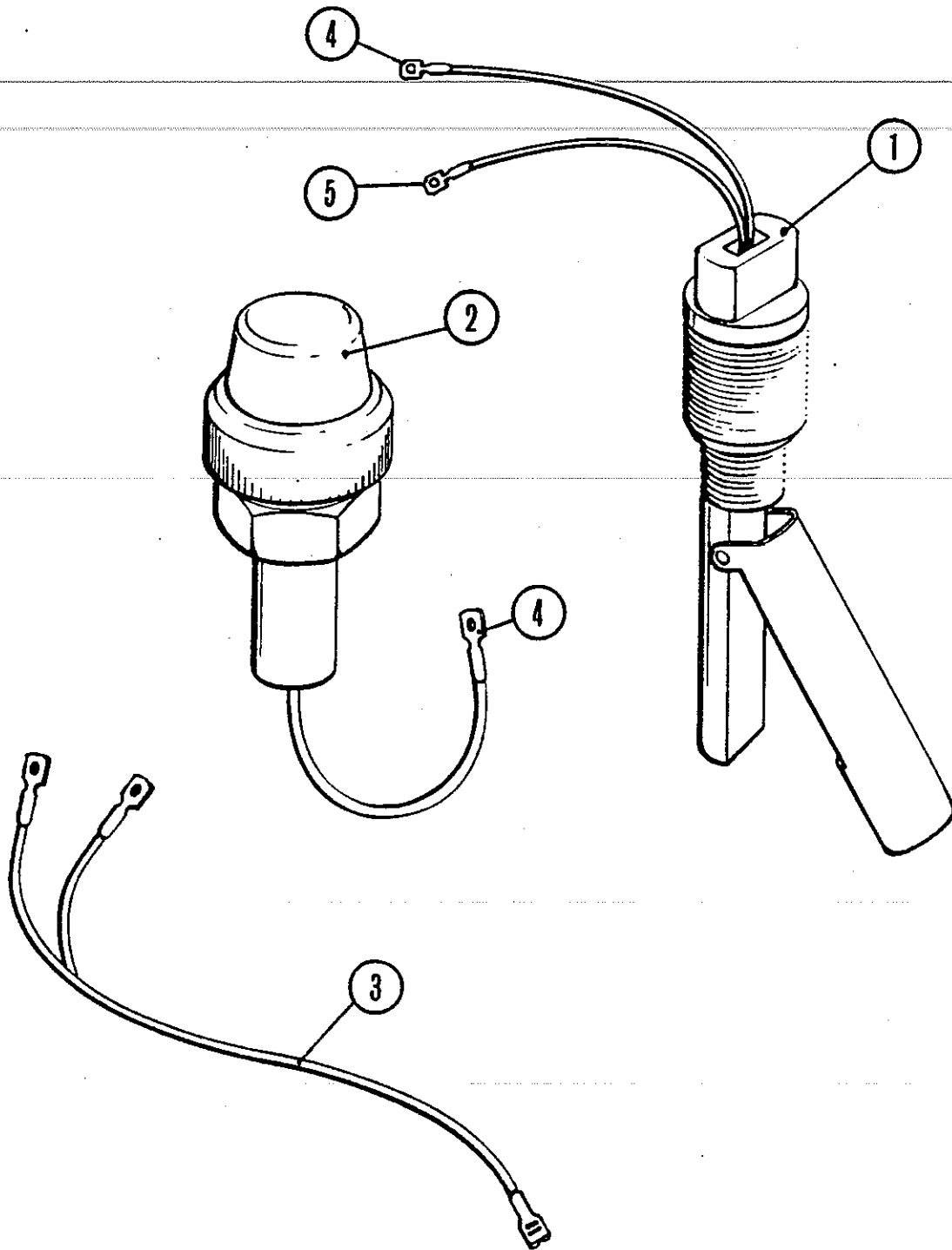


Figure 61. Solution and Recover Tank Level Indicator

FIGURE & INDEX	PART NUMBER	DESCRIPTION
61		SOLUTION AND RECOVERY TANK LEVEL INDICATOR
-1	302737	Switch, Level, Polysulfone
-2	301553	Light, Trash Relocator
-3	302749	Harness, Wiring
-4	302462	Terminal, Male Snap Plug
-5	302750	Terminal, Female Snap Plug

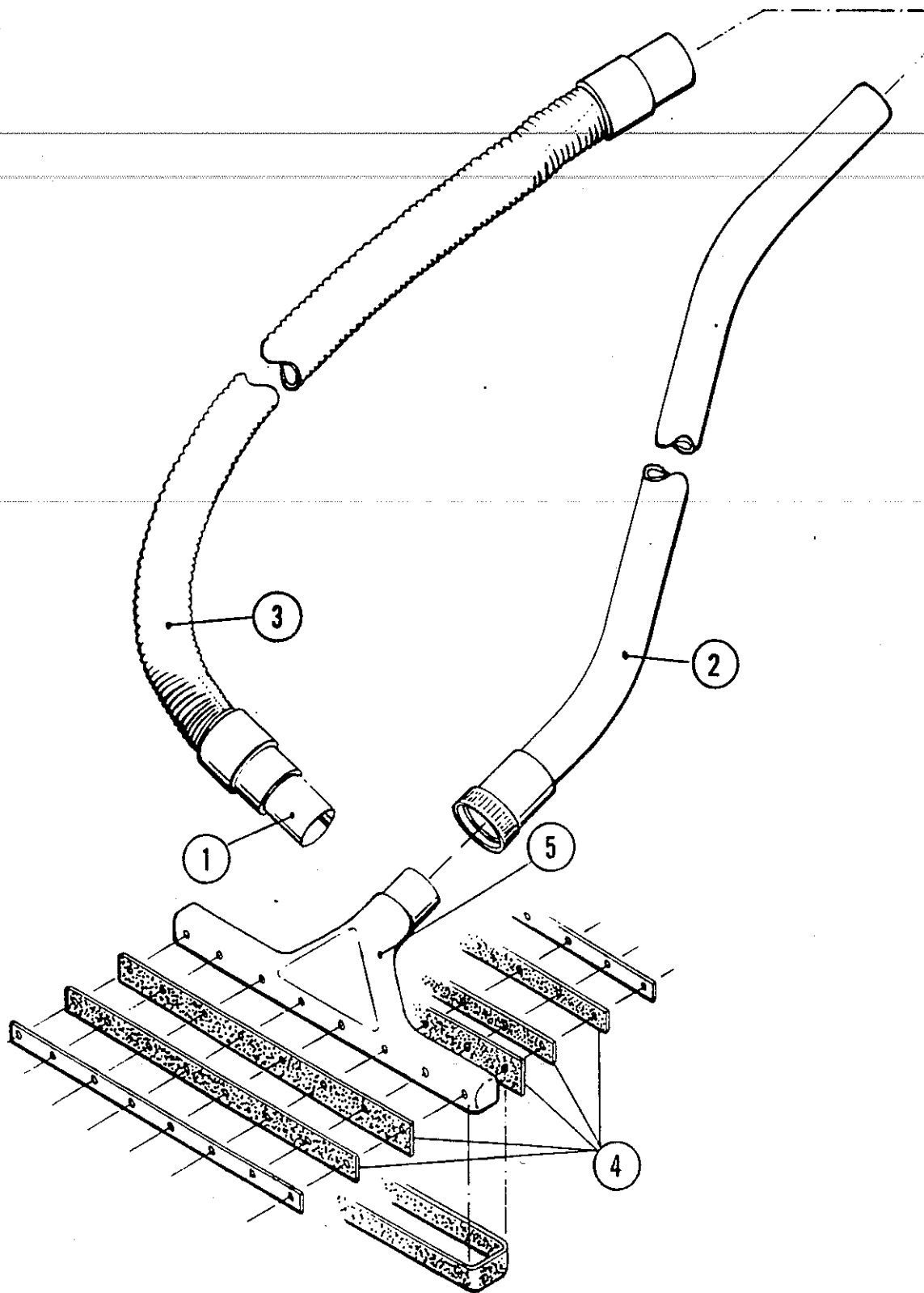


Figure 62. Squeegee Wand

FIGURE & INDEX	PART NUMBER	DESCRIPTION
62		SQUEEGEE WAND
-1	302773	Adaptor, Hose
-2	303557	Wand
-3	303556	Hose
-4	303555	Kit, Blades
-5	303558	Head Assembly, (w/Blades)

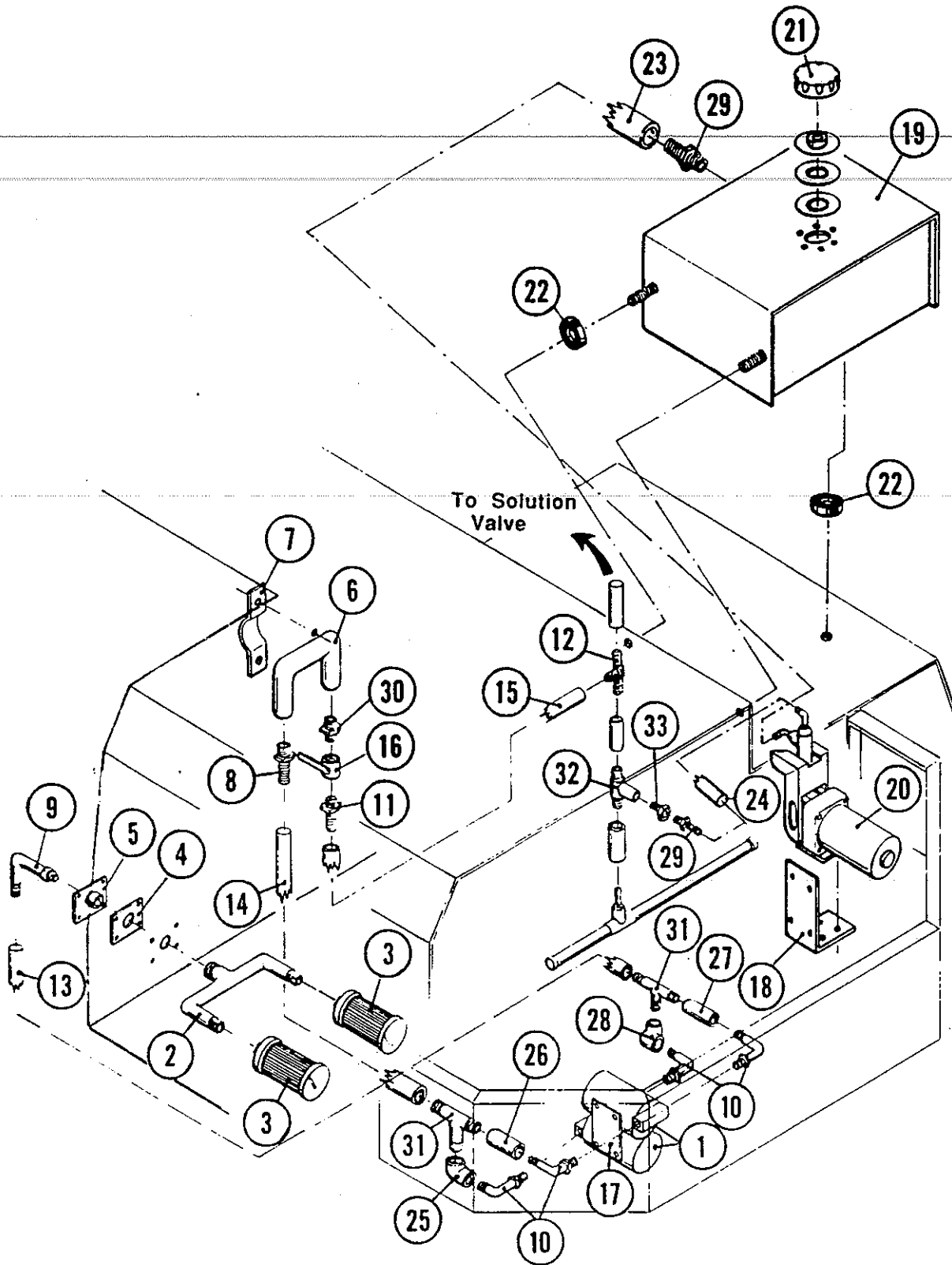


Figure 63. Water Recycling System

FIGURE & INDEX	PART NUMBER	DESCRIPTION
63		WATER RECYLING SYSTEM
-1	302243	Pump, Solution
-2	302725	Manifold Assembly
-3	300360	Strainer, Hydraulic Reservoir
-4	302962	Gasket, Tap
-5	302963	Tap Assembly
-6	302960	Loop Assembly
-7	302951	Clamp, Tube 1 1/2
-8	302952	Fitting, Adaptor 3/4 x 5/8
-9	302718	Fitting, 3/4 x 5/8 90° THD
-10	302719	Fitting, 3/8 x 5/8 90° THD
-11	300802	Adaptor, Male 3/4 x 3/4
-12	302950	Fitting, 3/4 Tee Hose Barb
-13	303331	Hose, Solution Delivery
-14	303332	Return, Solution
-15	302964	Hose, Delivery
-16	300330	Valve, Two Way Ball
-17	303191	Mount Assembly, Pump
-18	303194	Plate, Pump
-19	303213	Tank Assembly, Soap Solution
-20	303001	Pump, Metering, Bellows Type
-21	303310	Cap Assembly, Filler
-22	302482	Bumper, Seat Mount
-23	303333	Hose, Delivery Soap Tank
-24	303334	Hose, Solution Pump
-25	303335	Hose, Delivery
-26	303336	Hose, Delivery
-27	303351	Hose, Delivery Pump
-28	303352	Hose, Delivery Pump
-29	400261	Fitting, 1/4 NPT x 5/16 Hose Barb
-30	301480	Fitting, Nipple 3/4 NPT Brass
-31	303353	Fitting 5/8 Barb Tee
-32	303354	Fitting, 3/4 x 3/4 x 1/2 Branch Tee
-33	303355	Fitting, Reducer 1/2 NPT x 1/4 NPT

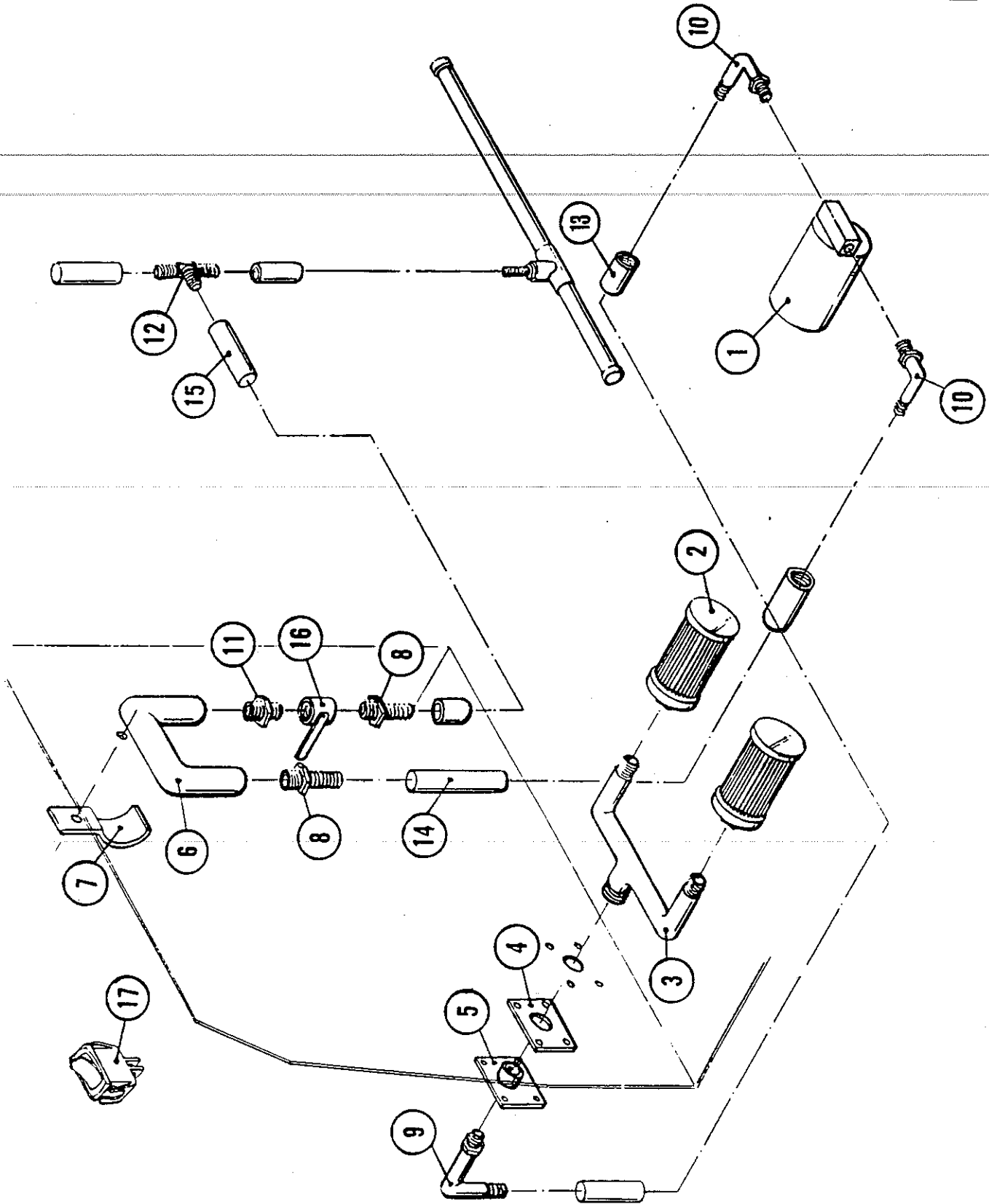


Figure 64. Extended Solution System

FIGURE & INDEX	PART NUMBER	DESCRIPTION
64		EXTENDED SOLUTION SYSTEM
-1	302243	Pump, Solution
-2	300360	Strainer, Hydraulic Reservoir
-3	302725	Manifold Assembly
-4	302962	Gasket, Tap
-5	302963	Tap Assembly
-6	302960	Loop Assembly
-7	302951	Clamp, Tube 1 5/16 Dia
-8	302952	Fitting, Adaptor 3/4 x 5/8
-9	302718	Fitting, 3/4 x 5/8 90° THD
-10	302719	Fitting, 3/8 x 5/8 90° THD
-11	301480	Fitting, Nipple
-12	302950	Fitting, 3/4 Tee Hose Barb
-13	202721	Hose, Solution Pump Inlet
-14	202722	Hose, Solution Pump Outlet
-15	302964	Hose, Delivery
-16	300330	Valve, Solution
-17	300442	Switch, Rocker Lights
	302965	Switch, Wiring Harness, Pump
	302966	Switch, Wiring Harness, Ignition

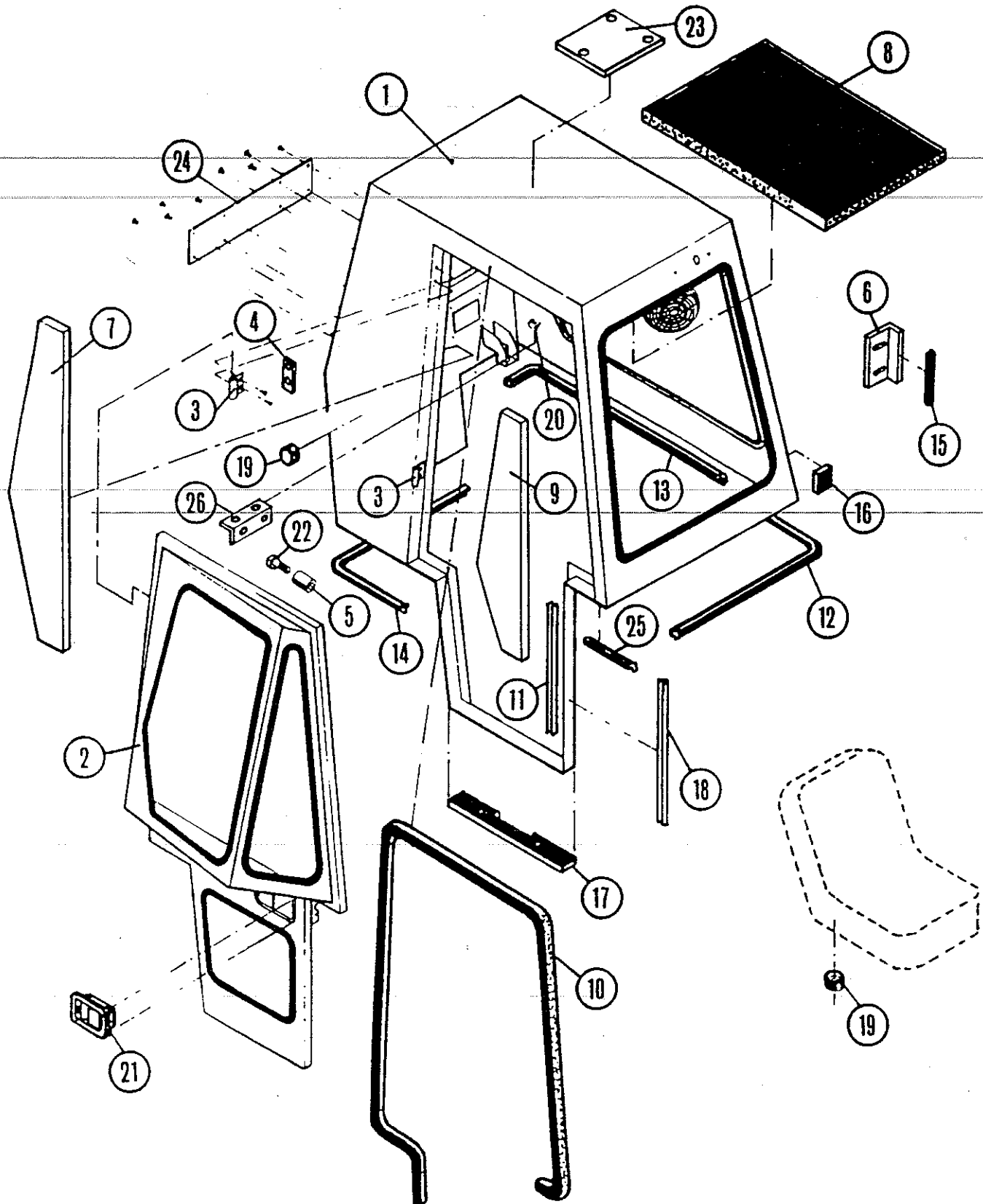


Figure 65. Cab

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
65			CAB
-1	302916		Frame Assembly, Cab
-2	302908		Door Assembly, Cab
-3	302877		Hinge Assembly
-4	302875		Spacer, Cab
-5	302857		Striker, Latch, Cab
-6	302882		Plate, Cab Filler
-7	302895		Insulation, Cab Door
-8	302888		Insulation, Cab Roof
-9	302887		Insulation, Cab Door
-10	302919		Seal, Cab Door
-11	302922		Seal, Cab Door Post
-12	302923		Seal, Cab, Bottom Front
-13	302924		Seal, Cab Bottom Left Hand
-14	302925		Seal, Cab Bottom Rear
-15	302926		Seal, Cab Filler Plate
-16	302928		Gasket, Frame, Short
-17	302929		Seal, Cab Foot Plate
-18	302927		Gasket, Cab Frame
-19	302482		Bumper, Seat Mount
-20	300465		Mount, Isolation
-21	302301		Latch, Cab
-22	302932		Bolt, Cab Latch
-23	303152		Plate, Cab Light Cover
-24	303153		Plate, Cab Pressurizer
-25	303141		Gasket, Cab Frame Lintel
-26	303293		Bracket, Sup Sub Seat Mount

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

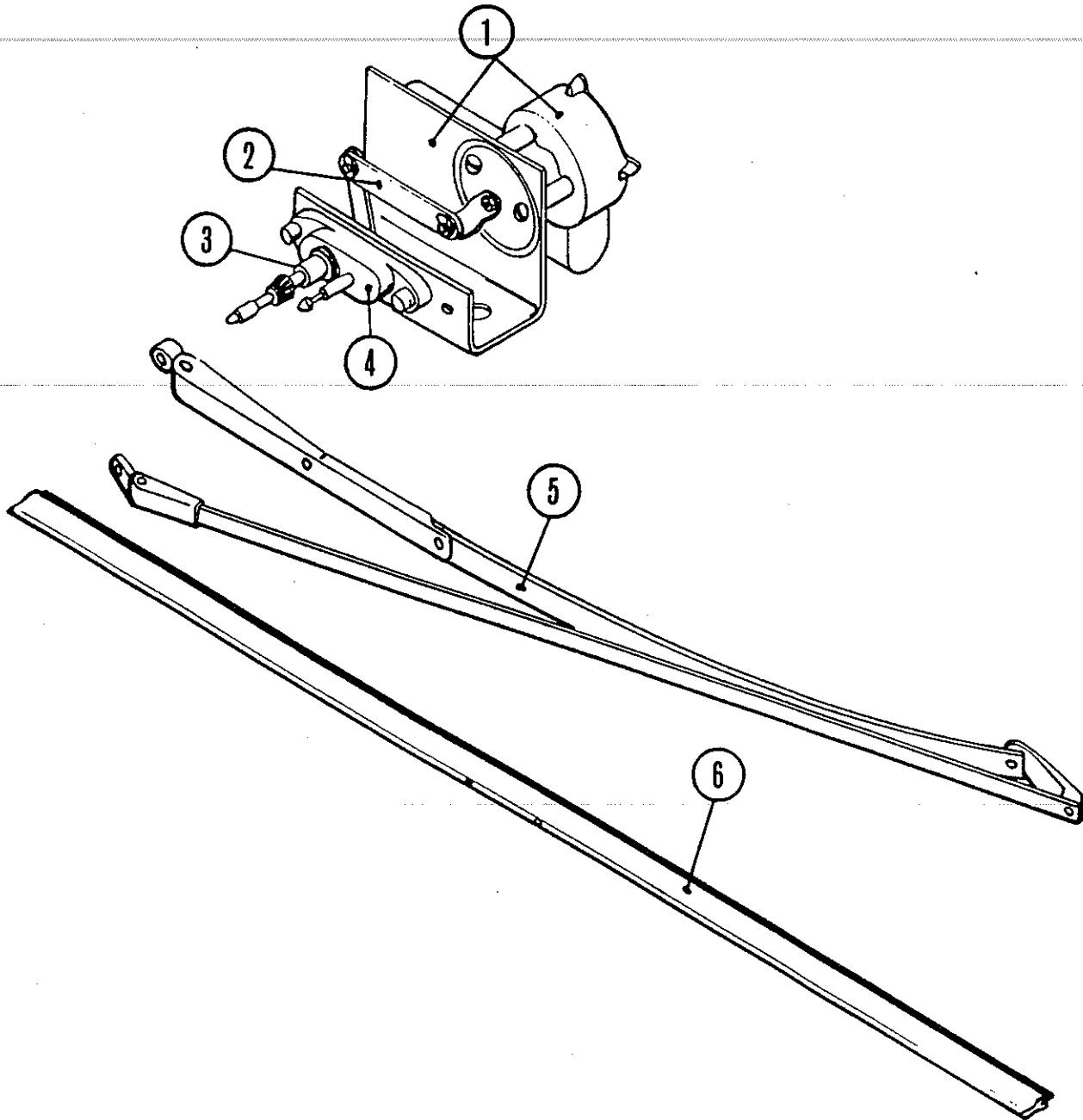


Figure 66. Windshield Wiper

FIGURE & INDEX	PART NUMBER	DESCRIPTION
66		WINDSHIELD WIPER
-1	303172	Kit, Wiper Motor
-2	303173	Arm, Wiper Drive
-3	303174	Shaft, Wiper Pivot
-4	303175	Kit, Pantograph Arm Adaptor
-5	303176	Arm, Wiper Fixed Length Pantograph
-6	303177	Blade, Wiper Flat

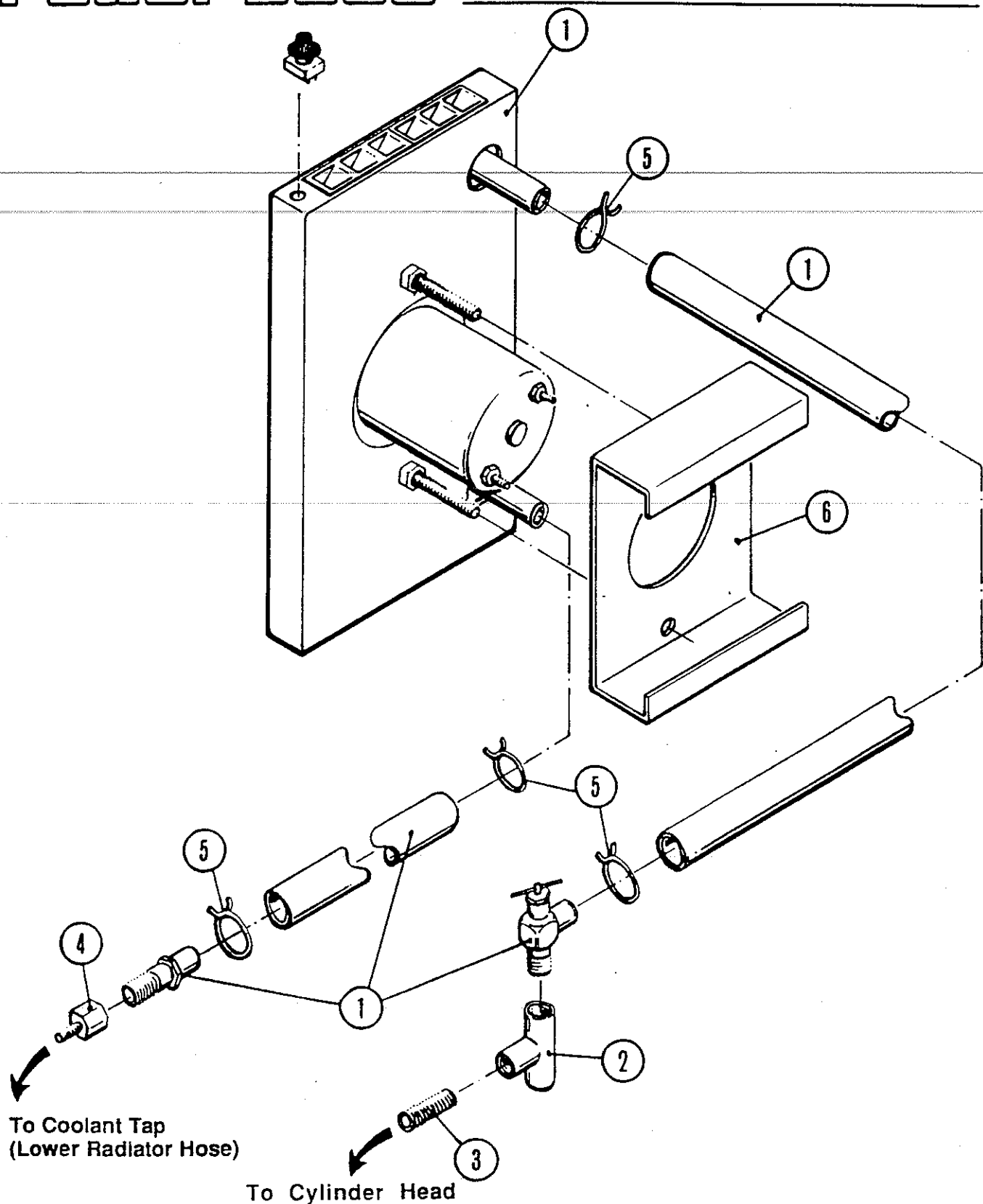


Figure 67. Heater/Defroster

FIGURE & INDEX	PART NUMBER	DESCRIPTION
67		HEATER/DEFROSTER
-1	302495	Heater, Cab
-2	303303	Fitting, Tee 3/8 NPT
-3	303304	Fitting, Nipple 3/8
-4	303302	Fitting, Reducer 3/8 NPT x 1/4 NPT
-5	302144	Clamp, Hose #6
-6	303251	Bracket, Heater Mount

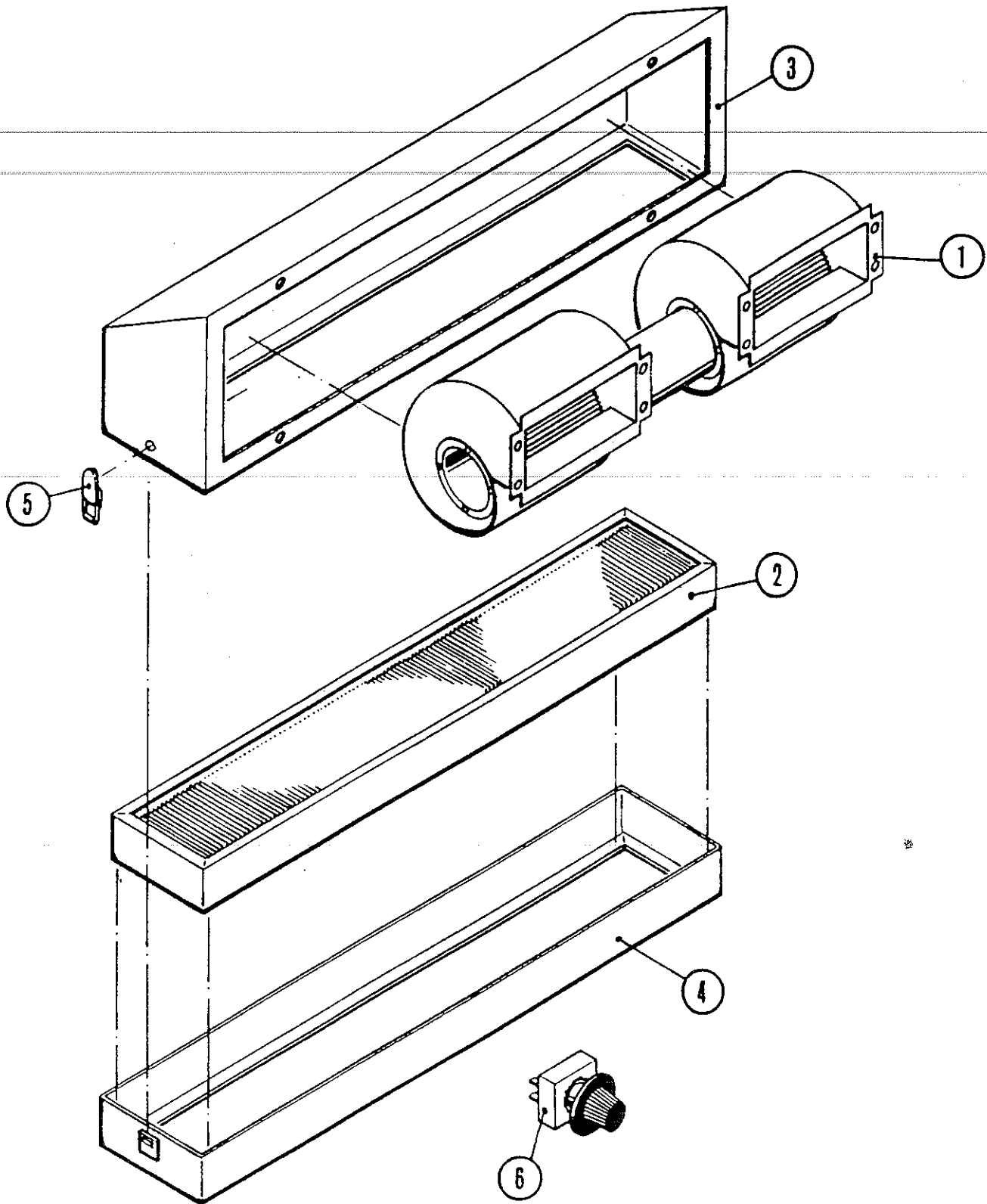


Figure 68. Cab Pressurizer

FIGURE & INDEX	PART NUMBER	DESCRIPTION
68		CAB PRESSURIZER
-1	302934	Pressurizer, Cab
-2	302936	Filter, Pressurizer
-3	303509	Housing Assembly, Cab Pressurizer
-4	303512	Retainer Assembly, Filter, Cab Pressurizer
-5	303513	Latch, Cab Pressurizer
-6	303072	Switch, 3-Speed

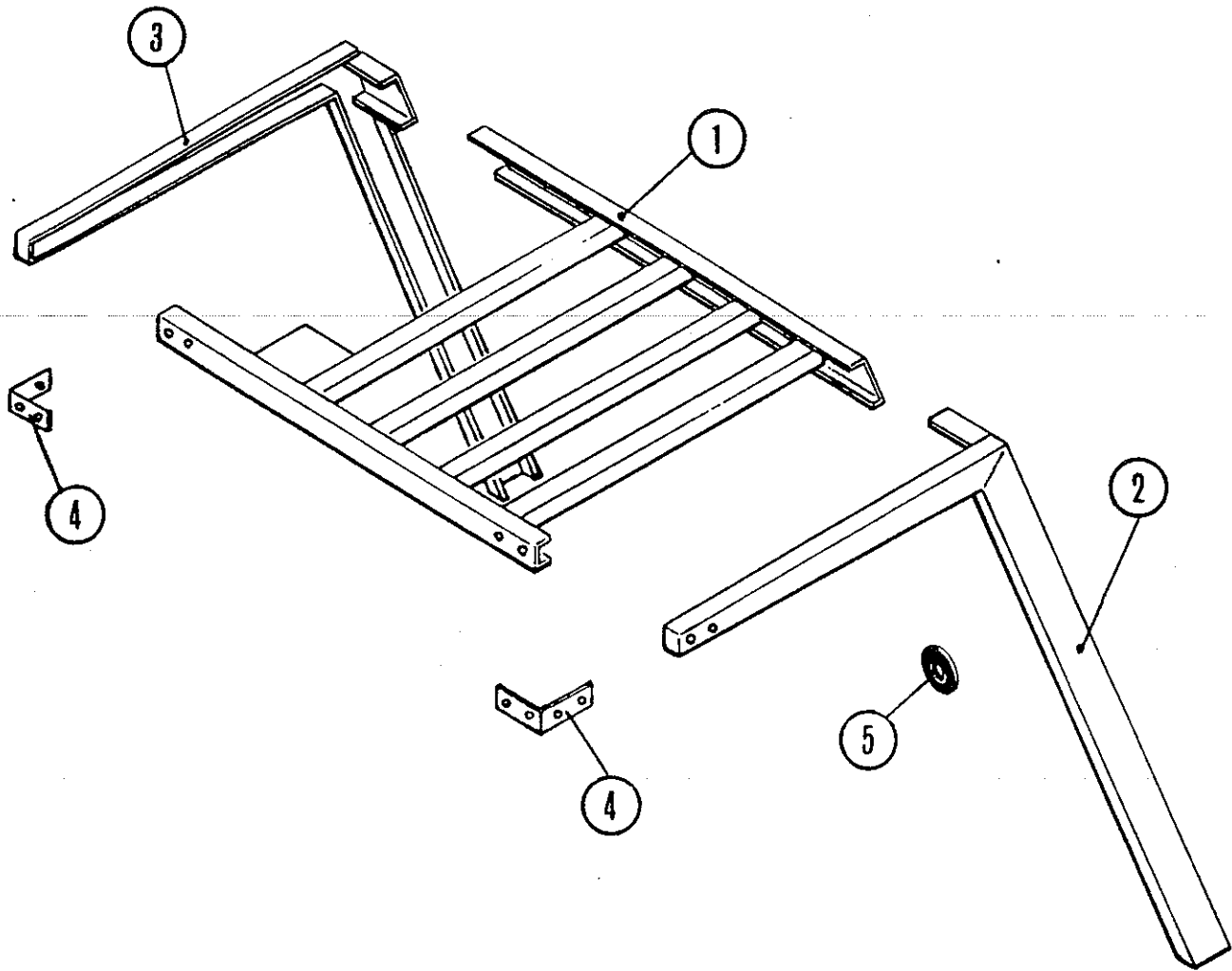


Figure 69. Overhead Guard

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
59			OVERHEAD GUARD
-1	300785	300784	Guard Assembly, Top, Overhead (Pntd)
-2	300763		Guard Assembly, RH Side, Overhead (Pntd)
-3	300762		Guard Assembly, LH Side, Overhead (Pntd)
-4	302708		Bracket, Corner, Overhead Guard (Pntd)
-5	400203		Washer, Neoprene .41 x 2.00 O.D.

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.

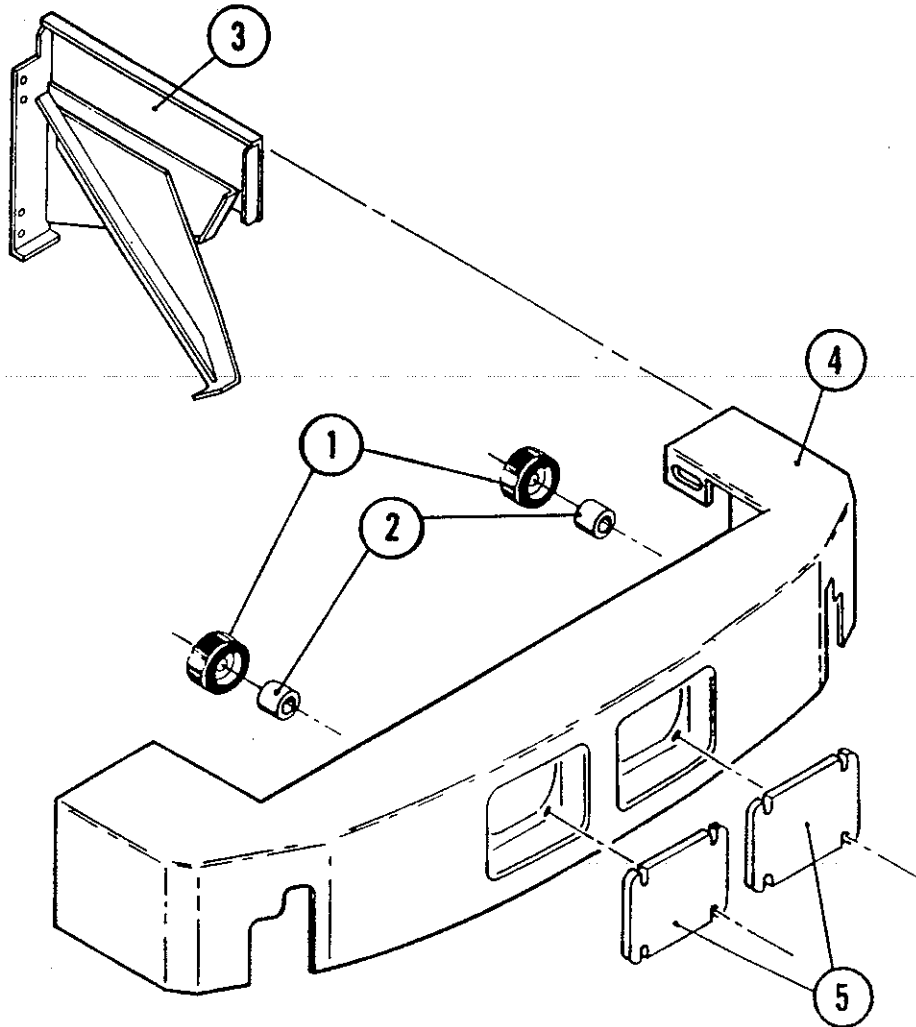


Figure 70. Front Bumper (TSS & SW Models)

FIGURE & INDEX	PART NUMBER		DESCRIPTION
	90 SERIES	80 SERIES*	
70			FRONT BUMPER (TSS MODELS)
-1	300338		Bumper, Rubber
-2	301085		Spacer, Front Bumper
-3	301687		Leg Assembly, Safety (HD)
	305543		Extension Assembly, Frame (LD)
-4	301042	301038	Bumper Assembly, Front
-5	301662		Filter, Headlight
-6	304624		Bumper, Rubber Cap (Not Illustrated)
-7	400355		Screw, Level Bolt (Not Illustrated)

When no part number appears in this column, the part number for the 80 Series is the same as that for the 90 Series.



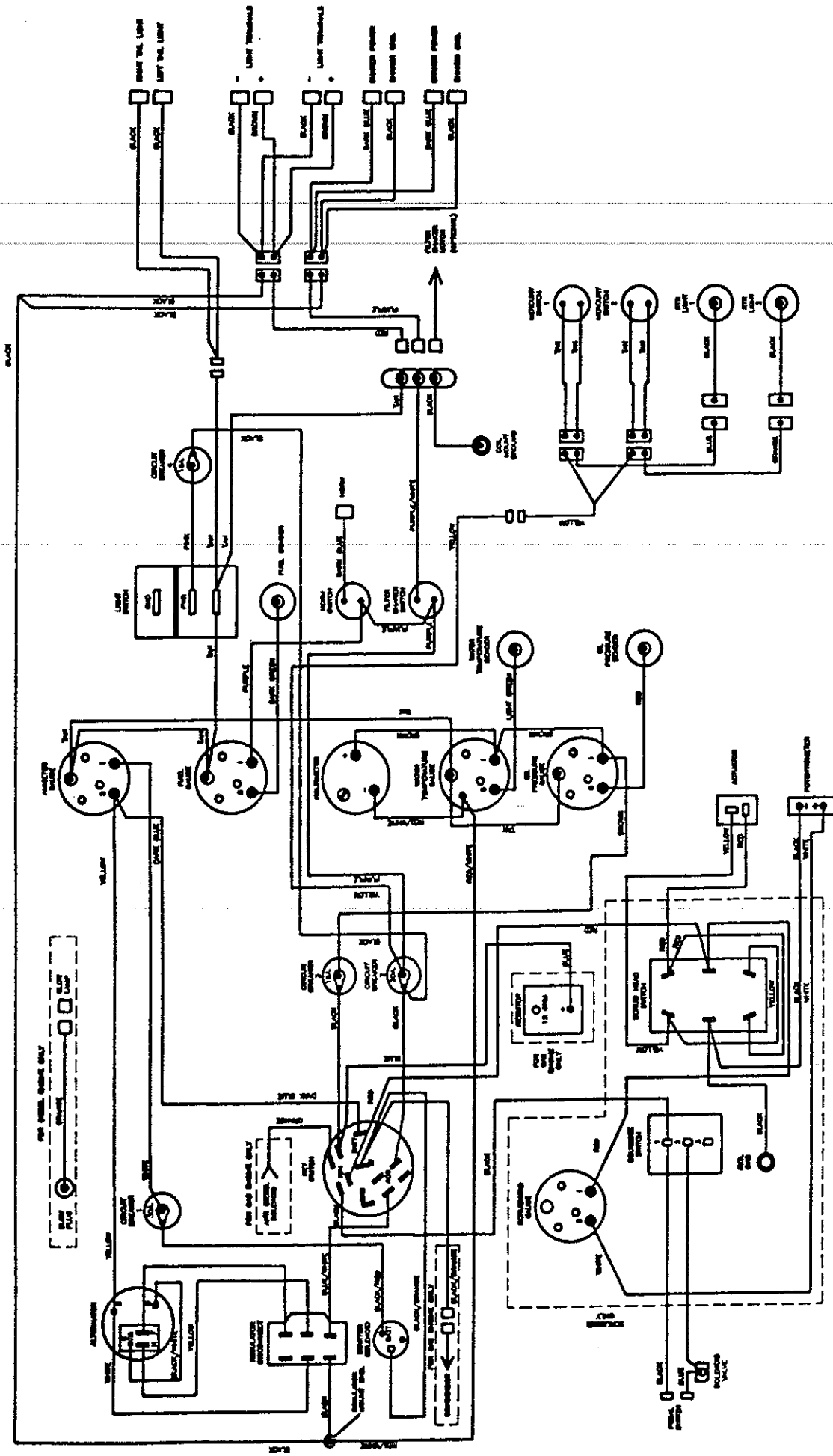
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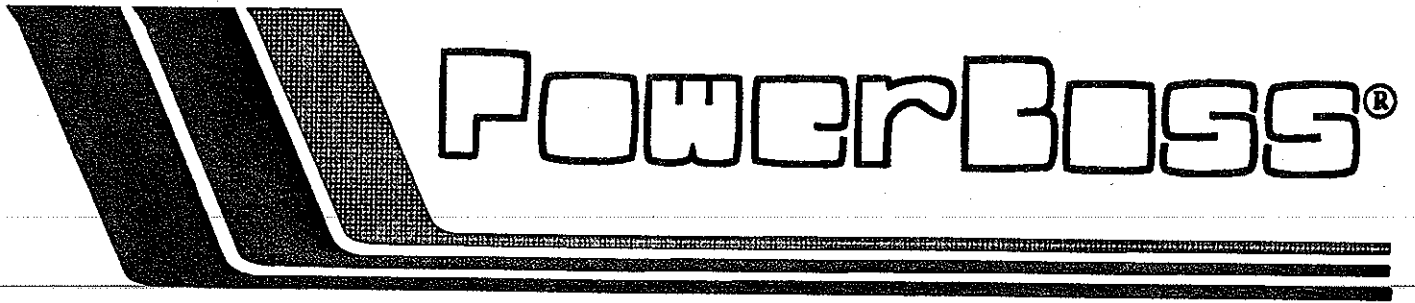


60/40 SERIES POWERBOOST
Wiring Diagram

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82 SERIES SWEEPER / SCRUBBER

TSS/82

Standard Model

Deluxe Model

Stainless Steel Tanks Model

ISS/82

Standard Model

Deluxe Model

Stainless Steel Tanks Model

CSS/82

Standard Model

Deluxe Model

Stainless Steel Tanks Model

OPERATION, MAINTENANCE & PARTS



AAR POWERBOSS

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AUGUST '91

PowerBoss[®]

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PowerBoss®

(LIMITED) PRODUCT WARRANTY (NORTH AMERICA ONLY)

AAR PowerBoss warrants that the PowerBoss machine will be free from defects in material and workmanship for a period of 24 months or 2,000 operating hours on rider units, 12 months or 500 operating hours on walk-behind units from date of installation, whichever comes first. Written notice of any claimed defect must be given to AAR within the warranty period and within thirty (30) days after such defect is discovered. Liability under this warranty is limited to either replacing or repairing, at AAR's election, any part or parts deemed defective after examination by AAR or an Authorized Service Representative. Any PowerBoss machine or any of its parts returned by customer to AAR or an Authorized Service Representative via prepaid transportation and which is found to be defective, will be repaired or replaced and returned to customer via prepaid surface transportation within the Continental U.S. On the other hand, should a part be found not defective, inspection and handling charges may be charged to the customer by AAR or an Authorized Service Representative.

For one hundred eighty (180) days from date of installation, AAR will provide repair labor, at no charge, solely through an Authorized Service Representative. Thereafter, labor will be charged.

This warranty does not extend to any PowerBoss machine, or its parts, that have been subject to misuse, accident or improper handling, installation, maintenance or application, nor does it extend to PowerBoss machine and/or parts which have been repaired or altered outside AAR's plant or the facility of Authorized Service Representative.

This warranty does not apply to routine wearable parts of the PowerBoss machine such as brushes, flaps, filters, seals, points, plugs, hoses or similar items. Moreover, this warranty does not extend to any PowerBoss machine or part replaced or repaired under this warranty.

Only replacement parts supplied by AAR are warranted for 30 days after installation.

The warranty for optional engines shall be limited to the warranty extended to AAR by the supplier.

THE WARRANTY SET FORTH HEREIN IS IN LIEU OF AND EXCLUDES ANY AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND CUSTOMER WAIVES ANY OBLIGATION OR LIABILITY OF AAR ARISING IN TORT OR STRICT LIABILITY IN TORT, OR FOR LOSS OR USE, REVENUE OR PROFIT WITH RESPECT TO PowerBoss MACHINE AND/OR PARTS FOR ANY LIABILITY OF CUSTOMER TO ANY THIRD PARTY, OR FOR OTHER DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES.

PowerBoss®

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SAFETY SYMBOLS

All PowerBoss sweepers and sweeper/scrubbers have been built with safety as a top priority. The safety information given in this manual is for the protection of the operator, the maintenance personnel and the equipment. Notice and strictly adhere to all safety instructions given in this manual.

Five symbols are used throughout this manual to emphasize various levels of safety information. These symbols and the meaning of each are listed below.



DANGER: To warn of immediate hazards which will result in severe personal injury or death.



WARNING: To warn of hazards or unsafe practices which could result in severe personal injury or death.



CAUTION: To warn of hazards or unsafe practices which could result in minor personal injury.



ATTENTION! To warn of practices which could result in extensive equipment damage.



NOTE: To direct your attention to important equipment information or special instructions for preventing damage to equipment.

Symbols at the top of the list are the strongest warnings. However, all symbols represent important information which should be observed to protect you and others from harm and injury, and to prevent damage to equipment.

SAFETY DECALS

Decals directly attached to various parts of the sweeper are highly visible safety reminders which should be read and observed. Make sure the decals are replaced if they become illegible or damaged. The decal below is located in the drive compartment. Other decals on your machine appear on the next page.

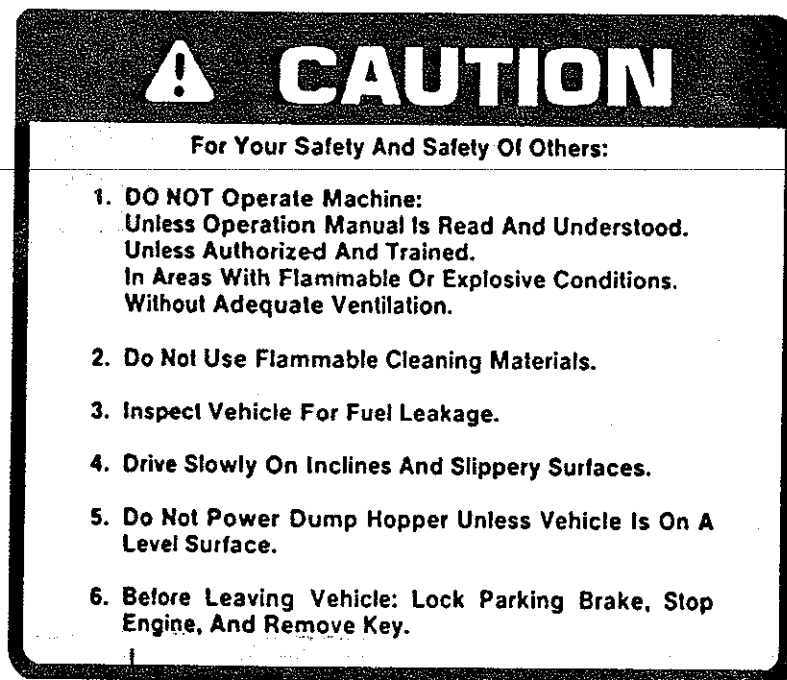


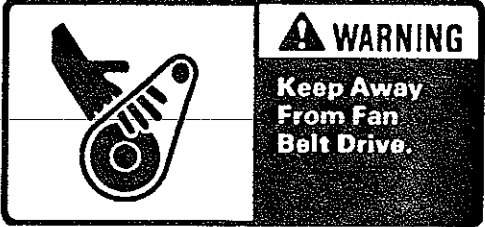
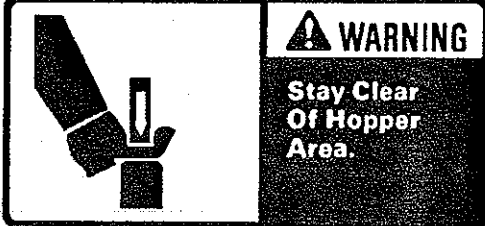
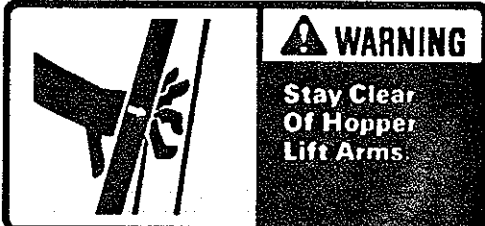



Figure 2

Part Number 301854

SAFETY DECALS

<p>SOLUTION TANK</p>  <p>Part Number 301733</p> <p>Part Number 301729</p> <p>Part Number 301730</p>	<p>IMPELLER</p>  <p>IMPELLER</p> 
<p>HIGH DUMP & LOW DUMP HOPPER</p>  <p>Part Number 301731</p>	<p>HIGH DUMP HOPPER</p>  <p>Part Number 301732</p>
<p>SHROUD OF RADIATOR</p>  <p>Part Number 301728</p>	

GENERAL INSTRUCTIONS

To ensure the safety of both the operator and the equipment, the sweeper/scrubber should be operated and maintained by only trained authorized personnel. All malfunctioning equipment should be removed from service until any necessary repairs and adjustments have been completed.

The following DANGER, WARNING, CAUTION and ATTENTION comments should be observed at all times.

DANGER

1. Keep cigarettes, matches and all other flame sources away from the sweeper/scrubber. Gasoline, LP gas and diesel fuel are highly flammable. Lead acid batteries are equally dangerous due to the highly explosive hydrogen gas they emit.

WARNING

1. Before starting the engine, make sure that:
 - You are securely seated in the operator's seat.
 - The parking brake is locked.
 - The directional control pedal is in neutral.
 - The throttle is in idle.
 - Hydraulic controls are in OFF position.
 2. During operation:
 - Keep your hands and body clear of moving parts, especially when the hopper or lift arms are partially or fully raised.
 - Make sure others in the area stay clear of the equipment and moving parts.
 - Never attempt to dump debris from a dock or mezzanine. Dump from ground level only.
 3. When leaving the sweeper/scrubber unattended:
 - Place the controls in OFF position.
 - Set the parking brake.
 - Shut off the engine.
 4. During cleaning and maintenance:
 - Always stop the engine and set the parking brake before servicing.
 - Never use detergents or cleansers that are flammable or combustible.
 - Never inflate a pneumatic tire without using a safety cage.
 - Lock and support the scrubhead assembly in raised position.
- NOTE:** Later models with electric scrubhead do not have a separate lock.

- Do not attempt any impeller adjustment unless you have shut off the engine. Never place your hands near the intake hoses or inlet when the engine is running.
 - With *high dump models*, always engage the safety arm before getting under the hopper.
 - Do not rely on the hydraulic cylinder to keep the hopper raised.
5. When servicing or repairing the fuel system:
 - Work in a properly ventilated area, do not smoke, or allow an open flame near the fuel system.
 - Never bypass safety components unless you are testing them.
 - Never bypass the fuel filter lock or oil pressure switch, except when testing them (and always reconnect them after testing).
 - Wear gloves to disconnect the tank coupling.
 6. Do not operate an LPG powered sweeper/scrubber when any component in the fuel system is malfunctioning or leaking.
 7. Replace any defective safety components before operating the sweeper/scrubber.

CAUTION

1. Do not drive with the hopper in the raised position except the few feet necessary to position the hopper over the dumpster or receptacle. Driving with the hopper raised reduces visibility and creates conditions for striking overhead objects, throwing the machine off-balance, and other hazards.
2. Travel slowly on grades.
3. Place a block or chock behind the wheels when parking on inclines.
4. Use special care when traveling on wet surfaces.
5. Observe all proper procedures for operation and maintenance of the sweeper/scrubber, as outlined in this manual.
6. Remain alert at all times to people and equipment in and around your area of operation.

ATTENTION!

1. Do not operate the #2 RTR lever before the #1 light illuminates.

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GENERAL

The PowerBoss sweeper/scrubber is a superior product, designed and built for the long haul. The PowerBoss sweeper/scrubber performs two jobs simultaneously doubling worker productivity. This is all accomplished with safety as the number one priority. To assure the safety of the operator and equipment, follow all safety instructions exactly. The safety instructions are found in the front of the manual.

SCOPE

This technical manual provides information to assist both the operator and maintenance personnel. The information is divided into the following sections:

Introduction	The Introduction lists each PowerBoss sweeper/scrubber covered in this manual and summarizes the special features they possess.
Specifications	The Specifications section lists specifications for each model of the PowerBoss indicating capacities, capabilities, and other basic information.
Operation	The Operation section locates and describes all controls and components on the PowerBoss as well as giving operating instructions for each.
Maintenance	The Maintenance section contains preventive maintenance charts and service instructions for required maintenance tasks.
Troubleshooting	The Troubleshooting section contains a troubleshooting chart to assist you in identifying and correcting problems which may occur during the operation of your equipment.
Parts	The Parts section contains parts lists and exploded views of all machine components and options.
Manufacturer's Literature	The Manufacturer's Literature section contains information supplied by manufacturers for purchased parts and assemblies used on the PowerBoss.
Service Bulletins	This section is available to store all service Bulletins required to keep this manual up to date and accurate.
Index	The Index contains an alphabetical listing of information found in this manual and a reference to the page on which that information can be found.

MODELS

Three models (with three possible configurations each) of PowerBoss sweeper/scrubbers as well as their options are covered in this manual. The information given in the main section of this manual is true for the TSS/82 Standard. The differences are pointed out in your specific model's section. Those models are:

- ① **Total Sweeper/Scrubber:**
 - TSS/82 Standard
 - TSS/82 Deluxe
 - TSS/82 with Stainless Steel Tanks

- ② **Intermediate Sweeper/Scrubber:**
 - ISS/82 Standard
 - ISS/82 Deluxe
 - ISS/82 with Stainless Steel Tanks

- ③ **Conventional Sweeper/Scrubber:**
 - CSS/82 Standard
 - CSS/82 Deluxe
 - CSS/82 with Stainless Steel Tanks

STANDARD FEATURES

The PowerBoss combines all features necessary to make an efficient reliable product. The following lists contain those features which are standard.

The features listed below are standard on all units:

- Rugged one-piece unitized frame
- Reliable hydraulic drive with premium, easy-to-service components
- Transverse mid-engine design for stability
- Single rear wheel drive and steering for exceptional maneuverability
- Efficient and effective direct throw sweeping
- Squeegee automatically raises when unit backs up
- Parabolic squeegee for effective water pick-up
- Four cylinder, liquid cooled engine
- Floating brooms, brushes, and squeegees for uneven surfaces
- Positive-seal, quick change filter
- Quick release squeegees and scrub brushes
- Oversize clean-out ports and screw-on caps
- Application designed air system
- Hi-Density polyethylene tanks (solution & recovery) to eliminate rust-thru or leakage, five year warranty

TERMS & ABBREVIATIONS

The following terms and abbreviations are used throughout this manual.

CSS	Conventional Sweeper/Scrubber
HD	High Dump (Hopper)
ISS	Intermediate Sweeper/Scrubber
LD	Low Dump (Hopper)
LP	Liquid Propane
MS	Mid-Size
RTR	Rotary Trash Relocator
TSS	Total Sweeper/Scrubber

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GENERAL

This section contains specifications for each of the three models covered in this manual. The specifications are given for reference only. Refer to the operation and maintenance sections of this manual to find specific procedures and safety information.

Model Specifications given in this section are in U.S. Customary units with metric equivalents in parentheses.

DELUXE MODELS

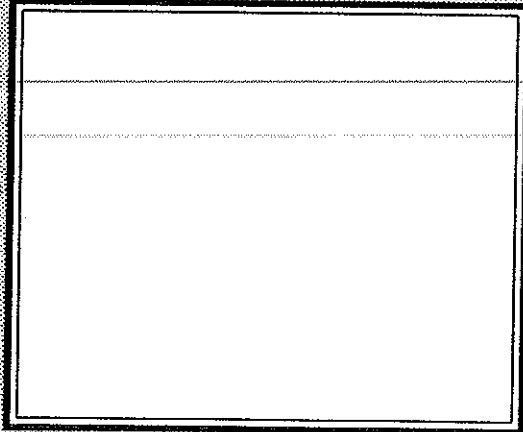
A Deluxe configuration is available for each of the three models (TSS, ISS & CSS). This Deluxe configuration of the various models consists of the addition of the following optional equipment:

- Power Steering
- Head, Tail & Instrument Lights
- Heavy Duty Curb Broom Guard (TSS only)
- Hand Lever Parking Brake

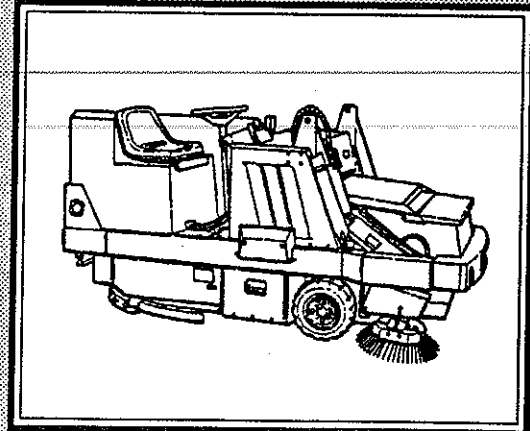
Each deluxe model (TSS, ISS, CSS) has its own section in this manual. These sections follow the "Standard" section for each model.

	TSS/82	ISS/82	CSS/82
BRAKES:	Mechanical Drum (Front two tires)	Mechanical Drum (Front two tires)	Mechanical Drum (Front two tires)
	Deluxe Units - Hand Lever Parking Brake		
DIMENSIONS:			
Length	119.00 in. (3028 mm)	95 in. (2417 mm)	95 in. (2417 mm)
Width	54.12 in. (1375 mm)	48 in. (1218 mm)	48 in. (1218 mm)
Height	57.00 in. (1448 mm)	57 in. (1448 mm)	57 in. (1448 mm)
Height (with overhead guard)	87.00 in. (2210mm)	87 in. (2210 mm)	87 in. (2210 mm)
ENGINE:			
Gasoline	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)
LPG	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)	47.5 HP (35.4 kw)
Diesel	32 HP (23.9 kw)	32 HP (23.9 kw)	32 HP (23.9 kw)
FLUID CAPACITIES:			
Fuel Tank	8 gal. (30.3 l)	8 gal. (30.3 l)	8 gal. (30.3 l)
Radiator	3 qt. (2.8 l)	3 qt. (2.8 l)	3 qt. (2.8 l)
Total coolant system	6 qt. (5.7 l)	6 qt. (5.7 l)	6 qt. (5.7 l)
Hydraulic Fluid Reservoir	6 gal. (22.7 l)	6 gal. (22.7 l)	6 gal. (22.7 l)
FRAME:	Unitized construction, 3/16 inch (4.8 mm) steel plate (Reinforced at stress points).		
HOPPER:			
Volume	14 ft ³ (.39 m ³)	6 ft ³ (.17 m ³)	5 ft ³ (.14 m ³)
Weight limit	1000 lb (454 kg)	300 lb (136 kg)	-
Manual Lift-Out	Not Available	Not Available	Standard
Low Dump	Standard on TSS/82LD	Standard	Not Available
Multi-Level High Dump [60 inch (1524 mm) max. ht.]	Standard on TSS/82HD	Not Available	Not Available
HYDRAULICS:			
Wheel Motor	Char-Lynn 4000 Series (15 in ³ /rev)	Char-Lynn 4000 Series (15 in ³ /rev)	Char-Lynn 4000 Series (15 in ³ /rev)
Broom & Brush Motors	Char-Lynn H Series	Char-Lynn H Series	Char-Lynn H Series
Propulsion Pump	Cessna Variable-displacement Piston Pump	Cessna gear pump (1.24 in ³ /rev)	Cessna gear pump (1.24 in ³ /rev)
Accessories Pump	Cessna gear pump (.84 in ³ /rev)	Cessna gear pump (.84 in ³ /rev)	Cessna gear pump (.84 in ³ /rev)
Directional Control Valve	Cessna	Cessna	Cessna
System Filter	Donaldson 10 micron	Donaldson 10 micron	Donaldson 10 micron
Heat exchanger	One-piece tubular coil	One-piece tubular coil	One-piece tubular coil
RECOVERY TANK CAPACITY:	65 gal. (246 l)	65 gal. (246 l)	65 gal. (246 l)

	TSS/82	ISS/82	CSS/82
SCRUBBING:			
Main Scrub Brushes (dia.)	14 in. (356 mm)	14 in. (356 mm)	14 in. (356 mm)
Side Scrub Brushes (dia.)	14 in. (356 mm)	14 in. (356 mm)	14 in. (356 mm)
Scrub Path	42 in. (1067 mm)	42 in. (1067 mm)	42 in. (1067 mm)
Scrub Path (w/Side Scrub Brush)	50 in. (1270 mm)	50 in. (1270 mm)	50 in. (1270 mm)
Scrub Coverage (4 in. overlap at 4 mph)	67,000 ft ² (6224 m ²)	67,000 ft ² (6224 m ²)	67,000 ft ² (6224 m ²)
Scrub Coverage (with Side Scrub Brush)	77,500 ft ² (7200 m ²)	77,500 ft ² (7200 m ²)	77,500 ft ² (7200 m ²)
SOLUTION TANK:			
	68 gal. (257 l)	68 gal. (257 l)	68 gal. (257 l)
SQUEEGEE:			
Rear	44 in. (1118 mm)	44 in. (1118 mm)	44 in. (1118 mm)
STEERING:			
	Cam & lever (Rear Wheel)	Cam & lever (Rear Wheel)	Cam & lever (Rear Wheel)
Deluxe Units - PowerSteering			
SWEEPING:			
Main Broom (dia.)	14 in. (356 mm)	14 in. (356 mm)	14 in. (356 mm)
Side Broom (dia.)	24 in. (610 mm)	24 in. (610 mm)	24 in. (610 mm)
Sweep Path (Main Broom)	42 in. (1067 mm)	42 in. (1067 mm)	42 in. (1067 mm)
Sweep Path (w/Side Broom)	54 in. (1372 mm)	54 in. (1372 mm)	54 in. (1372 mm)
Sweep Coverage	118,800 ft ² (11036 m ²)	118,800 ft ² (11036 m ²)	118,800 ft ² (11036 m ²)
Sweep Coverage (w/Side Broom) (w/Side Broom)(area/hour) (6 in. overlap at 7.5 mph)	154,000 ft ² (14715 m ²)	154,000 ft ² (14715 m ²)	154,000 ft ² (14715 m ²)
TIRES (diameter):			
	16 in. (406 mm)	16 in. (406 mm)	16 in. (406 mm)
TURNING RADIUS (LH):			
	81 in. (2057 mm)	81 in. (2057 mm)	81 in. (2057 mm)
VACUUM SYSTEM:			
Impeller	High-speed 9 in. (228 mm)	High-speed 9 in. (228 mm)	High-speed 9 in. (228 mm)
WEIGHT: (Shipping weight includes pallet.)			
<i>Gasoline or LPG -</i>			
Net (Low Dump)	3300 lb (1497 kg)	3100 lb (1406 kg)	2800 lb (1270 kg)
Net (High Dump)	3600 lb (1633 kg)	N/A	N/A
Shipping (Low Dump)	3700 lb (1678 kg)	3500 lb (1588 kg)	3200 lb (1452 kg)
Shipping (High Dump)	4000 lb (1814 kg)	N/A	N/A
<i>Diesel -</i>			
Net (Low Dump)	3375 lb (1531 kg)	3175 lb (1440 kg)	2875 lb (1304 kg)
Net (High Dump)	3675 lb (1667 kg)	N/A	N/A
Shipping (Low Dump)	3775 lb (1712 kg)	3575 lb (1622 kg)	3275 lb (1486 kg)
Shipping (High Dump)	4075 lb (1848 kg)	N/A	N/A

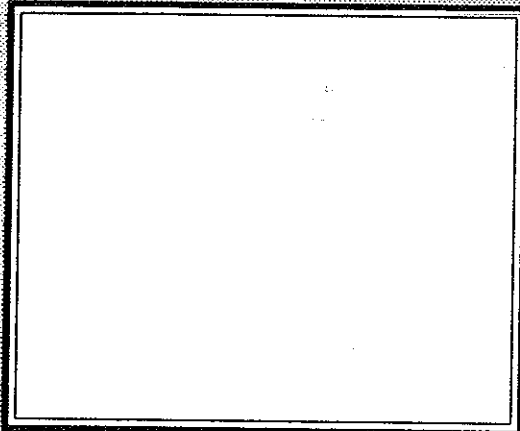


TSS/82 HD

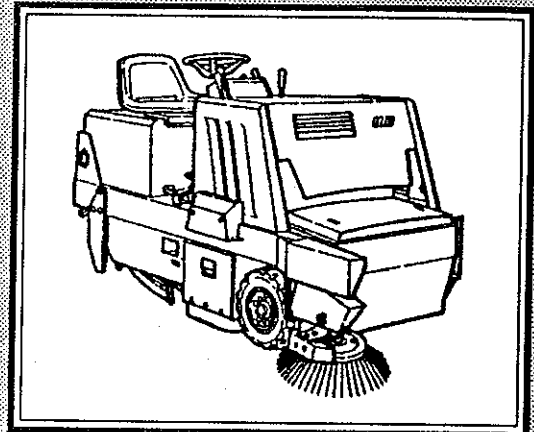


TSS/82 HD

(with optional Stainless Steel Tanks & High Dump)

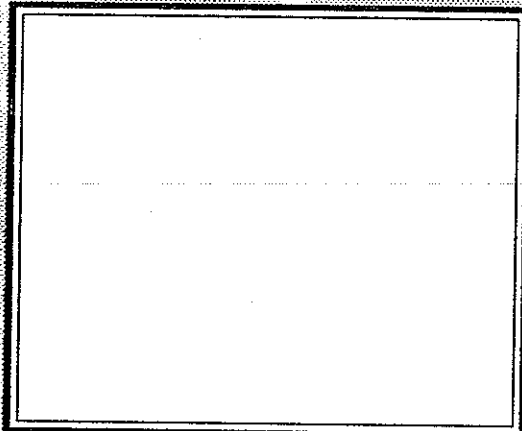


ISS/82

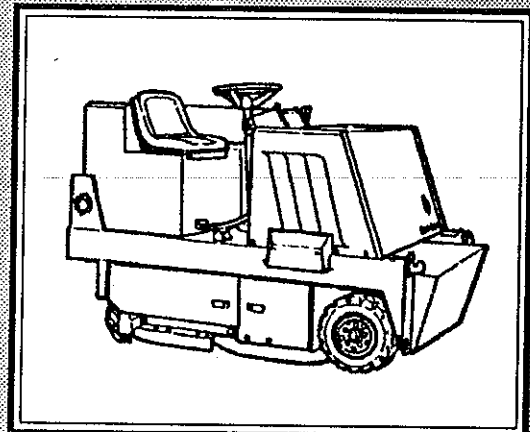


ISS/82

(with optional Stainless Steel Tanks & Side Broom)



CSS/82



CSS/82

(with optional Stainless Steel Tanks)

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GENERAL

This section contains operating instructions for three models of the PowerBoss sweeper/scrubbers and their available options. Disregard any information which does not pertain to your model. Read this entire section before attempting to operate the sweeper/scrubber. Then follow all operating instructions exactly to assure the safety and long life of this product.

THEORY OF OPERATION

PowerBoss sweeper/scrubbers combine two separate functions in one unit: sweeping and scrubbing. The sweeping system using a main broom, a side broom (optional on some models) and an application designed air system cleans surfaces thoroughly and efficiently without creating a dust problem. The side broom creates a wider sweeping path by pushing dirt and debris into the path of the main broom. The main broom then throws all dirt and debris in its path into the hopper. The scrubbing system takes water (with soap) from the solution tank and puts it on the floor where the scrub brushes do the cleaning. Then the vacuum system, with the help of the squeegees, picks up the water and puts it into the recovery tank leaving the floor virtually dry.

The two functions sweeping and scrubbing can be used individually or in combination such as: sweeping, scrubbing, double-scrubbing or sweeping/scrubbing. This makes the PowerBoss the most efficient, economical, and versatile unit available.

MAJOR COMPONENTS

A brief explanation of all major components and systems is provided in the following paragraphs.

AIR INTAKE SYSTEM

Engines are equipped with a dry cartridge type air filter with a rubber dust cup in the housing. The filters are readily accessible for easy removal and cleaning. All engines have two-stage Donaldson filters.

COOLANT SYSTEM

Engine coolant is stored in a three quart radiator and circulates through the hoses and engine block which bring the total system capacity to six quarts. A spring-loaded valve in the radiator pressure cap, designed to open at 14 psi, closes the outlet to the overflow pipe.

ELECTRICAL SYSTEM

Battery

The battery has 12 volts, 325 cold cranking amps and is maintenance free.

Fuses

The fuses are located in four fuse holders on the instrument control panel.

Instruments

Gauges and indicator lights include an ammeter, hour meter, fuel gauge, oil pressure gauge, water temperature indicator and scrubhead position indicator when equipped.

Scrubhead Lift Actuator

On all scrubbers, a scrubhead down pressure gauge is supplied to indicate to the operator when the scrub brushes touch the floor and visually displays how much pressure is being applied to the floor. It also indicates when the brushes are raised.

ENGINE

Engines on the PowerBoss have the following features: 4 cylinder, liquid cooled, electric start and transverse mid-engine design.

Gasoline Engines - 47.5 HP

Diesel Engines - 32 HP

For additional information on a specific engine refer to the manufacturer's literature furnished in this manual.

FUEL SYSTEM

Fuel from the 8-gallon capacity tank moves through the disposable inline filters to the engine. The fuel supply is monitored by a fuel gauge. Fuel system characteristics of gasoline, LPG, and diesel engines are listed below.

Gasoline

Major fuel system components for gasoline fueled engines are:

- Fuel tank
- Fuel filter
- Mechanical fuel pump
- Carburetor
- Manually operated carburetor choke

Liquid Propane Gas (LPG)

Major fuel system components for LPG fueled engines are:

- Fuel tank
- Pressure relief valve/fuel filter
- Vacuum lock-off valve
- Combination water-heated vaporizer and primary regulator
- Combination carburetor and secondary regulator

Diesel

Major fuel system components for diesel fueled engines are:

- Fuel tank
- Fuel water trap
- Fuel filter
- Fuel lift pump
- Fuel injection pump
- Fuel injectors

HOPPERS

To contain dust and fine debris within the hopper all machines are equipped with both a frame seal and side seals.

High-Dump Models have hoppers made of 12 GA steel.

Low-Dump Models have hoppers made of 12 GA steel.

Manual Lift-Out Hoppers are constructed from aluminum.

Rotary Trash Relocator

The rotary trash relocater (RTR) on high dump models increases the debris holding capacity of the hopper extending the sweeping time before dumping. By rotating the hopper about halfway through the dump rotation, the debris at the lip of the hopper moves to the front wall, leaving the entrance area clear to receive and hold more debris.

HYDRAULICS SYSTEM

Hydraulic fluid is pumped from an eight-gallon capacity reservoir. The fluid passes through a 100 mesh suction strainer into supply lines which circulate fluid through two systems: the propulsion system and the accessory system. Fluid returns through a heat exchanger and a filter equipped with a condition gauge.

Propelling System

The major component of the propelling system is a variable displacement piston pump protected by relief valves. The pump sends fluid to drive the wheel motor which controls the forward and reverse speed of the machine, as well as dynamic braking.

Accessories System

The major component of the accessories system is a gear pump. The gear pump protected by a relief valve sends fluid through a control valve to raise and lower the hopper, to rotate the hopper (on high dump models), and to drive brooms, brushes and other accessories. Brooms and brushes are driven by Gerotor-type hi torque, low speed motors. Hopper is raised, lowered, and rotated (on multi-level high dump) by hydraulic cylinders.

LUBRICATION SYSTEM

Grease fittings are located in the following areas:

- Impeller bearing housing
- Steering link arm
- Steering fork assembly
- Pillow blocks supporting dump arms

For detailed information on lubrication requirements and the lubrication points and grease fittings, refer to the Maintenance section of this manual.

SCRUB AND WATER PICK-UP COMPONENTS

The PowerBoss sweeper/scrubbers have three rotary quick change scrub brushes. An optional side scrub brush is available for all scrubber models, providing a wider scrub path.

Water Pick-Up Components

Two side squeegees and one main rear squeegee provide water pick-up. The side squeegees keep the water in front of the main squeegee and control water during turns.

Capabilities

Scrub paths and coverages are listed by model in the Specifications section of this manual.

STEERING, BRAKES AND TIRES

Steering

PowerBoss sweeper/scrubbers are designed with standard cam and lever steering through the rear wheel. Deluxe models are equipped with powersteering.

Brakes

PowerBoss sweeper/scrubbers are equipped with a parking brake, mechanically operated by a cable which connects to drum brakes on the front wheels. Deluxe models are equipped with a hand lever parking brake.

Tires

PowerBoss sweeper/scrubbers use an interchangeable, two-piece, bolt together cast rim for mounting tires. For more detailed information related to dimensions and pressure requirements, refer to the Specifications and Maintenance sections of this manual.

SWEEP COMPONENTS

Together the brooms and skirt take dirt debris and litter from the floor and throw it into the hopper.

Main Broom

The main broom has the following features:

- One-piece, cylindrical, and disposable
- Runs at constant RPM
- Can be changed in less than five minutes
- Is raised and lowered from operator compartment
- Floats for uneven surfaces
- Adjusts for pressure and wear

Side Broom

The rotary one-piece disposable side broom on TSS model (optional on ISS and CSS models) can be quickly changed in seconds without tools. It is bumper protected, and adjustable for angle, pressure, and wear.

Skirts

Skirts on the bottom of each broom door and at the back of the broom chamber help contain the dust inside the sweeping and vacuuming compartment.

Capabilities

Sweep paths and coverages are listed by model in the Specifications section of this manual.

TANKS

Solution and recovery tanks are constructed of high-density polyethylene to eliminate rusting and leakage (warranted for five years). The recovery tank is equipped with oversized clean-out ports with screw-on caps to facilitate draining and sludge removal. The drain hose for the recovery tank is located inside the left scrubhead access door on its storage bracket. The solution tank features an automatic shut-off to prevent overfilling.

Capacities

Size and capabilities of hopper and tanks vary and are listed by model in the Specifications section of this manual.

VACUUM SYSTEM

The vacuum system is comprised of an impeller, belts, filters and shakers.

Impeller and Belts

The vacuum system operates from three basic components: one high speed 9-inch belt-driven impeller and two hoses (one to the hopper and one to the recovery tank). The impeller provides water pick-up through the rear squeegee and dust control from the filters in the hopper. The air is expelled over the heat exchanger outside the engine compartment.

Filter and Shakers

ISS and TSS models are equipped with a manifold which controls dust and water pick-up. The air flow bias is operated from the drive compartment.

TSS models have two fully enclosed, positive sealed, quick-change filters providing 10 sq. ft. of filtering area and two electric shakers for cleaning the filters.

ISS models have one fully enclosed, positive sealed, quick-change filter providing 50 sq. ft. of filtering area and an electric shaker for cleaning the filter.

CONTROLS AND INDICATORS

All controls and indicators are highly visible and conveniently located for operator use. The operation of all controls is explained later in this section. The following is a list of all controls and indicators with a brief description.

AIR CONTROL KNOB (TSS AND ISS ONLY)

The air control knob is located beneath the choke knob on gasoline-fueled machines and beneath the engine stop knob on diesel-fueled machines. This knob should remain pushed all the way in for normal sweeping and scrubbing. In heavy dust conditions or when sweeping outdoors, pull the knob all the way out to divert all vacuum for sweeping.

AMMETER

The ammeter indicates the charging current which is being sent to the battery by the alternator. It also indicates the discharge of current being used by the sweeper/scrubber when the alternator is not charging.

BLOWER CONTROL

To activate the blower pull out on blower control knob.

BRAKE PEDAL

The mechanical drum brakes on the two front wheels are used primarily for parking the machine and are operated by the brake pedal. Always chock wheels if machine is parked on an incline.

BROOM AND BRUSH CONTROL LEVER

The broom and brush control lever to the left of the main broom handle activates the brooms and scrub brushes. Even though both brooms and brushes are rotating each can be lowered independently.

CHOKE KNOB

The choke knob on gasoline-powered machines is connected to a cable which controls the engine choke.

Pull the knob out for aid in cold starting the engine.
Push the knob in after the engine starts.

CLOGGED FILTER INDICATOR

This indicator alerts the operator to the need to shake the filters.

COOLANT TEMPERATURE GAUGE

The engine coolant temperature gauge registers the temperature of engine coolant. Temperatures above 210 degrees F indicate an overheating engine.

DIRECTIONAL CONTROL PEDAL

The directional control pedal controls the speed and direction of the machine. It is also used for slowing or stopping the machine during normal operation.

FUEL LEVEL GAUGE

The fuel level gauge indicates the amount of fuel remaining in the tank.

HAND BRAKE (OPTIONAL, STANDARD ON DELUXE MODELS)

This brake is used for parking. It operates the mechanical drum brakes on the front two wheels and is engaged by lifting up on the lever.

HORN

The horn is activated by pressing the horn button located on the right side of the instrument panel.

HOUR METER

The hour meter records the number of hours the machine has been operated providing a helpful guide for performing routine maintenance tasks.

HOPPER FIRE INDICATOR

The hopper fire indicator illuminates when a fire exists in the hopper.

HOPPER LEVERS 1 & 2 (HIGH DUMP)

The two far left lever on the front control panels are used to raise (up to 60 inches) and dump the hopper. The levers are spring loaded to the center off position.

HOPPER LEVER (LOW DUMP)

The left lever on the front control panel is used to raise and dump the hopper. This lever is spring loaded to the center off position. There is also a indent in the dump position to hold the hopper in the raised position.

HOPPER HEIGHT INDICATOR (RTR)

Light 1 illuminates when the hopper reaches the minimum height required to use the RTR feature.

HOPPER ROTATION INDICATOR (RTR)

Light 2 illuminates when the hopper reaches the rotation stop point.

IGNITION SWITCH

The four position ignition switch is used to start the engine.

LIGHT SWITCH (OPTIONAL, STANDARD ON DELUXE MODELS)

This switch is used to turn the lights on and off.

MAIN BROOM LEVER

The main broom lever to the immediate left of the instrument panel raises and lowers the main broom.

OIL PRESSURE

The engine oil pressure gauge ranges from 0 to 60 psi. A reading below 7 psi indicates problems which may result in damage to the machine.

PARKING BRAKE

The parking brake operates the mechanical drum brakes on the front two wheels and is engaged by the brake pedal.

RECOVERY TANK WARNING LIGHT

This light illuminates when the recovery tank is full.

REMOTE HOPPER SHUT-OFF

The remote hopper shut-off is used when sweeping areas which are wet. This tops the flow of air in the hopper from going through the filters and getting them wet as use of the filters is not required to control dust in these areas. To activate the hopper shut-off pull the knob out.

SOAP METERING PUMP SWITCH

The soap metering pump switch is used in conjunction with the water recycling to regulate the amount of soap added to the water.

SCRUBHEAD POSITION GAUGE

The scrubhead position gauge indicates the scrubhead position (raised, lowered) and the amount of pressure exerted on the scrubhead in the lowered position. Pressure variable is from 0 to 300 pounds.

SCRUBHEAD SWITCH

The scrubhead raise and lower switch is a spring-centered rocker switch. The switch raises and lowers the scrubhead and provides variable pressure to the scrubhead in the lowered position.

SIDE BROOM LEVER

The side broom lever to the right of the instrument panel raises and lowers the side broom.

SOLUTION DELIVERY LEVER

The solution delivery lever stops, starts, and regulates the flow of clean water solution to the floor for scrubbing. The amount of solution dispensed increases as the lever is moved forward, varying the flow rate between 0 gallons per minute (in the OFF position) and 3 gallons per minute (in the SOLUTION ON FULL position).

SOLUTION TANK WARNING LIGHT

This light indicates the solution tank is empty.

SQUEEGEE SWITCH

The squeegee rocker switch raises, lowers, and locks the squeegee.

STOP CABLE

The stop cable is used on diesel engines to stop the engine by shutting off the fuel flow. The stop cable knob should be pulled out only after turning off the key switch, to prevent running down the battery.

THROTTLE

The throttle adjusts the engine speed from idle to the normal operating speed.

The throttle should be in the IDLE position when starting the engine and immediately before shutdown.

The throttle should be in the RUN position during normal operation to ensure proper broom speed and dust control (RUN on sweeper/scrubbers and NORMAL on sweepers).

TIMED FILTER SHAKERS

This button is used to activate the filter shakers prior to dumping or as needed for cleaning the dust control filters. When the filter shaker button is pushed in, the timer will automatically shake the filter for approximately 20 seconds. This button should only be pushed when the machine is stopped, the engine speed is at idle and the hopper is raised approximately 4 inches above the ground.

WET SWEEP BY-PASS

This by-pass accomplishes the same results as the remote hopper shut-off. It stops the flow of wet air in the hopper from passing through the filters when sweeping wet areas. To achieve this, open the vent located on top of the hopper.

PRE-OPERATION CHECK

Prior to operating any PowerBoss sweeper/scrubber check the following:

If fluids are hot allow engine or system to cool before checking fluid levels.

1. Engine oil level.
2. Engine coolant level.
3. Hydraulic fluid level.
4. Fuel level.
5. Brakes, steering and directional controls.
6. Floor for wet spots caused by leaks.

Fluids are to be replenished only when engine is off.

Equipment can be damaged if it is used while fluid levels are incorrect.

Any problems found with the equipment must be corrected before attempting to operate the sweeper/scrubber.

GENERAL OPERATION

STARTING

To start the sweeper/scrubber proceed as follows:

Always be seated in the operator's seat with the parking brake locked when starting the engine.

1. Put the directional control pedal in neutral
2. Put the throttle in the IDLE position.
3. **Gasoline Engine:** Pull the choke knob out (if engine is cold). Turn the ignition switch to the START position; then release. When the engine is running smoothly, push in the choke knob.
Diesel Engine: Push in the engine stop knob. Turn the ignition switch to the first position; then press glow plug switch for approximately 15-20 seconds. Turn the ignition switch to the START position and release.

NOTE

For both gasoline and diesel engines, if the engine fails to start do not continue cranking more than ten seconds. Allow the starter motor to cool between attempts.

4. Allow the engine to warm up approximately two minutes.

DRIVING

To drive the sweeper/scrubber proceed as follows:

1. Move the throttle from the IDLE to the RUN position.
2. Unlock the parking brake.
3. Move the machine forward or backwards as follows:
 - a) Forward. Apply pressure to the front of the directional control pedal, increasing pressure to increase speed.
 - b) Reverse. Apply pressure to the rear of the pedal, increasing pressure to increase speed.

NOTE

The sweeper/scrubber is equipped with a speed limiter, a stop under the pedal which can be raised or lowered to reduce or increase maximum speed.

SLOWING, STOPPING & PARKING

To slow or stop the machine proceed as follows:

Slowing

Return the directional pedal to the neutral position.

Stopping

Return the directional pedal to the neutral position and coast to a stop or push the directional pedal in the opposite direction the machine is moving until the machine comes to a stop.

Parking

When parking the sweeper/scrubber engage the parking brake by pressing down on the pedal and tilting it forward. To disengage the parking brake apply pressure to the back of the pedal and release. If hand lever brake, engage by pulling up on the lever. Disengage by pushing the button at the end of the lever in and lowering the lever.

OPERATING ON GRADES

Observe the following rules when operating this machine on a grade.

1. Travel slowly.
2. Exercise extreme caution when traveling across or turning on grades.

The following options are available for operator safety and convenience: hand lever parking brake, back-up alarm, engine running beeper, grammar seat, curb broom spot light, brake lights, turn signals, stud mounted or flush mounted headlights, red rotating light, overhead guard, cab (on machines with stainless steel tanks only) and accessories.

SWEEPING

MAIN BROOM

To operate the main broom proceed as follows.

1. Lower the main broom. This is done by positioning the main broom lever in the **NORMAL** position for even floor surfaces or **FLOAT** position for extremely uneven surfaces. When not sweeping position the lever in the **RAISED** position.

NOTE

Extensive use of the float position reduces the life of brooms.

2. Activate the main broom only by putting the broom and brush control lever in the **SIDE BROOM OFF** position. To stop the broom return the lever to the center **OFF** position.

NOTE

Even though the brooms and brushes are both rotating each is lowered independently.

3. Drive the sweeper/scrubber over the area to be swept as explained earlier.

SIDE BROOM

The side broom (also known as the curb broom) is used to widen the sweep path and to clean close to walls and other obstructions. A heavy duty side broom guard (standard on Deluxe TSS models) is available to protect the side broom when brushing against obstacles. In areas of heavy dust a vacuumized side broom attachment can be used. This sealed enclosure provides optimum dust control. To operate the side broom follow these steps:

1. Place the side broom lever in the **LOWER** position. When not sweeping the lever should be placed in the **RAISED** position.
2. Both the side broom and main broom are activated by putting the broom and the brush control lever in the **ON** position. The side broom cannot be engaged independently.

HOPPER

The hopper holds all debris picked up when sweeping. Dump the hopper by following the appropriate set of procedures listed below:

Do not leave the hopper in the raised position for an extended period of time.

High Dump Models

Empty the hopper as follows:

1. Drive the machine to the dumping area.
2. Use the directional control pedal to position the machine so that the space between the machine and the container or dumpster is adequate to raise the hopper.

NOTE

Broom control lever must be in center OFF position.

3. Move the throttle to the IDLE position.
4. Pull back Lever 1 to RAISE position and hold until the bottom of the hopper is high enough to clear the top of the container (60 inch maximum).

Never place your hands or other body parts near the lift arms when the hopper is operating.

5. Use the directional control pedal to slowly and carefully move the machine forward until the hopper is properly positioned to dump debris into the container.

It is unsafe to travel an extended distance with the hopper raised. Travel only the distance necessary to position the hopper.

6. At this point, shake filters for 20-30 seconds. Pull back Lever 2 to DUMP position to rotate the hopper forward and empty the debris.
7. After hopper empties, push Lever 2 forward to RETURN position until the hopper rotates and stops.
8. Slowly back machine away from dumpster approximately 5 feet.
9. Push Lever 1 forward to the LOWER position until the hopper stops.

Rotary Trash Relocator (RTR)

The RTR is a standard feature on high-dump models. The two lever system with corresponding indicator lights is used to raise and rotate the hopper. This relocates the trash within the hopper to increase the holding capacity and make dumping necessary less frequently. Operate as follows:

1. Use the directional control pedal to stop the machine on a level surface.
2. Move the throttle to IDLE position.
3. Move the broom lever to the OFF position.

NOTE

As you complete steps four and five, observe the two red lights labeled 1 and 2 in the upper left corner of the control panel.

Light 1 illuminates when the hopper reaches the minimum height required to use the RTR feature.

Light 2 illuminates when the hopper reaches the rotation stop point.

4. Pull back Lever 1 to RAISE position and hold until Light 1 illuminates, then release.

Make sure no one is in the area under or around the hopper.

5. Pull back Lever 2 to DUMP position and hold until Light 2 illuminates, then release.

NOTE

This rotates the hopper, causing debris to move from the rear entrance to the front wall of the hopper. Rotating beyond this point will cause debris to be dumped from the hopper.

6. Push Lever 2 forward to RETURN position until the hopper rotates back and stops.
7. Push Lever 1 forward to the LOWER position until the hopper returns to the normal operating position.
8. Move the throttle back to RUN and resume sweeping.

Low Dump Model

Empty the hopper as follows:

1. Drive the machine to the dumping area.

NOTE

Broom control lever must be in center OFF position.

Never attempt to dump debris off a dock or mezzanine. Dump onto ground surface only.

2. Push the throttle to the IDLE position.
3. Pull back the lever marked DUMP from its center OFF position until the hopper raises and locks in dump position. Debris will empty onto floor.
4. With the hopper in the raised position, press the filter shaker button for 20 to 30 second to shake the dust from the hopper filter(s).
5. Use the directional control pedal to slowly back the machine a distance of about five feet.

It is unsafe to travel and extended distance with the hopper raised. Travel only the distance necessary to clear the debris area.

Never place your hands or other body parts under a raised or partially raised hopper unless the safety arm is in place.

6. Use the directional control pedal to stop the machine, then release the DUMP lever to return it to its center OFF position.
7. Pull the throttle back to RUN and resume sweeping.

Manual Lift-Out Models (CSS)

Empty the hopper as follows:

1. Drive the machine to the dumping area.
2. Grasp the handles on top of the hopper.
3. Lift the hopper straight up (about 3 inches) until the support brackets clear the frame.
4. Move the hopper back and dump it out.
5. Replace hopper.

NOTE

If the debris in the hopper is too heavy, the hopper can be rotated and partially dumped to make it lighter.

VACUUM ATTACHMENT

The vacuum attachment is designed to clean elevated surfaces and areas where the PowerBoss is unable to drive. This is especially useful in dust laden areas. To operate the vacuum, open the hopper lid, close the vacuum door (at the front of the dust filter housing) and attach the vacuum hose. With the parking brake locked, move the throttle to the run position. The vacuum is now ready for use.

BLOWER

The blower blows debris from hard to reach areas into the path of the sweeper. To operate the blower, remove the wand from the hanger and pull the blower control knob.

SCRUBBING

FILLING SOLUTION TANK

To fill the solution tank follow these steps:

1. Make sure the air control knob is pushed in (on TSS and ISS models).
2. Drive to the solution filling site.
3. Park the machine on a level area and lock the parking brake.
4. Make sure the solution delivery valve is closed.
5. Unscrew the largest (9 inch) cap located on the top of the solution tank and fill the tank with cleaning water solution.
6. When the tank is full, replace the screw-on cap.

Never use detergents or cleaners that are flammable or combustible.

MAIN SCRUB BRUSHES

To operate the main scrub brushes follow these steps:

1. Lower the scrubheads to the floor with the scrubhead switch. Obtain the correct pressure for the floor conditions by noting pressure shown on the scrubhead position gauge. The scrubheads are raised with the same switch.

For normal scrubbing, the main broom and side broom remain in the raised position.

To sweep simultaneously lower the brooms at this time.

2. Activate the scrub brushes by putting the broom and brush control lever in the SIDE BROOM OFF position. Stop the brushes by returning the lever to the center OFF position.

NOTE

Even though the brooms and brushes are both rotating each is lowered independently.

3. Lower the squeegee and lock it in the down position with the squeegee switch. The squeegee can also be raised with the same switch.
4. Start the flow of solution to the floor. To dispense solution push the solution delivery lever forward. To stop the flow of solution pull the lever back to the OFF position. The amount of solution dispensed increases as the lever is moved forward, varying the flow rate between 0 gallons per minute (in the OFF position) and 3 gallons per minute (in the SOLUTION ON FULL position).
5. Drive forward slowly.

NOTE

Do not drive in reverse with the squeegee down.

Use care when driving on wet surfaces.

Always travel slowly on grades.

SIDE SCRUB BRUSH

To use the side scrub brush (optional on some models) in conjunction with the main scrub brushes, proceed as follows:

1. Complete step 1 from Main Scrub Brushes operation section.
2. Lower the side scrub brush by positioning the side broom lever in the LOWER slot. To raise the scrub brush return the lever to the RAISED position.
3. Activate the main scrub brushes and the side scrub brush by placing the broom and brush control lever in the ON position. To stop both return the lever to the OFF position.
4. Complete steps 3, 4, and 5 from Main Scrub Brushes operation section.

NOTE

Do not drive in reverse with the squeegee down.

Use care when driving on wet surfaces.

Always travel slowly on grades.

DOUBLE SCRUBBING

For double scrubbing proceed as follows:

1. Follow the procedures in Main Scrub Brushes operation section for scrubbing without lowering the squeegee to the floor.
2. Make multiple passes over the same area of floor as conditions dictate.
3. Lower and lock the squeegee in the down position with the squeegee switch for the final pass. The squeegee can be raised with the same switch.

SQUEEGEE WAND

This attachment allows the operator to vacuum up spills and standing water in areas which the PowerBoss cannot maneuver. To operate the squeegee wand, follow these steps:

1. Remove the hose from the squeegee tool.
2. Attach the adapter to the hose.
3. Connect the squeegee wand to the adapter.
4. Set the engine at high idle and vacuum.

AIR CONTROL

During normal sweeping and scrubbing the air control knob should be pushed in all the way. In heavy dust conditions or when sweeping outdoors, pull the knob all the way out to divert all vacuum to sweeping.

DRAINING THE RECOVERY TANK

Follow these steps to drain the recovery tank.

1. Park the machine on a level surface with the left rear of machine beside the drain site.
2. Engage the parking brake.
3. Turn off the engine.
4. Open the left scrubhead access door.
5. Remove the flexible drain hose from its storage hook. Pull out the drain hose for maximum reach.
6. Place the drain hose at the floor drain opening, grate or on the ground.
7. Loosen and remove the drain plug.
8. Drain the tank completely and reinstall the plug.
9. Reposition the drain hose on its storage hook.

CLEANING THE RECOVERY TANK

To clean the recovery tank, proceed as follows:

NOTE

The recovery tank should be cleaned after each shift.

1. After draining the recovery tank, park the machine so the rear access doors are positioned over the drain opening or grate, or on the ground.
2. Engage the parking brake.
3. Shut off the engine.
4. Remove the two large screw-on caps located at the bottom rear of the tanks.
5. Remove the drain hose and position it over the floor drain opening.
6. Remove the drain plug.
7. Spray the recovery tank with clean water, flushing all sludge out the access ports.
8. Remove the ball and float. Rinse and reinstall.
9. Reinstall the drain plug.
10. Reposition the hose on the storage rack.
11. Reinstall the access caps.

TRANSPORTING THE POWERBOSS

LOADING

To load the PowerBoss on another vehicle or trailer, proceed as follows:

Exercise extreme caution when traveling on grades.

1. Position the machine on the trailer or vehicle.
2. Apply the parking brake.
3. Tie the machine down using the tie down holes in the frame behind both front wheels and eye bolts located at rear of frame.

NOTE

Attach the tie downs to the frame only.

PUSHING

Push the machine from the front or rear using bumpers only.

ATTENTION

Do not tow or push the machine a distance of more than .5 miles or faster than one mile per hour. Exceeding these restrictions may cause damage to the hydraulic system. If towing will exceed the above restrictions, the rear wheel must be raised or supported by a dolly.

ADDITIONAL OPTIONS

FLUSH MOUNTED HEAD LIGHTS

Available on all TSS models. (Standard on Deluxe models.)

STUD MOUNTED HEAD LIGHTS

Available on all ISS and CSS models.

CURB BROOM SPOT LIGHTS

Available on all models.

BRAKE LIGHTS

Available on all models.

TURN SIGNALS WITH 4-WAY FLASHER

Available on all models.

ROTATING RED LIGHT

Available on all models.

BACK-UP ALARM

Available on all models.

ENGINE RUNNING BEEPER

Available on all models.

GRAMMAR SEAT

Not available on machines with the cab option.

OVERHEAD GUARD

Available on all models.

CAB

Available only with Stainless Steel Tanks.

WINDSHIELD WIPER

Available on all models with the cab option.

CAB HEATER

Available on all models with the cab option.

FAN/DEFROSTER

Available on all models with the cab option.

CAB PRESSURIZER

Available on all models with the cab option.

HOPPER DOLLY

Recommended with all low dump models.

VACUUMIZED SIDE BROOM

Available for TSS model only.

FIRE EXTINGUISHER

Available on all models.

82 SERIES SWEEPER/SCRUBBER (PLASTIC TANKS)

The 82 Series Sweeper/Scrubbers are essentially the same as the 80 Series Sweeper/Scrubbers with the exception of the following items:

- Plastic Solution and Recovery Tanks
- Screw-On Caps for Tanks instead of Doors
- Redesigned Side Door (Impeller)
- Redesigned Top Door (Impeller)
- Redesigned Rear Bumper and Rear Bumper Extension
- Universal Seat Mount
- An In-line Solution Strainer
- Redesigned Console

This section should be referenced when servicing these areas. The existing sections for the 80 Series Sweeper/Scrubbers should be referenced for all other areas.

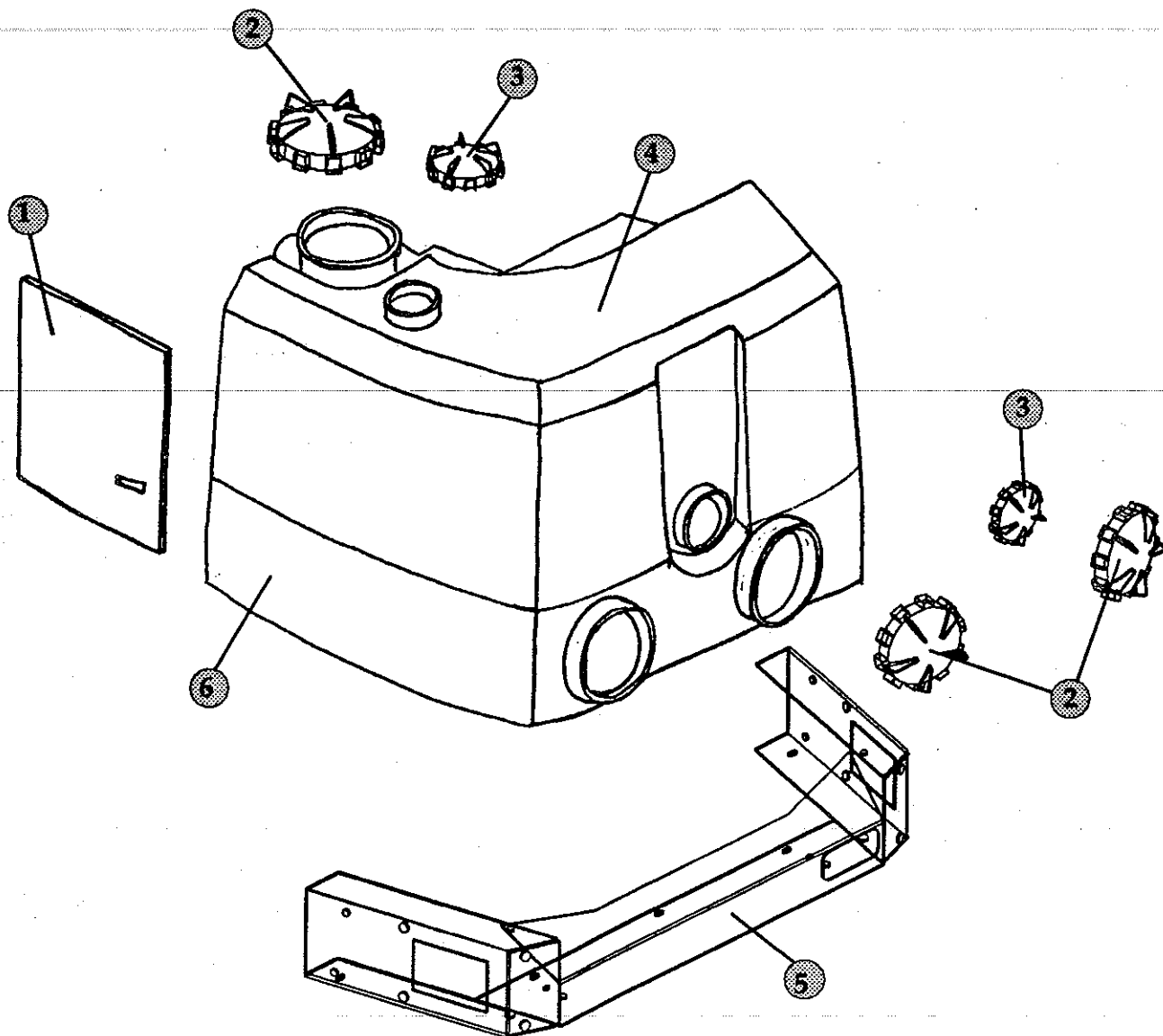
EXCEPTION PARTS LIST (FOR 82 SERIES MODELS W/ PLASTIC TANKS)

<u>Description</u>	<u>PowerBoss Part Number</u>
Angle - Cover Floorboard PNTD (SP)	309092
Assy - Bumper Extension 82 PNTD	309010
Assy - Console 82 PNTD	309064
Assy - Lever Sol Control 82 PLTD	309054
Assy - Squeegee Guard 82 PNTD	309037
Assy - Tube Suction Tank 82	309030
Bar - Tie Down Rear 82 PNTD	309020
Cage - Ball Float 82	309038
Cap - Tank 6.00 dia.	309006
Cap - Tank 9.00 dia.	309009
Clamp - Hose 1.0" Snap Type	309074
Clamp - Tube 1-1/2 dia	302951
Cover - Top Door HC 82 PNTD	309032
Decal - "82"	309036
Edging - Floor Pan 82	309058
Edging - Top Cover 82	309055
Fitting - Adap	309040
Fitting - ELL 90 3/4 MPT X 3/4 Barb	309051
Fitting - Ell 90 Street 3/4	309061
Fitting - Hose Barb 3/4 MPT X 3/4 HB	309073
Fitting - Plug 3/4 MGHT	309060
Float - Sol Shutoff 82	309067
Gasket - Cap 6.00 dia 82	309070
Gasket - Cap 9.00 dia. 82	309069
Guard - LH Sol/Rec Tank 82 PNTD	309017
Guard - LH Squeegee 82 PNTD	309021
Guard - RH Sol/Rec Tank 82 PNTD	309018
Guard - RH Squeegee 82 PNTD	309019
Hinge - Seat Mount Univ 82 PNTD	309028
Hinge - Side Door 82 PNTD	309044
Hinge - Top Cover PNTD	309088
Hinge - Top Door HC 82	309025
Hose - Impeller 82	309034
Hose - Sol Valve to Filter 82	309078
Hose - Sol Valve to Sol Tank 82	309077
Hose Long - Sol Delivery 82	309057
Hose Short - Sol Delivery 82	309056
Mount - Exhaust 82 PNTD	309039

EXCEPTION PARTS LIST (FOR 82 SERIES MODELS W/ PLASTIC TANKS)

<u>Description</u>	<u>PowerBoss Part Number</u>
Mount - Filter Sol 82 PNTD	309075
Mount - Gas Spring 82 PNTD	309046
Mount - Gas Strut 82 PNTD	309048
Mount - Seat Universal 82 PNTD	309027
Mount - Solution Valve 82 PNTD	309076
Mount - Tank/Console 82 PNTD	309042
Mount - Valve Sol Filter 82 PNTD	309052
Nut - Hex Weld 1/2-13	309041
Panel - Side Door HC 82 PNTD	309033
Plate - Backing for 6" Cap Gasket	309099
Plate - Backing for 9" Cap Gasket	309098
Plate - Heat Shield 82 Power Steering	309083
Plate - Retainer Sol/Rec Tank PNTD	309024
Plate - Stop Door Side HC 82 PLTD	309026
Rod - Float Sol Shutoff 82	309068
Rod - Stem Float 82	309072
Screen - Sol Filter 82 (SP)	309071
Seal - Console 82	309059
Spacer - Hinge Side Door 82 PNTD	309045
Spacer - Hinge Top Door 82 PNTD	309047
Spacer - Mnt Tank 82 PNTD	309043
Stop - Top Cover 82 PNTD	309035
Strainer - Sol Filter 82 w/mtg tab	309062
Tank - Recovery 82 LP (Plastic)	309091
Tank - Recovery 82 (Plastic)	309002
Tank - Solution 82 LP (Plastic)	309090
Tank - Solution 82 (Plastic)	309001
Tube - Exhaust Tailpipe 82	309049
Tube - Suction Tank 82	309029
Valve - Float Sol Shutoff 82	309066
** Valve - 2-Way Solution	300330

*** There is a possibility that some units remain in the field with plastic valves instead of this brass valve. If your machine is one of these, there is a kit available that will allow you to change to this brass valve. It is PowerBoss part number 319324. Its description is: Kit/Field - Valve Brass 82. Contact your PowerBoss distributor.*

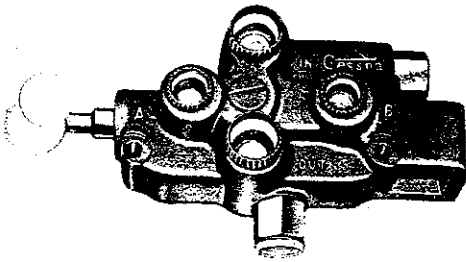


<u>Ref #</u>	<u>Part Number</u>	<u>Description</u>	<u>Number Required</u>
1	309033	Panel - Side Door HC 82 PNTD	1
2	309009	Cap - Tank 9.00 dia	3
	309098	Plate - Backing for 9" Cap Gasket	3
	309069	Gasket - Cap 9.00 dia 82	3
3	309006	Cap - Tank 6.00 dia	2
	309099	Plate - Backing for 6" Cap Gasket	2
	309070	Gasket - Cap 6.00 dia 82	2
4	309001	Tank - Solution 82 (Plastic)	1
	309090	Tank - Solution 82 LP (Plastic)	1
5	309010	Assy - Bumper Extension 82 PNTD	1
6	309002	Tank - Recovery 82 (Plastic)	1
	309091	Tank - Recovery 82 LP (Plastic)	1

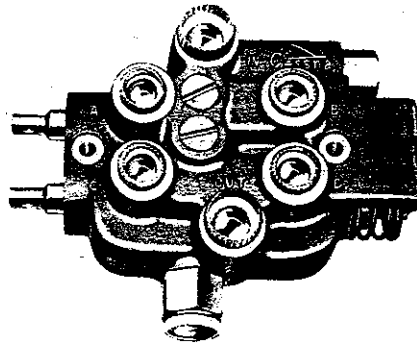
Cessna

FLUID POWER DIVISION
HUTCHINSON, KANSAS

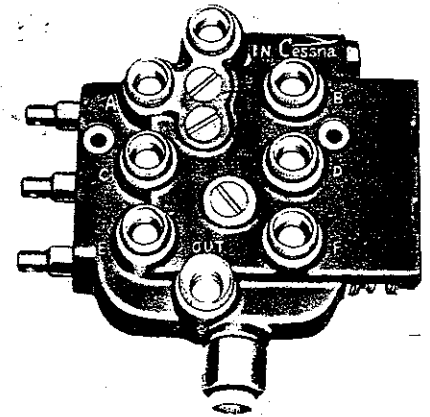
SERVICE MANUAL



30501



30502

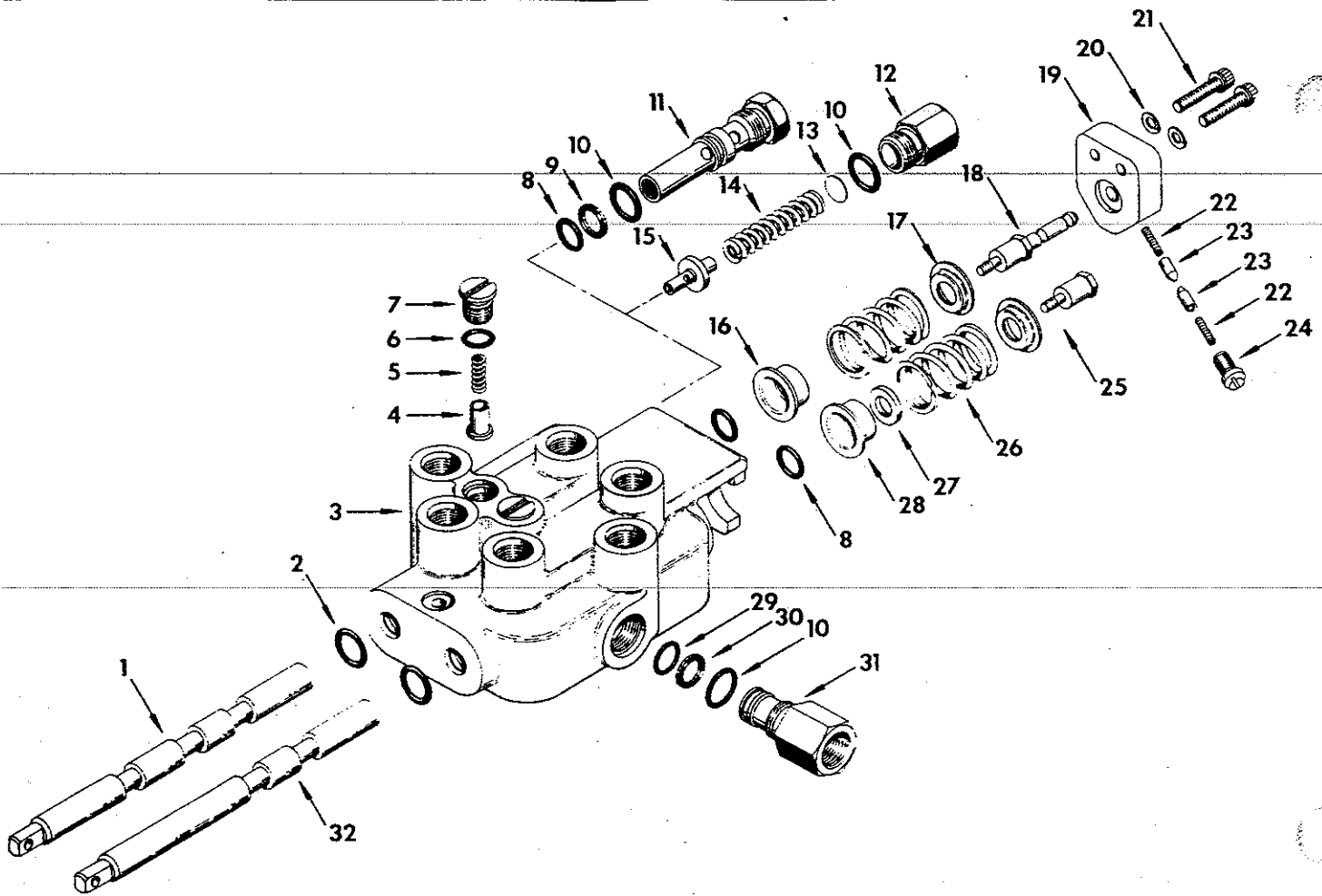


30503

**CESSNA MODEL 30501 ONE SPOOL, 30502 TWO SPOOL,
30503 THREE SPOOL DIRECTIONAL CONTROL VALVE**

4 WAY — WITH RELIEF VALVE

PARTS IDENTIFICATION



PARTS LIST

REFERENCE NUMBER	DESCRIPTION
1	Spool
2	O-ring, 1/8 x 5/8 I.D.
3	Body and Seat Assembly
4	Plunger, Lift Check
5	Spring, Lift Check
6	O-ring, 3/32 x 1/2 I.D.
7	Plug, Lift Check
8	O-ring, 3/32 x 5/8 I.D.
9	Back-up Washer, 3/32 x 5/8 I.D.
10	O-ring, 3/32 x 3/4 I.D.
11	Relief Valve, Cartridge Type
12	Cap. Relief Valve
13	Shim, Relief Valve
14	Spring, Relief Valve
15	Pin Assembly, Relief Valve
16	Washer, Deep

REFERENCE NUMBER	DESCRIPTION
17	Washer, Shallow
18	Screw, Spool Detent
19	Block, Detent
20	Lock Washer, 1/4 x .062
21	Cap. Scw. 1/4-20 Skt. HD 1" Lg.
22	Spring, Detent Pawl
23	Detent Pawls
24	Detent Pawl Plug
25	Clip Ring, 1/2" Shaft
26	Spring, Spool
27	Spacer
28	Washer, Deep
29	O-ring, 1/16 x 5/8 I.D.
30	Back-up Washer, 5/8 I.D.
31	Plug, Pressure Beyond
32	Spool

INSTRUCTIONS

DISASSEMBLY

1. Plug all outlets and thoroughly clean outside of valve.
2. Remove lift check plugs (7), springs (5) and lift check plungers (4).
3. Remove relief valve components (12, 10, 13, 14 & 15) or (8, 9, 10 & 11).
4. Mark spools and body position of each spool.
NOTE: Spools and bodies are matched sets. Be sure each spool is identified with the correct body bore.
5. Detent Spool
 - a. Remove screws (21) and lock washers (20). Remove detent block (19) and remove detent pawl plug (24), spring (22), detent pawls (23) from detent block.
 - b. Remove detent screw (18), and remove washer (17), spring (26) and washer (16).
Remove spool (1).
6. Standard Spool
 - a. Remove spool screw (25), washer (17), spring (26), spacer (27) and washer (28).
Remove spool (32).
7. Remove pressure beyond plug (31), o-ring (10), back-up washer (30) and o-ring (29).
8. Remove all o-rings and back-up washers from all plugs, relief valves and body bore.
9. Thoroughly clean all parts.

INSPECTION

1. Remove nicks and burrs from all parts.
2. Inspect spools and body bore for excessive wear.
NOTE: If internal leakage with the spools in spring centered position has been experienced, wear is indicated between the spool and body bore. This can be corrected by replacing the spools and body as an assembly. Spools or bodies cannot be serviced separately.
3. Inspect relief valve. See "Service of Relief Valves" section of this manual.
4. Inspection of o-rings and back-up washers is not necessary. It is recommended that these be replaced as new parts.
5. Inspect lift check seats in body for wear.

SERVICE OF RELIEF VALVES

CARTRIDGE TYPE

The pilot operated cartridge type relief valve is not adjustable and is pre-set at the factory. However, to insure cleanliness in the system, snap ring, washer, and screens may be removed, cleaned with air and replaced.

PIN TYPE

The pin type relief valve shown in the exploded view as items (12, 10, 13, 14 and 15) is serviced when disassembly of the valve is accomplished. If a higher or lower system pressure is required, shims (13) may be added or taken out as needed.

REASSEMBLY

1. Thoroughly clean and dry all parts. Metal parts should be lightly oiled prior to assembly.
NOTE: All o-rings and back-up washers should be replaced as new parts.
2. Position o-rings (2) and (8) in body bore.
3. Install o-rings and back-up washers on relief valve and plugs.
4. Insert plunger (4) and spring (5) into lift check seat.
5. Install lift check plugs (7).
6. Detent Spool
 - a. Install washer (16), spring (26) and washer (17) into proper position in body casting. Insert spool (1) into body bore and screw detent screw (18) into spool.
 - b. Install detent spring (22), detent pawls (23), spring (22) and detent pawl plug (24) into detent block (19). Slip detent block (19) over detent screw (18) and secure to valve body (3) with lock washer (20) and cap screws (21).
7. Standard Spool
 - a. Install washer (28), spacer (27), spring (26) and washer (17) into proper position in body casting. Insert spool (32) into body bore and secure with spool screw (25).
8. Install relief valve.
9. Install pressure beyond plug assembly (31).
10. Run operational check.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
1. Low system pressure.	a. Dirty relief valve screen or plugged orifice plate. b. Worn or stuck relief valve.	a. Remove and clean. b. Remove valve and replace with new assembly or add shims to pin type relief valve.
2. Sticky valve spool.	a. Misaligned control linkage. b. Foreign matter in spool bore.	a. Correct alignment. b. Remove spool and clean bore.
3. External leakage.	a. Damaged o-rings.	a. Disassemble valve and replace o-rings.
4. Work load lowers with spool in "slow-raise" position.	a. Damaged lift check plunger. b. Damaged lift check seat in body. c. Damaged o-ring on lift check plug.	a. Replace lift check plunger. b. Replace spool and body assembly. c. Replace o-ring.
5. Load drops with spool in centered position.	a. Damaged cylinder packing. b. Line to cylinder leaking. c. Scratched spool or body bore.	a. Replace cylinder packing. b. Tighten fittings or replace hose. c. Replace control valve.

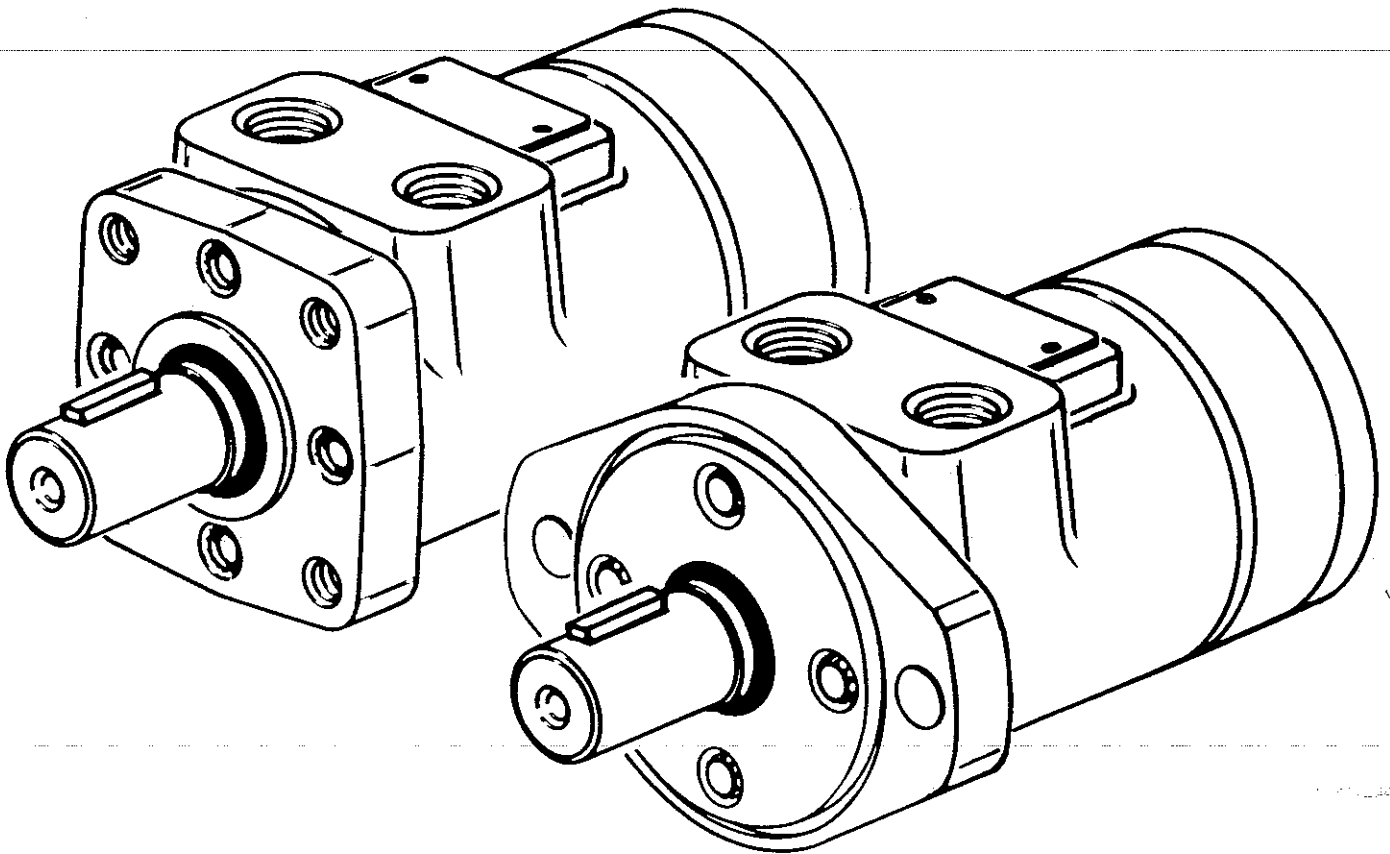


**Eaton
Hydraulics
Division**

Parts Information

H Series Char-Lynn® Motors

007 008 009



EAT•N

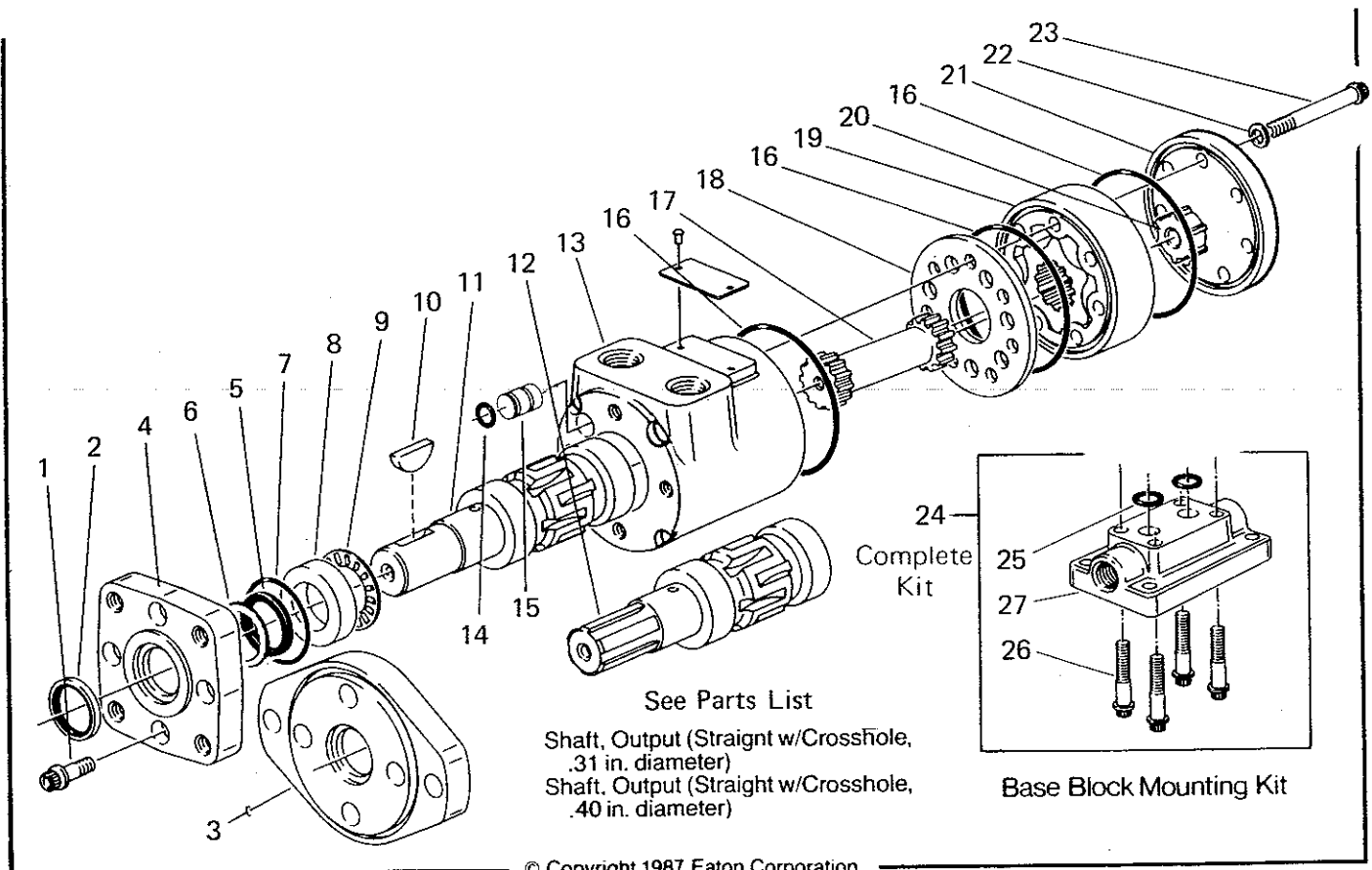
PARTS DRAWING

-008 Design Code

Ref. No. 17-Drive		Ref. No. 19-Gerotor		Ref. No. 20-Spacer		Ref. No. 23-Cap Screws	
Displ. cu. in. [cu. cm/rev.]	Part No.	Part No.	Width in. [mm]	Part No.	Width in. [mm]	Part No.	Length in. [mm]
3.0 [49]	602	8277-1	.25 [6,4]	N/A		5389-1	1.50 [38,1]
4.5 [74]	602	8277-2	.38 [9,7]	N/A		5389-2	1.63 [41,4]
6.2 [102]	616	8277-3	.52 [13,2]	N/A		5389-3	1.75 [44,5]
10.3 [169]	8664	8277-4	.86 [21,8]	N/A		5389-4	2.13 [54,1]
11.9 [195]	8664	8277-5	1.00 [25,4]	6901-9	.14 [3,4]	5389-5	2.25 [57,1]
14.9 [244]	8664	8277-6	1.25 [31,7]	6901-2	.31 [7,9]	5389-6	2.50 [63,5]
16.9 [277]	8664	8277-7	1.50 [38,1]	N/A		5389-7	2.75 [69,8]
23.8 [390]	8664	8277-8	2.00 [50,8]	6901-4	.55 [14,0]	5389-8	3.25 [82,6]

-009 Design Code

Ref. No. 17-Drive			Ref. No. 19-Gerotor		Ref. No. 23-Cap Screws	
Displ. cu. in. [cu. cm/rev.]	Length in. [mm]	Part No.	Part No.	Width in. [mm]	Part No.	Length in. [mm]
2.2 [37]	3.00 [76,2]	602	21850-22	.25 [6,4]	5389-1	1.50 [38,1]
2.8 [46]	3.00 [76,2]	602	8277-1	.25 [6,4]	5389-1	1.50 [38,1]
3.6 [59]	3.15 [80,0]	22250	21850-23	.40 [10,2]	5389-2	1.63 [41,4]
4.5 [74]	3.15 [80,0]	22250	8277-24	.40 [10,2]	5389-2	1.63 [41,4]
5.9 [96]	3.22 [81,8]	616	8277-3	.52 [13,2]	5389-3	1.75 [44,5]
7.3 [120]	3.40 [86,2]	22251	8277-9	.65 [16,5]	5389-10	1.88 [47,8]
8.9 [146]	3.54 [89,9]	22252	8277-20	.79 [20,1]	5389-15	2.00 [50,8]
9.7 [159]	3.61 [91,7]	8664	8277-4	.86 [21,8]	5389-4	2.13 [54,1]
11.3 [185]	3.77 [95,8]	22189	8277-5	1.00 [25,4]	5389-5	2.25 [57,1]
14.1 [231]	4.02 [102,1]	22190	8277-25	1.25 [31,7]	5389-6	2.50 [63,5]
17.9 [293]	4.35 [110,5]	22253	8277-26	1.59 [40,4]	5389-19	2.88 [73,2]
22.6 [370]	4.77 [121,2]	22191	8277-27	2.00 [50,8]	5389-8	3.25 [82,6]



PARTS LIST

Ref. No.	Design Code/Part Number			Description	Qty.
	-007	-008	-009		
1	5777	5777	5777	Screw, Cap 12 pt. Dr. 5/16-24 UNF x 3/8	4
X 2	9121-2	9121-2	9121-2	Seal, Exclusion	1
3	7463	22000-1	22000-1	Flange, Mounting (2 Bolt)	1
4	7464	22000-2	22000-2	Flange, Mounting (4 Bolt)	1
X 5	9057-1	9057-14	9057-14	Seal, Shaft Pressure	1
X 6	N/A	22002	22002	Ring, Back-up	1
X 7	9091-1	9091-1	9091-1	Seal	1
8	7462	7462	7462	Race, Bearing	1
9	7537	7537	7537	Bearing, Thrust Needle	1
10	14193	14193	14193	Key, Woodruff	1
11	7360-1	7360-1	7360-1	Shaft, Output (Keyed)	1
12	7360-2	7360-2	7360-2	Shaft, Output (Splined)	1
		7360-7	7360-7	Shaft, Output (Straight w/Crosshole, .31 in. diameter)	1
			7360-8	Shaft, Output (Straight w/Crosshole, .40 in. diameter)	1
13	7359-1	7359-1	22230-1	Housing 7/8-14 Str. Thd. SAE O-ring	1
	7359-2	7359-2	22230-2	Boss Ports	
	7359-3	7359-3	22230-3	1/2 NPTF Ports	
				Manifold Mount	
X14	15007	15007	250001-011	O-ring	1
15	8985	8985	22229	Plug	1
X16	9086-2	9086-2	9086-2	Seal	3
17	*	*	*	Drive	1
18	7358	7358	7358	Plate, Spacer	1
19	*	*	*	Gerotor Set	1
20	*	*	N/A	Spacer	1
21	7461	7461	7461	Cap, End	1
X22	14488	14488	14488	Washer, Seal	7
23	*	*	*	Screw, Cap 12 pt. Dr. 5/16-24 UNF	7
24	123-1007	123-1007	123-1007	Base Block Kit (1/2-NPTF)	
	123-1008	123-1008	123-1008	Base Block Kit (7/8-14 Str. Thd.) (Kits are optional on motors with manifold mount only.)	
X25	15058	15058	15058	Seal, O-ring	2
26	21046-3	21046-3	21046-3	Screw, Cap 5/16-18 UNC	4
27	NSS	NSS	NSS	Base, Block	1
	60023	60540	60540	Seal Kits	
	60032	60545	60545	Buna N Viton	

X-Seal Kit.
 *-See chart for part numbers of specific models.
 N/A-Not Applicable.
 NSS-Not sold separately.

-007 Design Code

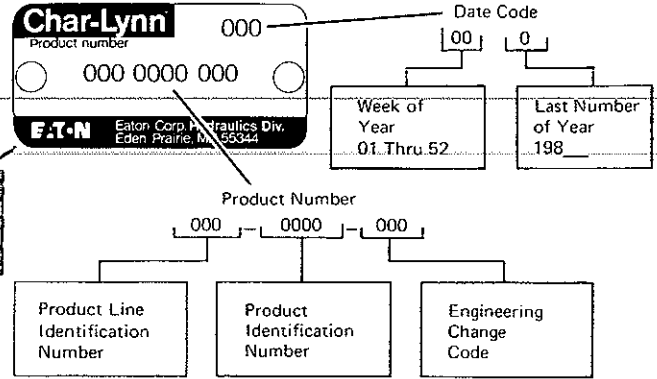
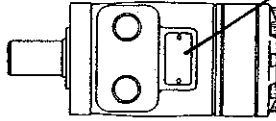
Ref. No. 17-Drive		Ref. No. 19-Gerotor		Ref. No. 20-Spacer		Ref. No. 23-Cap Screws	
Displ. cu. in. [cu. cm/rev.]	Part No.	Part No.	Width in. [mm]	Part No.	Width in. [mm]	Part No.	Length in. [mm]
3.0 [49]	602	8277-1	.25 [6,4]	N/A		5389-1	1.50 [38,1]
4.5 [74]	602	8277-2	.38 [9,7]	N/A		5389-2	1.63 [41,4]
6.2 [102]	616	8277-3	.52 [13,2]	N/A		5389-3	1.75 [44,5]
10.3 [169]	616	8277-4	.86 [21,8]	6901-2	.31 [7,9]	5389-4	2.12 [53,9]
11.9 [195]	616	8277-5	1.00 [25,4]	6901-3	.48 [12,2]	5389-5	2.25 [57,1]
14.9 [244]	616	8277-6	1.25 [31,7]	6901-5	.73 [18,5]	5389-6	2.50 [63,5]
16.9 [277]	616	8277-7	1.50 [38,1]	6901-6	.98 [24,9]	5389-7	2.75 [69,8]
23.8 [390]	616	8277-8	2.00 [50,8]	6901-8	1.48 [37,6]	5389-8	3.25 [82,6]

CHAR-LYNN®
HYDRAULIC MOTOR.
"H" SERIES
PARTS INFORMATION
NO. 6-121

HOW TO ORDER
REPLACEMENT PARTS

EACH ORDER MUST INCLUDE
THE FOLLOWING INFORMATION

1. Product Number
2. Date Code
3. Part Name
4. Part Number
5. Quantity of Parts



H Plus Series (009)

Mounting	Shaft	Port	Displacement (cu. in./rev.) Product Number 101-xxxx											
			2.2	2.8	3.6	4.5	5.9	7.3	8.9	9.7	11.3	14.1	17.9	22.6
2 Bolt Flange	1" Straight with Woodruff Key	3/8-14 O-ring	101-1700	-1033	-1701	-1034	-1035	-1702	-1703	-1036	-1037	-1038	-1039	-1040
		1/2 NPTF	101-1704	-1025	-1705	-1026	-1027	-1706	-1707	-1028	-1029	-1030	-1031	-1032
		Manifold	101-1708	-1041	-1709	-1042	-1043	-1710	-1711	-1044	-1045	-1046	-1047	-1048
	1" SAE 6B Splined	3/8-14 O-ring	101-1721	-1081	-1722	-1082	-1083	-1723	-1724	-1084	-1085	-1086	-1087	-1088
		1/2 NPTF	101-1725	-1073	-1726	-1074	-1075	-1727	-1728	-1076	-1077	-1078	-1079	-1080
		Manifold	101-1729	-1089	-1730	-1090	-1091	-1731	-1732	-1092	-1093	-1094	-1095	-1096
	1" Straight with .31 D. Crosshole	3/8-14 O-ring	101-1796	-1797	-1798	-1799	-1800	-1801	-1802	-1803				
		1/2 NPTF	101-1804	-1805	-1806	-1807	-1808	-1870	-1809	-1810				
		Manifold	101-1811	-1812	-1813	-1814	-1815	-1816	-1817	-1818				
	1" Straight with .40 D. Crosshole	3/8-14 O-ring	101-1819	-1323	-1820	-1324	-1325	-1821	-1822	-1326				
		1/2 NPTF	101-1823	-1319	-1824	-1320	-1825	-1826	-1827	-1828				
		Manifold	101-1829	-1463	-1830	-1831	-1832	-1833	-1834	-1871				
4 Bolt Flange	1" Straight with Woodruff Key	3/8-14 O-ring	101-1749	-1009	-1750	-1010	-1011	-1751	-1752	-1012	-1013	-1014	-1015	-1016
		1/2 NPTF	101-1753	-1001	-1754	-1002	-1003	-1755	-1756	-1004	-1005	-1006	-1007	-1008
		Manifold	101-1757	-1017	-1758	-1018	-1019	-1759	-1760	-1020	-1021	-1022	-1023	-1024
	1" SAE 6B Splined	3/8-14 O-ring	101-1761	-1057	-1762	-1058	-1059	-1872	-1763	-1060	-1061	-1062	-1063	-1064
		1/2 NPTF	101-1764	-1049	-1765	-1050	-1051	-1766	-1767	-1052	-1053	-1054	-1055	-1056
		Manifold	101-1768	-1065	-1769	-1066	-1067	-1770	-1771	-1068	-1069	-1070	-1071	-1072
	1" Straight with .31 D. Crosshole	3/8-14 O-ring	101-1835	-1836	-1837	-1838	-1839	-1840	-1841	-1842				
		1/2 NPTF	101-1843	-1497	-1844	-1449	-1352	-1845	-1846	-1847				
		Manifold	101-1848	-1466	-1849	-1459	-1850	-1851	-1852	-1853				
	1" Straight with .40 D. Crosshole	3/8-14 O-ring	101-1854	-1311	-1855	-1856	-1857	-1858	-1859	-1860				
		1/2 NPTF	101-1861	-1313	-1862	-1312	-1314	-1863	-1864	-1315				
		Manifold	101-1865	-1305	-1866	-1306	-1307	-1867	-1868	-1869				

101-1869

Eaton Corporation **Hydraulics Division** 15151 Highway 5, Eden Prairie, MN 55344 Telephone (612) 937-9800
Eaton G.m.b.H. **Hydraulics Division** ☐ 100 410 • D-5620 Velbert 1 West Germany ☎ 49-2051-20745



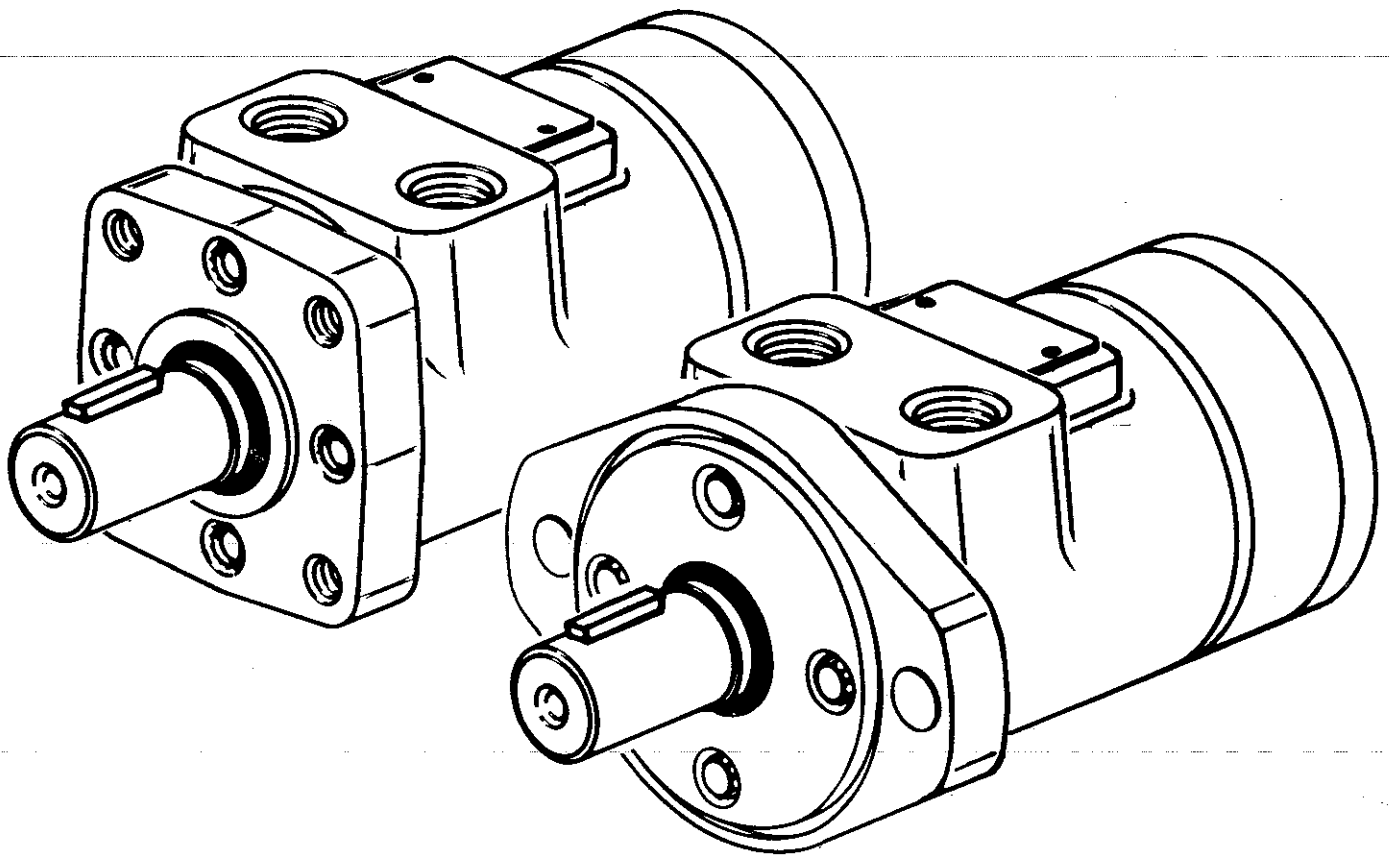
NO. 7-117

 **Eaton
Hydraulics
Division**

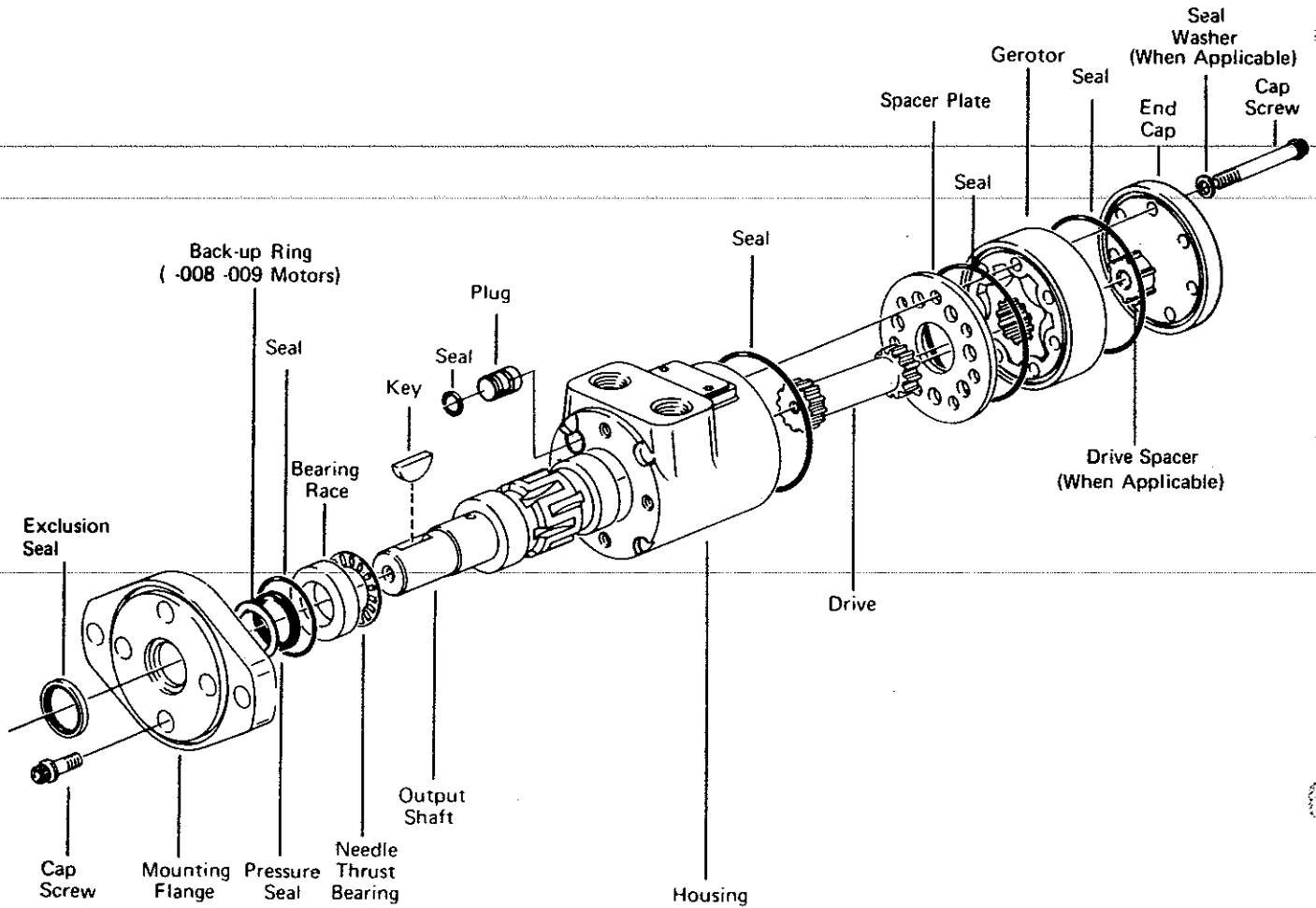
Repair Information

H Series Char-Lynn® Motors

007 008 009



 **EATON**



Tools required for disassembly and reassembly.

- Torque wrench (300 lb-in [34Nm] capacity)
- 12-16 in. [300-400mm] breaker bar
- * 5/16 in. -12 point socket no. 5422 (Heavy Duty 500 lb-in [56Nm] Capacity)
- Small screwdriver (6-8x1/4 in. [150-200x6mm] flat blade), see page 5 for tooling information.
- 3/16 in. [5mm] hex key
- * Shaft pressure seal installation tool for 007 motor P/N 600470, for 008 and 009 motors P/N 600523
- * Seal sleeve or bullet P/N 600304 (1 in. dia. shaft), P/N 600466 (7/8 in. dia. shaft)

* Tools available—by special order—through our service department.

Repair Information

H Series Char-Lynn Motors Disassembly

Instructions in this manual are for H Series Motors (101-XXXX-007, 008 and 009).

Cleanliness is extremely important when repairing these motors. Work in a clean area. Before disconnecting lines, clean port area of motor. Remove key when used. Check shaft and key slot. Remove burrs, nicks and sharp edges. Before disassembly, drain oil from motor. Then plug ports and thoroughly clean exterior of motor.

Although not all drawings show the motor in a vise, we recommend that you keep the motor in a vise during disassembly. Follow the clamping procedures explained throughout the manual.

Gerotor End

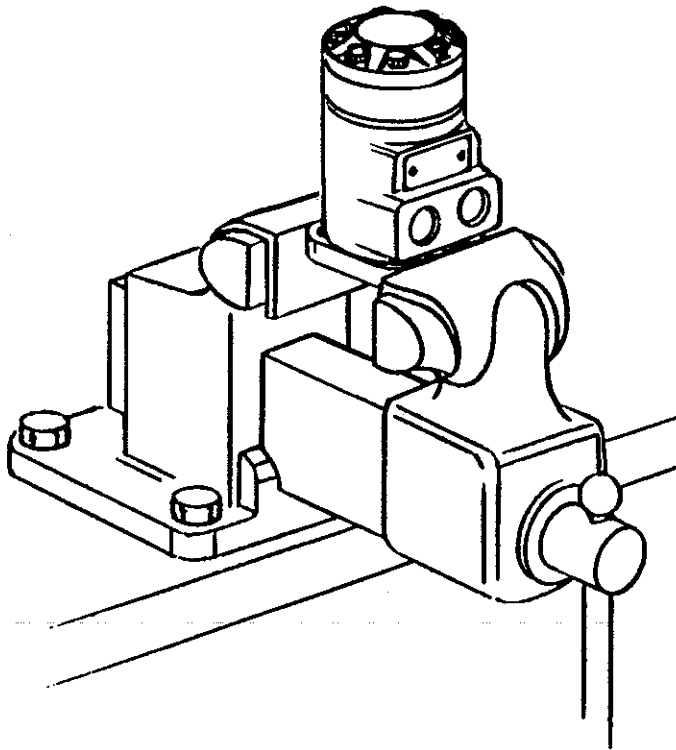


Figure 1

1 Place motor in vise and clamp across edge of flange with output shaft down. When clamping, use protective device on vise such as special soft jaws, pieces of hard rubber or board. See Figure 1.

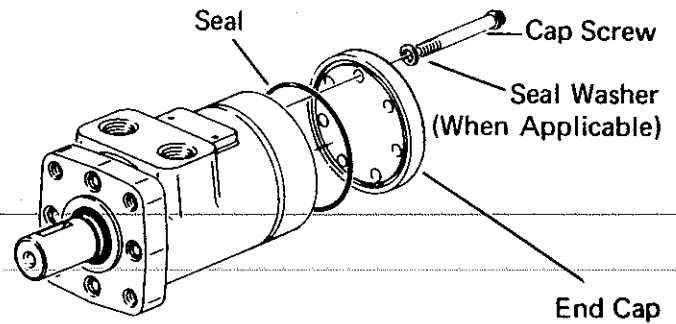


Figure 2

- 2 Remove cap screws and seal washers (when applicable). See Figure 2.
- 3 Remove end cap.
- 4 Remove seal from end cap.

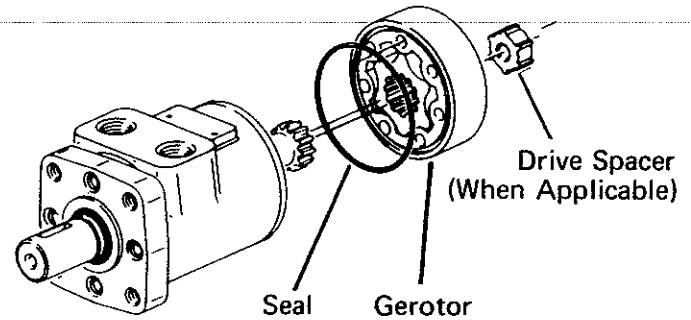


Figure 3

- 5 Remove gerotor.
- 6 Remove seal from gerotor (Figure 3).
- 7 Remove drive spacer if applicable.

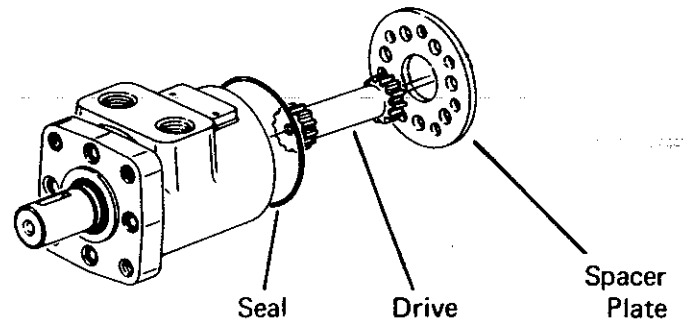


Figure 4

- 8 Remove drive. See Figure 4.
- 9 Remove spacer plate.
- 10 Remove seal from housing.

- 11 Remove output shaft from housing.
- 12 Remove needle thrust bearing from shaft or housing.

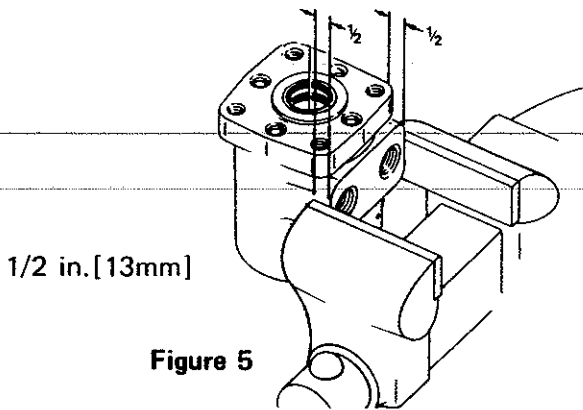


Figure 5

13 Reposition motor in vise. Clamp across ports as shown in Figure 5. Do not clamp on side of housing. Excessive clamping pressure on side of housing causes distortion.

14 Remove cap screws from mounting flange. These screws are assembled with Loctite to hold them in place.

The screws will require 300-400 lb-in [35-45 Nm] of torque to break loose and 100 lb-in [11 Nm] torque to remove. Do not use impact wrench on Loctited screws. This could result in rounded heads or broken sockets.

Note: If torque higher than given above is required to break screws loose, apply heat according to following instructions:

When heated, Loctite partially melts. This reduces torque required to remove screw. Use small flame propane torch to heat small area of housing where screw enters. See Figure 6. **Be careful not to overheat housing** and damage motor. Gradually apply torque to screw with **socket wrench** as heat is applied for 8 to 10 seconds. As soon as screw breaks loose, remove heat from housing. Continue turning screw until it is completely removed.

4

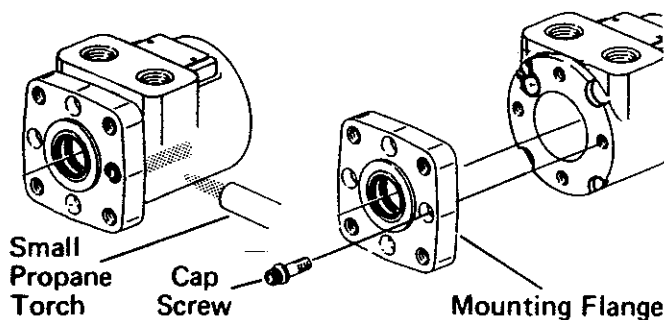


Figure 6

15 Carefully remove flange from housing.

Important: Some motors may have a quad seal and back-up ring in place of the pressure seal. The quad seal and back-up ring are no longer available and are replaced by the pressure seal. They are interchangeable, but some precautions must be taken to insure proper installation. Follow the reassembly instructions.

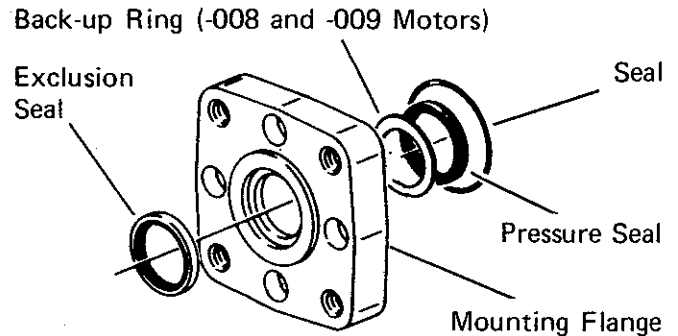


Figure 7

16 Exclusion seal, back-up ring, pressure seal and seal will come off with flange (Figure 7). Use seal removal tool, shown in Figures 8 and 9, to remove exclusion and pressure seals.

Important: Be careful not to scratch seal cavity O.D. This could create a leak path.

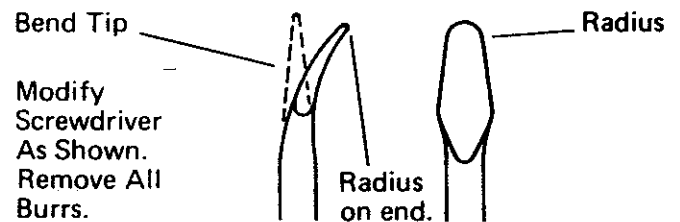


Figure 8

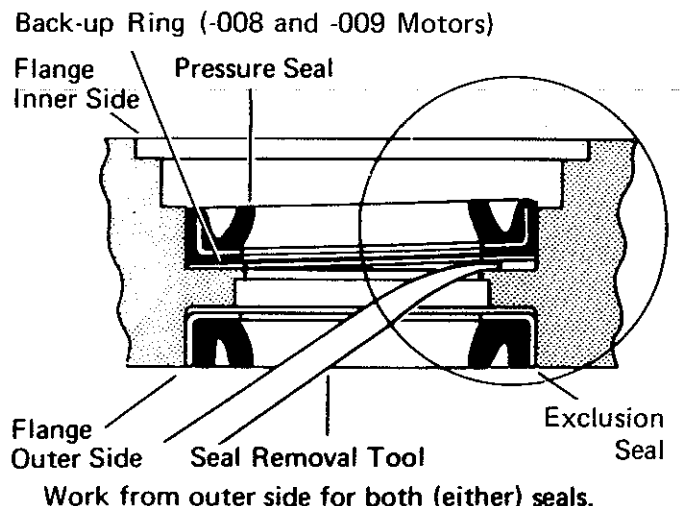


Figure 9

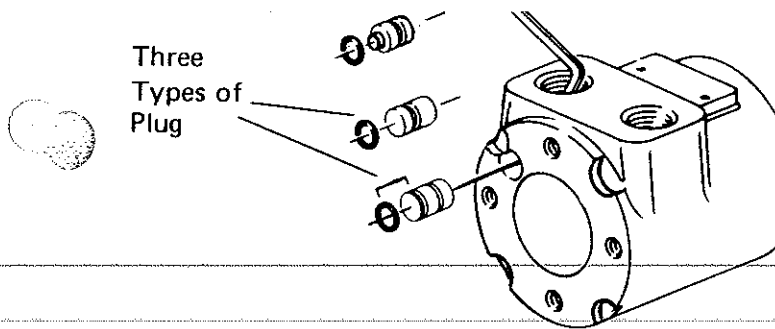


Figure 10

17 A metal plug, with seal, plugs a machining hole in the housing. It is not necessary to remove plug and replace seal unless leakage occurs around plug. To remove plug, insert $\frac{3}{16}$ in. [5 mm] hex key through port opening and push it out. See Figure 10. The 009 plug is not interchangeable with 007 and 008 plugs.

Reassembly

Shaft End

Check all mating surfaces. Replace any parts with scratches or burrs that could cause leakage or damage. Clean all metal parts in clean solvent. Blow dry with air. Do not wipe parts with cloth or paper towel because lint or other matter could get into the hydraulic system and cause damage.

Check around key slot and chamfered area of shaft for burrs, nicks or sharp edges that could damage seals during reassembly. Remove nicks or burrs with a hard smooth stone (such as an Arkansas stone). Do not file or grind motor parts.

Note: Lubricate all seals with petroleum jelly. Use new seals when reassembling motor. Refer to parts list 6-121 for proper seal kit numbers.

Important: Do not stretch seals before installing them.

Cleanliness is extremely important in the successful application of Loctite. Before Loctite can be applied, the parts should be cleaned as follows:

Note: Fully cured Loctite resists most solvents, oils, gasoline and kerosene and is not affected by cleaning operations. It is not necessary to remove cured Loctite that is securely bonded in tapped holes; however, any loose particles of cured Loctite should be removed.

a. Wash the housing with solvent to remove oil, grease and debris. Pay particular attention to four tapped holes on flange end.

b. Blow dry with compressed air. Clean and dry tapped holes.

c. Wire brush screw threads to remove cured Loctite and other debris. Discard any screws that have damaged threads or rounded heads.

d. Wash screws with non-petroleum base solvent. Blow dry with compressed air.

18 If you remove plug and seal, lubricate new seal and install on plug. Some plugs have two o-ring grooves but require only one o-ring. Install o-ring in groove closest to end of plug. Push plug into housing so plug and housing are flush. Be careful not to damage seal.

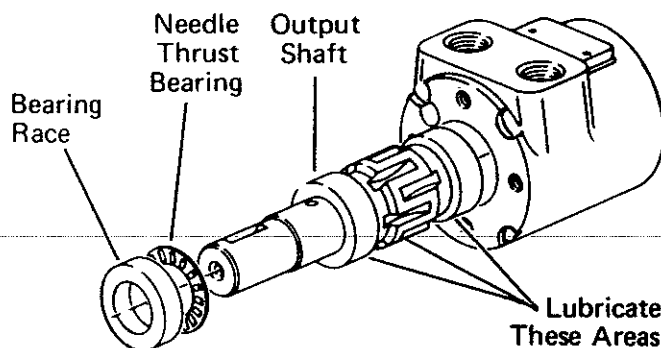
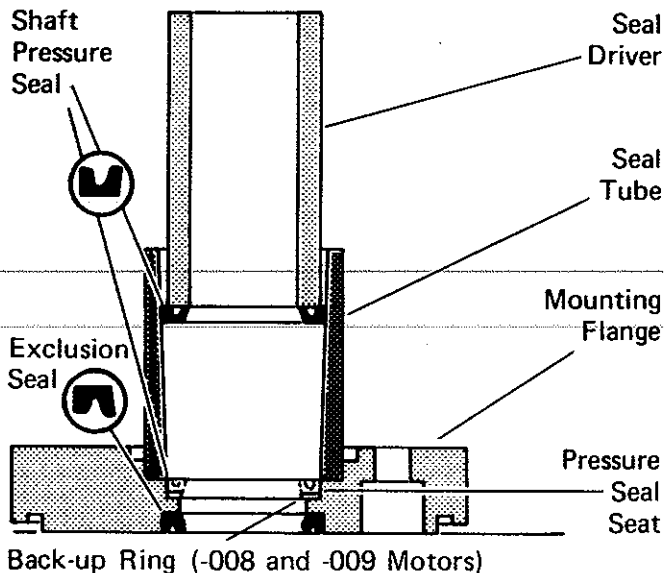


Figure 11

19 Lubricate output shaft with hydraulic oil, then install shaft in housing. See Figure 11.

Important: Do not permit oil to get into the four tapped holes.

20 - Install needle thrust bearing, then bearing race on shaft. Pull shaft partially out of housing. Push all three parts in housing together. See Figure 11. The bearing race must rotate freely when in position.



Back-up Ring (-008 and -009 Motors)

Seal Installation Tool

No. 600470 (007 Motors)

No. 600523 (008, 009 Motors)

Figure 12

21 Install exclusion seal in flange. See Figure 12. Carefully press exclusion seal into place.

22 Visually check seal seat in mounting flange for scratches or other marks that might damage the pressure seal. Check for cracks in flange that could cause leakage.

23 Lubricate I.D. of seal tube and O.D. of shaft pressure seal with light film of clean petroleum jelly. Align small I.D. end of seal tube with seal seat in mounting flange. Install back-up ring and pressure seal in tube with lips of seal face up. See Figure 12. Insert seal driver in tube and firmly push seal seat with a rotating action.

Important: After installing seal in flange, examine seal condition. If damaged or improperly installed, you must replace it before continuing with reassembly.

24 Install 1¹⁵/₁₆ in. [49 mm] I.D. seal in flange.

25 It is recommended to apply a light coat of Loctite Primer NF in tapped holes of housing. Allow primer to air dry for at least 1 minute. Do not force dry with air jet; the primer will blow away.

Use of primer is optional. With primer, Loctite curing time is approximately 15 minutes. Without primer, curing time is approximately 6 hours.

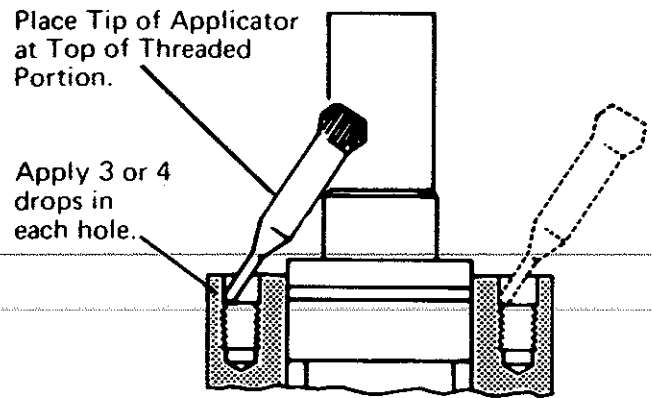


Figure 13

26 Apply 3 or 4 drops of Loctite sealant at top of thread for each of four holes in housing. See Figure 13. Do not allow parts with Loctite applied to come in contact with any metal parts other than those for assembly. Wipe off excess Loctite from housing face, using a non-petroleum base solvent.

Do not apply Loctite to threads more than 15 minutes before installing screws. If housing stands for more than 15 minutes, repeat application. No additional cleaning or removal of previously applied Loctite is necessary.

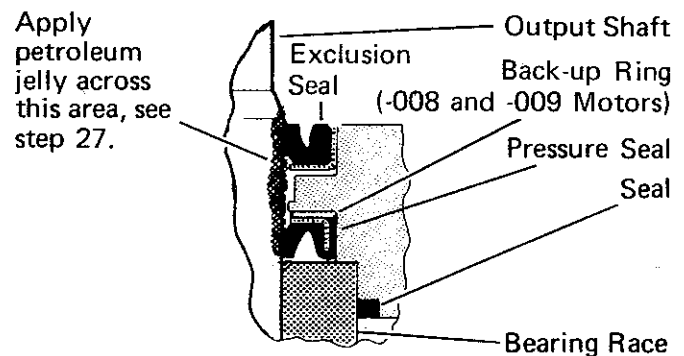


Figure 14

27 Before installing flange and seal assembly over shaft, place protective sleeve or bullet over shaft. Then lubricate space between exclusion seal and pressure seal, as well as lips of both seals. See Figure 14.

Install flange. Rotate flange slowly while pushing down over shaft. Be careful not to invert or damage seals.

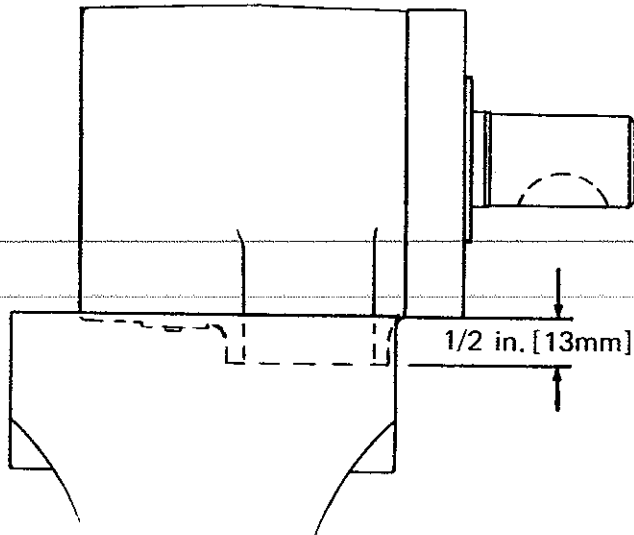


Figure 15

28 After removing bullet, clamp motor in vise as shown in Figure 15. Make sure shaft cannot fall out. Install **dry** screws and alternately torque them immediately to 250 lb-in [28 Nm]. If you use primer, allow to cure for **10 to 15 minutes**. Without primer, allow 6 hours curing time before subjecting motor to high torque reversals. On all other applications, you can run motor immediately.

If you use new screws, make sure they are the correct length: $\frac{7}{8}$ in. [22 mm] under head length. See parts list for correct part number.

Gerotor End

29 Reposition motor with gerotor end up, then clamp across ports. Do not clamp on side of housing.

Important: To aid installation of seals, apply light coat of clean petroleum jelly to seals. Do not stretch seals before installing them in groove.

30 Pour approximately 35 cc of clean hydraulic oil in output shaft cavity.

31 Install $2\frac{7}{8}$ in. [73 mm] I.D. seal in housing seal groove. Avoid twisting seal.

Timing Procedure

a. Install drive. Use felt tip marker to mark one drive tooth. Align this tooth with timing dot on shaft.

Note: If drive is not symmetrical, install larger splined end into shaft.

b. Install spacer plate.

c. Install $2\frac{7}{8}$ in. [73 mm] I.D. seal in gerotor seal groove. Carefully place gerotor on spacer plate, seal side toward spacer plate.

Standard Rotation Align any star point with tooth marked on drive. See Figure 16.

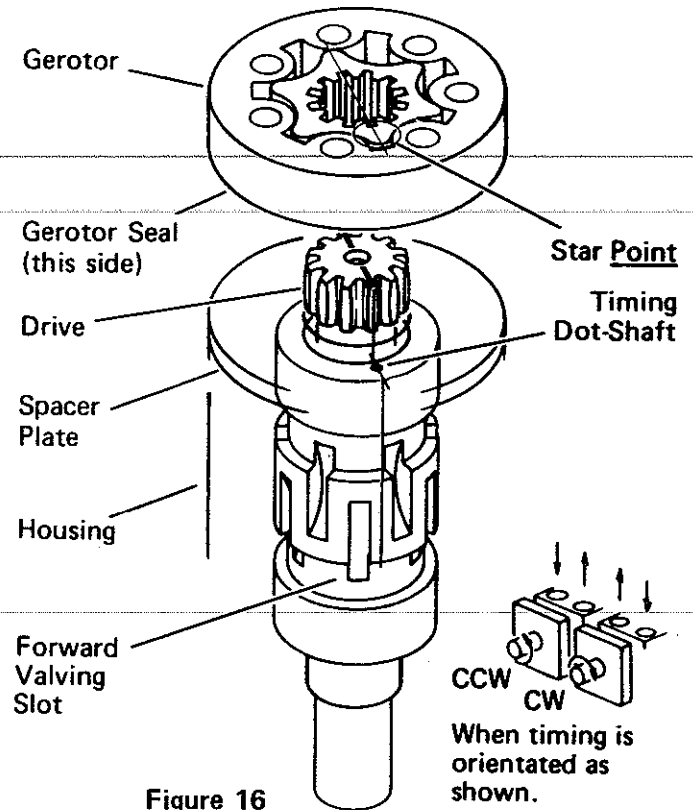


Figure 16

Reverse Rotation Align any star valley with marked tooth. See Figure 17.

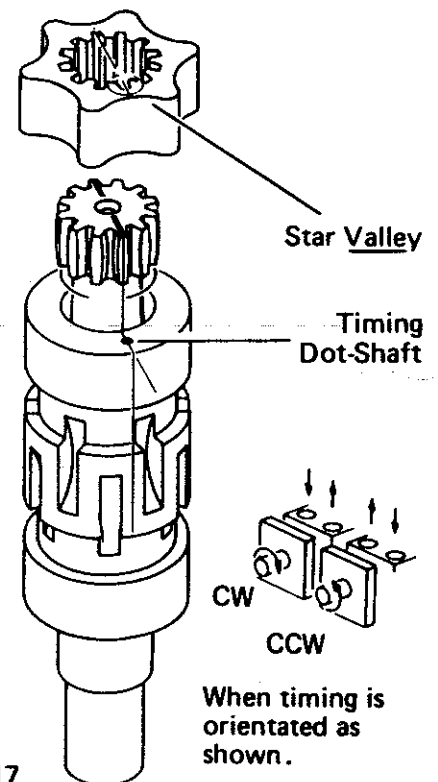
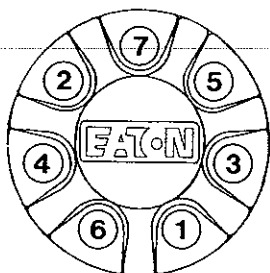


Figure 17

32 Rotate gerotor to line up bolt holes. Be careful not to disengage star from drive or disturb gerotor seal.

33 Install drive spacer if applicable.

34 Install 2 7/8 in. [73 mm] seal in end cap. Carefully place end cap on gerotor.

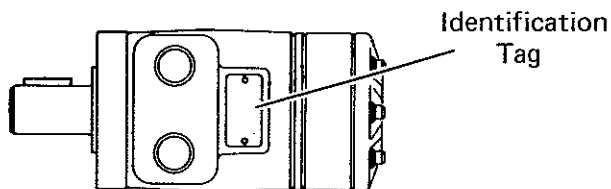


Bolt Torquing Sequence

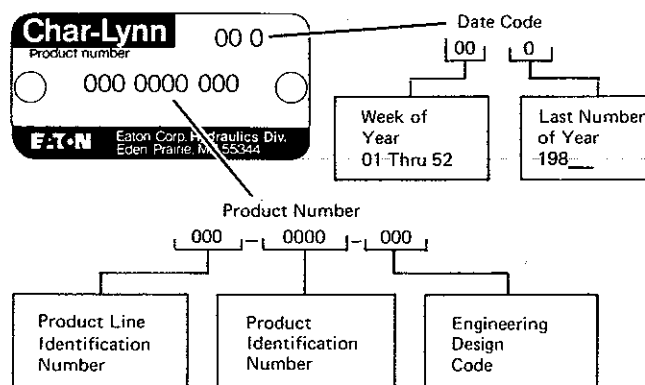
Figure 18

Each order must include the following information:

- 1 Product Number
- 2 Date Code
- 3 Part Name
- 4 Part Number
- 5 Quantity of Parts



35 Install cap screws and seal washers (if applicable) in end cap. Pretighten screws to 40 lb-in [7, 4 Nm]. Make sure seals are properly seated. Then torque screws 275-300 lb-in [30-34 Nm] in sequence, as shown in Figure 18.



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Eaton G.m.b.H. Hydraulics Division ☒ 100 410 · D-5620 Velbert 1 West Germany ☎ (0 20 51) 20 70



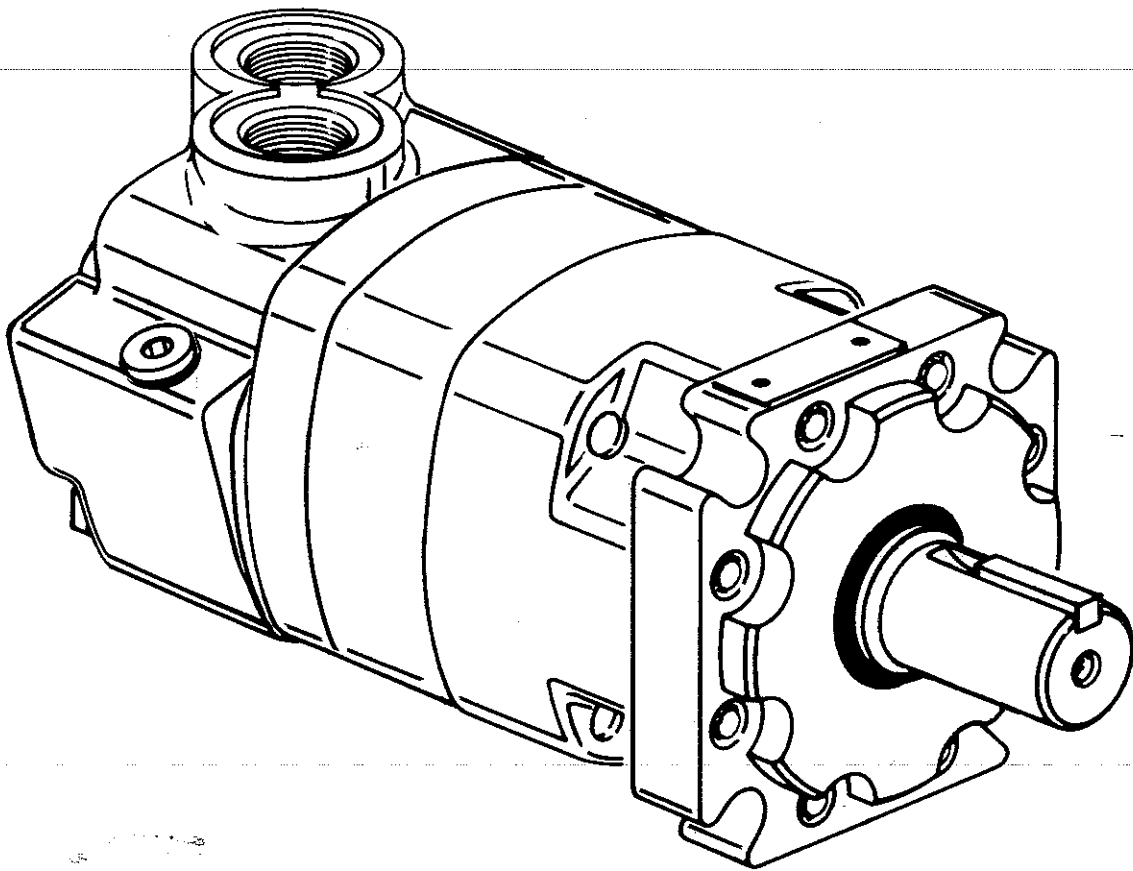
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 **Eaton
Hydraulics
Division**

Parts Information

4000 Series Char-Lynn® Motors

004

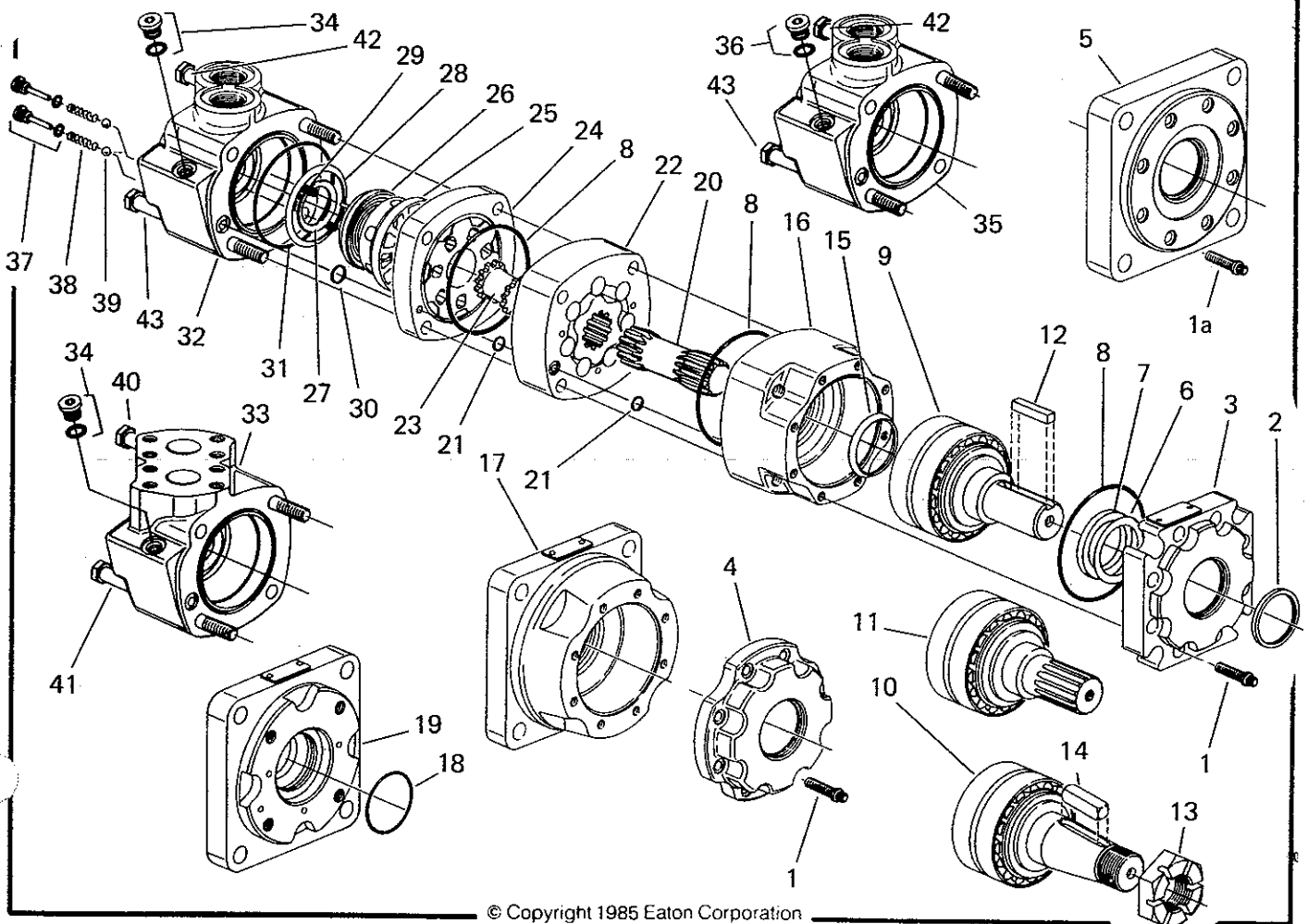


 **EAT•N**

PARTS DRAWING

Displ. cu. in./rev. [cu. cm/rev.]	Drive Ref. No. 20		Geroler® Ref. No. 22		Bolt Ref. No. 40	
	Part No.	Length in. [mm]	Part No.	Width in. [mm]	Part No.	Length in. [mm]
6.6 [110]	21372-1	3.49 [88,65]	8464-1	.84 [21,44]	14386- 9	6.16 [156,5]
7.9 [130]	21372-2	3.66 [92,96]	8464-2	1.01 [25,73]	14386- 9	6.16 [156,5]
9.9 [160]	21372-3	3.88 [98,55]	8464-3	1.26 [32,06]	14386-10	6.41 [162,8]
12.5 [205]	21372-4	4.22 [107,19]	8464-4	1.60 [40,59]	14386-11	6.91 [175,5]
15 [245]	21372-3	3.88 [98,55]	8464-5	1.26 [32,06]	14386-10	6.41 [162,8]
19 [310]	21372-4	4.22 [107,19]	8464-6	1.60 [40,59]	14386-11	6.91 [175,5]
24 [395]	21372-5	4.65 [118,11]	8464-7	2.02 [51,26]	14386-12	7.16 [181,8]

Displ. cu. in./rev. [cu. cm/rev.]	Bolt Ref. No. 41		Bolt Ref. No. 42		Bolt Ref. No. 43	
	Part No.	Length in. [mm]	Part No.	Width in. [mm]	Part No.	Length in. [mm]
6.6 [110]	14386-4	4.95 [125,7]	14386- 5	5.20 [132,1]	14386-3	4.70 [119,4]
7.9 [130]	14386-4	4.95 [125,7]	14386- 6	5.45 [138,4]	14386-4	4.95 [125,7]
9.9 [160]	14386-5	5.20 [132,1]	14386- 7	5.70 [144,8]	14386-5	5.20 [132,1]
12.5 [205]	14386-7	5.70 [144,8]	14386- 9	6.16 [156,5]	14386-7	5.70 [144,8]
15 [245]	14386-5	5.20 [132,1]	14386- 7	5.70 [144,8]	14386-5	5.20 [132,1]
19 [310]	14386-7	5.70 [144,8]	14386- 9	6.16 [156,5]	14386-7	5.70 [144,8]
24 [395]	14386-8	5.95 [151,1]	14386-10	6.41 [162,8]	14386-8	5.95 [151,1]



PARTS LIST

Ref. No.	Part Number	Description Dimension Ref. in. [mm]	Qty. Per Unit		
			Std.	Whl.	Brgl.
1	5389-22	Screw, Cap	8	8	
1a	5389-2	Screw, Cap	8		
† 2	9031-1	Seal, Dust	1	1	
3	8559	Flange, Mounting, SAE B	1		
4	8558	Retainer, Front		1	
5	21404	Flange, Mounting, SAE C	1		
† 6	6943	Ring, Back-up	1	1	1
† 7	9057-12	Seal, Shaft	1	1	
OX† 8	250052-043	Seal, 3½ [89] I.D.	3	3	2
9	8709-1	Shaft (Straight) & Bearing Kit, 1¼	1	1	
	8709-8	Shaft (Straight) & Bearing Kit, [40]	1	1	
10	8709-2	Shaft (Tapered) & Bearing Kit	1	1	
11	8709-3	Shaft (Splined) & Bearing Kit, 1¼ 14T	1	1	
	8709-9	Shaft (Splined) & Bearing Kit, 1½ 17T	1	1	
12	14392-11	Key (for 1¼ Straight Shaft)	1	1	
	14458-7	Key (for [40] Straight Shaft)	1	1	
13	14230	Nut, Hex	1	1	
14	14394-7	Key, (for Tapered Shaft)	1	1	
† 15	9079-1	Seal, Shaft Face	1	1	
16	8487	Housing, Bearing	1		
17	8488	Housing, Bearing		1	
O 18	15128	Seal, 2¼ [52] I.D.			1
19	8491	Flange, Mounting			1
20	*	Drive	1	1	1
OX 21	250001-010	Seal, ¼ [6,5] I.D.	2	2	2
22	*	Geroler	1	1	1
23	8510	Drive, Valve	1	1	1
24	21655	Plate, Valve	1	1	1
25	8500	Valve	1	1	1
26	21316	Balance Ring & Pins	1	1	1
OX 27	6961	Seal, Face, Inner	1	1	1
OX 28	6962	Seal, Face, Outer	1	1	1
29	6203	Spring	2	2	2
OX 30	15006	Seal, ⅝ [8] I.D.	1	1	1
OX 31	9022-7	Seal, ¾ [82,5] I.D.	1	1	1
32	8501-3	Housing, Valve, 1⅛ Str. Thd.— O-ring Ports	1	1	1
33	8501-2	Housing, Valve, ¾ Split Flange	1	1	1
34	9072-3	Plug Assembly, ⅞-20	1	1	1
	NSS	Plug	1	1	1
35	8501-6	Housing, Valve, R¾ BSP Ports	1	1	1
36	9170-2	Plug Assembly R¼ BSP Case Drain Plug	1	1	1
OX 37	250003-904	O-ring	1	1	1
	8350	Check Plug Assembly	1	1	1
	NSS	Plug	2	2	2
OX	15006	O-ring	2	2	2
38	6464	Spring	2	2	2
39	18026	Ball, Steel	2	2	2
40	*	Bolt	2	2	2
41	*	Bolt	2	2	2
42	*	Bolt	1	1	1
43	*	Bolt	3	3	3
X	61234	Seal Kit, Motor, Rear (Standard and Wheel Motors) Contains parts indicated by X			
†	61236	Seal Kit, Shaft (Standard and Wheel Motors) Contains parts indicated by †			
O	61235	Seal Kit, Motor, (Bearingless Motors Only) Contains parts indicated by O			
	61249	Viton Seal Kit (Bearingless Motors Only)			
	61248	Viton Seal Kit—Contains all seals for standard and wheel motors			

*—See Chart on Opposite Page
NSS—Not Sold Separately

CHAR-LYNN®
HYDRAULIC MOTOR
PARTS INFORMATION
NO. 6-126

HOW TO ORDER
REPLACEMENT PARTS

Type of Motor	Ports	Type of Shaft	Displacement (cu. in./rev.)						
			6.6	7.9	9.9	12.5	15	19	24
Standard Motor	1-1/16 Straight Thread O-ring	1-1/4 Str. Keyed	109-1100	109-1101	109-1102	109-1103	109-1104	109-1105	109-1106
		1-5/8 Tapered	109-1107	109-1108	109-1109	109-1110	109-1111	109-1112	109-1113
		1-1/4 Splined	109-1114	109-1115	109-1116	109-1117	109-1118	109-1119	109-1120
Wheel Motor	1-1/16 Straight Thread O-ring	1-1/4 Str. Keyed	110-1074	110-1075	110-1076	110-1077	110-1078	110-1079	110-1080
		1-5/8 Tapered	110-1081	110-1082	110-1083	110-1084	110-1085	110-1086	110-1087
		1-1/4 Splined	110-1088	110-1089	110-1090	110-1091	110-1092	110-1093	110-1094
Bearingless	1-1/16	Str. Thread O-ring	111-1033	111-1034	111-1035	111-1036	111-1037	111-1038	111-1039

Limited Availability

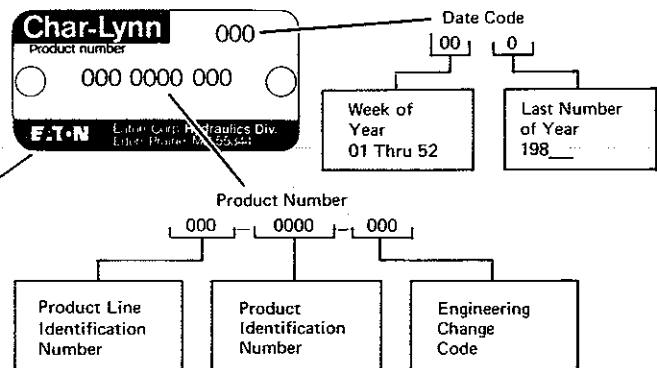
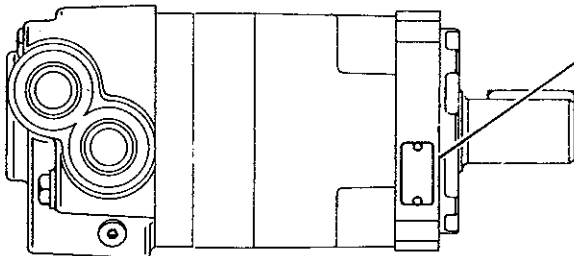
Standard Motor	3/4 Split Flange	1-1/4 Str. Keyed	109-1001	109-1054	109-1002	109-1003	109-1055	109-1056	109-1057
		1-5/8 Tapered	109-1006	109-1058	109-1007	109-1008	109-1059	109-1060	109-1061
		1-1/4 Splined	109-1011	109-1062	109-1012	109-1013	109-1063	109-1064	109-1065
Wheel Motor	3/4 Split Flange	1-1/4 Str. Keyed	110-1001	110-1040	110-1002	110-1003	110-1041	110-1042	110-1043
		1-5/8 Tapered	110-1006	110-1044	110-1007	110-1008	110-1045	110-1046	110-1047
		1-1/4 Splined	110-1011	110-1048	110-1012	110-1013	110-1049	110-1050	110-1051
Bearingless	3/4	Split Flange	111-1044	111-1015	111-1045	111-1046	111-1016	111-1017	111-1018

4000 Series (Metric)

Type of Motor	Type of Shaft	Ports	Displacement (cu. cm./rev.) and Product Number						
			110	130	160	205	245	310	395
Standard	40mm Str.	R $\frac{3}{4}$ BSP	109-1184	109-1185	109-1186	109-1187	109-1188	109-1189	109-1190
	1 1/2 17 T Splined	R $\frac{3}{4}$ BSP	109-1191	109-1192	109-1193	109-1194	109-1195	109-1196	109-1197
Wheel	40 mm Str.	R $\frac{3}{4}$ BSP	110-1108	110-1109	110-1110	110-1111	110-1112	110-1113	110-1114
Bearingless		R $\frac{3}{4}$ BSP	111-1052	111-1053	111-1054	111-1055	111-1056	111-1057	111-1058

EACH ORDER MUST INCLUDE THE FOLLOWING INFORMATION

1. Product Number
2. Date Code
3. Part Name
4. Part Number
5. Quantity of Parts



Eaton Corporation **Hydraulics Division** 15151 Highway 5 Eden Prairie, MN 55344 Telephone (612) 937-9800



REVISED NOVEMBER, 1988
 FORM NO. 6-126-118

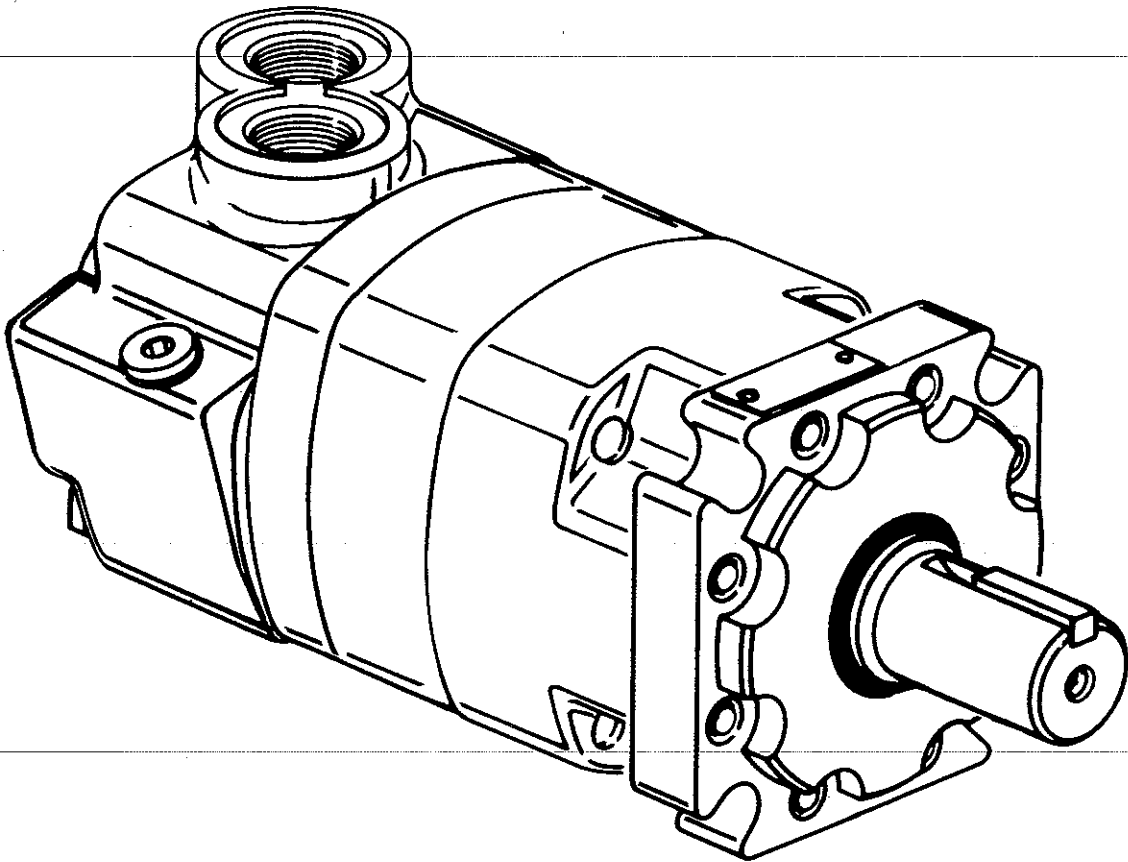
NO. 7-118

**Eaton
Hydraulics
Division**

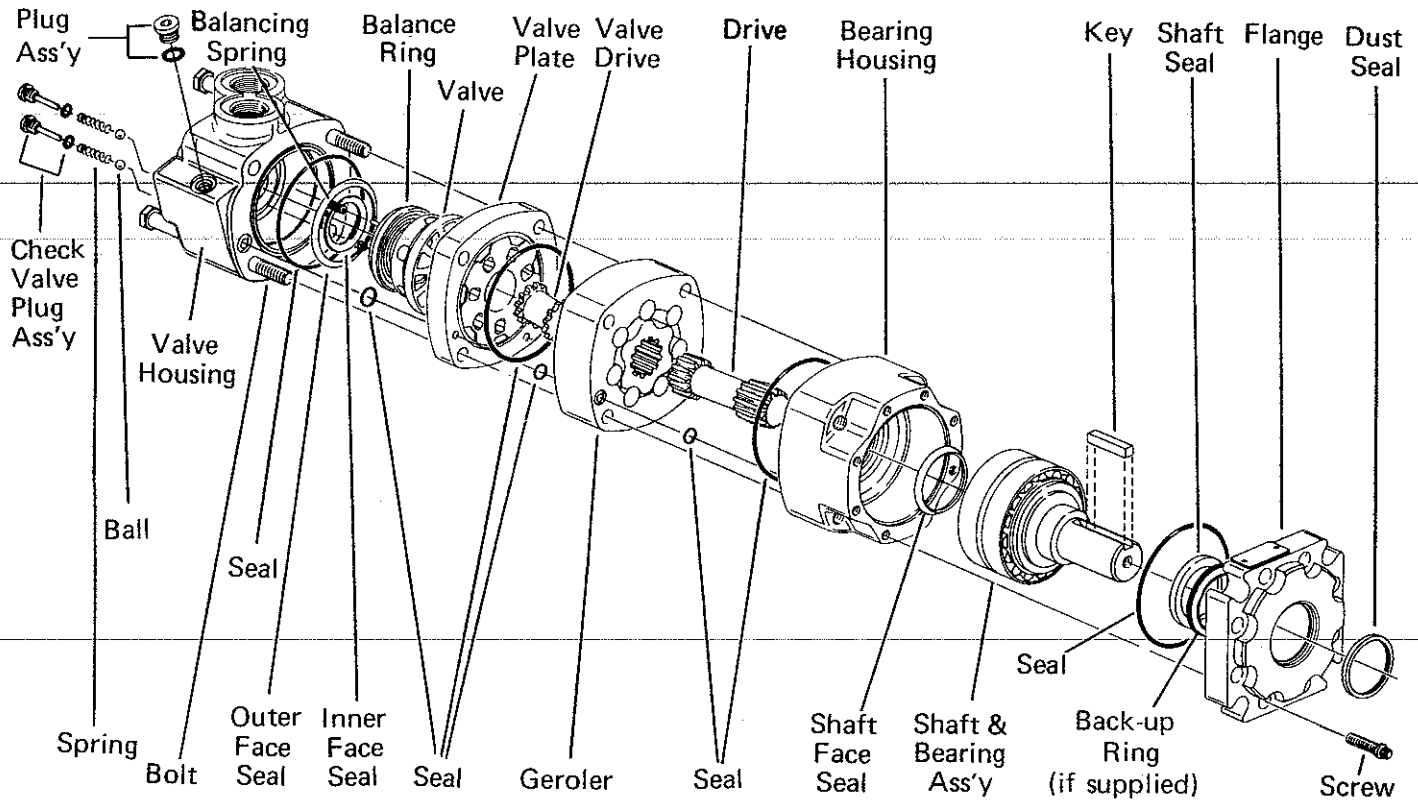
Repair Information

4000 Series Char-Lynn® Motors

004



EAT•N



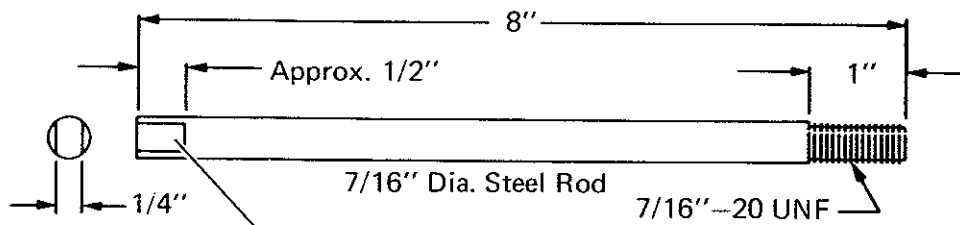
See pages 9 and 10 for wheel motor and bearingless motor repair information.

Tools required for disassembly and reassembly

- Torque wrench (600 inch pound capacity)
- 12" - 16" breaker bar
- 5/8" and 5/16" sockets
- Small screwdriver (6" - 8" long, 1/4" blade)
- 3/16" Allen wrench
- Plastic or rubber hammer
- Hydraulic Press - 300 lb. Maximum
- *--Shaft face seal installation tool (600468)
- *--Bullet (600463) for 1-1/4" diameter shafts
- Shaft seal installation tool (2 1/8 in. O.D. socket)

The following are not necessary for disassembly and reassembly but are extremely helpful

- Alignment studs (2), see dimensions below.



Grind flat spots on each side.

*Available-by special order--through our service department.

Disassembly

Cleanliness is extremely important when repairing a hydraulic motor. Work in a clean area. Before disconnecting the lines, clean the port area of the motor thoroughly. Use a wire brush to remove foreign material and debris from the exterior joints of the motor. Check the shaft and keyway, use a 600 grit sandpaper to remove all nicks, burrs, or sharp edges that might damage the shaft seals when installing the flange on the shaft and bearing assembly. Before starting the disassembly procedures, drain oil from inside the motor.

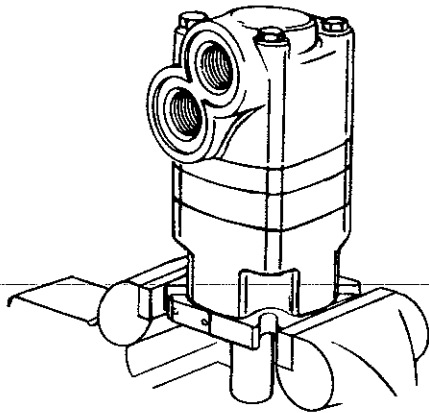


Figure 1

1 Place the motor in a vise with the output shaft down. Clamp across flange of motor not on housing. Excessive clamping pressure on the housing will cause distortion. When clamping, use a protective device on the vise, such as special soft jaws, pieces of hard rubber or board.

Although not all drawings show the motor in a vise, we recommend that you keep the motor in the vise during disassembly. Follow the clamping procedures explained throughout the manual.

2 Remove 4 bolts from the valve housing.

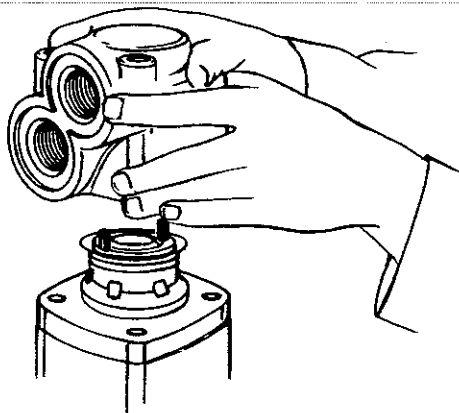


Figure 2

4

3 Lift valve housing straight up. If done carefully, the springs and balance ring will remain on valve for easy removal.

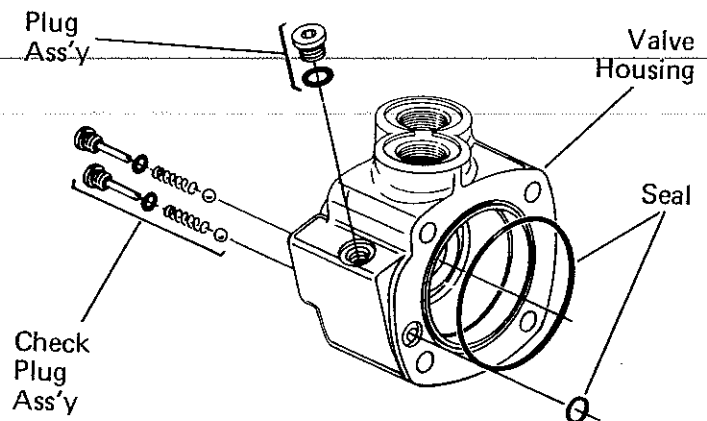


Figure 3

4 Carefully remove the following from the valve housing:

- 1 seal, 3-1/4" I.D.
- 1 seal, 5/16" I.D.
- 2 check plug assemblies (plug, seal, spring, ball).
- 1 plug (case drain) w/seal.

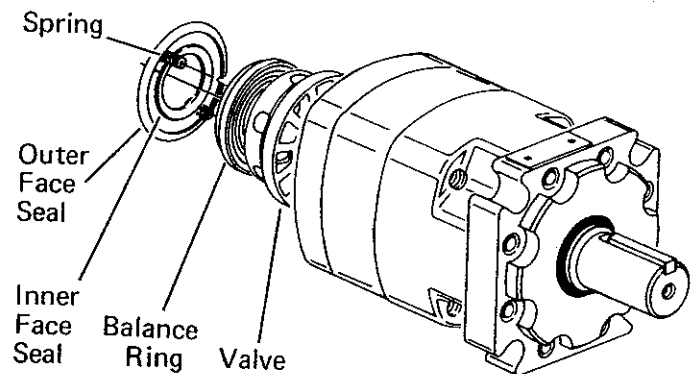


Figure 4

- 5 Remove 2 balance ring springs.
- 6 Remove balance ring subassembly.
- 7 Remove inner and outer face seals from the balance ring.
- 8 Lift off valve.

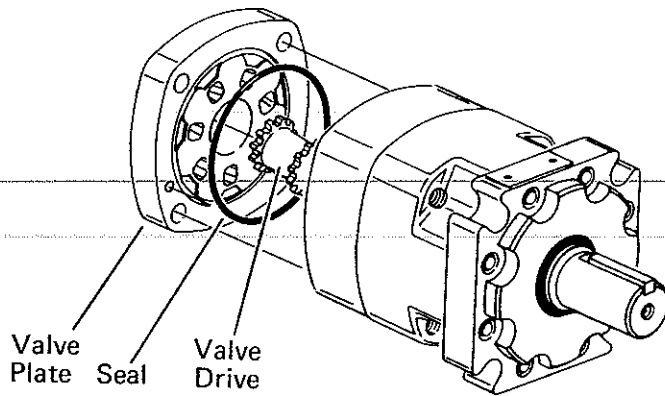


Figure 5

- 9 Remove valve plate.
- 10 Remove 3-1/2" I.D. seal from valve plate.
- 11 Remove valve drive.

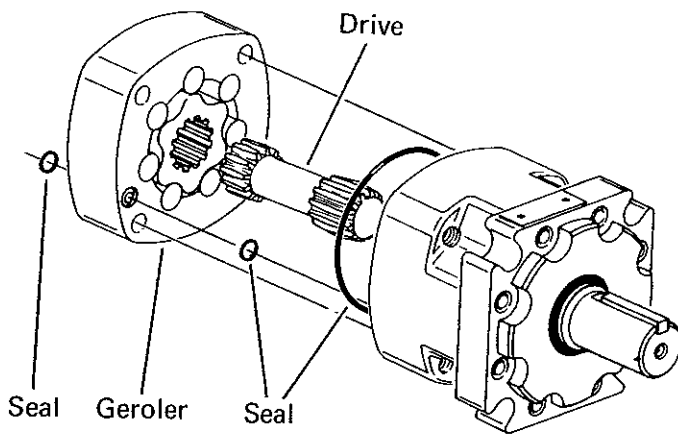


Figure 6

- 12 Remove Geroler. Retain rollers in outer Geroler ring if they're loose.
- 13 Remove 2 seals from Geroler, 1 on each side of Geroler.
- 14 Remove drive.
- 15 Remove 3-1/2" I.D. seal from bearing housing.

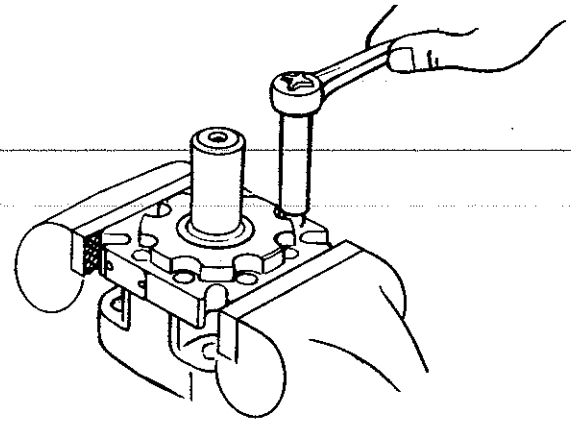


Figure 7

- 16 Clamp bearing housing in vise as shown in Fig. 7. Loosen 8 cap screws. Place housing on clean flat surface. Then remove cap screws, washers (discard washers, they're not required for reassembly), and mounting flange, see Fig. 8.

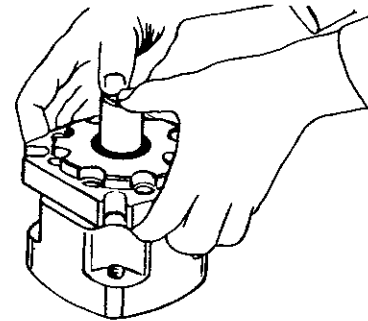


Figure 8

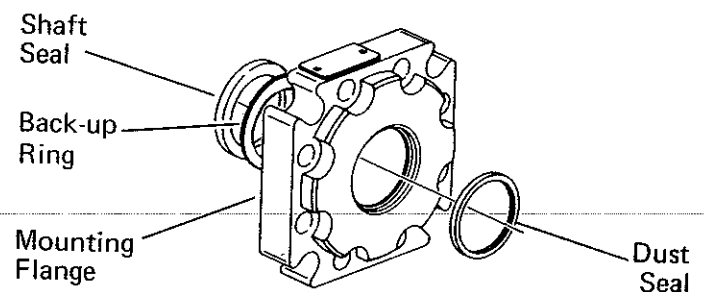


Figure 9

- 17 Remove shaft seal, back-up ring (if used) and dust seal from flange. Use a small screwdriver to remove dust seal. Do not damage bore of flange.

Disassembly

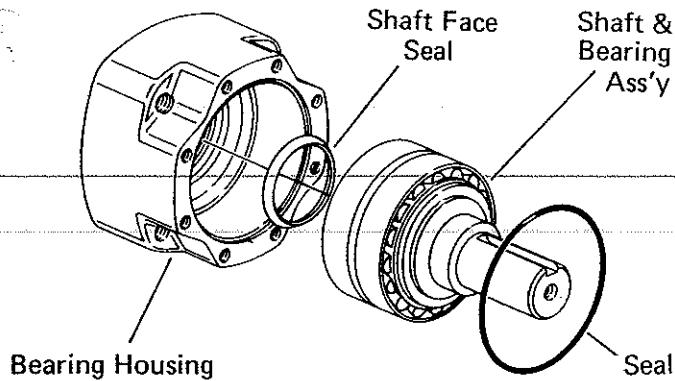


Figure 10

Reassembly

Check all mating surfaces. Replace any parts that have scratches or burrs that could cause leakage. Clean all metal parts in clean solvent. Blow dry with air. Do not wipe with cloth or paper towel because lint or other matter can get into the hydraulic system and cause damage. Do not use a coarse grit or try to file or grind motor parts. Check around the keyway and chamfered area of the shaft for burrs, nicks, or sharp edges that can damage the seals when reassembling the flange.

Note: Lubricate all seals (prior to installation) with petroleum jelly. Use new seals when reassembling the motor. Refer to parts list (6-126) for replacement parts and proper seal kit number.

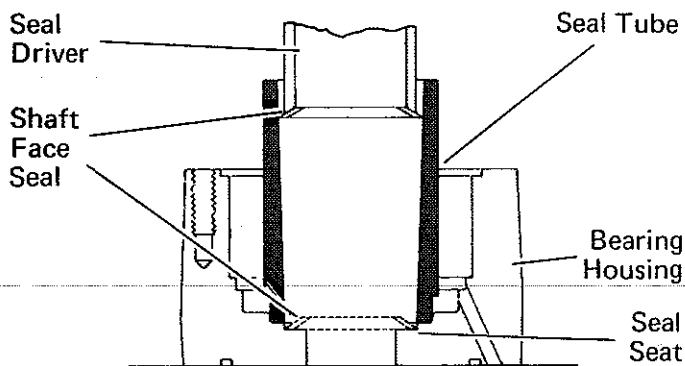


Figure 11

21 Place bearing housing on smooth flat surface with largest open end of housing up. Align seal installation tube (see note) with seal seat in housing. Apply petroleum jelly to shaft face seal. Install seal in bore of tube exactly as shown in Fig. 11. Then insert seal driver in tube to push (with rotating action) face seal in seal seat. Seat seal properly in groove, see Figs. 11 and 13. A damaged or improperly installed shaft face seal could cause internal lubrication loss and subsequent parts wear.

6

18 Remove 3-1/2" I.D. seal from housing.

19 Remove shaft and bearing assembly. You may (may not) need a press to remove shaft and bearing ass'y from housing, see Fig. 10.

20 Remove shaft face seal from bore of bearing housing, see Fig. 10. Do not damage bore of bearing housing.

Note: Individual parts of the shaft and bearing assembly are not sold separately and must be replaced as a unit.

Note: Shaft face seal installation tool 600468 is available-by special order-through our service department.

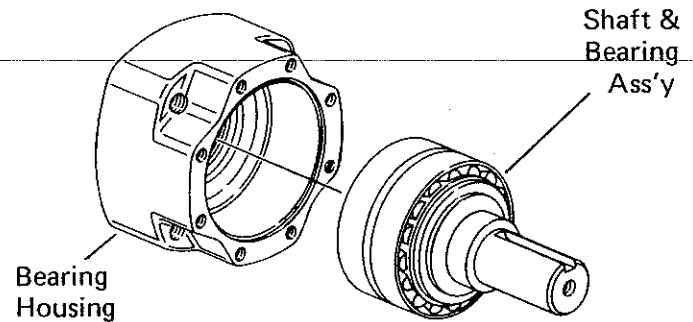


Figure 12

22 Install shaft and bearing assembly in bearing housing, see Fig. 12. You may (may not) need a press to install shaft and bearing ass'y. Do not damage seal in bore of housing.

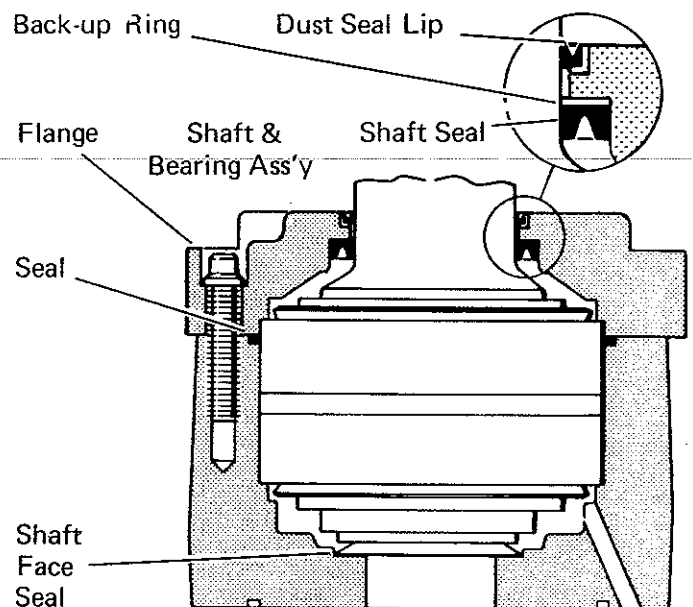


Figure 13

23 Apply petroleum jelly to 3-1/2" I.D. seal. Install seal in outer seal groove of bearing housing, see Fig. 13.

24 Use a small press, if available, to install dust seal in flange. Metal side of dust seal must face toward flange, as shown in Fig. 13. If a press isn't available, use a plastic or rubber hammer to tap dust seal in place.

25 Install back-up ring and shaft seal in flange, flat or smooth side of seal toward flange, as shown in Fig. 13. Apply petroleum jelly to inside diameter of shaft seal (after installing seal).

26 Before installing flange, place a protective sleeve or bullet (see note below) over shaft. Grease inside diameter of dust seal and shaft seal. To prevent damage to the seals, install flange over shaft with a twisting motion. Do not cut or distort shaft seal. Damage to shaft seal will cause external leakage.

Note: Bullet 600463 for 1-1/4" diameter shafts available-by special order-through our service department.

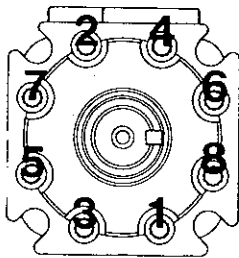


Figure 14

27 Lubricate threads of 8 cap screws with a light film of oil. Install and finger tighten cap screws. Clamp bearing housing in vise. Then torque cap screws to 250 inch pounds, in sequence, as shown in Fig. 14. Install key (when used) in keyway of shaft.

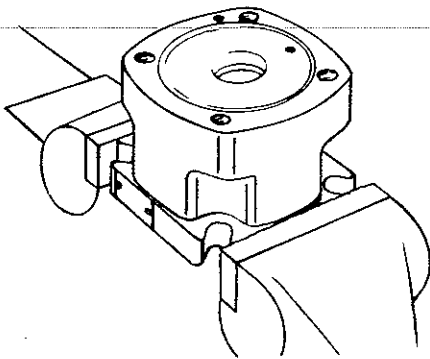


Figure 15

28 Reposition motor in vise with output shaft down. Clamp across edge of flange-as shown in Fig. 15.

29 Pour a small amount of light oil inside the output shaft.

30 Apply a light film of petroleum jelly on 3-1/2" I.D. seal. Install seal in outer seal groove of bearing housing.

31 Install drive in output shaft (insert longer splined end of drive first), see exploded view drawing on page 3.

32 To help in the reassembly procedure, we recommend using 2 alignment studs (see special tools page 3) diagonally opposed in the bolt holes of the bearing housing.

33 Apply petroleum jelly on 2 seals, 1/4" I.D. Install seals (1 on each side of Geroler) in case drain grooves of Geroler.

Note: Installation at this point involves 3 steps in timing the motor. Timing determines the direction of rotation of the output shaft.

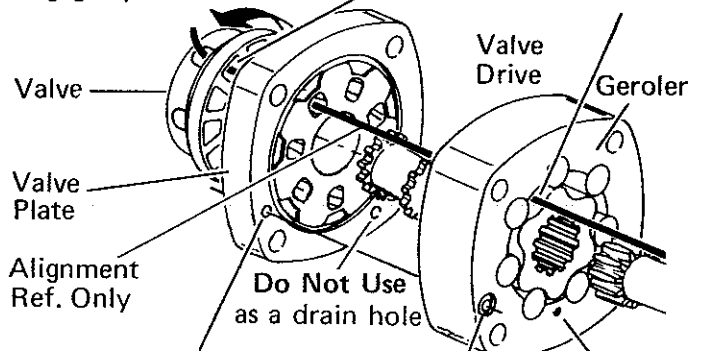
The timing parts include:

- | | |
|----------------|----------------|
| 1. Geroler | 3. Valve Plate |
| 2. Valve Drive | 4. Valve |

Rotate Valve Clockwise 1/2 Tooth to Engage Spline

Anyone of 6 Ports open to outside of valve

Largest Open Pocket



NOTE: Case Drain Holes (2) Case Drain Hole Pressure Relief Hole Proper Alignment Shown

Figure 16 Timing Alignment

Timing Step No. 1 — Locate largest open pocket in Geroler. Then mark location of pocket on outside edge of Geroler, see Fig. 16.

34 Align case drain hole and pressure relief hole in Geroler with case drain and pressure relief hole in the bearing housing. Install Geroler on bearing housing, see Fig. 16. Retain rollers in outer Geroler ring if they're loose.

35 Install valve drive in Geroler.

Reassembly

36 Apply a light film of petroleum jelly on 3-1/2" I.D. seal. Install seal in valve plate.

37 Align case drain hole in valve plate with case drain hole in Geroler. The case drain holes must be properly aligned. See figure 16 for correct alignment. Install valve plate (seal side toward Geroler) as shown in Figure 16.

Timing Step No. 2 – Locate slot opening in valve plate which is in line with largest open pocket of Geroler, see Fig. 16.

38 Use the following procedure for installing the valve on the valve plate.

Timing Step No. 3 – Locate any one of the side openings of the valve that goes through to the face of the valve. Line up this side opening with open slot of valve plate that is in line with largest open pocket of Geroler. Rotate valve clockwise (1/2 spline tooth) to engage spline teeth of valve drive, see Fig. 16. This will provide the rotation shown when pressurized as shown, see Fig. 17.

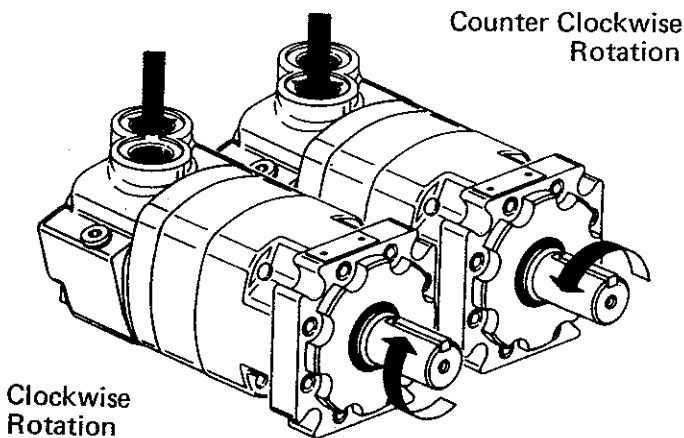


Figure 17

39 Apply clean grease to balance ring assembly springs. Install springs in 2 holes located inside bore-face of valve housing, see Fig. 18.

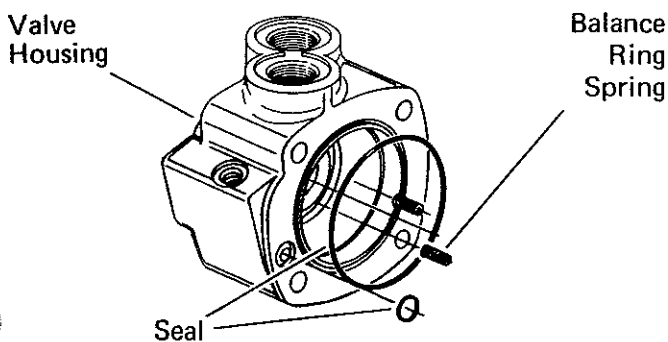


Figure 18

40 Apply a light film of petroleum jelly on 5/16" I.D. seal. Install seal in case drain groove of valve housing.

8

41 Apply a light film of petroleum jelly to 3-1/4" I.D. seal. Install seal in outer seal groove valve housing.

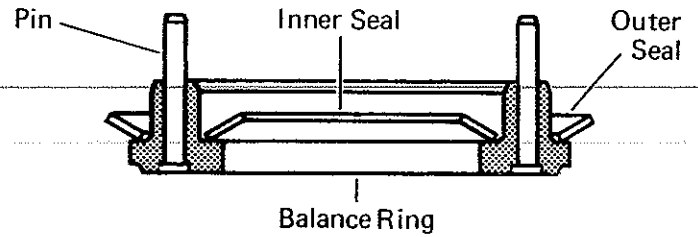
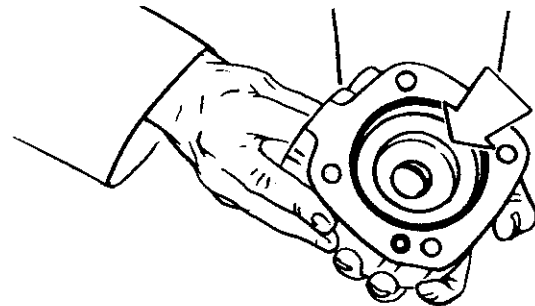


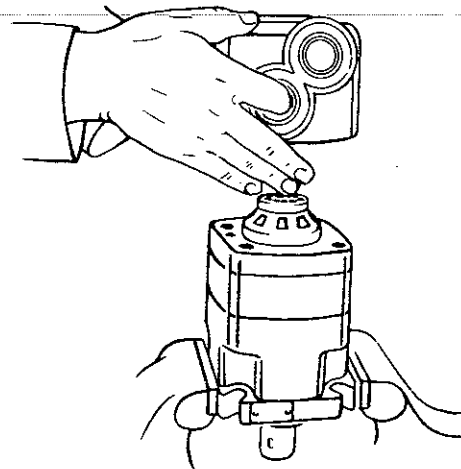
Figure 19

42 Apply petroleum jelly to inner and outer face seals. Install seals on balance ring exactly as shown in Fig. 19.

Important: Install face seals in the positions shown in Fig. 19 or the motor will not operate properly. Do not force or bend these face seals. Any damage to these seals will affect the operation of the motor.



43 Align 2 pins of balance ring with 2 spring holes in valve housing as shown in Fig. 20. Install balancing ring in valve housing.



44 Insert finger through port, see Fig. 21. Apply pressure to side of balance ring assembly. Hold ring in position until the valve housing is in place. Align case drain hole in valve housing with case drain hole in valve plate. Install housing against valve plate.

Note: After installing valve housing on valve plate, check between body parts of motor for unseated seals.

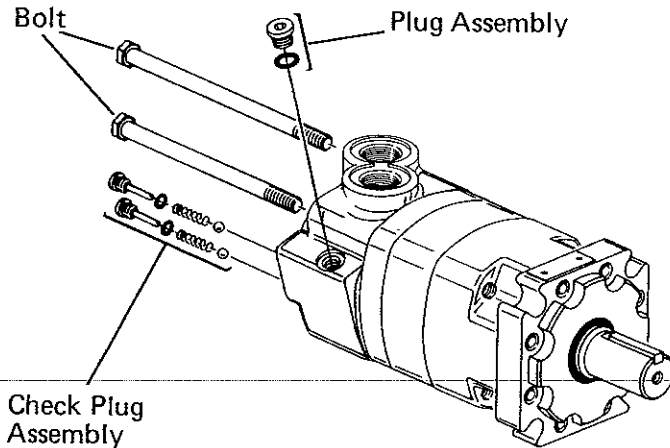


Figure 22

45 Install bolts. If you used alignment studs, install bolts opposite studs. Finger tighten bolts. Remove alignment studs and replace with 2 remaining bolts. Torque all 4 bolts alternately to 600 inch pounds- in the sequence shown in Fig. 23.

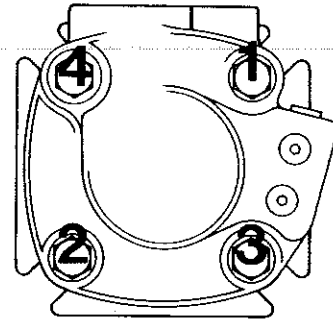


Figure 23

46 Install 2 check plug assemblies (ball, spring, plug w/seal). Also, install case drain plug w/seal, see Fig. 22.

Wheel Motor

On wheel motors, a different bearing housing is used, see Fig. 24. Other than this the parts are the same as the standard motor and the same disassembly and reassembly procedures apply.

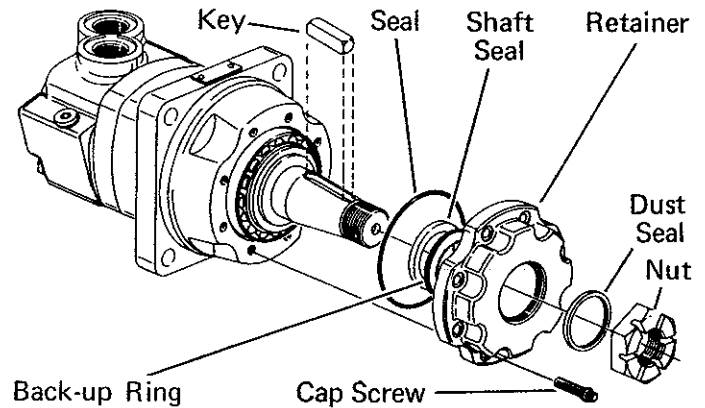


Figure 24

Bearingless Motor

This motor is the same as the standard motor without the shaft/bearing assembly, and bearing housing. The mounting flange replaces the bearing housing, see Fig. 25. Follow same disassembly and reassembly procedures as rear section of standard motor.

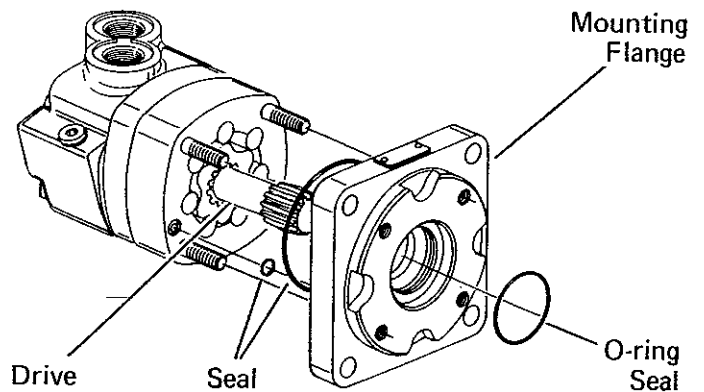


Figure 25

Important: Loctite information for Bearingless Motor on page 10.

Reassembly

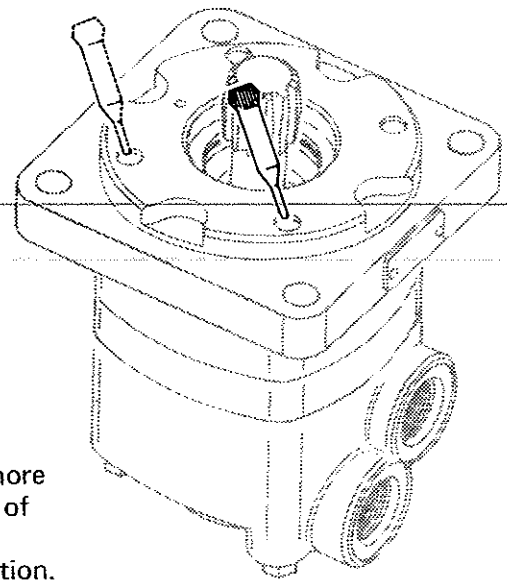
10

Important: This motor requires Loctite in threaded holes of mounting flange.

Follow these procedures:

Adequate Loctite penetration and sealing depend highly on cleanliness and dryness of threads. Use a non-petroleum base solvent to clean excess oil from threads of flange after disassembly. You may need to use a tap to clean threads of excess old Loctite. Then, after you've fully reassembled the motor, apply 2 to 3 drops of Loctite no. 290 at top of clean threaded holes--see example.

Note: Allow Loctite 5 minutes for thread penetration before installing motor on gear case.



Attention:
Do not use more than 3 drops of Loctite on threaded portion.

**How To Order
Replacement Parts**

Refer to parts list 6-126 for replacement parts.

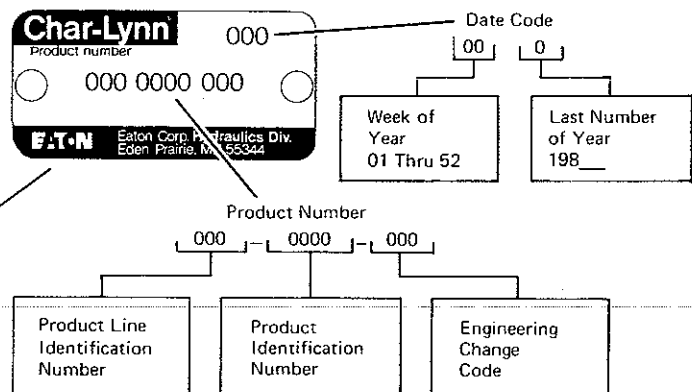
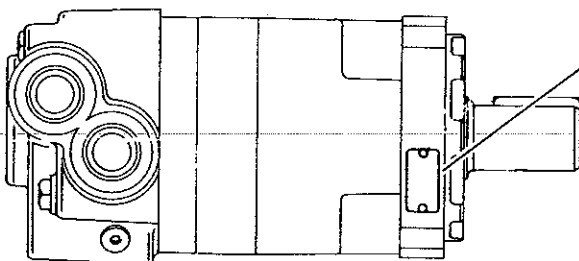
Type of Motor	Ports	Type of Shaft	Displacement (cu. in./rev.)						
			6.6	7.9	9.9	12.5	15	19	24
Standard Motor	1-1/16" Straight Thread O-ring	1-1/4" Str. Keyed	109-1100	109-1101	109-1102	109-1103	109-1104	109-1105	109-1106
		1-5/8" Tapered	109-1107	109-1108	109-1109	109-1110	109-1111	109-1112	109-1113
		1-1/4" Splined	109-1114	109-1115	109-1116	109-1117	109-1118	109-1119	109-1120
Wheel Motor	1-1/16" Straight Thread O-ring	1-1/4" Str. Keyed	110-1074	110-1075	110-1076	110-1077	110-1078	110-1079	110-1080
		1-5/8" Tapered	110-1081	110-1082	110-1083	110-1084	110-1085	110-1086	110-1087
		1-1/4" Splined	110-1088	110-1089	110-1090	110-1091	110-1092	110-1093	110-1094
Bearingless	1-1/16" Str. Thread O-ring		111-1033	111-1034	111-1035	111-1036	111-1037	111-1038	111-1039

Limited Availability

Type of Motor	Ports	Type of Shaft	Displacement (cu. in./rev.)						
			6.6	7.9	9.9	12.5	15	19	24
Standard Motor	3/4" Split Flange	1-1/4" Str. Keyed	109-1001	109-1054	109-1002	109-1003	109-1055	109-1056	109-1057
		1-5/8" Tapered	109-1006	109-1058	109-1007	109-1008	109-1059	109-1060	109-1061
		1-1/4" Splined	109-1011	109-1062	109-1012	109-1013	109-1063	109-1064	109-1065
Wheel Motor	3/4" Split Flange	1-1/4" Str. Keyed	110-1001	110-1040	110-1002	110-1003	110-1041	110-1042	110-1043
		1-5/8" Tapered	110-1006	110-1044	110-1007	110-1008	110-1045	110-1046	110-1047
		1-1/4" Splined	110-1011	110-1048	110-1012	110-1013	110-1049	110-1050	110-1051
Bearingless	3/4" Split Flange		111-1044	111-1015	111-1045	111-1046	111-1016	111-1017	111-1018

**EACH ORDER MUST INCLUDE
THE FOLLOWING INFORMATION**

1. Product Number
2. Date Code
3. Part Name
4. Part Number
5. Quantity of Parts



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Eaton G.m.b.H. **Hydraulics Division** ☐ 100 410 • D-5620 Velbert 1 West Germany ☎ 49-2051-2070



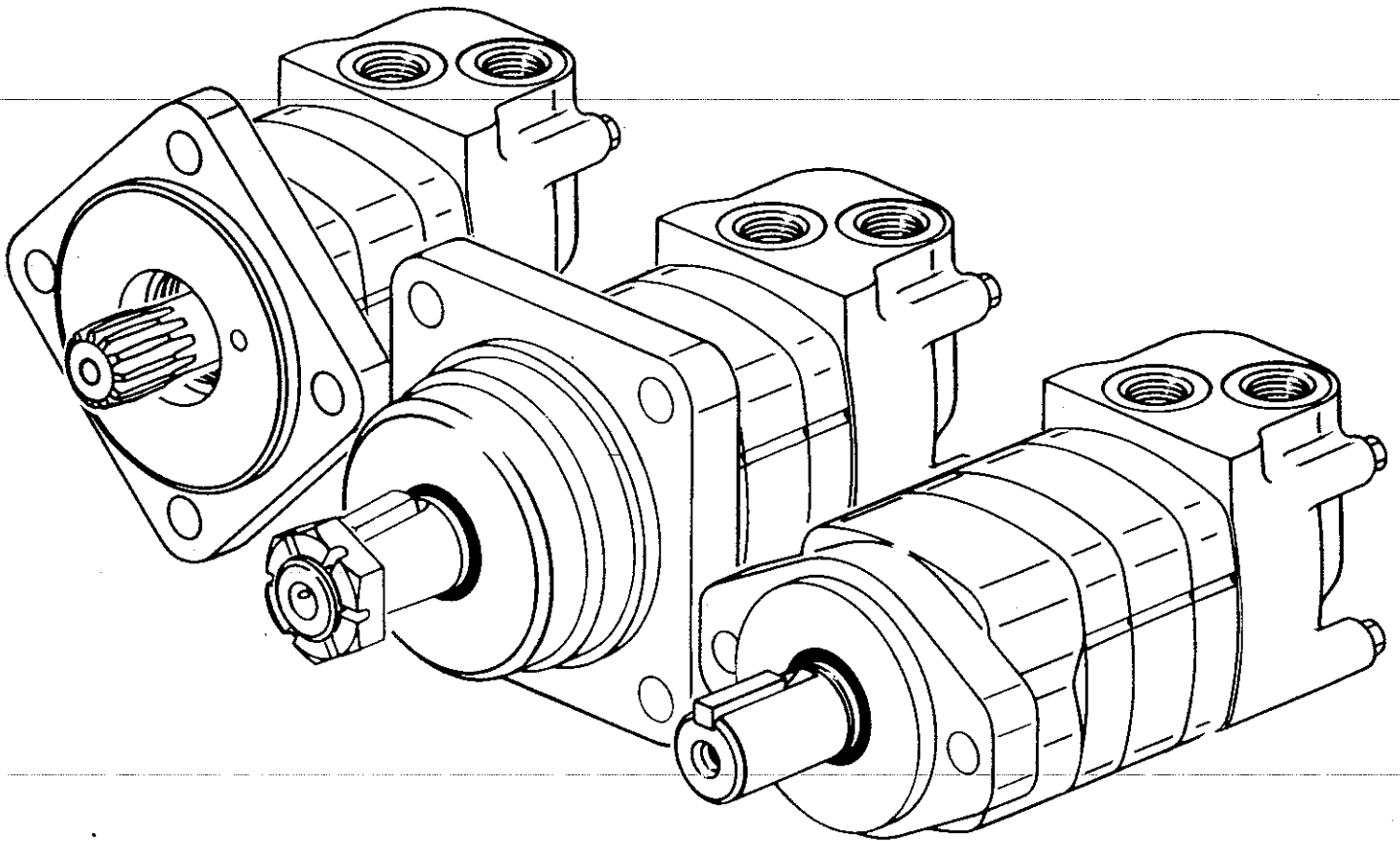


**Eaton
Hydraulics
Division**

Parts Information

2000 Series Char-Lynn® Motors

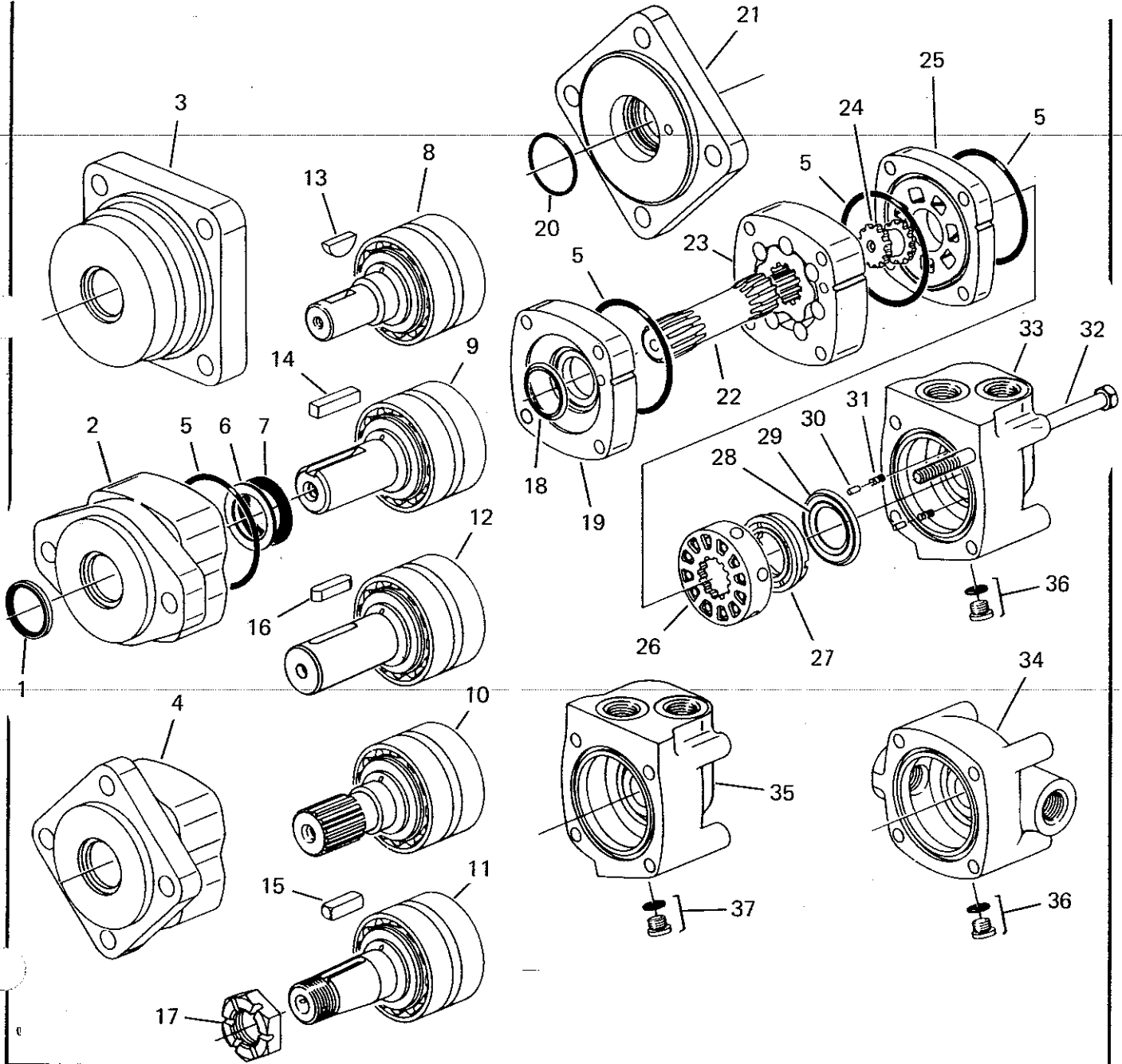
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PARTS DRAWING

Displacement cu. in./rev. [cu. cm./rev.]	Ref. No. 22 (Drive)	Ref. No. 23 (Geroler®)		Ref. No. 32 (Bolt)			
		Part No.	Width in. [mm]	Standard/Wheel		Bearingless	
4.9 [80]	21371-9	21625-1	.701 [17,8]	Part No.	Length in. [mm]	Part No.	Length in. [mm]
6.2 [100]	21371-10	21625-2	.884 [22,5]	14384-004	5.01 [127,3]	14384-001	4.26 [107,2]
8.0 [130]	21371-4	21625-3	1.137 [28,9]	14384-006	5.33 [135,4]	14384-002	4.45 [113,0]
9.6 [155]	21371-4	21625-4	1.137 [28,9]	14384-007	5.45 [138,4]	14384-003	4.77 [121,1]
11.9 [195]	21371-5	21625-5	1.402 [35,6]	14384-007	5.45 [134,4]	14384-003	4.77 [121,1]
14.9 [245]	21371-6	21625-6	1.758 [44,7]	14384-008	5.70 [144,8]	14384-004	5.01 [127,3]
18.7 [305]	21371-7	21625-7	2.206 [56,0]	14384-010	6.10 [154,9]	14384-007	5.45 [138,4]
24.0 [395]	21371-8	21625-8	2.833 [72,0]	14384-012	6.47 [164,3]	14384-008	5.70 [144,8]
30.0 [490]	21371-12	21625-10	3.518 [89,4]	14384-014	7.18 [182,4]	14384-012	6.47 [164,3]
				14384-019	7.86 [200,0]	14384-014	7.18 [182,4]



PARTS LIST

Ref. No.	Part No.	Description	Std.	Wheel	Brngless
X 1	9121-1	Seal, Exclusion	1	1	
2	21578-4	Housing, Bearing	1		
3	21578-3	Housing, Bearing		1	
4	21578-5	Housing, Bearing	1		
OX 5	14559-006	Seal, 3 in. [76mm] I.D.	4	4	3
X 6	7382	Ring, Back-up	1	1	
X 7	9057-9	Seal, Shaft	1	1	
8	21618-1	Shaft & Bearing Kit (1 in. Straight)	1	1	
9	21618-2	Shaft & Bearing Kit (1¼ in. Straight)	1	1	
10	21618-4	Shaft & Bearing Kit (1¼ in. Splined)	1	1	
11	21618-3	Shaft & Bearing Kit (1¼ in. Tapered)	1	1	
12	21618-12	Shaft & Bearing Kit (32 mm Straight)	1	1	
13	14193	Key (for straight shaft ref. no. 8)	1	1	
14	14392-8	Key (for straight shaft ref. no. 9)	1	1	
15	14392-6	Key (for tapered shaft ref. no. 11)	1	1	
16	14460-5	Key (for metric shaft ref. no. 12)	1	1	
17	14163	Nut, Hex (for tapered shaft ref. no. 11)	1	1	
X 18	9050	Seal, Shaft Face	1	1	
19	22102	Plate, Wear	1	1	
O 20	15127	Seal, O-ring 1½ in. [38 mm]			1
21	21569	Flange, Mounting			1
22	*	Drive	1	1	1
23	*	Geroler	1	1	1
24	8433	Drive, Valve	1	1	1
25	22134	Plate, Valve	1	1	1
26	21466	Valve	1	1	1
27	8915	Balance Ring	1	1	1
OX 28	9049-1	Seal, Face, Inner	1	1	1
OX 29	9135-2	Seal, Face, Outer	1	1	1
30	14351	Pin	2	2	2
31	7383	Spring	2	2	2
32	*	Bolt	4	4	4
33	21564-1	Housing, Valve (7/8-14 staggered ports)	1	1	1
34	21564-2	Housing, Valve (1¼-12 180° ports)	1	1	1
35	21564-7	Housing, Valve (R½-BSP ports)	1	1	1
36	9072-3	Plug Assembly 7/16-20 UNF	1	1	1
37	9170-2	Plug Assembly (R ¼ BSP)	1	1	1

- X 61258 Seal Kit for Standard and Wheel Motors
- O 61259 Seal Kit for Bearingless Motors
- X 61260 Viton Seal Kit for Standard and Wheel Motors
- O 61261 Viton Seal Kit for Bearingless Motors

*—See Chart this page and on opposite page for number of specific models

Ordering Information

2000 Series

Type of Motor	Type of Shaft	Ports	Displacement (cu. in./rev.) and Product Number								
			4.9	6.2	8.0	9.6	11.9	14.9	18.7	24.0	30.0
Standard with 2 Bolt SAE A flange	1 Str.	3/8-14 O-ring	104-1001	104-1002	104-1003	104-1004	104-1005	104-1006	104-1007	104-1143	
		1 1/8-12 O-ring 180°	104-1037	104-1038	104-1039	104-1040	104-1041	104-1042	104-1043	104-1044	
	1 1/4 Str.	3/8-14 O-ring	104-1022	104-1023	104-1024	104-1025	104-1026	104-1027	104-1028	104-1228	104-1420
		1 1/8-12 O-ring 180°	104-1061	104-1062	104-1063	104-1064	104-1065	104-1066	104-1067	104-1068	104-1421
	1 1/4 14 T Splined	3/8-14 O-ring	104-1029	104-1030	104-1031	104-1032	104-1033	104-1034	104-1035	104-1229	104-1422
		1 1/8-12 O-ring 180°	104-1087	104-1088	104-1089	104-1090	104-1091	104-1092	104-1093	104-1094	104-1423
Wheel	1 1/4 Tapered	3/8-14 O-ring	105-1001	105-1002	105-1003	105-1004	105-1005	105-1006	105-1007	105-1060	105-1152
		1 1/8-12 O-ring 180°	105-1071	105-1072	105-1073	105-1074	105-1075	105-1076	105-1077	105-1078	
	1 1/4 14 T Splined	3/8-14 O-ring	105-1029	105-1030	105-1031	105-1032	105-1033	105-1034	105-1035	105-1096	
		1 1/8-12 O-ring 180°	105-1079	105-1080	105-1081	105-1082	105-1083	105-1084	105-1085	105-1086	
Bearingless	—	3/8-14 O-ring	106-1008	106-1009	106-1010	106-1011	106-1012	106-1013	106-1014	106-1015	106-1047

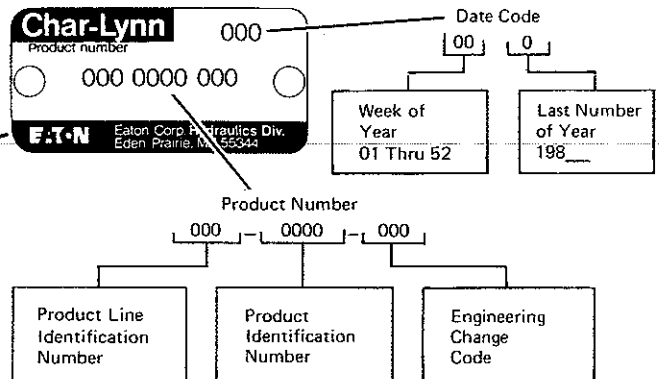
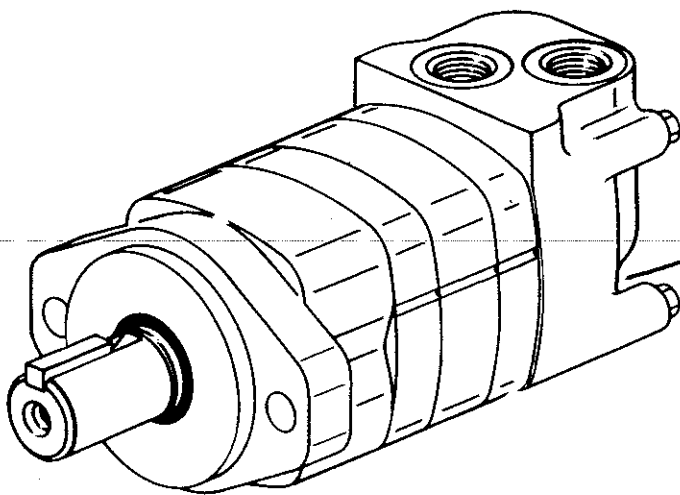
HOW TO ORDER REPLACEMENT PARTS

EACH ORDER MUST INCLUDE THE FOLLOWING:

1. Product Number
2. Date Code
3. Part Name
4. Part Number
5. Quantity of Parts

2000 Series (Metric)

Type of Motor	Ports	Type of Shaft	Displacement (cu. cm./rev.) and Product Number							
			80	100	130	155	195	245	305	395
Standard with 4 Bolt Square Flange	R 1/2 BSP	1 1/4 14 T Splined	104-1376	104-1377	104-1378	104-1379	104-1380	104-1381	104-1382	104-1383
		32mm Str.	104-1384	104-1385	104-1386	104-1387	104-1388	104-1389	104-1390	104-1391
Wheel Motor	R 1/2 BSP	32mm Str.	105-1134	105-1135	105-1136	105-1137	105-1138	105-1139	105-1140	105-1141
Bearingless	R 1/2 BSP	—	106-1038	106-1039	106-1040	106-1041	106-1042	106-1043	106-1044	106-1045



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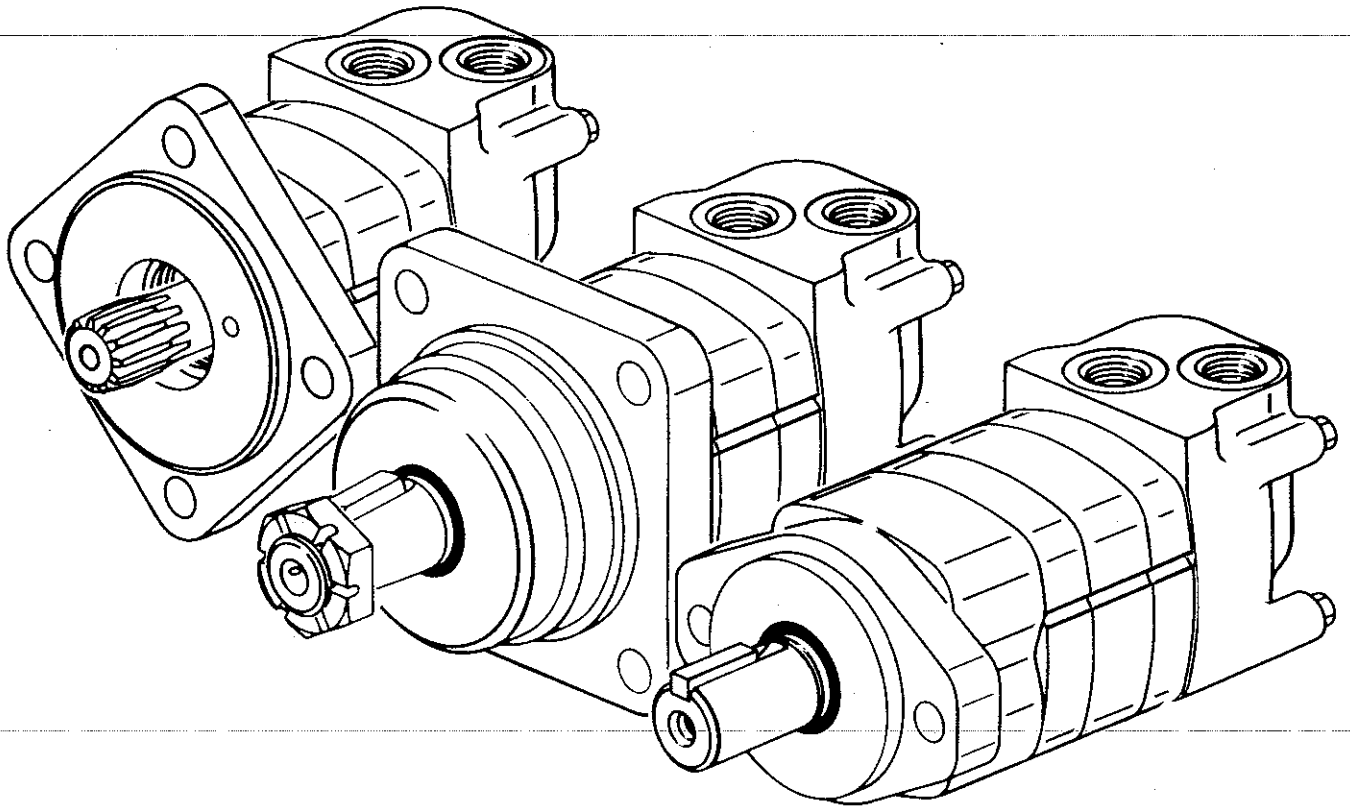
FORM NO. 6-129-98

**Eaton
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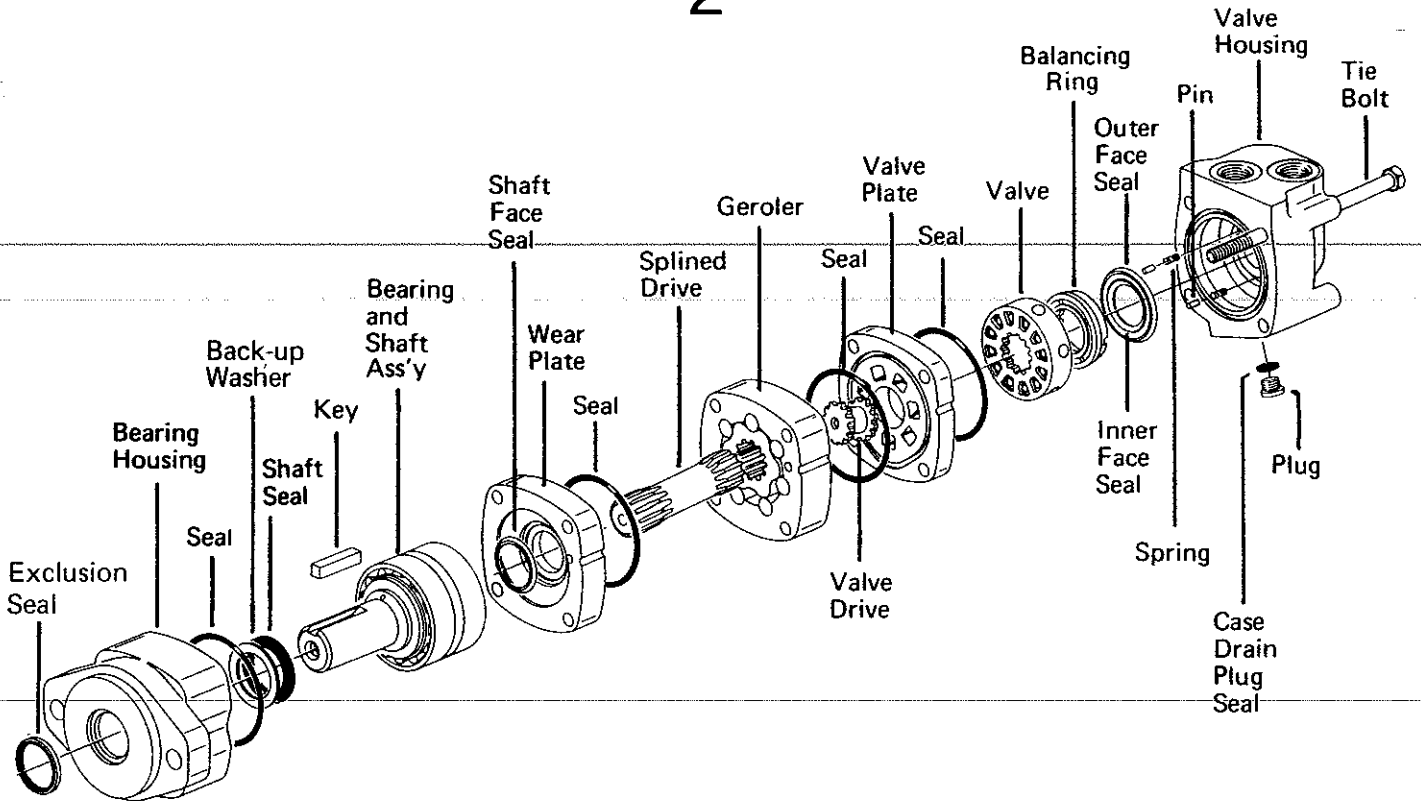
Repair Information

2000 Series Char-Lynn® Motors

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Tools required for disassembly and reassembly.

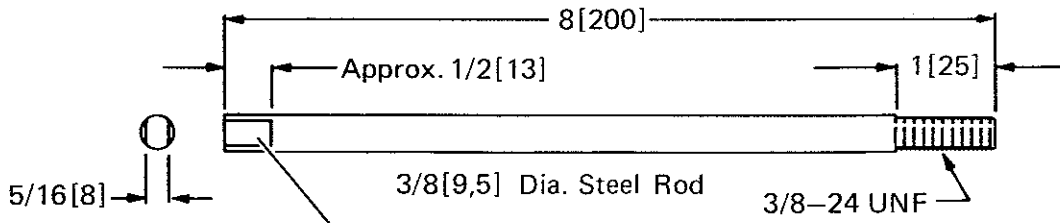
- Torque wrench 500 lb-in [57Nm] capacity
- 12-16 [300-450] * breaker bar
- 9/16 socket
- Small screwdriver 6-8x1/4 [150-200x6,5] blade
- 3/16 allen wrench
- Press

*Unless indicated otherwise, measurements are given in inches [mm].

- **Shaft seal installation tool (600496)
- **Bullet (600465) for 1 diameter shafts

The following tools are not necessary for disassembly and reassembly, but are extremely helpful.

Alignment studs (2)



Grind Flat Spots on Each Side
 ** Available-by special order

Cleanliness is extremely important when repairing a hydraulic motor. Work in a clean area. Before disconnecting the lines, clean the port area of the motor thoroughly. Use a wire brush to remove foreign material and debris from around the exterior joints of the motor. Check the shaft and keyslot, remove all nicks, burrs or sharp edges that might damage the bearing housing seals when installing the shaft and bearing assembly. Before starting the disassembly procedures, drain the oil from inside the motor.

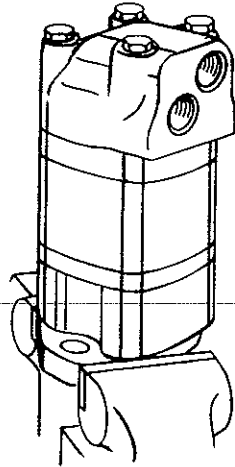


Figure 1

1 Place the motor in a vise with the output shaft down. Clamp across the mounting flange of the motor not the housing. Excessive clamping pressure will cause distortion. When clamping, use some protective device on the vise, such as special soft jaws, pieces of hard rubber or board.

Although not all drawings show the motor in a vise, we recommend that you keep the motor in the vise during disassembly and reassembly. Follow the clamping procedures explained throughout the manual.

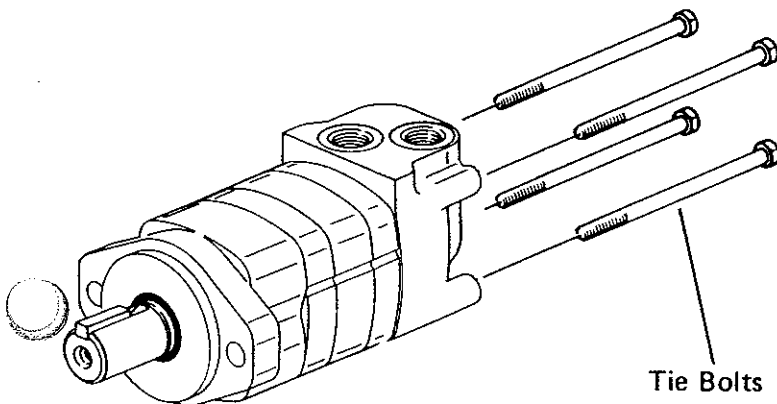


Figure 2

2 Remove 4 bolts from motor.

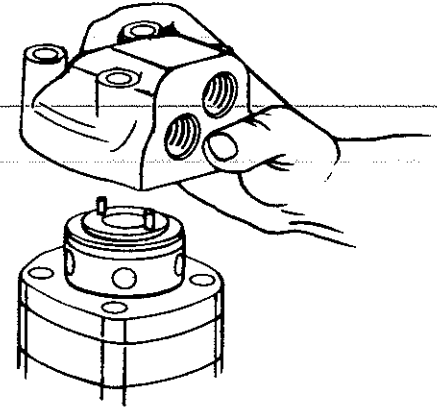


Figure 3

3 Lift valve housing straight up. If done carefully the pins, springs, balance ring assembly, and valve will remain on the valve plate.

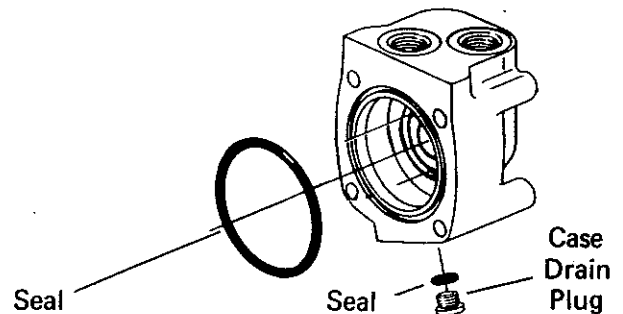


Figure 4

4 Carefully remove 3[76] diameter seal from valve housing.

5 Remove case drain plug—with seal, from valve housing.

6 Remove 2 pins and 2 springs from balance ring assembly, see Fig. 5.

Disassembly

4

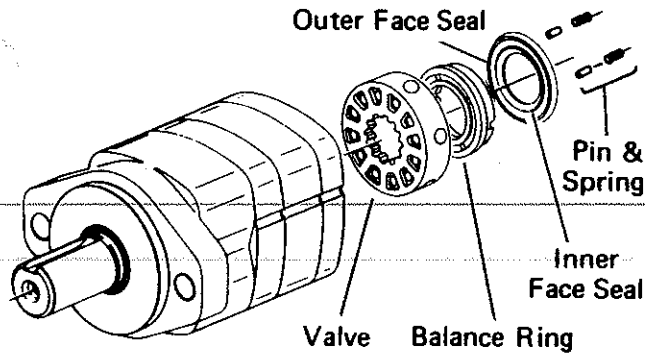


Figure 5

7 Remove balance ring assembly.

8 Remove inner and outer face seals from balance ring.

9 Remove the valve.

15 Remove the 3[76] diameter seal from wear plate, see Fig. 7.

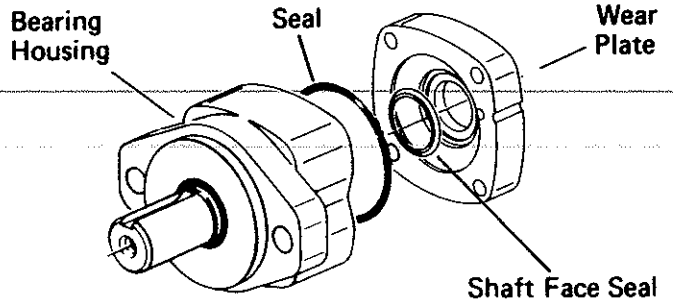


Figure 8

16 Remove the wear plate.

17 Remove the shaft face seal from the wear plate.

18 Remove the 3[76] diameter seal from bearing housing.

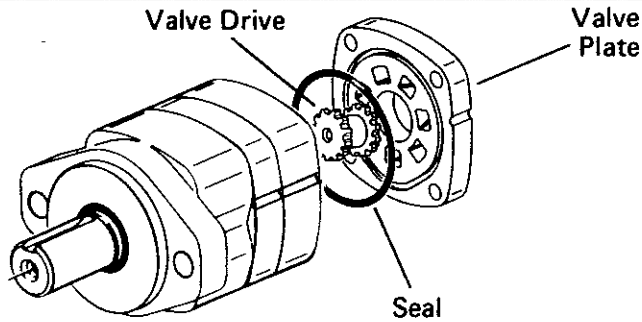


Figure 6

10 Remove the valve plate.

11 Remove the 3[76] diameter seal from valve plate.

12 Remove the valve drive.

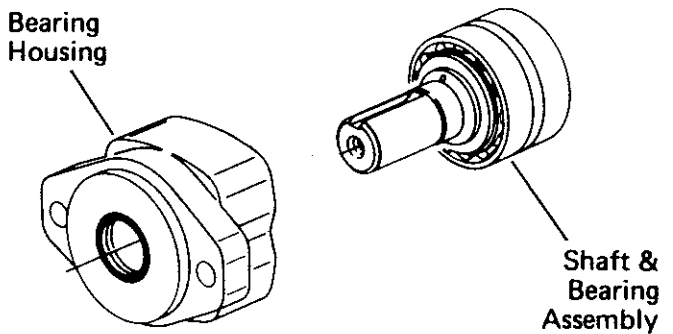


Figure 9

19 You may need a press to remove shaft and bearing assembly from bearing housing. (Key must be removed before removing shaft.)

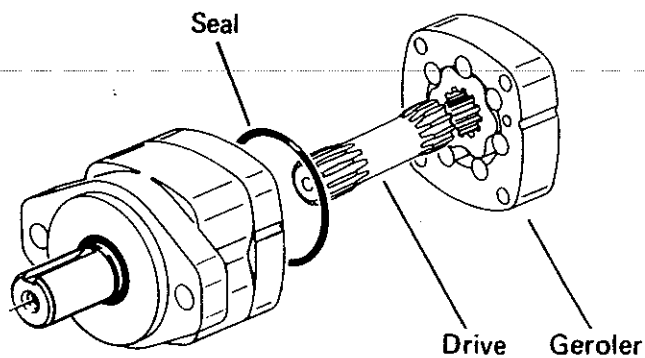


Figure 7

13 Remove the Geroler. Be sure to retain the rollers in the outer ring if they are loose.

14 Remove the drive.

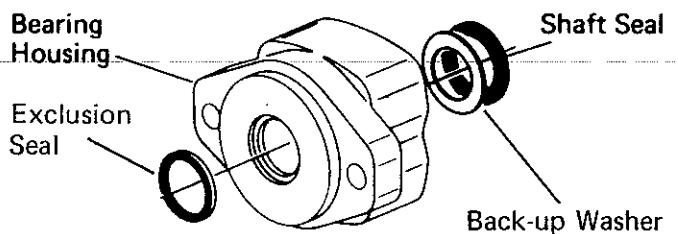


Figure 10

20 Use a small screwdriver to remove shaft seal, back-up washer and exclusion seal from bearing housing, see Fig. 10. Do not damage bore of housing.

Note: Individual parts of shaft and bearing assembly are not sold separately. Replace as a unit.

Check all mating surfaces. Replace any parts that have scratches or burrs that could cause leakage. Clean all metal parts in clean solvent. Blow dry with air. Do not wipe dry with cloth or paper towel because lint or other matter can get in the hydraulic system and cause damage. Do not use a coarse grit or try to file or grind these parts. Check around the keyway and chamfered area of the shaft for burrs, nicks or sharp edges that can damage the seals when reassembling the bearing housing.

Note: Lubricate all seals (prior to installation) with petroleum jelly such as Vaseline. Use new seals when reassembling this motor. Refer to parts list (6-129) for proper seal kit number.

21 Use a press to install exclusion seal in outer bore of bearing housing. Lip of seal must face outward. See Fig. 11. If a press is not available use a plastic or rubber hammer, being careful not to damage or cock seal in the bore.

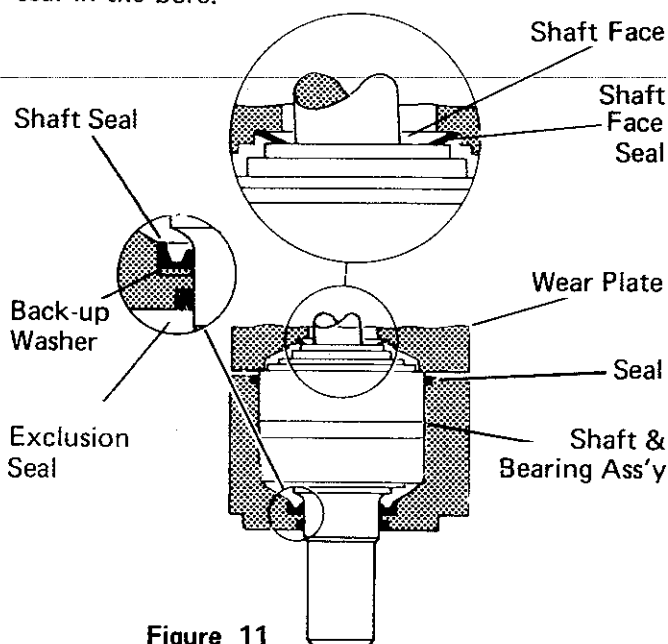


Figure 11

22 Place back-up washer into seal bore. Place shaft seal onto installation tool (600496) and press seal into seal bore of the housing.

23 Clamp housing in vise, see Fig. 1.

24 Place protective bullet (see note below) over shaft. Apply petroleum jelly to inside diameter of dust and shaft seal. You may need a press to install shaft and bearing assembly. Do not distort shaft seal. Damage to this seal will cause leakage.

Note: Bullet (600465), for 1" shafts, available by special order. Use tape over other shafts to prevent cutting the seals.

25 Apply petroleum jelly to the 3[76] diameter seal. Install seal into the bearing housing.

26 Alignment studs can be very helpful in reassembly of the motor. See special tool listing page 2. If you use studs, install 2 studs diagonally opposed in the bearing housing.

27 Install the shaft face seal in the wear plate as shown in Fig. 11. Do not distort seal.

28 Install the wear plate, see Fig. 11.

29 Apply a light film of petroleum jelly to the 3[76] diameter seal and install seal in the wear plate.

30 Install the drive into the output shaft.

31 Align the notch on the outside of the Geroler with the notch on the wear plate. Install the Geroler against the wear plate. Be sure to retain the rollers in the outer ring if they are loose.

32 Install the valve drive in the Geroler.

Note: Installation at this time involves 3 steps in the timing of the motor. Timing determines the direction of rotation of the output shaft. Timing parts include:

1. Geroler
2. Valve Drive
3. Valve Plate
4. Valve

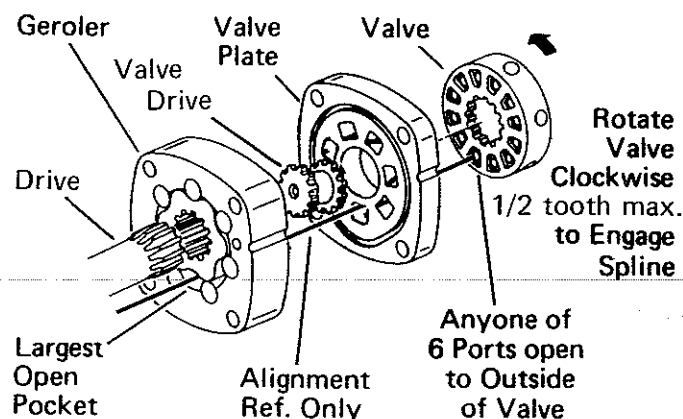


Figure 12 Timing Alignment

Timing Step # 1—Locate the largest open pocket in the Geroler and mark it on the outside edge of the Geroler.

33 Apply a light film of petroleum jelly to the 3[76] diameter seal. Install seal in groove of valve plate.

Reassembly

6

34 Align the notch on the outside of the valve plate with the notch on the Geroler as shown in Fig. 12.

Timing Step # 2— Locate the slot opening in the valve plate which is in line with the largest open pocket of the Geroler.

Timing Step # 3— Locate any one of the side openings of the valve and align this opening with the open slot of the valve plate that is in line with the largest open pocket of the Geroler. Install the valve by rotating it clockwise until the spline teeth engage (1/2 spline tooth max.). This will provide the proper rotation when pressurized as shown in Fig. 13.

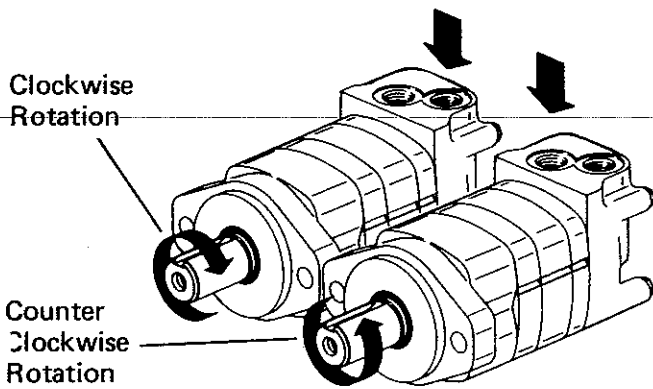


Figure 13

Important: Install face seals in the positions shown in Fig. 15. or the motor will not operate properly. Do not force or bend the face seals. Any damage to these seals will affect the operation of the motor.

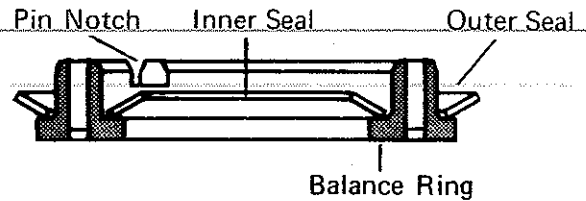


Figure 15

38 Align pin notches in balance ring with pins in bore of valve housing. Install balance ring assembly in valve housing.

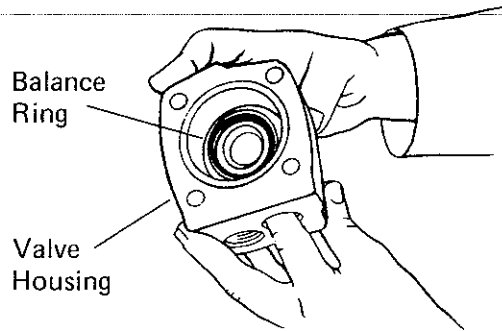


Figure 16

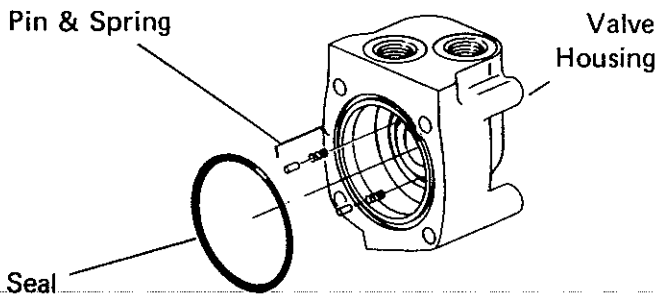


Figure 14

35 Install 2 springs and 2 pins in the holes located in the bore of the valve housing, as shown in Fig. 14.

36 Apply a light film of petroleum jelly to the 3[76] diameter seal. Install seal in the valve housing.

37 Apply petroleum jelly to inner and outer face seals. Install seals on balance ring as shown in Fig. 15.

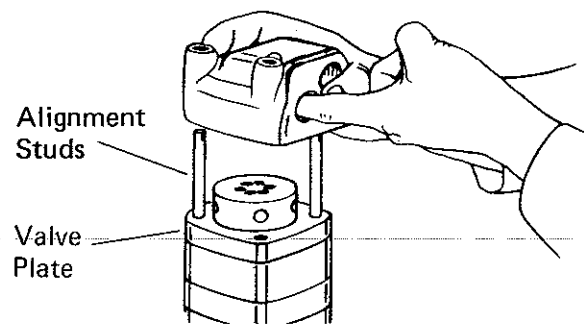


Figure 17

39 Insert your finger through port of valve housing. Apply pressure to side of balance ring as shown in Fig. 16. Hold ring in position until valve housing is in place against valve plate. See Fig. 17.

Note: After installing the valve housing on the valve plate check for proper placement. Push down on the valve housing. You should get a slight spring action.

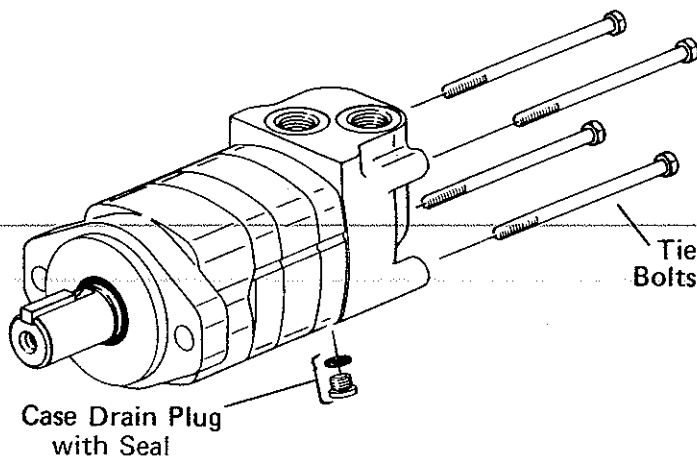


Figure 18

40 Install the tie bolts. If you use alignment studs, install 2 bolts opposite the studs. Finger tighten the bolts. Remove the alignment studs and replace with the 2 remaining bolts. Torque all 4 bolts alternately to 450 lb-in[50Nm].

41 Install seal on case drain plug then install in valve housing. Torque to 50 lb-in[6Nm].

Wheel Motor

On wheel motors, a different bearing housing is used, see Fig. 19. Other than this the parts are the same as the standard motor and the same disassembly and reassembly procedures apply.

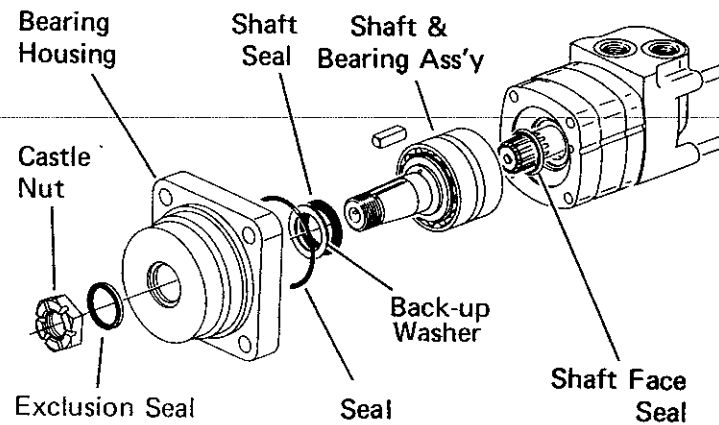


Figure 19

Bearingless Motor

This motor is the same as the standard motor without the shaft/bearing assembly, and bearing housing. The mounting flange replaces the bearing housing, see Fig. 20. Follow same disassembly and reassembly procedures as rear section of standard motor.

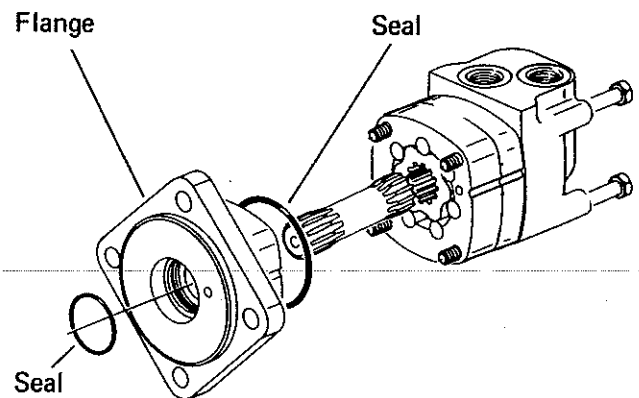


Figure 20

CHAR-LYNN®
HYDRAULIC MOTOR
2000 SERIES
PARTS INFORMATION
NO. 7-124

Ordering Information

2000 Series

Type of Motor	Type of Shaft	Ports	Displacement (cu. in./rev.) and Product Number							
			4.9	6.2	8.0	9.6	11.9	14.9	18.7	24.0
Standard with 2 Bolt SAE A flange	1 Str.	3/8-14 O-ring	104-1001	104-1002	104-1003	104-1004	104-1005	104-1006	104-1007	104-1143
		1 1/16-12 O-ring 180°	104-1037	104-1038	104-1039	104-1040	104-1041	104-1042	104-1043	104-1044
	1 1/4 Str.	3/8-14 O-ring	104-1022	104-1023	104-1024	104-1025	104-1026	104-1027	104-1028	104-1228
		1 1/16-12 O-ring 180°	104-1061	104-1062	104-1063	104-1064	104-1065	104-1066	104-1067	104-1068
	1 1/4 14 T Splined	3/8-14 O-ring	104-1029	104-1030	104-1031	104-1032	104-1033	104-1034	104-1035	104-1229
		1 1/16-12 O-ring 180°	104-1087	104-1088	104-1089	104-1090	104-1091	104-1092	104-1093	104-1094
Wheel	1 1/4 Tapered	3/8-14 O-ring	105-1001	105-1002	105-1003	105-1004	105-1005	105-1006	105-1007	105-1060
		1 1/16-12 O-ring 180°	105-1071	105-1072	105-1073	105-1074	105-1075	105-1076	105-1077	105-1078
	1 1/4 14 T Splined	3/8-14 O-ring	105-1029	105-1030	105-1031	105-1032	105-1033	105-1034	105-1035	105-1096
		1 1/16-12 O-ring 180°	105-1079	105-1080	105-1081	105-1082	105-1083	105-1084	105-1085	105-1086
Bearingless	—	3/8-14 O-ring	106-1008	106-1009	106-1010	106-1011	106-1012	106-1013	106-1014	106-1015

HOW TO ORDER REPLACEMENT PARTS

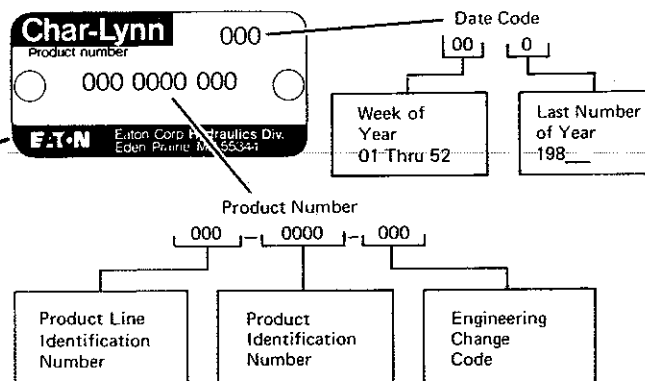
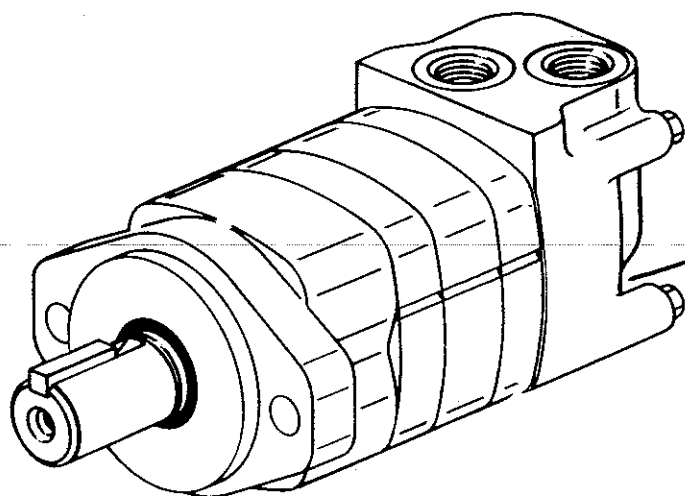
EACH ORDER MUST INCLUDE THE FOLLOWING:

1. Product Number
2. Date Code
3. Part Name
4. Part Number
5. Quantity of Parts

2000 Series (Metric)

Type of Motor	Ports	Type of Shaft	Displacement (cu. cm./rev.) and Product Number							
			80	100	130	155	195	245	305	395
Standard with 4 Bolt Square Flange	R 1/2 BSP	1 1/4 14 T Splined	104-1376	104-1377	104-1378	104-1379	104-1380	104-1381	104-1382	104-1383
		32mm Str.	104-1384	104-1385	104-1386	104-1387	104-1388	104-1389	104-1390	104-1391
Wheel Motor	R 1/2 BSP	32mm Str.	105-1134	105-1135	105-1136	105-1137	105-1138	105-1139	105-1140	105-1141
Bearingless	R 1/2 BSP	—	106-1038	106-1039	106-1040	106-1041	106-1042	106-1043	106-1044	106-1045

Refer to parts list no. 6-129 for replacement parts and seal kits.

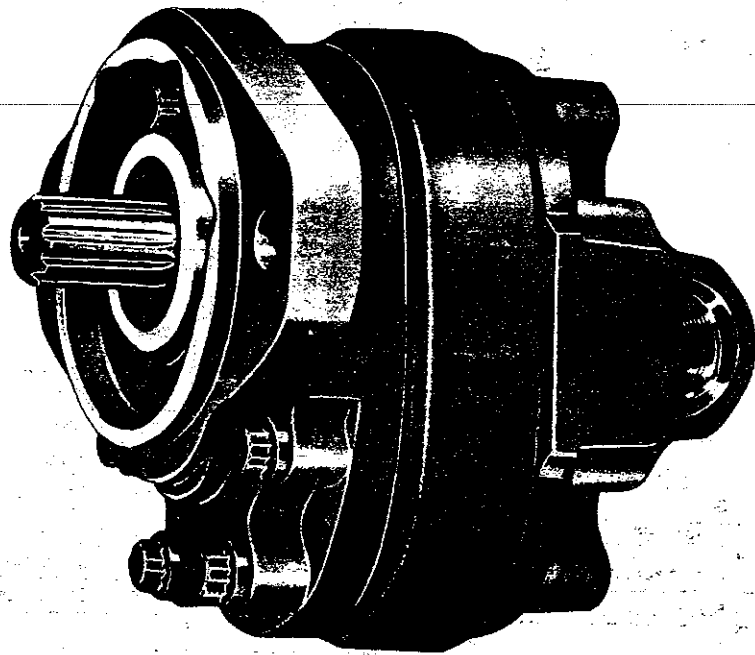


Eaton Corporation **Hydraulics Division** 15151 Highway 5 Eden Prairie, MN 55344 Telephone (612) 937-9800



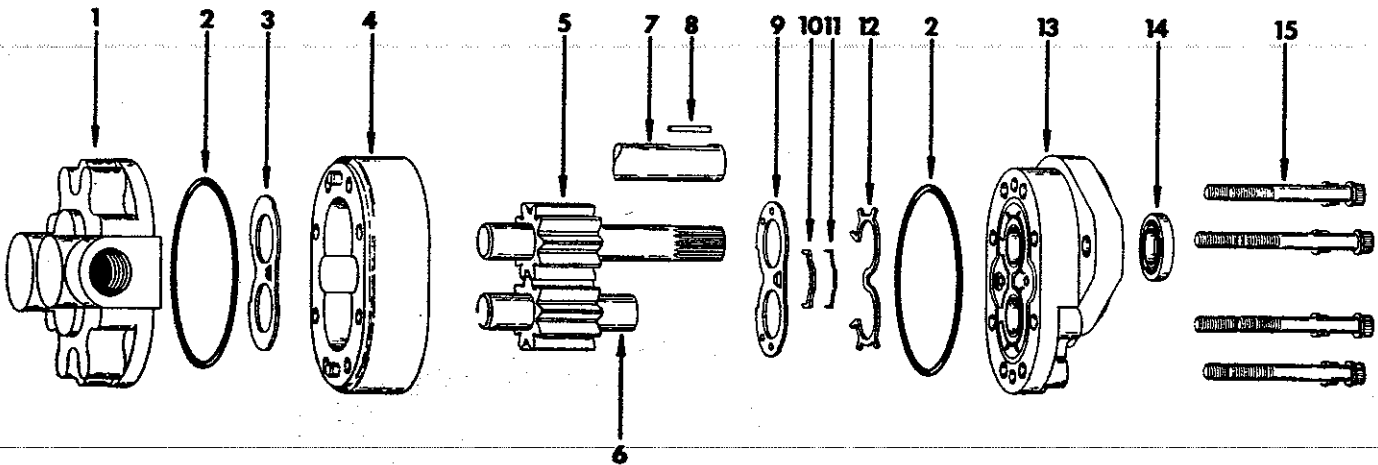
REVISED SEPTEMBER, 1988
FORM NO. 7-124-98

Service Manual



Model 25300 High Pressure Gear Pump *Inspection/Serviceing*

SINGLE PUMP



PARTS LIST

REF. NO.	DESCRIPTION	REQ'D. PER ASSY.	REF. NO.	DESCRIPTION	REQ'D. PER ASSY.
1	Back plate assembly	1	9	Wear plate	1
2	O-ring	2	10	Bearing seal	1
3	Optional thrust plate	1	11	Molded o-ring	1
4	Body	1	12	Back-up gasket	1
5	Spline drive gear assy.	1	13	Front plate assy.	1
6	Idler gear assy.	1	14	Shaft seal	1
7	Keyed drive gear assy.	1	15	Cap screw	8
8	Key	1			

Note: For pumps with Flow Divider, Flow Control or Relief Valve backplates refer to page 7.

DISASSEMBLY

- Remove key (8) from drive shaft if keyed drive gear assembly (7) is used.
- Thoroughly clean outside of pump.
- Use sharp tool to mark across front plate, body and backplate. This will assure proper reassembly.
- Clamp pump in vise, shaft up.
- Remove cap screws (15) eight each.
- Remove pump from vise, hold pump in hands and bump shaft against wooden block to separate front plate (13) from back plate (1). Body (4) will remain with either front plate or backplate.
- If backplate was removed first, remove optional thrust plate (3) from body gear pockets (4). If the front plate was removed first, remove wear plate (9) from body gear pockets (4).
- Remove drive gear assembly (5) or (7) and idler gear assembly (6) from body (4).
- To separate body (4) from the plate it remains with, place drive gear assembly (5) or (7) in bushing and tap protruding end with plastic hammer or rawhide mallet.
- Remove o-ring (2) from front plate (13) and backplate (1).
- Remove back-up gasket (12) from front plate (13) by prying with a sharp tool.
- Remove bearing seal (10) from front plate (13) by prying with a sharp tool.
- Remove molded o-ring (11) from front plate (13).
- Remove shaft seal (14) from front plate (13) by prying with a screwdriver.

INSPECT PARTS FOR WEAR

GENERAL

1. Clean and dry all parts.
2. Remove all nicks and burrs from all parts with emery cloth.

GEAR ASSEMBLY

1. Check drive shaft spline for twisted or broken teeth or check keyed drive shaft for broken or chipped keyway.
2. Inspect both the drive gear and idler gear shafts at bushing points and seal area for rough surfaces and excessive wear.
3. If shaft measures less than .748 in bushing area, the gear assembly should be replaced. (one gear assembly may be replaced separately; shafts and gears are available as assemblies only.)
4. Inspect gear face for scoring and excessive wear.
5. If gear width is below the following figures — the gear assembly should be replaced.

Pump Disp.	.50	.66	.84	1.02	1.20	1.37	1.54	1.69	1.87
Gear Width	.384	.510	.636	.762	.888	1.014	1.140	1.266	1.392

6. Be sure snap rings are in grooves on either side of drive and idler gears.
7. If edge of gear teeth are sharp, break edge with emery cloth.

FRONT AND BACKPLATE

1. Oil groove in bushings in both front plate and backplate should be in line with dowel pin holes and 180° apart. This positions the oil grooves closest to respective dowel pin holes.
2. If I.D. of bushings in front plate or backplate exceed .755 front or backplate should be replaced. (Bushings are not available as separate items.)
3. Bushings in front plate should be flush with face of front plate.
4. If optional thrust plate is not used, check for scoring on face of backplate. If wear exceeds .0015, backplate should be replaced.

BODY

1. Check inside gear pockets for excessive scoring or wear.
2. Body should be replaced if I.D. of gear pockets exceeds 1.713.

GENERAL INFORMATION

It is important that the relationship of the backplate, thrust plate, body, wear plate and front plate is correct. You will note two half moon cavities in the body which must face away from the front plate. Note: The smaller half moon port cavity must be on the pressure side of

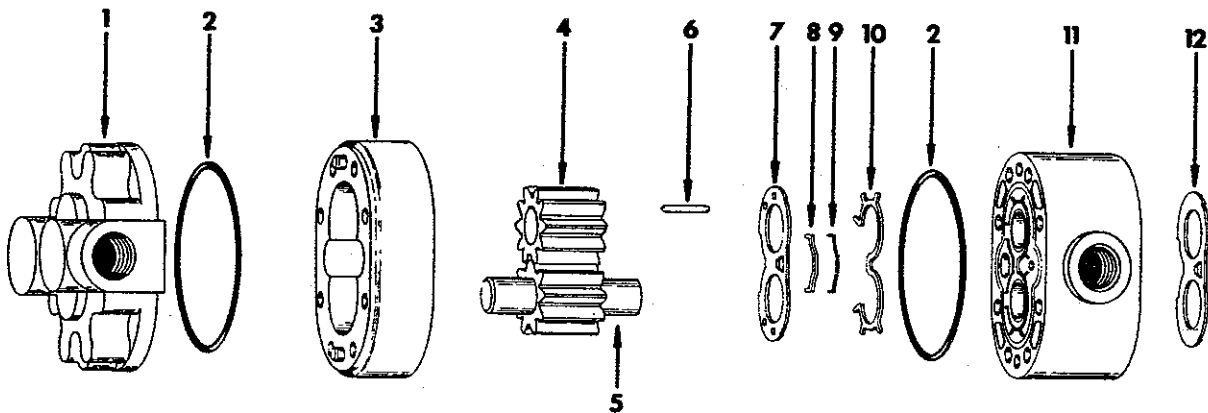
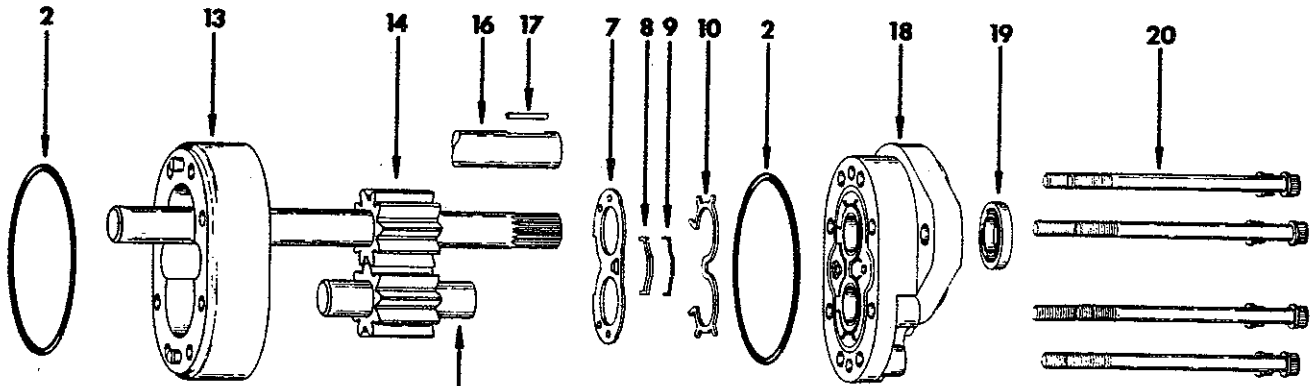
the pump. Side of thrust plate and wear plate with mid section cut out must be on suction side of pump. Suction side of backplate is always side with larger port boss.

REASSEMBLY

1. The optional thrust plate, wear plate, bearing seal, molded o-ring, back-up gasket, shaft seal and o-rings should be replaced as new parts.
2. Install o-ring (2) in groove of front plate (13).
3. Tuck back-up gasket (12) into groove in front plate (13) with open part of "V" section down.
4. Place molded o-ring (11) in groove in front plate. Place bearing seal (10) over molded o-ring — groove side down.
5. Apply a thin coat of heavy grease to both milled faces of body. Slip body onto front plate — half moon port cavities in body must face away from front plate.
Note: The small half moon port cavity must be on the pressure side of pump.
6. Place wear plate (9) on top of back-up gasket with bronze face up. The side with the mid section cut away must be on suction side of pump. (Be sure to note difference between wear plate (9) and optional thrust plate (3).
7. Dip gear assemblies into oil and slip into front plate bushings.
8. Install optional thrust plate (3) — bronze face toward gears. The side with mid section cut out must be on suction side of pump. Thrust plate must fit inside gear pockets.
9. Install o-ring (2) in groove in backplate (1).
10. Slide backplate (1) over gear shafts until dowel pins are engaged.
11. Install bolts (15). Tighten evenly to 25/28 ft. lbs. torque.
12. Liberally oil shaft seal (14) and carefully work over drive shaft being careful not to cut rubber sealing lip.
13. Place 1-5/16" O.D. sleeve over shaft and press in shaft seal (14) until flush with front surface of front plate.
14. Install key (8) on keyed shaft (7).

Note: Refer to Trouble Shooting and Start-up Procedure on page 6.

DOUBLE PUMP



PARTS LIST

REF. NO.	DESCRIPTION	REQ'D. PER ASSY.	REF. NO.	DESCRIPTION	REQ'D. PER ASSY.
1	Back plate assembly	1	11	Adapter plate	1
2	O-ring	4	12	Optional thrust plate	1
3	Rear body	1	13	Front body	1
4	Gear (slip fit)	1	14	Spline drive gear assy.	1
5	Idler gear assy. (rear)	1	15	Idler gear assy. (front)	1
6	Round key	1	16	Keyed drive gear assy.	1
7	Wear plate	2	17	Key	1
8	Bearing seal	2	18	Front plate assy.	1
9	Molded o-ring	2	19	Shaft seal	1
10	Back-up gasket	2	20	Cap screw	8

Note: For pumps with Flow Divider, Flow Control or Relief Valve backplates refer to page 7.

DISASSEMBLY

1. Remove key (17) if keyed drive gear assembly (16) is used.
 2. Clean outside of pump thoroughly.
 3. Use sharp tool to scribe a mark across all sections of the pump. This will assure proper reassembly.
 4. Clamp pump in vise, shaft up and remove cap screws (20) eight each.
 5. Remove pump from vise, hold pump in hands and bump shaft against wooden block to separate front pump sections. Body (13) will remain with either front plate (18) or adapter plate (11).
 6. Remove idler gear (15) from either front plate or adapter plate.
 7. Remove backplate (1) from body (3) by tapping on backplate with plastic hammer or rawhide mallet.
 8. Remove idler gear (5), slip fit gear (4) and key (6).
9. Place drive gear assembly in bushing and tap protruding end with plastic hammer or rawhide mallet to remove bodies (3) or (13) from plates they remained with.
 10. Remove wear plate (7) from front plate (18).
 11. Remove wear plate (7) from adapter plate (11).
 12. Remove o-rings (2) from front plate (18), adapter plate (11), and backplate (1).
 13. Remove back-up gasket (10), bearing seal (8) and molded o-ring (9) from front plate (18) and adapter plate (11) by prying out with a sharp tool.
 14. Remove shaft seal (19) from front plate (18) by prying with a screwdriver.

INSPECT PARTS FOR WEAR

GENERAL

1. Clean and dry all parts.
2. Remove nicks and burrs from all parts with emery cloth.

GEAR ASSEMBLY

1. Check drive shaft spline (14) for twisted or broken teeth or check keyed drive shaft (16) for broken or chipped keyway. Check for broken keyway in shaft where slip fit gear is installed for double pump.
2. Inspect both the drive gear and idler gear shafts at bushing points and seal area for rough surfaces and excessive wear.
3. If shaft measures less than .748 in bushing area, the gear assembly should be replaced. (One gear assembly may be replaced separately; shafts and gears are available as assemblies only. The slip fit gear is available separately).
4. Inspect gear face for scoring and excessive wear.
5. If gear widths are below the following figures the gear assembly should be replaced.

Pump Disp.	.50	.66	.84	1.02	1.20	1.37	1.54	1.69	1.87
Gear Width	.384	.510	.636	.762	.888	1.014	1.140	1.266	1.392

6. Be sure retaining rings are in grooves on either side of drive and idler gears.
7. If edge of gear teeth are sharp, break edge with emery cloth.

FRONT PLATE, BACKPLATE & ADAPTER PLATE

1. Oil grooves in bushing in both front plate, backplate and adapter plate should be in line with dowel pin holes and 180° apart. This positions the oil grooves closest to the respective dowel pin holes.
2. If I.D. of bushings in front plate, backplate or adapter plate exceed .755 the front plate, backplate, or adapter plate should be replaced. (Bushings are not available as separate items).
3. Bushings in front plate and back-up gasket side of adapter plate should be flush with face.
4. If optional thrust plates are not used check for scoring on face of backplate and adapter plate. If wear exceeds .0015 backplate or adapter plate should be replaced.

BODY

1. Check inside gear pockets for excessive scoring or wear.
2. Body should be replaced if I.D. of gear pockets exceed 1.713.

GENERAL INFORMATION

It is important that relationship of the backplate, body, wear plate and front plate is correct. You will note two half moon cavities in the body which must face away from the front plate. Note: The smaller half moon port

cavity must be on the pressure side of the pump. Side of thrust plate and wear plate with mid section cut out must be on suction side of pump. Suction side of backplate is always side with larger port boss.

REASSEMBLY

1. Optional thrust plate, wear plates, bearing seals, molded o-rings, back-up gaskets, shaft seal and o-rings should be replaced as new parts.
2. Install o-rings (2) in groove of front plate (18), adapter plate (11), and backplate (1) with a small amount of grease to hold in place.
3. Tuck back-up gasket (10) in front plate (18) and adapter plate (11) with open part of "V" section down.
4. Place molded o-ring (9) in groove in front plate and adapter plate. Place bearing seal (8) over molded o-ring, groove side down.
5. Apply a thin coat of heavy grease to both milled faces of body. Slip body onto front plate-half moon port cavities in body must face away from front plate. Note: The small half moon port cavity must be on the pressure side of pump.
6. Place wear plate (7) on top of back-up gasket with bronze face up. The side with the mid section cut away must be on suction side of pump.
7. Dip drive gear assembly (14 or 16) and idler gear assembly (15) into oil. Slip both gear assemblies into gear pocket of body and into front plate bushings.
8. Install optional thrust plate (12) into body (13) bronze face toward gears with mid section cut away towards suction side of pump.
9. Install adapter plate (11) in place on front body (13). Check positioning mark on all sections of pump.
10. Install second body (3) onto adapter plate (11) and install wear plate (7).
11. Install key (6) in slot of drive gear assembly shaft (14 or 16). Dip slip fit gear (4) in oil and slip on shaft and into gear pocket of body. Check key for proper location.
12. Dip idler gear (5) in oil and install in gear pocket of body (3).
13. Position backplate (1) over shafts until dowel pins in body are engaged.
14. Install cap screws (20). Tighten evenly to 25/28 ft. lbs. torque.
15. Work shaft seal (19) over drive gear shaft, being careful to not cut rubber sealing lip. (Oil seal liberally before installing). Place 1-5/16 O.D. sleeve over shaft and press in shaft seal (19) until flush with front surface of front plate.
16. Install key (17) on keyed shaft (16).

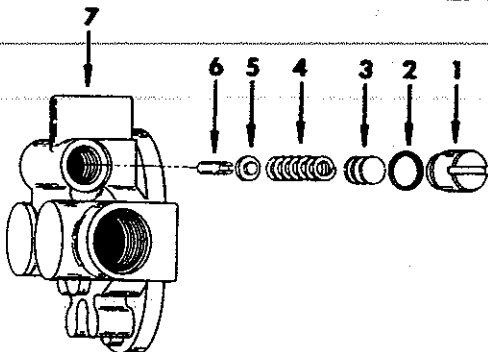
PLACING PUMP BACK INTO SERVICE

- If shop test stand is available, the following procedure for testing rebuilt pumps is recommended:
- A. Mount pump on test stand making sure that the proper level of clean oil is available in the reservoir. Check suction line for leaks and obstructions.
 - B. Start pump and run for three minutes at zero pressure.
 - C. Intermittently load pump to 500 P.S.I. for three minutes.
 - D. Intermittently load pump to 1000 P.S.I. for three minutes.
 - E. Intermittently load pump to 2000 P.S.I. for three minutes.
- F. Remove pump from test stand and check for freeness of drive shaft. Check for leaks.
- If shop test stand is not available, the following procedure for testing rebuilt pumps is recommended:
- A. Mount pump on equipment and run pump at 1/2 engine speed at zero pressure.
 - B. By operating control valve build pressure intermittently for three minutes.
 - C. Increase engine speed to full throttle and build pressure intermittently for three minutes.
 - D. Idle engine and check for leaks.

SINGLE OR DOUBLE PUMP TROUBLE SHOOTING

PUMP TROUBLE	PROBABLE CAUSE	REMEDY
1. Noisy pump caused by cavitation.	a. Oil too heavy. b. Oil filter plugged. c. Suction line plugged or too small.	a. Change to proper viscosity. b. Clean filters. c. Clean line and check for size.
2. Oil heating	a. Oil supply low. b. Contaminated oil. c. Setting of relief valve too high or too low. d. Oil in system too light.	a. Fill reservoir. b. Drain reservoir and refill with clean oil. c. Set to correct pressure. d. Drain reservoir and refill with proper viscosity oil.
3. Shaft seal leakage	a. Worn shaft seal. b. Worn shaft in seal area c. Broken bearing seal or back-up gasket d. Bushings out of position. e. Excessive internal wear.	a. Replace shaft seal. b. Replace drive shaft c. If replacing the shaft and shaft seal does not stop seal leakage, the pump should be disassembled and checked for items 3, c. & d. d. Disassemble pump and replace front plate. e. Disassemble pump inspect parts and replace as needed.
4. Foaming oil	a. Low oil level. b. Air leaking into suction line. c. Wrong kind of oil.	a. Fill reservoir. b. Tighten fittings. c. Drain and fill reservoir with non-foaming oil.

RELIEF VALVE BACKPLATE



PARTS LIST

REF. NO.	DESCRIPTION	REQ'D. PER ASSY.
1	Slotted plug	1
2	O-ring	1
3	Shims	As Req'd.
4	Spring, Relief Valve	1
5	Plug Seat	1
6	Seat	1
7	Backplate	1

DISASSEMBLY

1. Use slotted socket and remove relief valve plug (1), shims (3), spring (4), plug seat (5) and seat (6) from backplate (7).

Note: Do not remove internal relief valve cartridge assembly. Cartridge assembly has been set to a predetermined depth with locktite applied.

INSPECTION

1. Clean and dry all parts.
2. The o-rings need not be inspected as they should be replaced as new items.
3. Remove all nicks and burrs from all parts with emery cloth.
4. Oil grooves in bushings should be in line with dowel pin holes and 180 degrees apart. This positions the oil grooves closest to the respective pin holes.
5. If I.D. of bushings in backplate exceed .755, the backplate should be replaced. (Bushings are not

available as separate items).

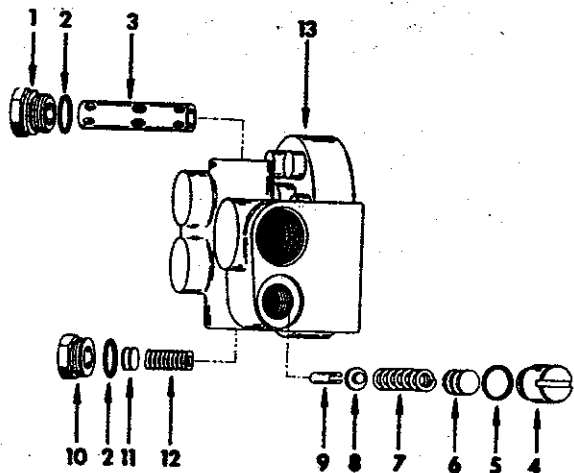
6. If optional thrust plate is not used, check for scoring on face of backplate. If wear exceeds .0015, backplate should be replaced.
7. Check shims (3) for wear.
8. Check spring (4) for weakness or breakage.
9. Wash backplate in clean solvent, direct compressed air into relief valve cavity in backplate to dry relief valve cartridge assembly. The procedure removes any trapped contamination.

REASSEMBLY

1. Install relief valve parts in backplate (7), seat (6), plug seat (5), spring (4), same number of

shims (3), new o-ring (2) on plug (1) and torque plug to 21 to 24 ft. lbs.

FLOW DIVIDER/FLOW CONTROL BACKPLATE



PARTS LIST

REF. NO.	DESCRIPTION	REQ'D. PER ASSY.
1	Hex Plug	1
2	O-ring	2
3	Flow Divider Spool	1
4	Slotted Plug	1
5	O-ring	1
6	Shims	As Req'd
7	Spring, Relief Valve	1
8	Plug Seat	1
9	Seat	1
10	Hex Plug	1
11	Shims	As Req'd
12	Spring, Flow Divider	1
13	Backplate	1

DISASSEMBLY

1. Use slotted socket and remove relief valve plug (4), shims (6), spring (7), plug seat (8) and seat (9) from backplate (13).

Note: Do not remove internal relief valve cartridge assembly. Cartridge assembly has been set to a

predetermined depth with locktite applied.

2. Remove plug (1), spool (3), plug (10), shims (11) and spring (12) from backplate (13).

INSPECTION

1. Clean and dry all parts.
2. The o-rings need not be inspected as they should be replaced as new items.
3. Remove all nicks and burrs from all parts with emery cloth.
4. Oil grooves in bushings should be in line with dowel pin holes and 180 degrees apart. This positions the oil grooves closest to the respective pin holes.
5. If I.D. of bushings in backplate exceed .755 the backplate should be replaced. (Bushings are not available as separate items).
6. If optional thrust plate is not used, check for scoring on face of backplate. If wear exceeds .0015,

backplate should be replaced.

7. Inspect backplate spool bore for scoring or contamination.
8. Inspect spool O.D. for scratches, it should be smooth and free of nicks and burrs. Spool should slide freely inside backplate bore.
9. Check shims (6) and (11) for wear.
10. Check springs (7) and (12) for weakness or breakage.
11. Wash backplate in clean solvent, direct compressed air into relief valve cavity in backplate to dry relief valve cartridge assembly. The procedure removes any trapped contamination.

REASSEMBLY

1. Install relief valve parts in backplate (13), seat (9), plug seat (8), spring (7), same number of shims (6), new o-ring (5) on plug (4) and torque plug (4) to 21 to 24 ft. lbs.

2. Install flow divider parts in backplate (13) spool (3), spring (12), same number of shims (11), new o-rings (2) on plugs (1) and (10) and torque plugs (1) and (10) to 27 to 30 ft. lbs.

FLOW DIVIDER/FLOW CONTROL TROUBLE SHOOTING

FLOW DIVIDER TROUBLE	PROBABLE CAUSE	REMEDY
1. External leakage.	a. Spool plug o-ring. b. Relief valve plug o-ring.	a. Remove spool plug and replace o-ring. b. Remove relief valve plug and replace o-ring.
2. Low priority pressure.	a. Low relief valve setting.	a. Replace weak or broken spring. b. Shim as required. c. Replace backplate assy.
3. Low priority flow.	a. Relief valve open or leaking. b. Scratched machined sealing surface in relief valve. (Either in seat or poppet within cartridge) c. Contaminant lodged in relief valve. d. Missing spring shims. e. Weak Spool spring.	a. Replace weak or broken spring. b. Replace parts as required. c. Clean relief valve cavity. d. Add shims as required. e. Replace spool spring.
4. No priority flow.	a. Broken spool spring. b. Orifice inside spool plugged.	a. Replace spool spring. b. Check for contaminant lodged in orifice.
5. No secondary flow.	a. Spool sticking.	a. Remove and clean spool bore.
6. Low secondary flow.	a. Pump flow degradation due to wear.	a. Check pump for worn parts and replace.

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