

INSTRUCTIONS-PARTS LIST



308-505

Rev A
Supersedes
802-133 &
802-278

This manual contains **IMPORTANT**
WARNINGS and **INSTRUCTIONS**
READ AND RETAIN FOR REFERENCE

HYDRA-CLEAN® 1535, 2040 Pressure Washer

P/N 800-165, Series B

P/N 800-367, Series A

1500 psi (103 bar) OPERATING PRESSURE

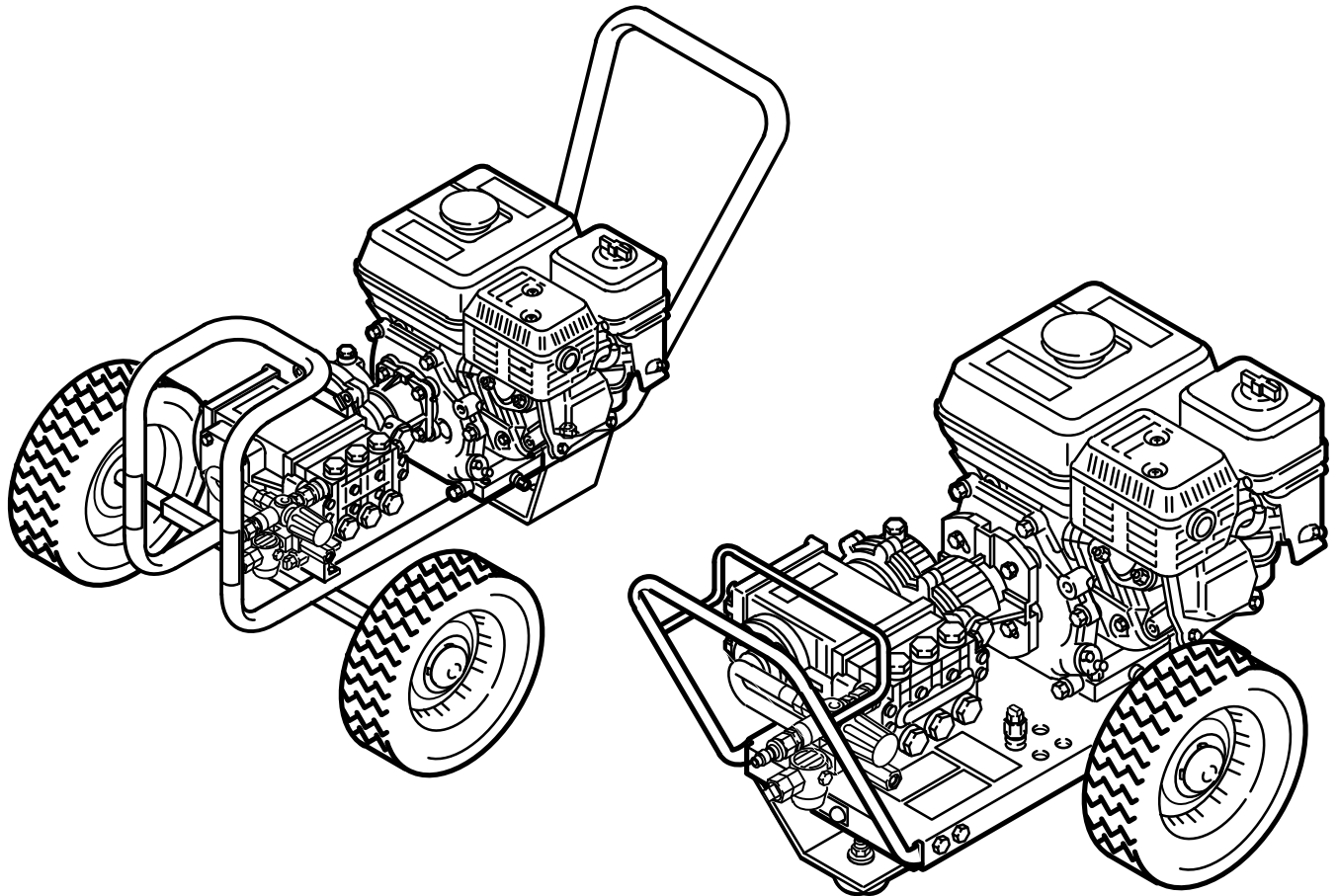
1900 psi (131 bar) MAXIMUM WORKING PRESSURE

P/N 800-164, Series C

P/N 800-290, Series B

2000 psi (138 bar) OPERATING PRESSURE

2400 psi (165 bar) MAXIMUM WORKING PRESSURE



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WARNING

**HIGH PRESSURE SPRAY CAN CAUSE SERIOUS INJURY.
FOR PROFESSIONAL USE ONLY. OBSERVE ALL WARNINGS.**

Read and understand all instruction manuals before operating equipment.

FLUID INJECTION HAZARD

General Safety

This pressure washer generates very high fluid pressure. Spray from the gun, leaks or ruptured components can inject fluid through your skin and into your body and cause extremely serious bodily injury including the need for amputation. Also, fluid injected or splashed into the eyes or on the skin can cause serious damage.

NEVER point the spray gun or wand at anyone or at any part of the body. *NEVER* put hand or fingers over the spray tip.

ALWAYS follow the **Pressure Relief Procedure**, before cleaning or servicing any part of the sprayer.

NEVER try to stop or deflect leaks with your hand or body.

Be sure equipment safety devices are operating properly before each use.

Medical Treatment

If any fluid appears to penetrate your skin, get **EMERGENCY MEDICAL TREATMENT AT ONCE. DO NOT TREAT AS A SIMPLE CUT.** Tell the doctor exactly what fluid was injected.

NOTE TO PHYSICIAN: *Injection in the skin is a traumatic injury. It is important to treat the injury surgically as soon as possible. Do not delay treatment to research toxicity. Toxicity is a concern with some exotic coatings injected directly into the bloodstream. Consultation with a plastic surgeon or reconstructive hand surgeon may be advisable.*

Pressure Relief Procedure

To reduce the risk of serious bodily injury, including fluid injection and splashing in the eyes, or on the skin, always follow this procedure whenever you stop spraying for more than 10 minutes, when shutting down, and before checking or repairing any part of the system.

1. Engage the trigger safety latch.
2. Turn the sprayer off.
3. Remove the ignition cable from the spark plug.
4. Shut off the water supply.
5. Disengage the trigger safety latch and trigger the gun to relieve pressure, and then engage the trigger safety latch again.
6. Before long-term (overnight) storage or transporting of unit, disconnect the water supply, and turn off the fuel supply valve.

Spray Gun Safety Devices

Be sure all gun safety devices are operating properly before each use. Do not remove or modify any part of the gun; this can cause a malfunction and result in serious bodily injury.

SAFETY LATCH: Whenever you stop spraying for a moment, always set the gun safety latch in the engaged or "safe" position, making the gun inoperative. Failure to properly set the safety latch can result in accidental triggering of the gun.

SPRAY TIP SAFETY : Use extreme caution when cleaning or changing spray tips. If a spray tip clogs while spraying, engage the gun safety latch immediately. *ALWAYS* follow the **Pressure Relief Procedure** and then remove the spray tip to clean it.

EQUIPMENT MISUSE HAZARD

General Safety

Any misuse of the pressure washer or accessories, such as overpressurizing, modifying parts, using incompatible chemicals and fluids, or using worn or damaged parts, can cause them to rupture and result in fluid injection, splashing in the eyes or on the skin, or other serious bodily injury, fire, explosion or property damage.

NEVER alter or modify any part of this equipment; doing so could cause it to malfunction.

CHECK all spray equipment regularly and repair or replace worn or damaged parts immediately.

ALWAYS wear protective eyewear and appropriate clothing. If using a chemical injector, read and follow the chemical manufacturer's literature for recommendations on additional protective equipment, such as a respirator.

System Pressure

This sprayer can develop high operating pressures. Be sure that all spray equipment and accessories are rated to withstand the maximum working pressure of this sprayer. *DO NOT* exceed the maximum working pressure of any component or accessory used in the system.

Chemical Compatibility

BE SURE that all chemicals used in the chemical injector are compatible with the wetted parts of the hose, gun, wand and tip, as given in the Technical Data (inside back cover). Always read the chemical manufacturer's literature before using any chemical in this pressure washer.

HOSE SAFETY

High pressure fluid in the hoses can be very dangerous. If the hose develops a leak, split or rupture due to any kind of wear, damage or misuse, the high pressure spray emitted from it can cause a fluid injection injury or other serious bodily injury or property damage.

ALL FLUID HOSES MUST HAVE STRAIN RELIEFS ON BOTH ENDS. The strain reliefs help protect the hose from kinks or bends at or close to the coupling, which can result in hose rupture.

TIGHTEN all fluid connections securely before each use. High pressure fluid can dislodge a loose coupling or allow high pressure spray to be emitted from the coupling.

NEVER use a damaged hose. Before each use, check entire hose for cuts, leaks, abrasion, bulging cover, or damage or movement of the hose couplings. If any of these conditions exist, replace the hose immediately. *DO NOT* try to recouple high pressure hose or mend it with tape or any other device. A repaired hose cannot contain the high pressure fluid.

HANDLE AND ROUTE HOSES CAREFULLY. Do not pull on hoses to move the pressure washer. Do not use chemicals which are not compatible with the inner tube and cover of the hose. *DO NOT* expose Graco hose to temperatures above 200° F (93° C) or below -40° F (-40° C).

FUEL AND EMISSION HAZARDS

NEVER fill the fuel tank while the unit is running or hot. The fuel used in this unit is combustible and when spilled on a hot surface can ignite and cause a fire. *ALWAYS* fill tank slowly to avoid spilling.

NEVER operate the unit in a closed building. The exhaust contains carbon monoxide, a poisonous, odorless, invisible gas which can cause serious injury or death if inhaled.

NEVER alter the throttle setting, which is factory set. Tampering with this adjustment can damage the pressure washer and will void the warranty.

MOVING PARTS HAZARD

Moving parts can pinch or amputate fingers or other body parts. *KEEP CLEAR* of moving parts when starting or operating the pressure washer.

NEVER operate the pressure washer without all guards and interlocks installed and functioning. Follow the

Pressure Relief Procedure before checking or servicing the pressure washer to prevent discharging high pressure fluid from the gun.

TERMS

WARNING: Alerts user to avoid or correct conditions that could cause bodily injury.

NOTE: Identifies helpful procedures and information.

CAUTION: Alerts user to avoid or correct conditions that could cause damage to or destruction of equipment.

IMPORTANT

United States Government safety standards have been adopted under the Occupational Safety and Health Act. These standards—particularly the General Standards, Part 1910, and the Construction Standards, Part 1926—should be consulted.

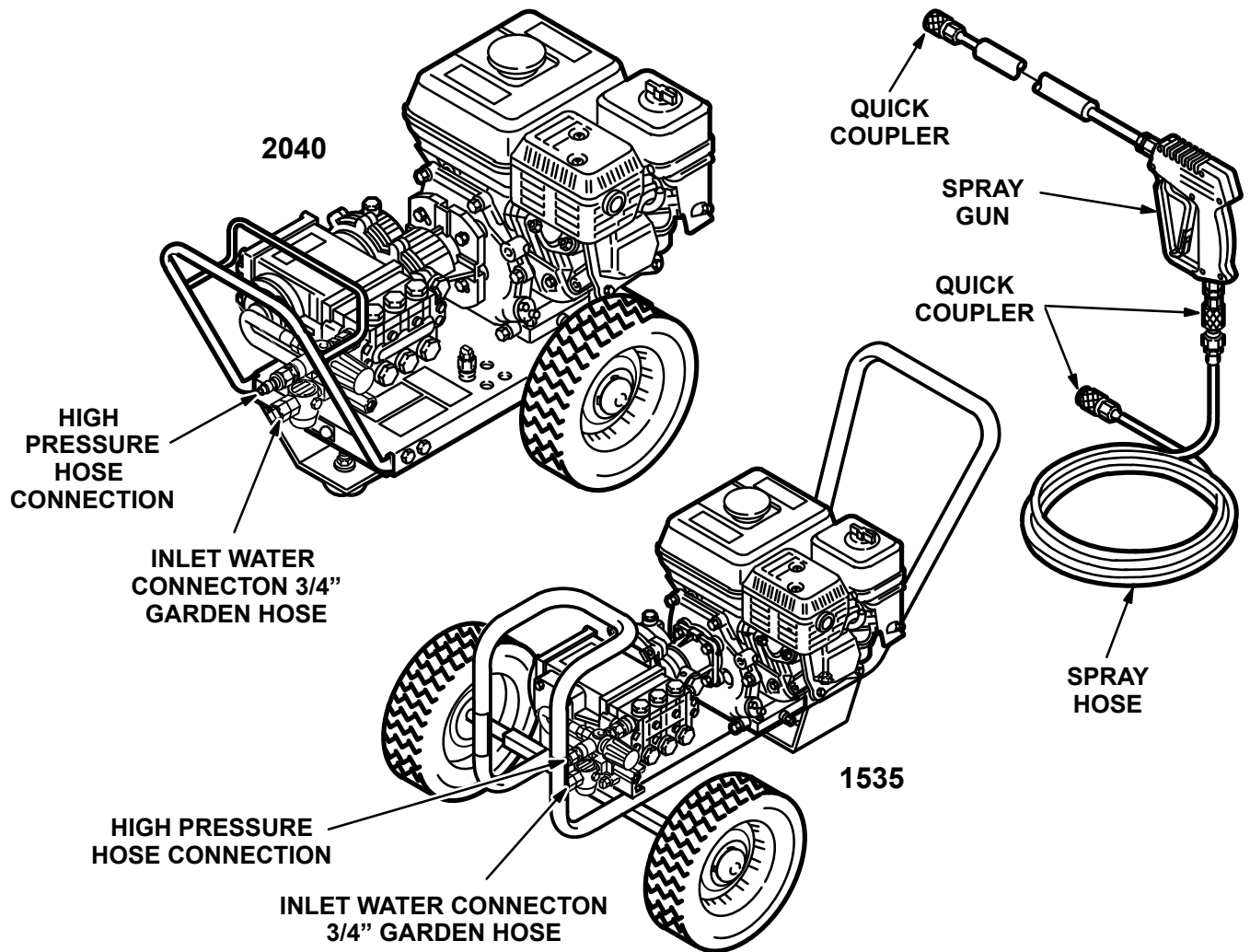


Figure 1

Check for Shipping Damage

The unit should be checked for any damage that may have occurred in shipping. Any damage should be noted and the **carrier notified immediately**.

Set Up

If you are using a downstream chemical injector, install it between the pump unloader and the high pressure hose, using the quick couplers provided.

Connect the high pressure hose between the pump outlet and the gun inlet. Both of these connections are made with quick couplers.

CAUTION

Up to 100 ft (30 m) of high pressure hose may be used. Longer hoses may affect sprayer performance, and chemical injector performance, if used.

Install the appropriate spray tip on the wand. See Installing and Changing Spray Tips. If you are using a sandblaster kit, see its separate manual for installation instructions.

Connect to Water Supply

CAUTION

Before attaching to the water supply, check your local plumbing code regarding cross-connection to the water supply. A backflow preventer P/N 801-133 is available to prevent backflow of contaminated water into the fresh water supply. Install it upstream from the pump.

If inlet water pressure is over 60 psi (4.1 bar) a regulating water valve P/N 800-258 must be installed at the garden hose connection.

Do not exceed 160 ° F (70 ° C) inlet water temperature.

Connect a hose with at least a 3/4 inch (19 mm) ID from the water supply to the unit's 3/4 inch garden hose inlet. The supply hose should not be more than 50 ft (15 m) long.

NOTE: The water source at the unit *must* have a minimum flow rate equal to that of the unit (see Technical Data, inside back cover).

STARTUP

Use this procedure whenever starting the pressure washer to help insure that the unit is ready to operate and starting is done safely.

1. Check oil levels.

Engine: Add SAE 30 or 10W–30 weight detergent oil as necessary.

Pump: Add SAE 20 or 30 weight non–detergent oil as necessary.

NOTE: Some units are equipped with a low–oil sensor that shuts the engine off if the oil level falls below a certain level. If the unit stops unexpectedly, check both the oil and the fuel levels. Check the oil level each time the unit is refueled.

2. Check fuel level.

WARNING

DO NOT refuel a hot engine. Refueling a hot engine could cause a fire. Use only fresh, clean regular or unleaded gasoline. Close the fuel shutoff valve during refueling.

3. Turn on the water supply.

CAUTION

Never run the unit dry. Costly damage to the pump will result. Always be sure the water supply is completely turned on before operating.

4. Trigger the gun until water sprays from the tip indicating that the air is purged from the system.

5. Open the fuel shutoff valve and be sure the spark plug ignition cable is pushed firmly onto the spark plug. On those units equipped with an ignition shutoff switch, the switch should be in the “on” position. Throttle should be in the “run” position.

6. Start the engine.

NOTE: For easier starting, have one person start the pressure washer while another person triggers the spray gun.

If the engine is cold, completely close the engine choke. Grasp the starter rope, brace one foot on the pressure washer chassis and pull rope rapidly and firmly. Continue holding the rope as it returns. Pull and return the rope until the engine starts. In cool weather, the choke may have to be kept closed for 10 to 30 seconds before opening it to keep the engine running. Otherwise, open the choke as soon as the engine starts.

If the engine is warm, leave the choke open, or just partly close it. Start the engine as described in the preceding paragraph. When it starts, be sure to open the choke completely.

CAUTION

On recoil start engines, never let the starter rope return by itself. It could jam the recoil system.

- ALWAYS* engage the gun’s trigger safety latch whenever you stop spraying, even for a moment, to reduce the risk of fluid injection or splashing in the eyes or on the skin if the gun is bumped or triggered accidentally.
- ALWAYS* observe the following **CAUTIONS** to avoid costly damage to the pressure washer.

CAUTION

DO NOT allow the pressure washer to idle for more than 10 minutes. Doing so may cause the recirculating water to overheat and seriously damage the pump. Turn off the pressure washer if it will not be spraying or cleaning at least every 10 minutes. If heated inlet water is used, reduce this time further.

DO NOT run the pump dry, which will quickly damage the pump. Be sure the water supply is fully turned on before starting the pump.

DO NOT operate the pressure washer with the inlet water screen removed. This screen helps keep abrasive sediment out of the pump, which could clog or scratch the pump. Keep this screen clean.

DO NOT pump caustic materials; such materials may corrode the pump components.

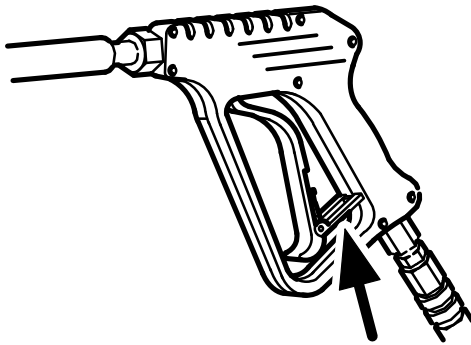
- See the chemical injector or sandblaster kit manual for detailed cleaning information if these accessories are used.

Trigger Safety Latch

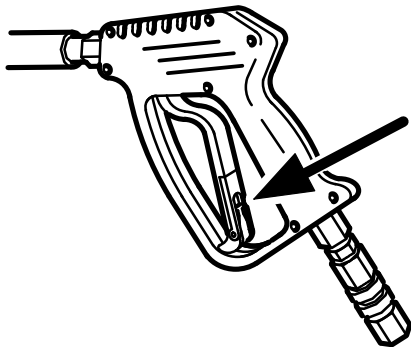
WARNING

To reduce the risk of serious bodily injury, including fluid injection, splashing in the eyes or on the skin, **ALWAYS** engage the trigger safety latch whenever spraying stops, even for a moment.

In the engaged position, the trigger safety latch prevents the gun from being triggered accidentally by hand or if it is dropped or bumped. Be sure the latch is pushed fully down when engaging it or it cannot prevent the gun from being triggered. See Figure 2.



TRIGGER SAFETY LATCH SHOWN ENGAGED



TRIGGER SAFETY LATCH SHOWN
DISENGAGED

Figure 2

Installing and Changing Spray Tips

WARNING

To reduce the risk of serious bodily injury, including fluid injection or splashing in the eyes or onto the skin, use extreme caution when changing spray tips. **ALWAYS** follow the procedure below.

1. Follow the **Pressure Relief Procedure**.
2. Point the gun and wand away from yourself and anyone else.
3. Without holding your hand over the spray tip (A), pull back the quick coupler ring (B). Remove the old tip and/or install a new one, and then release the ring. See Figure 3.
4. Be sure the tip is secure before starting to spray again.
5. Tip holding holes are provided on the chassis.

CAUTION

To avoid blowing the o-ring out of the quick coupler, due to the high pressure in the system, never operate the pressure washer without a tip securely mounted in the quick coupler.

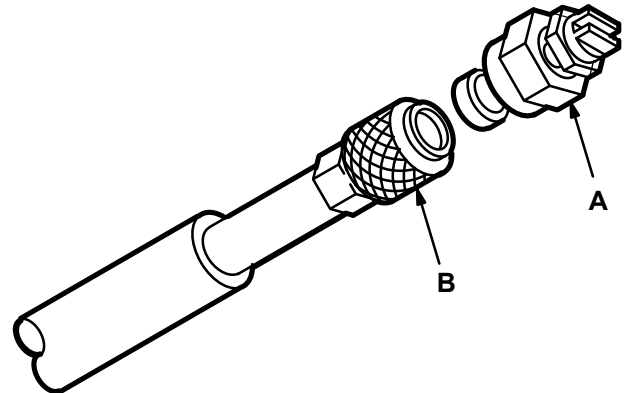


Figure 3

SHUTDOWN, FLUSHING AND STORAGE

WARNING

PRESSURE RELIEF PROCEDURE

To reduce the risk of serious bodily injury, including fluid injection and splashing in the eyes, or on the skin, always follow this procedure whenever you stop spraying for more than 10 minutes, when shutting down, and before checking or repairing any part of the system.

1. Engage the trigger safety latch.
2. Turn the sprayer off.
3. Remove the ignition cable from the spark plug.
4. Shut off the water supply.
5. Disengage the trigger safety latch and trigger the gun to relieve pressure, and then engage the trigger safety latch again.
6. Before long-term (overnight) storage or transporting of unit, disconnect the water supply, and turn off the fuel supply valve.

1. If the pressure washer will be exposed to freezing temperatures, drain all water out of the pump. If it must be stored in freezing temperatures, flush the unit with a 50% anti-freeze solution. Relieve pressure. Flush the pressure washer before using it again to remove the anti-freeze.

NOTE: An anti-freeze flush kit P/N 802-327 is available to make flushing easier.

CAUTION

If water does freeze in the pressure washer, thaw it in a warm room before trying to start it. *DO NOT* pour hot water on or into the pump; it may crack the ceramic plungers!

2. After each use, wipe all surfaces of the pressure washer with a clean, damp cloth.
3. Perform the appropriate maintenance. See maintenance chart.

MAINTENANCE

Observing regular maintenance intervals helps ensure that you get maximum performance and life from the pressure washer.

There is a break-in period for the engine, pump and gear reducer (if used). After changing the oil in these components following their respective break-in periods, the interval between required changes is longer.

If the unit is operating in dusty conditions, these maintenance checks should be made more often.

WARNING

To reduce the risk of serious bodily injury, including fluid injection, splashing in the eyes or on the skin or injury from moving parts, always follow the **Pressure Relief Procedure Warning** before proceeding.

Interval	What to do
Daily	Clean water inlet screen and filter. Check engine and pump oil levels. Fill as necessary. Check gasoline level. Fill as necessary.
After first 5 hours of operation	Change engine break-in oil. Drain oil when warm. Use SAE 30 or 10W-30 detergent oil.
Each 25 hours of operation	Clean and remove air cleaner foam. Wash with water and detergent. Dry thoroughly. Rub with oil and squeeze to distribute oil.
After first 50 hours of operation	Change pump break-in oil. Use SAE 20 or 30 non-detergent oil. Change gear reducer oil. Use SAE 90 gear oil.
Each 100 hours of operation or 3 months	Clean or replace paper air cleaner cartridge. Tap gently to remove dirt. Change engine oil. Use SAE 30 or 10W-30 detergent oil.
Each 500 hours of operation or 6 months	Change pump oil. Use SAE 20 or 30 non-detergent oil. Change gear reducer oil. Use SAE 90 gear oil.

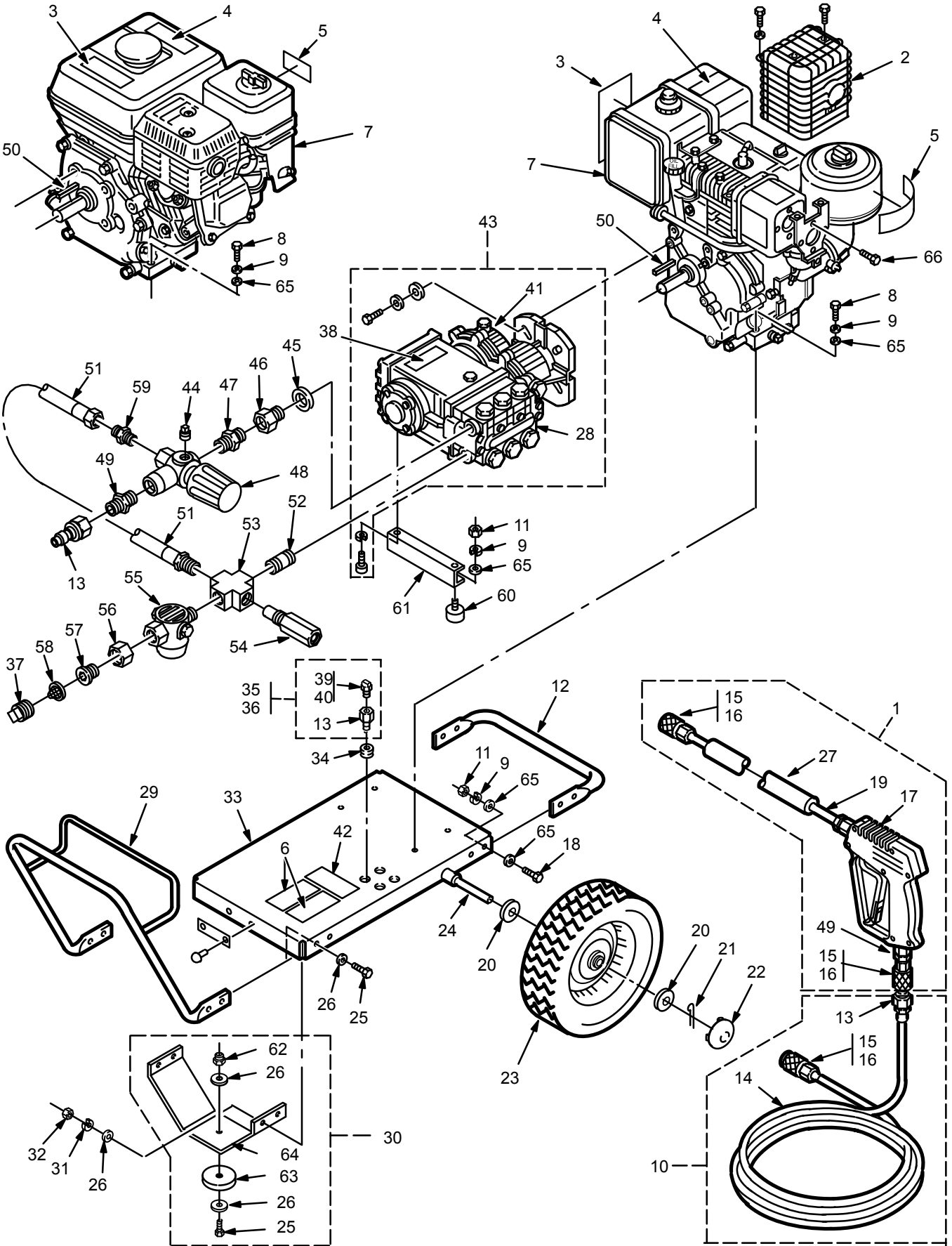
TROUBLESHOOTING CHART

WARNING

To reduce the risk of serious bodily injury, including fluid injection, splashing in the eyes or on the skin or injury from moving parts, always follow the **Pressure Relief Procedure Warning** before proceeding.

PROBLEM	CAUSE	SOLUTION
Engine will not start or is hard to start	No gasoline in fuel tank or carburetor. Low oil (on units with low oil sensor). Start/Stop switch in Stop position. Water in gasoline or old fuel. Choked improperly. Flooded engine. Dirty air cleaner filter. Spark plug dirty, wrong gap or wrong type. Spray gun closed.	Fill the tank with gasoline, open fuel shut off valve. Check fuel line and carburetor. Add to proper level. Move switch to start position. Drain fuel tank and carburetor. Use new fuel and dry spark plug. Open choke and crank engine several times to clear out gas. Remove and clean. Clean, adjust the gap or replace. Trigger spray gun.
Engine misses or lacks power	Partially plugged air cleaner filter. Spark plug dirty, wrong gap or wrong type.	Remove and clean. Clean, adjust the gap or replace.
Low pressure and/or pump runs rough	Worn or wrong size tip. Inlet filter clogged. Worn packings, abrasives in water or natural wear. Inadequate water supply. Fouled or dirty inlet or discharge valves. Even a small particle can cause the valve to stick. Restricted inlet. Worn inlet or discharge valves. Leaking high pressure hose.	Replace with tip of proper size. Clean. Check more frequently. Check filter. Replace packings. See PUMP SERVICE. Check water flow rate to pump. Clean inlet and discharge valve assemblies. Check filter. Check garden hose, may be collapsed or kinked. Replace worn valves. Replace high pressure hose.
Water leakage from under pump manifold	Worn packings.	Install new packings. See PUMP SERVICE.
Water in pump	Humid air condensing inside crankcase. Worn packings. Oil seals leaking.	Change oil as specified in MAINTENANCE. Install new packings. See PUMP SERVICE. Install new oil seals. See PUMP SERVICE.
Frequent or premature failure of the packings	Scored, damaged or worn plungers. Abrasive material in the fluid being pumped. Inlet water temperature too high. Overpressurizing pump. Excessive pressure due to partially plugged or damaged tip. Pump running too long without spraying. Running pump dry.	Install new plungers. See PUMP SERVICE. Install proper filtration on pump inlet plumbing. Check water temperature; may not exceed 160°F. Do not modify any factory-set adjustments. See EQUIPMENT MISUSE HAZARD. Clean or replace tip. See Installing and Changing Spray Tips. Never run pump more than 10 minutes without spraying. Do not run pump without water.
Strong surging at the inlet and low pressure on the discharge side	Foreign particles in the inlet or discharge valve or worn inlet and/or discharge valves.	Clean or replace valves. See PUMP SERVICE.
Oil leakage between the gear reducer cover and case	Worn gasket.	Replace the gasket. See SERVICE SECTION.
Oil leakage between the gear reducer cover and the pump	Worn oil seals and/or o-ring.	Replace oil seals and/or o-ring. See SERVICE SECTION.
Oil leakage between the gear reducer case and the engine	Worn oil seal.	Replace oil seal. See SERVICE SECTION.

PARTS DRAWING
800-164 & 800-290 Hydra-Clean® 2040 Pressure Washer



PARTS LIST

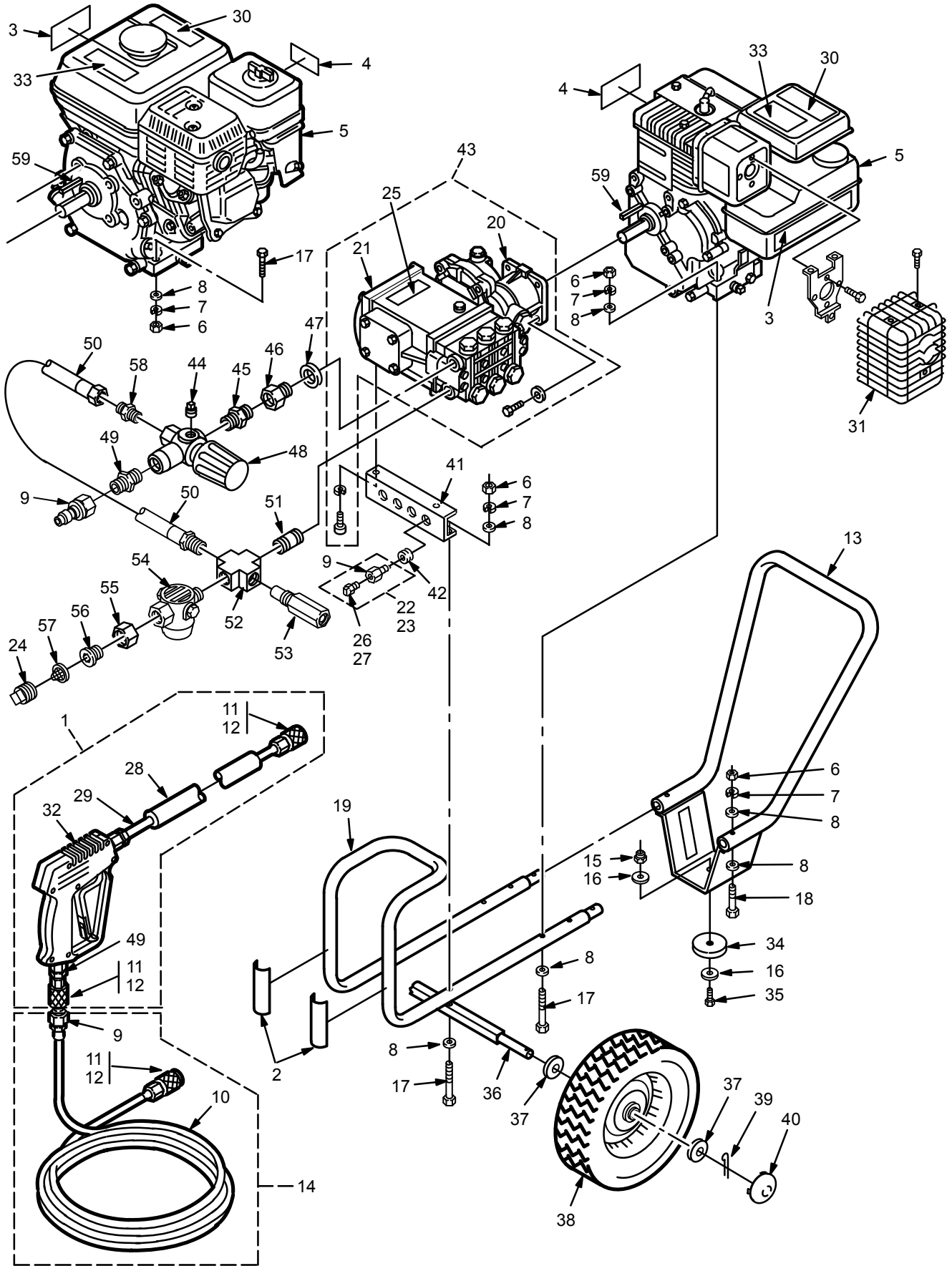
800-164 & 800-290 Hydra-Clean® 2040 Pressure Washer

REF NO.	PART NO.	DESCRIPTION	QTY	REF NO.	PART NO.	DESCRIPTION	QTY
1	800-394	GUN & WAND ASSEMBLY (incl. 15, 17, 19, 27, 49)	1	33	800-176	CHASSIS	1
2	802-257	GUARD, Muffler, Briggs & Stratton	1	34	801-548	GROMMET, Rubber	4
3	802-367	LABEL, Identification, 2040	1	35	800-173	TIP ASSEMBLY, 15 Degree (incl. 13, 39)	1
4	802-363	LABEL, Caution	1	36	800-174	TIP ASSEMBLY, 0 Degree (incl. 13, 40)	1
5	802-368	LABEL, Identification, 2040	1	37	402-278	PLUG, Plastic	1
6	179-885	LABEL, Warning, chassis	1	38	803-083	LABEL, Keep From Freezing	1
7 *	802-141	ENGINE, 8 hp, Briggs & Stratton I/C	1	39	801-729	TIP, Spray 15 Degree	1
□	802-998	ENGINE, 8 hp, Honda OHV	1	40	801-730	TIP, Spray 0 Degree	1
8	802-127	SCREW, Cap, hex hd. 5/16-18 x 1-3/4	4	41	802-143	GEAR REDUCER (see page 17)	1
9	801-025	WASHER, Lock 5/16	10	42	181-867	LABEL, Warning, ventilation	1
10	800-374	HOSE ASSEMBLY, w/Couplers (incl. 13, 14, 15)	1	43	802-299	PUMP & GEAR REDUCER ASSEMBLY (incl. 28, 41)	1
11	801-024	NUT, Hex 5/16-18	6	44	801-709	PLUG, Square hd. 1/4	1
12	801-539	BUMPER	1	45	801-907	WASHER, Flat	1
13	801-090	COUPLER, Male 1/4	4	46	801-905	ADAPTER, 3/8 G x 3/8 NPT	1
14	801-007	HOSE, High Pressure, 50'	1	47	801-868	NIPPLE, Hex 3/8	1
15	801-009	COUPLER, Female 1/4 (incl. 16)	3	48	802-315	UNLOADER, 2000 psi	1
16	801-202	O-RING, Female Coupler 1/4	3	49	801-103	NIPPLE, Hex 3/8 x 1/4	2
17	803-350	GUN, Spray	1	50	801-137	KEY, Square 1/4 x 2	1
18	801-941	SCREW, Cap, hex hd. 5/16-18 x 1	4	51	802-124	HOSE, Bypass (incl. 59)	1
19	801-935	WAND, 20"	1	52	801-523	NIPPLE, 1/2 x 2	1
20	801-235	WASHER, Flat 5/8	4	53	801-622	CROSS, 1/2	1
21	801-880	PIN, Cotter 1/8 x 1-1/2	2	54	800-115	VALVE, Thermal Relief	1
22	104-811	HUB CAP	2	55	800-113	FILTER	1
23	106-062	WHEEL & TIRE ASSEMBLY	2	56	801-111	NUT, Garden Hose	1
24	802-139	AXLE	1	57	801-110	ADAPTER, Garden Hose	1
25	801-546	SCREW, Cap, hex hd. 3/8-16 x 1-1/4	5	58	801-112	STRAINER, Garden Hose	1
26	801-015	WASHER, Flat 3/8	6	59	802-627	NIPPLE, Hex 3/8 NPSM x 1/4 NPT	1
27	801-957	SLEEVE, 18"	1	60	801-367	BUMPER, Rubber	2
28	803-405	PUMP ASSEMBLY, 2000 psi (see page 18)	1	61	802-140	BRACKET, Support	1
29	801-541	HANDLE	1	62	801-499	NUT, Lock 3/8-16	1
30	800-175	FRONT LEG ASSEMBLY (incl. 25, 26, 62, 63, 64)	1	63	801-504	BUMPER, Rubber	1
31	801-363	WASHER, Lock 3/8	4	64	801-858	BRACKET, Front Leg	1
32	801-878	NUT, Hex 3/8-16	4	65	801-023	WASHER, Flat 5/16	14
				66 *	100-078	SCREW, Cap, hex hd.	4

* Model 2040 (800-164)

□ Model 2040 (800-290)

PARTS DRAWING
800-165 & 800-367 Hydra-Clean® 1535 Pressure Washer



PARTS LIST

800-165 & 800-367 Hydra-Clean® 1535 Pressure Washer

REF NO.	PART NO.	DESCRIPTION	QTY	REF NO.	PART NO.	DESCRIPTION	QTY
1	800-394	GUN & WAND ASSEMBLY (incl. 11, 28, 29, 32, 49)	1	31 □	803-245	GUARD, Muffler, Briggs & Stratton	1
2	179-885	LABEL, Warning, chassis	1	32	803-350	GUN, Spray	1
3	802-366	LABEL, Identification, 1535	1	33	181-867	LABEL, Warning, ventilation	1
4	802-373	LABEL, Identification, 1535	1	34	801-504	BUMPER, Rubber	1
5 *	802-264	ENGINE, 5 hp, Honda OHV	1	35	801-546	SCREW, Cap, hex hd. 3/8-16 x 1-1/4	1
□	803-239	ENGINE, 5 hp, Briggs & Stratton I/C	1	36	802-273	AXLE	1
6	801-024	NUT, Hex 5/16-18	8	37	801-235	WASHER, Flat 5/8	4
7	801-025	WASHER, Lock 5/16	8	38	106-062	WHEEL & TIRE ASSEMBLY	2
8	801-023	WASHER, Flat 5/16	8	39	801-880	PIN, Cotter 1/8 x 1-1/2	2
9	801-090	COUPLER, Male 1/4	4	40	104-811	HUB CAP	2
10	801-007	HOSE, High Pressure, 50'	1	41	802-267	BRACKET, Support	1
11	801-009	COUPLER, Female 1/4 (incl. 12)	3	42	801-012	GROMMET, Rubber	4
12	801-202	O-RING, Female Coupler 1/4	3	43	802-300	PUMP & GEAR REDUCER ASSEMBLY (incl. 20, 21)	1
13	800-184	HANDLE	1	44	801-709	PLUG, Square hd. 1/4	1
14	800-374	HOSE ASSEMBLY, w/Couplers (incl. 9, 10, 11)	1	45	801-868	NIPPLE, Hex 3/8	1
15	801-499	NUT, Lock 3/8-16	1	46	801-905	ADAPTER, 3/8 G x 3/8 NPT	1
16	801-015	WASHER, Flat 3/8	2	47	801-907	WASHER, Flat	1
17	802-277	SCREW, Cap, hex hd. 5/16-18 x 2-1/2	6	48	802-316	UNLOADER, 1500 psi	1
18	802-127	SCREW, Cap, hex hd. 5/16-18 x 1-3/4	2	49	801-103	NIPPLE, Hex 3/8 x 1/4	2
19	802-269	CHASSIS	1	50	802-124	HOSE, Bypass (incl. 58)	1
20	802-266	GEAR REDUCER (see page 15)	1	51	801-523	NIPPLE, 1/2 x 2	1
21	802-265	PUMP ASSEMBLY, 1500 psi (see page 20)	1	52	801-622	CROSS, 1/2	1
22	800-173	TIP ASSEMBLY, 15 Degree (incl. 9, 26)	1	53	800-115	VALVE, Thermal Relief	1
23	800-174	TIP ASSEMBLY, 0 Degree (incl. 9, 27)	1	54	800-113	FILTER	1
24	402-278	PLUG, Plastic	1	55	801-111	NUT, Garden Hose	1
25	803-083	LABEL, Keep From Freezing	1	56	801-110	ADAPTER, Garden Hose	1
26	801-729	TIP, Spray 15 Degree	1	57	801-112	STRAINER, Garden Hose	1
27	801-730	TIP, Spray 0 Degree	1	58	802-627	NIPPLE, Hex 3/8 NPSM x 1/4 NPT	1
28	801-957	SLEEVE, 18"	1	59	801-137	KEY, Square 1/4 x 2	1
29	801-935	WAND, 20"	1	□	Model 1535 (800-367)		
30	802-363	LABEL, Caution	1	*	Model 1535 (800-165)		

WARNING

To reduce the risk of serious bodily injury, including fluid injection, splashing in the eyes or on the skin or injury from moving parts, always follow the **Pressure Relief Procedure Warning** on page 2 before proceeding.

Replacing the O–Ring

1. Remove the four bolts and lockwashers, and the four washers, bumpers, and bolts. Then pull the pump and gear reducer assembly off the engine.
2. Drain the gear reducer oil by placing a container under it and removing the drain plug with a 22 mm wrench. Replace the o–ring if damaged.
3. Remove the four screws and lockwashers with a 6 mm wrench and pull the gear case off the gear cover.
4. Remove the old o–ring. Clean the gear cover and case surface. Lightly coat the new o–ring with grease and install it in the gear case.
5. Follow steps 4 through 6 under Assembling the Gear Reducer if this is all the service required.

Replacing the Gasket

1. Follow steps 1 through 3 under Replacing the O–Ring.
2. Using a 4 mm wrench, loosen the setscrew and pull the gear off the pump with a gear puller.
3. Remove the four screws and lockwashers from the gear cover.
4. Remove the gear cover and gasket from the pump. Clean the gear cover and pump surface. Lightly coat both sides of the gasket with grease and install it on the gear cover.
5. Follow the instructions under Assembling the Gear Reducer if this is all the service required.

Replacing the Oil Seal

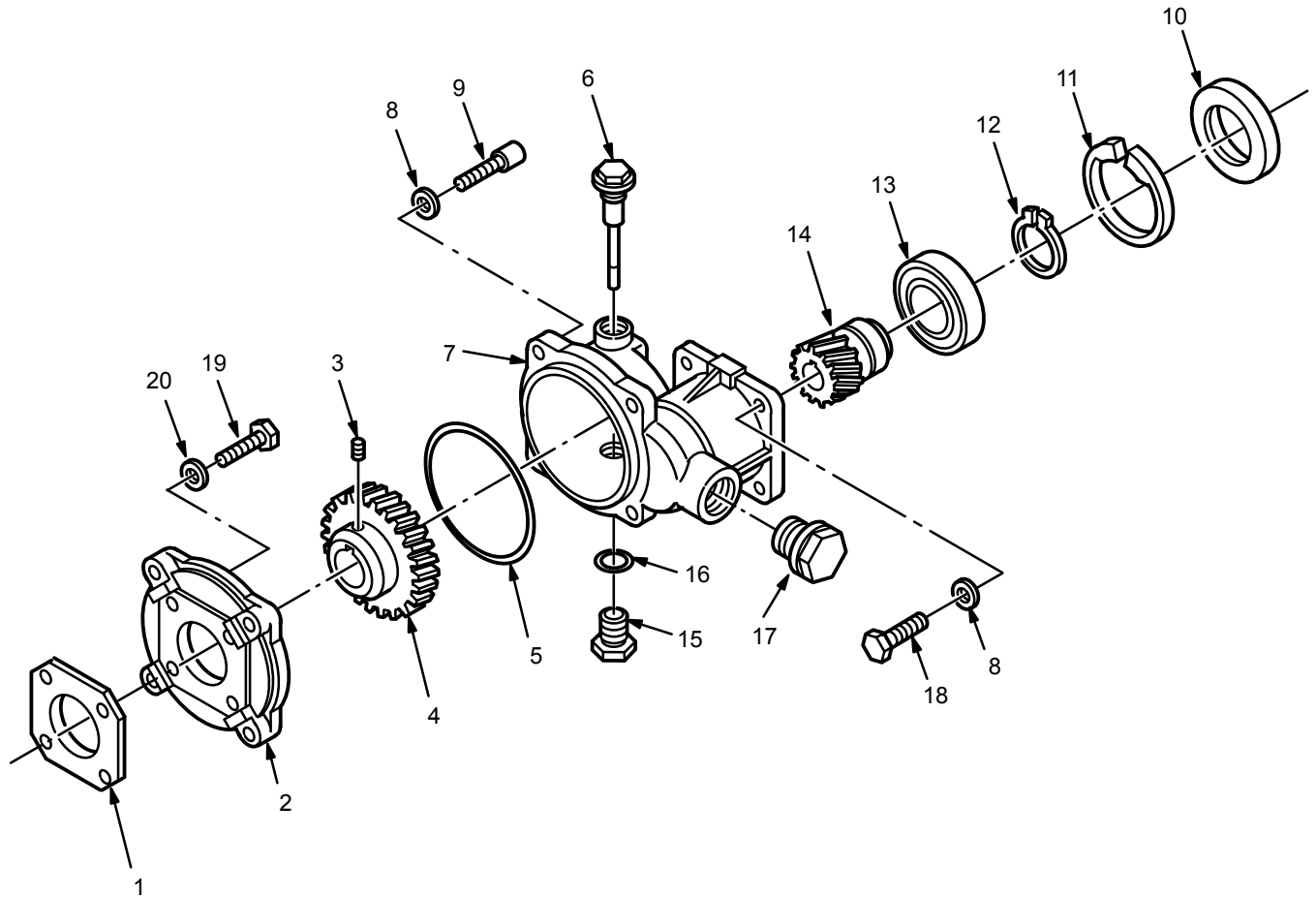
NOTE: The oil seal **MUST** be replaced if removed.

1. Follow steps 1 and 2 under Replacing the O–Ring.
2. Pry the oil seal out of the gear case. Be careful not to damage the gear case.
3. Wipe the inner surface of the gear case clean, then lightly coat it with grease. Place the oil seal into the gear case. Use a socket, placed against the surface of the seal, to push the seal into the case until its top surface is past the ridge in the bore.
4. Follow steps 4 through 6 under Assembling the Gear Reducer if this is all the service required.

Assembling the Gear Reducer

1. Make sure the gasket is properly placed on the gear cover. Refer to step 4 under Replacing the Gasket. Then, install the gear cover on the pump shaft.
2. Align the holes in the gear cover with the holes in the pump. Apply low strength Loctite[®] (blue) on the screw threads and secure the cover with the four screws and lockwashers. Tighten them oppositely and evenly.
3. Align the gear's slot with the key on the pump shaft and slide the gear onto the shaft, up to the pump's shoulder. Apply low strength Loctite[®] on the setscrew threads and tighten the setscrew to lock the gear on the shaft.
4. Make sure the o–ring is in place. Refer to step 4 under Replacing the O–Ring. Install the gear case on the cover, aligning the holes, and secure it with the four screws and lockwashers. Tighten them oppositely and evenly.
5. Grease the engine shaft. Align the gear's slot with the key on the engine shaft and slide the gear reducer onto the shaft, up to the engine's shoulder.
6. Secure the gear reducer to the engine with the four bolts and lockwashers.

PARTS DRAWING
802-266 Gear Reducer (1535)



PARTS LIST
802-266 Gear Reducer (1535)

REF NO.	PART NO.	DESCRIPTION	QTY
1	802-350	GASKET	1
2	802-351	COVER, Mounting	1
3	802-334	SCREW, Set	1
4	802-352	GEAR, Pump	1
5	802-353	O-RING	1
6	801-659	DIPSTICK	1
7	802-354	CASE, Mounting	1
8	801-023	WASHER, Lock	8
9	802-342	SCREW	4
10	802-355	SEAL, Oil	1
11	802-356	RING, Snap	1
12	802-357	RING, Snap	1
13	802-358	BEARING	1
14	802-359	GEAR, Engine	1
15	801-484	CAP, G 3/8 BSP	1
16	802-344	O-RING	1
17	802-345	GAUGE, Sight	1
18	802-331	BOLT, 5/16-24 x 1"	4
19	802-360	SCREW	4
20	801-139	WASHER, Lock	4

WARNING

To reduce the risk of serious bodily injury, including fluid injection, splashing in the eyes or on the skin or injury from moving parts, always follow the **Pressure Relief Procedure Warning** on page 2 before proceeding.

Replacing the Gasket

NOTE: To maintain a good seal, the gasket must be replaced whenever the gear reducer is disassembled.

1. Remove the four bolts and lockwashers, washers and pull the pump and gear reducer assembly of the engine.
2. Drain the gear reducer oil by placing a container under it and removing the drain plug with a 22 mm wrench. Replace the o-ring if damaged.
3. Remove the nine screws with a 6 mm wrench and pull the gear case off the gear cover.
4. Remove the old gasket. Clean the gear cover and case surface. Lightly coat the new gasket with grease and install it in on the gear case.
5. Follow steps 5 through 7 under Assembling the Gear Reducer if this is all the service required.

Replacing the Oil Seals

1. Follow steps 1 through 3 under Replacing the Gasket.
2. Loosen the setscrew, using a 4 mm wrench, and pull the gear off the pump with a gear puller.
3. Using a 6 mm wrench, remove the four screws. Be sure to keep them separate from the other nine screws removed previously.
4. Remove the four oil seals and replace them.
5. Follow steps 2 through 7 under Assembling the Gear Reducer if this is all the service required.

Replacing the O-Ring

1. Follow the instructions under Replacing the Gasket and Replacing the Oil Seals to disassemble the gear reducer.
2. Pull the gear cover of the pump and replace the o-ring.
3. Follow instructions under Assembling the Gear Reducer if this is all the service required.

Replacing the Oil Seal

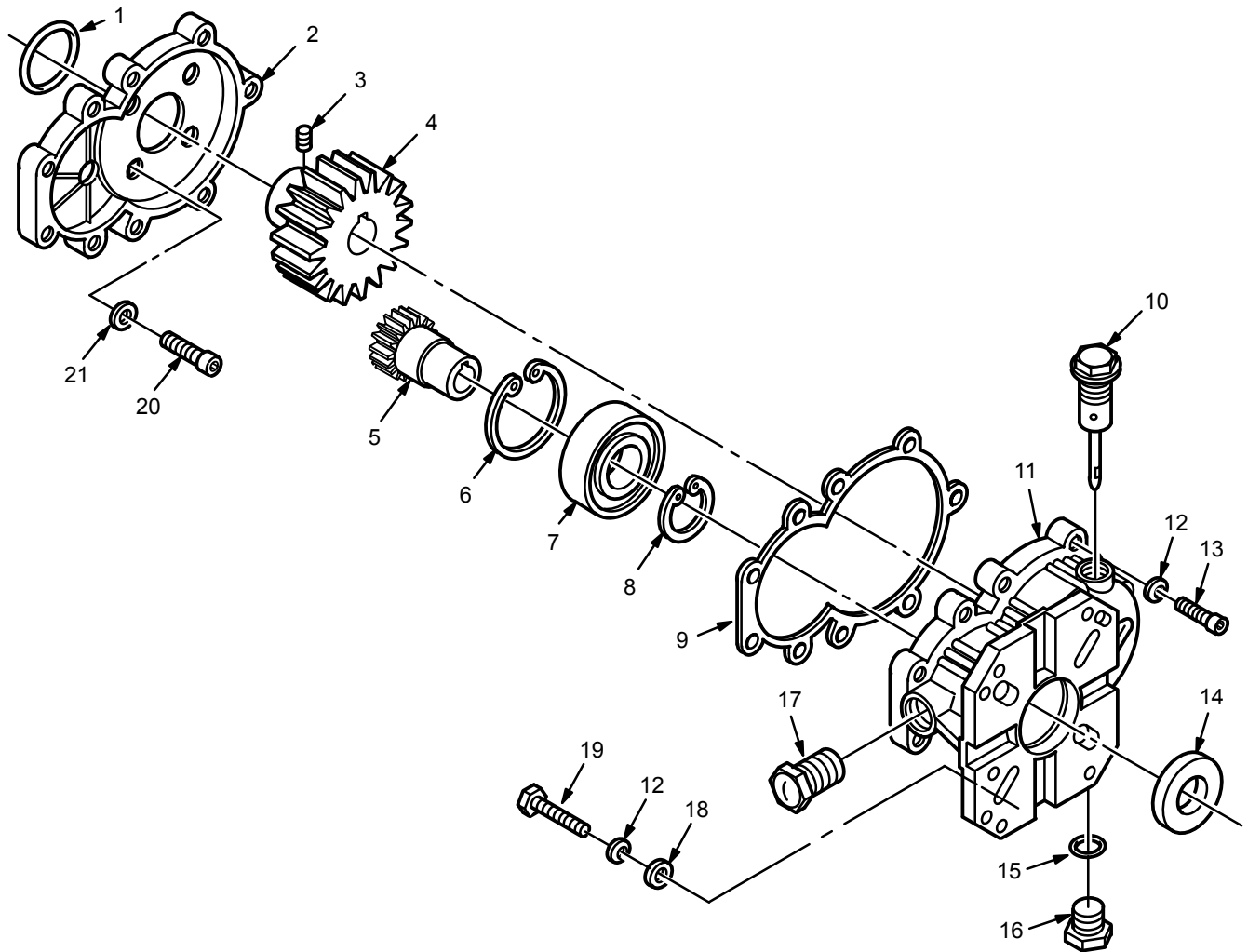
NOTE: The oil seal **MUST** be replaced if removed.

1. Follow steps 1 and 3 under Replacing the Gasket.
2. Remove the snap ring from the gear case, using a snap ring pliers. Pull the gear and bearing.
3. Push the seal from the inside to the outside of the gear case by placing screwdriver against the seal and lightly tapping it with hammer.
4. Wipe the inner surface of the case clean, then lightly coat it with grease. Place the oil seal into the gear case. Use a socket, placed against the surface of the seal, to push the seal into the case until its top surface is past the ridge in the bore.
5. Place the gear and bearing back into the gear case and install the snap ring.
6. Follow steps 4 through 7 under Assembling the Gear Reducer if this is all the service required.

Assembling the Gear Reducer

1. Grease the o-ring and make sure it's properly placed on the gear cover.
2. Place the four oil seals and screws in the gear cover. Place the o-ring on the screw to hold it in the cover.
3. Apply low strength Loctite[®] (blue) on the screw threads, align the screws with the holes in the pump, and tighten the screws oppositely and evenly.
4. Grease the pump shaft. Align the gear's slot with the key on the pump shaft and slide the gear onto the shaft, up to the pump's shoulder. Apply low strength Loctite[®] on the setscrew threads and tighten the setscrew to lock the gear on the shaft.
5. Make sure the gasket is in place (refer to step 4 under Replacing the Gasket). Install the gear cover on the case, aligning the holes, and secure it with the nine screws and lockwashers. Tighten the screws evenly in a crisscross pattern.
6. Grease the engine shaft. Align the gear's slot with the key on the engine shaft and slide the gear reducer onto the shaft, up to the engine's shoulder.
7. Secure the gear reducer to the engine with the four bolts, lockwashers, and washers.

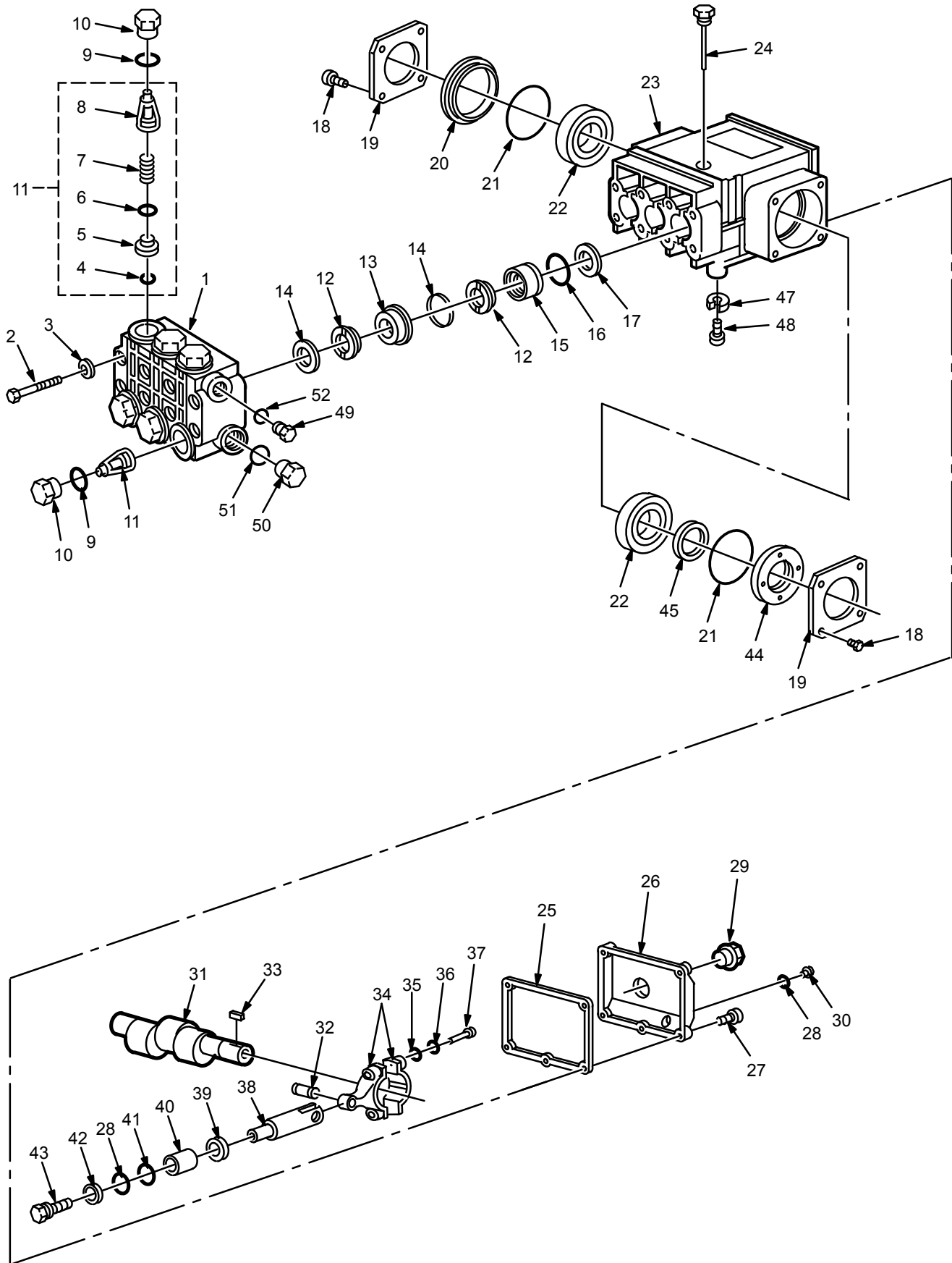
PARTS DRAWING
802-143 Gear Reducer (2040)



PARTS LIST
802-143 Gear Reducer (2040)

REF NO.	PART NO.	DESCRIPTION	QTY
1	802-332	O-RING	1
2	802-333	COVER, Mounting	1
3	802-334	SCREW, Set	1
4	802-335	GEAR, Pump	1
5	802-336	GEAR, Engine	1
6	802-337	RING, Snap	1
7	802-338	BEARING	1
8	802-339	RING, Snap	1
9	802-340	GASKET	1
10	801-475	DIPSTICK	1
11	802-341	CASE, Mounting	1
12	801-023	WASHER, Lock	13
13	802-342	SCREW	9
14	802-343	SEAL, Oil	1
15	802-344	O-RING	1
16	801-484	CAP, G 3/8 BSP	1
17	802-345	GAUGE, Sight	1
18	801-025	WASHER, Flat	4
19	802-331	BOLT, 5/16-24 x 1"	4
20	802-346	SCREW	4
21	802-347	SEAL, Oil	4

PARTS DRAWING
802-265 Pump Assembly, 1500 psi

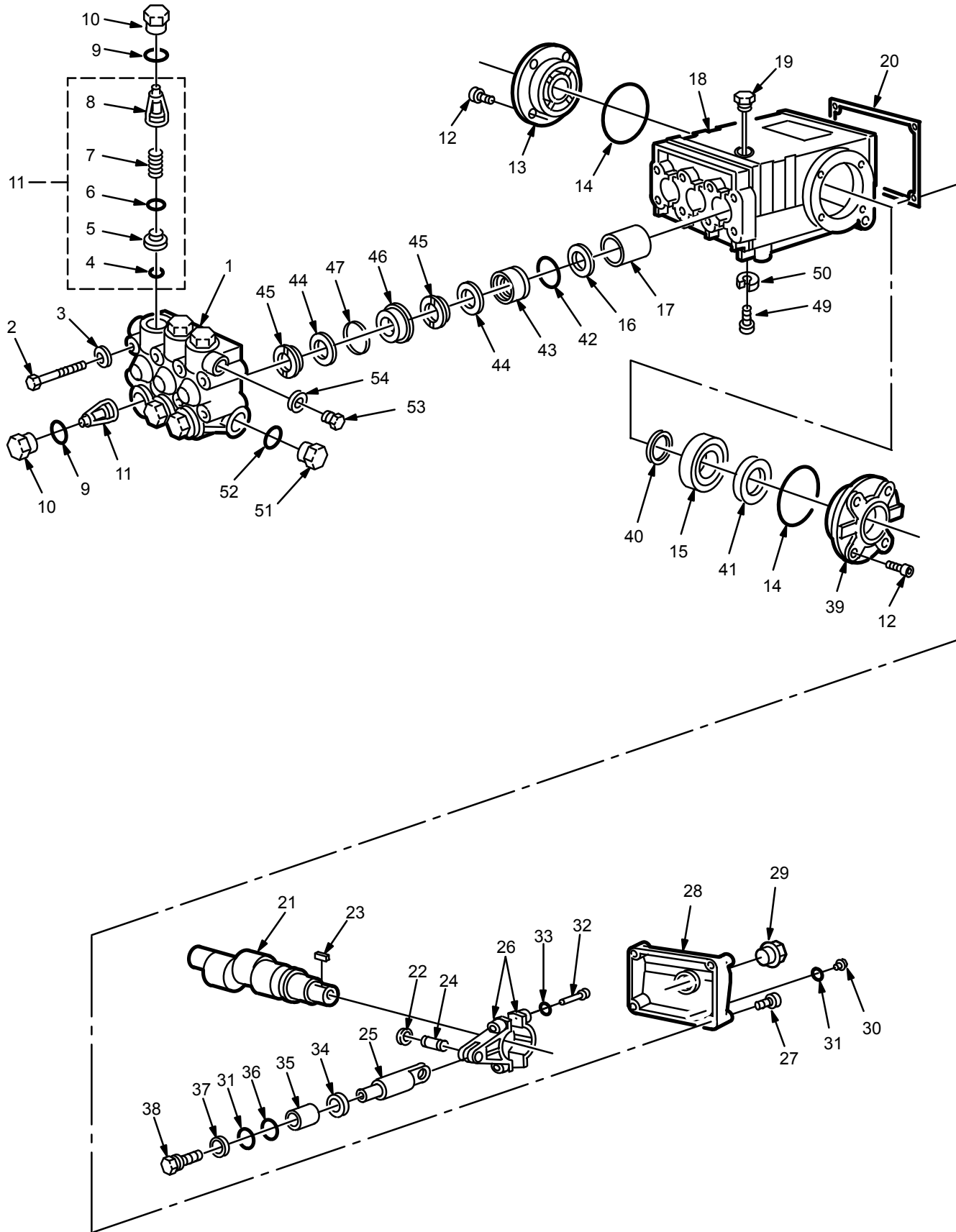


PARTS LIST
802-265 Pump Assembly, 1500 psi

REF NO.	PART NO.	DESCRIPTION	QTY	REF NO.	PART NO.	DESCRIPTION	QTY
1	802-319	MANIFOLD, 1500 psi	1	27	803-273	SCREW, Cap, socket hd.	5
2	801-651	SCREW, Cap, socket hd.	8	28	✓	O-RING	
3	801-652	WASHER, Lock	8	29	802-345	GAUGE, Sight	1
4	*	O-RING		30	802-793	PLUG, Oil Drain	1
5	*	SEAT, Valve		31	803-328	CRANKSHAFT	1
6	*	PLATE, Valve		32	803-275	PIN, Wrist	3
7	*	SPRING		33	802-794	KEY	1
8	*	GUIDE, Valve		34	803-276	ROD, Connecting	3
9	●	O-RING		35	803-277	WASHER, Flat	6
10	●	CAP		36	803-278	WASHER, Lock	6
11	*	VALVE ASSEMBLY		37	803-279	SCREW, Cap, socket hd.	6
12	#◆	PACKING		38	803-330	GUIDE, Piston	3
13	◆	RETAINER, Packing		39	801-489	WASHER, Flinger	3
14	◆	RING, Head		40	801-661	PLUNGER, Ceramic	3
15	◆	RETAINER, Packing		41	✓	RING, Backup	
16	◆	O-RING		42	✓	WASHER	
17	\	SEAL, Oil		43	✓	SCREW, Piston	
18	803-265	SCREW, Cap, hex hd	8	44	803-281	SPACER	1
19	803-266	COVER, Crankcase	2	45	803-282	SEAL, Crankshaft	1
20	803-267	SPACER	1	46		NOT USED	
21	803-268	O-RING	2	47	802-317	WASHER, Lock	2
22	803-269	BEARING, Ball	2	48	802-318	SCREW, Cap, socket hd.	2
23	803-326	CRANKCASE	1	49	801-484	PLUG, Hex	1
24	801-659	DIPSTICK	1	50	801-482	PLUG, Hex	1
25	803-327	GASKET, Cover	1	51	801-483	WASHER, Flat	1
26	802-526	COVER, Crankcase	1	52	801-485	WASHER, Flat	1

- * Part of kit 1, 801-472 Valve Kit
- Part of kit 4, 802-306 Valve Cap Kit
- ✓ Part of kit 6, 801-474 Plunger Repair Kit
- # Part of kit 19, 801-662 Packing Kit
- \ Part of kit 23, 801-658 Oil Seal Kit
- ◆ Part of kit 27, 801-664 Packing and Retainer Kit

PARTS DRAWING
803-405 Pump Assembly, 2000 psi



PARTS LIST
803-405 Pump Assembly, 2000 psi

REF NO.	PART NO.	DESCRIPTION	QTY	REF NO.	PART NO.	DESCRIPTION	QTY
1	801-467	MANIFOLD, 2000 psi	1	28	803-321	COVER, Crankcase, 2000 psi	1
2	801-468	SCREW, Cap, hex hd.	8	29	802-345	GAUGE, Sight	1
3	801-469	WASHER, Lock	8	30	802-793	PLUG, Oil Drain	1
4	*	O-RING		31	✓	O-RING	
5	*	SEAT, Valve		32	803-294	SCREW, Cap, socket hd	6
6	*	PLATE, Valve		33	801-652	WASHER, Lock	6
7	*	SPRING		34	801-489	WASHER, Flinger	3
8	*	GUIDE, Valve		35	801-490	PLUNGER, Ceramic	3
9	●	O-RING		36	✓	RING, Backup	
10	●	CAP		37	✓	WASHER	
11	*	VALVE ASSEMBLY		38	✓	SCREW, Piston	
12	803-283	SCREW, Cap, socket hd.	8	39	803-295	COVER, Crankcase	1
13	803-284	COVER, Crankcase	1	40	803-296	SHIM	2
14	802-500	O-RING, Crankcase Cover	2	41	★	SEAL, Oil	
15	803-285	BEARING, Tapered Roller	2	42	■	O-RING	
16	□	SEAL, Oil		43	■	RETAINER, Packing	
17	803-286	BUSHING, Piston	1	44	■†	PACKING	
18	802-895	CRANKCASE	1	45	■	RING, Head	
19	801-475	DIPSTICK	1	46	■	RETAINER, Packing	
20	803-144	GASKET, Cover	1	47	■	RING, Long Life	
21	803-332	CRANKSHAFT, 2000 psi	1	48		NOT USED	
22	803-288	RING, Retaining	6	49	802-305	SCREW, Cap, socket hd.	2
23	802-794	KEY	1	50	802-304	WASHER, Lock	2
24	803-289	PIN, Wrist	3	51	801-482	PLUG, Hex	1
25	803-323	GUIDE, Piston, 2000 psi	3	52	801-483	WASHER, Flat	1
26	803-291	ROD, Connecting	3	53	801-484	PLUG, Hex	1
27	803-273	SCREW, Cap, socket hd	5	54	801-485	WASHER, Flat	1

- * Part of kit 1, 801-472 Valve Kit
- Part of kit 2, 801-473 Oil Seal Kit
- ★ Part of kit 3, 802-511 Crankshaft Seal Kit
- Part of kit 4, 802-306 Valve Cap Kit
- ✓ Part of kit 6, 801-474 Plunger Repair Kit
- † Part of kit 8, 801-486 Packing Kit
- Part of kit 28, 801-487 Packing and Retainer Kit

PUMP SERVICE

WARNING

To reduce the risk of serious bodily injury, including fluid injection, splashing in the eyes or on the skin, or injury from moving parts, always follow the **Pressure Relief Procedure Warning** before proceeding.

NOTE: The following metric wrenches are needed: M10, M13 and M30. Repair kits are available. Refer to the individual repair sections and the pump parts page for more details. For the best results, use all parts in the kits.

NOTE: There are two different tool kits to aid in servicing the pump. P/N 800–298 is used to ease installation of packings. P/N 800–271 includes the items in 800–298 and tools to aid in the removal of packing retainers.

Valves

NOTE: For a set of six valves, order P/N 801–472.

1. Remove the hex plug from the manifold using an M30 wrench.
2. Examine the o-ring under the hex plug and replace it if it is cut or distorted.
3. Remove the valve assembly from the cavity; the assembly may come apart.
4. Install the new valve. Install the o-ring and hex plug; torque to 75 ft–lb (103 Nm).

NOTE: Retorque the plug after 5 hours of operation.

Pumping Section

1. Remove the eight capscrews and lockwashers from the manifold using an M13 wrench.
2. Carefully separate the manifold from the crankcase.

NOTE: It may be necessary to tap the manifold lightly with a soft mallet to loosen.

CAUTION

Keep the manifold properly aligned with the ceramic plungers when removing to avoid damage to the plunger or seals.

3. Carefully examine each plunger for any scoring or cracking and replace as necessary.

Servicing the Plungers

NOTE: Plunger repair kit, P/N 801–474 is available to replace retainers, o-rings, washers and backup rings for three cylinders.

1. Loosen the plunger retaining screw five to six turns, using an M10 wrench. Push the plunger towards the crankcase to separate the plunger and retaining screw.
2. Remove the screw from the plunger and examine the o-ring, backup ring and copper bearing/gasket washer. Replace these parts if necessary using kit 801–474.
3. Remove the plunger and flinger from the plunger shaft. Clean, examine and replace parts as necessary.
4. Inspect the plunger shaft for oil leakage from the crankcase. If leaking is obvious, replace the oil seals. Otherwise, DO NOT remove these seals as they cannot be reused. An oil seal kit is available to replace the seals.
5. Lightly grease the flinger and oil seal, if it is being replaced and replace them on the plunger shaft. Then install the plunger.
6. Lightly grease the retaining screw and the outer end of the plunger. Place the washer, o-ring and backup ring around the screw and install the screw through the plunger. Torque to 14.4 ft–lb (19.5 Nm).

NOTE: If you plan to replace the packings, refer to Servicing the V-Packings.

7. Lubricate the outside of each plunger. Slide the manifold onto the crankcase, being careful not to damage the seals.
8. Install the capscrews and washers finger-tight. Torque the screws to 21.7 ft–lb (29 Nm) following the tightening pattern (Figure 4). Uneven tightening may cause the manifold to bind or jam.

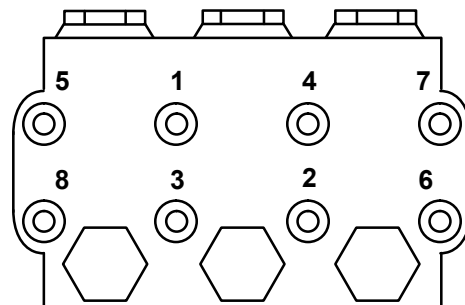


Figure 4

Servicing the V-Packings

NOTE: There are two types of packing kits: one is just packings, the other includes the packings, rings and retainers.

1. Remove the manifold as outlined in the Pumping Section.
2. Carefully pull the packing retainer from the manifold. Examine the o-ring and replace it if it is cut or damaged.
3. Remove the v-packing and head ring. Pull out the intermediate retainer ring. Remove the second v-packing and second head ring.
4. Inspect all parts and replace as necessary.

5. Thoroughly clean the packing cavities and examine.
6. Lightly grease the packing cavities and then replace the packings in the following order: head ring, v-packing, intermediate ring, head ring, v-packing and packing retainer with the o-ring installed in the retainer groove.

CAUTION

Be very sure the parts are installed in the proper order and facing the correct direction. See Pump assembly on pages 18 and 20. Improperly installed parts will cause a malfunction.

7. Reassemble the manifold as instructed in Servicing the Plungers.

ACCESSORIES

(Must be purchased separately)

DOWNSTREAM CHEMICAL INJECTOR KIT (1535) 800-139

DOWNSTREAM CHEMICAL INJECTOR KIT (2040) 800-111

For injecting harsh cleaning chemicals downstream from the pump.

UPSTREAM CHEMICAL INJECTOR KIT 800-257

For injecting mild cleaning chemicals upstream into the pump.

BACKFLOW PREVENTOR 801-133

Prevent back-up of contaminated water into fresh supply. Install upstream of pump.

ANTI-FREEZE FLUSH KIT 802-327

For flushing system with 50% anti-freeze solution prior to transporting or storing pressure washer in below freezing temperatures.

INLET PRESSURE REGULATOR 800-258

Regulates inlet water pressure to 60 psi (4 bar) maximum.

TECHNICAL DATA

	Model 800-165	Model 800-367	Model 800-164	Model 800-290
Engine (air-cooled, 4 cycle)	5 hp Honda OHV	5 hp Briggs & Stratton I/C	8 hp Briggs & Stratton I/C	8 hp Honda OHV
Gasoline Tank Capacity	3.8 quarts (3.6 liter)	3 quarts (2.8 liter)	6 quarts (5.7 liter)	6.2 quarts (6 liter)
Water Pump Maximum Working Pressure	1500 psi (103 bar)	1500 psi (103 bar)	2000 psi (138 bar)	2000 psi (138 bar)
Water Pump Maximum Flow	3.5 gpm (13 lpm)	3.5 gpm (13 lpm)	4 gpm (15 lpm)	4 gpm (15 lpm)
Inlet Hose Connection	3/4" garden hose (f)	3/4" garden hose (f)	3/4" garden hose (f)	3/4" garden hose (f)
Weight	105 lb (48 kg)	105 lb (48 kg)	152 lb (68 kg)	158 lb (70 kg)
Dimensions Length Width Height	37" (940 mm) 19" (483 mm) 20" (508 mm)	37" (940 mm) 19" (483 mm) 20" (508 mm)	36" (914 mm) 21" (533 mm) 22.5" (572 mm)	36" (914 mm) 21" (533 mm) 22.5" (572 mm)
Maximum Inlet Water Temperature	160° F (70° C)	160° F (70° C)	160° F (70° C)	160° F (70° C)
Wetted Parts High Pressure Hose Bypass Hose Pressure Washer (including fittings)	Acrylonitrile and Buna-N cover and tube Synthetic yarn and EPDM Anodized aluminum, Aluminum or bronze alloys, Brass Copper, Nylon- PTFE composite, Ceramic, Buna-N, Cotton phenolic, 303, 304, and 316 Stainless steel, Polyimide-12 thermoplastic, PTFE®, Carbon steel, Zinc with or without yellow chromate plate PTFE is a registered trademark of the DuPont Company.			

THE GRACO WARRANTY

WARRANTY AND DISCLAIMERS

Graco warrants all equipment manufactured by it and bearing its name to be free from defects in material and workmanship on the date of sale by an authorized Graco distributor to the original purchaser for use. As purchaser's sole remedy for breach of this warranty, Graco will, for a period of twenty four months from date of sale, repair or replace any part of the equipment proven defective. This warranty applies only when the equipment is installed, operated and maintained in accordance with Graco's written recommendations.

This warranty does not cover, and Graco shall not be liable for, any malfunction, damage or wear caused by faulty installation, misapplication, abrasion, corrosion, inadequate or improper maintenance, negligence, accident, tampering, or substitution of non-Graco component parts. Nor shall Graco be liable for malfunction, damage or wear caused by the incompatibility with Graco equipment of structures, accessories, equipment or materials not supplied by Graco, or the improper design, manufacture, installation, operation or maintenance of structures, accessories, equipment or materials not supplied by Graco.

This warranty is conditioned upon the prepaid return of the equipment claimed to be defective for examination by Graco to verify the claimed defect. If the claimed defect is verified, Graco will repair or replace free of charge any defective parts. The equipment will be returned to the original purchaser transportation prepaid. If inspection of the equipment does not disclose any defect in material or workmanship, repairs will be made at a reasonable charge, which charges may include the costs of parts, labor and transportation.

DISCLAIMERS AND LIMITATIONS

THE TERMS OF THIS WARRANTY CONSTITUTE THE PURCHASER'S SOLE AND EXCLUSIVE REMEDY AND ARE IN LIEU OF ANY OTHER WARRANTIES (EXPRESS OR IMPLIED), INCLUDING WARRANTY OF MERCHANTABILITY OR WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, AND OF ANY NON-CONTRACTUAL LIABILITIES, INCLUDING PRODUCT LIABILITIES, BASED ON NEGLIGENCE OR STRICT LIABILITY. EVERY FORM OF LIABILITY FOR DIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES OR LOSS IS EXPRESSLY EXCLUDED AND DENIED. IN NO CASE SHALL GRACO'S LIABILITY EXCEED THE AMOUNT OF THE PURCHASE PRICE. ANY ACTION FOR BREACH OF WARRANTY MUST BE BROUGHT WITHIN THREE (3) YEARS OF THE DATE OF SALE.

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GRACO MAKES NO WARRANTY, AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY GRACO. These items sold, but not manufactured by Graco (such as electric motor, switches, hose, etc.) are subject to the warranty, if any, of their manufacturer. Graco will provide purchaser with reasonable assistance in making any claim for breach of these warranties.

Factory Branches: Atlanta, Chicago, Dallas, Detroit, Los Angeles, West Caldwell (N.J.)
Subsidiary and Affiliate Companies: Canada; England; Switzerland; France; Germany; Hong Kong; Japan

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