FORM NO. 95-9093

TORO

Model No. 41443-80001 & UP
Model No. 41442-80001 & UP
Model No. 41441-80001 & UP
Model No. 41440-80001 & UP

OPERATOR'S INSTRUCTIONS

SKID SPRAYER

CONTENTS

To assure maximum safety, optimum performance, and to gain knowledge of the product, it is essential that you or any other operator of this Vehicle read and understand the contents of this manual before the engine is ever started. Pay particular attention to the SAFETY INSTRUCTIONS highlighted by the triangular safety alert symbol.

The safety alert symbol means CAUTION, WARNING or DANGER - personal safety instruction. Failure to comply with the instruction may result in personal injury.

SAFETY INSTRUCTIONS

Keep this Operator's Manual and the Engine Manual in the plastic tube on the side of the Tank Frame.

It is very important that all persons operating this equipment have easy access to these instructions at all times!

Carefully read and follow the "set-up" instructions that are provided with this equipment . The installation of accessories on the TORO Skid Frame, other than those designated and sold for that express purpose by TORO, may adversely affect the performance and safety characteristics of this equipment.

RECOGNIZE SAFETY INFORMATION

This safety-alert symbol is used to call attention to a **dangerous** situation, which could result in serious injury or death to the operator or a bystander.

Safety, mechanical and some general information in this manual are emphasized. **DANGER, WARNING** and **CAUTION** identify safety messages. Whenever the triangular safety symbol appears, it is followed by a safety message that must be read and understood. For more details concerning safety, read the Safety Instructions on this page and page 2. **IMPORTANT** identifies special mechanical information and **NOTE** identifies general information worthy of special attention.

These instructions are provided as a guide for the safe operation and maintenance of this equipment. However, the operator's personal safety, as well as those persons in the work area, will depend on the careful actions and good judgement of the operator. **To reduce the potential for injury or death, comply with the following safety instructions.**

BEFORE OPERATING:

1. Operate this machine only after reading and understanding the contents of this manual. A replacement manual is available by sending complete model and serial number to: Hahn Equipment Co., a subsidiary of The Toro Company, 1625 N. Garvin, Evansville, IN 47711.

2. Learn how to operate the Sprayer and how to use the controls properly. DO NOT let anyone operate this equipment without first receiving thorough instructions.

3. Keep all shields, safety devices and decals in place. If a shield, safety device or decal is malfunctioning, illegible or damaged, repair or replace it before operating the machine.

4. Chemicals can injure persons, animals, plants, soils or other property. To eliminate environmental damage and personal injury:

A. Obtain proper training before using or handling chemicals.

B. Select the proper chemical for the job.

C. Follow manufacturer's instructions on chemical container labels. Apply and handle chemicals as recommended.

D. Handle and apply chemicals with care. Wear goggles and other necessary protective equipment. Handle chemicals in well ventilated areas. Never smoke while handling chemicals.

E. Properly dispose of chemical container and unused chemicals.

4. To be sure of optimum performance and safety, always purchase genuine TORO replacement parts and accessories. Replacement parts and accessories made by other manufacturers could be dangerous. Altering the Skid Sprayer in any manner may affect the Skid Sprayer's operation, performance, durability or its use may result in injury or death. Such use could void the product warranty of the Toro Company.

5. This equipment should not be modified without The Toro Company's authorization. Direct any inquiries to:

Hahn Equipment Co.
1625 N. Garvin
Evansville, IN 47711

SAFETY INSTRUCTIONS

6. Since gasoline is highly flammable, handle it carefully.

A. Use an approved gasoline container.

B. Do not remove cap from fuel tank when engine is hot or running.

C. Do not smoke while handling gasoline.

D. Fill fuel tank outdoors and to about 1/2" below top of tank, (bottom of filler neck). Do not overfill.

E. Wipe up any spilled gasoline.

WHILE OPERATING:

Drive the transport vehicle safely.

⚠ WARNING

- **Attaching the trailer sprayer to a vehicle changes the weight and handling of the vehicle, and could cause loss of control resulting in serious injury or death.**
- **Refer to the vehicle's operator's manual for tow bar and braking capacities and do not exceed those recommendations.**
- **Consider the terrain that the trailer sprayer will be used on when evaluating the capacities of the tow vehicle. Hills and slopes will require more braking power and stopping distance than flat areas.**
- **Do not use the fully loaded sprayer in areas where stopping and vehicle handling is questionable. The following chart should be used to adjust the weight of the sprayer to fit the tow vehicle and its conditions.**

TANK VOL. (GAL)	TRAILER WT. (LBS)	SKID WT. (LBS)
110	1620	1385
100	1535	1300
90	1455	1220
80	1370	1135
70	1285	1050
60	1200	965
50	1120	885

Based on the weight of water.

1. DO NOT make sudden or sharp turns. DO NOT suddenly change direction of travel on an incline, ramp, grade, slope or similar surface.

2. Make certain everyone is clear of the machine before starting the engine to move the transport vehicle or to engage the Sprayer Pump drive.

3. Do not touch engine, muffler or muffler shield while engine is running or soon after it has stopped. These areas may be hot enough to cause burns.

4. If equipment begins to vibrate abnormally, **stop immediately.** Shut off the Skid Sprayer engine and disengage all power. Repair all damage before commencing operation.

MAINTENANCE:

⚠ WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

WARNING: Engine exhaust contains carbon monoxide which is an odorless, deadly poison. Do not run engine indoors or in an enclosed area.

1. Before servicing or making any adjustments to the Skid Sprayer:

A. Stop the transport vehicle on level surface and set the parking brake.

B. Disengage all power and wait until all moving parts have stopped.

C. Shut off the Skid Sprayer's engine and remove wire from spark plug. Make sure wire cannot contact plug accidentally.

D. Keep hands, feet and clothing away from all power driven parts.

2. Keep all nuts, bolts and other fasteners tightened securely. Replace any shields removed during servicing or adjustments.

3. To reduce potential fire hazard, keep the engine area free of excessive grass, leaves and accumulation of dirt.

PRODUCT IDENTIFICATION

Skid Sprayer
Model No. 41440
Serial No. _____

Briggs & Stratton Engine
Model No. 196432
Type No. 1063 E2
Code No. _____

Record the serial numbers on your equipment in the space above as soon as possible, as it is necessary to include this information when ordering service parts or requesting information. Please fill out the Product Registration Card and return it to:

The TORO Company
8111 Lyndale Ave. South
Minneapolis, MN 55420

Date Purchased _____

SPARK ARRESTOR

When the machine is used or operated on any California forest, brush or grass covered land, a properly operating spark arrestor must be attached to the muffler. The operator is violating state law, Section 442 Public Resources Code if a spark arrestor is not used.

All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

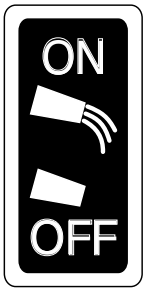
SAFETY INSTRUCTIONS

The following safety and instruction decals are installed on the Skid Sprayer. If any become damaged or illegible, replace them. Decals and part numbers are listed below and in the parts catalog. Order replacements from your Authorized Toro Distributor.

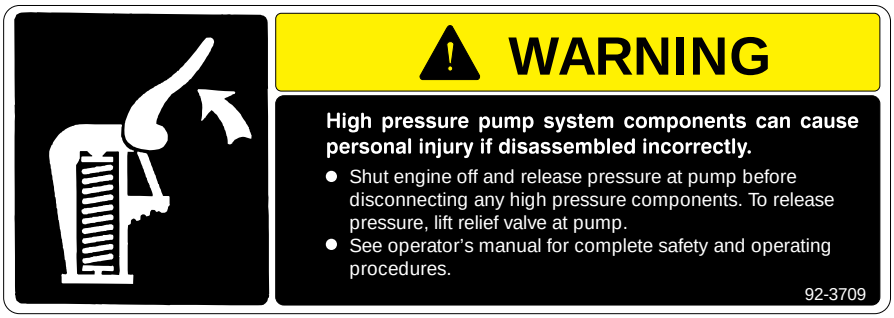
Part No. 92-3518: Located on front of Tank.

Part No. 87-0450: Located on top of Belt Guard.

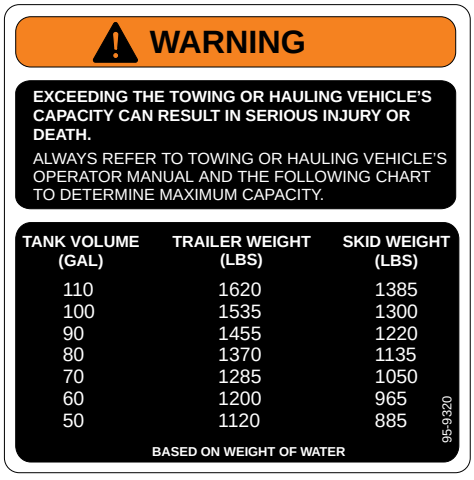
Part No. 65-3090: Located on top of Engine Cover.



Part No. 41174: Located on Belt Cover.



Part No. 92-3709: Located on top of Engine Air Cleaner. (41443 Diaphragm Pump only)



Part No. 95-9320: Located on front of Tank.

Part No. 80-9350: Located on Belt Cover.

BEFORE SPRAYING

NOZZLE SELECTION:

See the nozzle charts on page 7 or 8 to be sure that your spray nozzles have the capacity necessary to achieve the application rate selected.

To select the proper nozzle, you need to know:

1. Recommended chemical application rate in gallons per acre, gallons per 1000 sq. ft. or liters per hectare.

2. Average Vehicle speed in Miles per hour or kilometers per hour.

3. Nozzle spacing (20 inches or 50 centimeters.)

With this information you can calculate the volume per minute per nozzle, using the formulas below.

US FORMULA:

$$\text{G.P.M. (Per Nozzle)} = \frac{\text{G.P.A. x M.P.H. X 20 ins.}}{5940}$$

TU (Turf) FORMULA:

$$\text{G.P.M. (Per Nozzle)} = \frac{\text{G.P.K. x M.P.H. x 20 ins.}}{137}$$

SI (METRIC) FORMULA:

$$\text{lit/min (Per Nozzle)} = \frac{\text{lit/ha x km/h x 50 cm}}{60{,}000}$$

Use G.P.M. (lit/min) and Pressure to select appropriate nozzle from chart on page 7 or 8.

EXAMPLE (US FORMULA):

Application Rate = 75 Gallons/Acre
Vehicle Speed = 4 M.P.H.
Nozzle Spacing = 20 inches

$$\frac{\text{75 G.P.A. x 4 M.P.H. x 20}}{5940} = \text{1.00 G.P.M. (per nozzle)}$$

With 1.00 G.P.M. and a pressure of 40 P.S.I. you would select Nozzle No. 95-9188.

EXAMPLE (TU FORMULA):

Application Rate = 1.70 Gal./1000 sq. ft.
Vehicle Speed = 4 M.P.H.
Nozzle Spacing = 20 inches

$$\frac{\text{1.70 G.P.K. x 4 M.P.H. x 20}}{137} = \text{1.00 G.P.M. (per nozzle)}$$

EXAMPLE (SI FORMULA):

Application Rate = 907 lit/hectare
Vehicle Speed = 5 km/h
Nozzle Spacing = 50 cm

$$\frac{\text{907 lit/ha x 5 km/h x 50}}{60{,}000} = \text{3.78 lit/min. (per nozzle)}$$

With 3.78 lit/min and a pressure at 275 kPa you would select nozzle No. 95-9188

SYMBOL DEFINITIONS:

GPM	- Gallons per minute
lit/min	- Liters per minute
dl/min	- Deciliter per minute
PSI	- Pounds per square inch
kPa	- Kilopascal
GPA	- Gallons per acre
lit/ha	- Liter per hectare
ml/ha	- Milliliter per hectare
GPK	- Gallons per 1,000 sq. ft.
mm	- Millimeters
cm	- Centimeters
dm	- Decimeters
m	- Meter
MPH	- Miles per hour
km	- Kilometers
km/h	- Kilometers per hour
US	- Volume per ACRE
SI	- Volume per HECTARE
TU	- Volume per 1,000 sq. ft.

LIQUID CONVERSIONS

U.S. Gallons x 128 = Fluid Ounces
U.S. Gallons x 3.785 = Liters
U.S. Gallons x 0.83267 = Imperial Gallons
U.S. Gallons x 8.34 = Pounds (Water)

LENGTH

1 millimeter (mm) = 0.039 inch
1 centimeter (cm) = 0.393 inch
1 meter (m) = 3.281 feet
1 kilometer (km) = 0.621 mile
1 inch = 25.4 millimeters; 2.54 centimeters
1 mile = 1.609 kilometers

PRESSURE

1 psi = 6.89 kPa

AREA

1 square meter = 10.764 sq. feet
1 hectare (ha) = 2.471 acres; 10,000 sq.meters
1 acre = 0.405 hectare; 43,560 sq. ft.
1 sq. mile = 640 acres; 258.9 hectares

TORO TURF-JET NOZZLES

Gallons Per Acre Application Rates

TORO Part No.	Nozzle Number / Color Code	Pressure (PSIG)	Capacity 1 Nozzle (GPM)	Gallons per Acre at 20" Spacings							
				2.5 MPH	3 MPH	3.5 MPH	4 MPH	4.5 MPH	5 MPH	5.5 MPH	6 MPH
95-9221	Yellow	20	0.14	16.6	13.9	11.9	10.4	9.2	8.3	7.6	6.9
		30	0.17	20.2	16.8	14.4	12.6	11.2	10.1	9.2	8.4
		40	0.20	23.8	19.8	17.0	14.9	13.2	11.9	10.8	9.9
		50	0.22	26.1	21.8	18.7	16.3	14.5	13.1	11.9	10.9
95-9222	Red	20	0.28	33	28	24	21	18	17	15	14
		30	0.35	42	35	30	26	23	21	19	17
		40	0.40	48	40	34	30	26	24	22	20
		50	0.45	53	45	38	33	30	27	24	22
95-9223	Brown	20	0.35	42	35	30	26	23	21	19	17
		30	0.43	51	43	36	32	28	26	23	21
		40	0.50	59	50	42	37	33	30	27	25
		50	0.56	67	55	48	42	37	33	30	28
95-9224	Gray	20	0.42	50	42	36	31	28	25	23	21
		30	0.52	62	51	44	39	34	31	28	26
		40	0.60	71	59	51	45	40	36	32	30
		50	0.67	80	66	57	50	44	40	36	33
95-9225	White	20	0.57	68	56	48	42	38	34	31	28
		30	0.69	82	68	59	51	46	41	37	34
		40	0.80	95	79	68	59	53	48	43	40
		50	0.89	106	88	76	66	59	53	48	44
95-9188	Light Blue	20	0.71	84	70	60	53	47	42	38	35
		30	0.87	103	86	74	65	57	52	47	43
		40	1.00	119	99	85	74	66	59	54	50
		50	1.12	133	111	95	83	74	67	60	55
95-9226	Light Green	20	1.06	126	105	90	79	70	63	57	52
		30	1.30	154	129	110	97	86	77	70	64
		40	1.50	178	149	127	111	99	89	81	74
		50	1.68	200	166	143	125	111	100	91	83

Gallons Per 1000 Sq. Ft. Application Rates

TORO Part No.	Nozzle Number / Color Code	Pressure (PSIG)	Capacity 1 Nozzle (GPM)	Gallons per 1000 Sq. Ft. at 20" Spacings							
				2.5 MPH	3 MPH	3.5 MPH	4 MPH	4.5 MPH	5 MPH	5.5 MPH	6 MPH
95-9221	Yellow	20	0.14	0.38	0.32	0.27	0.24	0.21	0.19	0.17	0.16
		30	0.17	0.46	0.39	0.33	0.29	0.26	0.23	0.21	0.19
		40	0.20	0.54	0.45	0.39	0.34	0.30	0.27	0.25	0.23
		50	0.22	0.60	0.50	0.43	0.37	0.33	0.30	0.27	0.25
95-9222	Red	20	0.28	0.76	0.63	0.54	0.48	0.42	0.38	0.35	0.32
		30	0.35	0.95	0.79	0.68	0.60	0.53	0.48	0.43	0.40
		40	0.40	1.09	0.91	0.78	0.68	0.60	0.54	0.49	0.45
		50	0.45	1.22	1.02	0.87	0.77	0.68	0.61	0.56	0.51
95-9223	Brown	20	0.35	0.95	0.79	0.68	0.60	0.53	0.48	0.43	0.40
		30	0.43	1.17	0.97	0.84	0.73	0.65	0.58	0.53	0.49
		40	0.50	1.36	1.13	0.97	0.85	0.76	0.68	0.62	0.57
		50	0.56	1.52	1.27	1.09	0.95	0.85	0.76	0.69	0.63
95-9224	Gray	20	0.42	1.14	0.95	0.82	0.71	0.63	0.57	0.52	0.48
		30	0.52	1.41	1.18	1.01	0.88	0.79	0.71	0.64	0.59
		40	0.60	1.63	1.36	1.17	1.02	0.91	0.82	0.74	0.68
		50	0.67	1.82	1.52	1.30	1.14	1.01	0.91	0.83	0.76
95-9225	White	20	0.57	1.55	1.29	1.11	0.97	0.86	0.78	0.70	0.65
		30	0.69	1.88	1.56	1.34	1.17	1.04	0.94	0.85	0.78
		40	0.80	2.18	1.81	1.55	1.36	1.21	1.09	0.99	0.91
		50	0.89	2.42	2.02	1.73	1.51	1.34	1.21	1.10	1.01
95-9188	Light Blue	20	0.71	1.93	1.61	1.38	1.21	1.07	0.97	0.88	0.80
		30	0.87	2.37	1.97	1.69	1.48	1.31	1.18	1.08	0.99
		40	1.00	2.72	2.27	1.94	1.70	1.51	1.36	1.24	1.13
		50	1.12	3.05	2.54	2.18	1.90	1.69	1.52	1.38	1.27
95-9226	Light Green	20	1.06	2.88	2.40	2.06	1.80	1.60	1.44	1.31	1.20
		30	1.30	3.54	2.95	2.53	2.21	1.96	1.77	1.61	1.47
		40	1.50	4.08	3.40	2.91	2.55	2.27	2.04	1.85	1.70
		50	1.68	4.57	3.81	3.26	2.86	2.54	2.28	2.08	1.90

TORO TURF-JET NOZZLES

Liters Per Hectare Application Rates

TORO Part No.	Nozzle Number / Color Code	Pressure (kPa)	Capacity 1 Nozzle (L/min)	Liters per Hectare at 50 cm Spacings							
				4 km/h	5 km/h	6 km/h	7 km/h	8 km/h	9 km/h	10 km/h	11 km/h
95-9221	Yellow	150	0.53	159	127	106	91	80	71	64	58
		200	0.64	192	154	128	110	96	85	77	70
		275	0.76	228	182	152	130	114	101	91	83
		350	0.83	249	199	166	142	125	111	100	91
95-9222	Red	150	1.06	318	254	212	182	159	141	127	116
		200	1.32	396	317	264	226	198	176	158	144
		275	1.51	453	362	302	259	227	201	181	165
		350	1.70	510	408	340	291	255	227	204	185
95-9223	Brown	150	1.40	420	336	280	240	210	187	168	153
		200	1.61	483	386	322	276	242	215	193	176
		275	1.89	567	454	378	324	284	252	227	206
		350	2.13	639	511	426	365	320	284	256	232
95-9224	Grey	150	1.67	501	401	334	286	251	223	200	182
		200	1.93	579	463	386	331	290	257	232	211
		275	2.27	681	545	454	389	341	303	272	248
		350	2.56	768	614	512	439	384	341	307	279
95-9225	White	150	2.23	669	535	446	382	335	297	268	243
		200	2.58	774	619	516	442	387	344	310	281
		275	3.02	906	725	604	518	453	403	362	329
		350	3.41	1023	818	682	585	512	455	409	372
95-9188	Light Blue	150	2.79	837	670	558	478	419	372	335	304
		200	3.22	966	773	644	552	483	429	386	351
		275	3.78	1134	907	756	648	567	504	454	412
		350	4.28	1284	1027	856	734	642	571	514	467
95-9226	Light Green	150	4.18	1254	1003	836	717	627	557	502	456
		200	4.84	1452	1162	968	830	726	645	581	528
		275	5.67	1701	1361	1134	972	851	756	680	619
		350	6.40	1920	1536	1280	1097	960	853	768	698

STORAGE

FLUSH PUMP AFTER USE

One of the most common causes for faulty pump performance is "gumming" or corrosion inside the pump. Flush the pump and entire system with a solution that will chemically neutralize the liquid pumped. Mix according to chemical manufacturer's directions. This will dissolve most residue remaining in the pump, leaving the inside of the pump clean for the next use.

TO PREVENT CORROSION

After cleaning the pump as directed above, flush it with a permanent type automobile antifreeze (Prestone, Zerex, etc.) containing a rust inhibitor. Use a 50% solution - that is, half antifreeze and half water, or fill pump with FLUID FILM and then drain it. A protective coating of FLUID FILM will remain on the inner pump surfaces. Save the excess FLUID FILM for the next application. Plug the ports to keep out air during storage. For short periods of idleness, noncorrosive liquids may be left in the pump, BUT AIR MUST BE KEPT OUT. Plug ports or seal port connections.

IMPORTANT: FREEZING TEMPERATURES MAY DAMAGE THE PUMP & CONTROL VALVE IF THE WATER IS NOT DRAINED COMPLETELY!

SERVICING AFTER STORAGE:

Flush the entire spraying system with clean, clear water and detergent.

Flush the entire spraying system again with clean, clear water to rinse.

Drain entire spraying system.

STORAGE AND DISPOSAL OF CHEMICALS:

Follow chemical manufacturer's recommendations for storage and disposal of chemicals.

BEFORE OPERATING ENGINE

FILL ENGINE CRANKCASE WITH OIL:

IMPORTANT! The Skid Sprayer is shipped from the factory **without oil** in the engine's crankcase.

1. Position the Skid Sprayer on a level surface.

2. Clean the area around the oil fill/check plug and remove it.

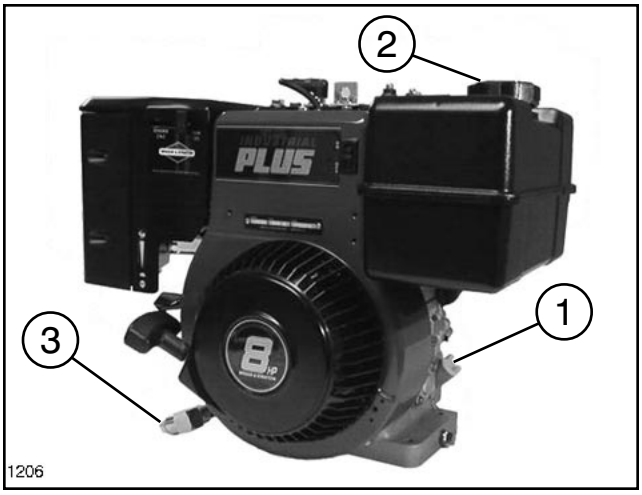


FIG. 1

1. Oil Fill/Check Plug 2. Fuel Tank Cap
3. Oil Drain

3. Insert a funnel into the oil fill tube and slowly pour engine oil into the crankcase. The engine uses any high-quality oil having the American Petroleum Institute-API - "service classification" SE, SF or SG. See viscosity on page 12 chart for recommended weight to use. The capacity of the crankcase is approximately 44 ounces (1.3 L).

4. The level should be up to, but not over, the point of overflowing the filler neck.

5. Reinstall the oil fill/check plug and tighten securely. Make sure it is tightened to 13 ft. lbs. (17.6 N m) torque.

IMPORTANT! Check the oil level every five (5) operating hours or each time the engine is started. For a new engine, drain the oil and replace it after the first five (5) hours of operation: thereafter, under normal conditions, change oil after every 25 hours of operation. Change the oil more frequently when the engine is operated in dusty or dirty conditions.

FILL FUEL TANK WITH GASOLINE:

Fuel tank capacity is approximately 4 U.S. quarts (3.8 L).

⚠ WARNING

Because gasoline is flammable, caution must be used when storing or handling it. Do not fill fuel tank while engine is running, hot or when machine is in an enclosed area. Vapors may build up and be ignited by a spark or flame source many feet away. DO NOT SMOKE while filling the fuel tank to prevent the possibility of an explosion. Always fill fuel tank outside and wipe up any spilled gasoline before starting engine. Use a funnel or spout to prevent spilling gasoline, and fill tank to about 1/2 inch (13 mm) below the filler neck. Store gasoline in a cool, well-ventilated place; never in an enclosed area such as a hot storage shed. To ensure volatility, do not buy more than a 30 day supply of gasoline. Gasoline is a fuel for internal combustion engines; therefore, do not use it for any other purpose. Since many children like the smell of gas, keep it out of their reach because the fumes are explosive and dangerous to inhale.

1. Clean area around fuel tank cap so foreign matter cannot enter tank when cap is removed. See FIG. 1.

2. Remove cap from fuel tank and fill tank with unleaded gasoline to within 1/2" (13 mm) from top of tank. Then reinstall fuel tank cap.

3. Wipe up any gasoline that may have spilled.

ENGINE OPERATING INSTRUCTIONS

BEFORE STARTING ENGINE TO BEGIN THE DAYS SPRAYER APPLICATION:

1. Check the engine crankcase oil.
2. Check the Air Cleaner.
3. Check cooling air intake areas.
4. Check the fuel tank.

STARTING THE ENGINE:

1. Set the Engine Stop Switch to “ON”.

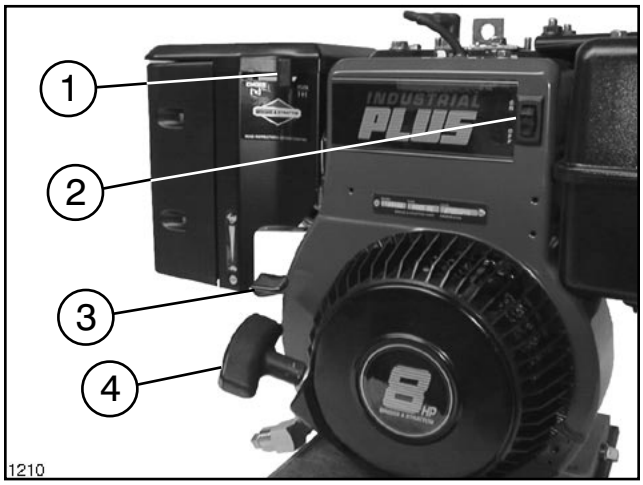


FIG. 2

1. Choke Control
2. Stop Switch
3. Throttle Control
4. Starter Handle

2. For a Cold Engine: Place the throttle control to the “FAST” positions. Move the choke control to the “CHOKE” position. Gradually return the choke control to the “RUN” position after the engine starts and warms up. See FIG. 2.

For a Warm Engine: (normal operating temperatures) Place the throttle control to the “fast” positions. Move the Choke Control to the “RUN” position.

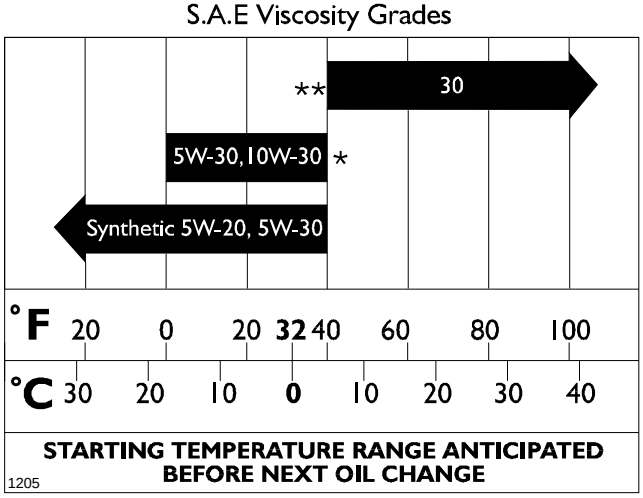
3. Pull the Starter Handle with a smooth, steady motion. Pull the handle straight out to avoid excess rope wear.

ENGINE MAINTENANCE

ENGINE LUBRICATION:

IMPORTANT! AFTER THE INITIAL RUN-IN PERIOD (APPROXIMATELY 5 HOURS) AND EVERY 25 HOURS THEREAFTER.

1. Change the oil in the engine's crankcase. Change oil while the engine is warm. Refill with new oil as recommended in the chart below.



* Air cooled engines run hotter than automotive engines. Use of multi-viscosity oils (10W-30, etc.) above 40 F (4 C) will result in high oil consumption and possible engine damage. Check oil more frequently if using these type oils.

** SAE 30 oil, if used below 40°F (4°C) will result in hard starting and possible engine bore damage due to inadequate lubrication.

Oil Capacity: Approximately 44 ounces or 1.3 liters.

2. Remove the pipe plug in the end of the oil drain pipe and let oil flow into a drain pan. When oil stops, reinstall drain plug. See FIG. 2.

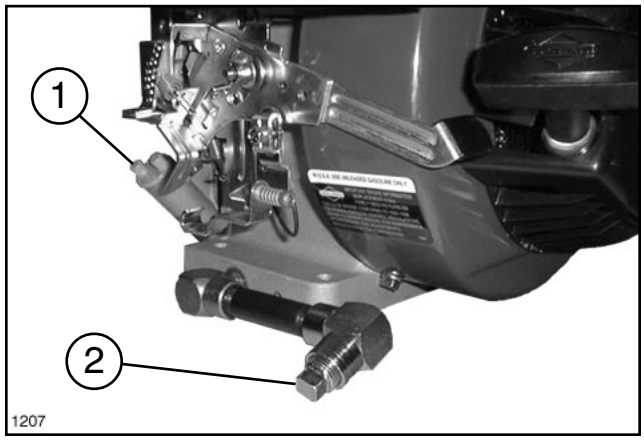


FIG. 2

1. Oil Fill
2. Drain Plug

AFTER EVERY 5 HOURS OR DAILY:

1. Check the oil level in the engine's crankcase before engine start-up, while engine is cool. Have the machine on a level surface.

2. Clean the area around the oil/fill check plug and remove it.

3. The level should be up to but not over, the point of overflowing the filler neck.

4. If the level is low, add API "service classification" SE, SF or SG. See viscosity chart for the recommended weight.

5. Reinstall the oil fill/check plug and tighten securely. Make sure it is tightened to 13 ft. lbs. (17.6 Nm) torque.

IMPORTANT! Keep the area around the fill tube clean, to prevent dirt from falling into the engine.

AIR CLEANER:

Clean the Pre-Cleaner after every 25 hours of operation. Clean more often in extreme dusty or dirty conditions. Replace air cleaner parts if very dirty.

1. Loosen Cover Screws and remove Cover, Pre-Cleaner and Cartridge. See FIG. 3.

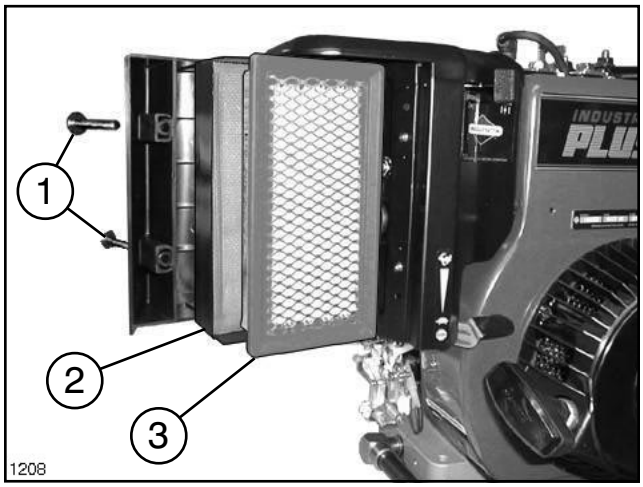


FIG. 3

1. Cover Screws
2. Pre-Cleaner
3. Cartridge

2. Wash Pre-Cleaner in liquid detergent and water. Squeeze dry in clean cloth. Saturate in engine oil. Squeeze in clean, absorbent cloth to remove ALL EXCESS oil. If very dirty or damaged, replace it.

3. Clean Cartridge by tapping gently on flat surface. If very dirty or damaged, replace it. Do NOT oil Cartridge.

4. Replace Cartridge, Pre-Cleaner and Cover. Secure Cover with the (2) Cover Screws.

ENGINE MAINTENANCE (Cont'd)

CHECK SPARK PLUG:

Every 50 hours of operation, clean the area around the base of the plug and check its condition. Reset the gap to .030 in. (0.76 mm) or replace with a new resistor spark plug as necessary. See FIG. 4.

Do not blast clean. Clean by scraping or wire brushing and washing with a commercial solvent.

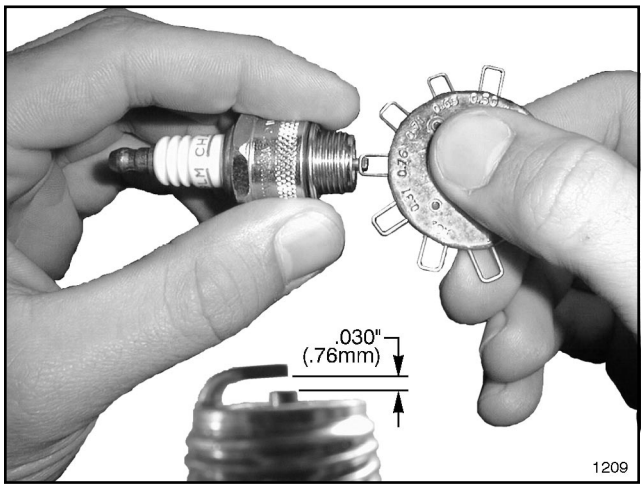


FIG. 4

CLEAN AIR INTAKE/COOLING AREAS:

To insure proper cooling, make sure the screen, cooling fins and other external surfaces of the engine are kept clean at all times.

NOTE: Operating the engine with a blocked screen, dirty or plugged cooling fins, and/or cooling shrouds removed, will cause engine damage due to overheating.

Every 100 hours of operation (more often under dusty, dirty conditions), remove the blower housing and other cooling shrouds. Clean the cooling fins and external surfaces as necessary. Make sure the cooling shrouds are reinstalled.

ENGINE STORAGE

If Skid Sprayer is stored over 30 days the engine needs to be protected or drained of fuel to prevent gum from forming in the fuel system or essential carburetor parts. See the B & S Engine Manual for complete storage instructions.

DANGER

GASOLINE IS HIGHLY FLAMMABLE AND CAN CAUSE SERIOUS INJURY OR DEATH IF IGNITED.

- **Never store a machine with gasoline in the tank or inside a building where gasoline fumes may reach an open flame or spark.**

CONTROLS
41441 CENTRIFUGAL PUMP

PUMP ENGAGEMENT LEVER: Engages and disengages centrifugal pump belt drive.

PUMP ENGAGEMENT RELEASE LEVER: Releases the Pump Engagement Lever to allow pump to be engaged.

AGITATOR VALVE HANDLE: Opens and closes the Agitator Valve to activate, adjust or stop the agitation of the spray solution in the Tank.

SUCTION VALVE HANDLE: Opens and closes the Suction Line Valve. Close during maintenance to the Suction Line Strainer or Centrifugal Pump.

IMPORTANT! The Pump will be damaged if it is activated with the Suction Line Valve closed, or before the tank contains enough liquid to flood the pump.

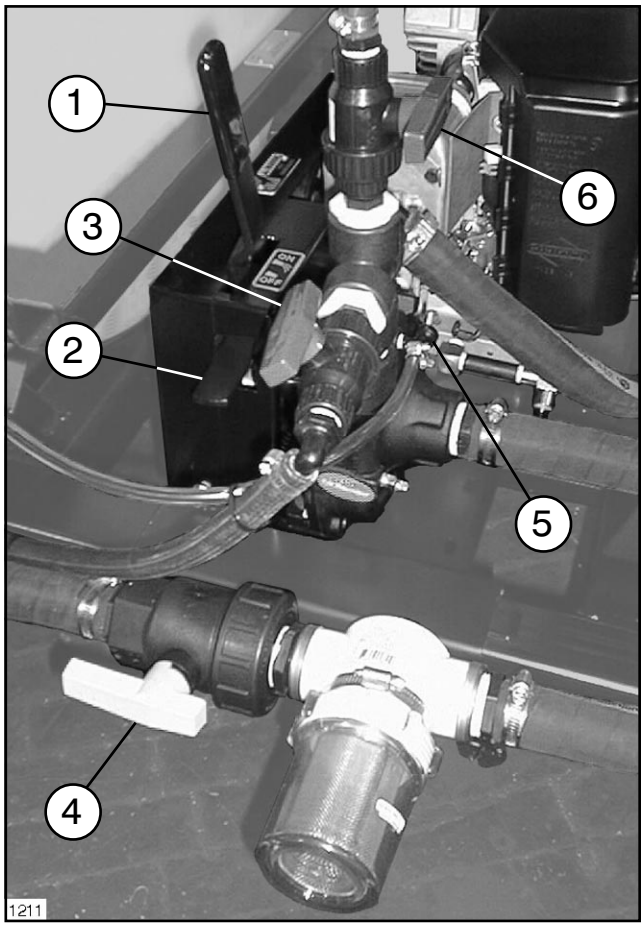


FIG. 5

1. Pump Engagement Lever
2. Pump Engagement Release Lever
3. Agitator Valve Handle (open)
4. Suction Valve Handle (open)
5. Bleed Valve
6. Optional Spray Gun Valve Handle (closed)

RATCHET VALVE HANDLE: Opens and closes the Ratchet Valve, starting or stopping flow to Booms.

PRESSURE ADJUST VALVE HANDLE: Controls spray pressure. Turn clockwise to decrease pressure and counterclockwise to increase pressure.

PRESSURE GAUGE: Shows spray pressure when Ratchet Valve is open. Shows deadhead pressure when the Ratchet Valve is closed.

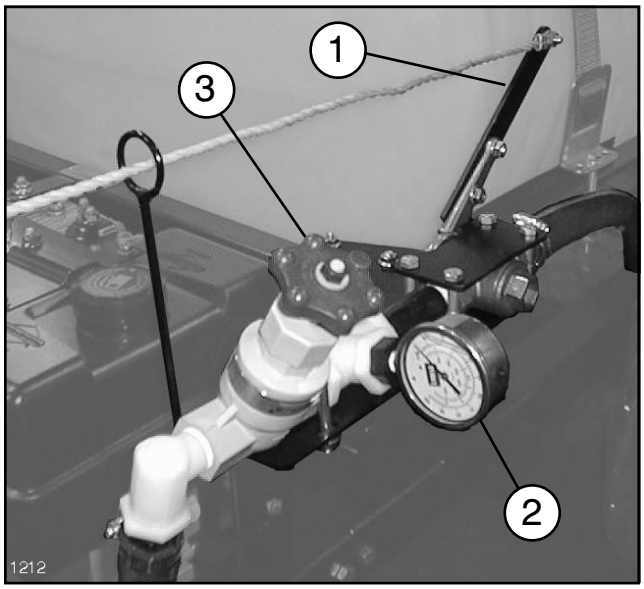


FIG. 6

1. Ratchet Valve Handle
2. Pressure Gauge
3. Pressure Adjust Valve Handle

LEFT BOOM SHUTOFF VALVE HANDLE: Starts or stops flow to left Boom.

RIGHT BOOM SHUTOFF VALVE HANDLE: Starts or stops flow to right Boom.

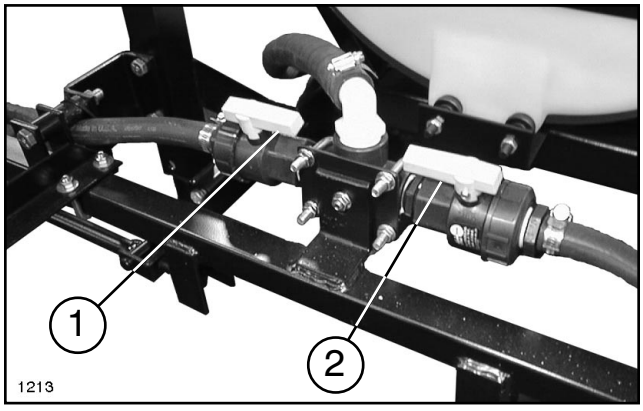


FIG. 7

1. Left Boom Shutoff Valve (open)
2. Right Boom Shutoff Valve (open)

BEFORE SPRAYING
41441 CENTRIFUGAL PUMP

INITIAL SYSTEM SET-UP:

1. Fill the Tank with clean, clear water and open the Suction Line Valve. See FIG. 5.

IMPORTANT: The pump will be damaged if it is activated before it is completely filled with liquid. Be certain the suction line valve is open and liquid has reached the pump.

2. Park vehicle on level surface and set the parking brake. Move the Pump Engagement Lever to the **"OFF"** position. See Fig. 5. Start the engine as instructed in the "ENGINE OPERATING INSTRUCTIONS" section.

3. Open Pressure Adjust Valve completely. See Fig. 6.

4. Move the Pump Engagement Lever to the **"ON"** position.

5. Assure that the Ratchet Valve is closed. See Fig. 6.

6. Using Engine Throttle set the Pressure Gauge to 10 P.S.I. above the desired operating pressure.

7. Assure that both Boom Shutoff Valves are open. See Fig. 7.

8. Open Ratchet Valve to begin spraying water from the booms.

NOTE: Ratchet Valve must be fully actuated in order to open or close valve completely.

9. Verify the Pressure Gauge reads the desired spray pressure. If necessary, decrease pressure by turning the Pressure Adjust Valve Handle clockwise or increase pressure by increasing Throttle Control.

NOTE: This entire procedure should be repeated whenever changing operating pressure, nozzles, speed, chemical, etc.

FILL THE FRESH WATER WASH TANK

NOTE: Fill Fresh Water Wash Tank with clean water only. Check to assure tank is full before each operation.

In case of chemical contact with skin or eyes, a fresh water wash tank has been installed on the Tank Saddle.

1. Turn Tank Spigot to on position. See FIG. 4.

2. Hold contaminated area directly under water stream.

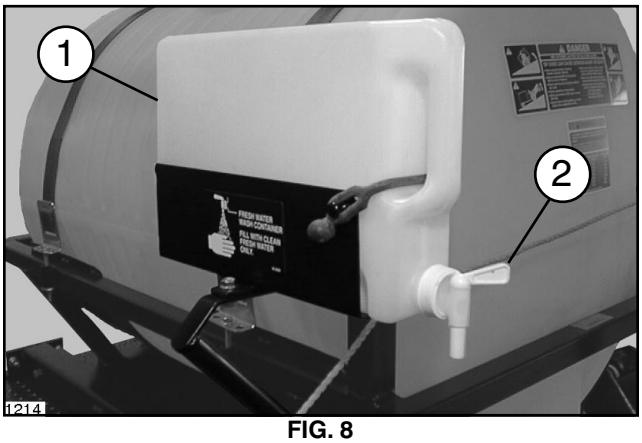


FIG. 8

1. Fresh Water Wash Tank 2. Tank Spigot

FILLING THE SOLUTION TANK:

⚠ WARNING

CHEMICALS ARE HAZARDOUS AND CAN CAUSE PERSONAL INJURY!

- **Carefully read the directions printed on the chemical manufacturer's labels before handling chemicals. Instructions on chemical manufacturer's container labels, regarding mixing proportions, should be read and strictly followed.**
- **Keep spray material from skin. If spray material comes in contact with body, wash it off immediately with clean water and detergent.**
- **Always wear goggles and other protective equipment as recommended by the Chemical Manufacturer.**

IMPORTANT: Do not add chemical to Tank until just before use. The concentrate should not be poured into an empty Tank. Fill Tank at least one-half full with clean, clear water, add chemical concentrate and finish filling Tank with water. Follow the chemical manufacturer's instructions for mixing spray solution to obtain desired application rate.

OPERATION
41441 CENTRIFUGAL PUMP

USING THE SPRAYER:

IMPORTANT: Check all of your equipment... make sure that all components are clean, including the Tank, Pump, Strainer, Check Valves, Hoses, Nozzles, Spray Tips and Suction Line Strainer.

1. Start the engine as instructed in the “ENGINE OPERATING INSTRUCTIONS” section.

2. Engage the Pump and use the Ratchet Valve to start and stop boom spray while spraying.

IMPORTANT! While operating the Sprayer:

• Do not overlap areas that have been sprayed previously.

• Watch for plugged Nozzles. Replace all worn Nozzles or those producing streaky or uneven patterns.

3. Stop the spray flow **before** stopping the Vehicle.

IMPORTANT! Pump can be damaged if run dry. Be prepared to disengage pump before tank is empty. DO NOT spray on slopes or hill sides with less than 10 gallons of spray solution in tank.

AFTER SPRAYING:

It is extremely important to carefully wash and clean the Tank after **every** use.

Not only the Tank but the Pump, Hoses, Nozzles, Screens, Filters, and the exterior of the Sprayer also should be cleaned.

Flush Pump After Use

One of the most common causes for faulty pump performance is "gumming" or corrosion inside the pump. Flush the pump and entire system with a solution that will chemically neutralize the liquid pumped. Mix according to the chemical manufacturer's directions. This will dissolve most residue remaining in the pump, leaving the inside of the pump clean for the next use.

A **minimum** of three 50 gallon rinses usually is required for all components of the Sprayer. The addition of a detergent cleaner may be advisable in the initial washing. Directions for such an addition, if required, are included on the chemical container.

Cleaning of the Sprayer should be accomplished in an area where there is no potential for the chemicals to be washed off in surface water or to enter subsurface drainage systems.

When Sprayer is not to be used for an extended period, refer to the “STORAGE “section of this Manual for the detailed instructions to prevent damage to the components.

PREVENTIVE MAINTENANCE
41441 CENTRIFUGAL PUMP

Preventative maintenance is most important to assure long life of the Manual Spray System. The following maintenance procedures should be followed on a regular basis:

Flush the entire spraying system as described on page 16 after each use. Failure to clean the system can result in a chemical residue which can plug the Control Valve, Hoses and/or Nozzle Tips, and seriously damage the Centrifugal Pump.

Wash spray nozzles thoroughly with water. Blow out orifice, clean and dry. If orifice remains clogged, clean it with a soft bristled brush... never use a metal object.

Check all of the nozzles frequently to spot any inconsistencies in the spray pattern. Worn nozzle orifices which allow a greater volume of spray material to flow through the nozzle can cause an expensive loss in chemical and/or turf damage.

SUCTION STRAINER:

Turn off Suction Line Valve if Tank is full of spray solution. Remove the cap and clean the strainer screen after every 50 hours when using liquid chemical, or after every use when spraying wettable powders.

IMPORTANT: Do not operate the pump dry! Be certain Suction Line Valve is opened when spraying is resumed. Damage to Spray Pump will result when operating the Sprayer with Valve closed.

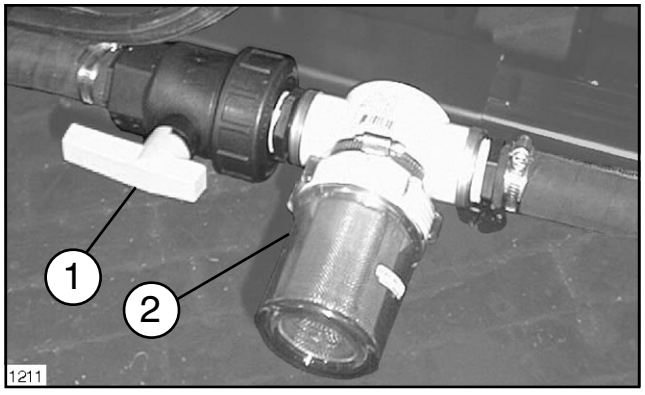


FIG. 8

1. Suction Line Valve (open)
2. Suction Strainer

BELT TENSION:

⚠ WARNING

ROTATING PULLEYS AND BELTS CAN CAUSE SERIOUS INJURY.

- **Keep hands, feet and clothing clear while engine is running.**
- **Stop engine before attempting any belt adjustment.**

Keep Belt and Pulley free from any foreign material which may cause slippage. If a belt slips, tighten it.

Check the tension on a new drive Belt **frequently** during the **first day** of operation and periodically thereafter.

After every 200 hours of operation, check the tension of all Belts. If a Belt shows signs of cracks or fraying, install a new Belt.

MAINTENANCE
41441 CENTRIFUGAL PUMP

CENTRIFUGAL PUMP SEAL PROBLEM TROUBLESHOOTING

Trouble	Probable Cause	Remedy
1. Cracked or broken stationary seat (Ceramic)	Seal ran dry and heated up. When liquid reached seal faces it was cooler, causing thermal cracks.	Check to insure seal chamber is full of liquid before starting pump. On high temperature application insure proper flushing at seal faces.
2. Carbon washer scored grooved.	Dirty System.	Have system cleaned and flushed.
3. Carbon washer worn	Seal improperly installed. unevenly.	Check installation instructions for proper assembly.
4. Rubber bellows of seal are hard and brittle Rapid carbon wear.	Did pump run dry or cavitate.	Check to insure seal chamber is full of liquid before starting pump.
5. Flexible bellows broken.	Seal improperly installed.	Check installation instructions for proper assembly.
6. Seal wears out shaft.	Check bearings for shaft end play. Check bearings for shaft radial movement. Check shaft straitness.	Replace bearings. Replace shaft.

MAINTENANCE
41441 CENTRIFUGAL PUMP

Always flush pump with water, or neutralizing agent before servicing.

Refer to the illustrated Parts List for part ordering information.

Pump Housing Disassembly

In most cases, seal replacement requires disassembly of only the pump half of the unit.

1. Remove the four casing cap screws with 9/16" box end wrench. Tap pump casing on discharge port with rubber hammer, if necessary, to break loose from mounting flange. Check inside of pump casing including suction port. If badly eroded (or damaged), pump casing should be replaced. Remove O-ring and discard. O-ring should always be replaced.

2. To remove the impeller nut, clamp the flange in a vise and insert a large screwdriver or file (at least 10" long) into impeller vanes to prevent impeller from turning when loosening nut. Use a 5/8" box end or socket wrench to remove the impeller nut by turning it counterclockwise. See FIG. 9.

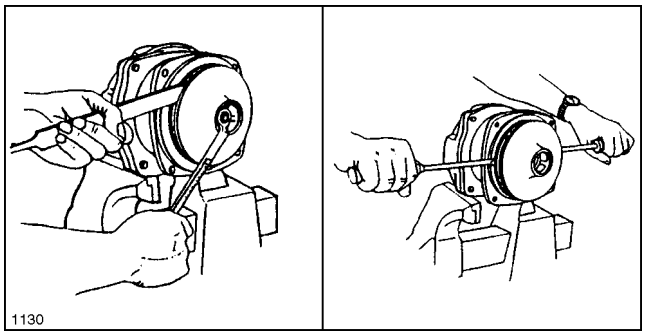


FIG. 9

3. Once nut is removed, place a screwdriver on each side (FIG. 9) behind the impeller and pry away from the mounting flange. Remove woodruff key from the shaft. Remove O-ring from the mounting flange.

Pump Seal Removal

1. Lightly lubricate shaft with mineral oil or glycerin for easier removal of seal. Using two screwdrivers positioned opposite each other, pry the rotary portion of the seal from the shaft. See FIG. 10.

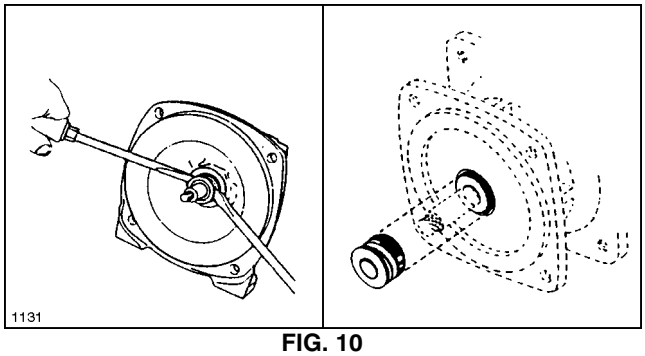


FIG. 10

2. Remove stationary seat and boot by prying out with two small screwdrivers in manner similar to impeller removal. (Caution: The seal will be damaged by removal in this manner. A new seal and rubber gasket MUST be used when pump is reassembled.)

Clean-Up of Pump Housing

1. Using a circular bottle-type wire brush with air or hand drill, clean the discharge port, suction port and the sealing areas of the O-ring on the pump casing and mounting flange.

2. After wire brush cleaning, it is recommended that the pump casing and mounting flange be further cleaned in a solvent tank to remove rust and corrosion particles.

Seal Replacement/Pump Housing Reassembly

NOTE: Reassemble if drive end is not to be repaired.

Be extremely careful with the new seal. Take special care not to scratch the lapped sealing faces of the rotary washer and stationary seat.

1. Lubricate seal cavity in mounting flange with mineral oil or glycerin.

2. Install the stationary portion of the mechanical seal by sliding over the shaft with the ceramic side out.

IMPORTANT: Make sure both seal cavity and seal are clean and lubricated. Never run the sealing faces dry.

3. To seat the seal in the seal cavity, use a piece of 3/4" PVC pipe 4" to 6" in length. Press it in firmly and squarely.

4. To install the rotary portion of the mechanical seal, place it over the shaft with the carbon side facing in, and press until it bottoms out against the stationary portion. Install rubber spacer. See FIG. 10.

5. Insert key into shaft key slot. Place impeller on shaft. Put impeller nut on shaft end using a large screwdriver or file in the impeller vanes for support, tighten impeller nut securely.

6. Install O-ring on mounting flange. Replace O-ring.

7. Place pump casing on mounting flange, insert and tighten bolts evenly.

SAFETY INSTRUCTIONS
41443 DIAPHRAGM PUMP

1. When the Diaphragm (high pressure) Pump System is to be used:

A. Check hoses for weak or worn condition before each use. Make sure that all connections are tight and secure.

B. Make sure there are no restrictions in the hoses serving the Diaphragm Pump. Liquids under high pressure are dangerous!

⚠ WARNING

Loss of control of the transport vehicle can cause serious injury to operator or bystanders.

- **Never use Spray Gun from operator's seat while vehicle is in motion.**
- **Always stop vehicle on level surface and set parking brake before dismounting to use Spray Gun.**

⚠ WARNING

The highly pressurized discharge of spray solution may cause a "whipping" action, causing personal injury and/or property damage.

- **Secure the Spray Gun and Hose before starting the Pump.**

⚠ WARNING

Fluids under high pressure can penetrate the human skin and can cause severe injury, possibly resulting in amputation or death.

- **Hot liquids and chemicals can also cause burns or injury.**
- **DO NOT at any time place hand or any other part of the body in front of spray stream.**
- **If any part of the body comes in contact with the spray stream, immediately consult a physician.**

2. Before servicing or making any adjustments to the Diaphragm Pump:

A. Release all pressure within the system; shut off the engine and lift the relief valve lever at the pump.

B. Drain all liquids from the system.

C. When replacing any parts, pipe, fittings, accessories, hoses, etc., they must be rated for the maximum pressure (600 PSI) of the Diaphragm Pump.

CONTROLS
41443 DIAPHRAGM PUMP

PRESSURE CONTROL UNIT: Controls the operating pressure and flow of spray solution.

A. Spray Gun Valve: Opens and closes to control the supply of spray solution to the Hand Spray Gun. See FIG. 11.

B. Pressure Relief/Adjustment Valve: Controls the operational pressure of the spray system. Raise the lever to relieve the pressure in the system. Hook loop into selected Pressure Adjustment Notch and push the lever down for the desired operating pressure.

C. Pressure Gauge: Indicates the operating pressure of the sprayer system.

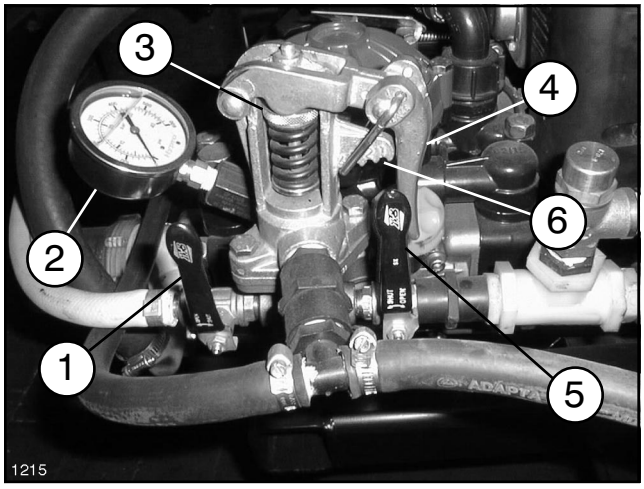


FIG. 11

1. Spray Gun Valve (Closed)
2. Pressure Gauge
3. Fine Adj. Knob
4. Press. Relief/Adjustment Valve (in # four position)
5. Optional Boom Valve (Closed)
6. Pressure Adj. Notches

LEFT BOOM SHUTOFF VALVE HANDLE: Starts or stops flow to left Boom.

RIGHT BOOM SHUTOFF VALVE HANDLE: Starts or stops flow to right Boom.

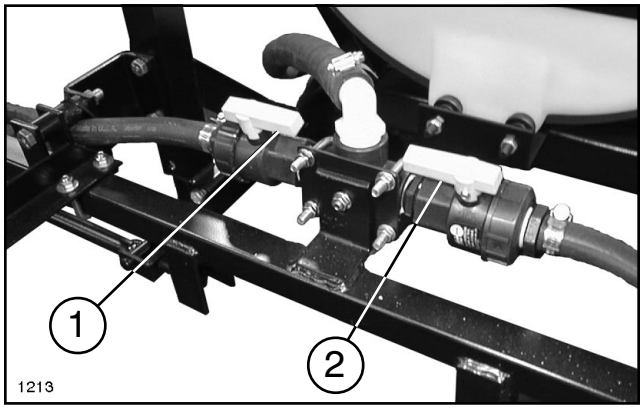


FIG. 12

1. Left Boom Shutoff Valve (open)
2. Right Boom Shutoff Valve (open)

PUMP ENGAGEMENT LEVER: Engages and disengages Diaphragm Pump.

PUMP ENGAGEMENT RELEASE LEVER: Releases the Pump Engagement Lever to allow pump to be engaged.

SUCTION VALVE HANDLE: Opens and closes the Suction Line Valve. Close during maintenance to the Suction Line Strainer or Diaphragm Pump.

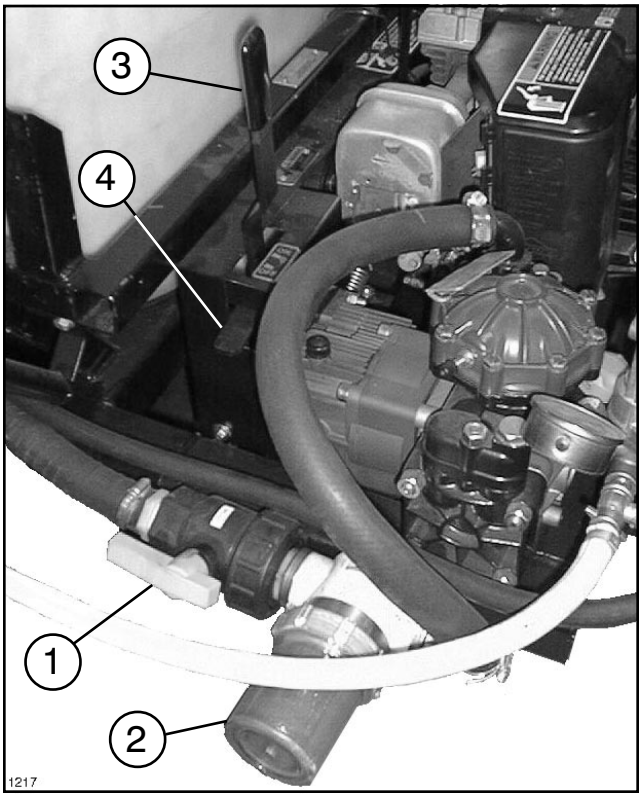


FIG. 13

1. Suction Valve (Open)
2. Suction Strainer
3. Pump Engagement Lever
4. Pump Engagement Release Lever

RATCHET VALVE HANDLE: Opens and closes the Ratchet Valve, starting or stopping flow to Booms.

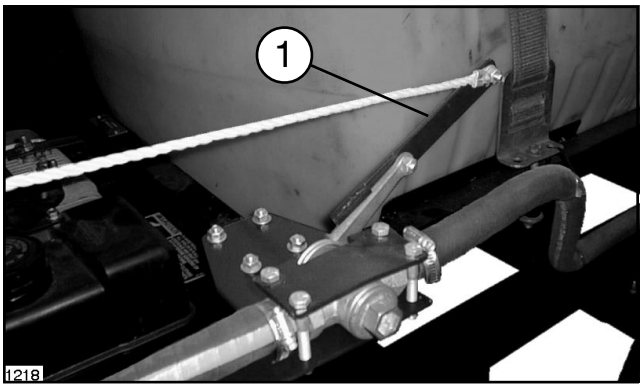


FIG. 14

1. Ratchet Valve

BEFORE SPRAYING
41443 DIAPHRAGM PUMP

INITIAL SYSTEM SET-UP FOR SPRAY GUN USE:

1. Fill the Tank with clean, clear water. Do NOT add chemical to the Tank until just before beginning to spray.

2. OPEN the Suction Line Valve.

3. Lift the Pressure Relief/Adjustment Valve Lever completely to relieve any pressure build-up in system. Close the valve.

4. Park vehicle on level surface and set the parking brake. Move the Pump Engagement Lever to the **"OFF"** position. See Fig. 13. Start the engine as instructed in the "ENGINE OPERATING INSTRUCTIONS" section.

5. Adjust the Diaphragm Pump to the desired pressure as follows:

A. Clamping the Relief Valve Lever down with the ball hook in number one position, the pressure is about 100 PSI See Fig. 11.

B. In the number two position, the pressure is about 250 PSI.

C. In the number three position, the pressure is about 450 PSI.

D. In the number four position, the pressure is about 550 PSI.

These pressures can be adjusted by using the fine adjustment knob located on top of the relief valve spring. The fine adjustment knob can be rotated when the relief valve lever is in the up position.

6. When the adjustment is complete and you have the hose line secured, to prevent any whipping action, open the Spray Gun Valve to begin spraying.

⚠ WARNING

Fluids under high pressure can cause severe injury.

- **NEVER USE DIAPHRAGM PUMP WHEN SPRAYING WITH A HOSE AND/OR A SPRAY GUN RATED AT LESS THAN 600 P.S.I.**

INITIAL SYSTEM SET-UP FOR BOOM SPRAY OPTION:

1. Adjust the Diaphragm Pump to the desired pressure as described in Initial System Set-up for use with Spray Gun.

NOTE: To use the standard light blue 95-9188 (1 GPM) Nozzles and all three Boom Sections, you must have the Relief Valve Lever hooked on the number four position and the engine running at full RPM.

2. OPEN the Boom Valve.

BEFORE SPRAYING
41443 DIAPHRAGM PUMP

FILLING THE SOLUTION TANK:

⚠ WARNING

CHEMICALS ARE HAZARDOUS AND CAN CAUSE PERSONAL INJURY!

- **Carefully read the directions printed on the chemical manufacturer's labels before handling chemicals. Instructions on chemical manufacturer's container labels, regarding mixing proportions, should be read and strictly followed.**
- **Keep spray material from skin. If spray material comes in contact with body, wash it off immediately with clean water and detergent.**
- **Always wear goggles and other protective equipment as recommended by the Chemical Manufacturer.**

IMPORTANT: Do not add chemical to Tank until just before use. The concentrate should not be poured into an empty Tank. Fill Tank at least one-half full with clean, clear water, add chemical concentrate and finish filling Tank with water. Follow the chemical manufacturer's instructions for mixing spray solution to obtain desired application rate.

FILL THE FRESH WATER WASH TANK

NOTE: Fill Fresh Water Wash Tank with clean water only. Check to assure tank is full before each operation.

In case of chemical contact with skin or eyes, a fresh water wash tank has been installed on the Tank Saddle.

1. Turn Tank Spigot to on position. See FIG. 15.

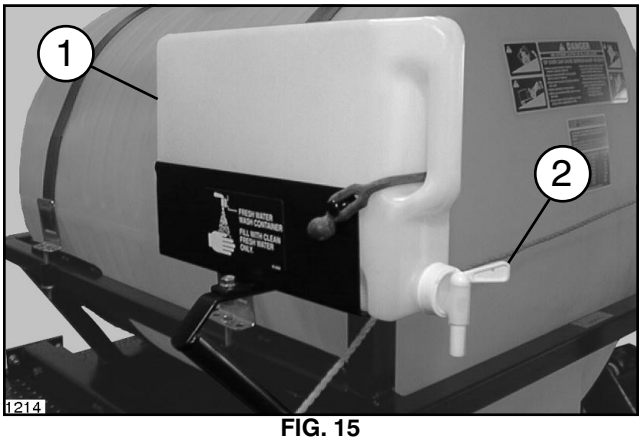


FIG. 15

1. Fresh Water Wash Tank 2. Tank Spigot

2. Hold contaminated area directly under water stream.

AFTER SPRAYING
41443 DIAPHRAGM PUMP

It is extremely important to carefully wash and clean the Tank after **every** use.

Not only the Tank but the Pump, Hoses, Nozzles, Screens, Filters, and the exterior of the Sprayer also should be cleaned.

Flush Pump After Use

One of the most common causes for faulty pump performance is "gumming" or corrosion inside the pump. Flush the pump and entire system with a solution that will chemically neutralize the liquid pumped. Mix according to the chemical manufacturer's directions. This will dissolve most residue remaining in the pump, leaving the inside of the pump clean for the next use.

A **minimum** of three 50 gallon rinses usually is required for all components of the Sprayer. The addition of a detergent cleaner may be advisable in the initial washing. Directions for such an addition, if required, are included on the chemical container.

Cleaning of the Sprayer should be accomplished in an area where there is no potential for the chemicals to be washed off in surface water or to enter subsurface drainage systems.

When Sprayer is not to be used for an extended period, refer to the "STORAGE" section of this Manual for the detailed instructions to prevent damage to the components.

MAINTENANCE
41443 DIAPHRAGM PUMP

⚠ WARNING

Fluids under high pressure can cause severe injury.

- **Liquid is discharged from the Diaphragm Pump under pressures that are high enough to cause personal injury!**
- **Before disconnecting any high pressure components:**
- **Shut engine off and lift relief valve level at pump to relieve any build-up of pressure.**

DIAPHRAGM PUMP:

After every 500 hours of operation, change oil and diaphragms.

1. Remove cap from oil sight tube, turn Pump upside down and rotate the shaft until oil stops flowing out.

2. Refill Pump with 30W oil; slowly pour oil into sight tube while turning the Pump shaft. Turning the shaft purges all the air out of the crankcase. Always change oil when replacing diaphragms.

VALVE AND O-RING REPLACEMENT:

Occasionally debris can cause the valves to not seat properly or damage the O-Rings. To check for this problem follow these steps:

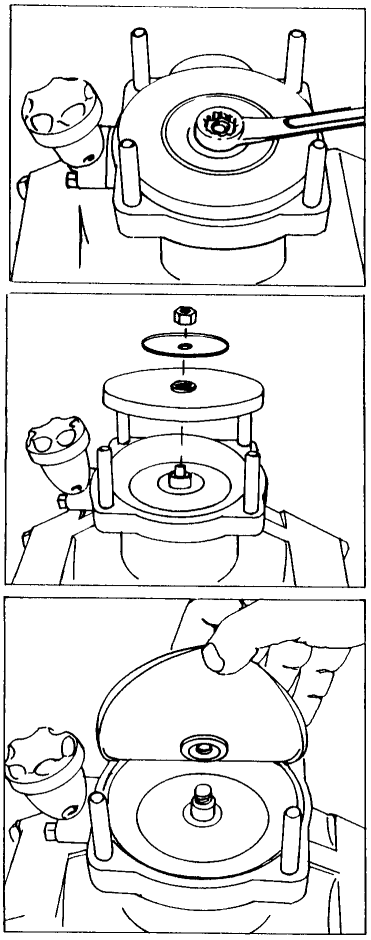
1. Remove the Pump manifold (See Parts List). Use a 17 mm box wrench to remove manifold nuts. With manifold removed, valves can readily be removed and checked for debris or wear.

2. To replace valves or O-Rings, see your TORO Dealer for the appropriate kits.

DIAPHRAGM REPLACEMENT:

1. Drain the oil from the Pump by removing cap from oil sight tube and inverting the Pump. Rotate the shaft to remove excess oil.

2. Remove the Pump manifold. Use a 17 mm box wrench to remove manifold nuts.



3. Use a 13 mm box wrench to remove the diaphragm retaining bolt, support washer and diaphragm.

4. To replace diaphragms, see your TORO dealer for the appropriate repair kit.

5. Turn the crankshaft to bring the piston to its downstroke and set the new diaphragm into the sleeve groove. Install retaining washer and tighten nut.

6. Replace the pulsation damper diaphragm by first bleeding the air from the damper. Use a 13 mm box wrench to remove the bolts holding the damper assembly together, then replace diaphragm. Recharge pulsation damper, using valve stem in head of Diaphragm Pump, to 20% of operation pressure.

7. Refill crankcase with 30W oil. Rotate the shaft to distribute and fill to proper level.

CONTROLS
41442 PTO PUMP

RATCHET VALVE HANDLE: Opens and closes the Ratchet Valve, starting or stopping flow to Booms.

PRESSURE ADJUST VALVE HANDLE: Controls spray pressure. Turn clockwise to decrease pressure and counterclockwise to increase pressure.

PRESSURE GAUGE: Shows spray pressure when Ratchet Valve is open. Shows deadhead pressure when the Ratchet Valve is closed.

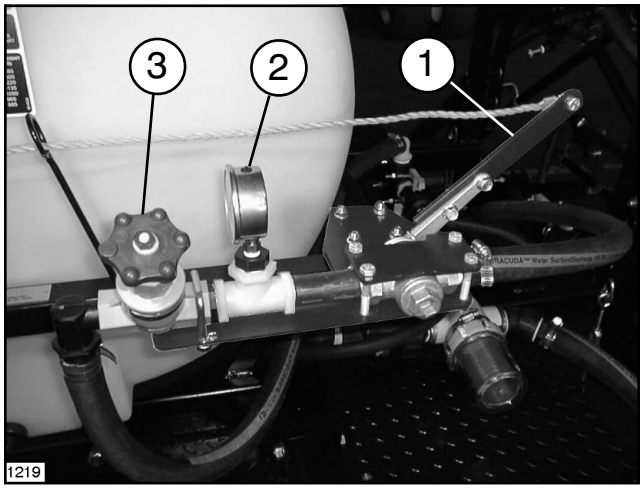


FIG. 16

1. Ratchet Valve Handle
2. Pressure Gauge
3. Pressure Adjust Valve Handle

AGITATOR VALVE HANDLE: Opens and closes the Agitator Valve to activate, adjust or stop the agitation of the spray solution in the Tank.

SUCTION VALVE HANDLE: Opens and closes the Suction Line Valve. Close during maintenance to the Suction Line Strainer or Centrifugal Pump.

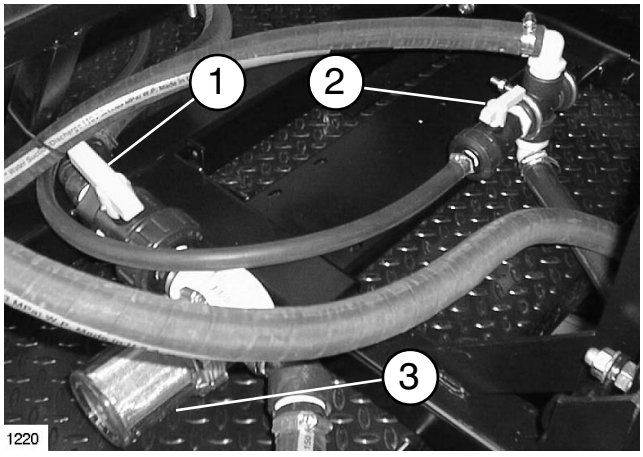


FIG. 17

1. Suction Valve Handle (open)
2. Agitator Valve Handle (open)
3. Suction Strainer

LEFT BOOM SHUTOFF VALVE HANDLE: Starts or stops flow to left Boom.

RIGHT BOOM SHUTOFF VALVE HANDLE: Starts or stops flow to right Boom.

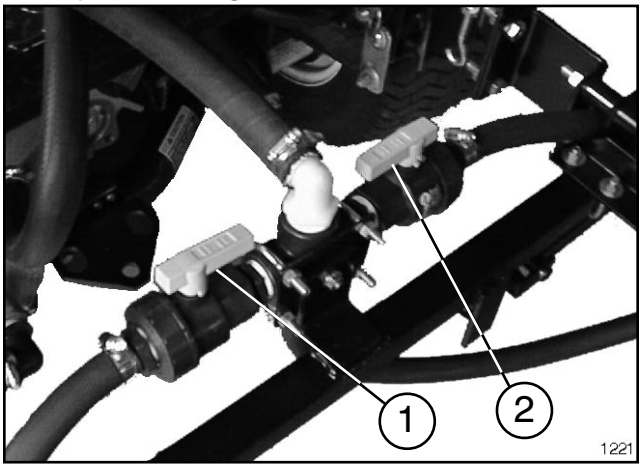


FIG. 18

1. Left Boom Shutoff Valve (open)
2. Right Boom Shutoff Valve (open)

BEFORE SPRAYING
41442 PTO PUMP

INITIAL SYSTEM SET-UP:

1. Fill the Tank with clean, clear water and open the Suction Line Valve.

IMPORTANT: The pump will be damaged if it is activated before it is completely filled with liquid. Be certain the suction line valve is open and liquid has reached the pump.

2. Take the vehicle out of gear and set the parking brake. Start the Vehicle's engine and set throttle to represent the desired spraying speed.

3. Engage PTO Drive.

4. Open Ratchet Valve to begin spraying water from the booms.

5. Adjust the Pressure Adjust Valve to the desired spray pressure.

NOTE: This entire procedure should be repeated whenever changing operating pressure, nozzles, speed, chemical, etc.

FILL THE FRESH WATER WASH TANK

NOTE: Fill Fresh Water Wash Tank with clean water only. Check to assure tank is full before each operation.

In case of chemical contact with skin or eyes, a fresh water wash tank has been installed on the Tank Saddle.

1. Turn Tank Spigot to on position. See FIG. 4.

2. Hold contaminated area directly under water stream.

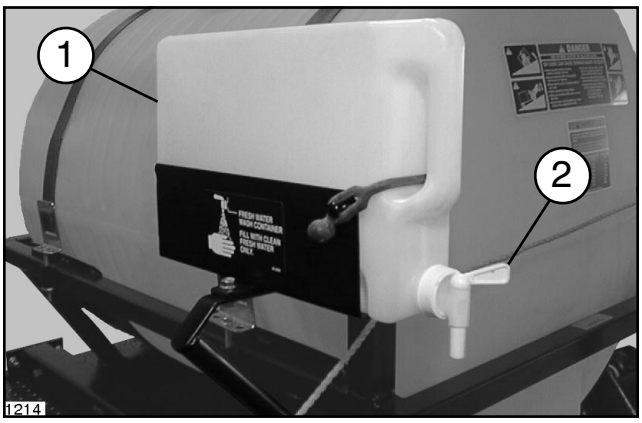


FIG. 19

1. Fresh Water Wash Tank 2. Tank Spigot

FILLING THE SOLUTION TANK:

⚠ WARNING

CHEMICALS ARE HAZARDOUS AND CAN CAUSE PERSONAL INJURY!

- **Carefully read the directions printed on the chemical manufacturer's labels before handling chemicals. Instructions on chemical manufacturer's container labels, regarding mixing proportions, should be read and strictly followed.**
- **Keep spray material from skin. If spray material comes in contact with body, wash it off immediately with clean water and detergent.**
- **Always wear goggles and other protective equipment as recommended by the Chemical Manufacturer.**

IMPORTANT: Do not add chemical to Tank until just before use. The concentrate should not be poured into an empty Tank. Fill Tank about one-half full with clean, clear water, add chemical concentrate and finish filling Tank with water. Follow the chemical manufacturer's instructions for mixing spray solution to obtain desired application rate.

PREVENTIVE MAINTENANCE
41442 PTO PUMP

Preventative maintenance is most important to assure long life of the Skid Sprayer. The following maintenance procedures should be followed on a regular basis:

It is extremely important to carefully wash and clean the Tank after **every** use.

Not only the Tank but the Pump, Hoses, Nozzles, Screens, Filters, and the exterior of the Sprayer also should be cleaned.

Wash spray nozzles thoroughly with water. Blow out orifice, clean and dry. If orifice remains clogged, clean it with a soft bristled brush... never use a metal object.

Check all of the nozzles frequently to spot any inconsistencies in the spray pattern. Worn nozzle orifices which allow a greater volume of spray material to flow through the nozzle can cause an expensive loss in chemical and/or turf damage.

Flush Pump After Use

One of the most common causes for faulty pump performance is "gumming" or corrosion inside the pump. Flush the pump and entire system with a solution that will chemically neutralize the liquid pumped. Mix according to the chemical manufacturer's directions. This will dissolve most residue remaining in the pump, leaving the inside of the pump clean for the next use.

A **minimum** of three 50 gallon rinses usually is required for all components of the Sprayer. The addition of a detergent cleaner may be advisable in the initial washing. Directions for such an addition, if required, are included on the chemical container.

Cleaning of the Sprayer should be accomplished in an area where there is no potential for the chemicals to be washed off in surface water or to enter subsurface drainage systems.

When Sprayer is not to be used for an extended period, refer to the “STORAGE “section of this Manual for the detailed instructions to prevent damage to the components.

SUCTION STRAINER:

Turn off Suction Line Valve if Tank is full of spray solution. Remove the cap and clean the strainer screen after every 50 hours when using liquid chemical, or after every use when spraying wettable powders.

IMPORTANT: Do not operate the pump dry! Be certain Suction Line Valve is opened when spraying is resumed. Damage to Spray Pump will result when operating the Sprayer with Valve closed.

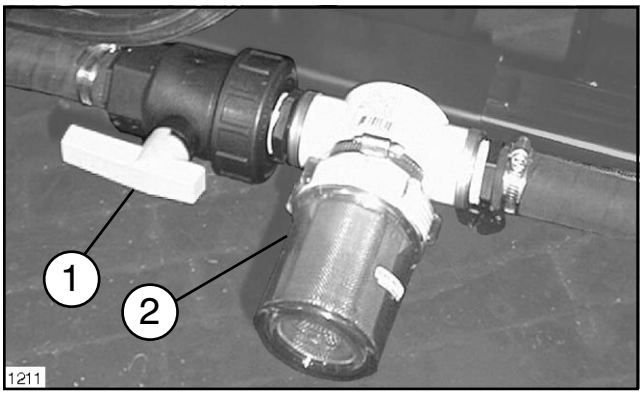


FIG. 20

1. Suction Line Valve 2. Suction Strainer (open)

BELT TENSION:

⚠ WARNING

ROTATING PULLEYS AND BELTS CAN CAUSE SERIOUS INJURY.

- **Keep hands, feet and clothing clear while engine is running.**
- **Stop engine before attempting any belt adjustment.**

Keep Belt and Pulley free from any foreign material which may cause slippage. If a belt slips, tighten it.

Check the tension on a new drive Belt **frequently** during the **first day** of operation and periodically thereafter.

After every 200 hours of operation, check the tension of all Belts. If a Belt shows signs of cracks or fraying, install a new Belt.

MAINTENANCE
41442 PTO PUMP

CENTRIFUGAL PUMP SEAL PROBLEM TROUBLESHOOTING

Trouble	Probable Cause	Remedy
1. Cracked or broken stationary seat (Ceramic)	Seal ran dry and heated up. When liquid reached seal faces it was cooler, causing thermal cracks.	Check to insure seal chamber is full of liquid before starting pump. On high temperature application insure proper flushing at seal faces.
2. Carbon washer scored grooved.	Dirty System.	Have system cleaned and flushed.
3. Carbon washer worn	Seal improperly installed. unevenly.	Check installation instructions for proper assembly.
4. Rubber bellows of seal are hard and brittle Rapid carbon wear.	Did pump run dry or cavitate.	Check to insure seal chamber is full of liquid before starting pump.
5. Flexible bellows broken.	Seal improperly installed.	Check installation instructions for proper assembly.
6. Seal wears out shaft.	Check bearings for shaft end play. Check bearings for shaft radial movement. Check shaft straitness.	Replace bearings. Replace shaft.

MAINTENANCE
41442 PTO PUMP

Always flush pump with water, or neutralizing agent before servicing.

Refer to the illustrated Parts List for part ordering information.

Pump Housing Disassembly

In most cases, seal replacement requires disassembly of only the pump half of the unit.

1. Remove the four casing cap screws with 9/16" box end wrench. Tap pump casing on discharge port with rubber hammer, if necessary, to break loose from mounting flange. Check inside of pump casing including suction port. If badly eroded (or damaged), pump casing should be replaced. Remove O-ring and discard. O-ring should always be replaced.

2. To remove the impeller nut, clamp the flange in a vise and insert a large screwdriver or file (at least 10" long) into impeller vanes to prevent impeller from turning when loosening nut. Use a 5/8" box end or socket wrench to remove the impeller nut by turning it counterclockwise. See FIG. 21.

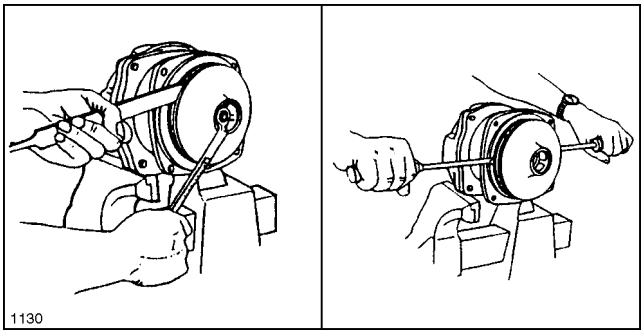


FIG. 21

3. Once nut is removed, place a screwdriver on each side (FIG. 21) behind the impeller and pry away from the mounting flange. Remove woodruff key from the shaft. Remove O-ring from the mounting flange.

Pump Seal Removal

1. Lightly lubricate shaft with mineral oil or glycerin for easier removal of seal. Using two screwdrivers positioned opposite each other, pry the rotary portion of the seal from the shaft. See FIG. 22.

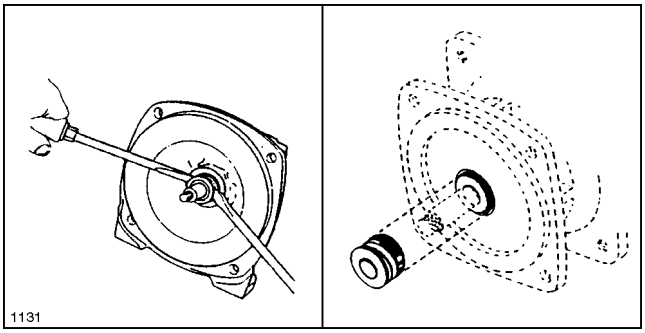


FIG. 22

2. Remove stationary seat and boot by prying out with two small screwdrivers in manner similar to impeller removal. (Caution: The seal will be damaged by removal in this manner. A new seal and rubber gasket MUST be used when pump is reassembled.)

Clean-Up of Pump Housing

1. Using a circular bottle-type wire brush with air or hand drill, clean the discharge port, suction port and the sealing areas of the O-ring on the pump casing and mounting flange.

2. After wire brush cleaning, it is recommended that the pump casing and mounting flange be further cleaned in a solvent tank to remove rust and corrosion particles.

Seal Replacement/Pump Housing Reassembly

NOTE: Reassemble if drive end is not to be repaired.

Be extremely careful with the new seal. Take special care not to scratch the lapped sealing faces of the rotary washer and stationary seat.

1. Lubricate seal cavity in mounting flange with mineral oil or glycerin.

2. Install the stationary portion of the mechanical seal by sliding over the shaft with the ceramic side out.

IMPORTANT: Make sure both seal cavity and seal are clean and lubricated. Never run the sealing faces dry.

3. To seat the seal in the seal cavity, use a piece of 3/4" PVC pipe 4" to 6" in length. Press it in firmly and squarely.

4. To install the rotary portion of the mechanical seal, place it over the shaft with the carbon side facing in, and press until it bottoms out against the stationary portion. Install rubber spacer. See FIG. 22.

5. Insert key into shaft key slot. Place impeller on shaft. Put impeller nut on shaft end using a large screwdriver or file in the impeller vanes for support, tighten impeller nut securely.

6. Install O-ring on mounting flange. Replace O-ring.

7. Place pump casing on mounting flange, insert and tighten bolts evenly.

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The Toro Commercial Products Two Year Limited Warranty

The Toro Company warrants your 1996 or newer Toro Commercial Product ("Product") purchased after January 1, 1997, to be free from defects in materials or workmanship for the period of time listed below. Where a warrantable condition exists, Toro will repair the Product at no cost to you including diagnosis, labor , parts, and transportation. This warranty begins on the date the Product is delivered to the original retail purchaser.

Warranty Duration: Two years or 1500 operational hours*, whichever occurs first.
***Product equipped with hour meter**

Owner Responsibilities:

As the Product owner, you are responsible for required maintenance and adjustments stated in your Owner's Manual. Failure to preform required maintenance and adjustments can be grounds for disallowing a warranty claim.

Instructions for Obtaining Warranty Service:

You are responsible for notifying the Commercial Products Distributor or Authorized Commercial Products Dealer from whom you purchased the Product as soon as you believe a warrantable condition exists.

If you need help locating a Commercial Products Distributor or Authorized Dealer, or if you have questions regarding your warranty rights or responsibilities, you may contact us at:

TORO Commercial Products Service Department
8111 Lyndale Avenue South
Minneapolis, MN 55420-1196
Telephone: (612) 888-8801
Facsimile: (612) 887-8258
E-Mail: Commercial.Service@Toro.Com

Maintenance Parts:

Parts scheduled for replacement as required maintenance ("Maintenance Parts"), are warranted for the period of time up to the scheduled replacement time for that part.

Items/Conditions Not Covered:

Not all product failures or malfunctions that occur during the warranty period are defects in material or workmanship. The items / conditions listed below are not covered by this warranty:

- Product failures which result from the use of non-Toro replacement parts, or from installation and use of add-on, modified, or unapproved accessories are not covered.
- Product failures which result from failure to perform required maintenance and/or adjustments are not covered.
- Product failures which result from operating the Product in an abusive, negligent, or reckless manner are not covered.
- This warranty does not apply to parts subject to consumption through use unless found to be defective. Examples of parts which are consumed, or used up, during normal Product operation include, but are not limited to, blades, reels, bedknives, tines, spark plugs, castor wheels, tires, filters, belts, etc.
- This warranty does not apply to failures caused by outside influence. Items considered to be outside influence include, but are not limited to, weather, storage practices, contamination, use of unapproved coolants, lubricants, additives, or chemicals, etc.
- This warranty does not apply to normal "wear and tear" items. Normal "Wear and Tear" includes, but is not limited to, damage to seats due to wear or abrasion, worn painted surfaces, scratched decals or windows, etc.

Other Legal Disclaimers:

The above remedy of product defects through repair by an authorized distributor or dealer is the purchaser's sole remedy for any defect. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Except for the Emissions warranty referenced below, If applicable, there is no other express warranty. All implied warranties of merchantability and fitness for use are limited to the duration of the express warranty.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you.

The Toro Company is not liable for indirect, incidental or consequential damages in connection with the use of the Product, including any cost or expense of providing substitute Product or service during periods of malfunction or non-use.

Some states do not allow the exclusion of incidental or consequential damages, so the above exclusion may not apply to you.

Note to California residents: The Emissions Control System on your Product may be covered by a separate warranty meeting requirements established by the U.S. Environmental Protection Agency (EPA), or the California Air Resources Board (CARB). The hour limitations set forth above do not apply to the Emissions Control System Warranty. Refer to the California Emission Control Warranty Statement printed in your Owner's Manual or contained in the engine manufacturer's documentation for details.