FORM NO. 93-1050

TORO®

Model No. 41120-50001 & UP
Model No. 41128-50001 & UP
Model No. 41020-50001 & UP
Model No. 41021-50001 & UP
Model No. 41122-50001 & UP

OPERATOR'S INSTRUCTIONS

STANDARD ELECTRIC SPRAY SYSTEM 1000
for the MULTI-PRO™ 1100 Vehicle

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 in the plastic tube behind the operator seat.

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 and the Safety Instructions in the Multi-Pro™ Operator's Manual.

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 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. Select the proper chemical for the job.

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

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

D. Properly dispose of chemical container and unused chemicals.

SAFETY INSTRUCTIONS

MAINTENANCE:

5. Before servicing or making any adjustments to the Sprayer:

A. Stop the Vehicle and set the parking brake.

B. Shut off the vehicle's engine and remove key from ignition.

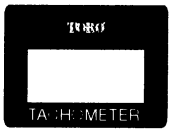
C. Disengage all power and wait until all moving parts have stopped.

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

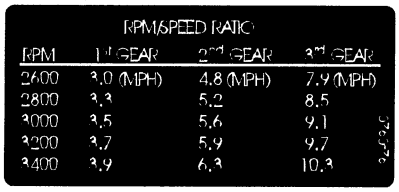
7. To be sure of optimum performance and safety, always purchase genuine TORO replacement parts and accessories. Replacement parts and accessories made by other manufacturers could be dangerous. Altering this equipment in any manner may affect the machine's operation, performance, durability or its use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

SAFETY AND INSTRUCTION DECALS

The following safety and instruction decals are installed on the Standard Electric Spray System. 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.

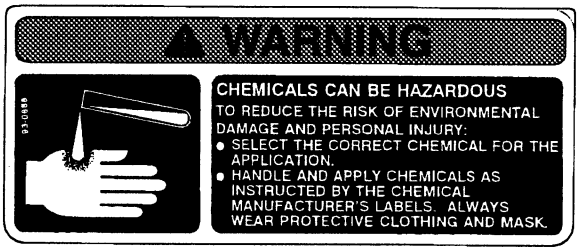


Part No. 93-1021: Located on face of Tachometer.

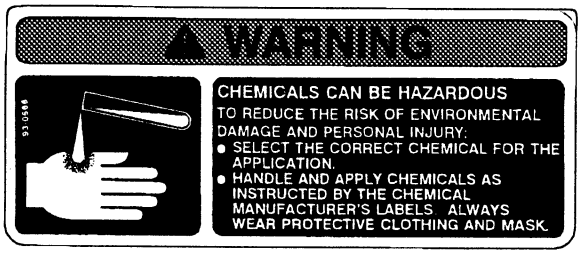


Part No. 93-0920 Located above Tachometer

Part No. 87-0570: Located on Rear Tank Band.



Part No. 93-0688: Located on lid of Sprayer Tank.



Part No. 93-0688: Located on Lid of Sprayer Tank.

Part No. 93-0800: Located on side of Clean Water Wash Tank Saddle.

CONTROLS

PUMP ENGAGEMENT LEVER: Pivot the Lever DOWN to lower the Centrifugal Pump and ENGAGE the Drive Belt. Pull UP to DISENGAGE.

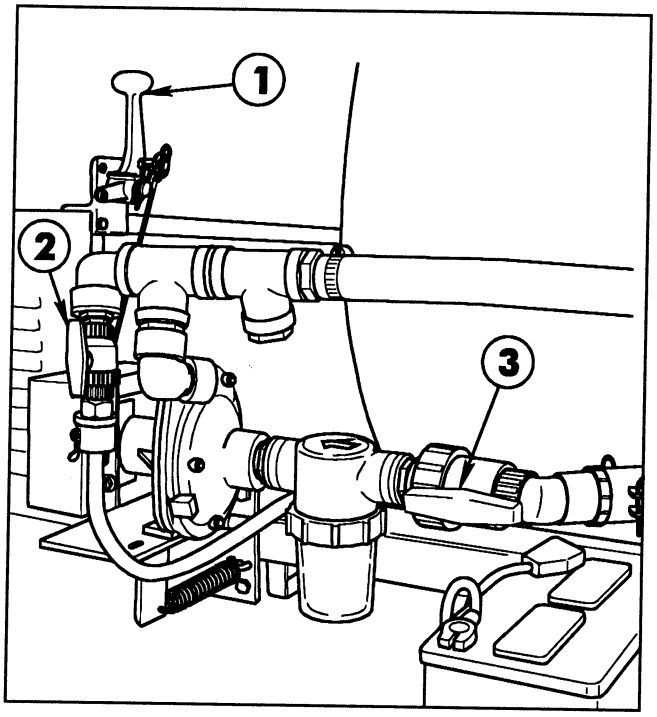


FIG. 1

1. Pump Engagement Lever
2. Agitator Valve Handle
3. Suction 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.

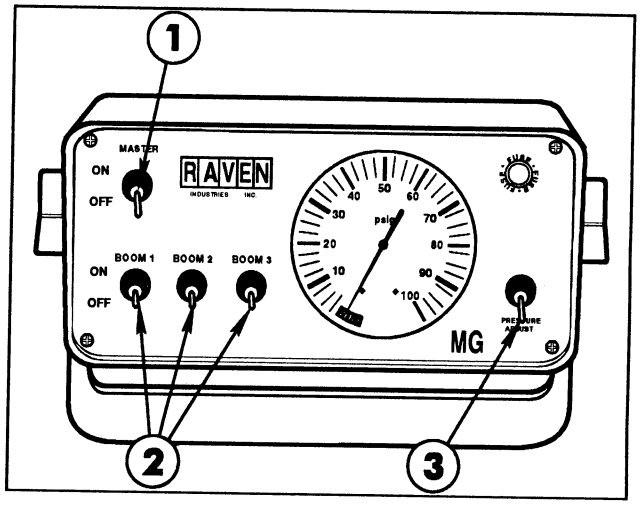


FIG. 2

1. Master ON/OFF Switch
2. Individual Boom ON/OFF Switches
3. Pressure Adjust Switch

PRESSURE ADJUST SWITCH: Hold to INCREASE or DECREASE spraying pressure to desired level. Located on Control Console.

MASTER ON/OFF SWITCH: Activates all three Boom Valves to control the flow of spray solution to the Boom sections. Located on Control Console.

INDIVIDUAL BOOM ON/OFF SWITCHES: Allow individual selection of Boom sections and control the flow of spray solution to left (Boom #1), center (Boom #2) or right (Boom #3) Booms.

IMPORTANT! CHECK ALL OF YOUR EQUIPMENT...MAKE CERTAIN THAT ALL COMPONENTS ARE CLEAN...INCLUDING THE TANK, PUMP, CONTROL VALVES, STRAINERS, CHECK VALVES, HOSES, NOZZLES, SPRAY TIPS AND SUCTION LINE STRAINER.

BEFORE SPRAYING

NOZZLE SELECTION:

See the nozzle charts on page ?? 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.

EXAMPLE (US FORMULA)

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

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

With 1.00 G.P.M. and a pressure of 40 P.S.I. you would select Nozzle No. 40444.

EXAMPLE (TU FORMULA):

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

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

EXAMPLE (SI FORMULA):

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

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

With 3.78 G.P.M. and a pressure at 275 kPa you would select nozzle No. 40444

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

US AND TU FORMULAS

TORO Part No.	Nozzle Number / Color-Code	Pressure (PSIG)	Capacity 1-Nozzle (GPM)	APPLICATION RATES FOR NOZZLES 20" SPACING — GALLONS PER ACRE				GALLONS PER 1000 SQ. FT.			
				3 MPH	4 MPH	5 MPH	6 MPH	3 MPH	4 MPH	5 MPH	6 MPH
92-3977	RA-4	20	.28	28	21	17	14	0.64	0.48	0.39	0.32
	120°	30	.35	34	26	20	17	0.78	0.60	0.46	0.39
	¼"	40	.40	40	30	24	20	0.92	0.69	0.55	0.46
	Yellow	50	.45	44	33	27	22	1.01	0.76	0.62	0.51
43082	RA-5	20	.36	35	26	21	17.5	0.80	0.60	0.48	0.40
	120°	30	.44	42	32	26	21	0.96	0.73	0.60	0.48
	¼"	40	.50	50	37	30	25	1.15	0.85	0.69	0.57
	Dk. Blue	50	.56	56	42	33	28	1.29	0.96	0.76	0.64
41088	RA-6	20	.43	42	32	25	21	0.96	0.73	0.57	0.48
	120°	30	.52	52	39	31	26	1.19	0.90	0.71	0.60
	¼"	40	.60	60	45	36	30	1.38	1.03	0.83	0.69
	Dk. Green	50	.67	66	50	40	33	1.52	1.15	0.92	0.76
42828	RA-8	20	.57	56	42	34	28	1.29	0.96	0.78	0.64
	120°	30	.70	68	51	41	34	1.56	1.17	0.94	0.78
	¼"	40	.80	80	59	48	40	1.84	1.35	1.10	0.92
	Red	50	.90	88	66	53	44	2.02	1.52	1.22	1.01
40444	RA-10	20	.71	70	53	42	35	1.61	1.22	0.96	0.80
	120°	30	.87	86	64	51	43	1.97	1.47	1.17	0.99
	¼"	40	1.0	100	74	59	50	2.30	1.70	1.35	1.15
	Tan	50	1.1	110	83	66	55	2.53	1.91	1.52	1.26
92-0027	RA-15	20	1.1	106	79	63	53	2.43	1.81	1.45	1.22
	120°	30	1.3	128	96	77	64	2.94	2.20	1.77	1.47
	¼"	40	1.5	148	111	89	74	3.40	2.55	2.04	1.70
	Lt. Blue	50	1.7	166	125	100	83	3.81	2.87	2.30	1.91
93-0903	RA-25	20	1.8	178	134	104	88	4.09	3.08	2.39	2.02
	140°	30	2.2	218	163	128	108	5.01	3.75	2.94	2.48
	3/4"	40	2.5	248	186	148	124	5.70	4.28	3.40	2.85
	Black	50	2.8	277	208	168	140	6.37	4.78	3.86	3.22

SI FORMULA

TORO Part No.	Nozzle Number / Color-Code	Pressure (kPa)	Capacity 1-Nozzle (L/min)	APPLICATION RATES FOR NOZZLES 50 cm SPACING — LITERS PER HECTARE			
				5 km/h	6 km/h	8 km/h	10 km/h
92-3977	RA-4	150	0.56	134	112	84	67
	120°	200	0.64	155	129	97	77
	¼"	275	0.76	181	151	113	91
	Yellow	350	0.85	205	171	128	102
43082	RA-5	150	1.4	335	279	209	167
	120°	200	1.61	387	322	242	193
	¼"	275	1.89	453	378	283	227
	Dk. Blue	350	2.13	512	426	320	256
41088	RA-6	150	1.67	402	335	251	201
	120°	200	1.93	464	387	290	232
	¼"	275	2.27	544	453	340	272
	Dk. Green	350	2.56	614	512	384	307
42828	RA-8	150	2.23	536	447	335	268
	120°	200	2.58	619	516	387	309
	¼"	275	3.02	726	605	453	363
	Red	350	3.41	819	682	512	409
40444	RA-10	150	2.79	670	558	419	335
	120°	200	3.22	773	645	483	387
	¼"	275	3.78	907	756	567	453
	Tan	350	4.26	1023	853	640	512
92-0027	RA-15	150	4.18	1008	840	630	504
	120°	200	4.84	1176	980	735	588
	¼"	275	5.67	1368	1140	855	684
	Lt. Blue	350	6.40	1536	1280	960	768
93-0903	RA-25	150	6.98	1675	1396	1047	836
	140°	200	8.06	1934	1612	1208	968
	3/4"	275	9.45	2268	1888	1418	1132
	Black	350	10.66	2558	2132	1598	1280

BEFORE SPRAYING

SYSTEM SET-UP:

1. Fill the Tank with clean, clear water.

IMPORTANT! BE CERTAIN THE SUCTION LINE VALVE IS OPEN AND LIQUID HAS REACHED THE PUMP. THE PUMP WILL BE DAMAGED IF IT IS ALLOWED TO RUN DRY!

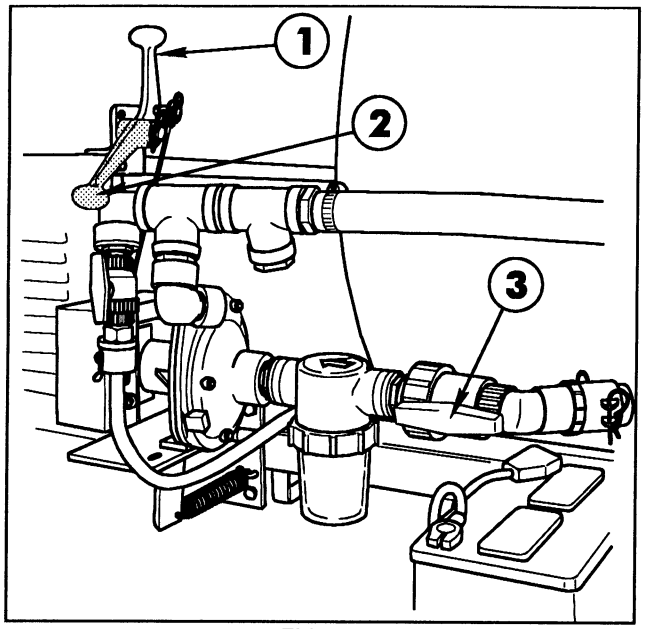


FIG. 3

1. Pump Engagement Lever (Disengaged)
2. Suction Valve Handle (open)
3. Pump Engagement Lever (Engaged)

2. Take the Vehicle out of gear and set the Parking Brake. Start the machine and set to full throttle for desired spraying speed.

3. Engage the Pump with the Agitator Valve open.

4. Turn "ON" The Master Boom Switch and all three Individual Boom Switches.

5. Set the Pressure Gauge to the desired operating pressure.

At this point, the Throttling Valves must be adjusted. This is accomplished as follows:

6. With all three Boom sections "ON", switch Boom #1 to "OFF". You will notice a change in pressure at the Gauge. Loosen the Locking Ring on #1 Boom's Throttling Valve and turn the Adjusting Cap until the original pressure setting is reached. Tighten the Locking Ring. Turn Boom #1 back on.

7. With all Booms "ON", switch Boom #2 to "OFF" and adjust the #2 Boom's Throttling Valve to reset original pressure. Turn Boom #2 back on.

8. With all Booms "ON", Switch Boom #3 to "OFF" and repeat this procedure for setting the #3 Boom's Throttling Valve. Turn Boom #3 back on.

To double check these settings, switch Boom sections ON and OFF. Verify that the pressure does not change at the gauge.

NOTE: This entire procedure should be repeated whenever changing to a different operating pressure.

FILLING THE SOLUTION TANK:

⚠ CAUTION

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 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.

FILL THE CLEAN WATER WASHTANK

NOTE: Fill Clean 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 R.H. side of the vehicle.

1. Turn Tank Spigot to on position. See FIG. 5.

2. Hold contaminated area directly under water stream.

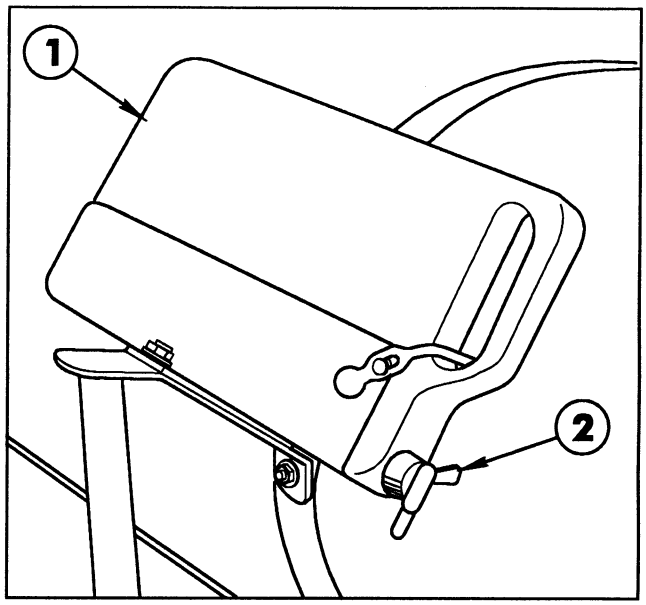


FIG. 4

1.Clean Water Wash Tank 2. Tank Spigot

OPERATION

USING THE SPRAYER:

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

1. Start the vehicle engine and select the proper gear. Position the throttle at full (or nearly full) speed to provide the necessary ground speed, pressure and volume.

2. Engage the Pump and use the Master ON/OFF Switch and individual Boom Switches, to control Boom sections.

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.

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 for 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 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 (3) 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 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

Preventative maintenance is most important to assure long life of the Standard Electric Spray Sytem. The following maintenance proceedures should be followed on a regular basis:

Flush the entire spraying system as described on page 14 after each use. Failure to clean the system can result in a chemical residue which can plug the solenoids, 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 when spraying wettable powders - after every 50 hours when using liquid chemical.

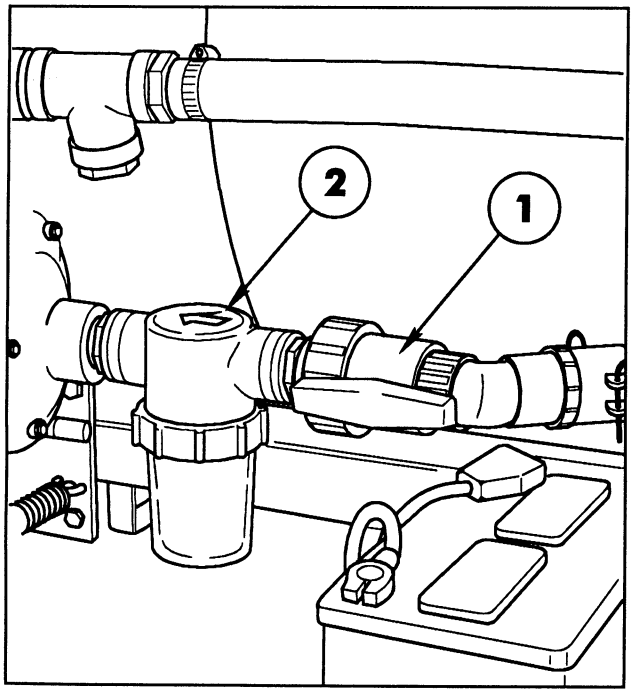


FIG. 5

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

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.

BELT TENSION:

⚠ DANGER

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.

The best tension for a V belt drive is the lowest tension at which the Belt will not slip under the highest load condition. Too much tension shortens Belt and Bearing life.

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

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

Check and maintain the clearances between all Belt Guides and the outside surfaces of the Belts at 1/8 inch.

After every 200 hours of operation, check the tension of all belts and clearances of Belt Guides. If a Belt shows signs of cracks or fraying, install a new belt.

MAINTENANCE

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 surfaces
2. Carbon washer scored grooved.	Dirty System.	Have system cleaned and flushed.
3. Carbon washer worn unevenly.	Seal improperly installed.	Check installation instructions for proper assembly.
4. Rubber bellows of seal are hard and brittle. Rapid carbon wear.	Pump ran dry or cavitated.	Check to insure seal chamber is full of liquid before starting pump.
5. Retainer drive tabs badly worn or broken.	Periodic loss of lubrication at seal faces.	Insure proper flushing at seal faces.
6. Flexible bellows broken.	Seal improperly installed.	Check installation instructions for proper assembly.
7. Seal wears out shaft.	Check bearings for shaft end play. Check bearings for shaft radial movement. Check Shaft straightness.	Replace bearings. Replace Shaft.

MAINTENANCE

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 a 9/16" box end wrench. Tap pump casing on discharge port with rubber hammer, if necessary, to break loose from the 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 flat 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 6.

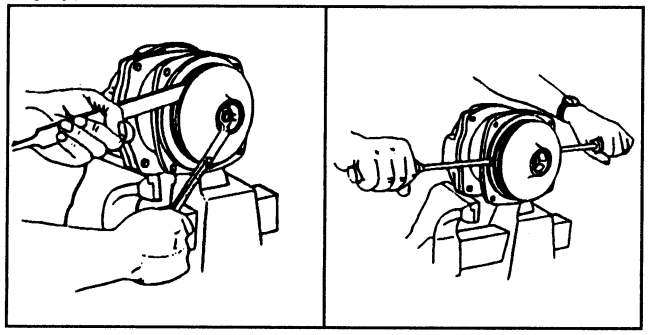


FIG. 6

3. Once nut is removed, place a screwdriver on each side (FIG 6)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 for easier removal of seal. Using two screwdrivers positioned opposite each other, pry the rotary portion of the seal from the shaft. See FIG. 7.

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.

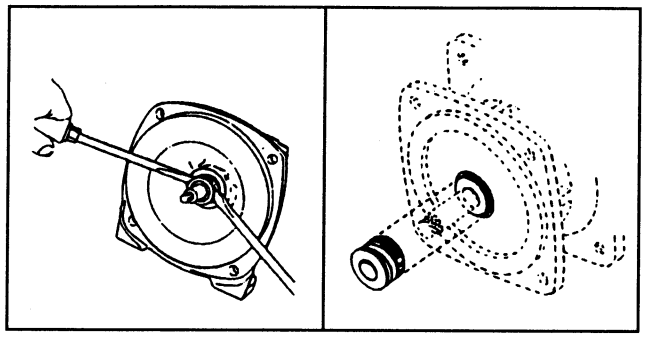


FIG. 7.

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 id 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 WD-40, LPS, or equivalent.

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 firmly and squarely. Lubricate sealing surface on seal after it is sealed.

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. See FIG. 7.

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 if worn or damaged.

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

MAINTENANCE
TROUBLESHOOTING THE 93-1027 SOLENOID VALVE

CONDITION	POSSIBLE CAUSES	SOLUTIONS
1. Valve won't open	**A.** Insufficient electrical power to valve	Check and clean electrical connections. Inspect electrical system. Voltage should be no less than 12 volts DC at coil.
	B. Stem movement restricted	Manually activate stem by pushing on lower diaphragm piston. If more than 5 lbs. of force is required to move stem, check lower outlet for obstructions. If no obstructions, remove coil and inspect armature and armature stop. If corrosion is found, disassemble valve, inspect and clean all parts. Apply a light coat of mineral oil on corroded parts after cleaning.
	C. Stroke too long	Reset stroke according to instructions.
	D. Coil failure	Check coil. Resistance should be approximately 6 ohms.
2. Valve won't shut off	**A.** Pressure too high	Maximum pressure at valve should not exceed 65 psi.
	B. Power on at valve	Disconnect one wire from valve. If valve shuts off, check electrical system.
	C. Stem movement restricted	Manually activate stem by pushing on lower diaphragm piston. If more than 5 lbs. of force is required to move stem, check upper outlet for obstructions. If no obstructions, remove coil and inspect armature and armature stop. If corrosion is found, disassemble valve, inspect and clean all parts. Apply a light coat of mineral oil on corroded parts after cleaning.
	D. Seat washer blown out of retainer or worn	Disassemble valve and inspect seat washer and diaphragms for damage. Replace if necessary.
	E. Seat washer worn or damaged	Disassemble valve and inspect body seat for damage. Replace if necessary.
	F. Stem bent from over tightening	Disassemble valve and assemble all internal stem components minus the diaphragms and body. Hand tighten. Roll stem assembly across a flat surface, if stem "wobbles" replace all stem components.
3. Leakage around coil or lower diaphragm piston.	**A.** Ruptured diaphragms	Disassemble and replace diaphragms.
4. Blowing fuses	**A.** Short circuit in power	Check and clean electrical connections. Inspect electrical system.
	B. Short within the coil	Remove connections from coil and activate switch, making sure connections don't touch. If fuse doesn't blow, replace coil.

MAINTENANCE

IMPORTANT: BEFORE PERFORMING ANY MAINTENANCE, MAKE SURE ELECTRICAL POWER TO THE COIL IS SHUT OFF AND LINE PRESSURE IS RELIEVED.

See parts drawing on page 13 for reference numbers in parentheses ( ).

TO REPLACE COIL ONLY:

1. Shut off power to coil and disconnect wires from terminals.

2. Remove two Screws (2) from top of Coil Cover (3). Lift off Coil (5) and replace with new Coil.

3. Replace Coil Cover (3) and attach securely with the two Screws (2).

TO REPLACE DIAPHRAGMS AND SEAT WASHER:

1. Remove the four Screws (21) that secure the Bottom Plate (20) and separate Coil sub-assembly. Remove Upper and Lower Diaphragm Housings (9 & 19).

2. Remove Washer (7) and Spring (8) from Armature (10).

3. Secure hole in Armature (10) with a small tool (1/8" or allen wrench). Unscrew entire assembly with screwdriver secured in slot of Lower Diaphragm Piston (18).

NOTE: Stem/Seat/Diaphragm assembly may unscrew at Lower Diaphragm Piston (18) (see step 4) or at Armature (10) (see step 5).

4. If Lower Diaphragm Piston (18) unscrews, remove Diaphragm (12), then slide Seat Washer Retainer (13) off and remove Seat Washer (14). Inspect and replace as necessary. Remaining Seat/Upper Diaphragm assembly may be removed from top of polypropylene Body (16) and disassembled by securing Stem (17) through the hole seen through the inlet port with a small round tool (3/32" or smaller allen wrench works well), unscrewing the Armature (10) and removing the Diaphragm (12) from the Seat Washer Retainer (13).

5. If Armature (10) unscrews, remove along with the Diaphragm (12) and the Seat Washer Retainer (13). Disassemble by securing stem (17) through the hole seen through the inlet port with a small tool (3/32" or smaller allen wrench works well), and using a screwdriver in slot of Lower Diaphragm Piston (18). Removal of Stem (17) from Seat Washer Retainer (13) is necessary to free Spacer (15) for removal of Seat Washer (14).

NOTE: While seat washer retainers and stem are removed from valve body, examine valve seats in body for nicks and/or roughness that may cause valve to leak.

TO REASSEMBLE:

1. Reassemble Seat Washer Retainer (13), Seat Washer (14) and Spacer (15) and slide onto one end of Stem (17).

2. Reassemble Upper Diaphragm (12) with "Fluid Side" marking facing valve body, and Armature (10) onto Stem (17).

3. Reassemble remaining Seat Washer Retainer (13), Seat Washer (14), and Spacer (15) then slide onto the other end of stem. Screw Lower Diaphragm Piston (18) with Diaphragm (12) in proper sequence into bottom end of stem assembly. Tighten Stem assembly using hole in the Armature (10) and the slot of the Lower Diaphragm Piston (18).

4. Reinstall Spring (8) over Armature (10) and Washer (7). Place Upper Diaphragm Housing (9) over Armature, Spring and Washer. Place Coil assembly (5) on top of Upper Diaphragm Housing (9).

5. Position polypropylene Body sub-assembly together as before disassembly.

6. Replace Lower Diaphragm Housing (19) and Bottom Plate (20). Secure Coil sub-assembly, Body sub-assembly and Bottom Plate using four Screws (21). Care must be exercised to uniformly tighten the Retaining Screws (21).

7. Replace electrical connections. There is no positive or negative terminal.

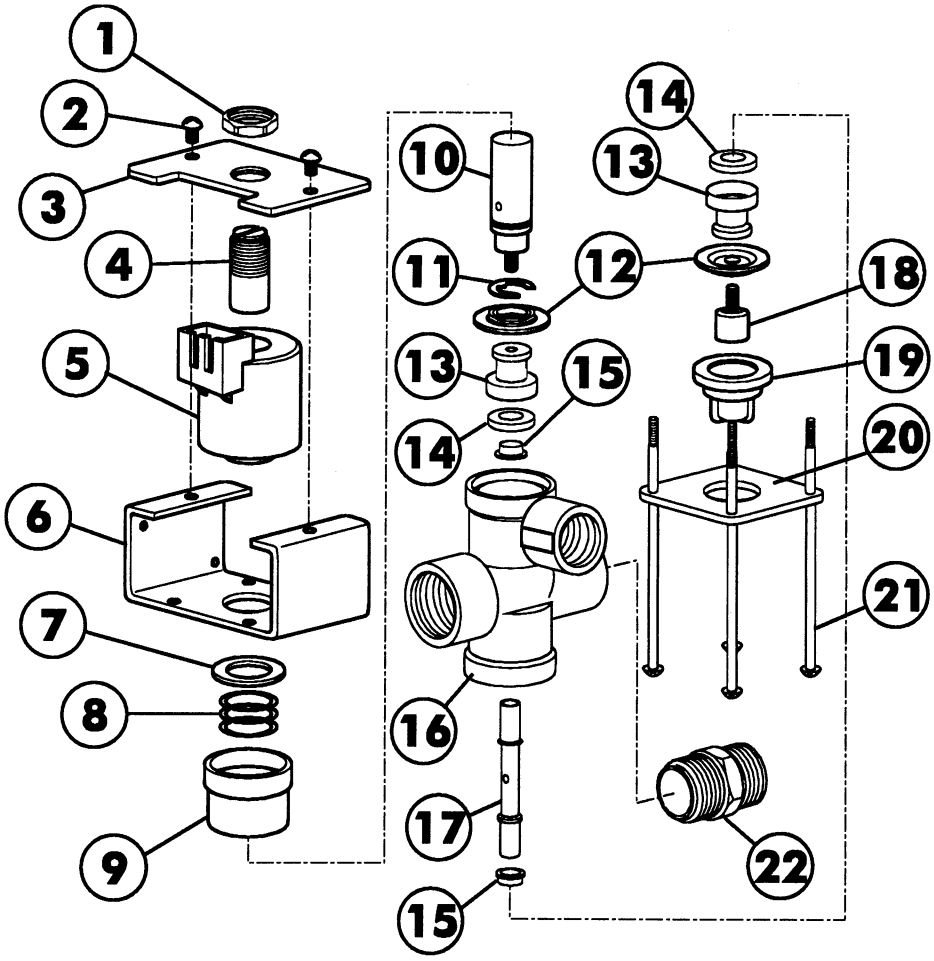
IF STROKE ADJUSTMENT IS NEEDED:

1. Unscrew Jam Nut (1). Push up on Lower Diaphragm Piston (18) until Seat Washer contacts body seating surface.

2. While holding Lower Diaphragm Piston up, turn Armature Stop (4) in until it just makes contact with Armature (10).

3. Turn Armature Stop (4) out 1/8 turn and lock with Jam Nut (1).

SOLENOID VALVE (93-1027)



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 pump. Mix according to 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 the 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 th 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, the motorized control valve, and the electric solenoids if the water is not drained completely!

SERVICING AFTER STORAGE:

Flush the entire spraying system with clean 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.

NOTES:

The Toro Promise
A One Year Limited Warranty

The Toro Company promises to repair your Model 41120 Standard Electric Spray System for the Multi-pro™ 1100 Vehicle if defective in materials or workmanship. The following time periods from the date of purchase apply special warranty terms, on certain components, may be offered through The Toro Company by the component manufacturers:

Commercial Products.....1 Year

The cost of parts, labor and transportation are included.

If you feel your TORO Product is defective and wish to rely on The Toro Promise, the following procedure is recommended:

1. Contact your Authorized TORO Distributor or Commercial Dealer (the Yellow Pages of your telephone directory is a good reference source).

2. The TORO Distributor or Commercial Dealer will advise you on the arrangements that can be made to inspect and repair your product.

3. The TORO Distributor or Commercial Dealer will inspect the product and advise you whether the product is defective and, if so, make all repairs necessary to correct the defect without an extra charge to you.

If for any reason you are dissatisfied with the distributor's analysis of the defect or the service performed, you may contact us.

Write:

TORO Commercial Products Service Department
8111 Lyndale Avenue South
Bloomington, MN 55420-1196

The above remedy of product defects through repair by an Authorized TORO Distributor or Commercial Dealer is the purchaser's sole remedy for any defect.

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 limitation may not apply to you.

This Warranty applies only to parts or components which are defective and does not cover repairs necessary due to normal wear, misuse, accidents, or lack of proper maintenance. Regular, routine maintenance of the unit to keep it in proper operating condition is the responsibility of the owner.

All warranty repairs reimbursable under The Toro Promise must be performed by an Authorized Toro Commercial Dealer or Distributor using Toro approved replacement parts.

Repairs or attempted repairs by anyone other than an Authorized TORO Distributor or Commercial Dealer are not reimbursable under The TORO Promise. In addition, these unauthorized repair attempts may result in additional malfunctions, the correction of which is not covered by warranty.

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 EQUIPMENT 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.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

COUNTRIES OTHER THAN THE UNITED STATES OR CANADA

Customers who have purchased TORO products exported from the United States or Canada should contact their TORO Distributor (Dealer) to obtain guarantee policies for your country, province, or state. If for any reason you are dissatisfied with your Distributor's service or have difficulty obtaining guarantee information, contact the TORO importer. If all other remedies fail, you may contact us at The Toro Company.

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