

# TORO®

## Multi Pro® 5500 Turf Sprayer Service Guide

Model 41564

FORM NO. 96-907-SL

Refer to Vehicle and Pro Control Operator and Service Manuals and follow all SAFETY Instructions.



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<b>Table Of Contents</b>	<b>Page</b>
<b>Accessories</b>	<b>1</b>
<b>Theory Of Operation</b>	<b>2</b>
<b>Spray System Flow Diagrams</b>	
<b>Standard Spray System</b>	<b>8</b>
<b>Spray System With Pro Control <sup>TM</sup></b>	<b>9</b>
<b>Electrical Diagrams</b>	
<b>Vehicle</b>	<b>10</b>
<b>Spray System (sn. 60229 and below)</b>	<b>11</b>
<b>Spray System (sn. 60230 and above)</b>	<b>12</b>
<b>Sprayer Set Up</b>	
<b>Programming Guide</b>	<b>13</b>
<b>Nozzle Charts &amp; Formulas</b>	<b>15</b>
<b>Setup and Performance Verification Charts</b>	<b>20</b>
<b>Troubleshooting and Service Guide</b>	
<b>Standard Sprayer System Troubleshooting</b>	<b>32</b>
<b>Pro Control System Troubleshooting</b>	<b>34</b>
<b>Flow Meter Cable Test</b>	<b>36</b>
<b>Flow Meter Maintenance and Adjustment</b>	<b>36</b>
<b>Flow Meter Re-Calibration</b>	<b>37</b>
<b>Centrifugal Pump Service</b>	<b>38</b>
<b>Centrifugal Pump Seal Troubleshooting</b>	<b>39</b>
<b>Solenoid Valve Troubleshooting</b>	<b>40</b>
<b>Solenoid Valve Service</b>	<b>41</b>
<b>Preventative Maintenance</b>	<b>43</b>
<b>Maintenance Schedule</b>	
<b>Equipment Maintenance and Service Report</b>	<b>44</b>
<b>Jacking Vehicle</b>	<b>48</b>
<b>Lubrication</b>	<b>49</b>
<b>Air Cleaner Maintenance</b>	<b>50</b>
<b>Engine Maintenance</b>	<b>51</b>
<b>Cooling System maintenance</b>	<b>53</b>

## **Maintenance Schedule Continued**

<b>Belt Maintenance</b>	<b>54</b>
<b>Hydraulic System Maintenance</b>	<b>55</b>
<b>Hydraulic System Flow Diagrams</b>	<b>56</b>
<b>Hydraulic System Test Points</b>	<b>58</b>
<b>Brake Adjustment</b>	<b>59</b>
<b>Throttle Lever Tension</b>	<b>59</b>
<b>Electrical Maintenance</b>	<b>60</b>
<b>Axle Maintenance</b>	
<b>Planetary Gear Oil</b>	<b>61</b>
<b>Front Wheel Toe-In</b>	<b>61</b>
<b>Traction Drive Linkage Maintenance</b>	<b>62</b>
<b>Traction Pedal &amp; Transmission Neutral Adjustment</b>	<b>63</b>
<b>Speedometer Sensor Installation</b>	<b>64</b>
<b>Neutral Lockout Switch Adjustment</b>	<b>65</b>
<b>Towing (Dump Valve)</b>	<b>66</b>
<b>Storage</b>	<b>37 + 67</b>

## **Multi Pro 5500 Accessories**

### **Multi Pro 5500 Requirements**

<b>Center Boom Kit</b>	<b>41020</b>
<b>Extension Pipes</b>	<b>41021</b>
<b>or</b>	
<b>Single Nozzle Kit (Boomless Sprayer)</b>	<b>41024</b>

### **Multi Pro 5500 Options**

<b>Pro Control</b>	<b>41083</b>
<b>Sonic Boom Kit (Req. 41030 Lift Kit)</b>	<b>41036</b>
<b>Electric Boom Lift Kit</b>	<b>41030</b>
<b>Hydraulic Lift Cargo Bed</b>	<b>41560</b>
<b>PA-17 Spreader (Req. 41552 Mount Kit)</b>	<b>41150</b>
<b>PA-17 Mount Kit for Multi.Pro 5500</b>	<b>41552</b>
<b>Foam marker Kit</b>	<b>41574</b>
<b>Pro Foam Concentrate</b>	<b>41048</b>
<b>Analog Speedometer</b>	<b>41571</b>
<b>Enclosed Boom</b>	<b>41357</b>
<b>Electric Hose Reel Kit, W/O R.O.P.S.</b>	<b>41026</b>
<b>Electric Hose Reel Kit, For All 5500s</b>	<b>41565</b>
<b>(New For 1997)</b>	
<b>Hand Gun Kit</b>	<b>41022</b>
<b>Topdresser</b>	<b>41570</b>

**R.O.P.S. New In Jan. 1997**



# **Multi Pro® 5500**

## **Vehicle Theory of Operation**

**4 Cylinder 1.3 Liter Gasoline Engine**

**Rear Wheel Hydrostatic/Planetary Drive**

**Hydrostatic Braking**

**Wet Brake For Parking/Emergency**

**Hydraulic Driven Centrifugal Pump**

### **Electrical Operation:**

The system's electrical power is activated by turning the Key Switch to its "ON" position. 12 volts D.C. energizes the Accessory Solenoid. This energizes the main electrical components of the vehicle. The headlights and Pro Control Console (if installed) are powered by the battery at all times. The vehicle's 30 amp main fuse provides protection for the headlights, gauges, speed control, and engine. The Hydraulic Control Valve and the Solenoid Valves are fused by the 20 amp spray system fuse in the fuse block. Accessories are fused individually through dedicated fuses located in the fuse block. The fuse block and Accessory Solenoid are located under the drivers seat.

The speed control has an additional 5 amp fuse in its wiring harness. The Pro Control is protected by its own 5 amp fuse. The electrical system is powered by a 51 amp alternator.

Turning the ignition key to the start position energizes the engine Starter Solenoid through the Neutral Start Switch on the Hydraulic Piston Pump, which in turn energizes the Starter Motor. The Traction Pedal must be in a neutral position to start the engine.

### **Engine:**

A Manual Choke is located in the front seat box panel. Pull out the Choke when starting a cold engine. Push in when engine has reached a warm running temperature. The throttle is located in the center console. It should be in the 1/3 fast position to start the engine.

## **Hydraulic Operation:**

The gasoline engine is the originating source of mechanical power. It is directly coupled to the Servo Controlled Piston Pump, Charge Pump, and Gear Pump.

The Servo Controlled Piston Pump is directly coupled to the gasoline engine.

The Charge Pump is direct coupled, "Piggy-Backed", to the Piston pump to form the Hydraulic Transmission.

The Gear Pump is direct coupled, "Piggy-Backed", to the Charge Pump.

The Piston Motors are connected to the Piston Pump by Hydraulic lines. Each Piston Motor, Wet Brake and Planetary Drive assembly are directly coupled to each other via a common Splined Brake Shaft.

The Charge Pump generates the (250 - 300 P.S.I.) "*Charge Pressure*" that provides the initial fluid flow through the Piston Pump. The Piston Pump generates the (0 - 4,000 P.S.I.) "*System Pressure*" to drive the Piston Motors. The Piston Motors drive the Planetary Gear Drives.

The Gear Pump generates the (0 - 1,500 P.S.I.) "*Operating Pressure*". To provide power for the Power Steering system and auxiliary components. A primary flow section is used to drive the Power Steering system. It generates a constant 3 G.P.M. up to 1,000 P.S.I.. A secondary section is used to drive the auxiliary components such as a Spray Pump Motor or a Dump Bed.

Internal pressure relief valves divert excess pressure to the case drain in the Piston Pump and Charge Pump. The Gear Pump has two relief valves. One is internal and is in the primary flow section. A second external Relief Valve is located on the left side of the Piston Pump.

## **Vehicle Motion:**

Forward or reverse movement and braking are selected by the operator.

Depressing the top of the Traction Pedal towards the front of the vehicle will shift the Piston Pump's Servo valve allowing pressurized fluid to flow from the Charge Pump, causing the Camplate to pivot. The angle of the Camplate changes the displacement of the piston group. The pistons move hydraulic fluid creating a larger volume and pressure of fluid flow.

Fluid flow from the Piston Pump is fed through each Piston Motor and causes its piston group to rotate. The rotating piston group is directly connected to an output drive shaft. The Piston Motor's drive shaft is connected to a Planetary Drive. The Planetary Drive rotates the rear wheel moving the vehicle forward. Resistance of the drive system causes pressure to build in the system.

Vehicle speed is increased by increasing the angle on the Camplate, in the Piston Pump, which causes a larger stroke of the pistons and a greater fluid flow to the Piston Motors. Each rear wheel has its own drive assembly.

Depressing the tail of the Traction Pedal down towards the floor will cause the Servo to move in the opposite direction. This causes fluid to flow in the Piston Pump and the Piston Motors, in the opposite direction, and move the vehicle in reverse.

For the Hydraulic pumps to generate their maximum pressure and flow rates, the gasoline engine's maximum speed must be set at  $3,200 \pm 50$  RPM.

A Hydraulic filter is located in the charge pump circuit to cleanse the hydraulic fluid.

An Oil Cooler is located in front of the engine radiator to provide hydraulic fluid cooling.

### **Braking:**

Allowing the Traction Pedal to return to a neutral position will cause dynamic braking to occur. Depressing the Brake Pedal will activate the Wet Brake and cause the vehicle to cease movement more rapidly.

Dynamic Hydrostatic Braking is accomplished by the equalization of fluid flowing through the forward and reverse drivetrain hydraulic paths. This causes the Piston Motor fluid flow to become equalized and slow to a stop, the motion in the Piston Motors. With equal fluid flow through the Piston Motors the vehicle is in a stopped condition.

The Parking/Emergency Brake is a Wet Brake. The Wet Brake is a mechanical brake actuated by a Foot Pedal via cables. A Brake Lock is provided to maintain Braking while the vehicle is at rest.

### **Steering:**

The Power Steering system consists of a Steering Control Unit and a Hydraulic Cylinder. The Control Unit receives its hydraulic pressure from the primary section of the Gear Pump. It directs fluid flow through a Hydraulic Cylinder connected to the steering linkage for left or right front wheel movement. The operator activates the Control Unit manually via a Steering Wheel. A constant flow of 3 G.P.M. is routed through the Power Steering system. The Flow is used to move the Hydraulic Cylinder for steering movement or diverted to the hydraulic tank.

### **Speed Control:**

The Speed Control circuit is activated by moving the on/off toggle switch to its "ON" position. At the selected speed, depressing the Enable Button will activate an electronic circuit energizing the Electric Clutch. The Electric Clutch will hold the Traction Pedal in the selected position. An indicator light on the Dash will illuminate when the Electric Clutch is energized. Turning off the toggle switch or



depressing the brake will disengage the Speed Control. A switch on the Brake Pedal is dedicated to the speed control circuit. The speed Control system is fused by the main 30 Amp fuse and a 5 Amp fuse located in its wiring harness under the Dash Panel.

### **Operator Gauges:**

The Operator is supplied with gauges and lights on the Instrument Panel to monitor Vehicle and Sprayer operation and performance.

## **Standard Sprayer Theory of Operation**

Hydraulic fluid generated by the Gear Pump passes through the Directional Valve, through the Hydraulic Control Valve then to the Hydraulic Pump Motor to drive the centrifugal pump to generate sprayer pressure. This system will generate a minimum of 80 P.S.I. static spray pressure.

The Directional Valve is a hydraulic on/off switch for the centrifugal pump. The Hydraulic Control Valve is a variable flow valve. It controls the speed of the Hydraulic Motor on the centrifugal pump.

The Hydraulic Motor transforms hydraulic fluid flow into direct rotating motion to drive the centrifugal spray pump. The normal setting for the Hydraulic Motor's bypass valve is fully seated, clockwise. This is necessary to achieve proper sprayer performance.

Turning "ON" the Pump Switch energizes the Directional Valve with 12 volts D.C. .

The three position Pressure Adjust Switch energizes a bi-directional electrical motor inside the Hydraulic Control Valve. The motor turns a variable fluid valve to regulate fluid flow to the Hydraulic Motor. The amount of fluid flow to the Hydraulic Motor is proportional to the Motor's speed. The Hydraulic Motor is directly coupled to the centrifugal sprayer pump. It therefore generates a spray pressure related to the speed of the Hydraulic Motor.

Four 12 volt D.C. Solenoid Valves control the chemical flow from the Centrifugal Pump through the booms and agitation ports. Toggle switches on the center console control the Solenoid Valves individually. The Master Boom switch and Remote Master Foot Switch control the three boom Solenoid Valves as a group.

On units with serial numbers 60229 and below, the Pressure Adjust Switch will become active, when the Master Boom and the Remote Master Foot switches are in their "ON" condition. The 16 pin plug in the sprayer wiring harness must be connected to a dust cap (jumper plug) or to a Pro Control Console. If the Pro

Control option is used, its "Flow Control" switch must be set to its "Manual" position.

On serial numbered units 60230 and greater, the Pressure Adjust Switch is active when the 16 pin plug in the sprayer wiring harness is connected to a dust cap (jumper plug) or to a Pro Control Console. If a Pro Control is used then the Pro Control must be set in the manual mode.

Check valves on each nozzle are preset to 10 P.S.I.. Spray pressure must exceed 10 P.S.I. to begin application of product. The check valves control weeping at the nozzles.

### **Agitation:**

Chemical agitation is achieved by routing tank solution directly from the centrifugal pump through a controlling solenoid valve then to three Jet Agitators located inside the chemical tank. The 12 volt agitation solenoid valve is manually controlled by a toggle switch on the Center Control Console.

Agitation rate is achieved by the use of varying sizes of orifices. They are located inside the three Jet Agitators. The 1/8th inch orifice is the standard size.

The use of a high foaming chemical can introduce large amounts of air into the tank's solution. This can cause a fluctuation in fluid flow through the sprayer system at a low tank volumes. Under this condition, suspending the use of agitation will normalize the solution and allow for its complete and accurate use.

## **Pro Control <sup>TM</sup> Sprayer Theory of Operation**

The Pro Control is a computer based application system. It is designed to regulate the Sprayer's fluid flow to provide accurate applications under varying conditions.

The Pro Control receives input signals from the Wheel Speed Sensor, Flow Meter and Boom Switches 1, 2, and 3. Programming from the operator is held in memory even after power is removed. Based on the proper nozzle size, programmed data and its input signals, the Pro Control will accurately control the output of applied chemical. This is accomplished by controlling the Centrifugal Pump speed via the Hydraulic Control Valve, thus automatically compensating for varying speeds and any number of activated booms.

The Flow Meter generates a signal proportional to the volume of chemical being delivered to the booms. The Speed sensor generates a signal proportional to the speed of the vehicle. In the "ON" position, 12 volts D.C. from each boom toggle switch is sent to the control console and each corresponding Solenoid Valve. These signals are mandatory for the Control Console to compensate for a varying number of activated booms. *NOTE: The solenoid valves are powered through the boom*

*switches and are fused through the main 30 amp fuse. The Pro Control Console is fused by its own 5 amp fuse.*

**This system generates spray pressure on an “As Needed Basis”. It generates only the pressure necessary to achieve the selected application rate. It would not be uncommon to monitor a spray pressure of 20 P.S.I. under a condition of slow vehicle speed, low application rate, and/or 1 boom activated.**

**With the absence of a speed signal, such as in a vehicle stopped condition, movement of the Hydraulic Control Valve is suspended. To suspend sprayer application, it is necessary to switch off the booms with one of the master boom switches. If the Vehicle is brought to gradual stop, the Pro Control will continue to adjust the Hydraulic Controls Valve until the vehicle is fully stopped. In most instances under this condition, the centrifugal pump will have minimum pressure and the check valves at each nozzle will suspend fluid flow.**

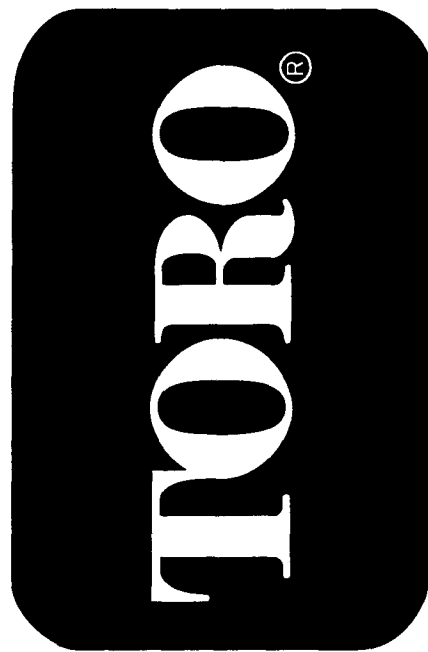
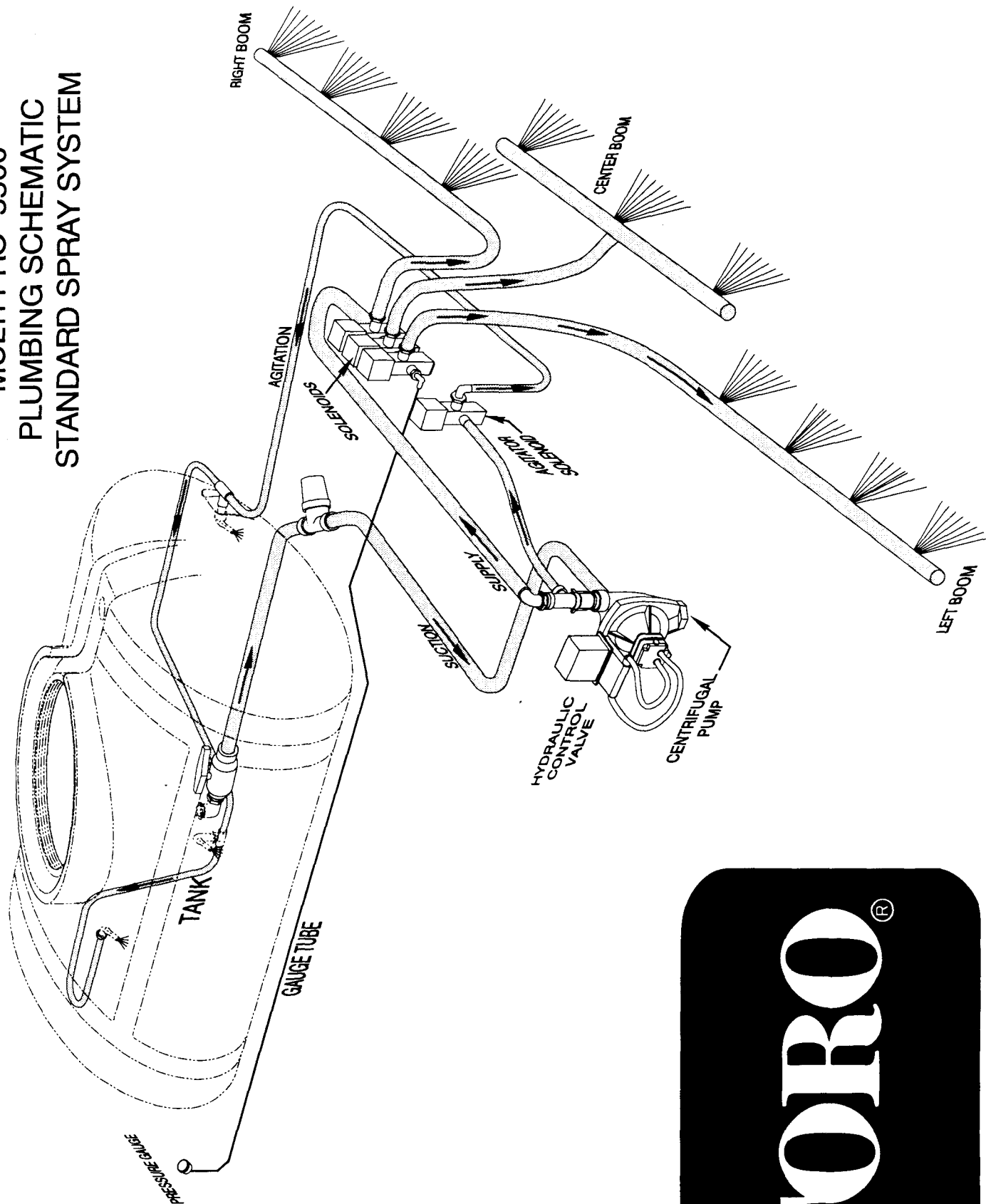
**Since the fluid supply for agitation is derived prior to the Flow Meter, fluid flow to the booms is not normally affected. The use of a high foaming chemical can introduce large amounts of air into the tank’s solution. This can cause a fluctuation in fluid flow through the sprayer system at a low tank volumes. Under this condition, suspending the use of agitation will normalize the solution and allow for its complete and accurate use.**

**Console programming and nozzle size must correlate for proper operation and to maintain system integrity.**

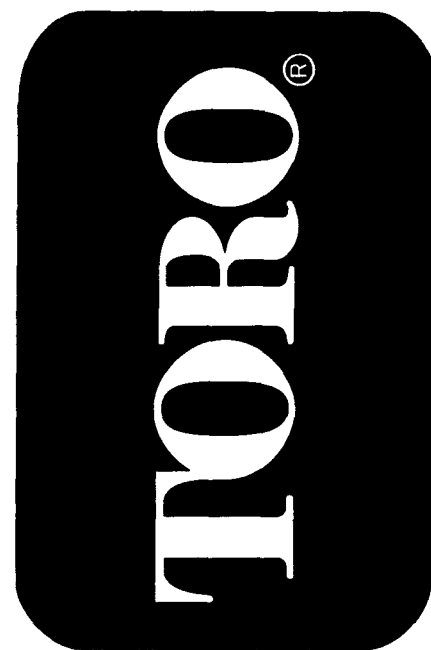
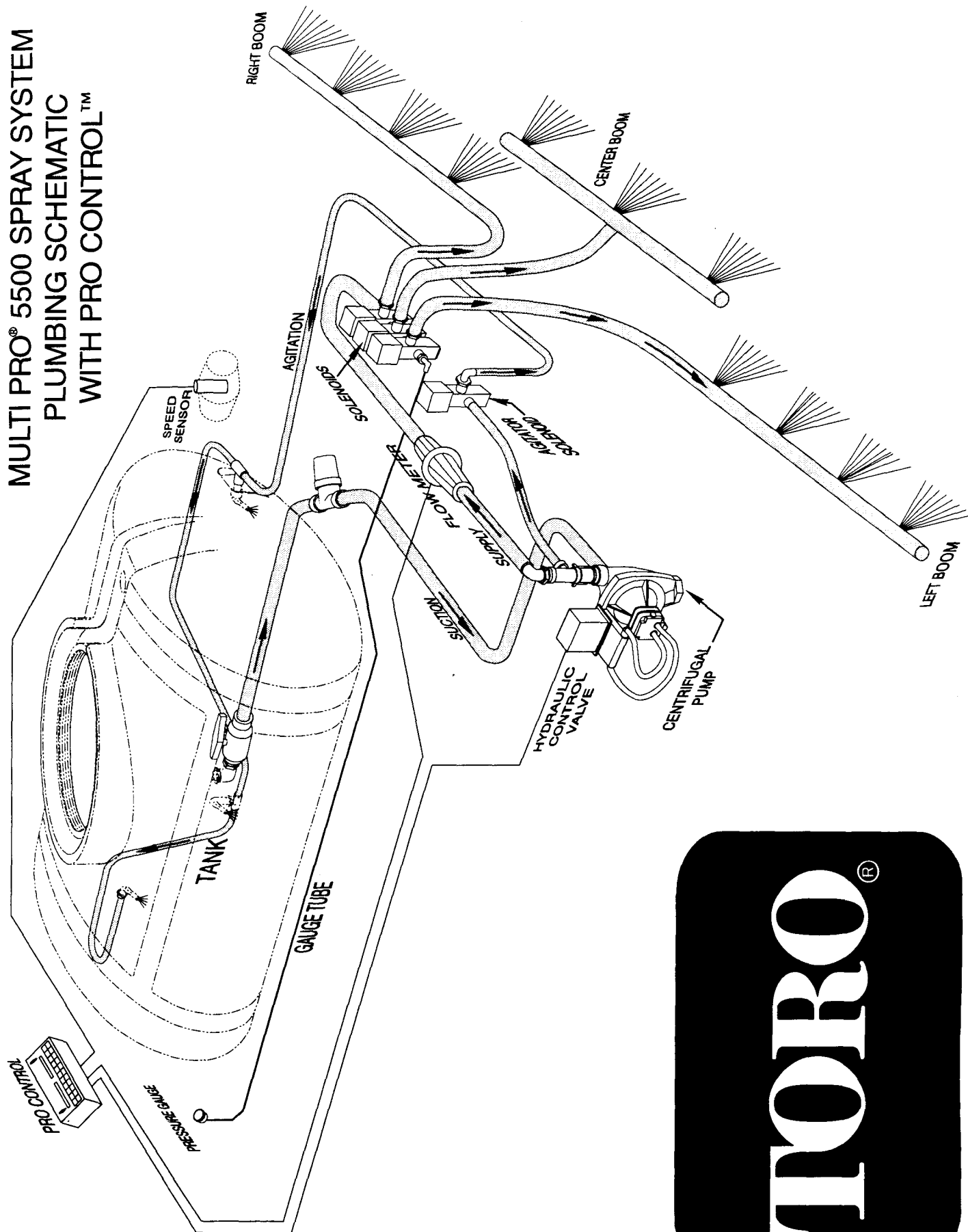
**Speed sensor programming must be set for SP-3 on the Multi Pro 5500.**

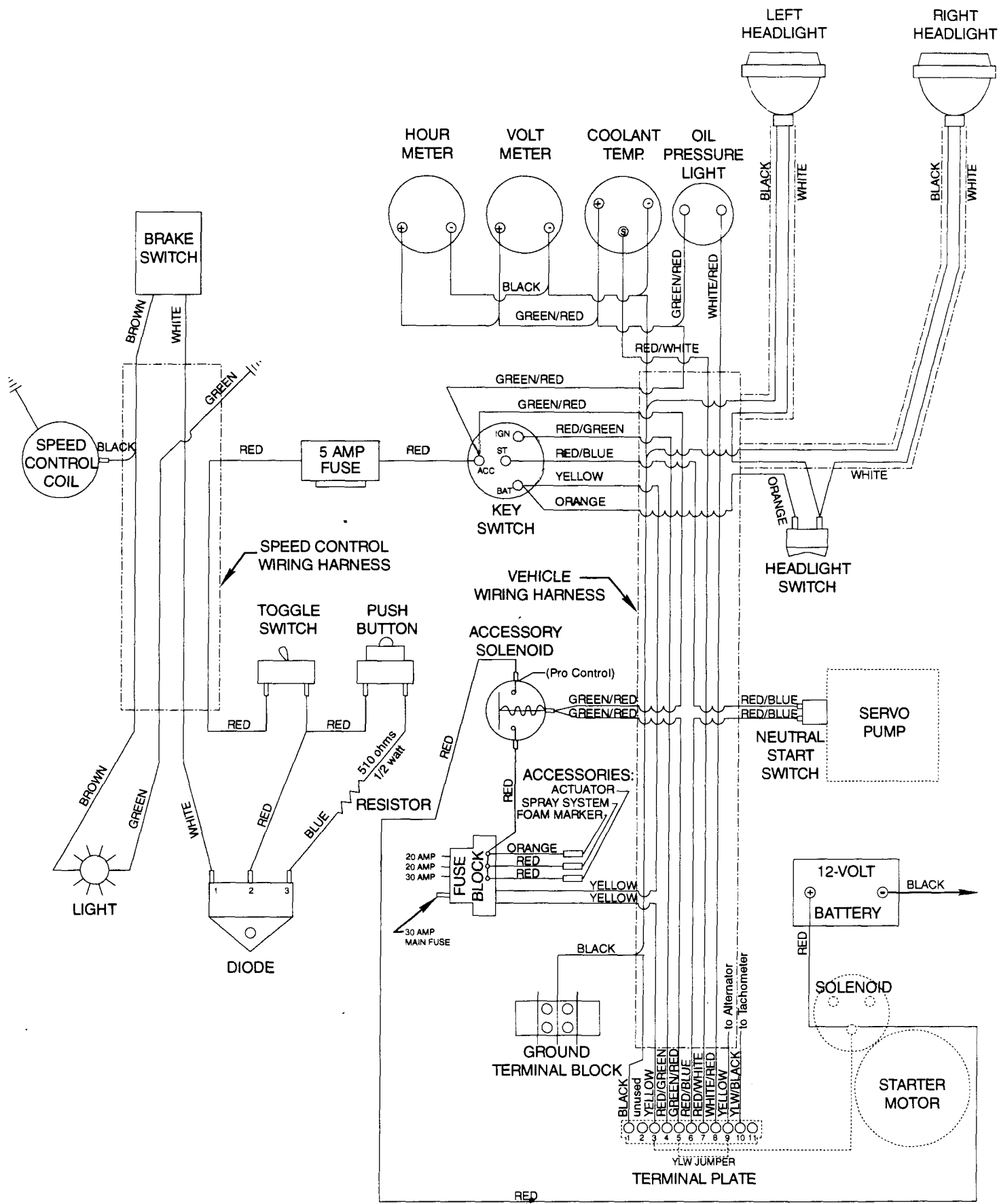
**In the event of a Console failure, the Standard Sprayer system can be reactivated. This is accomplished by removing the 16 pin plug from the Pro Control Console and replacing the dust cap (jumper) on the 16 pin plug.**

# MULTI PRO® 5500 PLUMBING SCHEMATIC STANDARD SPRAY SYSTEM



# MULTI PRO® 5500 SPRAY SYSTEM PLUMBING SCHEMATIC WITH PRO CONTROL™

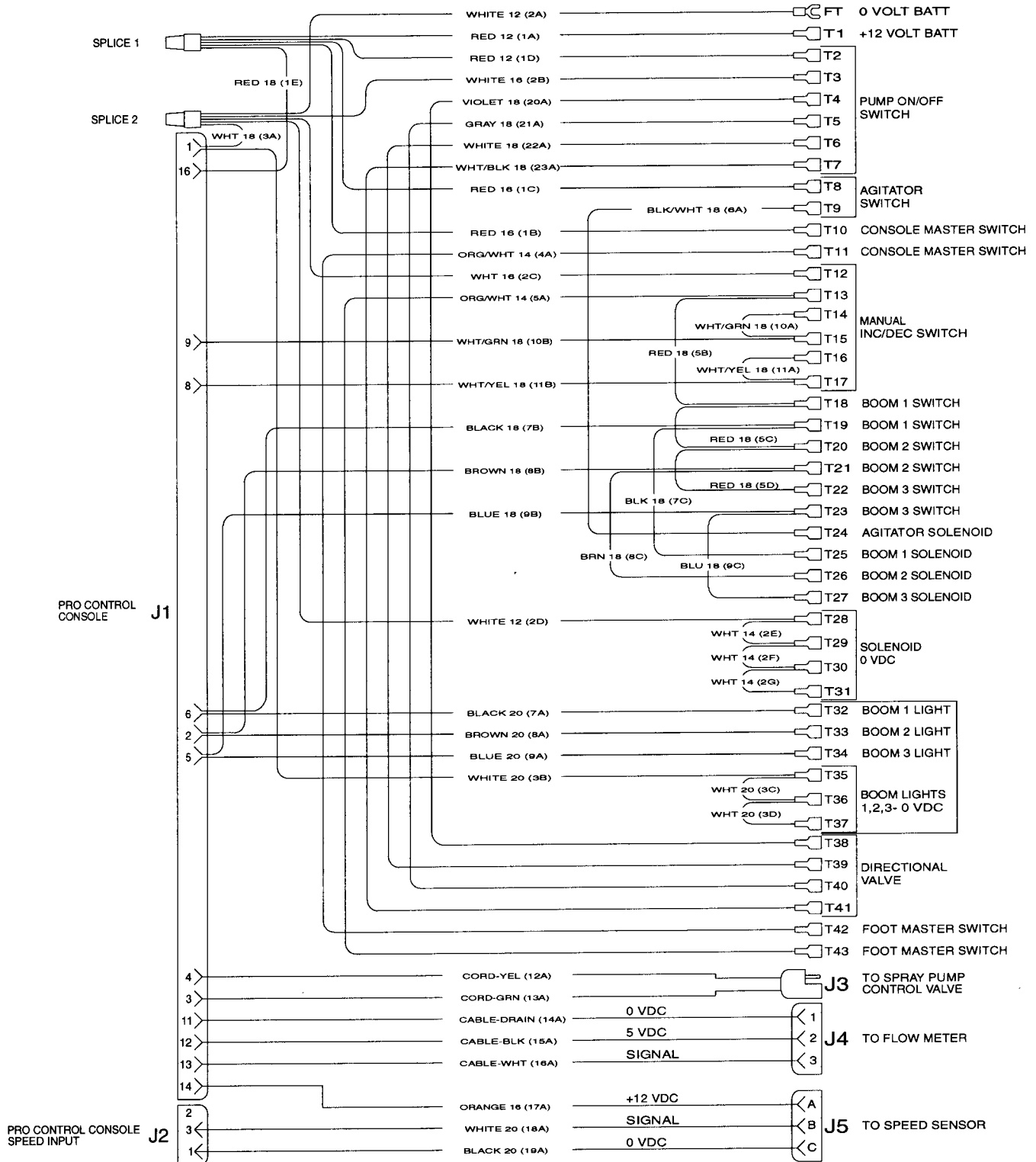




# SPRAY SYSTEM ELECTRICAL DIAGRAM

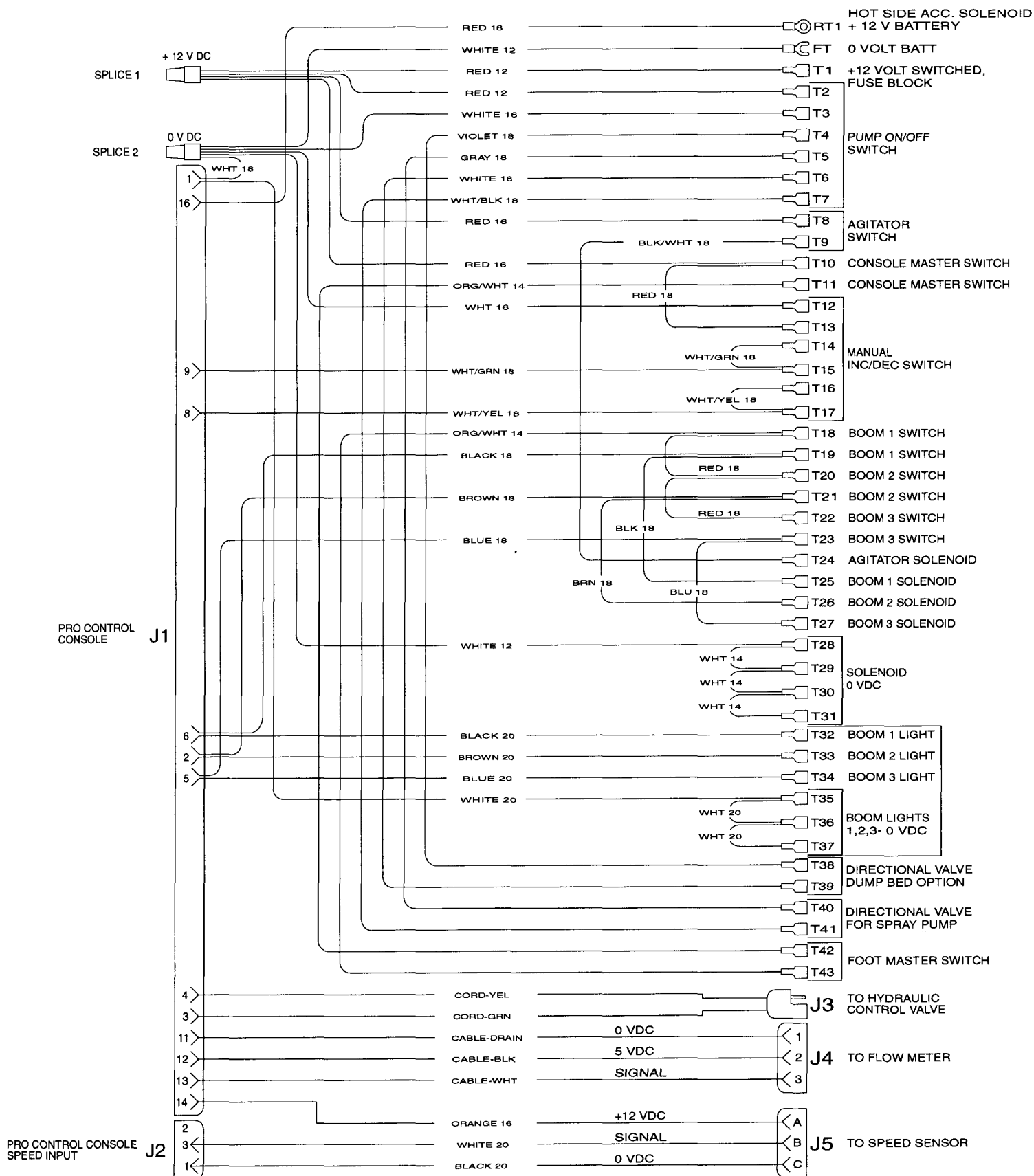
## MULTI PRO 5500

### SERIAL NUMBER 60229 And BELOW



# SPRAY SYSTEM ELECTRICAL DIAGRAM

MULTI PRO 5500 SERIAL NUMBER 60230 AND UP






# MULTI PRO 5500

## INITIAL CONSOLE PROGRAMMING



When you first turn on Console power, after all installation procedures have been completed, the Console will flash "CAL" in the RATE display. This means you must "calibrate" or program the Console before it can be operated. (This is a one-time operation which does not have to be repeated. Turning OFF the POWER ON/OFF Switch does not affect the Console memory. All data is retained.)

**The following steps must be followed:**

If an entry selection error is made during steps 1, 2 or 3, the Console can be reset by turning power switch off, depress and hold  and turn the power switch on at the same time.



### **Step 1**

Selecting US (Acres), SI (Hectares), or TU (1,000 Sq... Ft.)

- (a) Momentarily depress  until you reach the desired setting (US, SI or TU).
- (b) Once the desired setting has been reached, momentarily depress  to lock in your selection. The DATA display will now display SP1.

### **Step 2**

Select Wheel Drive SP3.

- (a) Momentarily depress  until you reach the desired setting of SP3.
- (b) Once the desired setting has been reached, momentarily depress  to lock in your selection.

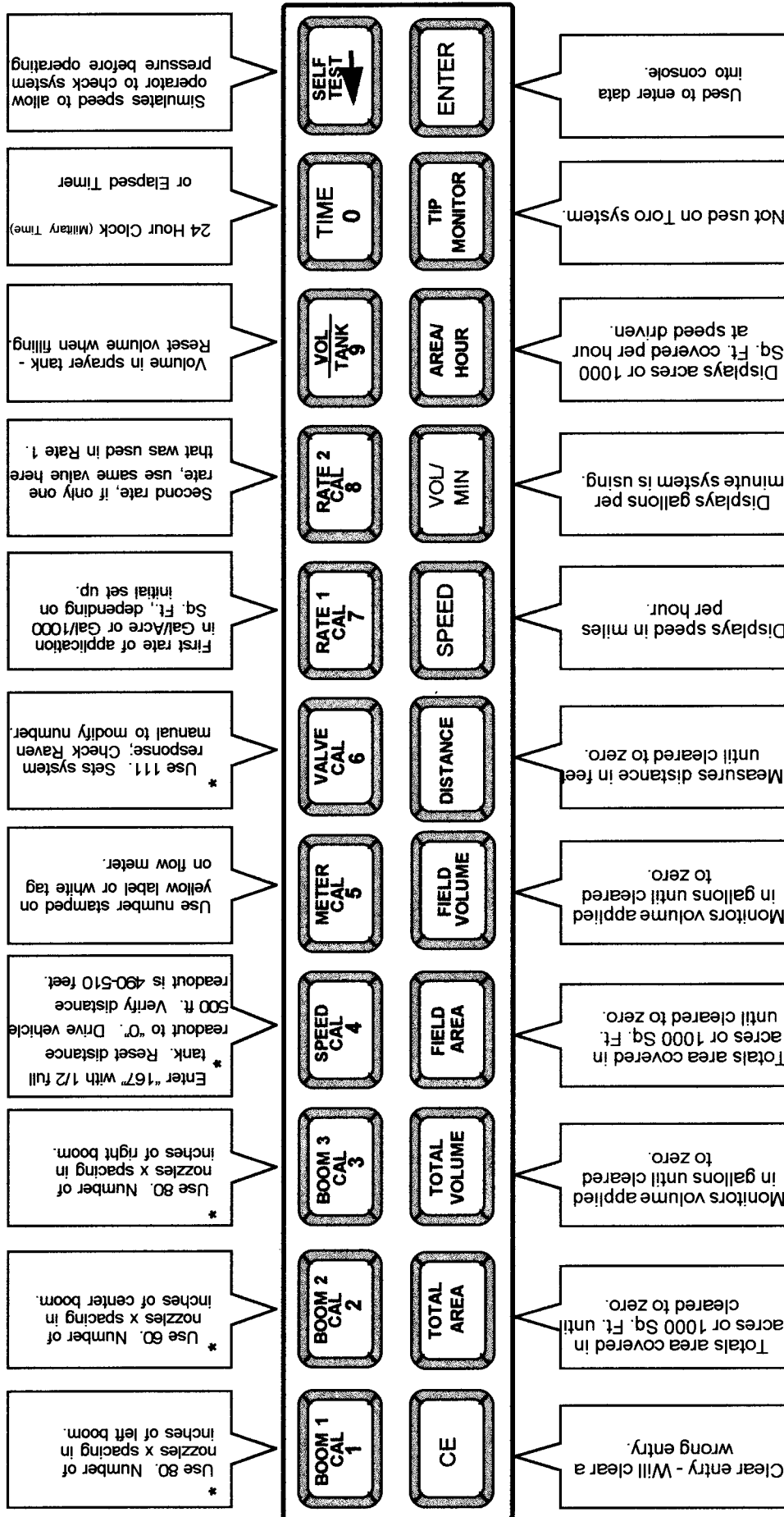
### **Step 3**

Set the control switch on the hydraulic control valve to "F" (fast) position. (The hydraulic control valve is the blue or black plastic box mounted on top of the centrifugal pump behind the left rear wheel).

*Refer to page 2 to complete console programming.*

# MULTI PRO 5500 PRO CONTROL SPRAY SYSTEM

**\*Calibration numbers listed are for reference only. Before spraying, check your sprayer to confirm the numbers used are correct.**



## Programming

- (1) Depress the key in which you wish to enter data (i.e. "Boom 1 Cal", "Speed Cal", etc.)
- (2) Depress ENTER.
- (3) Depress the keys corresponding to the number you wish to enter (i.e. "2", "4", etc.)
- (4) Complete the entry by again depressing the ENTER key.



## BEFORE SPRAYING

### NOZZLE SELECTION GPA/GAL/1000 FT<sup>2</sup>

See the nozzle chart below 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 or gallons per 1000 sq. ft.
2. Average Vehicle speed in Miles 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 to the right. Then select the proper nozzle from the chart below.

#### EXAMPLE (GPA FORMULA)

Application Rate = 75 Gallons/Acre

Vehicle Speed = 4 M.P.H.

Nozzle Spacing = 20 inches

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

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

#### EXAMPLE (GAL/1000 FT<sup>2</sup> FORMULA):

Application Rate = 1.70 Gal./1000 sq. ft.

Vehicle Speed = 4 M.P.H.

Nozzle Spacing = 20 inches

$$\frac{1.70 \text{ GAL/1000 FT}^2 \times 4 \text{ M.P.H.} \times 20}{137} = 1.00 \text{ G.P.M. (per nozzle)}$$

## NOZZLE SELECTION CHART

### GPA AND GAL/1000 FT<sup>2</sup> 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
93-6428	RA-2	20	0.14	14	10.5	8.4	7	0.32	0.29	0.19	0.16
	120°	30	0.17	17.2	12.9	10.3	8.6	0.39	0.30	0.24	0.20
	¼"	40	0.20	19.8	14.9	11.9	9.9	0.45	0.39	0.27	0.23
	Grey	50	0.22	22.2	16.6	13.3	11.1	0.51	0.38	0.31	0.25
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
	¾"	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

## BEFORE SPRAYING

### NOZZLE SELECTION LIT/HA

See the nozzle chart below 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 to the right.

**LIT/HA (METRIC) FORMULA:**

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

Use G.P.M. (lit/min) and Pressure to select appropriate nozzle from chart below .

**EXAMPLE (LIT/HA FORMULA):**

Application Rate = 907 lit/hectare

Vehicle Speed = 5 km/h

Nozzle Spacing = 50 cm

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

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

## NOZZLE SELECTION CHART

### LIT/HA 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
93-6428	RA-2	150	0.53	131	98	76	65
	120°	200	0.64	161	121	96	80
	¼"	275	0.76	185	139	111	93
	Grey	350	0.83	208	155	124	104
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
	¾"	275	9.45	2268	1888	1418	1132
	Black	350	10.66	2558	2132	1598	1280

# SYMBOL DEFINITIONS AND CONVERSIONS:

## 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
GAL/1000 FT <sup>2</sup>	- 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)

## AREA

1 Acre = 43,560 sq. feet  
 1 square meter = 10.764 sq. feet  
 1 hectare (ha) = 2.471 acres; 10,000 sq.meters

## 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

## Formulas:

$$\text{Speed (mph)} = \frac{\text{Distance (ft.)} \times 60}{\text{Time (seconds)} \times 88}$$

$$\text{GPM per nozzle} = \frac{\text{GPA} \times \text{mph} \times w^*}{5,940}$$

$$\text{GPM per nozzle} = \frac{\text{Gal/1000ft}^2 \times \text{mph} \times w^*}{136}$$

$$\text{GPA} = \frac{5,940 \times \text{GPM (per nozzle)}}{\text{mph} \times w^*}$$

$$\text{Gal/1000ft.} = \frac{136 \times \text{GPM (per nozzle)}}{\text{mph} \times w^*}$$

\* w = Nozzle spacing in inches.

## APPLICATION FORMULAS FOR MULTI-PRO SPRAY SYSTEMS

$$\blacksquare \quad \begin{array}{l} \text{GPM} \\ \text{(Per Nozzle)} \end{array} = \frac{\text{G.P.A.} \times \text{M.P.H.} \times W^*}{5940}$$

$$\blacksquare \quad \text{G.P.A.} = \frac{5940 \times \text{G.P.M. (Per Nozzle)}}{\text{M.P.H.} \times W^*}$$

$W^*$  - Nozzle spacing in inches (in boom spraying)  
or spray swath in inches (in boomless spraying)

$$\blacksquare \quad \text{Gallons Per 1000 sq. ft.} = \frac{\text{G.P.A.}}{43.56}$$

$$\blacksquare \quad \text{Gallons Per Acre (GPA)} = \text{Gallons Per 1000 sq. ft.} \times 43.56$$

$$\blacksquare \quad \text{Speed} = \frac{\text{Distance in Feet} \times 60}{\text{Time to Complete Distance} \times 88}$$

$$\blacksquare \quad \text{Boom Width} = \text{Number of Nozzles} \times \text{Spacing in Inches}$$

$$\blacksquare \quad \text{Oz. per Acre} = \text{Pints per Acre} \times 16$$

$$\blacksquare \quad \text{Vol. per Min.} = \frac{\text{Speed} \times \text{Boom Width (in.)} \times \text{Oz. per Acre}}{5,940}$$

$$\blacksquare \quad \text{Oz. per Min} = \frac{\text{Speed} \times \text{Boom Width (in.)} \times \text{Oz. per 1000 sq. ft.}}{137}$$

**Where Does The 5,940 & 136 Come From?**

**Minutes in Hour X Inches in Foot X Sq. Ft. in Acre**  
**Feet in Mile**

$$\frac{60 \times 12 \times 43,560}{5,280} = 5,940$$

(For Acre)

**For 1,000 Square feet**

$$\frac{5,940}{43.56} = 136$$

# 1996 TORO Service Training School

## **Multi Pro 5500**

### **Standard Sprayer System**

### **Set Up For Gallons Per Acre**

Determine Desired Application Rate From Manufacturers  
Labeling \_\_\_\_\_ G.P.A.

Determine a Vehicle Application Speed of \_\_\_\_\_ M.P.H.

Verify nozzle spacing (**TORO** Sprayers are set at 20") \_\_\_\_\_"

Determine Gallons Per Minute \_\_\_\_\_ G.P.M. (See Nozzle Mfg. Chart)  
and Use The Following Formula To Verify.

$$\frac{\text{G.P.A.} \times \text{M.P.H.} \times \text{Nozzle Spacing (inches)}}{5940}$$

$$\frac{\text{_____} \times \text{_____} \times 20}{5940} = \frac{\text{_____}}{5940} = \text{_____ G.P.M.}$$

Select Nozzle Size (See Nozzle Mfg. Chart) \_\_\_\_\_ based on G.P.M.

Determine Application Pressure (See Nozzle Mfg. Chart) \_\_\_\_\_ P.S.I .



## **Set Up Spray System**

Fill tank 1/2 full with water  
Install Correct Nozzles  
Open Suction Valve Handle  
Turn ON Pump  
Turn Booms On  
Set pressure to \_\_\_\_ P.S.I.  
Visually Check Output At Nozzles  
Turn Booms and Pump Off  
Perform Rate Check

## **Rate Check**

Determine G.P.A. application rate via **1/128th Acre Method**  
Mark off a test course at 204 feet.  
Drive the Sprayer with a 1/2 full tank at \_\_\_\_ M.P.H. and time how long it takes to drive 204 feet. \_\_\_\_seconds.

Park Vehicle. **SET PARKING BRAKE.**

Turn on all Booms and maintain \_\_\_\_ P.S.I. (predetermined). Hold the graduated cylinder under the far left nozzle on the left boom. Collect the output for the same amount of time that it took to travel 204 ft..

\_\_\_\_ oz = \_\_\_\_ G.P.A.

Each ounce collected equals 1 gallon per acre application rate.

### Repeat Test For Each Nozzle

Each Nozzle Should Be Within  $\pm 5\%$  Of The Average Of All Nozzles

Replace Each Nozzle Not  $\pm 5\%$  Of The Average Range

Replace All Nozzles If Two or More Are Not Within The  $\pm 5\%$  Range

#1	oz	#1	oz
#2	oz	#2	oz
#3	oz	#3	oz
#4	oz	#4	oz
#5	oz	#5	oz
#6	oz	#6	oz
#7	oz	#7	oz
#8	oz	#8	oz
#9	oz	#9	oz
#10	oz	#10	oz
#11	oz	#11	oz
Total		Total	
$\div 11$		$\div 11$	
Average		Average	

### Calculate Range

Average \_\_\_\_\_ x .95 = \_\_\_\_\_ - 5%

Average \_\_\_\_\_ x 1.05 = \_\_\_\_\_ + 5%

# 1996 TORO Service Training School

## **Multi Pro 5500**

### **Standard Sprayer Set Up Gallons Per 1,000 sq. ft.**

Determine Desired Application Rate From Manufacturers  
Labeling \_\_\_\_\_ G.P. 1,000 sq. ft.

Determine a Vehicle Application Speed of \_\_\_\_\_ M.P.H.

Verify Nozzle Spacing (TORO Sprayers are set at 20") \_\_\_\_\_"

Determine Gallons Per Minute \_\_\_\_\_ G.P.M. ( See Nozzle Mfg. Chart)  
and Use The Following Formula to verify

$$\frac{\text{G.P. 1,000 sq. ft.} \times \text{M.P.H.} \times \text{Nozzle Spacing (inches)}}{136}$$

$$\frac{\text{_____} \times \text{_____} \times 20}{136} = \frac{\text{_____}}{136} = \text{_____ G.P.M.}$$

Select Nozzle Size (See Nozzle Mfg. Chart) \_\_\_\_\_ based on G.P.M.

Determine Application Pressure \_\_\_\_\_ P.S.I. (See Nozzle Mfg. Chart)

## **Set Up Spray System**

Fill tank 1/2 full with water  
Install Correct Nozzles  
Open Suction Valve Handle  
Turn ON Pump  
Turn Booms On  
Set Pressure To \_\_\_\_ P.S.I.  
Visually Check Output At Nozzles  
Turn Booms and Pump Off  
Perform Rate Check

## **Rate Check**

Determine G.P.A. application rate via **1/128th Acre Method**  
Mark off a test course at 204 feet.  
Drive the Sprayer with a 1/2 full tank at \_\_\_\_ M.P.H. and time how long it takes to drive 204 feet. \_\_\_\_ seconds.

Park Vehicle. **SET PARKING BRAKE.**

Turn on all Booms and maintain \_\_\_\_ P.S.I. (pre determined). Hold the graduated cylinder under the far left nozzle on the left boom. Collect the output for the same amount of time that it took to travel 204 ft..

Each ounce collected equals 1 gallon per acre application rate.

To convert to G.P. 1,000 sq. ft.

$$\frac{\text{____ G.P.A.}}{43.56} = \text{____ G.P. 1,000 sq. ft.}$$

### Repeat Test For Each Nozzle

Each Nozzle Should Be Within  $\pm 5\%$  Of The Average Of All Nozzles

Replace Each Nozzle Not  $\pm 5\%$  Of The Average Range

Replace All Nozzles If Two or More Are Not Within The  $\pm 5\%$  Range

#1	OZ	#1	OZ
#2	OZ	#2	OZ
#3	OZ	#3	OZ
#4	OZ	#4	OZ
#5	OZ	#5	OZ
#6	OZ	#6	OZ
#7	OZ	#7	OZ
#8	OZ	#8	OZ
#9	OZ	#9	OZ
#10	OZ	#10	OZ
#11	OZ	#11	OZ
Total		Total	
$\div 11$		$\div 11$	
Average		Average	

### Calculate Range

Average \_\_\_\_\_ x .95 = \_\_\_\_\_  $\div$  43.56 = \_\_\_\_\_ - 5% G.P. 1,000 sq. ft.

Average \_\_\_\_\_ x 1.05 = \_\_\_\_\_  $\div$  43.56 = \_\_\_\_\_ + 5% G.P. 1,000 sq. ft.

(Range)

# **1996 TORO Service Training School**

## **Multi Pro® 5500**

**With Pro Control™**

### **Set Up For Gallons Per Acre**

Determine Desired Application Rate From Manufacturers  
Labeling \_\_\_\_\_ G.P.A.

Determine a Vehicle Application Speed Of \_\_\_\_\_ M.P.H.

Verify Nozzle Spacing (**TORO** Sprayers are set at 20") \_\_\_\_\_"

Determine Gallons Per Minute \_\_\_\_\_ G.P.M. (See Nozzle Mfg. Chart)  
and Use The Following Formula To Verify.

$$\frac{\text{G.P.A.} \times \text{M.P.H.} \times \text{Nozzle Spacing (inches)}}{5940}$$

$$\frac{\text{_____} \times \text{_____} \times 20}{5940} = \frac{\text{_____}}{5940} = \text{_____ G.P.M.}$$

Select Nozzle Size (See Nozzle Mfg. Chart) \_\_\_\_\_ based on G.P.M.

## **Set Up Spray System**

Fill Tank 1/2 Full With Water. **Do NOT** add Chemical at this time.

Install Correct Nozzles

Open Suction Valve Handle

Program Pro Control Console

Drive Vehicle at Selected Speed \_\_\_\_\_ M.P.H.

Turn ON Pump

Turn Booms ON

Visually Check Output At Nozzles

Turn Off Booms and Pump

Perform Rate Check

### **Rate Check**

Determine G.P.A. application rate via **1/128th Acre Method**

Mark off a test course at 204 feet.

Drive the Sprayer with a 1/2 full tank at (Selected Speed of Application) \_\_\_\_\_ M.P.H. and time how long it takes to drive 204 feet. \_\_\_\_\_seconds.

Park Vehicle. **SET PARKING BRAKE.**

Set Pro Control to Self Test mode. Turn on Sprayer Pump and Booms. Hold the graduated cylinder under the far left nozzle on the left boom. Collect the output for the same amount of time that it took to travel 204 ft..

Each ounce collected equals 1 gallon per acre application rate.

\_\_\_\_\_ oz = \_\_\_\_\_ G.P.A.

**Each ounce collected equals 1 gallon per acre application rate.**

**Repeat Test For Each Nozzle**

**Each Nozzle Should Be Within  $\pm 5\%$  Of The Average Of All Nozzles**

**Replace Each Nozzle Not  $\pm 5\%$  Of The Average Range**

**Replace All Nozzles If Two or More Are Not Within The  $\pm 5\%$  Range**

<b>#1</b>	<b>oz</b>		<b>#1</b>	<b>oz</b>
<b>#2</b>	<b>oz</b>		<b>#2</b>	<b>oz</b>
<b>#3</b>	<b>oz</b>		<b>#3</b>	<b>oz</b>
<b>#4</b>	<b>oz</b>		<b>#4</b>	<b>oz</b>
<b>#5</b>	<b>oz</b>		<b>#5</b>	<b>oz</b>
<b>#6</b>	<b>oz</b>		<b>#6</b>	<b>oz</b>
<b>#7</b>	<b>oz</b>		<b>#7</b>	<b>oz</b>
<b>#8</b>	<b>oz</b>		<b>#8</b>	<b>oz</b>
<b>#9</b>	<b>oz</b>		<b>#9</b>	<b>oz</b>
<b>#10</b>	<b>oz</b>		<b>#10</b>	<b>oz</b>
<b>#11</b>	<b>oz</b>		<b>#11</b>	<b>oz</b>
<b>Total</b>			<b>Total</b>	
<b><math>\div 11</math></b>			<b><math>\div 11</math></b>	
<b>Average</b>			<b>Average</b>	

**Calculate Range**

**Average \_\_\_\_\_ x .95 = \_\_\_\_\_ - 5%**

**Average \_\_\_\_\_ x 1.05 = \_\_\_\_\_ + 5%**



# 1996 TORO Service Training School

## **Multi Pro® 5500**

**With Pro Control™**

**Set Up For Gallons Per 1,000 sq. ft.**

Determine Desired Application Rate From Manufacturers  
Labeling \_\_\_\_\_ G.P. 1,000 sq. ft.

Determine a Vehicle Application Speed Of \_\_\_\_\_ M.P.H.

Verify Nozzle Spacing (TORO Sprayers are set at 20") \_\_\_\_\_"

Determine Gallons Per Minute \_\_\_\_\_ G.P.M. (See Nozzle Mfg. Chart)  
and Use The Following Formula To Verify.

$$\frac{\text{G.P. 1,000 sq. ft.} \times \text{M.P.H.} \times \text{Nozzle Spacing (inches)}}{136}$$

$$\frac{\text{_____} \times \text{_____} \times 20}{136} = \frac{\text{_____}}{136} = \text{_____ G.P.M.}$$

Select Nozzle Size (See Nozzle Mfg. Chart) \_\_\_\_\_ based on G.P.M.

## **Set Up Spray System**

Fill Tank 1/2 Full With Water. **Do NOT** add Chemical at this time.  
Install Correct Nozzles  
Open Suction Valve Handle  
Program Pro Control Console  
Drive Vehicle at Selected Speed \_\_\_\_\_ M.P.H.  
Turn ON Pump  
Turn Booms ON  
Visually Check Output At Nozzles  
Turn Off Booms and Pump  
Perform Rate Check

### **Rate Check**

Determine G.P.A. application rate via **1/128th Acre Method**  
Mark off a test course at 204 feet.  
Drive the Sprayer with a 1/2 full tank at (Selected Speed of Application) \_\_\_\_\_  
M.P.H. and time how long it takes to drive 204 feet. \_\_\_\_\_seconds.

Park Vehicle. **SET PARKING BRAKE.**

Set Pro Control to Self Test mode. Turn on Sprayer Pump and Booms. Hold the graduated cylinder under the far left nozzle on the left boom. Collect the output for the same amount of time that it took to travel 204 ft..

Each ounce collected equals 1 gallon per acre application rate.  
To convert to G.P. 1,000 sq. ft.

$$\frac{\text{_____}}{43.56} \text{ G.P.A.} = \text{_____} \text{ G.P. 1,000 sq. ft.}$$

### Repeat Test For Each Nozzle

Each Nozzle Should Be Within  $\pm 5\%$  Of The Average Of All Nozzles

Replace Each Nozzle Not  $\pm 5\%$  Of The Average Range

Replace All Nozzles If Two or More Are Not Within The  $\pm 5\%$  Range

#1	OZ	#1	OZ
#2	OZ	#2	OZ
#3	OZ	#3	OZ
#4	OZ	#4	OZ
#5	OZ	#5	OZ
#6	OZ	#6	OZ
#7	OZ	#7	OZ
#8	OZ	#8	OZ
#9	OZ	#9	OZ
#10	OZ	#10	OZ
#11	OZ	#11	OZ
Total		Total	
$\div 11$		$\div 11$	
Average		Average	

### Calculate Range

Average \_\_\_\_\_ x .95 = \_\_\_\_\_  $\div$  43.56 = \_\_\_\_\_ - 5% G.P. 1,000 sq. ft.

Average \_\_\_\_\_ x 1.05 = \_\_\_\_\_  $\div$  43.56 = \_\_\_\_\_ + 5% G.P. 1,000 sq. ft.  
(Range)

## Multi Pro 5500

### Standard Sprayer System Troubleshooting

1	No Spray Pressure Centrifugal Pump not running	<p>Check for 12 volts on Direction Valve.</p> <p>Check Pump Switch on Center Console.</p> <p>Perform steps 2 &amp;3 below.</p>
2	Can not generate 80 PSI static spray pressure	<p>Confirm that Center Console and Remote Foot, Boom Switches are in their "ON" state.</p> <p>Check main suction Ball Valve is fully open.</p> <p>Check for restriction in Suction Line</p> <p>Clean Strainer</p> <p>Verify Hydraulic Relief Valve on Pump Motor is fully CW, seated.</p> <p>Check that Charge Pump Hydraulic Pressure Relief Valve is set to One turn CCW open, from Fully closed CW seating.</p> <p>Check Engine Max. throttle is 3,200 <math>\pm</math> 50 RPM.</p> <p>Verify Hydraulic Control Valve is operating.</p> <p>Repair or replace Centrifugal Pump and Motor Assembly.</p>
3	Can not adjust Spray Pressure	<p>Confirm that Center Console and Remote Foot, Boom Switches are in their "ON" state.</p> <p>Check main suction Ball Valve is fully open.</p> <p>Confirm correct Nozzle size.</p> <p>Check Solenoid Valves.</p> <p>Check Wiring to Hydraulic Control Valve.</p> <p>Check Hydraulic Control Valve.</p>
4	Output not equal on all Booms	<p>Check for pinched hoses.</p> <p>Check Solenoid Valves for proper operation. Service as needed.</p>

# **Multi Pro 5500**

## **Standard Sprayer System Troubleshooting**

### **Continued**

<b>5</b>	<b>No output from one Boom</b>	<b>Check for 12 volts at Solenoid Valve.</b> <b>Check boom switch for affected boom.</b> <b>Check for minimum 10 PSI at affected boom(s).</b> <b>Service or Replace Solenoid Valve.</b>
<b>6</b>	<b>Low rate from one Nozzle</b>	<b>Check for clogging in affected nozzle.</b> <b>Check affected nozzle's Check Valve</b> <b>Check that all nozzles are the correct and same size.</b>

SSS5TSG.DOC

# Pro Control

## MAINTENANCE

### TROUBLESHOOTING GUIDE

NO.	PROBLEM	CORRECTIVE ACTION
1.	NO DISPLAY LIGHTS WITH POWER ON	<ol style="list-style-type: none"> <li>1. Check fuse on back of Console.</li> <li>2. Check battery connections.</li> <li>3. Check operation of POWER ON/OFF switch.</li> <li>4. Return Console to Raven, Inc. to replace Processor Board Assembly.</li> </ol>
2.	ALL KEYBOARD LIGHTS ON AT SAME TIME	<ol style="list-style-type: none"> <li>1. Return Console to Raven, Inc. to replace Face Plate Sub-assembly.</li> </ol>
3.	A DIGIT CANNOT BE ENTERED VIA KEYBOARD	<ol style="list-style-type: none"> <li>1. Return Console to Raven, Inc. to replace Face Plate Sub-assembly.</li> </ol>
4.	AN INDICATOR LIGHT ON A KEY WILL NOT ILLUMINATE	<ol style="list-style-type: none"> <li>1. Return Console to Raven, Inc. to replace Face Plate Sub-assembly and/or Processor Board Assembly.</li> </ol>
5.	CONSOLE DISPLAYS FLASHING "CAL" WHENEVER VEHICLE ENGINE IS STARTED	<ol style="list-style-type: none"> <li>1. Check battery voltage and battery connections.</li> </ol>
6.	CONSOLE DISPLAYS FLASHING "CAL" WHENEVER MASTER SWITCH IS TURNED ON OR OFF	<ol style="list-style-type: none"> <li>1. Check battery voltage and battery connections.</li> </ol>
7.	CONSOLE DISPLAYS FLASHING "CAL" WHENEVER SPEED IS CHANGED	<ol style="list-style-type: none"> <li>1. Check battery voltage and battery connections.</li> </ol>
8.	"TIME" FUNCTION IS INACCURATE OR DRIFTING	<ol style="list-style-type: none"> <li>1. Return Console to Raven, Inc. to replace Processor Board Assembly.</li> </ol>
9.	ONE DISPLAY DIGIT HAS ONE OR MORE MISSING SEGMENTS	<ol style="list-style-type: none"> <li>1. Return Console to Raven, Inc. to replace LCD Display Board Assembly.</li> </ol>
10.	SPEED DISPLAY "0"	<ol style="list-style-type: none"> <li>1. Check Speed Sensor cable connector and plug on back of Console for loose pins.</li> <li>2. Clean pins and sockets on Speed Sensor cable connectors.</li> <li>3. Replace Speed Sensor Switch Assembly.</li> </ol>
11.	SPEED INACCURATE OR UNSTABLE	<ol style="list-style-type: none"> <li>1. Verify "SP3" setting.</li> <li>2. Verify correct SPEED CAL number.</li> </ol>
12.	RATE READS "0000"	<ol style="list-style-type: none"> <li>1. Verify Speed is registering accurately. If SPEED is zero, refer to Troubleshooting Problem 11.</li> <li>2. Verify TOTAL VOLUME is registering flow. If not, refer to Troubleshooting Problem 16.</li> </ol>

# PRO CONTROL

## MAINTENANCE

### TROUBLESHOOTING GUIDE (Cont'd)

13.	RATE INACCURATE OR UNSTABLE	<ol style="list-style-type: none"> <li>1. Verify that all numbers "keyed in" Console are correct. Verify SPEED is registering accurately. If SPEED is inaccurate, refer to Troubleshooting Problem 11.</li> <li>2. In MAN (Manual) operation, verify that RATE display (GPA) holds constant when SPEED is held constant. If not, refer to Troubleshooting Problem 17.</li> <li>3. In MAN (Manual) operation, check low end and high end pressure range. If pressure cannot be adjusted manually, refer to Troubleshooting Problem 14.</li> <li>4. If problem persists, return Console to Raven, Inc. to replace Processor Board Assembly.</li> </ol>
14.	CANNOT VARY RATE IN MANUAL OPERATION OR IN AUTO	<ol style="list-style-type: none"> <li>1. Check cabling to hydraulic Control Valve for breaks.</li> <li>2. Check connections in cabling for cleanliness.</li> <li>3. Verify that there is voltage at the valve connector by placing MASTER switch ON; RATE 1 / RATE 2 / MAN switch to MAN; and Power switch to ON. Manually operate INCR/ DECR switch to verify voltage.</li> <li>4. Verify that valve is turning. If not, replace hydraulic Control Valve motor assembly.</li> </ol>
15.	SPRAYER PRESSURE IS CORRECT BUT RATE IS LOW	<ol style="list-style-type: none"> <li>1. Verify that nozzle check valves are not plugged.</li> <li>2. Verify that pressure at each boom is the same.</li> <li>3. Verify all nozzles are of proper and same orifice size.</li> </ol>
16.	TOTAL VOLUME DOES NOT REGISTER	<ol style="list-style-type: none"> <li>1. Check Flow Meter cable for breaks and shorts. See page 14 for test procedure.</li> <li>2. Check internals of Flow Meter; Clean and adjust. See pages 14 and 15.</li> <li>3. Replace Flow Meter Transducer.</li> </ol>
17.	TOTAL VOLUME REGISTERS FLOW INACCURATELY	<ol style="list-style-type: none"> <li>1. Verify that arrow on Flow Meter is pointing in direction of flow.</li> <li>2. See page 14 and 15.</li> </ol>
18.	BOOM SOLENOID(S) WILL NOT OPERATE	<ol style="list-style-type: none"> <li>1. Check cable for wires with breaks.</li> <li>2. Check connectors for cleanliness.</li> <li>3. Check BOOM switch and MASTER switch for operation.</li> <li>4. Service Boom Solenoid Valve.</li> </ol>

# FLOW METER

## MAINTENANCE

### PROCEDURE TO TEST THE FLOW METER CABLE:

Disconnect the Console Control Cable from the Flow Meter Cable. Hold the cable connector so that the key way is pointing in the 12 o'clock position. See FIG. 2.

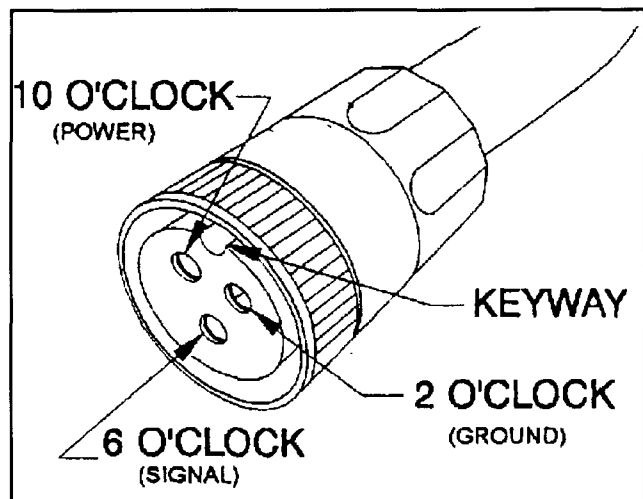



FIG. 2

### VOLTAGE READINGS

- 2 o'clock to 6 o'clock (+5 VDC)
- 2 o'clock to 10 o'clock (+5 VDC)

1. Enter a METER CAL number of one (1) in key labeled: .

2. Depress key labeled: .

3. Place MASTER and BOOM switches ON.

4. With small jumper wire (or paper clip), short between 2 o'clock and 6 o'clock sockets with a "short - no short" motion. Each time a contact is made, the TOTAL VOLUME total should increment up 1 or more counts.

5. If TOTAL VOLUME does not count up, replace defective cable.

6. Perform above voltage checks.

7. If cables all test good, replace Flow Sensor.

**NOTE: After testing is complete, re-enter correct METER CAL number before spraying.**

### FLOW METER MAINTENANCE AND ADJUSTMENT PROCEDURES:

Once per season the Flow Meter should be flushed and cleaned. Perform this procedure more often if suspension type products are being sprayed.

1. Thoroughly rinse and drain the entire spraying system.

2. Remove Flow Meter from Sprayer and flush with clean water to remove any chemicals.

3. Remove flange bolts from the Flow Meter. See FIG. 3.

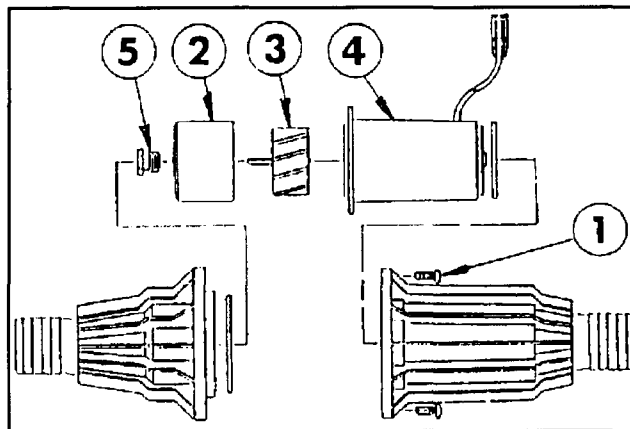


FIG. 3

- 1. Flange Bolt
- 2. Turbine Hub
- 3. Turbine
- 4. Transducer
- 5. Turbine Stud

4. Remove the turbine hub and turbine from inside Flow Meter.

5. Clean turbine and turbine hub of metal filings and any other foreign material, such as wettable powders. Confirm that turbine blades are not worn. Hold turbine in your hand and spin turbine. It should spin freely with very little drag.

6. If transducer assembly is replaced or if turbine stud is adjusted or replaced, verify the turbine stud fit before reassembling. Hold turbine hub with turbine on transducer. Spin turbine by blowing on it. Tighten turbine stud until turbine stalls. Loosen turbine stud 1/3 turn: the turbine should spin freely.

7. Reassemble Flow Meter.


8. Using a low pressure 5 PSI (50kPa) jet of air, verify that the turbine spins freely. If there is drag, loosen the hex stud on the bottom of the turbine hub by 1/16 turn, until the turbine spins freely.

9. If Turbine spins freely and if cables have checked out, but Flow Meter is not totalizing properly, replace Flow Meter Transducer.



# FLOW METER MAINTENANCE

## PROCEDURE TO RE-CALIBRATE FLOW METER:

1. Enter a METER CAL number of **100** in the key labelled .

2. Enter a TOTAL VOLUME of **0** in the key labelled .

3. Switch OFF all three Booms.

4. Remove Boom 1 hose at bottom connection and place in calibrated 5 gallon (10 liter) container.

5. Switch on Console and pump exactly two (2) full buckets (10 gallons [40 liters]).

6. The TOTAL VOLUME readout is your new METER CAL number. (Under normal circumstances, this number should be within +/- 3% of the number stamped on the tag on the Flow Meter). (Not applicable for metric).

**NOTE: If the Pro Control™ Console should malfunction or need repairs, spraying CAN BE RESUMED in manual mode by unplugging the cables from the rear of the Computer Console and re-installing the plastic caps over the cables. The unit can then be controlled using the Center Console Controls. THESE CAPS MUST BE RE-INSTALLED IN ORDER FOR THE MANUAL CONTROLS TO OPERATE.**

## STORAGE:

### SPRAYING SYSTEM:

1. Flush pump and entire spraying system with water and tank cleaning agent. Drain pump and spray system completely.

2. Add a rust inhibiting antifreeze solution to the pump and recirculate through the system, coating the pump interior. Drain solution completely.

3. Remove Flow Meter at the end of each spraying season. Clean Flow Meter turbine and inlet hub. Clean off all metal filings and wettable powders which have hardened on the plastic and metal parts. Check the inlet hub and turbine assembly for worn or damaged turbine blades and bearings. Flush Flow Meter with clear water and drain. **FREEZING TEMPERATURES MAY DAMAGE FLOW METER IF WATER IS NOT DRAINED.**

4. Remove Console from Sprayer Vehicle when not in use for extended periods of time.

5. Remove coil assemblies from solenoid valves. Apply a light film of petroleum jelly or equivalent to the armatures. Reinstall coil assemblies on solenoid valves.

7. Repeat this procedure several times to confirm accuracy. (Always "zero out" the TOTAL VOLUME display before retesting).

**NOTE: For greatest precision, set METER CAL to 100 and pump 100 gallons [500 liters] of water.**

8. Enter the correct METER CAL number before resuming chemical spraying.

9. An alternate method of calibrating your Flow Meter is to fill your applicator tank with a pre-determined amount of liquid (i.e., 200 gallons [1000 liters]). Set your METER CAL to the number on the tag attached to the Flow Meter. (For metric, divide the value on the Flow Meter tag by 3.785). Then go out and spray until the tank is empty. The number in the TOTAL VOLUME display should be the same as the amount you put in the tank. If not, increase or decrease the METER CAL by the percentage difference.

6. Check condition of spray hoses. Tighten all hose connections securely.

7. Lubricate boom pivot grease fittings and pivot points.

**IMPORTANT! WHEN A HIGH PRESSURE WASHER OR GARDEN HOSE IS USED FOR CLEANING, IT IS NECESSARY TO COVER AND PROTECT THE CONTROL CONSOLE. WATER ENTERING THE CONTROL CONSOLE WILL CAUSE SERIOUS DAMAGE TO THE ELECTRONICS.**

Remove the Control Console from the vehicle for storage, or otherwise protect it from the elements. If repairs are ever needed or assistance is required, contact an Authorized TORO Distributor.

**SERVICING AFTER STORAGE:** Flush the entire Spraying System with clean water and detergent. Rinse and drain the entire Spraying System.

**STORAGE AND DISPOSAL OF CHEMICALS:** Follow Chemical Manufacturer's recommendations for storage and disposal of chemicals.

# PUMP MAINTENANCE

## Pump Housing Disassembly

1. Using a 9/16" box end wrench, remove the four hex-head bolts holding the pump to the mounting flange. (If necessary, tap pump casing discharge port with rubber mallet or hammer to separate.)
2. To remove the impeller nut, 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" socket wrench to remove the impeller nut by turning it counterclockwise. See Fig. 46.

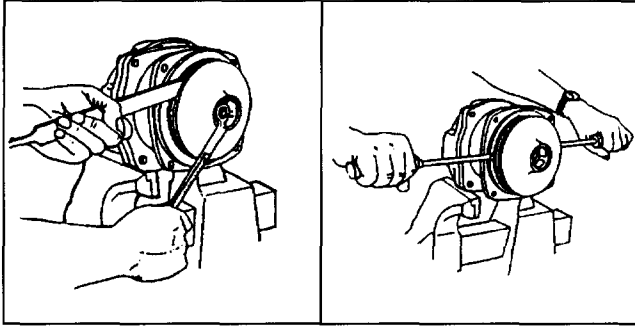


Figure 46

3. Once nut is removed, place a screwdriver on each side (as in Fig. 46) 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. 46.

**NOTE: In the case of a severe pump seal leak, check the shaft ball bearing in the hydraulic motor for possible contamination.**

2. Using a 1/2" box end wrench, remove the four bolts holding the motor to the mounting flange. Remove motor.

3. Using a screwdriver and hammer, tap out the stationary portion of the mechanical seal from the motor side of the mounting flange. (If motor is not removed, seal can be pried out with a small screwdriver. **CAUTION:** The seal will be damaged by removal in this manner. A new seal **must** be used when Pump is reassembled.)

**NOTE: This step is NOT required if servicing only the hydraulic motor.**

## Clean-Up Of Pump Housing

1. Using a 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. Using the port brush, clean the seal cavity in the 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 rest and corrosion particles.

## Seal Replacement/Pump Housing Reassembly

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.**

3. To seat the seal in the seal cavity, use a piece of 3/4" PVC pipe 4" to 6" in length. Lubricate sealing surface on seal after it is seated.
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. 47.

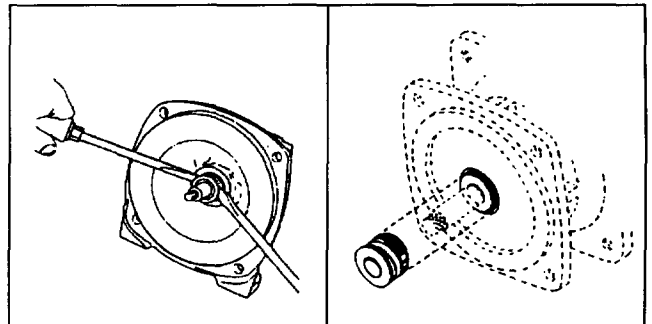


Figure 47

5. Install rubber gasket over shaft against rotary portion of seal.
6. Insert woodruff key into shaft key slot. Place impeller on shaft. Put impeller nut on shaft end and, using a large screwdriver or file in the impeller vanes for support, tighten impeller nut securely.
7. Install O-ring on mounting flange. Replace O-ring if worn or damaged.
8. Place Pump casing on mounting flange, insert and tighten bolts.

# MAINTENANCE TROUBLESHOOTING GUIDE PUMP SEAL 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 or 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.

# MAINTENANCE

## TROUBLESHOOTING THE 92-0356 SOLENOID VALVE

CONDITION	POSSIBLE CAUSES	HOW TO CHECK
1. Valve won't open	A. No electrical power to valve	Manually activate valve. If stem moves freely, check and clean electrical connections. Inspect electrical systems.
	B. Stroke too long	Energize coil. Check length of stroke - should be approximately 1/8". If not, reset stroke.
	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, disassemble valve, inspect and clean all parts.
2. Valve won't shut off	A. Spring malfunction	Manually activate stem. Stem should offer 2.6 lbs. resistance, but movement should be quick and smooth. If there is very little resistance, disassemble and check spring.
	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, disassemble valve, inspect and clean all parts. Replace any damaged or worn parts with new ones.
	C. Seat Washer blown out of retainer due to excessive pressure	Remove stem from valve body and inspect condition of seat washer.
	D. Seat Washer worn or damaged	Replace seat washer.
3. Leakage around coil or around lower diaphragm piston	A. Ruptured diaphragms	Disassemble valve and replace diaphragms with new ones.
4. Blowing fuses	A. Short circuit in power	Inspect wires for worn insulation and check connections.
	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.
5. Valve operating properly but pressure drop too high	A. Not getting full stroke	Energize coil. Check length of stroke - should be approximately 1/8". If not, remove coil and check for obstructions between armature and armature stop. If clean, reset stroke.
	B. Obstruction in valve body	Remove inlet and outlet connections and inspect body.

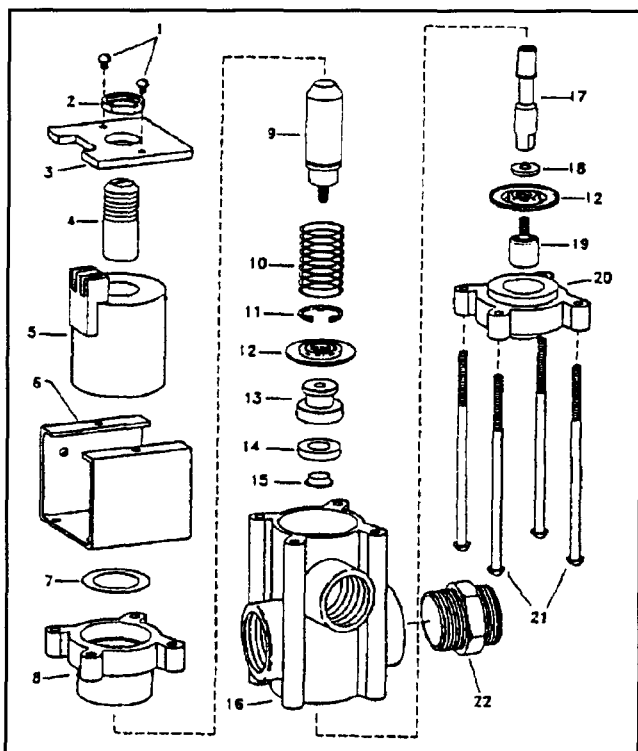
# MAINTENANCE

## SOLENOID VALVE:

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

- Keep all electrical connections, coil and metal strap clean at all times.
- A protective coating may be applied to the completed electrical connections if desired.
- Do not apply lubricating oils or other petroleum products to the valves, as this may cause swelling of the rubber parts. Also, check with the chemical manufacturer to be sure chemicals being used are compatible with the valve components.

See Parts drawing below for reference numbers in parentheses().



### TO REPLACE COIL ONLY

1. Shut off power to coil.
2. Disconnect wires from terminals.
3. Remove two screws (1) from top of coil cover.
4. Lift off coil (5) and replace with new coil.
5. Replace coil cover (3) and attach securely with the two screws (1).

### TO REPLACE DIAPHRAGMS AND SEAT WASHER

1. Remove the four screws (21) that secure the lower diaphragm housing and separate coil sub-assembly and washer (7). Remove the lower (20) diaphragm housing.
2. Remove spring (10) from armature (9).
3. Secure hole in armature (9) with 1/4" diameter rod or an Allen wrench. Unscrew entire assembly with screwdriver secured in slot of lower diaphragm piston (19).

**NOTE: STEM/SEAT/DIAPHRAGM/UPPER DIAPHRAGM HOUSING ASSEMBLY MAY UNSCREW AT LOWER DIAPHRAGM PISTON (19) OR AT ARMATURE (9).**

4. If lower diaphragm piston (19) unscrews, remove diaphragm (12) and washer (18) and inspect or replace as necessary. Remaining seat/upper assembly may be removed from top of polypropylene body (16) and disassembled by securing flats on stem (17) and unscrewing armature (9). Seat washer retainer (13) will then slide from the stem (17). Separate the upper diaphragm housing (8) and upper diaphragm from the seat washer retainer (13).
5. If armature (9) unscrews, remove the upper diaphragm housing (8) and the diaphragm (12). The seat washer retainer (13) slides off the stem (17) which allows the spacer (15) and seat washer (14) to be removed. The lower diaphragm piston (19) can be disassembled from the stem (17) by securing the stem with a wrench and unscrewing the lower diaphragm piston (19).

### TO REASSEMBLE

1. Reassemble seat washer retainer (13), seat washer (14) and spacer (15) onto stem (17).
2. Reassemble upper diaphragm (12) [with "Fluid Side" marking facing valve body], the upper diaphragm housing (8) and armature (9) onto stem end (17) and tighten securely against the seat washer retainer (13).
3. Insert the entire subassembly into valve body (16) from the top. Screw lower diaphragm piston (19) with diaphragm (12) and washer (14) in proper order into bottom end of stem assembly. Tighten snugly with screwdriver.
4. Reinstall spring (10) and washer (7) over armature (9) Place coil assembly (5) on top of upper diaphragm housing (8).

# MAINTENANCE

## SOLENOID VALVE

5. Position valve body subassembly and coil subassembly together.
6. Replace lower diaphragm housing (2). Secure coil subassembly, body subassembly, and lower diaphragm housing 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. Make adjustment in the fully assembled state. Seat washer (14) must be in good condition.
2. Unscrew jam nut (2).
3. Turn armature stop (4) clockwise until it just make slight contact with the armature (9).
4. From this point back the armature stop (4) out two full turns and lock with jam nut (2).
5. Stroke will be approximately 1/8" (3mm) and can be checked by measuring the travel of the lower piston (19) when the coil is energized.

# OPERATION

## 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 Tank cleaning agent. 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.

The addition of a detergent cleaner may be advisable in the initial washing. Directions for such and 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 system.

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

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

Flush the entire spraying system after each use. Failure to clean the system can result in a chemical residue which can plug the Hoses and/or Nozzle Tips, Solenoids, and seriously damage the Centrifugal Pump.

Wash spray nozzles thoroughly with water. Using compressed air, 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 strainer bowl and clean the strainer screen daily when spraying wettable powders - after every 50 hours when using liquid chemical.

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



***EQUIPMENT MAINTENANCE AND SERVICE HISTORY REPORT***

**Multi-Pro ® 5500**

TORO Model and Serial Number: \_\_\_\_\_ - \_\_\_\_\_

Engine Numbers: \_\_\_\_\_

Transmission Numbers: \_\_\_\_\_

Purchase Date: \_\_\_\_\_ Warranty Expires: \_\_\_\_\_

Purchased From: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Contacts:      Parts: \_\_\_\_\_ Phone: \_\_\_\_\_

Service: \_\_\_\_\_ Phone: \_\_\_\_\_

Sales: \_\_\_\_\_ Phone: \_\_\_\_\_

**See your TORO Distributor/Dealer for other Publications, Manuals, and Videos from The TORO Company.**



# MULTI PRO 5500 MAINTENANCE SCHEDULE

Minimum Recommended Maintenance Intervals:

Maintenance Procedure:		Maintenance Interval and Service Type:				
	Every 50 hrs	Every 100 hrs	Every 200 hrs	Every 400 hrs	Every 800 hrs	
Inspect Air Filter, Dust Cap, and Baffle Lubricate All Grease Fittings Check Battery Cable Connections Check Battery Fluid Level	A Level Service					
‡ Change Engine Oil and Filter Inspect Cooling System Hoses * Check Fan and Alternator Belt Tension Service Air Filter		B Level Service				
* Replace Hydraulic Filter Check Front Wheel Toe-In and Steering Linkage * Torque Wheel Lug Nuts Check Governor Oil Level Lubricate Throttle and Governor Linkage Perform Solenoid Valve Maintenance			C Level Service			
Change Fuel Filters Inspect Fuel Lines and Connections Check Rear Planetary Gear Oil Change Hydraulic Oil * Change Hydraulic Oil Filter Flush Cooling System and Replace Coolant Drain and Clean Fuel Tank † Pack Front Wheel Bearings				D Level Service		
† Change Rear Planetary Gear Oil					E Level Service	
* Perform This Service Also at Initial 10 Hour Break-In ‡ Perform This Service Also at Initial 50 Hour Break-In † Perform This Service Also at Initial 200 Hour Break-In						
<div>Annual Recommendations:</div> <div>Items listed are recommended every (800) hours or (2) years, whichever occurs first.</div> <div>Replace Safety Switches</div>						

See Operator's and Service Manual for specifications and procedures

See your TORO Distributor/Dealer for other Publications, Manuals, and Videos from The TORO Company.

# MULTI PRO 5500 DAILY MAINTENANCE CHECK LIST

Unit Designation: \_\_\_\_\_ TORO Model & Serial Number: \_\_\_\_\_ - \_\_\_\_\_

Daily Maintenance: (duplicate this page for routine use)

<b>Maintenance Check Item</b>	<b>Daily Maintenance Check For Week Of: _____</b>						
	Mon ____ hrs	Tue ____ hrs	Wed ____ hrs	Thu ____ hrs	Fri ____ hrs	Sat ____ hrs	Sun ____ hrs
✓ Neutral Lockout Switch Operation							
✓ Emergency/Park Brake Operation							
✓ Engine Oil and Fuel Level							
✓ Cooling System Fluid Level							
✓ Dust Cap and Baffle (Air Filter)							
✓ Radiator and Oil Cooler For Debris							
✓ Unusual Operating Noise							
✓ Unusual Engine Noises							
✓ Hydraulic System Oil Level							
✓ Hydraulic Hoses for Damage							
✓ Fluid Leaks							
✓ Tire Pressure							
✓ Instrument Operation							
✓ Sprayer Hose Clamp Connections							
Lubricate All Grease Fittings <sup>1</sup>							
Touch-up Damaged Paint							

<sup>1</sup> = Immediately after every washing, regardless of interval listed.

**Notation of areas of concern:** \_\_\_\_\_ **Inspection performed by:** \_\_\_\_\_

Item	Date	Information
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

See your TORO Distributor/Dealer for other Publications, Manuals, and Videos from The TORO Company.

# MULTI PRO 5500 SUPERVISOR MAINTENANCE WORK ORDER

DATE \_\_\_\_\_

Duplicate this page for routine use

Unit Designation:		Remarks:	
Hours:	TORO Identification Numbers:		
Technician:	Service to perform:		
<b>A B C D E Other</b>			

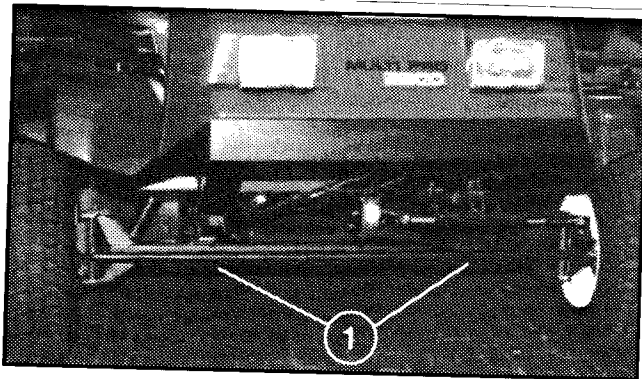
<b>A Service - (every 50 hours)</b> Inspect Air Filter, Dust Cap, and Baffle Lubricate All Grease Fittings Check Battery Cable Connections Check Battery Fluid Level	<b>B Service - (every 100 hours)</b> Change Engine Oil and Filter Service Air Filter Inspect Cooling System Hoses Check Fan and Alternator Belt Tension	<b>C Service - (every 200 hours)</b> Replace Hydraulic Filter Check Front Wheel Toe-In and Steering Torque Wheel Lug Nuts Check Governor Oil Level Lubricate Throttle and Governor Linkage Perform Solenoid Valve Maintenance
<b>D Service - (every 400 hours)</b> Change Fuel Filters Inspect Fuel Lines and Connections Check Rear Planetary Gear Oil Change Hydraulic Oil Change Hydraulic Oil Filter Flush Cooling System and Replace Coolant Drain and Clean Fuel Tank Pack Front Wheel Bearings	<b>E Service - (every 800 hours)</b> Change Rear Planetary Gear Oil	<b>Additional Servicing Items</b>         

(see Operator's and Service Manual for specifications and procedures)

Form No. 96-901-SL

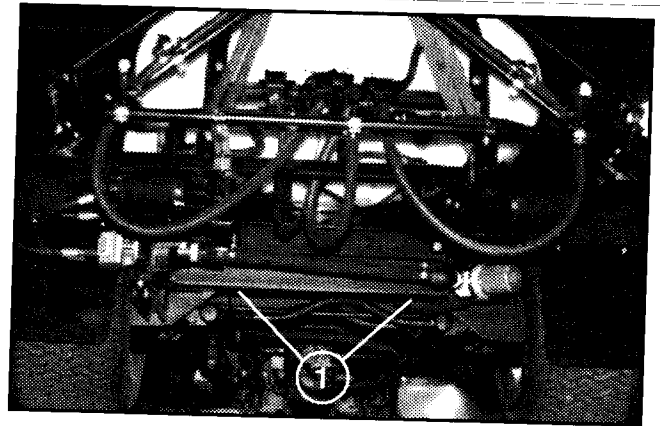
# JACKING VEHICLE

1. Do not start engine while vehicle is on jack, because engine vibration or wheel movement could cause vehicle to slip off jack.
2. Do not work under vehicle without jack stands supporting it. The vehicle could slip off the jack, injuring anyone beneath it.
3. The jacking points at the front of the vehicle are under the front axle directly beneath the leaf springs. (Fig. 21)
4. The rear jacking points are on the rearmost frame support, between the angle welds. (Fig. 22)
5. Always chock or block wheels opposite the side which is being jacked.



**Figure 21**

**1. Front Jacking Points**



**Figure 22**

**1. Rear Jacking Points**

# LUBRICATION

## WARNING

Servicing the vehicle while the engine is running or vehicle is not properly secured, could result in personal injury or death.

- Before servicing or making adjustments to the vehicle, set parking brake, stop engine, and remove key from the switch.

The MULTI PRO® 5500 has 11 grease fittings that must be lubricated regularly with No. 2 General Purpose Lithium Base Grease. If the machine is operated under normal conditions, lubricate all bearings and bushings every 100 hours of operation. More frequent lubrication is required if used for heavy duty vehicle operations.

The grease fitting locations and quantities are: Tie rod ends (2), Power steering cylinder (2), Front spindles (2), Drive linkage arms (2), Boom hinges (2), Governor lever (1). (See Fig. 23-26)

1. Wipe grease fitting clean so foreign matter cannot be forced into the bearing or bushing.
2. Pump grease into the bearing or bushing.
3. Wipe off excess grease.

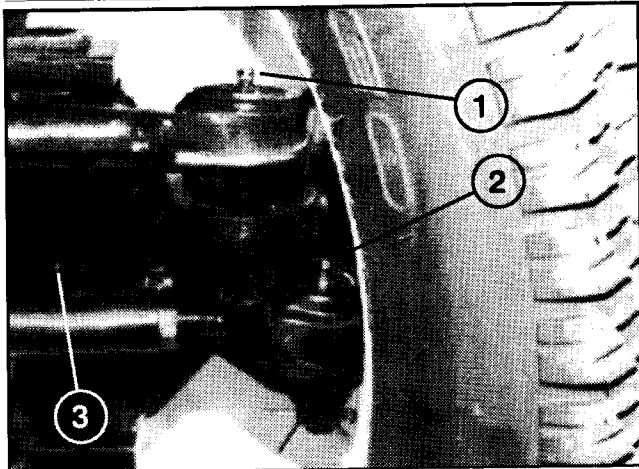


Figure 23

1. Steering Cylinder Fitting (one shown; one at other end of cylinder)
2. Tie Rod End Fitting (one on each side)
3. King Pin Fitting (one on each side)

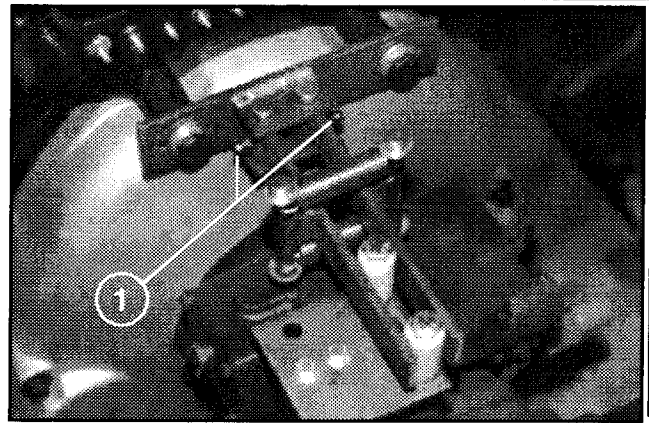


Figure 24

1. Neutral Centering Arm Fittings (one on each arm)

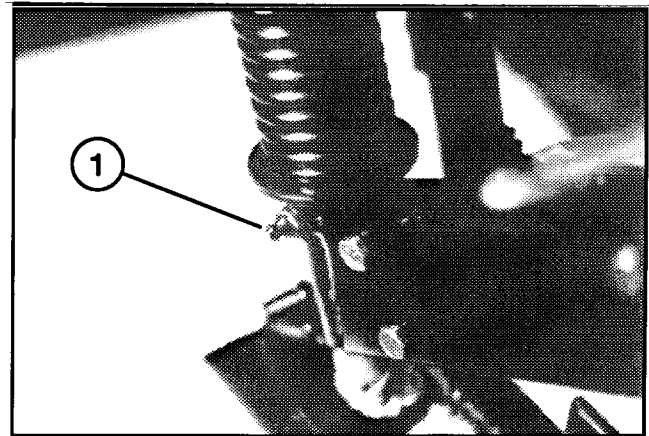


Figure 25

1. Boom Hinge Fitting (one on each side)

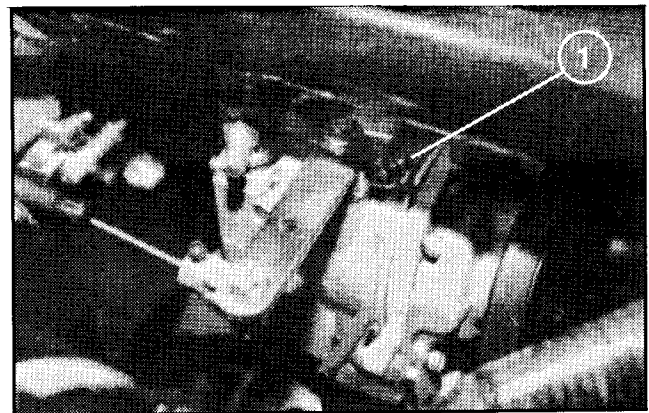


Figure 26

1. Governor Lever Fitting

# AIR CLEANER MAINTENANCE

## WARNING

Servicing the vehicle while the engine is running or vehicle is not properly secured, could result in personal injury or death.

- Before servicing or making adjustments to the vehicle, set parking brake, stop engine, and remove key from the switch.

## GENERAL AIR CLEANER MAINTENANCE PRACTICES

Inspect the Air Cleaner and Hoses periodically to maintain maximum engine protection and to ensure maximum service life. Extensive damage can result from operating with a dirty Air Cleaner.

1. Check Air Cleaner Body for dents and other damage which could possibly cause an air leak. Replace a damaged Air Cleaner Body.
2. Squeeze the Vacuator Valve to eject dust and water.
3. Service the Air Cleaner Filter every 100 hours. (more frequently in extremely dust conditions.)
4. Be sure Dust Cup is sealing around Air Cleaner Body.

## SERVICING AIR CLEANER FILTER (Fig. 27)

1. Loosen the Strap that is securing Dust Cup to Air Cleaner Body. Remove the Dust Cup from body. Clean inside of Dust Cup.

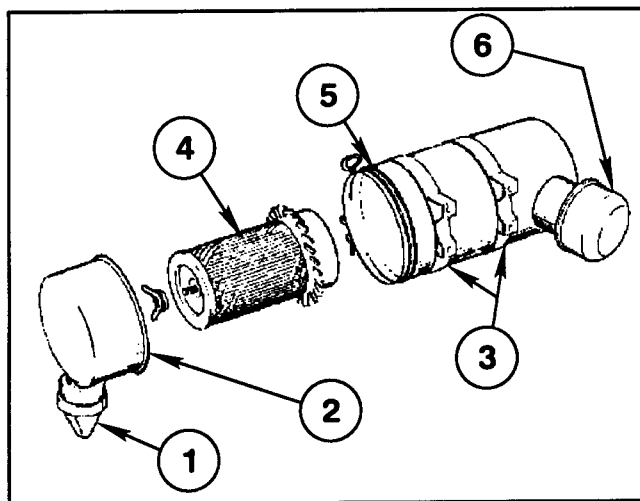


Figure 27

- |                   |                      |
|-------------------|----------------------|
| 1. Vacuator valve | 4. Filter element    |
| 2. Dust cup       | 5. Air cleaner strap |
| 3. Mounting bands | 6. Inlet hood        |

2. Remove Wing nut from the Air Filter guide bolt, and gently slide the Air Filter out of the Air Cleaner Body. Avoid knocking filter against Air Cleaner Body to reduce amount of dust dislodged.

3. Wipe inside of the Air Cleaner Body with a damp rag.

4. Inspect Air Filter, replace if damaged.

A. Place a bright light inside of filter.

B. Rotate filter slowly while checking for dirt, ruptures, holes, and tears.

C. Check fin assembly, gasket, and screen for damage.

5. Clean a reusable element by washing it, or blow out dirt by using compressed air. Do not reuse a damaged filter.

## WASHING METHOD:

**NOTE: Do not remove plastic fin assembly. Washing will remove dust from beneath fins.**

A. Prepare a solution of filter cleaner and water and soak filter element approximately 15 minutes. Refer to directions on filter cleaner carton for complete information.

B. After soaking, rinse with clear water. Maximum water pressure must not exceed 40 psi to prevent damage to the filter element. Rinse filter from clean side to dirty side.

C. Dry filter using, warm flowing air (160°F max), or allow element to air dry. Do not use compressed air or light bulb to dry the filter element because damage could result.

## COMPRESSED AIR METHOD:

**NOTE: Do not remove plastic fin assembly. Back-blowing with compressed air removes dust from beneath fins.**

A. Blow compressed air from inside to outside of filter element. Do not exceed 100 psi. (Wear eye protection)

B. Keep air hose nozzle at least 1 inch from pleated paper, and move nozzle up and down while rotating the filter. Inspect filter when dust and dirt are removed.

6. Inspect a replacement filter for any shipping damage. Install the new filter and secure the Wing nut, Dust Cup, and Air Cleaner Strap.

7. Check all ducting, hoses, and clamped connections for leaks.

# ENGINE MAINTENANCE

## WARNING

Servicing the vehicle while the engine is running or vehicle is not properly secured, could result in personal injury or death.

- Before servicing or making adjustments to the vehicle, set parking brake, stop engine, and remove key from the switch.

## CHANGING ENGINE OIL AND FILTER (Fig. 28)

Change oil and filter after the first 50 hours of operation, thereafter change oil and filter every 100 hours.

## WARNING

Continuous contact with used motor oil has caused skin cancer in laboratory mice.

- Do not handle a hot oil filter with bare hands.
- Protect your skin by washing with soap and water.

1. Remove drain plug and let oil flow into a drain pan. When oils stops, install drain plug.

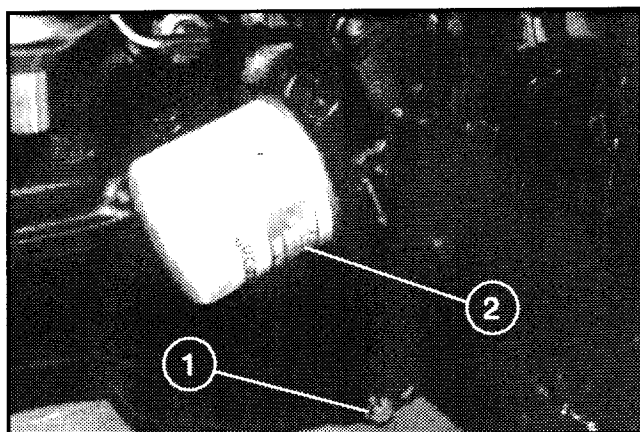


Figure 28

1. Engine Oil  
Drain Plug

2. Engine Oil Filter

2. Remove oil filter. Apply light coat of clean oil to the seal of the new oil filter before screwing it on. Hand tighten until the gasket contacts the base, then tighten 1/2 to 2/3 turn. DO NOT OVERTIGHTEN.

3. Add recommended oil to crankcase. Capacity is 3.5 quarts (3.25 Liter) with filter.

## ENGINE OIL

### SINGLE VISCOSITY OILS

#### Outside Temperature

- 10°F to +60°F	SAE 10W
+10°F to +90°F	SAE 20W-20
Above +32°F	SAE 30
Above +50°F	SAE 40

### MULTI-VISCOSITY OILS

#### Outside Temperature

Below +60°F	SAE 5W-30
- 10°F to +90°F	SAE 10W-20
Above -10°F	SAE 10W-40 or 10W50
Above +50°F	SAE 20W-40 or 20W50

## OIL FILTER

The Ford Engine Manual recommends use of a Motorcraft FL-400A Long-Life Oil Filter or equivalent which meets Ford Specification ES-E1ZE-6714-AA.

## GOVERNOR MAINTENANCE

For Governor maintenance refer to the instructions provided in the Ford Engine Maintenance and Operator's Manual. (Supplied with vehicle)

## WARNING

Carelessly performing adjustments to a running engine could cause personal injury.

- Engage parking brake and keep hands, feet, face, and other parts of the body away from fan and other moving parts.

# ENGINE MAINTENANCE

## WARNING

Servicing the vehicle while the engine is running or vehicle is not properly secured, could result in personal injury or death.

- Before servicing or making adjustments to the vehicle, set parking brake, stop engine, and remove key from the switch.

**IMPORTANT!** Check fuel lines and connections every 400 hours. Inspect for deterioration, damage, or loose connections.

## FUEL FILTERS (Fig. 29)

The MULTI PRO® 5500 is equipped with two fuel filters. One is an in-line type located between the fuel tank and fuel pump. The other is a threaded filter located between the fuel pump and carburetor. Replace filters every 400 hours of use.

### In-line:

1. Remove the inlet and outlet hose clamps.
2. Disconnect the hoses and discard the filter.
3. Install new filter by connecting the hose from the fuel tank to the inlet side and the hose from the fuel pump to the outlet side.
4. Position the hose clamps and tighten.

### Threaded:

1. Loosen and slide hose clamp down the fuel line. Remove the line from the filter.
2. Use 15/16" wrench to remove filter from elbow and discard old filter.
3. Thread new filter and tighten securely. DO NOT OVERTIGHTEN.
4. Install fuel line to new filter and secure with hose clamp.

**Note:** After replacing fuel filters start the engine and check for leaks.

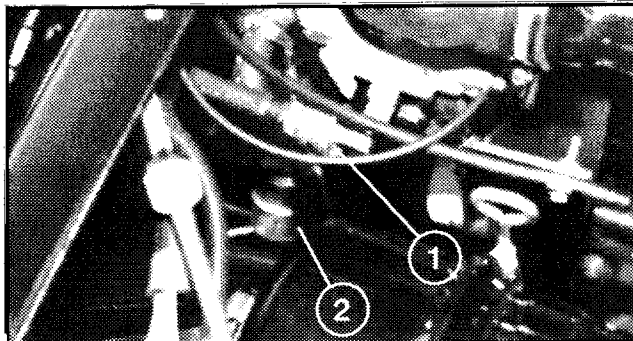


Figure 29

1. Inline filter

2. Threaded filter

## SPARK PLUGS (Fig. 30)

For specifications refer to the Ford Engine Maintenance and Operator's Manual. (Supplied with vehicle)

Replace spark plugs at recommended intervals. Maintenance of spark plugs is an important factor in assuring proper engine performance and reducing the exhaust emission level.

The MULTI PRO® 5500 uses Motorcraft-AGSF 22C or AGRF22 or equivalent Spark Plugs with air gap set as specified.

1. Remove wires from each Spark Plug by grasping, twisting, and then pulling the molded boot of the wire only. Do not pull directly on the wire because the wire connection inside the boot may become separated.
2. After loosening each Spark Plug one or two turns, clean the area around each Spark Plug port with compressed air, then remove Spark Plugs.
3. Check condition of side electrode, center electrode, and center electrode insulator. Replace spark plugs if damage is evident.

**IMPORTANT! A CRACKED, FOULED, DIRTY, OR OTHERWISE MALFUNCTIONING SPARK PLUG MUST BE REPLACED. DO NOT ATTEMPT TO SAND BLAST, SCRAPE, OR CLEAN ELECTRODES WITH A WIRE BRUSH BECAUSE GRIT MAY EVENTUALLY RELEASE FROM THE PLUG AND CAUSE ENGINE DAMAGE.**

4. Set gap between center and side electrodes as specified. Install correctly gapped Spark Plug and torque (tighten) plug as specified.
5. Connect Spark Plug wires securely.

**NOTE:** Do not overtighten plugs. The gap may change considerably due to the distortion of the plug outer shell.

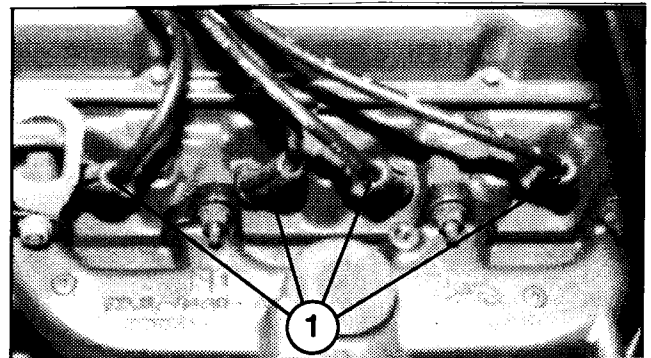


Figure 30

1. Spark Plugs



## COOLING SYSTEM MAINTENANCE

### **⚠ CAUTION**

Coolant in a hot radiator is under extreme pressure. Scalding hot coolant or steam can blow out of the radiator, causing serious injury.

- Never remove the radiator cap, under any conditions, when the engine is running.
- Never remove the radiator cap when the engine or radiator are hot.

**IMPORTANT! NEVER SPRAY WATER ONTO A HOT ENGINE AS DAMAGE MAY OCCUR.**

**IMPORTANT! NEVER ADD COOLANT TO AN ENGINE THAT HAS BECOME OVERHEATED, UNTIL THE ENGINE HAS COOLED. ADDING COOLANT TO AN EXTREMELY HOT ENGINE CAN RESULT IN A CRACKED BLOCK OR CYLINDER HEAD.**

Whenever coolant level checks are made check condition of the rubber seal on the Radiator Cap. Make sure the Radiator Filler Neck and Cap are clean and rinsed free of any dirt particles.

The cooling system has a total capacity of 12 quarts (11.5 liters). A 50/50 mix of anti-freeze and clean water is recommended.

Maintain the coolant level at approximately 3/4 to 1-1/2 inches below the Filler Neck seat on the Radiator when the coolant is cold.

Remove debris from engine area, oil cooler, and radiator daily, clean more frequently in dirty conditions.

### **CHANGING ENGINE COOLANT (Fig. 31)**

### **⚠ CAUTION**

If engine has been running, pressurized hot coolant can escape and cause burns if cap is removed.

- Before removing cap, allow engine to cool for at least 15 minutes or until the cap is not hot to the touch.

1. Park vehicle on level surface.
2. Remove radiator cap (ONLY IF IT IS COOL TO THE TOUCH!)

3. Open coolant drain cock at bottom of radiator and allow coolant to flow into drain pan. When coolant stops, close drain cock. (Fig. 31)

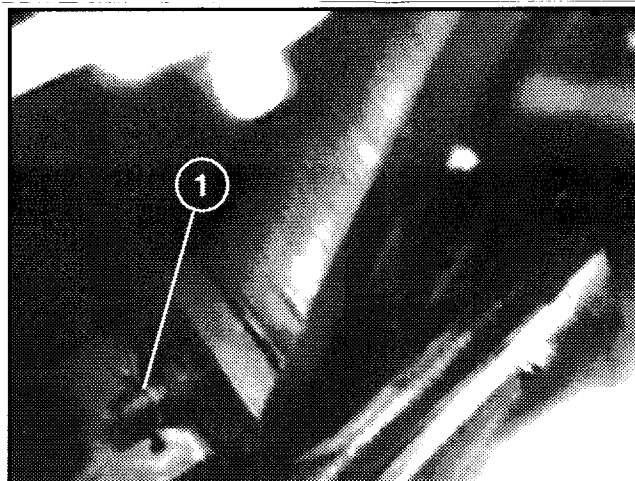
4. Slowly fill radiator with a 50/50 mixture of water and recommended coolant. Install the radiator cap securely.

5. Start engine and operate until warm. Recheck level and replenish, if required.

Use only a permanent-type coolant that meets Ford Specification ESE-M97B44-A. Refer to the coolant mixture chart on the container for additional antifreeze protection information. Do not use alcohol or methanol antifreeze.

Every 200 hours (more often in dusty areas) inspect the exterior of the radiator and oil cooler for obstructions. Remove all bugs, dirt, or foreign material with a soft brush or cloth. Use care to avoid damaging the fins. If available, use low pressure compressed air or a stream of water in the opposite direction of normal air flow.

Check all hoses and connections for leaks. If any of the hoses are cracked, frayed, or feel spongy, they should be replaced.



**Figure 31**

**1. Radiator Drain Cock**

# BELT MAINTENANCE

## DRIVE BELTS

The drive belts should be properly adjusted at all times. A loose drive belt causes improper alternator, fan and water pump operation, in addition to overheating. Overtightening the belt may result in excessive wear on the alternator and water pump bearings, as well as premature wear on the belt itself. Therefore, it is recommended that a belt tension gauge be used to check and adjust the belt tension. **Any belt that has operated for a minimum of 10 minutes is considered a used belt**, and when adjusted, it must be adjusted to the reset tension shown in the specifications below:

### Belt Tension Specifications

Alternator	Tension
New	79-101 lbs.
Used-Reset Minimum	56-75 lbs.
Governor	
New	75 lbs.
Used-Reset Minimum	50 lbs.

A used belt is one that has been in operation for 10 minutes or more. Reset belt tension when it meets minimum specification.

## ADJUSTING BELTS

Check tension of all belts initially after the first day of operation and every 100 hours thereafter.

### Alternator Belt (Fig. 32)

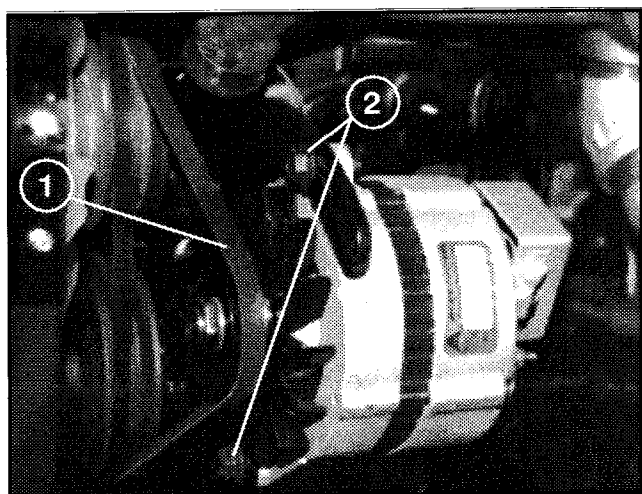


Figure 32

1. Alternator Belt      2. Mounting Bolts

1. To adjust belt tension, loosen bolt securing alternator brace to engine, bolt securing alternator to brace and alternator mounting bolt.

2. Insert pry bar between alternator and engine and pry out on alternator.

3. Hold alternator in position after proper belt tension setting is achieved and tighten alternator and brace bolts to secure adjustment.

### Governor/Cooling Fan Belt (Fig. 33)

1. To adjust belt tension, loosen upper and lower nuts securing idler arm to front engine mount.

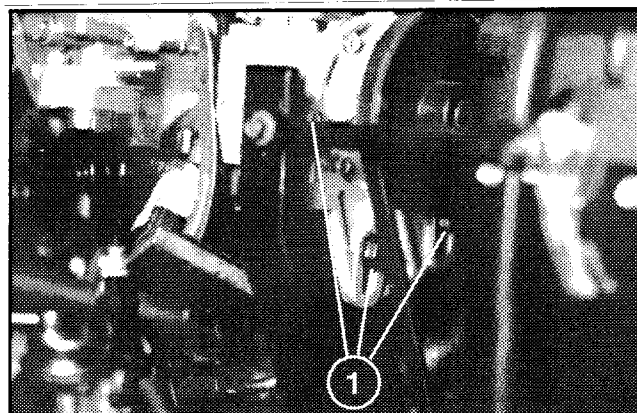


Figure 33

1. Governor/Fan Belt Mounting Bolts

2. Pull out on idler arm until desired belt tension is achieved.

3. Tighten mounting nuts to secure adjustment.

# HYDRAULIC SYSTEM MAINTENANCE

## CHANGING HYDRAULIC FLUID

Change hydraulic fluid after every 400 operating hours, in normal conditions. If fluid becomes contaminated, contact your local TORO distributor because the system must be flushed. Contaminated fluid looks milky or black when compared to clean oil.

1. Start engine, park machine on a level surface, set the parking brake, and shut engine off. Block the two rear wheels.
  2. Clean area around hydraulic oil filter and remove filter.
  3. Clean area around one hydraulic line on bottom of tank. Loosen and remove line from tank fitting and allow oil to flow into drain pan.
  4. Install new filter; refer to steps 1-2 in "Replacing Hydraulic Oil Filter", for proper procedures.
  5. Reinstall hydraulic line on tank fitting and tighten securely.
  6. Fill reservoir with approximately 12 gallons of hydraulic fluid. Refer to "Checking Hydraulic Fluid". (page 18)
- IMPORTANT! Use only hydraulic fluids specified. Other fluids could cause system damage.**
7. Install reservoir cap. Start and run engine at idle speed for about two minutes and turn the steering wheel lock to purge air trapped in the system. Turn the engine off.
  8. Check level of fluid and add enough to raise level to specified level. **DO NOT OVERFILL.**

## REPLACING HYDRAULIC OIL FILTER

**IMPORTANT! KEEPING THE HYDRAULIC SYSTEM CLEAN IS ESSENTIAL. SERVICING THE HYDRAULIC FILTER IS CRITICAL TO THE LIFE OF THE HYDRAULIC SYSTEM.**

The hydraulic filter keeps the hydraulic system relatively free of contaminants and must be serviced at regular intervals. **Initially, change filter after first ten hours of engine operation, and thereafter every 200 hours of operation or yearly, whichever comes first.** Use TORO oil filter, Part No. 86-3010, as a replacement.

1. Position vehicle on a level surface, stop vehicle, engage parking brake (lock), turn engine off, and remove key from ignition switch.

2. Clean area around filter mounting area. Place drain pan under filter and remove filter.
3. Lubricate new filter gasket, and fill the filter with recommended hydraulic fluid.
4. Make sure filter mounting area is clean. Screw filter on until gasket contacts mounting plate. Then tighten filter 1/2 to 2/3 turn.
5. Start engine and let run for about two minutes to purge air from the system. Stop the engine, check the hydraulic oil level, and check for leaks.

## CHECKING HYDRAULIC LINES AND HOSES

### CAUTION

**Pin hole leaks can eject high pressure hydraulic fluid. Hydraulic fluid escaping under pressure can penetrate skin and cause injury.**

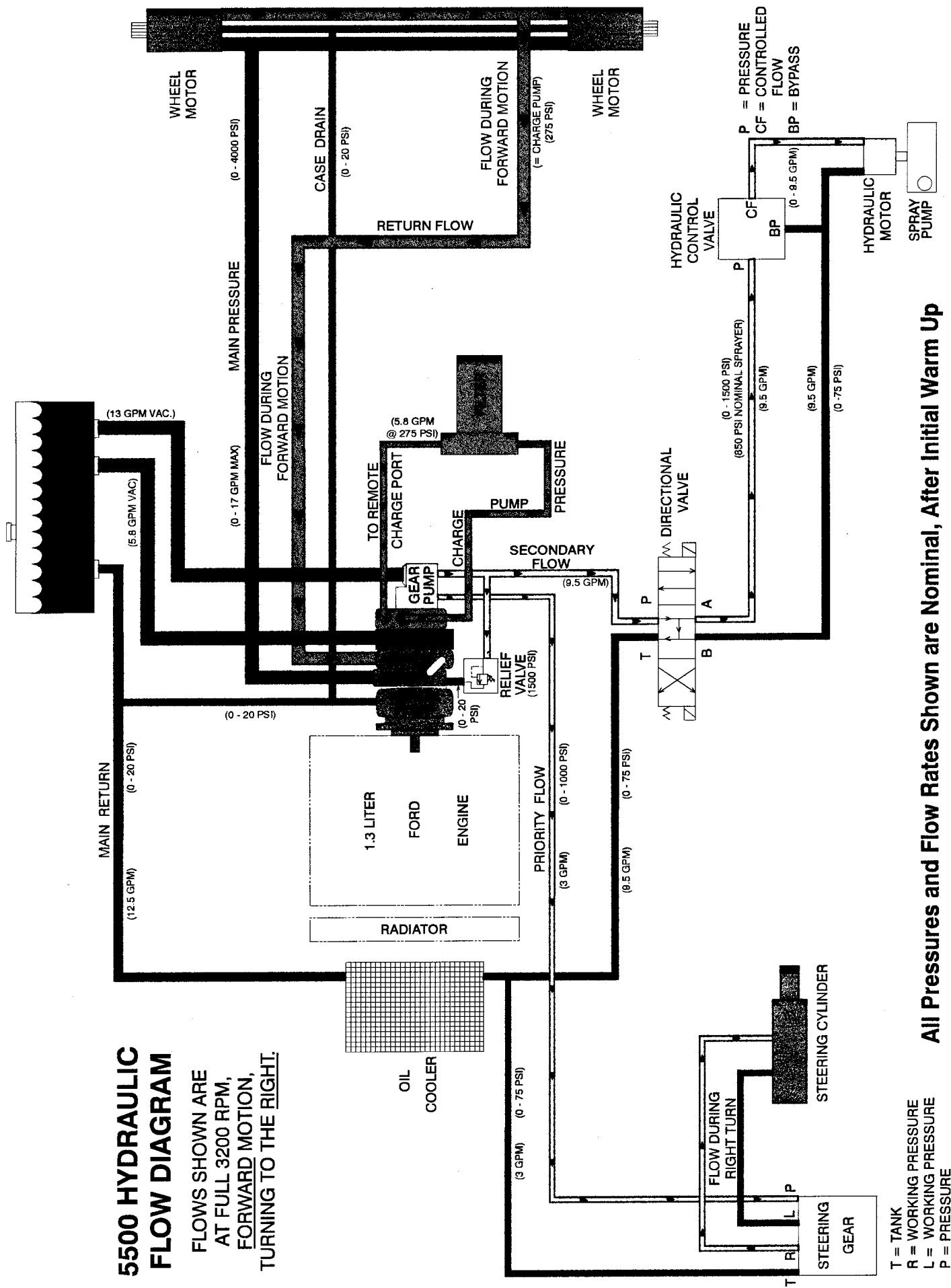
**Fluid accidentally injected into the skin must be surgically removed within a few hours by a doctor familiar with this form of injury or gangrene may result.**

- **Wear gloves and use cardboard or paper to find hydraulic leaks.**

Inspect hydraulic lines and hoses daily for leaks, kinked lines, loose mounting supports, wear, loose fittings, weather deterioration, and chemical deterioration. Make all necessary repairs before operating.

# 5500 HYDRAULIC FLOW DIAGRAM

FLows SHOWN ARE  
AT FULL 3200 RPM,  
FORWARD MOTION,  
TURNING TO THE RIGHT.

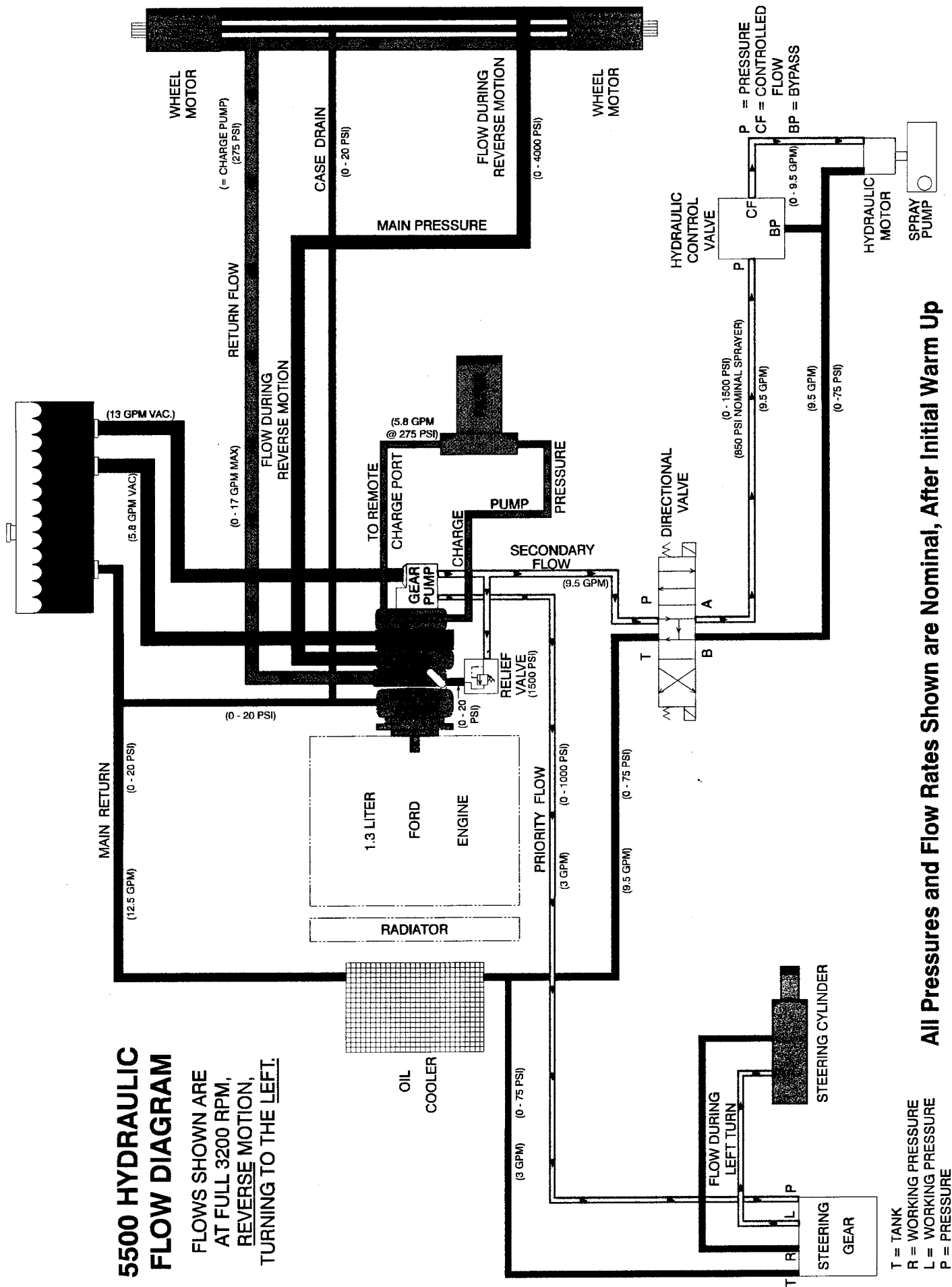


All Pressures and Flow Rates Shown are Nominal, After Initial Warm Up

T = TANK  
R = WORKING PRESSURE  
L = WORKING PRESSURE  
P = PRESSURE

# 5500 HYDRAULIC FLOW DIAGRAM

FLows SHOWN ARE  
AT FULL 3200 RPM,  
REVERSE MOTION,  
TURNING TO THE LEFT.



All Pressures and Flow Rates Shown are Nominal, After Initial Warm Up

T = TANK  
R = WORKING PRESSURE  
L = WORKING PRESSURE  
P = PRESSURE

# HYDRAULIC SYSTEM

## TEST PORTS (Fig. 34,35)

The test ports are used to test pressure in the hydraulic circuits. Contact your local TORO Distributor for assistance.

1. Auxiliary Port is located on left side of piston pump and is used to measure the charge pressure of the transmission. (Fig. 34)
2. Loosen and remove the Relief Valve and Swivel Assembly from the Adapter Fitting in left side of Piston Pump. (Fig. 34)
3. Connect the Pressure Gauge at Adaptor to check case drain pressure. (Fig. 34)
4. System pressure Test Ports. (Fig. 35)

**NOTE:** When testing the system pressure check system at **LOAD** and **NO LOAD** conditions.

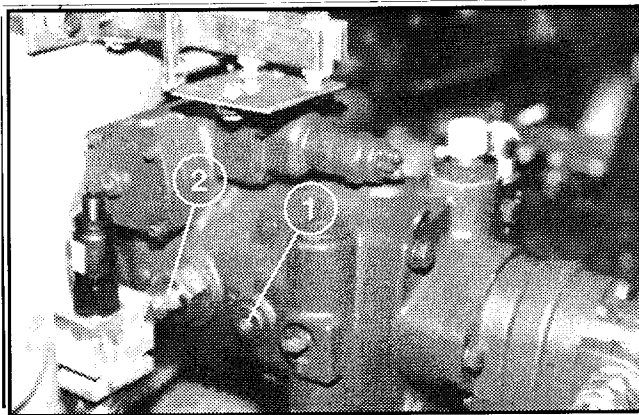


Figure 34

1. Auxiliary Test Port      2. Adaptor Fitting

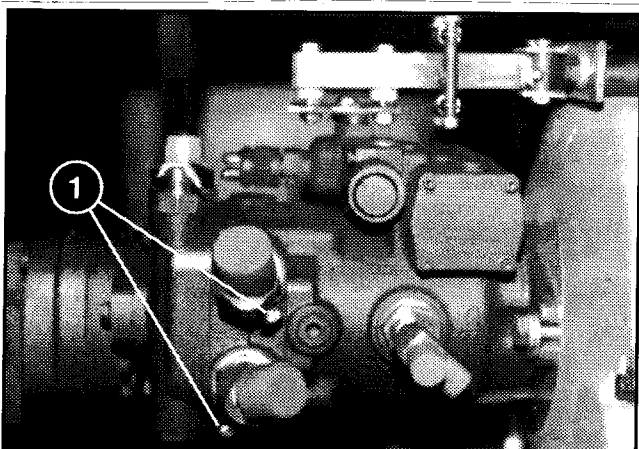


Figure 35

1. Test Ports

## PRESSURE SETTINGS:

Operating Pressure	0 - 1500 psi
Case Pressure	1.7 bar (25 psi) max.
Charge Pressure	17.24 to 20.68 bar (250 to 300 psi)
System Pressure	344 bar (4000 psi) max. intermittent  207 bar (3000 psi) continuous rated

The high pressure relief valves used in the MULTI PRO® 5500 are all factory preset at 4000 psi and cannot be readjusted.

## GAUGES RECOMMENDED:

System Pressure Gauge	700 bar (5,000 psi)
Charge Pressure Gauge	0 - 50 bar (0 to 500 psi)
Case Pressure Gauge	0 - 25 bar (0 to 100 psi)

## BRAKE MAINTENANCE

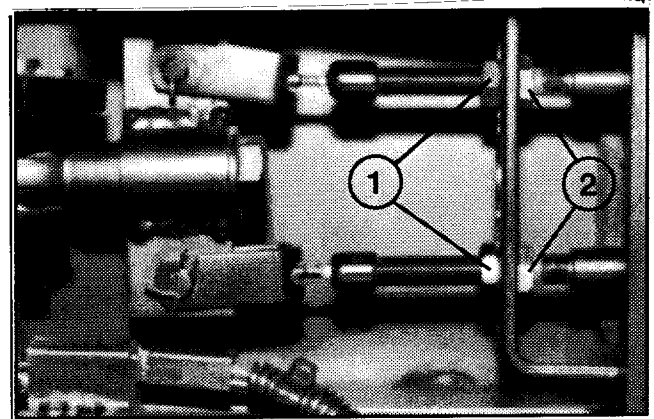
### ADJUSTING EMERGENCY/PARK BRAKE (Fig. 36)

Adjust the service brakes when there is more than one inch of "free travel" of the brake pedal, or when the brakes do not work effectively. Free travel is the distance the brake pedal moves before braking resistance is felt.

**To reduce free travel of brake pedal:**

1. Loosen front nuts on threaded end of brake cables.
2. Tighten rear nuts to move cable backward until the pedal has 1/2 to 1 inch of free travel.
3. Tighten front nuts after brake is adjusted correctly.

**NOTE:** Both brake cables must be adjusted simultaneously so that the brake equalizer is straight after adjustment is made.



**Figure 36**

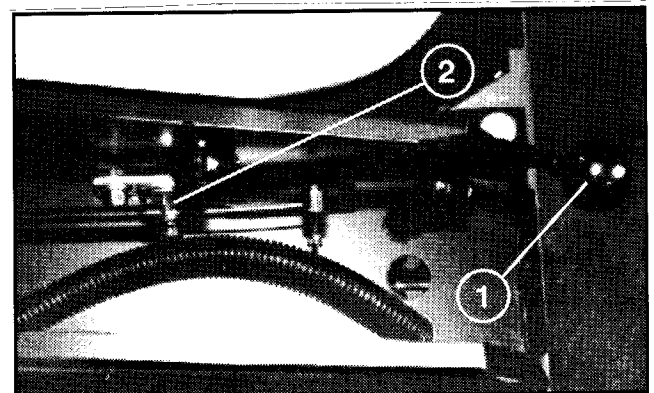
1. Front Nuts                      2. Rear Nuts

## THROTTLE LEVER TENSION

### ADJUSTING THROTTLE LEVER TENSION (Fig. 37)

If the Throttle Lever has a tendency to creep away from the "FAST" setting, the Throttle Pivot lock nut may need to be tightened:

1. Position vehicle on a level surface, stop vehicle, engage parking brake (lock), turn engine off, and remove key.
2. Remove the Throttle Lever knob and Console Cover.
3. Tighten Throttle Pivot lock nut.
4. Replace console cover and Throttle Lever knob. **NOTE:** Be sure to return the Throttle Lever to the "Slow" or starting position prior to starting engine.



**Figure 37**

1. Throttle Handle                      2. Pivot Lock Nut

# ELECTRICAL MAINTENANCE

## JUMP STARTING PROCEDURE

1. Connect a jumper cable between the positive (+) battery posts of the two batteries. The positive posts may be identified by a "+" sign on the top of the battery covers.
2. Connect one end of the other jumper cable to the negative (-) terminal of the battery in the other vehicle. The negative terminal has a "-" sign or NEG on the battery cover. DO NOT connect the other end of the jumper cable to the negative (-) post of the discharged MULTI PRO® 5500 battery. Connect it to the engine. DO NOT connect the jumper cable to the fuel system.
3. Start the engine of the vehicle providing the jump start. Let it run for a few minutes, then start the MULTI PRO® 5500 engine.
4. Remove the negative (-) jumper cable first from the MULTI PRO® 5500 engine, then from the battery in the other vehicle.
5. Finally, remove the remaining cable from both batteries.

### WARNING

**Jump starting can be dangerous. To avoid personal injury or damage to electrical components in vehicle, observe the following warnings:**

- Never jump start with a voltage source greater than 15 volts D.C. This will damage the electrical system.
- Never attempt to jump start a discharged battery that is frozen. It could rupture or explode during jump starting.
- Observe all battery warnings while jump starting your vehicle.
- Be sure your vehicle is not touching the jump start vehicle.
- Connecting cables to the wrong post could result in personal injury and/or damage to the electrical system.

## FUSES (Fig. 42)

There are two 30 amp fuses in the vehicle's electrical system. The fuse box is located under the left operators seat.

The 5 amp in-line fuse located under the dash panel on the left side, is for the speed control feature.

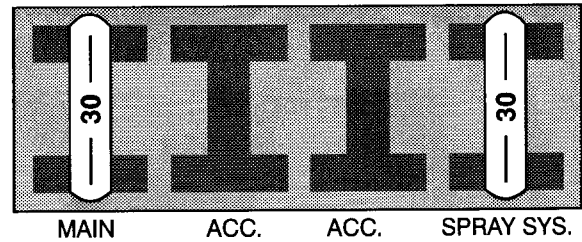


Figure 42

## BATTERY CARE

1. Battery electrolyte level must be properly maintained and the top of the battery kept clean. If the vehicle is stored in a location where temperatures are extremely high, the battery will run down more rapidly than if the vehicle is stored in a location where temperatures are cool.
2. Keep top of battery clean by washing periodically with a brush dipped in ammonia or bicarbonate of soda solution. Flush the top surface with water after cleaning. Do not remove fill cap while cleaning.
3. Battery cables must be tight on terminals to provide good electrical contact.
4. If corrosion occurs at terminals. Remove battery cover, disconnect cables, negative (-) cables first and scrape clamps and terminals separately. Reconnect cables positive (+) cable first and coat terminals with petroleum jelly.
5. Check the electrolyte level every 50 operating hours, or if machine is in storage, every 30 days.
6. Maintain cell level with distilled or demineralized water. Do not fill cells above the bottom of the ring inside each cell.

### CAUTION

**Electrolyte gases are explosive and can cause serious injury to eyes, lungs and skin. Nausea may result if the gases are inhaled.**

- Wear safety goggles and rubber gloves when working with electrolyte or battery.
- Charge the Battery in a well ventilated place so gases produced while charging can dissipate.
- Unplug charger from electrical outlet before connecting to or disconnecting charger leads from battery posts.
- Since the gases are explosive, keep open flames and electrical spark away from the battery; DO NOT SMOKE!



# AXLE MAINTENANCE

## CHANGING PLANETARY GEAR DRIVE OIL (Fig. 38,39)

Change oil initially after 200 hours operation and every 800 hours or yearly. Check oil level if external leakage is noted. (Refer to "Before Operating" page 19.) Use high quality SAE 85W-140 wt. gear lube replacement.

Capacity of each hub is 16 oz.

1. With machine on level surface, position wheel so the check/drain plugs are at the 3 and 6 o'clock positions. (Fig. 38 position 1.)
2. Remove both plugs. Allow oil to drain from the bottom hole into a pan.
3. Remove drain plug from bottom of hub on other side of wheel and allow oil to drain into pan. (Fig. 39)
4. When Gear Drive is completely drained, reinstall plug on bottom of hub and position wheel so holes are at 9 and 12 o'clock position. (Fig. 38 position 2.)
5. Add gear oil to the 12 o'clock positioned hole. Fill until the 9 o'clock hole begins to overflow.
6. Reinstall the Check/Drain plugs.
7. Repeat steps 1 thru 6 on opposite gear assembly.

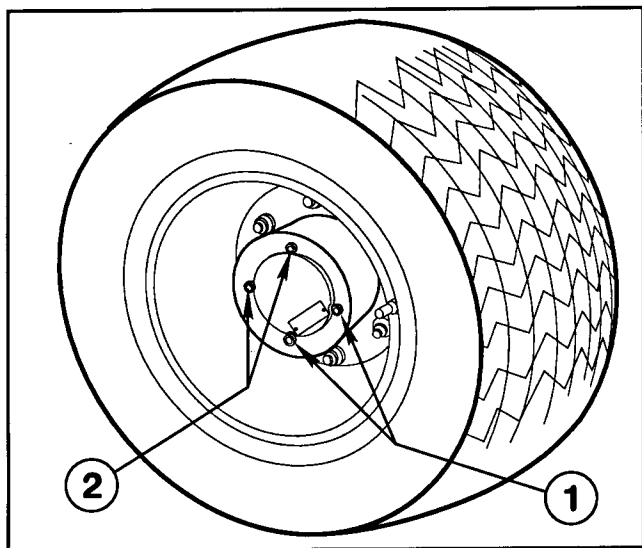


Figure 38

1. Position of Plugs for draining oil.

2. Position of Plugs for filling with oil.

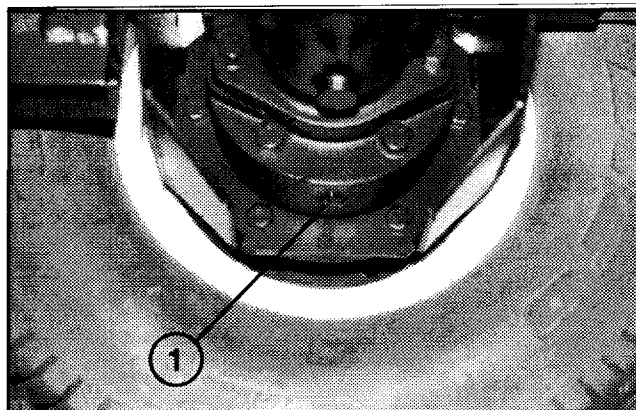


Figure 39

1. Check/Drain Plug

## FRONT WHEEL TOE-IN (Fig. 40,41)

After every 600 operating hours or annually, check front wheel toe-in.

1. Measure center-to-center distance (at axle height) at front and rear of steering tires. Front measurement must be 1/8 to 1/4 inch less than rear measurement. (Fig. 40)

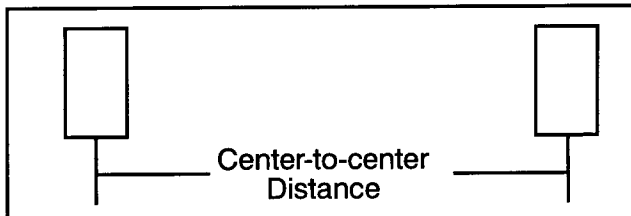


Figure 40

2. To adjust, loosen jam nuts at both ends of the tie rod. (Fig. 41)

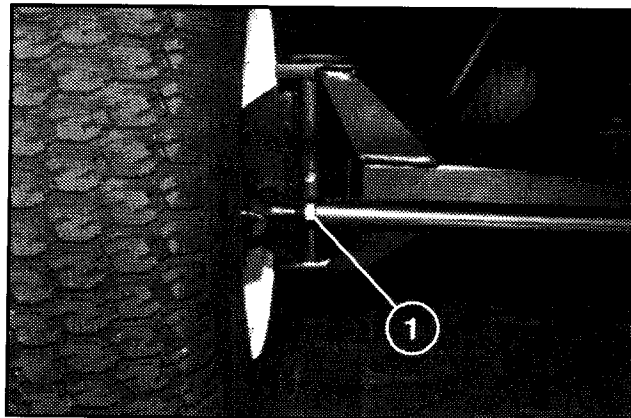


Figure 41

1. Tie Rod (one nut on each end)

3. Rotate tie rod to move front of tire inward or outward.
4. Tighten tie rod jam nuts when adjustment is correct.

# TRACTION DRIVE MAINTENANCE

## LINKAGE MAINTENANCE (FIG. 43)

It is very important that the foot pedal operate freely and return positively to the NEUTRAL or CENTERED position. Periodic maintenance of the traction pedal requires applying grease to the grease fittings on the linkage control arms as shown in Fig. 43.

## LINKAGE TROUBLESHOOTING (FIG. 43)

If the traction pedal fails to operate smoothly and freely, or fails to return to the NEUTRAL position, the following steps should be checked and corrections made if required:

1. Check that the traction pedal pivot tube is free on the pivot pin.
2. Check that the control linkage front and rear ball joints move freely.
3. Check that no cables, wiring harnesses, etc. are restricting or interfering with the linkage travel.

4. Check that the linkage centering arms are pivoting freely.
5. Check that both centering springs are in their proper position.
6. Check that the control plate is rotating freely.
7. Check that speed control clutch plate is operating freely.

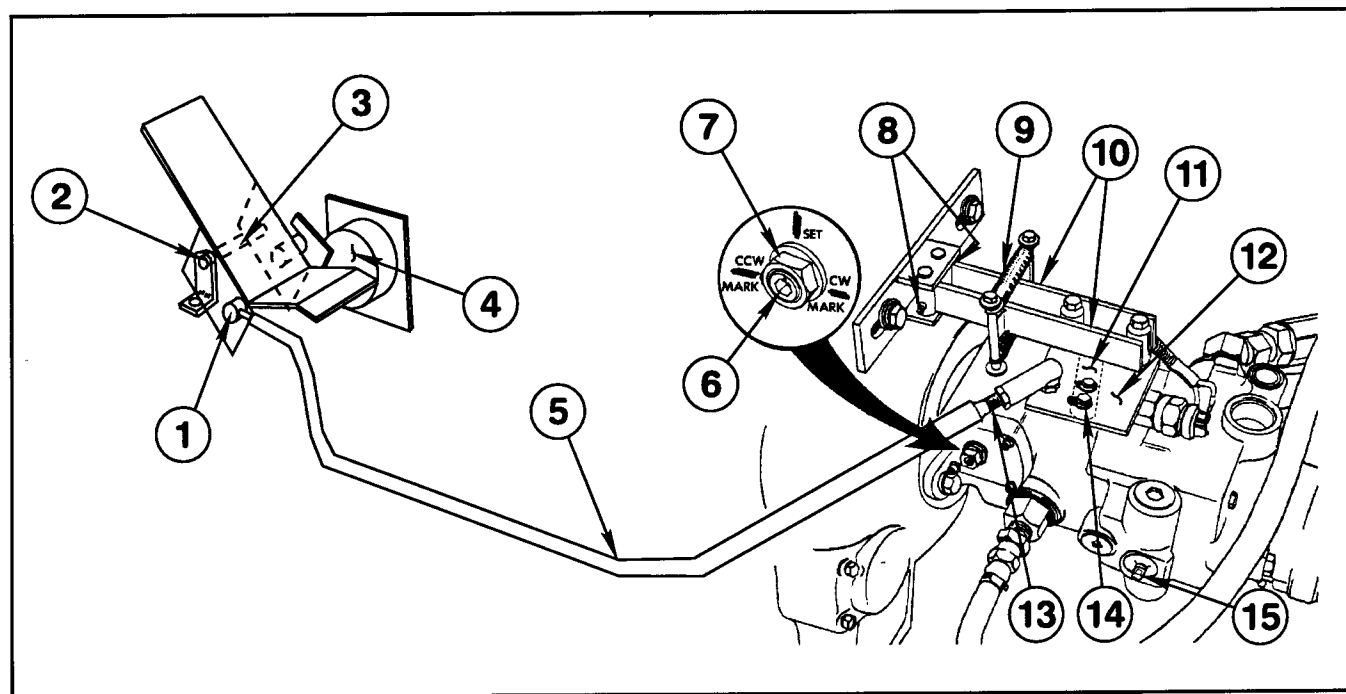


Figure 43

1. Ball Joint
2. Pivot Pin
3. Pivot Tube
4. Clutch Plate

5. Control Linkage
6. Servo Adj. Screw
7. Jam Nut
8. Grease Fittings

9. Centering Springs
10. Centering Arms
11. Servo Arm
12. Control Plate

13. Ball Joint
14. Control Plate Bolts
15. Dump Valve

# TRACTION DRIVE MAINTENANCE

## TRACTION PEDAL / TRANSMISSION NEUTRAL ADJUSTMENT (Fig.43)

The traction pedal and transmission adjustments are factory pre-set to assure the transmission is in the NEUTRAL or CENTERED position. If the MULTI PRO® 5500 Turf Sprayer should experience "creep" when the traction pedal is in the NEUTRAL or CENTERED position, **EMPTY THE TANK**, and adjust as follows:

1. Position vehicle on a level surface, stop engine, engage parking brake (lock), turn engine off, and remove key from ignition switch.
2. Raise rear wheels completely off the ground surface and support with jack stands. Chock the front wheels to prevent the vehicle from rolling forward or backward.
3. Remove the control linkage from the control plate at the rod end and pull away from the control plate.
4. Pull both control arms away from the control plate bearings (Fig. 43). When the control plate is adjusted correctly, the control plate **WILL NOT** rotate when the control arms are pulled away.
5. If control plate **IS NOT** adjusted correctly, proceed to STEP 7.
6. If control plate **IS** adjusted correctly, proceed to STEP 8.
7. To adjust the control plate, loosen the two control plate mounting bolts, so it allows the control plate to center itself and allows the servo control arm to move independently as shown in Fig. 43 Retighten the two control plate mount bolts and verify the proper adjustment by pulling both control arms away from the control plate bearings. The control plate **SHOULD NOT ROTATE!** After proper adjustment proceed to STEP 10.
8. Make a chalk mark on the servo adjusting screw to use as a reference point.
9. Loosen the jam nut on the servo adjusting screw. Release the brake pedal, start the engine, and turn the servo adjusting screw counter clockwise until the rear wheels begin to move. Make a chalk line on the servo housing next to the servo screw mark to show this location. Rotate the servo adjusting screw clockwise until the rear wheels begin to rotate in the opposite direction. Make a chalk mark on the servo housing next to the servo screw mark to show this location. Turn the servo adjusting screw to midway between these two marks and retighten the jam nut.

10. Reattach the control linkage to the control plate.

## TESTING THE ADJUSTMENT

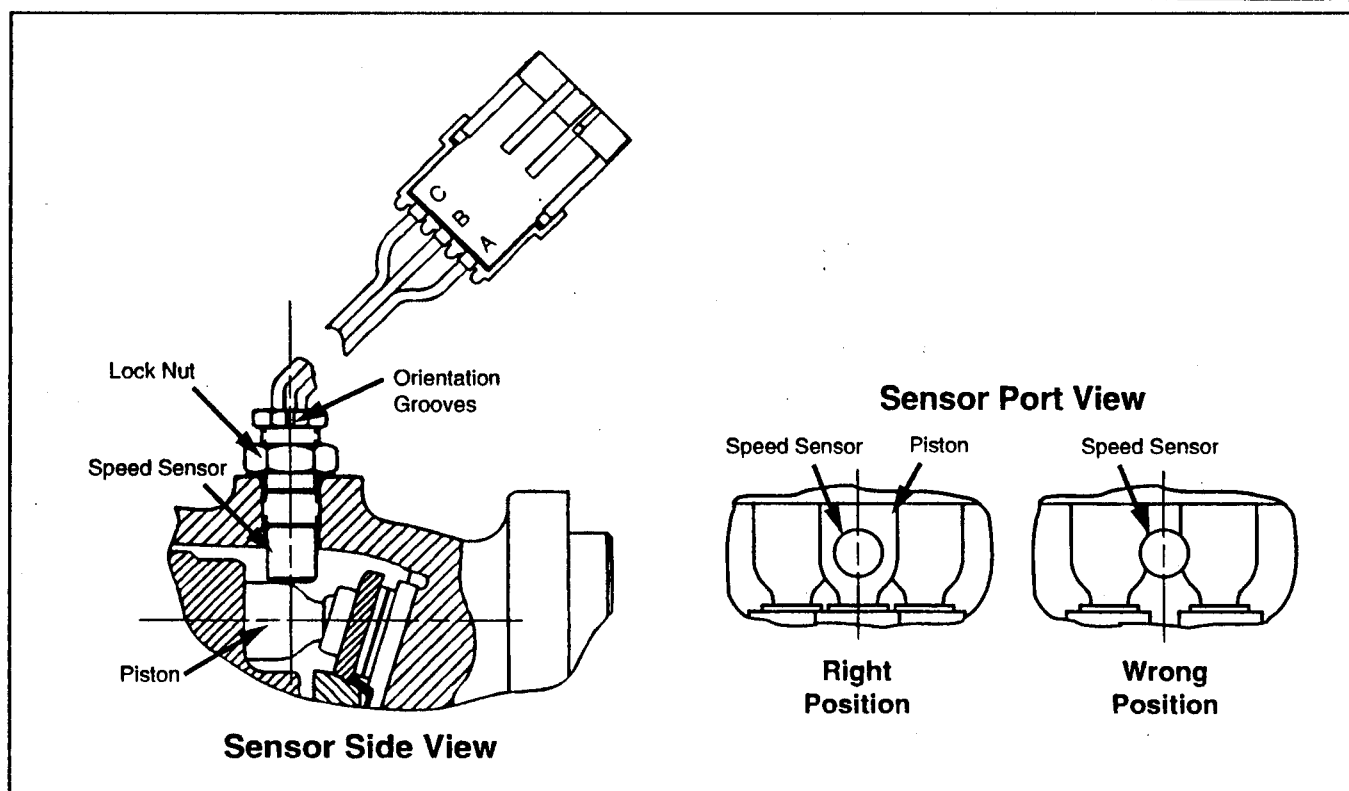
1. Lower the vehicle from the jack stand.
2. Start the engine and release the Parking/ Emergency Brake Pedal.
3. Verify the proper adjustment. The vehicle **SHOULD NOT** experience any "creep".

If "creep" is still present, recheck the control plate adjustment and the servo adjustment.

# Speedometer Sensor Installation

NOTE: It is recommended that this procedure be done with the motor removed from the machine.

1. Thread locknut onto speed sensor to allow full exposure of sensor threads.
2. Center a motor piston with the center of the sensor port (see Sensor Port View below). NOTE: If the motor is on the machine use a tool to feel when a motor piston is in the center of the sensor port.
3. Lubricate O-ring on sensor.
4. Thread sensor into port until sensor contacts piston. Motor output shaft must rotate freely 360°.
5. Turn sensor out (counter-clockwise) until sensor orientation grooves are at a right angle + 3° to motor centerline, then back out sensor one full turn or 360°. Hold sensor at this position and tighten locknut to a torque of 75 – 125 in-lb (8.5 – 14.1 Nm).



# Neutral Lockout Switch Adjustment

## Disassembly – Neutral Lockout Switch

1. Loosen set screw (17) in adapter (12) and remove neutral lockout switch (15) from adapter (12).
2. Remove Neutral lockout adapter (12) from control assembly (7).
3. Remove pin (14), ball (13), and o-rings (16) from adapter (12).

## Reassembly – Neutral Lockout Switch

1. Install new o-ring (11) onto adapter (12) and new o-ring (16) onto pin (14).
2. Install ball (13) and pin (14) into adapter (12). Lubricate with petroleum jelly to hold in place during installation.
3. Install adapter (12) into control assembly (7). Torque 60 to 70 Nm [44 to 53 lbf•ft].
4. Apply Loctite #222 or equivalent to threads of switch (15) and install neutral lockout switch (15) into adapter (12). The adjustment procedures for the switch are as follows.

A. Install switch, while moving control arm back and forth, until “detent” action is detected. Back out the switch until the “detent” action is very slight.

B. Obtain a test light or use a multimeter. Attach the leads from the test light to the switch or the wiring connector.

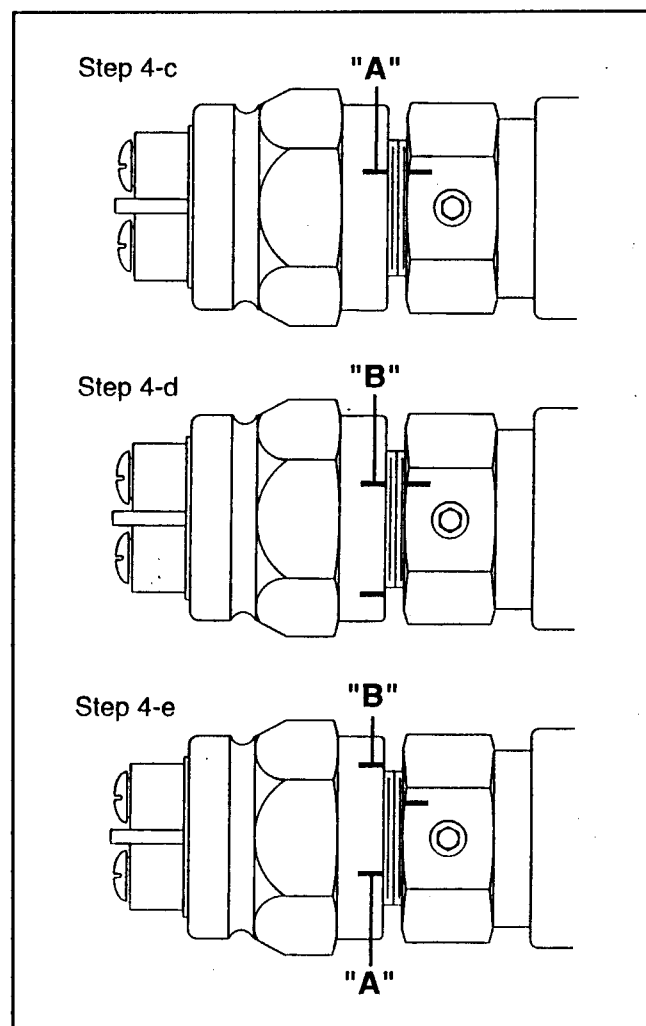
C. Move the control arm out of the detent position. The test light will go on. Screw in the switch until the light goes off. Mark this as position “A” See Figure 25. Move the control arm to the detent position and the test light should come back on.

D. Leaving the control arm in the detent position, the light will remain on. Screw in the switch until the light goes off. Mark this position “B”.

E. Unscrew the switch one third of the distance between “B” and “A”. Install and tighten the hex socket head set screw in one of the upper quadrants of the hex of the switch adapter. See Figure 25. Torque set screw 3.2 to 3.8 Nm [28 to 34 lbf•ft].

5. Test the switch by moving the control arm to the detent position, the light should be on. Move the control arm out of detent, the light should go off.

6. Remove test light and put servo control assembly into operation.



# OPERATING INSTRUCTIONS

## TOWING VEHICLE

In an emergency the MULTI PRO® 5500 can be towed a short distance by actuating the dump valve in the variable displacement hydraulic pump, and towing the vehicle. However, TORO does not recommend this as a standard procedure.

**IMPORTANT! Do not tow the vehicle faster than 2-3 mph (3-4.8 km/hr) because internal transmission damage may occur. The dump valve must be open whenever the vehicle is pushed or towed. If the vehicle must be moved a considerable distance, transport it on a truck or trailer.**

**Note:** When the engine is not running, the power steering will not function, making it difficult (increased effort) to steer.

### CAUTION

Towing at excessive speeds could cause vehicle to lose steering control.

- Never tow vehicle faster than 3 MPH.

## DUMP VALVE (Fig. 20)

1. The Dump Valve is located on the left side of the variable displacement pump. Rotate the valve 90° in either direction to open. This will allow hydraulic fluid to by-pass internally. When fluid is by-passed, the vehicle can be moved - **slowly** - without damaging the transmission.
2. Close dump valve before starting the engine. However do not exceed 5-8 ft-lb (7-11 N m) torque to close the valve.

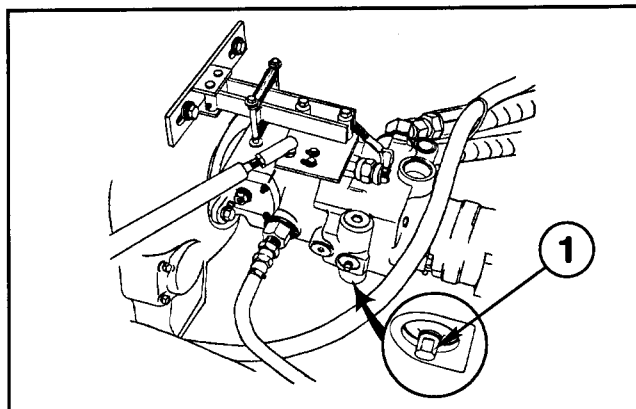


Figure 20

1. Dump Valve

## MAINTENANCE

### WARNING

Servicing the vehicle while the engine is running or vehicle is not properly secured, could result in personal injury or death.

- Before servicing or making adjustments to the vehicle, set parking brake, stop engine, and remove key from the switch.

Establish a regular schedule of lubrication to insure trouble free performance.

For a vehicle operated under normal conditions, check and service at the intervals indicated in the chart on the following page. When operating in extremely cold, hot, or dusty conditions, check and service more frequently. For additional engine maintenance information, refer to the Engine Operator's Manual supplied with the vehicle.

## STORAGE

Check the machine thoroughly for any replacement parts required. In the event parts are needed, place your order with your TORO distributor in the fall or winter to avoid the delays caused by the usual spring rush. When ordering parts please specify the MODEL NUMBER and the SERIAL NUMBER of the MULTI PRO® 5500 Turf Sprayer.

### TRACTION UNIT:

1. Thoroughly clean the traction unit and engine.
2. Check the tire pressure. Inflate all tires to 18-20 psi.
3. Check all fasteners for looseness; tighten as necessary.
4. Grease or oil all grease fittings and pivot points. Wipe up any excess lubricant.
5. Lightly sand and use touch up paint on painted areas that are scratched, chipped or rusted.
6. Service the battery and cables as follows:
  - A. Remove the battery terminals from the battery posts.
  - B. Clean the battery, terminals, and posts with a wire brush and baking soda solution.
  - C. Coat the cable terminals and battery posts with Grafo 112x skin-over grease (TORO Part No. 505-47) or petroleum jelly to prevent corrosion.
  - D. Slowly recharge the battery every 60 days for 24 hours to prevent lead sulfurizing of the battery.

### ENGINE:

1. Drain the crankcase completely, and refill with recommended engine oil (S.A.E. 10) or equivalent.
2. Run engine until completely out of gasoline, then restart and run on unleaded gasoline mixed with stabilizer for at least 10 minutes.
3. While the engine is still running and at completion of above run, treat upper cylinders by spraying one to two ounces of recommended engine oil into carburetor air intake for about 10 to 15 seconds. Open throttle for short bursts of speed, shut off ignition and allow engine to come to a stop while continuing to spray recommended engine oil into the air intake.
4. Check coolant protection.

5. Disconnect and remove battery.
6. Clean exterior surface of engine.
7. Leave spark plugs in holes or seal spark plug holes with suitable threaded metal plugs.
8. Seal all openings in engine and accessories with weatherproof tape. Mask off all areas used for electrical contact.
9. Make sure all surfaces are dry, including ignition wiring, and all exterior surfaces of engine.
10. Thoroughly clean and service the air cleaner assembly.
11. Seal the air cleaner inlet, the exhaust outlet, and the crankcase breather with weatherproof tape.
12. Check the oil filter cap, gas cap, and radiator cap to ensure they are all securely in place.

### SPRAYING SYSTEM:

1. Flush pump and entire spraying system with water and tank cleaning agent. Drain pump and spray system completely.
2. Add a rust inhibiting antifreeze solution to the pump and recirculate through the system, coating the pump interior. Drain solution completely.
3. Remove coil assemblies from solenoid valves. Apply a light film of petroleum jelly or equivalent to the armatures. Reinstall coil assemblies on solenoid valves.
4. Check condition of spray hoses. Tighten all hose connections securely.
5. Lubricate boom pivot grease fittings and pivot points.

### CAUTION

If the vehicle is stored in proximity to flames or sparks. Explosive fumes may accumulate and ignite. Causing injury or death.

- Never store a vehicle with gasoline in the tank.
- Never store a vehicle where fumes may reach an open flame or spark.
- Allow engine to cool before storing in any enclosure.



**Commercial Products**