

NELSON

Raintrain[®]

Instruction Manual

Thank you for purchasing a Nelson RainTrain2®.

Read this manual carefully to learn how to operate and service your machine properly. Failure to do so can result in personal injury and/or property damage.

Measurements in this manual are in U.S. units unless otherwise stated.

Right-hand and left-hand sides of the RainTrain2® are determined by the side of the machine where the turbine and cable drum are located. The turbine side of the RainTrain2® is considered the 'Left Side'. The cable is fed from the 'Front' of the machine.

If you have a problem or if you do not understand some feature of your RainTrain2®, contact us at 1-800-NELSON8.

- Damage caused by normal wear, accident, lack of reasonable care and maintenance, neglect or abuse.
- The replacement cost of normal service items such as hose fittings, gaskets, etc. unless these parts are known to be defective.
- Transportation, mailing, service call, diagnosis costs. Labor for repairs is also excluded unless unusual circumstances exist and then only if pre-approved.



Table of Contents

Introduction	2
Safety	4
Assembly	7
Controls	8
Lubrication and Service	12
Winterization and Storage	14
RainTrain2® Start-up & Operation	15
Speed Setting Guide	22
Sprinkler Adjustment	18
Disassembly and Assembly	19
Specifications	22
Performance Guide	23
Sprinkler Performance Charts	23

Safety

Owners Responsibilities:

The owner is responsible for the safe operation of this product.

It is the owner's responsibility to:

1. Read and understand these instructions.
2. Operate the machine according to prescribed limitations.
3. Properly train others who may be permitted to operate the machine.
4. Heed the rules of safety including, but not limited to, the instructions in this manual.
5. Exercise good judgment relating to safe operation and safe conduct by operators and spectators whether invited or not.
6. Always bring the safety decals and placards on the machine to the attention of operators and spectators.
7. **Keep all shields and guards in place!**

Read and Heed the Special Messages!

This safety alert symbol is used to indicate messages related to safety. When you see this safety symbol, obey the safety message to avoid personal injury, property damage or both.



- A "**Caution**" message in this manual or on a machine placard means that you could be injured and/or equipment or property may be damaged if you do not follow instructions.
- A "**Warning**" message in this manual or on a machine placard means that a hazard exists that could result in severe personal injury or death.
- A "**Danger**" message in this manual or on a machine placard means that a hazard exists that will result in severe personal injury or death.

Learn To Be A Safe Operator

Read This Manual. Know the controls on the RainTrain2® and also how to stop the water supply!

Do NOT allow children to operate the RainTrain2®.

Do NOT allow anyone to operate the RainTrain2® without proper instruction.

Protect Children

- Keep children away when you operate the RainTrain2®.
- Do not allow children to play around the machine or in the water from the sprinkler.
- Never allow children to climb or ride on the machine at any time.

Use Caution Around Pressurized Lines

- For your own protection, always take care when working with or around pressurized equipment. Shut off the pump before working with any components including the pump, supply lines, machine, or related equipment.
- Be sure pressure is relieved from the supply line when disconnecting.
- When the automatic sprinkler shut-off is used, pressurized water may be trapped in the hose supplying water to the RainTrain2®.

Stay Away From Operating Sprinklers

Stay away and keep others away from the sprinkler head during operation. Pressurized water from a sprinkler can inflict serious injury to bystanders.



Keep Hands and Clothing Away

Do not under any circumstances reach into the RainTrain2® while it is in operation. Do not reach into the RainTrain2® if the cable or hose is under tension.

Keep All Guards and Shields in Place

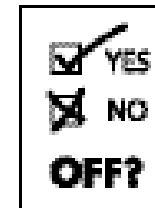
Never operate this machine with safety guards removed!

Never Service or Make Adjustments While the RainTrain2® is Pressurized

Shut the water off at the source before attempting to do any service, maintenance of adjustments.

Stay Away From Power Lines

Avoid letting irrigation water contact power lines. Be careful not to contact power lines with irrigation pipe, hose, travel cable, or mechanical equipment.



Assembly

The RainTrain2® is shipped with most of the assembly complete. Once the machine is completely assembled, read this entire manual before operating your RainTrain2®. The remaining items to be assembled before operation are the wheels, sprinkler, sprinkler nozzle, and hose fitting.

1. Assemble the four wheels to the chassis using 4 brass shoulder bolts and a 7/8" or 22 mm socket wrench (See figure 14 on page 19). The hubcaps can then be pressed into place. The hubcaps may need to be rotated and pressed at the same time to fit them in completely.
2. Attach the sprinkler head to the RainTrain2® using a 24 mm wrench. Use Teflon tape to seal the threads.
3. Install the appropriate sprinkler nozzle using a 3/4" wrench (refer to the "Specification and Performance" section to select the correct nozzle). Note: The orientation of the nozzle is extremely important for performance. The nozzle must be adjusted so that the sprinkler swing arm is perfectly flat against the nozzle stop. If the nozzle is even slightly cocked, the sprinkler may not have enough power to rotate.
4. Select and install the proper hose fitting on the water inlet port of the RainTrain2®. The type of fitting on the drag hose will determine which fitting should be used on the RainTrain2®.

Controls



Figure 1. Rear of the machine with the cover open.

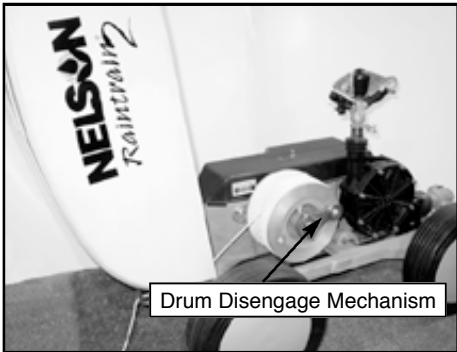


Figure 2. Left side view of machine with the cover open.

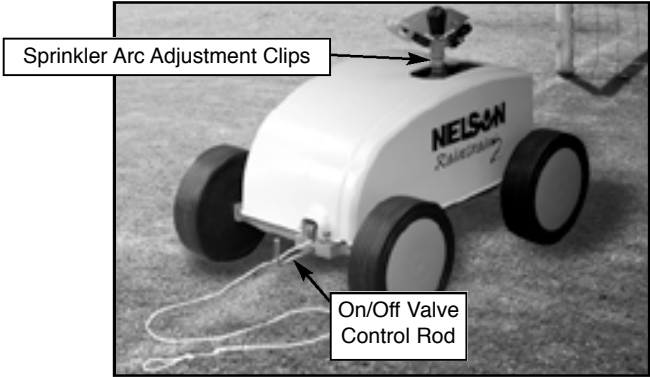


Figure 3. Front left-hand corner view of the machine with cover closed.

Controls

Operation of the On/Off Valve and Control Rod

The On/Off Valve and the Control Rod are an important part of the RainTrain2®. This section describes the operation of the On/Off Valve and Control Rod.

The Control Rod will latch in the Off position when the Control Rod Stem is up and pushed to the rear of the machine (see figure 4). Note: Verify that the Latching Spool on the Control Rod is adjusted correctly. The Latching Pawl should never fall behind the Latching Spool when the Control Rod is pushed completely into the machine.

In the Off position, the Control Rod unseats the Check Ball Valve and allows water to pass into the outer diaphragm cavity. This closes the diaphragm and does not allow water to pass through to the turbine or the sprinkler (see figure 4).

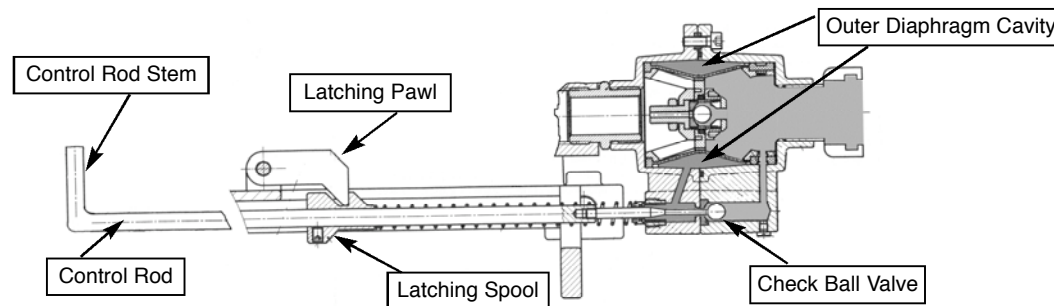


Figure 4. Valve in the latched Off position.

Controls

To reset and open the valve, rotate the Control Rod Stem down (see figure 5). The Latching Spool will release from the Latching Pawl and the spring should slide the Control Rod Forward. **Caution: There should not be any water pressure to the RainTrain2® when the valve is turned on. These diagrams show water pressure for educational purposes only. Pressurized water from a sprinkler can inflict serious injury to the operator or bystanders.**

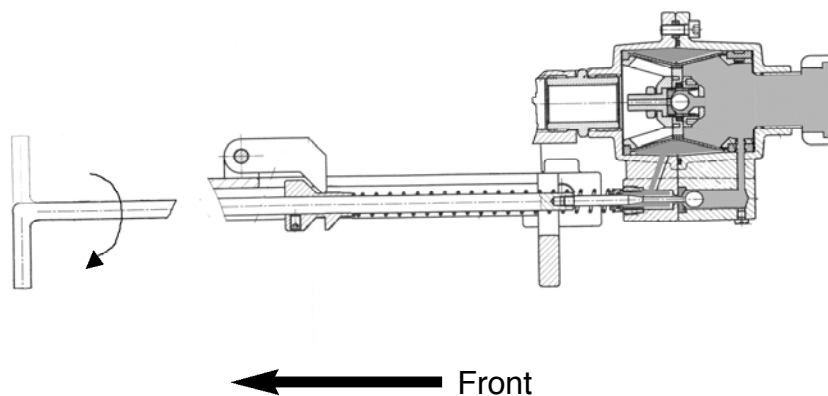


Figure 5. The Control Rod Stem is Turned Down (For illustration purposes, the rod is still back and valve is still off. Also see figures 6 and 7).

Controls

When the Control Rod slides forward, the Check Ball Valve will seat and will not allow water into the outer diaphragm cavity (see figure 6). The water that was in the outer diaphragm cavity is vented from around the rod as it is slid forward. The diaphragm is allowed to expand and allows water to reach the turbine and the sprinkler.

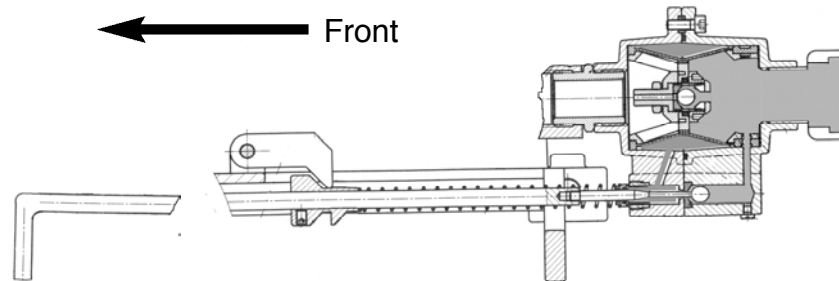


Figure 6. The valve is open and the Control Rod Stem is down.

The control Rod Stem is then turned up and the machine is ready for work (see figure 7). Notice that the Control Rod Latching Spool is now in position to catch on the Latching Pawl when the rod is pushed into the machine.

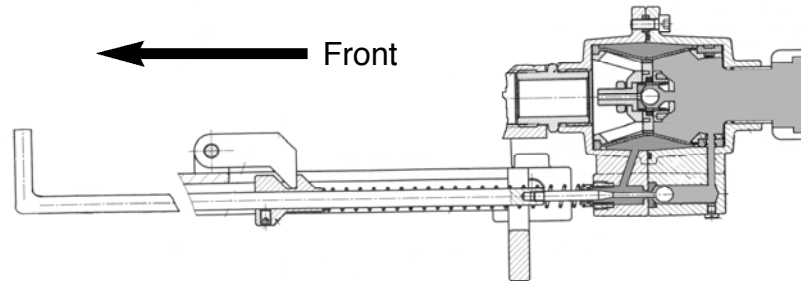


Figure 7. The valve is open and the Control Rod Stem is up. This is the normal operating position.

Lubrication and Service

The RainTrain2® requires very little maintenance. Inspect the RainTrain2® before each irrigation season and each irrigation run. Please follow these service recommendations to assure a long and productive life for your RainTrain2®.

Before each Irrigation Season

1. When taking the RainTrain2® out of storage, be sure there are no rodent or insect nests that may plug filters, valves, or sprinklers.
2. Carefully remove the gearbox cover (see Disassembly and Assembly) and inspect the gears for any missing teeth or abnormal wear (see figure 8). Your RainTrain2® gearbox does not require any further lubrication. Verify that the three drain holes in the bottom of the gearbox are not plugged. Make sure that there is no debris in your RainTrain2® gearbox. Replace the cover.
3. Pull the cable completely out of the unit and inspect for worn or frayed strands (see figure 8). If any strand is broken, the cable should be replaced.
4. Inspect the cable drum disengage mechanism. Repair or replace if necessary.
5. Inspect the cable guide pulley at the front of the unit (see figure 8). This pulley does not require lubrication. The pulley should rotate freely. If the pulley does not rotate freely, disassemble, clean, and replace (See Disassembly and Assembly).

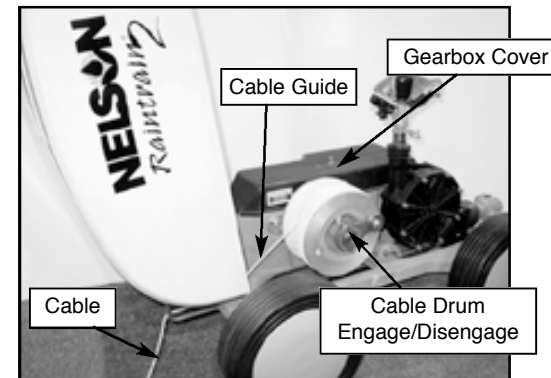


Figure 8. Left hand view of machine with cover open.

Lubrication and Service

Before each Irrigation Run

1. **Caution:** Make sure there is no water pressure to the RainTrain2® during this inspection!
2. Carefully lift the front of the unit and verify that the wheels rotate freely (see figure 9). Repeat for the rear wheels. (Note: The wheels will exhibit a slight amount of friction). If a wheel does not rotate freely, disassemble, clean, and replace (See Disassembly and Assembly).
3. Check sprinkler head for loose, worn, or missing pieces (see figure 9). Adjust or replace if necessary.
4. Verify that the on/off valve control rod functions correctly (see figure 9). Control rod should be turned down to release and slid forward. Turn the rod up. This is the 'on' position. Push the rod firmly towards the rear of the machine. Rod should move with light effort and catch in this rearward position. This is the 'off' position.
5. Verify that the control rod actuator is firmly attached to the cable and is at the appropriate distance from the cable end (see figure 9). The distance from the cable end may vary for certain applications.
6. Inspect the supply hose for your RainTrain2®. Replace or repair if necessary.

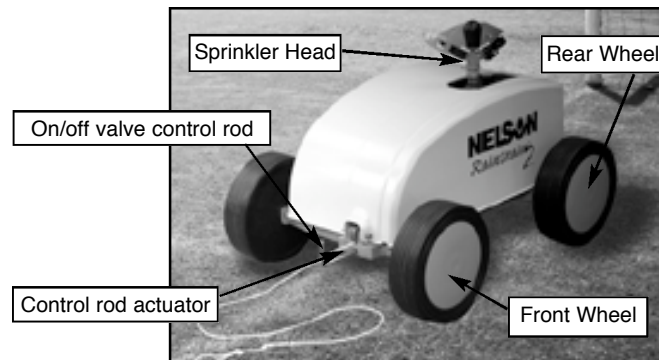


Figure 9. Front left hand corner view of the machine.

Lubrication and Service

After the irrigation season (Winterization)

1. After verifying to see that the supply hose is not under any pressure, remove supply hose from your RainTrain2®. Lift the front of the unit and cycle the on/off valve control rod in and out several times (see figure 10). This should allow the water to drain from your RainTrain2®.
2. Inspect the three gearbox drain holes. They should be open and the gearbox should not contain any water or foreign material.
3. Store the RainTrain2® away from the direct sunlight. Make sure all openings such as the water inlet and gearbox drain holes are covered so rodents and insects cannot bring foreign material into the RainTrain2®.

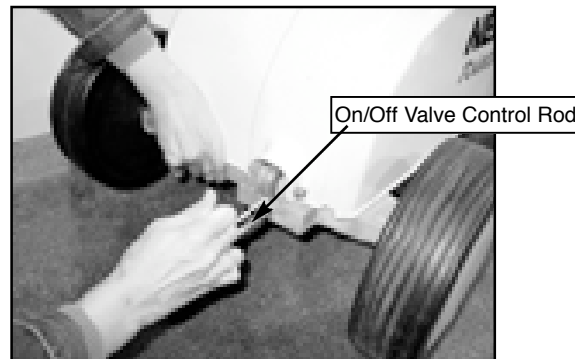


Figure 10. Winterizing the Machine.

RainTrain2® Start-Up & Operation

The success of the RainTrain2® irrigation system depends a great deal on the operator's understanding of the proper start up procedure. Please do not attempt to operate this RainTrain2® until you read and understand the contents of this manual.

Start-up and Operation of the Raintrain2®.

1. Set the RainTrain2® into position with the front (cable end) towards the area to be irrigated. The machine should be 40 to 50 feet inside of the beginning boundary and the wheels should be in line with the travel path and the cable anchor. The travel path should be straight and free of any obstacles.
2. Connect the drag hose to the inlet port of RainTrain2®. Make sure the hose is not bound or kinked to assure proper water flow. Check that all fittings are engaged and locked in place. See figure 11 for the proper layout of the water hoses.

Caution: Verify that the drag hose is long enough for your irrigation run! If the drag hose is drawn tight before the RainTrain2® has completed it's run, damage to the hose, the RainTrain2®, the anchor, the cable, or any other piping or related equipment may occur. Spectators or operating personnel may be injured if the drag hose length is inadequate for the irrigation run

Caution: Verify that the drag hose will be free from any obstacles during the irrigation run.

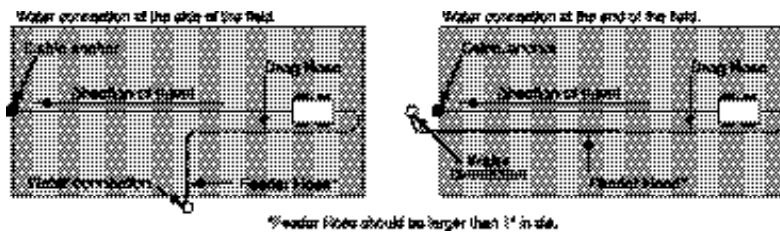


Figure 11. Travel Path and Hose Layout for RainTrain2®.



Start-up and Operation

3. Lift the cover and disengage the cable drum drive pin by pulling the pin out (see figure 11a). Turn the pin so that the pin is locked in the disengaged position. The cable drum should now turn freely. Close the cover.



Figure 11a. Drive Pin Disengaged.

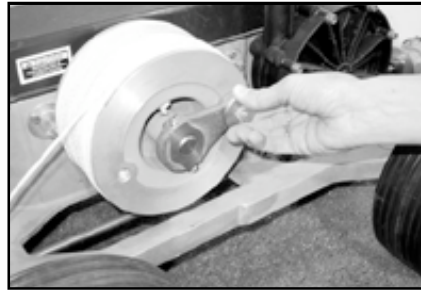


Figure 11b. Drive Pin Engaged.

4. Carefully pull the cable out to the cable anchor. The cable is 360 feet long so the cable anchor should be less than 360 feet from the RainTrain2®. Note: If you use less than the full 360 feet of cable, make sure the remaining coils of cable are tight on the cable drum. Secure the cable end to the cable anchor so that the cable is held as close to the ground as possible (see figure 11c). In light sandy soils it may be necessary to replace the standard anchor with a larger anchor.

5. Lift the cover and re-engage the cable drum drive pin to the cable drum (see figure 11b). Check for loose cable coils and tighten if necessary. Close the cover.

Start-up and Operation

6. Verify that the inlet water hose is not under pressure. Release the On/Off Valve Control Rod by turning the rod stem down. The rod should slide forward. Turn the stem back up 180 degrees and verify that the cable is not pinched or bound.
7. Verify that the sprinkler head is adjusted correctly. See "Sprinkler Adjustment". **Caution: Never adjust an operating sprinkler head. Pressurized water from a sprinkler can inflict serious injury to operators and bystanders.**
8. Caution: Verify that it is safe to begin irrigation. Turn on the water source to begin irrigating.
9. To adjust the speed of the irrigator, refer to page 22 of this manual.
10. The RainTrain2® will shut itself off at the end of the irrigation run when the control rod actuator is pulled against the control rod. You may also stop the irrigation by turning off the water.
11. Once the RainTrain2® has automatically stopped itself at the end of the irrigation run, turn off the water. Verify that the water has been shut off before approaching the machine. **Caution: The hose may still be under pressure. Safely relieve the water pressure before approaching the RainTrain2®. The unit could become active if the control rod is jarred to the on position.**

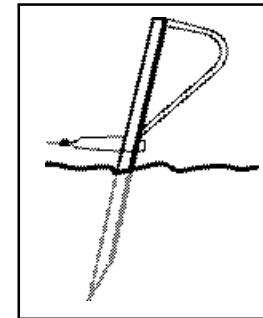


Figure 11c.



Sprinkler Adjustment

The ZE 30W Sprinkler.

See "Specification" section for sprinkler performance information.

The part circle stops are spring clips and they can be rotated to provide any desired arc of operation (see figure 12). No tools are required to move the clips. **Do not** attempt to remove the spring clips from the sprinkler base. Removing the clips by stretching them over the sprinkler base will destroy the spring tension and they cannot be re-used.

The part circle pin can be removed so it will not make contact with the part circle stops (see figure 13). When in this configuration, the sprinkler will operate "full circle". To remove the part circle pin, squeeze the two wires together and slip them out of the housing. Store pin in a safe place.

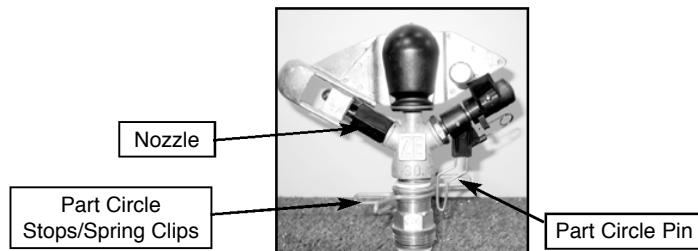


Figure 12. ZE 30W Sprinkler.



Figure 13. Removal of the Part Circle Pin.

Disassembly and Assembly

Caution: Make sure there is no water pressure to the RainTrain2® during any Disassembly and Assembly procedures.



Wheels

Carefully remove the Hub Cap with a flat-bladed screwdriver.
Remove the shoulder bolt using a 7/8" or M22 socket (see figure 14).

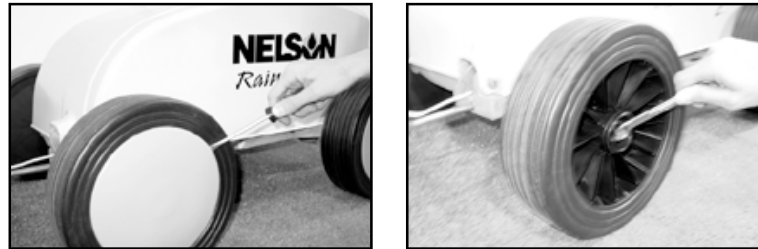


Figure 14. Removal of the Hubcap, Shoulder bolt and Wheel

Cover/Cable Pulley

To remove the cover and cable pulley, remove the front bolt and lock nut using a 1/2" wrench and a 6mm hex wrench (see figure 15). When replacing the pulley, the cable goes on the bottom of the pulley. Leave the lock nut loose enough during assembly so the cover can easily pivot about the bolt.

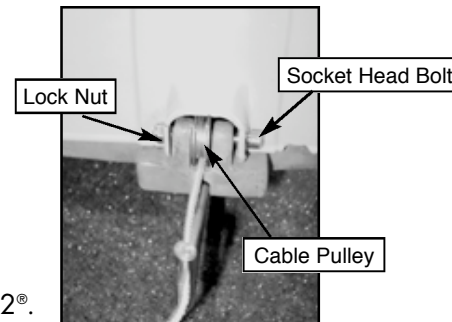


Figure 15. Front of the RainTrain2®.

Disassembly and Assembly

Gearbox Cover

Remove the nut on top of the gearbox with a 1/2" wrench (figure 16). Lift gearbox cover off of gearbox. Do not over tighten nut when replacing the cover.

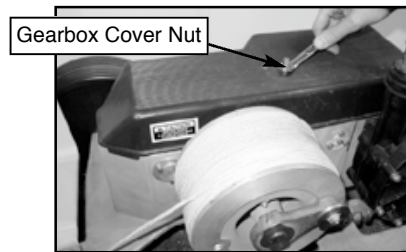


Figure 16. Top of Gearbox Cover.

Turbine Cover

To remove the turbine cover to inspect the turbine, remove the eight socket head bolts and washers from the cover using a 5mm hex wrench. Then, gently remove the cover with a screwdriver. When replacing the cover, carefully pull the cover in evenly with the socket head bolts to avoid damage to the o-ring seal.

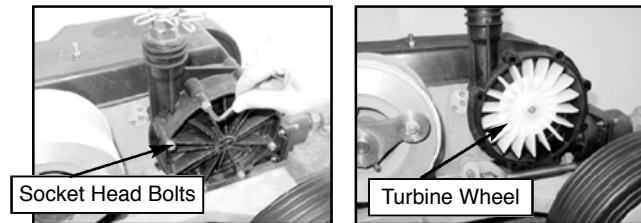


Figure 17. Removing the turbine cover.

Disassembly and Assembly

Latching Spool Adjustment

The Latching Spool is adjusted from the factory. However, if it is necessary to adjust the spool, it can be adjusted using a 3mm hex wrench. See the Controls Section of this manual for details on the operation of the Latching Spool.

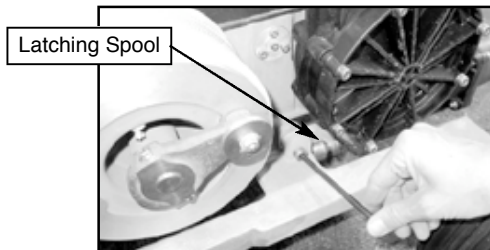


Figure 18. Adjusting the Latching Spool.

On/Off Valve

The On/Off Valve is maintenance free. However, you may wish to periodically remove the valve cartridge to remove any debris that has passed through the water line. Remove the four bolts using a 5mm hex wrench. Use a screwdriver to carefully open the housing. Take care not to puncture the valve bladder. Remove the cartridge from the other half of the housing. Note: The cartridge must only be reinstalled in the correct orientation to assure proper function of the valve. The nut on the inside of the bladder goes towards the front of the machine.

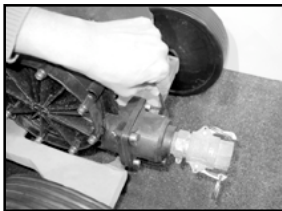


Figure 19. Removal of the On/Off Valve Cartridge.

Specifications

Dimensions, Weights, etc.

Machine Weight	80 lb.
Shipping Weight	90 lb.
Length (with hose fitting)	33"
Height (with sprinkler)	21-1/2"
Width	22"

Speed Setting Guide

The speed of the RainTrain2® is controlled with the Speed Controller Knob on the back of the machine (see figure 20). Caution should be used when modifying the speed while the unit is in operation. Stand clear of the sprinkler at all times. Roll the knob up to increase speed and down to decrease speed. The speed of the RainTrain2® directly affects the depth of water applied. See performance chart for details.

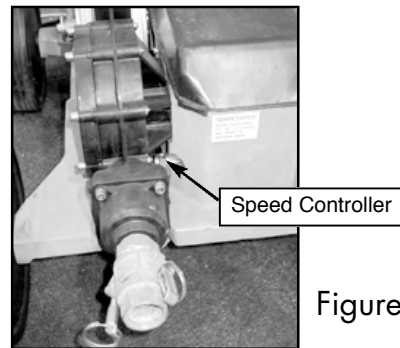


Figure 20. Rear View of Speed Controller.

Performance

Performance Chart

ZE 30V Nozzle mm	Sprinkler Performance			Machine Inlet PSI	Travel Lane Spacing	Maximum Irrigated Length	Average Depth of Application					
	PSI	GPM	DIA				20'/hr	30'/hr	40'/hr	50'/hr	60'/hr	70'/hr
6	30	8.8	100	44	70	400	0.54	0.36	0.27	0.22	0.18	0.15
6	35	9.5	104	49	75	400	0.54	0.36	0.27	0.22	0.18	0.15
6	40	10.1	107	54	78	400	0.56	0.38	0.28	0.23	0.19	0.16
6	45	10.7	110	60	80	400	0.58	0.39	0.29	0.23	0.19	0.16
7	30	12.6	104	48	75	400	0.72	0.48	0.36	0.29	0.24	0.21
7	35	13.6	108	54	80	400	0.73	0.48	0.36	0.29	0.24	0.21
7	40	14.6	112	64	80	400	0.79	0.52	0.39	0.31	0.26	0.22
7	45	15.4	116	69	85	400	0.78	0.52	0.39	0.31	0.26	0.22

Feeder hose selection guide (Water friction loss, psi/100ft of smooth bore hose.)

Flow	5/8"	3/4"	1"	1-1/4"	1-1/2"	2"
gpm	psi	psi	psi	psi	psi	psi
5	9.3	4.0	1.0	0.3	0.1	0.04
6	13.0	5.6	1.4	0.5	0.2	0.05
7	16.7	7.2	1.8	0.6	0.2	0.06
8	22.0	9.5	2.4	0.8	0.3	0.08
9		11.5	3.0	1.0	0.4	0.10
10		14.0	3.5	1.2	0.5	0.12
12		20.0	5.0	1.7	0.7	0.2
15			7.4	2.5	1.0	0.3
20			12.5	4.2	1.7	0.5
25			19.0	6.5	2.6	0.7
30				9.0	4.0	1.0

Note: Hose sizes shown refer to actual inside diameters.

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