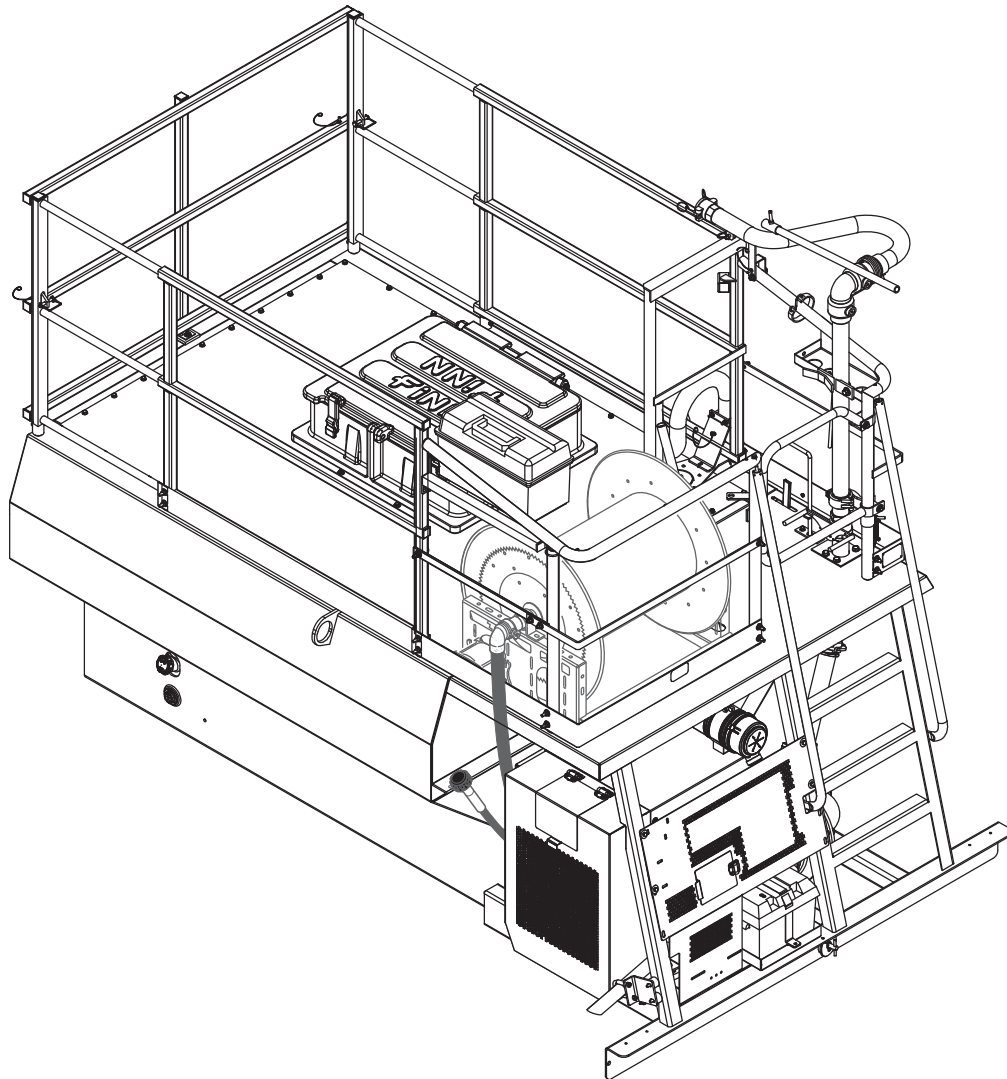




9281 LeSaint Drive • Fairfield, Ohio 45014
Phone (513) 874-2818 • Fax (513) 874-2914
Sales: 1-800-543-7166



T90 CE Compliant HydroSeeder®

Operator Instructions and Parts Manual

Model **ML** Serial No. _____

[illegible]



ACTIVATE YOUR FINN EQUIPMENT WARRANTY

IMPORTANT INFORMATION ON ACTIVATING YOUR FINN EQUIPMENT WARRANTY!!!

IT IS IMPERATIVE THAT YOU, THE PURCHASER, COMPLETE THE FOLLOWING STEP IN ORDER TO ACTIVATE THE FINN CORPORATION LIMITED WARRANTY.



COMPLETE THE EQUIPMENT REGISTRATION FORM
AND MAIL TO THE FINN CORPORATION.

IF FINN CORPORATION DOES NOT HAVE YOUR COMPLETED REGISTRATION
FORM ON FILE, YOUR WARRANTY CLAIM WILL BE DENIED.

Once your FINN equipment has been registered, your FINN Limited Warranty will
be activated per the warranty statement on the next page.

<<What should you do if you need repairs or parts under Warranty?>>



1. NOTIFY FINN CORPORATION OF THE FAILURE OF MATERIAL OR WORKMANSHIP
1-800-543-7166 Extension (246)
WARRANTY@FINNCORP.COM



2. AFTER YOU OR YOUR SERVICE DEALER NOTIFY FINN, FINN WILL:

- VERIFY THAT WE HAVE YOUR REGISTRATION ON FILE
- VERIFY THAT THE WARRANTY PERIOD IS IN EFFECT
- VERIFY THAT THE RELATED PART(S) ARE INCLUDED IN THE SCOPE OF WARRANTY (PENDING FINN'S INSPECTION OF DEFECTIVE PARTS)
- SEND YOU REPLACEMENT PART(S) AND A WARRANTY INFORMATION PACKET
- REQUEST YOU FOLLOW ALL INSTRUCTIONS AS NOTED IN THE PACKET

- **Completely fill out the Parts Tag.**
- **Attach the Parts Tag to the defective part(s).**
- **Return the part(s) and the completed Warranty Claim Form to FINN Corporation using the return shipping label. (Within 2 weeks)**
- **Tape the Orange identifier sheet, marked with the W/RMA number, on the outside of the box in which you are shipping the defective part(s).**



Warranty period:
Hydroseeder & Straw Blowers 2 years or 2000 hrs which ever comes 1st
All other equipment 1 year or 1200 hrs which ever comes 1st

Commercial Limited Warranty
Effective 4/1/2011

OUR WARRANTY TO YOU:

Finn Corporation warrants to you, the original purchaser, for use (or rental to others for use) all new construction machinery, parts and attachments (except those referred to herein) that are manufactured by Finn to be free from defects in material and workmanship for a period noted above. Replacement parts provided under the terms of this warranty are warranted for the remainder of the warranty period applicable to the product to which parts are installed, as if parts were original components of the product.

WHAT FINN WILL DO:

Upon notification of Finn concerning a failure of material or workmanship in accordance with the above stated Warranty, Finn Corporation will:

- Verify claim falls within the valid warranty time frame.
- Verify the product and equipment has been **registered** with Finn in order to be eligible for warranty coverage.
- Upon affirmation of warranty period and registration, Finn will send to you a new or repaired replacement part(s), whichever Finn elects and a "Warranty Claim Information packet" containing instructions for processing the warranty claim.
- Evaluate the part when defective part is returned. Note: Failure to return defective part within **two weeks** will result in an invoice being sent to the customer. In addition, if damage to a part is determined not to be covered under the warranty, the customer will be billed.
- Reconcile costs with customer for parts and shipping, as determined by our inspection of failed parts, and confirmation of warranty coverage, per the terms of this warranty.
- Correction of nonconformities, in the manner provided above, shall constitute fulfillment of all liabilities of Finn Corporation.

WHAT YOU MUST DO TO OBTAIN WARRANTY SERVICE:

- As the purchaser covered under the above limited warranty you must **REGISTER** the equipment with Finn **FAILURE TO REGISTER WILL VOID THE WARRANTY.**
- **Claim Number:** Notify the warranty Dept. same day or next day of any intent to do warranty work and obtain a "Warranty Claim Number."
- All warranty **labor** must be pre-approved by providing Finn with an estimate of labor costs. Once approved, Finn will issue you a Work **Authorization Number**, prior to work being performed. (EXCEPTION: Unless the labor is per the Labor Allowance Schedule or less)
- The labor costs reimbursement will be based on the **Labor Allowance Schedule** established by Finn and where not applicable, on a reasonable number of hours as determined by Finn.
- Notify Finn Corporation of any failure of material or workmanship as described under this warranty.
 - Web notification: Warranty@Finncorp.com
 - Phone 1-800-543-7166 extension 246
- Complete the required steps in the "Warranty Claim Information packet" (which Finn will send you) and return the defective part(s) as directed in the packet to Finn Corporation.
- Should the failed part, be a hydraulic component, Finn may send you an **"Oil Analysis Kit,"** requesting that a sample of oil from the hydraulic system be taken, and mail it to a lab. Follow the instruction sheet, on how to use your Finn Oil Analysis Kit that comes with the Kit. Failure to comply when requested will void the warranty.

WHAT THE WARRANTY DOES NOT COVER:

1. Normal wear parts and Allied Equipment or trade accessories not manufactured by it, such as but not limited to items such as various filters, fluids, brakes, clutch linings, belts, hoses, light bulbs, mechanical seal, over center clutches, tires, ignitions, starters, batteries, magnetos, carburetors, engines and labor, or like or unlike equipment or accessories. (Such being subject to the warranty, if any, provided by their respective manufacture).
2. Secondhand, used, altered, or rebuilt machines or parts.
3. Defects, malfunctions or failures resulting from accidents, abuse, misuse, improper servicing, or neglect of required operational guidelines and maintenance service, as outlined in the Finn Corporation's Operators Manual(s).

4. The warranty shall be null and void to the extent any defect or failure of the products warranted arises out of or is caused by accessories or component parts not manufactured or supplied by Finn Corporation, whether same are supplied by purchaser, dealers, or any other party.

5. This Warranty does **NOT** cover any costs associated with transporting the equipment for warranty service, such as mileage, fuel, or man hours; such is the responsibility of the equipment owner.

6. Dealers & Customers are responsible to follow all guidelines related to Seasonal & Long Term Storage of Equipment, as advised in operation & equipment manuals. i.e. Finn, Engine, Clutch, Pump, Motor, etc. Equipment failures caused by neglect of these guidelines are not warrantable.

THIS IS THE ONLY EXPRESS WARRANTY ON OUR PRODUCTS:

We neither assume nor authorize anyone to assume for us any other express warranty. The Distributor/Dealer has no authority to make any representation or promise on behalf of Finn Corporation or to modify the terms or limitations of this warranty in any way.

THIS WARRANTY THEREFORE SHALL BE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. **LIMITATIONS ON OUR RESPONSIBILITY WITH RESPECT TO PRODUCTS PURCHASED:**

THE REMEDIES OF THE USER SET FORTH HEREIN ARE EXCLUSIVE, WITHOUT REGARD TO WHETHER ANY DEFECT WAS DISCOVERABLE OR LATENT AT THE TIME OF DELIVERY OF THE PRODUCT TO THE PURCHASER.

ALL WARRANTY REPAIR MUST BE DONE BY A FINN AUTHORIZED SERVICE PROVIDER OR AUTHORIZED REPAIR SHOP OF FINN'S CHOICE.

TRANSPORTATION, HAULING, STORAGE, OR OTHER SIMILAR COSTS ARE NOT PART OF FINN'S OBLIGATION UNDER THE LIMITED WARRANTIES AND IS THE RESPONSIBILITY OF THE EQUIPMENT OWNER.

THE ESSENTIAL PURPOSE of this exclusive remedy shall be to provide the original purchaser with repair or replacement of parts that prove to be defective within the period and under the conditions previously set forth. This exclusive remedy shall not have failed of its essential purpose (as that term is used in the Uniform Commercial Code) provided Finn remains willing to repair or replace defective parts within a commercially reasonable time after it obtains actual knowledge of the existence of a particular defect.

IN NO EVENT shall Finn be liable for any special, consequential, incidental or indirect damages, including lost profits or lost commercial opportunities, with respect to the sale of the above warranted product or anything done in connection therewith, or for property damage sustained by a person claiming to be a third party beneficiary of a surviving warranty under the law of any jurisdiction.

NOTICE:

FINN CORPORATION URGES the use of only Finn corporation supplied parts and attachments to assure proper performance and safe operation of Finn corporation equipment. Insist on parts and attachments manufactured or supplied by Finn corporation when you purchase, repair or replace your Finn equipment and attachments. Because Finn corporation cannot assure that parts and attachments not manufactured or supplied by Finn meet Finn corporation's quality standards, specifications, or operating requirements, our warranty is not effective to the extent any failure of or defect in a Finn corporation product arises from or is caused by parts, attachments or components not originating with Finn corporation. Use of Finn corporation equipment with parts and attachments not manufactured or supplied by Finn could result in personal injury.

INDEX

Safety First	1
HydroSeeder® Safety Summary Section	2 - 4
Current Set of Safety Decals	5
Definition of Hydroseeding	6
The FINN HydroSeeder® and How It Works	6
Mounting the HydroSeeder®	6
Carrier Vehicle Requirements	6 - 7
Attachments	7
Pre-Start Check	8
Equipment Check	8 - 9
Two Valve Operation	10 - 11
Control Panel Guide	12
System Operation	13 - 18
Menu Navigation	13
Changing Data Displays	13
Main Menu Access	14
Main Menu Navigation	14
Changing Parameter Settings	14
Fault Codes	15
Active Fault Codes	15
Acknowledging Active Faults	15
Stored Fault Codes	15
Maintenance Timer	16
Maintenance Timer Alert	16
Acknowledging Maintenance Timer	16
Resetting Maintenance Timer	16
Backlight Setting	17
Contrast Setting	17
Display Mode Setting	18
Default Display	18
Engineering Units	19
Display List	20 - 21
About Menu	21
Engine Settings	21
Regeneration	22 - 30
Reset Regeneration Operation - Displays	23
Reset Regeneration Standby Due to Inhibit Switch	24
Reset Regeneration Standby Due to Low DOC Temperature	25
Stationary Regeneration by Engine Management	25 - 27
Manual Stationary Regeneration - Operator Request	27 - 28
Recovery Regeneration	29 - 30
Emergency Stop	31
Starting Procedure	32
Area Coverage – Material Capacity	32 - 33

INDEX CONTINUED

Tank Capacity Chart	34
Loading	34 - 35
Loading and Mixing BFM, FGM, SMM and Other Viscous Slurries	36 - 37
Prior to Application	38
Discharge Nozzle Selection	38
Application of Slurry	38 - 40
I. General Application Techniques	38 - 39
II. Discharge Through the Boom	39
III. Procedures When Using Hoses	39 - 40
Reloading Procedure	40
Liming With The HydroSeeder®	40 - 41
Cleaning and Maintenance	42 - 43
After First 4 to 8 Hours of Operation	42
Daily	42
Weekly or Every 40 Hours of Operation	43
Seasonal and Winter Storage Maintenance	43
Hydraulic System	43
Clump Maintenance	44 - 48
Pump Maintenance	44 - 46
Clutch Maintenance	46 - 48
Troubleshooting Your HydroSeeder®	49 - 52
Lubrication and Fluids Chart	54 - 55
T90 Skid-Mount Technical Specifications	56 - 57
T90-II HydroSeeder® Parts Manual	59 - 97
Skid	60 - 62
Operator's Platform (Skid Model)	64 - 66
Control Systems	68 - 69
Bearing/Agitator Assembly	70 - 71
Hydraulic Agitator Drive	72 - 73
Hydraulic System	74 - 75
Hydraulic Hose Reel Assembly (Option)	76 - 77
Hydraulic System with Hose Reel	78 - 79
Discharge Boom Assembly	80 - 81
Piping	82 - 83
Clutch/Pump Assembly	84 - 85
Engine Sheet Metal and Support Assembly	88 - 89
Specific Engine Parts	90 - 92
Hose Reel Nozzle/Remote Valve/Tool Kit	94
Electrical Components	95
Decals	96 - 97

SAFETY FIRST

With any piece of equipment, new or used, the most important part of its operation is **SAFETY!**

FINN Corporation encourages you and your employees to familiarize yourselves with your new equipment and stresses safe operation.

The first five pages of this manual are a summary of the main safety aspects associated with this unit. Be sure to read and understand completely before operating the machine.

The symbols below are used throughout the operation and maintenance sections of this manual to call attention to safety procedures.

DANGER

*Danger indicates an imminently hazardous situation which, if not avoided, **WILL** result in death or serious injury.*

WARNING

*Warning indicates a potentially hazardous situation which, if not avoided, **COULD** result in death or serious injury.*

CAUTION

*Caution indicates a potentially hazardous situation which, if not avoided, **MAY** result in minor or moderate injury.*

NOTICE

*Notice indicates important information, that if not followed, **MAY** cause damage to equipment.*

NOTE: This is helpful information.

CALIFORNIA PROPOSITION 65

WARNING

The engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm. Wear protective equipment.



WARNING

Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands after handling.

HYDROSEEDER® SAFETY SUMMARY SECTION

It is important that operators of this machine are familiar with all safety aspects covered in this section and have read the entire Operator's Manual before operating the machine. Always keep a copy of this manual with the machine. It is the responsibility of the operator of the machine to fully understand this safety summary section. Remember that YOU are the key to safety. Good safety practices protect not only you, but also the people working with and around you. Keep in mind that this safety section is written for this type of machine only. Practice all other usual and customary safe working precautions. Above all, remember that safety is up to you.



The FINN HydroSeeder® is designed to mix and apply water, seed, fertilizer, agricultural lime, and hydraulic mulch to the prepared seedbed. The resultant slurry from mixing one or more of the above materials may react, causing harmful or deadly gasses within the tank. Heat, evaporation, or extended emptying period can/will accelerate the formation of these gasses. Please contact your supplier(s) of these slurry components regarding their potential reactivity.

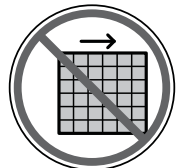
I. PRE-START EQUIPMENT CHECK (equipment check is to be made with the engine off)

1. If you have a chassis-mounted unit, check devices securing HydroSeeder® to the truck or trailer frame.
2. If HydroSeeder® is a trailer unit, check hitch and hitch bolts, lights, brakes, and all safety components.
3. Make sure loading hatch bag cutter is in place and secure.
4. Check that all guard railing is in place and secure.
5. Verify that all guards are in place.
6. With the ignition switch ON, verify that the signal horn is operating correctly.
7. By carefully looking down through the loading hatch, inspect the slurry tank for foreign objects. Never enter the tank without following the procedures described in step 3 of section IV. MAINTENANCE on page 4.
8. Remove unnecessary objects (or material) from the tank top.
9. Make sure no one is working on or inside the machine. Give a visual and audible signal that all is clear, before starting the engine.
10. Inspect all hydraulic hoses for cracks, bulges, or damage. If hoses are bad, replace immediately.
11. Inspect all discharge hoses for cracks, bulges, or damage. If hoses are bad, replace immediately.



II. MACHINE OPERATION

1. Always wear safety goggles when operating the machine. Other safety attire such as safety shoes, ear protection, gloves, hard hats, dust masks, etc. should be worn as required by warning decals on machine, operator's manuals, or job site requirements. Remove rings, watches, etc. Avoid wearing loose-fitting clothing that may get caught in rotating machinery.
2. Do not operate the machine without all guards in place.
3. Do not load unit while in transit. Load only when parked and unit is as level as possible. Take care not to drop pens, lighters, etc. or pieces of paper or plastic bags into the tank, as these objects might plug the slurry system. Should any object be dropped into the tank, do NOT reach into the tank to retrieve the foreign object. See step 3 under section IV. MAINTENANCE on page 4 before allowing any personnel to enter the tank.
4. Make sure area to be sprayed is clear of all persons, animals, etc.
5. The driver of the carrying or towing vehicle is responsible for the safety of the operator(s) of the machine. Make sure the driver is aware of and avoids all possible hazards to the operator(s) of the machine, such as low tree limbs, low power lines, etc. Vehicles on which equipment is mounted or towed must be stopped and started gradually. Avoid abrupt starts or stops. Never operate on a slope or a hill that may endanger the driver and/or the operator(s). All personnel should review and be familiar with stop/start signals between the driver and operator(s) before going into operation. Only the operator should be located on the platform during operation.



6. Operator(s) of equipment should never ride on the machine at speeds of greater than 5 mph (8 km/h).



7. Never operate machine in an enclosed area without venting the engine exhaust of both the equipment and vehicle on which the equipment is mounted. Deadly carbon monoxide fumes can accumulate.



8. Never operate this or any other machinery when fatigued, tired, under the influence of alcohol, illegal drugs, or medication. You must be in good physical condition and mentally alert to operate this machine.



9. Never modify the machine. Never remove any part of the machine (except for service and then reinstall before operating).

10. Use proper means (steps, ladder) for mounting and dismounting of the machine. Never mount or dismount a moving machine.

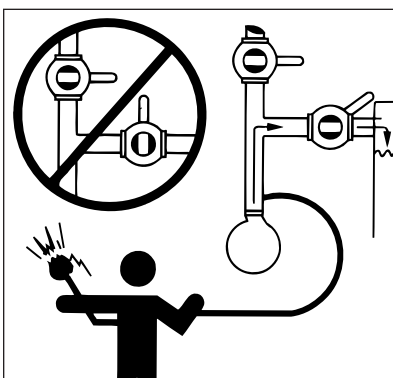


III. SLURRY APPLICATION

1. Do not aim discharge spray toward power-lines, transformers, or other high voltage electrical conductors. Also do not aim discharge spray towards people, animals or anything other than the intended application area.



2. Never engage (turn on) clutch when both the recirculation and discharge valves are closed (as illustrated to the right). Operation with both valves closed will result in



extreme heat generation that could cause severe bodily injury and damage to the equipment.

3. Recirculation valve must be open and material flowing back into the tank when using the remote valve. A closed or plugged recirculation line will cause extreme heat in the pump or discharge lines that will result in severe bodily injury and damage to the equipment.

4. During application through a hose, high pressure can be exerted at the end of the hose. Hose-holding personnel must establish good footing. The operator should apply gradual pressure to the hose only after hose-holding personnel are firmly positioned and have firm control of the hose. Additional personnel to direct hose may be necessary if working on slopes. The proper technique for grasping the hose used by hose-holding personnel is to route and firmly grasp the hose over the shoulder or under both arms. Never route/hold the hose so it goes between the legs. If the hose-holding personnel finds that it is uncomfortable for him to handle the hose by himself, additional hose-holding personnel should be positioned at the end of the hose.

5. Plan application so that the farthest area is covered first, then work back toward the HydroSeeder®, so individuals are not walking back over slippery ground.

6. Before opening any valves or pipe clamps, shut machine down and check if material in the pipe is hot. If hot, do **NOT** open valve or pipe clamps as the hot material may cause severe personal injury. Allow to cool and open with caution.



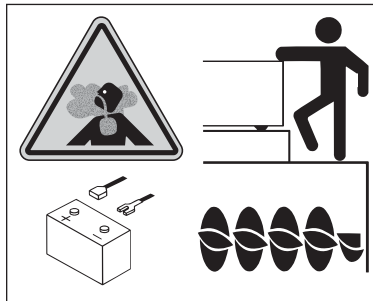
7. Except when loading materials, keep loading hatch lid closed to protect operator and prevent splashing of wet material onto the tank top.
8. Wash off spillage of slippery mulch or slurry additive from the tank top and platform before operating equipment.

IV. MAINTENANCE

1. Before servicing the machine, turn off engine and allow all moving parts to stop. To prevent accidental starting, disconnect battery cables. Tag the engine operating area to show that the machine is being serviced. Use lockout/tagout procedure (Occupational Health and Safety Administration (OSHA) 29 CFR 1910.147).



2. Certain hydroseeding amendments, when combined with or without the addition of water or heat or the element of time, may react causing harmful or deadly gasses.



Consult your material suppliers regarding reactivity information. The slurry tank must be flushed and drained after each day of operation.

3. Your slurry tank may be considered a confined space by OSHA under 29 CFR 1910.146. Before entering any confined space, your company must develop a procedure for safe entry. Make sure your company's plan meets all the requirements of 29 CFR 1910.146, or local legal requirement, including the following:

- a) Drain, flush, and ventilate tank interior.

- b) Turn off engine, disconnect battery cables, and perform lockout/tagout procedures (29 CFR 1910.147).



- c) Provide continuous ventilation or proper breathing apparatus.

- d) If tank must be entered, personnel entering the tank must be tethered to a lifeline.

- e) Provide a stand-by individual outside of tank who is able to communicate with person inside and haul him out with the lifeline if necessary.

4. Before loosening any clamps or opening any valves, determine if material in the line is hot by feeling the pipe. Do NOT allow material to come in contact with personnel. Severe bodily injury could result.



5. On trailer units, perform general maintenance such as checking the safety chains, hitch and hitch bolts, tires, and brakes. Repair or replace if worn or broken. Never operate machine on improperly inflated or damaged tires. Always use a safety cage or cable restraints when inflating a repaired tire.



6. Radiator maintenance: Liquid cooling systems build up pressure as the engine gets hot. Before removing radiator cap, stop the engine and let the system cool. Remove radiator cap only after the coolant is cool.

7. Battery maintenance: Lead-acid batteries contain sulfuric acid, which will damage eyes or skin on contact. Always wear a face shield to avoid getting acid in the eyes. If acid contacts the eyes, flush immediately with clean water and get medical attention. Wear rubber gloves and protective clothing to keep acid off skin. Lead-acid batteries produce flammable and explosive gasses. Keep arcs, sparks, flames, and lighted tobacco away.



8. Filling of fuel: Never fill the tank with the engine running, while smoking, or when near an open flame. Never smoke while handling fuel or working on the fuel system. The fumes in an empty fuel container are explosive. Never cut or weld on fuel lines, tanks, or containers. Move at least 10 ft. (3 m) away from fueling point before starting engine. Wipe off any spilled fuel and let dry before starting engine.

IMPORTANT: Be careful not to allow fuel, lubricant, hydraulic fluid, or cooling fluids to penetrate into the ground or be discharged into the water system. Collect all fluids and dispose of them in accordance with local municipal regulations.


9. It is recommended that only authorized, genuine FINN replacement parts be used on the machine.


10. Do not use ether cold start fluid, if engine is equipped with glow plug-type preheater, or other intake manifold type preheater. It could cause an explosion or fire and severe injury or death.





11. Diesel fuel or hydraulic fluid under pressure can penetrate the skin or eyes and cause injury, blindness, or death. Pressure may build up in the hydraulic system; use caution when removing the cap.



12. Make certain that all decals on the machine are maintained in good legible condition. Replacement decals are available through FINN Corporation by specifying part number shown in the lower right-hand corner of the decal. See page 5 for the current safety decals mounted on the unit. See the Parts Section of this manual for the location and quantity of all decals on this unit.



CURRENT SET OF SAFETY DECALS


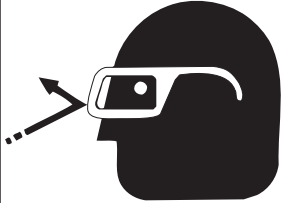
	<h2>WARNING</h2> <p>RUNAWAY VEHICLE HAZARD! Always inspect tow vehicle and equipment hitch before towing. Tighten all hitch bolts and properly connect wiring and safety chains.</p> <p>BREAKAWAY SWITCH DO NOT use for parking. Attach cable to towing vehicle with enough slack for turning. Engine battery on trailer must be charged and hooked-up for proper breakaway function.</p> <p>SAFETY CHAIN INSTALLATION Both the single and double chains must be crossed under tongue. They must be oriented in such a manner as to prevent tongue from dropping to ground in event of failure to hitch, coupler or ball. Chains must be connected to towing vehicle so slack for each length of chain, between trailer and towing vehicle, is the same and must have no more slack when in use than necessary to permit proper turning of vehicles. Forward end of chain must be attached to towing vehicle, not to ball, but to hitch or other frame member. Chain must be looped around member and hooked back into itself. Failure to comply could result in death or serious injury.</p>
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	<h2>WARNING</h2> <p>BURN HAZARD! Cooling system is under pressure. Allow system to cool before handling. Remove radiator cap slowly. Wear appropriate safety gear. Failure to comply could result in death or serious injury.</p> <p>RADIATOR HANDLING INSTRUCTIONS</p> <ol style="list-style-type: none"> 1. Use a 50/50 solution of water and antifreeze. Using 100% antifreeze will result in engine damage. 2. Check and replenish water prior to use. More water will be consumed when operating in hot conditions. 3. If overflow pipe begins emitting vapor, check and replenish water. 4. Remove and clean screen when dirty. 5. Check and clean fins periodically. Clogged fins will increase water consumption. 6. Protect radiator from fertilizer corrosion by washing radiator core with water.
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	<h2>WARNING</h2> <p>SEVER HAZARD! Keep hands clear! Rotating fan and gears. DO NOT operate without guards or doors in place. Shut off engine, disconnect battery and allow all moving parts to stop before servicing.</p>	
	<p>FLYING DEBRIS! Wear eye protection around equipment. Failure to comply could result in death or serious injury.</p>	


	
<h2>WARNING</h2> <p>BURN HAZARD! Contents could be under pressure. DO NOT come in contact with material. Ensure material in line is not hot before loosening clamps or opening valves. DO NOT operate pump with both recirculation and discharge valves closed. DO NOT use remote valve unless recirculation valve is open. Excessive heat or bodily injury could occur. Failure to comply could result in death or serious injury.</p>	

	
<h2>DANGER</h2> <p>ELECTROCUTION HAZARD! DO NOT aim stream toward electrical lines. Avoid spraying toward bystanders. Failure to comply will result in death or serious injury.</p>	

<h2>DANGER</h2>		
	<p>CONFINED SPACE HAZARD! (Reference: OSHA 29 CFR 1910.146) Before entering tank:</p> <ol style="list-style-type: none"> 1. Drain, flush and ventilate tank interior. 2. Turn off engine and disconnect battery cables. 3. Continuously ventilate area or wear appropriate breathing apparatus. 4. Provide standby individual outside tank able to communicate with person inside and able to remove him with a lifeline if necessary. <p>FLYING MATERIAL HAZARD! Wear eye protection around operating equipment. Failure to comply will result in death or serious injury.</p>	

	<h2>WARNING</h2> <p>FALL HAZARD! DO NOT ride on equipment when moving at speeds in excess of 5 MPH (8 km/h). Failure to comply could result in death or serious injury.</p>
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	<h2>WARNING</h2> <p>FALL HAZARD! DO NOT ride on hitch when vehicle is moving. ALWAYS use step when mounting and dismounting. Failure to comply could result in death or serious injury.</p>
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	<h2>WARNING</h2> <p>BURN HAZARD! Hot exhaust! Stay back! Failure to comply could result in death or serious injury.</p>
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<h2>CAUTION</h2> <p>FALL HAZARD! ALWAYS face ladder when mounting and dismounting. Failure to comply may result in moderate or minor injury.</p>

OPERATION AND MAINTENANCE. MANUAL FOR THE FINN T90 SERIES II HYDROSEEDER®

This manual gives you step-by-step instructions for the operation and maintenance of the FINN T90 HydroSeeder®. For best results and to ensure longer life of the equipment, please follow the instructions carefully. For your safety, read the entire manual before operating this unit.

DEFINITION OF HYDROSEEDING

Hydroseeding is the process whereby seed, fertilizer and/or lime and wood fiber mulch (using water as a carrying medium) are applied on the soil to establish vegetation.

THE FINN HYDROSEEDER® AND HOW IT WORKS

The FINN T90 HydroSeeder® will apply seed, fertilizer and/or lime, wood fiber mulch, or stabilizing materials in any prescribed or desired combination. The materials placed in the HydroSeeder® slurry tank are mixed with water and kept in suspension by a dual agitation process, recirculation of slurry and mechanical agitation, thus forming a slurry that is pumped to the discharge assembly and directed onto the seed bed by the operator. This equipment is designed to accomplish hydroseeding in one easy operation with maximum efficiency.

MOUNTING THE HYDROSEEDER®

For speed and mobility of operation, the HydroSeeder® should be mounted on a truck or trailer, however, it is important to select a carrier with sufficient capacity to handle the added weight.

CARRIER VEHICLE REQUIREMENTS

HYDROSEEDER®	
Type	Maximum Weight (Loaded)
T90S	13,455 lb (6,103 kg)

** Since truck weight will vary, ensure that vehicle's GVWR is sufficient for the particular application. This information can be obtained from the truck manufacturer or dealer.*

Once the proper carrier has been selected, the HydroSeeder® must be securely mounted to it.

⚠ CAUTION

Your FINN HydroSeeder® should be mounted by a qualified truck body installer. Failure to comply could result in minor or moderate personal injury. Product damage could also occur.

When mounting the HydroSeeder® to the truck, one of the following methods of mounting is acceptable:

1. Bolt the HydroSeeder® directly to the truck bed. Installer must ensure that the bed, as well as the bed-to-truck and HydroSeeder®-to-bed connections are adequate for the maximum weights loaded that are shown in the CARRIER VEHICLE REQUIREMENTS.
2. Mount the HydroSeeder® to the truck frame.

NOTE: The T90 HydroSeeder® has mounting legs that are 44 in. (111.76 cm) across and therefore require an adapter frame or a chassis bed of adequate strength to mount to the truck's 34 in. (86.4 cm) wide rails.

NOTICE

Mounting the HydroSeeder® to the truck must allow for tire clearance and frame twist. Place hard wood spacers along the length of truck rails or use FINN spring mounting kit (part number 011562) or equivalent.

3. Place chains over the HydroSeeder® and around truck bed and secure with binders. Secure the HydroSeeder® with blocks tied to the truck bed.

⚠ CAUTION

When using a truck with a tilt bed, make sure to chain the truck bed down to prevent the bed from being accidentally hoisted. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.

ATTACHMENTS

1. Extension hoses for reaching remote areas are available in 50 ft. (15 m) lengths. All connections are camlock, quick-operating fittings. The hose is connected to the end of the discharge boom in place of a nozzle. The nozzle is connected to the end of the hose and controlled by the person on the ground. The flow is controlled by a second person on the HydroSeeder®. This allows for a full pressure and volume operation.

⚠ DANGER

The recirculation valve must be open when using a remote valve. Failure to comply will result in death or serious injury.

2. For lower pressure applications, or for close-up work, i.e. around buildings, the remote valve attachment can be used. The attachment includes semi-rigid hose with quick-disconnect fittings along with a hand-held valve that fits the end of the hose and accepts the standard nozzle assemblies. The hose is connected to the outlet on the discharge pipe above the pump. The machine is run at 1/2 to 3/4 throttle and material is applied where desired.
3. Hose Reel: The live hose reel will mount either on the HydroSeeder® or on the truck frame. The 200 ft. (61 m) capacity hydraulic rewind reel will wind up and store empty hose.
4. Fill pumps can either be carried on the truck or mounted on the HydroSeeder®.
5. Hardened pump parts: Pump casing, impeller, and suction cover are treated with special material designed to resist wear.
6. Rear spray bar: The spray bar option is not designed for slurry application but for the dispersion of liquids for dust control, watering, feeding, and washing applications. Rear spray bar can be arranged so that operation is remotely controlled from the truck cab.

PRE-START CHECK

The following safety check should be made to ensure operator safety:

1. A. Skid Unit – Check condition of all mounting hardware that secures HydroSeeder® to truck frame rails.
B. Trailer Unit – Inspect hitch, safety chains, lights, brakes, and breakaway switch.
2. Make sure bag cutter is in place and secure.
3. Inspect that all railings are in place and secure.
4. Ensure that all guards are in place.

EQUIPMENT CHECK



Equipment check should be made with the engine OFF and all rotating parts stopped. Failure to comply could result in death or serious injury.

1. Verify that tool kit contains all the prescribed items. See PARTS SECTION.
2. Inspect slurry tank for foreign objects. See steps 2 and 3 in Section IV, MAINTENANCE of the HYDROSEEDER® SAFETY SUMMARY SECTION.
3. Check fuel level. Fill if necessary.
4. Check hydraulic oil level and fill if necessary. See HYDRAULIC SYSTEM for oil specifications.
5. Check engine oil level and fill if necessary. For oil type, refer to the engine manual.
6. Check fluid level in radiator and overflow tank.
7. Inspect air cleaner for dust and dirt, clean if necessary.
8. Secure drain plug on the outside-bottom of slurry tank.
9. Check to make sure the pump drain plug is in place.
10. Verify that the suction line shut-off valve is completely open.
11. Engage (turn on) and disengage (turn off) clutch to determine if it snaps in and out.
12. Install discharge assembly (if stored in location other than standard operating position).
 - A. Check and clear nozzle of any obstructions.
 - B. Tighten wing bolt at the opening around the top of discharge assembly and ensure that discharge assembly is secure.
13. Check pump discharge and recirculation valve handles for free movement.

14. Lubricate equipment – See LUBRICATION AND FLUIDS CHART.

- A. Each lubrication point on the machine is marked with a decal.
- B. Check automatic pressure lubricator at pump. If the stem is fully extended, with thumb nut all the way up, the automatic pressure lubricator contains lubricant. If not, lubricant must be replaced by the following procedure (See Figure 2):
 1. Turn thumb nut clockwise until stem rises to maximum height.
 2. Remove cap and fill cap with sodium- (water soluble) base grease (FINN part number 000698). DO NOT use lithium- base (chassis lube) grease.
 3. Replace cap.
 4. Turn thumb nut counterclockwise until thumb nut is at the top of the stem. The spring and pressure disk in the lubricator forces grease, under pressure, to the pump seal.

NOTICE

When thumb nut has moved down to within 1/2 in. (1.25 cm) of touching the cap, re-service the automatic pressure lubricator.

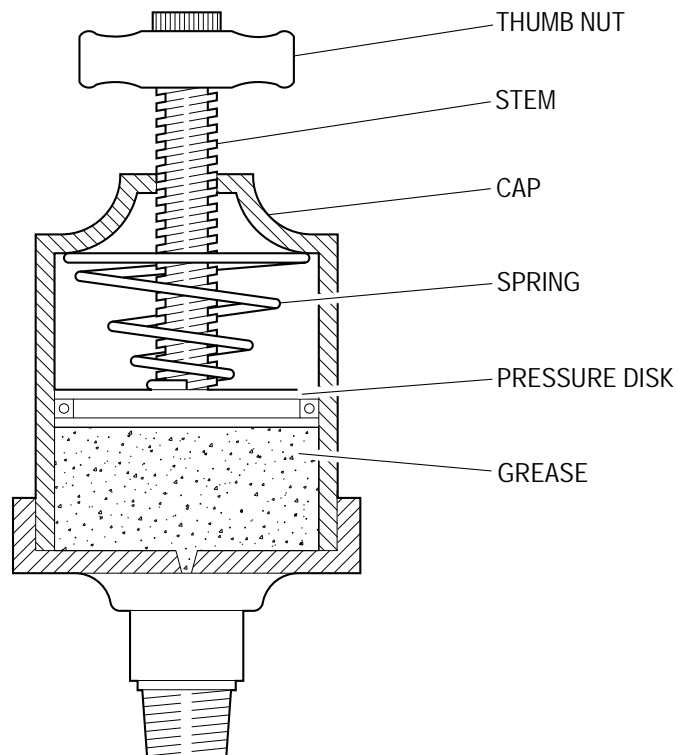


Figure 1 – Automatic Pressure Lubricator Components

TWO VALVE OPERATION

The T90 II HydroSeeder® is equipped with two independently operated ball valves to control slurry flow. One is located in the recirculation line below the platform, and the other is located in the discharge line above the platform. The recirculation valve is open when the handle is in line with the valve ports and is closed when the handle is at a right angle to the valve ports. The discharge valve is open when the V-notch in the foot pedal is in line with the valve ports and is closed when the V-notch is at a right angle to valve ports.

⚠ DANGER *Never engage (turn on) slurry pump clutch when both valve handles are positioned as shown in Figure 2. If both valves are closed, a situation of extreme heat generation will result. Failure to comply could result in death or serious injury. Failure to comply could also result in product or property damage.*

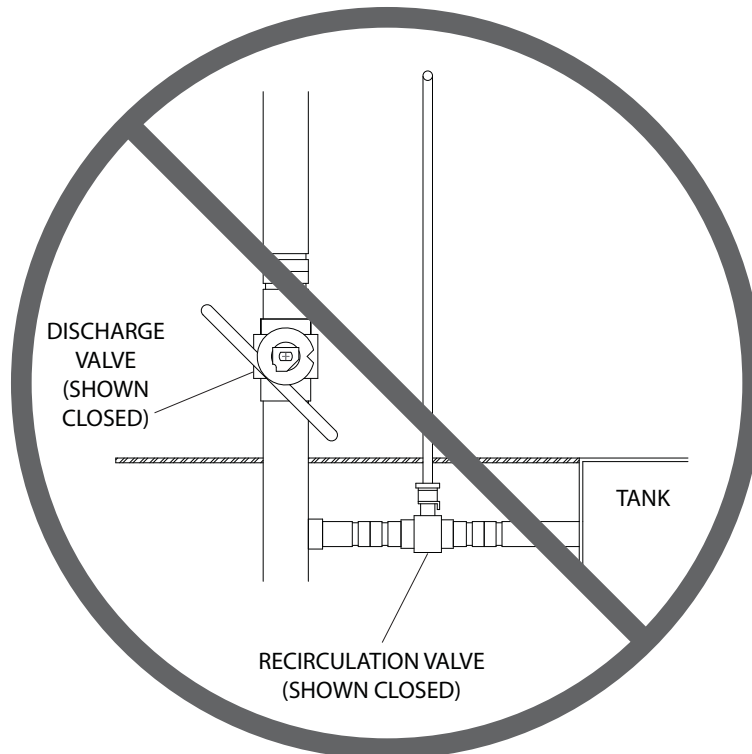


Figure 2 – NEVER Engage Slurry Pump Clutch with Both Valves Closed

1. DISCHARGE THROUGH BOOM

Flow is through boom with no flow through closed recirculation valve (Figure 3). Flow through boom is controlled by engaging and disengaging slurry pump clutch. Do not use the discharge valve to control distance. Valve should be either completely open or completely closed. Control the spray volume and spray distance by adjusting the engine RPM.

2. EXTENSION HOSE THROUGH BOOM

⚠ DANGER

Do not use remote valve in this application. Failure to comply will result in death or serious injury.

Flow is through boom with no flow through a closed recirculation valve (Figure 3). Extension hose is connected to boom and flow is controlled by engaging (turning on) and disengaging (turning off) slurry pump clutch, or by controlling the speed of the engine.

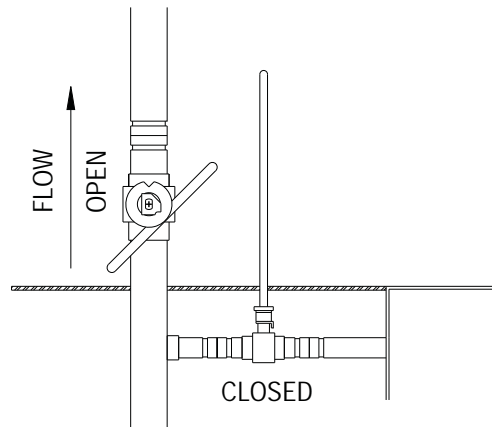


Figure 3 – Discharge Through Boom or Extension Hose Through Boom

3. EXTENSION HOSE OR HOSE REEL THROUGH REMOTE PORT

Flow is through recirculation valve with no flow through closed discharge valve (Figure 4). Flow through extension hose is controlled by engaging (turning on) and disengaging (turning off) the slurry pump clutch, or by the remote valve at end of hose. An open recirculation valve allows flow back into tank.

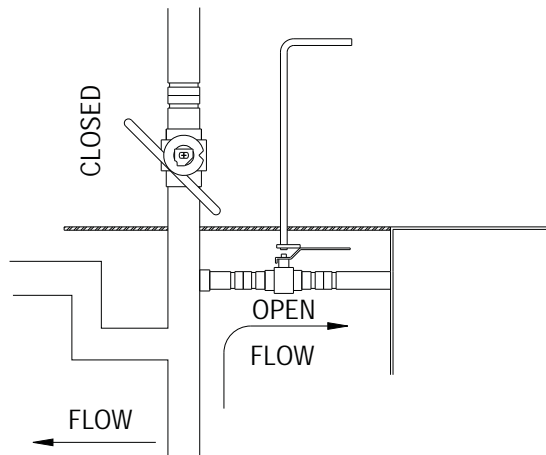


Figure 4 – Discharge Through Extension Hose or Hose Reel Through Remote Port

⚠ DANGER

The recirculation valve must be open when using a remote valve. Failure to comply will result in death or serious injury.

CONTROL PANEL GUIDE

NOTE: This information is to explain the function and use of the control panel when starting the unit. **DO NOT** start the unit at this point. Refer to **STARTING PROCEDURE** section for actual operation.

SYSTEM POWER UP

The control panel is powered from the engine battery connection from the engine harness connector. Make sure the engine harness is connected to the control panel before proceeding. Power up the system by turning the key switch to the **RUN** “①” position. This will activate the control panel and apply power to the engine ECU.

If the control panel indicates a fault condition, **DO NOT** start the engine. Review the fault condition and correct the condition before starting the engine. See Fault Codes section for details on system faults.



	ON Symbol Toggle switch flipped up to the ON position to activate components.		RUN Symbol Key switch is in the RUN position while in operation.
	OFF Symbol Key switch is in the OFF position cutting power from the unit, or toggle switch flipped down to the OFF position.		START Symbol The key switch is turned to the START position to start the unit.
	Hydraulics Symbol This blue symbol on the control panel represents the hydraulics system of the unit. This is the switch used to turn ON and OFF the hydraulic system.		Engine Speed Control (Throttle) This switch is used to change the engine speed, toggle the throttle control switch (“Fast-Rabbit/Slow-Turtle”) to the desired speed setting.

ENGINE START

To start the engine, turn the key switch clockwise to the **START** “⌚” position. If a fault condition exists, the engine ECU may prevent the engine from starting. All fault conditions will be indicated by the digital display. The display will indicate the active fault(s) by presenting a pop-up graphic describing the fault condition.

ENGINE SPEED CONTROL (THROTTLE)

Once the engine is started, the control panel will set the engine speed to the minimum RPM speed setting. To change the engine speed, toggle the throttle control switch (“Fast-Rabbit/Slow-Turtle”) to the desired speed setting. The engine speed cannot be set below the minimum RPM speed setting or above the maximum RPM speed setting.

Pressing the throttle up or down increases or decreases the RPM by 10 RPM. If the throttle is held down in one direction for three seconds, the RPM will have a full increase or decrease.



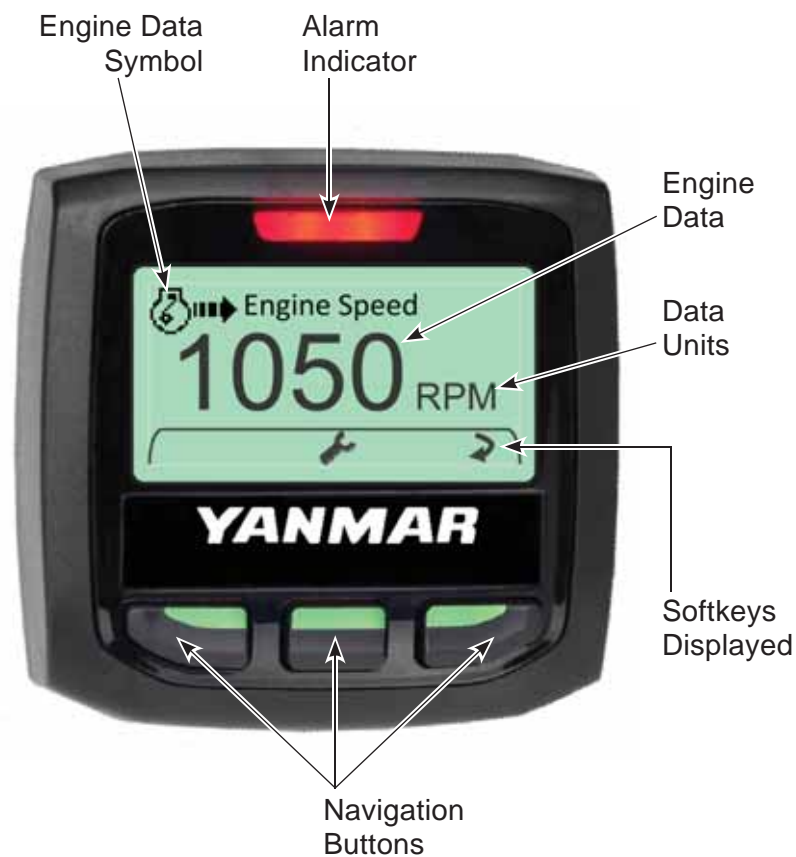
SYSTEM OPERATION

MENU NAVIGATION


The control unit has three navigation buttons which are configured as softkeys. The system softkeys are used to navigate between displays, select menu items and change data. Pressing any of the three navigation buttons will display the softkey menu that is associated with each button.

Softkeys Displayed

-  : Main Menu
-  : Exit
-  : Change
-  : Scroll Up
-  : Scroll Down
-  : Next
-  : Increase Value
-  : Decrease Value
-  : Acknowledge
-  : More Information



CHANGING DATA DISPLAYS

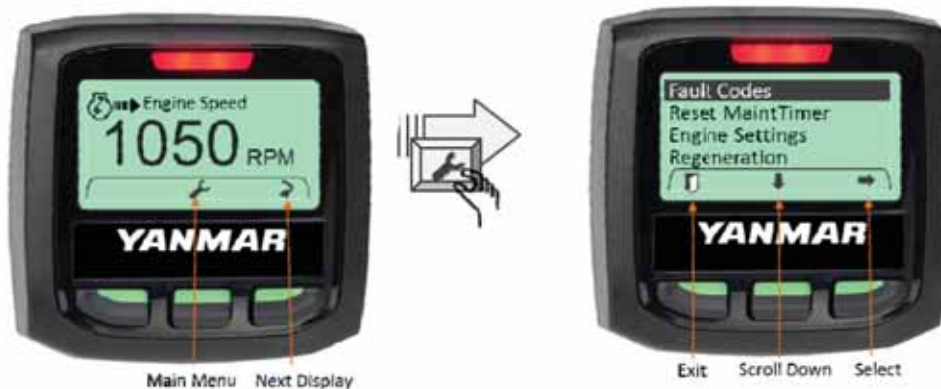
To change the data being displayed, press any key to activate the softkey menu. Press the Change “” softkey to access the next data display available.

See System Display List for complete selection of data displays available.



MAIN MENU ACCESS

To access the Main Menu, press any of the three navigation buttons. The unit will display a softkey popup window defining the available navigation possibilities. Select the Main Menu using the center softkey as shown.



MAIN MENU NAVIGATION

Access the main menu using the center softkey. The main menu will be displayed along with the main menu softkey popup window. Navigate through the main menu selections by using the “↓” key. When the desired menu item is highlighted, press the “→” key to select the menu item. To exit the main menu and return to the data displays press the EXIT “⏏” softkey.



CHANGING PARAMETER SETTINGS

Parameter settings can be changed in one of two ways: using the “+” / “-” softkeys to increase or decrease a numeric value or using the Change “↔” softkey to toggle through a list of programmed settings.

FAULT CODES

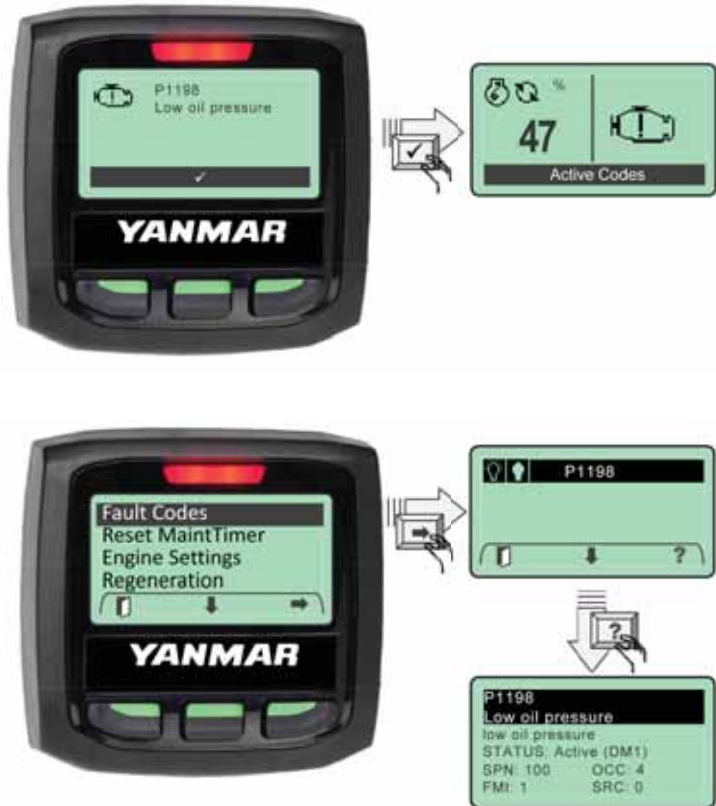
Engine fault codes (active and stored) are generated by the engine ECU and communicated to the control panel.

ACTIVE FAULT CODES

The control system reads standard messages to indicate active fault codes. When a fault is active the control system activates a popup fault display containing a check engine icon, fault code number (if applicable), a description of the active fault and an “Active Codes” alarm stripe at the bottom of the display. The control system will activate the red LED fault indicator above the digital display.

When an active fault is presented, the user must acknowledge the fault by pressing the softkey indicated. See “Acknowledging Active Faults” section.

After acknowledging a fault condition, the system will return to normal display operation. The controller will indicate that an active fault is present by displaying a “Check Engine” icon on the main data display. The system will also display an “Active Codes” alarm stripe at the bottom of the display.



ACKNOWLEDGING ACTIVE FAULTS

When the control system receives a new fault, the digital display responds by overlaying a fault pop-up graphic onto the currently active runtime display. This alerts the operator, signaling a response is needed by the operator. The display above (top) represents an unacknowledged fault for an oil pressure fault condition. To acknowledge an active fault, press the “Acknowledge” softkey (middle) button. This will remove the pop-up graphic. The control system will continue to inform the operator that a fault is active or until the fault is corrected.

Note: If the fault condition is cleared the associated pop-up will be automatically removed.

STORED FAULT CODES

The control unit allows the operator to request any stored fault codes that may be contained in the engine ECU. To view stored faults select the “Fault Codes” menu selection from the main menu. The control system will send a request to the engine ECU for any faults that the ECU may have stored. Should any faults exist, the control unit will display a list of the active and stored faults. The list will show if the fault is Active, Stored or both. The list will contain the engine manufacturer specific Fault Code (if available) for the fault condition. To view more detailed information about any of the fault conditions listed, navigate to the desired fault condition and select the “?” softkey. A more detailed description of the fault will be presented along with the current Status.

MAINTENANCE TIMER

The control system provides an engine maintenance timer feature. The maintenance timer is a countdown timer and indicates the amount of engine runtime remaining until maintenance is due. The maintenance timer is configurable and resettable by the operator. If the system is powered but the engine is not running maintenance hours will not be accumulated.

Note: Setting the timer to 0 will disable the maintenance timer operation.

The Maintenance Timer is factory-set to 250 hours.

MAINTENANCE TIMER ALERT

When the maintenance timer expires the system will activate an “Engine Maintenance Due” alert popup window. If the maintenance due alert is acknowledged but the timer is not reset the alert popup will re-initiate for each key “ON” cycle.

ACKNOWLEDGING MAINTENANCE TIMER

Acknowledge the maintenance alert by selecting the acknowledge “✓” softkey.



RESETTING MAINTENANCE TIMER

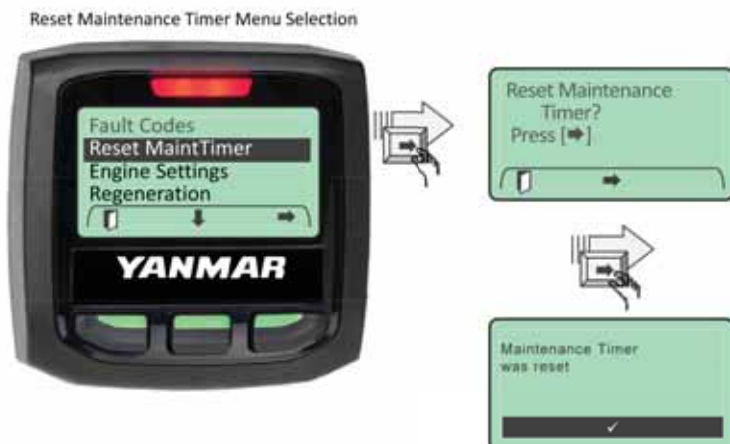
The maintenance timer is operator configurable and can be accessed through the engine settings menu. See “Reset MaintTimer” selection in engine settings menu. When the maintenance timer has expired, a pop-up alert window indicating that “Engine Maintenance is Due” will be displayed. The operator must acknowledge this pop-up to return the control unit to normal display operation.

To reset the maintenance timer enter the Main Menu and then scroll to the “Reset MaintTimer” entry using the “↓” softkey. Press the “➡” softkey to select the reset maintenance timer menu item.

Press the “➡” softkey to reset the timer.

Acknowledge the timer was reset by pressing the Acknowledge “✓” softkey.

Note: The maintenance hours data display will indicate 0 hrs when the timer has expired and the operator has not yet reset the timer.



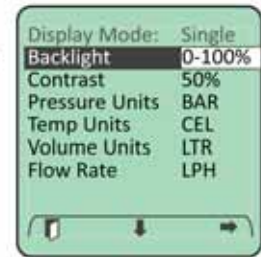
BACKLIGHT SETTING

The LCD backlight is adjustable from 0 to 100%. To adjust the LCD backlight enter the Main Menu and navigate to the “Display Setup” menu using the “↓” softkey.

When highlighted enter the Display Setup menu by selecting the “→” softkey. Navigate through the “Display Setup” menu using “↓” softkey until the “Backlight” entry is highlighted.

Press the “→” softkey to select the backlight parameter setting.

Use the “+” / “-” softkeys to set the backlight value.



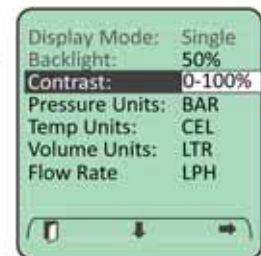
CONTRAST SETTING

The LCD contrast is adjustable from 0 to 100%. To adjust the LCD contrast enter the Main Menu and navigate to the “Display Setup” menu using the “↓” softkey.

When highlighted enter the Display Setup menu by selecting the “→” softkey. Navigate through the “Display Setup” menu using “↓” softkey until the “Contrast” entry is highlighted.

Press the “→” softkey to select the contrast parameter setting.

Use the “+” / “-” softkeys to set the contrast value.



Note: Setting the contrast value below 30 may render the display to be unreadable.

DISPLAY MODE SETTING

Two display formats are available: “Single” display and “Dual” display formats. To access the display format setting, enter the Main Menu. Navigate to the “Display Setup” menu entry using “↓” softkey. When highlighted, enter the Display Setup menu by selecting the “→” softkey. Navigate through the “Display Setup” menu using “↓” softkey until the “Display Mode” entry is highlighted.



Display Mode:	Single
Backlight	Dual
Contrast	50%
Pressure Units	BAR
Temp Units	CEL
Volume Units	LTR
Flow Rate	GPH

Choose the desired display mode setting by cycling through the list of choices using the Change “↔” softkey.



Language	English
Display Mode	Single
Backlight	80
Contrast	50

DEFAULT DISPLAY

To configure a particular display as the default startup display, access the desired display and leave active for 5 minutes. The system will automatically set this display as the default startup display.



Language	English
Display Mode	Single
Backlight	80
Contrast	50



Language	English
Display Mode	Single
Backlight	80
Contrast	50



Display Mode	Single
Backlight	80
Contrast	50
Pressure Units	PSI



Backlight	80
Contrast	50
Pressure Units	PSI
Temp Units	FAHR



Contrast	50
Pressure Units	PSI
Temp Units	FAHR
Volume Units	GAL



Contrast	50
Pressure Units	PSI
Temp Units	FAHR
Volume Units	GAL

ENGINEERING UNITS

Displayed engineering units can be configured for Pressure, Temperature and Volume. To access the engineering unit's settings, enter the Main Menu. Navigate to the "Display Setup" menu entry using "↓" softkey.

When highlighted enter the Display Setup menu by selecting the "→" softkey. Navigate through the "Display Setup" menu using "↓" softkey until the desired engineering unit's parameter is highlighted.

Choose the desired parameter setting by cycling through the list of choices using the change soft key.



Display Mode	Single
Backlight	50%
Contrast	50%
Pressure Units	BAR
Temp Units	kPA
Volume Units	PSI
Flow Rate	LPH

Display Mode	Single
Backlight	50%
Contrast	50%
Pressure Units	BAR
Temp Units	CEL
Volume Units	FAHR
Flow Rate	LPH

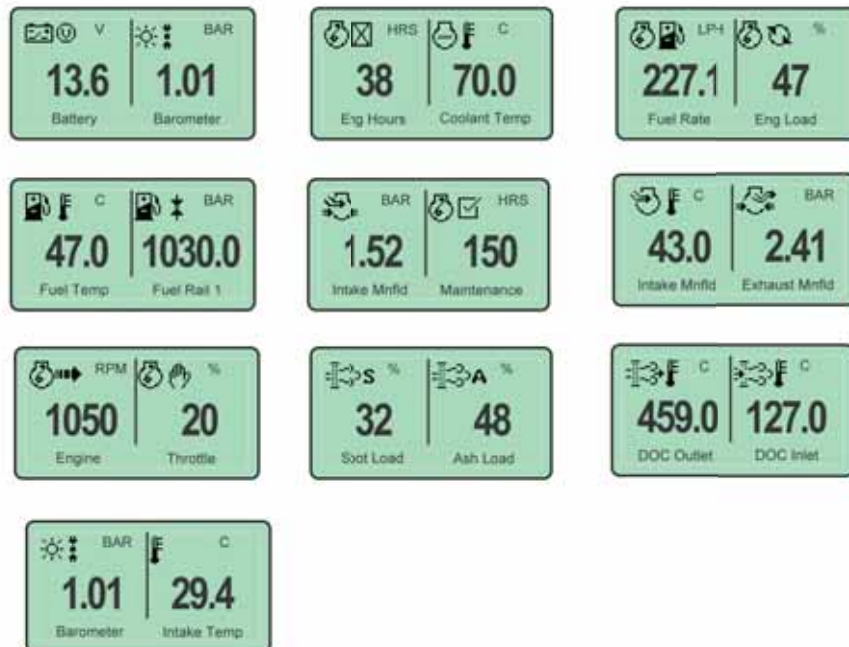
Display Mode	Single
Backlight	50%
Contrast	50%
Distance Units	miles
Pressure Units	psi
Temp Units	F
Volume Units	GAL
Flow Rate	LTR

DISPLAY LIST

SINGLE DATA FORMAT



DUAL DATA FORMAT



MISCELLANEOUS DISPLAYS



ABOUT MENU

The About Menu indicates the software information used for programming the control unit.



ENGINE SETTINGS

The Engine Settings are factory-specified. This feature is password-protected to ensure the correct use of the engine in this unit.



REGENERATION

See Engine Owner's Manual for information on the Diesel Particulate Filter (DPF).

Particulate Matter (PM) in the engine exhaust accumulates in the Soot Filter (SF) within the DPF causing it to clog, reducing engine performance. Therefore, it is necessary to burn off the accumulated PM. This process is referred to as Regeneration. The Engine Control Unit (ECU) uses components such as the DPF differential pressure sensor, temperature sensor, and intake throttle to control assisted DPF regeneration automatically and prevent PM from over-accumulating in the SF. The Yanmar engine uses a stepped approach of both Automatic and Back-up regeneration modes. A detailed description of this process is provided the Engine Owner's Manual, but a brief summary is also provided below.

Automatic Regeneration Modes – These modes are performed automatically by the Engine Control Unit and operate without input from the machine operator or impact to mulching operations.

Self Regeneration (Normal) – Regeneration without the use of assistance devices (e.g. intake throttle). During operation at high speed or high load, the exhaust temperature rises to a sufficient level such that PM is continuously combusted and eliminated.

Assisted Regeneration – Regeneration with the use of assistance devices (e.g. intake throttle). When the differential pressure in the SF inlet/outlet in the DPF rises, the differential pressure sensor installed on the DPF detects the increase. The Engine Control Unit (ECU) commands the intake throttle to adjust the amount of engine intake air to increase exhaust temperature to a sufficient level such that PM is combusted and eliminated.

Reset Regeneration – Regeneration with the combined use of Assisted Regeneration and post-injection. Approximately every 100 hours of operation, the Assisted Regeneration and post-injection are automatically used together to control regeneration by increasing the exhaust temperature to burn off and remove PM.

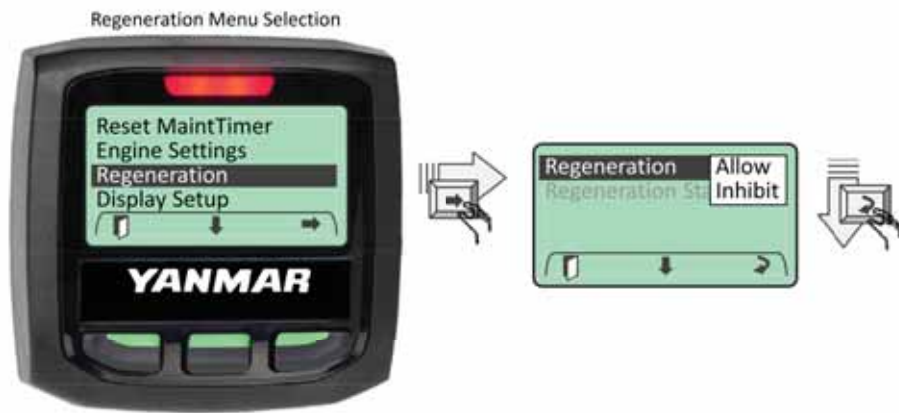
Back-up Regeneration Modes – These modes require direct action from the operator to be performed and the machine cannot be used for mulching operations while Back-up regeneration is underway.

Stationary Regeneration – Although the DPF performs the regeneration control, if the operation conditions with idling at no load and low speed/low load operations are frequently repeated, the PM may not be regenerated. If the ECU determines that performing the Stationary Regeneration is required at this time, the operator will be alerted via the control panel that a Stationary Regeneration is required. A Stationary Regeneration takes approximately 30 minutes to complete.

Recovery Regeneration – Recovery Regeneration occurs when Stationary Regeneration cannot be completed and the engine has gone into Limp Home Mode. The Recovery Regeneration takes approximately 3 hours to complete. If the Recovery Regeneration is unsuccessful, the Soot Filter will need to be serviced by a Yanmar certified service center.

RESET REGENERATION NORMAL OPERATION - DISPLAYS

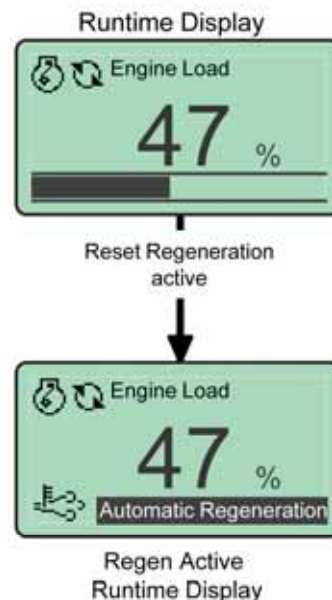
The engine control panel is set at the factory to allow Reset Regeneration to occur automatically. However, the operator has the option to inhibit Reset Regeneration via the control panel [Main Menu "→" Regeneration "→" Inhibit] if the work environment poses a risk to safe regeneration.



During machine operation with Regeneration in the "Allow" state, on the control panel, when the ECU begins Reset Regeneration, a notification and regeneration icon will display at the bottom of the screen.

NOTE: The ECU will not perform Reset Regeneration within the first 50 hours of engine life.

NOTE: The machine can be operated normally during Reset Regeneration. The machine can also be turned **OFF**. If this occurs, Reset Regeneration will resume again when the machine has been turned back **ON** and the DOC temperature has risen to a sufficient level.



CAUTION

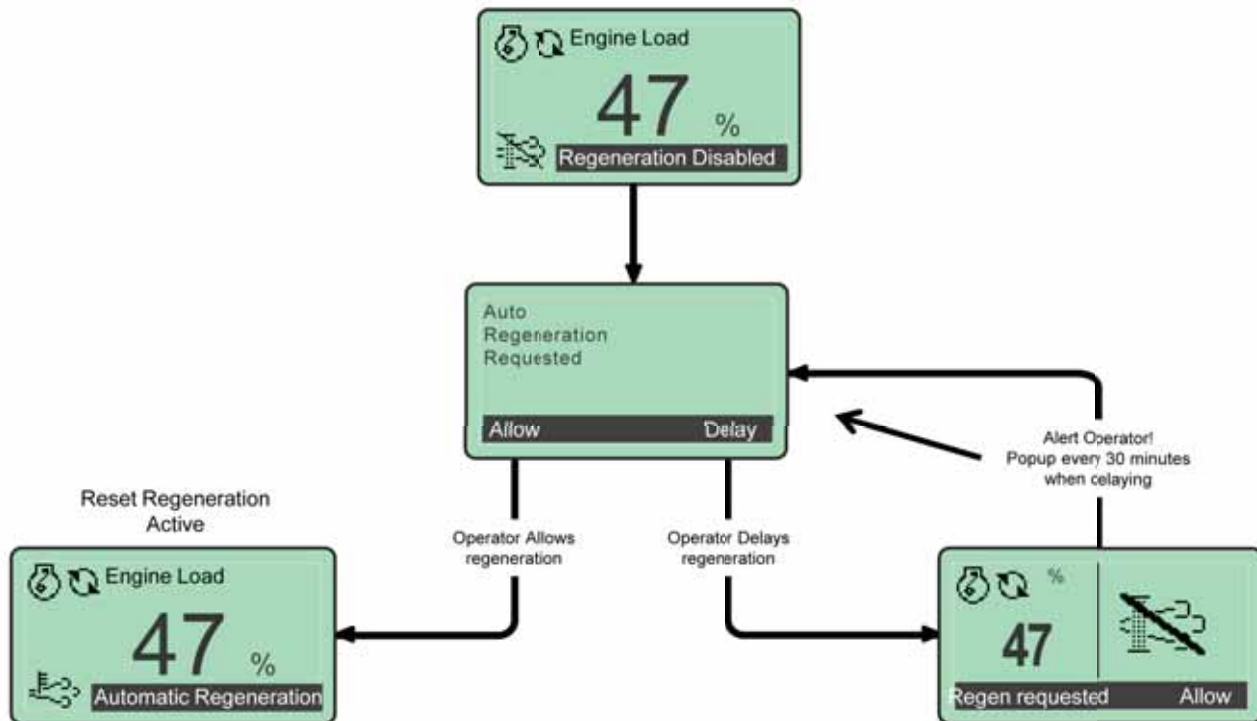
During Reset Regeneration, post-injection is used and fuel is burned directly inside the DPF (burned by chemical reaction inside the Diesel Oxidation Catalyst (DOC). Through this heat, regeneration occurs inside the SF, but the combustion increases the temperature of the exhaust gas to close to 600° C (1112° F). Be careful that neither people nor flammable materials are near the exhaust gas outlet.

NOTE: During Automatic Regenerations, the following conditions may occur due to the characteristics of the DPF system, but they are not malfunctions.

- The engine sound may change during idling operation at no load.
- White smoke may be discharged from the exhaust pipe right after starting a cold engine or during acceleration. This is due to the discharge of water vapor. When the exhaust temperature increases, the white smoke disappears.
- The exhaust gas is purified through the catalyst installed in the DPF, so the smell of the exhaust gas is different from the exhaust gas of a conventional diesel engine.

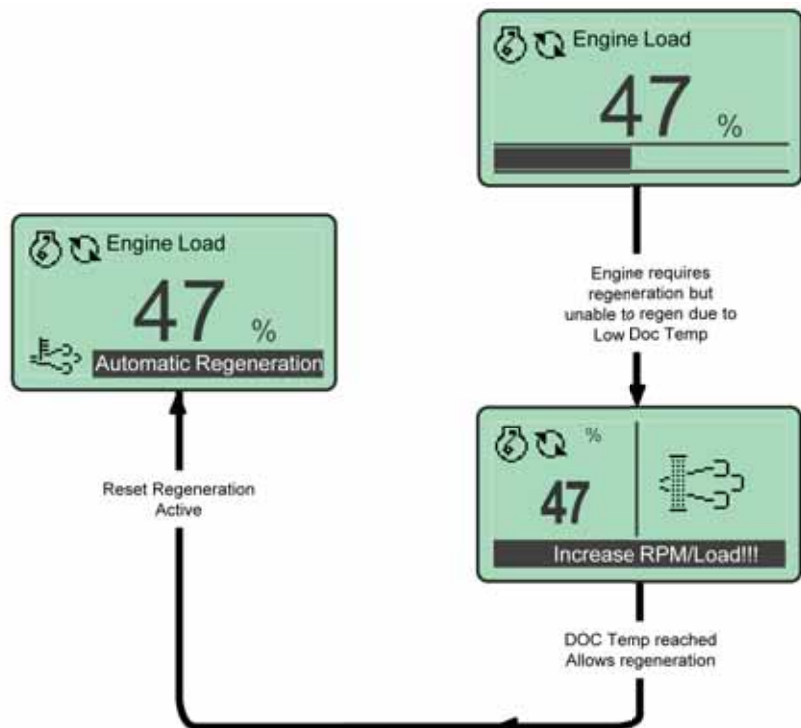
RESET REGENERATION STANDBY DUE TO INHIBIT SWITCH

During machine operation with Regeneration in the *Inhibit* state on the control panel, a notification and regeneration inhibited icon will display at the bottom of the screen. If the ECU determines that Reset Regeneration is required, a Auto Regeneration request will be displayed. If the operator allows the regeneration, it will begin and a notification and regeneration icon will display at the bottom of the screen. If the operator delays the regeneration, the display will go to dual mode with one display showing the regeneration inhibit icon and the regeneration request continuously displayed at the bottom of the screen. Further, the Auto Regeneration request message will re-display every 30 minutes. The machine can continue to operate with Reset Regeneration inhibited for 3 hours, however, after 3 hours, a Stationary Regeneration request may occur.



RESET REGENERATION STANDBY DUE TO LOW DOC TEMPERATURE

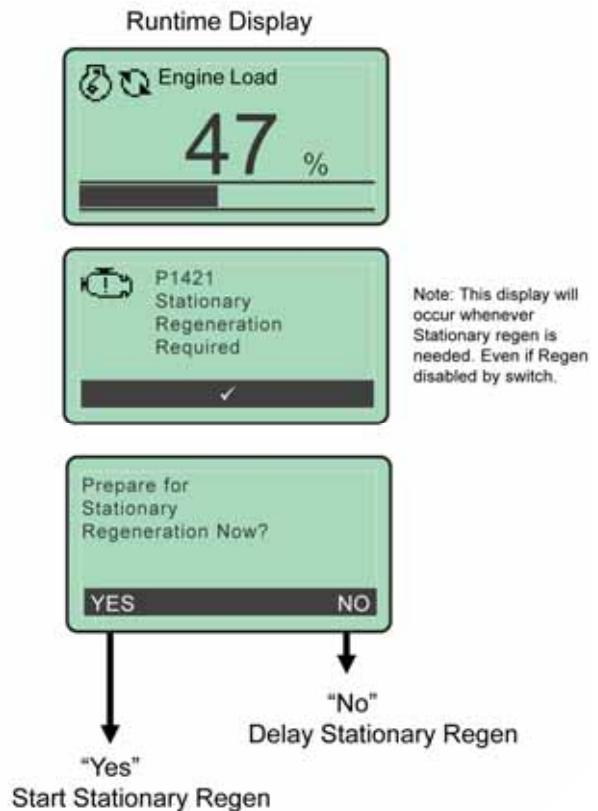
For Reset Regeneration to begin, the DOC temperature has to be at a sufficient level. If the DOC has not reached this temperature and Reset Regeneration is required, then a notification to Increase RPM/Load and the Regeneration icon will be displayed. Once the DOC reaches sufficient temperature, Reset Regeneration will begin and a notification and regeneration icon will display at the bottom of the screen.



STATIONARY REGENERATION BY ENGINE MANAGEMENT

If the ECU determines that performing the Stationary Regeneration is required, the operator will be alerted via the control panel that a Stationary Regeneration is required via a Diagnostic Trouble Code (DTC) even if Regeneration on the control panel is set to Inhibit. The operator should immediately conduct the Stationary Regeneration by performing the following operation.

1. Move the machine to a well-ventilated and safe location.
2. Acknowledge the DTC by pressing the middle soft key on the display marked "✓".
3. When the message "Prepare for Stationary Regeneration Now" is displayed, press the left soft key marked "YES".
4. When the message "Bring Machine to Lo-idle Speed and confirm interlocks" is displayed, make sure that the pump clutch is disengaged and hydraulic switch on control box is in the **REGEN INTERLOCK** (down) position. Reduce engine speed to low idle. Then acknowledge the message by pressing the middle soft key on the display marked "✓".
5. When the message "Ready to begin Stationary Regeneration Now?" is displayed, press the left soft key marked "YES".



STATIONARY REGENERATION BY ENGINE MANAGEMENT (CONTINUED)

Note: Stationary Regeneration will not begin if any of the following conditions are present:

- Coolant temperature is less than 60° C (140° F)
- The engine has not been running for 15 minutes
- An important DTC is active
- The interlock switch is off (pump clutch is engaged) or if the hydraulic system is on
- Idle speed is too high

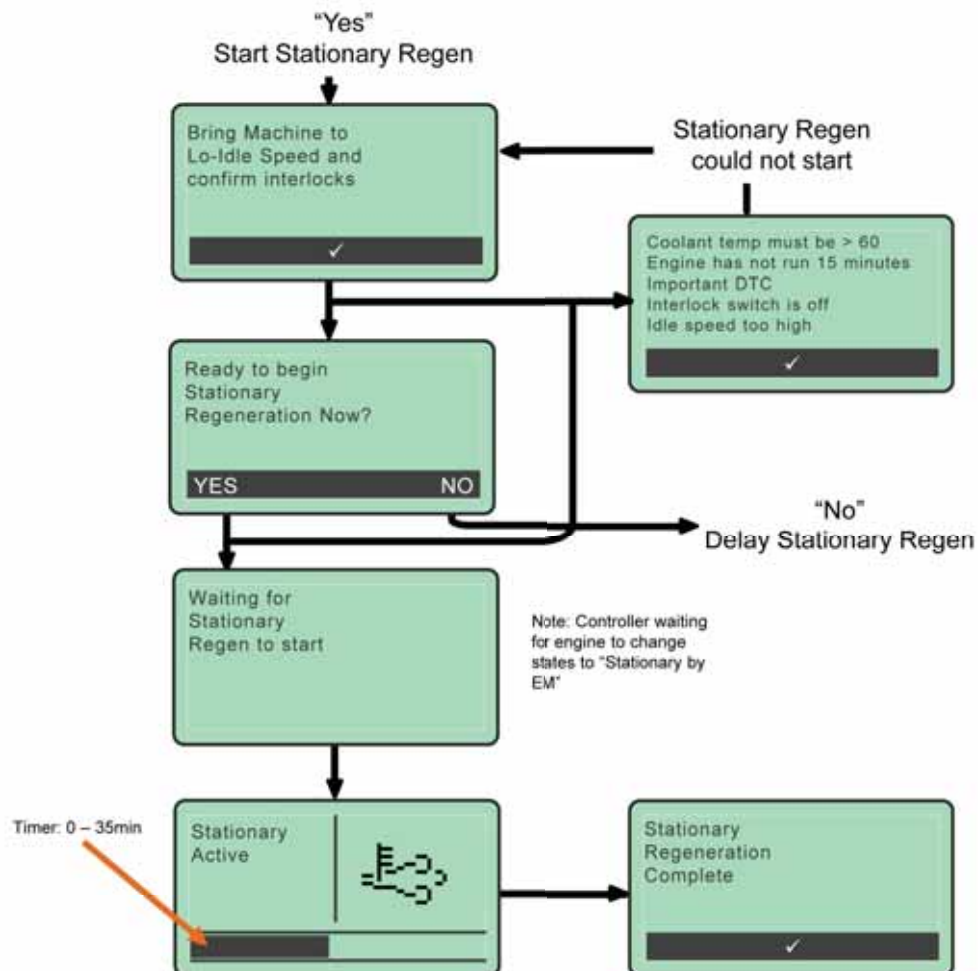
If these conditions are present, a notification will be displayed. Once these conditions are corrected by the operator, acknowledge the message and Stationary Regeneration will begin.

6. At this point, the ECU will take over control of the engine to perform the Stationary Regeneration and a notification of "Stationary Active" and the regeneration icon will be display along with a status bar (0 to 35 minutes) at the bottom of the screen.

Note: When the Stationary Regeneration starts, the engine speed increases gradually to high idle speed, then the regeneration begins and may modulate engine speed throughout the process.

Note: If Stationary Regeneration needs to be interrupted for any reason, turn off the key switch. One the machine is restarted, the Stationary Regeneration request will be repeated.

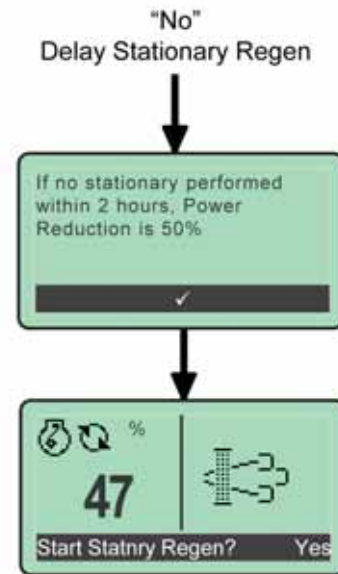
7. Once Stationary Regeneration is complete, a notification will be displayed and the engine will return to low idle, but will not automatically turn off. Normal machine operation can resume.



STATIONARY REGENERATION BY ENGINE MANAGEMENT (CONTINUED)

If the Stationary Regeneration is delayed by pressing the right soft key marked “**NO**” when the request is displayed, a 15% power reduction is immediately applied to the engine. A notification stating that “If no stationary performed within 2 hours, Power Reduction is 50%” will also be displayed. Once this message is acknowledged by pressing the middle soft key on the display marked “✓”, the regeneration icon will be displayed and the regeneration request will remain at the bottom of the screen.

Note: Although not recommended, the engine can be run in Stationary Standby mode (delaying Stationary Regeneration) for a total of 10 hours. For the first 2 hours, the engine power will be reduced to 85%. For the remaining 8 hours, engine power will be reduced to 50%. If the Stationary Regeneration is not performed when requested by the ECU, an excessive amount of PM will accumulate. Abnormal combustion of PM may cause damage to the DPF after extended operation in Stationary Standby mode.



Engine can be run in Stationary Standby Mode for 10 hours.

First 2 hours: 15% fuel cut

Next 8 hours: 50% fuel cut

MANUAL STATIONARY REGENERATION - OPERATOR REQUEST

The operator has the option of performing a Manual Stationary Regeneration should work conditions/schedule require. This is accomplished via the display [*Main Menu* “➡” *Regeneration* “➡” *Regeneration Start*]. Manual Stationary Regeneration can only be completed after the engine has accumulated 50 hours or more since its last regeneration.

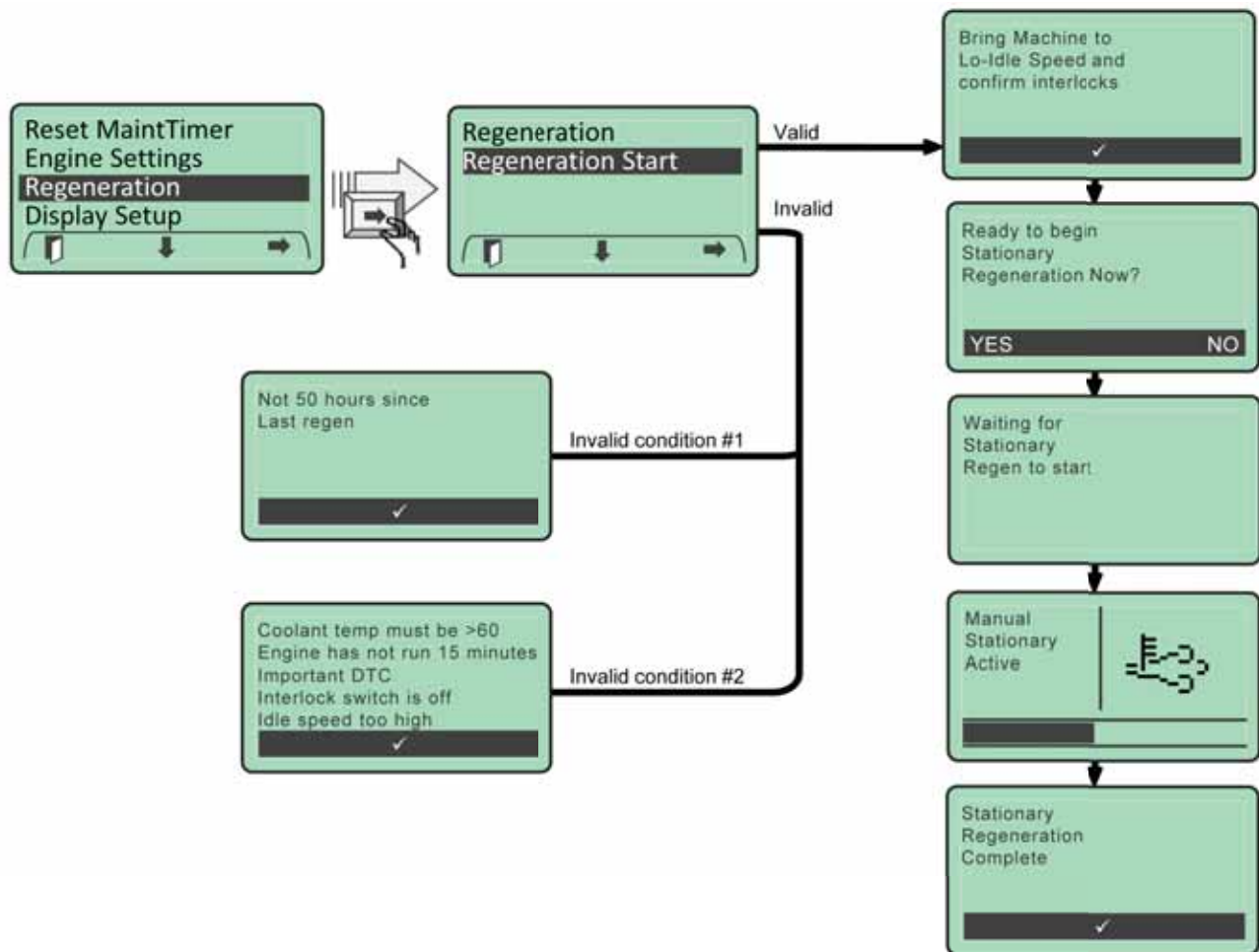
1. Move the machine to a well-ventilated and safe location.
2. When the message “Bring Machine to Lo-idle Speed and confirm interlocks” is displayed, make sure that the pump clutch is disengaged and hydraulic switch on control box is in the **REGEN INTERLOCK** (down) position. Reduce engine speed to low idle. Then acknowledge the message by pressing the middle soft key on the display marked “✓”.
3. When the message “Ready to begin Stationary Regeneration Now?” is displayed, press the left soft key marked “**YES**”.

Note: Stationary Regeneration will not begin if any of the following conditions are present:

- Coolant temperature is less than 60° C (140° F)
- The engine has not been running for 15 minutes
- An important DTC is active
- The interlock switch is off (pump clutch is engaged) or if the hydraulic system is on
- Idle speed is too high

If these conditions are present, a notification will be displayed. Once these conditions are corrected by the operator, acknowledge the message and Stationary Regeneration will begin.

MANUAL STATIONARY REGENERATION - OPERATOR REQUEST (CONTINUED)



- At this point, the ECU will take over control of the engine to perform the Stationary Regeneration and a notification of "Stationary Active" and the regeneration icon will be display along with a status bar (0 to 35 minutes) at the bottom of the screen.

Note: When the Stationary Regeneration starts, the engine speed increases gradually to high idle speed, then the regeneration begins and may modulate engine speed throughout the process.

Note: If Stationary Regeneration needs to be interrupted for any reason, turn off the key switch. One the machine is restarted, the Stationary Regeneration request will be repeated.

- Once Stationary Regeneration is complete, a notification will be displayed and the engine will return to low idle, but will not automatically turn off. Normal machine operation can resume.

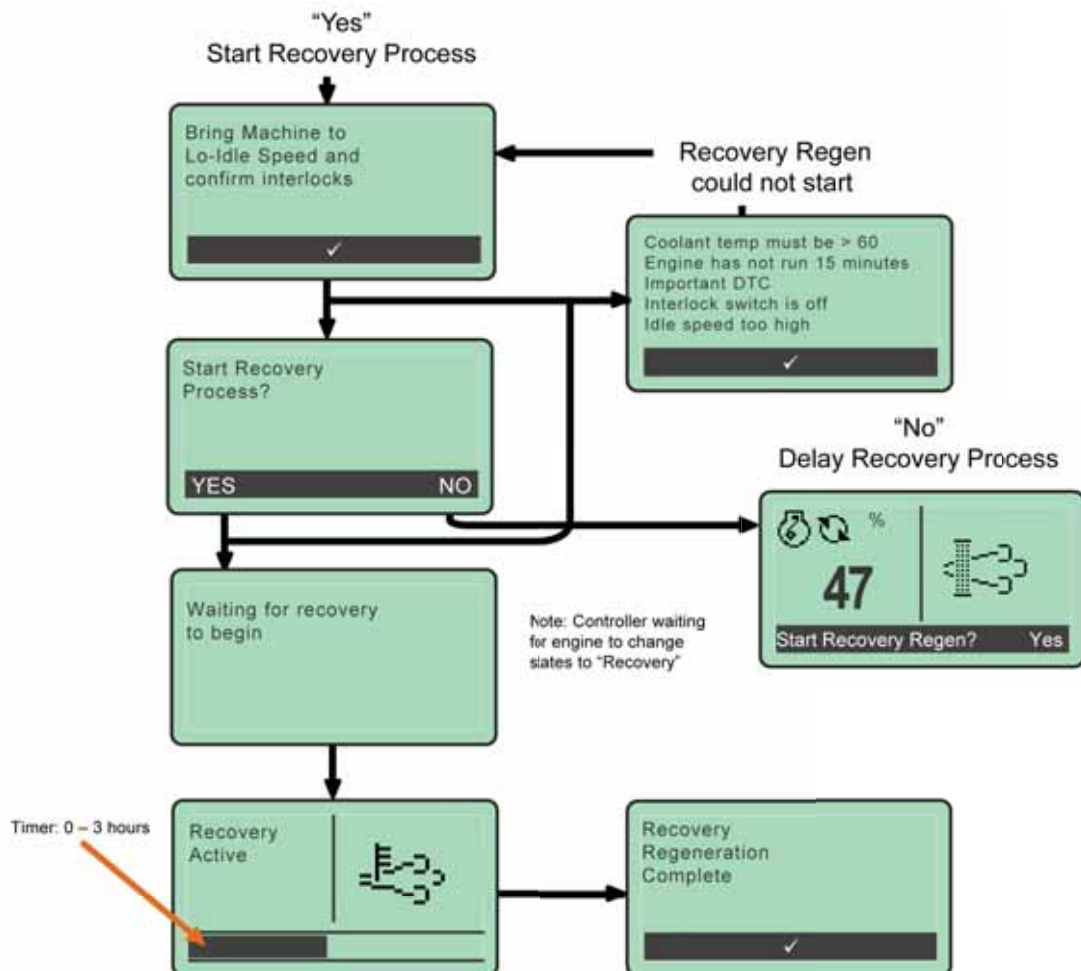
RECOVERY REGENERATION

If Recovery Regeneration is not performed within the allowed 10 hours, the engine will go into Limp Home Mode and a DTC will be displayed. There are only two ways out of Limp Home Mode, perform a Recovery Regeneration or perform a SF exchange at a Yanmar certified service center. The operator should immediately attempt the Recovery Regeneration by performing the following operation.

1. Move the machine to a well-ventilated and safe location.
2. Acknowledge the DTC by pressing the middle soft key on the display marked "✓".
3. When the message "Begin Recover Process" is displayed, press the left soft key marked "YES".
4. When the message "Bring Machine to Lo-idle Speed and confirm interlocks" is displayed, make sure that the clutch is disengaged and the hydraulic system is off. Reduce engine speed to low idle. Then acknowledge the message by pressing the middle soft key on the display marked "✓".
5. When the message "Start Recovery Process?" is displayed, press the left soft key marked "YES".



"Yes"
Start Recovery Process



RECOVERY REGENERATION (CONTINUED)

Note: Recovery Regeneration will not begin if any of the following conditions are present:

- Coolant temperature is less than 60° C (140° F)
- The engine has not been running for 15 minutes
- An important DTC is active
- The interlock switch is off (pump clutch is engaged) or if the hydraulic system is on
- Idle speed is too high

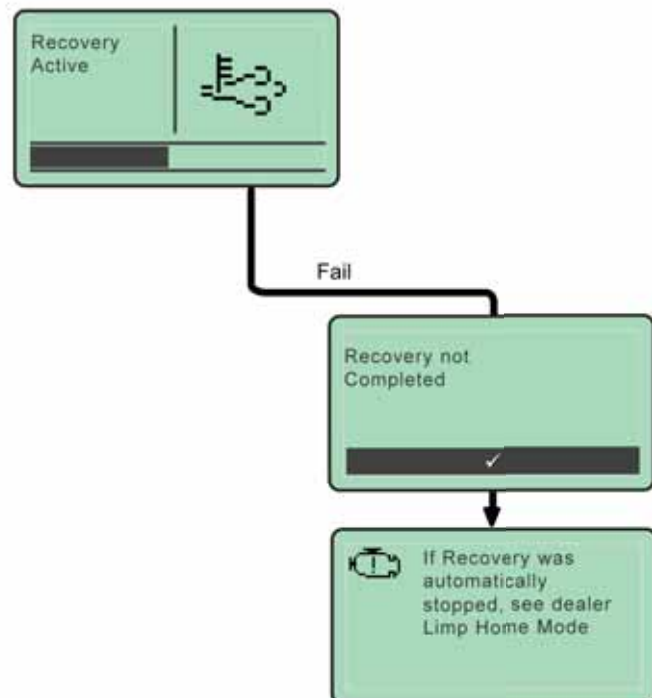
If these conditions are present, a notification will be displayed. Once these conditions are corrected by the operator, acknowledge the message and Stationary Regeneration will begin.

6. At this point, the ECU will take over control of the engine to perform the Recovery Regeneration and a notification of “Recovery Active” and the regeneration icon will be display along with a status bar (0 to 3 hours) at the bottom of the screen.

Note: When the Recovery Regeneration starts, the engine speed increases gradually to high idle speed, then the regeneration begins and may modulate engine speed throughout the process.

Note: If Recovery Regeneration needs to be interrupted for any reason, turn off the key switch. One the machine is restarted, the Recovery Regeneration request will be repeated.

7. If the Recovery Regeneration is successful, a notification will be displayed and the engine will return to low idle, but will not automatically turn off. Normal machine operation can resume.
8. If the Recovery Regeneration is not successful, a notification will be displayed. Stop the engine and see a Yanmar certified service center for a Soot Filter exchange.



There are 2 ways out of Limp Home:

1. Perform a Recovery Regeneration
2. Perform a Soot Filter exchange with SA-D

EMERGENCY STOP

EMERGENCY STOP EQUIPMENT

A critical safety component of this equipment is the Emergency Stop (E-Stop) switch. This device is located next to the control panel, and the button is colored red to be visible and to indicate a "stop" function based on color association. The button is made increasingly visible and distinct by the bright yellow plastic enclosure that the button sits on.

The button extends outward from the enclosure's surface. The E-Stop will cut all power to the machine when pushed (engaged). E-Stop devices should NEVER be disabled under any circumstances.



EMERGENCY STOP USE

When the E-Stop button is pushed (engaged), it will override all other functions and machine operating modes. The objective of the E-Stop is to remove power as quickly as possible from the equipment without creating additional hazards.

Emergency stop devices are considered complimentary or secondary safeguarding equipment. They are not considered primary safeguarding devices because they do not prevent access to a hazard nor do they detect access to a hazard.

Remember that SAFETY is FIRST in working with any piece of equipment.

- As operating personnel change, full training and complete understanding of this equipment must be given to the personnel prior to their operation of the equipment.
- Manufacturer and its agents disclaim any liability on such equipment operating without adhering to the aforementioned safety procedures.

Once pushed or engaged, the E-Stop will prevent the operation of this unit. Until the button is turned clockwise (released) and returned to its original position, the E-Stop will still be engaged. The E-Stop effectively turns OFF this equipment. After the E-Stop is released, follow the Starting Procedure to resume use of this equipment.

STARTING PROCEDURE

⚠ WARNING See **HYDROSEEDER® SAFETY SUMMARY SECTION** on pages 1 through 4 before operating the machine. Failure to comply could result in death or serious injury. Failure to comply could also result in product or property damage.

Before starting, open recirculation valve, close discharge valve, disengage (turn off) clutch, place agitator control in the **NEUTRAL** position and turn the hydraulic switch to the **REGEN INTERLOCK** (down) position.

1. Turn key clockwise to the **RUN** “**ⓘ**” position. This will activate the control panel and apply power to the engine ECU. Check the digital display of the control panel for any fault codes.
If there are fault codes, determine and fix the fault problem before moving on. If a fault condition exists, the engine ECU may prevent the engine from starting.
2. Turn the key clockwise to the **START** “**⏻**” position until the starter engages and the engine starts.
3. Allow engine to warm up for 3 to 5 minutes before operation.

NOTE: This engine has a safety system that will shut the engine off if the engine oil pressure drops below 7 psi (48 kPa) or if the water temperature reaches 230°F (110°C).

4. After engine has warmed up, turn on the hydraulics system by flipping the hydraulics toggle switch to the **HYDRAULICS ON** position (all the way up). The switch will automatically center itself, which is the **ON** position.



AREA COVERAGE – MATERIAL CAPACITY

To determine the coverage per load for any HydroSeeder®, three questions must be answered prior to the application. First, is the job to be done a one-step process (which is when the seed, fertilizer and mulch are applied proportionally per load) or a two-step process (which is when the seed and fertilizer are applied alone and then covered by mulch as a second operation). Second, at what rates (usually in pounds per 1,000 square feet, or pounds per acre) are the seeding materials to be applied. Finally, what are the loading capacities of the HydroSeeder®?

Application rates vary for different geographic locations, but in general, seed is applied at 6 to 10 lbs (2.7 to 4.5 kgs) per 1,000 sq ft. Fertilizer is applied at a rate of approximately 400 lbs (181 kgs) per acre, and fiber mulch is applied at 1,500 to 2,000 lbs (680 to 907 kg) per acre. (Note: There are 43,560 square feet in an acre). Local agronomists, agricultural extension agents, or soil and water conservation officials should be contacted for more specific information on application rates for a given area.

The following tables show loading versus coverage rates for the FINN T90 II. Table A shows rates for one-step applications. The coverage area is determined by the fiber mulch capacity of the HydroSeeder® and the rate at which it is applied. Table B shows the area coverage when seeding only, where little or no mulch is applied. The coverage area is determined by the granular solids capacity of the HydroSeeder® and the rate at which the solids are applied.

TABLE A

USING SEED, FERTILIZER, AND MULCH

Table is based on 1,500 lb (680 kg) of mulch, 400 lb (181 kg) of fertilizer, and 345 lb (156 kg) of seed at 8 lb (3.6 kg) / 1000 sq. ft. per acre.

Unit	Amount of Material in Tank in pounds (kilograms)			Coverage Area
	Seed	Fertilizer	Mulch	sq ft (sq m)
T90	92 (42)	107 (48)	400 (181)	11,600 (1,078)

TABLE A EXAMPLE:

$$\frac{400 \text{ lb (181 kg) Mulch per Tank}}{1,500 \text{ lb (680 kg) Mulch per Acre}} = 0.267 \text{ Acre per Load}$$

$$400 \text{ lb (181 kg) Fertilizer per Acre} \times 0.267 \text{ Acre} = 107 \text{ lb (48 kg) Fertilizer per Load}$$

$$345 \text{ lb (156.5 kg) Seed per Acre} \times 0.267 \text{ Acre} = 92 \text{ lb (42 kg) Seed per Load}$$

TABLE B

SEED AND FERTILIZER ONLY

Table is based on rates of 8 lb (3.6 kg) seed and 9.2 lb (4.2 kg) fertilizer per 1,000 sq. ft.

Unit	Amount of Material in Tank in pounds (kilograms)			Coverage Area	
	Seed	Fertilizer	Total	sq ft (sq m)	Acreage (Hectare)
T90	784 (356)	900 (408)	1,684 (764)	97,906 (9,095)	2.25 (0.91)

TABLE B EXAMPLE:

$$\frac{1,684 \text{ lb (764 kg) Tank Capacity (Solids)}}{8 \text{ lb (3.6 kg) of Seed} + 9.2 \text{ lb (4.2 kg) of Fertilizer per 1,000 sq. ft.}} = 97,906 \text{ sq. ft. per Load}$$

$$\frac{8 \text{ lb (3.6 kg) of Seed}}{1,000 \text{ sq. ft.}} \times 97,906 \text{ sq ft} = 784 \text{ lb (356 kg) of Seed per Tank}$$

TANK CAPACITY CHART

T90 II		
Gallons (Liters)	in. (cm) from top	in. (cm) from bottom
800 (3,028)	10 (25.4)	42 (106.7)
750 (2,839)	12.25 (31.1)	39.75 (101.0)
700 (2,650)	14.25 (36.2)	37.75 (95.9)
650 (2,460)	16.25 (41.3)	35.75 (90.8)
600 (2,271)	18.25 (46.4)	33.75 (85.7)
550 (2,082)	20.25 (51.4)	31.75 (80.6)
500 (1,893)	22.5 (57.2)	29.5 (74.9)
450 (1,703)	24.75 (62.9)	27.75 (70.5)
400 (1,514)	26.75 (67.9)	25.75 (65.4)
350 (1,325)	29 (73.7)	23 (58.4)
300 (1,136)	31.25 (79.4)	20.75 (52.7)
250 (946)	33.5 (85.1)	18.5 (47.0)
200 (757)	36 (91.4)	16 (40.6)
150 (568)	39 (99.1)	13 (33.0)
100 (378)	42.25 (107.3)	9.75 (24.8)
50 (189)	46 (116.8)	6 (15.2)

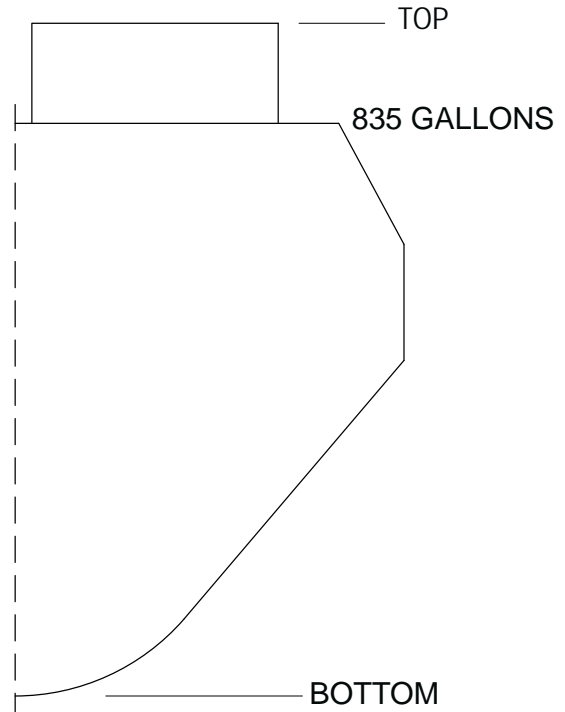


Figure 5 – Tank Capacity

LOADING

⚠ WARNING *Take care not to lose pens, lighters, etc. from shirt pockets, or drop pieces of paper or plastic bags into the tank, as these might plug the slurry system. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.*

1. With clutch disengaged (turned off), agitator control in the NEUTRAL position and hydraulics system is off, start engine and allow it to warm up. See STARTING PROCEDURE.
2. After engine has warmed up, turn on the hydraulics system by flipping the hydraulics toggle switch to the **HYDRAULICS [] ON** “U” position (all the way up). The switch will automatically center itself, which is the **ON** position.
3. Start filling unit with water from one of the water sources as listed below. When water reaches the top of agitator shaft, move agitator control to full REVERSE position.

Tank can be filled by using one of the sources of water as follows:

- A. Water from any stream or pond using a fill pump. When filling from a pond or stream, be sure to use a suction strainer to filter out contaminants that could damage the pump and unit.
- B. Any pressure source, e.g. fire hydrant. An optional air gap fill port is available for this unit but it is necessary to consult with local authorities before using a water main, in order to abide by all local ordinances.
- C. Water tanker.

4. Piping System Cleanout Procedure (Purging Line):
 - A. Remove discharge nozzle and gasket from discharge boom.
 - B. Aim discharge boom assembly into an open area away from any persons, obstructions, or high voltage power lines.
 - C. Open discharge valve and close recirculation valve.
 - D. Engage (turn on) clutch with a firm snap. Do NOT allow clutch to slip.
 - E. Increase engine speed to approximately 1/2 to 3/4.
 - F. When discharge stream is clear, open recirculation valve and close discharge valve. After recirculation stream is clear disengage (turn off) clutch.
 - G. Replace gasket in discharge boom.
5. Continue filling tank with water.
6. Increase engine speed to full RPM.
7. Start loading dry material, loading the lightest material first. Agitator control should be in full REVERSE for mixing.
 - A. Seed – Cut open the seed bag and dump contents into slurry tank. When using inoculant, add it in the tank along with the seed. When using quick-swelling seeds, load them just prior to application.
 - B. Wood Fiber Mulch – Empty the entire bag in or cut bag open and drop in the sections of fiber. The amount of mulch to be used should be loaded by the time the water level is at 3/4 full. If agitator stalls or a high pitch squeal comes from the hydraulic system, reverse agitation to FORWARD for a moment to clear the obstruction, then return agitation to REVERSE.

⚠ CAUTION

Hydraulic system will overheat if agitator shaft is jammed for extended period. This will damage hydraulic oil and system components.

⚠ DANGER



Keep hands and arms away from tank interior and agitator. Failure to comply will result in death or serious injury.

- C. Fertilizer – Stand over hatch opening and drop the bag onto the bagcutter. Grasp both ends of the bag and dump material into slurry tank.
 - D. All other additives – Consult with manufacturer for proper loading technique.
8. When all materials are loaded and in suspension, and the tank is full, move the agitator to NEUTRAL then full speed FORWARD to ensure all material is mixed. It may be necessary to change the agitator direction more than once to ensure a thorough mixture.
9. After material is thoroughly mixed, slow agitator in forward direction to 1/2 to 3/4 speed, or enough to create movement in all of the corners of the tank. Do not over-agitate the slurry. Always discharge the material with the agitator control in the FORWARD position.
10. Close hatch lid on slurry tank.

NOTE: The slurry should not be recirculated for more than 15 minutes prior to discharge to reduce wear and keep seed from swelling.

NOTE: If foaming occurs, reduce agitator speed.

LOADING AND MIXING BFM, FGM, SMM AND OTHER HIGHLY VISCOUS SLURRIES

1. With clutch disengaged (turned off), agitator control in the NEUTRAL position and hydraulic system off, start engine and allow it to warm up. See STARTING PROCEDURE.
2. After engine has warmed up, turn on the hydraulics system by flipping the hydraulics toggle switch to the **HYDRAULICS**  **ON** “” position (all the way up). The switch will automatically center itself, which is the **ON** position.
3. Start filling unit with water from one of the water sources as listed below. When water reaches the top of agitator shaft, move agitator control to full REVERSE position.

Tank can be filled by using one of the sources of water as follows:

- A. Water from any stream or pond using a fill pump. When filling from a pond or stream, be sure to use a suction strainer to filter out contaminants that could damage the pump and unit.
 - B. Any pressure source, e.g. fire hydrant. An optional air gap fill port is available for this unit but it is necessary to consult with local authorities before using a water main, in order to abide by all local ordinances.
 - C. Water tanker.
4. Piping System Cleanout Procedure:
 - A. Remove discharge nozzle and coupler gasket from the remote valve coupler at the end of the discharge hose (or from boom on the platform option).
 - B. Aim discharge hose (or boom on the platform option) into an open area away from any persons, obstructions, or high voltage power lines.
 - C. Open discharge and remote valves and close recirculation valve.
 - D. Engage (turn on) clutch with a firm snap. Do NOT allow clutch to slip.
 - E. Open throttle to approximately 1/2 to 3/4 full.
 - F. When discharge stream is clear, open recirculation valve and close discharge valve. After recirculation stream is clear, disengage (turn off) clutch.
 - G. Replace coupler gasket in the remote valve coupler (or in boom on the platform option).
 5. Continue filling tank with water.
 6. Increase throttle to 3/4 of full throttle.

7. Start loading dry material, loading the lightest materials first. Agitator control should be in full REVERSE for mixing.

Seed - Cut open the seed bag and dump contents into slurry tank. (When using inoculant, add it in the tank along with the seed.) When using quick-swelling seeds, load them just prior to application.

BFM, FGM, SMM, and other highly viscous slurries - When the water level is above the top of the agitator blades, begin adding the entire bag of material into the tank. It may become necessary to slow the rate of water being added to the tank. Add all bales before the tank is 3/4 full. If agitator stalls or a high-pitch squeal comes from the hydraulic system, reverse agitation to FORWARD for a moment to clear obstruction, then return agitator to REVERSE.

NOTE: BFM, FGM, and other viscous slurries will entrain air if proper mixing procedures are not followed. Ensure that the agitator blades are completely submerged prior to the addition of this material. This will prevent air from entering the slurry. Follow manufacturers suggested rates of materials as indicated on the packaging. Generally, this recommendation is 50 pounds of material to 125 gallons of water.

Fertilizer – Cut open the fertilizer bag and dump contents into slurry tank.

All other additives - Consult with manufacturer for proper loading technique.

8. When all materials are loaded and in suspension, and the tank is full, move the agitator to NEUTRAL then full speed FORWARD to ensure all material is mixed. It may be necessary to change the agitator direction more than once to ensure a thorough mixture.
9. Agitate per the manufacturer's recommendations. Generally, the agitation time is 10 minutes to allow the proper viscosity to be generated. Follow manufacturer's recommendations.
10. Once material is thoroughly mixed, place the agitator in FORWARD direction to 1/4 speed, or just enough to create movement in all corners of the tank. DO NOT OVER-AGITATE the slurry. Always discharge the material with the agitator control in FORWARD and at a slow speed.

NOTE: As the application process commences and the slurry level is decreased, which will expose the agitator blades, it is extremely important to ensure that the speed of the agitators is slow.

NOTE: Use of recirculation should be kept to a minimum.

NOTE: If foaming occurs, reduce agitator speed.

NOTE: When mixing multiple loads of BFM, FGM, SMM, and other viscous slurries, make sure to purge the lines with clear water before mixing the next load.

PRIOR TO APPLICATION

1. Operator should familiarize themselves with the area to be seeded and develop a plan to ensure uniform application.
2. Develop a plan for communication between operator and driver of the carrying or towing vehicle to signal for start, stop, turn, etc. through the use of the signal horn.
3. Operator takes up position on the platform. From this point, application will be controlled by the use of the clutch, valve, discharge assembly, and throttle.

DISCHARGE NOZZLE SELECTION

Nozzles are stored in the tool box. This HydroSeeder® is equipped with four nozzles – two long distance and two fan nozzles. The smaller, long distance nozzle is generally better suited for seed, fertilizer, and/or lime application, while the large long distance nozzle is better for wood fiber mulch application. Both of the fan nozzles are generally suited for both types of application.

Nozzle	Nozzle ID	Distance	Width	Discharge Time
Lg. Long Distance		Up to 180 ft (55 m)	-	5.5 min.
Sm. Long Distance	Brass	Up to 140 ft (43 m)	-	12 min.
Narrow Fan	151000	Up to 105 ft (32 m)	15.8 ft (4.8 m)	5.5 min.
Wide Fan	501000	Up to 75 ft (23 m)	20.5 ft (6.3 m)	5.5 min.

APPLICATION OF SLURRY

I. GENERAL APPLICATION TECHNIQUES

⚠ DANGER

Do not spray toward power lines, transformers or other high voltage conductors. Failure to comply will result in death or serious injury.

⚠ CAUTION

The driver of the carrying vehicle should remain alert for hazards to the operator, such as low power lines, hanging branches, etc. Driver should never start or stop abruptly. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.

1. Determine which nozzle would best suit the application needs according to the DISCHARGE NOZZLE SELECTION chart above.
2. When applying seed and fertilizer, elevate discharge nozzle no less than 10 degrees (25 cm) above the area to be sprayed, allowing the slurry to gently rain onto the seed bed.
3. When applying wood and paper fiber, whenever possible, aim the stream toward the ground to create a surface with small pockmarks, which helps get seed in contact with ground. Do not allow the stream to blast away the surface of the seed bed.
4. Generally, the most remote area of the seed bed should be covered first. Distance is controlled by engine speed and nozzle selection.

CAUTION

Do NOT partially close the valve to control the distance. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.

5. While moving along area to be seeded, the operator should move the nozzle back and forth in a slow, even arc.
6. If application is to be interrupted for a short period of time, leave the valves open and disengage (turn off) clutch. Engage (turn on) clutch to continue application.
7. It may be necessary to slow the agitator as the tank empties to reduce foaming.

II. DISCHARGE THROUGH THE BOOM:

1. Move the discharge valve handle to the open position, the recirculation valve handle to the closed position, and engage (turn on) clutch. At this time, should the operator want to stop spraying for a short period, disengage (turn off) clutch; then engage (turn on) clutch to continue spraying.
2. When the tank is empty, or when discontinuing discharge for an extended period of time, disengage (turn off) clutch, then immediately move the discharge valve to the closed position, and idle the engine. This will maintain moisture in the discharge piping and help prevent plugging. Move the agitator control to the NEUTRAL position.

III. PROCEDURES WHEN USING HOSES:

Always pump clear water through the hose before pumping mulch. If the inside hose liner is dry, it will de-water the mulch, causing hose to plug.

A. PUMP TAKE OFF SYSTEM OR HOSE REEL WITH REMOTE VALVE

1. Open recirculation valve, close discharge valve, and close remote valve at the end of the hose.
2. Engage (turn on) clutch. When stream is flowing freely through recirculation line, open pump take off valve.

CAUTION

The high pressure on the hose can exert strong forces, causing the potential for the hose operator to lose control of hose or footing. The hose will require additional hose holders when this operation occurs on slopes. Open the pump take-off valve and the remote valve slowly and only after the hose operator is firmly positioned and has firm control of hose. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.

3. With the engine at 3/4 speed, open remote valve at the end of the hose to discharge load.
4. When finished spraying, close remote valve, disengage (turn off) clutch, and stop engine. If using fiber mulch, retain as much water as possible in the hose by elevating the hose ends or by coupling the hose ends together.
5. If another load is to be done, see RELOADING PROCEDURE. If finished for the day, follow the clean up procedure described in DAILY CLEANING AND MAINTENANCE and flush out the hose.

DANGER

The recirculation valve must be open when using a remote valve. Failure to comply will result in death or serious injury.

B. EXTENSION HOSE SYSTEM – WITHOUT REMOTE VALVE

1. Connect extension hose into end of discharge boom.
2. An operator controlling the end of the hose, directs a second operator at the machine to control the clutch and adjust the engine speed.

CAUTION

Since the extension hose will be seeing the full output of the pump with the recirculation valve closed, the equipment operator and individual at the end of the hose should exercise extreme care when operating unit on high pressure. The high pressure on the hose can exert strong forces causing hose operator to lose control of hose or footing. The hose will require additional holders on slopes. Engage the clutch only after the hose operator is firmly positioned and has firm control of hose. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.

3. When hose operator is ready, signal the second operator to engage (turn on) clutch and slowly increase the engine rpm until the desired discharge pressure is reached.
4. When finished spraying, disengage (turn off) clutch, stop the engine, and close the discharge valve. If using fiber mulch, retain as much water as possible in the hose by elevating the ends or by coupling the ends together.
5. If another load is to be done, see RELOADING PROCEDURE below. If finished for the day, follow CLEANING PROCEDURE and flush out the hose.



RELOADING PROCEDURE

1. Start at step 2 in LOADING SECTION.
2. After last load of the day, refer to CLEANING AND MAINTENANCE section.

LIMING WITH THE HYDROSEEDER®

In using large concentrations of granular solids through the HydroSeeder®, it is advisable to keep the slurry moving through the pump at all times. This keeps the solids from settling in the lines and creating a stoppage. This unit was designed for the application of agricultural-grade lime or FINN-HLL Liquid Lime.

LIMING PROCEDURE

1. With clutch disengaged (turned off), agitator control in the NEUTRAL position and hydraulic system off, start engine and allow it to warm up. See STARTING PROCEDURE.
2. After engine has warmed up, turn on the hydraulics system by flipping the hydraulics toggle switch to the **HYDRAULICS**  **ON** “” position (all the way up). The switch will automatically center itself, which is the **ON** position.
3. Start filling unit with water. When water reaches to top of the agitator shaft, move agitator control to approximately 1/2 speed REVERSE.
4. Open both the recirculation and discharge valves.
5. Remove discharge nozzle and gasket from discharge boom.
6. Aim discharge boom assembly into an open area away from any persons, obstructions, or high voltage power lines.

7. Engage (turn on) the clutch, and move the throttle to full engine speed. A stream of water should be coming from the end of the recirculation pipe beside the hatch opening, as well as from the boom.
8. As soon as both streams are clear, close the discharge valve and make sure water is being recirculated back to the tank.
9. Decrease throttle to 3/4 speed. Increase agitator speed to full REVERSE.

NOTICE

Do not disengage (turn off) clutch.

10. Twenty (20) lbs (9 kg) of granular solids displaces approximately 1 gallon (3.8 L) of water. When filling the tank with water, the volume of granular solids must be accounted.

Use this method to determine how many gallons will be displaced by the granular solids.

$$\frac{X \text{ (number of lbs of granular solids being used)}}{20} = \text{number of gallons displaced}$$

For example:

If using the maximum recommended capacity of 2,500 lbs (1,134 kg) granular solids, then 2,500 divided by 20 equals 125, so 125 gallons (473 L) would have to be subtracted from the total tank capacity. If the total tank capacity is 940 gallons (3,558 L), then 940 gallons (3,558 L) minus 125 gallons (473 L) equals 815 gallons (3,085 L).

The tank can only be filled with 815 gallons (3,085 L) when using 2,500 lbs (1,134 kg) of granular solids.

11. Fill the tank to the required capacity for the rate of granular solids to be applied.
12. Load the material. See LOADING SECTION, Steps 5 through 8.
13. When ready to apply slurry, install gasket and nozzle into boom.
14. Move agitator control to 3/4 speed FORWARD.
15. With clutch still engaged (turned on), open the discharge valve.

CAUTION

To decrease pump wear and increase discharge distance, it may, at this point be desirable to close the recirculation valve. However, the recirculation valve must be open BEFORE closing the discharge valve if the application of slurry is to be interrupted. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.

16. Apply the slurry. See APPLICATION OF SLURRY SECTION.
17. If another load is to be applied, start again at step 1. If finished, follow CLEANING AND MAINTENANCE SECTION.

CLEANING AND MAINTENANCE

AFTER FIRST 4 TO 8 HOURS OF OPERATION

1. Check and adjust clutch. See CLUTCH MAINTENANCE SECTION.
2. Torque wheel lugs. Torque again after 7 days (Trailer Option only).

DAILY

1. Cleaning the HydroSeeder®:
 - A. Fill slurry tank to center of agitator shaft with clean water.
 - B. Move agitator lever to full speed to flush off inside of tank top and walls.
 - C. Remove discharge nozzle and gasket from discharge boom.
 - D. While aiming discharge hose or boom toward an open area, move discharge valve handle to discharge position and engage (turn on) clutch. Allow to discharge until clear water is coming out.
 - E. Move recirculation valve handle to recirculation and allow to run momentarily.
 - F. Disengage (turn off) clutch, idle the engine, move valve handle to DISCHARGE position, move agitator handle to NEUTRAL, and turn off the engine.
 - G. Always remove drain plug and allow tank to drain.
 - H. In freezing weather, leave main tank drain plug out and remove pump drain plug. Move all slurry valves to open position.
 - I. Wash the outside of HydroSeeder®, including radiator, to remove any corrosive materials.
 - J. If using lime – DAILY maintenance should be performed after every load.
 - K. Clean out extension hoses.
 - L. Replace coupler gasket before reinstalling discharge nozzle onto remote valve coupler.
2. Lubricating the HydroSeeder (see LUBRICATION AND FLUIDS CHART).

CAUTION *Lubrication should be performed IMMEDIATELY AFTER cleaning of the equipment, making sure the engine is NOT running. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.*

- A. Lubricate agitator shaft bearings located on the outside front and rear of slurry tank.
- B. Service automatic pressure lubricator on pump as needed. See EQUIPMENT CHECK SECTION.
- C. Check the engine oil and replenish when necessary. Change oil and filter after first 50 hours then every 200 hours thereafter. Consult the engine operator's manual for the correct grade of oil and the engine break-in procedure.

NOTICE

Change engine oil and filter at least once annually even if the 200 hours have not been met.

- D. Lubricate swivel on discharge assembly.

WEEKLY OR EVERY 40 HOURS OF OPERATING TIME

1. Clean air cleaner by following the instructions in the engine operator's manual.
2. Lubricate all points on HydroSeeder® as outlined in DAILY CLEANING AND MAINTENANCE SECTION. Additionally, lubricate the four grease fittings on clutch/pump.
3. Check the oil level in the hydraulic oil reservoir; maintain level at sight gauge.
4. Check the clutch adjustment to ensure that it snaps in and out of engagement. Adjust the clutch with the engine off.
5. Check the antifreeze in radiator.
6. Inspect slurry tank for build-up of residue in suction area and clear if necessary.
7. Check and clean engine radiator. Flush with clear, low-pressure water and blow dry with compressed air. Do NOT use high-pressure water spray.

SEASONAL AND WINTER STORAGE MAINTENANCE

1. Drain slurry tank of all water, prior to storage, and leave drain plug off while in storage.
2. Park unit in suitable location and chock wheels to prevent inadvertent movement.
3. If possible, cover machine with tarp or park inside of an enclosure.
4. Store the HydroSeeder® with all slurry valve handles in the open position. To prevent damage from freezing, it is advisable to remove all slurry valves and store in a heated area.
5. Pour 1 qt. (0.95 L) of mineral oil or environmentally safe lubricant into the pump housing and spin pump by hand to prevent rust in the pump. Remove drain plug.
6. Chip and steel-brush any interior rust spots in the slurry tank and touch-up with paint. See steps 2 and 3 in IV. MAINTENANCE of the HYDROSEEDER® SAFETY SUMMARY SECTION.
7. Lubricate all fittings.
8. Check anti freeze in radiator.
9. Lubricate equipment again just prior to putting into operation after having been in storage.
10. Change hydraulic oil and filter. (400 hours)
11. Disconnect battery cables. In cold weather, remove battery and store it in a safe, warm place.
12. Add fuel stabilizer to fuel tank.

HYDRAULIC SYSTEM

The hydraulic system on your FINN HydroSeeder® is designed to give trouble-free service, if maintained. The most important areas of maintenance are the hydraulic oil and filtration. The reservoir holds 19 gal (72 L) of ISO Grade 46 hydraulic oil. The hydraulic oil should be replaced per the LUBRICATION AND FLUIDS CHART, or if the oil becomes milky or gives off a burnt odor. The hydraulic oil filter must be replaced on schedule with a 25 micron absolute filter (FINN part number 021618). The hydraulic system relief is factory-set at 2,100 psi (12,479 kPa).

CLUTCH/PUMP COMBINATION (CLUMP) MAINTENANCE

NOTE: Refer to Figures 6 for all in-text callouts mentioned.

CAUTION *Clump maintenance should be done only while engine is not running and battery cables are disconnected. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.*

PUMP MAINTENANCE SECTION

CAUTION *Pump maintenance should be done only while engine is not running and battery cables are disconnected. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.*

A. FACTORY TOLERANCES

1. To check pump tolerances, loosen the two clamps on pump suction piping and remove the inlet elbow. Through the pump suction hole, insert a feeler gauge between the pump impeller (3) and the pump suction cover (1). This measurement on a new pump is between 0.040 to 0.045 in. (1.00 mm to 1.15 mm).

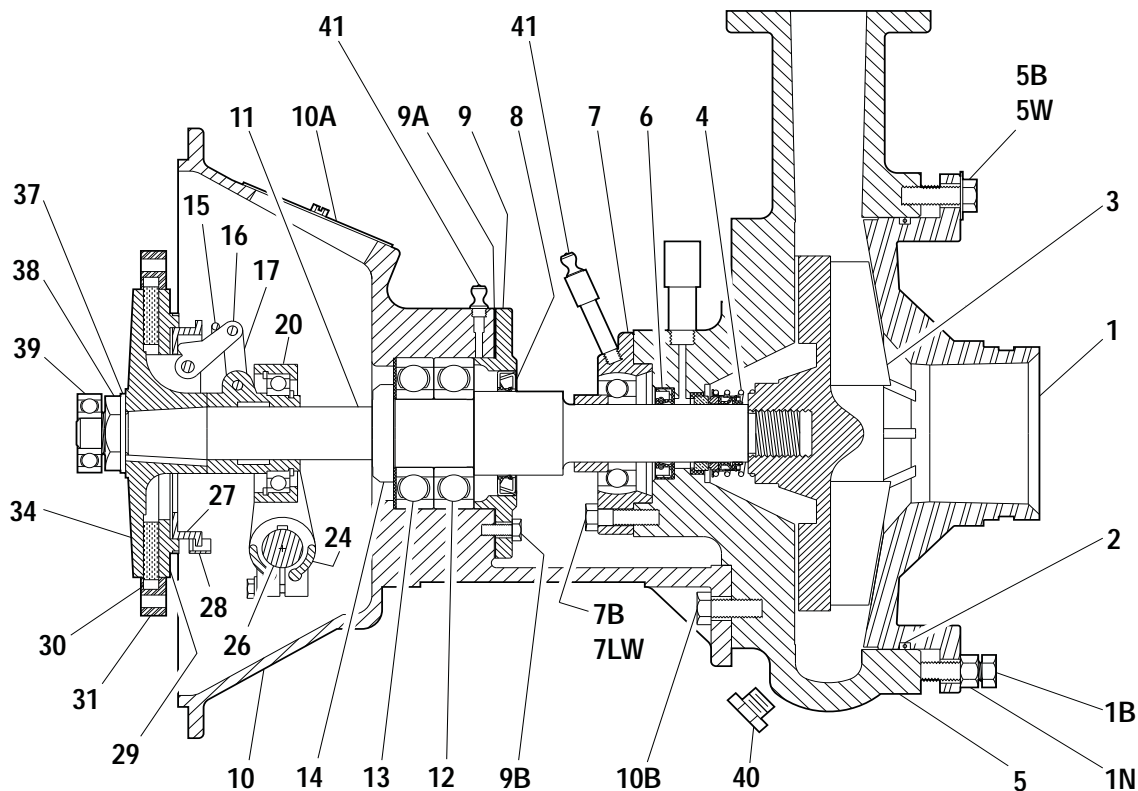


Figure 6 – Cross-Section Through Clutch/Pump Assembly (Clump)

NOTICE *Tightening of the bolts should be performed in a criss-cross pattern. DO NOT TIGHTEN OVER 15 lb-ft (20 N•m). Overtightening will crack the flange of the pump suction cover.*

B. IMPELLER CLEARANCE – To bring the pump back to proper tolerance, proceed as follows:

1. Loosen four bolts (1B), and push pump suction cover (1) into pump casing (5) until pump suction cover touches the pump impeller (3). Pump impeller should be in full contact with pump suction cover.
2. Tighten eight bolts (5B) finger-tight. Pump impeller should rub the pump suction cover and not turn easily through one revolution.
3. Tighten four bolts (1B) hand tight until they touch the pump casing (5).
4. Back off eight bolts (5B) 1-1/2 turn.
5. Tighten four bolts (1B) 1-1/2 turn and tighten four nuts (1N) to 15 lb-ft (20 N•m).
6. Tighten eight bolts (5B) to 15 lb-ft (20 N•m). Clearance gap should be about 0.040 in. (1.00 mm). Check to make sure if pump impeller turns freely through one revolution.

C. CLEANING

1. To clean pump impeller (3), loosen the two victaulic pipe clamps and remove suction pipe assembly. The eye of the pump impeller can then be seen through the pump suction cover (1) and is readily accessible for cleaning.
2. To further access pump impeller, remove eight bolts (5B) holding pump suction cover (1) in place. Remove pump suction cover, being careful not to damage O-ring (2).
3. To remove pump impeller, take the pump impeller wrench, which is stored in the toolbox, and position it so that the hole is aligned with any of the eight tapped holes in the front of the pump casing (5). The 90 degree leg of the wrench should face inward toward the pump impeller and be positioned between any two of the pump impeller fins. Bolt wrench securely in place with one of the pump suction cover bolts (5B). Using a pipe wrench on the clump shaft (11), unscrew pump impeller by turning clump shaft in a clockwise direction. Be careful not to unscrew pump impeller too far before removing the pump impeller wrench.

⚠ CAUTION *Do not turn the shaft backward with a pipe wrench. This will unscrew pump impeller from pump shaft. Consequently, when clutch is engaged (turned on), the pump impeller will screw onto pump shaft with a force great enough to break pump impeller. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.*

D. INSTALLING NEW SEAL ASSEMBLY

NOTICE *Do NOT unwrap new seal assembly until you are ready to install. All parts of seal assembly are packed in sequence of installation.*

1. To replace seal assembly (4), perform above steps in CLEANING, and remove pump casing (5) by removing four bolts (10B) that hold casing to the clutch/pump drive housing (10).
2. After cleaning all parts, including pump shaft, begin reassembly of pump. Install seal grease retainer (6) with the cavity portion of the seal facing outward. Rebolt the pump casing onto the clutch drive housing using three bolts (10B). Using a light oil lubricant (such as 3-in-1 oil), install the ceramic seat with its neoprene holder into the seal recess, making sure it is square with the pump shaft. Lubricate the inside of the bellows assembly with a light oil lubricant and check to make sure the steel ring is stuck (glued) to the end of the assembly. Slide the bellows assembly onto pump shaft and push till the steel ring is against the ceramic seat.

3. Install the seal spring on the hub of pump impeller. After coating the threads on pump shaft with an anti-seize compound, install pump impeller and seat it securely.
4. Utilizing O-ring (2), reinstall suction cover using eight bolts (5B). At this time, check to see that pump runs freely. If pump impeller rubs suction cover, you do not have pump impeller tight on pump shaft or the suction cover needs to be readjusted. See IMPELLER CLEARANCE SECTION. Tighten bolts uniformly using 15 lb-ft. (20 N•m) on the torque wrench.
5. After reinstalling suction pipe assembly, lubricate, and tighten victaulic clamps. Service the automatic pressure lubricator. See EQUIPMENT CHECK SECTION.

CLUTCH MAINTENANCE SECTION

This is an outline of the clutch adjustment and lubrication procedure. When you perform maintenance beyond this outline, refer to the power take-off manufacturer's service manual. In order to properly identify parts when ordering replacement parts, always refer to the unit and specification number stamped on the nameplate located on the top center of the power take-off housing.

⚠ CAUTION *Clutch maintenance should be done only while engine is not running and battery cables are disconnected. Failure to comply could result in minor or moderate personal injury. Failure to comply could also result in product or property damage.*

A. ADJUSTMENT

The clutch described in this manual does not automatically adjust to compensate for wear of the clutch facing(s), and must be manually adjusted. Maintaining the correct engagement pressure is the responsibility of the owner/operator. The owner/operator must periodically adjust the clutch to ensure correct clutch operation.

The clutch should be adjusted if the force to engage the clutch drops by 10-15% of the specified engagement force. Destructive damage may have already occurred if engagement force is allowed to diminish to the point where the clutch fails to carry the load (slippage), or if facing(s) has (have) overheated.

NOTICE *Do not adjust clutch too tightly. Overtightening can cause component failure.*

If the clutch does not pull, overheats, or the clutch operating lever pops out, the clutch must be adjusted. Proceed as follows:

1. Remove clump nameplate (10A) in the drive housing (10), and rotate clutch until adjusting lock collar and lock screw (28) can be reached. To avoid dropping the adjusting lock (28) into the housing, use caution when removing or disengaging.
2. With a flat blade screwdriver or 7/16 inch wrench, loosen the adjustment lock bolt and loosen or remove the adjustment lock.
3. Turn adjusting ring (27) counterclockwise to obtain recommended operating lever pressure. Rotating the adjustment ring clockwise will loosen the clutch. Adjust to obtain the proper handle engagement force. Lever engagement force should be measured with a spring scale at the end of the lever and pulling perpendicular to the lever.
4. When clutch is properly adjusted, reposition the adjustment lock (28) in the notches. Install and tighten the adjustment lock bolt. Rotate clutch and re-engage. Reinstall the nameplate (10A).

HANDLE PRESSURE

Variation in handle length directly affects the required handle pressure needed for clutch adjustment. See the table below to determine the correct handle pressure.

Clutch Size	Reference Lever Length	Pressure at Lever
7-1/2 in.	7-5/8 in.	130 - 146 lbs.

NOTICE

A new clutch generally requires several adjustments until the friction surfaces are worn in. Do not let clutch slip, as this will glaze the friction plates and may ruin them.

B. LUBRICATION

The operating shaft bearings should be lubricated every one (1) to three (3) months, depending on usage. The clutch cross shaft should be lubricated weekly. The clutch release bearing, accessible by removing the clutch nameplate, should be lubricated daily using a hand operated grease gun only.

1. Lubricant – Use any high grade, lithium-based number 2, short-fiber grease having an operating temperature of 200°F (93°C) that is recommended for roller bearings.

NOTICE

Do not mix sodium- or calcium-based grease with lithium-based grease. Lubricate sparingly to avoid oil seepage onto clutch facings.

2. Anti-Friction Bearings – Shaft bearings should be lubricated after every 50 hours of operation. Shaft bearings can be lubricated through the fittings (41) with a short-fiber, high-grade, high-temperature, lithium-based number 2 lubricant that has an operating temperature of 200°F (93°C).
On occasion, use the same lubricant to lubricate the two fittings at the cross-shaft (26).
3. Clutch Lever and Linkage – Clutch levers and linkage should be lubricated with engine oil after every 500 hours of operation.

C. REMOVAL OF CLUTCH/PUMP ASSEMBLY (CLUMP) FROM ENGINE

1. Remove clamps and piping from the suction and discharge side of pump.
2. Place a jack under bell housing of engine to support the rear of the engine after clump has been removed.
3. Place clutch control in the ENGAGE position to hold clutch facings in place when removing clutch from engine. Unbolt the rod that connects the clutch operating lever to operator's platform clutch handle
4. Attach a suitable lifting device to clutch/pump drive housing (10). Remove bolts that secure the drive housing to the engine flywheel housing and the two bolts holding the drive housing to the HydroSeeder® frame.

CAUTION

Caution should be exercised when removing clutch/pump housing from the engine so that the facings and pilot bearing are not damaged.

5. Support the housing assembly on blocks, making sure the output end of the shaft is facing downward.
6. Remove the clump nameplate (10A) from the housing for improved access to internal parts.

D. CLUTCH FACING PLATES (ITEM 30) REPLACEMENT

A common indication that the facing's friction surface is worn out is that the adjusting ring cannot be turned any tighter. To replace the facing plates, remove the clutch/pump from the engine as described above and proceed as follows:

1. Disengage (turn off) clutch operating lever, and remove the old facing plates (30).
2. Insert the new facing plates (three segments) in between clutch body (34) and pressure plate (29), and center facings as close as possible.
3. Lock clutch facings between pressure plates as follows:
 - A. Remove drive ring (31) from engine flywheel so that it can be used to center the facings.
 - B. With clutch assembly resting on a workbench, turn clutch adjusting ring counterclockwise until pressure plate (29) almost contacts clutch facing (30).
 - C. Place clutch driving ring over clutch facings with teeth in driving ring in mesh with teeth of clutch facings, and locate driving ring centrally relative to the pressure plate and clutch body.

NOTICE

If driving ring is not properly located relative to the pressure plate and clutch body, the clutch cannot be assembled to the flywheel, as the teeth of clutch facings will not enter the teeth of driving ring, even though the clutch drive shaft enters the pilot bearing.

- D. Engage (turn on) clutch by applying pressure on top of release sleeve and collar assembly (20), and lock clutch facings between pressure plate and clutch body. If clutch facings are still free to move, disengage (turn off) clutch, and turn adjusting ring counterclockwise just enough to lock the clutch facings in place when clutch is engaged (turned on).

NOTICE

Engage clutch (turn on) until the clutch assembly is attached to the engine.

4. Remove clutch driving ring (31) from clutch facings and attach it to the flywheel with the specified bolts and lock washers.
5. Before reinstalling clutch onto engine, lubricate release sleeve (21) through the grease fitting mounted on its side.
6. To reinstall the clutch/pump assembly onto the engine, reverse the procedure outlined under REMOVAL OF CLUTCH/PUMP ASSEMBLY (CLUMP) FROM ENGINE SECTION.
7. When clutch/pump are reinstalled, check handle, engage pressure, and adjust if necessary.

TROUBLESHOOTING YOUR HYDROSEEDER®

Because of the tremendous work load usually placed upon the HydroSeeder®, minor malfunctions will occur from time to time. If these are not remedied immediately, they could lead to poor performance and damage to the equipment. This section describes symptoms, possible causes, and the corrective actions to take.

1. Foam in tank and air entrainment:

The mixture of dry materials with water will sometimes cause excessive foaming, while other dry materials with water mixes will cause air entrainment. These situations will reveal themselves with the occurrences of an erratic slurry discharge, a drop in pressure of the discharge, and a drop off in distance of slurry discharge.

Some solutions are:

- A. As slurry level drops in tank, slow the agitator.
- B. Add 2 to 3 oz. (59 to 89 ml) of an anti-foaming agent to tank.
- C. If you can determine which additive is causing the air problem, either add it last or not at all – unless it is the water.
- D. Reduce recirculation time as much as possible.

2. Plugging or clogging:



Turn off engine and disconnect battery cables before working on equipment. Failure to comply could result in death or serious injury.

Sometimes, when a stoppage occurs, you will not be able to find anything in the line. When this happens, it means that the system became airborne. To remedy this, see FOAMING OF SOLUTION AND LACK OF DISTANCE SECTION. Plugging is caused by either foreign objects or de-watered fiber. Plugging can occur in any of four places: the valve and recirculation nozzle, the discharge nozzle, the pump area, and the sump area. If plugging does occur, perform any of the following tasks to clear the obstruction:

- A. Obstruction in discharge nozzle is determined by a change in or stoppage of the spray pattern. To clear an obstruction, perform the following steps:
 1. Disengage (turn off) clutch.
 2. Remove nozzle.
 3. Clean the discharge nozzle. To clean the discharge nozzle, use the nozzle cleaning rod attached to the underside of the guard rail. Insert the nozzle cleaning rod into nozzle to push and buildup out of the nozzle. Repeat procedure until nozzle is completely cleaned. (Platform option only.)



Before loosening any clamps, determine if the pipe is hot. If so, let it cool before attempting to perform repairs. Failure to comply could result in death or serious injury.

B. If the recirculation system is not working:

1. Disengage (turn off) clutch and stop engine.
2. Remove clamp attaching recirculation valve.
3. Slide rubber seal back and remove valve assembly.
4. Check valve assembly, recirculation nozzle in discharge pipe, and recirculation pipe going into tank. Clear any obstructions.
5. Replace valve assembly and slide seal back into place. Lubricate outside of seal.
6. Replace clamp.

- C. Obstruction in pump can be indicated by a drop in pressure. If a drop in pressure is accompanied by a frothy or whitish discharge stream, blockage is in the suction line or sump area. To clear the pump:
1. Disengage (turn off) clutch and stop engine. Close suction shutoff valve if applicable.
 2. Loosen suction pipe clamps. If there is material in tank, stuff a rag into the suction piping.
 3. Remove suction pipe clamp closest to pump.
 4. Remove elbow and slowly open suction shutoff valve.
- NOTE:** If no water comes out, the obstruction is in sump area.
5. Reach into pump and remove obstruction. If it is jammed, the pump suction cover may have to be removed.
 6. Reassemble, removing rag plugging the suction piping.
- D. Obstruction in sump area, which is located at the bottom of the tank on the inside where the suction pipe is attached. Three methods to remove an obstruction in the sump area are as follows:
1. Clear the sump by backflushing through the discharge plumbing with the water supply hose. This is the easiest method.
 2. Remove the drain plug and run a long pole through the opening and into the sump area. Remove the obstruction and replace the drain cap.
 3. Use a pipe or pole through the loading hatch opening to dislodge the obstruction.

TROUBLESHOOTING YOUR HYDROSEEDER®:

Problem	Probable Causes	Suggested Solutions
LEAKS:		
Tank Bearing	Lack of lubrication – seal worn	Replace seal and follow lube schedule.
	Bolts not tightened	Tighten uniformly to 25 lb–ft (34 N•m).
Pressure Pipe Clamps	Rubber seal cracked, pinched, or torn.	Replace, always grease seal before clamping shut.
Suction Pipe Clamps	Rubber seal cracked, pinched, or torn	Replace, always grease seal before clamping shut.
Discharge Swivels	Not greased often enough	Rebuild swivels w/ repair kit (part number 006969, qty. 2 required).
Pump Shaft	Pressure lubricator not serviced	Replace pump seal. Service automatic pressure lubricator daily.
Pump Suction Cover	O-ring bad	Replace O-ring; use grease when replacing.
Discharge Boom or Nozzle Camlock Fittings	Worn or no gasket	Replace gasket.
MACHINE JUMPS DURING OPERATION:		
Agitator	Agitator bent by heavy object falling on it	Straighten agitator or shim so it runs true.
Bent Paddles	Loading wood fiber mulch into tank before tank is half full	Straighten agitator paddle; realign agitator to run true.
FOAMING OF SOLUTION AND LACK OF DISTANCE:		
Pump loses prime – lacks distance – leaves excessive amount in tank – 100 gallons (378 L) or more	Sucking air in suction lines	Check all suction connections to see that rubber seals are in good shape. Grease seals before replacing clamps.
	Air entrainment	See TROUBLESHOOTING YOUR HYDROSEEDER SECTION..
	Low engine rpm (Below 3,600 rpm – No load)	See authorized engine dealer.
	Soft water	Slow the agitator.
	Too much agitation	Slow the agitator.
	Pump worn	Reset pump tolerance. See PUMP MAINTENANCE SECTION.
	Suction partially plugged	Clean out machine. See CLEANING AND MAINTENANCE SECTION.
	Nozzle worn or plugged	Clean nozzles; replace if necessary
	Fertilizer	Change type.
	Clutch slippage	Readjust clutch. See CLUTCH MAINTENANCE SECTION.

TROUBLESHOOTING YOUR HYDROSEEDER®:

Problem	Probable Causes	Suggested Solutions
VALVE:		
Valve stuck	Frozen	Thaw out ice and lubricate; leave in discharge position during storage.
Constant plugging during operation	Foreign material in slurry	Drain and clean out tank; check storage for foreign materials.
Constant plugging during loading and discharging	Loading HydroSeeder® before tank is half full of water	Reinstruct your operator. See LOADING SECTION.
	Incorrect loading procedure	See LOADING SECTION.
	Improper operation by operator	Reinstruct your operator. Review Operator's Manual.
	Not moving valve handle far enough	Valve should be fully open.
	Machine not being flushed out prior to reloading	See LOADING SECTION.
	Machine not being run at correct RPM during loading	Reinstruct your operator. See LOADING SECTION.
Extension hose plugs after use	Letting water run out, leaving wood fiber mulch to dry out	If hose has to be uncoupled, seal ends, to keep water in hose and prevent wood fiber mulch from drying out.
CLUTCH:		
Does not pull load or overheats	Out of adjustment	Readjust clutch. See CLUTCH MAINTENANCE SECTION.
Jumps out of engagement	Too loose or too tight	Readjust clutch. See CLUTCH MAINTENANCE SECTION.
PUMP:		
Excessive wear	Fertilizer with highly abrasive fillers	Change fertilizer – avoid abrasive fillers.
	Overloading machine with dry material	Load machine to recommended capacities.
	Too much time allowed between loading and discharging	After loading and mixing has been completed, set agitator at 1/2 discharging speed in reverse and disengage (turn off) pump.
	Recirculating all the time	Close recirculation valve when discharging through the boom.
Will not turn	Frozen	Warm housing to melt ice.
	Jammed with fertilizer or lime	Remove cover and clean interior.
	Impeller rusted to suction cover plate	Pull cover and remove rust.

NOTES

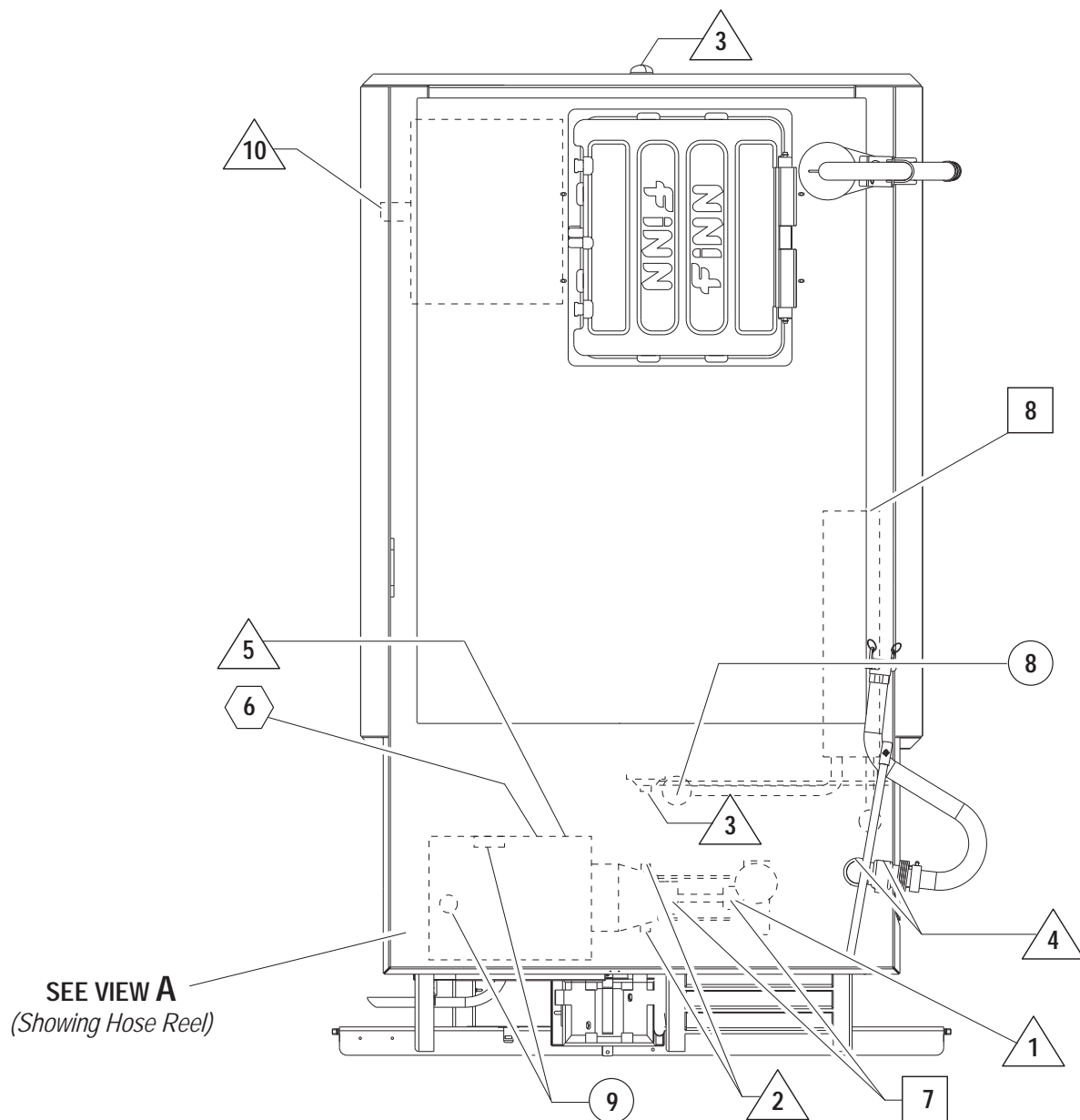
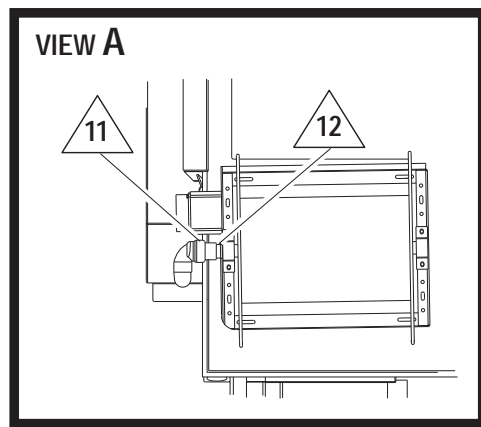


Figure 7 – Lubrication and Adjustment Points

LUBRICATION AND FLUIDS CHART (Reference Figure 7)

Ref. No.	Location	Lubricant	Frequency	Number
1	Check Grease Level in Automatic Pressure Lubricator	SL	Daily	1
2	Check Clutch Lever Bearings	CL	Daily	2
3	Grease Agitator Shaft Bearings	CL	Daily	2
4	Grease Discharge Swivels	CL	Daily	1
5	Check Engine Oil Level	MO	Daily	1
6	Change Engine Oil and Filter	MO	See Engine Manual	1
7	Grease Pump Bearings	CL	Weekly	2
8	Check Hydraulic Fluid Level	HO	Weekly	1
	Check Hydraulic Fluid and Filter	HO	Seasonally	1
9	Change Engine Coolant	AF	See Engine Manual	1
10	Check Fuel Tank	DF	Daily	1
11	Check Hose Reel Swivel	CL	Daily	1
12	Hose Reel Hank Crank Shaft	CL	Weekly	1

LUBRICANT OR FLUID USED

SL	Bearing Lube (Sodium-Based)
CL	Chassis Lubricant
MO	Motor Oil (See Engine Manual Recommendations)
HO	Hydraulic Oil, ISO Grade 46
AF	50/50 Anti-Freeze and Water Mixture
DF	Diesel Fuel

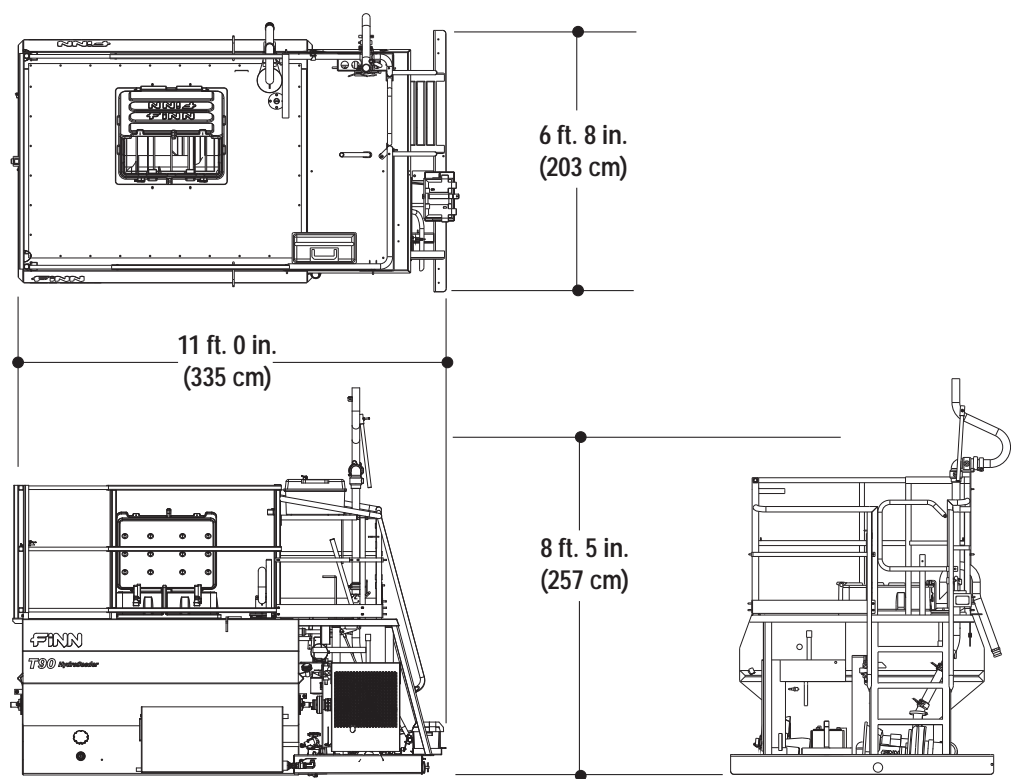
TIME KEY

△	Daily (8 Hours)
□	Weekly (40 Hours)
○	Seasonally (500 Hours)
◇	See Engine Manual

FLUID CAPACITIES

Diesel Fuel - 13.5 gallons (51 L)
 Engine Oil - See engine manual
 Engine Coolant - See engine manual
 Hydraulic Fluid - 19 gallons (72 L)

T90 SKID-MOUNT HYDROSEEDER® TECHNICAL SPECIFICATIONS



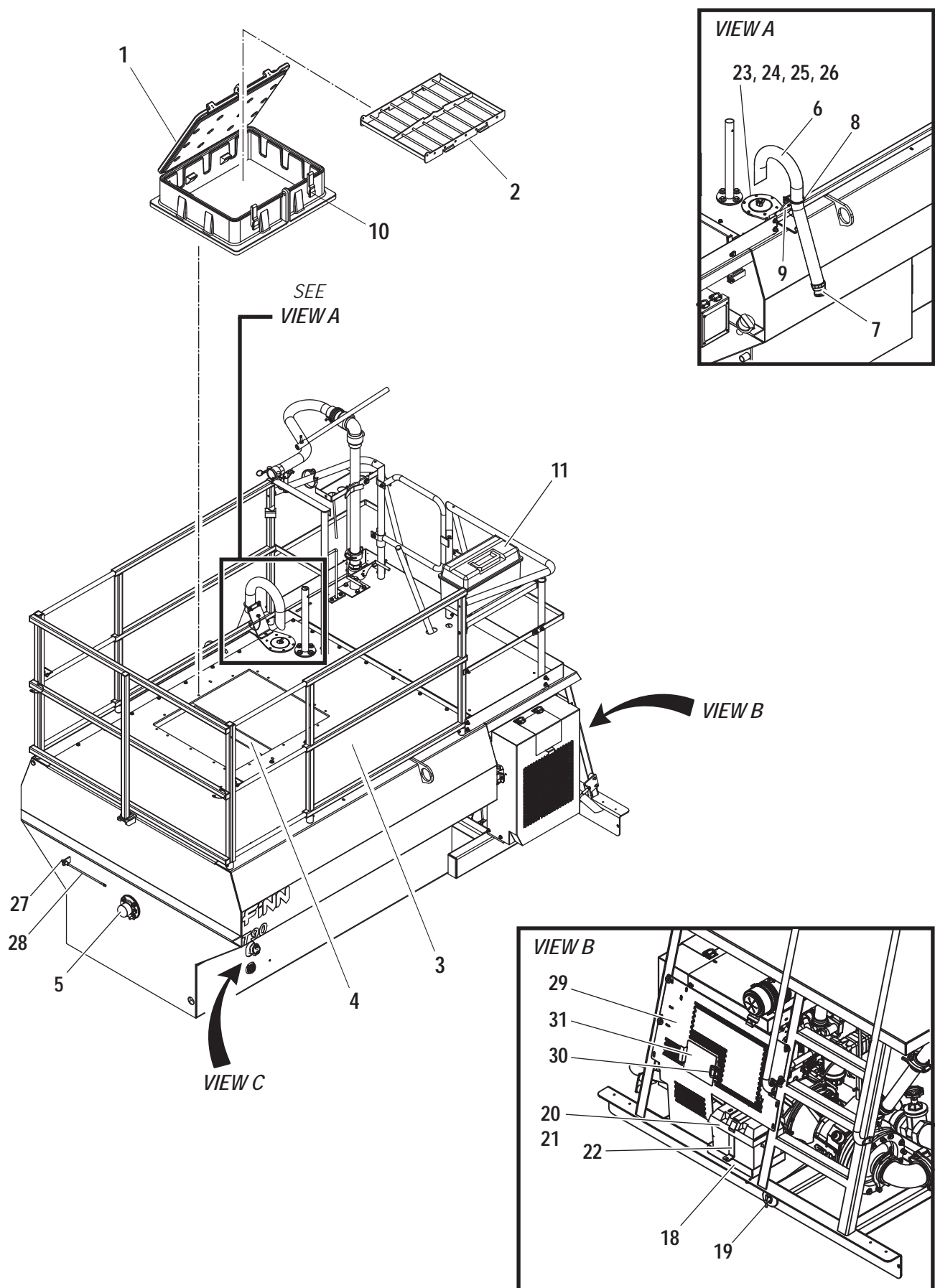
FINN T90 HYDROSEEDER® TECHNICAL SPECIFICATIONS

POWER	Yanmar 3TNV88C-DYEM, 35.1hp (26.2kW), 3 cylinder water cooled diesel engine. Tier 4Final. 1.642L	
ENGINE SAFETY SYSTEM	Low oil pressure, Electronic Engine Control and Monitoring	
TANK SIZE.....	940 gallon (3,558 L) liquid capacity 800 gallon (3,028 L) working capacity	
FUEL TANK CAPACITY	13.5 gallon (51.1L)	
PUMP.....	Centrifugal 4 in. x 2 in. (10 cm x 5 cm) 170 GPM @ 100 psi (689 kPa) (646 LPM @ 7 kg/cm ²), 3/4 in. (1.9 cm) solid clearance, external adjustment	
PUMP DRIVE.....	Direct drive with over center clutch, pump drive is independent of agitator operation	
AGITATION	Mechanical paddle agitation and liquid recirculation	
AGITATOR DRIVE	Reversible, variable speed hydraulic motor drive (0–100 RPM)	
DISCHARGE DISTANCE.....	Up to 180 ft. (55 m) from end of discharge tower	
MAX. MATERIAL CAPACITY	2,500 lbs (1,134 kg) granular solids 400 lbs (181 kg) fiber mulch	
NOZZLES	(1) narrow fan, (1) wide fan, (2) long distance	
EMPTY WEIGHT	T90S	4,150 lbs (1,882 kg)
WORKING WEIGHT*.....	T90S	13,455 lbs (6,103 kg)

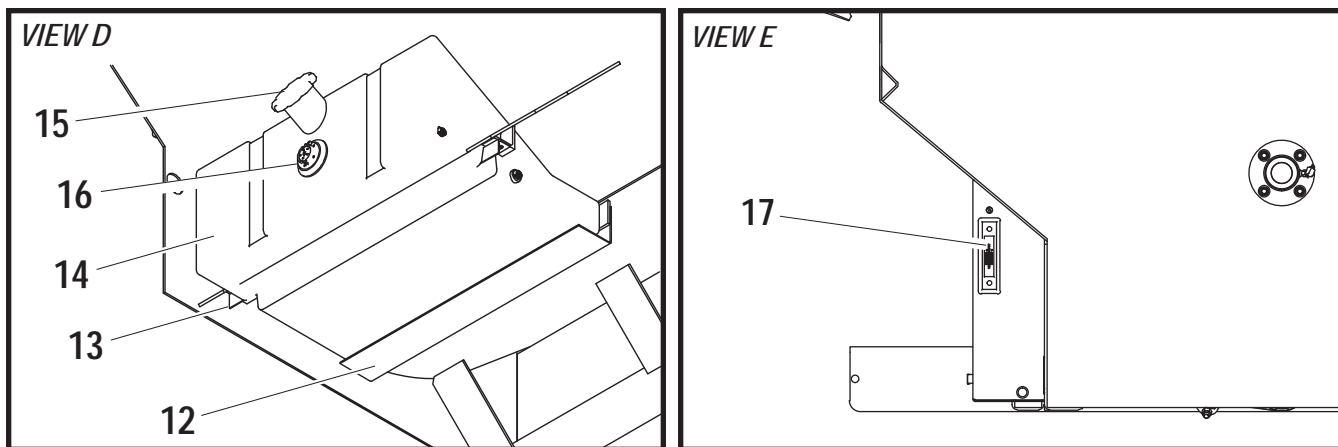
* Working weights are approximate and do not include options or stored materials.
Working weights assume maximum tank liquid capacity and maximum granular solids material capacity.

NOTES

T90-II
HydroSeeder®
Parts Manual
Model ML



**WHEN ORDERING PARTS, BE SURE TO STATE
SERIAL NUMBER OF MACHINE**



SKID (STANDARD MODEL)

Ref. No.	Part Number	Description	No. Req'd
1	012833	Poly Hatch Assembly	1
	190047	Tank Top Foam Gasket (3/8 in. thick x 1-1/4 in. wide)	10 ft.
2	012834	Bag Cutter – Stainless Steel	1
3	005898	Tank Top	1
	190047	Tank Top Foam Gasket (3/8 in. thick x 1-1/4 in. wide)	25 ft.
4	F120-0006	Hatch Safety Rail	1
5	005399	Agitor Shaft Guard	1
6	005880	Fill Port Pipe	1
7	006096	2 in. Male Coupler	1
8	011115	U-Bolt for 2 in. Pipe	1
9	F90-0017	Fill Port Support	1
10	005433	Hatch Latch	2
11	052160	Toolbox	1
12	005500-02	Fuel Tank Support Angle	1
13	005500-12	Fuel Tank Angle – Long	1
14	005913	Diesel Fuel Tank, 13.5 Gallons	1
15	005726	Diesel Fuel Cap	1
16	005721	Fuel Tank Gauge	1
17	080329	Hydraulic Level Sight Gauge	1
18	055847	Battery Tray	1
19	004593	Expansion Plug	1
20	080223	Battery Case	1
21	002256-12	12V Battery	1
22	F90-0016	Battery Box Hold Down	1
23	005700	Nylon Lanyard	1
24	005160	Fill Port Plug	1

Continued to next page.

**WHEN ORDERING PARTS, BE SURE TO STATE
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SKID

(STANDARD MODEL)

Ref. No.	Part Number	Description	No. Req'd
25	005544-01	Fill Port Gasket	1
26	005016	"S" Hook	1
27	012520	Bulkhead Fitting	2
28	012521	Grease Hose	2
29	F120-0011	Valve Mounting Plate/Muffler Guard	1
30	055669	Door Positioning Hinge	1
31	F120-0015	Check Door	1

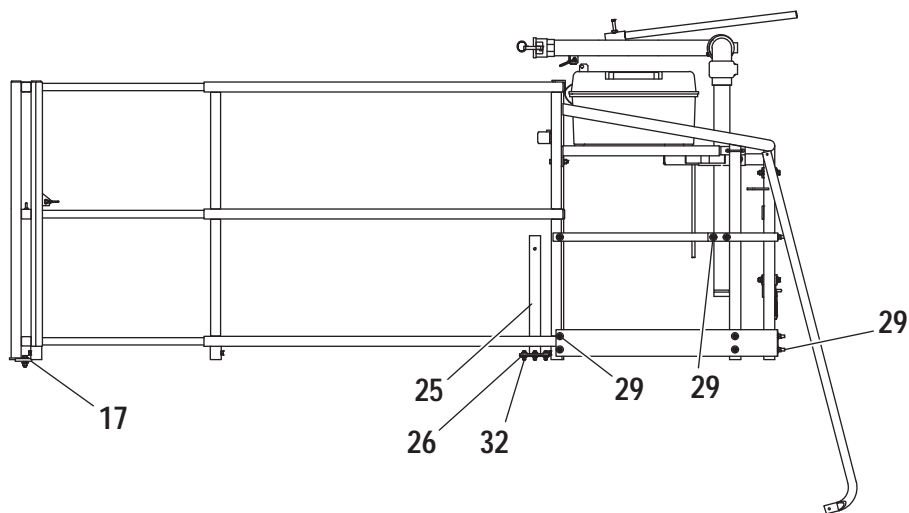
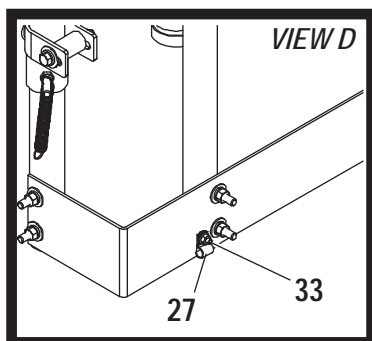
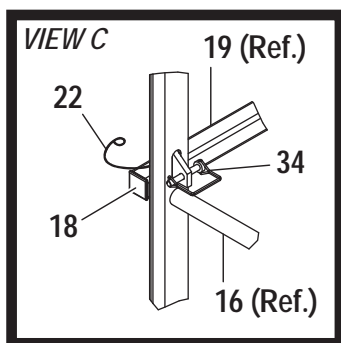
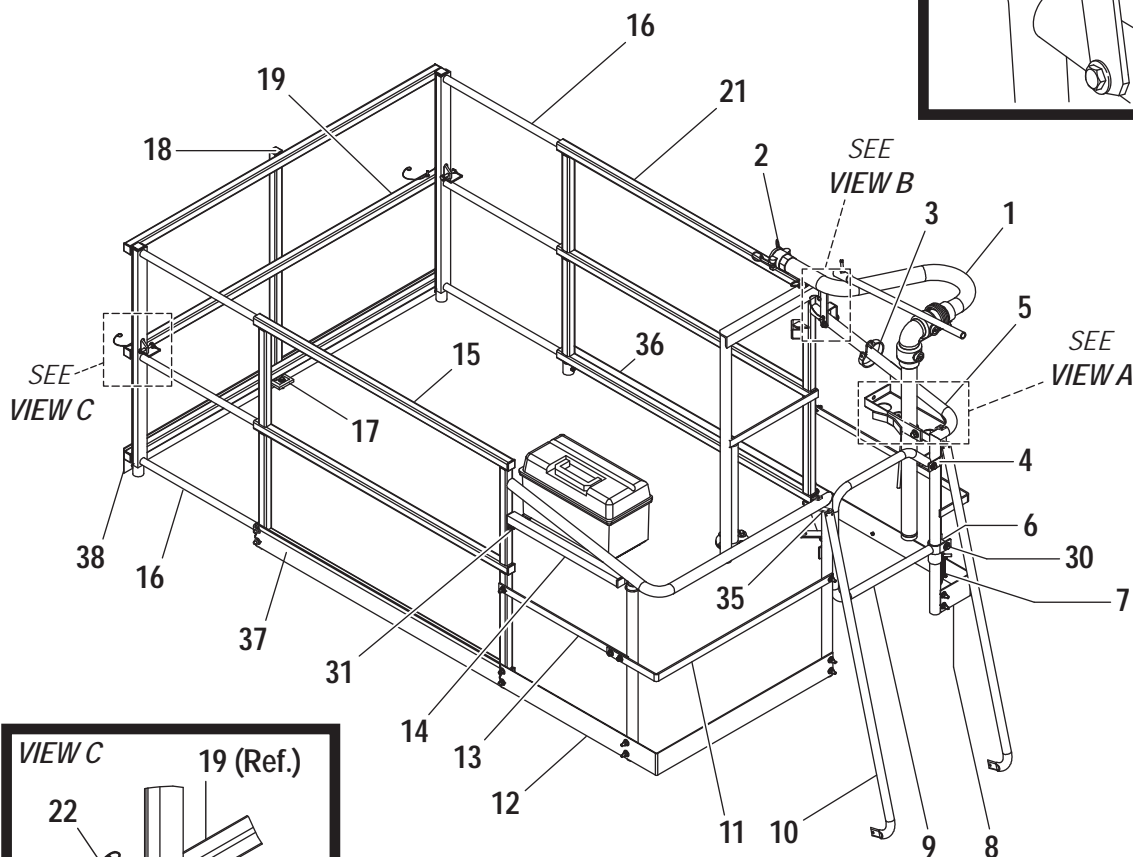
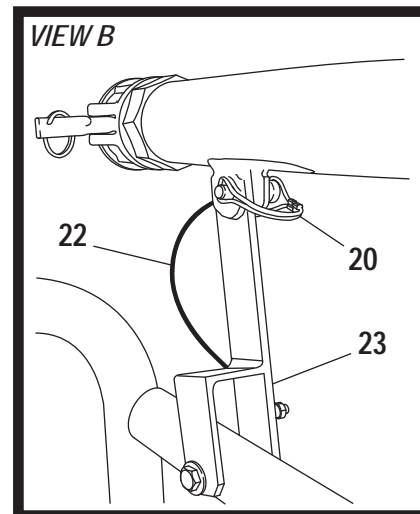
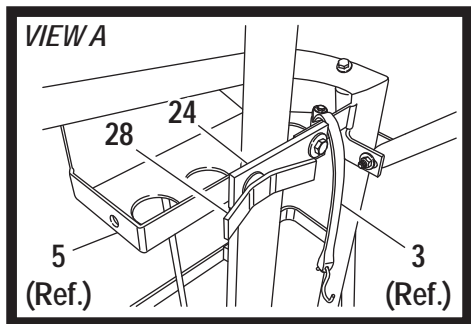
NOT SHOWN

008775	ECM Cover	1
F120-0012	Rear Agitator Bearing Guard	1
F260-0006-03	Hinge Spacer	1

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OPERATOR'S PLATFORM

(SKID MODEL)

Ref. No.	Part Number	Description	No. Req'd
1	005529	Discharge Boom Assembly (See <i>DISCHARGE BOOM ASSEMBLY</i> section)	1
2	006102	2 in. Female Coupler	1
3	005161	Rubber Strap with "S" Hooks	1
4	005532-05	Hinge Mounting Strap	1
	--	Hinge Mounting Strap Hardware	
	●	3/8 - 16 UNC x 3.0 Hex Bolt	1
	●	Helical Spring Lock Washer	2
	●	7/16 Plain Washer	1
	●	3/8 in. Hex Nut	1
5	005538	Right Rear Rail Weldment	1
6	005532-03	Spacer	1
7	012052	Gate Spring	1
8	005462-03	Platform Right Toe Rail	1
9	005533	Gate Weldment	1
10	005778	Hand Rail Weldment - CE	2
11	005534-01	Left Rear Guard Rail Strap	1
12	005462-02	Platform Left Toe Rail	1
13	005540	Left Rear Rail Weldment	1
14	005698	Tool Box Mount Weldment	1
	005619	U-Bolt for 1-1/4 in. Pipe	1
15	005776	Left Rear Rail - CE	1
16	005792	Slide Gate - CE	2
17	052136-07	Mounting Flat	1
	--	Mounting Flat Hardware	
	●	3/8 - 16 UNC x 1.5 Hex Bolt	1
	●	3/8 in. Plain Washer	2
	●	3/8 Helical Spring Lock Washers	2
	●	3/8 in. Hex Nut	1
18	005613	Square Tubing Plug	15
19	005777	Front Cross Rail - CE	1
20	031245	Snapper Pin	1
21	005775	Right Rear Rail - CE	1
22	005700	Nylon Lanyard	3
23	005528-02	Boom Hold Down Weldment	1
24	012487-05	Boom Clamping Strap	1
25	005714-01	Vent Port Weldment	1
26	008469	Pump Discharge Gasket	1

Continued to next page.

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OPERATOR'S PLATFORM

(SKID MODEL)

Ref. No.	Part Number	Description	No. Req'd
27	023684	Loop Clamp	2
28	002258	Clamp Handle Assembly	1
	--	Clamp Handle Hardware	
	●	1/2 - 13 UNC x 1.25 Hex Bolt	1
	●	1/2 Helical Spring Lock Washer	1
	●	1/2 Plain Washer	1
	●	1/2 in. Hex Nut	2
29	--	Operator's Platform Hardware	
	●	3/8 - 16 UNC x 1.25 Hex Bolt	2
	●	3/8 in. Plain Washer	20
	●	3/8 Helical Spring Lock Washers	20
	●	3/8 in. Hex Nut	16
	●	3/8 - 16 UNC x 2.5 Hex Bolt	2
30	--	Gate Hardware	
	●	3/8 - 16 UNC x 3.0 Hex Bolt	2
	●	Helical Spring Lock Washer	2
	●	3/8 Plain Washer	4
	●	3/8 in. Hex Nut	2
31	--	Tool Box Mount Weldment Hardware	
	●	3/8 - 16 UNC x 2.5 Hex Bolt	1
	●	3/8 in. Plain Washer	1
	●	3/8 Helical Spring Lock Washers	1
	●	3/8 in. Hex Nut	1
32	--	Vent Port Hardware	
	●	1/2 - 13 UNC x 1.5 Hex Bolt	4
	●	1/2 in. Plain Washer Type A	8
	●	Helical Spring Lock Washer	8
	●	1/2 in. Hex Nut	4
33	--	Loop Clamp Hardware	
	●	1/4 - 20 UNC x 0.75 Hex Bolt	2
	●	1/4 in. Plain Washer	2
	●	1/4 Helical Spring Lock Washers	2
	●	1/4 in. Hex Nut	2
34	FW71225	Snapper Pin	2
35	F120-0014	Hand Rail Upper Mount	2
36	F120-0008	Left Toe Rail - CE	1
37	F120-0007	Right Toe Rail - CE	1
38	F120-0009	Front Toe Rail - CE	1

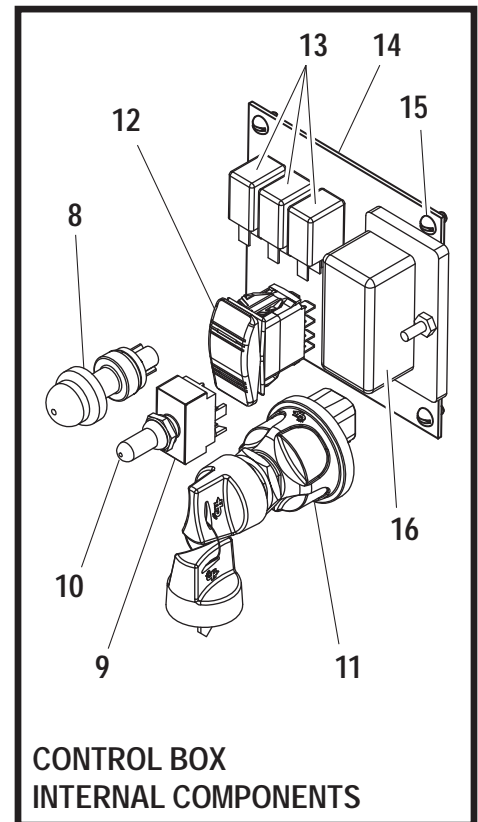
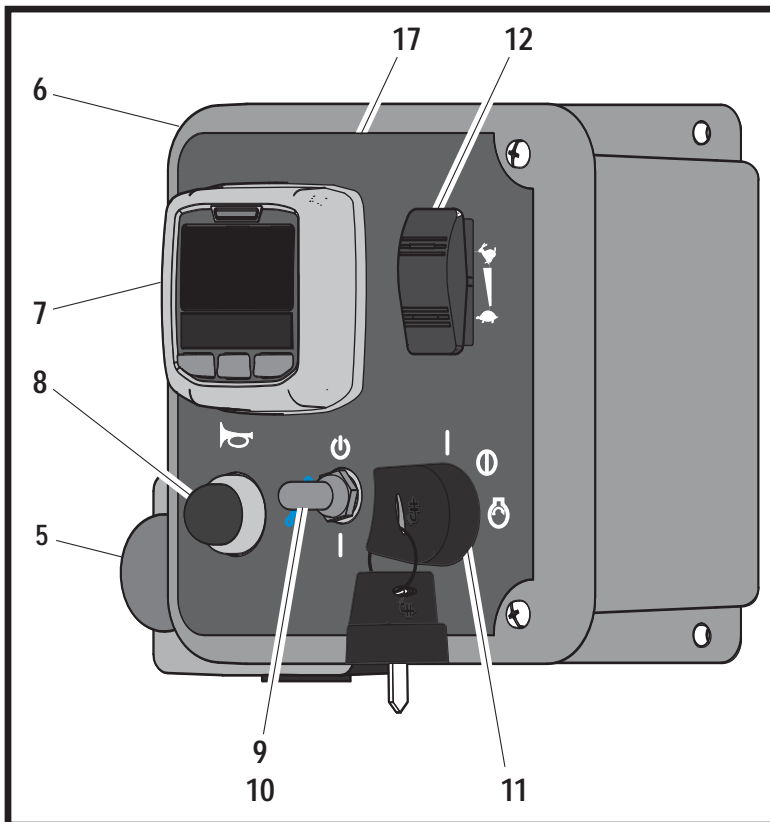
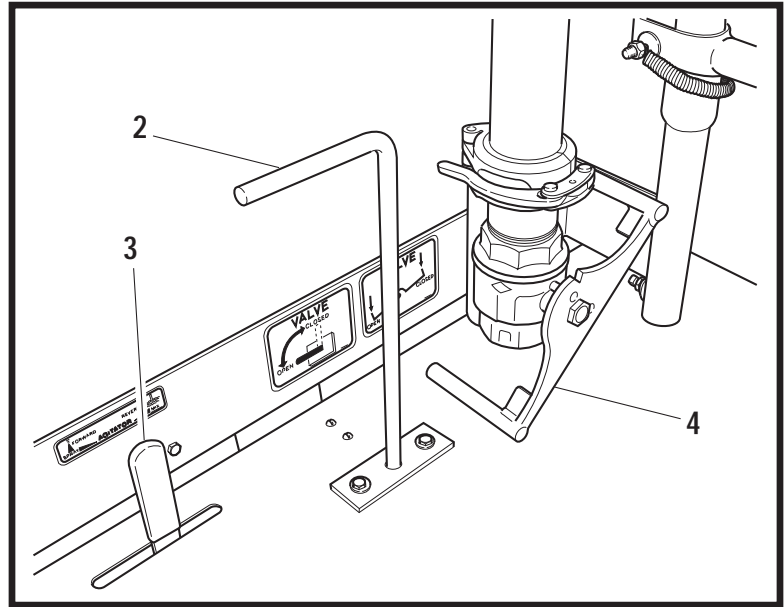
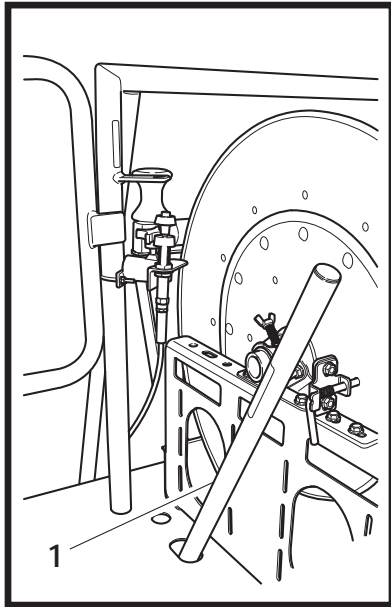
KITS AND MARKERS

- Standard Hardware Item - Available at your local hardware store.

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CONTROL SYSTEMS

Ref. No.	Part Number	Description	No. Req'd
1	005514-01	Clutch Handle Assembly	1
2	005512-01	Extension Handle	1
3	F60-0020	Agitator Control Handle	1
	022202	Black Handle Grip	1
4	005674	Foot Pedal Weldment	1
5	012970	E-Stop with Enclosure	1
6	031510	Control Box	1
7	031520	Digital Control Display System	1
8	020886	Horn Button	1
9	008739	Toggle Switch	1
10	080526	Toggle Switch Boot	1
11	031506	Key Switch	1
	031506-01	Keys	2
12	031507	Throttle Control Switch	1
13	031578	Micro Relays (12V, SPDT, 35A NO, 25A NC, Sealed)	3
14	031571	Control Box Back Panel	1
15	●	Slotted Round Head Machine Screw, 10 - 24 x 3/8 in.	4
16	031575	Fuse Block	1
17	005891	Control Box Decal	1

NOT SHOWN

	005912	Control Box Wiring Harness	1
	031576	Mini 15A Fuse	1
	031577	Mini 20A Fuse	2

ALSO AVAILABLE

	005907	Control Box Full Assembly	
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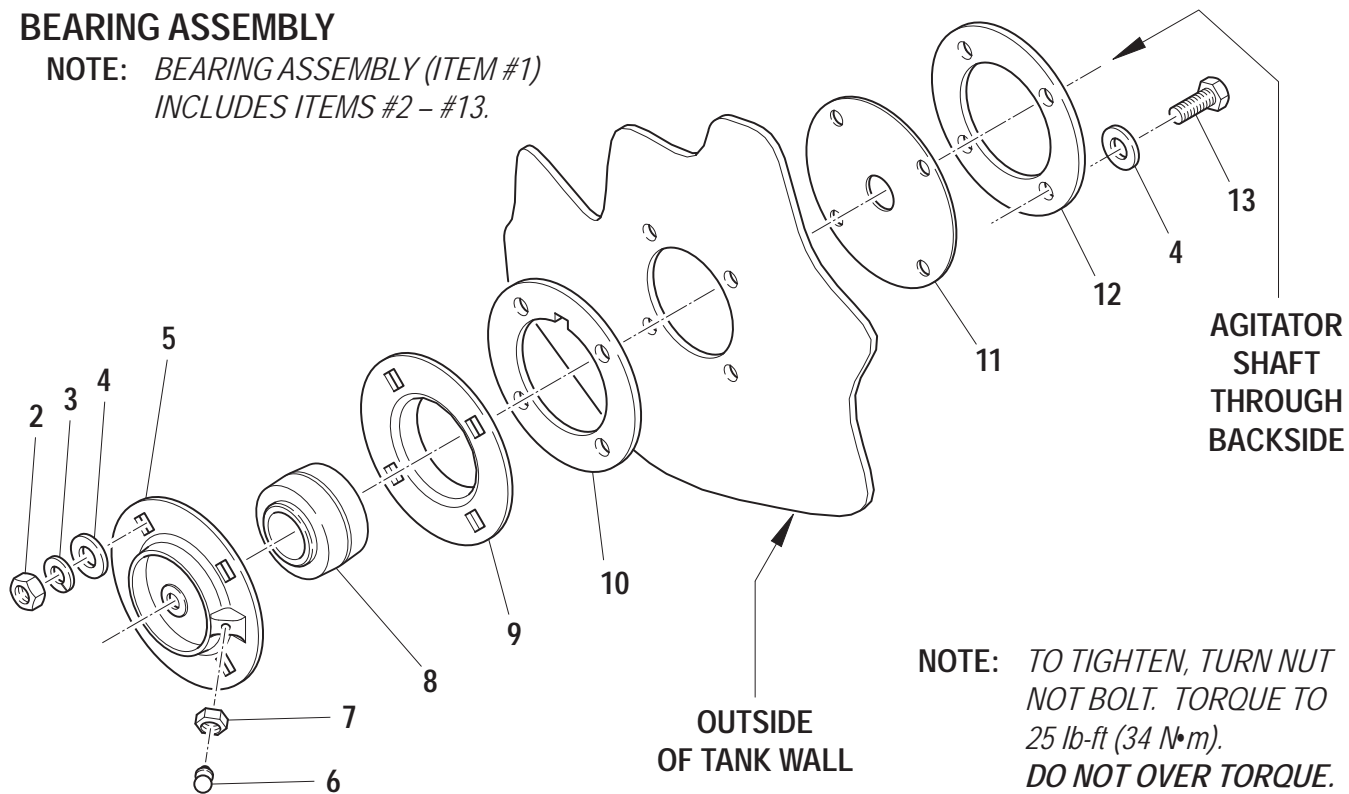
KITS AND MARKERS

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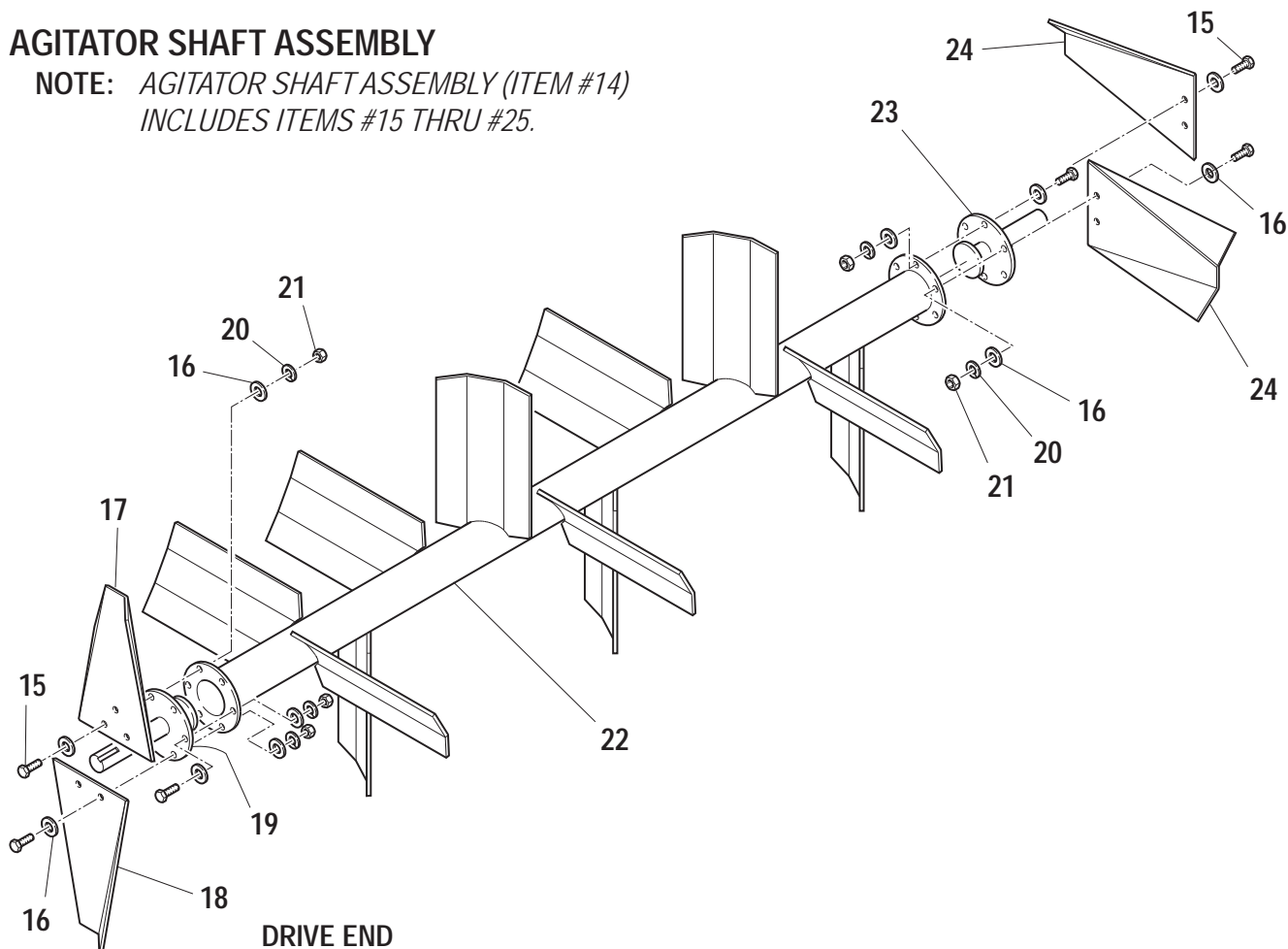
BEARING ASSEMBLY

NOTE: BEARING ASSEMBLY (ITEM #1)
INCLUDES ITEMS #2 – #13.



AGITATOR SHAFT ASSEMBLY

NOTE: AGITATOR SHAFT ASSEMBLY (ITEM #14)
INCLUDES ITEMS #15 THRU #25.



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BEARING/AGITATOR ASSEMBLY

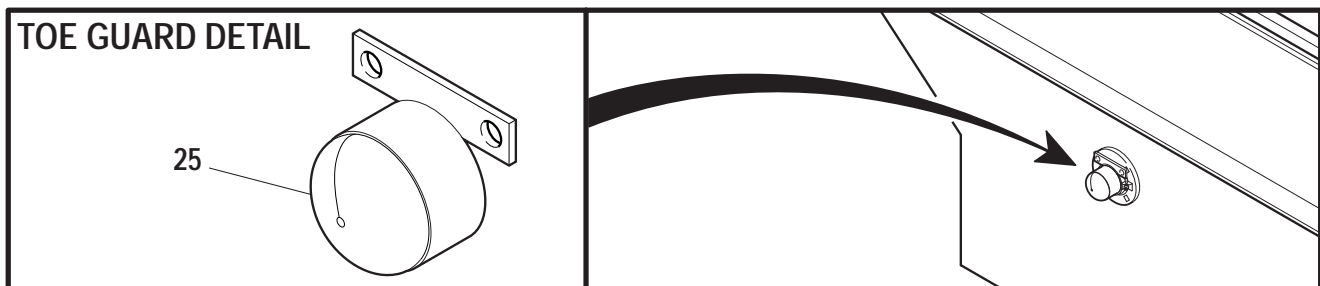
Ref. No.	Part Number	Description	No. Req'd
1	007420	Bearing and Seal Assembly	2
2	●	1/2 in. Hex Nut	4 per
3	●	1/2 in. Helical Spring Lock Washer	4 per
4	●	1/2 in. Plain Washer	8 per
5	007211-02	Flangette with Lube Coupling	1 per
6	007705	Grease Fitting	1 per
7	008154	Grease Fitting Adaptor	1 per
8	003022	Bearing	1 per
9	007212-02	Flangette	1 per
10	006975	Agitator Bearing Gasket	1 per
11	007416	Agitator Rotary Gasket	1 per
12	007417	Clamping Ring	1 per
13	X0828SS	1/2 in. - 13 UNC x 2.0 Hex Bolt	4 per
14	REF.	Agitator Shaft Assembly	1
15	●	1/2 in. - 13 UNC x 1.75 Hex Bolt	12
16	●	1/2 in. Plain Washer - Type B	12
17	005027-02	Rear Bolt-On-Paddle with Hole	1
18	005027-01	Rear Bolt-On-Paddle	1
19	005081-02	Agitator Drive Stub Shaft	1
20	●	1/2 in. Helical Spring Lock Washer	12
21	●	1/2 in. Hex Nut	12
22	005080	Main Agitator Section with Paddles	1
23	005081-03	Agitator Stub Shaft	1
24	005027-03	Front Bolt-On-Paddle	2
25	005399	Agitator Shaft Gaurd	1

NOT SHOWN

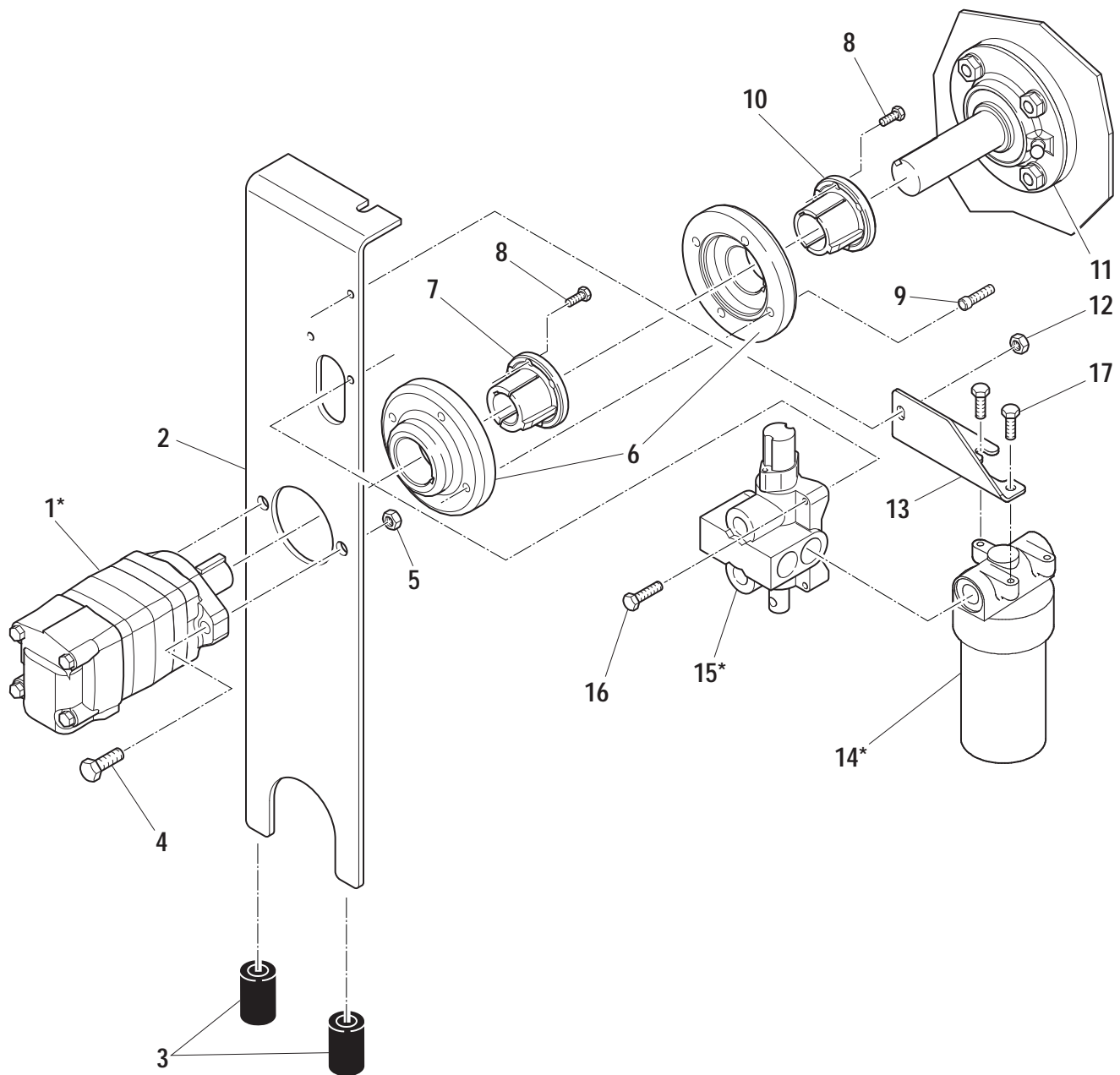
022407	Grease Line Elbow	1
012520	Brass Anchor Connector	1
012521	Grease Line Hose	1
008154	Male-to-female Adapter	1

KITS AND MARKERS

- Standard Hardware Item - Available at your local hardware store.



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**NOTE: See Hydraulic System Schematic.*

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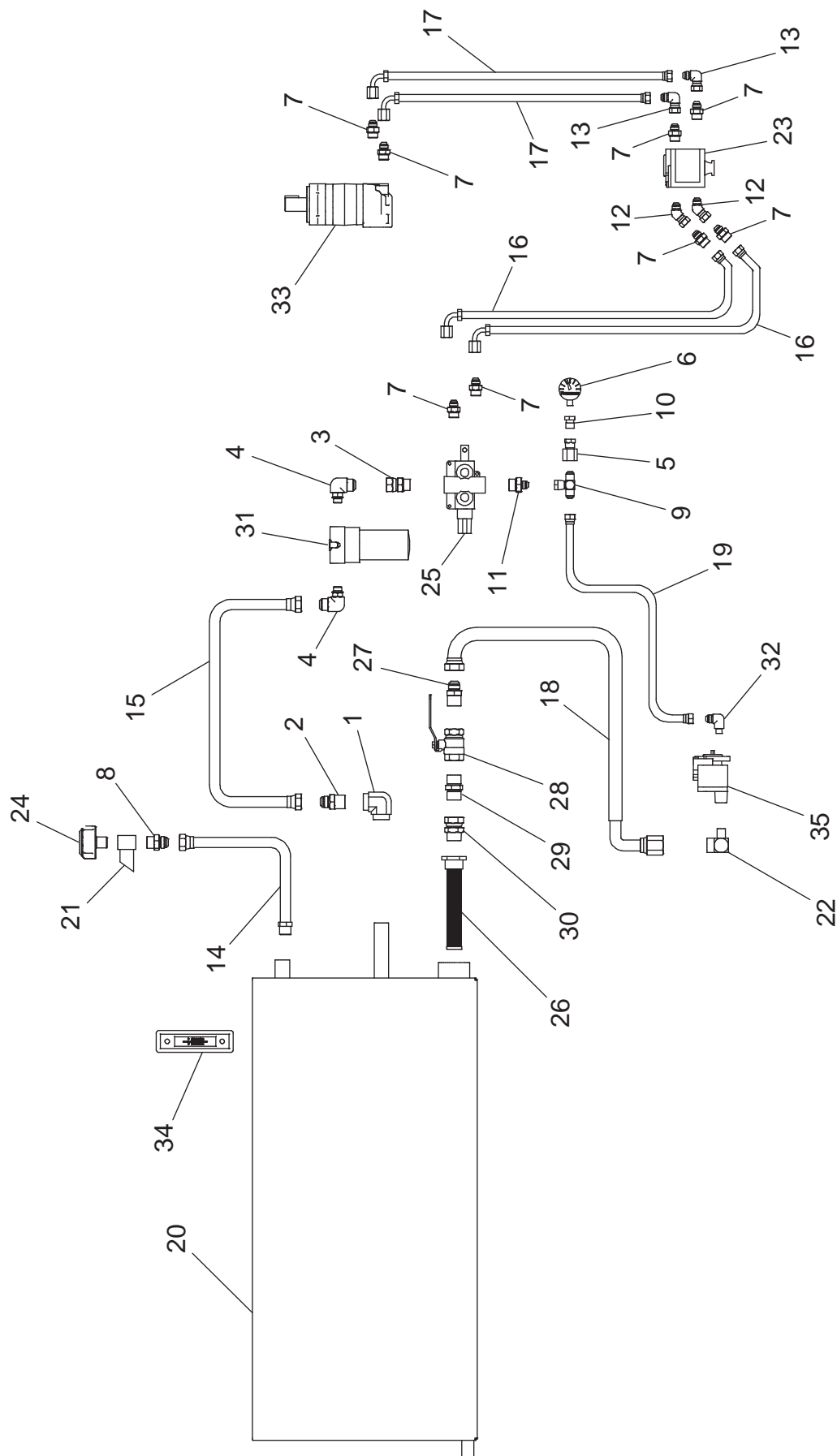
HYDRAULIC AGITATOR DRIVE

Ref. No.	Part Number	Description	No. Req'd
1	070660	Hydraulic Motor	1
	023295-006	Seal Kit for 070660 (Not Shown)	1
	070660K	1/4 in. x 5/16 in. x 1-1/2 in. Key (Not Shown)	1
2	005463	Torque Arrestor Plate	1
3	005927	Torque Arrestor Rubber Tubing	2
4	●	1/2 - 13 UNC x 1.75 in. Hex Head Cap Screw	2
5	●	1/2 - 13 UNC Prevailing Torque Hex Nut	2
6	023156	Coupling Assembly	1
7	021440	Hydraulic Motor Bushing	1
	190125-12	3/8 x 3/8 x 3/4 in. Key (Not Shown)	1
8	●	5/16 - 20 UNC x 1.0 in. Hex Head Cap Screw	6
9	●	3/8 - 16 UNC x 1.5 in. Socket Head Cap Screw	4
10	004635	Agitator Shaft Bushing	1
	004635K	3/8 x 1/2 x 1-15/16 in. Key (Not Shown)	1
11	007420	Bearing and Seal Assembly (See AGITATOR ASSEMBLY for Parts)	2
12	●	1/4 in. Hex Nut	3
13	F90-0025	Hydraulic Filter Mount	1
14	023913	Hydac Filter Assembly	1
	023914	Filter Element (Not Shown)	1
15	008686	Hydraulic Valve	1
	023120	Seal Kit for 008686 (Not Shown)	1
	023379-01	Valve Handle (Not Shown)	1
	0SF311	Handle Knob (Not Shown)	1
	0SF312	1/8 in. x 1-3/8 in. Roll Pin (Not Shown)	1
	023470	Handle Bracket (Not Shown)	1
16	●	1/4 - 20 UNC x 1.75 in. Hex Bolt	3
17	●	1/4 - 20 UNC x 1.0 in. Hex Bolt	2

KITS AND MARKERS

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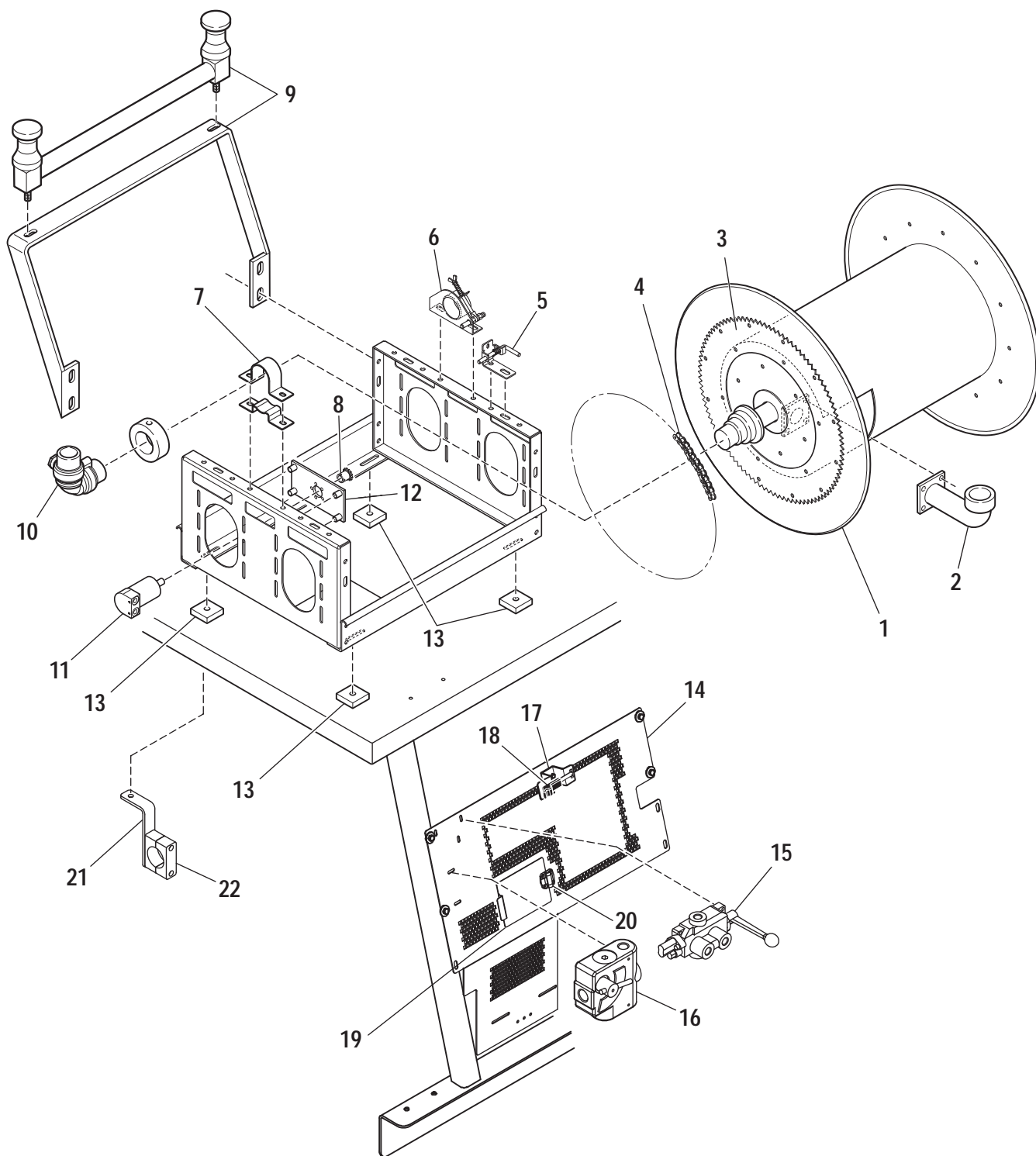
NOTE: Items marked with a ▲ are part of Hydraulic Kit (#005911).

HYDRAULIC SYSTEM

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
1	▲	005639	Female NPT Elbow	1
2	▲	005640	MNPT – FJIC Adapter	1
3	▲	005757	MSAE – FJIC Adapter	1
4	▲	005794	MSAE – MJIC 90° Elbow	2
5	▲	008690	FJIC – FNPT Adapter	1
6	▲	012044	Pressure Gauge	1
7	▲	012086	MSAE – MJIC Adapter	4
8	▲	023616	MNPT – MJIC Adapter	1
9	▲	005920	Tee Fitting	1
10	▲	055229	NPT Bushing	1
11	▲	055359	MNPT – MJIC Adapter	1
12	▲	005917	JIC - SAE 45° Elbow	2
13	▲	005923	JIC - SAE 90° Elbow	2
14	▲	005551	3/4 in. Hyd. Hose x 18 in.	1
15	▲	005916	3/4 in. Hyd. Hose x 36 in.	1
16	▲	005554	1/2 in. Hyd. Hose x 29 in.	2
17	▲	005555	1/2 in. Hyd. Hose x 34 in.	2
18	▲	005915	1 in. Suction Hose x 29-1/2 in.	1
19	▲	SX970403	1/2 in. Hyd. Hose x 80 in.	1
20		005878	Hydraulic Reservoir	Ref.
21		005501-02	Hydraulic Fill Coupling	Ref.
22	▲	FW75113	JIC – SAE 90° Elbow	1
23		085276	Dump Valve	1
		085276-01	Dump Valve Solenoid Coil Assembly	1
24		005793	Hydac Filler/Breather	1
25		008686	Hydraulic Valve	1
		023120	Hydraulic Valve Seal Kit	1
26		011648	Hydraulic Suction Strainer	1
27		005922	MNPT – MJIC Adapter	1
28		021559	Ball Valve	1
29		005892	NPT Union Adapter	1
30		041162	MSAE - FSAE Adapter Union	1
31		023913	Hydac Filter Assembly	1
		023914	Filter Element	1
32	▲	023621	JIC - SAE 90° Elbow	1
33		070660	Hydraulic Motor	1
		023295-006	Hydraulic Motor Seal Kit	1
34		080329	Hydraulic Level Sight Gauge	1
35		005889	Hydraulic Pump	Ref.

KITS AND MARKERS

▲	005911	Hydraulic Kit
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HYDRAULIC HOSE REEL ASSEMBLY (OPTION)

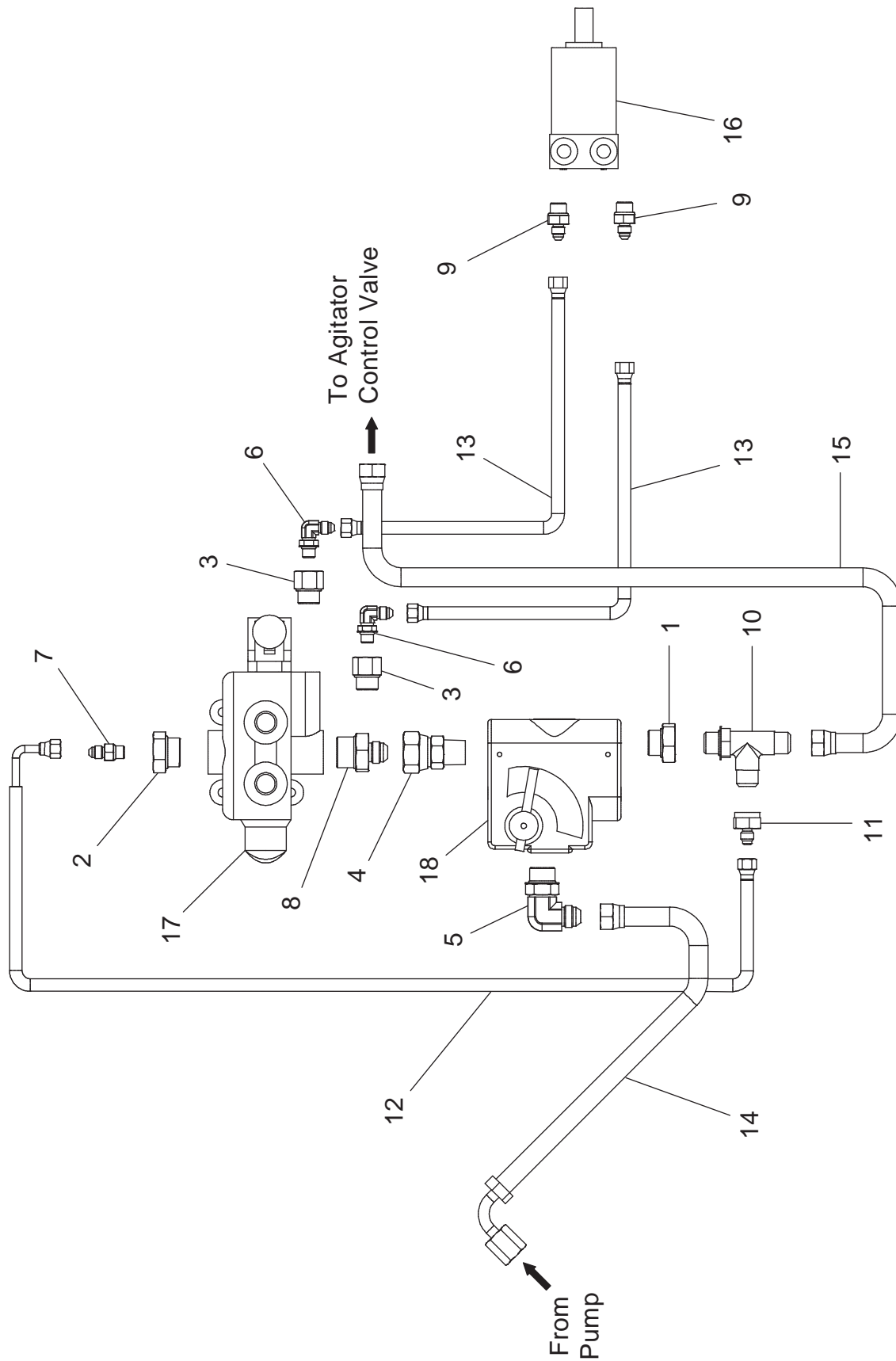
Ref. No.	Part Number	Description	No. Req'd
1	008212A	Hose Reel	1
2	080302	Flanged Riser	1
	080302G	Hose Reel Riser Gasket	1
3	008144	Hose Reel ring Gear	1
4	008200	Hose Reel Chain w/Connecting Link – 69 in. Lg.	1
5	008433	Pin Lock w/Brackets Assembly	1
6	008313	Idler Side Bearing	1
7	008314	Drive Side Bearing	1
8	008199	Chain Sprocket – 11 Tooth	1
9	011894	Hose Roller and Spool Guide	1
	011894-G	Guide Spool	1
10	008210	90° Swivel Elbow	1
10A	080183	Swivel Repair Kit	1
11	008635	Hydraulic Motor (See <i>HYDRAULIC SYSTEM with HOSE REEL</i>)	1
12	008634	Motor Mounting Plate	1
13	031018-01	Hose Reel Bearing Block	4
14	F120-0011	Valve Mounting Plate	1
15	012857	Direction Control Valve (See <i>HYDRAULIC SYSTEM with HOSE REEL</i>)	1
16	023890	Flow Divider (See <i>HYDRAULIC SYSTEM with HOSE REEL</i>)	1
17	005593	Remote Holder	1
18	005592	Soft Latch	1
19	055669	Door Positioning Hinge	1
20	F120-0015	Check Door	1
21	005939	Lead-in Hose Support Bracker	2
22	005940	Hose Clamp	2

NOT SHOWN

008111	Brake Pad (part of Hose Reel)	1
008112	Brake Spring (part of Hose Reel)	1
008109	Brake Wheel (part of Hose Reel)	1
041109	1-1/2 in. Dia. x 90 in. Lg. Lead-In Hose	1
007711	Take-Off Valve Assembly	1
007710	Pump Take-Off Valve	1
001207	1-1/2 in. Male Brass Adapter	1
002158	1-1/2 in. Female Brass Coupler	1
160756	1-1/2 in. x 1-1/4 in. Galvanized Reducer Bushing	1
160309	1-1/2 in. Galvanized Close Nipple	1
008422	Loop Clamps	2
F120-0013	Hose Reel Chain Guard - CE	1
F260-0006-03	Hinge Spacer	1

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Note: Items 1-15 are part of Hydraulic Kit (#005673).

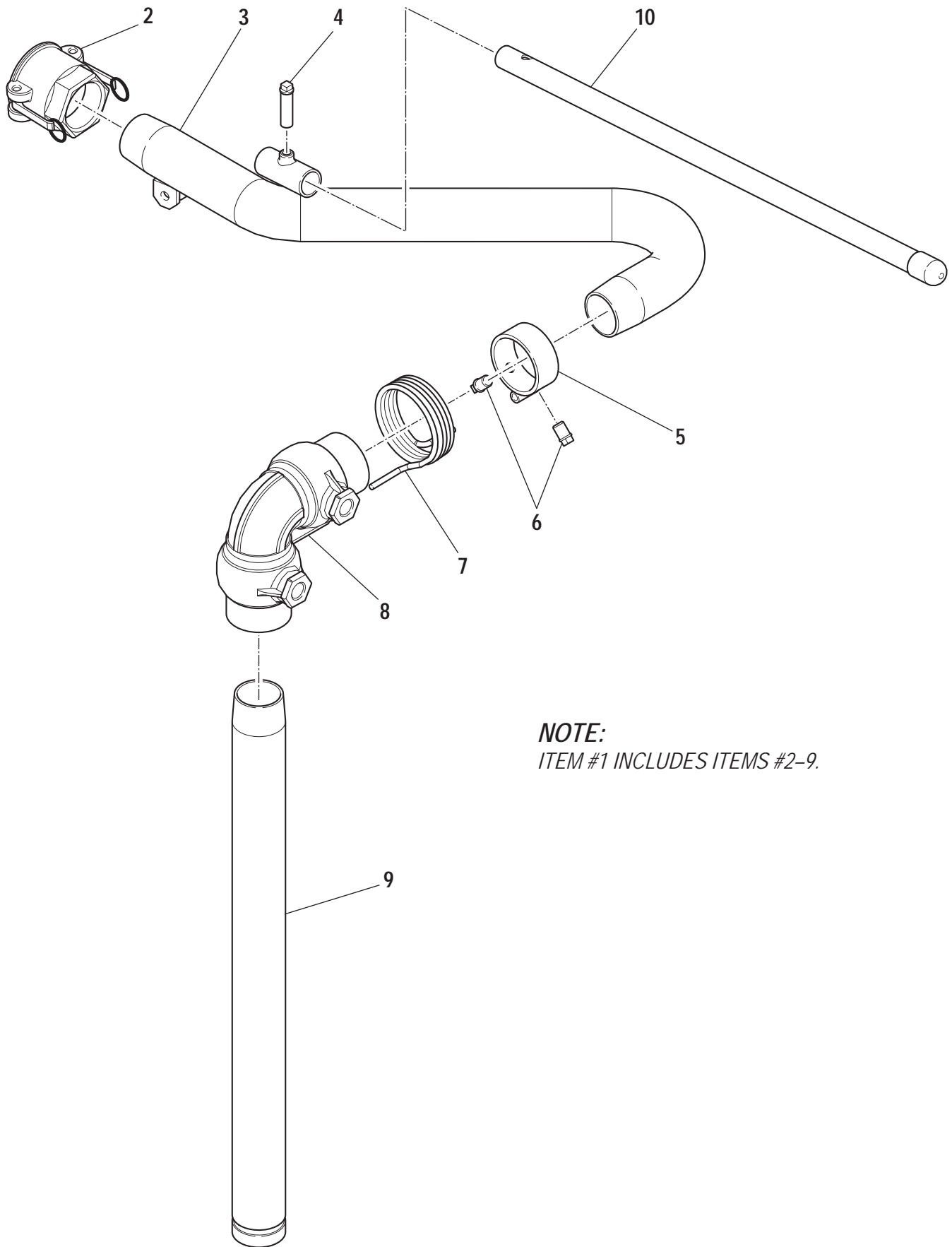
HYDRAULIC SYSTEM WITH HOSE REEL

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
1	▲	008696	SAE Reducer	1
2	▲	012871	SAE Reducer	1
3	▲	012872	SAE Reducer	2
4	▲	012873	MSAE – FJIC Swivel Adapter	1
5	▲	023621	MSAE – MJIC 90° Elbow	1
6	▲	055274	MSAE – MJIC 90° Elbow	2
7	▲	055308	MSAE – MJIC Adapter	1
8	▲	055359	MSAE – MJIC Adapter	1
9	▲	FW65217	MSAE – MJIC Adapter	2
10	▲	FW71869	SAE Run Tee	1
11	▲	FW71908	JIC Reducer	1
12	▲	008695	1/4 in. Hyd. Hose x 23 in.	1
13	▲	SX970331	1/4 in. Hyd. Hose x 46 in.	2
14	▲	005919	1/2 in. Hyd. Hose x 36 in.	1
15	■	SX970403	1/2 in. Hyd. Hose x 80 in.	1
16		008635	Hydraulic Motor	1
		8635SK	Hydraulic Motor Seal Kit	1
17		012857	Directional Control Valve	1
		023120	Seal Kit for 012857	1
		SF310B	Hydraulic Valve Handle	1
		0SF311	Handle Knob	1
		0SE312	Roll Pin	1
		023470	Handle Bracket	1
		008293-RC	Brand Valve Relief Cartridge	1
18		023890	Flow Divider	1
		023890-K	Indicator Lever Knob	1
		023890-SK	Seal Kit for 023980	1
		023890-L	Indicator Lever	1
		023890-LS	Setscrew for Lever	1

KITS AND MARKERS

▲	005918	Hydraulic Hose Reel Kit
■	005911	Standard Hydraulic Hose Kit

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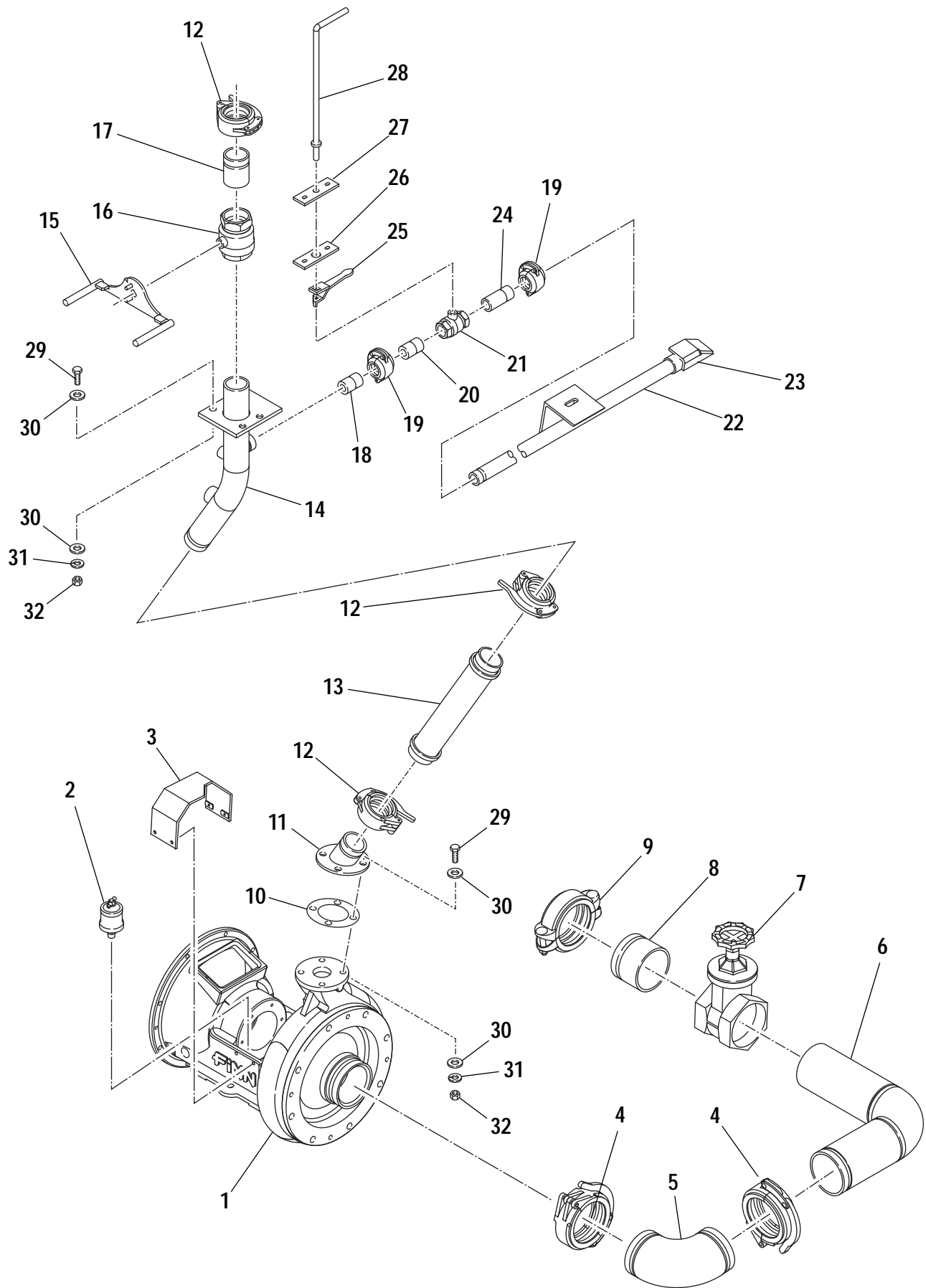
NOTE:
ITEM #1 INCLUDES ITEMS #2-9.

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DISCHARGE BOOM ASSEMBLY

Ref. No.	Part Number	Description	No. Req'd
1	005529	Discharge Boom Assembly	
2	006102	Female Coupler	1
	006514	Coupler Gasket	1
3	005734	Boom Pipe Weldment	1
4	Z0632SCP	Boom Handle Set Screw	1
5	005528-03	Boom Collar Weldment	1
6	Z0612SCP	Boom Collar Set Screw	2
7	007286	Discharge Boom Torsion Spring	1
8	007288	Swivel Joint	1
	006969	Swivel Repair Kit	2
9	005525-02	Stand Pipe	1
10	080559-01	Boom Handle (Not included in Discharge Boom Assembly)	1

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PIPING

Ref. No.	Part Number	Description	No. Req'd
1	005895	Clump Assembly <i>[See CLUTCH/PUMP (CLUMP) ASSEMBLY for Parts]</i>	1
2	002383	Automatic Pressure Lubricator	1
3	005470	Pump Shaft Guard	1
4	006144	Pipe Clamp	2
	006145	Pipe Clamp Gasket (not shown)	2
5	006359	90° Victaulic Pipe Elbow	1
6	005842	Suction Pipe Elbow Weldment	1
7	008280	Suction Line Shut-Off Valve	1
8	005523-06	Valve Outlet Pipe	1
9	006710	Pipe Clamp	1
	006145	Pipe Clamp Gasket (not shown)	1
10	008469	Discharge Flange Gasket	1
11	005526-03	Discharge Flange Weldment	1
12	006250	Pipe Clamp	3
	006251	Pipe Clamp Gasket (not shown)	3
13	005831	Clump Discharge Hose	1
14	005843	Upper Discharge Pipe Weldment	1
15	005674	Foot Pedal Weldment	1
16	012287	Discharge Ball Valve	1
17	006483	Boom Connector Pipe	1
18	005083-07	Recirculation Nozzle	1
19	005156	Pipe Clamp	2
	005183	Pipe Clamp Gasket (not shown)	2
20	005083-08	Recirculation Nozzle	1
21	021559	Recirculation Ball Valve	2
22	005706-01	Recirculation Pipe Weldment (T90 Trailer)	1
	005706-02	Recirculation Pipe Weldment (T90 Skid)	1
23	005703-01	Recirculation Coupling Deflector	1
24	005083-09	Recirculation Nozzle	1
25	005512-02	Recirculation Valve Handle	1
26	005511-03	Lower Valve Handle Seal	1
27	005511-02	Upper Valve Handle Seal	1
28	005512-01	Extension Handle	1
29	●	1/2 - 13 UNC x 1.25 in. Hex Bolt	8
30	●	1/2 in. Plain Washer - Type B	16
31	●	1/2 in. Spring Lock Washer	8
32	●	1/2 in. Hex Nut	8

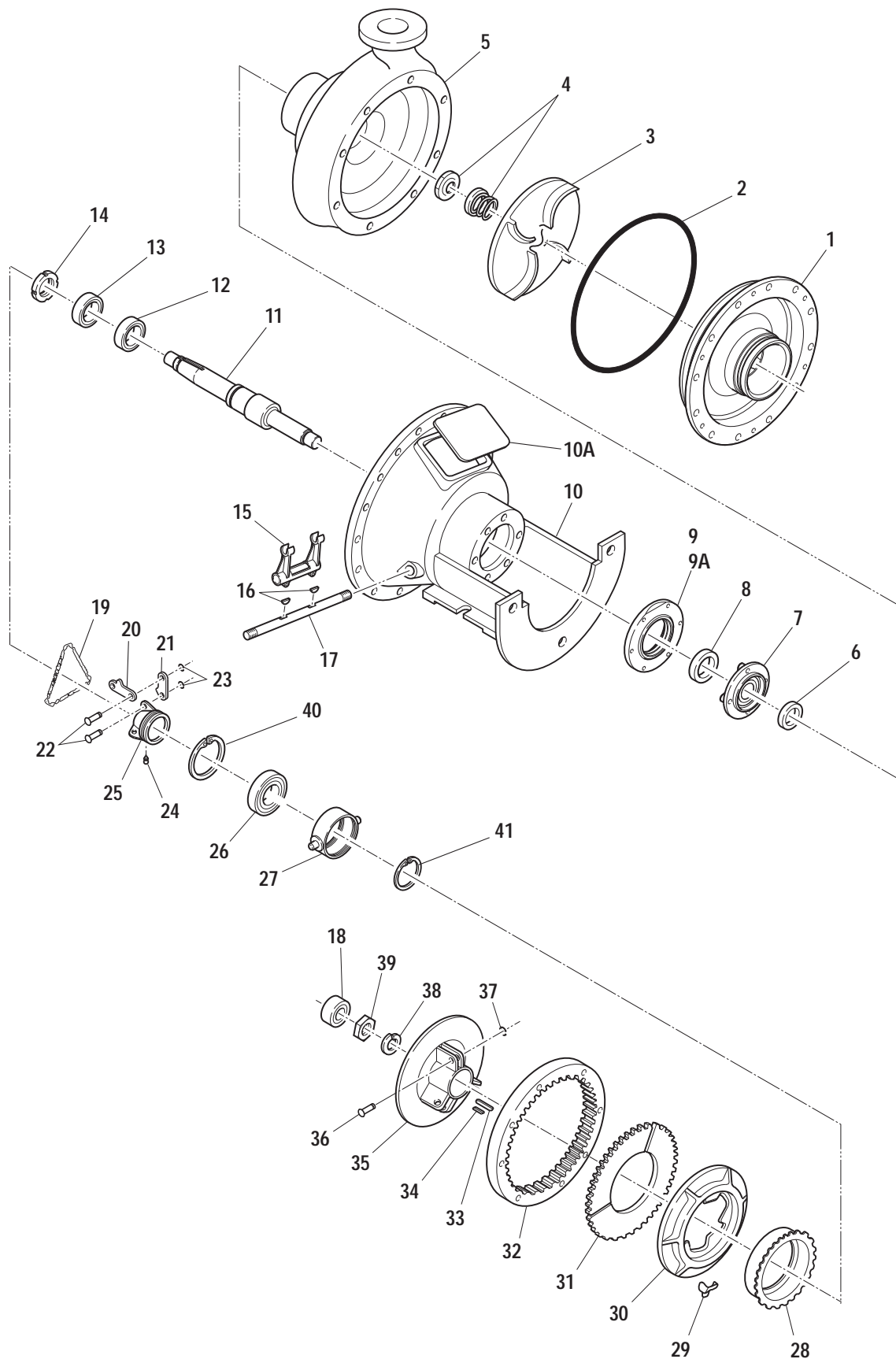
NOT SHOWN

	005141A	Quick Joint Full Coupling Nut	1
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KITS AND MARKERS

- Standard Hardware Item - Available at your local hardware store.

**WHEN ORDERING PARTS, BE SURE TO STATE
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CLUTCH/PUMP (CLUMP) ASSEMBLY

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
1		005146	Pump Suction Cover	1
1B		X0824SS	Suction Cover Bolt (not shown)	4
1N		Y08SS	Suction Cover Nut (not shown)	4
2		005150	O-ring	1
3		005543	Pump Impeller	1
4		006443	Mechanical Seal	1
5		005144	Pump Casing	1
5B		X0824SS	Pump Suction Cover Bolt (not shown)	8
5W		W08FSS	Pump Suction Cover Washer (not shown)	8
6		006444	Grease Retainer Seal	1
7		005446	Flange Bearing	1
7B		X0724SS	Flange Bearing Bolt (not shown)	4
7LW		W07LSS	Flange Bearing Lockwasher (not shown)	4
8		005447	Shaft Seal	1
9		005475	Thrust Bearing Retainer	1
9A		005544-02	Thrust Bearing Retainer Gasket	1
9B		X0512SS	Thrust Bearing Retainer Bolt (not shown)	6
10		005670	Clutch/Pump Drive Housing	1
10A		005570	Clump Nameplate	1
10B		XST0408SS	Clump Nameplate Screw (not shown)	2
11		005541	Clump Shaft	1
12		005450	Radial Ball Bearing	1
13		005449	Radial Ball Bearing w/ Seal	1
14		005448	Bearing Locknut	1
15	■	100073	Clutch Yoke Assembly	1
16	■	100042	Woodruff Key	2
17	■	100041	Cross Shaft	1
18		005151	Pilot Bearing	1
19	▲■	100211	Spring Lever	1
20	▲■	X	Lever	3
21	▲■	X	Connecting Link	6
22	▲■	X	Link Pin	6
23	▲■	X	Retaining ring	6
24	▲■	X	Grease Fitting	2
25	▲■	X	Release Sleeve	1
26	▲■	X	Release Bearing	1

Continued to next page.

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CLUTCH/PUMP (CLUMP) ASSEMBLY

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
27	▲■	X	Bearing Carrier	1
28	▲■	X	Adjusting Ring	1
29	▲■	100214	Adjusting Lock	1
30	▲■	X	Pressure Plate	1
31	▲■	100209	Clutch Facing	1
32	▲■	100218	Drive ring	1
33	▲■	100056	Clutch Key	1
34	▲■	X	Separator Spring	3
35	▲■	X	Clutch Body	1
36	▲■	X	Pivot Lever Pin	3
37	▲■	X	Retaining ring	3
38	▲■	100047	Lock Washer	1
39	▲■	100045	Drive Shaft Nut	1
40	▲■	X	Internal Snap Ring	1
41	▲■	X	External Snap Ring	1

NOT SHOWN

		160234	Pipe Plug	2
	■	031219	Modified Clutch Lever	1
	▲■	X	Wear Plate for Adjusting Ring	1
	▲■	X	Lock Bolt for Adjusting Lock	1
	▲■	X	Lock Washer for Adjusting Lock	1

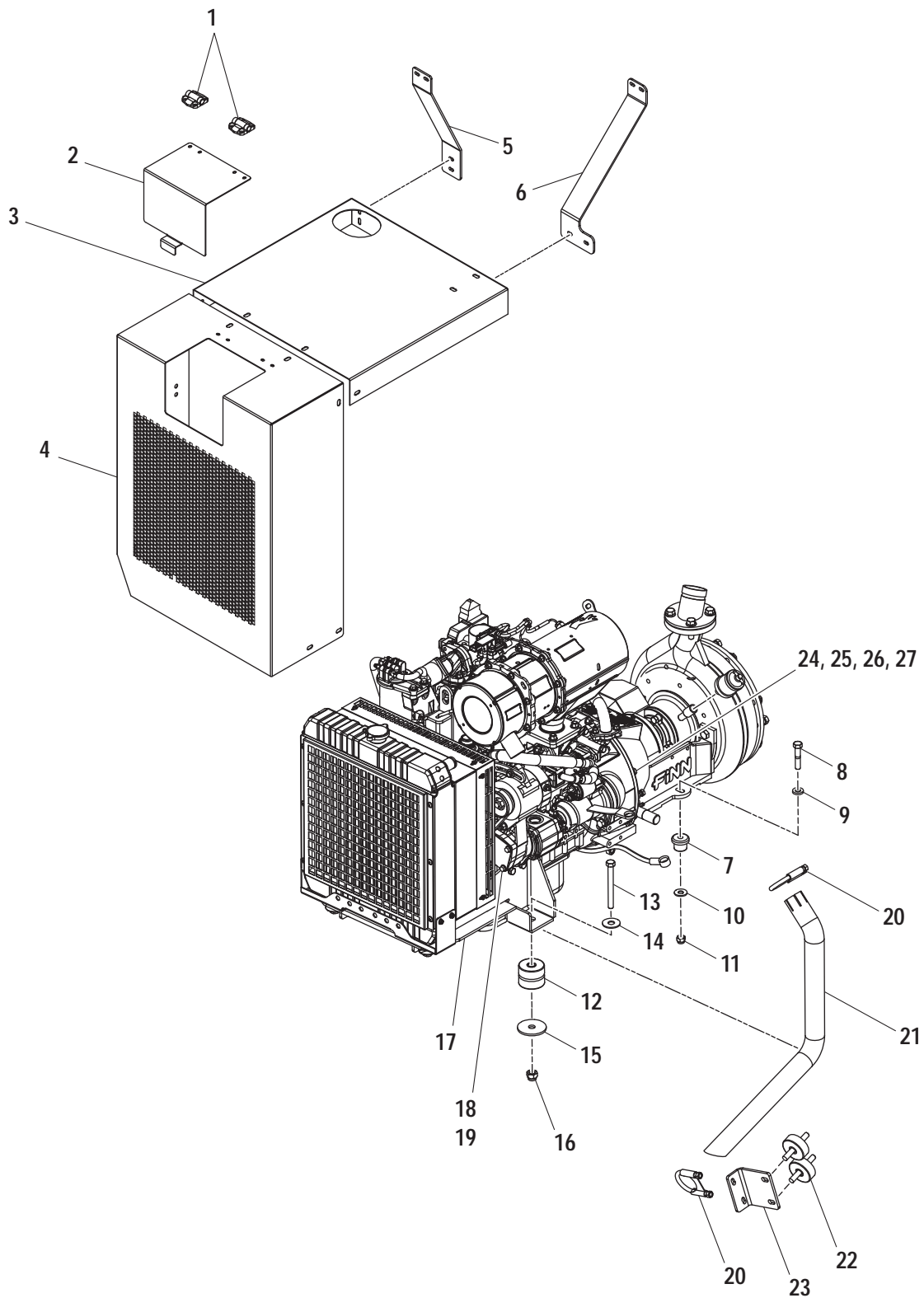
KITS AND MARKERS

▲	1000333	Clutch Assembly Kit
■	005432	Total Clutch Assembly Kit
X	Items are only available as part of assemblies listed.	

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ENGINE SHEET METAL AND SUPPORT ASSEMBLY

Ref. No.	Part Number	Description	No. Req'd
1	055669	Radiator Cover Door Hinge	2
2	005853	Radiator Fill Cover	1
3	005850	Engine Top Cover	1
4	005851	Radiator Shroud	1
5	005855	Left Hand Side Cover Hanger	1
6	005856	Right Hand Side Cover Hanger	1
7	005676	Center Bushing Mount	2
	Center Bushing Mount Hardware		
8	●	1/2 - 13 UNC - 2.5 Hex Bolt	2
9	●	1/2 in. Circular Washer	2
10	055505	Snubbing Washer	2
11	●	1/2 in. Prevailing Torque Hex Nut	2
12	005860-03	Center Bushing Mount	2
	Center Bushing Mount Hardware		
13	●	5/8 - 11 UNC - 3.0 Hex Bolt	2
14	●	5/8 in. Plain Washer Type B	2
15	005861	Snubbing Washer	2
16	●	5/8 in. Prevailing Torque Hex Nut	2
17	005854	Radiator/Engine Mount	1
18	●	Socket Head Cap Screw, M10 x 25 LG	2
19	●	Lock Washer, M10	2
20	000461	Tailpipe Support Clamp	2
21	005849	Exhaust Tailpipe	1
22	023438	Rubber Shock Mount	2
23	005858	Tailpipe Support Bracket	1
24	●	Hex Head Cap Screw, M10 x 30 LG	8
25	●	Lock Washer, M10	8
26	●	3/8 - 16 x 1.25 Hex Head Cap Screw	2
27	●	3/8 in. Hex Nut	2

NOT SHOWN

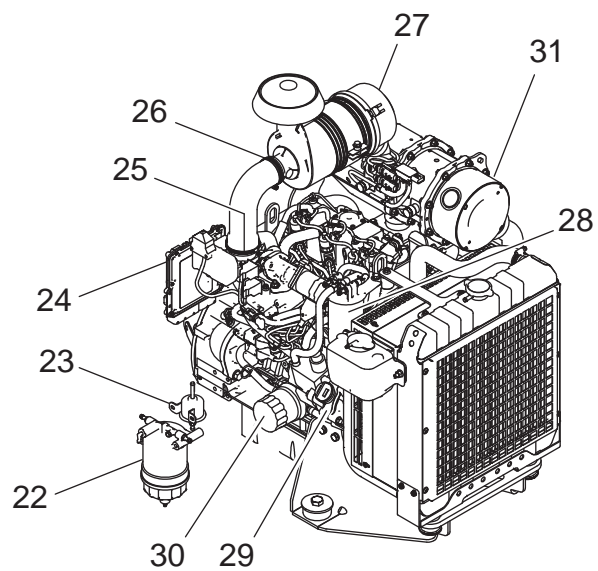
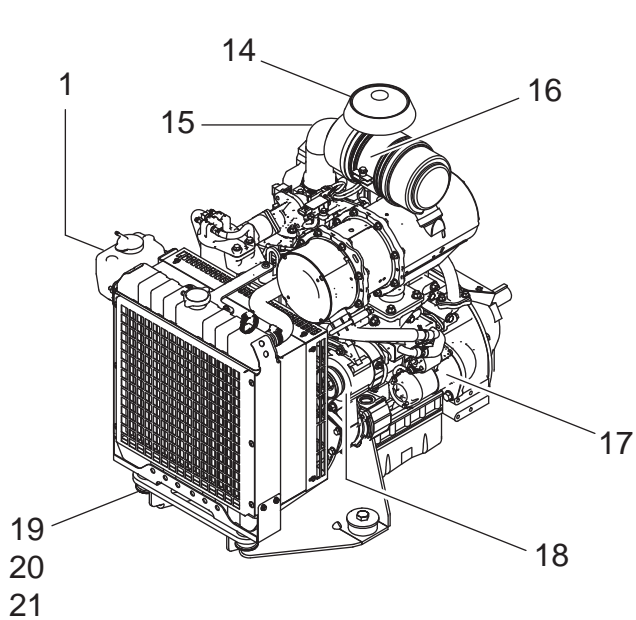
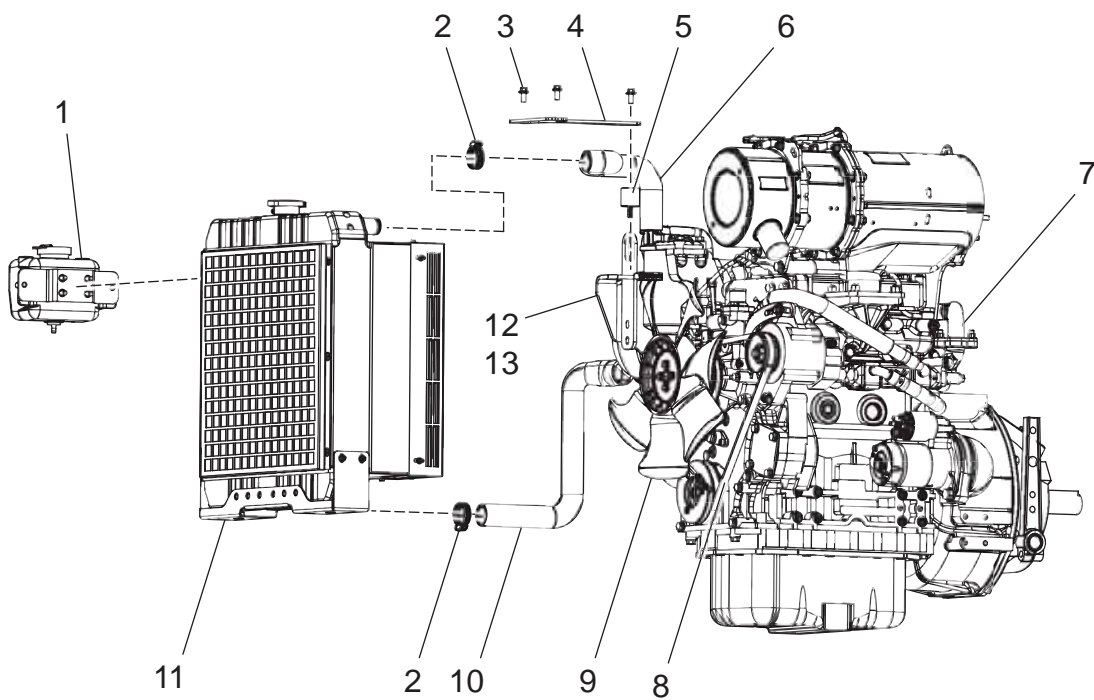
Radiator Cover Door Hinge Hardware

F260-0006-03	Hinge Spacer	2
●	Pan Head Screw No. 10 - 24 - 3/4	8
●	No. 10 Helical Spring Lock Washer	8
●	No. 10 - 24 Hex Nut	8
●	No. 10 Plain Washer - Type B	8

KITS AND MARKERS

- Standard Hardware Item - Available at your local hardware store.

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SPECIFIC ENGINE PARTS

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
1	▲	031542	Overflow Bottle Assembly, 1 quart	1
2	▲ ●		Hose Clamp, 24 - 44 mm	4
3	■ ●		Hex Flange Machine Screw, M8 - 16 x 1.25 LG	3
4	■	031534	Radiator Support, Upper	1
5	■	031538	Radiator Mount Isolator, Upper	1
6	▲	031544	Upper Radiator Hose	1
7		031504	Yanmar 3TNV88C-DYEM Engine	
8		031562	V-Belt, Fan	1
9		031563	Cooling Fan	1
10	▲	031545	Lower Radiator Hose	1
11	▲	031541	Radiator Assembly	1
12	■	031535	Radiator Mount, Upper	1
13	■	031536	Radiator Mount Spacer, Upper	2
14		031552	Rain Cap Assembly	1
15		005882	Hose, Air Intake	1
16		031551	Band, Air Cleaner	1
17		031555	Starter	1
18		031556	Alternator	1
19	■	031539	Radiator Isolator Mount	2
20	■	031537	Snubbing Washer	2
21	■ ●		Hex Head Cap Screw, 1/2 - 13 UNC x 2.5 LG	2
22		031522-00	Fuel/Water Separator Assembly	1
		031522-01	Upper Body Housing Assembly	1
		031522-02	O-ring	1
		031522-03	Filter Element	1
		031522-04	Float	1
		031522-05	Cup	1
		031522-06	Drain Plug	1
23		031521	Pump Assembly, Fuel Feed	1
24	---		ECU (Supplied with Engine)	1
25		007391	Pipe Clamp	1
26		022450	Pipe Clamp	1
27		031549	Air Cleaner Assembly with Air Filter Element	1
		031550	Air Filter Element	1
28		031564	Filter, Fuel Oil	1
29		031560	Oil Cooler Assembly	1
30		031561	Oil Filter	1

Continued to next page.

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SPECIFIC ENGINE PARTS

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
31		031558	DPF Assembly	1
		---	DPF Case (must be serviced by Yanmar)	1
		031558-02	Soot Filter	1
		---	Silencer (must be serviced by Yanmar)	1
		---	Gasket (must be serviced by Yanmar)	1
NOT SHOWN				
		031557	Oil Fill Cap	1
		031559	Pilot Bearing Retainer	1
		031566	Switch, Oil Pressure	1
		005913	Fuel Tank Assembly	1
		005724-01	Fuel Tank	1
		031464-03	Grommet	2
		005724-02	Fuel Tube Assembly	2
KITS AND MARKERS				
▲		031540	Complete Radiator Kit	
■		031533	Radiator Bracket Kit	
●		Standard Hardware Item - Available at your local hardware store		

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HOSE REEL NOZZLE/REMOTE VALVE/TOOL KIT

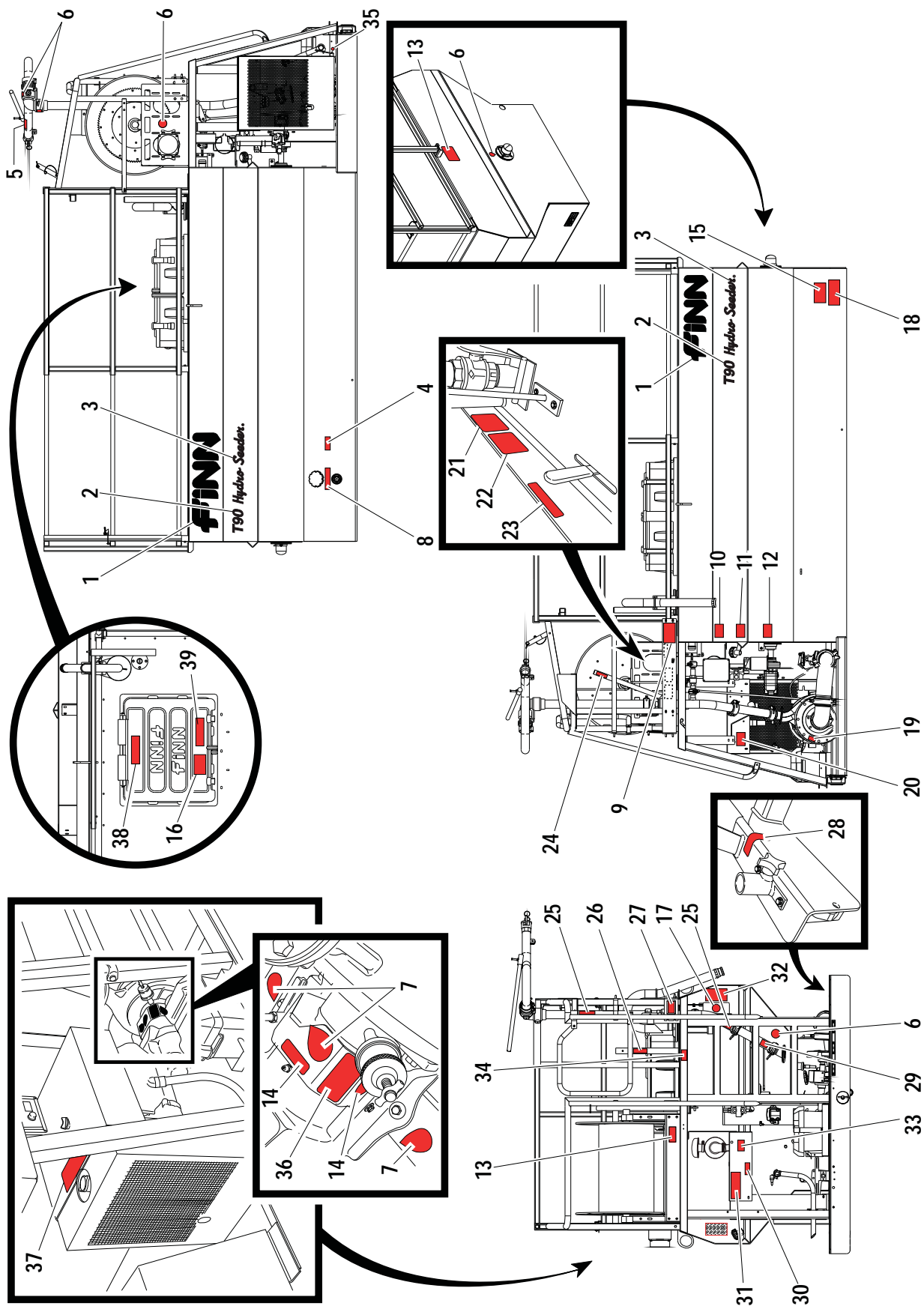
Part Number	Description	No. Required
HOSE REEL NOZZLES		
080273	Long Distance Hose Reel Nozzle Assembly	A/R
080131	Long Distance Nozzle	1 per
080260	Adapter	1 per
160749	Reducer Bushing	1 per
080394	Wide Fan Hose Reel Nozzle Assembly	A/R
006604	Wide Fan Nozzle	1 per
080260	Adapter	1 per
160750	Reducer Bushing	1 per
080395	Narrow Fan Hose Reel Nozzle Assembly	A/R
006605	Narrow Fan Nozzle	1 per
080260	Adapter	1 per
160750	Reducer Bushing	1 per
REMOTE VALVE		
080535	Remote Valve Assembly	A/R
080260	Adapter	1 per
160307	Close Nipple	1 per
012083	Ball Valve	1 per
160520	Nipple	1 per
080261	Coupler	1 per
006515	Gasket	1 per
TOOL KIT		
000698	Automatic Pressure Lubricator Grease, 1 lb Can	1
005220	Impeller Wrench	1
008187	Long Distance Nozzle	1
006632	Long Distance Nozzle Assembly	1
001042	Long Distance Nozzle	1
006096	Male Coupler	1
160309	Close Nipple	1
160763	Reducer Bushing	1
006619	Wide Fan Nozzle Assembly	1
006493	Wide Fan Nozzle	1
006096	Male Coupler	1
160762	Reducer Bushing	1
005603	Narrow Fan Nozzle Assembly	1
012117	Narrow Fan Nozzle	1
006096	Male Coupler	1
160762	Reducer Bushing	1
004593	Drain Plug	1
006102	Female Coupler	1
006514	Coupler Gasket	1
	FINN T90 HydroSeeder® Parts and Operator's Manual	1

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ELECTRICAL COMPONENTS

Part Number	Description	No. Required
005908-01	Engine Harness	1
005908-02	Battery Ground Cable Assembly	1
005908-03	Starter Cable Assembly	1
005908-04	Frame Ground Cable Assembly	1
005908-05	Regen. Interlock Switch Cable Assembly	1
005893	Regen. Interlock Switch Magnet	1
005890	Regen. Interlock Switch	1

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DECALS

Ref. No.	Part Number	Description	No. Req'd
1	023174	"FINN" Decal - Large	2
2	012661-05	"T90" Decal	2
3	011595	"Hydro Seeder" Decal	2
4	□	"Ultra Low Sulfur" Decal	1
5	□	"Do Not Aim . . ." Decal	1
6	□	"Service Daily" Decal	5
7	□	"Service Weekly" Decal	3
8	□	"Diesel Fuel Only" Decal	1
9	□	"CAUTION! SPL Exceeds 80dBA . . ." Decal	1
10	□	"800 Gallon" Decal	1
11	□	"500 Gallon" Decal	1
12	□	"250 Gallon" Decal	1
13	□	"CAUTION! Fall Hazard - Do Not Ride . . ." Decal	2
14	□	"Service" Decal	2
15	□	"U.S. Patent Nos." Decal	1
16	▲	"WARNING! Entanglement Hazard . . ." Decal	1
17	▲	"CE" Decal	1
18	031569	FINN Name Plate	1
19	□	"Tighten Suction Cover" Decal	1
20	□	"Clutch Adjustment" Decal	1
21	□	"VALVE - Open/Close" Decal	1
22	□	"VALVE - Open/Closed" (Handle) Decal	1
23	□	"AGITATOR - Forward (Spray) / Reverse (Mix)" Decal	1
24	□	"CLUTCH - Disengage/Engage" Decal	1
25	□	"DANGER! Do Not Use Remote . . ." Decal	2
26	□	"IMPORTANT. This Is A Vent . . ." Decal	1
27	012260	"IMPORTANT" Metal Plate	1
28	□	"CLUTCH - Engage/Disengage" Decal (Ground Level Controls Option Only)	1
29	□	"CAUTION! Hose Reel, Remote . . ." Decal	1
30	□	"DANGER! Hot . . ." Decal	1
31	□	"WARNING! Sever Hazard . . ." Decal	1
32	□	"CAUTION! Hydraulic System Instructions" Decal	1
33	□	"CAUTION! Do Not Use Ether Or . . ." Decal	1
34	□	"CAUTION! Fall Hazard . . ." Decal	1
35	▲	Ground Decal	1
36	□	"Pressure Lubricator" Decal	1
37	□	"WARNING! Burn Hazard . . ." Decal	1
38	□	"DANGER! Confined Space Hazard" Decal	1
39	□	"Operating Instructions - HydroSeeder" Decal	1

KITS AND MARKERS

□	005738	T90 Decal Kit
▲	080769	CE Decal Kit

NOTE: All of the decals depicted and listed on page 96 (except those identified with a □) are shown for location purposes only. To order replacements you must order T90 Decal Kit (005738). Replacement decal and plates for those identified with an asterisk are not part of the decal kit and must be ordered separately.

NOTE: Decals marked with a ▲ are part of the CE Decal Kit (080769) and cannot be ordered individually.

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