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# **T90-II HydroSeeder®**

## **Operator Instructions and Parts Manual**


Model T90S **MR**  
Model T90T **MR**

Serial No. \_\_\_\_\_

[illegible]



## **ACTIVATE YOUR FINN EQUIPMENT WARRANTY**

 It is the responsibility of the Finn Dealer to register your Finn Equipment shortly after the equipment start-up and operation overview at which time you will be asked to sign off on the **WARRANTY VALIDATION FORM**.

Be sure to confirm with your sales representative that this has been done.

This registration process activates the Finn Limited Warranty.

### **What should you do if you need repairs or parts under Warranty?**

#### ***How to get parts and or repairs done under warranty:***

Notify **YOUR DEALER** immediately when you discover a faulty material, workmanship, or faulty component. **Do not** wait weeks or months to get it reported. Be sure to tell the dealer that this is a failure that occurred under warranty.

**NOTE:** Warranty work must be done by a Finn Authorized Dealer in order to be covered by the Finn Warranty Program, unless otherwise approved by the Finn Warranty Administrator.

#### ***Instructions to Dealer on processing warranty work:***

##### **Initiating a claim**

1. Be sure to have the model, serial number and number of hours on unit.
2. A description of the problem as understood at the time.
3. Call Finn's Warranty Administrator to secure warranty claim authorization number.
4. Confirm with Warranty Administrator that the unit is eligible for warranty coverage.
5. Any parts needed for the repair work should be placed with the Warranty Administrator instead of the parts department. These will be shipped to you at no charge pending the outcome of the investigation.
6. Labor hours must coincide with the published "Labor Schedule" or estimate approved by the Finn Warranty Administrator.
7. Once work is done, a Finn Warranty Claim Form must be filled out and emailed along with any related receipts or invoices to the Warranty Administrator. We ask that this is done ASAP after work is completed.

#### ***Faulty or failed parts:***

**IF** Finn wants you to return failed parts, you will receive a return shipping label in the package with new parts. On that Label will be marked a return authorization number. (Which is the same number as you claim number.)

Please also mark the outside of the package that you are shipping back (using a marker) with the claim/return number. **THESE PARTS MUST BE RETURNED WITHIN 10 DAYS!** Failure to do so can void warranty coverage.

**NOTE:** Further information and related forms can be found on the Finn Web site in the Dealer Portal warranty section.



#### WARRANTY PERIOD

Hydroseeders® and Straw Blowers: 2 years or 2000 hours, whichever comes first.

Bark Blowers: 1 year or 1200 hours, whichever comes first.

**COMMERCIAL LIMITED WARRANTY**  
EFFECTIVE 01/01/2018

#### OUR WARRANTY TO YOU

Finn Corporation warrants to you, the original purchaser, for use (or rental to others for use) and to a second owner who purchases a used machine from an Authorized Dealer Rental Program (the remaining warranty), 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.

#### TO QUALIFY FOR WARRANTY CONSIDERATION

- A. Your Finn Dealer will register your equipment with Finn.  
**FAILURE TO REGISTER WILL VOID THE WARRANTY.**
- B. Notify your dealer same day or next day of any need for work under warranty.
- C. Warranty work must be done by an authorized Finn dealer or service provider of Finn's choice and any parts must be ordered through the Finn warranty administrator.

#### WHAT FINN WILL DO

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

- A. Verify claim falls within the valid warranty time frame.
- B. Verify the product and equipment has been registered with Finn.
- C. Upon affirmation of warranty period and registration, Finn will provide new or repaired replacement part(s), whichever Finn elects and a return shipping label for returning failed parts if applicable.
- D. Evaluate the part when defective part is returned. If damage to a part is determined not to be covered under the warranty, the customer will be billed.
- E. 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.
- F. Correction of nonconformities, in the manner provided above, shall constitute fulfillment of all liabilities of Finn Corporation.

#### WHAT THE WARRANTY DOES NOT COVER

1. Normal wear parts, Allied Equipment, trade accessories not manufactured by Finn, such as but not limited to items such as various filters, fluids, brakes, clutch linings, coupler insert, belts, hoses, light bulbs, mechanical seal, over center clutches, tires, ignitions, starters, batteries, carburetors, engines or like or unlike equipment or accessories. (Such being subject to the warranty, if any, 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. Any defect or failure of products warranted arises out of or is caused by accessories or parts not manufactured or supplied by Finn Corporation, whether same are supplied by purchaser, dealers, or any other party.

#### STORAGE

Dealers and customers are responsible to follow all guidelines related to Seasonal and Long Term Storage of Equipment, as advised in operation and 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. 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 and void warranty coverage.



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# 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.



TheFINN 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.

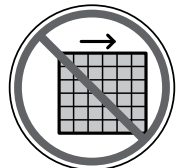
## I. PRE-START EQUIPMENT CHECK (equipment check is to be made with the engine off)

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.
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


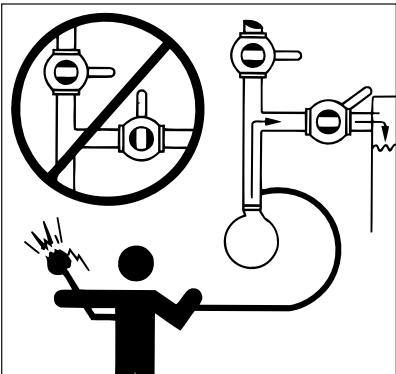
1. Always wear safety goggles when operating the machine. Other safety attire such as safety shoes, ear protection, gloves, hard hats, dust masks, etc. should be worn as required by warning decals on machine, operator's manuals, or job site requirements. Remove rings, watches, etc. Avoid wearing loose-fitting 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 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.


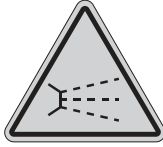


## II. MACHINE OPERATION (Continued)




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) the slurry pump 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. 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.

4. 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.
5. 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.
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

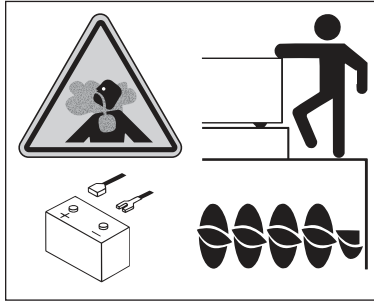
1. Before servicing the machine, turn off engine and allow all moving parts to stop. To prevent accidental starting, disconnect battery cables. Tag the engine operating area to show that the machine is being serviced. Use lockout/tagout procedure (Occupational Health and Safety Administration (OSHA)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

2. It is recommended that only authorized, genuine FINN replacement parts be used on the machine.
3. 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. 



# HYDROSEEDER® SAFETY SUMMARY SECTION

## IV. MAINTENANCE (Continued)

4. 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.

5. 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.

6. 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.



7. 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.



8. 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.



9. 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.



10. 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.

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.

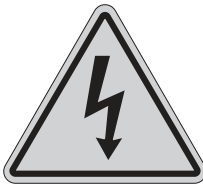
13. Do not pressure wash this unit. Do not pressure wash around any control boxes, radio remotes or control panels. Pressure washing this unit can cause damage to the electrical systems and components and also cause the unit to not function. Pressure washing injects water into sensitive electrical components. To clean the unit, use a method that controls the amount of water that is applied to surface of the unit.



## COMMON SAFETY DECALS



Hazard/  
Attention



Electrical  
Shock Hazard



Hearing  
Hazard



Arc Flash  
Hazard or  
Explosion  
Hazard



Electrocution  
Hazard



Fire Hazard



Body  
Entanglement  
Hazard



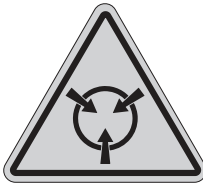
Electrostatic  
Discharge  
Hazard



Fumes/Dust  
Hazard



Burn Hazard



Electrostatic  
Sensitive Area  
Hazard



Pinch Point/  
Entanglement  
Hazard



Carbon  
Dioxide  
Hazard



Explosive or  
High Pressure  
Hazard



Grounding  
Required  
Hazard



Corrosive  
Hazard



Explosive  
Material  
Hazard



Crush Hazard



Cut/Crush  
Hazard



Vision Damage  
Hazard



Crush/Pinch-  
point Hazard



Cut/Sever  
Hazard



Vision and  
Hearing  
Damage  
Hazard



Crush/  
Entrapment  
Hazard



Sever/Reach  
Hazard



Vision,  
Hearing and  
Respiratory  
Damage  
Hazard



High Voltage  
Hazard

## COMMON SAFETY DECALS



Heavy Object  
Hazard



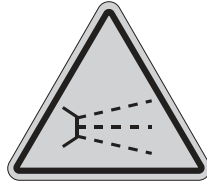
Skin Puncture  
Hazard



Vision  
Protection  
Required



Hot Surface  
Hazard



Splash/Spray  
Hazard



Hearing  
Protection  
Required



Loose Clothing  
Entanglement  
Hazard



Stumble  
Hazard



Vision, Hearing  
and Head  
Protection  
Required



Pinch Point/  
Moving Belt  
Hazard



Trip Hazard



Breathing,  
Vision, Hearing  
and Head  
Protection  
Required



Poison  
Hazard



Watch Head/  
Overhead  
Hazard



Foot  
Protection  
Required



Radio  
Frequency  
Hazard



Fall/Loss  
of Balance  
Hazard



Lockout/  
Tagout  
Procedure  
Required



Remote Start  
Hazard



Mandatory  
Operator  
Action  
Required



Gloves  
Required



Sever by  
Rotating Parts  
Hazard



Read Manual



Trailer Safety



Rotating Shaft  
Hazard



Breathing  
Protection  
Required

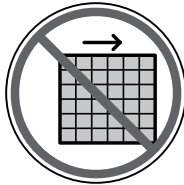


Lift Point

## COMMON SAFETY DECALS



Do Not Ride  
on Moving  
Vehicle



Do Not  
Remove  
Guards



Do Not  
Obstruct  
or Block



Do Not Spray  
Power Lines



Do Not Touch



Do Not  
Pressure Wash

## SAFETY DECALS EXAMPLES

**DANGER**

**CONFINED SPACE HAZARD! (Reference: OSHA 29 CFR 1910.146)**

Before entering tank:

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.

**FLYING MATERIAL HAZARD!**

Wear eye protection around operating equipment.  
Failure to comply will result in death or serious injury.

P/N 41392

**HYDRAULIC SYSTEM INSTRUCTIONS**

1. Check oil level weekly. Add oil when level goes down to first ring on filler screen.
2. Change filter on oil tank every 500 operating hours. (Use a 10 micron filter element only).
3. Check and clean suction strainer once a year or when oil is changed.
4. Change hydraulic oil when the color turns milky white. (Color change is due to water getting into hydraulic system).
5. Keep all fittings and hoses tight and leak free.
6. Keep system clean at all times.
7. DO NOT start or run engine without hydraulic oil in reservoir. Permanent pump damage will occur.

**HYDRAULIC FLUID ONLY**

See Operator's Manual for Type.

P/N 41386

**WARNING**

**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/N 41385

**DANGER**

**ELECTROCUTION HAZARD!**

DO NOT aim stream toward electrical lines.

Avoid spraying towards bystanders.

Failure to comply will result in death or serious injury.

P/N 41384

**NOTICE**

Seal lubricator must be kept in operation at all times for pump seal protection. See operators manual for instructions.

P/N 41387

**NOTICE**

To avoid damage to suction cover, tighten all bolts to 15 ft.-lbs. See Operator's Manual for instructions.

41389

**STOPPING INSTRUCTIONS**

Engine is equipped with a fuel shut-off solenoid. Move throttle to mid-range before stopping.

P/N 41434

**CAUTION**

Use on 2 5/16 inch ball only.

P/N 41388

# 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®		TRUCK REQUIREMENTS
Type	Maximum Weight [Loaded]	Approximate GVWR*
T90S	13,500 lbs. (6,124 kg)	-----
T90T	15,115 lbs. (6,856 kg)	Tow vehicle must be able to support 1,500 lbs. (680 kg) down on its hitch.

\* 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.

\*\* It is the owner/operator's responsibility to ensure that the total trailer payload (tank contents and materials stored at the top platform) does not exceed the trailer or carrier vehicle GVWR.

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



## CARRIER VEHICLE REQUIREMENTS (CONTINUED)

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.

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** *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.*

**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.*

**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.*

## 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. Hardened pump parts: Pump casing, impeller, and suction cover are treated with special material designed to resist wear.

## 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



**WARNING** *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 step 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 slurry 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) the slurry pump 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 slurry pump discharge and recirculation valve handles for free movement.

## EQUIPMENT CHECK (CONTINUED)

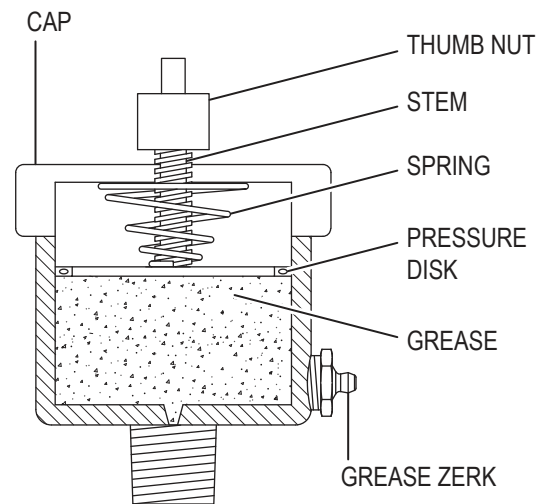
14. Lubricate equipment – See LUBRICATION AND FLUIDS CHART.

A. Each lubrication point on the machine is marked with a decal.

B. Check automatic pressure lubricator at pump. If the red indicator is fully raised, the automatic pressure lubricator contains lubricant. If not, lubricant must be replaced by the following procedure (See Figure 1):

1. Insert the 14 oz tube (A2401-001) into a manual or pneumatic grease gun.
2. Attach the grease gun to the grease zerk on the side of the lubricator. It is NOT necessary to remove or unthread anything from the lubricator.
3. Dispense the grease until the red indicator rises approximately 1 inch above the cap.

Monitor the red indicator for level of grease.

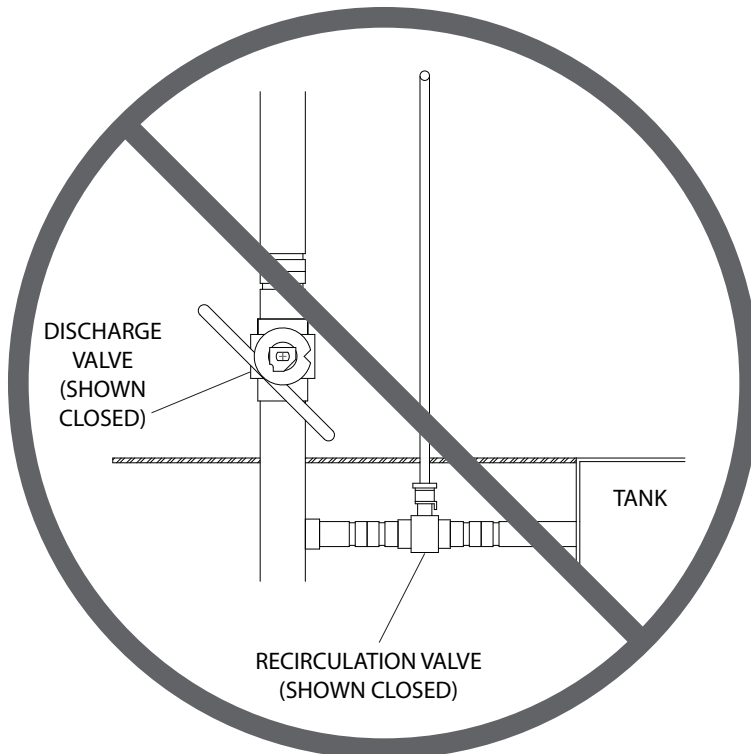


**Figure 1 – Automatic Pressure Lubricator Components**

## TWO VALVE OPERATION

The T90 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) the 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 the boom with no flow through the closed recirculation valve (Figure 3). The flow through boom is controlled by engaging and disengaging slurry pump clutch. To control the spray volume and distance, the user must adjust the engine RPMs. Do NOT use the discharge valve to control distance. The valve should either be completely open or closed.

## 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 started and stopped by engaging (turning on) and disengaging (turning off) the slurry pump clutch. The flow volume is controlled by adjusting the engine RPMs.

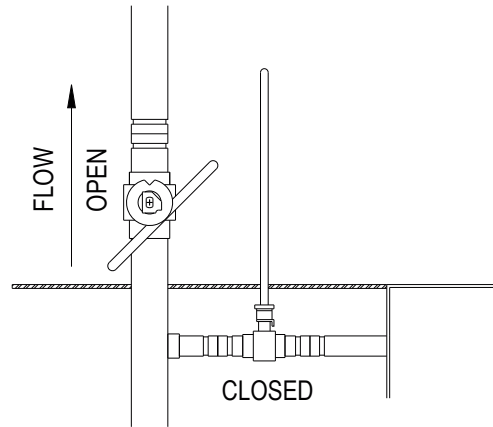


Figure 3 – Discharge Through Boom or Extension Hose Through Boom

## 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 started and stopped by engaging (turning on) and disengaging (turning off) the slurry pump clutch. The spray volume is controlled by opening and closing the remote valve at end of hose and by adjusting the engine RPMs.

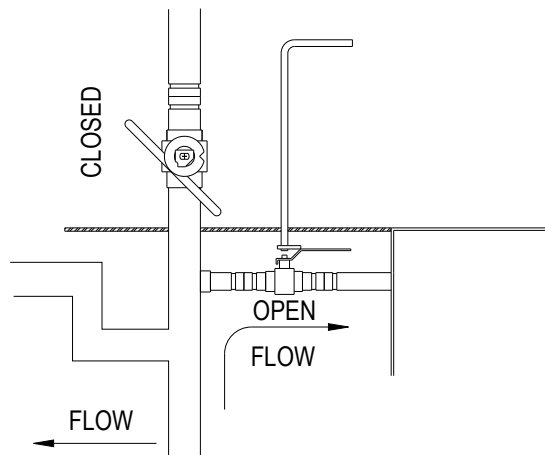


Figure 4 – Discharge Through Extension Hose or Hose Reel Through Remote Port

### **⚠ DANGER**

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









## CONTROL BOX

The FINN T90 HydroSeeder® control box is the operation point for the unit. The control box and corresponding control box icons are illustrated below.



Figure 3 – Control Box Assembly

	<b>ON Symbol</b> Toggle switch flipped up to the ON position to activate components.		<b>RUN Symbol</b> Key switch is in the RUN position while in operation.
	<b>OFF Symbol</b> Key switch is in the OFF position cutting power from the unit, or toggle switch flipped down to the OFF position.		<b>START Symbol</b> The key switch is turned to the START position to start the unit.
	<b>Hydraulics Symbol</b> 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.		<b>Engine Speed Control (Throttle)</b> This switch is used to change the engine speed, toggle the throttle control switch ("Fast-Rabbit/Slow-Turtle") to the desired speed setting.

## 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 **ON** “**I**” 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.



### ENGINE START

To start the engine, turn the key switch clockwise to the **START** “**II**” 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 switch up or down increases or decreases the RPMs by 10 RPMs. If the throttle switch is held down in one direction for three seconds, the RPMs will ramp up or down at a much faster rate.






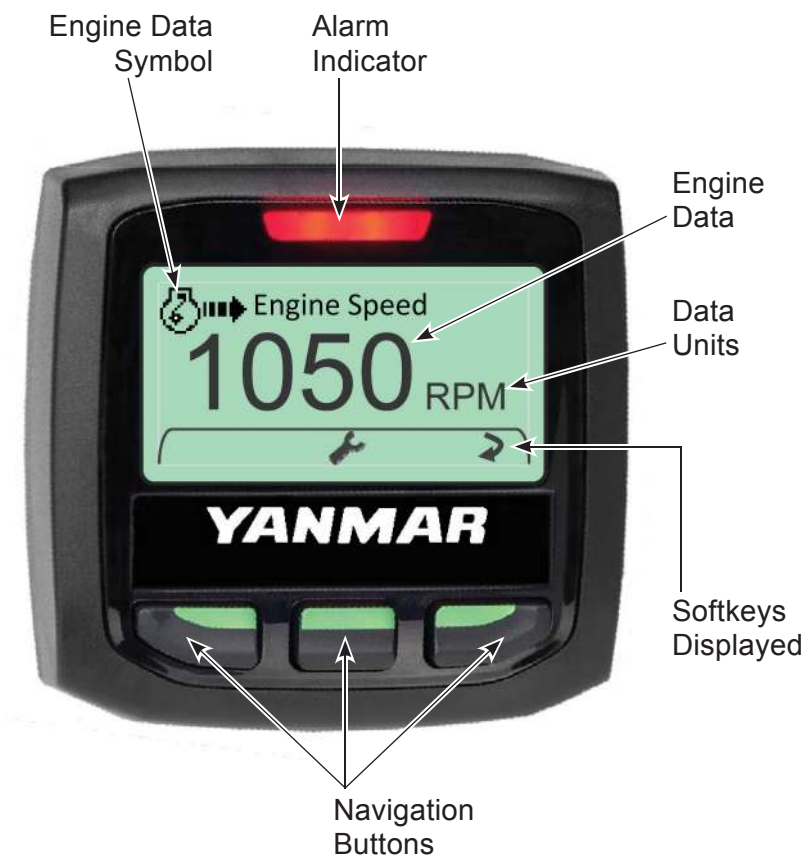
## SYSTEM OPERATION

### 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.

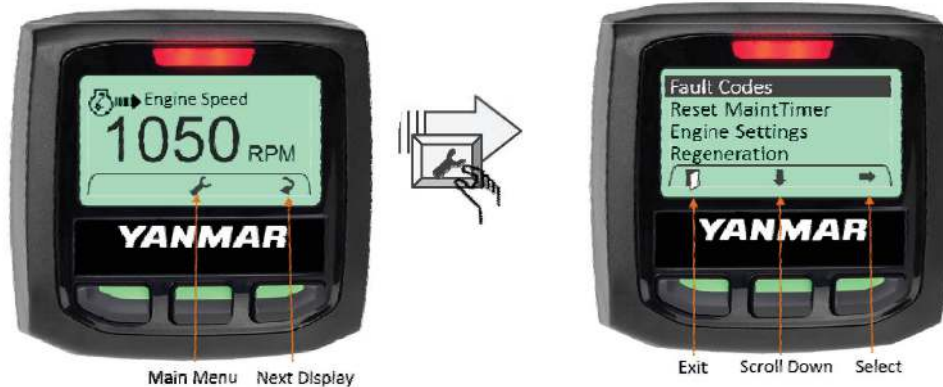
See System Display List for complete selection of data displays available.



## SYSTEM OPERATION (CONTINUED)

### 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

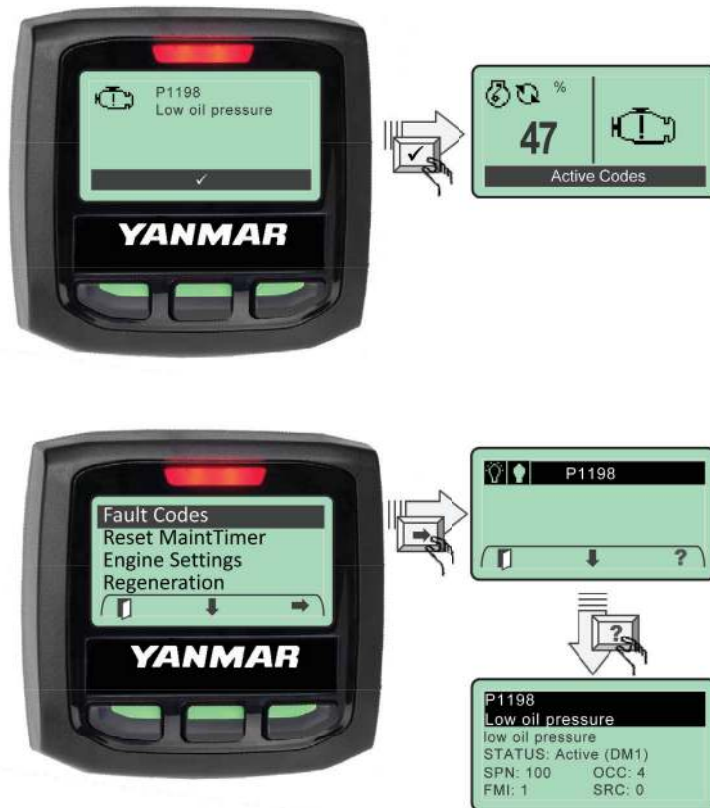
Engine fault codes (active and stored) are generated by the engine ECU and communicated to the control panel.

### 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.

Reset Maintenance Timer Menu Selection



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.

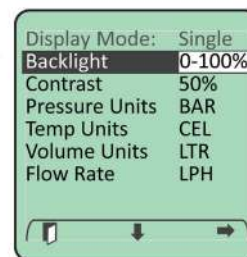
## BACKLIGHT SETTING

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

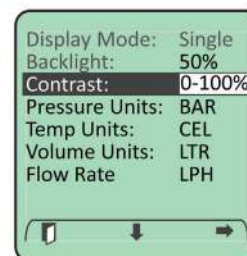
The LCD contrast is adjustable from 0 to 100%. To adjust the LCD contrast enter the Main Menu and navigate to the “Display Setup” menu using the “↓” softkey.

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.



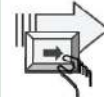
## DISPLAY MODE SETTING

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

## DISPLAY MODE SETTING (CONTINUED)

### 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

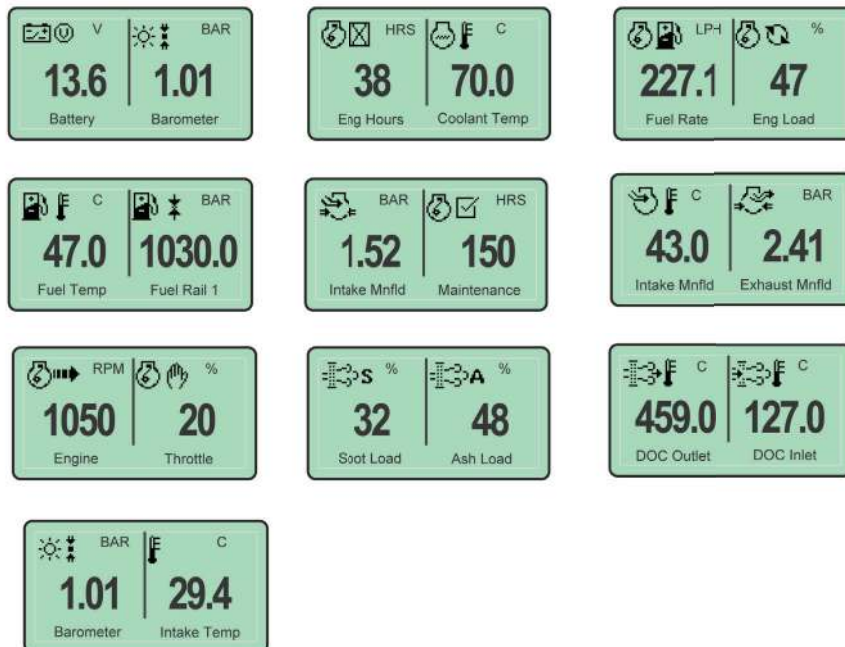
Display Mode	Single
Backlight	50%
Contrast	50%
Distance Units	miles
Pressure Units	psi
Temp Units	F
Volume Units	GAL
Flow Rate	LTR

## DISPLAY LIST

### SINGLE DATA FORMAT



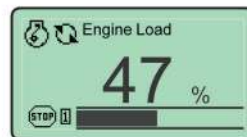
### DUAL DATA FORMAT





## DISPLAY LIST

### MISCELLANEOUS DISPLAYS



## ABOUT MENU

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

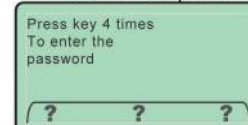


## ENGINE SETTINGS

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



### Password Required



## 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.

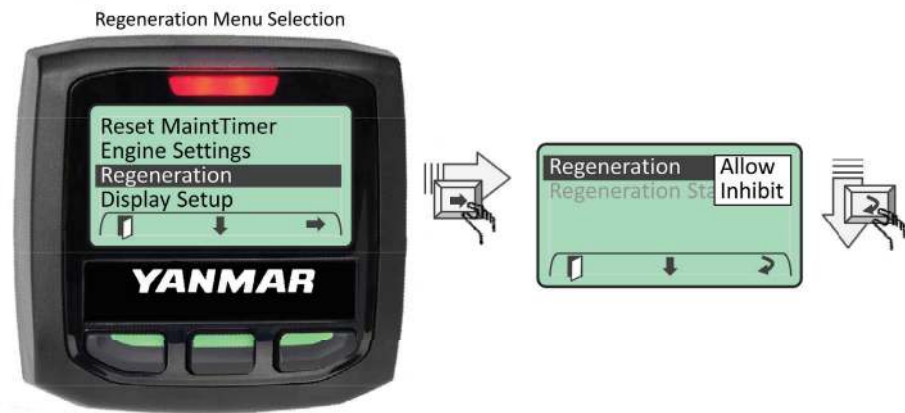
***Stationary Regeneration*** – Although the DPF performs the regeneration control, if the operation conditions with idling at no load and low speed/low load operations are frequently repeated, the PM may not be regenerated. If the ECU determines that performing the Stationary Regeneration is required 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

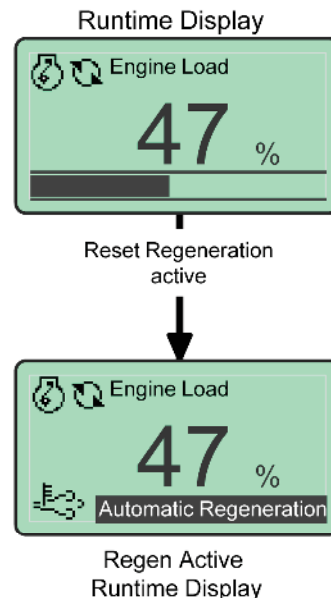
The engine control panel is set at the factory to allow Reset Regeneration to occur automatically. However, the operator has the option to inhibit Reset Regeneration via the control panel  
[Main Menu "→"  
Regeneration "→" Inhibit]  
if the work environment poses a risk to safe regeneration.



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**

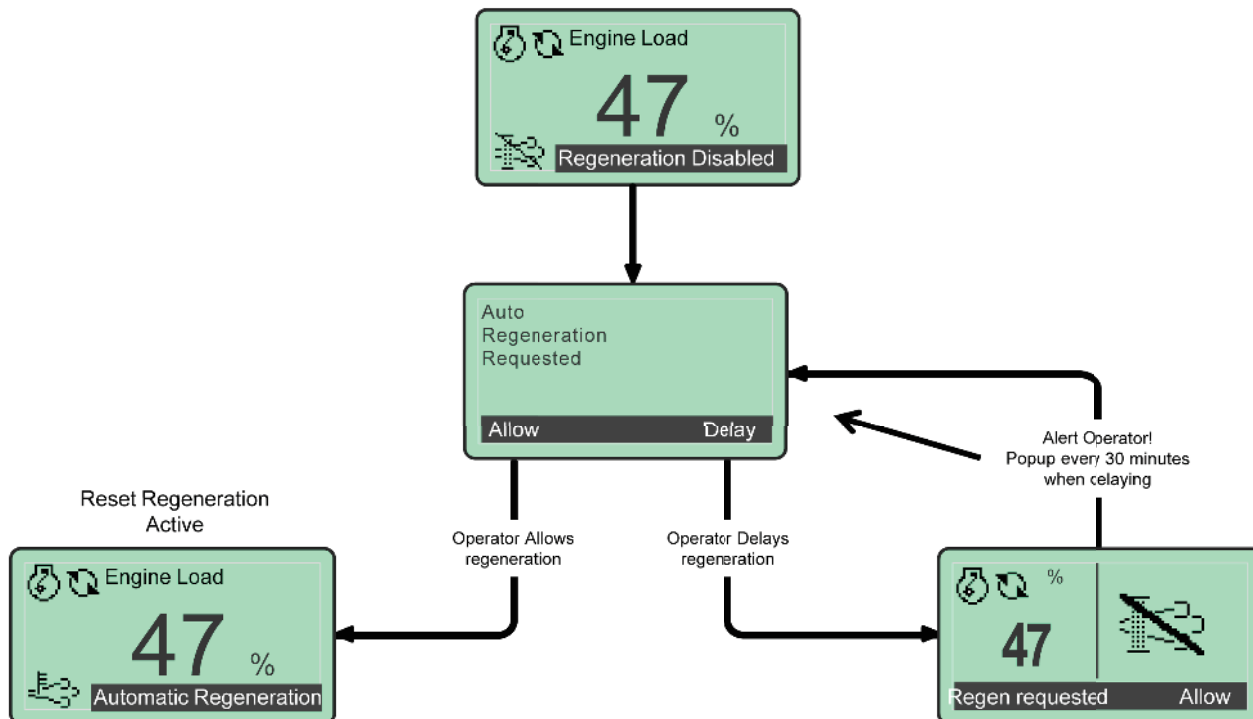
**During Reset Regeneration, post-injection is used and fuel is burned directly inside the DPF (burned by chemical reaction inside the Diesel Oxidation Catalyst (DOC). Through this heat, regeneration occurs inside the SF, but the combustion increases the temperature of the exhaust gas to close to 600° 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.

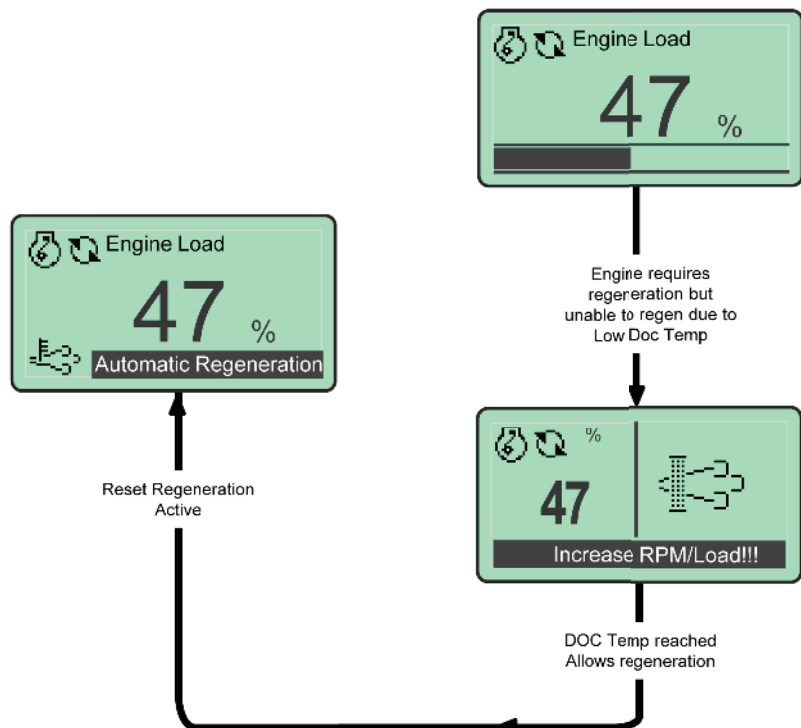
## RESET REGENERATION STANDBY DUE TO INHIBIT SWITCH

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

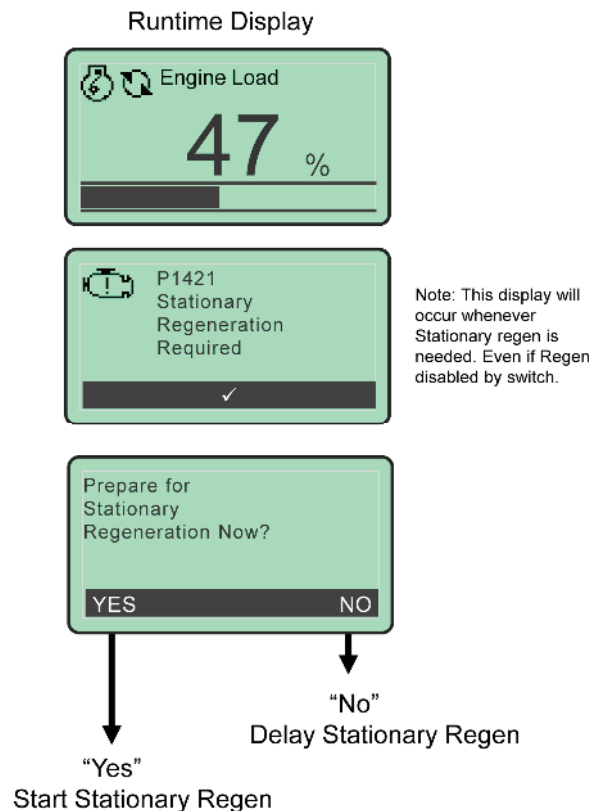
For Reset Regeneration to begin, the DOC temperature has to be at a sufficient level. If the DOC has not reached this temperature and Reset Regeneration is required, then a notification to Increase RPM/Load and the Regeneration icon will be displayed. Once the DOC reaches sufficient temperature, Reset 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 **HYDRAULICS OFF** (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

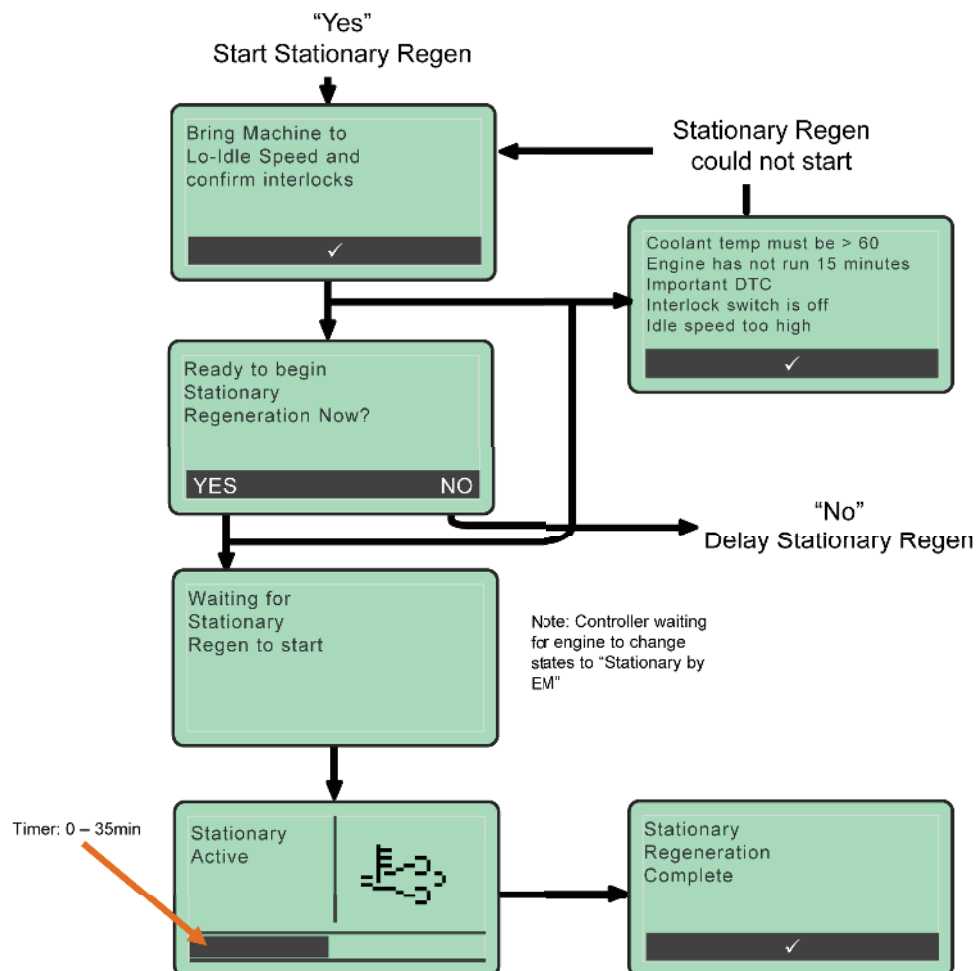
If these conditions are present, a notification will be displayed. Once these conditions are corrected by the operator, acknowledge the message and Stationary Regeneration will begin.

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.

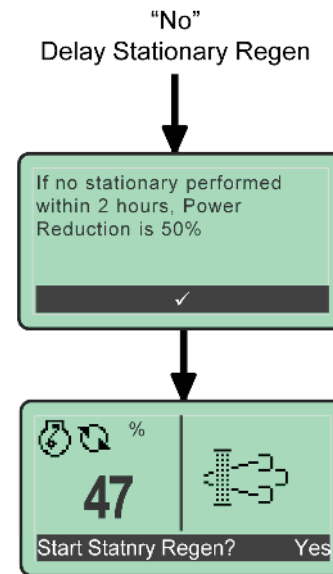
7. Once Stationary Regeneration is complete, a notification will be displayed and the engine will return to low idle, but will not automatically turn off. Normal machine operation can resume.



## 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.

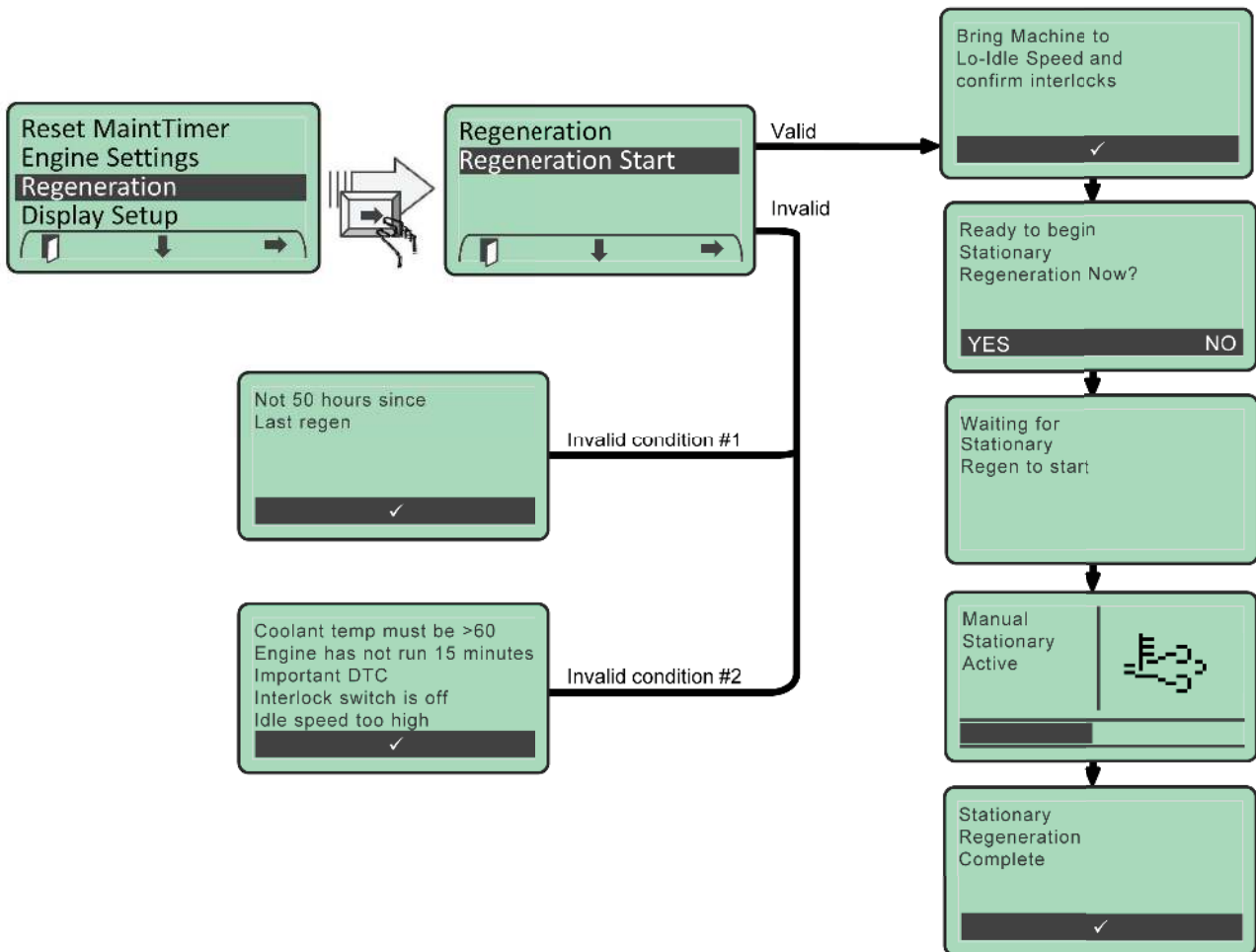
1. Move the machine to a well-ventilated and safe location.
2. When the message “Bring Machine to Lo-idle Speed and confirm interlocks” is displayed, make sure that the pump clutch is disengaged and hydraulic switch on control box is in the **HYDRAULICS OFF** (down) position. Reduce engine speed to low 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)



4. 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.

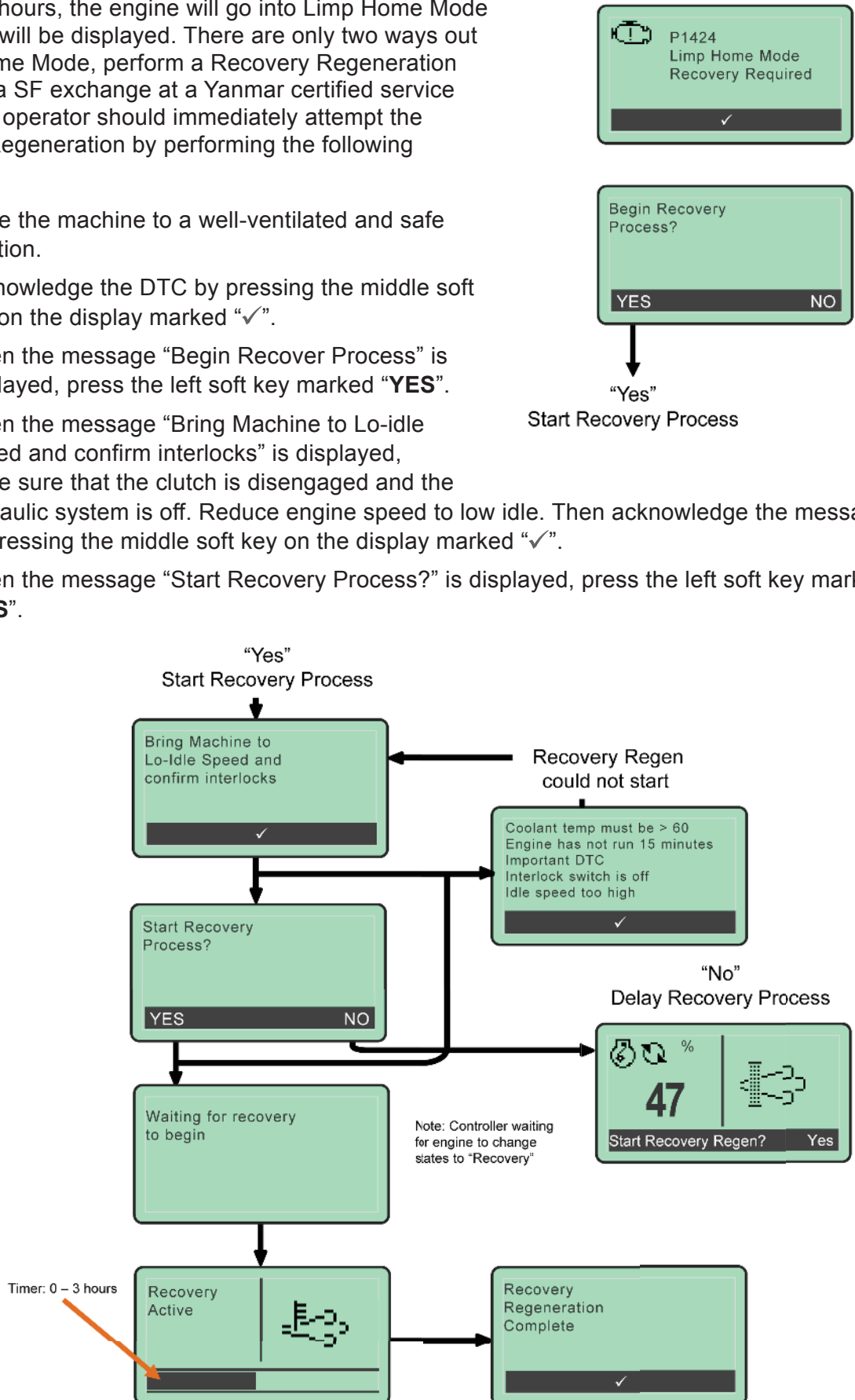
5. Once Stationary Regeneration is complete, a notification will be displayed and the engine will return to low idle, but will not automatically turn off. Normal machine operation can resume.



## 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".



## 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

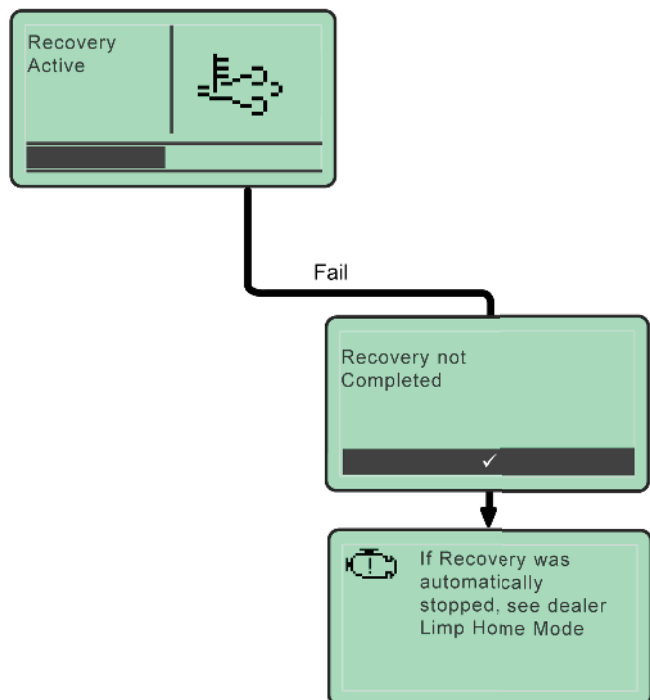
If these conditions are present, a notification will be displayed. Once these conditions are corrected by the operator, acknowledge the message and Stationary Regeneration will begin.

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 up 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 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) slurry pump clutch, place agitator control in the NEUTRAL position and turn the hydraulic switch to the **HYDRAULICS OFF** (down) position.

1. Turn key clockwise to the **ON** “

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** “A diagram of the control panel. On the left is a vertical key switch with three positions: OFF (top), ON (middle, marked with a circle containing the number 1), and START (bottom, marked with a key symbol). To the right of the key switch is a hydraulic toggle switch. It is shown in the 'ON' position, which is the top position. The switch has a white indicator and a red 'OFF' label at the bottom.

## 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. 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	Mulch	sq. ft. (sq m)	Acreage (Hectare)
T90	784 (356)	900 (408)	1,684 (764)	11,600 (1,078)	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		
Gallons (Liters)	inches (cm) from top	inches (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)

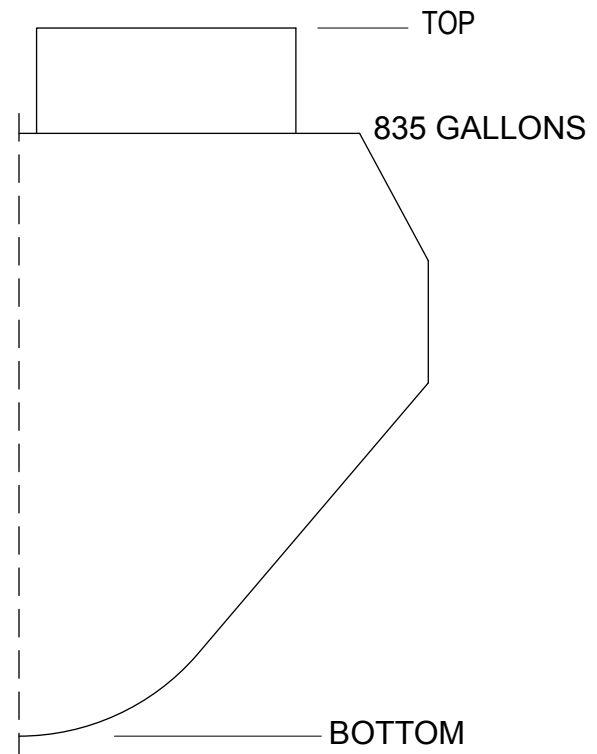


Figure 5 – Tank Capacity

## 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 the slurry pump 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** 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.



## LOADING (CONTINUED)

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. With the engine at low idle, engage (turn on) the slurry pump clutch with a firm snap. Do NOT allow clutch to slip.

### CAUTION

***Do NOT engage the slurry pump clutch above 1000 RPMs or damage to the slurry pump clutch will occur.***

- E. Increase engine speed to approximately 1/2 to 3/4 throttle.
  - F. When discharge stream is clear, open recirculation valve and close discharge valve. After recirculation stream is clear disengage (turn off) the slurry pump 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. Once the material is thoroughly mixed, place the agitator control lever in forward direction to 1/4 speed, or just 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 and at slow speed.
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 the slurry pump 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.
    - B. Aim discharge hose or boom 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. With the engine at low idle, engage (turn on) the slurry pump clutch with a firm snap. Do NOT allow clutch to slip.



***Do NOT engage the slurry pump clutch above 1000 RPMs or damage to the slurry pump clutch will occur.***

- E. Increase engine speed to approximately 1/2 to 3/4 throttle.
  - F. When discharge stream is clear, open recirculation valve and close discharge valve. After recirculation stream is clear, disengage (turn off) the slurry pump clutch.
  - G. Replace coupler gasket in the remote valve coupler or in boom.
5. Continue filling tank with water.
  6. Increase engine speed to full throttle.

## LOADING AND MIXING BFM, FGM, SMM AND OTHER HIGHLY VISCOUS SLURRIES (CONTINUED)

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 control 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 the with 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 slurry pump 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.

### T90 HYDROSEEDER®

Nozzle	Nozzle Part Number	Distance	Width	Discharge Time
Large Long Distance	008187	Up to 180 ft. (55 m)	-	5.5 minutes
Small Long Distance	006632	Up to 140 ft. (43 m)	-	12 minutes
Narrow Fan	005603	Up to 105 ft. (32 m)	15.8 ft. (4.8 m)	5.5 minutes
Wide Fan	006619	Up to 75 ft. (23 m)	20.5 ft. (6.3 m)	5.5 minutes

## 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.*

## APPLICATION OF SLURRY (CONTINUED)

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, disengage (turn off) the slurry pump clutch. If the shutdown is going to be for an extended period of time (i.e. lunch break, reloading, etc.), close the valves to prevent slurry from dewatering, re-engage (Turn on) the slurry pump clutch to continue the 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, with the engine at low idle, engage (turn on) the slurry pump clutch. At this time, should the operator want to stop spraying for a short period, disengage (turn off) the slurry pump clutch; then engage (turn on) the slurry pump clutch to continue spraying.

### CAUTION

***Do NOT engage the slurry pump clutch above 1000 RPMs or damage to the slurry pump clutch will occur.***

2. When the tank is empty, or when discontinuing discharge for an extended period of time, disengage (turn off) the slurry pump 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. With the engine at low idle, engage (turn on) the slurry pump 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) the slurry pump 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.***

## APPLICATION OF SLURRY (CONTINUED)

### III. PROCEDURES WHEN USING HOSES (CONTINUED)

#### 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 the slurry pump clutch and adjust the engine speed.

**⚠ CAUTION** *Since the extension hose will be seeing the full output of the slurry 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) the slurry pump clutch with the engine at low idle and then slowly increase the engine rpm until the desired discharge pressure is reached.

**⚠ CAUTION** *Do NOT engage the slurry pump clutch above 1000 RPMs or damage to the slurry pump clutch will occur.*

4. When finished spraying, disengage (turn off) the slurry pump 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 the slurry pump 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. With the engine at low idle, engage (turn on) the slurry pump clutch, and increase the engine speed to full throttle. A stream of water should be coming from the end of the recirculation pipe beside the hatch opening, as well as from the boom.

#### CAUTION

***Do NOT engage the slurry pump clutch above 1000 RPMs or damage to the slurry pump clutch will occur.***

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 engine throttle to 3/4 speed and 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.

## LIMING PROCEDURE (CONTINUED)

13. When ready to apply slurry, install gasket and nozzle into boom.
14. Move agitator control to 3/4 speed FORWARD.
15. With the slurry pump 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. With the engine at low idle, aim the discharge hose or boom toward an open area, move discharge valve handle to discharge position and engage (turn on) the slurry pump clutch. Allow to discharge until clear water is coming out.

#### CAUTION

***Do NOT engage the slurry pump clutch above 1000 RPMs or damage to the slurry pump clutch will occur.***

- E. Move recirculation valve handle to recirculation and allow to run momentarily.
- F. Disengage (turn off) the slurry pump 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 250 hours have not been met.***

- D. Lubricate swivels on discharge assembly.

## **CLEANING AND MAINTENANCE (CONTINUED)**

### **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 with the sight gauge.
4. Check the slurry pump 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 or damage to the radiator fins will occur.

### **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

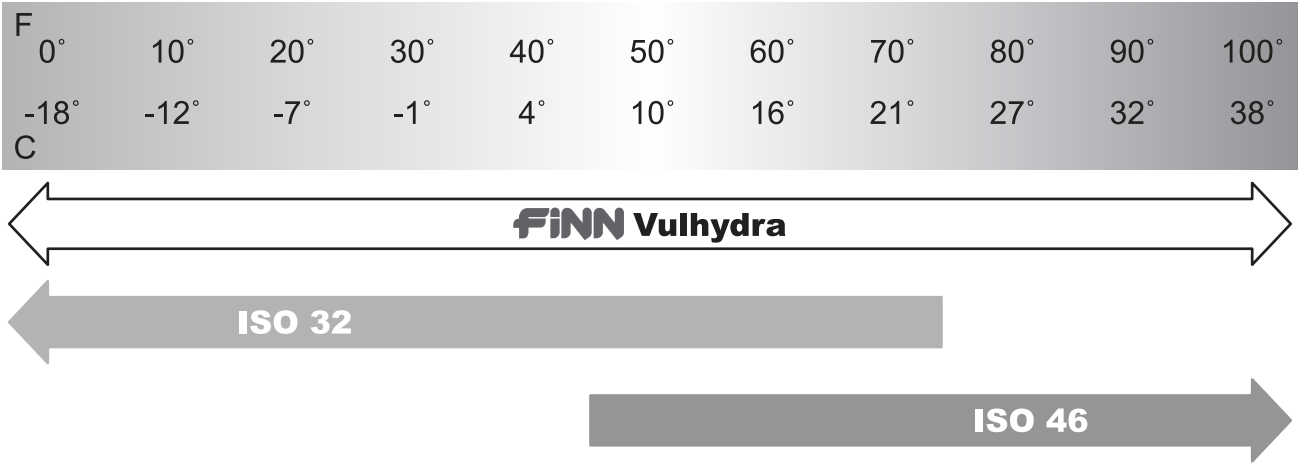
The hydraulic system on your FINN HydroSeeder® is designed to give trouble-free service, if maintained. The most important areas of maintenance are the hydraulic oil and filtration. The reservoir holds 19 gal (72 L) of hydraulic oil.

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 5 micron absolute filter (FINN part number A3556-001). The hydraulic system relief is factory-set at 2,100 psi (14,479 kPa).

At time of manufacture, this unit contains Finn Vulhydra hydraulic oil. The chart below illustrates the operating temperature range of the Finn Vulhydra hydraulic oil as well as the closest ISO equivalents.

**NOTE:** Use equal to, or better than, a 5 micron absolute filtration.

**NOTE:** The Finn Vulhydra hydraulic oil may be substituted for either of the two ISO oils listed below. Please use the temperature chart to determine what oil works best in your situation.



## 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.*

### 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).

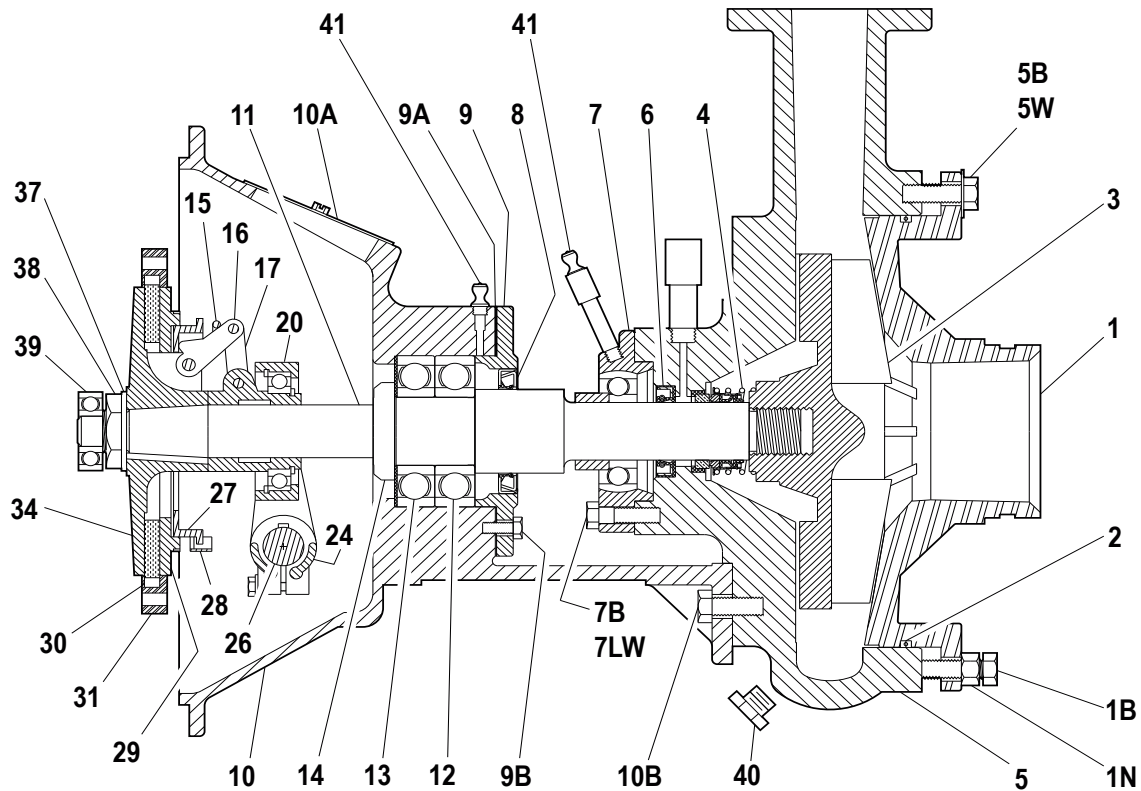


Figure 6 – Cross-Section Through Clutch/Pump Assembly (Clump)

### **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.*



## CLUTCH/PUMP COMBINATION (CLUMP) MAINTENANCE (CONTINUED)

**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 three 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.

## CLUTCH/PUMP COMBINATION (CLUMP) MAINTENANCE (CONTINUED)

### D. INSTALLING NEW SEAL ASSEMBLY (CONTINUED)

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 clutch 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 clump 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).

## CLUTCH MAINTENANCE SECTION (CONTINUED)

### A. ADJUSTMENT (CONTINUED)

#### 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 the slurry pump.
2. Place a jack under bell housing of engine to support the rear of the engine after clump has been removed.
3. Place the slurry pump clutch control in the ENGAGE position to hold clutch facings in place when removing clutch from engine. Unbolt the rod that connects the slurry pump clutch operating lever to operator's platform clutch handle
4. Attach a suitable lifting device to slurry pump clutch 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.

## CLUTCH MAINTENANCE SECTION (CONTINUED)

### 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) the slurry pump 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.



**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) the slurry pump 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.

## TROUBLESHOOTING YOUR HYDROSEEDER® (CONTINUED)

- 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) the slurry pump clutch and stop engine. Close suction shutoff valve.
  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 and reopen the suction line shutoff valve.
- 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.



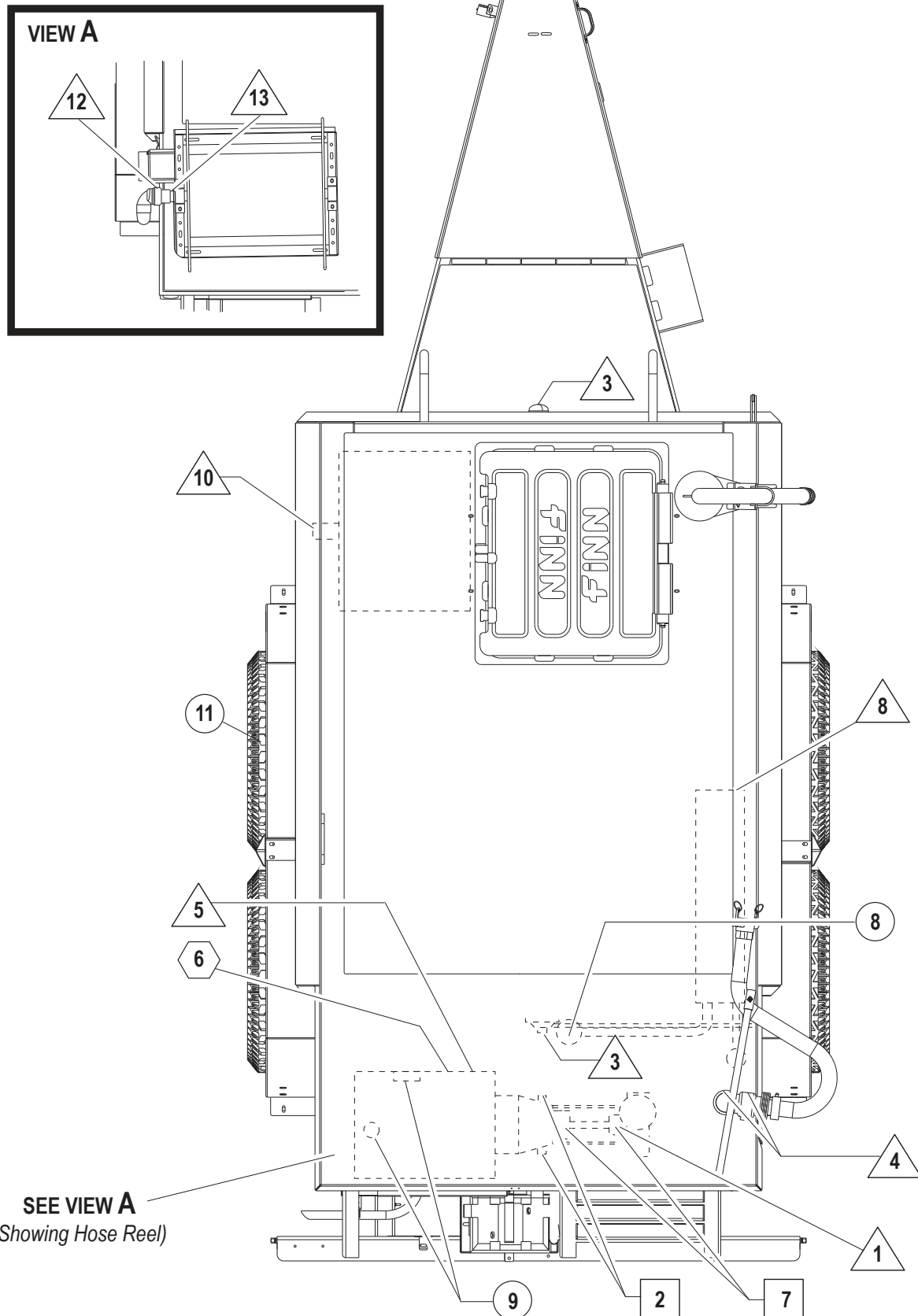
## TROUBLESHOOTING YOUR HYDROSEEDER® (CONTINUED)

Problem	Probable Causes	Suggested Solutions
<b>LEAKS</b>		
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.
<b>MACHINE JUMPS DURING OPERATION</b>		
Agitator	Agitator bent by heavy object falling on it	Straighten agitator shaft 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.
<b>FOAMING OF SOLUTION AND LACK OF DISTANCE</b>		
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® (CONTINUED)

Problem	Probable Causes	Suggested Solutions
<b>VALVE</b>		
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.
<b>CLUTCH</b>		
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.
<b>PUMP</b>		
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 1/4 discharging speed in reverse and disengage (turn off) the slurry 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 CHART (Reference Figure 7)

Ref. No.	Location	Lubricant	Frequency	Number
1	Check Grease Level in Automatic Pressure Lubricator	SL	Daily	1
2	Grease Clutch Lever Bearings	CL	Weekly	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	Daily	1
	Replace Hydraulic Fluid and Filter	HO	Seasonally	1
9	Change Engine Coolant	AF	See Engine Manual	1
10	Check Fuel Tank	DF	Daily	1
11	Repack Wheel Bearings	CL	Seasonally	4
12	Grease Hose Reel Swivel	CL	Daily	1
13	Grease Hose Reel Hank Crank Shaft	CL	Daily	1

## LUBRICATION OR FLUID USED

SL	Bearing Lube (Sodium-Based)
CL	Chassis Lubricant
MO	Motor Oil (See Engine Manual Recommendations)
HO	Hydraulic Oil [Finn Vulhydra hydraulic oil or the closest ISO equivalent (see Hydraulic System section for ISO Grade oil selection)]
AF	50/50 Anti-Freeze and Water Mixture
DF	Diesel Fuel

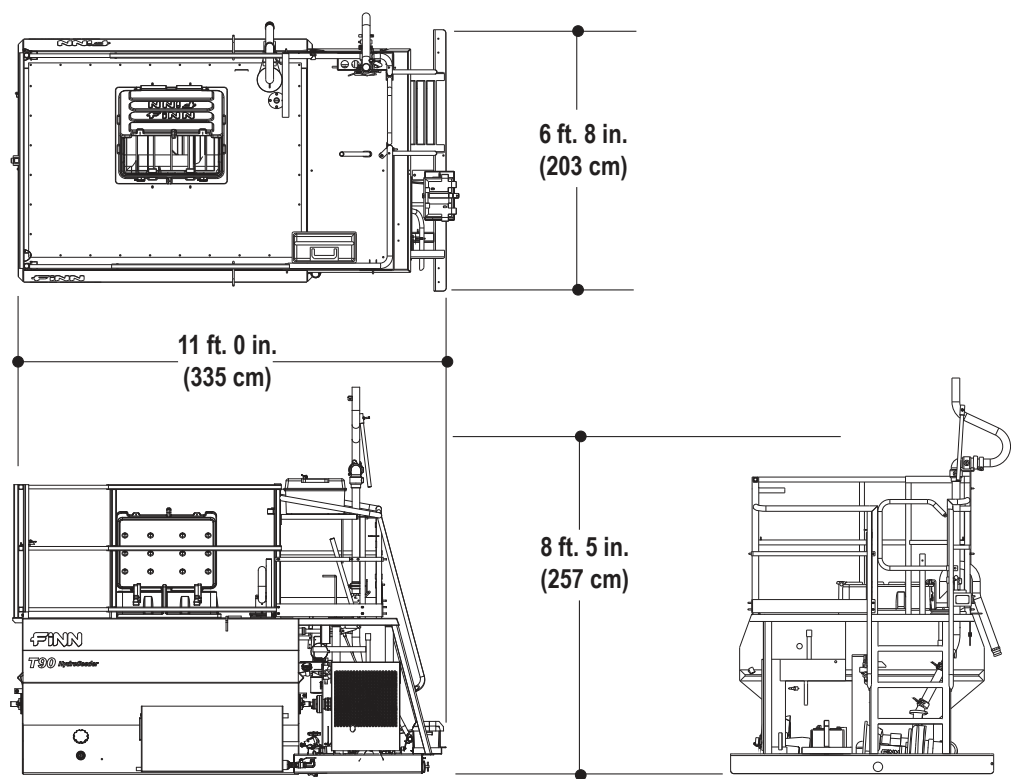
## FLUID CAPACITIES

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

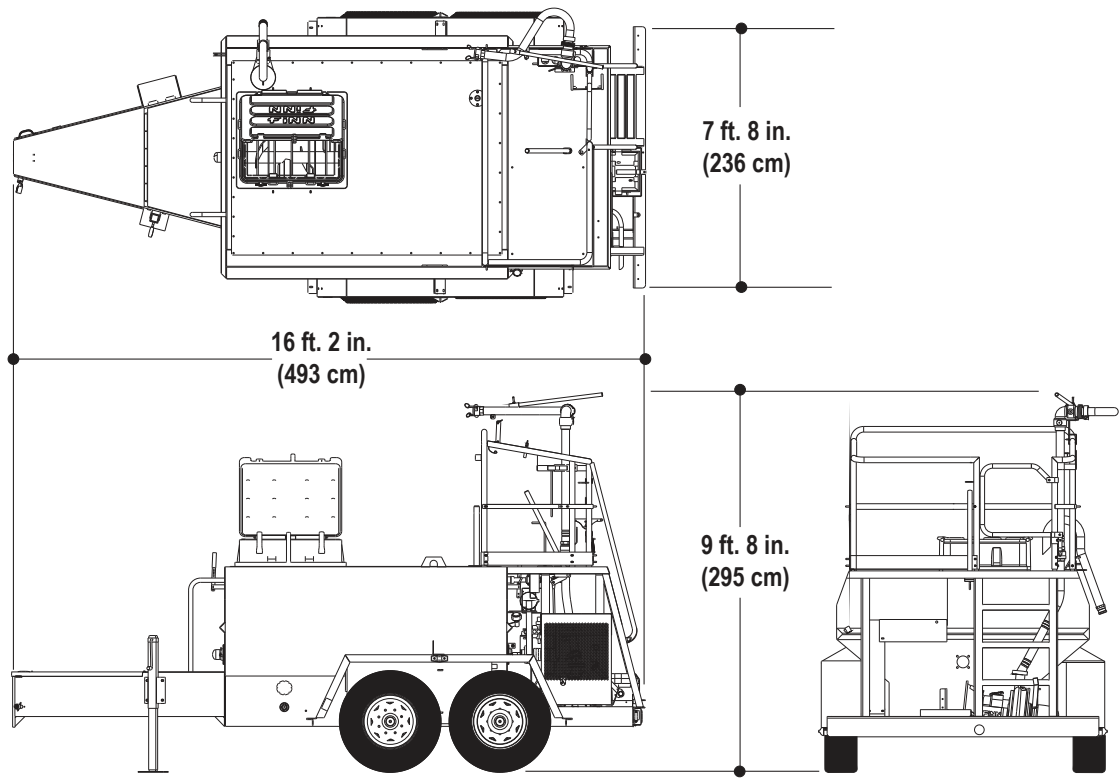
## TIME KEY

	Daily (8 hours)
	Weekly (40 hours)
	Seasonally (500 hours)
	See Engine Manual

# T90 SKID-MOUNT HYDROSEEDER® TECHNICAL SPECIFICATIONS



# T90 TRAILER 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 (646 LPM @ 7 kg/cm <sup>2</sup> ), 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 .....	T90T	5,810 lbs (2,635 kg)
	T90S	4,150 lbs (1,882 kg)
WORKING WEIGHT*.....	T90T	15,115 lbs (6,856 kg)
	T90S	13,455 lbs (6,103 kg)
BRAKES .....	Electric on both axles with breakaway switch	
LIGHTS .....	D.O.T. including side marker lights, an identification light, and a license plate light	
TIRES .....	ST225/90D16 bias ply tires, load range E	
TRAILER AXLES .....	Tandem 7,000 lbs (3,176 kg) rubber torsion with fenders	
GVWR.....	15,000 lbs (6,804 kg)	
HITCH WEIGHT.....	Approx. 1,500 lbs (680 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

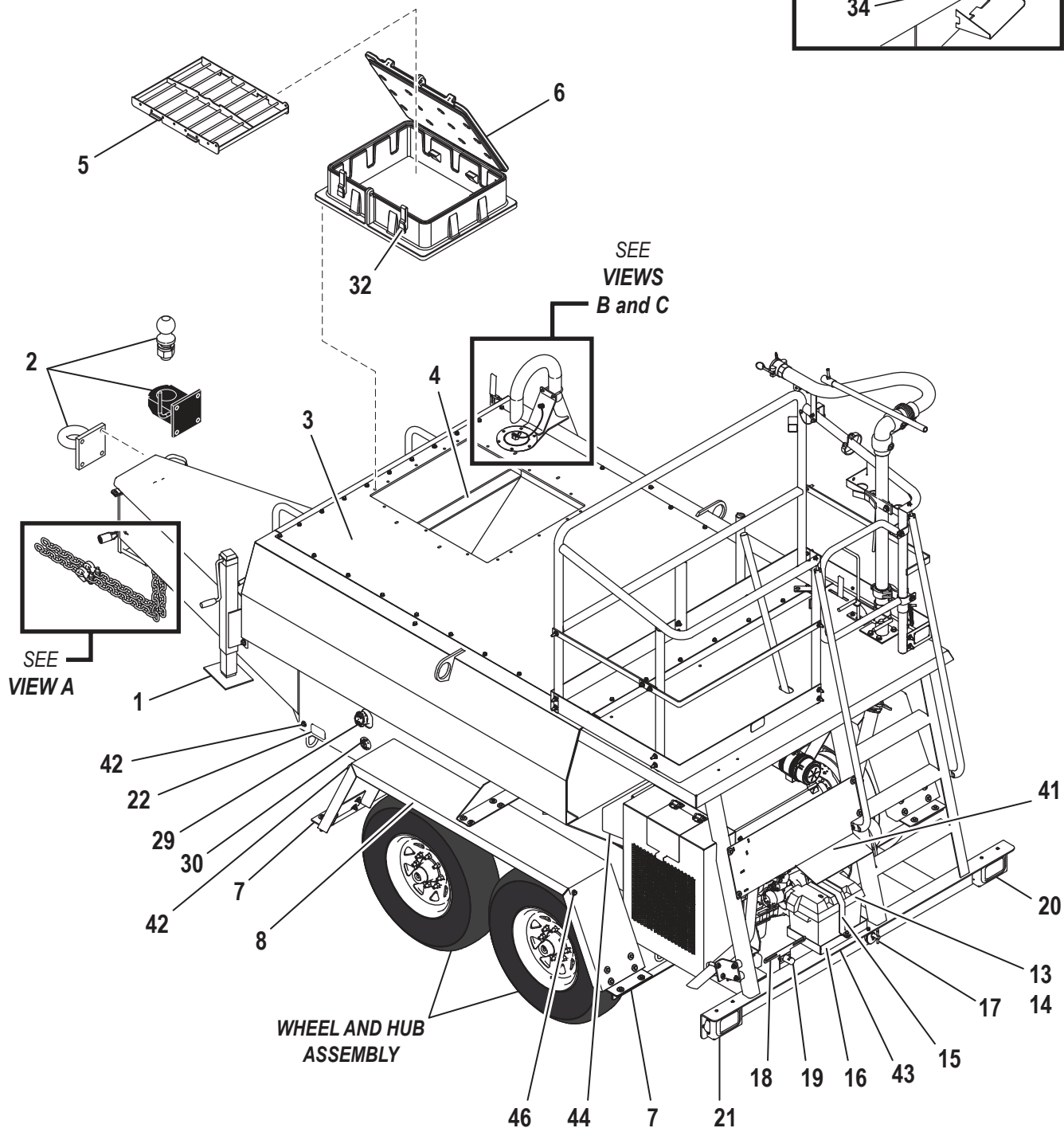
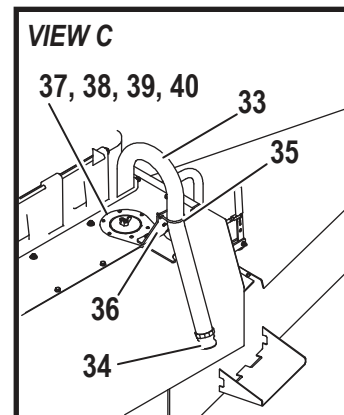
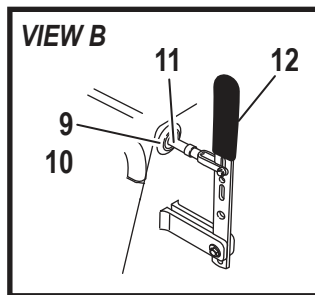
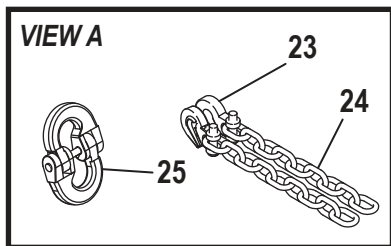
# **T90-II**

# **HydroSeeder®**

## **Parts Manual**

**Model T90S MB**

**Model T90T MBA**



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

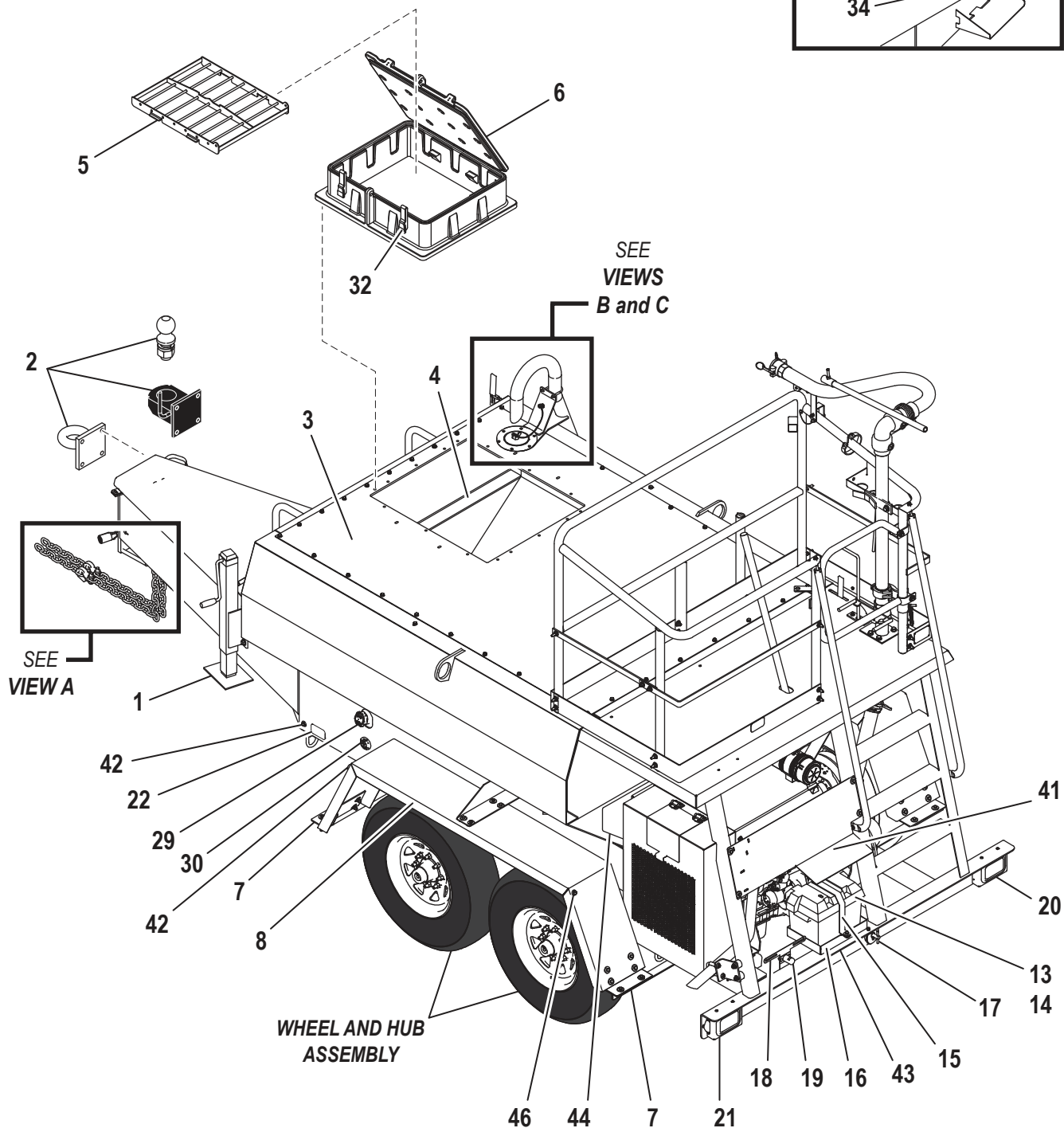
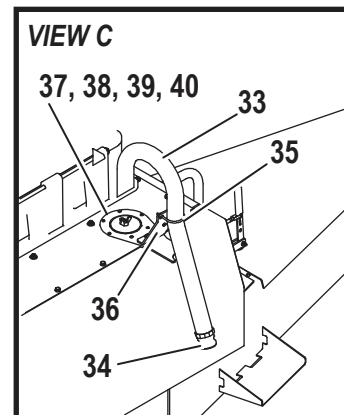
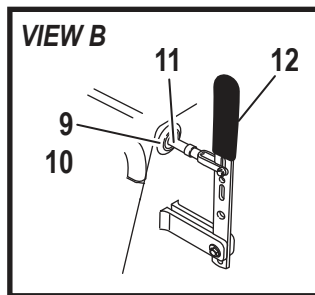
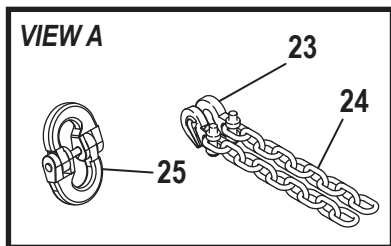
## TRAILER

### (STANDARD MODEL)

Ref. No.	Part Number	Description	No. Req'd
1	080701	Jack Weldment with Bracket	1
2	080043	Lunette Eye 2-1/2 in. Pintle Hitch ( <i>optional</i> )	1
	005134	2-5/16 in. Ball Coupler ( <i>optional</i> )	1
	005135	2-5/16 in. Ball ( <i>optional</i> )	1
3	F90-0020	Tank Top	1
	190047	Tank Top Foam Gasket (3/8 in. thick x 1-1/4 in. wide)	29 ft.
4	F120-0006	Hatch Safety Rail	1
5	012834	Bag Cutter – Stainless Steel	1
6	012833	Poly Hatch Assembly	1
	190047	Tank Top Foam Gasket (3/8 in. thick x 1-1/4 in. wide)	10 ft.
7	F90-0006	Fender Mounting Bracket	4
8	A1444-001	Fender	2
9	005515-01	Agitator Control Rod Conduit	1
10	005178	O-ring	1
11	005516-01	Agitator Control Rod Weldment	1
12	F60-0020	Agitator Control Handle	1
	022202	Black Handle Grip	1
13	080223	Battery Case	1
14	002256-12	12V Battery	1
15	F90-0016	Battery Box Hold Down	1
16	055847	Battery Tray	1
17	004593	Expansion Plug	1
18	004720	License Plate Bracket	1
19	A1220-001	License Plate Light	1
20	A1450-001	Right Hand Side Taillight Assembly	1
21	A1451-001	Left Hand Side Taillight Assembly	1
22	A1304-001	Amber, Rectangular Reflector	2
23	005796	Clevis Grab Hook – Self-Lock	2
24	190033	Safety Chain (3 ft.)	2
25	004888	Binder Chain Coupling Link	2
26	005500-02	Fuel Tank Support Angle	1
27	005500-12	Fuel Tank Angle – Long	1
28	005913	Diesel Fuel Tank, 13.5 Gallons	1
29	005726	Diesel Fuel Cap	1
	005724-02	Fuel Tube Assembly	2
	031464-03	Fuel Tube Grommet	2
30	005721	Fuel Tank Gauge	1

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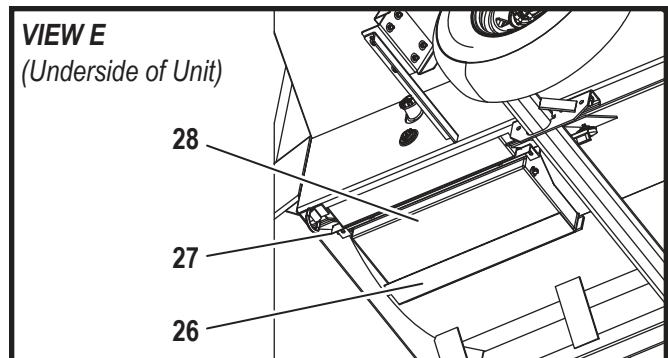
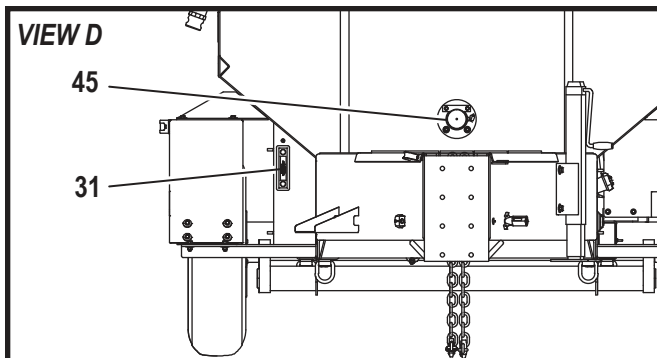
## TRAILER (CONTINUED)

### (STANDARD MODEL)

Ref. No.	Part Number	Description	No. Req'd
30	005721	Fuel Tank Gauge	1
31	080329	Hydraulic Level Sight Gauge	1
32	005433	Hatch Latch	2
33	005880	Fill Port Pipe	1
34	006096	2 in. Male Coupler	1
35	011115	U-Bolt for 2 in. Pipe	1
36	F90-0017	Fill Port Support	1
37	005160	Fill Port Plug	1
38	005016	"S" Hook	1
39	005544-01	Fill Port Gasket	1
40	005700	Nylon Lanyard	1
41	F90-0026	Valve Mounting Plate	1
42	A1227-001	Amber LED Marker Light	4
43	005944	LED Identification Light	1
	005945	Wire Sleeve	1
44	A0983-001	ECM/WIF/Fuel Pump Mounting Plate	1
45	005399	Agitator Shaft Guard	1
46	A1227-002	Red LED Marker Light	2

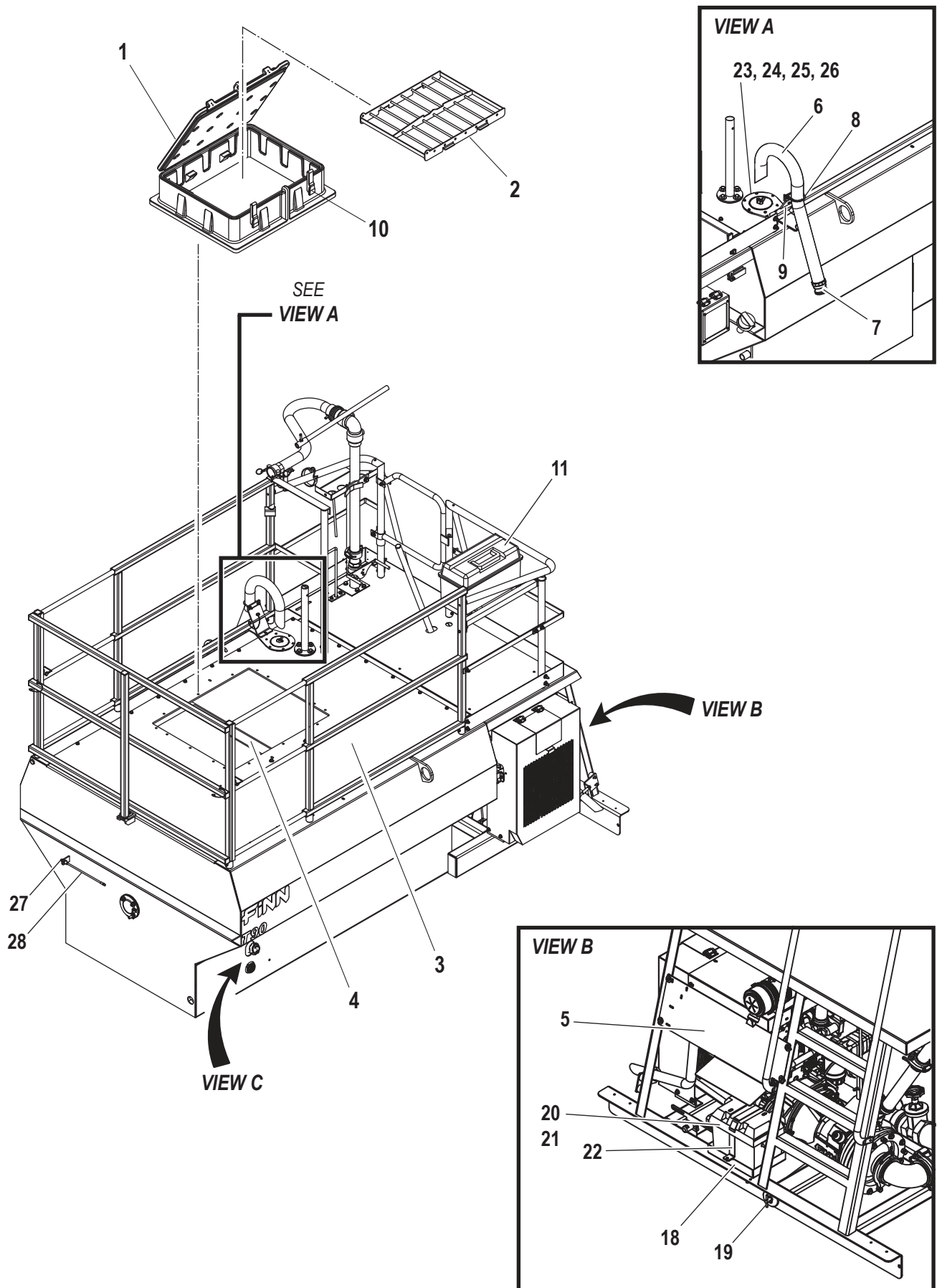
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A0897-001	ECM Cover	1
005905	ECM Mounting Isolators	4
031144	Clutch Lever	1
000427	Black Handle Grip	1

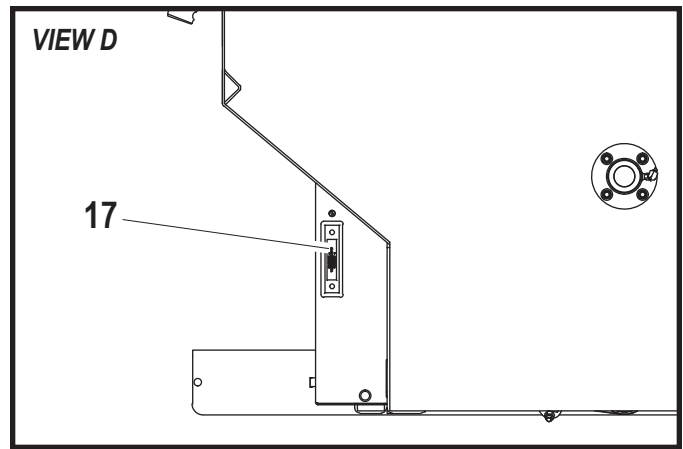
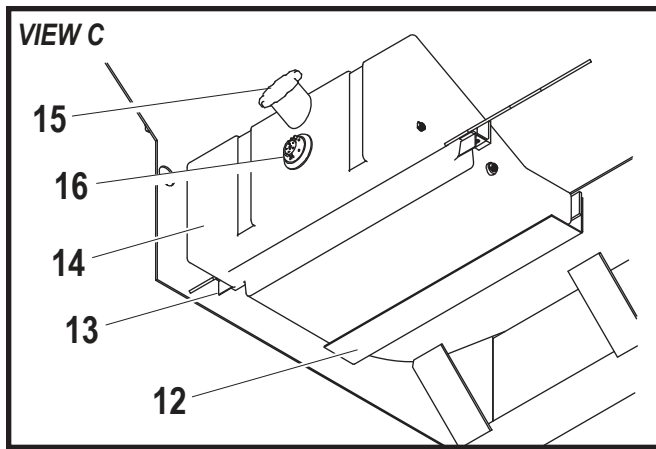


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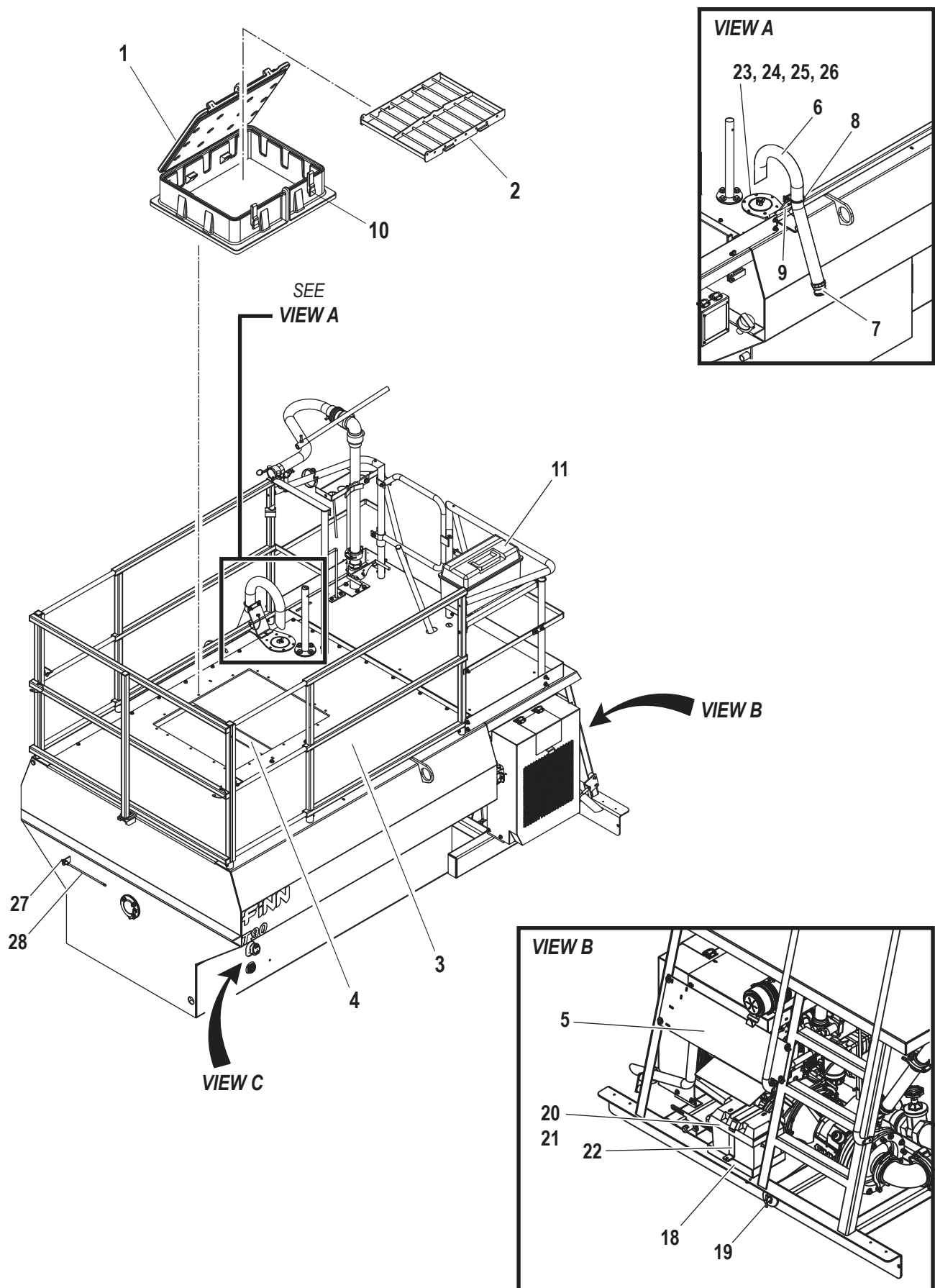


## SKID (STANDARD MODEL)

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	F90-0026	Valve Mounting Plate	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
	005724-02	Fuel Tube Assembly	2
	031464-03	Fuel Tube Grommet	2
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

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## SKID (CONTINUED)

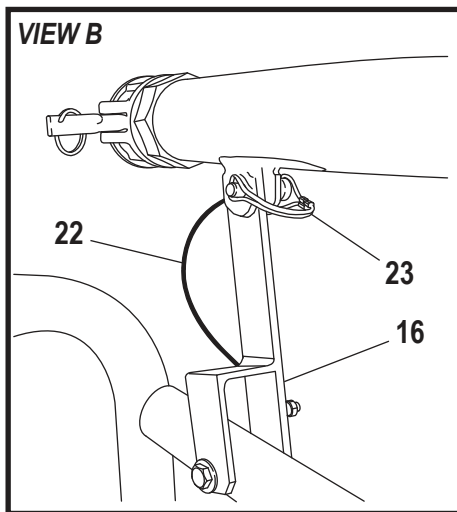
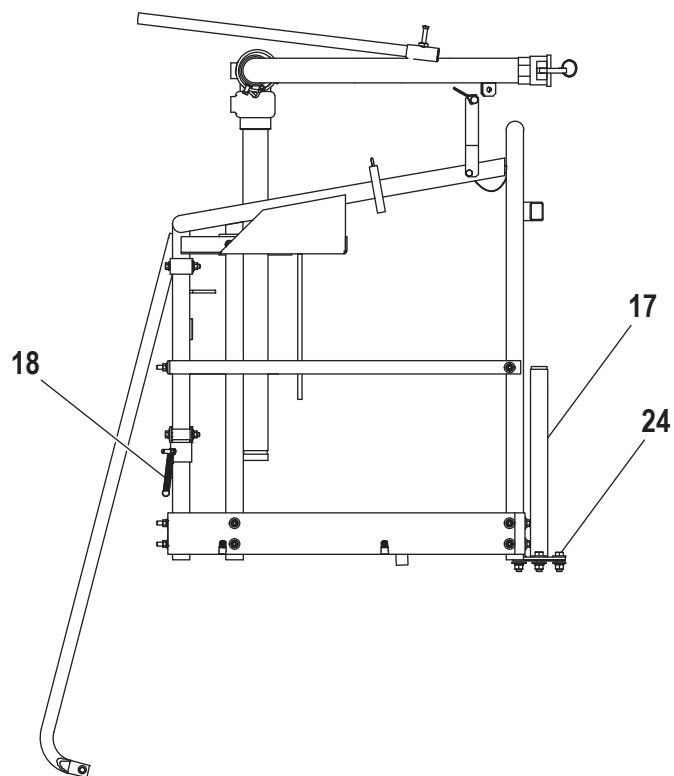
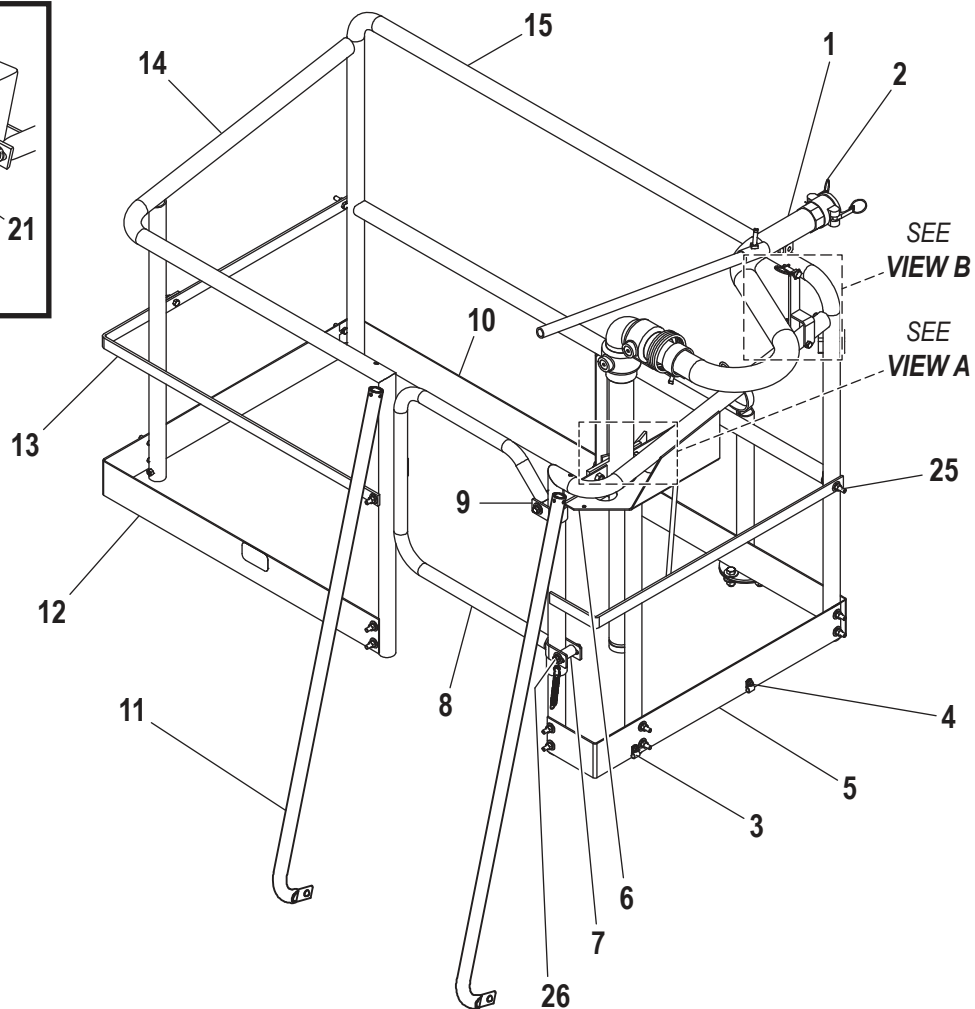
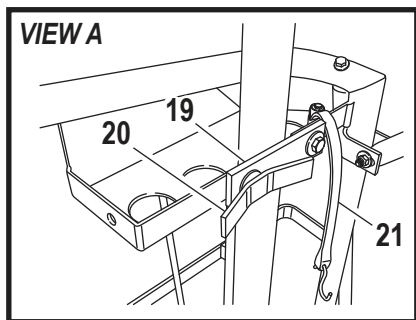
(STANDARD MODEL)

Ref. No.	Part Number	Description	No. Req'd
23	005700	Nylon Lanyard	1
24	005160	Fill Port Plug	1
25	005544-01	Fill Port Gasket	1
26	005016	"S" Hook	1
27	012520	Bulkhead Fitting	2
28	012521	Grease Hose	2

### NOT SHOWN

A0897-001	ECM Cover	1
A0983-001	ECM/WIF/Fuel Pump Mounting Plate	1
005905	ECM Mounting Isolators	4
031144	Clutch Lever	1
000427	Black Handle Grip	1
005654-01	Lower Control Box Mount	1
005924	GLC Control Box Mount	1

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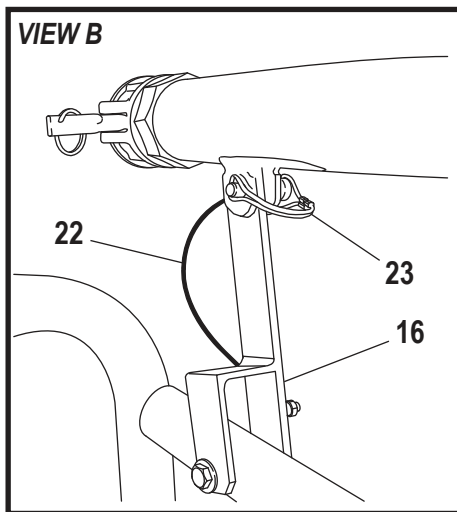
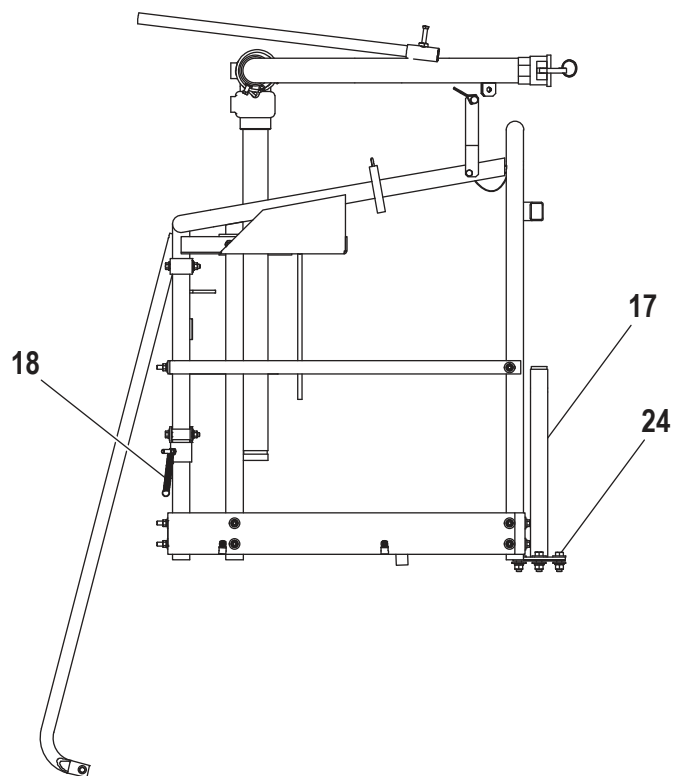
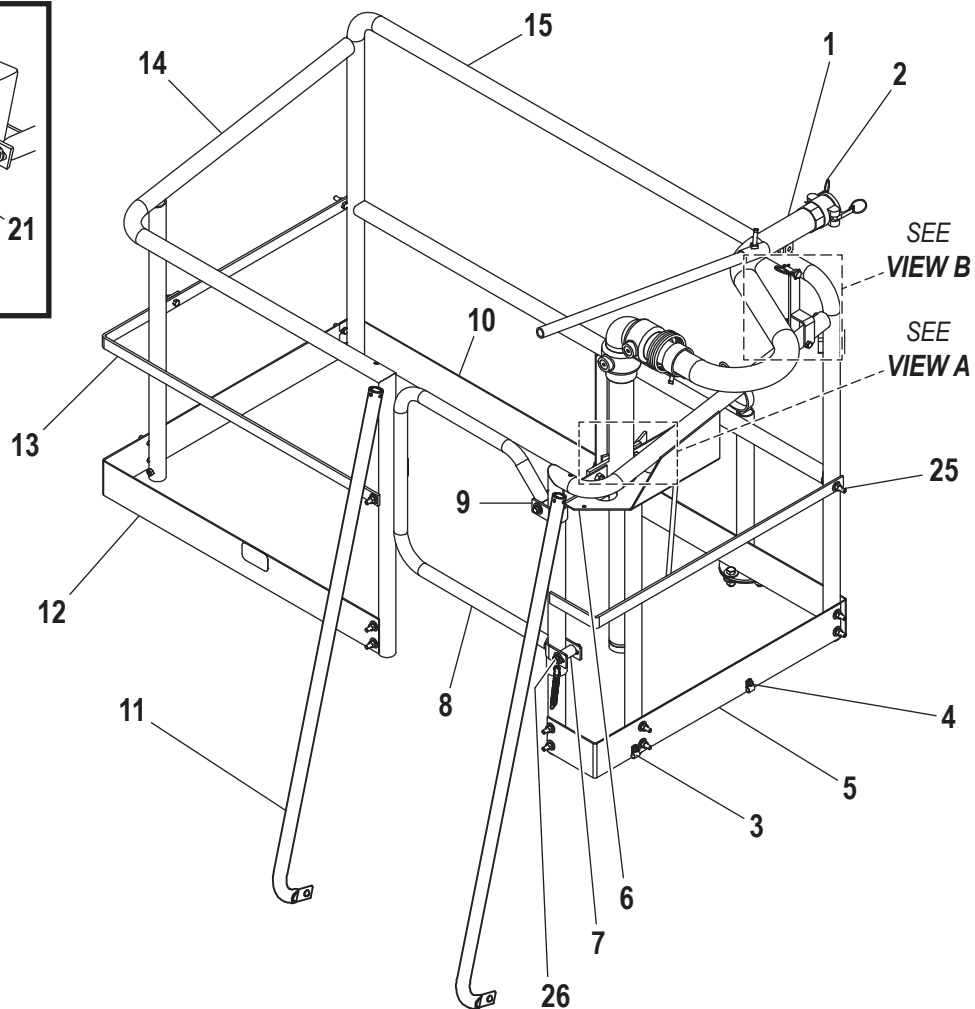
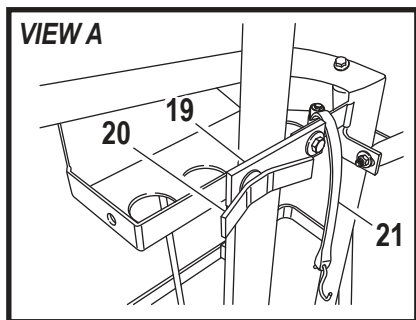
# OPERATOR'S PLATFORM

## (TRAILER 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	023684	Loop Clamp	2
4	--	Loop Clamp Hardware	
	●	1/4 - 20 UNC x 0.75 Hex Bolt	2
	●	1/4 in. Plain Washer	2
	●	1/4 in. Hex Nut	2
5	005462-03	Platform Right Toe Rail	1
6	005538	Right Rear Rail Weldment	1
7	005532-03	Spacer	1
8	005533	Gate Weldment	1
9	005532-05	Hinge Mounting Strap	1
	--	Hinge Mounting Strap Hardware	
	●	3/8 - 16 UNC x 3.0 Hex Bolt	1
	●	Helical Spring Lock Washer	1
	●	3/8 Plain Washer	2
	●	3/8 in. Hex Nut	1
10	005462-01	Platform Cross Toe Rail	1
11	005531-01	Hand Rail Weldment	2
12	005462-02	Platform Left Toe Rail	1
13	005534-01	Left Rear Guard Rail Strap	1
14	005540	Left Rear Rail Weldment	1
15	005536	Front Cross Rail Weldment	1
16	005528-02	Boom Hold Down Weldment	1
17	005714-01	Vent Port Weldment	1
18	012052	Gate Spring	1
19	012487-05	Boom Clamping Strap	1
20	002258	Clamp Handle Assembly	1
	--	Clamp Handle Hardware	
	●	1/2 - 13 UNC x 1.5 Hex Bolt	1
	●	1/2 Helical Spring Lock Washer	2
	●	1/2 Plain Washer	3
	●	1/2 in. Hex Nut	2
21	005161	Rubber Strap with "S" Hooks	1
22	005700	Nylon Lanyard	1
23	031245	Snapper Pin	1

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## OPERATOR'S PLATFORM (CONTINUED)

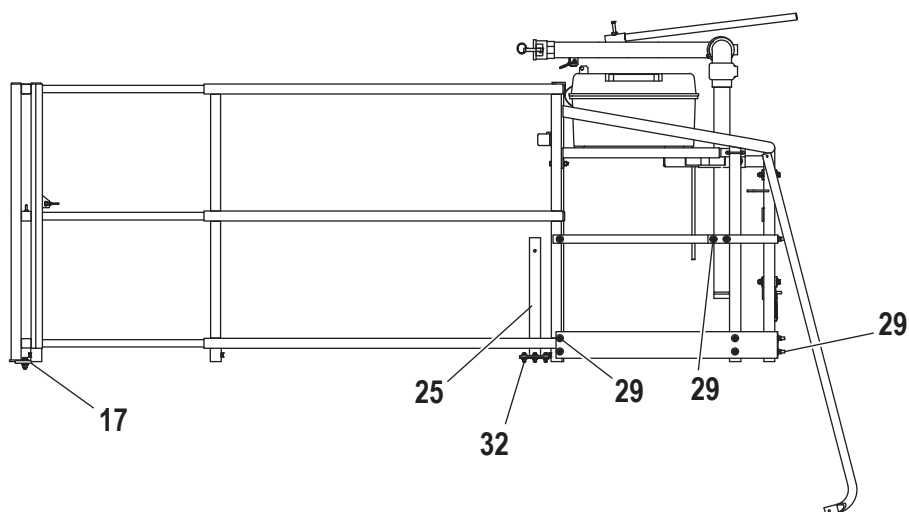
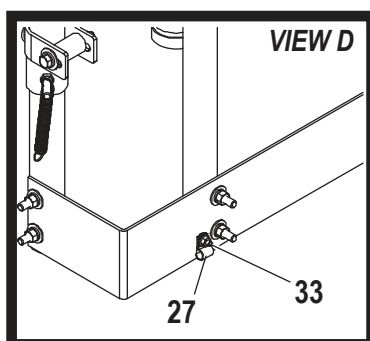
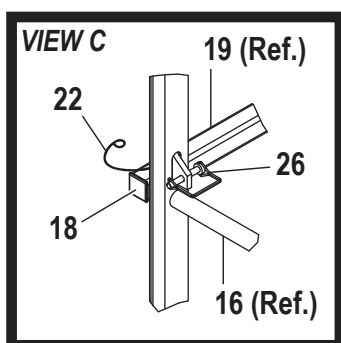
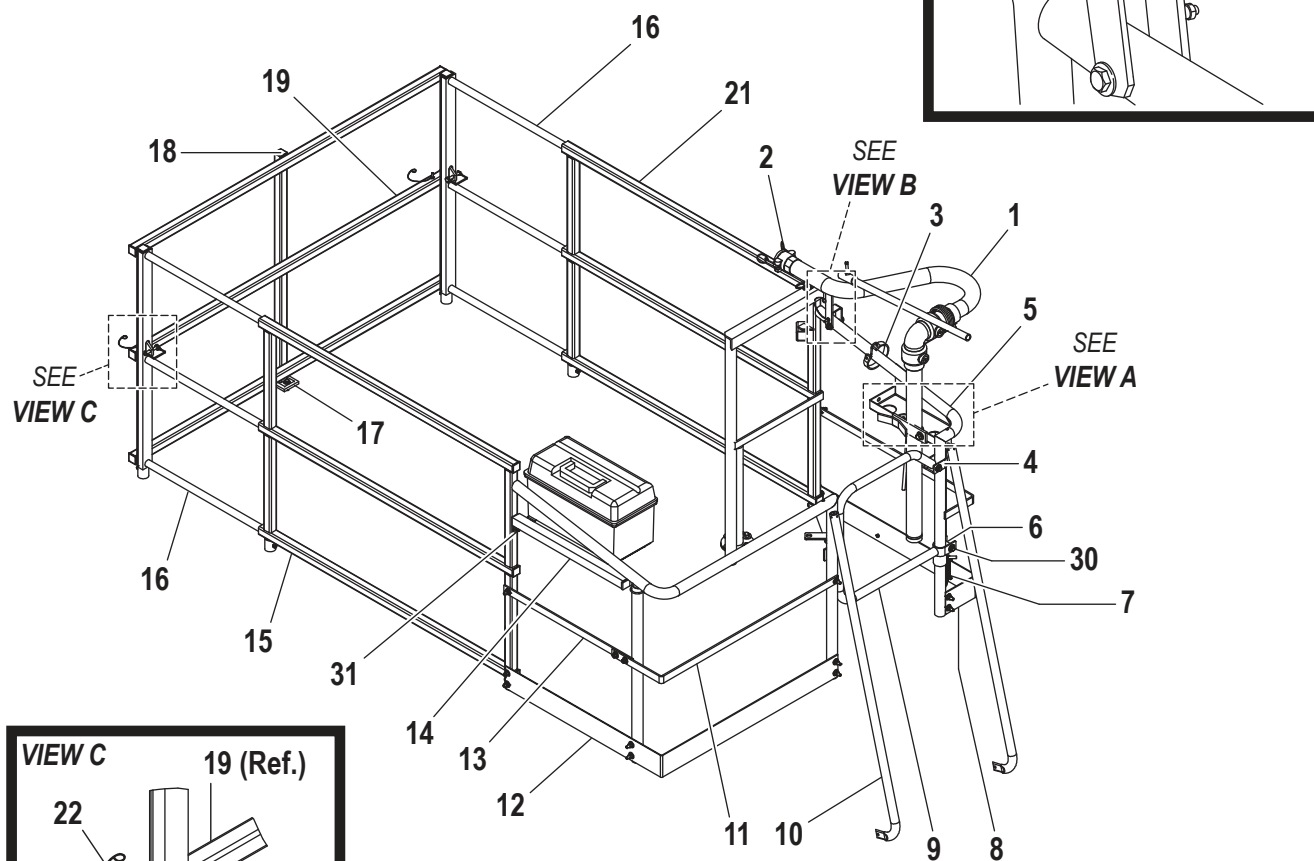
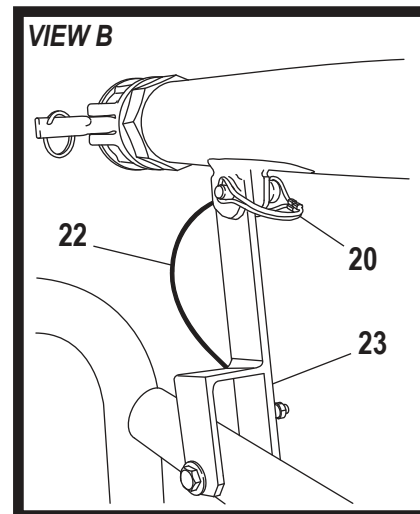
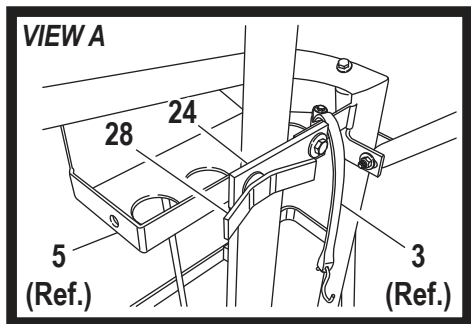
### (TRAILER MODEL)

Ref. No.	Part Number	Description	No. Req'd
24	--	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	4
	●	1/2 in. Hex Nut	4
25	--	Operator's Platform Hardware	
	●	3/8 - 16 UNC x 3 Hex Bolt	1
	●	3/8 - 16 UNC x 1.25 Hex Bolt	2
	●	3/8 in. Plain Washer	22
	●	3/8 Helical Spring Lock Washers	22
	●	3/8 in. Hex Nut	22
	●	3/8 - 16 UNC - 2.5 Hex Bolt	4
	●	3/8 - 16 UNC - 1 Square Head Bolt	6
	●	3/8 - 16 Jam Nut	6
26	--	Gate Hardware	
	●	3/8 - 16 UNC x 3.0 Hex Bolt	1
	●	Helical Spring Lock Washer	1
	●	3/8 Plain Washer	4
	●	3/8 in. Hex Nut	2

#### KITS AND MARKERS

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

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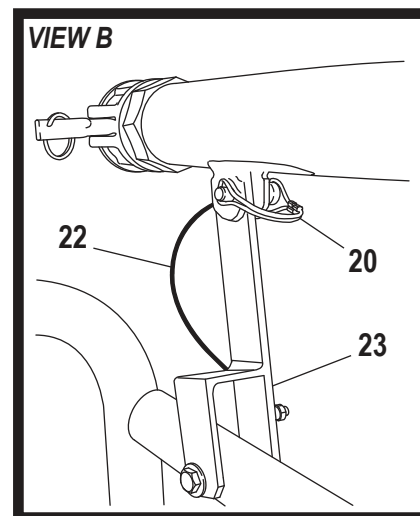
# OPERATOR'S PLATFORM

## (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	1
	●	3/8 Plain Washer	2
	●	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	005531-01	Hand Rail Weldment	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
15	005598	Left Rear Rail	1
16	005596	Slide Gate	2
17	052136-07	Mounting Pad	1
	--	Mounting Pad Hardware	
	●	3/8 - 16 UNC x 1.5 Hex Bolt	1
	●	3/8 in. Plain Washer	2
	●	3/8 Helical Spring Lock Washer	1
	●	3/8 in. Hex Nut	1
18	005613	Square Tubing Plug	13
19	005652	Front Cross Rail	1
20	031245	Snapper Pin	1
21	005600	Right Rear Rail	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	FW71225	Snapper Pin	2
27	023684	Loop Clamp	2

*Continued to next page.*

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



# OPERATOR'S PLATFORM (CONTINUED)

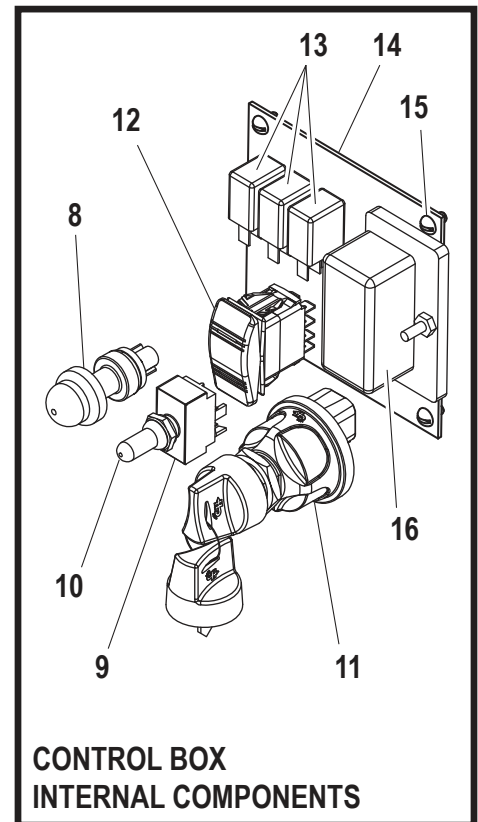
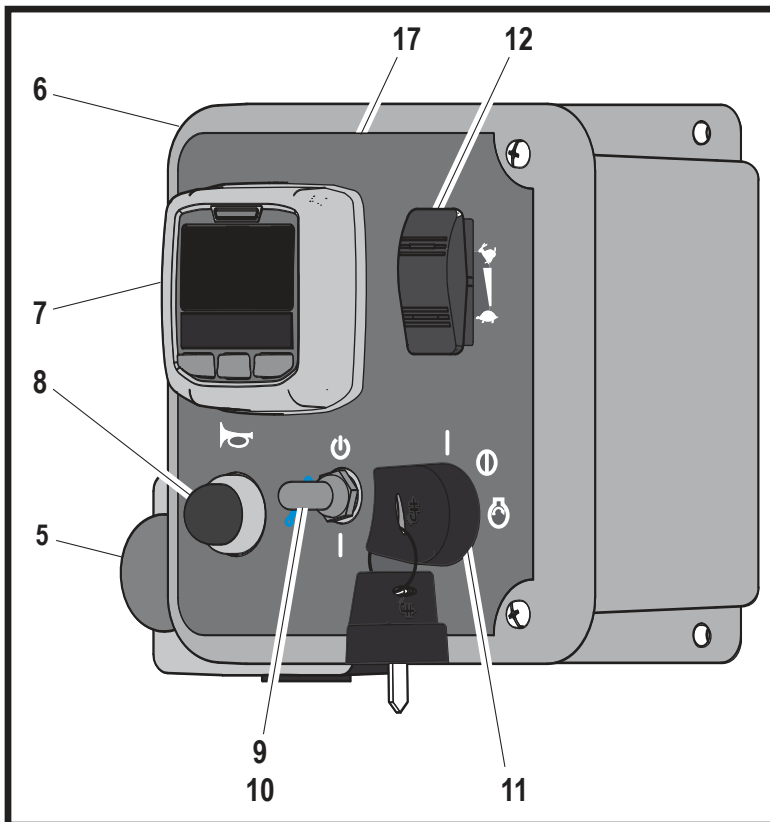
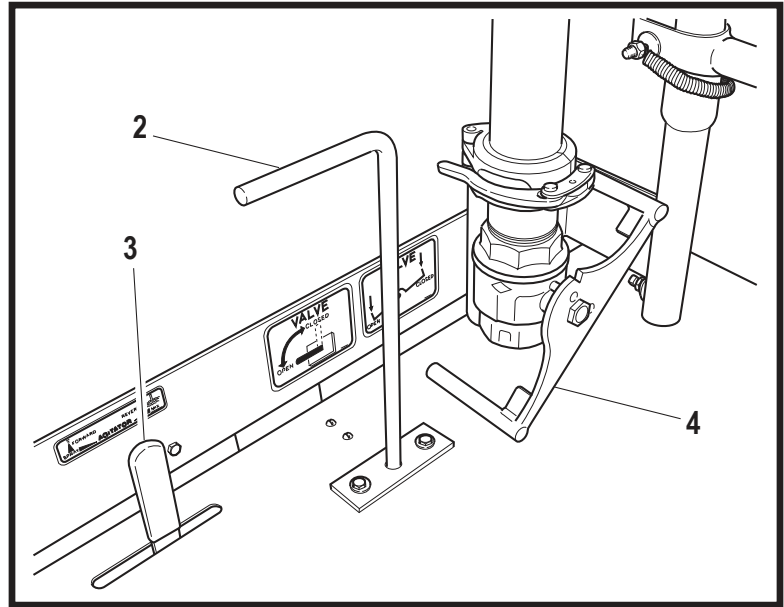
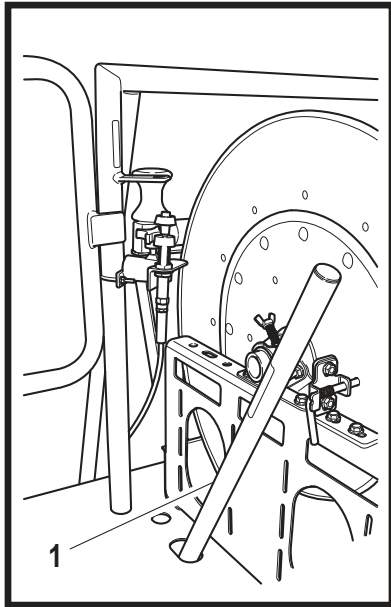
## (SKID MODEL)

Ref. No.	Part Number	Description	No. Req'd
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	2
	●	1/2 Plain Washer	3
	●	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	22
	●	3/8 Helical Spring Lock Washers	22
	●	3/8 in. Hex Nut	22
	●	3/8 - 16 UNC x 2.5 Hex Bolt	4
	●	3/8 - 16 UNC - 1 Square Head Bolt	11
	●	3/8 - 16 Jam Nut	11
	●	3/8 - 16 UNC - 3 Hex Bolt	1
30	--	Gate Hardware	
	●	3/8 - 16 UNC x 3.0 Hex Bolt	1
	●	Helical Spring Lock Washer	1
	●	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	2
	●	3/8 Helical Spring Lock Washers	1
	●	3/8 in. Hex Nut	1
	●	1-1/4 in. U-bolt Clamp	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	4
	●	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

### KITS AND MARKERS

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

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



**CONTROL BOX  
INTERNAL COMPONENTS**

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

# CONTROL SYSTEMS

Ref. No.	Kit Ref.	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	▲	031583	Control Box	1
7	▲	031520	Digital Control Display System	1
8	▲	020886	Horn Button	1
9	▲	008793	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	▲	008865	Control Box Decal	1

## NOT SHOWN

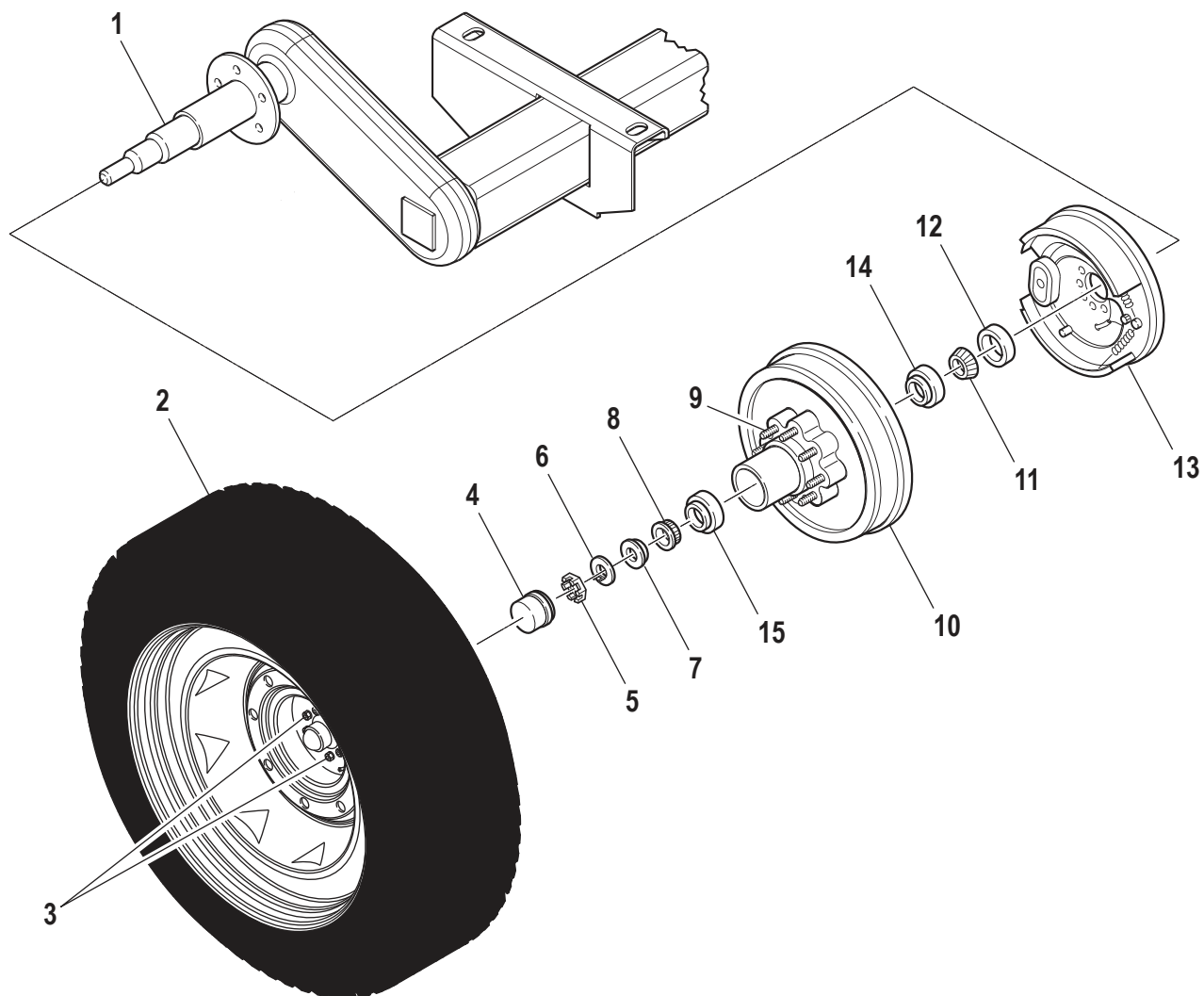
		005182-07	Clutch Rod Assembly	1
		005512-02	Modified Ball Valve Handle	1
	▲	005912	Control Box Wiring Harness	1
	▲	031576	Mini 15A Fuse	1
	▲	031577	Mini 20A Fuse	2
		005859	Control Box Mounting Bracket	1
		005509-02	Control Box Mount Receiver	1

## KITS AND MARKERS

- ▲ 005942 Control Box Full Assembly
- Standard Hardware Item - Available at your local hardware store.

**WHEN ORDERING PARTS, BE SURE TO STATE  
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**WHEN ORDERING PARTS, BE SURE TO STATE  
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## WHEEL AND HUB ASSEMBLY

Ref. No.	Part Number	Description	No. Req'd
1	005805	Axle Assembly <i>(Includes Hub, Drum, and Brakes)</i>	2
2	005830	Wheel Assembly ST225/90D16 on 16 x 6 Rim	2 per*
3	005825-01	9/16 in. Lug Nut	8 per*
4	005812-01	Dust Cover	1 per*
	005811-01	Rubber Plug Insert	1 per*
5	005813-01	Spindle Nut	1 per*
6	005930-01	Spindle Nut Retainer	1 per*
7	023741-01	Spindle Washer	1 per*
8	005816-01	Outer Bearing	1 per*
9	005818-01	9/16-18 Press-In Stud	8 per*
10	005819-01	Brake Drum	1 per*
11	005821-01	Inner Cone	1 per*
12	005822-01	Grease Seal	1 per*
13	005824-01	Right Hand Brake Assembly	1 per*
	005823-01	Left Hand Brake Assembly	1 per*
14	005820-01	Inner Bearing Race	1 per*
15	005817-01	Outer Bearing Race	1 per*

### NOT SHOWN

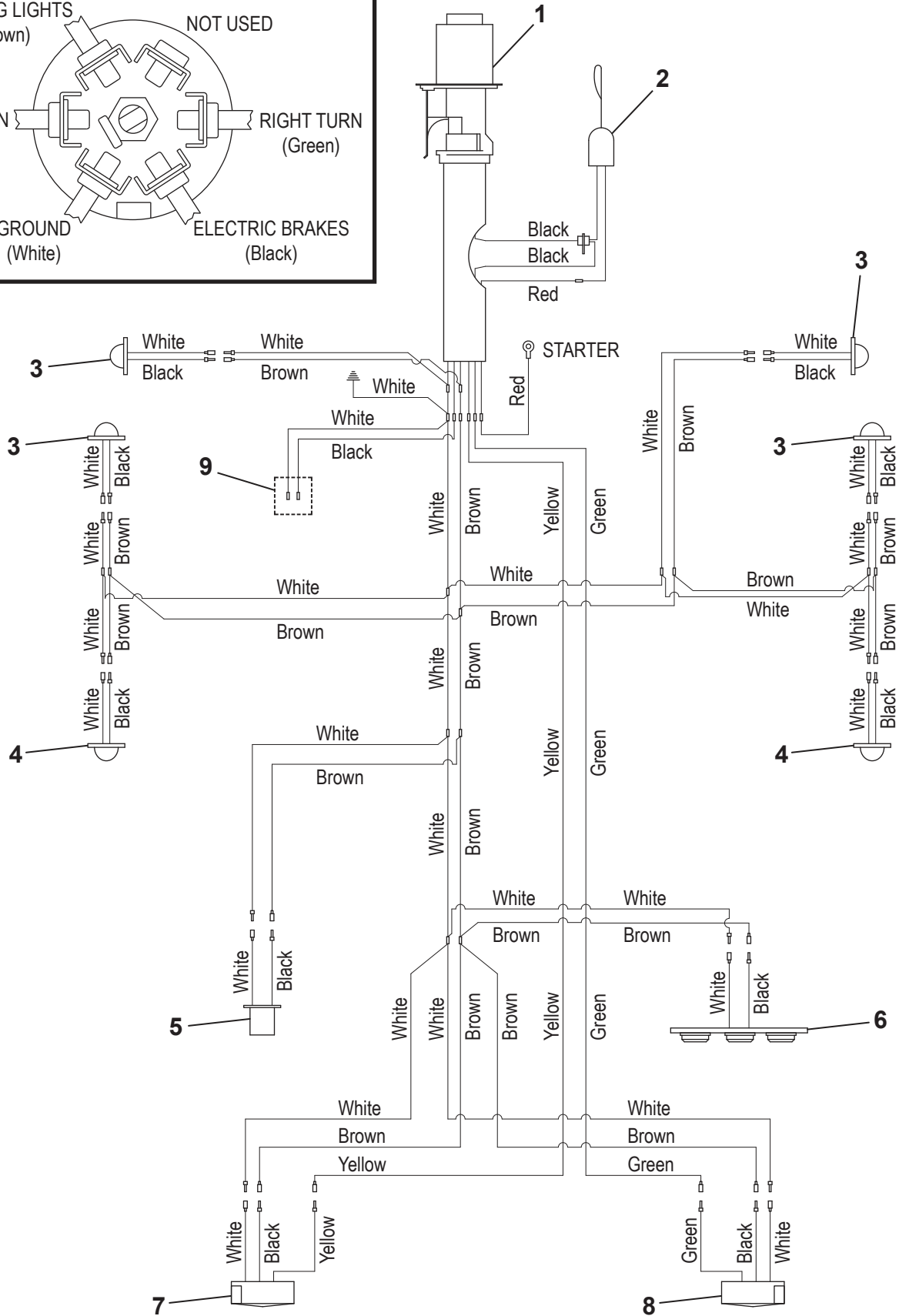
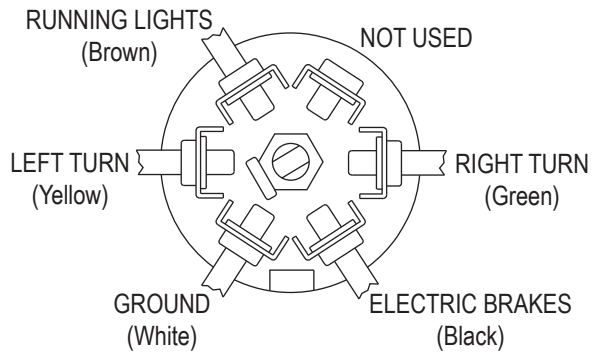
●	3/8 in. - 16 Hub Assembly Retaining Nut	5*
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### KITS AND MARKERS

- Standard Hardware Item - Available at your local hardware store.
- \* **NOTE:** All of these required quantities are quantities required per Hub and Drum Assembly, NOT per axle.

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

## TRAILER PLUG CONNECTIONS



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

## TRAILER WIRING

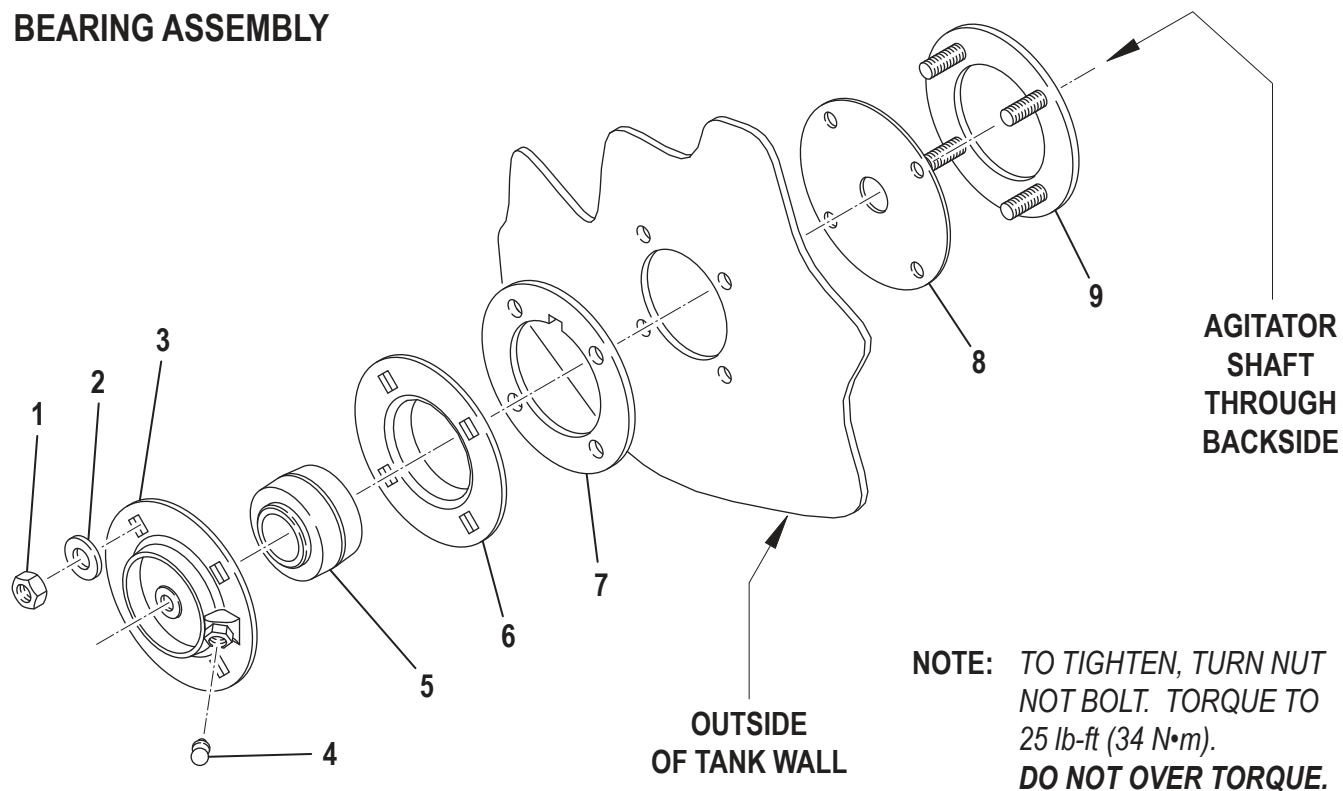
Ref. No.	Part Number	Description	No. Req'd
1	075592	7-Blade Trailer Plug	1
2	023424	Breakaway Switch	1
3	A1227-001	Amber LED Marker Light	4
4	A1227-002	Red LED Marker Light	2
5	A1220-001	License Plate Light	1
6	005944	LED Identification Light	1
7	A1451-001	Left Hand Side Taillight Assembly	1
8	A1450-001	Right Hand Side Taillight Assembly	1
9	005585-04	Trailer Brake Wiring Harness	1
	A2115-001	T90 Standard Trailer Wiring Harness	
	A2116-001	T90 Hitch Extension Trailer Wiring Harness	

### NOT SHOWN

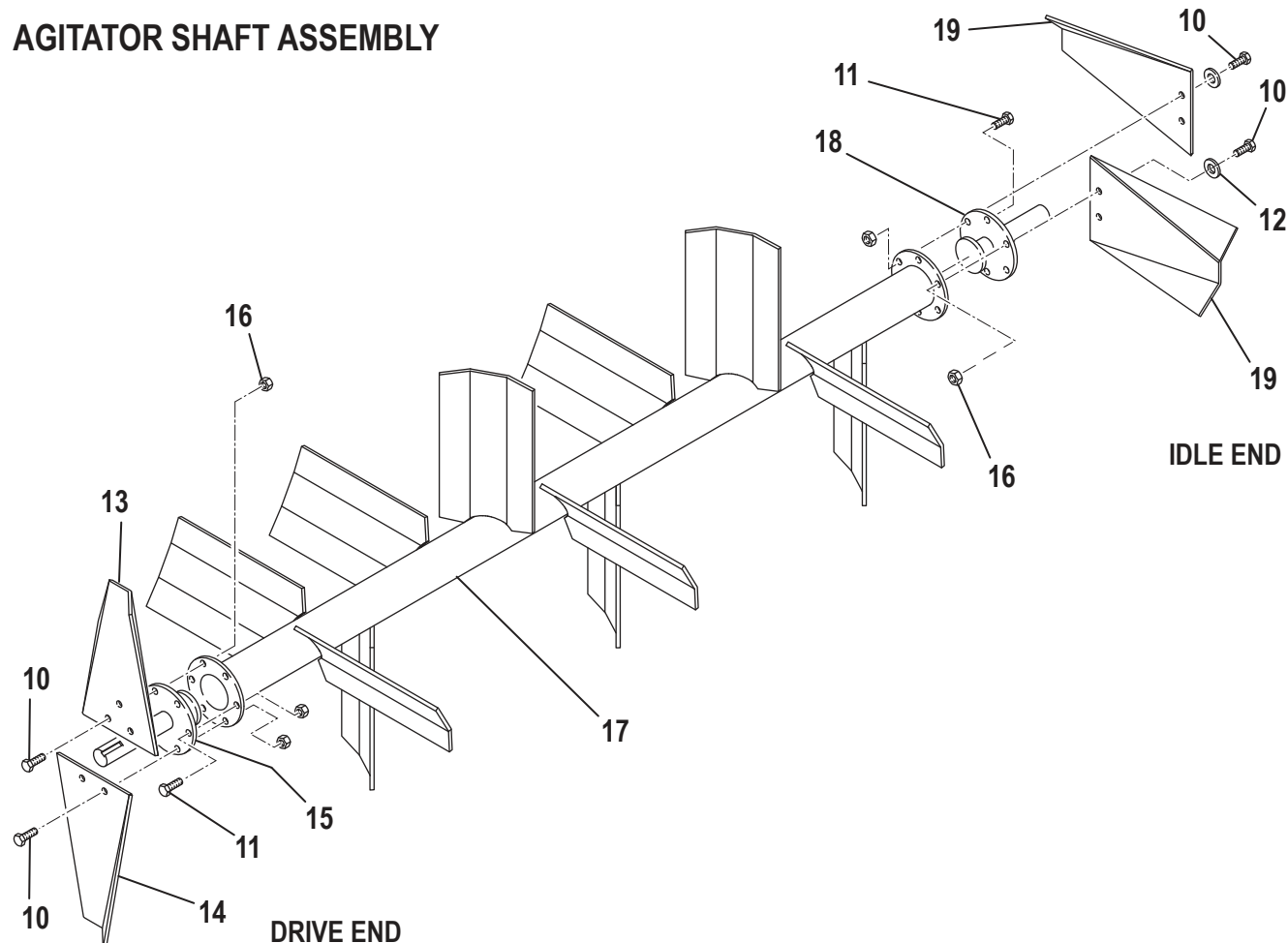
005945	Wire Sleeve	1
190029	Breakaway Switch Chain	2 ft
005016	Breakaway Switch Chain "S" Hook	1
005017	Breakaway Switch Chain Snap Hook	1

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

## BEARING ASSEMBLY



## AGITATOR SHAFT ASSEMBLY



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

# BEARING/AGITATOR ASSEMBLY

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
1	▲■	Y08SS	1/2 in. - 13 Hex Nut	4 per
2	▲■	012605	1/2 in. Sealing Washer	4 per
3	▲■	007211	Flangette with Lube Coupling	1 per
	▲■	008154	Grease Fitting Adapter	1 per
4	▲■	007705	Grease Fitting	1 per
5	▲■	003022	Bearing	1 per
6	▲■	007212	Flangette	1 per
7	▲■	006975	Agitator Bearing Gasket	1 per
8	▲■	007416	Agitator Rotary Gasket	1 per
9	▲	085162-01	Rear Clamping Ring Weldment	1 per
	■	085162-02	Front Clamping Ring Weldment	1 per
10	●		1/2 in. - 13 UNC x 1-3/4 in. Lg. Agitator Bolt	8
11	●		1/2 in. - 13 UNC x 1-1/4 in. Lg. Agitator Bolt	4
12	●		1/2 in. Plain Washer - Type B	4
13		005027-02	Rear Bolt-On-Paddle with Hole	1
14		005027-01	Rear Bolt-On-Paddle	1
15		A1599-001	Drive Stub Weldment	1
16	●		1/2 in. Lock Nut	12
17		A1584-001	Agitator Weldment	1
18		A1605-001	Idler Stub Weldment	1
19		005027-03	Front Bolt-On-Paddle	2

## NOT SHOWN

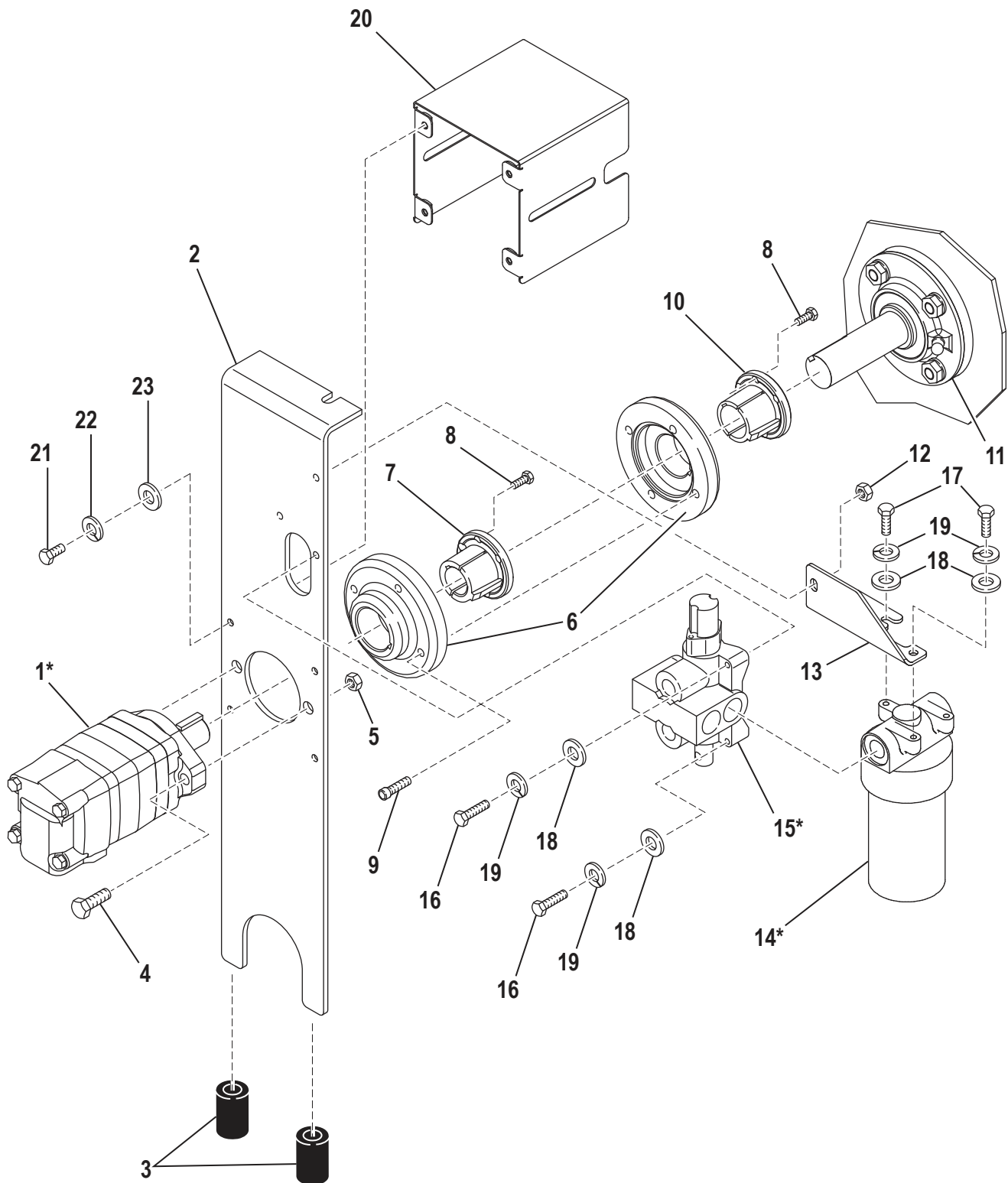
		022407	Grease Line Elbow	1
		012520	Brass Anchor Connector	1
		012521	Grease Line Hose	1

## KITS AND MARKERS

▲	085161-01	Rear Bearing and Seal Assembly Kit ★
■	085161-02	Front Bearing and Seal Assembly Kit
●	Standard Hardware Item - Available at your local hardware store.	

★ **NOTE:** On the T90 Skid unit, the quantity required of kit # 085161-01 is a total of 2 per unit. Skid units do not require kit # 085161-02. Only T90 Trailer units use both kits.

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**\*NOTE:** See Hydraulic System Schematic.

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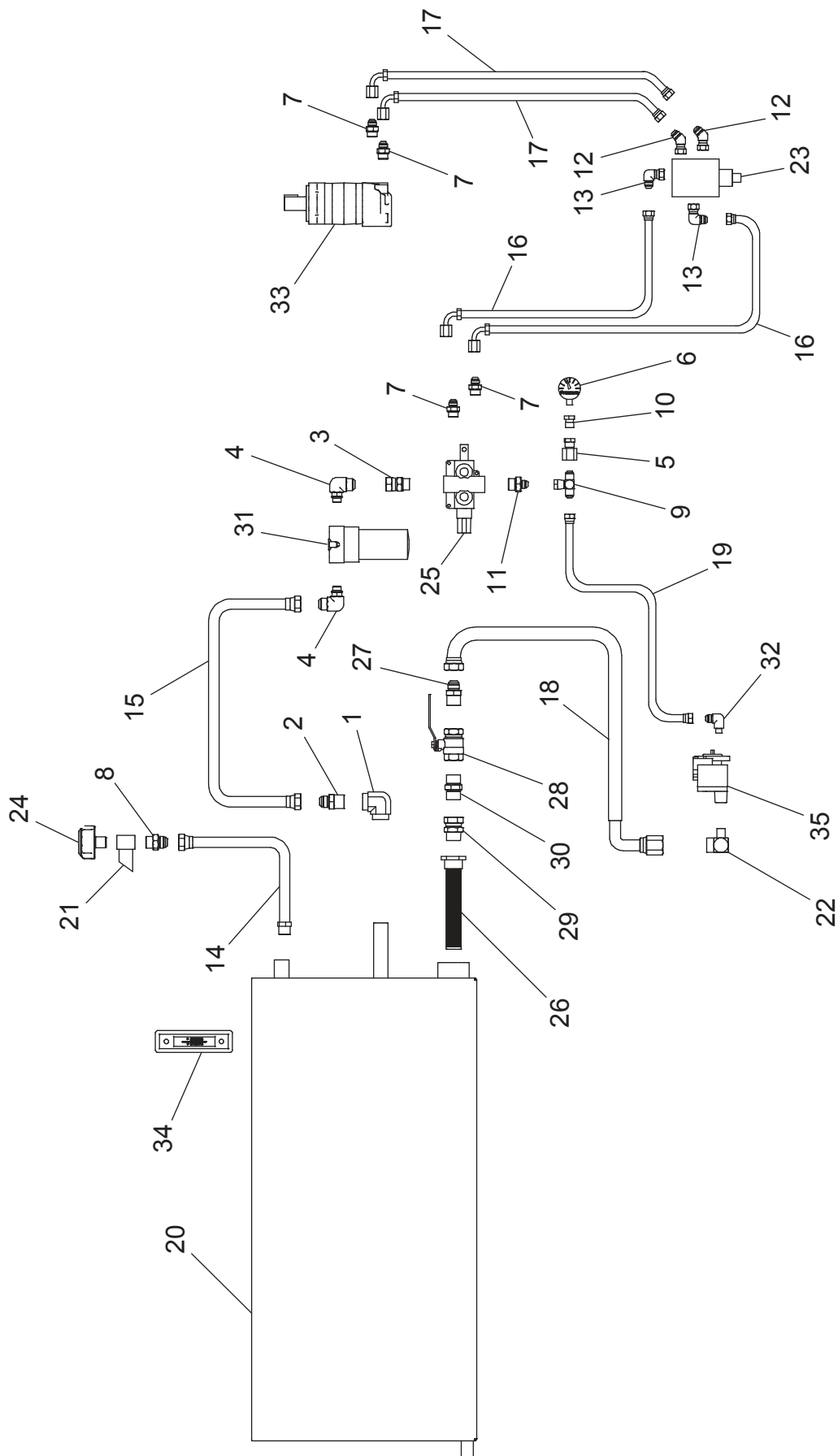
# HYDRAULIC AGITATOR DRIVE

Ref. No.	Part Number	Description	No. Req'd
1	070660	Hydraulic Motor	1
	023295-006	Seal Kit for 070660 (Not Shown)	1
	012124	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 1-1/2 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
8	●	5/16 - 20 UNC x 1 in. Hex Head Cap Screw	6
9	●	3/8 - 16 UNC x 1-1/2 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	085161-01	Rear Bearing and Seal Assembly Kit (See BEARING/AGITATOR ASSEMBLY for Parts)	Ref.
12	●	1/4 in. Hex Nut	3
13	A3538-001	Hydraulic Filter Mount	1
14	A3555-001	Filter Assembly	1
	A3556-001	Filter Element (Not Shown)	1
15	008686	Hydraulic Valve	1
	023120	Seal Kit for 008686 (Not Shown)	1
	0SF310B-01	Valve Handle (Not Shown)	1
	0SF311	Handle Knob (Not Shown)	1
	0SF312-01	Handle Pivot Pin with Clip (Not Shown)	1
	023470-01	Handle Bracket (Not Shown)	1
16	●	1/4 - 20 UNC x 2 in. Hex Bolt	3
17	●	1/4 - 28 UNF x 3/4 in. Hex Bolt	2
18	●	1/4 in. Flat Washer	5
19	●	1/4 in. Lock Washer	5
20	F120-0012	Rear Agitator Bearing Guard	1
21	●	1/4 - 20 UNC x 1-1/4 in. Hex Bolt	4
22	●	1/4 in. Lock Washer	4
23	●	1/4 in. Flat Washer	4

## KITS AND MARKERS

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

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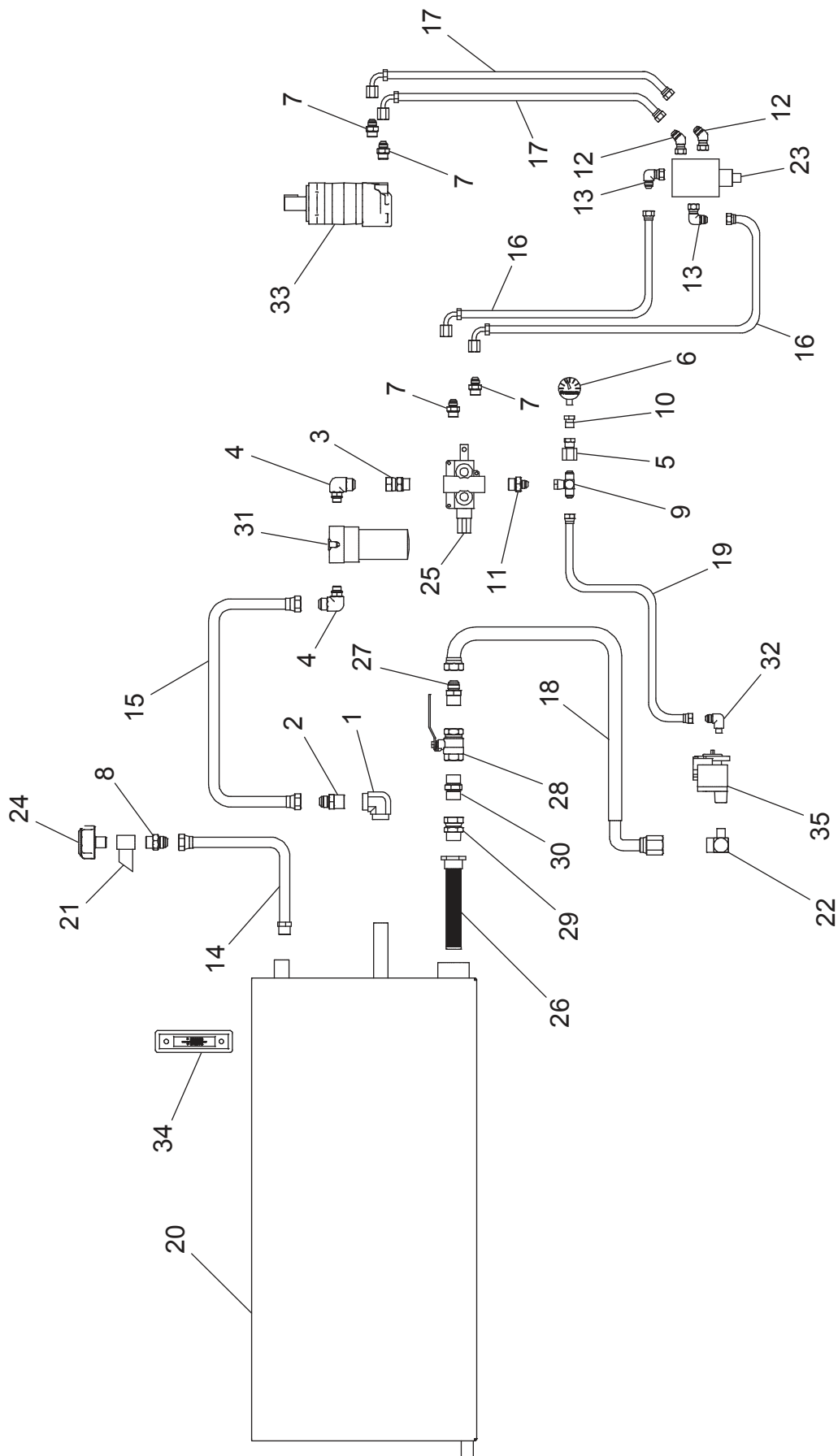
**WHEN ORDERING PARTS, BE SURE TO STATE  
SERIAL NUMBER OF MACHINE**

# HYDRAULIC SYSTEM

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
1	▲	005639	1 in. FNPT 90° Elbow	1
2	▲	005640	1 in. MNPT – #12 FJIC Adapter	1
3	▲	005757	#12 MSAE – #12 FJIC Adapter	1
4	▲	005794	#8 MSAE – #12 MJIC 90° Elbow	2
5	▲	008690	#8 FJIC – 1/2 in. FNPT Adapter	1
6	▲	012044	Pressure Gauge	1
7	▲	012086	#10 MSAE – #8 MJIC Adapter	4
8	▲	023616	3/4 in. MNPT – #12 MJIC Adapter	1
9	▲	005920	#8 Tee Fitting	1
10	▲	055229	1/2 in. x 1/4 in. NPT Bushing	1
11	▲	055359	#12 MSAE – #8 MJIC Straight Fitting	1
12	▲	005917	#12 MSAE – #8 MJIC 45° Elbow	2
13	▲	005923	#12 MSAE – #8 MJIC 90° Elbow	2
14	▲	005551	3/4 in. Hydraulic Hose x 18 in.	1
15	▲	005916	3/4 in. Hydraulic Hose x 36 in.	1
16	▲	005554	1/2 in. Hydraulic Hose x 29 in.	2
17	▲	005555	1/2 in. Hydraulic Hose x 34 in.	2
18	▲	005915	1 in. Suction Hose x 68 in.	1
19	▲	SX970403	1/2 in. Hydraulic Hose x 80 in.	1
20		Reference	Hydraulic Reservoir	Ref.
21		Reference	Hydraulic Fill Coupling	Ref.
22	▲	FW75113	#12 MSAE – #16 MJIC 90° Elbow	1
23		085276	Dump Valve	1
		085276-01	Dump Valve Solenoid Coil Assembly	1
		085276-02	Dump Valve Block	1
		085276-03	Dump Valve Cartridge	1
		055856-02	Dump Valve Cartridge Nut	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	1 in. MNPT – MJIC Adapter	1
28		021559	1 in. Ball Valve	1
29		005892	1 in. NPT Union Adapter	1
30		041162	1 in. NPT Pipe Nipple	1

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**WHEN ORDERING PARTS, BE SURE TO STATE  
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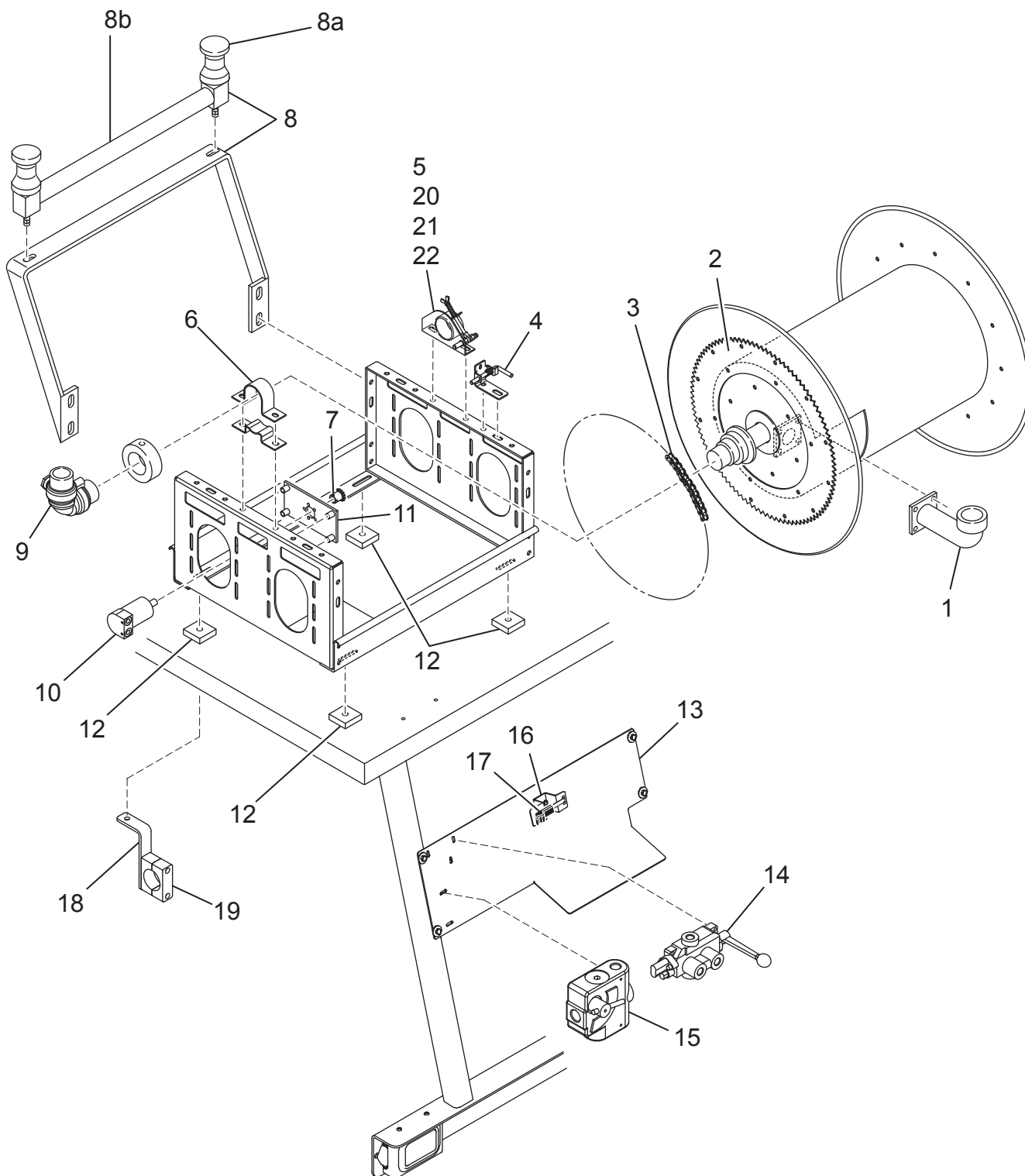


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## HYDRAULIC SYSTEM (CONTINUED)

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
31		A3555-001	Filter Assembly	1
		A3556-001	Filter Element	1
32	▲	023621	#10 MSAE – #8 MJIC 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	1
<b>KITS AND MARKERS</b>				
	▲	005911	Hydraulic Kit	

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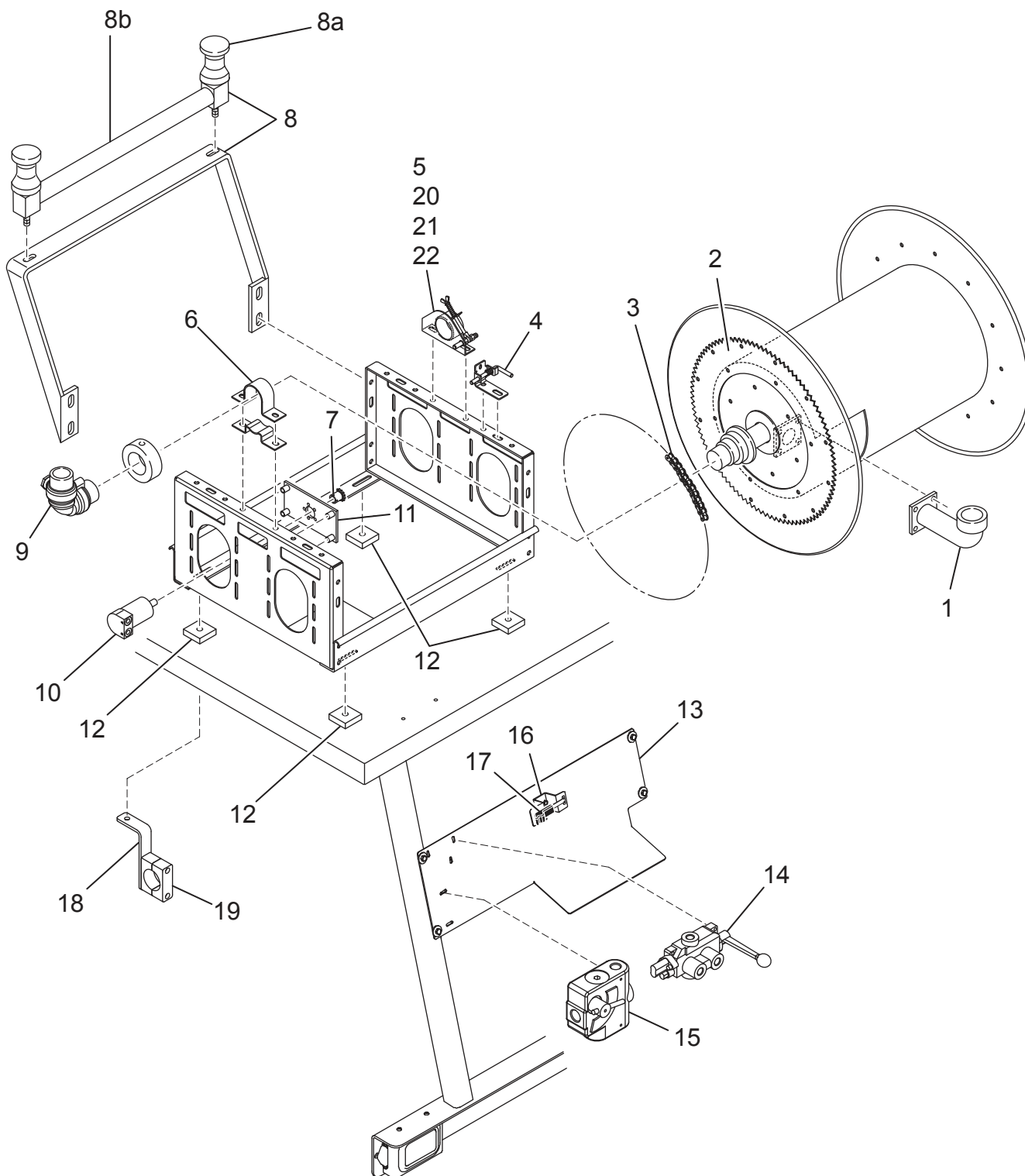
## HYDRAULIC HOSE REEL ASSEMBLY (OPTION)

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
1	▲	080302	Flanged Riser	1
	▲	080302G	Hose Reel Riser Gasket	1
2	▲	008144	Hose Reel ring Gear	1
3	▲	008200	Hose Reel Chain w/Connecting Link – 69 in. Lg.	1
4	▲	008433	Pin Lock w/Brackets Assembly	1
5	▲	008313	Idler Side Bearing	1
6	▲	008314	Drive Side Bearing	1
7	▲	008199	Chain Sprocket – 11 Tooth	1
8		011894	Hose Roller and Spool Guide	1
8a		011894-G	Guide Spool	1
8b		011894-R	Flat Roller	1
9		008210	90° Swivel Elbow	1
		080183	Swivel Repair Kit	1
10		008635	Hydraulic Motor (See <i>HYDRAULIC SYSTEM with HOSE REEL</i> )	1
11		008634	Motor Mounting Plate	1
12		031018-01	Hose Reel Bearing Block	4
13		F90-0026	Valve Mounting Plate	1
14		012857	Direction Control Valve (See <i>HYDRAULIC SYSTEM with HOSE REEL</i> )	1
15		023890	Flow Divider (See <i>HYDRAULIC SYSTEM with HOSE REEL</i> )	1
16		005593	Remote Holder	1
17		005592	Soft Latch	1
18		005939	Lead-in Hose Support Bracket	2
19		005940	Hose Clamp	2
20		008111B	Brake Pad (part of Hose Reel)	1
21		008112	Brake Spring (part of Hose Reel)	1
22		008109	Brake Adjustment Screw (part of Hose Reel)	1
<b>NOT SHOWN</b>				
		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
		002158	1-1/2 in. Female Brass Coupler	1
		160309	1-1/2 in. Galvanized Close Nipple	1

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**WHEN ORDERING PARTS, BE SURE TO STATE  
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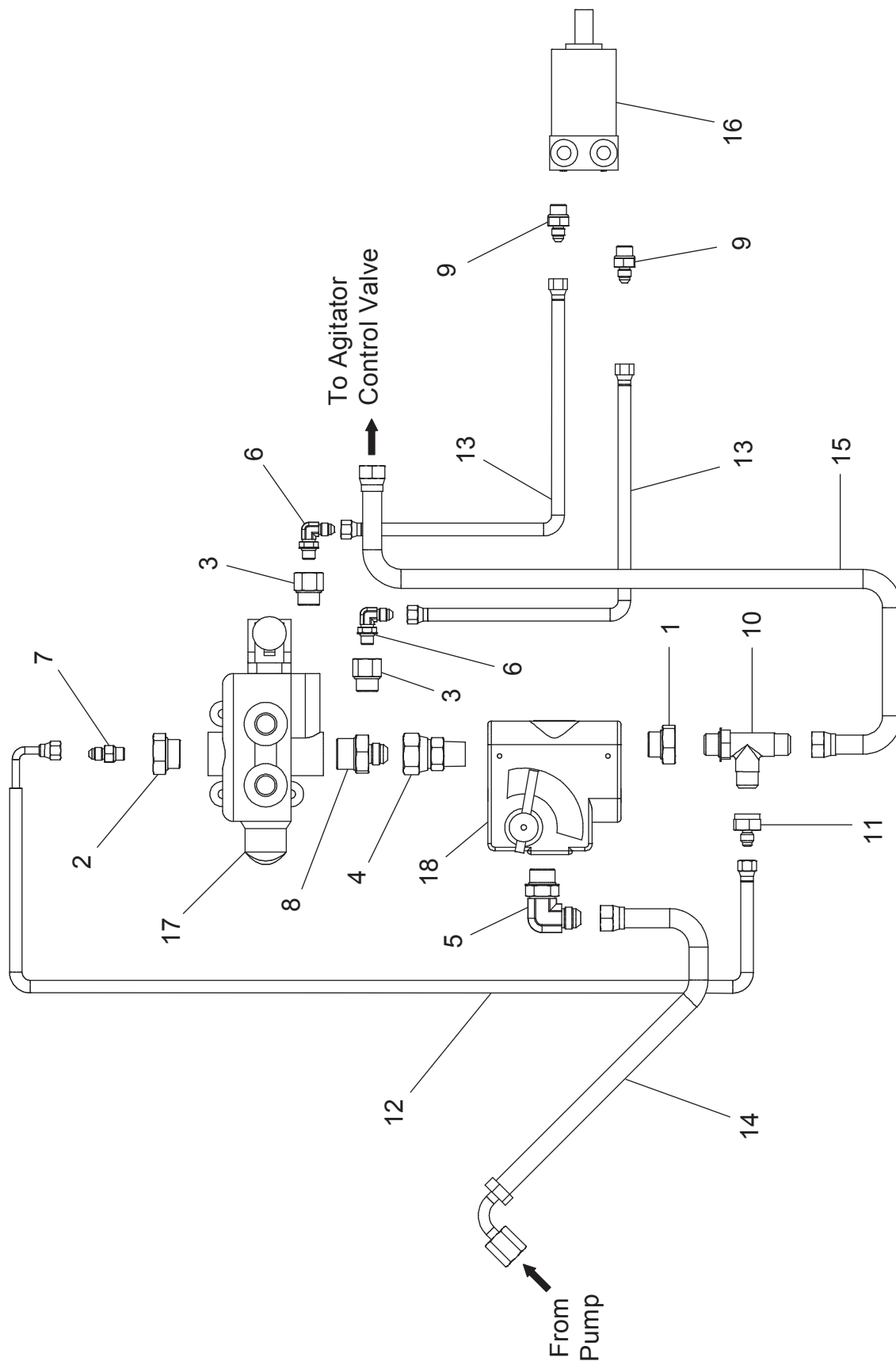


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SERIAL NUMBER OF MACHINE**

## HYDRAULIC HOSE REEL ASSEMBLY (OPTION)

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
<b>NOT SHOWN (Continued)</b>				
		001207	1-1/2 in. Male Brass Adapter	1
		008422	Loop Clamps	2
		080261	1-1/4 in. Female Nyglass Coupler	1
		005918	Hydraulic Hose and Fitting Kit (see Hydraulic System with Hose Reel)	1
		004832-20	1-1/4 in. Hose Reel Hose x 200 ft.	1
		A2073-001	Hose Protector	1
		A2071-001	1-1/2 x 1-1/4 in. NPT Swivel Adapter Fitting	1
<b>KITS AND MARKERS</b>				
	▲	008212A	Hose Reel Kit	

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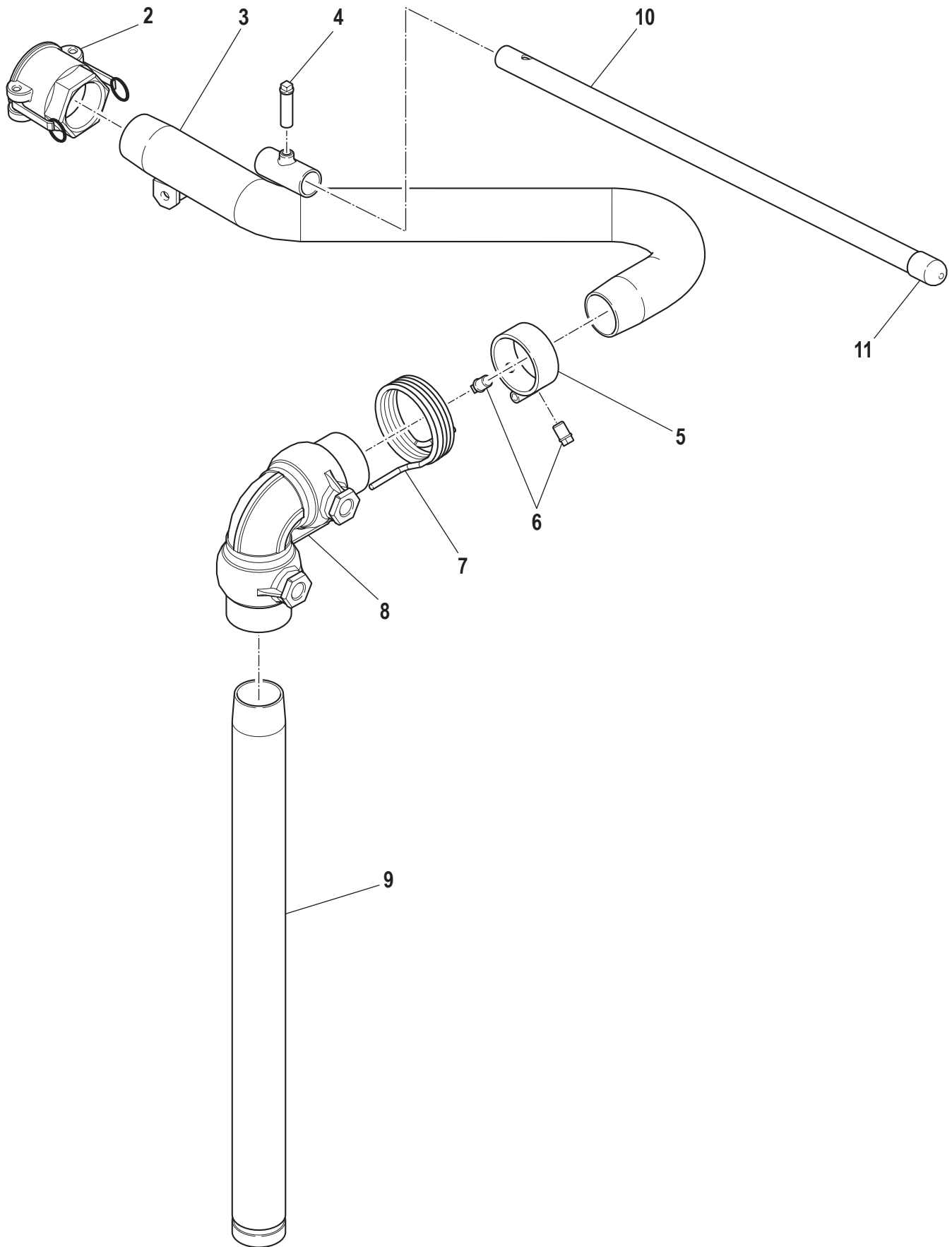
## HYDRAULIC SYSTEM WITH HOSE REEL

Ref. No.	Kit Ref.	Part Number	Description	No. Req'd
1	▲	008696	#10 MSAE – #8 FSAE Reducer	1
2	▲	012871	#12 MSAE – #4 FSAE Reducer	1
3	▲	012872	#10 MSAE – #4 FSAE Reducer	2
4	▲	012873	#10 MSAE – #8 FJIC Swivel Adapter	1
5	▲	023621	#10 MSAE – #8 MJIC 90° Elbow	1
6	▲	055274	#4 MSAE – #4 MJIC 90° Elbow	2
7	▲	055308	#4 MSAE – #4 MJIC Adapter	1
8	▲	055359	#12 MSAE – #8 MJIC Adapter	1
9	▲	FW65217	#6 MSAE – #4 MJIC Adapter	2
10	▲	FW71869	#8 MSAE – #8 MJIC Tee	1
11	▲	FW71908	#8 FJIC – #4 MJIC 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
		008635-SK	Hydraulic Motor Seal Kit	1
17		012857	Directional Control Valve	1
		023120	Seal Kit for 012857	1
		SF310B-01	Hydraulic Valve Handle	1
		0SF311	Handle Knob	1
		0SE312-01	Roll Pin	1
		023470-01	Handle Bracket	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

**WHEN ORDERING PARTS, BE SURE TO STATE  
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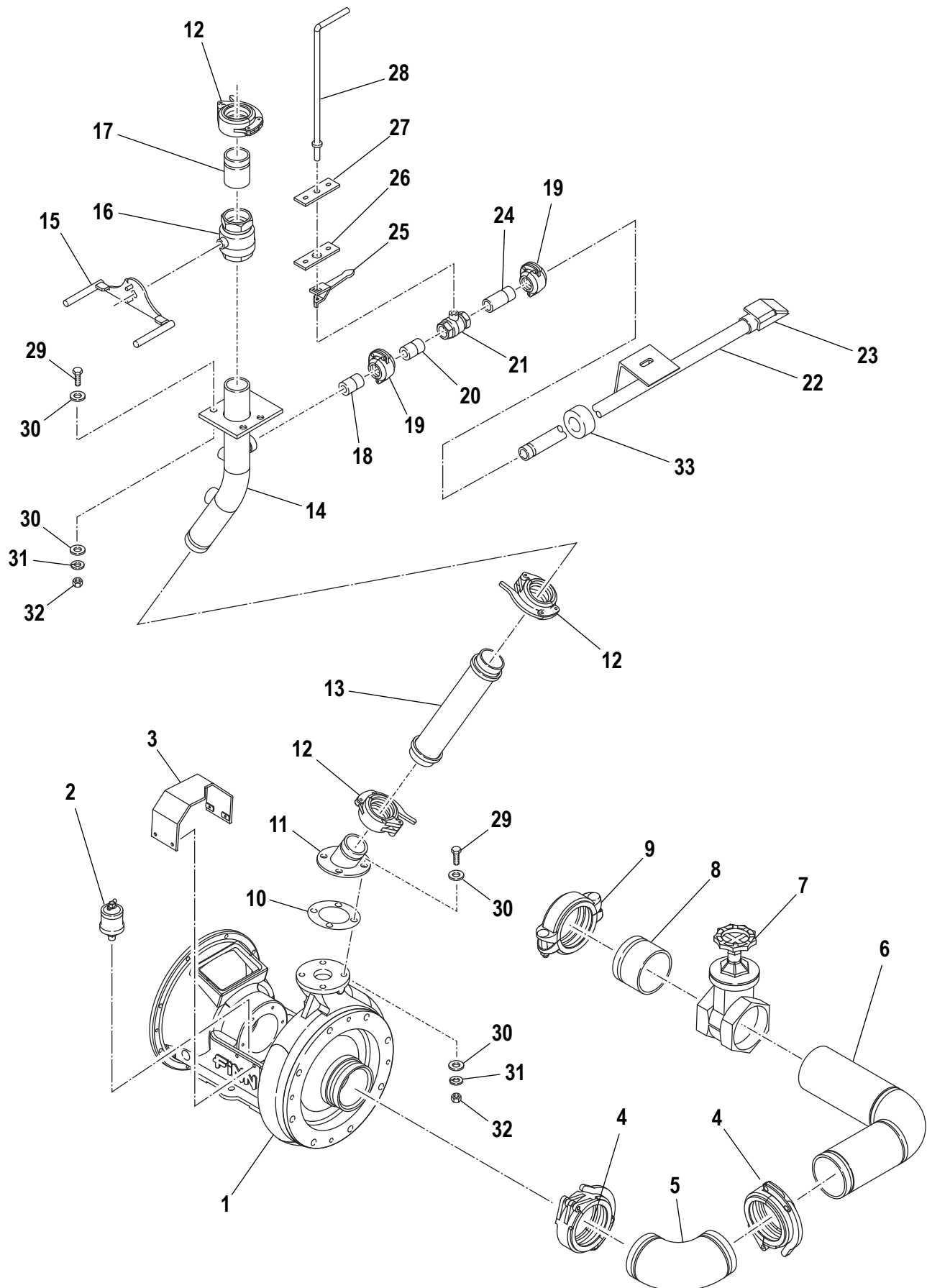


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## DISCHARGE BOOM ASSEMBLY

Ref. No.	Part Number	Description	No. Req'd
1	005529	2 in. Discharge Boom Assembly	
2	006102	2 in. Female Coupler	1
	006514	2 in. 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	2 in. 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
11	005931	Boom Handle Cap	1

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# PIPING

Ref. No.	Part Number	Description	No. Req'd
1	005895	Clump Assembly [See Section for Parts]	1
2	002383	Automatic Pressure Lubricator	1
	008190	Automatic Pressure Lubricator Seal Kit	1
3	005470	Pump Shaft Guard	1
4	006144	4 in. Pipe Clamp	2
	006145	4 in. Pipe Clamp Gasket (not shown)	2
5	006359	4 in. 90° Victaulic Pipe Elbow	1
6	005842	Suction Pipe Elbow Weldment	1
7	008280	4 in. Suction Line Shut-Off Valve	1
8	005523-06	Valve Outlet Pipe	1
9	006710	4 in. Pipe Clamp	1
	006145	4 in. Pipe Clamp Gasket (not shown)	1
10	008469	Discharge Flange Gasket	1
11	005526-03	Discharge Flange Weldment	1
12	006250	2 in. Pipe Clamp	3
	006251	2 in. 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	2 in. Discharge Ball Valve	1
17	006483	Boom Connector Pipe	1
18	005083-07	Recirculation Nozzle	1
19	005156	1 in. Pipe Clamp	2
	005183	1 in. Pipe Clamp Gasket (not shown)	2
20	005083-08	Recirculation Nozzle	1
21	021559	1 in. Recirculation Ball Valve	1
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
33	005141A	Quick Joint Full Coupling Nut	1

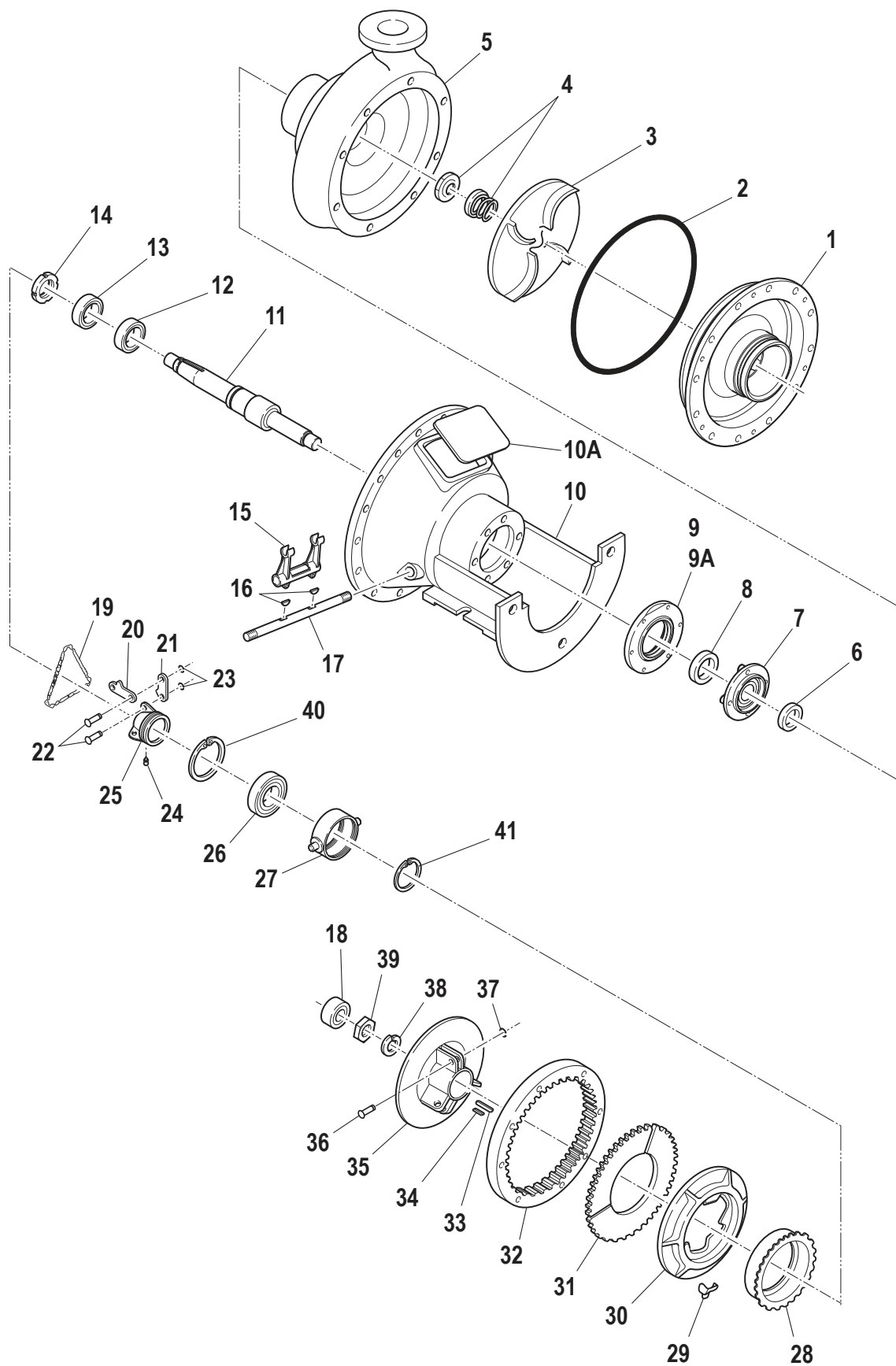
## NOT SHOWN

	160389	3/8 x 2 in. Sch 80 Nipple	1
	160160	3/8 Coupling	1

## KITS AND MARKERS

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

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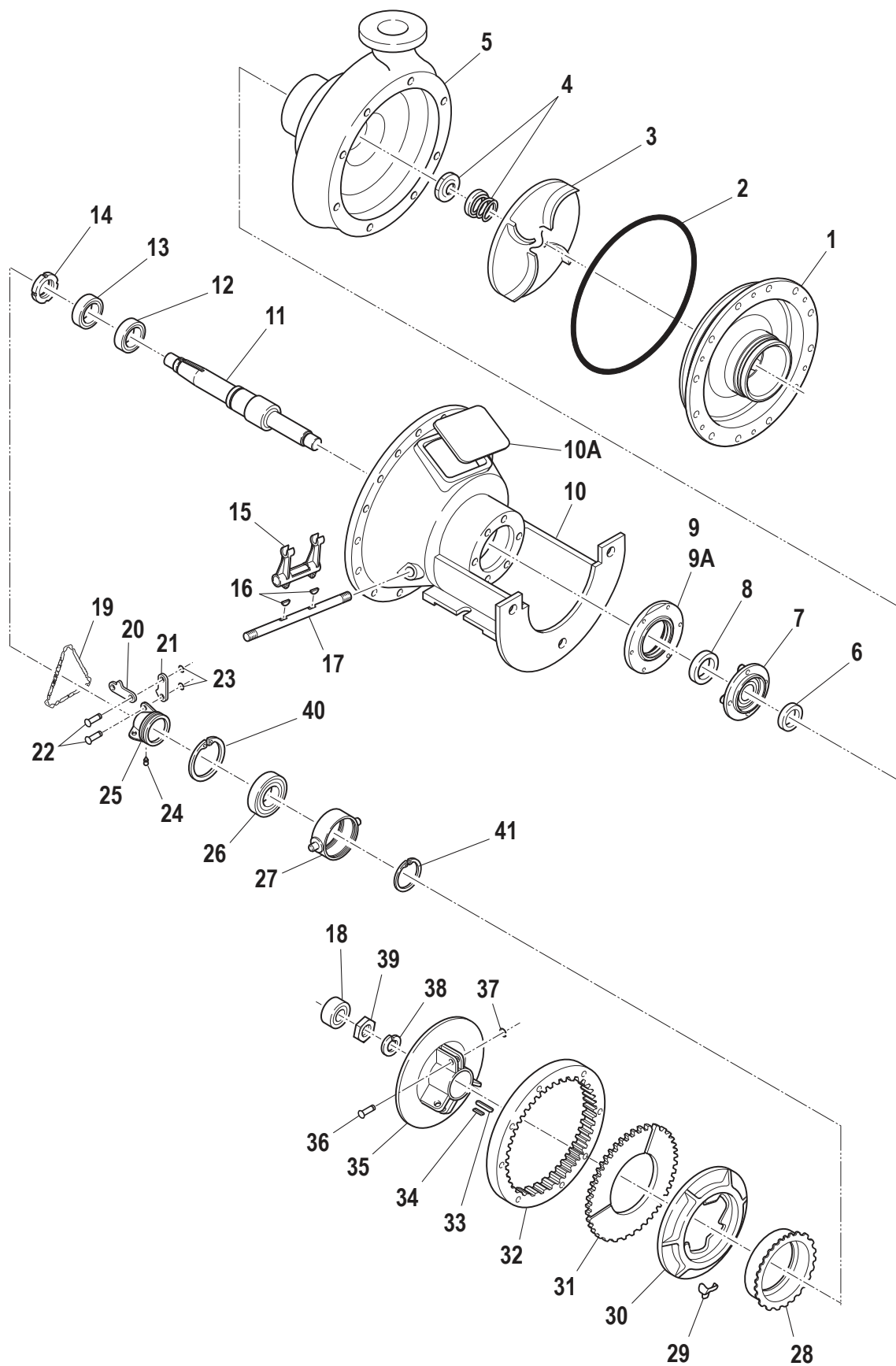
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# CLUTCH/PUMP (CLUMP) ASSEMBLY

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

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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

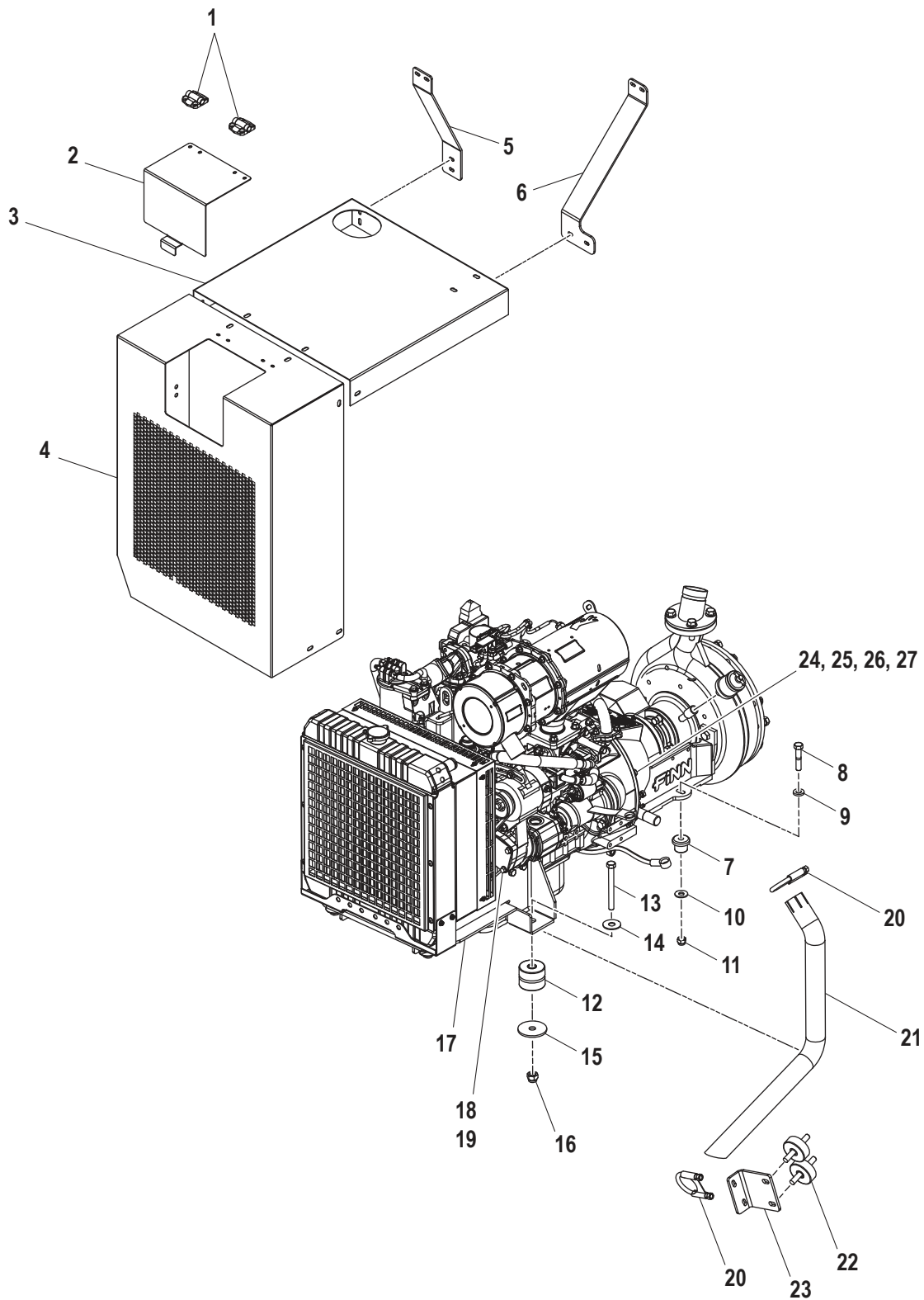
### NOT SHOWN

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

### KITS AND MARKERS

▲	100333	Clutch Assembly Kit
■	005432	Total Clutch Assembly Kit
◆	005895	Clump 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	Right Hand Side Cover Hanger	1
6	005856	Left 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	8
19	●	Lock Washer, M10	8
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

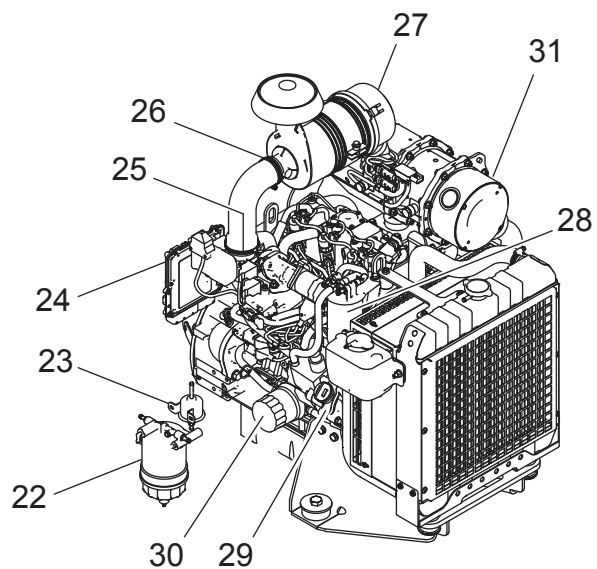
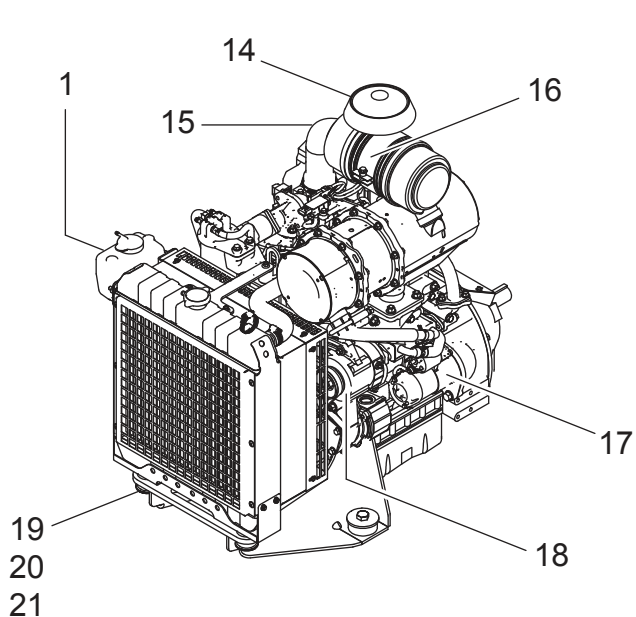
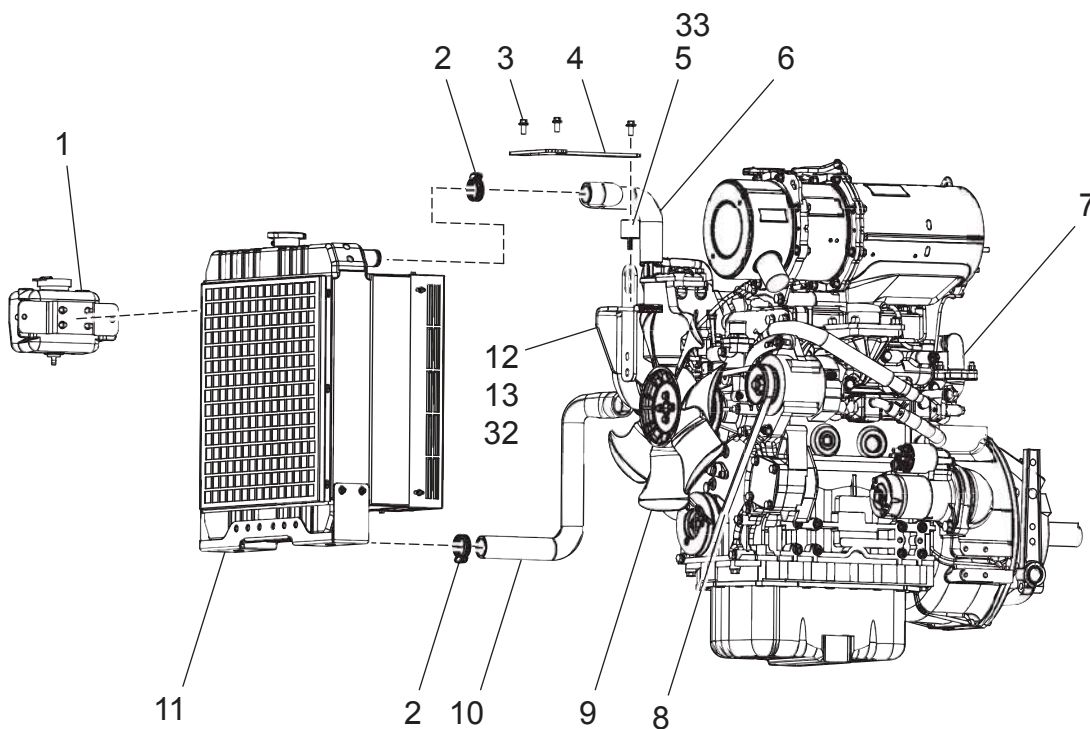
F260-0006-03	Hinge Spacer	2
●	Pan Head Screw No. 10 - 24 - 3/4	8
●	No. 10 Helical Spring Lock Washer	8
●	No. 10 - 24 Hex Nut	8
●	No. 10 Plain Washer - Type B	8

## KITS AND MARKERS

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

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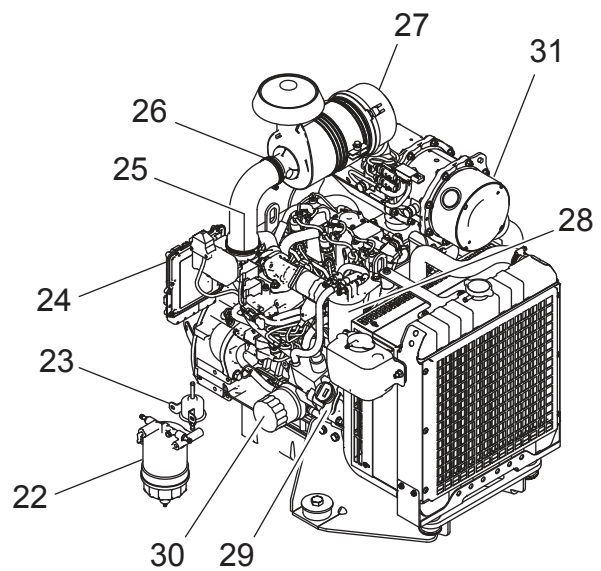
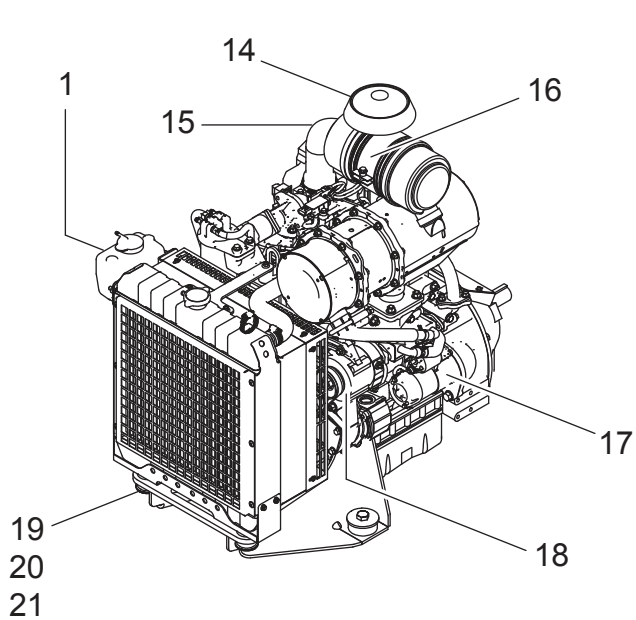
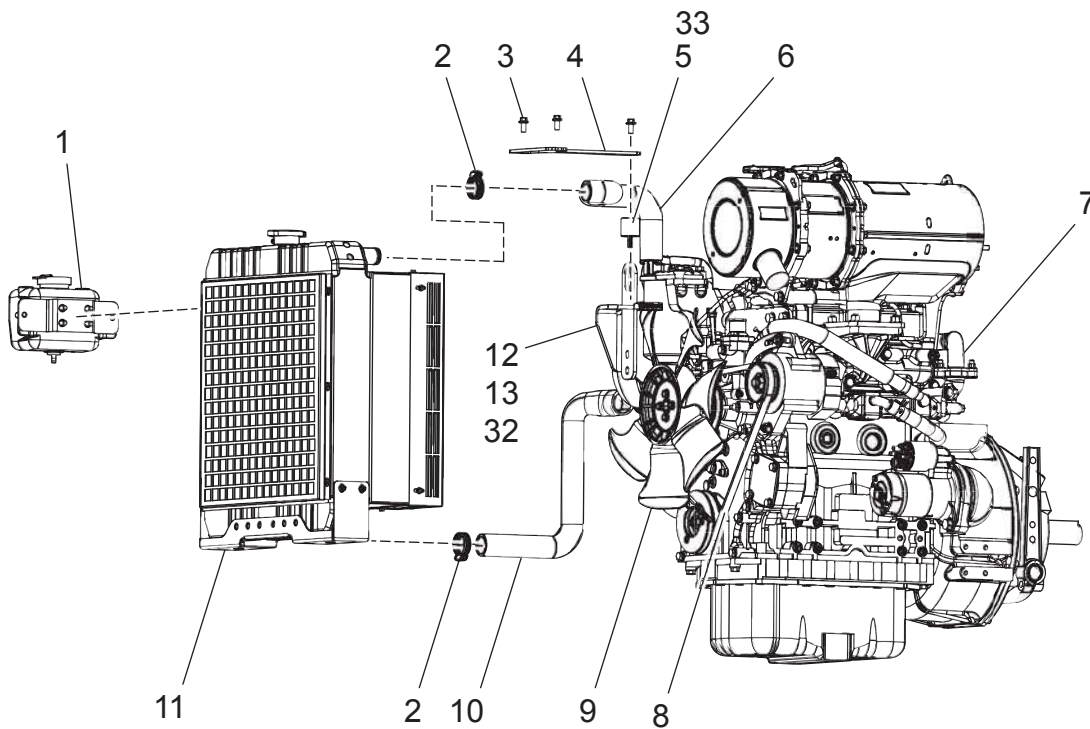
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## SPECIFIC ENGINE PARTS

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 x 1.25 x 16 mm 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, Lower	1
13	■	031536	Radiator Mount Spacer, Lower	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
		-----	Upper Body Housing Assembly	1
		031522-02	O-ring	1
		031522-03	Filter Element	1
		-----	Float	1
		-----	Cup	1
		-----	Drain Plug	1
23		031521	Pump Assembly, Fuel Feed	1
24	---		ECU (Supplied with Engine)	1
25		007391	3 in. Pipe Clamp	1
26		022450	2-1/2 in. 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		Reference	DPF Assembly (must be serviced by Yanmar)	1
		-----	DPF Case (must be serviced by Yanmar)	1
		-----	Soot Filter (must be serviced by Yanmar)	1
		-----	Silencer (must be serviced by Yanmar)	1
		-----	Gasket (must be serviced by Yanmar)	1
32	■ ●		Hex Flange Machine Screw, M8 x 1.25 x 25 mm LG	2
33	■ ●		Hex Nut, M8 x 1.25	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

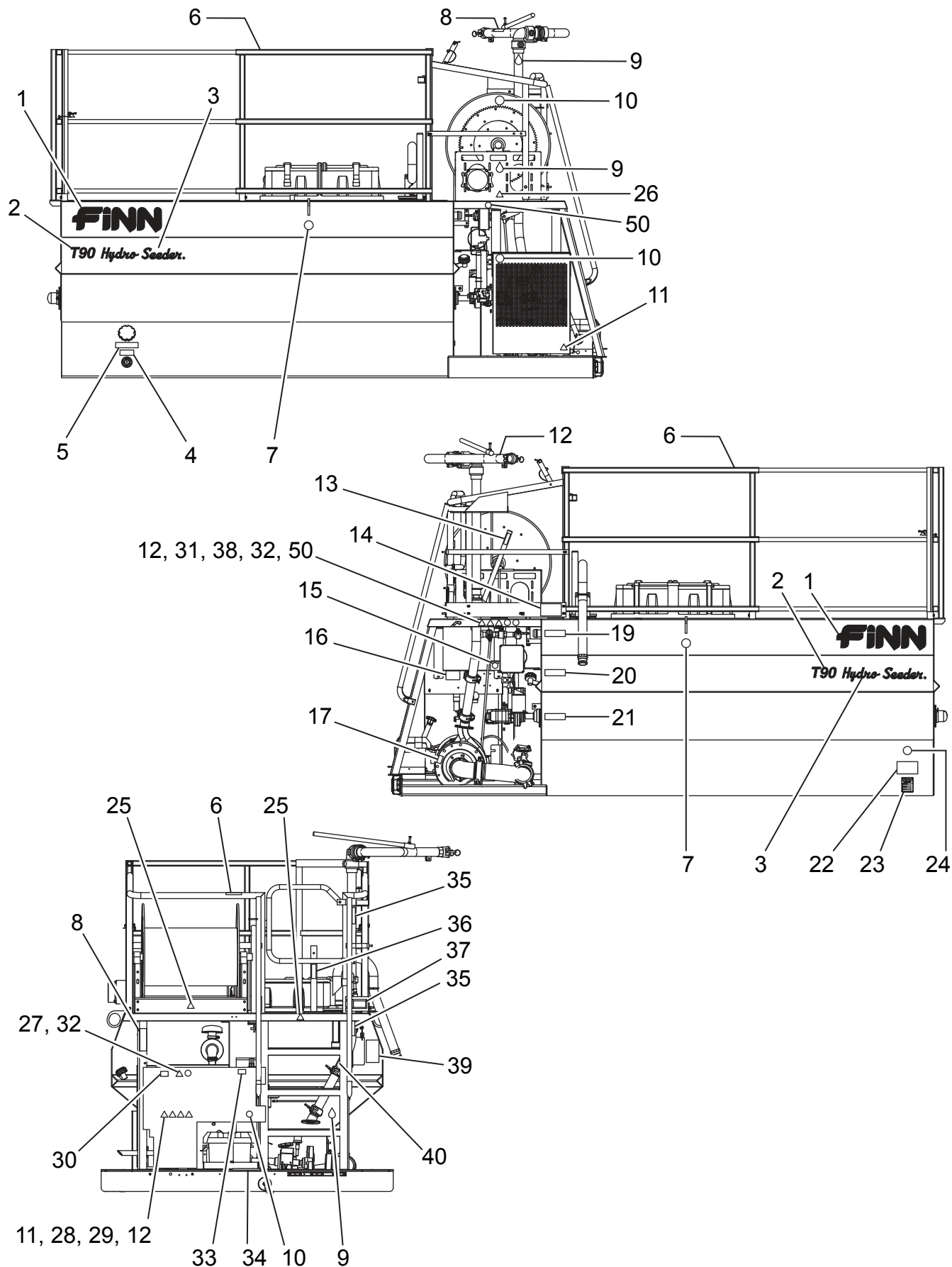
Part Number	Description	No. Required
<b>HOSE REEL NOZZLES</b>		
080273	Long Distance Hose Reel Nozzle Assembly	A/R
080131	Long Distance Nozzle	1 per
080260	1-1/4 in. Male NyGlass Coupler	1 per
160749	1-1/4 in. x 3/4 in. Reducer Bushing	1 per
080394	Wide Fan Hose Reel Nozzle Assembly	A/R
006604	Wide Fan Nozzle	1 per
080260	1-1/4 in. Male NyGlass Coupler	1 per
160750	1-1/4 in. x 1 in. Reducer Bushing	1 per
080395	Narrow Fan Hose Reel Nozzle Assembly	A/R
006605	Narrow Fan Nozzle	1 per
080260	1-1/4 in. Male NyGlass Coupler	1 per
160750	1-1/4 in. x 1 in. Reducer Bushing	1 per
<b>REMOTE VALVE</b>		
080535	Remote Valve Assembly	A/R
080260	1-1/4 in. Male NyGlass Coupler	1 per
160307	1-1/4 in. Close Nipple	1 per
012083	1-1/4 in. Ball Valve	1 per
160520	1-1/4 in. x 4-1/2 in. Lg Nipple	1 per
080261	1-1/4 in. Female NyGlass Coupler	1 per
021806	1-1/4 in. Gasket	1 per
<b>TOOL KIT</b>		
A2401-001	Automatic Pressure Lubricator Grease, 14 oz. (414 mL)	1
005220	Impeller Wrench	1
008187	Long Distance Nozzle	1
006632	Long Distance Nozzle Assembly	1
001042	1-1/2 in. Long Distance Nozzle	1
006096	2 in. Male Coupler	1
160309	1-1/2 in. Close Nipple	1
160763	2 in. x 1-1/2 in. Reducer Bushing	1
006619	Wide Fan Nozzle Assembly	1
006493	Wide Fan Nozzle	1
006096	2 in. Male Coupler	1
160762	2 in. x 1-1/4 in. Reducer Bushing	1
005603	Narrow Fan Nozzle Assembly	1
012117	Narrow Fan Nozzle	1
006096	2 in. Male Coupler	1
160762	2 in. x 1-1/4 in. Reducer Bushing	1
006102	2 in. Female Coupler	1
006514	2 in. Coupler Gasket	1
012681A	FINN Beige Aerosol Paint	1
	FINN HydroSeeder® Operator Instructions and Parts Manual	1
A1096-001	Manual Canister	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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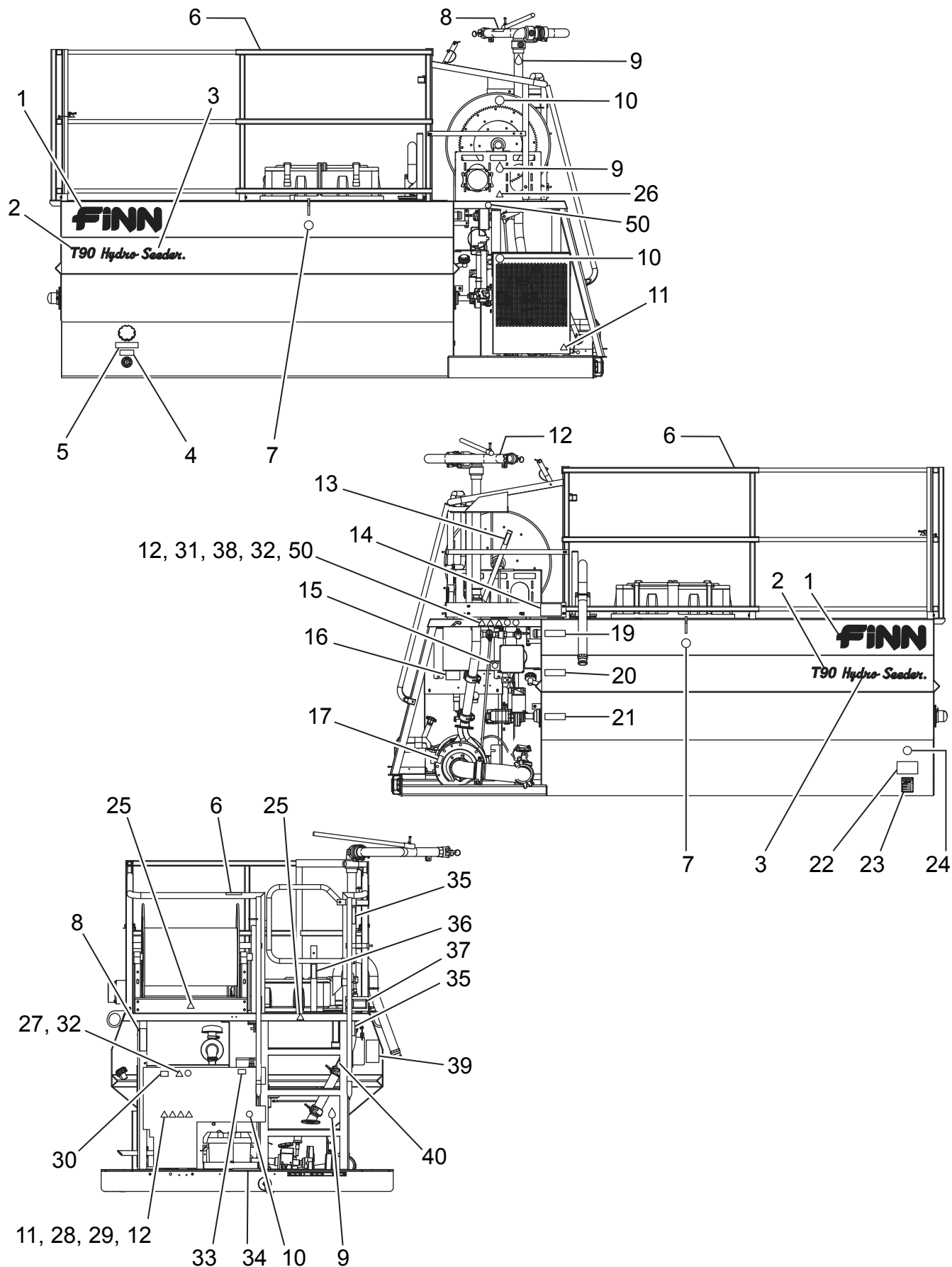


# SKID DECALS

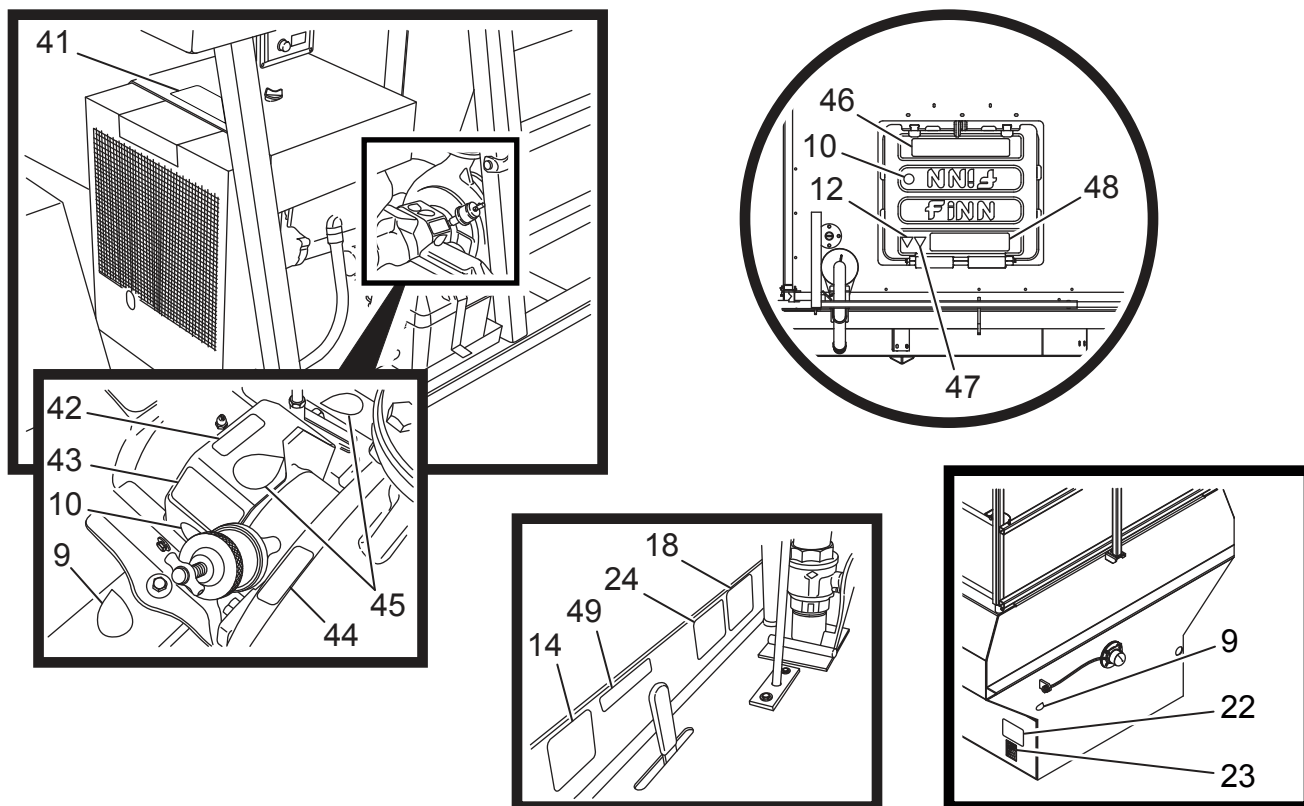
Ref. No.	Part Number	Description	No. Req'd
1	023174	"FINN" Decal - Large	2
2	012661-05	"T90" Decal	2
3	011595	"Hydro Seeder" Decal	2
4	□	"Diesel Fuel Only" Decal (Diesel units only)	1
5	□	"Ultra Low Sulfur" Decal (Diesel units only)	1
6	□	"WARNING! Fall Hazard..." Decal	3
7	□	Lift Point Decal	2
8	□	"Do Not Aim..." Decal	1
9	□	"Service Daily" Decal	4
10	□	Do Not Remove Guard Decal	6
11	□	Hot Surface Hazard Decal	2
12	□	Splash/Spray Hazard Decal	3
13	□	"VALVE - Open/Closed" (Handle) Decal	1
14	□	"CAUTION! SPL Exceeds 80 dB(A)..." Decal	2
15	□	"Emergency Stop" Decal	1
16	□	"CAUTION! New Clutch Information" Decal	1
17	□	"NOTICE Tighten Suction Cover..." Decal	1
18	□	"VALVE - Open/Close" Foot Pedal Decal	1
19	□	"800" Gallon Decal	1
20	□	"500" Gallon Decal	1
21	□	"250" Gallon Decal	1
22	□	U.S. Patent Nos. Decal	1
23	031569	FINN Name Plate	1
24	□	"VALVE - Open/Close" Handle Decal	1
25	□	Fall Hazard Decal	2
26	□	Pinch Point/Entanglement Hazard Decal	1
27	□	Vision Damage Hazard Decal	1
28	□	Sever/Reach Hazard Decal	1
29	□	Pinch Point/Moving Belt Hazard Decal	1
30	□	"Hose Reel Rewind" Decal	1
31	□	Vision and Hearing Damage Hazard	1
32	□	Read Manual Decal	2
33	□	"CAUTION! Do Not Use Ether..." Decal	1
34	□	"Drain Water Daily" Decal	1
35	□	"WARNING! Burn Hazard..." Decal	2
36	□	"CAUTION! Keep Tank Vent Clean..." Decal	1
37	012260	"IMPORTANT" Metal Plate	1
38	□	Attention Decal	1

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## SKID DECALS

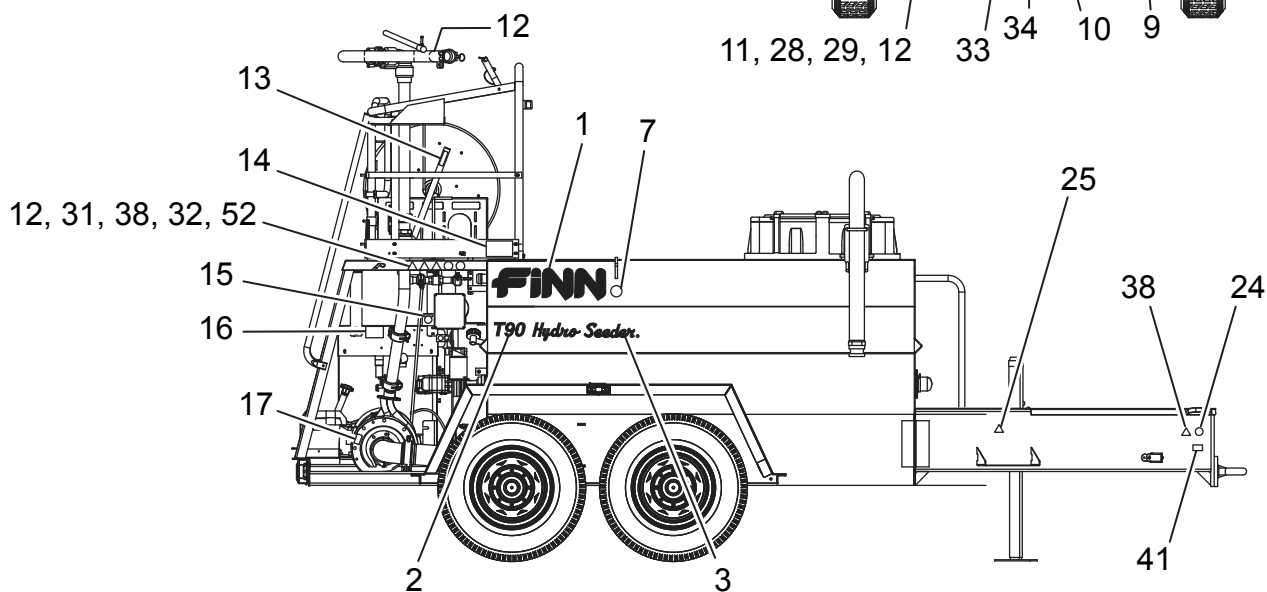
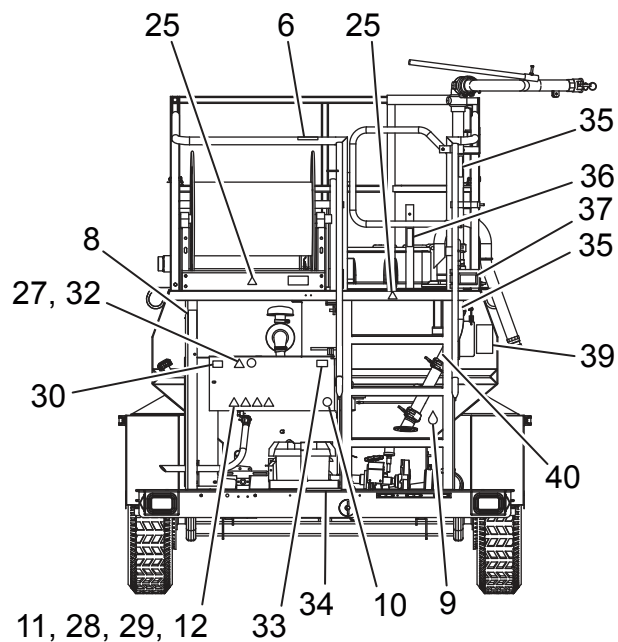
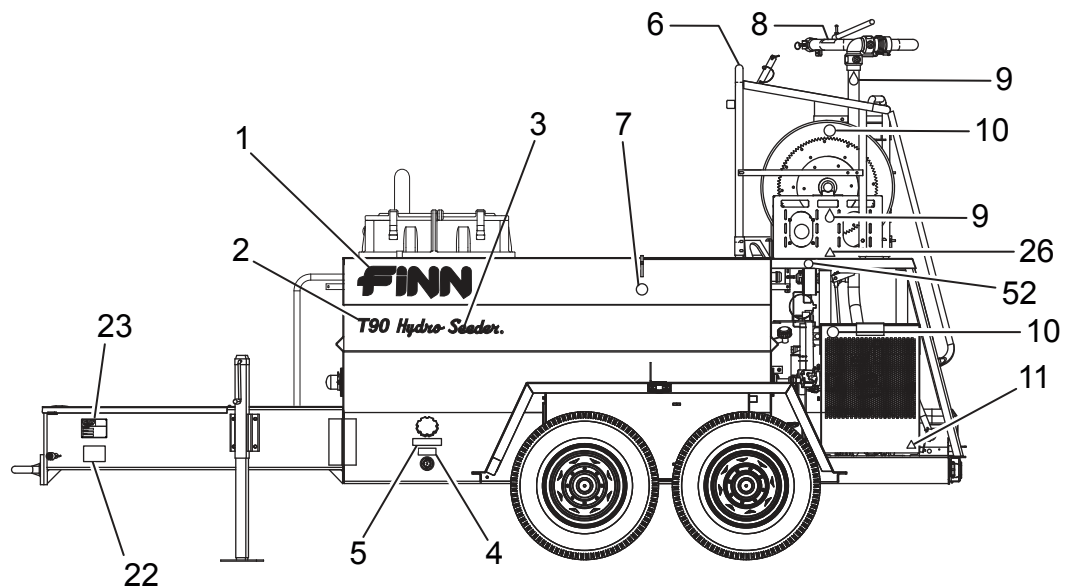
Ref. No.	Part Number	Description	No. Req'd
39	<input type="checkbox"/>	"Hydraulic System Instructions" Decal	1
40	<input type="checkbox"/>	"CAUTION! This Connection..." Decal	1
41	<input type="checkbox"/>	"WARNING! Burn Hazard and Radiator..." Decal	1
42	<input type="checkbox"/>	"Service Weekly" Decal (Rectangular)	1
43	<input type="checkbox"/>	"NOTICE Seal Lubricator..." Decal	1
44	<input type="checkbox"/>	"Service Daily" Decal (Rectangular)	1
45	<input type="checkbox"/>	"Service Weekly" Decal	3
46	<input type="checkbox"/>	"Operating Instructions" Decal	1
47	<input type="checkbox"/>	Body Entanglement Hazard Decal	1
48	<input type="checkbox"/>	"DANGER! Confined Space Hazard" Decal	1
49	<input type="checkbox"/>	"AGITATOR - Forward (Spray)/Reverse (Mix)" Decal	1
50	<input type="checkbox"/>	DO NOT Pressure Wash Decal	2
<b>NOT SHOWN</b>			
	<input type="checkbox"/>	Automatic Pressure Lubricator Decal	1
	<input type="checkbox"/>	Decal "Service Daily" (Automatic Pressure Lubricator)	1

## KITS AND MARKERS

<input type="checkbox"/>	041401-01	T90/T120 Decal Kit
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**NOTE:** All of the decals depicted and listed (except those identified with a ☐) are shown for location purposes only. To order replacements you must order the T90/T120 Decal Kit (041401-02). Replacement decal and plates identified with a part number are not part of the decal kit and must be ordered separately.

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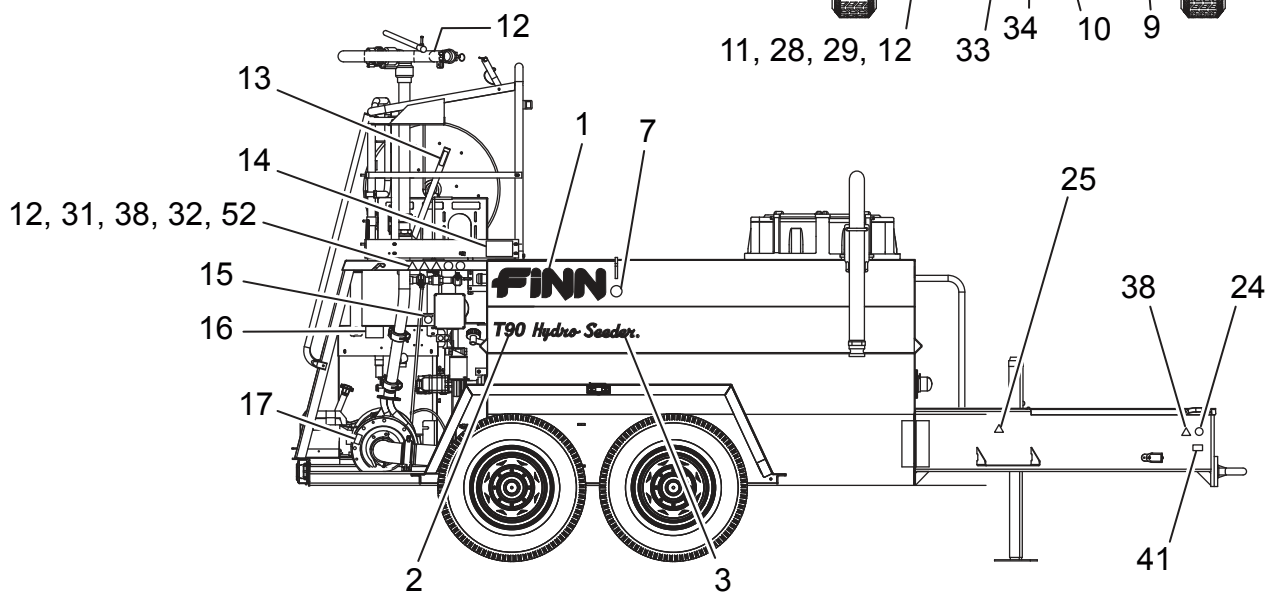
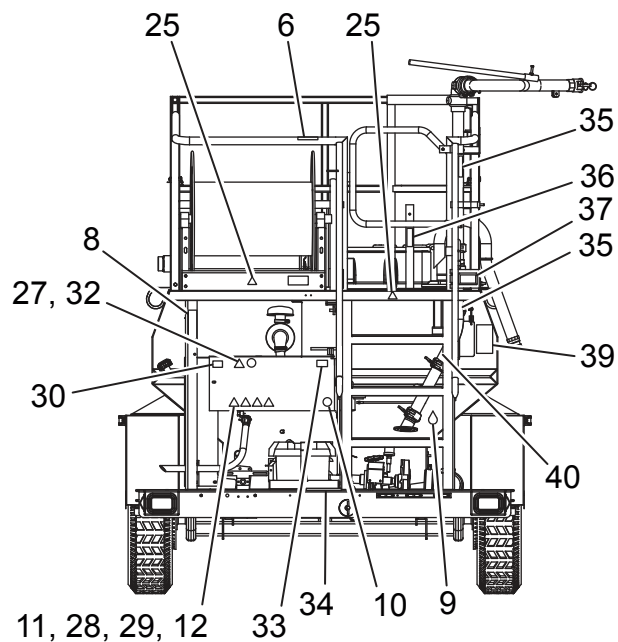
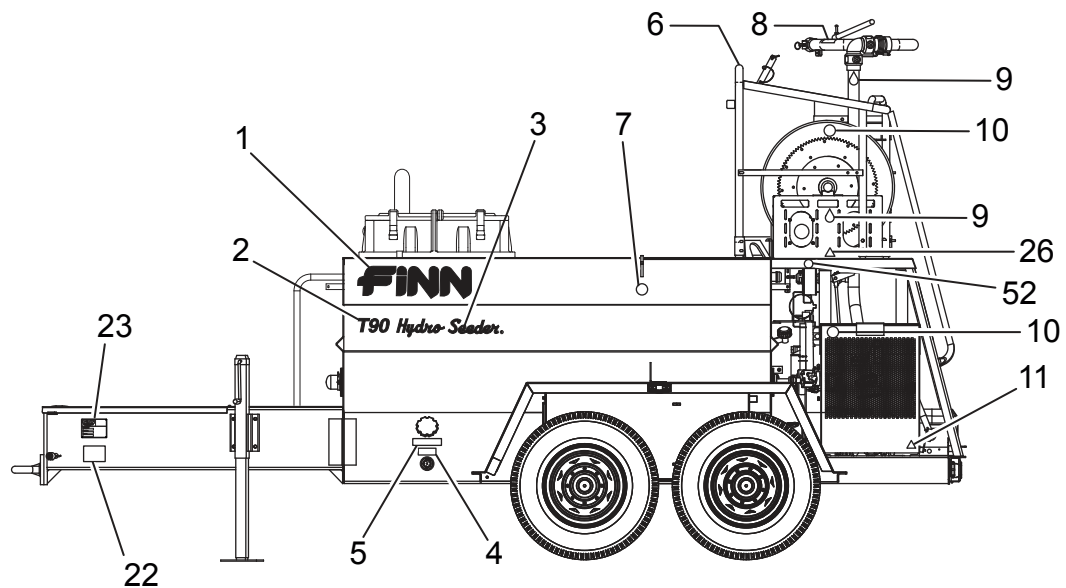
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# TRAILER DECALS

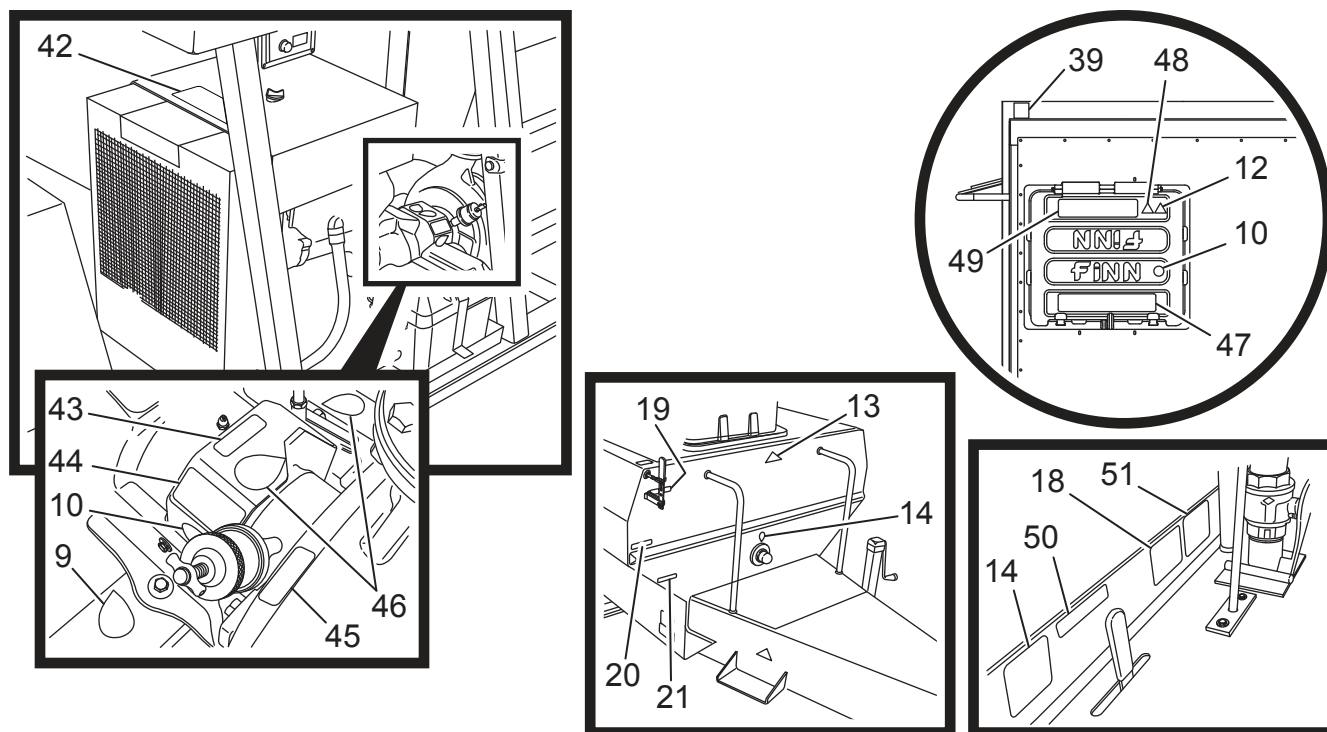
Ref. No.	Part Number	Description	No. Req'd
1	023174	"FINN" Decal - Large	2
2	012661-05	"T90" Decal	2
3	011595	"Hydro Seeder" Decal	2
4	□	"Diesel Fuel Only" Decal (Diesel units only)	1
5	□	"Ultra Low Sulfur" Decal (Diesel units only)	1
6	□	"WARNING! Fall Hazard..." Decal	3
7	□	Lift Point Decal	4
8	□	"Do Not Aim..." Decal	2
9	□	"Service Daily" Decal	4
10	□	Do Not Remove Guard Decal	6
11	□	Hot Surface Hazard Decal	2
12	□	Splash/Spray Hazard Decal	3
13	□	"VALVE - Open/Closed" (Handle) Decal	1
14	□	"CAUTION! SPL Exceeds 80dBA . . ." Decal	1
15	□	"Emergency Stop" Decal	1
16	□	"CAUTION! New Clutch Information" Decal	1
17	□	"NOTICE Tighten Suction Cover..." Decal	1
18	□	"VALVE - Open/Close" Handle Decal	1
19	□	"800" Gallon Decal	1
20	□	"500" Gallon Decal	1
21	□	"250" Gallon Decal	1
22	□	U.S. Patent Nos. Decal	1
23	005807	GVWR Data Plate	1
24	□	Trailer Safety Decal	1
25	□	Fall Hazard Decal	3
26	□	Pinch Point/Entanglement Hazard Decal	1
27	□	Vision Damage Hazard Decal	1
28	□	Sever/Reach Hazard Decal	1
29	□	Pinch Point/Moving Belt Hazard Decal	1
30	□	"Hose Reel Rewind" Decal	1
31	□	Vision and Hearing Damage Hazard	1
32	□	Read Manual Decal	2
33	□	"CAUTION! Do Not Use Ether Or . . ." Decal	1
34	□	"Drain Water Daily" Decal	1
35	□	"WARNING! Burn Hazard..." Decal	2
36	□	"CAUTION! Keep Tank Vent Clean..." Decal	1
37	012260	"IMPORTANT" Metal Plate	1
38	□	Attention Decal	1

*Continued to next page.*

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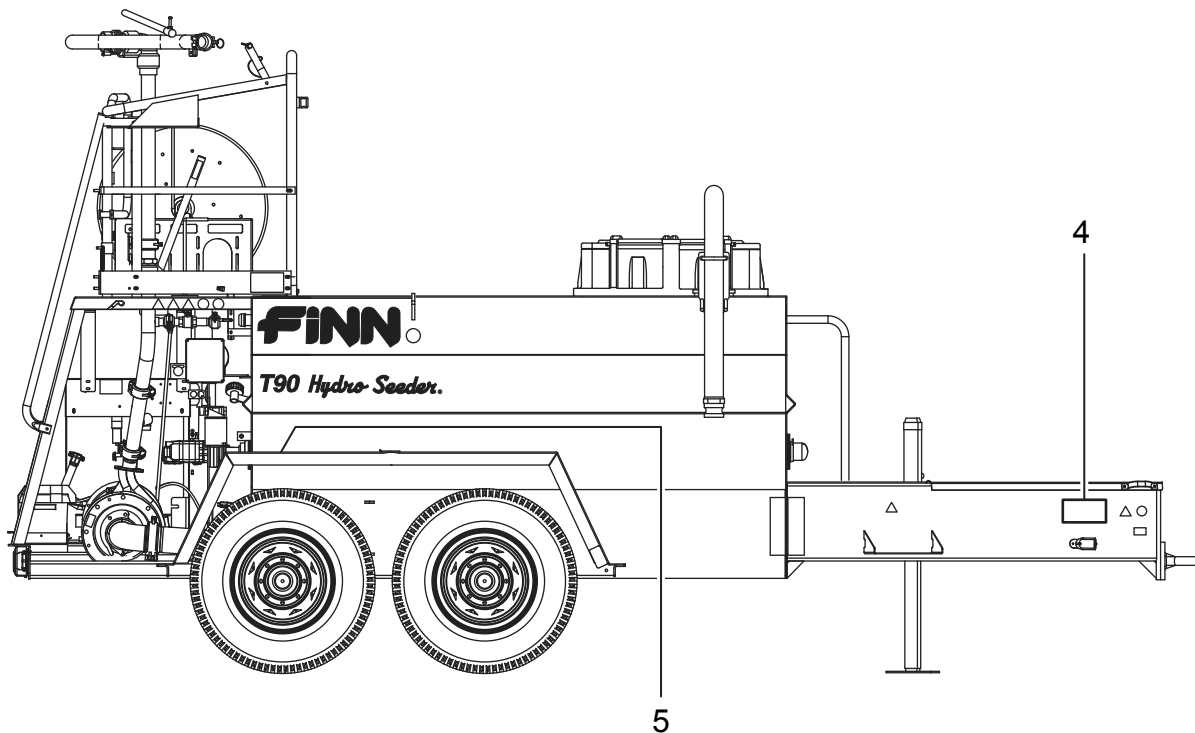
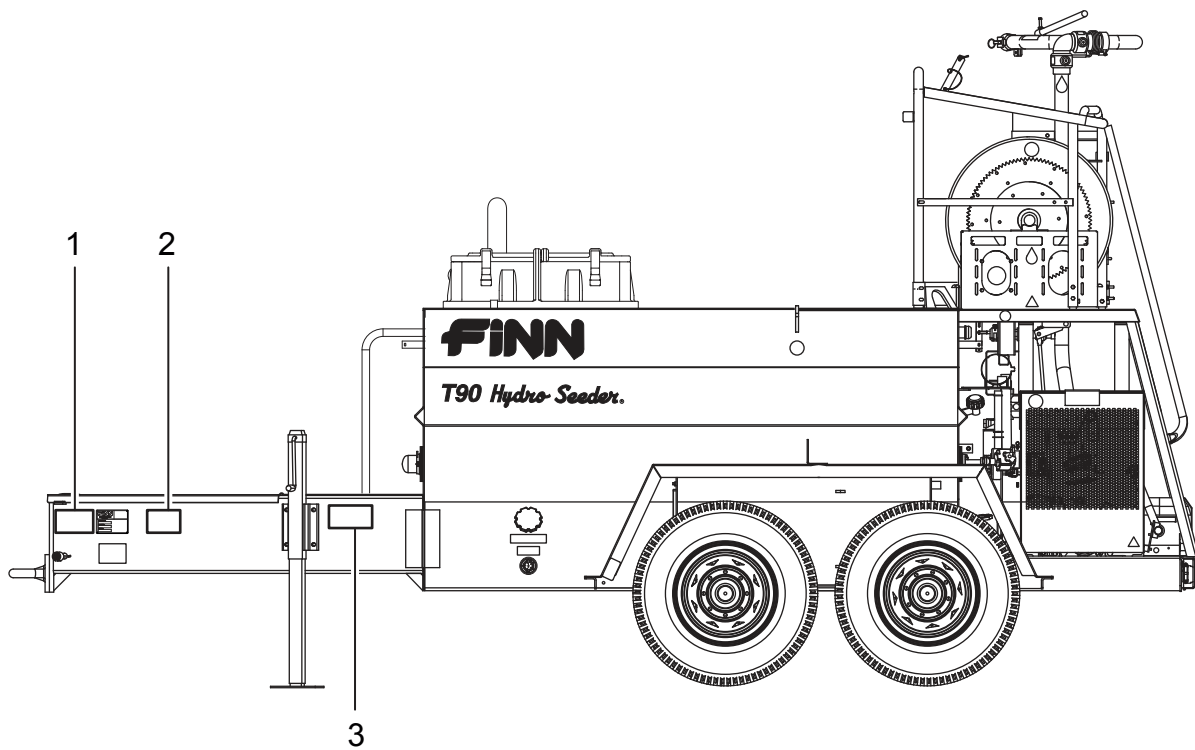
## TRAILER DECALS

Ref. No.	Part Number	Description	No. Req'd
39	<input type="checkbox"/>	"Hydraulic System Instructions" Decal	1
40	<input type="checkbox"/>	"CAUTION! This Connection..." Decal	1
41	<input type="checkbox"/>	"Use on 2 5/16 in...." Decal	1
42	<input type="checkbox"/>	"WARNING! Burn Hazard and Radiator..." Decal	1
43	<input type="checkbox"/>	"Service Weekly" Decal (Rectangular)	1
44	<input type="checkbox"/>	"NOTICE Seal Lubricator..." Decal	1
45	<input type="checkbox"/>	"Service Daily" Decal (Rectangular)	1
46	<input type="checkbox"/>	"Service Weekly" Decal	3
47	<input type="checkbox"/>	"Operating Instructions" Decal	1
48	<input type="checkbox"/>	Body Entanglement Hazard Decal	1
49	<input type="checkbox"/>	"DANGER! Confined Space Hazard" Decal	1
50	<input type="checkbox"/>	"AGITATOR - Forward (Spray)/Reverse (Mix)" Decal	1
51	<input type="checkbox"/>	"VALVE - Open/Close" Foot Pedal Decal	1
52	<input type="checkbox"/>	DO NOT Pressure Wash Decal	2
<b>NOT SHOWN</b>			
	<input type="checkbox"/>	Automatic Pressure Lubricator Decal	1
	<input type="checkbox"/>	Decal "Service Daily" (Automatic Pressure Lubricator)	1
<b>KITS AND MARKERS</b>			
<input type="checkbox"/>	041401-01	T90/T120 Decal Kit	

**NOTE:** All of the decals depicted and listed (except those identified with a ☐) are shown for location purposes only. To order replacements you must order the T90/T120 Decal Kit (041401-01). Replacement decal and plates identified with a part number are not part of the decal kit and must be ordered separately.

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## TRAILER SAFETY DECALS

Ref. No.	Part Number	Description	No. Req'd
1	<input type="checkbox"/>	Decal "Warning! Control Hazard! Lights..."	1
2	<input type="checkbox"/>	Decal "Warning! Load Balance and GVWR..."	1
3	<input type="checkbox"/>	Decal "Warning! Personal Injury Hazard! Trailer Jack..."	1
4	<input type="checkbox"/>	Decal "Warning! Runaway Vehicle Hazard! Breakaway..." and "Control Hazard! Chains..."	1
5	<input type="checkbox"/>	Decal "Warning! Control Hazard! Tires..." (Dual Axle)	1
<b>KITS AND MARKERS</b>			
<input type="checkbox"/>	A2270-001	Trailer Safety Decal Kit	

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