NEALCO™ EQUIPMENT, LLC
P.O. BOX 337
SHIPPENSBURG, PA 17257

PHONE 717-532-2439
TOLL-FREE 866-351-6325
FAX 717-532-7704

FORM OMP 550/760 *Revised 8/08*

OPERATION, MAINTENANCE, and PARTS MANUAL for the ESP-550/ESSP-550 and ESP-760/ESSP-760 Sealcoat Trailer & Skid Systems

Read this instruction manual before operating this equipment

DISCLAIMER

NEALCO™ Equipment, LLC is continually working to improve its products. We have taken the utmost care to provide you with a manual that is as accurate as possible. Should you find any questionable or conflicting documentation, instructions, or illustrations in any section of the manual provided and the actual physical equipment construction pertaining to the operation, maintenance, or repair of said product **consult the factory immediately for clarification before attempting further operation or completion of maintenance and/or repairs**.

DO NOT ATTEMPT TO OPERATE, REPAIR, OR MAINTAIN THE EQUIPMENT without completely understanding its proper operation and maintenance procedures and operational controls.

TABLE OF CONTENTS

INTRODUCTION

The purpose of this manual is to provide the operator and site maintenance personnel with knowledge of the fundamental rules and criteria to be followed for the on-site use and maintenance of the ESP-550 and ESP-760 Sealcoat System. This instruction manual must be read and fully understood by the operator before operating the machine.

This manual consists of:

• Introduction	• Troubleshooting
• Safety Rules	• Maintenance
• Operating Instructions	• Schematic
• Technical Specifications	• Parts Information

Always keep this manual where it can be easily referred to. If any part of this manual cannot be understood, contact your supervisor or local NEALCO™ Distributor. This is an essential condition for working safely with this machine. The correct machine operation, use, and regular maintenance are also essential elements to provide the highest performance and safety.

NOTE:

This manual is accompanied by an engine instruction manual provided by the engine's manufacturer. Please follow the operation and maintenance instructions as specified in both the machine and engine manuals.

PROCEDURE WHEN RECEIVING THE MACHINE

Your machine has been tested, accurately checked, and prepared for shipment. Every part of the machine, including the detached parts, has been accurately checked before being shipped from the factory. When you receive the machine, your dealer will go over each item on your machine and verify that there is no damage or missing parts. By signing this checklist you relieve NEALCO™ of liabilty, damages, or parts lost during shipping. Check the equipment by consulting the shipment documents. If goods are damaged or if parts are missing, inform the freight agent as soon as possible. They will inform you regarding how to proceed in order to make a complaint.

IDENTIFICATION DATA

An exact description of the model type and serial number of your machine will facilitate fast and efficient response from our parts and service operations. Always provide the model of your machine and its serial number when you contact the local NEALCO™ service or parts office. We advise you to enter your machine data in the following lines to maintain machine and engine information.

Model ..... Month/Year of Manufacture .....

Serial No. .....

Engine Type and Serial No. .....

MACHINE IDENTIFICATION

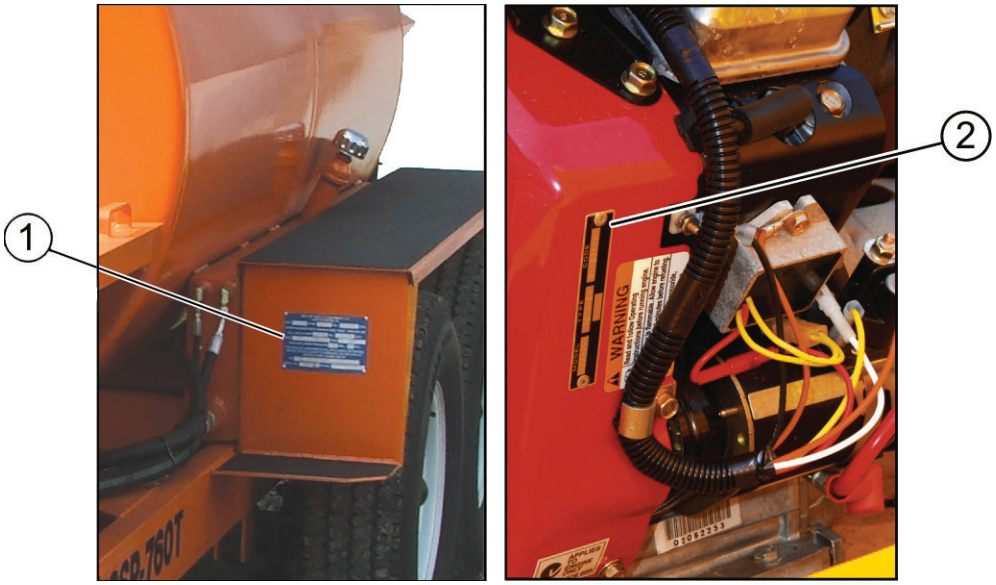


Figure 1

The ESP-550 and ESP-760 Trailer System machine identification plate is located at 1, Figure 1, and the engine serial number can be found on its identification plate located at 2, Figure 1. For skid units identification plate can be found on inside of frame rail, rear right side, adjacent to material pump.

GENERAL INFORMATION

All safety rules in *Section 1, Safety* must be observed.

If further information is required concerning the recommended use on asphalt applications, contact your local NEALCO™ Distributor.

Nealco™ Equipment LLC
Shippensburg, Pennsylvania 17257 USA
Tele: +1 - 717-532-2439
Toll-Free: 866-351-6325
Fax: +1 - 717-530-8158
NEALCO™ reserves the right to make changes or modifications without prior notice and without incurring any liability to retrofit machines previously shipped from the factory.

ESP-550 AND ESP-760 SEALCOAT SYSTEM MACHINE DESCRIPTION

The ESP-550 and ESP-760 Sealcoat System is designed for use on driveways and small to medium sized commercial lots. The trailer system is equipped with hydraulically driven 50 gpm (189.3 lpm) piston pumps or optional 100 gpm (378.5 lpm) piston pumps that are low in maintenance and simple to operate. The dual axle trailer, equipped with electric brakes, is designed for heavy work loads and built for safety and durability. Radial tires provide dependable stability when in tow. A spray bar and operator's seat are options on the ESP-550 and the ESP-760.

BE AWARE OF SAFETY INFORMATION

This is the Safety Alert Symbol. When you see this symbol in this manual, be alert to the potential for personal injury. This includes being alert to machine wear which can lead to part failure. Follow recommended precautions and safe operating practices.

(SAFETY ALERT SYMBOL)

UNDERSTAND SIGNAL WORDS

A signal word—DANGER, WARNING, or CAUTION—is used with the safety alert symbol.

DANGER, WARNING, or CAUTION safety labels may be located near specific hazards.

NOTICE labels are for general information. They notify people of installation, operation, or maintenance information which is important but not hazard related.

⚠ DANGER

(RED BACKGROUND)

DANGER IS USED TO INDICATE THE PRESENCE OF A HAZARD WHICH WILL CAUSE SEVERE PERSONAL INJURY OR DEATH IF THE WARNING IS IGNORED.

⚠ WARNING

(ORANGE BACKGROUND)

WARNING IS USED TO INDICATE THE PRESENCE OF A HAZARD WHICH CAN CAUSE SEVERE INJURY OR DEATH IF THE WARNING IS IGNORED.

⚠ CAUTION

(YELLOW BACKGROUND)

CAUTION IS USED TO INDICATE THE PRESENCE OF A HAZARD WHICH WILL OR CAN CAUSE PERSONAL INJURY OR PROPERTY DAMAGE IF THE WARNING IS IGNORED.

NOTICE

Notice is used to notify people of installation, operation, or maintenance information which is important but not hazard related.

SAFETY LABEL LOCATION

Refer to Figure 1-1 for the location of the safety labels:

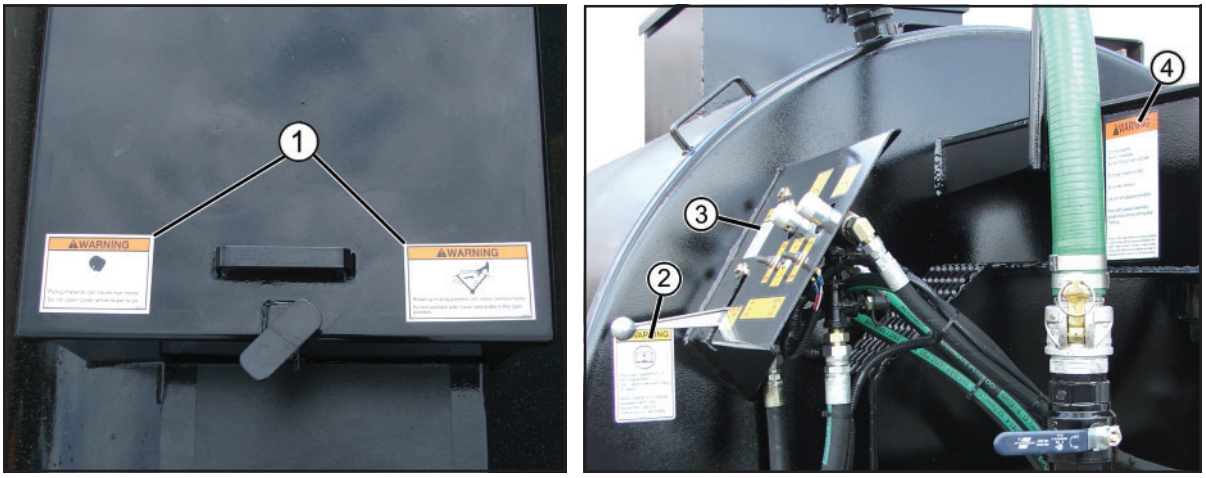


Figure 1-1

1. Safety Warning: “NEVER!!! Open Outer Hatch Lid With Agitator Engaged or Moving. NEVER!!! NEVER Open Inner Hatch Lid With System Running or Moving.”

2. Safety Warning: “WARNING. Improper operation of this equipment can cause serious injury or death. Read operator’s manual supplied with this equipment before operation or servicing.”

3. Caution: “CAUTION. Damage to pumps. Can cause serious property damage. Use only coal tar or asphalt emulsions with 30/60 sieve Silica Sand or Black Beauty in this equipment.”

4. Safety Warning: “WARNING. Cold liquid asphalt. Harmful if swallowed. May be irritating to skin and eyes. So not get in eyes or on skin. Do not take internally. Use only with adequate ventilation. Wear safety glasses, face shield, gloves, and protective clothing when handling. First Aid: Obtain medical attention as quickly as possible. In case of contact with eyes, flush immediately with plenty of water for at least 15 minutes. In case of contact with skin, wash affected area with detergent and water. If swallowed, give milk or olive oil. Do not induce vomiting.”

OVERVIEW

BEFORE YOU OPERATE, MAINTAIN, OR IN ANY OTHER WAY USE THIS MACHINE:

READ and STUDY this manual. KNOW how to safely use the ESP-550/760 and ESSP-550/760 Sealcoat System controls and what you must do for safe maintenance.

If you have ANY QUESTIONS about the safe use or maintenance of this machine, ASK YOUR SUPERVISOR OR CONTACT ANY NEALCO™ DISTRIBUTOR. NEVER GUESS—ALWAYS CHECK!

WARNINGS IN MANUAL

The following conventions are used in this manual to designate instructions of particular importance.

Note: Refers to special information on the efficient use of the machine.

Notice: Denotes special nonhazardous related information.

Caution: Refers to orders and prohibitions directed towards preventing minor personal injury or product/property damage.

Warning: Refers to orders and prohibitions designed to prevent severe personal injury, death or extensive damage.

GENERAL

The NEALCO™ ESP-550/760 and ESSP-550/760 Sealcoat System is built in accordance with state-of-the-art standards and recognized safety rules. Nevertheless, misuse may constitute a risk to life and limb of the user or of third parties, and may cause damage to the machine or other material property.

The machine must be used in accordance with its designated use as described in *Section 2, Operation* in this manual. The machine must only be operated by safety-conscious persons who are fully aware of the risks involved in operating the machine. Any functional disorders, especially those affecting the safety of the machine, must be corrected immediately.

The machine is designed exclusively for the sealing of asphaltic road construction materials. Use of the machine for purposes other than that mentioned is considered contrary to its designated use. The manufacturer/supplier cannot be held liable for any damage resulting from such use. The risk of such misuse lies entirely with the user.

Operating the machine within the limits of its designated use also involves compliance with the maintenance directives contained in *Section 5, Maintenance.*

SELECTION AND QUALIFICATION OF PERSONNEL

Work on and with the machine must be performed by qualified personnel only. Statutory minimum age limits must be observed.

Individual responsibilities of the personnel responsible for operation, setup, maintenance and repair of the machine should be stated clearly.

Do not allow persons being trained or instructed in the operation or maintenance of the machine to work without permanent supervision by an experienced person.

Work on the electrical system and equipment of the machine must be done only by a skilled electrician or by instructed persons under the supervision and guidance of a skilled electrician and must be in accordance with electrical engineering rules and regulations.

Work on ANY of the machine's systems must be performed by skilled personnel with special knowledge and training for such work.

ORGANIZATIONAL MEASURES

Manuals MUST always be available at the site where the machine is used.

OBSERVE AND INSTRUCT the user in all other generally applicable legal and mandatory regulations relevant to accident prevention and environmental protection. These compulsory regulations may also deal with the handling of hazardous substances, issuing and/or wearing of personal protective equipment, and traffic regulations.

SUPPLEMENT operating instructions with detailed working instructions pertaining to the specific work location.

ALWAYS be sure that persons entrusted with work on the machine have read the operating instructions and in particular the chapter on safety before beginning work. Reading the instructions after work has begun is too late. This is especially important for persons who work only occasionally on the machine, e.g. during set-up or maintenance.

MAKE CERTAIN personnel are working in compliance with the operating instructions and are alert to risks and safety factors.

ALWAYS tie back or otherwise secure long hair, wear close-fitting garments and avoid wearing jewelry such as rings. Injury may result from clothing, hair, or jewelry being caught up in the machinery.

ALWAYS wear or use the proper safety items required for your personal protection, including boots, protective clothing, gloves, hat, and safety glasses.

OBSERVE all safety instructions and warnings attached to the machine.

BE SURE all safety instructions and warnings attached to the machine are complete and perfectly legible.

STOP the machine immediately in the event of any malfunction. REPORT the malfunction to the proper authority/person.

NEVER provide service or maintenance to the machine in ANY manner other than that which is described in this manual.

NEVER make any modifications, additions or conversions to the machine which might affect safety without the manufacturer's approval. This also applies to the installation and adjustment of safety devices and valves as well as to welding work on load bearing elements.

ALWAYS ADHERE to prescribed intervals or those specified in the operating instructions for routine checks and inspections.

OBSERVE all fire-warning and fire-fighting procedures.

TRANSPORTING AND TOWING TRAILER SYSTEM

The machine must be towed and transported only in accordance with the operating instructions. For towing the machine, observe the prescribed transport position, admissible speed and itinerary. Never turn corners at excessive speeds. Look in all directions before reversing your direction of travel.

⚠WARNING

Failure to follow these instructions can cause severe injury or death.

- **Ensure that tires, wheels, and running gear are in good condition and secure.**
- **Ensure that tires are inflated to 65 psi.**
- **Do not tow this unit in excess of 50 mph (80 km/hr).**
- **Use a tow vehicle the towing capacity of which is greater than the gross weight of this unit.**

PRE-START INSPECTION

INSPECT your ESP-550/760 and ESSP-550/760 Sealcoat System machine daily. Ensure that the routine maintenance and lubrication are being dutifully performed (refer to the maintenance schedule in Section 5, Maintenance.). Have any malfunctioning, broken, or missing parts repaired or replaced before use.

VERIFY that all instruction and safety labels are in place and readable. These are as important asany other equipment on the machine.

USE CAUTION when opening the engine's protective covers. Ensure that no one is standing or sitting on, or leaning against the towing fork upon which the cover rests when open.

NEVER fill the fuel tank with the engine running, while near an open flame, or while smoking.

ALWAYS wipe up any spilled fuel.

KNOW the location of the water pump control and material pump control shut-off switches.

ALWAYS know the capabilities and limitations of your equipment.

BE AWARE of the dimensions of your NEALCO™ Sealcoat System—height and weight—as well as your towing/transporter's dimensions and weight.

CHECK for any conditions in the work area that could be dangerous—holes, banks, underground culverts, manhole covers, water meter pits, curb and/or street boxes.

Starting

NEVER reach across the engine to start it. Always stand on the same side as the electric key ignition.

ALWAYS place the engine cover in the closed position after starting and before operating the machine.

Safety Instructions Governing Operation

⚠WARNING

On the ESP-550/760 or ESSP-550/760 without an optional spray bar, NEVER open the spray bar, or distributor bar, ball valve (3, Figure 2-5 in *Section 2, Operation*). Material in the tank is under pressure. Opening the valve could allow the material to gush out and cause serious injury. NEALCO™ recommends that you remove the valve's handle to prevent the valve from accidentally being opened.

CHECK the machine at least once per working shift for obvious damage and defects. Report any changes, including changes in the machine's working behavior, to the competent organization/person immediately. If necessary, stop the machine immediately, shut down all controls, and turn off the engine.

AVOID any operational mode that might sacrifice safety.

TAKE all necessary precautions to ensure that the machine is used only when in a safe and reliable condition.

OPERATE the machine only if all protective and safety oriented devices are in place and fully functional.

USE CAUTION when standing on the platform to operate the machine's controls. The platform can be slippery when wet.

CLEAN any foreign material from the operator's platform to reduce the danger of slipping.

MAKE SURE no one is at danger or risk before starting up and when towing the machine while sealcoating.

ALWAYS KEEP at a distance from the edges of building pits and slopes.

AVOID any operation that might be a risk to machine stability.

ALWAYS SECURE the machine against inadvertent movement (chock wheels) and unauthorized use before leaving the unit unattended.

Operating

ALWAYS make sure that no person or obstruction is in your line of travel before starting to tow the machine.

NEVER CLIMB onto or off the machine at any time while it is being towed.

USE EXTREME CAUTION and be very observant when operating in close quarters or congested areas.

NEVER carry passengers.

KNOW the area in which you are working. Familiarize yourself with work site obstructions and any other potential hazards in the area, such as grades that could cause the machine to slide or tip over.

ALWAYS LOOK in all directions BEFORE changing your towing direction.

DO NOT run the engine in a closed building for an extended length of time. EXHAUST FUMES CAN KILL.

Stopping

ALWAYS park the machine on solid level ground. If this is not possible, always park at a right angle to the slope, chock the wheels, and lower the leveling device on the towing fork.

USE proper flags, barriers, and warning devices, especially when parking in areas of heavy traffic.

Maintenance

In any work concerning the operation, conversion or adjustment of the machine and its safety oriented devices or any work related to maintenance, inspection and repair, always observe the start-up and shutdown procedures set out in the operating instructions and the information on maintenance work.

Carry out maintenance and repair work only if the machine is positioned on stable and level ground and has been secured against inadvertent movement.

ALWAYS USE the correct tools and workshop equipment when performing maintenance to the machine.

KEEP all standing surfaces free from mud, dirt, snow and ice.

CLEAN the machine, especially connections and threaded unions, of any traces of oil, fuel or preservatives before carrying out maintenance/repair. NEVER use aggressive detergents. Use lint free cleaning rags.

Before cleaning the machine with water, steam jet (high pressure cleaning) or detergents, COVER OR TAPE up all openings which—for safety and functional reasons—must be protected against water, steam or detergent penetration. Special care must be taken with the engine and battery area.

REMOVE all covers and tapes applied for that purpose after cleaning machine.

After cleaning, EXAMINE all fuel and hydraulic fluid lines for leaks, loose connections, chafe marks and damage. REPAIR or REPLACE defective parts immediately.

Always TIGHTEN any screwed connections that have been loosened during maintenance and repair.

ENSURE that all consumables and replaced parts are disposed of safely and with minimum environmental impact.

AVOID, whenever possible, servicing, cleaning, or examining the machine with the engine running.

AVOID, whenever possible, servicing or providing maintenance unless the machine is adequately secured against movement.

NEVER fill the fuel tank with the engine running, while near an open flame, or while smoking. ALWAYS wipe up any spilled fuel.

DO NOT alter the engine's governor settings from those indicated in the engine manual and the engine option plate.

ALWAYS replace damaged or lost decals. Call NEALCO™ or your local distributor for new decals.

DISCONNECT the battery cables when working on the electrical system or when welding on the machine.

BE SURE the battery area is well ventilated (clear of fumes) should it be necessary to connect a jump battery or battery charger. Fumes from the battery can be ignited by a spark and explode.

BE SURE the battery charger is OFF when making the connections if battery charging is required.

The electrical equipment of machines is to be inspected and checked at regular intervals. Defects such as loose connections or scorched cables must be rectified immediately.

Welding, flame cutting and grinding work on the machine should only be done if expressly authorized, as there may be a risk of explosion and fire.

Before beginning welding, flame cutting and grinding operations, clean the machine and its surroundings from dust and other flammable substances and make sure that the premises are adequately ventilated. (Risk of explosion. Check all lines, hoses and screwed connections regularly for leaks and obvious damage. Repair damage immediately. Splashed oil may cause injury and fire.)

Depressurize the hydraulic system before carrying out any repair work on the system.

Hydraulic lines, when replaced, must be laid out in the same place and fitted properly. Ensure that no connections are interchanged. The fittings, lengths and quality of the hoses must be exactly like the machine's original equipment.

When handling oil, grease and other chemical substances, observe the product related safety regulations.

HAZARDOUS SUBSTANCE PRECAUTION

The following substances are used in the manufacture or produced during the operation of this machine and may be hazardous to health if used incorrectly:

SUBSTANCE	PRECAUTION
Hydraulic Oil	Avoid ingestion, skin contact and breathing fumes
Engine Lubricating Oil	Avoid ingestion, skin contact and breathing fumes
Engine Fuel	Avoid ingestion, skin contact and breathing fumes
Battery Electrolyte	Avoid ingestion, skin contact and breathing fumes
Engine Exhaust Fumes	Avoid breathing Avoid buildup of fumes in confined spaces
Sealcoating Mixtures	Avoid ingestion, skin contact and breathing fumes

Blank

TRANSPORTING AND TOWING TRAILER SYSTEM

The machine must be towed and transported only in accordance with the operating instructions. For towing the machine, observe the prescribed transport position, admissible speed and itinerary. Never turn corners at excessive speeds. Look in all directions before reversing your direction of travel.

⚠WARNING

Failure to follow these instructions can cause severe injury or death.

- **Ensure that tires, wheels, and running gear are in good condition and secure.**
- **Ensure that tires are inflated to 65 psi.**
- **Do not tow this unit in excess of 50 mph (80 km/hr).**
- **Use a tow vehicle the towing capacity of which is greater than the gross weight of this unit.**

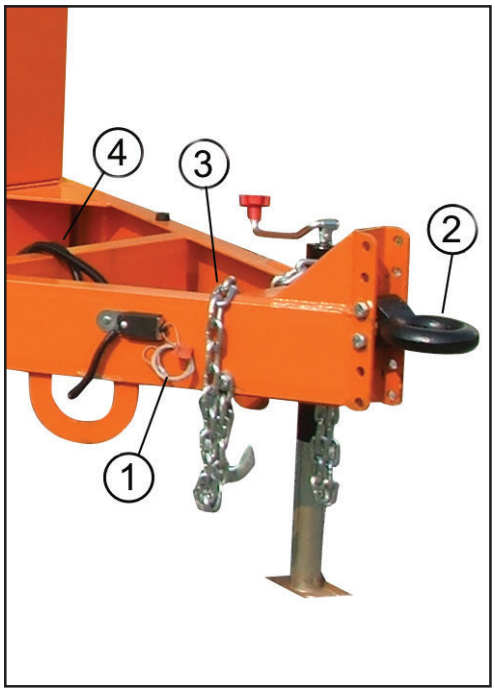


Figure 2-1

Always follow these steps to ensure that the ESP-550T and ESP-760T Sealcoat Trailer System Machine is transported in the safest possible manner.

1. Attach the breakaway electric switch cable loop (1, Figure 2-1) around the ball at the rear of the towing vehicle. This switch will automatically engage the trailer's electric brakes should the trailer and towing vehicle separate.

2. Connect the pintel ring (2, Figure 2-1) of the towing tongue securely to the hitch on the towing vehicle.

3. Attach the safety chains (3, Figure 2-1) that come with the machine to an approved location on the towing vehicle.

4. Connect the 6-pin female electric coupling (4, Figure 2-1) on the trailer to the male coupling at the back of the towing vehicle. This provides electric current for the trailer's taillights and electric brakes, and for charging the trailer's battery.

TRANSPORTING SKID SYSTEM

The machine must be transported only in accordance with the operating instructions. Observe the prescribed transport position, admissible speed and itinerary. Never turn corners at excessive speeds. Look in all directions before reversing your direction of travel.

Always follow these steps to ensure that the ESP-550S and ESP-760S Sealcoat Skid System Machine is transported in the safest possible manner.

1. Be aware of height of unit at all times.
2. Be aware of weight limits of your vehicle.
3. Check attach points before moving everytime.
4. Follow all safe driving pactices.

STARTING THE ENGINE

Figure 2-2

1. Open the cover that protects the engine and battery.
2. Add gasoline to the fuel tank if needed and check the oil level, adding oil if needed. (See “Check Fuel Level” on page 5-8 and “Check Engine Oil Level” on page 5-9, in *Section 5, Maintenance*.)
3. Move the throttle control lever (1, Figure 2-2) up to the FAST position.
4. Turn the fuel shut-off (2, Figure 2-2) to the ON position.
5. Turn the ignition key (3, Figure 2-2) clockwise as far as it will go to start the engine. Release the key as soon as the engine starts.
6. Close the cover that protects the engine and battery.

NOTE:

The starting rope is used to start the engine only if there is a failure of the electric starter.

Stopping the Engine

1. Open the cover that protects the engine and battery.
2. Move the throttle control lever down to the SLOW position.
3. Turn the fuel shut-off to the OFF position to stop the engine.
4. Turn the key counterclockwise to the vertical, or OFF, position.
5. Close the cover that protects the engine and battery.

ESP-550/760 AND ESSP-550/760 CONTROLS

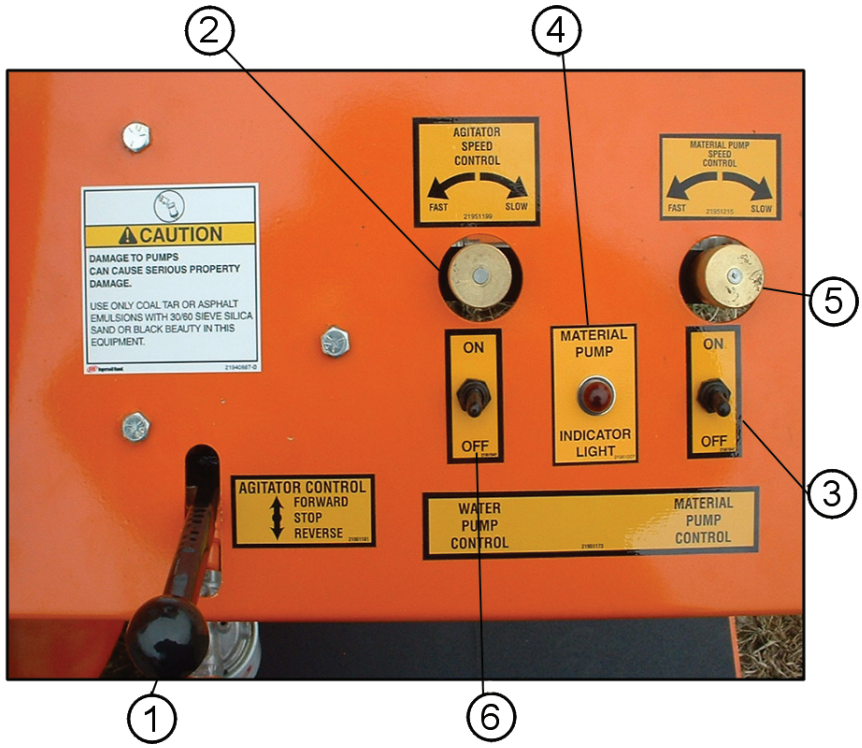


Figure 2-3

All controls for the operation of ESP-550/760 and ESSP-550/760 Sealcoat Systems are located on the dash panel (Figure 2-3). Controls are included for the agitator, material pump, and water pump.

AGITATOR CONTROLS

The direction of agitator rotation can be controlled by using the Agitator Control Handle (1, Figure 2-3). Push the handle forward and the agitator will begin to rotate. Pull the control handle back and the agitator will reverse its rotation. Moving the control handle to the center will stop agitator rotation.

NOTE:

Normally, the agitator is run in the FORWARD position, although the machine will function satisfactorily if the agitator control is in the REVERSE position. The sole purpose of the agitator is to keep the mixture blended. Should sand and solids in the coal tar settle during a prolonged period of machine inactivity, it may be necessary to "rock" the agitator between forward and reverse to loosen the mixture sufficiently so that the agitator will rotate freely.

The speed of the agitator blades is variable and is controlled by the agitator speed control valve (2, Figure 2-3). Rotating the knob clockwise slows the speed; counterclockwise increases the speed.

WATER PUMP CONTROL

The water pump is primarily used for clean-up purposes. The pump is activated by a toggle switch (6, Figure 2-3).

MATERIAL PUMP CONTROLS

The material pump is switched on or off using the toggle switch (3, Figure 2-3). When switched on, the indicator light (4, Figure 2-3) will illuminate signaling that the pump is in operation. When the pump is switched off, the indicator light will also turn off.

The speed of the material pump is variable and is controlled by the material pump speed control valve (5, Figure 2-3). Rotating the knob clockwise slows the speed; counterclockwise increases the speed.

Preparing to Spray the Material

Make sure all ball valves are closed before preparing to spray material.

1. Start the engine.
2. Push the agitator control handle into the FORWARD position (1, Figure 2-3). This will mix the material in the tank.
3. Allow the agitator to run for 5 minutes to insure that solids in the coal tar and the sand become thoroughly mixed.

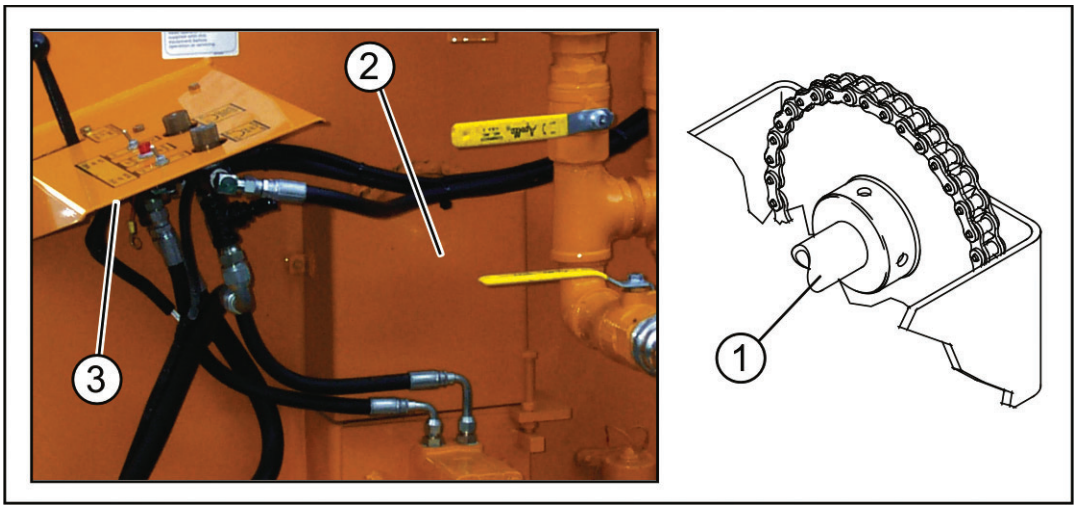


Figure 2-4

4. Set the agitator speed control valve (2, Figure 2-3) to between 18 and 22 revolutions per minute (RPMs) to maintain the product in suspension. You can determine the RPMs by counting the revolutions of the agitator shaft end attached to the large sprocket at the back of the tank (1, Figure 2-4). The shaft end and the sprocket are located inside the enclosure with the wire top (2, Figure 2-4) next to the control panel (3, Figure 2-4).

NOTICE

If the agitator speed is set while the material pump is in the OFF position, the speed of the agitator will change when the pump is turned ON due to a drop in hydraulic pressure. This is normal when you direct the flow of hydraulic fluid into additional areas of the hydraulic system.

5. Open ball valves (1 & 6, Figure 2-5)

6. Turn the material pump ON with the ON/OFF switch (3, Figure 2-3).

NOTE:

Always regulate the material flow from the Material Pump Speed Control Knob (5, Figure 2-3). Never regulate the material flow from any ball valve (see Figure 2-5); the sand will cause premature wear to the ball valve.

7. Regulate the material flow and spray pressure by adjusting the material pump speed control (5, Figure 2-3) until the spray is satisfactory.

The following describes the function of each valve in the machine's system:

Ball Valve Functions

Figure 2-5

Refer to Figure 2-5

VALVE	FUNCTION
Ball valve #1	The main valve to the entire plumbing system. Opening this valve allows material to flow into the system from the tank.
Ball valve #2	Has two purposes: Main function is loading material into the tank wilh ball valve #1 closed; when valve #1 is open along with valve #2, the material will flow from the tank.
Ball valve #3	Controls the spray bar, also called the distributor bar (see Figure 2-7). This valve needs to be open when spraying.
Ball valve #4	Allows the material to enter the hand wand (see “Hand Wand Operation” on page 2-7). Open this valve to spray through the wand.
Ball valve #5	Opens the surge tank. Open this valve during the spray mode and close it during recirculation (remixing) of the material. (See “Remix Procedure” on page 2-14.)
Ball valve #6	When open, allows the material to flow from the pump to the tank for recirculation (see “Remix Procedure” on page 2-14), and must be open with ball valve #2 when sucking material into the tank. Close this valve during the spray operation.

NOTICE

Ball Valve #5 and #6 always work opposed to each other. When #5 is open, close #6. When #6 is open, close #5.

Hand Wand Operation

⚠CAUTION

ALWAYS wear or use the proper safety items required for your personal protection, including boots, protective clothing, gloves, hat, and safety glasses.

NOTE:

The following instructions apply to ESP-550/760 and ESSP-550/760 Sealcoat System machines with one or two hand wands. A "tee" fitting is installed below ball valve #4 to accommodate the optional second wand.

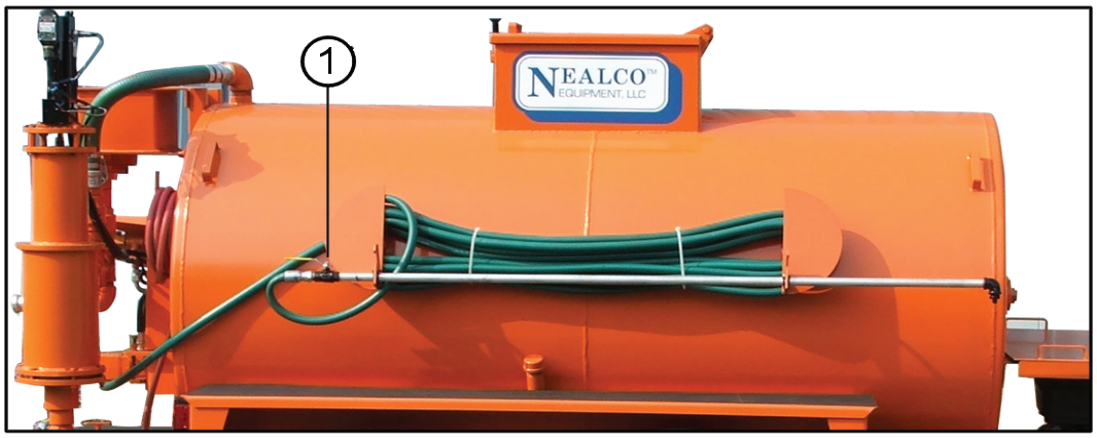


Figure 2-6

1. Begin with all valves closed.

2. Once the machine is running and the material pump is on, open valves #1 (1, Figure 2-5 and #5 (5, Figure 2-5) and leave the rest closed until the material pump builds enough pressure and stops stroking. This will signal that the pump is in NEUTRAL.

3. With the pump in NEUTRAL, open valve #4 (4, Figure 2-5) to operate the hand wand. This will pressurize the hose and fill it with material.

4. Open the ball valve on the hand wand (1, Figure 2-6) and start spraying with the sealing material. If two hand wands are used, they may be turned on and off independently of each other.

5. While the operator sprays, the helper should be controlling the flow of the material into the pump assembly. To achieve the desired flow, turn the material speed control knob (5, Figure 2-3) clockwise until the flow is too high and then back off on the speed of the pump by turning the knob counterclockwise to achieve the desired spray. (This procedure eliminates extra wear on the pump.)

NOTICE

At no time should the pressure on the hand wand be controlled by restricting the material flow with the hand wand's valve. This can cause premature wear on the ball valve. The hand wand needs to be either fully open or fully closed.

6. To stop spraying for a short time, shut OFF the ball valve on the hand wand. The pump will go into NEUTRAL. If both hand wands are being used, the pump will go in NEUTRAL when both hand wand ball valves are closed.

7. For a long idle period (spraying will be resumed), or when finished using the hand wand(s) for the day, such as when a job is finished, close ball valves #1 (1, Figure 2-5) and #5 (5, Figure 2-5). Return the hose and hand wand to their resting place on the side of the machine. (If all seal coatings have been applied with sand mixtures, the only time it will be necessary to flush out the complete system with water is if the machine will sit idle for a prolonged period of time, or for winterization. (See "Winterizing Procedure" on page 5-18 in *Section 5, Maintenance*.)

Spray Bar Operation

⚠CAUTION

ALWAYS wear or use the proper safety items required for your personal protection, including boots, protective clothing, gloves, hat, and safety glasses.

NOTE:

The ESSP pump and spray bar are optional equipment on the ESP-550/760. Figure 2-8 illustrates the spray bar lever and valves.

1. Begin with all valves closed.

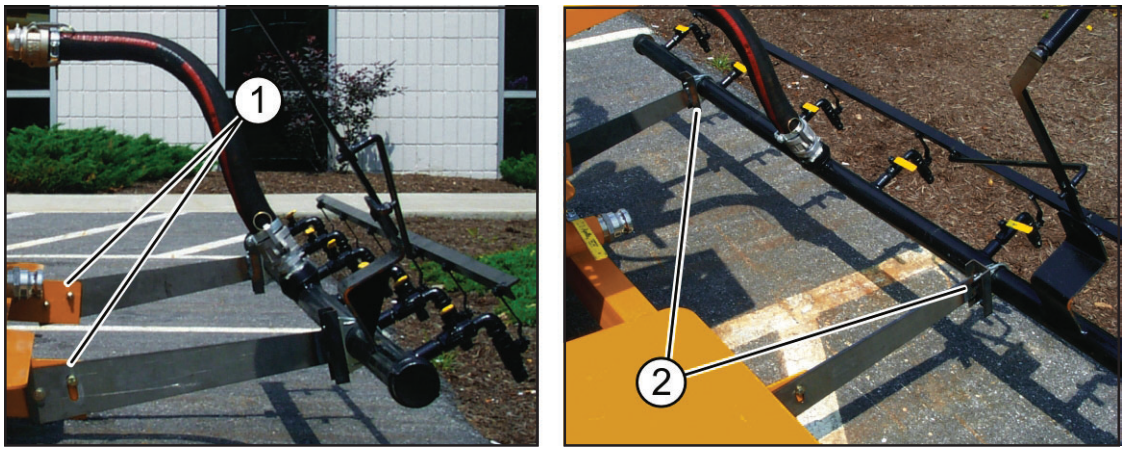


Figure 2-7

2. For best spraying results:

   - Set the nozzles so that they are 18 to 22 inches above the surface to be sprayed. You can adjust the height by loosening the four bolts by which the spray bar brackets are attached to the machine (1, Figure 2-7).

   - Adjust the spray bar by loosening the two U-bolts by which the spray bar is attached to the brackets so that the nozzles are at a 45-degree angle to the surface to be sprayed (2, Figure 2-7).

3. Once the machine is running and the material pump is on, open valves #1 (1, Figure 2-5) and #5 (5, Figure 2-5) and leave the rest closed until the material pump builds enough pressure and stops stroking. This will signal that the pump is in NEUTRAL.

Figure 2-8

4. Open the spray nozzle valves (2, Figure 2-8) that you wish to use on the spray bar.

5. With the pump in NEUTRAL, open the spray bar ball valve (3, Figure 2-8). This will supply material to the spray bar.

6. Use the spray bar lever (1, Figure 2-8) to open material flow to the nozzles.

7. To achieve the desired flow, turn the material speed control knob (5, Figure 2-3) counterclockwise until the flow is too high and then back off on the speed of the pump by turning the knob clockwise to achieve the desired spray. (This procedure eliminates extra wear on the pump.)

⚠WARNING

On the ESP-550/760 without an optional spray bar, NEVER open the spray bar ball valve (3, Figure 2-8). Material in the tank is under pressure. Opening the valve could allow the material to gush out and cause serious injury. NEALCO™ recommends that you remove the valve's handle to prevent the valve from accidentally being opened.

NOTICE

Anytime there is a change in the compound being used, the material pump needs to be adjusted with the pump speed control (5, Figure 2-3). Do not set the speed control and leave it in the same position as it could over-pressurize the pump causing it to wear out prematurely. The material pump is the most important part of the machine. When operated correctly, its lifetime will be maximized.

⚠CAUTION

As a general rule, when all ball valves are closed and sealing operations—hand wand or spray bar—are stopped for any length of time, depressurizing the system is recommended. Open recirculation ball valve #6 (6, Figure 2-5) to relieve the pressure and return it back to closed. This is very important. The plumbing system will hold pressure indefinitely. This could cause a weak or worn hose to burst and spray sealer.

Also, if your spray—hand wand or spray bar—starts to pulsate, depressurize the system and check the surge tank for sand buildup. If a sand buildup exists, the system needs to be flushed with water. There is a four-inch plug on the bottom of the surge tank and a 2" plug on the top of the surge tank for this purpose.

Material Loading Operation

⚠CAUTION

ALWAYS wear or use the proper safety items required for your personal protection, including boots, protective clothing, gloves, hat, and safety glasses.

1. Start with all ball valves closed.

2. Attach a 15-foot (4.57 meter) quick connect hose to the suction port (at ball valve #2 Figure 2-5), place the other end in the drum or container of sealer.

NOTE:

A standard 15-foot hose with quick connects is available as an option from the **NEALCO™** *parts and service department. See your* **NEALCO™** *dealer. Hoses of any length with quick connects on each end can be custom-ordered.*

3. Open ball valve #2 (2, Figure 2-5) and ball valve #6 (6, Figure 2-5).

4. Start the machine's engine and turn the material pump switch (3, Figure 2-3) to the ON position.

5. When material loading is complete, turn the material pump switch to the OFF position, shut off ball valves #2 and #6, and turn off the machine's engine.

6. Disconnect the suction hose and flush it clean with water using a garden hose.

PREPARING SEALCOAT MIX

The following recommendations are presented to help avoid problems when mixing sealer, water, latex additives, and sand.

NOTICE

Use of any sealer or sand not listed may void warranty.

Proper Materials

- Sealer: Use only coal tar or an asphalt emulsion that meets Federal Specification RP-355E.

- Water: Use only in the percentage as recommended by the manufacturer on the container.

- Additives: Select a recognized name brand when choosing a rubber latex additive.

- Sand: Use only Silica Sand or Black Beauty 30/60 U.S. Sieve. These are specified because the equipment is capable of handling 20-sieve sand. The 30/60-sieve sand will, however, allow more variations in mix design. Using 50/100-sieve is too fine. The individual particles will not separate and they do not get properly coated with sealer.

NOTICE

Be advised that Black Beauty 30/60 is very coarse and has sharp edges, and it may cause the material pump to wear faster.

Proper Mixing Sequence

⚠WARNING

Always pour the ingredients through the safety/dispersal grate in the top of the tank during this procedure. Do not open the grate, insert tools into, or reach inside the tank when the agitator is operating. Serious injury could result.

When starting to use additives, NEALCO™ recommends that you mix a small test batch as follows:

1. Put 50 gal. (189.3 l) of sealer in the tank with the agitator turning.

2. Add water in the quantity recommended on the sealer container and mix thoroughly.

3. Determine the amount of latex additive required. Mix latex additives in a one-to-one ratio (1:1) with water before mixing with sealer.

4. Slowly pour the diluted additive into the tank with the sealer mix while agitating.

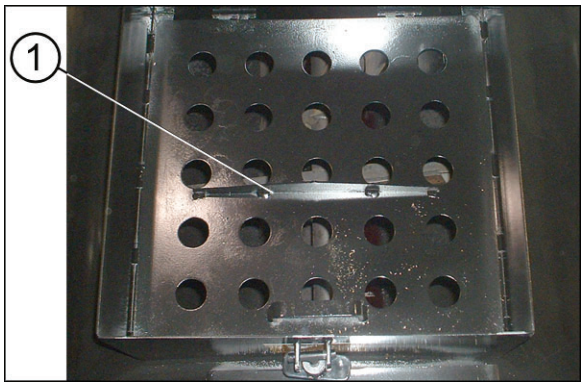


Figure 2-9

5. Add the desired quantity of sand slowly to allow for thorough mixing. Allow up to 1 minute for the sand to flow in through the grate. The grate has a sand bag splitter (1, Figure 2-9) incorporated into its design for ease of adding sand to the mix. Drop the bag on the splitter, then pick up the bag at both ends to allow the sand to slowly sift through the holes into the tank.

6. Drain 5 gal. (18.9 l) from the application and pour it through a screen. Use normal house screening. If you accumulate large lumps of mix on the screen, the sealer and additives are not compatible and should not be used.

Compatibility is a common problem when mixing latex additives with sealer. Sometimes the problem is obvious at the outset. Other times it may not show up until after the application or, worse yet,

not until the seal coat has been on the surface for many months. Problems may include difficult application, slow drying, tacky surface after drying, gray or blotchy color after drying, and flaking or peeling due to poor bond. Latex additives may tend to hide problems associated with an inferior sealer until later.

Several remedies exist regarding mix design:

- Stir the sealer in the original container and then strain the sealer as it goes into the tank to remove lumps.
- Try another brand of sealer.
- Stop using the additive.
- Try another brand of additive.
- Reduce the amount of sand if it appears to be overloaded.
- Make sure percentages of ingredient are correct according to manufacturers' recommendations.
- Consult directly with manufacturers for recommendations.
- Keep records of what works and what doesn't to avoid repeating problems.

Remix Procedure

Another problem related to sand mix designs is the clogging of the pump filter, plumbing, hand wand applicator, and spray tips. This is usually caused by sand settling out of the sealer. If the machine is to sit for a long period, the tank and plumbing should be flushed of mix at shut down. (For flushing procedure, see "Winterizing Procedure" on page 5-18 in *Section 5, Maintenance*, stopping short of adding the anti-freeze/water mixture.)

However, if the mix has been sitting in the tank overnight, use the following remix procedure at startup in the morning to avoid problems:

1. Start the engine and turn on the agitator. To remix the sealing material, let it run for 10 minutes at 18 to 22 RPM. You can determine the RPMs by counting the revolutions of the agitator shaft end attached to the large sprocket at the back of the tank (1, Figure 2-4).
2. Once the material is remixed, open ball valve #1 (1, Figure 2-5) to allow the mixture to flow into the plumbing.
3. Open recirculation ball valve #6 (6, Figure 2-5). Turn the material pump ON. The mixture is now pumped through the pump and plumbing and back into the tank. The separated sealer and sand is now replaced throughout the system with the thoroughly mixed material.

4. Allow the pump and agitator to run in the recirculation mode for at least another minute or two to remix all sand back into the sealer.

5. Shut OFF recirculation ball valve #6 (6, Figure 2-5) and the material pump.

6. Remove the spray nozzle from the tip of the hand wand. Introduce the fresh mix through the hose and wand by opening the hatch (see Figure 2-9) at the top of the machine, placing the wand into the hatch opening letting it catch in one of the holes in the inner hatch cover, opening the hand wand ball valve (1, Figure 2-6) and turning the material pump back ON.

7. Run the remixed material through the hose and wand for a minute until all separated sealer and sand is replaced with the thoroughly mixed material.

8. Shut off the hand wand ball valve, remove the wand from the hatch, close the hatch, and reinstall the spray nozzle on the tip of the hand wand.

9. If the spray bar on the rear is to be used, similarly flush out the separated sealer and sand into multiple buckets and dump it into the tank.

    - Open the spray nozzle valves (2, Figure 2-8).

    - With the pump in NEUTRAL, open the spray bar ball valve (3, Figure 2-8). This will supply material to the spray bar.

    - Use the spray bar lever (1, Figure 2-8) slightly to introduce a small material flow to the nozzles. Catch the discharge in multiple buckets until all separated sealer and sand is replaced with the thoroughly mixed material.

    - Dump the contents of the buckets into the tank through the hatch opening at the top of the machine.

    - Agitate until the material mixture in the tank is thoroughly mixed.

The machine is now ready for use. Using the procedure will help eliminate material pump problems and spray tip clogging. NEALCO™ recommends that the seal coat machines be remixed using this procedure at a minimum of every three days if a sand mixture remains in the machine.

NOTICE

If material is left in the tank for an extended period of time it may be necessary to rock the agitator forward and backward in order to free the agitator blades from the settled mix.

If all seal coatings have been applied with sand mixtures, the only time it will be necessary to flush out the complete system with water is if the machine will sit idle for a prolonged period of time, or for winterization. (Refer to *Section 5, Maintenance* for the winterization procedure.)

NOTICE

IMPORTANT: Do not wash out the plumbing and pump with water until remixing has been performed to get the sand back in suspension in the sealer. ALWAYS flush the system with sealer and NO sand first, then flush with water. The sealer acts as a lubricant in the pump and plumbing. Damage occurs when water is introduced. Water separates the sealer and the sand with the result that the sealer is flushed out and the abrasive sand remains to be circulated in the water. This creates excessive wear in the pump and plumbing usually requiring major repairs.

CLEANUP

After every use, the ESP-550/760 and ESSP-550/760 Sealcoat System machine should be hosed down with water to remove any splashed sealcoating material.

Figure 2-10

At the start of each work day, remove the water tank filler tube cap (1, Figure 2-10) and fill the tank with clean water. To wash down the machine, turn on the water pump switch on the dash panel (6, Figure 2-3), uncoil the pink water hose at the back of the machine (2, Figure 2-10), and spray off splashed sealcoating material.

GENERAL IDENTIFICATION

Type of machines: ESP-550T and ESP-760T Sealcoat Trailer Systems
ESP-550S and ESP-760S Sealcoat Skid Systems
Manufacturer: Nealco™ Equipment, LLC
PO Box 337
Shippensburg, Pennsylvania 17257

ESP-550T AND ESP-760T TRAILER SYSTEMS

Model	Length	Width	Height	Weight	Capacity	Brakes	Axles (GVW)
ESP-550T	184 in.	75 in.	80 in.	3,200 lbs.	550 gals.	electric	10,500 lbs.
ESP-760T	209 in.	75 in.	80 in.	3,750 lbs.	760 gals.	electric	12,000 lbs.

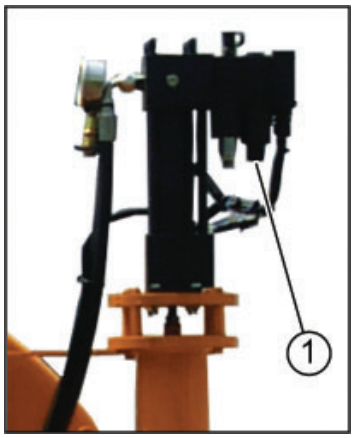
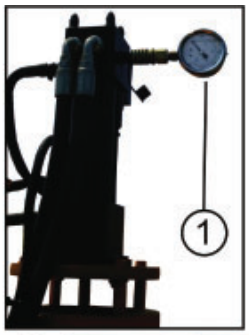
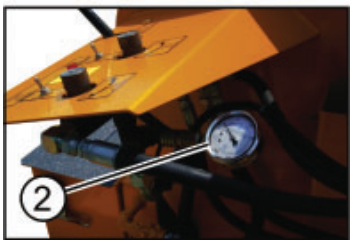
ESP-550S AND ESP-760S SKID SYSTEMS

Model	Length	Width	Height	Weight	Capacity
ESP-550S	111 in.	49 in.	64 in.	2,500 lbs.	550 gals.
ESP-760S	134 in.	49 in.	64 in.	2,950 lbs.	760 gals.

Models ESP-550T/ESP-550S & ESP-760T/ESP-760S	
Trailer	Pintel (military-style) hitch, 16 in. wheels, heavy duty jack, lighting system.
Engine	16 HP gas twin cylinder Briggs & Stratton® Vanguard™ engine w/ electric start. 2 yr. warranty.
Tank	Steel tank w/ 24 in. manway. Inner lid and safety hatch.
Pumping System	ESP 50 gpm piston pump w/ 2 in. material plumbing, 2 in. gravity flow discharge and quick connects. Pump speed is infinitely variable.
Agitation	1-1/2 in. shaft diameter. Infinitely variable speed control with forward and reverse. Offset paddles hydraulically driven for superior torque capabilities.
Handwand	75 feet of hose and a 6 foot hand wand.
Cleanup System	Water system w/ electric pump.
Optional	• ESSP 100 gpm piston pump • 2nd hose and handwand • Longer hose for handwand (100, 125, 150 ft.) • Operator seat • 6 nozzle spraybar • Spraybar extensions • Hose reel (spring loaded/self-retracting) • 15-foot suction hose • 2-5/16 in. ball hitch • Brush box

Blank

TROUBLESHOOTING: PUMP

Pump stops at bottom.  	1. Power relay on pump head is not functioning properly.	1. Switch OFF power at dash panel to return pump to the top of the stroke. If pump does not move, operate manual override by pushing up on the bottom of the pump's solenoid (see 1 in figure at left).
	2. The hydraulic circuit in pump head has become contaminated.	2. Clean the directional valve (direction control valve).
	3. The pump still not moving.	3. Call NEALCO™ service department.
Pump stops at top.   	1. Low hydraulic pressure.	1. Check hydraulic pressure. A quick connect connection for this purpose is located at the top of the ESP pump (see 1 in figure at left) and under the dash panel of the machine (see 2 in figure at left) regardless of pump size. The pressure should read 800 psi at the pump head (Figure 1) and 1200 psi at the dash panel (Figure 2). If pressure is good, operate manual override and clean if needed.
	2. The hydraulic circuit in pump head has become contaminated.	2. Clean the directional valve (direction control valve).
	3. Low voltage.	3. Check the voltage at coil. It should be 12 volts (10 volts will not operate pump).
	4. Loose wire.	4. Tighten or replace. (White wire is hot, black is ground.)
	5. Bad connection.	5. Tighten or replace.
	6. Blown fuse.	6. Replace fuse.
	7. Bad battery.	7. Charge or replace battery.
	8. Bad material pump toggle switch on dash panel.	8. Replace material pump switch (toggle switch assembly).
	9. Ball assembly (piston shaft) may be damaged.	9. Check the ball assembly (piston shaft assembly) and replace if needed.
	10. The pump is still not moving.	10. Call NEALCO™ service department.

TROUBLESHOOTING: GENERAL

Engine will not start.	1. Dead battery.	1. Charge or replace battery.
	2. Loose battery cable.	2. Tighten battery cables.
	3. Out of fuel.	3. Refuel.
	4. Contaminated fuel.	4. Drain fuel from carburetor bowl and tank. Replace with clean fuel.
	5. Engine ON/OFF switch turned OFF.	5. Turn switch ON.
	6. None of the above.	6. Contact nearest engine dealer for help.
Alternator not charging.	1. Alternator charging wire disconnected.	1. Reconnect wire.
Material pump does not reciprocate.	1. Material ON/OFF switch OFF (indicator light OFF).	1. Turn switch to ON position.
	2. Blown fuse (indicator light OFF).	2. Replace fuse.
	3. Recirculation ball valve closed and pump is dead-headed (indicator light OFF).	3. Open recirculation ball valve.
	4. System wiring loose or disconnected from battery (indicator light OFF).	4. Tighten and/or replace system wiring or battery.
	5. Defective solenoid valve or integral control unit (indicator light ON). Pump is in top position or descending. Pump will cycle when solenoid manual override activated.	5. Replace the solenoid valve.
	6. Loss of hydraulic pressure (check gauge).	6. Contact service department for details.
	7. Leather sealing cups are swollen and stuck in bore of pump housing.	7. Replace sealing cups.
Material has no pressure.	1. Filter basket is clogged.	1. Clean strainer basket in material filter.
	2. Recirculation ball valve not sealing.	2. Replace ball valve.
	3. Leather sealing cups in material pump are damaged or badly worn.	3. Replace leather sealing cups.
	4. Foreign material lodged under upper or lower check balls in material pump.	4. Disassemble material pump. Remove foreign material.
	5. Upper or lower check balls and/or seals badly worn.	5. Disassemble material pump. Inspect, replace as necessary.

TROUBLESHOOTING: GENERAL

Agitator control lever does not control agitator.	1. Actuator retainer ring has dislocated from control spool.	1. Remove agitator control valve. Replace spool retainer.
Agitator stalled in one position.	1. Sand or solids have fallen out of suspension and collected on the bottom of the material tank, obstructing agitator.	1. Rock agitator back and forth by alternately pushing and pulling on the agitator control knob. If after a short time agitator still will not turn, it may be necessary to drain out the liquid and manually remove solids from tank.
Agitator and material pump inoperable.	1. Hydraulic pump/motor coupling broken. 2. Hydraulic oil level too low.	1. Replace coupling. 2. Add hydraulic oil (should fill to within 2 in. of top).
Material surging through hand wand or spray bar.	1. Surge tank clogged. 2. Material pump leather seal worn. 3. Filter gasket damaged or dislocated. 4. Surge tank leaking air.	1. Remove clean-out plug. Flush, clean surge tank. 2. Replace leather seals. 3. Relocate or replace filter gasket. 4. Replace or repair the tank.
Material leakage from top of pump.	1. Leather seals and back-up plates loose. 2. Leather seals damaged or badly worn.	1. Tighten leather seals and back-up plates by tightening upper nut assembly. 2. Replace leather seals.

Blank

The NEALCO™ Sealcoat Systems have been carefully designed and manufactured to provide the utmost in dependable service. To obtain the best results and keep the machine operating efficiently, read and follow the information in this section.

The machine has been factory tested and lubricated with initial settings carefully made. However, it is recommended that the entire machine be thoroughly inspected before starting to correct any problems resulting from transit. Additionally, the machine should only be operated and serviced by someone properly instructed. You should read this manual, the engine manual, and any other information supplied before attempting operation or servicing.

⚠WARNING

Escaping hydraulic fluid under pressure can have sufficient force to penetrate skin causing serious personal injury. Fluid escaping from a very small hole can be almost invisible. Use a piece of cardboard or wood, rather than hands, to search for suspected leaks. If injured by escaping fluid, serious infection or reaction can develop. Seek medical help immediately.

Before disconnecting a line for any reason, be sure the hydraulic pressure has been relieved by allowing the system to cool. And, before applying pressure to the system, make sure all connections are tight and that line, tubes, and hoses are not damaged.

NOTICE

Failure to maintain the ESP-550/760 and ESSP-550/760 machine by this maintenance schedule could void the warranty. A sound maintenance schedule will keep the machine in good working condition, and also prevent injuries.

Failure to use and maintain the engine following the manufacturer's operating instructions and maintenance schedule—changing oil, cleaning air filter, etc.—could void the engine's warranty.

GENERAL MAINTENANCE INFORMATION

To prevent minor irregularities from developing into serious conditions, several services or checks are recommended at periodic intervals. The purpose of these services is to ensure the uninterrupted and safe operation of the machine.

Before doing any maintenance work, ensure that the following instructions are followed:

1. The machine should be parked on firm, level ground.

2. Make sure that the engine is shut down and allowed to cool.

3. Disconnect the battery and cover the exposed terminals before working on the machine's electrical system.

4. Stop the engine and allow the hydraulic oil pressures to fall before working on the hydraulic hose system.

5. Thoroughly wash all fittings, caps, plugs, etc., with a nonflammable, nontoxic cleaning solution before servicing, to prevent dirt from entering the engine and its components while performing the service.

Handling Fluids and Oil Filters

1. When draining fluids, ensure that adequate sealable containers are available and that every care is taken to prevent spillage.

2. Always make sure that waste fluids are disposed of in an environmentally safe manner following applicable local regulations.

3. Always make sure that used filters are stored in secure containers and disposed of in an environmentally safe manner following applicable local regulations.

MAINTENANCE SCHEDULE

The "Periodic Maintenance Schedule" on page 5-3 shows those items that require regular service and the interval at which each service should be performed. A regular service program should be geared to the items listed under each interval. These intervals are based on average operating conditions. In the event of extremely severe, dusty, or wet operating conditions, more frequent maintenance than specified may be necessary.

PERIODIC MAINTENANCE SCHEDULE

ACTION AND INTERVAL	DO THE FOLLOWING:
Note: For complete information about engine service recommendations, refer to the engine's manufacturer's Operation and Maintenance Instruction manual for additional information.	
Check daily	1. All fluid levels (engine oil, fuel, hydraulic fluid, water). 2. Clean around the engine's muffler, linkage, and springs. 3. Entire machine for leaks, loose bolts, and general working condition. 4. Engine air cleaner cap for dust build-up. 5. Allen head screws on chain sprocket. See Figure 2-4 on page 2-4 in *Section 2, Operation,* for location of the sprocket at the end of the agitator shaft. *(Note: When the machine is new, vibration could cause the sprocket's Allen head screws to loosen until they become "set." When daily loosening is no longer detected, check weekly.)* 6. Hydraulic pressure with gauge supplied with machine. A quick connect connection for this purpose is located at the top of the ESP pump. The pressure should read 650 psi ESP/50 gpm pump, or 1150 psi on the ESSP/100 gpm pump. A second quick connect, under the dash panel, can be used to check the system pressure. This pressure should not be over 1200 psi. 7. Tire pressure (65 psi) on sealcoat trailer system. 8. Electrical system—electric brakes, taillights, integrity of emergency breakaway switch on trailer and electric brake controller in towing vehicle.
Change after first 8 hours of operation.	1. Engine oil. Change oil while the engine is warm. (See "Change Engine Oil" on page 5-13.)
Change after first 50 hours of operation.	1. Hydraulic oil filter.
Service every 25 hours	1. Change engine oil if operating under heavy load or high ambient air temperatures. (See "Change Engine Oil" on page 5-13.) 2. Service the air cleaner's "pre-cleaner." (See "Cleaning the Air Cleaner Elements" on page 5-7.)
Service every 50 hours	1. Change engine oil while the oil is warm. (See "Change Engine Oil" on page 5-13.)
Service every 100 hours or every season	1. Service the engine's air cleaner cartridge. (See "Cleaning the Air Cleaner Elements" on page 5-7 and "Replacing the Air Cleaner Elements" on page 5-7.) 2. Change engine oil filter. (See "Change Engine Oil Filter" on page 5-14.)

ACTION AND INTERVAL	DO THE FOLLOWING:
Annually	1. Repack wheel bearings on sealcoat trailer system. 2. Inspect brake linings for wear and replace if necessary on sealcoat trailer system. 3. Replace the engine's spark plugs. 4. Replace the engine's inline fuel filter. (See "Keep Engine Clean" on page 5-10.)
Annually or after 500 hours of operation	1. Change hydraulic oil filter. 2. Change hydraulic fluid. Use SAE Hydraulic Fluid with anti-wear and anti-foam additives. Use 10W for cooler climates, 20W for warmer climates.
Before storage.	1. Drain all gasoline from the engine's fuel tank, fuel line and carburetor (or add a fuel stabilizer to the gasoline then run engine for a few minutes).

NOTICE

The material pump does not need to be flushed each day after use. However, when necessary to clean the pump, ALWAYS flush with sealer WITHOUT sand first, then flush with water. Flushing with only water will cause the sand and sealer to separate. The sealer would be flushed out leaving the abrasive sand to circulate with the water causing damage to the pump.

INITIAL BREAK-IN MAINTENANCE

New equipment requires the following initial one-time break-in maintenance after eight hours of operation. After this initial phase, the regular intervals listed on the following pages should be followed.

1. Change the engine oil. Refer to "Change Engine Oil" on page 5-13 for the procedure.

ROUTINE MAINTENANCE—AS REQUIRED

Checking, Removing Air Cleaner Elements

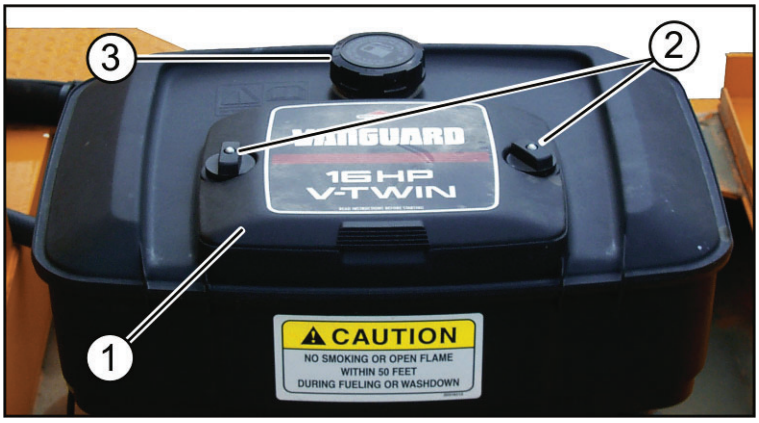


Figure 5-1

The air cleaner (1, Figure 5-1) is a dual element type consisting of an outer, foam pre-cleaner that is cleanable and replaceable, and an inner cartridge that can be cleaned, but is normally replaced. The inner cartridge should be replaced if it is very dirty or damaged.

Maintenance for the air cleaner consists of a daily check of the elements, and cleaning or replacement of the pre-cleaner (1, Figure 5-2) after every 25 hours, and cleaning or replacement of the air cleaner cartridge (2, Figure 5-2) after every 100 hours or every season.

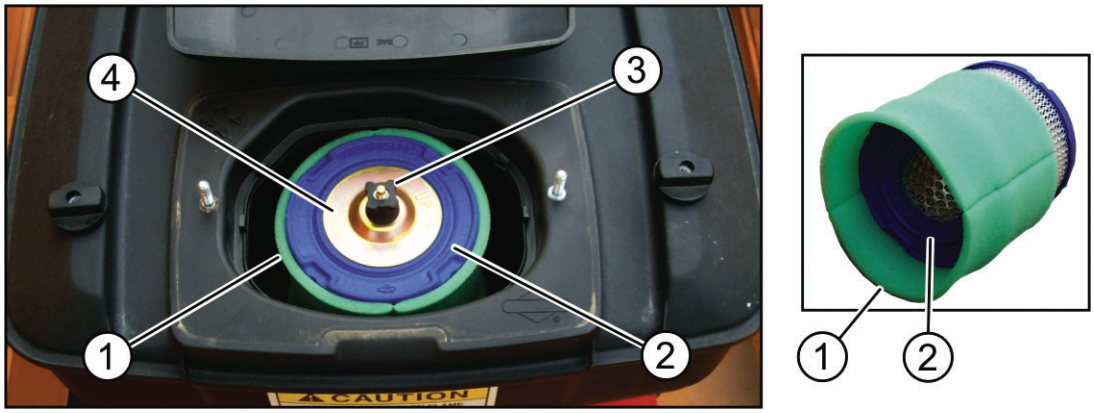


Figure 5-2

⚠WARNING

Raw, unfiltered air can cause engine damage. NEVER service the air cleaner while the engine is running.

1. Open the cover that protects the engine and battery.

2. Unscrew two plastic, threaded thumb screws (2, Figure 5-1) and remove the air filter housing cover (1, Figure 5-1) to access the filter elements. Clean the inside of the housing cover, and the area upon which the cover rests when closed, with a clean, damp cloth.

3. Unscrew the threaded locking knob (3, Figure 5-2) and remove the retainer plate with the word “UP” stamped into it (4, Figure 5-2).

4. Remove the cartridge being careful not to let any debris get into the carburetor.

5. Slide the foam pre-cleaner (1, Figure 5-2) from the inner cartridge (2, Figure 5-2).

Cleaning the Air Cleaner Elements

1. Pre-Cleaner:

   - Wash the foam pre-cleaner (1, Figure 5-2) in liquid detergent and water, then squeeze it dry in a clean cloth.

   - Saturate the foam pre-cleaner in engine oil, then squeeze in a clean, absorbent cloth to remove all excess oil.

2. Inner cartridge:

   - To clean the inner cartridge (2, Figure 5-2), tap gently on a flat surface. Do not oil the cartridge.

Replacing the Air Cleaner Elements

1. Replace the pre-cleaner (1, Figure 5-2) if very dirty or damaged.

2. Replace the inner cartridge (2, Figure 5-2) if very dirty or damaged.

3. Clean the inside of the air cleaner housing (where the air cleaner rests when installed) with a clean, damp cloth.

4. Install the foam pre-cleaner element onto the inner cartridge.

5. Carefully install the cleaned or replaced cartridge into the housing, making sure that it seats securely atop the carburetor.

6. Install the retainer plate with the word “UP” stamped into it, and screw on the threaded locking knob (3, Figure 5-2).

7. Replace the air cleaner cover (1, Figure 5-1) and screw on the two plastic, threaded thumb screws (2, Figure 5-1).

8. Inspect the air cleaner to ensure that all connections between the air cleaner and engine are tight and sealed.

9. Close the cover that protects the engine and battery.

Check Fuel Level

⚠WARNING

Fuel is flammable, and may cause severe injury or death. Shut down the engine, extinguish all open flames, and do not smoke while filling the tank. Always wipe up any spilled fuel.

NOTICE

The fuel tank should always be filled at the end of the work day to prevent condensation from forming on the tank's inside walls.

1. Open the cover that protects the engine and battery.
2. Clean around the fuel filler before removing the cap to refuel.
3. Turn the fuel tank cap (3, Figure 5-1) counterclockwise to remove.
4. To determine if refueling is required, look into the fill opening on the fuel tank. If fuel is needed, fill the tank to approximately 1.5 inches (38.1 mm) below the top of the filler neck to allow for fuel expansion. Use clean, fresh regular unleaded gasoline with a minimum of 85 octane.
5. Check the fuel filler screen for debris or other foreign matter. Remove the screen and clean, then replace.
6. Replace the fuel tank cap by turning it clockwise until it is snug.
7. Close the cover that protects the engine and battery.

ROUTINE MAINTENANCE

Check Engine Oil Level

1. Park the machine on a stable, level surface and shut down the engine.

2. Open the cover that protects the engine and battery.

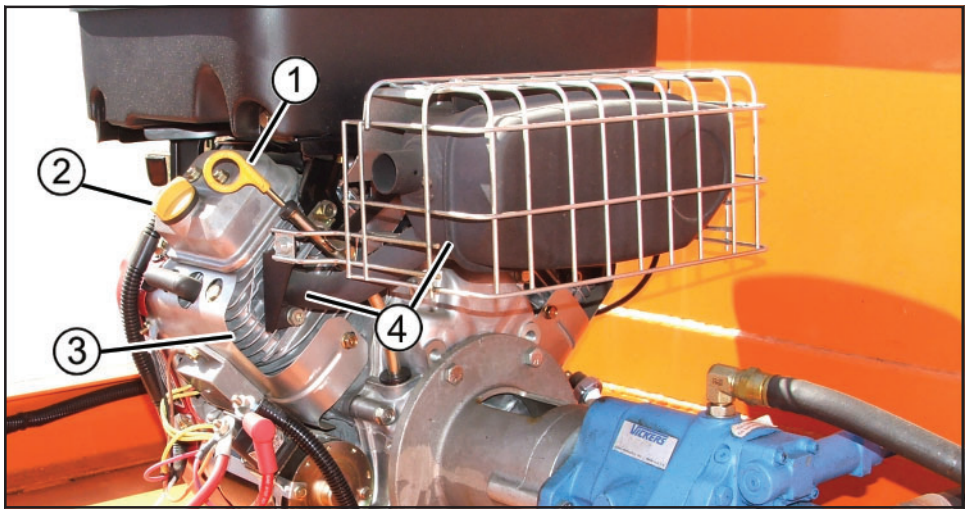


Figure 5-3

3. Pull out the dipstick (1, Figure 5-3), wipe it clean with a clean, lint-free, dry cloth, then replace the dipstick.

4. Pull out the dipstick again. The oil level must be in the checkered area near the bottom of the stick between the full (top) mark and the low (bottom) mark.

5. If the oil level is low, add the appropriate amount of motor oil through the filler located under the right edge of the fuel tank (2, Figure 5-3). Air cooled engines run hotter than automotive engines. The recommended motor oil for all temperature ranges is SAE 10W-30 synthetic motor oil. The use of non-synthetic, multi-viscosity oils in temperatures above 40 degrees F (4 degrees C) will result in higher than normal oil consumption. When using a non-synthetic, multi-viscosity oil, check the oil level more frequently.

6. Check the oil level again after the engine has run for about one minute. Add oil if necessary.

7. Replace the engine oil dipstick and close the cover that protects the engine and battery.

Keep Engine Clean

NOTICE

Do not spray engine with water because water could contaminate fuel.

⚠CAUTION

Always wear or use the proper safety items required for your personal protection, including boots, protective clothing, gloves, hat and safety glasses.

1. Periodically remove chaff/debris buildup from engine. Check for signs of clogging of exposed cooling fins (3, Figure 5-3) on both sides of the engine.

2. If clogging is dried-on dirt, use a suitable brush to remove it from the cooling fins. If dry dust is present, use compressed air with which to clean the fins.

3. Remove any accumulated chaff or debris around the exhaust system (4, Figure 5-3).

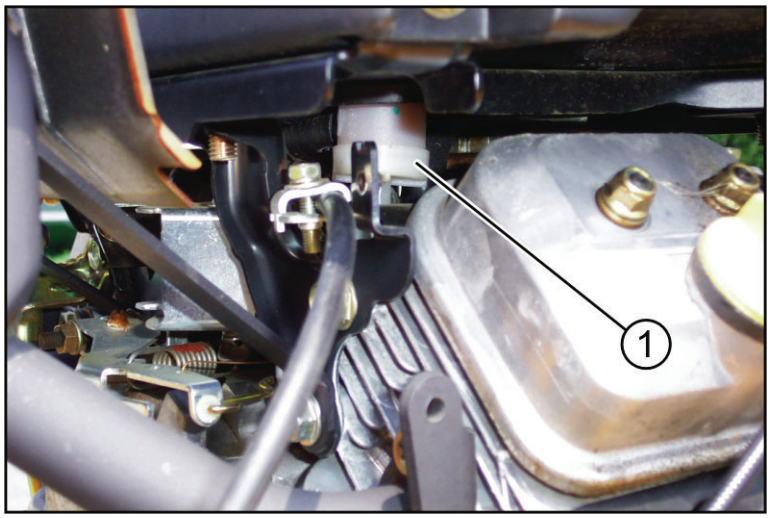


Figure 5-4

4. Replace the inline fuel filter (1, Figure 5-4) every season. To do this, empty the fuel tank and carefully lift up the tank from the top of the engine by removing the four hex-head bolts, two on each end of the tank.

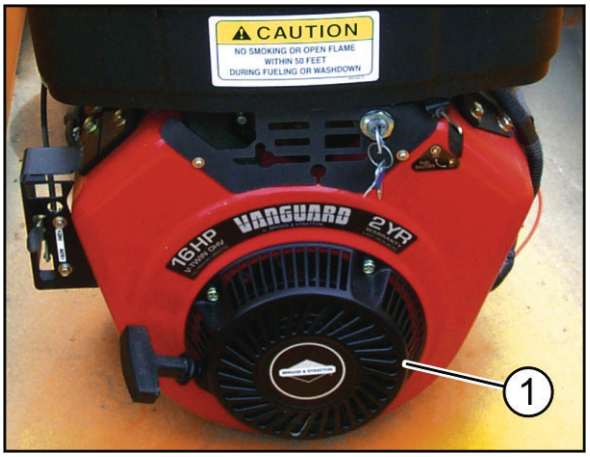


Figure 5-5

5. Chaff or debris may clog the engine's air cooling system, especially after prolonged service. Every 100 hours or every season, clean the cooling fins (3, Figure 5-3) on both sides of the engine. Also, remove the blower housing (1, Figure 5-5) by unscrewing the four Phillips head screws, and clean any dirt and debris from the cooling fan blades.

Check Hydraulic Oil Level

NOTICE

Dirt in the hydraulic system will lead to premature component failure. A clean, contaminant-free system is extremely important to the machine's proper function. Take extra care when working around or on the hydraulic system to ensure its complete cleanliness.

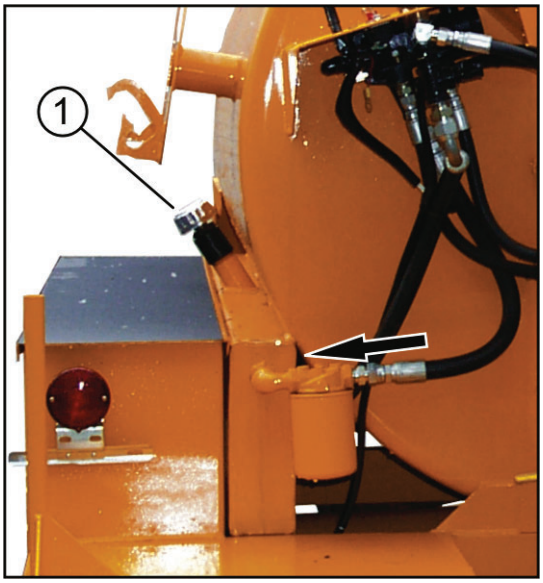


Figure 5-6

1. Check the hydraulic oil level by turning the hydraulic tank filler tube cap (1, Figure 5-6) counterclockwise. Always check the oil level when the machine is cool, which depressurizes the hydraulic system.

2. Use a flashlight, if necessary, to see inside the filler tube. The hydraulic oil should be approximately 1.5 inches (38.1 mm) below the top of the tank. There should always be room at the top of the tank for expansion of the oil due to heat and pressure.

3. Add fresh, clean hydraulic oil through the filler tube until the oil is approximately 1.5 inches (38.1 mm) below the top of the tank. (For informational purposes, the black arrow in Figure 5-6 indicates the flow of hydraulic oil through the machine's system.)

4. Replace the cap by turning clockwise until snug.

50 HOUR OR WEEKLY ROUTINE MAINTENANCE

Change Engine Oil

⚠WARNING

Hot oil or components can burn. Change oil while engine is warm, not hot. Avoid contact with oil or components. Do not allow oil to drain into the ground. Dispose of used oil properly.

1. Position the machine on a stable, level surface. Make sure the engine is not running. However, the engine oil should be warm.

2. Open the cover that protects the engine and battery.

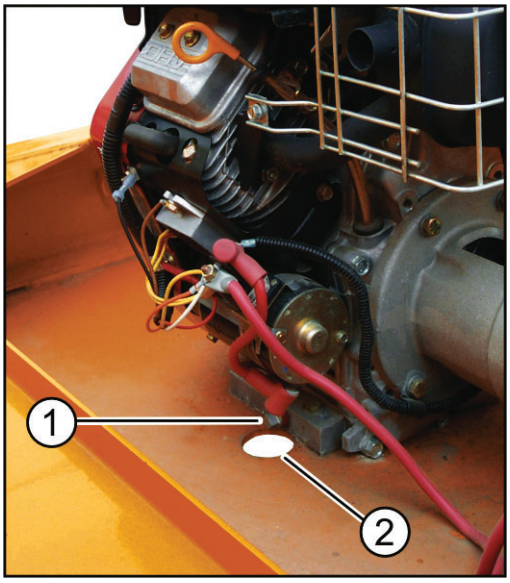


Figure 5-7

3. Place a collection container with a capacity of at least 2 quarts (1.9 l) under the machine directly beneath the round opening indicated at 2, Figure 5-7.

4. Remove the engine oil drain plug (1, Figure 5-7) to allow the used oil to drain through the round opening to the collection container.

5. When the oil has finished draining, replace the drain plug.

6. Refill the crankcase with approximately 1-1/2 quarts (48 oz., or 1.6 l) of motor oil through the filler located under the right edge of the fuel tank (2, Figure 5-3). Air cooled engines run hotter than automotive engines. The recommended motor oil for all temperature ranges is SAE 10W-30 synthetic motor oil. (Note: The use of non-

synthetic, multi-viscosity oils in temperatures above 40 degrees F [4 degrees C] will result in higher than normal oil consumption. When using a non-synthetic, multi-viscosity oil, check the oil level more frequently.)

7. Start the engine and run for one minute.

8. Shut down the engine and wait several minutes. Pull out the dipstick (1, Figure 5-3), wipe it clean with a clean, lint-free, dry cloth, then replace the dipstick.

9. Pull out the dipstick again. The oil level must be in the checkered area near the bottom of the sick between the full (top) mark and the low (bottom) mark.

10. If the oil level is low, add the appropriate amount of motor oil through the filler located under the right edge of the fuel tank (2, Figure 5-3).

11. Replace the oil filler cap, replace the engine oil dipstick, and close the cover that protects the engine and battery.

100 HOUR OR ANNUAL MAINTENANCE

Change Engine Oil Filter

⚠WARNING

Hot oil or components can burn. Change oil while engine is warm, not hot. Avoid contact with oil or components. Do not allow oil to drain into the ground. Dispose of used oil properly.

1. Position the machine on a stable, level surface. Make sure the engine is not running. However, the engine oil should be warm.

2. Open the cover that protects the engine and battery.

3. Drain the engine oil and refill with fresh oil as described in “Change Engine Oil” on page 5-13.

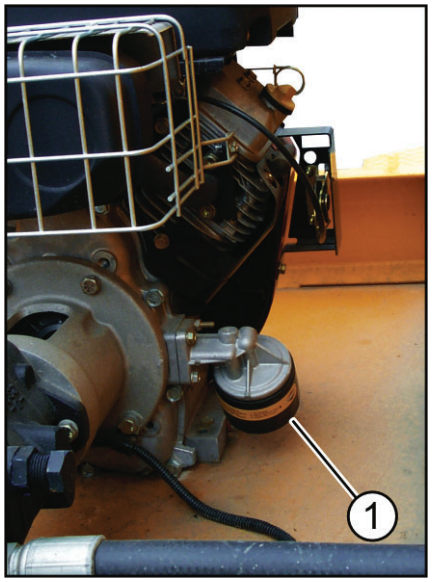


Figure 5-8

4. Clean around the head of the filter (1, Figure 5-8), then remove the used filter with an automotive filter wrench. Wipe up any oil that spilled and dispose of the oily cloth and filter in accordance with local regulations.

5. Wipe the sealing face of the filter head with a clean cloth.

6. Apply a thin film of clean oil to the gasket of the new filter before installing.

7. Install and hand tighten approximately 1/4 turn past snug.

8. Start the engine and check for any leaks around the filter.

9. Shut down the engine and wait several minutes. Pull out the dipstick (1, Figure 5-3), wipe it clean with a clean, lint-free, dry cloth, then replace the dipstick.

10. Pull out the dipstick again. The oil level must be in the checkered area near the bottom of the stick between the full (top) mark and the low (bottom) mark.

11. If the oil level is low, add the appropriate amount of motor oil through the filler located under the right edge of the fuel tank (2, Figure 5-3).

12. Replace the oil filler cap, replace the engine oil dipstick, and close the cover that protects the engine and battery.

500 HOUR OR ANNUALLY

Change Hydraulic Oil Filter

⚠WARNING

Hot oil or components can burn. Oil must be at ambient air temperature when draining. Avoid contact with oil or components. Do not allow oil to drain into the ground. Dispose of used oil properly.

NOTICE

Dirt in the hydraulic system will lead to premature component failure. A clean, contaminant-free system is extremely important to the machine's proper function. Take extra care when working around or on the hydraulic system to ensure its complete cleanliness.

1. Remove the hydraulic filter (1, Figure 5-9) with an automobile oil filter wrench. Dispose of the used filter in accordance with local guidelines.

2. Clean the filter head (2, Figure 5-9) with a clean, lint free cloth. Be sure that all of the old gasket material is removed.

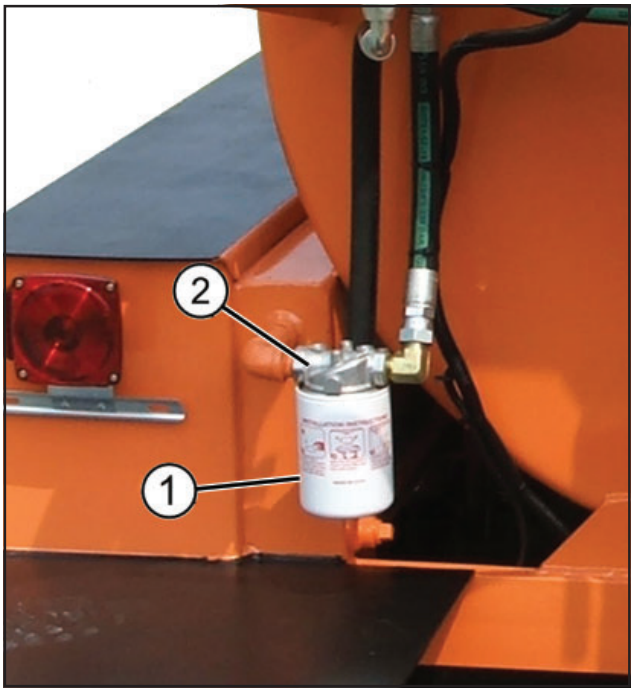


Figure 5-9

3. Fill the new hydraulic filter with fresh, clean hydraulic oil. It is recommended that the hydraulic oil be 5W-30 multi-viscosity, low foam oil.

4. Apply a thin film of hydraulic oil to the gasket of the new filter and install the filter onto the filter head until the gasket makes contact with the filter head. Tighten an additional 1/2 turn.

5. Start the machine and check for leaks.

Change Hydraulic Oil

⚠WARNING

Hot oil or components can burn. Oil must be at ambient air temperature when draining. Avoid contact with oil or components. Do not allow oil to drain into the ground. Dispose of used oil properly.

NOTICE

Dirt in the hydraulic system will lead to premature component failure. A clean, contaminant-free system is extremely important to the machine's proper function. Take extra care when working around or on the hydraulic system to ensure its complete cleanliness.

1. Position the machine on a stable, level surface. Raise jack to lift front of machine so hydraulic oil will drain to the drain plug opening.

2. Place a container with a capacity of at least 20 gallons (76 liters) under the hydraulic tank drain plug on the rear inside of the tank.

3. Remove the drain plug (3, Figure 5-9) and drain the hydraulic tank. Dispose of the used hydraulic oil in accordance with local regulations. When the tank is drained, reinstall the drain plug and tighten securely.

4. Open the cover that protects the engine and battery.

5. Remove the hydraulic filler tube cap (1, Figure 5-6) and fill the hydraulic tank with clean hydraulic oil to within 1.5 inches (38.1 mm) of the top of the tank. It is recommended that the hydraulic oil should be 5W-30, multi-viscosity, low foam oil.

6. Replace the cap by turning clockwise until snug.

7. Start the engine and check for hydraulic oil leaks.

8. Close the cover that protects the engine and battery.

WINTERIZING PROCEDURE

Refer to *Section 2, Operation*, Figure 2-5, for the location of the ball valves, and to the operating instructions to determine which valves to open and close for the procedures described below.

NOTICE

The ESP-550/760 and ESSP-550/760 Sealcoat System machines need to be winterized in most parts of the United States. It is VERY important that no material be left in the machine if temperatures approach freezing. Damage to the plumbing, filter receptacle, and material pump can occur. For temperatures below 10° F (-12.2 C), this machine should be stored indoors.

For this procedure you will need:

- 2-inch x 15-inch (50.8 mm x 4.57 m) suction hose with quick connects on both ends.
- 20 gal. (75.7 l) of Federal Grade (RP335e) sealer with no sand or water added.
- 100 gal. (379 l) of water.
- Approximately 5 gal. (18.9 l) of 50/50 anti-freeze/water mixture.
- Garden variety water hose.

1. Start the engine and pump approximately 20 gallons (75.7 liters) of sealer through the machine's plumbing following the "Material Loading Operation" on page 2-11 in *Section 2, Operation*. Introducing raw sealer acts as a lubricant for any sand that may have settled in the plumbing system. Sand must be removed from the system first. Pump out the sealer and dispose of in accordance with all applicable local, state, and federal regulations. Stop the engine.

2. Put approximately 100 gallons (379 liters) of water in the tank, restart the engine, and agitate at 15-20 revolutions per minute for about 20-30 minutes to clean the inside of the tank.

3. Circulate the water through the plumbing system for two to three minutes, then discharge through the spray bar and hand wand assembly to flush out sealing mixture residue. Make sure that valves #2, #5, and #6 are open. Valve #5 is particularly important to allow water to enter and flush the surge tank. Contrary to operating instructions in *Section 2, Operation*, during flushing it is advisable to have valves #5 and #6 open at the same time.

4. Drain the tank completely by removing the 2-inch plug on the bottom rear of the tank. If necessary, use the garden hose through the tank's top hatch to make sure all residue is flushed through the drain. Replace the plug.

5. Remove the tee bolt from the top of the material filter canister (adjacent to ball valve #2) and remove the cover. Remove the plug from the bottom of the canister to drain all

water. Flush clean with fresh water using the garden hose. When all the water has drained, replace the drain plug, and replace the cover and tee bolt.

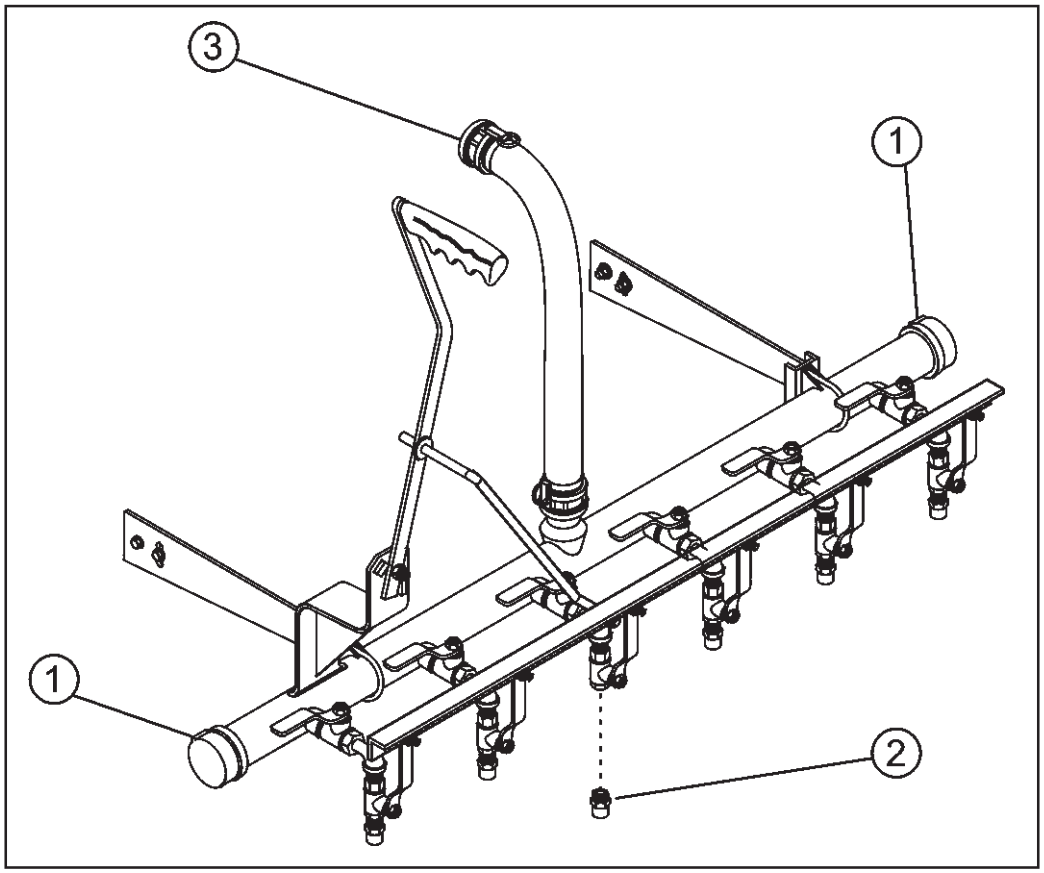


Figure 5-11

6. Remove the spray bar, spray bar hose (3, Figure 5-11), and brackets from the machine. Remove the end caps (1, Figure 5-11) and the spray nozzles (2, Figure 5-11). Clean the nozzles and store in a safe place. Using a garden hose flush water through the spray hose, then the spray bar, making sure water flows from the nozzle openings. When the water runs clear, allow the bar to drain thoroughly. Replace the end caps. Store the spray bar, nozzles, hose, and brackets in a safe place. Make sure that ball valve #3 is closed.

NOTE:

Leaving the spray bar and spray bar hose off the machine and stored out of the way assures that both will not be damaged during off-season storage.

7. Now that the machine is completely clean, draw the anti-freeze/water mixture into the plumbing following the steps under “Material Loading Operation” on page 2-11 in *Section 2, Operation*. Remove the hand wand and a coil of hose from their resting place on the side of the machine. Open the hand wand ball valve until anti-freeze discharges.

Close the hand wand ball valve and continue pumping until the material pump goes into NEUTRAL. Turn the engine off. The material pump and plumbing are now winterized. Replace the hose and hand wand to their place on the side of the machine, the safest place to store them during long periods of inactivity.

8. Pump the water out of the water tank and put 2 gal. (7.6 liters) of the anti-freeze/water mixture into the water tank. Turn the water pump ON and discharge through the pink water hose (see Figure 2-10 on page 2-16 in *section 2, Operation*) into the water tank until the anti-freeze mixture discharges. Turn the water pump OFF.

9. Store the machine in a safe place, preferably heated. If it cannot be stored inside, wrap the engine and material pump in plastic and tape securely to protect them from winter's elements. Alternately, consider covering the entire machine with heavy gauge plastic sheeting secured with tape and/or heavy cord.

NOTICE

In the spring, remember to flush out all anti-freeze before using the ESP-550/760 or ESSP-550/760 Sealcoat System machine.

ESP/ESSP PUMP ASSEMBLY AND DISASSEMBLY INSTRUCTIONS

Disassembly

1. Be sure the pump is at the top of its stroke.

2. Remove the 4 bolts on the top plate holding the pump head to the pump and unscrew the pump head shaft from the pump shaft using the wrench flats on the pump head shaft (if necessary).

3. Remove the pump from the machine by loosening the two unions connecting the pump to the plumbing.

4. Remove the 4 (or 6) bolts holding the bottom of the pump to the lower check ball assembly. Then remove the lower check ball assembly.

NOTICE

The ESP is a 50 GPM pump with 4 bolts on the lower housing.

The ESSP is a 100 GPM pump with 6 bolts on the lower housing.

5. Inspect the check ball located within the lower check ball assembly. Ensure it is free of debris and can properly seat within the assembly.

6. Position the pump in a vise, right side up.

7. Place a piece of pipe with approximately 1-1/4" inside diameter over the pump shaft at the top of the pump and drive the shaft assembly out the bottom of the pump housing with a 3 pound hammer.

8. Remove the two 1" hex nuts, the small steel rings and the old leather cups from the top of the shaft assembly.

9. Remove the spanner nut, the large steel rings and the old leather cups from the bottom of the lower shaft assembly.

10. Inspect the check ball located within the shaft assembly. Ensure it is free of debris and can properly seat within the assembly

11. Inspect the pump housing for pits and grooves. If the housing is not perfectly smooth, it should be honed to a concentric smoothness.

Reassembly

1. Assemble the steel rings and leather cups on the top section of the shaft assembly. Refer to the diagram on pages 6-4 or 6-5 for proper sequence. Put two 1" nuts on the shaft but do not tighten at this point.

NOTICE

The beveled edge of the steel rings MUST face the inside of the leather cups.

2. Apply a thin coating of lubricating oil to the inside of the pump housing and to the three upper leather cups.

3. Put the partially assembled shaft in the pump housing from the bottom end and push the shaft in until the shaft is completely in the housing (approximately 4 inches).

4. Put a large beveled ring inside of a large leather cup. Insert this assembly sideways in the pump housing and press with thumbs until it straightens out and slides on the shaft (apply a thin coat of lubricating oil to the pump housing and leather cup if necessary). This beveled steel ring should be installed closest to the central ball and this leather cup must face the top of the pump.

5. Install the large spacer ring.

6. Install the final beveled ring and leather cup assembly facing the bottom of the pump.

7. Install the spanner nut on the shaft assembly.

8. Drive the shaft assembly to the top position.

9. Put a bar in through the discharge outlet of the pump into the hole of the check ball cage to hold shaft from rotating while tightening the top 1” nuts and the lower spanner nut.

10. Replace the gasket on the bottom of the pump.

11. Reinstall the lower check ball assembly.

12. Reinstall pump assembly on the machine and tighten the plumbing unions.

13. Reinstall the pump head assembly.

Section 6

Parts Manual

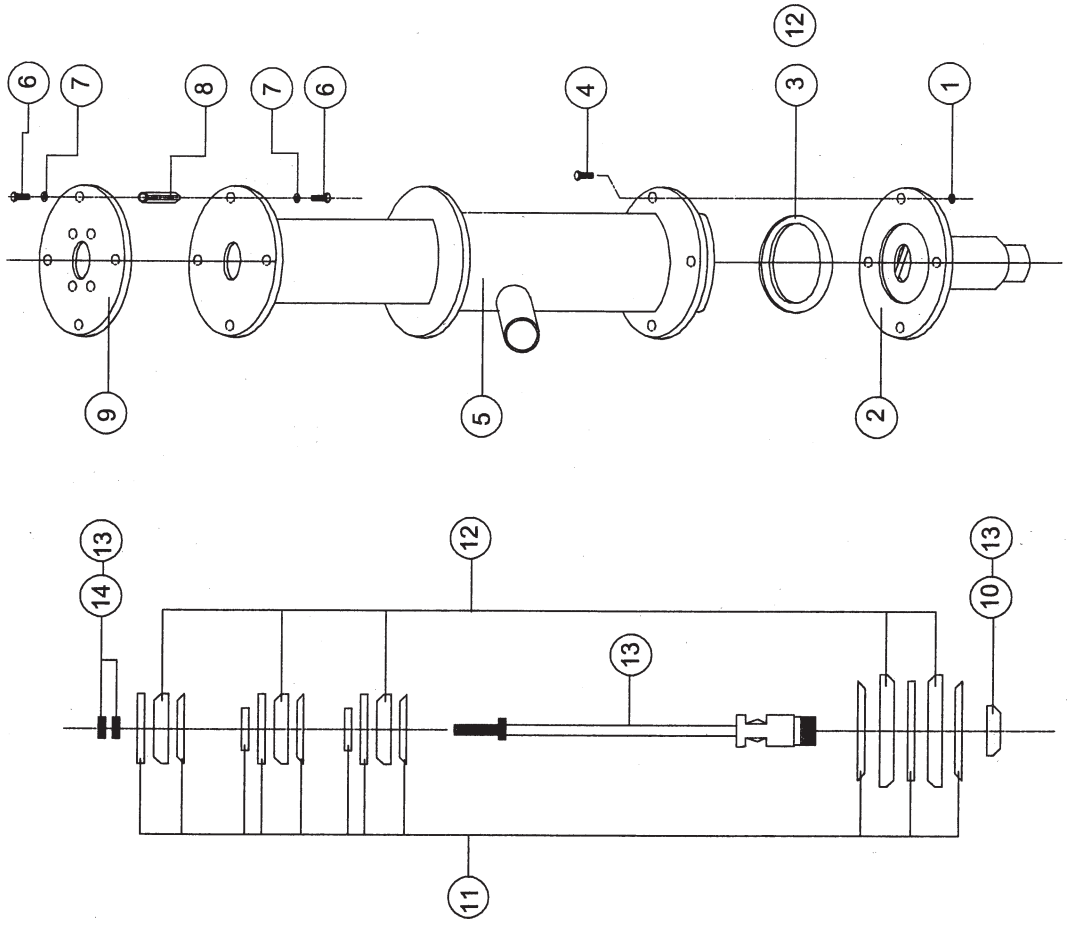
ESP-550/760 and ESSP-550/760
SEALCOAT EQUIPMENT

STANDARD ABBREVIATIONS

AC	Alternating Current
A/R	As Required
ARC	Authorized Rebuilt Component
Assy	Assembly
BHCS	Button Head Cap Screw
Cu Yd	Cubic Yard
Cyl	Cylinder
DC	Direct Current
Dia	Diameter
Eff	Effective
FHCS	Flat Head Cap Screw
F-N-R	Forward-Neutral-Reverse
FOPS	Falling Object Protection System
F/P	Fork Positioning
Gr	Grade
HHCS	Hex Head Cap Screw
HHMS	Hex Head Machine Screw
HSBHCS	Hex Socket Button Head Cap Screw
ID	Inside Diameter
LH	Left Hand
M	Metric
MIK	Maintenance Interval Kit
mm	Millimeter
Nat Asp	Naturally Aspirated
Neg	Negative
NSS	Not Sold Separately
NSVA	Non Serviceable Assembly
OD	Outside Diameter
Pos	Positive
PSI	Pounds per Square Inch
Q/A	Quick-Attach

Ref	Reference
RH	Right Hand
RHSS	Round Head Self-Tapping Screw
ROPS	Roll-Over Protection System
RPM	Revolutions Per Minute
SAE	Society of Automotive Engineers
Sec	Section
SFH	Slotted Fillister Head
SHCS	Socket Head Cap Screw
SMV	Slow Moving Vehicle
S/N	Serial Number
SPST	Single Pole/Single Throw
S.T.	Self-Tapping
Std	Standard
Str	Straight
Sw	Swivel
Tach	Tachometer
Temp	Temperature
Thd	Thread
Thk	Thick
Typ	Typical
UNC	Unified Coarse
UNF	Unified Fine
Univ	Universal
Var	Variable
V	Volt
VPM	Vibrations Per Minute
Wgt	Weight
w/	With
w/o	Without
Wp	Weatherproof

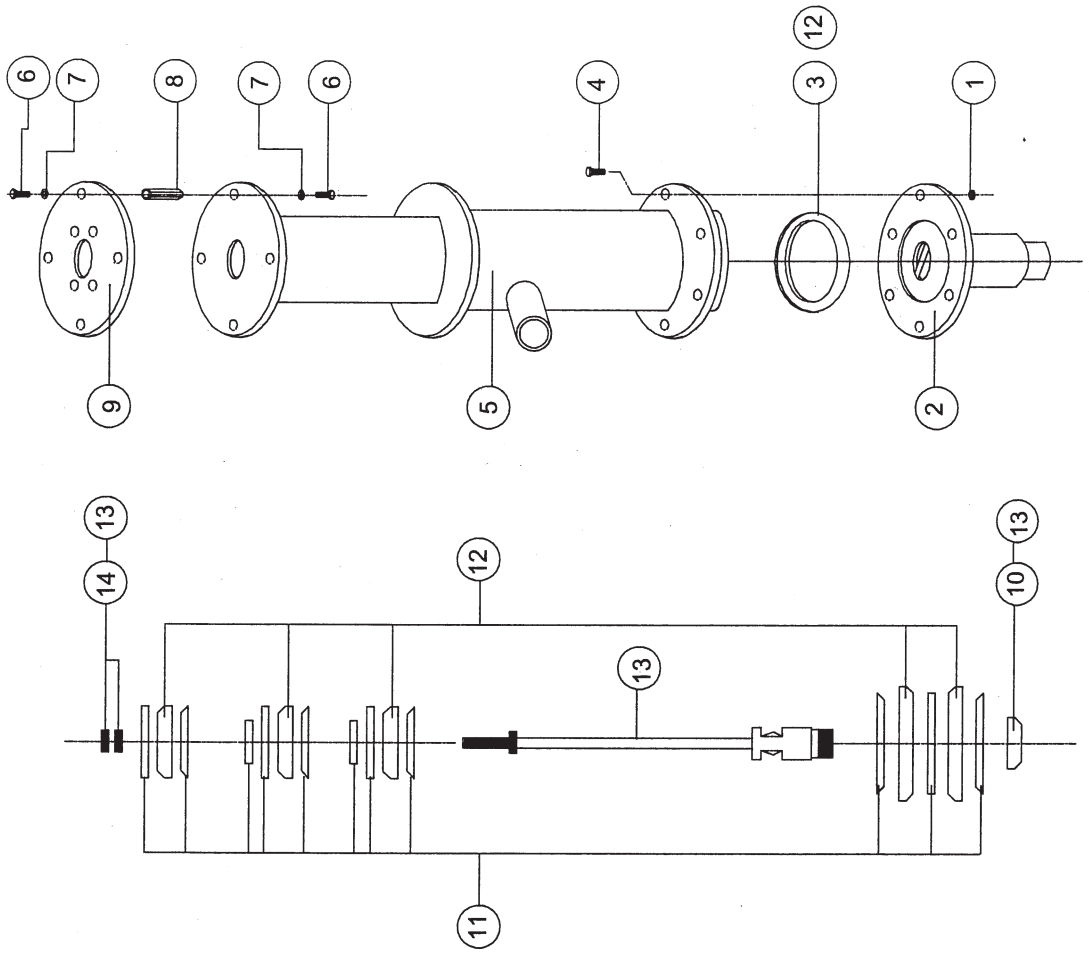
ESP PUMP (50 GALLON)



ESP PUMP (50 GALLON)

ITEM	QTY.	PART NO.	DESCRIPTION
1	4	95505681	NUT, LOCK
2	1	20323119	LOWER CHECK BALL ASSY.
3	1	20322889	GASKET
4	4	95782371	BOLT
5	1	20323085	PUMP HOUSING
6	8	95430534	BOLT
7	8	95081857	LOCKWASHER
8	4	21924873	SPACER
9	1	21934948	PUMPHEAD MOUNTING PLATE
10	1	20323051	NUT, SPANNER, N-12
11	1	21915970	KIT, WASHER, PUMP
12	1	20323093	SET, LEATHERS
13	1	20323077	CENTRAL BALL ASSY.
14	1	95997490	1-14 HEX NUT

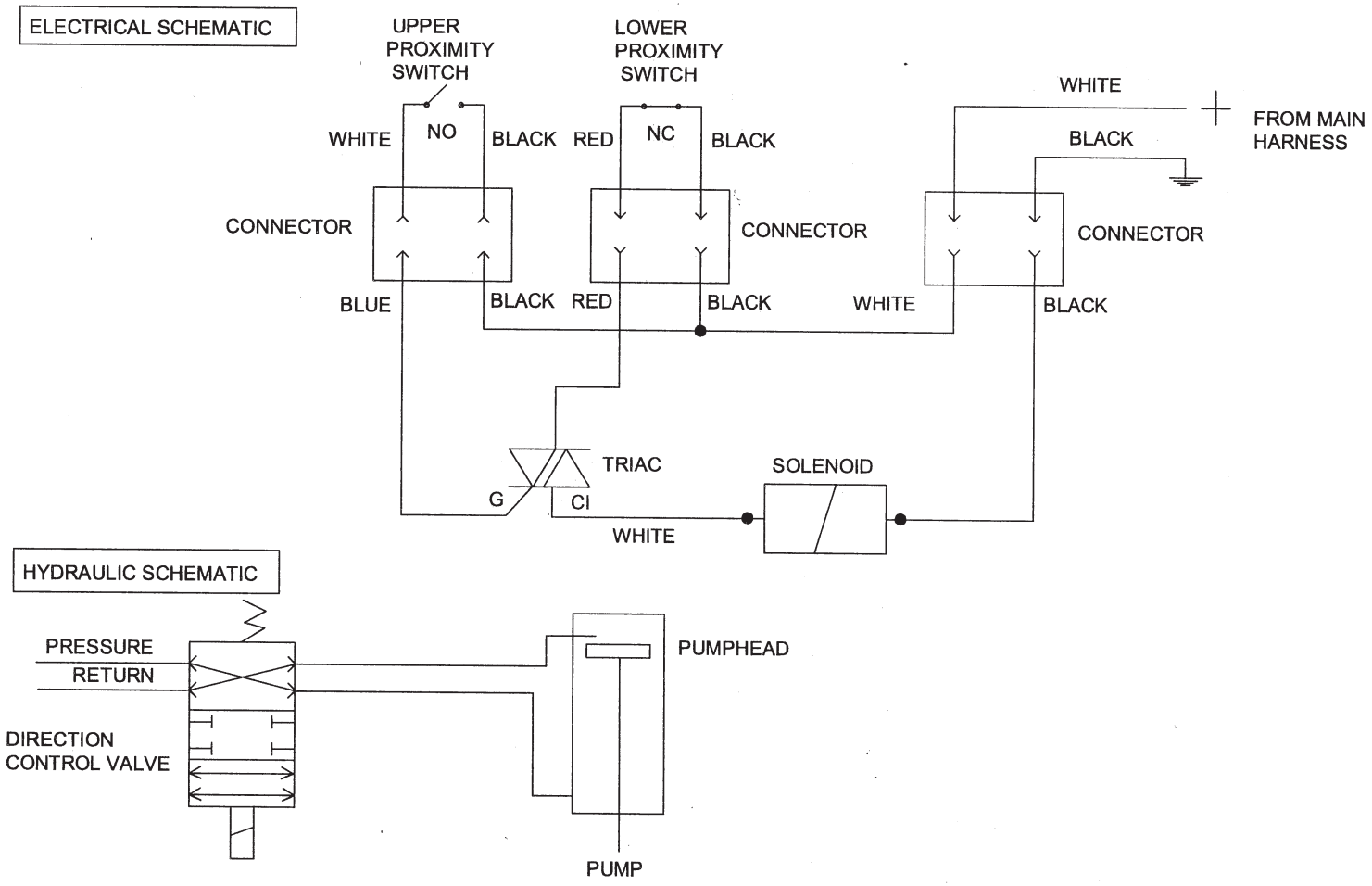
ESSP PUMP (100 GALLON)



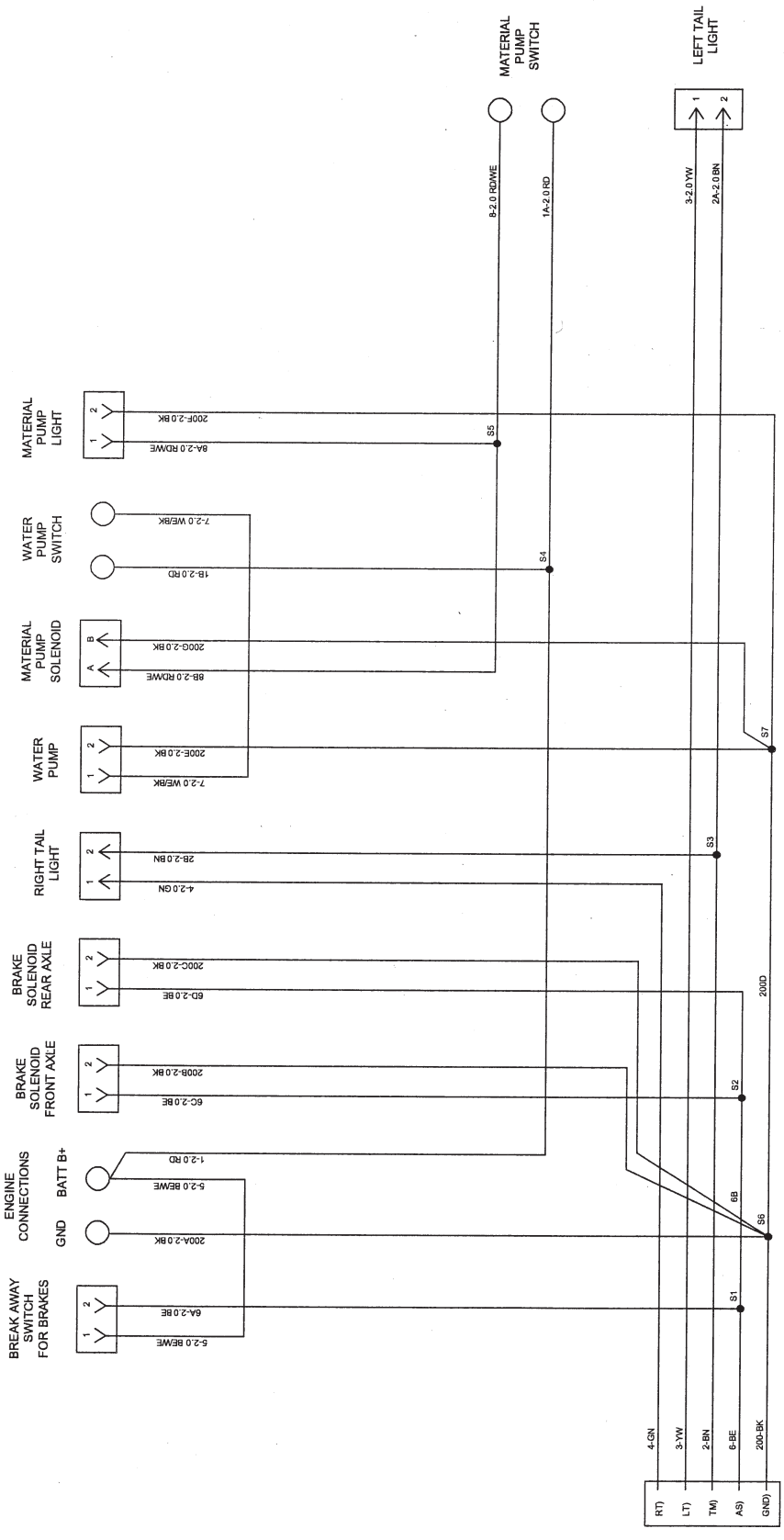
ESSP PUMP (100 GALLON)

ITEM	QTY.	PART NO.	DESCRIPTION
1	6	95505681	NUT, LOCK
2	1	20323101	LOWER CHECK BALL ASSY.
3	1	20322871	GASKET
4	6	95782371	BOLT
5	1	20323135	PUMP HOUSING
6	8	95430534	BOLT
7	8	95081857	LOCKWASHER
8	4	21924873	SPACER
9	1	21935127	PUMPHEAD MOUNTING PLATE
10	1	20323051	NUT, SPANNER, N-12
11	1	21916044	KIT, WASHER, PUMP
12	1	20323143	SET, LEATHERS
13	1	20323077	CENTRAL BALL ASSY.
14	1	95997490	1-14 HEX NUT

PUMPHEAD SCHEMATIC



COMPLETE WIRING SCHEMATIC



NEALCO™ EQUIPMENT, LLC SOLD BY DISTRIBUTORS

Warranty

NEALCO™ Equipment, LLC, through its distributor, warrants that each item of equipment manufactured by it and delivered hereunder to the initial user to be free of defects in material and workmanship for a period of six (6) months from the date of shipment to the initial user, or six (6) months from date of warranty registration by its dealer, whichever occurs first.

NEALCO™ Equipment, LLC will provide a new part or repaired part, at its election, in place of any part which is found upon its inspection to be defective in material and workmanship during the period prescribed above. Such part will be repaired or replaced without charge to the initial user during normal working hours at the place of business of a NEALCO™ distributor authorized to sell the type of equipment involved or other establishment authorized by NEALCO™. User must present proof of purchase and date at the time of exercising warranty.

This warranty does not apply to failures occurring as a result of abuse, misuse, negligent repairs, corrosion, erosion and normal wear and tear, alterations or modification made to the product without express written consent of NEALCO™; or failure to follow the recommended operating practices and maintenance product's operating and maintenance publications.

Accessories or equipment furnished by NEALCO™, but manufactured by others, including, but not limited to, engines, tires, batteries, engine electrical equipment, hydraulic transmissions, carriers, shall carry whatever warranty the manufacturers have conveyed to NEALCO™ and which can be passed on to the initial user.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES (EXCEPT OF TITLE), EXPRESSED OR IMPLIED, AND THERE ARE NO WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

Limitation of Liability

THE REMEDIES OF THE USER SET FORTH UNDER THE PROVISIONS OF WARRANTY OUTLINED ABOVE ARE EXCLUSIVE AND THE TOTAL LIABILITY OF NEALCO™ OR ITS DISTRIBUTORS WITH RESPECT TO THIS SALE OR THE EQUIPMENT AND SERVICE FURNISHED HEREUNDER, IN CONNECTION WITH THE PERFORMANCE OR BREACH THEREOF, OR FROM THE SALE, DELIVERY, INSTALLATION, REPAIR OR TECHNICAL DIRECTION COVERED BY OR FURNISHED UNDER THIS SALE WHETHER BASED ON CONTRACT, WARRANTY, NEGLIGENCE, INDEMNITY, STRICT LIABILITY OR OTHERWISE SHALL NOT EXCEED THE PURCHASE PRICE OF THE UNIT OF EQUIPMENT UPON WHICH SUCH LIABILITY IS BASED.

Nealco™ , ITS SUPPLIER(S) AND ITS DISTRIBUTORS SHALL IN NO EVENT BE LIABLE TO THE USER, ANY SUCCESSORS IN INTEREST OR ANY BENEFICIARY OR ASSIGNEE RELATING TO THIS SALE FOR ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, SPECIAL OR PUNITIVE DAMAGES ARISING OUT OF THIS SALE OR ANY BREACH THEREOF, OR ANY DEFECTS IN, OR FAILURE OF, OR MALFUNCTION OF THE EQUIPMENT UNDER THIS SALE WHETHER BASED UPON LOSS OF USE, LOST PROFITS OR REVENUE, INTEREST, LOST GOODWILL, WORK STOPPAGE, IMPAIRMENT OF OTHER GOODS, LOSS BY REASON OF SHUTDOWN OR NON-OPERATION, INCREASED EXPENSES OF OPERATION OF THE EQUIPMENT, COST OF PURCHASE OF REPLACEMENT POWER OR CLAIMS OF USERS OR CUSTOMERS OF THE USER FOR SERVICE INTERRUPTION WHETHER OR NOT SUCH LOSS OR DAMAGE IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, INDEMNITY, STRICT LIABILITY OR OTHERWISE.