

# OPERATION MANUAL

# WARHORSE

## IMPORTANT SAFETY INSTRUCTIONS



**WARNING:** Failure to observe these instructions can cause personal injury to machine operator or bystanders.



**WARNING:** Asphyxiation Hazard. An improperly maintained engine can produce excessive levels of carbon monoxide. Excessive levels of carbon monoxide can make you sick or cause death. **NEVER** operate machine in an area less than 5,000 square feet for more than 15 minutes unless there is adequate ventilation.



**WARNING:** Fire or explosion hazard. **NEVER** use with flammable or combustible materials, such as gasoline, kerosene, or other fuels or volatile solvents to clean floor. **NEVER** operate this machine in an explosive atmosphere.

### INTENDED USE

This machine is intended for commercial use, burnishing floors in an indoor, well-ventilated environment. NSS does not recommend using this machine for any other purpose.

### FOR SAFETY:

- **ALWAYS** read and understand all instructions before operating or servicing machine.
- **ALWAYS** use this machine **ONLY** as described in this manual.
- **NEVER** attempt to operate this machine unless you have been trained in its operation.
- **NEVER** allow an untrained person to operate machine.
- **NEVER** attempt to operate this machine if it is not working properly or has been damaged in any manner.
- **NEVER** let go of the handles when the machine is operating.
- **NEVER** disconnect or modify any switches or safety devices.
- **NEVER** service machine near fire or flame.
- **NEVER** operate this machine with any air opening blocked. Keep all air openings free of dust, lint, hair, etc.
- **NEVER** allow this machine to be used as a toy. Close attention is necessary when used by or near children.
- **ALWAYS** keep face, fingers, hair or any other body part or loose clothing away from any machine opening or moving part (revolving pad & pad driver).
- **ALWAYS** use extreme caution when operating the machine on a ramp or loading/unloading this machine into or out of a truck/trailer. Use extreme caution if the ramp is wet, oily, or covered with cleaning chemicals.
- **ALWAYS** turn the machine off when attaching pads.
- **ALWAYS** be sure that the ramp is secured to the vehicle before attempting to load/unload.

- **NEVER** stop or turn the machine on a ramp or incline.
- **NEVER** attempt to climb a grade or operate this machine on a ramp or incline of more than 8 degrees.
- **NEVER** park or store the machine near a dock, on ramps, near a furnace, boiler, open flame, or other high heat source.
- **NEVER** expose the machine to rain, snow, or extreme temperatures.
- **NEVER** store any items on this machine.
- **ALWAYS** store this machine indoors in a dry, cool area.
- **ALWAYS** store or transport LP fuel tank in the upright position.
- **ALWAYS** use only tank and connections provided with the Warhorse. This tank is fitted only for vapor withdrawal, not liquid. It has safety features (check valves, etc.) that are not found in tanks regularly found in an LP supplier's yard.
- **NEVER** fill tank with any fuels other than propane HD-5 Spec. carburetor grade. Do not use blends or butane.
- **ALWAYS** have a qualified LP dealer fill the tank. The dealer can be found in the yellow pages under "Gas Liquefied Petroleum".
- **NEVER** store propane tank where unauthorized personnel may tamper with it.
- **NEVER** alter or change the fuel system as incorrect fuel mixture or gas leakage may result.
- **ALWAYS** check fuel system components and hoses for leaks before operating.
- **NEVER** tip the engine on either side. Engine oil can enter the air cleaner and cause the engine to run rich and shut down.
- **ALWAYS** allow the engine time to cool before performing any maintenance as hot parts can cause severe burns.

**ALL REPAIR SERVICE MUST BE PERFORMED BY AN NSS AUTHORIZED DISTRIBUTOR/ SERVICE STATION USING ONLY NSS ORIGINAL EQUIPMENT PARTS.**

**SAVE THESE INSTRUCTIONS**



## **MACHINE INSPECTION**

- Carefully unpack the Warhorse and recycle all packing materials.
- Inspect machine for damage or missing components. If damage is found, contact the local freight company to file a freight claim.

## **MACHINE COMPONENTS**

### **Engine**

The Warhorse is equipped with an engine specially manufactured to use LP (propane) gas as the fuel source. The engine manufacturer and size (displacement) may vary. Observe the name on the engine and refer to the manual provided with this machine by the engine manufacturer.

### **Fuel Tank**

The Warhorse is equipped with a “vapor” withdrawal type fuel tank with a fuel gauge. It is referred to as a 20 lb. (9Kg.) tank. Empty and full weights are stamped on the side of the tank. Do not use other tanks.

### **Solenoid Valve and Pressure Regulator**

The solenoid valve is an electrical control that stops the flow of LP (propane) gas when the key switch is turned off. The pressure regulator controls the amount and pressure of the LP (propane) gas flowing to the engine. This regulator is preset by the engine manufacturer and is not adjustable.

### **Battery**

The Warhorse is equipped with a 12 volt “gel” starting battery that requires no water additions. The charge is maintained by the built-in engine charging system.

### **Pad Driver System**

The Warhorse 27 flexible pad driver is powered by a dual “V” belt and pulley system. The Warhorse 20/21 flexible pad driver is powered by a single “V” belt and pulley system. A centrifugal clutch transfers the power of the engine to the belt and pulley system. The clutch is not engaged when the engine is at idle speed.

### **Pad Driver**

The Warhorse is equipped with a flexible pad driver with a spring clip pad holder. Use approved hair or synthetic type pads in sizes 20 in.(51 cm), 21 in.(53 cm), or 27 in. (69 cm). Consult your local NSS authorized distributor for more complete pad application advice.

### **Units with Dust Control System**

Weekly, check vac hose connections at the Flexiwall Shield and cloth filter bag. When the filter bag is more than one-half (1/2) full, empty, shake out, then replace back in the machine. Inspect Flexiwall Shield for dents,

cracks, and wear. A damaged Flexiwall Shield will greatly reduce the burnishing and dust control capabilities. Dirt build up on the brush should be removed.

### **Control Handles**

The Warhorse has two (2) bicycle type handles for the operator to control the direction of the machine.

### **Dead-man Safety Lever**

There is a “dead-man” safety lever next to each control handle. These levers control the speed of the engine during operation. When the operator releases these levers, they return the engine to idle speed. This allows the clutch to “idle” and the pad driver stops rotating. Always operate at full speed to have maximum power and engine cooling.

### **Key Switch and indicator Light**

Below the control handle is the key switch that turns the engine on and off. This machine is equipped with a 12 volt electric starter. There is an indicator light next to the key switch. The light is ON whenever the key switch is turned ON. If you leave the key switch turned ON for an extended length of time, the battery will go dead.

### **Hour Meter**

On the right side of the chassis is the hour meter. This meter records the time (hours) that the motor is running. This time record is very critical to the performance of scheduled maintenance procedures. Do not attempt to modify or disconnect this meter.

### **Emissions Sensor**

The Warhorse is equipped with an emissions sensor. It measures the level of certain emissions in the engine exhaust. The monitor and warning levels are preset by the manufacturer.

- If emissions in the exhaust gasses approach the preset safe levels, the sensor light will signal a warning to the operator to turn off the engine and service the machine.
- If the operator continues to run the machine in this condition, the sensor will shut down the engine.
- If the engine is shut down due to improper emissions levels:
  - Turn the key switch off, close the tank valve and take the machine outside.
  - Open doors and windows to increase the fresh air oxygen (O<sub>2</sub>) and reduce carbon monoxide (CO) levels in the building. Check oil level, clean top precleaner, and air filter (refer to maintenance chart). Contact your local NSS authorized distributor or engine service center for assistance.

## Carbon Monoxide (CO)

Various levels of carbon monoxide are present in the exhaust gases of all internal combustion engines. Carbon monoxide is an odorless, colorless and tasteless gas.

**WARNING:** An improperly maintained engine can produce excessive levels of carbon monoxide. Excessive levels of carbon monoxide can make you sick or cause death.

## INITIAL MACHINE SET-UP

### Engine

The Warhorse engine is shipped with oil in the engine crankcase. Always check the oil level before you start the engine. Use 10w30 or 15w40 motor oil with an API designation of SG. The valve and hose clamp under the engine must be closed securely or oil will leak out of the engine. Refer to the manual provided by the engine manufacturer.

### Fuel Tank

The Warhorse fuel tank is shipped **empty**. New tanks must be purged by an authorized LP (propane) gas distributor before use.

- Keep tank upright at all times. Do not overfill tank.
- The fuel tank must be filled with the proper type (HD-5) and amount of LP (propane) gas. Refer to the operators manual provided by the engine manufacturer.
- The hose connection from the pressure regulator to the fuel tank fitting must be tight.
- Do not damage threads by overtightening or cross threading.
- The fuel tank must be securely attached to the machine by the clamp during operation.
- Always turn the key switch to OFF then shut the valve on the propane tank to turn the machine off.
- Always remove the fuel tank from the machine and place tank outside in an upright position in a secure, tamper-proof, steel mesh storage cabinet. Check with your local fire marshal.

## DAILY USE

### Burnishing Methods

The Warhorse is designed to dry burnish or to spray buff (non-Vac-Trac models only) a hard surface floor. Each procedure may be performed with a 20 in. (51 cm), 21 in. (53 cm), or 27 in. (69 cm) hair type or synthetic type pad. Consult your local NSS authorized distributor for more complete chemical/pad application advice.

## Burnishing Path

The Warhorse pad driver extends past the frame of the machine. This extension allows burnishing the edge of the floor near obstructed areas (walls or shelving).

- Sweep and dust mop the floor to remove dirt and debris before burnishing. Accumulations of dirt or debris on the floor will reduce machine performance.
- Some spills or stains may need to be precleaned before burnishing. Consult your local NSS authorized distributor for procedures and more complete chemical advice.

### Daily Preparation

- Inspect machine for damage, loose or missing parts.
- Check oil level in crankcase.
- Clean air precleaner on top of engine and air cleaner filter.
- Remove fuel tank from locked storage container and bring to machine. Install tank in position and secure with clamp.
- The hose connection from the pressure regulator to the fuel tank must be tight.
- *Note:* Do not damage threads by over tightening or cross threading.
- Tilt machine back to rest on small wheels to obtain access to pad driver.
- If necessary change or install new pad on pad driver. Secure pad with pad holding cup.

### WORK COMPLETION

- Always turn OFF key-switch then shut the valve on the propane tank.
- Remove the key when work has been completed or if machine is left unattended at any time.

## **MANDATORY PERIODIC MAINTENANCE**

It is important for you to maintain a record of the amount of machine operating hours in order to perform this machine maintenance. The maintenance procedures shown in the chart on the following page must be performed at the designated intervals. Failure to perform maintenance procedures will result in poor machine performance, component damage and may void the warranty. We recommend the service procedures be performed by an NSS authorized service center or the authorized service center for the engine manufacturer.

**Always turn the key switch OFF, shut tank valve, and remove key before performing any maintenance.**

### **Authorized Repair Service**

Repair service for this machine must be performed by an NSS authorized service center or the authorized service center for the engine manufacturer. Repairs performed by any unauthorized company will void the machine and engine warranty. If you require assistance finding an authorized service center, please contact NSS Enterprises.

## PERIODIC MACHINE MAINTENANCE SCHEDULE

MAINTENANCE OPERATION	MAINTENANCE FREQUENCY							
	Break in after first 25 hours	Every day or every 8 hours	Every 50 hours	Every month	Every 100 hours	Every 200 hours	Every 500 hours	Every 1,000 hours
Inspect machine (engine, pad, pad driver, etc.)		● <sup>1</sup>						
Check oil level		●						
Clean air precleaner (top)		● <sup>2</sup>						
Clean air cleaner foam wrapper			● <sup>2</sup>					
Clean cylinder cooling fins			●					
Change engine oil and oil filter.	●		●					
Lubricate wheels and pad driver bearings	●		●					
Check starting battery connections				●				
Replace air cleaner element and foam wrapper						● <sup>2</sup>		
Adjust engine valve clearance	● <sup>3</sup>					● <sup>3</sup>		
Clean spark arrestor	● <sup>4</sup>					● <sup>4</sup>		
Replace LPG filter						● <sup>3</sup>		
Clean duty solenoid (20" & 21" models only)						● <sup>3</sup>		
Replace spark plugs							●	
Replace oxygen sensor								● <sup>3</sup>
Replace catalytic muffler (27" model only)								● <sup>3</sup>
Clean cylinder heads								● <sup>3</sup>
Replace duty solenoid (20" & 21" models only)								● <sup>3</sup>

1. Check for oil, fuel, and exhaust leaks, loose parts and unusual noises and vibrations.

2. Do not oil filters.

3. Must be performed by a qualified mechanic according to the engine Service Manual.

4. Remove and clean — take machine outside and operate 15 minutes to expel buildup — replace.

## TROUBLESHOOTING

PROBLEM	CORRECTIVE ACTION
1. The engine fails to crank.	<ul style="list-style-type: none"> <li>a. Clean and tighten the positive (+) and negative (-) battery cable connections at the battery and at the engine.</li> <li>b. Recharge the battery. Refer to the equipment or battery manufacturer's recommendations</li> </ul>
2. The engine cranks slowly.	<ul style="list-style-type: none"> <li>a. Clean and tighten the positive (+) and negative (-) cable connections at the battery and at the engine.</li> <li>b. Recharge the battery. Refer to the equipment or battery manufacturer's recommendations.</li> <li>c. Change engine oil to oil having the proper viscosity for the ambient temperature.</li> </ul>
3. The engine cranks but fails to start.	<ul style="list-style-type: none"> <li>a. Fill the LPG container if low on fuel, or if over-filled, return to filling station for adjustment.</li> <li>b. Check, and if necessary, reconnect the fuel line to the <i>vapor-withdrawal fitting</i> on the LPG container.</li> <li>c. Slowly open any closed fuel shut-off valves.</li> <li>d. Service the air cleaner. Do not soak with oil!</li> <li>e. Clean the cooling air precleaner (top).</li> <li>f. Check to make sure the spark plug cable is on tight.</li> <li>g. Replace the spark plug.</li> <li>h. Check the oil level and add oil if necessary.</li> <li>i. Check both ends of the vacuum hose to make sure it is on tight.</li> <li>j. Reconnect any loose wiring.</li> <li>k. Make sure the proper type of LPG container is being used. The container must have a <i>vapor-withdrawal fitting</i> to supply the engine.</li> </ul>
4. The engine runs and then stops.	<ul style="list-style-type: none"> <li>a. Check the LPG container and fill as necessary. <i>On cold days, the LPG container may have to be kept at least half-full to provide the rate of vaporization necessary to keep up with the engine fuel demand.</i></li> <li>b. Check, and if necessary, reconnect the fuel line to the <i>vapor-withdrawal fitting</i> on the LPG container.</li> <li>c. Check the engine oil level and add oil as necessary. Drain excess oil if the level is above the dipstick Full mark.</li> <li>d. Clean spark arrestor.</li> </ul>
5. The engine lacks power.	<ul style="list-style-type: none"> <li>a. Service the air cleaner.</li> <li>b. Check the LPG container and fill as necessary. <i>On cold days, the LPG container may have to be kept at least half-full to provide the rate of vaporization necessary to keep up with the engine fuel demand.</i></li> <li>c. Clean the spark arrestor.</li> </ul>
6. The engine exhausts black smoke.	<ul style="list-style-type: none"> <li>a. Service the air cleaner</li> </ul>
7. The engine misfires.	<ul style="list-style-type: none"> <li>a. Replace the spark plugs. Check connections.</li> </ul>

**NOTES:**



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