



M157310K.1

ITEM NUMBER:	157310
SERIAL NUMBER:	_____
Engine Model:	_____
Pump Model:	_____
Flow:	_____
Hose Length:	_____
Nozzle Size:	_____
Pressure:	_____
Lance Length:	_____

Installation, Operation, and Maintenance Manual

HOT WATER PRESSURE WASHER: *Cleans dirty surfaces with high pressure hot water.*

To the Owner:

Thank you for purchasing a NorthStar hot water pressure washer. Your machine is designed for long life, dependability and the top performance you demand! Take time now to read through this manual so you better understand the machine's operation, maintenance and safety precautions. Everyone who operates this machine must read and understand this manual. The time you take now will prolong your machine's life and prepare you for its safe operation. Enjoy the exceptional performance of your NorthStar hot water pressure washer, the industry leader! The manufacturer reserves the right to make improvements in design and/or changes in specifications at any time without incurring any obligation to install them on units previously sold.

Quick Facts

Engine Oil	Engine is shipped without oil. Fill before starting. Use SAE 10W-30 motor oil.	
Pump Oil	Pump is shipped with oil. Remove shipping tape and check pump oil level before starting. Use SAE 30 Non-detergent pump oil (item # 4043) or Cat Pump Oil (item #22158) for oil changes.	
Water	Make sure your water flow is 20% higher than the pressure washer's flow rate. Make sure your water is clean and particle free.	
Storage	Do not allow water to freeze in the pump, hose, coil, or spray gun.	
Spraying Chemicals	Use any NorthStar brand or equivalent pressure washer chemicals. Adjust soap adjustment knob to regulate cleaning power.	
Maintenance Schedule	Engine:	Oil: change after first 20 hours, then annually or every 100 hours. Spark Plug: clean every 100 hours, replace annually or every 300 hours. Air Filter: clean every 100 hours, replace annually or every 300 hours.
	Pump:	Oil: change after first 40 hours, then every 3 months or 500 hours.
Read and understand all manuals before operating.		

Any Questions, Comments, Problems, or Parts Orders
Call NorthStar Product Support 1-800-270-0810

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Important Safety Instructions

WARNING -Risk of injection or injury to persons - Do not direct discharge stream at persons. - Do not use hose if exterior damage is evident.

CAUTION -Risk of explosion. Do not spray flammable liquids. Do not operate in a flammable environment. -Risk of asphyxiation. Exhaust fumes are deadly. For outdoor use only. Avoid inhaling exhaust fumes.

-Risk of fire. Do not add fuel when the product is operating or hot.

-Gun kicks back, hold with both hands.

-To reduce the risk of injury, read and understand operating instructions carefully before use.

WARNING - When using this product basic precautions should always be followed, including the following:

- 1.) Read all the instructions before using the product.
- 2.) To reduce the risk of injury, close supervision is necessary when the product is used near children. Do not allow irresponsible use by children. Always stop the product and bleed pressures before leaving unattended, disconnecting hoses, or servicing the pump.
- 3.) Know how to stop the product and bleed pressures quickly. Be thoroughly familiar with the controls.
- 4.) Stay alert - watch what you are doing.
- 5.) Do not operate the product when fatigued or under the influence of alcohol or drugs. Never smoke while operating or fueling this machine.
- 6.) Keep operating area clear of all persons.
- 7.) Do not overreach or stand on unstable support. Keep good footing and balance at all times. Wear footwear capable of maintaining a good grip on wet surfaces - Do not place the machine on soft or unstable ground.
- 8.) Follow the maintenance instructions specified in all manuals. Do not run machine without sufficient lubrication or sufficient water to cool the pump.
- 9.) Wear safety glasses, gloves, face protection and appropriate clothing when operating the machine.
- 10.) Do not operate this machine with broken or missing parts. - Never alter the manufacturer's original design or deactivate any safety device on the machine.
- 11.) Risk of exposure to dangerous chemicals. Wear protective gloves when handling and cleaning with chemicals. Follow the chemical manufacturer's directions. Understand all safety hazards and first aid for all chemicals being used. Check whether dangerous chemicals have been used and take any precautions that may have been recommended by the supplier of these chemicals when cleaning filters. Do not pump highly abrasive fluids or use with incompatible chemicals or solvents.
- 12.) Know the pressure and temperature limits of your machine. Be sure all high pressure accessories meet or exceed your machine's limits. Do not set the pressure relief valve above the machine's limit.
- 13.) Do not move this machine by pulling on the hose. Do not use the pump to support other items of equipment that impose unacceptable loads on the pump. Do not attempt to use this machine as a prop.
- 14.) To reduce risk of injury, do not secure the spray gun open. Your spray gun is equipped with a built-in trigger safety latch to guard against accidental trigger release and potentially dangerous high pressure spray. Rotate the safety latch to the locked position when not spraying.
- 15.) Do not clean this machine with its own spray. Cleaning should be done with a damp sponge with the engine OFF.
- 16.) NEVER attempt to immediately run or re-light the burner if it doesn't ignite the first time. Unburned oil or gas may have accumulated causing potential explosion or fire hazard.
- 17.) Always make sure all switches and controls are in the OFF position prior to starting the engine.

SAVE THESE INSTRUCTIONS

Specifications

ITEM	157310
Pressure Rating	3000 psi
Flow Output	4 gpm
Pump Type	Cat 66DX
Water Supply	Standard tap water @ 20-75 psi
Engine Horsepower	13 hp
BTU Output	353,700 BTU
Temperature Rise	140° F
Maximum Temperature	250° F
Approved Fuels	#1 or #2 Diesel, Kerosene, Fuel Oil
Fuel Capacity	8.5 Gal
Gasoline Capacity	8.5 Gal
Discharge Hose	3/8" X 50'
Dimensions	
Length	64"
Width	33"
Height	44"
Weight (shipping)	655 lbs
Weight (dry)	557 lbs
Weight (fueled)	710 lbs

Machine Component Identification

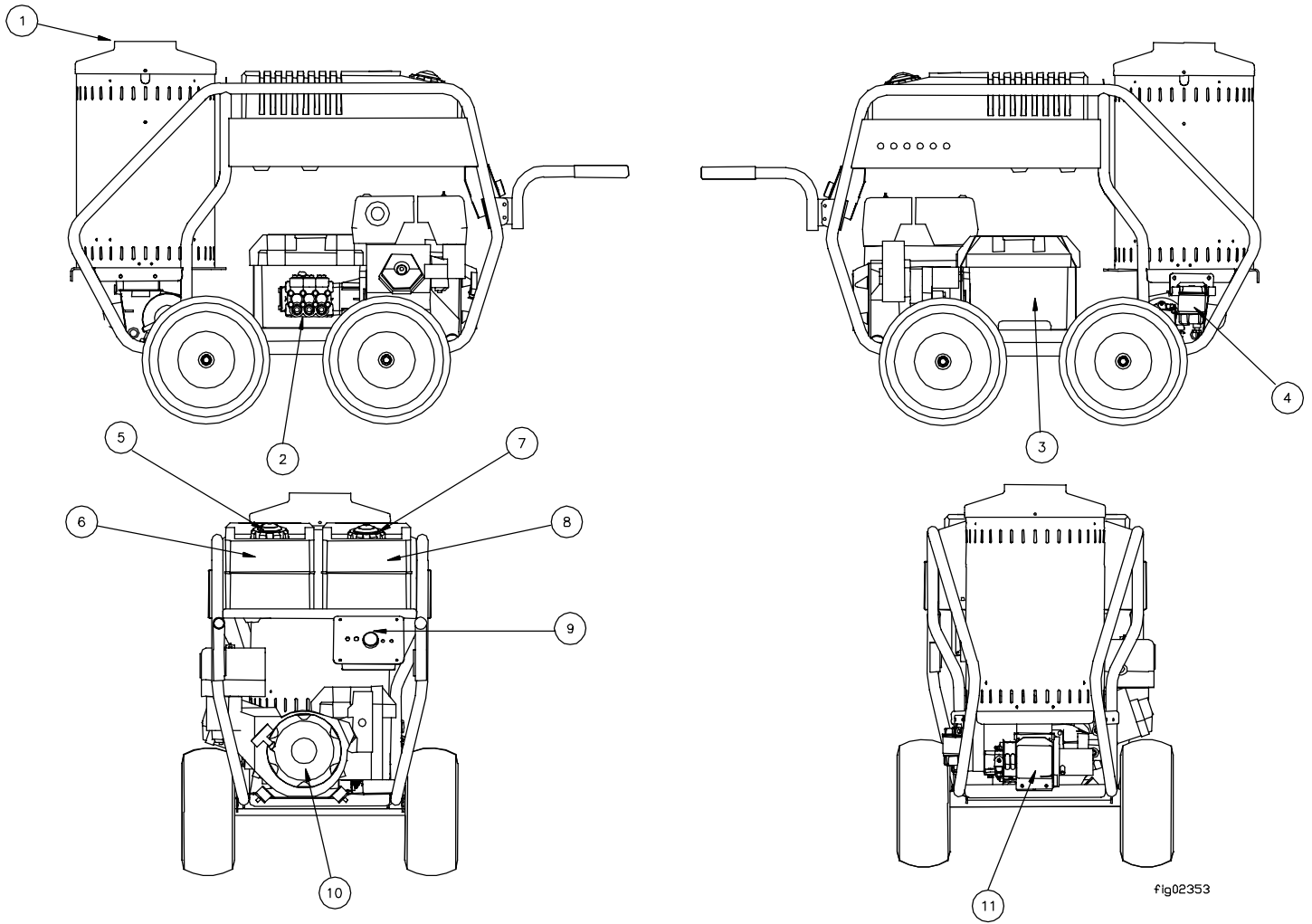


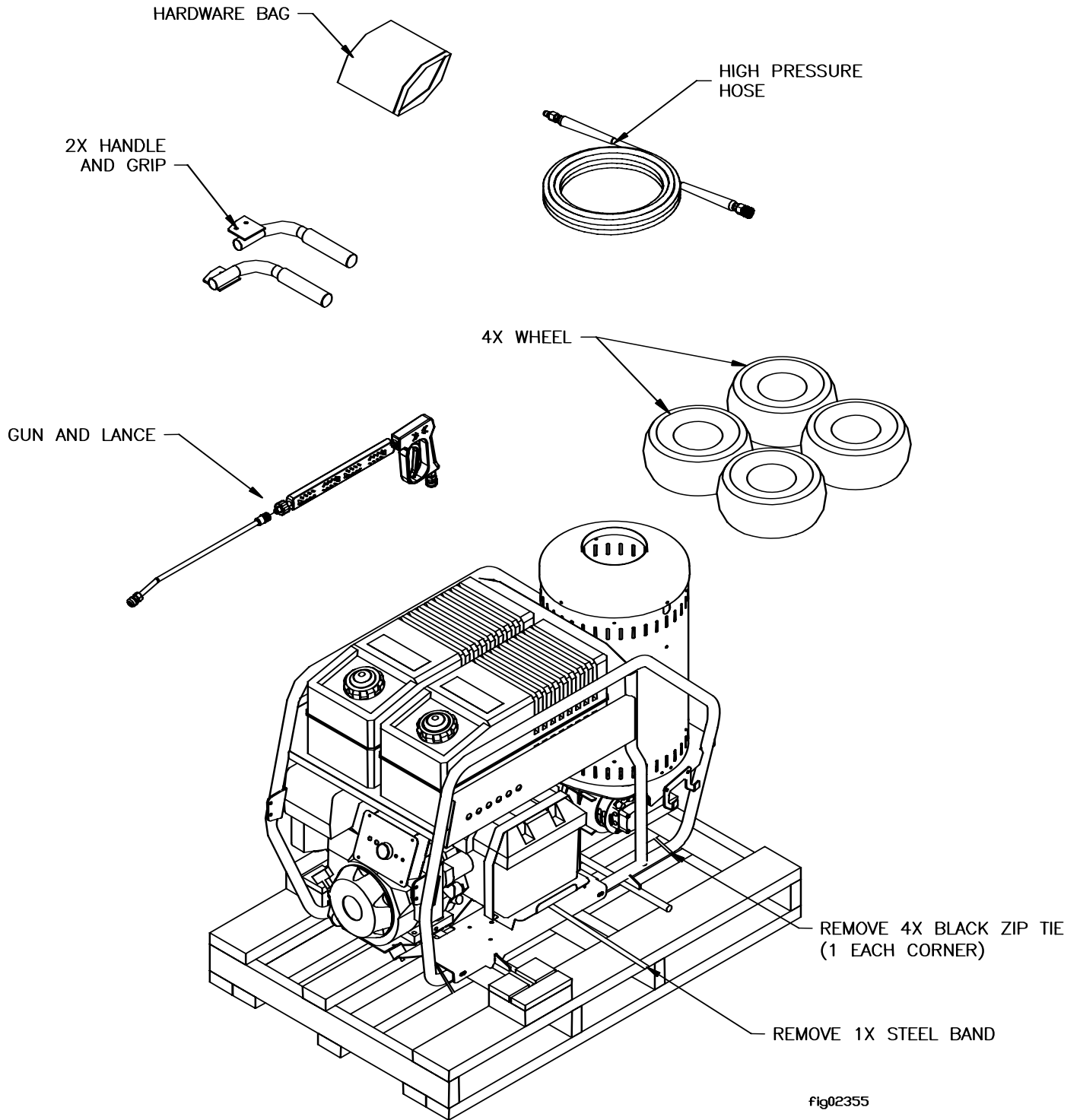
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Ref #	Description	Ref #	Description
1	Exhaust Vent	7	Fuel Cap
2	Pump	8	Fuel Tank
3	Battery Box	9	Control Panel
4	Fuel Filter/Water Separator	10	Engine
5	Gas Cap	11	Burner
6	Gas Tank		

Installation Instructions

I.) Unpack

Your pressure washer is shipped on one pallet. Separate and identify the components and use the assembly instructions in this manual for assembly.



Hardware Bag

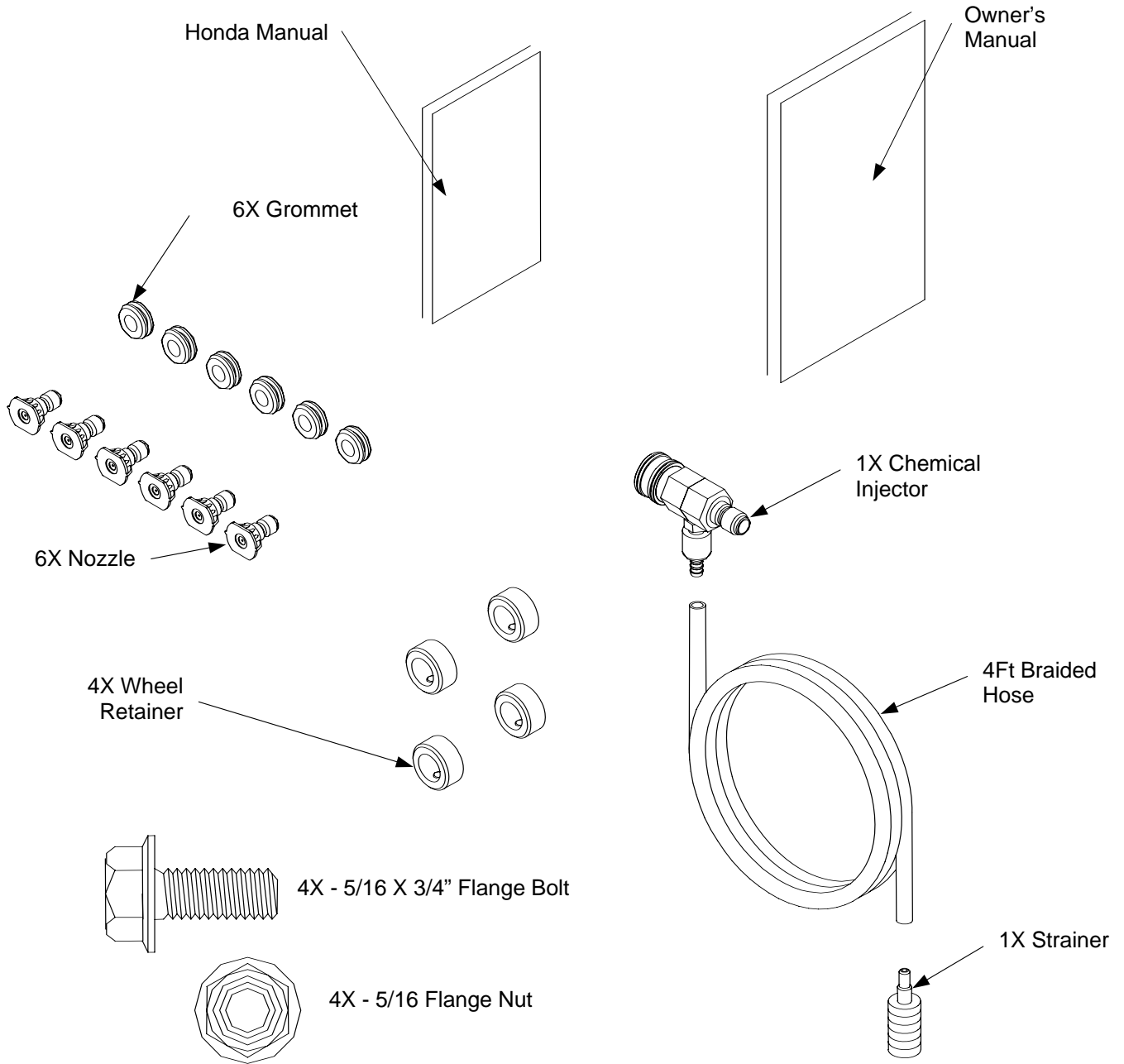
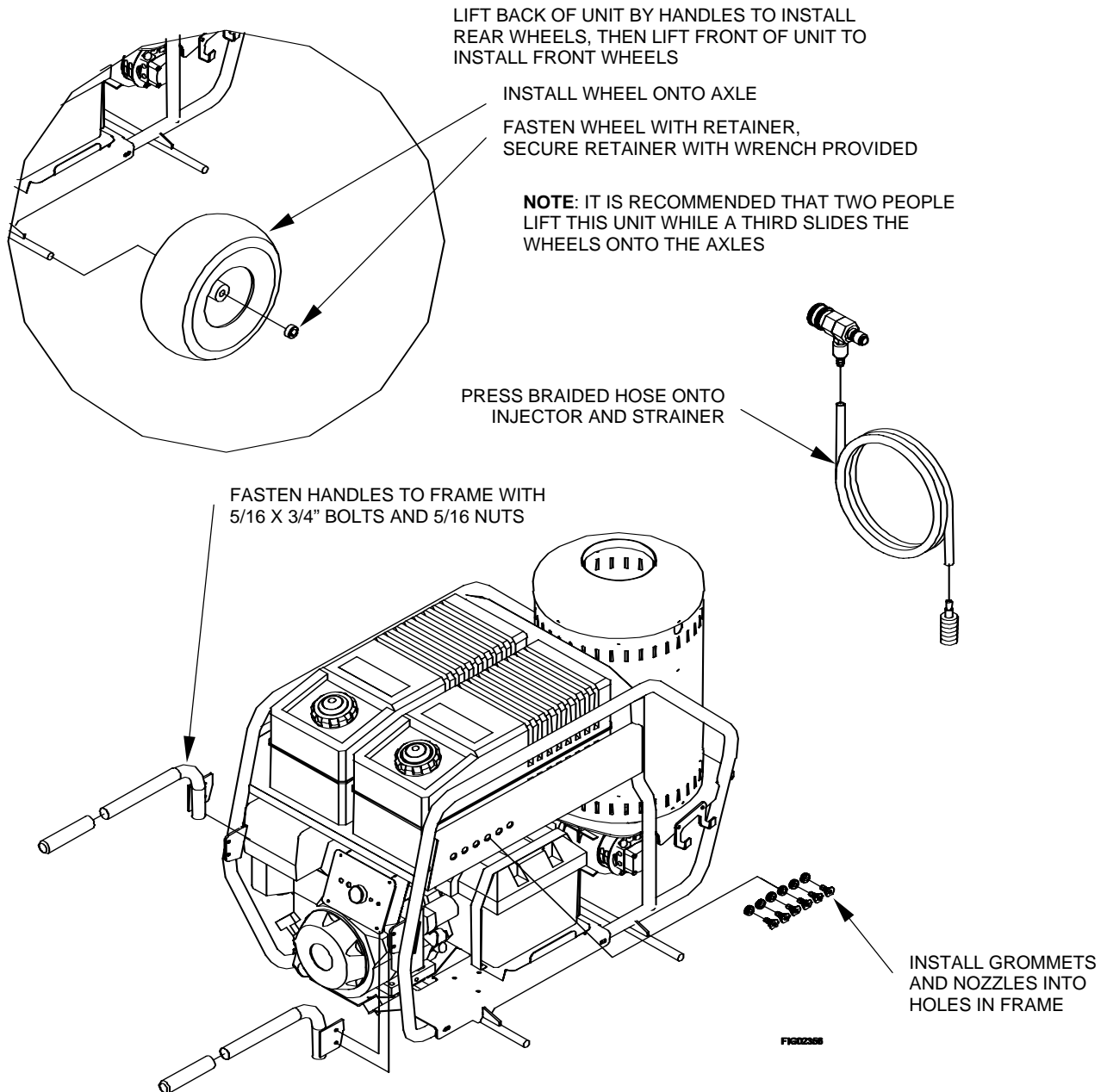


FIG02354

II.) Assembly Instructions



III.) Pump Preparation

- A.) Remove shipping tape and make sure the oil is 1/2 way up oil sight glass.

IV.) Engine Preparation

- A.) Fill engine with 1.16 qt of oil.
 B.) Fill fuel tank with unleaded gasoline, 86 octane min.

Quantities Of Fluid

Engine/Pump	Type of Fluid	QTY
Honda GX390	SAE 10W30	1.16 qt (1.1L)
Cat 66DX	SAE 30**	18oz (0.55L)

**SAE Non-Detergent (Item# 4043)

V.) Battery

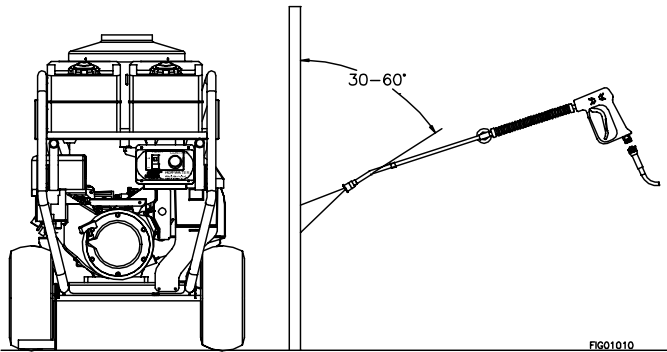
Warning: Sulfuric acid is a corrosive poison. Avoid contact with skin, eyes or clothing. Always wear safety glasses when working on or near the battery.

The battery box provides protection for the battery and will accept a standard lawn tractor size battery (Group U1-7). The engine requires a 12-volt battery, with a minimum rating of 18 Ah (Amp-hour). When installing a battery, always connect the red colored ("positive" or "+") cable first. When disconnecting a battery, always remove the black colored ("negative" or "-") cable first.

VI.) Getting Started

IMPORTANT: Proper initial installation of equipment will assure more satisfactory performance, longer service life, and lower maintenance cost.

Make sure the pressure washer is on a level surface and in a protected area where it is not readily influenced by outside forces such as strong winds, freezing temperatures, rain, etc. Locate the pressure washer for easy access for filling fluids, adjustments, and maintenance.



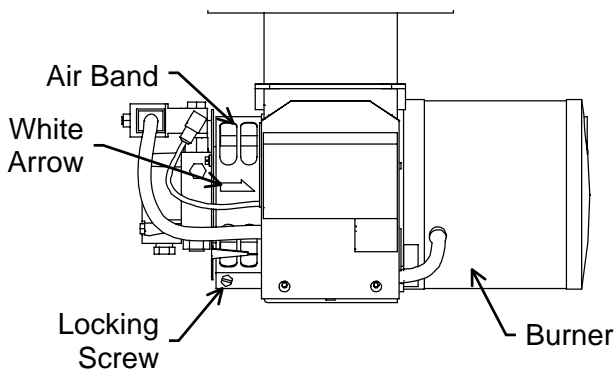
It is recommended that a partition be made between the wash area and the pressure washer to prevent direct nozzle spray from coming in contact with the pressure washer. Moisture reaching the equipment will reduce the pressure washer's service life.

VII.) Venting

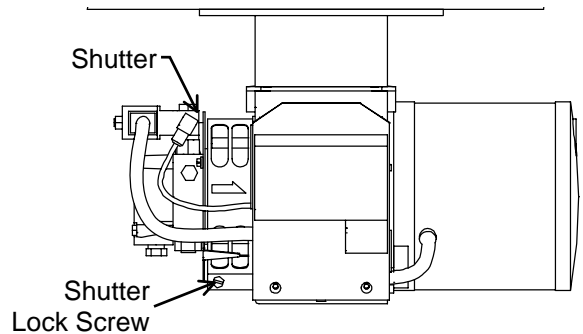
DANGER: Do not run machine indoors, in an enclosed area, or in areas where flammable vapors, (gasoline, solvents, etc.) may be present.

VIII.) Oil Burner

Burner Air Adjustment: The oil burner is preset and performance tested at the factory (elevation 1100 feet). Different altitudes may require a one-time initial burner correction.



- 1.) Turn the engine and heat switches ON (Refer to "Operation" for details). Have someone operate the spray gun so the burner fires.
- 2.) Loosen the locking screw and close the air band until black smoke appears from the burner exhaust vent. Note the position of the white arrow on the air band.
- 3.) Slowly open the air band until white smoke just starts to appear.
- 4.) Turn the air band half way back to the black smoke position previously noted. Tighten the locking screw.
- 5.) Fine tune the burner air by loosening the shutter lock screw and turning the shutter until the exhaust is cleanest. Tighten the shutter lock screw.



CAUTION: If white smoke appears from the burner exhaust vent during start-up or operation, discontinue use and readjust air bands.

Operating Instructions

Read and understand the entire manual before operating the pressure washer.
Follow these instructions every time you use the pressure washer.

I.) Pre-Operation

- ☑ A.) Position the machine for easy access to all controls.
- ☑ B.) Position the machine on a solid surface, with less than a three degree slope, and so it is protected from external damage.
- ☑ C.) Position the machine so that ambient lighting is sufficient for the surface you are cleaning to be seen with ease. Use artificial light if needed.
- ☑ D.) Check hoses, fittings, wand, trigger gun and fuel connections for signs of wear, cracks and looseness, and replace as required.
- ☑ E.) Check and clean the nozzle orifice.
- ☑ F.) Check and clean the water inlet screen and filter.
- ☑ G.) Read entire manual, especially the important safety instructions listed on page 2.
- ☑ H.) Check and maintain proper oil levels in the pump and engine.

II.) Check Your Water Supply

- ☑ A.) Make sure the water supply is clean. Debris can cause excess pump wear and reduce performance.
- ☑ B.) An insufficient water supply will damage your pump. Make sure the water supply is steady and is 20% over the rated flow of your pump. Use a stopwatch to time how long it takes to fill a 5 gallon bucket with your garden hose.

Example: If the rated flow is = 4gpm
Then required flow = $4 \times 1.20 = 4.8\text{gpm}$
 $5\text{gallons} / 4.8\text{gpm} = 1.04\text{ minutes}$
 $1.04\text{min} \times 60\text{sec}/\text{min} = 62\text{ seconds}$
Therefore, you must be able to fill a 5 gallon bucket in 62 seconds or faster.

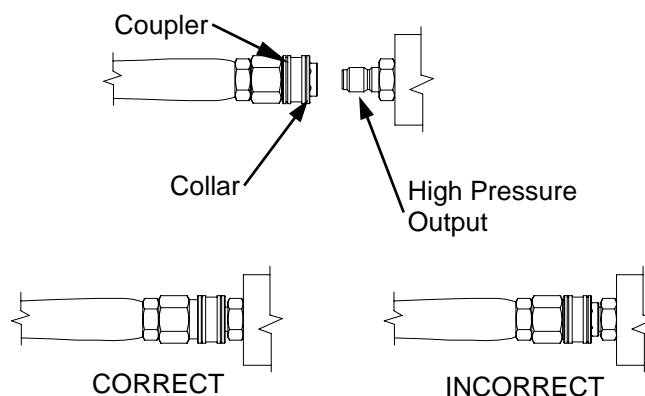
- ☑ C.) The water supply garden hose must have an inside diameter of at least 5/8". If the hose is more than 100 ft. long, the diameter must be at least 3/4".
- ☑ D.) Never use a reservoir tank as a water source. This pressure washer is designed for a pressurized water source such as a city water faucet. Sucking water out of a tank may cause pump cavitation and damage to your pump. However, the inlet pressure of the pump must not exceed 75 psi (5.25 bar).
- ☑ E.) Always use a flexible rubber hose for your water supply. Do not use rigid piping.
- ☑ F.) Do not pump flammable liquids or liquids containing incompatible chemicals or solvents.

III.) Attach Garden Hose

Remove shipping plug from pump inlet and confirm rubber washer is in place. Attach garden hose to water inlet. See Machine Component Identification for location of water inlet.

IV.) Attach High Pressure Hose

Your pressure washer hose is equipped with quick couplers. Simply pull the collar back and push the coupler onto the nipple. Make sure the collar slides over the ball bearings. Once the connection is made, pull on the hose to assure a positive connection.



V.) Turn Water Supply ON

Make sure the hose is not "kinked". A kinked hose will provide insufficient water supply to the pump and will reduce its life. Make sure the hose remains unkinked after moving the pressure washer.

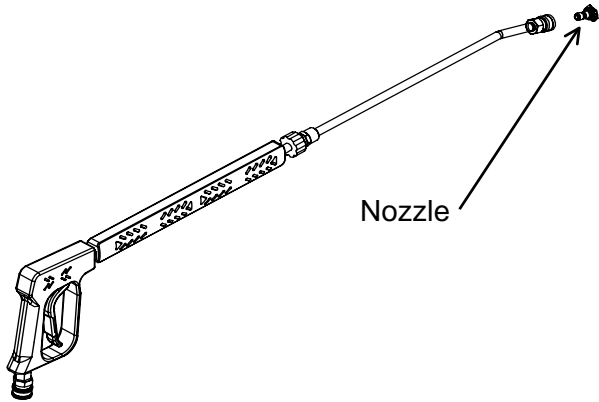
VI.) Squeeze Trigger

Squeeze the trigger until a steady flow of water sprays out the nozzle. Make sure all the air is out of all hoses before running the pressure washer. This step is very important, it will prolong the pump's life. NEVER run the pump dry.

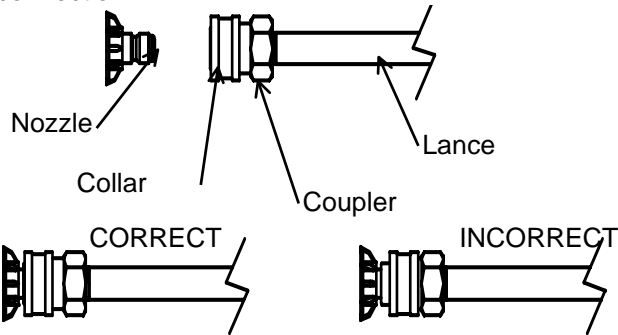
VII.) Attach Nozzle

Color of Nozzle:	Spray Angle	Used For:
Red	0	Highest Impact
Yellow	15	Tough Stains/ Stripping
Green	25	General
White	40	Light Cleaning
Black	65	Chemicals
Yellow	15	Steam

Your pressure washer is equipped with four high pressure nozzles. To install a nozzle pull back the collar



and push the nozzle into the coupler. Once the connection is made, pull on the nozzle to assure a tight connection.



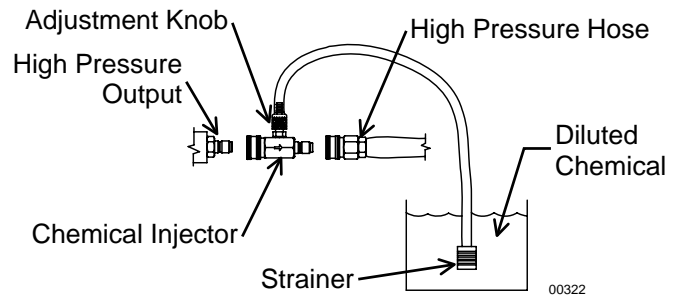
WARNING: Make sure the nozzle is correctly inserted. The nozzle may become a projectile if not inserted correctly. Do not attempt to use different types of nozzles that may not fit the coupler.

VIII.) Applying Chemicals

WARNING: Only use NorthStar pressure washer chemicals or chemicals specifically formulated for pressure washers. Follow the chemical manufacturer's recommendations. Understand all safety precautions and first aid for all chemicals.

NOTE: Your pressure washer is equipped with a low pressure chemical injector. The proper chemical used for the proper application can speed up cleaning jobs tremendously.

A.) Snap the quick couple chemical injector onto the high pressure outlet and high pressure hose and submerge the suction strainer into the chemical solution.



B.) You need to use the low pressure nozzle to spray chemicals onto the cleaning surface.

C.) Squeeze the spray gun trigger. The chemical injector will draw the chemical into the water stream

D.) Apply chemicals evenly to the cleaning surface. Allow the chemicals to react with the dirt, then clean at high pressure with green nozzle.

E.) Never use more chemical than is necessary to clean the surface.

F.) If you do not intend on using chemicals, we suggest removing the chemical injector to obtain maximum cleaning pressure.

Max chemical ratio is 13:1

IX.) Start Engine

***Refer to the engine manual to start your engine.**

IMPORTANT: *The water must be turned on before starting. Running the pump dry will cause damage and void the warranty.*

IMPORTANT: *Make sure the fuel shutoff valve located under the fuel tank is in the ON position.*

WARNING: *Check that there are no leaks in the vicinity of the pump before starting engine.*

Once the engine is started, begin cleaning. If the engine doesn't start on the first try, pressure may build up in the pump. Relieve the pump pressure by squeezing the spray gun trigger. This will make starting easier.

WARNING: *Do not inhale the exhaust from the engine. Do not point the lance at anyone even if the engine has stopped because there could be a release of water under retained pressure if the spray gun trigger is actuated.*

X.) For Hot Water

1. If HOT water is desired, make sure there is fuel in the fuel tank, turn the heat switch ON, and adjust the thermostat to the desired temperature. The burner will fire when the trigger is squeezed. You may need to initially adjust your burner for peak performance. See the "Oil Burner" section under INSTALLATION. When the trigger is released or the temperature setting is reached, the burner will automatically turn off.

IMPORTANT: Do not run the machine in hot mode without any fuel in the fuel tank. *The fuel pump will be damaged if it is run dry.*

XI.) Cleaning

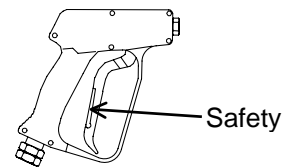
WARNING: *Wear eye, ear, hand, foot and skin protection at all times while operating this pressure washer.*

DANGER: *Do not point the spray wand at yourself or at any person. Bodily injury may result from water under high pressure.*

CAUTION: *Be careful on painted or delicate surfaces. The pressure may damage the surface if the nozzle is too close.*

IMPORTANT: *Your spray gun is equipped with a built-in trigger safety latch to guard against accidental trigger actuation and potentially dangerous high pressure spray. Rotate the safety latch to the locked position when not spraying.*

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- A.) Hold the lance with two hands, have a sturdy stance.
- B.) Point lance at dirty surface and squeeze trigger.
- C.) Wash from the bottom to the top, using side to side motions. This washes away heavy dirt and allows the detergent to soak as you work toward the top.
- D.) Use the width of the spray pattern to wash in a wide path. Overlap spray paths for complete coverage.
- E.) The nozzle should be 12" to 24" from the work, closer for tough areas.
- F.) Small parts should be washed in a basket so the pressure does not push them away. Larger, light weight parts should be clamped down.
- G.) The pressure washer is set and locked to the maximum rated pressure when it leaves the factory. There is an easy way to adjust your pressure.
 - a. Turn the unloader knob (red handle on pump) counterclockwise.

WARNING: *Do not alter the unloader valve's maximum pressure. Excess pressures could cause serious injury and/or pump damage. Any alteration other than turning the adjustment knob will void your warranty.*

XII.) Shut-Down Instructions

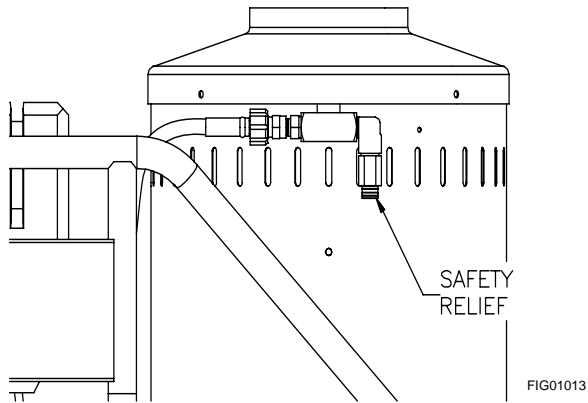
WARNING: *Do not leave an operating machine unattended. Always shut the machine OFF and relieve the pressure before leaving the machine. Never disconnect the high pressure hose from the pump or spray gun while the system is pressurized. Depressurize the system by squeezing the spray gun trigger after the engine is turned OFF.*

- A.) Turn heat switch OFF and run cold water through the coil for 3 minutes.
- B.) Turn engine OFF.
- C.) Turn water supply OFF.
- D.) Actuate spray gun trigger to relieve system pressure.
- E.) Remove garden hose.
- F.) Remove pressure hose.

Safety Features

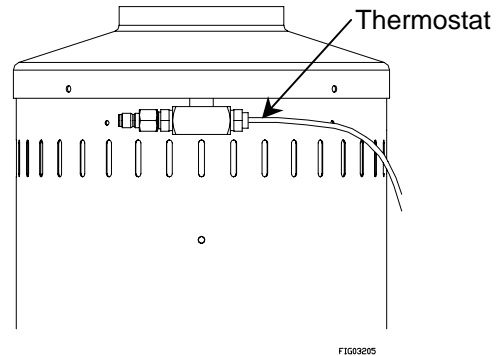
I.) Safety Relief

The safety relief valve is a backup safety feature. If the unloader malfunctions, the safety relief valve will open and relieve system pressure.



II.) Thermostat

The adjustable thermostat is another safety feature. If the discharge water reaches the desired temperature setting, the burner will cycle off until the water temperature is below the desired temperature setting and then it cycles the burner back on for firing.



WARNING: If the safety relief valve ever discharges water, turn the engine off and do not use the machine. See a dealer or call Customer Service at 1-800-270-0810.

Maintenance Instructions

WARNING: Unauthorized machine modification or use of non-approved replacement parts may cause personal injury and/or property damage and will void the manufacturer warranty.

All mechanical equipment, no matter how well designed, will need repairs. A North Star pressure washer is no exception. At times, a North Star pressure washer may be inoperable because repairs are required. North Star Customer Service will assist in these repairs as needed, but if an inoperable pressure washer creates a major expense to your business then we strongly recommend the following:

1. Have someone on staff who is trained in the operation of the pressure washer and is capable of making minor repairs and performing all preventative maintenance procedures as outlined in the provided manuals.
2. Keep a stock of recommended service parts for maintenance and minor repairs.

Recommended Service Parts List

Following is a list of the service parts we recommend stocking.

Description	Part Number
0° Nozzle	782122
15° Nozzle	782120
25° Nozzle	777844
40° Nozzle	778737
Chemical Nozzle	778949
Steam Nozzle	778945
O-Ring for Hose	30784
Pump Oil	4043
Chemical Injector	31935
Spray Gun	31915
Lance Extension	31930
50' Pressure Hose	38525
Pump Seal Kit	GPK28
Pump Valve Kit	GPK1
Electrode Kit	5780
Fuel Pump	2184402
Flow switch	784621
Igniter	51776
Burner Nozzle	21463
Fuel Filter Element	RCR12T

Maintenance Mode

Before performing any maintenance on the pressure washer, it must be placed in maintenance mode.

- A.) Turn off water supply.
- B.) Bleed water from system.
- C.) Turn off engine and disconnect the spark plug cable.
- D.) Disconnect battery.

Maintenance Schedule

What to Check	When To Check	What to Do
Inlet Filter	Each Use	Clean
Tires	Each Use	Check Pressure
Hoses	Each Use	Check for Wear
Bolts	Each Use	Check for Loose Bolts

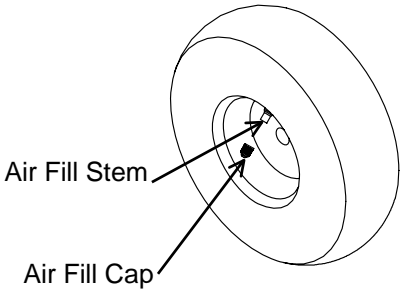
Cleaning The Inlet Filter

WARNING: Check whether dangerous chemicals have been used, and take precautions when handling filters.

- A.) Unscrew inlet filter.
- B.) Remove filter screen.
- C.) Run water through to clean filter.

Checking the Tire Air Pressure

- A.) Remove air fill cap.
- B.) Fill tire to 14psi (.965 bar).
- C.) Replace air fill cap.



Burner Fuel Filter

IMPORTANT: Make sure to close the valve on the fuel tank before removing the filter bowl.

Drain water which has accumulated in the fuel filter bowl and replace the filter as needed.

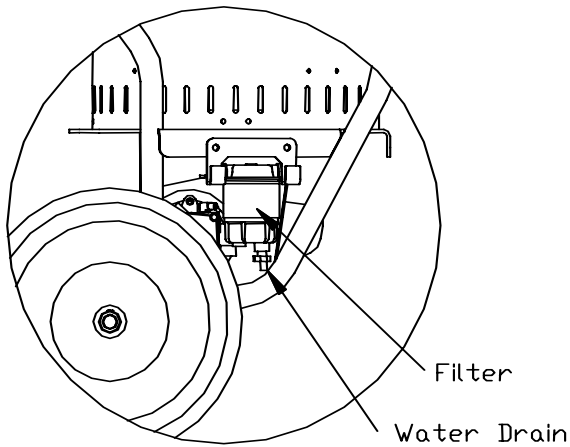
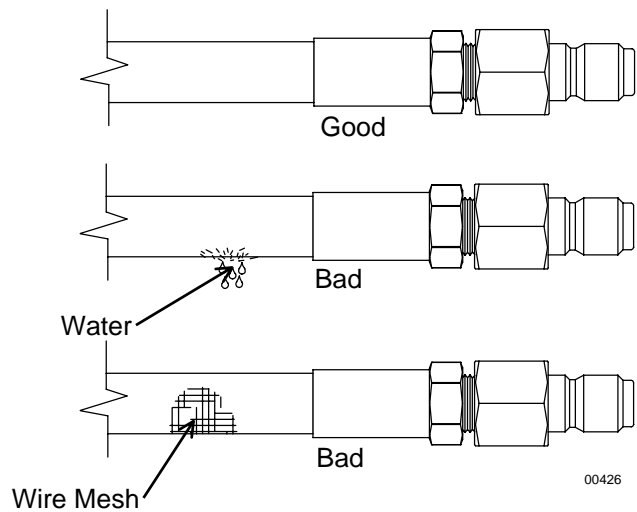


FIG02289

Checking the Hoses

WARNING: Do not use a finger or skin to check for leaks. Escaping fluid under pressure has sufficient force to penetrate the skin, causing serious injury. Do not operate the pressure washer if the hose is cracked, worn, or leaking.

- A.) Check all hoses for leaks.
- B.) Check all hoses for worn areas.



Changing The Pump Oil

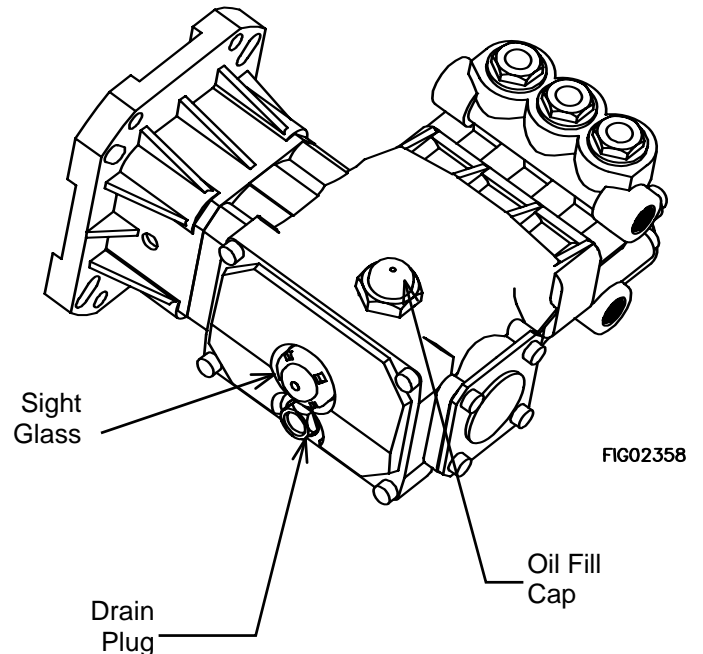
*Change oil after first 40 hours, then every 3 months or 500 hours

- 1.) Remove oil drain plug
- 2.) Drain pump oil
- 3.) Replace oil drain plug
- 4.) Fill pump with SAE 30 non-detergent pump oil.
- 5.) Fill to middle of sight glass window.

Quantities Of Fluid

Pump	Type of Fluid	QTY
Cat 66DX	SAE 30**	18 oz (0.55L)

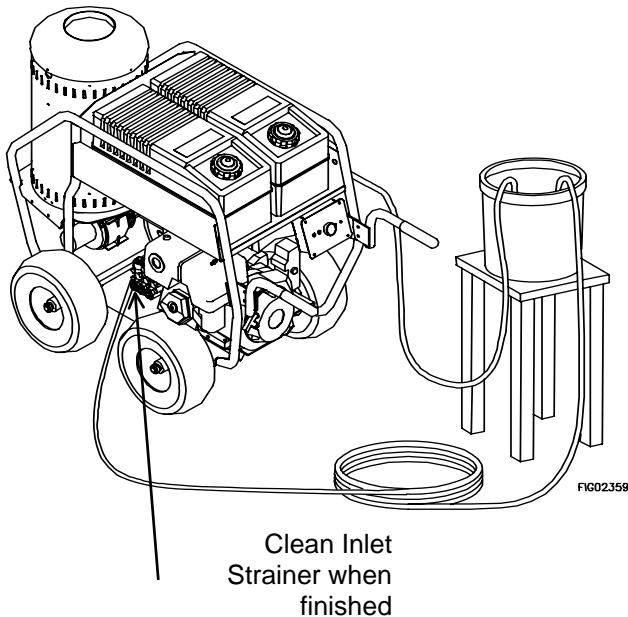
**Non-Detergent Oil (order pump oil Item #4043 or Cat Oil item # 22158)



Coil Descaling

In hard water areas, scale build-up within the heating coil will occur. Scale deposits will decrease the water temperature rise and may eventually clog the heating coil.

1. Mix coil cleaner in a 5 gallon bucket and elevate the bucket so it is higher than the unloader.
2. Attach the high pressure hose to the high pressure water outlet on the machine. Do not hook up the spray gun.
3. Place the other end of the high pressure hose in the 5 gallon bucket.
4. Attach a short length of hose to the garden hose inlet on the pump.
5. Prime the pump by filling the hose with water, then place the end of the hose in the bucket.



6. Run the pressure washer in cold mode for 1 to 3 hours re-circulating the cleaning solution.

Warning: Do not run the burner.

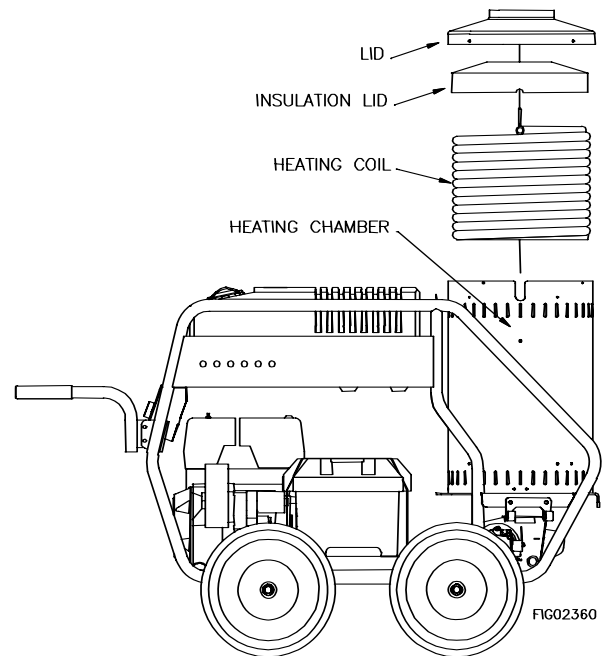
7. Dispose of the cleaning solution where it is not harmful to animals or the environment.
8. Flush with fresh water and clean the inlet strainer when finished.

Coil Desooting

Poor grades of fuel oil or inadequate combustion air will cause heavy soot build-up on the outside surface of the heating coil. These deposits will insulate the coil. This will restrict the air flow through the coil, further aggravating the soot build-up.

Most coils will never require desooting. However, to desoot a coil...

1. Wear protective clothing, goggles, and gloves.
2. Disconnect high pressure hose on inlet side of coil and thermostat on outlet side of coil.
3. Remove the lid and insulation lid from the heating chamber and hoist the coil out. Be careful, the coil weighs 125 lbs.

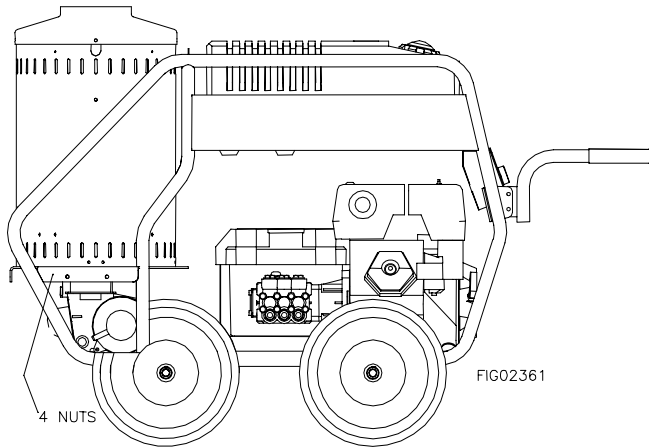


4. Clean the coil.
5. Reassemble the coil to the machine. Make sure the white insulation remains in place.
6. Reattach high pressure hose and thermostat, and make sure all fittings are tight before using the machine.

Electrodes

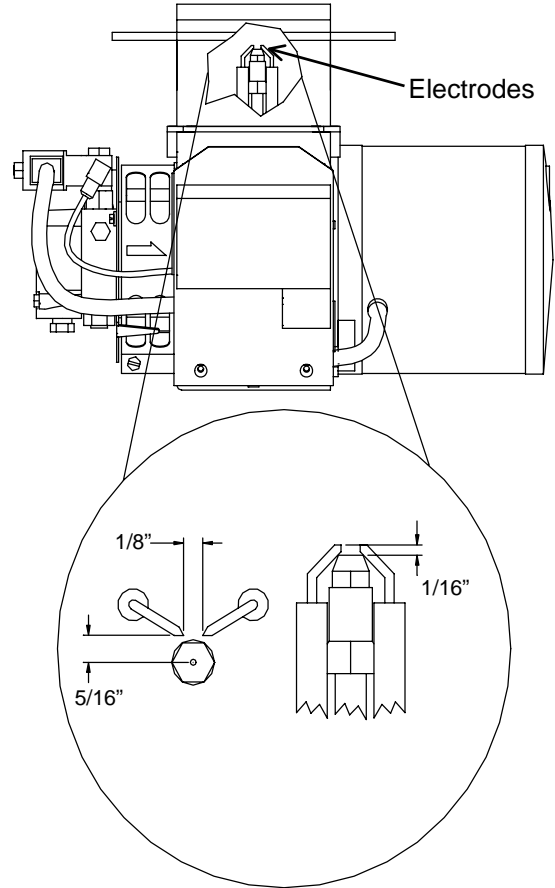
On a yearly basis the electrodes should be inspected and any necessary adjustments made.

1. Remove the 4 nuts that attach the burner to the heating chamber. You do not have to disconnect the fuel lines or the electric cords.



2. Pull the burner out from underneath the heat exchanger. Tip the burner away from the machine so the electrodes are visible.
3. Clean off carbon deposits, which may have accumulated on the tips of the electrodes.

4. Reset the spacing as shown below.



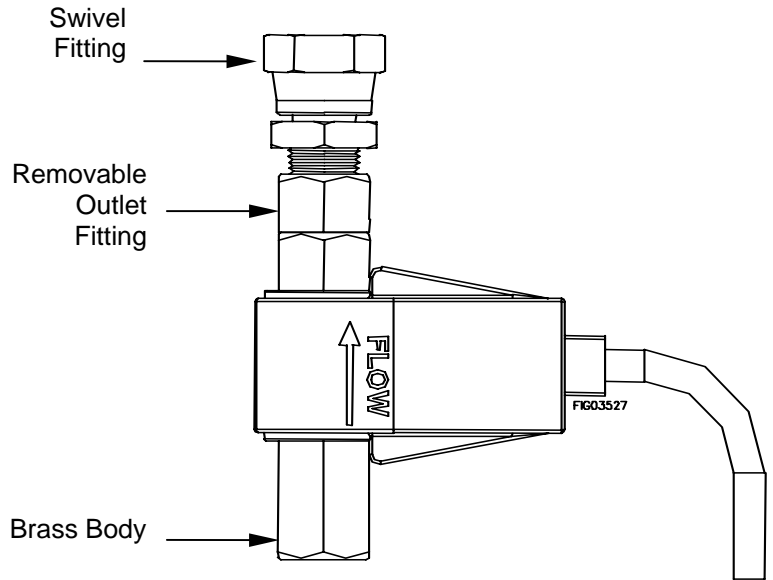
5. Reinstall burner using the four nuts and tighten accordingly.

Flow Switch

Mineral build-up and/or debris within the flow switch can occur and may affect burner operation if not periodically cleaned. Mineral build-up and/or debris can stop the movement of the shuttle inside the flow switch body. Shuttle movement is important because the burner will not fire if the shuttle does not move. The shuttle movement actuates a switch inside the flow switch housing which allows the burner to fire during spray mode.

Inspect and clean the flow switch as needed

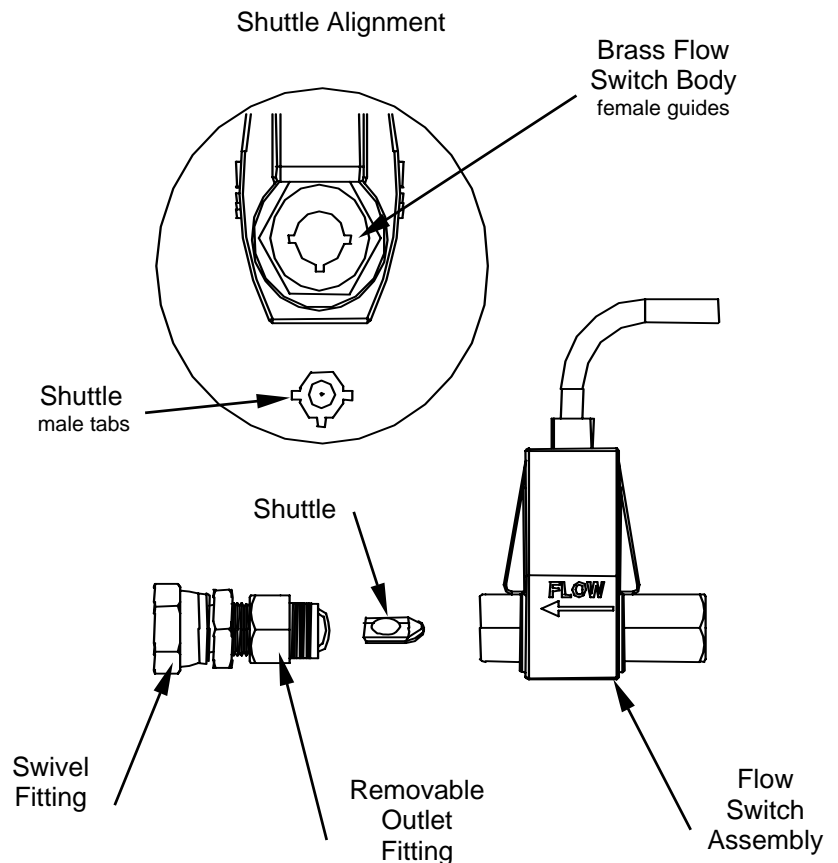
- 1) Disconnect the swivel fitting from elbow to the inlet of the coil
- 2) Disconnect the whole flow switch assembly including the swivel and removable outlet fitting where the brass body connects to hose or tee depending on model



- 3) Unthread the removable outlet fitting with the swivel still attached from the flow switch assembly
- 4) Remove the shuttle
- 5) Clean the inside of the brass flow switch body and the shuttle with water and a soft brush
- 6) Insert the shuttle into the brass flow switch in the orientation shown

Note: Aligning the male tabs on the shuttle to the female guides inside the brass flow switch body can be difficult since the shuttle is magnetic.

- 7) Thread the removable outlet fitting with the swivel still attached into the flow switch assembly
- 8) Thread the brass flow switch body onto the incoming water flow source (hose or tee) depending on the model
- 9) Reconnect the swivel fitting to the inlet of the coil



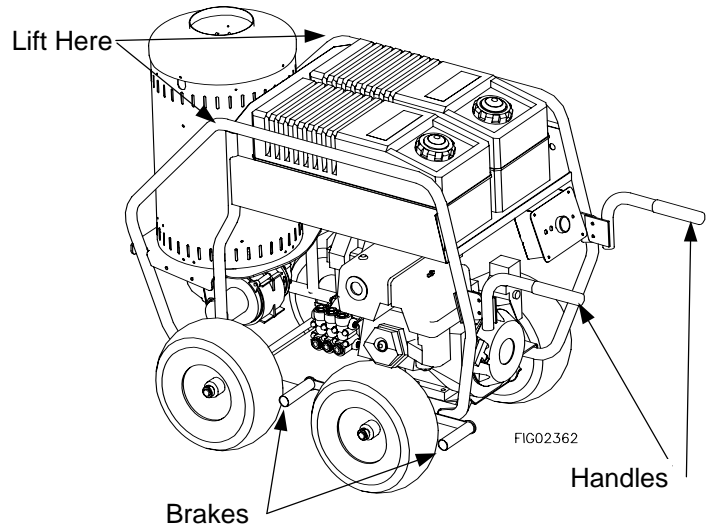
Moving and Handling Instructions

Maneuvering Your Pressure Washer

- 1.) Use the handles to move the pressure washer.
- 2.) To turn, lift slightly on the handles and pivot the pressure washer on its front wheels.
- 3.) To engage brakes, pull brake arms out, rotate them down and use them as chocks.

Lifting Your Pressure Washer

- 1.) To reduce risk of injury, it is recommended to use a hoist to lift this pressure washer.
- 2.) Lift from lifting points.



Long Term Storage

During cold weather, store the pressure washer indoors and move it outdoors before starting the engine. Follow these instructions to prevent the pump from freezing during storage.

Storage:

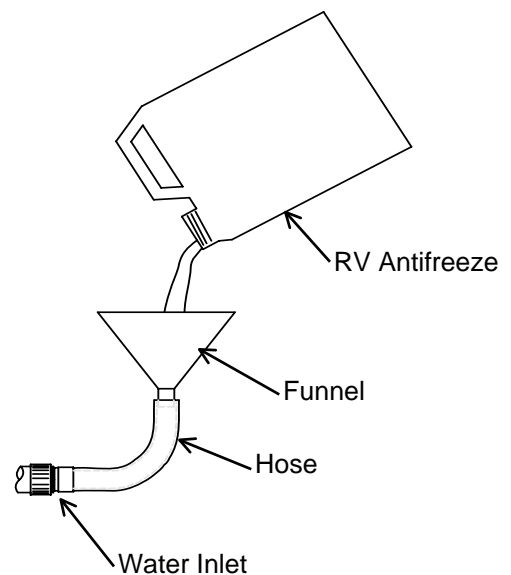
Before you store the pressure washer, make sure you do the following:

- 1.) If adding stabilizer, run pressure washer with high pressure hose for five minutes.
- 2.) Disconnect the battery and store it indoors.
- 3.) Disconnect high pressure and garden hose.

Winter Storage:

Items needed: 12" piece of garden hose or equivalent, funnel and RV antifreeze (approximately 6 oz.)

- 1.) Follow the storage instructions listed above.
- 2.) Disconnect spark plug cable. Make sure the engine start switch is OFF, and the fuel valve is OFF.
- 3.) Attach the garden hose with funnel to the pump inlet (see illustration).
- 4.) Pour RV antifreeze into the funnel, then turn the engine over until antifreeze comes out the pump outlet.
- 5.) Drain all water from the high pressure hose. Depress trigger on gun and drain all water out of gun/lance.



Troubleshooting Guide

Engine Will Not Start

Causes	Solutions
Low Oil Shutdown	Fill engine with the adequate amount of oil.
Cold Engine	Choke engine to start.
No Fuel	Add gas to engine, make sure fuel shutoff valve is open.
Dead Battery	Recharge/Replace battery.
Spark plug wire not attached	Attach spark plug wire to spark plug.

Pressure Washer Runs But Burner Doesn't Fire

Causes	Solutions
Heat switch turned OFF	Turn heat switch ON.
Thermostat set too low or off	Set thermostat to desired temp.
Fuel tank empty	Fill fuel tank with kerosene, diesel, or fuel oil.
Defective Burner	Call Customer Service.

Pressure Washer Runs But No Pressure

Causes	Solutions
Partially clogged or damaged nozzle	Clean or replace nozzle.
Low water flow	Make sure the water supply is more than 4 gpm.

Pressure Washer Surges Or Cycles While In Bypass

Causes	Solutions
Leak between unloader and gun.	Check all connections between unloader and gun for leaks. Tighten loose components and replace damaged components.
Gun leaking internally	Replace spray gun.

Smoke From Heat Exchanger

Causes	Solutions
Air band not adjusted properly	Adjust the air band until the burner burns cleanly. See <i>Installation Instructions</i>
Poor quality fuel	Use kerosene for the cleanest burn.

Water Not Heating Sufficiently

Causes	Solutions
Scale build-up in coil	See <i>Coil Descaling</i> under <i>Maintenance Instructions</i> .
Coil is full of soot	See <i>Coil Desooting</i> under <i>Maintenance Instructions</i> .

Poor Or No Detergent Supply

Causes	Solutions
Soap control knob set too low.	Adjust soap control knob.
Inadequate detergent supply	Refill detergent container. Make sure chemical strainer is fully submerged.
High pressure hose too long	Use less hose. Move machine closer to the work.
Chemical strainer or injector clogged	Clean the strainer and injector. Always start with a clean detergent container. Run clean water through the injector after each use.

Any Questions, Comments, Problems, or Parts Orders
Call NorthStar Product Support 1-800-270-0810

Parts Explosion 157310 – Rev K.1

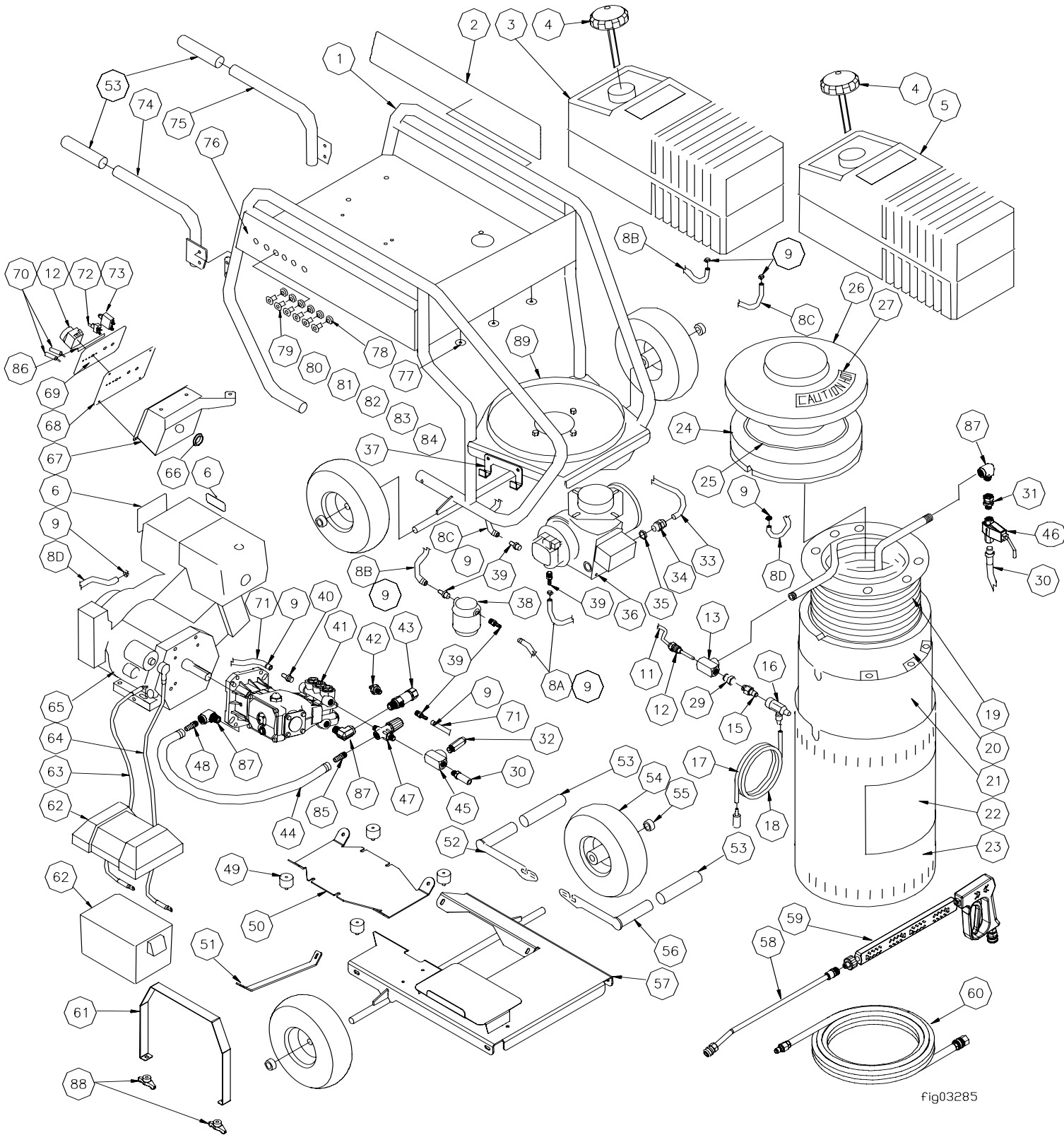


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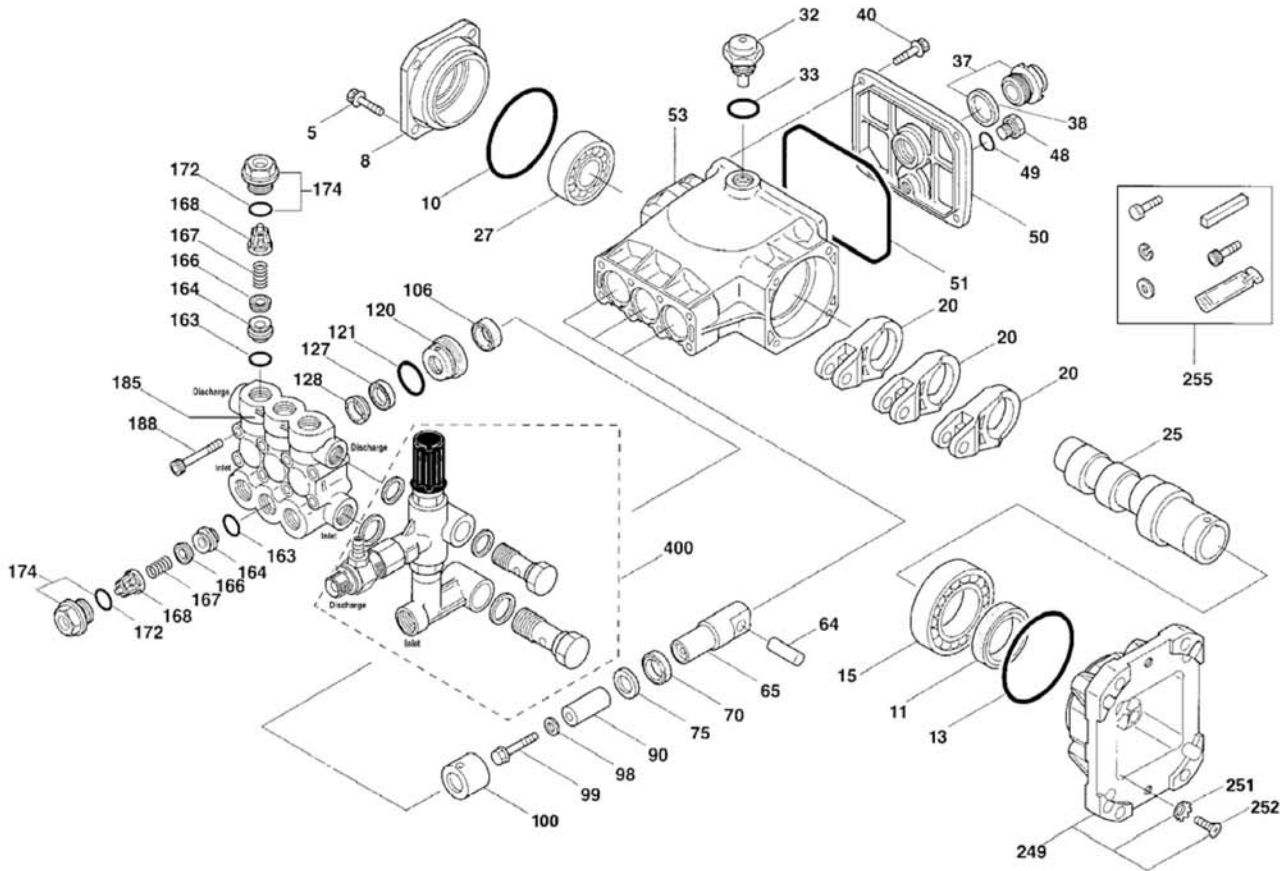
Parts Explosion 157310 – Rev K.1

ITEM	PART#	DESCRIPTION	QTY
1	778210	Outer Frame Weldment	1
2	778274	Instruction Decal	1
3	3083041	Fuel Tank	1
4	777149	Fuel/Gas Cap	2
5	3083030	Gas Tank	1
6	35743	Warning Label (Kit)	1
8A	777345	1/4" Fuel Line Hose	25"
8B	777345	1/4" Fuel Line Hose	26"
8C	777345	1/4" Fuel Line Hose	32"
8D	777345	1/4" Fuel Line Hose	30"
9	777834	1/4" Hose Clamp	11
11	30501	1/4" Split Loom	48"
12	781999	Thermostat	1
13	305208	1/2" Tee, Plated Steel	1
15	777913	Quick Couple Nipple, 3/8" male nipple	1
16	779614	Chemical Injector, Quick Connect	1
17	777165	1/4" Braided Chemical Hose	48"
18	221222	Chemical Strainer	1
19	779228	Heating Coil	1
20	33387	Ceramic Insulation Can	1
21	779232	Inner Wrap	1
22	777725	NorthStar Label	1
23	36180	Stainless Steel Wrap	1
24	38398	Ceramic Insulation Lid	1
25	36302	Fiberglass Rope	36"
26	35331	Lid, Heat Exchanger	1
27	305410	Label, Caution Hot	1
29	30048	Reducer 8MP-6FP	1
30	37549	3/8 36" 3000PSI RXS Assembly	1
31	38379	Swivel fitting 6MP-8FPS	1
32	22393	Pop-Off Valve	1
33	778262	Wire Harness	1
34	22502	Strain Relief	1
35	305267	Strain Relief Nut, 1/2" NPT	1
36	777669	ADC Burner, 12V	1
37	778297	Filter Mount Bolted	1
38	32308	Fuel Filter/Water Separator	1
39	777340	1/4" Hose Barb X 1/4" MPT	5
40	38584	3/8" NPT Easy Start Valve	1
41	38198	66DX40GG1 Cat Pump	1
42	35918	Thermal Protector	1
43	35169	Inlet Filter	1
44	2264	1/2" Hose	15"
	777119	Hose Clamp, 1/2"	2

ITEM	PART#	DESCRIPTION	QTY
45	777411	3/8" Tee Forged	1
46	784621	Flow Switch, 8.0 GPM 8000 PSI	1
47	777800	Unloader	1
48	2294	1/2" NPT x 1/2" Hose Barb	1
49	30825	1.0" Iso Mount CR50	4
50	778219	ISO-Mount Plate	1
51	778228	ISO Support Bar	1
52	777232	Rear Brake	1
53	30747	Handle/Brake Grip	4
54	778295	Turf Tire	4
55	305200	Wheel Retainer	4
56	777231	Front Brake	1
57	778217	Base Weldment	1
58	779166	18.5" Lance Extension	1
59	779165	Gun With Lance	1
60	38525	50' Quick Couple Hose	1
61	778205	Battery Strap	1
62	777647	Battery Box	1
63	777667	Battery Cable, Black W/ Post Terminal	1
64	777668	Battery Cable, Red W/ Post Terminal	1
65	778239	13 HP Honda H-AP GX390	1
66	31985	Grommet	1
67	778209	Control Box Weldment	1
68	778207	Control Box Front	1
69	777660	Decal, Control Panel	1
70	777646	Red LED, 12 VDC	2
71	777165	1/4" Braided Chemical Hose (Bypass)	24"
72	777855	Toggle Switch	1
73	31085	Circuit Breaker	1
74	34945	Right Hand Weldment	1
75	34946	Left Hand Weldment	1
76	778269	Nozzle Decal	1
77	30754	Leather Washer	12
78	35198	Grommet	6
79	778945	Nozzle, 15° QC, #3.5 (Steam) – Yellow	1
80	778949	Nozzle, Soap QC, #4.5 – Black	1
81	782122	Nozzle, 0° QC, #4.5 – Red	1
82	782120	Nozzle, 15° QC, #4.5 – Yellow	1
83	777844	Nozzle, 25° QC, #4.5 – Green	1
84	778737	Nozzle, 40° QC, #4.5 – White	1
85	777839	1/2" HB x 3/8 MPT	1
86	778464	Control Box Decal	1
87	5027	8 MP – 8 FP 90 Elbow	3
88	38578	T-handle Knob	2
89	778111	Heat Exchanger Mount	1

EXPLODED VIEW
April 2005

66DX PLUNGER PUMP
With Unloader/Injector



PARTS LIST

ITEM	P/N	MATL	DESCRIPTION	QTY	ITEM	P/N	MATL	DESCRIPTION	QTY
5	92519	STZP	Screw, Sems HHC (M6x16)	4	100	48755	NY	Retainer, Seal	3
8	48259	AL	Cover, Bearing	1	106	45188	NBR	Seal, LPS w/S-Spg	3
10	14028	NBR	O-Ring, Bearing Cover - 70D	1	120	48759	BB	Case, Seal	3
11	46419	NBR	Seal, Oil, Crankshaft - 70D	1	121	13980	NBR	O-Ring, Seal Case - 70D	3
13	14037	NBR	O-Ring, Bearing Cover - 70D	1	127	48758	SNG	V-Packing	3
15	146421	STL	Bearing, Ball - Inner	1	128	48757	NY	Adapter, Male	3
20	48843	TNM	Rod, Connecting	3	163	17547	NBR	O-Ring, Seat - 85D	6
25	48970	CM	Crankshaft (8.6 mm) 30G11	1	164	45790	S	Seat	6
	48977	CM	Crankshaft (10.0 mm) 35G11	1	166	46429	S	Valve	6
	48839	CM	Crankshaft (11.4 mm) 40G11	1	167	43750	S	Spring	6
27	14480	STL	Bearing, Ball - Outer	1	168	46583	NY	Retainer, Spring	6
32	46798	—	Cap, Domed, Oil Filler	1	172	17616	NBR	O-Ring, Valve Plug - 80D	6
33	14179	NBR	O-Ring, Filler Cap - 70D	1	174	48760	BB	Plug, Valve w/O-Ring	6
37	92241	—	Gauge, Oil Bubble w/Gasket	1	185	48846	BB	Head, Manifold	1
38	44428	NBR	Gasket, Flat, Oil Gauge - 80D	1	188	87870	STZP	Screw, HSH (M8x65)	8
40	92519	STZP	Screw, Sems HHC (M6x16)	4	249	48841	AL	Flange Mount	1
48	25625	STCP	Plug, Drain (1/4"x19BSP)	1	251	46123	STZP	Lockwasher, Conical (M8)	4
49	23170	NBR	O-Ring, Drain Plug - 70D	1	252	46403	STZP	Screw, FH (M8x25)	4
50	48862	AL	Cover, Rear	1	255	30510	STZP	Assy, Bolt Mount	1
51	14048	NBR	O-Ring, Rear Cover - 70D	1		34100	STZP	Screw (3/8-16x1-3/8")	4
53	48830	AL	Crankcase	1		30921	STZP	Lockwasher (3/8")	4
64	46404	CM	Pin, Crosshead	3		30980	STZP	Washer, Flat (3/8")	4
65	48845	BB	Rod, Plunger	3		6106	—	Antiseize Lubricant	1
70	48911	NBR	Seal, Oil, Crankcase	3		45217	STL	Key (1/4"x1/4"x2-1/2") HD	1
75	48754	NBR	Slinger, Barrier - 70D	3		87788	STZP	Screw, Set (M5x8)	1
90	48752	CC	Plunger (M14x47)	3	300	34262	NBR	Kit, Seal (Incls: 98,106,121,127,128)	1
98	46730	NBR	Washer Seal, Plunger Retainer - 90D	3	310	34260	NBR	Kit, Valve (Incls: 163,164,166,167,168,172)	2
99	48201	SSL	Retainer, Plunger	3	400	7800	BB	Unloader Assembly w/Fixed Injector	1

Italics are optional items. See Tech Bulletins 024, 060, 074 and 083 for additional information.

MATERIAL CODES (Not Part of Part Number): AL=Aluminum BB=Brass CC=Ceramic CM=Chrome-moly NBR=Medium Nitrile (Buna-N) NY=Nylon S=304SS SNG=Special Blend (Buna) SSL=316SS/Low Carbon STCP=Steel/Chrome Plated STL=Steel STZP=Steel/Zinc Plated TNM=Special High Strength

Electrical Wiring Diagram – Rev K.1

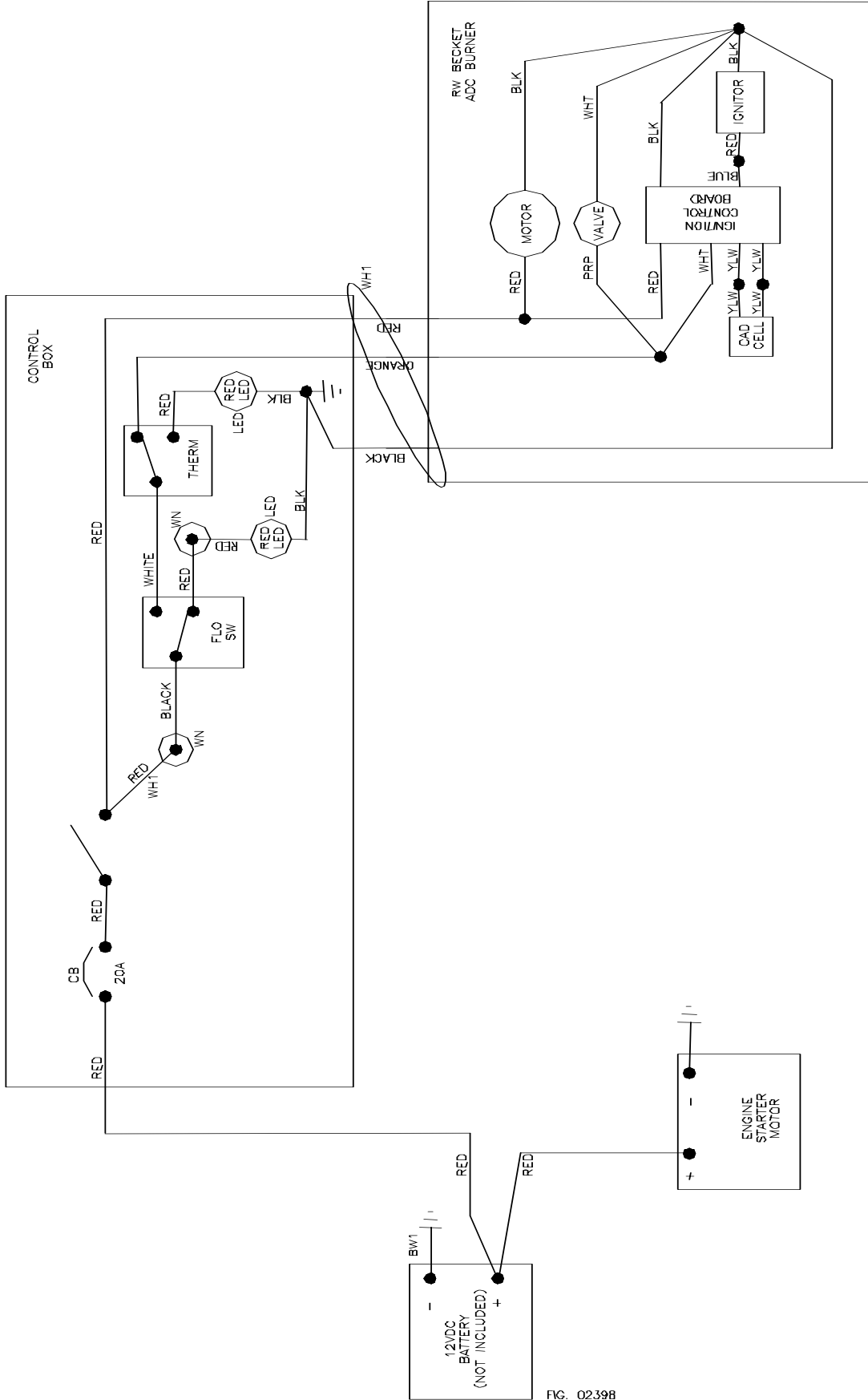
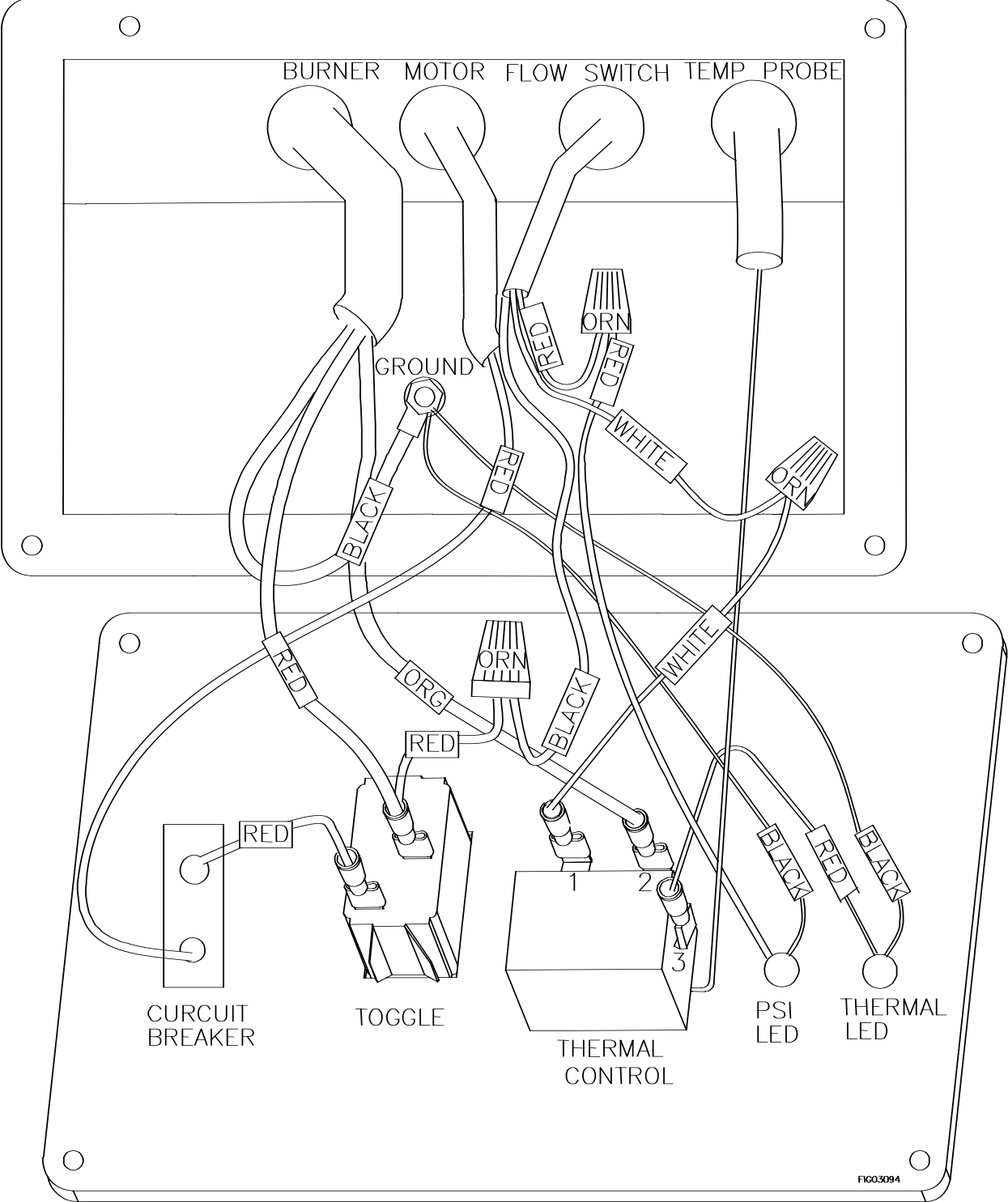
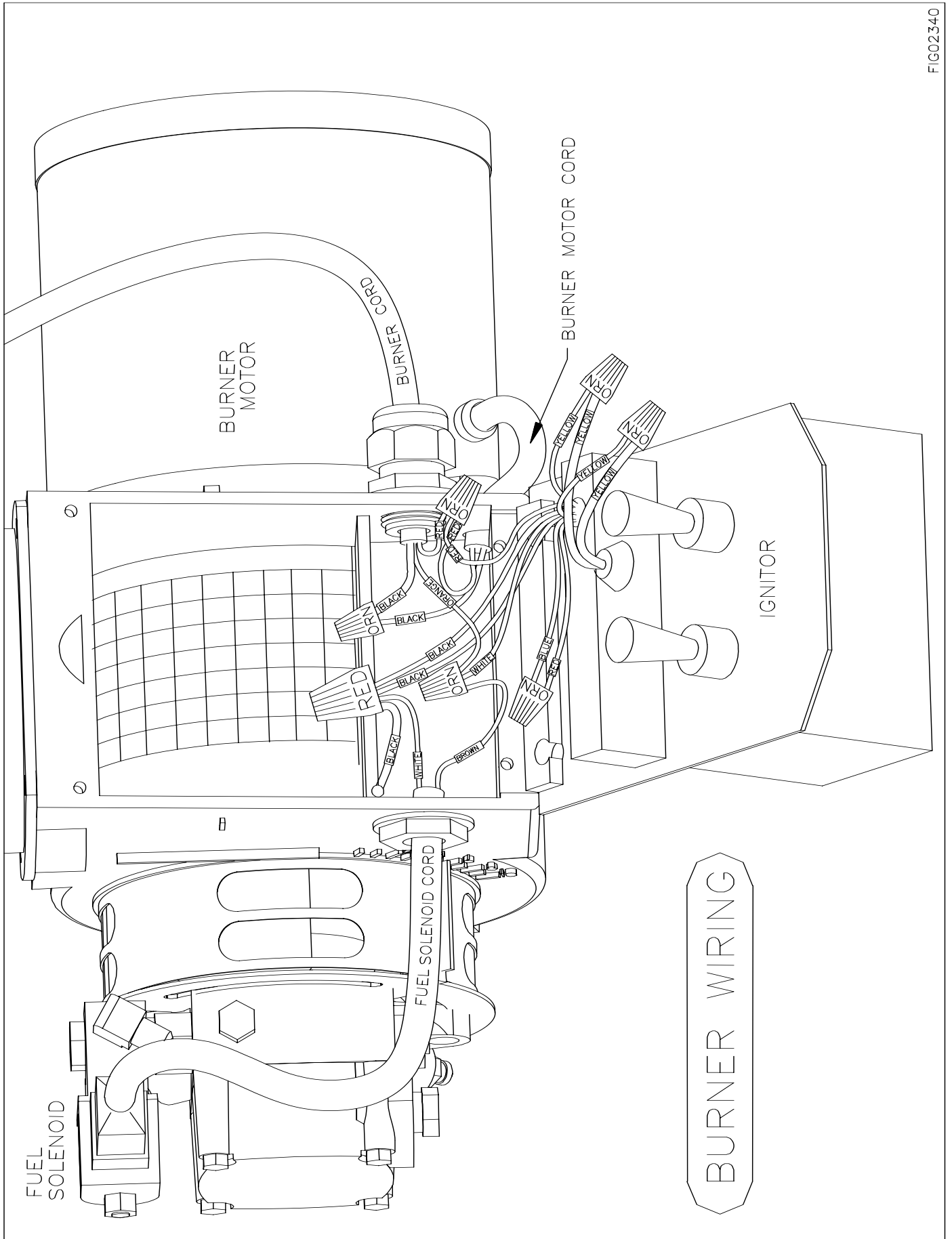


FIG. 0239B

WIRING LAYOUT

CONTROL PANEL





Limited Warranty

Dear Valued Customer:

The NorthStar Product you just purchased is built with the finest material and craftsmanship. Use this product properly and enjoy the benefits from its high performance. By purchasing a NorthStar product, you show a desire for quality and durability.

Like all mechanical equipment this unit requires a due amount of care. Treat this unit like the high quality piece of machinery it is. Neglect and improper handling may impair its performance. Please thoroughly read the instructions and understand the operation before using your product.

Limited Warranty

NorthStar shall warranty any piece of equipment manufactured, or parts of equipment manufactured, to be free from defects in material or workmanship for a period of 2 years from the date of purchase by user. This warranty applies to the original purchaser of the equipment and is non transferable. Verification of purchase is the responsibility of the buyer. Parts will be replaced or repaired at no charge, except when the equipment has failed due to lack of proper maintenance. Any misuse, abuse, alteration or improper installation or operations will void warranty. Determining whether a part is to be replaced or repaired is the sole decision of NorthStar.

NOTE: Some services performed by parties other than NorthStar may void warranty.

This warranty covers parts only. It will not provide for replacement of complete products due to defective parts. Components not manufactured by NorthStar such as engines are guaranteed by their manufacturer and can be serviced at factory-authorized locations near you. Any costs incurred due to replacement or repair of items outside of a NorthStar approved facility is the responsibility of the buyer and not covered under warranty. NorthStar can supply you with the service center location in your area.

This warranty specifically excludes the following; failure of parts due to damage caused by accident, fire, flood, windstorm, acts of God, applications not approved by NorthStar in writing, corrosion caused by chemicals, use of replacement parts which do not conform to manufacturer's specifications, and damage caused by vandalism. Additional exclusions: loss of running time, inconvenience, loss of income, or loss of use, including any implied warranty of merchantability of fitness for a specific use.

Warranty does not cover items subject to normal wear such as tires, receptacles or any part subject to direct physical contact by the public. This warranty does not cover any personal injury or damage to surrounding property caused by failure of any part.

This warranty is in lieu of any other warranty expressed or implied and NorthStar assumes no other responsibility or liability outside that expressed within this warranty.

Please fill in the following information and have it on hand when you call in a warranty claim.

Customer Number: _____

Date of Purchase: _____

NorthStar Serial Number: _____

Item Number: _____



Manufactured by
Northern Tool + Equipment Co.,
2800 SouthCross Drive West
P.O. Box 1499 Burnsville, MN 55337-0499