TITAN™

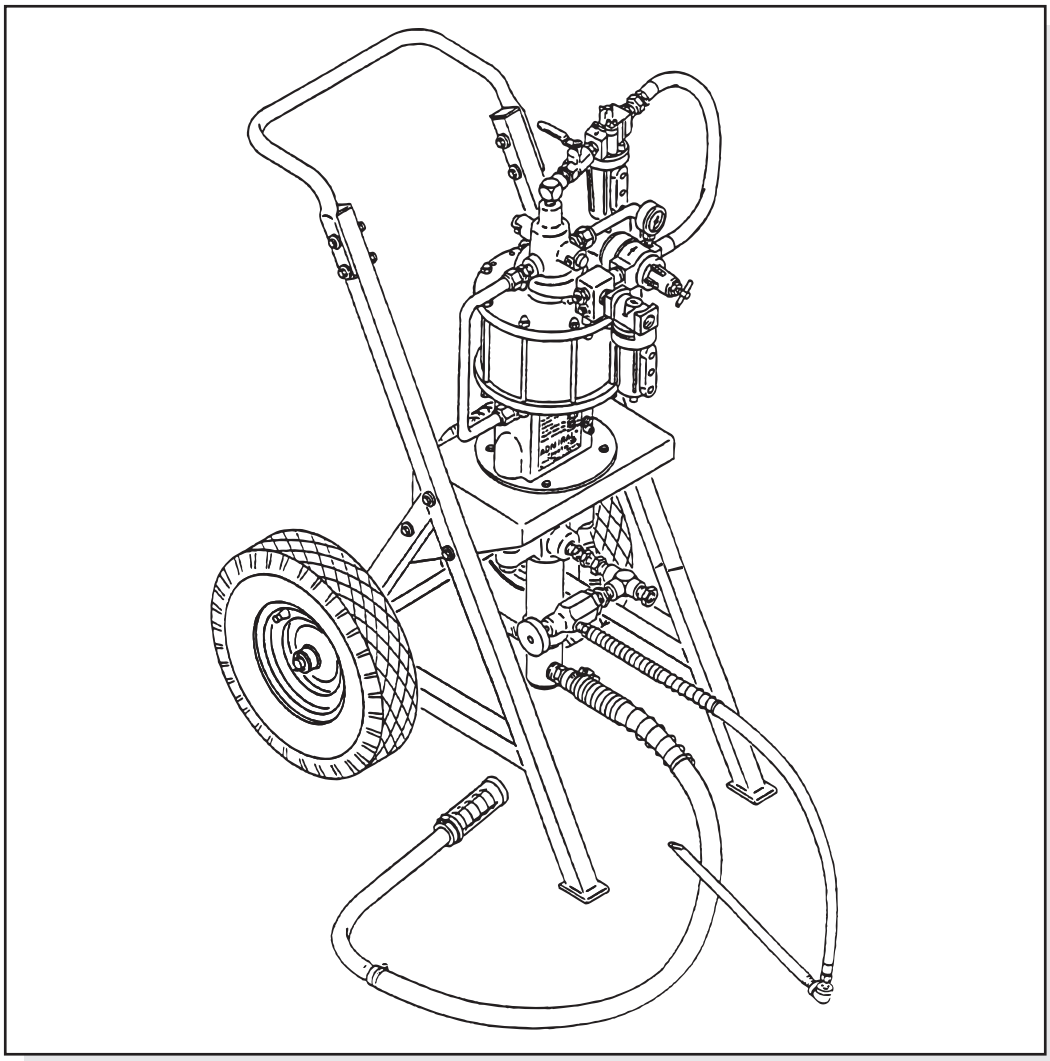
Advanced Performance. Total Reliability.

Owner's Manual
For professional use only

Do not use this equipment before reading this manual!

SPEEFLO Admiral

Air Powered Airless Sprayer



Model Numbers:

830-331	**860-451**
830-451	**941-441**

NOTE: This manual contains important warnings and instructions. Please read and retain for reference.

Printed in the U.S.A.

Important Safety Information • Read all safety information before operating the equipment. SAVE THESE INSTRUCTIONS.

This symbol indicates a hazardous situation, which, if not not avoided could result in death or serious injury.

To reduce the risks of fire or explosion, electrical shock and the injury to persons, read and understand all instructions included in this manual. Be familiar with the controls and proper usage of the equipment.

HAZARD: INJECTION INJURY

A high pressure paint stream produced by this equipment can pierce the skin and underlying tissues, leading to serious injury and possible amputation. See a physician immediately.

DO NOT TREAT AN INJECTION INJURY AS A SIMPLE CUT! Injection can lead to amputation. See a physician immediately.

PREVENTION:

- NEVER aim the gun at any part of the body.
- Do not aim the gun at, or spray any person or animal.
- NEVER allow any part of the body to touch the fluid stream. DO NOT allow body to touch a leak in the fluid hose.
- NEVER put your hand in front of the gun. Gloves will not provide protection against an injection injury.
- ALWAYS lock the gun trigger, shut the pump off, and release all pressure before servicing, cleaning the tip or guard, changing tip, or leaving unattended. Pressure will not be released by turning off the motor. The PRIME/SPRAY valve or pressure bleed valve must be turned to their appropriate positions to relieve system pressure. Refer to the PRESSURE RELIEF PROCEDURE described in this manual.
- ALWAYS keep the tip guard in place while spraying. The tip guard provides some protection but is mainly a warning device.
- ALWAYS remove the spray tip before flushing or cleaning the system.
- Paint hose can develop leaks from wear, kinking and abuse. A leak can inject material into the skin. Inspect the hose before each use. Do not use hose to lift or pull equipment.
- NEVER use a spray gun without a working trigger lock and trigger guard in place.
- All accessories must be rated at or above the maximum spraying pressure of the unit. This includes spray tips, guns, extensions, and hose.
- Do not leave the unit energized or under pressure while unattended. When the unit is not in use, turn off the unit and relieve the pressure in accordance with the PRESSURE RELIEF PROCEDURE described in this manual.
- Verify that all connections are secure before operating the unit. Unsecured parts may eject at great force or leak a high pressure fluid stream causing severe injury.
- Always engage the trigger lock when not spraying. Verify the trigger lock is functioning properly.

NOTE TO PHYSICIAN:

Injection into the skin is a traumatic injury. It is important to treat the injury as soon as possible. DO NOT delay treatment to research toxicity. Toxicity is a concern with some coatings injected directly into the blood stream. Consultation with a plastic surgeon or reconstructive hand surgeon may be advisable.

HAZARD: HAZARDOUS VAPORS

Paints, solvents, insecticides, and other materials can be harmful if inhaled or come in contact with the body. Vapors can cause severe nausea, fainting, or poisoning.

PREVENTION:

- Use a respirator or mask if vapors can be inhaled. Read all instructions supplied with the mask to be sure it will provide the necessary protection.
- Wear protective eyewear.
- Wear protective clothing as required by coating manufacturer.

HAZARD: EXPLOSION OR FIRE

Solvent and paint fumes can explode or ignite. Property damage and/or severe injury can occur.

PREVENTION:

- Provide extensive exhaust and fresh air introduction to keep the air within the spray area free from accumulation of flammable vapors. Solvent and paint fumes can explode or ignite.
- Do not spray in a confined area.
- Avoid all ignition sources such as static electric sparks, open flames, pilot lights, electrical appliances, and hot objects. Connecting or disconnecting power cords or working light switches can make sparks. Paint or solvent flowing through the equipment is able to result in static electricity.
- Do not smoke in spray area.
- Fire extinguisher must be present and in good working order.
- Place pump at least 25 feet (7.62 meters) from the spray object in a well ventilated area (add more hose if necessary). Flammable vapors are often heavier than air. Floor area must be extremely well ventilated. The pump contains arcing parts that emit sparks and can ignite vapors.
- The equipment and objects in and around the spray area must be properly grounded to prevent static sparks.
- Keep area clean and free of paint or solvent containers, rags and other flammable materials.
- Use only conductive or grounded high pressure fluid hose. Gun must be grounded through hose connections.
- For electric units — power cord must be connected to a grounded circuit.
- Always flush unit into a separate metal container, at low pump pressure, with spray tip removed. Hold gun firmly against side of container to ground container and prevent static sparks.
- Follow the material and solvent manufacturer's warnings and instructions. Know the contents of the paints and solvents being sprayed. Read all Material Safety Data Sheets (MSDS) and container labels provided with the paints and solvents. Follow the paint and solvent manufacturer's safety instructions.
- Use extreme caution when using materials with a flashpoint below 100ºF (38ºC). Flashpoint is the temperature that a fluid can produce enough vapors to ignite.
- Plastic can cause static sparks. Never hang plastic to enclose a spray area. Do not use plastic drop cloths when spraying flammable materials.
- Use lowest possible pressure to flush equipment.
- Do not spray onto pump assembly.

Important Safety Information • Read all safety information before operating the equipment. SAVE THESE INSTRUCTIONS.

HAZARD: EXPLOSION HAZARD DUE TO INCOMPATIBLE MATERIALS

Will cause property damage or severe injury.

PREVENTION:

- Do not use materials containing bleach or chlorine.
- Do not use halogenated hydrocarbon solvents such as bleach, mildewcide, methylene chloride and 1,1,1 - trichloroethane. They are not compatible with aluminum.
- Contact your coating supplier about the compatibility of material with aluminum.

HAZARD: GENERAL

Can cause severe injury or property damage.

PREVENTION:

- Read all instructions and safety precautions before operating equipment.
- Follow all appropriate local, state, and national codes governing ventilation, fire prevention, and operation.
- The United States Government Safety Standards have been adopted under the Occupational Safety and Health Act (OSHA). These standards, particularly part 1910 of the General Standards and part 1926 of the Construction Standards should be consulted.
- Use only manufacturer authorized parts. User assumes all risks and liabilities when using parts that do not meet the minimum specifications and safety requirements of the pump manufacturer.
- All hoses, fittings, and filter parts must be secured before operating spray pump. Unsecured parts can eject at great force or leak a high pressure fluid stream causing severe injury.
- Before each use, check all hoses for cuts, leaks, abrasion or bulging of cover. Check for damage or movement of couplings. Immediately replace the hose if any of these conditions exist. Never repair a paint hose. Replace it with another grounded high-pressure hose.
- Do not kink or over-bend the hose. Airless hose can develop leaks from wear, kinking and abuse. A leak can inject material into the skin.
- Do not expose the hose to temperatures or pressures in excess of those specified by manufacturer.
- Do not spray outdoors on windy days.
- Wear clothing to keep paint off skin and hair.
- Do not operate or spray near children. Keep children away from the equipment at all times.
- Do not overreach or stand on an unstable support. Keep effective footing and balance at all times.
- Use lowest possible pressure to flush equipment.
- Stay alert and watch what you are doing.
- Do not operate the unit when fatigued or under the influence of drugs or alcohol.
- For electric units — Always unplug cord from outlet before working on equipment.
- Do not use the hose as a strength member to pull or lift the equipment.
- Do not lift by cart handle when loading or unloading.

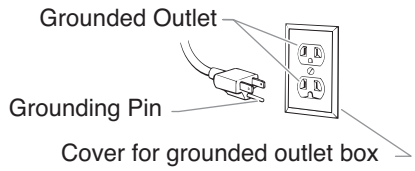
Grounding Instructions

This product must be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. This product is equipped with a cord having a grounding wire with an appropriate grounding plug. The plug must be plugged into an outlet that is properly installed and grounded in accordance with all local codes and ordinances.

WARNING - Improper installation of the grounding plug can result in a risk of electric shock.

If repair or replacement of the cord or plug is necessary, do not connect the green grounding wire to either flat blade terminal. The wire with insulation having a green outer surface with or without yellow stripes is the grounding wire and must be connected to the grounding pin.

Check with a qualified electrician or serviceman if the grounding instructions are not completely understood, or if you are in doubt as to whether the product is properly grounded. Do not modify the plug provided. If the plug will not fit the outlet, have the proper outlet installed by a qualified electrician.



IMPORTANT: Use only a 3-wire extension cord that has a 3-blade grounding plug and a 3-slot receptacle that will accept the plug on the product. Make sure your extension cord is in good condition. When using an extension cord, be sure to use one heavy enough to carry the current your product will draw. An undersized cord will cause a drop in line voltage resulting in loss of power and overheating. A 12 gauge cord is recommended. If an extension cord is to be used outdoors, it must be marked with the suffix W-A after the cord type designation. For example, a designation of SJTW-A would indicate that the cord would be appropriate for outdoor use.

Table of Contents

Specifications

30:1

Gallons per minute (GPM)	6.0
Liters per minute (LPM)	22.7
Cycle rate per gallon	13
Cycle rate per liter	3.4
Maximum tip size @2000 psi	0.72”
Pressure ratio	30:1
Maximum pressure	3000 psi (20.7 MPa, 207 bar)
Fluid inlet	1 1/4” NPT(F)
Fluid outlet	3/4” NPT(F)
Hose connection	3/8” NPSM (M)
Approximate air requirement per gallon of output @ 100 psi air pressure	29 SCFM (0.82m^3/min)
Air inlet	3/4” NPT (F)

40:1

Gallons per minute (GPM)	4.0
Liters per minute (LPM)	15.1
Cycle rate per gallon	20
Cycle rate per liter	5.3
Maximum tip size @2000 psi	0.57”
Pressure ratio	40:1
Maximum pressure	4000 psi (27.6 MPa, 276 bar)
Fluid inlet	1” NPT(F)
Fluid outlet	1/2” NPT(F)
Hose connection:	
941-331	1/4” NPSM (M)
941-441	1/4” NPSM (M)
941-183	3/8” NPSM (M)
941-421	3/8” NPSM (M)
Approximate air requirement per gallon of output @ 100 psi air pressure	40 SCFM (1.13m^3/min)
Air inlet	3/4” NPT (F)

60:1

Gallons per minute (GPM)	2.6
Liters per minute (LPM)	10.1
Cycle rate per gallon	30
Cycle rate per liter	7.9
Maximum tip size @2000 psi	0.47”
Pressure ratio	60:1
Maximum pressure	6000 psi (41.4 MPa, 414 bar)
Fluid inlet	1” NPT(F)
Fluid outlet	1/2” NPT(F)
Hose connection	3/8” NPSM (M)
Approximate air requirement per gallon of output @ 100 psi air pressure	53 SCFM (1.50m^3/min)
Air inlet	3/4” NPT (F)

Introduction

Congratulations on having selected the finest airless sprayer available in the world. This Admiral™ represents the latest in airless technology. Its ability to efficiently apply a wide range of coatings makes it an excellent buy. We thank you for your purchase and welcome you to our large and growing family of Titan users.

Titan pumps are proven performers for all types of jobs. There are models for virtually any application, including architectural, finishing, industrial maintenance, corrosion control, cold applied roofing, waterproofing and marine protective coatings. More than 75,000 Titan pumps are in operation around the world, providing their owners with dependable, efficient operation.

Pumps are specifically designed for easy application of today's low VOC, high solids and abrasive coatings.

Standard features assure superior reliability. Famous Titan Severe Service™ paint pumps and high efficiency air motors are standard on all models.

Severe Service paint pumps mean twice the life, half the maintenance.

- Hard-chrome precision polished rods and cylinders give maximum abrasion and corrosion resistance with minimum friction. Result: long life.
- Tungsten carbide valve seats with hardened stainless steel check balls prevent fluid cutting and resist plugging.

Long-Life Packings are also standard.

- Self adjusting, pressure compensated spring loaded packings ensure proper seal and long life.
- Standard packing sets of leather and UHMWPE (ultra high molecular weight polyethylene) provide the industry's longest packing life.
- Wiper seal on lower packings keeps abrasive materials from hardening on cylinder wall.
- Alternate packing materials are available fro specialized applications.

Standard air motor features include:

High-efficiency -

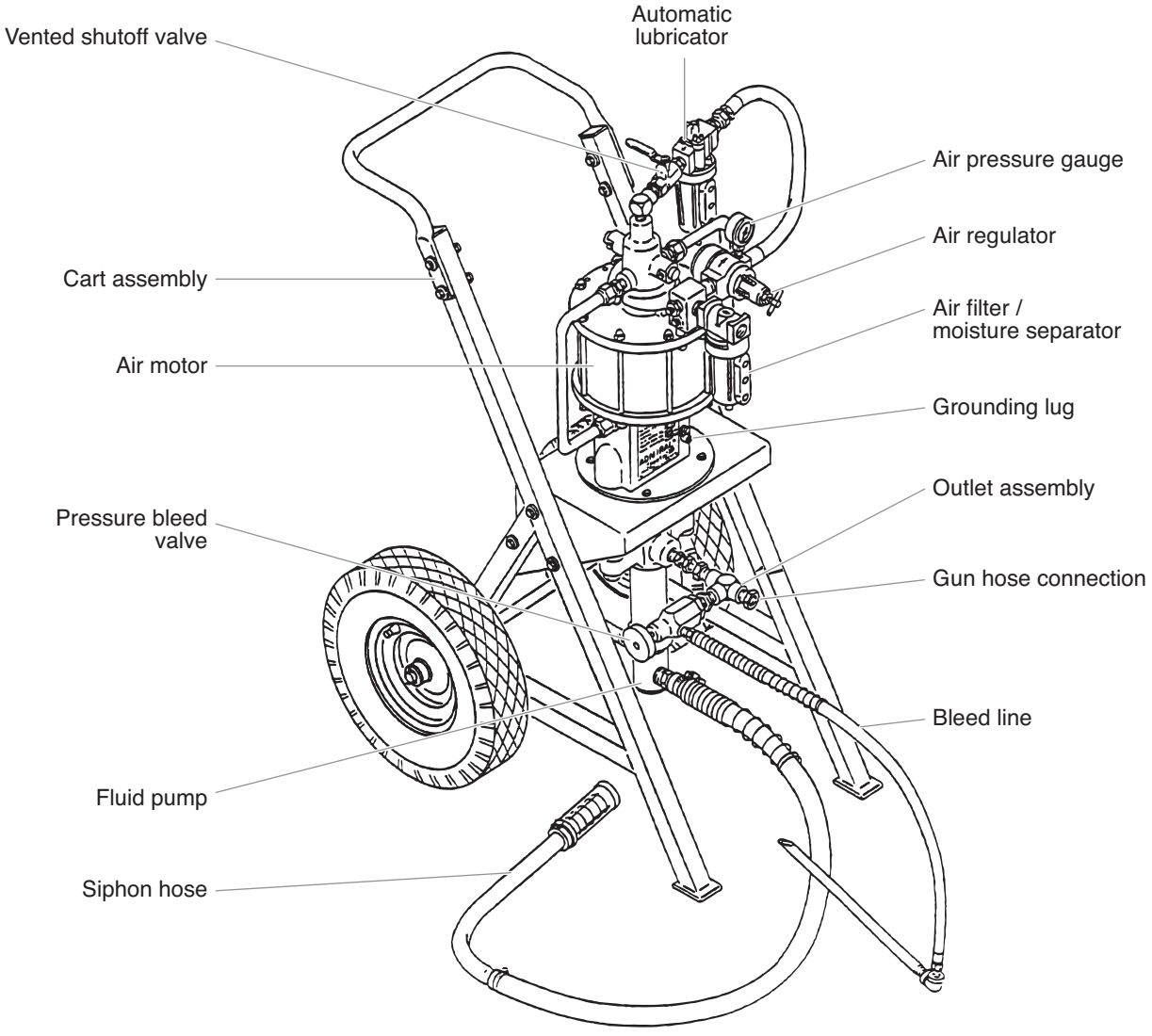
- Maximum output per cubic foot of air input.
- More work with less air than competitive air motors.

No motor icing -

- Continuous operation without icing even at high cycle rates.
- Oversized valving and exhaust porting.

You have made an excellent choice. We know you will be pleased with your new Admiral™. Thanks again for selecting Titan. We appreciate your business.

Admiral™ Series



Setup

The flow from the spray tip is at very high pressure. Contact with any body part may be dangerous. Do not place finger on gun outlet. Do not point the gun at any person.

Read, understand, and follow all warnings before starting or operating this sprayer.

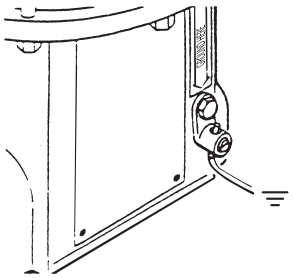
Required tools: Crescent wrench and screwdriver

1. **Compressor Requirements:**
   Consult the Technical Specifications on each model for the approximate air requirements.

NOTE: The requirements will vary on each model.

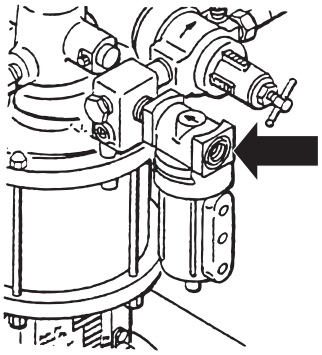
Proper grounding in important. This applies to gas, electric and air powered models. The passage of some materials through the nylon hose will build up a static electric charge, which if discharged, could ignite solvent vapors present and create an explosion.

2. **Grounding the pump:**
   Be sure the Admiral™ system is grounded. All Titan units are equipped with a grounding lug. A Grounding Clamp, Part No. 101-208 and Ground Wire, Part No. 101-212 should be used to connect the unit to a true earth ground. These accessories can be ordered from your local distributor.
   - **a.** Loosen the Grounding Screw.
   - **b.** Insert one end of the Grounding Wire into the slot in the Grounding Lug. Tighten the screw.
   - **c.** Connect the other end of the Grounding Wire to a true earth ground. Check local electrical regulations for detailed grounding instructions.

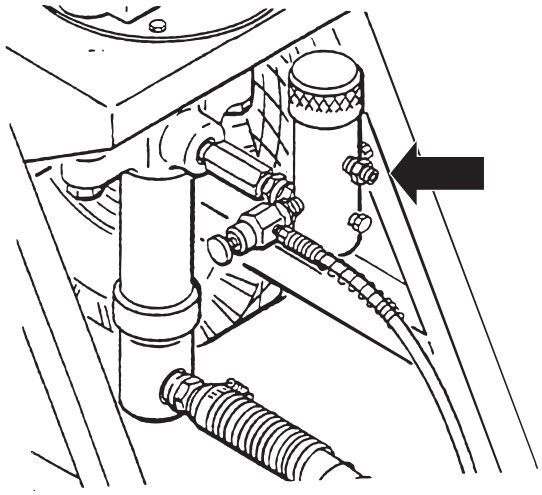


3. **Ventilation:**
   Areas must be well ventilated to prevent hazardous operation with volatile solvents or exhaust fumes.

4. **Connecting compressor to the sprayer:**
   Tighten the air hose wrench tight. The air hose has factory installed PTFE ape on the male end of the hose. See figure below.

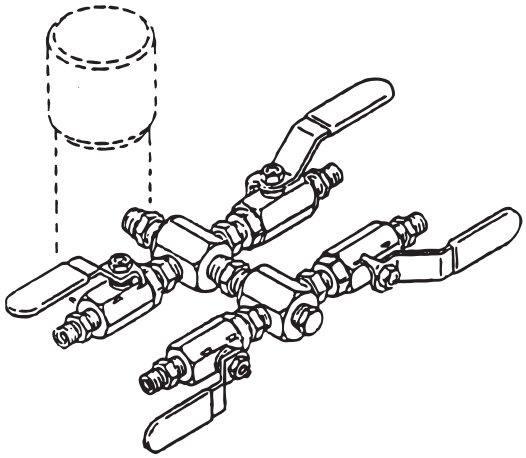


5. **Connecting the paint hoses:**
   The siphon hose and the bleed line hose have factory installed PTFE tape on the male end of the hoses. Tigthen the siphon hose and bleed line wrench tight.



6. **One Gun Operation:**
   Attach the gun and hose. Always use a spray hose at least 50 feet long. Do not use PTFE or thread sealant on this assembly. Do not install the spray tip.

7. **Multiple Gun Operation:**
   For models equipped with a second gun outlet, remove the plug from the outlet and connect a second hose and gun to the outlet.
   Multigun manifolds with shut-off valves can be used when more than two guns are needed. Never use this second gun outlet for a one-gun operation.
   For guns without a second gun outlet, connect a multi-gun manifold at the single gun outlet. These manifolds are either 2, 3, or 4 gun manifolds with shut-off valves. Connect a hose and gun to each outlet.

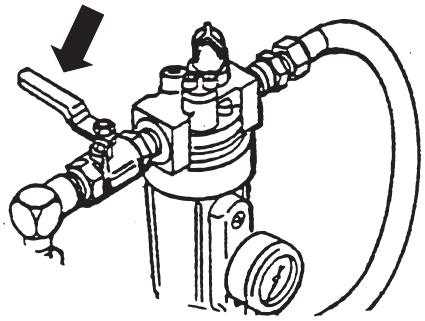


8. Fill the Wet-Cup 1/2 full with Titan's **Lubrisolv**, supplied by the factory. This extends packing life.

9. Strain all paints with Titan's 5 gallon Nylon strainer, Part No. 160-500 or 1 gallon Nylon strainer, Part No. 160-100 to assure trouble-free operation and freedom from frequent cleaning of inlet screen and gun strainer.

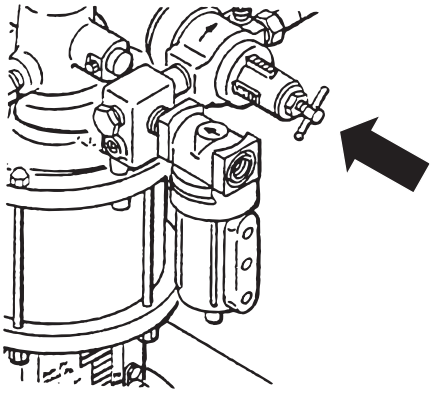
Startup

1. Close the self relieving shutoff valve. The figure below shows the handle in the closed position.



2. Start the compressor.
3. Drain the Petcock by pushing it off center.
4. **Adjusting the air regulator:**

   The air motor is designed for a maximum air input of 120 psi. Turn the T-Handle clockwise to increase pressure and counter-clockwise to decrease pressure. Verify the amount of air pressure by reading the air gauge.



Paint pressure is directly proportional to the amount of air pressure.

Example: Admiral 30:1

100 psi reading at air gauge = 3000 psi at pump outlet.

Consult the materials manufacturer for guidelines in establishing the correct air pressure.

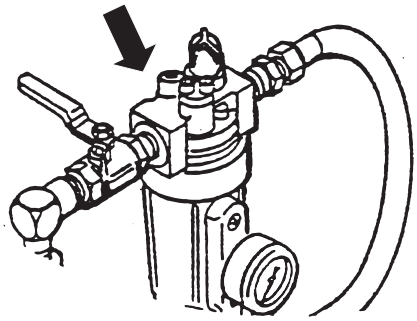
NOTE: Using a higher pressure than required will only wear out tips. Use the guidelines in establishing the lowest pressures for proper atomization.

Once the correct air pressure has been established, lock the air regulator by tightening the lock nut.

5. Place the siphon hose in the compatible flushing fluid.

   A water soluble oil was used to test your new sprayer at the factory. You must clean the system before spraying to avoid contamination of the sprayed material.

   - If you are spraying a water-based latex, flush with warm soapy water followed by a clean water rinse.
   - If you are using any other coating, flush with warm soapy water followed by a solvent. Check with the material manufacturer for a compatible solvent.
6. Place waste container below bleed line.
7. Open pressure bleed valve.
8. Open self-relieving vented shutoff valve. The handle should now be in line with the valve.
9. The **Automatic Lubricator** was set at the factory for the correct injection rate. Do not adjust the lubricator until it is necessary to refill the reservoir. The lubricator is filled with AirCare™ lubricant. See figure below.



10. After refilling the reservoir, the automatic lubricator will need adjusting. Turn the adjusting screw clockwise to increase the AirCare™ injection rate and counter-clockwise to decrease it.

    Check the injection rate by observing the flow through the sight dome. The proper flow rate is 1 drop of AirCare™ per minute or every 90-125 cycles. In cold weather when icing may occur, increase to one drop every 50-60 cycles.

    Operation at very high cycle rates (i.e. greater than 60) will require a higher AirCare™ injection rate.

IMPORTANT: Use only Titan AirCare™ Part No. 311-011 lubricant. Use of any detergent-type lubricants will cause a serious problem with the pump and void the warranty.

11. Close the pressure bleed valve. The system is now under pressure.

Operation

1. Repeat above Startup procedure with paint material. Lock gun trigger and attach spray tip. See the Technical Data Sheet on the gun provided for installation and selection of the proper tip size.
2. Test spray pattern. Operate the pump at the lowest air gauge reading which provides good atomization.

   See the Troubleshooting guide if you are not getting the proper pattern.
3. When restarting the unit, reduce the pressure at the air regulator and open the pressure bleed valve.

Pressure Relief Procedure

Always reduce fluid pressure when you are cleaning a clogged tip, changing a tip, servicing any part of the system, or shutting down. Follow the steps below.

1. Engage the gun trigger lock.
2. Close the self-relieving vented shutoff valve.
3. Open the pressure bleed valve by turning it counter-clockwise three full turns.
4. Disengage the gun trigger lock and hold trigger open until flowof material stops.

Cleaning a Clogged Tip

The flow from the spray tip is at very high pressure. Contact with any body part may be dangerous. Do not place finger on gun outlet. Do not point the gun at any person. Never operate the spray gun without the proper tip guard.

1. Follow the Pressure Relief Procedure outlined above.
2. Lock the gun trigger.
3. Unscrew the nozzle cap and remove the spray tip. Wash the tip in solvent and use a tip probe to remove any clogged material.
4. If the gun is equipped with a Titan TAC 5™ Assembly, see Technical Data Manual 150:99 for instructions.
5. Release the gun trigger lock and spray briefly into a waste container to flush out any clogged particles.
6. Reset the trigger lock in the “Trigger Locked” position. Release the trigger lock and resume spraying.

Color Change / Clean Out

IMPORTANT: Use only compatible solvents when cleaning out oil based enamels, lacquers, coal tar, and epoxies. Check with the fluid manufacturer for a recommended solvent.

1. Reduce pressure by following the Pressure Relief Procedure.

   The pressure bleed valve should be turned counter-clockwise three full turns.
2. Pull the siphon tube out of the material container.
3. Remove the spray tip from the gun. Hold the gun trigger open until material flow stops.
4. Put siphon tube into wash solvent or water as applicable, and operate pump slowly at low pressure until solvent flows freely from pressure bleed valve line.
5. Close pressure bleed valve and hold gun trigger open until solvent flows freely from gun. If solvent is not too dirty, recirculate it by flowing gun stream back into solvent container. Use additional clean solvent and repeat procedure if necessary.
6. If your model is equipped with a gun strainer screen and pump outlet filter, check them daily. Use 50 mesh screens with spray tip size .018 and larger. Use 100 or 200 mesh screens with spray tip sizes .015 and smaller. Always check the materials manufacturer’s recommendations for proper filtration requirements.
7. On models with a outlet paint filter, replace paint filter cap by turning clockwise. The filter cover should be hand removable after the first or second use with a new PTFE O-ring.

IMPORTANT: O-ring must have PTFE backup washer to seal properly.

8. If unit has been spraying a water soluble material, flush with water and then repeat procedure with mineral spirits or similar solvent.
9. Wash spray tip and preorifice in solvent. Blow tip clean with air pressure directed through the tip in the reverse direction. Store preorifice and tips in clean place.

Air Motor Maintenance

Air motors require a normal maintenance and service inspection at 1500 hours service. Service procedure includes replacement of motor service kit, minor. It is suggested that one motor service kit, major (which includes the minor kit) be kept on hand for normal maintenance and emergency repairs. Check the individual model's specifications for correct part numbers.

Air motors should be served with moisure free air and for this, an airline filter / moisture separator, such as Titan Part No. 141-057 is recommended. Very cold and humid air conditions combined with high speed and high operating pressure may require a moisture separator and an automatic lubricator to avoid icing.

NOTE: An air line filter / moisture separator are standard on many models.

Best lubrication will be obtained with an automatic lubricator such as Titan Part No. 151-055.

Fluid Pump Maintenance

If the fluid pump is going to be out of service for an extended period of time, it is recommended that following cleanup, a kerosene and oil mixture be introduced as a preservative. Packings may tend to dry out from lack of use. The is particularly true of the upper packing set for which upper packing lubricant, **Lubrisolv**, Titan Part No. 310-200, is recommended in normal usage. A sample of **Lubrisolv** accompanies each new unit. Do not substitute water or paint solvent for **Lubrisolv.** Ordinary oil may contaminate the paint material and is not recommended.

If the fluid pump has been out of service for an extended period of time, it may be necessary to prime the suction by pouring some of the paint solvent into the inlet siphon tube to restart.

IMPORTANT: It is very important that the threads on the inlet siphon hose coupling are properly sealed. Any air leakage will produce erratic operation of pump and may damage the system.

The up and down strokes should be approximately equal in time. That is, one should not be faster than the other. A fast up or down stroke may indicate air in the system or malfunctioning valve seats. See Troubleshooting guide.

Hydraulic Motor and Paint Pump Service

See the individual Technical Data Manual Sheets for maintenance and service instructions on the reciprocating hydraulic motor and for mechanical service and maintenance on the fluid pump.

Troubleshooting - Airless Spraying

Condition	Possible Cause	Correction
A. Poor spray pattern and / or tails at top and bottom of the spray pattern.	Worn or incorrect tip and/or insufficient atomization. Hose size or length is too small or too long. Dirty filter.	Be sure the tip is not worn. Increase pressure. Lower viscosity. Reduce surface tension by increasing hose size to minimize pressure drop through hose and/ or reduce hose lengths. Use preorifice disc (H disc).
B. The gun drips or throws a drop at the beginning or end of the spray pattern.	Needle may not be seating correctly. Increase spring tension.	Needle-orifice combination should be factory relapped. Needle packing may be too tight. Loosen as much as possible without leakage. Turn adjusting screw on back of gun clockwise to increase tension or use the green HP spring Part # 701-098.
C. Spray tip stops up frequently.	Particles too large for spray tip are passing filter and/or gun screen.	Use 100 mesh gun screen instead of 50 mesh for small spray tips. Use 100 mesh screen in pump filter. Strain paint.
D. Spray pattern changes with pump cycle.	Restrictions in the fluid system.	Check gun and pump filter screens. Always clean screens before they load up.
E. Irregular flow of material. One stroke faster than the other.	Packings are worn or valve balls are not seating. Restriction in the siphon system.	Check siphon hose assembly to be sure no air is entering, then recheck all threaded fittings for leakage. See Troubleshooting - Fluid Section for additional service information.
F. Spitting.	Air in system. Dirty gun.	Inspect for siphon hose leak. Disassemble and clean gun.
G. Gun does not spray any fluid.	Suction hose leak. No paint. Plugged foot valve. Plugged filters or tip. Ball check valve stuck open.	Inspect for siphon hose leak. Check fluid supply. Remove, clean, inspect foot valve. Clean filters or tip. Clean and inspect pump ball check valve.

Troubleshooting - Spray Patterns

Condition	Possible Cause	Correction
A. Tails 	Inadequate fluid delivery. Fluid not atomizing correctly.	Increase fluid pressure. Change to small tip orifice size. Reduce fluid viscosity. Reduce hose length. Clean gun and filter(s). Reduce number of guns using pump.
B. Hour glass 	Inadequate fluid delivery.	Same as above.
C. Distorted 	Plugged or worn nozzle tip.	Clean or replace nozzle tip.
D. Pattern expanding and contracting (surge) 	Suction leak. Pulsating fluid delivery.	Inspect for siphon hose leak. Change to a smaller tip orifice size. Install pulsation dampener in system or drain existing one. Reduce number of guns using pump. Remove restrictions in system, clean tip screen if filter is used.
E. Round pattern. 	Worn tip. Fluid too heavy for tip.	Replace tip. Increase pressure. Thin material. Change nozzle tip.

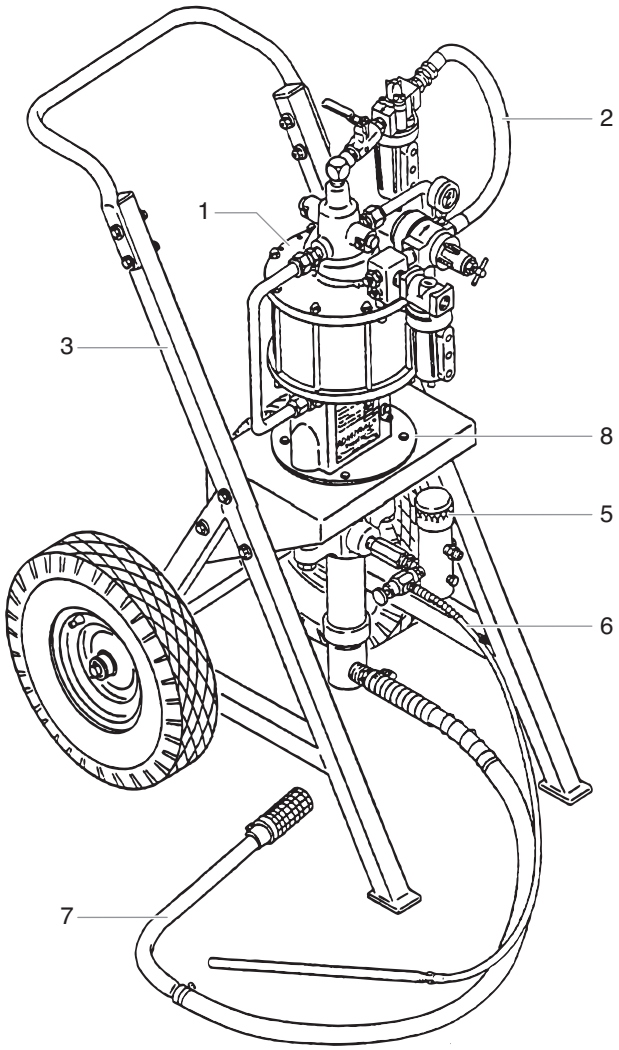
Troubleshooting - Air Motor

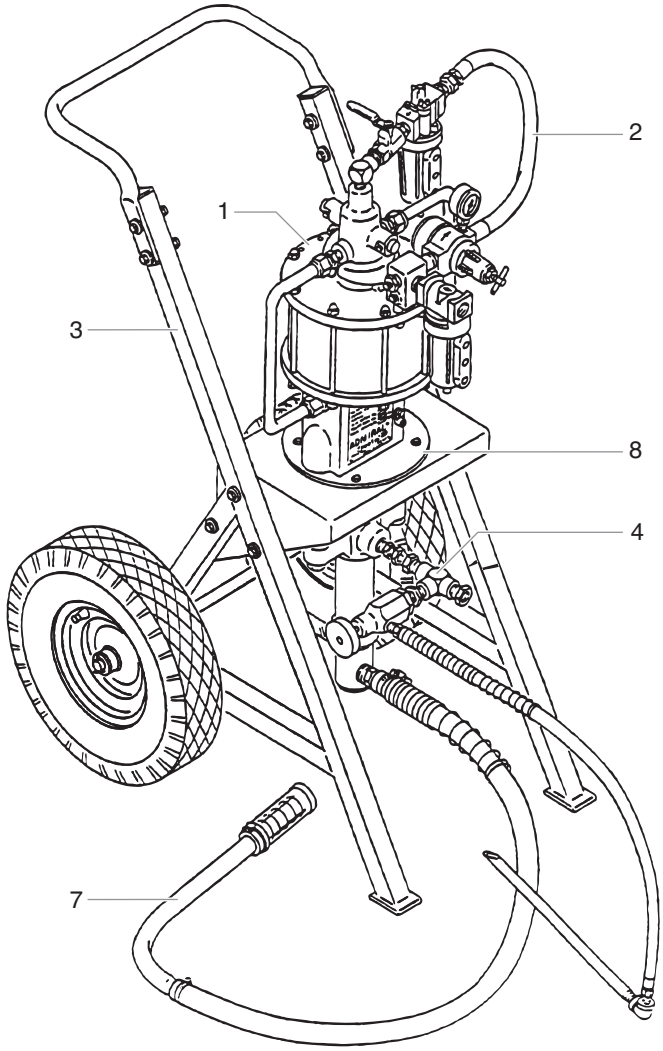
Condition	Possible Cause	Correction
A. Motor stops at top or bottom of stroke - air does not exhaust when gun is open.	Piston rod is loose where it connects to the fluid section.	Tighten connection.
	Trip springs or valve spring broken.	Inspect and replace where neessary.
	Motor is frozen due to icing or lack of lubrication.	Add 30 weight nondetergent oil to manual oiler. If condition persists, install moisture separator and automatic lubricator.
B. Motor stops, blows air from exhaust when gun is open.	See above.	See above.
	Air valve is in dead stall position.	Remove one trip spring retainer, trip spring and ball. Push spool valve up or down, lubricate, reassemble and restart.
	O-rings were worn or damaged.	Install minor service kit and follow instructions in General Maintenance and Service section of manual.
		If dust or dirt is found inside motor, check air supply for contamination.

Troubleshooting - Fluid Sections

Condition	Possible Cause	Correction
A. Pump delivers on upstroke only or goes up slowly and down fast (commonly called downstroke dive).	Lower foot valve ball is not seating due to trash or wear.	Remove foot valve assembly. Clean and inspect. Test foot valve by filling with water. If ball fails to seal the seat, replace ball.
	Material to viscous to siphon.	Thin material - contact manufacturer for proper thinning procedures.
	Air leaking in on siphon side or damaged siphon hose. Siphon may be too small for heavy material.	Tighten all connections between pump and paint container. If damaged, replace. Switch to bigger siphon set.
	Upper packing nut (if applicable) is loose or upper packings are worn.	If tightening upper packing nut does not correct, change upper packings.
B. Pump delivers on down stroke only or goes up fast and down slowly.	Upper ball is not seating due to trash or wear.	Check upper seat and ball with water. If ball fails to seal seat, replace.
	Lower packing set is worn.	Replace packing set is worn.
C. Pump moves up and down fast, not delivering material.	Material container is empty or material is too thick to flow through the siphon hose.	Refill with new material. If too thick, remove siphon hose and immerse pump or add thinner to material. Change to bigger siphon set. Open bleed valve to remove air and restart pump.
	Bottom ball stuck to foot valve seat.	Remove foot valve. Clean ball and seat.
	Siphon hose is kinked or loose.	Straighten.
D. Pump moves up and down slowly when spray gun is shut off.	Loose connections. Bleed valve is open partially or bleed valve is worn. Lower packing set is worn.	Check all connections between pump and gun. Tighten as necessary. If material is flowing from bleed hose, close bleed valve or replace if necessary. Should none of above be evident, replace lower packing.
	Upper and/or lower ball not seating.	Reset balls by cleaning.
E. Not enough fluid pressure at gun.	Spray tip is worn.	Replace.
	Compressor (air operated units only) too small. Outlet filter or gun filter is clogged.	Clean or replace filter. Recommend proper hose size and/or air compressor size.
	Low voltage and/or inadequate amperage.	Check electrical service. Correct as required.
	Hose size or length is too small or too long.	Increase hose size to minimize pressure drop through hose and/or reduce hose lengths.
F. Pump chatters on up or down stroke	Solvent has caused upper packing to swell, or packing is too tight.	Back off upper packing nut 1/4 turn (if applicable) and restart pump. Repeat if necessary.

Admiral™ Series Portable Models

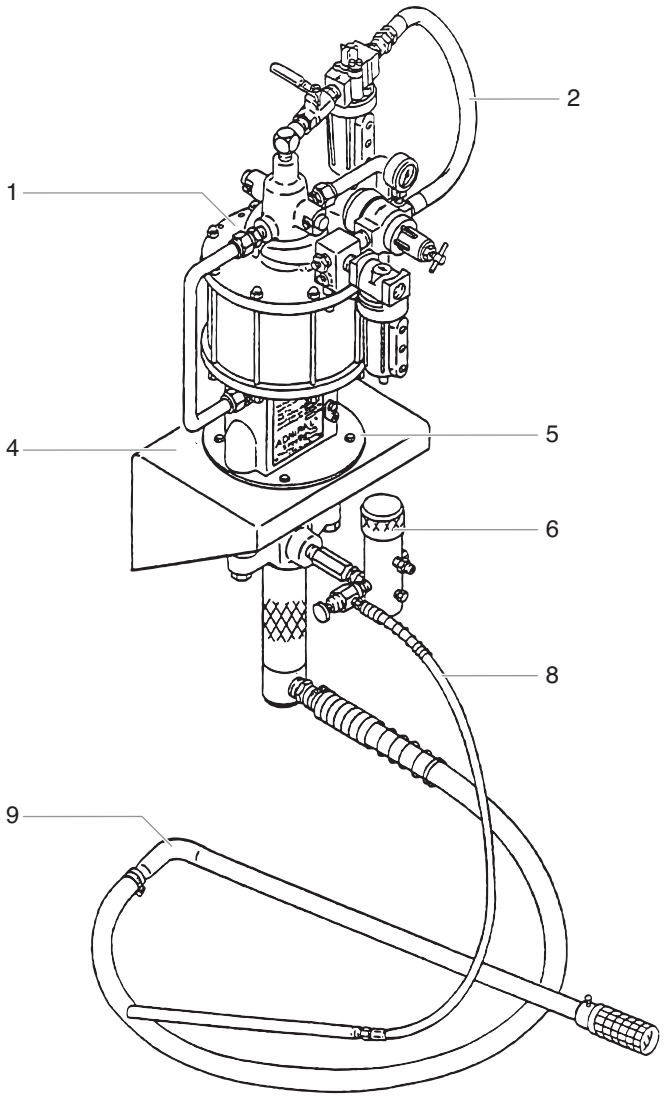


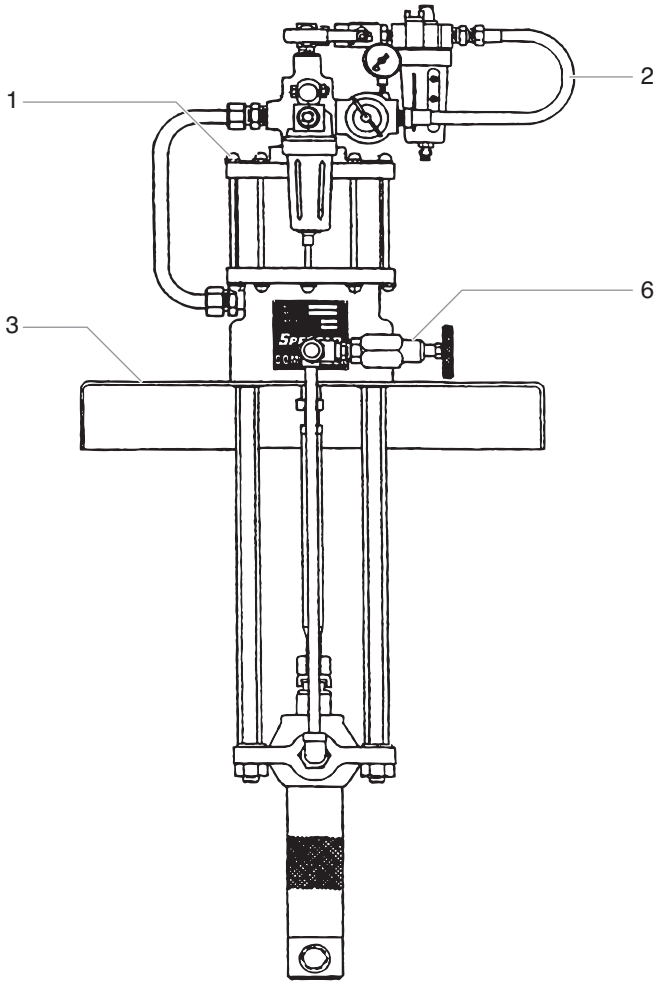


Admiral™ Series Portable Models

ALL MODELS WITH HEAVY DUTY CART			30:1	40:1		60:1	
ITEM NO.	**PART NO.**	**DESCRIPTION**	**830-451**	**941-421**	**941-441**	**860-451**	**860-461**
1	850-245 850-557 142-104 245-556	Motor pump assembly Air motor Assembly set Fluid pump assembly	1				
1a	850-185 850-555 142-100 185-551	Motor pump assembly Air motor Assembly set Fluid pump assembly		1	1		
1b	860-559 850-555 142-102 155-559	Motor pump assembly Air motor Assembly set Fluid pump assembly				1	1
2	928-835	Airline assembly, 3/4”	1	1	1	1	1
3	590-301	Cart assembly, heavy duty	1	1	1	1	1
4	840-205	Outlet assembly, 1/2”	1	1		1	
5	920-554	Filter assembly, outlet			1		
5a	920-605	Filter assembly, outlet manifold, 6000 psi					1
6	840-209	Bleed line assembly w/valve			1		1
7	103-807	Siphon hose assembly, 1” w/filter screen	1		1		1
7a	103-810	Siphon hose assembly, 1” w/strainer		1		1	
8	219-100	Mounting kit			1		1
8a	219-200	Mounting kit	1	1		1	

Admiral™ Series Wall Mount and Drum Mount Models

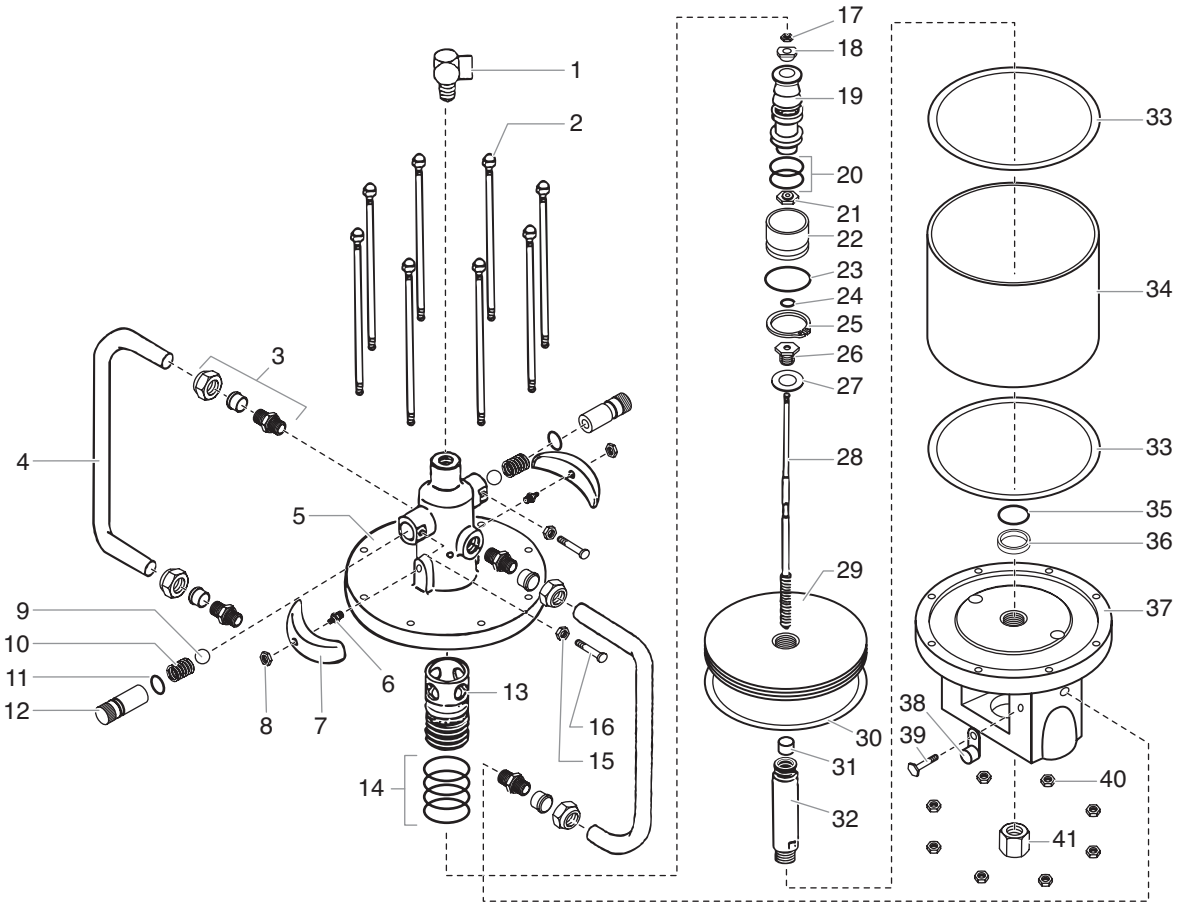




Admiral™ Series Wall Mount and Drum Mount Models

			30:1	40:1			60:1
			Wall Mount	Drum Mount	Wall Mount	Wall Mount	Wall Mount
ITEM NO.	PART NO.	DESCRIPTION	830-331	941-183	941-331	941-431	860-355
1	850-245 850-557 142-104 245-556	Motor pump assembly, drum mount Air motor Assembly set Fluid pump assembly	1				
1a	850-187 850-555 183-101 185-551	Motor pump assembly Air motor Assembly set Fluid pump assembly		1			
1b	850-186 850-555 142-101 181-556	Motor pump assembly Air motor Assembly set Fluid pump assembly			1		
1c	850-185 850-555 142-100 185-551	Motor pump assembly Air motor Assembly set Fluid pump assembly				1	
1d	860-559 850-555 142-102 159-559	Motor pump assembly Air motor Assembly set Fluid pump assembly					1
2	928-835	Airline assembly, 3/4”	1	1	1	1	1
3	219-600	Drum cover assembly, 55 Gal.		1			
4	590-300	Bracket assembly, wall mount	1		1	1	1
5	219-504	Plate, adapter		1			
6	840-205	Outlet assembly, 1/2”		1			
6a	920-605	Filter assembly, outlet					1
7	920-554	Filter assembly, outlet	1				
7a	920-556	Filter assembly, outlet			1	1	
8	840-209	Bleed line assembly w/valve	1		1	1	1
9	103-806	Siphon hose assembly, 3/4” w/rock catcher			1	1	
9a	103-808	Siphon hose assembly, 1” w/filter screen	1				1

Admiral™ 850-555 and 850-557 Air Motor



ITEM NO.	PART NO.	DESCRIPTION	850-555 QTY.	850-557 QTY.
1	818-010	Elbow	1	1
2	738-026	Bolt	8	8
3	742-007	Adapter	4	4
4	742-943	Air line	2	2
5	850-997	Head, cylinder	1	1
6	928-103	Adapter	2	2
7	850-967	Plate, exhaust	2	2
8	862-701	Nut	2	2
9	138-340	Ball	2	2
10	738-213	Spring, trip	2	2
11	742-001	O-ring	2	2
12	742-905	Retainer, trip spring	2	2
13	742-913	Sleeve, valve	1	1
14	742-223	O-ring	4	4
15	858-611	Nut	2	2
16	858-660	Screw	2	2
17	858-812	Nut, stop	1	1
18	738-218	Keeper, upper valve	1	1
19	740-925	Valve	1	1
20	738-224	O-ring	2	2
21	740-985	Keeper, lower valve	1	1

ITEM NO.	PART NO.	DESCRIPTION	850-555 QTY.	850-557 QTY.
22	742-011	Bushing	1	1
23	742-223	O-ring	1	1
24	890-114	O-ring	1	1
25	742-016	Clip, retainer	1	1
26	738-985	Nut, piston	1	1
27	742-005	Washer, piston	1	1
28	743-011	Valve rod assembly	1	1
29	850-917	PIston	1	1
30	850-016	O-ring	1	1
31	743-227	Collar, valve trip	1	1
32	738-937	Rod, piston	1	1
33	850-004	Gasket	2	2
34	850-952	Cylinder	1	1
35	738-021	O-ring	1	1
36	742-224	Ring, wear	1	1
37	850-947	Base, motor	1	1
38	101-205	Lug, ground	1	1
39	858-624	Screw	1	1
40	862-701	Nut	8	8
41	138-007	Nut, coupling	1	
41a	138-017	Nut, coupling		1

Air Motor Service Procedure

This Air Motor requires a normal mantenance inspection at 1500 hours of service on the non-circulating models and 800 hours of service on the circulating models. Service procedure includes replacement of the Motor Service Kit, Minor Part # 850-050 listed below. It is suggested that one Motor Service Kit, Major Part # 850-550 (which includes the minor kit) be kept on hand for normal maintenance and emergency repairs.

Maintenance

The 850 Series Air Motor should be served with moisture-free air. A water trap, Titan Part #141-057, is recommended. For use under very cold and humid conditions a moisture separator and an automatic oiler may be necessary to avoid icing.

Disassembly Procedure

1. Disconnect air hose from elbow (1).
2. Remove locking bolts and nuts (15, 16), trip spring retainers (12), O-rings (11), trip springs (10), and balls (9) from both sides of the cylinder head (5).
3. Disconnect air line (4) from adaptors (3) top and bottom.
4. Remove eight nuts (40) and eight bolts (2).
5. With piston (29) in down position, place wrench on flats of piston rod (32) and disconnect piston rod from pump connecting rod.
6. With piston (29) at top of stroke, raise cylinder head (5) and remove retainer (25). Lift off cylinder head (5). Valve sleeve (13) may pull out of cylinder head. If so, lift valve sleeve off separately.
7. Remove stop nut (17) and then unthread upper valve keeper (18).
8. Remove air valve (19) followed by lower valve keeper (21) and bushing (22).
9. If valve sleeve (13) is still in cylinder head, leave it there unless it is necessary to change O-rings. To remove, use Sleeve Removal Tool Part # 900-021 to remove sleeve (13).
10. Remove cylinder (34).
11. Remove piston rod (32) and piston (29) from motor base (37).
12. Secure piston (29) in vise and remove piston nut (26) and piston washer (27).

IMPORTANT: Do not clamp on O.D. of the piston.

13. Remove valve rod assembly (28) and valve trip collar (31).
14. Unscrew piston rod (32) from piston (29).
15. Remove O-ring (30) from piston (29).
16. Remove O-rings (23, 24) from bushing (22), O-ring (35) and wear ring (36) from motor base (37).

Reassembly Procedure

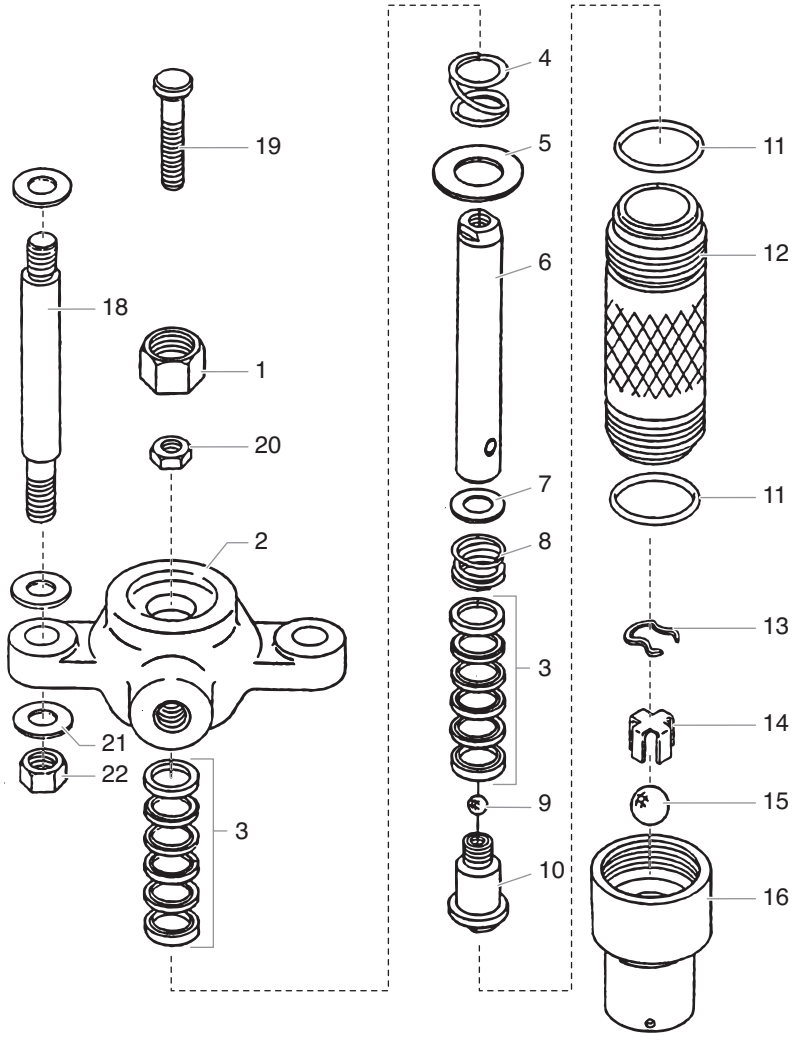
Wash all replaceable parts thoroughly with kerosene and lubricate with Lubri-Plate or similar non-water soluble grease. For routine servicing, use new parts from the Air Motor Servic Kit Part # 850-500. Inspect all other parts for abnormal wear or damage and replace if necessary.

1. Install new O-ring (35) and new wear ring (36) into motor base (37) and new O-rings (23, 24) into bushing (22). Use care to avoid damaging O-rings and make sure they are properly seated in the O-ring grooves.
2. Place valve trip collar (31) into piston rod (32) followed by valve rod assembly (28).
3. Screw piston rod (32) into piston (29). Replace piston nut and washer (26, 27).
4. Install new piston O-ring (30) into piston (29).
5. Place new gasket (33) into position in motor base (37).
6. Place piston assembly (29, 32) into motor base (37). Do not damage O-ring.
7. Place new O-rings (20) on air valve (19).
8. Mount air valve assembly onto valve rod (29) by placing bushing (22) over valve rod (28), followed by keeper (21), air valve (19) and upper valve keeper (18). Thread upper valve keeper (18) down on air valve hand tight. Then loosen approximately 1/4 turn. Place wrench on flats of valve rod (28) and hold to prevent valve rod (28) from turning. Thread stop nut (17) down on valve rod (28) to lock upper valve keeper (18) in position. Be sre upper valve keeper (18) does not change position.
9. Grease inside of cylinder (34) and work cylinder down over piston gently in order to avoid damage to piston O-ring (30).
10. Install new O-rings (14) on valve sleeve (13). Grease valve sleeve and install into cylinder head (5) so large holes in sleeve line up with trip retainer holes in cylinder head (5). Put one trip retainer (12) with new O-ring (11) into cylinder head without ball (9) or spring (10) and hold in position temporarily with locking bolt (16) and nut (15).
11. Place new gasket (33) into position in cylinder head (5) and hold with gasket cement or grease.
12. Carefully position air valve assembly up into cylinder head (5).
13. Push bushing (22) up into bottom of cylinder head (5) to sufficiently permit installation of retainer (25).
14. To install trip spring retainer be sure one of the detents of valve (19) is properly lined up with hole in the cylinder head (5). Place new trip spring retainer O-ring (11) onto remaining trip spring retainer (12). Install new ball (9) followed by trip spring (10) and trip spring retainer (12) into hole of cylinder head (5). Lock into position with bolt (16) and nut (15).
15. For opposite trip spring retainer (12) replacement, repeat step #14.
16. Connect air line (4) to adapters (3) top and bottom.
17. Replace bolts (2) and nuts (40). Always tighten nuts 180 degrees apart in order to obtain proper and even compression.
18. Place wrench on the flats of piston rod (32) and connect pump connecting rod.
19. Reconnect air hose to elbow (1).

Service Kits

Part No.	Description
743-012	Valve rod and spring assembly Includes items 17, 28 and 31
850-050	Motor service kit, minor Includes items 9-11, 14, 17, 20, 23-24. 30, 33, 35-36.
850-500	Motor service kit, major Includes minor service kit 850-050, and items 13, 18-19, 21, 28 and 31.
742-942	Air line assembly Includes item 4, and compression nut, part # 742-009 and ferrule, part # 742-010 (each is a component of item 3, adapter part # 742-007).

Admiral™ 155-559 Fluid Pump Assembly



ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	431-007	Nut, coupling	*
2	155-907	Block, pump	1
3	155-053	Packing set, Poly/Lthr.	2
4	155-906	Upper packing spring	1
5	155-010	Washer	1
6	155-982	Rod, displacement	1
7	155-009	Washer, piston	1
8	155-001	Lower packing spring	1
9	155-225	Ball, S.S.	1
10	155-921	Piston seat assembly	1
11	891-373	O-ring	2
12	155-932	Cylinder	1
13	174-113	Stop, ball	1
14	174-102	Cage, ball	1
15	178-700	Ball, S.S.	1
16	155-991	Valve, foot	1

142-102 Assembly Set

ITEM NO.	PART NO.	DESCRIPTION	QTY.
18	140-016	Stanchion	2
19	441-956	Rod, connecting	1
20	868-101	Nut	1
21	870-004	Washer	6
22	870-401	Nut	2

Displacement Rod		Stroke Length		Displacement Volume / Stroke			Displacement Volume / 40 Cycles / 80 Strokes				Motor Selection	Motor Pump ratio
IN^2	CM^2	IN	CM	IN^3	CM^3	LITER	IN^3	GAL.	CM^3	LITER		
.976	6.3	4	10.2	3.9	63.9	.0639	312	1.35	5113	5.113	850 Series	60:1

155-559 Fluid Pump Service Information

IMPORTANT: Use of non-Titan manufactured service parts may void warranty.

The 155 Series Pump should receive a routine servicing after approximately 1000 hours of use or earlier if there is excessive leakage from the top packing, or if pump strokes become faster on one stroke or another. The use of Titan **Lubrisolv Part # 310-200** is recommended as an upper packing lubricant. DO NOT SUBSTITUTE oil, water or solvent for an upper packing lubricant.

Disassembly Procedure

1. Remove siphon hose assembly.
2. If the pump is connected to air motor, hold motor piston rod at wrench flats and unthread coupling nut (1) to separate pump from motor.
3. Unthread and remove foot valve (16) and pump cylinder (12) to separate from pump block (2) and remove ball (15), ball stop (13), ball cage (14) and O-ring (11).
4. Secure piston seat assembly (10) in a vise and unthread displacement rod (6) to remove packing set (3), spring (8) and washer (7).
5. Inspect and clean all parts. Reject cylinder (12) and/or displacement rod (6) if hard chrome is grooved or worn through to gray metal.

Reassembly Procedure

NOTE: If cylinder (12) and displacement rod (6) are reusable, then only a minor kit part # 155-051 or 155-055 may be required for reassembly.

1. Place new packing set (3) over piston seat (10) with "V" packings point downward (V) and reassemble with ball (9), spring (8),washer (7) and displacement rod (6) in that order. Tighten and use Loctite on clean threads.
2. Insert new upper packing set (3) into pump block (2).

IMPORTANT: Peak of "V" packings must point upwards on reassembly.

Install upper packing spring (4) and washer.

3. Insert displacement rod assembly (6) through pump block (2) holding upper packing set (3) in place with fingers.
4. Lubricate the threaded ends of cylinder (12) including the O-rings (11) to protect them on reassembly.
5. Thread cylinder (12) into pump block (2). Do not overtigthen.
6. Replace ball (15), ball cage (14) and ball stop (13) into foot valve (16) and thread into cylinder (12). The O-rings (11) should be lubricated to protect it on replacement of foot valve. It is not necessary to overtighten as seal is obtained when parts are fully threaded together.

NOTE: It is not necessary to overtighten foot valve and cylinder into pump block. O-ring seals perform sealing function without excessive tightening. Full thread engagement is sufficient. The foot valve may be rotated back up to 1/2 turn from full engagement for convenient hose position.

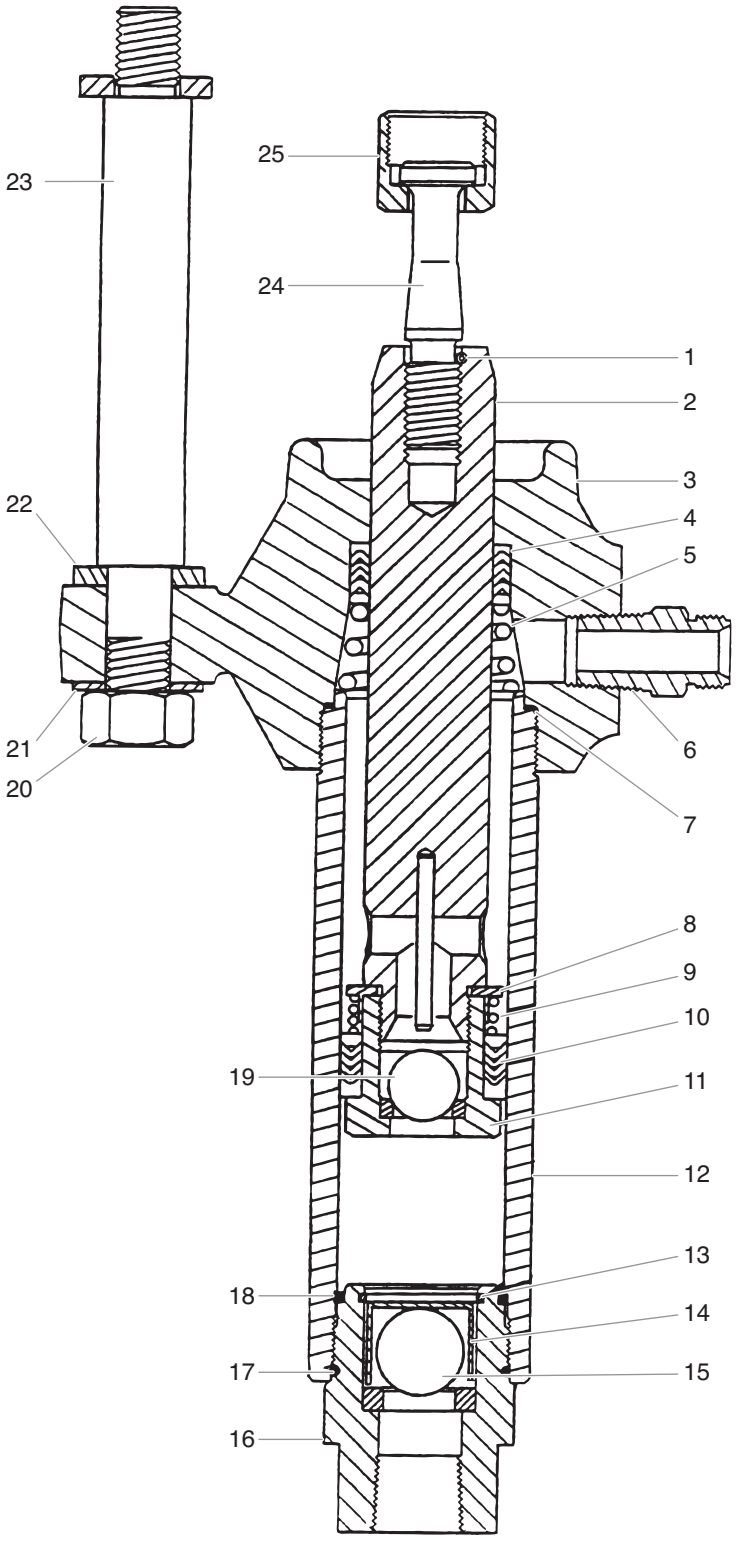
NOTE: For siphon hose attachment, it is critically important that the threads of the siphon hose fit snugly into the foot valve with the hose assembly couplings PTFE taped and sealed to prevent air inlet leakage.

Service Kits

Pump service kits, minor				
ITEM NO.	**PART NO.**	**DESCRIPTION**	**155-051**	**155-055**
3	155-052	Packing set, leather	2	
3a	155-053	Packing set, Leather/Poly		2
9	155-225	Ball, S.S.	1	1
11	891-373	O-ing	2	2
15	178-700	Ball, S.S.	1	1
	426-051	Loctite sealant	1	1

Pump service kits, major				
ITEM NO.	**PART NO.**	**DESCRIPTION**	**155-051**	**155-055**
	155-051	Minor service kit	1	
	155-055	Minor service kit		1
6	155-981	Rod, displacement	1	1
12	155-932	Cylinder	1	1

Admiral™ 181-556 Fluid Pump Assembly



ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	185-981	Pin, roll	1
2	185-984	Rod, displacement	1
3	181-906	Block, pump	1
4	175-001	Upper packing set, Lthr.	1
5	182-906	Spring, packing	1
6	228-002	Nipple, hex	1
7	182-007	O-ring, PTFE	1
8	185-011	Retainer, spring	1
9	185-010	Spring, packing	1
10	180-002	Lower packing set, Lthr.	1
11	182-921	Seat, piston	1
12	182-932	Cylinder	1
13	174-113	Stop, ball	1
14	174-102	Cage, ball	1
15	178-700	Ball, S.S.	1
16	155-981	Valve, foot	1
17	742-223	O-ring	1
18	174-001	O-ring, PTFE	1
19	920-103	Ball	1

142-101 Assembly Set

ITEM NO.	PART NO.	DESCRIPTION	QTY.
20	868-101	Nut	2
21	870-004	Washer	2
22	870-005	Washer, spacer	4
23	140-016	Stanchion	2
24	441-956	Rod, connecting	1
25	138-007	Nut, coupling	*

* Not included in this assembly

Displacement Rod Area		Stroke Length		Displacement Volume / Stroke			Displacement Volume / 40 Cycles / 80 Strokes				Motor Selection	Motor Pump ratio
IN^2	CM^2	IN	CM	IN^3	CM^3	LITER	IN^3	GAL.	CM^3	LITER		
1.38	8.90	4	10.2	5.55	90.9	0.091	444	1.92	7272	7.27	850 Series	40:1

181-556 Fluid Pump Service Information

IMPORTANT: Use of non-Titan manufactured service parts may void warranty.

The 181 Series Pump should receive a routine servicing after approximately 1000 hours of use or earlier if there is excessive leakage from the top packing, or if pump strokes become faster on one stroke or another. The use of Titan **Lubrisolv Part # 310-200** is recommended as an upper packing lubricant. DO NOT SUBSTITUTE oil, water or solvent for an upper packing lubricant.

Disassembly Procedure

1. Test pump before disassembly. Follow test procedure in Troubleshooting Guide - Fluid Section.
2. Remove siphon hose assembly.
3. Remove stanchion nuts (20) and washers (21).
4. If the fluid section is connected to an air motor, hold the air motor piston rod at the wrench flats and unthread coupling nut (25) to separate pump from motor.

   If the motor is connected to a hydraulic motor, remove allen set screw between the two flats on hydraulic motor rod. Hold the hydraulic motor rod at the wrench flats and unthread coupling nut (25) to separate pump from hydraulic motor.

IMPORTANT: Never use a pipe wrench, pliers, etc. on the chrome part of hydraulic, air or fluid section rod.

5. Remove roll pin (1) on connecting rod (24). Remove connecting rod from displacement rod (2).
6. Unthread and remove foot valve (16).
7. Remove PTFE O-ring (18), O-ring (17), ball stop ring (13), ball cage (14) and ball (15).
8. Remove cylinder (12).
9. Remove displacement rod (2).
10. Place piston seat (11) in a vise and use a wrench on the flats to remove the displacement rod (2) from the piston seat (11).
11. Remove lower packing set (10), spring (9), spring retainer (8) and ball (19).
12. Remove upper packing spring (5), O-ring (7) and packing set (4) from pump block (3).
13. Clean and inspect all parts. Inspect rod or pump tube's hard chrome for grooves, dents or worn areas. Replace if hard chrome is damaged. Inspect valve seats and replace if cracked or worn.

Reassembly Procedure

1. Insert upper packing set (4) into pump block (7)

IMPORTANT: Peak of "V" packings must point upwards on reassembly.

2. Insert upper spring (5); small end of spring must go toward the packing set.
3. Place packing set (10) over piston seat (11).

IMPORTANT: Peak of "V" packings must point downward on reassembly.

4. Replace spring (9), spring retainer (8) and ball on piston seat (11).
5. Thread seat back onto displacement rod (2).

IMPORTANT: Use Loctite on clean threads.

6. Insert displacement rod (2) assembly through upper packing set (4) in pump block (3).
7. Place O-ring (7) on end of cylinder (12) and thread back into pump block (3).

IMPORTANT: Lubricate all O-rings before assembly.

8. Insert ball (15), ball cage (14), ball stop retainer ring (13), O-ring (17) and PTFE O-ring (18) into foot valve.

IMPORTANT: Lubricate all O-rings.

9. Thread foot valve (16) back into cylinder (12).

NOTE: It is not necessary to overtighten foot valve and cylinder into pump block. O-ring seals perform sealing function without excessive tightening. Full thread engagement is sufficient. The foot valve (16) may be rotated back up to 3/4 turn from full engagement for convenient hose position.

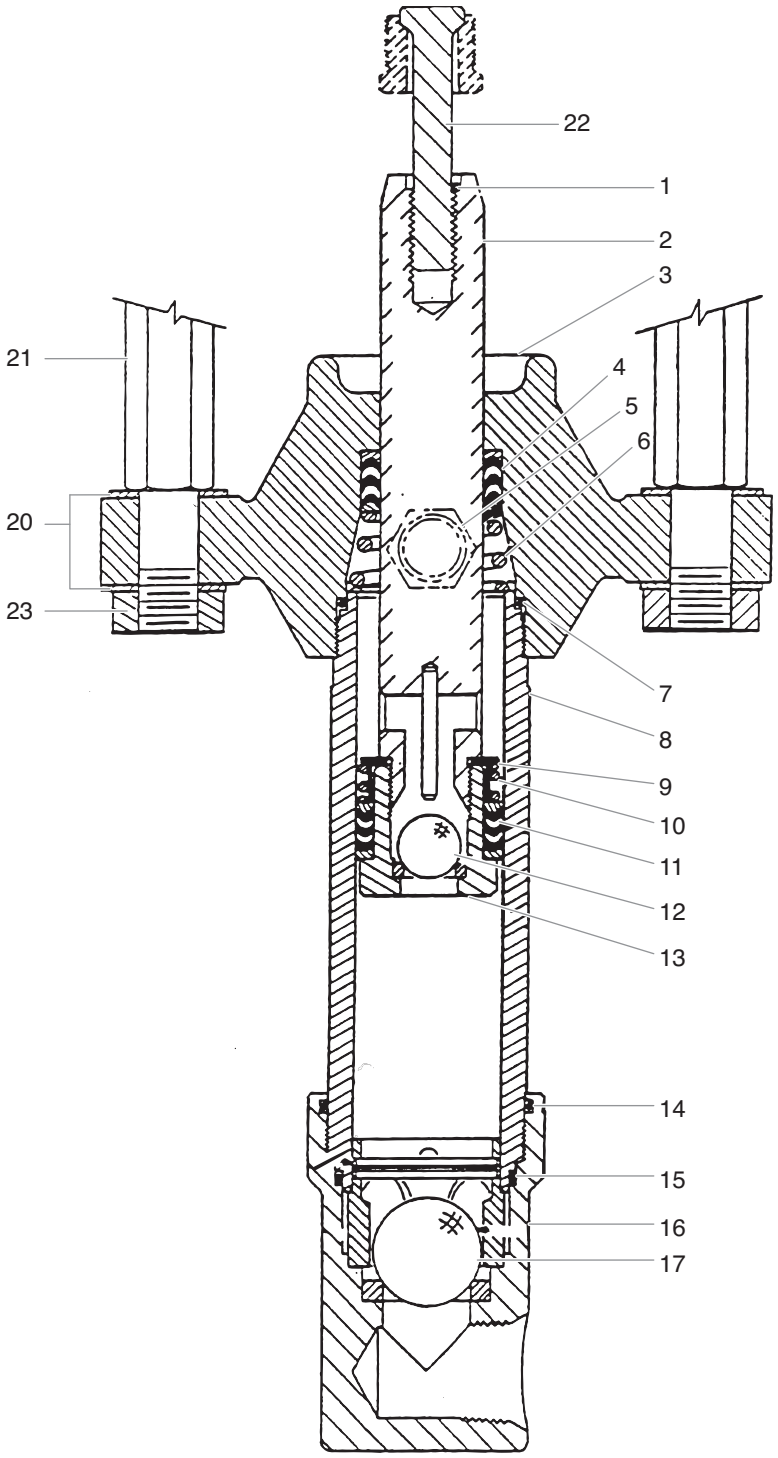
10. Insert coupling nut (25) back onto connecting rod (24) and thread connecting rod (24) back onto displacement rod (2).

Service Kits

Pump service kit, minor (Part # 182-050)			
ITEM NO.	**PART NO.**	**DESCRIPTION**	**QTY.**
4	175-001	Packing set, leather	1
7	182-007	O-ring, PTFE	1
10	180-002	Packing set, leather	1
15	178-700	Ball	1
17	742-223	O-ring	1
18	174-001	O-ring, PTFE	1
19	920-103	Ball	1

Pump service kit, major (Part # 182-520)			
ITEM NO.	**PART NO.**	**DESCRIPTION**	**QTY.**
	182-050	Pump service kit, minor	1
2	185-984	Rod, displacement	1
11	182-921	Seat, piston	1
12	182-932	Cylinder	1

Admiral™ 185-551 Fluid Pump Assembly



ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	185-981	Pin, roll	1
2	185-984	Rod, displacement	1
3	181-906	Block, pump	1
4	178-001	Packing set, upper	1
5	228-002	Nipple, hex	1
6	182-906	Spring, packing	1
7	182-007	O-ring, PTFE	1
8	183-930	Cylinder	1
9	185-011	Retainer, spring	1
10	185-010	Spring, packing	1
11	180-001	Packing set, lower	1
12	920-103	Ball	1
13	182-921	Seat, piston	1
14	183-230	O-ring,	1
15	182-007	O-ring, PTFE	1
16	183-992	Valve, foot	1
17	314-180	Ball	1
18	240-022	Cage, ball	1
18a	241-109	Pin	1

142-100 Assembly Set

ITEM NO.	PART NO.	DESCRIPTION	QTY.
19	870-401	Nut	2
20	870-004	Washer	6
21	140-016	Stanchion	2
22	442-956	Rod, connecting	1
	868-101	Nut (not shown)	1

183-101 Assembly Set** (for 55 gallon drum cover)

ITEM NO.	PART NO.	DESCRIPTION	QTY.
19a	870-401	Nut	2
20	870-004	Washer	6
21a	314-024	Stanchion	2
22	442-956	Rod, connecting	1
22a	180-979	Extension, connecting rod	1
23	868-101	Nut	1
24	840-214	Riser pipe assembly	1

** Not shown

Displacement Rod Area		Stroke Length		Displacement Volume / Stroke			Displacement Volume / 40 Cycles / 80 Strokes				Motor Selection	Motor Pump ratio
IN^2	CM^2	IN	CM	IN^3	CM^3	LITER	IN^3	GAL.	CM^3	LITER		
1.38	8.90	4	10.2	5.55	90.9	0.091	444	1.92	7272	7.27	850 Series	40:1

185-551 Fluid Pump Service Information

IMPORTANT: Use of non-Titan manufactured service parts may void warranty.

The 185 Series Pump should receive a routine servicing after approximately 1000 hours of use or earlier if there is excessive leakage from the top packing, or if pump strokes become faster on one stroke or another. The use of Titan **Lubrisolv Part # 310-200** is recommended as an upper packing lubricant. DO NOT SUBSTITUTE oil, water or solvent for an upper packing lubricant.

Disassembly Procedure

1. Test pump before disassembly. Follow test procedure in Troubleshooting Guide - Fluid Section.
2. Remove siphon hose assembly.
3. Remove stanchion nuts (19) and washers (20).
4. Hold the air motor piston rod at the wrench flats and unthread coupling nut to separate pump from motor.

IMPORTANT: Never use a pipe wrench, pliers, etc. on the chrome part of hydraulic, air or fluid section rod.

5. Remove roll pin (1) or jam nut on connecting rod (22). Remove connecting rod (22) from displacement rod (2).
6. Unthread and remove foot valve (16).
7. Remove PTFE O-ring (15), O-ring (14), ball cage assembly (18) and ball (17).
8. Remove cylinder (8).
9. Remove displacement rod (2).
10. Place piston seat (13) in a vise and use a wrench on the flats to remove the displacement rod (2) from the piston seat (13).
11. Remove lower packing set (11), spring (10), spring retainer (9) and ball (12).
12. Remove upper packing spring (6), packing set (4) and O-ring (7).
13. Clean and inspect all parts. Inspect displacement rod's (2) and cylinder's (8) chrome for grooves, dents or worn areas. Replace if hard chrome is damaged. Inspect valve seats and replace if cracked or worn.

Reassembly Procedure

1. Insert upper packing set (4) into pump block (3)

IMPORTANT: Peak of "V" packings must point upwards on reassembly.

2. Insert upper spring (6); small end of spring must go toward the packing set.
3. Insert spring retainer (9).
4. Place new lower packing set (11) over piston seat (13).

IMPORTANT: Peak of "V" must point downward on reassembly.

5. Replace spring (10), spring retainer (9) and new ball (12) on piston seat (13).
6. Thread piston seat (13) back onto displacement rod (2).

IMPORTANT: Use Loctite on clean threads.

7. Insert displacement rod (2) assembly through upper packing set (4) in pump block (3).
8. Place new O-ring (7) on end of cylinder (8) and thread back into pump block (3).

IMPORTANT: Lubricate all O-rings before assembly.

9. Insert new ball (17), ball cage (18), and new O-ring (14) into foot valve.

NOTE: Ball cage pin (18a) to be in lower position unless pump is to be used for heavy block filler or roofing materials.

10. Place new PTFE O-ring (15) on cylinder (8) and then install foot valve assembly (16)

NOTE: It is not necessary to overtighten foot valve and cylinder into pump block. O-ring seals perform sealing function without excessive tightening. Full thread engagement is sufficient. The foot valve (16) may be rotated back up to 3/4 turn from full engagement for convenient hose position.

11. Insert connecting rod (22) through coupling nut and thread connecting rod (22) into displacement rod (2).
12. Insert roll pin (1) into connecting rod (22).

For siphon hose attachment, it is critically important that the thread of the siphon hose fit snugly into the foot valve with the hose assembly couplings PTFE-taped and sealed to prevent air inlet leakage.

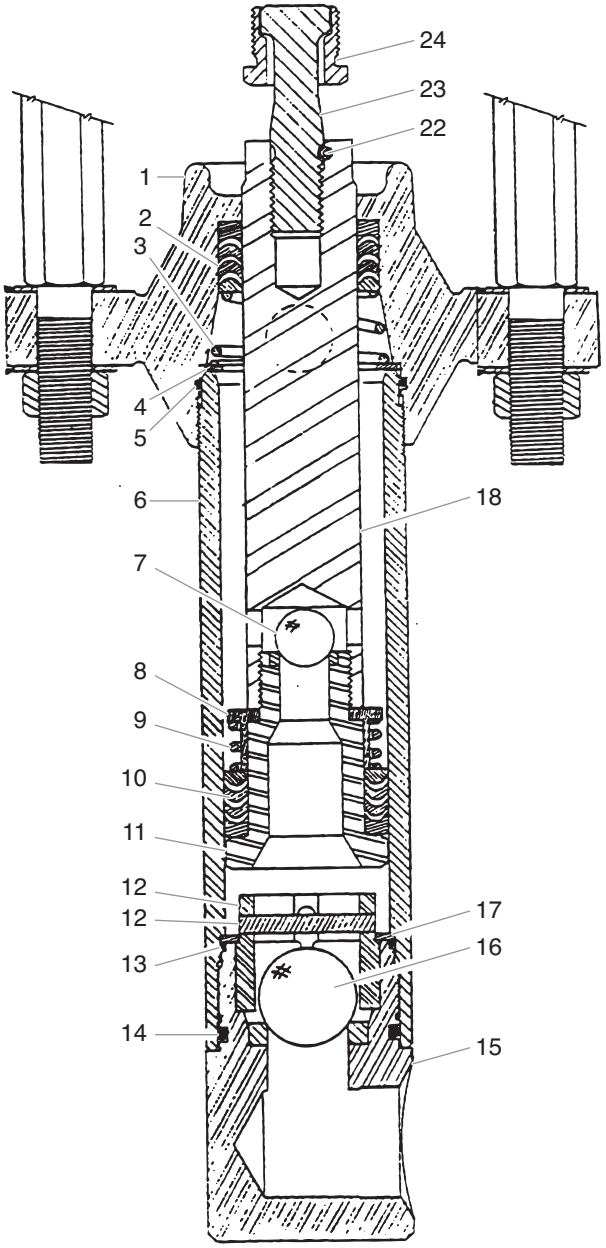
Service Kits

NOTE: Minor service kit # 185-050 has polyethylene/ leather packings.
Minor service kit # 180-051 has leather packings.
Minor service kit # 185-052 has PTFE packings.

Pump service kit, minor			CTR	IND	PTFE
ITEM NO.	PART NO.	DESCRIPTION	185-050	185-051	185-052
4	175-001	Packing set, upper		1	
4	178-001	Packing set, upper	1		
4	178-320	Packing set, upper			1
7	182-007	O-ring, PTFE	1	1	1
11	180-002	Packing set, lower		1	
11	180-322	Packing set, lower			1
11	183-001	Packing set, lower	1		
12	920-103	Ball	1	1	1
14	183-230	O-ring	1	1	1
15	182-007	O-ring, PTFE	1	1	1
17	314-180	Ball	1	1	1
	426-051	Loctite Sealant	1	1	1

Pump service kit, major			CTR	IND	PTFE
ITEM NO.	PART NO.	DESCRIPTION	185-500	185-501	185-502
	185-050	Minor kit	1		
	185-051	Minor kit		1	
	185-052	Minor kit			1
2	182-984	Displacement rod	1	1	1
6	182-906	Spring, packing	1	1	1
8	183-930	Cylinder	1	1	1

Admiral™ 245-556 Fluid Pump Assembly



ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	245-907	Block, pump	1
2	240-001	Packing set, Poly/Lthr.	1
3	245-005	Packing spring, upper	1
4	245-013	Retainer, spring	1
5	892-323	O-ring, Telfon	1
6	245-012	Cylinder	1
7	920-103	Ball, S.S.	1
8	245-020	Retainer, spring	1
9	245-014	Spring, packing	1
10	240-001	Packing set, Poly/Lthr	1
11	241-007	Seat, piston	1
12	240-022	Cage, ball	1
12a	241-109	Pin, ball stop	1
13	891-403	O-ring, PTFE	1
14	892-281	O-ring	1
15	245-018	Valve, foot	1
16	314-180	Ball, S.S.	1
17	245-021	Retainer, cage	1
18	245-009	Rod, displacement	1

ITEM NO.	PART NO.	DESCRIPTION	142-104
19	870-401	Nut	2
20	870-004	Washer	6
21	140-016	Stanchion	2
22	245-109	Roll pin	1
23	442-959	Connecting rod	1
24	138-007	Nut, coupling	*

* Not included in this assembly

Displacement Rod Area		Stroke Length		Displacement Volume / Stroke			Displacement Volume / 40 Cycles / 80 Strokes				Motor Selection	Motor Pump ratio
IN^2	CM^2	IN	CM	IN^3	CM^3	LITER	IN^3	GAL.	CM^3	LITER		
2.08	13.42	4	10.2	8.38	137.32	0.137	670	2.9	10.986	11	850 Series	30:1

245-556 Fluid Pump Service Information

IMPORTANT: Use of non-Titan manufactured service parts may void warranty.

The 245 Series Pump should receive a routine servicing after approximately 1000 hours of use or earlier if there is excessive leakage from the top packing, or if pump strokes become faster on one stroke or another. The use of Titan **Lubrisolv Part # 310-200** is recommended as an upper packing lubricant. DO NOT SUBSTITUTE oil, water or solvent for an upper packing lubricant.

Disassembly Procedure

1. Test pump before disassembly. Follow test procedure in Troubleshooting Guide - Fluid Section.
2. Remove siphon hose assembly.
3. Remove stanchion nuts (19) and washers (20).
4. If the fluid section is connected to an air motor, hold the air motor piston rod at the wrench flats and unthread coupling nut (24) to separate pump from motor.

   If the fluid section is connected to a hydraulic motor, remove allen set screw between the two flats on hydraulic motor rod. Hold the hydraulic motor rod at the wrench flats and unthread coupling nut (24) to separate pump from hydraulic motor.

IMPORTANT: Never use a pipe wrench, pliers, etc. on the chrome part of hydraulic, air or fluid section rod.

5. Remove roll pin (22) or jam nut on connecting rod (23). Remove connecting rod (23) from displacement rod (18).
6. Unthread and remove foot valve (15).
7. Remove PTFE O-ring (13), O-ring (14), ball cage retainer (17), ball cage (12) and ball (16).
8. Remove cylinder (6).
9. Remove displacement rod (18).
10. Place piston seat (11) in a vise and use a wrench on the flats to remove the displacement rod (18) from the piston seat (11).
11. Remove lower packing set (10), spring (9), spring retainer (8) and ball (7).
12. Remove upper spring retainer (4), spring (3), PTFE O-ring (5) and packing set (2).
13. Clean and inspect all parts. Inspect rod's and cylinder's hard chrome for grooves, dents or worn areas. Replace if hard chrome is damaged. Inspect valve seats and replace if cracked or worn.

Reassembly Procedure

1. Insert new upper packing set (2) into pump block (1)

IMPORTANT: Peak of "V" packings must point upwards on reassembly.

2. Insert upper spring (3); small end of spring must go toward the packing set.
3. Insert spring retainer (4) and new O-ring (5) into pump block (1).

IMPORTANT: Lubricate all O-rings before assembly.

4. Place new lower packing set (2) over piston seat (11).

IMPORTANT: Peak of "V" must point downward on reassembly.

5. Replace spring (9), spring retainer (8) and ball (7) on piston seat (13).
6. Thread piston seat back onto displacement rod (18).

IMPORTANT: Use Loctite on clean threads.

7. Insert displacement rod assembly through upper packing set (2) in pump block (1).
8. Thread cylinder (6) back into into pump block (1).
9. Insert new ball (16), ball cage (12), ball cage retainer (17) new O-ring (14) and new PTFE O-ring (13).

IMPORTANT: Lubricate all O-rings into foot valve (15).

NOTE: Ball cage pin (12a) to be in lower position unless pump is to be used for heavy block filler or roofing materials.

10. Thread foot valve (15) back into cylinder (6).
11. Place connecting rod (23) through coupling nut (24) and thread connecting rod (23) into displacement rod (18).
12. Replace roll pin (23) into displacement rod (18).

NOTE: It is not necessary to overtighten foot valve and cylinder into pump block. O-ring seals perform sealing function without excessive tightening. Full thread engagement is sufficient. The foot valve (16) may be rotated back up to 1/2 turn from full engagement for convenient hose position.

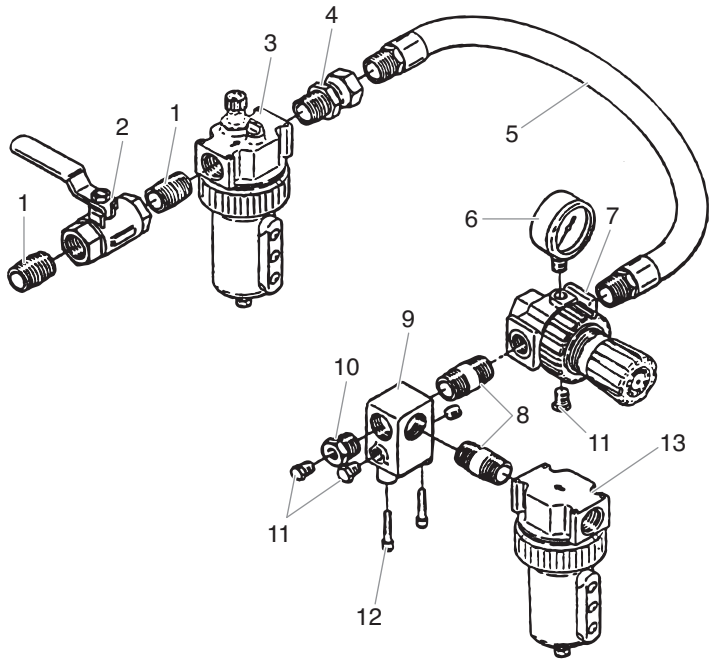
For siphon hose attachment, it is critically important that the thread of the siphon hose fit snugly into the foot valve with the hose assembly couplings PTFE-taped and sealed to prevent air inlet leakage.

Service Kits

Pump service kit, minor					
ITEM NO.	**PART NO.**	**DESCRIPTION**	**245-050**	**245-051**	**245-052**
2	240-001	Packing set, upper, Poly/Lthr	1		
2	240-101	Packing set, upper, Leather		1	
2	240-201	Packing set, upper, PTFE			1
5	892-323	O-ring, PTFE	1	1	1
7	920-103	Ball	1	1	1
10	240-001	Packing set, lower, Poly/Lthr	1		
10	240-101	Packing set, lower, leather		1	
10	240-201	Packing set, lower, PTFE			1
13	891-403	O-ring, PTFE	1	1	1
14	182-007	O-ring	1	1	1
16	314-180	Ball	1	1	1
	426-051	Loctite Sealant	1	1	1

Pump service kit, major					
ITEM NO.	**PART NO.**	**DESCRIPTION**	**245-500**	**245-501**	**245-502**
	245-050	Minor kit	1		
	245-051	Minor kit		1	
	245-052	Minor kit			1
6	245-012	Cylinder	1	1	1
9	245-014	Spring, packing	1	1	1
18	245-009	Displacement rod	1	1	1

Admiral™ 928-835 Air Assembly

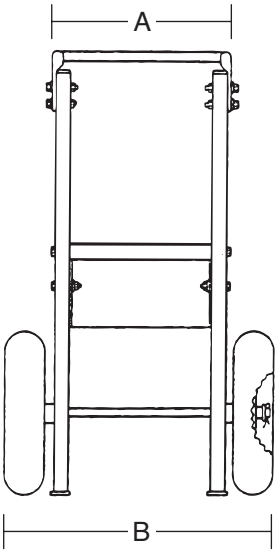


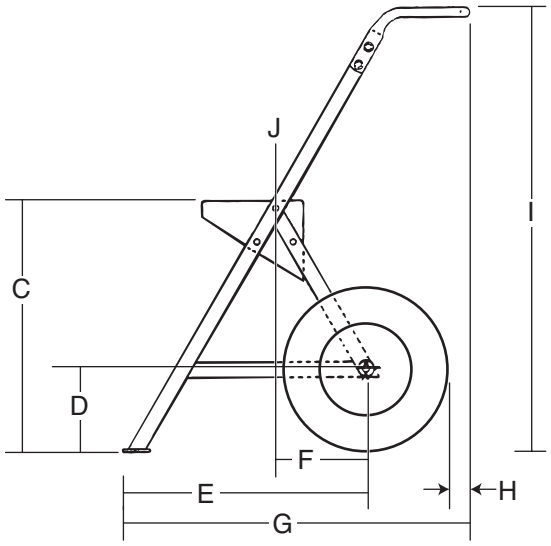
Air Assembly 928-835			
ITEM NO.	**PART NO.**	**DESCRIPTION**	**QTY.**
1	112-302	Nipple, 3/4”	2
2	940-562	Valve, vented, 3/4”	1
3	151-157	Lubricator, 3/4”	1
4	138-037	Adapter, swivel	1
5	542-035	Air hose assembly	1
6	227-100	Gauge, air	1
7	921-734	Regulator, air, 3/4”	1
8	112-301	Nipple, 3/4”	2
9	928-916	Air block, 3/4”	1
10	929-062	Bushing, hex	1
11	227-027	Plug, pipe, 1/2”	3
12	858-647	Screw	2
13	141-159	Moisture separator, 3/4”	1
	311-100	Lubricant, Air Care™	*

* Filled at factory

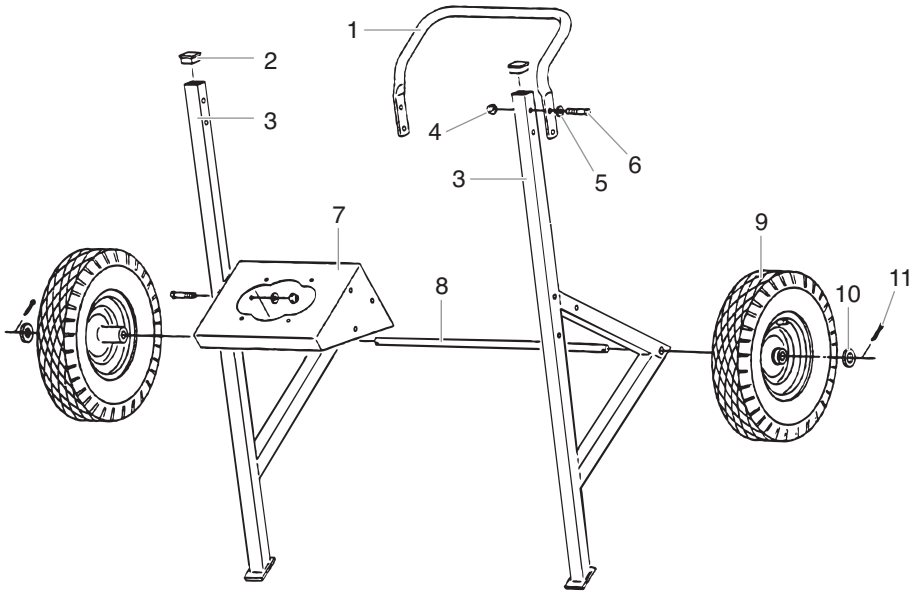
Repair Kits	
	Repair Kit Part No.
For 921-734 Air regulator **order**	924-054
For 141-159 Moisture separator **order**	141-050
For 151-157 Lubricator **order**	151-050

Admiral™ Heavy Duty Cart



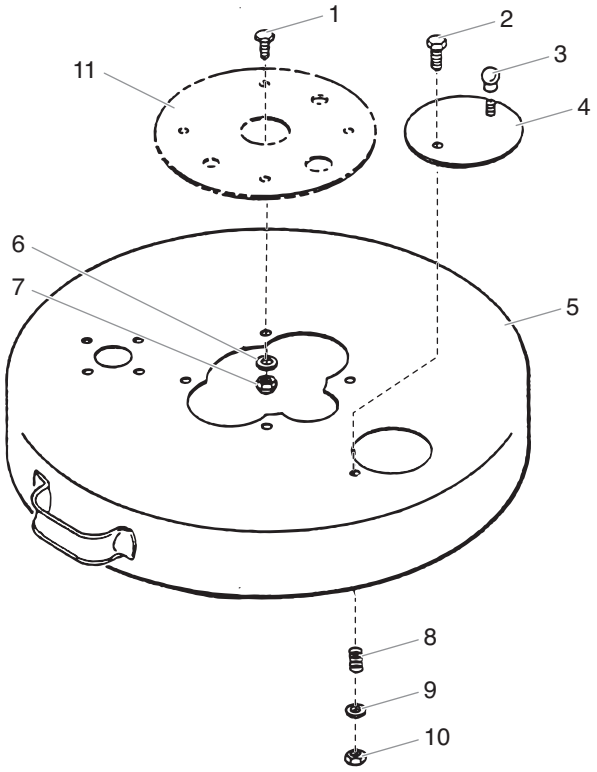


Cart Dimensions	
A	17 3/8”
B	26 3/4”
C	24 1/2”
D	8”
E	24 1/4”
F	9 1/4”
G	34 1/4”
H	2”
I	43 5/8”
J	CL of pump



Part No. 590-301 Heavy Duty Cart Assembly			
ITEM NO.	**PART NO.**	**DESCRIPTION**	**QTY.**
1	590-352	Handle	1
2	935-014	End cap	2
3	590-350	Frame	2
4	862-410	Nut, 3/8” - 16	10
5	862-001	Washer, 3/8”	14
6	862-472	Screw, 3/8” - 16 x 2 1/4”	10
7	590-351	Bracket	1
8	590-353	Axle	1
9	670-105	Wheel, 16 inch	2
10	870-003	Washer	2
11	570-010	Cotter key	2

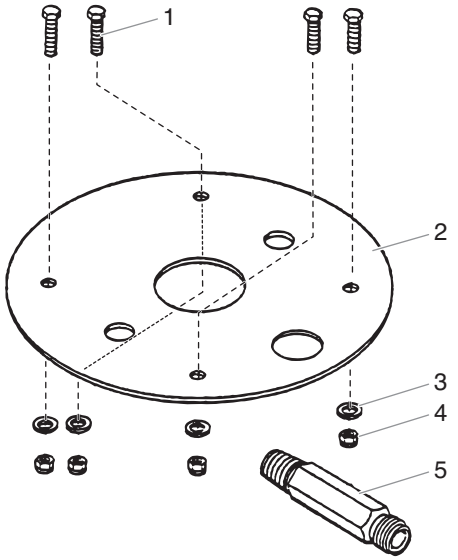
Admiral™ Pump Mount Drum Cover



55 Gal. Drum Cover Assembly, Part No. 219-600			
ITEM NO.	**PART NO.**	**DESCRIPTION**	**QTY.**
1	860-535	Screw, HH, 5/16 - 18 x 7/8”	4
2	862-452	Screw, HH, 3/8 - 16 x 1.5”	1
3	219-506	Knob, plastic	1
4	219-505	Plate, inspection	1
5	219-555	Cover, 55 Gal. Drum	1
6	860-003	Washer, flat, 5/16	4
7	860-502	Nut, Ela. Stp 5/16 - 18	4
8	738-213	Spring	1
9	862-001	Washer, flat, 3/8”	1
10	862-411	Nut, Flex Lock, 3/8 - 16	1
11*	219-504	Plate, adapter	*

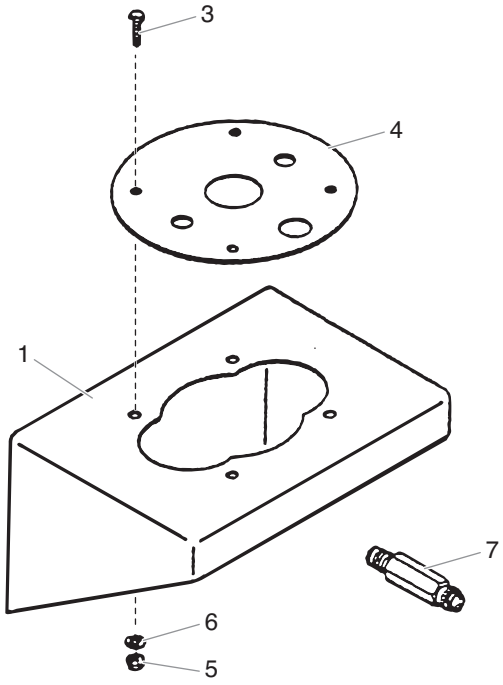
* Not included in this assembly

Admiral™ Pump Mounts



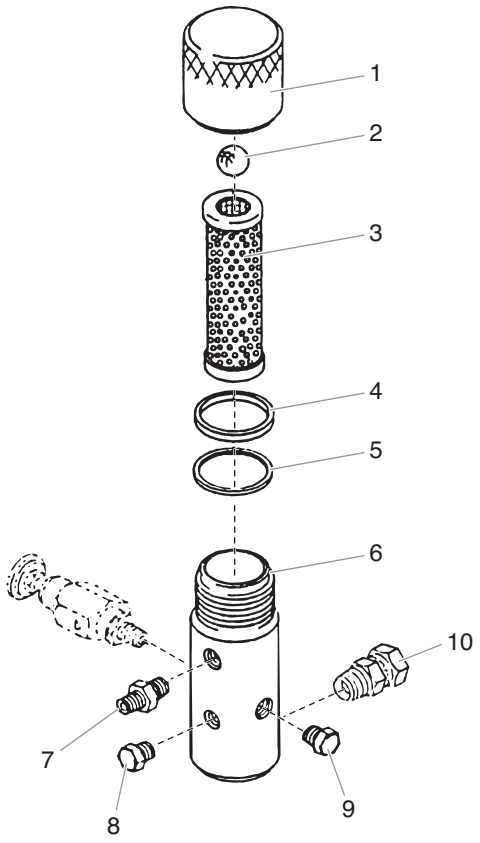
Mounting kit for 2 stanchion pump			Part # 219-100*	Part # 219-200
ITEM NO.	PART NO.	DESCRIPTION	QTY.	QTY.
1	860-535	Screw	4	4
2	219-504	Adapter plate	1	1
3	860-003	Washer	4	4
4	860-502	Nut	4	4
5	191-444	Nipple, extension	1	

* For use with outlet filters and surge chambers



Wall Bracket 590-300			
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	590-351	Bracket	1
2	219-100	Mounting kit	1
3	860-535	Screw (4)	
4	219-504	Adapter plate (1)	
5	860-502	Nut (4)	
6	860-003	Washer (4)	
7	191-444	Nipple (1)	

Admiral™ Outlet Accessories - 920 Outlet Manifold Filter Assembly



Outlet Manifold Filter Assembly					
ITEM NO.	PART NO.	DESCRIPTION	5000 psi 920-554	5000 psi 920-556	6000 psi 920-605
1	920-917	Cap, filter (5000 psi)	1	1	
1a	920-930	Cap, filter (6000 psi)			1
2	920-103	Ball, S.S.	1	1	1
3	920-004	Screen, filter, 50 mesh	1		1
3a	920-005	Screen, filter, 100 mesh		1	
4	920-006	Gasket, PTFE (thick)	1	1	1
5	920-070	Gasket, PTFE (thin)	1	1	1
6	920-927	Body, filter (5000 psi)	1	1	
6a	920-931	Body, filter (6000 psi)			1
7	812-003	Nipple, hex	1	1	1
8	227-027	Plug, pipe	1	1	
9	227-033	Plug, pipe	1	1	1
10	200-555	Adapter, swivel	1	1	
10a	200-554	Adapter, swivel			1

Admiral™ 920 Outlet Manifold Filter Assembly Service Instructions

Cleaning

Clean filter regularly. Dirty or clogged filters can greatly reduce filtering ability and cause a number of system problems including poor spray patterns, clogged spray tips, etc.

To clean the filter, shutoff system and relieve all system pressure. See the Pressure Relief Procedure on page 7.

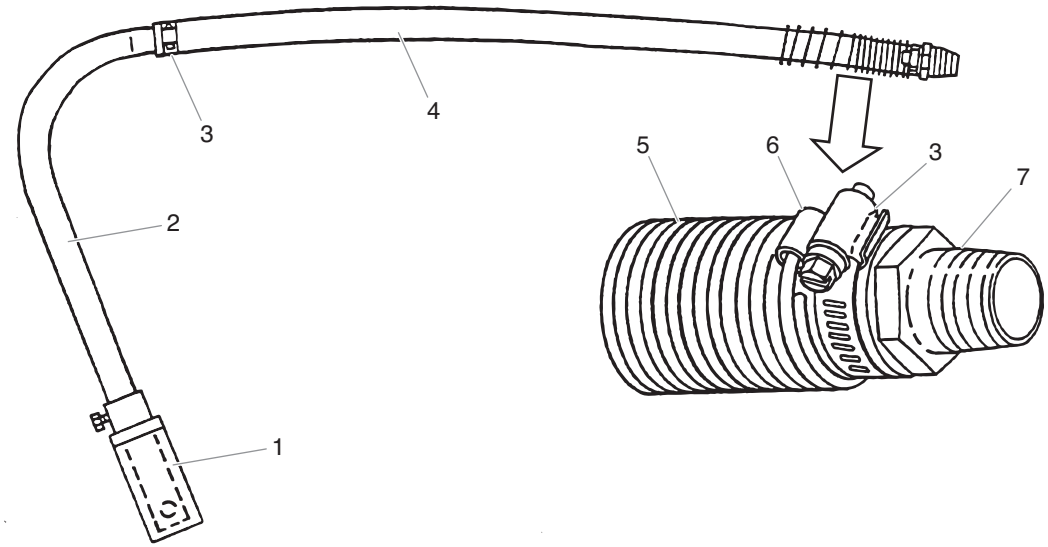
1. Remove filter cap (1).
2. Pull filter element with check ball (3) straight out of the filter body (6).
3. Thoroughly clean inside filter body (6), filter element with check ball (3) and filter cap (1) with appropriate solvent. Use care in handling parts as dirt, debris, scratches or nicks may prevent O-rings or gaskets from sealing.

The 920 Series Filter Elements filter from the inside out. Be certain to clean the screen element thoroughly on the inside. Soak in solvent to loosen hardened paint, etc. or replace.

Part No. 920-050 Filter Service Kit			
ITEM NO.	**PART NO.**	**DESCRIPTION**	**QTY.**
2	920-103	Ball	1
4	920-006	Gasket, PTFE	1
5	920-070	Gasket, PTFE	1

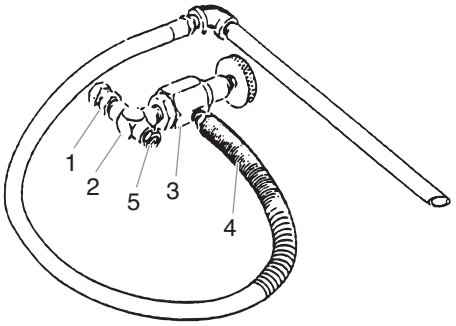
Specifications		
Max. Working Pressure	5000 psi (345 bar)	6000 psi (413 bar)
Filter Area	18in^2 (116 cm^2)	
Outlet Ports	(1) 1/4” NPT (F) for bleed valve (1) 3/8” NPT (F) with 1/4 NPSM (M) hose connection (1) 3/8” NPT (F) plug for additional gun hookup.	
Wetted parts	Carbon steel with electroless nickel and cadmium plating, stainless steel, PTFE	

Admiral™ Fluid Accessories - Siphon Hoses

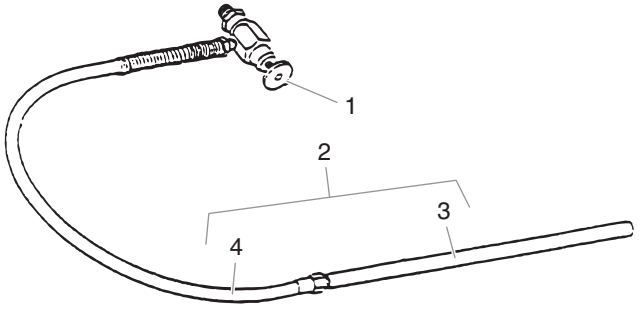


Siphon Hose Assemblies						
ITEM NO.	**PART NO.**	**DESCRIPTION**	**103-806**	**103-807**	**103-808**	**103-810**
1	103-625	Rock Catcher	1			
1a	710-046	Filter screen		1	1	
1b	103-665	Strainer, 30 mesh				1
2	103-585	Siphon tube, 1” x 36”			1	
2a	103-595	Siphon tube, 3/4” x 36”	1			
2b	0509763	Siphon tube, 1” x 17”		1		1
3	103-682	Clamp, hose, 1/2”	2			
3a	103-679	Clamp, hose, 1”		2	2	2
4	420-650	Hose, fluid, 3/4”	6’	1’		
4a	420-700	Hose, fluid, 1”			6’	4’
5	103-130	Spring	1			
6	103-119	Clip, hose guard	1	1	1	1
7	194-661	Adapter	1			
7a	194-771	Adapter		1	1	1
8	205-559	Elbow				1

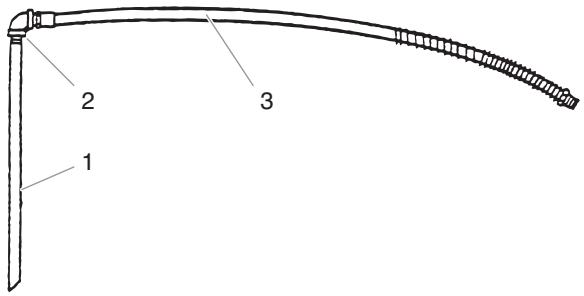
Admiral™ Fluid Accessories



Outlet Tee Assembly with Pressure Bleed Valve Part # 840-205			
ITEM NO.	**PART NO.**	**DESCRIPTION**	**QTY.**
1	200-554	Adapter, swivel	1
2	817-003	Tee	1
3	945-600	Pressure bleed valve	1
4	103-106	Bleed line assembly	1
5	813-555	Nipple, hex	1

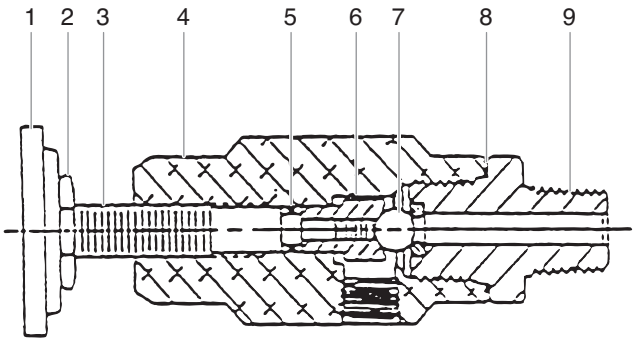


840-209 Bleed Line Assembly			
ITEM NO.	**PART NO.**	**DESCRIPTION**	**QTY.**
1	944-620	Valve, bleed	1
2 3 4	103-101 103-117 538-030	Bleed line assembly Tube (1) Hose assembly (1)	1



103-106 Bleed Line Assembly			
ITEM NO.	**PART NO.**	**DESCRIPTION**	**QTY.**
1	103-317	Tube	1
2	201-555	Elbow	1
3	538-031	Hose assembly	1

Admiral™ Outlet Accessories



944-620 Bleed Valve Assembly			
ITEM NO.	PART NO.	DESCRIPTION	QTY.
1	944-005	Knob	1
2	860-721	Nut, lock	1
3	944-023	Valve stem	1
4	944-020	Valve body	1
5	944-004	O-ring	1
6	944-026	Valve stem stop	1
7	569-170	Ball, T.C.	1
8	945-003	Gasket, copper	1
9	944-904	Valve seat	1

Service Instructions

The 944-620 Series Bleed Valve has a tungsten carbide seat (9) and should not require frequent replacement. The tungsten carbide ball (7), in normal service, will last a long time because it rotates and wears evenly. If there is leakage, replace the ball.

IMPORTANT: Open the adjustment knob (1) to full counterclockwise position before unthreading valve seat (9) from valve body (4).

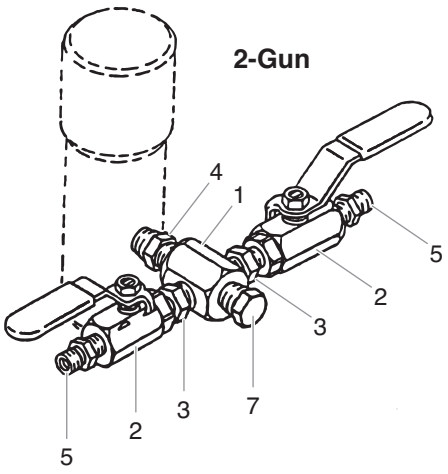
If the valve stem (3) is rotated inwardly with the ball removed, the PTFE O-ring (5) may require replacement. If there has been leakage from the valve stem, the PTFE O-ring should be replaced.

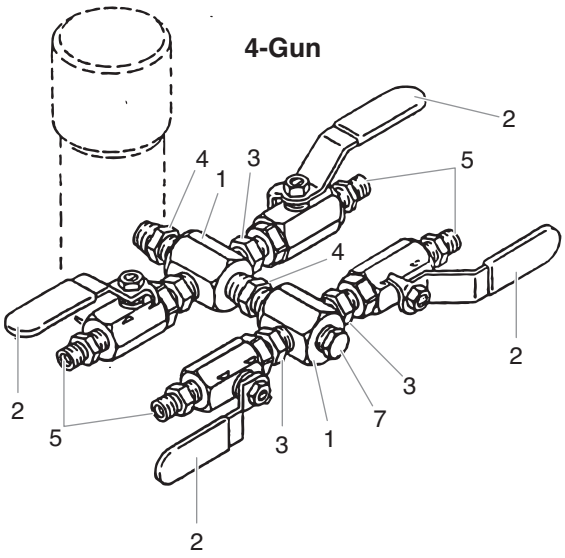
IMPORTANT: The valve stem stop (6) must be unthreaded from the valve stem (3) with a socket screwdriver, then the valve stem can be threaded out of the valve body.

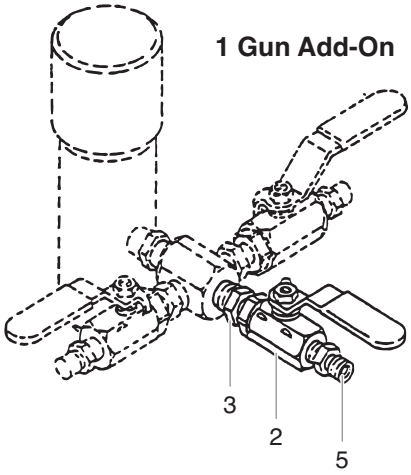
IMPORTANT: All non-moving threads must be assembled with Loctite sealant, Titan part # 426-051.

944-050 Bleed Valve Service Kit			
ITEM NO.	PART NO.	DESCRIPTION	QTY.
5	944-005	O-ring	1
7	569-170	Ball, T.C.	1
8	945-003	Gasket, copper	1

Admiral™ Outlet Accessories - Gun Manifold Assemblies







Gun Manifold Assemblies								
ITEM NO.	PART NO.	DESCRIPTION	975-102	975-104	975-111	975-302	975-304	975-311
			2 - GUN 1/4"	4 - GUN 1/4"	1 - GUN ADD-ON 1/4"	2 - GUN 3/8"	4 - GUN 3/8"	1 - GUN ADD-ON 3/8"
1	970-100	Manifold	1	2		1	2	
2	940-553	Valve, ball	2	4	1			
2a	941-555	Valve, ball				2	4	1
3	814-002	Nipple, hex	2	4	1			
4	814-004	Nipple, hex	1	2		3	6	1
5	227-006	Nipple, hex	2	4	1			
6	808-555	Nipple, hex				2	4	1
7	227-033	Plug, pipe	1	1		1	1	

Admiral™ Key Accessories and Service Kits

These items may be purchased separately from your local Titan distributor.

Part No.	Description
103-806	Siphon hose assembly with rock catcher 3/4" x 6'
103-807	Siphon hose assembly with rock catcher 1" x 4'
103-810	Siphon hose assembly with 30 mesh strainer 1" x 4'
103-625	Rock catcher
103-627	Rock catcher
103-665	Strainer, 30 mesh
920-001	Paint filter element, 5 mesh (for multicolors and heavy materials)
920-004	Paint filter element, 50 mesh (for latex and normal architectural materials)
920-005	Paint filter element, 100 mesh (for stains, lacquers and fine finish materials)
711-001	Gun and hose kit - for architectural coatings (includes 520-100 gun with 641-517 SC-5 reversible tip and 250-514 1/4" x 50' 3300 psi airless hose assembly)
711-002	Gun and hose kit - for architectural coatings (includes 520-100 gun with 641-517 SC-5 reversible tip and 250-114 1/4" x 50' 5000 psi airless hose assembly)
160-124	Nylon paint strainer - 1 gallon (pack of 24)
160-524	Nylon paint strainer - 5 gallon (pack 24)

Part No.	Description
101-208	Grounding clamp
101-212	Grounding wire, 12 gauge x 25'
310-203	Lubrisolv™ upper packing lubricant, 8 ounces
310-200	Lubrisolv™ upper packing lubricant, 1 quart
920-050	Service kit for paint filter
850-050	Service kit for air motor
155-055	Service kit for fluid pump 155-559
182-050	Service kit for fluid pump 181-556
185-050	Service kit for fluid pump 185-551
245-051	Service kit for fluid pump 245-556
975-102	2-gun manifold with ball valves, 1/4"
975-104	4-gun manifold with ball valves, 1/4"
975-111	1-gun add-on, 1/4"
975-302	2-gun manifold with ball valves, 3/8"
975-304	4-gun manifold with ball valves, 3/8"
975-311	1-gun add-on, 3/8"

Titan Warranty for the Admiral™ Airless Sprayers

Titan Tool, Inc., ("Titan") warrants that at the time of delivery to the original purchaser for use ("End User"), the equipment covered by this warranty is free from defects in material and workmanship. With the exception of any special, limited, or extended warranty published by Titan, Titan's obligation under this warranty is limited to replacing or repairing without charge those parts which, to Titan's reasonable satisfaction, are shown to be defective within twelve (12) months after sale to the End User. This warranty applies only when the unit is installed and operated in accordance with the recommendations and instructions of Titan.

This warranty does not apply in the case of damage or wear caused by abrasion, corrosion or misuse, negligence, accident, faulty installation, substitution of non-Titan component parts, or tampering with the unit in a manner to impair normal operation.

Defective parts are to be returned to an authorized Titan sales/service outlet. All transportation charges, including return to the factory, if necessary, are to be borne and prepaid by the End User. Repaired or replaced equipment will be returned to the End User transportation prepaid.

THERE IS NO OTHER EXPRESS WARRANTY. TITAN HEREBY DISCLAIMS ANY AND ALL IMPLIED WARRANTIES INCLUDING, BUT NOT LIMITED TO, THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, TO THE EXTENT PERMITTED BY LAW. THE DURATION OF ANY IMPLIED WARRANTIES WHICH CANNOT BE DISCLAIMED IS LIMITED TO THE TIME PERIOD SPECIFIED IN THE EXPRESS WARRANTY. IN NO CASE SHALL TITAN LIABILITY EXCEED THE AMOUNT OF THE PURCHASE PRICE. LIABILITY FOR CONSEQUENTIAL, INCIDENTAL OR SPECIAL DAMAGES UNDER ANY AND ALL WARRANTIES IS EXCLUDED TO THE EXTENT PERMITTED BY LAW.

TITAN MAKES NO WARRANTY AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO ACCESSORIES, EQUIPMENT, MATERIALS OR COMPONENTS SOLD BUT NOT MANUFACTURED BY TITAN. THOSE ITEMS SOLD, BUT NOT MANUFACTURED BY TITAN (SUCH AS GAS ENGINES, SWITCHES, HOSES, ETC.) ARE SUBJECT TO THE WARRANTY, IF ANY, OF THEIR MANUFACTURER. TITAN WILL PROVIDE THE PURCHASER WITH REASONABLE ASSISTANCE IN MAKING ANY CLAIM FOR BREACH OF THESE WARRANTIES.

Material Safety Data Sheets (MSDS) are available on Titan's website or by calling Customer Service.

TITAN™

United States Sales & Service

Phone: 1-800-526-5362
Fax: 1-800-528-4826

1770 Fernbrook Lane
Minneapolis, MN 55447
www.titantool.com

International
international@titantool.com
Fax: 1-763-519-3509

1770 Fernbrook Lane
Minneapolis, MN 55447