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FTI OPERATIONS, MAINTENANCE, AND REPAIR MANUAL

FT-200 Series PowerPak

Part #2720-016
Revision N

May 4, 2022

CE

Original Instruction

FATIGUE TECHNOLOGY

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The detailed tooling information in this manual was compiled and written by FTI. The tooling was designed specifically for use with FTI's Cold Expansion (Cx™) Systems. FTI cannot be held responsible for damage or injury as a result of operating this equipment if it is used for other than the process intended, with any other tooling not provided by FTI, or not used in accordance with the instructions contained in this manual. To avoid personal injury, please observe all safety precautions and instructions. FTI reserves the right to change specifications or configurations of equipment detailed in this manual as part of our ongoing technical and product improvement programs. If you have any questions about the use or serviceability of this equipment, please contact our Sales Department.

FTI's systems and processes are the subject matter of one or more of the following patents: 4,809,420, 4,885,829, 4,934,170, 5,083,363, 5,096,349, 5,103,548, 5,127,254, 5,129,253, 5,218,854, 5,245,743, 5,305,627, 5,341,559, 5,380,136, 5,405,228, 5,433,100, 5,468,104, 6,077,010, 6,183,180, 6,487,767, 6,792,657, 6,990,722, 7,024,908, 7,100,264; 1,061,276, 513,898, 692015124, 581,385, 69310828, 468,598, 69105390, 643,231, 69414946, 696,686, 785,366, 1032769, and other patents pending. These systems and processes are tooling critical and must be performed in accordance with FTI's specifications or controlling documents. To ensure proper results from FTI's cold expansion systems and to be licensed to use FTI's patented processes, it is essential that FTI's complete integrated system of tooling be purchased and utilized. The use of tooling purchased from other than a licensed supplier could jeopardize fatigue life enhancement and may constitute patent infringement.

FTI reserves the right to change the specifications or configurations of tooling detailed in this manual as part of its ongoing technical and product information program. Should inconsistencies occur between your tooling and this manual, please contact our Sales Department.

ABOUT FATIGUE TECHNOLOGY

FTI has provided innovative solutions to fatigue problems in metal structures since 1969. Complete systems of tooling are used worldwide to enhance the fatigue life of holes in airframes, turbine engines, and other critical structures.

The FTI staff of professionals provides a full range of support services including:

- Application engineering
- Detailed project planning, implementation and management
- On-site assistance, including training and tool room setup

The Sales Department is always available to assist with special fatigue enhancement requirements. Please contact FTI with questions at any time.

This manual can be made available in other languages. Please contact the Sales Department to request a copy.

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SECTION 1.0: INTRODUCTION

This instruction manual contains information on the operation and maintenance of the FT-200 series hydraulic PowerPaks. To obtain optimum performance and many years of trouble-free service, operate the PowerPak properly and follow maintenance procedures carefully. The key to trouble-free operation is maintaining a clean air supply and clean hydraulic oil. **Before operating the PowerPak, read this manual** and retain it for future reference.

1.1 ABOUT THE FT-200 SERIES POWERPAKS

The FT-200 Series is the standard PowerPak that best supports the FTI system of tooling. It is used to operate the FTI family of puller units, including the Big Brute, Medium Brute and Little Brute. A smaller, more portable PowerPak (FT-20) is also available.

The FT-200 contains an air-operated hydraulic pump that generates up to 10,000±500 psi (689.5±34.5 bar) hydraulic pressure. The external pressure regulator may be used to limit the maximum pressure output. The air motor is driven by compressed air at 90 to 120 psi (6.2 to 8.3 bar) and 40 to 50 cubic feet per minute (cfm) (1132.7 to 1415.9 liter/minute) flow through a 1/2-inch (12.7 mm) inside diameter air hose.

1.2 IDENTIFICATION OF FT-200 SERIES POWERPAKS

There are several different models in the FT-200 series. The primary identification method is reading the model number stamped on the data plate on your FT-200 series pump. Alternative methods of identification are:

- Model FT-200 does not have a filler/dipstick or an external filter/lubricator protruding from the shroud.
- Model FT-200A has a filler/dipstick protruding above the shroud, but no external filter/lubricator protruding from the shroud.
- Model FT-200B has both a filler/dipstick and a filter/lubricator protruding from the shroud.
- Model FT-200M is the same as FT-200B above, but is mounted on a cart (illustrated in Section 7.0).
- Model FT-200D has new closed bracket, air filter, lubricator, and muffler.
- Model FT-220 has directional control knob above dual hydraulic connectors (one male, one female).

FT-200 revisions are identified below along with the principal changes made for that revision:

- FT-200: Original version
- FT-200A: New valve, exterior filler/dipstick
- FT-200B: Filter/lubricator air preparation unit
- FT-200C: FT-200B without castor wheels—used only for FT-200M assembly, not for sale
- FT-200M: Cart with FT-200C mounted on it
- FT-200D: Closed bracket, new air filter, lubricator, and muffler
- FT-220: Same as FT-200B but with directional flow control valve for use with double-acting cylinders

If you are unsure of which FT-200 series PowerPak you have, please contact FTI for assistance in determining which revision you have. An FT-200B-to-FT-200D conversion kit is offered if you would like to convert your PowerPak to the most recent version. If you have an earlier version, please contact FTI Sales for assistance in converting your pump.

1.3 GENERAL SPECIFICATIONS (applicable to all models)

Dimensions:	In the box: 26 x 26-1/8" x 16-1/4" (660.4 x 663.6 x 412.8 mm)
Weight:	65 lbs. (29.5 kg) dry; 85 lbs. (38.6 kg) shipping weight
Operating Hydraulic Pressure:	10,000±500 psi (689.5±34.5 bar) maximum
Air Supply:	Use of air pressure regulator recommended 90 to 120 psi (6.2 to 8.3 bar), clean and dry; 40 to 50 cfm (1132.7 to 1415.9 liter/minute) flow
Air Supply Hose:	1/2 inch (12.7 mm) inside diameter
Air Lubricator Fluid:	5-20w synthetic oil
Hydraulic Fluid Capacity:	2 U.S. gallons (7.8 liters)
Hydraulic Fluid Characteristics:	Power Team Hydraulic Oil ASTM 215; AW ISO 46
Viscosity Index:	100 minimum
Viscosity at 210°F:	48° SUS
Viscosity at 100°F:	15° SUS
Specific Gravity at 60°F:	31.0
Flash Point, degrees:	440°F (227°C)
Fire Point, degrees:	490°F (254°C)
Pour Point, degrees:	-30°F (-34°C) from PowerTeam Specification
Aniline Point, degrees:	210°F/220°F (99°C/104°C)
Paraffinic Base Color:	ASTM 2.0
Suitable Substitutes for Hydraulic Fluid:	Power Team Hydraulic Oil #9637; or U.S. MIL-SPEC #5606; MIL-PRF-83282; FTI Part Number 1045-154; Aeroshell 41; ASTM 215; Enerpac HF-100
Emission sound pressure level at the work station (according to EN ISO 11201:1995)	(FT-200 Model) On load: <83.1 dB(A)

IMPORTANT: FTI completed a risk assessment on this unit at our factory. Any modifications done by a third party or the final user are excluded from that risk assessment. As a result, modifications done by a third party or the final user nullify the CE marking.

SECTION 2.0: SAFETY

Consult the appropriate puller unit manual for safety precautions before installing a puller unit onto a PowerPak.

When used in accordance with these instructions, the PowerPak is safe and easy to use. All general safety precautions associated with hydraulic and pneumatically operated power tools should be observed. Many of these are noted in this section. Ultimately, the operator is responsible for personal safety; however, the following general safety precautions should be observed.

Note that the FT-200 series pumps are not sealed units and must not be tipped or shipped wet. Tipping the unit while filled will result in oil leaks, and oil may enter the air motor and cause operational issues.

1. Wear eye and ear protection when operating the PowerPak.

2. Disconnect the air supply when:
   - Maintenance is to be performed.
   - Hydraulic hose is disconnected.
   - PowerPak is not in use.

3. In the event of a ruptured or leaking hydraulic hose, IMMEDIATELY RELEASE THE TRIGGER AND DISCONNECT THE AIR LINE from the PowerPak at the air coupler (see Figure 2.0-1). **Never use your hands** to grasp a leaking hose under pressure. The force of escaping hydraulic fluid could cause serious injury. If hydraulic oil should penetrate the skin, medical attention must be sought immediately.

Figure 2.0-1
Air Disconnect (FT-200D Model)

4. **DO NOT** attempt to disconnect the hydraulic hose while the pump is running.

5. **DO NOT** expose hoses to potential hazards such as extreme heat or cold, sharp surfaces, heavy impact, or vehicular traffic.

6. **DO NOT** allow hoses to kink, twist, curl or bend so tightly that the oil flow within the hose is blocked or reduced.

7. Periodically inspect the hose and fittings for wear or damage that could cause premature failure of the hose or fittings and possibly result in injury. Replace damaged hoses or fittings prior to use.

8. Hose material and coupler seals must be compatible with the hydraulic fluid used (see Section 1.2 for hydraulic fluid requirements). Hoses and fittings must have a minimum working pressure of 10,000 psi with a minimum burst pressure of 20,000 psi. Note: Hydraulic hoses supplied by FTI meet these requirements.

9. Hoses must not come in contact with toxic materials such as creosote-impregnated objects and some paints. Keep clean and never paint couplers or hoses. Hose deterioration due to chemical degradation may cause the hose to fail under pressure.

10. Use caution when operating the PowerPak near electric power sources. The PowerPak is not generally insulated for coming into contact with electric power sources.

11. Do not use in potentially explosive atmospheres.

12. Three ISO safety labels have been placed on machinery to alert the operator of certain precautions that must be met to ensure proper and safe operation of the machinery. These safety labels and their definitions are shown in Figure 2.0-2.

6017-ISO: "Read Operator's Manual"

The operator must read the Operator's Manual prior to operating the machinery.

6040-ISO: "Wear Eye Protection"

The operator must wear eye protection while operating the machinery.

6041-ISO: "Wear Ear Protection"

The operator must wear ear protection while operating the machinery.

Notes:
a. Safety labels are not shown actual size. Actual size is Ø0.75 inch (Ø19.05 mm).
b. Actual colors on the safety labels are a white image on a blue background.

Figure 2.0-2
Safety Labels

13. **DO NOT** exceed the psi hydraulic pressure rating noted on the pump nameplate or tamper with the internal high relief valve. Creating pressures beyond rated capacities may result in personal injury.

14. **WARNING**: For safety, do not exceed recommended air pressure of 90 to 120 psi (6.2 to 8.3 bar). A regulated air supply is recommended.

15. Before operating the pump, tighten all hose connections using the proper tools. Do not overtighten the connections. Connections need only be tightened securely and leak-free. Overtightening may cause premature thread failure, or cause high-pressure fittings to split at pressures lower than their rated capacities.

16. Periodically pump clean oil through the entire length of hose, then pressurize the hole and check for leaks at the crimped connectors, between the hose material and the fitting, and between the fitting and coupler.

17. Before replenishing the oil level, retract all cylinders to prevent overfilling the pump reservoir. An overfill may cause personal injury due to excess reservoir pressure created when cylinders are retracted.

18. **DO NOT use the hose to move attached equipment.** Stress may damage the hose and cause personal injury.

SECTION 3.0: OPERATING INSTRUCTIONS

Become familiar with these instructions before operating the PowerPak.

3.1 HYDRAULIC POWERPAK SETUP PROCEDURE AND OPERATION

See Section 6.0 and beyond for part identification.

Note: Prior to shipping from FTI, all hydraulic fluid was drained from the FT-200 to comply with international transport regulations. Before operating the PowerPak, fill the hydraulic reservoir with the PowerTeam ASTM 215 hydraulic oil (or equivalent) shipped with the unit. Refer to Section 4.3 (Filling Hydraulic Fluid Reservoir) for instructions. If this unit is to be reshipped, refer to Section 4.6 (Transportation and Shipment) for instructions.

Conduct the following procedures **BEFORE ACTUATION**:

1. Use dipstick to check oil level. If model doesn't have dipstick/filler tub combination, the level should be within 1 inch (25.4 mm) of the top of the reservoir. If oil level is down, see instructions in Section 4.3 (Filling Hydraulic Fluid Reservoir).

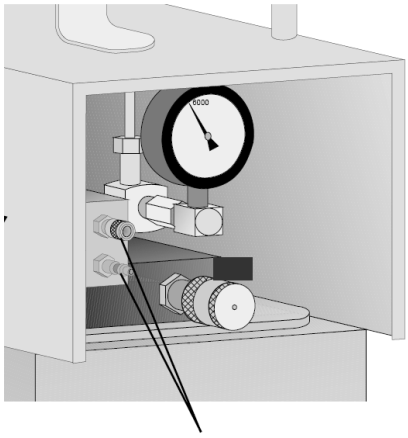


Figure 3.0-1
Air Fittings

2. Inspect all threads and fittings for signs of wear or damage and replace them if necessary.

3. Uncoil the hose assembly from the puller unit to be used and inspect all threads, couplings and hoses for damage and degradation.

4. Remove the dust cap from the hydraulic fitting. Prior to making connection, wipe couplers clean of any dirt or metal chips. Completely thread the hydraulic hose from a puller unit (male) onto the quick coupler hydraulic fitting (female) of the PowerPak.

5. Connect the male/female air quick-disconnects from a puller unit onto the coupler plug and coupler socket (Items 33 and 34, Figure 6.1-1*) fittings of the PowerPak (see Figure 3.0-1).

6. Fill the air lubricator with the supplied SAE No. 30 non-detergent oil and adjust to one to three drops of oil per minute.

7. Connect the female quick-disconnect for 1/2-inch (12.7 mm) ID air line to the male air inlet fitting (Item 1, Figure 6.4-1*). The air supply must be clean and dry, and between 90 and 120 psi (6.2 and 8.3 bar) at a flow of 40 to 50 cfm (1132.68 to 1415.9 liter/minute). Use of air pressure regulator recommended.

*Note: Item numbers refer to FT-200D parts detailed in Section 6.0. Corresponding parts for other models can be found by locating the section appropriate for your model.

3.2 ACTUATION OF THE POWERPAK

1. The PowerPak can be activated only when connected to a FTI puller unit.

2. Activate the PowerPak by depressing the trigger on the handle of the puller unit. Hydraulic pressure is transmitted through the hose to the cylinder of the puller unit, which then retracts the hydraulic piston.

3. Releasing the trigger allows the pilot valves to shift and returns the puller piston to the start position.

4. If actuation fails to take place, refer to Section 5.0 (Troubleshooting).

3.3 EXTERNAL PRESSURE ADJUSTMENT

The PowerPak pressure may need to be adjusted if:

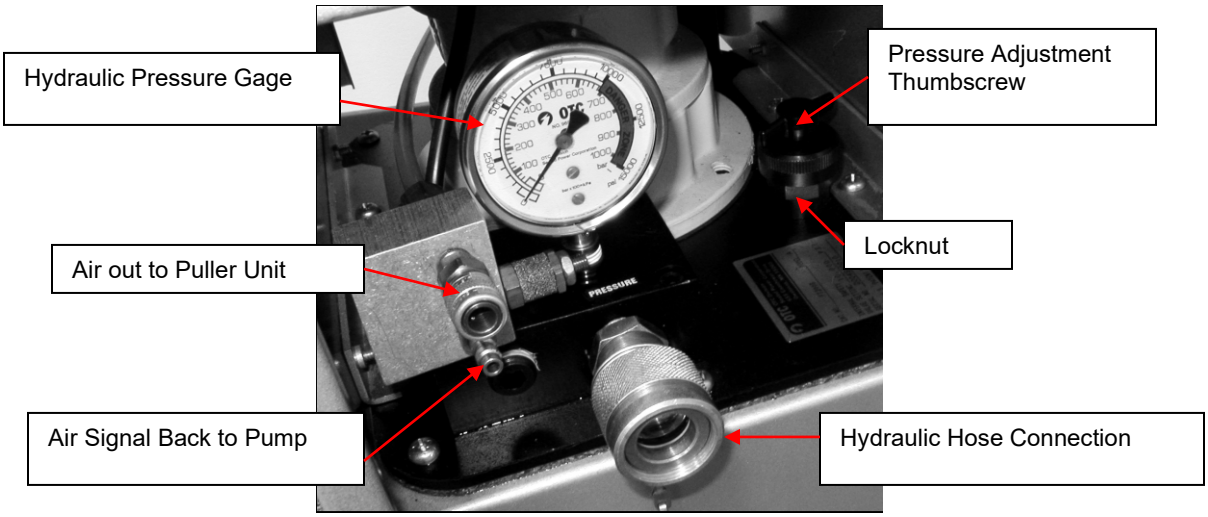
- The PowerPak is not generating 10,000 psi (689.5 bar) when the puller unit is bottomed out, or
- The application Tip Sheet specifically requires reduced pressure for installation, seating, or removal.

In the event a situation requires an adjustment to pressure, follow the steps below:

1. To check the pressure, press and hold the puller unit trigger until the puller unit bottoms out in stroke and the pump pressure holds steady on the pressure gage.

2. Adjust the pump pressure as needed by loosening the locknut and turning the thumbscrew clockwise to increase pressure, and counterclockwise to decrease pressure.

3. Once the pressure is set, retighten the locknut by hand to keep the thumbscrew from backing out during service. See Figure 3.3-1.



3.4 ACCESSORIES

Depending on your model, both an external water separator and lubricator and a Versa Valve conversion kit are recommended for longer, more dependable operation (Refer to Section 11.0, Conversion Kits). Contact an FTI office or representative for more information.

SECTION 4.0: MAINTENANCE

The PowerPak requires routine checking of the unit and periodic preventative maintenance to ensure safe, trouble-free operation. No special maintenance is required. The following maintenance actions are suggested.

WARNING:
Disconnect the PowerPak from the air supply before performing maintenance.
Maintain clean air supply and hydraulic oil for correct operation.

4.1 GENERAL CLEANING

1. Periodically clean the outer surfaces.

2. When not in use, ensure that dust cap is reinstalled on hydraulic coupler.

3. Keep all hose connections free of dirt and grime. Connecting hoses that have metal filings or other dirt on the couplers will result in decreased seal life in the puller unit and may cause damage to the pump.

4. Keep the breather hole in the vented filler cap clean and unobstructed.

5. Keep the equipment that is used with the PowerPak clean.

4.2 CHECKING HYDRAULIC FLUID LEVEL

1. Use dipstick to check oil level, add fluid if necessary. If unit is not equipped with dipstick/filler follow Steps 2 through 4.

2. Remove the shroud to gain access to the filler cap by removing four screws (Items 9 and 11, Figure 8.4-1).

3. Remove the filler cap and visually check the oil level in the reservoir after every 10 hours of use.

4. The proper oil level is within 1 inch (25.4 mm) of the top of the reservoir when the puller mandrel is in its normal starting position (mandrel extended and trigger released).

4.3 FILLING HYDRAULIC FLUID RESERVOIR

1. See Section 1.2 (General Specifications) for hydraulic fluid specifications.

2. Before adding fluid:
   a. Puller unit must be in starting position and air supply disconnected.
   b. For models without filler/dipstick tube (FT-200), remove PowerPak shroud to gain access to vented filler cap.
   c. Clean entire area around filler cap.
   d . Remove filler cap, and insert clean funnel with paper filter.

3. Fill with hydraulic fluid to within 1 inch (25.4 mm) of the top of filler hole and replace filler cap, making sure that breather hole in cap is open.

4. If PowerPak has dipstick/filler tube, use dipstick to check hydraulic fluid level; if low, fill to appropriate level on dipstick.

5. Cycle the PowerPak (with puller unit attached) several times, and recheck the oil level.

4.4 CHANGING THE HYDRAULIC FLUID

> **Note:** Early versions of the FT-200 PowerPak do not have a drain plug. Steps 2 through 6 below detail the method for changing hydraulic fluid for the earlier models. For information about retrofit of a drain plug, contact FTI.

1. After approximately 500 hours of use, the hydraulic fluid should be changed. The frequency of oil changes will depend upon the general working conditions, severity of use, overall cleanliness and care given the PowerPak.

2. To drain the FT-200, remove the cover plate by unscrewing the retainer screws exposing the reservoir. (If a drain plug is present, unscrew the plug and drain oil through port.)

3. Drain the hydraulic fluid by pouring the oil over and out one corner of the reservoir.

4. Though not required, the unit may be flushed using clean hydraulic oil in the PowerPak and cycling the unit several times. To drain the flushing oil, follow Steps 2 and 3.

5. Refill the reservoir with hydraulic fluid. See Section 1.2 for hydraulic fluid specifications.

6. Dispose of used hydraulic fluid per the Material Safety Data Sheet (shown in Section 12.0) for this material and per the local, state and federal regulations (if outside the United States, dispose per the appropriate local and county regulations) so as not to harm personnel or the environment.

4.5 LUBRICATION AND AIR REQUIREMENTS

1. The air supply must be clean and dry, and provided at 90 to 120 psi (6.2 to 8.3 bar). Volume must be 40 to 50 cfm (1132.7 to 1415.9 liter/minute), and a 1/2-inch (25.4 mm) ID air hose is required.

2. FTI recommends that an automatic air line oiler be installed in the air inlet line as close to the PowerPak as possible unless your pump is equipped with a filter lubricator.

3. Set the oiler to feed 1 to 3 drops of oil per minute (one drop for every 50 to 75 cfm [1132.7 to 1415.9 litre/minute] of air) into the system. Use SAE No. 30 non-detergent oil.
   Adjusting the Oiler:
   FT-200B model – Remove/unthread cap on the lubricator. Use screwdriver to adjust screw.
   FT-200D model – Use Allen wrench for screw on top of lubricator. Push trigger on puller unit until it bottoms out. With the FT-200D bottomed out, turn the screw one way or the other.

4.6 TRANSPORTATION AND SHIPMENT

1. A PowerPak will leak if tipped or inverted. Therefore, it is essential to DRAIN ALL HYDRAULIC FLUID prior to shipment. This is especially important because many federal and international regulations restrict shipment of containers that may leak fluids.

2. A new PowerPak is shipped dry with two 1-gallon (3.79-liter) containers of hydraulic fluid. Refer to Section 4.3 for instructions on adding oil to the reservoir. It is recommended that once these containers are emptied, they be retained, especially if the PowerPak is to be periodically transported.

3. Prior to shipment the hydraulic fluid must be drained back into the plastic containers. If unit does not have a drain plug, refer to Section 4.4 for instructions for the removal of the cover plate to drain the hydraulic fluid.

SECTION 5.0: TROUBLESHOOTING

This section provides some basic steps to identify possible causes of trouble, together with troubleshooting solutions. If you cannot solve your maintenance or operation problem with the information provided in this section, contact the nearest FTI representative.

WARNING

To prevent injuries, repair work or troubleshooting must be completed by qualified personnel familiar with this equipment. Use proper equipment when troubleshooting. Always disconnect the air supply before working on the PowerPak or puller unit.

IMPORTANT: Refer to the parts lists (Sections 6.0 through 10.0) when using the Troubleshooting Guide.

PROBLEM	CAUSE	SOLUTION
5.1 MANDREL WILL NOT PULL BACK INTO THE BARREL OF THE PULLER		
	(a) Inadequate air pressure or flow.	(a) Obtain air pressure at 90 to 120 psi (6.2 to 8.3 bar) and flow at 40 to 50 cfm (1132.7 to 1415.9 liter/minute) with a hose diameter of ½ inch (12.7 mm) inside diameter.
	(b) Trigger response valve not properly adjusted (also see Section 5.7).	(b) If you have an aluminum trigger: While squeezing trigger of the puller unit, loosen lockring and adjust the speed control muffler (Item 36, Figure 6.1-1*) in and out until the desired sensitivity is obtained (refer to Section 5.7). If you have a brass trigger: Close valve completely as it is not needed.
	(c) Loose oil coupling to the puller unit.	(c) Check quick-disconnect couplings to hose. Inspect couplers to ensure that they are completely tightened. Occasionally couplers have to be replaced because the ball-check valve does not stay open due to wear. If gun is in retracted position, the hoses may be under high pressure and tightening may not be possible in this case. Place a rag over the coupler and tighten using pliers.
	(d) Oil level too low.	(d) Refer to Section 4.2, Checking Hydraulic Fluid Level.

***Note:** Item numbers refer to FT-200D parts detailed in Section 6.0. Corresponding parts for other models can be located in the applicable section.

PROBLEM	CAUSE	SOLUTION
5.1 (***Continued)***		
	(e) Hydraulic line from puller is not attached to hydraulic quick-coupler.	(e) Connect hydraulic line to hydraulic quick-coupler.
	(f) Vacuum in reservoir.	(f) Check for plugged vent in the vented filler cap. Loosen filler cap one to two turns.
	(g) Flow check valve in coupler does not stay open in coupler position.	(g) Replace coupler(s); contact FTI.
	(h) Dirt in pump or filter plugged.	(h) The strainer (at the end of the tank siphon) should be cleaned; and, if necessary, PowerPak should be dismantled and all parts inspected and cleaned.
	(i) Air leak in suction line.	(i) Check and tighten the connection at the junction of the intake tube and the pump housing.
	(j) Relief valve or low pressure unloading valve out of adjustment.	(j) For safety and warranty reasons, contact FTI about procedures for return or repair.
	(k) Sheared drive shaft key(s).	(k) Return to FTI for repair.

Refer to figures and parts lists in the applicable section.

PROBLEM	CAUSE	SOLUTION
5.2 POWERPAK BUILDS HYDRAULIC PRESSURE BUT CANNOT MAINTAIN PRESSURE (SURGING MOTOR)		
	(a) Insufficient volume of air.	(a) Check air supply. Air lines must be 1/2-inch (12.7-mm) inside diameter with sufficient air supply.
	(b) External pressure regulator.	(b) Loosen knob locknut until it tops out on thumb screw. Tighten thumb screw until it stops. Retighten knob locknut. See Section 3.3.
	(c) Faulty air valve.	(c) Problems have been experienced with the ISI brand air valves (black body). (Refer to 6-1* Item 26.) Clean this valve. If problems persist, replace ISI valve spool with FTI Part. #1045-405 for FT-200A and FT-200B models, or with Part #1045-406 for FT-200 models. If pump is already fitted with Versa valve (gold body), it may be repaired with Seal Kit Part #1045-361. Refer to Section 12.0 for Versa valve refitting kit.
	(d) External oil leaks.	(d) Reseal leaking pipe fittings with pipe sealant. Reseal or replace any faulty line fittings. If no oil leakage is visible, the problem may be internal.

CAUTION
Operation of the pump motor with it lifted from the reservoir may result in oil spray.
Please shroud the assembly accordingly.

	(e) Pressure control valve leaks.	(e) To test for a leaking control valve, lift the pump from the reservoir but keep the intake filter in the oil. Remove the drain line to see if the oil is leaking from the valve. If the control valve is not leaking, the internal check valve could be leaking. (Refer to Problem 5.2f.)
	(f) Internal check valve is leaking.	(f) If the internal valve(s) is leaking, the PowerPak must be dismantled and the seat areas repaired, poppets replaced, etc. Return pump to FTI for repair.
	(g) Cross fitting is cracked.	(g) Cross fittings have cracked in the weld. If leaking, replace cross fitting.

PROBLEM	CAUSE	SOLUTION
5.3 POWERPAK HAS STEADY MOTOR OPERATIONS, BUT WILL NOT BUILD FULL HYDRAULIC PRESSURE		
	(a) External pressure regulator not adjusted.	(a) Loosen knob locknut until it bottoms out on thumb screw. Tighten thumb screw until it stops. Retighten knob locknut. See Section 3.3.
	(b) Inadequate air pressure or air flow.	(b) Check air supply. Hoses must be 1/2-inch (12.7-mm) inside diameter.
	(c) Faulty pressure gauge.	(c) Calibrate gage (.1 6-1*, Item 37).
	(d) External fitting leakage.	(d) Seal leaking pipe fittings with hydraulic pipe sealant, or replace.
	(e) Faulty internal pressure regulator. Incorrect relief valve setting.	(e) Lift the pump from the reservoir but keep the filter immersed in oil. Note the pressure reading when the relief valve begins to open. If functioning normally, it should start to bleed off at approximately 10,000 psi (689.5 bar). Return the pump to FTI for repair.
	(f) Internal leakage in puller.	(f) Disconnect the puller. Use a different puller unit to test the PowerPak; if it builds to full pressure using a different puller, the first puller is defective. If another puller is unavailable, look for oil leaks and their locations. Refer to appropriate puller unit manual for instructions.
	(g) Leaks in pressure control valve.	(g) Clean and reseal or replace valve part.
	(h) Internal leakage in PowerPak. Defective high pressure pump inlet or ball check valves.	(h) Return to FTI for repair.
	(i) Shifting spool seat and/or shifting spool poppet (located under high pressure pump assembly (is worn).	(i) Clean and reseat or replace.
	(j) Shifting spool O-ring (located within shifting spool bore) work or broken.	(j) Remove O-ring and backup washer through low pressure pump assembly end with O-ring pick. Replace O-ring.
	(k) Faulty air valve.	(k) Refer to Section 5.2(c).

CAUTION
Operation of the pump motor with it lifted from the reservoir may result in oil spray.
Please shroud the assembly accordingly.

PROBLEM	CAUSE	SOLUTION
5.4 POWERPAK DELIVERS EXCESS OIL PRESSURE		
	(a) External pressure control valve not properly set.	(a) Adjust external regulator until desired pressure is achieved. See Section 3.3.
	(b) Defective pressure gage.	(b) Calibrate gage (Figure 6.1-1* Item 37).
	(c) Internal pressure control valve is not properly set.	(c) Return PowerPak to FTI for repair.

PROBLEM	CAUSE	SOLUTION
5.5 AIR RUSHES OUT AROUND PULLER TRIGGER WHEN ACTUATED; PUMP DOESN'T OPERATE		
	(a) An airline from puller is not connected.	(a) Connect the air line.
	(b) The trigger response valve is broken or not properly adjusted.	(b) Readjust the trigger response valve (see Problem 5.7).
	(c) Hose fittings from puller unit or PowerPak are reversed.	(c) Check all hose fitting configurations for compliance with Figure 6.1-1*.
	(d) Faulty air valve.	(d) Ensure proper air flow to the pump. Refer to Section 5.2(c).

***Note:** Item numbers refer to FT-200D parts detailed in Section 6.0. Corresponding parts for other models can be located in the applicable section.

PROBLEM **CAUSE** **SOLUTION**

5.6 PULLER RETRACTS ON FIRST TRIGGER ACTUATION, BUT WILL NOT RETURN TO START POSITION

CAUTION
Hydraulic oil under extreme pressures may cause serious injuries if not handled carefully. For technical assistance, please contact FTI's Sales department.

(a) The new puller unit requires lubrication through the piston and cylinder.

(a) Cycle trigger several times to introduce hydraulic fluid to the cylinder. If piston fails to return, proceed to (b) below.

(b) The hydraulic quick-coupler has not been completely tightened at the PowerPak manifold. This keeps either the check valve in the PowerPak's quick coupler, or the check valve in the puller unit hydraulic hose quick-coupler closed. Once hydraulic pressure has been introduced to the hose, the pressure must be relieved before the coupler can be sufficiently tightened.

(b) Complete these six steps:

1) Disconnect main air supply.

2) Disconnect coupler from PowerPak.

3) Connect Enerpac CT-604 to the coupler and bleed off hydraulic oil to relieve the built-up pressure. Figure 5.6-1 shows the Enerpac CT-604 Pressure Relief Tool.

4) Once pressure is relieved, coupler may be tightened and reinstalled onto PowerPak.

5) Re-attach air lines to get puller to return.

6) Check oil level in PowerPak reservoir.

Figure 5.6-1
Enerpac CT-604 Pressure Relief Tool

PROBLEM	CAUSE	SOLUTION
5.7 POWERPAK WILL NOT GENERATE CONSTANT PRESSURE (HICCUPS)		
	(a) The trigger response control valve requires adjustment.	(a) For aluminum triggers: 1) Loosen locknut on trigger response valve. 2) Using a screwdriver, open screw counterclockwise until PowerPak will not start when puller trigger is depressed. 3) Turn screw clockwise until: a) PowerPak generates constant pressure when puller trigger is depressed, and b) PowerPak starts instantly when puller trigger is depressed and stops instantly when released. 4) Hold set screw in position and tighten locknut. (a) For brass triggers: Completely close trigger response valve.
	(b) Not enough air is being supplied to the air valve to hold valve open.	(b) Check the following: 1) Check for proper air flow of 90 to 120 pst (6.2 to 8.3 bar) and 40 to 50 cfm (1132.7 to 1415.9 liter/minute) to pump. 2) If extension hoses are being used, try puller/pump combination without extensions. If pump operates without extensions, increase air flow when using extensions. 3) Refer to Section 5.2(c).

Refer to figures and parts lists in the applicable section.

PROBLEM	CAUSE	SOLUTION
5.8 POWERPAK WILL NOT STOP OPERATING WHEN TRIGGER RELEASED		
	(a) Puller retracts and will not return because hydraulic pump will not shut off, or there is a delay in PowerPak shut-off.	(a) Trigger response valve is not properly adjusted (refer to Section 5.7(a).
	(b) Faulty air valve.	(b) Problems have been experienced with the ISI brand air valves (black body). (Refer to Figure 6.1-1 Item 26.) Clean this valve. If problems persist, replace ISI valve spool with FTI Part #1045-405 for FT-200A and FT-200B models, or with FTI Part #1045-406 for FTI-200 models. If pump is already fitted with Versa valve (gold body), it may be repaired with Seal Kit Part #1045-361. Refer to Section 9.3 for Versa valve refitting kit.

SECTION 6.0: FT-200D ILLUSTRATED PARTS BREAKDOWN

Parts breakdowns, consisting of a diagram and a parts list, for the FT-200D are contained in the following sections:

6.1 Air Hydraulic Pump
6.2 Basic Pump Assembly
6.3 High-Pressure Pump with Automatic Valve
6.4 Shroud Assembly
6.5 Pneumatic Hydraulic

6.1 AIR HYDRAULIC PUMP DIAGRAM; GENERAL PARTS LIST

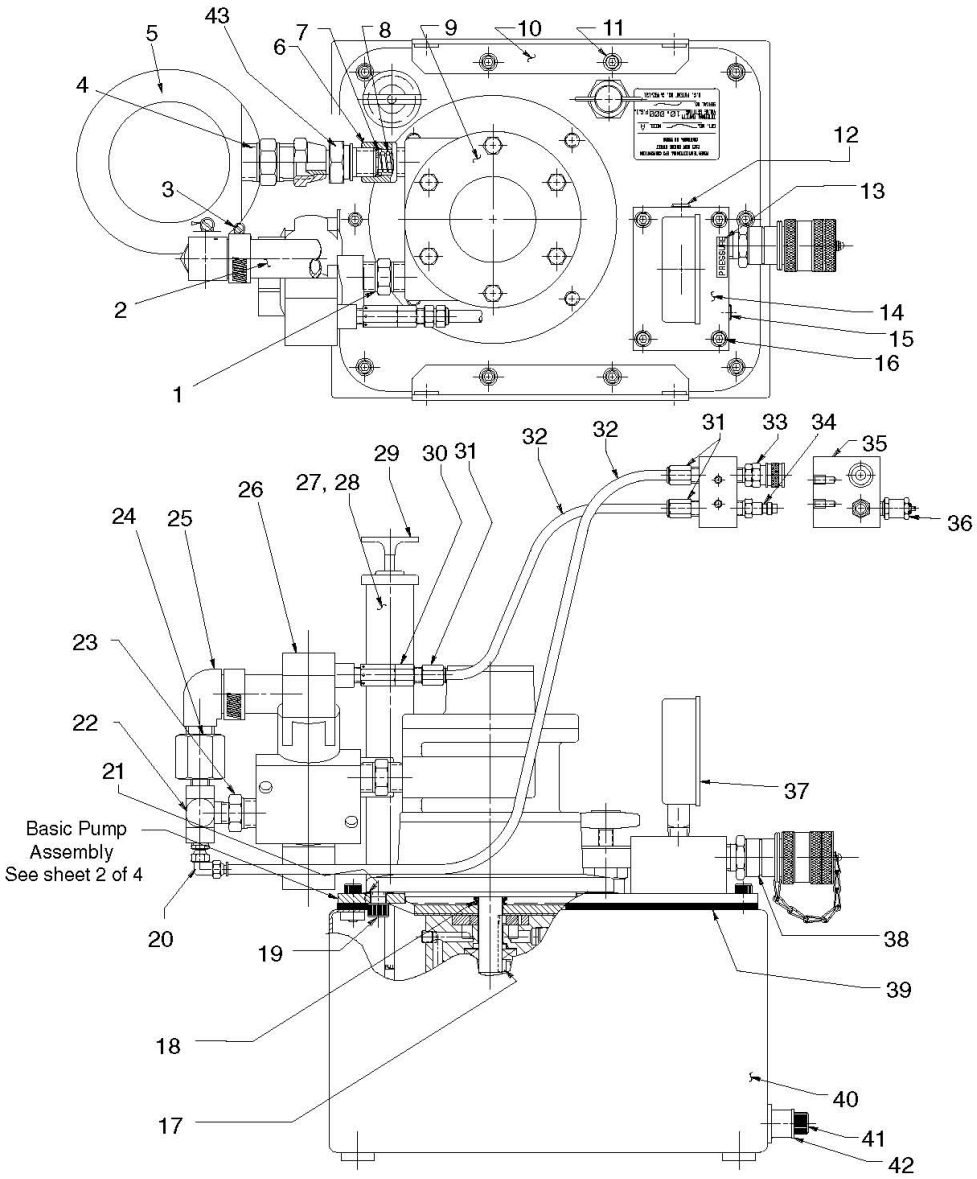


Figure 6.1-1
FT-200D Air Hydraulic Pump

6.1 PARTS LIST FOR FT-200D HYDRAULIC PUMP

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-185	250643	1	Bushing Fitting
2	1086-164	212898	.92 ft.	Pressure Hose
3	1086-163	12367	1	Hose Clamp
4	1086-208	250643	1	Fitting, Exhaust Muffler Extension
5	1086-206	F23-04-000	1	Exhaust Muffler
6	1086-125	214973	1	Extension Fitting
7	1086-187	10257	1	Washer
8	1086-186	16465	1	Compression Spring
9	1086-001	14717*	1	Air Motor
10	1086-126	47401GY8	2	Cover Mounting Bracket
11	1086-196	10008	10	Soc. Head Cap Screw
12	1086-017	10479	1	Pipe Plug (1/4 NPTF)
13	1086-067	201747	1	Decal
14	1086-052	45911	1	Manifold
15	1086-050	10909	1	Plug (3/8 NPTF)
16	1086-065	10022	4	Cap Screw (1/4-20 x 1-1/2 lg.)
17	1086-127	214097	1	Key
18	1086-128	213674	1	V-Ring
19	1086-129	15187	4	Cap Screw (Torque to 90/100 in. lbs.)
20	1086-123	15457	1	Elbow Fitting
21	1086-130	307425	1	Gasket
22	1086-160	208699	1	Tee Fitting
23	1086-015	10677	1	Reducing Fitting
24	1086-161	11965	1	Straight Fitting
25	1086-162	212897	1	90° Elbow Fitting
26	1086-184	308608	1	Air Valve
27	1086-131	308628	1	Stand-off Tube
28	1086-195	14725	1	O-Ring (1-1/8 x .937, -119)
29	1086-132	214955	1	Oil Dipstick
30	1086-011	213345	1	Quick Exhaust Valve
31	1086-194	250464	3	Poly Flow Fitting
32	1086-010	15883	1.9 ft.	Plastic Tubing
33	1125-020	213343	1	Coupler Socket
34	1086-058	213343	1	Coupler Plug
35	1086-061	307320	1	Manifold Block
36	1125-022	213346	1	Speed Control Muffler (Trigger Response Valve)
37	1086-056	9040	1	Gauge
38	1047-013		1	Coupler
39	1086-133	47409	1	Cover Plate Gasket
40	1086-134	61799GY8	1	Reservoir
41	1086-135	10412	1	Cap Screw (3/8-16 UNC x 1/2 lg.)
42	1086-136	19779	1	Seal Washer
43	1086-209	252355	1	Fitting, Air Motor/Exhaust Muffler
--	1187-770	-----	0	Enerpac CT-604 Pressure Relief Tool[1]

*For Air Motor Repair Kit, order SPX 252100 (FTI P/N 1086-211).
Note 1: Not included.

6.2 BASIC PUMP ASSEMBLY DIAGRAM; PARTS LIST

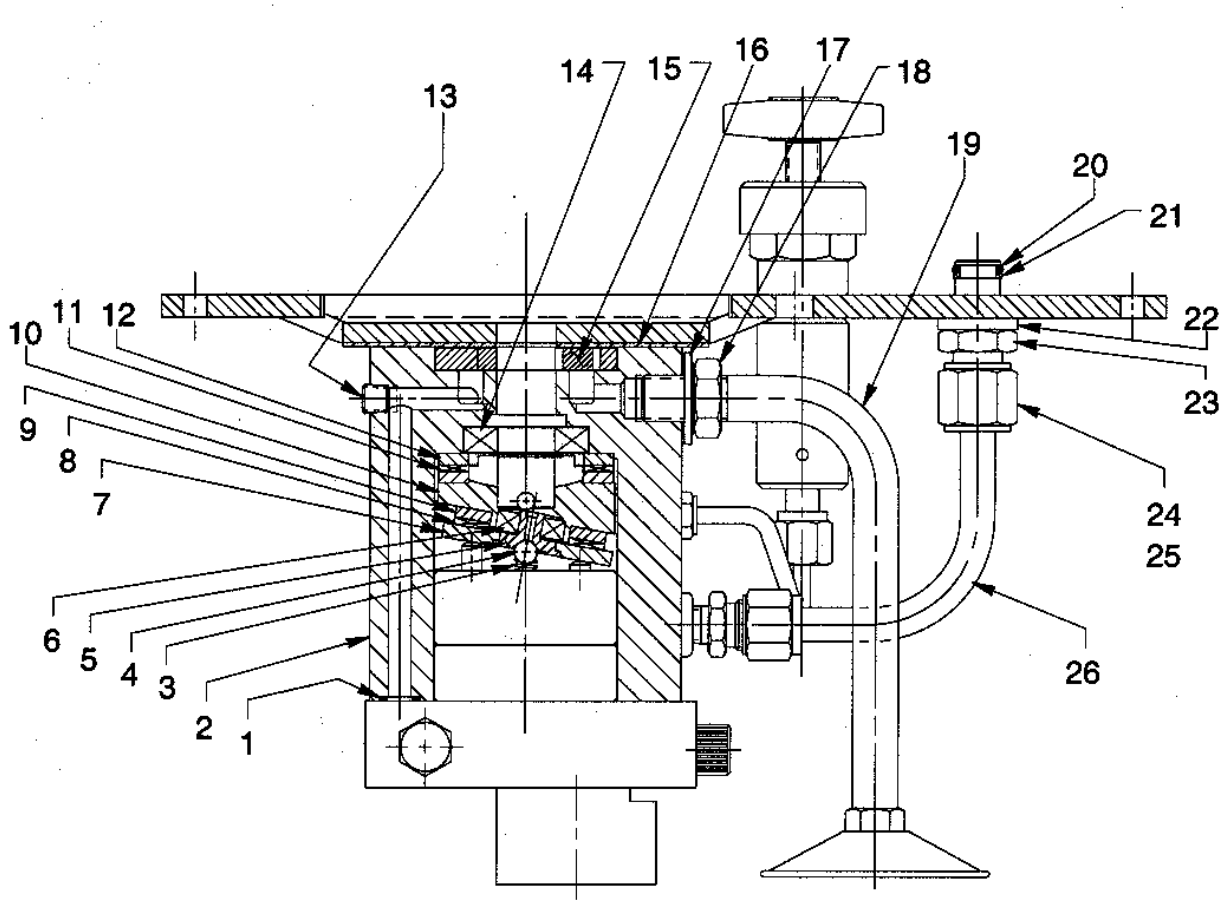


Figure 6.2-1a
FT-200D Basic Pump Assembly

6.2 PARTS LIST FOR BASIC PUMP ASSEMBLY

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-137	10267	1	O-Ring (7/16 x 5/16 x 1/16, -011)
2	1086-138	52883	1	Pump Body
3	1086-166	16320	1	Spring (1/4 outer diameter x 3/4 lg.)
4	1086-031	10375	1	Steel Ball (1/4 diameter)
5	1086-033	23547	1	Bearing Top Plate
6	1086-039	11814	1	Ball Bearing
7	1086-030	23548	1	Top Plate
8	1086-038	15431	1	Needle Bearing
9	1086-027	15432	1	Bearing Race
10	1086-026	350725	1	Angle Plate
11	1086-025	11228	1	Thrust Bearing
12	1086-024	11227	1	Bearing Race
13	1086-023	11084	1	Plug (1/16 NPTF; torque to 35/45 in. lbs. oiled)
14	1086-167	15695	1	Ball Bearing
15	1086-019	15693	1	Gerotor Set
16	1086-140	307296	1	Wear Plate
17	1086-141	213709	1	Seal Washer (turn on; do not push on)
18	1086-142	10390	1	Jam Nut (1/2-20 IMF)
19	1086-143	213686	1	Intake Tube
20	1086-049	10268	2	O-Ring (1/2 x 3/8 x 1/16, -012)
21	1086-048	11863	1	Backup Washer (1/2 x 3/8 x 1/16, -012)
22	1086-144	21484	1	Spacer
23	1086-145	214882	1	Connector Valve
24	1086-043	10430	1	Tube Sleeve
25	1086-044	10431	1	Tube Nut (5/8-18 UNF)
26	1086-168	308614	1	Oil Line Tube

6.2 BASIC PUMP ASSEMBLY DIAGRAM; PARTS LIST (Continued)

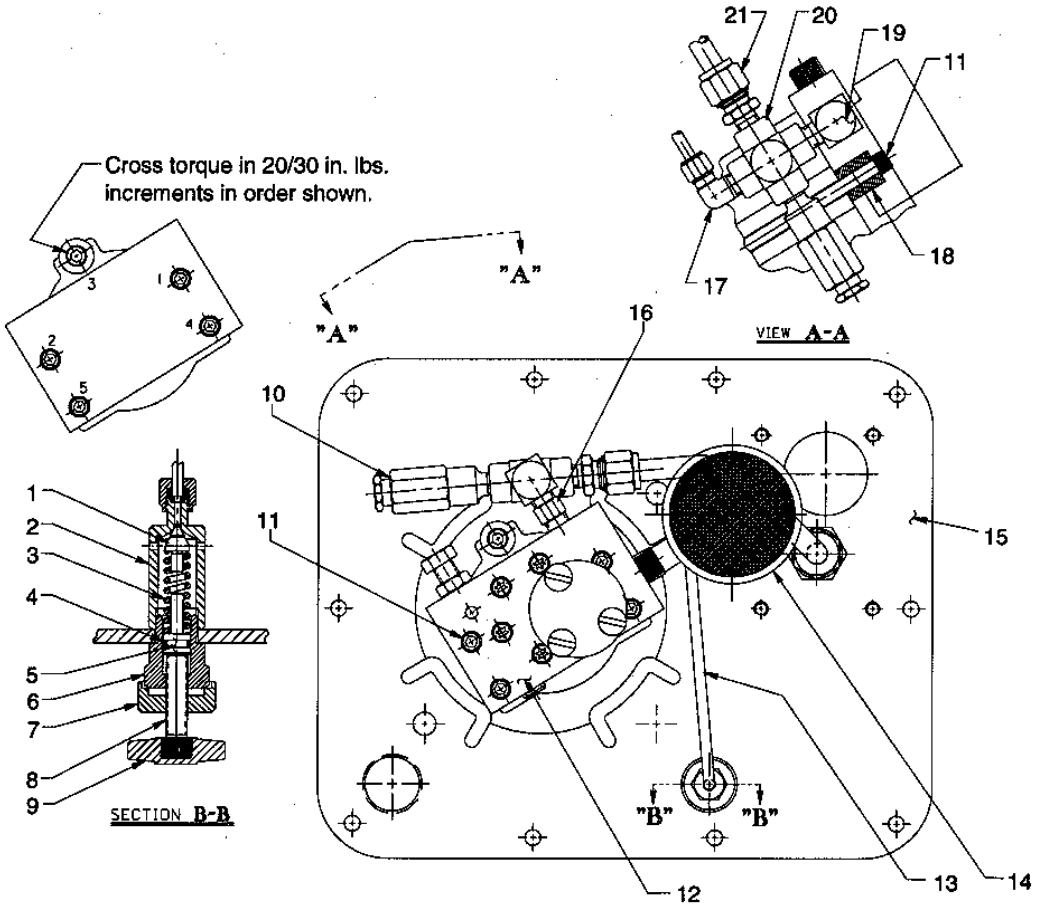


Figure 6.2-1b
FT-200D Basic Pump Assembly, Top View

6.2 PARTS LIST FOR BASIC PUMP ASSEMBLY

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-085	21046	1	Valve Stem
2	1086-080	22361	1	Body
3	1086-079	10495	1	Compression Spring (1/2 outer diameter x 1-5/8 lg.)
4	1086-049	10268	2	O-ring (1/2 x 3/8 x 1/16, -012)
5	1086-078	21306	1	Spring Gasket
6	1086-084	21305	1	Valve Cap
7	1086-083	24573	1	Knob Locknut
8	1086-082	208148	1	Cap Screw (3/8-24 x 1-1/2 lg.)
9	1086-149	205788	1	Thumb Screw
10	1086-075	21278	1	Relief Valve Assembly (set at 10,100/10,700 psi)
11	1086-151	15642	5	Cap Screw (1/4-20 UNC x 5” lg.; torque to 55/65 in. lbs.)
12	1086-156	308612	1	Pump Body Assembly
13	1086-155	308615	1	Pressure Regulator Tube
14	1086-077	29682	1	Strainer
15	1086-154	47404	1	Cover Plate
16	1086-153	11421	1	Pipe Nipple
17	1086-076	11278	1	Tube Elbow
18	1086-152	214720	1	Spacer
19	1086-150	24730	1	Elbow
20	1086-149	208077	1	Single Cross Fitting
21	1086-148	12696	1	Connector

6.3 HIGH-PRESSURE PUMP ASSEMBLY WITH AUTOMATIC VALVE; PARTS LIST

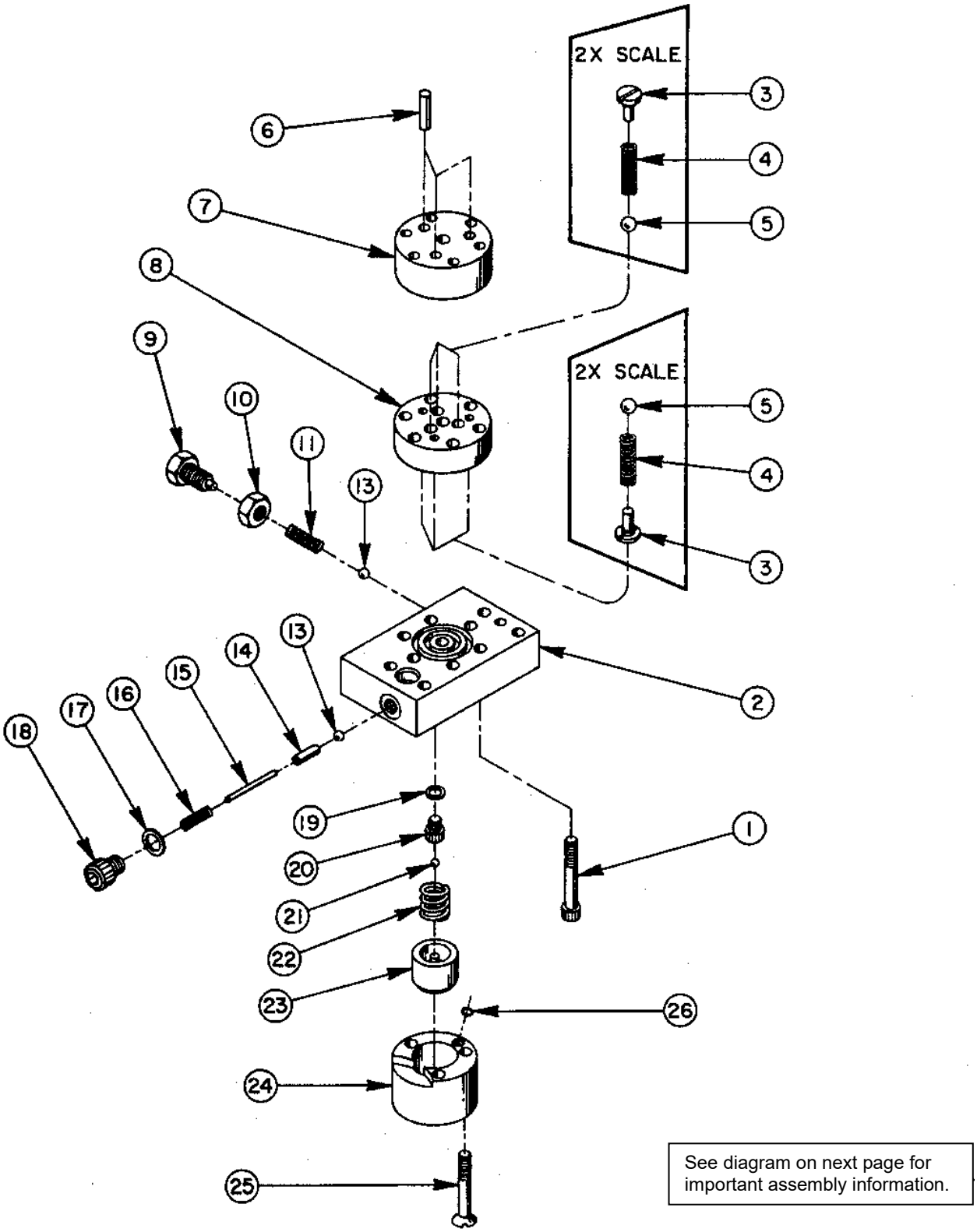
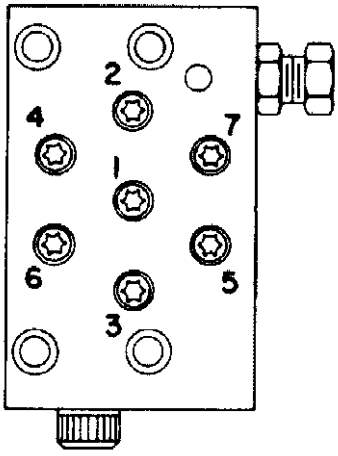


Figure 6.3-1
FT-200D Pressure Regulator Assembly

6.3 PARTS LIST FOR AUTOMATIC VALVE

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-086	*16747	7	Torx Drive Cap Screw
2	1086-087	*36911	1	Pump End Plate
3	1086-088	*24549	6	Valve Guide
4	1086-089	*10445	6	Compression Spring
5	1086-090	*12223	6	Steel Ball
6	1086-091	*21628	3	Piston
7	1086-092	*41062	1	Pump Barrel
8	1086-093	*40630	1	Valve Head
9	1086-169	29786	1	Adjusting Screw
10	1086-094	10386	1	Jam Nut
11	1086-170	11221	1	Compression Spring
13	1086-031	10375	2	Steel Ball
14	1086-098	201998	1	Sleeve
15	1086-099	12571	1	Roll Pin
16	1086-100	15129	1	Compression Spring
17	1086-101	12042	1	Copper Washer
18	1086-102	29690	1	Cap Screw
19	1086-103	10442	1	Copper Washer
20	1086-104	201995	1	Cap Screw
21	1086-105	10419	1	Steel Ball
22	1086-106	16465	1	Compression Spring
23	1086-107	202088	1	Piston
24	1086-157	308613	1	Valve Cylinder
25	1086-158	214941	3	Machine Screw
26	1086-110	10264	1	O-Ring

*Consult FTI before replacing items marked with an asterisk (*).



Assemble in sequence shown; lubricate under head and on threads; torque to 170 in. lbs.

Figure 6.3-2
FT-200D Bolt-Tightening Sequence

6.4 SHROUD ASSEMBLY; PARTS LIST

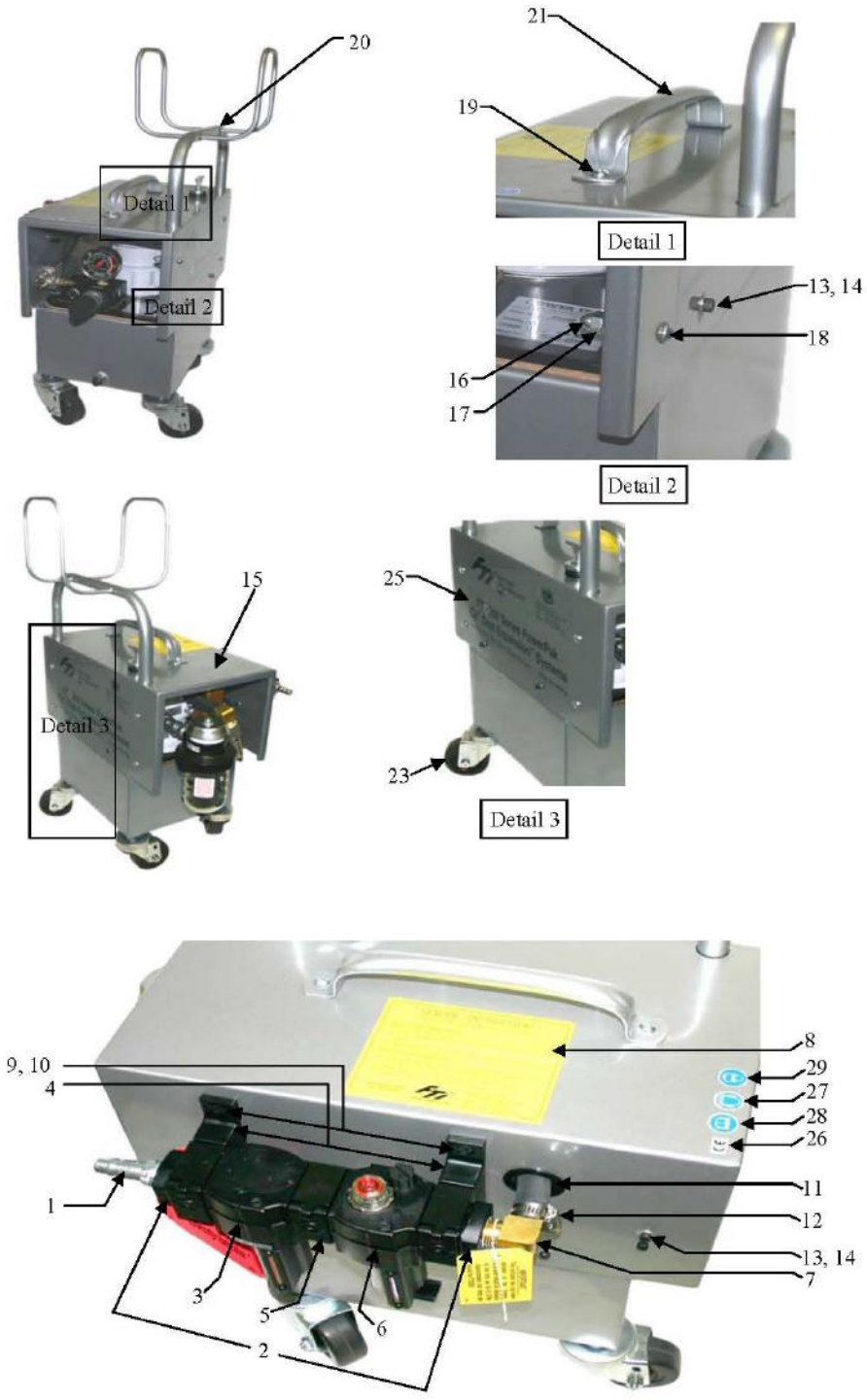


Figure 6.4-1
FT-200D Shroud Assembly

6.4 PARTS LIST SHROUD ASSEMBLY

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-005	250644	1	Air Coupler
2	1086-201	2001428	2	Pipe Adapter
3	1086-205	2001426	1	Air Filter
4	1086-203	2001430	2	Wall Mount
5	1086-202	2001429	1	Quick Clamp
6	1086-204	2001427	1	Air Lubricator
7	1086-174	212897	1	90° Elbow Fitting
8	1086-122	213776	1	Instruction Decal
9	1086-175	10166	4	Round Head Machine Screw (#10-24 x ½ Lg.)
10	1086-176	11089	4	Washer (#10)
11	1086-177	250661	0.32 ft.	Snap Bushings
12	1086-163	12367	1	Hose Clamp
13	1086-189	250617	6	Screw (#10-24 UNC x 3/8 Lg. Note: Use Loctite #222 or Equiv.)
14	1086-188	10241	6	Lockwasher (#10 Split)
15	1086-207	61867-D	1	Cover
16	1086-113	10486	5	Nut (1/4-20 UNC)
17	1086-159	10199	6	Nut (1/4-20 UNC)
18	1086-179	10614	4	Machine Screw (1/4 UNC x 1-1/2 Lg.)
19	1086-008	253371	2	Screw (1/4 UNC x 3/4 Lg.)
20	1086-210	2001433	1	Pump Bracket
21	1086-116	35903GY8	1	Handle
23	1086-180	216384	4 (1 each per part number)	Swivel Caster (optional rubber feet replacement FTI P/N 1045-390)
24	1086-188	16963	4	Lockwasher (not pictured)
25	1086-120	350908	1	FTI Decal

6.5 PNEUMATIC HYDRAULIC SCHEMATIC

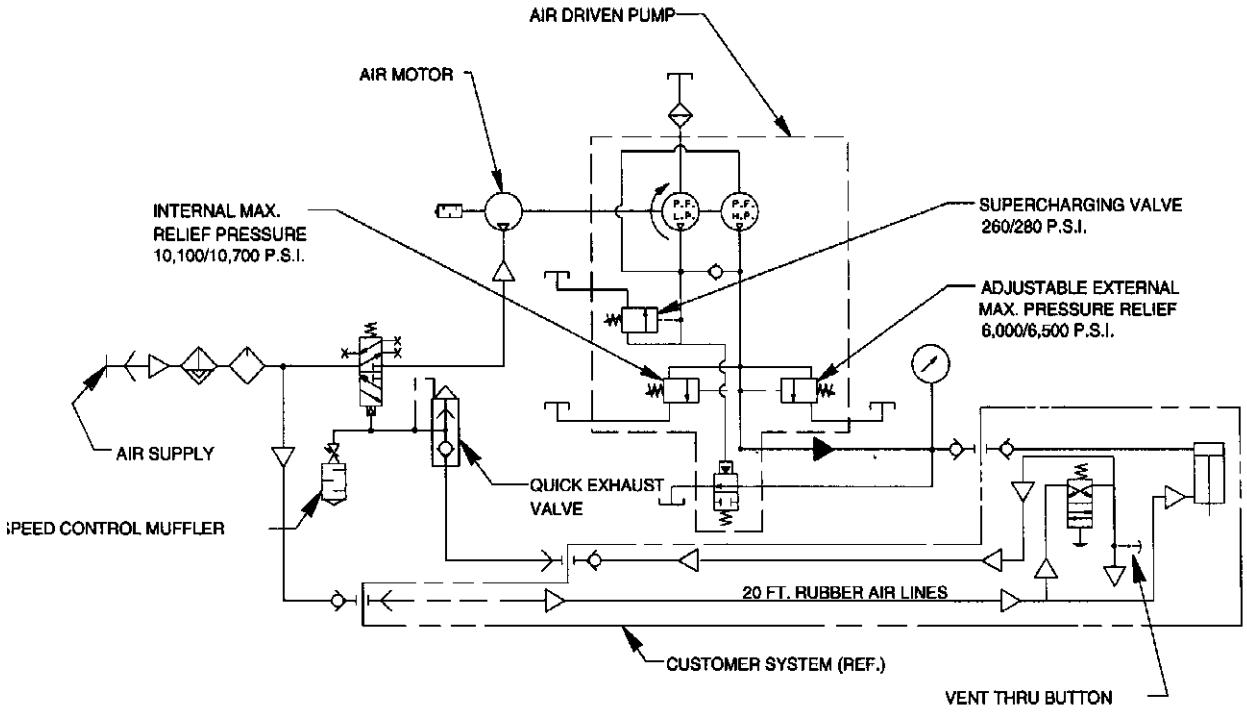


Figure 6.5-1
FT-200D Pneumatic Hydraulic Schematic

SECTION 7.0: FT-200B ILLUSTRATED PARTS BREAKDOWN

Parts breakdowns, consisting of a diagram and a parts list, for the FT-200B are contained in the following sections:

7.1 Air Hydraulic Pump
7.2 Basic Pump Assembly
7.3 High-Pressure Pump with Automatic Valve
7.4 Shroud Assembly
7.5 Pneumatic Hydraulic

7.1 AIR HYDRAULIC PUMP DIAGRAM; GENERAL PARTS LIST

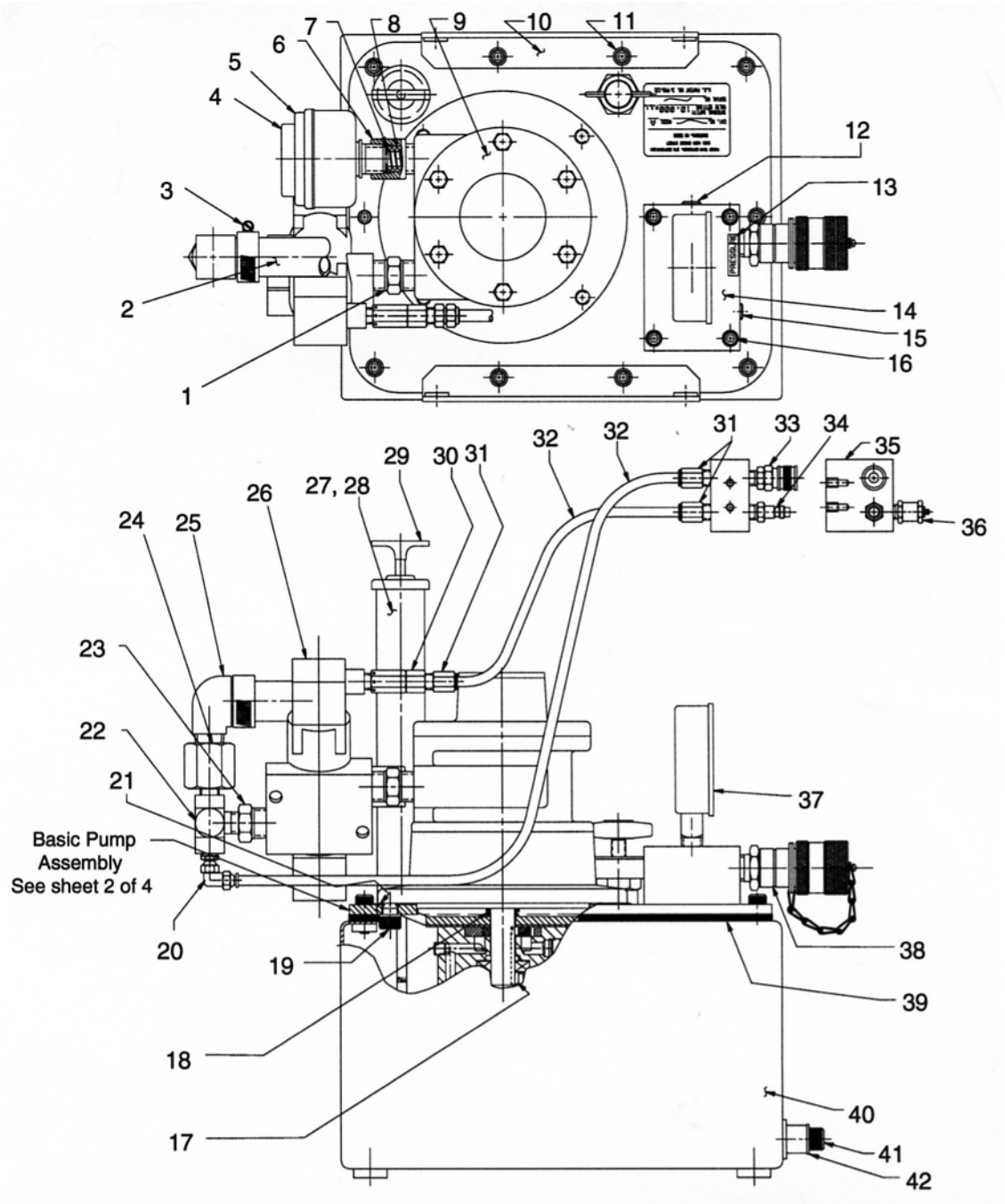


Figure 7.1-1
FT-200B Air Hydraulic Pump

7.1 PARTS LIST FOR FT-200B HYDRAULIC PUMP

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-185	250643	1	Bushing Fitting
2	1086-164	212898	.92 ft.	Pressure Hose
3	1086-163	12367	1	Hose Clamp
4	1086-004	2505505	1	Deflector
5	1086-003	13966	1	Muffler
6	1086-125	214973	1	Extension Fitting
7	1086-187	10257	1	Washer
8	1086-186	16465	1	Compression Spring
9	1086-001	14717*	1	Air Motor
10	1086-126	47401GY8	2	Cover Mounting Bracket
11	1086-196	10008	10	Soc. Head Cap Screw
12	1086-017	10479	1	Pipe Plug (1/4 NPTF)
13	1086-067	201747	1	Decal
14	1086-052	45911	1	Manifold
15	1086-050	10909	1	Plug (3/8 NPTF)
16	1086-065	10022	4	Cap Screw (1/4-20 x 1-1/2 lg.)
17	1086-127	214097	1	Key
18	1086-128	213674	1	V-Ring
19	1086-129	15187	4	Cap Screw (Torque to 90/100 in. lbs.)
20	1086-123	15457	1	Elbow Fitting
21	1086-130	307425	1	Gasket
22	1086-160	208699	1	Tee Fitting
23	1086-015	10677	1	Reducing Fitting
24	1086-161	11965	1	Straight Fitting
25	1086-162	212897	1	90° Elbow Fitting
26	1086-184	308608	1	Air Valve
27	1086-131	308628	1	Stand-off Tube
28	1086-195	14725	1	O-Ring (1-1/8 x .937, -119)
29	1086-132	214955	1	Oil Dipstick
30	1086-011	213345	1	Quick Exhaust Valve
31	1086-194	250464	3	Poly Flow Fitting
32	1086-010	15883	1.9 ft.	Plastic Tubing
33	1086-060	213344	1	Coupler Socket
34	1086-058	213343	1	Coupler Plug
35	1086-061	307320	1	Manifold Block
36	1125-022	213346	1	Speed Control Muffler
37	1086-056	9040	1	Gauge
38	1047-013		1	Coupler
39	1086-133	47409	1	Cover Plate Gasket
40	1086-134	61799GY8	1	Reservoir
41	1086-135	10412	1	Cap Screw (3/8-16 UNC x ½ lg.)
42	1086-136	19779	1	Seal Washer
--	1187-770	-----	0	Enerpac CT-604 Pressure Relief Tool[1]

*For Air Motor Repair Kit, order SPX 252100 (FTI P/N1045-153).

Note 1: Not included.

7.2 BASIC PUMP ASSEMBLY DIAGRAM; PARTS LIST

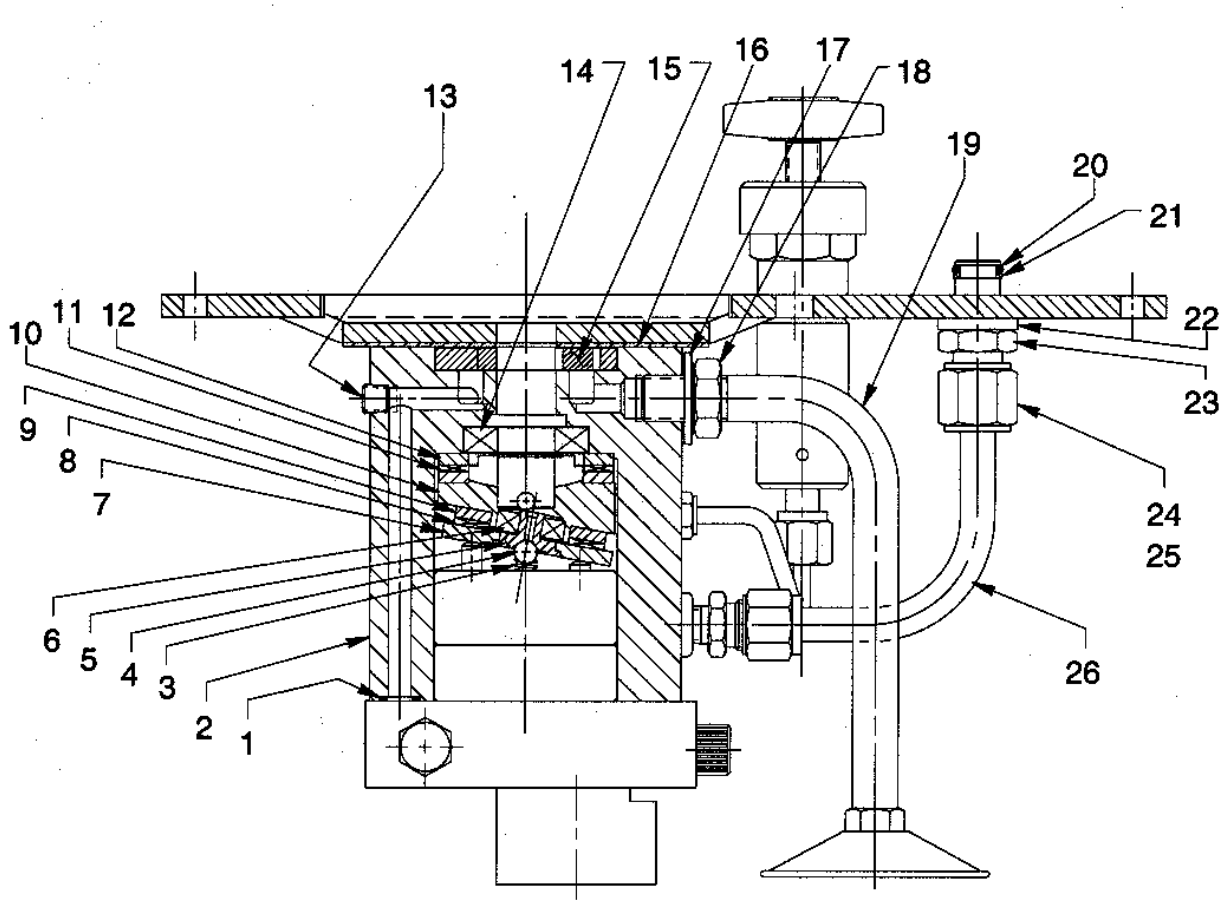


Figure 7.2-1a
FT-200B Basic Pump Assembly

7.2 PARTS LIST FOR BASIC PUMP ASSEMBLY

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-137	10267	1	O-Ring (7/16 x 5/16 x 1/16, -011)
2	1086-138	52883	1	Pump Body
3	1086-166	16320	1	Spring (1/4 outer diameter x 3/4 lg.)
4	1086-031	10375	1	Steel Ball (1/4 diameter)
5	1086-033	23547	1	Bearing Top Plate
6	1086-039	11814	1	Ball Bearing
7	1086-030	23548	1	Top Plate
8	1086-038	15431	1	Needle Bearing
9	1086-027	15432	1	Bearing Race
10	1086-026	350725	1	Angle Plate
11	1086-025	11228	1	Thrust Bearing
12	1086-024	11227	1	Bearing Race
13	1086-023	11084	1	Plug (1/16 NPTF; torque to 35/45 in. lbs. oiled)
14	1086-167	15695	1	Ball Bearing
15	1086-019	15693	1	Gerotor Set
16	1086-140	307296	1	Wear Plate
17	1086-141	213709	1	Seal Washer (turn on; do not push on)
18	1086-142	10390	1	Jam Nut (1/2-20 IMF)
19	1086-143	213686	1	Intake Tube
20	1086-049	10268	2	O-Ring (1/2 x 3/8 x 1/16, -012)
21	1086-048	11863	1	Backup Washer (1/2 x 3/8 x 1/16, -012)
22	1086-144	21484	1	Spacer
23	1086-145	214882	1	Connector Valve
24	1086-043	10430	1	Tube Sleeve
25	1086-044	10431	1	Tube Nut (5/8-18 UNF)
26	1086-168	308614	1	Oil Line Tube

7.2 BASIC PUMP ASSEMBLY DIAGRAM; PARTS LIST (Continued)

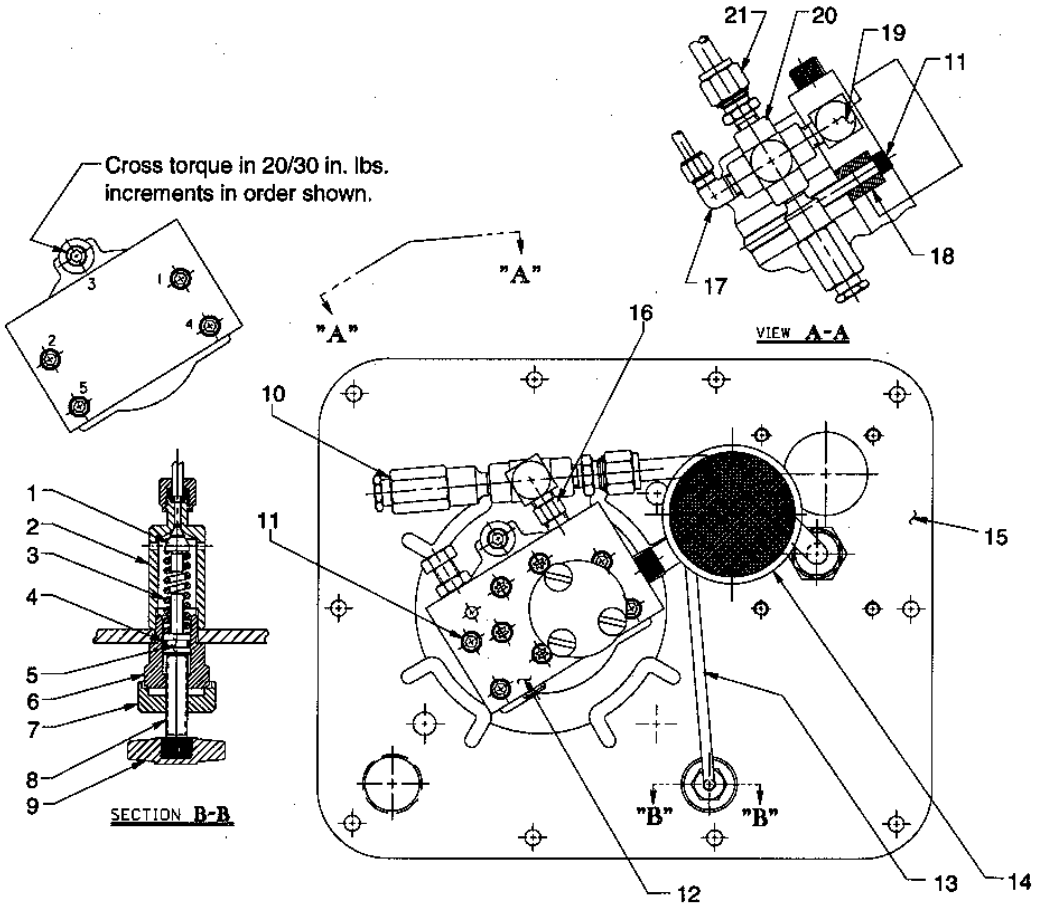


Figure 7.2-1b
FT-200B Basic Pump Assembly, Top View

7.2 PARTS LIST FOR BASIC PUMP ASSEMBLY

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-085	21046	1	Valve Stem
2	1086-080	22361	1	Body
3	1086-079	10495	1	Compression Spring (1/2 outer diameter x 1-5/8 lg.)
4	1086-049	10268	2	O-ring (1/2 x 3/8 x 1/16, -012)
5	1086-078	21306	1	Spring Gasket
6	1086-084	21305	1	Valve Cap
7	1086-083	24573	1	Knob Locknut
8	1086-082	208148	1	Cap Screw (3/8-24 x 1-1/2 lg.)
9	1086-149	205788	1	Thumb Screw
10	1086-075	21278	1	Relief Valve Assembly (set at 10,100/10,700 psi)
11	1086-151	15642	5	Cap Screw (1/4-20 UNC x 5” lg.; torque to 55/65 in. lbs.)
12	1086-156	308612	1	Pump Body Assembly
13	1086-155	308615	1	Pressure Regulator Tube
14	1086-077	29682	1	Strainer
15	1086-154	47404	1	Cover Plate
16	1086-153	11421	1	Pipe Nipple
17	1086-076	11278	1	Tube Elbow
18	1086-152	214720	1	Spacer
19	1086-150	24730	1	Elbow
20	1086-149	208077	1	Single Cross Fitting
21	1086-148	12696	1	Connector

7.3 HIGH-PRESSURE PUMP ASSEMBLY WITH AUTOMATIC VALVE; PARTS LIST

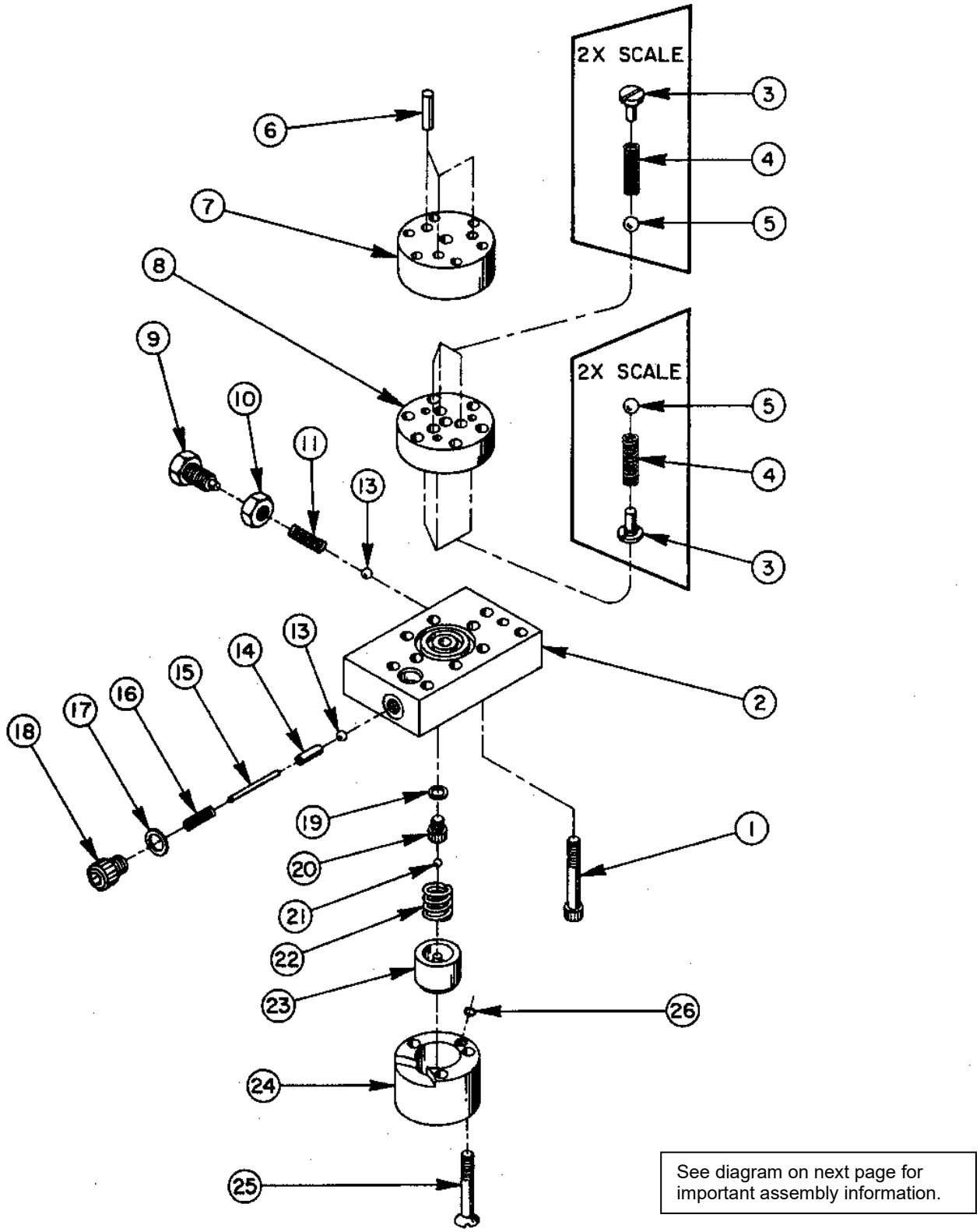
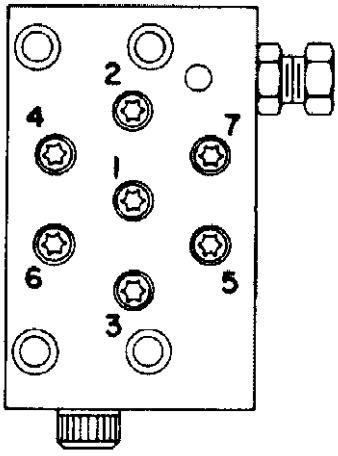


Figure 7.3-1
FT-200B Pressure Regulator Assembly

7.3 PARTS LIST FOR AUTOMATIC VALVE

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-086	*16747	7	Torx Drive Cap Screw
2	1086-087	*36911	1	Pump End Plate
3	1086-088	*24549	6	Valve Guide
4	1086-089	*10445	6	Compression Spring
5	1086-090	*12223	6	Steel Ball
6	1086-091	*21628	3	Piston
7	1086-092	*41062	1	Pump Barrel
8	1086-093	*40630	1	Valve Head
9	1086-169	29786	1	Adjusting Screw
10	1086-094	10386	1	Jam Nut
11	1086-170	11221	1	Compression Spring
13	1086-031	10375	2	Steel Ball
14	1086-098	201998	1	Sleeve
15	1086-099	12571	1	Roll Pin
16	1086-100	15129	1	Compression Spring
17	1086-101	12042	1	Copper Washer
18	1086-102	29690	1	Cap Screw
19	1086-103	10442	1	Copper Washer
20	1086-104	201995	1	Cap Screw
21	1086-105	10419	1	Steel Ball
22	1086-106	16465	1	Compression Spring
23	1086-107	202088	1	Piston
24	1086-157	308613	1	Valve Cylinder
25	1086-158	214941	3	Machine Screw
26	1086-110	10264	1	O-Ring

*Consult FTI before replacing items marked with an asterisk (*).



Assemble in sequence shown; lubricate under head and on threads; torque to 170 in. lbs.

Figure 7.3-2
FT-200B Bolt-Tightening Sequence

7.4 SHROUD ASSEMBLY; PARTS LIST

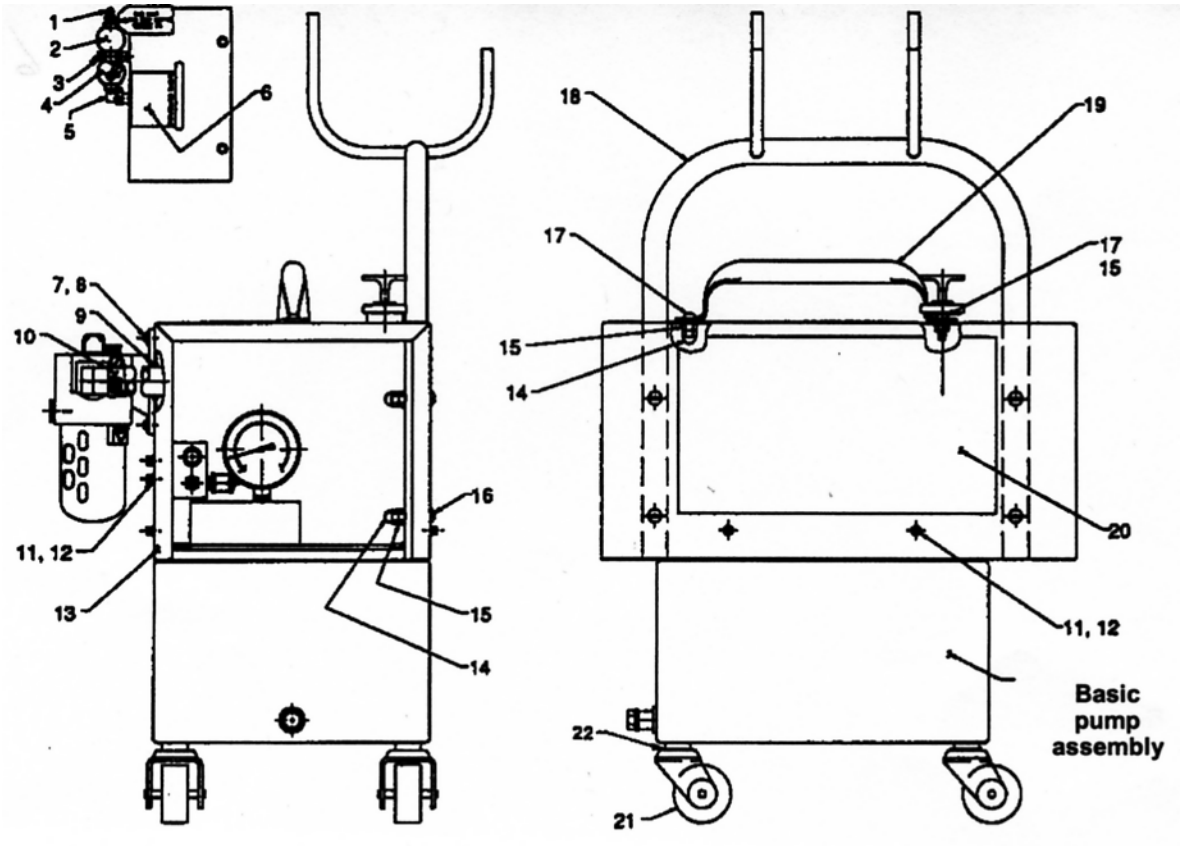


Figure 7.4-1
FT-200B Shroud Assembly

7.4 PARTS LIST SHROUD ASSEMBLY

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-005	250644	1	Air Coupler
2	1086-171	250054	1	Air Filter
3	1086-172	250055	1	Mounting Bracket
4	1086-173	214500	1	Air Lubricator
5	1086-174	212897	1	90° Elbow Fitting
6	1086-122	213776	1	Instruction Decal
7	1086-175	10166	2	Round Head Machine Screw
8	1086-176	11089	2	Washer
9	1086-212	13047	.32 ft.	Grommet Strip
10	1086-163	12367	1	Hose Clamp
11	1086-189	250617	6	Screw
12	1086-188	10241	6	Lockwasher
13	1086-178	61867GY8	1	Cover, Shroud
14	1086-113	10486	5	Nut
15	1086-159	10199	6	Nut
16	1086-179	10614	4	Machine Screw
17	1086-008	253371	2	Screw
18	1086-115	61542GY8	1	Pump Bracket
19	1086-116	35903GY8	1	Handle
20	1086-120	350908	1	Decal
21	1086-180	216384	4	Swivel Caster
22	1086-188	16963	4	Lockwasher

7.5 PNEUMATIC HYDRAULIC SCHEMATIC

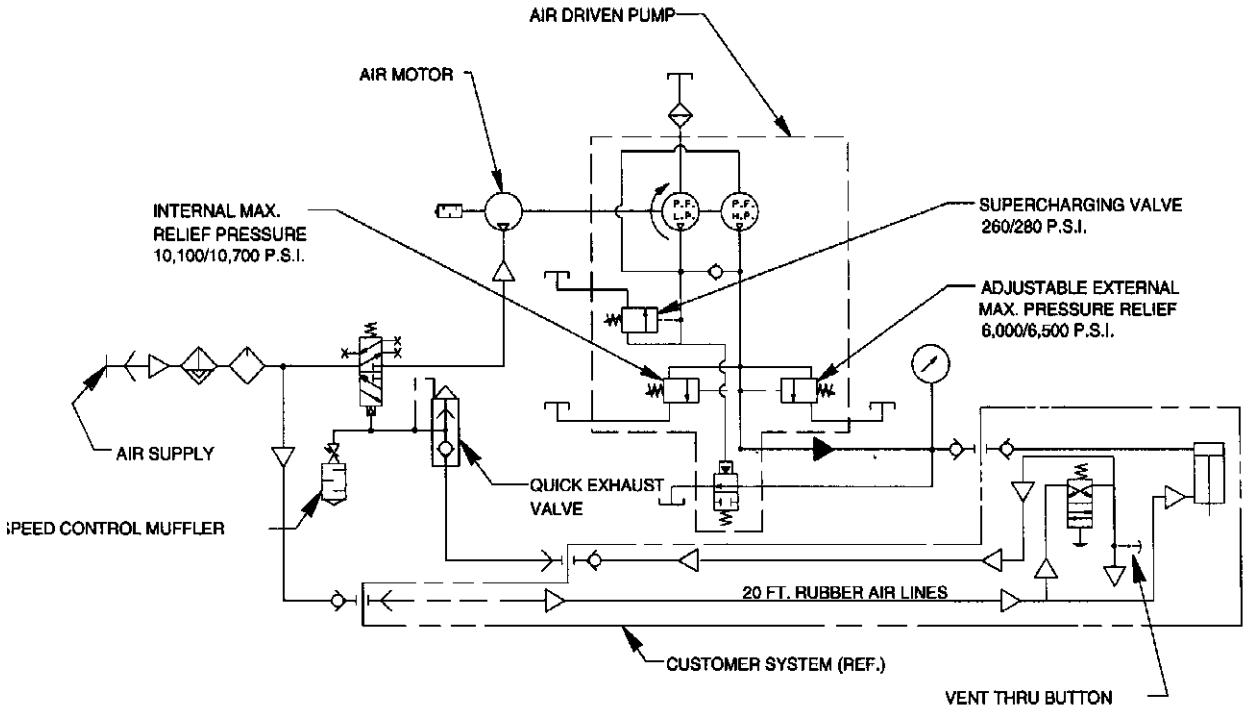


Figure 7.5-1
FT-200B Pneumatic Hydraulic Schematic

SECTION 8.0: FT-200M ILLUSTRATED PARTS BREAKDOWN

Parts breakdowns, consisting of a diagram and a parts list, for the FT-200M are contained in the following sections:

8.1 Air Hydraulic Pump
8.2 Basic Pump Assembly
8.3 High-Pressure Pump with Automatic Valve
8.4 Shroud Assembly
8.5 Pneumatic Hydraulic

8.1 AIR HYDRAULIC PUMP DIAGRAM; GENERAL PARTS LIST

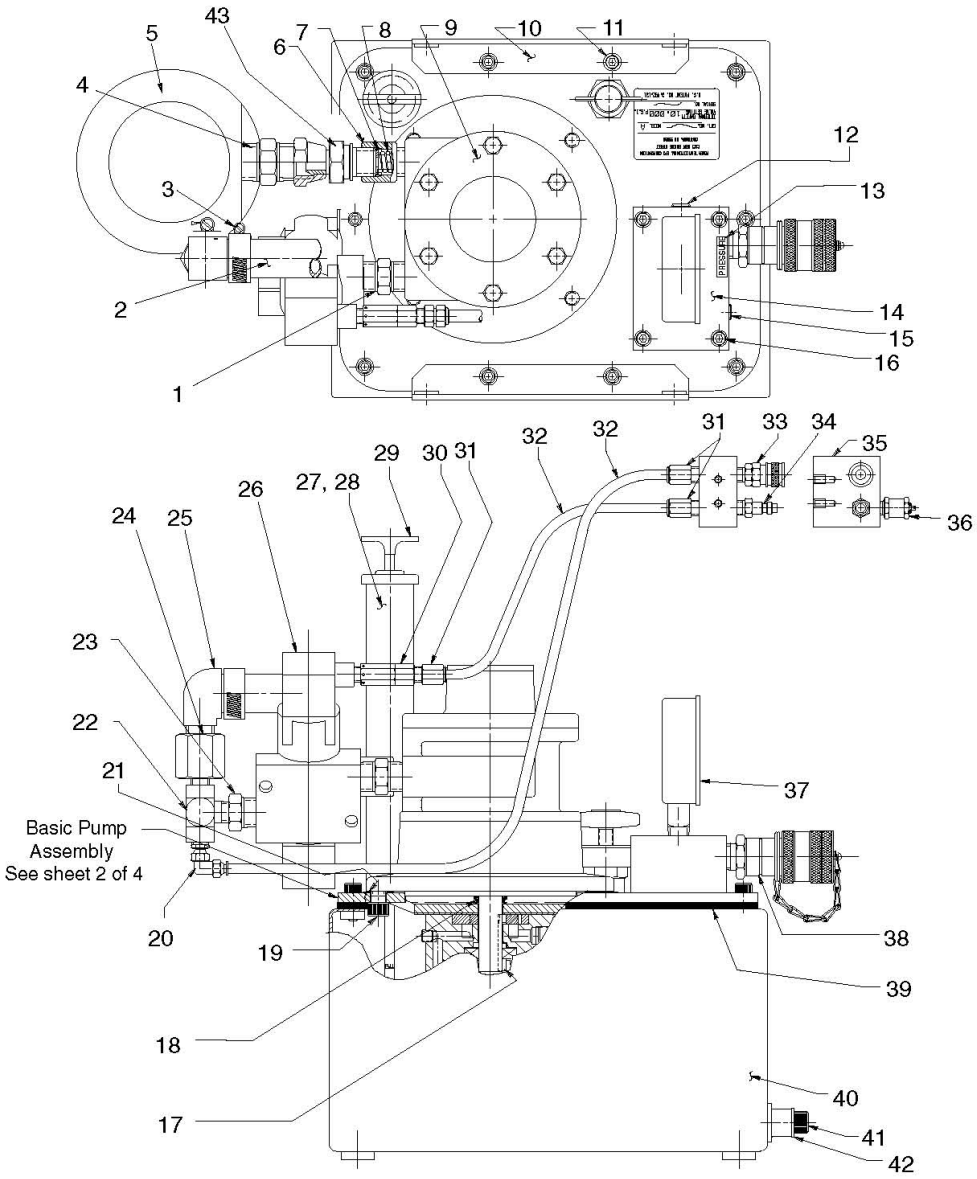


Figure 8.1-1
FT-200M Air Hydraulic Pump

8.1 PARTS LIST FOR FT-200M HYDRAULIC PUMP

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-185	250643	1	Bushing Fitting
2	1086-164	212898	.92 ft.	Pressure Hose
3	1086-163	12367	1	Hose Clamp
4	1086-208	250643	1	Fitting, Exhaust Muffler Extension
5	1086-206	F23-04-000	1	Exhaust Muffler
6	1086-125	214973	1	Extension Fitting
7	1086-187	10257	1	Washer
8	1086-186	16465	1	Compression Spring
9	1086-001	14717*	1	Air Motor
10	1086-126	47401GY8	2	Cover Mounting Bracket
11	1086-196	10008	10	Soc. Head Cap Screw
12	1086-017	10479	1	Pipe Plug (1/4 NPTF)
13	1086-067	201747	1	Decal
14	1086-052	45911	1	Manifold
15	1086-050	10909	1	Plug (3/8 NPTF)
16	1086-065	10022	4	Cap screw (1/4-20 x 1-1/2 lg.)
17	1086-127	214097	1	Key
18	1086-128	213674	1	V-Ring
19	1086-129	15187	4	Cap Screw (torque to 90/100 in. lbs.)
20	1086-123	15457	1	Elbow Fitting
21	1086-130	307425	1	Gasket
22	1086-160	208699	1	Tee Fitting
23	1086-015	10677	1	Reducing Fitting
24	1086-161	11965	1	Straight Fitting
25	1086-162	212897	1	90° Elbow Fitting
26	1086-184	308608	1	Air Valve
27	1086-131	308628	1	Stand-off Tube
28	1086-195	14725	1	O-Ring (1-1/8 x .937, -119)
29	1086-132	214955	1	Oil Dipstick
30	1086-011	213345	1	Quick Exhaust Valve
31	1086-194	250464	3	Poly Flow Fitting
32	1086-010	15883	1.9 ft.	Plastic Tubing
33	1086-060	213344	1	Coupler Socket
34	1086-058	213343	1	Coupler Plug
35	1086-061	307320	1	Manifold Block
36	1125-022	213346	1	Speed Control Muffler
37	1086-056	9040	1	Gauge
38	1047-013		1	Coupler
39	1086-133	47409	1	Cover Plate Gasket
40	1086-134	61799GY8	1	Reservoir
41	1086-135	10412	1	Cap Screw (3/8-16 UNC x 1/2 lg.)
42	1086-136	19779	1	Seal Washer
43	1086-209	252355	1	Fitting, Air Motor/Exhaust Muffler
--	1187-770	-----	0	Enerpac CT-604 Pressure Relief Tool[1]

*For Air Motor Repair Kit, order SPX 252100 (FTI P/N 1086-211).

Note 1: Not included.

8.2 BASIC PUMP ASSEMBLY DIAGRAM; PARTS LIST

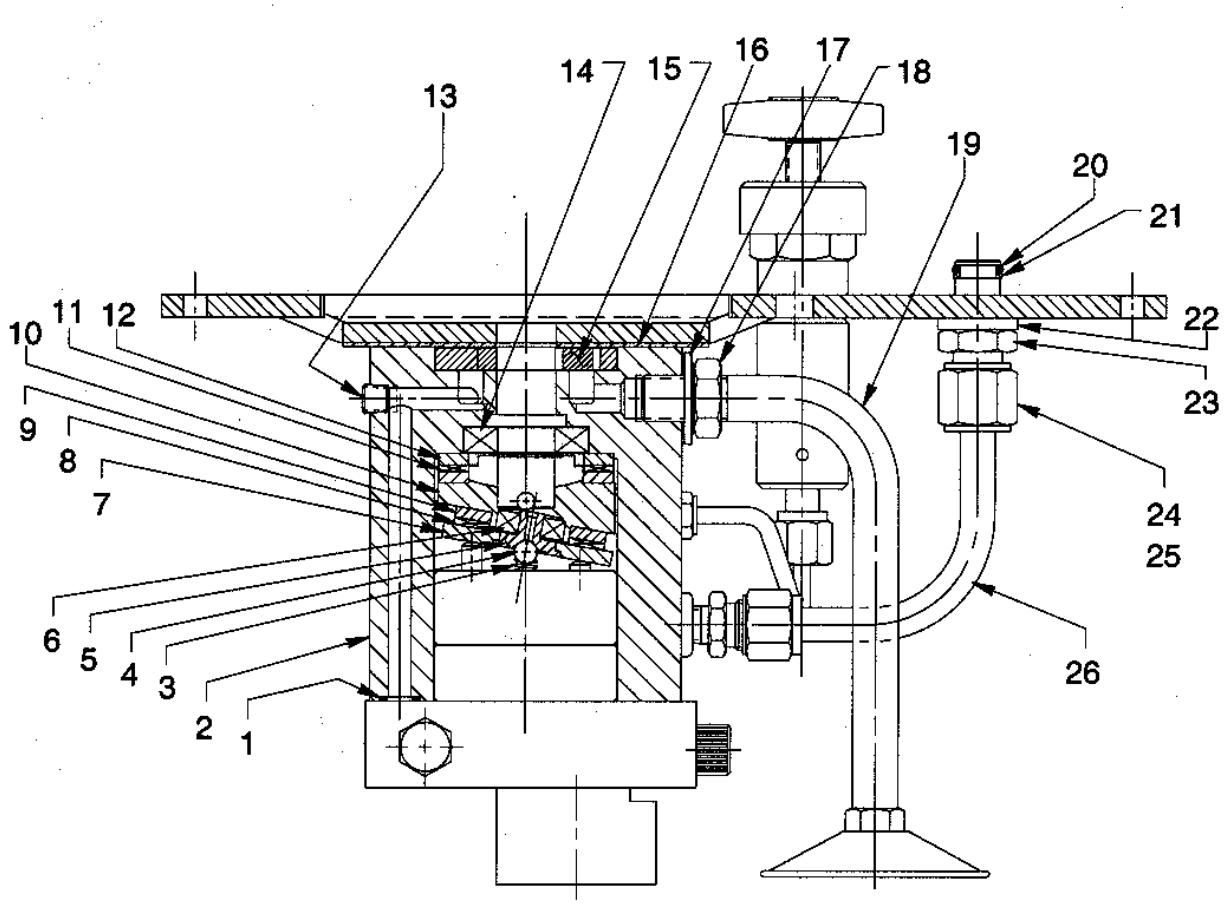


Figure 8.2-1a
FT-200M Basic Pump Assembly

8.2 PARTS LIST FOR BASIC PUMP ASSEMBLY

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-137	10267	1	O-Ring (7/16 x 5/16 x 1/16, -011)
2	1086-138	52883	1	Pump Body
3	1086-166	16320	1	Spring (1/4 outer diameter x 3/4 lg.)
4	1086-031	10375	1	Steel Ball (1/4 diameter)
5	1086-033	23547	1	Bearing Top Plate
6	1086-039	11814	1	Ball Bearing
7	1086-030	23548	1	Top Plate
8	1086-038	15431	1	Needle Bearing
9	1086-027	15432	1	Bearing Race
10	1086-026	350725	1	Angle Plate
11	1086-025	11228	1	Thrust Bearing
12	1086-024	11227	1	Bearing Race
13	1086-023	11084	1	Plug (1/16 NPTF; torque to 35/45 in. lbs. oiled)
14	1086-167	15695	1	Ball Bearing
15	1086-019	15693	1	Gerotor Set
16	1086-140	307296	1	Wear Plate
17	1086-141	213709	1	Seal Washer (turn on; do not push on)
18	1086-142	10390	1	Jam Nut (1/2-20 IMF)
19	1086-143	213686	1	Intake Tube
20	1086-049	10268	2	O-Ring (1/2 x 3/8 x 1/16, -012)
21	1086-048	11863	1	Backup Washer (1/2 x 3/8 x 1/16, -012)
22	1086-144	21484	1	Spacer
23	1086-145	214882	1	Connector Valve
24	1086-043	10430	1	Tube Sleeve
25	1086-044	10431	1	Tube Nut (5/8-18 UNF)
26	1086-168	308614	1	Oil Line Tube

8.2 BASIC PUMP ASSEMBLY DIAGRAM; PARTS LIST (Continued)

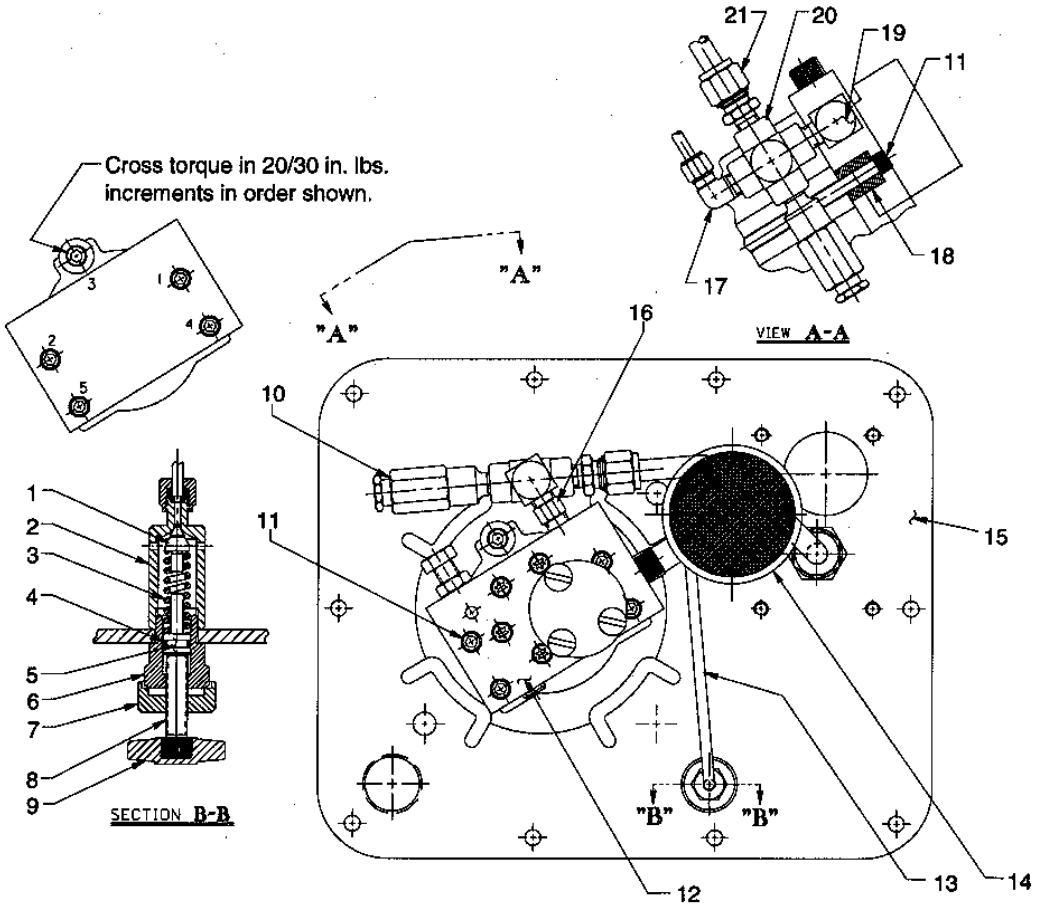


Figure 8.2-1b
FT-200M Basic Pump Assembly, Top View

8.2 PARTS LIST FOR BASIC PUMP ASSEMBLY

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-085	21046	1	Valve Stem
2	1086-080	22361	1	Body
3	1086-079	10495	1	Compression Spring (1/2 outer diameter x 1-5/8 lg.)
4	1086-049	10268	2	O-Ring (1/2 x 3/8 x 1/16, -012)
5	1086-078	21306	1	Spring Gasket
6	1086-084	21305	1	Valve Cap
7	1086-083	24573	1	Knob Locknut
8	1086-082	208148	1	Cap Screw (3/8-24 x 1-1/2 lg.)
9	1086-149	205788	1	Thumb Screw
10	1086-075	21278	1	Relief Valve Assembly (set at 10,100/10,700 psi)
11	1086-151	15642	5	Cap Screw (1/4-20 UNC x 5” lg.; torque to 55/65 in. lbs.)
12	1086-156	308612	1	Pump Body Assembly
13	1086-155	308615	1	Pressure Regulator Tube
14	1086-077	29682	1	Strainer
15	1086-154	47404	1	Cover Plate
16	1086-153	11421	1	Pipe Nipple
17	1086-076	11278	1	Tube Elbow
18	1086-152	214720	1	Spacer
19	1086-150	24730	1	Elbow
20	1086-149	208077	1	Single Cross Fitting
21	1086-148	12696	1	Connector

8.3 HIGH-PRESSURE PUMP ASSEMBLY WITH AUTOMATIC VALVE; PARTS LIST

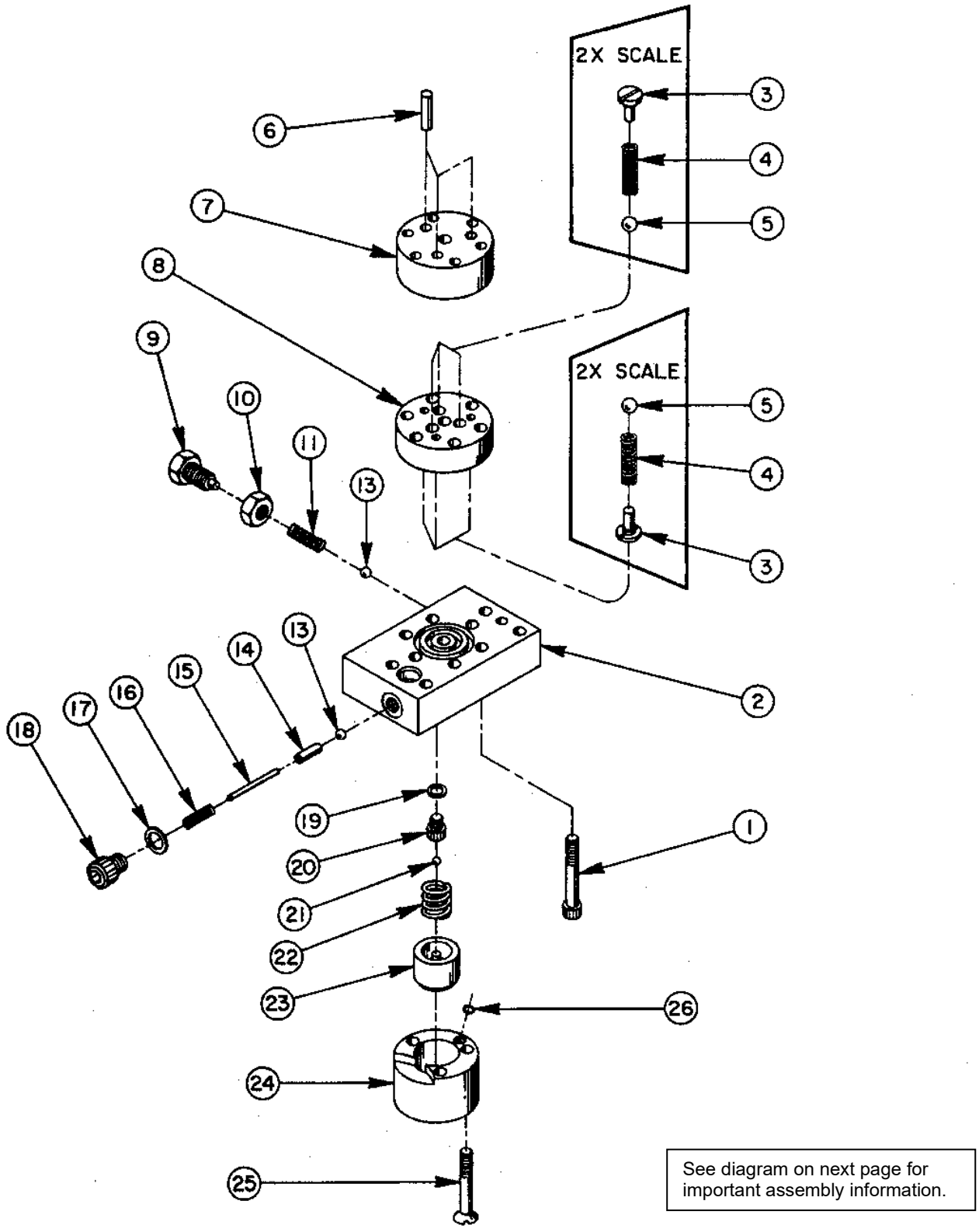
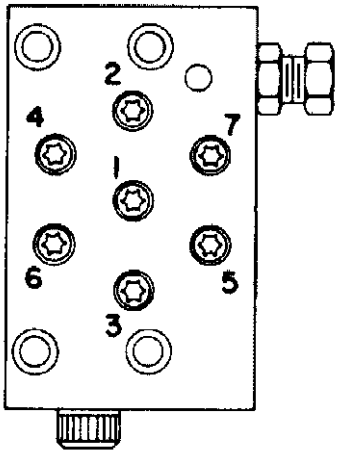


Figure 8.3-1
FT-200M Pressure Regulator Assembly

8.3 PARTS LIST FOR AUTOMATIC VALVE

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-086	*16747	7	Torx Drive Cap Screw
2	1086-087	*36911	1	Pump End Plate
3	1086-088	*24549	6	Valve Guide
4	1086-089	*10445	6	Compression Spring
5	1086-090	*12223	6	Steel Ball
6	1086-091	*21628	3	Piston
7	1086-092	*41062	1	Pump Barrel
8	1086-093	*40630	1	Valve Head
9	1086-169	29786	1	Adjusting Screw
10	1086-094	10386	1	Jam Nut
11	1086-170	11221	1	Compression Spring
13	1086-031	10375	2	Steel Ball
14	1086-098	201998	1	Sleeve
15	1086-099	12571	1	Roll Pin
16	1086-100	15129	1	Compression Spring
17	1086-101	12042	1	Copper Washer
18	1086-102	29690	1	Cap Screw
19	1086-103	10442	1	Copper Washer
20	1086-104	201995	1	Cap Screw
21	1086-105	10419	1	Steel Ball
22	1086-106	16465	1	Compression Spring
23	1086-107	202088	1	Piston
24	1086-157	308613	1	Valve Cylinder
25	1086-158	214941	3	Machine Screw
26	1086-110	10264	1	O-Ring

*Consult FTI before replacing items marked with an asterisk (*).



Assemble in sequence shown; lubricate under head and on threads; torque to 170 in. lbs.

Figure 8.3-2
FT-200M Bolt-Tightening Sequence

8.4 SHROUD ASSEMBLY; PARTS LIST

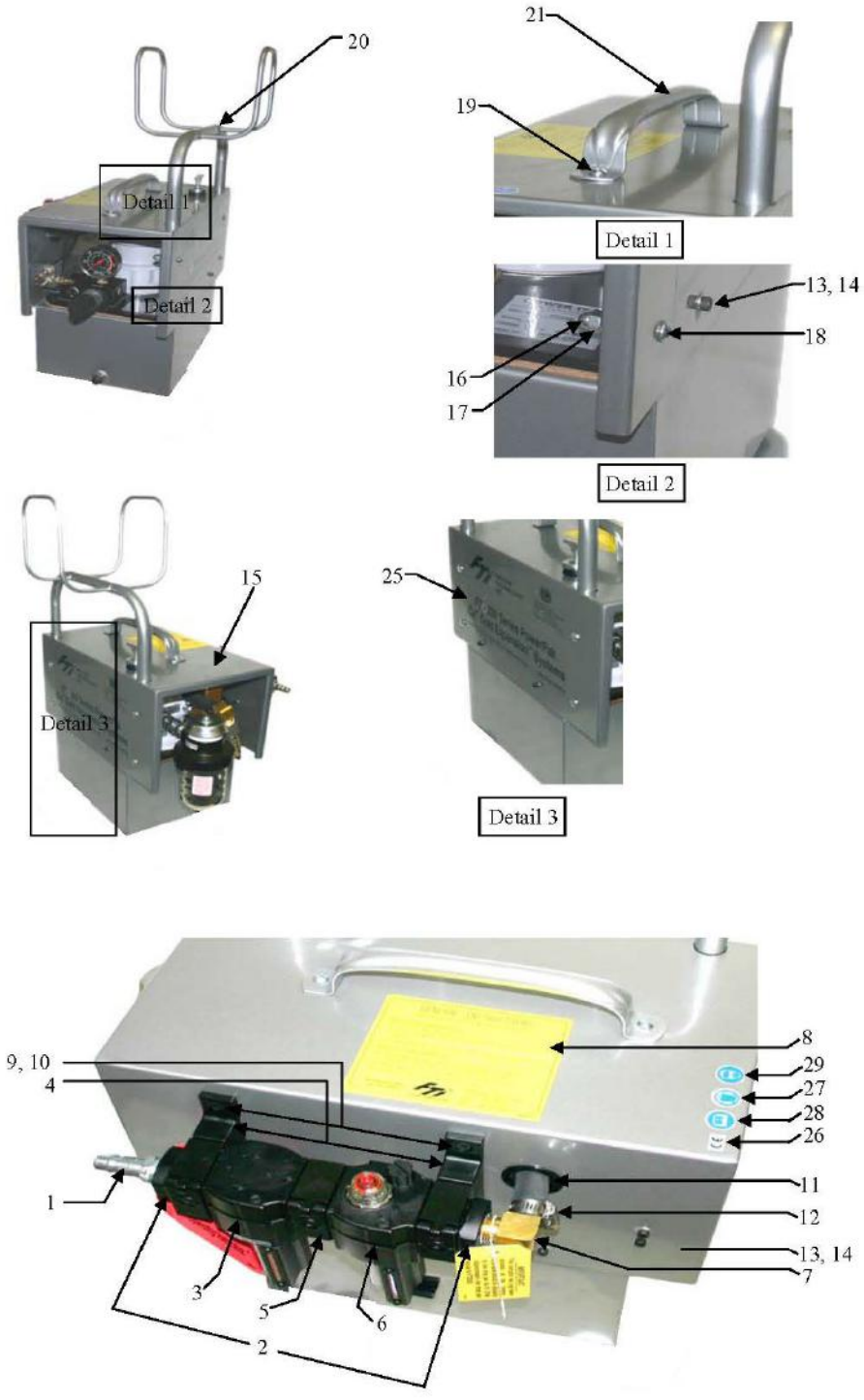


Figure 8.4-1
FT-200M Shroud Assembly

8.4 PARTS LIST SHROUD ASSEMBLY

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-005	250644	1	Air Coupler
2	1086-201	2001428	2	Pipe Adapter
3	1086-205	2001426	1	Air Filter
4	1086-203	2001430	2	Wall Mount
5	1086-202	2001429	1	Quick Clamp
6	1086-204	2001427	1	Air Lubricator
7	1086-174	212897	1	90° Elbow Fitting
8	1086-122	213776	1	Instruction Decal
9	1086-175	10166	2	Round Head Machine Screw (#10-24 x ½ Lg.)
10	1086-176	11089	2	Washer (#10)
11	1086-177	250661	.32 ft.	Snap Bushings
12	1086-163	12367	1	Hose Clamp
13	1086-189	250617	6	Screw (#10-24 UNC x 3/8 Lg. Note: Use Loctite #222 or Equiv.)
14	1086-188	10241	6	Lockwasher (#10 Split)
15	1086-207	61867-D	1	Cover
16	1086-113	10486	5	Nut (1/4-20 UNC)
17	1086-159	10199	6	Nut (1/4-20 UNC)
18	1086-179	10614	4	Machine Screw (1/4 UNC x 1-1/2 Lg.)
19	1086-008	253371	2	Screw (1/4 UNC x 3/4 Lg.)
20	1086-210	2001433	1	Pump Bracket
21	1086-116	35903GY8	1	Handle
24	1086-188	16963	4	Lockwasher
25	1086-120	350908	1	Decal, Trade Name
	5855-001		1	Cart, Pump, FT-200M (see Figure 8.6-1)

8.5 PNEUMATIC HYDRAULIC SCHEMATIC

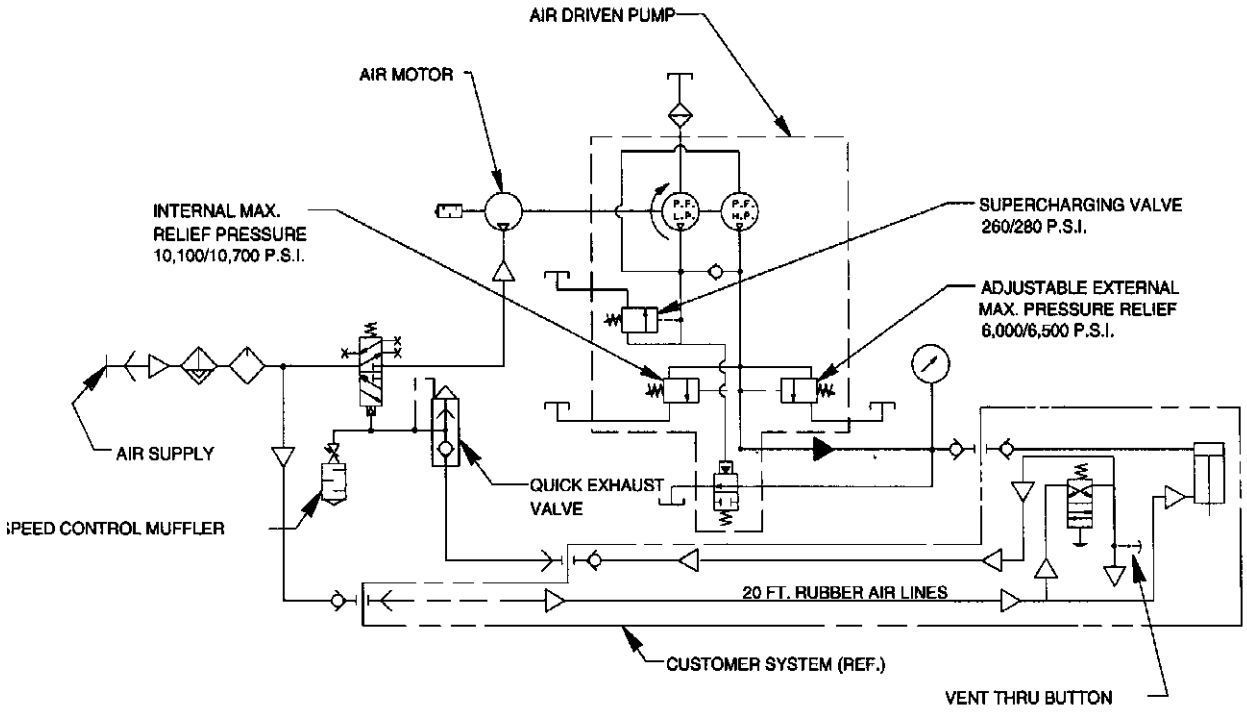


Figure 8.5-1
FT-200M Pneumatic Hydraulic Schematic

8.6 FT-200M CART

Figure 8.6-1
FT-200M Cart

FTI Part Number	Number Required	Part Description
5855-001	1	Cart, Pump, FT-200M

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SECTION 9.0: FT-200A ILLUSTRATED PARTS BREAKDOWN

Parts breakdowns, consisting of a diagram and a parts list, for the FT-200A are contained in the following sections:

9.1 Air Hydraulic Pump
9.2 Basic Pump Assembly
9.3 High-Pressure Pump with Automatic Valve
9.4 Shroud Assembly
9.5 Pneumatic Hydraulic

9.1 AIR HYDRAULIC PUMP DIAGRAM; PARTS LIST

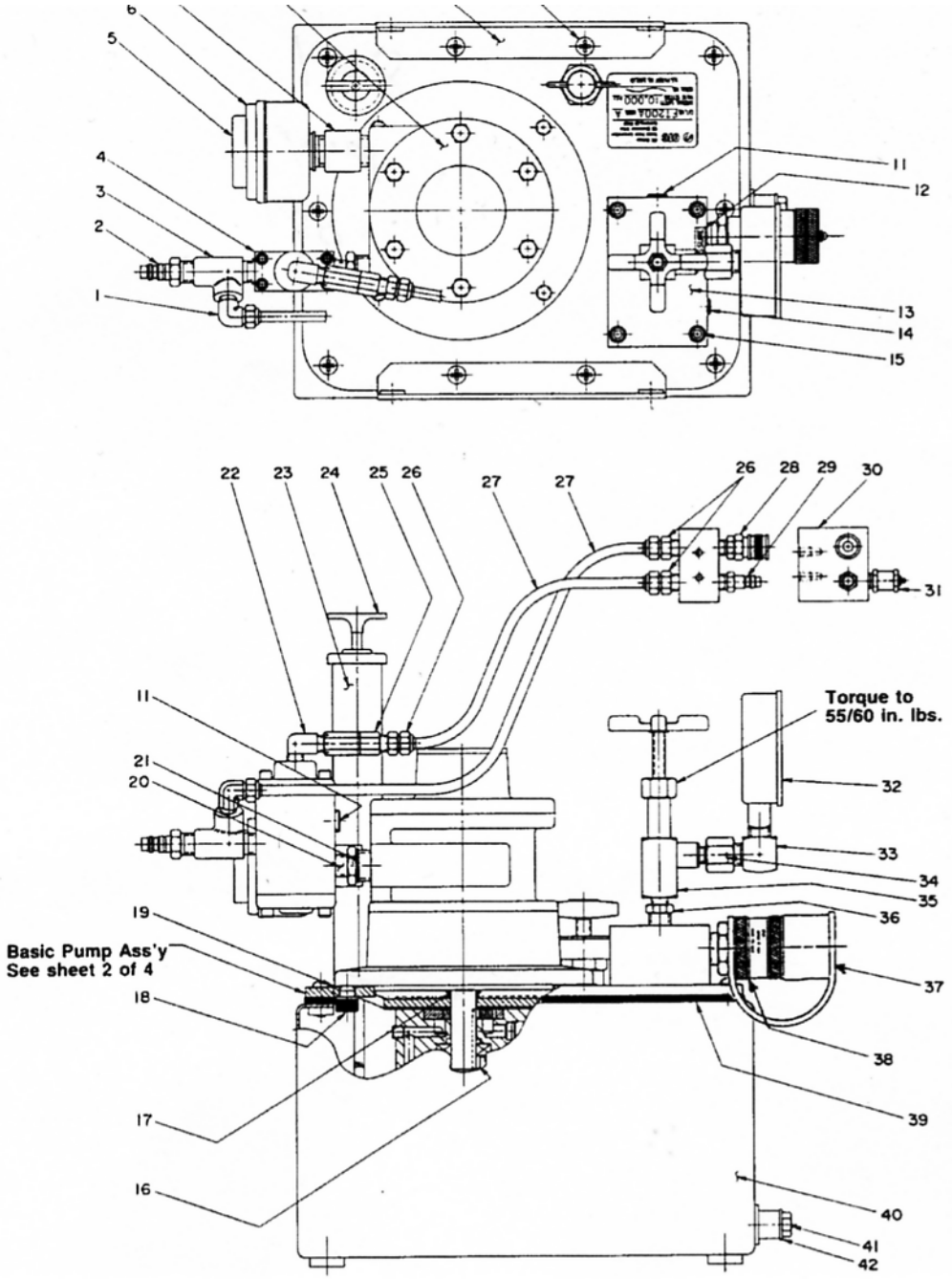


Figure 9.1-1
FT-200A Air Hydraulic Pump

9.1 PARTS LIST FOR FT-200A AIR HYDRAULIC PUMP

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-123	15457	1	Elbow Fitting
2	1086-005	210153	1	Air Coupler
3	1086-006	10618	1	Tee Fitting
4	1086-124	212404	1	Air Valve
5	1086-004	205505	1	Deflector
6	1086-003	13966	1	Muffler
7	1086-125	214793	1	Extension Fitting
8	1086-001	14717	1	Air Motor
9	1086-126	47401GY8	2	Cover Mounting Bracket
10	1086-008	10177	10	Round Head Machine Screw (1/4-20 UNC x 3/4 lg.)
11	1086-017	10479	2	Pipe Plug (1/4 NPTF)
12	1086-067	201747	1	Decal
13	1086-052	45911	1	Manifold
14	1086-050	10909	1	Plug (3/8 NPTF)
15	1086-065	10022	4	Cap Screw (1/4-20 UNC x 1-1/2 lg.)
16	1086-127	214097	1	Key
17	1086-128	213674	1	V-Ring
18	1086-129	15187	4	Cap Screw (3/8-16 UNC x 5/8 lg.; torque to 90/100 in. lbs.)
19	1086-130	307425	1	Gasket
20	1086-014	213349	1	Straight Fitting
21	1086-015	10677	1	Reducing Fitting
22	1086-012	14680	1	90° Elbow Fitting
23	1086-131	308628	1	Stand-off Tube
24	1086-132	214955	1	Oil Dipstick
25	1086-011	213345	1	Quick Exhaust Valve
26	1086-009	15042	3	Poly Flow Fitting
27	1086-010	15883	1.9 ft.	Plastic Tubing
28	1086-060	213344	1	Coupler Socket
29	1086-058	213343	1	Coupler Plug
30	1086-061	307320	1	Manifold Block
31	1125-022	213346	1	Speed Control Muffler
32	1086-056	38973	1	Gauge
33	1086-054	16823	1	90° Elbow Fitting
34	1086-055	15235	1	Reducing Fitting
35	1086-057	16822	1	Measure Control Valve
36	1086-053	16691	1	Reducing Fitting
37	1086-069	9797	1	Dust Cap
38	1047-013		1	Coupler
39	1086-133	47409	1	Cover Plate Gasket
40	1086-134	61799GY8	1	Reservoir
41	1086-135	211185	1	Cap Screw (3/8-16 UNC x 3/4 lg.)
42	1086-136	19779	1	Seal Washer
--	1187-770	-----	0	Enerpac CT-604 Pressure Relief Tool[1]

Note 1: Not included.

9.2 BASIC PUMP ASSEMBLY DIAGRAM; PARTS LIST

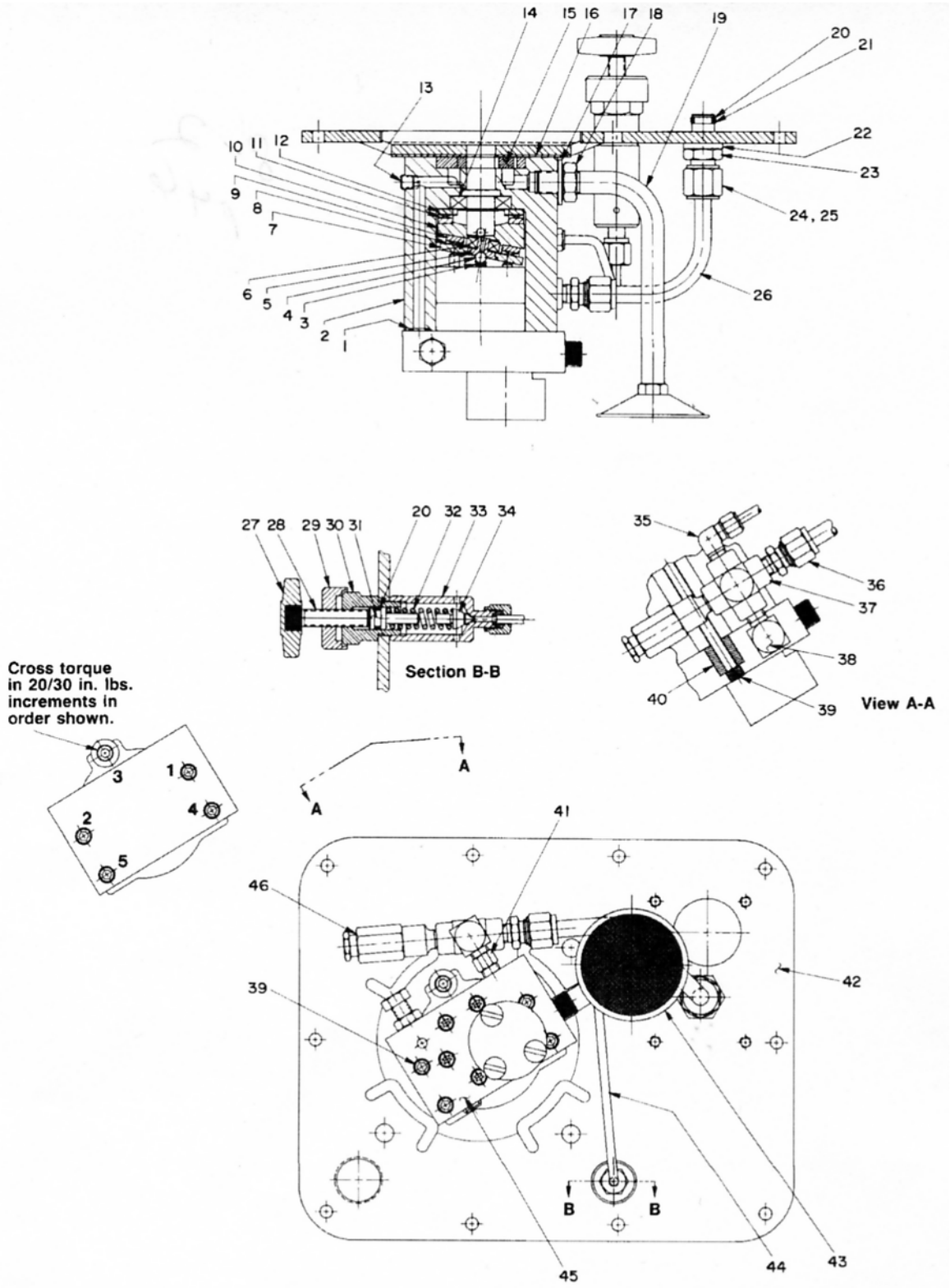


Figure 9.2-1
FT-200A Basic Pump Assembly

9.2 PARTS LIST FOR BASIC PUMP ASSEMBLY

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-137	10267	1	O-Ring (7/16 x 5/16 x 1/16, -011)
2	1086-138	52883	1	Pump Body
3	1086-166	16320	1	Spring (1/4 outer diameter x 3/4 lg.)
4	1086-031	10375	1	Steel ball (1/4 diameter)
5	1086-033	23547	1	Bearing Top Plate
6	1086-039	11814	1	Ball Bearing
7	1086-030	23548	1	Top Plate
8	1086-038	15431	1	Needle Bearing
9	1086-027	15432	1	Bearing Race
10	1086-139	35271	1	Angle Plate
11	1086-025	11228	1	Thrust Bearing
12	1086-024	11227	1	Bearing Race
13	1086-023	11084	1	Plug (1/16 NPTF; torque to 35/45 in. lbs. oiled)
14	1086-041	15695	1	Ball Bearing
15	1086-019	15693	1	Gerotor Set
16	1086-140	307296	1	Wear Plate
17	1086-141	213709	1	Seal Washer (turn on; do not push on)
18	1086-142	10390	1	Jam Nut (1/2-20 IMF)
19	1086-143	213686	1	Intake Tube
20	1086-049	10268	2	O-Ring (1/2 x 3/8 x 1/16, -012)
21	1086-048	11863	1	Backup Washer (1/2 x 3/8 x 1/16, -012)
22	1086-144	21484	1	Spacer
23	1086-145	214882	1	Connector Valve
24	1086-043	10430	1	Tube Sleeve
25	1086-044	10431	1	Tube Nut (5/8-18 UNF)
26	1086-146	308614	1	Oil Line Tube
27	1086-147	205788	1	Thumb Screw
28	1086-082	208148	1	Cap Screw
29	1086-083	24573	1	Knob Locknut (leave loose)
30	1086-084	21305	1	Valve Cap
31	1086-078	21306	1	Spring Gasket
32	1086-079	10495	1	Compression Spring
33	1086-080	22361	1	Body
34	1086-085	21046	1	Valve Stem
35	1086-076	11278	1	Elbow Fitting
36	1086-148	12696	1	Connector
37	1086-149	208077	1	Single Cross Fitting
38	1086-150	24730	1	Elbow
39	1086-151	15642	5	Cap Screw (torque to 55/65 in. lbs.)
40	1086-152	214720	1	Spacer
41	1086-153	11421	1	Pipe Nipple
42	1086-154	47404	1	Cover Plate
43	1086-077	29682	1	Strainer
44	1086-155	308615	1	Pressure Regulator Tube
45	1086-156	308612	1	Pump Body Assembly
46	1086-075	21278	1	Relief Valve Assembly

9.3 HIGH-PRESSURE PUMP ASSEMBLY WITH AUTOMATIC VALVE; PARTS LIST

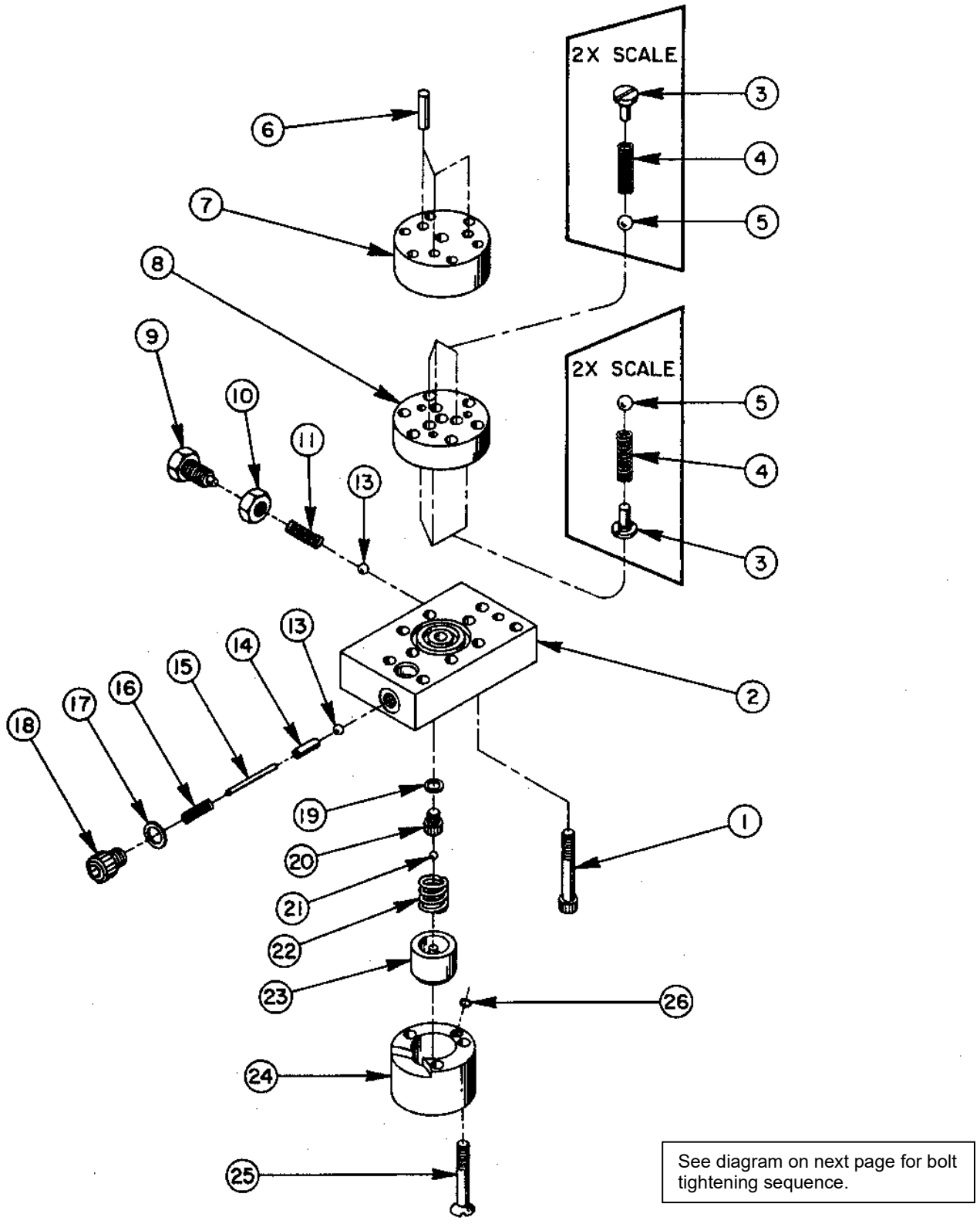
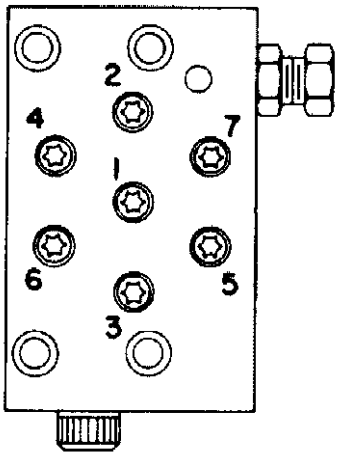


Figure 9.3-1
FT-200A Pressure Regulator Assembly

9.3 PARTS LIST FOR AUTOMATIC VALVE

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-086	*16747	7	Torx Drive Cap Screw
2	1086-087	*36911	1	Pump End Plate
3	1086-088	*24549	6	Valve Guide
4	1086-089	*10445	6	Compression Spring
5	1086-090	*12223	6	Steel Ball
6	1086-091	*21628	3	Piston
7	1086-092	*41062	1	Pump Barrel
8	1086-093	*40630	1	Valve Head
9	1086-169	29786	1	Adjusting Screw
10	1086-095	10386	1	Jam Nut
11	1086-170	11221	1	Compression Spring
12	1086-097	200796	1	Spring And Ball Adapter
13	1086-031	10375	2	Steel Ball
14	1086-098	201998	1	Sleeve
15	1086-099	12571	1	Roll Pin
16	1086-100	15129	1	Compression Spring
17	1086-101	12042	1	Copper Washer
18	1086-102	29690	1	Cap Screw
19	1086-103	10442	1	Copper Washer
20	1086-104	201995	1	Cap Screw
21	1086-105	10419	1	Steel Ball
22	1086-106	16465	1	Compression Spring
23	1086-107	202088	1	Piston
24	1086-157	308613	1	Valve Cylinder
25	1086-158	214941	3	Machine Screw
26	1086-110	10264	1	O-Ring

*Consult FTI before replacing items marked with an asterisk (*).



Assemble in sequence shown; lubricate under head and on threads; torque to 170 in. lbs.

Figure 9.3-2
FT-200A Valve End Plate
Bolt-Tightening Sequence

9.4 SHROUD ASSEMBLY; PARTS LIST

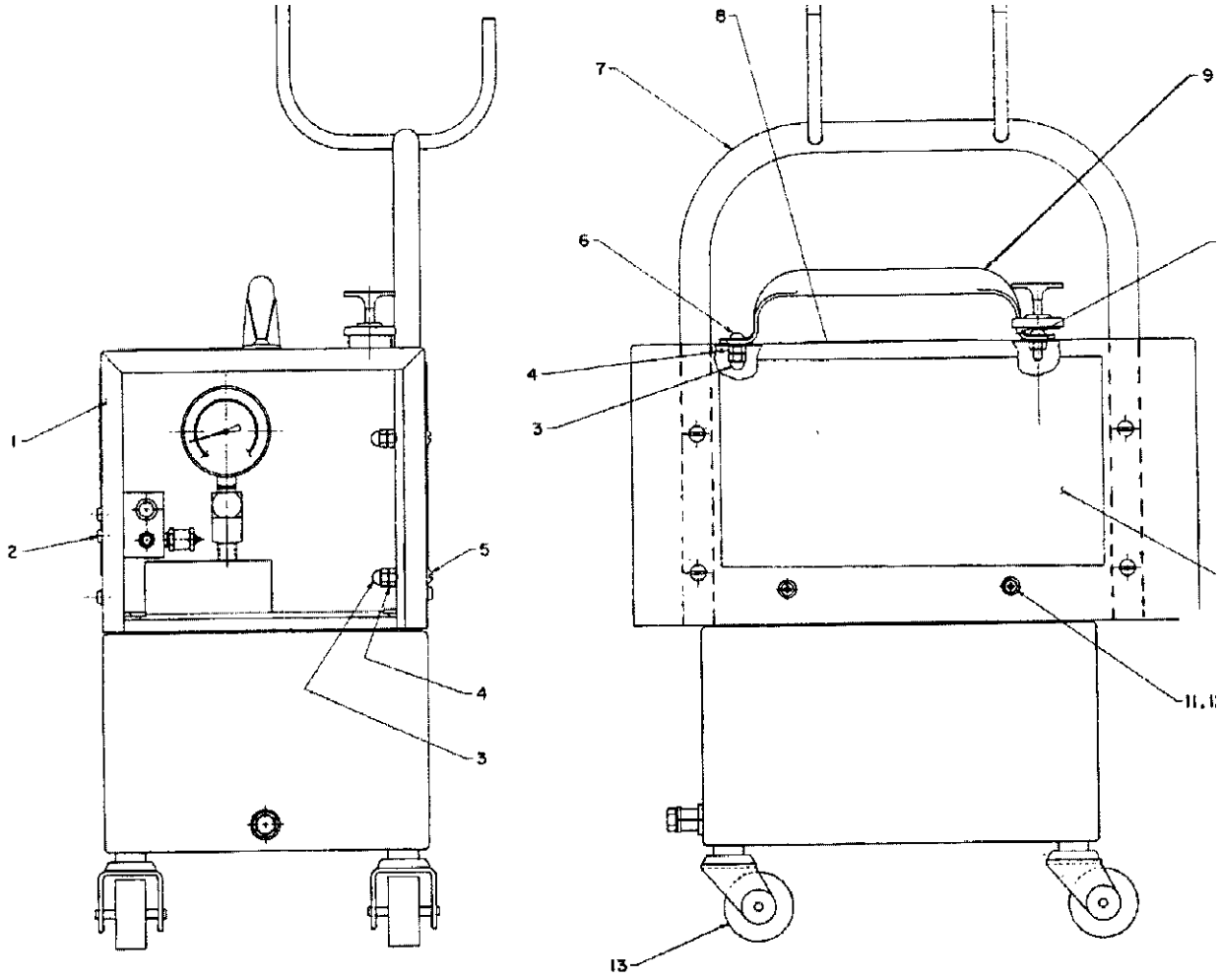


Figure 9.4-1
FT-200A Shroud Assembly

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-111	61574GY8	1	Cover
2	1086-112	16613	2	Screw
3	1086-113	10486	5	Nut
4	1086-159	10199	6	Screw
5	1086-109	10614	4	Machine Screw
6	1086-008	10177	2	Screw
7	1086-115	61542GY8	1	Pump Bracket
8	1086-122	213776	1	Decal
9	1086-116	35903GY8	1	Handle
10	1086-120	307511	2	FTI Decal
11	1086-117	16876	4	Screw
12	1086-119	12356	4	Lockwasher
13	1086-118	10494	4	Casters

9.5 PNEUMATIC HYDRAULIC SCHEMATIC

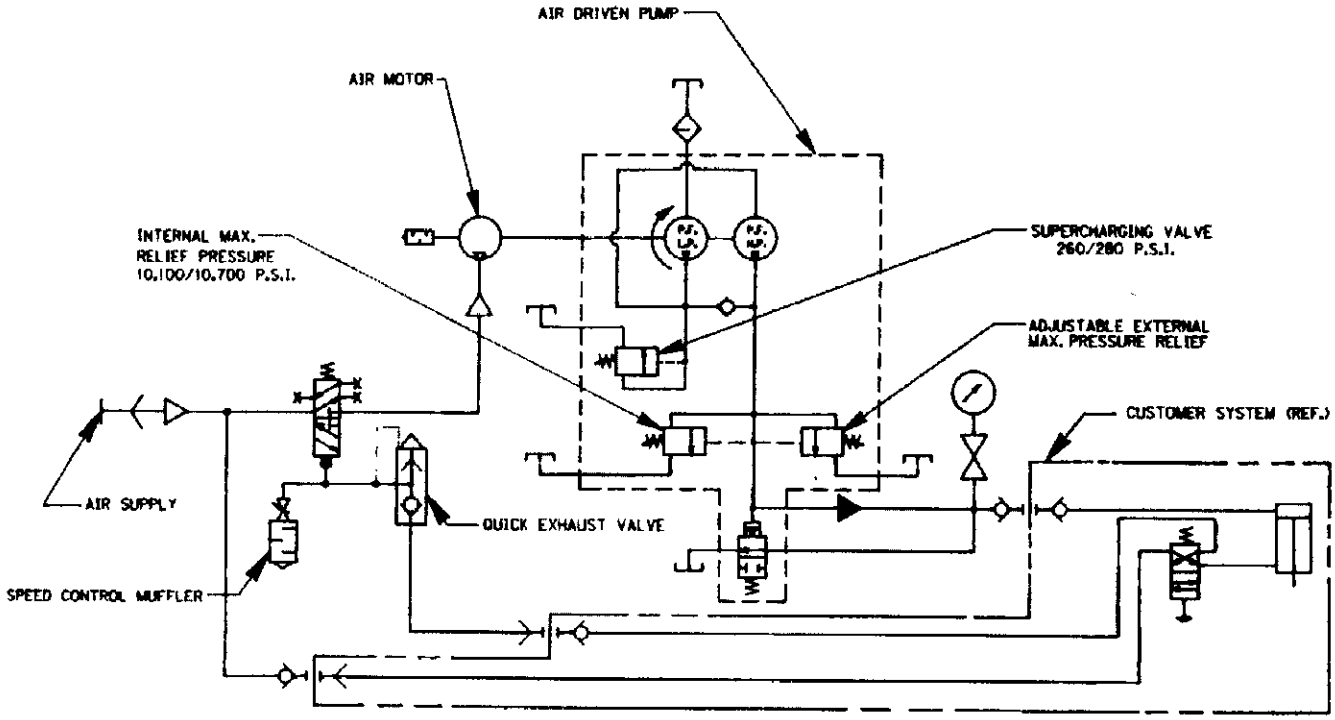


Figure 9.5-1
FT-200A Pneumatic Hydraulic Schematic

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SECTION 10.0: FT-200 ILLUSTRATED PARTS BREAKDOWN

Parts breakdowns, consisting of a diagram and a parts list, for the FT-200 are contained in the following sections:

10.1 Air Hydraulic Pump
10.2 Pump and Pressure Regulator Assembly
10.3 High-Pressure Pump with Automatic Valve
10.4 Shroud Assembly
10.5 Pneumatic Hydraulic

10.1 AIR HYDRAULIC PUMP DIAGRAM; PARTS LIST

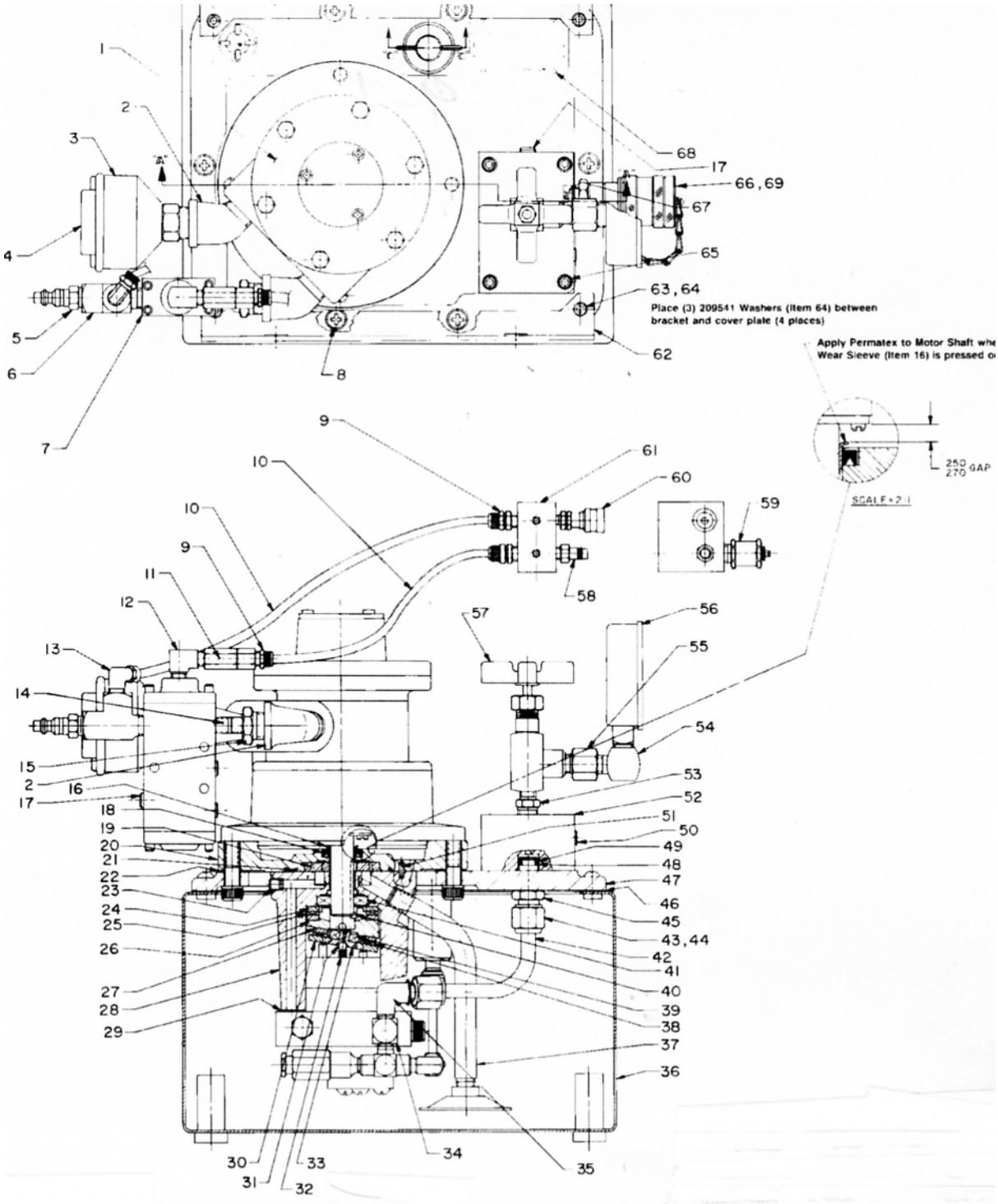


Figure 10.1-1
FT-200 Air Hydraulic Pump

10.1 PARTS LIST FOR AIR HYDRAULIC PUMP

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-001	14717	1	Air Motor
2	1086-002	15453	2	45° Elbow Fitting
3	1086-003	13966	1	Muffler
4	1086-004	205505	1	Deflector
5	1086-005	210153	1	Air Coupler
6	1086-006	10618	1	Tee Fitting
7	1086-007	306033	1	Air Valve
8	1086-008	10177	6	Screw
9	1086-009	15042	3	Poly-Flo Fitting
10	1086-010	15883	1.8 ft.	Plastic Tubing
11	1086-011	213345	1	Quick Exhaust Valve
12	1086-012	14680	1	90° Elbow Fitting
13	1086-013	15457	1	Poly-Flo Fitting
14	1086-014	213349	1	Straight Fitting
15	1086-015	10677	1	Reducing Fitting
16	1086-016	15696	1	Wear Sleeve
17	1086-017	10479	4	Pipe Slug
18	1086-018	15694	1	Shaft Seal
19	1086-019	15693	1	Gerotor Set
20	1086-020	50751	1	Pump Housing
21	1086-021	15690	1	O-Ring
22	1086-022	35541	1	Gasket
23	1086-023	11084	1	Pipe Plug
24	1086-024	11227	2	Bearing Race
25	1086-025	11228	1	Thrust Bearing
26	1086-026	35271	1	Angle Plate
27	1086-027	15432	1	Needle Thrust Bearing
28	1086-028	50752	1	Pump Assembly
29	1086-029	27776	1	Gasket
30	1086-030	23548	1	Top Plate
31	1086-031	10375	1	Steel Ball
32	1086-032	10361	1	Compression Spring
33	1086-033	23547	1	Top Plate Bearing
34	1086-034	14538	1	Tee Fitting
35	1086-035	10475	1	90° Elbow
36	1086-036	40063GY8	1	Reservoir
37	1086-037	200799	1	Intake Tube
38	1086-038	15431	1	Needle Thrust Bearing
39	1086-039	11814	1	Ball Bearing
40	1086-040	200798	1	Key

Continued next page

10.1 PARTS LIST FOR AIR HYDRAULIC PUMP (Continued)

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
41	1086-041	15695	1	Radial Ball Bearing
42	1086-042	213342	1	High-Pressure Oil Line
43	1086-043	10430	1	Tube Sleeve
44	1086-044	10431	1	Tube Nut
45	1086-045	20787	1	Valve Connector
46	1086-046	40164	1	Cover Plate Gasket
47	1086-047	50851	1	Cover Plate
48	1086-048	11863	1	Backup Washer
49	1086-049	10268	1	O-Ring
50	1086-050	10909	1	Pipe Plug
51	1086-051	10808	1	Dowel Pin
52	1086-052	45911	1	Manifold
53	1086-053	16691	1	Reducing Fitting
54	1086-054	16823	1	90° Elbow Fitting
55	1086-055	15235	1	Reducing Fitting
56	1086-056	38973	1	Gauge
57	1086-057	16822	1	Pressure Control Valve
58	1086-058	213343	1	Coupler Plug
59	1125-022	213346	1	Trigger Response Valve
60	1086-060	213344	1	Coupler Socket
61	1086-061	30732	1	Manifold Block
62	1086-062	46764GY8	2	Mounting Bracket
63	1086-063	10016	4	Cap Screw
64	1086-064	209541	12	Washer
65	1086-065	10022	4	Cap Screw
66	1086-066	213730	1	Quick Coupler
67	1086-067	201747	1	Decal
68	1086-068	10575	4	Drive Screw
69	1086-069	9797	1	Dust Cap
70	1086-070	20771	1	Shifting Spool Poppet
--	1187-770	-----	0	Enerpac CT-604 Pressure Relief Tool[1]

Note 1: Not included.

10.2 PUMP (BOTTOM VIEW) AND PRESSURE REGULATOR ASSEMBLY; PARTS LIST

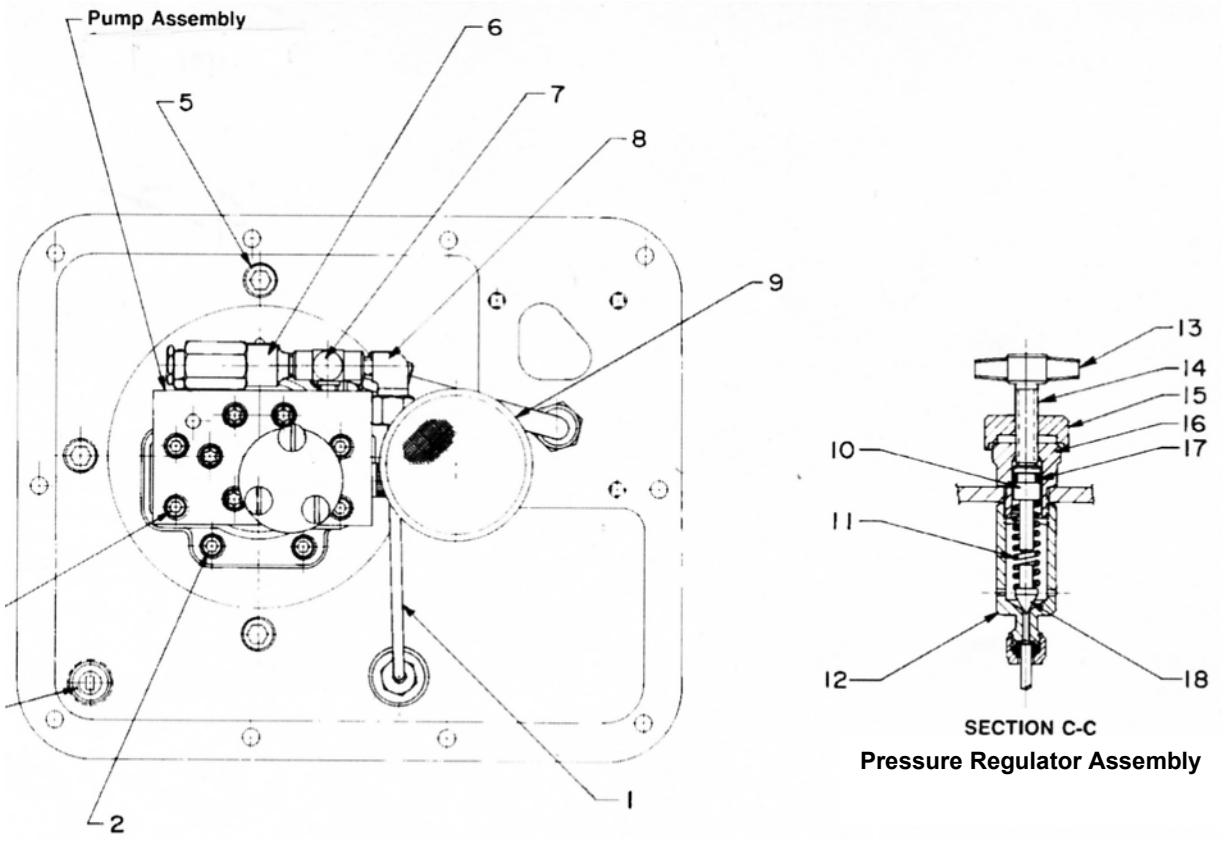


Figure 10.2-1
FT-200 Basic Pump Assembly, Bottom View

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-071	213340	1	Pressure Regulator Line
2	1086-063	10016	4	Cap Screw
3	1086-072	20937	1	Vented Filler Cap
4	1086-073	10020	4	Cap Screw
5	1086-074	12577	4	Cap Screw
6	1086-075	21278	1	Relief Valve
7	1086-034	14538	1	Tee Fitting
8	1086-076	11278	1	Fitting
9	1086-077	29682	1	Strainer
10	1086-078	21306	1	Spring Guide
11	1086-079	10495	1	Compression Spring
12	1086-080	22361	1	Valve Body
13	1086-081	205788	1	Knob
14	1086-082	208148	1	Cap Screw
15	1086-083	24573	1	Locknut Knob
16	1086-084	21305	1	Vale Cap
17	1086-049	10268	1	O-Ring
18	1086-085	21046	1	Valve Stem

10.3 HIGH-PRESSURE PUMP ASSEMBLY WITH AUTOMATIC VALVE; PARTS LIST

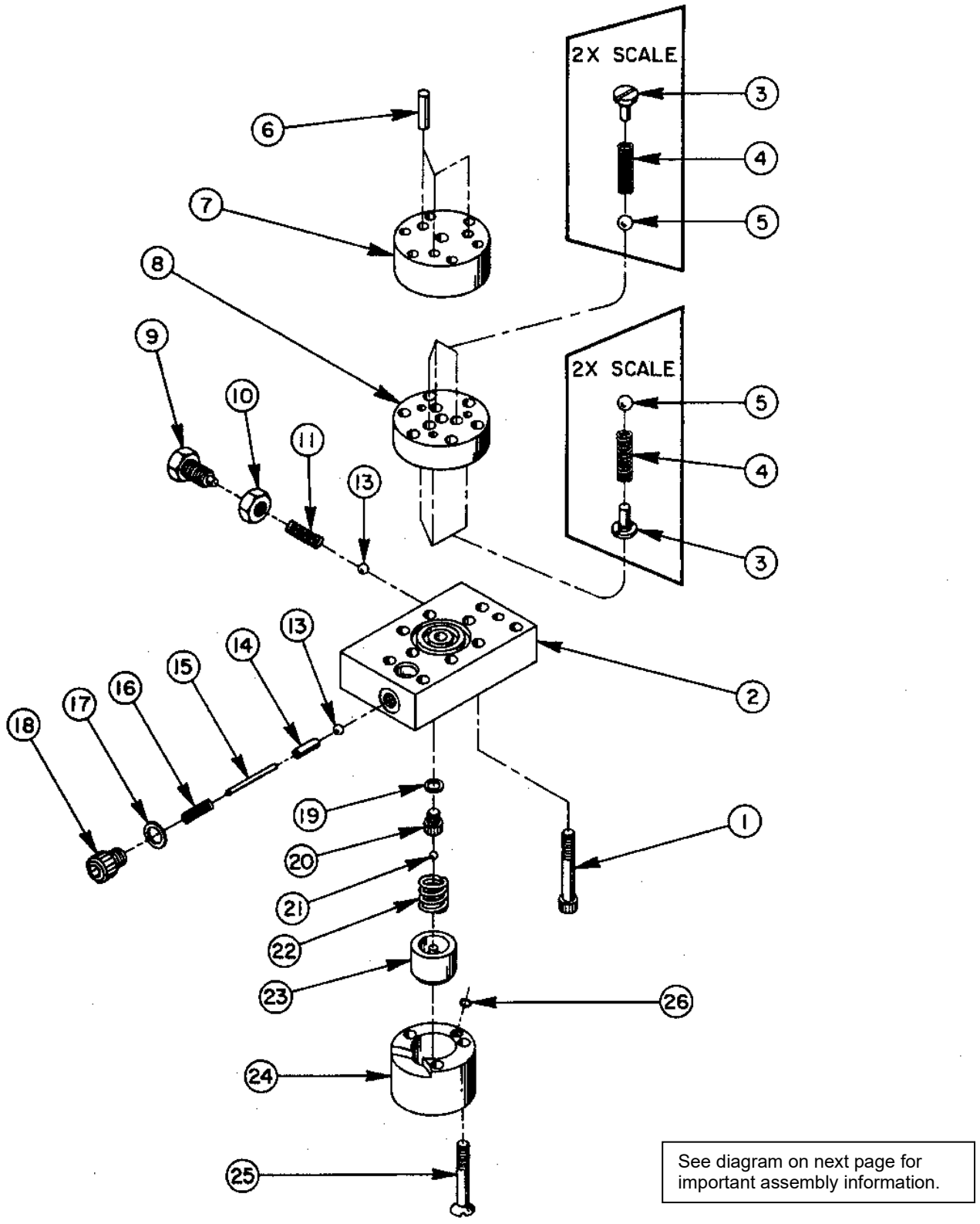
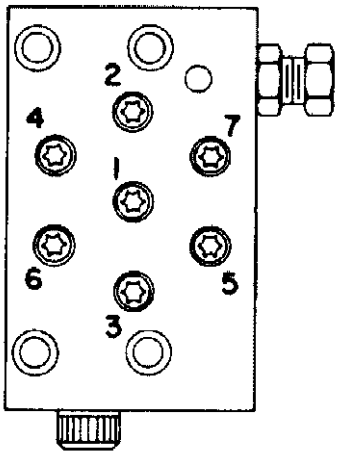


Figure 10.3-1
FT-200 Pressure Regulator Assembly

10.3 PARTS LIST FOR AUTOMATIC VALVE

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-086	16747	7	Torx Drive Cap Screw
2	1086-087	32911	1	Pump End Plate
3	1086-088	24549	6	Valve Guide
4	1086-089	10445	6	Compression Spring
5	1086-090	12223	6	Steel Ball
6	1086-091	21628	3	Piston
7	1086-092	41062	1	Pump Barrel
8	1086-093	40630	1	Valve Head
9	1086-094	200797	1	Adjusting Screw
10	1086-095	10386	1	Jam Nut
11	1086-096	15691	1	Compression Spring
12	1086-097	200796	1	Spring and Ball Adapter
13	1086-031	10375	2	Steel Ball
14	1086-098	201998	1	Sleeve
15	1086-099	12571	1	Roll Pin
16	1086-100	15129	1	Compression Spring
17	1086-101	12042	1	Copper Washer
18	1086-102	29690	1	Cap Screw
18	1086-103	10442	1	Copper Washer
20	1086-104	201995	1	Cap Screw
21	1086-105	10419	1	Steel Ball
22	1086-106	16465	1	Compression Spring
23	1086-107	202088	1	Piston
24	1086-108	32077	1	Valve Cylinder
25	1086-109	10614	3	Machine Screw
26	1086-110	10264	1	O-Ring



Assemble in sequence shown; lubricate under head and on threads; torque to 170 in. lbs.

Figure 10.3-2
FT-200 Valve End Plate
Bolt-Tightening Sequence

10.4 SHROUD ASSEMBLY; PARTS LIST

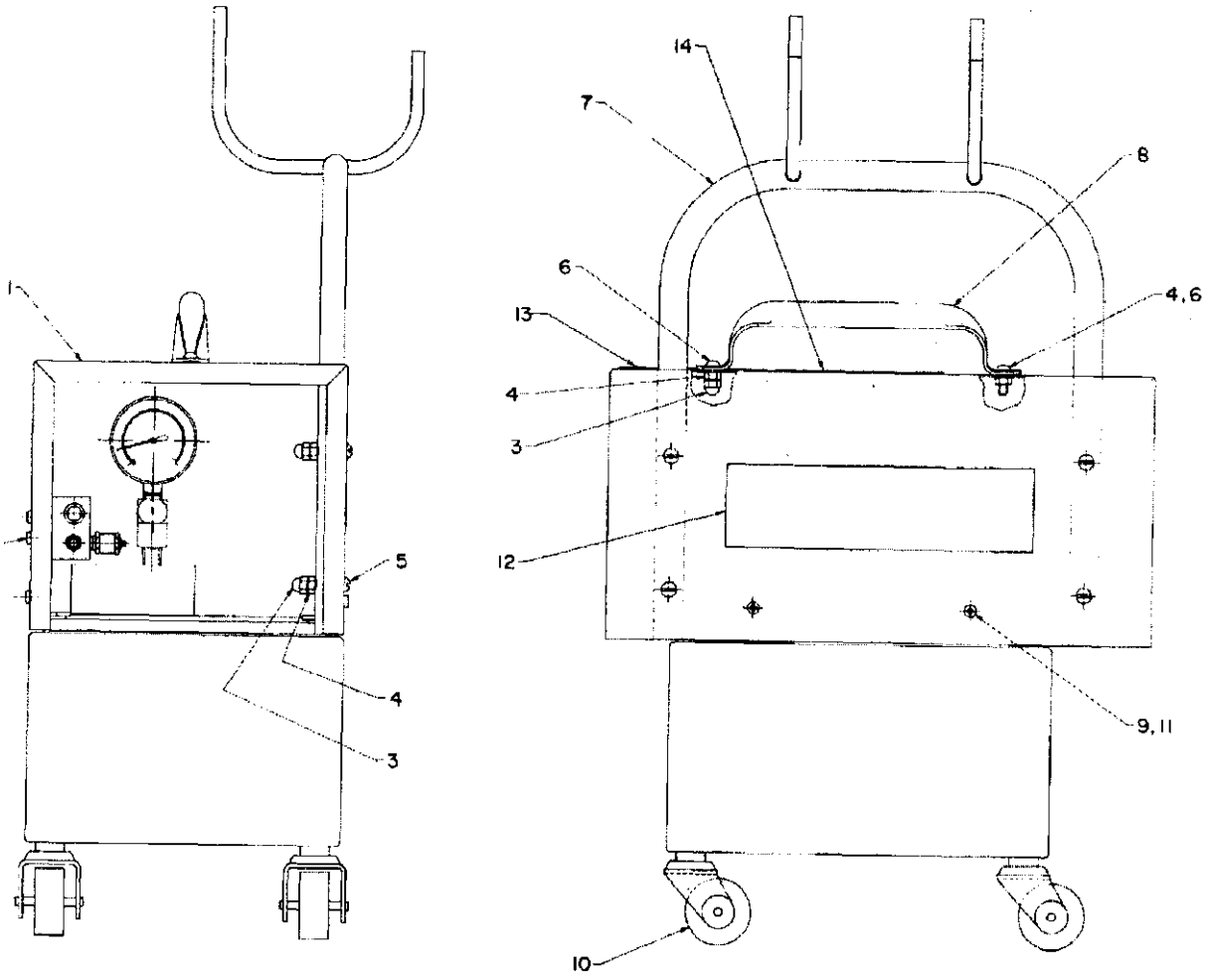


Figure 10.4-1
FT-200 Shroud Assembly

Item Number	FTI Part Number	SPX Part Number	Number Required	Part Description
1	1086-111	61574GY8	1	Cover
2	1086-112	16613	1	Screw
3	1086-113	10486	5	Nut
4	1086-159	10199	8	Screw
5	1086-114	213347	4	Machine Screw
6	1086-008	10177	2	Screw
7	1086-115	61542GY8	1	Pump Bracket
8	1086-116	35903GY8	1	Handle
9	1086-117	16876	4	Screw
10	1086-118	10494	4	Casters
11	1086-119	12356	4	Lockwasher
12	1086-120	307511	2	FTI Decal
13	1086-112	213775	1	FT-200 Decal
14	1086-122	213776	1	Decal (Instruction)

10.5 PNEUMATIC HYDRAULIC SCHEMATIC

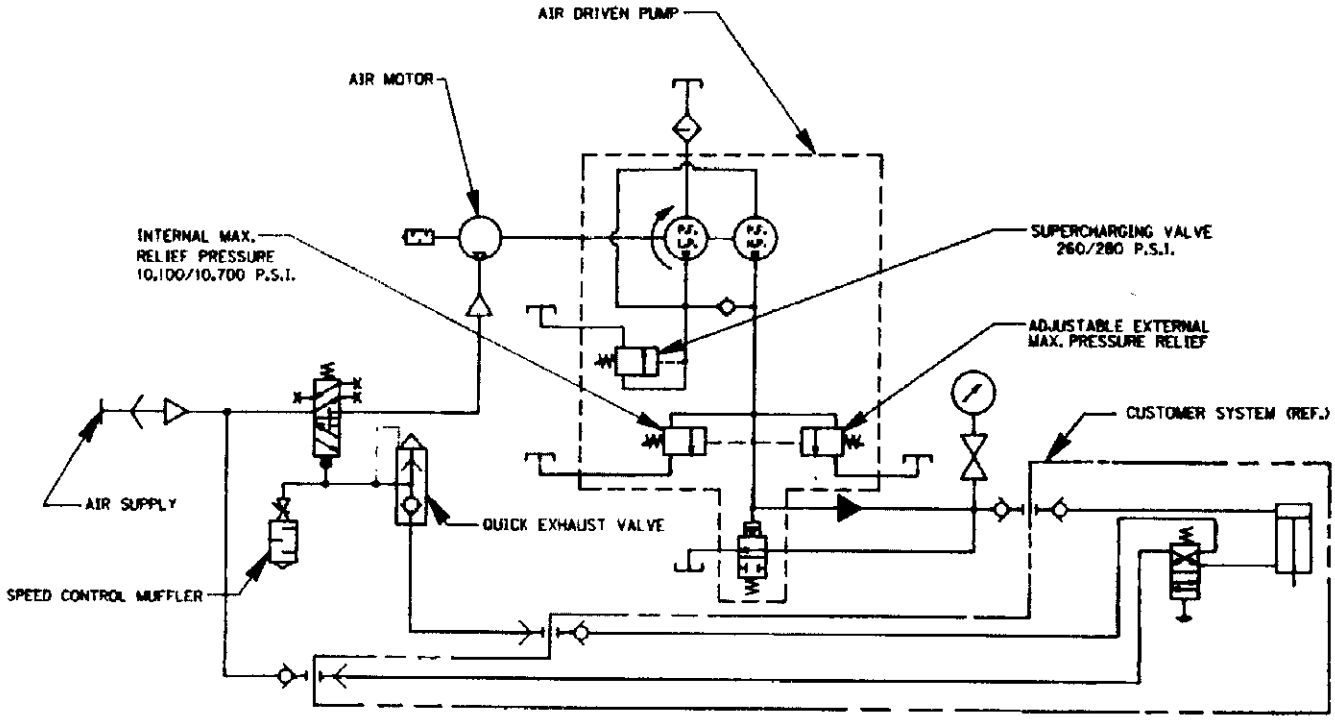


Figure 10.5-1
FT-200 Pneumatic Hydraulic Schematic

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SECTION 11: FT-200B TO FT-200D CONVERSION KIT

11.1 CONVERSION INSTRUCTIONS

This kit converts Model FT-200B to Model FT-200D.

FT-200B to FT200D Conversion (Air Preparation Unit)

1. Remove shroud from pump.

2. ***Using Hole Drilling Template (P/N 2720-098) as a guide, drill four 0.190 inch diameter holes and one 1.25 inch diameter hole in the shroud where indicated. If desired, a drawing with relevant dimensions has also been included to locate holes (Figure 11.1-1).***

3. Install grommet strip (P/N 1086-177) on the inside edge of the 1-1/4-inch diameter hole.

4. Assemble Air Filter (P/N 1086-205), Lubricator (P/N 1086-204), Wall Mount T-Bracket (P/N 1086-203), Pipe Adapters (P/N 1086-201), and Quick Clamp (P/N 1086-202) as shown.

5. ***Position the air filter and lubricator mounting bracket on the outside of the shroud over the four 0.190 inch holes that were drilled. Attach to the shroud using Machine Screws (P/N 1086-175), Washers (P/N 1086-176), Lockwashers (1045-476), and Hex Nuts (1045-178).***

6. Assemble the existing Reducing Fitting (P/N 1086-015) and Air Coupler (P/N 1086-005) to the air filter.

7. Assemble Elbow Fitting (P/N 1086-174) to the lubricator.

8. Attach air line to elbow fitting using the Hose Clamp (P/N 1086-163).

9. Test final assembly for proper operation prior to installing parts.

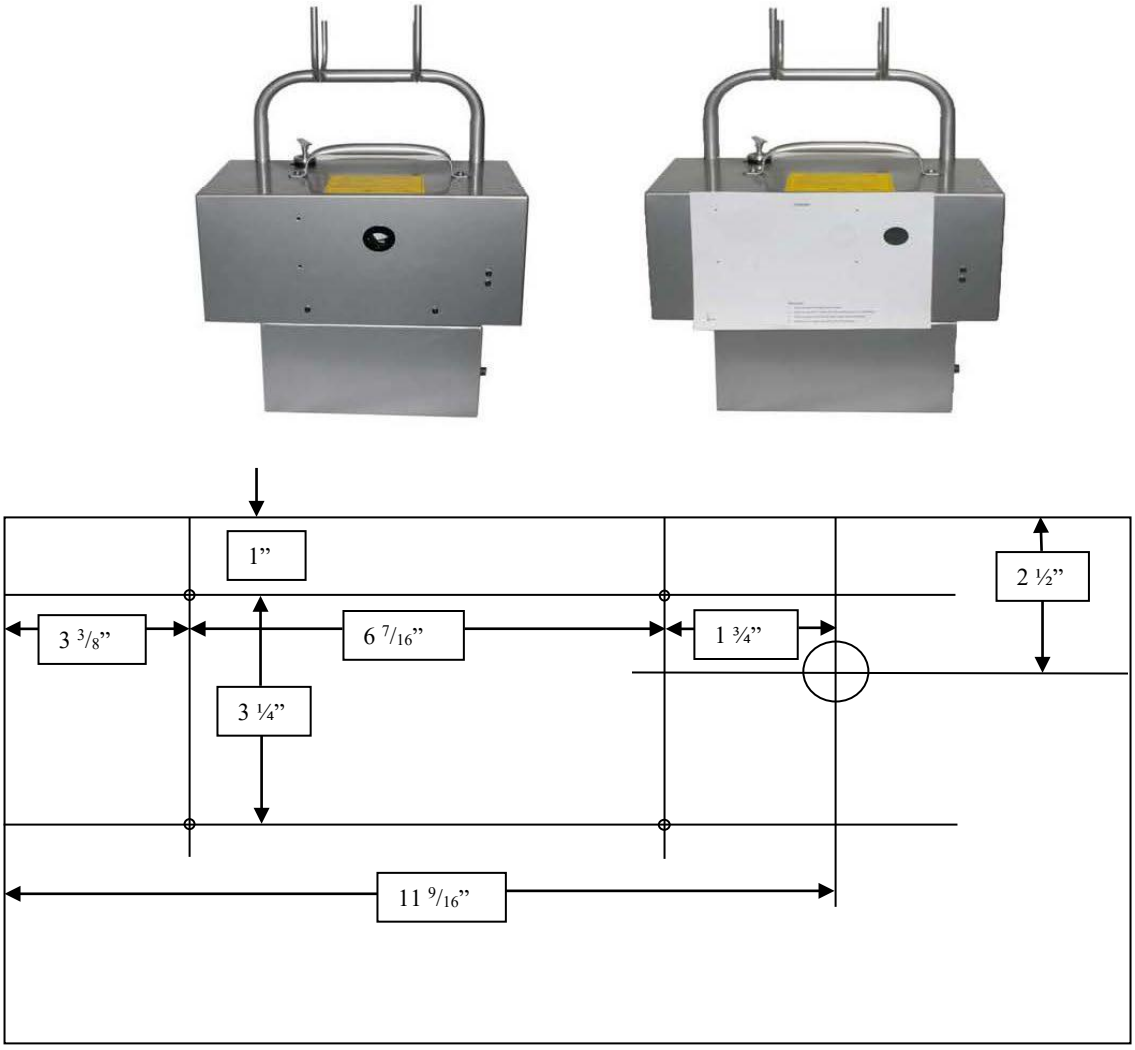

Figure 11.1-1
Hole Drilling Dimensions and Template

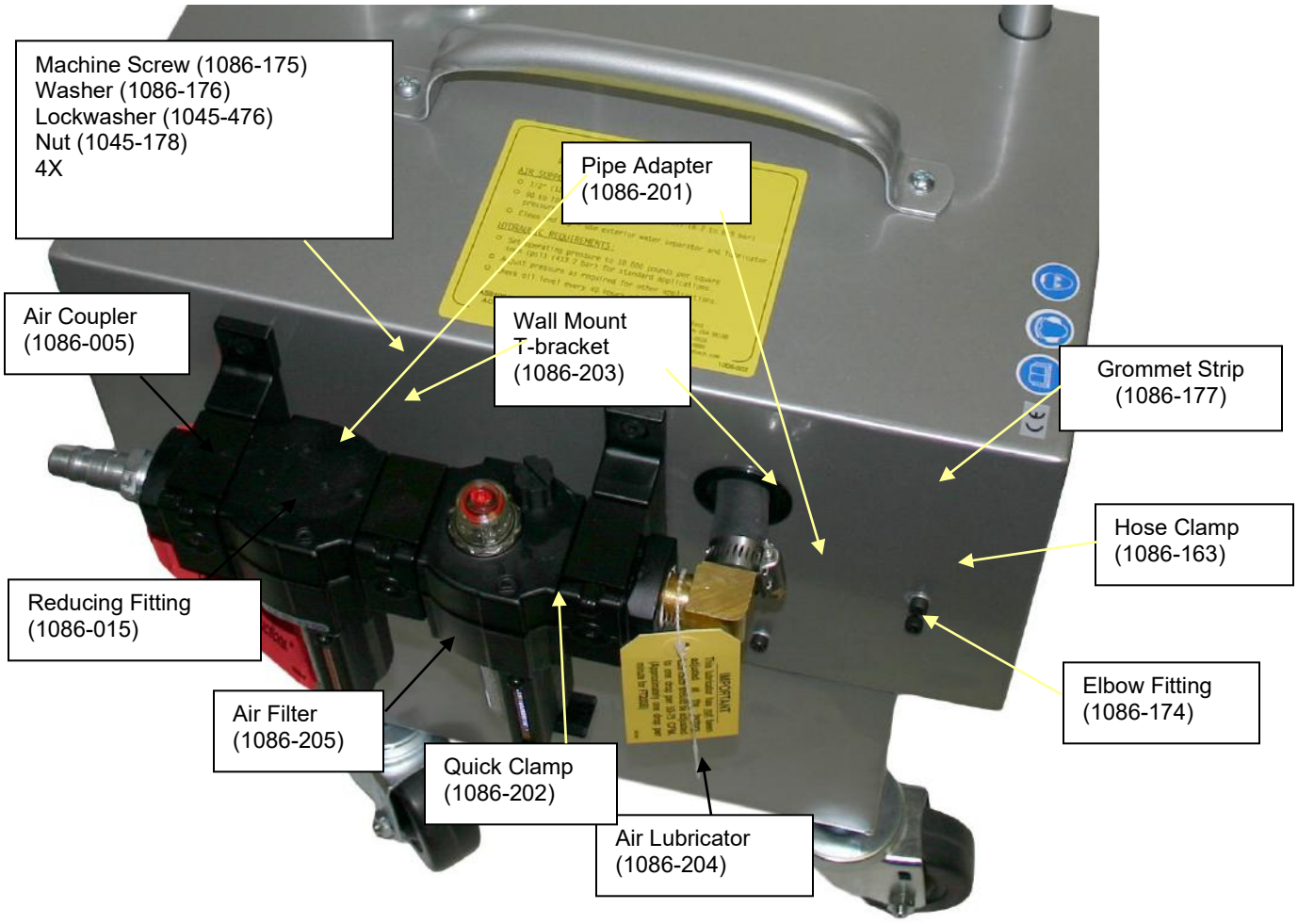

Figure 11.1-2
Conversion Kit

FT-200B to FT200D Conversion (Muffler)

1. Remove existing Muffler (P/N 1086-003).
2. Assemble new Muffler (P/N 1086-206) and Fittings (P/N 1086-208 and P/N 1086-209) as shown on FT-200D Air Motor assembly and parts list, Section 6.1.
3. Install new Muffler (1086-206).
4. Test final assembly for proper operation prior to installing parts.

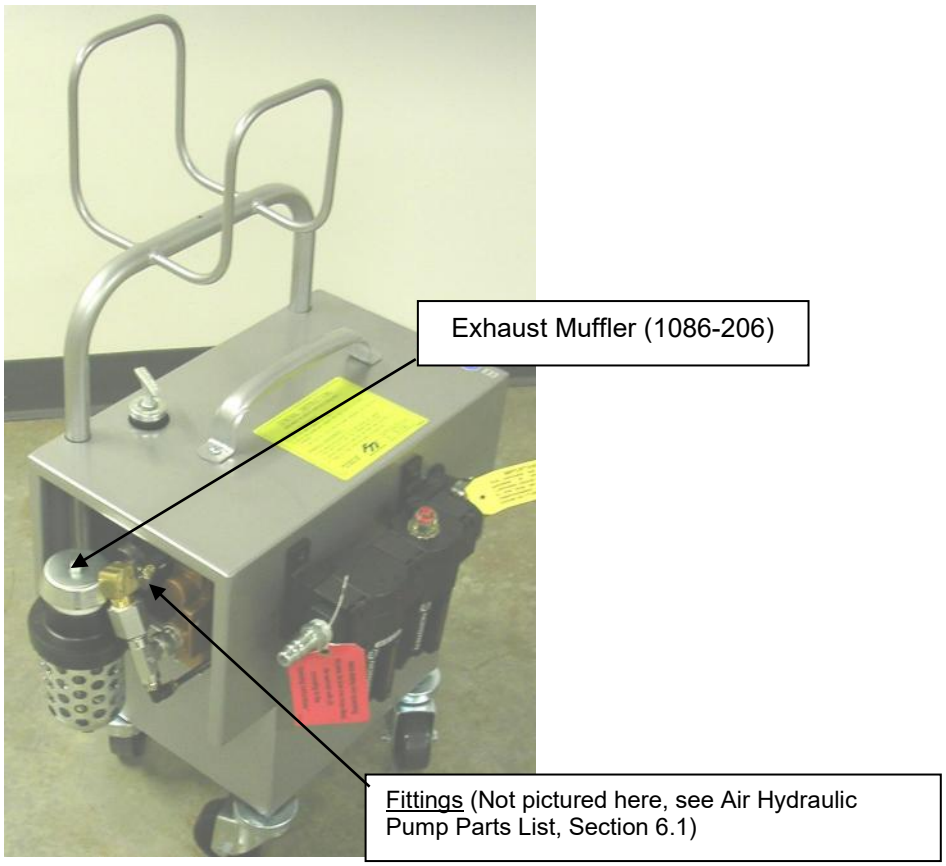

Figure 11.1-3
Muffler Installation

FT-200B to FT200D Conversion (Pump Hose Hanger Bracket)

1. Remove existing Bracket (P/N 1086-115).

2. Install new Bracket (P/N 1086-210) using existing Dome Nuts (P/N 1086-113), Nuts (P/N 1086-159), and Machine Screws (P/N 1086-179). For items not pictured, see assembly drawing and parts list in Section 6.5.

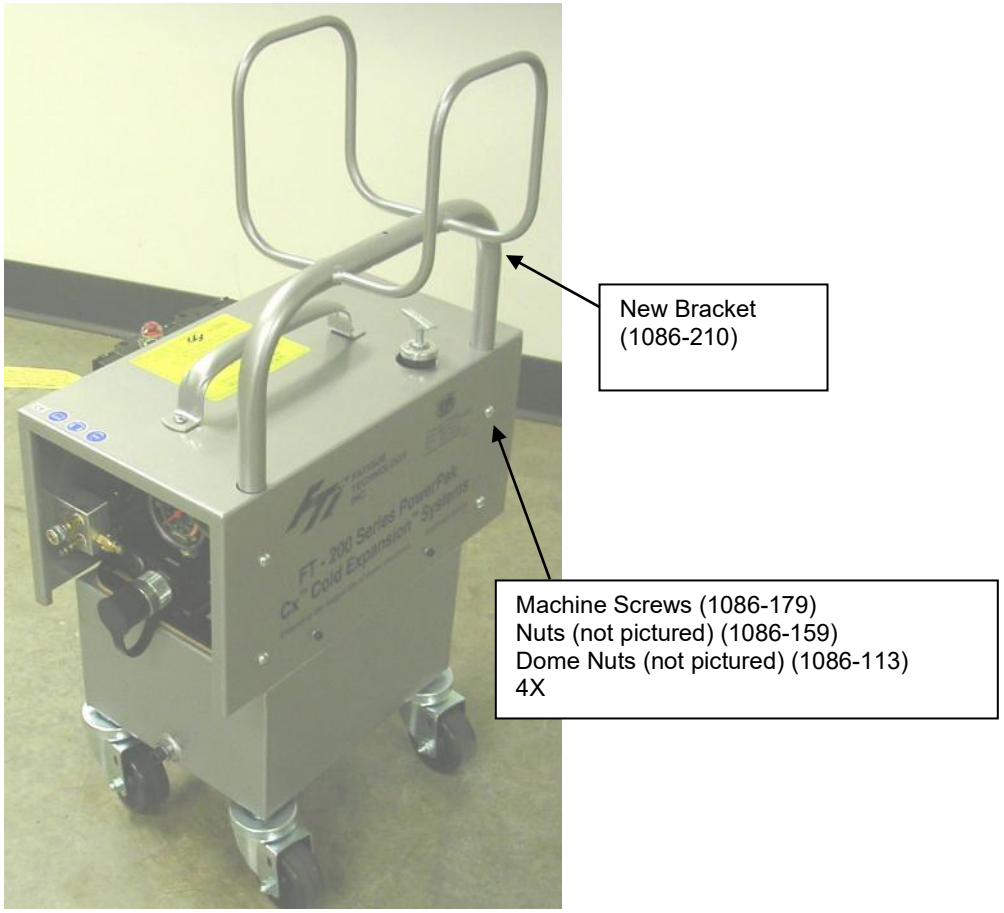

Figure 11.1-4
Final Installation

11.2 CONVERSION KITS PARTS LIST

Kit Parts List
Kit Part #8006-976

Item Number	FTI Part Number	SPX Part Number	Required Number	Parts Description
1	1086-201	2001430	2	Pipe Adapter
2	1086-205	2001426	1	Air Filters
3	1086-203	2001428	2	Wall Mount T-Brackets
4	1086-202	2001429	1	Quick Clamps
5	1086-204	2001427	1	Air Lubricator
6	1086-206	F23-04-000	1	Exhaust Muffler
7	1086-208	250643	1	Fitting, Exhaust Muffler Extension
8	1086-209	252355	1	Fitting, Air Motor/Exhaust Muffler
9	1086-175	10166	4	Round Head Machine Screw (#10-24 x 1/2 long)
10	1086-176	11089	4	Washer (#10)
11	1045-178	n/a	4	Nut (#10-24)
12	1045-476	n/a	4	Lockwasher (#10)
13	1086-210	2001433	1	Pump Hose Hanger Bracket
14	1086-177	13047	0.32 ft.	Grommet Strip
15	2720-098	n/a	1	Hole Drilling Template

SECTION 12.0: VERSA VALVE CONVERSION KIT

12.1 VERSA VALVE REPLACEMENT INSTRUCTIONS

As part of FTI's ongoing commitment to continuous quality improvement, we are now providing a new air valve on our FT-200B PowerPaks. Several customers reported problems with the old ISI valves so we are now supplying the FT-200 PowerPak with a Versa valve which we believe will provide more consistent service with fewer problems. All pumps shipped after December 1991 already have the new Versa valve installed. If you are not sure if you have the new Versa valve or the older ISI valve, check under the cover near the rear of the pump. The new versa valve is gold in color while the older ISI valve is black.

If you still have the older ISI valve and would like to upgrade your PowerPak, please contact FTI's Sales Department. You may either send your pump to FTI to be refitted or you may order the parts from FTI and follow the instructions listed below.

NOTE: These instructions are designed for a pump fitted with a filter/lubricator assembly. The filter/lubricator kit is available from FTI as an addition to the pump, and is required for this modification. When ordering this valve kit, specify whether or not a filter/lubricator kit is required. See pages 42 and 43 of this manual.

1. Remove dipstick from pump.

2. Loosen rubber hose clamp at filter/lubricator assembly.

3. Remove two screws which hold trigger response valve block to cover. It is not necessary to disconnect small pilot air lines from the trigger response block assembly.

4. Remove four (4) pump cover mounting bolts and star washers.

5. Lift cover slightly with one hand and, with the other, reach under the cover and twist and pull the rubber hose from the filter/lubricator assembly.

6. Remove air motor muffler and muffler extension assembly and separate.

7. Disconnect both small pilot air lines; one from the air pilot valve and the others from the main air supply line. Do not disturb the position of the small white sealing sleeves.

8. Loosen rubber hose clamp and remove the hose from the main air supply line.

9. Remove small Mead quick exhaust valve and 90 degree elbow assembly.

10. Remove entire ISI valve/fittings assembly from motor inlet port. If the small threaded pipe nipple remains in the motor port reducing adapter, it is easily removed at this time by grasping the threads with a vice grip or pliers and turning it out counterclockwise. Discard this small strait fitting as it will not be reused.

11. Separate fittings assembly from ISI valve and remove all traces of Teflon tape from the male 3/8-inch service T connector which is part of the fittings assembly.

12. Remove large reducing bushing #10677 from the air motor inlet port and remove any/all traces of Teflon tape from it and the motor inlet port. Re-tape and install this bushing into the “IN” port of the new Versa® valve # 308608.

13. Properly hand tighten Teflon taped #250643 bushing fitting into air motor inlet port. This piece will be tightened later.

14. Thread outlet port of new Versa valve onto #250643 bushing fitting and tighten both the valve and fitting securely, leaving the Versa valve in a slightly beyond vertical position with the small pilot air port in the nearest to upright position.

    NOTE: The air valve end cap with the small air port in it must be rotated so that it is pointing toward the front of the pump or the end of the pump where the hydraulic hose attaches.

15. Reinstall the small Mead quick exhaust valve #213345 directly into the Versa valve's pilot air port. DO NOT OVER TIGHTEN. Reconnect the small pilot air line (shorter of the two lines coming from the air manifold block #307320 and is also the line that connects with the #2I3343 coupler plug on the manifold block).

16. Install "fittings" assembly into #10677 reducing bushing in "T" port of Versa valve. This fitting assembly can be reinstalled as it was previously removed from the ISI valve. It is made up of #15457 elbow fitting, #208699 tee fitting, #11965 straight fitting, and #212897 90 degree elbow fitting. Do not over-tighten any of these air fittings. Tighten to vertical position with the large elbow fitting #212897 at the top.

17. Reinstall rubber air hose to "fittings" assembly and tighten hose clamp securely.

18. Install muffler spring #16465 in muffler extension #214973, and then add washer #10257 onto end of spring. Now screw muffler #13966 into the muffler extension and install the entire muffler/extension assembly into the air motor exhaust port. Tighten securely. It is extremely important that this spring and washer get added ahead of the muffler as failure to do so will allow the air motor to over speed and shorten the air motor's service life.

19. Install the other longer small pilot air line to the small elbow fitting #15457 at the bottom of the "fittings" assembly.

20. Reinstall cover assembly by placing over pump assembly. Hold the cover up slightly with one hand and, reaching under the cover with the other hand, guide the rubber hose through the opening and onto the air filter/lubricator assembly fitting. Tighten hose clamp securely.

21. Install four (4) cover mounting bolts #250617 and four (4) lockwashers #10241.

22. Install two (2) trigger response valve block screws #25067 and two (2) lockwashers # 0241.

23. Remove old male quick disconnect air coupler and reducing fitting from the filter/lubricator assembly on the side of pump cover. Replace with 1/2-inch NPTF male coupler #250644.

    NOTE: This coupler will require a 1 /2-inch air supply hose and female fitting. This will allow a "healthier" air supply to the air motor.

24. Connect proper air line supply. Adjust trigger response valve so that proper trigger response and pump performance is attained. If proper pump performance cannot be attained by completely adjusting the trigger response valve in, check to make sure that there are no air leaks and an adequate air supply. Poor performance may also be attributed to a malfunctioning Mead quick exhaust valve due to contamination or improper installation, causing the valve body to deform. If any air is detected coming from the small ports of the Mead valve while the pump is running, the Mead valve should either be cleaned or replaced.

12.2 VERSA VALVE REPLACEMENT PARTS LIST

FTI Part Number	SPX Part Number	Quantity	Description
1086-183	250644	1	1/2-Inch NPTF Male Air Coupler
1086-184	308608	1	Versa® Valve Mod. VSP-2501
1086-185	250643	1	Bushing Fitting
1086-186	16465	1	Muffler Spring
1086-187	10257	1	Muffler Flow Restrictor
1086-188	10241	4	Lockwasher
1086-189	250617	4	Shroud Screw
2720-016	------	1	FT-200 Manual

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SECTION 13.0 SHIPPING/RECEIVING BILL OF MATERIALS

The following items are contained in the initial shipping box:

1. FT-200 PowerPak (FT-200D)

2. Swivel Casters – quantity of 4 (1086-180, 1 each per part number)

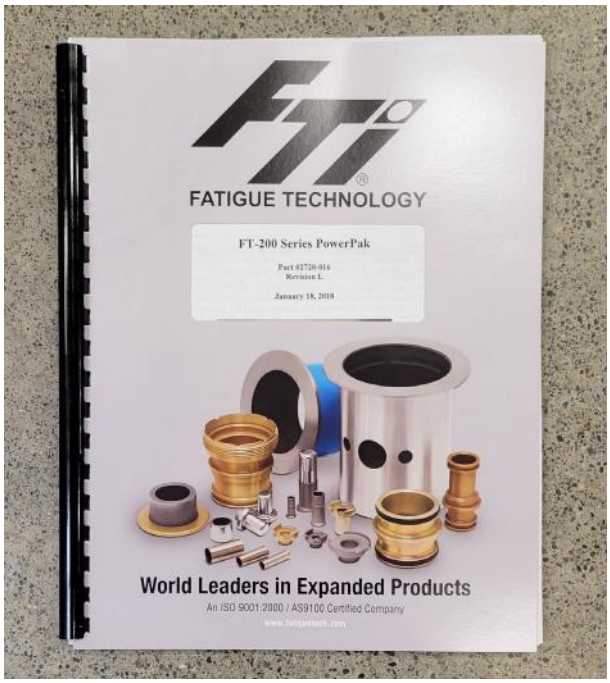
3. Lockwashers – quantity of 4 (1086-188, 1 each per part number)

4. Hydraulic Oil – 2 one-gallon cartons (1045-154)

5. Air lubrication oil – The brand of oil may vary (1045-510)

6. Funnel

7. Operations, Maintenance, and Repair Manual (2720-016)



Safety Data Sheet

In Compliance with Regulation (EC) No. 1272/2008 as amended by Commission Regulation (EU) 2015/830.

Revision date: 1-2-19 **Date of issue: Dec. 27, 2018**

Product name: AW Hydraulic Oil ISO 46

SECTION 1: Identification of Substance/Product and of the Company/Undertaking

1.1 Product identifier

Trade Name:	**AW Hydraulic Oil ISO 46**
Other names:	Standard Hydraulic Oil
Reach Registration #:	Not Applicable - Mixture
EC Number:	Not Applicable - Mixture
Index Number:	Not Applicable - Mixture
Product Code Number:	9616, 9636, 9637, 9638.
SDS number:	CGF001-EU

1.2 Relevant identified uses of the substance or mixture and uses advised against

Relevant identified uses:	Standard Hydraulic Oil.
Uses advised against:	None known.

1.3 Details of the supplier of the safety data sheet

Supplied By:	
Company Name:	SPXFlow
Company Address:	5885 11th Street Rockford, IL 61109
Company Telephone:	Office hours (Mon – Fri) 8.00am – 5:00pm (CST) (815) 874-5556
Company Contact Name:	EH&S Department.
E-mail address of person Responsible for this SDS:	Info@powerteam.com

1.4 Emergency telephone number

Emergency telephone number (including hours of operation):	INFOTRAC 24 Hour Emergency Numbers: USA, Canada, Puerto Rico (800) 535-5053. International (352) 323-3500.

SECTION 2: Hazard(s) identification

2.1 Classification of the substance or mixture

Classification in accordance to Regulation (EC) No. 1272/2008 (CLP/GHS).

This product is not hazardous according to the criteria for classification criteria for classification in accordance with Regulation (EC) No 1272/2008.

2.2 Label elements

Labelling in accordance with Regulation 1272/2008 (CLP).

Hazard pictograms: None

Signal word: None

Hazard statements: Not Applicable

Precautionary Statements:

Storage Statements: Not Applicable

Disposal Statements: Not Applicable

Supplemental Hazard Statements: None known

2.3 Other hazards

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

SECTION 3: Composition/information on ingredients

3.1 Substance

Not applicable.

3.2 Mixture

Highly refined mineral oils and non-hazardous additives. Contains less than 3% (w/w) DMSO extract for total polycyclic aromatic compound (PAC) using IP 346.

Product/ Ingredient name	Identifiers	Wt. %	Harmonized Classification Annex VI of (EC) No 1272/2008 CLP	Notes
Distillates (petroleum), solvent- dewaxed heavy paraffinic	CAS No: 64742-65-0 EC No:265-169-7 Index No: 649-474-00-6	50 - 100	Carcinogen – Category 1B:H350	L*
Note L: The Classification as a carcinogen need not apply f it can be shown that the substance contains less than 3% DMSO extract as measured by IP 346 "Determination of polycyclic aromatics in unused lubricating base oils and asphaltene free petroleum fractions – Dimethyl sulphoxide extraction refractive index method", Institute of Petroleum, London.				

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section. Occupational exposure limits, if available, are listed in section 8. See section 16 for the full text of the H and EUH phrases declared above.

SECTION 4: First-aid Measures

4.1 Description of first aid measures

If inhaled: Move to fresh air. Treat symptomatically. See Section 8 for additional measures to reduce or eliminate exposure. If symptoms persist, seek medical attention.

In case of skin contact: Wash area of contact thoroughly with soap and water. If symptoms persist, seek medical attention.

In case of eye contact: If eyes become irritated, flush immediately with copious amounts of lukewarm water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention if irritation persists.

If swallowed: DO NOT induce vomiting. Consult a physician if necessary.

4.2 Most important symptoms and effects, both acute and delayed

Not expected to be a health hazard when used under normal conditions. An aspiration hazard may be appropriate if the oil is vaporized under pressure.

4.3 Indication of any immediate medical attention and special treatment needed

No additional information.

SECTION 5: Fire-fighting measures

5.1 Extinguishing media

Suitable extinguishing media: Water spray, Carbon dioxide, Dry chemical, Alcohol foam

Unsuitable extinguishing media: Do not use water jet.

5.2 Special hazards arising from the substance or mixture

Hazardous combustion products may include carbon monoxide and other toxic gases/vapors.

Hazardous combustion products: Toxic/Irritating fumes, gases and vapours including carbon oxides and other products of incomplete combustion

5.3 Advice for firefighters

Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Fight fire from a protected location. Water may be ineffective in fighting the fire. Use water spray to keep fire-exposed container cool.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel
No action shall be taken involving any personal risk or without suitable training. Stop leak if able to do so without risk. Keep unnecessary and unprotected personnel from entering. Eliminated ignition sources. Avoid breathing mist/vapor/aerosol/gas/fume. Do not walk through spilled material. Avoid contact with eyes, skin and clothing. Wear recommended personal protective equipment (refer to Section 8 Exposure controls/ personal protection).

For emergency responders
Keep unauthorized people away and upwind. Wear appropriate personal protective equipment (refer to Section 8 Exposure controls/ personal protection) and avoid inhalation or contact with eyes and skin. See also the information in "For non-emergency personnel".

6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains waterways or sewer systems. Avoid release to the environment.

6.3 Methods and materials for containment and cleaning up

Absorb in vermiculite, dry sand or earth. Sweep up and place in a clearly labeled container for chemical waste.

6.4 Reference to other sections

See Section 8 for personal protective equipment.
See Section 8 for information on personal protection equipment.

SECTION 7: Handling and Storage

7.1 Precautions for safe handling

Avoid breathing mist or vapors. Avoid contact with eyes. Use only with adequate ventilation. Wash thoroughly after handling. Observe good personal hygiene practices. Change protective gloves/clothing when signs of contamination appear. Keep out of reach of children.

7.2 Conditions for safe storage, including any incompatibilities

Store in original factory container in a dry area. Do not transfer to an unmarked container. Keep container tightly closed and in a well-ventilated place. Store away from heat and light.
Refer to Section 10 – Stability and Reactivity for incompatibilities.

7.3 Specific end use(s):

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limit values:

Ingredient name	Occupational exposure limits	Source
Oil Mist, Mineral	TWA: 5 mg/m³ (8 hr.)	USA: OSHA PEL
	TWA: 5 mg/m³ (8 hr.)	USA: ACGIH TLV
	TWA: 5 mg/m³ (8 hr.)	USA: NIOSH REL
	STEL: 10 mg/m³ (15 min.)	USA: NIOSH REL
	TWA: 5 mg/m³ (8 hr.)	Austria: MAK
	TWA: 1 mg/m³ (8 hr.)	Denmark: Limit Values
	STEL: 2 mg/m³ (15 min.)	Denmark: Limit Values
	TWA: 5 mg/m³ (8 hr.)	Netherlands: MAC OELs

Monitoring procedures: Use methods described in European Standards.

8.2 Exposure controls

Appropriate Engineering Measures

Maintain air concentrations below occupational exposure standards using engineering controls if necessary. Local exhaust ventilation is recommended. Eye wash station and showers required for emergency use.

Individual protection measures, such as personal protective equipment:

Eye and face protection: Wear safety glasses or full-face shield if splashes are likely to Occur. If possible, have eye-washing facilities readily available where eye irritation can occur. Use equipment for eye protection tested and approved under appropriate government standards such as EN 166(EU).

Skin protection:

Hand protection: Where hand contact with the product may occur the use of gloves approved to relevant standards made from the following materials may provide suitable chemical protection: PVC, neoprene or nitrile rubber gloves. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it. Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material, glove thickness, dexterity. Always seek advice from glove suppliers. Contaminated gloves should be replaced. Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended.

Other skin protection: Use as necessary to prevent exposure. Work clothing should be changed daily. Contaminated clothing should be removed and washed thoroughly before re-using.

Respiratory protection: No respiratory protection is ordinarily required under normal conditions of use. In accordance with good industrial hygiene practices, precautions should be taken to avoid breathing of material. If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation. Check with respiratory protective equipment suppliers. Where air-filtering respirators are suitable, select an appropriate combination of mask and filter. Use respirators and components tested and approved under appropriate government standards such as CEN (EU).

Thermal hazards: None known

Environmental exposure controls
Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance	
Physical state:	Liquid
Form:	Liquid
Color:	Blue
Odor:	Mild
Odor threshold:	Not available
pH:	Not available
Melting point/freezing point:	Not available
Initial boiling point and boiling range:	Not available
Flash point:	>380 °F
Evaporation rate:	Not available
Flammability (solid, gas):	Not available

Upper/lower flammability or explosive limits	
Flammability limit – lower %):	Not available
Flammability limit – upper (%):	Not available
Explosive limit – lower (%):	Not available
Explosive limit – upper (%):	Not available
Vapor pressure:	Not available
Vapor density:	Not available
Relative density:	0.87 -0.89
Solubility(ies):	Insoluble
Partition coefficient (n-octanol/water):	Not available.
Auto-ignition temperature:	Not available
Decomposition temperature:	Not available
Viscosity:	46 cSt @40 degrees C
Explosive properties:	Not available
Oxidizing properties:	Not available

9.2 Other information:
No further data available

SECTION 10: Stability and Reactivity

10.1 Reactivity
No hazardous reactions anticipated under normal storage and handling conditions.

10.2 Chemical stability
Stable under normal storage and handling conditions.

10.3 Possibility of hazardous reactions
No hazardous reactions anticipated under normal storage and handling conditions.

10.4 Conditions to avoid
Incompatible materials, Extreme heat, Open Flame, Sparks

10.5 Incompatible materials
Oxidizing Agents

10.6 Hazardous decomposition Products
Not anticipated under normal conditions of use.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Routes of Exposure: Oral, Dermal, Inhalation, Eye Contact

Numerical measures of toxicity

Acute Toxicity Data:

Substance	Test Type (species)	Value
Distillates (petroleum), solvent- dewaxed heavy paraffinic	LD_{50} Oral (Rat)	>5000 mg/kg
	LD_{50} Dermal (Rabbit)	>5000 mg/kg
	LC_{50} Inhalation (Rat)	>5 mg/l (4h)

Acute Toxicity: Does not meet the criteria for classification as Acutely Toxic by inhalation, ingestion or skin contact.

Skin corrosion/irritation: Does not meet the criteria for classification.

Serious eye damage/eye irritation: Does not meet the criteria for classification.

Respiratory sensitization: Does not meet the criteria for classification.

Skin sensitization: Does not meet the criteria for classification.

Germ cell mutagenicity: Does not meet the criteria for classification.

Carcinogenicity: Does not meet the criteria for classification.

Reproductive toxicity: Does not meet the criteria for classification.

STOT - Single exposure: Does not meet the criteria for classification.

STOT - Repeat exposure: Does not meet the criteria for classification.

Aspiration hazard: Does not meet the criteria for classification.

SECTION 12: Ecological information

12.1 Toxicity

Ingredient Information:

Ingredient	Test Type	Species	Value
Distillates (petroleum), solvent- dewaxed heavy paraffinic	LL/EL/IL50 NOEC/NOEL	Fish	Practically nontoxic: LL/EL/IL50 > 100 mg/l NOEC/NOEL > 100 mg/l (based on test data)
	LL/EL/IL50 NOEC/NOEL	Invertebrate	Practically nontoxic: LL/EL/IL50 > 100 mg/l NOEC/NOEL expected to be > 1.0 - <= 10 mg/l (based on test data)
	LL/EL/IL50	Algae	Practically nontoxic: LL/EL/IL50 > 100 mg/l

12.2 Persistence and Degradability:
Major constituents are expected to be readily biodegradable, but the product contains components that may persist in the environment.

12.3 Bioaccumulative potential:
Contains components with the potential to bioaccumulate.

12.4 Mobility in soil:
If it enters soil, it will adsorb to soil particles and will not be mobile.

12.5 Results of PBT and vPvB assessment:
This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects:
None Known

12.7 Additional information:
None known

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Product
Dispose of in accordance with all applicable local, state, national and international regulations. Recover or recycle if possible. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste classification and disposal methods. Do not dispose into the environment, in drains or in water courses.

Contaminated packaging
Contaminated packaging may contain traces of the product and therefore should be disposed of in the same way as product.

SECTION 14: Transport Information

International transport regulations

14.1 UN number

ADR/RID: Not Applicable IMDG: Not Applicable IATA: Not Applicable

14.2 Proper shipping name

ADR/RID: Not Regulated for Transport.

IMDG: Not Regulated for Transport.

IATA: Not Regulated for Transport.

14.3 Transport hazard class(es)

ADR/RID: Not Applicable IMDG: Not Applicable IATA: Not Applicable

14.4 Packing group

ADR/RID: III IMDG: III IATA: III

14.5 Environmental hazard

Marine Pollutant: No

14.6 Special precautions for user

No additional information.

14.7 Transport to bulk according to Annex II of MARPOL and the IBC Code

No additional information.

SECTION 15: Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

This safety datasheet complies with the requirements of:
EU Commission Regulation (EU) 2015/830 (Reach)
EU Regulation (EC) No 1272/2008 (CLP)

EINECS: All components in this product are listed on the European Inventory of Existing Chemical Substance

15.2 Chemical safety assessment

A chemical safety assessment has not been carried out.

SECTION 16: Other Information

Full text of H Codes referred to in section 3.

H350 May cause cancer.

Training advice: Before using/handling the product one must read carefully present SDS.

Abbreviations and acronyms:

ACGIH:	American Conference of Governmental Industrial Hygienists
ADR:	Accord européen sur le transport des marchandises dangereuses par Route European Agreement concerning the International Carriage of Dangerous Goods by Road
CAS:	Chemical Abstracts Service (division of the American Chemical Society)
CLP:	Classification, Labelling and Packaging
OSHA:	Occupational Safety and Health Administration
EINECS:	European Inventory of Existing Commercial Chemical Substances
EC50:	Half maximal effective concentration
EU:	European Union
GHS:	Globally Harmonized System of Classification and Labeling of Chemicals
IATA:	International Air Transport Association
IBC CODE:	Intermediate Bulk Container
IMDG:	International Maritime Code for Dangerous Goods
LC50:	Lethal concentration, 50 percent
LD50:	Lethal dose, 50 percent
NIOSH:	National Institute for Occupational Safety & Health
OEL:	Occupational Exposure Limits
PEL:	Permissible Exposure Limits
REACH:	Registration, Evaluation and Authorization of Chemicals
REL:	Recommended Exposure Limits
RID:	Gefahrgutvorschriften für den Transport mit der Eisenbahn
STEL:	Short Term Exposure Limits
TLV:	Threshold Limit Value
TWA:	Time Weighted Average
STEL:	Short Term Exposure Limits
UN:	United Nations

Document history

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Reason for revision:	Created to comply with EU requirements

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