HUSKY 3

FOAM SYSTEM

Operation & Maintenance Manual

Part No. PM-F-OM590-1224

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1. Purpose of Manual

The information in this manual is for the operation and maintenance of Pierce Husky 3 Proportioning System. It is intended to serve as a guide to assist qualified operators and mechanics in the operation and maintenance of their vehicle.

Keep this manual with the vehicle at all times.

NOTE: Some of the details of your vehicle's design and construction may be unique to your department alone. For this reason, information contained in this manual may be generic at times. Questions on major inconsistencies between your vehicle's configuration and the information contained in this manual should be directed to your Pierce Dealer or Sales Representative.

2. Scope

This supplemental operator's manual provides operating and maintenance instructions for Husky 3 Proportioning Systems on vehicles manufactured by Pierce Manufacturing Inc.

This manual provides information under the following headings:

Safety. Contains important safety information, requirements before placing a vehicle in service, and information on installing custom equipment and accessories.

General. Includes information and instructions on the operation of major systems, controls, and indicators.

Operation. Contains procedures on performing common operations.

Maintenance. Contains scheduled preventive maintenance checks and inspections.

Appendixes. Contains information obtained directly from vendors who supply major components found on this unit.

3. Customer Assistance Information

Your satisfaction with your Pierce apparatus is important to your dealer and Pierce Manufacturing Inc. Normally, any question or concern you may have with your apparatus can be handled by your selling or servicing dealer. Your dealer has the facility, trained technicians, special tools, and up-to-date information to promptly address any issue that may arise. Pierce Manufacturing Inc. has empowered dealers to make decisions and repair vehicles, and they are eager to resolve your issues to your complete satisfaction. Should you encounter an issue with your Pierce apparatus that requires service, take the following steps:

Step 1.) Contact your authorized Pierce selling or servicing dealer. They will make the necessary arrangements to order the necessary parts and make the required repairs.

Step 2.) If they are not able to repair the problem to your satisfaction, discuss your concern with a member of dealer management. Normally, concerns can be quickly resolved at that level. If the matter has already been reviewed with the Sales, Service, or Parts Manager, contact the owner of the dealership or the General Manager.

Step 3.) If, after contacting a member of the dealership management, it appears your question or concern cannot be resolved by the dealership without further help, you may contact Pierce Manufacturing Inc. at 888-Y-PIERCE (888-974-3723).

1-1. Introduction

1-1.1 To the Owner—Operation and Maintenance of This Apparatus

The information in this manual is for the operation and maintenance of this apparatus. The intent is to instruct operators in the proper operation of this equipment and to warn of improper procedures and potentially dangerous situations.

Only personnel who are totally familiar with this manual and have training are qualified to operate this apparatus. It is the responsibility of the department owning this equipment to permit only qualified personnel to operate this apparatus.

Qualified drivers of other fire apparatus will require further training for the handling of this unit.

1-1.2 Description of “DANGER,” “WARNING,” and “CAUTION”

THIS SAFETY SYMBOL INDICATES IMPORTANT SAFETY MESSAGES IN THIS MANUAL.

WHEN YOU SEE THIS SYMBOL, CAREFULLY READ THE MESSAGE THAT FOLLOWS THIS SYMBOL.

BE ALERT TO THE POSSIBILITY OF PERSONAL INJURY OR DEATH.

Warning labels located on the vehicle and warning statements contained in this manual all use the same terminology to warn of potential hazards. Each of these potentially harmful conditions is described below:

⚠ DANGER

A hazard that will result in death or serious personal injury.

⚠ WARNING

A hazard which might result in death or serious personal injury.

⚠ CAUTION

A hazard which might result in personal injury or damage to property or equipment.

The “signal words” of **DANGER**, **WARNING**, and **CAUTION** have specific meanings to alert you to the relative level or probability of the hazard.

Take the safety warnings seriously. If you do not understand them or have questions about them, contact Pierce Manufacturing Inc.

1-2. List of Abbreviations

TERM	DEFINITION
AFFF	Aqueous Film Forming Foam
AR-AFFF	Alcohol Resistant Aqueous Film Forming Foam
FFFP	Film Forming Fluoro-Protein
GPM	Gallons per Minute
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LPM	Liters per Minute
LVDT	Linear Variable Displacement Transducer
NFPA	National Fire Protection Association
PSI	Pounds per Square Inch
RPM	Revolutions per Minute

2-1. Husky 3 Specifications

2-1.1 Foam Proportioner

The foam proportioning system is an on demand, automatic proportioning, single point, direct injection system suitable for all types of Class A & Class B foam concentrates, including the high viscosity (6000 cps), alcohol resistant Class B foams. The operation of the system is based on direct measurement of water flow, and remains consistent within the specified flows and pressures. The system automatically proportions foam solution at rates from 0.1% to 3% (0.1% to 1.0% in 0.1% increments and a 3% setting) regardless of variations in water pressure and flow, up to the maximum rated capacity of the foam concentrate pump.

The design of the system allows operation from draft, hydrant, or relay operation. This provides a versatile system to meet the demands at a fire scene.

2-1.2 System Capacity

The system has the ability to deliver the following (minimum) foam solution flow rates at accuracies that meet or exceed NFPA requirements at a pump rating of 150 PSI.

Table 2-1: Maximum Foam Solution Flow

Concentration Percentage	Capacity
3%	100 GPM
1%	300 GPM
.5%	600 GPM*
.3%	1,000 GPM*

The Class A foam setting is in .1% increments from .1% to 1%. Typical settings are .3% and .5%. *The maximum capacity is limited to the plumbing and water pump capacities.

2-1.3 Discharges

The number of discharges capable of dispensing foam varies from truck to truck, depending on customer specifications. Foam discharges can be identified by red/white tags; water only discharges can be identified by silver/black tags.

2-1.4 System Electrical Load

The electrical load for the foam proportioning system is 65 amps at 3 GPM at 150 PSI.

2-1.5 Foam Concentrate Compatibility

⚠CAUTION

Emulsifier type agents may cause damage to seals in Husky foam systems.

In the event you are using an emulsifier type encapsulating agent, do not store foam system wet. Perform a flush after every use and keep system dry when not in use.

Failure to comply may result in damage to equipment.

The Husky 3 Foam Proportioning System is designed to be compatible with most known Class A and Class B foam concentrates at the date of printing of this manual.

The Husky 3 can proportion foam concentrates across a wide range of viscosity, from low viscosities such as Class A or AFFF, through high viscosity AR-AFFF.

Table 2-2: Acceptable Foam Concentrate Viscosity Range

Acceptable Foam Concentrate Viscosity Range	
Minimum	3 Centistokes
Maximum	6000 Centipoise*

* Brookfield #3 Spindle @ 30 RPM

2-2. Description of Major Components

To understand the relationship of the various components and their functions, refer to ***Para 4-11., System Diagrams***. The following information is intended to identify the various components and describe their function within the system. For specific construction, maintenance, and parts information, please refer to applicable service groups (chapters) in the service manual, drawings included in this manual, and the parts catalog for this unit.

2-2.1 Hydraulic Drive System

The hydraulic drive system that powers the foam pump is automatically activated when the system ON/OFF button is turned “ON”, except on AAT and BX3 products, where the water pump must also be engaged.

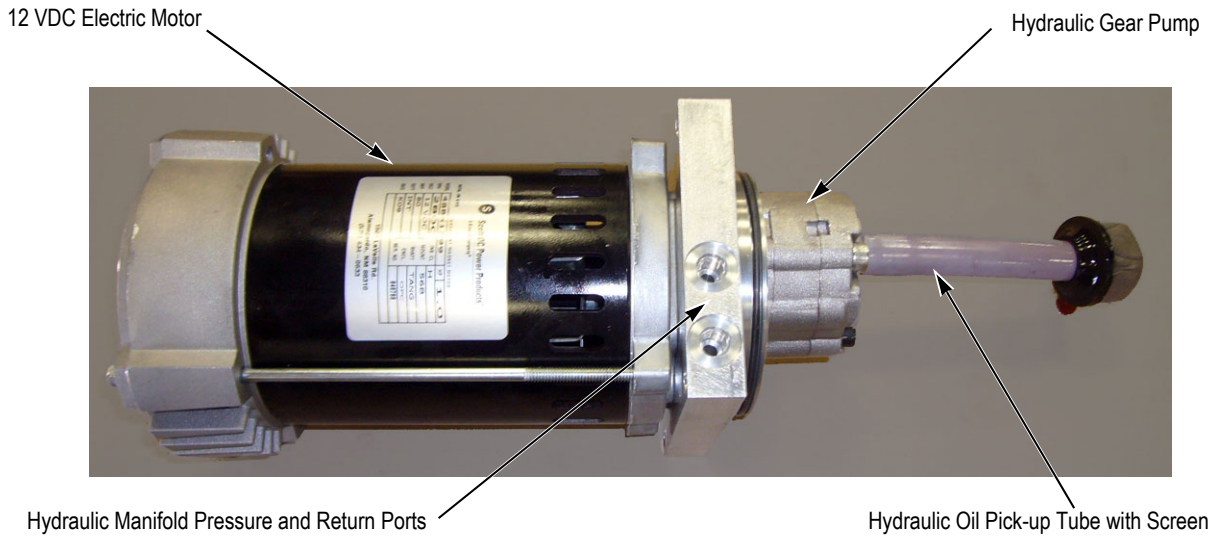
A hydraulic oil cooler prevents overheating of the hydraulic oil, which can be detrimental to system components. The oil cooler is designed to allow continuous system operation without allowing hydraulic oil temperature to exceed the oil specifications.

The system is delivered with ISO 68 hydraulic oil.

2-2.1a Hydraulic Gear Pump

Figure 2-1: Hydraulic Gear Pump with Electric Motor

NOTE: On AAT and BX3 systems, a hydraulic gear pump is used instead.



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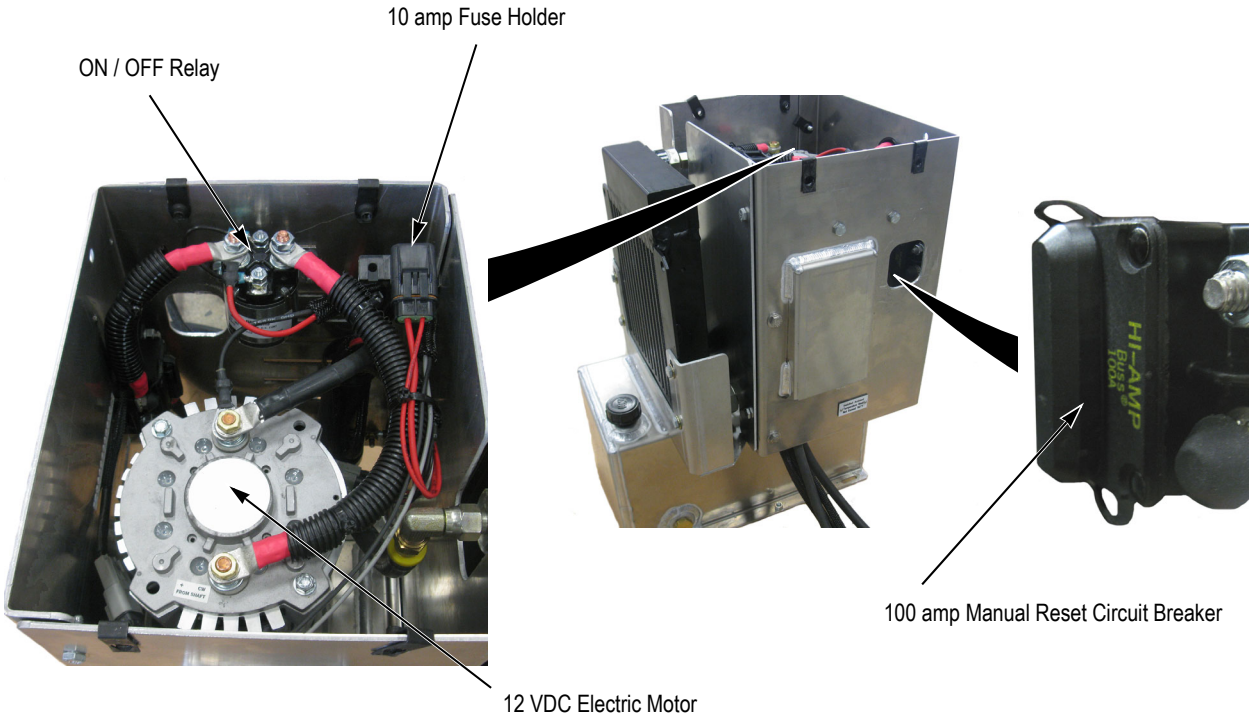
2-2.1b Hydraulic Gear Pump Electrical Components

Figure 2-2: Hydraulic Gear Pump Electrical Components



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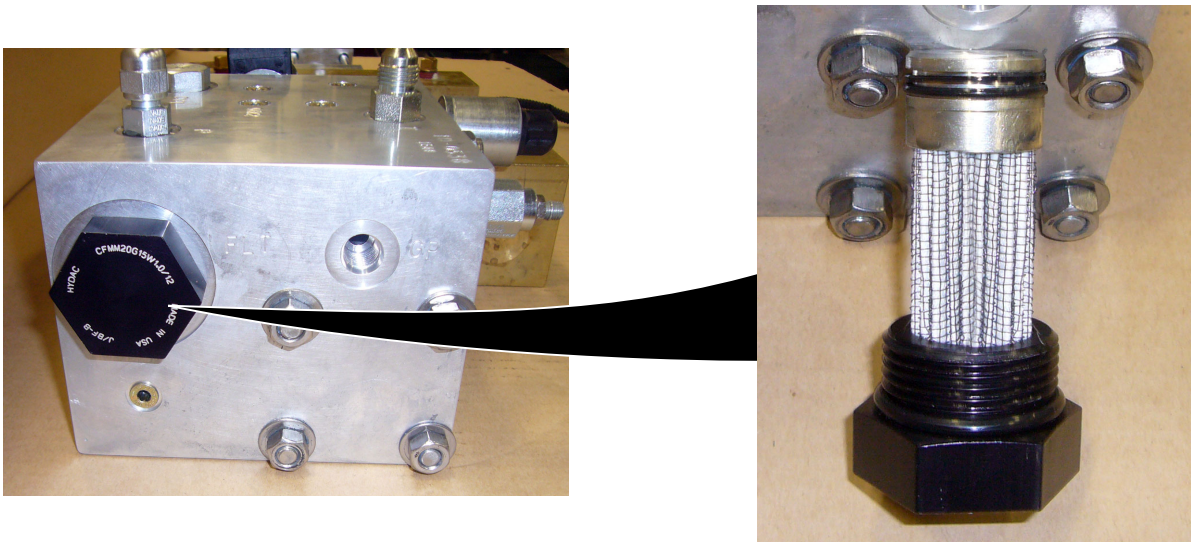
Hydraulic Gear Pump Electrical Components located in the main assembly consist of the following:

- ON / OFF Relay;
- 10 amp Fuse Holder;
- DC Motor;
- 100 amp Manual Reset Circuit Breaker.

2-2.1c Hydraulic Oil Filter

Figure 2-3: Hydraulic Oil Filter



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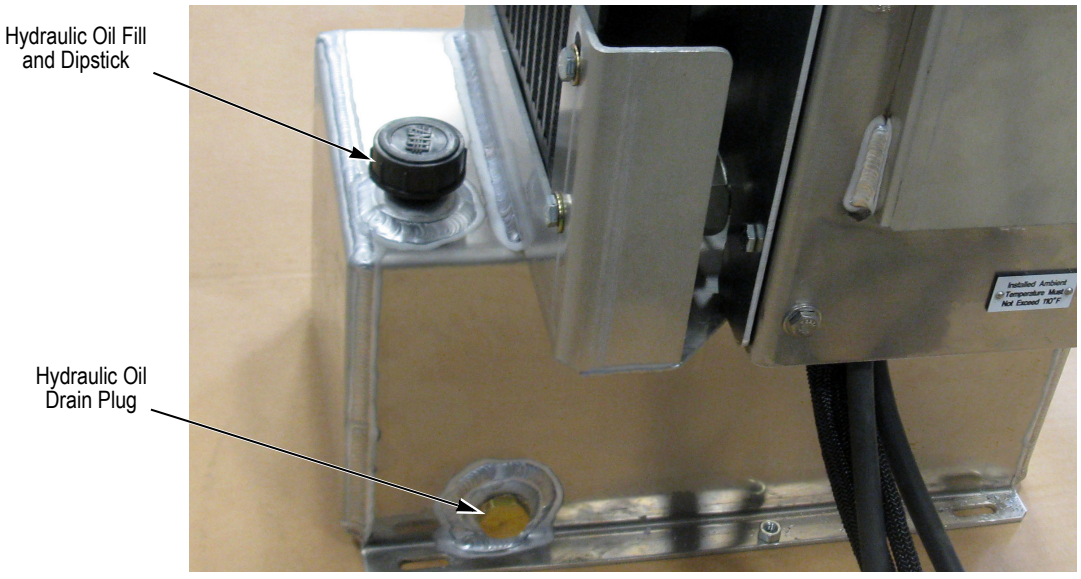
The Hydraulic Filter is a replaceable paper type covered with a screen mesh. The filter is installed inside the hydraulic manifold on the foam pump. It is used to filter the hydraulic drive system oil. The filter (Pierce PN 2518612) should be checked and/or replaced every 500 operating hours or every five years, whichever comes first.

2-2.1d Hydraulic Oil Reservoir

Figure 2-4: Hydraulic Oil Reservoir



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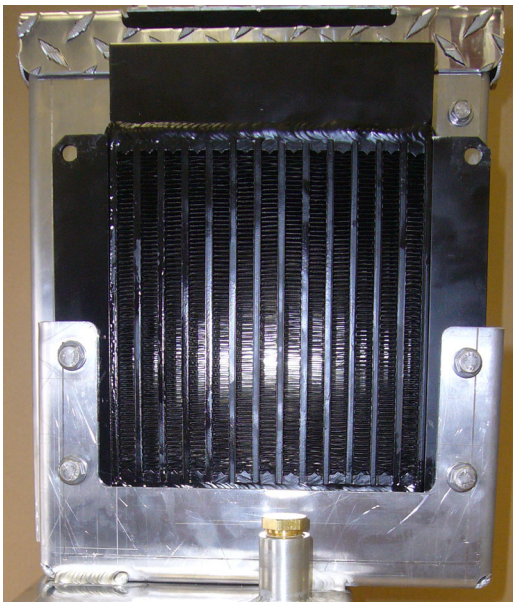
The Hydraulic Reservoir (approximately 2 1/2 gallon capacity) provides a reservoir for the hydraulic drive system. The tank is sufficient size to minimize foaming of the hydraulic oil and is located to facilitate checking level and adding oil. Refer to *"Recommended Hydraulic Oil for Husky 3 Proportioning System"* on *page 4-22* for recommended hydraulic oil for the Husky 3 system.

2-2.1e Hydraulic Oil Cooler

Figure 2-5: Hydraulic Oil Cooler



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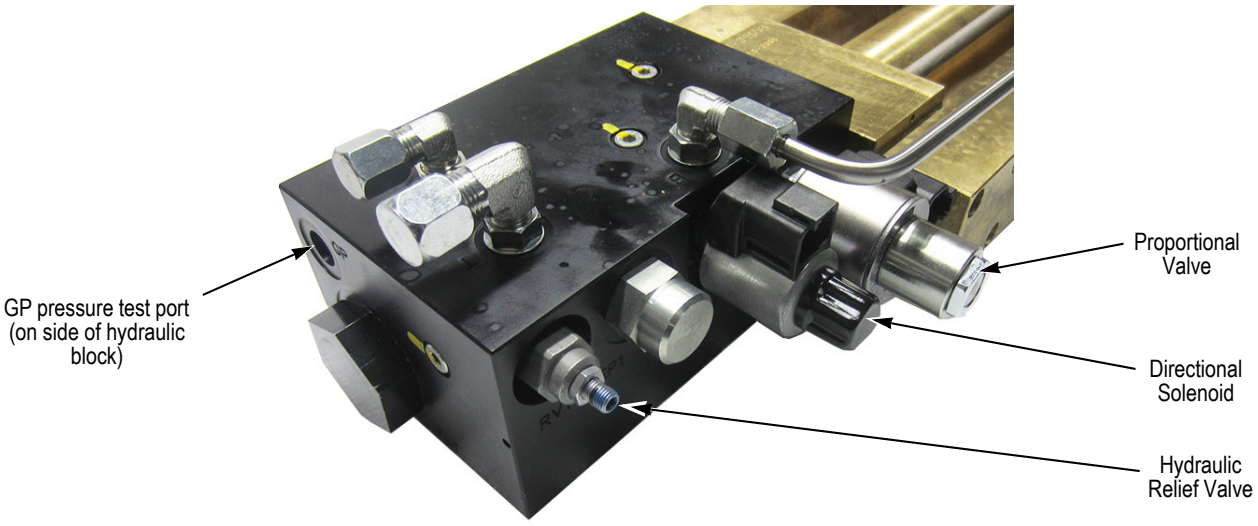
The Hydraulic Cooler is an air-to-oil type heat exchanger. The hydraulic cooler allows for continual operation of the Husky 3 hydraulic system.

2-2.1f Hydraulic Manifold Block

Figure 2-6: Hydraulic Manifold Block



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The Hydraulic Manifold Block assembly is a manifold block that controls the direction of the hydraulic oil flow in the system. The manifold block consists of the machined block, a hydraulic compensating valve, an hydraulic directional valve, a hydraulic relief valve, hydraulic pressure test port, internal hydraulic filter and the hydraulic proportional valve.

2-2.2 Foam Supply System

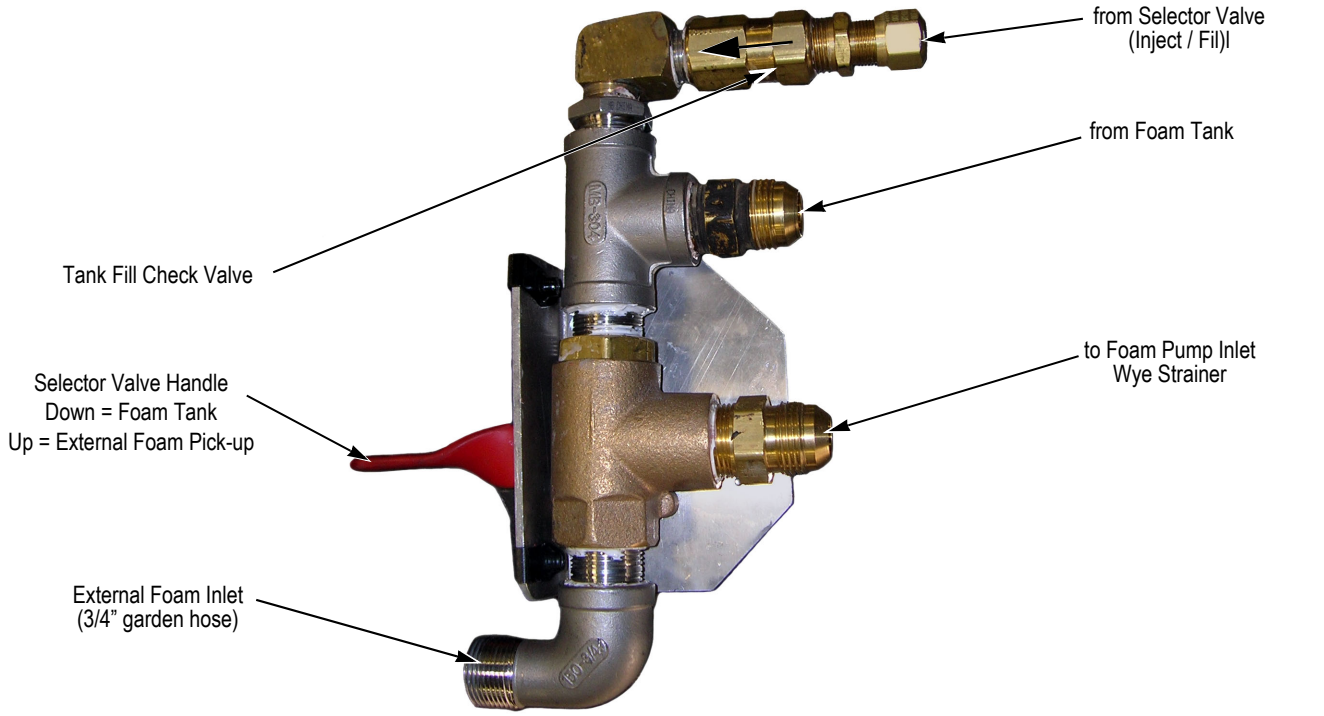
The Foam Supply System stores, pumps and distributes the foam concentrate to the foam/water discharges by use of a foam concentrate tank, foam tank shut-off valve, auxiliary foam inlet, in-line foam strainer, foam pump, check valve and foam injection manifold.

2-2.2a Foam Concentrate Tank

The Foam Concentrate Tank is designed to provide on-board storage of foam concentrate. Design features shall include: construction compatible with foam concentrates, foam tank drain valve, expansion dome with locking fill hatch and pressure/vacuum vent. The expansion dome allows for changes in foam concentrate volume due to variations in temperature. Foam concentrate level shall be maintained at the one-third full mark in the expansion dome at a minimum to reduce the air to foam concentrate interface. The pressure vacuum vent automatically balances internal foam tank pressure under both suction and filling operations.

2-2.2b Foam Supply Valve

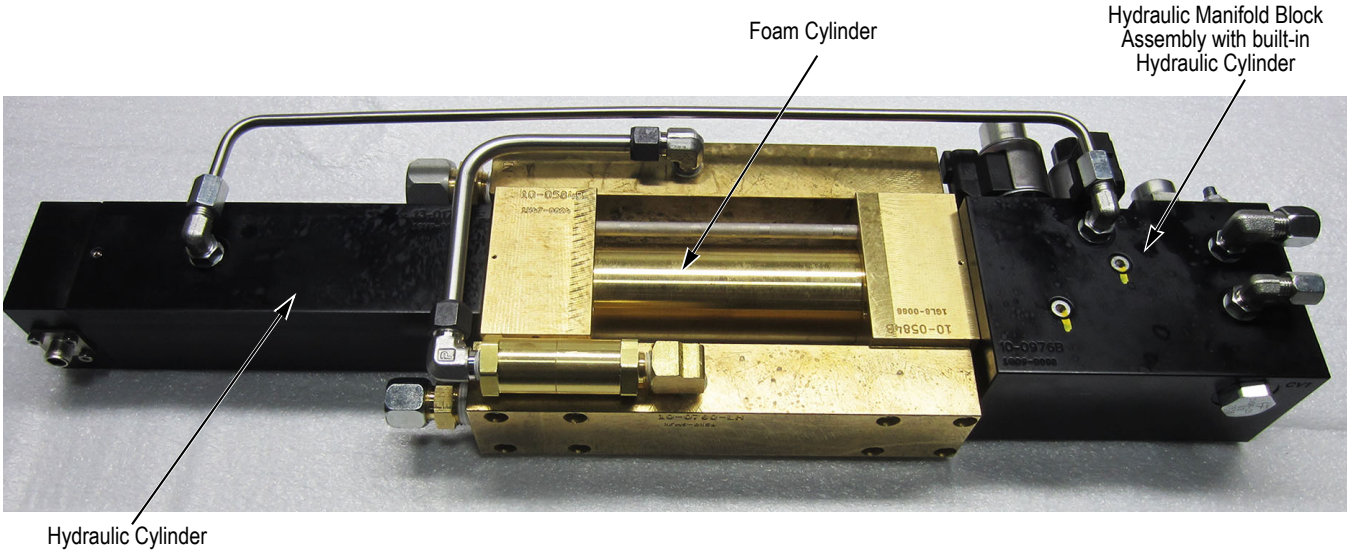
Figure 2-7: Foam Supply Valve (Tank/Draft Valve)



A manual valve is used for the Foam Supply Valve. The supply valve is located to eliminate air pockets in the foam tank supply hose. The Tank/Draft Valve selects between the on-board foam concentrate tank and an external foam supply (i.e. foam pail) by means of the Foam Inlet.

2-2.2c Foam Concentrate Pump

Figure 2-8: Foam Concentrate Pump



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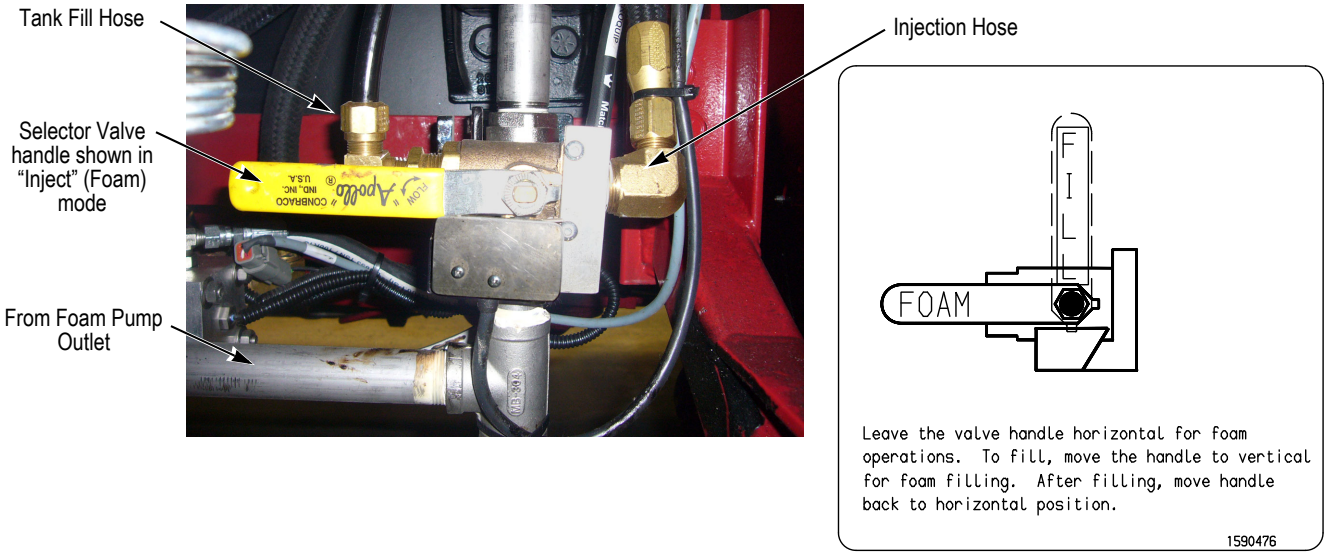
The Foam Concentrate Pump assembly is a brass/steel/aluminum constructed, double-acting cylinder pump. The hydraulic ends of the pump control the speed and direction of both cylinders. he hydraulic piston is connected to the foam piston by a single, straight shaft. The foam end of the pump is brass construction and contains 4 cartridge type check valves to prevent foam from flowing the wrong direction in the pump.

The foam pump also has a pressure relief valve that recirculates the foam from the discharge side to the inlet side in the case of an obstruction or overpressure situation. The foam pump speed and operation are monitored by a foam pump transducer located in the hydraulic end of the pump assembly.

The foam concentrate pump is self-priming and has the capability to draw foam concentrate from external supplies such as drums or pails. The foam concentrate pump has a maximum capacity of 3 GPM with all types of foam concentrates with a viscosity at or below 6000 cps including protein, fluoroprotein, AFFF, FFFP, or AR-AFFF.

2-2.2d Foam Selector Valve (Injection/Fill) (ALL except 100ft Ascendant Aerial Tower)

Figure 2-9: Foam Selector Valve (ALL except 100ft Ascendant Aerial Tower)



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The Foam Selector Valve is a selector valve that directs the foam for foam injection (normal operation) or tank filling. A solid red LED light "VALVE POSITION ERROR" is displayed by the control head in the event that the valve is not in the correct position for the operation selected.

2-2.2e Foam Selector Valve (Injection/Fill) (100ft Ascendant Aerial Tower Only)

Figure 2-10: Foam Selector Valve (100ft Ascendant Aerial Tower Only)

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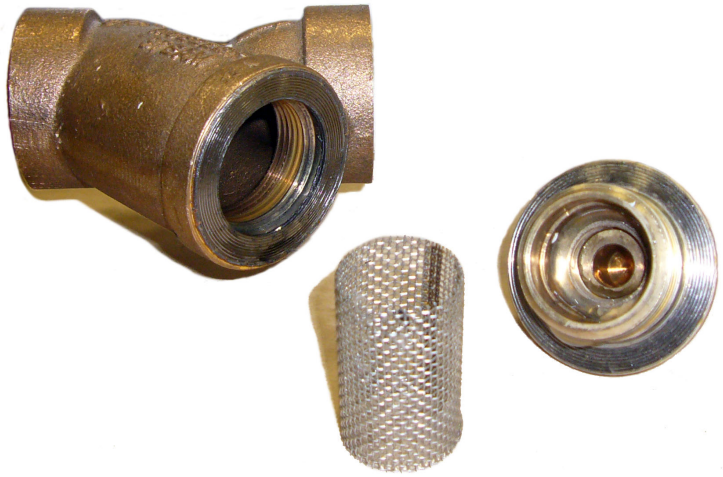
The Foam Selector Valve is a Push-Pull valve that directs the foam for foam injection (normal operation) or tank filling. A solid red LED light "VALVE POSITION ERROR" is displayed by the control head in the event that the valve is not in the correct position for the operation selected.

2-2.2f Inline Foam Strainer

Figure 2-11: Inline Foam Strainer



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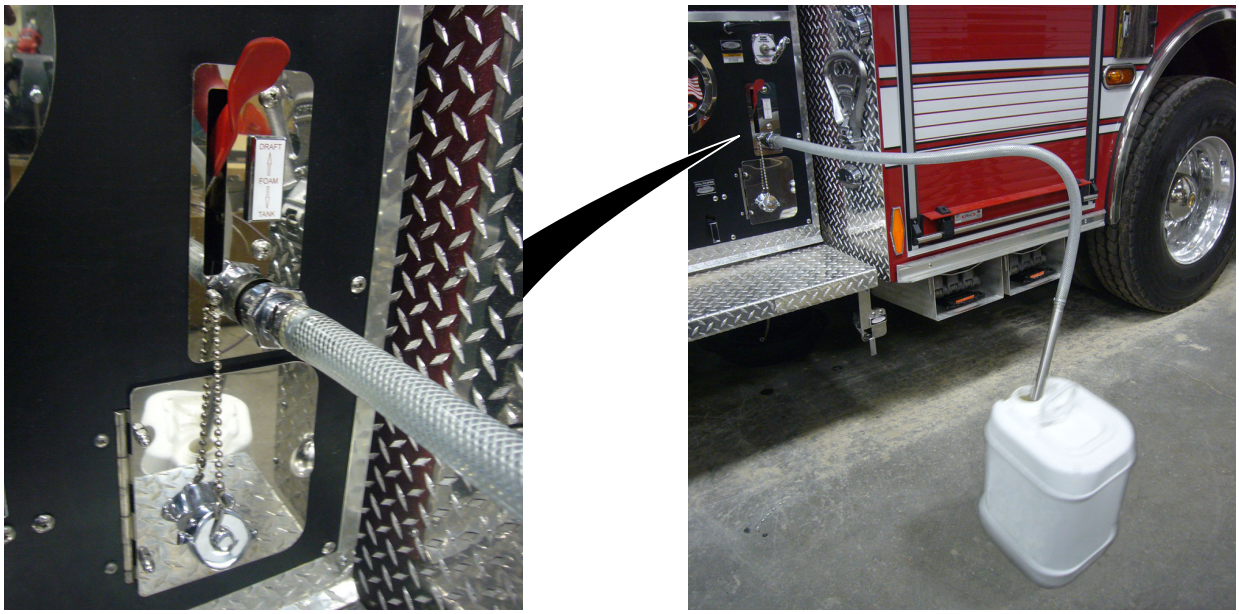
The Inline Foam Strainer is located before the inlet to the foam pump and screens all foam and flush water before it enters the foam pump. The strainer is used to prevent any debris from entering the foam system and possibly interfering with the internal foam pump check valves. The strainer contains a removable 20-mesh screen. The strainer will be mounted in an accessible service area.

2-2.2g Pick-Up Hose

Figure 2-12: Pick-up Hose



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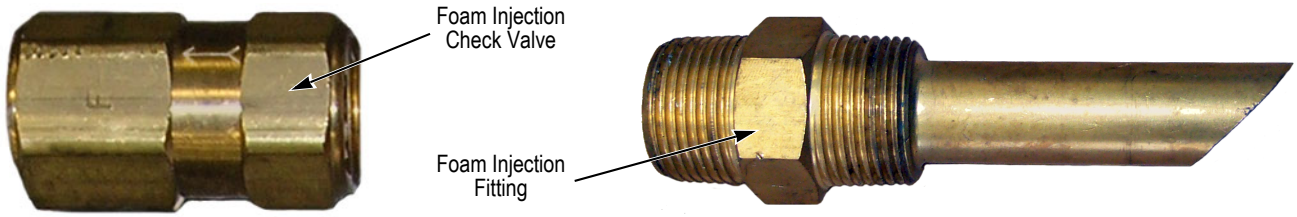
A 3/4 in. flexible hose, with an end for insertion into foam containers, is provided. The hose has a 3/4 in. female swivel garden hose thread swivel connector. (The hose is part of loose equipment.)

2-2.2h Foam Injection Check Valve

Figure 2-13: Foam Injection Check Valve



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The Foam Injection Check Valve located in the foam discharge line prevents water from flowing backwards through the foam system and contaminating the foam supply.

2-2.3 Water Supply System

The water supply system supplies water to the foam injection manifold for foam to be added and distributed to the foam/water discharges. This system consists of an in-line water check valve, water flowmeter and flowmeter installation tee. The size of the check valve and the flowmeter installation tee are dependent on the water flow rates and the number of foam/water discharges in the system.

2-2.3a Manifold and Master Drains

Figure 2-14: Manifold & Master Drains

1325, 1067

The manifold drains are used to bleed off pressure/water anytime the water pump has been pressurized (after the water pump is shut off). If a dry water pump condition is desired, leave manifold drains open until the fire scene is reached.

The master pump drain will empty both the discharge and inlet manifolds of water when opened. The water pump drain should be pulled (opened) daily.

2-2.3b In-line Water Check Valve

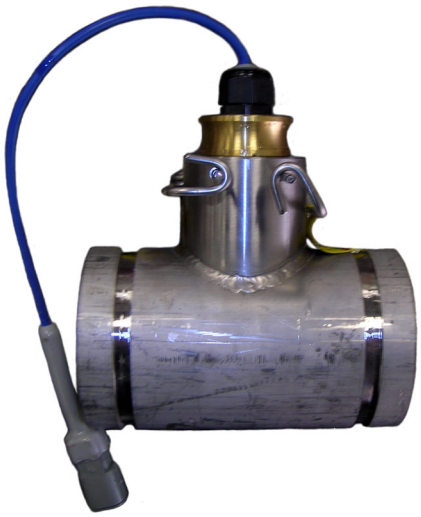
Figure 2-15: In-line Water Check Valve

1014

The In-line Water Check Valve prevents foam from entering the water pump and the remainder of the water system. It is installed in the water piping, before the foam injection manifold and the water flowmeter.

2-2.3c Water Flowmeter

Figure 2-16: Water Flowmeter



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The Water Flowmeter measures the flow of water supplied to the foam/water discharges before foam is injected. This controls the amount of foam that is injected when the Husky 3 foam system is turned on.

2-2.4 Control System

The control head directs a microprocessor, which receives input from the system's water flowmeter while also monitoring the position of the foam concentrate pump. The microprocessor compares the values of the water flow versus the position/rate of the foam pump, to ensure the proportion rate is accurate.

2-2.4a Control Head

Figure 2-17: Control Head

1311

The Foam System Control Head is the operator interface with the foam system. It is located on the main pump panel. It has four operating buttons: System On/Off, Prime, INC %, and DEC %. The display is a 3 character LED screen. System power is indicated by the display showing the default % setting IE 0.5; the foam system ON is indicated by a solid green LED.

Information displayed on the LED screen includes: mode of operation and various information displays. If the foam system is turned OFF, the display will show the last setting or default % setting.

The percent of injection has presets for class A foam. The preset can be changed at the fire department as desired. The percent of injection can be easily changed at the scene to adjust for changing demands.

The modes of operation are: Onboard Tank, Draft, Tank Fill, Manual Mode and Set Up. Pressing the INC % or DEC % buttons and/or changing the position of one or both of the two way valves (Tank/Draft valve or Injection/Fill valve). (Detailed instructions on the operation of each mode can be found in *Section 3, "Operation"*.)

The foam system is controlled by a foam system controller module which is intergrated into the Foam System Control Head. This contains the programming to actuate the appropriate valves, direct the hydraulic fluid, and control the injection rate of the foam. All components plug into the foam system controller module. The foam module is what actually controls the system. The user interfaces with the controller through the foam system control head. If replaced, the system calibration must be checked.

Figure 2-18: Control Head Display Modes

This is the default setting and will come up anytime system is turned “ON”

This is will come up when the system is in “FILL” mode

This is will come up when the system is at maximum capacity due to flow rates or high pressure

1350, 1332, 1330

Display setting will automatically reset to default setting (“0.5”) by cycling the batteries ON and OFF. Powering up of the batteries will flash program revision level and then go to default injection % setting.

3-1. Foam System Operation

3-1.1 Class A Foam - using on-board Foam Tank

Figure 3-1: Control Head in Class A Foam Mode

1311, 1350, 1335

1. Engage water pump transmission.
2. Recirculate water.
3. Turn the system ON.

   NOTE: The green LED will illuminate and stay lit constant.

4. Begin flowing water out of one of the foam/water discharges, foam pump will activate (flashing green LED when foam pump is injecting).
5. Use the INC % or DEC % buttons to change percentage *(if needed)*.
6. When beginning the mop up phase, turn the system OFF; use the foam that is left in the hose and plumbing for mop up.

   NOTE: The only flush needed is to run the hose until it is mostly free of bubbles. The foam pump is designed to be flooded with foam

3-1.2 Class A Foam - Drafting

Figure 3-2: Class A Foam Drafting Mode

1333, 1323, 1311, 1335, 1350

1. Set up for drafting operation.

   NOTE: Always make sure the Foam Tank/Draft handle is completely moved to the handle stops. A partially open valve can drain the on-board foam tank.

2. Move Foam Tank/Draft handle UP to the Draft position before removing cap.

   NOTE: Make sure that gasket is in place on the pick-up swivel connector on the panel to prevent any vacuum leaks.

3. Connect the flexible pick up hose to the contector on the panel and position pick up tube in foam bucket.
4. The default percentage will remain the same as the on-board Class A tank current setting.

   NOTE:
   - Make sure you are flowing water out of a foam discharge or open foam pump discharge drain when using foam system prime.
   - The Prime button may be used to prime (pump) air out of the pick-up tubing) when you first start to draft.

5. Use the INC % or DEC % buttons to change percentage *(if needed)*.
6. See Para 3-2.1, General Flushing Information.

3-1.3 Class B Foam - Drafting

Figure 3-3: Class B Foam Drafting Mode

1333, 1323, 1311, 1334, 1335

1. Set up for drafting operation.

   NOTE: Always make sure the Foam Tank/Draft handle is completely moved to the handle stops. A partially open valve can drain the on-board foam tank.

2. Move Foam Tank/Draft handle UP to the Draft position.

   NOTE: Make sure that gasket is in place on the pick-up swivel connector on the panel to prevent any vacuum leaks.

3. Connect the flexible pick up hose to the contector on the panel and position pick up tube in foam bucket.

   NOTE:
   - Make sure you are flowing water out of a foam discharge or open foam pump discharge drain when using foam system prime.
   - The Prime button may be used to prime (pump) air out of the pick-up tubing) when you first start to draft.

4. Use the INC % or DEC % buttons to change percentage to 1.0 or 3.0.
5. See Para 3-2.1, General Flushing Information.

3-2. Flushing System

3-2.1 General Flushing Information

NOTE: For the purposes of this manual, it is assumed that Class A foam is the most commonly used agent and that the system will be stored wet with Class A foam concentrate. If Class A foam is not the primary agent, adjust procedures to accommodate the primary foam concentrate.

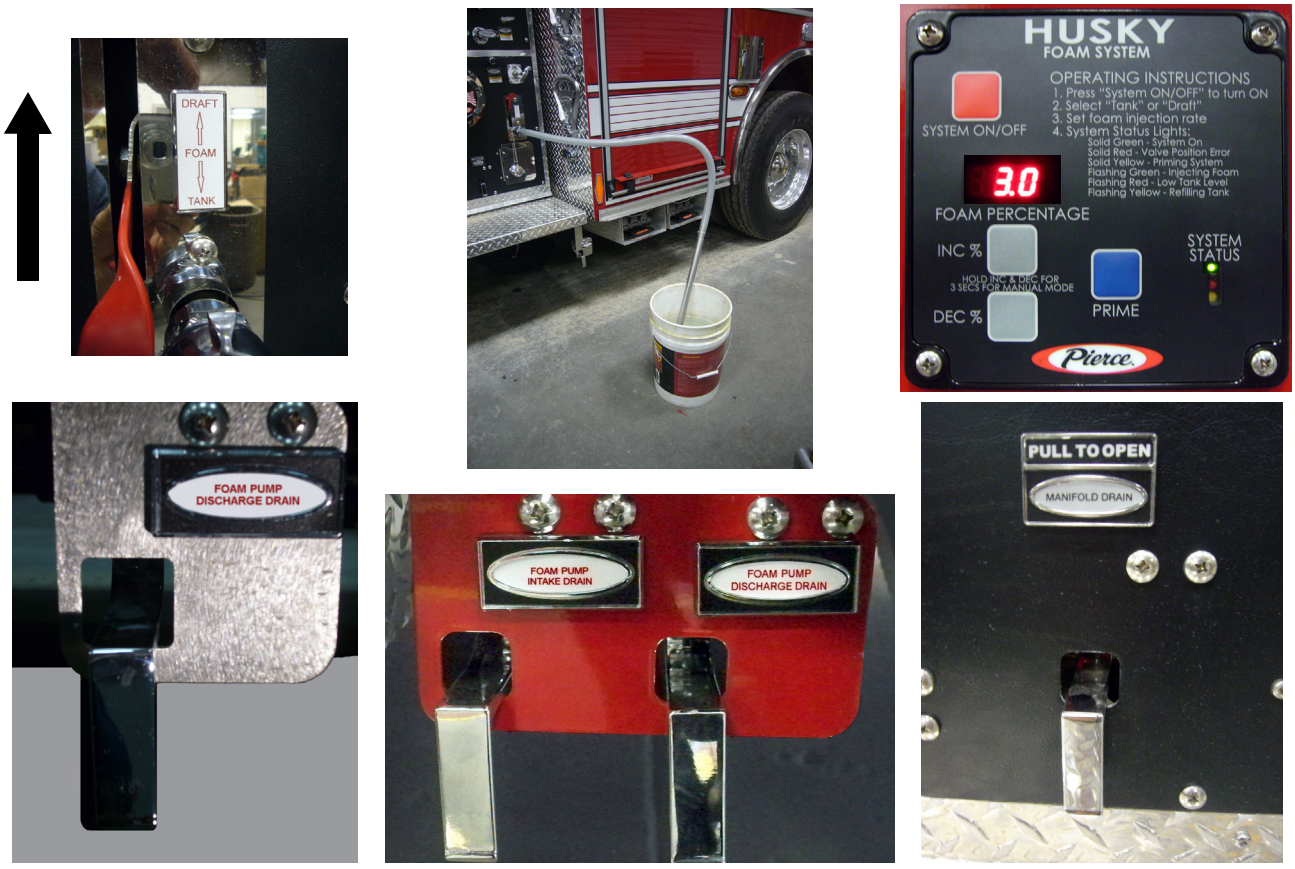
Typically, no flushing is needed. The Husky 3 foam pump is designed to be flooded with foam. Unless a different brand of Class A foam was drafted, or Class B foam was drafted, the only system flush that is needed is to turn the system OFF and continue flowing water until the presence of bubbles is minimal.

When beginning mop-up operations at the scene, turn the system OFF and use the foam that is left in the hose and plumbing for mop-up.

When mop-up operations are complete and water pump is disengaged, make sure to relieve the pressure that is trapped in Water/Foam system manifold plumbing by opening the manifold drain valve for a few seconds.

3-2.2 Manual Flush Mode

Figure 3-4: Manual Flush Mode



1333, 1322, 1311, 1334, 1335, 1336, 1325, 1364

NOTE: The Manual Flush Mode is only for use when additional flush time is desired, such as after switching between types and / or brands of foam.

1. Move Foam Tank/Draft handle UP to the Draft position.
2. Connect the flexible pick up hose to the contector on the panel and position pick up tube in a bucket of clean water.
3. Flow water out of discharge(s) that were used during the foaming operation.
4. Turn system ON and use the INC % or DEC % buttons to set the percentage to 3.0.
5. Open foam pump discharge drain until clean water is discharging to ground.
6. Open manifold drain until clean water is discharging to ground.

⚠CAUTION

Water must be flowing through an open foam discharge OR open manifold drain to give the flush solution somewhere to go.

7. Continue flowing water out of discharge(s) until clean water is flowing out of all open discharges.
8. Shut system OFF.
9. Open foam pump drain(s) to drain excess water from foam pump and piping.
10. Close foam pump drain(s).
11. Clean the flexible pick up hose assembly and place in storage compartment.
12. Recharge system with on-board tank agent.

3-2.3 Flushing After Drafting Class A Foam

1. If the same type and brand of foam as in the on-board tank was used:
   a. Turn the system OFF and flow water through the discharges that were used until the presence of bubbles is minimal.
   b. Clean the flexible pick up hose assembly and place in storage compartment.
2. If a different type or brand of foam was used other than what was in on-board tank, perform Para 3-2.2, Manual Flush Mode.

3-2.4 Flushing After Drafting Class B Foam

1. Continue flowing though all foam discharges that were used.
2. Perform Para 3-2.2, Manual Flush Mode.

3-3. Priming (Charging) System

Figure 3-5: Prime Mode

1311, 1356

The Prime Mode is used to accelerate the foam pump for a short period of time, such as to purge the air out of the on-board tank lines after initial filling or to fill the flexible pick up hose while drafting.

1. Select foam source.

⚠ CAUTION

Water must be flowing through an open foam discharge OR open manifold drain to give the foam solution somewhere to go.

NOTE: When the PRIME button is held down, it will run the foam pump at approximately 1.5 GPM.

2. Press and hold down the PRIME button (solid yellow LED will illuminate).
3. Release the button when foam is discharged out of the manifold drain.
4. Allow water/foam solution to run out of manifold drain until it is mostly clear of foam if unit is not immediately going to be used to fight fire.
5. Close manifold drain. System is now charged and ready for use.

3-4. Filling Foam Tank

⚠CAUTION

Do not mix different types or manufacturer's brands of foam concentrate in the foam cells or piping. Mixing of different foam concentrates (either type or manufacturer) may cause deterioration of the foam concentrate, improper proportioning, and poor performance in a fire situation. Mixing of Class A and Class B foam concentrates may result in a chemical reaction that can create globules, which can clog orifices and cause system failure.

NOTE: For the purposes of this manual, it is assumed that Class A foam is the most commonly used agent and that the system will be stored wet with Class A foam concentrate. If Class B foam concentrate is used, ensure system is completely flushed before filling foam tank and after use.

3-4.1 On-Board Tank Fill

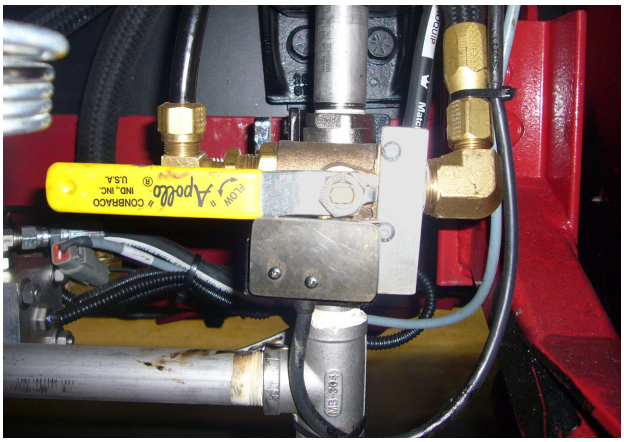
Figure 3-6: On-Board Tank Fill

1333, 1323, 1311, 1332

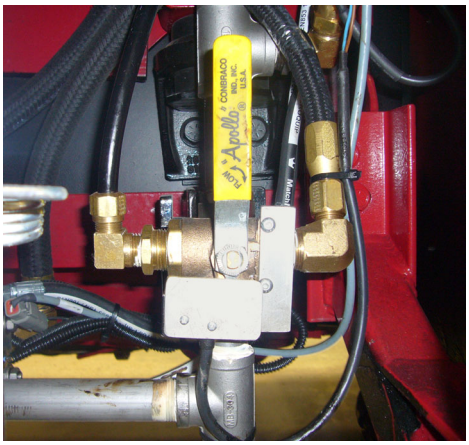
NOTE: DO NOT turn Foam System ON until Step (6).

1. Turn Battery Switch ON.
2. Move Foam Tank/Draft handle UP to the Draft position.
3. Connect the flexible pick up hose to the connector on the panel and position pick up tube in foam bucket or drum.

Figure 3-7: Selector Valve (ALL except 100ft Ascendant Aerial Tower)



Foam Inject Position



Tank Fill Position

1320, 1337

Figure 3-8: Selector Valve (100ft Ascendant Aerial Tower Only)

Foam Inject Position

Tank Fill Position

POM0931, POM0932

4. Place selector valve to Fill position.
5. On AAT and BX3 systems, engage water pump (see Pump Operation & Maintenance Manual).

6. Press DEC % button until FIL is displayed in LED.

NOTE:

- The high level float switch in foam tank dome will automatically stop the fill process when the tank is full.
- When system is filling, the green LED will illuminate and stay lit constant and the yellow LED will be flashing.
- When the tank is full, the yellow LED will go out.
- If the red LED illuminates and stays lit constant, there is a valve position error. One or both of the valves are in the wrong position (Draft/Tank or Injection/Fill).

7. Have pails set up so that you can go directly from pail to pail without turning the system OFF and ON.
8. Turn system ON, filling will begin.
9. Filling operation will stop automatically when tank is full.
10. When tank is full, turn system OFF.
11. Turn selector valve to Foam Injection position.
12. Move Foam Tank/Draft handle DOWN to the Tank position.
13. Install the cap on the Inlet.
14. Clean the flexible pick up hose assembly and place in storage compartment.
15. Clean running board if needed.
16. Use the INC % or DEC % buttons to change percentage to default setting of 0.5% or turn battery switch OFF.
17. On AAT and BX3 systems, disengage water pump (see Pump Operation & Maintenance Manual).

3-4.2 Fill through Foam Tank Fill Dome

CAUTION

Do not mix different types or manufacturers brands of foam concentrate in the foam cells or piping. Mixing of different foam concentrates (either type or manufacturer) may cause deterioration of the foam concentrate, improper proportioning and poor performance in a fire situation. Mixing of Class A and Class B foam concentrates may result in a chemical reaction that can create globules, which can clog orifices and cause system failure.

NOTE: Locate and close all foam tank and manifold drains. They may be found on and behind both the driver and passenger side pump panels.

When filling the foam concentrate during a non-fire situation, the following procedure is recommended:

1. The vehicle should be parked on a level surface or with the expansion dome of the tank slightly inclined.
2. If filling from a pressurized source through the expansion dome hatch, the hose should be extended to the bottom of the tank to minimize frothing of the foam concentrate.
3. If foam concentrate must be added by pouring through the expansion dome hatch, it must be done slowly to prevent aeration. If aeration occurs inside the tank, stop pouring until the foam concentrate bubbles dissolve. Take care not to allow dirt or debris to enter the tank. Pour the foam concentrate down the center of the round tube when filling the tank. This tube goes into the tank and allows the foam concentrate to enter under the surface of foam currently in the tank to reduce aeration of the foam per NFPA.

3-5. Manual Mode

This mode of operation is the NFPA required manual override. This mode is used to activate the foam pump without the flowmeter operating.

⚠WARNING

In this mode, the foam pump will run regardless of water flow. If discharges are closed, these lines may be charged to over 300 PSI. At least one discharge or manifold drain must be open before entering this mode.

Figure 3-9: Control Head in Manual Mode

1311, 1357

NOTE: Manual mode is based on 100 GPM flow rate of water, i.e.; .5% = 1/2 GPM concentrate. If you know your hand line flows 200 GPM and you want .5% injection; you would:

- divide 200 by 100 which equals 2.
- 2 times .5% equals 1%.
- 1% is your setting.

1. Turn system ON (green LED will illuminate).
2. Press and hold the INC % and the DEC % buttons until the first LED decimal point (to the left) is flashing for 3 seconds.

   NOTE: Adjusting percentage to zero will stop the foam pump from flowing, but will leave system in manual mode.

3. Monitor and adjust for estimated water flow rate changes.
4. Turn foam pump OFF to stop manual mode OR turn the battery switch OFF.

3-6. Set-up Mode

Refer to Para 4-2.1, Set-up Mode for Set-up Mode information.

4-1. Maintenance Introduction

This section of the manual has been prepared to help keep your equipment in good operating condition and ready for its primary mission.

The procedures and recommended intervals in this section are based on normal operating conditions and may have to be modified to meet the existing conditions. Some environmental concerns may dictate that inspection and maintenance be performed at more frequent intervals.

For various proportioning system components (water pump, discharge devices, valves, actuators, etc.), refer to that particular component's Operation and Maintenance Manual or Service Manual Group (chapter).

4-1.1 Testing After System Maintenance

If during the course of normal system maintenance it becomes necessary to replace, repair, or modify system components, component parts, operating devices or equipment, the system must be tested to ensure proper operation before being placed back into service.

The services of a qualified field engineer to inspect the system, run the tests for start-up, and the annual inspection can be provided. Additional details can be obtained by contacting Pierce Manufacturing.

⚠CAUTION

During cold weather, the foam system must be blown out after testing with water. Water cannot remain in the foam system after testing. Either fill the foam system with foam concentrate or blow out the foam system with compressed air using the following procedure. Failure to comply may result in the water freezing and damaging foam system components.

1. Draining Foam Pump After Testing **(with water in foam cell)**
   a. Open all drains.
   b. Remove foam inlet cap.
   c. Turn selector valve to the middle position (halfway between TANK FILL and FOAM INJECT).
   d. Open foam tank drain valve.
   e. Open Tank/Draft valve halfway until water stops draining.
   f. Install foam inlet cap.
   g. After moving truck to its destination, cycle the foam tank valves again to get any residual water out of the lines.
2. Draining Foam Pump After Testing **(with water in draft mode and foam in foam cell)**
   a. Remove water source from draft inlet (leave Foam Tank/Draft handle UP in the Draft position).
   b. Open foam pump drain(s) to drain excess water out of foam pump.
   c. Close foam pump drain(s).
   d. Install foam inlet cap.
   e. Move Foam Tank/Draft handle DOWN to the Tank position.
   f. See *"Priming (Charging) System"* on *page 3-6*. to recharge foam system.
3. Blowing Out After Testing

a. After blowing out the main water pump, attach shop air (90 psi or less) directly to the foam inlet.
b. Open Manifold Drain Valve on pump panel.
c. Move Foam Tank/Draft handle UP to the Draft position (air and water will discharge out of manifold drain hose).
d. Make sure foam pump is ON and run the foam pump through a couple of cycles to get the water out by pressing and holding down the PRIME button.
e. Open and close the foam pump drain(s).
f. Move the selector valve UP and Down two or three times.
g. Remove shop air and return all valve to normal operating modes.
h. After moving truck to its destination, cycle the foam tank valves again to get any residual water out of the lines.
i. Recharge foam tanks and system as needed.

4-2. Set-up & Calibration

CAUTION

Set-up and Calibration Modes should only be used by qualified personnel, as any changes made while in the Set-up or Calibration Modes may adversely affect the system performance.

4-2.1 Set-up Mode

1358, 1359

4-2.1a Configuration Procedure

1. Locate configuration plug behind the Inject/Fill selector valve access door.
2. Remove the fuse plug cover from the two-pin connector on cable.
3. Momentarily ground out the two pins on the cable.
4. The display head should now be in configuration mode and reading “C1”.

   NOTE: There should **NOT** be a fuse installed in this two-pin connector.

5. Install the fuse plug cover on the two-pin connector on cable.

6. Select from the list in the table below which configuration setting to change.
   — Pushing the INC % and DEC % buttons will scroll up and down the list.
   — Pushing the PRIME button will select the option.
7. After the option is selected, the current value is displayed and can be changed by using the INC % and DEC % buttons to change the value.
8. "To set value and exit the selected option, press the PRIME button and you will return to “C” menu.

NOTE:
- VALUES MUST BE STORED TO RETAIN VALUES IN PERMANENT MEMORY.
- Escaping from a menu item does not soft store the value.

9. In any of the sections the system ON/OFF button acts as an escape and will move back a level.
10. Values are stored into soft memory and will run until system power is cycled.

Table 4-1: Calibration Buttons

SCREEN	ACTION	DESCRIPTION	VALUE
	Refill Rate	Sets the rate of the foam pump fill mode for filling the tank. Default setting is 3.0 GPM	0 to 3 GPM
	Prime Rate	Sets the rate that the foam pump will prime at when the PRIME button is pushed and held down. Default setting is 1.5 GPM	0 to 3 GPM
	Default % Setting	Sets the default setting for the injection rate of foam at time of power up. Default setting is 0.5%	0.1% thru 0.9%, 1.0% and 3.0%
	Rate Adjust Percent	Sets the adjust point for foam output. Default setting is 0.04 GPM.	(correction factor) 0.01 to 1.00
	Rate Adjust Percent	Sets the adjust point for foam output. Default setting is .20 GPM.	(correction factor) 0.01 to 1.00
	Paddle Wheel Water Flow Calibration	Inputs low and high flow rate pulses to control head, PRIME button stores value. **NOTE:** Green LED will be flashing while running. Establish the correct water flow set rate and when it has become stable, press PRIME to store. Go on to next step and repeat for high flow rate.	See FC1 & FC2
	Low Flow Rate Calibration	Default setting	30 GPM
	High Flow Rate Calibration	Default setting	300 GPM

SCREEN	ACTION	DESCRIPTION	VALUE
	Calibrate Foam Pump (LVDT) Transducer	**NOTE:** Run LVDT Calibration with foam pump discharge drain open.  While (SET) is on display, the INC % and DEC % buttons can be used to check the low and high voltage settings of the LVDT.	Voltages will not change with a Gen 2 foam pump
	Press Prime button again to start the auto calibration procedure. There will be a Green flashing LED while running CAL mode. When complete, it will do one of the following: -> Red flashing LED if no cylinder movement is detected. -> Yellow flashing LED if MIN/MAX voltage for LVDT stroke sensor is too narrow. -> Red and Yellow flashing LED if possible coil reversal or LVDT sensor voltage is out of adjustment. -> No LED's flashing & return to selection menu means calibration completed correctly.		
	Low Flow Paddle Wheel Set Point	Default 30 GPM	0 to 999 GPM
	High Flow Paddle Wheel Set Point	Default 300 GPM	0 to 999 GPM

Table 4-2: Store and Clear Value Buttons

SCREEN	DESCRIPTION
	Stores values into permanent memory by pressing PRIME button.
	Clears values into permanent memory by pressing PRIME button. Resets default values.

4-2.1b Check Current Software Revision

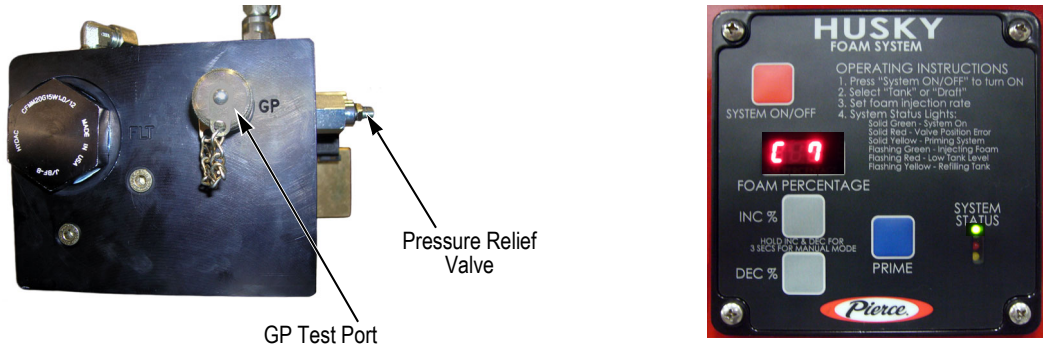
Figure 4-1: Control Head showing Software Revision

1311, 1335, 1363

This information is also displayed when the system is first turned ON and also after storing (STR) the program by pressing the PRIME button.

4-2.1c Checking Hydraulic System Pressure

Figure 4-2: Checking Hydraulic System Pressure



1311, 1335, 1346, 1361

1. Remove cap from the GP test port on the pumping cylinder of the Husky 3 and install a 0-3000 PSI pressure gauge (a higher range is acceptable).
2. Go to address (C7) in the calibration menu on the Husky 3 Control Head. See *"Configuration Procedure"* on *page 4-2*.
3. Press the PRIME button once.
4. Then hold down either the INC % or DEC % button to dead-head the pumping cylinder.
5. While holding either INC % or DEC % buttons down, observe the pressure on gauge.
6. If pressure is not at 2000 PSI, adjust the pressure relief valve in until 2000 PSI is achieved.
7. Remove the pressure gauge from the GP test port and install cap.

4-3. Troubleshooting

The following outline represents operational difficulties that may arise during the deployment of the unit. It is not a comprehensive list meant to exhaust every possible malfunction of the equipment. Rather it is a quick checklist to allow operating personnel to ensure that operator error is not preventing the safe deployment of the unit.

Refer to Service Group 7950-V-014 in the Service Manual provided with your apparatus for addition information regarding the Linear Variable Displacement Transducer (LVDT) signal conditioning unit.

Table 4-3: General Troubleshooting

Symptom	Possible Cause	Corrective Action
1. Husky 3 display doesn't light up.	No power.	• Check/reset 100 amp circuit breaker.
	Faulty circuit breaker.	• Check system voltage before and after circuit breaker. Replace circuit breaker.
	Blown/Faulty 10 amp display fuse.	• Replace 10 amp display fuse
	Wiring issue.	• Check power and ground wire connections.
2. Power unit will not start.	No power.	• Check/reset 100 amp circuit breaker.
	Faulty circuit breaker.	• Check system voltage before and after circuit breaker. Replace circuit breaker.
	Faulty start solenoid.	• Check for voltage at start solenoid. Replace start solenoid.
	Wiring issue.	• Check for voltage at motor power stud.
	Wiring issue.	• Check power and ground wire connections.
	Faulty control head.	• Replace control head.
3. Pump cycles but will not draft	No foam concentrate.	• Check foam tank level. Fill if required.
	Inlet strainer plugged.	• Check inlet strainer for obstructions.
	Vacuum leak.	• Check inlet hose and/or inlet connections for vacuum leak.
	Vacuum leak.	• Install vacuum gauge on inlet and confirm vacuum level (20hg).
	Vacuum leak.	• If low vacuum on pump inlet, remove inlet manifold and inspect inlet check valves or possible check valve obstruction.
	Faulty foam pump seals.	• Inspect cylinder bore or piston seals on piston.

Table 4-3: General Troubleshooting

Symptom	Possible Cause	Corrective Action
4. System is using excessive foam.	LVDT or water flow meter out of calibration.	• Recalibrate LVDT and water flow meter.
	Wrong software version.	• Contact Pierce for latest software version.
	Inspect the check valve at the injection fitting.	• Foam should not leak past the injection fitting check valve with system OFF. If fitting leaks, replace.
5. Delay before getting foam from hand line.	Wrong software version.	• Contact Pierce for latest software version.
	Needless flushing of system and not recharging.	• See Chapter 3, Operating Procedures.
	System not turned on before charging line.	• Turn on system at pump panel as first step in operation.
	Flowmeter (paddle wheel) sticking.	• Pull flowmeter out of tee fitting and clean with soap & water so paddle spins freely.
6. Foam in water tank after using foam system.	Hand lines not flushed.	• Flush hand lines.
	UPF tank issue.	• Fill foam tank; add florescent dye. Let unit sit overnight. Check the water tank to see if the florescent color is present in the water. If so, the foam tank is cracked.
	Bad manifold check valve.	• If foam manifold bleeds down rapidly, replace or disassemble/ clean check valve. It is normal for the manifold to bleed down slowly.
	Bad foam injection check valve.	• Foam should not leak past the injection check valve with system OFF. If fitting leaks, replace.
	Manifold drain not bled down.	• Manifold drain should be used after each use.
7. Foam tank empty after pumping operation with foam system turned off.	Bad check valve for foam tank fill.	• Check selector valve for being in INJECTION mode.
	Bad foam injection check valve.	• Check injection check valve to see if foam leaks by.
8. Tank fill inoperable.	Selector valve in wrong mode.	• Check tank fill/injection switch at selector valve for being in TANK FILL position.
	Switch on Draft/Tank valve did not open.	• Check Draft/Tank valve and the switch on the valve. Switch will open when in Draft Mode.
	Float stuck full (false reading), High Level Float.	• Check float. Make sure it moves freely and opens/closes switch.
	Tank fill check valve does not open.	• Check to see if check valve is free.

Table 4-3: General Troubleshooting

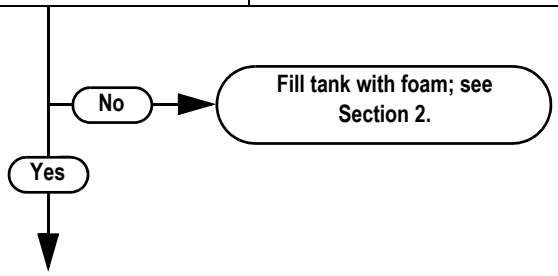
Symptom	Possible Cause	Corrective Action
9. Pump stalls with power unit running.	Incorrect hydraulic system pressure.	• Install pressure gauge on the GP pressure port and confirm pressure setting is 2000 PSI. See *"Checking Hydraulic System Pressure"* on *page 4-5*.
	Foam Pump (LVDT) Transducer feedback voltage not correct. -low set range is 0.55 to .75 volts -high set range is 4.40 to 4.20 volts	• Confirm feed back voltage range in calibration mode (screen C7). See *"Configuration Procedure"* on *page 4-2*.
	Foam Pump (LVDT) Transducer not calibrated.	• Auto-Calibrate Foam Pump (LVDT) Transducer (screen C7). See *"Configuration Procedure"* on *page 4-2*.
	Incorrect voltage at proportional valve.	• Confirm 12 vdc at proportional valve.
10. System runs but doesn't make capacity.	No foam concentrate.	• Check foam tank level. Fill if required.
	Inlet strainer plugged.	• Check inlet strainer for obstructions.
	Vacuum leak.	• Check inlet hose and/or inlet connections for vacuum leak.
	Vacuum leak.	• Install vacuum gauge on inlet and confirm vacuum level (20hg).
	Insufficient voltage to power unit.	• Confirm truck voltage at the power unit is 13.4 volts.
	Incorrect hydraulic system pressure.	• Install pressure gauge on the GP pressure port and confirm pressure setting is 2000 PSI. See *"Checking Hydraulic System Pressure"* on *page 4-5*.
	Foam Pump (LVDT) Transducer feedback voltage not correct. -low set range is 0.55 to .75 volts -high set range is 4.40 to 4.20 volts	• Confirm feed back voltage range in calibration mode (screen C7). See *"Configuration Procedure"* on *page 4-2*.
	Foam Pump (LVDT) Transducer not calibrated.	• Auto-Calibrate Foam Pump (LVDT) Transducer (screen C7). See *"Configuration Procedure"* on *page 4-2*.
	Foam Pump Inlet and Outlet Check Valves (four) not sealing properly	• Remove Inlet and Outlet Manifolds and inspect the Check Valves and O-Rings for damage.

Table 4-3: General Troubleshooting

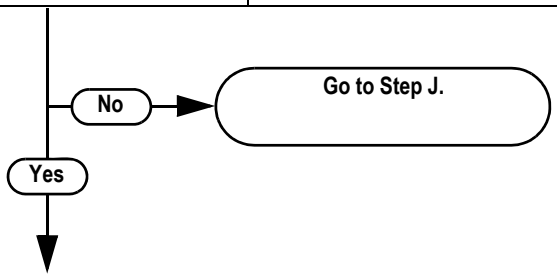
Symptom	Possible Cause	Corrective Action
11. Erratic pump operation.	No foam concentrate.	• Check foam tank level. Fill if required.
	Inlet strainer plugged.	• Check inlet strainer for obstructions.
	Vacuum leak.	• Check inlet hose and/or inlet connections for vacuum leak.
	Foam Pump (LVDT) Transducer feedback voltage not correct. -low set range is 0.55 to .75 volts -high set range is 4.40 to 4.20 volts	• Confirm feed back voltage range in calibration mode (screen C7). See *"Configuration Procedure"* on *page 4-2*.
	Foam Pump (LVDT) Transducer not calibrated.	• Auto-Calibrate Foam Pump (LVDT) Transducer (screen C7). See *"Configuration Procedure"* on *page 4-2*.
12. External foam or oil leakage out of pump weep holes.	Piston rod and piston rod seals leaking.	• Pump assembly will have to disassembled and inspected. Inspection will have to be completed on the piston rod assembly and piston rod seals. It's in probable that both the piston rod and piston rod seals will have to be replaced.
13. "HI" is displayed on screen.	This is normal if pumping system limit of 3gpm of foam.	• Decrease Foam Flow.
	If system is inoperable, check foam pump LVDT transducer voltage.	• Confirm feed back voltage range in calibration mode (screen C7). See *"Configuration Procedure"* on *page 4-2*.
14. System will not pump foam from foam tank.		• See *Table 4-4*., System Will Not Pump Foam from Foam Tank.

Table 4-4: Specialized Troubleshooting-
System Will Not Pump Foam from Foam Tank

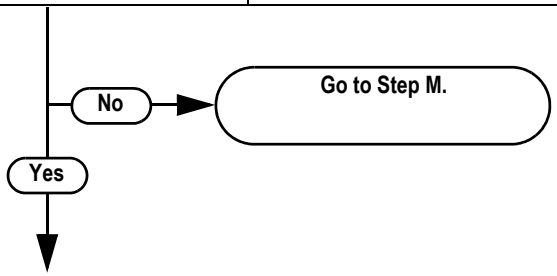
Question	Reason for Question	Test Procedure
A. Is there foam in the foam tank?	The foam system will not operate properly without an adequate supply of concentrate.	Visual inspection.



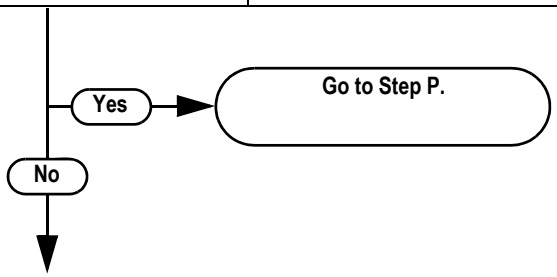
Question	Reason for Question	Test Procedure
B. Is the green light on the control module ON?	A green light indicates that the electrical portion of the system is functioning.	Visual inspection.



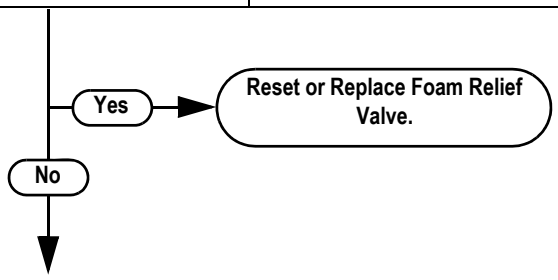
Question	Reason for Question	Test Procedure
C. Does the foam pump engage?	To isolate the problem from between electrical and mechanical failures.	**NOTE:** You must be flowing water for the foam pump to operate. Turn the foam percent up and listen for the foam pump to engage. Press and hold PRIME button with foam pump discharge drain open. If foam pulsates out of drain valve, foam pump is stroking (pumping).



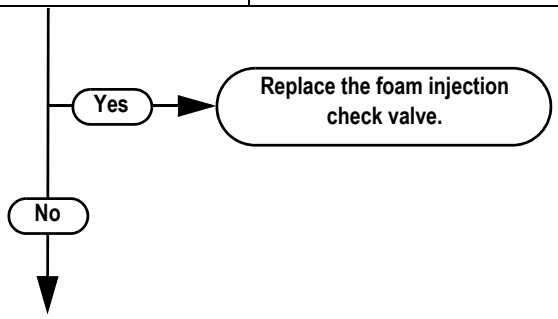
Question	Reason for Question	Test Procedure
D. Tank fill option - look to see if the selector valve is in the TANK FILL mode.	If the tank fill valve is open, all of the foam concentrate will circulate between the foam pump and the foam tank, with little or none being injected.	Remove the tube from the outlet of the tank fill valve. Operate the foam system. If foam concentrate is discharged, the tank fill valve is open.



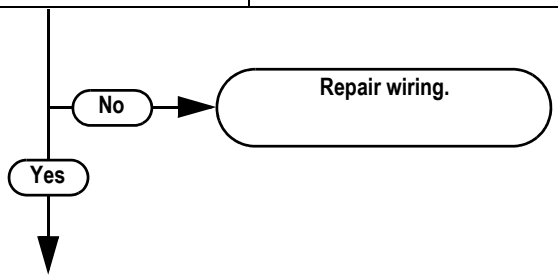
Question	Reason for Question	Test Procedure
E. Is the foam relief valve stuck OPEN on the foam pump?	Foam concentrate will circulate between the inlet and outlet of the foam pump and not inject into any waterway.	Remove the hydraulic hose from the foam injection check valve and install a pressure gauge at the end of the hose (600 psi). Turn system ON and hold PRIME button down, foam relief valve should be set at 400 PSI.



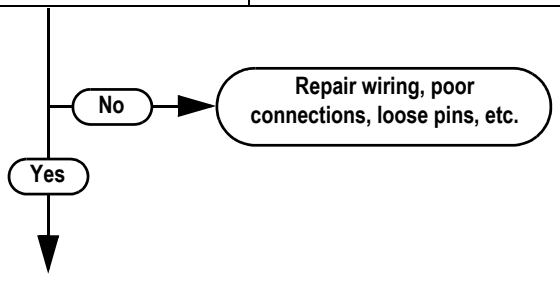
Question	Reason for Question	Test Procedure
F. Is the foam injection check valve stuck in the CLOSED position?	Foam concentrate cannot reach the foam injection manifold if the check valve is stuck closed.	Check by visual inspection, or the foam pump may make a squealing noise when the pump goes into the relief mode.

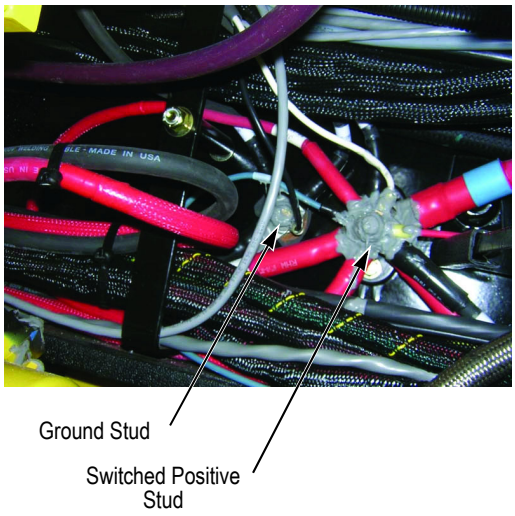


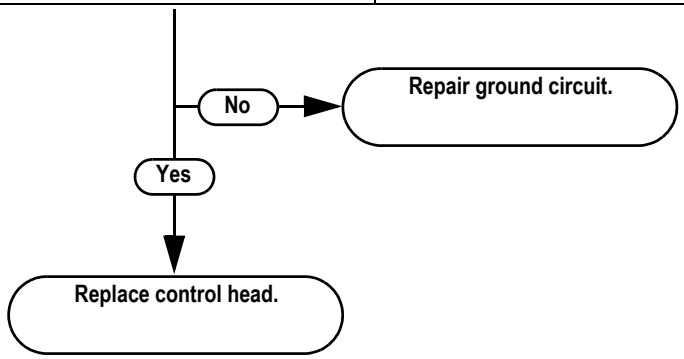
Question	Reason for Question	Test Procedure
G. Is the wiring OK?	The foam system will not operate properly if the wiring is faulty.	Refer to the wiring diagram for circuit information.



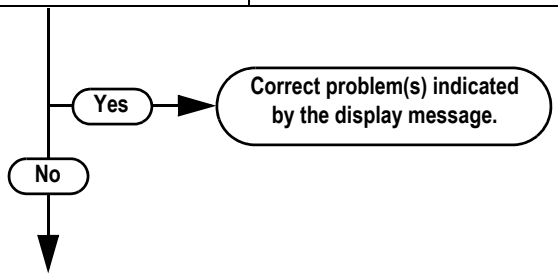
Question	Reason for Question	Test Procedure
H. Is the system voltage OK?	Voltage at the control head must be within .2 volt of the battery voltage for the foam system to operate.	**NOTE:** Refer to *"System Diagrams"* on *page 4-23* for additional circuit information. • Check the voltage at the battery.  1148 • Check the voltage at the control head, ckt# 2878, pin 7 and ckt# 1640, pin 15. Voltage at the control head should be within .2 volt of the battery voltage.  1146



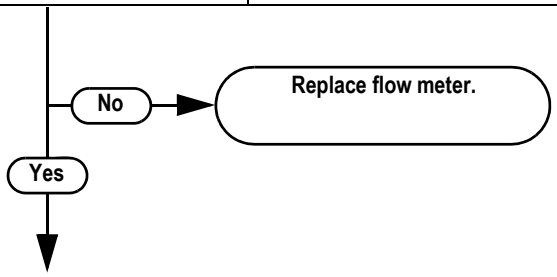
Question	Reason for Question	Test Procedure
I. Is the ground circuit OK?	The foam system must have an adequate ground (continuity) for the system to operate.	Check ground circuit (ckt# 1640K). Refer to *"System Diagrams"* on *page 4-23* for additional circuit information. 



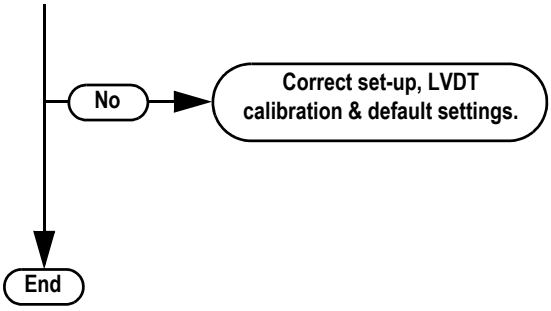
Question	Reason for Question	Test Procedure
J. Are there any error messages on the display?	Messages on the display will indicate if there is a low foam level or if the system is being operated beyond its capacity.	Visual inspection.



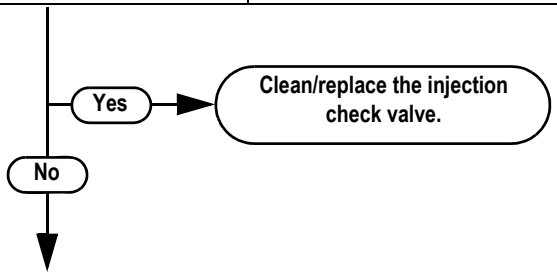
Question	Reason for Question	Test Procedure
K. Is the flow meter operating correctly?	The flow meter provides the foam system with information on how much water is being flowed. No signal from the flow meter will result in the foam system not operating.	Check for power and ground at flow meter. Check for pulse counts on signal wire while quickly spinning paddle wheel by hand.



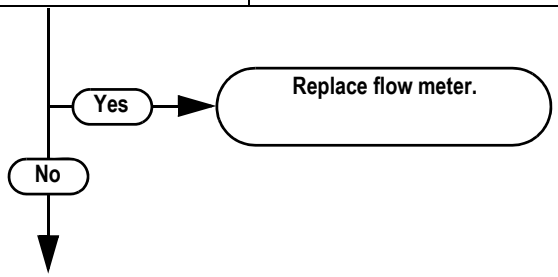
Question	Reason for Question	Test Procedure
L. Are the system set-up, LVDT calibration, and defaults set correctly?	The foam system will not operate if the system has not been set-up and calibrated correctly.	See *"Set-up & Calibration"* on *page 4-2*: • Check the set-up; • Calibrate the LVDT; • Check all default settings.



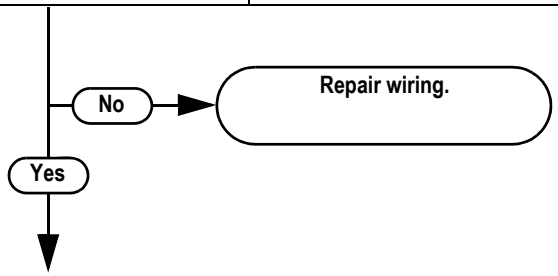
Question	Reason for Question	Test Procedure
M. Does the foam pump engage with the Discharge Foam Pump Drain open?	To check the foam injection check valve. If the foam pump engages with the valve open, it is likely there is contamination in the injection check valve.	Open the Discharge Foam Pump Drain valve. Attempt to operate the system.



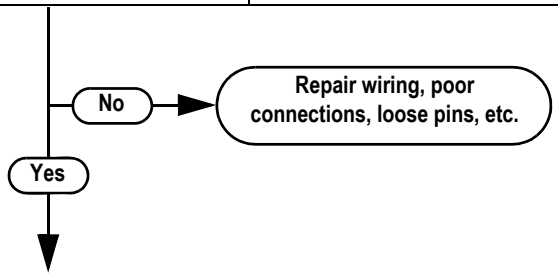
Question	Reason for Question	Test Procedure
N. Does the foam pump engage in the manual mode?	To isolate the flow meter from the system and eliminate it as a possible cause.	See *"Manual Mode"* on *page 3-11*.

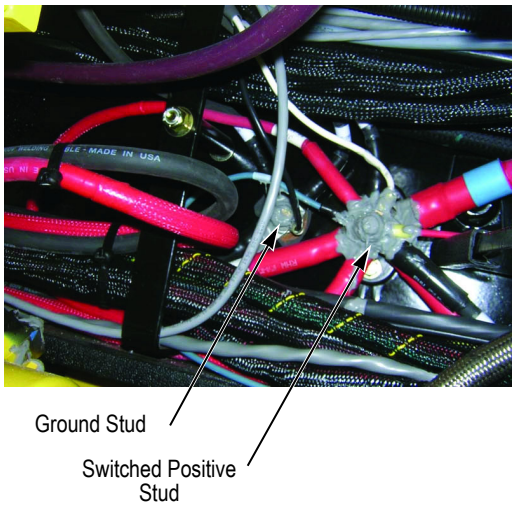


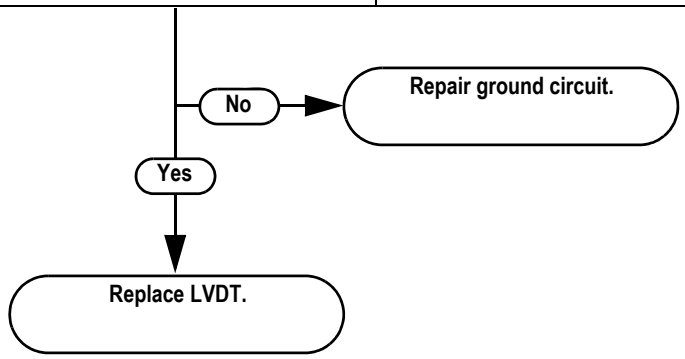
Question	Reason for Question	Test Procedure
O. Is the wiring OK?	The foam system will not operate properly if the wiring is faulty.	Refer to *"System Diagrams"* on *page 4-23* for additional circuit information.

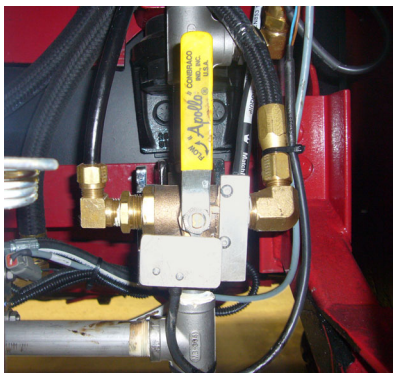


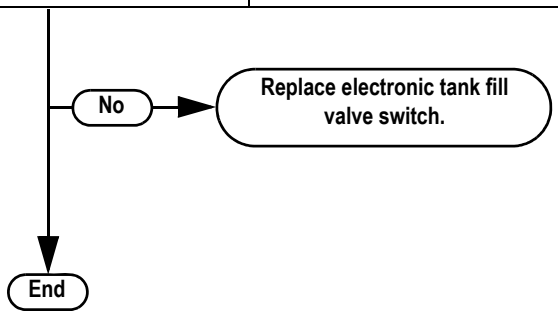
Question	Reason for Question	Test Procedure
P. Is the system voltage OK?	Voltage at the control head must be within .2 volt of the battery voltage for the foam system to operate.	**NOTE:** Refer to *"System Diagrams"* on *page 4-23* for additional circuit information. • Check the voltage at the battery.  1148 • Check the voltage at the control head, ckt# 2878, pin 7 and ckt# 1640, pin15. Voltage at the control head should be within .2 volt of the battery voltage.  1146



Question	Reason for Question	Test Procedure
Q. Is the ground circuit OK?	The foam system must have an adequate ground circuit (continuity) for the system to operate.	Check ground circuit (ckt# 1640K). Refer to *"System Diagrams"* on *page 4-23* for additional circuit information.  1149



Question	Reason for Question	Test Procedure
R. Is the Inject/Fill valve OK?	If the Inject/Fill valve sticks open or has a bad seal, most of the foam concentrate will circulate between the foam pump and the foam tank, with little being injected into the water stream.	Inspect the valve for proper operation. Switch is closed in Inject Mode, open in Fill Mode. Check the adjustment of the micro switch. Inspect the micro switch for moisture.  ALL except 100ft Ascendant Aerial Tower 1337  100ft Ascendant Aerial Tower Only POM0931



4-4. Periodic Operation

The foam system should be operated periodically to insure that the foam system is operational, and also to circulate the foam concentrate through the pump. The preferred method is a periodic operation of the system in a normal discharge condition as described in *Section 3, "Operation"*.

4-5. General Maintenance Procedures

⚠WARNING

Personal hearing can be PERMANENTLY DAMAGED if exposed to constant high noise levels of 85 db or higher. Wear approved hearing protection devices when working in high-noise-level areas. Hearing loss occurs gradually, but becomes permanent over time.

Cleanliness

Dirt, grease, oil, and debris may cover up a serious problem. Use an approved dry cleaning solvent to clean all metal surfaces.

Common Hardware

Check bolts, nuts, and screws for obvious looseness, or missing, bent, or broken conditions. Look for rust around bolt heads. Tighten any obvious loose parts.

Weldments

Inspect for rust or gaps where parts are welded together. Broken parts should be repaired or replaced.

Electrical Wiring and Connectors

Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure wires are in good shape. Repair all bad wiring and connectors.

Lines and Fittings

Look for wear, damage, and leaks. Make sure clamps and fittings are tight. Wet spots can indicate a leak, and a stain around a fitting or connector can also indicate a leak. If a leak originates from a loose fitting or connector, tighten it. Replace any leaking line or fitting.

Hydraulic Tank

The fluid return line, located at the top of the tank, should be cracked open when performing service on the hydraulic system to prevent siphoning of oil that is in the tank.

4-6. Preventive Maintenance Checks and Service

4-6.1 Introduction

These checks and services have been provided to help you keep your equipment in good operating condition and in service.

The preventive maintenance section is intended to formally maintain and document the device on a regular schedule. This schedule is intended as a minimum and is greatly dependent on operating conditions. Heavy use and extreme environmental conditions such as heat, cold, sand, or salt spray will demand increased inspection and maintenance.

This preventive maintenance section is not intended to replace or negate any routine pre-operation safety inspections. The operator must be aware of the condition of the equipment before operating. A pre-operational visual safety inspection should always be performed.

During the warranty period and thereafter, inspections and maintenance schedules must be performed according to the specified Pierce Manufacturing Inc. standards.

Failure to comply with these requirements will be considered grounds or conditions that may void the warranty on individual components, assemblies, or the entire device.

4-6.2 Explanation of Columns

Item No.	Numbers in this column are to be used as a source of the item number for the "Item No." column on the Equipment Inspection and Maintenance Worksheet.
Item to Check/Service	This column tells you the item to be checked or serviced.
Procedure	This column tells you how to perform the required check or service.

4-7. After Every Use Inspection

NOTE: After every use of the system, the following components and systems should be inspected and repaired/replaced as necessary:

Table 4-5: After Every Use Inspection

Item No.	Item to Check/Service	Procedure
1	Hydraulic Oil Level	Check the oil level in the hydraulic reservoir.  1362
2	Foam Tank Level	Check foam concentrate level in the foam tank and fill as necessary.

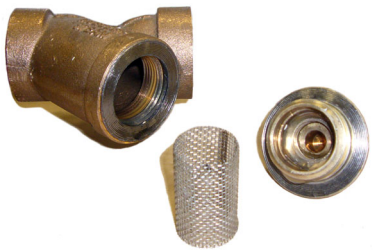
Table 4-5: After Every Use Inspection (Continued)

Item No.	Item to Check/Service	Procedure
3	Hydraulic System	Check hydraulic tubing/hoses for leaks, loose fittings, damage, etc.
4	Foam System Plumbing	Check foam system plumbing for leaks, loose fittings, damage, etc.
5	Manifold Drains	Open manifold drain.

4-8. Quarterly Inspection

NOTE: After every three months of service (quarterly), perform the following maintenance procedure:

Table 4-6: Quarterly Inspection

Item No.	Item to Check/Service	Procedure
1	Inline Foam Strainer	**NOTE:** Draft/Tank Valve **MUST** be in Draft Mode or the foam tank will drain out. Remove clean-out cap and remove screen. Inspect for foreign debris. If any are found, clean the screen with water and reinstall. Inline Foam Strainer  1321

4-9. Annual Inspection

NOTE: Annually, perform the Quarterly inspection, then the following maintenance procedure:

Table 4-7: Annual Inspection

Item No.	Item to Check/Service	Procedure
1	Hydraulic Oil Sample	Obtain an oil sample and compare to previous results. If the current sample matches previous test results, the oil does not have to be changed. Replace oil and filter (Pierce PN 2518612) if test results indicate oil degradation.

4-10. Recommended Hydraulic Oil for Husky 3 Proportioning System

4-10.1 Characteristics

The system is delivered, charged with ISO 68 hydraulic oil. It is recommended that same or similar oil be used to maintain optimum efficiency and component life. If the vehicle has been subjected to extreme cold temperatures for extended periods of time, engaging the foam system will allow the hydraulic oil to warm up before initiating operation of the Husky 3 system.

4-10.2 Recommendations

U.S. Oil Multi-Vis 68R, Mobil DTE16M ISO 68 or equivalent.

⚠WARNING

The hydraulic fluid used for cold weather application may not function properly at higher temperatures, and must be changed to an appropriate recommended type for proper operation of unit.

4-10.3 Oil Change Information

We recommend taking an initial sample of hydraulic oil and having it analyzed to serve as a baseline for future oil analysis results. Annually, obtain an oil sample and compare to previous results. If the current sample matches previous test results, the oil does not have to be changed. Replace oil and filter (Pierce PN 2518612) if test results indicate oil degradation.

4-11. System Diagrams

Figure 4-3: Husky 3 Schematic Legend

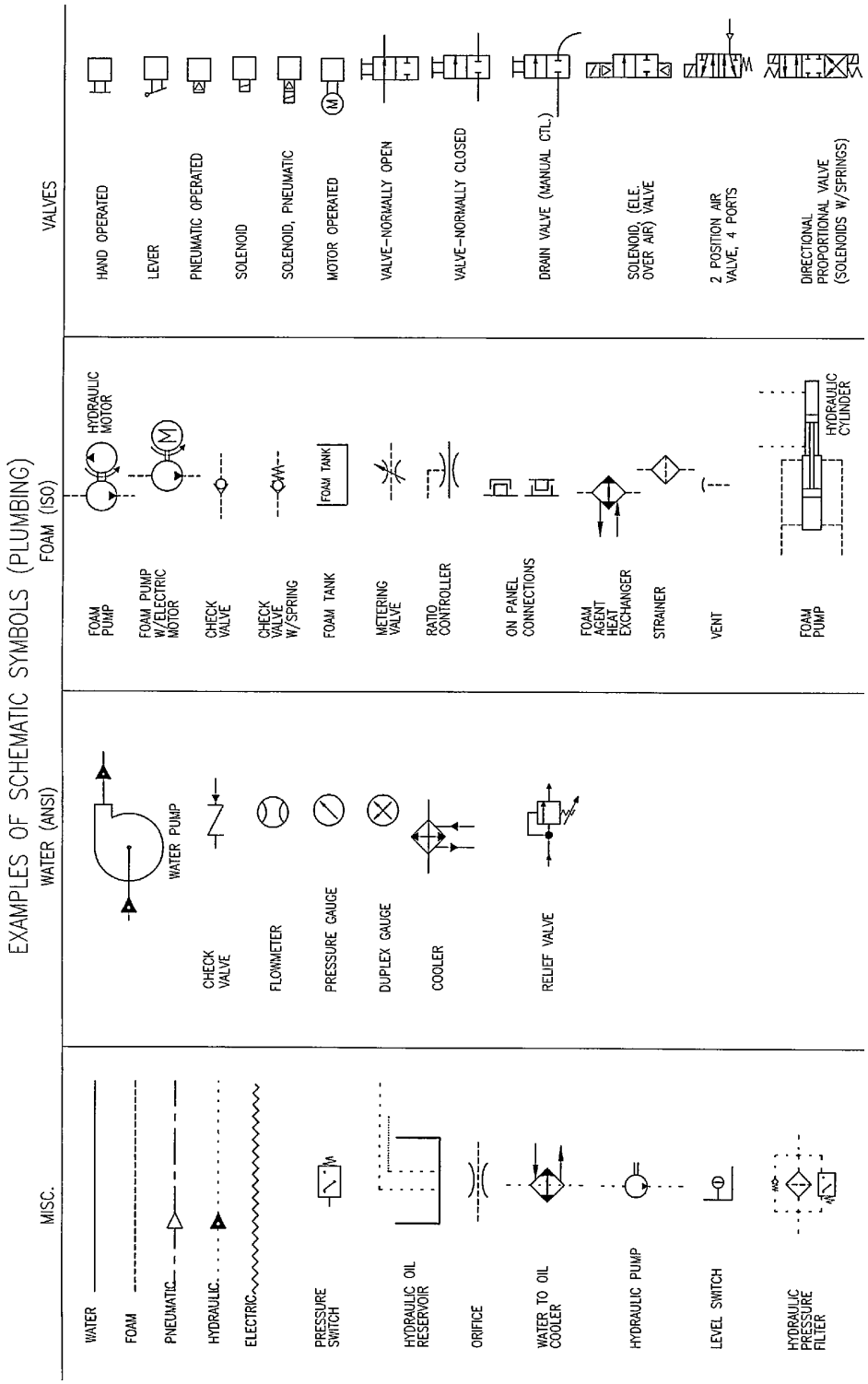


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Figure 4-4: Husky 3 Hydraulic Schematic

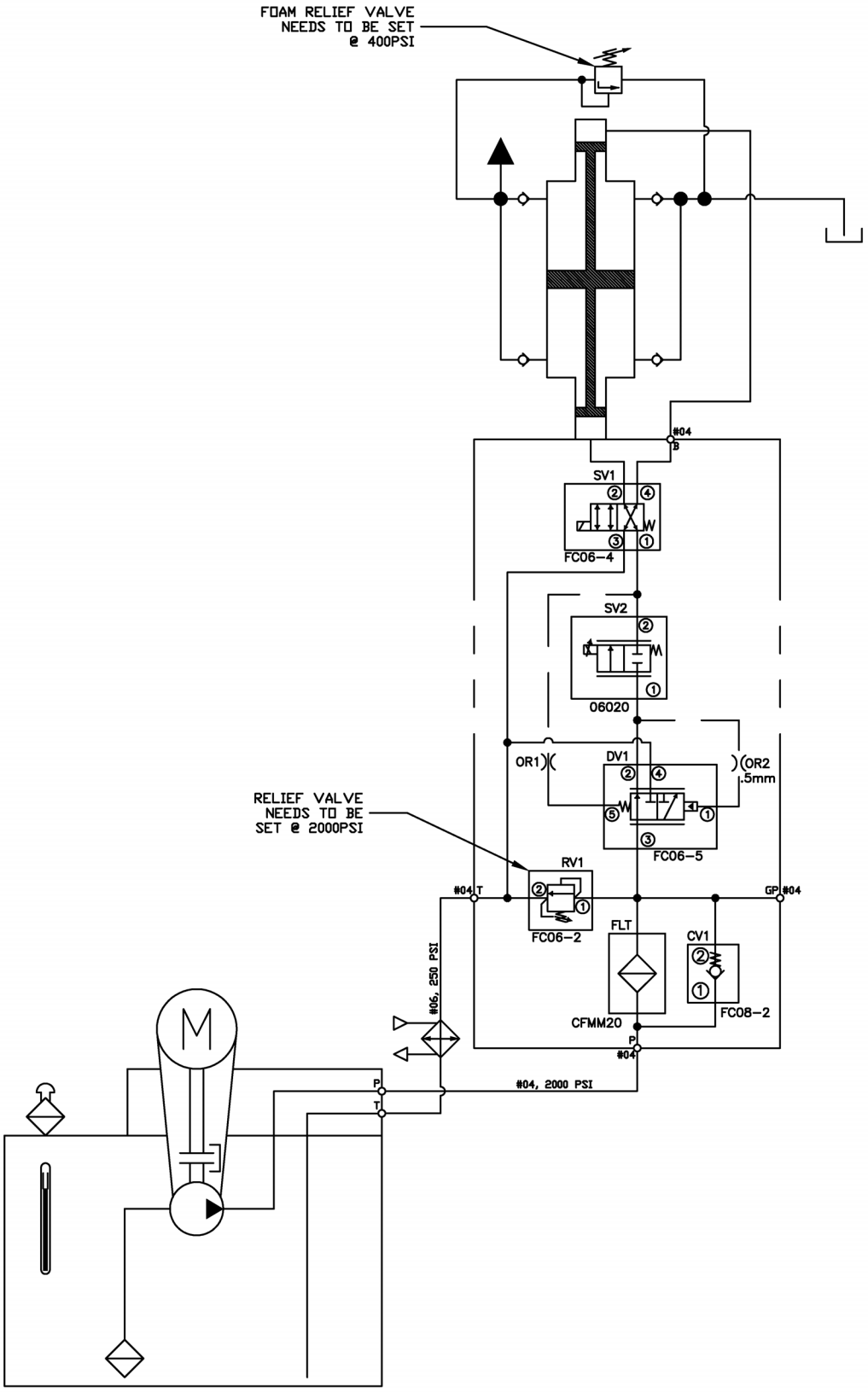

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Figure 4-5: Husky 3 Foam System Schematic

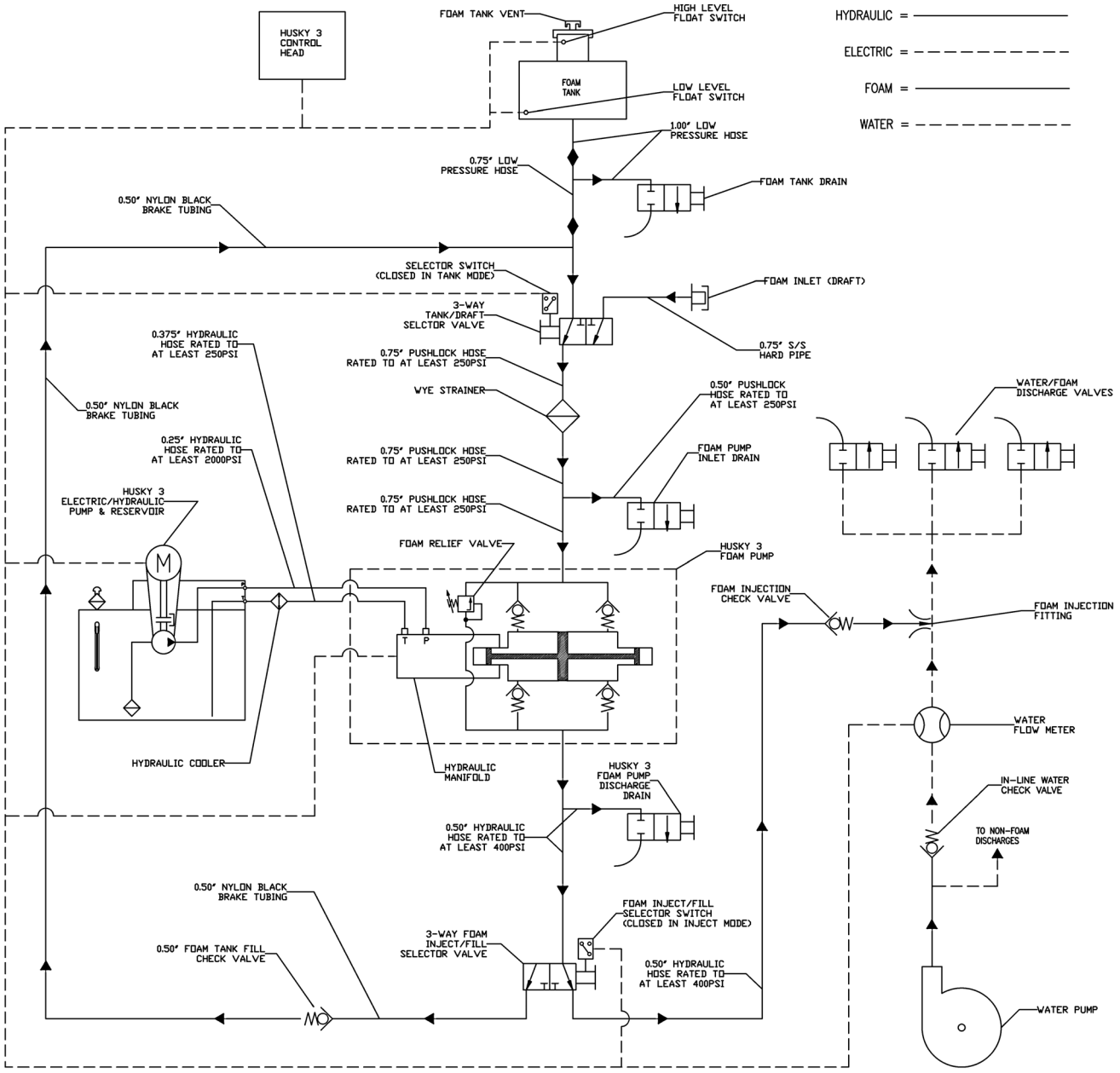

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Figure 4-6: Husky 3 Electrical System

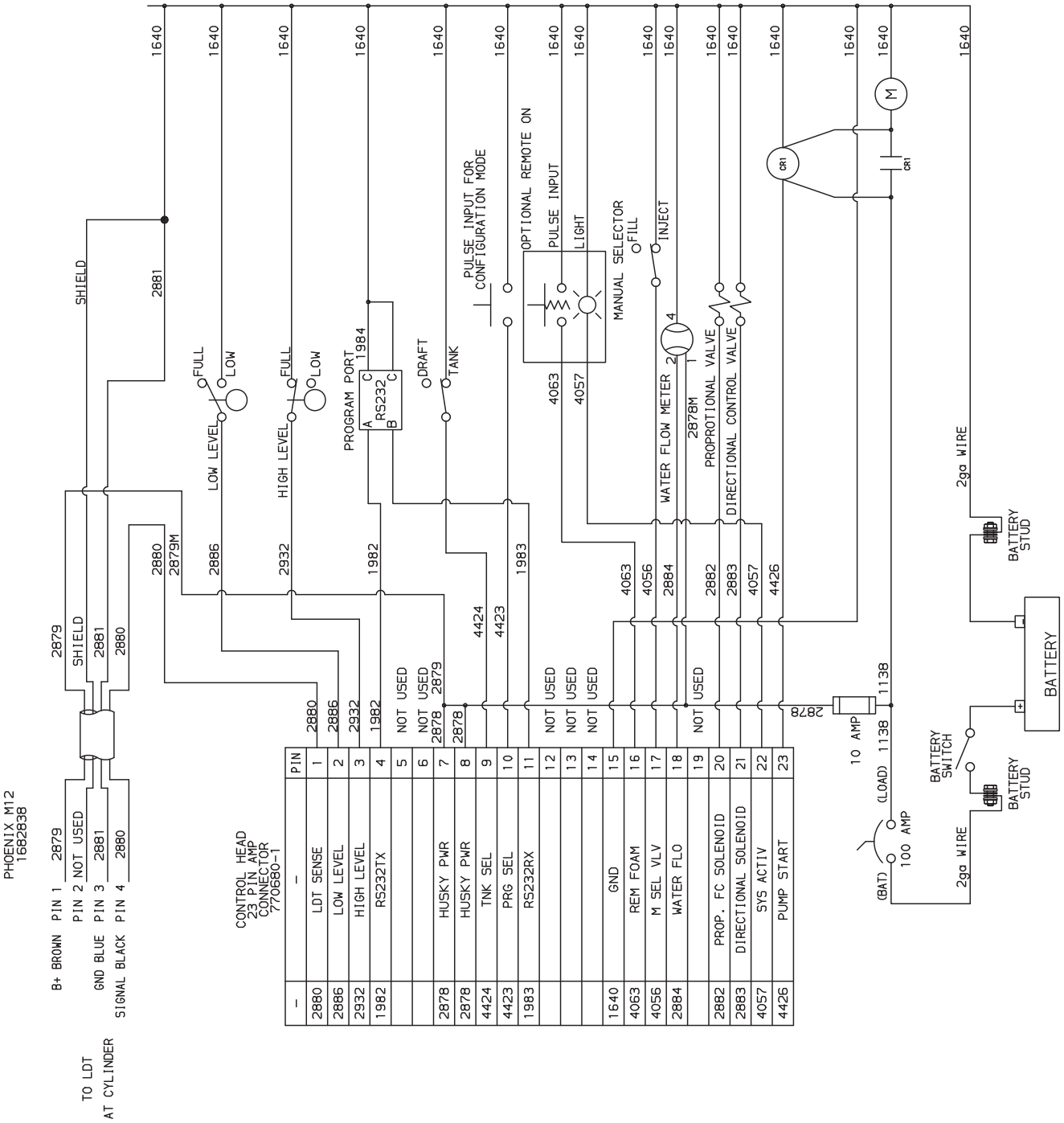

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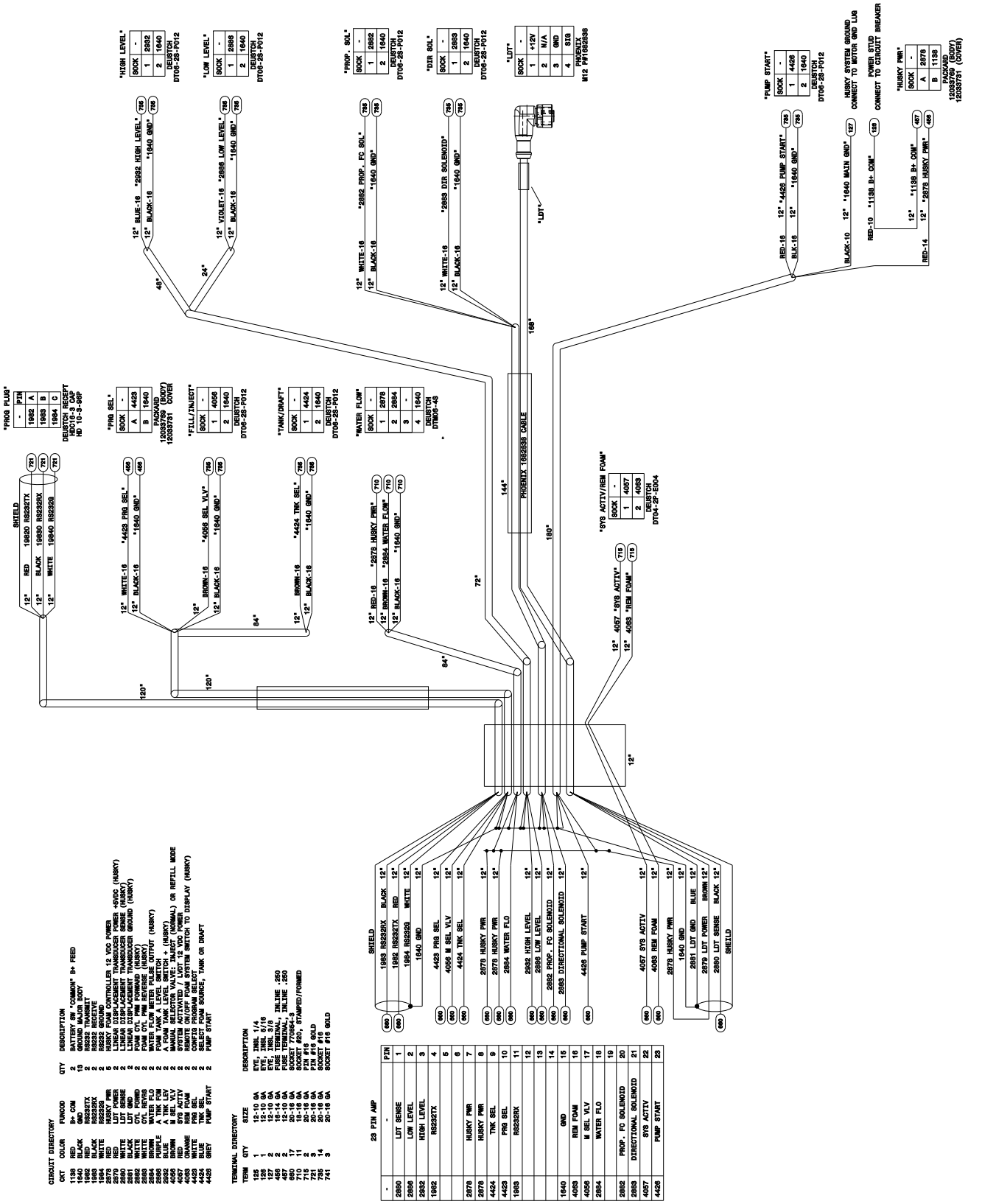
Figure 4-7: Husky 3 Wiring Harness



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