



30 Series

COMPRESSED AIR FOAM SYSTEMS

OPERATIONS, TRAINING, & MAINTENANCE MANUAL

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CHAPTER 1

INTRODUCTION

1-1. MANUFACTURER:

- A. The TRI-MAX 30 is manufactured by:

Kingsway Industries, INC
6680 Lockheed Dr Ste B
Redding, CA 96002

Phone: (530) 722-0272
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E-mail: info@trimax.us
Website: www.trimax.us

- B. The manufacturer is totally committed to supporting the owners and operators of the TRI-MAX 30 system. Don't hesitate to contact the factory either by telephone, E-Mail, FAX, or the Website if you have a problem that you can't solve or have a product improvement idea. The TRI-MAX website has a Comment/Assistance Page for obtaining product information, providing customer feedback, and soliciting technical assistance.

- 1-2. WARRANTY:** The TRI-MAX 30 has a 1-year limited warranty to be free from defects in material and workmanship beginning on the date of delivery. The manufacturer's liability is limited solely to the repair or replacement of the defective part and does not include labor. The warranty card that accompanies the unit should be returned to the manufacturer. The manufacturer shall in no way be liable for any incidental or consequential damages which may result from any defects in material or workmanship or from the breach of any express or implied warranty. The manufacturer does not warranty the performance of the system impacted by environmental conditions, abuse and end user competence. If the optional protective cover is purchased with and used on the system, the Limited 1-Year Warranty shall be extended to a 5 year period. Individuals with a warranty claim should contact the manufacturer and provide the Serial Number for the system which can be found on the data plate on the foam tank.

Kingsway Industries Inc. is proud to offer what we believe to be the best designed, world-class, state-of-the-art safety equipment available anywhere in the world. Our products have been deployed in the harshest conditions worldwide for over a decade and are the *de facto* standard for force protection by the toughest customers in the world – the US Military. Our products are designed and built to survive anywhere, in almost any weather condition and always provide reliable protection with minimal maintenance. We strongly believe in our extremely high quality design, parts selection and manufacturing methods of all of our products and use only EPA approved "Green" non-toxic, non-hazardous and non-corrosive agents in all of our systems. Customer protection, safety and absolute reliability are our top priorities. We prevent and put out fires other equipment simply can't handle. Because of this, we stand behind each and every product we offer with the absolute best warranty in the industry. All new Kingsway/Tri-Max systems come with a 1 year manufacturer's warranty against defects in materials and workmanship, which starts from the date of purchase. This warranty can be extended to a standard setting 5 year period with the purchase of the appropriate weather cover if included in the original purchase agreement. If a defect is found during the warranty period, Kingsway

will make it right. However, you the customer also have a part to play in the warranty. Very simply - the warranty will be void if the required preventative checks and simple periodic maintenance procedures required in the appropriate Operators Manual are not performed and documented by Kingsway qualified, trained and certified personnel. Client to provide documentation upon request. Copies of these inspections must be provided with any warranty claim submission. Kingsway provides the appropriate training and certification free of charge at our factory in Redding, California. Come visit us. When lives and futures depend on equipment choices, you'll choose Kingsway/Tri-Max!

1-3. WARNINGS, CAUTIONS, & NOTES: Are used to emphasize important and critical instructions and are used for the following conditions:

- A. **WARNING**: An operating procedure, practice, etc., which if not correctly followed could result in personal injury or loss of life.
- B. **CAUTION**: An operating procedure, practice, etc., which, if not strictly observed, could result in damage to, or destruction of, equipment.
- C. **NOTE**: An operating procedure, condition, etc., which it is essential to highlight.

1-4. MANUAL CHANGES AND REPRODUCTION:

A. MANUAL CHANGES:

- (1) This manual and the associated updates will be posted on the TRI-MAX web site (<http://www.trimax.us>) .

B. REPRODUCTION: Reproduction of training information, illustrations, and checklists in this manual is authorized.

CHAPTER 2 - SYSTEM DESCRIPTION

2-1. GENERAL INFORMATION: The TRI-MAX 30 Compressed Air Foam fire suppression system uses compressed air to propel fire fighting foam. Thousands of tight radius bubbles quickly cool and smother a fire by providing a thick vapor-sealing blanket of foam that virtually eliminates re-ignition. The foam will adhere to horizontal and vertical surfaces. This system allows the operator to seal a fuel spill and flammable vapors with foam thus reducing or eliminating a potential fire. The 30 gallon system produces approximately 600 gallons of finished foam. It takes approximately 1.5 minutes, in the full open position, to fully discharge the 600 gallons of finished foam. The system will discharge the foam approximately 65 feet in a no wind condition allowing fire fighting personnel without protective clothing to avoid thermal injuries. There is an approximate 25% reduction in discharge distance using the Freeze Protected Foam solution at -40 degrees F/C due to the increased viscosity of the foam. The system can easily be serviced by the operator. Trained personnel can accomplish all maintenance except the hydrostatic pressure testing of the Air Cylinders, Premix Tank, and the Discharge Hose.

2-2. SPECIFICATIONS:

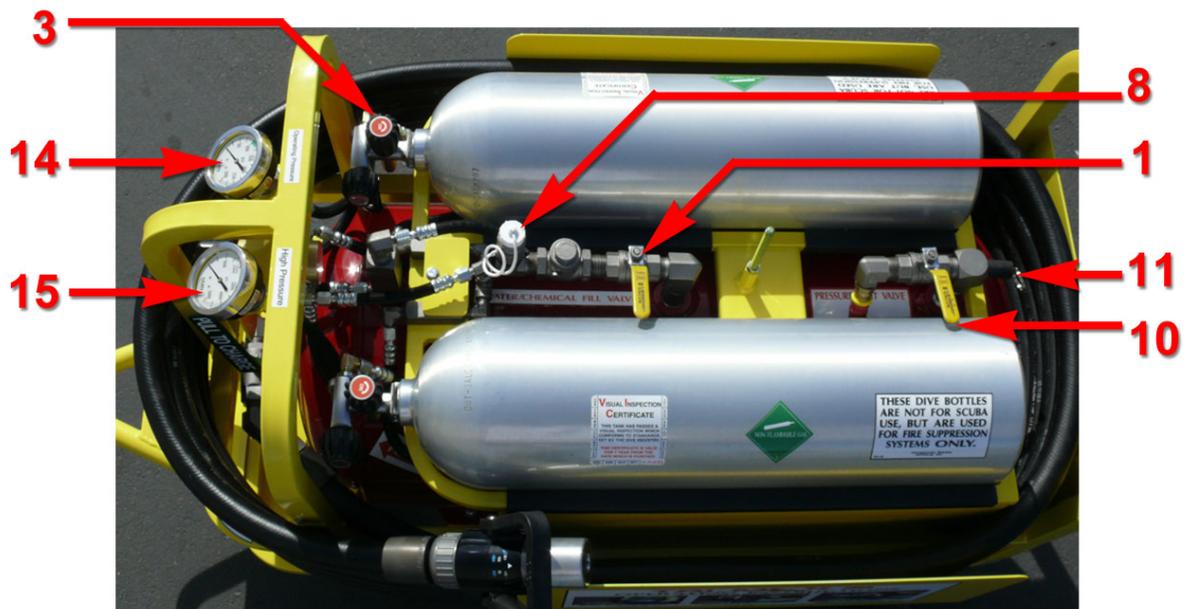
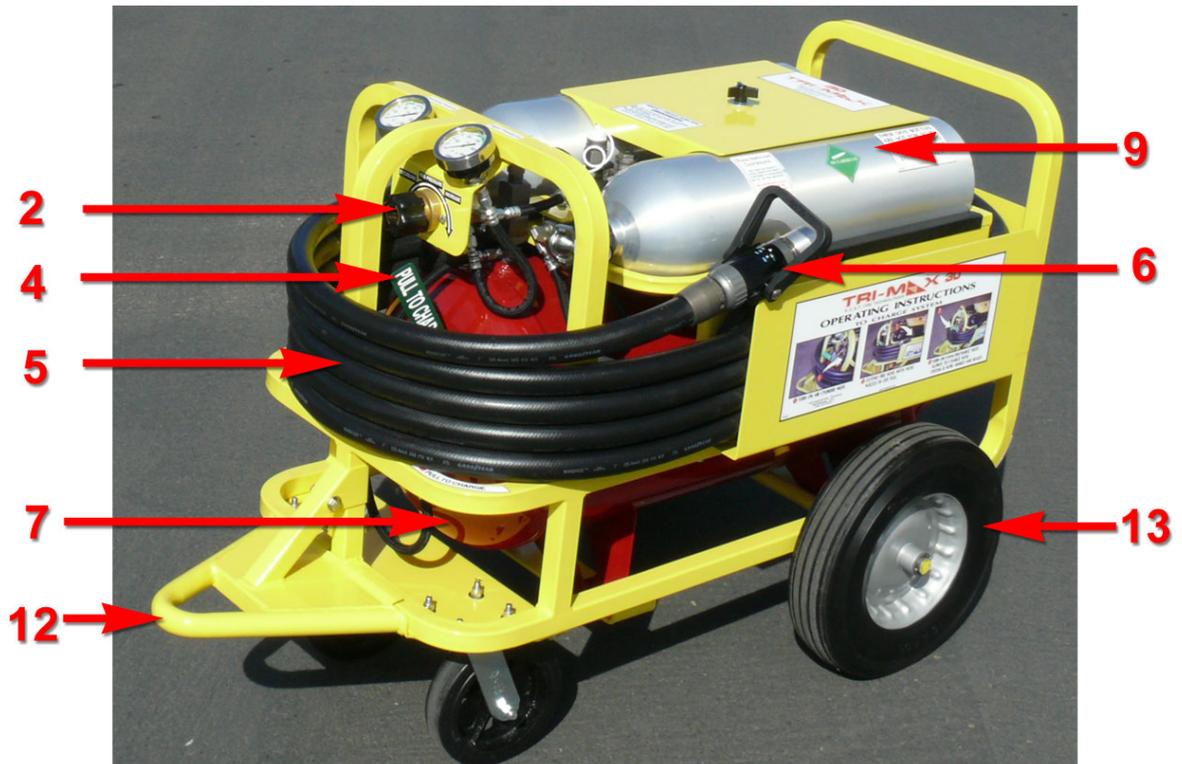
- A. Height: 36 inches Width: 33inches Length: 44inches
- B. Loaded Weight: 600 LBS Empty Weight: 360 LBS
- C. Premix Tank: 30 gallon capacity
- D. Finished Foam Capacity: Approximately 600 gallons
- E. Discharge Nozzle: 1" pistol grip style
- F. Discharge Rate (max): 400 gal/minute of finished foam
- G. Foam Discharge Distance: 65 feet in a no wind condition
(50-60 feet at -40 degrees F/C using the Freeze Protected Foam solution)
- H. Air Cylinder (Scuba): Two (2) 80 CF 3000 psi
- I. Regulator: Adjustable pressure 0-400 psi
- J. Dispensing Hose: 50 feet of 1" hard rubber or collapsible forestry hose
- K. Hose Length (max): 200 feet
- L. Pressure Relief Valve: 200 psi
- M. Air Hose: ¼ inch 3000 psi
- N. Ball Valves: 400 psi
- O. Check Valves: Three one-way
- P. Recharge Time: 6-8 minutes
- Q. Tires: 8 inch casters on front; 4w x 16h inch (tube or tubeless) on rear

2-3. TRANSPORTING: The TRI-MAX 30 should be thoroughly secured when transporting in trailers and vehicles. The towing eye was designed exclusively to handle all ground towing and external lift operations. Other sections of the system should not be used for these purposes. Utilize the frame when re-positioning the system. Do not push on any of the components (i.e. gauges, regulators etc.) when moving the system.

2-4. SYSTEM COMPONENTS:

1. **WATER/CHEMICAL FILL VALVE** is located below the Premix Tank Refill Port and allows solutions to enter the Premix Tank. The valve should be open (parallel to the supply line) to fill the Premix Tank and closed (in the perpendicular position) at all other times.
2. **AIR CYLINDER REGULATOR** adjusts the air flow from the Air Cylinders for the system. The regulator maintains a constant pressure in a range of 0-175 psi. The regulator has been set to an operational pressure of 160-165 psi at the factory. The regulator's operational temperature range is -40 to +160 degrees F.
3. **AIR CYLINDER VALVES** are located on the Air Cylinder. An internal over pressure relief valve opens and vents the Air Cylinder if the internal pressure reaches 4000 psi. An air pressure indicating gauge is mounted on the main control panel.
4. **FOAM CHARGE/"PULL TO CHARGE" VALVE** fills the discharge hose with pressurized foam when placed in the open position. The valve should be positioned in the full open position (handle is in line with the hose) for all operations and closed (handle is perpendicular to the hose) at all other times.
5. **FOAM DISCHARGE HOSE** is 1 inch inside diameter x 50 feet rubber or Wild land collapsible hose. The Arctic Hose is to be used in extreme cold temperatures. A combination of hose sections up to 200 feet can be used without system performance degradation.
6. **FOAM DISCHARGE NOZZLE** has a 2 position hand activated lever with a pistol grip handle. Forward is closed and aft is full open. The valve is marked with open and closed decals.
7. **PREMIX TANK** has a capacity of 30 gallons and is ASME approved. The Serial number for the system is stamped on a data plate on the tank and printed on the serial number label. Mounted to the tank are the Foam Charge/"Pull to Charge" Valve, Foam Discharge Valve, Foam Discharge Hose, Pressure Vent Valve, Water/Chemical Fill Valve, Refill Port, and Pressure Relief Valve (on early models). The tank pressure normal operating range is 100-170 psi. A manual drain plug is located in the bottom of the tank.
8. **PREMIX TANK REFILL PORT** is located on the Tank Fill Valve. It is threaded to accept a funnel for adding foaming agent and water. A standard water hose can be attached to the Premix Tank Refill Port to facilitate the refilling process. The port has a one way check valve and a dust cap to keep foreign objects from entering the system.
9. **AIR CYLINDERS** are standard 80 CF SCUBA 3000 psi tanks pressure tested at 5000psi. The system has 2 Air Cylinders; however, only one is required to fully operate the system. Compressed air can be used in the air cylinders.
10. **PRESSURE VENT VALVE** is located on top of the Premix Tank. The valve is used in the foam refill process and to depressurize the system after use. The valve is closed when it is perpendicular to the Premix Tank and is open when parallel with the Premix Tank.
11. **PRESSURE RELIEF VALVE** is located on the 90 degree elbow fitting on the Pressure Vent Valve. The static pressure in the PREMIX TANK may increase during warm weather if the unit is left in the direct sunlight. When the system is pressurized for operation, the Premix Tank pressure may exceed 200 psi. If this happens, the Pressure Relief Valve will open and vent any excess pressure. Some agent may appear on the ground, however, the function or the operation of the system is not affected.
12. **TOWING EYE** is located on the front of the unit and should be used for all towing and external lift operations.
13. **STANDARD TIRES:** Are pneumatic wheels that offer excellent mobility.
14. **OPERATION SYSTEM PRESSURE GAUGE:** Shows the System operating pressure in the PREMIX TANK. Normal pressure should read 100-175 psi.
15. **HIGH PRESSURE AIR CYLINDER GAUGE:** Indicates the Air Cylinder Pressure. When testing the Air Cylinder Pressures this gauge should read between 2300-3400 psi.

TRI-MAX 30 COMPONENTS



CHAPTER 3

OPERATING INSTRUCTIONS

3-1. INITIAL SETUP: The TRI-MAX 30 users should turn on the Air Cylinder handles and verify there is 2300-3400 psi pressure. The Air Cylinders should be refilled if the cylinder pressure is less than 2300 psi. The 30 gallon Premix Tank must be filled prior to use. The proper Aqueous Film Forming Foam (AFFF) solution should be selected based on operational ambient temperatures prior to putting the unit in service. Liquid dish soap can be used in the Premix Tank if training is going to be conducted. The dish soap does not harm the system and can be mixed with the AFFF without any performance degradation.

3-2 FOAM SOLUTION PRODUCTS:

A. The TRI-MAX 30 can use any type of AFFF fire suppression foam chemical solution. Recommended foam chemicals include Class A foam, Class B foam and Freeze Protected AFFF Foam solution.

B. The following amounts of foam solution should be added to the 30 gallon Premix Tank:

- (1) Class A (Wild land) foam : 2 quarts
- (2) Class B 3% solution: 1 gallon
- (3) Class B 6% solution: 2 gallons
- (4) Liquid Dish soap: 16 ounces
- (5) Freeze Protected Foam solution: 30 gallons
- (6) Other foam products: Follow the foam manufacturer's recommendation including Training Foams.

C. It is recommended that freeze protected foam solution be used in the concentrate form when positioning the units outside during freezing weather. Both freeze protected solutions should be used at full strength and not mixed with water.

3-3. SYSTEM DEPRESSURIZATION

CAUTION

Ensure the Premix Tank is depressurized and the Air Cylinders are closed before conducting any maintenance on the system.

- A. Close the Air Cylinder Valves.
- B. Close the Foam Charge/"Pull to Charge" Valve (if open).
- C. Open the Pressure Vent Valve slowly to relieve the Premix Tank and gauge pressures.
- D. Close the Pressure Vent Valve.

3-4. PREVENTATIVE MAINTENANCE CHECKS & SERVICES (PMCS)

- A. Recommend the PMCS CHECKLIST be completed every month.
- B. Personnel completing the PMCS should be thoroughly familiar with the TRI-MAX 30 system and the information in this manual.
- C. Recommend a tag be maintained on each unit that indicates the date and the initials of the individual completing the PMCS, the type and ratio of the AFFF in the Premix Tank, and the location of the MSDS for an emergency situation.

TRI-MAX 30

PREVENTATIVE MAINTENANCE CHECKS AND SERVICES (PMCS) CHECKLIST

DATE COMPLETED _____

NAME _____ SIGNATURE _____

- _____ 1. Conduct a visual inspection of the system for chaffing lines, loose lines, dirt, corrosion or damage. Check that the O-ring is not protruding where the Air Cylinder valve screws into the Air Cylinder. If the O-ring is protruding, the cylinder should be removed and the O-ring replaced.

- _____ 2. Check to ensure tamper seals are installed on the Air Cylinder Valves, the Foam Charge/"Pull to Charge" Valve, and the Water/Chemical Fill Valve and Pressure Vent Valve. Tamper seals are optional on the Water/Chemical and Pressure Vent Valves if the large Air Cylinder Retention Plate that fully covers both tank valves is installed).
 - A. Turn on one air cylinder and note pressure. Close the air cylinder and check the pressure on the remaining air cylinder.
 - (1) Conduct a leak check if either Air Cylinder pressure is below 2300 psi:
 - (a) Turn on Air Cylinder(s).
 - (b) Spray a light soap solution on all air lines and fittings.
 - (c) Tighten fittings, replace O-rings, or replace leaking component.
 - (2) Remove, recharge, and reinstall Air Cylinders
 - (3) Reapply tamper seals

(Continued on following page)

3-5. NORMAL OPERATING INSTRUCTIONS

WARNING

The TRI-MAX 30 discharges foam solution at a high pressure. A sudden pressure surge could cause the operator to lose control of the hose if the nozzle and hose are not held securely when the Foam Discharge Nozzle is opened. Open the nozzle slowly to the full open position.

Consult the foam manufacturer's MSDS for the proper precautions and treatments if the foam is sprayed into the facial area (eyes, nose, and mouth).

NOTE

It is recommended that the air cylinders normally be left in the closed position.

- A. Ensure the Foam Discharge Nozzle is in the closed (forward) position.
- B. Open one Air Cylinder by turning the valve counter clockwise.
- C. Extend the hose.
- D. Turn on the Foam Charge/"Pull to Charge" Valve slowly to the full open position (handle should be in line with the hose).
- E. Aim the Nozzle at the base of the fire and open the pistol grip Foam Discharge Valve slowly (rear position).
- F. Shoot the system in 5 to 10 second bursts across the base of the fire or directly on objects that are on fire. Move the nozzle slowly to build up a layer of foam over the fire surface.

3-6. COLD WEATHER OPERATIONS

- A. It is recommended that the TRI-MAX 30 system be equipped with an arctic Discharge Hose, Protective Cover and freeze protected foam solutions when extreme cold weather conditions are anticipated.
- B. There will be a degraded performance in extreme cold weather since the viscosity and density of the foam is greater.
- C. The foam blanket in cold temperatures will be wetter and the discharge distances will decrease. Users should anticipate a discharge distance of 50-60 feet in sustained Sub 0 temperatures.
- D. The foam will tend to skip a short distance on a frozen surface so the person employing the system should aim short of the intended target.

3-7. EMERGENCY PROCEDURES

A. LOOSE HOSE

WARNING

Do not attempt to catch a runaway hose.

- (1) Move to the unit and close the Foam Charge/"Pull to Charge" Valve immediately (valve handle should be perpendicular to the hose).
- (2) Close the Foam Discharge Nozzle (valve handle is full forward).

IF CONTINUING TO FIGHT THE FIRE:

- (3) Open Foam Charge/"Pull to Charge" Valve slowly.
- (4) Hold the hose securely and open the Foam Discharge Nozzle slowly (valve handle should be full aft).

B. NO FOAM DISCHARGE

- (1) Close the Foam Discharge Nozzle (move the handle full forward).
- (2) Close the Foam Charge/"Pull to Charge" Valve.
- (3) Open the backup Air Cylinder Valve.
- (4) Open Foam Charge/"Pull to Charge" Valve slowly (valve handle should be in line with the hose).

- (5) Hold the hose securely and open the Foam Discharge Nozzle (valve handle is full aft) slowly.

C. SHUT DOWN PROCEDURES

- (1) Close the Foam Discharge Nozzle.
- (2) Close the Foam Charge/"Pull to Charge" Valve.
- (3) Close the Air Cylinder Valve.
- (4) Open the Foam Discharge Nozzle to depressurize the hose. Close the valve when all of the foam has been expended from the hose.
- (5) Open the Pressure Vent Valve slowly until all pressure is relieved.
- (6) Secure the fire hose.

3-8 AVIATION REFUELING OPERATIONS

A. Helicopter hot refuel operations are by nature hazardous. An accident during refueling can result in catastrophic damage to the aircraft and possible injury or loss of life to the refuel/aircraft crew. The TRI-MAX 30 provides the user a stand off capability along with the ability to prevent fires by covering up flammable liquids, sealing vapors, and cooling the surface.

B. The following techniques will help prevent catastrophic affects of accidents and reduce the overall risk of aviation refueling operations. These are offered as a guideline, and are not a substitute for certified Fire training:

- (1) **FIREGUARDS:** The protective cover (if utilized) should be removed from the unit and the hose be moved to the fireguard position. Fireguards should stand just outside the rotor disc at a 45 degree angle on the side of the aircraft the refueling nozzle is located on. This position allows the fire guard the best view to monitor the refuel operation, alert the crew to any problem, and quickly react to a fire or fuel spill situation while remaining well clear of the affected area. Priorities should be given to the crew, the fuel spill, and the main fire areas.
- (2) **IN THE EVENT A FIRE OCCURS:** The safety of the re-fueler and aircraft crew is the number one priority. Fuel burning in the vicinity of the aircrew should be extinguished first. Open the Foam Discharge Nozzle fully and sweep the foam stream across the base of the flames starting at the leading edge and moving slowly to the rear. Use short 5-10 second bursts checking the effectiveness of the foam between bursts. Once the fuel on the ground has been extinguished, begin foaming any remaining portion of the aircraft that is burning.

(3) IF FUEL HAS BEEN SPILLED ON THE GROUND AND THE AIRCRAFT:

Foam the aircraft first by positioning the Foam Discharge Nozzle to the full open position in order to get the maximum foam possible on the aircraft. Fuel spilled in the vicinity of the engine, exhaust, or the intake should be foamed immediately to prevent ignition. Once the aircraft has been foamed, the fuel on the ground should be covered with a blanket of foam. Monitor the crew egress and reapply foam to any areas where the foam blanket has been compromised. This action can be accomplished in approximately 20 seconds by a trained fireguard. Quick action on the part of the fireguard is critical to prevent a fuel spill from becoming a fuel fire.

3-9. FUEL SPILL PROCEDURES:

- A. The hazard of fuel spills can be reduced by applying a blanket of foam on top of the fuel to seal vapors and reduce the chance of combustion.
- B. Cover any personnel who have been drenched with fuel with foam to prevent combustion.

WARNING

Do not hit the spilled fuel directly with an unrestricted flow of foam or with the Nozzle in the full open position. This action could spread the fuel creating a greater hazard and cause injury to refuel personnel. The operator should be positioned a minimum of 30-40 feet from the fire to maximize the effectiveness of the system. Personnel exposed to foam should follow the instructions listed in the foam manufacturer's Material Safety Data Sheet (MSDS).

CHAPTER 4

TRAINING

4-1. TRAINING PROGRAM

- A. Training on the TRI-MAX 30 system should be conducted at least annually for all operators.
- B. Maintainers should complete initial training and refresher training as required.
- C. Trainers should be thoroughly familiar with the system, fire behavior, hazard identification and basic fire fighting skills.
- D. Operator training should be conducted using a “hands-on” approach in a live fire scenario whenever possible. Live fire training can often be accomplished through coordination with a local fire department.

4-2. TRAINING AIDS: Liquid dish soap or training foam can be mixed with water at a ratio of 16oz gallon per 30 gallon tank providing the training is being conducted in non-freezing environment. The training solution should be placed in the Premix Tank when it is almost full of water in order to maximize the volume of solution available. Dish soap does not cause any damage to the system and can be mixed with AFFF without any impact on the operation.

4-3. TRAINING PROGRAM OF INSTRUCTION (POI):

A. OPERATORS & MAINTAINERS

- (1) Component Identification (Pages 6-7)
- (2) PMCS (Pages 9-11)
- (3) Normal and Cold Weather Operating Instructions (Pages 12-13)
- (4) Emergency Procedures (Pages 13-14)
- (5) Aviation Refueling Operations (if applicable) (Page 15)
- (6) Fuel Spill Operations (Page 15)
- (7) Hands-On Operation, preferably on a live fire scenario (Page 12)

B. MAINTAINERS

- (1) General Maintenance Instructions and Technical Assistance (Page 19)
- (2) Repair Parts and Special Tools (Pages 19-20)
- (3) Visual Tamper Seals (Page 20)
- (4) Foam Solution Products (Page 8)
- (5) Maintenance Log (Page 22)
- (6) Servicing Under Normal and Cold Conditions (Pages 24-29)
- (7) Scheduled Maintenance (Page 28)
- (8) Unscheduled Maintenance (Page 31)
- (9) Troubleshooting Procedures (Page 33)
- (10) Storage and Protection (Page 34)

CHAPTER 5

MAINTENANCE

5-1. GENERAL INSTRUCTIONS

- A. The TRI-MAX 30 system was designed to be easy to operate and simple to maintain. The system has few moving parts; however, it is a vital lifesaving piece of equipment that requires some minimal maintenance.
- B. It is recommended that the monthly PMCS be accomplished.
- C. It is also very important that responsible personnel be assigned the responsibility to service and maintain the system.
- D. The final important task is maintaining thorough documented records of the maintenance performed. These records should include copies of the completed PMCS Checklists, the Maintenance Log, when the Premix Tank was filled and the type/mixture of foam in each unit. A MSDS sheet should be readily available for the type of foam being utilized. Recommend a tag be affixed to each unit that lists the date and initials of the individual performing the PMCS, the foam type and mixture ratio (if any), and the location of the MSDS.

5-2. TECHNICAL ASSISTANCE: The manufacturer is totally committed to providing technical assistance whenever required. Maintainers should contact the manufacturer whenever a problem arises that cannot be solved using the information in this manual or when unusual situations are encountered.

5-3. REPAIR PARTS

- A. The TRI-MAX 30 repair parts are listed in this section. All repair parts can be obtained from the manufacturer by using a credit card or a purchase order. Many of the parts can also be purchased at local dive shops or hardware stores. O-rings should be purchased from the factory, an authorized TRI-MAX distributor, or from a certified scuba shop.
- B. The manufacturer will replace parts that fail due to defects in workmanship during the one-year warranty period at no cost (Or during Five-Year period, see Section 1-3 for warranty information). The defective part must be identified for the manufacturer by submitting a digital photograph and the part number. Users should contact the manufacturer by phone, e-mail, fax, or by completing the comment page on the website to receive replacement parts.

TRI-MAX 30 REPAIR PARTS

ITEM CODE	DESCRIPTION
TM30PC	TriMax 30 Protective Cover
C400S	1/4" Check Valve
2395-050-OS	1/2" Check Valve
DX SWCV75	3/4" Flapper Valve
DX BAS976	Funnel Adapter (Garden Hose)
Funnel	Funnel, 2 qt.
569-006-254-00200	Hose, Standard Discharge (1" x 50')
58-034	3/4" Ball Valve (Fill/Vent)
6KK50	3/4" Ball Valve (Discharge)
5A710	Pressure Relief Valve
4317005	High Pressure Gauge
4309005	Low Pressure Gauge
96	Pistol Grip Nozzle
T80	PSI Aluminum 80 cu ft Air Bottle
00052H	Wheel
3G135	Caster
18	Airline 1/4" x 12"
18A	Airline 1/4" x 13"
18B	Airline 1/4" x 14"
18C	Airline 1/4" x 15 1/2"
18D	Airline 1/4" x 24"
18E	Airline 1/4" x 5"
2-216 N1470-70	O-Ring Air Cylinder Lower
415-400 NV	Regulator Aqua Adjustable
657	Regulator Mounting Ring
6011	Cap, Nozzle Screw On
5705-20	Cap, Tank Fill Dust
22	Plug, Pre-Mix Tank 1/4"
25	Plug, Pre-Mix Tank 1/2"
RT5-21	Knob, Air Bottle Retention Plate
101B	Pressure Tester Filler Adapter
109	O-Ring, Pistol Grip Nozzle
300105-00	30-gallon Tank, Fully-Plumbed
300105-02	30 gallon Tank, Manifold and dip tube (Ft. Hood Only)
LPCV	Low Pressure Check Valve Assembly
Fill System	Fill System Assembly
VVA	Vent Valve Assembly
QR&A	Quick Release & Airline Assembly
HPVA	High Pressure Valve Assembly

5-4. SPECIAL TOOLS & ACCESSORIES

- A. **PRESSURE TESTER:** A hand held gauge to easily determine the amount of pressure in the Air Cylinders is available from the manufacturer or local distributors.
- B. **FUNNEL:** A Two (2) Quart threaded funnel is provided with each unit to fill the Premix Tank.

5-5. VISUAL TAMPER SAFETY SEALS

- A. The manufacturer recommends that visual tamper seals be applied to the Foam Charge/"Pull to Charge" Valve, Air Cylinder Valves, Water/Chemical Fill Valve and the Pressure Vent Valve when positioned in the closed position. Placing tamper seals on the Water/Chemical and Pressure Vent Valves is optional if the large Air Cylinder retention plate, which fully covers both valves, is installed. The tamper seals on the Air Cylinder and Foam Charge/"Pull to Charge" Valve should be a breakaway plastic or safety wire type.
- B. Pressure Vent Valve, Water/Chemical Fill Valve Tamper Seals: The handles have a small hole at the end of the handle or they come pre-drilled at the factory. The hole at the end of the handle can be opened using a sharp object such as a small nail to create an open hole that a visual tamper seal can pass through.
- C. Air Cylinder Valve Tamper Seals:
 - (1) Holes are drilled in the air cylinder valve knob at the factory.
 - (2) Insert a plastic tamper seal or breakaway safety wire into one hole, loop it under the Air Cylinder support frame and draw it back out the second hole. Re-install the Air Cylinder into the Air Cylinder Support.
 - (3) Install the Air Regulator on the Air Cylinder. Loop the tamper seal around the Air Regulator and connect the ends.
- D. Foam Charge/"Pull to Charge" Valve Tamper Seal: If no hole is available on the valve handle, drill a hole in the location indicated with an arrow on the image below.

TRI-MAX 30 TAMPER SEAL LOCATIONS



Air Cylinder Valve



Foam Charge/"Pull to Charge" Valve



Water/Chemical Fill Valve



Pressure Vent Valve

TRI-MAX 30 MAINTENANCE LOG

PREVENTATIVE MAINTENANCE CHECKS & SERVICES (PMCS)

SCHEDULED DATE	DATE COMPLETED	SIGNATURE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

SCHEDULED MAINTENANCE

ACTION	DATE DUE	DATE COMPLETED	SIGNATURE
Check Air Cylinder pressures	_____ (6 months)	_____	_____
Wash unit & apply WD40 or equivalent over non-painted surfaces	_____ (6 months)	_____	_____
Lubricate and cycle pressure relief valve	_____ (6 months)	_____	_____
Lubricate wheel bearings	_____ (6 months)	_____	_____
Air Cylinder visual inspection and certification	_____ (12 months)	_____	_____

**TRI-MAX 30 MAINTENANCE LOG
SCHEDULED MAINTENANCE
(Continued)**

ACTION	DATE DUE	DATE COMPLETED	SIGNATURE
System Operations check (12 months)	_____	_____	_____
Manifold Airline Purge (12 months)	_____	_____	_____
Air Cylinder hydrostatic test (5 years)	_____	_____	_____
Premix Tank & Discharge Hose hydrostatic test (5 years)	_____	_____	_____

UNSCHEDULED MAINTENANCE

ACTION	DATE COMPLETED	SIGNATURE
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

5-7. SERVICING UNDER NORMAL CONDITIONS

A. SYSTEM PRESSURE CHECK

- (1) Ensure the Pressure Vent Valve, Water/Chemical Fill Valve, and the Foam Charge/"Pull to Charge" Valves are closed. Tamper seals should be applied to the Air Cylinders Valves, the Foam Charge/"Pull to Charge" Valve, and the Pressure Vent and Water/Chemical Fill Valves (Premix tank seals are optional on the tank valves if the large Air Cylinder retention plate that covers both valves is installed).
- (2) Open one Air Cylinder and check the pressure reading on the gauge is between 2300-3400 psi. Check the pressure on the Premix Tank gauge, if installed, is between 160-165 psi. Close the Air Cylinder and open the Pressure Vent Valve to release pressure in the Premix Tank. Open the other Air Cylinder and check for an operating pressure of 2300-3400 psi. Close the Air Cylinder.
- (3). Conduct a leak check if either Air Cylinder pressure is below 2300 psi or if any air noise or solution leaks are detected.
 - (a) Spray a light soap solution on all air lines and fittings to check for leaks.
 - (b) Tighten leaking fittings or replace O-rings.
 - (c) Contact manufacturer if regulator has a leak.
 - (d) Recharge and replace the Air Cylinder(s).
- (4) Reapply tamper seals

B. AIR CYLINDER PRESSURE CHECK, RECHARGE AND REPLACEMENT

CAUTION

Ensure the system is depressurized before conducting any maintenance on the system. The Air Regulator can be damaged if removal is attempted with pressure in the system. Extreme care should be used when handling and transporting the Air Cylinders. Do not fully drain the Air Cylinders as this will allow moisture to enter the cylinders. Ensure that all replacement o-rings for the Air Cylinder valve and the Air Cylinders are purchased from the factory, a TRI-MAX distributor, or a certified scuba shop

NOTE

Ensure the O-ring is secured when removing and transporting the Air Cylinder.

- (1) AIR CYLINDER PRESSURE CHECK:** Check the Air Cylinder pressures for normal operating pressure (2300-3400psi).

Preferred Method: Remove the Air Cylinder yoke, apply the hand held pressure indicating gauge, open each Air Cylinder, and note the psi reading.

Alternate Method: Turn on the Air Cylinder(s) and note pressures on Air Cylinder gauges. This method will result in the loss of 50-100 lbs of air per cylinder which, in turn, will require a more frequent refilling of the Air Cylinders.

Conduct a leak check if either Air Cylinder pressure is below 2300 psi:

- (a) Turn on Air Cylinder(s) with broken seal.
- (b) Spray a light soap solution on all air lines and fittings.
- (c) Tighten fittings, replace O-rings, or replace leaking component.

(2) AIR CYLINDER RECHARGE

- (a) Ensure the Air Cylinder Valve is closed.
- (b) Depressurize the system by opening the Pressure Vent Valve.
- (c) Unscrew the Air Cylinder connector.
- (d) Unscrew and remove the Air Cylinder support plate.
- (e) Lift out the Air Cylinder.
- (f) Have the Air Cylinder filled to 3200 psi by a certified technician. Either compressed air or nitrogen can be used in the Air Cylinders.
- (g) Verify the Air Cylinder pressure using the pressure tester.
- (h) Place the Air Cylinders in the cradle.
- (i) Place the Air Cylinder support plate and secure with three prong knob.
- (j) Re-connect yoke to air cylinder.
- (k) Turn on Air Cylinder and verify 2300-3400 psi pressure if the pressure was not verified by using a pressure tester.
- (l) Reapply tamper seals.

C. PREMIX TANK FILLING

CAUTION

Ensure the system is depressurized before conducting any maintenance on the system. Also ensure the Water/Chemical valve is closed prior to pressuring the system to prevent a backsplash of the solution which might cause an injury to personnel.

- (1) Close the Air Cylinder Valves.
- (2) Close the Foam Charge/"Pull to Charge" Valve.
- (3) Open the Pressure Vent Valve slowly and leave open.
- (4) Open the Water/Chemical Fill Valve.
- (5) Remove the Filler Port Dust Cap and install the 2 Quart Filler Funnel.
- (6) Open the Water/Chemical Fill Valve and add the appropriate amount of foam agent: 2 Quarts for Class A (Wildfire), 1 gallon for 3% AFFF, training foam and liquid Dawn dish soap (for training only), 2 gallons for 6% AFFF, and 30 gallons for Freeze Protected Foam solutions.
- (7) Connect a standard water hose to the Tank Refill Port. A funnel may be used if a water hose is not available or an AFFF is being used that should not be mixed with water.
- (8) Add water until it flows out of the Pressure Vent Valve drain line.
- (9) Close the Water/Chemical Fill and Pressure Vent Valves. Remove the water hose.

CAUTION

Failure to close the Pressure Vent Valve will cause the Premix Tank drain hose to oscillate and may cause injury to personnel.

- (10) Purge the solution from the Water/Chemical fill lines to prevent freezing by waiting 5 minutes for the solution to settle, opening both tank valves, tipping the unit to the 45 degree position, and closing the valves. An alternate method is to use air to force the solution into the tank after the foam has settled.
- (11) Annotate the type of foam and mixture ratio on a self-installed water proof label applied in a visible area on the Premix tank.
- (12) Secure the dust cap on the Fill Port.

- (13) Apply tamper seals on the Pressure Vent Valve and the Water/Chemical Fill Valve in the closed position (not required if the large cover plate is installed).

5-8. SERVICING UNDER COLD CONDITIONS

- A. Fill the Premix Tank with Freeze Protected Foam solution whenever the existing temperatures are below 32 degrees F. The Freeze Protected Foam solutions should be used in the concentrate form and not diluted.
- B. The procedures outlined in Paragraph 5-9 should be used for filling the Premix Tank with the following exceptions:
 - (1) Remove the Pressure Vent Discharge hose, unscrew the JIC fitting from the valve, and push it one inch laterally. This procedure will provide adequate ventilation for the Premix Tank to be completely filled. Reattach the fitting and hose when the tank is full.
 - (2) It is recommended that the following procedure be used to purge the Freeze Protected Foam solutions from the Water/Chemical Fill line after the Premix Tank has been filled to reduce the residual buildup:
 - (a) Close the Pressure Vent Valve and wait 5 minutes after filling the tank for the solution to settle.
 - (b) Either position the unit in the 45 degree position for at least 5 seconds or apply air in the Water/Chemical Fill Valve line to force the solution from the fill line into the Premix Tank. Do not use any water to wash the solution into the tank as the Freeze Protected Foam cannot be diluted.
 - (c) Close the Water/Chemical and Pressure Vent Valves.
 - (d) Wash any residual foam off the unit and place the unit in service.

5-9. SCHEDULED MAINTENANCE RECOMMENDATIONS:

- A. AIR CYLINDERS
 - (1) Pressures to be checked at least every 6 months.
 - (2) An annual visual inspection be completed every 12 months
 - (3) A hydrostatic test to be completed every 5 years.
- B. CLEANING AND LUBRICATION: (Complete at least every 6 months)
 - (1) Wash unit with soap and water.

- (2) Apply WD40 or equivalent on all non-painted surfaces.
- (3) Apply WD40 on Pressure Relief Valve and recycle.
- (4) Grease wheel bearing zerk fittings.

C. PREMIX TANK:

- (1) Pressurize and check for leaks every 12 months.
- (2) Hydrostatic test be completed every 5 years. This test includes an internal and external visual inspection as well as pressure testing the hose and tank.

D. DISCHARGE HOSE: Hydrostatic test be completed every 5 years.

E. PERFORMANCE CHECK

The system should be pressurized and discharged once a year. Freeze Protected Foam solutions can be reused if desired.

F. MANIFOLD AIR LINE PURGE PROCEDURE

1. The current production model Tri-Max 30 and systems include a “quick release” coupling at the Foam Expansion Manifold. This fitting allows the air line to be purged during the recommended Annual Maintenance Procedure.
2. If your Tri-Max 30 does not have the quick release coupling, the airline at the manifold will need to be removed for the test and reconnected afterwards, using care not to over-tighten the fitting. Pressurize and check for air leaks with a soap solution after reattaching. Depressurize the system IAW instructions in appropriate operators manual.
3. Older systems may be retrofitted with an Air Line Purge Kit. The parts may be ordered as a Purge Kit.

When the system is discharged once a year, this procedure should be performed when the PRE-MIX tank is empty. If the PRE-MIX TANK is not empty, solution will leak from the system and will need to be replenished.

- 1) Remove the air cylinders from air cylinder rack.
- 2) Position the system in a 45 degree or 90 degree stance.
- 3) Open pressure vent valve
- 4) Attach a female coupler to the end of the air compressor hose line to be used for blowing out the air line connecting the Tri-Max manifold and the pre-mix tank..
- 5) Identify the quick connect coupling at the Tri-Max manifold. Disconnect it and hook a double sided coupler male ends (nipples). This coupler is provided with each new system.



- 6) Hook female quick coupler from air compressor line into dual male sided coupler and blow compressed air through hose for 5 seconds to remove any residual solutions from air line.
- 7) Disconnect air hose and remove dual male end.
- 8) Connect female end of the compressor air hose into the male end (nipple), to which the female end of the air line normally attaches.
- 9) Blow compressed air through manifold for 5 seconds to remove any residual solution.
- 10) Reconnect quick disconnect fitting between manifold and air line.
- 11) Close pressure vent valve.
- 12) Re-install air cylinders and air cylinder hold-down plate.

G. REGULATOR TEST PROCEDURE

It is recommended that a functional check of the regulator be accomplished annually to verify the normal operating flow and pressure. The functional test consists of both (1) a static and (2) a flow test (dynamic test).

Recommendation: Consider using only one Scuba Air Cylinder or an extra air cylinder, to perform the Regulator Test on all of your Tri-Max 30 systems. This prevents the need to refill more than one air cylinder at the end of the testing.

A. The STATIC REGULATOR TEST:

The STATIC REGULATOR TEST is accomplished by opening one (1) air cylinder and verifying the system operating pressure in the foam solution tank is stabilized within the normal operating range. (High Pressure Range of 2600-3200 PSI and Operating Pressure of 160-165).

This test should be performed after the completion of the ANNUAL PURGE TEST or DISCHARGE of the system, as there is a chance of decreased tank pressure and a substantial reduction in discharge distance (30-35 feet), which could be caused not by a faulty regulator, but by a clogged lower airline between the manifold and pre-mix tank.

An annual pressurization check meets the static pressure test requirement, as it measures the static pressure in the tank.

B. DYNAMIC/FLOW RATE REGULATOR CHECK:

1. Pressurize your system and ensure the pre-mix foam tank pressurizes in 7 seconds or less. The pre-mix foam tank should hold pressure between 155 to 165, as indicated by the high low pressure gauges. This test is adequate for testing the dynamic function of the regulator for normal use.
2. A "Performance Test," can be performed as an alternative method to test the dynamic/flow rate of the regulator. The discharge distance range in a no wind condition should be at least 65' and the low pressure gauge will drop no more than 10 psi from 160-165 down to 150-155 psi and the regulator should maintain a steady pressure.
3. The foam tank should be serviced and the manifold airline purged after performing the "Performance Check." Use correct AFFF foam, and do not dilute freeze protected foam with water. Ensure both Scuba air bottles are not below 2800 psi.

4. The manufacturer should be contacted if a Tri-Max 30 regulator fails to pass the test or other problems (ie. Over pressurization, etc) are encountered.

H. HYDROSTATIC TEST PROCEDURE

1. **PREPARATION FOR TESTING:** All valves (excluding the pressure relief valve which is located on the side of the pre-mix tank of earlier models, and located on the vent valve assembly on current generation models) and hose assemblies shall remain in place. The fire suppression system emptied before testing. The Freeze Protected AFFF concentrate should be stored and refilled in the premix tank after the hydrostatic test has been successfully completed. Any AFFF diluted with water (non-freeze protected 3% AFFF), should be disposed of in accordance with local environmental regulatory guidance.
2. **TESTING PROCEDURES:** The hydrostatic test shall be done by a certified facility and shall include both an internal and external visual examination of the cylinder along with pressure test utilizing water or another non compressible fluid as the test medium. Chapter 5-5 of NFPA outlines the specific hydrostatic testing procedures.
3. **RECORDING PROCEDURES:** A record shall be maintained for each cylinder tested in section 5-6 of this manual. The testing facilities identification number along with the month and year of the test shall be stamped on each cylinder which passes the test. Hose assemblies that pass do not require any markings.
4. **HYDROSTATIC TEST INTERVALS AND TEST PRESSURES:** The appropriate hydrostatic test interval and pressures are shown below. A hydrostatic test must be also be accomplished immediately if there is evidence of cuts through the discharge hose braiding or when there are dents or penetrating scratches on the air cylinders or foam tank.

<u>SYSTEM</u>	<u>COMPONENT</u>	<u>INTERVAL (Years)</u>	<u>TEST PRESSURE (PSI)</u>
TM30	Discharge Hose	5	300
	Foam Tank	5	200
	Air Cylinder	5	5500

1. Performance Test

- 1) Pressurize the system
- 2) Verify a minimum discharge distance of 65 feet is obtained
- 3) Service the system

2. Tires

- 1) The TM30 is available with solid and pneumatic tires
- 2) The tire pressure for the pneumatic tires is 40psi for the rear tires and 32psi for the front ones.
- 3) Pneumatic tires can be temporarily repaired and placed in service utilizing pressurized “Fix A Flat”.

3. Foam Replacement Intervals

- 1) AFFF foam concentrate that is mixed with water shall be replaced every three (3) years.

- 2) Cold weather foam concentrate shall be replaced every 5 years in conjunction with the hydrostatic testing.

5-10. UNSCHEDULED MAINTENANCE

- A. Unscheduled maintenance will need to be performed as required. Contact the manufacturer if a malfunction cannot be corrected after employing good troubleshooting procedures.
- B. The following procedures should apply to all TRI-MAX 30 systems:

(1) AIR REGULATOR REPLACEMENT

NOTE

The Aqua 415 Regulator is adjustable; however, the pressure is set at the factory at 150-160 psi. The adjustable control knob was removed and a non-adjusting knob was installed to preclude tampering. The adjustable control knob should be re-installed if a higher or lower pressure is desired.

REMOVAL PROCEDURE

1. Ensure air cylinder valves are closed.
2. Depressurize system by opening the pressure vent valve. Verify all pressures read 0 psi.
3. Remove both ¼" hose lines from both the low (300 psi) and the high (5000 psi) pressure gauges.
4. Remove both ¼" hose lines from the pressure in and out ports on the air regulator.
5. Loosen both lock bolts in the lock ring. Remove adjustment knob from the regulator, slide regulator back and out of ring.
6. Remove remaining hoses and fittings from the regulator and replace in the same position on the new regulator.

INSTALLATION PROCEDURE

1. Slide the regulator into the ring and attach both ¼" in and out lines. using two wrenches to prevent damage to the hoses and regulator.
2. Reattach ¼" hoses to the low (300 psi) and the high (5000 psi) gauges. Tighten bolts in the ring to the regulator.
3. Re-install the non adjusting knob.
4. Charge the system by opening air cylinder valve.
5. Check for leaks using soap and water spray.

(2) REPLACE GAUGES

CAUTION

Ensure the system is depressurized before conducting any maintenance on the system.

- (a) Ensure that the Air Cylinder Valve is closed.
- (b) Depressurize the system by opening the Pressure Vent Valve. Ensure all pressure gauges read 0 psi.
- (c) Remove gauge using proper wrenches.
- (d) Install new gauge.
- (e) Charge the system by opening Air Cylinder Valve and check for leaks by squirting soap solution on connections.

(3) REPLACE PRESSURE RELIEF VALVE

- (a) The location of the Pressure Relief Valve varies depending on model variation. The earlier models had the valve on the Premix Tank and it is positioned on the 90 degree fitting by the Water/Chemical Valve on the later models. It may be necessary to remove the Air Cylinder located on the left side of the unit (while facing it from the front) to get access.
- (b) Ensure the Premix Tank is fully depressurized.
- (c) Remove defective Pressure Relief Valve and install new one.
- (d) Pressurize the system and check for air stabilization and leaks.

(4) REPLACE CHECK VALVE:

- (a) Remove air line from the 90 degree JIC fitting
- (b) Remove 90 degree fitting from the low pressure check valve
- (c) Install the 90 degree fitting into the check valve in the direction of the airflow which is towards the Premix Tank.

(5) REPLACE O-RING BETWEEN AIR CYLINDER VALVE AND AIR CYLINDER

- (a) Fully depressurize Air Cylinder slowly to prevent injecting moisture.
- (b) Remove the Air Cylinder Valve.
- (c) Replace the O-ring.
- (d) Re-torque the valve to 40-50 lbs.

5-11. TROUBLESHOOTING

A. NO PRESSURE ON GAUGES

- (1) Air Cylinder Valve is not turned on.
- (2) Air Cylinders are empty.
- (3) Pressure indicating Gauge is inoperative.
- (4) Broken or blocked air line.
- (5) Air Regulator has malfunctioned.

B. FOAM DOES NOT DISCHARGE FROM HOSE

- (1) Premix Tank is empty.
- (2) Air Cylinder is empty.
- (3) Air Cylinder is not turned on.
- (4) Foam Charge/"Pull to Charge" Valve is off.
- (5) Nozzle is in the off position.
- (6) Nozzle valve has malfunctioned.
- (7) Blockage in the dispensing hose.
- (8) Foam solution in Premix Tank is frozen.
- (9) Faulty check valve

C. AIRLINE LEAK

- (1) Air hose fitting is loose or broken.
- (2) Air line is blocked or broken.

D. SYSTEM IS NOT FULLY DISCHARGING

- (1) Insufficient volume of air in the Air Cylinder.
- (2) Foam Discharge Nozzle is not fully opening.
- (3) Foam Discharge Hose has a restriction.
- (4) Air Regulator has malfunctioned or is not properly adjusted
- (5) The solution is frozen or near freezing.
- (6) There is a blockage in the Premix Tank.
- (7) Defective check valve

E. SOLUTION IS RUNNING OUT OF PREMIX TANK OVERFLOW

Pressure vent valve is open.

F. SOLUTION IS RUNNING OUT OF WATER/CHEMICAL FILL PORT

Water/Chemical Fill Valve is open.

5-12. STORAGE AND PROTECTION

- A. The TRI-MAX 30 can be positioned in the vertical, horizontal, or 45 degree position. The 45 degree position is the best position for unwinding the discharge hose and dispensing the maximum amount of foam solution from the Premix Tank. It is recommended that the wheels be chalked when the unit is placed in the horizontal or 45 degree position.
- B. A PMCS should be conducted if the system has been placed in storage prior to placing the unit in an operational status.
- C. It is recommended that a weatherproof protective cover be used if the unit is going to be positioned outside. Ultraviolet sunrays can cause long term damage to the hoses, tires, and gauges if the unit is not covered. Additionally, frozen rain and snow can restrict the movement of discharge hose. A heavy duty protective cover with reflective markings and frame securing devices is available from the manufacturer.