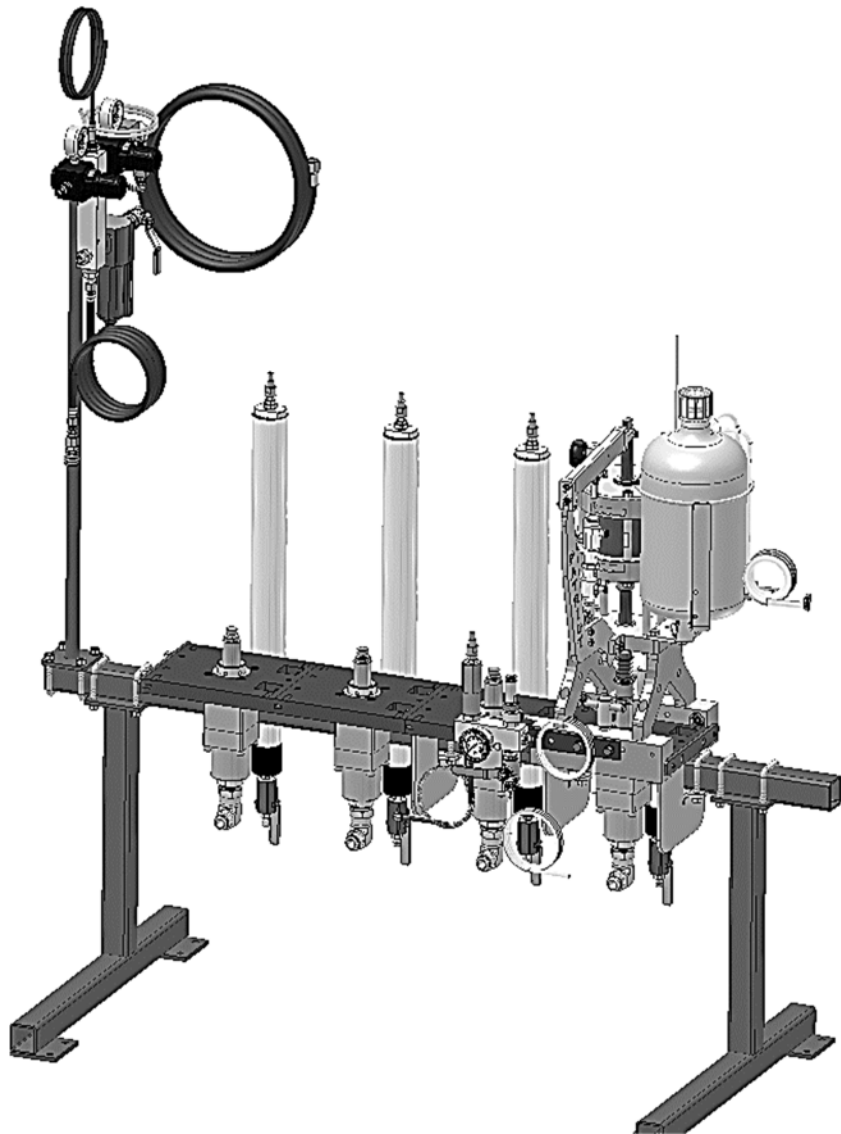


Patriot Multi-Color Gelcoater

Operations Manual

This manual is applicable to the following models:

- MVE-PAT-1500-x



Rev. December 2018



CORPORATE HEADQUARTERS

2030 Falling Waters Rd, Suite 350, Knoxville, TN 37922 · USA · Tel: (865) 686-5670

DISTRIBUTION AND PURCHASING

642 Barbrow Ln, Knoxville, TN 37932 · USA · Tel: (865) 684-4416

TECHNOLOGY CENTER AND MANUFACTURING

1862 Ives Ave, Kent, WA 98032 · USA · Tel (253) 854-2660 · Fax (253) 854-1666

E-mail: info@mvpind.com

For a list of international distributors, visit our website at :

www.mvpind.com/mvp-international

Use of this product confirms that Magnum Venus Products, Inc.'s standard terms and conditions of sale apply.

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Safety & Warning Information

Warnings

Due to the vast number of chemicals that could be used and their varying chemical reactions, the buyer and user of this equipment should determine all factors relating to the fluids used, including any of the potential hazards involved. Particular inquiry and investigation should be made into potential dangers relating to toxic fumes, fires, explosions, reaction times, and exposure of human beings to the individual components or their resultant mixtures. MVP assumes no responsibility for loss, damage, expense or claims for bodily injury or property damage, direct or consequential, arising from the use of such chemical components.

The end user is responsible for ensuring that the end product or system complies with all the relevant laws in the country where it is to be used and that all documentation is adhered to.

Recommended Occupational Safety & Health Act (OSHA) Documentation:

- 1910.94 Pertaining to ventilation
- 1910.106 Pertaining to flammable liquids
- 1910.107 Pertaining to spray finishing operations, particularly paragraph (m), Organic Peroxides and Dual Component Coatings

For Additional information, contact the Occupational Safety and Health Administration (OSHA) at <https://www.osha.gov/about.html>.

Recommended National Fire Protection Association (NFPA) Documentation:

- NFPA No.33 Chapter 14 Organic Peroxides and Dual Component Materials
- NFPA No. 63 Dust Explosion Prevention
- NFPA No. 70 National Electrical Code
- NFPA No. 77 Static Electricity
- NFPA No. 91 Blower and Exhaust System
- NFPA No. 654 Plastics Industry Dust Hazards

Fire Extinguisher – code ABC, rating number 4a60bc using Extinguishing Media –Foam, Carbon Dioxide, Dry Chemical, Water Fog, is recommended for this product and applications.

The following general warnings and guidelines are for the setup, use, grounding, maintenance, and repair of equipment. Additional product-specific warnings may be found throughout this manual as applicable. Please contact your nearest MVP Technical Service Representative if additional information is needed.

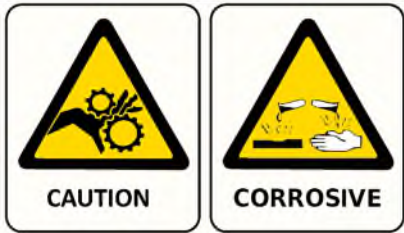
Safety Precautions

- Avoid skin contact and inhalation of all chemicals.
- Review Material Safety Data Sheet (MSDS) to promote the safe handling of chemicals in use.
- Restrict the use of all chemicals to designated areas with good ventilation.
- Chemicals are flammable and reactive.
- Noxious fumes released when combusted.
- Operate equipment in a ventilated environment only.
- Uncured liquid resins are highly flammable unless specifically labeled otherwise.
- Cured laminate, accumulations of overspray, and laminate sandings are highly combustible.
- Do not operate or move electrical equipment when flammable fumes are present.
- Ground all equipment.
- If a spark is seen or felt, immediately halt operation. Do not operate the equipment until the issue has been identified and repaired.
- Contaminated catalyst may cause fire or explosion.
- Containers may explode if exposed to fire / heat.
- Use and store chemicals away from heat, flames, and sparks.
- Do not smoke in work areas or near stored chemicals.
- Do not mix Methyl Ethyl Ketone Peroxide (MEKP) with materials other than polyethylene.
- Do not dilute MEKP.
- Keep food and drink away from work area.



Physical Hazards

- Never look directly into the spray gun fluid tip. Serious injury or death can result.
- Never aim the spray gun at or near another person. Serious injury or death can result.
- Chemical compounds can be severely irritating to the eyes and skin.
- Inhalation, ingestion, or injection may damage internal organs and lead to pulmonary disorders, cancers, lymphomas, and other diseases or health conditions.
- Other potential health effects include: irritation of the eyes and upper respiratory tract, headache, light-headedness, dizziness, confusion, drowsiness, nausea, vomiting, and occasionally abdominal pain.
- Eye contact: Immediately flush with water for at least 15 minutes and seek immediate medical attention.
- Skin Contact: Immediately wash with soap and water and seek immediate medical attention.
- Inhalation: Move the person to fresh air and seek immediate medical attention.
- Do not remove shields, covers, or safety features on equipment that is in use.
- Never place fingers, hands, or any body part near or directly in front of the spray gun fluid tip. The force of the liquid as it exits the spray tip can shoot liquid through the skin.
- Keep hands and body parts away from any moving equipment or components.
- Do not stand under plunger
- An improperly loaded drum may lead to an imbalance, causing a unit to tip over



Personal Protective Equipment (PPE)

- MVP recommends the use of personal safety equipment with all products in our catalog.
- Wear safety goggles, hearing protection, a respirator, and chemical resistant gloves.
- Wear long sleeve shirts or jackets and pants to minimize skin exposure.
- PPE should be worn by operators and service technicians to reduce the risk of injury.



For Additional information, contact the Occupational Safety and Health Administration (OSHA). <https://www.osha.gov/about.html>

Symbol Definitions



Indicates the risk of contact with chemicals that are hazardous, which may lead to injury or death.



Indicates the risk of contact with voltage / amperage that may lead to serious injury or death.



Indicates that the materials being used are susceptible to combustion.



Indicates the risk of contact with moving components that may lead to serious injury or death.



Indicates that the system or component should be grounded before proceeding with use or repair.



Indicates the use of lit cigarettes or cigars is prohibited, because the materials being used are susceptible to combustion.



Indicates that the materials and/or the process being performed can lead to ignition and explosion.



A recommendation for the use of Personal Protective Equipment (PPE) before using or repairing the product.

Polymer Matrix Materials: Advanced Composites

Potential health hazards associated with the use of advanced composites can be controlled through the implementation of an effective industrial hygiene and safety program.

https://www.osha.gov/dts/osta/otm/otm_iii/otm_iii_1.html#t_iii:1_1

Resins		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Epoxy resins	Skin, lungs, eyes	Contact and allergic dermatitis, conjunctivitis
Polyurethane resins	Lungs, skin, eyes	Respiratory sensitization, contact dermatitis, conjunctivitis
Phenol formaldehyde	Skin, lungs, eyes	As above (potential carcinogen)
Bismaleimides (BMI)	Skin, lungs, eyes	As above (potential carcinogen)
Polyamides	Skin, lungs, eyes	As above (potential carcinogen)
Reinforcing materials		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Aramid fibers	Skin (lungs)	Skin and respiratory irritation, contact dermatitis (chronic interstitial lung disease)
Carbon/graphite fibers	Skin (lungs)	As noted for aramid fibers
Glass fibers (continuous filament)	Skin (lungs)	As noted for aramid fibers
Hardeners and curing agents		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Diaminodiphenylsulfone	N/A	No known effects with workplace exposure
Methylenedianiline	Liver, skin	Hepatotoxicity, suspect human carcinogen
Other aromatic amines		
Composite Component	Organ System Target (Possible Target)	Known (Possible) Health Effect
Meta-phenylenediamine (MPDA)	Liver, skin (kidney, bladder)	Hepatitis, contact dermatitis (kidney and bladder cancer)
Aliphatic and cyclo-aliphatic amines	Eyes, skin	Severe irritation, contact dermatitis
Polyaminoamide	Eyes, skin	Irritation (sensitization)
Anhydride	Eyes, lungs, skin	Severe eye and skin irritation, respiratory sensitization, contact dermatitis

Catalyst - Methyl Ethyl Ketone Peroxide (MEKP)

MEKP is among the more hazardous materials found in commercial channels. The safe handling of the “unstable (reactive)” chemicals presents a definite challenge to the plastics industry. The highly reactive property which makes MEKP valuable to the plastics industry in producing the curing reaction of polyester resins also produces the hazards which require great care and caution in its storage, transportation, handling, processing and disposal. MEKP is a single chemical. Various polymeric forms may exist which are more or less hazardous with respect to each other. These differences may arise not only from different molecular structures (all are, nevertheless, called “MEKP”) and from possible trace impurities left from the manufacture of the chemicals, but may also arise by contamination of MEKP with other materials in its storage or use. Even a small amount of contamination with acetone, for instance, may produce an extremely shock-sensitive and explosive compound.



WARNING

Contamination with promoters, materials containing promoters (such as laminate sandings), or with any readily oxidizing material (such as brass or iron) will cause exothermic redox reactions which can be explosive in nature. Heat applied to MEKP or heat buildup from contamination reactions can cause the material to reach its Self-Accelerating Decomposition Temperature (SADT).

Researchers have reported measuring pressure rates-of-rise well over 100,000 psi per second when certain MEKP's reach their SADT. For comparison, the highest-pressure rate-of-rise listed in NFPA Bulletin NO.68, “Explosion Venting”, is 12,000 psi per second for an explosion of 12% acetylene and air. The maximum value listed for a hydrogen explosion is 10,000 psi per second. Some forms of MEKP, if allowed to reach their SADT, will burst even an open topped container. This suggests that it is not possible to design a relief valve to vent this order of magnitude of pressure rate-of-rise. The user should be aware that any closed container, be it a pressure vessel, surge chamber, or pressure accumulator, could explode under certain conditions. There is no engineering substitute for care by the user in handling organic peroxide catalysts. If, at any time, the pressure relieve valve on top of the catalyst tank should vent, the area should be evacuated at once and the fire department called. The venting could be the first indication of a heat, and therefore, pressure build-up that could eventually lead to an explosion. Moreover, if a catalyst tank is sufficiently full when the pressure relief valve vents, some catalyst may spray out, which could cause eye injury. For this reason, and many others, anyone whose job puts them in an area where this vented spray might go, should always wear full eye protection even when laminating operations are not taking place.

Safety in handling MEKP depends to a great extent on employee education, proper safety instructions, and safe use of the chemicals and equipment. Workers should be thoroughly informed of the hazards that may result from improper handling of MEKP, especially regarding contamination, heat, friction and impact. They should be thoroughly instructed regarding the proper action to be taken in the storage, use, and disposal of MEKP and other hazardous materials used in the laminating operation. In addition, users should make every effort to:

- Store MEKP in a cool, dry place in original containers away from direct sunlight and away from other chemicals.
- Keep MEKP away from heat, sparks, and open flames.
- Prevent contamination or MEKP with other materials, including polyester over spray and sandings, polymerization accelerators and promoters, brass, aluminum, and non-stainless steels.

- Never add MEKP to anything that is hot, since explosive decomposition may result.
- Avoid contact with skin, eyes, and clothing. Protective equipment should be worn at all times. During clean-up of spilled MEKP, personal safety equipment, gloves, and eye protection must be worn. Firefighting equipment should be at hand and ready.
- Avoid spillage, which can heat up to the point of self-ignition.
- Repair any leaks discovered in the catalyst system immediately, and clean-up the leaked catalyst at once in accordance with the catalyst manufacturer's instructions.
- Use only original equipment or equivalent parts from Magnum Venus Products in the catalyst system (i.e.: hoses, fitting, etc.) because a dangerous chemical reaction may result between substituted parts and MEKP.
- Catalyst accumulated from the purging of hoses or the measurement of fluid output deliveries should never be returned to the supply tank, such catalyst should be diluted with copious quantities of clean water and disposed of in accordance with the catalyst manufacturer's instructions.

The extent to which the user is successful in accomplishing these ends and any additional recommendations by the catalyst manufacturer determines largely the safety that will be present in his operation.

Clean-Up Solvents and Resin Diluents



WARNING

A hazardous situation may be present in your pressurized fluid system! Hydro carbon solvents can cause an explosion when used with aluminum or galvanized components in a closed (pressurized) fluid system (pump, heaters, filters, valves, spray guns, tanks, etc.). An explosion could cause serious injury, death, and/or substantial property damage. Cleaning agents, coatings, paints, etc. may contain Halogenated Hydrocarbon solvents. Some Magnum Venus Products spray equipment includes aluminum or galvanized components and will be affected by Halogenated Hydrocarbon solvents.

There are three key elements to the Halogenated Hydrocarbon (HHC) solvent hazard.

- | | | |
|----|---|--|
| 1. | The presence of HHC solvents. | 1,1,1 – Trichloroethane and Methylene Chloride are the most common of these solvents. However, other HHC solvents are suspect if used; either as part of paint or adhesives formulation, or for clean-up flushing. |
| 2. | Aluminum or Galvanized Parts. | Most handling equipment contains these elements. In contact with these metals, HHC solvents could generate a corrosive reaction of a catalytic nature. |
| 3. | Equipment capable of withstanding pressure. | When HHC solvent contact aluminum or galvanized parts inside a closed container such as a pump, spray gun, or fluid handling system, the chemical reaction can, over time, result in a build-up of heat and pressure, which can reach explosive proportions. When all three elements are present, the result can be an extremely violent explosion. The reaction can be sustained with very little aluminum or galvanized metal; any amount of aluminum is too much. |

- The reaction is unpredictable. Prior use of an HHC solvent without incident (corrosion or explosion) does NOT mean that such use is safe. These solvents can be dangerous alone (as a clean-up or flushing agent) or when used as a component or a coating material. There is no known inhibitor that is effective under all circumstances. Mixing HHC solvents with other materials or solvents such as MEKP, alcohol, or toluene may render the inhibitors ineffective.
- The use of reclaimed solvents is particularly hazardous. Reclaimers may not add any inhibitors. The possible presence of water in reclaimed solvents could also feed the reaction.
- Anodized or other oxide coatings cannot be relied upon to prevent the explosive reaction. Such coatings can be worn, cracked, scratched, or too thin to prevent contact. There is no known way to make oxide coatings or to employ aluminum alloys to safely prevent the chemical reaction under all circumstances.
- Several solvent suppliers have recently begun promoting HHC solvents for use in coating systems. The increasing use of HHC solvents is increasing the risk. Because of their exemption from many state implementation plans as Volatile Organic Compounds (VOCs), their low flammability hazard, and their not being classified as toxic or carcinogenic substances, HHC solvents are very desirable in many respects.



WARNING

Do not use Halogenated Hydrocarbon (HHC) solvents in pressurized fluid systems having aluminum or galvanized wetted parts.

Magnum Venus Products is aware of NO stabilizers available to prevent HHC solvents from reaction under all conditions with aluminum components in closed fluid systems. HHC solvents are dangerous when used with aluminum components in a closed fluid system.

- Consult your material supplier to determine whether your solvent or coating contains Halogenated Hydrocarbon solvents.
- Magnum Venus Products recommends that you contact your solvent supplier regarding the best non-flammable clean-up solvent with the heat toxicity for your application.
- If, however, you find it necessary to use flammable solvents, they must be kept in approved, electrically grounded containers.
- Bulk solvent should be stored in a well-ventilated, separate building, 50 feet away from your main plant.
- You should only allow enough solvent for one day's use in your laminating area.
- NO SMOKING signs must be posted and observed in all areas of storage or where solvents and other flammable materials are used.
- Adequate ventilation (as covered in OSHA Section 1910.94 and NFPA No.91) is important wherever solvents are stored or used, to minimize, confine and exhaust the solvent vapors.
- Solvents should be handled in accordance with OSHA Section 1910.106 and 1910.107.

Catalyst Diluents

Magnum Venus Products spray-up and gel-coat systems currently produced are designed so that catalyst diluents are not required. Magnum Venus Products therefore recommends that diluents not be used to avoid possible contamination which could lead to an explosion due to the handling and mixing of MEKP and diluents. In addition, it eliminates any problems from the diluent being contaminated through rust particles in drums, poor quality control on the part of the diluents suppliers, or any other reason. If diluents are absolutely required, contact your catalyst supplier and follow his instructions explicitly. Preferably the supplier should premix the catalyst to prevent possible “on the job” contamination while mixing.



WARNING

If diluents are not used, remember that catalyst spillage and gun, hose, and packing leaks are potentially more hazardous since each drop contains a higher concentration of catalyst and will therefore react more quickly with overspray and the leak.

Cured Laminate, Overspray and Laminate Sandings Accumulation

- Remove all accumulations of overspray, Fiberglass Reinforced Plastic (FRP) sandings, etc. from the building as they occur. If this waste is allowed to build up, spillage of catalyst is more likely to start a fire; in addition, the fire would burn hotter and longer.
- Floor coverings, if used, should be non-combustible.
- Spilled or leaked catalyst may cause a fire if it comes in contact with an FRP product, oversprayed chop or resin, FRP sandings or any other material with MEKP.

To prevent spillage and leakage, you should:

- | | |
|--|---|
| 1. Maintain your Magnum Venus Products System. | Check the gun several times daily for catalyst and resin packing or valve leaks. REPAIR ALL LEAKS IMMEDIATELY. |
| 2. Never leave the gun hanging over or lying inside the mold. | A catalyst leak in this situation would certainly damage the part, possibly the mold, and may cause a fire. |
| 3. Inspect resin and catalyst hoses daily for wear or stress at the entry and exits of the boom sections and at the hose and fittings. | Replace if wear or weakness is evident or suspected. |
| 4. Arrange the hoses and fiberglass roving guides so that the fiberglass strands DO NOT rub against any of the hoses at any point. | If allowed to rub, the hose will be cut through, causing a hazardous leakage of material which could increase the danger of fire. Also, the material may spew onto personnel in the area. |

Toxicity of Chemicals

- Magnum Venus Products recommends that you consult OSHA Sections 1910.94, 1910.106, 1910.107 and NFPA No.33, Chapter 14, and NFPA No.91.
- Contact your chemical supplier(s) and determine the toxicity of the various chemicals used as well as the best methods to prevent injury, irritation and danger to personnel.
- Also determine the best methods of first aid treatment for each chemical used in your plant.

Equipment Safety

Magnum Venus Products suggest that personal safety equipment such as EYE GOGGLES, GLOVES, EAR PROTECTION, and RESPIRATORS be worn when servicing or operating this equipment. Ear protection should be worn when operating a fiberglass chopper to protect against hearing loss since noise levels can be as high as 116 dB (decibels). This equipment should only be operated or serviced by technically trained personnel!



CAUTION

Never place fingers, hands, or any body part near or directly in front of the spray gun fluid tip. The force of the liquid as it exits the spray tip can cause serious injury by shooting liquid through the skin. NEVER LOOK DIRECTLY INTO THE GUN SPRAY TIP OR POINT THE GUN AT OR NEAR ANOTHER PERSON.



DANGER

Contaminated catalyst may cause fire or explosion. Before working on the catalyst pump or catalyst accumulator, wash hands and tools thoroughly. Be sure work area is free from dirt, grease, or resin. Clean catalyst system components with clean water daily.



DANGER

Eye, skin, and respiration hazard. The catalyst MEKP may cause blindness, skin irritation, or breathing difficulty. Keep hands away from face. Keep food and drink away from work area.

Treatment of Chemical Injuries



CAUTION

Refer to your catalyst manufacturer's safety information regarding the safe handling and storage of catalyst. Wear appropriate safety equipment as recommended.

Great care should be used in handling the chemicals (resins, catalyst and solvents) used in polyester systems. Such chemicals should be treated as if they hurt your skin and eyes and as if they are poison to your body. For this reason, Magnum Venus Products recommends the use of protective clothing and eye wear in using polyester systems. However, users should be prepared in the event of such an injury.

Precautions include:

1. Know precisely what chemicals you are using and obtain information from your chemical supplier on what to do in the event the chemical gets onto your skin or into the eyes, or if swallowed.
2. Keep this information together and easily available so that it may be used by those administering first aid or treating the injured person.
3. Be sure the information from your chemical supplier includes instructions on how to treat any toxic effects the chemicals have.

**WARNING**

Contact your doctor immediately in the event of an injury. If the product's MSDS includes first aid instructions, administer first aid immediately after contacting a doctor.

Fast treatment of the outer skin and eyes that contact chemicals generally includes immediate and thorough washing of the exposed skin and immediate and continuous flushing of the eyes with lots of clean water for at least 15 minutes or more. These general instructions of first aid treatment may be incorrect for some chemicals; you must know the chemicals and treatment before an accident occurs. Treatment for swallowing a chemical frequently depends upon the nature of the chemical.

Emergency Stop Procedure

In an emergency, follow these steps to stop a UPS System:

1. The ball valve located where the air enters the power head of the resin pump, should be moved to the "OFF" or closed position.

Note **The "open" or "on" position is when the ball valve handle is parallel (in line) with the ball valve body. The "closed" or "off" position is when the ball valve handle is perpendicular (across) the ball valve body.**

2. Turn all system regulators to the "OFF" position (counter-clockwise) position.
3. Verify / secure the catalyst relief line, located on the catalyst relief valve.
4. Verify / secure the resin return line, located on the resin filter.
5. Place a container under the resin pump ball valve to catch ejected resin.
6. Locate the ball valve on the resin pump.
7. Rotate the ball valve 90 degrees to the "On" or open position.

Grounding

Grounding an object means providing an adequate path for the flow of the electrical charge from the object to the ground. An adequate path is one that permits charge to flow from the object fast enough that it will not accumulate to the extent that a spark can be formed. It is not possible to define exactly what will be an adequate path under all conditions since it depends on many variables. In any event, the grounding means should have the lowest possible electrical resistance.

Grounding straps should be installed on all loose conductive objects in the spraying area. This includes material containers and equipment. Magnum Venus Products recommends grounding straps be made of AWG No.18 stranded wire as a minimum and the larger wire be used where possible. NFPA Bulletin No77 states that the electrical resistance of such a leakage path may be as low as 1 meg ohm (10 ohms) but that resistance as high as 10,000 meg ohms will produce an adequate leakage path in some cases.

CAUTION



Whenever flammable or combustible liquids are transferred from one container to another, or from one container to the equipment, both containers or container and equipment shall be effectively bonded and grounded to dissipate static electricity. For further information, see National Fire Protection Association (NFPA) 77, titled “Recommended Practice on Static Electrical”. Refer especially to section 7-7 titled “Spray Application of Flammable and Combustible Materials”.

Introduction

This manual provides information for the operation, maintenance, and simple repair of the MVP Patriot Multi-Color Gelcoater. The following procedures are included:

- Step-by-step assembly and disassembly
- Installation, start-up, and shut-down instructions
- Step-by-step operation instructions



Please read this manual carefully and retain for future reference. Follow the steps in the order given, otherwise you may damage the equipment or injure yourself.

Component Assemblies

MVP’s Patriot Multi-Color Gelcoater can be configured several ways. Units can be configured with either an external or internal mix gun and with 2 to 6 colors by adding a fluid section for each color needed. Each unit consists of multiple components. The major components referenced will vary depending on the configuration of your unit. Each component has its own detailed manual and drawings. For complete repair and maintenance instructions, refer to the following manuals:

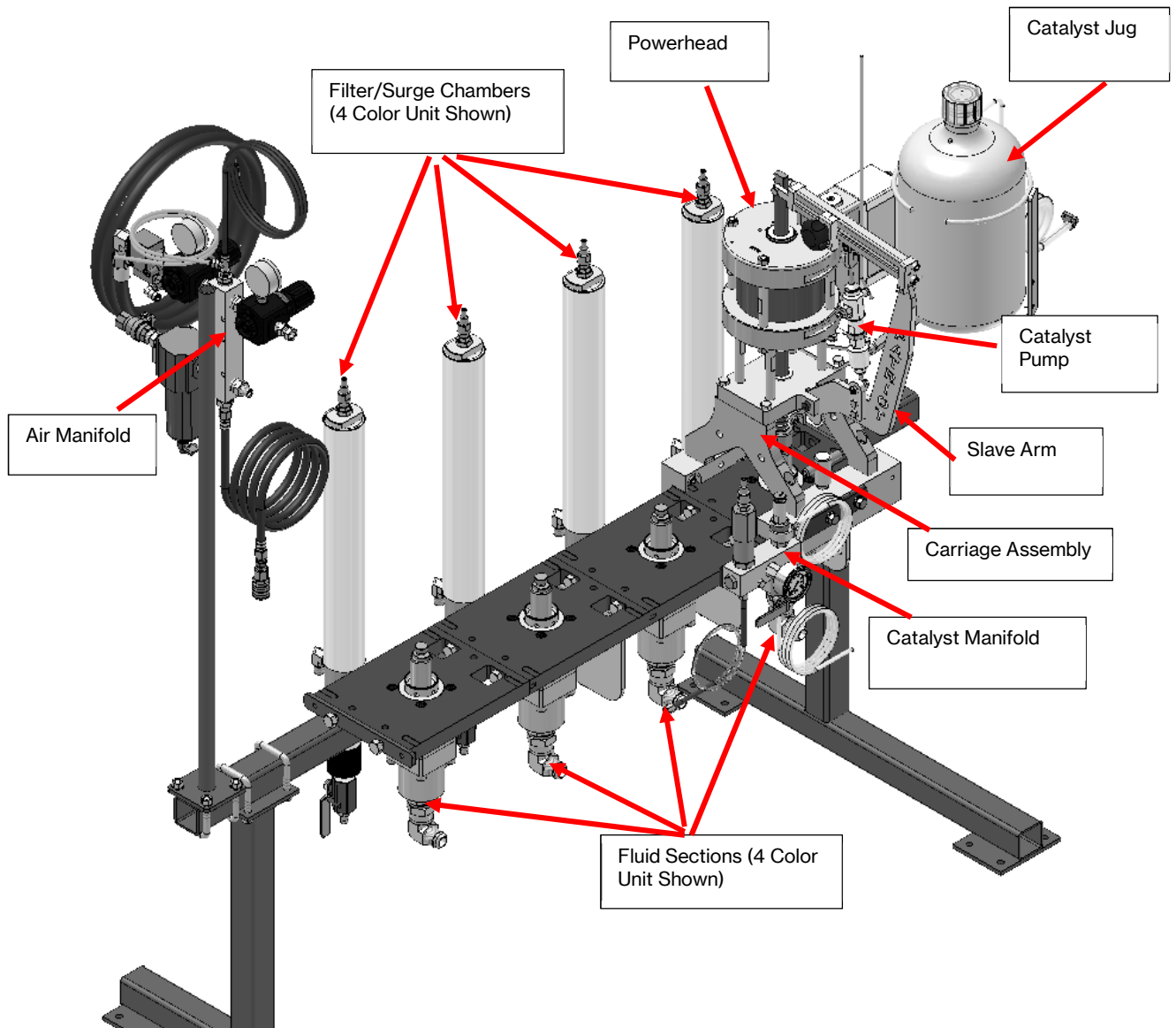
- MVE – EXTERNAL MIX: ATG-3500 GEL COAT REPAIR & MAINTENANCE MANUAL
- MVG – INTERNAL MIX: CLASSIC PRO GUN REPAIR MANUAL
- XXX-PAT-1500: 15:1 PATRIOT PUMP ASSEMBLY, STANDARD OUTPUT
 - PATRIOT POWERHEAD MANUAL – PAT-PH-5000
 - PATRIOT 1.25 FLUID SECTION MANUAL – PAT-LS-12270
 - CATALYST PUMP MAINTENANCE & REPAIR – PAT-CP-0550
- XXX-PAT-15-746: 15:1 HO PATRIOT PUMP ASSEMBLY
 - PATRIOT POWERHEAD MANUAL – PAT-PH-7000
 - PATRIOT 1.75 FLUID SECTION MANUAL – PAT-LS-24050
 - CATALYST PUMP MAINTENANCE & REPAIR – PAT-CP-0980

Air Requirements

1. The system requires a supply of air (30 cfm) and at least 100 psi (7 bar).
2. The unit requires a ½ inch (12 - 13 mm) inside diameter air hose minimum (use caution when using quick disconnects; they may restrict air flow).
3. Preferably the air will be clean, dry, and oil free.

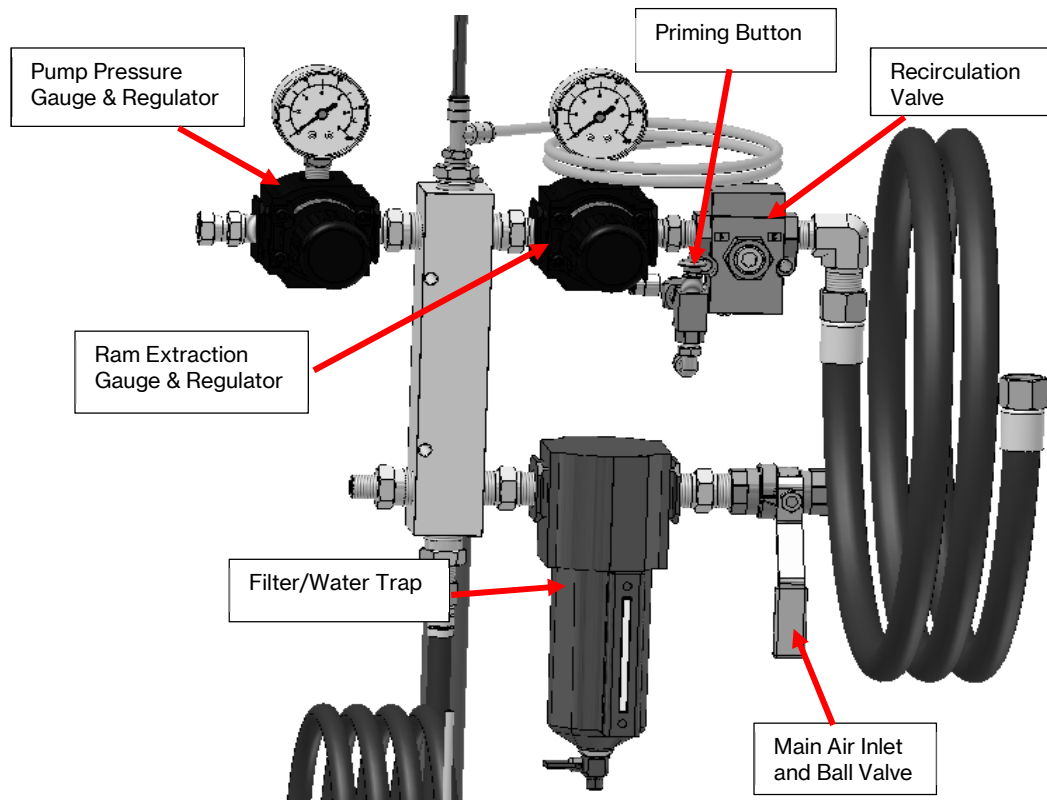
Unit Overview

Below helps identify the main components and controls the operator needs to know for proper operation for the unit.

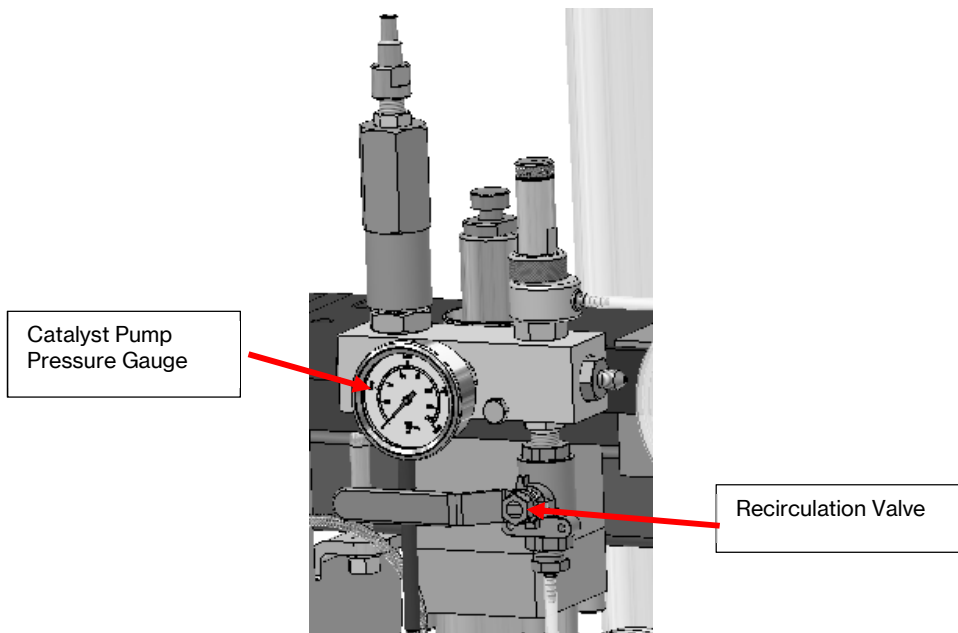


Overview of Controls

Main Air (Upper) Manifold



Catalyst (Lower) Manifold

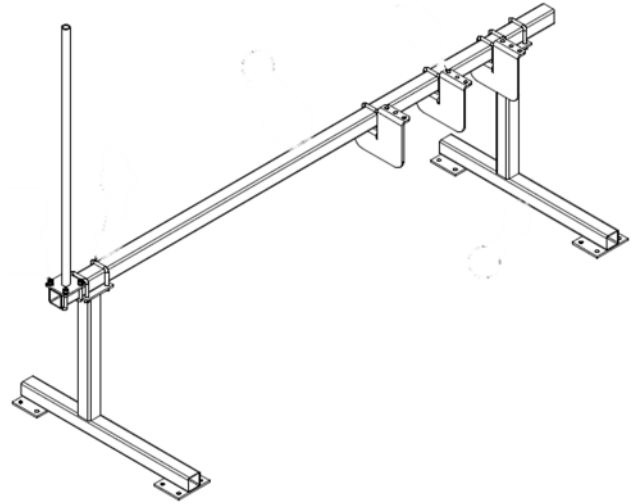


Getting Started

Installation and Set Up

1. Unpack the unit and all components.
2. Assemble the frame work as needed.

Note **3 mounting brackets are provided with the standard frame (enough for 2 colors). Additional mounting brackets and hardware can be ordered for each additional color and will need to be installed.**



3. Install the carriage assembly to the pump module assembly.
4. Install the catalyst jug in the jug bracket.
5. Install the gelcoat filter and surge chamber assembly.
6. Install the air manifold and manifold air hose to the power cylinder.
7. Attach hose fittings to gelcoat pump, catalyst pump, and gun air.
8. Attach pickup hoses to the inlet of the pump.
9. If your system has an internal mix gun, place the flush tank in the holder, attach the air hose from the manifold to the flush tank, and connect the yellow flush tube from the gun to the tank.
10. Check to make sure all hose fittings and connections are tight.
11. Connect an adequate air supply.
12. Open the incoming air supply ball valve all the way.

Note **The main air supply ball valve is a safety ball valve and must be fully open or closed or air will leak. When the valve is close the air pressure remaining the syst air manifold and air system will be released.**

13. Check that the system pressure is set between 90 and 100 psi.

Charging Accumulators

Low pressure spray or pour applications where fluid pressures are medium to low will not require charging the accumulators; in these instances the accumulators can be used as surge chambers.

In applications where a medium fluid pressure is used (most likely a spray or medium viscosity pour application), only a Line Pressure Charge on the resin accumulator is necessary. The line charge procedure uses the charging hose attached to the air manifold.

For high fluid pressure applications, it may be required to charge the accumulators to between 280 and 300 psi. These are applications using filled resins or spray putties. To charge the accumulators, you will need a charging pump or similar device or a high-pressure tank and regulators. If you have a charging pump, follow the steps for a Hand Pump Charge. To charge with a high-pressure tank and regulators, follow the steps for Charging with High Pressure Tank and Regulators.

If you perform a pour test and find it necessary to charge one or both accumulators, repeat the pour test after charging and confirm an even cure.

Note ***It is not necessary to charge a catalyst accumulator for external mix systems.***

Line Pressure Charge

1. Shut off air to the resin pump by turning the pump control valve to the off position.
2. Lock the gun in the open position over an appropriate container or open the ball valve at the bottom of the resin filter if one is installed.

Note ***For catalyst charging, lock the gun in the open position over an appropriate container or open the recirculation/dump valve on the manifold.***

3. Relieve any existing charge by inserting a blunt object (such as an Allen wrench) into the top of the charging valve.
4. Push the quick coupling on the charging hose onto the charging valve on top of the resin accumulator and hold in place for approximately 5 seconds.

Note ***If air is exiting the front of the gun or valve during accumulator charging, the poly ball in the accumulator is not seating properly. Repair the accumulator as needed.***

5. Remove the charging hose from the resin accumulator.
6. Check the top of the accumulator for leaks by applying a light fluid (such as water) to the top of the accumulator valve body.
7. If any air leaks are detected, remove and repair the charging valve.
8. Close the gun and flush into an appropriate container or close the resin return valve.
9. If you need to charge the catalyst accumulator (not normally required), follow the same procedure on the catalyst system.

Hand Pump Charge

10. Shut off air to the resin pump by turning the pump control valve to the off position.
11. Lock the gun in the open position over an appropriate container or open the ball valve at the bottom of the resin filter if installed.

Note ***For catalyst charging, lock the gun in an open position over an appropriate container or open the recirculation/dump valve on the manifold.***

12. Relieve any existing charge by inserting a blunt object (such as an Allen wrench) into the top of the charging valve.

13. Attach the charging pump by connecting the black charging hose to the charging valve on top of the resin accumulator.

Note ***Do not overtighten the charging pump hose.***

14. Pull the charging pump handle all the way out and connect the air hose to the male quick disconnect on the charging pump.



CAUTION

Not pulling out the handle before attaching the air line can cause bodily injury or damage to the charging pump.

15. Pump the charging handle with steady even strokes until the gauge on the charging pump reads approximately 280 psi.

Note ***280 to 300 psi is recommended for most applications, but some materials or applications may require different charging pressures to achieve an even flow of material. Increase or decrease the charge by 5 psi increments as required to fine tune the accumulator charge.***

Note ***The gauge will only show an accurate reading on the down/in stroke while pressure is building.***

Note ***If air is exiting the front of the gun or valve during accumulator charging, the poly ball in the accumulator is not seating properly. Repair the accumulator as needed.***

16. Disconnect the air hose from the charging pump and remove the charging pump hose from the resin accumulator.
17. Check the top of the accumulator for leaks by applying a light fluid (such as water) to the top of the accumulator valve body.
18. If any air leaks are detected, remove and repair the charging valve.
19. Close the gun and flush into an appropriate container or close the appropriate valve.
20. Repeat this procedure on the catalyst accumulator.

Charging with High Pressure Tank and Regulators

21. Shut off air to the resin pump by turning the pump control valve to the off position.
22. Lock the gun in the open position over an appropriate container or open the ball valve at the bottom of the resin filter.

Note ***For catalyst charging, lock the gun in an open position over an appropriate container or open the recirculation/dump valve on the manifold.***

23. Relieve any existing charge by inserting a blunt object (such as an Allen wrench) into the top of the charging valve.

24. Attach the charging system to the resin accumulator by connecting the black charging hose to the charging valve on top of the resin accumulator.

Note ***Do not overtighten the charging pump hose.***

25. Open the main regulator on top of the tank.
26. Set the desired pressure on the charging regulator attached to the charging valve.
27. Slowly open the ball valve connected to the charging hose to charge the accumulator.
28. Allow approximately 5 seconds for charging before closing the valve again.

Note ***If air is exiting the front of the gun or valve during accumulator charging, the poly ball in the accumulator is not seating properly. Repair the accumulator as needed.***

Note ***For spray applications, charge accumulators to between 280 to 300 psi in general. Some materials or applications may require different charging pressures to achieve an even flow of material. Increase or decrease the charge by 5 psi increments as required to fine tune the accumulator charge.***

29. Disconnect the charging hose from the resin accumulator.
30. Check the top of the accumulator for leaks by applying a light fluid (such as water) to the top of the accumulator valve body.
31. If any air leaks are detected, remove and repair the charging valve.
32. Close the gun and flush into an appropriate container or close the appropriate valve.
33. Repeat this procedure on the catalyst accumulator.

Changing Colors

1. Trigger the gun or use the priming button to move the pump until it is at the bottom of the stroke (lowest position).
2. Prepare your gun as follows:
 - *If you have an external mix gun:* Brush gelcoat spray tip and catalyst tip with solvent.
 - *If you have an internal mix gun:* Flush the mix chamber with solvent.
3. Turn the air motor regulator counterclockwise to lower the air pressure to zero.
4. Place an appropriate container under the ball valve if a return hose is not installed.
5. Open the ball valve at the bottom of the resin filter housing to relieve resin pressure to the supply container.

Note ***It is important to release fluid pressure in the hose that is no longer going to be in use.***

6. Release the pressure in the gelcoat accumulator by pushing a small dull rod (such as an Allen wrench) into the top of the accumulator charging valve.

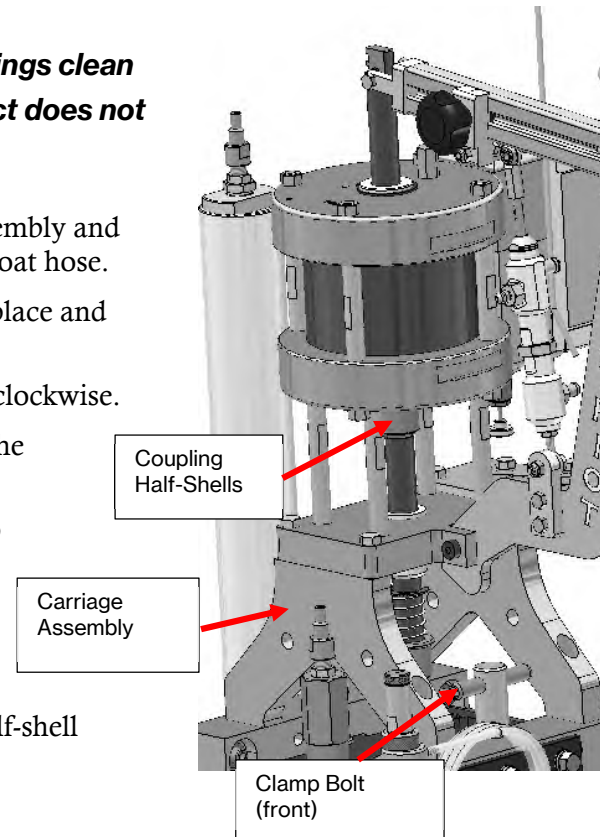
7. Rotate the ball valve on the catalyst manifold to the open position to relieve catalyst pressure to the supply jug.
8. Close the ball valve at the quick disconnect end of the resin hose assembly.
9. Disconnect the current resin hose assembly from the gun assembly and clean the quick disconnect fittings with solvent.

Note *It is important to keep the quick disconnect fittings clean so that the O-ring in the female quick disconnect does not become damaged and leak.*

10. Connect the desired gelcoat hose assembly to the gun assembly and open the ball valve at the quick disconnect end of the gelcoat hose.
11. Push up on the sleeve holding the coupling half-shells in place and remove the half-shells from the rod ends.
12. Loosen the two clamp bolt assemblies by turning counterclockwise.
13. Slide the carriage assembly to the approximate center of the desired fluid section and align the shafts.

Note *The air motor or fluid section shaft may need to be moved up or down to allow proper alignment.*

14. When the shafts are properly aligned and touching end to end, push the sleeve up and re-install the two coupling half-shell connectors.
15. Tighten the two clamp bolts by turning clockwise.
16. Charge the gelcoat accumulator if applicable to your system.
17. Close the ball valve that the bottom of the gelcoat filter body.
18. While pressing the pump prime button, adjust the pump regulator to the desired air pressure.
19. Close the ball valve on the catalyst manifold.
20. Using the catalyst drive, hand prime the catalyst pump pressure and replace the pivot pin into the slide drive assembly.
21. Adjust the spray pattern as desired.



Priming the Unit

Priming Solvent (Internal Mix Systems Only)

1. Open the solvent tank lid and fill $\frac{3}{4}$ full.
2. Install lid on tank and close the relief valve located on top of the lid.
3. Set the flush tank pressure at 50 to 60 psi (3.5 – 4 bar).
4. Check for leaks and fix as necessary.

5. Push the flush valve on the side of the gun block to test solvent flush.

Select Gelcoat Pump Color

6. Connect the carriage assembly to the desired gelcoat fluid section as described in the Changing Colors section.
7. Connect the accompanying gelcoat hose assembly to the gun and open the ball valve at the quick disconnect end.

Priming Catalyst to Gun

8. Prepare the gun as follows:
 - *For external mix system:* Remove the catalyst and spray tip from the front of the gun.
 - *For internal mix system:* Tighten the packing nuts on the gun and trigger the gun 10 to 15 times. Snug the packing nuts and repeat triggering, repeating this process three to four times. Remove the nozzle and mixer from the chamber.
9. Tighten the catalyst packing nut $\frac{1}{8}$ to $\frac{1}{4}$ turn to snug packing.
10. Fill the catalyst jug $\frac{3}{4}$ full and then purge the air out of the catalyst feed line by slightly tilting the jug.
11. Open the recirculation valve on the catalyst manifold.
12. Remove the pivot pin on the catalyst drive linkage.
13. Using the catalyst drive, hand prime catalyst back to the jug through the recirculation valve until there is no air in the tube.
14. Close the recirculation valve.
15. Lock or hold the gun trigger in the open position over an appropriate container.
16. Remove the pivot pin from the catalyst drive linkage.
17. Use the catalyst drive to hand prime catalyst out to the gun until a steady stream is achieved.

Note ***Do not reinstall the pivot pin at this time. Open the catalyst recirculation valve to prevent over pressurizing the catalyst system.***

Priming Gelcoat to Gun

Note ***The resin pump was tested using oil. It may require up to $\frac{1}{2}$ gallon of gelcoat be run through the unit to purge any remaining oil from the system.***

18. Fill the packing nut cavity $\frac{3}{4}$ full of TSL or equivalent oil.
19. Insert the gelcoat suction wand into a container of gelcoat.
20. Clamp or tape the resin return hose coming from the bottom of the inline filter to the resin pickup wand and into the drum.
21. With the gun locked in the open position, slowly increase pump regulator pressure until pump is running at a slow but steady rate.

22. Allow pump to run until a steady stream of gelcoat is being dispensed.
23. Close the gun and clean as follows:
 - *For external mix system:* Brush the front of the gun head clean with solvent.
 - *For internal mix system:* Flush the mix chamber clean.
24. Slowly increase gelcoat pump pressure to 100 psi (7 bar).
25. Allow the unit to set under static load for 15 to 30 minutes to seat the resin packing set.
26. Turn the pump regulator to zero.
27. Slowly open the ball valve at the bottom of the resin filter to drain the fluid pressure.
28. Repeat priming to gun each time you change fluid sections/colors.

Charging the Gelcoat Surge Chamber (if applicable)

29. Open the ball valve below the inline resin filter.
30. To charge the resin surge chamber, use the air hose with the female quick disconnect (charging hose) and insert it over the male quick disconnect at the top of the resin surge chamber.
31. Push down on the female quick disconnect for 5 to 10 seconds and disengage.
32. Close the ball valve below the inline filter.

Pressurize Fluids

33. Push the priming button and slowly increase the gelcoat pump regulator to between 40 and 50 psi as a starting point.

Note ***On the air manifold, the blue valve is the safety override. The small brass button is the priming button. The safety override valve automatically opens and closes the air supply to the pump air motor. The safety valve opens when the gun is triggered or when the priming button is pushed.***

34. Move the catalyst drive arm slowly up and down to pressurize the catalyst pump as follows:
 - *For external mix system:* Prime a little pressure; there is no gauge on this system to determine an exact setting.
 - *For internal mix system:* Prime to between 200 and 400 psi. There should be gain in pressure on both the up and down strokes; watch the catalyst gauge to determine this is occurring.
35. Pin the catalyst drive into the pivot arm at the desired catalyst percentage.

Set Up the Gun

External Mix

36. Use a little red grease on the O-rings and threads of the spray tip, catalyst tip, and retainer.
37. Install the gelcoat spray tip into the front of the gun block.

38. Install the catalyst tip over the spray tip.

Note ***Use caution not to damage the O-rings on the front of the gun block.***

39. Install the retainer to secure the catalyst tip and spray tip in place.
40. Spray a test pattern.
41. Make gelcoat pump pressure adjustments until a fairly uniform pattern is achieved with slight horns on either side of the spray fan.
42. Slowly open the air-assist needle valve located on the side of the gun handle until a soft, uniform pattern is achieved.

Internal Mix

43. Use a little red grease on the O-rings and threads of the spray tip, catalyst tip, and retainer.
44. Install the turbulent mixer into the mix chamber.
45. Insert the static mixer and spray tip onto the air assist housing and screw the air-assist onto the gun mix housing.

Note ***For longer turbulent mixer life, do not overtighten the air assist nozzle housing.***

46. Attach the air-assist tube from the needle valve on the side of the gun handle to the air-assist head.
47. Spray a test pattern.
48. Make gelcoat pump pressure adjustments until a fairly uniform pattern is achieved with slight horns on either side of the spray fan.
49. Slowly open the air-assist needle valve located on the side of the gun handle until a soft, uniform pattern is achieved.

Performing Daily Tasks

Daily Start Up – External Mix

1. Check all hoses for damage; replace as needed.
2. Check all material supplies and refill or replace as needed.
3. Open the recirculation valve on the catalyst manifold.
4. Open the main air inlet valve on the manifold.
5. Remove the pivot pin from the catalyst drive.
6. Manually pump the catalyst pump with the catalyst drive until you observe the stream returning to the catalyst jug is air free.
7. Close the recirculation valve on the catalyst manifold.
8. Manually pump the catalyst pump with the valve arm drive, bringing the catalyst pressure to operating pressure of about 100 psi.
9. Check the pump pressure; if adjustment is needed, press and hold the priming button while slowly adjusting the air pressure.

10. Replace the pivot pin into the catalyst pump drive.
11. Check atomizing air pressure and adjust as necessary.
12. Lubricate the nozzle O-rings, stud O-rings, and gun front threads.
13. Install the nozzle, catalyst tip, and retaining ring onto the front of the gun.

Daily Start Up – Internal Mix

14. Check all hoses for damage; replace as needed.
15. Check all material supplies and refill or replace as needed.
16. Close the flush tank relief valve.
17. Open the recirculation valve on the catalyst manifold.
18. Open the main air inlet valve on the manifold.
19. Remove the pivot pin from the catalyst drive.
20. Manually pump the catalyst pump with the catalyst drive until you observe the stream returning to the jug is air free.
21. Close the recirculation valve on the catalyst manifold.
22. Manually pump the catalyst pump with the slave arm drive, bringing the catalyst pressure to operating pressure between 100 and 200 psi.
23. Check the pump pressure; if adjustment is needed, press and hold the priming button while adjusting the air pressure.
24. Replace the pivot pin into the catalyst pump drive.
25. Insert the distribution ring into the mix chamber locating rim.
26. Place the mix housing seal into the mix chamber locating rim.
27. Insert the catalyst injector seal into the aperture in the distribution ring and the spring into the gun block.
28. Place the mix chamber and catalyst injector onto the front of the gun and secure with 2 screws.
29. Apply a small amount of red grease to the threads of the mix chamber.
30. Install the mixer, seal, and air-assist assembly onto the mix chamber.

Daily Shut Down – External Mix

31. Wipe the face of the nozzle and catalyst tip with solvent.
32. Turn off the main air ball valve at the air manifold.
33. Remove the nozzle and catalyst tip and clean with solvent.
34. Wipe the gun face clean with a rag or brush and solvent.
35. Hang the gun with the gun block exit holes facing downward.

Daily Shut Down – Internal Mix

36. Flush the mix housing and air assist with solvent.
37. Wipe the face of the air-assist nozzle after flushing.
38. Turn off the main air ball valve at the air manifold.
39. Release the solvent flush tank pressure.
40. Disassemble the air-assist and clean with solvent.
41. Remove the mix housing and clean.
42. Wipe the gun block face with a clean rag.
43. Hang the gun with the gun block exit holes facing downward.