
AEROBELL 33R™ ROTARY ATOMIZER



MODEL: 76690



IMPORTANT: Before using this equipment, carefully read **SAFETY PRECAUTIONS**, starting on page 1, and all instructions in this manual. Keep this Service Bulletin for future reference.

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SAFETY

SAFETY PRECAUTIONS

Before operating, maintaining or servicing any ITW Ransburg electrostatic coating system, read and understand all of the technical and safety literature for your ITW Ransburg products. This manual contains information that is important for you to know and understand. This information relates to **USER SAFETY** and **PREVENTING EQUIPMENT PROBLEMS**. To help you recognize this information, we use the following symbols. Please pay particular attention to these sections.

A WARNING! states information to alert you to a situation that might cause serious injury if instructions are not followed.

A CAUTION! states information that tells how to prevent damage to equipment or how to avoid a situation that might cause minor injury.

A NOTE is information relevant to the procedure in progress.

While this manual lists standard specifications and service procedures, some minor deviations may be found between this literature and your equipment. Differences in local codes and plant requirements, material delivery requirements, etc., make such variations inevitable. Compare this manual with your system installation drawings and appropriate ITW Ransburg equipment manuals to reconcile such differences.


Careful study and continued use of this manual will provide a better understanding of the equipment and process, resulting in more efficient operation, longer trouble-free service and faster, easier troubleshooting. If you do not have the manuals and safety literature for your Ransburg system, contact your local ITW Ransburg representative or ITW Ransburg.




WARNING



- ▶ The user **MUST** read and be familiar with the Safety Section in this manual and the ITW Ransburg safety literature therein identified.
- ▶ This manual **MUST** be read and thoroughly understood by **ALL** personnel who operate, clean or maintain this equipment! Special care should be taken to ensure that the **WARNINGS** and safety requirements for operating and servicing the equipment are followed. The user should be aware of and adhere to **ALL** local building and fire codes and ordinances as well as **NFPA 33 SAFETY STANDARD, 1995 EDITION**, prior to installing, operating, and/or servicing this equipment.

WARNING

- ▶ The hazards shown on the following page may occur during the normal use of this equipment. Please read the hazard chart beginning on page 2.

AREA Tells where hazards may occur.	HAZARD Tells what the hazard is.	SAFEGUARDS Tells how to avoid the hazard.
<p>Spray Area</p> 	<p>Fire Hazard</p> <p>Improper or inadequate operation and maintenance procedures will cause a fire hazard.</p> <p>Protection against inadvertent arcing that is capable of causing fire or explosion is lost if any safety interlocks are disabled during operation. Frequent power supply shutdown indicates a problem in the system requiring correction.</p>	<p>Fire extinguishing equipment must be present in the spray area and tested periodically.</p> <p>Spray areas must be kept clean to prevent the accumulation of combustible residues.</p> <p>Smoking must never be allowed in the spray area.</p> <p>The high voltage supplied to the atomizer must be turned off prior to cleaning, flushing or maintenance.</p> <p>When using solvents for cleaning:</p> <p>Those used for equipment flushing should have flash points equal to or higher than those of the coating material.</p> <p>Those used for general cleaning must have flash points above 100°F (37.8°C).</p> <p>Spray booth ventilation must be kept at the rates required by NFPA 33, 1995 Edition, OSHA and local codes. In addition, ventilation must be maintained during cleaning operations using flammable or combustible solvents.</p> <p>Electrostatic arcing must be prevented.</p> <p>Test only in areas free of combustible material.</p> <p>Testing may require high voltage to be on, but only as instructed.</p> <p>Non-factory replacement parts or unauthorized equipment modifications may cause fire or injury.</p> <p>If used, the key switch by-pass is intended for use only during set-up operations. Production should never be done with safety interlocks disabled.</p> <p>Never use equipment intended for use in waterborne installations to spray solvent based materials.</p>
<p>General Use and Maintenance</p>	<p>Improper operation or maintenance may create a hazard.</p> <p>Personnel must be properly trained in the use of this equipment.</p>	<p>Personnel must be given training in accordance with the requirements of NFPA-33, Chapter 16, 1995 edition.</p> <p>Instructions and safety precautions must be read and understood prior to using this equipment.</p> <p>Comply with appropriate local, state, and national codes governing ventilation, fire protection, operation maintenance, and housekeeping. OSHA references are Sections 1910.94 and 1910.107. Also refer to NFPA-33, 1995 edition and your insurance company requirements.</p>

AREA Tells where hazards may occur.	HAZARD Tells what the hazard is.	SAFEGUARDS Tells how to avoid the hazard.
Electrical Equipment 	<p>High voltage equipment is utilized. Arcing in areas of flammable or combustible materials may occur. Personnel are exposed to high voltage during operation and maintenance.</p> <p>Protection against inadvertent arcing that may cause a fire or explosion is lost if safety circuits are disabled during operation.</p> <p>Frequent power supply shut-down indicates a problem in the system which requires correction.</p> <p>An electrical arc can ignite coating materials and cause a fire or explosion.</p>	<p>The power supply, optional remote control cabinet, and all other electrical equipment must be located outside Class I or II, Division 1 and 2 hazardous areas. Refer to NFPA No. 33, 1995 Edition.</p> <p>Turn the power supply OFF before working on the equipment.</p> <p>Test only in areas free of flammable or combustible material.</p> <p>Testing may require high voltage to be on, but only as instructed.</p> <p>Production should never be done with the safety circuits disabled.</p> <p>Before turning the high voltage on, make sure no objects are within the sparking distance.</p>
Explosion Hazard / Incompatible Materials 	<p>Halogenated hydrocarbon solvents for example: methylene chloride and 1,1,1,-Trichloroethane are not chemically compatible with the aluminum that might be used in many system components. The chemical reaction caused by these solvents reacting with aluminum can become violent and lead to an equipment explosion.</p>	<p>Aluminum is widely used in other spray application equipment - such as material pumps, regulators, triggering valves, etc. Halogenated hydrocarbon solvents must never be used with aluminum equipment during spraying, flushing, or cleaning. Read the label or data sheet for the material you intend to spray. If in doubt as to whether or not a coating or cleaning material is compatible, contact your material supplier. Any other type of solvent may be used with aluminum equipment.</p>
Toxic Substances 	<p>Certain material may be harmful if inhaled, or if there is contact with the skin.</p>	<p>Follow the requirements of the Material Safety Data Sheet supplied by coating material manufacturer.</p> <p>Adequate exhaust must be provided to keep the air free of accumulations of toxic materials.</p> <p>Use a mask or respirator whenever there is a chance of inhaling sprayed materials. The mask must be compatible with the material being sprayed and its concentration. Equipment must be as prescribed by an industrial hygienist or safety expert, and be NIOSH approved.</p>

AREA Tells where hazards may occur.	HAZARD Tells what the hazard is.	SAFEGUARDS Tells how to avoid the hazard.
<p>Spray Area / High Voltage Equipment</p> 	<p>There is a high voltage device that can induce an electrical charge on ungrounded objects which is capable of igniting coating materials.</p> <p>Inadequate grounding will cause a spark hazard. A spark can ignite many coating materials and cause a fire or explosion.</p>	<p>Parts being sprayed must be supported on conveyors or hangers and be grounded. The resistance between the part and ground must not exceed 1 megohm.</p> <p>All electrically conductive objects in the spray area, with the exception of those objects required by the process to be at high voltage, must be grounded.</p> <p>Any person working in the spray area must be grounded.</p> <p>Unless specifically approved for use in hazardous locations, the power supply and other electrical control equipment must not be used in Class 1, Division 1 or 2 locations.</p>
<p>Personnel Safety / Mechanical Hazards</p> 	<p>The bell atomizer can rotate at speeds up to 50,000 rpm. At these speeds, the edge of the applicator can easily cut into skin. Loose articles can also be caught by the rotating bell.</p>	<p>Personnel must stay clear of the bell whenever it is rotating.</p> <p>Before touching the bell, the turbine air must be shut off.</p> <p>If the bell has been rotating, allow at least two minutes for it to come to a complete stop before touching it.</p>

NOTES:

INTRODUCTION

FEATURES

Features which make the Aerobell 33R™ Rotary Atomizer advantageous for use in electrostatic applications include:

- Factory Mutual approved, energy is limited to prevent ignition of flammable air/solvent mixtures.
- Assembly components and bell made of durable plastic material for optimum mechanical strength and solvent resistance.
- Proven long life turbine motor capable of speeds up to 50k rpm at minimal air consumption. See page 9 for bell cup speed ratings.
- Patented serrated edge bell provides excellent atomization quality at minimal rotational speeds.
- 70mm, 57mm and 30mm diameter bell assemblies available for application flexibility.
- Annular shaping air passage design providing excellent pattern control at minimal air consumption.
- Aerodynamic design for ease of cleaning external surfaces.
- Speed readout (or control) uses reliable magnetic pickup for fiberoptic transmission of rotational speed data.
- Negligible maintenance down time. With the quick disconnect feature, an atomizer can be exchanged in less than 1 minute for off line maintenance.
- The easily removable front and rear shrouds, turbine assembly and the internally mounted regulator and fluid valves, make off line maintenance more efficient and economical.
- Fast color changes are achieved using center feed fluid delivery, integral brake air, high flow setting on the dual range regulator and the three fluid valves which provide for simultaneous paint push out while solvent washes the feed tube and bell cup.
- Bell wash is quick and efficient. Solvent usage is controlled at the feed tube with an internally mounted solvent valve.
- Less waste to the spray booth, with the dump valve located internally next to the feed tube.
- More precise fluid regulation, with an internal dual range regulator.
- No external high voltage cable. The internally mounted high voltage cascade requires only low voltage control wiring.
- Compact high voltage control system. The MicroPak cascade control takes only 1/4 of the space in a 19 inch Euro rack, leaving room for additional control modules.
- 60° angled body provides more maneuverability and facilitates robotic programming.
- Heavy duty design ensures excellent service life even when subjected to the quick motions of robotic applications.
- Various adapter plates available to match most robotic mounting configurations.

GENERAL DESCRIPTION

Aerobell 33 Robot Rotary Atomizer

The ITW Ransburg Aerobell 33R Rotary Atomizer is designed to meet safety approval agency requirements. The Aerobell 33R provides electrostatic application with excellent atomization and transfer efficiency for a wide variety of coating materials.

WARNING

- ▶ The Aerobell 33R is designed to provide safe operation in accordance with NFPA 33, Chapter 9. It can operate down to a minimum of 4 inches from the target. However, equipment cleanliness and proper routine maintenance are required to maintain continuous safe operation.

Bell Assembly

This plastic bell cup is coated with a proprietary resistance material for transfer of electrostatic charge to the atomized fluid. Three different sized bell cups are available: 30mm, 57mm and 70mm. Each bell cup size has a compatible shroud and shaping air ring. (See Figure 12.)

NOTE

- ▶ The 70mm shroud cannot be directly threaded onto the air turbine assembly without first installing the six piece seal/ adapter. (See Figure 12.)

Air Turbine Assembly

The air bearing turbine assembly with bell cup is mounted to the turbine manifold assembly with four socket head screws.

Turbine Manifold Assembly

The air and fluid manifold assembly is angled at 60° for robot applications. The fluid feed tube and fiber optic turbine speed pick up are threaded into the front of the manifold. A valve manifold with three pilot operated valves is fastened to the backside with three screws. The turbine and valve manifolds are separated from the backplate assembly by four support rods. Nested between the manifolds and the backplate are the dual range fluid regulator and high voltage cascade.

Backplate Assembly

The robot mount backplate assembly is designed to be grounded electrically. The air and fluid ports are compactly oriented for use with robotic applications. The interior air ports are directly tubed to the turbine manifold assembly. The interior solvent and dump fluid ports are directly tubed to the valve manifold. The paint port is connected to the inlet of the dual range fluid regulator. The regulator outlet is connected to the valve manifold through a coiled tube. Pilot operating air for the fluid valves and fluid regulator are also tubed directly from the backplate. On the exterior side of the backplate the ports are provided with o-ring seals so that the atomizer can be quickly mated and secured to the mounting plate assembly.

Mounting Plate Assembly

The mounting plate is intended to be permanently mounted to the robot by means of an adapter which matches the robots mounting configuration. Incoming air lines, fluid lines, low voltage electrical cable and fiber optic cable are connected to the fittings provided on the back of the mounting plate. The backplate of the robot atomizer is secured to its mounting plate with a threaded retaining ring.

Power Supply and Controls

The high voltage cascade located inside the Aerobell 33R is controlled by the MicroPak™ control unit. The low voltage output of the MicroPak is multiplied by the internal cascade to the high voltage level required. This eliminates the need for a high voltage cable. A low voltage cable interconnects the cascade and MicroPak control. The MicroPak Eurocard format is designed to fit in a conventional 19 inch rack and requires a 24 V power input at a maximum 3 amps. The MicroPak and the internal cascade will produce voltages up to 100,000 VDC.

The MicroPak is designed to electronically limit current to provide safe operation in a spray booth. The voltage and current draw of the atomizer are continuously displayed on the MicroPak control panel. Voltage and overcurrent limits are adjustable on the front of the MicroPak. MicroPak internal safety circuits will shut down the system on over-current and cable faults.

With additional control modules, all of the functions of Aerobell 33R and MicroPak can be controlled by a programmable controller. An Atomizer module pneumatically controls the speed of the rotary atomizer with dynamic feedback through a fiber optic transmitter located on the applicator. An Analog module pneumatically controls the atomizer's shaping air. An Adapta-Flow module provides closed loop flow control through the dual range fluid flow regulator. A Digital module pneumatically controls the paint, solvent and dump valves located on the atomizer. An I/O module provides communication between these modules and the PLC.

The above modules are mounted in one 19 inch rack and interconnected through a common mother board.

NOTES:

SPECIFICATIONS

Mechanical

Turbine Speed:	(Continuous/Intermittent)
30mm Bell Cup:	40,000/50,000 rpm
57mm Bell Cup:	40,000/50,000 rpm
70mm Bell Cup:	30,000/40,000 rpm
Turbine Type:	Air Bearing Impulse Drive
Weight:	22 lbs.
Length:	16.75 in.
Diameter:	7.8 in.
Turbine Air:	At 40k rpm, nominal 40 psi, 10 scfm
Bearing Air:	90 psi nominal 2.4 scfm 70 psi min.
Shaping Air:	60 psi max. 24 scfm Normal 5-15 psi, 4-8 scfm
Brake Air:	60 psi nominal
Fluid Pressure:	80 psi max.
Fluid Flow Rate:	25-500 cc/min.
Spray Pattern Size:	15 in. - 30 in. usable pattern
Rotator Assembly Change Time:	Less than 2 minutes
Bell Change Time:	Less than 2 minutes
Bell Cleaning Time:	Approx. 2-3 sec.
Color Change Time:	Dependent on system configuration, fluid pres- sures, line lengths, etc.
Speed Readout:	Magnetic pickup, uni- directional fiberoptic transmission

Electrical

Power Supply Type:	MicroPak
Charging Method:	Direct
Output Voltage:	30-100 kV Variable
Output Current:	125 μ A
Turbine Speed Control:	Eurocard Atomizer Module
Shaping Air Control:	Eurocard Analog Module

INSTALLATION

AIR FILTER INSTALLATION

The following air filter installation guidelines are essential for optimum performance.

1. Use only recommended pre-filters and bearing air filters as shown in Figure 2. Additional system air filtration (i.e., refrigerated air dryer) may also be used if desired.
2. Mount the bearing air filter as close as possible to the Aerobell 33R. (Do not mount further than 30 feet away.)
3. Do not use teflon tape, pipe dope, or other thread sealant downstream of the bearing air filter. Loose flakes of teflon tape or other sealant can break loose and plug the very fine air holes in the turbine air bearings.
4. If air heaters are used in the system (to minimize the effect of excessively humid conditions), and the heated air will exceed 120°F, the heaters must be located after all filters to prevent damage to the filter media.

AIR PRESSURE REQUIREMENTS

	Tube Size	Air Pressure Requirements
Bearing Air Supply	1/4" O.D.	90 psi ±10
Bearing Air Return	1/4" O.D.	70 psi ±10 (At Atomizer Card)
Turbine Air	3/8" O.D.	Variable
Pattern Shaping Air	3/8" O.D.	Variable
Brake Air (if used)	1/4" O.D.	60 psi ±10
Trigger Valve Control	3/16" O.D.	80 psi ±10
Dump Valve Control	3/16" O.D.	80 psi ±10
Cleaning Solvent Valve Control	3/16" O.D.	80 psi ±10
Paint Fluid Regulator:		
High Flow Signal Air	3/16" O.D.	Variable 70 psi max.
Low Flow Signal Air	3/16" O.D.	Variable 80 psi max.

Figure 1: Air Tubing Connections

NOTE

- With the exception of fluid, dump, and bearing air, all other pilot and air supply lines should be bulkheaded at the robot and their diameters increased one size. For example: Turbine air should be increased to a 1/2" O.D. from robot to the volume booster.

AIR FILTRATION REQUIREMENTS

ITW Ransburg Filter Model No.	Description / Specifications	Replacement Element Part No.
HAF-503	Pre-filter, removes coarse amounts of oil, moisture & dirt. Used upstream of RPM-417 pre-filter (used in systems with poor air quality).	HAF-15 Element, One
RPM-417	Pre-filter, coalescing type, 136 scfm, 98.5% efficiency particulate removal .3 to .6 micron, max. aerosol passed 1.0 micron, max. solid passed .4 micron (dependent upon scfm requirement per applicator, one RPM-417 can be used with up to three Aerobell 33's).	RPM-32 Elements, Carton of 4
RPM-418	Bearing air filter, coalescing type, 19 scfm, 99.995% efficiency particulate removal .3 to .6 micron, max. aerosol passed .6 micron, max. solid passed .2 micron (one per applicator).	RPM-33 Elements, Carton of 8

Figure 2: Recommended Air Filtration

⚠ CAUTION

- ▶ Air must be properly filtered to ensure extended turbine life and to prevent contamination of the paint finish. Air which is not adequately filtered will foul the turbine air bearings and cause turbine failure. The correct type of filters must be used in an Aerobell 33R system. The filter elements must be replaced on a regular schedule to assure clean air.

- ▶ **It is the user's responsibility to ensure clean air at all times. Turbine failure resulting from contaminated air will not be covered under warranty.**
Figure 2 shows the pre-filter and bearing air filter(s) which are recommended for use in Aerobell 33R systems. If other filters are incorporated in the system, the filters to be used must have filtering capacities equal or better than those shown in Figure 2.

- ▶ The user must ensure the bearing air supply is not inadvertently turned off while the Aerobell 33R air motor is turning. This will cause air bearing failure.

MOUNTING

The Aerobell 33R is equipped with a quick disconnect assembly. The quick disconnect feature consists of a mounting plate which is permanently attached to the robot through an adapter plate, and a mating backplate which is a part of the Aerobell 33R's atomizer assembly (see Figure 14). The atomizer is secured to the mounting plate with a threaded retaining ring.

Mounting Plate

The incoming tubing and cables are connected to the back of the mounting plate. The robotic atomizer uses a grounded mounting plate assembly. An adapter plate matches the mounting plate to the robot wrist. Various designed adapter plates are available to match most robot mounting configurations.

Backplate

The ports on the backplate of the Aerobell 33R are provided with o-ring seals which mate up with the ports on the mounting plate. The seals should be checked to ensure that they are properly seated and in good condition before attaching the Aerobell 33R to the mounting plate. The Aerobell 33R is secured to its mounting plate with a threaded retainer ring.

NOTE

- ▶ An adjustable spanner wrench (part# 76772) is available to tighten the threaded ring to Aerobell 33R's backplate.

ELECTRICAL AND FIBER OPTIC CONNECTIONS

The low voltage electrical and fiber optic connections are made on the back of the atomizer's mounting plate. The low voltage electrical and fiber optic cables come preassembled with connectors that are secured in place by set screws tightened from the side of the mounting plate. Before securing the electrical cable, the slot in the connector must be aligned with the slot in the mounting plate. An adequate ground must be provided to the mounting plate to ensure that fluid fittings and tubing do not electrically break down.

FLUID CONNECTIONS

The paint, solvent and dump fluid tubing are connected on the back of the mounting assembly with modified stainless steel compression fitting and PFA teflon tubing. Fluid tubing requirements are shown below in Figure 3.

NOTE

- ▶ The Aerobell 33R is not designed to be used with waterbase coatings.


	Fixed Atomizer	Pressure (nominal/max.)
Paint Line	1/4" O.D. PFA, Teflon	50-80 psi
Solvent Line	1/4" O.D. PFA, Teflon	30-60 psi
Dump Line	1/4" O.D. PFA, Teflon	Variable


Figure 3: Fluid Tubing Connection Requirements

INTERLOCKS

The following system interlocks are required to prevent equipment damage:

1. Bearing air should remain on at all times and should be shut off only by turning off the main air to the pneumatic control cabinet.

 CAUTION
<ul style="list-style-type: none">▶ When the turbine air is turned off, the turbine will continue to operate or "coast down" for about two minutes. Provisions should be made to assure that the operator waits at least three minutes, after shutting off the turbine air, before shutting off the main air supply.▶ The bell cup must be removed when making flow checks. If the paint is turned on when the bell is mounted on the motor shaft and not rotating, paint will enter the shaft and possibly damage the air bearing. Normally pneumatic interlocks will not allow the paint to trigger on when the turbine air is off.

 WARNING
<ul style="list-style-type: none">▶ The high voltage and/or coating material must never be turned on unless the bell cup is mounted on the motor shaft and the turbine is rotating.▶ Pneumatic input to the turbine air inlet must be controlled to prevent the turbine from exceeding the maximum rated intermittent speed of 50,000 rpm. (See "Specifications".)

2. It should not be possible for the coating material to be sprayed unless the turbine is spinning.

3. Two interconnected bearing air ports are provided, one for supply air and the other to be used as a return signal for measuring bearing air pressure at the atomizer. If bearing air falls below 60 psi at the atomizer, the turbine air should be automatically interlocked to shut off.

OPERATION

⚠ WARNING

- ▶ Operators must be fully trained in safe operation of electrostatic equipment. Operators must read all instructions and safety precautions prior to using this equipment (See NFPA 33, Chapter 16).

As with any spray finishing system, operation of the Aerobell 33R involves properly setting the operating parameters to obtain the best finish quality for the coating material being sprayed, while maintaining correct operation and reliability of the equipment used. Adjustments to operating parameters, which cover spraying, cleaning and on/off control, include:

- Coating Materials
- Fluid Flow Rate Control
- Fluid Valve Control
- Turbine Speed
- Bearing Air Adjustment
- Shaping Air
- Brake Air
- Electrostatic Voltage
- Target Distance

COATING MATERIALS

The Aerobell 33R can be used with a full range of coating material conductivities. However, with coatings having very high conductivities, such as waterborne paints, it may be necessary to isolate paint supply from ground.

⚠ WARNING

- ▶ Electrical discharge of a high electrical capacitance fluid/paint system can cause fire or explosion with some materials. If arcing occurs when a specific coating materials is used, turn the system off and verify that the fluid is non-flammable. In these conditions the system is capable of releasing sufficient electrical and thermal energy to cause ignition of specific hazardous material in air.

FLUID FLOW RATE CONTROL

Fluid flow is controlled by an internally mounted dual diaphragm fluid regulator. The regulator's paint inlet is connected to the backplate of the Aerobell 33R. Paint is supplied to the regulator through the Aerobell 33R's quick disconnect mounting by 1/4 inch tubing from the paint supply. Reference the 75902, DR-1™ Fluid Regulator, Manual # LN-9228-00 for detailed information.

The regulator features two independently controllable flow pressure ranges from the fluid output port. The high flow range port accommodates higher fluid deliveries thereby providing increased film build capabilities and minimal color change times. The low flow range provides precise fluid delivery control. There are seven low range models available (1:1, 1:2, 1:3, 1:4, 1:6, 1:8, and 1:10) which can be selected based on the required fluid flow rate.

Separate pilot signals modulate each of the regulator's two diaphragms to control the amount of paint being delivered from the regulator to the atomizer bell cup. These pilot signals can be controlled manually or automatically with the AdaptaFlow 5000, closed loop flow control system.

Because of the regulator's dual range capabilities, it provides the user flexibility of selecting either the high flow range or the low flow range. Different coating material viscosities and quick color change requirements may necessitate the use of both ranges. If color change time is not a factor or if material viscosity remains relatively constant, either port may be used depending on flow rate requirements.

The high flow port characteristics are similar to those found in most commercially available, air operated fluid regulators. Fluid regulation from the high flow port is therefore comparable in total flow capacity, although consistency of flow is improved considerably when using a regulator. All regulators, regardless of ratio designation, have the high flow port.

The low flow (i.e. 1:2, 1:4, etc.) port provides a lower, more precise flow response curve. Fluid output, as a result, is less likely to be affected by pilot signal errors. An increase in the ratio (i.e. from 1:2 to 1:4) provides a lower slope, but, more precise response curve. This same increase in ratio, however, will reduce flow capacity and should be considered when selecting the proper regulator ratio.

The following factors must then be considered when selecting the regulator ratio required for proper fluid control:

- Maximum fluid output requirements (Guide: 10 psi minimum, 30 psi max.)
- Fluid tubing inside diameter (ID) and length
- Fluid feed tube inside diameter
- Fluid viscosity
- Fluid input pressures (Guide: 10 psi above max. fluid output pressure)

Only proper testing will determine which regulator ratio should be used. If conditions change after installation which require a different low flow ratio, this regulator can be altered easily by replacing the existing ratio spacer ring and upper retainer with the desired ratio (ratio designation is etched on the side of the spacer ring).

The output of the regulator is connected to a paint fitting on the fluid valve manifold. The fluid valve manifold is equipped with three valves which are pneumatically operated to direct the flow of paint to either the feed tube or dump line and to supply a intermittent solvent wash for the feed tube and bell cup.

The feed tube is available in several sizes (see Figure 5). The correct size of feed tube for each installation is determined by the viscosity and volume of coating material being sprayed. The feed tube diameter acts as a linear restrictor to create back pressure on the fluid regulator so that it can provide accurate and repeatable flow to air signal resolution.

Fluid Flow Rate Check:

In the test mode, the flow rate can be measured by removing the bell cup from the atomizer,

turning the fluid flow ON and capturing the material in a graduated beaker or measuring cup for a fixed period of time (shaping air, high voltage and turbine air must be off).

! WARNING	
<p>► Danger of shock and/or personal injury can occur. Proper grounding procedures must be followed. Personnel must never work around the turbine when the turbine is spinning or when high voltage is turned ON.</p>	

Low Flow Rates	Fixed Atomizer Regulator Part No.
1:1	75902-01B
1:2	75902-02B
1:3	75902-03B
1:4	75902-04B
1:6	75902-06B
1:8	75902-08B
1:10	75902-10B

Figure 4: Fluid Regulator Selections

Orifice Size	Part No.
.031 I.D.	75906-04
.045 I.D.	75906-03
.093 I.D.	75906-02
.125 I.D.	75906-01

Figure 5: Fluid Tube Selections

FLUID VALVE CONTROL (Trigger, Dump & Solvent)

The fluid valves in the Aerobell 33R are actuated by an air signal. The air pressure must exceed 70 psi to assure proper actuation of the valve. Applying air to the valve actuator turns on the fluid flow for that valve.

The trigger valve controls the paint flow to the bell. When actuated, paint flows through the valve to the fluid tube, and into the rear of the bell cup. The bell cup must be spinning at least 10,000 RPM when fluid is turned on to enable the fluid to flow through the bell paint passage holes and be atomized.

The dump valve controls the paint flow through the dump line. When actuated, paint flow is directed to the dump return line. This provides a method of rapidly removing paint from the incoming line for cleaning and/or color change. Normally, the dump valve is not actuated at the same time as the paint trigger valve since the trigger valve is intended to cause the fluid to flow to the bell at the prescribed input pressure.

The solvent valve controls the flow of cleaning solvent to the bell. When actuated, solvent flows through the manifold and fluid tube and into the rear of the bell cup. This provides cleaning of the inside of the bell cup. The solvent valve is not triggered at the same time as the paint trigger valve to prevent solvent from flowing backward into the paint line.

CAUTION

- ▶ The normal fluid flow range is 25-500 cc/min. During a color change or when flushing the system, higher flow rates may be required. However, the maximum flow rate through the bell cup must not exceed 500 cc/min. to avoid solvent or paint from flooding into the internal portion of the air bearing motor assembly or front shroud.
- ▶ High voltage must be interlocked with the solvent valve to prevent solvent spraying while high voltage is on.

WARNING

- ▶ When flushing the Aerobell 33R always flush through the **dump valve** rather than the trigger valve. Only use solvent to flush the fluid tube in the bell. A solvent/air mixture or sequence will cause paint build-up on the fluid tube.

TURBINE SPEED

Turbine speed is determined by the input pressure at the rear of the atomizer.

Turbine speed is intended to be closed loop controlled using the fiber optic speed transmitter, located on the turbine manifold. A speed input to a remote speed controller, such as the Atomizer module, is recommended.

NOTE

- ▶ The bell rotational speed determines the quality of atomization and can be varied for various paint flow rates and paint formulations. For optimum transfer efficiency and spray pattern control, the bell rotational speed should be set at the minimum required to achieve proper atomization. **Excessive speed reduces transfer efficiency!**


WARNING

- ▶ Do not exceed the maximum rated intermittent operating speed and turbine inlet pressure (50,000 rpm at approximately 60 psi for the 57mm bell or 50,000 rpm at approximately 45 psi for the 30mm bell, and 40,000 rpm at approximately 70 psi for the 70mm bell). Excessive speed may cause air turbine damage or damage to the bell.

BEARING AIR ADJUSTMENT

The nominal bearing air pressure is 90 psi, measured at the rear of the atomizer. Minimum pressure is 70 psi and maximum pressure is 100 psi. The turbine should never be operated with less than 70 psi bearing air pressure.

Bearing air must be present when turning the turbine on. Bearing air must remain on when the turbine air is turned off until the turbine stops spinning. Never turn off bearing air to cause the turbine to stop spinning. If connected, brake air can be used to slow the turbine.

 CAUTION	
<ul style="list-style-type: none"> ▶ Air bearing air must be on whenever the turbine is operated. If not, severe bearing damage will occur. It is recommended that bearing air be left turned on at all times, except during maintenance or disassembly. 	<p>Bearing damage (and subsequent turbine failure) caused by running the turbine without bearing air will not be covered under the ITW Ransburg warranty.</p>

The Aerobell 33R is equipped with a bearing air return line to monitor bearing air pressure at the turbine manifold. When connected to the remote Atomizer speed controller, operation of the turbine will automatically be shut down whenever the bearing air pressure falls below 60 psi.

SHAPING AIR

Shaping air is used to shape the spray pattern. Lower input pressure results in wider pattern size, while higher input pressure reduces the pattern size. Shaping air does not help atomize the material, but will assist in the penetration of atomized particles into cavity areas. Ideally, shaping air should be kept at the minimum pressure which will provide a proper finish for the

fluid being sprayed. Excessive shaping air will cause some atomized particles to blow by the target, reducing the wrap around effect at edges and corners. Excessive shaping air may also cause some paint particles to bounce back onto the atomizer, causing the atomizer surface to become contaminated.

BRAKE AIR

Brake air is used to slow the turbine speed in a minimum length of time. It is advantageous for short cycle times during color change, or may be used to reduce speed or stop the turbine. Never operate brake air with the turbine air on. Approximate brake times to reduce the turbine speed are shown in Figure 6. These times are based on 60 psi air pressure at the brake air connector.

The use of brake air is optional, and may not be required for many installations. The Atomizer Module control system provides the circuitry for automatic use of the brake air.

To Brake From (RPM)	Seconds (Approx.)
50,000 to 40,000	3.7
50,000 to 20,000	7.5
50,000 to 0	10.0
40,000 to 20,000	4.0
40,000 to 0	9.0

Figure 6: Braking Time

ELECTROSTATIC VOLTAGE

The Aerobell 33R Rotary Atomizer receives a low voltage control input from the MicroPak to control the operating electrostatic voltage. Refer to the MicroPak manual for detailed operating instructions.

NOTE

- ▶ If paint defects occur, such as fatty edges or picture framing, reducing the voltage should be a **last** resort. To correct the problem, adjustments to paint resistivity or lead and lag trigger adjustments should be made.

The electrostatic voltage applied to the Aerobell 33R will affect pattern size, transfer efficiency, wrap and penetration into cavity areas. Normally 100 kV setting is appropriate for most applications.

TARGET DISTANCE

The distance between the Aerobell 33R atomizer and the target will affect the finish quality and efficiency. Closer distances give a smaller pattern, wetter finish and greater efficiency. Greater distance will provide a larger pattern size and drier finish. The MicroPak control circuit will enable the applicator bell to be operated to within a few inches of the target without adjusting the voltage setting. The recommended target distance is 6 to 12 inches.

CAUTION

- ▶ In accordance with FM test standards and NFPA 33, the Aerobell 33R should never be closer than 4 inches from the target.

NOTES:

MAINTENANCE

CLEANING PROCEDURES

WARNING

- ▶ Electrical shock and fire hazards can exist during maintenance. MicroPak supply must be turned off before entering the spray area and performing any maintenance procedures on the atomizer. Spray booth fans should remain on while cleaning with solvents.
- ▶ Never touch the atomizer bell while it is spinning. The front edge of the bell can easily cut into human skin or cut through gloves and other materials. Be sure the atomizer bell has stopped spinning before attempting to touch it. Approximate time for the bell to stop spinning after turning off turbine drive air is three minutes.

In addition to the above Warning, which relates to potential safety hazards, the following information must be observed to prevent damage to the equipment.

CAUTION

- ▶ Do not immerse the Aerobell 33R turbine in solvent or other liquids. Turbine components will be damaged.
- ▶ Bearing air must be on during all cleaning procedures to protect the air bearing components.

Internal Fluid Path Cleaning

Cleaning the incoming paint line (from paint supply source such as color manifold through the fluid valve block and bell assembly):

Turn off the high voltage and turn on the trigger valve. With the bell spinning, flush cleaning solvent through the incoming paint line and through the manifold passages, through the fluid tube and onto the bell. The spinning bell will atomize the solvent and clean out the bell passages. If desired, open the dump valve to flush through the dump line for a faster and contained system flush.

Internal Fluid Path Cleaning (Without Cleaning the Incoming Paint Line)

Turn off the high voltage and trigger valve. With the bell spinning, turn on the solvent valve to allow cleaning solvent to flow through the manifold passages, through the fluid tube, and onto the bell. The spinning bell will atomize the solvent, clean out the bell passages.

With the solvent valve open, open the dump valve to clean the remaining manifold fluid passage and to flush the dump line if desired.

CAUTION

- ▶ The maximum flow rate of 500 cc/min. must not be exceeded during a flush routine.

External Atomizer Surface Cleaning

Verify that the high voltage is turned off.

WARNING

- ▶ To reduce the risk of fire or explosion, OSHA and NFPA 33 require that solvents used for exterior cleaning, including bell cleaning and soaking, be nonflammable (flash points higher than 100°F/37.8°C). Since electrostatic equipment is involved, these solvents should also be non-polar. Examples of non-flammable, non-polar solvents for cleaning are: Amyl acetate, methyl amyl acetate, high flash naphtha and mineral spirits.
- ▶ Do not use conductive solvents such as MEK to clean the external surfaces of the Aerobell 33R.
- ▶ When using a rag to hand wipe the Aerobell 33R, the turbine air should be off but leave the shaping air turned on. Ensure the rotation has come to a complete stop. Be careful not to drip solvent into the opening behind the bell.

Bell Cleaning

Normally, the internal cleaning instructions will suffice to clean the bell. If the internal cleaning instructions does not sufficiently remove all paint and residue from the bell, the bell may be removed for hand cleaning.

Inspection of the bell semiconductive coating is required to determine if wear or flaking has occurred. Excessive loss of bell coating can cause poor transfer efficiency and paint wrap back onto the atomizer.

Clean the bell by soaking in an appropriate solvent to loosen paint residue. Do not soak for more than a 24 hour period. Use a soft cloth to remove the paint and a soft tool like a toothpick to clean the paint holes. Be sure that all signs of paint are removed. Rinse and dry the bell.

WARNING

- ▶ Do not attempt to clean the bell edge while the bell is rotating. When attempting to stop or slow down the bell cup, **do not** hold a rag or gloved hand against the bell edge. This could cause physical harm and/or damage the bell edge which would adversely affect transfer efficiency and coating quality.

CAUTION

- ▶ Do not use abrasive materials which will scratch or damage the plastic bell, or which will scratch the semiconductive coating on the surface of the bell.
- ▶ Before reinstalling the bell onto the shaft, check and clean the tapered mating surfaces of the turbine shaft and bell for any paint residue.

Using an atomizer bell with paint buildup may cause a bell imbalance. An imbalanced bell may cause bearing damage and turbine failure, or may create mechanical stress on the plastic bell when operating at high speeds. Excessive paint residue caught between the internal tapered surface which seats in the motor shaft can prevent the bell from seating properly and result in an unbalanced turbine condition.

- ▶ Care must be taken when mounting the bell assembly onto the motor shaft. The bell should turn on freely for several turns or until it fully bottoms on the motor shaft. If resistance is felt when the bell is first being turned onto the shaft, do not proceed further, the bell is being cross-threaded on the shaft. Remove the cup and carefully reinstall. If it is still difficult to turn, replace the bell.

WARNING

- ▶ A bell assembly that is cross-threaded on the shaft can damage the bell, motor or shaping air housing and may come off the shaft while rotating.

VIBRATION NOISE

If the Aerobell 33R is vibrating or making an unusually loud noise, it may mean that there is an unbalanced situation. The bell assembly may have dried paint on it, the bell may be physically damaged, or there may be paint trapped between the bell and shaft preventing the bell from properly seating. If any of these conditions exist, they must be corrected prior to further operation. Do not continue to operate a noisy turbine. Warranty does not cover failure caused by imbalanced loading conditions.

⚠ WARNING

- ▶ If a bell cup comes off a rotating shaft because of motor seizing or any other reason, the bell must be returned to ITW Ransburg for inspection and evaluation to determine if the bell can be used in operation.

TURBINE REPAIR & REBUILD

Turbine field repair or rebuild only after factory warranty expires. Any attempt to disassemble turbine during warranty period will void warranty. (3 years or 15,000 hours).

Contact your distributor or ITW Ransburg for turbine rebuilding instructions.

HIGH VOLTAGE CONNECTIONS

Use a small amount of light dielectric grease, part number 59972-00, on the connector at the high voltage end of the cascade to prevent moisture damage and ensure the integrity of the electrostatic system.

AIR FILTERS / ELEMENT REPLACEMENT

ITW Part#	Qty. Elements Per Carton	Used On
RPM-32	4	RPM-417, Pre-Filter
RPM-33	8	RPM-418, Bearing Air Filter

Figure 7: Replacement Elements

VALVES

No maintenance is normally required on the valve other than flushing solvent through the valve daily. If there is any question about the valve opening when air is present, slide back the rear shroud on the Aerobell 33R and observe the valve action through the valve viewing port. When the valve actuates, a red indicator will be visible in the viewing port. Visual inspection for leaks should be made on a weekly basis. Should the valve fail to function properly or leaks appear, it can be easily replaced. Refer to the fluid valves service manual for detailed instructions on preventive maintenance and inspections.

GENERAL

Verify daily that the operating parameters have not varied much from the norm. A drastic change in high voltage turbine air, shaping air or fluid pilot air pressure can be an early indicator of potential component failure.

PREVENTIVE MAINTENANCE

Daily Maintenance

(During Each Preventive Maintenance Break)

A laminated poster entitled "Aerobell 33R checklist", part number AER0075, is included with the assembly to be posted near the station as a handy reference.

- Open solvent valves and flush out feed tubes and bell cups for 3-5 seconds (trigger and dump valve closed).

⚠ WARNING

- ▶ Make sure high voltage is off before approaching applicator with solvent cloth.
- ▶ Do not use reclaim solvent containing D-Limonite. This can cause damage to certain plastic components.
- ▶ Do not stop bell rotation by using a rag or gloved hand against the bell cup edge. This can damage the resistance coating at the bell cup edge.

⚠ CAUTION

- ▶ **Maximum flow rate should not exceed 500 cc/min.**
- ▶ Daily removal and soaking of the bell cup may not be required if the bell cup is properly flushed as indicated above. However, the frequency of the feed tube and internal motor shaft inspection indicated below under weekly maintenance can be done daily and later adjusted to weekly or as required depending on the results of the inspection.

- Wait for rotation to cease and then clean off bell cup edge and shaping air ring and any other non-protected (unwrapped) outer surfaces. Use a soft cloth dampened with solvent. The protective disposable wrapping should be a material such as the type used on electrostatic guns. One such suitable material is manufactured by Safety Ware, located in Fort Wayne, IN, telephone 219-456-3535, or fax 219-744-9231.

- Visually inspect the bell cup edge for signs of abrasion. If the coating is excessively worn back (1/16 inch or more) or badly chipped as the result of contact with a part, replace the cup.

⚠ WARNING

- ▶ In the event the bell cup comes in contact with a part, that cup should be checked for damage and replaced if necessary before continuing to spray.

- Check bell cup voltage using high voltage probe. Voltage should not be less than 82 kV when 100 kV is set on the power supply.

⚠ WARNING

- ▶ Do not place high voltage probe on bell edge unless rotation is fully stopped.

NOTE

- ▶ Refer to the attached high voltage trouble shooting guide for details on determining the causes of low voltage at the bell cup.

- Check the amount of paint build up on the outer protective wrap. If excessive, replace wrap as required.

NOTE

- ▶ Normally the wrap will not need replacement daily and could last about one week. See weekly schedule on the following page.

Weekly Maintenance
(Prior to Start or End of Production Week)

- Monitor rotational speed of all bells at the speed control (should be within approximately 5% of target speed).
- Monitor high voltage output indicated on the MicroPak display (should be within approximately 5% of target output).
- Check paint flow on all bells at minimum and maximum specified settings by taking beakered readings.
- Check solvent flow by opening solvent valve and taking a beakered reading (should be within approximately 10% of target flow rate).

CAUTION

- ▶ **Maximum flow rate should not exceed 500 cc/min.**

- Remove protective wrap from outer housing and discard. Clean any paint on outer surface of front and rear housing with soft cloth dampened with solvent. (See warning, previous page, on avoiding the use of cleaning solvent containing D-Limonene.)
- Remove the front shroud and check for any signs of solvent or paint leakage. Clean as required.
- Remove bell cup and soak in solvent (MEK and Xylene blend) for 1 to 2 hours. Remove from cleaning solution and blow dry before replacing.

WARNING

- ▶ Do not use reclaim solvent containing D-Limonene to soak bell cups.

NOTE

- ▶ It may be necessary to remove the bell cups for cleaning more frequently than weekly. (See note under daily maintenance.)

- Inspect the feed tube tip and clean any paint build up that has occurred on the feed tube tip. Using a pen light, determine if there is build up of paint in the motor shaft and/or around the paint feed tube. If so, remove the motor assembly following the disassembly procedures and clean out the inside diameter of the motor shaft using a tube brush and solvent. Clean the outer surfaces of the feed tube.

WARNING

- ▶ Make sure that no solvent or other contamination is allowed to enter the motor assembly (air bearing and outer shaft).

- Disconnect the Aerobell 33R from its mounting and remove the rear shroud to expose valves and fluid regulator. Visually inspect for signs of fluid leaks around fluid connections, valve housings and fluid regulator cap. Correct problem by tightening fitting, replacing component, etc. and clean paint from all components including internal portion of shroud.
- Reinstall rear shroud, bell cup and front shroud. Reassemble the Aerobell 33R to its mounting plate and rewrap the outer housing (refer to "Disassembly Procedures" for definite instructions).

NOTE

- ▶ The outer protective wrap may have to be replaced more frequently than weekly. Daily inspection of the amount of paint buildup on the plastic will determine the frequency of replacement.

DISASSEMBLY PROCEDURES

Make sure the following conditions exist prior to disassembly:

- The air supply to all supply and pilot lines is off.
- The MicroPak power supply has been shut off.
- The atomizer's valves, feed tube, bell cup and fluid supply lines have been cleaned with solvent and purged dry with air.
- The bell cup has stopped rotating.

The fixed Aerobell 33R must be removed from its mounting plate to disassemble the components enclosed by the rear shroud. Some of the components enclosed by the front shroud can be removed with the atomizer mounted. These include the components shown in Figure 12 and the air turbine assembly (Figure 10, item 8).

NOTE

- For reassembly instructions, use the reverse of the following disassembly procedures.

Atomizer Removal

The atomizer is secured to the mounting plate with a threaded retaining ring (Figure 10, item 20). While steadying the atomizer with one hand unscrew the retaining ring with the other. Then pull the atomizer forward to clear the alignment pins and fluid connections.

Reassembly Note: Make sure the proper o-ring seals on the face of the atomizer's backplate are in place and clean. (Refer to Figure 14 on the placement of these o-rings prior to reassembly to the mounting plate.)

Front Shroud Removal

Remove the front shroud from the atomizer, using the RPM-419, or other properly fitting spanner wrench, and turning CCW (viewed as facing the front end).

Note that when the front shroud is removed, the shaping air cap is removed with it. The Aerobell 33R turbine and the bell assembly will now be exposed.

Using the same wrench, it is also possible to separate the shaping air cap from the front shroud. This is much easier to do if the front shroud is mounted on the turbine assembly, since it is difficult to grasp the shroud and the wrench simultaneously if the parts are removed from the mechanical support of the assembly. Hold the front shroud stationary while turning the shaping air ring CCW. Note that it is only necessary to separate these parts if replacing one of them, or for thorough cleaning.

When installing the front shroud onto the turbine assembly, be sure that it is fully tightened. The shroud will appear tight after a few turns, but will still be loose. The shroud can then be tightened down fully until it bottoms against the air manifold bulkhead.

Atomizer Bell Cup Removal

To remove the atomizer bell cup, insert a 5/32 inch Allen wrench into the hole in the front side of the motor housing. Rotate the bell slowly until the wrench engages with the hole in the motor shaft. Unscrew the bell by turning CCW with one hand (viewed as facing the front end). If the bell cannot be removed by hand, use the RPM-419, wrench, on the flats of the bell cup.

Refer to the "Preventive Maintenance" section (page 22) for important information about bell and shaft cleanliness. Do not install a paint contaminated or damaged bell on the turbine shaft. When installing the bell on the shaft, the bell should be **firmly** secured by hand or use wrench, RPM-419, and torque to 50 in. lbs. -0/+40 in. lbs.

Turbine Removal

The turbine assembly is removed from the Aerobell 33R atomizer after removing the front shroud assembly. Four mounting bolts will then be exposed, which hold the turbine assembly to the turbine manifold. These are the larger socket head screws located toward the outer edge of the motor housing.

Holding the turbine assembly carefully so that it does not drop and using a 5/32 inch Allen wrench, remove the four mounting screws which hold the turbine to the valve manifold. Pull the turbine assembly straight forward until it is beyond the end of the fluid tube.

The turbine assembly can now be replaced or serviced as necessary.

Reassembly Note: Prior to replacing the turbine assembly, make sure the bearing air and shaping air o-rings are in place on the air turbine manifold. (Figure 13, items 10 and 11). Also make sure the electrical contact spring protrudes beyond the face of the air turbine manifold (Figure 13, item 9). Lubricate the o-ring on the turbine assembly to insure it stays in place. To replace the turbine assembly, center the turbine shaft over the feed tube and push the turbine assembly slowly in. Make sure the shaping air and bearing air ports are aligned with their respective port on the air turbine manifold. Make sure the electrical spring on the turbine manifold makes contact with the isolated metal surface on the flange of the turbine assembly. Holding the turbine securely in place, screw the four mounting bolts (Figure 10, item 7) through the rear of the turbine assembly into the turbine manifold. Tighten the four mounting bolts alternately to a final torque of 15 in. lbs.



CAUTION

- ▶ Make sure the turbine assembly is properly seated by examining the fit between the rear of the turbine assembly and the front of the turbine manifold. Any irregularity in this seam between the two assemblies would indicate improper mounting.

Looking into the front of the motor shaft, observe the concentricity of the paint feed tube to the inside of the motor shaft. If the paint feed tube is off center by more than .020-.028 inches radially the motor assembly may not be seated properly.

Do not use the four mounting bolts to pull the turbine assembly into air manifold. This can cause the thread to be damaged. Torque the four mounting bolts to 15 in. lbs.



WARNING

- ▶ Using the RPM-419, wrench, a minimum of 50 in. lbs. of torque must be applied when tightening the bell cup onto the motor shaft to deter the bell cup from spinning off the shaft if the motor seizes.
- ▶ Operating the turbine motor when it is not properly fitted to the air manifold can cause severe damage to the motor, bell assembly and/or operating personnel.

Rear Shroud Removal

The atomizer must be disassembled from its mount to remove the rear shroud.

Remove the threaded ring (Figure 10, item 21) by unscrewing the three set screws (Figure 10, item 16) enough so that the flange will slide off. Slide the rear shroud back off the end of the atomizer.

Cascade Removal

Remove the rear shroud. Remove the two backplate screws and 1.5" spacer on both sides of the cascade. (Figure 10, items 13 & 15). Remove the cascade bracket (Figure 10, item 11). Unscrew the lower support post (Figure 10, item 10) from their studs at the turbine manifold. Disconnect the cascade's low voltage electrical connection and slide the cascade out of its base in the turbine manifold assembly.

Fluid Regulator Removal

Follow the steps above to remove the rear shroud and cascade. Disconnect the air pilot lines from the side of the regulator. Disconnect the regulator's discharge fluid line at its connection into the valve manifold (Figure 13, item 16). Loosen the regulator's inlet connection from the backplate's paint fitting. Loosen the two remaining backplate screws (Figure 10, item 16) for clearance to slide the regulator down and out of the atomizer.

Fluid Manifold Valve Removal

Follow the steps above to remove the rear shroud, cascade and regulator. Then disconnect the air pilot lines from the fluid valves. Remove the dump, solvent and paint fluid lines from the valve manifold (Figure 11b, items 14, 15 & 20). Remove the three screws which secure the valve manifold to the turbine manifold (Figure 13, item 4) and lift the valve manifold up to clear the fluid tube connection on the turbine manifold.

Fluid Valve Removal

All three fluid valves can be removed by following the steps for the removal of the fluid manifold. The valves can also be removed by following the steps for removal of the rear shroud, cascade and regulator. Disconnect the valve's pilot line and unscrew the solvent valve from the manifold. With the solvent valve removed, access can be gained to unscrew the paint valve. Both the solvent and paint valve must be removed to gain access to remove the dump valve.

Speed Transducer Removal

Follow the procedures above for removal of the front shroud, bell cup and turbine. Then, disconnect the fiber optic cable from the backplate by loosening set screw (Figure 14, item 3). Loosen the fiber optic fitting nut on the turbine manifold (Figure 13, item 14).

With the turbine removed (Figure 10, item 8), the speed transducer (Figure 13, item 8) is exposed on the front face of the turbine manifold. Use a 3/8" wrench to unscrew the transducer from the turbine manifold. Pull the transducer 3 inches out from the manifold and disconnect the fiber optic cable by unscrewing the compression fitting. With the rear shroud removed, the fiber optic cable can be pulled out from the rear of the turbine manifold.

Fluid Tube Removal

Follow the procedures above for removal of the front shroud, bell cup and turbine.

With the turbine removed, the fluid tube (Figure 13, item 12) is exposed on the front face of the turbine manifold. The fluid tube is fastened to the turbine manifold with left hand threads. Use a 3/8" wrench at the slots provided on the feed tube shaft and turn CW.

CAUTION

- Care should be taken to not over tighten the fluid tube and strip the threads.

When installing a new or old feed tube, once it is securely tightened, check the position of the feed tube in the shaft at the front of the assembly. If the feed tube is off center by more than .020-.028 radially, replace it with another feed tube. If the feed tube protrudes out of the shaft a distance other than .207 (-.015 / +.030), replace the tube with another feed tube.

TROUBLESHOOTING GUIDE

General Problem	Cause	Solution
Bad Spray Pattern	<ol style="list-style-type: none"> 1. Bell cup damaged 2. Low voltage 3. Bad fluid regulator 4. Paint lodged in shaping air ring. 	<ol style="list-style-type: none"> 1. Replace bell cup 2. See "low voltage" below 3. Repair or replace regulator 4. Disassemble and clean
Poor Transfer Efficiency or Light Coverage on Some Parts	<ol style="list-style-type: none"> 1. Paint hangers, hooks or carriers are not clean 	<ol style="list-style-type: none"> 1a. Clean hangers b. Check ground continuity (must be below 1 megohm resistance to ground according to NFPA 33).
Low Voltage	<ol style="list-style-type: none"> 1. Improper limiting current and voltage settings 2. Atomizer grounding out (usually indicated by high current draw or by MicroPak over current fault light) 3. Faulty low voltage connections (usually indicated by MicroPak feedback fault light) 4. Faulty high voltage connection 5. MicroPak or cascade failure 6. Improper color change. i.e., paint or solvent in dump line 	<ol style="list-style-type: none"> 1. To readjust settings, refer to MicroPak operating manual 2a. Clean atomizer externally with non-polar solvent b. Check the atomizer for internal fluid leaks c. Check for fluid leaks at quick disconnect mounting d. Check for internal arcing (usually indicated by internal sparking sounds) e. Make sure cascade low voltage connection is properly shielded 3a. Make sure quick disconnection electrical connection is aligned and clean b. Check low voltage connection at cascade 4a. Remove cascade and check continuity between cascade connection and turbine shaft. b. Replace high voltage contact spring (Figure 13, item 9) 5. Refer to MicroPak manual for detailed troubleshooting guide 6. Optimize color change

Figure 8: Troubleshooting Guide

FLUID REGULATOR TROUBLESHOOTING

Before removing the fluid regulator from the Aerobell 33R assembly for repair, use the following troubleshooting guide to determine if the problem is actually in the fluid regulator:

- Check the air signal by removing the air pilot connection at the fluid regulator. The air pressure should first be relieved before removing the air tube and then adjust the air regulator at the control panel until a flow of air is coming from the tube end.
- Make sure that there is appropriate fluid pressure available to the fluid regulator in port.
- Check the trigger valve to make sure it is functioning properly. (See the "Valves" section (page 16) of this manual for further information on the trigger valve.)
- Make sure there is no blockage downstream of the trigger valve. Turn the trigger valve and then the solvent valve ON with the bell rotating and the high voltage OFF. Solvent should exit the bell cup and be atomized.

NOTE

- ▶ If some blockage is suspected, run solvent through the fluid tube for one or two minutes, with the bell cup spinning and the high voltage OFF. Alternate methods of flushing are described in "Cleaning Procedures" (page 19).

For additional information on the fluid regulators operation, troubleshooting, disassembly and assembly instructions, refer to the fluid regulator Service Instruction LN-9228-00.

NOTES:

DR-1 FLOW VS. SIGNAL PRESSURE

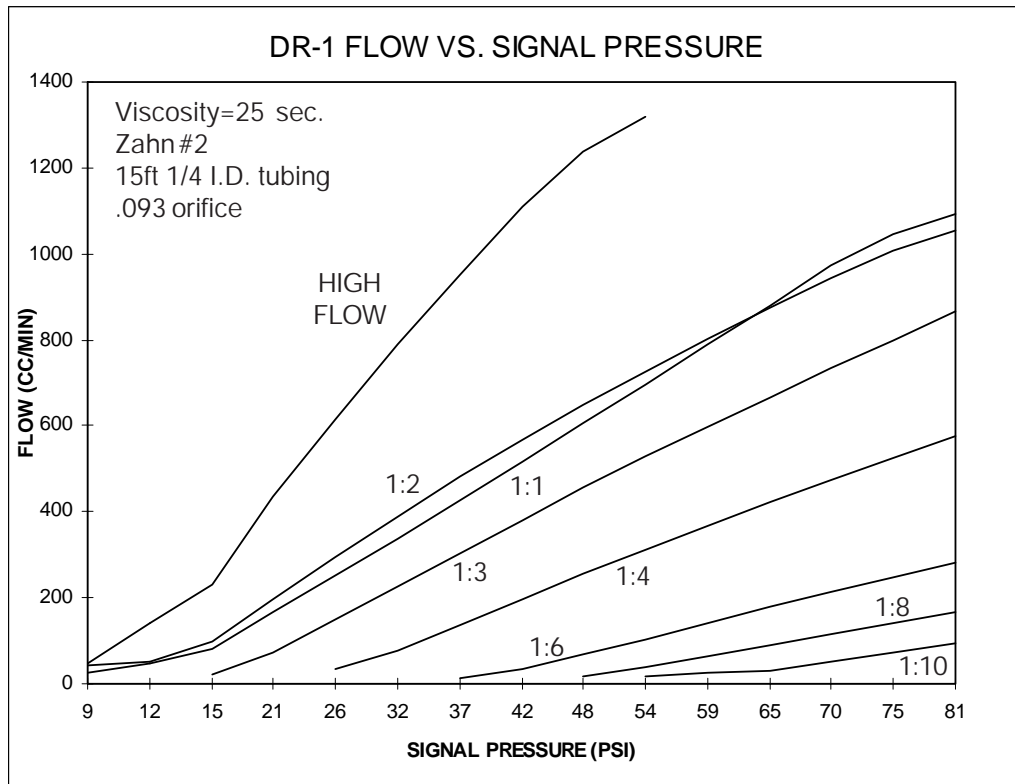
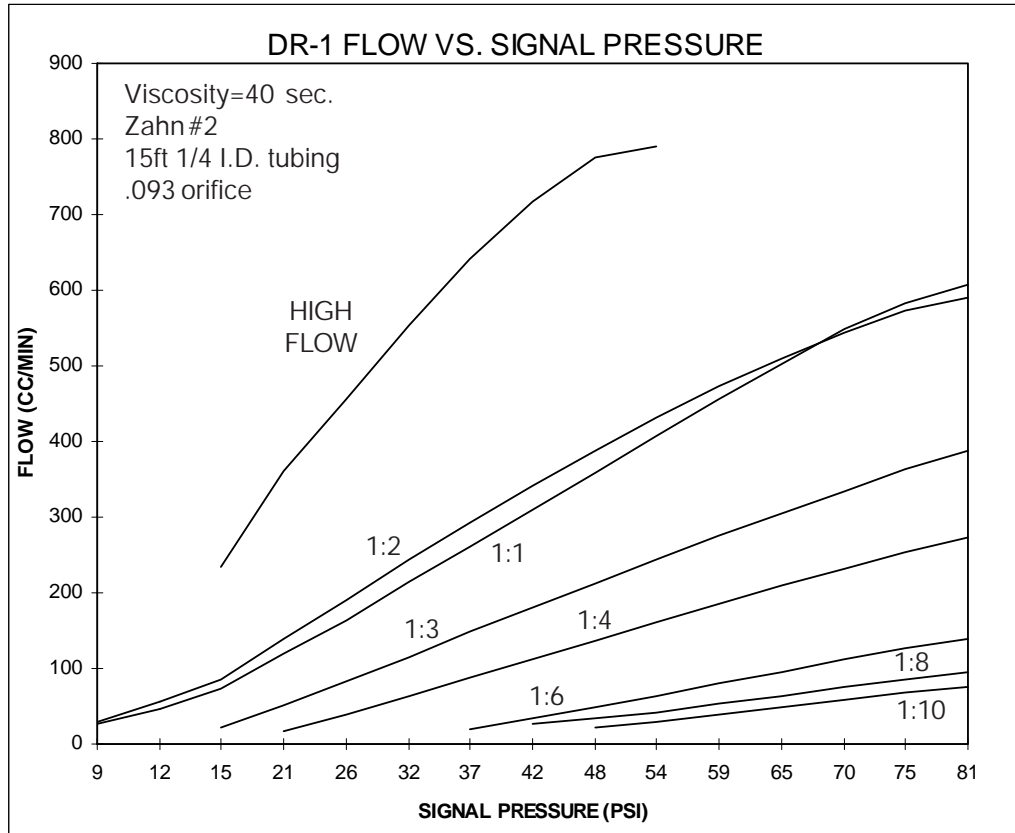


Figure 9: DR-1 Flow vs. Signal Pressure

PARTS IDENTIFICATION

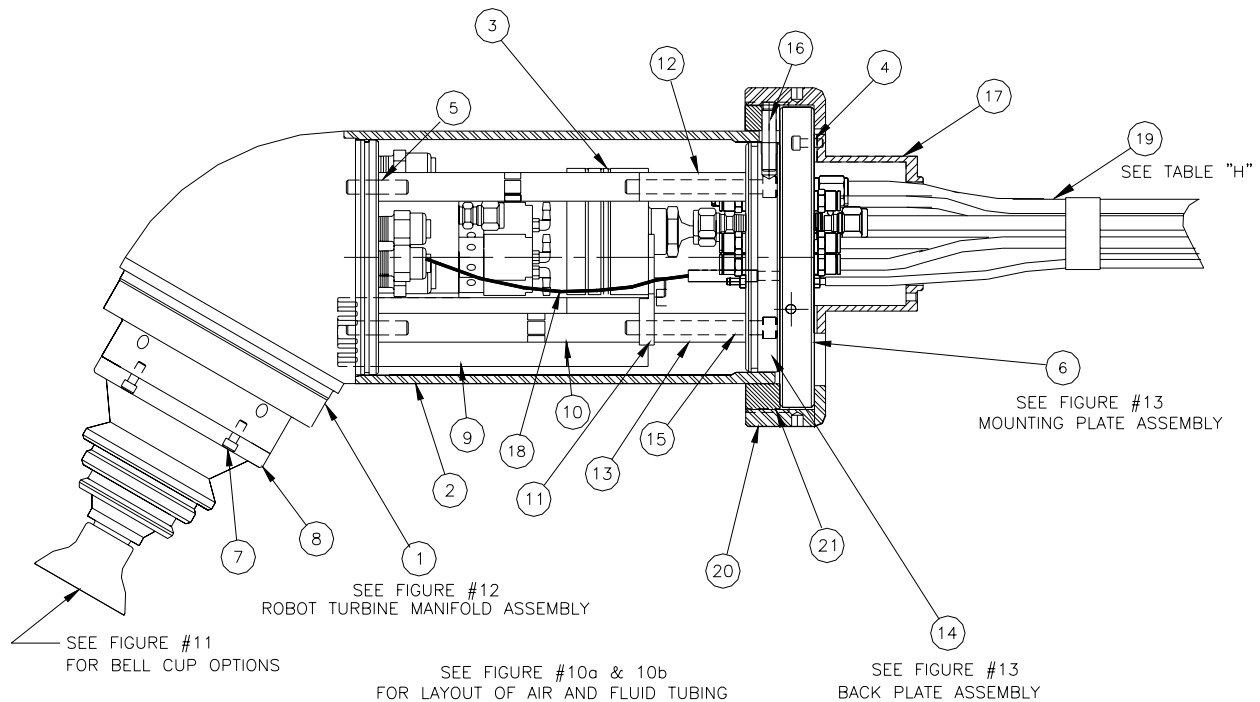


Figure 10: Aerobell 33R (Single Supply) Main Assembly

AEROBELL 33R MAIN ASSEMBLY - PARTS LIST (Figure 9)			
Item #	Part #	Description	Qty
1	See Figure 12	Turbine Manifold Assembly	1
2	75863-00	Rear Shroud	1
3	See Table "D"-Page 32	DR-1 Regulator	1
4	7959-24C	Screw, 1/4-20 x 3/4" Long	6
5	75953-02	Stud, 7/16" x 1.5" Long	4
6	See Figure 13	Mounting Plate Assembly	1
7	LSFA0006-16F	Socket Screw, Turbine	4
8	75867-00	Air Turbine Assembly	1
9	75933-00	Cascade Assembly	1
10	75924-00	Support Rod	4
11	75922-00	Cascade Bracket	1
12	75923-03	Support Rod Spacer, 2.317" Long	2
13	75923-00	Support Rod Spacer, 2" Long	2
14	See Figure 13	Robot Backplate Assembly	1
15	76774-00	Backplate Screw, 5/16" x 3"	4
16	76702-00	Set Screw, 5/16-18 x 1" Long	3
17	See Table "F"-Page 33	Robot Adapter Plate	1
18	75921-01	Fiber Optic Cable	1
19	See Table "H"-Page 33	External Tubing & Cables	Various
20	76679-00	Retaining Ring	1
21	76688-00	Threaded Ring	1

NOTES:

AEROBELL 33R MODEL IDENTIFICATION

-Pages 32-33

When ordering, use part number 76690-ABCDEFG as indicated by Tables A through E.

Table A: Designates the bell type

Table B: Designates the fluid manifold assembly (Enter "1" for single paint supply assemblies)

Table C: Designates the fluid tube

Table D: Designates the regulator assembly

Table E: Designates the voltage module

Table F: Designates the robot adapter

Table G: Designates the mount, cable and tubing assembly

(Seven characters must follow the the basic part number as shown in the example below.)

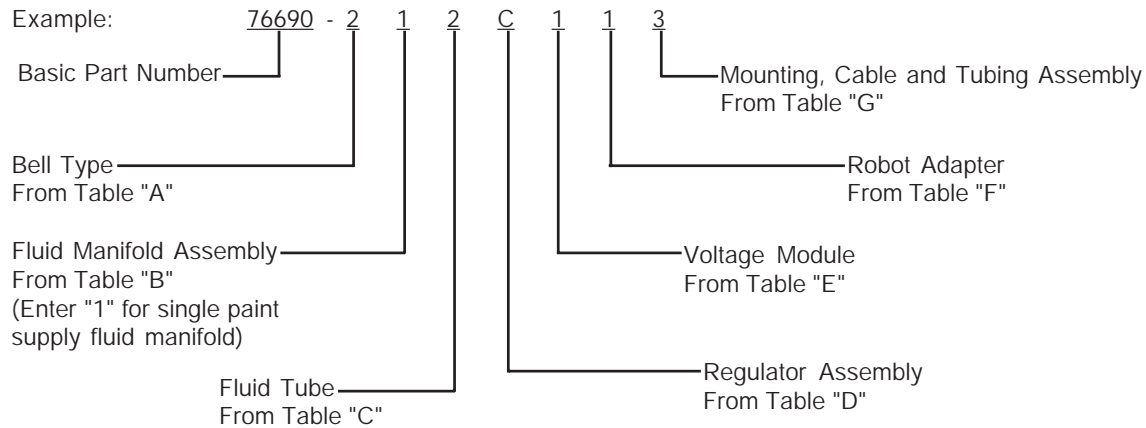


TABLE "A"		
Code Letter	Part Number	Description
1	AER4016-02	Liquid Bell Assy, 57mm
2	AER4015-02	Liquid Bell Assy, 30mm
3	None	
4	75861-02	Liquid Bell Assy, 70mm

TABLE "B"		
Code Letter	Part Number	Description
1	75913-02	Fluid Manifold, Single Paint Supply
2	76700-02	Fluid Manifold, Dual Paint Supply

TABLE "C"		
Code Letter	Part Number	Description
1	75906-03	Fluid Tube, .045 I.D.
2	75906-02	Fluid Tube, .093 I.D.
3	None	
4	75906-04	Fluid Tube, .031 I.D.
5	75906-01	Fluid Tube, .125 I.D.

TABLE "D"		
Code Letter	Part Number	Description
A	75902-01B	Low Flow Ratio 1:1
B	75902-02B	Low Flow Ratio 1:2
C	75902-03B	Low Flow Ratio 1:3
D	75902-04B	Low Flow Ratio 1:4
E	75902-06B	Low Flow Ratio 1:6
F	75902-08B	Low Flow Ratio 1:8
G	75902-10B	Low Flow Ratio 1:10
H	None	

AEROBELL 33R MODEL IDENTIFICATION

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TABLE "E"		
Code Letter	Part Number	Description
1	75933	Cascade Assembly

TABLE "F"		
Code Letter	Part Number	Description
1	76686-00	ABB Robot Adapter
2	76693-00	Fanuc Robot Adapter
3	None	

TABLE "G" - MOUNTING CABLE & TUBING ASSY.*		
Code Letter	Part Number	Description
1	76696-15	15' Tubing & Cable Length
2	76696-25	25' Tubing & Cable Length
3	76696-50	50' Tubing & Cable Length
4	76696-75	75' Tubing & Cable Length
5	76696-100	100' Tubing & Cable Length
6	None	

*REFERENCE TO TABLE "G"			
Item#	Part Number	Description	Qty
9-20	76679-00	Retaining Ring	1
9-6	See Figure 13	Mounting Plate Assembly	1
9-4	7959-24C	Screw, 1/4-20 x 3/4	6
9-19	See Table "H"	External Cable & Tubing	5**

** Available in five different lengths.

Note: The mounting, cable and tubing assembly include the parts listed above.

TABLE "H" - EXTERNAL TUBING & CABLES			
Code Letter	Part Number	Description	Qty
1	SSP-5014	Air Pilot Tube, 3/16" O.D.	5 (Specify Length)
2	9704-03	Bearing & Brake Air Tube, 1/4" O.D.	3 (Specify Length)
3	SSP-5013	Turbine & Shaping Air Tube, 3/8"	2 (Specify Length)
4	76698-01	Paint #1, Dump & Solvent Fluid, 1/4"	2 (Specify Length)
5	SMC-424-X (See Note 1)	Fiber Optic Cable	1
6	76041-XX (See Note 2)	Low Voltage Cable	1

Note 1: Designate Length: 0=65', 1=100', 2=50', 3=120', 4=150', 5=15', 6=25', 7=75'

Note 2: Designate Length: 15=15', 25=25', 50=50', 75=75', 100=100'

ATOMIZER INTERNAL TUBING LAYOUT

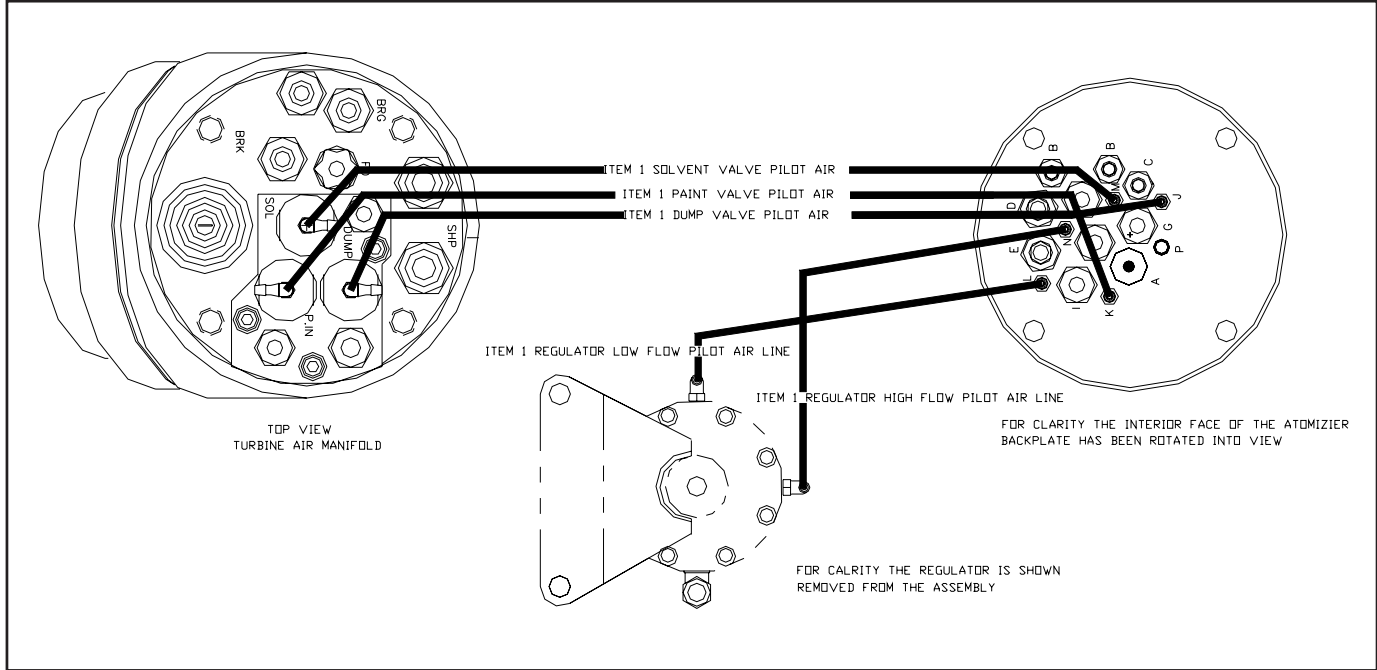


Figure 11a: Pilot Tubing Layout

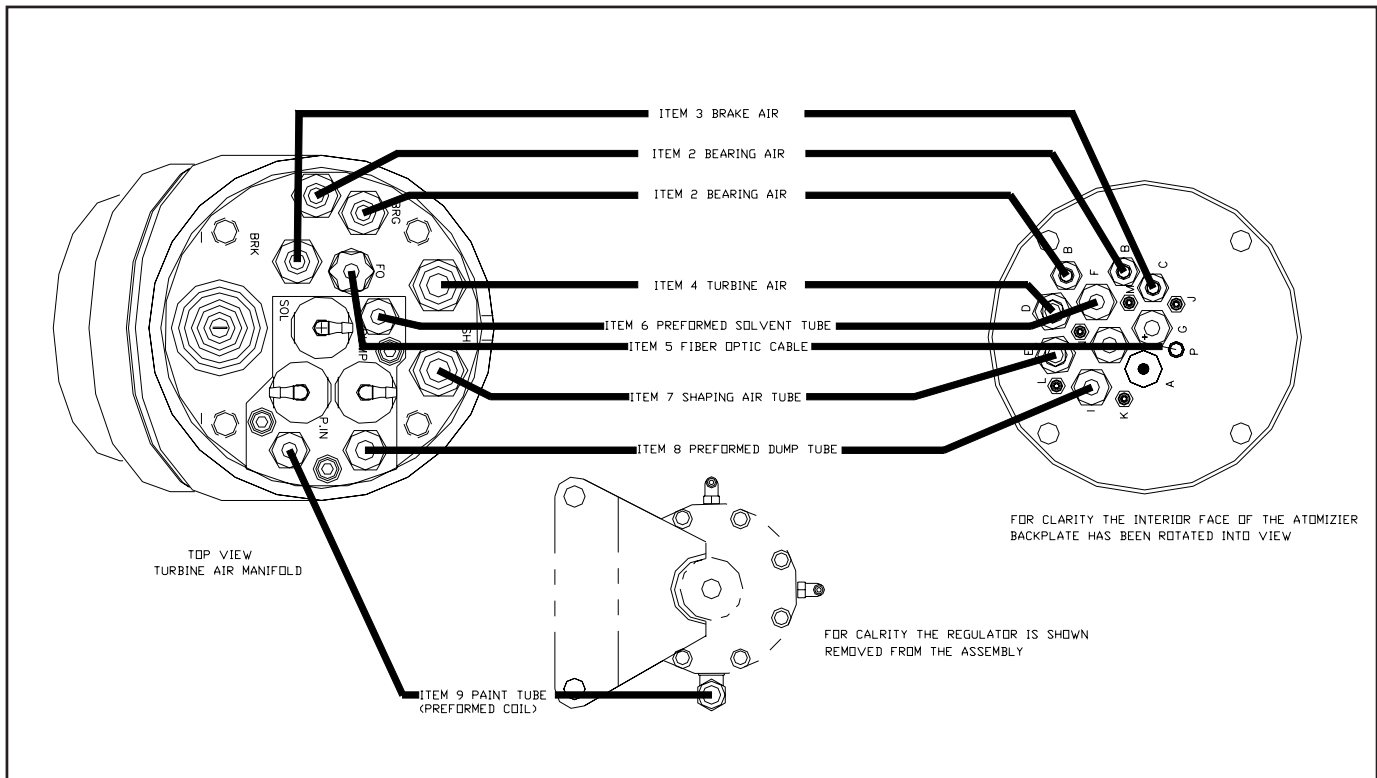


Figure 11b: Fluid and Air Tubing Layout

ATOMIZER INTERNAL TUBING - PARTS LIST (Figure 11)			
Item #	Part #	Description	Qty
1	75949-01	Air Pilot Tube, 3/16" x 10" Long	5
2	9704-03	Bearing Air Tube, 1/4" x 7.5" Long	2
3	9704-03	Brake Air Tube, 1/4" x 7.62" Long	1
4	SSP-5013	Turbine Air Tube, 3/8" x 7.125" Long	1
5	75921-01	Fiber Optic Cable	1
6	75937-00	Preformed Solvent Tube, 1/4"	1
7	SSP-5013	Shaping Air Tube, 3/8" x 7.125"	1
8	75939-00	Preformed Dump Tube, 1/4"	1
9	75938-00	Preformed Paint Tube Coil, 1/4"	1

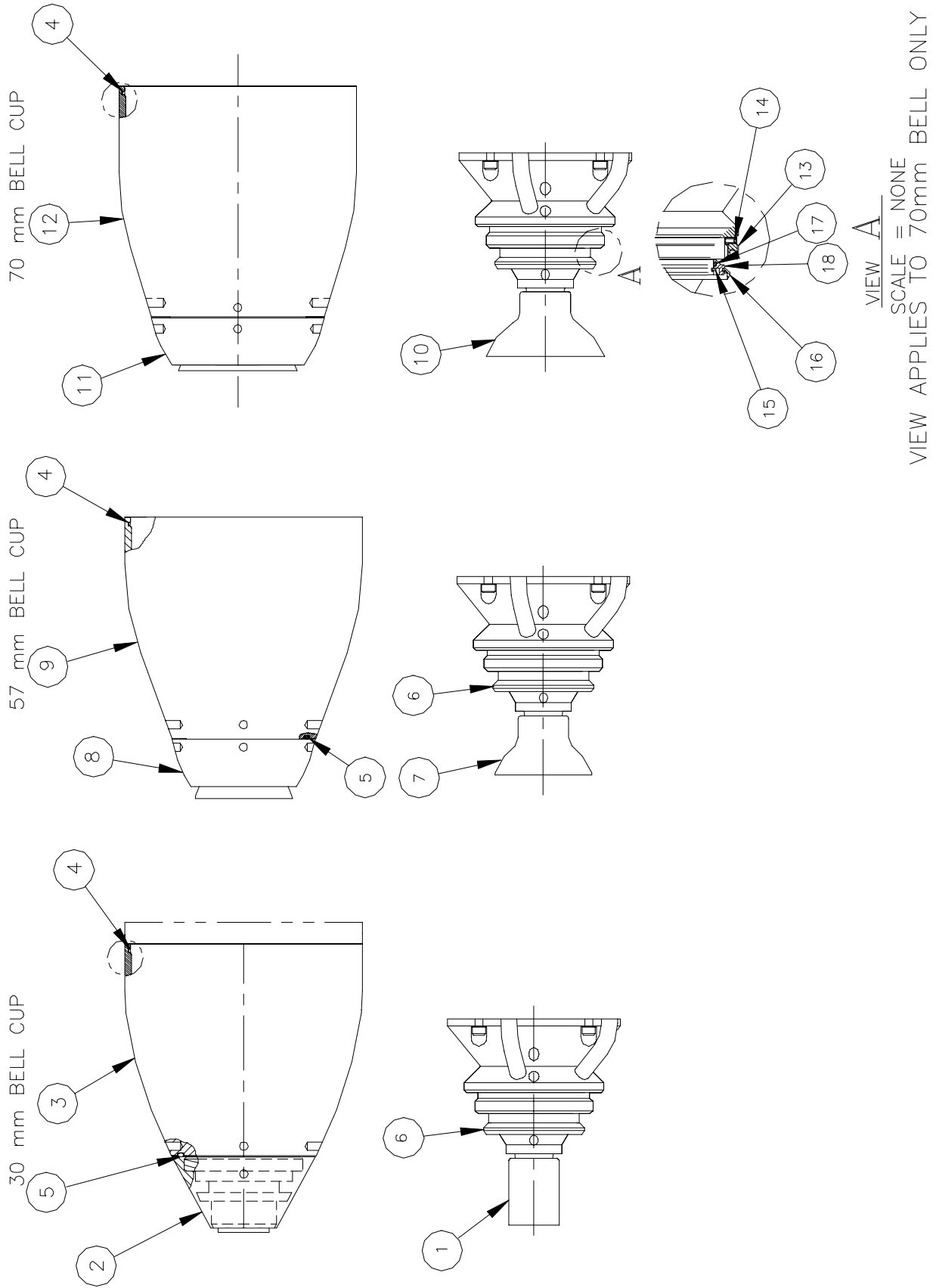


Figure 12: Bell Cup Assemblies

BELL CUP ASSEMBLIES

30mm BELL CUP - PARTS LIST (Figure 12)			
Item #	Part #	Description	Qty
1	AER4015-02	Bell Cup, 30mm	1
2	RPM-80	Cap	1
3	75928-00	Front Shroud	1
4	LSOR0005-04	O-Ring, Front Shroud	0
5	LSOR0005-01	O-Ring, Bell Cup Cap	1
6	RPM-2	Shaping Air Seal	1

57mm BELL CUP - PARTS LIST (Figure 12)			
Item #	Part #	Description	Qty
4	LSOR0005-04	O-Ring, Front Shroud	0
5	LSOR0005-01	O-Ring, Bell Cup Cap	1
6	RPM-2	Shaping Air Seal	1
7	AER4016-02	Bell Cup, 57mm	1
8	75893-00	Cap	1
9	75892-00	Front Shroud	1

70mm BELL CUP - PARTS LIST (Figure 12)			
Item #	Part #	Description	Qty
4	LSOR0005-04	O-Ring, Front Shroud	0
10	75861-02	Bell Cup, 70mm	1
11	75866-00	Cap	1
12	75862-00	Front Shroud	1
13	LRPM0110-00	Adapter, 70mm Shaping Air Ring	1
14	LSFA0012-08C	Set Screw, 70mm Adapter	4
15	75917-02	Retaining Ring, 70mm Shaping Air	1
16	LRPM0111-00	Seal, 70mm Shaping Air	1
17	7554-105	O-Ring	1
18	LRPM0112-02	Adapter Seal	1

TURBINE MANIFOLD ASSEMBLY - PARTS LIST (Figure 13)			
Item #	Part #	Description	Qty
1	75941-00	Robot Manifold, 60 Degree	1
2	7554-109	O-Ring, #2-049	0
3	75891-00	Fluid Valve Manifold	1
4	75950-01	Barbed Fitting, 3/16" Tube Right Angle	3
5	LSFI0013-02	Push-On Fitting, 3/8 tube x 1/4 NPT	2
6	SSG-8128	O-Ring, #6	3
7	LSFI0013-04	Push-On Fitting, 1/4 tube x 1/4 NPT	3
8	75911-00	Fiber Optic Transmitter	1
9	76701-00	High Voltage Contact	1
10	7554-03	O-Ring, Bearing Air Orifice	1
11	7554-07	O-Ring, Shaping Air Orifice	1
12	See Table "C"-Page 32	Feed Tube	1
13	75918-00	Union	1
14	76703-00	Fiber Optic Fitting, 3/16"	1
15	75958-02	Fluid Valve	3
16	LSFI0022-04	Flared Fitting, 1/4" Tube	3

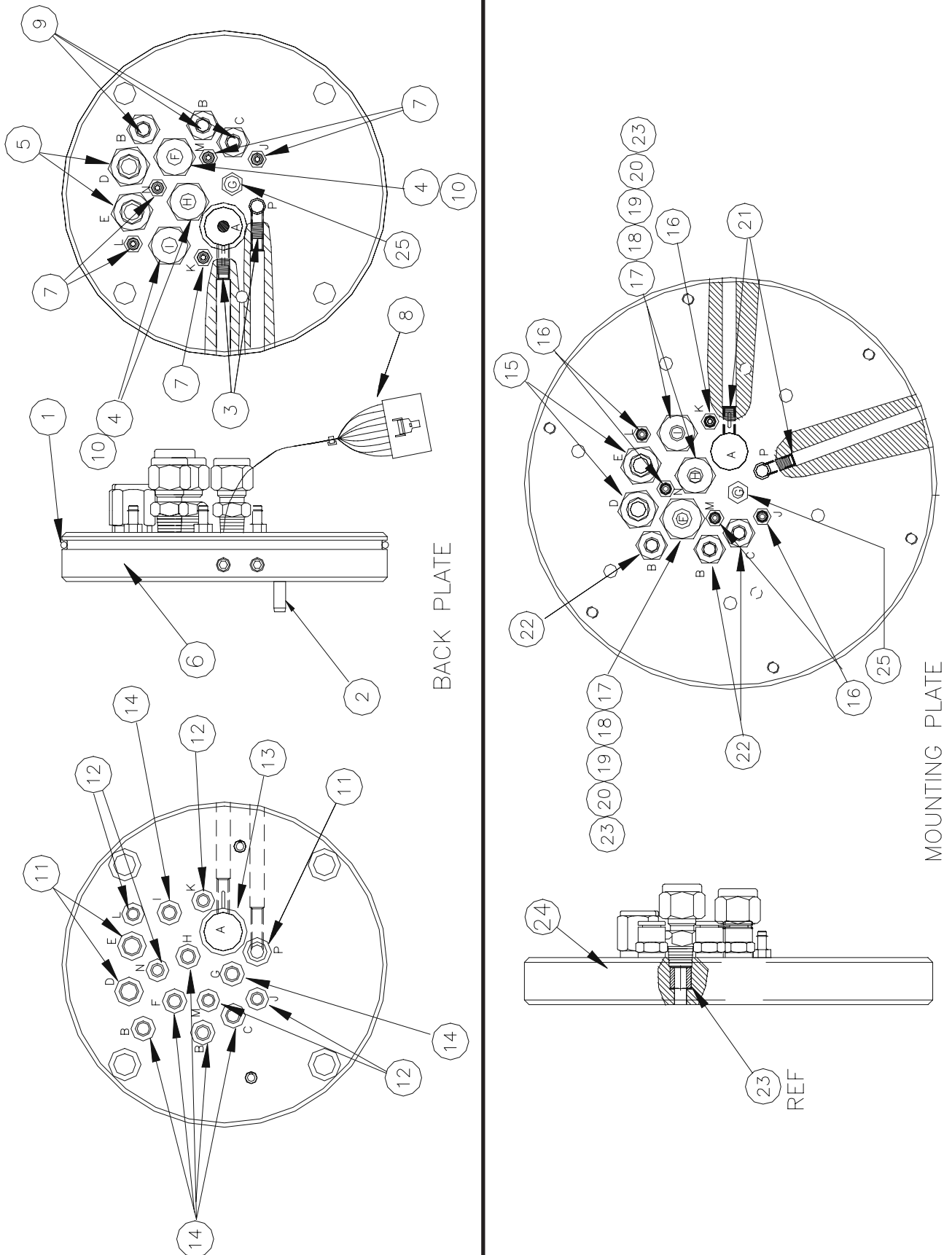


Figure 14: Back and Mounting Plate Assemblies

BACKPLATE ASSEMBLY - PARTS LIST (Figure 14)

Item #	Part #	Description	Qty
1	7554-110	O-Ring, #2-158	0
2	21132-027	Alignment Spring Pin	2
3	SSF-2052	Set Screw	2
4	76680-01	Fluid Fitting, 1/4 x 1/8 NPT, Male, SS	4
5	SSP-6066	Push-On Fitting, 3/8" Tube x 1/4" NPT	2
6	76678-00	Backplate	1
7	75946-01	Barbed Fitting, 3/16" Tube	5
8	75932-00	Wire Harness Assembly	1
9	75947-01	Push-On Fitting, 1/4" Tube x 1/8" NPT	3
10	76676-00	Seal, NPT Fitting	4
11	SSG-8134	O-Ring, #011	3
12	SSG-8163	O-Ring, #009	5
13	SSG-8149	O-Ring, #016	1
14	SSG-8128	O-Ring, #10	7
25	9410-01	Plug	1

MOUNTING PLATE ASSEMBLY - PARTS LIST (Figure 14)

Item #	Part #	Description	Qty
15	SSP-6066	Push-On Fitting, 3/8" Tube x 1/4" NPT	2
16	75946-01	Barbed Fitting, 3/16" Tube, 10-32	5
17	76680-01	Fluid Fitting, 1/4 x 1/8 NPT, Male, SS	3
18	76681-01	Tube Insert, 1/4	3
19	76682-01	Tube Ferrule, 1/4	3
20	76683-01	Tube Fitting Collar, 1/4	3
21	SSF-2052	Set Screw	2
22	75947-01	Push-On Fitting, 1/4" Tube x 1/8" NPT	3
23	76676-00	Seal, NPT Fitting	4
24	76677-00	Mounting Plate	1
25	9410-01	Plug	1

**TUBING CONNECTIONS
(Figure 14)**

Code Letter	Connection
A	Cascade Electrical Connector
B	Bearing Air
C	Brake Air
D	Turbine Air
E	Shaping Air
F	Solvent
G	Plug
H	Paint
I	Dump
J	Pilot Air, Dump #1 Valve
K	Pilot, Paint Valve
L	Pilot Air, Regulator Low
M	Pilot Air, Solvent Valve
N	Pilot Air, Regulator High
P	Fiber Optic Connector

RECOMMENDED SPARE PARTS			
Figure# - Item #	Part #	Description	Qty
11-1	AER4015-02	Bell Cup, 30mm	0-1
11-7	AER4016-02	Bell Cup, 57mm	0-1
11-10	75861-02	Bell Cup, 70mm	0-1
9-8	75867-00	Air Turbine Assembly	1
9-9	75933-00	Cascade Assembly	1
9-3	Select Options Below	Dual Range Regulator	
	75902-01B	Low Flow Ratio 1:1	0-1
	75902-02B	Low Flow Ratio 1:2	0-1
	75902-03B	Low Flow Ratio 1:3	0-1
	75902-04B	Low Flow Ratio 1:4	0-1
	75902-06B	Low Flow Ratio 1:6	0-1
	75902-08B	Low Flow Ratio 1:8	0-1
	75902-10B	Low Flow Ratio 1:10	0-1
12-8	75911-00	Fiber Optic Transmitter	1
9-18	75921-01	Fiber Optic Cable	1
10b-8	75939-00	Performed Dump Tube, 1/4"	1
10b-6	75937-00	Preformed Solvent Tube, 1/4"	1
12-12	Select Options Below	Fluid Tube	
	75906-04	093 & .031 I.D.	0-1
	75906-03	093 & .045 I.D.	0-1
	75906-02	.093 I.D.	0-1
	75906-01	.125 I.D.	0-1
	Select Options Below	Shaping Air Seal	
11-6	RPM-2	30mm Bell Cup	0-1
11-6	RPM-2	57mm Bell Cup	0-1
11-16	LRPM0111-00	70mm Bell Cup	0-1
11-17	7554-105	Shaping Air Seal O-Ring, 70mm	0-1
12-6	SSG-8128	O-Ring (For Fluid Tube and Union)	3
13-14	SSG-8128	O-Ring (For Backplate, 1/4" Air and Fluid)	7
12-11	7554-07	O-Ring, Shaping Air Orifice	1
12-10	7554-03	O-Ring, Bearing Air Orifice	1
12-2	7554-109	O-Ring, Turbine Manifold	0
12-7	LSFI0013-04	Push-On Fitting, 1/4"	3
12-5	LSFI0013-02	Push-On Fitting, 3/8"	2
12-16	LSFI0022-04	Flared Fluid Fitting, 1/4"	3
12-15	75958-02	Fluid Valve Assembly	3
12-04	75950-01	Barbed Fitting, 90°	3
13-08	75932	Cascade Wire Assembly	1
13-11	SSG-8134	O-Ring, Backplate, 3/8", Air & F.O.	3
13-13	SSG-8149	O-Ring, Backplate, Electrical	1
13-12	SSG-8163	O-Ring, Backplate, Pilot Air	6
13-1	7554-110	O-Ring, Backplate Shroud	0
13-4, 17	76680-01	Connector Fitting, Male, 1/4", Stainless Steel	6
13-7, 16	75946-01	Barbed Fitting, Straight, 1/8"	10
13-10, 23	76676-00	Seal, 1/8" NPT	1
13-9, 22	75947-01	Push-On Fitting, 1/4"	6
13-5, 15	SSP-6066	Push-On Fitting, 3/8"	4
10b-9	75938-00	Preformed Coiled Paint Tubing, 1/4"	1
10a-1	75949-01	Pilot Air Tubing, 3/16"	10 ft.

SERVICE KITS	
Part #	Description
75987	Fluid Valve Repair Kit
73913-01	Regulator Repair Kit
AER4019	Air Bearing Rebuild Kit

AEROBELL TOOLS	
Part #	Description
RPM-419	Shroud Wrench
76772	Adjustable Spanner Wrench

NOTES:

WARRANTY POLICIES

WARRANTY FOR AEROBELL 33R ROTARY ATOMIZER

The ITW Ransburg Aerobell 33R rotary atomizer is warranted to be free of defects in workmanship and material. The terms of this warranty, except as hereinafter provided, extend from one year from the date of first installation. This excludes equipment failures which are the result of misapplication, misuse, incorrect maintenance, or normal wear. If, after inspection by ITW Ransburg a defect is confirmed, we will at our option repair, replace or issue credit, minus allowance for usage received.

SPECIFIC AEROBELL AIR TURBINE WARRANTY

The air turbine only is warranted for 15,000 operating hours, or three years from the date of first installation, whichever ever occurs first. If, after inspection by ITW Ransburg, defect is confirmed, we will repair or replace the air turbine, free of charge, during the warranty period. The repaired air turbine (or replacement air turbine) will continue to be warranted for the remainder of the initial warranty period (from installation date). The warranty period for the air turbine does not begin again when a repair is completed under warranty. Air turbines repaired by ITW Ransburg after the warranty period will be warranted for 90 days from the date of shipment from the repair center.

This Warranty Does NOT Cover:

1. Aerobell 33R that has become inoperative because of:
 - a). Misuse - Particularly the flooding of the rotor area due to turning on the fluid before the turbine is up to speed.
 - b). Negligence.
 - c). Accidents - Collisions with external objects, fires, or similar occurrences.
 - d). Improper maintenance procedures.
 - e). Attempted customer repair of air turbine during warranty.
 - f). Failure to ensure clean air to air bearing and turbine.
 - g). Operating turbine without air bearing air.
 - h). Operating turbine with less than the minimum specified air bearing pressure (60 psi min., measured at turbine inlet).
 - i). Operating with imbalanced loads (heavy paint buildup on atomizer bell or shaft, or damaged atomizer bell).
 - j). Acts of God, flood, earthquake, or similar occurrence.
 - k). Aerobell 33R being operated by control systems not designed by ITW Ransburg, or when others have modified the ITW Ransburg control system, unless reviewed and approved in writing by an authorized ITW Ransburg Technical Representative.
2. Labor or incidental costs occasioned by removal, replacement or repair of rotary atomizer or air turbine by an unauthorized entity.
3. Rotary atomizers inspected and determined by ITW Ransburg not to have been installed and maintained in accordance with ITW Ransburg service instruction LN-9226-00.1 (latest edition).

4. Cost of repair/replacement and return transportation from ITW Ransburg of merchandise determined not to be defective.

There is no other express warranty, implied warranties, including those of merchantability and fitness for a particular purpose are limited to one year from purchase and to the extent permitted by law any and all implied warranties are excluded. This is the exclusive remedy, and liability for consequential or incidental damages under any and all warranties are excluded to the extent exclusion is permitted by law. Some states do not allow limitations on how long an implied warranty lasts, or the limitation or exclusion of consequential or incidental damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

In the event of malfunction, first ensure that the equipment is the correct equipment to do the job required, is properly installed and adjusted, and is correctly maintained and operated. Then, if a claim is made that ITW Ransburg equipment or a part thereof does not operate properly, contact your ITW Ransburg distributor through which the equipment was purchased or your ITW Ransburg representative.

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Manufacturing

1910 North Wayne Street
Angola, Indiana 46703-9100
Telephone: 260/665-8800
Fax: 260/665-8516

Technical/Service Assistance

Automotive Assembly and Tier I
Industrial Systems
Ransburg Guns

Telephone: 800/ 626-3565 Fax: 419/ 470-2040
Telephone: 800/ 233-3366 Fax: 419/ 470-2071
Telephone: 800/ 233-3366 Fax: 419/ 470-2071

Technical Support Representative will direct you to the appropriate telephone number for ordering Spare Parts.

